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Transit Executive Committee Agenda

Council Chambers
Regional Headquarters Building
605 Rossland Road East, Whitby

Wednesday, March 4, 2020 **1:30 PM**

1. **Declarations of Interest**

2. **Adoption of Minutes**

   A) Durham Region Transit Executive Committee meeting – February 5, 2020 Pages 3-7

3. **Delegations**

   There are no delegations

4. **Presentations**

5. **Correspondence**

6. **Reports**

   B) General Manager's Update – March 2020 (2020-DRT-06) Pages 8-20

   C) Durham Region Transit Automated Shuttle Pilot (2020-DRT-07) Pages 21-34

   D) Durham Region Transit Stop Guidelines (2020-DRT-08) Pages 35-82

7. **Advisory Committee**

   There are no advisory committee items to be considered

8. **Confidential Matters**

   There are no confidential matters to be considered

9. **Other Business**

10. **Date of Next Meeting**

Wednesday, April 8, 2020 at 1:30 PM

11. **Adjournment**

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The Regional Municipality of Durham

MINUTES

DURHAM REGION TRANSIT EXECUTIVE COMMITTEE

Wednesday, February 5, 2020

A regular meeting of the Durham Region Transit Executive Committee was held on Wednesday, February 5, 2020 in the Council Chambers, Regional Headquarters Building, 605 Rossland Road East, Whitby, Ontario at 1:30 PM

Present: Commissioner Collier, Chair
Commissioner Barton, Vice-Chair
Commissioner Anderson
Commissioner Bath-Hadden
Commissioner Carter
Commissioner Drew
Commissioner Mulcahy
Regional Chair Henry

Also Present: Commissioner Crawford

Absent: Commissioner Pickles

Staff Present: E. Baxter-Trahair, Chief Administrative Officer
W. Holmes, General Manager, Durham Region Transit
J. Austin, Deputy General Manager, Business Services, Durham Region Transit
A. Mak, Supervisor, Financial, Durham Region Transit
A. McKinley, Deputy General Manager, Maintenance, Durham Region Transit
A. Naeem, Solicitor, Corporate Services – Legal Services
C. Norris, Manager, Customer Experience, Durham Region Transit
N. Pincombe, Director of Business Planning, Budgets and Risk Management
S. Pollock, Coordinator Communications, Durham Region Transit
N. Taylor, Treasurer, Durham Region Transit, and Commissioner of Finance
M. White, System Support Specialist, Corporate Services – IT
C. Tennisco, Committee Clerk, Corporate Services – Legislative Services

1. Declarations of Interest

There were no declarations of interest.

2. Adoption of Minutes

Moved by Commissioner Mulcahy, Seconded by Commissioner Carter,
(9) That the minutes of the regular Durham Region Transit Executive Committee meeting held on Wednesday, January 8, 2020, be adopted.
CARRIED

3. Delegations

There were no delegations to be heard.

4. Presentations

4.1 Bill Holmes, General Manager, Durham Region Transit, and Nancy Taylor, Treasurer, Durham Region Transit, Finance Department, regarding: 2020 Durham Region Transit Business Plans and Budgets (2020-DRT-05) [Item 6. B)]

On behalf of B. Holmes, Jamie Austin, Deputy General Manager, Business Services, Durham Region Transit; and, Nancy Taylor, Treasurer, Durham Region Transit, provided a PowerPoint presentation regarding the 2020 Durham Region Transit Business Plans and Budgets.

N. Taylor advised that the 2020 Durham Region Transit (DRT) Business Plans and Budgets submission meets the approved guideline of 2.5%.

Highlights of the presentation included:

- 2020 Budget – Strategic Priorities
- Budget Overview
  - 2019 Accomplishments
    - > Customer Experience
    - > Customer Outreach
    - > Service Improvements
  - 2020 Proposed Expenditures and Financing
    - > Proposed Expenditures by Program Area (millions)
    - > Proposed Revenue by Source (millions)
  - 2020 Priorities and Highlights
    - > Operating Costs
    - > Capital Initiatives
    - > Staffing
- 2020 Risks and Uncertainties
- 2020 Initiatives to Modernize & Find Service Efficiencies
- Future Budget Pressures
  - 2020 budget items with annualization impacts in 2021
  - Forecasted pressures for DRT over the next 4 years

C. Norris responded to questions regarding the replacement of the Route 506 Clarington Community Route with the new proposed On Demand daily services in the Municipality of Clarington, including Newcastle, the Wilmot Creek community area, and Orono; the On Demand four hour minimum booking policy; and the scheduling of pick-ups.

B. Holmes responded to questions regarding the Metrolinx proposed reserved paid parking spots at GO Transit stations. It was noted that currently, the Metrolinx paid reserved parking spots cost riders approximately $98.00 a month. Detailed discussion followed on transportation options to get to and from the GO Train station, including the DRT $.80 cent Co-Fare; the purpose that Metrolinx facilitates; potential funding opportunities; and, the need for ongoing collaboration and communication between Metrolinx and staff.

At the request of Chair Collier, J. Austin reviewed how the property portion of DRT's revenue cost ratio was calculated. C. Norris also reviewed the proposed Route 200 Z service connections from the Ajax GO Train station to destinations including the Rouge National Urban Park and the Toronto Zoo. The Route 200 Z will operate from May to September, during the weekends and on statutory holidays.

B. Holmes advised that staff will bring forth a report to TEC on the advancements of the Route 200 Z services.

Discussion ensued regarding the recent transit service issues in the Town of Whitby. At the request of Chair Collier, B. Holmes provided an update on the Route 302 Baldwin – Brock and 305 Thickson fleet availability and capacity issues; the steps taken with Pacific Western Transportation to ensure the daily requirements of these services are met by the end of March; and DRT's next steps in terms of operating the transit services in Whitby.

Staff was asked to provide a future report to TEC identifying the next steps for operating the transit services in Whitby; prior to the end of the contract with Pacific Western Transportation.

Commissioner Crawford asked that the 2020 Durham Region Transit Business Plans and Budgets presentation be electronically sent to all the Durham Region Transit Commissioners.

5. Correspondence

There were no correspondence items to be considered.

6. Reports

A) General Manager's Report – February 2020 (2020-DRT-04)

Report #2020-DRT-04 from B. Holmes, General Manager, Durham Region Transit, was received.

Moved by Commissioner Barton, Seconded by Commissioner Drew,
(10) That Report #2020-DRT-04 of the General Manager, Durham Region Transit, be received for information.

CARRIED

B) 2020 Durham Region Transit Business Plan and Budget (2020-DRT-05)

Report #2020-DRT-05 from B. Holmes, General Manager, and N. Taylor, Treasurer, Durham Region Transit, was received.

Moved by Commissioner Bath-Hadden, Seconded by Commissioner Mulcahy,
(11) That we recommend to the Finance & Administration Committee for subsequent recommendation to Regional Council:

That the 2020 Business Plan and Budget for Durham Region Transit be approved.

CARRIED

This matter will be considered by the Finance and Administration Committee on February 11 and 12, 2020 and presented to Regional Council on February 26, 2020.

7. Advisory Committee Resolutions

7.1 Durham Region Transit Advisory Committee

A) Resolution regarding Report # 2019-DRT-16: Update on DRT Kids Ride Free Incentive Pilot Program

Moved by Commissioner Carter, Seconded by Commissioner Anderson,
(12) That the resolution regarding Report #2019-DRT-16: Update on DRT Kids Ride Free Incentive Pilot Program be received for information.

CARRIED

8. Confidential Matters

There were no confidential matters to be considered.

9. Other Business

There was no other business to be considered.

10. Date of Next Meeting

The next regularly scheduled Durham Region Transit Executive Committee meeting will be held on Wednesday, March 4, 2020 at 1:30 PM in the Council Chambers, Regional Headquarters Building, 605 Rossland Road East, Whitby.

11. Adjournment

Moved by Regional Chair Henry, Seconded by Commissioner Barton,
(13) That the meeting be adjourned.
CARRIED

The meeting adjourned at 2:02 PM

Respectfully submitted,

S. Collier, Chair

Committee Clerk

If this information is required in an accessible format, please contact 1-800-372-1102 ext. 3702

Durham Region Transit Report

To:	Durham Region Transit Executive Committee
From:	General Manager, Durham Region Transit
Report:	#2020-DRT-06
Date:	March 4, 2020

Subject:

General Manager's Report – March 2020

Recommendation:

That the Durham Region Transit Executive Committee recommends:

That this report be received for information.

Report:

1. Purpose

1.1 This report is submitted at each Transit Executive Committee (TEC), for information.

2. Background

2.1 The General Manager Report provides regular updates on key performance measures and summaries of current activities and transit issues in Attachment #1.

3. Financial

3.1 The General Manager's Report focuses mainly on performance and service standards. There are no financial impacts associated with TEC's receipt of this report.

4. Attachment

Attachment #1: General Manager's Report – March 2020

Respectfully submitted,

Original signed by

Bill Holmes
General Manager, DRT

Recommended for Presentation to Committee

Original signed by

Elaine C. Baxter-Trahair
Chief Administrative Officer

General Manager Report
March 4, 2020
TEC
Attachment #1

Performance Measures Dashboard

Safety

Key performance indicator	Description	Latest Measure	Current	Target[1]	Current Variance to Target (per cent)	YTD Status[2] (per cent)
Collisions	Preventable collisions per 100,000 km	January	0.47	0.64	✓ -40.0	✓ -40.0

Ridership

Conventional						
Ridership	Monthly passengers	January	1,027K	939K	✓ 9.4	✓ 9.4
PRESTO Ridership	Customers paying using PRESTO	January	33.8 per cent	32.3 per cent	✓ 10.4	✓ 10.4
Bus full occurrences	Number operator reported occurrences	January	433	365	✗ 18.6	✗ 18.6
On Demand (OD) and Specialized Services (SS)						
Ridership (OD)	Number customer trips	January	141	27	✓ 422	✓ 422
Ridership (SS)	Number customer trips	January	14,660	14,783	⚑ -0.8	⚑ -0.8
Trip Demand (SS)	Total of trips delivered, no show or cancelled at door, unaccommodated	January	15,012	15,050	⚑ -0.3	⚑ -0.3
Unaccommodated Rate (SS)	Trip requests not scheduled	January	1.0 per cent	0.6 per cent	⚑ 0.4	⚑ 0.4

Service Delivery

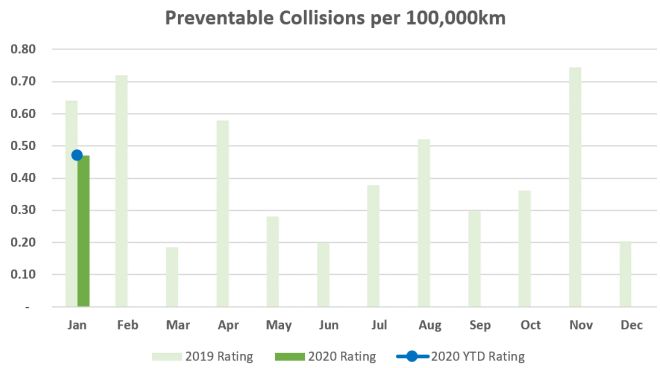
Conventional						
On time performance	Per cent on-time departures from all stops	January	81 per cent	76 per cent	✓ 5	✓ 5
Service availability	Per cent scheduled service delivered	January	98.9 per cent	99.2 per cent	⚑ -0.4	⚑ 0.4

[1]Target is 2018 measure for the same period as latest measure

[2]Year to Date (YTD) compared to previous year

Safety

Preventable Collisions per 100,000 km



Definition: A preventable collision is one in which the driver failed to do everything reasonable to avoid it. A collision may not be reportable to police based on the Highway Traffic Act, but for Durham Region Transit (DRT) purposes all collisions are documented and investigated.

Analysis

The collision rate for January 2020 was 26 per cent lower than 2018, the second consecutive month with an improved rate compared to the previous year.

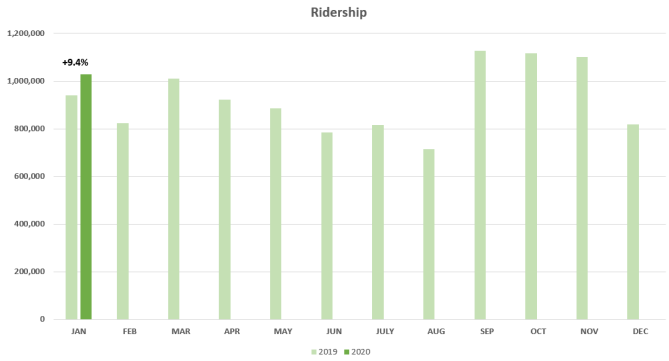
DRT is committed to reducing the annual rate of preventable collisions each year. As previously reported DRT implemented an enhanced collision investigation process in 2019 (increased awareness for documenting on-site incidents, identifying secondary preventable incidents, use of on-board surveillance system), which increased the 2019 collision rate compared to 2018.

Action Plan

DRT Safety and Training, Operations Supervisors, and the Joint Health & Safety Committees continue to monitor collision trends and root cause factors to identify appropriate mitigation strategies to mitigate preventable collisions.

Ridership

Conventional



Definition: Ridership is the sum of all passenger trips. A passenger trip is considered a one-way trip from origin to destination, regardless of the number of transfers that may be required. Ridership data is calculated from fare box data and data from PRESTO, GO Bus One Fare Anywhere, and On Demand.

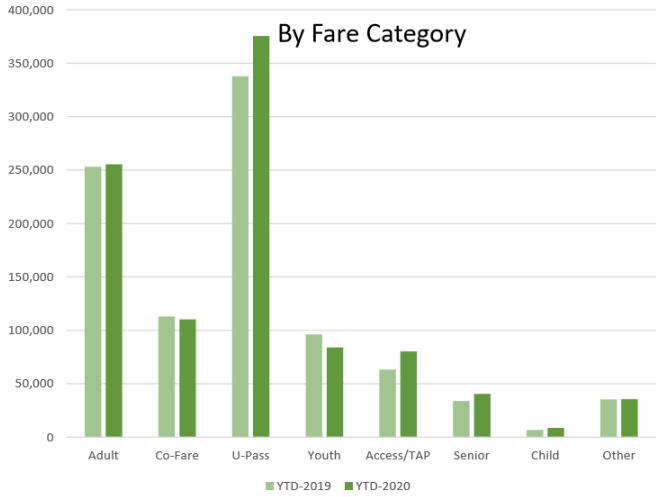
Results

Ridership in January 2020 was 9.4 per cent higher than 2018, and 7.5 per cent higher than budgeted.

An eight per cent reduction in Youth ridership is attributed to the continued labour actions at local schools.

Customers continue their transition to PRESTO electronic fare payment, increasing by 22.7 per cent in January with a corresponding 10.5 per cent reduction in the use of paper fare media.

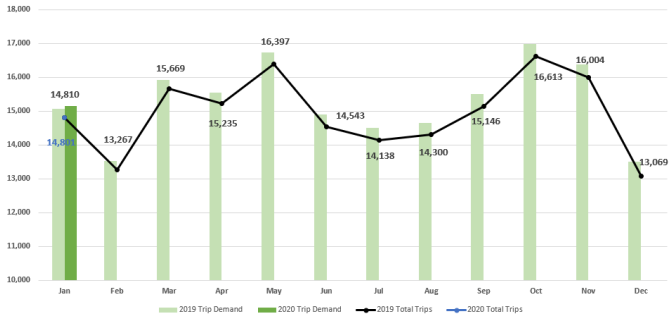
U-Pass contributed most significantly to the improved January ridership, up 11.2 per cent over last year.



Action Plan

Staff will review detailed ridership data to validate the impact to ridership from the continued labour action at local schools. Staff are also investigating the impacts to ridership resulting from the recent service challenges experienced from the Whitby location, with an update to be provided in a subsequent GM Monthly report.

On Demand / Specialized Services



Definitions:

Ridership: A Specialized Services trip is considered a one-way passenger trip from origin to destination, regardless of the number of transfers that may be required. Ridership data is calculated from the scheduling system used by DRT Specialized Services.

Trip Demand: Trip demand is the sum of all trips delivered, no-shows and cancelled at the door, and unaccommodated trips.

Unaccommodated Rate: An unaccommodated trip is one where DRT is unable to schedule a trip for the specific requirements of the customer, or the customer declined to accept the trip option provided by the booking agent.

Results

On Demand ridership has stabilized and the monthly ridership pattern is consistent with the scheduled service. The increase for January 2019 was 422 per cent higher than January 2018.

Approximately 54 per cent of On Demand trips were delivered in Scugog, with 30 per cent and 16 per cent of trips in Brock and Uxbridge, respectively.

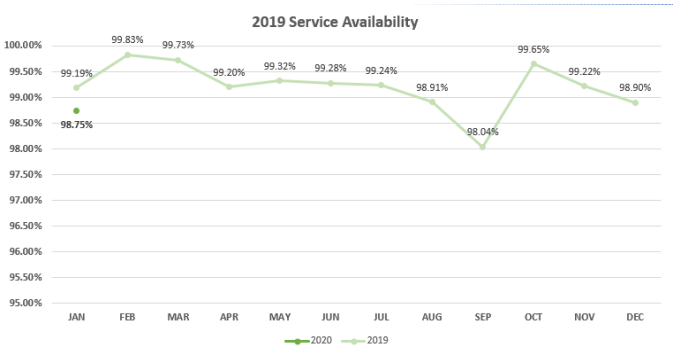
For January, the number of Specialized Service trips delivered was the same as 2018, and the 2018 trend for increased demand continued into January.

The number of unaccommodated trips in January were slightly higher than last year, one per cent compared to 0.6 per cent, and reflects the recent trend of increased demand for specialized service.

Action Plan

Specialized Services recently hired the Temporary Eligibility Coordinator who is leading the eligibility review process for customers registered before January 2015. The review will ensure customers are provided specialized service eligibility consistent with established AODA eligibility criteria, and it's expected that many existing customers will be able to use either the scheduled service exclusively, or the integrated service that includes portions of trips delivered using specialized service vehicles and scheduled service. This transition of eligible customers to accessible scheduled service will improve specialized service capacity to meet the increasing demand.

On Time Performance & Availability (conventional)



Definition

On-Time Performance (OTP) is a measure of the percentage of buses departing a bus stop no more than zero minutes early and five minutes late. The annual OTP target is 78 per cent.

Service availability measures the actual service delivered by DRT compared to the scheduled revenue service. The service availability target is 99.5 per cent.

Results

DRT has updated the OTP target to 78 per cent from the previous target of 70 per cent, which will challenge DRT and staff to further improve service reliability for customers.

In 2019 DRT leverage the increasing data analytics capacity to support enhanced reporting of OTP data and engagement of operations staff, including front line operators. Staff efforts to improve service for customers has resulted in a dramatic improvement in service reliability and OTP.

The overall OTP for January was 81 per cent, up from 76-77 per cent in 2019. Contributing to this exceptional improvement was an OTP of 85 per cent for the weekday morning peak period, up from 81 per cent in November 2019, and an OTP of 78 per cent for the weekday afternoon peak period, up from 69 per cent in November 2019.

Service availability in January was 98.9 per cent.

As previously reported, service from the Whitby location experienced challenges starting in December, resulting in a January service availability of 92.9 per cent, well below the target of 99.5 per cent. Service availability form the remaining DRT locations was 99.9 per cent in January.

Action Plan

The collective and individual efforts and actions of supervisors and bus operators in a short period of time has resulted in the five per cent improvement in OTP and clearly demonstrates the commitment of DRT employee's commitment to improving the reliability of our public transit system and the experience of our customers.

See page 9 for an update on the Whitby location.

Updates

Improving Access

1. Zero Fare for Children

Effective March 1, 2020, all children 12 years of age or younger can ride DRT without paying a fare. Further all child tickets and passes, child PRESTO fares and the Ride-to-Read program will be eliminated effective May 1, 2020. Additionally, all existing child PRESTO cards with an e-purse will be changed to the default adult concession to eliminate other passengers from using the previously discounted Child concession. The Toronto Transit Commission (TTC) has recently raised concerns regarding fare evasion resulting from customers using child PRESTO cards. DRT will not experience the fare evasion challenges facing the TTC, since all boarding is through the front door where bus operators view the PRESTO card concession on the PRESTO Driver Control Unit, and children will not be required at this time to have or tap a PRESTO card when boarding the bus.

Infrastructure

1. PRESTO Device Refresh

DRT are currently testing new PRESTO devices on three buses. Feedback from customers and operators have been positive through the first month of testing. Customers have expressed that the new devices did not process the card tap as fast as the original devices. PRESTO quickly reviewed the concern and have since updated and replaced the devices. The implementation team continue to monitor the performance of the devices with a focus on the customer experience.

All PRESTO devices will be replaced by October 2020. The new devices will enable the modernization of PRESTO services, including the ability for customers to benefiting from a one-hour card upload. This feature eliminates the current challenge of waiting up to 24 hours for PRESTO cards to be updated after adding money to the e-purse or purchasing a pass. The devices will also enable GTHA agencies to implement future PRESTO enhancements.

- Payment with smart phone
- Single use e-tickets
- Open payment

2. Scarborough-Durham BRT Update

The Metrolinx/DRT/Toronto project team have completed the second round of Public Information Centres (PICs) for the ongoing Durham-Scarborough Bus Rapid Transit (BRT) project. The PICs presented the evaluation of the alternatives and the recommended preferred alternatives for each of the pinch-points (i.e. constrained road segments) along the corridor – i.e. through Pickering Village in Ajax; through downtown Whitby (the four corners); and through downtown Oshawa. Further to comments received, additional discussions and work are under way in consultation with impacted local area municipalities to refine and finalize the preferred alternatives.

Based on comments from Whitby, the project team met with Town staff to explore additional alternatives through downtown Whitby. As a result, a revised option that further prioritizes public transit through downtown while expanding the pedestrian realm is now being examined.

Further to specific requests from Oshawa, the project team is reviewing the preferred alternative through downtown Oshawa, taking into consideration recent boulevard improvements completed by the City and potential feasibility for additional alternatives including curbside BRT.

The project team is planning a meeting with Ajax representatives in March, to discuss the preferred alternative through Pickering Village.

It should be noted that a technical analysis will be required to finalize the preferred alternative for each pinch-point location.

General

1. Another 'A' Rating for DRT Maintenance

On February 6, 2020, the Ministry of Transportation (MTO) visited DRT maintenance in Oshawa to perform a regular site inspection. DRT must maintain a minimum standard, as regulated by the province, to retain the vehicle inspection station license. The MTO officer performing the inspection checked historical and current work orders, select a few random buses to inspect for mechanical fitness, and ensured all emergency related equipment is functioning properly. Given our robust preventative maintenance program, dedication of the maintenance staff and the effective record management program, the inspection was a success and our 'A' rating remained in tact.

2. Service Availability, Whitby

The Whitby location has consistently delivered peak service requirements since February 4. DRT continue to monitor progress, and the Whitby location plan to reinstate the cancelled trips on routes 302 and 304 by March 21, 2020.

3. Durham Live

DRT and other Regional departments continue to liaise with stakeholders regarding the opening of the Durham Live facility in Pickering. The Gaming Corporation (casino operator) has advised DRT that the facility will operate shuttle services to meet transportation requirements to and from the casino, and DRT transit service is not required. However, as a precaution DRT will develop a contingency plan to support potential public transportation needs during the late evenings and nights for the initial period of the facility opening. At this time, it is envisioned that the contingency plan will be implemented during the opening weekend if necessary, with support to subsequent weekends determined based on actual needs of the public.

4. Service Change, April 6, 2020

Further to the approval of the DRT Strategic Issues and Financial Forecast and 2020 Business Plans and Budget, several service changes will be implemented on April 6, 2020.

Pickering – West Ajax Route Restructure

- Routes 101, 103, 110, 112, 120, 193, 232, 291: Routes modified to reduce service duplication, address underperforming routes, serve new growth areas, and enhance connections to Rouge Hill Station and the Pickering City Centre
- Route 110 weekday morning and afternoon peak service extended to Rouge Hill Station, provides new link between north west Pickering and the Rouge Hill Station
- Introducing On Demand service, seven days a week, to south Rosebank in Pickering, replacing scheduled weekday peak-hour service on route 107

Serving New Growth & Enhancing Connections

- Routes 112 and 603, weekday morning and afternoon peak service extended to Taunton at Seaton development
- Route 304, service modified to operate into Windfield Farms community in north Oshawa, seven days a week, most trips will begin or end at Ontario Tech / Durham College North Campus Terminal

- Route 315, new weekday morning and afternoon peak route serving new growth areas in west Whitby
- Route 410, weekday morning and afternoon peak service extended to Conlin and Townline area of north Oshawa, and to Oshawa Station
- Route 411, weekday morning and afternoon peak service extended to Oshawa Station via Bloor Street
- Route 417, service modified to operate along Britannia Road between Ritson and Simcoe Street, seven day a week service to Kedron area.
- Route 422, service extended from Oshawa Station to Whitby Station.
- Route 910, weekday morning and afternoon peak service extended to Ajax Station via Bayly and Victoria, for a new east-west intra-regional link south of highway 401
- New seasonal service (May to September) to the Toronto Zoo and Rouge National Urban Park on weekends and statutory holidays, with pick-up/drop-off at Ajax Station and Pickering Parkway Terminal

Frequency and Service Increase

- Route 215, additional weekday morning peak trips
- Route 223, Sunday daytime service frequency increased to 30 minutes between Ajax Station and Pickering Parkway Terminal until 19:00
- Route 405, additional Saturday trips
- Route 410, Sunday daytime service frequency increased to 30 minutes until 19:00

Route & Schedule Changes

- Route 312, routing changed to operate via Taunton and Garden Streets
- Route 403, schedule changes to improve reliability
- Easter Monday: all routes to operate on a Saturday schedule

Service Optimization

- Routes 111, service cancelled and replaced with modified services
- Route 217, weekday and Saturday evening service reduced to one-way, Saturday daytime service frequency reduced to 60 minutes
- Routes 219, Saturday service frequency reduced to 60 minutes
- Route 223, weekday and Saturday evening service reduced to one-way, east of Ajax Station, Saturday daytime service frequency reduced to 60 minutes east of Ajax Station
- Routes 225, weekday and Saturday service after 21:00 cancelled, Sunday service to begin an hour later
- Route 226, service cancelled and replaced with modified services
- Routes 303, Sunday service to begin an hour later
- Routes 304, Sunday service to begin an hour later
- 409, weekday and Saturday service after 21:00 cancelled
- Route 414, service cancelled, alternate service available along route
- Routes 501, weekday and Saturday service after 18:30 cancelled, Saturday service frequency reduced to 60 minutes
- Routes 502, weekday and Saturday service after 19:00 cancelled, Saturday service frequency reduced to 60 minutes

- Route 601, service cancelled, On Demand services available
- Route 922, service cancelled and replaced with modified services
- Route 960 (Uxbridge – Newmarket), service cancelled and replaced with On Demand service to Mount Albert, in York Region, with connections to York Region Transit service

If this information is required in an accessible format, please contact 1-800-372-1102 ext. 3702

Durham Region Transit Report

To:	Durham Region Transit Executive Committee
From:	General Manager, Durham Region Transit
Report:	#2020-DRT-07
Date:	March 4, 2020

Subject:

Durham Region Transit Automated Shuttle Pilot

Recommendation:

A) That Report #2020-DRT-07 to the Transit Executive Committee authorize the General Manager of Durham Region Transit, working with Regional staff partners, to:

i) Deliver a one-year automated shuttle pilot starting June 1, 2020 in partnership with the Town of Whitby, SmartCone Technologies Inc., Pacific Western Transportation and the Ontario Centres for Excellence;

ii) Negotiate and execute the necessary agreements with project partners including the Town of Whitby, SmartCone Technologies Inc. and Pacific Western Transportation subject to approval of Region of Durham Legal Services, with substantive terms as identified herein; and

iii) Report back to the Transit Executive Committee at the conclusion of the pilot on the results and key learnings.

Report:

1. Purpose

1.1 This report updates the Transit Executive Committee (TEC) on the initiative to pilot the application of automated, driverless shuttle technology and smart infrastructure in Durham Region, including partnering with the Town of Whitby, SmartCone

Technologies Inc., Pacific Western Transportation and the Ontario Centres of Excellence, and DRT's contribution to the initiative.

2. Background

2.1 At its meeting of January 9, 2019, TEC received an information report 2019-DRT-2 Preparing for Transit Innovations, outlining the steps Durham Region Transit (DRT) is taking to better assess and prepare to implement transportation innovations. This includes understanding how innovative technologies and service models can be leveraged to create value for DRT customers benefiting the transit experience and/or producing financial efficiencies.

2.2 At its meeting of June 5, 2019, TEC approved report 2019-DRT-12 Durham Region Transit Automated Shuttle Pilot, authorizing the General Manager of DRT to continue discussions with Pacific Western Transportation (PWT) on the opportunity to test PWT's electric autonomous shuttle. The report further directed DRT to report back to TEC on the necessary agreements to proceed with the pilot.

2.3 The report outlined DRT working in collaboration with other Regional Departments and partners to explore interest in deploying an automated shuttle demonstration project, including:

a. To pilot the application of automated, driverless shuttle technology over a one-year period to better understand technology performance in a range of weather and traffic conditions;
b. To assess the operational, financial and customer service benefits and implications of automated shuttle technology in community transit and first mile/last mile applications;
c. To improve the Region's understanding of the physical and digital infrastructure necessary to support safe and efficient operation of connected and automated/autonomous vehicles; and
d. To raise the profile of Durham Region as a forward-looking jurisdiction preparing for coming changes in transportation and mobility.

2.4 PWT deployed a fully accessible 12-person automated electric vehicle in partnership with municipalities in western Canada in September 2018. This includes successful controlled, short term deployments in Calgary, Edmonton, Vancouver and Surrey carrying a combined total of more than 11,000 passengers over 108 days and nearly 1,700 kilometres (including in winter conditions). The most recent shuttle deployment took place over an extended period in Beaumont, Alberta between May and October 2019 in mixed traffic conditions.

3. Automated Vehicle Pilot Project Framework

3.1 Over the past 12 months, DRT has had preliminary concept discussions with PWT regarding a potential test of its driverless automated shuttle in the delivery of passenger transportation services over a one-year period in Durham Region in a first mile/last mile role, connecting south Whitby to Whitby Station using DRT services.

3.2 Over the same period, DRT also advised on the development of an automated shuttle trial being led by SmartCone Technologies Inc. in partnership with the Town of Whitby. SmartCone Technologies, as the lead proponent, was awarded $986,000 by the Ontario Centres of Excellence through the Autonomous Vehicle Innovation Network (AVIN) to undertake the project.

3.3 The parties subsequently agreed that the best available option to ensure success was to enter into a collaborative partnership between SmartCone Technologies, Town of Whitby, DRT, and PWT, to deliver a one-year in-service automated shuttle pilot.

3.4 PWT will be responsible to provide the automated shuttle vehicle for the pilot. The vehicle selected will have extensive operating experience in various international applications

3.5 As of January 1, 2019, provincial regulatory changes permit the testing of fully driverless automated vehicles subject to Ontario Regulation 306/15 under the Highway Traffic Act. Any party conducting testing of automated vehicles on Ontario roads must apply to the Ministry of Transportation (MTO) for authorization. PWT, together with the shuttle manufacturer, will be the applicant and responsible to obtain the required provincial approvals to permit on-road operation of the automated shuttle for the purposes of this pilot.

3.6 A central component of SmartCone’s successful AVIN funding application is the development and testing of roadside sensor technology supporting vehicle to infrastructure communication and monitoring. Through a series of installations along the shuttle route mounted on cones or torches (i.e. SmartCones) within the right-of-way, the sensors collect data and communicate key information to the shuttle and the operations control centre. The sensors support the safe and efficient operation of the shuttle including the provision of advanced audio and visual alerts to other motorists and vulnerable road users of approaching automated shuttle operations.

3.7 DRT will be responsible for scheduling and oversight of shuttle operating hours, bus stop infrastructure and maintenance (such as snow and ice clearing), and related data collection.

3.8 The Region's Works Department will install and maintain traffic signal units to support vehicle-to-infrastructure communication with the shuttle and conduct road maintenance and signage installations on regional roads as needed to support shuttle operations.

3.9 The Town of Whitby will complete the required road maintenance/repair to comply with Municipal Maintenance Standards for Municipal Highways, Ontario Regulation 239/02 (if required) and other infrastructure that may be needed to accommodate shuttle operations (e.g., traffic signal communication units, additional lane markings, signs, etc.). Parking restriction by-laws that may be required to support shuttle operation on the route will be brought forward to the respective Councils based on the shuttle operating schedule.

3.10 A full list of project partners and their contributions are described in Attachment #1.

3.11 Project partners agree that the preferred area to launch the pilot is in the Port Whitby area south of Whitby Station, and expect the demand in this area to be well suited to a 12-person vehicle. The route includes.

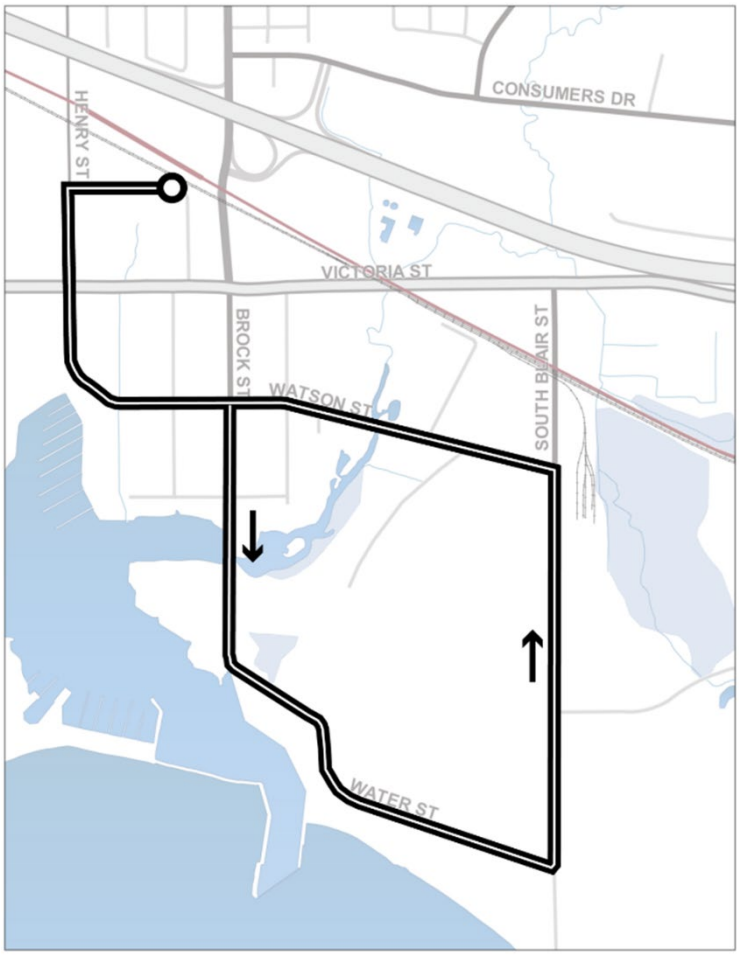
a. a six-kilometre loop that starts and ends at Whitby Station;
b. a mix of residential, commercial and recreational land uses; and
c. limited existing transit services.

3.12 The shuttle route is shown in Figure 1 with access to Whitby Station from the south entrance on Henry Street:

- south on Henry Street, cross Victoria Street and proceed east on Watson Street before turning south onto Brock Street
- Brock Street south to Water Street, and continue east along Water Street before turning north on South Blair Street
- north along South Blair Street, turning west on Watson Street and continuing through Brock Street
- Watson Street west through Victoria Street and north on Henry Street to the south entrance to Whitby Station.

An alternate route travelling east on Watson Street and south on South Blair Street, with a turnaround on Water Street, has been identified should the southern end of Brock Street be closed due to flooding or other causes during the pilot.

Figure 1: Whitby Automated Vehicle Shuttle Pilot Route



3.13 The shuttle will operate weekdays during off-peak hours (e.g. between 8:30 am and 3:00 pm) and on weekends, using existing bus stop infrastructure. Additional temporary bus stops and hard surfacing of existing stops will be installed as necessary within DRT's bus infrastructure program. Off-peak weekday and weekend service will avoid high traffic volumes and speeds that occur on major arterials such as Brock Street and Victoria Street near Whitby Station during peak traffic times. Subject to successful operations south of Whitby Station, the project team may consider limited testing to the north between Whitby Station and downtown Whitby later in the pilot period.

3.14 DRT is working with Metrolinx to confirm the storage and charging requirements at the Whitby Station. Alternatively, the Town of Whitby will provide storage and charging space at the nearby Iroquois Park Sports Centre.

3.15 The shuttle will be staffed at all times by PWT. The on board attendant will assist passengers with boarding, fare payment (regular PRESTO fares will apply) and

other customer service needs. In the event of any technical or operational issues with the vehicle, the attendant will disengage the automated navigation system and assume manual control of the vehicle.

3.16 In the Spring 2020, the Town of Whitby, with the support of DRT and other project partners, will lead delivery of a community engagement and education plan prior to the launch of the pilot to build awareness of the shuttle and how it operates. Project partners will also be developing a robust data collection and evaluation plan to support assessment and reporting on pilot outcomes in accordance with applicable privacy regulations.

3.17 DRT does not envision automated shuttle vehicles replacing current bus services and operators. Current estimates suggest the ability of the technology to provide fully driverless operations on all roads in mixed traffic at high speed to be up to twenty years or more away. Rather, the technology is complementary to existing transit services, offering additional opportunity to improve access to public transit in areas or communities not suited to full size, conventional bus service. In this capacity, automated shuttles may play a role as a collector service in the first or last mile of the trip, picking up passengers near to their home or place of work and connecting them with the broader transit network.

4. Financial Implications

4.1 DRT has contracted with Pacific Western Transportation (PWT) since 2017 to deliver transit services within the Town of Whitby and North Durham. Under the current agreement, all vehicles operated by PWT in Whitby are owned by DRT. The current agreement does not include terms for the provision of automated vehicle service. DRT will work with PWT to establish an agreement specifying that, for the purposes of this pilot, an automated shuttle provided by PWT is to be used to deliver service during specified hours (with back-up conventional bus service to be provided should the automated shuttle be unavailable) and that operating costs be paid through SmartCone.

4.2 The total cost of the 3,150 service hours to be operated by PWT for the purposes of the AV shuttle pilot is $284,119 for a twelve-month period between June 1, 2020 and May 31, 2021. This includes a total of $150,726 for service between June 1, 2020 and December 31, 2020, and $133,392 for service operation between January 1, 2021 and May 31, 2021. These service hours are included in the 12,064 additional service plan hours approved by Council on February 26, 2020 to be phased in over 2020 and 2021. The budgeted cost also includes provision for a back-up conventional bus to be operated if the shuttle is unavailable. A detailed

breakdown of DRT's budget and contribution to the project is provided in Attachment #2.

4.3 DRT's contribution of service hours is approximately 13 per cent of the overall pilot cost of $2.2 million. The total project budget including funding contributions from each partner is provided in Attachment #3.

4.4 DRT funding of operating service hours will be paid to SmartCone as the principal partner to the AVIN funding agreement with the Ontario Centres of Excellence. In accordance with the funding parameters, AVIN provides 50 per cent matching dollars for the contributions of project partners. As DRT was not a signatory to the original funding agreement, its financial contributions to the project are not eligible for matching funding. By directing DRT's shuttle operation funding to SmartCone as the principal partner in the agreement and provider of automated vehicle operations monitoring and alerts through its AutoGuardian division, the contribution is eligible for matching funding to be allocated to cover other shuttle costs including vehicle shipping, route programming, lease costs and insurance. The transfer of these funds, including payment schedule and terms, will be established through a tri-partite agreement to be executed with the Town of Whitby and SmartCone Technologies Inc.

4.5 Contracting with the Town of Whitby and SmartCone Technologies Inc. through a sole source arrangement will allow for the provision of an integrated automated shuttle service and safety monitoring solution for all road users. SmartCone's intelligent warning system provides motorists and vulnerable road users (e.g., cyclists, pedestrians) with advanced warning of approaching automated shuttle operations through visual and audio alerts along the shuttle route. The development and testing of this technology in an automated shuttle application is central to the AVIN funding contribution from the Ontario Centres of Excellence, and offers added protection to road users, consistent with the Region's Vision Zero objectives, over and above the safety features of the shuttle itself.

4.6 Region Works Department commitments to support shuttle navigation along the route include the installation of roadside traffic signal units at the two signalized intersections along the route (Henry Street and Whitby Station, Henry Street and Victoria Street) to support vehicle navigation, installation of two additional CCTV cameras, road maintenance (e.g. pothole and crack repairs) along the route, signage installations and lane marking adjustments. Total costs are not expected to exceed $50,000 and will be covered from within existing program budgets.

4.7 Based on the results of this pilot, procurement of future automated vehicles or advanced intelligent roadside warning systems for advancing DRT's regular transit network, will be conducted in accordance with the Region's Purchasing By-law.

4.8 The Region and DRT will explore risks relating to cyber security, shifts in liability exposures, indemnification clauses in agreements and the effect these issues may have with the Region and the Town of Whitby's insurers. The risk management plan for the pilot is described in Attachment #4.

5. Next Steps

5.1 DRT will collaborate with Finance, Works and other Regional partners to finalize and execute the necessary agreements with the project partners including a tri-partite agreement with the Town of Whitby and SmartCone Technologies setting out DRT's contribution to the project along with necessary liability and insurance considerations, and any necessary agreement with PWT to confirm the funding source for the shuttle's operating hours.

5.2 DRT will continue to work with the Works Department, Town of Whitby, SmartCone and PWT to ensure the necessary roadside and traffic signal technology installations are completed for on-road shuttle testing to begin in May 2020 with passenger service commencing by June 2020.

5.3 DRT will support Town of Whitby staff in the development and implementation of a community engagement and awareness strategy ahead of the start of on-road testing.

5.4 This report has been prepared with the assistance of the Finance, Legal and Works Departments.

6. Attachments

Attachment #1: Partner Roles and Responsibilities

Attachment #2: DRT Contribution for Shuttle Operations

Attachment #3: Whitby Automated Shuttle Pilot Project Funding Contributions

Attachment #4: Risk Management Plan

Respectfully submitted,

Original signed by

Bill Holmes
General Manger, DRT

Recommended for Presentation to Committee

Original signed by

Elaine C. Baxter-Trahair
Chief Administrative Officer

Attachment #1: Partner Roles and Responsibilities

Partner	Role/Contribution
SmartCone Technologies Inc.	• overall project management • coordination and integration of the reference design, coordination with Town of Whitby, Durham Region Transit and Region of Durham on deployment of the shuttle communication and safety equipment • overall financial and milestone management related to AVIN funding requirements • coordination with other potential stakeholders
Pacific Western Transportation	• project management of shuttle deployment, including testing and securing required regulatory approvals • training and supervision of shuttle attendants • maintenance and operation of shuttle in accordance with scheduled hours (including operation of back-up bus)
Durham Region Transit	• scheduling, and funding of shuttle operating hours • bus stop infrastructure and maintenance along shuttle route • PRESTO fare collection devices • customer service enquiries and service notifications • ridership and revenue data collection
Durham Region Works Department	• install and maintain traffic signal vehicle-to-infrastructure communication technologies to support shuttle navigation • road maintenance and signage installations on regional roads as needed to support shuttle operations
Town of Whitby	• lead community engagement and awareness activities • road maintenance and signage installations on local roads as needed to support shuttle operations
Nokia	• provide private LTE wireless broadband network to enable a dedicated wireless connectivity for partner devices to intercommunicate along the proposed route
Aurrigo	• testing of communication between SmartCone sensors and automated shuttle at test track in Ottawa prior to launch
Ontario Tech University/ Durham College	• student training and development opportunities related to shuttle deployment and maintenance • data collection and analysis

Attachment #2: DRT Contribution for Shuttle Operations

Whitby AV Shuttle Pilot - DRT Operations Budget

Period	Description	Hours Daily	Revenue Hours	PWT Contract Hourly Rate	Kms Daily	Total Kms	Fuel/Tire Rate per Km	Gross Cost	Estimated Revenue	Net Cost
June 1, 2020 to December 31, 2020	New weekday midday (8:30 - 15:00) AV service between Whitby Station and the Port Whitby area.	7.00	910	$88.37	85	11,381.50	$0.55	$ 86,676.53	$ 4,333.71	$ 82,342.82
	New Saturday daytime and evening (8:00 - 19:00) AV service between Whitby Station and the Port Whitby area.	12.00	360	$88.37	145	4,480.50	$0.55	$ 34,277.48	$ 1,713.83	$ 32,563.65
	New Sunday daytime and evening (8:00 - 19:00) AV service between Whitby Station and the Port Whitby area.	12.00	396	$88.37	145	4,928.55	$0.55	$ 37,705.22	$ 1,885.21	$ 35,820.01
January 1, 2021 to May 31, 2021	New weekday midday (8:30 - 15:00) AV service between Whitby Station and the Port Whitby area.	7.00	833	$88.37	85	9,783.50	$0.55	$ 78,993.14	$ 3,949.55	$ 75,043.59
	New Saturday daytime and evening (8:00 - 19:00) AV service between Whitby Station and the Port Whitby area.	12.00	300	$88.37	145	3,494.50	$0.55	$ 28,432.98	$ 1,421.61	$ 27,011.36
	New Sunday daytime and evening (8:00 - 19:00) AV service between Whitby Station and the Port Whitby area.	12.00	348	$88.37	145	4,061.45	$0.55	$ 32,986.56	$ 1,649.28	$ 31,337.27
Total								**$299,071.89**	**$14,953.19**	**$284,118.70**

Attachment #3: Whitby Automated Shuttle Pilot Project Funding

Contributions

Partner	Contribution	Contribution In-Kind	Total
Autonomous Vehicle Innovation Network (Ontario Centres of Excellence)	$986,250		$986,250
SmartCone Technologies Inc.*	$788,750*	$50,000	$838,750
Town of Whitby		$260,800	$260,800
Nokia Canada	$147,500		$147,500
Aurrigo Canada	$50,000		$50,000
Total	**$1,972,486**	**$260,800**	**$2,283,300**

*Includes $284,119 in shuttle service hour contribution from Durham Region Transit and $50,000 in-kind project management contribution from Pacific Western Transportation.

Estimated Project Expenditures:

Component	Cost
Testing AV Shuttle & Smart Infrastructure at L5 in Ottawa	$100,000
Communications Equipment	$295,000
Smart Infrastructure Development and Operations	$763,000
AV Shuttle Set-up and Operations	$654,000
Town of Whitby Road and Infrastructure Changes (in-kind)	$65,000
Communications and Stakeholder Consultations	$196,300
Project Management	$210,000
Total	**$2,283,300**

Note: Funding and expenditure contributions do not include estimated in-kind Region road and infrastructure changes of up to $50,000 as these are not eligible for matching Ontario Centres of Excellence funding.

Attachment #4: Risk Management Plan

Potential Risk	Risk Mitigation Strategy
A delay in the Transport Canada regulation to allow shuttles on public roads	PWT is currently deploying two shuttles that have already been approved by Transport Canada for use on public roads.
Unforeseen delays in the Ontario Government regulation to allow autonomous shuttles on public roads	PWT and DRT have been advising MTO on progress of pilot development and timelines to ensure awareness of forthcoming application. No issues identified by MTO to date. Any unexpected delays could impact shuttle deployment date. In this event, back-up conventional bus to be used to deliver scheduled service in the interim.
Inclement weather issues with the shuttle such as ice or snow	PWT shuttle has operated in snow and ice in western Canada. In the event that weather prevents shuttle deployment, a back-up conventional bus will be used to deliver scheduled service along the route.
Cyber Security Risks	SmartCone Technologies will conduct a cybersecurity audit through its AutoGuardian division in accordance with Transport Canada guidelines prior to any on-road shuttle deployment.
Interoperability Issues (i.e. issues with connectivity among devices and systems)	All partners have engineers and technicians support to address potential interoperability issues. Interoperability will be subject to testing prior to deploying the shuttle on a public road.
Shuttle Incidents	On-board attendant can assume control of steering and braking in the event of an incident or technical issue. Advanced safety equipment along the shuttle route via SmartCone sensors (e.g., warning for pedestrians, cyclist and motorists). Private LTE network for command and control operation in the event of a natural disaster or other issues. Communication and control protocols to be established between operations centres at SmartCone Technologies, PWT and DRT with respect to incident notification and response coordination.

Potential Risk	Risk Mitigation Strategy
	Cyber security in place for the shuttle and the supporting infrastructure. All interoperability issues addressed prior to public road use.
Non-line of Sight	SmartCone technology can be used to help the shuttle "see around corners" with real time information on potential safety issues.
Temporary Road Closures/Vehicle Collisions	On-board attendant can take control of shuttle to navigate around any closures and/or impediments. SmartCone technology can be used as an alert and help the shuttle to navigate temporary closures.
Pedestrian Safety	Shuttle will operate at a maximum speed of 35 kilometres per hour helping to reduce stopping distance. SmartCone Technology alert devices placed along the route.
Cyclist Safety	Shuttle will operate at a maximum speed of 35 kilometres per hour helping to reduce stopping distance SmartCone Technology alert devices will alert all road users of a vehicle/bike presence.

If this information is required in an accessible format, please contact 1-800-372-1102 ext. 3702

Durham Region Transit Report

To:	Durham Region Transit Executive Committee
From:	General Manager, Durham Region Transit
Report:	#2020-DRT-08
Date:	March 4, 2020

Subject:

DRT Transit Stop Guidelines

Recommendation:

That the Transit Executive Committee receive this report for information.

Report:

1. Purpose

1.1 The purpose of this report is to inform the Transit Executive Committee (TEC) of the guidelines used by Durham Region Transit (DRT) to locate new bus stops, relocate existing bus stops, and bus stop design and configuration, that support DRT's objectives to work with the local area municipalities to integrate transit stops with the pedestrian network.

2. Background

2.1 The current DRT transit network includes 2,730 bus stops and 530 transit shelters of various designs.

2.2 DRT currently consult with Regional Works and local area municipalities on bus stop locations during the design of road reconstruction projects, sidewalk installations, and redevelopment activities.

2.3 In the absence of a bus stop standard, the current transit stop network includes inconsistent bus stop installations, locations, sizes, and access to transit from the pedestrian networks provided by local area municipalities. When collaborating with

local municipalities to locate and install bus stops, a transit stop guideline will ensure a consistent transit experience for customers and road users.

3. Discussion

3.1 There are six principles crucial to planning an effective and efficient bus stop.

a. access and accessibility
b. community compatibility
c. proximity of transit
d. safety of all road users
e. convenient, safe and comfortable bus stop environment
f. efficient bus operations
g. these principals balance the diverse needs of the people impacted by bus stops, curbs, customers, bus operators, residents, employees, pedestrians, and road users

3.2 These guidelines inform bus stop placement and design and were developed in consultation with the Regional Works department and local area municipalities, specifically engaging those responsible for road safety and infrastructure in the public right-of-way. The transit and transportation network will evolve in the coming years, including new cycling infrastructure and On Demand services, and these guidelines will provide a crucial starting point to support conversations with road authorities and other stakeholders.

3.3 Accessibility is central to the design of any pedestrian infrastructure. Feedback from accessibility advisory committees of local area municipalities have been considered in the guidelines, with the consistent recommendations being adequate space to enable customers using mobility devices to navigate in and around stops, and that stops be connected to the pedestrian network (sidewalks).

3.4 For locations where the bus stop standard cannot be accommodated the guidelines provide design principles to customize the required infrastructure while reflecting the Region’s Standard Construction Drawings.

4. Conclusion

4.1 The DRT Transit Stop Guidelines provide a framework for the placement and design of transit stops within the region. The guidelines will accelerate the location review process by stakeholders, assist local area municipalities during their project design activities, and support a consistent and improved transit stop environment

throughout the region that meets the current and future expectations of DRT customers and the community.

5. Attachments

Attachment #1: Transit Stop Guidelines

Respectfully submitted,

Original signed by

Bill Holmes
General Manager, DRT

Recommended for Presentation to Committee

Original signed by

Elaine C. Baxter-Trahair
Chief Administrative Officer

Durham Region Transit

Transit Stop Guidelines

Table of Contents

Table of Exhibits

1 Executive Summary

This document provides guidelines for locating new and changed stops and illustrates stop configurations that meet DRT's customer experience and accessibility objectives. Section 2 provides an introduction to DRT services and the role of our transit stops. Section 3 describes the planning process for new and changed stops, identifying stakeholders and general timelines.

Section 4 articulates the six guiding principles for planning DRT stops. Stop-related decisions have a profound impact on passengers, transit operators, residents, employees, and road users and these principles aim to balance their diverse needs:

- Enabling a fully-accessible transit system
- Ensuring community compatibility
- Ensuring transit is nearby
- Supporting the safety of all road users
- Providing a convenient and comfortable transit environment
- Enabling efficient bus operations

Section 5.1 discusses how frequently stops should be placed along a roadway. This is largely a function of the surrounding roadway and pedestrian network. Where the pedestrian network is more grid-like and tightly spaced, thus offering multiple walking routes to major streets, stops may be spaced farther apart while still maintaining a short walk from homes and businesses to their nearest stop. In other areas, stops may be spaced closer together to enable short walks from nearby locations that have few possible paths to a bus route and a potentially longer walk to the main street.

Sections 5.2 and 5.3 discuss how factors like the type of traffic control (e.g., traffic signals, stop signs) and other roadway characteristics influence decisions about where stops should be placed at a given intersection. Factors including the availability of space in the road right-of-way to provide an accessible stop or locate amenities, route alignments, and the presence of transit signal priority features play a large role in these decisions.

Section 6 discusses precise details about stop placements, such as how far from an intersection transit stops are ideally placed, and how various roadway configurations impact those decisions. Section 7 illustrates various typical and alternative stop configurations.

2 Introduction

Transit plays an important role in supporting quality of life and economic development in communities by providing mobility options and access to opportunities to live, work, and leisure. To meet these objectives, transit agencies must not only provide services that meet customer needs but ensure that reaching those services is convenient, safe and accessible.

The placement of and the environment around transit stops presents an opportunity to provide a positive customer experience. It is important to recognize that stops are a "gateway" to using transit and are therefore a core component of any transit system. High quality stops can enhance the streetscape and the users' experience of transit. They should be connected to local pedestrian networks to meet the accessibility needs of users and enable ridership growth. When properly planned, they can also benefit the overall efficiency of transit operations. To achieve these functions successfully, the approach to stop placement must be clear, comprehensive, and consistent.

Durham Region Transit (DRT) plans its services, including stops, according to the following guiding principles:

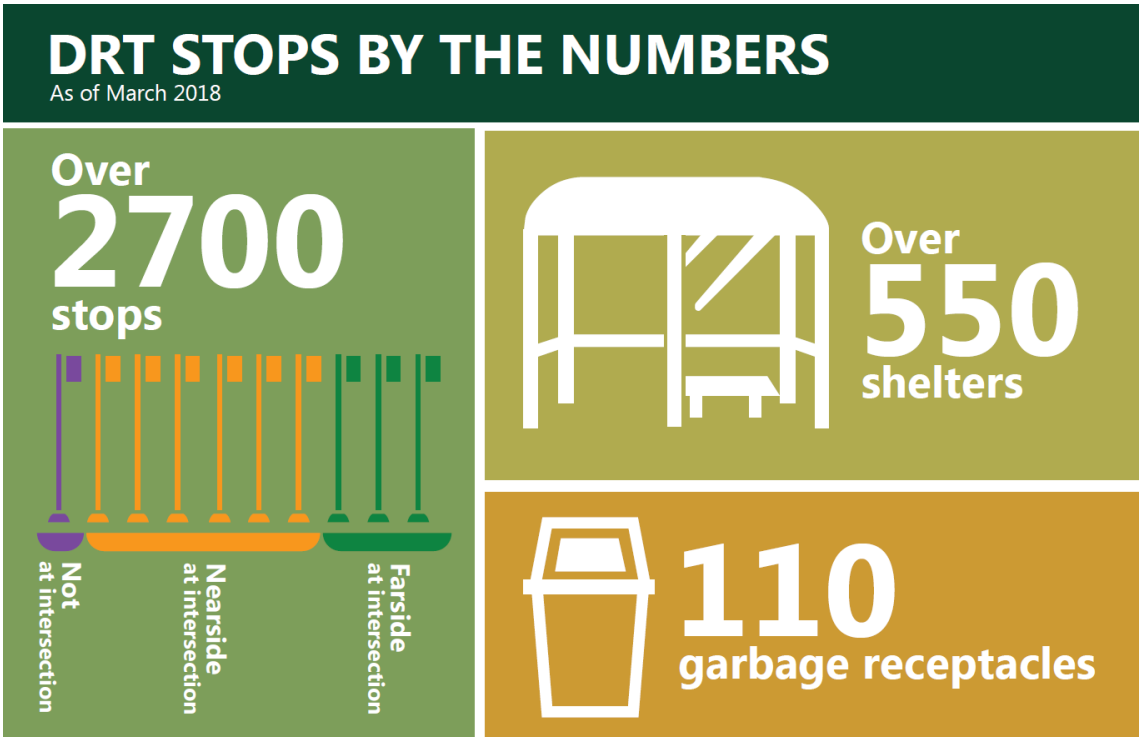
- Enabling a fully accessible system
- Ensuring community compatibility
- Ensuring transit is nearby
- Supporting the safety of all road users
- Providing a convenient and comfortable transit environment

With these stop guidelines, DRT has the opportunity to demonstrate leadership in implementing stops that promote transit use.

2.1 Local Context

The Region assumed responsibility for transit from the local municipalities of Pickering, Ajax, Whitby, Oshawa and Clarington in 2006 and created DRT. With the amalgamation

of services, the agency inherited a variety of different approaches to stop placement and amenities from the previous agencies. In addition, the DRT service area encompasses a broad range of land uses and constraints, and diverse historic and contemporary built forms.



All of DRT's conventional transit services are operated with accessible transit vehicles which kneel and deploy ramps to provide improved access for people with disabilities and those using mobility devices. Consistent with developing an accessible system, DRT and its regional and local partners must ensure that the whole experience to getting to and from a stop is accessible. This means ensuring that our bus stops are accessible and connected to the pedestrian network.

Increasing the number of accessible stops allows a greater number of Durham residents and visitors to use conventional transit service spontaneously and independently. Ongoing efforts to make additional stops fully accessible will strengthen the success of the Integrated Service model which combines conventional and on-demand service to facilitate a fully-accessible journey to those with mobility restrictions.

Providing the necessary transit stop infrastructure requires DRT's planning office to coordinate with Durham Region and local municipal partners. It also requires coordination with the crews responsible for the actual stop installation, including signage, concrete landing pads, and amenities such as shelters.

2.2 Future Plans

With a recent update to the Durham Region Transportation Master Plan (TMP) and related DRT 5-year Service Strategy, the Region is placing increased emphasis on transit with the objective of leveraging existing capacity within the transportation network and to reduce auto mode share. Through various strategic multimodal improvements, the Region aims to achieve a transit mode share target of 12.2 per cent by 2031 – up from the current share of 10.7 per cent. These improvements include expanded service levels and the introduction of higher-order services such as Bus Rapid Transit (BRT) along key corridors.

As the Region grows, there is an opportunity for transit to take on a greater role in meeting travel demand needs by offering a more reliable and competitive choice to auto travel. Key actions recommended in the TMP to elevate the role of integrated transit include:

- Continue expansion of BRT in the Regional Highway 2 corridor from the Toronto-Durham boundary to Downtown Oshawa
- Implement a High Frequency Network that includes transit priority measures and buses operating in High Occupancy Vehicle (HOV) lanes on key corridors
- Designate Other Transit Spines to facilitate service to rural communities
- Promote transit-supportive development in areas served by the recommended Higher-Order Transit network
- Consider expanding these services into other low demand areas of the Region and through new development areas like Seaton

As of 2017, the conventional transit fleet currently consists of 184 12-metre (40-foot) and seven 9.8-metre (32-foot) buses. The specialized transit fleet of 30 vehicles are primarily 25-foot (7.6-metre) lift-equipped buses.

DRT anticipates the future acquisition of 18-metre (60-foot) articulated transit buses on Bus Rapid Transit corridors and other high volume routes. Articulated buses will require the expansion of existing infrastructure, and it will be imperative to plan for these changes to the system.

2.3 Purpose of this Document

This document describes a consistent approach to stop placement and design and identifies issues to consider when planning new or changed stops. The recommendations take into consideration the diverse interests within the Region and its constituent municipalities, ranging from local residents, operators, regional and local staff, and politicians. The guidelines have been developed with input from DRT, staff from Durham Region and local municipalities, as well as through a review of best practices from other jurisdictions across Canada and the United States.

These guidelines can be used by municipalities, developers, planners, homeowners, politicians, transit users and anyone involved in the design of transit facilities in Durham Region. They focus on ensuring that DRT services encourage transit use by ensuring that the gateways to its services are attractive, readily identifiable, and easily accessed.

2.4 Structure of this Document

The remainder of this report is structured into the following sections:

- **Section 3 – Planning for New and Changed Stops** the roles and responsibilities related to the installation of new stops and the improvement of existing ones;
- **Section 4 – Guiding Principles** outlines major factors that determine where and how stops are placed and designed;
- **Section 5 – Transit Stop Placement Considerations** describes the process for determining the location of stops;
- **Section 6 – Detailed Stop Location Guidelines** describes the precise siting of stops at intersections; and
- **Section 7 – Stop Environment** describes the amenities and physical infrastructure of a stop.

3 Planning for New and Changed Stops

There are a number of situations that require existing stop modifications or new stops, including:

- Requests from stakeholders (e.g. provincial, regional, area municipal staff, community groups);
- Requests from the general public (e.g. individual passengers, residents, business owners, employees); and
- Introduction of service where none previously existed.

Changes to existing stops can take many forms. Examples may include:

- the installation of a hard-surface (which is conducted primarily in priority sequence according to the number of riders using a stop and subject to property availability);
- the installation of a shelter (which is conducted primarily in priority sequence according to boardings and subject to property availability);
- the relocation of a stop to accommodate construction, to or reflect new developments or road design;
- the relocation of a stop's post and flag to improve visibility; and
- the change in route alignments.

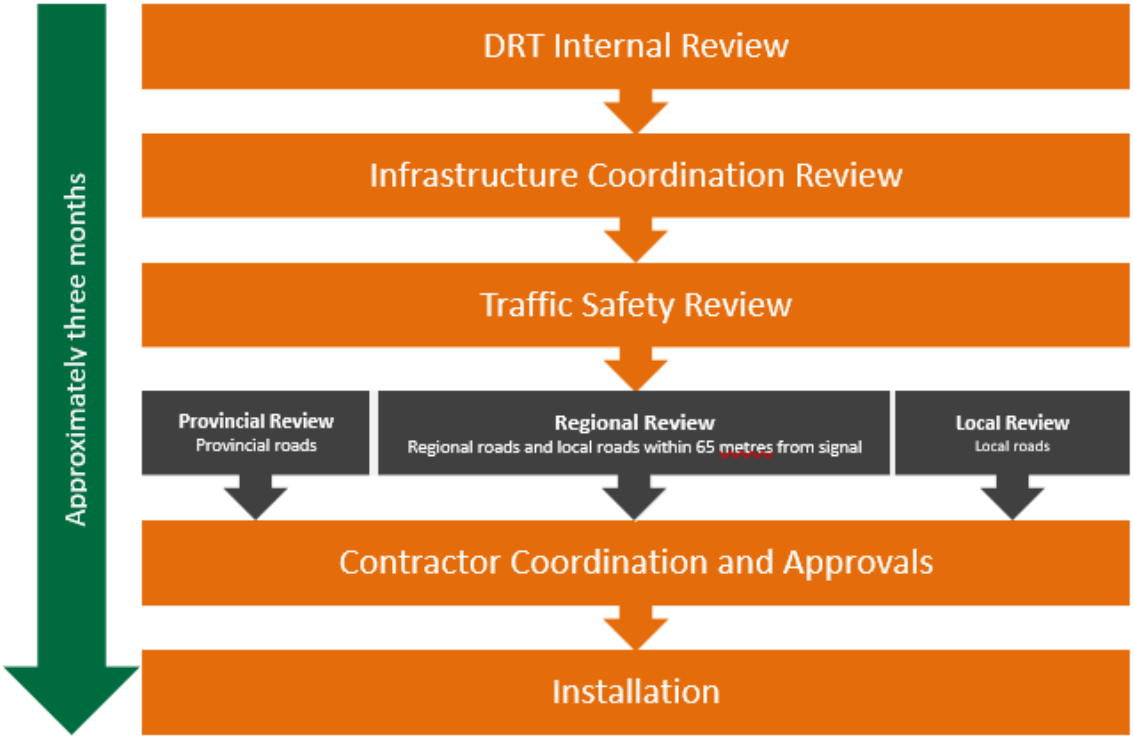
This chapter describes in detail the process for obtaining approval for stop-related modifications and the subsequent work to implement the planned changes.

3.1 Approvals and Implementation Process

The planning for a new stop or stop change follows a series of steps. From the initial planning to final implementation takes approximately three months. Timelines vary

depending on the number of stops being planned, the complexity of the stops, and varying schedules in obtaining approvals. Exhibit 3.1 summarizes the steps taken to introduce or change a stop.

Exhibit 3.1 – DRT Stop Approval Process



DRT Internal Review

DRT staff conducts an internal review and identifies the specifications of the new or revised stop infrastructure.

Infrastructure Coordination and Traffic Safety Review

Working with the road authority having jurisdiction, DRT identifies planned road construction and development to ensure that new or updated stop infrastructure does not conflict with other work in the area and to identify opportunities to coordinate work.

The precise location of a transit stop is subject to the approval of the road authority. Durham Region has jurisdiction on Regional Roads and roads within 65 metres of a signalized intersection. In all other instances, the local municipality is responsible for the approval of transit stop locations in their jurisdictions, while the Ministry of Transportation administers the approval for transit stops on provincial roads. The approving body gives consideration specifically to roadside safety, pedestrian crossing safety, major traffic impediments, and traffic signal operation for transit stop location requests.

Contractor Coordination and Installation

Once the traffic safety review is complete and approved by the relevant road authority, DRT coordinates the work with partner contractors for the installation of stop infrastructure. The contractor obtains utility locates and road occupancy permits where required.

3.2 Temporary Stops

Where the installation or replacement of a stop cannot be completed within the necessary timelines required by DRT, a temporary stop may be placed at the location. The placement of temporary stops will follow the same guidelines as permanent stops. The temporary stop sign will be replaced by a permanent sign as soon as is practicable and when appropriate approvals have been obtained.

Temporary stops will also be placed to respond to unforeseen or emergency events, temporary conditions, and planned construction. DRT staff will follow the guidelines set out in this document to support the placement of temporary stops.

4 Guiding Principles

Stop-related decisions have a profound impact on passengers, transit operators, residents, employees, and road users of all modes. Gathering the ongoing feedback received directly from the community and from regional and local staff, and internally within DRT, this section sets out the key guiding approaches to making stop improvements.

4.1 Enabling a Fully Accessible System

Transit customers, regardless of their mobility requirements, should be able to access transit services. Supported through the Accessibility for Ontarians with Disabilities Act (AODA) and the Ontario Human Rights Code, the Province of Ontario is working towards building a fully accessible province by the year 2025.

A fully accessible conventional transit system will enable deeper integration between fixed route service and OnDemand service for those with mobility restrictions. This will allow DRT to efficiently accommodate the growing need for transportation among those with diverse needs.

What makes a stop accessible?

An accessible transit stop includes the following elements:

- **Accessibility Clearance Area** – A hard surfaced area that is free of obstruction and is of sufficient size to accommodate accessible boarding and alighting with a mobility device at the front door of the bus. The running slope (slope parallel the curb) of the accessibility clearance area should not exceed the running slope of the curb, while the cross slope (perpendicular to the curb) must not exceed four per cent.
- **Tactile Walking Surface Indicators (TWSI)** – Distinctive hard surface textures that indicate the boundary between the bus stop passenger zone edge and adjacent roadways, at stops lacking other indications such as a curb or barrier.

- **Connections to Pedestrian Walkway Network** – Transit stops should be accessible to the area pedestrian network. In cases where a sidewalk is not present, short stretches of sidewalk may be constructed between the bus stop and area crosswalks or intersections. See Section 6.2.4 for information about pedestrian connections at rural stops.

4.2 Ensuring Community Compatibility

DRT strives for our bus stops to be an important part of our communities—places where the Region's residents and workers connect to work, school, or wherever life takes them on transit.

Where possible, transit stops should be located in areas that best meet our customers' needs, while respecting area residents and business concerns such as minimizing noise and litter, as well as maintaining accesses to adjacent land uses.

Transit stops and amenities should be placed considering other non-transit boulevard features (e.g. trees, street furniture, street lights, sidewalks). Collaboration is often required between various stakeholders to identify how these various components should optimally fit together.

4.3 Ensuring Transit is Nearby

Where safely possible, bus stop locations will be chosen to minimize walking distance to area homes, businesses, and destinations. The generally accepted distance most customers are willing to walk to a transit stop is 400 to 600 metres. It is DRT's objective to ensure that most homes, businesses and destinations are within this distance from a bus stop.

The walking distance to bus stops will be measured using the pedestrian walk network, which includes sidewalks and other pedestrian connections that are maintained year-round.

4.4 Supporting the Safety of All Road Users

Transit stop placement should facilitate convenient, comfortable, and safe access to transit, while maintaining the safety of all road users.

Proposed bus stop locations should be selected with consideration for potential safety issues, including:

- Sightline obstructions
- Propensity for crossing away from designated pedestrian crossings
- Unexpected or unusual stopping locations
- Pedestrian and passenger visibility including lighting
- Pedestrian and passenger exposure to traffic

The road authority having jurisdiction should review stops for potential road user safety issues as part of their reviews.

4.5 Providing a Convenient and Comfortable Transit Environment

To achieve the Region's objectives of boosting transit's share of overall travel, DRT must strive to compete with the conveniences of auto driving. This requires placing stops at locations in convenient locations and installing amenities to improve the experience while on and off the vehicle.

At the stop level, attention should be paid to lighting, roadside vegetation, access to area buildings, perceived safety, natural surveillance (e.g. eyes on the street), and traffic speeds. All these factors contribute to creating an inviting atmosphere when accessing transit.

Installing specific amenities such as shelters, benches, and customer information help to make the transit experience easier and more comfortable for passengers.

4.6 Enabling Efficient Bus Operations

Having an efficient bus operation is important so that our service is as competitive with the automobile as possible. An efficient bus operation also has a financial impact because it allows DRT to operate more services within its defined budget.

Transit stop locations should enable efficient bus operations by discouraging the need for buses to pull out of and into traffic lanes, taking advantage of transit signal priority, skipping traffic queues where possible, and ensuring sufficient space between stops to improve vehicle speed.

5 Transit Stop Placement

This section describes guidelines for the general location of bus stops. It covers the appropriate spacing, placement at intersections, and considerations for stops between designated pedestrian crossings.

5.1 Stop Frequency

Stop frequency refers to the general distance between stops on a particular route. The frequency of transit stops in urban areas and hamlets is guided by DRT's objective to provide the greatest access to transit with the fewest stops, which reduces maintenance and operational costs and increases vehicle speed.

Specifically, DRT has established transit walking distance coverage area guidelines as follows:

- 70 per cent of residences and businesses are within a 400-metre walk of a transit stop
- 90 per cent of residences and businesses are within a 600-metre walk of a transit stop

The coverage distance is measured along the pedestrian walkway network, including sidewalks and other pedestrian connections that are maintained year-round. The configuration of the pedestrian network is a significant factor affecting the number of stops that must be installed to serve a given population.

As illustrated in Exhibit 5.1, the number of destinations that can be served by a single stop depends on block size, pedestrian links between arterial roads and adjacent neighbourhoods, and nearby land uses. Therefore, DRT does not apply a one-size-fits-all standard for stop spacing but rather places stops to maximize their effective coverage, reducing costs and passenger's total travel time. Factors such as other nearby transit routes, pedestrian infrastructure, and the location of safe pedestrian crossings may also affect the number of stops in a given location.

Exhibit 5.1 – 400-Metre Stop Coverage – Comparison between street configurations

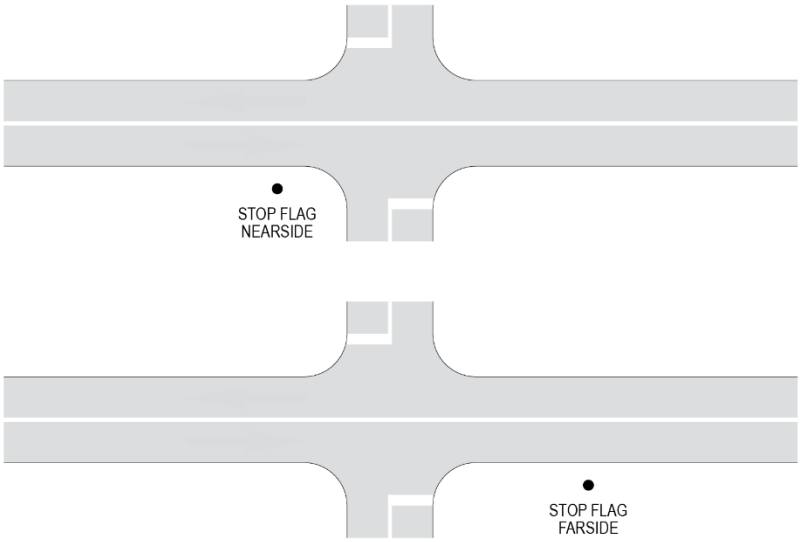
Special considerations can be made to provide better access to major trip generators, such as community facilities, employment and commercial centres, and higher density residential uses– including seniors housing. These land uses can generate more ridership and may justify access to accommodate the high passenger volumes. In areas served by numerous bus routes, stop placement should be coordinated to facilitate passenger transfers.

Where Bus Rapid Transit (BRT) or express services operate, wider stop spacing is acceptable in order to achieve lower overall travel time. Specific details about the appropriate stop spacing will be completed as part of the detailed planning for BRT. A local route paralleling the BRT service would serve stops planned according to these guidelines.

5.2 Stop Placement at Intersections

Transit stops are typically placed close to intersections, where pedestrian connectivity is strong, transfers are facilitated, and the coverage potential of a stop is maximized. When a stop is located near an intersection, it could be placed nearside or farside. Nearside stops are located on the side of the block before crossing the intersection, while farside stops are located on the side after crossing the intersection (see Exhibit 5.2

Exhibit 5.2 – Example of Nearside and Farside Stop



Placing a stop nearside or farside depends on:

- the conditions of the roadway,
- nearby pedestrian infrastructure,
- the location of major trip generators,
- the transit route's operating path, and
- the location of other nearby transit stops.

This section provides further direction on the placement of a stop based on different road roadway conditions as summarized in Exhibit 5.3

Exhibit 5.3 – Classification of Roadway Conditions for Stop Placement Decisions

Roadway Conditions	Description
Roadway Crossing Types	
Signalized intersections	Intersections where a traffic signal is present
Stop-controlled intersection approaches	Intersections where a bus approaches a stop sign
Uncontrolled intersection approaches	Intersections where a bus approaches without a traffic signal nor stop signs
Midblock locations	Roadway sections not at an intersection

Roadway Conditions	Description
Roadway Types	
Major Roads	• All Type A Arterial Roads, as described in the Durham Region Official Plan • Roadways where pedestrians cannot reliably cross the street, due to the number of lanes, speed of traffic, and consistently high traffic volumes, for example, portions of: ○ Kingston Road ○ Dundas Street (Euclid Street to Lake Ridge Road; CP Rail Belleville Subdivision to Stevenson Road) ○ Salem Road ○ Stevenson Road
Minor Roads	All other roadways not defined as Major Roads

5.2.1 Signalized Intersections

Major Roads

Primary considerations when locating stops at intersections on Major Roads include:

- reducing walking distance to the stops from nearby neighbourhoods and destinations, and between transit stops where transfer activity occurs;
- providing accessible, comfortable infrastructure for waiting, boarding, and alighting; and
- reducing transit delay and improving travel time reliability.

In any case, selected stop locations must consider safety implications described in section 4.4, with a focus on road crossings.

All else being equal, the safety of those walking toward a bus stop can be improved by placing the stop farside. Pedestrians rushing to catch a departing bus are less likely to be crossing in front the bus, and the stopped bus would not block crossing pedestrians from the view of other motorists approaching the intersection. Other considerations such as avoiding unexpected stopping locations may offset these benefits. In any case, locating the stop closer to the intersection makes it more likely pedestrians will cross at the designated crossing location, which is generally easier at nearside stops.

Where a right-turn lane exists, locating the stop there can succeed in both locating the stop near the intersection and keeping the stopped bus out of the flow of through traffic.

Conditions indicating farside stops at signalized intersections
Where roadway design and traffic conditions permit locating a farside stop close to an intersection, there may be operational benefits to doing so. At signalized intersections where buses normally spend short periods of time relative to the signal cycle, and where the intersection approach operates near capacity, farside stops often results in less delay to transit vehicles. Under less constrained conditions or where there is no right-turning traffic, the relative benefits of farside over nearside stops diminish and other factors should carry a greater weight. This may also apply to situations with very low right-turning traffic volumes coupled with significantly higher overall volumes on the farside. **Open Bus Bays** Where an open bus bay is provided at a signalized intersection, especially if coupled with a queue-jump lane or right-turn lane, transit stops should be located there. **Transit Signal Priority** The Durham Region TMP proposes the installation of Transit Signal Priority (TSP) on several Major Roads, to provide a faster and more reliable transit service for passengers. Farside stops are more advantageous at TSP-enabled intersections because it allows the transit vehicle to clear the intersection before stopping to pick up and drop off passengers.

Minor Roads

The placement of transit stops on Minor Roads at signalized intersections depends on the intersection:

- **Bus intersecting with a higher-hierarchy roadway** – Where a traffic signal cycle favours traffic perpendicular to a bus route making it more likely that an approaching bus will face a red signal, a nearside stop is preferred to take advantage of time already spent stopped.
- **Bus intersecting with a similar or lower-hierarchy roadway** – There is no operational advantage between a nearside and farside stop for these intersection conditions. Stops should be located where walking distance to the

intersection is minimized and where infrastructure can be installed, considering significant differences in traffic volumes on either side of the intersection. Where a right-turn lane is provided, locating the stop there should be considered.

5.2.2 Stop-Controlled Intersection Approaches

Transit stops on stop-controlled roadways are generally on slow, narrow, low-volume roads and face different challenges to signalized intersections where signals separate conflicting flows of traffic. Stops on these roads may take one of several forms and should be selected on a case-by-case basis according to available boulevard space and the location of stop-controlled intersections.

Considerations:

- Avoid placing a stop immediately at the stop bar if a stopped bus will obstruct the only stop sign for that approach. Alternatively, have a stop sign installed on the left side of the street.
- If possible avoid placing a stop close to, but not at, the stop bar to avoid stopping twice in quick succession. Stopping twice increases travel time, is frustrating for passengers, and is noisier—a particularly important concern in residential areas where transit stops at stop-controlled intersections tend to be located.
- Locating the stop near an intersection encourages the use of designated pedestrian crossings, where drivers will expect pedestrian crossing to occur. This is a less significant concern than on major roads, though a site-specific assessment should be made in conjunction with the road authority having jurisdiction.

5.2.3 Uncontrolled Intersection Approaches

Stops should be located where walking distance to the intersection is minimized and where infrastructure can be installed, considering significant differences in traffic volumes on either side of the intersection. Where a right-turn lane is provided, locating the stop there should be considered.

5.2.4 Overriding Considerations

Stop Infrastructure and Curb Space

To achieve the accessibility standards established under AODA, it is DRT's intention to provide a concrete or other hard surface at each of its transit stops by 2025. The typical design of these surfaces calls for a 10-metre length and at least 3 metres of depth is required at the front door to provide sufficient space for a wheelchair to clear the bus's ramp after disembarking. On major routes where articulated buses might operate, a longer hard surface is required. Additionally, shelters are installed at busy stops, transfer locations and where vulnerable users are known to board to improve waiting conditions for riders and space must be allocated to that purpose.

When space for a hard surface and/or shelter in the public right-of-way is only available on one side of the intersection, the stops should be located there.

Tree Protection

Stop placement should consider the location of trees in the boulevard and behind the sidewalk. Where possible, stops should be located to avoid potential interference with trees and other landscaping and should conform to the tree protection bylaws and guidelines applicable to the roadway. In general, construction should be avoided within 1 metre of a tree's dripline. Where no alternative stop location exists, and the location of existing trees precludes hard surface construction, DRT should consult with the road authority or property owner responsible for the tree(s) to identify potential solutions including removing and replacing the tree or other boulevard features.

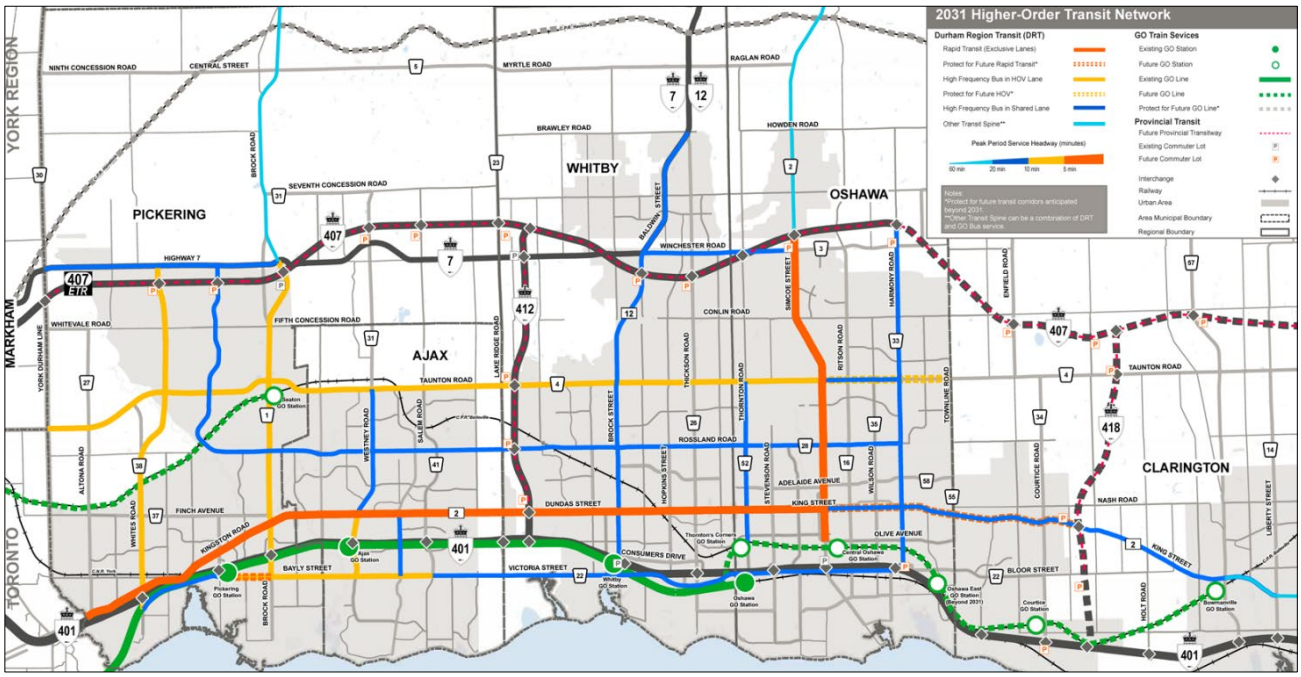
Transit Signal Priority

Where transit signal priority measures are present or planned, stops should be placed and designed in one of the following ways, by order of preference:

- Farside stops in an open bus bay with a nearside queue-jump lane (often combined with the right-turn lane) (see Exhibit 6.7)
- Farside in an open bus bay
- Nearside (see Exhibit 6.1)
- Farside without an open bus bay (see Exhibit 6.2)

This section applies generally to corridors identified in Durham Region's TMP as being a Rapid Transit or High Frequency Bus corridor (orange and dark blue in the diagram below).

Exhibit 5.4 – 2031 Higher-Order Transit Network from the Durham Region Transportation Master Plan



Route Configuration

Certain route alignments, particularly left turns (except where the left turn can be made from the curb lane or where the bus turns left onto the intersecting roadway's curb lane without needing a lane change), necessitate placing the stop farside or nearside unacceptably far from the intersection. In some cases where the left turn lane is short and buses can reliably merge into the left turn lane after serving a stop or when a farside stop is precluded, the stop can be placed nearside.

Stops should be located where the walking distance to the intersection is minimized—whether that is nearside before making the left turn or farside after making the left turn. For nearside, the location of the stop should be located where the bus can navigate to the left lane without crossing the solid white pavement marking.

Less often, a right-turn where the curb radius is small may require a greater setback from the intersection or a farside stop sufficiently downstream to allow the bus to come flush with the curb may be needed.

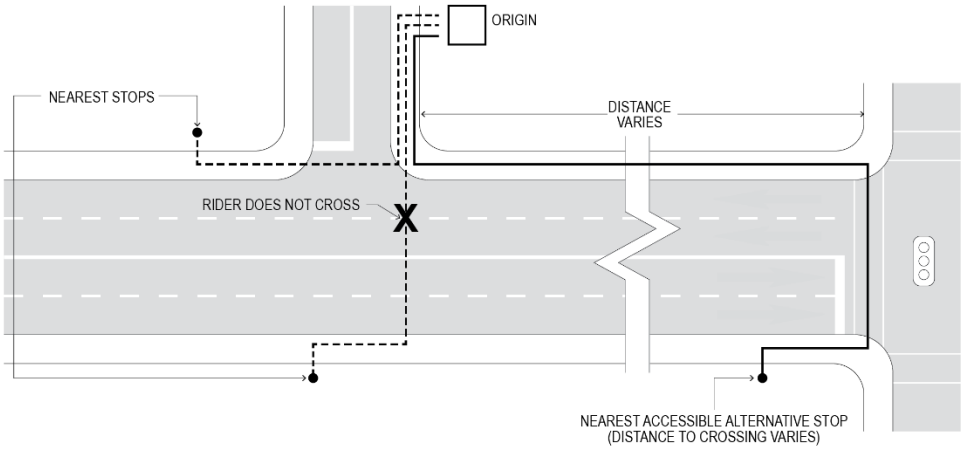
5.3 Stops at Midblock Locations and Uncontrolled Crossings

Major Roads

Distances of more than 700 metres between controlled pedestrian crossings are not uncommon on Durham Region roads, both regional and local. While it is DRT's preference to locate stops at controlled or otherwise designated pedestrian crossings, achieving the coverage goals (as described in Section 5.1) necessitates locating stops at midblock locations and uncontrolled intersections. Not achieving coverage goals effectively means not providing transit service to a particular area.

Conditions indicating stops away from designated crossings
As is typical among transit systems, DRT's transit service coverage objectives are based on the distance to the nearest transit stop. On low-speed, low-volume roads and at controlled pedestrian crossings, this distance roughly corresponds to the walking distance both to and from transit service in both directions since stops tend to be located in bi-directional pairs. Ideally, a controlled crossing would be present at each stop pair. Placing stops a significant distance from a controlled pedestrian crossing is a second-best approach for providing transit service because one direction may be direct (close to the origin or destination) while the other will require additional walking distance to the nearest pedestrian crossing for accessing a stop on the opposite side of the roadway (see Exhibit 4.6). The alternative is placing neither stop and making walking distance longer in both directions.

Exhibit 5.5 – Access Challenges of Stops at Unsignalized Intersections on Major Roads



In some cases, the transit route might circle back or make a turn that provides an alternative route to one's destination but in accordance with DRT's 5-Year Service Strategy, circuitous routes and one-way services have been largely phased out in favour of bidirectional services as part of a grid transit network. In other cases, other nearby transit routes can be used in the opposite direction of travel albeit sometimes in a less direct fashion.

The utility of these stops should be carefully reviewed. For example, stops on the rural side of the urban-rural interface often lack any destinations of their own and any rider using this stop and walking to a designated crossing would likely pass another stop at that crossing.

Stops on Major Roads will not be installed within 215 metres of a controlled crossing (not including the stop installed at the crossing) except where available pedestrian infrastructure makes it impractical to reach the next nearest stop. Within this distance, a controlled crossing is not likely to be installed and the additional walking distance, while less than ideal, is generally acceptable.

Where the walking distance to the next nearest stop exceeds 215 metres, and no alternative stop and/or route combination provides adjacent neighbourhoods or destinations acceptably close transit service, the placement of stops should continue to be considered, based on the following conditions:

- **Distance to alternative stop is between 215 metres to 400 metres**:
    - DRT will work with Regional partners to identify whether a signal or other crossing treatment could be installed.
    - DRT will evaluate on a case-by-case basis whether the stop could be excluded, if an improved crossing treatment is not installed.
- **Distance to alternative stop is over 400 metres**
    - DRT will work with the road authority having jurisdiction to install the stop to meet required service coverage goals.

Minor Roads

As discussed in the previous section, stops midblock and at uncontrolled crossings are required to achieve the service coverage goals. Minor local roads have narrower roadways, operate at lower traffic speeds, and operate with wider gaps in traffic—allowing passengers to more reliably cross the roadway to access bus stop locations.

For that reason, these stops on Minor Local Roads will be placed as required, consistent with the stop frequency guidelines described in Section 5.1.

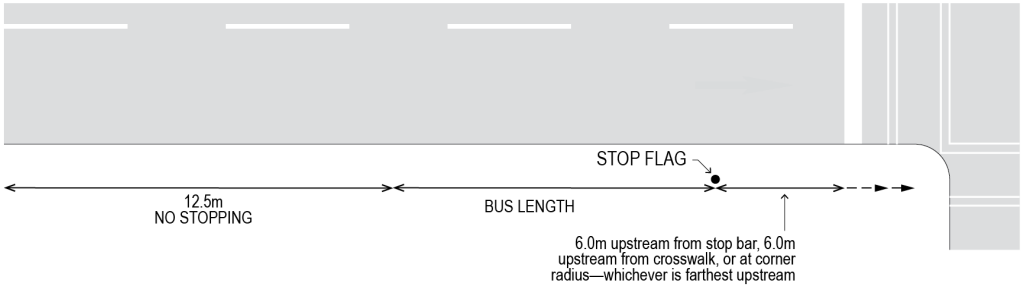
6 Detailed Stop Location Guidelines

The previous section describes the general directions of location bus stops under different roadway types and configurations. Building on those directions, this section provides detailed dimensions to stops and its related amenities.

6.1 General Applications

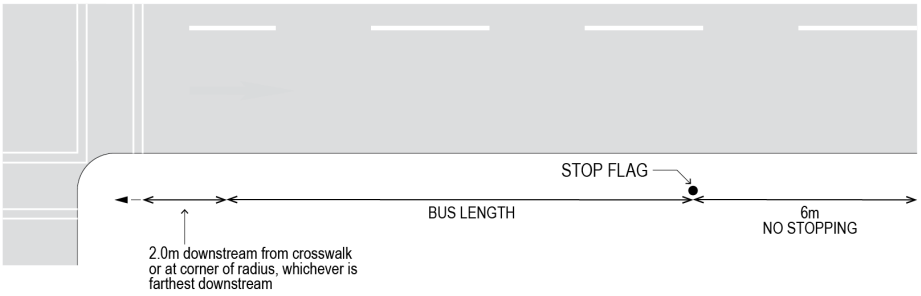
Nearside stops, other than those at stop signs (see section 5.2.2), should be positioned so that they are six metres upstream of the crosswalk or stop bar, whichever is farther upstream. If that would place the stop downstream beyond the straight edge of the curb, the stop should be located where the corner radius begins so that the bus doors can remain flush with the curb.

Exhibit 6.1 – Nearside Stop Detailed Placement



Farside stops should be located so that a two-metre gap exists between the back of a stopped bus and the crosswalk. Like nearside stops, the stop should be placed sufficiently downstream that the rear of the bus does not overhang the corner radius. See Exhibit 6.2 for details.

Exhibit 6.2 – Farside Stop Detailed Placement



6.2 Specific Applications

6.2.1 In-lane Stop Zone Dimensions

Transit vehicles typically stop curb-side and most often in the travel lane. In-lane stops are beneficial for operations because they reduce delays caused by transit vehicles merging in and out of traffic to make stops. In-lane stops are applicable at nearside, farside and midblock stops, and require less space than bus bays.

The Stop Zone, an area designated for use primarily by transit vehicles where passengers board and alight, should be generally clear of obstructions. These dimensions can be used to evaluate suitability of a proposed stop location and to determine the extents of desirable No Stopping restrictions around stops.

The Stop Zone generally includes three components:

1. a pull-out zone in front of the transit stop sign to allow the vehicle to pull away from the curb and rejoin traffic – in the case of a nearside stop, the intersection itself provides additional distance to re-enter the through lane if needed;
2. the length of the transit vehicle; and
3. a pull-in zone which the vehicle uses to manoeuvre to the curb.

If a bus will be serving a farside stop after making a left or right turn additional distance from the intersection is required to allow the bus to properly line-up with the curb. Space within the intersection will often accommodate portions of the pull-in and pull-out zones when buses are travelling straight through. Where a bus stop is located in a closed bus bay, see the following section for appropriate dimensions. Road designers should consult the Region of Durham's Standard Drawings for the most precise and up-to-date requirements.

The dimensions of the Stop Zone are identified in Exhibit 6.3.

Exhibit 6.3 – In-Lane Stop Zone Dimensions (in metres)

	Nearside Stops			Farside Stops			
Bus Type	**Pull-out Zone**	**Bus Length**	**Pull-in Zone**	**Pull-out Zone**	**Bus Length**	**Pull-in Zone by preceding movement**	
Standard Bus	To inter-section	12.5	12.5	6	12.5	Left Turn	Sufficient space to reach stop safely
						Through	From intersection
						Right Turn	*12.5*
Articulated Bus	To inter-section	18.5	12.5	6	18.0	Left Turn	Sufficient space to reach stop safely
						Through	From intersection
						Right Turn	16

Note: In-Lane Stop Zone dimensions for midblock stops requires the 6 metres in front of the stop, the appropriate bus length (whether it is 12.5 metres for standard buses and 18.0 metres for articulated buses), and 12.5 metres behind the bus length.

6.2.2 Bus Bays

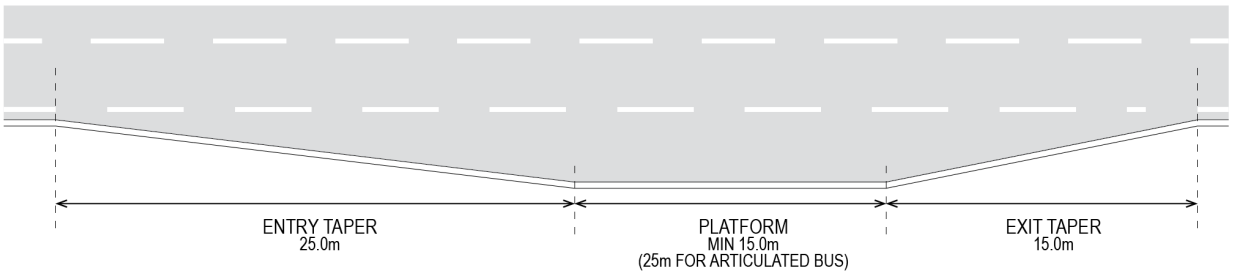
A bus bay is a designated area on the side of a roadway where bus can pull out from the flow of traffic. When placed at an intersection, full bus bays (distinguished from open bus bays) are typically placed farther from intersections, which:

- increases walking distance,
- reduce the available right-of-way for shelters, benches and other amenities, and
- delay transit vehicles as they re-enter the flow of traffic.

Consequently, full bus bays should be avoided except where safety or operational needs demand. Where buses have scheduled dwell time (i.e. a layover location), bus bays should be provided to prevent blocking a through-lane for an extended period.

See Exhibit 6.4 for bus bay dimension details.

Exhibit 6.4 – Typical Bus Bay Dimensions



6.2.3 Cycling Facilities

Where cycling facilities interact with transit stops, it is important to make all road users aware of the shared space in order to minimize conflict. Signage and lane markings should be designed with regard for OTM Book 18's guidance on conflict zones.

Multi-Use Trails
Where possible, newly constructed multi-use trails (MUTs) at transit stops, especially those where a shelter is likely to be installed, should leave sufficient space between the curb and the multi-use trail for passengers to wait and for a shelter to be installed. By routing a MUT behind transit shelters potential conflicts between cyclists and passengers exiting the shelter, boarding, and alighting can be mitigated. Where a shelter with an advertising panel is to be placed next to an existing multi-use trail, a minimum of one metre should be provided between the shelter and the multi-use path if the shelter entrance is adjacent to the MUT, otherwise a minimum of 0.5 metre should be provided. See Section 7.1.2 for detailed concepts for how bus stop infrastructure is placed near multi-use trails.

6.2.4 Rural Cross-Sections

Rural roadway cross-sections are generally those without a curb-and-gutter drainage system, and often lack sidewalks. Despite being found within the Region's urbanized area, these locations often lack suitable waiting areas or pedestrian connections. Providing a convenient and accessible area to wait, board, and alight requires the installation of infrastructure beyond what is necessary on urban cross-sections.

A passenger waiting zone with the same dimensions as urban stops should be installed at the edge of the roadway, along with a curb and appropriate drainage features. The waiting zone should be connected to the broader pedestrian network either by

connecting to a nearby sidewalk or designated pedestrian crossing. Where no pedestrian network exists, the stop should be designed with an access point accessible to those with mobility issues (e.g., curb cut and appropriate roadway signage). A bus bay may or may not be provided.

Most rural cross-section stops require site-specific design due to differences among:

- Drainage and watercourses
- Road user safety, particularly pedestrian crossings
- Pedestrian network configurations

Exhibit 6.5 – Stop Located on a Rural Cross-Section at a Controlled Intersection

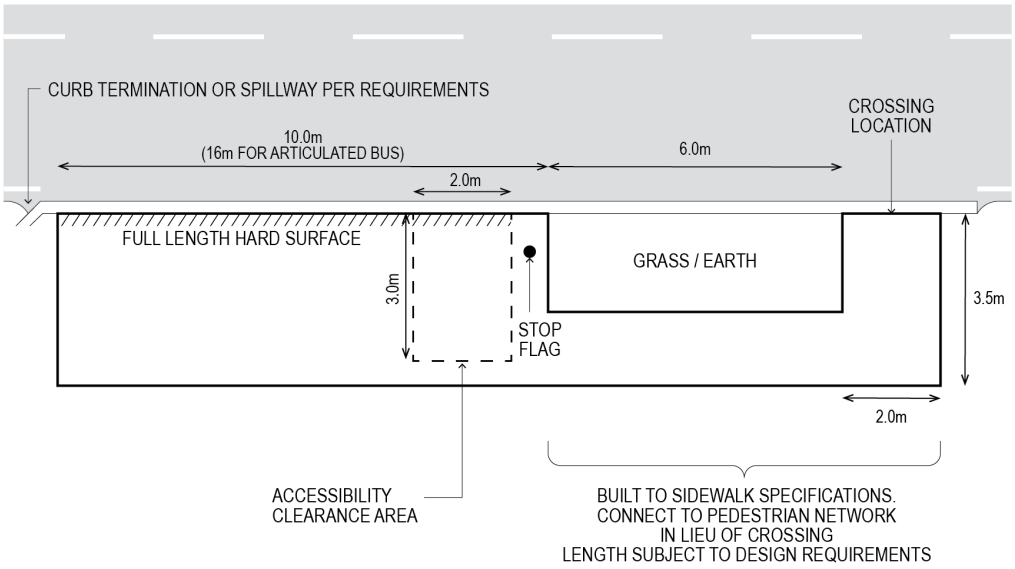
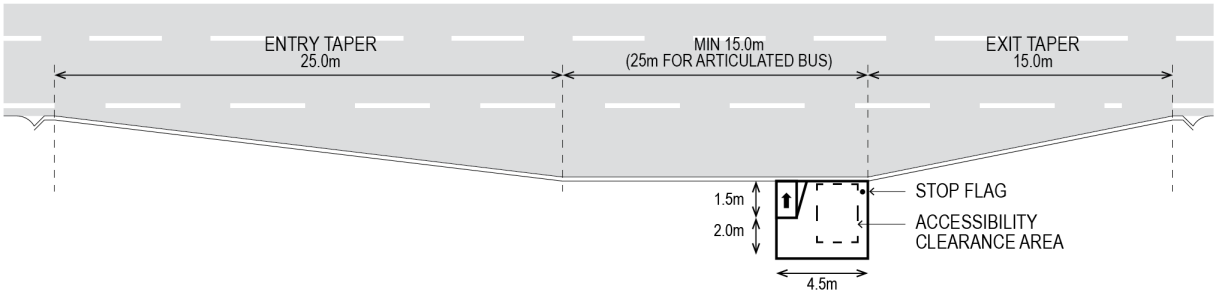


Exhibit 6.6 – Stop Located on a Rural Cross Section at an Uncontrolled Intersection or Midblock

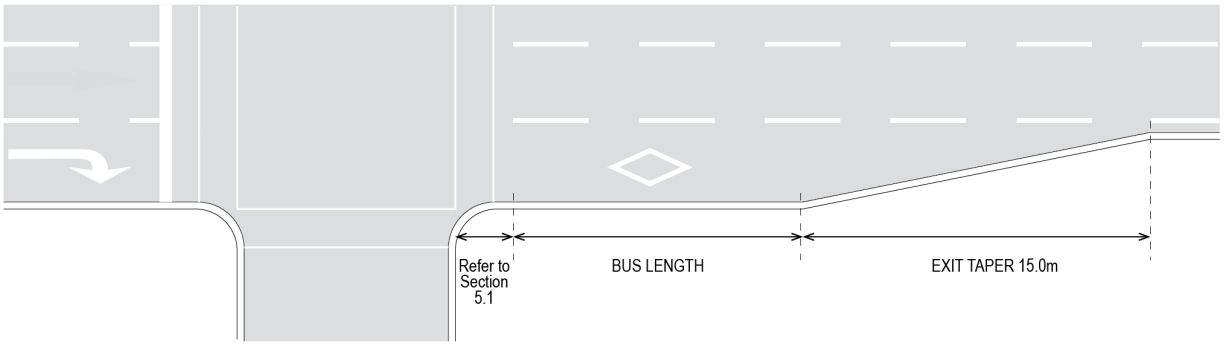


6.2.5 Open Bus Bays

Signalized intersections with farside stops can benefit from a combination of queue-jump lanes and open bus bays. A queue-jump lane allows buses to bypass traffic

stopped at a red signal using either a dedicated bus-only lane or a right-turn lane. When the signal turns green a bus, using a queue-jump lane is nearer to the intersection than had it been queued behind other vehicular traffic. These are often paired with open bus bays on the corresponding downstream intersection leg. They should not be relied upon where pedestrian traffic delays right-turning vehicles, potentially causing more delay than had the bus been waiting in a through-lane.

Exhibit 6.7 – Open Bus Bay Concept



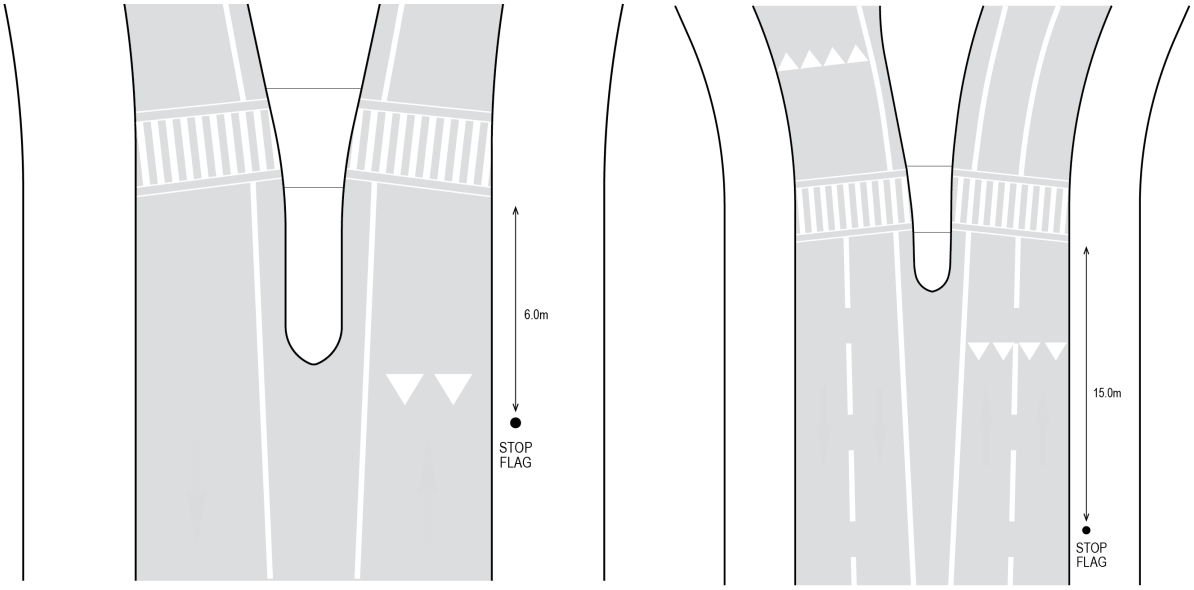
An open bus bay concept is depicted in Exhibit 6.7. Generally, they conform to the design specifications of full bus bays; however, an open bus bay has the entry taper omitted and is located nearer to the intersection. The open design allows buses to pull directly into the stop, reducing the overall length of the bus bay—more in line with the guideline's guiding principles (e.g. Ensuring Transit is Nearby). Open bus bays mitigate the impact on intersection capacity of having a bus stop at a point immediately farside of an intersection near the beginning of a green phase.

6.2.6 Roundabouts

On a one-lane approach to a roundabout, stops should be placed near the entrance to the roundabout to deter vehicles from passing a stopped transit vehicle and to encourage pedestrians to cross at the crosswalk. Placing the stop at the entrance to the roundabout approach (i.e., at the upstream end of the traffic island splitting traffic entering and existing the roundabout) ensures drivers at other roundabout approaches are not surprised by vehicles suddenly passing a stopped bus. These locations tend to be where space is available for stop infrastructure.

On a multi-lane approach to a roundabout, stops should be placed at least 15 metres behind the crosswalk. The 15-metre distance increases visibility of crossing pedestrians and conflicting traffic at the roundabout. Refer to Exhibit 6.8 for details.

Exhibit 6.8 – Location of Nearside Stops in Roundabouts



If farside stops are considered, a site-specific design may be required to ensure sufficient distance from the roundabout to prevent queuing traffic from spilling into the roundabout.

6.2.7 Channelized Right Turns

Channelized right turns present a challenge for locating stops in keeping with the guiding principles described in Section 4. For example, placing a stop before the beginning of a channelized right turn lane increases pedestrian walking distance to both a safe crossing location as well as to a stop itself but moving the stop closer to the intersection may not be operationally practical if the bus does not have sufficient distance to re-entre through traffic ahead of the traffic island. Channelized right turn lanes also generally preclude queue-jump lanes.

The placement of transit stops to accommodate through movements at channelized right turns should be considered using a site specific approach based on a multimodal assessment of the intersection to understand the flow of traffic and pedestrian movements.

7 Stop Environment

This section describes the physical design of stops including placement of amenities, as well as possible stop configurations that are common in the Durham Region context. It also considers accessibility requirements, the interaction of transit stops with different road geometries and modes of travel and stop amenities.

7.1 Stop Design

7.1.1 Basic Infrastructure

To enhance accessibility, customer convenience, comfort, and safety in accordance with DRT's guiding principles, transit stops should incorporate the following elements, at a minimum:

- Stop Marker
- Accessibility Clearance Area

Stop Marker

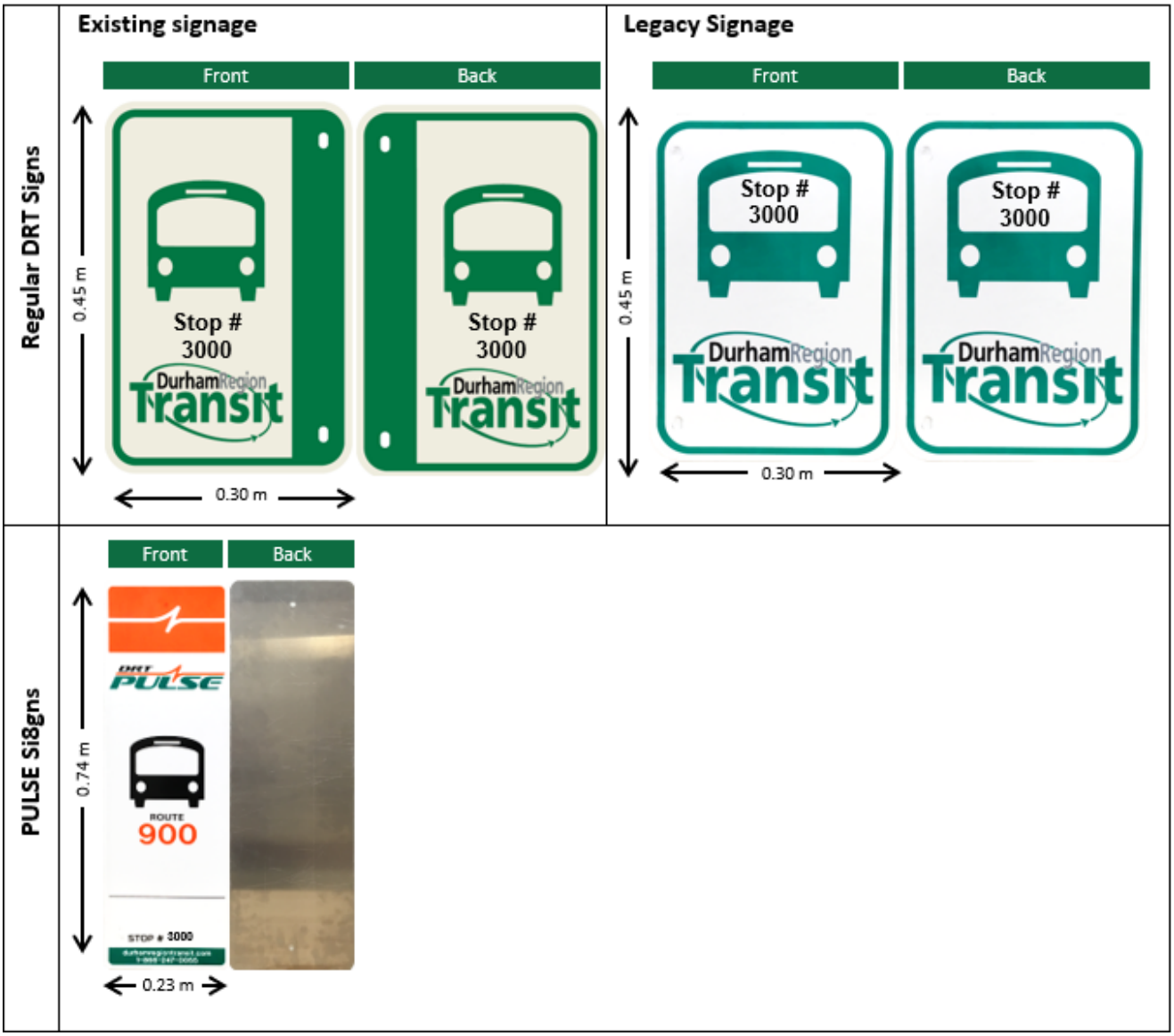
A stop marker is important component for different users:

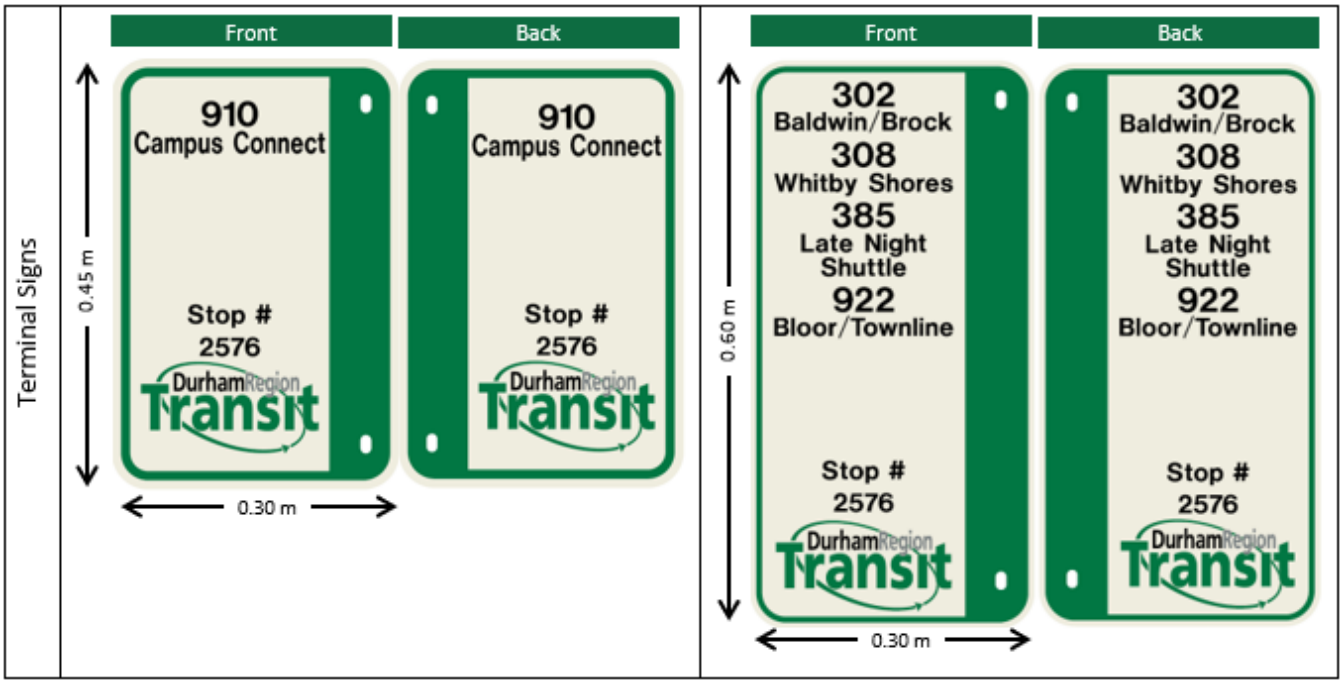
- **Passengers** – A distinctive and readily identifiable transit stop marker is required to help passengers identify precisely where to access transit services. It also helps raise awareness of transit services in the community.
- **Operators** – The stop marker indicates to the operators where the front of the bus is expected to line up when serving the stop.
- **Maintenance staff** – Snow clearing contractors use the stop marker for reference to find a stop buried under snow.

Exhibit 7.1 shows the different signs that are currently used in the system, this includes:

- current and legacy regular signs,
- terminal signs (which list the routes served by the stop), and
- PULSE signs.

Exhibit 7.1 – DRT and DRT PULSE Signs

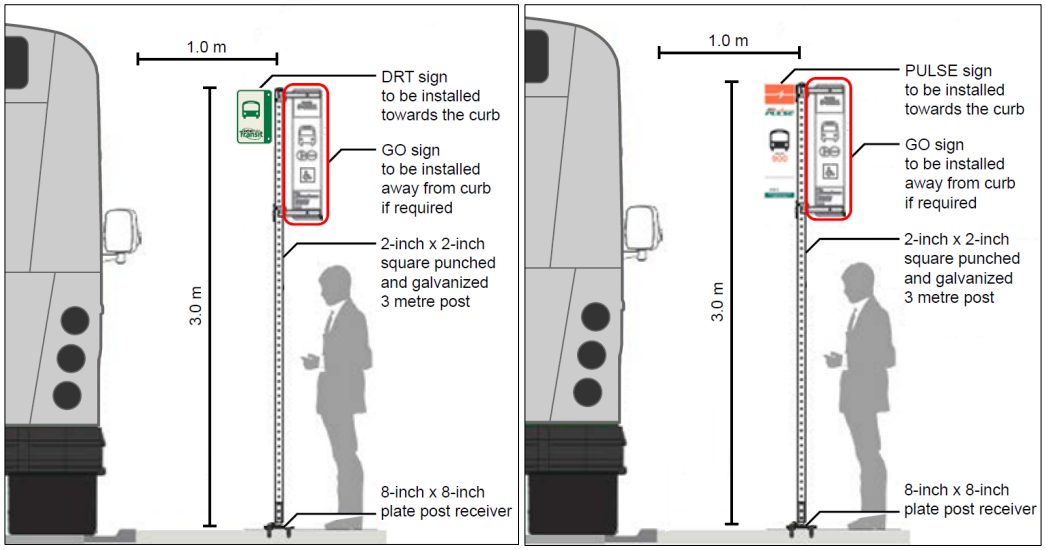




Regular and PULSE signs are to be installed at a typical height of three metres flagged towards the roadway. Where the marker must be located closer than 1m to the roadway, it should be flagged away from the curb. Where DRT and GO stops are shared, DRT signs continues to be flagged towards the roadway, while GO signs are installed away from the road.

The signs should be installed on a square two-inch by two-inch square punched and galvanized post. The post should be installed at the most downstream part of the stop pad, one metre away from the curb where possible. Installing bus signs on traffic light posts and street light posts are permitted so long as it is located close to the downstream portion of the bus stop area. Where available, the post is to be affixed onto or into the concrete pad. See Exhibit 7.2 for details.

Exhibit 7.2 – Desired installation of DRT and PULSE stop markers



Accessibility Clearance Area

To accommodate riders using the accessible ramp, an area two metres wide and ideally three metres deep should be provided (in space-constrained situations a minimum of 2.25 meters of depth is required). This allows riders using a mobility device to clear the ramp while it is being retracted, without leaving the concrete or paved surface. This element is often contained within the passenger waiting area (see below) or sidewalk connection. This element usually needs to be specifically constructed where a standard-width sidewalk abuts the curb.

Exhibit 7.3 – Concept of a Stop with Basic Infrastructure (Sidewalk at curb)

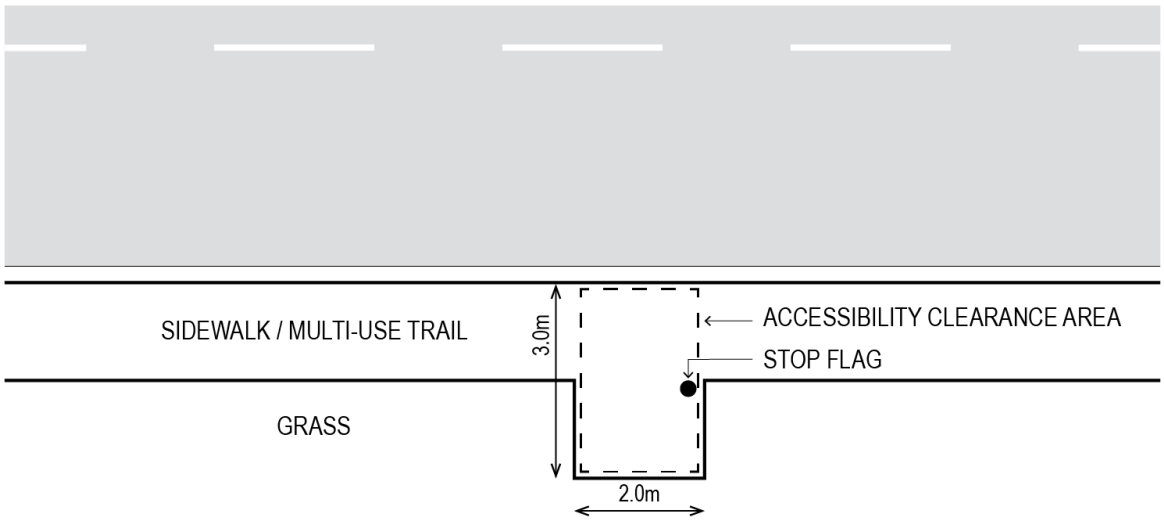
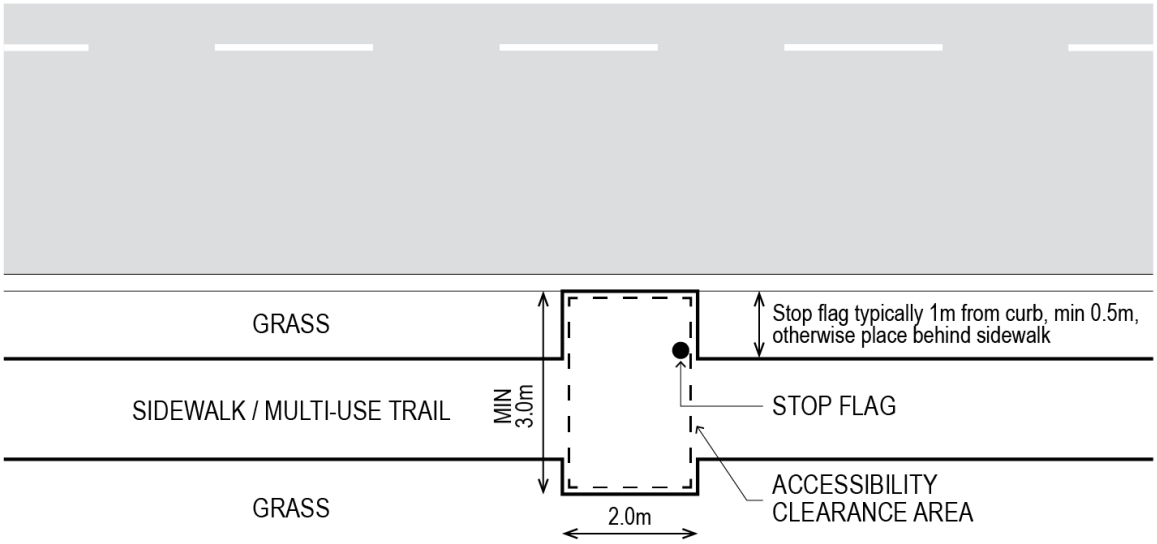


Exhibit 7.4 – Concept of a Stop with Basic Infrastructure (Sidewalk separated from curb)



7.1.2 Additional Infrastructure

Beyond the basic requirements for each stop, additional components may be necessary to meet guideline objectives:

- Passenger waiting area
- Shelters
- Waste receptacles

Passenger Waiting Area

The passenger waiting area is a hard surface area beyond the minimum accessibility clearance requirements (as described in Section 7.1.1). This passenger waiting area helps to:

- accommodate the number of passengers who may be waiting for a bus (without obstructing a sidewalk);
- provide a hard surfaced area to accommodate alighting passengers from the rear door, and
- provide space for a future shelter, so a passenger waiting area larger than strictly necessary for accessibility purposes is typically installed.

Typical dimensions of this surface are 3.5 metres by 10 metres; where the boulevard is significantly wider than 3.5 metres, a sidewalk-like connection between the standing area and sidewalk is provided. A longer pad is required where articulated buses operate or are expected to operate.

Where the sidewalk or some other infrastructure functions as an unloading area, an additional standing area may be installed behind the sidewalk.

Where possible, the standing area's location (and thus the stop itself) should be evaluated as if a shelter were to be present in the future so that one can be installed without moving the stop.

Shelters

The installation of shelters is prioritized according to the level of boardings that occur at stops. Some exceptions to this priority sequence may be made for locations serving vulnerable populations such as hospitals. Stops in Brock, Scugog, Uxbridge, and Clarington (except Courtice) are evaluated separately, reflecting lower historical levels of transit service, and lower service frequencies.

The shelter location should not obstruct the accessibility clearance area (dimensions found in Exhibit 7.3 and Exhibit 7.4) to allow riders to board the bus. DRT's shelter dimensions are typically 1.5 metres by 3.0 metres, although they can be increased to 1.8 metres by 4.8 metres for high-volume bus stops. The shelter must be installed on a concrete pad—the pad must include an additional 0.25-metre buffer around the perimeter of the shelter.

Waste Receptacles

Waste receptacles support guideline principles to ensuring DRT stops support community compatibility. Priority for waste receptacles will be made at stops with large volumes of boarding and alighting passengers, as well as those located adjacent to major commercial establishments where a larger volume of litter typically occurs. DRT will rely on feedback frequently made by passengers, residents, and businesses as part of the waste receptacle prioritization process.

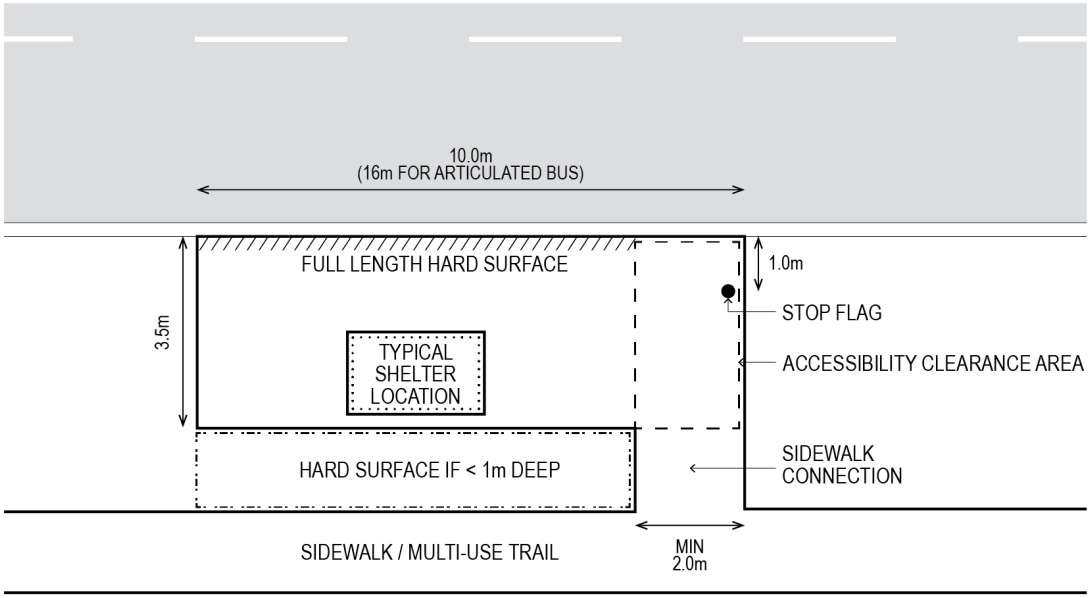
Additional Infrastructure Placement Concepts

Boulevard Width Greater than or Equal to 3.5 metres

The general placement of amenities for stops with additional infrastructure varies depending on the width of the boulevard. Exhibit 7.5 illustrates the typical concept for

a bus stop with additional infrastructure with a boulevard width greater than or equal to 3.5 metres.

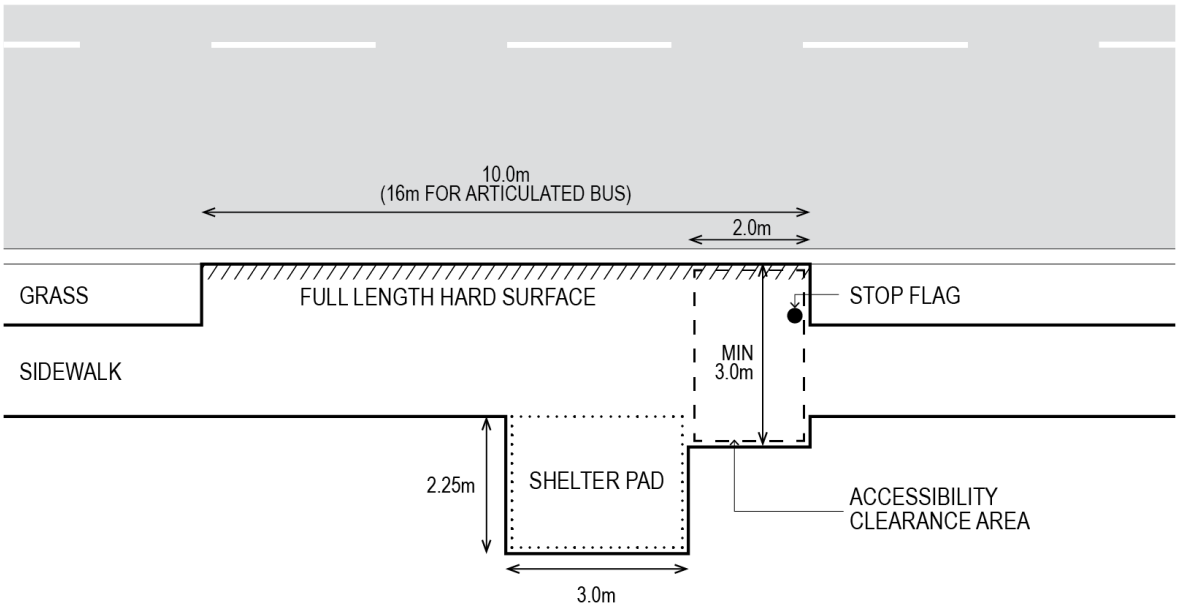
Exhibit 7.5 – Typical Concept of Bus Stop with Additional Infrastructure (Boulevard width ≥ 3.5 metres)



Boulevard Width Less than 3.5 metres

For stops with boulevard widths less than 3.5 metres, the accessibility clearance area must maintain a three-metre minimum depth, this may be achieved by incorporating the width of the sidewalk. In cases where a shelter pad is being installed, the accessibility clearance area should be extended beyond the minimum depth so that it aligns with the depth of the shelter pad. Refer to Exhibit 7.6 for details.

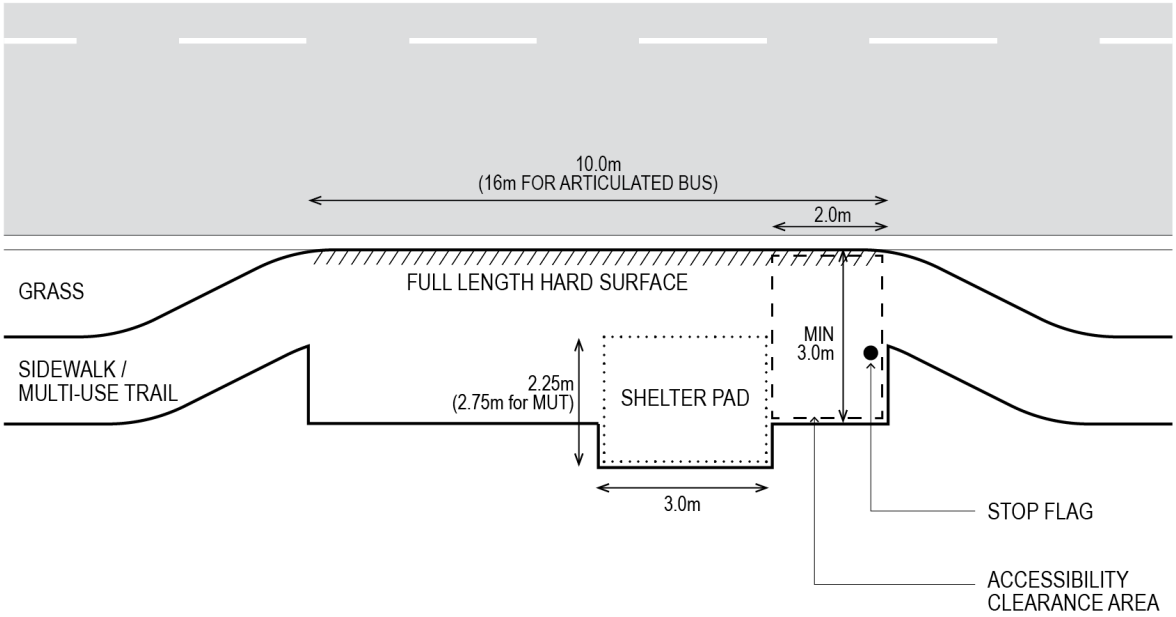
Exhibit 7.6 – Typical Concept of Bus Stop with Additional Infrastructure – Boulevard width < 3.5 metres



The concept shown in Exhibit 7.6 will also apply to stops where amenities are retrofitted into an existing multi-use trail. However, due to the higher speed of potential cyclists using the multi-use trail, the shelter pad will be made deeper by 0.25 metres to provide a larger buffer between the shelter and the multi-use trail.

If there is limited public right-of-way to place a shelter pad behind the sidewalk, the sidewalk could be modified so that it serves as the passenger platform area as well. The shelter pad is then placed behind the diverted sidewalk. Refer to Exhibit 7.7 for details.

Exhibit 7.7 – Alternative Concept of Bus Stop with Enhanced Infrastructure – Boulevard width < 3.5 metres, Limited Public Right-of-Way



If a new multi-use trail is being constructed, the stop should be designed with all amenities incorporated into one contiguous stop area, with multi-use trail deviating away from it, as shown in Exhibit 7.8.

Exhibit 7.8 – Alternative Concept of Bus Stop with Enhanced Infrastructure – Boulevard width < 3.5 metres, Stop Incorporated into New Multi-Use Trail