Appendix A: GRT Bus Stop Guidelines

GRAND RIVER TRANSIT BUS STOP DESIGN GUIDELINES

February 2024

Region of Waterloo

GRT GRAND RIVER TRANSIT

Document Information

Owner	Region of Waterloo
Prepared by	Arcadis IBI Group
Report Title	Grand River Transit Bus Stop Design Guidelines
DOCS #	4452373
Version	2024.01 - February 2024
Reviewer	Shen-Hao Chang, Supervisor, Transit Development Yige Tong, Principal Planner, Transit Development
Authorization	Doug Spooner, Director, Transit Services Blair Allen, Manager, Transit Development
History	2024.01 – February 2024 – Original Version

TABLE OF CONTENTS

List of Figures

Cover photo source: Arcadis IBI Group

1 Introduction

1.1 Purpose

Bus stops are essential components of the transit customer experience; they are the first and last touchpoints on a customer's transit journey. The improvement of transit stops and customer waiting areas is therefore a key priority for transit systems across Canada.

Grand River Transit's (GRT) Bus Stop Design Guidelines ("the Guidelines") provide direction for those involved in the planning and design of on-street transit stops and amenities in Waterloo Region ("the Region"). The Guidelines serve as a toolkit for decision-making that balances the needs and expectations of transit customers, bus operations, and other road users. They outline clear, consistent, and contextual guidance for a variety of stop types with reference to accessibility, physical constraints, and supporting land uses. The Guidelines provide recommendations for what bus stop infrastructure should look like to align with the goals of the Region. However, certain stop contexts may warrant a deviation from the recommendations outlined in the Guidelines (i.e. limited curb space and other unique circumstances). The Guidelines should be used with an understanding that flexibility and professional judgement should be exercised on a case-by-case basis.

The Guidelines reflect current and emerging conditions in Canadian transit and transportation more broadly and aim to help the Region's transit network function more effectively.

Source: Arcadis IBI Group

1.2 About Waterloo Region & Grand River Transit

The Region of Waterloo (“the Region”) is a two-tier municipality located in the heart of southwestern Ontario, consisting of the cities of Kitchener, Waterloo and Cambridge, and the townships of Wellesley, Woolwich, Wilmot, and North Dumfries. Featuring a mix of urban and rural communities and a flourishing technology sector, the Region is one of the fastest-growing areas in Ontario. It has a population of over 620,000 people, which is projected to grow to over 920,000 by 2051.

A high-quality, efficient transit system is key to fostering and sustaining the economic, social, and environmental conditions that contribute to the Region’s success. Grand River Transit (GRT), formed in 2000, provides these essential services in the Region. GRT’s network has grown rapidly in recent years.

As of 2023, GRT operates ION light rail in the Central Transit Corridor in Kitchener and Waterloo, ION Bus rapid transit between Kitchener and Cambridge, and 270 buses on 52 iXpress and local bus routes. These routes serve the Region’s approximately 2,500 bus stops, which act as the interface between the public and GRT.

Policy Background

The Guidelines draw upon and reflect applicable design and engineering standards used by the Region and its seven area municipalities, as well as current research and recommendations from transit experts, including (but not limited to):

- the Institute of Transportation Engineers (ITE);
- the Canadian Urban Transit Association (CUTA);
- the Transportation Association of Canada (TAC); and,
- the National Association of City Transportation Officials (NACTO).

This document and the Region of Waterloo’s Wayfinding Strategy provide system-wide standards for design and wayfinding for transit users in the Region, complementing guidance outlined in GRT’s 2017-2021 Business Plan, Regional Corridor Design Guidelines, and the Regional Transportation Master Plan 2041. The Guidelines have also been informed by the Accessibility for Ontarians with Disabilities Act (AODA) and its Integrated Accessibility Standards, and meet all applicable Regional engineering standards.

The Guidelines are designed to support the goals and objectives included in local municipal transportation master plans, active transportation master plans, and complete streets policies. These plans and policies are all designed to support and enhance the use and prominence of sustainable transportation in the Region. GRT has an important role to play in achieving this outcome, both by providing sustainable transportation services and by supporting access to transit via active modes through stop design and amenity provision.

Designing for Emerging Trends

In tandem with local population, economic, and transit network growth, new forms of mobility are growing in prominence throughout the Region. On-demand transit, ride-hailing (also known as “auxiliary taxis” in the Region of Waterloo), autonomous vehicles, and micromobility (referring to a family of emerging, shared transportation technologies) are just a few examples of new developments in urban mobility that present opportunities to improve traditional transportation design approaches in the Region. Figure 1-1 summarizes some of the changes to the transit context in the past two decades.

Considering these new developments along with an uncertain COVID-19 pandemic recovery, the Guidelines serve as a living document that will be updated as conditions evolve. The Guidelines are intended to foster collaboration between all stakeholders with the goal of continually improving processes and decision-making criteria not only for designing and implementing bus stops, but also for supporting modal integration and easy access to transit.

Specific areas for future work include, but are not limited to:

- exploring winter maintenance procedural improvements;
- refining pedestrian crossing warrants to better account for context-sensitivity, desire lines, and transit access;
- exploring warrants for additional accessibility enhancements;
- green infrastructure considerations; and,
- curbside and delivery activity management (ride-hailing and deliveries).

Continued collaboration and improvement ensures that the Guidelines help designers and decision-makers produce high-quality bus stops that meet the community’s needs today while accommodating emerging trends and future requirements.

Figure 1-1: Emerging Trends

Much has changed in mobility, technology, and our cities in the past twenty years:

Category	**Past**	**Present/Future**
Amenities	Newspaper boxes at each stop	Wifi hotspots
Customer Information	Payphones with access to transit information	Real-time information displays
Service	Fixed route services and bus stops	Higher-quality waiting environments integrated with the streetscape On-demand services and virtual bus stops based on individual and shared trips
Cycling Amenities	Bike racks	Bike racks, bike share stations, scooter parking, e-bike charging
Shelters	Basic shelters	Solar-powered shelters with lighting and heating
Payment	On-board fare payment / off-board vending machines	Mobility-as-a-Service subscriptions, mobile and open payments
Specialized Transit	Separate specialized and conventional transit systems	Integration of accessible family of transit services
Utilities	Wired electrical connections	Connected and solar-powered amenities

1.3 The Process: How We Got Here

This technical document is a reference source for Grand River Transit and other Regional staff, as well as other municipal staff, contractors, and utility providers who regularly work with bus stops. It encourages consistent standards to be applied in the design, construction, and operation of stops across GRT's service area. The document considers trade-offs and varied interests among different user groups across the Region to design transit stops that are as safe, effective, and efficient as possible.

This document has been developed according to the needs and input of GRT, Regional, area municipality staff with reference to the policy and design documents outlined in Section 1.2. Industry best practices were incorporated through a review of design documents from other jurisdictions and standards from industry-recognized transit research organizations.

Source: Grand River Transit

Key Themes from Internal Stakeholders

- Providing flexibility is important.
- Improving documentation of roles and responsibilities.
- Reflecting operational perspectives from front-line staff.
- Need to update our understanding of customer needs with emerging trends.

What we Heard

As part of the development of the Guidelines, an internal technical stakeholder group was formed to provide expertise, advice, and review. This group included representatives from:

Grand River Transit, including staff from:

- Transit Development (Planning)
- Transit Development (Scheduling)
- Marketing and Customer Service
- Transit Operations
- Transit Maintenance
- On-Street Passenger Amenities

Region of Waterloo divisions, including:

- Transportation Planning
- Corridor Management
- Design and Construction
- Corridor Planning
- Community Planning
- Citizen Services

Area Municipalities

- City of Cambridge
- City of Kitchener
- City of Waterloo
- Township of Woolwich
- Township of Wilmot
- Kitchener Utilities
- Enbridge Gas

Two workshops were held:

- The first workshop (fall 2021) discussed principles of bus stop design, and input was received on key issues, processes, and opportunities.
- The second workshop (winter 2022) discussed the draft guidelines, and input was received on stop classification, location and amenities.

The Project Team also engaged the Grand River Accessibility Advisory Committee (GRAAC) in December 2021 to understand needs and opportunities and to receive advice on how to develop guidelines that maximize accessibility. Members of the committee were involved in the review of the draft guidelines in November 2023.

1.4 How to read the Guidelines

This document is organized into nine chapters, arranged into four levels of increasing specificity in both geography and design detail. Figure 1-2 provides an overview of the document structure and the questions each section seeks to address.

Figure 1-2: Document Structure

Chapter 2
Guiding Principles

What are the objectives that we are trying to achieve?

What are some approaches to achieving these objectives?

Chapter 3
Operating Requirements

What are basic definitions of GRT service?

What are the operational requirements that need to be met?

Chapter 4
Bus Stop Planning Process

How do we go about establishing a new stop or upgrading an existing one?

Chapter 5
Justification

What warrants and standards are used to justify providing or improving a stop?

What are the stop spacing guidelines?

Chapter 6
Classification

What are the different types of bus stops?

How do we choose the type of bus stop to be implemented?

Chapter 7
Location, Placement and Integration

What is the difference between stop “location” and stop “placement”?

What is the difference between stop “location” and stop “placement”?

What should be considered when determining the location of a bus stop?

What considerations determine the optimal placement at a location?

Where a bus stop should be placed relative to other infrastructure, such as active transportation facilities?

Chapter 8
Customer Amenities

What are the potential customer amenities at bus stops?

How do we choose what amenities to include at a bus stop?

What are the basic design requirements?

How will bus stops integrate with other urban amenities and forms of mobility?

Chapter 9
Design Requirements by Stop Class

What are the basic requirements and design for each type of bus stop?

What are special considerations or exceptions to the basic design?

2 Guiding Principles

This chapter outlines the guiding principles, goals, and objectives for the design and implementation of bus stops that support the operation of an attractive, safe, and integrated transit system in the Region of Waterloo. These reflect stakeholder input and broader Regional objectives.

2.1 Goals and Objectives

GRT aims to build a strong transit network to provide sustainable mobility, which helps to manage congestion, reduce urban sprawl, optimize transportation infrastructure, and support the vitality of Waterloo Region.

To support this, the basic function of bus stops is to:

- Express GRT's brand on-street.
- Offer comfortable places for customers to access transit.
- Provide information and amenities to improve the customer experience.

Bus stops also provide opportunities to enhance the public realm and provide integration with other modes of mobility.

In support of these functions, the Bus Stop Design Guidelines are framed around the following system **goals**, namely to provide:

- A **safe & integrated** transit system.
- An **accessible** transit system.
- A **sustainable** transit system.
- A **customer-focused** transit system.

Additional **objectives** and **potential approaches** are found under each goal in the following sections. Objectives refer to "goals within a goal," while potential approaches should be understood as generalized actions that could be taken to make progress towards the objectives and goals.

Connecting goals with the guidelines

Throughout the document, the following icons will be used to highlight any recommendations, elements, or approaches that are directly applicable to achieving one of the four system goals.

			
A **safe & integrated** transit system	An **accessible** transit system	A **sustainable** transit system	A **customer-focused** transit system

A Safe & Integrated Transit System

Improving the safety of the transit system for customers and other roadway users is a key goal for these Guidelines. Bus stops are a transition point between modes – customers roll, walk or bike to the stop to board the bus. The Guidelines recognize that customers are more vulnerable road users while accessing and using a bus stop, and provide strategies and considerations to improve their safety. Continuing to make the Region's streets a safer and more attractive place to walk, cycle, take transit, and drive for those of all ages and abilities is a priority for the Region and its partners.

Objectives:

	Encourage the safety, comfort, and convenience of transit customers of all ages and abilities at bus stops and pathways.
	Work collaboratively between planning, engineering, traffic, and operations staff (among other Regional and area municipal groups) to emphasize efficient, effective, safe transit design and operations.
	Integrate stops and cycling infrastructure to effectively manage space in the roadway and reduce conflicts among modes.

Potential Approaches:

- Locate bus stops adjacent to intersections, crossings, and/or direct pathways to near-by destinations.
- Develop and refine processes to improve year-round access to stops and station facilities.
- Assess the need for minimum lighting requirements or standards for bus stops

Relates to:

Regional Strategic Plan (2023-2027):	• Strategic Priority 2: Climate Aligned Growth
Regional Transportation Master Plan:	• Strategy 1: Build a transportation network that supports all modes of travel. • Strategy 3: Position the Region for new mobility.
GRT Business Plan:	• Achieve Transportation Master Plan ridership target for 2023 and set foundation to achieve 2031 target.

An Accessible Transit System

Improving the accessibility of bus stops is another important guiding principle behind these Guidelines. Waterloo Region is committed to working towards Ontario's goal of a fully accessible province by 2025 as specified under the Transportation Standard of the Accessibility for Ontarians with Disabilities Act 2005 (AODA). The goal of the guidelines is to identify what makes new or upgraded stops accessible, and GRT's broader goal is to enable customers with disabilities to navigate transit independently, with confidence – embodying universal design.

Objectives:

	Update GRT's standards for accessible design as best practices evolve.
	At minimum, meet the guidance of the AODA and the Integrated Accessibility Standards.
	Prioritize accessible amenities and enhancements at stops where warranted.

Potential Approaches:

- Prioritize stop reviews where accessibility issues are present.
- Design all new bus stops to meet accessibility standards.
- Provide hard-surfaced, all-weather pedestrian links to sidewalks from bus stops.
- Offer alternative ways to get information at bus stops.
- Continue regular engagement with the Grand River Accessibility Advisory Committee.

Relates to:

Regional Strategic Plan (2023-2027):	• Strategic Priority 2: Climate Aligned Growth • Strategic Priority 3: Equitable Services & Opportunities
Regional Transportation Master Plan:	• Strategy 1: Build a transportation network that supports all modes of travel. • Strategy 2: Promote a healthy community.
GRT Business Plan	• Achieve Transportation Masterplan ridership target for 2023 and set foundation to achieve 2031 target.

A Sustainable Transit System

While transit is inherently a more sustainable mobility option compared to private automobiles, there are opportunities for transit to further reduce its impact and provide more sustainable service and infrastructure. Beyond vehicle electrification to reduce carbon output, sustainability can be integrated into bus stops and the streetscape through green design techniques.

Objectives:

Integrate relevant green design features related to streets and facilities.
Design stops and amenities to be resilient to a changing climate.
Design stops that are flexible for future needs, such as bus electrification.

Potential Approaches:

- Work with Regional and municipal partners to ensure integration of bus stop requirements in streetscape standards and sustainable design guidelines.
- Encourage the use of durable, sustainable materials and innovation in environmental design in the procurement of bus stop amenities.
- Integrate solar panels and other energy collection technology at stops where conditions warrant.
- Consider protection for electric bus recharging requirements at end-of-line bus stops.

Relates to:

Regional Strategic Plan (2023-2027):	• Strategic Priority 2: Climate Aligned Growth
Regional Transportation Master Plan:	• Strategy 1: Build a transportation network that supports all modes of travel. • Strategy 2: Promote a healthy community.
GRT Business Plan:	• Achieve Transportation Masterplan ridership target for 2023 and set foundation to achieve 2031 target. • Support regional growth and urban intensification goals.

A Customer-Focused Transit System

Transit makes cities great by improving connectivity and liveability. Designing for the customer is important for building a transit system that is attractive and straightforward. Design needs to consider different types of trips and day-to-day needs of transit customers – for example, places to rest bags off the ground at stops near grocery stores or prioritizing real-time information displays at stops at transfer locations.

Objectives

	Make transit more comfortable, convenient, and attractive to existing and prospective regular and occasional customers.
	Increase service efficiency by reducing travel times and speeding up boarding.
	Integrate an equity and accessibility lens into the planning and design of bus stops.

Potential Approaches:

- Continue to improve GRT's stop prioritization tool to encourage the equitable and effective implementation of stops, amenities, and upgrades.
- Provide effective wayfinding and passenger information at bus stops to improve the ease of customer's journeys.
- Improve GRT's visibility in the community through the development of attractive, highly-visible facilities that are well-integrated with adjacent land uses.

Relates to:

Regional Strategic Plan (2023-2027):	• Strategic Priority 2: Climate Aligned Growth • Strategic Priority 3: Equitable Services & Opportunities
Regional Transportation Master Plan:	• Strategy 2: Promote a healthy community. • Strategy 3: Develop a frequent transit network.
GRT Business Plan:	• Support implementation of LRT through seamless integration of LRT and bus service. • Improve productivity, service quality and financial performance.

3 Operating Requirements

Transit systems require associated infrastructure that is designed to encourage safe and efficient operations. This section describes GRT operating requirements relevant to stop infrastructure, with reference to its fleet of vehicles, and other considerations that are required for transit to operate, such as roadway dimensions and bus lay-bys.

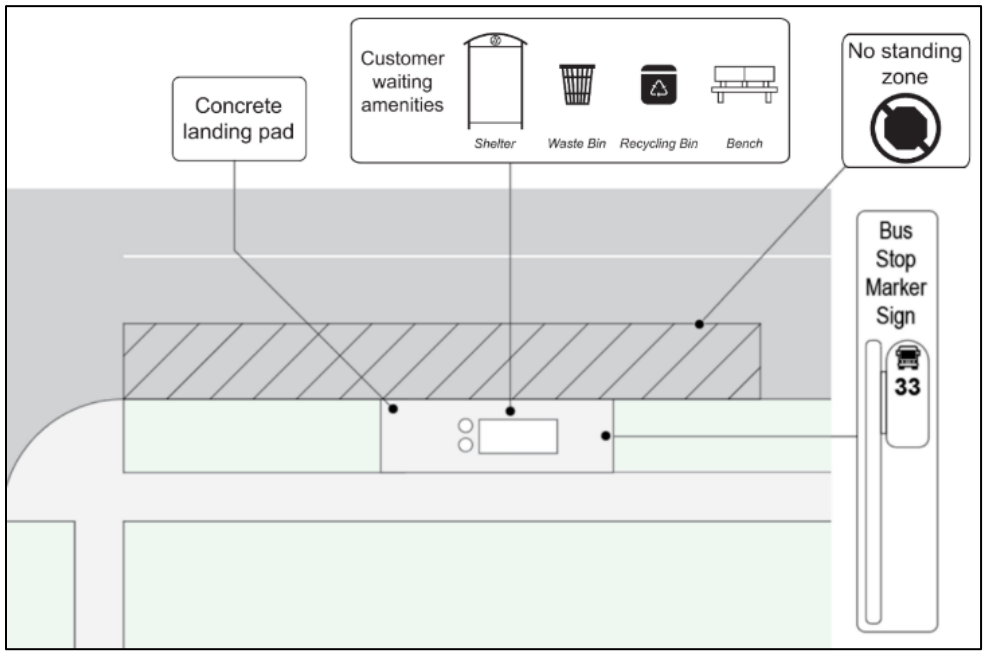
3.1 Basic Components of Bus Stops

A bus stop zone includes the customer waiting, boarding and alighting area(s) on the sidewalk and boulevard, along with the area of the roadway where parking and stopping is prohibited to provide clearance for the bus to pull in and out of the stop. Key components of a bus stop can/may include (see Figure 3-1):

- A **landing pad** providing a hard surface for accessible customer boarding and alighting.
- A **stop marker**, which indicates the presence of a bus stop to customers.
- A **no-standing zone** providing clearance for a bus to safely enter, serve, and exit the stop.
- **Customer amenities,** as warranted, such as a shelter (discussed in Chapter 8).

The size and configuration of bus stops can be determined by the stop's classification, design vehicle, available space, the presence of utilities (e.g. electrical distribution, stormwater collection, etc.) and other conditions.

Figure 3-2: Component of a bus stop



3.2 Accessibility

Accessibility is a core principle of transit provision. On a broad scale, transit provides mobility for people; maximizing accessibility means removing physical and other barriers for all people.

GRT is committed to:

- Continuing to develop accessible transit services and infrastructure; and,
- Working to ensure facilities, stop locations, and connections are barrier-free.

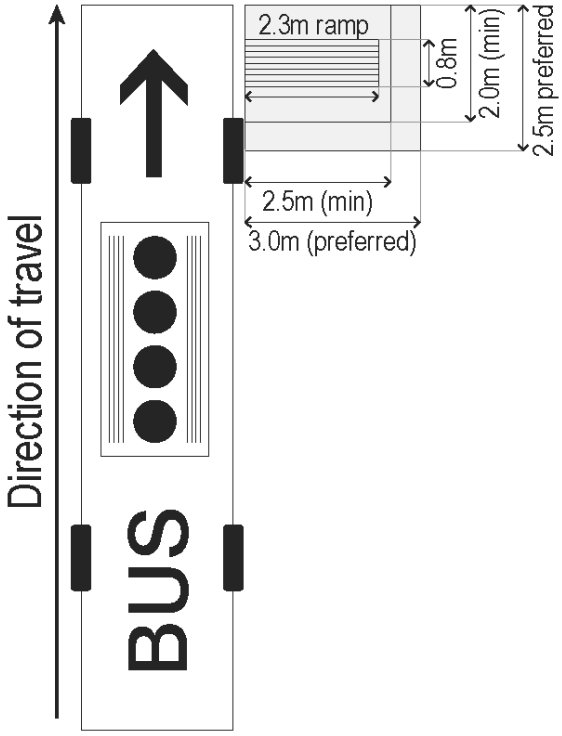
GRT continues to progress towards a fully accessible transit system. All vehicles are accessible, with low-floor and ramp-equipped buses and light rail vehicles featuring on-board stop announcements, accessible multi-purpose spaces, and priority seating.
Improving bus stop design is a critical aspect of making the transit system accessible:

- As of 2023, more than 72% of bus stops have hard-surfaced landing pads and clear space for boarding and alighting.
- While most bus stops are accessible, some are not, either due to physical constraints or surrounding context, such as in rural areas.
- Of the 28% of bus stops not designated accessible, approximately half of those have other accessibility constraints other than the lack of a landing pad, such as a lack of sidewalk connection, obstructions, and steep grades.

These Guidelines draw upon the latest research and best practices in accessible stop design and aim to provide recommendations to improve the level of accessibility at all stops, and those that do not currently meet standard accessibility requirements. Figure 3-3 shows the minimum accessible boarding clearance area and a standard wheelchair ramp deployment.

The application of the Guidelines through service expansion, capital projects, development review, and road projects will improve the proportion of fully-accessible stop locations over time.

Figure 3-3: Standard Accessibility Requirements



Core criteria for accessible stops include:

- A concrete pad flush with the curb that allows for level boarding or deployment of the accessible ramp, with a minimum clear area of 2.0 m (minimum) to 2.5 m (preferred) in width (parallel to curb) and 2.5 m (minimum) to 3.0 m (preferred) in length (perpendicular to curb) at the head of the stop, which can be a combination of concrete pad and sidewalk in constrained locations (see Section 8.3).
- A horizontal cross slope of 2% or less.
- Meeting other requirements set out in updates to the Accessibility for Ontarians with Disabilities Act (AODA) and the Integrated Accessibility Standards Regulation (IASR).

Key design considerations for accessible stops include:

- Ensuring that boarding and alighting areas, connecting pathways, and amenities such as shelters are clear of obstructions.
- Encouraging accessible connecting pathways from bus stops to adjacent destinations.
- Identifying potential hazards and conflicts and providing mitigating measures such as railings, separation, and tactile strips where appropriate.

Other Accessible Features

- **Tactile Strips** provide guidance for customers by indicating the location of a boarding / alighting area or conflict zone using different material treatments or raised domes. They are typically in a vibrant red, yellow, or rust colour that allows the stopping location to stand out for customers with limited vision who may also be using a cane.
    - GRT currently uses tactile strips on ION light rail and ION bus platforms for platform edge delineation.
    - Some bus stops co-located with cycling infrastructure have tactile strips where customers are required to cross.
    - The Region of Waterloo is currently reviewing the use of tactile strips in relation to various types of infrastructure.
- **Tactile stop markers,** which some transit systems have included on bus stops and poles to indicate the routes served by the stop in raised braille lettering. These are not currently in use at GRT but may be considered in the future.
- **Colour contrast**, of signage and bus stop elements, can be an important tool to assist riders with vision impairments.
- **Other accessible features** detailed in Chapter 8 include:
    - Customer information and security amenities.
    - Shelters and benches.

3.3 Vehicle Dimensions

Grand River Transit operates bus service with the following standard vehicle types:

- Conventional (standard) bus
- Articulated bus (future)
- Midibus
- Minibus

These are referred to in this document as **design vehicles** in relation to design elements for bus stops (e.g. landing pads). Where a design vehicle is cited, a bus of that size must be accommodated at minimum at the stop type in question. Conventional buses are the common vehicle type in GRT's fleet and are therefore the most-used design vehicles in the network.

Conventional (Standard) Buses

Source: Grand River Transit

GRT currently operates conventional buses manufactured by Nova Bus and New Flyer that measure 12.2m (40') in length and 2.6m in width, with side mirrors increasing the operating width of the bus to 3.1m. Turning radii varies from 40'10" (12.5m) for Nova Bus vehicles to 44' (13.4m) for New Flyer vehicles. The distance between the front and centre doors are approximately 7m, and the distance between the centre and rear doors are approximately 6.5m.

Articulated Buses

Source: Grand River Transit

Articulated buses will be added to GRT's fleet in the future and will be used on routes with higher levels of demand. Articulated buses are generally up to 18.9 (62') in length and 2.6m in width, with side mirrors increasing the operating width to 3.1m. The turning radii for standard articulated buses is 44'8'' (13.61m).

Midibus

Source: Grand River Transit

Midibuses are operated by GRT on local routes with lower levels of demand, where the capacity of a standard bus is not required and/or in cases where a bus must make tight turning movements that would cause difficulty for a conventional bus. GRT currently operates midibus vehicles manufactured by Vicinity Motor Corporation. Midibuses are approximately 9.2m (30') in length, 2.5m in width (3m mirror-to-mirror) and feature a turning radius of 8.9m.

Minibus

Source: Grand River Transit

Minibuses are used on BusPLUS routes, which feature lower demand than local routes, as well as MobilityPLUS accessible transit service which provides door-to-door service for passengers with mobility needs. Minibuses are cutaway vehicles, based on existing chassis and modified specifically for transit purposes. GRT's busPLUS and MobilityPLUS minibuses are manufactured by Arboc Specialty Vehicles. Vehicle dimensions vary but are approximately 8m in length and 2.5m in width, with side mirrors increasing the operating width of the bus to 3m.

Figure 3-4: Summary of Bus Specifications

Bus Type	Length	Width	Operating Width (mirror to mirror)	Seated Load	Turning Radius (m)
Articulated*	18.9 m	2.6 m	3.1 m	62	13.61 m
Conventional (Standard)	12.2 m	2.6 m	3.1 m	33-35	12.5 m – 13.4 m
Midibus	9.2 m	2.5 m	3 m	24	8.9 m
Minibus	8 m	2.5 m	3 m	19	Varies by Model
*Articulated Bus Specifications are subject to change					

3.4 Service Types

Local

Local bus service comprises the majority of GRT's service network, operating throughout the Region, providing service coverage to residential communities, industrial employment areas, and some major corridors. It is used by customers for short to medium distance trips, or to connect to a rapid transit service for longer trips. The design vehicle for regular bus service is a conventional bus, though regular service may also be provided by an articulated bus if warranted by ridership.

BusPLUS

BusPLUS service is a type of introductory transit service operated in new-growth and lower-demand areas. BusPLUS service often does not run all day when the service is introduced, with service hours added or conversion to local service taking place over time. BusPLUS service generally facilitates shorter trips and connections to other routes. BusPLUS service is typically served by 19-seat minibuses.

iXpress

iXpress service provides limited stop, higher-frequency service on major corridors in Kitchener, Waterloo, and Cambridge. iXpress service facilitates more medium- and long-distance trips compared to local services due to faster average operating speed than local service. The design vehicle for an iXpress route is a conventional or articulated bus, depending on levels of demand.

ION Bus

ION Bus is an express service implemented as a precursor to the introduction of ION light rail service to Cambridge. It provides the fastest and most frequent service of GRT's bus services. ION Bus stops are located near with the location of future ION light rail stations, and connect with a variety of iXpress and local routes to facilitate longer-distance travel. The design vehicle for ION Bus stops is a conventional or articulated bus, although the interior and layout offer greater customer comfort than other buses in the fleet.

MobilityPLUS

MobilityPLUS is GRT's specialized transit service for customers who are unable to use the conventional system. This is an on-demand, pre-booked service that typically provides curb-to-curb journeys; however, there may be instances where MobilityPLUS trips connect to the conventional system at bus stops, terminals, and ION stations.

On-demand (Flexible) Transit

GRT uses on-demand (flexible) transit to serve areas that are difficult to serve with conventional transit. This can include areas with curvilinear streets, a lack of arterial and connector roads, a lack of sidewalks, large building setbacks, physical barriers, low-density neighbourhoods and transit-dependent locations that are not located close to conventional transit (i.e. apartments, medical buildings, large employers, seniors' complexes). On-demand (flexible) transit services can implement a mix of fixed and flexible stops and schedules.

3.5 Service Considerations

Bus Stop Placement

The placement of bus stops relative to intersections (nearside, farside or mid-block) must reference service considerations, such as if transfers occur at the intersection or if transit priority measures are in place, alongside land use and access considerations. This is discussed in detail in Section 7.2.

Layover Locations

Layover is an operational requirement for all transit routes. Layover consists of time in the schedule, usually at the end point of the route, for the bus to stop for an extended period. This extra time improves schedule reliability and adherence, accounting for delays and operator breaks.

Layover generally takes place at terminal facilities or at Major Stops adjacent to ION stations. More information about the Major Stop typology is found in Chapter 6.

Where a bus must lay over at an on-street stop, facilities should be provided where possible to minimize impacts to flows of traffic, such as a lay-by (also known as a bus bay) or other means of stopping outside the travel lane.

Layover locations may also be candidates for future electric bus charging infrastructure. A stop designed for layover should consider protecting or providing space and infrastructure for bus charging.

Source: Grand River Transit

Bus Loops

Where an on-street layover is not provided or not desired, a bus loop would be required to provide space to turn the bus around. These are typically used on transit systems:

- To maximize bi-directional service on a transit route and avoid the need for on-street looping.
- To avoid the need for buses to lay over on streets, which may be challenging where there are sensitive adjacent land uses.
- To more directly serve the destination served at the end-of-line of a route.

Disadvantages of using bus loops include a higher degree of property requirement and higher capital and maintenance costs.
Bus loops must be designed to the TAC B-12 bus turning template, accepted as an industry standard for a conventional bus. Articulated buses typically have a more constrained turning radius, therefore the standard bus turning template is applicable. These details will be confirmed based on GRT's articulated bus procurement.

Transfer Locations

Where large volumes of customer transfers take place, bus stops should be placed to minimize walking distance from intersections and street crossings for customers:

- Stops with the greatest corresponding transfer patterns should be installed on the same corner of an intersection so that customers do not have to cross the street, if possible.
- Where very heavy transfer volumes exist at large intersections, multiple stops to accommodate all transfer patterns may be considered in exceptional circumstances to reduce walking and crossing distances if there is an overall travel time benefit for customers.
- Drop-off only stops are not recommended to avoid customer confusion and the potential for operators to have to manage customer frustration.

Transfer patterns can be determined through a review of data collected from the electronic fare management system.

Timepoints

A timepoint is a mid-route location where buses are scheduled to stop for a longer period of time if arriving ahead of schedule to maintain reliable operations. Timepoints may also be used to provide timed transfers between bus services or ION light rail trains.

To maintain schedule adherence, GRT's preference is to remain in-lane at timepoints unless there is scheduled layover at the location, or if there is insufficient space on-street for a bus to stop without blocking a full direction of travel – for example, on two-lane roadways, or where on-street bicycle facilities would be blocked by a stopped bus. In these cases, lay-bys may be included at timepoints, but this is generally not GRT's preference given the significant space and cost requirements this infrastructure entails (see Chapter 3.7 for more information on lay-bys).

Operator Relief Points

An operator relief point is a timepoint in the network where an operator can take over a bus from another operator without taking the bus to a garage. At a relief point, the operator taking over the bus will walk around the bus to inspect its exterior. This is known as a circle check.

Operator relief points may be in-lane or in a lay-by depending on the roadway in question. Road speed and road width should be considered to promote conditions where operators can safely perform circle checks. If a lay-by is provided, it should be as wide as possible (up to 5m) to allow the operator to safely perform a circle check away from the flow of traffic. Relief points can also feature dedicated break space (including washrooms and dining facilities) where feasible as well.

Virtual Stops

GRT operates on-demand transit service using virtual stops in select areas. On-demand (flexible) transit service requires customers to book trips prior to travelling using a software application or phone call. Flexible transit is used to complement gaps in the conventional transit network, fulfilling trip patterns with lower demand or specialized destinations. Flexible transit may also be used to gradually phase transit service into a community prior to demand levels requiring a BusPLUS or local route.

Virtual stops are bus stops which do not require physical infrastructure at the stop location. This enables the flexible transit service to adapt stop locations to usage patterns in real time. Virtual stops make use of existing infrastructure where possible (such as hard curb-faced surfaces and pedestrian connections) to provide a safe and efficient boarding and alighting environment for customers using flexible transit. The virtual stop location is communicated to the customer while booking their trip, without the need for signage.

Flexible transit service typically utilizes minibuses (and should use even smaller vehicles). At the discretion of GRT, a virtual stop may be warranted for an upgrade to a concrete pad if the stop exceeds a passenger volume of 10 boardings per day, or is identified as a key connection point between routes. This warrant does not apply to pilot projects which are designed to provide temporary flexible transit service.

Temporary Stops

Construction projects or other disruptions may require the use of temporary stops to ensure continuity of transit service at the general stop location. Often temporary stops will be placed on the other side of the intersection, or on an adjacent street. Temporary stops do not require stop infrastructure, other than signage to indicate that it is an active bus stop. Signage should also be placed at the original stop location to redirect riders to the temporary stop. Where possible, temporary stop locations should facilitate accessible boarding.

For longer-term temporary stops that may be required in cases of significant construction projects, GRT should aim to provide stop amenities as warranted, which may include shelters, benches, or customer information.

3.6 Roadway Requirements

Roadways and travel lanes must meet minimum geometric requirements for transit to operate safely and efficiently. This section describes these requirements and provides guidance for changes to roadway and intersection design to support transit services and stop locations.

Minimum Lane & Turning Widths

Conventional buses require the following minimum lane widths to operate safely:

- Travel lanes should feature a preferred width of 3.5m when straight and 5.5m at the apex of a 15m radius curve.
- A minimum straight road width of 3.3m is permitted in constrained urban core areas and lower-speed roadways.
- Conventional/articulated buses require 15m curb radii to support safe turning movements.

On a case-by-case basis, upon review by GRT staff, 3.25m minimum lane widths can be permitted in constrained areas for short distances (under 500m), such as turning lanes. Lane widths below 3.25m create challenges for bus operation due to the increased risk of mirror clipping.

Sidewalk Widths

Sidewalks and pathways connecting to bus stops should provide adequate widths to meet accessible requirements:

- A minimum clear width of 1.5m is required on all sidewalks and paths, as required by the Accessibility of Ontarians with Disabilities Act (AODA).
- At transfer locations, there should be consideration for higher pedestrian volumes with a preferred width of at least 2.1m. A minimum clear width of 2.4m is required where a bus stop is co-located with a sidewalk to allow for the safe deployment of the accessible ramp.

3.7 Bus Lay-bys

Bus lay-bys are dedicated lanes or pockets on the curb side of the road for buses to enter to pick up and drop off passengers and, if required, observe scheduled layovers.
Some of the advantages of bus lay-bys include:

- Stopped buses are clear of travel lanes, maintaining designed roadway capacity.
- Bus stops are highly visible, improving safety at bus stops.

However, there are also disadvantages:

- Buses can have difficulty re-entering the travel lane due to passing traffic, causing delays and impacting schedule adherence (reliance on “Yield-to-Bus” legislation is not generally sufficient).
- Perceived prioritization of automobiles at the expense of buses if they are installed without regard to transit operating needs.
- Additional infrastructure costs and space requirements within the right-of-way.

Bus lay-bys can be considered in the following select locations:

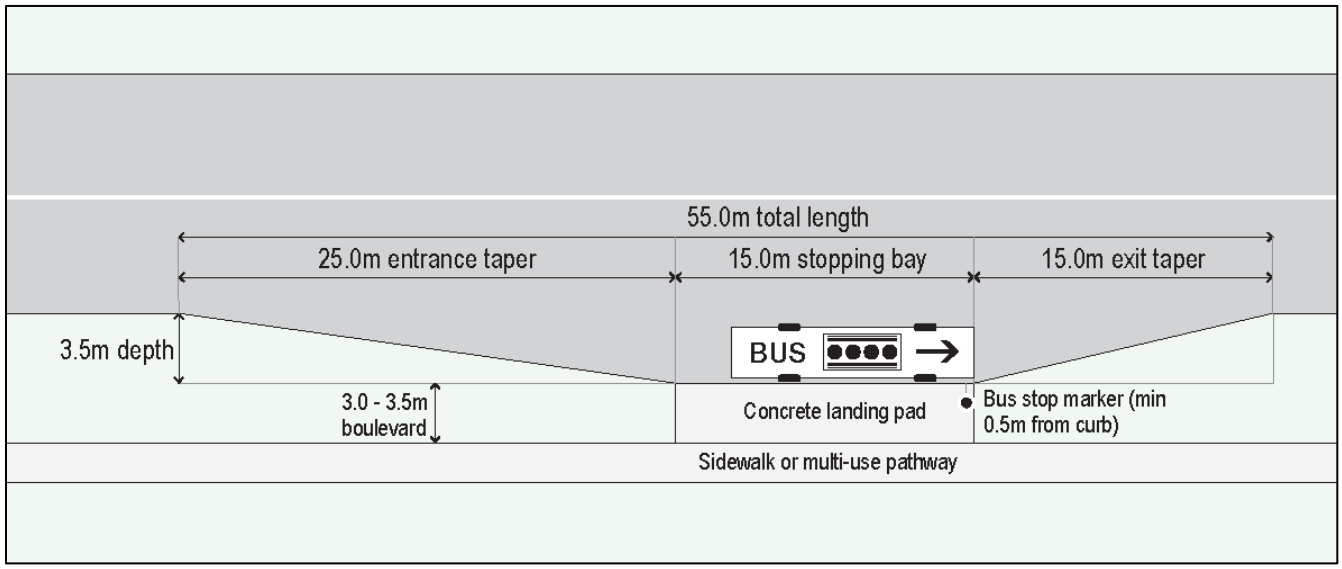
- Stops with schedule layovers and operator relief points.
- End-of-route locations.
- Roadways with posted speeds of 70km/h or greater.
- Bus stops served by multiple bus routes.
- On the exiting end of a roundabout.
- Where stops and lay-bys can be integrated with transit signal priority and queue jump lanes.

The acceleration and deceleration tapers of a bus lay-by must be sufficient to allow buses to safely stop within the lay-by and re-enter the traffic stream after allowing passengers to alight and board the bus. Figure 3-6 show a lay-by in a relatively lower-speed operating environment. A more detailed Lay-By drawing is provided in Appendix A.

Figure 3-5: Lay-by Design Criteria Selection Table

Posted roadway speed (km/h)	Entry taper (deceleration)	Required bay length	Spacing between buses	Exit taper (acceleration)
60 and under	18 m	15 m conventional 22 m articulated	6 m (independent departures only); 8-11 m (independent arrivals and departures)	10 m
Over 60	25 m	15m conventional 22 m articulated	6 m (independent departures); 8-11 m (independent arrivals and departures)	25 m

Figure 3-6: Typical Bus Lay-by Dimensions (Conventional) 60 km/h and Under Roadway.



4 Bus Stop Planning Process

This chapter provides an overview of processes for managing implementation, changes, and upgrades to GRT's bus stops. Process summaries were developed based on GRT's current experience and procedures and with the input of other stakeholders. The primary goal of this process documentation is to:

- Document and provide a clear, mutual understanding of responsibility at each stage of the bus stop design and implementation process.
- Encourage consistency, predictability, and transparency in the bus stop planning process.

Bus stop planning processes include:

- New stops in subdivisions and stemming from development applications (as enabled under Section 5.3 of the Regional Official Plan 2015).
- New stops implemented in response to new or revised GRT services.
- New stops or changes to existing stops as part of road reconstruction projects.
- Stop removals and consolidations.
- Temporary stops in response to construction or other detours.
- Stops upgrades in response to internal or external triggers.

Clear communication between different jurisdictions and different groups is essential for achieving the goals and objectives outlined in this guidelines document. It is important to note that the processes described in this document provide detail primarily about GRT's role in stop improvement. The Guidelines acknowledge that other Regional departments, utilities, and area municipalities have their own processes for reviewing changes to bus stops that result in an input to GRT's processes. However, roles for other stakeholders are scoped out in this section as well. There are also additional processes in place (e.g. for ensuring that stop amenities are placed correctly, and that stops are properly maintained) that are not included here, but are no less critical for maintaining a safe, comfortable, and convenient transit system.

Note that in cases where required stop or amenity areas cannot be accommodated within the public right-of-way, property acquisition may be necessary while developing a new bus stop, including easements. Finally, as the Guidelines are a living document, the intent is for the processes presented here to be further improved and/or streamlined over time as needed.

Expropriation (Point for Future Discussion)

If a stop has been identified for an upgrade, meets all the criteria below, and is not in a low-ridership residential area, expropriation may be pursued:

- **Stop Type**: Major Stop or above, as defined in Bus Stop Design Guidelines (Section 6).
- **Attempted Easement**: Easement negotiations have not been successful, and are expected to take or have already taken greater than 12 months.
- **Volume**: Must not exceed 3 locations/year due to additional time and costs compared to easement; review with Legal Services staff before proceeding.

Figure 4-1: New Stop Process (Development Review)

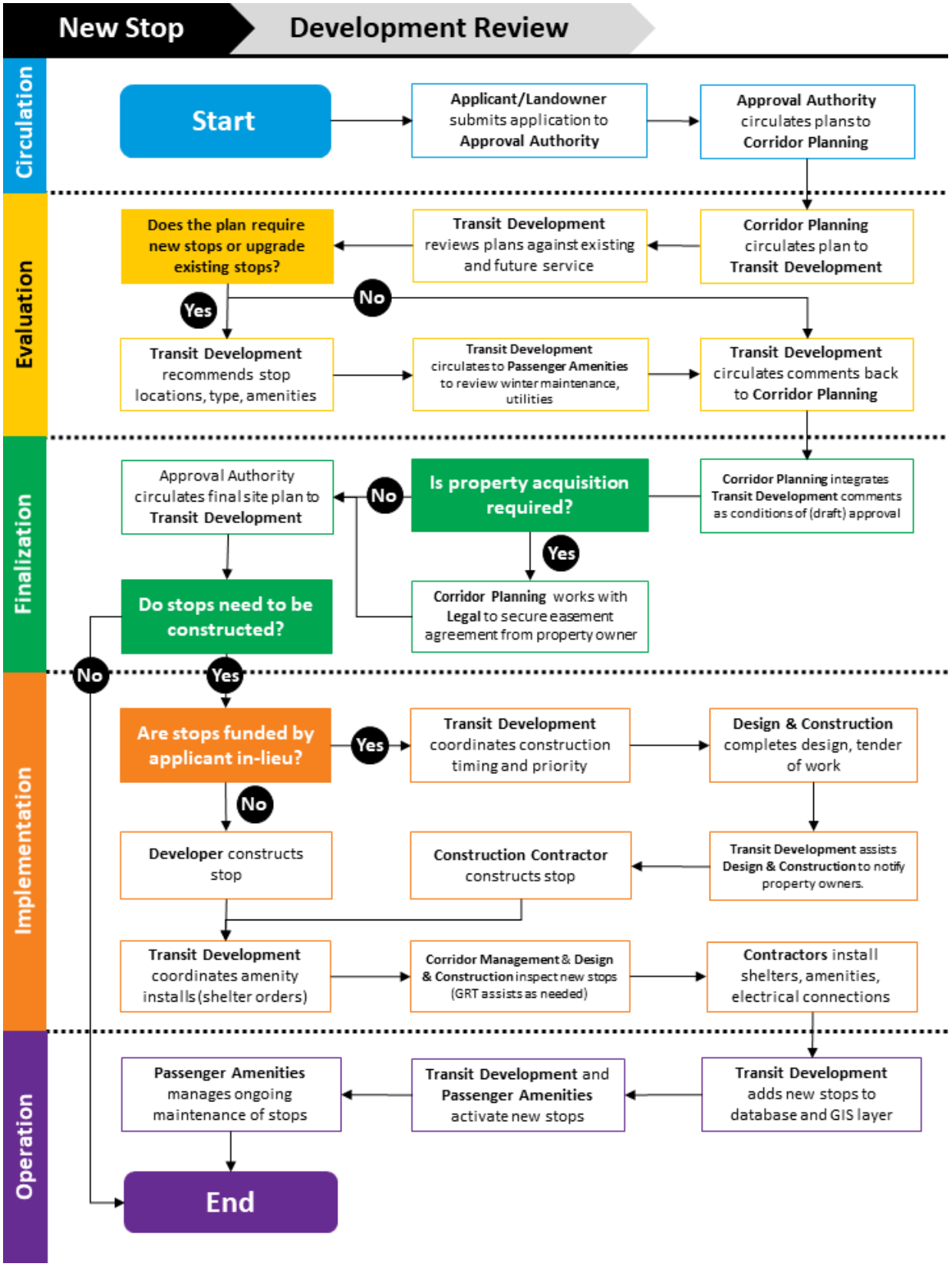


Figure 4-2: New Stop Process (New Service)

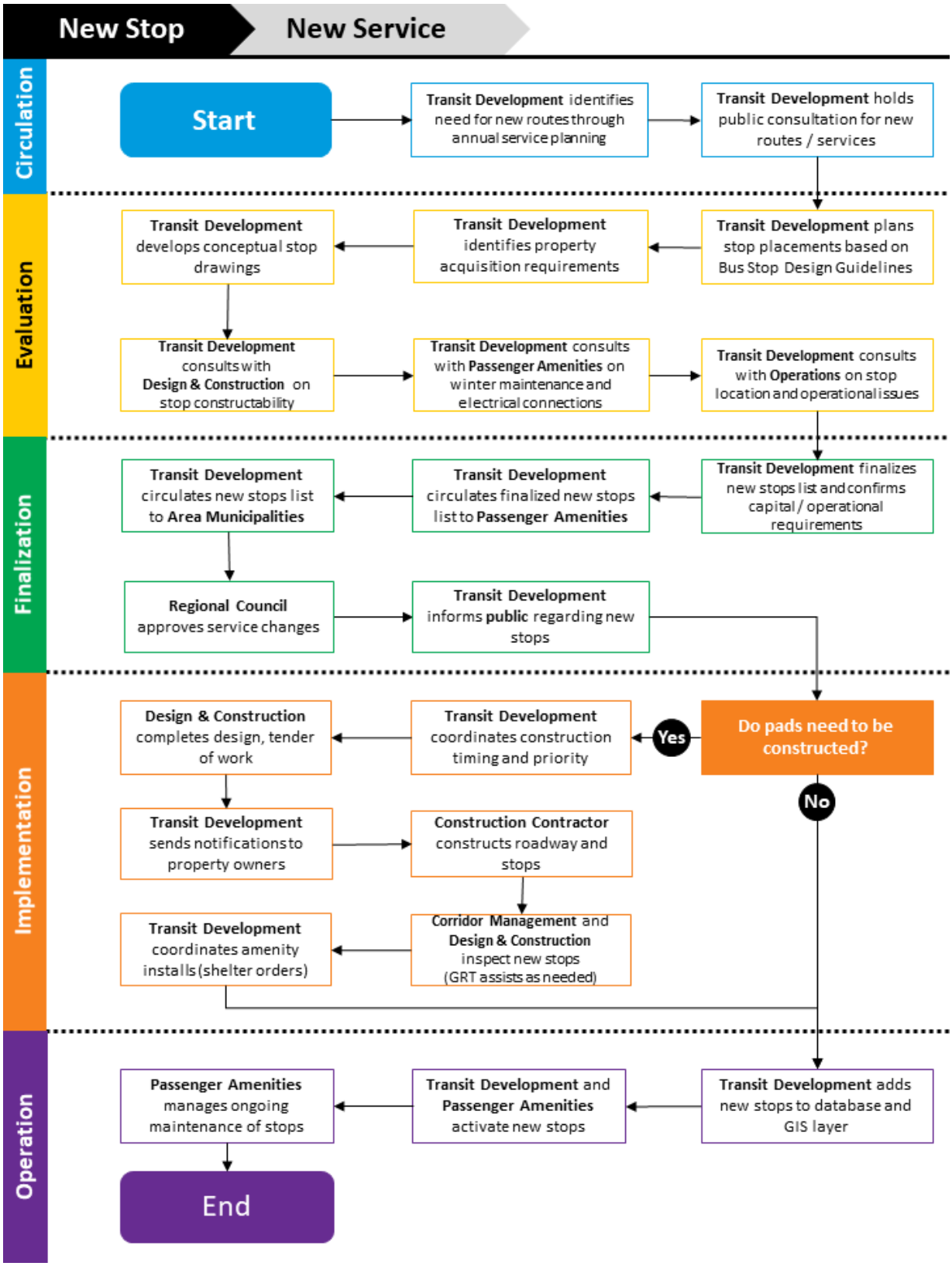


Figure 4-3: New Stop Process (Roadway Reconstruction)

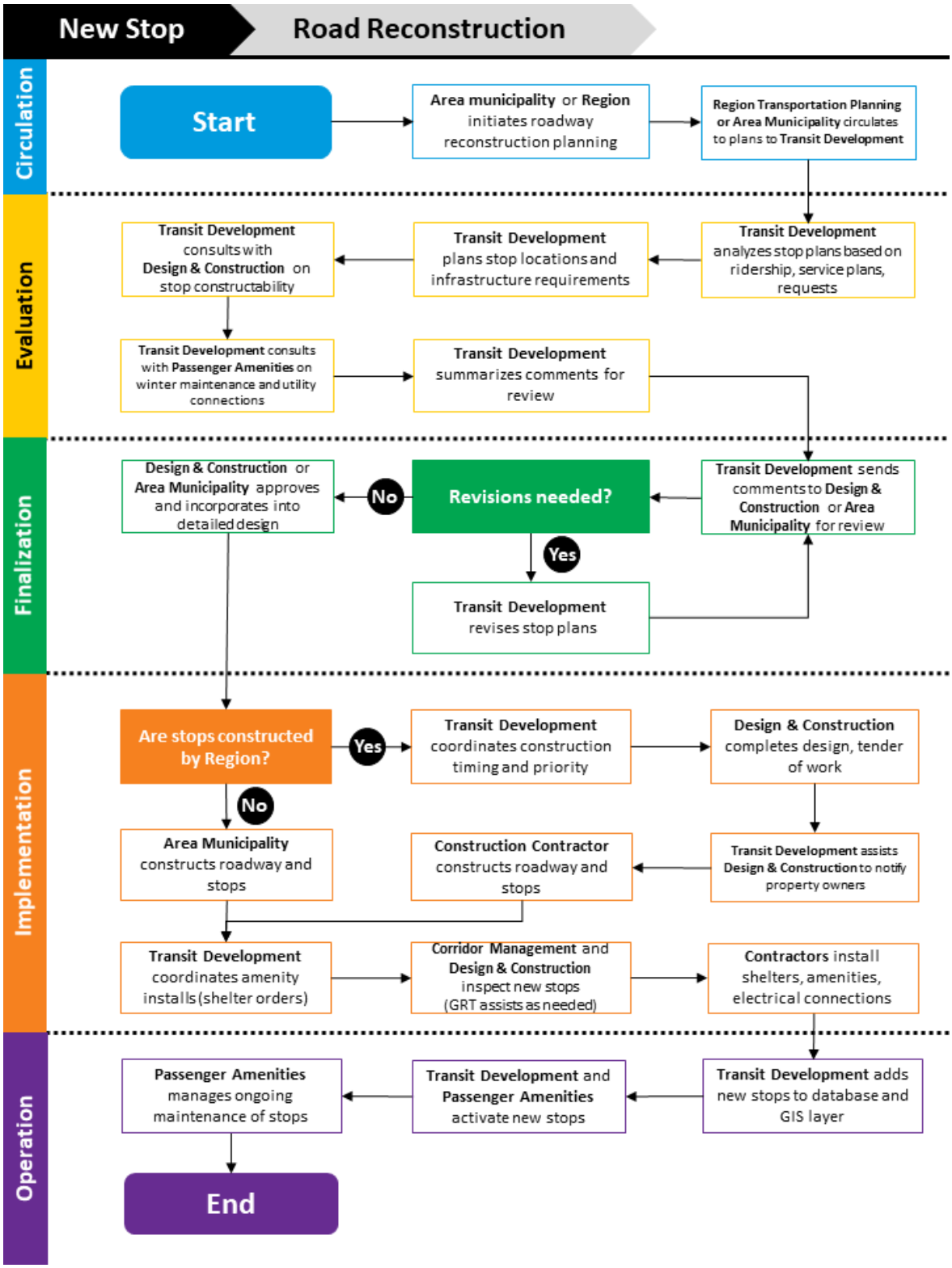


Figure 4-4: Stop Change Process (Removals and Consolidation)

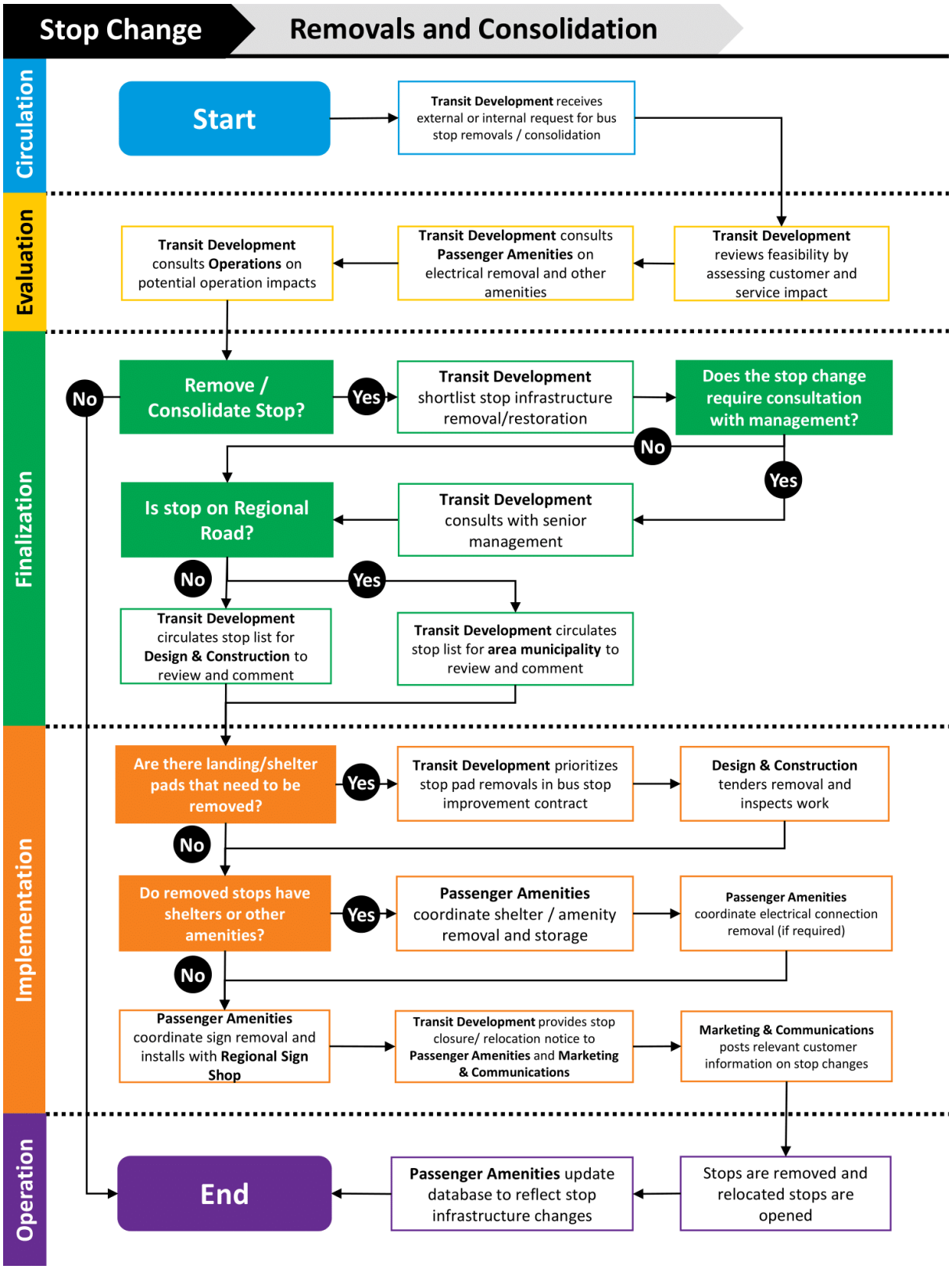


Figure 4-5: Stop Change Process (Temporary Stop Relocation)

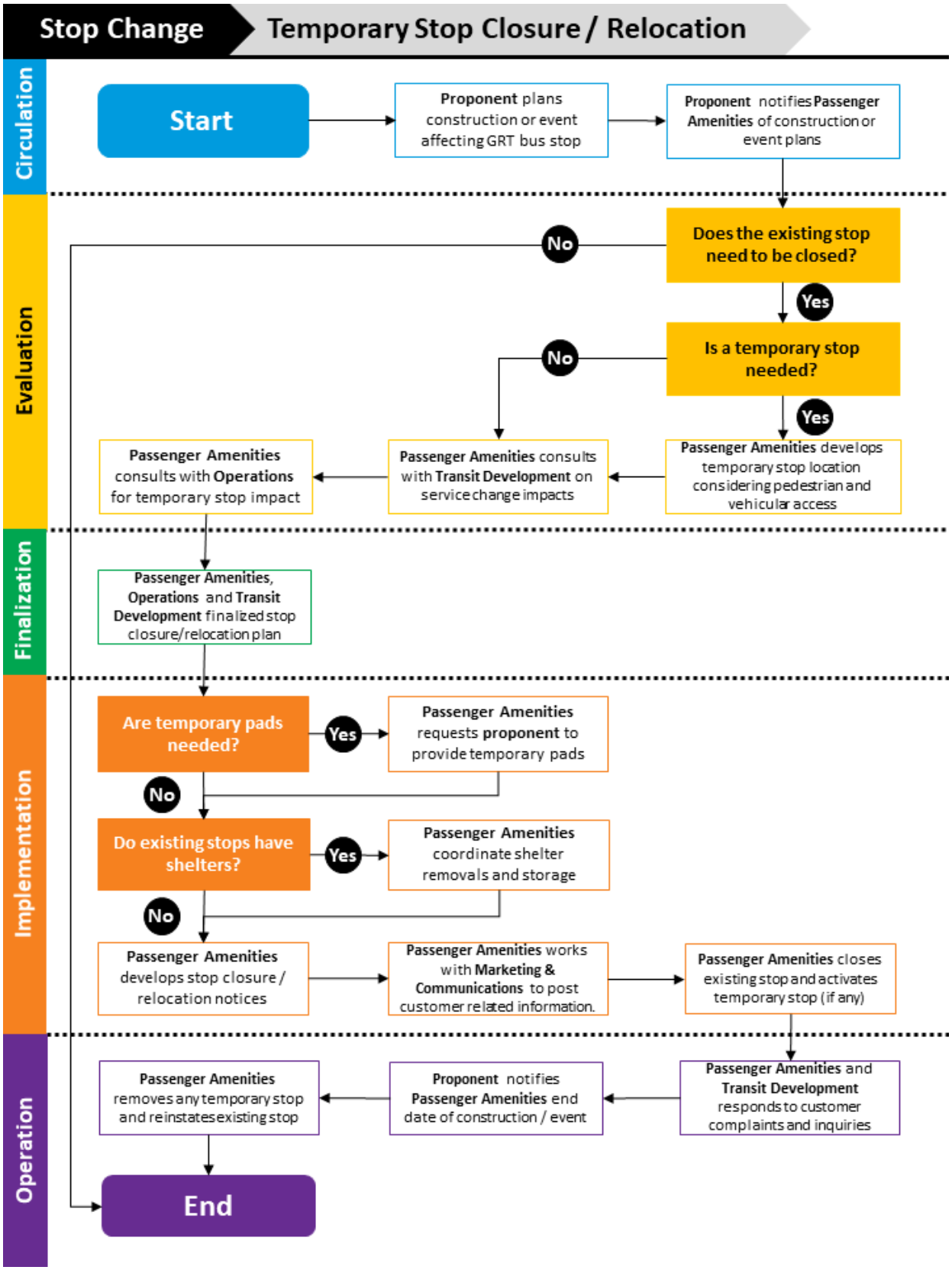
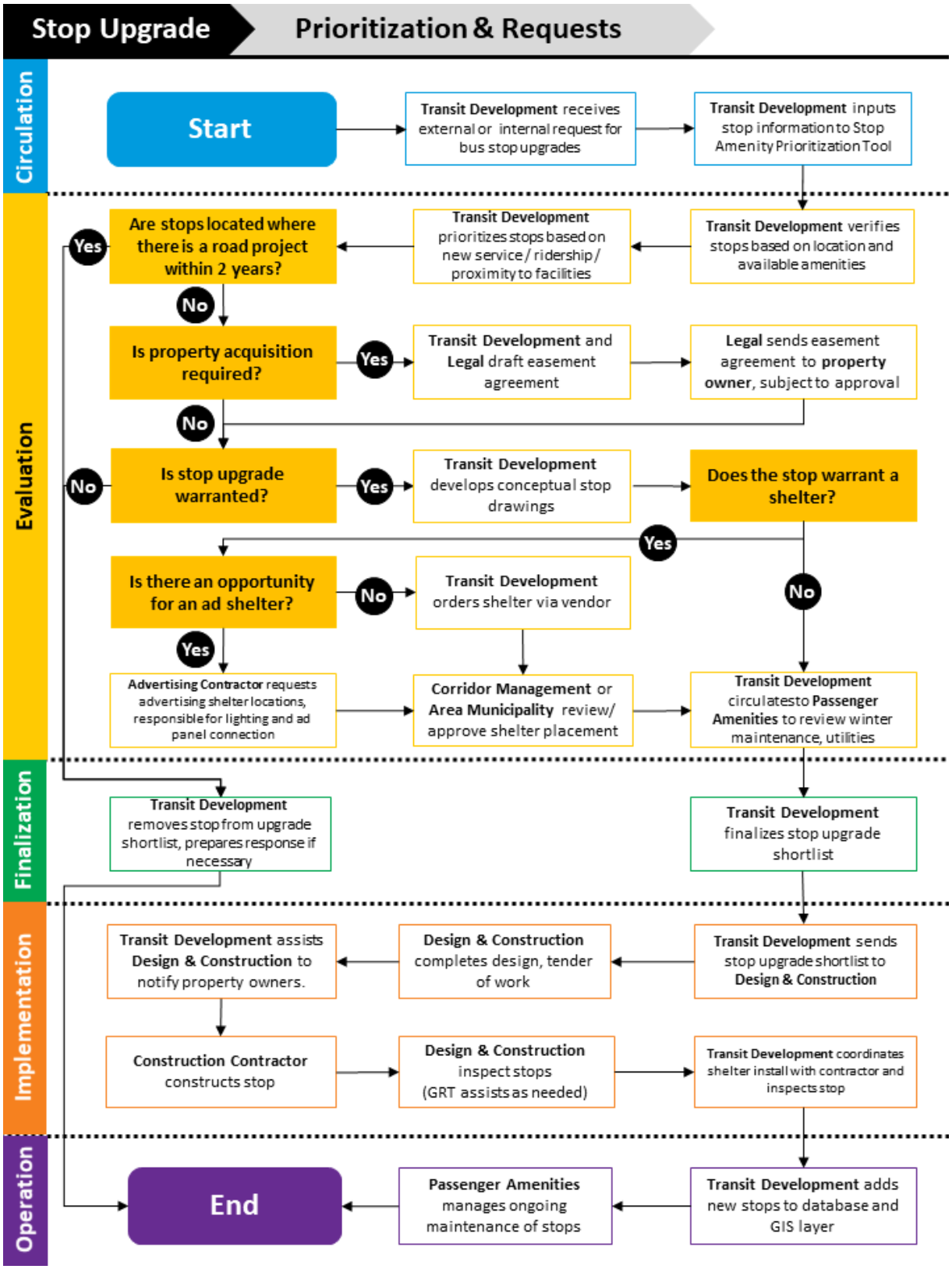


Figure 4-6: Stop Upgrade Process (Prioritization and Requests)



5 Justification

Before the design of a bus stop is specified, the decision to implement a stop must be made. This chapter describes guidelines for the justification to install (or remove) a bus stop. The initiation phase is the first step of the bus stop design process, from which the selection of specific design elements and positioning of the stop follow.

5.1 Bus Stop Justification

The decision to install, relocate or upgrade a bus stop is made with regard to a number of factors, including:

- Introduction of a new transit route, or revisions to an existing transit route.
- Development or redevelopment of a property or area (including the introduction or expansion of a destination for customers on an existing transit route).
- Roadway reconstruction and rehabilitation projects.
- Requests from residents, transit customers, businesses, community groups, and other members of the public.
- Requests from bus operators, Regional groups, municipal councillors, and other technical stakeholders.
- Application of GRT's stop upgrade prioritization tool, which tracks and integrates stop usage, requests (see above) accessibility issues, and proximity to sensitive land uses. This tool informs capital upgrade decision-making on an annual basis.
- Construction requiring a temporary or permanent stop relocation, such as general roadwork.
- Introduction of a new transit priority measure.

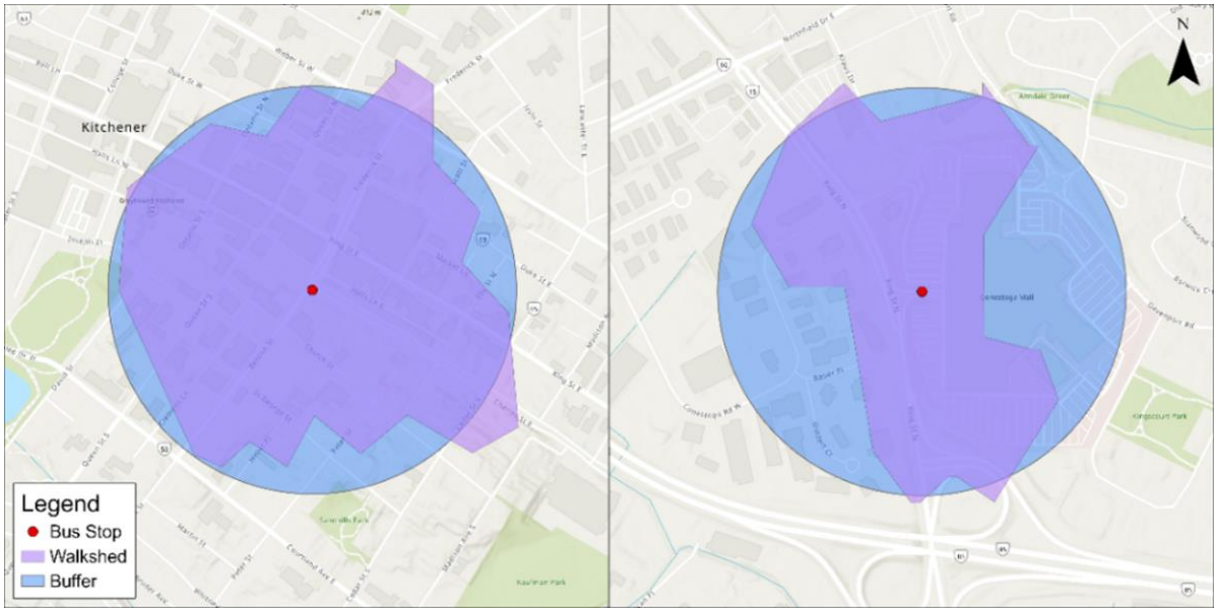
5.2 Catchment Area

The catchment (or coverage area) of a local bus stop is approximately 450m (representing an average 5-minute walk):

- Catchment areas for frequent service, express bus service, and ION bus and light rail service may be larger, reflecting the concept that customers will walk further to access higher-quality service.
- In general, catchment areas can be identified by simple buffer from the stop location. However, the preferred analysis calculates coverage based on the surrounding pedestrian network, given that it better reflects reality identified through walkshed GIS analyses; see Figure 5-1.

Figure 5-1 was calculated using a simple radius versus walkshed analysis. The map on the right shows much of the coverage area is cut off from transit, while the map on the left features a wider range of pedestrian connections to transit stops.

Figure 5-1: Two Examples of Bus Stop Coverage



GRT aims to provide bus stops within 450m of rider origins and destinations, although in many areas this is not possible or desirable based on low densities, ridership, and unsupportive road network design.
In general, transit stops should be spaced to provide service coverage to as many people and jobs as possible and serve major destinations without compromising the average operating speed of a transit route. GRT's stop spacing standards (see Section 5.3) provide general guidance for different types of transit service.

5.3 Stop Spacing

The distance between bus stops varies according to the nature of surrounding land uses, the connectivity of the street network, the location of destinations (or trip generators) along a route, and other factors.

The distance between bus stops can affect:

- Overall travel times on the route, with more closely-spaced stops resulting in
- slower average speed, especially at peak times.
- Coverage of bus service (see Section 5.1).
- Operating and capital costs, due to longer running times and higher costs of building and maintaining more bus stops.
- Ability to provide enhanced amenities, particularly if stop spacing results in less ridership at more stops instead of more ridership at fewer stops.

Guidelines for minimum and maximum stop spacing provide clarity and transparency in decisions on adding, removing, or relocating stops.

GRT defines stop spacing by service type:

- **Local and BusPLUS stops should be no less than 250m and no more than 500 metres apart**. Average stop spacing over the entire route should be approximately 350m to reflect the emphasis on coverage that these routes provide (based on the GRT Business Plan – Service Standards Working Paper).
- **iXpress stops should be no less than 400m metres and no greater than 1km apart**. Average stop spacing over the entire route should be approximately 800m, which achieves a balance between coverage and service efficiency and reduces overall travel times.
- **ION Bus stops should be no less than 600m and no more than 1.5km apart**. Stop placement for ION Bus corridors identified for future light rail service should be consistent with probable future light rail station locations.

Exceptions to stop spacing guidelines should only be considered when:

- There are natural or artificial barriers, such as green space, waterways, and highways (for example, the Grand River).
- There is an identified socio-demographic accessibility requirement where there is a higher expected volume of customers requiring shorter access distance (for example, in areas with a higher proportion of seniors, or adjacent to a hospital, healthcare facility, school, or major community facility).
- Pedestrian infrastructure is limited or is disconnected to destinations served by the bus service.
- There is a need to accommodate transfers and/or key destinations necessitating multiple stops at an intersection (for local routes only).
- There are undeveloped areas where stop spacing is longer.

6 Classification

Bus stops throughout GRT's network serve different purposes, depending on the geographic context in which they are located, and the type of service that operates.
This chapter describes the different types of stops that exist within the GRT service area, and how stops are classified. These Guidelines define a classification structure that balances service type with other contextual considerations.

6.1 Bus Stop Typology

All bus stops must be designed in a manner compatible with street and neighbourhood context. The typology developed in these Guidelines provides clear definitions of different types of stops and how they should be designed. These typologies provide guidance that allows for clear and objective decision-making regarding the construction of stops and the selection and installation of different customer amenities (with room for the consideration of contextual factors – see Chapter 8).

A bus stop may also be re-classified for a variety of reasons. These include an increase or decrease in ridership, a new or emerging customer transfer pattern, a major destination being introduced, or an upgrade in the type of transit service being offered (described in Chapter 5). There are three classifications of bus stops introduced in these Guidelines:

- Standard Stop
- Enhanced Stop
- Major Stop

In general, **average daily boardings** are the measure to justify bus stop typology and amenities. This is because boarding activity typically involves a customer waiting at the bus stop, resulting in space and amenity requirements. Stops with heavy alightings may not require the same level of stop amenity.

Stops in Rural Areas

For stops in the Region's four townships, a different threshold for amenity warrants needs to be applied to reflect lower population densities but often more exposed waiting conditions and lower frequencies. For the purposes of warrants described in the following sections, consider rural stops as needing to meet 50% of the stated value to qualify for amenities and upgrades, with regard for challenges and constraints posed by differences between urban and rural cross-sections (e.g. curbing). However, amenities may be provided on a case-by-case basis depending on the context of a particular stop.

6.2 Standard Stop

A standard stop is the most common stop type in the transit network. These stops are located on residential, collector, major collector, and arterial streets. Standard stops are typically served by at least one local or BusPLUS route. Standard stops are the baseline stop classification and the only warrant is the provision of bus service at the stop location.

Basic requirements at a standard stop include:

- A concrete pad, or equivalent hard-surfaced landing area approved by GRT; and,
- Bus stop pole and marker.

Today, not all standard stops feature concrete pads. To prioritize new pad installations in relation to scarce capital resources, GRT evaluates locations annually with regard to the following inputs:

- Stop usage (boardings and alightings);
- Proximity to senior homes/facilities;
- Proximity to medical facilities;
- Proximity to lower-income populations;
- Planned or recent service changes; and,
- Requests from customers/operators.

Other customer amenities may be installed at standard stops, where warranted, at GRT's discretion. Customer waiting amenities are defined and discussed further in Chapter 8.

A bench is warranted at any standard stop that exceeds 10 customer boardings per day. The installation of stand-alone benches at standard stops, where warranted, may be reviewed and prioritized by GRT depending on the availability of benches and the public right-of-way. More information about benches can be found in Section 8.6.

All standard stops exceeding 20 customer boardings per day meet the warrant for upgrading to an enhanced stop, which includes installation of a shelter. Other factors that may contribute to a warrant for shelter installation at a standard stop include some of the factors describe previously in this section. More detailed information about shelter warrants can be found in Section 8.6.

Figure 6-1: Example of Standard Stop

Source: Grand River Transit

6.3 Enhanced Stop

An enhanced stop is a standard stop upgraded with a shelter to provide a higher level of service. These stops are located along major collector and arterial streets. Enhanced stops are typically served by at least one local or BusPLUS route.

The purpose of the enhanced stop typology is to formalize in policy the necessary upgrades for a bus stop with higher ridership or customer transfer volumes.

Warrants for the installation of/upgrade to an enhanced stop may include any the following:

- More than 20 average daily boardings.
- High observed customer transfer volumes.
- Adjacent to major destinations.
- Observed overcrowding at existing standard stop, such as through customer complaints or operator reports – this may be due to specific trips with higher demand.

Figure 6-2: Example of Enhanced stop

Source: Grand River Transit

6.4 Major Stop

A major stop is designed to accommodate a very high volume of customers. These stops are commonly applied along corridors with higher-frequency service. Major stops are primarily served by at least one iXpress or ION Bus route. They could also be served by local or BusPLUS routes with high ridership or observed transfer activity. Many major stops are located at a transfer location between a bus route and ION light rail.

Warrants for the installation of a major stop include the following:

- iXpress or ION Bus service at the stop. or any of:
  - More than 100 average daily boardings.
  - Located at transfer point for other routes.
  - Adjacent to major destinations.
  - Observed overcrowding at existing enhanced stop.
  - bus stops for connecting routes located at ION stations, or in close proximity to ION stations, or a maximum of 100m from the ION light rail station platform entrance

Major stops have expanded customer amenities to accommodate high passenger volumes compared to standard and enhanced stops. Key features include:

- **Customer information features**, including real-time information displays, system maps and other wayfinding information.
- **Medium-sized shelters (16’ at a minimum)**, with large shelters (20’) being installed at stops or routes with the highest ridership; note that the 20 daily boarding warrant applies to Major stops as well (see Section 8.4 for details and definitions regarding shelter sizes).
- **Customized shelter designs** may be considered at stops featuring a combination of high passenger volumes, major transfer point, and iXpress or ION LRT connections.
- **Expanded waiting areas** within available right-of-way to accommodate high volumes of transferring customers. Waiting areas should be integrated with surrounding public realm to create a “transit plaza” where possible.
- **Longer concrete pads (at least 15m in length)** to protect for articulated bus operations. The longer concrete pad ensures all bus doors connect to a paved area.
- **Bicycle parking** (e.g. a bike rack) is recommended to be installed at all major stops.
- **Waste receptacles**.

Figure 6-3: Example of Major Stop

Source: Grand River Transit

6.5 Applications of Bus Stop Typology

Bus stops may be classified or reclassified as standard, enhanced, or major stops depending on factors such as ridership, type of transit service, connecting transit services, and nearby destinations. Factors to determine the classification of a stop type are shown in Figure 6-4. Design and implementation processes can be found in Chapter 5.

Figure 6-4: Application of Stop Typologies

	Standard	Enhanced	Major
Service Type			
Local	✓	✓	✓
iXpress			✓
ION Bus			✓
Urban Context			
Rural	✓	✓	
Suburban	✓	✓	✓
Urban	✓	✓	✓
Ridership			
Low	✓		
Medium (> 20 boardings)		✓	
High (> 100 boardings)			✓
Other Considerations			
Transfer Location		✓	✓
Connects to ION LRT			✓
Major Destination		✓	✓

Legend	✓ Suitable	✓ Secondary Factor	✓ Primary Factor

7 Location, Placement, and Integration

This section describes guidelines for the general placement and location of bus stops. Placement is dependent on factors including the spacing between stops (See Section 5.3), location in relation to an intersection or roundabout, and design of the roadway on which the stop is located.

7.1 General Principles

Stop location decisions are driven by factors designed to encourage safe, convenient, and efficient transit operations.
The selection of a stop location should:

- **Consider customer and operator safety:** the ability to access the stop and cross the street and provide adequate sight lines.
- **Maximize customer convenience and efficiency:** minimizing walking distance from major trip generators and minimizing the distance required for customers to transfer between routes.

To promote safety and easy access to transit, GRT endeavours to locate bus stops in places where pedestrian facilities, including sidewalks and crossings/crosswalks, are already present.

- Most GRT stops are located near intersections, close to controlled pedestrian crossings such as stop or yield signs, pedestrian crossovers, or full traffic control signals.
- In the case of mid-block stops, pedestrian facilities may not be present. In these cases, GRT coordinates with the respective roadway owner to explore the feasibility of installing a pedestrian crossing to facilitate access to transit and promote safety. Means of integrating the presence and usage of transit stops into warrant decisions for pedestrian facilities is identified as an area for further exploration (see Chapter 1).

Facilitating easy transfers is an important part of making transit safe and convenient. To enable easy transfers between transit routes:

- Stops should be located to minimize walking distance and ideally eliminate the need to cross the street.
- In cases where there is dominant transfer activity observed, such as a local route intersecting with an iXpress route, stops should be placed on the same corner of the intersection (if possible) to eliminate the need to cross the street to complete the transfer.
- At stops with no defined transfer pattern, stops should be placed based on the guidance provided in Section 7.2.

There are other operational factors to consider when placing a bus stop, including lane configurations/road design, snow clearing/maintainability, traffic volumes, route alignment, and the presence of transit priority measures. The location of a bus stop should also provide a safe and visible waiting environment for customers and be designed to integrate with and minimize conflicts between buses / transit customers and other modes. More details on the considerations of each stop type is provided in Section 7.2 and general considerations are provided in the table below. Further details are provided in subsequent sections of this chapter and in Chapter 8.

Figure 7-1: Locational Factors for Bus Stops

Factor / Guideline	Goals			
	Safe & Integrated	Accessible	Sustainable	Customer-Focused
				
Primary Locational Factors – Transit Service, Safety, and Customer Convenience				
Intersections Locate bus stops as close to intersections as possible, depending on nearside vs. farside preference (see Section 7.2 below). Sightlines should not be obstructed.	✓			✓
Pedestrian crossings Locate bus stops near intersections controlled by traffic signals, pedestrian crossovers, or stop signs (or uncontrolled pedestrian refuges) to provide safe pedestrian access.	✓	✓		✓
Grades Locate bus stops on flat grades to minimize potential weather impacts to bus operations and improve accessibility. Bus stops should not be located on steep grades (more than 8%); cross-slopes for bus stops cannot exceed 2%.	✓	✓		
Sidewalks Locate stops along sidewalks or pathways to allow customers a safe and convenient connection to their destination.	✓	✓		✓
Walkways and multi-use pathways Locate stops near walkways and multi-use pathways where applicable, to reduce walking distance for customers and support access to transit.	✓	✓		✓
Transfers between routes Locate bus stops to minimize roadway crossings and walk distances for transferring passengers.	✓	✓		✓
Bus turning movements Consider bus stop turning movements when locating bus stops, particularly at locations where buses make left turns before or after accessing the stop.	✓			

Factor / Guideline	Goals			
	Safe & Integrated	Accessible	Sustainable	Customer-Focused
Street Design Considerations				
Roadway alignment/ geometry Maximize sightlines for operators, motorists, and pedestrians.	✓	✓		✓
On-street bike lanes Design bus stops to minimize potential conflicts between transit operations, pedestrians, and cyclists.	✓	✓	✓	✓
Off-street bicycle facilities Design bus stops to minimize potential conflicts between cyclists and boarding or alighting passengers.	✓	✓	✓	✓
Traffic volumes Collaborate with local traffic officials to minimize traffic impacts, particularly on streets and at intersections with high traffic volumes.	✓			
Site-Specific Considerations				
Customer amenities Bus stop locations should provide adequate space for bus shelters and other customer waiting amenities as warranted.	✓	✓	✓	✓
Traffic control hardware & utility Poles Traffic control hardware, utility poles, and signage should not block bus stop signage, bus doors or the path of passengers between the waiting area and the bus doors.	✓			✓
Landscaping and street furniture Trees and street furniture should not block bus doors or paths connecting the bus stop to bus doors, including accessible paths for users of wheelchairs and other accessibility devices.	✓	✓		✓

Factor / Guideline	Goals			
	Safe & Integrated	Accessible	Sustainable	Customer-Focused
				
Land use Place stops next to or in proximity to major trip generators and areas with supportive land use characteristics. Integrate stops into adjacent development where appropriate and feasible.		✓		✓
Driveways Stopping buses should avoid blocking driveways where possible (unavoidable in some residential areas where raised curb extents are limited). Timepoint stops should not block driveways.	✓			
Minimum lighting Bus stops should be in areas with adequate illumination to promote safety and security for bus passengers.	✓	✓		✓
Snow clearing Bus stop locations should enable machine clearing of snow and allow for sufficient snow storage space that does not impact customers or pedestrian movements.	✓	✓		

7.2 Positioning

Bus stop positions are defined by their relationship to intersecting streets. The three possible positions for a bus stop are:

- **Nearside:** located immediately before the intersection in the direction of travel.
- **Farside:** located immediately after the intersection in the direction of travel.
- **Midblock:** located anywhere along a roadway between the farside and nearside of an intersection.

Application of Bus Stop Placement

Deciding where to place a bus stop at an intersection is based on the information in these Guidelines in cooperation with other relevant stakeholders depending on the means of improvement (see Chapter 4). Nearside, farside, and midblock stops provide advantages and disadvantages depending on the surrounding context. These are described in Figure 7-2.

In general, bus stops should be placed at intersections wherever possible:

- Nearside bus stops are the most common.
- Farside bus stops are considered based on service and operational contexts.
- Midblock stops are generally not preferred, especially without a pedestrian crossing, but may be required due to site-specific conditions such as proximity to a major trip generator.

Key questions to be considered when positioning the bus stop in a location include:

- Are there transfers between bus routes at stops or stations at the same intersection?
- Are there transit priority signals or measures planned or in place?
- Is there a designated right-turn lane at the intersection?
- Is there a mid-block walkway connection or major destination?
- Is there a mid-block traffic signal or pedestrian crossover?

Additional elements to consider in the positioning of bus stops include:

- **Entry area/tapers:** Buses require a clear entry area (or taper) from the travel lane to the stop location at the curb to allow the bus to safely merge into the stop without obstruction. This is important because it allows the front and back doors of a bus to align properly with the curb to allow for accessible customer access.
- **Exit area/tapers:** The area within the roadway that buses use to depart from a stop should also be clear of parking spaces and crosswalks. Exit areas/tapers can include intersection space.
- Stops should only be located within designated right turn-only lanes if the bus is turning right at the location, the right turn lane is configured for a queue jump, or buses are excepted from a mandatory right turn via by-lawed traffic signage.
- All parts of the bus stop must be located outside the radius of the curve at the intersection, on a tangent (straight) section of curb if possible.
- The bus stop passenger waiting area should be configured parallel to the street and along the curb line, with no landscaping, grass or other uses between the passenger waiting area and the curb. It should provide for a safe and convenient access to the sidewalk from the bus stop.

Figure 7-2: Comparison of Bus Stop Placements

Stop Placement	Advantages	Disadvantages
Nearside	• Facilitates transfers between routes when combined with a farside bus stop on an intersecting route. • Transit customers served closer to the intersection. • Bus may stop for traffic signal or stop sign and passengers at the same time (reduces delay). • Reduces walking distance to crosswalk at roundabouts. • Better view of customers approaching bus stops for operators.	• Reduced operational efficiency at congested signalized intersections, as bus may have to wait an additional cycle while loading passengers. • Blocks traffic approaching intersection, reducing roadway and intersection capacity (may also encourage drivers to turn around stopped bus). • Stopped bus can obstruct visibility of intersection, traffic signs, or crossing pedestrians. • Difficult for buses to re-enter traffic from a lay-by without TSP.
Farside	• Facilitates transfers between routes when combined with a nearside bus stop on an intersecting route. • Lowest impact on intersection traffic level of service. • Pedestrians cross intersection behind bus. • Shorter overall bus access requirements. • Improved accommodation of bus turning movements at intersection. • Provides receiving lane for most transit priority signals.	• Bus stopping space may be limited if more than one bus serves the stop. • Traffic approaching bus stop must wait or move around bus (queuing into intersection possible). • Buses may have to stop twice (at the intersection and at the stop), depending on signal timing and traffic volumes. • Requires distance from roundabouts for traffic safety purposes, increasing customer walk distance (see Chapter 8.5).
Midblock	• May serve particular locations further away from intersections. • Can be made convenient and discourage unsafe crossings if pedestrian crossovers or refuges provided. • Improves adherence to stop spacing guidelines.	• Walking distance from intersecting streets increased. • Difficult for buses to re-enter traffic from a lay-by. • Longer access requirements vs. nearside and farside locations (no intersection space for taper). • Risk of unsafe pedestrian crossings if dedicated crosswalk or refuge not provided.

Nearside Bus Stops

Nearside bus stops should end before the sidewalk, crosswalk or stop bar on the near side of the intersection.

If there is a designated or signed right turn lane nearside of the intersection, nearside bus stops should be located so that the head of the stop is located before the beginning of the right turn lane or restriction, unless an exception for through-travel is provided for buses.

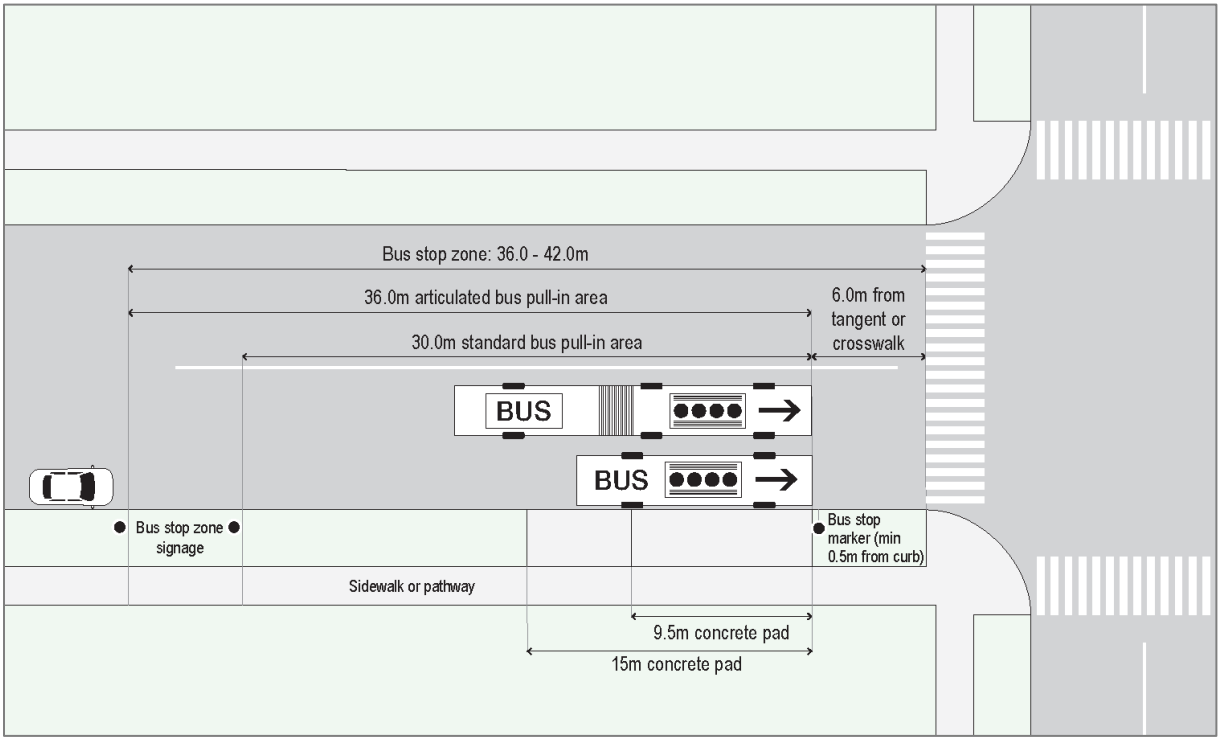
Nearside bus stop zones require 36m (for conventional buses) of linear clear space from the nearest obstacle to the stopping position, to allow the bus to maneuver into the stopping area (changing lanes as necessary).

Nearside bus stops are generally favoured for stop-controlled intersections, curb extensions, and roundabouts.

Nearside bus stops may be located in non-designated right turn lanes. These lanes have pavement markings but are not signed with black and white regulatory signs nor designated in traffic by-laws. While it is not preferred to locate a nearside bus stop in a non-designated right turn lane if the route is going straight through the intersection, it may be required based on other factors noted in Section 7.2 or based on availability to introduce amenities. Stops in a non-designated right turn lane are preferably set back from the stop bar to allow room for buses to change into through-traffic lanes where possible.

More information about bus stops at roundabouts is provided in Section 8.5. A typical nearside bus stop is shown in Figure 7-3. A more detailed drawing is provided in Appendix A.

Figure 7-3: Typical Layout – Nearside Bus Stop



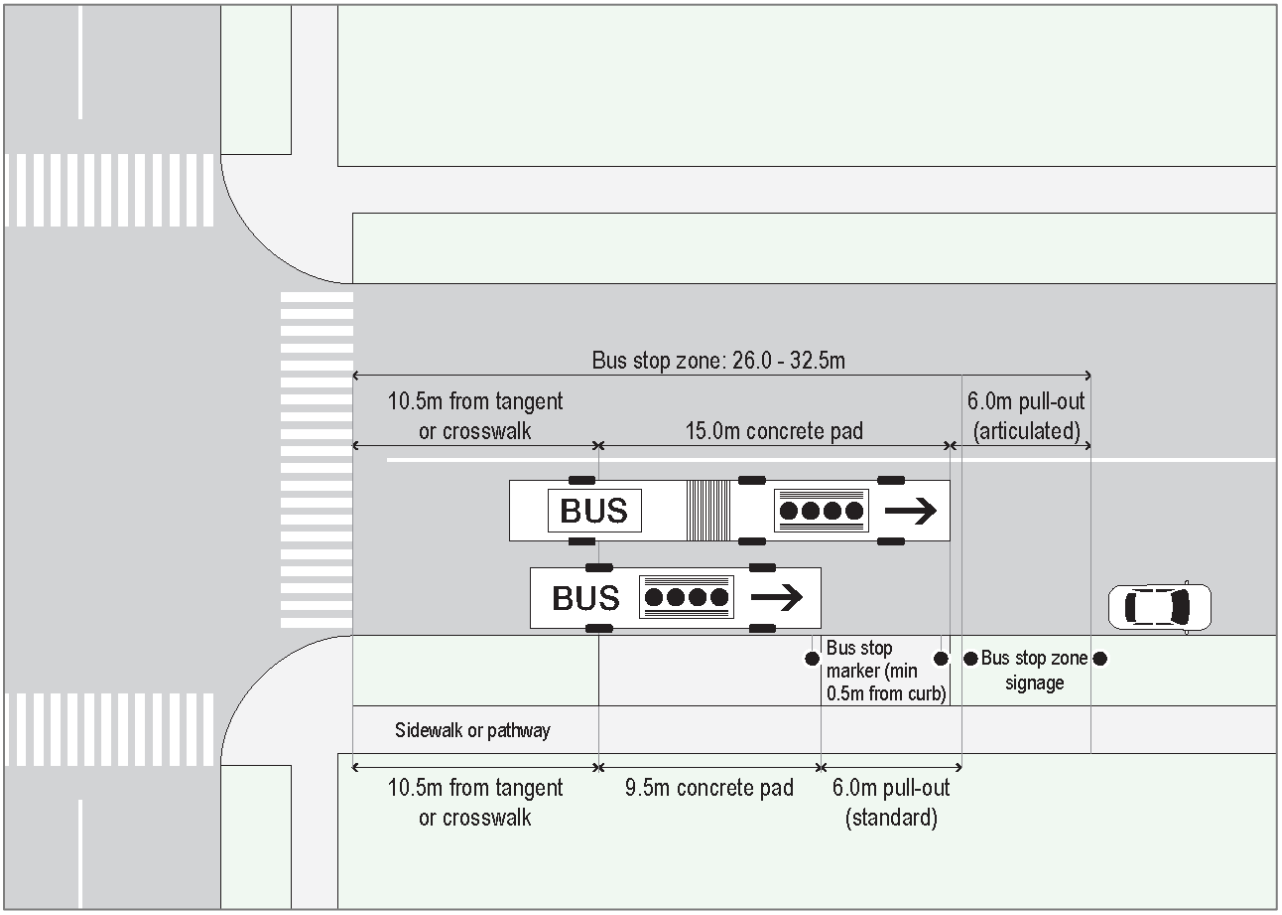
Farside Bus Stops

Farside bus stops should begin beyond the end of the curved section of the curb (and beyond an intersecting sidewalk and/or crosswalk) at the far side of the intersection. Farside stops require 26m of linear clear space (for conventional buses) beyond the intersection. The bus approaches in the curb lane and across the intersection into the bus stop area without having to maneuver past a parking lane.

Farside bus stops are generally favoured for standard signalized intersections, uncontrolled intersections, intersections with a transit-only receiving lane, and bus lay-bys.

A typical farside bus stop is shown in Figure 7-4.

Figure 7-4: Typical Layout - Farside Bus Stop



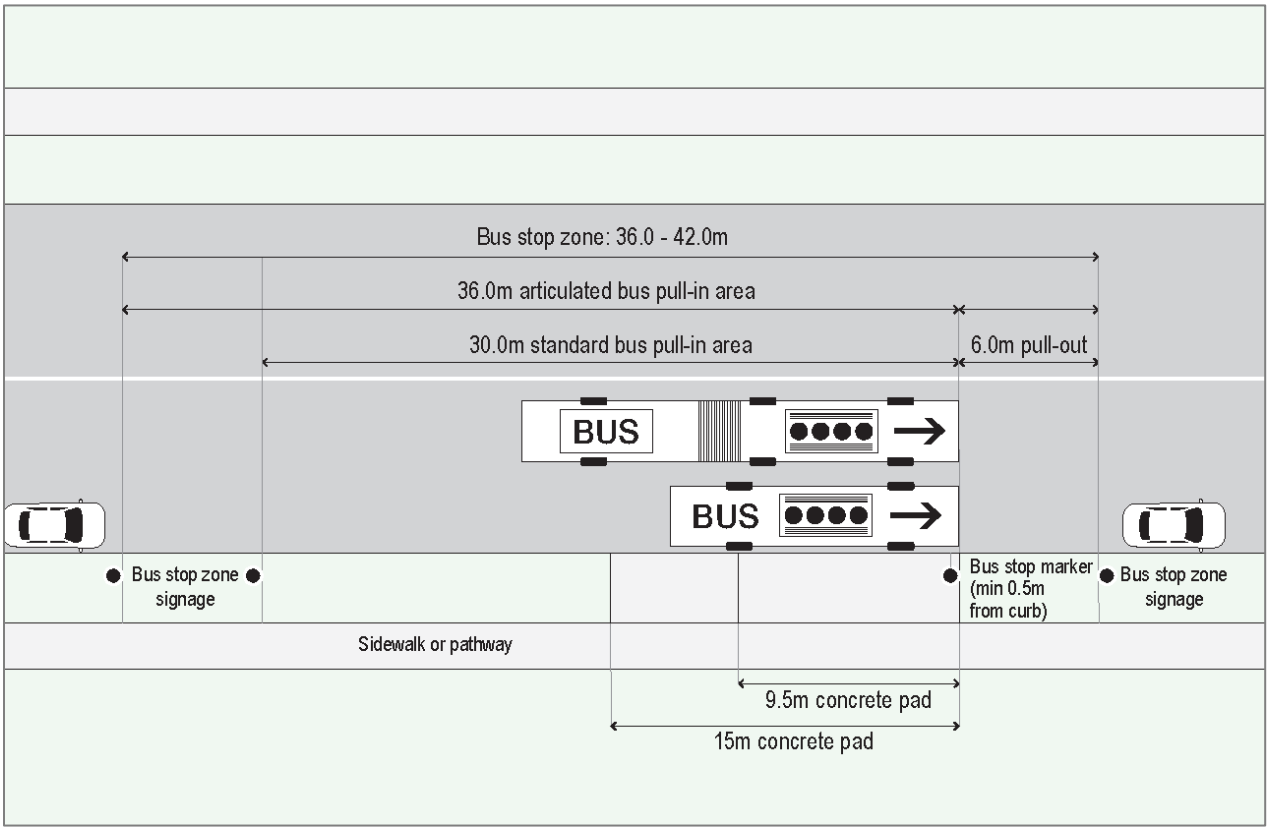
Midblock Bus Stops

Midblock bus stops are comparatively uncommon. When used, these stops should be located so as to avoid driveways and other access points, if possible. Midblock stops require 36m of linear clear space from the nearest obstacle to the stopping position, to allow the bus to maneuver into the stopping area. Stops adjacent to a T-intersection use the same design dimensions as a midblock stop, and should account for turning movements from the perpendicular street.

Midblock bus stops are generally not favoured due to the potential for increased walking distance for customers, unless located in proximity to a crosswalk, walkway, or major destination that is located away from an intersection.

A typical midblock stop is shown in Figure 7-5.

Figure 7-5: Typical Layout - Midblock Bus Stop



7.3 Bus Stops at Roundabouts

Roundabouts are an approach to intersection control widely used in Waterloo Region that can improve traffic safety, intersection capacity, and reduce congestion/delay. However, roundabouts generate unique challenges for pedestrians (and therefore transit customers) by increasing walk distance at intersections and may reduce visibility of pedestrians at crossings. Crosswalks at roundabouts are divided at the centre of the street and splayed in a “V” pattern to help ensure that the crosswalks are at right angles to approaching traffic.

Bus stops at roundabouts are generally further removed from the intersection (compared to traditional intersection configurations) due to crosswalk setbacks and the curvature of the roadway.

Nearside bus stops are generally preferred for safety and accessibility reasons, as motorists approaching roundabouts are already expecting to slow down and the stop can be placed closer to the crosswalk. A nearside bus stop at a roundabout is typically located 15m back from the crosswalk to ensure that the stopped bus does not block the visibility of crossing pedestrians from oncoming traffic.

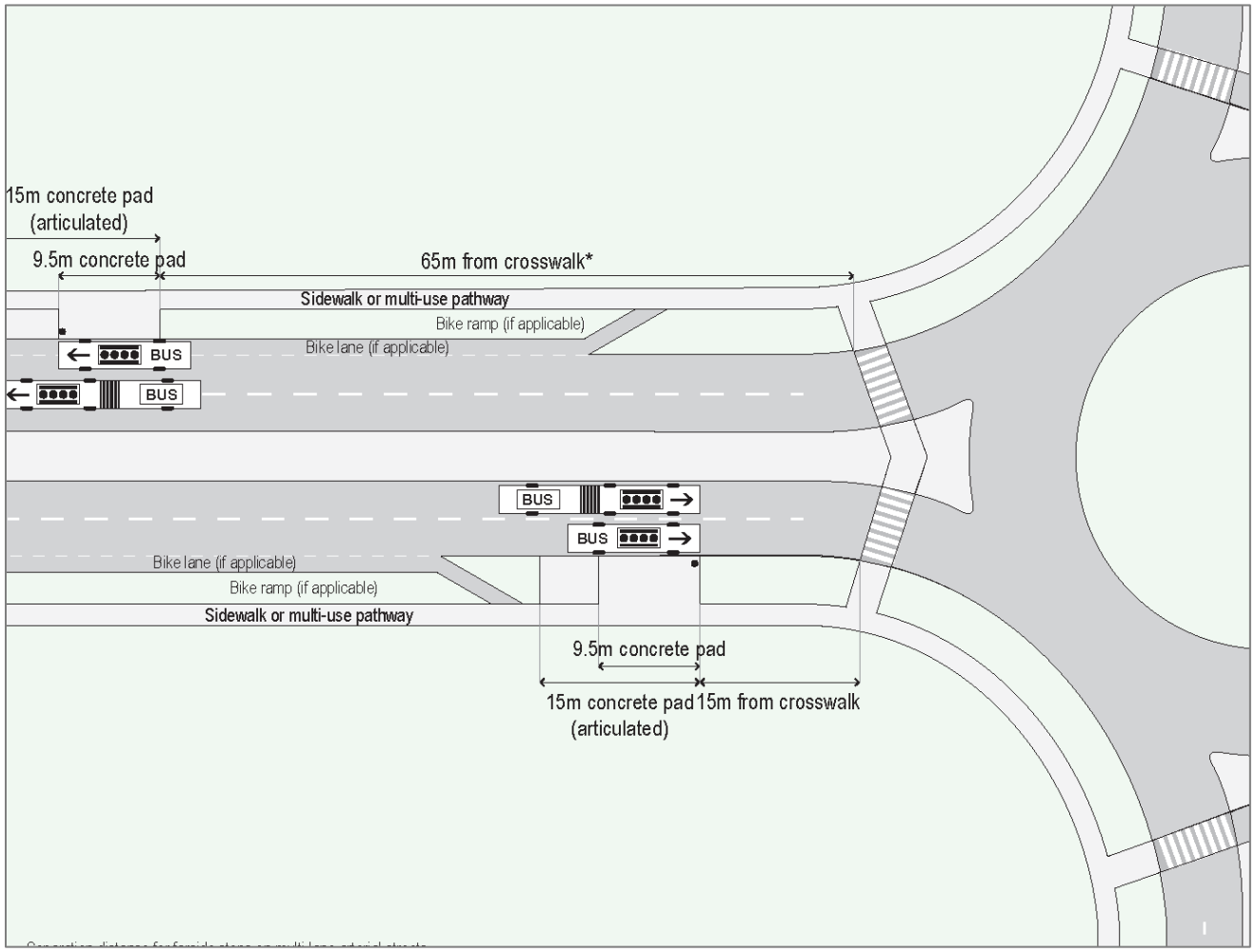
Farside bus stops are generally not preferred due to potential conflicts with general traffic exiting the roundabout and increased walking distances to the crosswalk. In some instances a farside stop may be implemented due to lack of suitable nearside location, proximity to a major destination, limiting street crossings for high transfer volumes, or to accommodate operational needs such as a left-turning bus or convergence of multiple routes.

Where a farside stop is required, a lay-by can be considered to mitigate traffic conflicts. However, this can further increase walking distances and has cost and property acquisition implications. The distance of a farside bus stop from the crosswalk of a roundabout depends on the width of the roundabout and the posted speed of the street.

A farside stop at a single-lane roundabout can be located just 20m from the crosswalk, in a similar configuration as a standard on-street farside stop. A farside stop at a multi-lane roundabout should be located 35m past the crosswalk if the posted speed is 50km/h or less, while the pad should be placed at least 65m from the crosswalk if the posted speed is 60km/h or more. These figures are guidelines only and specific stop placement locations must be determined on a case-by-case basis accounting for local context. Separation distances for stops at roundabouts can be adjusted as necessary at the direction of Grand River Transit.

Figure 7-6 shows the typical layout and dimensions of bus stops at multi-lane roundabouts, integrated with crosswalks and cycling lanes on the approaching street.

Figure 7-6: Guidance for Nearside and Farside Stops at Multi-Lane Roundabout



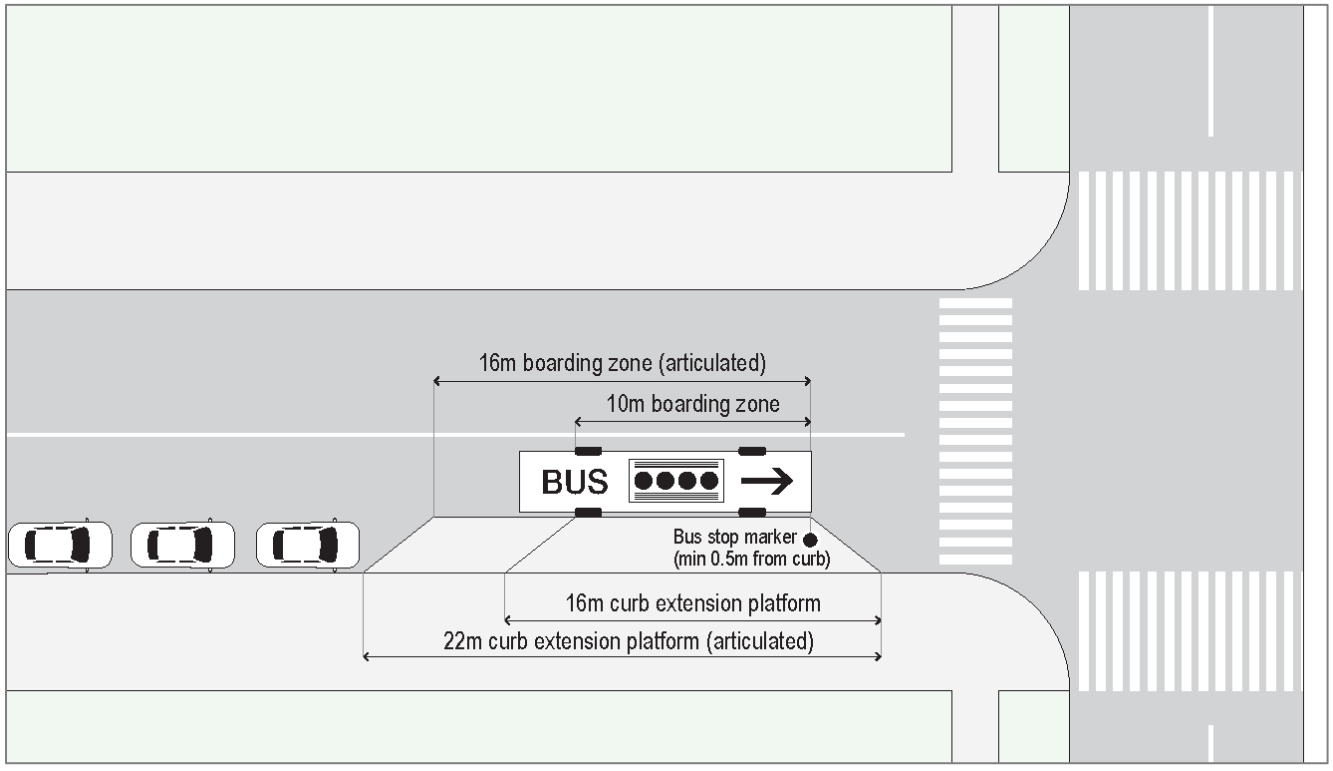
7.4 Curb Extension Bus Stops

A curb extension stop involves the curb “bulbing out” into the travel lane, allowing buses to serve the stop without moving laterally. Curb extension stops are typically found in urban environments with parallel parking. Some advantages to curb extension stops include:

- An expanded and more prominent pedestrian realm.
- Reduced crossing distances for pedestrians.
- Reduced curb space requirements, maintaining on-street parking.
- Reducing delays associated with entering/exiting lay-bys.
- Buses cannot be obstructed by illegally-parked vehicles.

A curb extension stop also functions as a method of traffic calming. By using a curb extension, the roadway at the intersection can be narrowed, slowing traffic speeds and improve safety. A curb extension stop is 16m in length, with a 10m continuous boarding zone and 3m tapers on either side of this. These dimensions are illustrated in Figure 7-7. Examples of curb extension stops in Waterloo Region can be found along King Street in Downtown Kitchener and Uptown Waterloo.

Figure 7-7: Typical Curb Extension at Bus Stop



7.5 Bus Stops with Cycling Infrastructure

Integrating and accounting for cycling infrastructure when designing bus stops is important for encouraging the safety of transit users, cyclists, and other road users.
Ensuring that transit and cycling infrastructure is coordinated is also important for encouraging more sustainable transportation use, both in terms of encouraging access to transit by active modes, and by encouraging positive experiences for both transit customers and cyclists – encouraging sustainable mode use is a central Regional and municipal transportation planning objectives (see Chapter 2).

This section provides an overview of typical transit stop-cycling integration design approaches **based on the recommendations of Ontario Traffic Manual Book 18.**

However, before any specific design is considered it is important for GRT to review Regional and municipal Transportation Master Plans and Cycling Master Plan to determine what type of cycling infrastructure, if any, is planned for a particular corridor, and approximately when construction will take place. This enables GRT to account for any future cycling infrastructure when implementing new stops and/or upgrading existing stops.

The main stop types, whose selection is mainly driven by the type of cycling facility under consideration, in this section include:

- Bike Lanes – Curbside Stops
- Bike Lanes – Lay-by Stops
- Cycle Tracks – Shared Curbside
- Cycle Tracks – Island Boarding
- Multi-Use Pathways (In-Boulevard):

The cycling facilities listed above are defined as follows:

- **Bike Lanes** are a portion of the roadway dedicated for cyclists that are designated by pavement markings and signs. They generally operate in the direction of traffic on the right side of the road. A painted buffer is sometimes present to provide separation between the travel lane and/or parked cars.
- **Cycle Tracks** are a cycling facility adjacent to the roadway that provide additional separation between cyclists and general traffic by providing a curb or concrete median to separate the facility from the roadway Cycle tracks are also generally vertically separated from the roadway. Cycle tracks generally operate in the direction of travel.
- **Multi-Use Pathways (In Boulevard)** facilities that are shared by pedestrians, cyclists, and other form of active transportation. Multi-use pathways are separated from the roadway by a curb and buffer. In-Boulevard Multi-Use Pathways operate in the road right-of-way, whereas multi-use trails operate in a dedicated corridor (e.g. through a park).

When making decisions on stop design, it is important to consider the surrounding context and overall vision for the corridor, including general modal priority and intended level-of-service for each mode. This underscores the importance of consulting Regional and municipal plans when making design decisions. In addition, there are several other general factors to consider including:

- Total transit service frequency;
- Boardings and alightings at stop and the stopping frequency of buses;
- Transit vehicle dwell time;
- Operating speed of traffic (including buses);
- Location of stops (nearside, farside, midblock); and,
- Right-of-way width and available space.

Bike Lanes – Curbside Bus Stop

For a curbside bus stop on a street with a conventional or buffered bike lane, transit vehicles would need to stop in the bike lane. This design involves conflicts between buses and cyclists, however, conflicts are a direct function of the frequency of transit service. Ontario Traffic Manual Book 18 recommends only using this design on corridors with fewer than four trips per hour.

If this stop treatment is applied in relation to a separated facility, a break in separation of 50m is typically required to provide bus stop access and egress. For conventional bike lanes, it is assumed that no exit taper is required, as buses can use a portion of the bike lane to merge back into the travel lane. Drawings of stop configurations with different types of stop infrastructure are provided in Appendix B.

Figure 7-8: Example of Curbside-Bike Lane Stop

Source: Grand River Transit

Bike Lanes – Lay-by Bus Stop

This design involves buses crossing a cycling facility, typically a conventional on road or buffered bike lane, to access a bus stop or lay-by at the curb. There is no conflict between cyclists and transit customers in this design; however, there are conflicts between cyclists and arriving/departing buses, as vehicles enter and exit the stop. This contributes to higher levels of traffic stress for cyclists. Lay-bys in general also cause delays to transit vehicles as they must merge into the travel lane (see Chapter 1.1).

Figure 7-9: Example of Lay-by bus stop with Bike Lane

Source: Grand River Transit

Cycle Tracks – Shared Curbside

This stop configuration can potentially be applied when a cycle track is routed between the curb and customer waiting area – customers board and alight from the vehicle across the cycle track while cyclists yield. In this configuration, the cycle track is raised to the same level as the sidewalk adjacent to the transit stop. This design is also compatible with a conventional bike lane that raise to curb height at a transit stop.

This design eliminates conflict between transit vehicles and cyclists but creates conflict between boarding/alighting customers and cyclists. However, this conflict only occurs when transit vehicles are present at the stop. Of note, this design uses less right-of-way space vs. the Island Boarding configuration.

Figure 7-10: Example of Shared Curbside Cycle Track Stop

Source: Grand River Transit

Cycle Tracks – Island Boarding

Island boarding is typically associated with a cycle track or other physically separated cycling infrastructure and involves the cycling facility routing behind the passenger boarding and waiting area to travel between the sidewalk and waiting area. Transit customers access the waiting area by crossing the cycling facility from the sidewalk.

This design eliminates conflict between transit vehicles and cyclists, and between cyclists and waiting transit customers. Cyclists are required to yield to transit customers crossing the cycling facility. However, there can be accessibly concerns with this design, as customers must cross the cycling facility to access the stop. This conflict can be managed by installing barriers to direct pedestrians to a single crossing point and ensuring that all accessibility design features are present. While customers must cross the cycling facility when boarding/alighting in the Shared Cycle Track design the conflict only occurs when a bus is present and the bus acts as a clear signal to cyclists that transit customers are present.

Figure 7-11: Example of Cycle Track Island Boarding Stop

Source: Grand River Transit

Multi-Use Pathways

Multi-Use Pathways (MUPs) present unique considerations when integrating transit stops with these facilities. As separate multimodal active transportation facilities that accommodate walking, cycling, and other forms of active mobility, a variety of potential conflicts must be managed. In particular, on higher-volume MUPs there is greater potential for conflicts between cyclists and pedestrians at bus stops. Furthermore, as separate facilities that generally provide a high level of comfort, MUPs have the potential for higher speed cyclists, which underscores the importance of managing potential conflicts with transit customers.

OTM Book 18 indicates that MUPs should be routed behind bus stops to separate transit customers from cyclists where possible. In addition, The York Region Pedestrian and Cycling Planning & Design Guidelines recommend signage and different pavement surfaces at transit stops to communicate pedestrian priority. In constrained corridors, OTM Book 18 notes that a shared design can be implemented similar to the Cycle Track – Shared Curbside design described in this section.

Figure 7-12: Example of Bus Stop at Multi-Use Pathway

Source: Grand River Transit

8 Customer Amenities

The following section describes amenities commonly included at bus stops to enhance comfort and the overall customer waiting experience. The specific amenities included at a stop depend on the stop usage, the availability of space and traffic and operational safety considerations. This amenity selection process is guided by the stop typology system, as well as stop-specific warrants for different types of amenities (introduced in Chapter 6).

8.1 General Principles

The installation of customer amenities shall minimize interference with passengers waiting, boarding, or alighting, nor with snow clearing operations and visibility of passengers waiting at the stop (by operators and other modes). Amenities such as shelters, benches, garbage containers, and landscaping must remain clear of the boarding and alighting areas. Amenities are included to enhance the stop environment and must not compromise the safety or accessibility of the stop.

In Spring 2022, GRT, in collaboration with the University of Waterloo School of Planning, conducted a study to review the accessibility of Fairway Park ION LRT Station for people with visual impairments. While the scope of the study was ION LRT stations, the recommendations from this process have been incorporated into the Guidelines where applicable to encourage consistency across the network and promote accessibility. It is recommended that tactile ground surface indicators are supplemented with directional tactile ground surface indicators to indicate safe movement paths. Tactile wayfinding posts and signage should also be installed at directional tactile ground surface indicator pathway intersections at eye level or 1500mm above the finished floor surface.

8.2 General Applicability of Bus Stop Amenities

A summary of recommended customer amenities at each stop, organized by stop typology, is provided in Figure 8-1. A dark circle indicates requirement, a white circle indicates recommendation where appropriate, and an X indicates that a particular amenity is not contextually appropriate. However, amenities that could improve the accessibility of a stop may be considered based on customer need at a particular location even if not typically warranted.

Figure 8-1: Bus Stop Amenity Matrix

	Stop Typology		
Amenity	**Standard**	**Enhanced**	**Major**
Required Amenities			
Bus Stop Sign	●	●	●
Concrete Landing Pad	●	●	●
Customer Comfort			
Bench	○	●	●
Standard Shelter (12')	×	●	×
Medium Shelter (16')	×	○	●
Large Shelter (20')	×	×	○
Waste Receptacles	○	○	●
Customer Information			
Passenger Information Display	×	○	●
Announcement Systems	×	×	○
Maps & Wayfinding	×	○	●
Safety and Security			
Passenger Assistance Intercom	×	×	○
Security/CCTV Cameras	×	×	○
Pedestrian / Stop Lighting	○	○	○
Multi-Modal Integration			
Bicycle Parking	○	○	●
Micromobility	○	○	●

Legend ● recommended ○ potential application × not recommended

8.3 Required Amenities

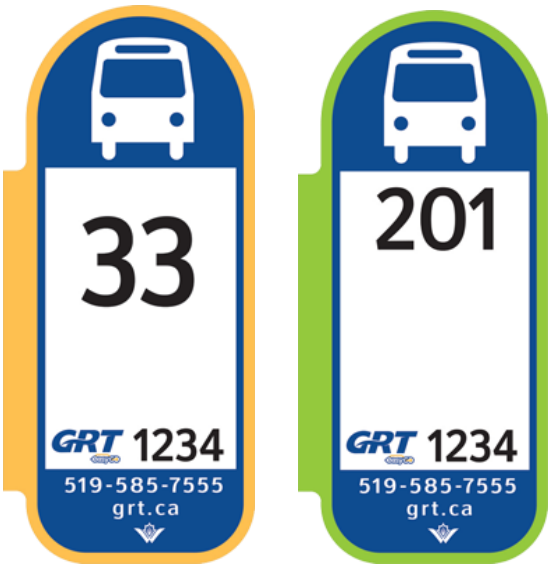
Bus Stop Markers

Note: The outcome of GRT's Wayfinding Strategy may change bus stop markers guidance

The bus stop marker is an elevated sign that indicates the location of the stop to customers on the sidewalk and bus operators on the road:

- Bus stop markers are required at all stops.
- This sign prominently features the universal bus icon at the top and the GRT logo and 4-digit bus stop number listed at the bottom. The service (such as local, iXpress, etc.) is indicated by the colour along the edge of the sign. Examples of standard bus stop signage are shown in Figure 8-2.
- The sign is dual sided to be read from any direction of approach.
- Stop marker placement should consider the stop context to ensure clear visibility and sightlines.
- It clearly indicates the route(s) served by the stop and meets relevant AODA requirements using large text, high-contrast colours, and universal symbology that can be read in any language.
- The sign may be mounted on a stand-alone post, or on a utility post if it is located adjacent to the head of the stop.
- Polished and brushed metals should not be used on poles due to their low visibility and potential to create glare.
- Poles should be surfaced to provide a clear visual contrast with the surrounding environment.
- Standard and enhanced stops generally use a wooden/u-channel/unistrut post while major stops generally use silver poles.
- Where parking demand is high and there is the potential for parked vehicles to encroach on the ability of buses to access stops, supplementary "No Parking" signs may be installed according to the required dimensions. Parking is prohibited within 30 metres on either side of a point designated as a bus stop.
- Schedules or information panels may be attached to stop markers if appropriate for the stop context.
- GRT is currently updating bus stop signage around the region. Older-style signs that do not follow the current style may still be found at some stops in advance of replacement. Examples of this legacy bus stop signage are shown in Figure 8-3.

Figure 8-2: Standard Bus Stop Signage



Source: Grand River Transit

Figure 8-3: Legacy Bus Stop Signage

Source: Grand River Transit

Concrete Landing Pads

A concrete landing pad is an area that is separate from the sidewalk and provides an accessible, designated, and safe space to wait (particularly in the absence of a shelter), board, and alight.

- **Pads should be at least 9.5m in length** to accommodate for a conventional bus.
- For stops served by articulated buses, pads should be at least 15m in length.
- **Pads should be at least 2m in width**, dependent on the width of the boulevard and required amenities. Additional pad space may be added between the sidewalk and property line if the boulevard is not wide enough to fit all required customer amenities.
- Pads must connect to the curb and sidewalk.
- If the combined width of a pad and sidewalk is less than 2.5m, then additional pad space behind the sidewalk is required to meet accessibility requirements. The pad must be at least 1.9m wide if a shelter is to be installed.
- Pads should consider available space to facilitate snow clearance at the bus stop.
- **Front-door only pads** are a minimum requirement in cases where space is limited.
- **Curb faced sidewalks** can be considered as a hard surface in lieu of landing pads, however, they still must have a minimum width of 2.5m to meet accessibility requirements.

GRT endeavours to provide concrete landing pads at all bus stops, including upgrading stops in rural contexts that do not currently feature pads. A paved boarding and alighting area is required for accessibility. Sidewalk connections should be extended to all landing pads.

Combined landing/shelter pads are implemented when the boulevard is sufficiently wide or when a separate shelter pad cannot be accommodated within the right-of-way. This stop layout is preferred for roads featuring active transportation infrastructure to minimize passenger conflicts.

- **Combined pads should be at least 2.7m in width** to allow for the installation of a shelter within the boulevard. For landing pads of width between 2.7m and 3.5m, shelters shall be installed with the entrance facing the sidewalk.
- Combined pads that are at least 3.5m in width allow for the installation of a shelter with entrance facing the roadway.

Figure 8-4: Example of Concrete Landing Pad (less than 2.5m width)

Source: Grand River Transit

Figure 8-5: Example of Combination Concrete Landing/Shelter Pad

Source: Grand River Transit

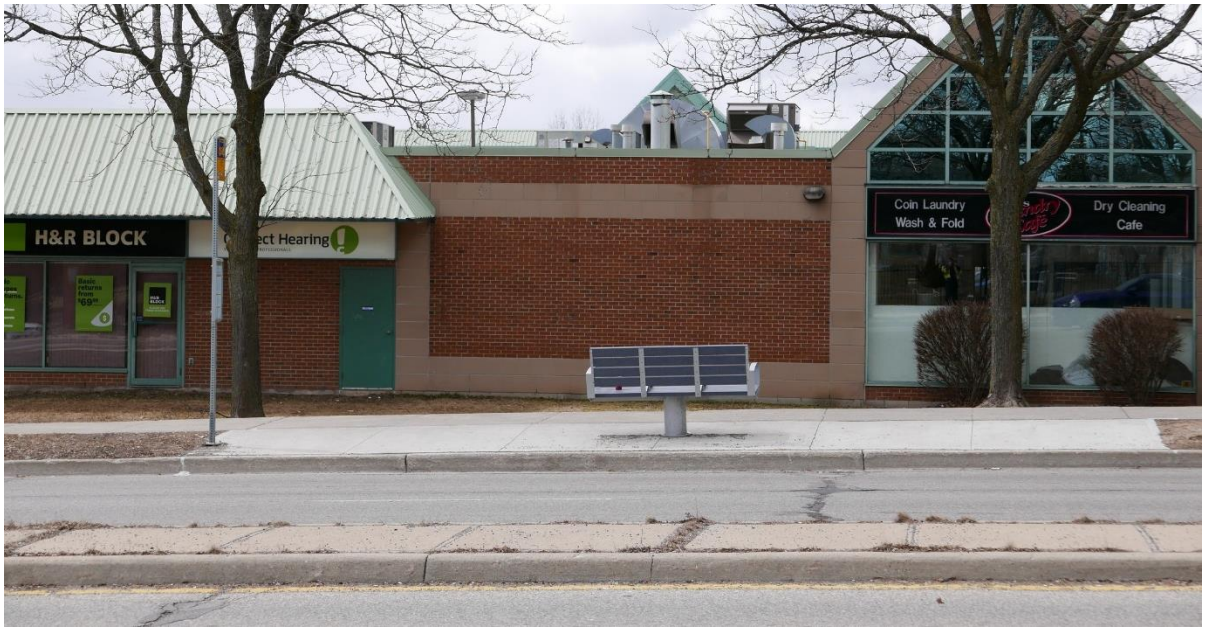
8.4 Customer Comfort

Benches

Benches improve comfort and accessibility as they provide customers with a place to sit down and rest while waiting for the bus. This is particularly important for customers who may have difficulty standing for extended periods of time. Stand-alone benches may be provided by GRT or by third-party advertisers.

- **Benches are warranted at standard stops exceeding 10 boardings per day**. At enhanced or major stops, customer seating is required within the shelter at minimum.
- Stand-alone benches and benches in shelters may both be installed at enhanced, or major stops. This requires available space in the right-of-way (on the landing or shelter pad).
- Installation must not negatively impact sightlines for drivers or pedestrians or raise other safety or accessibility concerns.
- Bus stop benches should be fixed in place and oriented to provide direct sightlines for approaching buses.
- Benches should be surfaced in a manner that provides clear visual contrast with the surrounding environment.
- Wherever possible, polished and brushed metals should not be used due to their low visibility and potential to create glare.

Figure 8-6: Example of Bench at Bus Stop



Source: Grand River Transit

Shelters

Shelters increase customer comfort and safety by shielding customers from weather such as rain, wind, or snow. Shelters improve the visibility of bus service and provide available space for wayfinding and passenger information displays. Advertising shelters generate advertising revenue for the transit agency while also improving customer comfort.

Shelters should:

- Be designed with strength and durability to resist weather and vandalism.
- Have transparent walls on at least three sides and translucent roofs to encourage customer visibility for approaching buses and increase safety for all road users.
- Include a built-in bench to allow passengers to sit within the shelter.
- Be surfaced in a manner that provides clear visual contrast with the surrounding environment.
- Not use polished and brushed metals due to their low visibility and potential to create glare.

Grand River Transit generally provides three distinct shelter sizes: small (5'x12'), medium (5'x16'), and large (5'x20'). In general:

- Enhanced stops must, at minimum, provide a small shelter.
- Major stops must, at minimum, provide a medium shelter.
- A large or customized shelter may be considered based on fulfilling additional criteria.
- Standard four-post shelters should be installed where warranted and feasible. In some situations, there may be space constraints where two-post (cantilever) and half-footprint shelters may be installed.
- All shelters are required to be located on a concrete pad. For shelters on dedicated pads behind sidewalks, the pad specifications are as follows:

Shelter Size	Shelter Pad Specification	Property Requirement
Small	4.5m x 2.3m	5m x 3m
Medium	6m x 2.3m	6.5m x 2.3m
Large	7m x 2.3m	7.5m x 3m

- Where possible, shelters include a minimum 2" electrical conduit for powered connections to facilitate illuminated advertising, in-shelter lighting and/or a passenger information display. Solar-powered shelters may also be provided, particularly in areas where power connections are challenging).

Generally, shelters should be set back 0.5m from the curb, unless within 20m of an intersection, where 1m should be provided if possible. When located near multi-use pathways, shelters should be set back 0.5m (minimum) to 1m (preferred) to accommodate snow clearing and reduce the risk of damage from plowing equipment. Drawings of concrete pads with shelter installation are provided in Appendix C.

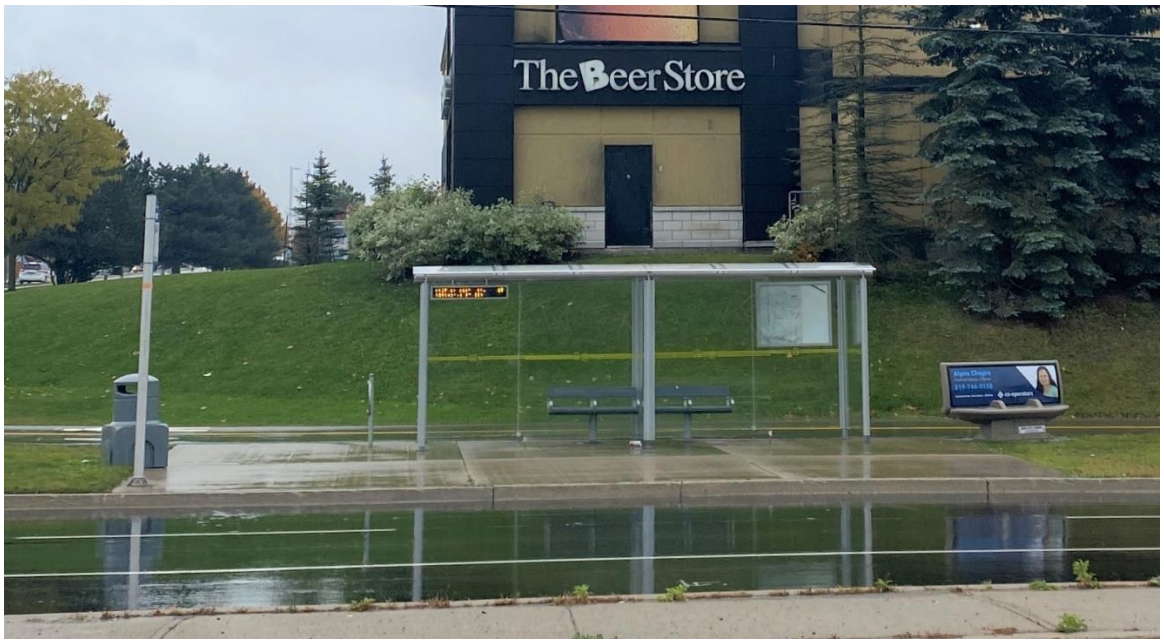
Figure 8-7: Example of Small Shelter

Source: Grand River Transit

Figure 8-8: Example of Medium Shelter

Source: Grand River Transit

Figure 8-9: Example of Large Shelter



Source: Grand River Transit

Figure 8-10: Example of Customized Shelter

Source: Grand River Transit

Shelter Warrants at Standard Stops

A shelter is warranted for installation at any standard stop exceeding 20 customer boardings per day. Shelters may also be warranted at standard stops depending on the following factors:

- A bus stop that is adjacent to or across the street from a seniors' residence or long-term care facility.
- A bus stop with a catchment area where at least 20% of the population is over the age of 65.
- A bus stop that is adjacent to a hospital or medical clinic.
- A bus stop with a catchment area where at least 20% of the population falls below the Low Income Cut-Off (LICO).
- A bus stop where a route change is planned, or has occurred in the last two years, assuming the change does not result in the stop being closed.
- A bus stop with at least one customer request for shelter installation.
- A bus stop with 15 or more observed customer transfers per day.

For the above factors involving census demographic data, the catchment area of a bus stop shall be defined as including any census Dissemination Area (DA) that borders or abuts the intersection served by the bus stop.

Each of the above factors is valued at 5 "points" for a shelter warrant, in addition to 1 "point" per average daily customer boarding. These scoring factors are used to prioritize stops where shelters are needed most in order to maximize available capital funds.

Shelter Design & Bird Collisions

The transparent glass sides of bus shelters can be a hazard to birds. Collisions with the glass may result in injuries or death to the birds and serve as hazards to passengers waiting at the stops. Bus shelter designs that mitigate this issue include the following:

- **Fritted Glass:** This is a glass design that employs small white circles across the surface of the glass. These circles disrupt the reflection of standard glass and increase the visibility of the solid glass walls.
- **Public Art:** Forms of public art may be displayed on the glass sides of the shelters. This helps the birds identify the glass sides as solid structures and provides aesthetic value to customers waiting at the stop.

In some cases, birds may attempt to nest on the roof of bus shelters. This can result in a hazard for customers waiting at the stop due to the presence of the birds and bird droppings. Bird spikes, that are dull and do not harm the animals, and reflective flash tape can be used to reduce bird roosting on shelter roofs.

Waste Receptacles

Waste receptacles are an important element to improve cleanliness and safety at transit stops. Waste receptacles can reduce litter along key corridors, particularly when stops are located near commercial uses.
Currently, waste receptacles can be found at major and enhanced stops served by iXpress routes. Waste receptacles are recommended at all major stops, and may be considered for future installation at standard and enhanced stops where warranted by customer and resident requests. Waste receptacles should avoid polished and brushed metals, due to their low visibility and potential to create glare, and be surfaced to provide a clear visual contrast with the surrounding environment.

8.5 Customer Information

Passenger Information Displays

Note: The outcome of GRT's Wayfinding Strategy may change customer information guidance

Passenger Information Displays (PIDs) are electronic signs placed at bus stops to deliver next-bus and other service information to customers. They are typically mounted inside shelters; there are also applications available on free-standing poles or integrated with stop signage.
PIDs can be used to convey any type of information to customers; the most common is real-time arrival information that tells customers when the bus will arrive. PIDs can also be used to communicate detours or closures.

- PIDs shall be installed at all Major stops.
- PIDs may be considered at Enhanced stops at GRT's discretion, particularly in the case of major destinations or high transfer volumes.
- Solar-powered displays are an option in areas where electrical service is not feasible.
- On-demand audible announcements of passenger information displays should be considered as part of future product procurement.
- GRT should monitor PID technology advancements such as e-paper displays and consider developing pilot projects.
- Wherever possible, polished, and brushed metals such as aluminum and stainless steel should not be used due to their low visibility and potential to create glare.

Passenger Announcement Systems

Passenger announcement (PA) systems provide customer information through a loudspeaker at transit stations. These announcement systems can be an important aspect of communicating information to customers, providing an alternative for customers who are blind or low-vision.
As with PIDs, passenger announcement systems can communicate information to customers such as real-time arrival information, detours and closures, or upcoming or recent service changes.

- Passenger announcement systems are currently provided on ION LRT station platforms.
- Passenger announcement systems can be considered as part of an overall system-wide communications strategy at Major stops in the future.

Maps and Wayfinding

Note: The outcome of GRT's Wayfinding Strategy may change customer information guidance

Maps and other wayfinding information are installed at bus stops to help customers navigate the transit system. This information is commonly posted inside shelters to reduce wear and tear from weather exposure. For more details, refer to GRT's Wayfinding Harmonization Guidelines.

- Maps that may be installed include network maps, and maps of the surrounding area (e.g. within 500 or 800m – these are installed at ION stations and terminal locations).
- Maps and wayfinding are recommended for Major stops. Maps and wayfinding may be considered at Enhanced stops, particularly in the case of major destinations or high transfer volumes.
- Standard GRT map frames measure 31" wide x 40" high. These frames have a secure closing mechanism, and are resistant to vandalism, rust, and weather damage.
- Tactile maps may be considered for Major stops to enhance wayfinding and accessibility.

8.6 Safety and Security

Bus Stop Lighting

Bus stops should be adequately lit to provide safe and effective transit service at night, ensuring that customers can be seen by operators on approaching buses. In many cases, this is provided by the standard street lighting of the surrounding area, but pedestrian-scale or stop-oriented lighting may be considered. Some transit shelters also have built-in lighting that provides for higher visibility, although this doesn't extend to the curb in all cases (depending on distance).

- All bus stops (regardless of typology) should be lit to a horizontal illuminance of 15 lux and a vertical illuminance of 10 lux unless otherwise approved by GRT. Supplemental lighting is recommended at stops where this minimum is not met.
- Where bus stops are lit by street lighting, the light should not be obscured or obstructed and must light the stop area.
- Supplemental lighting provided by pedestrian-scale lights or shelter-based lighting is recommended for Major stops.
- Supplemental lighting is required for stops with significant active transportation integration, to limit safety conflicts with cyclists.
- Supplemental lighting at stops should be designed to minimize light pollution and/or avoid negative impacts on adjacent properties.
- Solar powered lighting should be considered – either integrated in shelters or free-standing - where electrical connections are not available or to reduce energy use and requirements.

Security Cameras/Closed Circuit Television (CCTVs)

Security or CCTV cameras provide additional security on transit platforms by monitoring the customer waiting area and recording footage that can be reviewed in case of an incident. The presence of security cameras may also act as a deterrent against criminal behaviour.

- Security cameras are currently provided at all ION LRT station platforms.
- Where security cameras from ION platforms cannot reach a nearby Major, separate cameras for the stop may be considered.
- Security cameras can be considered as part of an overall system safety strategy at Major stops. Consider future-proofing these stops features by protecting for conduits and systems space.
- Where security or CCTV cameras are provided at a transit stop, enhanced lighting to 25 lux is recommended.

Passenger Assistance and Emergency Intercoms

Emergency call boxes (ECBs) provide a means for customers to call for help, either for customer information or in the event of an emergency. Payphones previously provided this function when installed at busy transit stops, either through free 911 dialing or push-button to transit assistance. While most customers have access to cellphones, there are circumstances where passenger assistance intercoms may be justified, such as very busy stop locations.

- Passenger assistance intercoms are currently provided at all ION LRT station platforms.
- At Major stops, ECBs can be considered as part of an overall system safety strategy. Consider future-proofing these stops for these features by protecting for conduits and systems space.
- Wherever possible, polished, and brushed metals such as aluminum and stainless steel should not be used due to their low visibility and potential to create glare.
- Passenger assistance intercoms should be surfaced to provide a clear visual contrast with the surrounding environment.

Figure 8-11 shows an example of an ECB on an ION platform.

Figure 8-11: Emergency Call Box

Source: Grand River Transit

8.7 Multi-Modal Integration

Bicycle Racks

Bicycle parking infrastructure at bus stops represents a convenient way for transit customers to address the “first-mile/last-mile” problem in accessing transit, providing storage if needed. This is particularly helpful for rapid transit services such as iXpress, which have a wider stop spacing and depend on a larger catchment area of potential customers, supporting longer-distance trips. The provision of bicycle racks at GRT bus stops also increases the overall supply of bicycle parking for community use.

- Bicycle parking is recommended for all Major stops.
- Bicycle parking may also be installed at Enhanced or Standard stops if sufficient right-of-way and/or pad space and customer demand is present.
- Bike racks should be located 0.45m (minimum; 0.6mm preferred) from shelter walls, while 1.8m in clear width from the edge of the bike rack to the curb should be provided. The intent of this placement is to optimize use of the rack while reducing impact to winter maintenance operations and stop accessibility.
- Covered or fully enclosed secure bike racks are typically 8’ x 18’ and may be considered at ION stations in proximity to Major stops in consultation with area municipal partners based on their local bike parking programming.

Bicycle racks should be securely surface-mounted instead of embedded in concrete to allow greater flexibility to adapt the stop area and/or reuse the racks from stops impacted from construction. They should not use polished or brushed metals, due to their low visibility and potential to create glare, and should be surfaced to provide a clear visual contrast with the surrounding environment.
Bus stops adjacent to bike lanes and other cycling infrastructure should be prioritized for bicycle rack installation.

Figure 8-12: Covered Bicycle Parking at an ION Bus Station

Source: Grand River Transit

Shared Micromobility

Shared micromobility refers to a family of emerging transportation technologies involving a shared active transportation fleet checked in and out by users. Examples of shared micromobility trialled in Waterloo Region include bikeshare and e-scooters. As with bicycle parking at bus stops, shared micromobility can be a helpful solution to the "first mile/last mile" problem, allowing customers to travel longer distances to a bus stop more quickly.

- The provision of parking areas for shared micromobility shall be coordinated between Grand River Transit and the Region of Waterloo, and determined based on the system's service characteristics and shared vehicle needs outlined in the Region and municipal partners' shared micromobility plans.
- Shared micromobility parking space and infrastructure can be considered at any bus stop. They are recommended for Major stops, although may be warranted at Enhanced stops with significant active transportation demand.
- Shared micromobility parking space and infrastructure should be deliberately placed to avoid encroaching on pedestrian waiting areas, and ensure accessibility is maintained at the stop.
- As shared micromobility becomes more common throughout the Region, specific processes for integrating shared micromobility at bus stops should be developed.

9 Requirements by Stop Class

This chapter provides further details on requirements by stop class and summarizes information from Chapters 6 and 8. This Chapter also provides drawings of each stop class in an overhead view with customer amenities that may be considered based on customer demand, as well as the minimum design requirements of the stop class.

9.1 Standard Stop

Service Type	Local or BusPLUS service
Design Requirements	Minimum requirements: • Bus stop marker • Concrete pad sized to accommodate standard bus
Optional	• Bicycle parking
Warrants	• Meets baseline stop justification

A standard stop is the most common type of bus stop in the transit network. The minimum requirements for a standard stop include a concrete pad and a bus stop marker. Standard stops may also accommodate amenities such as benches and bicycle parking if warranted by customer demand. Figure 9-1 below shows a standard stop sized for a standard bus with a bench installed in the middle of the pad. The pad provides clear boarding and alighting areas, which line up with the front and rear doors of the bus, on either side of the bench.

9.2 Enhanced Stop

Service Type	Local or BusPLUS service
Minimum Design Requirements	Minimum requirements: • Bus stop marker • Concrete pad sized to accommodate standard bus • Standard shelter (12”) • Bench
Optional	• Medium shelter (16”) • Waste receptacle • Real-time display • Maps & wayfinding • Bicycle parking • Bikeshare/micromobility docks
Warrants	• Local or BusPLUS service And any of: • Located at transfer point to other routes • Adjacent to major destinations • Observed overcrowding at existing stop • Ridership of greater than 20 average daily boardings observed

An enhanced stop is an upgraded bus stop that serves a higher level of customer demand than a standard stop. A standard (3.7m) shelter must be provided at each enhanced stop, with the potential to upgrade to a medium (4.9m) shelter if warranted. Other types of passenger waiting infrastructure may be provided at enhanced stops if warranted by customer demand. Figure 9-2 below shows an enhanced stop with a standard shelter, a waste receptacle, a bicycle rack, and a designated micromobility parking area.

9.3 Major Stop

Service Type	iXpress, high-demand Local or BusPLUS urban or suburban service
Minimum Design Requirements	• Bus stop marker • Concrete pad sized to accommodate articulated bus • Medium shelter (16”) • Bench • Real-time display • Maps & wayfinding • Bicycle parking
Optional	• Large shelter (20”) • Waste receptacle • Bikeshare/micromobility docks • Pedestrian lighting • Passenger intercom • Tactile strips
Warrants	• iXpress service • ION LRT or ION Bus service Or any of: • Located at transfer point to other routes • Adjacent to major destinations • Observed overcrowding at existing stop • Ridership of greater than 100 average daily boardings observed

A major stop serves the highest level of customer demand outside of the ION service network. A major stop is typically served by one or more iXpress or other major crosstown transit routes. Each major stop must have, at minimum, a medium (4.9m) shelter, a bench, real-time arrival information, maps & wayfinding, and bicycle parking. The shelter may be expanded to a large (6.1m) shelter if warranted by demand. Figure 9-3 below shows a major stop with a medium shelter, a map and real-time display board, a bicycle rack, two waste receptacles, and a designated micromobility parking area.

Figure 9-1: Preferred Standard Stop

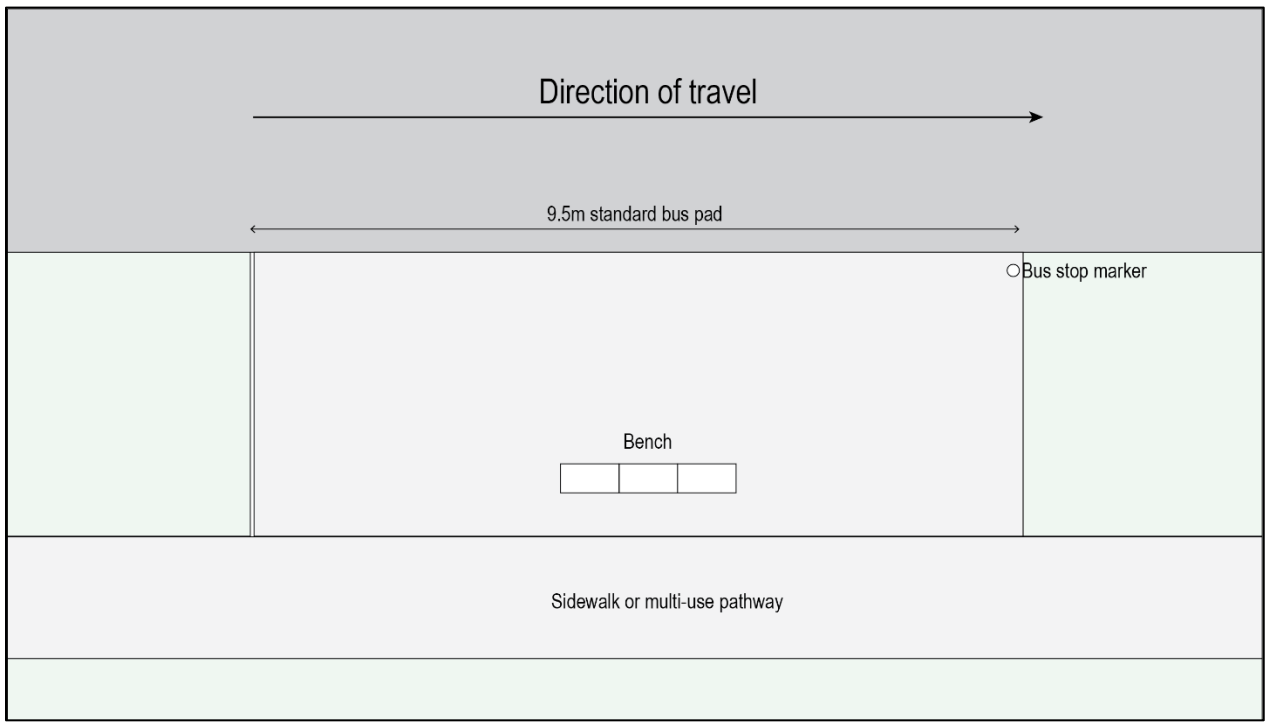


Figure 9-2: Preferred Enhanced Stop

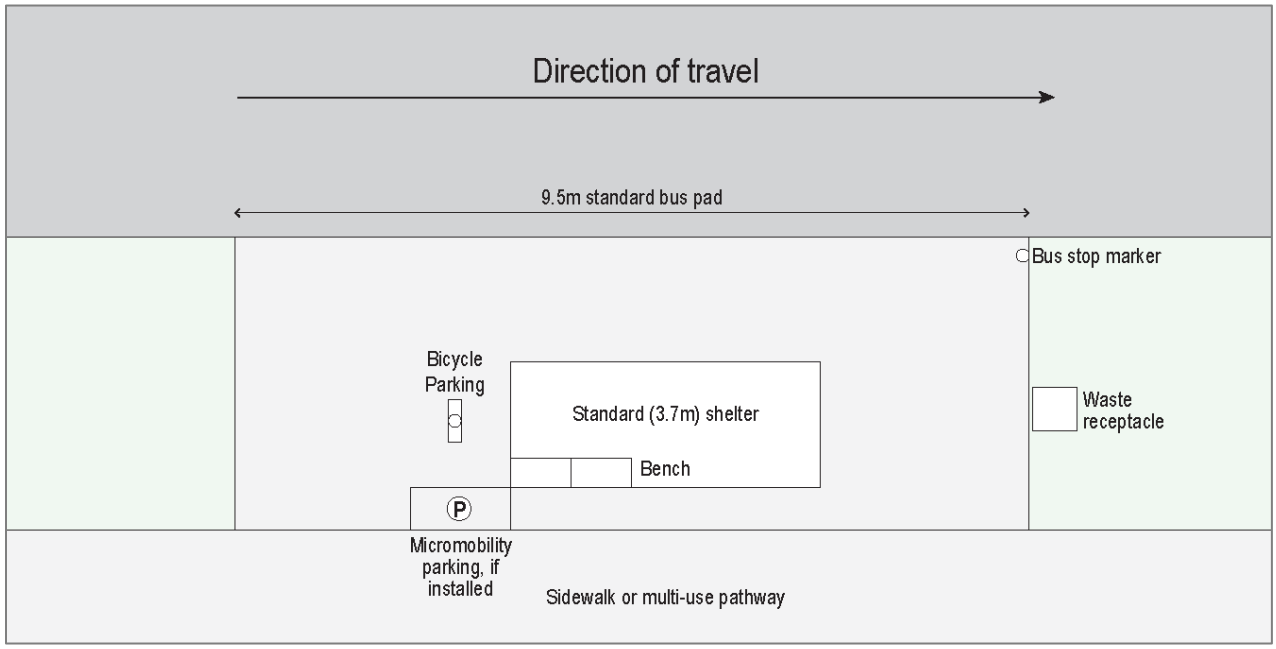


Figure 9-3: Preferred Major Stop

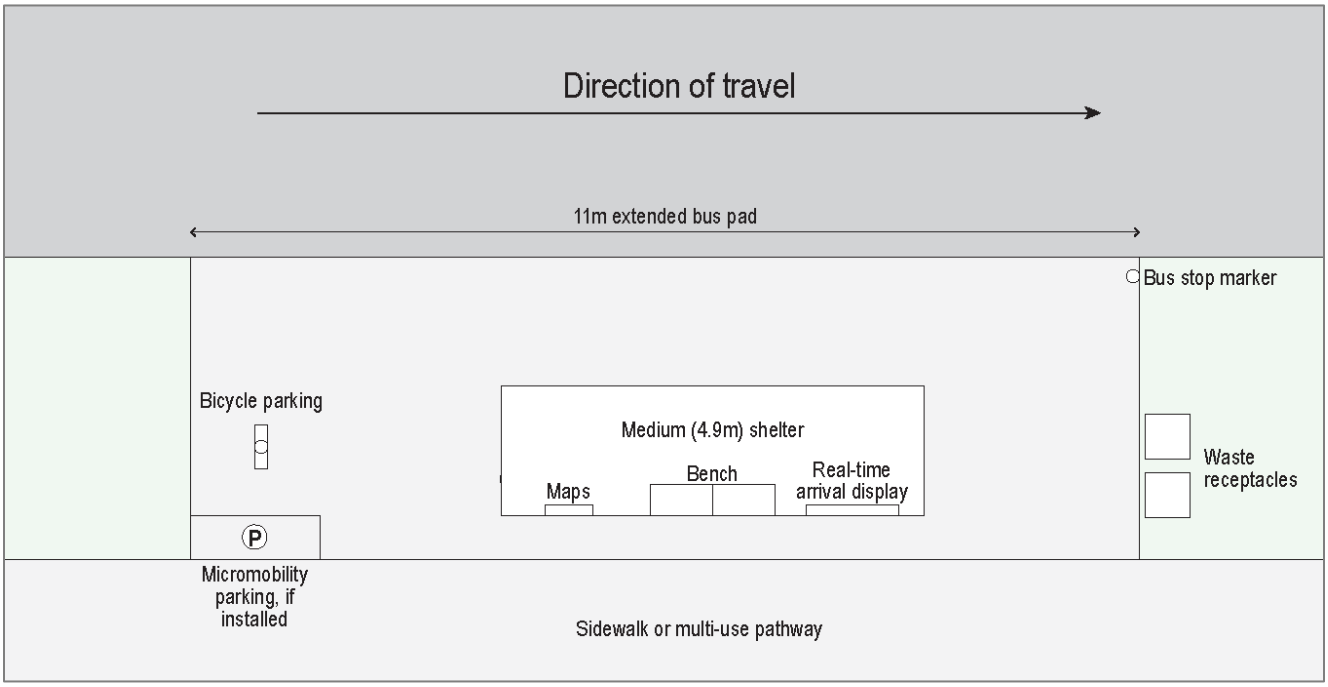
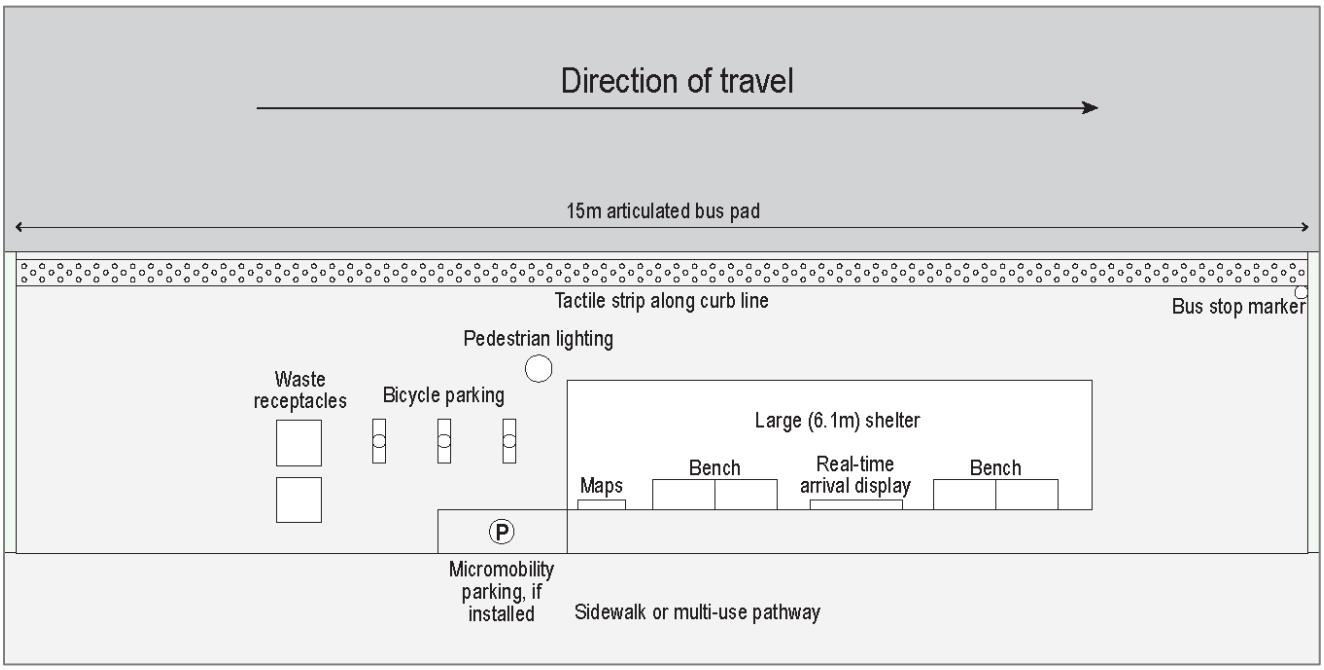


Figure 9-4: Preferred Major Stop with Large or Customized Shelter



Glossary of Terms

Some terms have been adapted from the following documents:

- *Metrolinx Seamless Network – Interim Design Standards*
- *Grand River Transit – ION Rapid Transit Wayfinding Harmonization – Draft Guidelines and Reference Document*
- *Context Sensitive Regional Transportation Corridor Design Guidelines (2013)*
- *Region of Waterloo Accessibility Design Standards (2015)*
- *Metrolinx 2041 Regional Transportation Plan*

Accessible: refers to any space, feature, element, site, environment or facility that can be used (e.g., located, approached, entered, exited or operated) by people with varying disabilities, with or without the use of mobility aids or assistive devices. Can also refer to services, practices and programs.

Active Transportation: human-powered travel such as cycling, walking, in-line skating and the use of mobility aids (such as motorized wheelchairs).

Amenities: features or services that are usable by the public that typically increase physical comfort throughout the built environment.

Bike Lanes: a portion of the roadway dedicated for cyclists that are designated by pavement markings and signs. They generally operate in the direction of traffic on the right side of the road. A painted buffer is sometimes present to provide separation between the travel lane and/or parked cars.

Boulevard: the area between the property line and the curb of the road.

Braille: a system of touch reading for the blind which employs embossed dots evenly arranged to represent numbers and letters.

Bus Lay-By: dedicated lanes or pockets on the curb side of the road for buses to enter to pick up and drop off passengers and, if required, observe scheduled layovers.

Catchment Area: the coverage area of a bus stop, approximately 450m for local bus stops (representing an average 5-minute walk).

Connect/Connections: the action of transferring between two routes, regardless of mode.

Crosswalk: the part of a roadway that is marked for safe pedestrian crossing.

Curb Extension (bus stop): where the curb “bulbs out” into the travel lane, allowing buses to serve the stop without moving laterally.

Cycle track: a lane adjacent to the roadway that provide additional separation between cyclists and general traffic by providing a curb or concrete median to separate the facility from the roadway Cycle tracks are also generally vertically separated from the roadway. Cycle tracks generally operate in the direction of travel.

Emergency Call Boxes (ECBs): a means for customers to call for help in the event of an emergency.

Farside Stop: a stop located immediately after the intersection in the direction of travel.

Frequency: the number of vehicles per unit of time past a certain point on a route, usually measured in vehicles per hour.

Grade: the slope parallel to the direction of travel that is calculated by dividing the vertical change in elevation by the horizontal distance covered.

Layover: time built into the schedule, usually at the end point of a route, for busses to stop for an extended period. This extra time improves schedule reliability and adherence, accounting for operator breaks and on-route delays.

Midblock Stop: a stop located between two intersections.

Multi-Use Pathways (In Boulevard): facilities that are shared by pedestrians, cyclists, and other forms of active transportation. Multi-use pathways are separated from the roadway by a curb and buffer. In-Boulevard Multi-Use Pathways operate in the road right-of-way, whereas multi-use trails operate in a dedicated corridor (e.g. through a park).

Nearside Stop: a stop located immediately before the intersection in the direction of travel.

No-Standing zone: an area that provides clearance for a bus to safely enter, serve, and leave the stop. Motorists are only permitted to receive and discharge passengers.

Operator Relief Point: a timepoint in the network where an operator can take over a bus from another operator without taking the bus to a garage. At a relief point, the operator taking over the bus will walk around the bus to inspect its exterior. This is known as a circle check.

Passenger Announcement (PA) Systems: systems that provide customer information through a loudspeaker at transit stations. These announcement systems can be an important aspect of communicating information to customers, providing an alternative for customers who are blind or low-vision.

Passenger Information Displays (PIDs): electronic signs placed at bus stops to deliver next-bus and other service information to customers. They are typically mounted inside shelters; there are also applications available on free-standing poles or integrated with stop signage.

Queue Jump Lanes: transit-only lanes that allow transit vehicles to bypass vehicular queues at intersections. They can be used in combination with transit signal priority to allow buses to enter traffic flow.

Ramp: a walking surface with a running slope steeper than 1:20.

Right-Of-Way: the width of a corridor from property line to property line.

Shared Micromobility: a family of emerging transportation technologies involving a shared active transportation fleet checked in and out by users.

Sidewalk: a path designated for pedestrian use and typically located between the curb or roadway and the adjacent property line that is part of the overall right-of-way.

Stop Marker: an elevated sign that indicates the location of the bus stop to customers and bus operators on the road.

Street Furniture: elements in the public right-of-way that are intended for use by pedestrians, including benches, lighting fixtures, waste receptacles and paper vending machines.

System map: a map showing the services from a single transit agency (Grand River Transit).

Tactile Walking Surface Indicator (TWSI): a surface detectable underfoot or by a long white cane, to assist persons with low vision or blindness by alerting or guiding them (often implemented as tactile strips).

Timepoint: a mid-route location where buses are scheduled to stop for a longer period of time if arriving ahead of schedule to maintain reliable operations.

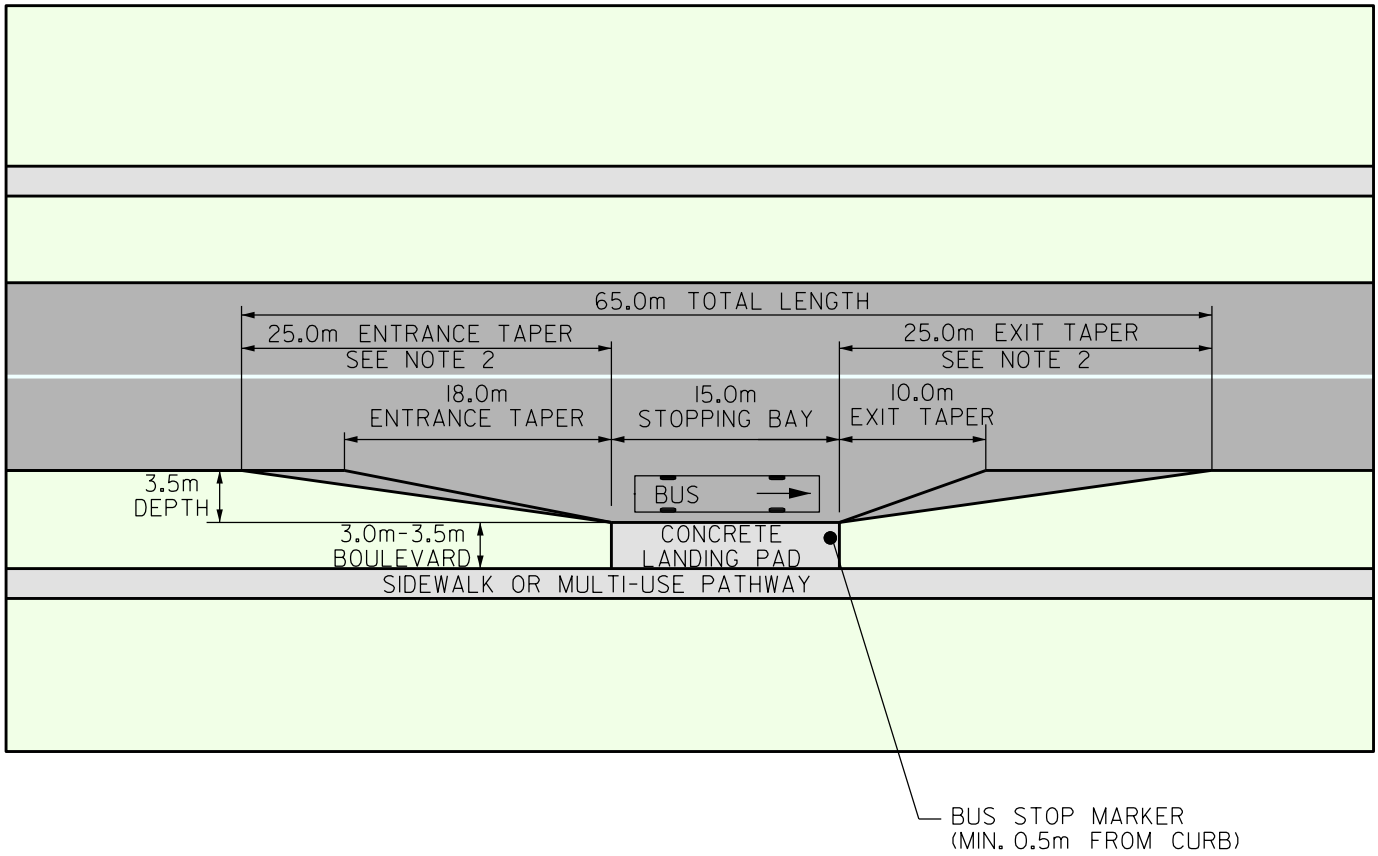
Transit Priority Lanes: a portion of the road that is dedicated or prioritized for transit vehicles.

Transit Signal Priority: tools that modify traffic signal phasing and timing when a transit vehicle is present to ensure that the transit vehicle movements are prioritized over automobiles.

Utilities: above ground or below ground infrastructure including water, hydro, cable, phone, fiber optics, wastewater and storm water.

Wayfinding: a term used to describe a variety of means for spatial orientation and finding one's way to a destination. Wayfinding design describes a variety of means for helping people find their way, through touch, print, signage, architecture and landscaping, for example.

Appendix A: Lay-By and Nearside Stop Drawings



TYPICAL BUS LAY - BY

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

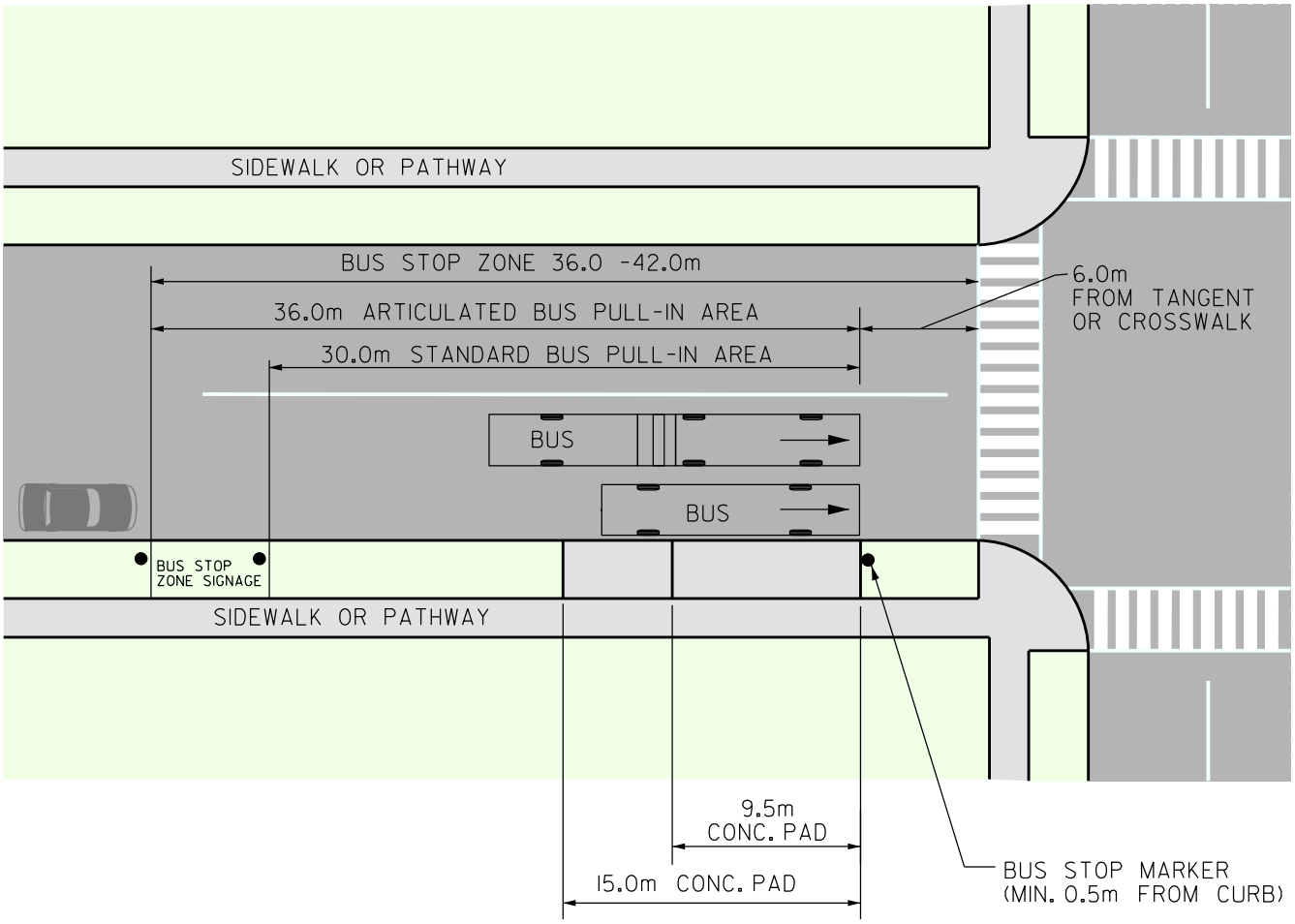
GRT
GRAND RIVER TRANSIT

NOTES:

1. STANDARD DRAWING IS APPLICABLE TO CONVENTIONAL BUSES.
2. LARGER ENTRY / EXIT TAPERS APPLY TO ROADS WITH SPEED LIMITS > 60km/h.

TYPICAL BUS LAY - BY

EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.		DRAWN: LL	STANDARD No. A-1



TYPICAL NEARSIDE BUS STOP

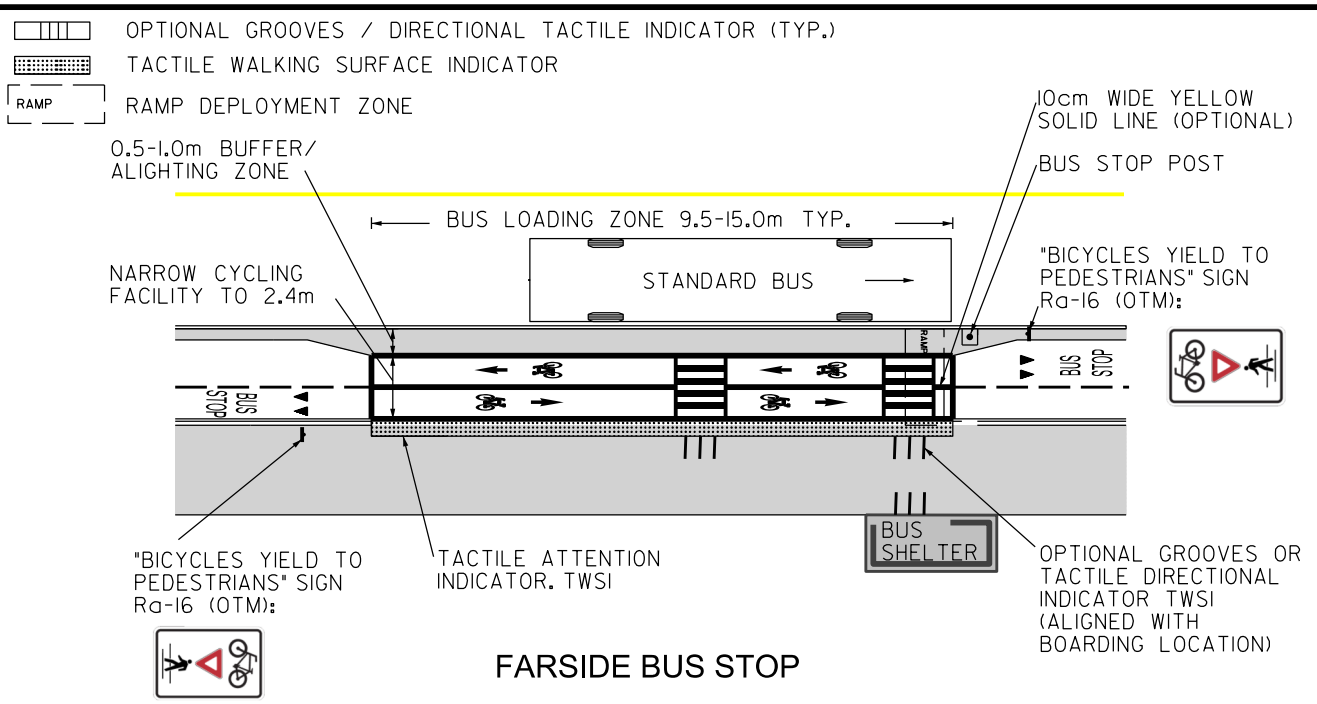
ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

GRT
GRAND RIVER TRANSIT

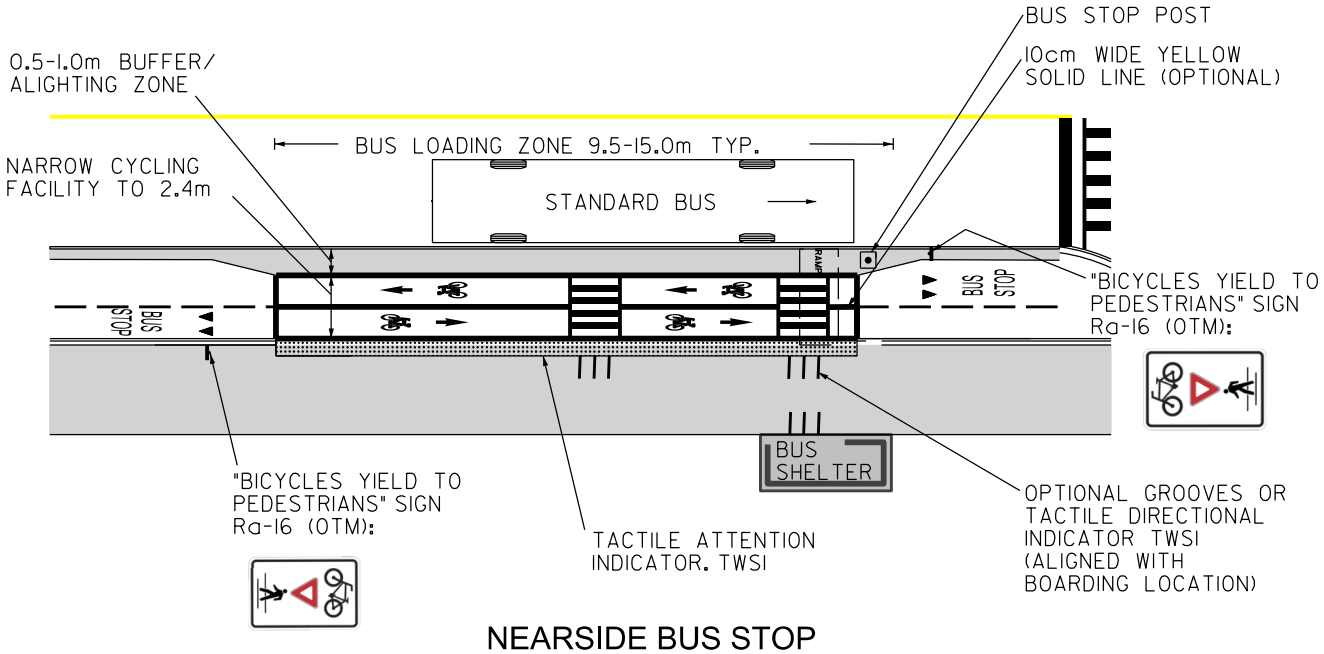
TYPICAL NEARSIDE BUS STOP

EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.		DRAWN: LL	STANDARD No. A-2

Appendix B: Active Transportation Drawings



FARSIDE BUS STOP



NEARSIDE BUS STOP

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

GRAND RIVER TRANSIT

NOTES:

1. PRIMARY BUS STOP POST MUST BE A MINIMUM OF 0.60m FROM FACE OF CURB.
2. THIS DRAWING REPRESENTS THE CONSTRAINED DESIGN THROUGH TRANSIT STOPS. FOR THE PREFERRED DESIGN, REFER TO STANDARD DRAWING B-2.
3. FOR CYCLING PAVEMENT SYMBOL DETAILS, REFER TO OTM BOOK 18.

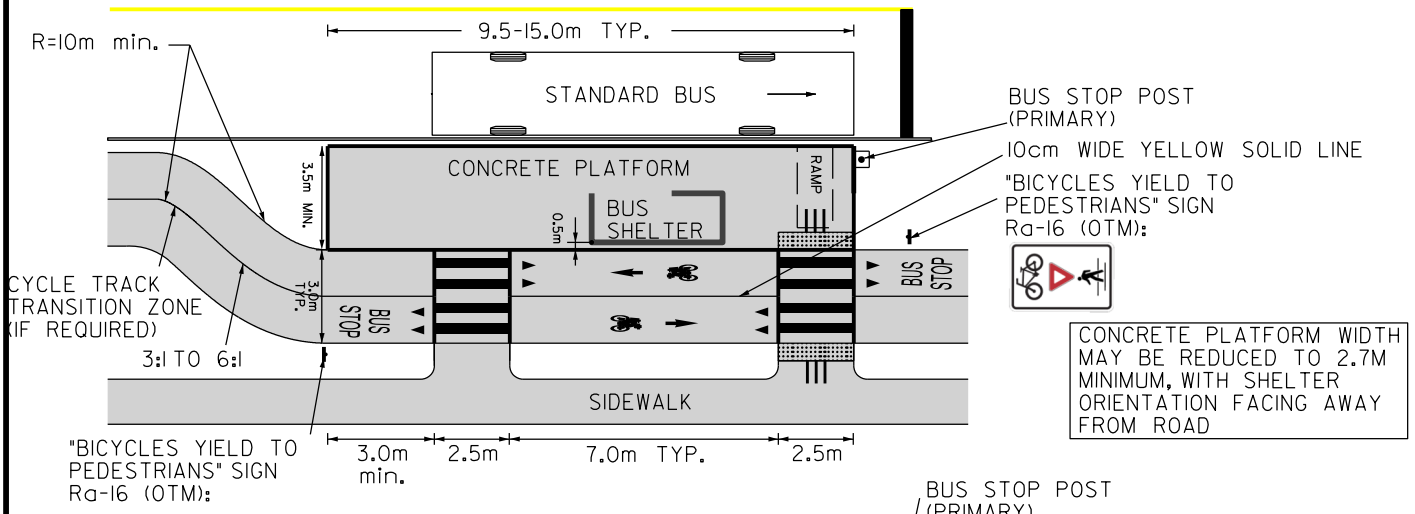
TWO - WAY RAISED CYCLE TRACK AT NEARSIDE & FARSIDE BUS STOPS (CONSTRAINED)

EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.	0	DRAWN: SO	STANDARD No. B-1

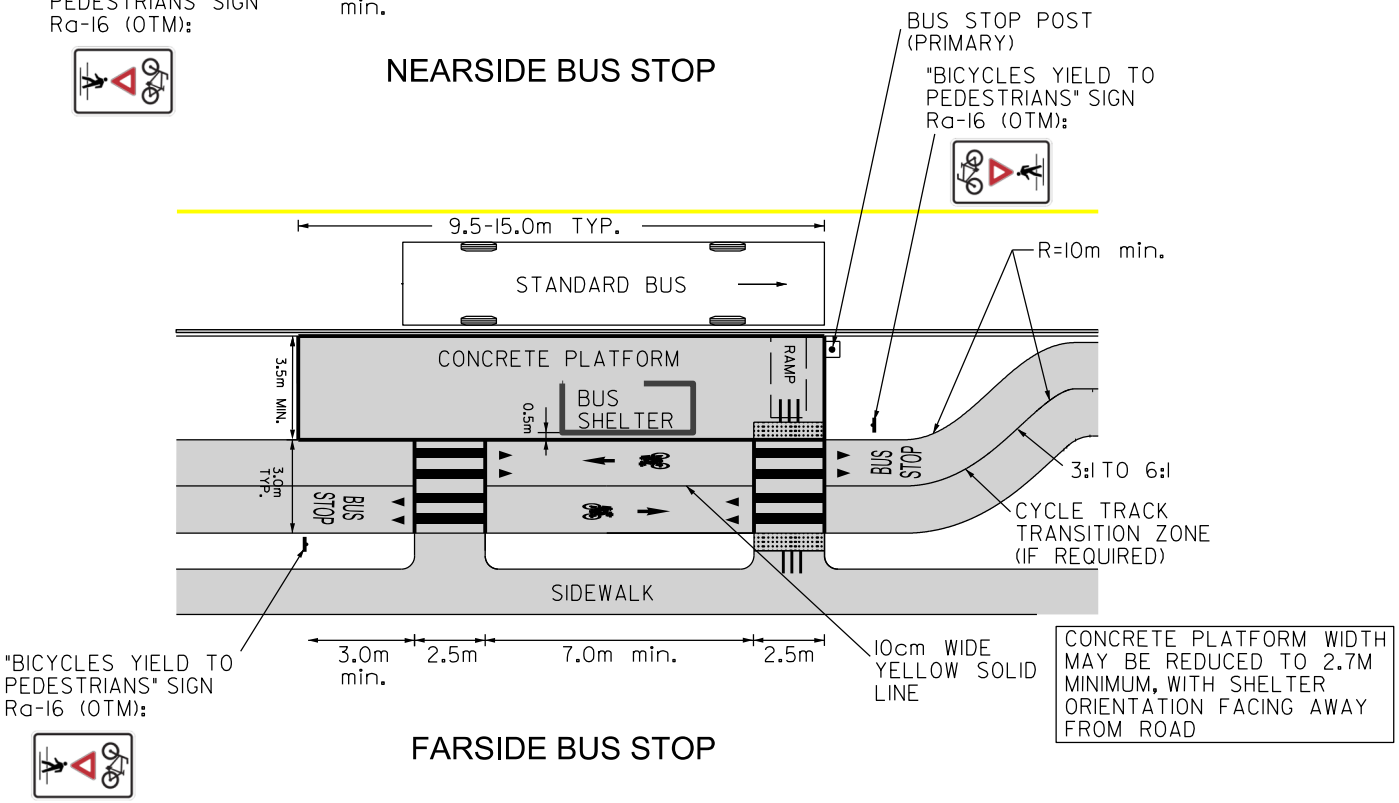
OPTIONAL GROOVES / DIRECTIONAL TACTILE INDICATOR (TYP.)

TACTILE WALKING SURFACE INDICATOR

RAMP DEPLOYMENT ZONE



NEARSIDE BUS STOP



FARSIDE BUS STOP

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

GRAND RIVER TRANSIT

NOTES:

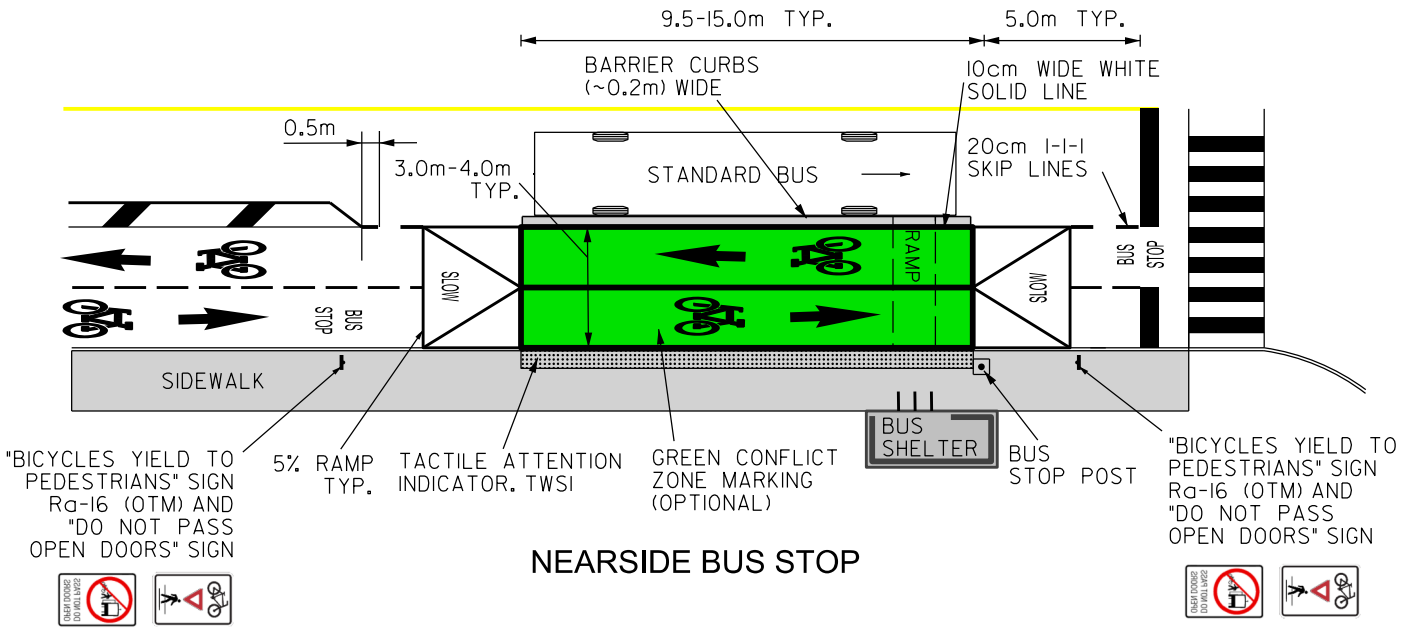
1. THIS DRAWING REPRESENTS THE PREFERRED DESIGN THROUGH TRANSIT STOPS. HOWEVER WHERE CONSTRAINED, REFER TO STANDARD DRAWING B-1.
2. FOR CYCLING PAVEMENT SYMBOL DETAILS, REFER TO OTM BOOK 18.

TWO - WAY RAISED CYCLE TRACK AT NEARSIDE & FARSIDE BUS STOPS (PREFERRED)

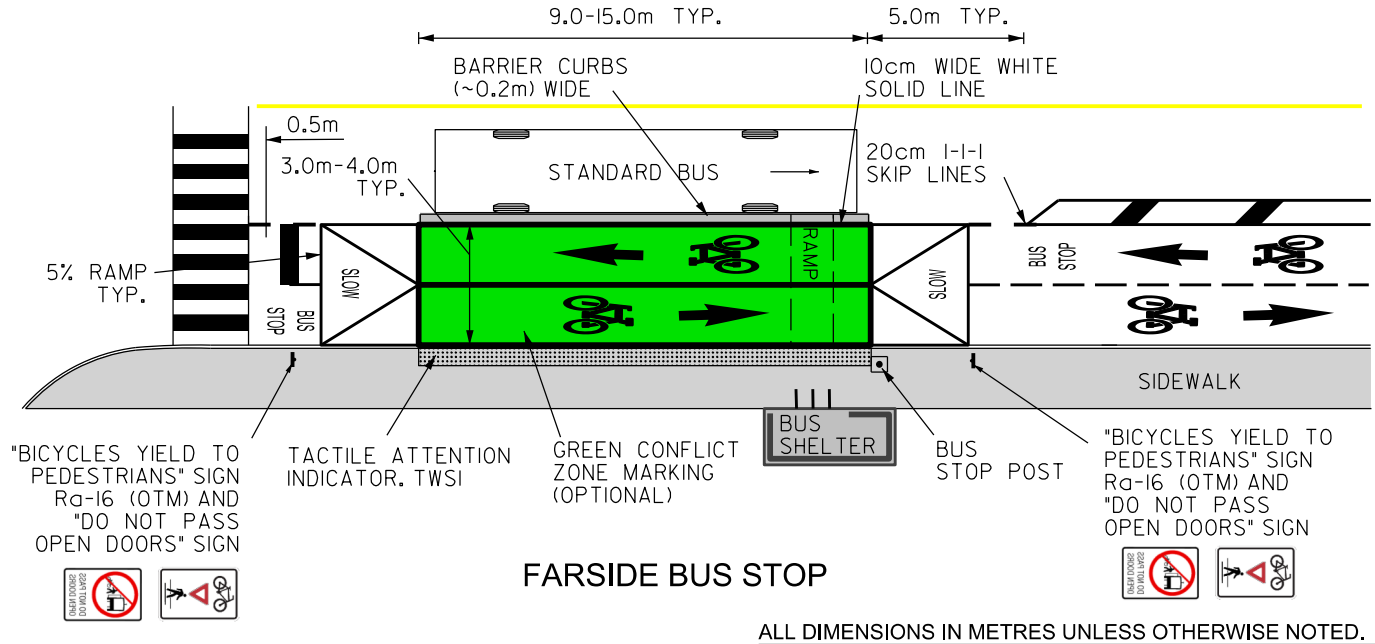
EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.		DRAWN: SO	STANDARD No. B-2

= OPTIONAL GROOVES / DIRECTIONAL TACTILE INDICATOR (TYP.)

= TACTILE WALKING SURFACE INDICATOR



NEARSIDE BUS STOP



FARSIDE BUS STOP

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

GRAND RIVER TRANSIT

NOTES:

1. FOR CYCLING PAVEMENT SYMBOL DETAILS, REFER TO OTM BOOK 18.

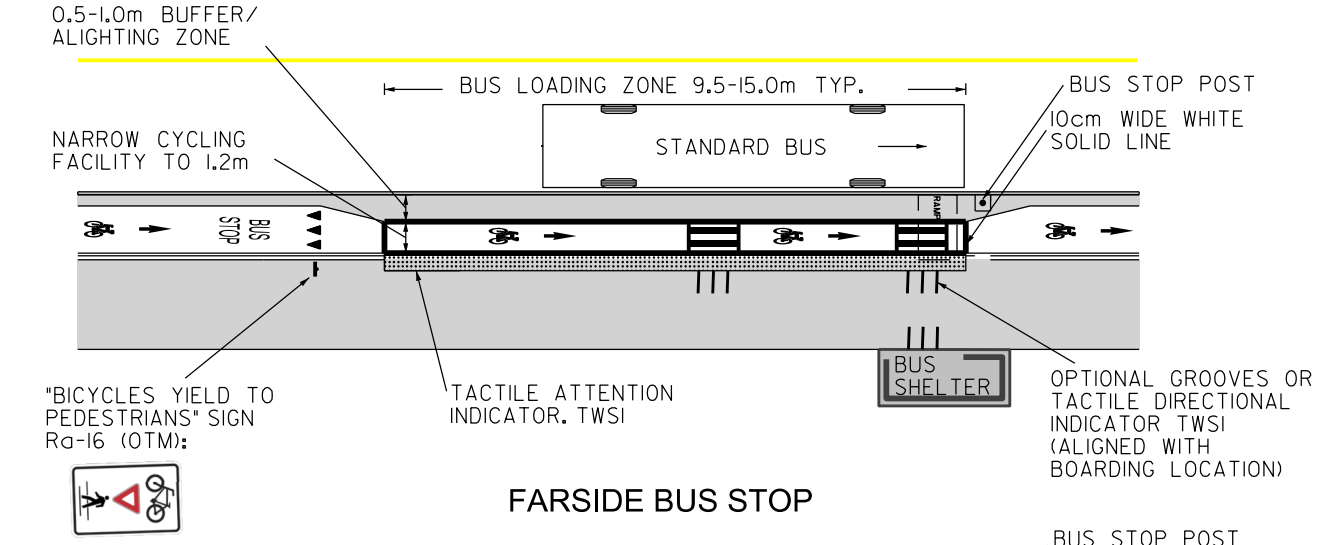
TWO - WAY BIKE LANE (INTEGRATED PLATFORM)

EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.		DRAWN: SO	STANDARD No. B-3

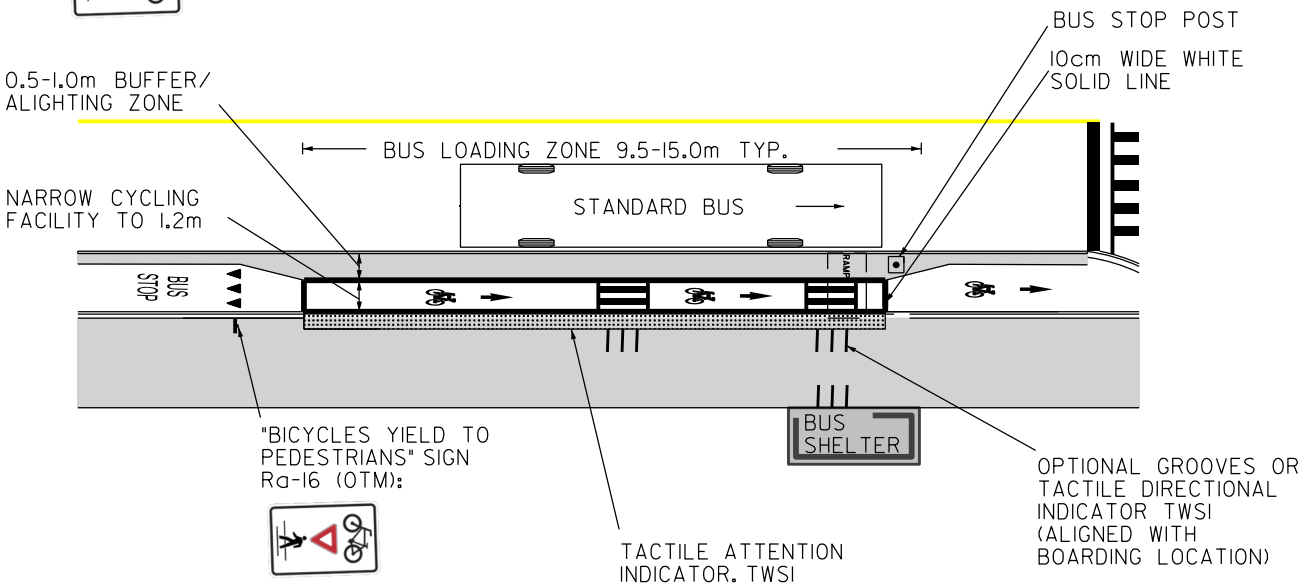
OPTIONAL GROOVES / DIRECTIONAL TACTILE INDICATOR (TYP.)

TACTILE WALKING SURFACE INDICATOR

RAMP BUS RAMP DEPLOYMENT ZONE



FARSIDE BUS STOP



NEARSIDE BUS STOP

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

GRAND RIVER TRANSIT

NOTES:

1. PRIMARY BUS STOP POST MUST BE A MINIMUM OF 0.60m FROM FACE OF CURB.
2. THIS DRAWING REPRESENTS THE CONSTRAINED DESIGN THROUGH TRANSIT STOPS. FOR THE PREFERRED DESIGN, REFER TO STANDARD DRAWING B-5.
3. FOR CYCLING PAVEMENT SYMBOL DETAILS, REFER TO OTM BOOK 18.

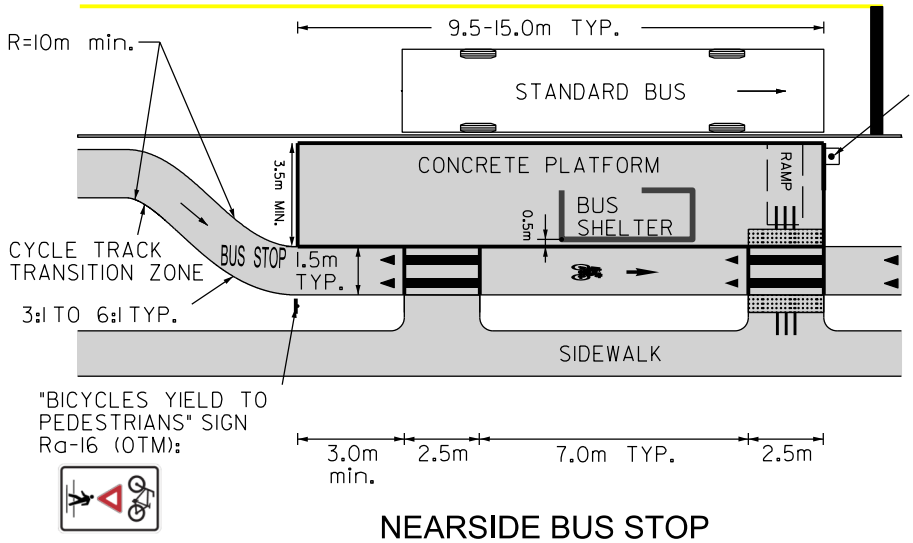
RAISED CYCLE TRACK AT NEARSIDE & FARSIDE BUS STOPS (CONSTRAINED)

EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.	0	DRAWN: SO	STANDARD No. B-4

OPTIONAL GROOVES / DIRECTIONAL TACTILE INDICATOR (TYP.)

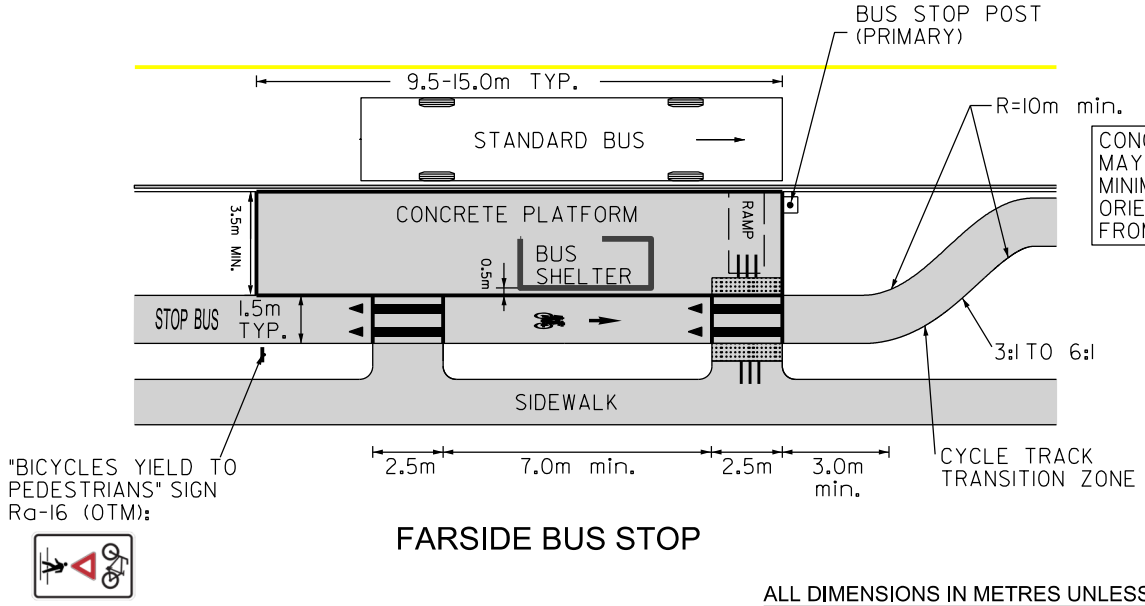
TACTILE WALKING SURFACE INDICATOR

RAMP BUS RAMP DEPLOYMENT ZONE (CONCEPTUAL ONLY)



CONCRETE PLATFORM WIDTH MAY BE REDUCED TO 2.7M MINIMUM, WITH SHELTER ORIENTATION FACING AWAY FROM ROAD

NEARSIDE BUS STOP



CONCRETE PLATFORM WIDTH MAY BE REDUCED TO 2.7M MINIMUM, WITH SHELTER ORIENTATION FACING AWAY FROM ROAD

FARSIDE BUS STOP

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

GRT GRAND RIVER TRANSIT

NOTES:

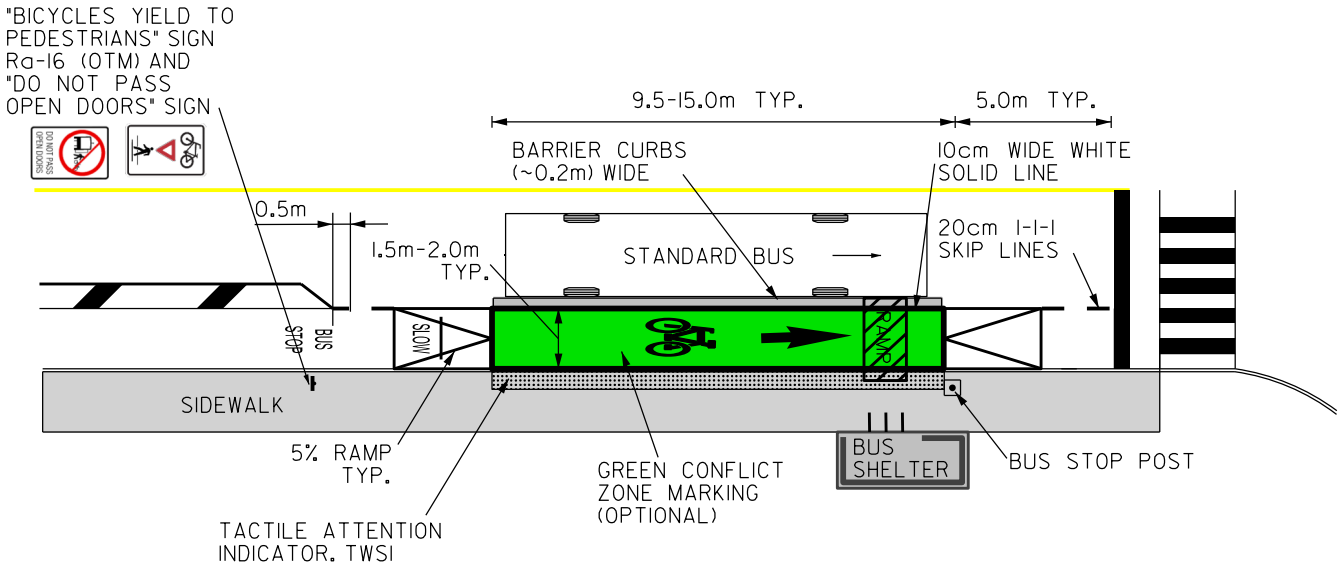
1. THIS DESIGN CAN ALSO BE USED FOR TWO-WAY CYCLE TRACKS. REFER TO STANDARD DRAWINGS B-2.
2. THIS DRAWING REPRESENTS THE PREFERRED DESIGN THROUGH TRANSIT STOPS. HOWEVER WHERE CONSTRAINED, REFER TO STANDARD DRAWING B-4.
3. FOR CYCLING PAVEMENT SYMBOL DETAILS, REFER TO OTM BOOK 18.

RAISED CYCLE TRACK AT NEARSIDE & FARSIDE BUS STOPS (PREFERRED)

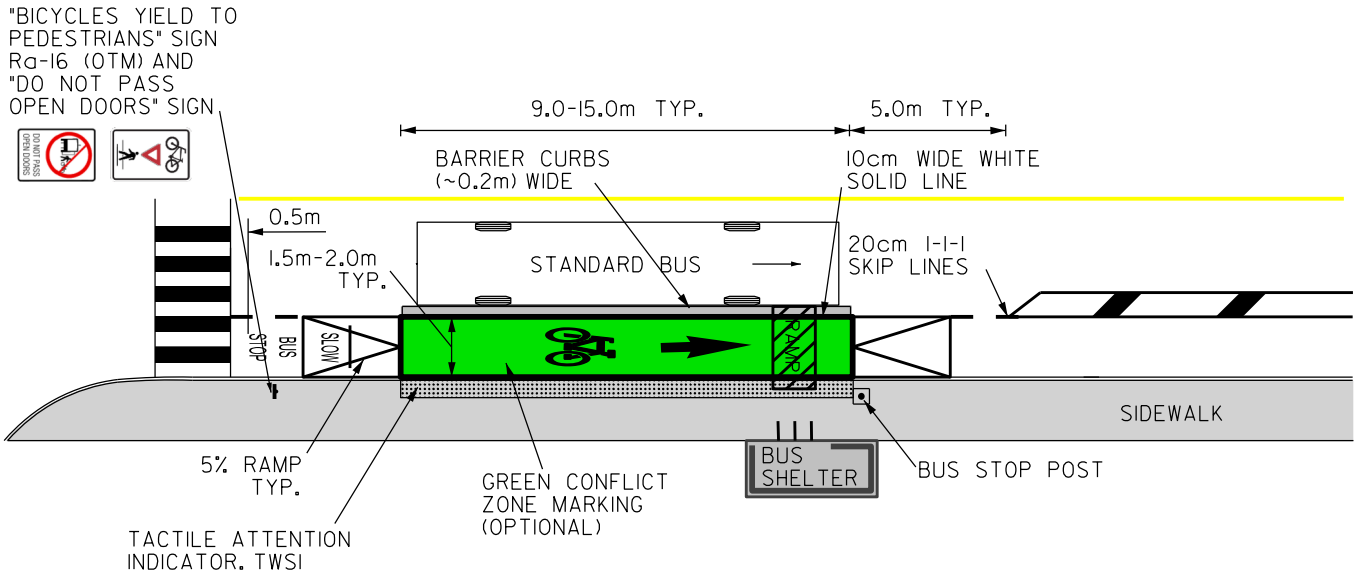
EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.		DRAWN: SO	STANDARD No. B-5

OPTIONAL GROOVES / DIRECTIONAL TACTILE INDICATOR (TYP.)

TACTILE WALKING SURFACE INDICATOR



NEARSIDE BUS STOP



FARSIDE BUS STOP

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

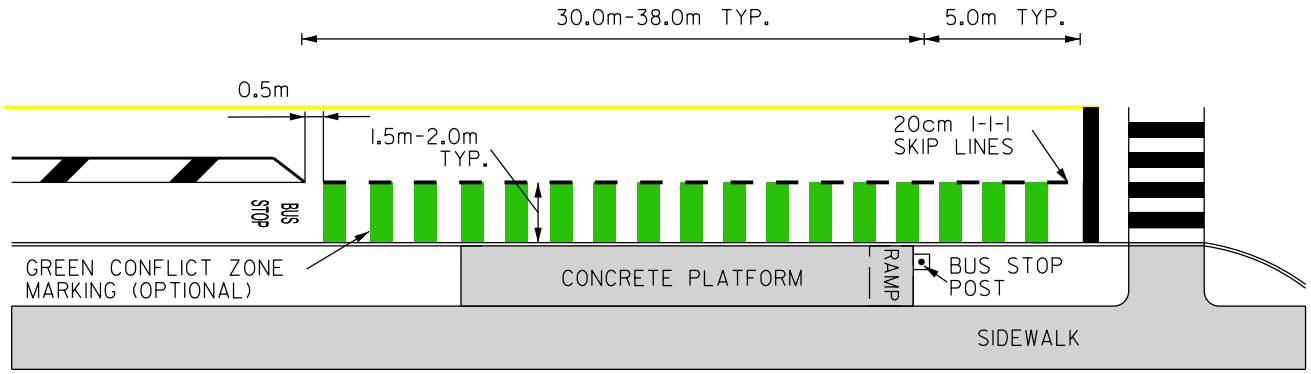
GRT
GRAND RIVER TRANSIT

NOTES:

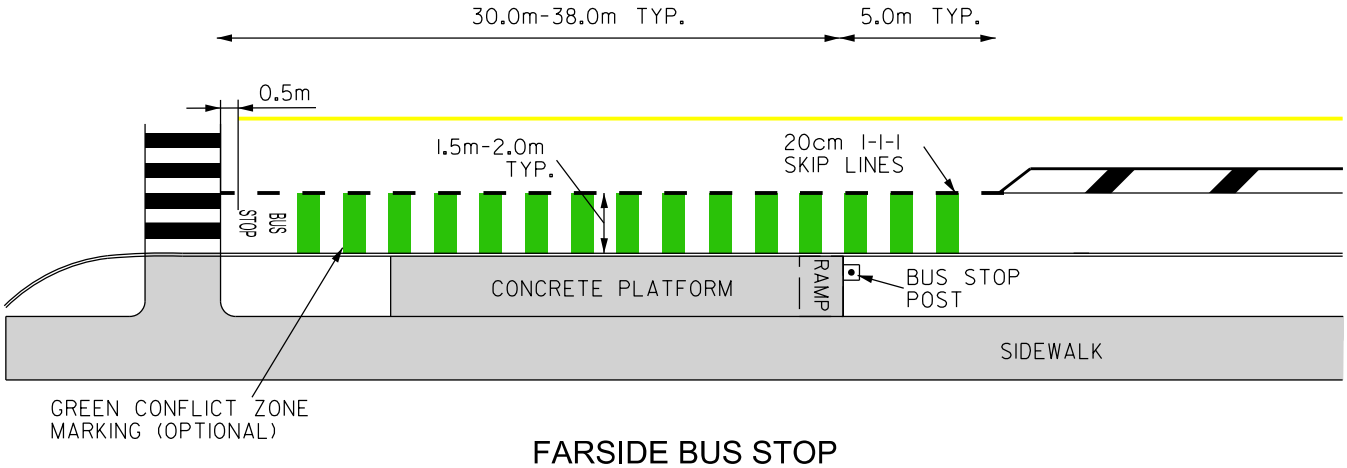
1. FOR CYCLING PAVEMENT SYMBOL DETAILS, REFER TO OTM BOOK 18.

BIKE LANE (INTEGRATED PLATFORM)

EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.		DRAWN: SO	STANDARD No. B-6



NEARSIDE BUS STOP



FARSIDE BUS STOP

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

GRT
GRAND RIVER TRANSIT

NOTES:

1. FOR CYCLING PAVEMENT SYMBOL DETAILS, REFER TO OTM BOOK 18.
2. WHERE POSSIBLE, RAMP BIKE LANE UP TO SIDEWALK HIEGHT (SEE BIKE LANE - INTEGRATED PLATFORM DETAIL)

BIKE LANE (RETROFIT)

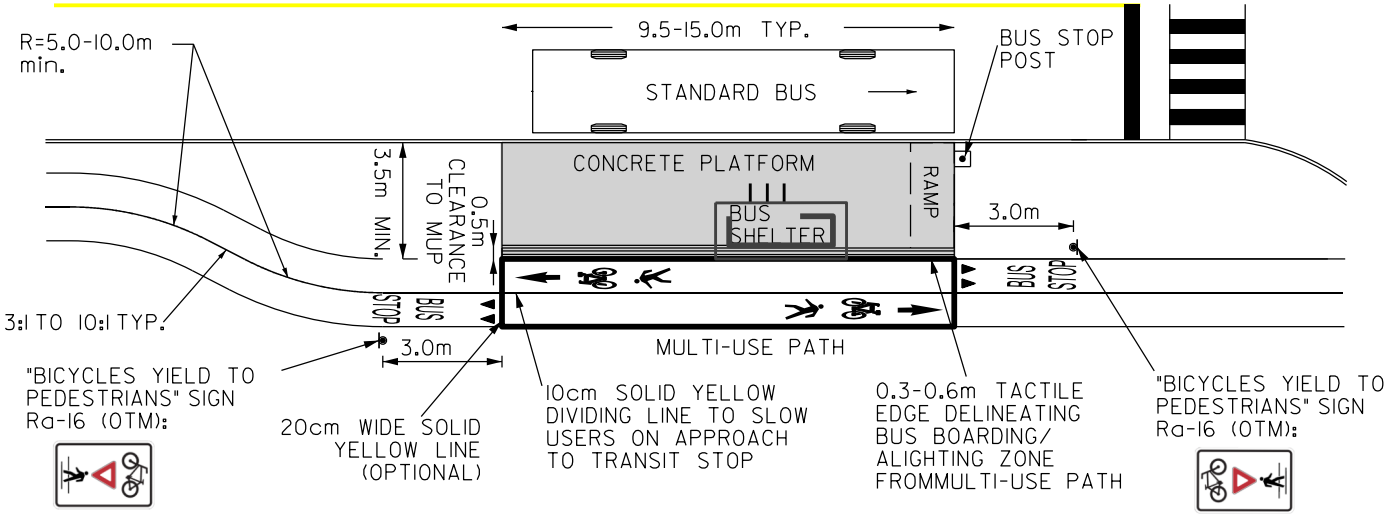
EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.		DRAWN: SO	STANDARD No. B-7

OPTIONAL GROOVES / DIRECTIONAL TACTILE INDICATOR (TYP.)

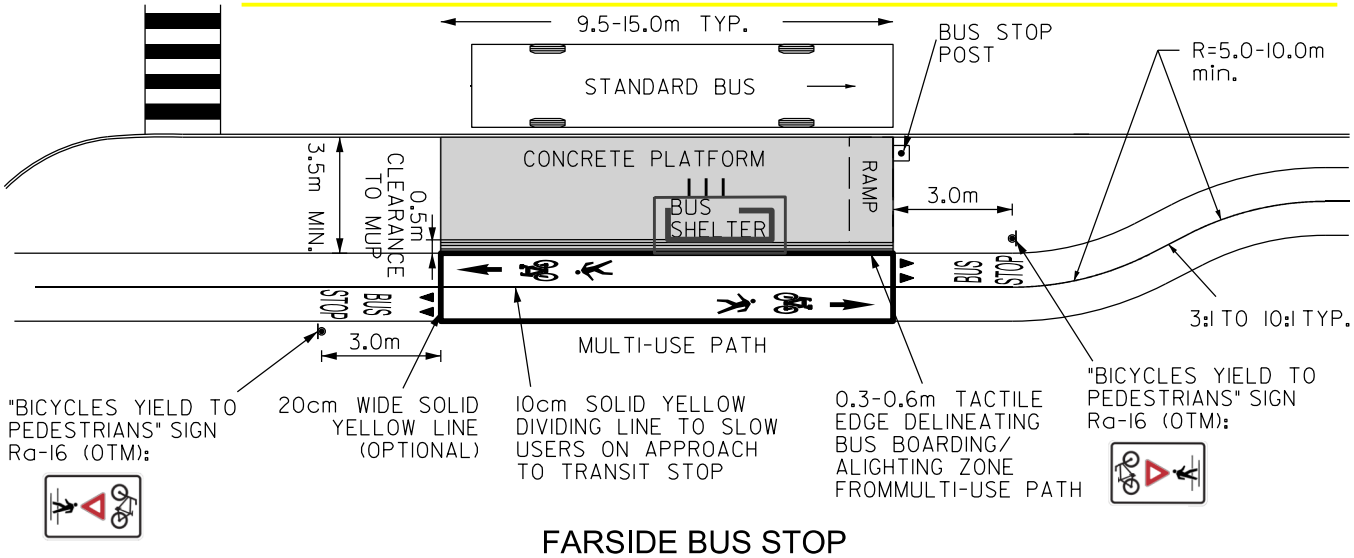
0.3-0.6m TACTILE EDGE DELINEATING BUS BOARDING/ ALIGHTING ZONE FROMMULTI-USE PATH

RAMP | RAMP DEPLOYMENT ZONE

CONCRETE PLATFORM WIDTH MAY BE REDUCED TO 2.7M MINIMUM, WITH SHELTER ORIENTATION FACING AWAY FROM ROAD



NEARSIDE BUS STOP



FARSIDE BUS STOP

CONCRETE PLATFORM WIDTH MAY BE REDUCED TO 2.7M MINIMUM, WITH SHELTER ORIENTATION FACING AWAY FROM ROAD

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

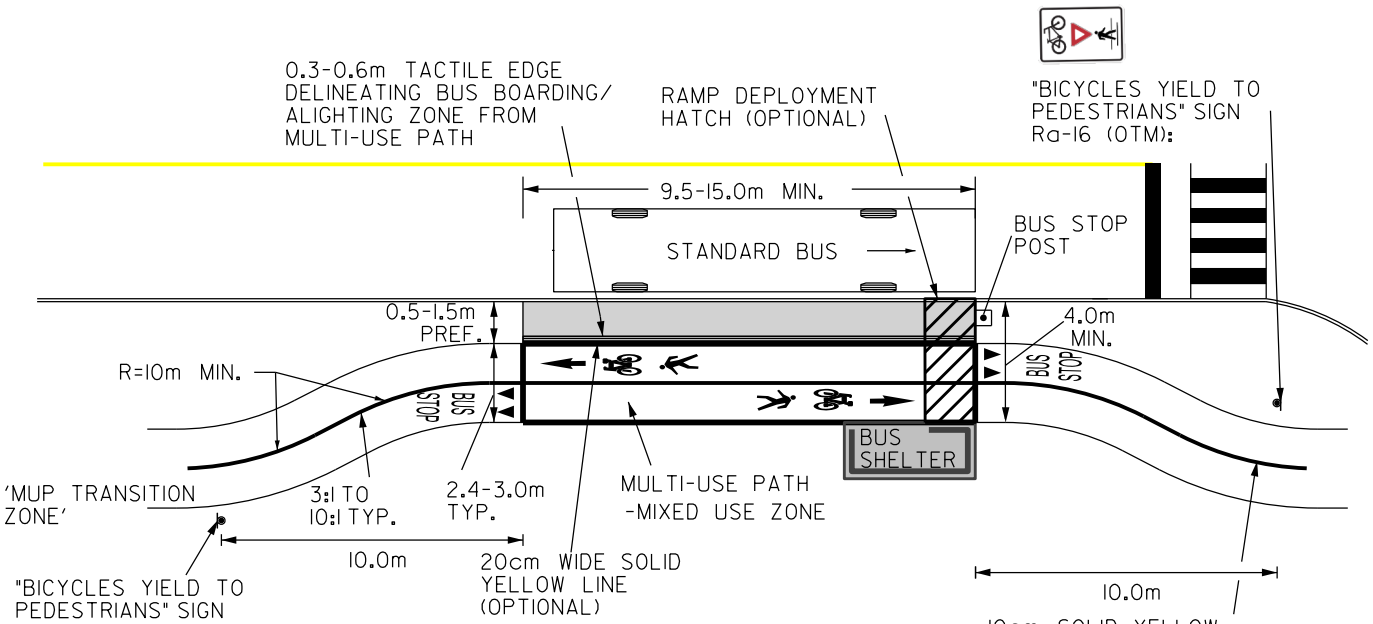
GRT
GRAND RIVER TRANSIT

NOTES:

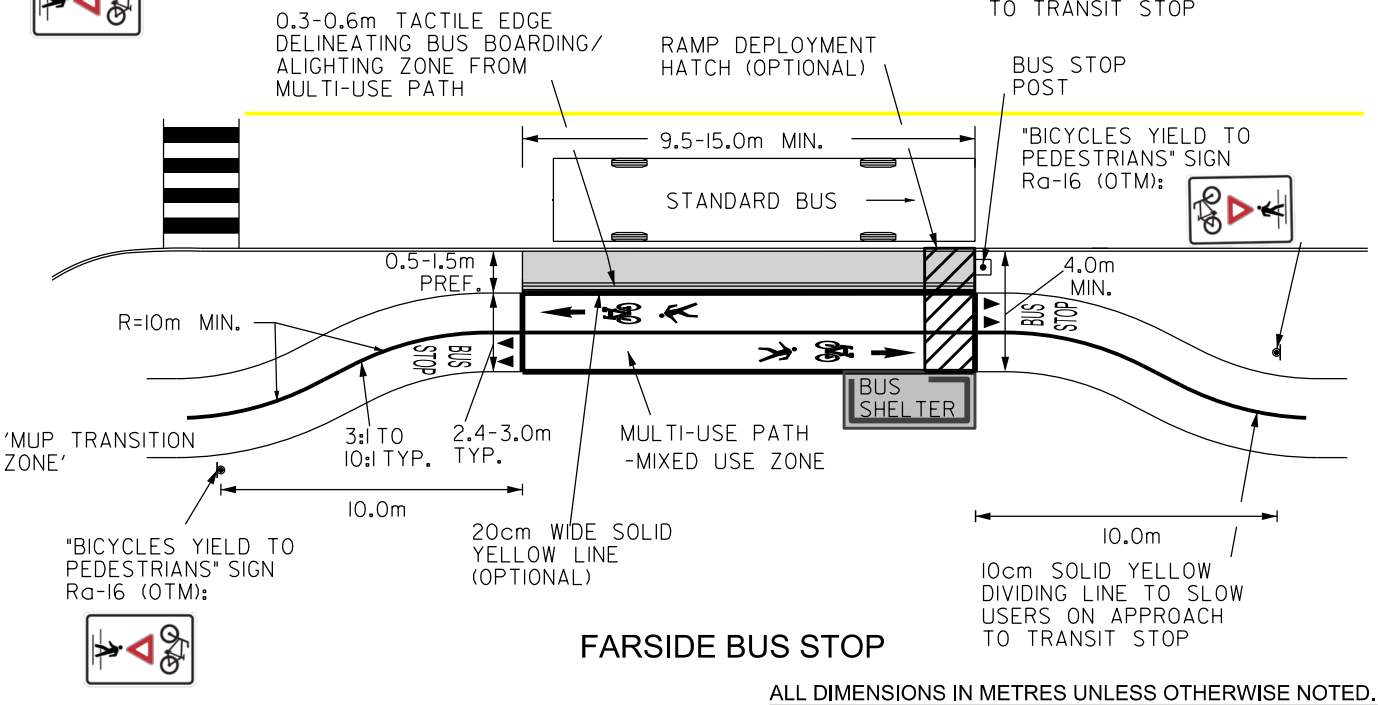
1. FOR CYCLING PAVEMENT SYMBOL DETAILS, REFER TO OTM BOOK 18.

MULTI-USE PATH (PREFERRED)

EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.		DRAWN: SO	STANDARD No. B-8



NEARSIDE BUS STOP



FARSIDE BUS STOP

ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

GRAND RIVER TRANSIT

NOTES:

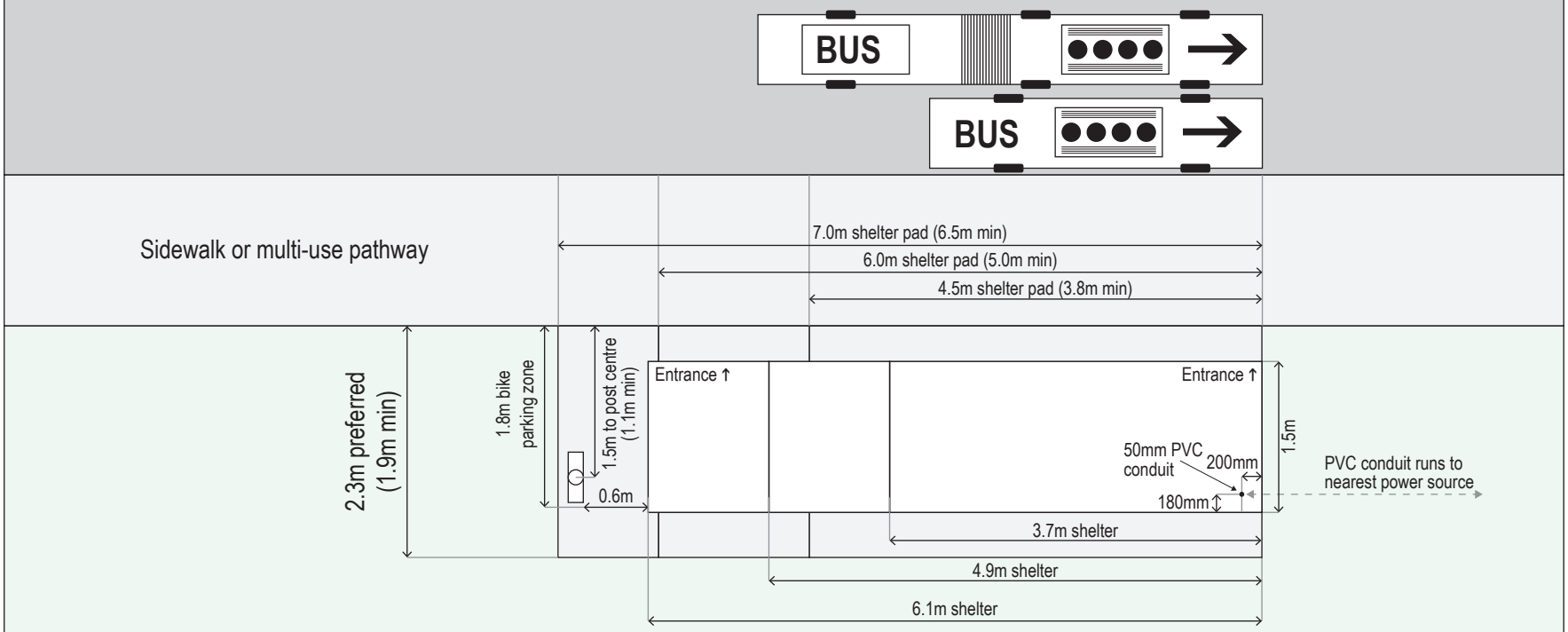
1. FOR CYCLING PAVEMENT SYMBOL DETAILS, REFER TO OTM BOOK 18.

MULTI-USE PATH (CONSTRAINED)

EFF. DATE: FEB. 2024			SCALE: N.T.S.
REV.		DRAWN: SO	STANDARD No. B-9

Appendix C: Concrete Pad with Shelter Installation Drawings

Standard Drawing C-1: Typical Shelter Pad Dimensions for Shelter Placement Behind Sidewalk



Notes:

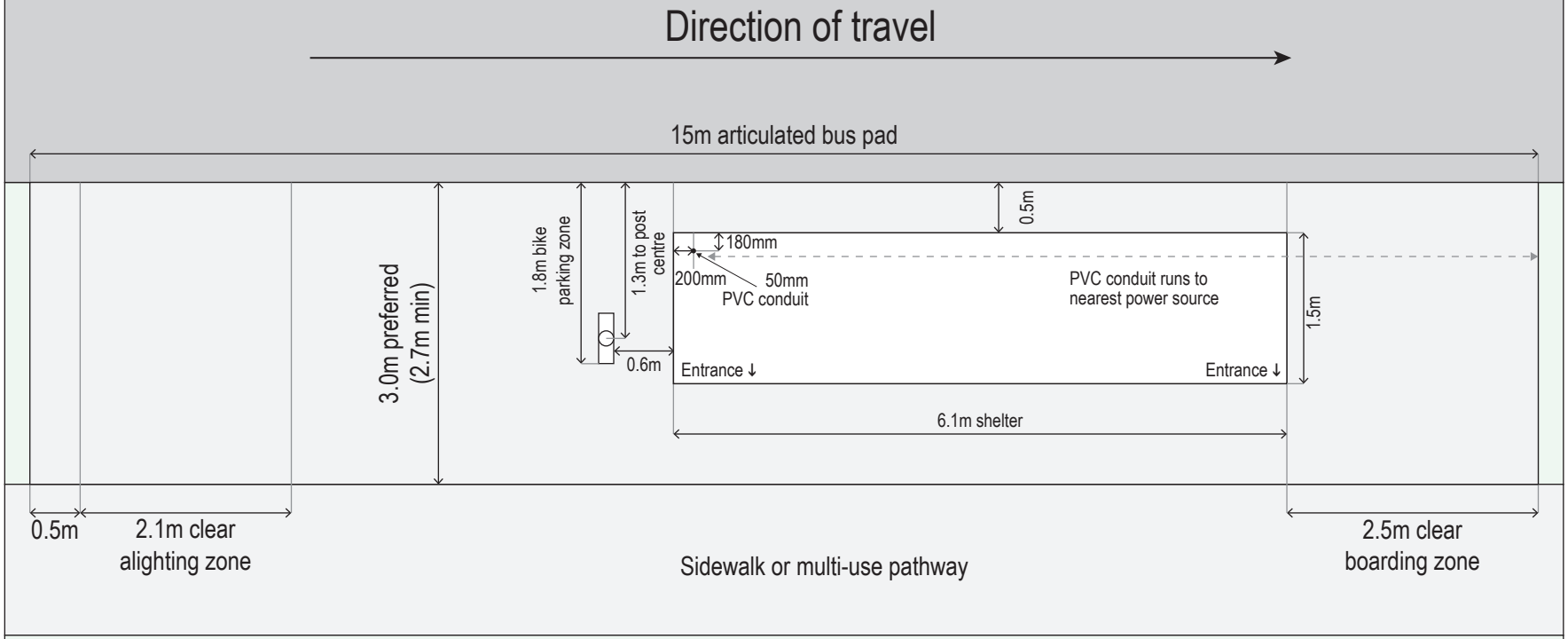
A concrete pad behind the sidewalk is required for shelter installation where the boulevard is narrower than 2.7m.

Where a bike rack is provided, it must be placed a minimum of 0.6m from the shelter.

A 50mm PVC conduit shall be installed 200mm from the front wall and 180mm from the side wall of the shelter.

Conduit setback can be adjusted at the direction of Grand River Transit.

Standard Drawing C-2: Minimum Landing Pad Dimensions for Shelter Placement in Boulevard Opening to Sidewalk (Major Stop)



Notes:

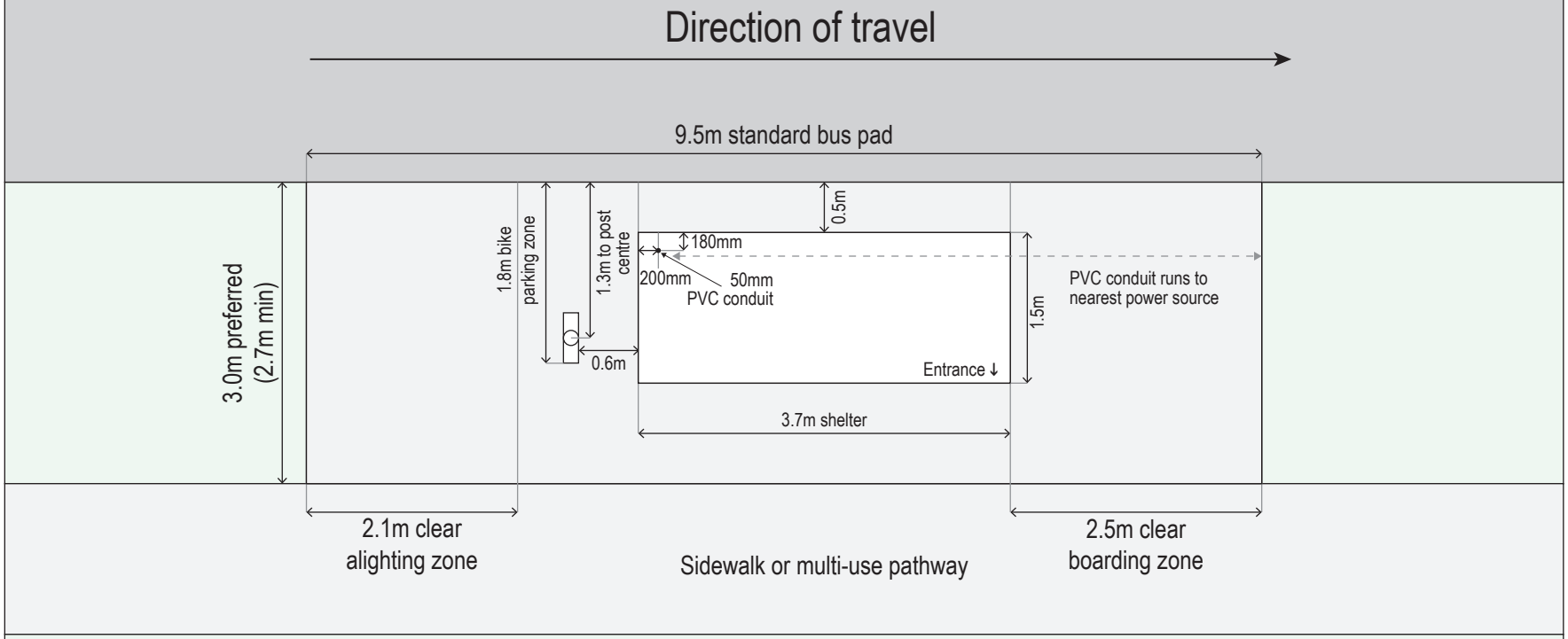
The boulevard must be a minimum of 2.7m in width to allow for shelter installation in the boulevard.

Where a bike rack is provided, it must be placed a minimum of 0.6m from the shelter.

A 50mm PVC conduit shall be installed 200mm from the rear wall and 180mm from the side wall of the shelter.

Conduit setback can be adjusted at the direction of Grand River Transit.

Standard Drawing C-3: Minimum Landing Pad Dimensions for Shelter Placement in Boulevard Opening to Sidewalk (Enhanced Stop)



Notes:

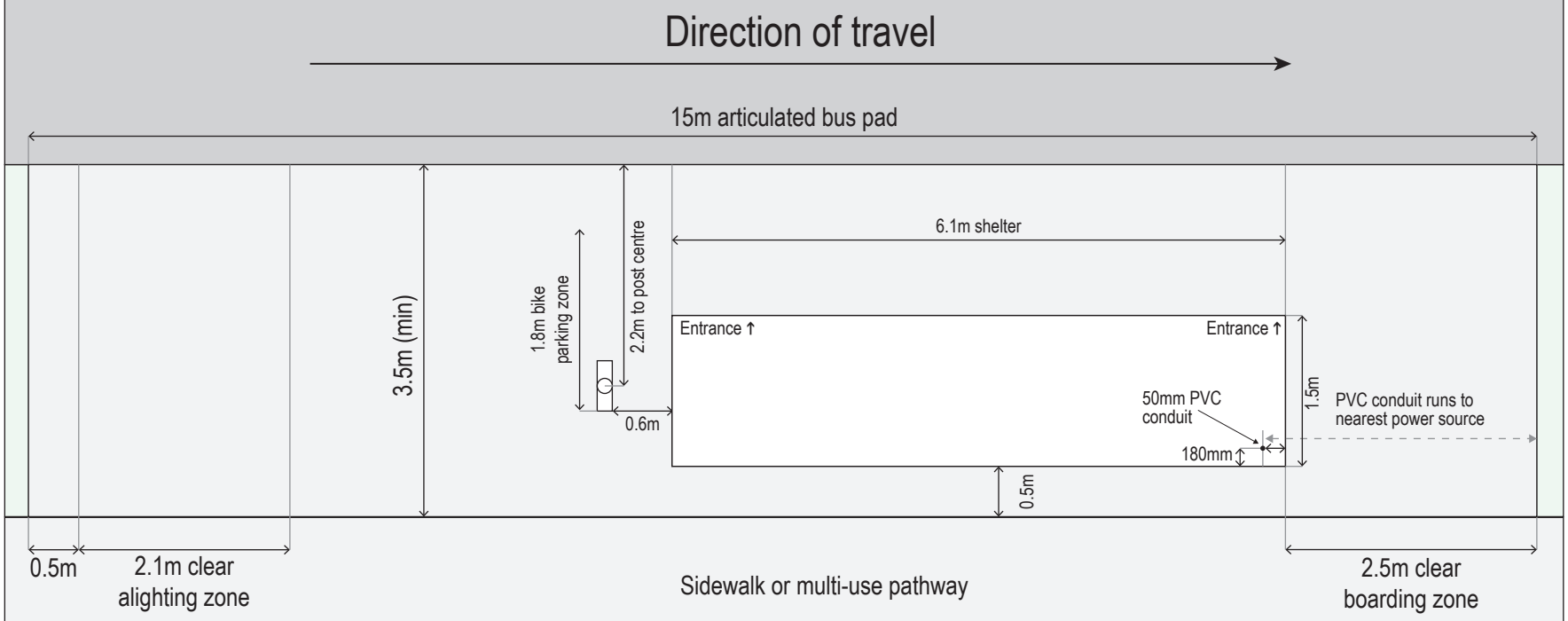
The boulevard must be a minimum of 2.7m in width to allow for shelter installation in the boulevard.

Where a bike rack is provided, it must be placed a minimum of 0.6m from the shelter.

A 50mm PVC conduit shall be installed 200mm from the rear wall and 180mm from the side wall of the shelter.

Conduit setback can be adjusted at the direction of Grand River Transit.

Standard Drawing C-4: Minimum Landing Pad Dimensions for Shelter Placement in Wide Boulevard Opening to Road (Major Stop)



Notes:

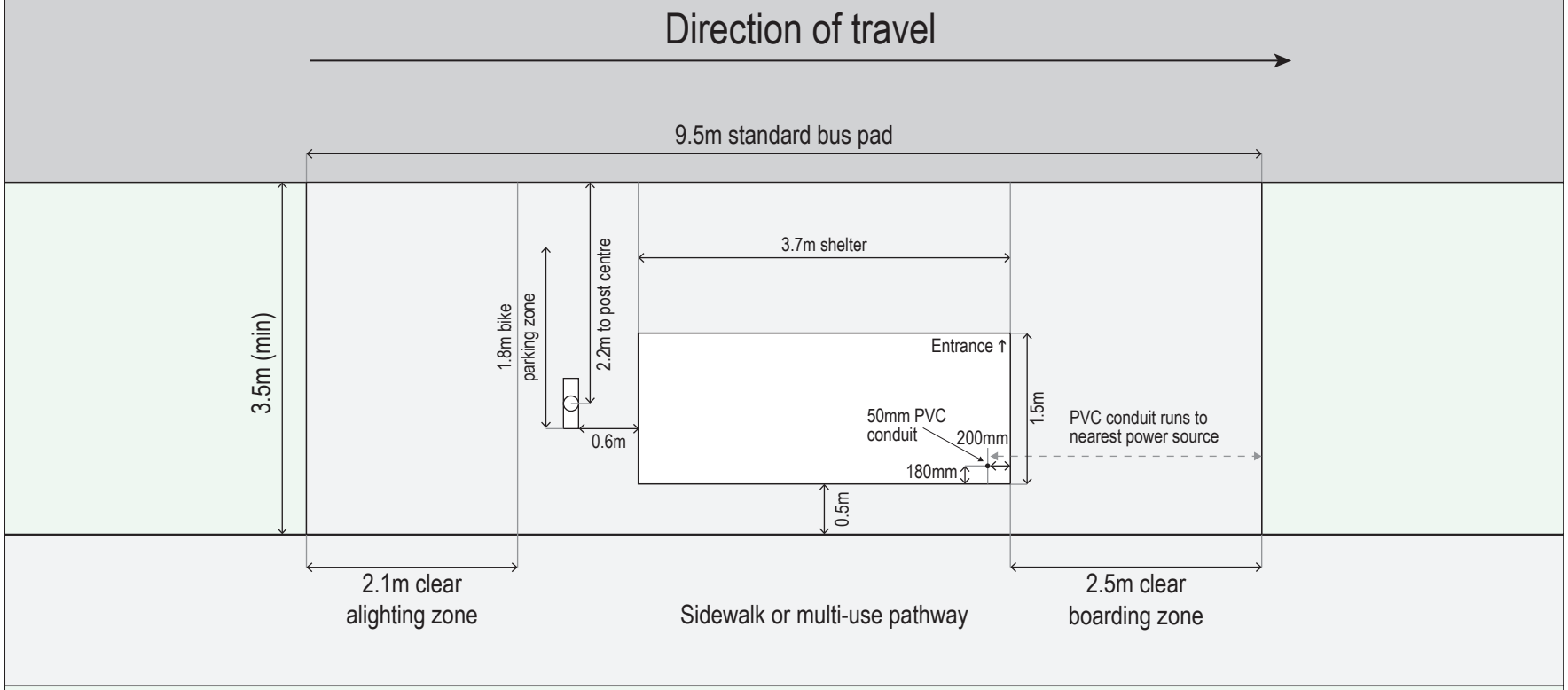
The boulevard must be a minimum of 3.5m in width to allow for the shelter to face the roadway.

Where a bike rack is provided, it must be placed a minimum of 0.6m from the shelter.

A 50mm PVC conduit shall be installed 200mm from the front wall and 180mm from the side wall of the shelter.

Conduit setback can be adjusted at the direction of Grand River Transit.

Standard Drawing C-5: Minimum Landing Pad Dimensions for Shelter Placement in Wide Boulevard Opening to Road (Preferred Stop)



Notes:

The boulevard must be a minimum of 3.5m in width to allow for the shelter to face the roadway.

Where a bike rack is provided, it must be placed a minimum of 0.6m from the shelter.

A 50mm PVC conduit shall be installed 200mm from the front wall and 180mm from the side wall of the shelter.

Conduit setback can be adjusted at the direction of Grand River Transit.