METROLINX

Engineering Bulletin

August 12th, 2020

Facilities Engineering Assurance

FEA-002

Amendment Notice: Bus Infrastructure

This bulletin applies to and amends the following document:

- GO Design Requirements Manual (DRM), GO-DRM-STD-2017 Revision 3, dated February 2020

This Bulletin reinstates key information for designers and consultants to use in addition to current requirements for Bus Infrastructure. As a result of continuous updates to the DRM, relevant information on Bus Infrastructure had been removed or simplified over time. Through project experience, these details no longer included in the current DRM (2020), are important to ensuring safe and functional GO facilities.

The purpose of this revision is to fill information gaps that exist and update the current DRM with information found in a superseded version, DRM (2015) under 'Tab 3: Bus Infrastructure'. The majority of new content will be captured under the existing 'Bus Loops' section, retitled 'Bus Infrastructure'. The existing Bus Loop information will remain, as a subchapter to Bus Infrastructure.

Information to be reinstated includes requirements for passenger bus platforms, material specifications, clearances, vehicle criteria and more. The content prioritizes functional requirements, optimizes site layouts and helps mitigate safety risks. The DRM will also include reference to Metrolinx Universal Design Standard (DS-02), Metrolinx Wayfinding Design Standard (DS-03) and GO Station Architecture Design Standard (DS-04) for additional detailed requirements. This information clarifies Metrolinx standards and will improve compliance during design and construction.

Amendments to the DRM are provided in the following attachment:

- Attachment 1: Revisions to GO DRM Feb. 2020 – Bus Infrastructure Content

On MyLinx the amendments to the DRM are available for staff to download from the Go Manual page.

The amendments to the DRM will be available for external users to download via the Metrolinx public download site (http://www.gosite.ca/engineering_public/).

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1 Preface

This is the 33rd edition of the *GO Design Requirements Manual* (also referred to as the *DRM*) and supersedes all previous editions. It incorporates the valuable feedback received from the Design Division since the March 2019 update.

This edition has been updated to reflect the removal of duplicated requirements that are currently being addressed in Design Standards: Easier Access Design Features, Integrated Design, Wayfinding & Signage, Accessible Parking Space Requirements, Bicycle Infrastructure, Station Building Interior Design, Station Building Interior Light Fixture Schedule, Fixtures and Furnishings – General Placement Requirements, Finishes and Materials, Station Building Interior Program Finishes Schedule.

The DRM is a reference tool for engineering and design consultants and internal Metrolinx staff. The DRM consists of requirements and technical details for the infrastructure requirements to design and build GO stations, terminals and facilities. The requirements may exceed industry regulations and codes. The DRM is part of a suite of publications that inform the design and construction of Metrolinx capital assets. It is applicable to new construction and retrofit capital infrastructure programs.

The DRM is available for external users to download via the Metrolinx public download site at http://www.gosite.ca/engineering_public/

February 2020

2 Contents

2.1 Table of Contents

- Maintenance access is to be provided around the bridge in the form of a catwalk or similar structure

5.2.5.2 Pedestrian Bridges

Pedestrian bridges over tracks shall be single-span structures with supports beyond the operating right-of-way, to the approval of the Railway. Intermediate supports are not allowed. Pedestrian bridges connecting platforms shall have unobstructed interior barrier-free routes and turn-around spaces. Corridors shall be free from protruding hazards.

5.2.5.3 Bridges at Public Thoroughfares

Bridges at public thoroughfares may have intermediate supports, subject to the approval of the authority having jurisdiction.

5.2.5.4 Bridge Structure

Where pedestrian overpasses over the ROW have stairs/elevators down to an island platform, the bridge structure shall be cable-stayed to uphold the bridge in case of derailment.

~~5.3 Bus Loops~~

- ~~Bus Loops shall provide separate access for bus, segregated from other vehicular, bicycle and pedestrian traffic~~
- ~~Decorative Fencing and / or Landscaping is to be used to control pedestrian traffic and limit pedestrian access through the bus loop~~
- ~~Bus access and egress must allow clearances necessary to accommodate coaches~~
- ~~When designing GO facilities, GO vehicles should govern the design. MCI model shall be used for bus length and width, and the double deck coach shall govern the height clearance~~
- ~~Passenger waiting bus platform shall be hard, level materials~~
- ~~Concrete Curbs to be painted yellow (top and side) along the entire length of the bus loop~~
- ~~Refer to Metrolinx Standard Drawings Bus Bay Requirements for straight and sawtooth platform details~~
- ~~The vertical clearance height between driveway pavement and underside of overhead structures shall be 5.3 m minimum in any bus travel area~~
- ~~Overhead canopies, or other roof assemblies, shall be set back 2.0 m minimum from the face of the curb at bus platforms~~
- ~~The supporting structure of a canopy, or any other structure, shall have a minimum horizontal clearance of 3.0 m from the face of curb at bus platforms. The horizontal clearances are set to allow for wheelchair lift deployment~~
- ~~The bus platform curb shall be 150 mm above the bus driveway pavement level~~

5.3 Bus Infrastructure

The site development of Bus Facilities is generally similar to the station site, excluding rail references. The same access and parking principles shall apply. Refer to Metrolinx Universal Design Standard (DS-02), Metrolinx Wayfinding Design Standard (DS-03) and GO Station Architecture Design Standard

(DS-04) for additional detailed requirements.

- Bus access lanes shall be separated from vehicular traffic to speed up public transport and avoid traffic congestion.
- Walkways or sidewalks shall not be located where buses may require back up movement.
- Municipalities may request GO to provide bus stops or bus bays on a municipal road. For street stops GO design requirements shall govern and MTO guidelines shall be followed.
- Refer to GO DRM Section 7 Technical Requirements for Electrical, Communications and Mechanical requirements including lighting, CCTV coverage, Fare Systems etc. as applicable to Bus Infrastructure.

There are several different GO Bus Facilities:

- Maintenance Facilities;
- Bus Storage Facilities;
- Bus Terminals;
- Bus Loops;
- Park & Ride / Carpool Lots;
- Bus Rapid Transit; and
- On Street Bus stops

The key elements to bus infrastructure design vary for each type of facility.

5.3.1 Vehicle Design Criteria

GO has three types of highway coaches~~: single deck and double deck.~~

- Single Deck Coach Model MCI – 2.591 m wide, 13.843 m long with an additional 0.3 m for bike rack when stored (add 1.0 m for deployed bike rack).
- Double Deck Coach Model ADL – 2.520 m wide, 13.015 m long with an additional 0.3 m for bike rack when stored (add 1.0 m for deployed bicycle rack) and the height is 4.255 m.
- Double Deck Coach, Enviro 500 Super Low Model ADL – 2.580 m wide, 13.817 m long with an additional 0.3 m for bike rack when stored (add 1.0 m for deployed bike rack) and the height is 3.910 m.
- The bike rack accommodates two (2) bicycles.

When designing Metrolinx facilities, GO vehicles should govern the design. MCI model shall be used for bus length, width, turning radius and the double deck coach shall govern the height clearance.

GO coach fleet is fully accessible and will seat two (2) wheelchairs. Accessible Highway buses require a platform side clearance of 3.0 m minimum for their exterior wheelchair lifts. Highway buses have one front door and most have the ability to kneel, lowering the front end.

Wheelchair lifts are located as follows:

- GO Double Deck Buses at the front door; and
- MCI Model lift is located off center, towards the front of the bus.

Refer to Metrolinx Standard Drawings, Rolling Stock Standard Drawings for further details.

5.3.2 Bus Radii Design Guidelines

The bus route, movement, and turning radius shall be designed to meet performance requirements and ensure safe and smooth vehicle movements with minimum restrictions.

The following criteria shall be considered when using the turning template:

- Design Vehicle GO Bus Model MCI D4500;
- Bus speed–15 km/h;
- Bicycle rack deployed;
- Steering wheel turned all of the way to the Right stop;
- Lateral clearance of 0.5 m; and
- Bus turn does not begin until the rear wheels have reached the Tangent–Curve (TC) point of the inside face of curb or other obstruction.

The design bus turning template shall be used where the operating speed of the bus is low, 15 km/h, and sharp short turns can be made without rider discomfort, for the design of surface features such as:

- Straight and saw-toothed platforms;
- Bus bay entrances;
- Bus loops;
- Entrance roads; and
- Bus maintenance and storage facilities.

Refer to Metrolinx Standard Drawings Bus Bay Requirements for Bus Bay Design Guidelines.

5.3.3 Bus Platform and Design Guidelines

The factors affecting the layout of areas for bus platforms are the turning space and turning radius. In the design of off-street terminals, on street bus bays and roadways, these factors are of prime importance to the operating efficiency and safety of the layout.

Vehicle turning requirements shall be in accordance with GO guidelines.

A clearance of 1.5 m shall be provided between each (inner and outer) line given by the Design Vehicle Turning Radius and any fixed object that a bus could collide with. Fixed objects shall include curbs.

5.3.3.1 Clearances

- The vertical clearance height between driveway pavement and underside of overhead structures shall be 5.3 m minimum in any bus travel area. This applies to any road accessible buses and does not extend onto the sidewalks.
- For outdoor accessible bus stops, a vertical clearance of 4.5 m shall be maintained.
- Overhead canopies, or other roof assemblies, with a vertical clearance of 4.5 m or less shall be set back 2.0 m minimum from the face of curb at bus platforms.
- A 3.0 m continuous horizontal clearance is required from face of curb to any structure at all bus platforms. The horizontal clearances are set to allow for wheelchair lift deployment
- Bus Shelters shall be set back from the curb with opening oriented to the curb. Refer to GO

Design Standards and GO Transit Standard Drawings and Specifications for detailed bus stop shelter specifications.

5.3.3.2 Bus Platform Layout

Refer to Metrolinx Standard Drawings Bus Bay Requirements for Bus Bay Design Guidelines.

Refer to Metrolinx Universal Design Standard (DS-02) for accessible platform requirements.

- Passenger platform shall be located and designed to minimize passenger path of travel and ideally to avoid passengers crossing any vehicular roads or bus loop. Platform configuration shall be dictated by the number of bus bays.
- Waiting areas at bus stops shall be a minimum 3 m wide by 6 m long to accommodate waiting persons (Clear Accessible Area). See Clear Accessible Area in the DRM for further details.
- The bus platform curb shall be 90 degrees upright, 150 mm above the bus driveway pavement level.
- Grading to be flat and allow space for bus barrier free lift deployment.
- Bus boarding and alighting areas shall have firm, stable surface and be clear of any landscape or streetscape elements.
- Passenger safety shall be given consideration when locating the passenger platform to minimize danger from overhead ice accumulation which may occur on hydro cables and support structures.
- Where the bus driveway length is the limiting factor, the full sawtooth shall be used. Conversely, if bus driveway width is the limiting factor, the straight platform shall be used. If the limiting factor is a combination of driveway width and length, the appropriate partial indent sawtooth platform shall be used.

5.3.3.2.1 Straight Platforms

Straight platform layout requires minimum driveway width, but maximum length.

- Minimum width for straight platform shall be not less than 8.0 m.
- The platform is kept to a practical length by allowing the rear corner of the bus to be offset from the platform curb by approximately 0.45 m.

5.3.3.2.2 Sawtooth Platforms

Sawtooth platform layout has the minimum length requirements, but requires an increase in driveway width.

- The minimum driveway width is 8.8 m and it is determined by summing the clearance path of the bus (7.3 m), the additional bus clearance (0.5 m) and 1/2 the indent depth (1.0 m).
- The nominal driveway width is the average of the high and low points of the sawtooth and allows a direct comparison, with the straight platform.

5.3.3.3 Stop Identification Pole and Sign

Stop identification pole and sign are means of identifying a bus stop. Refer to Metrolinx Wayfinding Design Standard (DS-03) for detailed signage requirements.

Stop identification pole (also referred to as “standard design pole”) shall be located at a standard or uniform position at all stops to the maximum extent possible, as they serve as a point of reference for those with disabilities, particularly the visually impaired to determine the approximate location of the

front entrance of the bus. Refer to Metrolinx Universal Design Standard (DS-02) for detailed accessibility requirements.

The stop identification pole shall be located 1.0 m from the back of the face of the curb, provided that a minimum 1.8 m accessible path can be maintained on at least one other side of the pole.

5.3.4 Bus Loops

5.3.4.1 Guidelines for all Bus Loop Configurations

- Bus loops shall provide separate access for bus, segregated from other vehicular, bicycle and pedestrian traffic. If not possible to fully segregate bus access / egress, a risk assessment shall be completed to ensure public and passenger safety.
- Bus loops shall plan for dedicated “Bus Only Out” lanes to speed up public transport and avoid traffic congestion.
- Bus loops shall be designed and located to allow a natural pedestrian flow.
- If pedestrian traffic must go through the bus loop, design for predictable flow in accordance with DRM requirements as they relate to pedestrian crosswalks.
- Fencing is to be used to control pedestrian traffic and as preventative measure to limit pedestrian access through the bus loop.
- Bus access and egress must maintain all clearances necessary to accommodate GO coaches and local transit which may have their own requirements.
- Bus Loop configuration to be designed and located to accommodate for layovers, as required by Metrolinx.
- Lighting Levels to be in accordance with section 7 Technical Requirements.
- Incorporate Bioswales in the centre of bus loops wherever possible.

5.3.4.2 Materials

- Bus loop area, bus bay area and bus access roads shall be concrete with final texturing meeting OPSS 350 recommendations to achieve desired skid resistant surface that can provide greater levels of surface friction for critical locations, such as roundabouts, curves, approaches to pedestrian crossings, etc.
- Bus loop area, bus bay area and bus access roads shall be concrete. The section closest to the bus loop entrance shall be painted red for 6 m in length to alert passenger cars from entering the bus loop. The pavement design shall be based on the Geotechnical Consultant’s recommendations
- Passenger waiting bus platform shall be hard, level materials that are resistant to slipping and capable of clearing during winter months by motorized equipment.
- Concrete curbs to be painted yellow (top and side) along the entire length of the bus loop for safety. The depth of the painted yellow line shall be 610 mm. Additional elements, which might be difficult for bus drivers and passengers to see in the bus loop area to be painted yellow at the discretion of GO Transit.
- For tactile attention indicator placement including continuous tactile indicator requirements, refer to Metrolinx Universal Design Standard (DS-02) for boarding and alighting requirements.

5.3.4.3 ~~5.3.1~~ Bus Loop Configuration and Traffic Flow

The configuration for a bus loop is to be selected based on-site constraints and optimal traffic flow patterns (vehicle, cyclists, local services, and connections). The following configurations provide standard requirements and details for each of these options. Refer to the Bus Loop Configuration and Traffic Flow figures for examples of each.

- ~~Figure D-11:~~ Figure 8: Linear Configuration – Linear Traffic Flow (Preferred)
- ~~Figure D-12:~~ Figure 9: Island Configuration – Clockwise Traffic Flow
- ~~Figure D-13:~~ Figure 10: Teardrop Configuration – Counter-Clockwise Traffic Flow
- ~~Figure D-14: Bi-Directional Configuration – Clockwise and Counter-Clockwise Traffic Flow~~

5.3.4.3.1 ~~5.3.1.1~~ Linear Configuration – Linear Traffic Flow (Preferred)

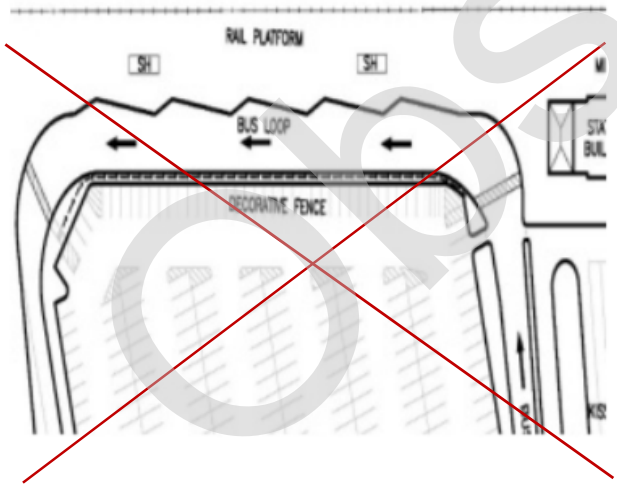
The linear configuration has a platform along the passenger side of the bus loop where passengers have access to the bus. In linear bus loops, buses follow a linear flow of traffic to circulate the loop.

Where applicable:

- High pedestrian traffic: clear visibility for pedestrians and drivers, pedestrians do not cross the bus loop to access bus/rail platforms.
- At stations with limited real estate.
- At stations with minimal bus-to-bus transfers.
- At stations located in urbanized areas.

Proceed to Island Configuration ~~(B)~~ if:

- Anticipate significant volume of bus service (both GO and Municipal) as linear loops have limited space for platform expansion and accessibility concerns (lengthy distances) for bus to bus transfers.



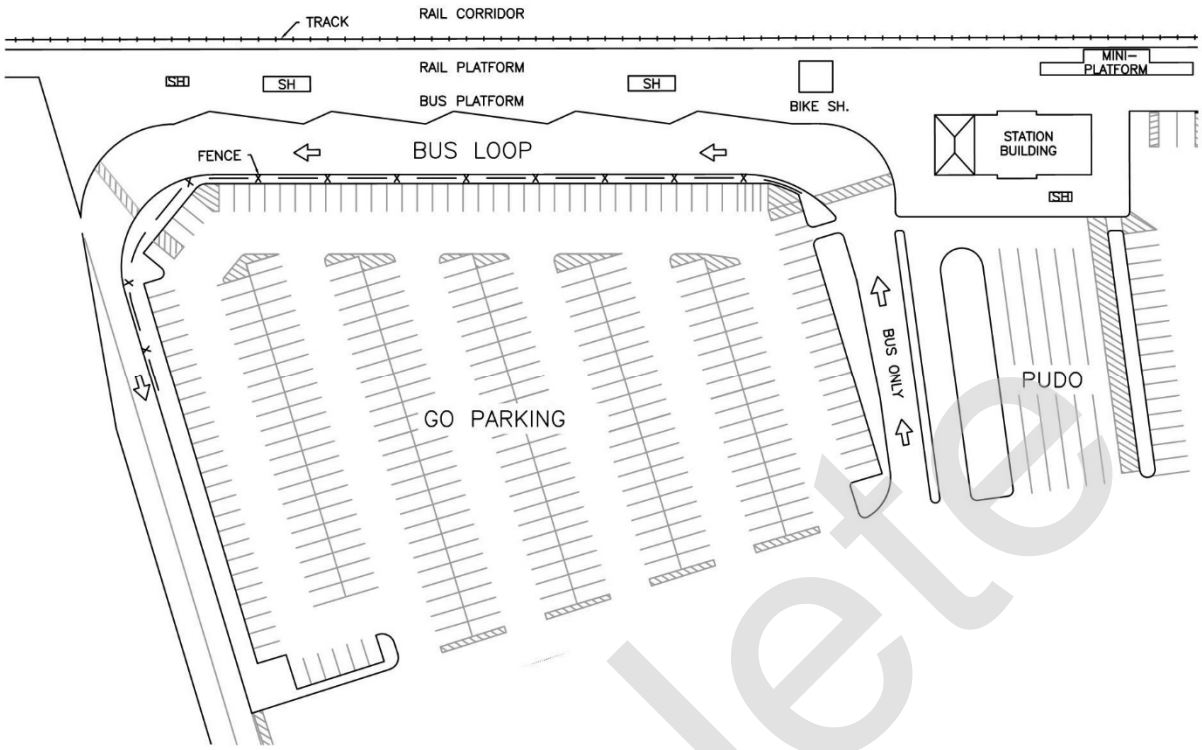


Figure 8: ~~A.~~ Linear Bus Loop Configuration - Linear Traffic Flow

5.3.4.3.2 ~~5.3.1.2~~ Island Configuration – Clockwise Traffic Flow

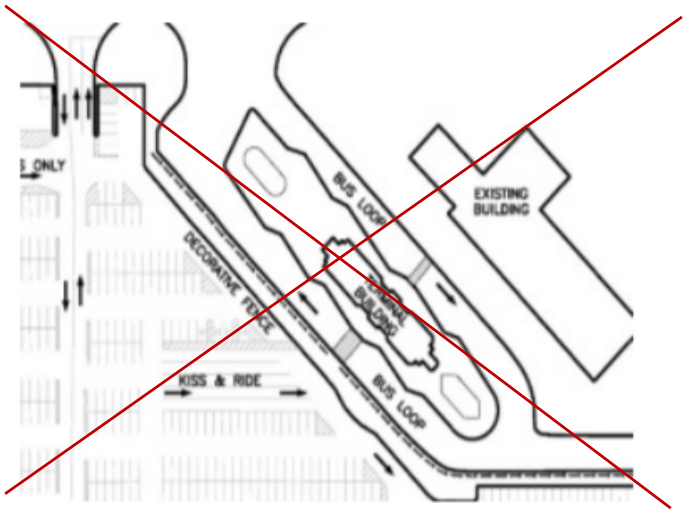
The island configuration has platforms in the centre of the bus loop where passengers follow a defined path for access to the bus. In island bus loops, buses follow a clockwise route to circulate the loop.

Where applicable:

- Effective at bus terminals and stations with bus to bus (GO and local transit) transfers.
- ~~At stations with limited real estate~~
- At stations with no real estate restrictions.
- At stations with multiple points of access / egress to municipal roads allowing for controlled and predictable movements within the loop.

Proceed to Teardrop ~~(C)~~ Configuration if:

- Anticipate significant level of bus service at location as islands have limited room for platform expansion
- Anticipate safety concerns from clockwise traffic flow and limited access / egress points (bus route crosses at throat of loop and passengers cross loop to access platforms)



~~(Kiss & Ride) is PUDO (Passenger Pick-Up and Drop-Off~~).

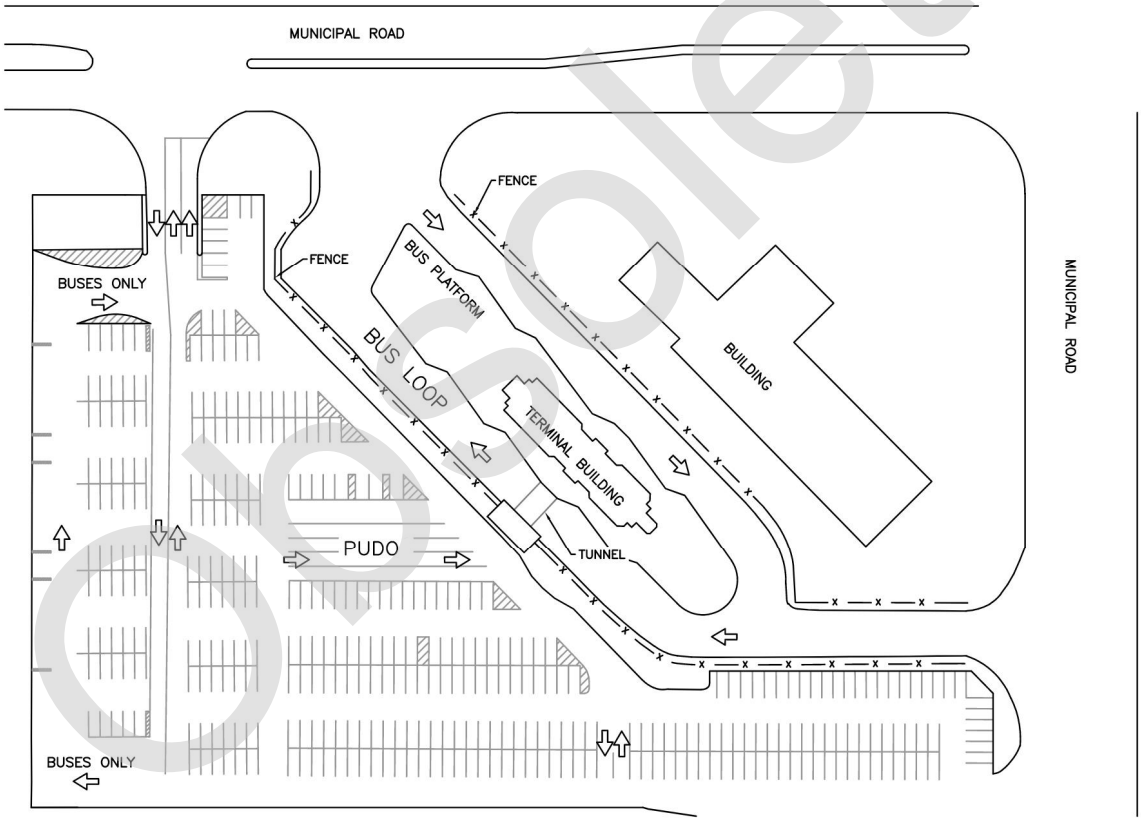


Figure 9: ~~B.~~ Island Bus Loop Configuration - Clockwise Traffic Flow

5.3.4.3.3 ~~5.3.1.3~~ Teardrop Configuration – Counter-Clockwise Traffic Flow

The teardrop configuration has platforms on the perimeter of the bus loop where passengers access the bus. The bus follows a counter-clockwise route to circulate the loop.

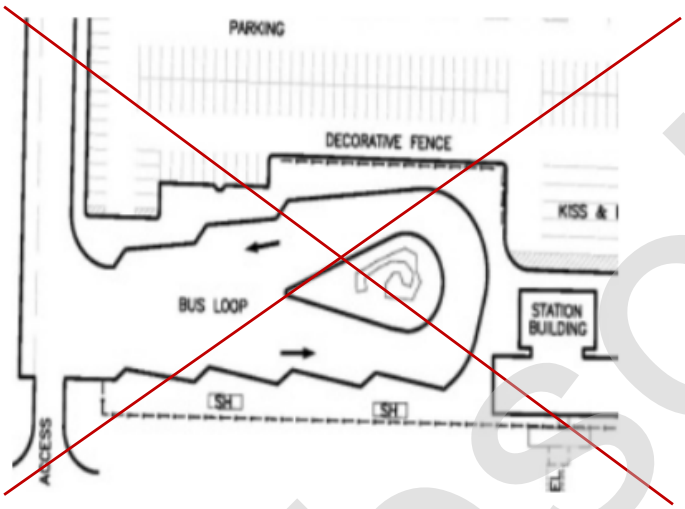
A safety concern resulting from clockwise flow of traffic can be mitigated in ensuring that bus route does not cross at throat of loop and platforms are on the perimeter

When applicable:

- At stations with a high volume of GO Bus service
- At stations anticipating future expansion
- At stations with high bus-to-rail transfers
- A safety concern resulting from clockwise flow of traffic can be mitigated in ensuring the bus route does not cross at the throat of loop and platforms are on the perimeter.
- ~~Anticipate safety concerns resulting from clockwise flow of traffic (bus routes do not cross at throat of loop and platforms are on perimeter)~~
- No real estate restrictions

~~Proceed to Bi-Directional Configuration (D) if:~~

- ~~Largest stations or bus terminals with highest volumes of GO and Local bus service~~



~~(Kiss & Ride) is PUDO (Passenger Pick-Up and Drop-Off).~~

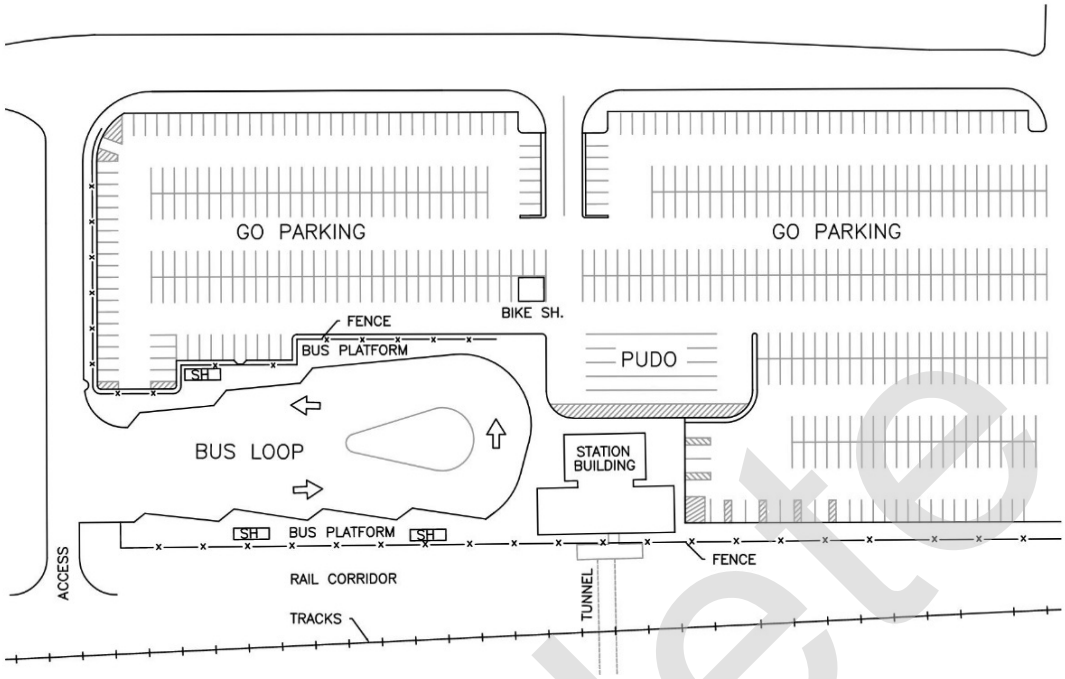


Figure 10: ~~C.~~ Teardrop Bus Loop Configuration - Counter Clockwise Traffic Flow

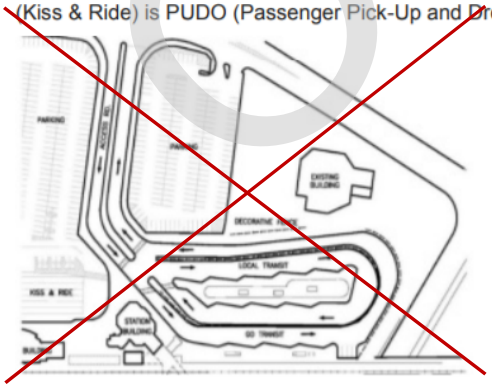
~~5.3.1.4 Bi-Directional Configuration – Clockwise and Counter Clockwise Traffic Flow~~

~~Bi-Directional bus loops include an island platform and a perimeter platform with bus traffic moving in both a clockwise and counter-clockwise direction. Passengers board from platforms on the perimeter of the outer teardrop loop and platforms from the inner island.~~

~~When applicable:~~

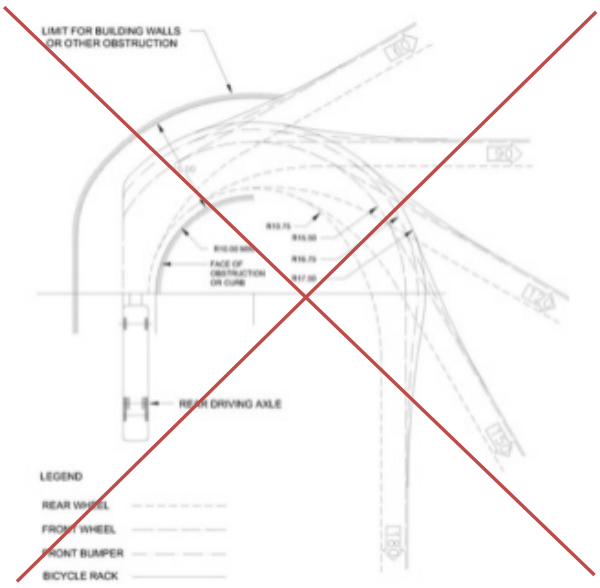
- ~~Effective at high volume stations and bus terminals with both GO bus and local bus service as the island and teardrop configuration offer an intuitive separation and easy transfer between services while accommodating a higher number of platforms.~~
- ~~Availability of tunnels to connect pedestrians to island platforms without crossing bus loops~~
- ~~No real estate restrictions, although this configuration offers an efficient use of real estate~~

~~(Kiss & Ride) is PUDO (Passenger Pick-Up and Drop-Off).~~



~~**Figure 11: D. Bi-Directional Bus Loop Configuration and Traffic Flow**~~

~~5.3.2 Bus Radii~~



~~**Figure 12: Bus Radii Turning Template**~~

~~The following criteria shall be considered when using the turning template:~~

- ~~Design Vehicle GO Bus Model MCI D4500~~
- ~~Bus speed–15 km/h~~
- ~~Bicycle rack deployed~~
- ~~Steering wheel turned all of the way to the Right stop~~
- ~~Lateral clearance of 500 mm~~
- ~~Bus turn does not begin until the rear wheels have reached the Tangent–Curve (TC) point of the inside face of curb or other obstruction~~

~~The design bus turning template shall be used where the operating speed of the bus is low, 15 km/h, and sharp short turns can be made without rider discomfort, for the design of surface features such as: Straight and saw-toothed platforms; Bus bay entrances; Bus loops; Entrance roads; and Bus maintenance and storage facilities.~~

5.3.5 Clear Accessible Area

A clear accessible area is needed at every bus bay / stop to accommodate deployment of the bus lift / ramp device plus the roll off / roll on area for wheeled mobility aids (WMA's). Refer to Metrolinx Universal Design Standard (DS-02) for detailed accessibility requirements.

A clear accessible area must meet the following requirements:

- Be 3.0 m deep x 6.0 m in length (as a minimum).
- The front edge of the required space shall be from the front of the bus bay / stop.
- Maximum gradient for bus stop or any ramps shall be as per AODA or Metrolinx Universal

Design Standard. When requirements vary between documents, the most stringent requirements providing the most inclusive solution shall apply.

- Be clear and free of any obstructions including bus bay markers.
- The clear accessible area shall have a clear height for its full area so it is not infringed by elements such as bus shelter overhangs, lighting fixtures, and sign blades, etc.
- Final position of the clear accessible area shall be reviewed with GO Transit's Bus Services Staff representative.
- Must incorporate a landing area, adjacent and directly connected to the sidewalk via a firm, smooth surface for customers using wheeled as part of the overall clear accessible area.

The clear accessible area is required to accommodate the two types of buses GO will utilize in their accessible bus routes, with one having a front door folding ramp and the other a mid-bus door lift.

Bus Shelters shall be installed or positioned as to provide an accessible exterior route from the shelter to adjacent sidewalks, streets or pedestrian paths and passenger zone.

5.4 Passenger Pick-Up and Drop-Off (PUDO)

Short-term parking facilities for passenger pick-up and drop-off (PUDO) shall be provided at GO Stations. Passenger PUDO facility shall be designed to:

- Be free flowing and give easy access to station entrance and exit.
- Orient vehicle circulation in a direction to eliminate vehicle crossover
- Face the station building or secondary entrance to the platform
- Provide capacity of a minimum 2-3 % of total parking space
- Be a lineal, parallel layout, sized on the basis of passenger loading and vehicle projections, allowing a space 3000 mm wide by 6000 mm long for each vehicle. Where possible, provide more lanes of shorter length to allow for easier vehicles access and exit
- Be visible from enclosed passenger waiting areas
- Accommodate the physical requirements of customers in a mobility aid device
- Have pedestrian movement parallel with the flow of traffic, minimizing the conflict between cars and people
- Include a 3000 mm wide hatched area for lift equipped vehicles. Ensure a barrier-free drop-off zone complete with curb cuts and dedicated loading/unloading area to be located on the right to discharge passengers at the curb or walkway
- Allow physical separation through a 2500 mm, raised curb or landscaped buffer between vehicles and pedestrians
- Taxi Lane shall be part of the PUDO

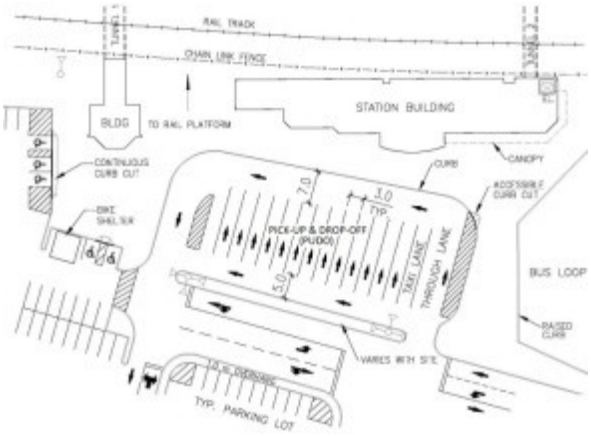


Figure 13: Typical PUDO Configuration

5.5 Pedestrian Connections

5.5.1 Walkways

- Use dedicated and continuous routes, throughout the station and connections to surrounding areas
- Create separation from vehicular traffic, whenever possible
- Make walkways a minimum ~~1600~~ 1800 mm wide, as per the Metrolinx Universal Design Standard
- When a pedestrian entrance is provided from a recreational trail, provide a clear opening of at least 1200 mm to allow the passage of wheeled mobility aids (as per the Metrolinx Universal Design Standard), ~~between 850 mm and 1000 mm,~~ whether the entrance includes a gate, bollard, or other barrier
- Raised and constructed of hard and sustainable level materials that are slip resistant
- Smooth with few joint and visually distinct from surrounding areas

5.5.2 Delineated Crosswalks

Shall be installed in conjunction with signs and ~~accessible crosswalk markings~~ provide guidance for pedestrians and alert road users of a designated pedestrian crossing point by defining and delineating paths. When pedestrian traffic must go through the bus loop, sensor/pushbutton activated flashing lights shall be installed at both sides of crosswalk. Refer to the Metrolinx Universal Design Standard and Metrolinx Wayfinding Design Standard for detailed requirements.

5.6 Vehicular Access & Accommodations

Provide a complete system of vehicular roads and access points that promotes efficient circulation and maintains fluid access and egress to and from local streets.

Maximize the number of vehicular access points, in particular egress lanes, to mitigate the congestion. Design of vehicular access roads shall passively encourage speed reduction.

Provisions shall be made for access by emergency vehicles. Designated fire access route, if required, shall meet OBC and local fire department requirements.

Organize large surface parking areas into smaller lots to manage traffic flow, facilitate better site

navigation.

Locate parking structures to balance desired direct access to the rail platform.

Provide barrier-free parking close to the rail platform access and station building

- Access roads = one for 300 parking spaces
- Single lane access roads = 4500 mm wide for single lane one-way traffic
- Two-lane access road = 7000 mm wide
- Three lane access road = 10500 mm wide lane
- Parking lot aisles shall be 7000 mm wide

Important: Parking layouts shall respond to property size and site geometry. Parking structures and surface parking shall be designed as an integral component of the coordinated site plan and architectural theme.

Awkward, irregular gaps in parking layouts shall be filled in wherever possible (eg. bike, scooter parking, etc.).

5.6.1 Parking Stall Design Requirements

Table 3: Parking Stall Requirements

Criteria	Specifications
Standard parking stalls	2500 mm wide and 5500 mm long
Stalls abutting curbs	4500 mm long with a 1000 mm allowance for vehicle overhang
Parallel parking stalls	3000 mm wide x 7000 mm long
Vehicular overhang	1000 mm
Sign posts	Shall be provided at parking row locations to indicate tow away zones (refer to the Static Signage Standards for details)

5.9 Park and Ride Lots

Park & Ride lots are intermodal transfer facilities. They provide a location for travelers to transfer between the auto mode and transit or between the single occupant vehicle (SOV) and other higher occupancy vehicle (HOV or carpool) modes. Other modes potentially supported by a park-and-ride facility can include: pedestrian, bicycle, paratransit, carpool and vanpool, intercity bus transit, airport service, and other modes, based on the location, surrounding community and opportunities available.

Park & Ride Lots are typically on MTO property and operated by GO Transit. The lots are serviced by GO transit and may be used by other local and regional carriers. When designing a Park and Ride Lot on MTO property, MTO or any higher third party standards govern, with consideration to GO standards and requirements such as lighting levels. Otherwise GO standards shall govern along with the consideration of MTO or any higher third party standards or requirements. However, this may vary on project basis.

Bus access and bus loop within Park and Ride lots shall be designed to meet movement and turning radius performance requirements and ensure safe and smooth vehicle movements with minimum restrictions. For bus loop and pavement design requirements please refer to Bus Loops section. For passenger safety requirements please refer to Bus Platform and Design Criteria.

All requirements from applicable sections apply, specifically:

- Site Plan Layout & Organization
- Bus Infrastructure
- Passenger Pick-Up and Drop-Off
- Pedestrian Connections
- Vehicular Access and Accommodations
- Landscaping and Civil Works
- Fixtures and Furnishings

Refer to GO DRM Section 7 Technical Requirements for Electrical, Communications and Mechanical requirements including lighting, CCTV coverage, Fare Systems etc.

~~Park & Ride Lots are typically on MTO property and operated by GO Transit. The lots are serviced by GO transit and may be used by other local and regional carriers.~~

~~Car Pool lots are owned by the regions or MTO, whose standards govern. They may be serviced by GO Transit and other transit agencies.~~

5.10 At Grade Pedestrian Crossings

Important: Where at grade rail pedestrian crossing is required, in addition to adhering to Transport Canada regulations, approval shall be obtained from Railway Corridors and System Safety at Metrolinx.

Table 7: At Grade Pedestrian Crossings

Element	Design Requirement
Flangeway Gap	• The flangeway width may not be less than 65 mm and shall not exceed 75 mm • Extend rail seal and taper asphalt at least 254 mm beyond edge of crossing surface • Material: Use rubber rail seal to match the rail size and profile

5.11.5 Civil Works

5.11.5.1 Storm Drainage

5.11.5.2 Catch Basins

Catch basins shall be located upstream of pedestrian crossing areas, and 1500 mm clear of any driveway curb depressions. Grates shall be diagonal type. Catch basins and maintenance holes shall be located out of bus wheel path. Side inlet catch basins shall be used within bus travel path. Passenger platform curbs shall not be indented around catch basins. Retention ponds and catch basin flow restrictors shall be provided in accordance with stormwater management requirements. Catch basins shall not be located on walkways and/or in front of building doors.

5.11.5.3 Gutter Drainage

Gutter drainage shall be restricted to access roads if required to prevent storm run-off onto adjacent property. Road and gutter gradients shall not exceed Fire Access Route requirements.

5.11.5.4 Ditch Drainage

Where a storm sewer system is not available, or where an "interim" type of development is desired, ditches and related culverts may be used to carry the drainage down one or both sides of the paved areas. Culverts shall have safety grilles at ends, and ditches subject to substantial ponding shall be fenced, for safety, or filled with rip-rap, and topped with geotextile fabric and granular topsoil and sod.

5.11.5.5 Grading

Grading shall be designed to avoid excessive slopes and shall be integrated with surrounding landforms to provide slope stabilization and positive flows to the drainage system. Where existing landforms, or vegetation, are to be preserved, appropriate protection and construction controls shall be designed.

5.11.5.6 Retaining Wall

The Consultant shall select the optimum permanent retaining method (wood shall not be used for retaining walls). Where concrete retaining walls are in proximity to the public, they shall be sandblasted. Low retaining walls shall be precast concrete units. Gabion walls may be used in non- public areas. Where retaining walls are adjacent to buildings, the material shall be compatible with the architecture.

5.11.5.7 Stormwater Management

Manage rainwater and snowmelt on-site with designs that encourage infiltration, evapotranspiration and water re-use:

- Sustainable materials paving for parking surface, drive aisles, overflow parking, snow storage areas and other hard surfaces in the parking lot
- Provide a planting medium, composed of good quality soil, with a minimum depth of 0.6m and at least 0.9m depth if trees are planted
- Plant trees (if applicable) above grade from ponding areas and clear of stormwater flow
- Ensure that any surface water is fully drained within 48 hours or less
- Use poured in place curbs with cuts for water inlets
- Include a perforated subdrain, check dams and overflow catchbasins as required to manage excess water
- Ensure overland flow routes and stormwater inlets and outlets are clear of debris and snow piling

6 Building Program

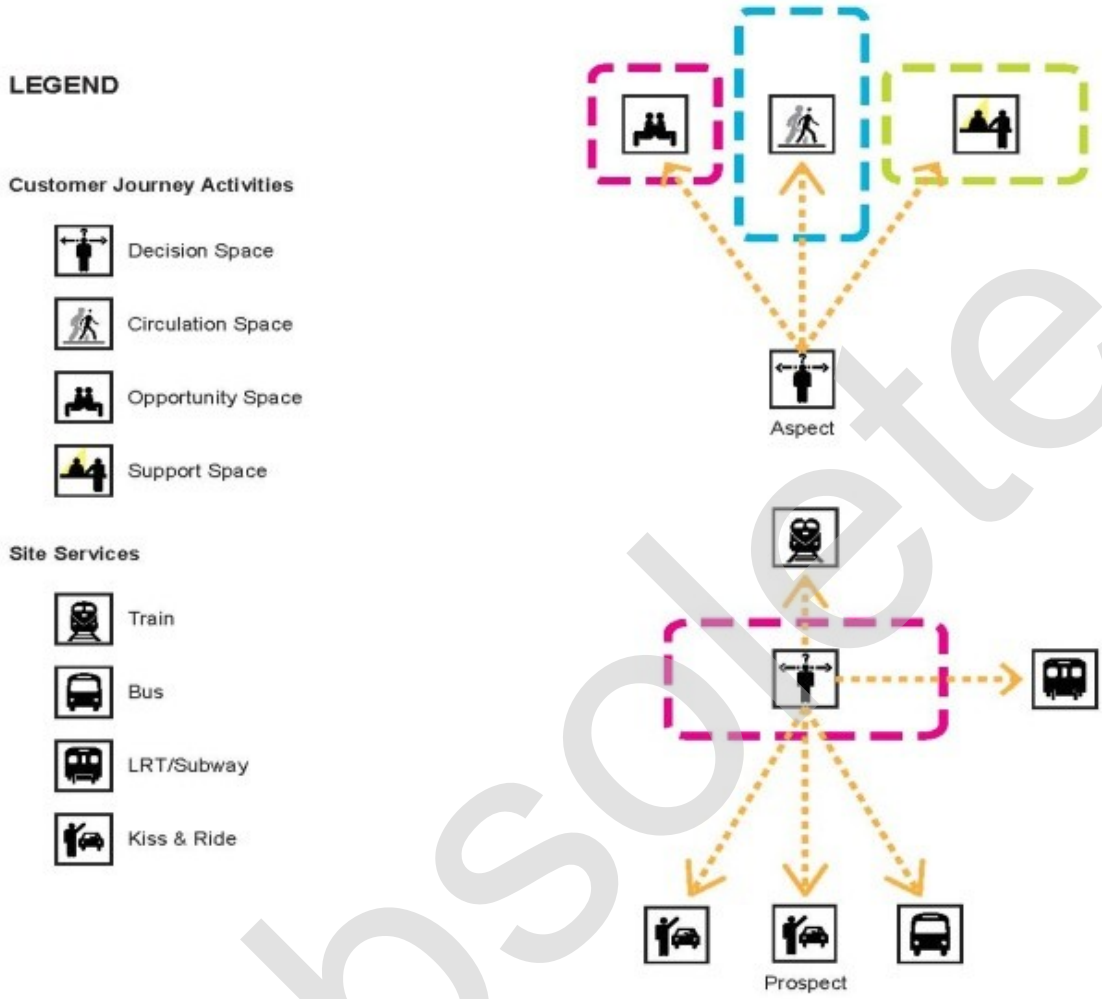


Figure 24: Station Building Program – Wayfinding and Customer Journey Points

6.1 Key Sustainability Accommodations

- Apply passive means of reducing energy where it does not conflict with other customer service and operational design requirements
- Maximize the use of natural light by using photosensor and /or daylight harvesting controls and dimming
- Utilize motion sensors and controls for lighting as required
- Reduce energy consumption and emissions at all buildings. Use heat recovery to conserve energy for heating and cooling
- Design sites using Crime Prevention Through Environmental Design (CPTED) principles to provide natural surveillance and safe travel through the site. This includes safe routes for

pedestrians and cyclists.

- Provide thermal comfort for staff and customers with protection from weather via canopies and shelters

6.2 Bus Terminals

GO Transit has three basic types of bus terminals: stand-alone, station-shared and joint-development. The exterior architectural form will vary as follows:

- Stand-alone terminal buildings shall be designed to suit the architectural context of the site. Refer to GO Station Architecture Design Standards for detailed requirements;
- For stations and terminals that share space with other agencies, functional program and building size shall be determined in consultation with partner agencies; and
- Joint-development terminals shall conform to the architecture of the development that encompasses them or shall be designed as stand-alone terminals, where external visual identity is warranted within the development. Refer to GO Station Architecture Design Standards for detailed requirements.

Building Program for Terminals follows the Station Building requirements with the exception of areas outlined below. Refer to GO Station Architecture Design Standard for detailed requirements. Refer GO DRM Section 7 Technical Requirements and GO DRM Section 6.3 Operational Facilities for building service details.

6.2.1 Dispatcher Room

The bus dispatcher room, where required, shall be elevated to permit the dispatcher in a seated position to have sight lines of all buses. It shall be located strategically for visibility of bus bays, particularly of arriving buses~~, where possible~~. The usual location is on an external wall, but it may also be located within the waiting room. Generally, it shall be adjacent to the driver room and shall have access from the driver room.

Both rooms may also be adjacent to the station attendant room, in which case a staff room may be provided in common for the dispatcher, drivers, and station attendants, with shared washroom and kitchenette facilities. Depending on the size of the facility, separate male and female staff/driver washrooms may be required.

The floor shall be elevated a minimum of 570 mm above the waiting room floor level and platform level, equivalent to a minimum 3-riser stair requirement. The seated dispatcher's eye level will then be approximately 1.69 m above platform level, over the heads of most passengers. Other design requirements include:

- Desk-height counter with insulated glazing above, knee-space below;
- Side and/or back counters to be typical counter height with task lighting from wall-hung cabinets;
- Wall hung cabinets with adjustable shelves and lockable doors;
- Non-glare recessed LED luminaries with lense;
- If the room is on an exterior wall, insulating glass shall be fully tempered tinted low-E glass;
- Interior locations to have fully tempered 10 mm clear glazing;
- Where a dispatcher room is adjacent to a driver room, but has a separate entrance, a pass-through sliding-glass window shall be provided between them, operable by the dispatcher, for receiving driver reports and direct communications;

- Where a dispatcher room is in a waiting room, the pass-through window may be required into the waiting room;
- A coat storage closet, or coat space behind entrance door;
- A Driver Manual storage cabinet with shelves and doors;
- A window transom/bulkhead designed for blinds;
- A magnetic bulletin/white-board, wall mounted or on cabinet doors above counter-height, built-in if required;
- Access to a staff washroom (see above); and
- Water cooler.

6.3 Operational Facilities

6.3.1 Rail Operational Facilities

- Refer to standalone GO specifications for Rail Operational Facilities.

6.3.2 Bus Operational Facility

GO owns a number of Bus Operational Facilities for the purpose of storage, repair, maintenance, cleaning, and fueling, with ancillary administrative offices. Bus Operational Facilities are classified as Type A, B or C based on land sizing, parking, facilities provided and fleet size requirements.

7.5 Fixtures and Furnishings

7.5.1 Shelters

Refer to GO Station Architecture Design Standards, GO Transit Standard Drawings and Specifications and Metrolinx Universal Design Standard for detailed shelter requirements.

~~Because GO is primarily a commuter system, operating in accordance with timetables, most passengers arrive on platforms to coincide with train or bus departures.~~

Important: Sheltered areas for customer comfort integrated within the canopy on the rail or bus platform are the preference for application of the sheltered areas.

Sheltered areas shall typically provide the following amenities:

- Heaters
- Digital Information Walls
- GO Standard Benches
- Wi-Fi reception
- Charging Receptacles
- Fare Systems (only in certain applications at car pool lots and or remote station access locations or where there is no station building).

~~Fare Systems (only in certain applications at car pool lots and or remote station access locations or where there is no station building).~~

Refer to GO DRM Section 7 Technical Requirements for Electrical, Communications and Mechanical requirements including lighting, CCTV coverage, fare systems, shelter heating etc. as applicable.

Where the integrated sheltered option is not applicable, standalone shelters shall be provided within the GO Standard suite of shelters, comprising of:

- Passenger Shelters
- Car Pool Shelters (sizing shall be determined by the Capital Projects Bus Rapid Transit Program)

The number of sheltered areas on a bus platform is determined such that each bus passenger shelter would accommodate approximately a bus-load of passengers. Where bus bays are remote from the terminal building, passenger shelters shall be provided where required by GO.

The number of sheltered areas on a rail platform is determined such that each rail passenger shelter would accommodate approximately two coach-loads of passengers.

Shelter rain water leaders shall discharge into subgrade where available to avoid slippery conditions on platforms.