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2026
***BUS STOP
STANDARDS &
TECHNICAL
GUIDELINES***

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EXECUTIVE SUMMARY

The bus stop is often the customer's first physical interface with transit service and as such should project a positive first impression.

The benefits of formalized stop standards include:

- establishing a consistent approach to stop location and placement;
- enhancing the corporate image of the transit system by ensuring that bus stop locations are clean, modern, safe, and attractive, with appropriate passenger amenities and features to accommodate accessible conventional transit; and,
- assist with providing a safe and secure area for passengers waiting to board or those deboarding from a bus.

With the increase in vehicular traffic, urban sprawl and implementation of alternative land use designs, as well as the expansion of conventional transit, it is becoming increasingly important to *design* stop locations, as opposed to simply applying a bus stop sign to the most convenient pole.

The purpose of this report is to:

- Update standards relating to bus stops, including stop location, passenger amenities at stops, and accessibility; and,
- Update technical guidelines relating to bus stops, including design criteria, maintenance procedures, passenger amenities, accessibility, and maintenance of the Bus Stop Inventory System.

In the past, the lack of established standards and criteria has resulted in a number of inconsistencies, namely:

- processing of complaints & requests
- management of stop location issues (existing services and new developments)
- variations in stop signage and public information techniques at permanent and temporary locations

The implementation of stop standards and adherence to technical guidelines assists with consistency in signage, stop spacing, development of the Commission's accessibility program, and overall management of stop locations.

A consistent approach and published technical guidelines are necessary due to the number of LTC internal departments and outside agencies who are directly involved in stop issues, ranging from day-to-day operational issues to long range stop planning and design. Implementation of bus stop standards, technical guidelines, and procedures is in keeping with the Business Plan and creates a positive image of the system for users and non-users alike.

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INTRODUCTION

The bus stop is often the customer's first physical interface with transit service and as such should project a positive first impression.

The benefits of formalized bus stop standards include:

- establishing a consistent approach to stop location and placement;
- enhancing the corporate image of the transit system by ensuring that bus stop locations are clean, modern, safe, and attractive, with appropriate passenger amenities and features to accommodate accessible transit; and,
- assist with providing a safe and secure area for passengers waiting to board or those deboarding from a bus.

Several factors have made it increasingly important to *design* stop locations in a formalized manner, as opposed to simply applying a bus stop sign to the most convenient pole along a route, such as:

- increased vehicular traffic and its impact on transit operating efficiency
- increased urban sprawl, and implementation of alternative land use designs
- increased ridership on high use corridors and major traffic generators (i.e. post secondary tuition-based passes and regional malls)
- expansion of accessible conventional transit and integration of specialized transit

The purpose of this report is to:

- update standards relating to bus stops to ensure clear and consistent stop placement and associated amenities; and,
- update technical guidelines relating to bus stops, including design criteria, passenger amenities and accessibility.

As part of this review, an examination of past London Transit practices, existing London Transit and City of London policies, and the standards & procedures of peer transit properties was undertaken. This included assessing and improving upon best practices, while recommending changes to those standards which require updating to be consistent with the changing environment in which London Transit does business.

The objectives of establishing bus stop standards and procedures are to:

- define standards and criteria for the management of bus stops, including location, installation, and maintenance of stops, shelters and associated street furniture;
- define areas of responsibility in the management of bus stops and related amenities;
- update a technical manual for use by staff and field personnel to assist in dealing with stop related issues;
- define guidelines for displaying public information at the individual bus stop level, including route designation, transfer and service level information; and,
- ensure that stop issues are dealt with in a consistent manner, focusing on the needs of the customer and the employee.

Several departments may refer to this document for differing purposes. With varying levels of detail required, certain sections will be more appropriate depending on the information readers are trying to obtain. For broad-based statements setting the direction for the management of bus stops, see section 1, the stop standards. For specific design considerations to be applied at each stop, see section 2, the technical guidelines. For an outline of the stop planning procedure and how temporary conditions are handled, see section 3. For a description of long-range stop planning in proposed new subdivisions see section 4. And finally for details pertaining to the bus stop inventory and updating of AVL data, see sections 5 & 6

BACKGROUND

In the past, the absence of documented standards and criteria has resulted in a number of inconsistencies in the processing of complaints, requests, management of stop location issues for existing services and new developments, and variations in stop signage and public information techniques at permanent and temporary bus stop locations. The implementation of stop standards and adherence to technical guidelines assists with:

- consistency in signage
- consistency in stop spacing
- consistency in stop locations
- access to conventional transit
- improving aesthetics and compatibility with surrounding land uses
- projecting a positive corporate image
- enhanced customer service information
- management of stop locations
 - complaints & requests
 - maintenance of stops/plates
 - public information
 - maintenance of stop inventory
 - temporary relocations
 - passenger amenities

A number of LTC internal departments and external agencies can be involved in stop issues, including:

- | | |
|------------------------|--|
| London Transit: | <ul style="list-style-type: none"> - Planning (stop locations, stop amenities, site plans, subdivisions) - Operations (operators, inspectors, front line stop maintenance, accident and injury investigations and prevention,) - Customer Service (public information, customer contacts) |
| City of London: | <ul style="list-style-type: none"> - Facilities (garbage cans) - Roadside Operations (snow clearance) - Transportation (approval of locations, approval of amenity installation) - Planning (new subdivisions) - Building Control Division (site plans) |
| Others: | <ul style="list-style-type: none"> - University of Western Ontario (Facilities, UWO Police) - Fanshawe College - Regional Malls (Westmount, Masonville, White Oaks, Argyle) - London Health Sciences Centre - Ministry of Transportation (where applicable on Kings Highways) - Shelter & bench contractors - Bus Stop Pole contractor - Concrete Pad contractor |

A formalized stop policy can be of assistance when dealing with the LTC on stop issues within the jurisdictions of the above noted agencies. The process undertaken in the updating of this report was:

- review and documentation of current LTC processes and technical guidelines as they relate to bus stops;
- review of procedures, policies and technical standards of other properties, to establish a “best practices” concept within the framework of LTC structure and resources;
- identify improvements to internal procedures; and, develop standards and technical criteria, based on transit industry “best practices” and established traffic engineering standards, with reasonable adjustments for LTC’s operating environment.

1.0 - BUS STOP STANDARDS

General stop standards are broad-based statements which set out the direction for the management of bus stop issues, while the bus stop technical guidelines (Section 2.0) define the specific design considerations for application on an individual site basis.

1.1 City of London Policies

The London Plan (City of London Official Plan) was updated to incorporate all modes of transportation (walking, cycling, transit and personal vehicles) into all aspects of the planning process. A number of policies set out in the London Plan will help ensure access to transit for all residents and assist with stop planning;

- 213- Street patterns will be easy and safe to navigate by walking, cycling and will be supportive of transit services.
- 217- Neighbourhood street networks and block sized will be designed to ensure connectivity and support transit service and active mobility. Infrastructure and amenities to support transit and active mobility will be incorporated.
- 218- Street networks should be designed to support connections to transit and other neighbourhood amenities within a 10-minute walk
- 223- Street design standards will be adopted to reflect pedestrian, cycling and transit priorities within neighbourhoods

These city policies have been incorporated into the process for reviewing existing stops, identifying new stop locations in existing developments, proposed community plans, and/or plans of subdivision.

1.2 LTC Stop Standards

1.2.1 Marked Stops Policy

Designated marked stops shall be provided throughout the city to indicate stopping places for buses.

The provision of marked stopping places for buses is essential to customers, bus drivers and other users of the road, permitting an orderly, consistent pattern of bus operation. Designated marked stops throughout the system are beneficial in that they:

- group boarding and debording passengers at selected points, thereby minimizing decelerating, stopping and accelerating cycles;
- encourage upgrading of walking conditions to connect the stop with the surrounding pedestrian network, including consideration of the Commission's Accessibility Plan, and upgrading of road shoulders at stopping points; and,
- permit opportunities to provide enhanced passenger amenities and service information at the stop.

The stop marker denotes the location for boarding, as passengers tend to queue up at the marker. Operators are instructed to stop the bus with the stop marker as a guide point, stopping with the front door just short of the marker pole, using discretion to adjust for:

- obstructions such as poles, hydrants etc.
- landing area (broken sidewalk or muddy/icy conditions, or large ponds of water)
- emergency conditions
- temporary conditions i.e. construction
- snow plow casts
- allowing the bus to clear the travelled portion of the road
- courtesy stops and the Travel Safe program

Where permanent obstructions exist, or the marker is in an inappropriate place which may result in passengers queuing away from where the bus will actually stop (i.e. at the end of a bus bay taper), the stop marker should be adjusted. This will assist operators in properly and safely positioning the bus and indicate to passengers the most likely stopping place.

In addition to the marked stops standard, the standing orders set out operational procedures for courtesy stops and the Travel Safe program, the marked stops standard does not supersede these procedures. The details of these standing orders are included in Appendix 1.

1.2.2 Stop Positioning Standard

In locating stops, each potential location shall be assessed on its own merit, and, all things being equal, a farside location shall be preferred at signalized intersections, while a nearside stop shall be preferred at stop signs.

Based on the current Bus Stop Inventory data, Table 1 sets out the current breakdown of stop locations in London:

Table 1 - Distribution of Stop Locations

Stop Location	Definition	% of LTC Stops
Nearside	stop located at or before intersection	47%
Farside	stop located after intersection	43%
Midblock	stop located in-between intersections	7%
Special Stops	Malls, Fanshawe, Western etc.	3%

There are a number of arguments for and against nearside versus farside stop locations. For the most part, these arguments focus on vehicular traffic and transit operations, and rarely speak to what is most beneficial to the transit passenger.

The evaluation of the individual stop location is based upon related policies and technical guidelines. The farside preference at traffic signals came about with the implementation of traffic signal priority measures. Having a bus stop located on the farside of the intersection allows late vehicles to take advantage of the extended green by travelling through the intersection before allowing passengers to board and alight the bus. The nearside preference at stop signs is based on decreasing the number of times the bus has to stop. Since the bus is already stopping for the stop sign it makes more operational sense to have the bus stop on the nearside instead of having to stop twice.

1.2.3 Stop Spacing Standard

Stop spacing is dependent on service type and subject to site level consideration, however, the distance between stops should be consistent with the route type and aim to strike the appropriate balance of access to transit with operational efficiency as determined by the service type being offered.

In most instances, stops can be expected between 250 and 400 meters along non-express or rapid transit routes, however, exceptions occur when no appropriate stopping location is available, or no destination would be serviced better by the addition of stops between existing locations. For instance, on Fanshawe

Park Rd, between stop 2979 – opposite 517 Fanshawe Park and stop 2514 – Fanshawe at Pinnacle, the spacing exceeds what is typical, but there is no destination between the two stops that would be better served by adding a stop in-between.

Table 2 sets out the standard stop spacing to be expected and the priority of for each route type.

Table 2 – Typical Spacing by Route Type

Route Type	Priority (Access vs Operational Efficiency)	Optimum Spacing (meters)
Rapid Transit / Express	Travel Speed	500- Major Destinations
Core Routes	Travel Speed	300 - 400
Local Routes	Walk Distance / Pedestrian Access	200 - 400
Industrial Routes	Travel Speed	250- Major Destinations
Alternate Service Delivery Zones	Access	As warranted

Further detail on stop spacing criteria can be found in the stop spacing section of the technical guidelines section 2.4.1.

1.2.4 Relocation Standard

A stop relocation due to a specific issue must solve or reduce the problem, as opposed to merely relocate it.

Stops should not be relocated:

- *from flankage to frontage in residential areas;*
- *from an adjacent commercial land use to a residential lot; and,*
- *if the requested change will not make a noticeable change in conditions, but merely shift the location of a problem.*

The most common public contact with respect to bus stops is a request to relocate a stop away from a private residence. The reasons given usually include perceived problems from noise, litter, security concerns, or are related to traffic operations (bus blocking lane, driveway, etc).

In most cases, moving the stop simply moves the perceived problem. This frequently leads to complaints from the adjacent landowner at the new stop location. The simple movement of a stop can set off a cycle of “ping-pong” with the stop location, as it’s location bounces around, and can often lead to political intervention by Councillors and/or Commissioners. Often the result is a final location being to no one’s satisfaction, least of all the passenger.

If a bus stop is recommended for relocation due to a request, it is to be stipulated that the change be made on a trial basis only (6 months), with the option of returning to the original location if significant difficulties develop.

Except for emergency relocations, effort should be made to provide reasonable advance notice to the public, passengers and operations employees of stop relocations, additions or deletions. A minimum of 2 weeks notice is preferred and whenever possible coordinating the stop relocation with a change in sign-up period should be the priority.

Establishment and relocation of stops from mid-December to mid-March should be avoided, as snow and ground frost conditions make the necessary inspection and installation work difficult. Problems include:

- snow cover prevents inspection of landing area; may not be able to anticipate spring conditions (mud, ponding, etc);
- utility locates, if required, are difficult to obtain (snow piles and hard ground impede use of detection equipment);
- difficulty in proper installation of marker posts in frozen ground.
- New accessible bus top pads can not be poured in the cold weather

Stops should not be relocated until all of the preparation work for the AVL has been completed in order to reduce the delay in having the stop announced on the bus.

1.2.5 Accessibility Standard

In support of the Commission's Accessible Transit Plan, all bus stops shall be designed for barrier free access with a consistent design for both conventional and specialized transit.

The Commission is committed to the objective of fully accessible conventional transit, and the integration of conventional and specialized transit services. The technical criteria for bus stop locations and amenities shall be designed to support full accessibility to bus stops.

An accessible bus stop is defined as a stop area which:

- provides barrier free connection between the bus and the surrounding pedestrian network, including a flat, level, hard surface landing area and necessary connectors,
- designed to be consistent in layout for ease of access for all passengers and;
- provides passenger amenities which are user-friendly to those persons with mobility difficulties.

As stops are assessed for accessibility needs, the goal shall be to make as many stops as possible barrier free, taking into account natural barriers (geometrics, gradient), and undue hardships (such as excessive cost to meet accessibility criteria). When necessary and where possible, stop locations should be adjusted to facilitate accessibility.

1.2.6 Bus Bay Standard

Bus bays should be located where it is operationally beneficial for both transit operations and vehicle movements.

London Transit and the City of London Transportation Division have agreed upon the following criteria for bus bay locations:

- i) at major intersections of arterial roads;
- ii) at major transfer points or timepoints, where buses may sit for any length of time (arterial and primary collector roads); and,
- iii) locations where a stopped bus creates extraordinary problems to safe traffic operations.

Bus bays are defined as a localized widening of the roadway to permit a bus to pull clear of the travelled portion of the road when stopping at a bus stop, resulting in minimal traffic interruption during passenger service time, or scheduled layovers. However, on roads with high traffic volume it is often difficult for the bus to re-enter the traffic stream from the bus bay. Thus, while bus bays are often beneficial to general road traffic, they often impede efficient transit operation.

There are approximately 164 bus bays, representing approximately 8.4% of bus stops in London. Design specifications for bus bays are set out in Table 7 of section 2.5.2.

1.2.7 Hierarchy of Stops

A hierarchy of stops shall be established to assist with the evaluation of the types of amenities to be provided, and the relevant technical standards, for each stop.

There are four distinct categories of bus stop locations, which relate to:

- Level of ridership and passenger activity (i.e. ons vs. offs or transfers)
- Type and frequency of transit service provided
- Surrounding land use
- Road classification

The following hierarchy of stops has been defined to assist with evaluating:

- Stop location criteria
- The type of passenger amenities to be provided
- Technical specifications for passenger amenities and features

Table 3 - Hierarchy of Stops

Stop Type	Characteristics	Types of Amenities
Standard	• Can be located on all street types • Served by at least one local route • Standard stops are the baseline stop classification and the only warrant is the provision of bus service at the stop location	• Stop marker • 9m concrete landing pad Considerations for; • Bench • Waste receptacles • Pedestrian/stop lighting • Bicycle Parking
Enhanced	• Often identifiable as a standard stop upgraded with a shelter • Usually located along major collector and arterial streets • Express route stops are typically a minimum of level of enhanced • Commonly has more than one route serving the stop	• Stop marker • 9 m concrete landing pad • Standard 4x8 shelter Considerations for; • 14m concrete landing pad (if high usage of articulated buses) • Bench • Waste receptacle • Passenger Information Display • Maps and Wayfinding • Pedestrian/stop lighting • Bicycle Parking
Major	• Typically, where arterial streets intersect • Commonly applied along corridors with higher frequency service • Designed to accommodate a very high volume of customers • Could also be served by local routes with high ridership or observed transfer activity • Often located at a transfer location between an express or local bus route and the future Rapid Transit service	• Stop marker • 14 m concrete landing pad • Standard shelter (4x8) • Maps and wayfinding Considerations for; • Bench • Waste Receptacles • Passenger information display • Pedestrian/stop lighting • Bicycle parking
Rapid Transit	• Centre Running or curbside along the designated Rapid Transit corridors • In designated Bus Only lane • The highest frequency of service • Served by at least one Rapid Transit route • In some instances (especially curbside locations) local and express routes will also serve the Rapid Transit Stations	• 20 m concrete platform (minimum) • Bench (standard sitting and leaning bars) • Rapid Transit Shelter • Waste receptacles • Passenger information display • Maps and wayfinding • Security/CCTV cameras • Pedestrian/stop lighting Considerations for; • Bicycle Parking

1.2.8 Designated Specialized Transit Stops

Designated Specialized Transit stops are established to provide a protected stopping location for specialized vehicles

A designated Specialized Transit stop may be established on-street:

- where Specialized Transit vehicles are unable to access a main entrance of a major trip generator or institutional facility; and/or;
- to establish a central pick-up and drop off point at major trip generators.

The application of on-site Specialized Transit stops are defined in the City of London Site Plan Control Manual. These measures are considered in the process of site plan review by the LTC Planning Department, in consultation with the London Community Transportation brokerage.

All accessible stop criteria apply to a designated Specialized Transit stop, including clear landing area, landing pad, and barrier free connection to the surrounding buildings and pedestrian network. The stop location should be as close as possible to a designated accessible entrance.

Signage at designated Specialized Transit stops should include a Specialized Transit/LCTB stop sign, and the stop area should be signed and authorized as a Paratransit Stop Zone, as per the relevant City of London traffic by-law.

1.2.9 Bus Stop Zones

Designating a stop area as a “Bus Stop Zone” assists by-law enforcement and parking control officers to keep the area clear and issue citations when warranted

Where a demonstrated problem with vehicular traffic parking or stopping in bus bays or at bus stops exists, the City of London shall be requested to delineate a bus stop area with the proper Transportation Association of Canada designated parking/stopping control signs, and authorize the stop as a “Bus Stop Zone” in the relevant City of London traffic by-law.

The need for an enforceable by-law has increased due to traffic and parking demand, as well as potential liability in cases where buses are prevented from turning into the bus stop properly.

1.2.10 Shelter Standard

Transit Passenger Shelters shall be installed where warranted and where physically feasible, as per the current Operating Standard for Shelter Installation.

The current LTC Shelter Warrant is attached as Appendix 2. This has been previously approved by the Commission and is reviewed, as required, to reflect operating conditions, ridership trend changes, and revised shelter installation warrants. The warrant is to determine which stops qualify for a shelter installation based upon the approved criteria i.e. Average daily boardings, frequency of service, corridor conditions (windswept) etc. See section 2.7.3 for guidance on how shelters are installed.

1.2.11 Advertising Bench Standard

Transit advertising benches shall be installed where warranted and where physically feasible.

Current advertising contracts with the bench contractor will determine when and how advertising benches are installed.

Per the agreement with the shelter contractor, the installation of an advertising shelter will take precedence over the implementation of an advertising bench. A single stop is not to have both an advertising shelter and an advertising bench installed.

If both a shelter and bench are to be installed at a stop location, the shelter contractor will have first right of refusal with regards to the installation of an advertising shelter. If it is determined that an advertising shelter is to be installed, a non-ad bench must then be installed at the stop.

1.3 Areas of Responsibility

1.3.1 Determination of Permanent Stop Locations

LTC Planning Department with the approval of the City of London Transportation Division.

1.3.2 Determination of Temporary Stop Locations

Pre-planned Detours- In instances when construction or other road closures are known in advance, the Planning department in consultation with the Operations department will be responsible for determining the detour routing and establishing the locations of temporary stop locations.

Emergent Detours- Detours that are not known in advance (i.e. MVC's watermain breaks etc.) will be the responsibility of the On Road Inspectors to determine the detour routing and establish the temporary stop locations as necessary.

1.3.3 Stops Marker Installation & Maintenance

Installation on existing poles, repairs: co-ordinated by the LTC Transit Planning Technician and/or the Director of Planning

Installation, repair and/or relocation of stops on U-channel posts: contracted to Steeper Service Ltd.; co-ordinated by the Transit Planning Technician in consultation with the Director of Planning

1.3.4 Snow Removal

Contracted to the City of London:

- contract responsibility of the Director of Planning
- administrative issues handled by the Transit Planning Technician
- incidents/accidents handled by the Transit Planning Technician

1.3.5 Passenger Amenities

(Benches, shelters, advertising benches): Co-ordinated by LTC Planning Department with approval from Transportation Planning & Design at the City of London.

1.3.6 Accessibility Pads

Locations are coordinated by LTC Planning Department with approval from Transportation Planning and Design at the City of London.

1.4 City Approval Requirements

All stop locations or permanent relocations; passenger amenities and accessibility pads must have the approval of the City's Transportation Planning and Design Department.

2.0 - STOP TECHNICAL GUIDELINES

The bus stop technical guidelines in this section define the specific design criteria and measurements to be applied on an individual site basis. These are the details used to meet the directions set out in the standards section.

2.1 Basic Components of Bus Stops

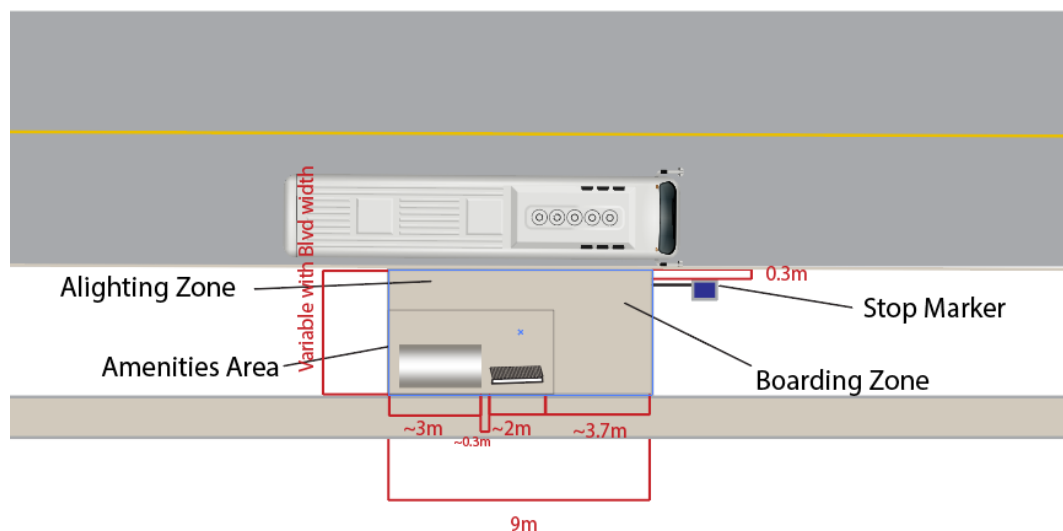
Across transit agencies and in consultation with the Canadian Institute for the Blind, Vision Loss Rehabilitation and the London Transit Accessible Public Transit Service Advisory Committee, the most important aspect when designing a bus stop area is consistency. Ensuring each bus stop across the city is designed as close to the standard as possible to ensure all passengers are able to easily identify and access the bus stop independently is the critical component to any bus stop design. While the above noted hierarchy of stops will determine the amenities located at each stop level all local/express bus stops will have the following elements;

- A 9m to 14 m landing pad providing a hard surface for accessible customer boarding and alighting.
- A stop marker on a U-channel pole, which indicates the presence of a bus stop to customers.
- Standardized placement of bus stop amenities- where warranted amenities such as shelters, benches etc. will be placed in a consistent location at each stop.

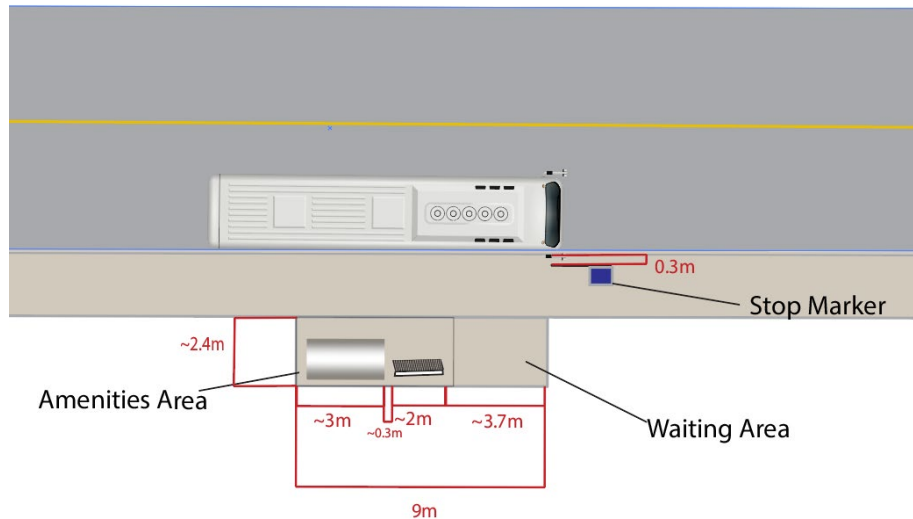
There are 4 main types of stop design;

1. Boulevard Stops where a grass boulevard is located between the curb and the sidewalk
 - a. In these instances, a 9-meter or 14-meter pad will be installed at the bus stop dependant upon stop classification to provide a hard landing surface for boarding and alighting at the front and rear doors
 - b. Bus stop amenities will be installed as set out in Figure 1

Figure 1: Standard Design for Bus Stops with a Grass Boulevard

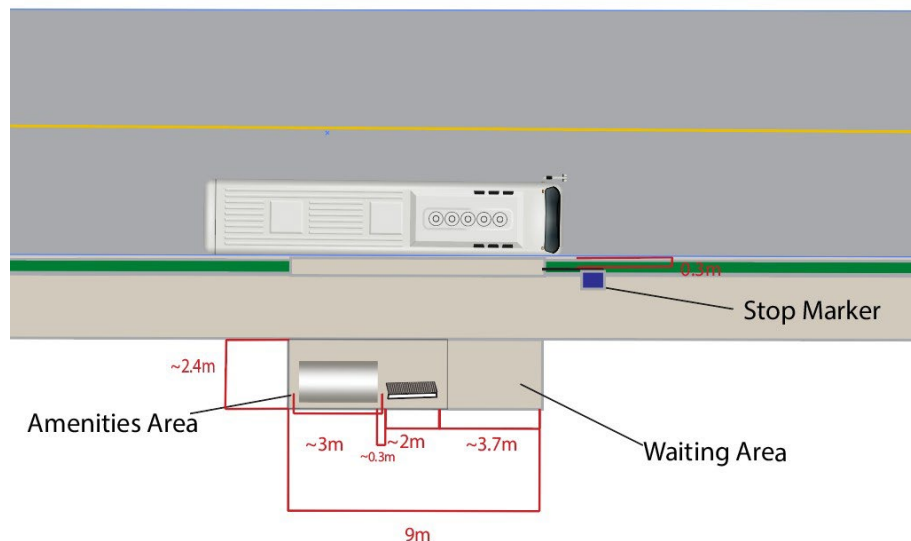


2. Curb adjacent stops where there is no boulevard and the sidewalk abuts the curb
 - a. In these instances, a concrete landing pad is not required when the sidewalk abuts the curb. A 2.4 x 9 m pad will then be installed behind the sidewalk to allow for additional waiting space, provide space for wheelchair turning movements and a space for amenities
 - b. Bus stop amenities will be installed as set out in Figure 2



3. Narrow Boulevard stops are where the sidewalk is not immediately abutting the curb, but there isn't sufficient space between the sidewalk and the curb for amenities or a passenger waiting area clear of the sidewalk.
 - a. In these instances, a 9 or 14-meter connector pad will be placed between the sidewalk and the curb to provide a hard surface for boarding and alighting. Additionally, a 2.4 x 9 m pad will be installed behind the sidewalk to allow for additional waiting space, provide space for wheelchair turning movements and a space for amenities.
 - b. Bus stop amenities will be installed as set out in Figure 3

Figure 3: Standard Design for Bus Stops with Narrow Grass Boulevards



4. Rural cross-section bus stops are when no sidewalk, curb, or gutter exist along a transit route, but accessible stops are still necessary
 - a. In these instances, a raised pad is installed along the side of the road with ramps on either end
 - b. The design of a rural bus stop example can be seen in Appendix 3

2.2 Fleet and Service Context Informing Stop Technical Guidelines

It's important to consider the context in which transit stops are planned to be used. The dimension of vehicles, and the type of service passing stops, play an important role in determining stop locations and the appropriate infrastructure at stopping locations.

2.2.1 Fleet / Vehicle Dimensions

The makeup of LTCs fleet helps to inform design of bus stops. In particular, the distance between doors, the turning radius, and the full length of both vehicle types currently in-use are considered when planning the size of the accessibility pad, and how close to an intersection stops can be placed.

London Transit operates bus service with the following standard vehicle types:

- Conventional bus (40ft)
- Articulated bus (60ft)

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 London Transit's fleet and are therefore the most-used design vehicles in the network.

Conventional Buses



London Transit currently operates conventional buses manufactured by 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 is 44' (13.4m). The distance between the front and rear doors is approximately 5.41m, and 9m pads are considered sufficient to provide a hard surface at the rear door.

Articulated Buses



London Transit currently has 13 Articulated buses in the fleet and are 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). The distance between the front and last set of rear doors is approximately 12.51m, and 14m concrete pads are considered sufficient to provide a hard surface at the rear doors

Table 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	35	12.5 m – 13.4 m

2.2.2 Route Classification

Similar to the fleet considerations, the type of service passing a stop has an impact on what stop design is selected and how stops should be situated along a route.

Rapid Transit Routes

Rapid Transit is anticipated to start operation in 2027 and will be a bus-based system that mirrors many features of a rail system with the flexibility and cost savings associated with using over the road vehicles. London's RT network will include two routes, and will provide the highest levels of service frequency, acting as the spine of the transit network. Stations along Rapid Transit have their own design with features tailored to board and alight passengers efficiently and maintain quick service in the dedicated bus lanes. They also have upgraded amenities like VMS signs displaying ETAs for all passing routes to facilitate easier transfers to other branches of the network.

Core Routes

The purpose of core routes is to provide consistent, frequent service on high demand corridors, connecting residential areas with major destinations like shopping, employment, schools and services. What differentiates core routes from other route types is the sustained demand for transit over the course of the day. These routes are well positioned to support increased residential density along the corridors which will, in turn, support increased in potential ridership. Stops along core routes can fall within several of the categories listed in the stop hierarchy depending on the demand and transfer activity expected.

Local Routes

The purpose of local routes is to connect neighborhoods and communities to one another, to higher frequency routes like core routes or RT and to supplement transit service on corridors which are served by RT. Local routes provide coverage-oriented service, ensuring access to transit for London residents, even when demand is lower. As such, they typically operate at a lower frequency than core routes. Stops along local routes typically fit the standard stop category in the stop hierarchy. With more dispersed boardings and alightings, individual stops don't see the daily usage to warrant upgraded amenities, and smaller footprints help them integrate better with neighborhood street networks. Where several routes converge, or at intersections with core routes, stops serviced by local routes may be enhanced.

Feeder Routes

Core routes and select local routes have been identified as "feeders" into the RT network. Feeder routes are core or local routes that do not duplicate or compete with RT service and are oriented to connect residential and employment areas to the RT network. Stops served by feeder routes can vary depending on where along the route they are. Stops within neighborhoods may be more fitting of a standard or enhanced stop design, however, where feeder routes tie into Rapid Transit, consideration for amenities described in the major category of the stop hierarchy would be more appropriate for handling the volume of transfers expected.

Industrial Routes

Industrial Routes provide service to the industrial employment areas. These routes generally operate at lower frequencies due to less demand for the service and are often operated during the weekday peak periods only. Service on industrial routes is designed to try to match start and end times of the businesses in the Industrial areas as much as possible, noting there are shift times that are outside of London Transit's operating hours. Transit stops along industrial routes are typically located for proximity to businesses; however, they are often on roads without sidewalks and see limited ridership. For these reasons, many stops along industrial routes are configured like the rural bus stop described in section 2.1.

Alternative Service Delivery Zones

In some areas of the City, conventional transit service will not be the most efficient or effective way to meet demand for transit service. In these locations, Alternative Service Delivery (ASD) zones are proposed as an opportunity to introduce new service or replace underperforming routes with a service that operates on-demand. London Transit does not currently have any ASD zones, but two locations are proposed to be transitioned to ASD by 2029. In ASD zones, stops should be located such that a fixed route could be aligned between stops in order to be prepared for increased passenger volumes that would warrant fixed route service in the future.

Community Bus Routes

The community bus service is specially designed to serve the needs of seniors and persons with mobility challenges. Service is provided, where possible, to the doors of specified seniors residences, medical facilities and shopping centers. Community bus stops should be designed with careful consideration to walkability for the population it serves.

For details on the classification of specific routes within the London Transit network, refer to the current Five-Year Service Plan Framework.

2.2.3 Schedule and Relief Considerations

Layover Locations

Layovers are an operational requirement for all transit routes. Layovers consist 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.

Layovers generally take place at terminal facilities or at Major Stops.

Where a bus must layover 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.

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.

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 routes.

To maintain schedule adherence, LTC'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 LTC's preference given the significant space and cost requirements this infrastructure entails.

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.

Operator relief points may be in-lane or in a lay-by depending on the roadway in question.

2.3 Stop 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.

LTC is committed to

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

LTC continues to progress towards a fully accessible transit system. All vehicles are accessible, with low-floor and ramp-equipped buses 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.

Core criteria for accessible stops:

- Stops are to have a concrete pad flush with the curb that allows for level boarding or deployment of the accessible ramp,
- The concrete pad should have a horizontal cross slope of 2% or less.
- Stops meet other requirements set out in updates to the Accessibility for Ontarians with Disabilities Act (AODA)

Key design considerations for accessible stops:

- 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.

Visibility of Bus Stops

Colour contrast, of signage and bus stop elements, can be an important tool to assist riders with vision impairments. London Transit's Bus Stop plate were updated in 2012 to blue background with white reflective text to ensure high contrast for those with vision impairments.

Other Accessible Features

Tactile stop markers, which some transit systems have included on bus stop poles to make the stop cane detectable by those with vision impairments. These are not currently in use by London Transit but may be considered in the future.

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.

While LTC recognizes that sidewalk construction is the responsibility of the City of London, consideration for sidewalk connections is a part of the stop review and City approval process. On an annual basis, London Transit also provides the city with a list of bus stop locations that do not have connecting sidewalks for consideration as part of the annual sidewalk program.

2.4 Location Factors

2.4.1 General Considerations

Proper location of bus stops is a balance between the competing needs of the customer to have convenient access to the system, versus the need for operational efficiency (i.e. reasonable average operating speed). To provide the optimum service for transit users, bus stops should be near intersections and/or major trip generators. This minimizes walking distances and the potential for conflict between pedestrians and vehicular traffic. In suburban residential areas, stops should be located so as to maximize service access. The comfort and safety of passengers waiting to board or having deboarded is a factor. Consistency in stop location, spacing and amenities is a benefit to operators, passengers, and other users of the road; however, certain stop contexts may warrant a deviation from the recommendations outlined in these 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.

Factors to consider in evaluating a stop location include the following:

- **Ground Conditions:**
 - flat, level, solid landing area
 - raised curb & boulevard or curblane sidewalk
 - driveway approaches
 - drainage
 - winter relocations to be avoided except in emergencies
 - suitable area to deposit snow from cleared stop
- **Accessible Transit Considerations:**
 - flat level landing area, raised curb with sidewalks
 - barrier free connection to the rest of the pedestrian network (i.e. curb cuts both sides of street, and all quadrants of intersections)
 - no fixed obstructions in landing area (utility poles and/or guide wires, hydrants, utility boxes)
 - adequate clearance to deploy the accessibility ramp
- **Adjacent Land Use:**
 - open areas, commercial / institutional uses preferable over residential
 - if a stop must be located near a private residence, it is desirable to position it on a flankage lot rather than on a frontage property
 - bus stops should not be relocated from a commercial, industrial/institutional, open space or residential flankage to a residential frontage
- **Safety Considerations:**
 - location in relation to existing and proposed traffic signals and/or intersection pedestrian signals to permit passengers to cross busy arterial or collector roads with the protection of signalized traffic control
 - location of trip generator in relation to stop i.e. minimize jay-walking potential or unprotected crossing of arterial roads. Any request for permanent relocation of a bus stop which may lead to a jaywalking problem should be strongly opposed
 - school/pedestrian crossings sightlines i.e. passengers leaving the transit vehicle have a tendency to walk in front of the vehicle and are not visible to following traffic
 - comfort & safety of passengers waiting to board or having alighted i.e. avoid adjacent wooded areas, secluded or poorly lit areas
 - overhead issues – snow loads/icicles falling from roofs, etc

- **Security Considerations**
 - comfort & safety of passengers waiting to board or having deboarded:
 - avoid:
 - adjacent wooded areas
 - secluded or poorly lit areas
 - adjacent alleyways, unlit walkways, etc.
- **Roadway alignment/geometry & Traffic Control:**
 - curves, gradient, profile, vehicular sightlines
 - driveways, storm sewer catch basins
 - pedestrian sightlines
 - school/pedestrian crossings (no closer than 30m before or after a posted School Crossing)
 - traffic control (stop/yield/lane designation signs)
 - parking
 - wide right of way on arterials with no pedestrian refuge
- **Economic Considerations**
 - discretion should be exercised in selecting stop spacing – the greater the number of stops, the greater the burden on operating efficiency

2.4.2 Stop Spacing

Narrow stop spacing increases access to transit service and reduces walking distance, but also reduces route travel speed, which:

- increases transit trip time;
- creates a negative perception in the eyes of the passenger; and,
- may have economic consequences (i.e. more buses required to maintain service level within round trip time).

Long stop spacings improve operational efficiency (bus required to stop less frequently = higher average speed), but results in inconvenience for passengers accessing the system (longer walking distances). Therefore, a balance between operating speed and passenger convenience is required.

Stop spacing should vary with land use and roadway classification. In establishing a pattern of bus stops on major roadways, locations at existing (and proposed) signals and intersection pedestrian signals should first be considered, so that passengers may cross the street with the aid of signals. Additional locations between signals, such as at crosswalks, minor intersections, and traffic generators, are then established at a reasonable spacing for the particular type of route and environment.

On collector streets in suburban areas, priority is given to locating stops to minimize impact on the neighbourhood (i.e. at open spaces and flankages), balanced with the need to provide reasonable spacing and walk distances to access the transit system.

With the implementation of the AVL system minimum stop spacing criteria also needs to be set in order to allow sufficient time for the stop announcement to be made before reaching the location.

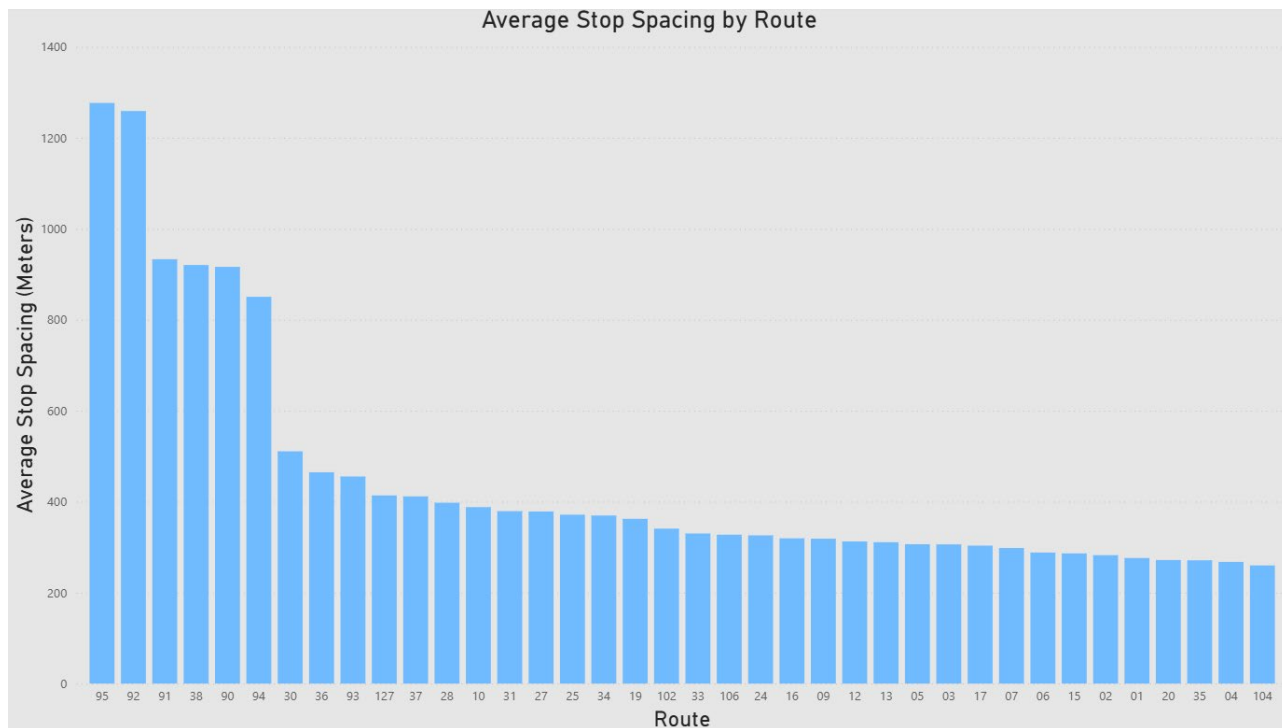
In most areas stops should be placed no closer than 250 metres apart, however a minimum spacing of 300 metres is optimal

Table 5 sets out the characteristics and criteria for stop spacing, by type of route and service area. Where significant deadheading occurs due to lack of adjacent development or pedestrian connections, stop spacing may be increased.

Table 5 - Stop Spacing Criteria

Route Type / Area	Priority	Route / Area Characteristics & issues	General Location Criteria	Optimum Spacing Criteria (meters)
Rapid Transit/Express Routes	Travel Speed	- Dedicated Lanes on Rapid Transit Corridors - High use stops on heavily travelled arterial roads	Limited Stop service with stops located at major intersections, transfer points and Major passenger generators	500- Major Destinations
Core Routes	Travel Speed	- Travel primarily on arterial corridors and provide a direct trip for passengers with few deviations - Provide a high level of service in areas of the City where RT is not provided, but passenger demand is high - Ridership demand is high and sustained over the course of the day, week and year bidirectionally	at major intersections, transfer points and major passenger generators	300 - 400
Local Routes	Walk distance and pedestrian circulation	- Connect neighbourhoods and communities to one another, to higher frequency routes (Core or RT) and to supplement transit service on corridors which are served by RT - Provide coverage-oriented service, ensuring access to transit for London residents even when demand is lower	- at intersections with collector roads, near walkways and at local streets where required to reduce pedestrian walk distance. - approximately 1 every 2-3 blocks	200 - 400
Industrial	Travel Speed	- Low use stops along roads often with rural cross-sections - Traveling through Industrial Employment areas - Focus on where employment opportunities exist	At major intersections, and major employment opportunities	250- Major Destinations
Alternative Service Delivery Zones	Access	Introduce service into new areas or replace under performing routes, which may be difficult to serve with traditional fixed route services	Major Terminals, intersections, major employment opportunities	As warranted
Special Location	Serve major trip generator or special needs	- institutional facilities - private property - regional malls - transfer terminals - community bus	- generally site specific designs or agreements with private property owners. - stop location policies and criteria should still be applied.	As required

Set out in Figure 4 is the current LTC average stop spacing by route.



2.4.3 Stop Positioning

The farside preference at signalized intersections was established with the implementation of Traffic Signal Priority measures. Farside stop locations help to achieve improved operational efficiency with the implementation of TSP, as it allows the bus to take advantage of extended green phases without the need to stop to service the stop prior to the traffic signal. The nearside preference at stop signs decreases the number of stops required and increases the average travel speed.

Priority of location should be given to transit stop locations at major intersections and near the street entrance of major destinations (avoid mid-block locations where possible).

Other criteria to look for in determining stop positioning include:

- **Nearside-**
 - at stop signs:
 - reduced delays when passenger service time occurs when stopping is already required
 - operators can see passengers approaching from three directions (front, 2 sides)
- **Farside:**
 - At signalized intersections
 - - where a high volume of right turns exist or after the bus makes a left turn
 - at the point of convergence of two routes to better facilitate transfers connections (i.e. with a nearside stop)
- **Midblock:**
 - at major trip generators or where connected to pedestrian network
 - to facilitate proper spacing

For each stop location, confirm with other City Departments (eg. Planning and Development and Road and Transportation staff) that there are good pedestrian connections between the stop position and the trip origins/destinations.

2.4.4 Special Locations

Stops should not be located in areas where they may interfere with certain activities or create /aggravate traffic problems. Such locations may include:

- **Fire Halls/Ambulance Stations** - bus stops are not to be placed so as to interfere in any way with emergency vehicles access/egress, with motorists view of same, or create a traffic backlog which may create interference.
- **Funeral Homes** - stop locations in the vicinity of funeral homes are to be avoided, especially if the hearse and cortege form up on the street.
- **Railway Grade Crossings** - bus stops farside of railway grade crossings are to be avoided, as the stopped bus may back traffic up onto the tracks. Bus stops nearside of a railway grade crossing should not be placed within the greater of 3.5 meters from the tracks (end of cross-ties) or the limits of the railway right-of-way. Stop markers are not to be placed on, or be obstructing, grade crossing protection signals or signage).
- **School Bus Loading Zones** - bus stops within school bus loading zones at primary schools should be avoided. At Secondary schools they are only acceptable if necessary to provide a reasonable stop location to serve the school or surrounding area.
- **Fire Routes** stops shall not be placed within the defined laneway of designated fire routes, noting that the designated fire lane is not necessarily the curb lane at a development. This issue should be reviewed on a site-specific basis at site plan stage or when transit is planned to operate on private property.
- **School Crossings or Pedestrian Crossovers:** stops should not be placed within 30 meters of school crossings or pedestrian crosswalks in respect of the related no passing regulations at these locations, and to ensure adequate sightlines for oncoming traffic.
- **Regulatory Signs:** stops should not be located on poles with regulatory signs (as defined by the Highway Traffic Act), such as Stop and Yield signs, speed limit signs, and directional or lane control signs.
- **Roundabouts-** Stops located at roundabouts are preferred nearside the majority of the time, however placements need to be considered on a site-specific basis. For example if a community mailbox is already located in the area it would be better to move the bus stop to the farside to avoid traffic conflict. The advantage of nearside bus stops would be preventing vehicles from being “trapped” within the traffic circle waiting for the bus stopped on the far side of the circle to move and creating possible vehicle conflicts. The Bus stop should be placed on a straight section of road ideally one or two properties before the entrance to the traffic circle.

2.5 Dimensions & Technical Criteria for Stop Areas

The dimensions as set out below are based on established transit industry and traffic engineering guidelines.

On major routes and arterial roads where multiple routes serve stops, it may be necessary to provide additional bus storage capacity. This would add an extra 13m for a straight first-in, first out operation and 20m for special circumstances, primarily at terminal points when the trailing bus could be scheduled to leave prior to the lead bus.

On arterial roads and selected primary collectors, bus stop and bus bay dimensions should be such to accommodate articulated buses.

2.5.1 Stop Areas

Tables 5 and 6 below sets out the minimum desirable dimensions for bus stops on both collector and arterial/primary collector roads:

Table 5 - Bus Stop Dimensions - Secondary Collector / Local Streets - Standard Buses

Stop Type	Stop Marker Position	Pull-in Clearance	Bus Storage	Pull-out Clearance
Nearside	before the end of curb return, property line, crosswalk or stop bar	12.5m (40')	12.5m (40')	n/a
Farside (after straight through)	18.5m (60.5') after the end of curb return, property line, crosswalk or stop bar	n/a	12.5m (40')	7.5m (25')
Farside (after right turn)	27.5m (90') after the extended curb line of the point of turn to permit the bus to square up to the curb after turning	n/a	12.5m (40')	7.5m (25')
Farside (after left turn)	Same dimensions as after right turn. To be avoided if left turn is onto street with two or more lanes to avoid having to weave across one or more travelled lanes to access the stop, and difficulty with squaring up to the curb.	n/a	12.5m (40')	7.5m (25')
Midblock	as required	12.5m (40')	12.5m (40')	7.5m (25')

Table 6 - Bus Stop Dimensions - Arterial / Primary Collector - Adjusted for Articulated Buses

Stop Type	Stop Marker Position	Pull-in Clearance	Bus Storage	Pull-out Clearance
Nearside	before the end of curb return, property line, crosswalk or stop bar	12.5m (40')	18.5m (60')	n/a
Farside (after straight through)	24.5m (80.5') after the end of curb return, property line, crosswalk or stop bar	n/a	18.5m (60')	7.5m (25')
Farside (after right turn)	34.5m (113') after the extended curb line of the point of turn to permit the bus to square up to the curb after turning	n/a	18.5m (60')	7.5m (25')
Farside (after left turn)	Same dimensions as after right turn. To be avoided if left turn is onto street with two or more lanes to avoid having to weave across one or more travelled lanes to access the stop, and difficulty with squaring up to the curb.	n/a	18.5m (60')	7.5m (25')
Midblock	as required	12.5m (40')	18.5m (60')	7.5m (25')

2.5.2 Bus Bays

There are varying standards for bus bay dimensions. In general, they provide for a 15 – 25 m entrance and exit taper, and a 15m storage area per bus, and are a minimum 3.0 m wide. The length of the entrance and exit tapers is related to the signed speed of the roadway. Higher speeds require longer taper lengths to facilitate proper acceleration and deceleration of the bus.

Corner locations do not require tapers at both ends, which would increase the distance from the stop to the corner, but should be evaluated on a site-specific basis. The recommended minimum design specifications for bus bays are set out in Table 7:

Table 7 - Bus Bay Design Specifications

Condition	Entrance Taper	Storage Bay *	Exit Taper	Width	Crossfall
Collector roads, off-street stops, roads up to 60 kph:	20m (min)	15m	20m (min)	3.25 (min)	2%
Collector & arterial roads; 60 kph & over - Standard Bus: Articulated Bus:	25m 25m	15.0m 18.5m	25m -	3.50 (min) -	2%

Storage bay dimensions are for 1 bus; add 13.5 m for each additional standard bus, 19.0 for each additional articulated vehicle. See drawings attached as Appendices 4 and 5.

2.5.3 Stop Area Clearance

For a distance of 18m back from the stop marker, the landing area should be clear of obstacles, such as:

- driveways
- landscaping
- utility poles/guy wires
- newspaper boxes
- utility boxes

This distance can be shortened to 12m if it is not anticipated that an articulated bus will ever be needed on the route.

When shelters are located on the boulevard, there should be a minimum 2.0 meters clearance from the shelter to the curb, and a clear minimum 1.5m pad at the side of the shelter to permit barrier-free travel between the bus and the adjacent pedestrian network.

2.6 Stop Identification, Traffic Control Signage, Public Information

2.6.1 Basic Principles of Stop Identification Signage:

The bus stop is the customer's first interface with the system, and is also a highly visible corporate symbol. To this end, bus stop signage should:

- be visible in both directions of travel (helps operators locate return stops for customer enquiries and assists passenger walking upstream to the stop);
- contrast with surrounding environment to be easily visible while at same time be aesthetically pleasing; and,
- be consistent in shape, size, and colours to be easily recognized by passengers, motorists, and pedestrians.

Stop markers generally have the following characteristics:

- colours typically reflect corporate colours of the transit property, municipality, or region;
- use of reflective material for nighttime illumination;
- basic system information:
 - system I.D. (logo/name/nickname);
 - Bus Stop I.D.
 - route identification (routes serving stops;
 - Telephone Information System telephone number or general information line number;
 - supplementary information on the plate (unless additional space required);
 - two-way visibility.

2.6.2 Current Conditions:

Current LTC signage consists of eight basic marker types:

1. 12" x 18" plate, 16 gauge steel with rounded corners, side or centre punched oval holes, double sided, Blue Scotchlite Plus with white border and white bus pictogram (current specification), procured externally; This is the standard signage used for all permanent local bus stop locations
2. 8.5" x 11.25" 0.24" PVC board with rounded corners, 3 rivets on the left-hand side, double sided, blue with white border and white bus pictogram (current specification), procured externally. This sign is used in locations where a permanent plate has been damaged and will be down for a period of time, or for locations where permanent plates have yet to be determined (i.e. RT stop locations).
3. 12" x 9" or 12" x 18" 16 gauge steel with rounded corners, side or centre punched oval holes, double sided, Orange Scotchlite Plus with white boarder and white Express Route number. Made in house by the Paint shop. This is the standard Express Route stop, used for limited stop services.
4. 6" x 24" plastic (1 mm) with Red Stop Not in Use and crossed out bus pictogram. Used for temporary bus stop closures (i.e. due to construction). Also has space for details to be added to the sign to direct passengers to the closest stop (permanent or temporary) location to catch the bus- Procured externally with the planning department or Inspectors adding additional information based on the situation.
5. 6" x 24" plastic (1mm) with blue Temporary Stop and bus pictogram. Used for temporary bus stop locations (usually for construction) with the ability to add the routes that are serving the stop. Procured externally with the Planning department or Inspectors adding additional information based on the situation.
6. 6" x 11.5" plastic (1mm) with green Routes on Detour. Used for routes serving permanent bus stop locations while on detour. Allows for the routes temporarily serving the stop to be listed to aid customers in finding the stop locations for the detoured routes. Procured externally with the Planning department or Inspectors adding additional information based on the situation.
7. 8 ½" x 11" never tear paper signs. These signs are used to provide advance notice to customers regarding upcoming detours, stop closures, service changes etc.- prepared in house
8. 12" x 18" plate, 16 gauge steel with rounded corners, side punched oval holes, double sided, white background with black lettering "Possible Future Transit Stop Area", procured externally. These signs are installed in all new subdivision areas to inform potential homebuyers where transit stops and routes may be located in the future. The poles for these signs are installed by the developer of the subdivision and the plates are installed by LTC.

All bus stop plates have the bus stop ID and routes serving the stop included to provide wayfinding information for passengers.

Some routes which operate on limited schedules or reverse loops have supplementary information at the stop, designed to provide the customer with more information.

Other supplementary signage includes reminders to operators of any special operating conditions at a particular stop (i.e. no layover, etc).

2.6.3 LTC Stop Installation – Technical Specifications

(a) Plate Information Standard:

To ensure information is applied in a standard and consistent manner:

- route number & name (1" Arial white);
- supplementary information i.e. hours / days of operation or route destination (3/4" Arial white) custom applied as warranted.
- Individual plates are created by our supplier with unique Stop ID#, routes serving the stop and any supplementary information
- See Appendix 6

(b) Plate Positioning Standard:

To ensure two-way visibility:

- signs perpendicular (90° angle) to road;
- flagged post (U-channel or other) -
 - concrete/steel light poles - banded double plate or single offset plate to ensure two-way visibility
 - wood poles – bolted double plate
- Sign height- bottom of plate to be 7-9 feet from ground level to comply with the City of London Sign and Canopy By-law.

2.6.4 Bus Stop Zones & Traffic Control Signs

A Bus Stop Zone is a bus stop area which has been delineated with a standard Transportation Association of Canada (TAC) RB-58 Road Use Control Sign (No Stopping/Bus Zone) and authorized as a "Bus Stop Zone" in the relevant City of London by-law. This assists by-law enforcement and parking control officers to keep the area clear and issue citations when required. Bus Stop Zones should be enacted at the following stop locations:

- all downtown stops and bays
- on-street stops adjacent to major traffic generators where vehicles have a tendency to stop/stand in the bus bay or at the stop area.
- at any stop where there is a demonstrated problem with parking or stopping/standing vehicles

The defined zone should conform with the stop area dimensions set out in section 2.5.1 of this report. Similar signage may be installed at private property stops, however enforcement is the responsibility of the property owner, as the City by-law may not apply.

2.6.5 Locating Utilities

Stops requiring the installation of in-ground poles should be contracted to Steeper Services Ltd (LTC's current contractor) who are then responsible for obtaining locates prior to installing the pole.

2.6.6 Markers on Private Property

Where buses operate on private property, permission must be obtained from the property owner for the placement of stops and stop markers. Stop location, markers, and passenger amenity provisions should be consistent with established policies and procedures.

Installation of the stops is generally the responsibility of the property owner, but should be identified in the relevant operational agreement, contract, or site plan approval/development agreement.

As these stops are usually located at or on major trip generators, the maximum possible amount of customer information should be provided.

2.6.7 Temporary Condition Signs

Where a temporary bus stop is required due to construction or road closures, two types of stop markers may be used:

- Plastic “Temporary Stop” sign attached to, existing U-channel poles, wood posts or small radius round steel poles.
- Where there is no existing usable pole, a portable bus stop sign (a plate on short pole attached to a weighted plastic temporary sign base) can be used. Temporary bases are currently procured from Cedar Signs Inc.

All signs should clearly indicate “Temporary Stop” for the information of customers and adjacent landowners, and be supplemented with as much additional customer service information as possible.

A temporary stop is defined as any stop, which is not intended to be in place after the construction or closure, regardless of duration.

2.6.8 Temporary Relocations

When a stop must be closed or temporarily relocated, it is important to convey to the customer as much information as possible, including:

- effective date of closure
- duration of closure (if known)
- routes affected (if not all)
- alternate stop(s) to board bus

Closed stops should have temporary “Stop Not In Use” signs attached on the pole below the permanent bus stop plate. For U-channel poles or lamp posts zip ties should be used to attach the sign. On wooden hydro poles the signs should be stapled to the poles.

When known in advance, the planning department will prepare messaging on weather resistant labels to attach to the temporary signs with detailed information regarding the stop closure and where to catch the bus. If closure is not known about in advance, On Road Inspectors will handwrite the information onto the temporary signs. The signs should be easily read from the ground and frequently monitored to ensure they are in place during the course of the service disruption.

A notice indicating the road closure or stop relocation must also be posted on the LTC website if lasting longer than 5 days and/or impacting more than 5 stops. All detours are to be entered into OnRoute Bus Ops and set to public so they are shown on realtime.london.ca regardless of duration or number of stops impacted. Any known information regarding the duration and where to catch the bus should be included in the notice and posted for passengers as far in advance as possible.

2.7 Passenger Area Amenities

2.7.1 Passenger Amenities – General

Passenger amenities are those items at bus stops which provide comfort or shelter to customers waiting to board the bus, or having just alighted. These include:

- shelters
- benches – ad/non ad, and privately provided
- garbage receptacles
- Solar powered lighting

The type of amenities provided at individual stops is evaluated on a site-specific basis but should generally follow the guidelines set out in the hierarchy of stops (Table 3).

A summary of recommended customer amenities at each stop, organized by stop typology, is provided in Figure 5. 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 5: Bus Stop Amenity Matrix

Amenity	Stop Classification			
	Standard	Enhanced	Major	Rapid Transit
Required Amenities				
Bus Stop Sign	●	●	●	○
Concrete Landing Pad	●	●	●	●
Customer Comfort				
Bench	○	○	○	●
Standard Shelter (4'x8')	×	●	●	×
Rapid Transit shelter	×	×	×	●
Waste Receptacles	○	○	○	●
Customer Information				
Passenger Information Display	×	○	○	●
Maps & Wayfinding	×	○	●	●
Safety and Security				
Security/CCTV Cameras	×	×	×	●
Pedestrian / Stop Lighting	○	○	○	●
Multi-Modal Integration				
Bicycle Parking	○	○	○	○

Legend ● Required ○ potential application × not recommended

Amenities must be kept clear of pedestrian travel routes, stop landing areas, and bike paths. It is also important to keep the landing area clear for ramp deployment. A minimum clearance zone of 9' (2.75m) is required to allow the ramp to deploy and permit wheelchairs/scooters to manoeuvre on and off the ramp.

2.7.2 Landing Areas

Pad designs are typically a 9m-14m wide concrete surface built between the curb and the city sidewalk, intended to provide a firm safe landing area and connection to and from the front door of the bus to the surrounding pedestrian network, and to accommodate accessible transit.

Pads should be built to current City of London sidewalk specifications. The design of each pad should be based on a site-specific evaluation, taking into account:

- stop usage;
- accessibility requirements;
- passenger amenities (existing or planned);
- geometrics (gradients, crossfall, to pedestrian network);
- obstructions (poles, pavement furniture, bike paths);

Where a stop can be improved with a minor adjustment to avoid obstructions, grade changes, etc, this should be undertaken before upgrading the stop.

Surface material should be concrete. Use of materials such as interlocking brick and patio stones should be avoided, as they can become uneven and create tripping hazards and barriers to accessibility.

In rural areas and subdivisions with rural road cross section (i.e drainage ditch, soft shoulders, etc), it is desirable to improve bus stops as soon as practical. Priorities should be co-ordinated with municipal ditch elimination and sidewalk upgrading programs.

All new pad locations must be approved by the City of London Transportation Planning and Design department before installation can proceed. A full list of all the proposed locations for the year should be given to the department at least 2 months prior to the planned installation start date to allow time for the approvals to be granted.

2.7.3 Shelters

Shelters increase customer comfort and safety by shielding customers from weather such as rain, wind, or snow. Shelters also improve the visibility of bus service and in the case of advertising shelters, provide space for revenue generation for the transit agency.

The LTC Shelter Warrant is attached as Appendix 2. This has been previously approved by the Commission and is reviewed as required to reflect operating conditions. The warrant is meant to ensure consistency

A standard shelter is 4' x 8' however, select locations may have a 4' x 12' shelter installed. A 4'x12' shelter may be considered at:

- special locations (institutional, major trip generators, mall terminals)
- high use stops (greater than 125 total boardings)

The door layout on 4x12 and larger shelters should provide 2 doorways to reduce the passenger perception of being "trapped". Large shelters configured with one doorway at the end only should be avoided. Large shelters where more than one interior shelter bench is beneficial (i.e. high use seniors areas) may be configured with a single centre exit. In a 4x12 shelter, this allows two easier access benches at the ends, while still permitting wheelchair access at the single centre door.

Canopy style shelters may be installed where space does not allow for the installation of a full shelter.

Shelters should be equipped with interior seating, such as the Daytech's "Easier Access" design bench or equivalent. Bench placement should not obstruct the door, restrict accessibility, or prevent access to the swing-up interior panel on advertising shelters.

Each shelter should have transparent walls on at least three sides and translucent roofs to encourage customer visibility for approaching buses.

New and replacement shelters should also have interior solar powered lighting. Alternatively, grid powered lighting can be used in locations with grid powered advertising panels

Factors in considering placement of shelters at a warranted stop include:

- sightlines
- intersection sight triangle
- clearance door to curb
- 0.5m sidewalk snowplow clearance
- Minimum 0.6m back from road with door oriented to the road
- 3.2m minimum from inside curb to shelter for blvd installation with door oriented to sidewalk side.

Appendices 7A-D includes specifications for shelters, and geometric design standards for pads and electrical hook-ups.

2.7.3.1 Rapid Transit Station Stop Shelters

Rapid transit shelters were designed to provide modularity and a consistent look and feel across the corridors, while also accommodating the need for minor customization and value engineering at each location to best fit the shelters within the context of the neighbourhood.

Each Rapid Transit Station Stop will have a shelter. The shelter warrant described above applies only to non rapid transit station stops.

Each rapid transit shelter will feature an obelisk to help identify the location of the rapid transit station and it is intended to be a landmark feature, wayfinding element, and branding device.

Passenger seating area, route information, security cameras, enhanced lighting, and tempered glass are a few key features of the new rapid transit shelter.

2.7.4 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 third-party advertisers.

Advertising benches may be located on arterial or collector roads. Installations require City of London approval and must provide as a minimum 0.5m sidewalk snowplow clearance. Advertising benches are not permitted in the Downtown Business Improvement Area or where the bench would not fit in with the surrounding area (i.e. Old North).

Non-advertising benches provided by the advertising bench contractor are installed on request by LTC under the terms of the current contract. City of London approval is required.

Bench placement must not interfere with maintaining full accessibility at the stop.

Advertising benches can not be placed at a location with an advertising shelter. Placement of advertising shelters take priority over advertising benches.

2.7.5 Garbage receptacles

Pole mounted or ground bin garbage receptacles may be installed on city right-of-way upon LTC request of the City of London. They are maintained by the city and installation criteria is determined by the City.

2.7.6 Realtime Arrival Information

Variable Message Signs (VMS) are electronic signs placed at bus stops to deliver next-bus and other service information to customers and are typically mounted inside shelters.

VMS signs 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. VMS signs can also be used to communicate detours or closures.

- VMS signs shall be installed at all Rapid Transit Station Stops
- VMS signs may be considered at major stops located in high passenger volume areas with large numbers of daily transfers.
- Larger stand alone signs allowing for up to 8 lines of information to be displayed at one time, are installed at major terminal locations (i.e. Regional Malls, Western University, Fanshawe College and the RT Park and Ride).
- All signs installed in the shelters have automatic audible announcements to read the next bus arrival information, stop location and time to passengers with visual impairments.

2.7.7 Bus Stop Lighting

Where street lighting is not sufficient for safe and effective transit service at night, supplemental bus stop lighting should be installed.

Solar powered lighting for both stand alone and shelter lighting is the primary lighting source used by London Transit. Grid powered lighting in shelters may be used in cases where the shelter is supplied with grid powered lighting for advertising shelters.

Current stand alone solar powered lighting is operated by push button to illuminate the bus stop area for a period of 5 minutes. The button can be pushed again if the passenger is still waiting at the stop. Having the light activated by a push button minimizes the potential negative impacts to surrounding uses.

Stand alone solar lighting is installed at stops more than 25 from a street light (as determined by GIS analysis), and where no transit shelters containing a light is present.

Bus stop lighting is still subject to each site's suitability.

- Whether there is space at the stop
- If the location receives enough sunlight to charge during the day
- If the stop is adjacent to a residence

Additional stop lighting can be installed by request, or further GIS analysis as funding and supplies permit.

Stop lighting locations should generally match the guidelines outlined in the stop hierarchy.

2.7.8 Security Cameras / Closed Circuit Television (CCTVs)

Security cameras are used to provide additional security at transit station stops by monitoring the stop area and recording footage that can be reviewed in the processes of an investigation should an incident occur. The presence of security cameras may also serve as a deterrent criminal behaviour.

Security cameras are currently provided at all Rapid Transit Station Stops

Security cameras are installed, maintained and monitored by the City of London.

2.8 Bus Stops with Cycling Infrastructure

Planning bus stops around cycling infrastructure takes careful consideration to ensure the safety of transit users, cyclist, and road users alike. Successful coordination is necessary to make sustainable transportation a desirable choice and promote access to transit by active modes.

At the time of writing (Fall of 2026), the City of London is undergoing a review of its current cycling infrastructure designs at transit stops. The review is meant to take feedback from transit users, cyclist, and the accessibility community, including London Transit's Accessible Public Transit Service Advisory Committee (APTSAC), to help identify potential conflicts and improve best practices.

While LTC awaits the updated best practices from this review, the following stop types are currently used to integrate cycling infrastructure around transit stops.

Curbside Stops with On-Road Bike Lanes

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

Shared Curbsides with Cycle Tracks

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.

Island Boarding Areas with Cycle Tracks

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 accessibility 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

Transit Stops along 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.

Before any specific design is considered it is important for LTC to review 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 LTC to account for any future cycling infrastructure and coordinate stop infrastructure with contacts at the City's Transportation Planning and Design Department.

3.0 – OPERATIONAL PLANNING & UPDATE PROCEDURES

3.1 Stop Planning Procedures

3.1.1 Standard Stop Review Procedure

The need to review stop locations is generated by a number of sources:

- Route changes
- Public contacts (users and non-users)
- Operator and inspector reports
- City Transportation and Design Division
- Planning Liaison – Site Plan Review and Subdivision Planning
- Construction resulting in the need to permanently relocate a stop

Stop issues are reviewed by the LTC Planning Department. If a relocation of the stop is determined the new location must first be approved by the City of London Transportation and Design division

The process of evaluating a stop location issue should be consistent with the above referenced general policies and technical standards. The basic procedure should be as follows:

1. Issue forwarded to Planning (contact, operator or inspector report, development issue, etc)
2. With guidance from this document Planning is to review:
 - existing ridership
 - surrounding landuse
 - impact on existing ridership
 - impact on adjacent landowners
 - traffic and operational issues
 - accessibility issues
 - stop spacing- i.e. current spacing between subject stop and previous and next stops as well as what the spacing would be should the stop be relocated or removed
3. For minor issues (amenity requests, etc), resources such as the Bus Stop Inventory photos and Google Maps imagery photos may be used. For major issues (stop relocation requests, major infrastructure work, controversial or politically charged issues), a site visit may be required, involving the appropriate LTC staff and representatives of the City of London.
4. Once a recommendation has been formed, the approval of the City of London Transportation and Design division is required prior to making a change.
5. Planning will then prepare bulletins to advise operations, customer service personnel and passengers about the changes, and issue the appropriate work orders to undertake the work. A minimum of 2 weeks notice for the public is required before a stop is permanently relocated.

Unless the stop location change is emergency in nature, or to resolve an identified safety concern, it is beneficial to change stops co-incidental with sign-up changes in order to maximize opportunities for operator information and avoid moving stops part-way through a work cycle, thereby reducing potential conflicts/complaints from passengers/operators who have become accustomed to existing locations.

3.1.2 Express Stop Location Procedures

When a request is received either through public contacts, operators or inspectors, for a new Express Stop installation the following criteria are assessed to evaluate the proposed location;

1. Boardings at the stop- Express stops should be located in areas where there is high ridership
2. Transfer Opportunities- potential locations will score higher if there are opportunities to transfer to other routes at the proposed stop location
3. Distance between the previous and next Express Stop location- Express stops should be at least 500 meters apart to ensure the express nature of the route is maintained
4. Surrounding land uses- priority should be given to installing Express Route stops at major trip generators and major intersection locations. Mid-block stops should be avoided unless it is adjacent to a major trip generator

An example of the current Express Stop warrant is attached as Appendix 8

3.2 Short Term Adjustments and Operational Monitoring

3.2.1 Temporary Conditions

Detours and temporary bus stop arrangements for construction or special events are co-ordinated by the Transit Planning Technician, who will co-ordinate re-routes based on liaison with the Construction Administration Team or the Major Projects Team (RT construction) and construction personnel in the field. See section 2.6.2 for signage used in detour conditions.

3.2.2 Stop Maintenance Procedures

Each inspector has been assigned an area of the city which they are responsible for checking on bus stop maintenance. When an inspector notices a problem with a bus stop plate the following steps are to be taken;

1. If a bus stop plate has been vandalized/damaged the inspector will first, try to clean/repair the sign.
2. If this is not possible a new plate will need to be ordered. Depending on the nature of the vandalism (i.e. racial etc.) the plate may be removed and a temporary plate installed until the new plate can be prepared.
3. Any maintenance or replacing of signs will be recorded on the LTC Bus Maintenance Report located under incident reports in the AVL system.

If a report regarding a bus stop requiring maintenance/repair is received through other means (i.e. customer contacts, operator reports etc.) The following process should be followed;

1. The problem is reported to the Planning Department
2. Planning will notify the Transportation Supervisor who will assign an inspector to repair the sign.
3. The information should be entered into the LTC Bus Maintenance Report by the planning department and updated by the inspector once the repair has been completed.

4.0 – STOPS AND INFRASTRUCTURE FOR NEW SUBDIVISIONS

4.1 Policy for Community Planning & New Subdivisions

In the process of reviewing plans of subdivisions and community plans, consideration of future planning of stop locations should be made. A protocol has been developed in conjunction with the City of London Planning Department (Subdivision & Development) whereby advance notice of proposed bus stop locations within new developments are posted publicly. This includes:

- on billboard maps showing lotting and land use at the entrance to a new subdivision; and,
- installing signage at the proposed stop locations well in advance of significant development taking place.

Identification of transit routes should be done at the Community Plan or Area plan stage, as the collector roads are designed.

At the plan of subdivision stage, the proposed stop locations should be identified, and the developer requested, as a condition of approval, to install the appropriate signage and a concrete landing pad, as the collector road and the adjacent sidewalks are built. The stop locations and amenities to be constructed by the contractor should be noted on the relevant engineering drawings.

Advance notice of stop locations has a number of advantages, including:

- stop pole and pad are pre-constructed and installed by the developer
- potential purchasers are aware of likely bus routings and stop locations and can make decisions on lot location accordingly
- makes the community aware that transit service is planned for the area
- reduces potential problems with adjacent residents when service is introduced and permanent stops installed

4.2 Signage & Implementation

Where applicable, subdivision agreements contain a clause which states in part that “the owner agrees to meet the requirements of the London Transit Commission with respect to transit stop locations”.

At the proposed stop location, a U-channel post should be installed, with a “Possible Future Transit Stop” marker attached. The specification for this sign is attached as Appendix 9. A 9m concrete pad should be installed, as the adjoining sidewalks are constructed, at the proposed stop.

The signage should be installed as soon as possible, in order to serve as public information as to the intended stop locations. Some flexibility in the timing of the concrete pad installations is permissible, to account for phasing in the construction of sidewalks and adjacent developments.

Prior to being assumed by the city, the inspection process should include an inspection by LTC staff to ensure that stop locations and the required amenities are in place, and a full report of such made to the City of London Subdivision & Development Division (Environmental Services Department).

5.0 – BUS STOP INVENTORY

5.1 Inventory Format & Summary

The Bus Stop Inventory contains all of the information regarding a specific stop including if the stop is accessible, the type of amenities at the stop (bench shelter etc.), the annunciator announcement (announcement heard on the buses to announce the stop), the IVR stop identification number and which routes service the stop, Google Links to see the stop on a map, links to the updated photo inventory etc. Separate sheets within the inventory were also created to keep track of deleted stops, amenities that have been removed for construction and possible future transit stop locations.

The purpose of maintaining a detailed inventory is to:

- identify accurately the location of all bus stops in the system;
- identify any deficiencies with existing bus stop locations, signage, landing areas, etc;
- improve response to public complaints by having a detailed inventory of all items at bus stops including, corner, pole type, information displayed, condition of area and items, shelter size and type, benches, overhead lighting, litter containers, etc; and,
- provide an efficient method of updating, archiving, and generating reports on bus stop locations for use by the transit maintenance division, public works department, customer service, transit planning and other departments requiring information on bus stop locations.

The inventory consists of two parts:

1. Digital photos of each stop; and,
2. Excel spreadsheet with detailed inventory information

5.2 BSI Maintenance Procedures

It is critical that the bus stop inventory is updated on a continual basis as conditions in the field change. The new AVL system relies on the data from the bus stop inventory to create accurate route patterns. (See section 6 AVL Procedures and Maintenance).

Keeping the bus stop inventory updated is also critical for maintaining up to date information for use in GIS mapping programs. London Transit shares data regarding the bus stop locations with the city of London so it is important that all of the data is as up to date as possible. Although it is critical to have the bus stop inventory updated on a continual basis it is not always practical to update such things as the digital photo inventory. The best time to take updated photographs is in the spring and summer when all of the elements of the stop can be clearly seen.

In cases where there are changes to the bus stop location or amenities are added the following process should be followed;

1. All updated data should be immediately entered into the bus stop inventory spreadsheet
2. Any changes to stop location need to be conveyed to the Scheduling Technician and the Transit Planning Technician so that appropriate changes can be made to the AVL system (see section 6 for AVL Procedures and Maintenance)
3. A note needs to be made in the file name of the digital photo for the stop to indicate an updated photograph of the location is required
4. As soon as weather and time permits a new digital photograph should be taken to update the inventory and the old photographs should be archived for historical reference.

6.0 – AVL

6.1 AVL Summary

The Automatic Vehicle Location and Communication (AVL) system works to monitor service in real time. Its primary function is to provide up to the minute information to dispatchers and operators aiding in the delivery of service matching pre-planned schedules. The AVL does this by tying together the fixed geographic and temporal information of stops and schedules, with the real-time operation information of vehicle position. By acting as the interface between planned service and operations, the AVL system produces several useful measures including adherence and the relative position of vehicles to stops. In addition to advising the actions of dispatchers, information from the AVL is also used to produce the public facing GTFS feed, and automate features such as on-board stop announcements, which inform passengers in a timely manner of upcoming stops and allow drivers to remain focused on the road.

Below is a more complete listing of processes / features dependant on the AVL:

1. Internal stop announcements
2. External route direction announcements
3. Headsigns displaying the destination
4. Real-time schedule adherence shown to drivers on their Mobile Data Terminal (MDT)
5. Real-time trip updates provided to passengers through apps like google maps or transit app
6. Communication of detour information to drivers through MDTs, and to passengers through trip planning apps
7. Interactive Voice Response (IVR) – Phone based trip updates
8. Recording of operational data such as passenger counts, or runtimes with location and time stamps. – used for informing future planning and scheduling decisions or investigating operating incidents.

To accomplish any of these functions effectively the AVL requires an accurate listing of stops that reflect the conditions on the road. In instances where on road infrastructure has changed, the AVL system needs to be updated accordingly. Where misalignment exists, the possibility of errors such as mis-timed announcements, or inaccurate adherence, arises.

6.2 AVL Stop Update Procedures

Based on updates to the Bus Stop Inventory, the Scheduling & AVL technician ensures the current AVL stop dataset matches the on-road placement of permanent stops to the best of the organization's knowledge. Any time a stop's geographic or identifying information such as its name or IVR ID changes, it must be updated in the AVL system.

Steps involved in updating stop placement in the AVL (applicability depends on whether stops are being created, updated or removed):

1. Create a stop record with a unique 8-character identification code (typically the first 4 letters of the on-street followed by the first 3 letters of the cross street, and a number indicating the direction 1 = NB/EB, 2 = SB/WB) and descriptive name (Ex. King at Wellington EB)
2. Geocode the position of the stop on the map using drawings approved by the City as a reference for where the front of the bus will come to a stop while boarding or aligning passengers.
3. List the stop as a geonode of applicable routes in the schedule database.
4. Determine if the stop will serve as a timing point or simply a pickup drop-off location. Timing points represent a checkpoint along the route for operators to compare their current location and time to that of the schedule. They should be evenly distributed and align with major intersections where transfers are common. Consideration should also be made for where it is feasible for a bus to wait if they are ahead of schedule.
5. Attach the stop to any applicable patterns on the route. Patterns represent variants of trips. For example, a 2A trip and a 2B trip are separate patterns and will have different stop sequences.

6. Ensure the path of a bus from stop to stop is traced for any applicable patterns.
7. Calculate the distance between stops in any pattern following those paths.
8. Determine runtimes between timepoint locations for each service period. This is done using data recorded by the AVL/C from previous signups for minor adjustments, or by speed, distance, time calculations and test drives for major adjustments. Importantly, changing the location of a timepoint can have an impact on runtimes, and therefore schedules as well as on-time performance.
9. Schedule trips based on the service level planned for the route and the estimated runtime between timepoints. Non-timepoint stop passing times are then calculated based on the distance from the proceeding timepoint and the average speed calculated by the distance and runtime between bounding timepoints.
10. Assign the scheduled trips to blocks, which represent a vehicle completing successive trips.
11. Blocks are then cut into shifts using passing times of designated timepoints as a shift change point. This means changing the location of a timepoint can have a direct impact on where and when operators get on / off the bus, something that is agreed upon weeks in advance as part of the signup process as per the collective agreement with ATU.
12. Export the schedule, stop details and supporting information in the General Transit Feed Specification (GTFS) format. This fixed schedule product is shared with third parties such as Transit App and used in combination with a real-time feed of vehicle positions to update riders on the bus they are trying to board.
13. Import the schedule into Transit Master, and determine a cutover date to transition from the current timetable to the updated timetable (typically done with signup changes)
14. Use the survey vehicle to drive each new interval between adjusted stops. This measures the real-world position of stop markers and the driving distance between them rather than the map distance for greater accuracy of operating data.
15. Designate the announcement, arrival and departure zones associated with each stop. These zones determine how far in advance announcements are played on board for passengers requesting stops, as well as which stop datapoints such as passenger boardings are associated with.
16. Record and assign announcements for each stop.
17. Export route and announcement data and load copies onto each buses Integrated Vehicle Logic Unit (IVLU) – the IVLU will then read off announcements, communicate with the app server in dispatch, and record any operational data based on the active set of stops.
18. Deliver Service

As evident from the steps above, moving a bus stop involves a lot more than simply relocating the stop marker, or any associated amenities. There is a digital infrastructure that must also be updated. Further, the steps listed should be completed in the order specified, skipping steps or completing them out of order can easily lead to mismeasurement of stop intervals and undermine the quality of information provided by the AVL/C. Given that LTC operates 365 days of the year, the continuous nature of AVL/C tracking and data recording, as well as the number of steps involved for each stop movement, it is not feasible to move individual stops on an ad-hoc basis. It is therefore most effective to coordinate stop updates in batches that are implemented with each signup change. On these critical dates, changes to stop infrastructure and routing alignment can be made with minimal misalignment of data and increased likelihood of smooth operation.

7.0 – APPENDICES

<u>Appendix</u>	<u>Subject</u>
1	Courtesy Stop and Travel Safe Program – Excerpts from Standing Orders
2	Operating Standards for Transit Passenger Shelter Installation
3	Stand Alone Raised Pad (for rural cross-section) – Preferred Design
4	Typical Bus Bay- Standard Bus
5	Typical Bus Bay – Articulated Bus
6	Standard Stop Marker
7	Transit Shelters Design Specs
8	Express Stop Warrant Example
9	Future Transit Stop Example

Appendix 1

Courtesy Stops and Travel Safe Programs **Excepts from Standard Operating Procedures**

As set out in 1.2.2 – Marked Stops Policy, the marked stops policy shall not supersede the provisions of the Courtesy Stop/Travel Safe programs, as set out in the standard operating procedures:

Courtesy Stops

Passengers should be politely encouraged to use LTC bus stops whenever possible, however, if requested and it is safe to do so, Operators will discharge or pick up passengers between stops. Operators are requested to use discretion when doing so, taking into consideration weather, frequency of service and safety. If the area is not deemed a safe place to stop, Operators will indicate this to the passenger and make a stop at the nearest safe location.

Travel Safe Program

All LTC employees will continue to maintain the standards of quality service and concern for our passenger's safety. Operators will apply the following principles at all times:

- recognize the special safety concerns of all passengers and accommodate them with courtesy stops whenever possible particularly during hours of darkness (morning or evening), during periods of extreme weather or in the event that the passenger(s) safety and/or health may be jeopardized;
- offer the safety of the bus to anyone who requires assistance;
- be alert to emergency situations and notify LTC Dispatch for assistance;
- assist whenever possible, within the constraints of safety, to ensure that the community is a safe place to live and travel.

Appendix 2

Shelter Warrant – Stop Name and Stop ID Number

Background

TRANSIT PASSENGER SHELTER EVALUATION

Location Information

Stop Location:

Routes:

Request Source:

Review Date:

A - Passenger Usage (Maximum 40 points) 1 point per passenger, all day boardings for all routes (to a max of 40 points.)

Total Daily Boardings:

Count Date:

Score A:

B - Passenger Waiting Time (Maximum 20 Points)

Half of the scheduled headway (in minutes) during the peak, base, and early evening operating periods. If no service during a particular period, score = 0. If the stop is used by more than one route, the cumulative headway will be used.

½ of Headway (minutes)	Points by Operating Period		
	Peak	Base	Early Eve
0 – 4	0	0	0
5 – 9	2	1	1
10 – 14	4	2	2
15 – 19	6	3	3
20 – 29	8	4	4
30+	10	5	5

Headway:			
½ Headway:			
Score:			

Score B:

C - Physical Applications (maximum 30 points)

Exposure to Weather Elements

Criteria

Protected (buildings or other shelter)

Minor (residential/local street)

Moderate (collector or arterial, wide right of way)

Extreme (wide open area, wind-swept, no refuge)

(Degree of Protection in waiting area)

Points

0

5

10

15

Score:

Site Line Hazard

Would shelter installation constitute a sight line hazard to vehicular traffic or pedestrians?

Yes = 0 No = 5

Lighting

Night-time illumination at waiting area.

Poor = 5 Good = 0

Score:

Score:

Street Crossing Hazard to Bus Stop

If the stop is not accessible with a safe crossing of a major street, it is penalized by not receiving full possible marks.

Yes (explanation required) = 0 No = 5

Score:

Score C:

D - Area Being Serviced (maximum 30 points.)

Criteria	Points
Retail	3
Transfer Points	10
Hospital	10
Seniors Complex	10
Special Needs Facilities	10
Special Locations	10

Comments:

Score:

Point Total

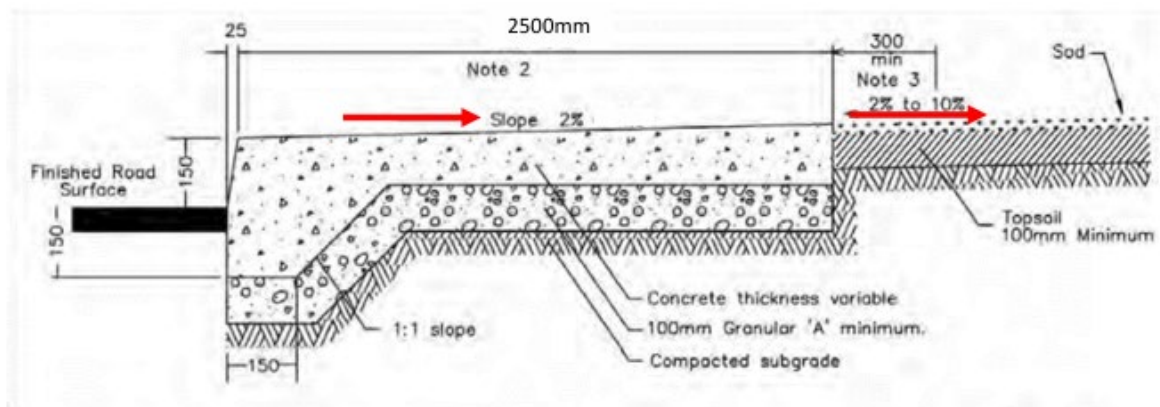
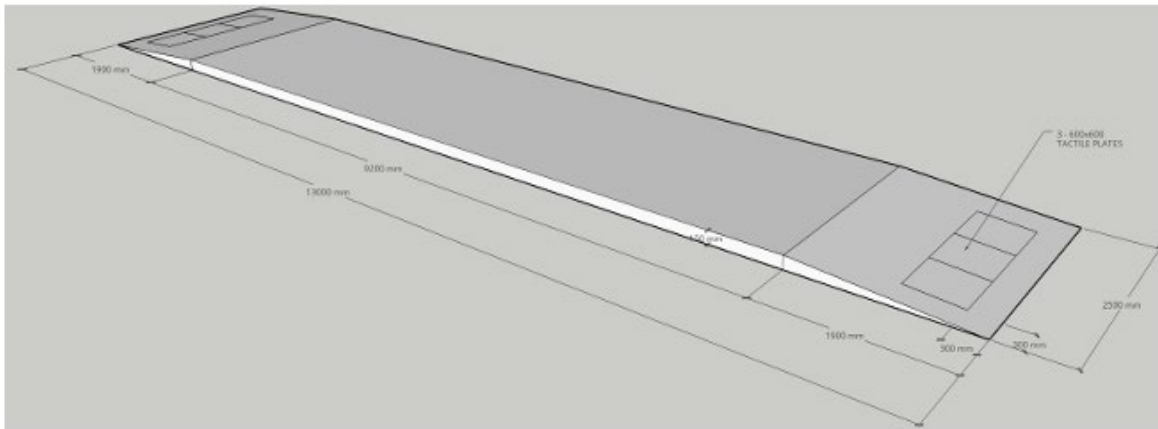
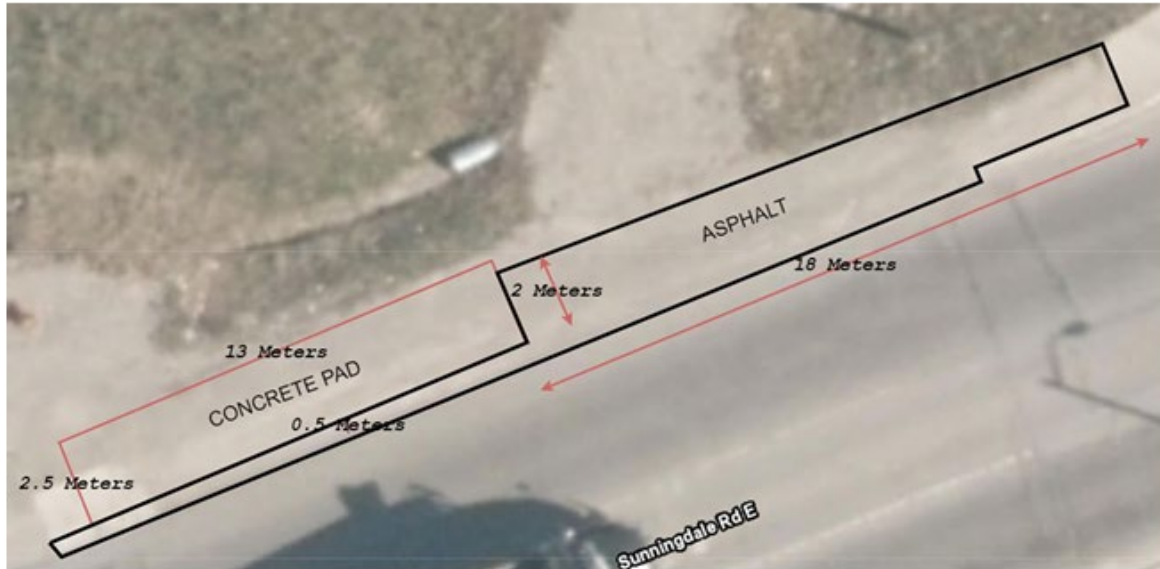
A:	
B:	
C:	
D:	
Total Score:	

Recommendation:

Appendix 3

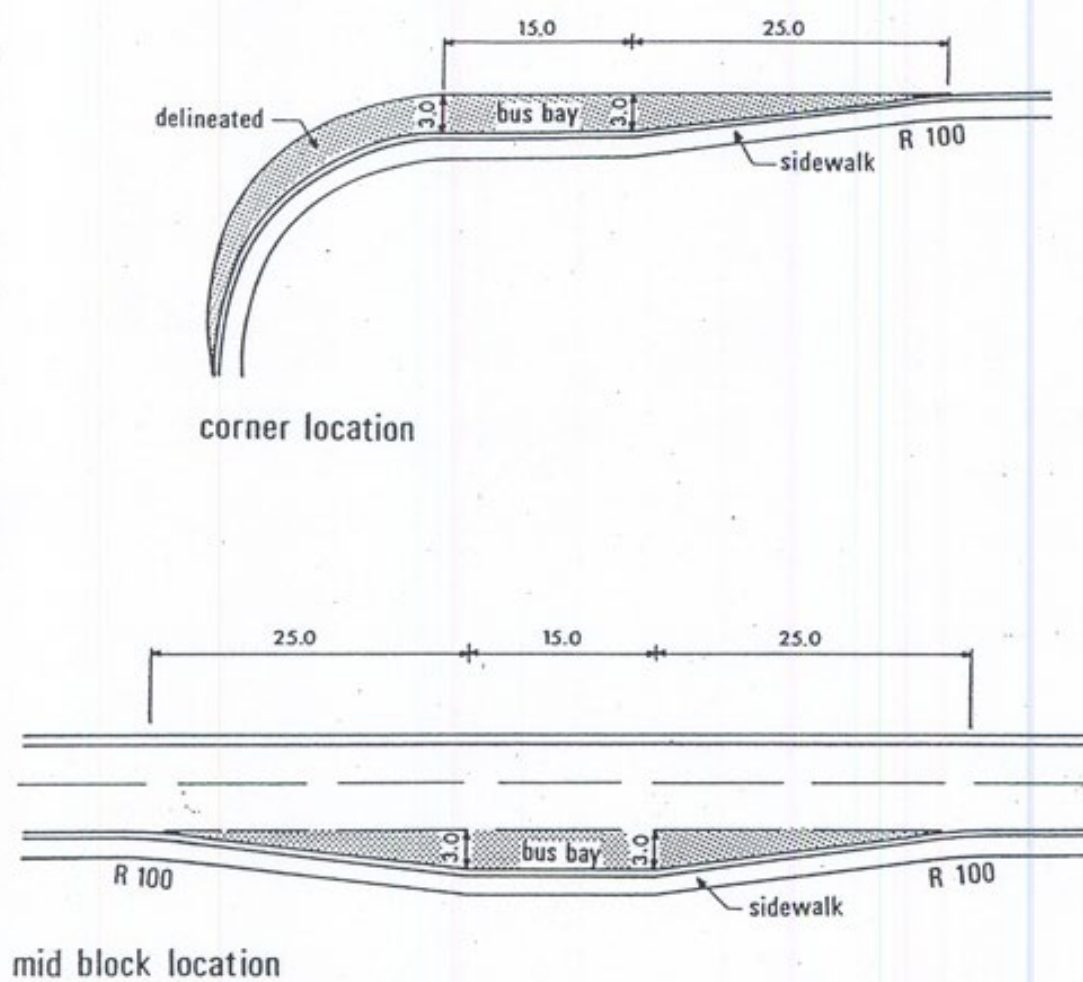
Stand Alone Raised Pad (rural cross-section)– Preferred Design

Concrete Pad for Bus Stop # 2697

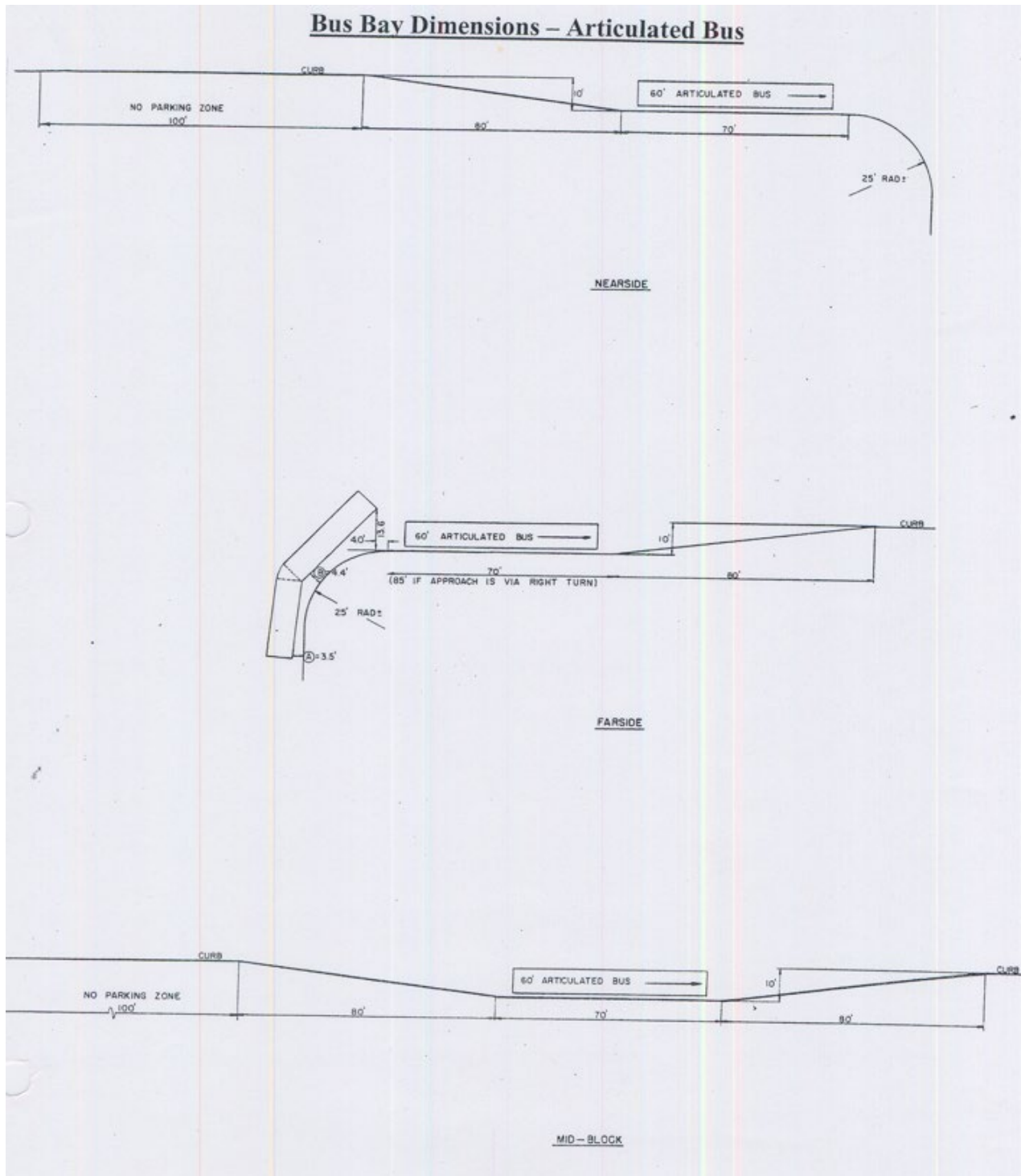


Appendix 4

Typical Bus Bay

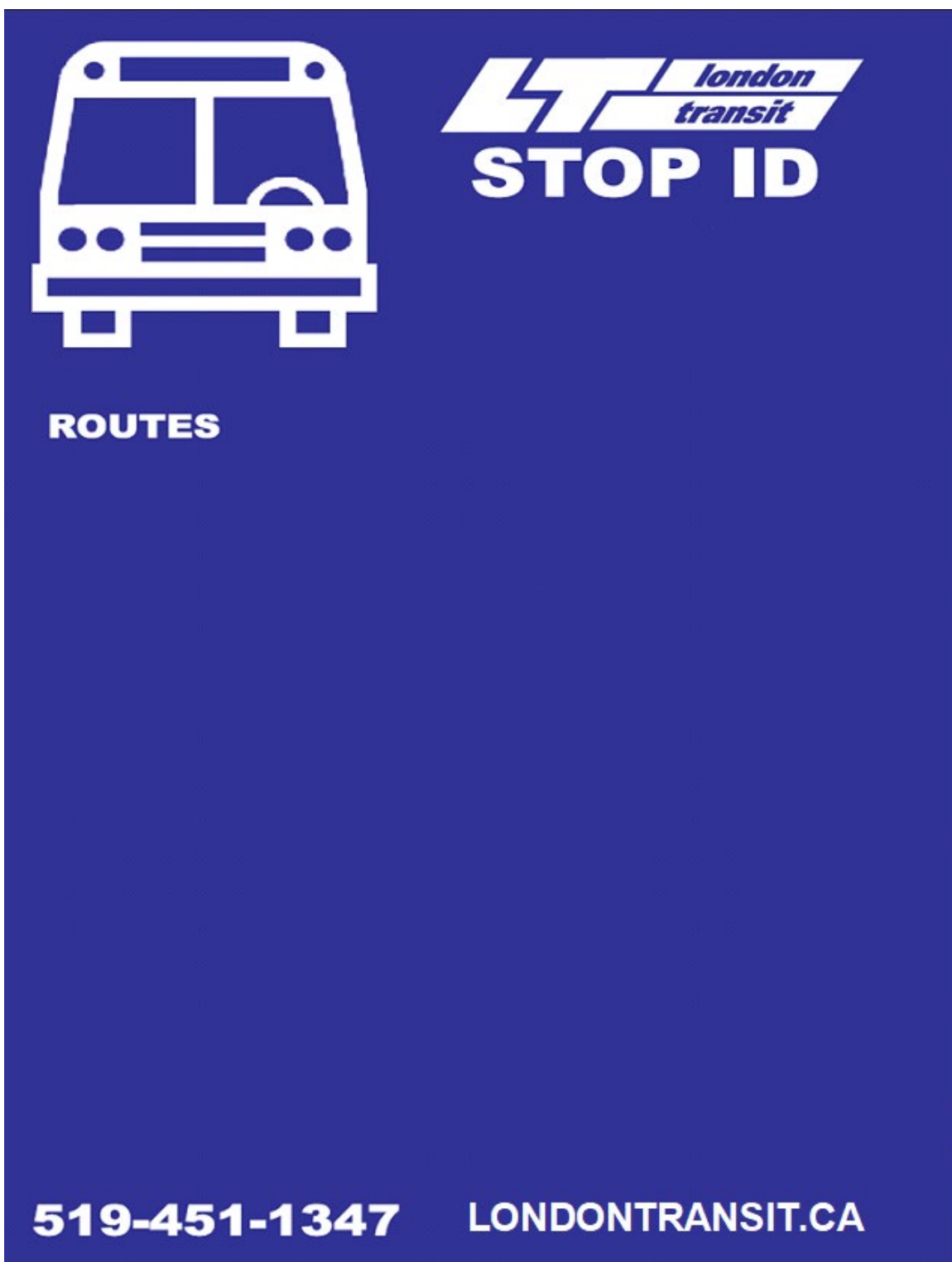


Appendix 5



Appendix 6

Stop Marker Standard



Appendix 7

Design Specifications – Transit Passenger Shelters & Foundation Pads

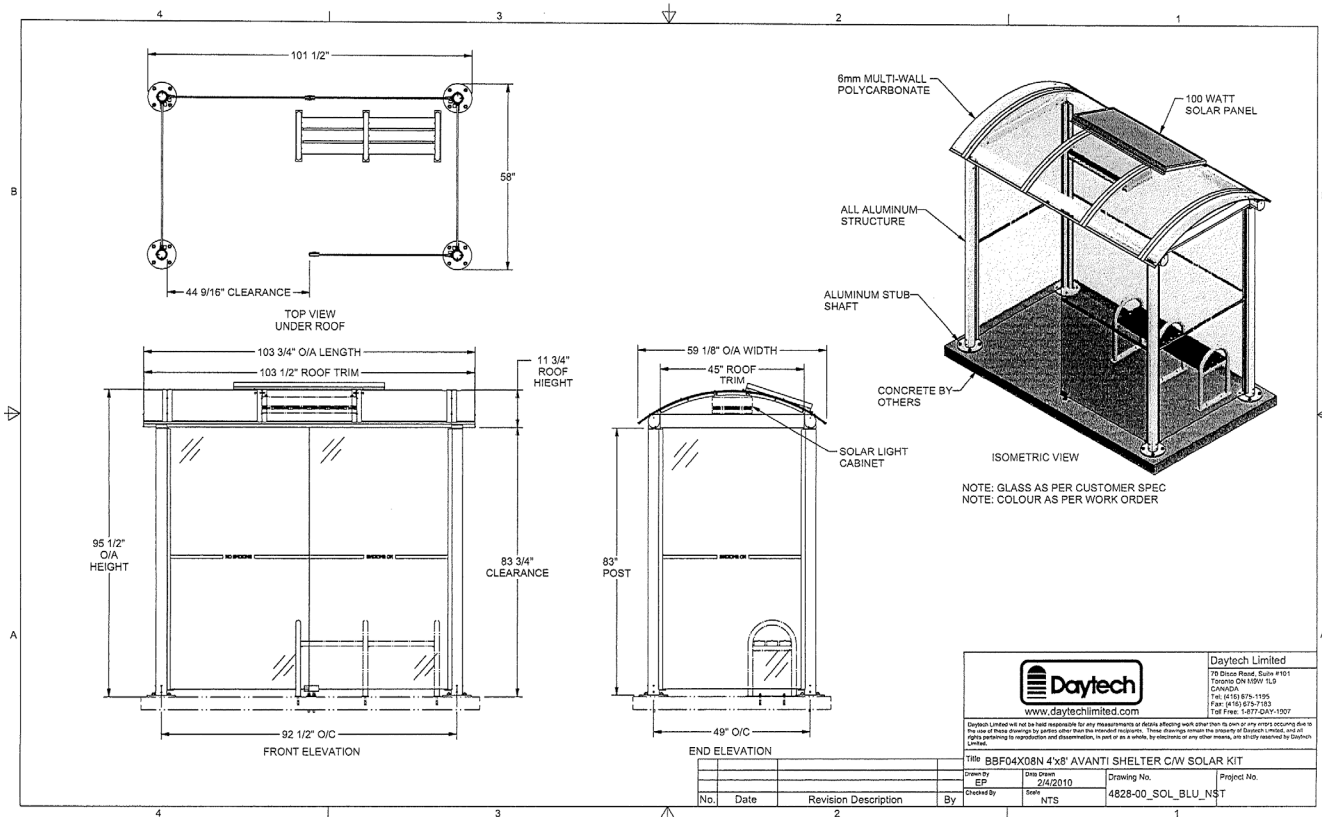
7A – Standard 4x8 Shelter Specification

7B – Canopy Shelter Specification

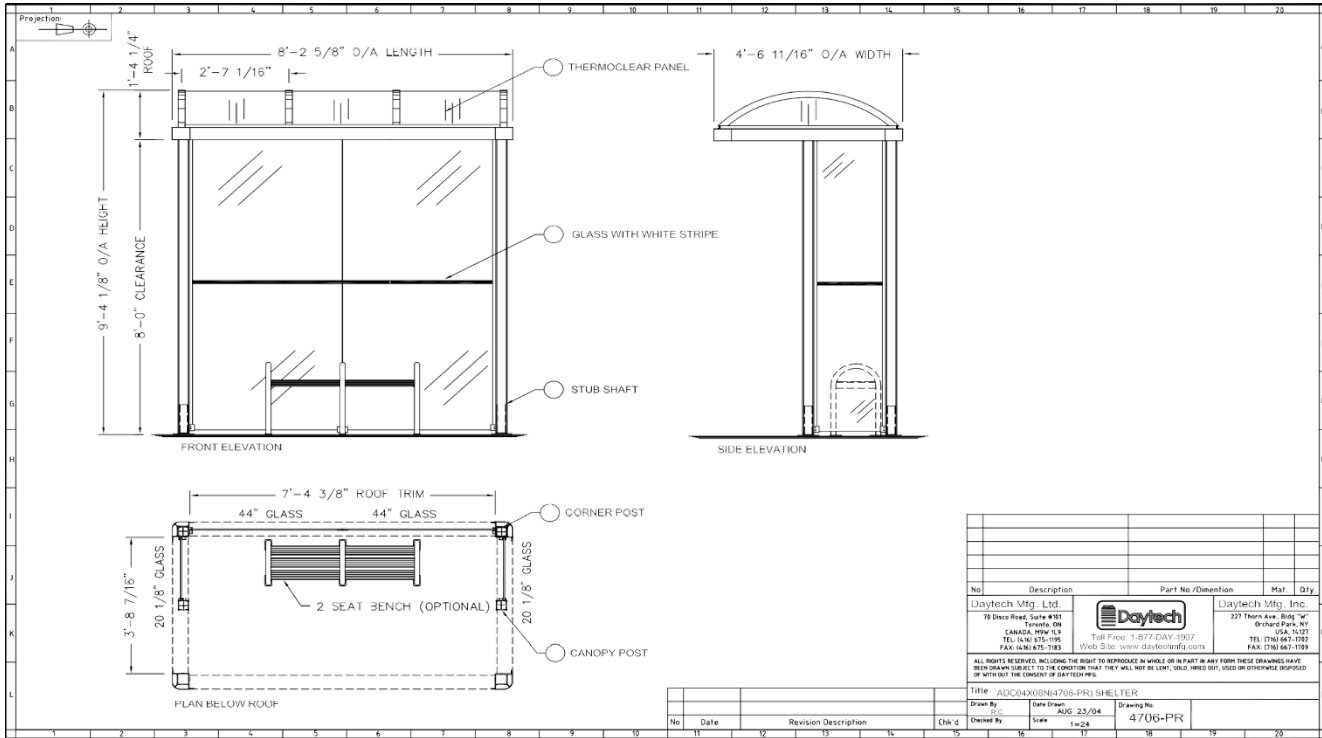
7C- 4x12 Shelter Specification

7D – Concrete Shelter Foundation Specification

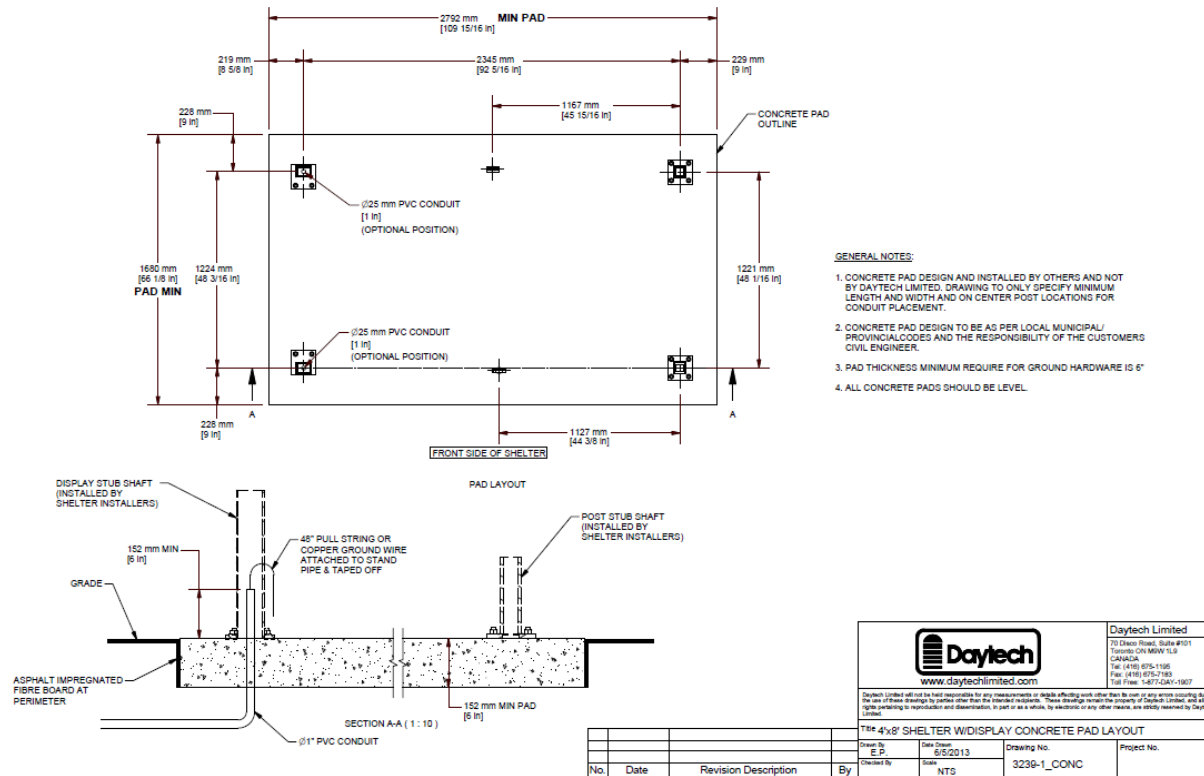
Appendix 7A – Standard 4x8 Shelter



Appendix 7B – Canopy Shelter Specification



Appendix 7D – Concrete Shelter Foundation Specification



Appendix 8

Express Stop Warrant- Sample

Express Bus Stop Review

Route 92 – Stop 80 Adelaide at Tennent NB

Routes:

92 (Express Route)

Background

This review is analyzing Stop 80 at Adelaide and Tennent for the suitability of a new express stop. The LT Express Stop Warrant System requires Ridership (40%), Stop Spacing (30%), Transfers (20%) and Land Use (10%) be considered when balancing passenger access, and network benefit, with travel time savings. A score of 65 must be achieved to warrant an express route stop.

Stop Ridership - 40 points:

A minimum 30 daily passengers in each direction (60 total) sets the zero point value while 150 daily passengers in each direction (300 total) will score a full 40 points. Stops with less than 60 passengers will be penalized. The score is calculated by awarding one point for every 6 passengers over 60.

$$\text{Ridership Points} = (\text{Average of ons \& offs} - 60)/6$$

Table 1- Existing Ridership and Score

Stop Name	Stop ID	Total Ridership*		Daily Ridership		Daily Total	Score
		On	Off	On	Off		
Adelaide at Tennent NB	80	124	193	31	48	79	3

** Ridership period for calculations is: February 3 – February 6, 2025*

Stop Spacing - 30 points:

A minimum of 500 metres average stop spacing sets the zero-point value while 1400 metres will score a full 30 points. Stops located closer than 500 metres will be penalized. The score is calculated by awarding one point for every 30 metres over 500.

$$\text{Stop Spacing Points} = (\text{Average stop spacing} - 500)/30$$

Table 2- Express Stop Spacing and Score

Stop Name	Stop ID	Near Side (Meters)	Far Side (Meters)	Average Spacing (Meters)	Score
Adelaide at Tennent NB	80	1510	580	1045	18

Transfers - 20 points:

If no transfers are present at a stop location zero points are awarded, while 20 points are awarded to a location with transfer opportunities of 4 peak buses/ hour. The score is calculated by awarding five points for every connecting peak bus/ hour.

$$\text{Transfer Points} = \text{Peak Buses per Hour} * 5$$

Table 3 – Logical Transfer Matrix

16 NB	
Adelaide at Tennent NB	No

Table 4 – Transfer Buses and Score

Stop Name	Stop ID	Connections Available	New Logical Connections	Count of Peak Buses / Hour	Score
Adelaide at Tennent NB	80	16	0	0	0

Land Use - 10 points:

A simple scoring system offers points based on the surrounding land use within a 400m radius of the stop. Zero points are awarded if the land use is low-density and single-use. Five points are awarded if the land use is high density single-use, or low-density mixed-use. Finally, ten points are awarded if the land use is high-density mixed-use or institutional.

Table 5 – Land Use Classification and Score

Stop Name	Stop ID	Population Density	Land Use	Score
Adelaide at Tennent NB	80	Low-Density	Mixed Use	5

Recommendation

Table 6 – Total Express Stop Warrant Score

Stop Name	Stop ID	Ridership	Stop Spacing	Transfers	Land Use	Total
Adelaide at Glenora NB	80	3	18	0	5	26

Based on the LT Express Stop Warrant System, Adelaide at Tennent NB failed to reach the threshold score of 65 points required to implement express stops. This stop scores below average in all categories compared to other express stops. Therefore, the gains in passenger access and network benefit are not sufficient to offset the loss in travel time savings, the differentiating feature of express routes.

Appendix 9

Sign – Future Stop Area

