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.

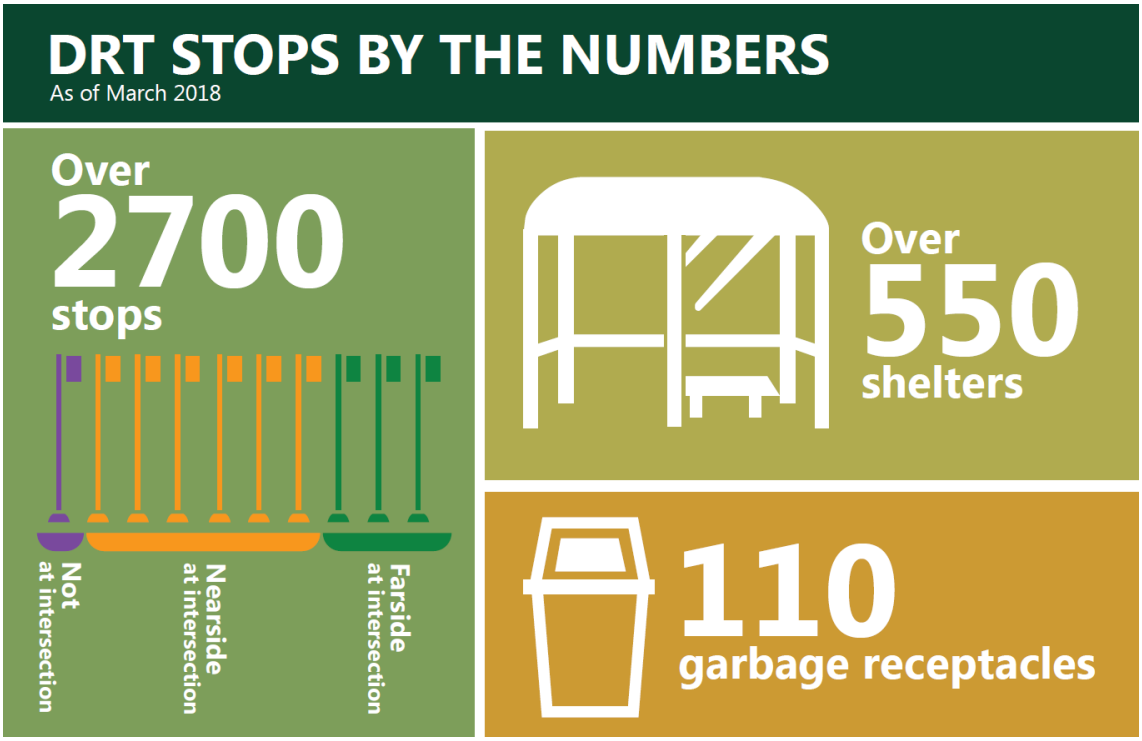
Durham Region Transit (DRT) plans its services, including stops, according to the following guiding principles:

- 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 percent by 2031 – up from the current share of 10.7 percent. 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:

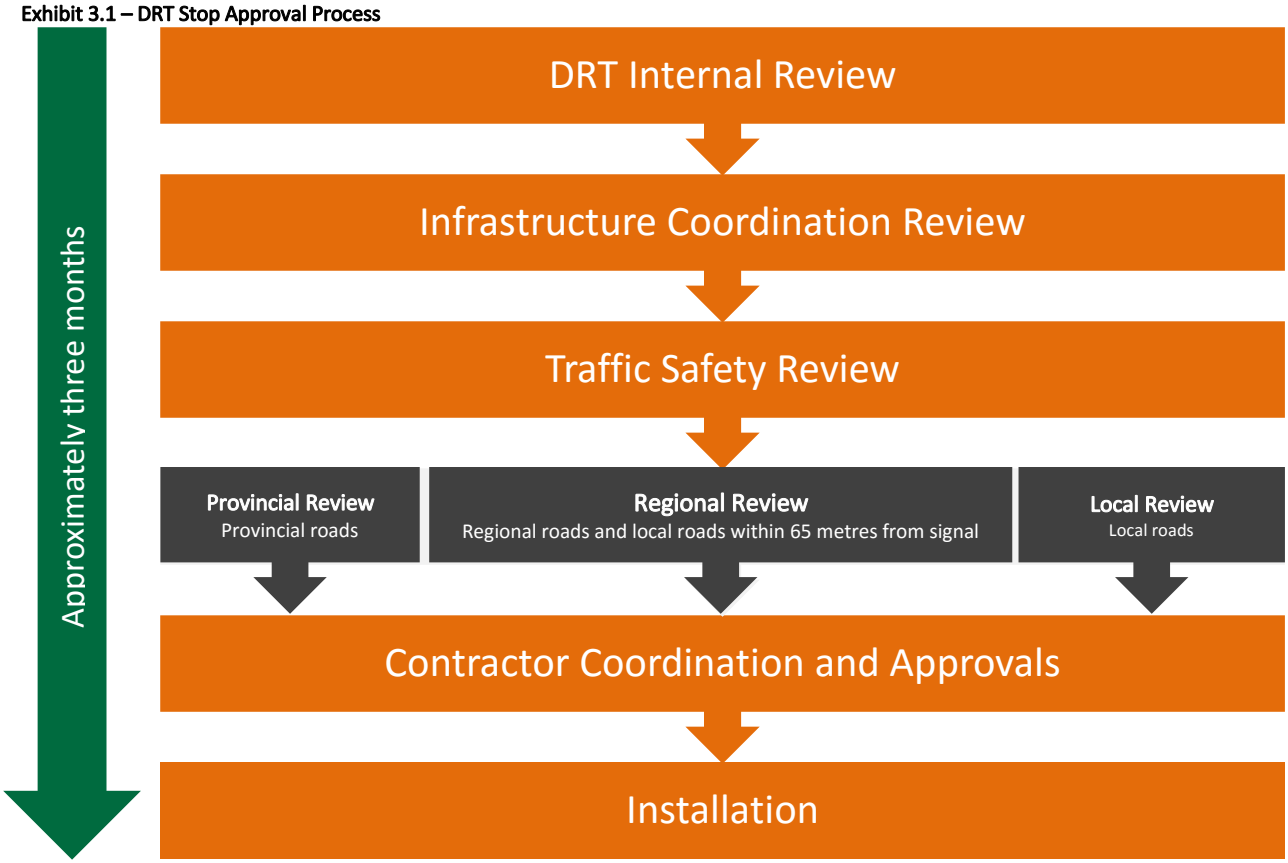
- the installation of a hard-surface (which is conducted primarily in priority sequence according to the number of riders using a stop and subject to property availability)
- the installation of a shelter (which is conducted primarily in priority sequence according to boardings and subject to property 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 4 percent. • **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 percent of residences and businesses are within a 400-metre walk of a transit stop
- 90 percent 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

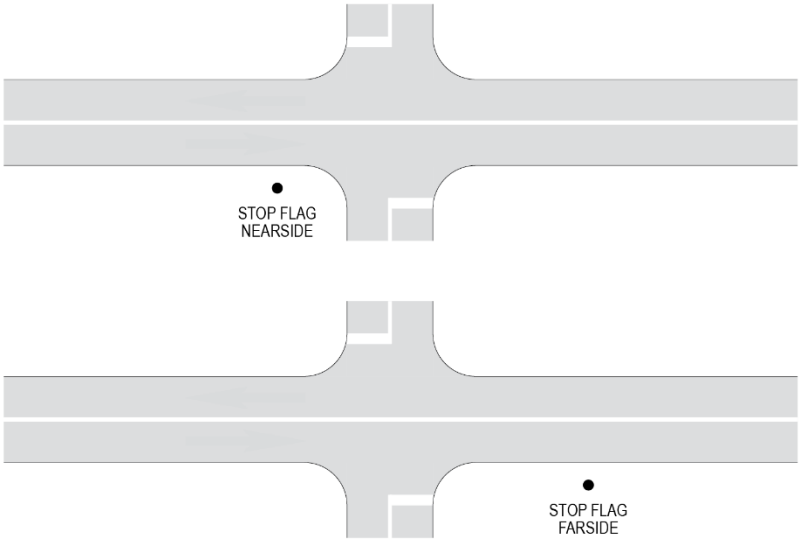
Special considerations can be made to provide better access to major trip generators, such as community facilities, employment and commercial centres, and higher density residential uses– including seniors housing. These land uses can generate more ridership and may justify access to accommodate the 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.

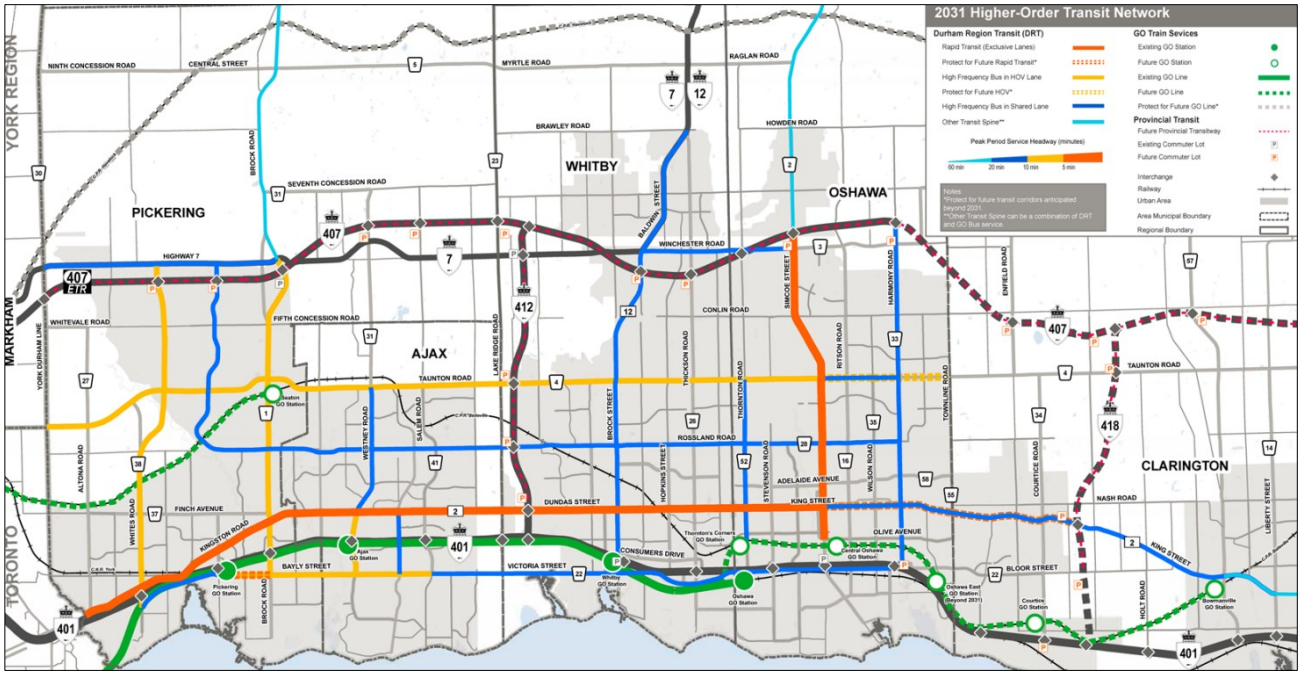
Transit Signal Priority

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.

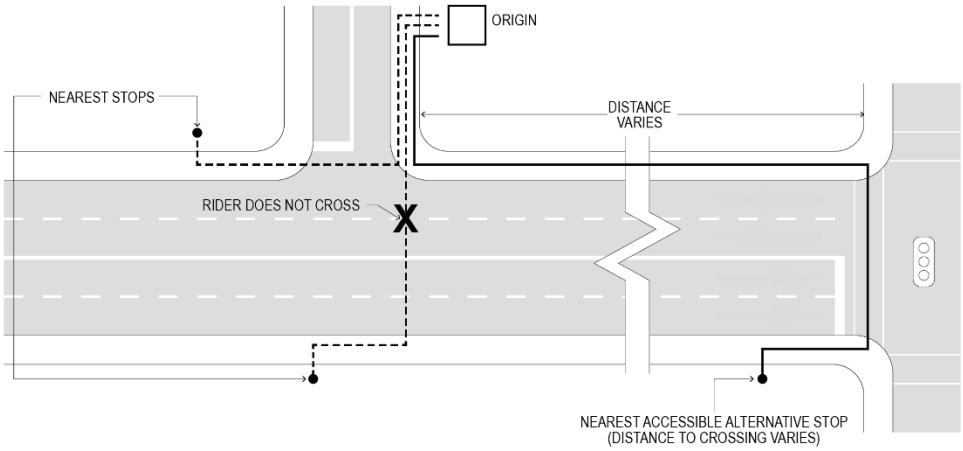
5.3 Stops at Midblock Locations and Uncontrolled Crossings

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.

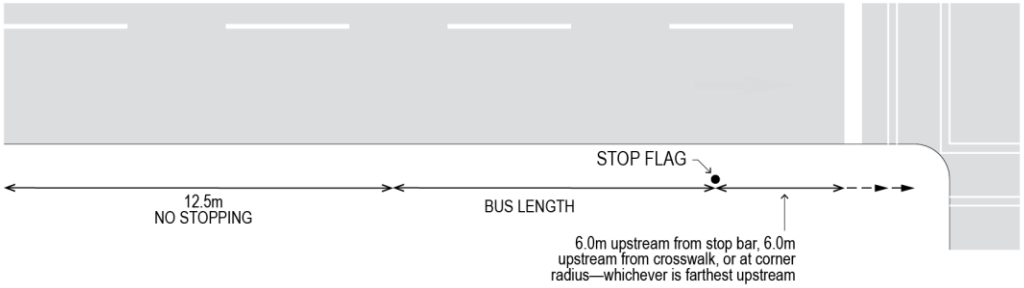
6 Detailed Stop Location Guidelines

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

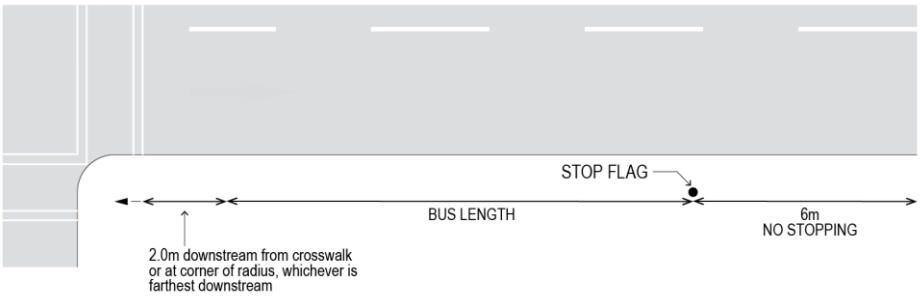
Nearside stops, other than those at stop signs (see section 5.2.2), should be positioned so that they are 6 metres upstream of the crosswalk or stop bar, whichever is farther upstream. If that would place the stop downstream beyond the straight edge of the curb, the stop should be located where the corner 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 2-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

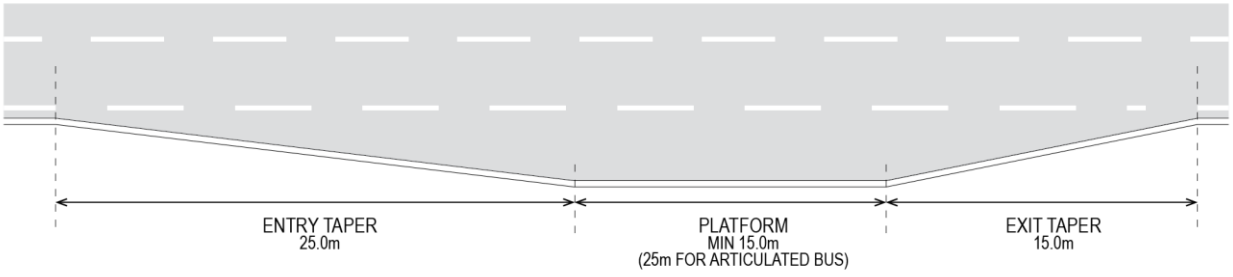
A bus bay is a designated area on the side of a roadway where bus can pull out from the flow of traffic. When placed at an intersection, full bus bays (distinguished from open bus bays) are typically placed farther from intersections, which:

- 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 1 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

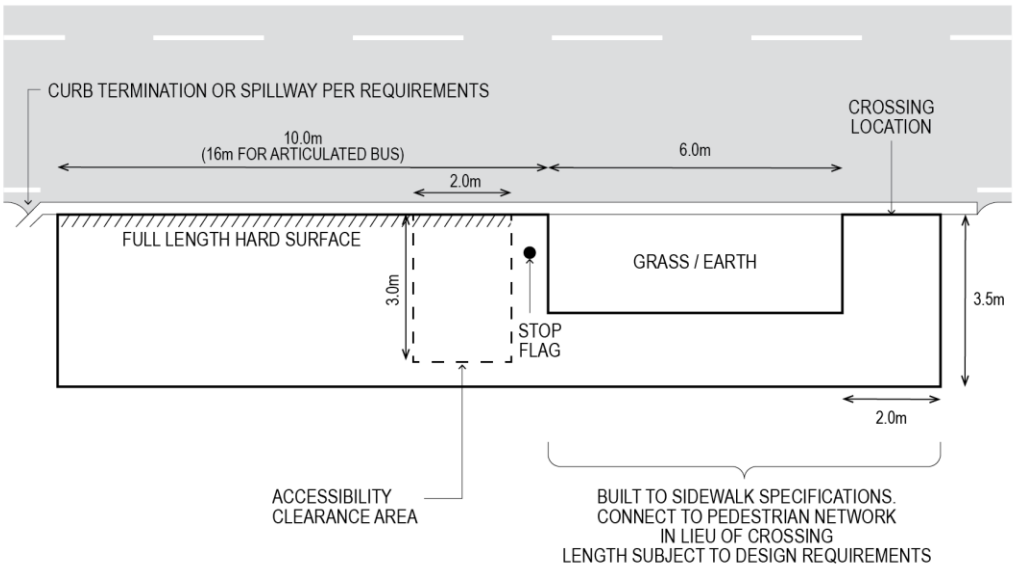
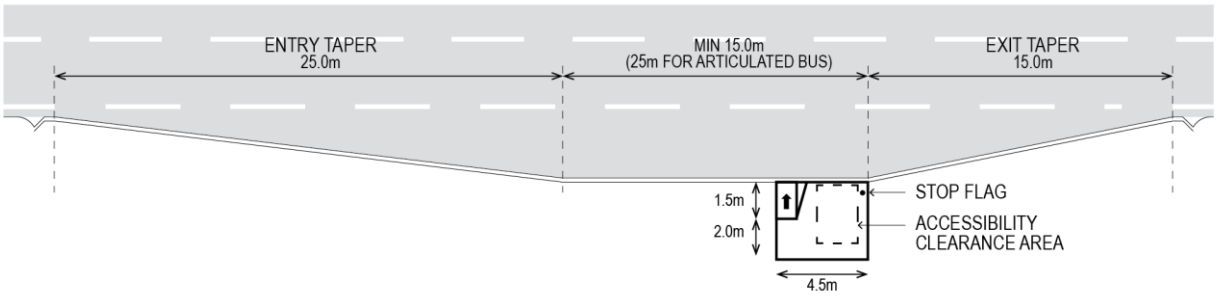


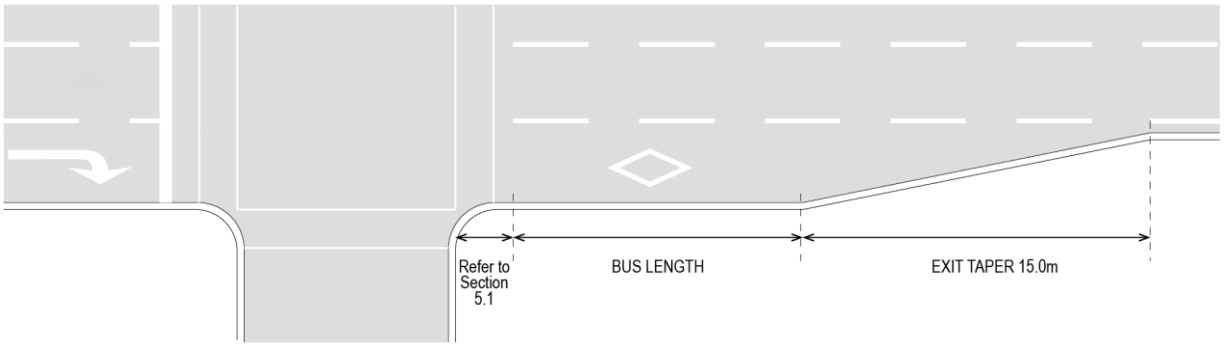
Exhibit 6.6 – Stop Located on a Rural Cross Section at an Uncontrolled Intersection or Midblock



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



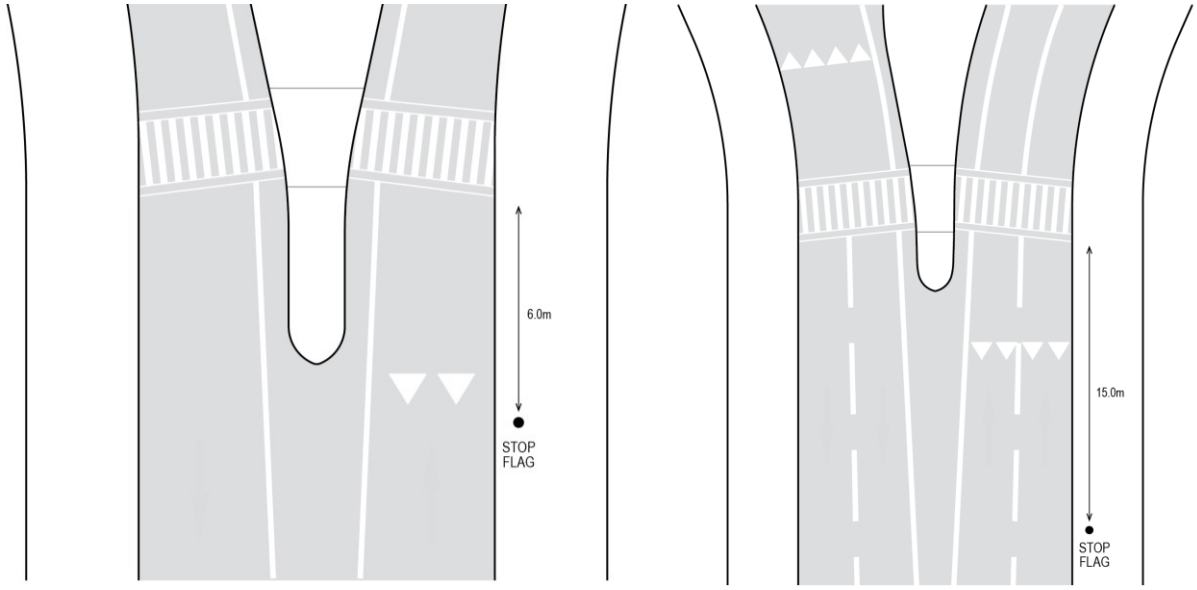
An open bus bay concept is depicted in Exhibit 6.7. Generally they conform to the design specifications of full bus bays; however, an open bus bay has the entry taper omitted and is located nearer to the intersection. The open design allows buses to pull directly into the stop, reducing the overall length 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

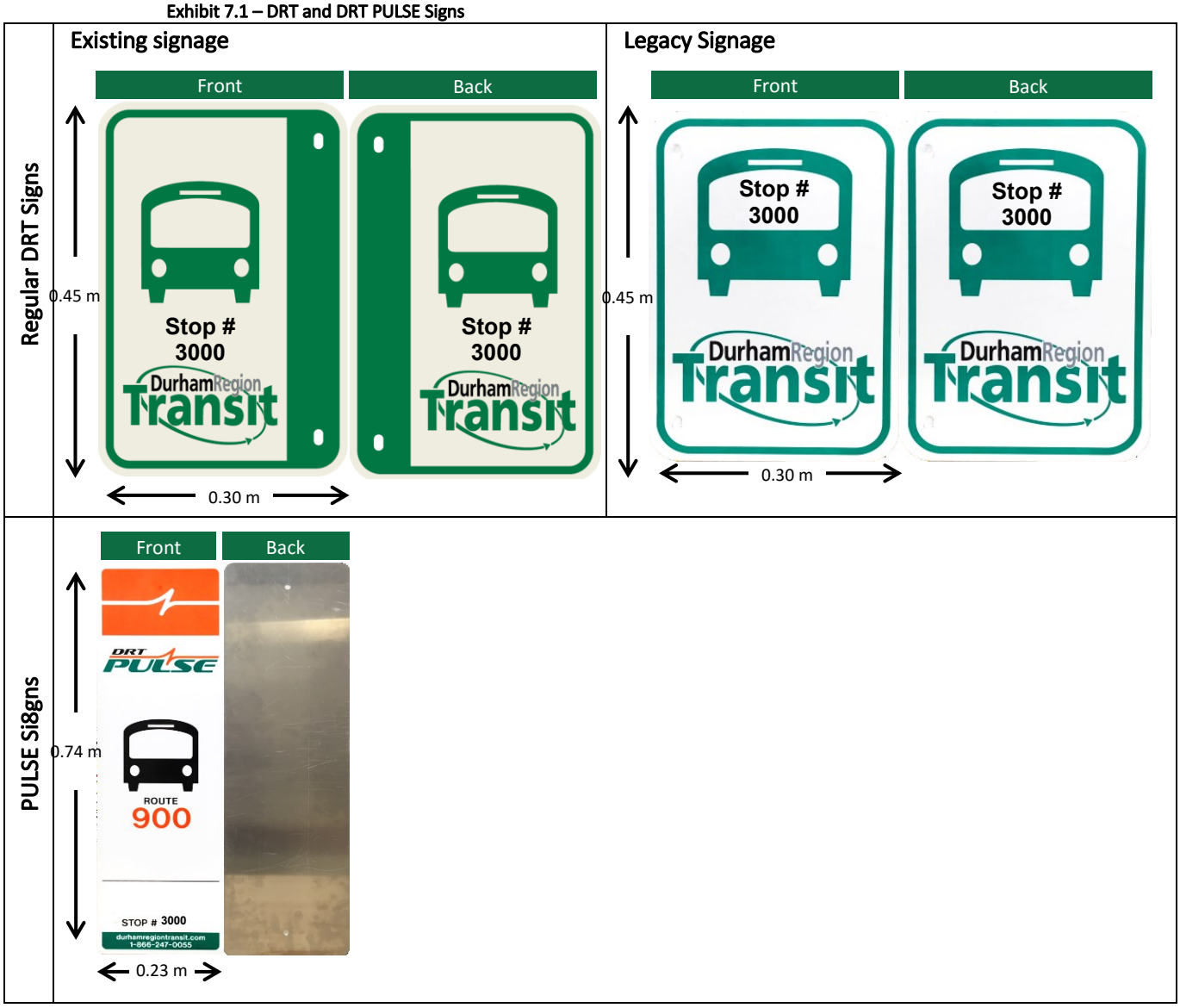
A stop marker is important component for different users:

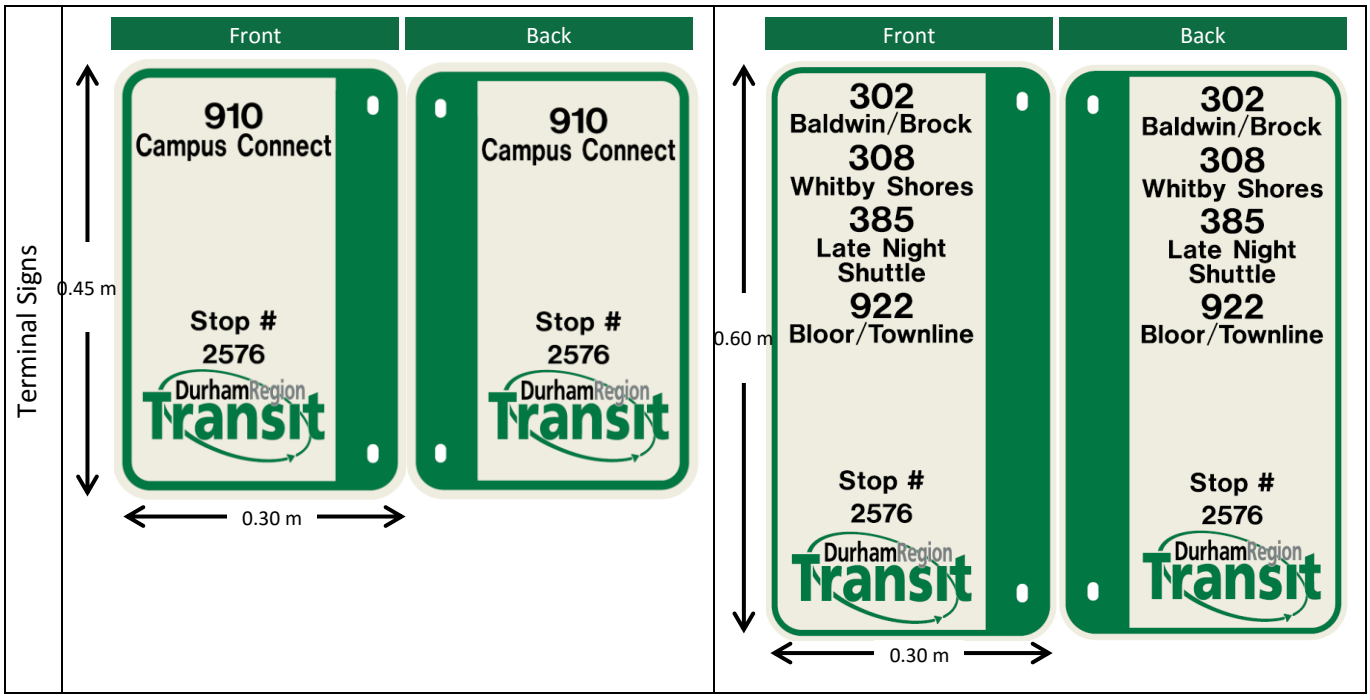
- **Passengers** – A distinctive and readily identifiable transit stop marker is required to help passengers identify precisely where to access transit services. It also helps raise awareness of transit services in the community.
- **Operators** – The stop marker indicates to the operators where the 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

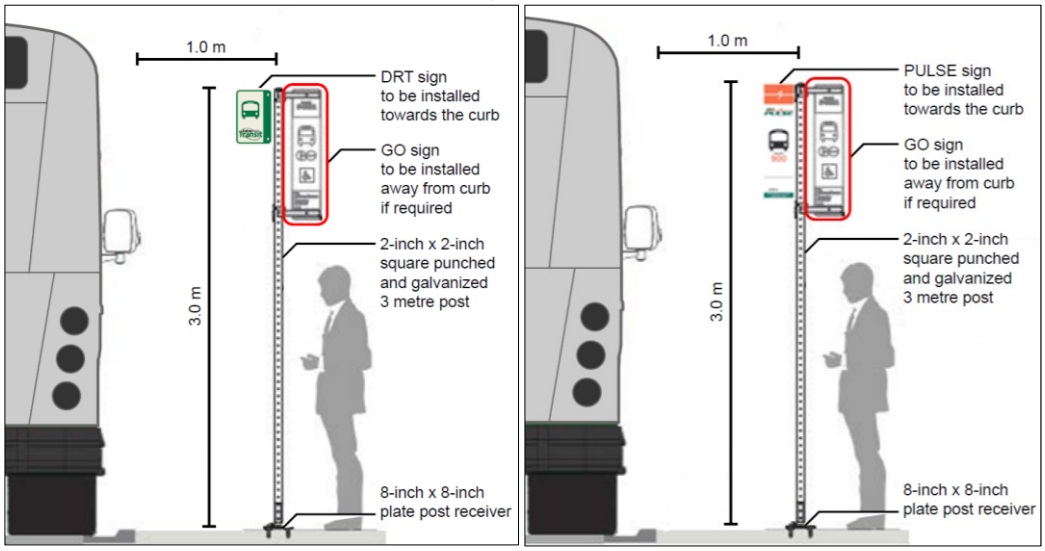




Regular and PULSE signs are to be installed at a typical height of 3 metres flagged towards the roadway. Where the marker must be located closer than 1m to the roadway, it should be flagged away from the curb. Where DRT and GO stops are shared, DRT signs continues to be flagged towards the roadway, while GO signs are installed away from the road.

The signs should be installed on a square 2-inch by 2-inch square punched and galvanized post. The post should be installed at the most downstream part of the stop pad, 1 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 2 metres wide and ideally 3 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)

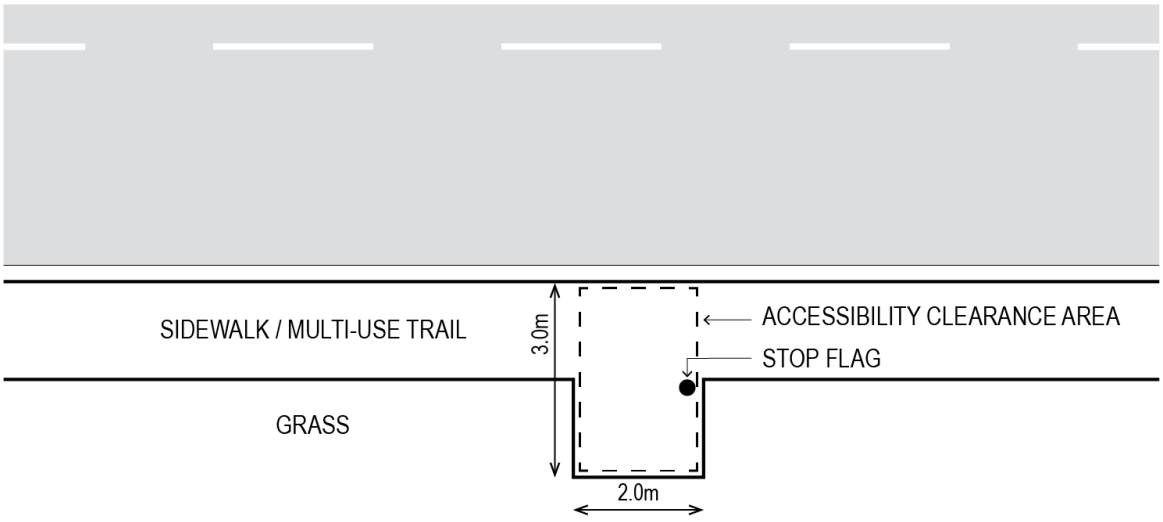
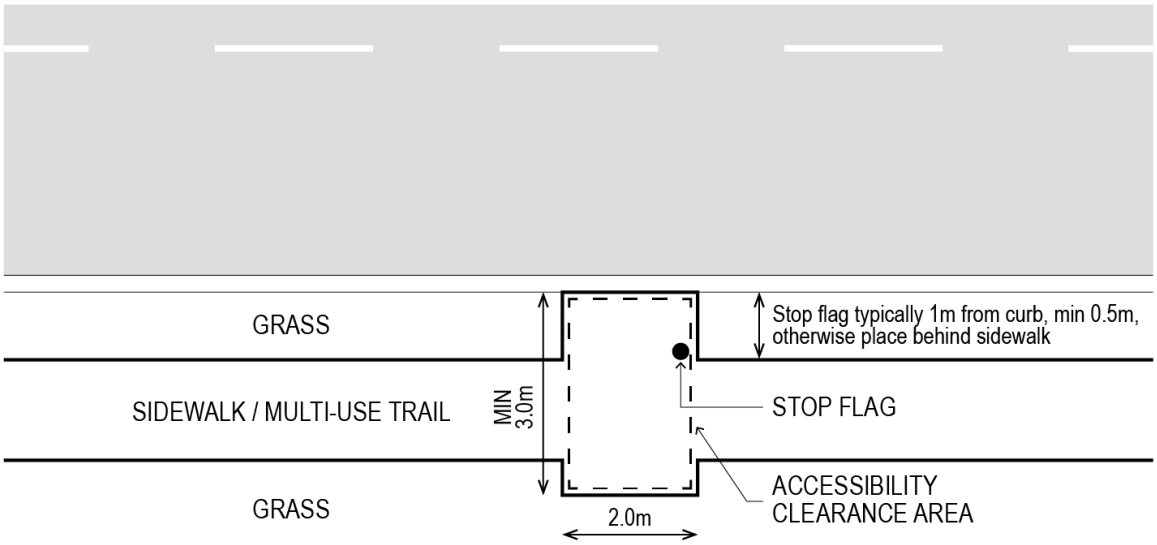


Exhibit 7.4 – Concept of a Stop with Basic Infrastructure (Sidewalk separated from curb)



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

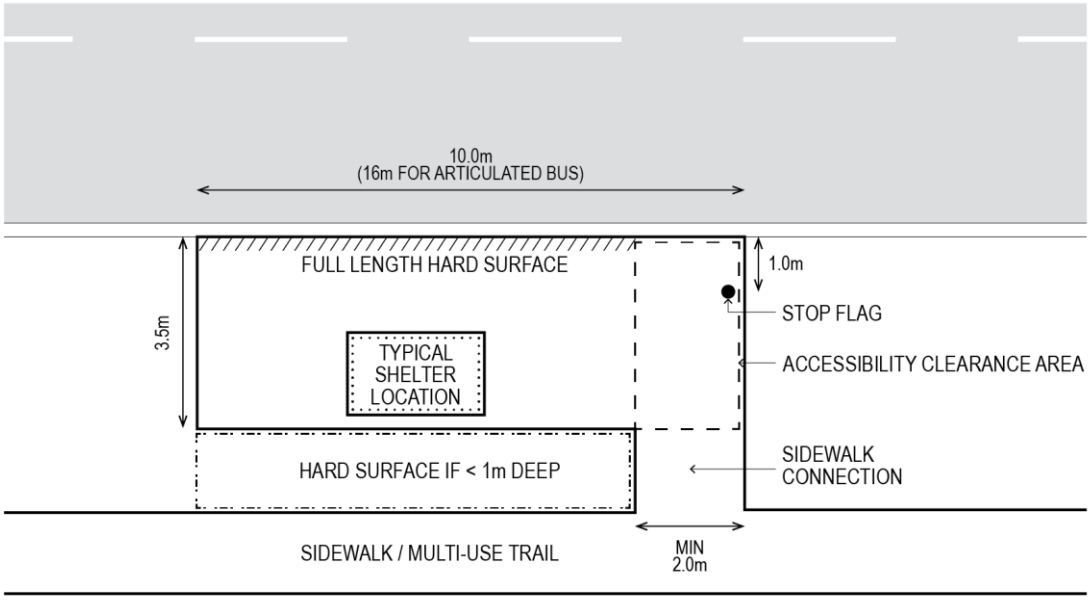
Waste receptacles support guideline principles to ensuring DRT stops support community compatibility. Priority for waste receptacles will be made at stops with large volumes of boarding and alighting passengers, as well as those located adjacent to major commercial establishments where a larger volume 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.

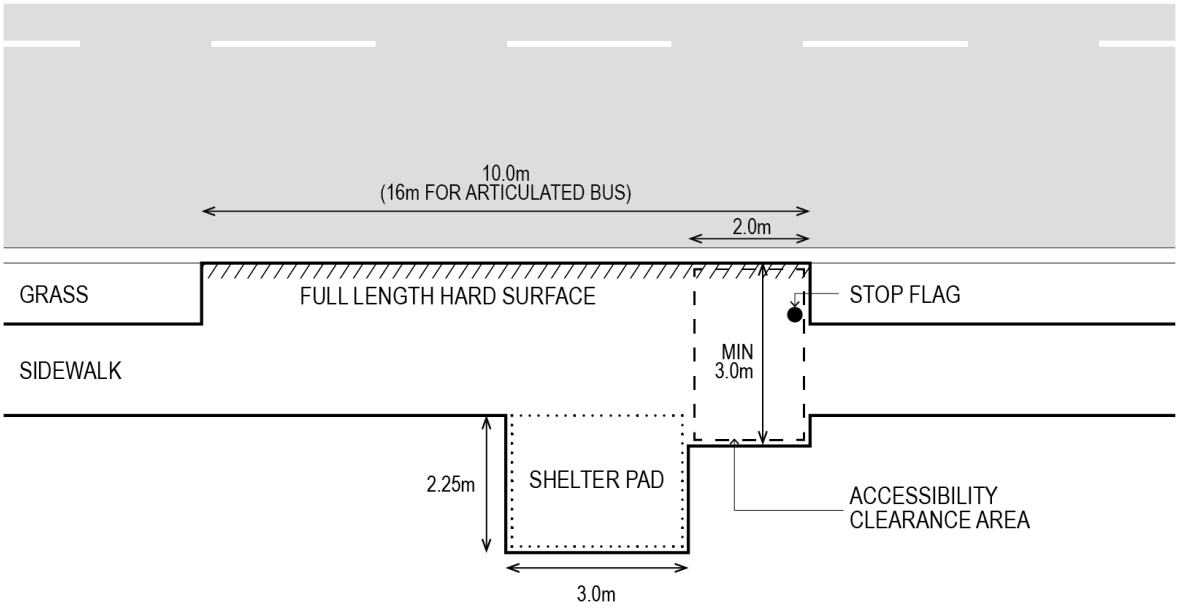
Exhibit 7.5 – Typical Concept of Bus Stop with Additional Infrastructure (Boulevard width ≥ 3.5 metres)



Boulevard Width Less than 3.5 metres

For stops with boulevard widths less than 3.5 metres, the accessibility clearance area must maintain a 3-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.

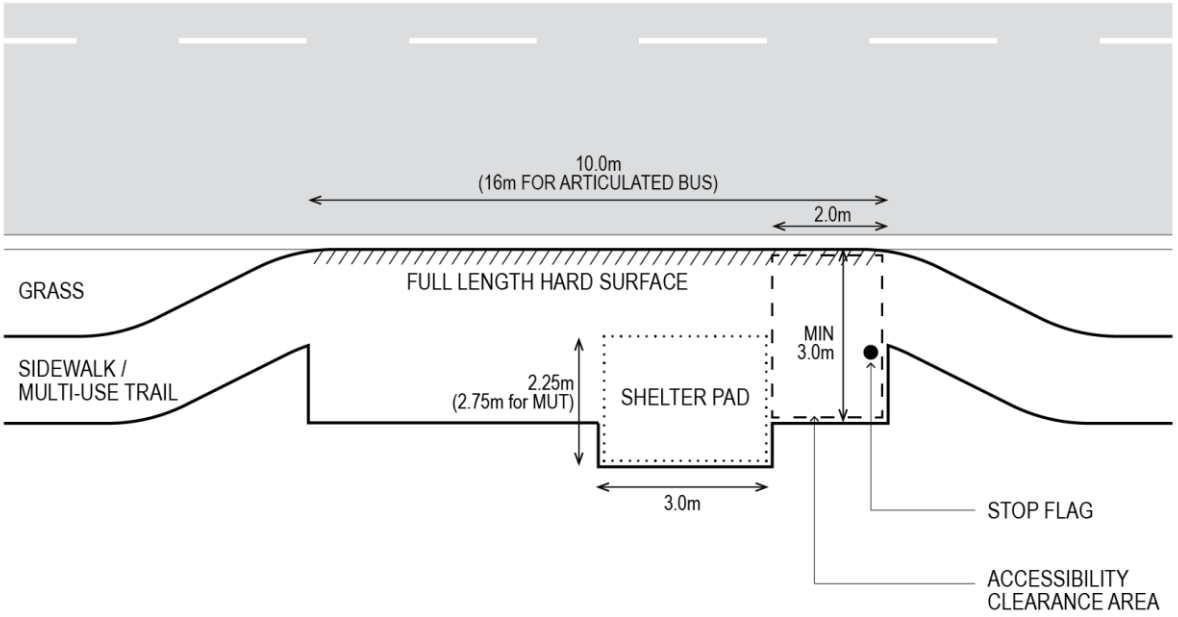
Exhibit 7.6 – Typical Concept of Bus Stop with Additional Infrastructure – Boulevard width < 3.5 metres



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