SUBWAY STATION ARCHITECTURE DESIGN STANDARD (DS-09)

Facilities Architecture & Engineering
Version 2.0
February 2025

METROLINX

Metrolinx Design Standards
Subway Station Architecture Design Standard-Rev1
Publication Date: August 21, 2020
Revision Date: February 2025

an Agency of the Government of Ontario

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AMENDMENT RECORD

Version No.	Publication Date	Remarks
1.0	November 2020	First Publication
2.0	February 2025	Revisions to various sections including, vertical circulation, entrance types, thermal comfort, sustainability, accessibility, removal of TTC references, coordination between Design Standards (Section 1.2, Section 2.1, and Section 3 content migration to DS-00 Front End Design Standard). LEED requirements moved to an appendix for future incorporation into DS-05 Sustainable Design Standard. TWSI moved to an appendix for future incorporation into DS-02 Universal Design Standard.

TABLE OF CONTENTS

1.0 Introduction

1.1 PREFACE

This is the second edition of the DS-09 Metrolinx Subway Station Architecture Design Standard document.

The purpose of this document is to ensure a consistent, safe and inclusive customer experience, as well as a highly functional and maintainable transit environment for Metrolinx Subway assets. It incorporates conclusions from lessons learned on similar projects as well as contemporary and emerging design paradigms that facilitate efficiency and maintainability while optimizing the customer experience. The focus of this document is on assets within the immediate station environment within Metrolinx property and emphasizes coordination with municipal partners and their relevant standards for shared and interface conditions. The content of this document has been sequentially organized to guide the user from the overall vision of he regional network, highlighting priorities and principles, through to elaboration via built environment requirements.

This standard is applicable to all Metrolinx Subway projects, and provides architectural and urban design requirements for stations and associated customer-facing infrastructure. Operator-specific requirements and amenities are not in the scope of the standard.

For additional information, contact the owner of this Standard

1.2 DESIGN PRIORITIES

Refer to DS-00 Metrolinx Front End Design Standard.

1.3 VISION & DESIGN APPROACH

Metrolinx is committed to delivering a world-class, connected and sustainable transit network. The agency's stated goal is to provide a safe, reliable and convenient customer experience that encourages the shift away from personal vehicles and brings about a quickening reduction in transportation emissions.

Quality architectural design, sensitive urban design and a connected transport system are critical to ensuring that Metrolinx anticipates and exceeds customer needs and expectations and builds ridership and revenue across the network. To help meet the transformational vision and aspirations of Metrolinx, architects and designers must embrace a holistic, forward-thinking mindset that delivers solutions that are future-proof, creative, adaptable, enduring and responsive to the changing world of intelligent transport and mobility.

The design imperative is to ensure the comfort and wellbeing of every single user, whatever gender, age, ability or level of comprehension.

When the Yonge Line opened in 1954, there was a common architectural language for all stations, defined by simple, rectilinear shapes and consistent materials such as brick, concrete and Vitrolite glass. The combination of these materials across stations helped create a sense of consistency and coherence to the entire line and formed the basis for the subway's uniquely Torontonian identity.

This 'kit of parts' approach adopted back then has been used many times and has very clear advantages. The city of Copenhagen employed this method for the Cityringen line and Sydney has done the same on the Chatswood to Sydenham extension. The approach prioritizes the customer by creating uniform, consistent journeys from street to platform, and adds variability by means of incorporating features of the local neighbourhood through architectural nuances, materials selection and art. The end result is a sense of familiarity with the station environment, which in turn delivers a consistent customer experience and promotes brand recognition.

1.4 BRAND CONSIDERATIONS

The subway design standard is intended to be applicable for all subway projects and thus its approach to brand is designed to be flexible to allow the requirements to be adapted successfully, regardless of brand direction. Brand concepts and needs change over time and will vary across projects, i.e. the image and brand needs of one subway project may differ from that of others. The standard does not seek to create a brand for all subways but strives to support branding, whatever it may be, through minimalist design and a modular kit of parts framework.

There are several benefits of this approach:

- Optimal legibility and identity of the system architecture.
- Building familiarity with the station environment, to provide customers with a consistent, predictable, but inherently interesting experience.
- Predictability of cost, while allowing for variety, interest and placemaking for each station.
- Ease of procurement and implementation, through a series of standardized details that support consistent experience and promote brand recognition, while increasing the quality and efficiency of station buildings.
- Stimulus for systemic design thinking and strategy, rather than “cookie cutter” or “case by case” approach.
- Translation of concept into subway extensions.

To allow for flexibility from site to site and to facilitate integration with context, the brand application at a station will follow a ‘gradient’ approach. The further into the station environment, the greater the consistency of brand and customer experience. The closer to the public realm, the greater the flexibility of the station to respond to the site context.

The gradient approach allows designers to deal with elements of consistency and variability in three categories:

a) Line-wide consistency of safety, security and information systems, and the positioning of core brand and customer service elements.

b) Variability of station typologies, demanding a response to specific site circumstances and program of uses, through systematized application of materials, fixtures and equipment.

c) Contextual variability arising from the location of the station, in order to create a sense of place by reflecting the heritage and history of the locality or site condition.

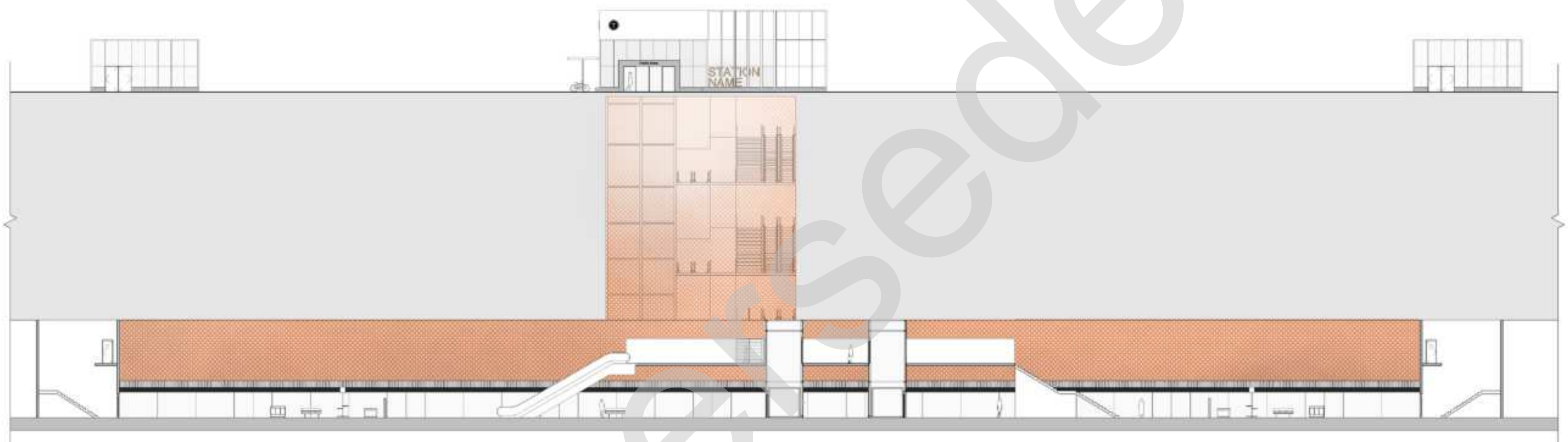

Figure 1-2: Brand gradient

Diagram demonstrating the application of branding elements and density of feature elements from entrance to platform. The approach to consistent kit of part interiors will be consistent through the station and this diagrams is representing the gradient approach to station identifier like color and feature elements only.

1.5 CUSTOMER JOURNEY

The Customer Journey Map illustrates the stages, challenges, emotions and touchpoints that customers experience when planning and executing their journeys.

A customer's journey starts well before they leave their home - it begins when they have identified a reason to travel. The customers first interaction with the branded customer experience is at the planning stage of their trip. At this point, the customer decides whether or not to use the transportation network. Important factors in this decision-making process will be availability through digital channels of user-friendly, accurate information, and effortless connectivity across all modes and easy access to the network. If customers cannot immediately see how to get to their destination and back again, or access on onward connection, they are less likely to make a positive choice.

At each stage of the journey, there are touchpoints where the customers interact with a Metrolinx product, service, system or facility. The customer journey map diagram captures these touchpoints and notes the elements that are important to customers, which shall inform our design development.

The journey map is organized into eight main phases, which, starting with arrival, mirror the chapters presented in this document. Each of these phases contains one or more steps relating to the architecture of the site or building.

Each phase of the journey contains touchpoints where customers interact with a specific Metrolinx product, service, system or part of the actual facility. The journey map captures these touchpoints and identifies the elements that are important to customers, and informs design development of future stations.

Arrival is the first physical touchpoint. Customers will reach the station on foot or by bike, car or other transportation modes. Irrespective of their choice, the definition of station planning area is typically considered by walking time to the station, neighbourhood characteristics and density around the station. The plaza serves both arriving and departing customers and shall be designed with the needs of both in mind.

The station building or head house is the next step in the customer journey. Consistent architectural expression, entry portal and identification provide a sense of familiarity and aid wayfinding and navigation. Station buildings may include vertical circulation from street level if not located at grade.

The unpaid zone is the area where customers plot their journeys, look at the maps, buy fares and obtain assistance if needed. This zone forms an important part of the customer experience, and the kit of parts approach is key to delivering consistent and predictable design. The fare gates separate unpaid and paid zones, and are a consistent element through the network.

The paid zone connects the fare threshold to the platform and can expand on different levels, depending upon whether the station platform is below or above ground. This zone typically includes customer amenities, including retail, washrooms and advertising. Vertical circulation systems are important elements in this step and consistent design is essential in accomplishing customer satisfaction.

Platforms are the most branded environment in any transit system. Customer amenities including trip confirmation, digital displays of times of next trains, seating, advertising, public announcements and other information systems. Platforms must be designed to service both arriving and departing passengers.

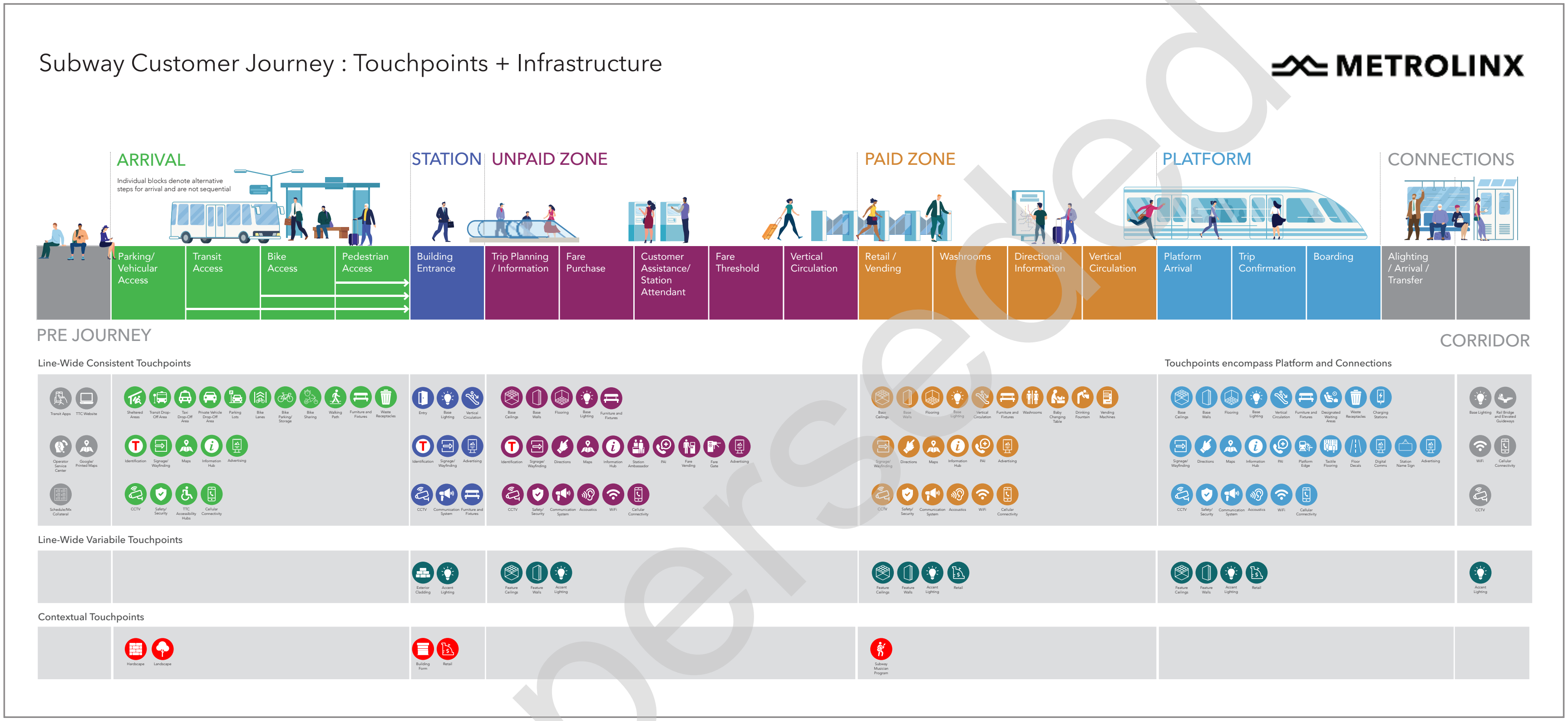

Figure 1-3: Customer journey: Touchpoints and infrastructure

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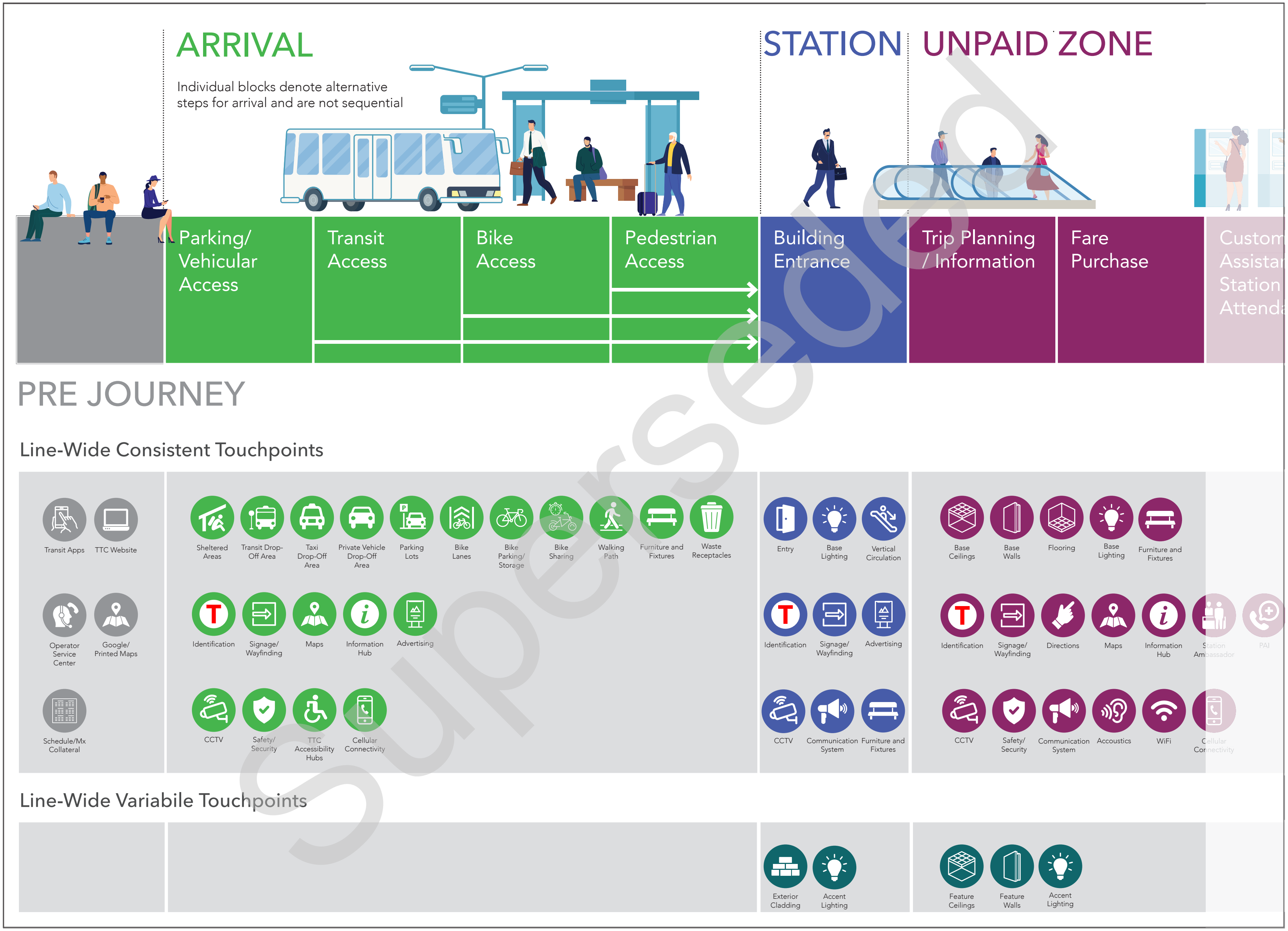

Figure 1-3A: Customer journey: Detail of touchpoints and infrastructure

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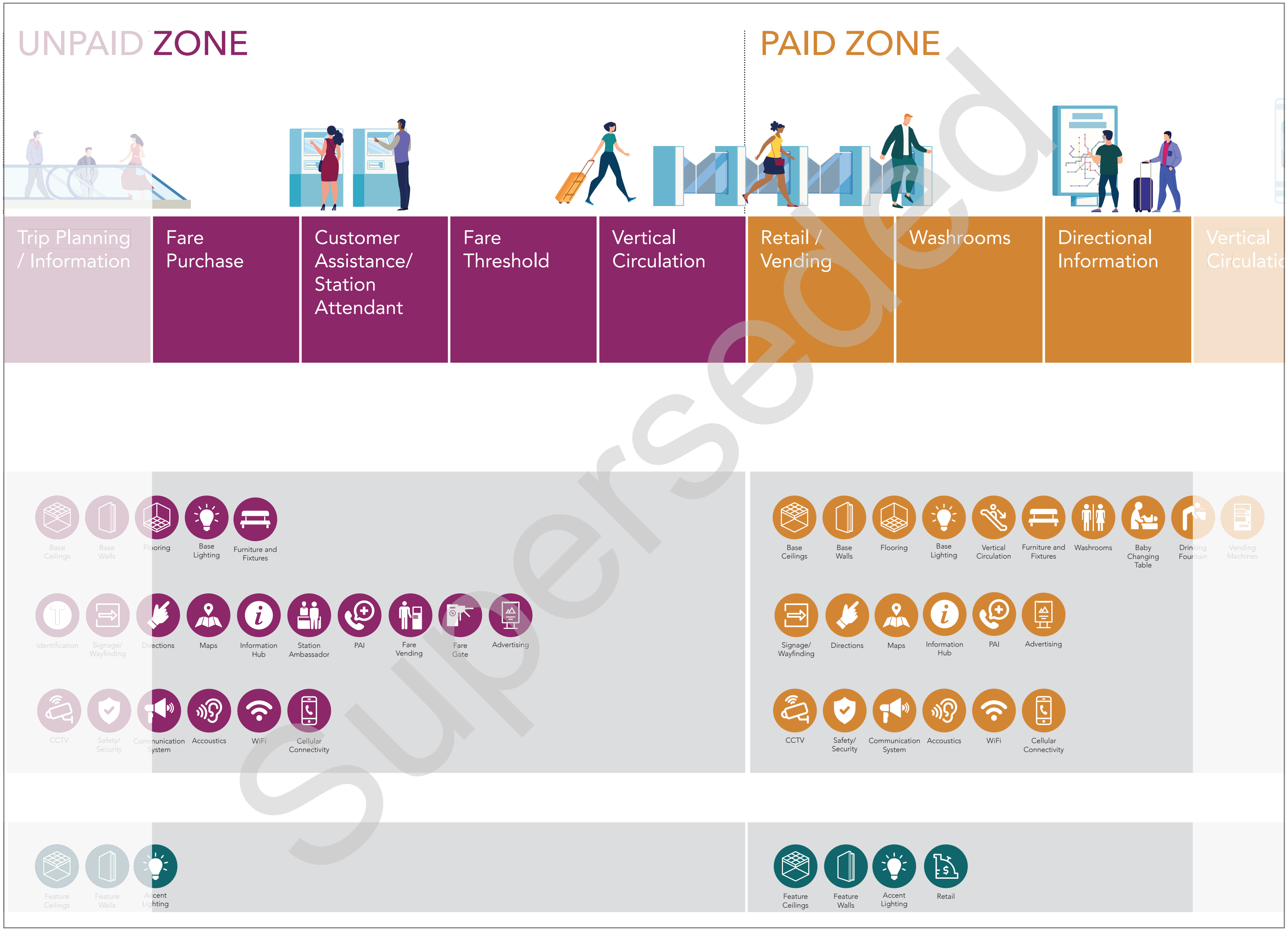

Figure 1-3B: Customer journey: Detail of touchpoints and infrastructure

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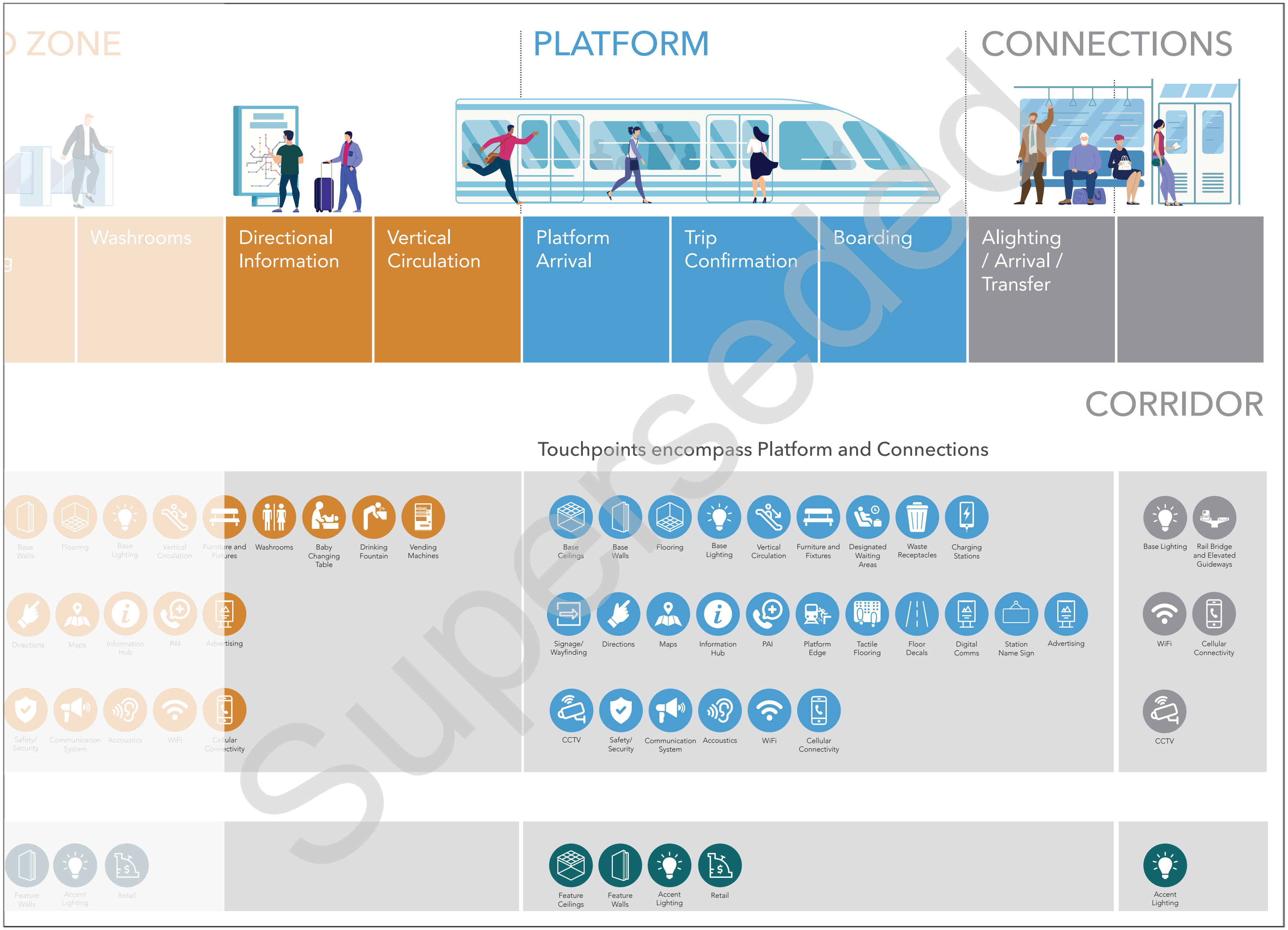


Figure 1-3C: Customer journey: Detail of touchpoints and infrastructure

1.6 TOUCH POINTS AND INFRASTRUCTURE DESIGN PRINCIPLES

Station design is informed by many factors, including safety, accessibility, functionality, sustainability, durability, maintainability and cost, but most of all by the needs and reactions of customers who use the transit system.

Customers encounter various physical and digital touchpoints along their journey. These touchpoints build familiarity with the system and aid feelings of security, safety and comfort. The design of the infrastructure and the siting of these touchpoints play an important part in the overall experience, providing reassurance and developing the perception of efficiency and reliability.

Some touchpoints affect the customer experience more than others, and this design standard requires that designers prioritize first the most important elements relating to customer flow, and develop their plans around them, using the 'kit of parts' approach.

A consistent relationship between different elements, for instance the hub wall or the proximity of maps, fare machines and station ambassador, fosters awareness, reduces uncertainty and mitigates stress, all of which result in heightened customer satisfaction.

Overall, the aim is to develop consistency whilst avoiding uniformity, to develop environments that are familiar and reassuring, but not devoid of personality and local context. Sites will vary because of plot size, location, accessibility to other transport modes, and individual neighbourhood characteristics, and each situation will affect the design strategy. It is important that designers take care to categorize between consistent, variable and contextual elements, for instance, identity canopy, architectural fins and glazing system, back-of-house panelling, perforated mesh, feature walls and ceilings.

Care has been taken in the design of consistent elements that create a recognizable look and feel, and support the customer journey and brand experience. These elements include architecture, interior and exterior design, landscaping, placemaking, retail offers, amenities, and information and advertising. Regarding the interior design elements including furniture, performance requirements are intended to inform design of the kit of part elements. However, off the shelf products which meet the requirements of this standard are accepted.

The final stage, to prove the efficacy of the strategy and kit of parts approach, is to produce renderings that locate all touchpoint elements in the space, to ensure the optimum design solution.

1. Entrance Zone
2. Identity Canopy
3. Station Name
4. Bike Sotrage Room
5. Accent Ceiling
6. Exterior Glazing System
7. Exterior Branding Fins

- Arrival Plaza
- Station Entrance
- Unpaid Transaction Zone
- Paid Access Zone
- Platform
- Vertical Circulation
- Interior Elements
- Feature Elements
- Platform Edge Door
- B.O.H.

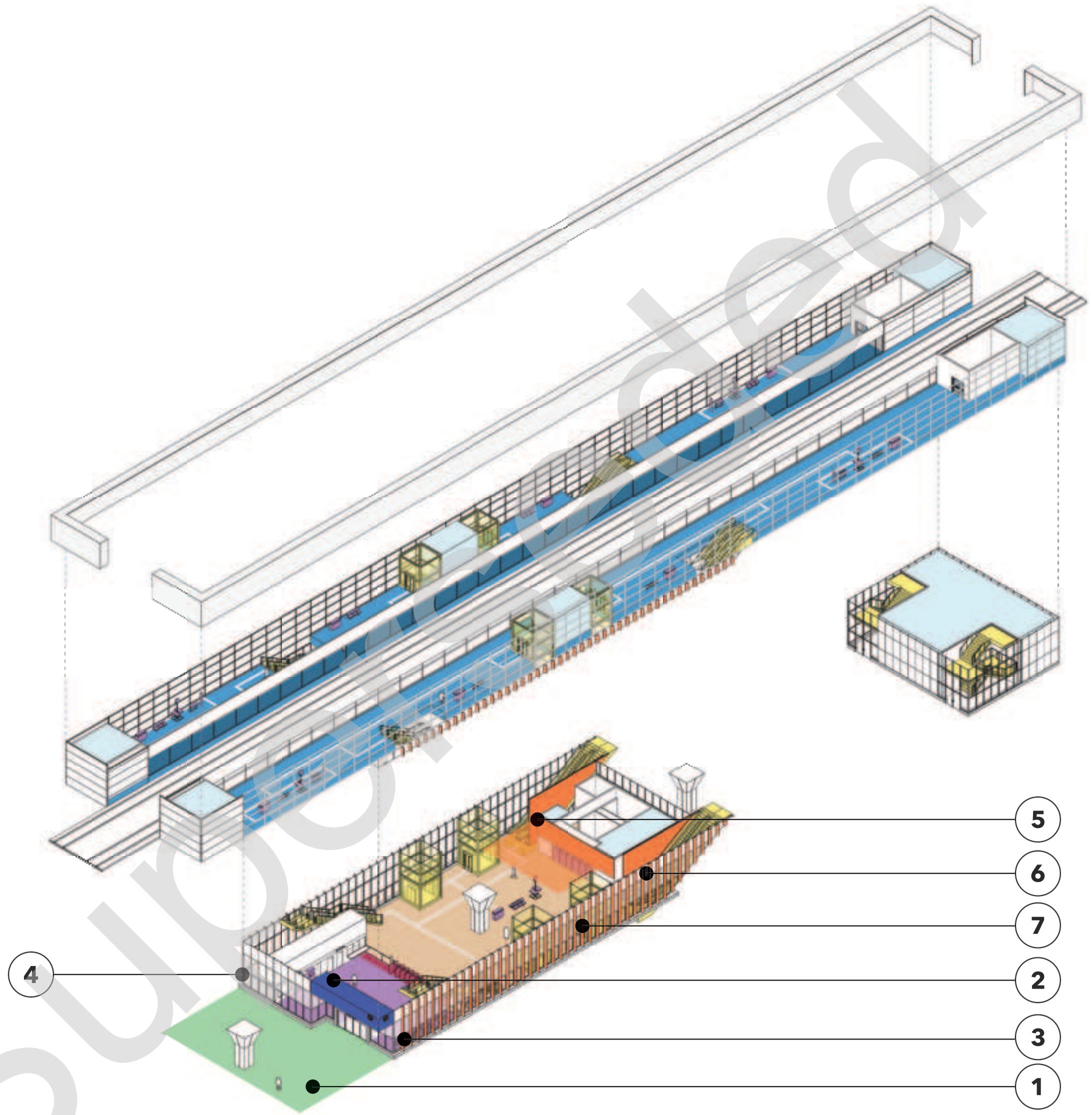


Figure 1-4: Elevated platform: Kit of parts diagram

Diagram demonstrating the relationship between the kit of parts elements in the elevated platform station typology

1. Entrance Zone
2. Identity Canopy
3. Station Name
4. Bike Sotrage Room
5. Accent Ceiling
6. Exterior Glazing System
7. Exterior Branding Fins

- Arrival Plaza
- Station Entrance
- Unpaid Transaction Zone
- Paid Access Zone
- Platform
- Vertical Circulation
- Interior Elements
- Feature Elements
- Platform Edge Door
- B.O.H.

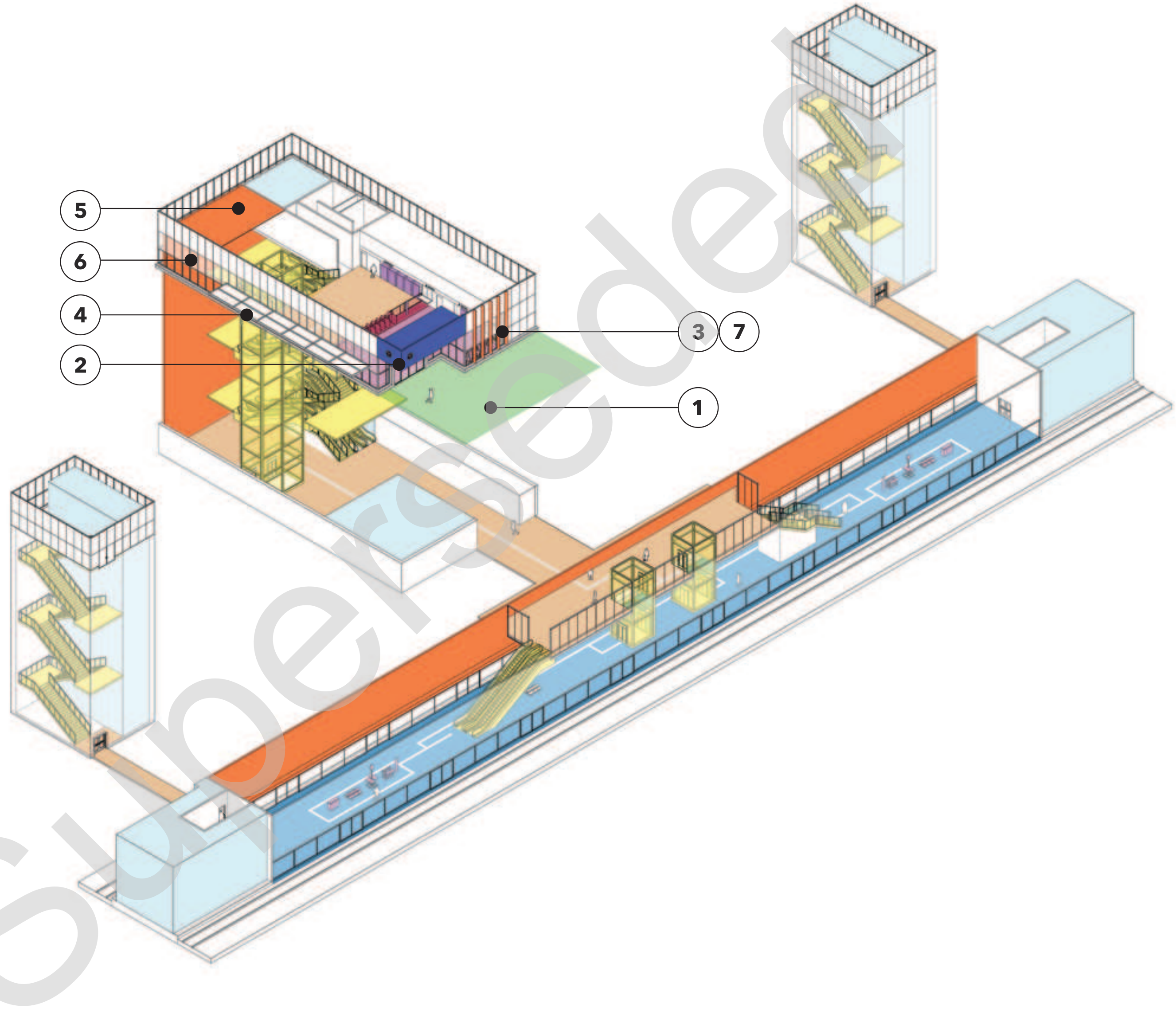


Figure 1-5: Below grade platform: Kit of parts diagram

Diagram demonstrating the relationship between the kit of parts elements in the below grade platform station typology

General Touchpoints :: Unpaid Zone

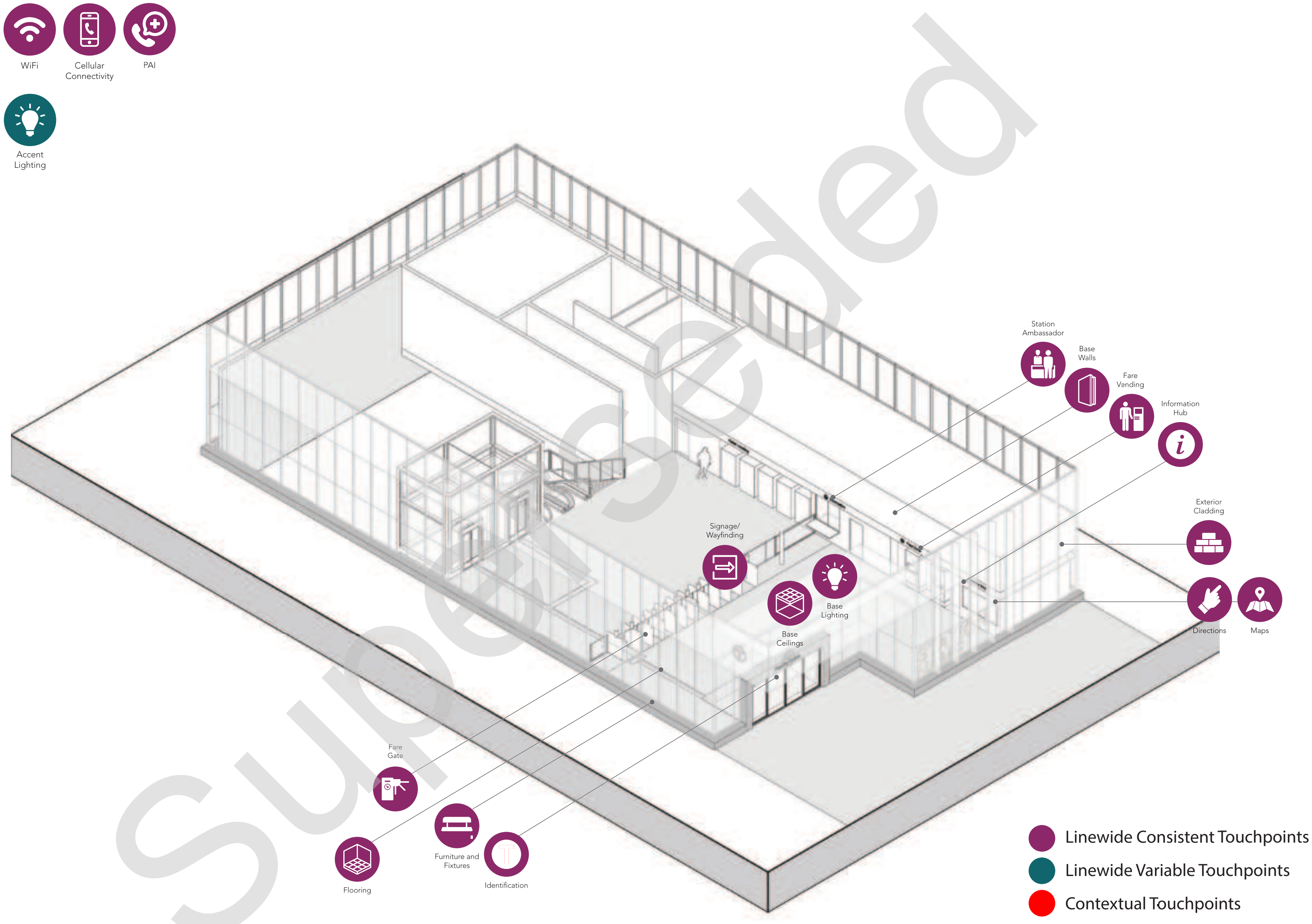
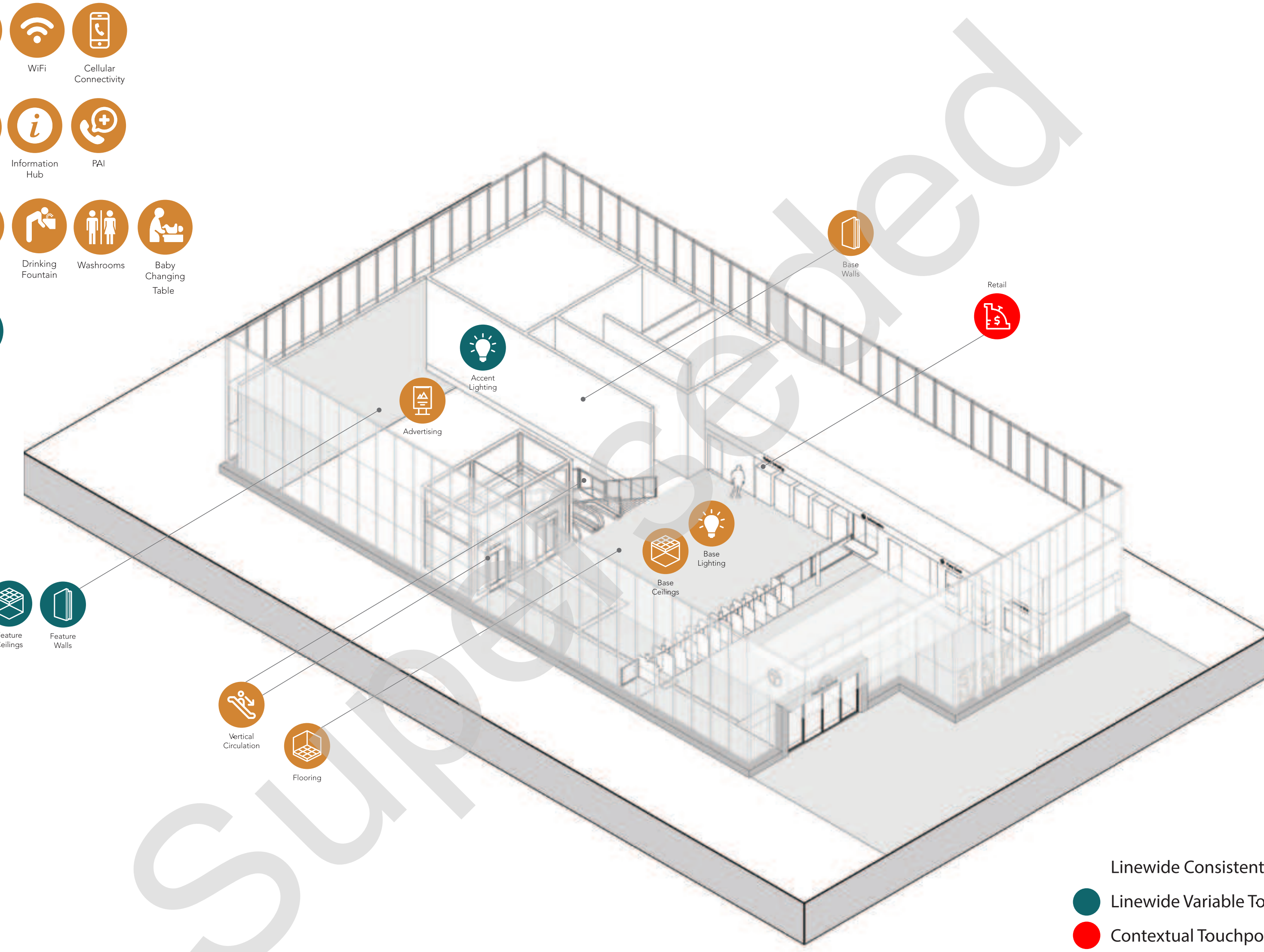


Figure 1-6: Unpaid transaction zone: Touchpoints and infrastructure Diagram demonstrating the relationship between the touch points in the unpaid zone and the application of consistent, variable and contextual

General Touchpoints :: Paid Zone



Linewide Consistent Touchpoints

Linewide Variable Touchpoints

Contextual Touchpoints

Figure 1-7: Paid access zone: Touchpoints and infrastructure

Diagram demonstrating the relationship between the touch points in the paid transaction zone and the application of consistent, variable and contextual

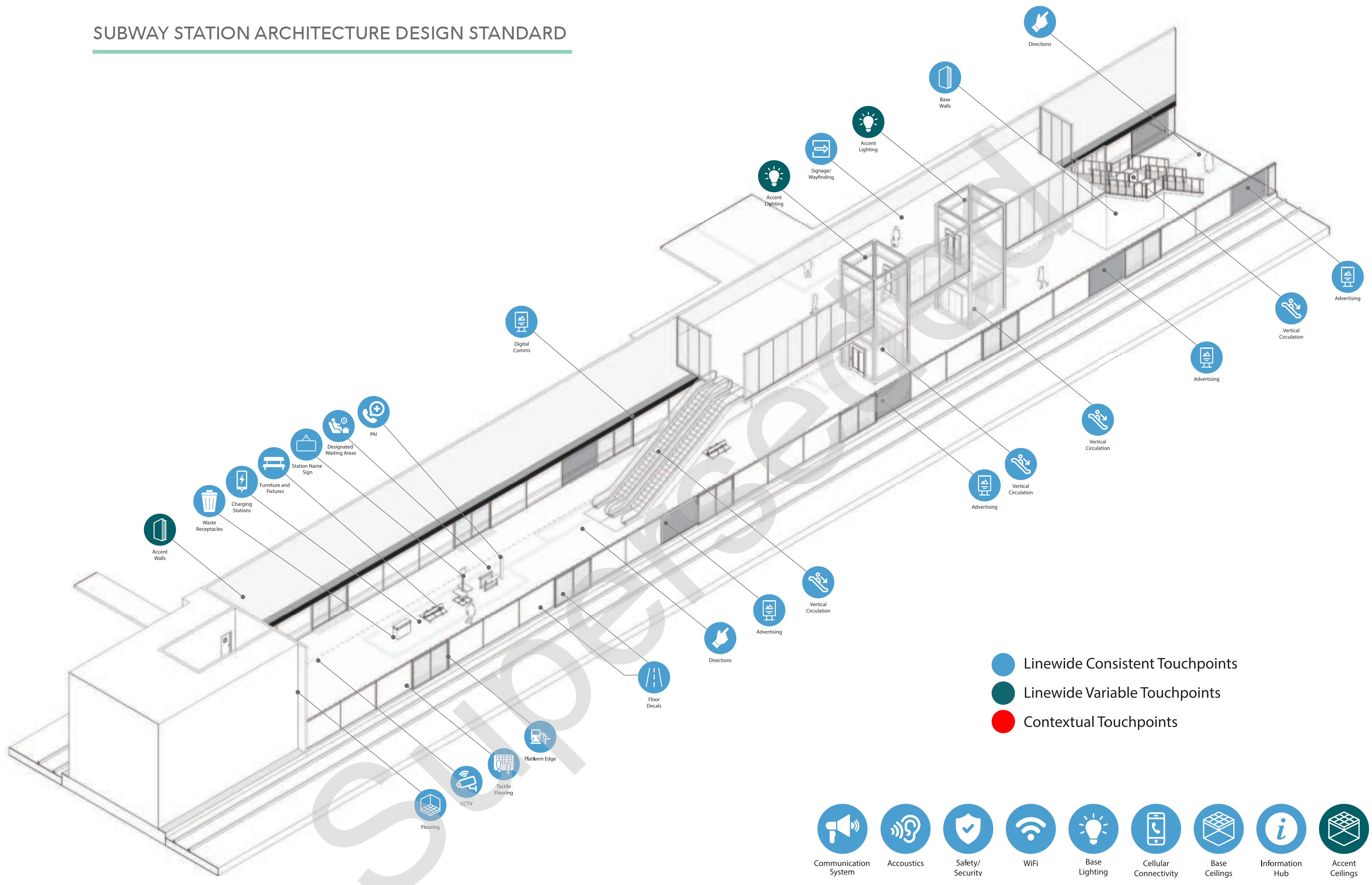


Figure 1-8: Platform: Touchpoints and infrastructure

Diagram demonstrating the relationship between the touch points in the platform and the application of consistent, variable and contextual

1.7 ADMINISTERING STANDARDS

1.7.1 Overview

The Subway Station Architecture Design Standard provides design direction and requirements for customer-facing elements of new subway stations. This standard shall be applied together with the project contract documents.

1.7.2 Relationship Between Metrolinx Standards

Refer to DS-00 Front End Design Standard

1.7.3 Legislative Codes and Standards

Refer to DS-00 Front End Design Standard

1.7.4 Design Review and Submittal Process and Requirements

Refer to DS-00 Front End Design Standard

1.7.5 Acronyms and Terminology

Refer to DS-00 Front End Design Standard

2.0 Principle Elements Throughout

2.1 OVERVIEW

The following section consists of customer facing principle elements that directly impact the safety, comfort and well-being of all customers throughout the station environment.

2.2 LIFE SAFETY AND SECURITY

2.2.1 Ventilation

Ventilation systems in stations are provided based on the need to control the ambient climate to provide for passenger comfort and for fire emergencies to preserve occupant safety and assist emergency responders. The requirement for a ventilation system is case specific and governed by the OBC, ASHRAE, and NFPA 130.

The design of the ventilation system shall incorporate the intended objective(s) and provide a system that can serve multiple purposes. The ventilation system is part of a holistic approach to fire life safety includes incorporation of, but is not limited to, fire protection system, communications, accessibility, security, operating protocols, risk, and emergency responders and municipal agencies.

Retrofits and upgrades of existing infrastructure could have an impact on existing systems and the extent of those impacts and viability shall be analyzed relative to the life safety value it provides. Where additional systems are installed (such as Platform Edge Doors, PED's) the impact on the ventilation shall be evaluated so that there is no degradation in performance.

2.2.2 Dead End Corridors

a) Dead end corridors shall not be included in public areas. Corridors shall be sized according to Level of Service, required queue and runoff space, CPTED principles, and applicable code requirements.

   i. A dead end corridor shall be defined as any pathway that is longer than 6000 mm and less than 9000 mm wide.

   ii. Where elevator lobbies are proven not possible to be co-located with stairs and escalators, access to emergency exit stairs shall be provided adjacent to the elevators within the corridor. Where exit stairs are not possible, the corridor length and width dimensions shall follow a 2:1 ratio with a minimum corridor width of 6m. All corridors shall maintain clear sightlines to prevent concealment.

Figure 2-1: Transparency between levels: Elevated platform

Figure 2-2: Transparency between levels: Below grade platform

2.3 BARRIER FREE ACCESS / UNIVERSAL DESIGN

2.3.1 Life Safety Accessible Design

a) Provisions for accessible life safety design shall utilize a holistic approach relative to the configuration of the station or structure. This shall include, at minimum, above or below grade configuration, number of levels below grade, accessibility to the surface and number of levels to navigate; multiple platforms and connectivity, fire protection and life safety systems installed, and how they function as a system.

b) Measures that are part of the life safety strategy and to the extent they are installed shall include:

i. emergency telephones, where required;

ii. defined Designated Waiting Areas (DWA's) on the platform;

iii. visual and audible fire alarm systems and accessible two-way communications for passenger assistance as required by the OBC.

c) Other supplemental measures may be required, subject to the station configuration, such as areas of refuge as per DS-02 Universal Design Standard.

2.3.2 Tactile Walking Surface Indicators (TWSI)

2.3.2.1 Overview

There are two different TWSI types to be used within the Metrolinx Subway Network:

a) Attention indicators (truncated domes) signal a need for caution at a change in elevation, a vehicular route, train platforms, etc.;

b) Direction indicators (elongated flat top bar surface) facilitate wayfinding in open areas and indicates a possible route that may be taken.

2.3.2.2 Requirements

Refer to Appendix F for requirements

2.4 SECURITY

The reality of a customer's safety as well as the perception of safety, are both equally important to consider. Closed Circuit Television (CCTV), audio and speakers, and two-way communication for passenger assistance are physical forms of safety that form a security network helping to inform, protect, and assist the customer.

2.4.1 CCTV

2.4.1.1 Overview

Perceived safety is one of the main drivers based on customer satisfaction, and personal security is a foundational human need. Customers demand that they shall be and feel safe along their entire journey while on or within Metrolinx property, the built environments, and all forms of transit including buses, streetcars, subways and trains. Video surveillance is a critical form of security infrastructure that aids in deterring crime, overseeing customer circulation flows, while monitoring and providing customer safety.

2.4.1.2 Description

The Closed Circuit Television system shall provide live monitoring and recording of all public and non-public areas, exterior and interior areas, for new line wide station safety and security in surveillance of passenger movement and flow, monitor train and bus arrivals and departures, Maintenance and Storage Facilities (MSF), vehicle movement, intrusion detection, security control, and operational control measures for assistance to customers throughout the transit system. The primary use of cameras is for security purposes.

In requirements defined as a low or high crime areas, the definition and level of crime activity shall be defined in the Project Agreement (PA) on a station by station, project by project basis.

The following requirements shall apply, unless noted otherwise per operator requirements or agreements.

Figure 2-3: CCTV – Example of unacceptable mounting method

2.4.1.3 Functional Design Requirements: General

a) CCTV shall be integrated with the ceiling where possible. Maximum mounting height of CCTV cameras shall not exceed 3000 millimetres, unless noted otherwise noted by operator or security requirements. Final placement shall be confirmed by security consultants and approved by operator. Placement shall balance the need for protection from damage and vandalism, maintenance requirements and security coverage with maintaining overall consistent architectural datums.

b) Minimum mounting height of CCTV cameras shall not be below 2440 millimetres to prevent issues of access to damage and / or vandalism. Final placement to be confirmed by security consultants and approved by operator.

c) Back-up power for all CCTV cameras shall be provided to continue operation and recording upon loss of utility power.

d) Cameras shall be positioned and aligned to eliminate unwanted glare as a result of rising and setting sun and reflections. Final placement to be confirmed by security consultants and approved by operator.

e) For new facilities, CCTV layout and infrastructure shall be co-ordinated and designed concurrently with all ceiling and wall related systems including lighting, speakers, sprinklers, architectural, and interior finishes to ensure an integrated appearance where placement of cameras is aligned with ceiling grid and/or wall reveals, and are located in a consistent pattern. Where CCTV cameras are mounted on poles, cameras shall be integrated where exposed fasteners are maintained to a minimum.

f) There shall be no visual impact and/or perception of cameras positioned or directed toward neighbouring properties.

g) Visual impact of CCTV cameras and related devices including mounting brackets, shall be reduced where colour of the devices including camera housing, trim, and raceways shall match adjacent wall or ceiling surface finish.

h) Mounting brackets shall only be used where direct fixation is demonstrated not feasible or would reduce CCTV performance.

i) All cables shall be run in a neat and orderly fashion in a conduit system, concealed from view.

j) Mounting location of all CCTV cameras shall be co-ordinated with security personnel and structural design subject to evaluation as part of the Threat and Vulnerability Assessment (TVA).

k) Final CCTV placement/location shall be by operator and reviewed and approved by Metrolinx's Corporate Security.

l) Where facial recognition may be required in future, infrastructure provisions shall allow for integration with existing CCTV system to support future contactless fare systems.

m) CCTV image quality criteria, especially those located at station building entrance / exit doors shall provide dedicated CCTV coverage at the following levels, at minimum:

- Identify - 250 pixels/metre
- Recognition – 125 pixels/ metre
- Monitor - 75 pixels/ metre

n) For specific information pertaining to CCTV cameras as defined by specific zones, refer to Table 2-1: CCTV Tables

2.4.1.4 Functional Design Requirements: Locations

Specific camera locations relative to the safety of the customer shall be located as follows:

a) Cameras shall be located to provide 95% coverage of all public facing areas excluding public washrooms, both within the station and the Metrolinx property, outside within the public realm.

b) Cameras shall be placed to specifically view all station entrances and exits, fare gates, Fare Vending Machines (FVM's), Passenger Assistance Intercoms (PAIs), elevator cabs interiors, elevator lobbies, escalators and public stairs, all passenger tunnels, pedestrian bridges, platforms, co-located with all platform edge doors, washroom entrances, interior bicycle storage facilities, and exterior bicycle parking, parking lots, and parking garages.

c) Cameras for coverage of Designated Waiting Areas (DWA) shall be placed so that the DWA fills 100% of the field of view.

d) Cameras shall be located at all choke points where stations with multiple entrances branch from a single hallway in lieu of at each entrance and exit.

e) Cameras shall be located in all sensitive back of house areas such as corridors, views to all rooms and all entry/exits.

f) CCTV cameras shall be co-located in close proximity where waste and recycling units are located to follow potential suspicious activities.

2.4.1.5 CCTV at Platform: Requirements

a) Cameras shall be required at platforms edges to detect overcrowding conditions.

b) Each platform camera shall visually see full height of all specific Platform Edge Doors (PED's) and all train doors. Co-ordinate location of cameras with locations of PED's

c) A minimum of one camera on each platform shall be positioned to include the Electronic Article Surveillance (EAS) so that each EAS location is covered by a camera.

d) At least one camera on each platform shall be positioned to monitor staff door intrusions so that each staff door is covered by a camera.

e) CCTV's shall be mounted above, co-located, and interfaced with all PED's. Supporting infrastructure for CCTV's, digital signage, and speakers, shall be concealed in continuous horizontal chase, above the PED's as an integrated part of the PED assembly.

f) CCTV camera shall be required to be positioned to monitor both ends of platforms, facing access to service corridor and track.

2.4.1.6 Camera Housing Design Criteria: Requirements

The following criteria is required for the design of all CCTV camera housings:

a) CCTV cameras shall be vandal resistant with a minimum impact protection rating of IK10.

b) CCTV cameras shall be selected to integrate within the architectural aesthetic of the station and its surroundings.

c) All CCTV camera enclosures shall be weatherproof moisture and dust-proof, vandal resistant, tamper proof and maintain the ambient temperature within the housing in the camera operating temperature range of –10°C to +50°C.

d) A sunscreen shall be fitted to protect camera's in path of direct sunlight.

e) Indoor housings shall be fabricated using high impact polycarbonate or epoxy coated steel, dust-proof, with top mount assembly, suitable for cameras with fixed focal length.

f) Cameras for both interior and exterior shall be tinted dome enclosure type to conceal the direction of the camera. Domes specified shall be constructed of vandal resistant hardened shells. Optical domes shall be able to withstand temperature extremes and not become brittle or cloudy with exposure to solar and ultraviolet radiation. Materials that loose transparency with age in sunlight are unsuitable for outdoor camera use.

g) Sealed housings shall be required for cameras placed in hostile environments, or in areas where electrical components shall be sealed to prevent a possible explosion. A sealed housing requires gaskets to prevent contamination from the outside environment. Pressurized housings employ chemically inert nitrogen gas to replace the air inside the housing.

h) Impact-resistant housings or anti-vandal housings shall be required in high crime areas. These housings shall be heavy gauge steel, and the optical surfaces shall be a thick acrylic or polycarbonate plastic. Wire cages over the acrylic domes shall be required in areas where greater protection is required.

i) Tamper resistant housings shall be required to have hardened protective housings similar to impact-resistant housings, with additional protection against the use of tools to vandalize the camera. A tamper resistant housing shall be lockable and designed to withstand cutting, hammering, or prying.

j) Lenses fixed with auto-iris: Aspherical lenses shall be used on platforms to suit lighting conditions. The viewing ports of enclosures shall be reflection inhibiting.

k) All exterior camera housing materials shall be noncorrosive.

l) Sun shades shall be installed on all outdoor cameras that are exposed to high temperatures and direct sunlight. This requirement shall reduce the heat load on the camera and lens components, maintain image quality, and potentially extend the life of the camera.

m) Wipers for cameras shall not be recommended as the use of a wiper can cause debris to erode the optical surface. Wipers also add to the maintenance requirements where rubber wiper blades must be replaced periodically, and washer fluid reservoirs must be kept filled.

n) Heaters and Ventilator: Temperature differences between the interior and exterior of the camera housing may cause fogging, moisture problems, and icing. Therefore, certain camera housings may require additional hardware or capabilities to ensure the camera can operate under extreme conditions. Heaters and ventilators are often used to address environmental issues with cameras, although the need for additional electrical power increases the operational costs. Regular cleaning and maintenance as per manufacturers recommendations shall be followed to prevent potential maintenance issues with heated or ventilated camera housings.

o) CCTV mounting brackets and extension posts shall not be used, except where surface mount conditions are not suitable, or where the position of the camera must be positioned away from the surface to provide optimal viewing. In these scenarios, mounting brackets shall be consistent throughout the subway environment and meet the following requirements:

   i. Shall be fabricated of a continuous diameter that can be demonstrated to be the minimum required to carry design loads of the respective device;

   ii. Length of mounting bracket shall not extend further than required to support the CCTV device;

   iii. Finish colour and sheen shall match with colour of adjacent finishes (background colour);

   iv. All infrastructure such as conduit, cabling, and wiring shall be concealed;

   v. Mounting brackets shall be integrated within wall or ceiling design and finishes where mounting brackets align with reveals, joints, and or intersection of materials;

   vi. Fasteners shall be concealed and tamperproof;

   vii. Where exterior pole mounting is required, all connections from pole to camera mount shall be shop fabricated with shop finishes and integral corrosion protection. Field installation of mounting brackets that compromises the corrosion performance is not permitted;

   viii. Mounting brackets shall not be attached to poles using straps or loops around the diameter of the pole Refer to Figure 2-1:CCTV - Example of unacceptable mounting method;

   ix. Mounting brackets shall not be: bulky; fabricated from square stock; coloured to contrast with background colour; and shall not include exposed fasteners.

TABLE 2-1: CCTV TABLES

LOCATION	AREA	FIXED	PTZ	TYPE	COMMENT
STATION PARKING LOTS	Entrances To Specific Lots	X		Identify	Identify driver and plate
	Exits from Specific Lots	X		Identify	Read plate, monitor traffic flow
	General Area Coverage	X		Monitor	Provide coverage, aid in investigation, customer security, deter crime. General coverage shall be provided through the use of multiple strategically placed cameras on dedicated poles for each lot area. The goal is to achieve 100% coverage.
	Main Entry drive Feeding to Multiple Lots	X		Identify	Capture plate number, driver identification, monitor traffic flow
	Main Exit Leaving	X		Identify	Read plate, monitor traffic flow, aid in investigations
	Immediate Area		X	Monitor	Pan Tilt Zoom (PTZ) cameras within or adjacent to lot in order to facilitate operational needs / safety inquiries / security investigations / incident response / etc. Positioning shall be in a manner that a PTZ camera is able to zoom in and view any immediate area. Multiple strategically located PTZ cameras through the parking lot perimeter areas shall be coordinated to allow viewing of all parking lots for the entire station during investigation only. PTZ cameras shall not be counted as part of the typical coverage areas under surveillance.
PUDO	Entrances To Specific Lots	X		Identify	Identify driver and plate
	Exits from Specific Lots	X		Identify	Read plate, monitor traffic flow
	General Area Coverage	X	X	Monitor	Provide coverage, aid in investigation, customer security, deter crime. PTZ cameras on as-needed basis. Higher crime rates will dictate the usage of additional cameras.

LOCATION	AREA	FIXED	PTZ	TYPE	COMMENT
PUDO (cont'd)	Bike Shelters	X		Recognize	Monitor and recognize all who enter the shelter providing investigational information, customer reassurance
PARKING STRUCTURES	Entrances To Structure	X		Identify	Identify driver and plate dedicated to entry lane.
	Exits from structure	X		Identify	Read plate, monitor traffic flow. Dedicated to exit lane
	General Area Coverage	X		Monitor	Provide coverage, aid in investigation, customer security, deter crime. Each drive and parking lane shall have at least one dedicated camera at each end looking in to provide a more complete coverage area.
	Pedestrian Entry	X		Identify	Identify all who enter through a controlled entry point.
	Pedestrian Exit	X		Identify	Identify everyone who exits through a controlled entry pt.
	Stairs	X		Monitor	From top looking down maximum view, use 2 cameras if U-shaped stairs. Intent to aid in customer slip and fall claims, decrease likelihood of vagrancy, vandalism and violence.
	Stair Vestibules	X		Monitor	Coverage to promote safety and for investigational purposes.
	Elevators	X		Recognize	Passenger security, investigation purposes, emergency situations, confined space monitoring. Dedicated inside elevator viewing maximum area with emphasis on the emergency call button.
	Elevator Vestibules	X		Monitor	Dedicated to view vestibule outside elevator, viewing 2-way call for assistance button and ability to view maximum area inside the elevator. When multiple elevators exist side by side it may be necessary to share coverage with 2 cameras
	Elevator Lobby / Waiting Area	X		Monitor	Dedicated to view vestibule outside elevator, viewing 2-way call for assistance button and ability to view entire waiting area. If required, more than 1 camera shall be used to achieve 100% coverage.
	Service Rooms	X		Monitor	Monitor door - can share camera with other service rooms if sharing a common entry area.

LOCATION	AREA	FIXED	PTZ	TYPE	COMMENT
PARKING STRUCTURES (cont'd)	Perimeter	X	X	Monitor	Strategically place fixed cameras on each side monitoring entire exterior perimeter walls. One PTZ to monitor and investigate on each side of perimeter.
	2 Wall Call Devices	X		Recognize	Each 2 way call device shall have a dedicated fixed camera monitoring the device.
STATION EXTERIOR	Entry Points - Doors	X		Identify	Facial recognition at all entry points. Where vestibules exist, cameras shall be dedicated to identify passengers. Separate dedicated cameras shall be used to provide vestibule coverage with no hiding spots.
	Waiting Areas Include DWA	X		Monitor	Waiting areas shall have dedicated coverage of entire area. If area is large multiple cameras may need to be utilized to ensure 100% coverage.
	Kiss And Ride Pickup	X		Monitor	Cover entire area with fixed cameras ensuring the Bell telephone and any 2-way communication device locations are covered by fixed monitoring. Provide PTZ for investigation in area. Ability to view vehicle plates and passenger pick up and drop off points.
	Pedestrian Walkways	X		Monitor	Provide coverage of entire walkway on property.
	Bike Shelters	X		Recognize	Monitor and recognize all who enter the shelter providing investigational information, customer reassurance. Larger bike shelters may require 2 fixed cameras for best viewing.
	Bike Lanes	X		Monitor	Bike lanes within Metrolinx property, end to end.
	Property Perimeter	X	X	Monitor	Strategically place fixed cameras to monitor entire station and lot perimeter. One PTZ to monitor and investigate on each side of perimeter.

LOCATION	AREA	FIXED	PTZ	TYPE	COMMENT
STATION EXTERIOR (cont'd)	Laneways / driveways	X		Monitor and Identify	Coverage of all laneways allowing for continuous monitoring of vehicle movement throughout the property; this must provide ability to track vehicles from when they enter the property to final parking location in lot or parking structure. Entry points not covered by the parking lot cameras shall have the capability to capture license plates with an image quality of "Identify" if specific location placement allows.
STATION INTERIOR	Stairs / Escalator	X		Monitor	From top looking down - maximum view, if long stairs use 2 cameras.
	Stair Vestibules	X		Monitor	Dedicated camera to cover vestibules not covered by stair cameras
STATION INTERIOR	Elevators	X		Recognize	Passenger security, investigation purposes, emergency situation, confined space monitoring. Dedicated inside elevator viewing - maximum area with emphasis on the emergency call button.
	Elevator Vestibules	X		Monitor	Dedicated to view vestibule outside elevator, viewing 2-way call for assistance button and ability to view maximum area inside the elevator. When multiple elevators exist side by side it may be necessary to share coverage with 2 cameras.
	Elevator Lobby / Waiting Area	X		Monitor	Dedicated to view vestibule outside elevator, viewing 2-way call for assistance button and ability to view entire waiting area. Possibly more than one camera shall be used to achieve 100%.
	Station Lobby	X		Monitor	Coverage of entire lobby with fixed camera , 1 PTZ for live monitoring and investigation centrally located.
	Station Entry Points (pedestrian)	X		Identify	Identify any person who enters through any controlled entry point (pedestrian entry points).
	Station Exit Points	X		Identify	Identify everyone who exits through a controlled entry point.

LOCATION	AREA	FIXED	PTZ	TYPE	COMMENT
STATION INTERIOR (cont'd)	Customer Service Desk Interior	X		Identify	Fixed dedicated camera for each service counter attendant, camera placed to view customer face over the shoulder of service attendant. Provide fixed camera dedicated to view door entry to customer service area (from inside area)
	Customer Service Desk Exterior	X		Monitor	Camera shall view the side of the service counter, providing a profile view of anyone at service counter.
	Station Vestibules	X		Monitor	Coverage of entire vestibule area. Separate from entry and exit cameras at doorways and entry points
	Service Rooms	X		Monitor	Monitor door - can share camera with other service rooms if on same side of building
RAIL PLATFORMS	Service Rooms	X		Monitor	Monitor door - can share camera with other service rooms if on same side of building.
	Stairs / Escalators	X		Monitor	From top looking down maximum view, if long stairs use 2 cameras.
	Stair Vestibules	X		Monitor	Dedicated camera to cover vestibules not covered by stair cameras
	Elevators	X		Recognize	Dedicated to view interior elevator, viewing 2-way emergency call for assistance button.
	Elevator Vestibules	X		Monitor	Dedicated to view vestibule outside elevator, viewing 2-way call for assistance button and ability to view maximum area inside the elevator.
	Elevator Lobby/Waiting Area	X		Monitor	Dedicated to view vestibule outside elevator, viewing 2-way call for assistance button and ability to view entire waiting area. Possibly more than one camera shall be used to achieve 100%.
	Platform Ends Both -Rail Operations		X	Monitor	Looking down track to monitor rail traffic and switches (Operational)
	Platform Ends Both - Platform Monitoring	X		Monitor	Monitoring platform, looking in towards customer waiting areas on platform.
	General Platform Area	X		Monitor	Coverage with fixed cameras 100%.

2.4.2 Audio / Speakers

Note: Information below is to be read in conjunction with:

DS-02 Universal Design Standard,

Section 2.9 Acoustics.

2.4.2.1 Overview

Intelligible clear audible information shall be designed to be reliable, consistent, and provided in real-time to inform all customers such that the outcome ensures that all messages are understood at the first broadcast. Audible and visual information shall be synchronized for all customers at the same time, while addressing customers with accessible needs and equitable access.

In addition to using speakers within a public address system, alternate means of providing information using a Passenger Visual Information System (PVIS) or hearing loop system, shall be provided for those that are hard of hearing.

2.4.2.2 Description

Audible information made available to all customers in real time is critical to ensure customer safety, comfort, while informing customer journey decisions. Clear public address messaging through both audio (speakers) and visual means such as Variable Message Signs (VMS) are both essential forms of communication combined together that aid towards informing the customer. Audible information shall be provided in both English and French as per the French Language Act.

Acoustics and Digital signage are important elements that directly affect messaging discernibility, such as sharpness, distinctness, distortion etc. Refer to Sections 2.4 Digital signage and 2.7 Acoustics for further information.

2.4.2.3 Functional Design Requirements: General

a) Public Address System (PA System) including speakers shall be placed in all public facing areas of the station including: all station interior and exterior entrances and exits, fare gates, fare vending machines and Passenger Assistance Intercoms (PAIs), elevator cab interiors, elevator lobbies, escalators and public stairs, all passenger tunnels, pedestrian bridges, platforms, interior bicycle storage facilities, and exterior bicycle parking, parking lots, and parking garages.

b) Public Address (PA) system shall provide a consistent and reliable signal coverage within all transit facilities, regardless if they are below, at, or above grade. The audio system shall be the primary means of voice communications and provide support for emergency services such as fire, police and emergency medical services.

c) Public address and call systems shall be capable of being zoned to key areas, rather than blanketing all areas of the station at all times. PA in stations shall be divided into zones in all reasonable separable areas, such as fare vending, elevators, elevator lobbies, pedestrian passageways, pedestrian bridges, all washrooms, waiting areas, mezzanines, and platforms.

d) Essential audible signals, such as fire-alarm signals or elevator arrival call systems, shall be loud/distinct enough to be heard above normal ambient sounds by persons with sensory disabilities.

e) PA and VMS messaging shall be designed to meet AODA standards and support operations and emergency evacuation plans and procedures.

f) PA and VMS pre-recorded and ad hoc messages shall be deliverable from all PA/VMS workstations.

g) Speakers shall be mounted with the purpose of integrating with exterior and interior environments including ceilings, walls, structure, and enclosures.

h) Colour of public facing speaker trim including raceways, shall match the colour of the mounting surface/background to eliminate colour contrast and appear visually less prominent for aesthetic consistency.

i) Microphone locations for system announcements shall be located and be made available for staff at the station ambassador office, at both ends of the platform in a dedicated box adjacent to the Electronic Article Surveillance (EAS) cabinet, and station manager hubs located in specific stations.

j) PA system shall be designed with loop wiring and continuous fault monitoring to ensure high availability of its functionality consistent with its role as an emergency voice communication system.

k) Sound level from the PA system shall be designed to reduce unwanted noise to nearby residences and shall not exceed 50dBA at the property line of the transit facility when conveying general information. This limit shall not apply for emergency signals.

l) The PA system shall maintain a spatial uniformity and shall achieve a maximum 3dB (decibel) deviation between minimum and maximum levels measured at 1500 millimetres above the floor. A sound level survey shall be conducted to verify spatial uniformity.

m) PA shall dynamically self-adjust volume to compensate for ambient noise. PA shall be designed for optimal sound quality under all known conditions.

n) Speaker housing shall be recessed and concealed in suspended ceiling system where the speaker cover plate is flush with ceiling. Speakers shall be fully integrated within architectural ceiling system, and be positioned and coordinated in relation to all other ceiling elements to minimize clutter. Placement shall discourage vandalism and other damage. Where suspended ceilings do not occur, speakers shall be surface mounted. Colour of all surface mount speakers and mounting brackets shall match background colour. All infrastructure including conduit and cabling shall be concealed. The maximum mounting height shall not exceed 4000 millimetres and shall be reviewed in co-ordination with operator. Where speakers are required to be pole mounted, speakers shall be integrated with station lighting.

o) PA and VMS shall be in sync and shall be capable of communicating audible and visual information by automatically announcing train arrivals, departures, and other real time and schedule based information to inform customers.

p) PA and VMS shall allow for synchronized messages in real time.

q) PA systems shall be clear and intelligible, whether they are conveying emergency or general information.

r) Technologies shall support and be able to automatically convert speech to text, to allow for real-time information to be easily conveyed to digital signs for customers who are hard of hearing; or PA and VMS shall allow for synchronized messages in real time for pre-recorded and unplanned messages.

s) PA announcements shall be clearly audible with ambient noise canceling and supplemented by visual information.

t) Audible information through station speakers and visual information via digital signage, shall be bi-lingual in both English and French as per the French Language Act.

2.4.2.4 Functional Design Requirements: Platforms

a) Microphones installed at both ends of a side platform, shall broadcast messages to the speakers on both sides or on one side, and are dependent upon the information being provided.

b) Microphones installed at the end of a center platform shall be equipped with a toggle switch to allow announcements to be broadcast to the speakers installed at either platform edge or both platform edges.

c) At station platforms, PA sound levels shall be automatically adjusted to be audible above ambient noise levels with the use of microphones. Noise monitors shall be installed to monitor ambient noise levels.

d) The minimum sound level at station platforms shall be the greater of 10 dB above ambient noise level to a maximum of 98 dBA.

2.4.3 Two Way Communication for Passenger Assistance Intercom (PAI)

Note: Information below to be read in conjunction with: DS-02 Universal Design Standard

PAI's shall be provided as per below unless noted otherwise in operator agreements

2.4.3.1 Overview

In addition to the support services provided by a station ambassador, strategically designated Passenger Assistance Intercoms (PAI's) provide two essential functions for customers:

- request for information through both visual and audible means for customers by pressing the information button; or,
- emergency support through both visual and audible means for customers by pressing the information button.

The intent of the PAI is to provide communication access for customers requesting information or emergency support, where safety and security are vital. This service is required to function for all customers, including customers who use wheeled mobility aids, are visually impaired, and / or hard of hearing, to ensure the safety, trust, and well-being of all customers. The PAI not only functions in the form of a physical support element, but also in a perceived form of safety and security.

2.4.3.2 Description

The two way communication device is a required service that provides both enhanced live audio and support text communication (text input and output) assistance for the benefit of customers who are deaf, hard of hearing, deafened, or non-verbal. The PAI system shall be provided for the purposes of providing passenger assistance and security, including the reporting of security incidents and initiate emergency response operations.

2.4.3.3 Functional Design Requirements: General

a) All PAI's shall be enhanced and equipped with:

  i. an accessible screen and keyboard for text-to-text communications and,

  ii. localized hearing induction loop capabilities to support tele-coil wireless technologies.

b) Locations of PAI's shall be easily accessible along barrier free path of travel and visibly identifiable to support a customer's perception of safety. Customers shall have clear unobstructed access to PAI's.

c) Provide a minimum of one enhanced PAI at the following station locations:

  i. All entry/exit point(s) within the unpaid transaction zone near station ambassador office. Refer to Figure 2-3 Enhanced Passenger Assistance Intercom;

  ii. Designated Waiting Area(s) (DWA). Refer to Figure 2-2 DWA Assistance Intercom at platform level;

  iii. all elevator lobby(s) and landing(s). Refer to Figure 2-4 Enhanced Passenger Assistance Intercom;

  iv. pedestrian tunnel(s) and bridge(s);

  v. Universal washroom(s). Additional PAI's located at other public washrooms other than universal washrooms shall be determined on a project by project basis.

  vi. Parking areas, where applicable

d) Passenger Assistance Intercoms (PAIs) shall be clearly visible and not hidden from view while complying to the hazard detection requirements as per DS-02 Universal Design Standard.

e) In order for the PAI to be visible, ensure contrast percentage between PAI and surrounding environment is achieved as per DS-02 Universal Design Standard.

f) Voice communications shall be initiated by pressing the "Push To Talk" buttons on each PAI device.

Figure 2-4: DWA Assistance Intercom at platform level

Note: Images for visual reference only.

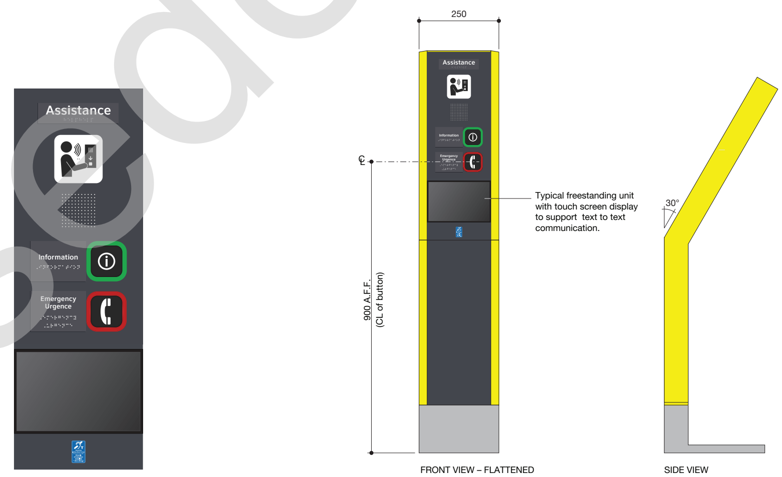


Figure 2-5: Enhanced Passenger Assistance Intercom

Note: Images for visual reference only.

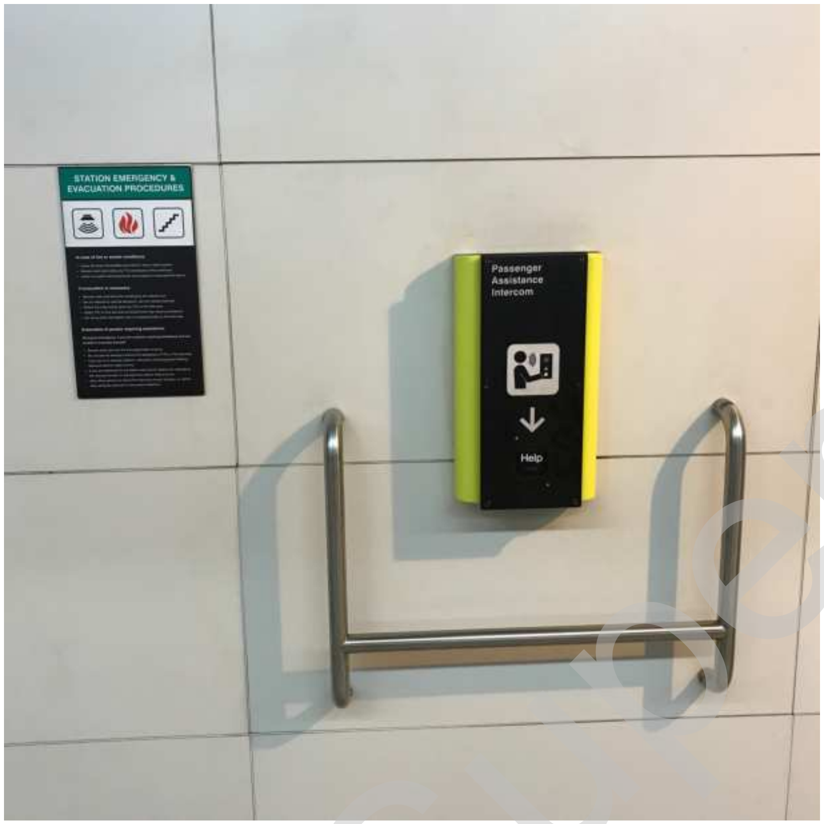


Figure 2-6: Grab bars for wall mount PAI

g) Each PAI device shall include a customer information button (except at DWA) and an emergency assistance button. Button colour and labeling are as follows:

   i. The customer information button shall be green and labelled "Information"; and

   ii. The emergency assistance button shall be red and labelled "Emergency".

   iii. Buttons shall be labeled in both English and French with English and French Braille located to the left of each respective button.

h) The emergency assistance button shall direct the request to emergency help staff.

i) The customer information button shall direct the request to the Operator's customer service line.

j) All infrastructure including conduit and power and data cabling shall be concealed from view and required to support both audio and visual communication for all PAI's at specific locations listed above.

k) PAI devices shall be either floor mounted/free-standing or wall mounted and shall be barrier free accessible for all users as per DS-02 Universal Design Standard for reach and clearance requirements.

l) Grab bars shall be provided where wall mount PAI's are located. Mounting PAI to columns is an option only where wall or floor mount is not possible such as areas where glazing occurs. Refer to Figure 2-5: Grab bars for wall mount PAI.

m) Each PAI device shall be vandal resistant and composed of a steel faceplate.

n) All PAI's shall be clearly identified using standard signage, colours and graphics.

o) PAI shall be clearly identified with the ISO International T-Coil Symbol and PAI installation shall comply with requirements under DS-02 Universal Design Standard.

2.4.3.4 Functional Design Requirements: PAI Initiation Process

a) When a PAI call is initiated, an audible ring tone shall be emitted until the PAI call has been acknowledged by the operator.

b) Once voice communications is established between a PAI device and the operator, constant application of pressure on the button shall not be required to maintain the call.

c) PAI calls associated with a Designated Waiting Area (DWA) or an Emergency Assistance Button (EAB) shall have the highest call priority over all other calls.

d) Each PAI device shall have a visual indication that a call has been made and has been connected.

2.4.3.5 Functional Design Requirements: Technical Requirements

a) The elevator car emergency telephone system shall be provided in each elevator car in accordance with ASME A17.1/CSA B44, Appendix E, TSSA for emergency call system requirements within the elevator cab, and Safety Code for Elevators and Escalators.

b) Transit personnel shall be able to place and receive PAI calls at PAI consoles. The PAI consoles shall be located at any remote location that has OPS (Ontario Public Service) LAN (Local Area Network) or PAI LAN.

c) PAI console shall provide an indication of incoming calls, calls in progress, the destination/origin of the calls, and a video feed from intercoms with an integrated camera. PAI calls shall only be terminated from the PAI console.

d) The PAI console made available to transit staff, shall be able to receive multiple calls and shall monitor multiple intercoms such that any/all calls or events placed through all PAI's are not missed.

e) PAI console shall be able to initiate/receive communication with any intercom in the PAI system that is programmed to a monitor.

f) Call escalation shall also be configurable for cases where all PAI consoles monitoring a certain set of intercoms are engaged. In those cases, the call shall be forwarded to another set of PAI consoles that don't normally monitor those intercoms.

g) Activation of a PAI within CCTV coverage range, especially at DWA's, shall automatically trigger the associated CCTV camera to display event location video images at the Operations Control Center (OCC) emergency management work station.

h) A localized assistive listening system (hearing induction loop) shall be installed at service counters at station ambassador offices to aid communication for the benefit of hard of hearing customers. Hearing induction loops shall meet the requirements of the IEC 60118-4 Standard. Service counters equipped with hearing induction loops shall be clearly identified with the ISO international T-Coil Symbol.

i) Hearing induction loop systems shall be mounted at a height of 1100 millimetres from the floor in order that it can serve both standing and seated persons.

2.5 SEATING AND WASTE RECEPTACLES

The following requirements shall be read in conjunction with:

DS-02 Universal Design Standard,

4.10 Finishes and Materials,

Section 3.0 Public Realm.

2.5.1 Overview

Seating and waste receptacles for interior environments shall be a standardized line wide new station element and shall carry a consistent language throughout the station environment from the urban realm to the station platform. Furniture arrangements and orientation of seating elements shall provide direct sight-lines to vehicle connections, transit information, path of travel, while ensuring customer safety.

Design and fabrication shall be based upon a kit of parts system, providing flexibility and modularity for a variety of customers types, that is easy to assemble, repair, and replace.

Seating and waste receptacles serve a functional purpose and provide customer convenience, thus, consideration should be given to understanding how these elements can enhance the customer experience, such as being positioned to aid in wayfinding.

For specific requirements related to exterior seating and waste receptacles, refer to Section 3.0 Public realm.

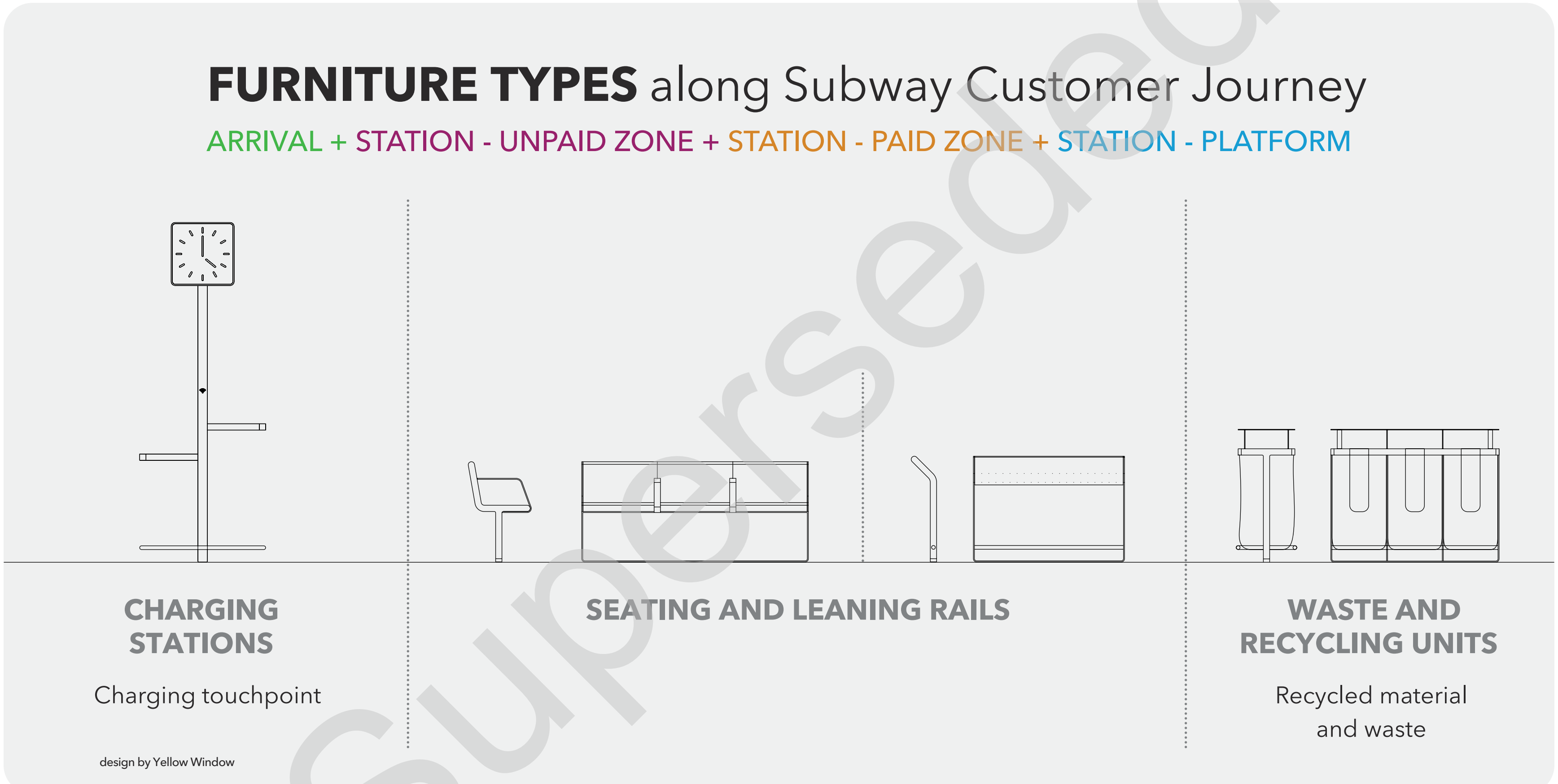


Figure 2-7: Furniture typologies

2.5.2 Customer Experience: Inclusive, Continuous Element

All seating and waste receptacles shall provide an integrated, convenient, usable and safe experience that is inherently accessible to all customers. Design shall convey detectable information, minimize hazards, and be designed with appropriate proportion, size and space for use, regardless of a customer's age, body size, posture or mobility, to promote ease of access for all.

Both seating and waste receptacles shall be inclusive, contribute to the station identity, while enhancing customer experience.

2.5.3 Furniture Typologies

All furniture including seating and waste receptacles shall provide an essential service, while enhancing the customer experience, where synergies can be maximized. Furniture selection and their locations shall respond to, and be reflected based on the needs of customers throughout their journey.

The furniture elements consist of the following furniture typologies (refer to Figure 2-7: Furniture typologies):

a) Charging stations;

b) Customer seating and leaning rails;

c) Waste receptacles and recycling units.

Seating includes both benches with back rests, and leaning rails. These elements shall be integrated within the interior and public realm environments as either stand alone or integrated elements. All furniture elements shall not interfere with the path of travel and shall be located within "slow zones" outside areas of main circulation.

2.5.3.1 Customer Seating: Requirements

a) Customer seating shall include seat and back/lumbar support for customers. Bench seating with no seat backs located in center of island platforms shall be reviewed and approved by Metrolinx on a project by project basis.

b) Locations of customer seating shall occur at the unpaid transaction zone, paid access zone, and platform areas, including Designated Waiting Areas (DWA).

c) Seating shall accommodate seating for one (armchair), two (bench), three (bench), or four (bench) customers with the intent of providing flexibility while responding to customers individual needs.

d) Dimensions of seating types shall be as per Figure 2-8: Customer seating.

e) Bench seating shall be designed to be either floor or wall mounted. Where benches are wall mounted, anchoring of seat bench to wall shall be co-ordinated during early design planning with structural engineer to ensure wall structure and anchoring is firmly secured to prevent damage due to vandalism. For floor mount seating, design shall reflect a clean and minimalist approach that allows for easy maintenance. All fasteners to be concealed and vandal proof.

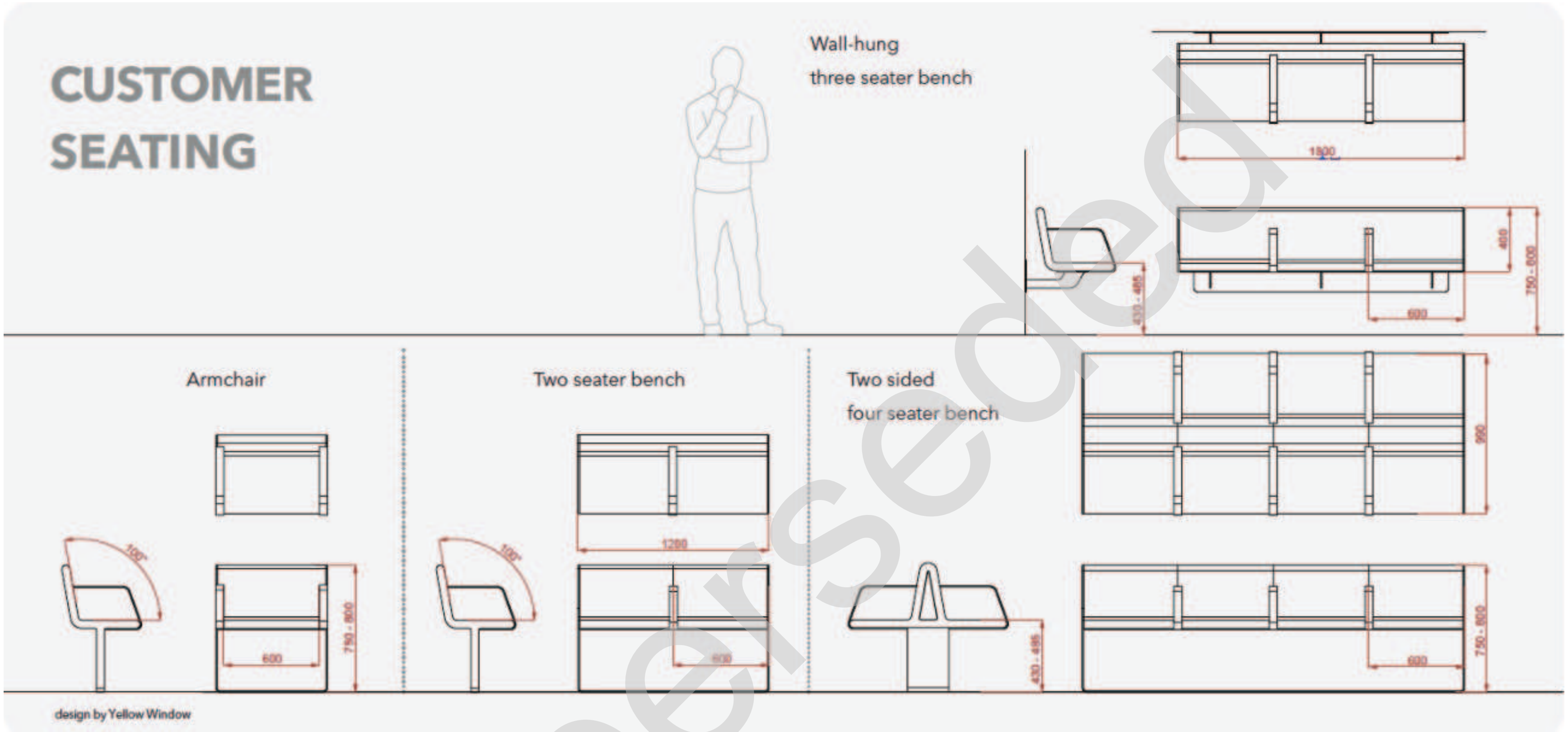


Figure 2-8: Customer seating

f) A gap shall be incorporated between seat and seat back to allow for easy maintenance.

g) Design shall eliminate opportunities for items to be concealed from view.

h) Design of seating shall conform to requirements outlined in DS-02 Universal Design Standard.

i) A minimum of 3 seating units (3-4 seater) shall be evenly distributed throughout each level of the station, unless demonstrated not possible due to site constraints. Additional quantities shall be included where noted within the Project Agreement.

j) Back to back seating shall only be used on island platforms and waiting areas within paid access areas where seating does not interfere with required clearances and/or path of travel.

2.5.3.2 Leaning Rails: Requirements

Leaning rails shall be strategically located to respond to customer needs where short rest is required. Leaning rails shall include a horizontal support member with the intention for customers to lean on.

a) Leaning rails shall not substitute or replace requirements for seating.

b) Seating quantities shall be distributed to suit demand and be configured to reflect requirements based on ridership. Dimensions of these seating types shall be as per Figure 2-9: Leaning rails.

c) Leaning rails shall be mounted where height of horizontal leaning rail is 700 millimetres above finished floor. Other critical dimensions shall be as per Figure 2-9: Leaning rails.

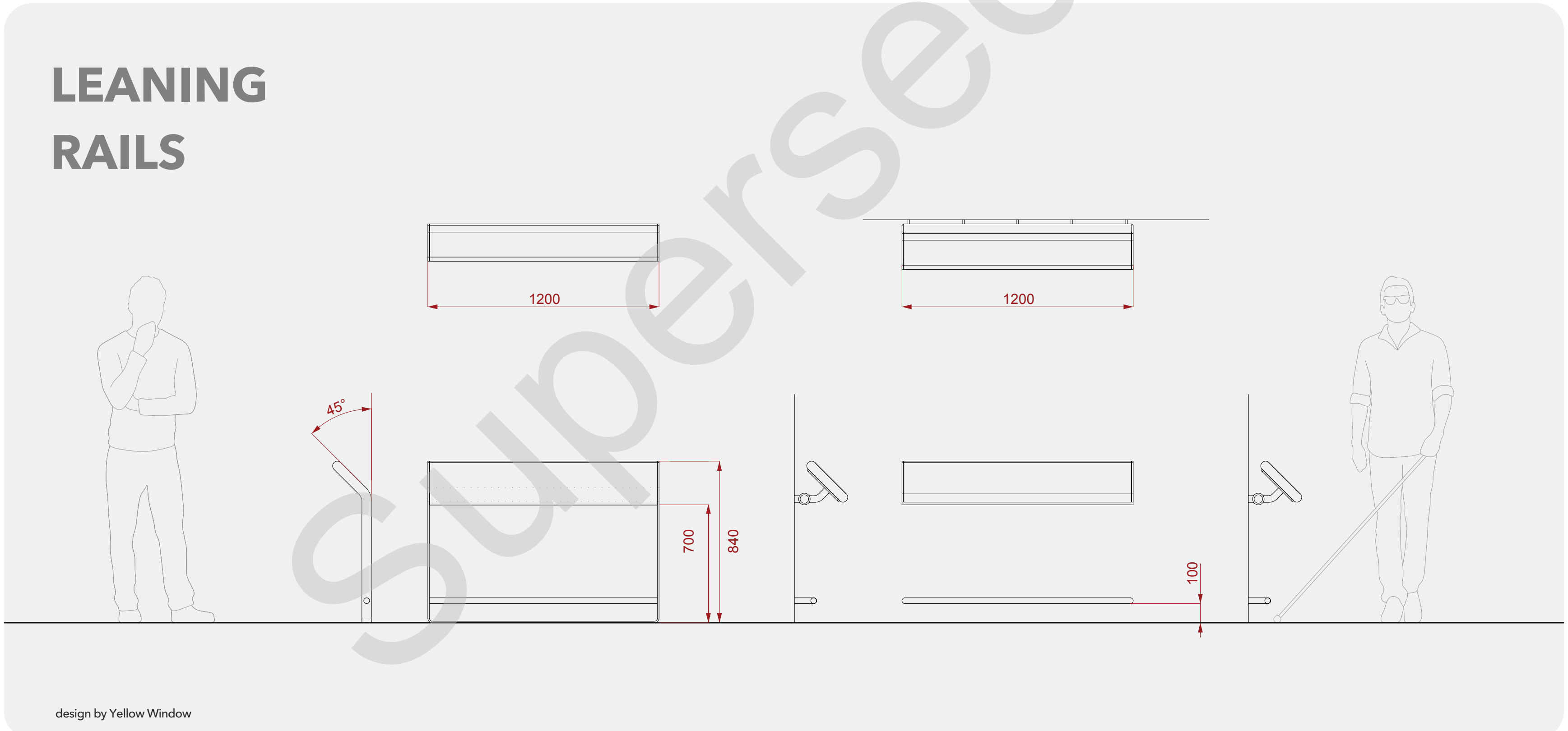


Figure 2-9: Leaning rails

d) Leaning rails shall be designed to be either floor or wall mounted. Where leaning rails are wall mounted, anchoring of leaning rails to wall to be co-ordinated during early design planning with structural engineer to ensure wall structure and anchoring is firmly secured to prevent damage due to vandalism. For floor mount, design shall reflect a clean and minimalist approach that allows for easy maintenance. All fasteners to be concealed and vandal proof.

e) Provide integrated horizontal guard rail integrated within base of leaning rail to meet the needs of visually impaired people using cane detection as per DS-02 Universal Design Standard.

f) A minimum of 2 leaning rail units shall be evenly distributed throughout the station. Additional quantities shall be as per Project Agreement.

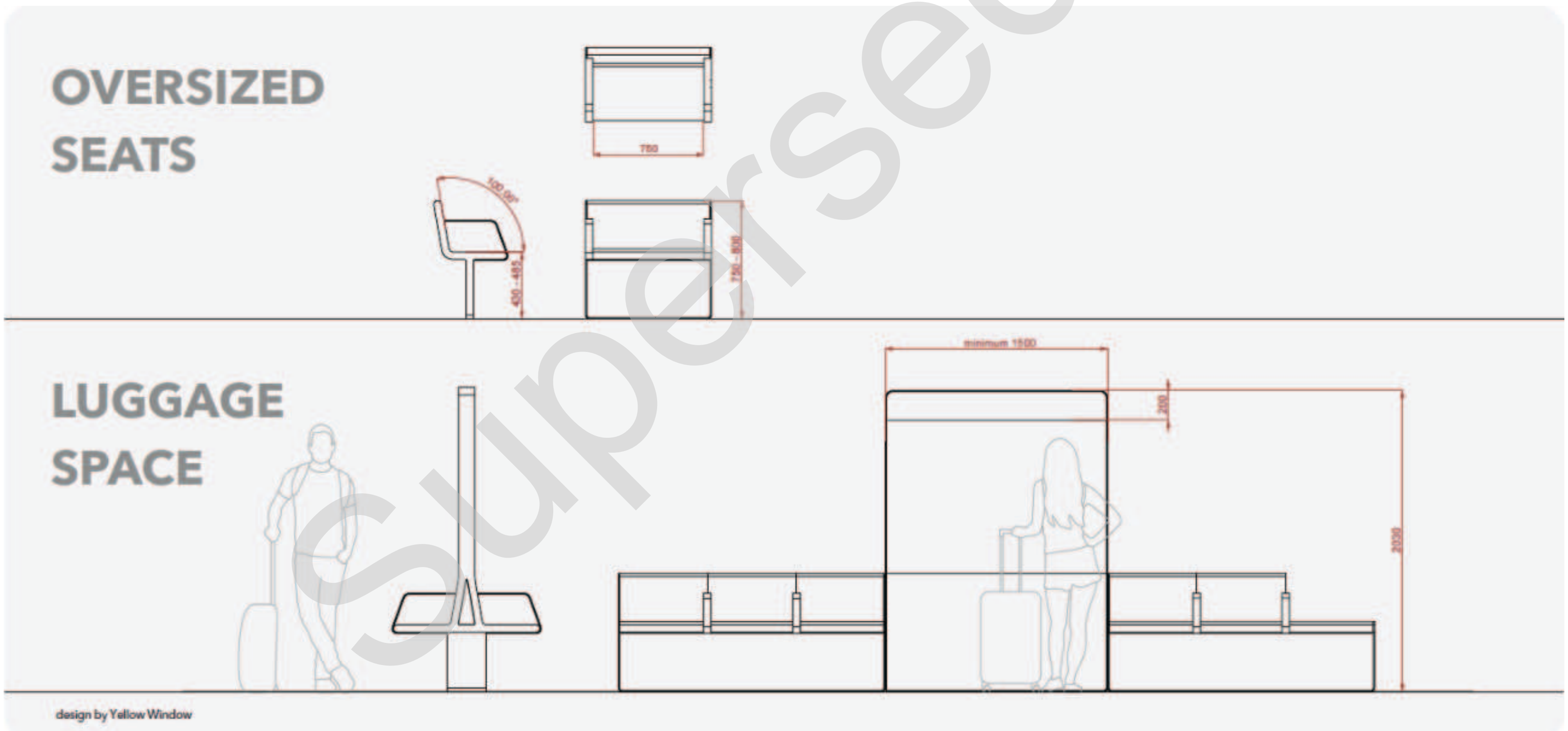


Figure 2-10: Specialty seating

2.5.3.3 Specialty Seating: Requirements

Seating used within the station environment shall include a variety of seating sizes and types in order to respond to a variety of customer needs, abilities, and challenges. Oversized seats, and allocation of space for customer luggage shall be considered to provide a consistent inclusive approach. For critical dimensions relating to these specific furniture items, refer to Figure 2-10: Specialty seating.

a) A minimum of one oversized seats shall be integrated within the DWA seating elements to improve accessibility while accommodating a variety of users.

b) Luggage space – Shall function in multiple ways including luggage storage, clear space for strollers, and users of both wheelchairs and scooters. Luggage space shall be dedicated space adjacent to, and located between, seating groupings at both interchange and terminal stations.

c) Quantities shall be provided as per Project Agreement.

2.5.3.4 Charging Station

Where charging stations are in scope, the following shall apply:

a) There are multiple ways customers are able to charge their smart devices:

   i. through using the charging station, a physical fixture item allowing customers to charge devises by plugging in or using wireless charging option;

   ii. and/or using power outlets/ports located adjacent to/ co-located with seating elements.

b) Provision for Wi-Fi service shall be consistent throughout the customer journey including all station environments and transit vehicles.

c) Charging stations shall be strategically located in multiple locations throughout the station facility and allow customers to easily and rapidly find, throughout their journey, areas allowing them to quickly recharge their smart devices and to connect to the internet by accessing Wi-Fi.

d) Charging stations shall be designed as totems and contribute to the identity of the network / station.

e) Charging stations shall provide USB charging ports or induction surfaces, fixed charging cables, clock, transaction surfaces/shelves with one shelf positioned to meet mounting height, and shall comply with forward and side reach requirements as per DS-02 Universal Design Standard.

CHARGING STATIONS

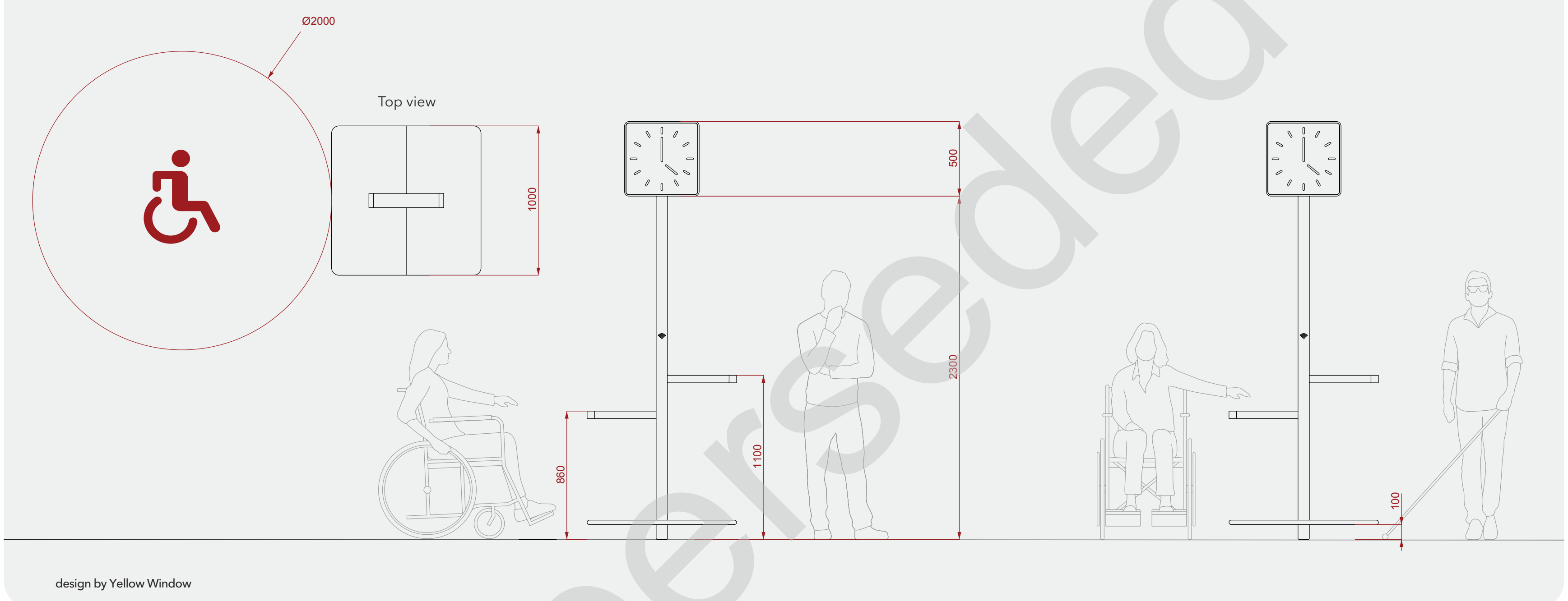


Figure 2-11: Charging station

f) Provide integrated horizontal guard rail integrated within base of charging station to meet the needs of visually impaired people using cane detection as per DS-02 Universal Design Standard.

g) For dimensions relating to charging stations, refer to Figure 2-11: Charging stations

h) In addition to charging stations, co-locate outlet ports in close proximity to seating to allow customers to conveniently charge personal digital technologies. Provide outlet ports on walls, near wall base in the form of USB port or power outlet. For open areas where seating occurs, locate power poles with outlet ports adjacent to furniture. Outlet ports shall not be provided recessed at floor level. Ideally, outlet ports shall be designed to be multi-purpose for both customer and maintenance staff use.

i) Charging stations shall be located at waiting areas within paid access zones and/or DWA's at platforms where requirements and quantities shall be confirmed on a case by case basis and at the discretion of Metrolinx.

2.5.3.5 Waste Receptacles

a) All waste receptacles shall conform to the DS-02 Universal Design Standard including requirements for clear space for side or front access approach, and reach and space ranges.

a) Waste receptacles shall be accessible to all customers, including those who use wheeled mobility aids and/or scooters and the visually impaired.

b) All waste receptacles shall be located adjacent to high traffic areas along main path of travel. Specific locations include area adjacent to fare vending machines, waiting areas, retail areas, and platforms.

c) Design shall remove the need for customer to touch/operate waste receptacle.

d) Consistent signage, graphics, and colour shall be used to clearly identify the various waste/recycling streams and examples of typical items that belong in each stream across all new line stations.

e) Access for depositing waste/recycling shall be from the top and all sides.

f) Ensure longevity using robust design and durable materials. Material performance and durability requirements shall meet those outlined in this section, and section 4.10 Finishes and Materials, and shall conform with CSA-S478.

g) All waste receptacles shall be securely anchored to floor or wall using tamper proof hardware.

h) Waste units shall not obstruct any part of an accessible route and ensure access is along a barrier-free path.

i) Any protrusion hazards along the pedestrian path shall conform to hazard detection requirements as per DS-02 Universal Design Standard.

j) Waste receptacles shall be fabricated to be have tamper-proof and/or hidden fasteners.

k) All waste receptacles shall be adjacent to seating areas and 3 meters from nearest seat/bench.

l) Provide installation tolerances and operational requirements to facilitate ease of ongoing site operations and maintenance.

m) Materials shall be non-combustible and corrosion resistant.

n) Waste receptacle unit shall be consolidated and incorporate: one waste receptacle; one recycled glass/plastic receptacle, one recycled paper receptacle. Potential for additional compost stream for organics to be determined by operations and governed by municipal requirements.

o) Signage, graphics, and colour shall be used to clearly identify and differentiate the various waste/recycling streams.

p) Unless otherwise noted by the operator, all waste and recycle units shall be visible on all sides using removeable clear transparent bags and a clear outer covering fabricated using a transparent material such as rigid lexan and/or plexiglass. Outer covering shall be designed to be removeable in future to allow for potential replacement. Examples of similar waste receptacles can be found installed at Union Station within public areas. All waste and recycling units shall be positioned such that views to contents are unobstructed and in clear view of strategically located CCTV cameras.

q) Acceptable waste/recycling unit materials include stainless steel frame; main container shall be transparent and scratch resistant plexiglass/lexan to allow for clear visibility of contents within.

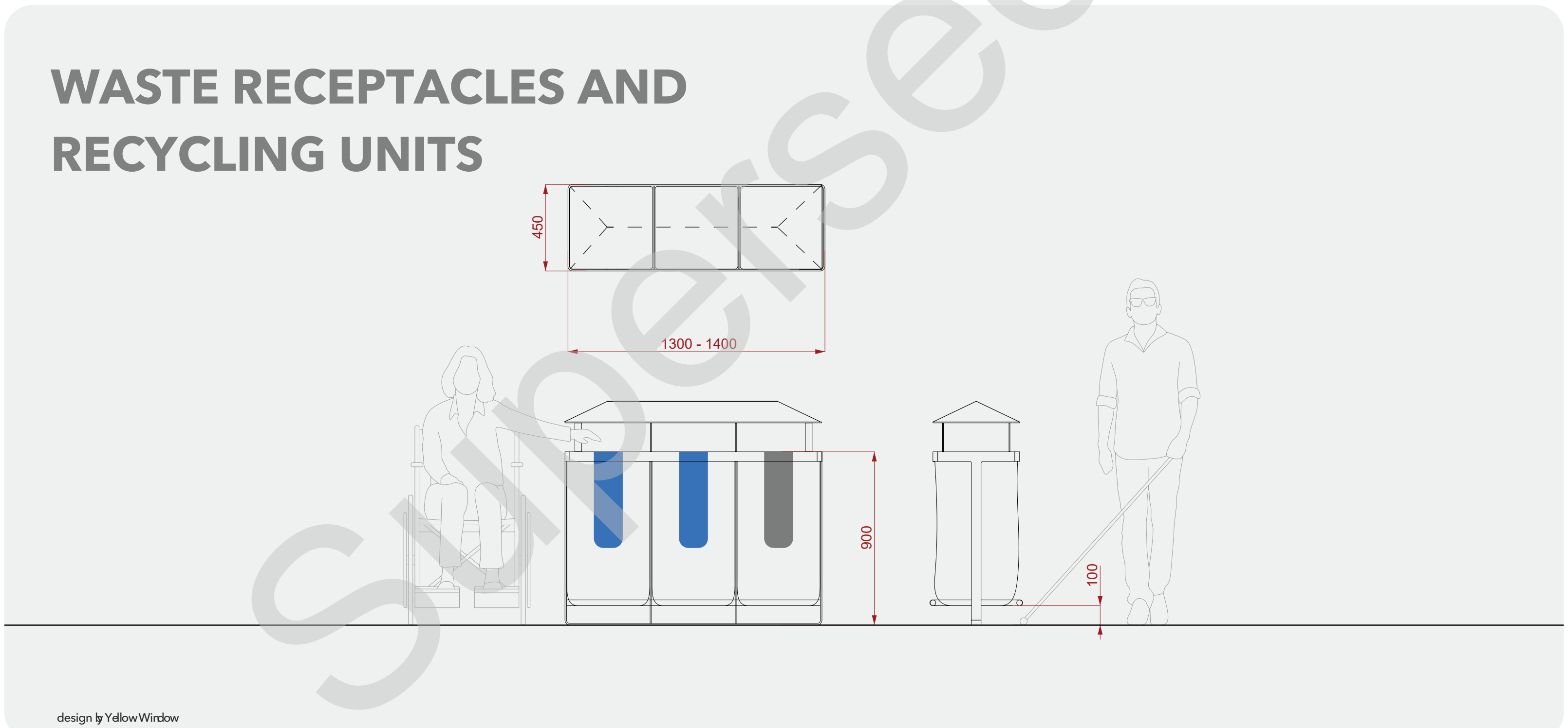


Figure 2-12: Waste receptacles and recycling unit

r) Waste and recycling units shall be provided in the following locations:

- Unpaid zone, adjacent to the self serve hub and information/journey maps;
- Paid zone, adjacent to all waiting areas and DWA's on the platform.

s) A minimum of 2 waste receptacle units shall be evenly distributed throughout the station as per locations identified on drawings. Additional quantities shall be confirmed by operator.

t) Design of seating and waste receptacles shall not include horizontal flat surfaces to discourage customers from placing waste and recyclables such as empty cups, plastic bottles and waste.

u) For dimensions relating to waste receptacles, refer to Figure 2-12: Waste receptacles and recycling unit.

2.5.4 Ergonomics and Accessibility

a) Seating and waste receptacles shall be fully inclusive and enhance customer comfort, while addressing each customer's specific needs including:

i. people with luggage;

ii. pregnant women;

iii. bariatric patients or individuals with high body mass index (BMI);

iv. people with mobility challenges;

v. people who use wheeled mobility aids; and / or strollers;

vi. people who are blind or who have low vision with or without a guide dog.

b) Each seating area shall provide a clear space for side approach and side transfer to a seat for people who use wheeled mobility aids and/or scooters, and shall include an adjacent clear floor area of 1700 millimetres by 1700 millimetres for an unobstructed U-turn as per DS-02 Universal Design Standard.

c) Clear floor area directly beside each seating element shall be made available to allow space for a guide dog and its owner.

d) Areas between seating and or fixed objects shall ensure a clearance diameter of 2000 millimetres for people who use wheeled mobility aids and/or scooters to allow customers to maneuver easily without any interference. Refer to Figure 2-13: Wheelchair clearances.

e) All seating shall conform to the DS-02 Universal Design Standard including requirements for reach and space ranges.

f) Seating and all wait areas shall not obstruct any part of an accessible route and shall ensure access to seating is along a barrier-free path.

g) Any protrusion hazards along the pedestrian path shall conform to hazard detection requirements as outlined in DS-02 Universal Design Standard.

h) Waiting areas shall establish clear sight lines to major arrival areas maintaining clear views from seating areas reserved for customers who use wheeled mobility aids and/or scooters.

i) Within all waiting areas, space shall be provided within banks of seating, to allow people who use wheeled mobility aids and/or scooters to sit alongside other seated customers such that the back of the wheelchair is aligned with the backs of the seats.

j) One end of all seating fixtures shall be open, without an arm rest, to allow for easy side transfer for people who use wheeled mobility aids and/or scooters.

k) Connectivity points and leaning rails shall be designed to include guard rails as a form of hazard cane detection. Figure 2-14: Accessibility, hazard detection.

l) Permanent furniture and equipment that cannot be located outside the main accessible path of travel shall include contrasting reflective bands and shall be cane detectable to the ground as per DS-02 Universal Design Standard.

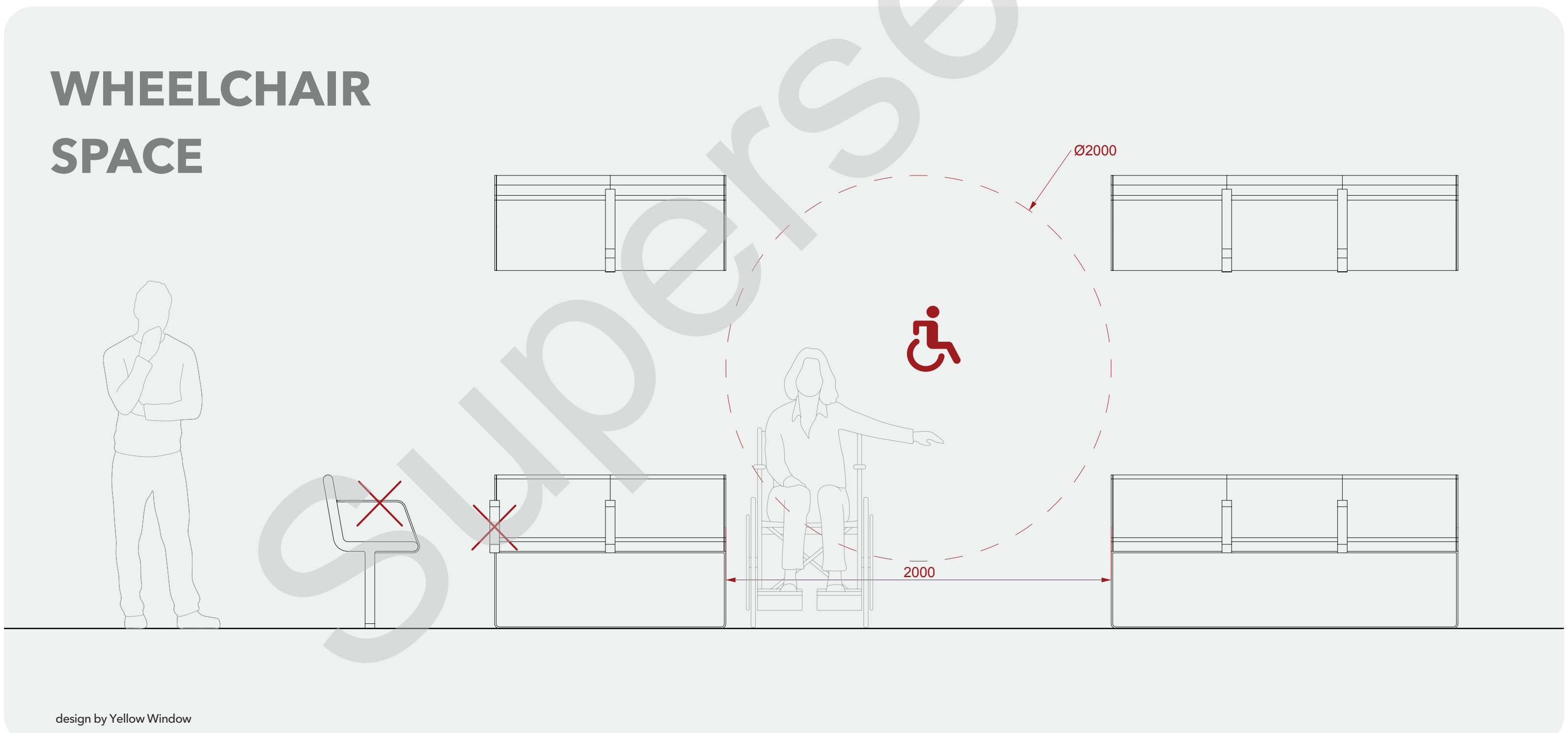


Figure 2-13: Wheelchair clearances

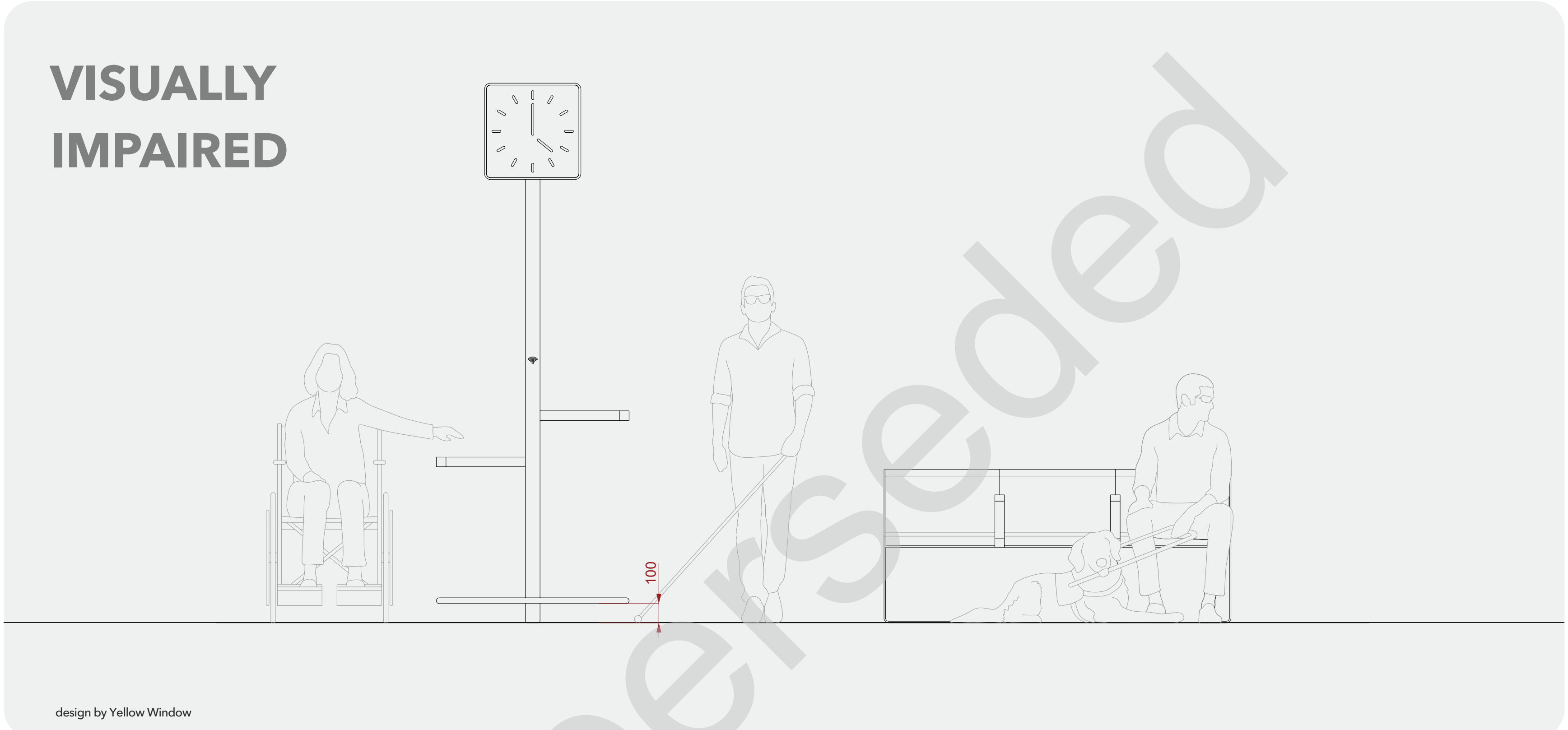


Figure 2-14: Accessibility, hazard detection

m) The majority of all seating shall have integrated back rests, full-length and inset armrests and to facilitate use by all customers. Refer to DS-02 Universal Design Standard.

n) Benches design shall be detailed to prohibit a person from laying down and skateboarding, yet shall be designed to not promote hostile architecture.

o) Angle of incline for both seat and seat back shall be designed to ensure proper ergonomic design. Refer to Figure 2-8: Customer seating

p) Locate outlet ports in close proximity to seating to allow customers to charge personal digital technologies. Ensure proximity allows customers to charge devices within reach of seating, allowing them to self-monitor and prevent theft while charging.

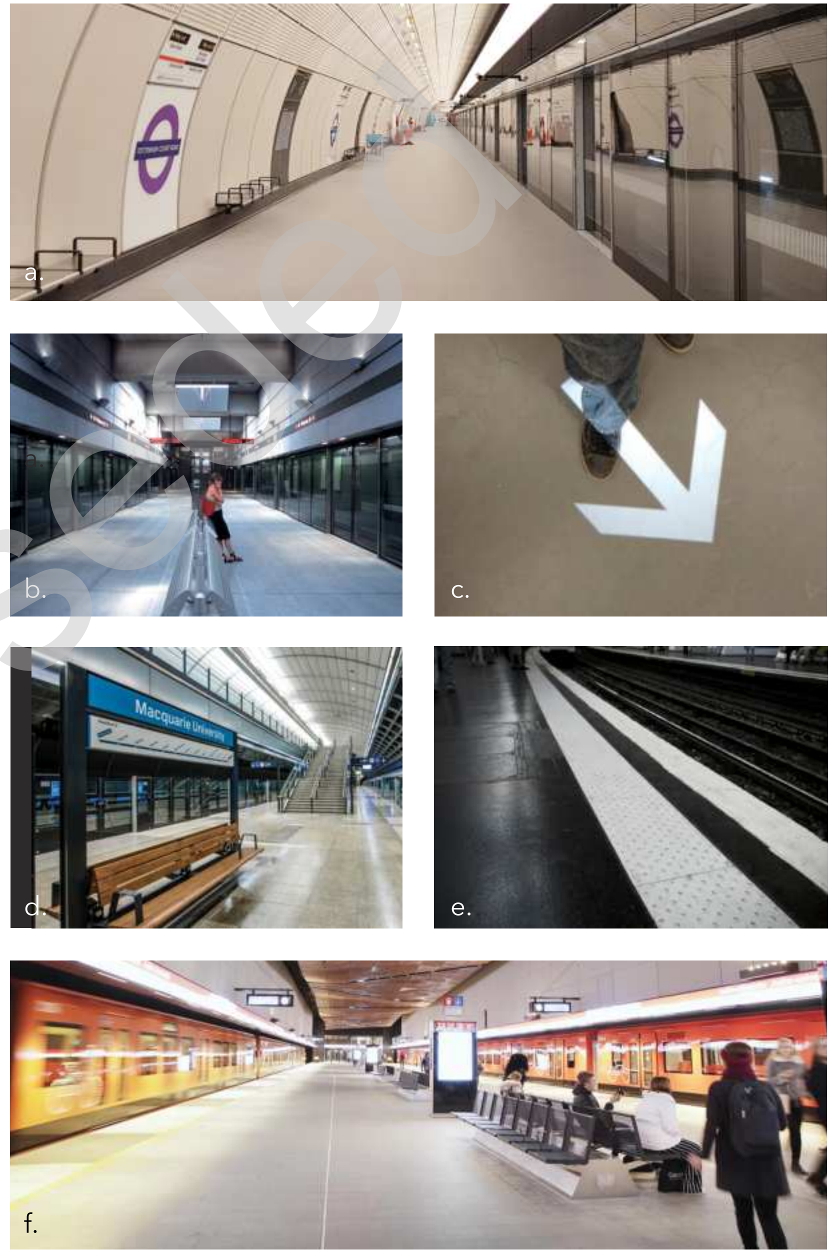


Figure 2-15: Precedent images

Precedent identification images:
a. London station platform, Elizabeth Line, London, UK; Crossrail

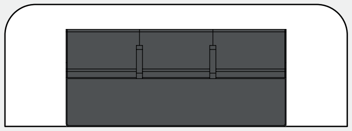
b. Islands Brygge Platform, Copenhagen Metro, Copenhagen, Denmark.

c. Wayfinding - Light projection.

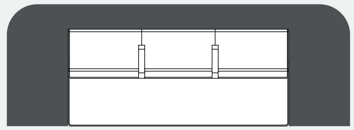
d. Macquarie University Platform, Sydney Metro, Sydney NSW, Australia.

e. Tactile wayfinding - Raised domes and bars

f. Aalto University Platform, Helsinki, Finland; ALA Architects, Esa Piironen Architects



Use dark color furniture for environments with surrounding light finishes



Use light color furniture for environments with surrounding dark finishes

	Beige	White	Gray	Black	Brown	Pink	Purple	Green	Orange	Blue	Yellow	Red
Red	78	84	32	38	7	57	28	24	62	13	82	0
Yellow	14	16	73	89	80	58	75	76	52	79	0	
Blue	75	82	21	47	7	50	17	12	56	0		
Orange	44	60	44	76	59	12	47	50	0			
Green	72	80	11	53	18	43	6	0				
Purple	70	79	5	56	22	40	0					
Pink	51	65	37	73	53	0						
Brown	77	84	26	43	0							
Black	87	91	58	0								
Gray	69	78	0									
White	28	0										
Beige	0											

PERCENTAGE CONTRAST BETWEEN DIFFERENT COLORS

Acceptable | Do not use | Borderline

Table taken from "Orientation et points de repère dans les édifices publics" (1988)" (1988) by Arthur P. and Passini R. recreated and provided for information only.

Figure 2-16: Contrast

2.5.5 Identification

Seating and waste receptacles shall be easily identifiable by being positioned consistently along the customer journey. This is especially critical for customers that are visually impaired. Criteria that supports this approach include contrast, colour and brightness, as elaborated below. Refer to Figure 2-15: Precedent images.

2.5.5.1 Contrast

Visual contrast is an important factor that allows customers to identify and differentiate between surfaces, and is especially critical for customers with low vision.

a) Colour contrast between seating and waste receptacles and surrounding surfaces shall achieve 50 Light Reflective Value (LRV) as per DS-02 Universal Design Standards.

b) For colour contrast percentages and corresponding LRV examples, refer to Figure 2-16: Contrast.

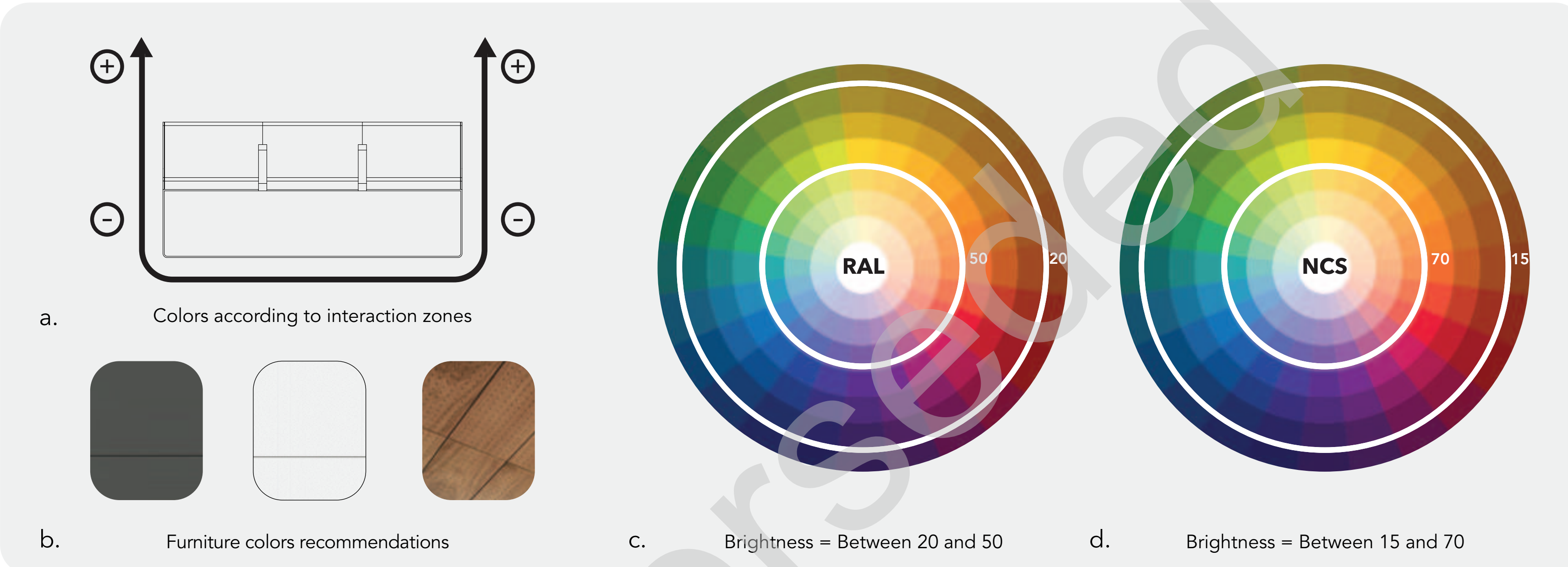


Figure 2-17: Colour and Brightness

2.5.5.2 Colour and brightness

a) Colour of all furniture elements including seating and waste receptacles, shall be consistent in all stations.

b) Colour and brightness of material for all seating and waste / recycling units shall be reviewed and approved by the owner of this standard.

c) Colour shall reflect required LRV contrast required as per DS-02 Universal Design Standards.

d) Colors used shall reference the international RAL colour system. Ranges of colour brightness, chroma, and saturation shall be considered when selecting specific colours. Refer to Figure 2-17: Colour and Brightness.

Figure 2-18: Aesthetic/design character

2.5.6 Furniture Aesthetics

a) Design shall be based on a kit of parts that maximizes flexibility and modularity. This approach shall aid in providing minimal customization and efficient fabrication.

b) Design shall create a consistent language that delivers a long term, durable solution.

c) Furniture shall be designed with rounded edges and corners to minimize potential injury or hazard to customers. Refer to Figure 2-18: Aesthetic/design character.

2.5.7 Furniture Finishes and Materials: General Requirements

Note: Refer to Section 3.0 Urban Realm for further information regarding exterior furniture.

2.5.7.1 Durability and Appearance

a) Materials shall maintain their good appearance throughout their useful life and shall have a minimum 30 year lifecycle.

b) Ensure longevity of all seating and waste/recycle units using robust design and durable materials. Material performance and durability shall conform with CSA-S478 as a guideline.

c) Provide materials of high quality with excellent wear, strength, and weathering qualities while considering both initial and replacement costs.

d) Integral and applied colours shall be colourfast and selected to resist undue fading in both hot and cold weather climates, while maintaining good appearance throughout the minimum required lifecycle.

e) Where fasteners are exposed, they shall be capped and the finish colour of the cap shall match adjacent finish.

2.5.7.2 Materiality

a) Furniture composition shall be integral throughout the material. Materials and finishes with applied coatings that are subject to being scratched, chipped, or easily damaged shall not be used.

b) Acceptable seating materials include, stainless steel or aluminum with high percentage of recycled and recyclable content. Acceptable waste/recycling unit materials include stainless steel or aluminum; main container shall be transparent, scratch resistant plexiglass/lexan to allow for clear visibility of contents within.

c) Wood is an acceptable seating and seat back material for both interior and exterior applications due to its thermal comfort benefits. Wood species selected shall meet all of the following requirements:

   i. shall be FSC certified and verified by third parties and;

   ii. shall be durable and dense such that wood species hardness is no less than 1300 based on the Janka hardness scale and;

   iii. shall be resistant to rot such as ipe (Brazilian Walnut) wood and;

   iv. shall be fire retardant.

d) Furniture fabricated for exterior applications shall use brushed stainless steel type 316, XL Blend S for its anti-corrosive properties. Galvanized metal material shall not be permitted. All interior furniture shall be fabricated using stainless steel grade 304. Painted metal mesh for furniture shall not be permitted.

e) Combustible materials that produce toxic fumes and /or smoke such as plastics, resins, fabric, synthetic materials without a fire retardant shall not be used. Materials such as natural stone and man-made quartz shall not be used.

f) Seat and back materials shall minimize the amount of opaque surfaces and shall be perforated/ open to allow liquids and/ or moisture to pass through and not accumulate.

g) All finishes and materials shall be chemically inert, acid and alkali-resistant, dense, non-porous and non-staining.

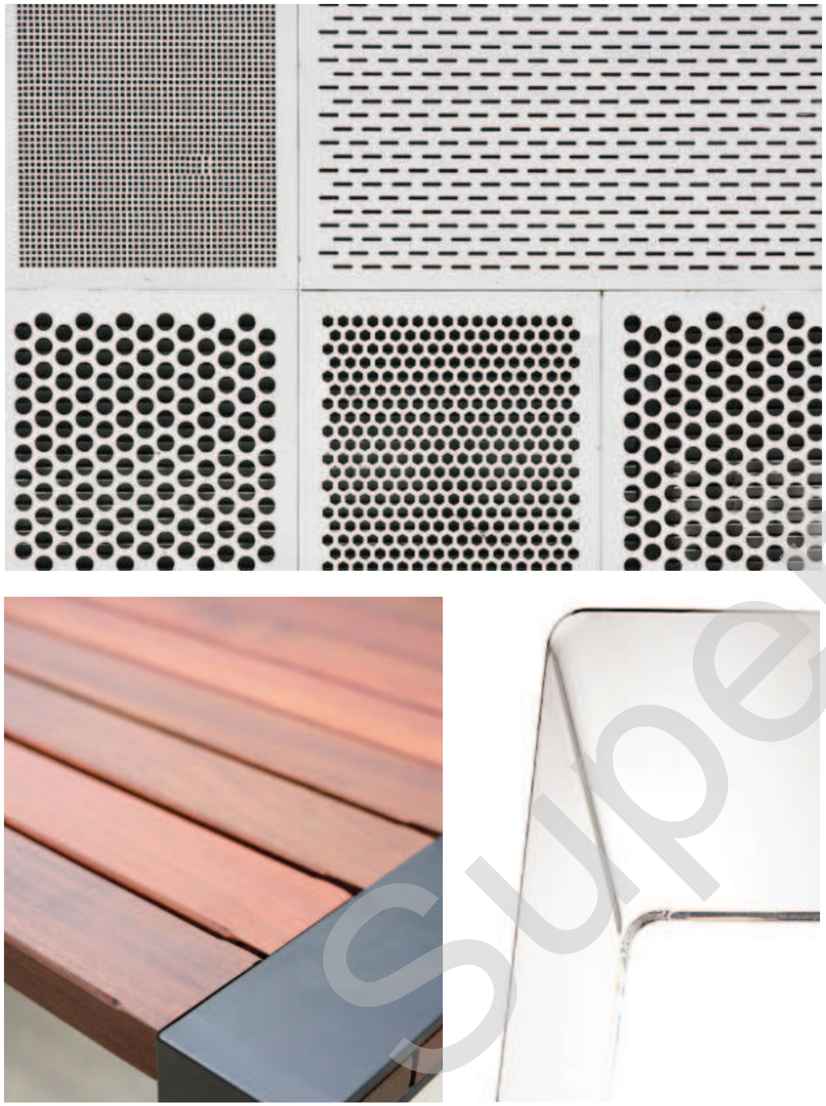


Figure 2-19: Finishes and materials

2.5.7.3 Continuity

Seating and waste / recycling units for both interior and exterior applications shall be consistent in both look and feel and shall appear as a consistent family of elements. Refer to section 3.0 Urban Realm for further information regarding exterior furniture.

2.5.7.4 Maintenance, Repair, and Replacement

a) Finish and materials shall be selected for ease of cleaning, repair, and shall have matching replacement stock available for the expected life of the material.

b) Finish and materials in public areas shall withstand, and not be damaged by the rigors of regular cleaning, washing and high-pressure water spray. The cleaning process shall require only a one step operation.

c) Finish and materials shall resist soiling and be cleanable with commonly used equipment and environmentally benign cleaning agents.

d) Removal and replacement of damaged materials shall be designed to facilitate easy removal and replacement without damage occurring to materials and adjacent areas.

e) Materials selected shall perform consistently based on proven maintenance procedures.

f) All furniture shall not be located/positioned in areas where access for the purposes of maintenance/repair is difficult or unsafe. Allow for a minimum of 100 millimetres between seating/waste units and wall finishes and or architectural elements and infrastructure.

g) Use standard high performance materials to minimize maintenance costs, so that if damaged, are easily repaired in the field or replaced with minimal impact on station operations.

h) Finishes selected in all public areas shall allow for common maintenance methods to readily remove casual vandalism.

2.5.7.5 Corrosion

a) Materials shall be able to withstand corrosion, uphold their intended interior or exterior use and function, and maintain their good appearance (no rusting or fading in colour) throughout their useful life and shall have a minimum 30 year lifecycle.

b) Ensure metal anchor material and metal fastener materials are not dissimilar, or if dissimilar, provide separation in order to prevent galvanic corrosion.

c) Provide protective coating films or insulating membranes where potential for electro-chemical corrosion between metals occurs, for example: aluminum to stainless steel, brass, bronze, copper; stainless steel to brass, bronze, copper zinc; metals to concrete.

2.5.7.6 Fabrication and Finishing

a) All furnishings shall be fabricated in sections/parts, assembled, primed, painted and factory finished, and secured on site.

b) Furniture shall be fabricated to eliminate any field welding and/or touch up on site.

c) Field painting on site shall not be permitted.

2.5.7.7 Health and Safety

a) Materials shall be selected so as to reduce the risk of any hazard to all customers, transit staff, or maintenance staff.

b) All finishes and materials shall be non-combustible or be fire retardant and meet all Ontario Building Code requirements.

c) All surfaces of furnishings shall be non-reflective / non glare in order to prevent interference with customer's ability to wayfind or CCTV's ability to provide uninterrupted coverage. Refer to DS-02 Universal Design Standards.

d) Finishes and materials shall use fasteners with bond strength engineered to eliminate hazards from dislodgement due to temperature change, vibration, wind, seismic forces, aging, and / or vandalism. For bonding strength, materials shall be required to meet a bonding strength or minimum peel strength of 20 psi.

2.5.7.8 Resistance to vandalism

a) All fasteners of finishes and materials shall be concealed and tamper proof.

b) All furniture shall be securely anchored with tamper-proof hardware, into a concrete base or securely wall mounted where site conditions allow.

c) All furniture finishes and materials in public areas shall be resistant to vandalism and graffiti including hammer blows, felt markers, spray paint, burning, and scratching. Material finishes and surfaces shall be resistant to graffiti with a permanent and non-sacrificial type scratch and graffiti resistant coating.

d) Furnishings shall be fabricated using materials and details that are difficult to deface, damage, or remove, while implementing operational and maintenance strategies that discourage vandals.

e) When using wood, seating design shall strategically locate wood for seating areas where human contact would occur.

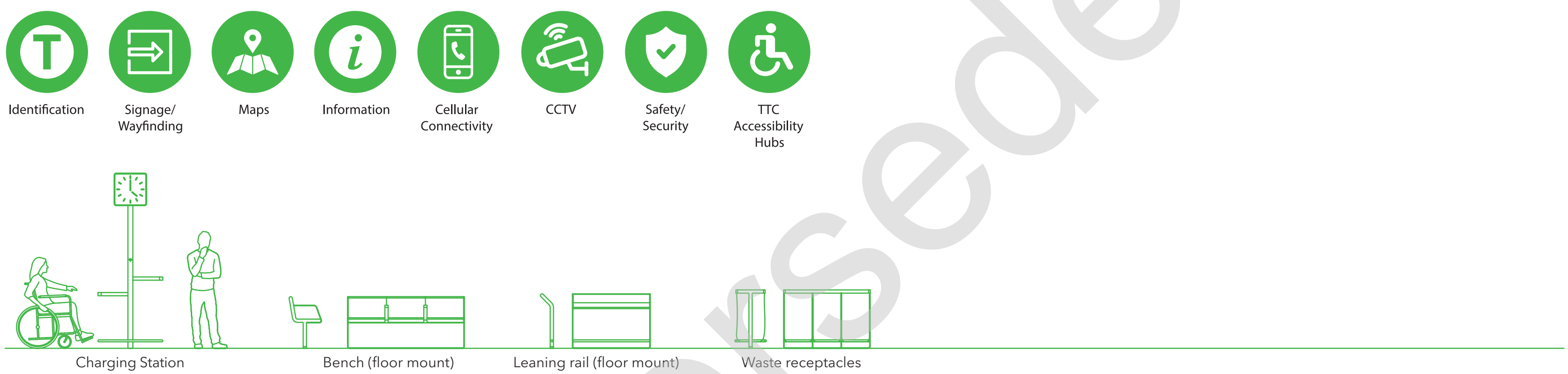
Figure 2-20: Seating precedent examples

a. ProRail bench, Netherland Station; Fabrique Public and Industrial Design

2.5.8 Journey stages

The locations and types of all seating, waste receptacles, and connectivity points are to be positioned strategically along the customer journey and are outlined in more detail in the journey stages. Refer to Figure 2-21: Furniture along Journey Stages – Arrival, unpaid zone and Figure 2-22: Furniture along Journey Stages – Paid zone, platform.

ARRIVAL



STATION - UNPAID ZONE

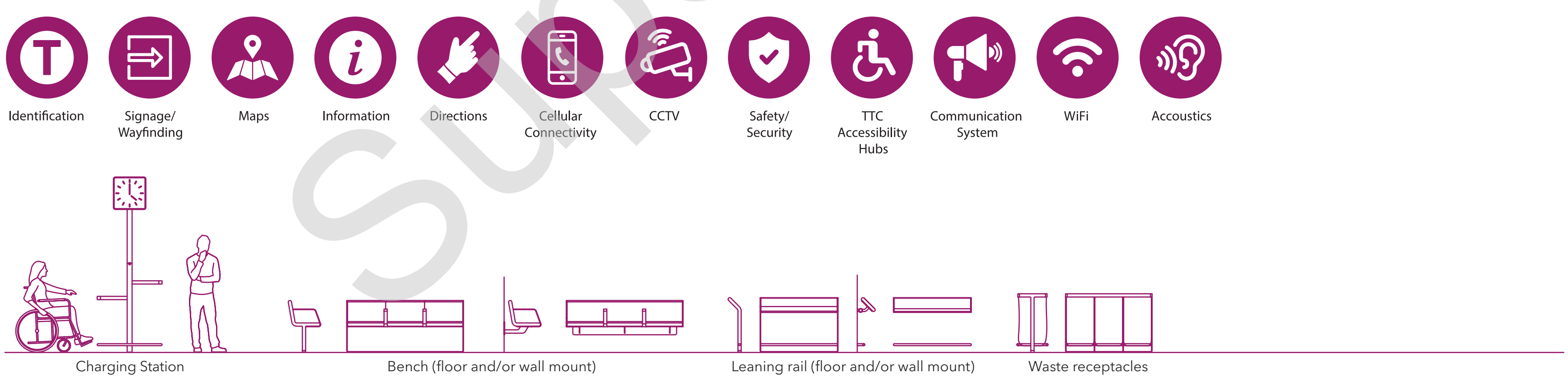
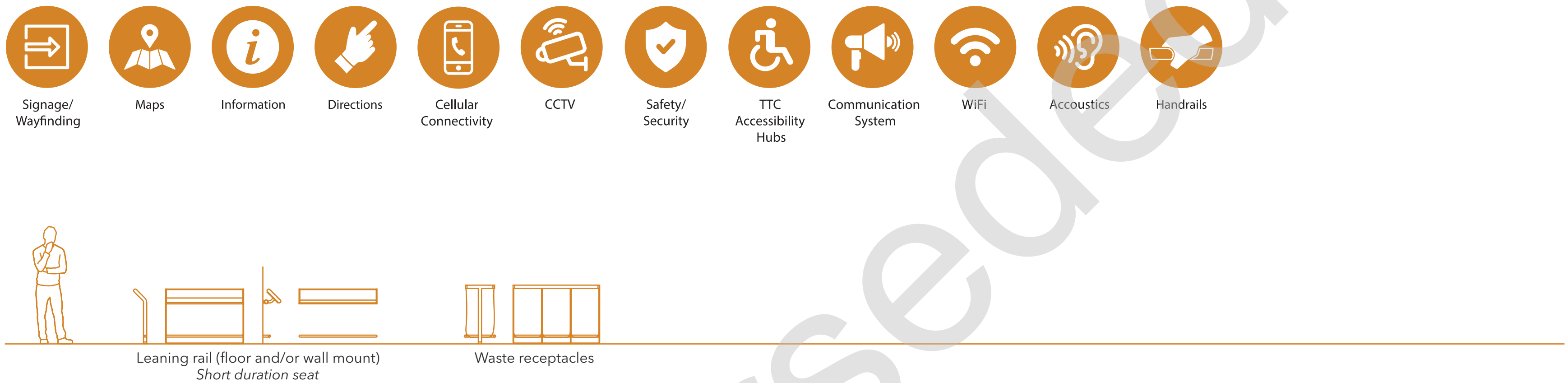


Figure 2-21: Furniture along Journey Stages - Arrival, unpaid transaction zone

STATION - PAID ZONE



STATION - PLATFORM

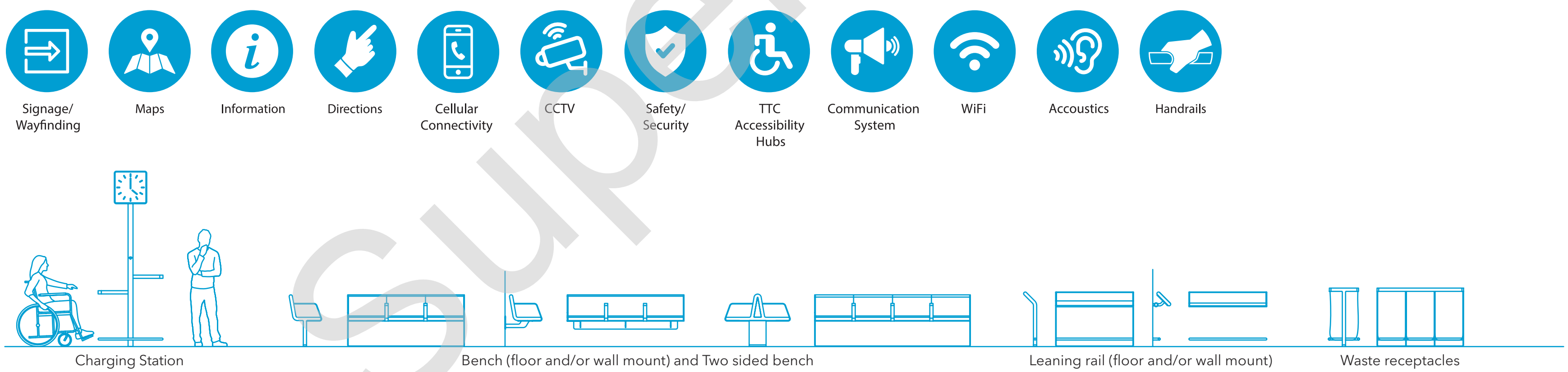


Figure 2-22: Furniture along Journey Stages - Paid access, platform

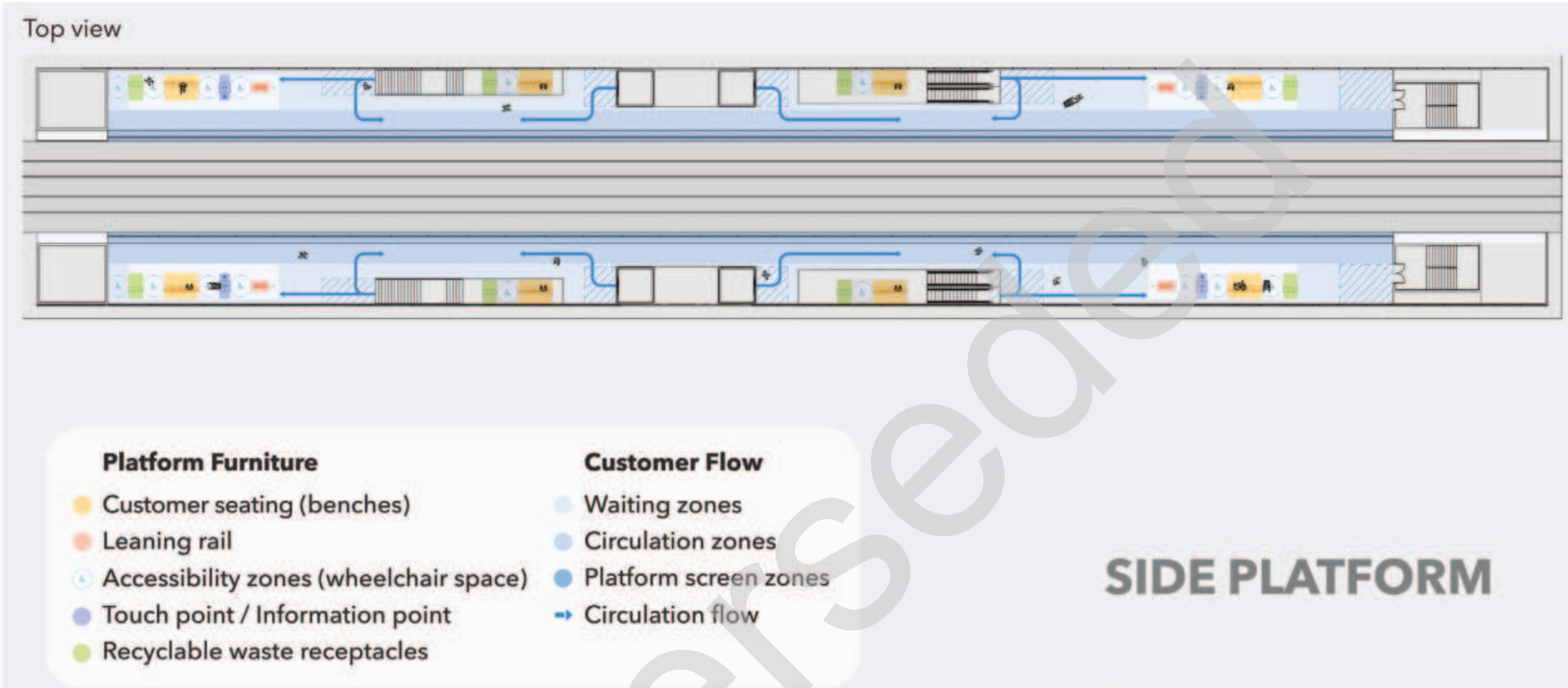


Figure 2-23: Side platform furniture placement

2.5.9 Planning and Placement: Requirements

a) Seating shall be located along the path of travel to elevators, escalators and stairs and outside the required surge space for Vertical Circulation Elements (VCE). Critical seating locations include: platforms, Designated Waiting Areas (DWA), elevators, escalators, stairs, station ambassador, bus platforms, connections to heavy rail and GO Transit interchanges, and along path of travel at regular intervals. Refer to Figure 2-23: Side platform furniture placement, Figure 2-24: Island platform furniture placement, and Figure 2-25: Furniture elements – Summary.

b) Seating areas shall be provided every 30 metres along accessible routes from entry to the platforms. Interval of 25 metres for waiting areas is preferred, aligned with designated accessible boarding areas, where provided along main pedestrian circulation routes.

c) One centrally located and designated DWA is required at each subway platform adjacent and accessible to platform elevators. DWA's shall include a dedicated PAI, a barrier-free space, a three-person seat bench with one wider seat, and waste and recycling receptacles where customers with low stamina can rest. Seating areas including emergency rest zones shall be located not more than 30 metres apart and at, or at the top of stairs with a vertical rise greater than 10 metres, outside the required 5 metre surge space.

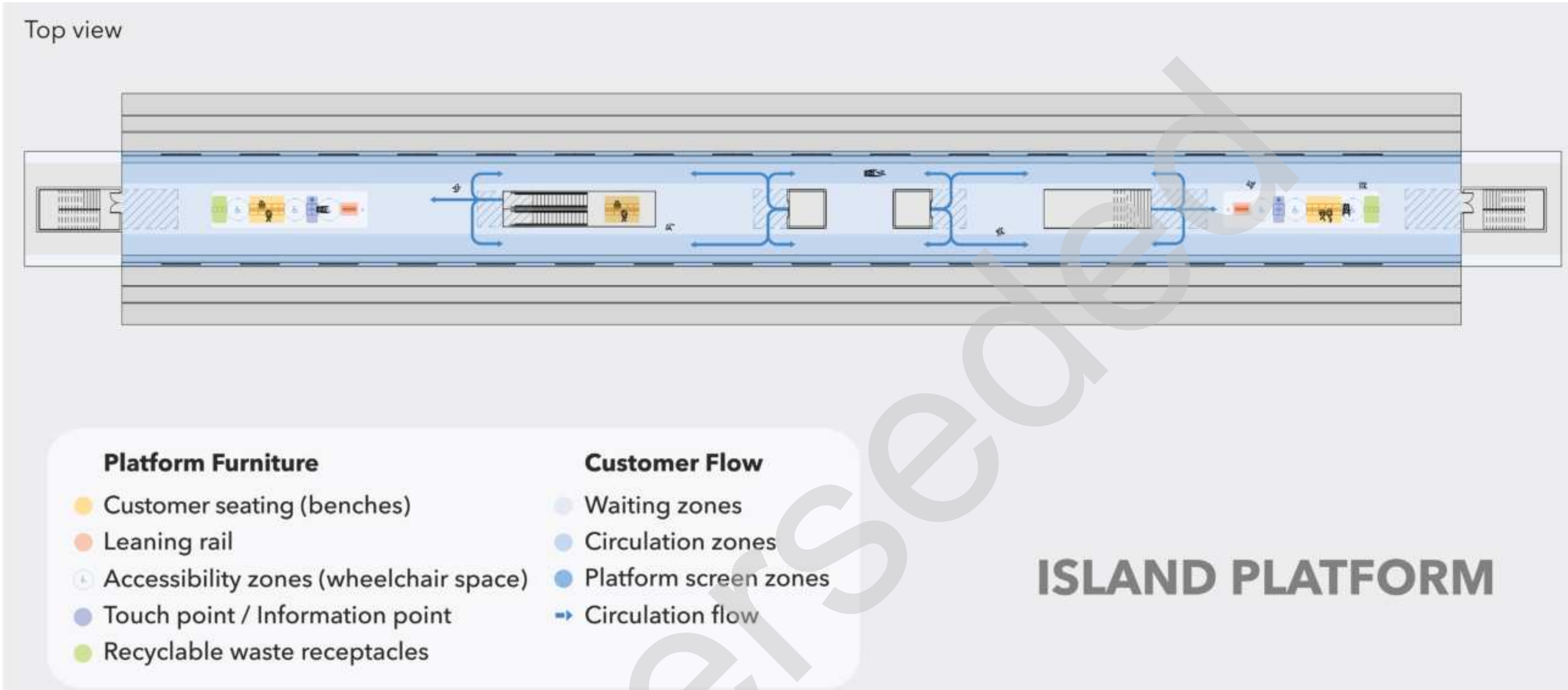


Figure 2-24: Island platform furniture placement

d) Seating shall be located with clear visibility to encourage intuitive wayfinding, passenger safety, and passive surveillance of adjacent environments.

e) Seating shall be clustered to clearly identify points of passenger service, information and efficiently utilize station infrastructure.

f) In waiting areas, encourage inclusion and provide a variety of seating types to suit a variety of users including single seats, grouped seats, leaning rails, space and seating provisions for people who use wheeled mobility aids, scooters, strollers, luggage, service dogs, and children.

g) Waiting area seating including DWA seating at platform shall be in close proximity of transit information including digital signage and direct views to bus or trains.

h) All waste receptacles to be located adjacent to high traffic areas along main path of travel. Specific locations include area adjacent to fare vending machines, retail areas, and platforms.

SUMMARY

ERGONOMICS & ACCESSIBILITY
MATERIALS & MAINTENANCE
STYLE

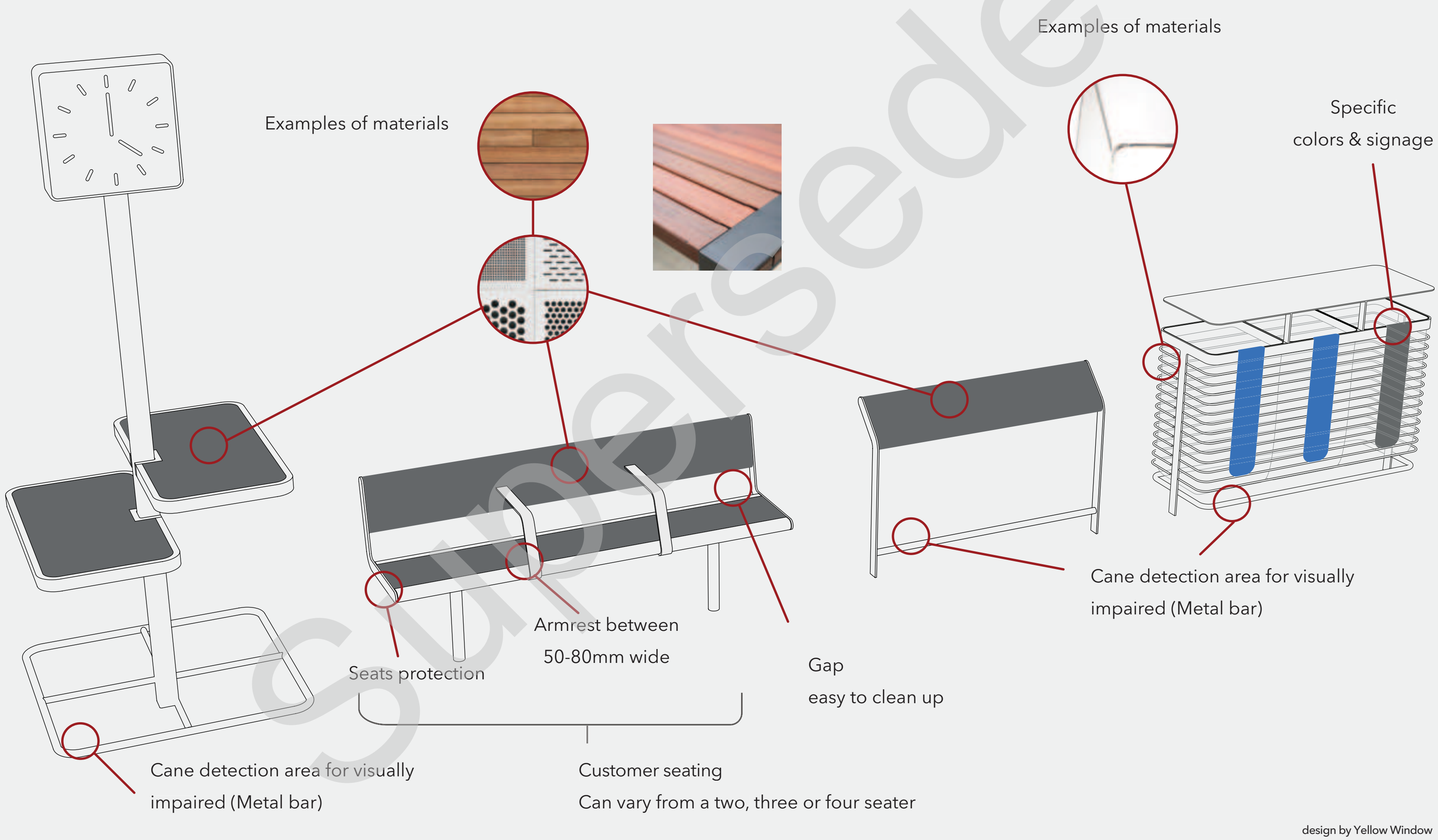


Figure 2-25: Furniture elements - Summary

2.6 SIGNAGE: WAYFINDING AND DIGITAL SIGNAGE

The following requirements shall be read in conjunction with:

- DS-03 Metrolinx Wayfinding Design Standard, Part 1 and Part 2B
- DS-02 Universal Design Standard

2.6.1 Wayfinding

Refer to DS-03 Metrolinx Wayfinding Design Standard, Part 1 and Part 2B.

2.6.2 Mobile Wayfinding: Infrastructure Requirements

With rapid advancements in technology and the state of mobile wayfinding applications currently being used in the marketplace to help support customers navigate along their journey, required infrastructure shall be provided that anticipates the inclusion of these technologies in the future.

Where mobile wayfinding is deemed to be in the project scope, digital integration throughout the customer journey will be critical to the travel experience. Integration of self serve digital channels such as Omnichannel, web, mobile, applications, and social platforms will help to enhance and support the customer journey where mobile wayfinding requirements have been approved.

Where mobile wayfinding has been approved on a project by project basis, the following supporting infrastructure requirements for all customer's shall apply:

a) Empty conduit shall be installed and concealed from view.

b) Beacons shall be deployed and located discreetly while concealed from customer's view.

Where mobile wayfinding is employed, it shall be designed to ensure it is inclusive and meets the needs of persons with disabilities, in specific, person(s) with visual impairments while meeting compliance requirements under the AODA.

In addition to wayfinding signage, it is important to recognize how intuitive wayfinding as an architectural concept can help support and improve wayfinding and the customer journey experience. This strategy utilizes an approach in the form of the organization of space, use of daylight, material, and sight lines to reduce or potentially eliminate the need for signage. For further information, refer to Section 4.0 Architecture.

2.6.3 Digital Signage

2.6.3.1 Real Time Information

Digital signage shall provide real-time, location based information for customers with the intent to inform and support the decision making process, leading to efficient journey planning.

Note:

a) It is important to communicate that real-time, informational based, digital signage shall support decision making for customers and shall not take priority over static wayfinding signage as a primary source of wayfinding.

b) Across all subway types, Wi-Fi and supporting infrastructure including concealed conduit and cabling, shall be provided in all stations. Empty conduit and associated shell space shall be provided for in all pedestrian tunnels.

2.6.3.2 Description

Digital signage shall have the ability to convey critical information to the customer from arrival, throughout the station, platform and on boarding of fleet vehicles. Digital information provided shall include trip information such as general transit information and / or alerts, next train information, service changes, disruptions across different modes and Transit Agencies (TA), and related journey information that allow customers to make informed decisions at key locations. Digital signage shall be strategically integrated throughout the customer journey, creating a positive travel experience.

2.6.3.3 Functional Requirements: General and Location Requirements

a) All digital signage and information shall be integrated within the station environment, and be consistent and familiar across all new line wide stations.

b) Where digital signage cannot be displayed in its entirety on a single screen, additional displays shall be allocated so as to not require pagination or scrolling.

c) Digital signage shall conform to DS-02 Universal Design Standard.

d) Digital Signage shall be designed holistically to provide accurate, timely, and synchronized, and consistent information for all customers as they navigate all transit portions of their trip (including progressive disclosure that is location based), providing audio-visual equivalents and additional supports to meet accessibility needs.

e) As a base line, all digital signage shall be located at the following key locations within the station environment:

i. Within the unpaid transaction zone, co-located with the self serve hub, and visible from within station and from the exterior. Real time signage content shall include, but not be limited to, transit delays and departure times. Provide supporting infrastructure for a quantity of 2-3 digital screens depending on requirements established in the Project Agreement (PA).

ii. At platform level, integrated above platform edge doors (PED). Real time signage content shall include, but not be limited to, next train, upcoming trips, and service disruptions. CCTV's shall be mounted above, co-located, and interfaced with all PED's. Supporting infrastructure for digital signage, CCTV, and speakers, shall be concealed in continuous horizontal chase, above the PED's as an integrated part of the PED assembly.

iii. At interchange stations where both subways and bus connections occur. Real time signage content shall include, but not be limited to, arrival and departure times for buses, buses and their associated platform number.

iv. At intermodal stations where GO Transit service occurs. In these scenarios, digital signage shall be used to identify trains and their departure or arrival platform number.

v. Digital screen to capture real-time information and shall be included at grade in the unpaid transaction zone, and for departure of connecting routes in areas such as bus and streetcars. Digital signage shall be positioned to be made visible to customers potentially inside and outside station.

f) Where digital signage is integrated within the exterior envelope:

i. signage shall be recessed and made flush with wall finish face;

ii. placement of digital signage shall align with exterior finish reveals or shall be centered on material faces;

iii. it shall conform to mounting heights as per DS-03 Metrolinx Wayfinding Design Standard, Part 1 and Part 2b.

iv. all conduit and supporting infrastructure shall be concealed;

v. fasteners shall not be exposed.

g) For details and further information specific to digital signage locations, digital messaging content, and all other digital signage information, refer to DS-03 Metrolinx Wayfinding Design Standard, Part 1 and Part 2b.

h) Audible information through station speakers and visual information via digital signage, shall be bi-lingual in both English and French as per the French Language Act.

i) Infrastructure such as conduit and connections for power and data cabling shall be concealed where digital signage is required. Provision for floor boxes as required.

j) Placement of digital signage shall not conflict from a site line perspective, or impair the function of operator devices and systems such PAI's and the Blue Light System.

2.7 LIGHTING: EXTERIOR AND INTERIOR

2.7.1 Overview

This section describes the customer experience and lighting strategy by zone. For luminaire requirements described below see Section 2.5.5. For illumination levels required by zone see section 2.5.6.

2.7.1.1 Pre-Journey / Arrival

Outdoor lighting is an integral part of urban life—it helps make our roadways and pedestrian pathways safe, it enhances our public spaces, and it allows us to enjoy our city's urban fabric at night. Architectural lighting works to foster the spatial experience and function as wayfinding. Lighting can influence mood and texture while complementing architectural features. To enhance the arrival experience to the station building, the underside of the identity canopy which sits over the recessed entry will glow. The transit identifier logo will also be backlit and visible from afar. The glazed elevated platform exterior clad with perforated metal screening elements provides shade by day and glows softly by night. The approaching customer has a clear reference and understanding of their surroundings, the station building, and the point of entry.

Figure 2-26: Elevated platform station typology - Interior view from fare gates and elevator

2.7.1.2 Unpaid Transaction Zone

Upon entry to the station unpaid transaction zone, linear lighting reinforces the concept of movement and direction of the customer's pathway into the next phase of their journey towards the fare gates. The unpaid transaction zone is comprised of a multi-layered lighting approach that shall consist of:

a) general ambient lighting using linear lighting that continues across the fare gates and into the paid access zone;

b) focused illumination of wayfinding markers such as pay stations and information boards.

The above lighting concepts provide a level of comfort, reinforces positive customer experience during initial transaction and clearly indicates a direction of travel through the fare gates between the unpaid and paid zones.

2.7.1.3 Paid Access Zone

Once entering the paid access zone, the lighting strategy may vary based on the scale of the station. Linear directional lighting continues to align with the flow of customers into the station and towards vertical circulation. For larger stations where the paid access zone includes further amenities such as washrooms and retail there are more opportunities for pause in the journey. Here, geometrical artificial skylight luminaires note a moment of pause to orient oneself to the appropriate vertical transportation to the platform or pause in at a retail location.

The paid access zone shall consist of the following multi-layer lighting approach:

a) general ambient staggered lighting continued from the unpaid zone;

b) for larger paid station areas large artificial skylights may be used:

   i. to simulate natural light entering into the space,

   ii. enhance customer experience,

   iii. strengthen the calming effect for the customer's voyage;

c) vertical circulation elements complete with integrated luminaires;

d) supplemental ambient lighting to highlight path of travel;

e) focused illumination of wayfinding markers such as retail, washrooms and directional information.

The lighting design approach is to reduce confusion, invoke a safe, calming effect to the customer as they travel towards the platform. The above approach provides a focused highlighted element of illumination throughout the space which informs the rider a safe path of travel towards the platform zone.

2.7.1.4 Platform

Once entering the platform, the customer experiences a lighting scheme that enhances the station's prime function – transportation.

The platform shall consist of the following lighting concepts:

a) artificial skylights,

   i. simulating natural light into the space, connecting the rider back to the street level,

   ii. ensuring the customer that they are in the right part of the building,

   iii. reinforces a positive experience and maintains a sense of calmness.

b) directional linear luminaires provide ambient illumination throughout the space and towards the platform edge.

c) luminaires integrated at the feature walls highlight the unique identity and site specific design of each station as customers continue the journey to the next station.

2.7.1.5 Pedestrian Bridges

a) The customer shall be able to clearly identify the entrance of the pedestrian bridge by highlighting the architectural entry markers. The path of travel to the station shall have a clear view of all areas of the bridge.

b) A pedestrian bridge shall incorporate daylighting and associated controls.

c) Pedestrian bridges shall integrate linear lighting into the bridge’s structural members.

d) Supplemental lighting can be achieved by integrating luminaires within the handrail design and informs the rider with a safe path of travel towards the station entrance.

e) Auxiliary lighting shall be provided in the public realm at the support bases of the bridge and its superstructure for security and operational purposes.

f) Directional linear lighting shall be provided within the ceiling of bridges.

2.7.1.6 Pedestrian Tunnel

a) As the customer approaches a pedestrian tunnel a higher illumination shall be provided to identify with the entrance.

b) Directional linear or indirect lighting shall be provided within the ceiling of the pedestrian tunnels.

c) Backlit media signage and digital advertising shall be factored in calculating light levels when included in the pedestrian tunnel.

d) Higher illumination levels shall be provided in pedestrian tunnels to give the customer a sense of safety and minimize claustrophobia.

e) Since pedestrian tunnels typically have lower ceiling heights all luminaires shall be vandal resistant.

2.7.2 Description

The lighting design shall address human needs and be coordinated with the architectural details of the spaces. The intent is to provide a quality atmosphere for customers and staff alike. The overall lighting shall be in harmony with the architectural features of the station’s interior and exterior while incorporating natural daylight into the building.

2.7.3 Functional Requirements: Exterior

a) Exterior lighting shall:

i. meet dark sky standards;

1) 3000k;

ii. be aimed downwards to reduce light pollution;

iii. be shielded to reduce glare and light trespass to surrounding neighborhoods.

b) Exterior lighting design shall include uniform quality lighting.

c) Lighting shall be integrated into built site elements to act as beacons to support wayfinding.

d) Associate lighting types with the same conditions/activities at each element, to provide a recognizable visual language.

e) Pedestrian scaled illumination shall be provided for areas of rest and waiting that promote activity specific design, comfort and feel of the space.

f) In areas of vehicular movement and parking, the lighting shall meet the Backlight, Uplight, and Glare (BUG) rating system, be uniform and have no glare.

g) The station entrance shall have the highest level of illumination within the facility, creating an easily recognizable destination focus.

h) The station entrance shall:

   i. provide a visually comfortable transition from the street;

   ii. the Station entrance shall be provided with daylight harvesting controls to adjust illumination levels during daylight hours to minimize energy consumption and for smooth light level transitioning from indoor to outdoor and vice versa.

i) Entrances located either off-street or in conjunction with non-transit facilities shall be illuminated to emphasize the station entrance.

j) All exterior lighting shall be co-ordinated with locations of Closed Circuit Television (CCTV) cameras to prevent light glare.

k) All exterior lighting shall provide illumination to address Crime Prevention Through Environmental Design (CPTED) principles.

l) With regards to maintenance and operations, exterior lighting shall:

   i. provide illumination to address CPTED principles;

   ii. be energy efficient LED sources of lighting;

   iii. be vandal-proof and rated appropriately for outdoor installations.

m) Controls for exterior lighting shall be:

   i. dimmable and integrated to the lighting controls scheme;

   ii. controlled by photocells, occupancy sensors, central override switches and/or contactors with a manual override;

   iii. through a computer-based lighting control system that controls the various lighting circuits through the building;

   iv. programmable scheme to revise illumination levels to suit Metrolinx requirements;

   v. designed to increase energy efficiency and improved operations;

n) All exterior lighting shall have:

   i. lens rating of IK10;

   ii. IP65 weatherproof rating;

      1) IP66 where lighting is subject to pressure washing

   iii. vandal-proof features;

   iv. 0-10V dimming capability.

o) All exterior lighting shall have a uniformity ratio at:

   i. maximum to minimum: 4 to 1 or better;

   ii. average to minimum: 3 to 1 or better.

2.7.4 Functional Requirements: Interior

a) Lighting shall complement station architecture and surrounding station elements.

b) Surfaces including walls, ceilings, floors and columns, shall be a non glare finish where the Unified Glare Rate (UGR) have low reflectivity and not exceed 25 for circulation areas as per DS-02 Universal Design Standard.

c) Key elements in the customer journey shall have focused lighting to support wayfinding.

d) Lighting levels shall complement signage and readability of signage.

e) Continuous lighting shall be provided to ensure clear visibility for CPTED and of CCTV coverage and resolution.

f) The lighting design shall ensure vertical lighting illuminance of customer faces for identification purposes. The vertical lighting design height shall be between 914 millimetres and 2134 millimetres.

g) Lighting levels shall be coordinated with CCTV camera capabilities.

h) Lighting fixtures and associated louvers/grilles/reflectors specified shall have low reflectivity and not exceed the Unified Glare Rate (UGRL) as per DS-02 Universal Design Standard.

i) The luminaires shall be selected and located to reduce glare to customers, transit operators and the CCTV as per the DS-02 Universal Design Standard.

j) The lighting design shall visually assist the customer along the preferred circulation paths.

k) Lighting in the unpaid transaction fare zone shall emphasize system graphics, informational messages, fare vending equipment and fare gates.

l) The paid access zone area lighting shall direct the customer to the elements of circulation which leads to the platform.

m) The platform area shall be illuminated to enhance the customer's ability to detect, recognize, and identify objects and events. This can be achieved with upward lighting components and lighting contrast to enhance the overall lighting effect and to eliminate the relatively dark ceilings. Lighting with a colour rendering and index (CRI) of 80 or higher supports comfort, well-being and health.

n) Integrated lighting within seating shall be provided as per Section 2.3.

o) The Designated Waiting Area (DWA) shall be illuminated to a higher level than the general waiting area, to delineate the emphasized area.

p) The platform edge shall be illuminated to a higher intensity than the waiting area to indicate the transition between station and train.

q) Illumination level of the trackway shall be significantly less than the platform edge to purposefully highlight the contrast with the platform edge. Note this is a specific deviation of uniformity requirements for the purpose of highlighting the platform edge.

r) Colour temperature shall be consistent throughout the interior of the station.

s) Colour temperature range shall be between 3000k-4000k.

t) Colour Rendering Index (CRI) shall be a minimum of 80.

u) Surface Reflectance shall be as follows:

  i. Ceilings shall be 80% reflective;

  ii. Walls shall be 50% reflective;

  iii. Floors shall be 20% reflective.

v) Daylight and Natural Light

  i. Natural daylight shall be incorporated into the overall lighting design to support intuitive wayfinding, as a visual refreshment and energy saving. This natural lighting shall be diffused so as to not create glare.

  ii. Where natural daylight is proven not physically feasible, lighting design shall integrate artificial lighting components to replicate daylight, including at vertical circulation shafts where natural light can signify vertical movement up.

  iii. Daylight modelling shall be completed for all public areas of the building using industry recognized and accepted modelling software.

w) Maintenance and operations

  i. No light fixture shall be located over escalators or stairs unless they can be readily serviced by maintenance without the use of an aerial lift.

  ii. Lighting fixtures and poles shall be designed for ease of maintenance, and readily serviceable by system maintenance equipment.

  iii. Corridor areas that are not easily accessible due to operations shall have light fixtures with quick connects / support system and safety chains. The light fixtures shall come with a plug and play wiring system.

  iv. Lighting shall consist of energy-efficient, low-maintenance lighting fixtures such as LED lighting.

  v. LED lamp modules shall conform to IESNA LM-79, LM-80 and shall have a minimum rated life of 60,000 hours at 70% (L70).

  vi. All interior lighting in public spaces shall be vandal-proof.

x) Emergency Lighting:

  i. Emergency lighting shall be provided upon power loss.

  ii. Emergency lighting power shall be provided via battery or generator power.

  iii. Emergency illumination levels shall meet the minimum code requirements.

  iv. Battery operated emergency lighting meeting code requirements shall be provided in rooms such as the Emergency Generator Room, Electrical Rooms, and Mechanical Rooms.

y) Controls:

  i. Interior lighting shall be controlled daylight sensors, occupancy sensors, central override switches and/or contactors with a manual override.

ii. A computer-based lighting control system shall control the various lighting circuits through the building.

iii. All lighting fixtures shall be dimmable and sensor based to provide ability to be reduced when there are no customers and increased when customers are present.

iv. Minimum lighting levels while dimmed shall meet the CCTV system requirements.

v. The lighting controls scheme shall be programmable to revise illumination levels to suit Metrolinx requirements.

2.7.5 Luminaires

a) All interior light fixtures shall have IK10 rated lens.

b) All light fixtures in the Platform shall have IP65 weatherproof rating.

  i. IP66 where subject to pressure washing

c) General ambient linear lighting shall be:

  i. 75 millimetres wide recessed linear lighting;

  ii. wet location listed;

  iii. of corrosion resistant materials;

  iv. with extruded aluminum housing;

  v. provided with a built-in reflector;

  vi. lensed;

  vii. a unit easily removed from housing for maintenance.

d) Supplemental ambient lighting shall:

  i. be recessed architectural round;

  ii. include extruded aluminum housing that is rolled and welded with non-visible seams;

  iii. include built-in reflector;

  iv. be lensed;

  v. be a unit easily removed from housing for maintenance.

e) Artificial skylights shall be:

  i. minimum 1830 millimetres diameter or square artificial skylight;

  ii. recessed;

  iii. diffused regressed lens;

  iv. dimmable;

  v. minimum reveal of 305 millimetres to provide the appearance of a real skylight.

f) Vertical circulation LED Handrail shall:

  i. be a linear LED handrail suitable for indoor or outdoor applications;

  ii. be dimmable;

  iii. be of stainless or extruded aluminum LED housing;

  iv. include polycarbonate lens;

  v. be 24 volt DC operation with remote power supply;

vi. be a long life minimum 100,000 hours;

vii. be quick connect “plug and play”;

viii. be custom lengths to suit application.

g) Platform directional linear luminaire shall be:

i. a continuous linear luminaire;

ii. glare free;

iii. suspended;

iv. extruded aluminum housing.

2.7.6 Illumination Levels

The lighting system shall be designed to suit Illuminating Engineering Society of North America (IESNA) recommendations for industrial facilities. Refer to Table 2-2 for illumination levels by zone.

TABLE 2-2 ILLUMINATION LEVELS

ZONE	Minimum Average Maintained Illumination Level (lux)
Pre Journey / Arrival:	
Building Entrances and Exits	100
Aboveground Entry to Subway (Daytime / Nighttime)	50 / 300
Stairs	200
Station / Unpaid zone:	
General Ambient lighting	200
Fare Area – Turnstiles	300
Passages	200
Paid Zone:	
General Ambient Lighting	200
Concessions and Vending Machine Areas	300
Mezzanine	200
Stairs and Escalators	200
Elevator (interior)	200
Washrooms	100
Pedestrian Tunnels	200
Platform:	
Platform, subway	100
Platform, under canopy, surface and aerial	100
Platform, DWA	200
Uncovered platform ends, surface	50
Tunnel/trackway safety walkways and cross passages	15
Tunnel/trackway track level and service ways	10
Emergency Exits:	
Within Stairwells:	50

2.8 THIRD-PARTY ART

2.8.1 Overview

The incorporation of artwork in subway stations is accepted as a way to thematically link architectural expression to art in a way that is meaningful for users and has the potential to make significant connections to the communities around a particular subway station.

2.8.2 Description

Where third party stakeholders have identified a need, Metrolinx will endeavor to work with municipalities, BIA's, community groups or other non-governmental entities to safely accommodate the installation of public art at agreed locations on a case-by case basis. Metrolinx is not responsible for the funding, commissioning, and ongoing maintenance of third-party art. This shall be the responsibility of the requesting party.

The unique nature of third-party artwork on public transit calls for vision, practicality, and integration. Issues such as site, durability, usage patterns, integration with lighting and infrastructure design (station, portals, plazas, medians, etc.), and themes drawn from the local physical and broader social context may inform the work at the conceptual level. Practicality and functionality are also paramount: artwork must be sustainable from a maintenance and durability perspective and must not interfere with the ongoing functionality of the station, track infrastructure, or plaza where it is located.

Third party artwork is defined as the product of a creative process led by critically recognized professional artists and includes any type of physical, visual, or audiovisual media integrated or free-standing artwork that goes above and beyond the base expression of a building or open space. Third-party artwork may be applied to or integrated into standard facility finishes. The vision and process for public art will be defined on a station by station basis. The following requirements apply when integrated artwork is included in a subway station.

2.8.3 Design Objectives

a) Artwork introduced into the transit system shall serve as a visual enhancement, to make the transportation experience as comfortable and pleasant as possible.

b) The artwork shall be compatible with the station architecture and enhance its overall image. It shall assist in creating a humane and inviting atmosphere by the imaginative use of colour, texture, light, and contrast.

c) The artwork may be introduced into projects for construction of new stations and station modernizations that affect the finishes of existing stations.

2.8.4 Placement Requirements

a) The potential for location of artwork as an integral element for public areas of the transit facilities shall be identified at the preliminary design stage and agreed upon by Metrolinx and the third-party group.

b) Artwork may be located adjacent to the station building on retaining walls, bridge abutments, hoarding, noise walls, and other exteriors structures that do not require on-going building maintenance. If artwork is proposed to be located within the station environment, it shall be reviewed on a station-by-station basis.

c) Locations of artwork in the exterior public realm shall follow requirements in Section 3.3.13 Third Party Integration.

d) Locations of artwork inside the station shall follow the requirements for third party advertising in Section 6.4 Non Fare Revenue / Advertising and identified in the visual elements strategy Figures 6-4, and Figure 6-5 for placement. Placement strategy shall consider how artwork can assist customers as the build mental maps of the station.

e) Third party art may not occupy the locations identified for feature elements; however, artists may be engaged by the design team for creative input into the design concept of these elements.

2.8.5 Design Requirements

a) Artwork shall comply with applicable codes and safety regulations.

b) Artwork shall not interfere with wayfinding, passenger security features such as CCTV and PAI, and barrier free access. Artwork shall not provide confusing cues to the visually impaired and cause security risks by creating alcoves. Refer to DS-02 Universal Design Standard.

c) Artwork shall be non-combustible and shall not produce dense or toxic smoke.

d) All works shall be durable, washable, resistant to both corrosion and vandalism, and be made of materials that will not deteriorate.

e) Artwork shall be suitable for permanent installation or temporary display as appropriate.

f) Maintenance of artwork shall not interfere with station maintenance and operations.

g) Artwork must be structurally sound, have no moving parts, and require no special environmental controls. In addition, proposed artwork shall not interfere with existing building services.

h) Artwork shall be maintained by third-party.

i) Artwork shall maintain sightlines for passengers, pedestrians, and vehicles.

j) The Artwork shall not create real or perceived safety hazards tripping and optical illusions.

2.9 ACOUSTICS

Note: To be read in conjunction with Section 2.4.2 Audio/ speakers

2.9.1 Overview

A key component of the customer experience is ease of receiving and understanding relevant information. Acoustic design plays an important role in how well information is received through audio cues and can create a sense of calm and safety.

2.9.2 Description

This primary goals for acoustic design of new stations are to achieve the following objectives for the customer experience:

- Intelligible speech communication both face-to-face and through the public address system.
- Maintaining appropriate background sound levels within public areas.
- Minimizing noise impacts to surrounding communities.

2.9.3 Universal Design

Acoustic design plays an important role in the customer experience for customers with visual impairments and customers who are hard of hearing.

a) The acoustic design shall address concerns of customers with visual impairments and who are hard of hearing by:

   i. ensuring maximum background sound levels caused by ventilation and ancillary mechanical equipment are not exceeded;

   ii. the distribution and placement of acoustically absorptive materials.

b) The following guidelines shall be met in the acoustic design:

   i. ISO 21542 Building construction – Accessibility and usability of the built environment, Section 32 Acoustic environment;

   ii. Canadian Hard of Hearing Association, Universal Design and Barrier-Free Access, Guidelines for Persons with Hearing Loss, Section 6.0 Desirable Acoustics;

   iii. CNIB, Clearing our Path, Section 2.4.0 Acoustics.

2.9.4 Noise Impacts to Surrounding Community

a) Noise impacts to surrounding communities shall at a minimum comply with local noise ordinances and guidelines applicable to the local municipalities and the Ministry of Environment, Conservation and Parks Environmental Noise Guideline NPC 300.

b) Local and Provincial sound level limits shall be met for all mechanical equipment associated with the station.

c) The acoustic impacts of transit vehicles idling at grade or elevated platforms shall be factored into the overall acoustic performance of the station.

2.9.5 Background Sound Levels

a) In all enclosed public areas, the background sound level from mechanical equipment noise sources shall not exceed NC 45, or 50 dBA, inclusive of all mechanical equipment sources impacting a given space (e.g. noise from ventilation supply / exhaust openings, breakout noise from mechanical rooms etc.)

b) The maximum background sound levels shall apply to noise within public areas due to ventilation and mechanical equipment operating under normal conditions, and do not apply to noise levels caused by transit vehicles, or emergency ventilation conditions.

c) For any exposed ancillary equipment within enclosed public areas, the maximum background sound level in public areas shall be met at a 3 metre setback from the ancillary equipment.

d) Prediction of background sound levels shall be verified by calculations or modelling conforming to the calculation methods provided in the 2015 ASHRAE Handbook – HVAC Applications, Chapter 48 – Noise and Vibration Control.

e) In all enclosed public areas, the maximum background sound level caused by traffic from nearby streets shall not exceed 50 dBA (1 hour Leq).

2.9.6 Demising Wall Sound Transmission Class

a) The following minimum Sound Transmission Class (STC) ratings shall be achieved for adjacencies to public areas:

PUBLIC AREA ADJACENCY	MINIMUM STC RATING
Staff Areas	45
Washrooms	50
Mechanical, Ancillary Equipment Rooms	55*

*** Higher STC ratings may be required at mechanical rooms based on equipment noise levels as required to achieve public area background noise levels.**

b) The above ratings shall apply to wall and floor/ceiling assemblies, and do not apply to doors or glazing assemblies.

c) Noise control measures shall be provided for mechanical equipment room doors located within public areas such that the maximum background sound level is met in the public area at a 3 metre setback from the equipment room door.

d) Sound lock vestibules or access corridors shall be provided for mechanical equipment rooms where access is required from the public area.

e) STC rated wall assemblies shall be selected from tested assemblies such as those provided in the Ontario Building Code Supplementary Standard or ULC listed assemblies, or by predictive modelling software.

f) Appropriate acoustic treatments shall be applied at flanking paths, penetrations, and other components that may degrade the performance of the wall assembly to ensure that the acoustic integrity of the assembly is maintained.

2.9.7 Reverberation Time

a) Control of reverberation within public areas is critical for ensuring intelligible speech communication through the public address system.

b) A reverberation time (RT60) at 500Hz and above of 1.2s shall be targeted within public areas. A maximum reverberation time (RT60) at 500Hz and above of 1.5s shall not be exceeded within all public spaces.

c) Reverberation within public areas is controlled by incorporating sound absorptive finishes where practical on available wall and ceiling surfaces. In general, the following requirements are provided for acoustically absorptive finishes:

   i. Transaction zone ceiling finishes with an NRC performance of 0.9 shall cover 100% of the ceiling area;

   ii. Transaction zone wall finishes with a Noise Reduction Coefficient (NRC) performance of 0.7 or higher shall cover a minimum 10% of total wall area;

   iii. Platform ceiling finishes with an NRC performance of 0.8 or higher shall cover a minimum 70% of the ceiling area, evenly distributed across the length of the platform;

   iv. Platform wall finishes with an NRC performance of 0.7 or higher shall cover a minimum 15% of total wall area, evenly distributed across the length of the platform;

   v. Stairwells ceiling finishes with an NRC performance of 0.8 or higher shall cover a minimum 100% of the landing area above.

d) Acoustic wall treatments shall be located above a height of 2500 millimetres above the finished floor.

e) The predicted reverberation time in public spaces shall be confirmed based on the Sabine Equation in an unoccupied space.

f) Acoustic design shall coordinate with Audio Visual (AV) design to achieve speech intelligibility requirements as per relevant project specific requirements and is subject to coordination with the operator. For further information, reference section 2.2.3.

2.10 AIR QUALITY

2.10.1 Overview

Air pollutants can have harmful effects, particularly on the respiratory and cardiovascular systems of station occupants. Improving air quality will improve both short term and long-term impacts on occupant health.

2.10.2 Description

Air quality can be improved by controlling the dispersion of pollutants, displacing contaminated air with higher quality air and by filtering air supplied to an occupied area.

a) Stations shall be designed to reduce the accumulation of pollutants throughout the various areas of the station. Passive and active design measures shall be use to improve air quality.

2.11 THERMAL COMFORT

2.11.1 Overview

a) Stations shall be designed to optimize occupant comfort by designing with the following factors of thermal comfort:

i. Metabolic rate

ii. Clothing level

iii. Mean radiant temperature

iv. Air speed

v. Humidity

b) Correct analysis of these design conditions shall serve to improve customer health and well-being, while mitigating stress and discomfort.

i. Spaces shall be designed to implement passive design measures to the greatest extent possible. Where occupant thermal comfort requirements cannot be met with passive design, active design measures shall be implemented. Active design within this standard is defined as airflow strategies for supplemental ventilation or cooling without the need for providing full station HVAC systems to meet requirements. Active strategies may include but are not limited to the use of mechanical ventilation for exchange of airflow, localized heating/cooling, ceiling fans, use of tunnel ventilation systems etc.

ii. Passive design shall follow passive house strategies including but not limited to reduction of solar heat gain, shading strategies, building orientation, microclimates, cross-ventilation, etc. Designs shall ensure an integrated design solution that meets CPTED principles.

2.11.2 Description

a) Thermal comfort shall be analyzed for both transient and continuously occupied areas.

b) Design Principles of ASHRAE 55 - Thermal Environmental Conditions for Human Occupancy shall be applied in the design of conditioned and non-conditioned spaces. ASHRAE 62.1 – Ventilation for Acceptable Indoor Air Quality shall be applied for minimum ventilation and air quality requirements that are acceptable to human occupants.

c) For all station designs it must be demonstrated, through a Dynamic Thermal Model that follows the principles of CIBSE AM 10, and in subsequent commissioning that each station maintains the following comfort criteria in all interior public spaces, including platforms through the year 2050:

i. For elevated and open cut station buildings:

1) During winter, Universal Thermal comfort Index (UTCI) shall achieve moderate cold sensation or better.

2) A minimum temperature for all station interior space of -5°C, at any hour during transit service.

3) Where enclosed Designated Waiting Areas are provided at platform level, radiant heating shall be installed to meet a minimum temperature of -5°C.

4) During winter, the indoor dry bulb temperature (DBT) shall be higher than outdoor DBT - when indoor DBT is below 0°C - for more than 99% of annual revenue service hours.

5) During summer, indoor wet bulb globe temperature (WBGT) shall not exceed 32.5°C for more than 1% of annual revenue service hours to ensure customer and staff safety and comfort.

6) The indoor WBGT shall not exceed outdoor WBGT by 2°C, when outdoor WBGT is above 25°C, for more than 1% of annual revenue service hours.

ii. For underground station buildings, concourse and platform level:

1) During winter, indoor Universal Thermal comfort Index (UTCI) shall achieve moderate cold sensation or better.

2) A minimum temperature for all station interior space, including platforms of -5°C, at any hour during transit service.

3) During summer, indoor wet bulb globe temperature (WBGT) shall not exceed 32.5°C for more than 1% of annual revenue service hours.

4) The indoor WBGT shall not exceed outdoor WBGT by 2°C, when outdoor WBGT is above 25°C, for more than 1% of annual revenue service hours.

5) During winter, the indoor Dry Bulb Temperature (DBT) shall be higher than outdoor DBT - when indoor DBT is below 0°C - for more than 99% of annual revenue service hours.

iii. For any temperature days above 32.5 °C, the proponent shall demonstrate how customer and staff comfort and safety will be ensured without providing additional burden on operator budgets, and provide detailed analysis and evidence as proof, subject to Metrolinx approval.

iv. Thermal comfort criteria is established based on the following working conditions:

1) Thermal comfort maximum temperature criteria noted above is a broad minimum and is based on an assumed exposure time that relates to the relatively short headways of subway systems, as such, no more than 15 minutes.

2) Criteria assumes that staff will be primarily working in air-conditioned spaces.

3) In accordance with the ACGIH, if workers are exposed to heat for the entirety of their shift, the maximum temperature is 31 WBGT for light duty, and 28 WBGT for moderate duty. (American Conference of Governmental Industrial Hygienists (ACGIH), 2023, p.239 to 247).

4) Where staff are expected primarily to work outside of conditioned spaces, the station shall be designed to respect exposure limits for the appropriate time frame.

5) Design temperature criteria shall be compliant with relevant Occupational Health and Safety guidance and legislation.

d) All thermal modelling shall use projected median temperature increases up to the year 2050 unless noted otherwise in the project agreement, using data from the Canadian Centre for Climate Services (CCCS), and assuming an RCP 8.5 scenario.

i. The building energy model shall use the most current 12 consecutive months of complete historical climate data (from Environment and Climate Change Canada) available as a base unless otherwise noted in the Project Agreement.

1) The historical weather data including but not limited to projected temperature, solar radiation, cloud cover, wind and humidity, shall be incorporated as a base from which to escalate the temperature increases, while all other variables (humidity, wind) remain constant.

e) Design criteria shall reflect the intended operating concept.

f) For high ridership interchange/intermodal stations intended to function as hubs with higher anticipated dwell times and ancillary uses such as lease retail, commercial services, etc., the most stringent modal requirements shall be applied. Where Interchange stations are considered occupied spaces they shall be heated and cooled.

2.11.3 Functional Requirements

a) All staff areas, including the station ambassador office shall be ventilated and conditioned in accordance with the relevant project specific requirements and is subject to coordination with the operator.

b) A microclimate analysis shall be carried out for each station area, unique to each project, in order to determine the best design practices for ensuring passenger thermal comfort for each area. Refer to section 2.9.2 e) for additional considerations relating to passenger thermal comfort.

c) Where pedestrian tunnels connect to the subway platform, ventilation shall be provided by the piston effect of the moving subway train.

d) Where pedestrian tunnels do not connect to a subway platform:

i. mechanical ventilation shall be provided;

ii. air intake shafts / relief wells shall be provided to enable ventilation of the tunnels.

e) For non-conditioned areas, ventilation systems shall be designed in a manner that improves thermal comfort of occupants.

f) Additional consideration should be given to ensuring occupant comfort in transient areas. For example, for partially enclosed platforms above grade, the use of additional heating systems should be considered. For partially enclosed areas subject to temperature rises, additional ventilation or alternative cooling measures, including passive mitigation strategies should be considered

g) In general, the entire subway station shall be designed in a manner that minimizes rider exposure to the elements. Glazing and shading elements such as canopies and screening shall be incorporated in a manner that reduces occupant exposure to undesired solar loads, while still accounting for desired natural daylight requirements.

2.12 PLUMBING

Note: To be read in conjunction with:

Section 2.14 Sustainability
Section 6.3 Drinking fountains / Bottle filling stations
Section 6.2 Public washrooms

2.12.1 Description

Applicable design standards and specific design requirements for the plumbing systems are outlined in the sections below and the mechanical subsections of ensuing areas of focus.

2.12.2 General Requirements

a) Plumbing services shall be provided to serve the domestic water usage, drainage and maintenance needs of the station occupants.

b) Piping associated with the plumbing systems shall be concealed in all public areas.

c) Hot and cold water shall be provided at all lavatories and sinks to ensure a comfortable handwashing experience.

d) Drinking fountains are addressed in Section 6.3 - Drinking Fountains / Bottle Filling Stations.

2.12.3 Functional Requirements

a) Plumbing and drainage systems shall be designed in accordance with the relevant project specific requirements and is subject to coordination with the operator.

b) Pedestrian tunnels and bridges shall be provided with recessed lockable hose bibbs.

c) Sanitary drainage shall be provided in pedestrian tunnels and in areas where water can be expected.

d) At least one recessed, lockable hose bibb shall be provided at all levels.

e) At least one floor drain shall be provided at each station level.

f) All piping in unconditioned areas shall be heat traced.

g) Clean-outs shall be easily accessible.

h) Station shall be provided with low flow plumbing fixtures compliant with the requirements of the LEED Indoor Water Efficiency Credit. See Appendix D - LEED Requirements

2.12.4 Design Requirements

a) Headers, valves and meters shall be located in dedicated rooms, separated from cross passages and not located in public spaces.

b) Fire extinguishers in public areas shall be enclosed in cabinets with solid covers and proper identification.

c) For detailed additional fire protection technical requirements refer to the relevant project specific requirements and is subject to coordination with the operator.

2.13 SUSTAINABILITY

Sustainability is a critical component of how Metrolinx plans, designs, builds and operates its transit facilities and is the core concept framing the vision of the Metrolinx 2041 Regional Transportation Plan.

The DS-05 Sustainable Design Standard sets out the principles of sustainability throughout the design phase of projects and is an important tool in ensuring that Metrolinx's facilities are practical, durable and reliable.

2.13.1 Envision

The pursuit of Envision, a framework for assessing sustainability, resiliency and equity in civil infrastructure, is preferred, and must be evaluated at a minimum, through completion of the Envision Pre-Assessment checklist, particularly for a new transit line or extension

2.13.2 LEED

Suitability of LEED certification at each Station shall be evaluated on a case by case basis. Where LEED certification is not pursued, select credit requirements may be included in the project agreement in lieu of the requirement of LEED certification.

In general, the pursuit of LEED certification is encouraged when:

a) the Station meets LEED Minimum Program Requirements;

b) the Station has enclosed and actively heated and cooled public spaces that will be regularly occupied by people;

c) achievement of all prerequisite credits is possible; and

d) the implementation of enough credits is possible such that LEED certification can be achievable.

Refer to Appendix D: LEED Requirements Table D-1 for credit applicability when LEED certification is pursued. If select credit requirements are to be included in project agreement, selection is to be from those designated as mandatory.

A minimum of LEED Gold certification is required at the MSF, unless stated otherwise in the Project Agreement. Refer to DS-05 Sustainable Design Standard for consistent requirements and design best practices to apply to the delivery of capital and operationally cost-efficient buildings, facilities, and sites with high life-cycle sustainability performance. Applicability may vary depending on the size and nature of Stops and Stations.

Refer to Appendix D: LEED Requirements Table D-2 for MSF requirements

3.0
Public Realm

3.1 PUBLIC REALM

3.1.1 Introduction

At its most basic level, the Public Realm consists of spaces for people to use. They are shared civic assets made accessible for public use. The public realm consists of the connecting points between buildings, and the right of ways that structure how we move around the city – cycling, walking, driving, or taking transit.

The Public Realm has a significant impact on every Transit Oriented Community (TOC). The public realm's context and scale determines the **strategies** and the deployment of their **common elements**.

Strategies and requirements shall be applied to Metrolinx property and coordinated with municipalities to allow for a coherent design approach.

3.1.2 Strategies

Strategy deployment will be dependent on scale and proportion of the available public realm zone in front of and around the station. The public realm shall be designed using three clear strategies: the Streetscape, The Plaza at the Station Entrance, and finally the Forecourt which takes advantage of additional space by adding landscape strategy to the Plaza and the Streetscape. The Forecourt is particularly important when there is a standalone pavilion station typology whether within a development or within a park. The Plaza, introduces a setback to the station entrance, creating an expanded entry space that stretches from the curb edge to the face of the building. The smallest strategy, the Streetscape addresses sites where the public realm is the scale of the sidewalk. This public realm strategy seeks to integrate the unpaid zone, the Plaza and the public right of way into a threshold to establish a clear sense of arrival and departure in a limited space.

3.1.3 Common Elements

The design and function of the infrastructure, furnishings and materials underscore the civic character of the public realm at each station.

Note: This section shall be read in conjunction with the DS-02 Universal Design Standard and with relevant project specific requirements and is subject to coordination with the operator.

3.2 PRIORITIES

The Metrolinx vision is for a harmonized system focused on consistent design language, detail, and civic quality across the entire line. The following provides a summary of the principles and requirements to support Metrolinx's urban design goals.

Note: The following principles shall be read in co-ordination with DS-02 Universal Design Standard.

1. A Narrative Vision
2. Passenger Experience
3. Civic Scale, Materiality and Quality
4. Integrated Systems
5. Responsiveness to Climate and Context

3.2.1 A Narrative Vision

A recognizable narrative vision across the system ensures that the station is recognizable from the distant, middle, and close view as the customer reaches the station. The shaping and the deployment of common elements supports the customer's approach to the Metrolinx station. This narrative vision ensures that the Customer Experience at Arrival and Departure shall be well-connected, convenient, safe and frustration-free.

3.2.1.1 Similar language and environment at Stations

a) Consistent materials, urban design elements, and detailing.

b) High quality at grade surface materials that embody the civic character of the public realm.

c) A systematic and codified use of landscape, materiality, and pattern act as the Station public realm identifier and support passenger experience.

3.2.1.2 Visible and functional sustainable features including a signature sustainable lighting strategy

3.2.1.3 An urban design approach based on high functionality with a simple, predominantly rectilinear language at its core, void of non-essential form making

3.2.1.4 A clear public realm strategy for determining and applying elements of Continuity and Variability at each station

a) Elements of Continuity are the common elements deployed within the public realm strategies.

b) Elements of Variability may include, but are not limited to, public art, streetscapes, heritage requirements, and responses to micro-climates and to future development.

c) Deployment and detailing of all common elements shall be considered holistically.

3.2.1.5 Integration of right of way into public realm treatment is limited to public-facing, publicly-accessible facilities.

3.2.1.6 Design solutions shall consider future expansions.

a) Including future connections to other multi-modal transit services and adjacent local transit services and highlight potential future opportunities for integration with the surrounding community.

b) Consider future integration with potential adjacent development through transit-oriented communities.

3.2.2 Public Experience

The Public Realm design shall elevate the quality of the customer journey and serve the diverse needs and abilities of all customers regardless of age, gender, income or familiarity of the system. Equally, this experience shall remain a priority to ensure customers feel safe throughout their passage across the public realm at any time of day and at any location.

3.2.2.1 Openness through optimal spatial porosity

Optimize spatial porosity, visual transparency, and sight lines free of obstruction between Streetscapes, Plazas, Forecourts to increase safety (actual and perceived), and ease of wayfinding.

3.2.2.2 Optimized Flow

All elements and amenities shall be organized and integrated into a unified scheme to support wayfinding, navigation, and optimize circulation space and pedestrian flow. Services and amenities shall be integrated into urban furniture, or planted areas to ensure optimized pedestrian flow in high circulation areas.

3.2.2.3 Inclusive and Equitable

Provide access for all through the implementation of the principles in alignment with the DS-02 Universal Design Standard.

a) **Inclusive:** The public realm shall provide an integrated, convenient, usable and safe experience for customers through designs that are inherently accessible to people with diverse abilities.

b) **Equitable:** The public realm shall be designated with appropriate size and space for use regardless of a user's age, body size, posture or mobility to promote ease of movement for all. The public realm shall support equitable convenience and opportunity for enjoyment.

3.2.3 Civic Scale, Materiality and Quality

3.2.3.1 Materials shall create a unified surface directionally consistent between inside and outside of Stations

a) The exterior and interior surface materials shall complement one another and aim to align with the architectural grid.

3.2.3.2 Consistent and well proportioned that complement Station buildings

a) The public realm shall have a consistent material, colour and proportion that aligns with that of the Station architecture.

b) Public realm surface materials shall define a distinctive Station zone characterized by unique surface expressions and/or patterns, with base dimensions aligned with the Station architecture.

c) Public realm material surfaces shall coordinate with 3rd party designs within the Development and Transit Oriented Communities, including spaces on private property (publicly owned private space) that may also serve transit entrances.

3.2.4 Integrated Systems

Integrated Design includes the integration of all infrastructure and systems to enhance customer experience. The public realm **Strategies** and **Common Elements** shall integrate infrastructure and systems through an integrated design approach. The Strategies and Common Elements sections elaborate on this approach.

3.2.4.1 Integrated Lighting Systems

The lighting strategy is a key to both the wayfinding strategy and the overall public realm strategy and shall focus on and reinforce the station address. To that end, exterior illumination shall be coordinated with public realm and streetscape lighting levels and treatments to provide reasonable use of outdoor lighting for evening hour safety, security, productivity, enjoyment and retail uses. The lighting strategy reinforces the station address.

a) Optimize consistency in the lighting design and its associated infrastructure. For specific requirements refer section 4.4.5.

b) Lighting shall be coordinated to align with datums and modules integrating with the overall design for each site, and set at a consistent datum that defines movement and directs spatial continuity.

c) Higher lighting levels shall be provided at decision points or areas where safety and convenience suggest it, and where it is desired to emphasize the building as a beacon, provide a sense of welcoming. For specific requirements refer section 4.4.5.

d) Lighting shall be designed and selected to achieve optimal colour accuracy and minimize sharp contrasts

e) Specialized lighting shall be dark sky compliant and be provided to highlight interesting landscape, architectural and interior design features.

f) Achieve acceptance/support from the Municipality for the exterior illumination approach.

3.2.4.2 A clear hierarchy and plan for user-centered integrated information and navigation

a) Location of wayfinding and signage shall always take precedence over location of advertising.

b) Wayfinding shall be highly legible and characterized by simplicity of information delivery for all customers of all abilities.

c) Always follow the public realm design standard Strategies and Common Elements as set out in this document. This approach limits visual clutter and offers a typology for integration of advertising, fare media, retail and third party public art.

d) Provide illumination at decision making points.

3.2.4.3 Simplified, integrated modular signage and hardware language shall be consistent across new and retrofit Public Realm spaces, Stations, and Portals

a) Provide consistent sign elements, installation methodology and placement

b) Information displays shall be designed to facilitate the provision of current and remotely updated information.

3.2.4.4 Integration of system identifiers and coordination of common elements including regional transit identity brand, Station name, line number and logo

3.2.4.5 Clearly organized and integrated passenger amenities

a) Demonstration of a strategy for organizing the hierarchy of passenger amenities shall prioritize transit usage amenities over secondary amenities. Transit usage amenities are outlined in the Common Elements section of these Standards and include bicycle amenities, benches and passenger focused retail.

b) Passenger amenities shall be integrated into the built structures of Stations to avoid visual clutter while facilitating ease of use.

3.2.4.6 Integrated Retail Strategy

a) Retail signage shall be secondary to transit identity and wayfinding signage, and should be co-ordinated to ensure that it does not obscure/detract from these.

b) Retail shall be visually integrated as part of each site's volumetric whole without projection or overhead intrusion of signage.

c) Ensure that the Retail Strategy does not compete, complicate or elongate the customer journey at each station.

3.2.5 Responsiveness to Climate and Context

Responsiveness to contextual, local, man-made and natural conditions. Responding to climate includes following relevant sustainability standards and frameworks while applying them in a way that is responsive to site context. This includes seizing opportunities for improving, mitigating, or exploiting local urban micro-climate conditions including prevailing sun, shade, and wind conditions.

3.2.5.1 Urban design shall be integrated with historical context and the attributes and/or values associated with unique heritage properties

3.2.5.2 The distinct civic realm of Station plazas and Portals shall be visually coordinated with the Unpaid Zone and the public right of way.

3.2.5.3 Vents and mechanical elements shall be screened using a consistent screen and material palette that is part of the overall public realm language.

a) Vent and mechanical elements placement shall avoid sidewalks or planters and show a preference for integration with the buildings and their cladding treatments. For specific requirements refer section 4.6.

b) Vents and mechanical elements must also be placed in consideration of adjacent property uses, particularly proximity to sensitive elements such as operable windows and exterior gathering spaces.

3.2.5.4 Common elements shall be responsive to the community and municipal stakeholder considerations and services.

a) Public Ream Infrastructure shall be integrated with the neighbourhoods in which it resides, bridging these community Streetscapes with a coordinated approach to common elements that link to the adjacent communities.

b) Within the Landscape Forecourt, Trees and landscaping, shall be used to frame views and circulation routes; giving them prominence on the site and making them part of the customer journey and experience.

c) **Future Proofing:** Accommodate for future change including changing climatic conditions, development opportunities, socio-economic trends, customer profiles and behaviour and the evolution of mobility service delivery.

d) **Local Context:** Respond to the impact of local site conditions. Properties impacted and demolished for the Project shall be left in an interim condition that includes a primary landscape strategy that limits the need for fencing.

e) **Smart City Technologies:** Provide the flexibility to allow for future technologies and recognize key trends in transportation technology to ensure station environments remain responsive and relevant in the future.

3.3 STRATEGIES

The public realm typologies set a station design idiom, a set of standard conditions that demonstrate how to design the ideal subway station public realm for the ideal journey by responding to the scale and context of the urban condition.

The public realm strategies are introduced below as the Streetscape, the Plaza and the Forecourt. These strategies are based on incremental increases in scale and scope, with arrival and identity as priority regardless of project size. At minimum the public realm will be established with a clear material character in the right-of-way that draws on the Streetscape strategy. This expands to include the setback area at the station entry forming the Plaza. On even larger sites, the plaza entry will be supplemented with expanded planting creating the Forecourt.

Note: Strategy requirements shall be read in conjunction with Transit Oriented Communities guidelines as they pertain to developer led portions of the project.

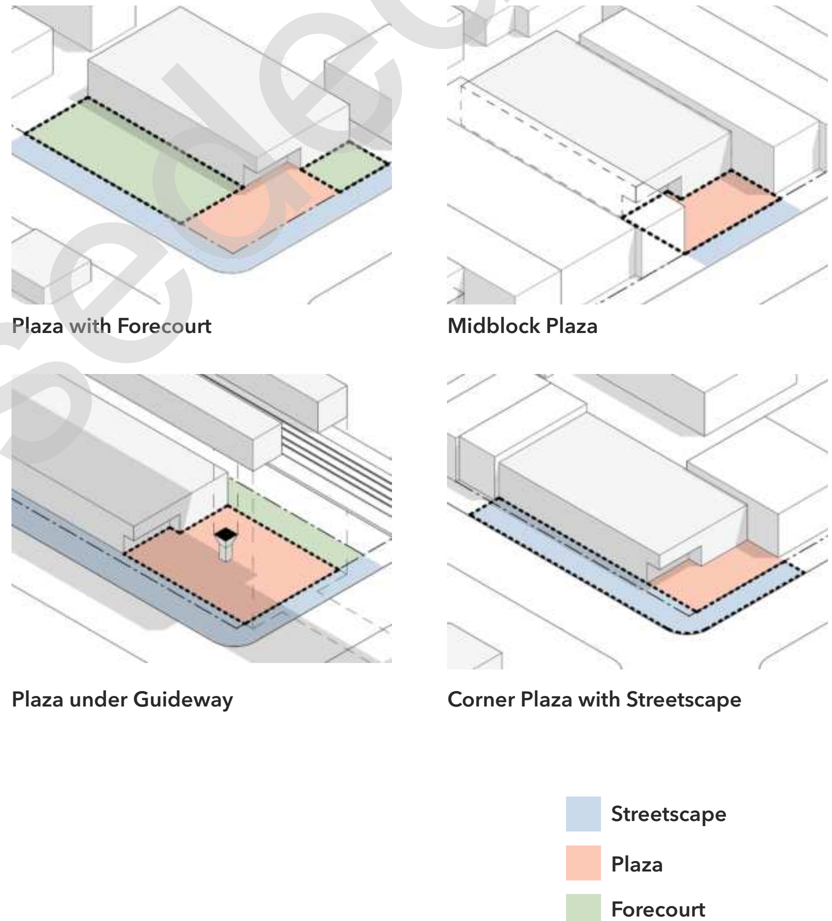


Figure 3-1: Strategies Matrix

3.3.1 Forecourt

The Forecourt is created with the site area is large enough to augment the Plaza entry with the addition of planters and landscape that structure and frame spaces for pedestrian flow and gathering.

The Forecourt is a device that, space permitting, can frame the Plaza to signify entrance. For the larger sites a series of planters and tree groves with understorey can frame the Plaza and for the smallest sites they can simply frame the Streetscape.

The metrics that determine the addition of the Forecourt to the Plaza are based on site conditions and respective design parameters including pedestrian flow modelling on a site by site basis.

Scale and Context

Where there is space for trees and softscape elements, a consistent signature landscape design language of perennials, ornamental grasses, low growing plants and deciduous tree species that provide all- season visual interest shall be demonstrated. The softscape environment of The Forecourt shall be developed to enhance and complement the hardscape elements, infrastructure and station facilities.

Trees and planting material shall assist in defining spaces and enhancing the pedestrian experience as well as providing guidance for pedestrian movement and wayfinding.

Trees and planting material shall be consistent in form, size and species selection as they relate to both site context, climatic conditions and maintenance requirements throughout the transit line. Variability shall be employed for each station to provide a unique signature and to assist in creating a softscape identity.

Guiding Principles

a) The softscape is to work in close harmony with the hardscape in creating spaces that are clear in their function and reinforce the built environment of all stations.

b) The Forecourt design will use plant material that is non-invasive, hardy, drought tolerant and predominantly native species. The plant material selection must comply with applicable Municipal Standards. The Forecourt will establish a planting palette responsive to the planting location within the site and its use or purpose including:

   i. Planting to mark major entrances,

   ii. Mass planting to screen mechanical and service areas while allowing access, yet not conflict with Wayfinding and Safety by Design Principles.

   iii. Varied and specialty planting within service areas for Low Impact Development storm water management practices.

   iv. Transition to adjacent properties.

c) The Forecourt planting shall provide comfort in supporting the customer journey

d) Conceptual layout of the Forecourt is important for the design and location of the below grade structured parking and/or foundation systems to allow for soil volume above the top of slab to a depth of one metre to ensure that the trees to thrive and grow.

e) Deciduous trees are to be used to provide shade, canopy, framing of views, spatial definition and microclimate attributes. Trees shall be spaced and coordinated to provide planting density either in groups or as individual specimens. Trees shall provide rhythm, and definition to contain and articulate public realm activation;

   i. In large Forecourt spaces where pedestrian movement is not impeded, tree groves in raised planters are recommended. Ideal spacing for these groves is dependent on available soil volume and tree type.

   ii. In small Forecourt spaces, raised planters shall not impede with pedestrian movement.

   iii. Where planters are recommended, they shall be designed to discourage skateboarding along planter edges.

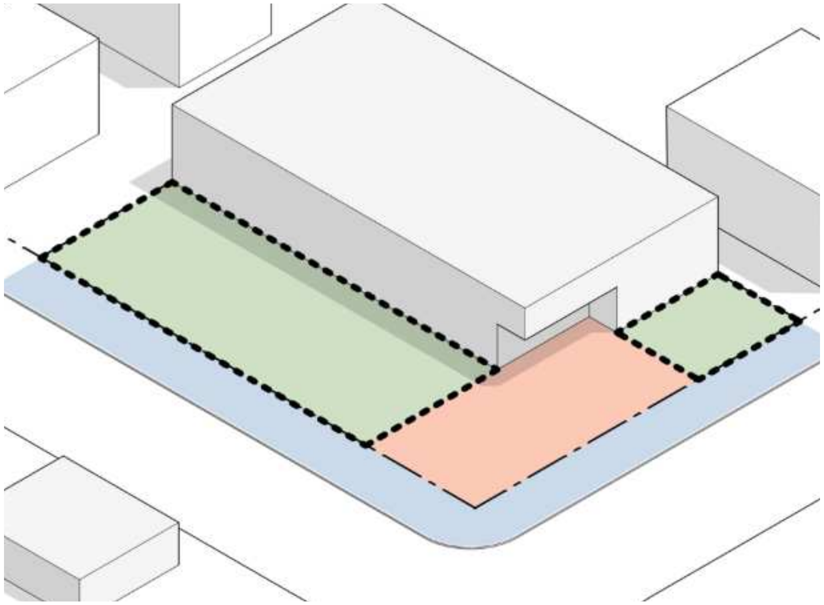
   iv. Where space allows trees shall be placed in groves to create microclimates that support customer comfort

f) Forecourt landscape design will be used as screening to protect the site from natural elements (such as wind, noise and snow) and as visual screening.

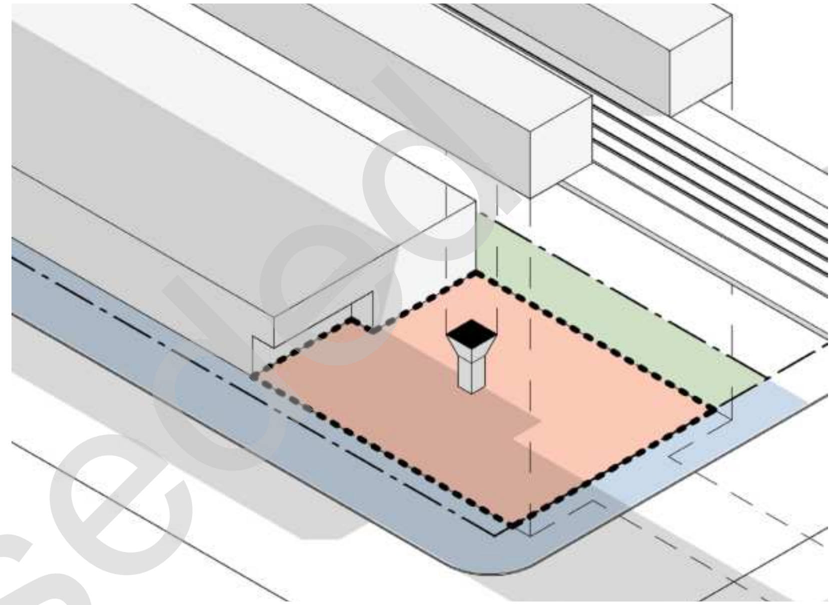
g) Plant material along sensitive areas such as the Natural Heritage System and the Ravine Protected Area to be 100 percent native plants (including trees, shrubs and herbaceous plants). Only non-invasive plants shall be used.

h) Tree species shall be coordinated to eliminate impact with overhead and below grade utilities.

i) Refer to section 3.4.2.1 for the minimum seating area requirements.



3.3.1.1 Plaza with Forecourt



3.3.1.2 Plaza Under Guideway

- **Streetscape**
- **Plaza**
- **Forecourt**

Figure 3-2: Forecourt Typologies

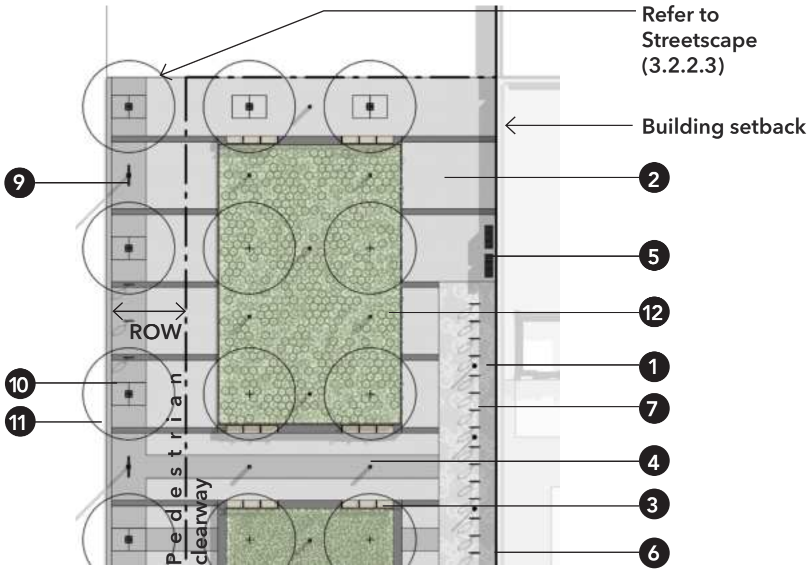


Figure 3-3a: Plaza with Forecourt Plan

Figure 3-3b: Plaza with Forecourt Axonometric View

Common Elements (Section 3.4)

- \# Black label: Required
- \# Grey label: If conditions permit

1. Cycling super graphics (3.4.4)
2. Paving pattern (3.4.2.3)
3. Seating (3.4.2.1)
4. Safety Bollards (3.4.2.2)
5. Waste Receptacle (3.4.2.3)
6. Signage (3.4.2.4)
7. Bicycle Parking (3.4.3)
8. PUDO (3.8.7)
9. Light Standards (3.4.5)
10. Tree grates with soil cells (3.4.9)
11. Trees (3.4.10)
12. Planters with ground cover planting

Figure 3-3: Plaza with Forecourt

Figure 3-3c: Plaza with Forecourt Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

3.3.2 Plaza

The harmonized vision for the Plaza sets out parameters that welcome both public and private realm integration. The materials, colour and proportion elaborate on the Metrolinx branding. The following provides a summary of the principles and requirements to support the Metrolinx Plaza design standards.

The size and arrangement of elements in plazas shall be informed by pedestrian volumes and micro-simulation modeling of pedestrian flows and queues. Recommend establishing desired and minimum pedestrian level of service standards for regular operations as well as exceptional conditions such as construction.

Analysis shall include all planned and informal activities, beyond commuting, that occur in station plazas such as walking, waiting, queuing, group gathering, shopping and socializing. This shall also include any major pedestrian traffic generators attributed to local attractions (cultural, recreational, sports, restaurant ROW).

Scale and Context

The Plaza strategy shall be followed when there is more than 10m x 2m of public realm to create an outdoor room in front of the Station.

Scale

a) In addition to being adjacent to the sidewalk, plazas shall have uninterrupted continuity and permeability for pedestrian access, avoiding changes in grade and physical obstructions that impede unencumbered access.

b) The scale of the Plaza and the allowance for a Landscape Forecourt will be in response to the predicted population density, the expected pedestrian flow and the existing or planned land use context.

c) Determination of the Plaza proportions shall be informed by contextual variations such as the tight downtown condition to the super block, or the Transit Oriented Community development block.

d) Refer to section 3.4.2.1 for the minimum seating area requirements.

Context

e) The Plaza shall follow a consistent and continuous public realm language through the exclusive deployment of the Common Elements set out in this Standard.

Plaza Functional Requirements:

The Subway station shall be sited to include direct connections to the public sidewalk with an area designed to function as a 'lobby' between the transit facility and the immediate surroundings. This designated space will form the plaza and shall:

f) Include the following zones:

   i. Pedestrian clearway, sized to accommodate peak movement, and located to connect directly to the station entrance;

   ii. Amenity zone, contiguous with the pedestrian clearway, sized to accommodate anticipated volume of informal waiting, and designed to include seating, lighting, and related amenities.

   iii. Planting zone, located so as not to impede pedestrian movement, or visibility, and designed to include street trees or other suitable plantings to enhance the appearance and frontage of the station entrance and support a positive relationship with adjacent or integrated development, where applicable.

g) Facilitate connections between transit services, accessible pickup and drop-off, ride share, and cycling facilities, where applicable.

h) Be located and sized to accommodate or connect to unsecured bike-storage, and/or Municipal Bike Share facilities. Where space permits, bike-storage should be considered in areas that are covered by a pavilion, awning etc.

i) Be enlarged through negotiation with adjacent third parties to provide direct uninterrupted connection with adjoining municipal rights of way, privately-owned publicly accessible open spaces (POPS) or public parkland.

j) Size of the plaza to be informed by confirmation of pedestrian level of service.

k) Provision for pop-up retail to animate the plaza, where space permits.

3.3.2.1 Midblock Plaza

The Midblock Plaza is formed by integrating the streetscape right-of-way with a space formed by setting back the building from adjacent structures. This shift in the street frontage creates a legibly courtyard entry at the front of the station.

The hallmark of the space outside the midblock station is that it can be used for multiple purposes at different times. Scale and Context will determine these parameters.

Scale

a) Midblock Plazas size shall be in direct proportion to the station they serve. They shall be at least a third of the total of the width of the station front and at least a quarter of the length of the side of the station. The property side for the midblock type is defined as the shared sides of the property perpendicular to the main entrance property line or frontage.

b) The minimum width of the Midblock Plaza shall be determined by the minimum width of the facade of the subway station entrance.

c) Refer to section 3.4.2.1 for the minimum seating area requirements.

Context

d) Midblock Plazas will respond to one of these three contextual conditions:

   i. Large Midblock: Larger than 20m width.

   ii. Medium Midblock: 10 to 20m width

   iii. Small Midblock: 10m or less width

e) Hardscape transition from adjacent properties to Midblock Plaza shall be coordinated and integrated to achieve a coherent deliberate outcome in terms of overall design, alignment, colour, and finish.

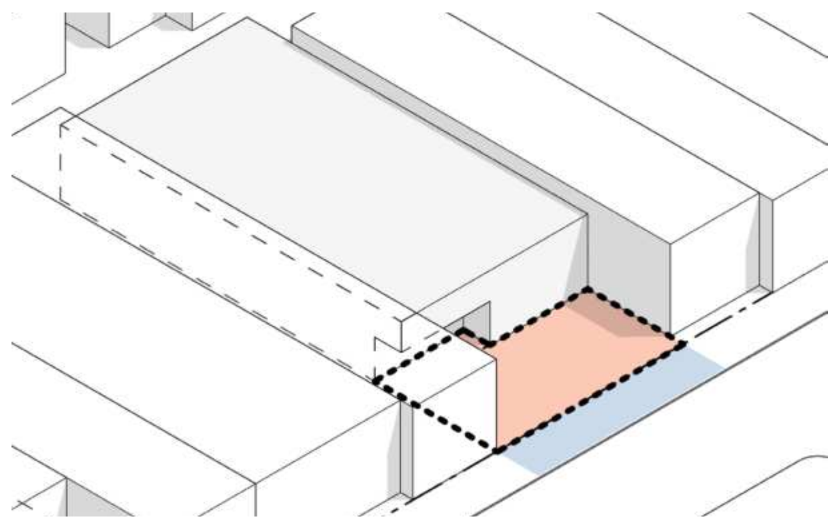


Figure 3-4: Midblock Plaza

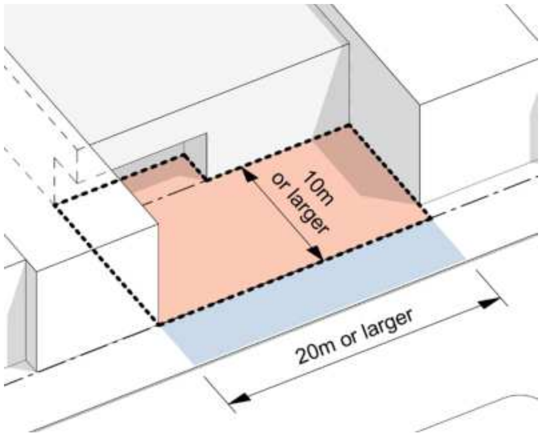


Figure 3-5a: Large Midblock Plaza

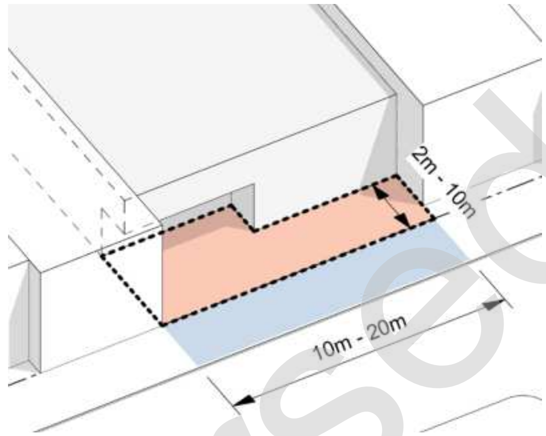


Figure 3-5b: Medium Midblock Plaza

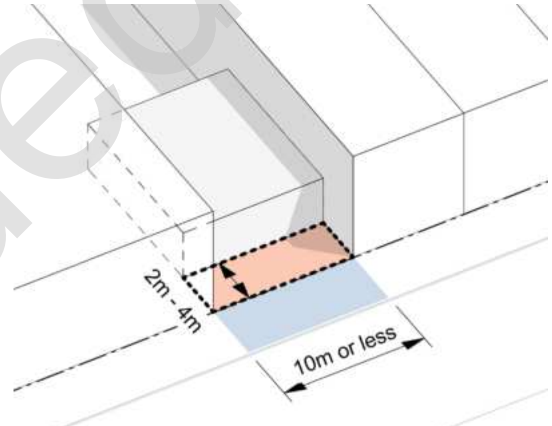


Figure 3-5c: Small Midblock Plaza

Streetscape

Plaza

Forecourt

Figure 3-5: Midblock Plaza Strategies

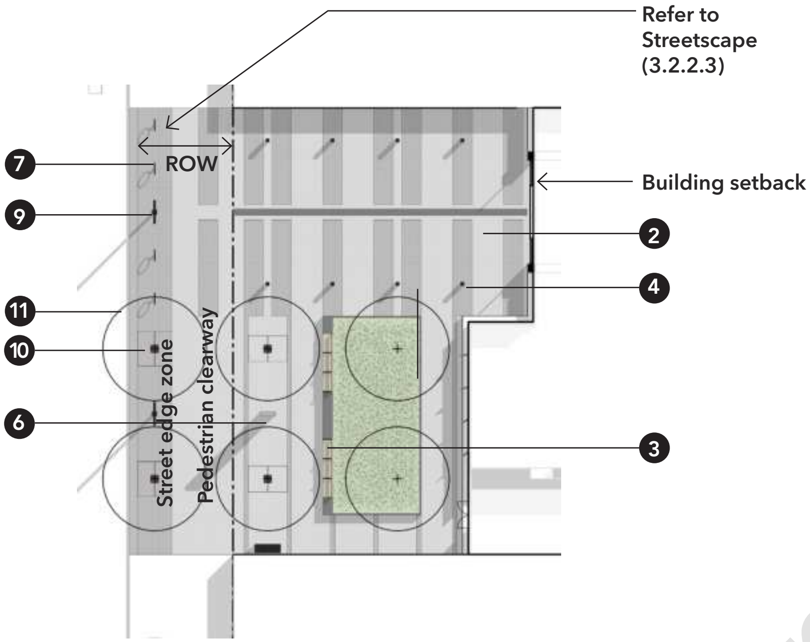


Figure 3-6a: Large Midblock Plaza Plan

Figure 3-6b: Large Midblock Plaza Axonometric View

Common Elements (Section 3.4)

- # Black label: Required
- # Grey label: If conditions permit

- 1 Cycling super graphics (3.4.4)
- 2 **Paving pattern (3.4.2.3)**
- 3 **Seating (3.4.2.1)**
- 4 **Safety Bollards (3.4.2.2)**
- 5 Waste Receptacle (3.4.2.3)
- 6 **Signage (3.4.2.4)**
- 7 **Bicycle Parking (3.4.3)**
- 8 PUDO (3.8.7)
- 9 **Light Standards (3.4.5)**
- 10 **Tree grates with soil cells (3.4.9)**
- 11 **Trees (3.4.10)**
- 12 Planters with ground cover planting **(3.4.11)**

Figure 3-6: Large Midblock Plaza

Figure 3-6c: Large Midblock Plaza Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

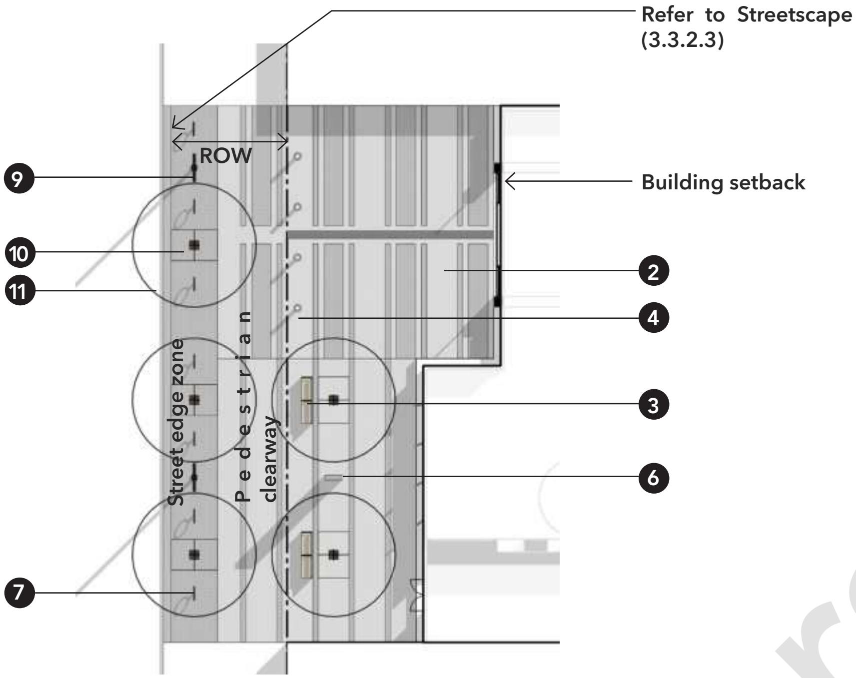


Figure 3-7a: Medium Midblock Plaza Plan

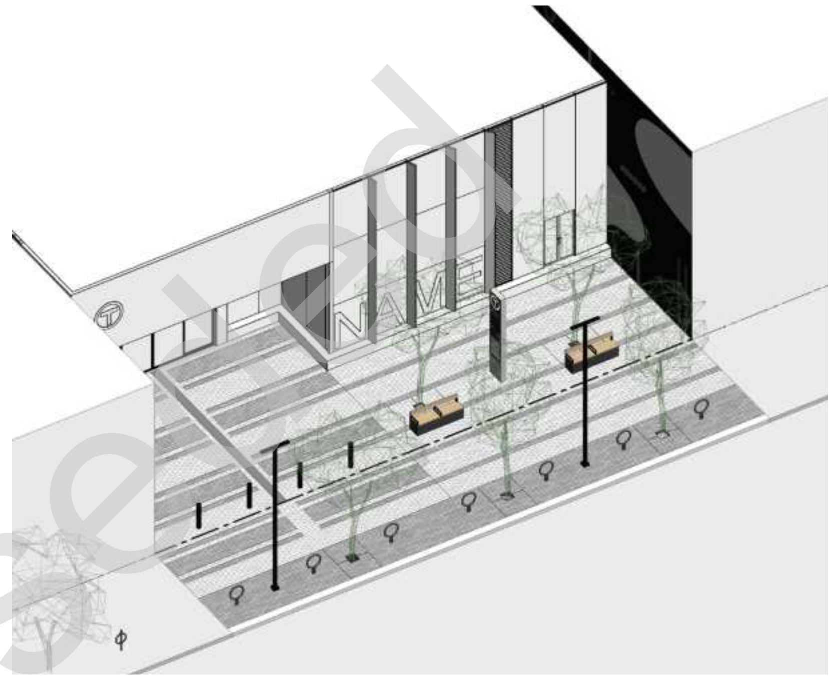


Figure 3-7b: Medium Midblock Plaza Axonometric View

Common Elements (Section 3.4)

- **#** Black label: Required
- **#** Grey label: If conditions permit

- 1 Cycling super graphics (3.4.4)
- 2 **Paving pattern (3.4.2.3)**
- 3 **Seating (3.4.2.1)**
- 4 **Safety Bollards (3.4.2.2)**
- 5 Waste Receptacle (3.4.2.3)
- 6 **Signage (3.4.2.4)**
- 7 **Bicycle Parking (3.4.3)**
- 8 PUDO (3.8.7)
- 9 **Light Standards (3.4.5)**
- 10 **Tree grates with soil cells (3.4.9)**
- 11 **Trees (3.4.10)**
- 12 Planters with ground cover planting

Figure 3-7: Medium Midblock Plaza

Figure 3-7c: Medium Midblock Plaza Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

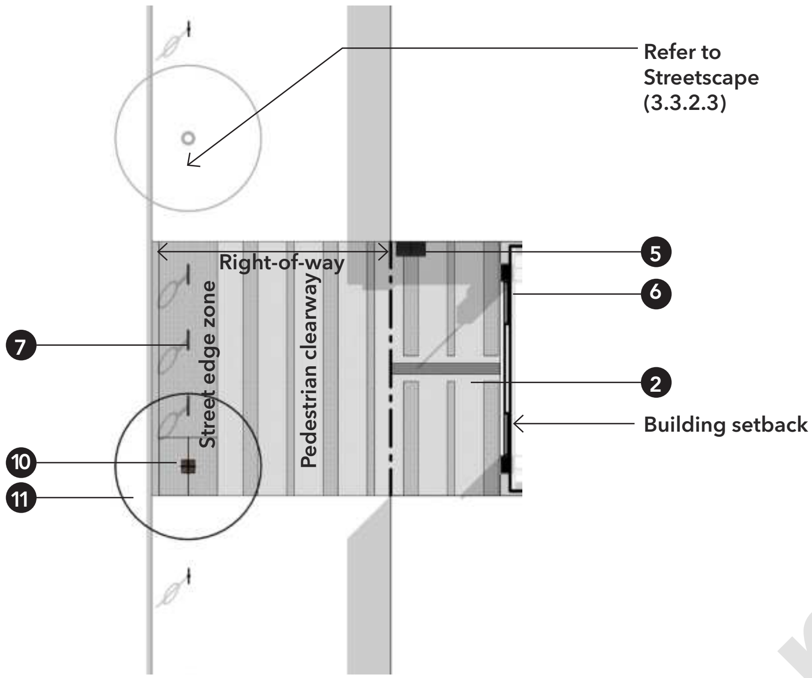


Figure 3-8a: Small Midblock Plaza Plan

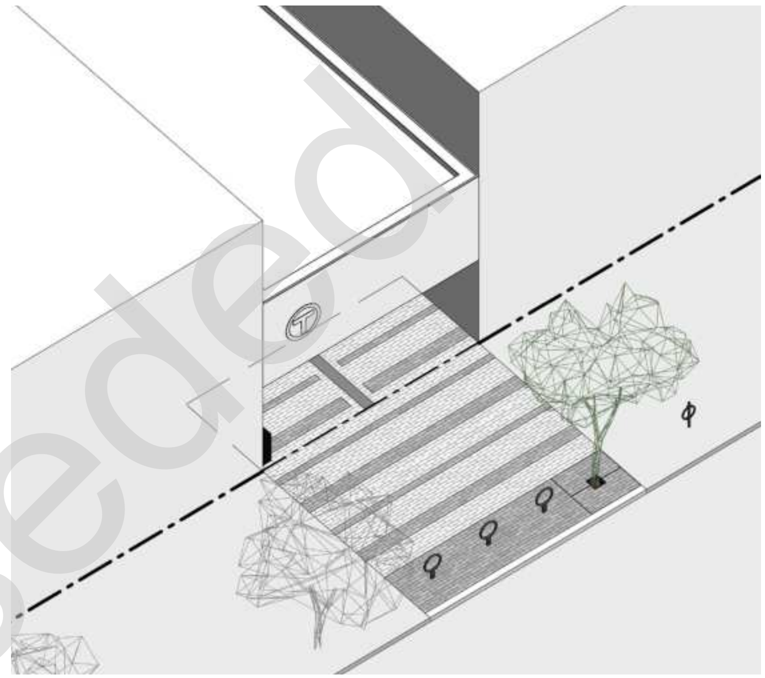


Figure 3-8b: Small Midblock Plaza Axonometric View

Common Elements (Section 3.4)

- # Black label: Required
- # Grey label: If conditions permit

- 1 Cycling super graphics (3.4.4)
- 2 Paving pattern (3.4.2.3)
- 3 Seating (3.4.2.1)
- 4 Safety Bollards (3.4.2.2)
- 5 Waste Receptacle (3.4.2.3)
- 6 Signage (3.4.2.4)
- 7 Bicycle Parking (3.4.3)
- 8 PUDO (3.8.7)
- 9 Light Standards (3.4.5)
- 10 Tree grates with soil cells (3.4.9)
- 11 Trees (3.4.10)
- 12 Planters with ground cover planting

Figure 3-8: Small Midblock Plaza

Figure 3-8c: Small Midblock Plaza Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

3.3.2.2 Corner Plaza with Streetscape

The Corner Plaza is when the station entrance is at the corner with frontage on two sides. The Corner Plaza integrates the Streetscape right-of-way spaces on both frontages, preferencing one or both to create a legible courtyard entry.

The Corner condition offers visibility from multiple directions and aids with the identification of the station entrance. At tighter corner site conditions, the Corner Plaza identity is extended from the station entrance(s) to the curb.

Scale

a) The minimum width of the plaza shall be 10.0m which is the minimum width of the Station Entrance.

b) The Corner Plaza seating shall accommodate at a minimum 10% of total expected peak ridership.

c) Refer to section 3.4.2.1 for the minimum seating area requirements.

Context

d) Corner Plazas shall respond to the contextual conditions.

e) Hardscape transition from adjacent properties to the Corner Plaza shall be coordinated and integrated.

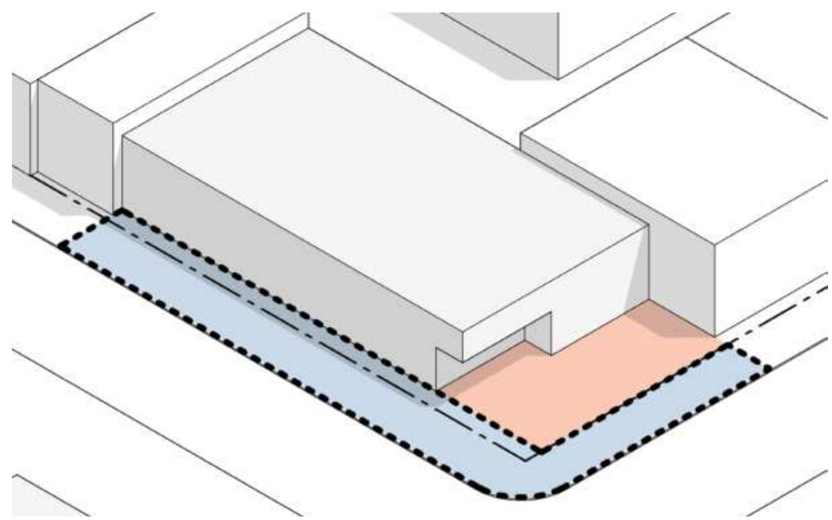


Figure 3-9: Corner Plaza with Streetscape

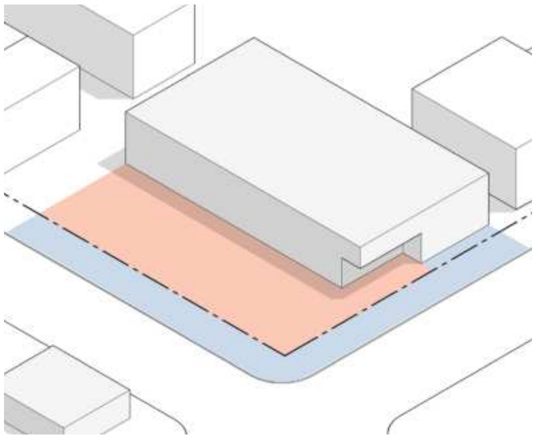


Figure 3-10a: Long Corner Plaza

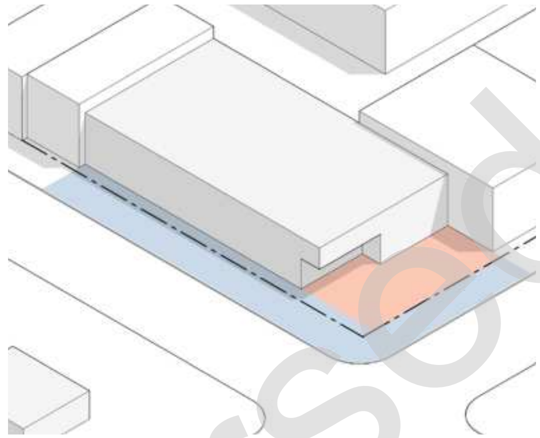


Figure 3-10b: Short Corner Plaza

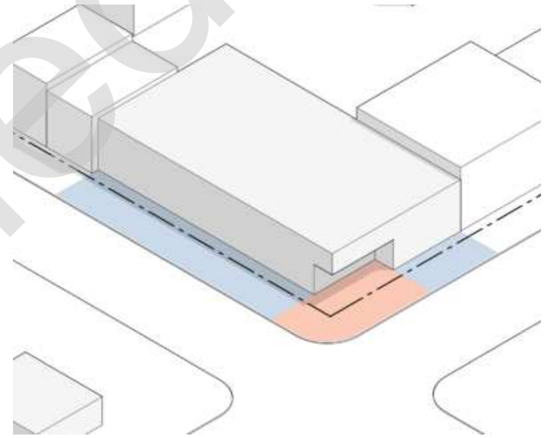


Figure 3-10c: Small Corner Plaza

Streetscape

Plaza

Forecourt

Figure 3-10: Corner Plaza with Streetscape Typologies

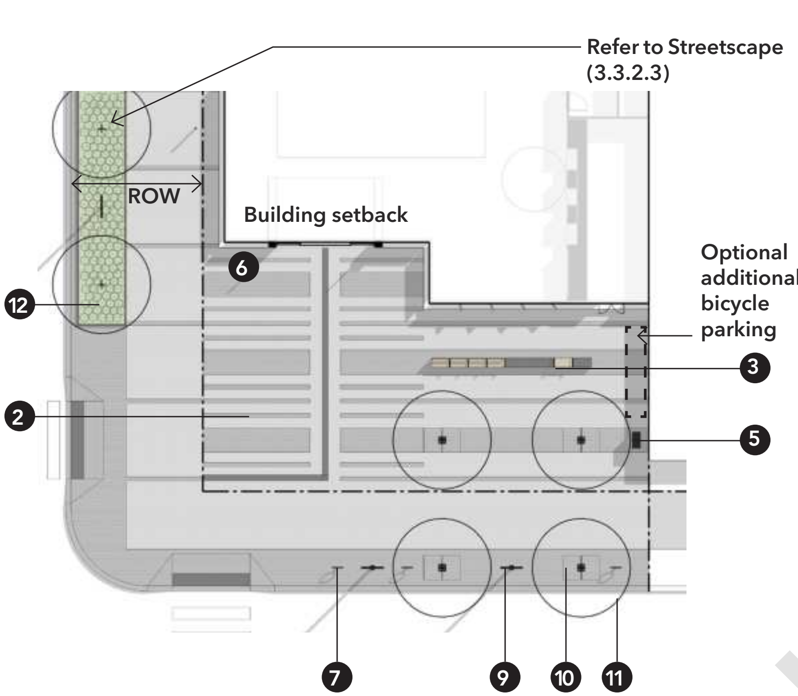


Figure 3-11a: Short Corner Plaza Plan

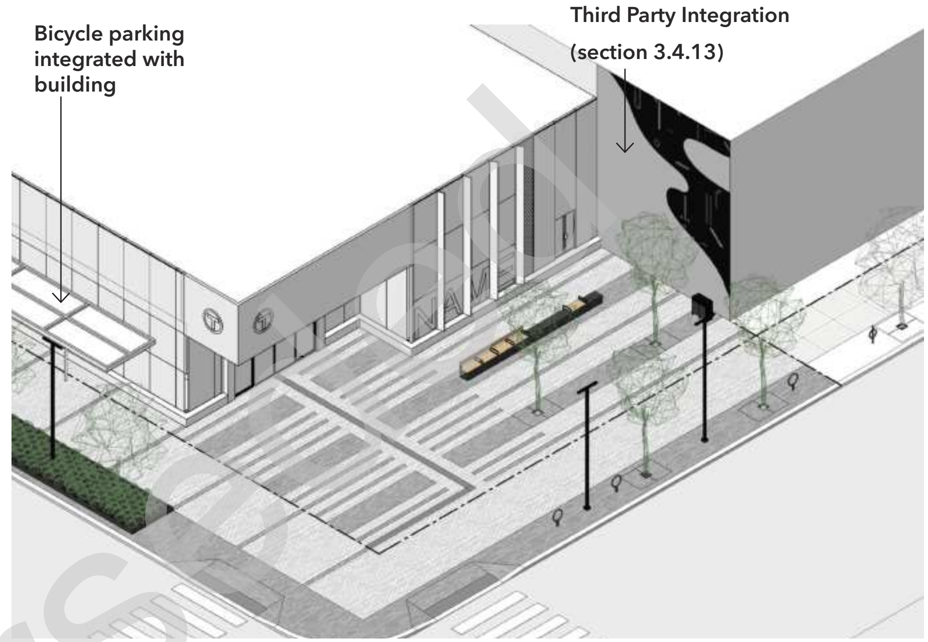


Figure 3-11b: Short Corner Plaza Axonometric View

Common Elements (Section 3.4)

- # Black label: Required
- # Grey label: If conditions permit

- 1 Cycling super graphics (3.4.4)
- 2 **Paving pattern (3.4.2.3)**
- 3 **Seating (3.4.2.1)**
- 4 Safety Bollards (3.4.2.2)
- 5 **Waste Receptacle (3.4.2.3)**
- 6 **Signage (3.4.2.4)**
- 7 **Bicycle Parking (3.4.3)**
- 8 PUDO (3.8.7)
- 9 **Light Standards (3.4.5)**
- 10 **Tree grates with soil cells (3.4.9)**
- 11 **Trees (3.4.10)**
- 12 Planters with ground cover planting

Figure 3-11: Short Corner Plaza

Figure 3-11c: Short Corner Plaza Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

3.3.2.3 Streetscape

The Streetscape, the Plaza and the Forecourt combine to form the daily foundation for the active well being and social enrichment of the journey.

The Streetscape is the strategy for the tightest of urban conditions and requires an approach to aid with the identification of the entry for the subway station. The space of the Streetscape, including street tree planting, pedestrian clearway and subway entry Streetscape will be designed to be a significant arrival point for the subway while continuing to maintain civic function as a thoroughfare.

The Streetscape is the most compact of the Subway Station sites and thus review by operator will be required, and particularly important in this case, to ensure a maintenance effort is being provisioned for.

a) For all stations, the required pedestrian clearway dimension is 2.1m. The overall width of the plaza, including planting /furnishing zones shall be at least 4.8m or 6.0m, depending on the right-of-way width (<30m vs. ≥30m).

b) The Streetscape elements shall reinforce wayfinding and unobstructed navigation of the subway public realm.

c) Streetscapes shall include trees.

d) The focus shall on the provision of below grade soil to support tree growth.

Streetscape and Common Elements

The Streetscape strategy shall adapt the following:

e) Station entrance approaches shall be directly from the main street allowing passengers to identify the Station entrance in the context of busy avenue activity.

f) Direct routes shall be provided between entrances, train and bus platforms, passageways and corridors. This shall be done to avoid disorientation and enhance security.

g) Streetscape design and common element deployment will need to be reviewed by the operator to ensure maintenance effort is being provided for.

h) Trees/ raised planter on city own property may need a separate service agreement with the city or 3rd party entity.

i) Where dedicated on-street PUDO is in-plan, it shall be located to allow for a direct connection to the primary station entrance to reduce conflicts between pedestrians, bike lanes, and other potential obstructions.

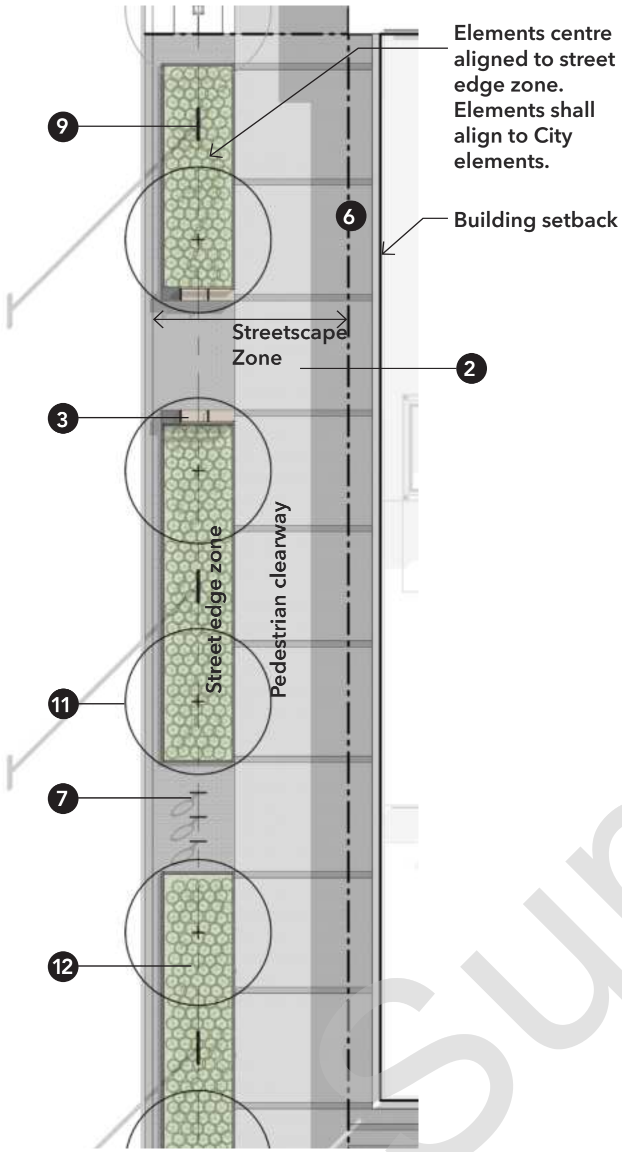


Figure 3-12a: Streetscape Plan

Common Elements (Section 3.4)

- **#** Black label: Required
- \# Grey label: If conditions permit

1. Cycling super graphics (3.4.4)
2. **Paving pattern (3.4.2.3)**
3. **Seating (3.4.2.1)**
4. Safety Bollards (3.4.2.2)
5. Waste Receptacle (3.4.2.3)
6. **Signage (3.4.2.4)**
7. **Bicycle Parking (3.4.3)**
8. PUDO **(3.8.7)**
9. **Light Standards (3.4.5)**
10. Tree grates with soil cells (3.4.9)
11. **Trees (3.4.10)**
12. **Planters with ground cover planting (3.4.11)**

Figure 3-12b: Streetscape Axonometric View

Figure 3-12: Streetscape - Option A

Figure 3-12c: Streetscape Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context. Paving in the Streetscape Zone to be coordinated with the Municipality.

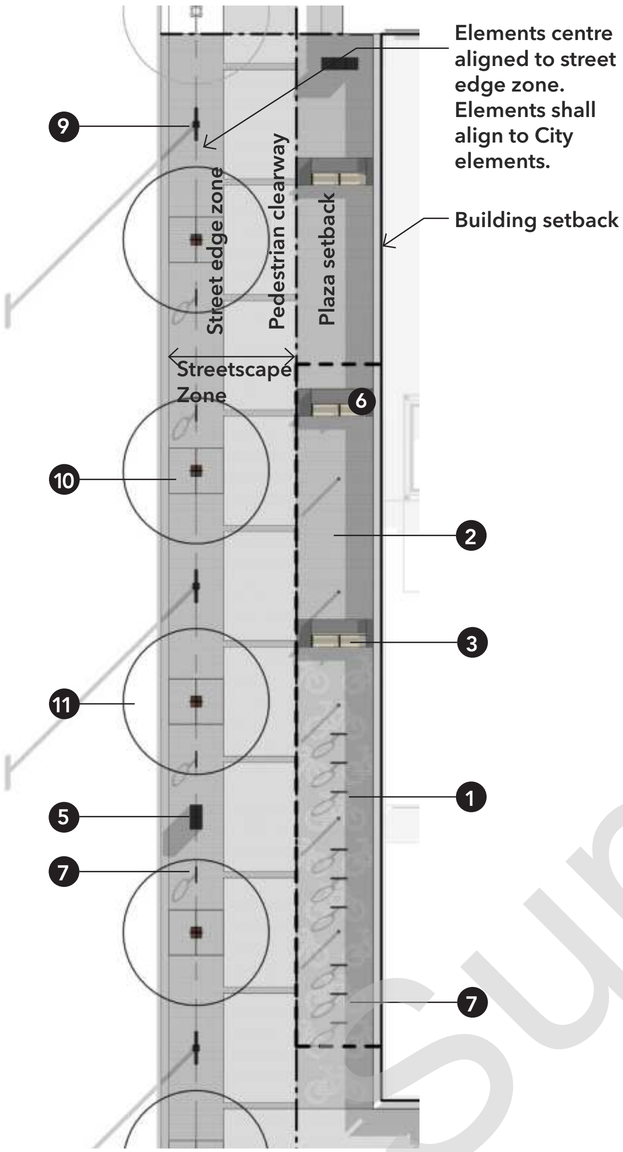


Figure 3-13a: Streetscape Plan

Common Elements (Section 3.4)

- # Black label: Required
- # Grey label: If conditions permit

1. Cycling super graphics (3.4.4)
2. Paving pattern (3.4.2.3)
3. Seating (3.4.2.1)
4. Safety Bollards (3.4.2.2)
5. Waste Receptacle (3.4.2.3)
6. Signage (3.4.2.4)
7. Bicycle Parking (3.4.3)
8. PUDO (3.8.7)
9. Light Standards (3.4.5)
10. Tree grates with soil cells (3.4.9)
11. Trees (3.4.10)
12. Planters with ground cover planting (3.4.11)

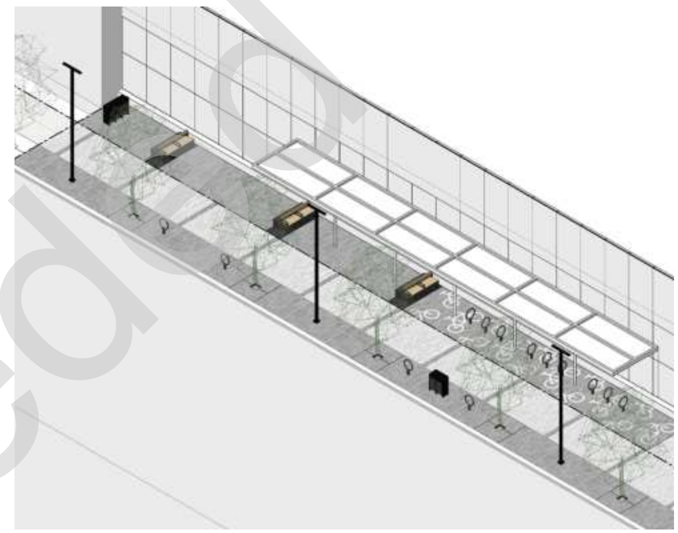


Figure 3-13b: Streetscape Axonometric View

Figure 3-13c: Streetscape Perspective View

Figure 3-13: Streetscape - Option B

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context. Paving in the Streetscape Zone to be coordinated with the Municipality.

3.4 COMMON ELEMENTS

This section describes a suite of common site components that will work together to form an identifiable Subway Public Realm language. The Constant Elements shall be the same to branding and continuity through their form, materiality and repetitive identity. The Variable Elements shall also be present on each site, but their specificity in terms of form and appearance will depend on particular site circumstances. The choice of common elements shall be determined by the scale and context of each station.

The deployment of Common Elements across the Streetscape, Plaza, and Forecourt shall be developed in consultation with the Municipality through the Site Plan Approval process to confirm if the proposed tree planting and pavement treatment can extend beyond the station property line onto the public right of way.

Note: Section to be read in conjunction with:

- DS-02 Universal Design Standard
- Section 2.13 Sustainability
- Section 4.10 Finishes and Materials

CONSTANT ELEMENTS

The Constant Elements shall be the same to contribute to branding and continuity through their form, materiality and repetitive identity.

3.4.1 Paving

3.4.2 Furniture

3.4.3 Bicycle Parking

3.4.4 Supergraphics

3.4.5 Light Standards

3.4.6 Stairs and Ramps

3.4.7 Raised Planters

3.4.8 Tree Grates

3.4.9 Soil Cells

3.4.10 Stormwater Management

VARIABLE ELEMENTS

The form, character or species of Variable elements may vary from station to station based on specific contextual factors.

3.4.11 Trees

3.4.12 Groundcover Plant Material

3.4.13 Third Party Integration

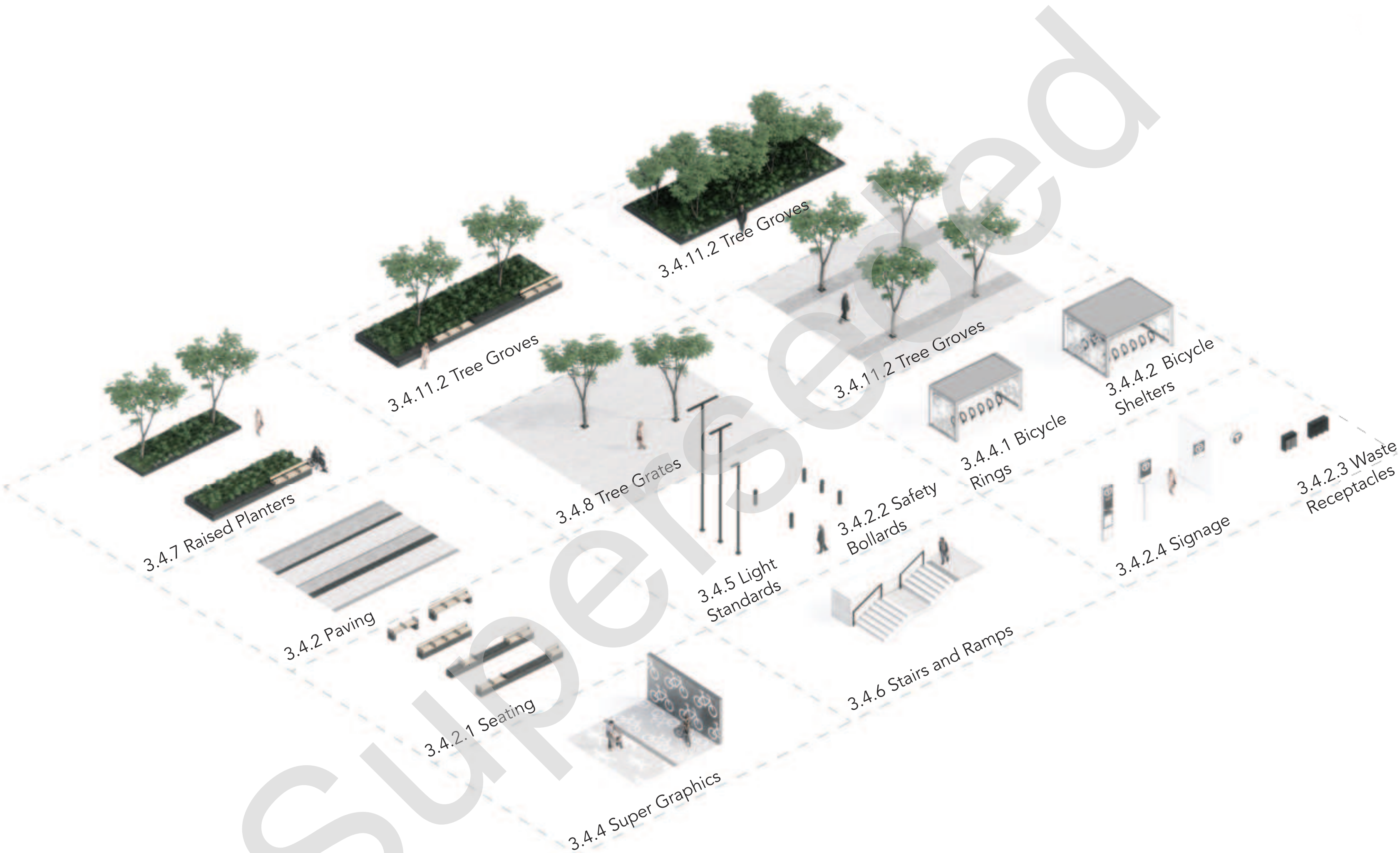


Figure 3-14: Common Elements

CONSTANT ELEMENTS

The Constant Elements shall be the same to contribute to branding and continuity through their form, materiality and repetitive identity.

3.4.1 Paving

Pavement systems and other hard surfaced areas will form the direct connection between the street and the station in the form of Streetscapes, Plazas and Forecourts. The paving shall be designed for openness and maximized flow. Where stations are integrated with TOC, paving materials shall be coordinated with 3rd party designs in order to avoid difference in treatments and to preference, strength of brand, simplicity and continuity. The paving approach shall embed durability, low maintenance and life-cycle considerations.

In all applications the colour contrast of the pavers shall be in alignment with the DS-02 Universal Design Standard.

3.4.1.1 Paving Strategies

a) Paving within plazas shall consist of concrete pavers. The use of asphalt within Streetscapes, Plazas and Forecourts is prohibited. Where site conditions, such as flood plains/ poor drainage, may not support the use of pavers, concrete may be used in lieu. Substitutions may be requested for approval by the owner of this standard.

b) Paved areas and landscaping shall support intuitive wayfinding by providing clear direct access to and from destinations with open unobstructed paths to support safety of passengers.

c) Paving shall be constructed of consistent, high-quality materials that connect the exterior to the interior as described in section 3.4.1.2.

d) A hierarchy of patterns shall be used to define primary, secondary and transitional spaces.

e) A systematic use of colour and pattern shall be applied to reinforce network branding as a feature of passenger experience.

f) Paving colours shall follow a logical system of accents. These accents shall be part of contextual assimilation, perception of space and branding.

g) The paving colour system shall be used to create a safe and efficient differentiation between passenger and staff areas to avoid disruptions.

h) Paving shall include pavement marking made from preformed thermo-plastic material that is set into the pavers using reheating technology.

    i. Markings shall be used to separate pedestrian and cycling areas to avoid potential conflicts.

i) Paving systems will follow the maximum colour contrast of 30% and shall be in alignment with the DS-02 Universal Design Standard.

j) The pedestrian approach to the Station shall have a sense of protection, openness and transparency as defined in Crime Prevention Through Environmental Design (CPTED) guidelines.

k) A strategy for organizing passenger walkways and roadways shall be prioritized in compliance with Municipal Standards and Accessibility for Ontarians with Disabilities Act (AODA) Guidelines.

l) Grading of pedestrian surface shall follow best practices and building codes for ideal performance slopes for surface materials and shall align with the DS-02 Universal Design Standard.

m) Paving strategies to consider location for rough-ins where bike share programs are provisioned for.

3.4.1.2 Pavers

The paver specifications set out in this standard adhere to a high level of quality, durability and sustainability including life-cycle considerations. Paver shape, colour and pattern options are depicted figure 3-15 and figure 3-16. Pavers shall be tested and proven to resist vandalism and to accommodate freeze thaw cycles, winter maintenance, heavy vehicular traffic and service vehicle traffic.

Pavers shall work together to retain overall design coherence and integrity. Pavers shall be resilient enough to accommodate regular winter maintenance such as snow removal, based on winter maintenance requirements, practices, methods, and materials as outlined in each project agreement.

Where a unified approach for pavers are selected to extend beyond Metrolinx property, the paver specifications shall be coordinated with the Municipal Transportation Services to confirm acceptable paver specifications at locations where the application crosses into the public Right of Way (ROW), or other areas where the Municipal jurisdiction/ maintenance prevails. The paver specifications shall be coordinated with the local municipality.

The design of sidewalks shall be in accordance with local municipal standards with a uniformed finish with adjacent municipal sidewalks.

3.4.1.3 Paving - At Grade

a) All surfaces to have positive drainage, eliminate ponding, icing, and grade away from buildings/structures.

b) Paving material palette integrates visual and functional durability.

c) Hardscaping shall allow for easy maintenance and repairs.

d) Hardscape replacements shall maintain the same level of quality, materiality, durability and sustainability, including lifecycle considerations, to retain overall design coherence and integrity. These metrics shall also include lifecycle costs of the pavers.

e) Paving shall follow industry best practices.

f) Ensure that substructure best practices are followed to ensure that the paving at grade meets the design excellence.

g) All pavers to be suitable to heavy duty applications. Sub base to be detailed according to required use.

h) The designed paver shall be meet CSA A231.1/CSA A231.2 Precast Concrete Paving Slabs/Precast Concrete Pavers.

i) Paving shall comply with Facilities Civil Engineering Standards.

3.4.1.4 Paving Patterns

a) Paving patterns and textures shall be used to differentiate the transition between pedestrian pathways, trails, bike lanes and vehicular paths.

b) Paving patterns and choice of colour shall conform to the DS-02 Universal Design Standard in terms of reflective qualities and abrasive (non-slip) characters.

c) Overall paving patterns shall have a solar reflectance (SR) of at least 0.29. Paving pattern shall comply with the DS-02 Universal Design Standard.

d) Paving patterns alignment shall be based on the strategy type.

e) A minimum of 5 percent of total paver quantity shall be retained to allow for maintenance and repairs. This quantity shall be in line with the requirements of the operator.

f) All pavers shall accommodate:

   i. Emergency and service vehicle access and circulation (same or distinction in paving)

   ii. Off-Street Non-Revenue Vehicle Parking (Service Vehicle)

3.4.1.5 Drains

Drainage will be determined on a site by site basis and will be guided by the scale and context. The following are a clear set of drain principles.

a) All surfaces to have positive drainage, eliminate ponding, icing, and grade away from buildings/structures.

b) Drains shall be kept away from the accessible path of travel and shall conform to AODA, DS-02 Universal Design Standard and colour contrast requirements.

c) Drain size and shape shall be integrated into the paving system, located in logical positions that co-relate to the overall paving patterns.

d) Drain shapes can vary, provided they are sized to capture and discharge the volumes of water that are required as per the storm water requirements of the hard surface capture area. Linear drains integrated with the paving pattern are preferred.

e) Drainage shall comply with Facilities Civil Engineering Standards

3.4.1.6 Tactile Walking Surface Indicators (TWSI)

Refer to Section 2.3.2 for TWSI requirements.

Tactile Attention Indicators and Tactile Direction Indicators shall be dark, in contrast to the light pavers within the colour scheme as in figure 3-15.

This section shall be read in conjunction with DS-02 Universal Design Standard for additional details.

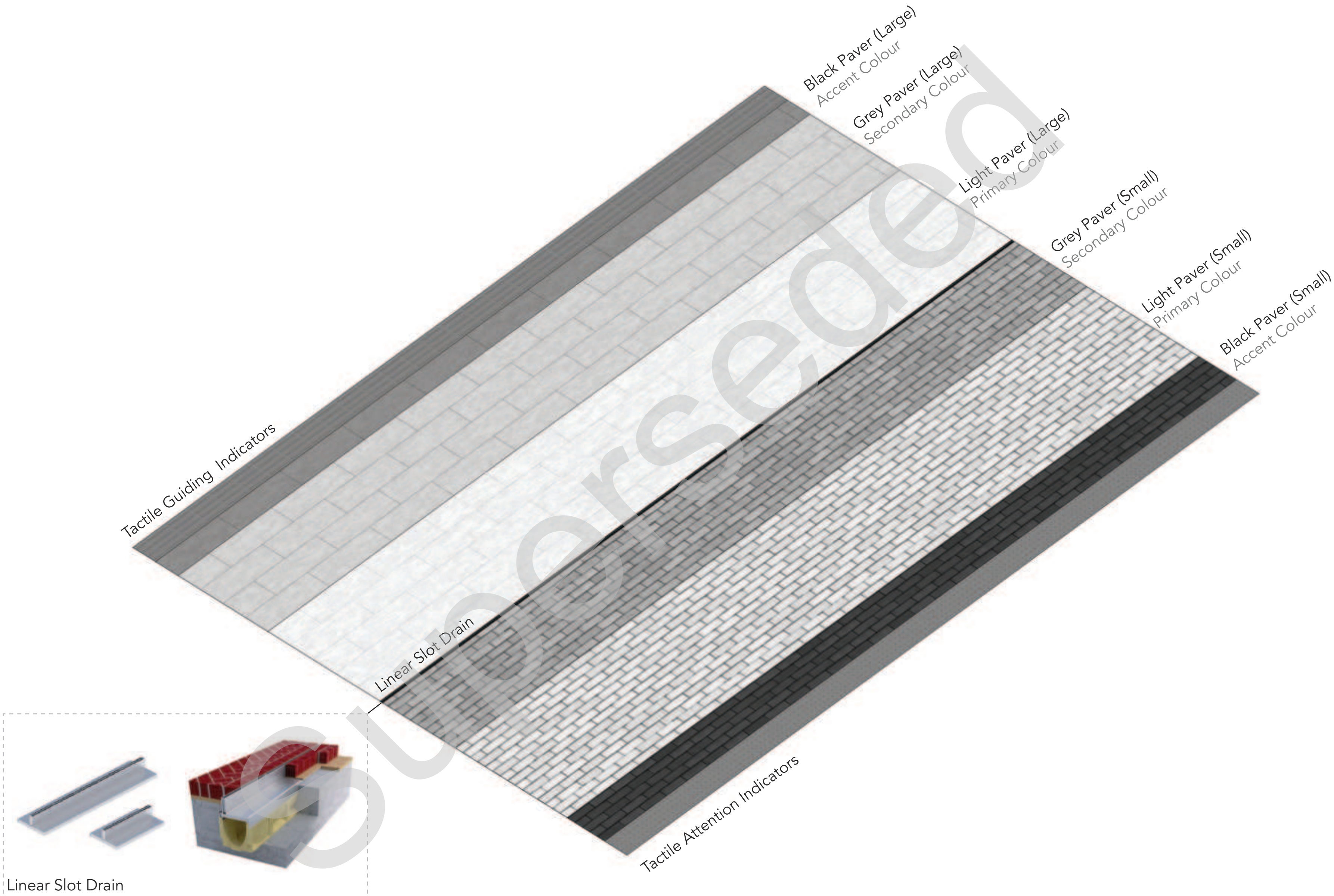
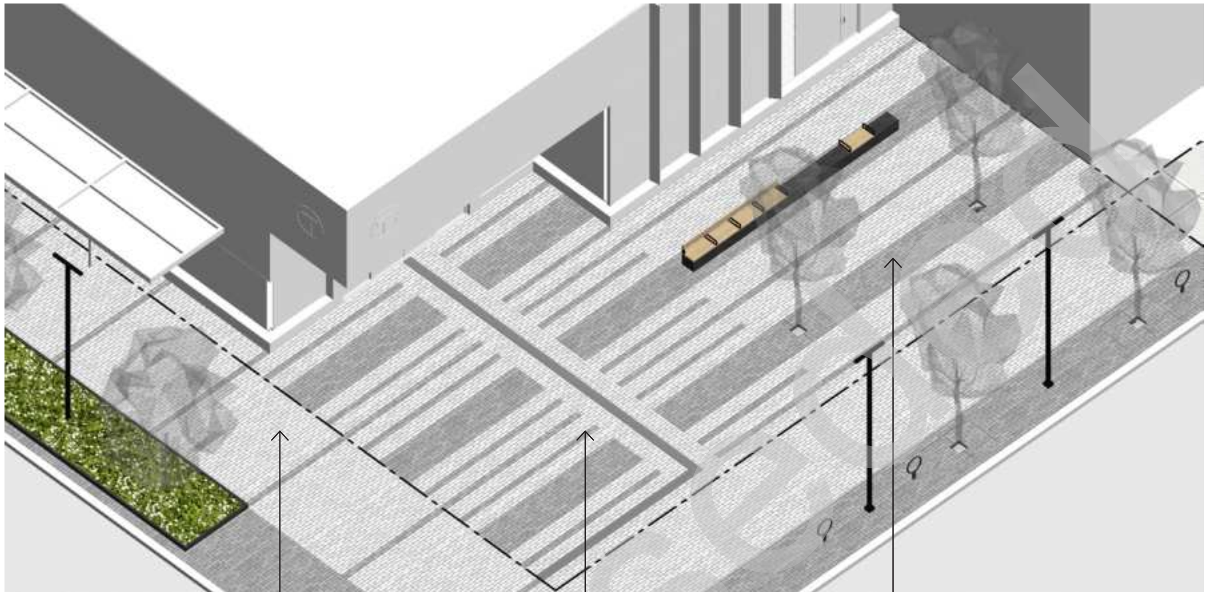
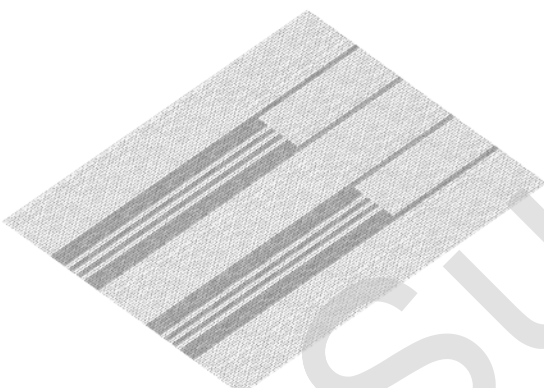
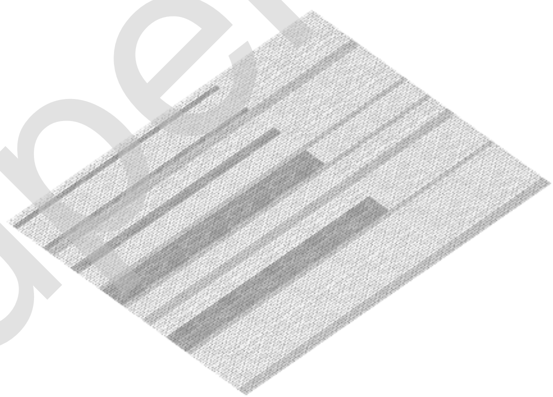


Figure 3-15: Paving Patterns

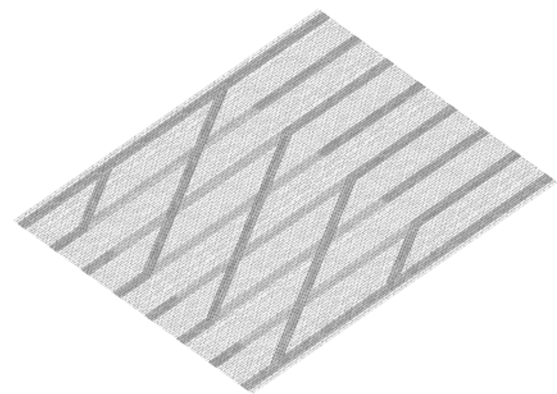




Example A : Entry Pattern



Example B : Entry Pattern



Example C: Interchange Pattern

Line direction could indicate direction of travel of intersecting networks

Figure 3-16: Example Acceptable Paving Patterns

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context. Paving in the Streetscape Zone to be coordinated with the Municipality.

3.4.2 Furniture

Site furniture in the public realm will be made up of a consistent suite of elements that include a standard colour and material palette. Furnishings are chosen for durability, functionality, ergonomic comfort and as signature elements.

Furniture placement shall be co-ordinated with the neighbouring property owners (municipality and others). This early coordination will ensure the avoidance of unnecessary redundancy such as Metrolinx waste receptacle placement on plaza directly near municipality waste receptacle on city sidewalk.

Materials and Maintenance: General Requirements

a) Furniture materials shall be integral throughout. Materials and finishes with applied coatings that are subject to being scratched, chipped, or easily damaged shall not be used.

b) Finish and materials selected shall have matching replacement stock available for the expected life of the material.

c) Finish and materials shall be selected for ease of cleaning, repair, or replacement.

d) Finish and materials shall resist soiling and be cleanable with commonly used equipment and environmentally benign cleaning agents.

e) All fasteners of finishes and materials shall be concealed and tamper proof.

f) Removal and replacement of damaged materials shall be possible without specialized tools or proprietary tools, and without damage occurring to adjacent areas.

g) All furniture finishes and materials in public areas shall be generally resistant to vandalism and graffiti including hammer blows, felt markers, spray paint, burning, and scratching.

h) Secure finishes and materials using engineered connections and bond strength to eliminate hazards from dislodgement due to temperature change, vibration, wind, seismic forces, aging, vandalism.

i) Fastenings to be concealed. Where fastenings cannot be concealed, they are to be tamper proof and match the colour of the base material.

j) Provide stainless steel and metal fabrications as follows: Factory finished and pre-fit stainless steel and metal fabrications - Grade 316 stainless steel per ASTM A167.

3.4.2.1 Seating

Bench seating opportunities contribute significantly to the quality of public life. A bench is an offering to sit and rest, and welcomes the customer to the station. Bench space allows one to belong within the flow of city life, to see and be seen. A bench is a beginning of new contact and a symbol of what it means for space to be shared. The subway bench standard is based on the principles of continuity and comfort. The bench shall have solid walls clad with modular materials that coordinate with the paving and shall be freestanding. The bench elements have three secondary purposes, they shall frame space, create safety barriers and direct movement.

a) The bench shall have wood toppers which provide a high level of comfort and inhibit skateboard use.

   i. bench toppers can also be coordinated with interior site furnishings where deemed appropriate.

   ii. The topper shall often set at the end of the bench to allow for accessible access.

   iii. Benches shall incorporate integrated wheelchair seating spaces.

b) Benches shall be designed to incorporate backrests

c) The Plaza and the Forecourt shall accommodate seating at a minimum ratio of 1.0 m^2 of seating for every 28m^2 of Plaza and Forecourt area. When the Plaza and the Forecourt area is less than 28m^2, provide 1.0 m^2 of seating area.

Note: This section shall be read in conjunction with section 2.5 Seating and Waste Receptacles.

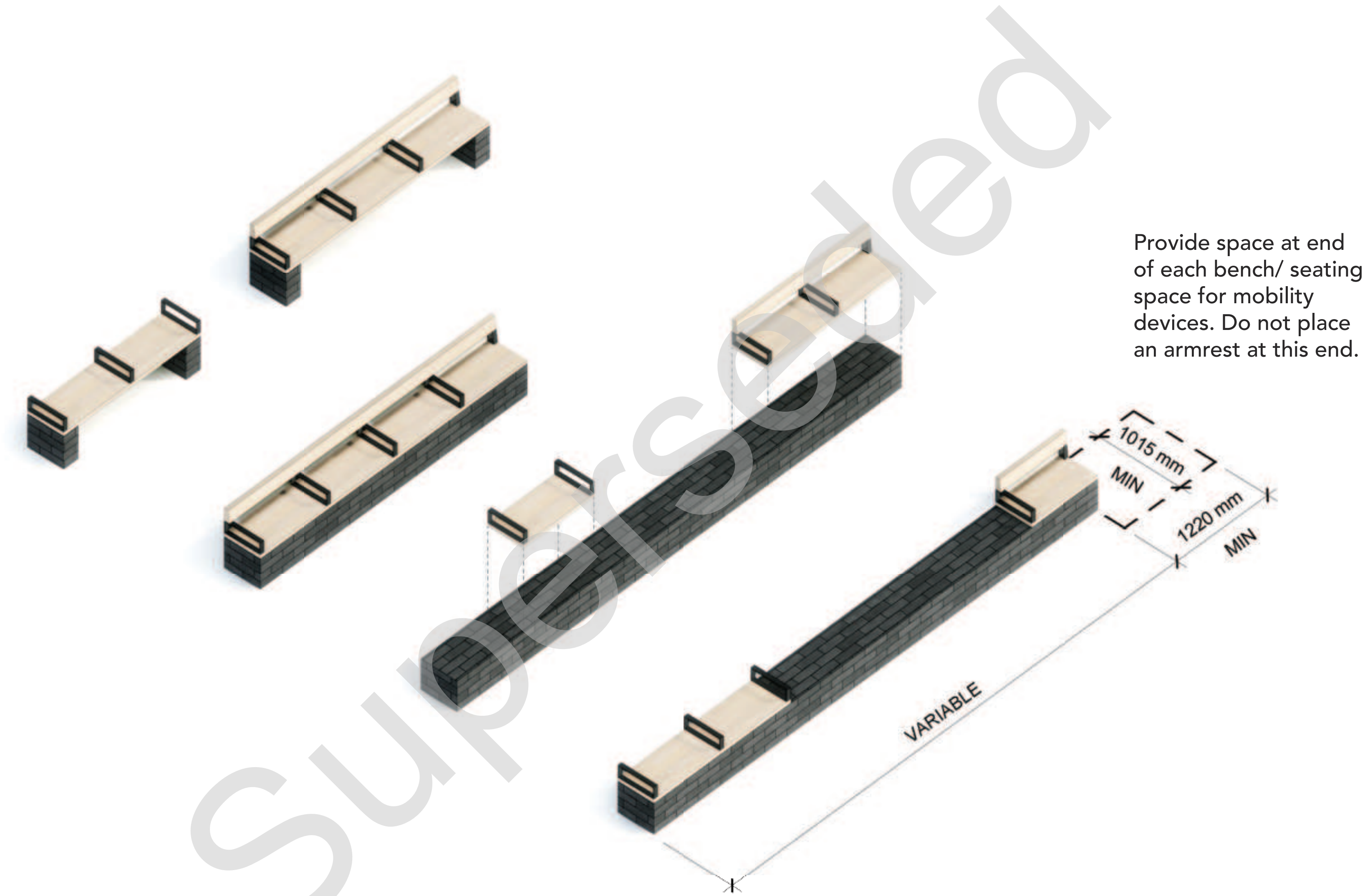
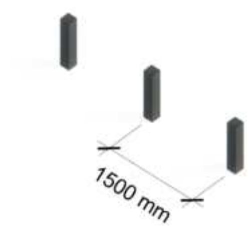


Figure 3-17: Seating

3.4.2.2 Safety Bollards

Non-removable exterior bollards shall be integrated with stations, bus terminals, etc. They shall be approximately 200 mm in diameter, made from 316 grade stainless steel with a satin finish, extend 1000-1200 mm above grade, and be set a minimum of 1200 mm into a concrete pier. These bollards shall feature a 50 mm contrasting reflective band in a designated recessed space 80 mm below the top surface. In areas requiring additional safety, such as a bus plaza with roll-over curbs, bollards shall be made from a 200 mm diameter galvanized steel pipe, filled with concrete, and protected with a 316 grade stainless steel cover and two 50 mm contrasting reflective bands.



Bollards to be removable as required to allow access to service aisles or direct access to stations.

Figure 3 -18: Safety Bollards

3.4.2.3 Waste Receptacles

Figure 3-19a: Four bin
Perforated panel option

Figure 3-19b: Three bin
Wire mesh panel option

Waste Receptacles shall be placed close to the street on Metrolinx property.
This section shall be read in conjunction with section 2.5 Seating and Waste Receptacles

Figure 3-19: Waste Receptacles

3.4.2.4 Signage

Totems shall be placed close to the street on Metrolinx property. Refer to DS-03 Wayfinding Design Standard for exterior TH threshold signage.

3.4.3 Bicycle Parking

Providing convenient access to stations for cyclists and well-located, secure and fit-for-purpose cycle parking is important for promoting sustainable transport and modal integration. Dedicated lighting should be provided for all bicycle parking. The basis of any cycling infrastructure (e.g. bicycle rings) shall provide colour contrast with the ground surface, to assist individuals with low vision with navigating around it.

Bicycle ring parking shall be provided on the street or in the public realm and it must not clutter the footway. It shall be located close to the station entrance and be well overlooked and allow for cycles of all types to be securely locked. The bicycle parking both covered and secured must be visible and well marked and be at a maximum distance of 20 metres from the station entrance. The number of bicycle parking spaces are to be determined on a project-specific basis, in alignment with planning and ridership data. This shall be coordinated with the Metrolinx Planning and the owner of this standard.

Secure cycle parking shall be provided at high demand locations such as commuter stations. While this type of parking can be further away from the entrance, it shall be close, clearly visible and feel safe to access. Locations both in and around the stations shall be potential locations. If the station is within a designated bike share area, space for a docking station shall be included.

Suitable amounts of parking shall be determined for bike sharing, covered parking and secured parking by linking to density and commuting metrics and by checking with planning and setting agreements with Metrolinx. With regard to bike share, the dimension of the plaza must ensure area to include both current and planned bike share areas. Planning shall be consulted to determine the, environics, density and future growth plan around the station. This growth plan shall determine the number of bike share stalls, bicycle rings and secure bicycle parking required for each station. This number shall be agreed upon with Metrolinx. Accommodation for current and future planned bikeshare shall be accounted for in the design. How cycle users get from surrounding streets to the cycle parking shall be accounted for in the design. These connections shall eliminate long stretches where cyclists must wheel their bikes across pedestrian areas, which will also help reduce pedestrian-cyclist conflicts. Locations shall be easily reached by the most direct route.

Refer section 3.4.2 Furniture for Materials and Maintenance Requirements.

Consult with Metrolinx Stations Planning for bicycle parking quantities.

This section shall be read in conjunction with the DS-07 Bike Infrastructure Design Standard.

3.4.3.1 Bicycle Rings

Bicycle ring design shall be durable, clean, consistent across the Metrolinx brand and shall have two contact points for locking the frame and the wheel.

The bike ring shall have a steel loop frame finished in dark grey powder coating or high density polyurethane foam.

The bike ring must be embedded. The bike ring shall require durability testing for impact resistance, colour fastness, corrosion resistance, UV resistance, and scratch resistance. The bike ring shall meet the Association of Pedestrian and Bicycle Professionals (APBP) guidelines.

This section shall be read in conjunction with the DS-07 Bike Infrastructure Design Standard.

Recommended Dimensions:

Depth: 3"

Width/diameter: 23"

Height: 32"

Figure 3-21: Bike Ring

3.4.3.2 Bicycle Shelters

Bicycle shelters for short term stay shall offer consistency, transparency and accessibility. The bicycle shelter is a part of the language and brand of the Metrolinx common elements.

In tighter urban areas, standalone shelters may consume unnecessary and it may be difficult to match materials to the plaza design using an off-the-shelf shelter. In tighter urban areas, Architectural features of a station building shall also be used to provide weather protection for bicycle parking.

Figure 3-22a: Small Shelter

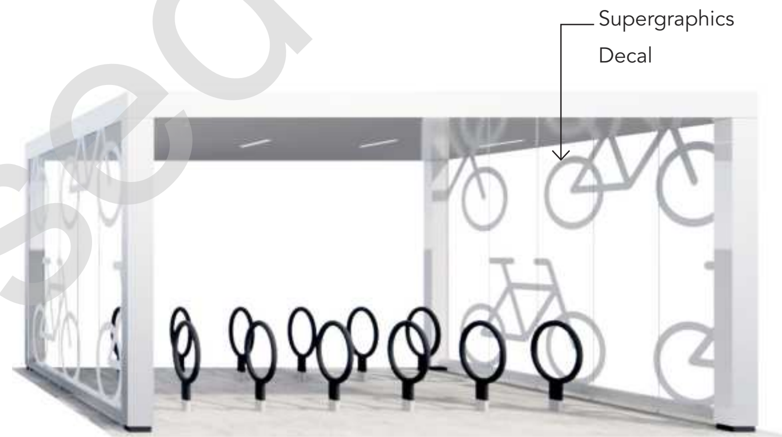


Figure 3-22b: Large Shelter

Figure 3-22: Bike Shelters

3.4.3.3 Covered Bicycle Parking

Bicycle parking shall be integrated with the architectural form. Where it is demonstrated that property is not available to accommodate integrated secure shelters, it shall be covered under overhangs or recessed within the building face.

a) The planning and technical design of Covered Bicycle Storage and Parking shall meet the requirements in the DS-07 Bike Infrastructure Design Standard.

b) The design of Covered Bicycle Storage and Parking shall be consistent with the architecture of the station.

c) Refer to section 3.4.3.2 for Bicycle Shelters.

d) Where space permits, bike-storage should be considered in areas that are covered by a pavilion, awning etc.

3.4.3.4 Secure Bicycle Storage

a) Where space permits, secure bicycle storage shall be integrated with the station building.

b) Secure bicycle storage shall be designed to reflect the same design language established by the station architecture, and it shall incorporate the maximum amount of glazing to support natural surveillance.

c) The planning and design of Secure Bicycle Storage and Parking shall meet the requirements in the DS-07 Bike Infrastructure Design Standard.

d) Secure Bicycle Storage shall be located within or adjacent to the station building.

Figure 3-23a: Evening Render

Figure 3-23b: Daytime Render

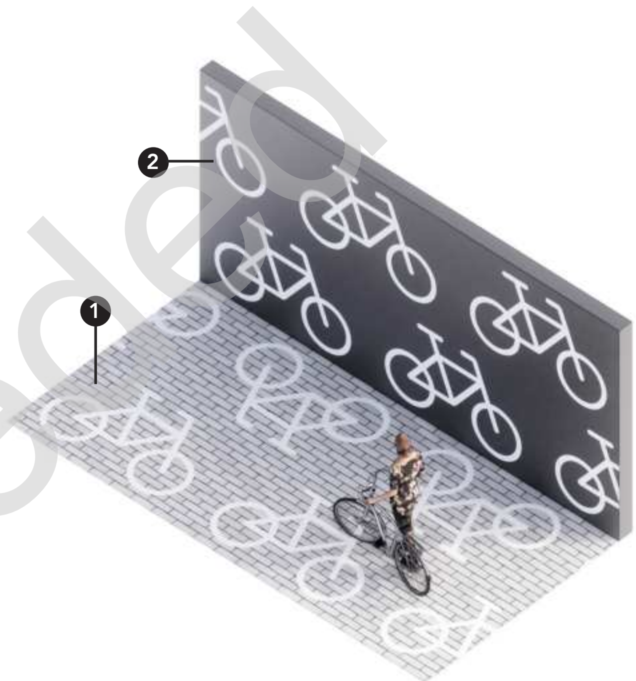
Figure 3-23: Elevated Station Covered Bike Parking

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

3.4.4 Supergraphics

The Plaza and the walls that define it, are the bones of the subway public realm. Transforming the space with Supergraphics can improve the customer journey and make the customers in the Plaza feel like they are connected to it.

Supergraphics make an impact on the viewer and change the way someone feels emotionally in that space. Transforming the Plaza with wayfinding supergraphics can imbue a sense of optimism, and encourage people to choose public and active transportation.



1. Cycling surface supergraphics (30% colour contrast)
2. Cycling supergraphics, applied to vertical surface (30% colour contrast)

Figure 3-24: Supergraphics

3.4.5 Light Standards (public realm lighting atmosphere)

Light Standards will be uniform across all stations. Their illumination levels shall be coordinated between the municipal public realm, Metrolinx urban realm and 3rd party/development areas to ensure consistency in levels, eliminating contrasts, dark spots, and ensuring light levels spread. Choice of type and quantity of light standards and light bollards must be determined by meeting the functional requirements as laid out in 3.4.5.1.

Refer section 3.4.2 Furniture for Materials and Maintenance Requirements.

3.4.5.1 Functional Requirements

a) Exterior lighting shall be designed to:

   i. Meet dark sky standards;

   ii. Be aimed downwards to reduce light pollution

   iii. Shielded to reduce glare and light trespass to neighborhood.

b) Exterior lighting design shall provide consistent lighting level of 50 lux.

c) Lighting shall be integrated into built site elements to act as beacons to support wayfinding.

d) Associate lighting types with the same conditions/activities.

e) Pedestrian scaled illumination shall be provided for areas of rest and waiting that promote activity specific design, comfort and feel of the space.

f) In areas of vehicular movement and parking, the lighting shall meet the Backlight, Uplight, and Glare (BUG) rating system, be uniform and have no glare.

g) The station entrance shall have the highest level of illumination within the facility, creating an easily recognizable destination focus.

h) The station entrance shall

   i. Provide a visually comfortable transition from the street.

   ii. With illumination levels to be controlled during daylight hours to prevent abrupt changes from outdoors to indoors and vice versa.

i) Entrances located either off-street or in conjunction with non-transit facilities shall be illuminated to emphasize the station entrance.

j) All exterior lighting shall be co-ordinated with locations of CCTV cameras to prevent light glare.

k) All exterior lighting shall provide illumination to address CPTED principles.

l) With regards to maintenance and operations exterior lighting shall:

   i. Provide illumination to address CPTED principles.

   ii. Be energy efficient LED sources of lighting.

   iii. Be vandal-proof and rated for appropriately rated for outdoor installations.

m) Controls for exterior lighting shall be:

   i. dimmable and integrated to the lighting controls scheme.

   ii. Controlled by photocells, occupancy sensors, central override switches and/or contactors with a manual override.

   iii. Through a computer-based lighting control system that controls the various lighting circuits through the building.

   iv. Shall be programmable scheme to revise illumination levels to suit Metrolinx requirements.

REQUIRED:

- Backlight, Uplight, and Glare (BUG) Rating B0 U0 G0
- Dark Sky Compliant
- 50 lux lighting level

Figure 3-25: Light Poles and Light Bollards

3.4.6 Stairs and Ramps

The site design shall make every effort to eliminate grade changes between the public realm and station plazas requiring stairs or ramps altogether.

a) Any required stairs must follow all applicable building codes, AODA requirements and the DS-02 Universal Design Standard.

b) The design of the handrails and ramps need to take into account CPTED principles.

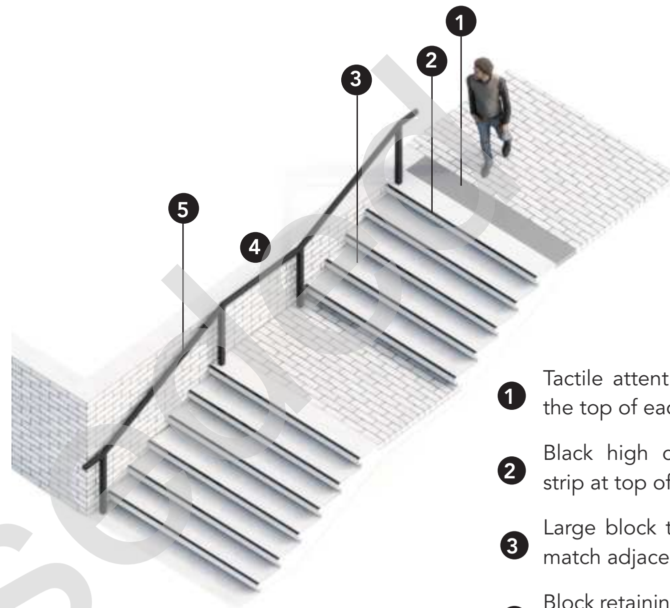
c) Handrails to be consistent station to station. The black powder coated steel top of handrail to be rounded, with vertical pieces square. Transition as illustrated. Coatings shall be visibly free from flow lines, streaks, blisters or other surface imperfections in the dry-film state on exposed surfaces when observed at a distance of 10 feet (3 m) from the metal surface and inspected at an angle of 90 degrees to the surface. The powder coating shall meet or exceed requirements in the American Architectural Manufacturers Association (AAMA) 2605 Standard.

d) Ramps are to be eliminated given limited site areas.

e) Stairs and ramps shall serve distinct paths along a route. Integrated stairs and ramps, referred to as "stramps" are not permitted.

f) Where bicycle access is required, provide a 110 millimeter wide continuous runnel channel raised flush with the top of the tread and riser beneath handrails.

Note: This section shall be read in conjunction with the Section 3.8 Street Elements and Connections and the DS-02 Universal Design Standard.



1. Tactile attention indicators at the top of each stair run
2. Black high contrast warning strip at top of each step
3. Large block treads, colour to match adjacent paving
4. Block retaining walls, to match adjacent paving
5. Black powder coated metal railings, with square profile and rounded top

Figure 3-26: Stairs

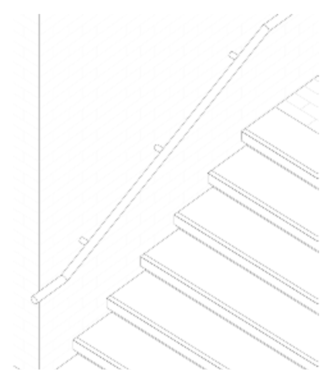


Figure 3-27a: Railing Attached to Wall

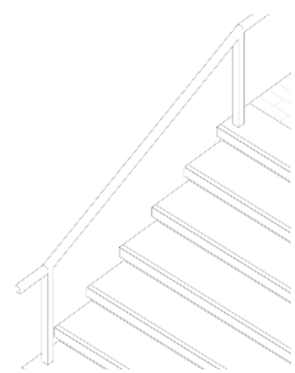


Figure 3-27b: Railing Attached to Steps

Figure 3- 27: Railing Options

3.4.7 Raised Planters

Tree Groves and planted areas shall be framed by raised planters. Raised planters allow for integration with furniture, reinforce important flow directions and are an effective tool to maintain and ensure the survival of planting in areas of high pedestrian traffic. These structures are also needed in conditions where planting is installed above built areas. Their careful use in isolation or in relation with the building and other structures such as ramps and stairs are powerful ways to shape the open space and to give proper balance of hardscape and softscape in the overall public realm.

a) Raised planters shall be located to reinforce major pedestrian flows and to allow for gathering pockets and resting places.

b) Planters shall integrate with furniture. Examples of this are wide seating walls in combination with planting walls, raised planters aligned with monolithic bollards and lighting elements to create sense of direction.

c) Raised planters shall be higher (150 to 405 mm) than raised curbs used on site in order to follow Universal Design principles and to protect plant material from salt spray and animal damage. A maximum height of 405 mm is recommended so that a 50 mm thick bench top will meet seating height recommendation of 460 mm. This max height is to be adjusted accordingly if the bench top thickness were to change. A 405 mm-high planter is recommended in a plaza condition, or where soil depth is restricted by subgrade conditions. A 150 mm-high planter is recommended in all other conditions, such as forecourt and streetscape.

d) Finish and material shall be consistent with strategy and location within the site. Emphasis in material quality shall be placed in areas that serve the public and more modest forms of planters may be considered in service areas not visible to the public.

e) Raised planters shall be designed to discourage skateboarding along planter edges. The 50mm thick bench top creates a natural break in the smooth surface of the planter, thereby discouraging skateboarding.

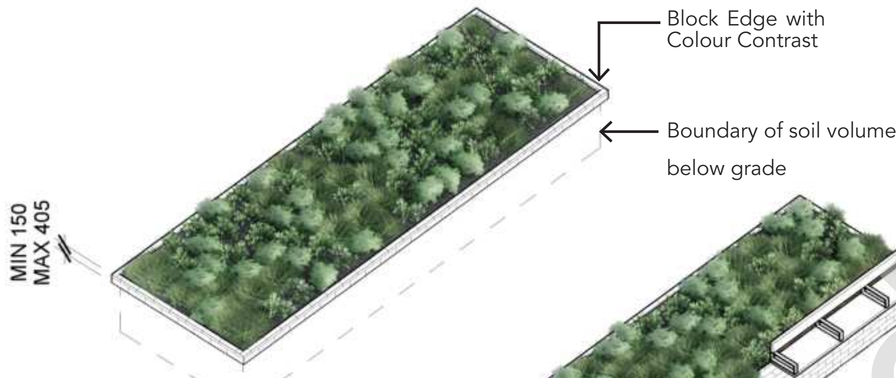


Figure 3-28a: Raised Planters- Axonometric View

Figure 3-28b: Raised Planters with Seating- Axonometric view

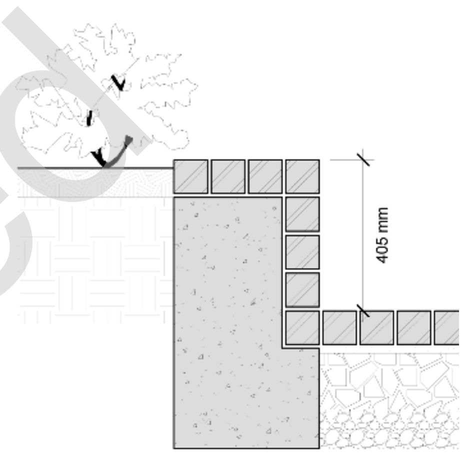


Figure 3-28e: Raised Planter with Seating Section A Detail

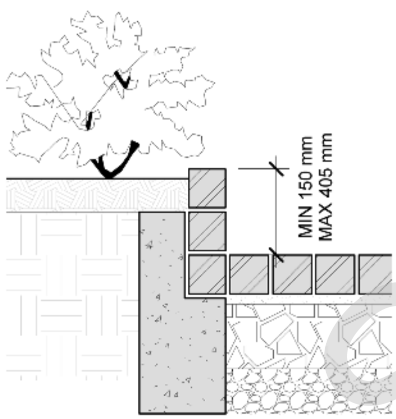


Figure 3-28c: Raised Planter - Detail

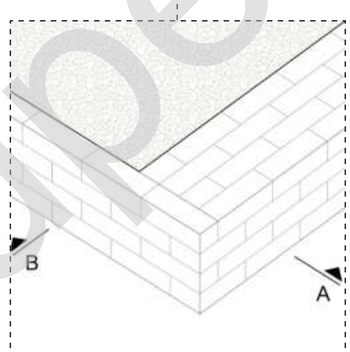


Figure 3-28d: Raised Planter with Seating - Detail

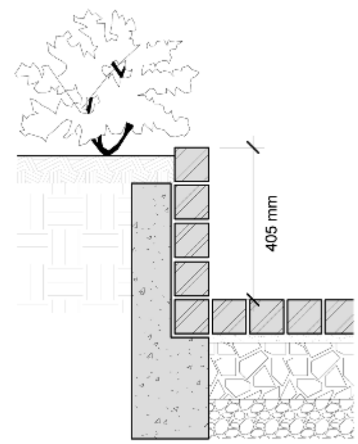


Figure 3-28f: Raised Planter with Seating Section B Detail

Figure 3-28: Raised Planters

3.4.8 Tree Grates

Trees planted in tree grates will be used in the Streetscape, Plaza or Forecourt strategies where pedestrian flow requires continuous movement over the soil volume zones. Soil volumes will be accommodated in soil cells under paving in these conditions.

Tree species in this context will be deciduous, upright, single stem, high canopy shade trees. They shall be selected for form and higher branching height that allows for maximum movement under their canopy within a minimum number of years post-planting.

In the Streetscape context, the species selection shall be unique to the station along the street. In other words, the trees shall be the same across the front of the midblock entry but be distinct from adjacent street trees in order to establish identity for the public realm.

In the Plaza context, the species shall be the same throughout the plaza to establish a recognizable identity for the site. These would ideally include the street trees within the plaza zone so in order to integrate the right-of-way. These trees shall be distinct in species from adjacent properties.

In the Forecourt context, tree species shall be used to reinforce landscape rooms and architectural relationships.

Tree grates feature narrow slits to allow for moisture, light, and air to pass through. Tree grates shall be deployed to protect trees from urban traffic, mitigate salt infiltration into soil from winter maintenance activities and allow them to thrive and grow.

Figure 3-29: Tree Grates with Pavers

Tree grates are protective barriers for trees in areas with high pedestrian traffic and shall be used as an alternative to planting beds. Tree grates shall also be used also in conditions where pedestrian traffic is medium or low but there is space constraint.

a) Size, shape and material finish of tree grates shall follow the branding principles and material standards set by adjacent paving surfaces and specific requirements of tree maintenance and growth.

b) Tree grates are to comply with DS-02 Universal Design Standard.

c) Tree grates shall be used in conjunction with soil cells to ensure compliance with required soil volume.

d) Tree grates shall be leveled to match adjacent paving taking special precautions to eliminate tripping hazards.

3.4.9 Soil Cells

a) A healthy tree canopy shall be the hallmark of passenger experience at the stations.

b) Soil cells pavement systems shall use uncompacted soil material below ground to support large tree growth while allowing above ground infrastructure such as pavement and other infrastructure to be incorporated into the design.

c) Soil cells shall be used in areas where a hardscape surface is required to maintain maximum pedestrian flow together with the need to provide deciduous trees within the hardscape environment.

d) The use of soil cells shall be determined by the requirement to provide a minimum of 30m^3. of topsoil.

e) Smaller trees can be used when there is not enough soil volume for canopy trees. These can be planted closer as as long as there are no safety concerns.

3.4.10 Stormwater Management

All stormwater management designs for service spaces, such as parking lots and plaza's, shall adhere to the established standards of the local municipality and Conservation Authority, and MECP, as applicable to the infrastructure on each site.

a) Stormwater management shall comply with Facilities Civil Engineering Standards

VARIABLE ELEMENTS

Variable elements will exist at all sites, but their actual form, character or species may vary from station to station based on specific contextual factors.

3.4.11 Trees

Trees shall be provided on all sites where soil volumes can be accommodated. Trees are listed as "Variable Elements" because their species will depend on the specifics of the given site. Issues that will impact the species selection are: available soil volume, available canopy space, light exposure, orientation, reflected material surface areas, overhead conditions, subgrade conditions, adjacent or nearby species, microclimate and other environmental and contextual factors that vary from site to site.

Trees shall be provided and planted in formation to support wayfinding and placemaking.

a) Tree placement and selection shall conform with relevant applicable Municipal Green Standards.

b) Tree planting will enhance the structure of spaces by acting as an active space creator, their arrangement as individual or groups must respond to purposely reinforce design moves of the built environment.

c) Selection and layout shall comply with CPTED principles, support intuitive wayfinding, natural surveillance and help screening views to service areas and neighbouring properties.

d) Tree planting to enhance the site's microclimate (shading, wind screens).

e) Tree location and arrangement shall have enough soil to thrive and grow to maturity. Soil volume minimum shall be a $30m^3$.

f) Tree selection not to rely on irrigation system or high maintenance.

g) Tree planting palette to be consistent and support overall branding. Shape, height and canopy density are also key aspects to follow along building main entrances and plazas. Planting palette for areas not visible to the public may be determined on a project by project basis

h) Tree planting will be selected not to impact with overhead or below grade utilities.

i) In a scenario where no trees (or only one) can be sustained given the site area or sub grade conditions, it may be more effective to interrupt the street tree line and have no trees in order to prioritize placement of station identity elements.

j) All trees, shade and understorey, shall be offset a minimum of 3m from a building face.

k) All planters shall be offset a minimum of 1.8m from a building face.

3.4.11.1 Tree Species

Trees are to be selected based on aesthetics, upright form, seasonal value and site-specific conditions. Size of tree and planting condition (tree grates, soil cells, planting beds) will be coordinated with required soil volumes. Small trees can be placed in groupings in raised beds as their soil volumes are flexible. Canopy trees must have 30m^3 soil volume each or 20m^3 if in a shared bed. Groupings can be gridded or random as long as soil volume requirements are met. Canopy trees can be in tree grates with soil cells beneath adjacent paving or in raised beds, or a combination of both in order to satisfy required soil volumes.

a) Select trees according to hardiness zone. Native and hardy species shall be used.

b) Select species that require low maintenance and do not require an irrigation system.

c) Tree selection to allow for 4 seasons interest in main entrances and gathering areas. More flexibility can be applied to service areas and where screening of views is not solely achieved by tree planting.

d) Select appropriate tree species for planting based on site context and conditions (soil type, aspect, upland/ lowland).

e) Tree planting will be selected not to impact with overhead or below grade utilities.

f) Tree planting at stations and non-natural (man-made) areas shall use a minimum of 50 percent native plants.

g) Within Natural Areas, Natural Heritage System and the Ravine Protected Area plant trees 100 percent native. Within Conservation Authority regulated areas, conform with regulating agency's requirements.

h) Do not plant any invasive species within the site or along street frontages.

Table 3-1: Tree Species

NO.	COMMON NAME	BOTANICAL NAME
Small Trees		
1	Serviceberry	Amelanchier canadensis
2	American Hornbeam	Carpinus caroliniana
3	Pagoda Dogwood	Cornus alternifolia
4	Staghorn Sumac	Rhus typhina
5	Nannyberry	Viburnum lentago
Canopy Trees		
6	Freeman Maple	Acer x freemanii
7	Red Maple	Acer rubrum
8	Common Hackberry	Celtis occidentalis
9	Honey Locust	Gleditsia triacanthos var inermis
10	Tulip Tree	Liriondendron tulipifera
11	Pin Oak	Quercus palustris
12	American Basswood	Tilia americana

3.4.11.2 Tree Groves

Tree groves shall be utilized where three or more trees are required within the Plaza and its Forecourt.

a) Tree groves are to be placed in a raised planting bed, provided that space for pedestrian movement is maintained.

b) Tree selection on tree groves shall achieve a dense canopy coverage when the site conditions require protection from the elements and a more transparent (less dense) canopy coverage where site conditions of the built environment allow it (e.g. when building provides shade canopy, when the building orientation provides shade). This can be achieved by varying the spacing of the trees and/or by selecting a tree based on its form (I.e. broad, columnar, pyramidal).

c) Tree groves with raised planters shall be used in Landscape Forecourts to help direct flow and frame space. The species used in the groves is dependent on available soil space and subgrade conditions.

d) Canopy trees will require $30m^3$ of topsoil. If this soil volume can be accommodate within a raised bed, the tree species can be either a large canopy or a smaller ornamental and the raised bed can be any height. Trees shall be spaced based on species requirements to create a grove.

e) If canopy trees are being used, and the $30m^3$ of topsoil cannot be accommodated with the volume of the raised bed, soil cells will also be needed adjacent to the planting bed. In this scenario, the raised bed edge must be the minimum height of 150mm so that the trees are able to access the additional soil volume. Trees shall be spaced based on species requirements to create a grove.

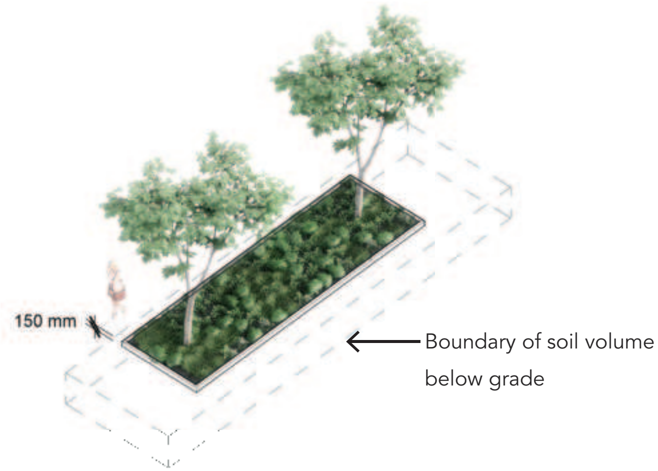


Figure 3-30a: Trees in Small Planters

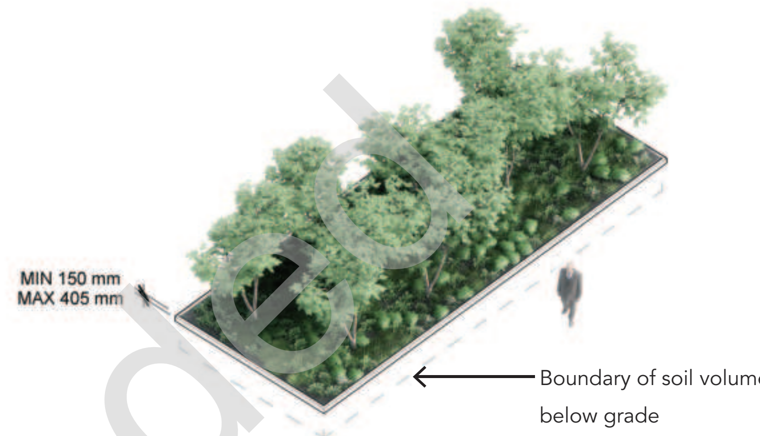


Figure 3-30b: Trees in Planters

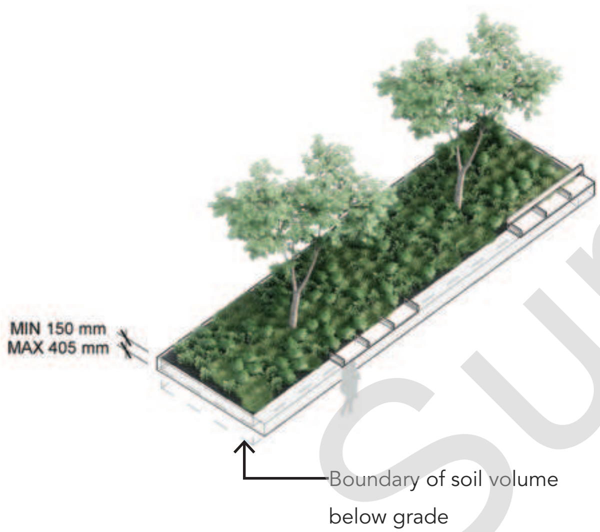


Figure 3-30c: Trees in Large Planters

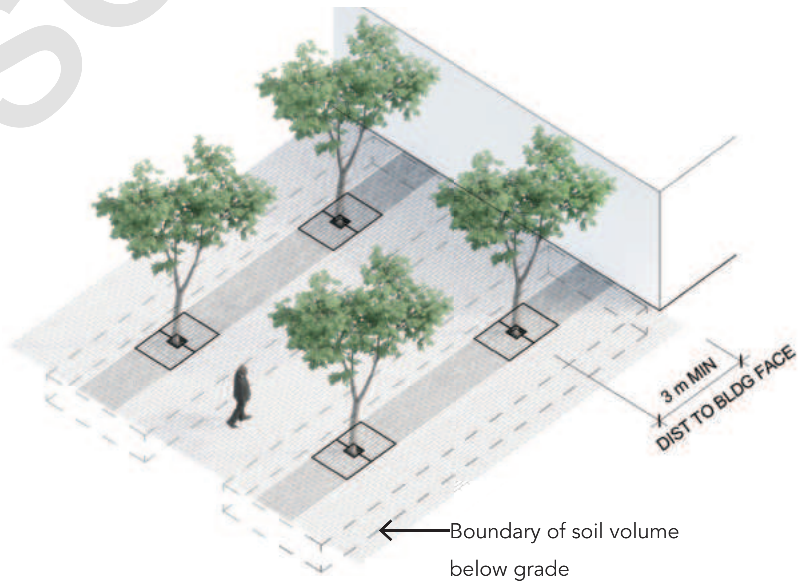


Figure 3-30d: Trees in Tree Grates

Figure 3-30: Tree Groves in Planters and Tree grates

Deployment of Trees within the Forecourt can be realized as above. It is recommended that trees be planted within planters, whether they small or large planters with trees on a grid or in a grove. In tight urban conditions, trees can be planted in tree grates as demonstrated above.

3.4.12 Groundcover Plant Material

3.4.12.1 Layout

Groundcover plant material shall be arranged according to their role and location within the site.

a) Arrangement of understorey plant material and ground cover shall complement the built environment and correlate to the circulation flow.

b) CPTED principles and guidelines shall be used to ensure proper visibility and safety.

c) Spacing of planting shall ensure proper massing and absence of visible gaps. It shall respond to the species space requirement.

d) Plant material shall be selected to provide seasonal interest, vary in texture, colour and form and create a meaningful pedestrian experience.

e) Plant material shall be contained within a planting bed or raised planter. The edge of the planting bed shall have a distinctive edge treatment that is a minimum of 150mm above the adjacent pavement covered in raised planter.

3.4.12.2 Groundcover Species

Groundcover plant material has an important role in the support of the built environment. Groundcovers, vines, perennials and ornamental grasses are highly related to the human scale and are primary in the experience of the space. Groundcover plantings shall be used to reinforce the built environment and to reinforce directionality and wayfinding.

Plant species shall be drought-tolerant, inundation tolerant and beneficial for stormwater retention. All subway station plant materials must comply to applicable municipal Green Standards and the LID guidelines with tolerance of inundation as well as drought conditions.

Use of ground cover and perennial grass plantings shall follow these principles:

a) Selection of plant material shall respond to its location according to hardiness, immediate context (neighbourhood) and branding.

b) There shall be a minimum of 50% of native plant species.

c) Plant species shall include deciduous and coniferous groundcovers, vines, perennials and ornamental grasses. They shall be hardy, drought and salt tolerant.

d) Selection shall respond to CPTED guidelines and principles.

e) Selection shall maintain visual interest throughout the seasons.

f) Selection shall deploy a selective species palate.

g) Plant placement and spacing shall be consistent; incorporate mass groupings, repeat plant groupings, materials and/or design elements

h) Species shall always be grouped in a minimum of three plants of same species

i) Planting beds shall be fully vegetated.

NO.	COMMON NAME	BOTANICAL NAME
Perennial Grasses and Groundcovers		
1	Big Bluestem	Andropogon gerardii
2	Gramma side oats	Bouteloua curtipendula
3	Awned Sedge	Carex atherodes
4	Tufted Hairgrass	Deschampsia cespitosa
5	River Wild-rye	Elymus riparius
6	Path Rush	Juncus tenuis
7	Mexican Muhly	Muhlenbergia mexicana
8	Switch grass	Panicum virgatum
9	Little Bluestem	Schizachyrium scoparium
10	Cottongrass bulrush	Scirpus cyperinus
11	Yellow Indian-grass	Sorghastrum nutans
12	Prairie Cordgrass	Spartina pectinata
13	Purple Wintercreeper	Euonymus fortunei 'Coloratus'

Table 3-2: Groundcover Species

3.4.13 Third Party Integration

All Urban Plaza designs shall ensure that there is a surface reserved for Third Party Integration. The adjacent figure showcase that opportunity. Coordinate 3rd party advertising integration while ensuring primacy of station signage.

Third Party Advertising Integration

Each station shall have a wall surface with a designated area for Third Party Advertising.

Performance requirements shall be in collaboration with Third Party. The contract between the asset owner and the Third Party shall determine assistance regarding patching, repairing and painting of the surface. Metrolinx wayfinding shall take priority over Third Party integration.

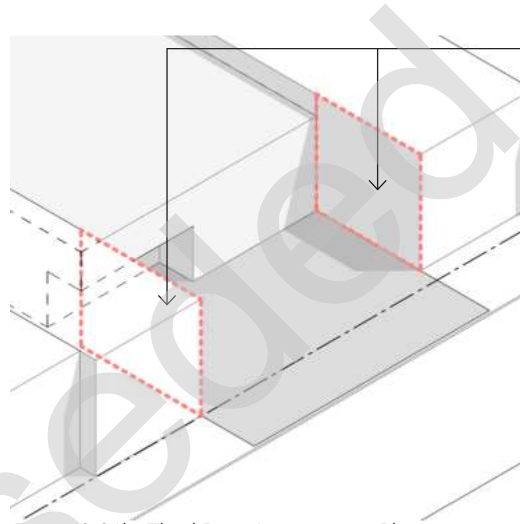


Figure 3-31b: Third Party Integration - Plaza

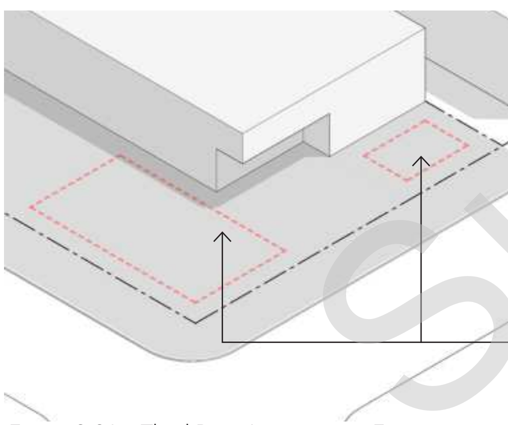


Figure 3-31a: Third Party Integration - Forecourt

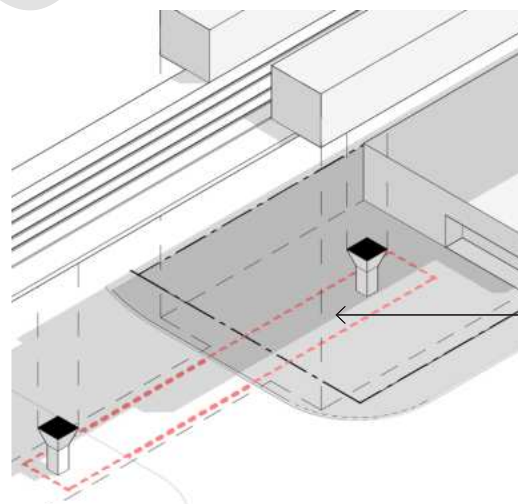


Figure 3-31c: Third Party Integration - Under Guideway

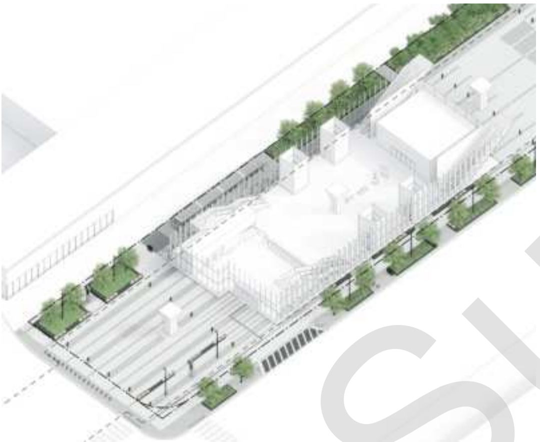
Figure 3-31: Third Party Integration

3.5 DEMONSTRATION DESIGN

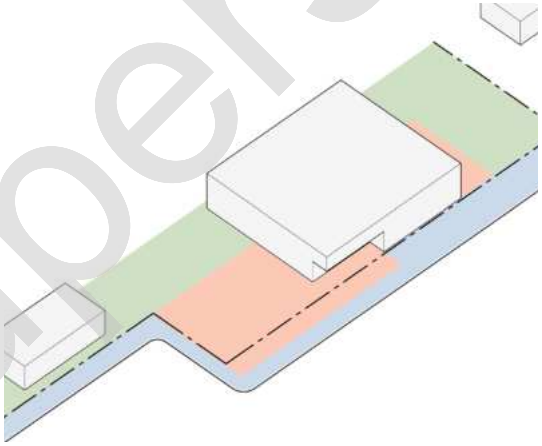
Public realm design inspires the customer and the community, and builds pride of place. All public transit system emphasis on design excellence catalyzes urban growth, increases ridership, and improves pride in transit as a preferred mode of travel.

What follow are demonstration designs for the public realm for the transit system that set the standards for the Architecture Typologies set out in this document. These designs demonstrate how to deploy the Public Realm Strategies and Common Elements within the Architecture Typologies. These Designs are demonstrative and act as a Proof for the Strategies.

The Demonstration Designs have been developed as proofs of the Strategies and deployment of the Common Elements. Each Architectural Typology: Elevated, At-Grade and Below Grade is developed in this section, as shown as in the figures below. These Demonstration Designs show indicative sites and as the Transit Oriented Communities grow site conditions may change. The configuration and density of the site will be subject to change, project by project.



3.5.1 Elevated Platform



3.5.2 At Grade Platform

3.5.3 Below Grade Platform

Figure 3-32: Demonstration Design Typologies

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

3.5.1 Elevated Platform

The plan and renderings that follow show the demonstration design for the elevated guideway. Principles for this typology include the focus on hardscape and paving patters. The design and placement of the pavers, seating and bollards guide the customer to the entrance. The planters, trees and tree groves are kept at the perimeter of the guideway and never under the guideway. Groves are to be planted in the forecourt away from the entrance as seen in this demonstration plan for the Elevated Platform.

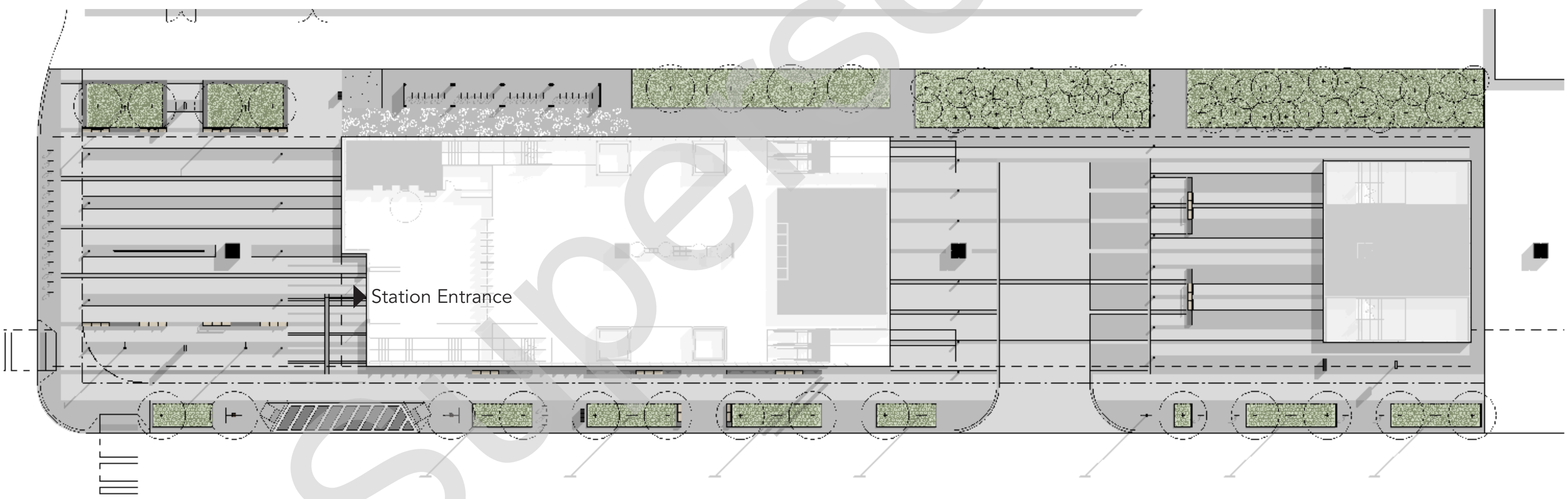
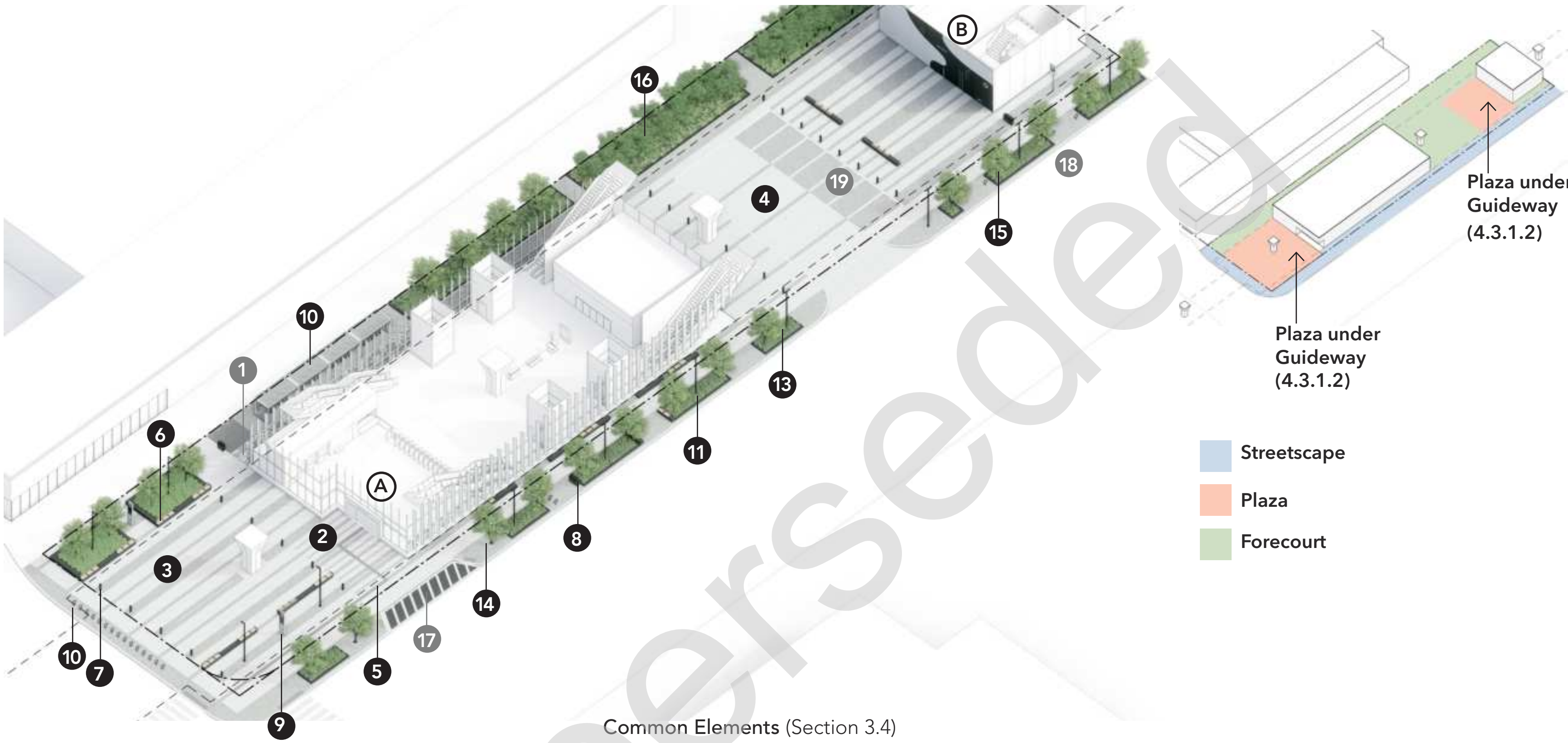


Figure 3-33: Elevated Platform - Site Plan

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.



Common Elements (Section 3.4)

1 Cycling super graphics (3.4.4)
2 Paving Pattern (Primary) (3.4.1)
3 Paving Pattern (Secondary) (3.4.1)
4 Paving Pattern (Transitional) (3.4.1)
5 Tactile Guiding Indicators (3.4.1)
6 Seating (3.4.2.1)
7 Safety Bollards (3.4.2.2)
8 Waste Receptacle (3.4.2.3)
9 Signage (3.4.2.4)
10 Bicycle Parking (3.4.3)
11 Light Pole (3.4.5)
12 Light Bollard (3.4.5)
13 Planters with ground cover planting (3.4.7)
14 Shade trees in grates with soil cells (3.4.9)
15 Shade trees in planters (3.4.11.2)
16 Small trees in planters (3.4.11.2)
17 PUDO (3.8.7)
18 On-street Parking
19 Staff Parking (Figure 3-38)

A Station Entrance
Refer to Architectural Standards (Section 4)

B Station Exit
Refer to Architectural Standards (Section 4)

\# Black label: Required

\# Grey label: If conditions permit

Figure 3-34: Elevated Platform - Axonometric View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-35: Elevated Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-36: Elevated Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-37a: Perspective View

Figure 3-37b: Perspective View

Note: The In-ground lighting is optional and for illustration purposes only.

Figure 3-37: Elevated Platform - Perspective Views

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-38: Elevated Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

3.5.1.1 Elevated Platform Plaza Scenarios

The four scenarios to the right are illustrative only and offer suggestions as to how the space might be used by Third Party.

The Elevated Platform typology creates unique opportunities for plaza scenarios. Illustrated here are recreational, cultural, commercial and other third party programming opportunities.

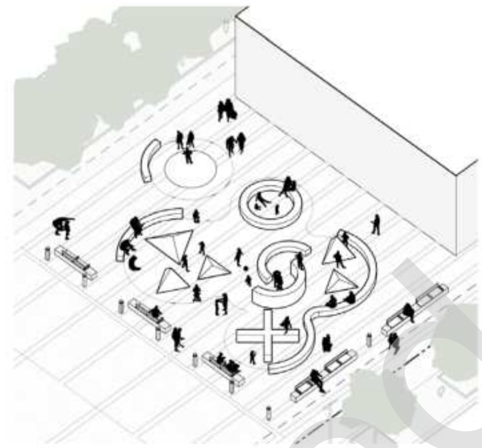


Figure 3-39a: Recreation Variation

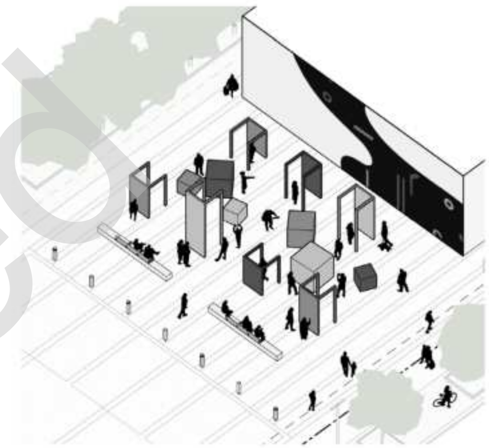


Figure 3-39b: Culture Variation

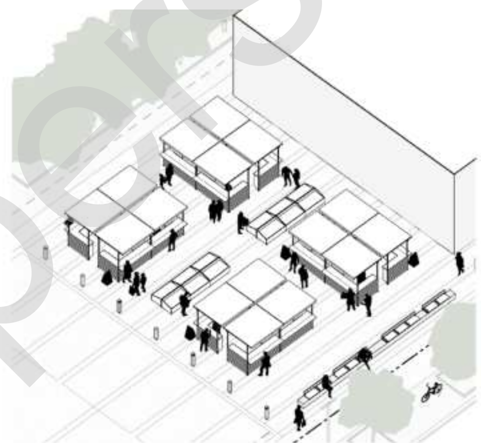


Figure 3-39c: Commercial Variation

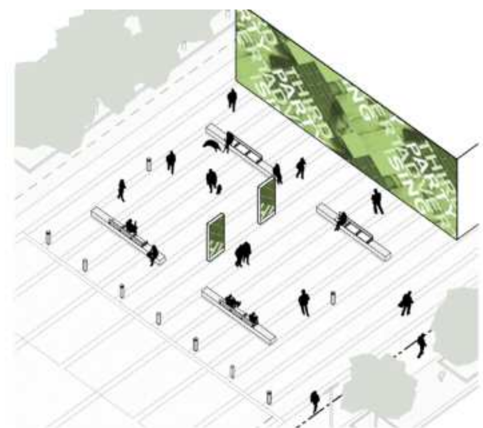


Figure 3-39d: Third Party Variation

Requirement:

Minimum of 20m by 10m required to deploy Plaza scenarios

Figure 3-39: Elevated Platform - Plaza Scenarios

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

3.5.2 At Grade platform

The plan and renderings that follow show the demonstration design for the At Grade Typology. Principles for this typology include the focus on the fine grain paving patterns to denote the Station Entrance. The design and placement of the pavers, seating and bollards guide the customer to the entrance. The planters, trees and tree groves are adjacent to the entrance pavers. The trees are planted in planters in groves in the forecourt guiding the customer to the entrance as seen in this demonstration plan for the At Grade Platform.

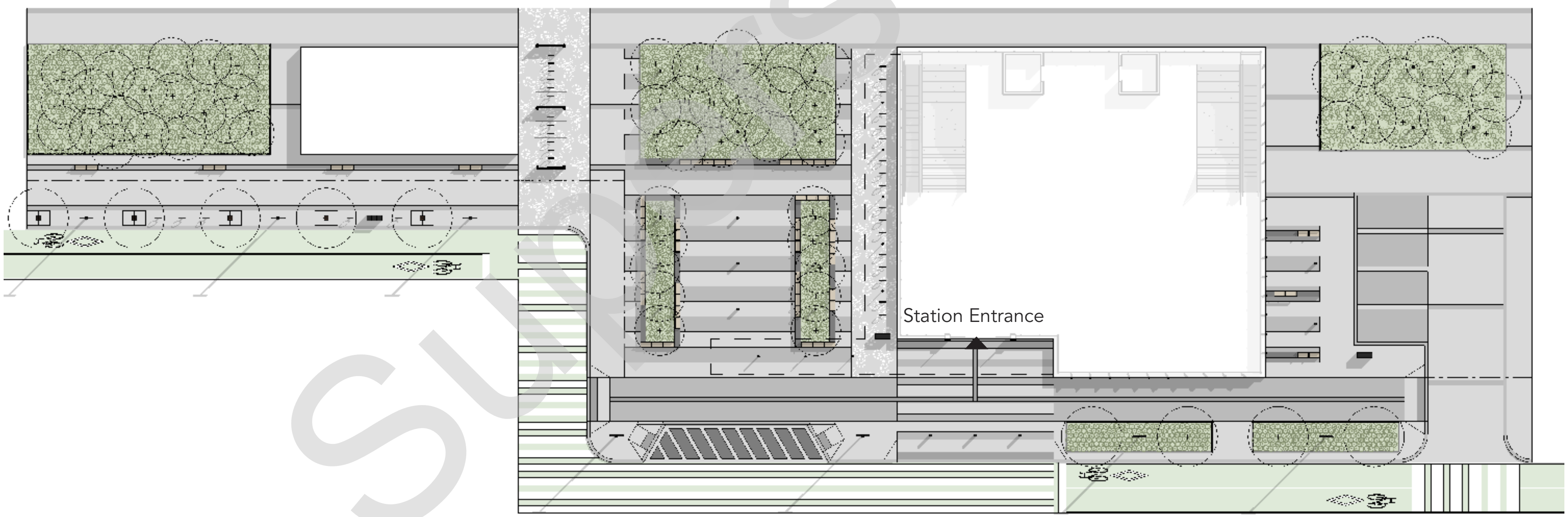
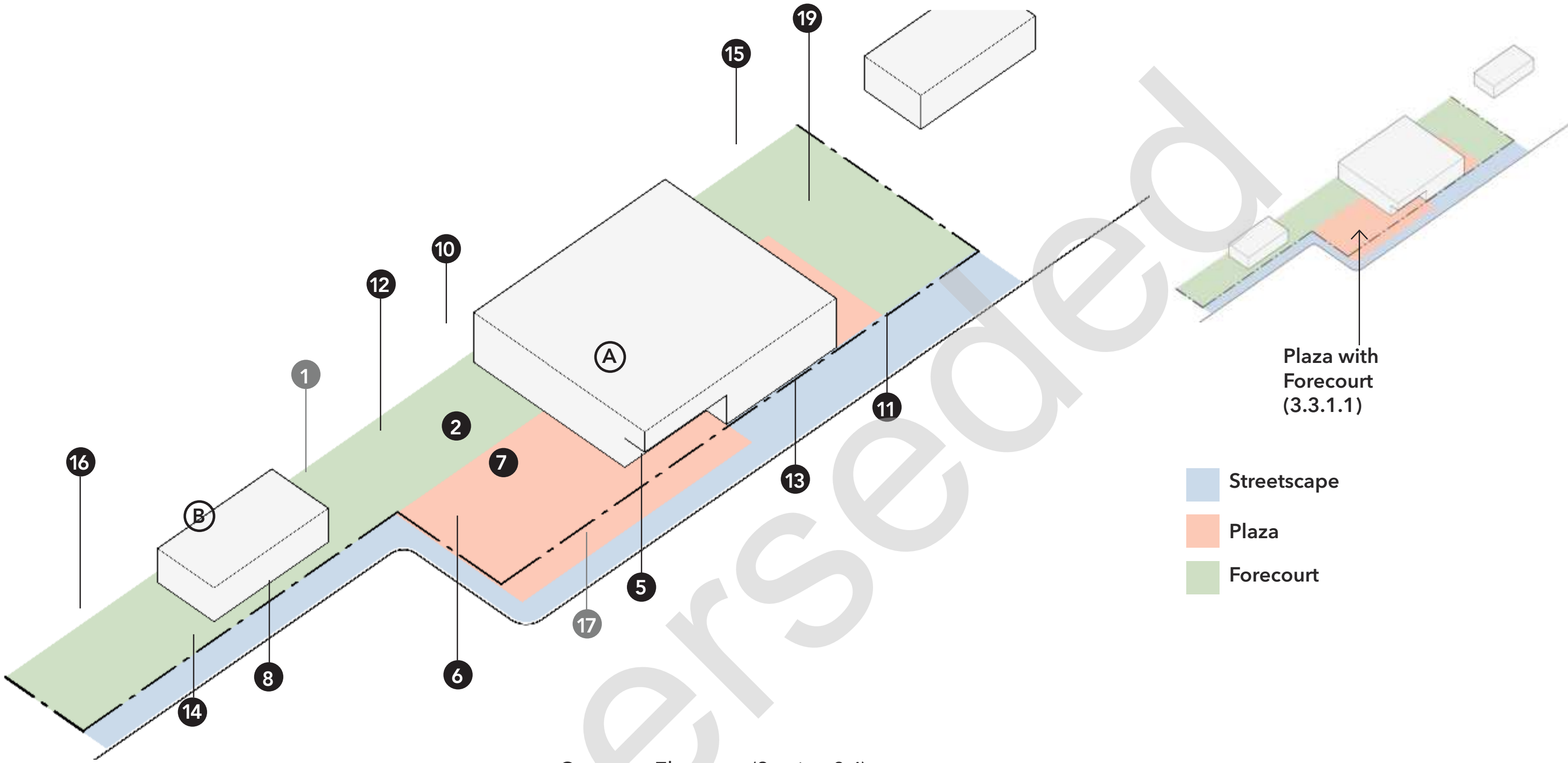


Figure 3-40: At Grade Platform - Site Plan

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.



Ⓐ Station Entrance
Refer to Architectural Standards (Section 4)

Ⓑ Station Exit
Refer to Architectural Standards (Section 4)

Black label: Required

Grey label: If conditions permit

Common Elements (Section 3.4)

1 Cycling super graphics (3.4.4)
2 Paving Pattern (Primary) (3.4.1)
3 Paving Pattern (Secondary) (3.4.1)
4 Paving Pattern (Transitional) (3.4.1)
5 Tactile Guiding Indicators (3.4.1)
6 Seating (3.4.2.1)
7 Safety Bollards (3.4.2.2)
8 Waste Receptacle (3.4.2.3)
9 Signage (3.4.2.4)
10 Bicycle Parking (3.4.3)

11 Light Pole (3.4.5)
12 Light Bollard (3.4.5)
13 Planters with ground cover planting (3.4.7)
14 Shade trees in grates with soil cells (3.4.9)
15 Shade trees in planters (3.4.11.2)
16 Small trees in planters (3.4.11.2)
17 PUDO (3.8.7)
18 On-street Parking
19 Staff Parking

Figure 3-41: At Grade Platform - Axonometric View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

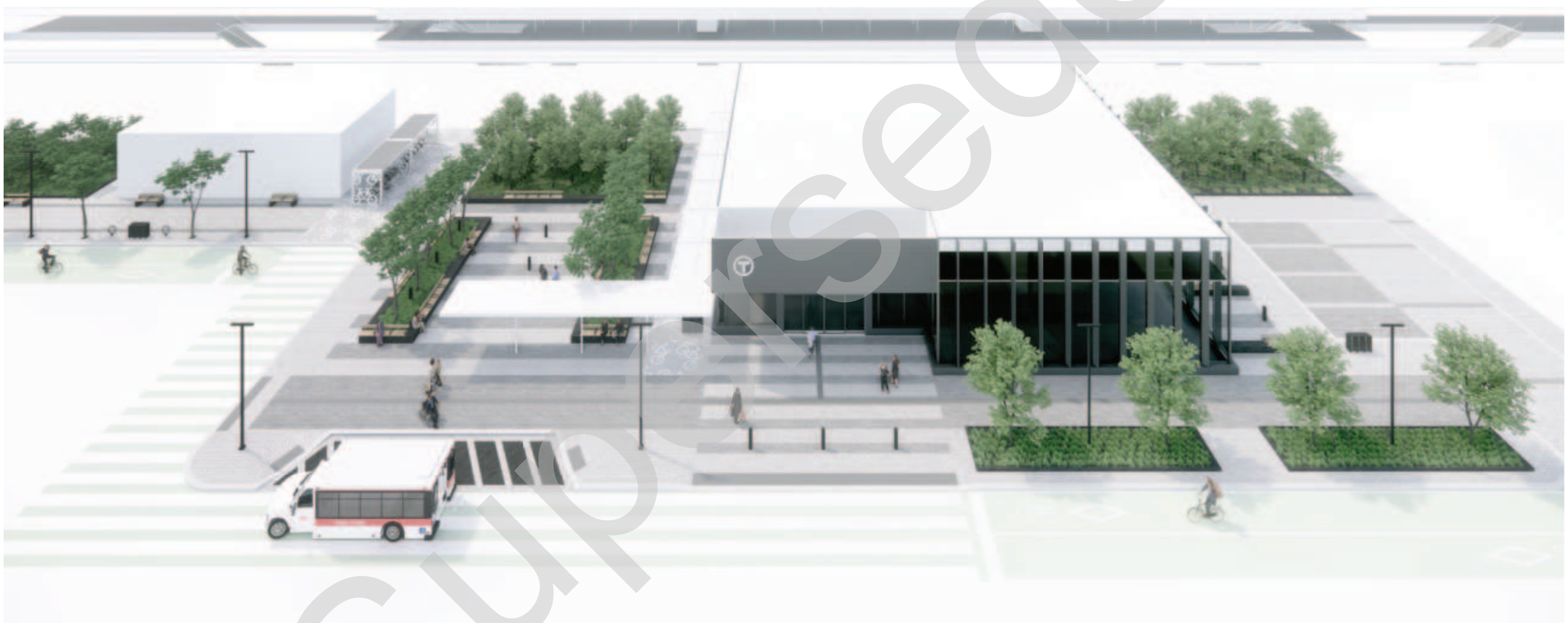


Figure 3-42: At Grade Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-43: At Grade Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-44: At Grade Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-45: At Grade Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-46: At Grade Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

3.5.3 Below grade platform

The plan and renderings that follow show the demonstration design for the Below Grade Platform with entrance on the short side of this corner siting. Principles for this typology include the focus on hardscape and paving patterns to indicate both directionality of the subway below and to guide the customer to the entrance. The entrance pavers follow the width of the entrance facade guiding the customer journey. The trees are planted on a grid in the planters side of the corner that does not contain an entrance. What follows are renderings of the three dimensional demonstrations of this typology.

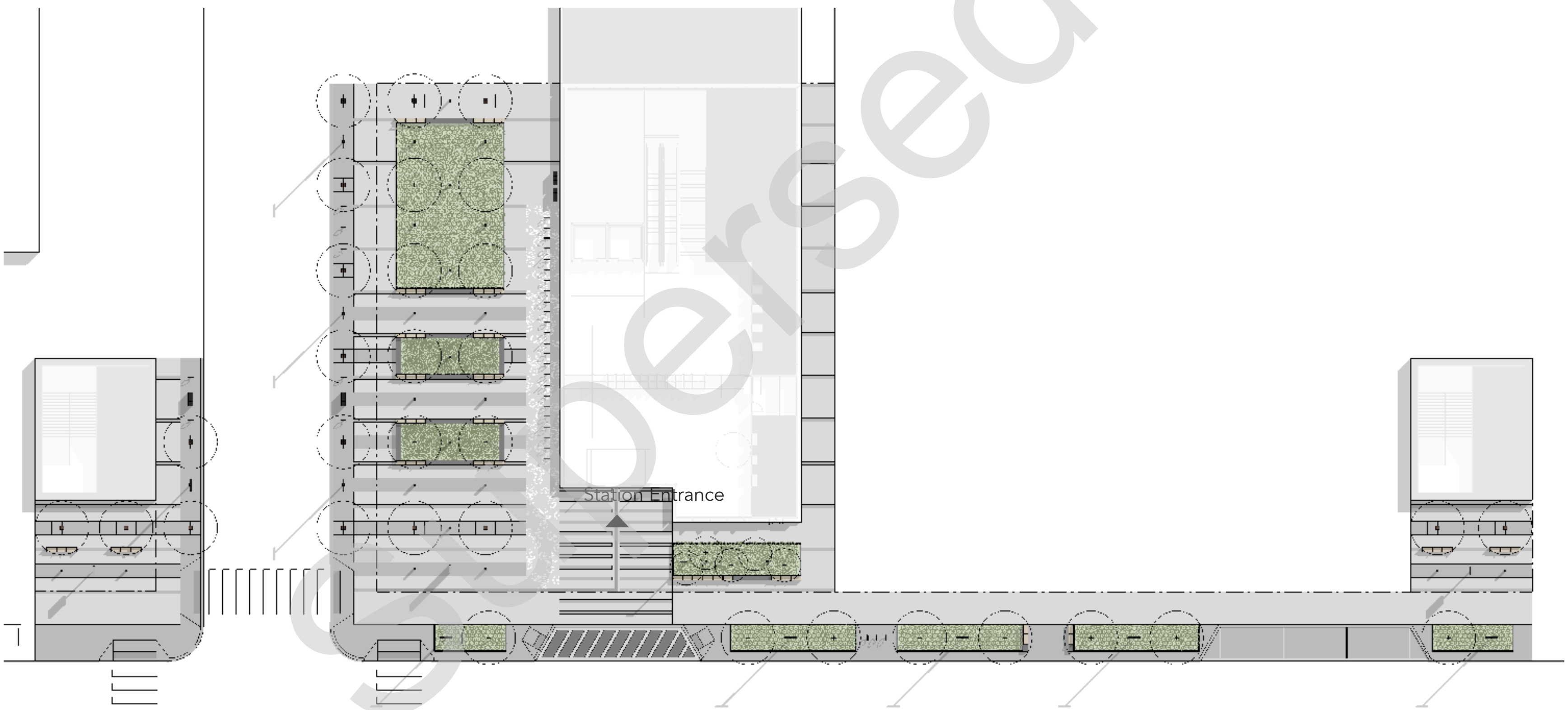
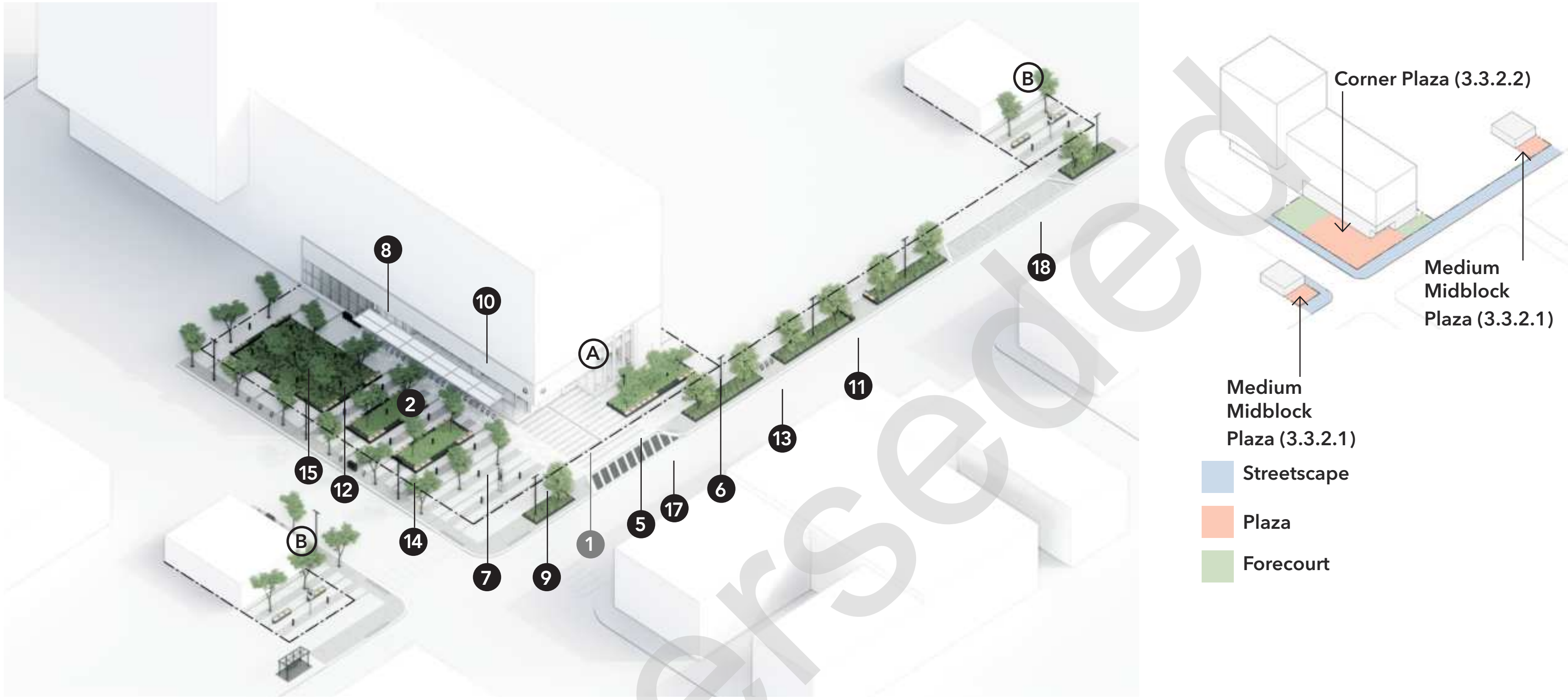


Figure 3-47: Below Grade Platform - Site Plan

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.



- (A) Station Entrance
  Refer to Architectural Standards (Section 4)
- (B) Station Exit
  Refer to Architectural Standards (Section 4)
- (#) Black label: Required
- (#) Grey label: If conditions permit

Common Elements (Section 3.4)

1. Cycling super graphics (3.4.4)
2. Paving Pattern (Primary) (3.4.1)
3. Paving Pattern (Secondary) (3.4.1)
4. Paving Pattern (Transitional) (3.4.1)
5. Tactile Guiding Indicators (3.4.1)
6. Seating (3.4.2.1)
7. Safety Bollards (3.4.2.2)
8. Waste Receptacle (3.4.2.3)
9. Signage (3.4.2.4)
10. Bicycle Parking (3.4.3)
11. Light Pole (3.4.5)
12. Light Bollard (3.4.5)
13. Planters with ground cover planting (3.4.7)
14. Shade trees in grates with soil cells (3.4.9)
15. Shade trees in planters (3.4.11.2)
16. Small trees in planters (3.4.11.2)
17. PUDO (3.8.7)
18. On-street Parking
19. Staff Parking

Figure 3-48: Below Grade Platform - Axonometric View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-49: Below Grade Platform - Aerial View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-50: Below Grade Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-51: Below Grade Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

Figure 3-52: Below Grade Platform - Perspective View

Configuration of common elements is illustrative only. The configuration of the site may evolve over time and shall respond to the local context.

3.6 CORRIDOR IDENTITY

A transport corridor is understood as the linear area that is defined by one or more modes of transportation like highways, railroads or public transit which share a common course. Potential subway customers reside within the communities that these alignments pass through and as such must be designed to consider the architectural and urban design context.

The Corridor material palette provides a uniform set of materials for all customer facing fences, barriers and walls. Figure 3-53: Corridor Material Palette, illustrates the form and quality of this palette.

Figure 3-53: Corridor Material Palette

All customer facing walls shall take the following approach to ensure that the height is pedestrian and cyclist friendly:

i. Walls shall be setback from the sidewalk by a minimum of 3m. The space between the corridor wall and the sidewalk shall be landscaped. Refer to sections 3.4.11 and 3.4.12 for form, character and species of the landscape elements.

ii. The wall shall stepback by a minimum of 1m upon reaching 4.5m in height.

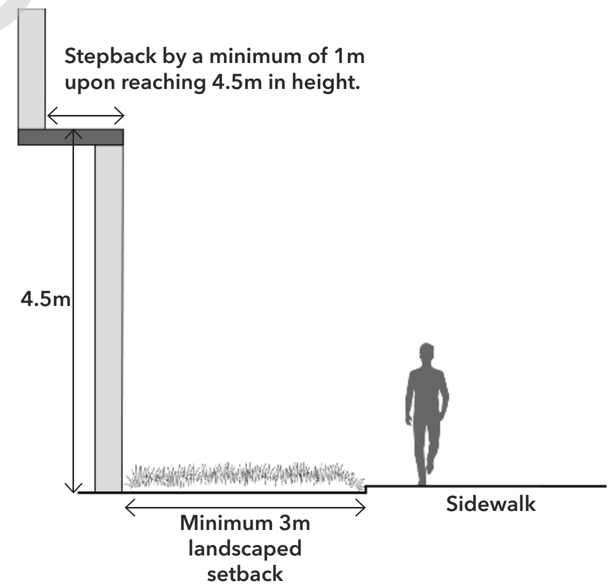


Figure 3-54: Customer Facing Walls

3.6.1 Transportation Corridor

Customer facing transportation corridor elements need special attention. The presentation and treatment of fencing, retaining walls, sound barriers, and portals in the public view shall provide visual interest that is complementary to the line wide identity.

The transit line corridor will link the subway stations and will pass through a variety of community types and adjacent uses. The boundaries of the alignment must be designed to reduce their impact on these adjacent communities and to provide safe and secure protection from public intrusion.

a) The edges of the alignment will be secured with a safe and secure fence that will be vandal resistant and non-climbable and shall be regulated by local requirements in terms of height and density. Public facing fencing shall conform to a high level of design that is consistent in style and materialism as it relates to the overall transit line.

b) The spaces between the limits of the guideway and the metrolinx property shall be a softscape environment with the exception of maintenance roads to access the corridor and the infrastructure within it.

c) There shall be no planting below the guideways as there is no light or water to sustain those plants.

d) Where variations in grade occur between the train envelope/access roads, the softscape shall conform to standard industry practices to prevent soil erosion.

3.6.2 Fencing

All fencing provides security on a gradient from a transparent edge experience to an opaque and highly secure fence. All fencing shall have consistent materiality and identity that can be deployed at varying degrees of transparency, to support natural surveillance.

The application of these fences and screen elements include:

a) TPSS and EEB

b) portals and guideways

c) at grade mechanical units

d) roof top mechanical enclosures

e) acoustic barriers

f) public ROW

g) barriers, and

h) bridges.

Design for these elements shall include:

i. visibility

ii. contextual response

iii. scale

iv. integration with architecture and infrastructure

v. kit-of-parts approach

vi. consistent/complementary PSOS requirements

vii. ventilation

viii. materiality

ix. security performance including grounding

x. maintenance including graffiti and vandalism

xi. consistency with municipal standards

xii. property acquisition extent to accommodate appropriate design response

xiii. fence support, including concrete footings below the frost line, designed to support the weight of the fence

3.6.2.1 Opaque Security Fencing

The use of fencing within the alignment will provide both security and spatial definition as well as screening. It shall be of a high level of design that is durable and low maintenance and consistent in its appearance throughout the corridor.

a) Chain link fencing is not allowed in public areas. The prohibition on chain link fencing shall apply to all fencing, not just security fencing, including directional fencing, crowd control fencing, and fall protection fencing.

b) Fencing shall be complemented with plant material to reduce its visual impact. Plant material shall adhere to CPTED guidelines.

c) Height requirements for fencing shall be governed by the requirements of municipal by-laws as they relate to the purpose of adjacent uses for which the fencing is provided. Fence heights to meet functional and security requirements.

d) Where gabion walls are used, they shall be Omega Max or equivalent powder coated metal, black or grey filled with rundle rock as illustrated on the following page.

3.6.2.2 Transparent Public Facing Fencing

Public facing transparent fences shall be used to provide direction and spatial definition. They shall be galvanized double wire mesh fences and posts as in figure 3-55. They shall be constructed of powder coated metal in either black or grey.

Figure 3-55a: Wire Mesh Fence

Figure 3-56a: Gabion Fence filled with Rundle Rock

Figure 3-55b: Wire Mesh Fence - Section

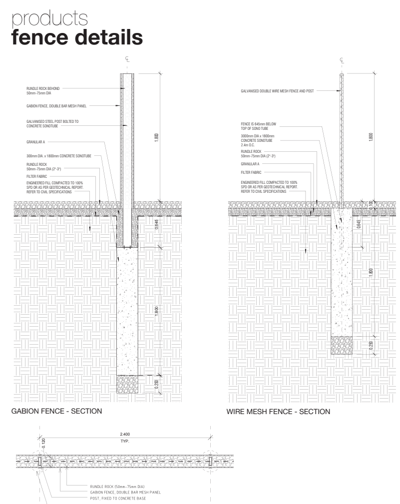


Figure 3-56b: Gabion Fence - Section

Figure 3-55: Transparent Fencing

Figure 3-56: Opaque Fencing

3.6.3 Barriers and Walls

3.6.3.1 Retaining Walls

Retaining walls may be required to accommodate changes in grades between adjacent surfaces. The design and aesthetics of the retaining wall shall be consistent throughout the corridor and shall be durable, aesthetically interesting and include, colour, texture and a variety of form.

a) Materials for retaining may need to include cast-in-place concrete, precast modular or a substructure clad with a precast concrete veneer.

b) Retaining walls shall also provision for proper drainage behind the wall and drains or weep holes where necessary.

c) Cast-in-place concrete walls shall have design qualities that include a combination the following techniques:

   i. Coloured concrete

   ii. Form liners and/or patterns

   iii. Grafitti coating or Sand blasted or bush hammered

d) Precast modular style retaining walls shall be consistent with the Metrolinx identity and may include supergraphics. Single colour modular blocks are not permitted.

e) Lighting shall be incorporated into the design of retaining walls to enhance the surface quality and to provide visual interest. Lighting is required as a safety measure. Lighting shall be designed/located to facilitate maintenance and access.

f) All retaining walls shall have graffiti protection along their entire height. They shall include an approved graffiti protection coating that can be applied to concrete.

Figure 3-57: Retaining Wall - Coloured and pattern concrete

3.6.3.2 Sound Barriers

The use of sound barriers within the alignment will provide both security and sound attenuation as well as screening. It shall be of a high level of design that is durable and low maintenance and consistent in its appearance throughout the corridor.

a) They shall meet the requirements of sound barrier design as outlined in a Sound Attenuation report. This includes density of materials and minimum heights.

b) All sound barriers shall have graffiti protection, they shall include an approved graffiti protection coating that can be applied to concrete.

c) When a combination of a retaining wall and sound barrier is required, the wall design shall integrate the two functions to eliminate separate structures running adjacent to each other.

Figure 3-58: Living Wall Sound Barrier

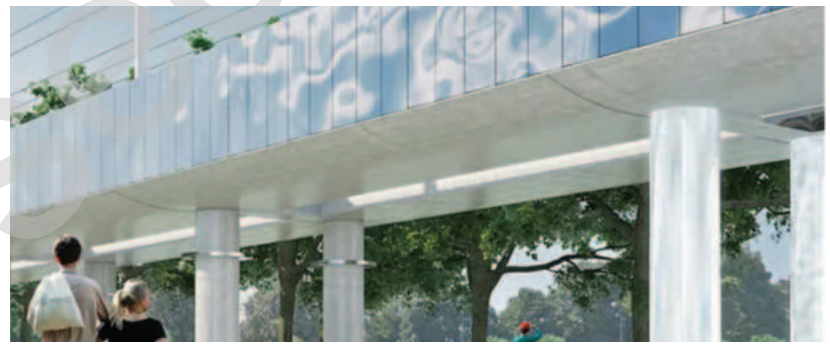


Figure 3-59a: Elevated Sound Barrier- cladding with integrated noise wall and public art

Figure 3-59b: Elevated Sound Barrier - Concrete

Figure 3-59: Elevated Sound Barrier

3.6.3.3 Traffic Barriers

Traffic barriers shall be designed to withstand the direct horizontal force of a vehicle as well as conform to the overall branding of the corridor design. It shall employ elements that are complementary or consistent with other site furniture and infrastructure elements.

a) Traffic barrier styles shall be either continuous or segmented in a consistent repetitive pattern.

b) Continuous barriers shall consist of raised planters. Refer section 3.4.7.

c) Jersey barriers or similar prefabricated traffic barriers are not permitted.

d) Traffic barriers shall include graffiti resistant surface treatments and shall be vandal resistant.

e) A segmented traffic barrier refers to the use of a single element such as a bollard that is laid out in a rhythm and spacing consistent with the requirements needed to prevent vehicular passage. Refer section 3.4.2.2 Bollards.

f) Traffic barriers shall maintain the required clearances for accessibility and not obstruct the accessible path of travel.

g) Refer to Facilities Civil Engineering Standards for bollards and raised planters.

Figure 3-60: Bollards and Raised Planters as Traffic Barriers

3.6.3.4 Medians

A key aspect to supporting pedestrian safety is to design public realm to reduce the crossing distance, and thereby eliminate the need for a median 'refuge' area for pedestrians. Medians also reallocate public realm plantings away from public boulevards adjoining sidewalks, where they provide greater benefit through close proximity to pedestrians and as a buffer to vehicle lanes. For these reasons, suggest to acknowledge that medians are not desired. When they are required they shall be designed to provide pedestrian protection. The medians shall be consistent throughout the corridor with a signature design language that provides a safe edge and directs pedestrians in a safe and orderly manner.

a) Medians may vary in width and shall consist of a hardscape element where they are too narrow for plant material.

b) Where medians are a minimum of one metre they can accept plant material. The following shall apply to the planting within the median:

   i. Utilize a variety of ornamental grasses and perennials that are drought tolerant and low maintenance while maintaining minimum heights in accordance with CPTED guidelines.

   ii. Provide a consistent palette of species that will unify the planting design throughout the corridor but will also allow for differences that are specific to each station.

   iii. Tree species shall be employed in all medians that will support a minimum of $30m^3$ of topsoil.

c) Medians shall maintain the required clearances for accessibility and not obstruct the accessible path of travel.

3.6.4 Portals

Portals will form an integral part of the subway alignment and will occur at areas where the train transitions from an at grade location to an underground tunnel. These portals will be comprised of retaining structures on both sides of the tracks (or slopes and terraces where land area allows) to maintain adjacent grades and amenities, as well as to demarcate the tunnel entrance. The design and aesthetics of the retaining wall shall be consistent throughout the corridor and shall be durable, and consistent.

a) Where the gabion fence is proven to be infeasible, materials for retaining walls shall include cast-in-place concrete, precast modular or a substructure clad with a precast concrete veneer.

b) Cast-in-place concrete walls shall have design qualities that include a combination the following techniques:

   i. Coloured concrete

   ii. Form liners and/or patterns

   iii. Grafitti coating or Sand blasted or bush hammered

c) Grafitti coating or Sand blasted or bush hammered include concrete, natural stone or man-made stone or a material that is consistent and unified with station facility materials.

d) Precast modular style retaining walls shall include a variety of colour, texture and vertical variation. Single colour modular blocks are not permitted.

e) All retaining walls shall include graffiti resistant surface treatments and shall be vandal resistant.

f) Lighting shall be incorporated into the design of retaining walls to enhance the surface quality and to provide visual interest.

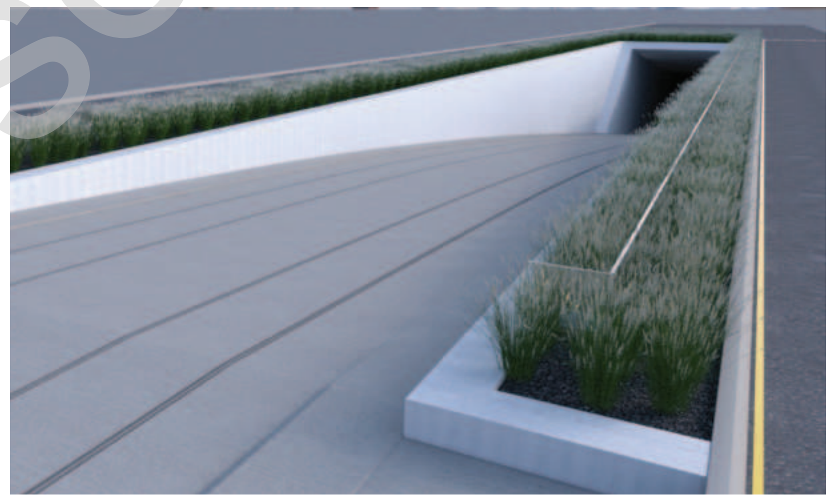


Figure 3-61: Portal

3.6.5 Elevated Guideways

The subway trains may in some locations, pass through a community on an elevated guideway. The space below the guideway is designed to provide a safe and enjoyable public realm or respects and protects a natural environment.

a) Revitalization of the natural systems shall follow the regulations and requirements as provided by the local conservation authority and other jurisdictions.

b) In situations where the guideway passes through an urban area. The following shall be followed:

   i. The underside of the guideway shall be designed as a solid element, providing colour, texture and materialism that projects a clean and modern appearance.

   ii. The underside of the guideway shall incorporate lighting within public areas. Refer demonstration design section 3.5.1.

   iii. Support columns shall be located to eliminate obstructions to walkways and shall be designed to enhance the public realm in their form, shape and colour.

   iv. Fencing and/or sound barriers shall be incorporated where required to direct pedestrian movement and to provide security and sound attenuation.

   v. Lighting within the immediate vicinity of stations shall conform to minimum lighting requirements within this standard. Alternative lighting requirements shall be provided for Metrolinx review.

   vi. Plant material shall be incorporated utilizing appropriate species for the climatic conditions conducive to the local site context.

   vii. Seating areas shall be provided along walkways at intervals of no less than 30m on centre.

   viii. Walkways shall be strategically located to provide safe, direct connections under the guideway to the adjacent neighbourhoods.

   ix. All elements shall be designed utilizing CPTED principles.

3.6.6 TPSS and Large Ancillary Structures

Some types of ancillary structures will be located along the corridor, such as Electrical & IT System Cabinets (ELE/ITS), Traction Power Substations (TPSS), and Emergency Exit Buildings (EEB). Consistency in architectural elements shall be balanced with enhancement of the public realm and response to context. These structures shall align with the architecture and landscaping kit of parts without becoming a focal point. These structures shall extend the colours, materials, patterns and finishes of the subway standards. While efforts shall be made to integrate ancillary structures within their immediate context, for the most part, they will be static structures that remain inaccessible to the public. For architectural treatment of the TPSS and Large Ancillary Structures refer to Section 4.9.4.

The integration with the urban context shall be a driving principle, incorporating urban design, architectural and landscape treatments that enhance the transition to the immediate civic realm, supporting and protecting for the future development and intensification of adjacent properties. Consistency in architectural elements shall be balanced with enhancement of the civic realm and response to context.

Along a corridor there are various potential TPSS sites such as: sites surrounded by existing vegetation, sites within parking lots, greenfield sites and, sites with specific and sensitive contextual conditions. Each site of a TPSS shall be carefully screened through architectural treatment and/or landscape screening.

3.6.6.1 Landscape and Site Enhancements

Landscape, surrounding the TPSS sites shall be used as an additional enhancement to positively respond to and connect with existing local and future contextual conditions.

The general approaches to enhancing the TPSS sites through landscape are as follows:

a) Where sites are adjacent to existing vegetation or sites identified as prominent or highly sensitive, TPSS structures and landscape shall be well integrated with the surrounding landscape.

b) Where sites are situated in a parking lot and the available space for landscape enhancements is limited due to proximity to parking spots, TPSS surface treatment or cladding shall have hardscaped buffers surrounding the work area in order to define the boundary of the TPSS and differentiate it from the parking lot area.

c) Where sites are located within a non-urban context surrounded by no development, TPSS structures shall be surrounded by landscape enhancements. Refer to section 3.3.1, for further understanding of landscape standards.

d) Ancillary equipment, such as switchgears, disconnect switches, and interlocks shall be screened with fencing (refer section 3.6.2) and landscape.

e) Locate landscaping at the perimeter of the site outside of the work area and within the TPSS property limits.

f) Landscaping and vegetation around TPSS, transformers, switchgear, energized equipment etc shall be located to screen these elements with consideration for safety, grounding, and removal of equipment.

g) Provide the Landscape and site layout of TPSS in accordance with CPTED design principles and Section 4.9.4, and in coordination with the existing and planned context.

h) Preserve existing trees within the TPSS sites.

i) Provide the TPSS Landscape to include mixed planting, to provide year round interest.

j) Organize TPSS planting in groupings where appropriate and compatible with the surrounding neighbourhood.

k) Provide the TPSS Landscape to include mixed planting, to provide year round interest.

l) Organize TPSS planting in groupings where appropriate and compatible with the surrounding neighbourhood.

m) Screen all free standing equipment in the TPSS site, depending on its size and screening requirements, with vegetation.

n) In addition the design of the TPSS shall also incorporate special lighting treatments to accentuate their presence especially in highly public locations.

Note: This section shall be read in conjunction with sections 3.4.11 and 3.4.12 for further understanding of landscape standards.

3.6.6.2 Coordinated Ancillary Structures

Each subway stop platform may need to accommodate an ancillary structure and this shall be coordinated with the subway stop architecture. They will be located beyond the dead end platform, and/or away from public access. They shall visually coordinate with the architecture and landscaping of the subway stop without becoming a focal point. They shall extend the colours, materials, and finishes of the subway stop platform elements. While efforts shall be made to integrate ancillary structures within their immediate context, for the most part, they will be static structures that remain inaccessible to the public.

3.6.6.3 Large Ancillary Structures without Public Use - TPSS

TPSS are large, stand-alone ancillary buildings without public function or public access, frequently surrounded by a landscaped security buffer with required service vehicle access and short-term parking. This parking is usually accommodated on the access drive. These facilities shall be designed not to call undue attention to themselves but instead to integrate with their immediate surroundings or maintain the architectural design language of the line and the system. They shall:

a) If adjacent to significant buildings or structures, reflect the design language and rhythm of their context.

b) If sited in open, landscaped area the structure shall follow the Metrolinx Standard's design language and material palette.

c) If tall enough, have a ground level that is differentiated from upper levels.

3.6.6.4 Small Ancillary Structures without Public Use - Exit Building

Small stand-alone ancillary buildings that are not accessible, such as Emergency Exit Buildings (EEB), will be located in areas with no development opportunity. They shall:

a) Be well designed and treated as a subtle background structure.

3.6.7 Tunnel Ventilation Shafts

Tunnel ventilations shafts shall reflect the design language of this standard. These ventilation shafts shall be designed not to call undue attention to themselves but instead to integrate with their immediate surroundings and to maintain the architectural and public realm design language as set out in this standard.

When the tunnel ventilation shaft is in the primary path of travel, it shall not encroach on the path of travel, in particular on the path of accessible travel. It shall be:

a) Flush with the paving.

b) Openings shall be a maximum of 8mm in width.

Where applicable the tunnel ventilation shaft elements shall be designed as seating or as sculptural elements if located in park like settings (see figure 3-61).

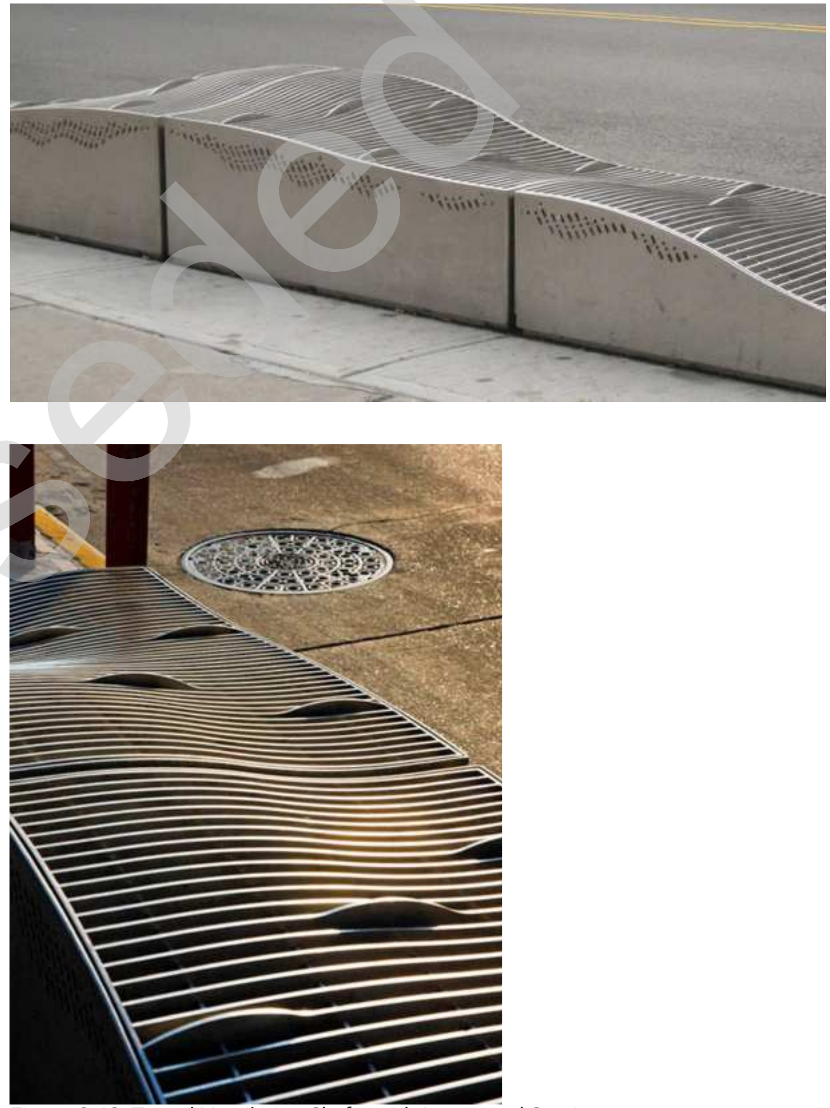


Figure 3-62: Tunnel Ventilation Shafts with Integrated Seating

Source: MTA, New York City

3.7 MAINTENANCE AND STORAGE FACILITIES

Public realm integration is an important requirement, for all Maintenance and Storage Facilities (MSF) along the Subway Corridors. The interface of the MSF with the surrounding Right of Way (ROW) and public realm is the focus of this section. Passengers shall perceive that they are within a coordinated and aesthetically consistent public realm. The landscape plan, including fencing, shall reflect the site sustainability ambitions and a consistent design language.

Any security fence shall be designed to reduce the amount of area fenced in, and shall be buffered with native "meadow" or shrub planting to reduce its visual impact. Where fencing is required at the main site entrance, fencing that complements the architectural expression of the building shall be used. Refer to Section 5.9.6 for architectural design requirements.

Buildings related to the MSF shall respond to the contextual urban condition, and/or assist in the creation of a new urban condition. Strategies shall include fronting buildings onto public streets, locating active uses within the MSF on the street-facing side of the building, and providing visual permeability from the public realm into the MSF for the public to view.

The MSF site shall appear verdant, treed, and parklike.

The landscape and urban design plan represents an opportunity to extend the sustainability principles of the building design into the surrounding site, responsive to its siting.

Figure 3-63: MSF Public Facing Elements

The landscape approach shall incorporate the following:

a) An innovative sustainable landscape approach which shall be deployed as part of a sustainable place-making strategy that encourages a bio-diverse environment.

b) Low impact development (LID) stormwater management measures shall be employed, such as use of soil cells for water retention (refer section 3.4.9 Soil Cells). Any storm water management pond shall be appropriately positioned and take advantage of opportunities to provide visual interest from adjacent streets and designed to provide a comfortable outdoor break amenity areas for employees in addition to enhancing wildlife habitat.

c) Landscaping shall restore ecological function to the site, incorporate the use of permeable surfaces, native trees, and LID (low impact development) features such as bioswales around all parking areas and maintenance buildings.

d) Hardscape elements of the landscape design language shall complement the design language of rectilinear architectural elements, reflect a contextual design, integrating with adjacent landscape, patterns and colours.

e) Where fencing is required along the MSF edges visible to pedestrians, passengers and passing vehicles, fencing, living green walls or a combination shall be provided. The security fence shall be located to reduce the amount of fences required. Refer to Section 3.6.3.

f) Any fenced area shall be buffered with native tree or shrub planting to reduce visual impact. Where fencing is required at the main site entrance, fencing that complements the architectural expression of the building shall be used.

g) Where fencing is required, it shall not obstruct clear views into and from the public areas following the principles of CPTED.

h) As facilities may be situated at a prominent location along the corridor, the perimeters of the site shall be deemed public-facing and designed with screening measures to mitigate the visual impact of MSF on development or any future development adjacent to the site as demonstrated by a viewing angle and screening study.

i) If required, noise attenuation walls shall demonstrate quality of design commensurate with a well-designed contemporary industrial facility. Refer to Section 3.6.3.

j) The use of retaining walls are generally discouraged. Where necessary, the design and profile of the retaining walls shall be designed to reduce negative visual impact on the public realm. Refer to Section 3.6.3.

3.8 STREET ELEMENTS AND CONNECTIONS

This section outlines the requirements for street furniture, street operations and maintenance as well as safe and comfortable connections for pedestrians and cyclists.

3.8.1 Street Elements

The following standards define the space parameters for integration of City requirements:

a) Provide a designated snow storage area to facilitate clear customer and accessible site access during heavy snowfall conditions. Where there is no room for snow storage, snow will be cleared and taken away by truck to a location where it can be stored. Snowmelt shall be required at stairs, ramps and entrances. It is important to note that during design development the operator will request a snow clearing plan to assess vehicular access and how many parking spaces would be taken up.

b) Outside utility boxes shall not be installed within the Metrolinx station premises.

c) Exterior Emergency Blue Light Station (Passenger Assistance Intercom) is an emergency intercom located outside the subway station on Metrolinx property. The intercom connects directly to Subway Station Security and/or the police. This direct connection is a convenient option for customers. The emergency blue light flashes to make it highly noticeable when active.

   i. Blue Light Stations shall be provided outside the entrance of the subway station.

   ii. Placement of blue light stations shall ensure high visibility and be unobstructed by other site elements.

   iii. Number of blue light stations to be determined on a site by site basis where included in project scope.

d) Design a space for a permanent salt/sand box with dimensions of 1050 mm width x 725 mm depth x 750 mm height at each exterior entrance. The salt box area shall be at least two metres away from any Metrolinx station glass facades.

e) Modes of travel and modes of arrival shall not interfere with one another.

Figure 3-64: Exterior Emergency Blue Light Station

Source: ravemobilitysafety.com

f) Pedestrian access and walkways shall:

   i. be clearly visible and well-lit;

   ii. not cross bus bays or bus loops;

   iii. shall be separated from vehicular routes;

   iv. be free of any hazards including openings, gaps and/ or gratings that would create a hazard to a person using a mobility device, a cane or compromisable footwear.

g) Pedestrian access and walkways shall comply with the DS-02 Universal Design Standard and with the relevant project specific requirements and is subject to coordination with the operator.

h) The deployment of Common elements (refer to section 3.4) shall be coordinated between the Municipality and Metrolinx when they fall within the Municipal property.

i) Paving, refer to section 3.4.1.

j) Bicycle Parking, refer to section 3.4.3.

k) Lighting Standards, refer to section 3.4.5.

l) Raised Planters, refer to section 3.4.7.

m) Seating shall be provided, Refer to section 3.4.2.1.

n) Locate safety bollards around the station to provide for pedestrian safety from vehicles. Refer to section 3.4.2.2.

o) Waste Receptacles shall be provided, See section 3.4.2.3.

p) Signage & Wayfinding shall be provided as per and conform to the DS-03 Wayfinding Design Standard.

q) The Pedestrian Totem shall be located on the approach to the subway station, close to the street.

r) CCTV shall be provided as per section 2.4.1.

s) Stairs and ramps shall be eliminated. For site conditions where a significant change in grade is required, locate stairs and ramps adjacent to each other. Refer to section 3.4.6.

3.8.1.1 Street Elements Within Metrolinx Property Boundary

Metrolinx Owned Land: Metrolinx has design control over this area either through ownership or through agreements with public access provisions for transit where appropriate. The site may be owned by Metrolinx or be a joint Metrolinx led Transit Oriented Community.

Privately Owned Land: In some cases, the subway station may be integrated with a privately initiated joint development and in other cases, the subway station may have access through an adjacent privately led development. In these cases, the Subway Stations Integrated with Development Guidelines will complement this standard by providing high level guidance on TOC.

Subway Station Public Realm shall provide:

a) Site slope for easy drainage through a drainage system to facilitate near zero ponding during a 100-year storm event.

b) Landscaped areas to promote ground infiltration and reduce storm surface runoff.

c) Stormwater management systems which are visible to the customer only when those systems are part of the landscape feature of the site and shall be aesthetically appealing to the customer. The Low Impact Design shall be adopted when the Metrolinx property is large and there is ample space for a Forecourt. This is likely in the Station as a Pavilion in the Park condition.

d) Irrigation strategies for the public realm may rely on stored site rainwater with suitable treatment technologies.

e) An exterior hose bib both for vegetation and also for general site maintenance.

f) Integrated design of footings of the elevated guideways with the public realm, for the above grade stations. The footings shall adhere to the vision of a harmonized system focused on consistent design language, detail, and civic quality. Any drainage pipes or other utility lines on the footings shall be integrated into their design.

g) Site asphalt pavement shall not be used in customer-facing areas. Where all other alternatives have been explored, the site asphalt type and thickness shall be as per Metrolinx Facilities Civil Engineering Standards.

Note: This section shall be read in conjunction with the DS-02 Universal Design Standard. When conflicting requirements arises, the most stringent requirement is to apply.

3.8.1.2 Street Elements beyond Metrolinx Property Boundary

This section addresses the Public Realm for the Subway Stations where the property is seeking maintenance agreements with municipalities. In order to meet the intent of existing policies, guidelines or local initiatives, specific interface conditions are suggested within the public realm and city streetscape to facilitate a coherent, uninterrupted design, and positive public perception in and around the subway station and in connecting to alternate modes of transit in the vicinity. Where Metrolinx is collaborating with a private owner or a municipality, the following requirements shall govern:

a) Where feasible, the transition between the city property and Metrolinx subway station property shall be imperceptible to the customer.

b) Work completed as part of the subway station site development that is beyond Metrolinx property shall:

   i. Follow requirements established for within the Metrolinx property boundary.

   ii. Be reviewed and confirmed with the municipality for operations and maintenance agreements.

   iii. Be reviewed and confirmed with the party responsible for maintaining the area if other than the applicable municipality.

c) Refer to Safety By Design (refer to section 3.8.4) for additional content to be reviewed with the relevant municipality.

d) Designers are encouraged to work with municipalities and transit providers to locate stations near signalized intersections and re-locate adjacent transit stops to facilitate safe, accessible and convenient pedestrian access to and from the station.

e) Footings of the elevated guideways for the above grade stations shall have aesthetically pleasing look and finishing. Any drainage pipes or other utility lines on the footings shall not be directly visible to the customers.

3.8.2 Transit Connectivity

Site access design will require coordination with the relevant municipality and other Authorities Having Jurisdiction (AHJ) with regards to proximity of the subway station to other modes of transportation in order to facilitate a friction-free customer experience.

The intent of this section is provide high level guidance around integration with adjacent transit service across all the subway projects.

a) Visibility shall be maintained between station and connecting transit from the station plaza and from inside the station. Real-time arrival information shall be available within the station building and visible from or within the fare paid area to allow customers to use in-station amenities before they navigate to the stop.

b) Surface transit operation improvements, including the re-location of stops to align with station access points shall be pursued and designed for, in co-ordination with all applicable partners. Where new or reinstatement of on-street bus or on-street streetcar stops are included in the project scope, they shall offer similar amenities to current transit stops. Size of the waiting areas and sheltered spaces for on-street stops shall be commensurate with the anticipated volume of customers at each location.

c) Public Realm hardscape treatments shall support safe & intuitive wayfinding in support of connections between transit stations and adjacent mobility functions. These include connecting transit, bicycle share, car share and ride-hailing services. These shall account for the natural behaviour of customers to seek the shortest distance and most direct route. Refer to sections 3.4 Common Elements.

d) Lighting shall be designed at appropriate heights and levels of illumination to aid safe and intuitive wayfinding to the transit connections and take into account places/locations where customers will be waiting. Lighting shall ensure no "dark areas" as they can be perceived as unsafe by customers. Areas of increased personal vulnerability, such as waiting areas or payment spaces, require special design focus. Refer to section 3.4.5.

e) Widths of connecting routes shall be designed to safely and comfortably accommodate project pedestrian flows, as determined through pedestrian flow modelling for maximum flows, in addition to the required minimum dimensions required by applicable codes and standards. Read in conjunction with DS-12 Pedestrian Flow Modelling Design Standard.

f) Protection from the weather elements shall be provided along the route from the station to the on-street stop.

g) Pedestrian safety including CPTED shall be prioritized in the design of the connections. Improvements within the public right of way shall ensure street crossing, where required, is safe and convenient and shall account for the natural behaviour of customers to seek the shortest distance and most direct route. This includes but is not limited to the provision of crosswalk, elimination of blind spots, signalized crossing, separation of modes such as walking and cycling, pavement markings and treatments.

h) Wayfinding and Digital Signage shall be designed holistically to provide accurate, timely, and synchronized information to passengers. As passengers navigate all transit portions of their trip, progressive disclosure that is location based shall be provided. Audio-visual equivalents and additional supports shall meet accessibility needs.

3.8.3 Municipal District Signage (BIA) Strategy

The Municipal District Signage and BIA furnishings shall not be located on Metrolinx Property. Metrolinx shall coordinate with the local municipality to determine the requirements for the placement of Municipal District Signage and BIA furnishings outside of Metrolinx property. Municipal District Signage and BIA furnishings within the Station precinct shall not be in the immediate vicinity of the Metrolinx Wayfinding system, shall not obstruct views, and shall not confuse passengers.

3.8.4 Streetscape Continuity

The common elements shall be choreographed to frame and guide the customer approach to the station. Key to this choreography is to reinforce directionality, connection and continuity in the space and materiality of each strategy, the Streetscape, Plaza and Forecourt. The common elements shall emphasize the branding, simplicity and continuity, and embed durability and lifecycle requirements.

The organization of the streets, blocks, paths, mid-block connections and movements across the Streetscape, Plaza and Forecourt combine to ensure a visual connection to the station entrance.

3.8.5 Safety by Design

Safe and efficient movement of passengers between the platforms, adjacent bus infrastructure, city sidewalks, and along guideways in the community is required. Design shall be in alignment with CPTED principles, safety, comfort, and security.

To ensure safety, lighting levels across the plaza shall be at 50 lux with higher lighting levels at key customer journey decision points.

To ensure that safety, the design and dimension of the Urban Plazas serving the customer journey shall be based on capacities and pedestrian volumes associated with the subway station location. Crosswalks between the municipal sidewalk and the subway station entrance shall work with the provisions as set out in the DS-02 Universal Design Standard.

3.8.5.1 Surrounding Community Protection

a) The pedestrian approach to the Station shall have an enhanced sense of protection as per the guidelines on openness and transparency.

b) Pedestrian connections and walkways shall use dedicated and continuous routes, throughout the station and connections to surrounding areas.

c) Make pedestrian clearways a minimum 1800 mm wide.

d) When a pedestrian entrance is provided from a multi-use path, provide a clear opening of at least 1200mm. When the entrance includes a gate, bollard, or other barrier, it shall be raised and constructed of hard and sustainable level materials that are slip resistant.

e) Provisions shall be made to prevent potential conflicts between pedestrians and road vehicles as outlined in DS-02 Universal Design Standard.

f) Higher lighting levels shall be provided at decision points.

3.8.5.2 On site Protection

a) The approach to the transit facility shall be in conformance with project specific requirements.

b) Provision shall be made for access by emergency vehicles, including fire trucks, police and ambulances. Designated fire routes and no parking zones shall comply with municipal, local fire department, and Ontario's Building Code regulations.

c) Access to station facilities shall address safety, service, convenience, and proximity to station entrances.

d) The safety and convenience of passengers is of paramount importance as is their efficient transfer between transit modes and direct access to the transit system.

e) Approach to the transit facility shall be in conformance with project specific requirements.

f) Pedestrian path shall not ice during winter weather conditions.

g) When exterior stairs and ramps are present, include heat tracing and snow melt to reduce slip and fall incidents. The use and type of snow melting system shall be verified with the operators of the specific facilities. The operators will be consulted to confirm if snow melting is preferred or if operators will undertake snow cleaning in lieu of snow melting.

h) When exterior stairs and ramps are present, exterior ramps shall be designed as per requirements in the DS-02 Universal Design Standard and with the relevant project specific requirements and is subject to coordination with the operator. In every case, the more stringent requirement shall apply.

i) Design details for pedestrian travel paths, ramps and curb cuts shall meet the requirements of the local municipality, Ontario's Building Code, AODA and DS-02 Universal Design Standard.

j) Provide means of egress from the stations.

k) Bollards, refer section 3.4.2.2 for spacing requirements.

l) Passenger approach to transit facility, especially when the pedestrian path intersects with vehicular entry points (PUDO/Bus) shall be designed as per Metrolinx DS-02 Universal Design Standard.

3.8.5.3 Crosswalk Protection

a) Crosswalks shall be installed in conjunction with signs and accessible crosswalk markings to provide guidance for pedestrians and alert road users of a designated pedestrian crossing point.

b) Accessible Pedestrian Signal (APS) buttons for crossings shall be provided. APS shall comply with AODA requirements and municipal standards.

c) Crosswalks that connect the station to the city sidewalks shall be 3 metres wide and shall use a striped-ladder, white crosswalk pattern with reflector glass beads, all in accordance with the municipal standards.

d) Where pedestrian flow modelling determines a significantly higher than normal pedestrian volume, wider crosswalk widths of 4 metres shall be provided. These wider crosswalks will further aid in intuitive wayfinding, and elevate the pedestrian's stature, security, and comfort.

e) Provisions shall be made to prevent potential conflicts between pedestrians and road vehicles. This shall take the form of safety bollards as in section 3.4.2.2.

f) All work within the roadway, including crosswalks shall be approved by the relevant municipality.

3.8.6 Pedestrian/ Cyclist Zone

All users of stations will be pedestrians within the public realm at some point in their journey. The total number of pedestrians in the space will almost always outweigh the number of other types of users. The public realm must in general prioritize pedestrian movement, followed by cycle and then vehicular movement.

A station's public realm must balance pedestrian and cycle movement with various types of road traffic movement. Each type must be understood separately, along with the interactions between them and the relative levels of each. An appropriate hierarchy of needs shall be agreed early in the conceptual design process.

At-grade station entrance approach defines the approach to an entire Subway system facilitating passenger safety, security and convenience. The customer experience upon arrival to the station shall be direct and easy to navigate. Customers are looking for direction in the form of clear signage and views to access the site. They must be able to orient themselves quickly and safely transition from their mode of arrival to the station entrance. The following needs of pedestrian and cyclist zones shall be met in the design:

a) **Pedestrian Priority:** For reasons of safety, pedestrians shall be given priority. This includes customers requiring barrier-free access.

b) **Critical Distances for Pedestrians:** Buses, Streetcars, Light Rail Vehicles, and specialized transit vehicles serve the largest volume of passengers and therefore pedestrian access to and from other modes of transportation shall be a priority in terms of optimizing distance between Subway Station Entrances and stops or stations for other modes of transit.

c) **Passenger Pick-up and Drop-Off (PUDO):** PUDO enable high volumes of passengers to access stations in short periods of time and serve as the para-trans vehicle drop-off. They provide an incentive for safe and convenient access to the subway. The layout and capacity of PUDO shall be determined by the limitations of the site and optimal traffic flow patterns (vehicle, cyclists, local services, and connections). However, PUDO activity related to subway stations in an urban context may sometimes be so low or there are minimal or no station lands available that it can be accommodated curbside, without any special facilities such as lay-bys or off-street PUDO. In such cases, the PUDO facility may be located on a public or private road, subject to agreement with the relevant municipality or agency. Project specific requirements to be determined by Metrolinx Stations Planning.

d) Bicycle elements and facilities shall be separated from other modes of transportation and pedestrian foot traffic.

Note: This section is to be read in conjunction with Section 3.4.3 Bicycle Parking and DS-07 Bike Infrastructure Design Standard.

3.8.6.1 Pedestrian Zone

Within the pedestrian zone in front of the station all movement shall be non-vehicular and focused on the needs of the pedestrian. The zone extends from inside the station building to the curb. The design of the pedestrian zone shall provide easy, efficient and enjoyable connections from the station to key local destinations and other transport. Any pedestrian crossings shall be understood to be part of the pedestrian zone and shall be in areas that enable pedestrians to follow their desire lines and accommodate the highest likely level of demand.

The design of the public realm shall enable, encourage and empower people to choose walking for a portion of their journey. This can be achieved by providing:

a) The most direct routes between key destinations and modes of transport and making them clear and free from physical clutter.

b) Appropriately dimensioned routes that create a comfortable walking experience even at the busiest times.

c) Clear sightlines along routes that promote intuitive wayfinding.

d) Clear wayfinding signage at appropriate locations.

e) Crossing points that adhere to desire lines and are appropriately dimensioned.

f) Additional space for conflicting movement routes outside station entrances.

g) A well-lit and pleasant environment that feels safe and secure at all times.

3.8.6.2 Cyclist Zone

Design of the public realm outside stations shall give priority to cyclists over mechanized vehicles by:

a) Considering the relationship between cyclists and other road users, and providing paths protected from vehicular traffic including but not limited to segregated cycle routes.

b) Managing potential conflicts between cyclists and pedestrians on the sidewalk and those using public transport and pedestrian crossings.

c) Minimizing the distance between cycle routes and cycle parking and encouraging cycle users to dismount where there is a need to leave the bike path.

3.8.7 Pick Up Drop Off (PUDO) Layby

Description:

Pick -up and Drop-Off (PUDO) facilities may consist of a layby off an adjacent roadway, an off-street PUDO facilities or other forms of on-street PUDO that shall accommodate specialized transit vehicles. PUDO locations shall prioritize pedestrian access to the main station entrance. PUDO requirements vary by site and shall be determined in the Project Agreement. PUDO location shall also be co-ordinated with municipality transit service providers, Metrolinx, and Municipalities.

Design Requirements:

When required by the Project Agreement, PUDO's shall be provided in the form of a layby within view of, and in close proximity to, the Subway Station entrance as depicted in figure 3-64. Where space is not available, at a minimum, street treatments such as signage, painting, and curb cuts, shall be provided for dedicated specialized transit drop-off.

a) An accessible vehicle drop-off area shall be designated within the PUDO zone that accommodates all specialized transit vehicles and accessible taxis.

b) PUDO shall be barrier-free and meet requirements in the DS-02 Universal Design Standard.

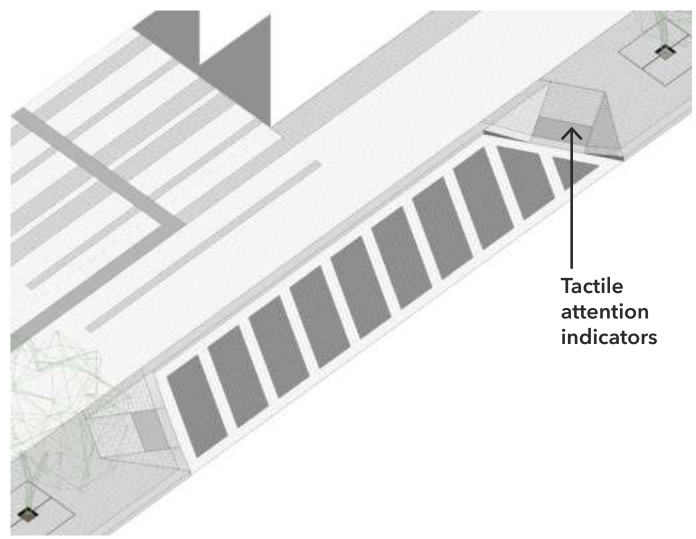


Figure 3-65: Pick Up Drop Off (PUDO) Layby

c) PUDO shall be clearly marked and meet requirements in the DS-03 Wayfinding Design Standard.

d) PUDO and their accommodation of non-transit and accessible taxi vehicles are subject to demand, land availability and TOC partnerships. Project specific requirements will be in the Project Agreement.

e) In the case of TOC, PUDO shall be integrated and/or coordinated with drop off areas for the mixed use development.

f) PUDO shall be convenient to the station entrance and adjacent to the shortest accessible path of travel making a direct connection from Street Level to Station areas and platforms.

g) PUDO areas shall be integrated with the Subway Station landscape/streetscapes.

3.8.8 Parking Requirements

Transit and transit connections are the primary focus of station and site design for passenger vehicular parking and parking shall be included where required on a project by project basis.

a) Where parking is required, it shall be designed to consider future re-development. Parking requirements shall be negotiated with Transit-Oriented Community project stakeholders, developers and municipalities.

b) Number of public parking stalls and type of parking stalls shall be determined by project requirements and site requirements.

c) Where there is parking, hierarchy of access shall be informed by the MTO Transit Supportive Guidelines. The following is the consolidated approach to hierarchy of access:

   i. Pedestrian and bicyclists.

   ii. Buses, streetcars, light rail vehicles (LRV), and specialized transit vehicles.

   iii. Passenger pick-up and drop-off (including taxis).

   iv. Park-and-ride.

d) For Maintenance parking coordination with operational entities or municipalities is required.

e) For Global minimum service parking coordination with operational entities or municipalities is required.

Note: This section shall be read in conjunction with the accessible parking requirements in the DS-02 Universal Design Standard.

4.0 Architecture

4.1 SITE AND BUILDING RELATIONSHIP

4.1.1 Overview

This section addresses customer facing building elements and their relationship with one another within both exterior and interior architecture, in parallel with the public realm. The principle architectural building elements include main entrances and exits, fare thresholds, circulation routes, bus and subway platforms, service and ancillary spaces, and leased areas. Principle site elements found within the public realm include the plaza/forecourt, connections to other modes of transit, and customer pick-up and drop-off which are elaborated in more detail within Section 3 Public Realm. The exterior and interior zones along the customer journey require careful integration to ensure a cohesive and consistent customer experience.

From a customer perspective, the subway station needs to be easily identifiable and user-friendly within an environment that is efficient, safe and secure. Consistent application of identity and signage, and clear views and sightlines, are critical contributors to customer experience.

4.1.2 Design Requirements

a) The transition between the urban realm and the station shall be coordinated to achieve a coherent deliberate outcome in terms of overall design, alignment, colour, and finish, through:

   i. direct sight lines;

   ii. a consistent design language of base materials from indoor to outdoor;

   iii. station entrances that are predictable and discernible from other elements of the urban realm.

   iv. PUDO locations shall prioritize pedestrian access to the main station entrance.

b) Station sites and buildings shall:

   i. contribute to place-making;

   ii. provide a positive presence in the various site-specific contexts enhancing the public realm;

   iii. align with Crime Prevention through Environmental Design (CPTED) principles.

   iv. meet sustainable requirements as identified in section 2.13 Sustainability.

4.2 BUILDING MODULARITY, MASSING, AND TYPOLOGIES

4.2.1 Overview

The massing and design of the building plays a significant role towards maximizing efficiencies and reducing customer anxiety as they navigate to and throughout the station environment. A sense of familiarity between station buildings impacts wayfinding from a system-wide perspective for an integrated, consistent customer experience. Being able to locate and identify the building entrance intuitively while following a clear and unobstructed path to the entrance is imperative.

4.2.2 Description

Subway station buildings and entrances are an important part of where the customer journey begins, transitions, or ends. These significant destination and transfer points shall provide a consistent and effortless customer experience through a common design approach to all stations. This design standard promotes a modular approach to station planning and design that results in a clear, minimalistic approach to design. Each specific station identity shall be appropriate to the individual character or development quality of each site, neighbourhood and/or community. The design shall be based on high functionality and durability with a simple, predominantly rectilinear language at its core. The design approach shall allow for maximum flexibility while adapting to site specific conditions, functional requirements and sharing functions with third party developers.

4.2.3 Subway Station Types

These design requirements shall be applied to the following subway station types:

a) Line stations occur between terminal stations and serve a particular geographic area. Keele station on Line 2 Bloor–Danforth of the Toronto subway, is an example of a line station. Line stations are typically in more dense urban environments. In future, it is possible that a completed line station may be required to transition to become an interchange station as a result of the intersection with a new line (e.g., Sheppard Station on Line 1 Yonge–University and Line 4 Sheppard of the Toronto subway).

b) An interchange station enables customers using the same mode of transport to transfer from one line to another. The Bloor–Yonge subway station on Line 1 Yonge–University and Line 2 Bloor–Danforth is an example of an interchange station.

c) A terminal station is located at the end of a transit line. Transit vehicle change of direction is achieved with a turnback. Kipling station is an example of an subway/SRT turnback terminal station. Kipling station is the western terminus station of Line 2 Bloor–Danforth of the Toronto subway. Terminal stations may transition to become line stations as a result of a line extension (e.g., Islington Station on Line 2 Bloor–Danforth of the Toronto subway). Terminal stations are more likely to have larger customer catchment areas and ridership, with greater bus infrastructure needs, and increased bus and park-and-ride (where applicable) access trips.

d) An intermodal station is a station where two or more modes of transportation stop at a station. Modes are a particular type of transit or method of undertaking journeys. Train, subway, bus and walking are all different modes of travel. (e.g. Union Station on Line 1 Yonge–University of the Toronto subway allows customers to connect to intercity bus and rail services). Line, interchange and terminal stations can all be intermodal.

Figure 4-1a - Subway station type - Line station

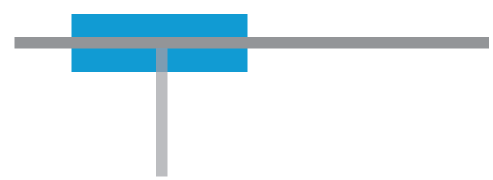


Figure 4-1b - Subway station type - Interchange station

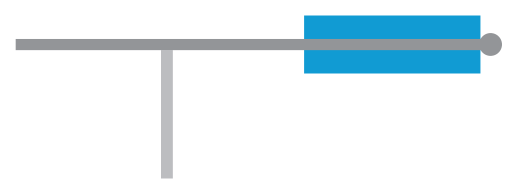


Figure 4-1c - Subway station type - Terminal station

4.2.4 Relationship to Grade

Stations may be located at grade, below grade, or above grade. Stations could be located on an embankment, in a cut, on an elevated structure or incorporated into a Transit Oriented Community (TOC) development. The location with respect to ground level is primarily a function of the need for the transportation mode to have an exclusive right-of-way. Environmental impact, technology, geotechnical conditions, and cost are examples of factors that influence the station buildings relationship to topography.

The relationship to grade for station typologies includes:

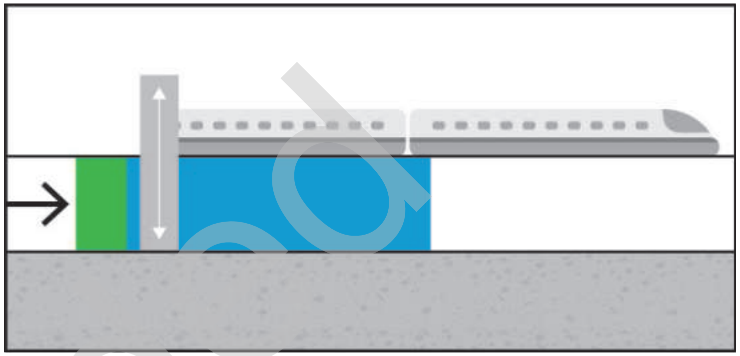
a) Elevated platform stations consist of an elevated rail corridor with a station building entrance(s) at grade and vertical circulation connecting all levels.

b) Below grade platform stations consist of a below grade rail corridor with a station building entrance(s) at grade and vertical circulation connecting all levels.

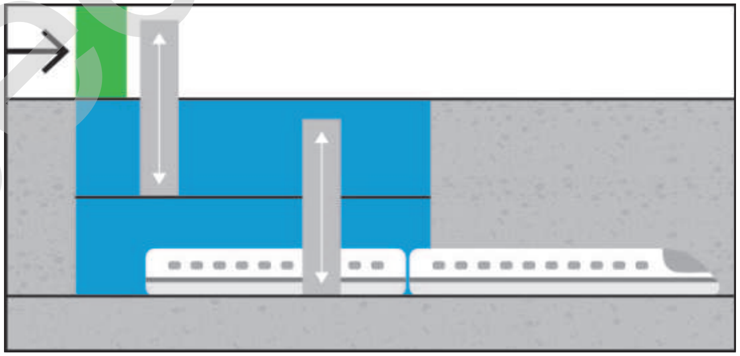
c) At grade platform stations consist of a platform at grade. Platforms may be shared with another type of rail transportation.

4.2.5 Relationship to Context

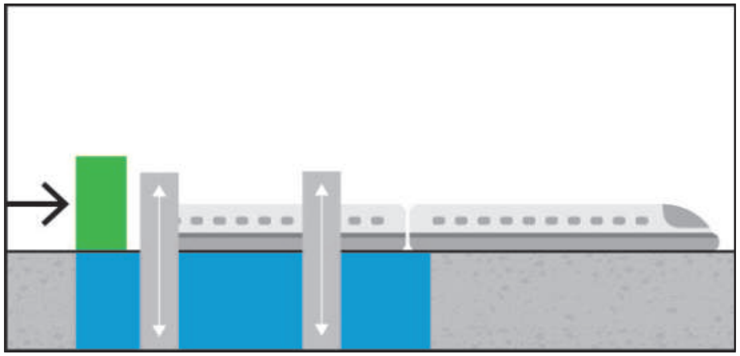
Stations are part of living cities and provide access to employment, recreational activities, amenities and new experiences. The station building shall respond to its surrounding context. “Context” refers to the existing state of development around a prospective site. Surrounding land uses and scale of development have a significant impact on the volume of customers, mode of access and complexity of the station facility. For example, a station in a central business



Elevated station



Below grade station



At grade station

Figure 4-2: Subway station type - Relationship to grade district may be quite different compared to one in a residential or industrial area. Some stations will need to respond to special events that are held in large, nearby stadiums. Others may be located in areas that serve special facilities such as shopping malls, airports, universities or large medical centres. Stations may be integrated into a Transit Oriented Community (TOC) or a large development, these conditions may have additional considerations and stakeholders. The current and future character, quality and land-use of the station context directly affects site planning and design. Station buildings have the potential to affect the image and character of civic space and can strengthen local connectivity and support place-making opportunities. See *Section 4.4 Entrances and Exits* for further requirements on context. Design goals for station massing are to:

a) reflect and contribute to neighbourhood and community character and quality;

b) reinforce and guide established, planned and desired development patterns;

c) Optimize development opportunities by locating entrances on sites that anticipate future development;

d) protect and promote Transit Oriented Community (TOC) opportunities;

e) recognize complementary emerging development patterns to enhance and inform subway station site planning and design;

f) prevent loss, reduction or destruction of parkland and other public amenity access when required to locate station buildings in park-like settings and to be complimentary through design, fitting in with the established open space character and local context;

g) contribute public realm space, such as a spacious plaza/ forecourt when site allows;

h) enhance and/or connect with adjacent public amenity space, residential, employment or retail uses.

a) Small entry integrated with TOC development. b) Medium entry integrated with TOC development. c) Large entry integrated with TOC development.

Figure 4-3: Subway station - Relationship to context

ARRIVAL	**STATION ENTRANCE**	**UNPAID TRANSACTION ZONE** Fare Vending Machine & Hub Wall Fare Gates Station Ambassador	**PAID ZONE** Washrooms (Transfer stations)	**VERTICAL CIRCULATION**	**PLATFORM**	**BACK OF HOUSE** Mechanical & Electrical Service Spaces Emergency Building Exits Staff Spaces	PEDESTRIAN BRIDGE PEDESTRIAN TUNNEL

4.2.6 Massing Modules

The physical size of a station is primarily determined by the mode of transport technology and the volume of customers to be served. Level of Service requirements and projected customer flows are provided by Metrolinx. The building massing for stations is comprised of the following principle modules: Entrance, unpaid transaction zone, fare gates, paid access zone, Vertical Circulation, platform, and back of house areas, including mechanical and electrical services and staff spaces. All these modules are required for a functional station. Additional modules that may be used as required include cross-over space, pedestrian tunnels and pedestrian bridges.

The combination and arrangement of these modules will vary on a site by site basis. The massing diagrams demonstrate the potential for various combinations of the modules depending on existing context and the site-specific conditions including topography, geographic location and surrounding development.

The massing modules for the Subway Design Guideline are:

a) Upon **arrival** principle site elements include the plaza or forecourt, bicycle parking, connections to other modes of transit in the public realm and customer pick-up and drop-off. Refer to Section 3.0 Public Realm.

b) The **entrance** to the subway **station** will be at grade and shall be an enclosed structure with touchless sliding, lockable doors. Entries and exits are described in Section 5.4 Entrances and Exits.

c) The **unpaid transaction zone** is located immediately upon entry to the station and includes fare vending, the self serve hub, and information and journey planning. This zone could be at grade, elevated or below grade. See Section 5 – Unpaid Transaction Zone.

d) **Fare gates** are the point where customers transition from the unpaid to the paid fare zone. When a station ambassador office is provided, it shall be located adjacent to the fare gates as described in Section 6 – Unpaid Transaction Zone.

e) The **paid access zone** includes retail vending and leased retail, washrooms (if applicable), and back of house elements. Refer to Section 6 – Paid Access Zone.

f) **Vertical Circulation Elements (VCEs)** consist of stairs, elevators, and escalators. Vertical circulation connects the multiple levels and can be within the subway station or part of a TOC. See section 4.6 Vertical Circulation.

g) The **platform** space can be below grade, at grade or elevated. Platform configurations include centre, side and stacked platforms. Refer to Section 7 – Platform.

h) **Back of house** spaces are necessary components that support the operation of the station and indirectly the customer experience. Back of house spaces include mechanical & electrical services, staff spaces and emergency building exits. Content in this document for mechanical and electrical services addresses the design impact of these services on the customer experience.

i) **Pedestrian tunnels** are underground passageways for pedestrians. These passageways are an opportunity to make connections to the surrounding community and other TOC's below grade. See Section 4.7 Pedestrian Tunnels.

j) **Pedestrian bridges** are above grade passageways for pedestrians. These passageways are an opportunity to make connections to the surrounding community and other TOC's above grade. See section 4.8 Pedestrian Bridges.

4.2.7 Massing Scenarios

The following diagrams represent massing scenarios and how modules can be positioned to achieve the most direct connections for customers. In many cases, stations will be integrated into a Transit Oriented Community development. Note that the massing scenario diagrams demonstrate customer facing elements only and do not show back of house or ancillary spaces.

a) **Below Grade Platform Station - Massing Scenario 1**

This scenario demonstrates maximum massing at grade. In this case the station is within a TOC development. A second entrance via the TOC development is provided connecting directly to the unpaid transaction zone. Vertical circulation elements bring customers to a lower level that connects to a second vertical circulation zone via a pedestrian tunnel. This second vertical transition is required only when single vertical transportation connections are not proven possible, for example, due to the platform being under the road right of way. It is ideal for the number of elevator transfers to be kept to a minimum.

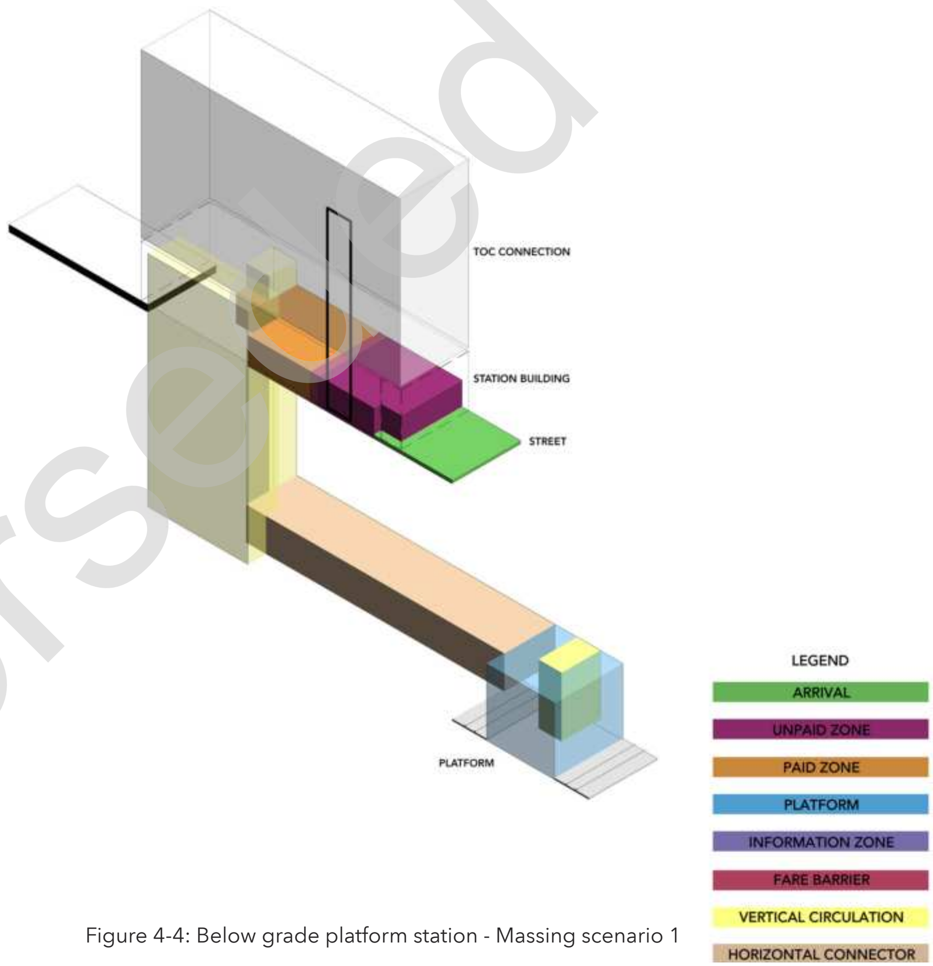


Figure 4-4: Below grade platform station - Massing scenario 1

b) **Below Grade Station Massing – Scenario 2**

This scenario demonstrates maximum massing at grade. In this case the station is within a TOC development. A second entrance via the TOC development is provided connecting directly to the unpaid transaction zone. Vertical circulation elements bring customers directly to the platform. This is the ideal scenario to limit elevator transfers.

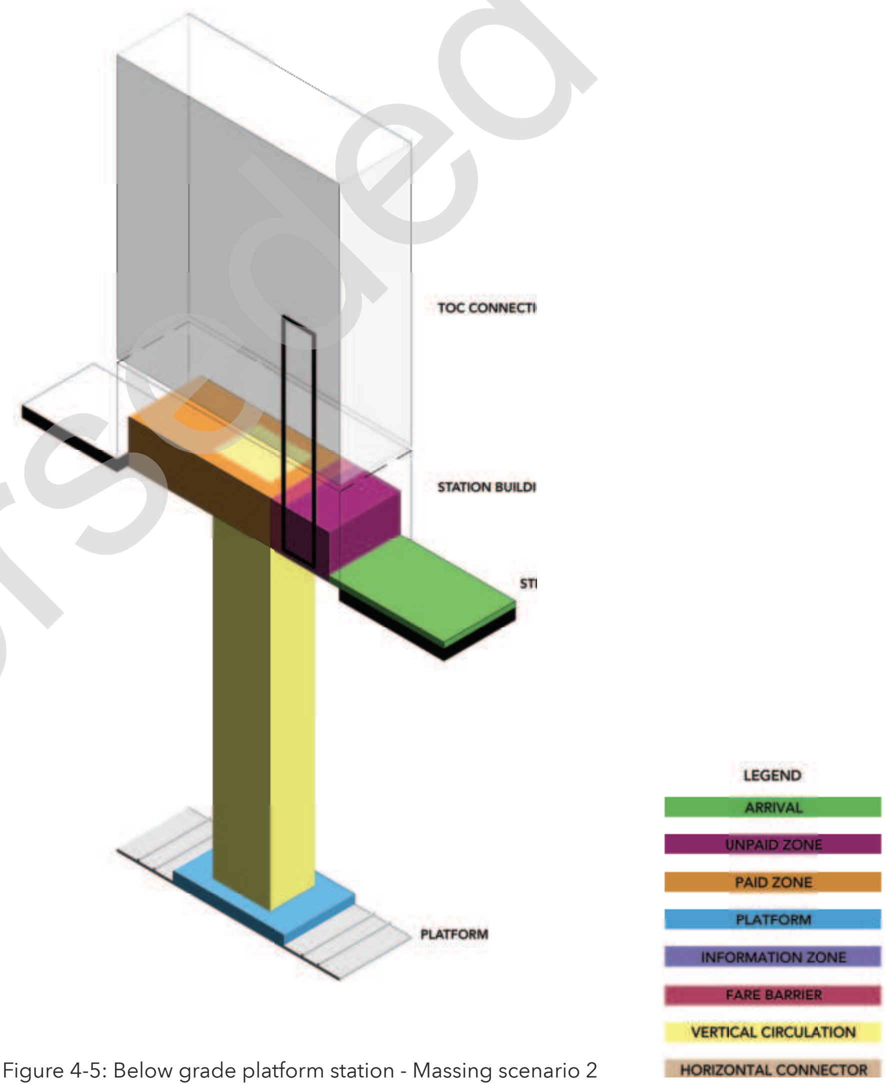


Figure 4-5: Below grade platform station - Massing scenario 2

c) **Elevated Station Massing – Scenario 3**

This scenario demonstrates maximum massing at grade with an elevated split platform. The massing modules are located under the guideway with a shared paid transfer zone providing vertical circulation to each platform. A pedestrian bridge connection can come from a high traffic community area or a Third-Party Entrance connection via a TOC development. This connection is shown at the desired location, the unpaid transaction zone. Bridge connections are used where entrance connections cannot be made at grade.

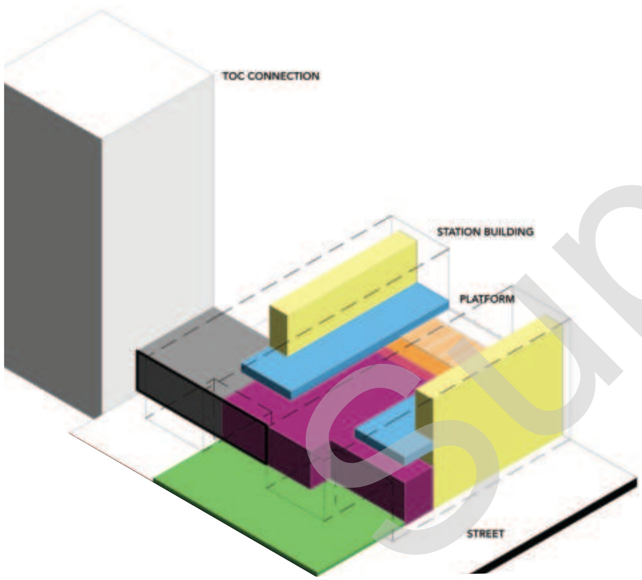


Figure 4-6: Elevated platform station - Massing scenario 3

d) **Elevated Station Massing – Scenario 4**

This scenario demonstrates similar conditions to scenario 3. Here, a Third-Party Entrance connection via a TOC development is shown as a pedestrian tunnel. It is ideal for this connection to be at the unpaid transaction zone. If the connection is made to the paid transaction zone a set of fare gates is required.

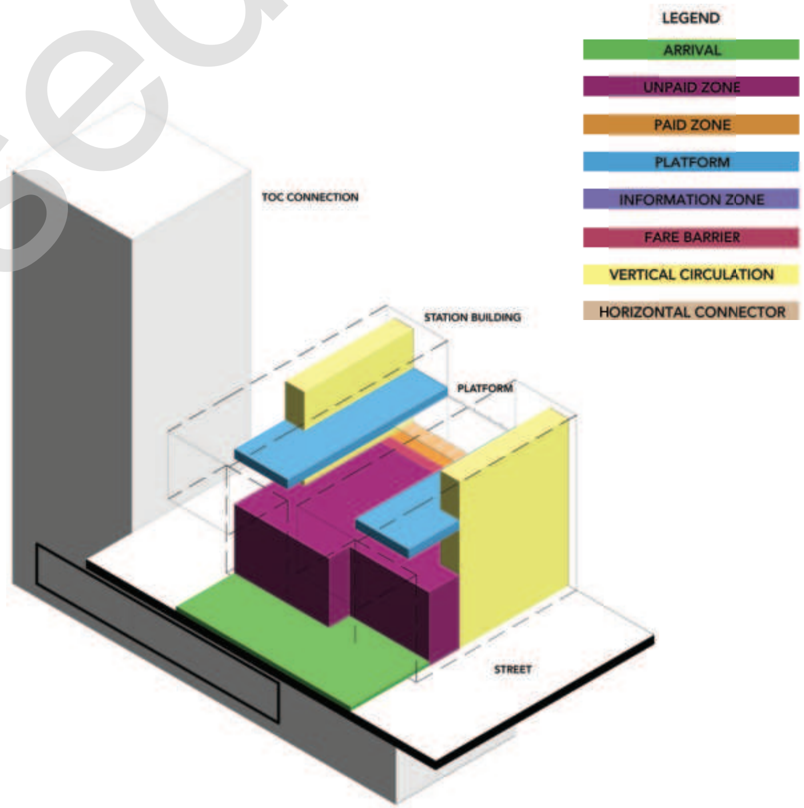


Figure 4-7: Elevated platform station - Massing scenario 4

e) At Grade Station with Shared Corridor Platform Massing – Scenario 5

This scenario demonstrates an at grade pavilion entry to a lower level unpaid transaction zone and paid transfer zone where customers can access platforms on either side of the tracks located at grade. It is ideal for any additional entrances to join directly to the below grade unpaid transaction zone. In some cases, the pedestrian route can be significantly reduced by connecting to the paid transfer zone and, in these cases, an additional set of fare gates is required at the connection point.

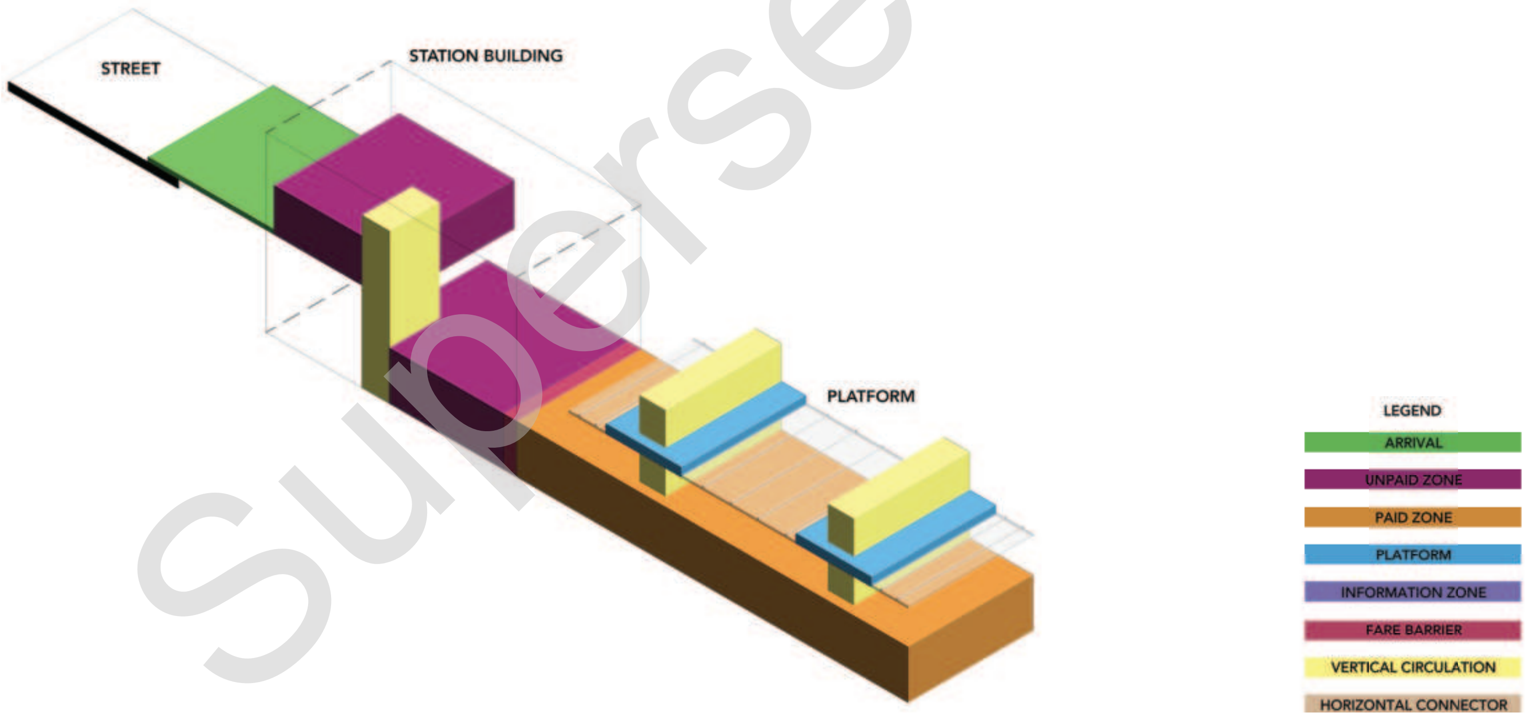


Figure 4-8: At grade station with shared corridor platform - Massing scenario 5

4.2.8 Massing Design Requirements

The following massing requirements address the variety of station contexts that include inner-core urban, outer-urban and suburban applications. Inner core urban stations are likely to be integrated within a transit-oriented development. Outer-urban core stations may have space for a station entry and customer unpaid transaction zone at grade but will need to locate the customer paid transfer zone space below or above grade. In a suburban application there may be space for an entire station at grade, with the platform either above, below or at grade.

4.2.8.1 General Massing Requirements

a) The functional diagram for the building shall be a clear response to the site conditions, largely informed by the platform layout.

b) Platform and transfer zone configurations shall be rectilinear.

c) Station massing shall be civic scale informed and respond/ contribute to the surrounding context.

d) Station massing shall respond to existing and planned adjacent development horizontal datum lines and setbacks.

e) Station massing and design shall be coordinated with existing infrastructure to maintain and/or enhance existing circulation patterns and systems.

f) Building footprint(s) shall be minimal and limited to requirements based on applicable codes and standards including the OBC, NFPA 130, Level of Service, the DS-02 Universal Design Standard, and this document.

g) Building massing shall be without non-essential form-making.

h) Building zone adjacencies shall be defined by the customer journey route from entrance, to unpaid transaction zone, to paid access zone, to platform with Vertical Circulation Elements (VCE) located where required.

i) As site conditions allow, the entrance and the customer transfer zone shall be built at grade to allow for access to natural light.

j) Massing shall be arranged for the fewest number of elevator transfers in the journey from the entrance to the platform. Refer to Section 4.6 Vertical Circulation.

k) Massing shall be arranged to provide the minimum travel distances between the entrance and the platform of a station.

l) VCEs shall be grouped together and clearly visible on the customer path of travel.

m) For stations where it is demonstrated that grouped VCE elements are not applicable they shall be visible from the entrance with clear signage and guidance.

n) Multiple entrances shall lead to a joined unpaid transaction zone (with shared fare gates, station ambassador office, back of house, fare vending, and retail).

o) The number of fare zones at a station shall be the demonstrated minimum required, as multiple fare zones pose additional operational and safety challenges.

p) The development program, site organization of a development, or configuration of the development massing will influence the location of additional entrance connections. For stations where it is demonstrated that additional entrance connections directly to the unpaid transaction zone are not proven to be impossible:

   i. connections may be made to a paid transfer zone and shall include fare gates and access to all station platforms;

   ii. additional subway station entrances shall be provided with requirements as outlined in the unpaid transaction zone section or as defined in the Project Agreement (PA);

   iii. Third-party entrance connections shall follow requirements in Section 4.4.8 Third Party Entrance Connections and the Metrolinx Third Party Entrance Standard.

q) Paid transfer zones within the station building or TOC development shall be used to provide access to split platform arrangements as opposed to building additional cross-over connections.

r) Mechanical and electrical services, service and maintenance rooms, operator and staff facilities shall be:

   i. consolidated and integrated away from public and customer zones and paths of travel;

   ii. placed below grade, or to the back of station buildings;

   iii. strategically placed to obscure their visibility using building massing and screening.

s) Mechanical and electrical services shall be consolidated with exit stairs and other back of house elements integrated into the design approach.

t) The placement of service rooms at grade shall be avoided.

u) Where service rooms such as waste collection are required at grade, these shall be located at the back of the station, or on a service lane and away from public and customer zones and paths of travel.

v) Where stations are integrated into TOC developments the station massing modules shall be incorporated in the composition of the facade of the TOC and articulated as a subway station through architectural materials, building form, and architectural language.

w) Where stations are integrated between developments or alongside a podium condition, the station height shall match with retail and other occupants of the development. Where stations entrances and circulation are incorporated inside a TOC, these elements shall be articulated through the kit of parts materials and finishes together with wayfinding and signage that conforms to DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

x) Secure bicycle storage shall be provided and integrated with the station building massing or TOC development.

y) It is encouraged when space is available to incorporate bicycle storage within adjacent and integrated TOC developments in order to exceed the number of bicycle parking spaces required.

z) Secure bicycle storage planning and design shall:

    i. reflect the same design language established by the station architecture;

    ii. meet the requirements in the DS-07 Bike Infrastructure Design Standard;

    iii. meet the requirements in the DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

4.2.9 Approach to Architectural Expression

The following requirements shall be followed for the above finish/material.

The design requirements in this document shall ensure a consistent customer experience across the subway stations whether as a standalone pavilion building or integrated into surrounding development. These requirements use a kit of parts approach tied to overall massing and proportion, material, material location, texture, colour and transparency, signage, lighting and feature elements.

The use of repetitive architectural elements sets out to establish a system-wide design approach that is consistent, recognizable and reinforces the systems identity. Site specific identities can be expressed through the feature elements of each location. The intent for this approach is to allow for flexibility in architectural expression and integration with various site conditions and developments.

Figure 4-9: Below grade typology - Exterior view

4.2.9.1 General Design Requirements

a) The building design shall employ the kit of parts in service of a consistent and recognizable station brand. Refer to Figure 4-10.

b) Non-essential form making shall be avoided.

c) Materials, finishes, colour and texture shall be composed in an organized visual appearance. See below kit of parts for elaboration on strategies for materials.

d) A minimalistic approach shall be employed with detailing to support massing concept.

e) Material intersections, connections and transitions shall be carefully resolved with detailing.

f) Vents, mechanical elements, platform-based Electrical & IT system cabinets, etc. shall be screened from public view using consistent screen and material palette from the kit-of-parts.

g) The design shall comply with sustainability requirements identified in Section 2.13 – Sustainability.

h) The building design shall comply with CSA S478 Guidance on Durability in Buildings.

i) All architectural elements that provide a ledge or horizontal surface shall be designed to reduce the need for bird mitigations to deter birds from rousting. Bird spikes shall not bed used as a design solution. Design of these elements shall be minimalistic and woven into the building details, including canopies, building screen near the sidewalk and signage.

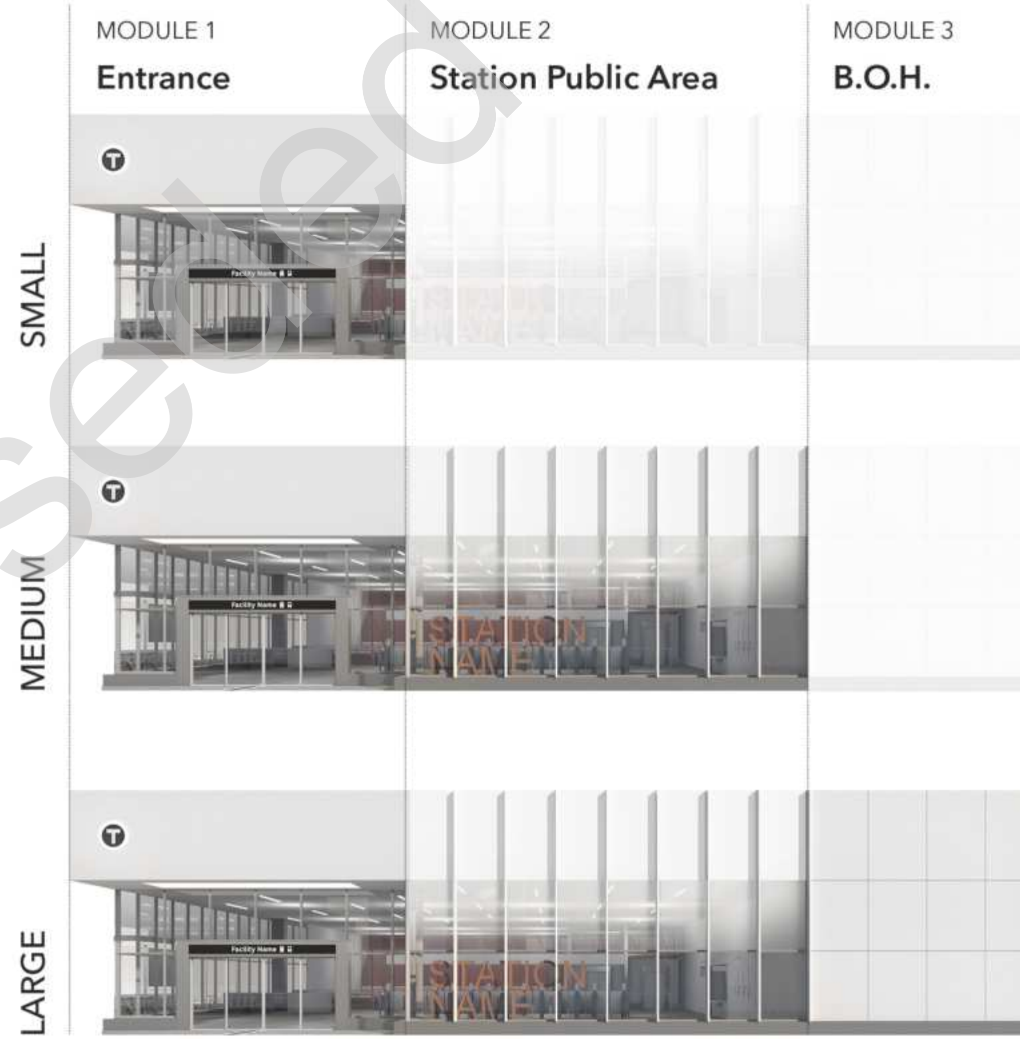


Figure 4-10: Below grade typology - Kit of parts approach - Elements of station building

4.2.9.2 Kit of Parts Elements: Building Facade

The below list of elements and materials is further detailed in Section 4.10 Finishes and Materials.

a) Identity Canopy - This element functions as both a system-wide identity element that is associated with the station entry and a canopy that provides protection from the elements. The identity wall canopy materials, dimensions and strategies of incorporation into the various site conditions shall be as follows:

   i. The identity canopy shall be constructed with opaque ceramic tile (EW1) with minimal joints between panels as proven technically achievable in order to achieve a monolithic appearance and include the 'T' network identifier. Required dimensions are as demonstrated in Figures 4-11 and Figure 4-13.

   ii. The identity canopy shall be incorporated into the overall massing of the station box. Refer to Figure 4-12.

   iii. The minimum setback/depth of the identity canopy shall be 2500 millimetres.

   iv. The identity canopy length shall extend across the entire length of the entry portal with a minimum extension of 1200 millimetres on either side of the entry door.

   v. More generous canopy lengths may be incorporated and balanced with overall massing as appropriate.

   vi. For entrances into pavilion stations the underside height of the identity canopy shall be as shown on Figure 4-13.

Figure 4-11: Station entrance identity canopy

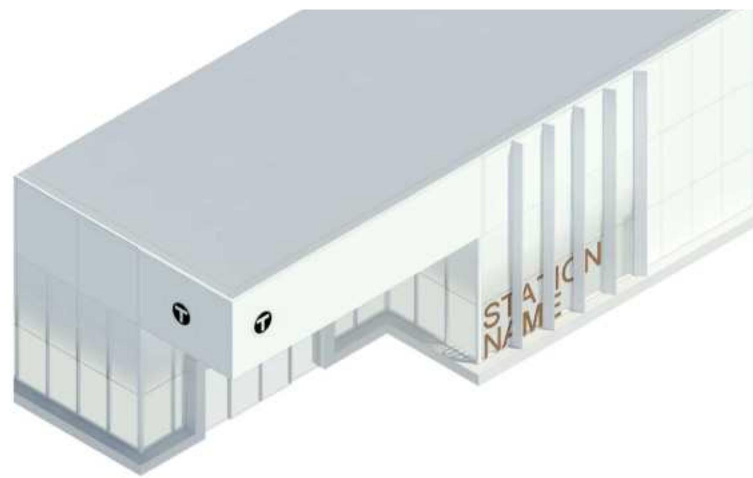


Figure 4-12: Station entrance identity canopy - Recessed Entrance

For full drawing set demonstrating the kit of parts for each station typology refer to Appendix A.

vii. The dimension to the underside of the canopy shall be 3000 mm.

1) The underside height of the identity canopy may change based on the site conditions. Where the underside of the identity canopy is higher than 3000 mm the depth of the identity canopy shall increase in proportion to the height to ensure protection from the elements. Refer to Figure 4-14.

b) The design of the identity canopy shall:

i. Recessed or cantilevered from the station building above the entrance. Refer to Figure 4-11 and 4-12;

ii. be placed to cover the entry portal;

iii. be accompanied by the station identifier placed on a pole beside the entrance as opposed to on the canopy if space does not permit;

iv. be subject to review and approval by the Metrolinx design standard team.

c) For context or wrapped station entrances within or directly adjacent to other developments, the underside height of the identity canopy may be adjusted/aligned with key massing indicators from adjacent/incorporated building facades and include overall coordination with canopies designed for the development. Reveals between adjoining and adjacent buildings shall be employed as identified in Section 4.10.1 Overall Finishes Strategy.

i. Where it is demonstrated that the identity canopy is not achievable due to site constraints the signage totem shall be placed at the entrance and visible for all directions of travel in accordance with the DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

d) Entry Portal – Station entries are defined by a consistent entry portal frame with fully transparent sliding entry doors.

i. Sliding station entry doors (DR1) shall be used at all entry locations.

ii. The entry portal frame shall be constructed with (EW1B) composite metal panels and match the colour of the building base.

iii. Entry portal width and depth dimensions shall be 400 millimetres x 400 millimetres.

iv. The underside of the entry portal frame shall be 2500 millimetres.

v. CW1 – Vision glazing shall surround the entry portal.

vi. Entry portal shall contain station identity signage.

vii. Entry portal shall facilitate integrated CCTV and PA speakers, and any additional entrance threshold lighting where all infrastructure is concealed within the portal frame and exposed elements of these items are colour matched to the portal frame colour.

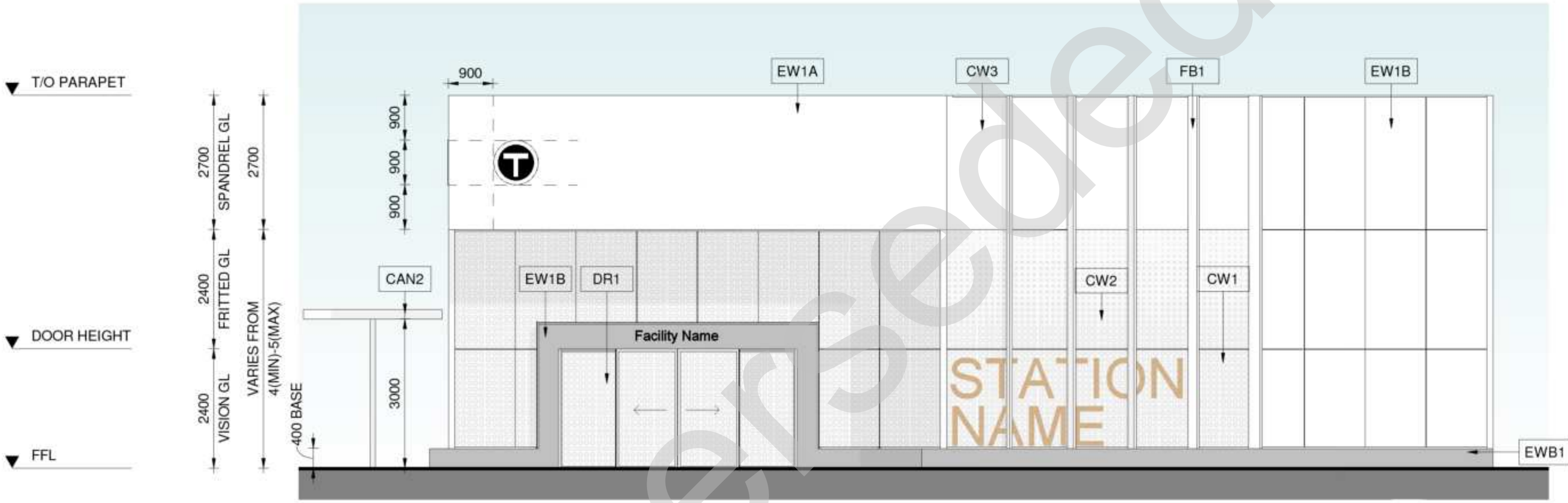


Figure 4-13: Below grade platform station - West elevation

For full drawing set demonstrating the kit of parts for each station typology refer to Appendix A.

e) **Base – EWB1 –** The wall base is a robust grounding gesture for the station building.

   i. The exterior wall base shall be granite.

   ii. The exterior wall base height shall be 400 millimetres.

   iii. The exterior wall base depth shall be 400 millimetres and match or exceed the depth of the facade baffles.

f) **CW - Curtain Wall System –** The curtain wall system is a glazed aluminum wall system with ceramic frit patterning. A high degree of transparency is desired for visibility balanced with varying degrees of ceramic frit to mitigate heat gain and better manage thermal comfort together with natural ventilation. The glazed components are described in Section 5.10 Finishes and Materials. The design strategy and arrangement is described below.

   i. The horizontal and vertical division of the CW panels and their arrangement in a gradation from transparent to opaque shall be as shown in Figure 4-13 & Figure 4-14 and elevation drawings in Appendix A.

   ii. For areas where self serve hub or information zones back on to a primarily glazed wall CW-3, panels shall be used on middle and lower curtain wall system panel locations.

   iii. Joints between glazing shall be butt joints that are consistent in width, as minimal in width as proven technically achievable, and neutral in colour to blend with the colour scheme of the project.

   iv. Where fasteners are used, they shall be concealed.

   v. Custom designed curtain walls are encouraged as described in the project agreement and shall meet or exceed the performance requirements for the curtain wall system (CW) outlined in this document and shall be subject to Metrolinx review and approval.

   vi. The Vertical Mullions and Vertical Structure, such as building columns, shall be calibrated to align centerlines, where applicable. 45° corner mullions shall be offset from corner structure to align at centre points. Refer to Figure 4-14.

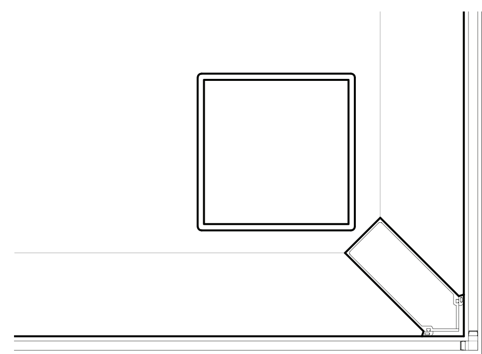


Figure 4-14 - Mullion and Structure alignment at corners

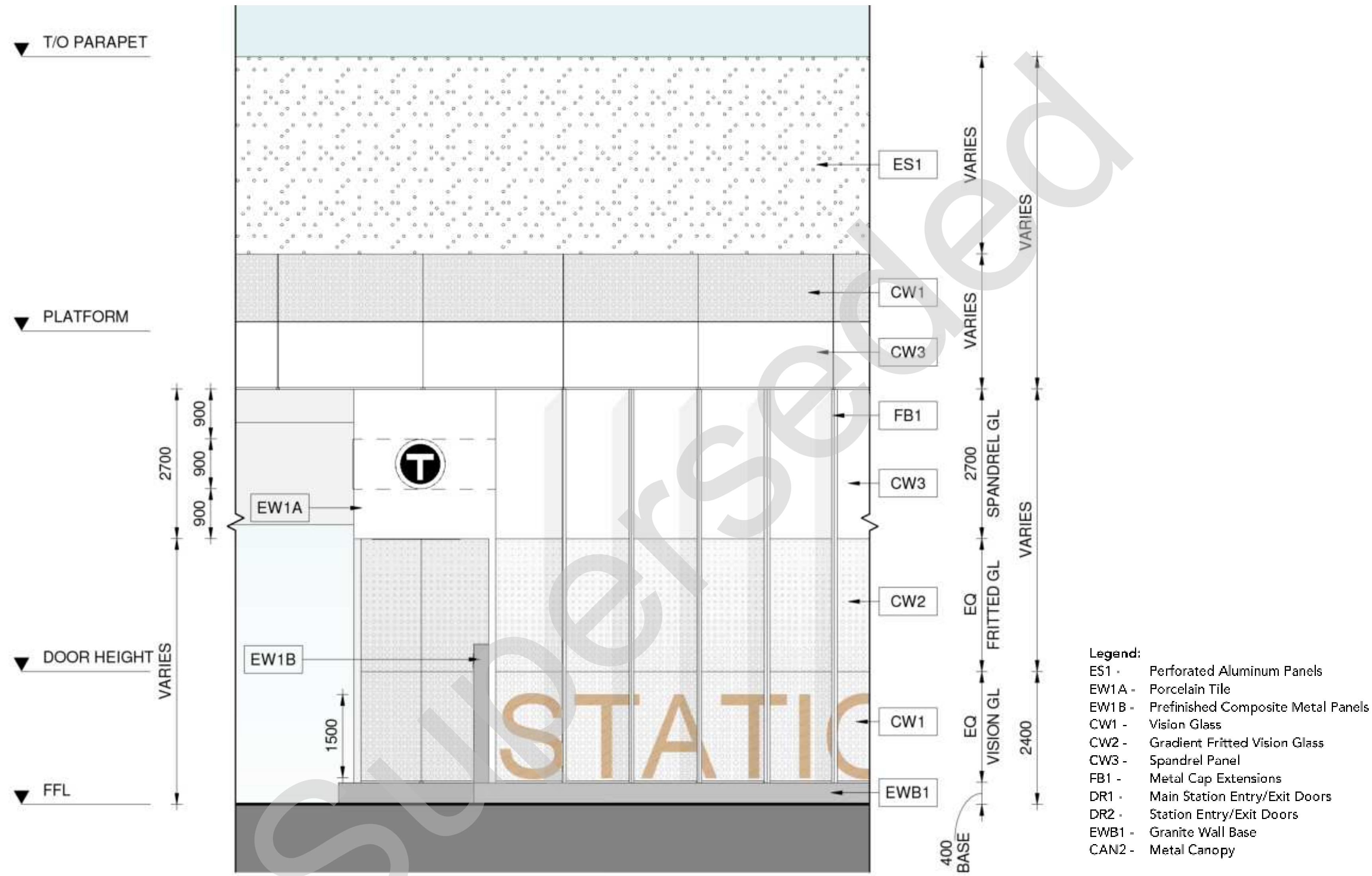


Figure 4-15: Elevated platform station - West elevation

For full drawing set demonstrating the kit of parts for each station typology refer to Appendix A.

g) **FB1** – Facade Baffles are vertical aluminum sunshade fins that are a part of the curtain wall system.

   i. Where required, baffles shall be located on the station facade for the purpose of solar mitigation.

   ii. Fins to run vertically full height of glazed wall system and shall be 300 millimeters deep.

   iii. These elements shall be used on ground floor entry facades to identify station entries as part of a network and provide additional shading.

   iv. Where required, baffles shall be located on the station facade for the purpose of solar mitigation. Facade baffles may be rotated to achieve varying shading.

   v. Facade baffles shall match overall facade colour scheme.

h) **Wall System:** Opaque wall cladding consists of sintered ceramic tile and aluminum panel.

   i. Opaque ceramic tile (EW1) shall be used for the identity canopy.

   ii. Aluminum panel (EW1B) shall be used for back of house areas.

i) The exterior shading system (ES1) consists of perforated aluminum panels. These elements are a clean and functional approach to provide shading together with a simple modern design strategy that can be customizable for site specific locations and integrated with design strategies of other developments. This material shall:

   i. be employed over glazing for sun shading on elevated platform massing, to reduce solar heat gain in warm weather, and achieve customer comfort and natural ventilation;

   ii. be used as an exterior feature element on elevated platform massing;

   iii. be used as the primary facade material on stand-alone emergency exit buildings, ventilation structures and other small ancillary buildings when located in prominent public realm settings;

Figure 4-16: Precedent image demonstrating use of perforated metal cladding as an exterior feature element, creating a site specific station identity through printing of imagery. Ashville Regional Airport, Fletcher, North Carolina by Gresham Smith and Partners

iv. create a site-specific identity for the station location through creative variable perforation patterns, or printing of imagery or motifs to create a facade that is on par with or exceeding adjacent buildings, structures, and community context;

v. be used as a site specific feature wall material for elevated platforms by including an additional layer of perforated aluminum panel on the exterior of the building facade that is visible from the interior platform area as shown in Figure 7-2.

vi. Refer to Figure 4-15, Figure 4-17 and Figure 4-24 as examples of using this material;

j) **Overall facade composition:** The combination of systems and materials described above provide a variety of tools to address the following design concerns:

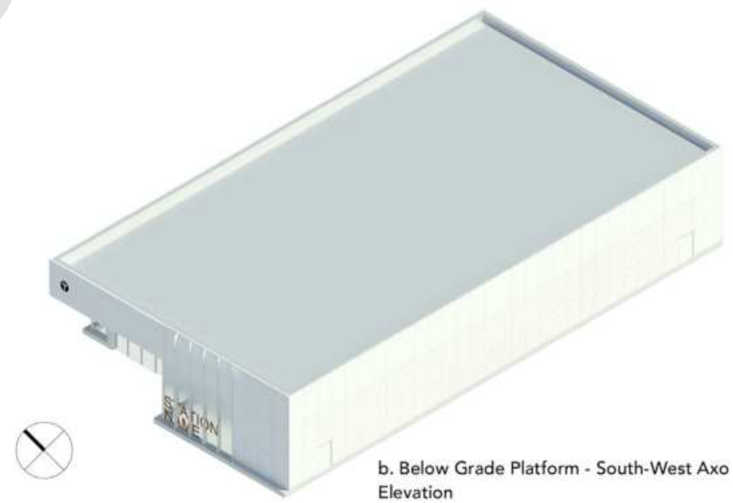
i. Above grade percentage of glazing shall be established with site analysis together with daylight and energy modelling in accordance with requirements in Section 4 - Sustainability;

ii. CS2, CW3 and EW1 finishes and materials may be used to achieve the proper ratio of glazing to meet sustainability requirements and achieve occupant comfort.

iii. Refer to Figure 4-16 and Figure 4-17.

k) The station building shall include the station name super graphic.

a. Below Grade Platform - North-West Axo Elevation



b. Below Grade Platform - South-West Axo Elevation

Figure 4-17: Below grade platform station - Axonometric views

For full drawing set demonstrating the kit of parts for each station typology refer to Appendix A.

4.2.9.3 Kit of Parts Elements – Station Identity and Harmonization

Stations are often wrapped by or within the context of another development. The kit of parts as clean and simple elements allow for a degree of harmonizing with other buildings. All station modules identified in Section 4.2.6 are required for a subway station, and some of these modules may be included within the massing of another development. The requirements in this document allow for flexibility to harmonize with other developments while maintaining network consistency.

Figure 4-18: Elevated platform station typology - Exterior view

4.3 STRUCTURES, ASSOCIATED ENCLOSURES AND INTEGRATION

4.3.1 Overview

The visual impact of clutter on a customer navigating through an environment can be a significant distraction from directional signage and other design and massing cues. Incorrect placement can create obstacles and block views. Strategies to eliminate design clutter around elements such as canopies, rooftops, parapets, windscreens, and equipment screening shall be incorporated and demonstrated in the station design.

4.3.2 Design Requirements

a) A clear architectural expression shall be achieved through integrated design of all systems and elements.

b) Designs shall consolidate mechanical and electrical servicing with structural and massing elements to reduce visual clutter (for e.g. drains at canopies).

c) Designs shall incorporate canopies, parapet, windscreens, and equipment screening with massing and materials to reduce visual clutter.

d) All exterior equipment and maintenance elements including roof top fall arrest shall be hidden from view at street level through strategic positioning and incorporation with the overall massing.

e) Rooftop areas shall be treated as a 5th elevation where it can be viewed from above. Care shall be taken to create a visually cohesive and organized arrangement of rooftop elements.

f) In order to reduce visual impact from street level where rooftop equipment is required it shall be:

   i. grouped together;

   ii. located to the rear of the station building;

   iii. set back from the building parapet by a minimum of 1500 millimetres;

   iv. recessed to a maximum of 3000 millimetres to lower the overall height of these elements;

   v. screened with mechanical louvers (LV1) that match existing adjacent finishes and are consistent in sizing with the overall modular dimensions of the facade elements.

g) Recessing of the roof for reducing visual impact of rooftop equipment shall not occur over the entrance or unpaid zone. Refer to Figure 4-18.

h) Where there is a gap between a station box and a subsequent overbuild: any rooftop equipment shall be enclosed with mechanical louvers (LV1) and screened from view:

   i. using ES1 perforated metal panels from the architectural kit of parts to enclose the gap, provided the openings in the perforated metal panels allow for the required airflow of louvers enclosing equipment being screened;

ii. and be of a neutral colour that matches adjacent finishes.

i) Skylights and/or clerestories shall be included to allow for natural light penetration where site conditions prevent access to natural light available through exterior vertical walls.

j) Skylights shall be positioned:

i. for diffusion of light deep down through escalator/ stairwells and other vertical openings;

ii. to help mark and light logical routes through stations;

k) Skylights geometries shall be developed to demonstrate minimal heat gain and to maximize natural light temperature and color.

l) Where Transit Oriented Development (TOD) overbuild prevents skylight placement near escalator/stairwell openings, skylights may be placed where space is available.

m) Skylights and sloped glazing systems shall have:

i. be designed and tested to comply with NAFS AAMA/ WDMA/CSA 101/I.S.2/A440-17 (NAFS) and A440S1:19 (Canadian Supplement to NAFS), ensuring resistance to structural loads from wind and snow, minimizing air leakage, and preventing water penetration. Skylights at grade or in accessible areas will have additional safety and structural requirements.

ii. undergo durability and life cycle testing, where relevant, to prove they can maintain their performance over time without notable deterioration.

iii. have a specified minimum condensation resistance factor, reducing condensation risk.

iv. be tested according to relevant standards, with a comprehensive test report available to verify their performance. This applies to both heated and unheated spaces. The report must include a summary of results detailing the product manufacturer, type, series/model, primary designator (including class and performance grade), tested size, design pressures, water penetration resistance test pressure, and air leakage resistance.

v. have allowance for maintenance and cleaning without lifts or staging.

vi. incorporate a built-in condensation gutter or drainage system to capture and direct accumulated moisture away from interior surfaces, where feasible.

n) Provide enclosures to all exterior access stairs at entrances, complete with all necessary signage. Doors to enclosures shall be lockable from the interior, during station shut down periods.

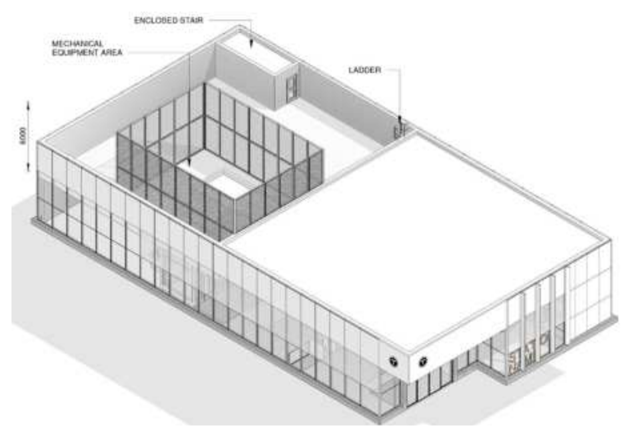


Figure 4-19: Below grade platform station - Roof elements

4.4 ENTRANCES/EXITS

4.4.1 Overview

Careful consideration shall be paid to entrance locations and the number of entrances provided. Station entrances shall be highly visible. It is desirable to have multiple entrances to the station with the most direct access. Land availability, transit connectivity, station area conditions, TOC development opportunities, and use of existing infrastructure all play a role in determining the number, location, and type of entries to the station. For any Station, there may be more than one entrance type based on the criteria.

Definition of Entrances/Access Points

Transit Entrance: A part of a building used for the purpose of loading and unloading passengers of a transit service that provides access from outside or another building. Access to the area and may include multiple sets of doors.

Primary (Main) Entrance: The main and most prominent entrance to a transit station, typically serving as the primary means of access for commuters, including facilitating access to/from intermodal/ interchange connections. It is strategically located for high traffic flow and often houses the Station Ambassador and other amenities. It is typically the station address. The primary entrance usually accommodates the largest percentage of ridership or pedestrian flow using a particular station. Often these entrances support other transit facilities such as bus depots or loops and can play a significant role in connecting other modes of transportation to the subway.

Secondary Entrance: An additional entry point to a transit station, designed to ease congestion and provide convenient access to specific areas or platforms within the station. Secondary entrances are usually situated in proximity to major thoroughfares or nearby facilities, or other modes of transit such as bus loops. The secondary entrance usually accommodates equal or less than the primary entrance ridership percentage or pedestrian flow.

Figure 4-20: Below grade platform station – Entrance

Tertiary Entrance: Any additional access point (beyond the primary and secondary) to a transit station, intended to distribute passenger flow and optimize station capacity. Additional entrances are strategically placed to serve specific neighborhoods, reduce crowd density, and enhance access to the station. Additional entrances usually accommodate equal or less than a secondary entrance ridership percentage or pedestrian flow.

Overview Requirements

a) Primary (Main), Secondary, and Tertiary entrances all form part of access, egress and circulation strategies for stations and shall be considered as part of station sizing and pedestrian flow calculations and vertical circulation elements.

b) Where feasible, two access points with independent paths to the platform is preferred to allow for redundancy of access during operational repairs and other entrance closures.

   i. For stations with only one access point (e.g. a single headhouse), multiple doors to the headhouse may be implemented based on site context and considerations for community connections and site access.

   ii. Note that these entrance requirements are for subway stations and intermodal stations may have additional requirements based on these modes. Where requirements are combined for various modes, all requirements shall apply. Where there is conflict, the most stringent requirements shall be applied to create a holistic design approach. For example, where combined with a GO station, requirements are to be read in conjunction with the GO DRM. Number of entrances for intermodal stations are cumulative and site specific.

c) Where these Primary (Main), Secondary and Additional entrances are incorporated in a Third Party property (e.g. TOC) they shall:

   i. follow all Metrolinx requirements and be available during station operating hours; and

   ii. "circulation requirements in addition to Metrolinx requirements must be provided for and accommodated in the egress and access strategy, additional elements required for TOC shall not impact the station circulation requirements or functionality. See to DS-11 Third Party Entrance Connection Standard.

d) Underground entrances and connections shall be minimized, and where provided, at least one alternate means to enter the station at an above grade entrance shall be provided.

4.4.2 Design Requirements: General

a) For requirements addressing the public realm related to station entrances refer to Section 3 Public Realm.

b) Station entrances and exits shall be provided at grade and be highly visible.

c) The number of public entrances to a station shall depend on the volume of passengers, their mode of arrival, site constraints and opportunities.

d) Entry locations shall be:

   i. in an optimal location to serve the area with the highest pedestrian volume;

   ii. placed within close proximity to intersections to reduce pedestrian crossing at mid-block crosswalks and reduce impacts to traffic;

iii. be adjacent to connecting surface transit services for quick and convenient transfer points.

e) Where there is only one station entry location and where opportunity permits, locate the entrance close to an intersection as opposed to being located between intersections to prevent pedestrian street crossing at mid-block to access the station and for improved visibility of the station entrance from multiple street view corridors.

f) Stations shall have more than one entrance where it provides significant benefits to the urban fabric and/or is warranted by customer volumes to destinations in the local context.

g) Where stations have two or more entrances, entrances shall be placed so as to serve the two highest sources of pedestrian volumes, provide the most direct customer access routes, and most direct relationships to other modes of transportation including bus and streetcar stops.

h) For stations where it is demonstrated that a single entrance at an intersection is not possible, the station shall have access to each of the streets at the intersection. The development program, site organization of a development, or configuration of the development massing will influence the location of additional entrance connections.

i) Entrances shall include an entryway with automatic sliding doors (DR1) and full-width x 3000 millimetres deep foot grille including recessed drainage pan.

j) A 3000 millimetres depth runoff clearance space shall be provided at entrance doors without overlapping other runoff spaces or clearances.

i. Where foot grilles longer than 3000 millimetres deep are provided at entrance doors, the foot grille may not overlap with the clear fare gate queuing clearance requirements.

k) Station entrances shall be capable of being locked during non-operating hours.

l) Entrances shall be the most transparent element of the station building and be visually discernible from site access points to encourage easy site navigation and station access, including where integrated with TOC.

m) Entrances shall be designed with the kit of part elements for station entries.

n) Rain canopies shall be provided at entrance doors to prevent the passage of water into the vestibule and provide interim shelter to existing customers.

o) Refer to Section 4.2.9.2 for dimensions to the underside of the identity canopy.

p) Where canopies extend from the building for bicycle protection, the distance from ground surface to underside of canopy shall be 3000 millimetres.

q) Vertical Circulation Elements at entrances shall:

i. be sized and determined on a station specific basis and based on OBC requirements, forecasted station demand and Level of Service provided by Metrolinx

ii. be located near the entrance as a readily identifiable feature and visible from the entry.

r) Provide doors required as means of egress during non-operating hours per OBC and AHJ requirements.

s) Where main Fire Alarm Control Panel (FACP) is provided it shall:

   i. be adjacent or in sight of station ambassador;

   ii. not conflict or compete with signage and wayfinding;

   iii. be located adjacent to the hub wall.

t) Minimum clear exit widths per most stringent criteria of OBC, NFPA 130 and AHJ shall be provided.

u) Additional protected egress routes may be required at interchange stations.

v) There shall be no freestanding object placed within 2000 millimetres of the front entrance facade.

4.4.3 Pavilion Entrance Type

A pavilion entrance is a free-standing building that is a focal point. A pavilion entrance can be an entry at grade to a below grade transfer zone circulation area or at grade with transfer zone circulation space also at grade. Pavilion entrances are station area landmarks on high profile sites anchoring block corners or key views as well as small corner sites with limited potential for integration with existing or future development and in existing or proposed parks and open spaces.

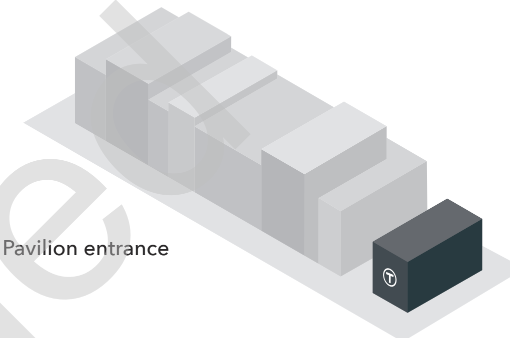


Figure 4-21: Pavilion entrance

4.4.4 Wrapped Entrance Type

Wrapped entrances are a freestanding pavilion building that is or will be surrounded by future development. A wrapped entrance has limited integration with an existing development or undetermined integration with a future development where timing or logistics of the adjacent development cannot include for a context entrance. Wrapped entrances can be on the corner or mid-block. Wrapped entrances can become context entrances when future developments are built.

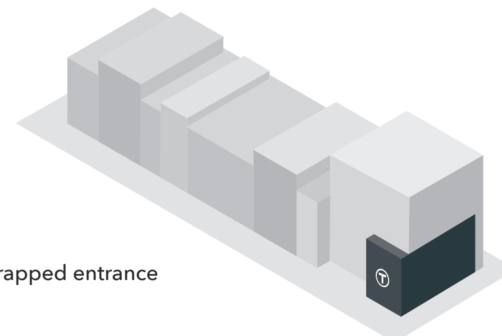


Figure 4-22: Wrapped entrance

4.4.5 Context Entrance Type

Context entrances reinforce the existing urban fabric or are incorporated into the base of a building and form a number of ground floor elements within a mixed-use development or tall building where the subway entrance shares functions with a third-party developer. This entry type occupies street level frontage alongside multiple entities depending on the size of the entry or host building. Context entrances are incorporated into Transit Oriented Community developments where there is a need to balance access to the station with other viable aspects of the development program such as at-grade retail and other street frontages of commercial value.

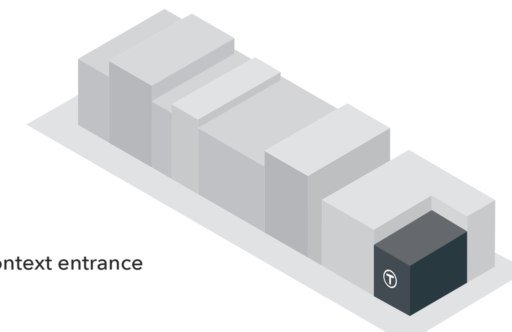


Figure 4-23: Context entrance

Diagrams demonstrating the three typologies of entrances: pavilion, wrapped, and context related to urban environment. For more details on the urban environment refer to Section 3.

4.4.6 Design Requirements: Integration with Heritage Buildings

a) Station entrances shall:

i. respectfully and sensitively integrate additions or modifications to heritage structures using simple, modern clean materials;

ii. balance achieving a visible and predictable entrance with a simple design that does not overpower the architectural language of the heritage building;

iii. provide station entrances adjacent to designated heritage structures to to provide the greatest visual exposure of the heritage building;

iv. maintain existing access to and functions of heritage resources.

4.4.7 Design Requirements: Integration with Surroundings

a) Design of context and wrapped entrance building facades shall:

i. be clean and simple and respectfully integrate with adjacent development;

ii. provide for additional setbacks for extra sidewalk room or small plazas;

iii. at a minimum reinforce a consistent setback with adjacent development;

iv. be given primacy of location and visibility within the development context.

b) Wrapped entrances shall be designed to accommodate potential future connections to adjacent future development sites in planning layout of station.

c) Design and siting of station vent shafts shall be grouped with entrance building for an efficient footprint and coordinated with adjacent development plans if known.

d) Context Entrances shall be designed to have prominence, without having adverse impact on commercially viable street frontages.

e) Context Entrances within other developments shall:

i. be given primacy of location and visibility in the development;

ii. occupy the minimum amount of frontage to optimize uses along ground floors for commercial value;

iii. be sized based on what is required by Level of Service, applicable DS-02 Universal Design Standard barrier-free requirements, and OBC requirements to provide access to the subway station and sustain transit operation.

Figure 4-24: Elevated platform station typology - Elevation

f) Entrances incorporated into other developments shall:

   i. be visible and located at or in the vicinity of the street wall or primary facade of the development;

   ii. not be recessed beyond the depth of the Identity Wall/Canopy;

   iii. employ the portal frame from the architectural kit of parts to achieve prominence and act as a consistent visual identity as a station entrance;

   iv. be of a height that provides prominence to the transit entrance relative to the scale of the development and its associated built-form components, for example, provide a double height entrance within a podium of several storeys.

g) For stations where entrances into developments are shared between the development and the station, the entrance shall:

   i. be clearly signed with transit identifier and branded elements;

   ii. be of a width that provides capacity to accommodate the Level of Service for transit users in addition to requirements for patrons, visitors and customers accessing other uses within the development in compliance with DS-12 Metrolinx Pedestrian Flow Design Standard requirements;

h) Where it is demonstrated that an entrance to the station is required from within a development, the entrance shall:

   i. be placed in a highly visible location;

   ii. be clearly signed with transit identifier and branded elements including the portal frame from the architectural kit of parts;

   iii. be of a width that provides capacity to accommodate the Level of Service for transit in compliance with DS-12 Metrolinx Pedestrian Flow Design Standard requirements..

4.4.8 Emergency Exit Buildings

Emergency Exit Building (EEB) structures include dedicated exit facilities from underground structures (tunnels) or guideways. This section addresses the EEB structures from the perspective of the customer experience.

4.4.8.1 Location and Siting Requirements:

a) For EEBs located in main street areas, EEBs shall be sensitively integrated within planned development or existing buildings, ensuring that the design of the EEB is discrete, with minimal impact on the public sidewalk or urban realm. Main streets are typically principal streets with shops and other commercial street fronts.

b) To protect for successful integration with new development opportunities, EEBs shall be placed to the side of development parcels.

c) When sited in street settings EEB setbacks shall be consistent with adjacent development setbacks.

d) Where opportunities exist to integrate EEBs in new development, orient EEBs to protect for the maximization of ground floor commercial space or other uses.

e) EEBs shall not be located at intersections where they reduce visibility and result in a blank facade at the corner when integrated with new development over time.

f) Where EEBs are paired with entrances at an intersection, the entrance shall be most architecturally prominent.

g) EEBs shall be sited to prevent negative impacts on their effect on mature vegetation in streetscapes and park settings.

4.4.8.2 **General Design Requirements:**

a) Dimensions of EEBs shall be determined according to existing requirements.

b) EEBs shall be laid out efficiently to ensure minimum size and reduced visual impact.

c) EEBs shall be rectilinear in form.

d) Doors shall open in the direction of exit travel.

   i. The location and path of travel from the EEB shall be designed to ensure safety and minimize the risk of traffic interference or other potential hazards that could pose a danger.

b) Bollards shall be placed at exit doors to prevent passing pedestrians from being struck by an opening door.

c) Exit facade with exit doors shall include signage that conforms to the DS-03 Metrolinx Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

d) Where louvers (LV1) are required the material and colour of louvers shall match facade materials.

e) A paved surface extending across the width of the exit facade with exit doors shall be provided with an 1800 millimetre wide path extending from the EEB to the nearest hardscape public area.

f) A simplistic approach to the architectural expression shall be achieved through integrated design of all systems and elements.

g) Protrusions shall not show above the roofline.

h) The exterior base of EEBs shall be a flush concrete base.

i) EEB facades shall be low maintenance, with graffiti resistant textures, treatments, and materials to reduce potential vandalism. Refer to Section 4.10 Finishes and Materials for further information.

j) EEBs shall be secure, and climb-proof.

k) All gutters, scuppers and servicing elements shall be integrated as part of the architectural expression.

l) EEBs shall be designed to not appear and/or be confused with an entrance.

m) EEB doors and frames shall:

   i. blend with and match adjacent finishes;

   ii. be DR3 where matching adjacent opaque material and finish;

   iii. be DR2 where matching adjacent transparent/ translucent material and finish.

4.4.8.3 Design requirements for EEBs from below grade structures are as follows:

The following requirements provide a number of approaches that respond to a variety of site contexts.

a) Where EEB structures are located in close proximity or connected to the station they shall have minimal impact and be designed as a background element in the streetscape setting, leaving the station entrance as the most prominent and distinguishable element. They may be co-located with other back of house elements and be clad in the corresponding EW panel material. Refer to Figure 4-25.

b) EEB structures when incorporated into a development shall be architecturally compatible with the character of the development. In these cases, materials other than EW1B and EW1C may be used and they shall meet material finish criteria in Section 4.10.4. Alternate material choices shall be approved by the owner of this standard.

Figure 4-25: Precedent image demonstrating use of perforated metal cladding with creative perforation patterns on an EEB in the public realm. One Workplace, Santa Clara, California, by Design Blitz. Image Courtesy © Bruce Damonte

Figure 4-26: Precedent image demonstrating use of opaque wall system cladding on an EEB that has been integrated with other back of house elements and clad in the same materials for an integrated architectural expression. Faber Headquarters, Battipaglia, Italy, by Geza. Image Courtesy Massimo Crivellari

c) When in a highly visible civic realm including a pavilion in a park, or plaza EEBs shall use perforated metal panel (ES1) and be designed as a public realm enhancement. Refer to Figure 4-26. In cases where an alternate material may be better suited to the context, materials other than EW1B and EW1C may be used, and they shall meet material finish criteria in Section 4.10.4. Alternate material choices shall be approved by the owner of this standard.

d) Refer to Figure 4-24 for an example of creative design with perforated metal panels in the public realm. See requirements listed in Section 4.10 Finishes and Materials.

e) EEB pavilion structures shall have a flat roof.

f) Exit doors and frames shall be neutral in appearance and match with adjacent finishes so as not to appear as an entrance.

g) Where EEB's are integrated into other developments, doors and frames shall be neutral in appearance and match the adjacent exterior wall finish.

4.4.8.4 Design requirements for EEBs from elevated structures are as follows:

a) EEB structure shall be designed with the kit of parts materials of the station building element to which it is connected.

b) The architectural expression of the EEB shall be integrated with the architectural expression of the elevated platform from which it extends. Refer to Figure 4-27.

c) Where EEB structure is glazed to integrate with the building element to which it is connected, the glazing of the EEB shall be treated with a frit pattern rendering the structure semi-transparent so as to prevent confusion with a subway station entrance. Refer to Figure 4-27.

d) Where EEBs from elevated platforms are combined with other back of house elements and are not in a visible public area, they may be integrated with the architectural expression of the massing volume and finish material they are combined with.

e) Exit doors and frames shall be neutral in appearance and match with adjacent finishes so as not to appear as an entrance.

f) Doors shall open in the direction of exit travel.

g) Bollards shall be placed at exit doors to prevent passing pedestrians from being struck by an opening door.

4.4.8.5 Lighting Requirements

a) Emergency exit signs to be provided per OBC requirements for means of egress.

b) Emergency egress lighting to be powered by the stations emergency power system.

4.4.8.6 Mechanical Requirements

a) There shall be no heating or cooling of EEBs.

b) EEB's shall be passively ventilated, this may include piston effect. Where not possible, mechanical ventilation shall be provided

c) At least one recessed, lockable hose bib shall be provided. Hose bibs shall be located in accordance with the relevant project specific requirements and is subject to coordination with the operator.

d) At least one floor drain shall be provided. Floor drains shall be located in accordance the relevant project specific requirements and is subject to coordination with the operator.

e) All piping shall be heat traced.

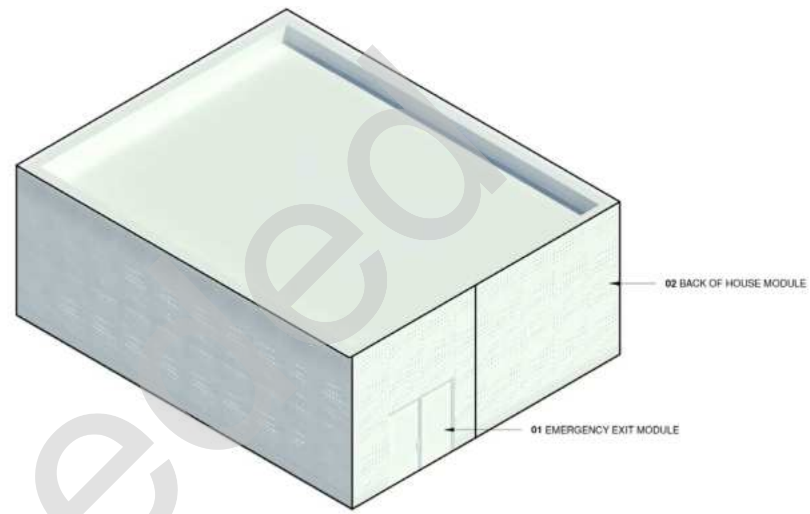


Figure 4-27: Below grade platform station typology – EEB pavilion in public realm

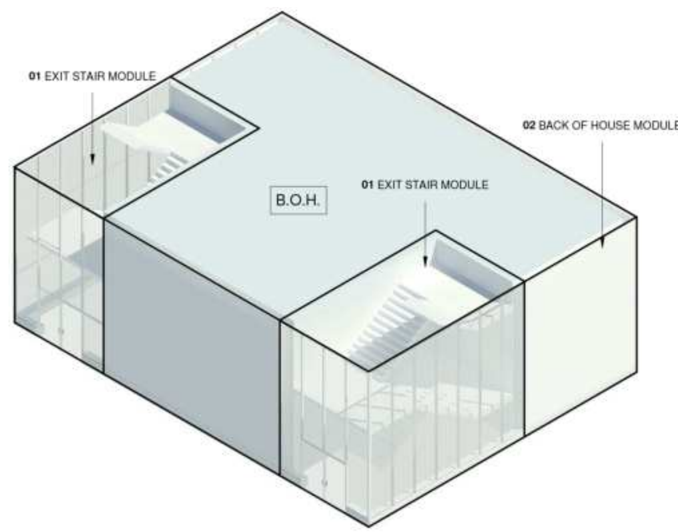


Figure 4-28: Elevated platform station typology – EEB in public realm

4.4.9 Third Party Entrance Connection

Third party entrance connection requirements are intended to assure a consistent customer experience and coherent integration of transit stations into adjacent development where direct or indirect access to the stations is proposed, to provide benefit to both the transit system and its customers. The connection consists of a passageway and a vestibule to separate the transit station and adjacent building.

4.4.9.1 Design Requirements

a) Third Party Entrance Connections shall comply with the latest version of the DS-11 Metrolinx Third Party Entrance Connection Requirements.

b) Connections to adjacent buildings shall comply with OBC requirements. and exit signage connected to the respective building fire alarm system to notify occupants if there is an emergency event in the adjacent building.

4.4.9.2 Finish Materials Requirements

a) Vestibule floor, base, ceiling and integrated lighting shall follow base material requirements as outlined in Section 4.10 Finishes and Materials.

b) Vestibule doors shall follow Metrolinx Third Party Entrance Connection Requirements.

c) Passageway floor, base, ceiling and integrated lighting shall follow base material requirements as outlined in Section 4.10 Finishes and Materials.

d) Where the Metrolinx Third Party Entrance Connection Requirements identify requirements for highlighted nodes and access points, these highlighted nodes shall use Feature Wall finishes and materials as outlined in Section 4.10 Finishes and Materials.

e) Where the Metrolinx Third Party Entrance Connection Requirements identify requirements for highlighted nodes and access points, these highlighted nodes shall have a horizontal dimension extending a minimum of 3600 millimetres from the passageway connection point into the passageway and be coordinated with floor tile.

f) Where the Metrolinx Third Party Entrance Connection Requirements identify requirements for highlighted nodes and access points, these highlighted nodes shall have a vertical dimension spanning from wall base to finished ceiling.

Figure 4-29: Precedent image demonstrating a third party entrance connection from an adjacent development. Pedestrian Bridge, San Francisco, USA, by Bohlin Cywinski Jackson. Image Courtesy ©Nic Lehoux.

4.5 CIRCULATION

4.5.1 Overview

This document outlines requirements for the design approach to overall circulation and customer flows specific to the customer journey. Circulation elements within stations include entrances, interior circulation space, fare gates, platforms, Vertical Circulation Elements (including stairs, escalators and elevators), pedestrian passageways, pedestrian tunnels and pedestrian bridges. The size and number of these elements is determined by the length and type of the train, the proximity of train tracks to surface features, site conditions, intermodal transfers and the volume of passengers. Exterior circulation is covered in Section 3 Public Realm.

Passageway within this document is defined as a pedestrian path, greater than 6000mm in length, that allows access between buildings or areas within buildings, typically having walls, guards or barriers on either side.

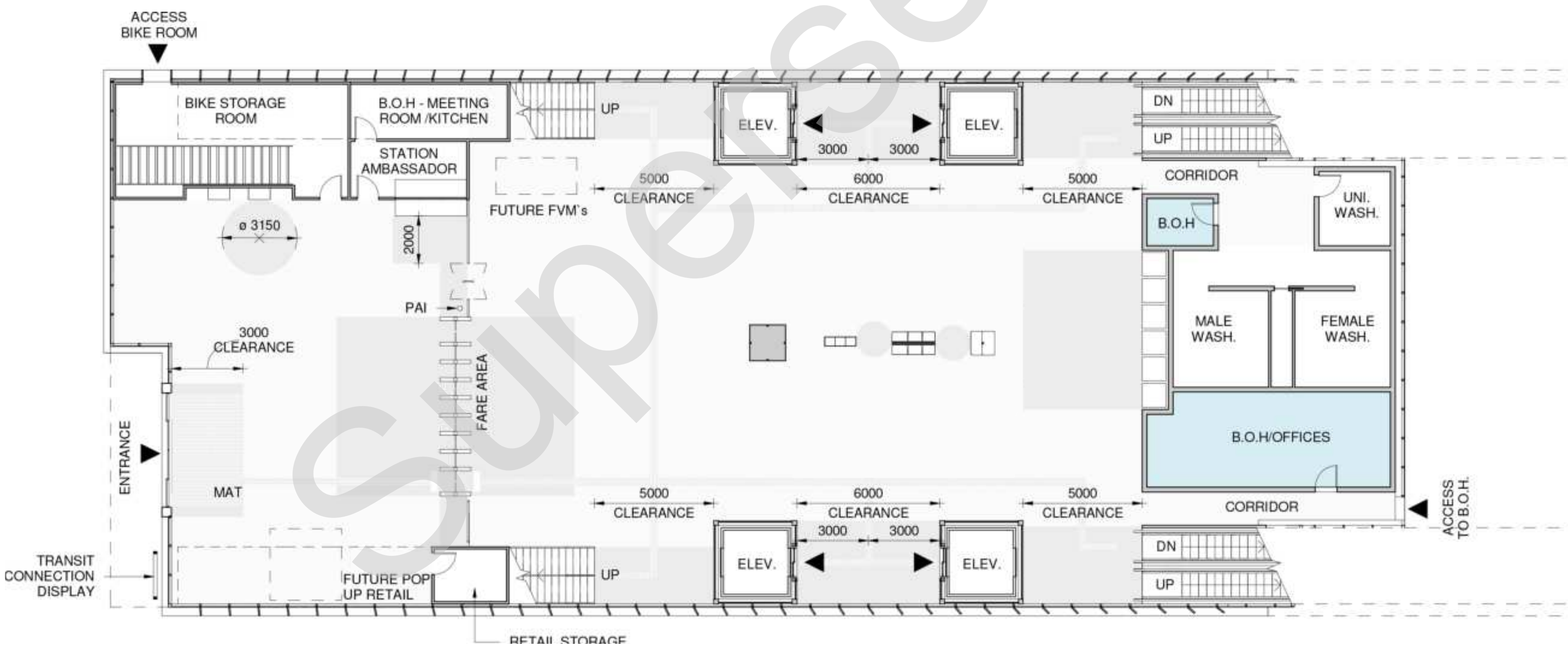


Figure 4-30: Elevated platform station typology - Ground floor plan

4.5.2 Circulation and Level of Service

While the length of platforms is a function of the train length and the length of passageways is a function of site geography, the width is determined by both the Ontario Building Code (OBC) and the level of comfort to be provided to passengers in peak and emergency conditions. The level of comfort is often referred to as Level of Service (LOS). Level of Service is the relative measure of the amount of floor area available to each passenger. It is a measure of comfort and maneuverability within the station.

4.5.2.1 Level of Service

a) Levels of Service (LOS) concept outlined in J.J. Fruin's book, Pedestrian Planning and Design, shall be used to achieve the level of passenger comfort. The minimum Levels of Service for specific areas shall be as indicated in the following table.

b) Levels of Services for Platforms and Waiting areas are queuing,

c) LOS, Passageways are Walking LOS,

d) Stairways are Stairways LOS.

LOCATION	Level of Service (LOS)	Measure
Platforms (Normal)*	C	0.8m2 per person
Platforms (Emergency)*	D	0.4m2 per person
Waiting Areas	C	0.8m2 per person
Passageways one way two way	 D C	 50 people per minute per metre 40 people per min. per metre
Stairways one way two way	 E D	 56 people per min. per metre 35 people per min. per metre
*Platforms (Normal) refers to the level of service during the peak 15 minutes. *Platforms (Emergency) refers to the platform density to be provided when the emergency occupant load is calculated in accordance with the OBC.		

Table 4-1: Levels of service

Note that Level of Service requirements may be superseded by Metrolinx Pedestrian Flow Modelling Standard once adopted.

4.5.2.2 Ridership

a) Ridership shall be provided by Metrolinx.

b) Ridership data is essential for planning the station circulation system. This information shall be used to determine the platform area, the width of vertical and horizontal circulation, the number of escalators, number of fare gates and the emergency egress requirements.

c) The ridership data shall be reviewed at regular intervals to confirm the operating performance and safety of the station.

d) Ridership requirements may be superseded by DS-12 Metrolinx Pedestrian Flow Modelling Standard.

4.5.3 Customer Experience: Efficient and Easy to Navigate

Part of an end to end journey includes navigating to and within stations with ease. This will keep customers on the move through the station (reducing or eliminating the need to stop at any touchpoint unless they choose to). As a part of this approach, the overall spatial design, architectural visual cues, and static and digital information will facilitate passenger flows to create an easy and stress-free station navigation experience.

4.5.4 Intuitive Wayfinding

Intuitive wayfinding (in architecture) is the orchestration, placement, and expression of architectural elements and finishes to create spaces that are highly legible in conjunction with strategically placed wayfinding signage. It leverages natural human tendencies, understanding how humans make decisions as they navigate through buildings to influence movement through 'passive' means to support the development of an individual's mental map of a space. In other words, how the architecture leads one through the space without additional interventions such as technology, signage, etc.

In architecture this is composed of two layers:

a) Spatial organization and space planning to ensure maximum sight lines and minimize required changes in direction and decision points along the journey.

b) Design strategies or gestures that when co-located or physically connected to relevant decision points will aid in development of mental maps. This includes but is not limited to:

   i. changes in lighting, with preference for natural day light, especially at vertical circulation elements;

   ii. changes in ceiling height (expansion or compression);

   iii. changes in surface materials via colour, texture, and patterns on walls, floors, or ceilings;

   iv. placement of unique/memorable elements that act as 'landmarks'. This can include murals, art, feature walls, information displays, retail and other amenities;

   v. allowing visual character to vary subtly along the user journey/path;

   vi. in corridors, directional wall surfaces that are visually different depending upon the direction of travel can also passively assist in wayfinding;

   vii. ceiling design, because it is typically less encumbered by functional and spatial constraints than floors often presents opportunities for subtle sculptural treatments.

The above principles when implemented into the design of a building passively support wayfinding and do not replace signage and related wayfinding information and principles. See DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

4.5.5 Design Requirements: General Circulation

a) Circulation elements within stations include interior circulation space, fare gates, Platforms, Vertical Circulation Elements (including stairs, escalators and elevators), pedestrian passageways, pedestrian tunnels and pedestrian bridges.

b) Circulation elements shall be sized in accordance with the capacities and flow rates as defined in the Ontario Building Code (OBC)

c) Stations shall be planned to accommodate the projected customer flows, OBC, desired Level of Service, together with ridership information provided by Metrolinx and be demonstrated through pedestrian modelling.

d) The circulation elements within a station shall be designed to accommodate the projected ridership for Level of Service and emergency evacuation requirements.

e) The capacity and distribution of means of escape to accommodate emergency conditions shall be calculated in accordance with the OBC.

f) The circulation system shall be designed to have enough capacity so that the platform can be cleared within one headway, with simultaneous train arrivals on each platform, during the peak 15-minute period, and permit evacuation as required by the Ontario Building Code (OBC). The peak 15-minute period refers to ridership information that has been gathered for an existing system on a 15 minute basis in the peak hour.

g) Platform space for projected customer volume for balanced boarding and alighting shall be provided. Refer to Section 7.0 - Platforms for additional requirements.

h) Pedestrian flow modeling based on normal peak 15-minute conditions shall be developed to confirm directional flows and capacities of all circulation elements include analysis of fast and slow spaces and decision-making points.

i) Fire ventilation requirements shall be factored into the final selection of vertical and horizontal egress widths and confirmed with computational fluid dynamics modeling.

j) The circulation system shall be planned such that customers can comfortably and safely move within the station, without obstruction or confusion.

k) Circulation routes shall be:

   i. clear of obstructions, simple, and straightforward;

   ii. without backtracking and include no unnecessary turns and dead ends.

l) Circulation patterns shall be based on righthand flows.

m) Distances shall be demonstrated to be the most direct between station elements.

n) Customer flow from entrance to fare gate to vertical circulation shall be direct. Each touch point shall be visible from one to the next.

o) Circulation routes shall be kept short, direct and wide enough to accommodate moving and queuing customers. Clear sightlines shall be provided for visibility from one touch point to the next touch point on the journey.

p) Interruptions to walking speed and direction shall be minimized. Columns shall not be in principal passageways.

   i. Columns shall be located not to obstruct designated circulation routes, ensuring pedestrians can move freely and safely without any barriers or obstacles in their path.

   ii. Where columns are required to be located within circulation routes, they shall be consolidated with vertical circulation elements, service areas, and/or other elements.

   iii. Columns shall be sized and positioned not to impede sightlines, ensuring visibility around them is maintained.

   iv. A pedestrian flow model shall be provided to ensure that the required LOS is maintained where columns must be located within circulation paths.

q) Minimum grade changes shall occur.

r) The planning and design of the customer journey shall prioritize ease of navigate and not exclusively reliant on wayfinding signage.

s) The customer journey circulation routes shall be marked with clear, legible, and consistent signs and graphics in accordance with the DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual in support of an intuitive wayfinding strategy.

t) Benches, recycling/waste receptacles, telephones, bottle filling stations, and floor-mounted signs shall be kept clear of primary circulation routes.

u) The minimum width of all internal public passageways shall be 5000 millimetres.

v) CPTED (Crime Prevention through Environmental Design) principles shall be implemented into new design or retrofit of station planning.

w) Transparent materials shall be specified to enhance visibility from one zone to another.

x) A simple colour/material palette and selected feature walls shall be employed to promote intuitive wayfinding. Refer to Section 4.10 Materials.

y) Circulation routes shall be lit with ample visual transparency for surveillance to discourage vandalism and increase personal safety in compliance with CPTED principles. Refer to Section 2.5 - Lighting.

4.5.6 Design Requirements: General Circulation within TOCs

In some subway station scenarios, horizontal paths of travel through common corridors, retail concourses and Vertical Circulation Elements will be shared with circulation for occupants within a TOC development.

a) Circulation routes shared between stations and TOCs shall:

   i. be sized to accommodate the Level of Service for transit users in addition to spatial requirements for patrons, visitors and customers of other uses within the development in compliance with DS-12 Metrolinx Pedestrian Flow Design Standard requirements;

   ii. ensure that paths of travel from the building entrance to the station entrance are demonstrated to be the most direct;

   iii. be universally accessible and meet requirements stated in DS-02 Universal Design Standard;

   iv. incorporate transit identifier and brand elements including signage as part of an overall wayfinding strategy in accordance with the DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

4.5.7 Design Requirements: Surge Spaces, Queuing and Runoff

The below requirements are minimums to be provided. Projected customer volumes, pedestrian flow modelling, and code requirements may result in a more stringent requirement.

a) Surge spaces and places of rest shall be provided.

b) Surge, queuing and run-off space shall be provided for entrances, fare collection areas, and at all vertical circulation elements so as not to block pedestrian circulation and allow for changes in circulation direction or mode in compliance with DS-12 Metrolinx Pedestrian Flow Design Standard requirements.

c) All surge spaces, queuing and runoff spaces shall be uninterrupted and clear of any obstructions.

d) The minimum queuing dimension on either side of the fare barrier shall be 5000 mm millimetres. Refer to Figure 4-29, Figure 4-30 and Section 5.3 fare gates Fare Gates for additional requirements.

e) The minimum runoff at the top and bottom of escalators shall be 5000 millimetres. Refer Figure 4-29, Figure 4-30 and Figure 4-43.

f) The minimum surge space at the top and bottom of public stairs shall be 5000 millimetres. Refer to Refer Figure 4-29, Figure 4-30 and Figure 4-33.

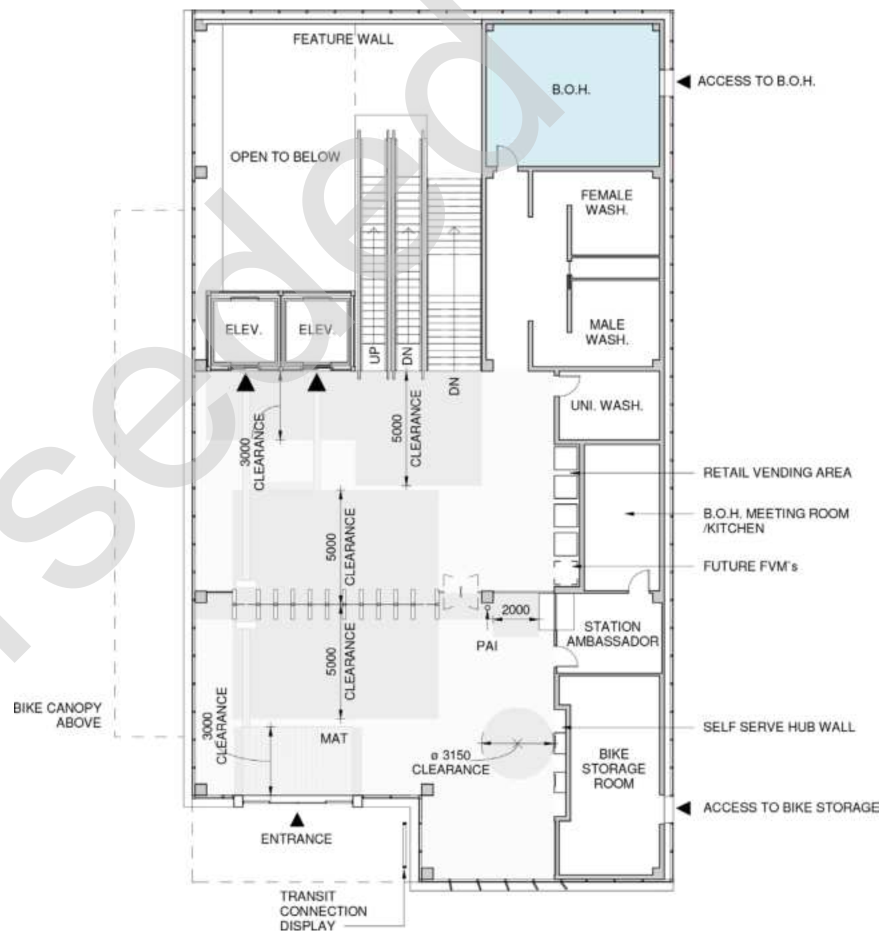


Figure 4-31: Below grade platform station typology - Ground floor plan

g) The minimum runoff space in front of an elevator shall be 3000 millimetres. Refer Figure 4-29, Figure 4-30 and Figure 4-37.

h) Where two or more elements converge, the surge or runoff spaces shall be cumulative and shall not overlap.

i) Circulation shall be planned to avoid a customer path of travel crossing a surge space perpendicular to the path of travel.

j) Surge areas shall be planned so as not to interfere with boarding or alighting from trains.

4.5.8 Travel Distances & Accessible Path of Travel

Refer to DS-02 Universal Design Standard

4.6 VERTICAL CIRCULATION

4.6.1 Overview

This section outlines requirements for the design approach to overall Vertical Circulation Elements (VCE) (stairs, escalators, elevators, and ramps) specific to the customer journey. Key design objectives for vertical circulation include highest degree of safety and security, functionality for universal accessibility, service reliability, convenient operations and maintenance, and non-proprietary tools, equipment, and knowledge. In the layout of VCE's increased spatial penetration between station levels improves the perception of and the level of safety, facilitates wayfinding, and maximizes daylight penetration.

4.6.2 Description

Vertical transportation connects the customer from the station entrance to the platform. It is important that all forms of vertical circulation be grouped together to ensure spatial efficiencies, and minimize building footprint, while consolidating an intuitive wayfinding element. When navigating between levels, sightlines, transparency of views, and finishes and materials are equally important for orienting customers along their journey and visually connecting to their destination.

4.6.3 Design Requirements: General

Note: Information below to be read in conjunction with DS-02 Universal Design.

a) Provide vertical circulation including stairs, escalators and elevators and ramps to connect all zones and station components on different levels.

b) Platforms shall be served by a combination of stairs, elevators and escalators. The balance between stairs, elevators and escalators shall be based on vertical rise and the time required to clear the platform. Provision may be made for future escalators and elevators.

c) Circulation elements shall be sized for egress capacity, minimizing wait times to less than 40 seconds, and the appropriate Level of Service performance.

d) Vertical circulation elements shall be located outside of the net platform area and shall be distributed in order to provide balanced train loading and convenient platform exiting. The net usable area is the gross area of the platform (length x width) less safety strips, buffers, openings, structure, and furniture.

e) Stations shall be provided with redundant barrier free access to all platforms by means of two or more elevators.

f) When determining escalator and elevator requirements, the circulation elements within connected developments shall be treated as part of the station requirement and shall be available at all operating hours and are located within a walking distance from:

   i. the street entrance to the escalator/elevator;

   ii. the fare control area to the escalator/elevator;

g) Provide vertical circulation based on each station site plan configuration to promote safe, clear and intuitive way-finding through every station level.

h) VCEs shall be placed on the main path of travel direct line of site of the entrance into the station.

i) VCEs shall be grouped together for ease of flow and to act as beacons within the space, reinforcing customers mental map as the 'stitching' element between street and platform, thus demonstrating intuitive wayfinding.

j) Elevators and escalators shall follow CSA B44 requirements

k) In order to reduce downtime to all equipment serving customers including vertical transportation equipment, it shall be demonstrated that equipment components and controllers are non-proprietary and that equivalent performing alternatives are available for timely maintenance and repair.

Figure 4-32: Precedent image demonstrating the transparency of materials required for subway station elevators. Copenhagen Metro, Cityringen, Denmark. Image Courtesy Peter Bartonbach @ Bartenbach GmbH

l) General Vertical Circulation criteria for passenger comfort:

Change in Level	Primary Means	Secondary Means
<0.5m	Refer to DS-02 for requirements (applicable ramp requirements included)	Ramp
0.5m – 2.5m	Stairway or Sloped Walkway	Ramp or Elevator
2.5m – 6m	Stairway and escalator (if applicable where benefits are justifiable to efficiently move large volumes of people)	Elevator
6m +	Mechanical means of access shall be provided. Escalator as primary means.	Elevator and stairway

4.6.4 Design Requirements: Transparency Between Levels

a) Provide a continuous customer journey through the station route from entrance to platform using direct views, transparent materials, and transparency between levels in alignment with CPTED principles.

b) Elevator cabs and enclosures and escalators balustrades shall be constructed of glass and be transparent.

c) Voids between levels shall be provided to encourage a more open environment (subject to CFD analysis).

d) Stair/escalator openings in the station between levels may include gaps on one or both sides between the stair/escalator and the adjacent walls to create a high level of openness and allow for natural light to penetrate through the station as possible (subject to CFD analysis).

i. Where stairs/escalators are in a stacked configuration gaps between stairs/escalators and adjacent walls can provide a gap between 300-600 millimetres, with appropriate fall protection as required by the OBC, unless proven not feasible.

ii. Gaps shall be sized for maintenance and cleaning.

iii. Where stairs occur between escalators and/or walls, ensure no space allows for collection of dust, dirt and debris.

iv. Where openings contain continuous runs of stair/escalators that are greater than 6m, these gaps are not required.

v. Where gaps between the stairs/escalators and the adjacent walls are not feasible or desirable due to station configuration, stainless steel enclosure panel shall be provided between the escalator and adjacent wall with the glass escalator balustrades frosted adjacent to the wall where glass balustrades are used. Refer to figure 4-33.

vi. Configuration and placement of stairs and escalators must consider potential negative effects experienced by passengers with cognitive impairments, people with low vision, height phobias etc. VCE shall be designed to ensure safety and comfort of all passengers.

e) Between levels, transparent guards shall be used around all openings. Guards shall meet OBC requirements.

f) Glass escalator balustrades shall be provided to reinforce the perception of openness.

4.6.5 Design Requirements: Stairs

Note: Stairs and Stairways are used interchangeably in this standard.

a) Stairs shall be located near the major circulation routes.

b) Stairs shall be offset from the direct route of travel so that they are not an obstacle in the path of travel.

c) Stairs shall be provided at all entrances (note that stations may require additional emergency exit stairs).

d) Stairs shall meet requirements shown in Figures 4-35, 4-36, 4-37, and 4-38.

e) Stairs shall be a minimum width of 2200 millimetres and sized to meet pedestrian flow for Level of Service and emergency exiting calculations. The most stringent requirement shall apply.

   i. Width of public stairs shall meet the governing of emergency egress capacity and station Level of Service requirements.

f) Stairs shall have a minimum slope of 30 up to 35°. All stair slopes shall maintain a continuous and consistent slope.

g) Stairs and stair elements including nosings, handrails, and landings shall comply with the DS-02 Universal Design Standard and all other regulatory and barrier free requirements. The more stringent requirement to apply.

h) All balustrades to be mounted to raised 150 millimeters terrazzo base.

i) Stairs shall be easy to find, and clearly identifiable through intuitive wayfinding.

Figure 4-33: Precedent image demonstrating stainless steel enclosure and frosted glass balustrade adjacent to wall.

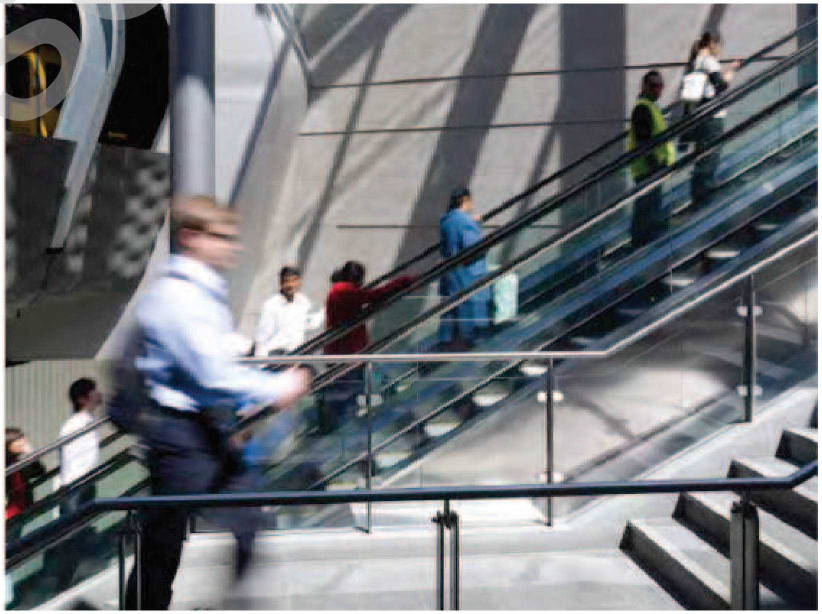


Figure 4-34: Precedent image demonstrating maximum transparency of materials for VCEs. Chatswood Station, Sydney, NSW. Architect: Cox Design, Inc.

j) Stairs shall maximize light transmittance and transparency between levels through use of transparent materials and with stairwell openings that extend from grade level to platform level for daylighting and to reduce the apparent below grade platform lengths.

k) Where site conditions allow, straight run stairs shall be used to achieve end-to-end visibility to encourage customers to use them. Research suggests customers are more likely to use stairs if they can see where they end.

l) Vertical and horizontal wiring conduits in stairways shall be concealed and integrated within the structure.

m) Stair materials shall be as per the materials table. See Section 4.10 - Finished and Materials.

n) A 110 millimeter wide continuous bike runnel channel raised flush with the front edge of each tread beneath handrails shall be provided for bicycle access where station vertical distance from grade to platform is 15m or less.

   i. Bike channels shall be provided on at least one stairway. Enclosed fire stairs, intended only for emergency egress, do not require a bike channel.

   ii. Bike channels shall be placed on both sides of the stairway to accommodate travel in each direction.

   iii. Bike channels shall be located on the stairway perimeter and shall not be below an intermediate handrail.

   iv. The stairway and channel materials selected shall prevent bicycle tires from causing abrasion or impact damage, including dents, scratches, chips, or cracking, to the finish.

o) Stairway centre handrails shall terminate at landings to permit crossover.

p) Lighting at stairs shall be:

   i. A continuous LED strip located in the underside of the handrail to illuminate the stringer edge of the stair tread. Where a stair has secondary lower height handrails the LED strip shall be located in the lower handrail.

   ii. where stairway runs are stacked, an LED strip lighting shall be embedded into the bottom of the upper right to light the lower run of stairs;

   iii. as per requirements in Section 2.5 – Lighting.

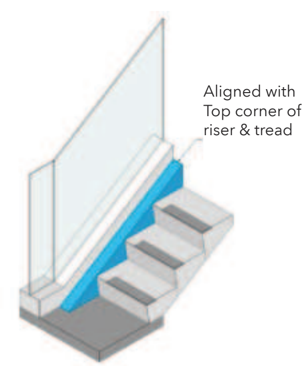


Figure 4-35: Stair - Bike Runnel channel

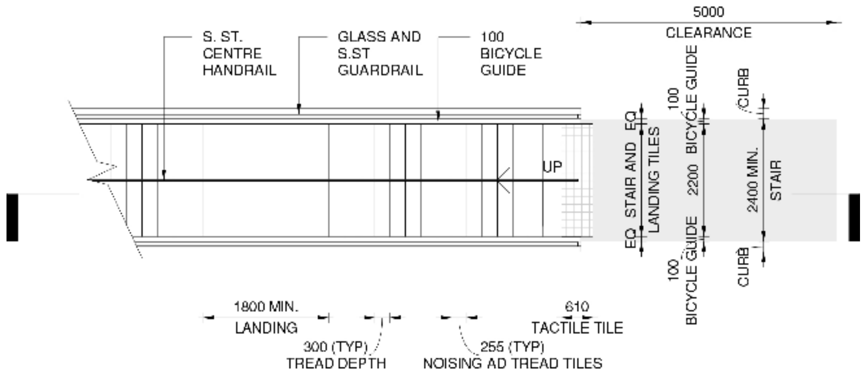


Figure 4-36: Stair - Plan

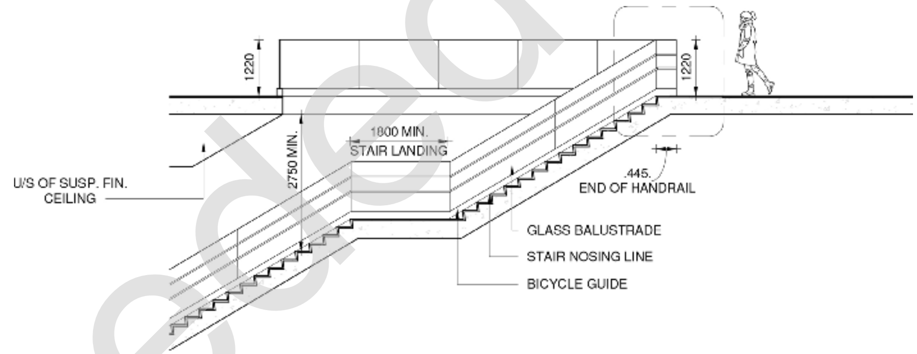


Figure 4-37: Stair - Section

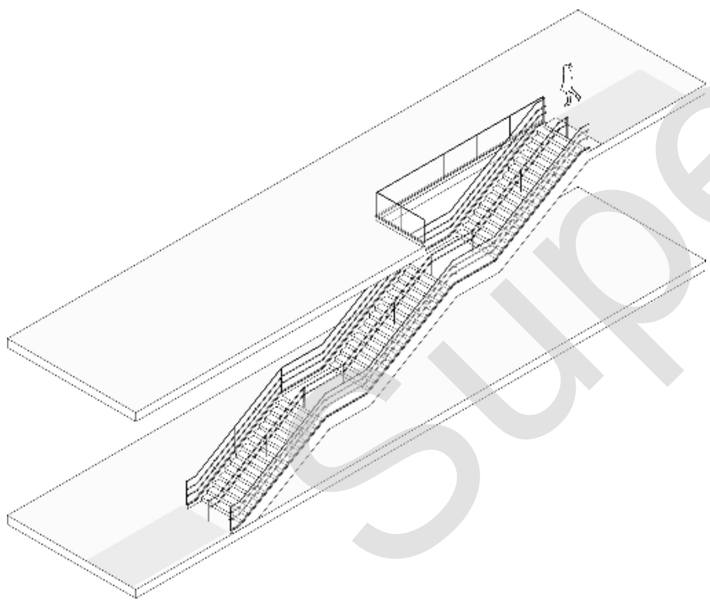


Figure 4-38: Stair - Axonometric

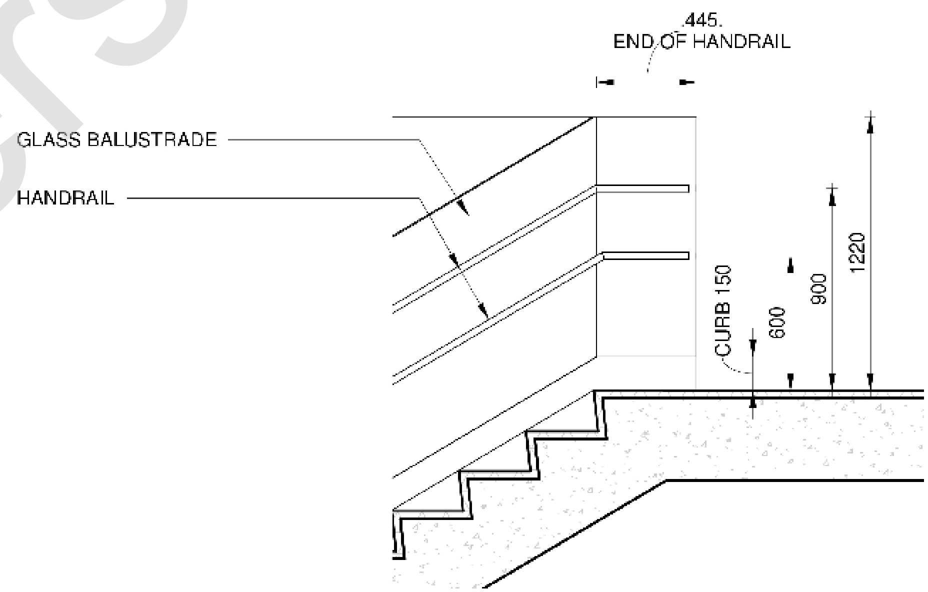


Figure 4-39: Stair - Section detail

q) Where stair secondary handrails are provided as per the DS-02 Universal Design Standard, the following exceptions shall apply:

   i. Lower, secondary handrails shall only be deployed where there is a full height wall adjacent to the stair to minimize climbability;

   ii. Lower, secondary handrails are not recommended where bike runnel channels are deployed to reduce potential conflict.

4.6.6 Passenger Elevators

4.6.6.1 Planning and Sizing Requirements:

Dynamic pedestrian flow modelling and/or elevator simulations shall be used to confirm project specific elevator requirements in conjunction with the minimum requirements outlined in this standard and other Metrolinx standards. One elevator at each level shall be assumed out of service for calculation purposes and must demonstrate a minimum of LOS D with one elevator out of service per level.

a) Passenger elevators shall be sized to accommodate padded metal patient gurneys with wheels per OBC including space for at least two emergency service providers or the largest maintenance materials and equipment to be moved between levels served, whichever is greater.

b) Passenger elevators for vertical transportation between levels shall be designed to meet requirements in the DS-02 Universal Design Standard.

c) Elevators shall comply with the OBC and ASME A17.1/CSA B44.

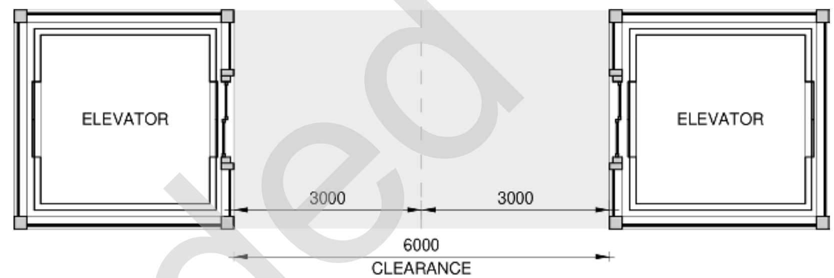


Figure 4-40: Elevator clearance - Plan

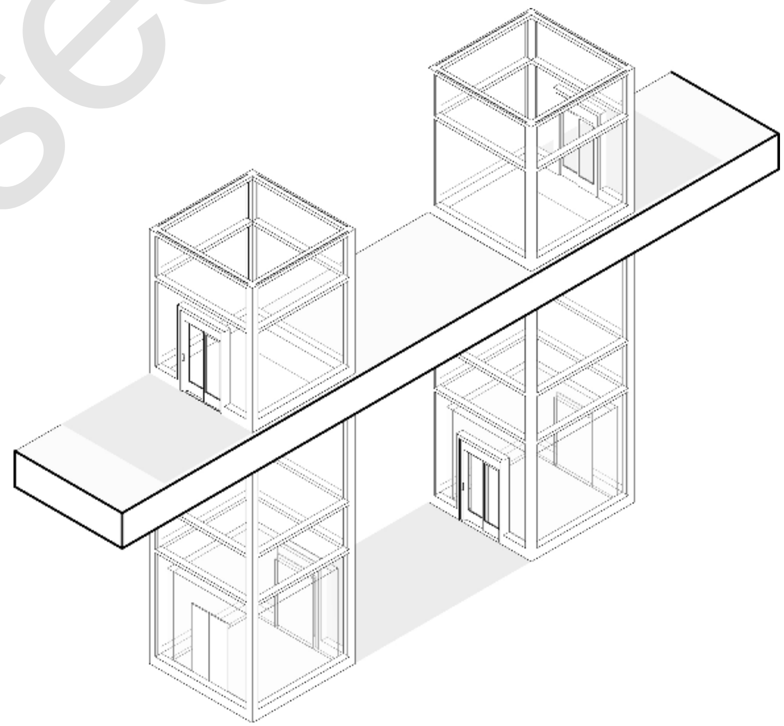
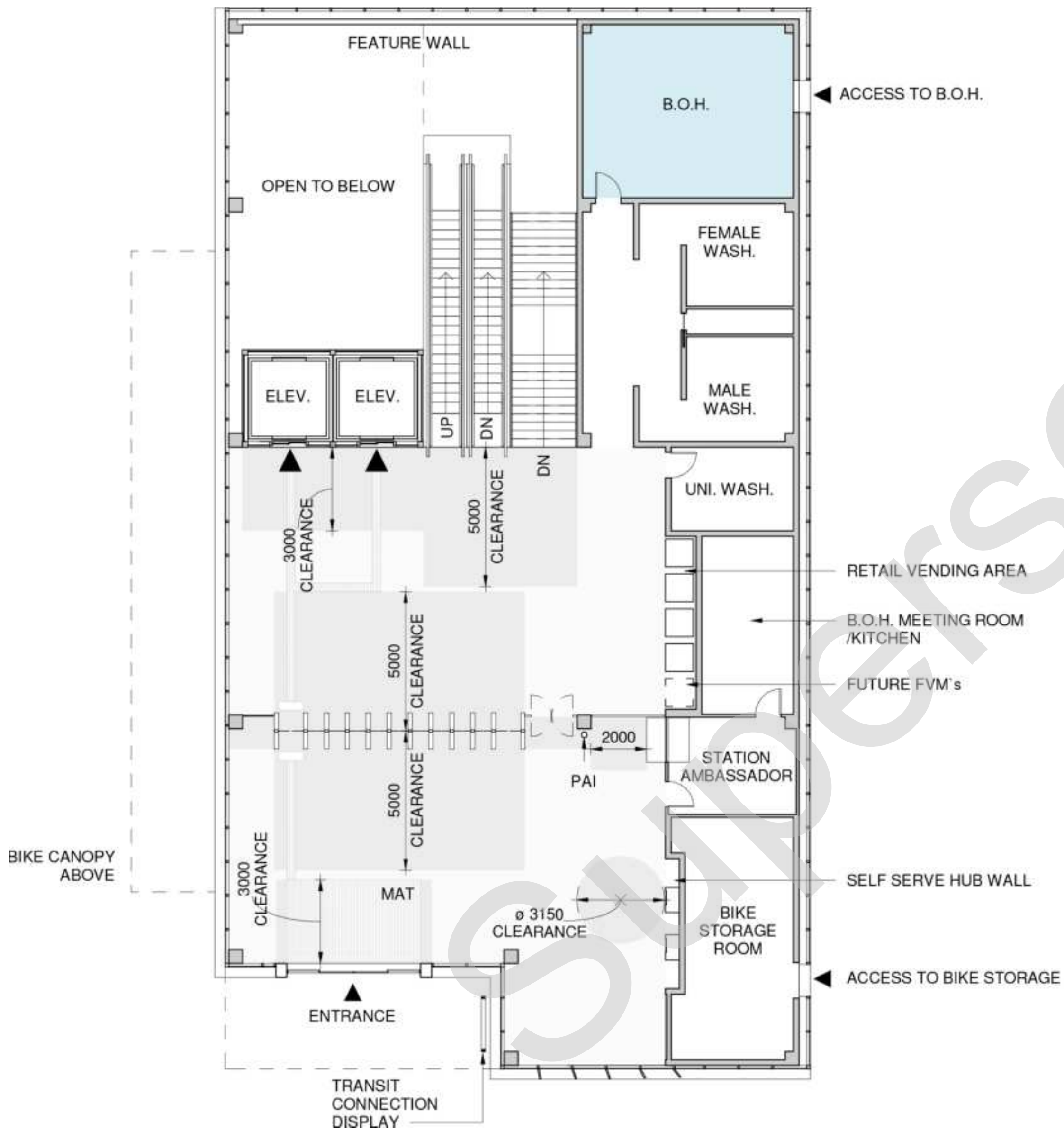


Figure 4-41: Elevator - Flow through configuration - Axonometric

The following series of drawings demonstrate 3 options for meeting the requirement for elevators to have flow-thorugh configuration.



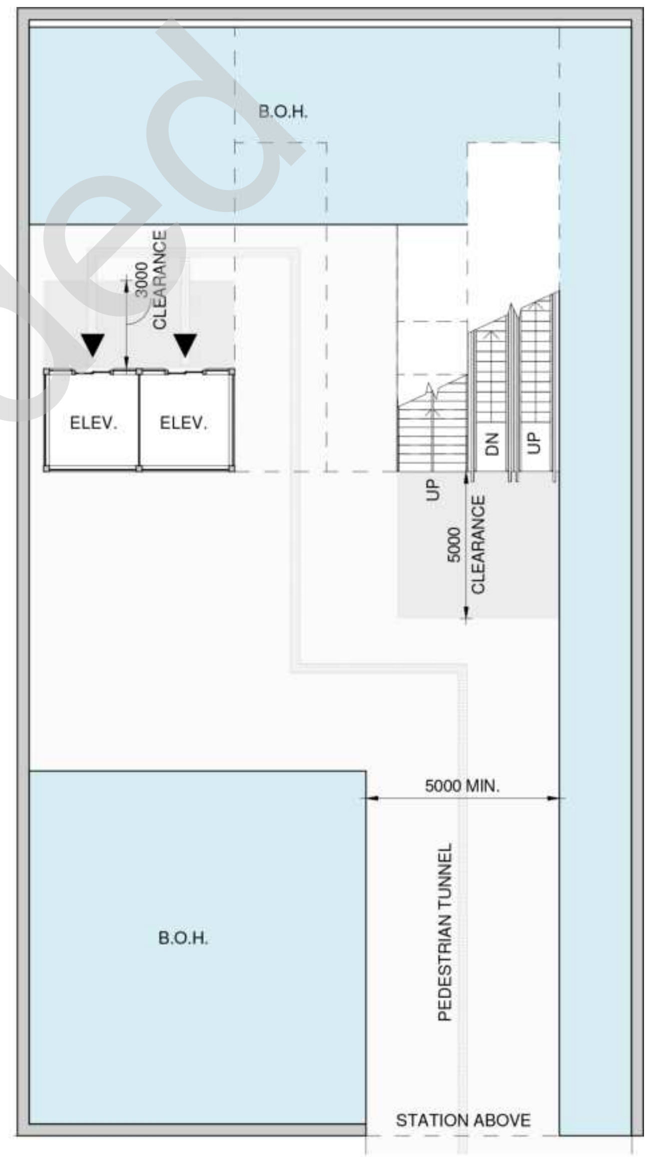


Figure 4-42: Flow-through elevator - Option 1 - Ground floor and transfer level

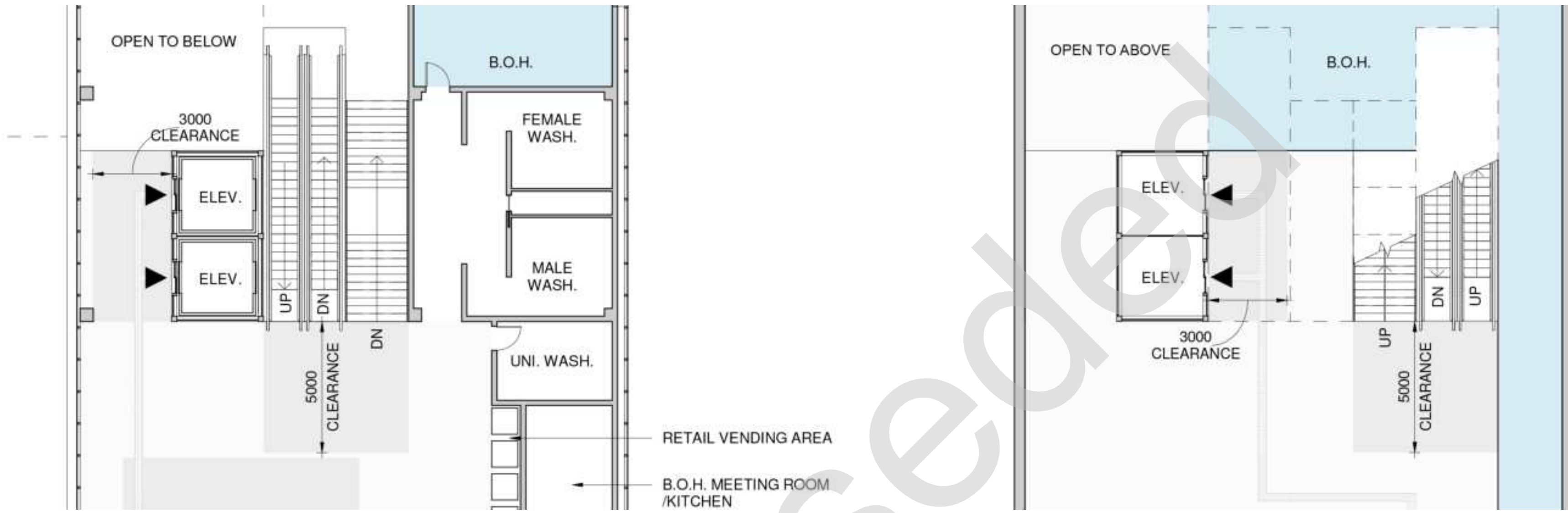


Figure 4-43: Flow-through elevator - Option 2 - Ground floor and transfer level

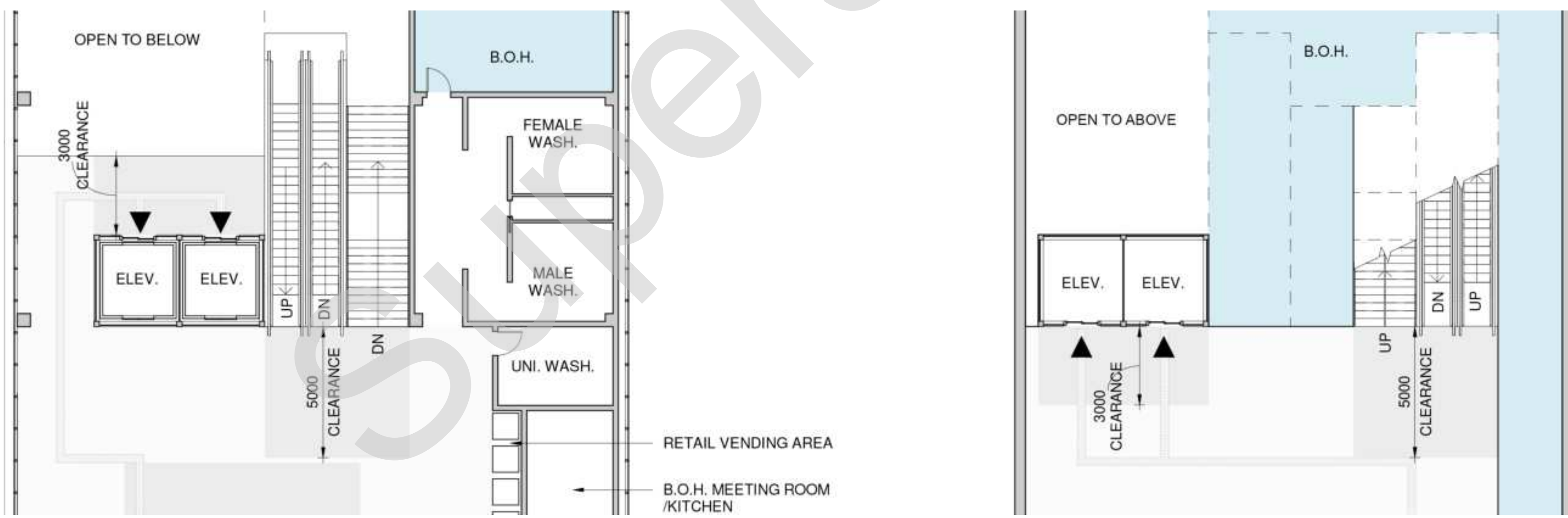


Figure 4-44: Flow-through elevator - Option 3 - Ground floor and transfer level

d) Elevators provided shall be configured as flow-through elevators to avoid turning stretchers, push chairs, wheelchairs, or goods carts inside the elevator car. Refer to Figures 4-39, 4-40, 4-41 and 4-42.

   i. Where flow-through elevators are not feasible, they shall conform to requirements outlined in DS-02 Universal Design Standard

e) Elevators shall be easy to find, and clearly identified with wayfinding and signage in accordance with the DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

f) Stations shall be provided with redundant barrier free access to all platforms by means of a minimum of two elevators.

   i. Design and placement of elevators shall consider the level of effort when one elevator is out of service to ensure station design facilitates the continuation of the journey for those requiring elevators without a significant effort or detour.

g) Redundant access to all platforms shall be achieved with dedicated subway station elevators.

h) For stations with only one station entrance, two co-located elevators (adjacent) shall be provided at the entrance.

i) For stations with two or more station entrances:

   i. the number of elevators provided, and elevator placement shall account for travel distances between station entrances, vertical rise, quality of service (waiting time for customers), handling capacity, access to other modes of transportation, and convenient access to services and amenities. Refer to section 4.6.9 for additional requirements.

j) Elevator transfers shall be demonstrated to be the minimum required.

k) Where feasible, direct elevator connections shall be provided from station access level (typically street level) to platform level.

l) Where it is demonstrated that direct elevator connections are not possible due to conditions beyond the control of the design team:

   i. the elevator system shall be designed to meet OBC Section 3.13.8.3. Elevator Requirements for maximum number of transfers;

   ii. elevators shall be located within sightlines of each other, otherwise appropriate wayfinding shall be provided to ensure ease of locating;

   iii. elevators shall have rest areas as per DS-02 Universal Design Standard. Rest areas shall be within 30m of each other and the elevators.

m) Elevators shall be designed to minimum technical overrun requirements and with no visible rooftop projections.

n) If mechanical overruns are required, design shall be reviewed and approved by Metrolinx and visibility of projections shall be minimized using design strategies such as:

   i. machine-room-less elevators;

   ii. placing the elevator inboard of the exterior wall to eliminate prominence of projections;

   iii. incorporating with the architectural strategy and/or, screening the projections;

o) Provide electronic public information signs at station entrances displaying real time elevator operational status.

4.6.6.2 General Requirements

a) Elevator shaft, car enclosure and entrance doors shall:

   i. be transparent to achieve maximum visibility through these elements and to meet safety and CPTED requirements as demonstrated in Figure 4-32.

   ii. have a durable stainless steel base to protect the enclosure from glass breakage. Datum of the base plate shall coordinate with surrounding adjacent design elements.

   iii. comply with Section 4.10.5.10.

b) Standard passenger elevator approaches, interior car layouts and controls, shall be provided for customer orientation and ease of access.

c) Interior elevator button designators shall have clear messaging that make sense to customers.

d) Elevators shall be provided with elevator cab buttons located on the longest side wall of the car and be easily accessible.

e) The emergency call system inside the elevator shall be designed to accommodate persons who are deaf or non-verbal in compliance with ASME A17.1-2019/CSA B44. Controls for emergency call system shall be located on the same panel as the emergency phone push button.

f) Elevators shall be provided with elevator cab control buttons shall be arranged with numbers in ascending order as per Appendix E of ASME A17.1/CSA B44.

g) Elevators shall be numbered as per Appendix E of ASME A17.1/CSA B44.

h) Call buttons, car controls, and Passenger Assistance Intercoms shall be provided at each elevator landing. The elevator cab PAI shall be as per Appendix E of CSA B44 and TSSA.

i) Elevator call buttons and cab buttons shall be durable and be resistant to vandalism.

j) Elevators and elevator control rooms shall be ventilated, heated and cooled.

i. Where Machine-Room-Less elevators are used, hoistways shall maintain a minimum winter temperature of 15°C and a maximum summer temperature of 25°C. Temperatures in the hoistways shall be monitored via temperature sensors in both the top and bottom of the hoistway. Additional consideration shall be provided for operating points of other facility equipment such as escalators. Mechanical heating or cooling shall be provided wherever required to ensure reliable operation of any equipment within the facility.

ii. Where hydraulic elevators are used, hoistways shall maintain a minimum winter temperature of 9°C and a maximum summer temperature of 30°C. Elevator control rooms shall maintain a minimum winter temperature of 9°C and maximum summer temperature: temperature set point of 26°C, design temperature of 32°C unless specified otherwise by manufacturer.

4.6.6.3 Services, Operations and Maintenance Requirements

a) Self-cycling elevators for reliable operation especially in cold weather shall be provided.

b) Elevator cars shall be specifically designed for heavy-duty transit system needs and requirements.

c) Elevator maintenance requirements and operation failure data shall be accounted for to establish heavy-duty transit suitability.

d) Elevators shall be provided with maintenance features to reduce repair time and to increase mean time between failures.

e) All serviceable equipment not directly connected to elevator operation, shall be serviceable from the exterior of the shaft.

f) Auxiliary standby power shall be provided to permit continued operation of the elevator(s).

g) All electric elevators shall be provided with their own back-up battery power system.

h) All elevators shall be provided with battery powered emergency lighting

i) Elevators shall comply with requirements in Section 2.5 – Lighting.

j) All elevators shall have CCTV camera mounted inside elevator cab.

k) Camera mounted in vestibules and lobbies shall view inside and outside of each elevator at each level.

l) All elevators shall have a two-way emergency call system.

m) Refer to section 2.9.3b) for detailed HVAC requirements.

n) Elevators shall be equipped with remote monitoring.

o) Elevator drainage shall be provided with a backwater valve complete with a dry access pit, external to the elevator hoistway and a dedicated drain to a sanitary sump. No other drainage shall tie into elevator drains upstream of the sump connection.

4.6.7 Escalators

These requirements are specific to the customer journey and do not constitute a project specification.

4.6.7.1 Planning and Sizing Requirements

Dynamic pedestrian flow modelling shall be used to confirm project specific escalator requirements in conjunction with the minimum requirements outlined in this standard and other Metrolinx standards. One escalator at each level shall be assumed out of service for calculation purposes and must demonstrate a minimum of LOS D with one escalator out of service per level.

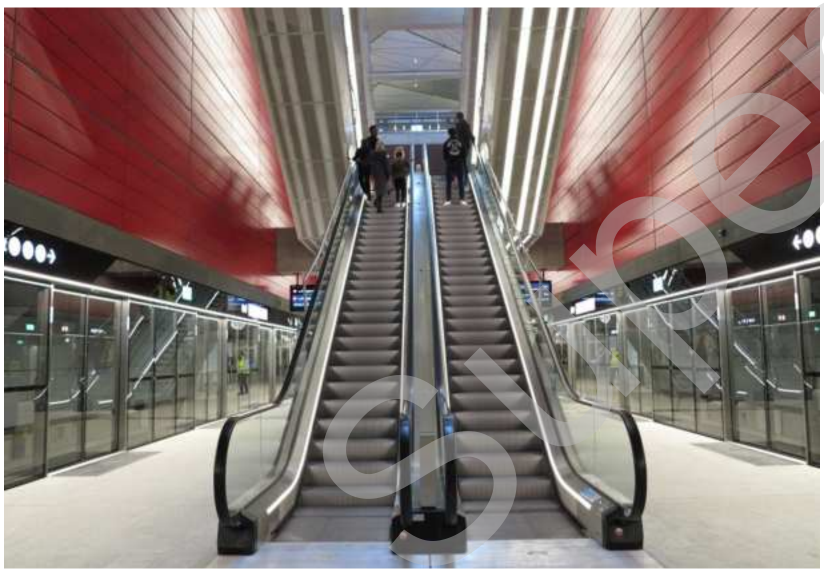


Figure 4-45: Precedent image demonstrating the maximum transparency of materials required for subway station escalator. Copenhagen Metro, Queen Margrethe II Cityringen, Denmark, by KHR Architekter, Image Courtesy Robert Schwandl

a) Escalators for vertical transportation between levels shall be designed to meet requirements in the ASME A17.1/ CSA B44.

b) Escalators shall be aligned with stairs in a consistent alignment throughout the station;

c) Where escalators are open to below in an atrium condition for more than 1 storey and fall protection is required, glass guards shall be provided to enhance customer safety.

4.6.7.2 Materials and Finishes Requirements

a) Escalator balustrades shall be a transparent element and constructed of glass.

b) Continuous skirt band lighting and balustrade lighting under the handrail shall be provided for added safety and illumination of the path of travel. Refer to Section 2.5 – Lighting.

c) Additional protective balustrades for fall protection and vertigo mitigation shall:

   i. be provided on multi-story escalators;

   ii. be provided where distance between finish floor and area open to below is more than 4000 millimetres;

   iii. be provided on each side of the escalator where no wall partition or other transparent safety barrier is provided directly adjacent to escalators;

   iv. be transparent to facilitate views from one level to another;

v. be presented to the owner of this standard for review and approval of design solutions where these scenarios occur.

d) Any wall partition adjacent to escalators (and stairs) shall be transparent.

e) The design and materials of escalators shall be as demonstrated in precedent Figure 4-42.

4.6.8 Ramps and Sloped Surfaces

a) Sloped floors are preferred over ramps.

b) Interior ramps for pedestrian travel shall meet the requirements of the local AHJ, Ontario's Building Code, the AODA and the Universal Design Standard. The most stringent requirements to apply.

c) Refer to Section 2.3 Barrier Free/Universal Design

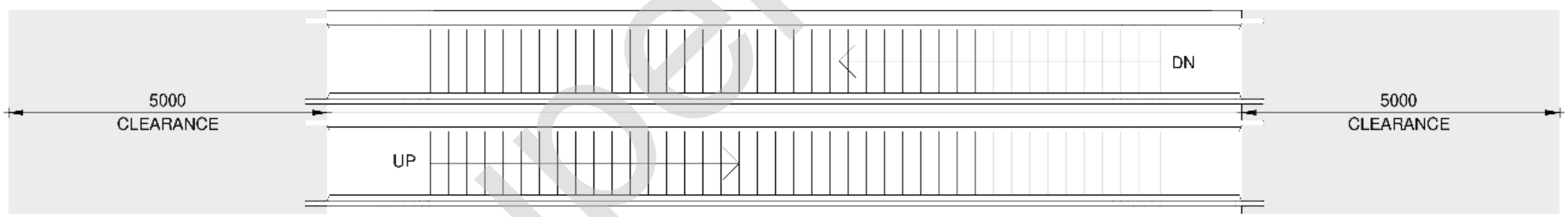


Figure 4-46: Escalator runoff space

4.6.9 Vertical Circulation Requirements by Entrance Type

4.6.9.1 Overview

Vertical circulation requirements by entrance type apply to continuous vertical circulation elements (VCEs) that move passengers the majority of the distance from the entrance to the platform. Vertical circulation requirements based on vertical distance shall be measured and applied from access level at grade to platform level.

Where there are interchange connections, vertical circulation shall maintain a single direction of travel, avoiding acute changes in direction, or switchback paths, where possible. All VCE requirements are subject to demonstration of satisfactory operational redundancy while maintaining compliant pedestrian flow LOS levels.

Number of entrances are to be determined on a project basis. Where entrance types are in scope, the following requirements shall be provided.

a) The minimum requirements within this section are intended to be applied from grade to concourse level. Due to physical constraints on platforms, solutions for vertical circulation between concourse and platform level shall comply with required LOS levels.

b) The entrance type and associated vertical circulation requirements may be relaxed where a dynamic pedestrian flow model demonstrates a level of service that meets or exceeds the requirements in DS-12 Pedestrian Flow Design Standard. Requirements shall be reviewed and approved by the owner of this standard.

4.6.10 Vertical Circulation Requirements

For Stations less than 11 metres deep from the entrance at grade to platform level, the following requirements shall apply:

4.6.10.1 Primary (Main) Entrance

a) The primary entrance shall have as many or more VCE options as any other entrance;

b) At a minimum, the following vertical circulation elements shall be provided at a Primary Entrance as part of an overall station VCE solution that balances the use of stairs, elevators and escalators based on vertical rise and the time required to clear the platform:

   i. 1 public stair

   ii. 2 escalators (paired, 1 up + 1 down);

   iii. a minimum of 1 elevator

c) A minimum of 2 elevators shall be provided at each Primary Entrance where;

   i. there is no accessible path of travel from the Primary Entrance to the Secondary Entrance;

   ii. the Secondary Entrance is not visible from the primary entrance of the Primary Entrance. Where demonstrated no possible, signage shall be provided to guide passengers from one entrance to another; and

iii. the Secondary Entrance is more than a walking distance of 200 metres from the Primary Entrance. For stations where the distance exceeds 200 metres, the designers shall submit justification for review and approval by the owner of this standard; or

iv. there is no secondary entrance.

d) Where more than one entrance is provided, entrances that serve as a connection between more than one mode of transit or transit agency shall be designed as a Primary Entrance.

4.6.10.2 Secondary Entrance

a) Where in scope, secondary entrances provide part of an overall projected pedestrian flow that balances use of stairs, elevators and escalators overall in the station and shall be based on vertical rise and the time required to clear the platform and at a minimum shall include:

i. 1 public stair;

ii. 2 escalators (1 up + 1 down);

1) Where space constraints exist, escalators may be substituted with elevators. Quantity and performance of elevators shall be subject to satisfactory operational redundancy and pedestrian flow LOS levels.

iii. 1 elevator

1) Elevator can be removed if all the following conditions are met:

a. the Primary Entrance has 2 elevators;

b. there is a clear accessible path of travel from the Secondary Entrance to the Primary Entrance

c. the Primary Entrance is visible from the Secondary Entrance

d. the Primary Entrance is less than 200 metres walking distance from Secondary Entrance.

b) A minimum of 2 elevators shall be provided at each Secondary Entrance where;

i. there is no accessible path of travel from the Secondary Entrance to the Primary Entrance;

ii. the Primary Entrance is not visible from the Secondary Entrance. Where demonstrated no possible, signage shall be provided to guide passengers from one entrance to another; and

iii. the Primary Entrance is more than a walking distance of 200 metres from the Secondary Entrance. For stations where the distance exceeds 200 metres, the designers shall submit justification for review and approval by the owner of this standard.

c) Vertical circulation elements to be determined as part of an overall projected pedestrian flow that balances use of stairs, elevators and escalators overall in the station and shall be based on vertical rise and the time required to clear the platform.

d) Where secondary entrances or tertiary entrances connect more than one mode of transit, escalators between different platform levels shall be provided in accordance with Primary Entrance requirements.

e) Where an 'all elevator' solution for a Secondary or Tertiary Entrance is proposed, refer to requirements under section 5.6.10

4.6.10.4 Tertiary Entrance or Convenience Access

a) VCE requirements shall be provided as part of an overall projected pedestrian flow that balances use of stairs, elevators and escalators overall in the station and shall be based on vertical rise and the time required to clear the platform.

4.6.11 Vertical Circulation Requirements: Deep Station Considerations

4.6.11.1 Deep Stations are where the station platform is greater than 11 metres below grade from street level to platform.

a) Vertical circulation for deep stations shall be commensurate with level of effort/height difference and be considered separately from minimum requirements for entrances. The balance between stairs, elevators and escalators shall be based on vertical rise and the time required to clear the platform.

b) At a minimum, the following vertical circulation elements shall be provided:

i. Primary Entrance:

1) 1 public stair

2) 3 escalators (1 up + 1 down + 1 reversible); Reversible escalator can be replaced with an elevator, subject to satisfactory operational redundancy and pedestrian flow LOS levels. To be coordinated with Reliability and Operations.

3) a minimum of 1 elevator

ii. Secondary Entrance:

1) 1 public stair

2) 2 escalators (1 up + 1 down);

3) a minimum of 1 elevator

iii. Tertiary Entrances:

1) Requirements as per Section 4.6.9.4

c) A minimum of 2 elevators shall be provided at each Primary Entrance where;

i. there is no accessible path of travel from the Primary Entrance to the Secondary Entrance;

ii. the Secondary Entrance is not visible from the primary entrance of the Primary Entrance. Where demonstrated no possible, signage shall be provided to guide passengers from one entrance to another; and

iii. the Secondary Entrance is more than a walking distance of 200 metres from the Primary Entrance. For stations where the distance exceeds 200 metres, the designers shall submit justification for review and approval by the owner of this standard; or

iv. there is no secondary entrance.

4.6.11.2 **For stations greater than 30 metres below grade from street level to platform:**

a) Where escalators are proven not feasible based on the stations vertical distance from grade to platform, alternative solutions such as 'all elevators' may be proposed for secondary entrances. Where 'all elevator' solutions are proposed, the following shall apply:

i. there is more than one entrance to the station.

ii. at least one entrance shall maintain the minimum vertical circulation requirements for a primary entrance.

iii. maintain a public stair with a minimum width of 2200mm.

1) Where the station vertical distance (grade to platform) is between 11m and 14m, up to 10% of passengers may be included in the access calculations but may be included in the egress calculations as demonstrated by pedestrian modelling and best practices.

2) For Station vertical distances greater than 15m, the stair shall not be included in the access calculations but may be included in the egress calculations.

3) Public stairs are not required to be provided at secondary entrances with vertical distances greater than 18m.

iv. LOS and other requirements for elevators including maximum queue space at elevators shall be the more stringent of the DS-12 Pedestrian Flow Standard, the DS-09, applicable codes and standards and the traffic flow predicted by the 'all elevator' solution;

v. Average wait times for elevators shall be no longer than 40 seconds during peak hour;

vi. Total round trip time per elevator, for an identified number of passengers, and a resulting average passengers/hour calculator shall be considered;

vii. Average trip time from entrance to concourse comparisons between escalator and elevator access shall be demonstrated reflecting an equal or greater than 50% customer travel time savings to platform by elevator;

viii. Calculations shall consider passenger movements of persons who have disabilities and passengers with impaired mobility (bags, strollers, luggage etc.) in terms of both speed of entry/exit and physical space requirements.

ix. Secondary entrances proposed as an 'all elevator' mechanical solution shall be demonstrated with a report provided to Metrolinx and shall:

1) include a pedestrian traffic analysis that identifies entrance-specific calculations (or modeling of the system) to ensure that the size and number of elevators provide acceptable level of performance in terms of handling capacity, average wait times and maximum queue size in line with industry best practices, and in compliance with DS-12.

2) demonstrate being advantageous as compared to a solution with escalators in terms of time savings and spatial considerations.

3) be based on peak projected ridership, station design and include entrance-specific calculations to determine the number of elevators to be included within the station paid zone as well as at concourse and platform levels;

4) ensure barrier-free redundant access during typical service disruptions, regular maintenance and known operational irregularities; This shall be established through numbers determined by dynamic pedestrian flow per DS-12 Pedestrian Flow Standard.

5) consider elevator and escalator availability based on current existing data, with a plan for major maintenance events;

6) allowance for future growth/ridership increase;

7) include a code analysis;

8) include a safety review according to Metrolinx safety risk analysis processes and procedures;

9) include consultation and approval of proposal from fire and emergency services.

4.7 PEDESTRIAN TUNNELS

4.7.1 Overview

Pedestrian Tunnels are a part of the transit network of barrier-free pedestrian circulation that is required to access subway platforms in various site and grade conditions. Pedestrian tunnels can connect pedestrians to other modes of transportation in a more direct and safe way, such as eliminating the crossing of other modes of transportation like bus loops or busy roadways. Pedestrian tunnels can provide community connection points on either side of the tracks or roadways or from adjacent developments.

Figure 4-47: Precedent image demonstrating a pedestrian tunnel. Pedestrian tunnel with LED light wall, King's Cross railway station, London N1, by Allies & Morrison Architects, Spiers & Major, The Light Lab, 2014. Image Courtesy © edk7/Flickr

4.7.2 Description

In addition to the pedestrian tunnel serving as a functional requirement to connect customers along their journey, travel distances shall be demonstrated to be minimized while creating a safe and inviting environment. Customers shall feel safe and comfortable in tunnels during peak activity periods as well as all other times of day. These requirements outline a system-wide approach for a consistent customer experience with special attention to tunnels that serve as passageways for multiple community functions in TOCs.

4.7.3 Design Requirements: Planning

a) Connections made with pedestrian tunnels shall follow the below hierarchy:

   i. Tunnels shall connect directly to the subway station unpaid fare zone.

   ii. Pedestrian tunnels shall connect directly to the paid fare zone.

b) Pedestrian tunnels connecting:

   i. directly to the paid fare zone shall include fare gates;

   ii. directly to a platform shall include fare gates where the runoff shall not overlap with the platform at the juncture point;

   iii. connecting directly to the subway station from community connection points or adjacent developments shall follow Metrolinx Third Party Entrance Connection Standards.

c) Pedestrian tunnel placement shall account for future site development in their placement and the potential for extension at a later date.

d) Knock out panels shall be provided where future connections are planned.

e) Public corridors and passageways shall provide a barrier free path of travel and comply with the DS-02 Universal Design Standard

f) Public corridors and passageways shall be sized to satisfy Level of Service required and meet or exceed the most stringent exiting requirements per the OBC and NFPA.

g) Minimum dimensions for pedestrian tunnels shall be 5000 millimetres minimum clear width and 3000 millimetres minimum clear height unless a larger dimension required based on Level of Service and the required egress capacity or is existing to remain. These dimensions are exclusive of finishes.

h) The widths of pedestrian tunnels shall be determined based on the Level of Service of a station and the pedestrian tunnels must provide the required egress capacity.

i) Passenger flow modeling shall be completed to ensure Level of Service criteria is met.

j) Where 90-degree corners and angled wall corners are proven unavoidable, convex mirror units shall be provided at directional changes.

4.7.4 Design Requirements: General

a) Pedestrian tunnels shall be designed to:

i. be compatible with CCTV requirements;

ii. prevent CCTV field view from being obscured by overhead signs;

iii. have a minimum slope of 0.5% towards the side gutters for drainage and a maximum slope as per the DS-02 Universal Design Standard;

iv. include side-gutters 40 millimetres deep by 80 millimetres wide with metal grating. Side-gutter shall have a minimum slope of 0.5% towards the drain;

v. not locate drains, pits or other obstructions at the bottom of stairs or in front of service doors and elevator doors;

vi. include pump rooms with pits.

b) Ensure dedicated access to sump pits and ensure sump pit access doors/covers are not located in public paths of travel.

c) Digital signage shall require both power and communications.

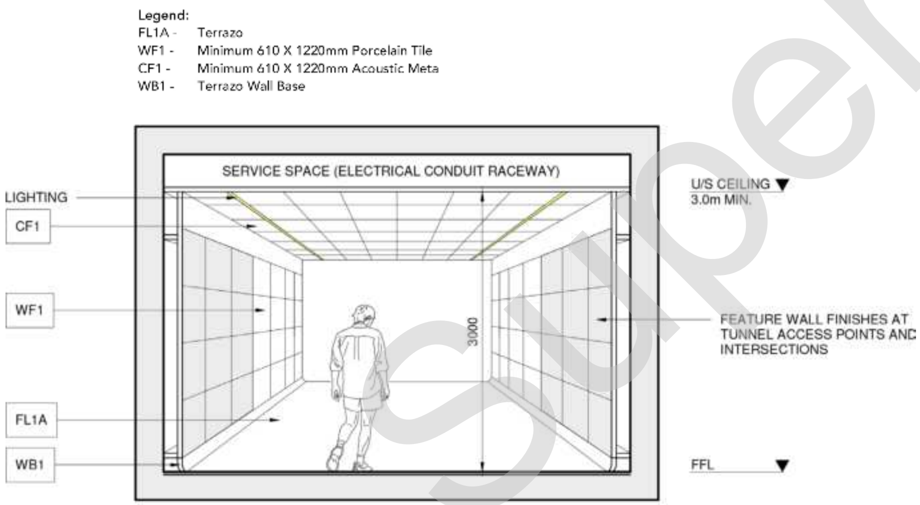


Figure 4-48: Pedestrian tunnel - Cross section

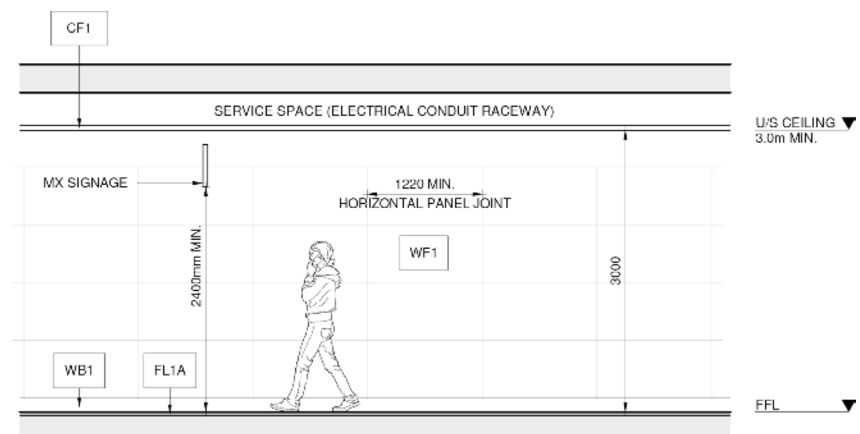


Figure 4-49: Pedestrian tunnel - Longitudinal section

4.7.5 Design Requirements: Servicing

a) ENT or PVC raceways shall be concealed and placed to feed boxes in the ceiling for mounting speakers, cameras, antennas (cell and WI-FI coverage), exit signs, fire alarm systems, digital signs, advertising and all electrical and IT elements.

b) Chases and cavities shall be coordinated, continuous, always concealed and not visible to customers.

c) The design shall include a method of mounting the raceways to the ceiling in a clean organized manner.

d) Location of raceways and crossovers shall be coordinated.

e) If the pedestrian tunnel is capable of being extended, the design shall include an easy way of extending the chases in the future.

f) The chase cavity:

   i. shall be continuous above door, stair and elevator openings as well as pedestrian tunnel interconnections.

   ii. covering shall be easily removable cover pans with similar material as the pedestrian tunnel flooring.

   iii. cover pans shall require a special tool to be removed and a covered opening to place the tool in to remove the pan.

   iv. below the floor shall be equipped with a drainage system.

g) Vertical chases (for raceways) shall remain concealed in pedestrian tunnel transitions to stairways and elevators.

h) The chase shall have pull, junction and receptacle boxes. There shall also be allowance for drivers and boxes.

i) Conduit and raceways shall be located in the ceiling and walls of the pedestrian tunnel.

j) Chases shall be provided for interconnection of raceways to the ceiling or wall space that the pedestrian tunnel is connecting to.

k) Power and communication raceways shall be separate and dedicated where they cannot be combined. Each raceway shall have at minimum a hand well or manhole feeding and/or exiting the pedestrian tunnel and at each 90-degree turn.

l) All concealed services shall be accessible for maintenance.

4.7.6 Design Requirements: Service Spaces

a) The tunnels shall include at a minimum: elevator machine rooms, pump rooms and (if not in an adjacent space such as the platform or other station building space) HUB rooms for electrical and communications distribution.

4.7.7 Design Requirements: Wall Requirements

a) Active walls, as defined in Section 4.10.3.2 General Walls, shall be provided along both sides of the pedestrian tunnel walls. This shall accommodate the depth of the digital signage and advertising (non-fare revenue zone) plus mounting space for services.

b) Photo-luminescent Strips shall be:

  i. provided along both sides of pedestrian tunnel walls;

  ii. integrated within wall panel system; and

  iii. installed continuously along entire length of pedestrian tunnel.

c) If water piping is required in the chase, it shall be located at the bottom of the cavity and easily accessible as defined in Section 4.10.3.2 General Walls.

4.7.8 Design Requirements: Finishes

a) Ceiling finish and integrated lighting shall be as per base materials identified in the Interior Finishes Schedule in Section 4.10 and Section 2.5 Lighting.

b) Floors shall include tactile guiding indicator in accordance with Section 2.3 and finished with base materials identified in the Interior Finishes Schedule in Section 4.10.

c) Walls of tunnels shall be clad with a tile wall system as b identified in the Interior Finishes Schedule in Section 4.10

4.7.9 Design Requirements: Mechanical

a) Potential obstructions, such as floor drains or clean-outs shall be located in a manner that is out of the customer path of travel.

b) Rooms to house sump pits and associated lifting equipment shall be provided.

c) Pedestrian tunnels shall have recessed, lockable hose bibbs every 30 meters or less along the length of the pedestrian tunnel.

d) Pedestrian tunnels, at a minimum, shall be passively ventilated.

e) Where pedestrian tunnels do not connect to the subway platform, mechanical ventilation shall be provided.

f) Air intake shafts / relief wells shall be provided to enable ventilation of the pedestrian tunnels.

g) Sanitary drainage shall be provided in tunnels in accordance with the relevant project specific requirements and is subject to coordination with the operator.

h) All piping shall be heat traced.

i) A CFD analysis shall be carried out to evaluate the impact of the piston effect of the subway train on the ventilation requirements for the corridor.

4.8 PEDESTRIAN BRIDGES

4.8.1 Overview

Pedestrian Bridges are a part of the network of barrier-free pedestrian circulation that is required to access subway platforms in various site and grade conditions. Bridges can provide community connection points on either side of the tracks or roadways, from one platform to another, or from an adjacent development. Bride overpasses are normally quite visible and can be successful as system, line, and station signifiers.

4.8.2 Description

In addition to the pedestrian bridge serving as a functional requirement to connect customers along their journey, travel distances shall be demonstrated to be minimized while creating a safe and inviting environment. The transparency of bridges allow access to natural daylight and views for an enhanced experience while aiding in orientation to the site. In addition, enclosed bridges help to protect the customer from the inclement weather and the elements.

4.8.3 Design Requirements: Planning

a) Connections made with pedestrian bridges shall follow the below hierarchy:

   i. Pedestrian bridges shall connect directly to the subway station unpaid transaction zone;

   ii. Pedestrian bridges shall connect directly to the paid fare zone.

b) Pedestrian bridges connecting:

   i. directly to the paid fare zone shall include fare gates;

   ii. directly to a platform shall include fare gates where the runoff shall not overlap with the platform at the juncture point;

   iii. connecting directly to the subway station from community connection points or adjacent developments shall follow Metrolinx Third Party Entrance Connection Standards.

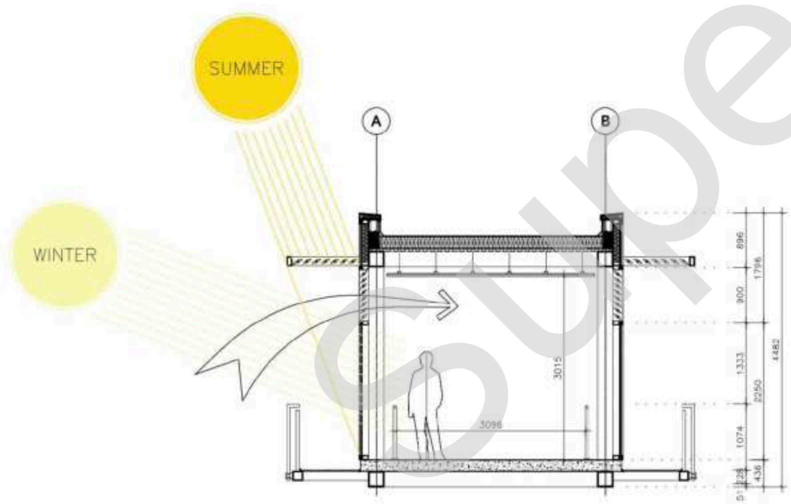


Figure 4-50: Pedestrian bridge section

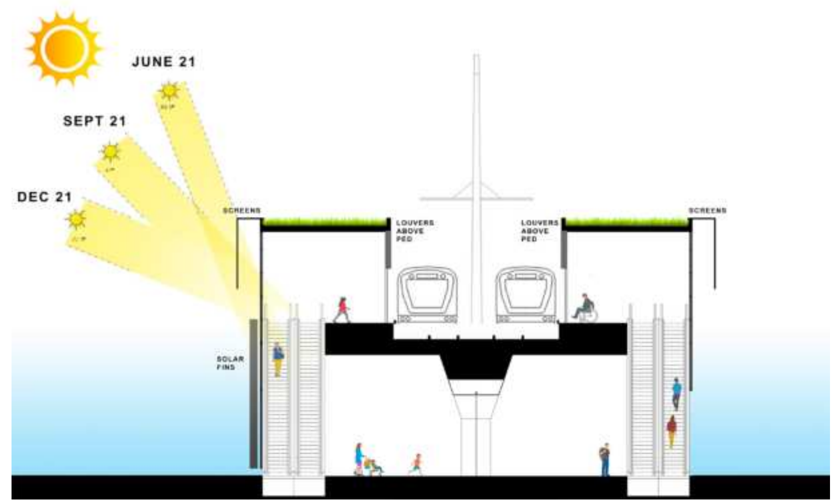


Figure 4-51: Elevated platform station typology - Sun study section

c) Placement of bridge supports, and spans shall account for future site and adjacent development in their placement.

d) Pedestrian bridge supports shall be placed to the side of development parcels and be consistent with setbacks of adjacent structures.

e) Pedestrian bridges shall be sited to demonstrably minimize their effect on mature vegetation in streetscapes and park settings.

f) 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.

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

h) 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.

i) Public corridors and passageways shall provide a barrier free path of travel and comply with the DS-02 Universal Design Standard.

j) Redundant barrier free access shall be provided to pedestrian bridges.

k) Bridge overpasses connecting platforms shall offer unobstructed interior barrier-free routes and turnaround spaces.

l) Public corridors and passageways shall be sized to satisfy Level of Service required and meet or exceed the most stringent exiting requirements per the OBC and NFPA.

m) Minimum dimensions for pedestrian bridges shall be 5000 millimetres minimum clear width and 3000 millimetres minimum clear height unless larger dimensions required based on Level of Service and the required egress capacity or is existing to remain. These dimensions are exclusive of finishes.

n) The widths of pedestrian bridges must be determined based on the Level of Service of a station and they must provide the required egress capacity.

o) Convex mirror units shall be provided at internal 90-degree corners and angled wall corners at directional changes.

p) Interior bridge corridors shall be free of overhead and protrusion hazards.

q) Building and rail services shall run concealed from passenger view and reach at pedestrian bridges.

Figure 4-52: Precedent image demonstrating a pedestrian bridge using ceramic frit as a shading strategy. Bridge in Vienna, Austria, by SOLID architecture. Image Courtesy Günter Kresser

4.8.4 Design Requirements: General

a) The architectural expression of bridges shall have a material and compositional relationship to the station building using the architectural kit of parts elements and materials. Refer to Figure 4-48 showing use of kit of parts shading element.

b) The pedestrian bridge element shall provide a consistent and familiar experience in as much as it will share design concepts, lighting strategies with other station elements.

c) Pedestrian bridges shall be glazed in order to take advantage of expansive views across the site. Glazing allows the bridge to benefit from natural lighting as well as creating a safer environment.

d) Transparent elements of the pedestrian bridge shall:

   i. use glazing elements from the kit of parts elements and materials that identifies the bridge as a transit element;

   ii. use frit patterns for shading and heat mitigation that relate to the frit patterns used on the station building.

e) The bridge screening elements shall relate to the design approach of the screening elements used in the architecture of the station building.

f) When incorporated in TOCs, the design may incorporate the architectural expression of adjacent development provided that elements ensure visual harmony/compatibility with the station architectural expression.

g) The design shall have minimal physical impact and be treated as a complementary and subtle background structure that shall be subject to Metrolinx review.

h) Drains and other services shall be integrated with massing and structure to eliminate visual clutter.

i) When visible in the public realm, bridges shall contribute and enhance the public realm.

j) The roof and underside of bridges shall be treated as facades of the bridge structure that shall be designed using the architectural kit of parts materials where they are prominent facades due to context. For example, viewed from above from a TOC development or from below in a public space.

k) Pedestrian bridges shall be enclosed and provide protection from the elements.

l) The design shall balance the use of transparent, semi-transparent, and opaque materials and address exposure to natural daylight, glare, heat gain/thermal loss, and views experienced in extreme summer and winter months.

m) The design shall utilize passive/natural means of ventilation where possible and/or feasible in order to reduce the maintenance, operational costs and operational carbon footprint of pedestrian bridges. If passive/natural means of ventilation are utilized, they shall be designed in a manner that prevents the intrusion of wind driven rain and snow.

n) Enclosed overpasses and stairs shall have windows/ skylights, including at the end points.

o) Maintenance access shall be provided around the bridge in the form of a catwalk or similar structure

p) For lighting requirements refer to Section 2.5 Lighting.

q) All architectural bridge elements that provide a ledge or horizontal surface shall be designed to reduce the need for bird mitigations to deter birds from rousting. Bird spikes shall not bed used as a design solution. Design of these elements shall be minimalistic and woven into the building details, including canopies, building screen near the sidewalk and signage.

r) Pedestrian bridges shall comply with Facilities Civil Engineering Standards.

4.8.5 Design Requirements: Finishes

a) Ceiling finish and integrated lighting shall be as per base materials identified in the Interior Finishes Schedule in Section 4.10 Materials and Finishes and Section 2.5 Lighting.

b) Floors shall include finished with base materials identified in the Interior Finishes Schedule in Section 4.10 Materials and Finishes.

c) Bridge enclosures shall be glazed and include appropriate shading to prevent and minimize heat gain and achieve customer comfort. Refer to Section 4.10 for materials kit of parts.

d) Handrails shall match profile and requirements of stair handrails. Refer to Section 4.6 Vertical Circulation.

e) Where handrails incorporate lighting, attention shall be paid to glare projection to lower levels. Refer to Section 4.6 Vertical Circulation.

4.8.6 Design Requirements: Services

a) Concealed in ceiling – Power and Communications, lighting, drains

4.9 RAIL CORRIDOR ARCHITECTURE ELEMENTS

4.9.1 Overview

The rail corridor that connects the various stations, can be found below grade, at grade, and elevated above grade. This section will focus on the architectural elements for at-grade and elevated conditions, with the goal of outlining requirements to ensure minimum impacts on the surrounding neighbourhoods, while seeking opportunities that create synergies that enhance the local community and overall experience.

There are several key architectural infrastructure components found within the rail corridor exposed to local communities. They include:

a) Rail Bridges and Elevated Guideways

b) Catenary/Overhead Contact System

c) TPSS and Large Ancillary Structures

d) Tunnel Ventilation Shafts

Aesthetics, access to daylight and views, safety, lighting, landscaping, acoustics, are just some of the elements that have a significant impact on people and communities, where design has a direct relationship on the desired outcome specific to rail corridors. Architecture, Civil, Urban planning, Landscape design, are all integral to creating a holistic solution that enhances local community.

For all public realm elements found within the rail corridor, refer to Section 3.0 Public Realm.

4.9.2 Rail Bridges and Elevated Guideway

4.9.2.1 Customer Experience: Holistic Approach

The operation of a rapid transit system on an elevated guideway creates a significant urban impact primarily due to the physical presence of the guideway structure and its supporting piers. Minimizing the massiveness of the guideway and consideration of its aesthetic features, therefore, is a significant design requirement and a necessary factor in obtaining community acceptance. Rail bridges and elevated guideways when properly integrated within the public realm, can create a safe, durable, non-intrusive, multi-model space for the local community at a neighborhood scale. They also have the opportunity to be designed to minimize their impact on the surrounding community, while creating synergies that enhance and local community the overall experience.

4.9.2.2 Description

Rail bridges and elevated guideways including support columns throughout the railway corridors, are an integral element required in all new above grade conditions. While the various components serve a primary function, they shall be designed as a uniform consistent kit of parts across the transit line, while promoting a progressive, modern, sleek look and feel that is synonymous with the overall Subway network.

4.9.2.3 Design Requirements

a) The design approach shall

   i. demonstrably minimize impact of the structure on the surrounding area;

   ii. be designed to be simple structures that demonstrate minimal visual impact on surrounding development and public streets;

   iii. have horizonal structural elements that are designed to be a continuous linear form and eliminate abrupt transitions between sections.

b) The width of the guideway shall follow minimum clearance requirements.

c) For double-track configurations, a gap may be provided between guideways to limit shade effects at grade by permitting light passage between the guideways.

Figures 4-53 to 4-54: Precedent images demonstrating minimizing the impact of an elevated guideway in the public realm through tapering of elements, continuity of horizontal lines, concealing of clutter, an maximizing slope of guideway at portals to demonstrably minimize obstructions at grade. Valley Line LRT, Edmonton, Alberta, by Dialog.

d) Tapered, sloping members and curved forms shall be used to produce a softening shadow effect and to create a more slender appearance of the overall mass and depth of the guideway especially where acoustic side walls are required in addition to the structural member.

e) The guideway shall taper and slope upwards from the centre towards the outer edges for a minimized visual impact.

f) The support columns size shall be as slender and visually unobtrusive as the proven minimum allowed by structure.

g) The form and profile of the support columns shall be rounded and tapered where structurally permitted to minimize visual presence.

h) The support column, pier cross head and underside of the elevated guideway shall be the same material and transitions between forms shall be continuous and not abrupt.

i) The pier cross head shall be integrated with the guideway structure and there shall be no visible transition material between the support column, cross head and the underside of the elevated guideway.

j) The pier cross head shall be incorporated within the depth of the girders and not below the girders to minimize the overall depth of the guideway. Girder depth shall be the proven minimum allowed by structure.

k) Prestressing and post-tensioning anchor blocks shall receive architectural finish treatment in exposed locations.

l) Box-outs or other items which would detract from the overall appearance of the exposed guideway shall be placed out of view.

m) Visual clutter shall be reduced by:

   i. maximum spans between columns, with spacing as far apart as proven technically feasible while still maintaining more or less equal spacing along the guideway;

   ii. limiting the number of visible components that comprise these systems;

   iii. grouping, recessing and concealing from view smaller service elements including utility lines and drainage pipes;

   iv. concealing construction joints through recessing;

   v. attaching communication and signaling cables to the inside face of sidewalls.

n) Access for maintenance and inspections shall be provided to concealed services.

o) Refer to Section 2.5 – Lighting for requirements around guideways.

p) Railings and guards on the guideway when emerging above grade shall be:

   i. transparent and unadorned;

   ii. neutral in colour so as to blend with the material tone and colour of the guideway;

   iii. fabricated from steel and suitable for outdoor use.

q) The height of the guideway shall allow for clear views at grade.

r) The slope of the guideway shall be the maximum technically allowable at portals to reduce the length of portal retaining walls and obstructed views at grade.

4.9.3 Catenary / Overhead Contact System (OCS)

4.9.3.1 Aesthetics

The OCS infrastructure has a direct impact for both the transit customer and the communities that the system traverses through. The location and number of OCS poles are critical to the overall visual impact along the guideway, elevated guideway, grade separations and through portals. In addition to the impact of the poles and wires, there may be additional infrastructure attached to these poles that will need to be accounted for as part of the design, such as antenna's and conduit.

4.9.3.2 Description

Where required, the Catenary / Overhead Contact System (OCS) is an integral overhead power distribution system for train propulsion by the use of a continuous element stretching along all sections of the guideway.

4.9.3.3 Design Requirements

a) OCS support poles and associated elements shall be simplified and lessen the visual impact of the power cable system, antennas, conduit and any additional infrastructure fixed to the pole.

b) OCS support poles and associated elements shall be a symmetrical design for messenger and contact wires where the pole is center running.

c) Where OCS support poles are used, they shall be:

   i. spaced as far apart as proven technically feasible (typically 50 - 60m);

   ii. maintain more or less equal spacing along the guideway.

d) Where located on platforms, OCS poles shall be located so as not to impede pedestrian flow.

e) Where OCS support poles are located on platforms, the pole base shall provide a minimum 50% colour contrast with the floor surface.

f) The support poles for all new guideways shall be designed:

   i. with a clean uncluttered profile;

   ii. to be as slender and visually unobtrusive as proven technically feasible;

   iii. to be tapered to reduce visual impact;

   iv. to incorporate cover plates as well as any other opportunities to conceal the number of components that comprise these systems in order to reduce visual clutter;

g) The look and feel of the support poles shall align with the specifications for the light standards found 3.4.5 Light standards (Public Realm Lighting Atmosphere) within Section 3.0 - Public Realm to distinguish this system element as a consistent part of the system wide network.

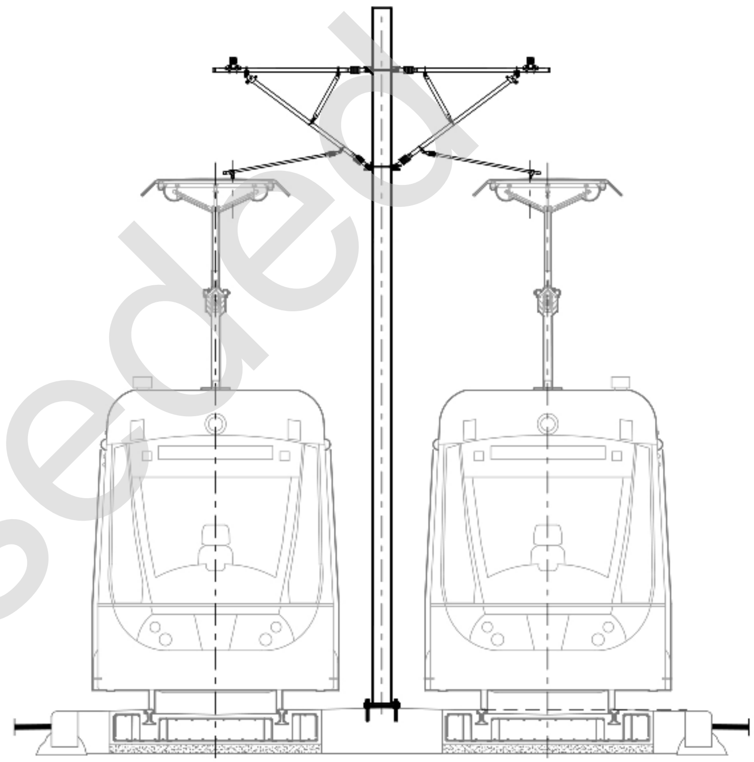


Figure 4-55: Precedent image demonstrating minimizing the visual impact of an OCS in the public realm through tapering of elements, symmetrical design, and concealing of clutter. Drawing: typical centre pole catenary typology, by Mosaic Transit Group.

4.9.4 Traction Power Substation (TPS) and Large Ancillary Structures

4.9.4.1 Overview

While ancillary structures are essential across any transit network, a design strategy is required to aim at minimizing the visual impact to local communities and harmonizing with the Urban Realm.

4.9.4.2 Description

Traction Power Substations (TPS) and large ancillary structures are required infrastructure components that allow for the safe and functional operations of any transit network. TPSs are large, stand-alone ancillary buildings without public function or public access, frequently surrounded by a landscaped security buffer with required service vehicle access and short-term parking. These facilities shall be designed not to call undue attention to themselves and maintain the architectural design language of the line and the system in an understated way. Minimizing structure size, visual impact, noise from equipment within, is required in all cases. Structures shall be designed to be robust and enduring, while designed as a consistent architectural language from the kit of parts employed across the transit line.

4.9.4.3 Planning Requirements

a) TPSs shall be integrated with station facilities such as ventilation shafts, emergency exit buildings or entrances where space permits to reduce property take and neighbourhood impact.

b) Where a TPS must front on a main street, the building shall be sited perpendicular with the smallest face to the street to reduce impact and minimize the frontage on the street.

c) For cases where a site is adjacent to a surrounding natural area or open public amenity space the TPS may be located parallel to the street to reduce impact to public amenity space.

d) TPSs shall have access from front and rear where located along a main street to integrate the TPS consistently and in line with adjacent development allowing for a continuous street wall.

e) TPS related parking shall be provided to the rear of the TPS with access via a rear lane or side street.

f) Where located in a main street setting or a street with consistent setback characteristics, site the TPS to reinforce adjacent development general setback characteristics and integrate it with adjacent building scale and surrounding context.

g) TPS and large ancillary structures shall be designed to allow for easy removal or replacement of equipment, such as with a crane.

h) The TPS shall be integrated with the urban fabric and be compatible with the surrounding neighbourhood through study of building proportions and the use of similar massing to the context in which it sits.

i) Where TPS are not integrated with other structures, they shall be located to minimize visual impact and using smaller single-story configurations.

j) Enclose TPS internal elements on all four sides with access only from within the TPS.

k) TPS shall be configured to reduce the number of components, such as doors and air conditioning units, along the public face.

l) Where fencing is deemed required, it shall be in conformance with the requirements outlined in Section 3.0. TPS designs shall demonstrate how the amount of the fencing is kept to a minimum.

m) TPS and ancillary structures shall be sited to demonstrate a minimum surface development footprint.

n) The design and placement of the TPS and ancillary structures shall conform with CPTED design principles.

4.9.4.4 Approach to Architectural Expression

The design requirements in this document shall ensure a consistency of brand experience across the subway stations and ancillary structures related to supporting and maintaining a transit network. The approach to architectural expression shall use the same kit of parts approach and material palette that is used for the station buildings. The goal is to provide a building design that has a simple, clutter-free presence with cleanly designed, low maintenance surfaces. The overall massing and proportion of these building types is largely dependent on their function. Material location, texture, colour and transparency, lighting, third party artwork and signage can be employed to design a site-specific response to the local development character.

a) The approach to architectural expression for TPSs and large ancillary structures shall follow the requirements in Section 4.2.9.1 General Design Requirements.

b) The building design cladding shall incorporate CL2 precast concrete panels together with ES1 perforated metal panels. These panels shall be the heights of the structure and cover the roof. In cases where an alternate material may be better suited to the context, materials other than CL2 and ES1 may be used, and they shall meet material finish criteria in Section 4.10.4. Alternate material choices shall be reviewed and approved by the owner of this standard.

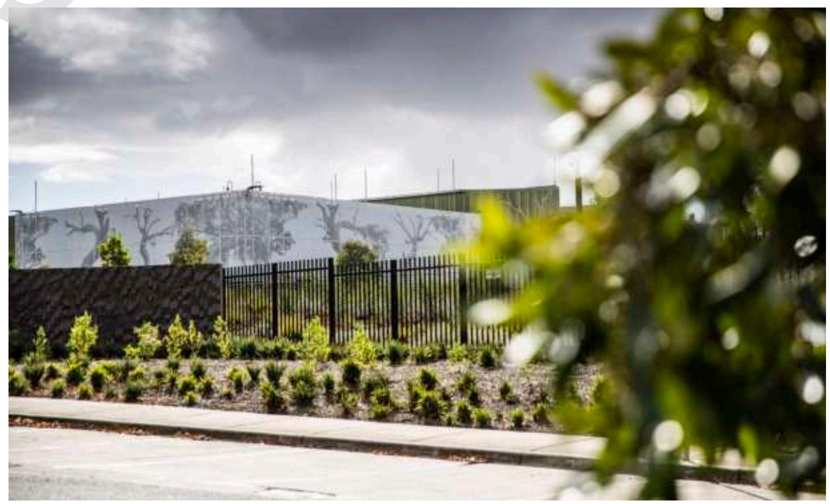
c) The perforated metal shall be used in a creative way to contribute to its surroundings by patterning of perforations, or printing of imagery on the perforated screen.

d) If adjacent to significant buildings or structures, TPSs and large ancillary structures shall reflect the design language and rhythm of its context using the kit of parts materials noted in Section 4.10.

e) TPSs and large ancillary structures shall have roof lines that are compatible with a modular, rectilinear approach to massing. Roofs shall not be peaked.

f) Cladding or screening of the TPS shall be secure, climb-proof, cut-proof, and vandal-proof.

g) Rooftop equipment shall be carefully screened and consolidated to simplify the aesthetic of the roof as seen from above.



Figures 4-56 to 4-57: Precedent images demonstrating metal screen as a facade for an industrial building application such as a traction power substation (TPS). Brunswick Power Terminal Station, Brunswick East, Australia by Beca.

4.9.5 Tunnel Ventilation Shafts

4.9.5.1 Aesthetics and Unwanted Noise

Tunnel Ventilation Shafts and their proximity to the general public shall be accounted for during the planning stages. Sound generated along with exhaust of air can negatively impact a customer's experience. Minimizing the visual, physical, audible and exhaust impact to the local community is paramount. Where vents must be placed in the public realm, they become an opportunity to enhance and contribute to their surroundings. See Section 3.0 Public Realm. When adjacent to or enveloped by a TOC development, coordination is required between developers and the design project team to establish and review the design criteria.

4.9.5.2 Overview

Tunnel ventilation shafts play an important role in the supporting infrastructure for any transit line. Subway Ventilation System (SVS) is a general term to define subway ventilation fans, dampers, vent shafts, ductwork and associated controls including electrical power distribution network. The SVS provides a comfortable environment for customers, ventilation during tunnel maintenance operations, and controls the movement of smoke during an emergency.

4.9.5.3 Design Requirements

a) Ventilation shafts shall terminate in the following locations in order of priority:

   i. open space areas above grade;

   ii. elevated median strips of divided highways.

b) Vent and mechanical functions like exhaust fans shall not be located where adjacent development could reasonably be anticipated.

c) Vent shafts shall be:

   i. consolidated to minimize effects on existing or future development;

   ii. placed in areas that do not adversely impact the appearance of the public realm.

d) Once consolidated, shifts of vent shafts both perpendicular and parallel to the box may assist in minimizing vent shaft effects at-grade, either concealed in or integrated with entrances.

e) For vent shafts consolidated with station building components and visible on the building facade they shall:

   i. be integrated in a manner that masks the ventilation with coordinated architectural treatments;

   ii. be screened by architectural grade mechanical louvers (LV);

iii. include screening in front of the mechanical louvres that unifies them into the overall architectural expression using perforated metal screening (ES1) from the architectural kit of parts provided the openings in the perforated metal panels allow for the required airflow of louvers enclosing equipment being screened;

iv. have perforated metal panel screening (ES1) that blends with and matches adjacent finishes and is consistent in sizing with the overall modular dimensions of surrounding facade elements.

f) Stand-alone ventilation shafts shall be:

i. designed as simple geometric forms that contribute to their context;

ii. use finishes from the kit-of-parts material palette including perforated metal screening (ES1) to create a facade that is on par with or exceeding adjacent buildings, structures, and community context.

g) The Subway Ventilation System (SVS) shall be used to refer to all ventilation fans, ductwork distribution, ductwork accessories and controls systems/equipment associated with the ventilation of the subway tunnels and subway corridor.

h) Fan locations shall be determined by system wide analysis and station emergency analysis.

i) Fan rooms dimensions and layout shall provide space to remove and disassemble fan assemblies for purposes of fan motor, fan hub and fan blades replacements, and other fan room equipment in line with manufacturer, operator and maintenance needs.

j) Design documentation shall fully identify the path, means and methods to deliver, remove and replace the Subway Ventilation System equipment and components for installation and replacement.

k) The elevation of ventilation shaft terminations shall be a minimum of 150 millimetres higher than the surrounding grade level (and 1000 millimetres wherever the minimum is not proven practical or possible) to exclude surface run-off drainage into the shaft.

l) Where gratings and louvers are accessible to the public, they shall be of a high security, heavy duty, tamper-proof design.

m) Shaft termination louvers shall have free area percentage of not less than 50%.

n) When located on a barrier free path of travel in accordance with OBC, shaft grating space profile openings shall not be greater than 13 millimetres perpendicular to the principal direction of travel.

o) When not located on a barrier free path of travel in accordance with OBC, shaft grating space profile openings shall not be greater than 19 millimetres perpendicular to the principal direction of travel, and shaft termination gratings shall have free area percentage of not less than 75%.

p) When located in sidewalks, the shaft grating shall not occupy more than 40% of the available sidewalk width. Sidewalk locations shall be a last resort and are allowable to be located in sidewalks only upon the approval of Metrolinx.

Note: Technical requirements related to sizing and location are not detailed in this document.

4.9.6 Maintenance and Storage Facilities

4.9.6.1 Overview

Maintenance Storage Facilities (MSF) are large industrial-use facilities with unique site-specific conditions. While not a publicly accessible facility, the MSF will remain visible and shall be designed to reflect the surrounding urban context while harmonizing with the civic environment of the specific project location. The exterior architectural language, including the roof design, shall be equally treated especially when located in close proximity to tall buildings or major highways. The MSF building includes four major occupancy classifications which shall all be integrated in one building for improved function and efficiency of the facility operation. Office buildings shall be designed to harmonize with the local architectural and public realm environment, where material selection, proportion, and composition of the design shall be addressed in the design.

Below are some examples of MSF functions:

a) vehicle maintenance and repair areas;

b) maintenance of way areas;

c) yard control facility areas;

d) operating personnel facilities.

Building massing and visual identity of this large facility shall address two primary aspects:

e) seen from the primary site access with the building's main address, whereby employees as well as service vehicles access the site;

f) seen from above and adjacent surrounding areas.

The functional diagram for the facility shall be a clear response to site conditions and largely informed by track layout and functional imperatives. The architectural concept shall be clear, rigorously applied and celebrate the sense of scale with an architectural gesture that responds to its surroundings and the function of the building. The public face of the MSF shall be welcoming, with service elements, such as delivery, loading and garbage collection docks, consolidated and hidden from street view by a combination of building components and/or landscape treatment and screening. The employee entrance may be shared with the public entrance or be situated in close proximity to employee amenities such as parking or outdoor break areas. A public outdoor amenity space or courtyard for employees will delineate the main entrance area. It shall incorporate both hard and soft landscape elements and connect the inside and outside. All aspects of the MSF will require careful coordination.

Figure 4-58: Precedent image demonstrating the use of opaque wall system cladding in a modular fashion for a larger maintenance storage facility (MSF) including an approach for ample natural light. TTC Roncesvalles Carhouse, Toronto, by Strasman Architects Inc.

4.9.6.2 Design Requirements

a) Exterior cladding material shall be designed as modular kit of parts and shall be easily installed and continuous across all MSFs. Material is required to be durable, low maintenance, resistant to vandalism, and retain an anti-graffiti coating. Refer to Section 4.10 Finishes and Materials.

b) Acceptable exterior cladding materials include pre-cast concrete, and metal panels based on durability and appearance to minimize maintenance.

c) Employ multiple strategies to incorporate daylight into all employee working spaces. The following strategies shall be employed:

   i. windows and sections of curtain wall;

   ii. transom and clerestory glazing;

   iii. glazing within garage doors and large vehicle doors;

   iv. refer to Figure 4-55.

d) Glazing shall consist of double glazed insulating glass units that are IGMAC certified.

e) Skylights shall be provided as an alternative where vertical glazing is proven to be not possible due to site-specific constraints.

f) All fencing, barriers, retaining walls shall not allow for access to roof.

g) All roof ladders shall either be located internally or where positioned externally, be screened in and lockable.

h) Color palette and modularity shall match line identity as outlined in this design standard.

i) For all information pertaining to sustainability and LEED requirements, refer to Appendix D for LEED requirements for MSF building.

j) Rooftop mechanical units shall be carefully screened and consolidated to simplify the aesthetic of the roof as seen from above.

4.10 MATERIALS AND FINISHES

Note: Section to be read in conjunction with:

DS-02 Universal Design Standard

Section 4.0 Architecture

Table 4-2: Exterior Finishes and Materials Schedule;

Table 4-3: Interior Finishes and Materials Schedule;

Figure 4-57: Finishes Palette

DS-05 Sustainable Design Standard

DS-24 Material and Finishes Design Standard

4.10.1 Material and Finish Design Strategy

Exterior and interior architectural finishes and materials along the customer journey contribute significantly towards the customer experience.

The finishes strategy is organized into two distinct layers, including a consistent and a variable approach. General finishes shall be presented as a minimalistic, neutral, and formalized background, where colour, pattern, and texture are consistent within the station environment and along the customer journey. Feature elements including walls and ceilings are variable and shall differentiate between stations. These elements shall be strategically allocated and shall function to support the customer in more than one way such as creating identity, aiding in wayfinding, providing environmental comfort, and/or provide visual interest through colour, texture, contrast, and pattern.

Refer to Table 4-2: Exterior Finishes and Materials Schedule; Table 4-3: Interior Finishes and Materials Schedule, and Figure 4-57: Finishes Palette.

Feature walls and ceilings shall be provided as variable design elements both within and across the subway line, providing unique identity and differentiation. In order for these elements to have the greatest impact and support the customer experience, this unique element is required to function in multiple ways to demonstrate maximum proven value and benefit. The feature walls support intuitive wayfinding in two ways: they draw a customer to vertical circulation points and, at platform level, they provide a visual cue (beyond the station name) to customers on the train where they are along the line.

Note: The materials and finishes outlined in this document present a kit of parts for a consistent experience for transit customers. In some cases, the Project Agreement (PA) may suggest alternate materials and finishes. In scenarios such as where adjacency to heritage structure occurs, another material may be more appropriate. As such, where an alternate material or finish is proposed, the material or finish shall meet the performance requirements of the material that is being replaced according to requirements included in this document. All alternate materials and finishes shall be reviewed and are subject to Metrolinx approval.

The following strategy informs the design direction to be implemented, with the goal of providing a long term, durable and sustainable solution, while continually enhancing the customer experience.

a) Overall design strategy shall represent finishes that create a coherent design direction that is organized, providing the customer with a sense of order, comfort, and security.

b) Design expression shall carry a consistent architectural expression of materials for familiarity, while allowing opportunities for variable expression in strategic locations to allow for differentiation across stations.

c) Material palette shall consist of a limited variety of high-quality, robust, sustainable, and recyclable materials, scaled in proportion to the environment.

d) Materiality strategy shall be modular, adaptable, and repeatable while following a kit of parts approach with simple installation methodologies.

e) Detailing shall be minimalistic and consistent and shall be carefully resolved at material intersections, connections and transitions.

f) Durable finishes and materials shall be resistant to vandalism through the provision of tamper-proof design, including graffiti-proof, easy-to-clean surfaces.

g) Materials shall require demonstrated minimal maintenance and shall be easily repaired on site or replaced.

h) Use of colour, texture, pattern, and graphics as it relates to materials shall be implemented that either reflect local context, support intuitive wayfinding, and/or highlight key decision-making points.

i) Materials used shall be integral and homogeneous throughout. Materials with applied coatings that can be easily scratched shall be prevented from being specified.

j) Material and finish lifecycle costs and ease of operations and maintenance shall be accounted for.

k) In conditions where new station walls/facades/roofs adjoin adjacent existing buildings, materials between existing and new construction shall be delineated with the intent to break the plane of finishes using a continuous vertical reveal 100 millimetres in width and 100 millimetres deep.

l) All wall and ceiling finishes shall be non-glare and shall not exceed 25 Unified Glare Rate (UGRL) as per DS-02 Universal Design Standard.

m) All other door requirements including clear opening dimensions, contrast, distraction patterns on glass, opening force, shall follow requirements outlined as per DS-02 Universal Design Standard.

n) Any natural materials being incorporated for feature walls and/or ceilings, shall:

  i. be a through and through natural consistent material void of any synthetic binders;

  ii. be resistant to moisture absorption, and shall meet required absorption rates specific to the material;

  iii. not shrink, expand, or warp due to fluctuations in moisture content and temperature such that elements do not warp, expand, or contract in any direction more than 1 millimetre over 10 metres in length;

  iv. be flame retardant and meet minimum smoke generation requirements;

  v. be resistant to fading due to exposure to UV rays; and

  vi. shall be presented to Metrolinx for review and approval.

o) Materials shall be non-combustible, with the exception of acoustic backing material which shall be fire-rated.

p) Materials shall meet moisture absorption ratings where water absorption is to meet the following requirement: (ASTM C373): 0.3%,

q) Provide exterior finish materials with freeze/thaw resistance performance rating to achieve minimum 30 year lifespan.

r) Perforations:

  i. The maximum perforation size in acoustic feature elements is: 100 millimeters;

  ii. The minimum perforation size in acoustic feature elements is: 3.175 millimeters (1/8”); and

  iii. Shall achieve a minimum 20% open area.

s) To demonstrate minimum potential for “oil canning” and “dished” panels, maximum deflection of panels measured normal to the panel surface after application and removal of the design loads, must not exceed L/800 of distance between supported edges of panel or distance between stiffeners where stiffeners are used. Stiffeners, where used, shall not deflect more than L/180 of span under load.

t) Protect surfaces subject to graffiti with a sacrificial and non-sacrificial type scratch and graffiti-resistant coating. Apply all coatings full height of all public-facing walls, from grade to 2500 millimetres high, including retaining walls. Coatings to be colourless and there shall be no appreciable colour difference to the coated surface when compared to non-coated surface.

u) All interior stainless steel, such as handrails, door hardware, shall be Grade 304.

v) All exterior stainless steel such as handrails, door hardware, shall be 316 Grade. Galvanized metal shall not be permitted.

w) Provide public area floor, wall, ceiling and stair finish materials with moisture absorption ratings where water absorption is to meet the following requirement: (ASTM C373): 0.3%.

x) Provide exterior finish materials with freeze/thaw resistance performance rating to achieve minimum 30 year lifespan.

y) Provide protective coating films or insulating membranes where potential for electro-chemical corrosion between metals occurs, for example:

   i. Aluminum to stainless steel, brass, bronze,copper;

   ii. Stainless steel to brass, bronze, copper zinc;

   iii. Metals to concrete.

z) Shrinkage Resistance

   i. Design station elements to accommodate the following requirements without producing detrimental effects:

   ii. Average daily maximum and minimum temperatures.

   iii. Cyclic minimum 40 degree Celsius daily thermal swing excluding direct exposure to sunlight.

   iv. Cyclic, dynamic loading and release of loads such as wind loads.

4.10.2 Floors

a) All floors located in public facing interior areas shall be a consistent element throughout all zones within the station, and across the subway network. This would include the unpaid transaction zone, paid access zone, stairs, platform, passenger tunnels, pedestrian bridges, washrooms and all interior waiting areas.

b) Size, colour, texture and pattern shall be consistent, where colour shall be neutral and shall contrast with vertical wall surfaces. For required contrast levels refer to DS-02 Universal Design Standards.

c) Materials to be accounted for include high performance porcelain tile or poured terrazzo selected for their long term durability, easy maintenance, quality, thru and thru consistency, and slip resistance.

d) Interior Floor Tile and Base (FL1B)

   i. Exterior base for all other buildings (EEB's, MSF's, Ancillary): Concrete base with clear sealer.

   ii. Construct build-up of 150 millimetres high terrazzo base to receive balustrades that occur at stair and escalator openings.

e) Terrazzo or tile flooring shall be provided in all high occupancy areas. Flooring shall be designed and installed in the form of a modular rectangular grid to allow for isolated repair / replacement / maintenance while allowing for greater flexibility and reduced impact on customer inconvenience.

f) Highly patterned walking surfaces shall be prevented.

g) Joints shall be coordinated with structural grids and thresholds.

h) Floors shall be flush with exterior surroundings across door openings to create a visually continuous surface.

i) Maximum slopes shall conform to DS-02 Universal Design Standard.

j) Flooring shall be dry, ice free, and well drained.

k) Tactile Walking Surface Indicators (TWSI) including both attention indicators and guiding indicators shall be designed to be integrated and conform to the DS-02 Universal Design Standard requirements for configuration and location and shall be included as part of the overall provision for sensory information within the transit environment.

4.10.3 Walls

a) Most wall surfaces located in public facing interior areas shall be a consistent element throughout all zones within the station and across the subway network. This would include the unpaid transaction zone, paid access zone, stairs, platform, passenger tunnels, and all interior waiting areas.

b) Size, colour, texture and pattern shall be consistent, where pattern shall be stacked and colour shall be neutral and shall contrast with horizontal surfaces. For required contrast levels refer to DS-02 Universal Design Standards.

c) Materials shall be a high-performance rectangular porcelain tile mounted to a wall frame system selected for its durability, flexibility, easy maintenance, quality, colour fastness, and thru and thru consistency.

d) Newly constructed public facing wall partitions shall be constructed as either an active or passive partition assembly. All active wall assemblies shall be constructed using an integrated wall frame system, designed as a wall cavity to be built out from the structural wall a minimum of 250 millimetres deep to accommodate where the following infrastructure/services are located, including but not limited to: signage, mechanical, electrical, and data infrastructure, fire extinguisher cabinets, fire hose cabinets, and digital advertising screens. Modular wall tile panels shall be designed to be removeable by maintenance personnel only, where access for servicing/maintenance purposes is required within wall cavity. Wall panels shall not be easily removed by the public and all fasteners shall be concealed and be tamperproof. All integrated wall elements shall be recessed and made flush with face of wall plane finish with no voids or gaps. All passive partition assemblies shall be designed without a wall cavity in areas where infrastructure, or access to infrastructure behind wall is not required. Attachment of any items to face of either wall system shall not be allowed. Any exceptions shall be presented to the owner of this standard for review and approval.

e) Wall datums - Finishes shall be aligned with the following horizontal datums above finished floor: 150 millimeter base tile; standard door frame height; 2300 millimeter to underside of signage; allow for 450 millimeter signage band/information above 2300 millimeter. Other datums for alignment include horizontal datums at glass panels within curtain wall assembly.

f) Where wall access panels are required in wall assemblies other than active wall tile assemblies, they shall be concealed from view and shall match the colour of adjacent wall finish material colour.

g) All wall mounted safety related equipment, including, but not limited to, Fire Hose Cabinets (FHC), shall be integrated flush into wall assemblies and shall be installed to align with horizontal/vertical wall tile reveal datums. Where an FHC is not technically feasible to be integrated into a wall assembly, standalone floor mounted FHCs are permissible and shall not obstruct path of travel and shall be encased on all sides with a stainless steel shroud where overall dimensions are minimized to prevent impeding CPTED.

h) Wall bases shall be provided at 150 millimetres up from the finished floor; Electrical boxes and other wall-mounted equipment shall not project into this base; The bases of floor-anchored equipment shall be continuous, matching adjacent wall base details; Thresholds shall be flush with the finished floor;

i) Structural columns shall be clad with finish as per Figure 5-3 Interior Finishes and Materials Schedule. Column cladding to conceal all downspouts and exposed conduit and infrastructure.

j) Tunnel walls shall be porcelain tile wall system as per Figure 4-3 Interior Finishes and Materials Schedule.

k) Large surfaces areas such as wall, floors, columns and furniture shall achieve LRV points difference with their surrounding surfaces as per DS-02 Universal Design Standard.

l) Acoustic materials such as perforated acoustic panels to be installed above 2500 millimetres.

4.10.4 Ceilings

a) Ceiling finish shall be durable to resist potential impact where ceilings and suspended elements are within 3000 millimetres reach of passengers carrying large packages or long objects.

b) All ceiling access panels shall be concealed and colour of access panel shall match adjacent finish material colour of surroundings.

c) All ceiling mounted elements including mechanical diffusers, lighting, speakers, CCTV cameras, etc. shall be integrated within ceiling plane where elements are organized in a modular and consistent arrangement and align within ceiling grid.

d) All ceiling tile at platform level to be secured/clipped in place to meet 2kpa pulse created when train/vehicle approaches/departs station.

4.10.5 Feature Walls and Feature Elements

a) Feature walls comprise of station-specific colours, and at platform level shall also contain a graphic element that may be distinct or consistent from station to station.

b) The following are required functions of feature walls and feature elements:

   i. Provide a unique and recognizable station identifier;

   ii. Provide architectural expression that provides visual interest and/or contrast with base walls/ceiling/floors;

iii. Be located such that it provides physical cues that support intuitive wayfinding along the journey from entrance to platform and vice versa;

iv. Where applicable, feature elements shall provide additional functions:

1) solar screening when located on the exterior,

2) acoustic attenuation within the station.

4.10.5.1 Feature Walls and Feature Elements: Guidance

a) Colours shall appear inviting and welcoming.

b) Station-specific colours shall not repeat along the line. No two adjacent stations shall have the same colour tone in varying shades.

c) All feature wall materials shall meet all overall general requirements outlined in this section including 4.10.4.4 Maintenance and Cleaning.

d) Wall surfaces that are not directly or indirectly in view of the customer, shall be less of a priority.

e) Monochromatic gradient patterns to highlight movement and/or direction vertically or horizontally are acceptable but not required.

f) Where space for advertising is not available above the platform doors and it is proven that the amount of advertising required by a project agreement cannot be met through other locations within the station, the following apply to advertising placed on feature walls:

i. the feature wall shall maintain its prominence as a cohesive feature;

ii. advertising placement shall be determined based on the principle of reducing visual clutter;

iii. up to 20% of wall area may be designated to advertising with layout is subject to review by Metrolinx.

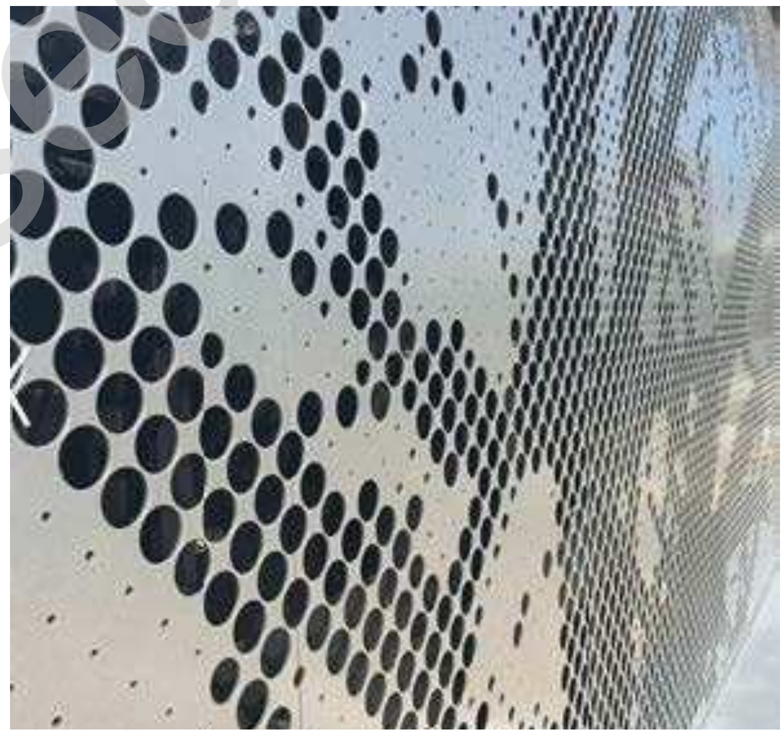


Figure-4-59: Perforated metal panel

4.10.5.2 Feature Walls and Feature Elements: Required Approvals

a) Architectural design is subject to Metrolinx approval. Designs shall be submitted to the owner of this standard for review and approval.

b) Metrolinx reserves the right to provide design and graphic collateral in line with requirements contained in this standard, at its sole discretion.

4.10.5.3 Feature Walls and Feature Elements: Colour and Graphics

a) Distinct colours shall be used to uniquely identify each station to ensure differentiation across the line.

b) Station-specific colours along the line/extension shall complement each other and complement the line-wide colour.

c) A minimum of 2 colours shall be required per station that are within the same colour family and are discernable to be different tones of the same colour, in order to create monochromatic gradient patterns that add depth and interest.

d) Colours and colour combinations shall be unique to each station along the line and in the colour selection process may consider the community context and history for inspiration.

e) Station-specific colours shall not repeat. No two adjacent stations shall have the same colour tone in varying shades.

f) Colour selection for each station shall be related to the colour selections of proximate stations along the line as a variation of the principal or secondary accent colour via tint, hue, saturation.

g) Where located, acoustical backing material shall be a custom colour coordinated with the colour selections for each station and contrast with exposed painted metal face.

h) The selection of the graphic element on feature walls shall support a customer from distinguishing one station from another. The graphic pattern may be repeated from station to station, but may be distinguished by colour. If the graphic pattern is distinct from station to station, they must complement each other cohesively. Station specific colours and graphics shall take inspiration from any of the following elements within the community in which it is situated:

   i. Characteristic streetscapes;

   ii. Natural features, topographical elements and/or vegetation;

   iii. Architectural landmarks and common architectural features;

   iv. Street art and murals;

   v. Heritage, historical, and community landmarks.

i) Station-specific patterns shall not include people's faces, words, or any derogatory or inappropriate images.

j) Graphic patterns on the feature wall shall span at least 70% of the length of the feature wall and should be easily visible from the train. The height of the patterning on the feature wall may be determined by the consultant considering the locations of signage, advertising, other wall-mounted elements, and the overall wall height.

4.10.5.4 Feature Walls and Ceilings: Finish and Material

a) For stations that do not use Platform Edge Doors (PED), materials such as tile or back painted glass may be used in the feature wall strategy provided that glare from the material will not exceed requirements as per DS-02 Universal Design Standard. When back painted glass is used as a feature element, low iron glass shall be used to ensure true likeness of colour is achieved.

4.10.5.5 Feature Walls and Ceilings: Location Criteria

a) Placed as specified in this standard;

b) in line with the above-noted required functions of feature walls;

c) At vertical circulation elements, feature walls shall be installed on ceiling and/or walls outside of easy reach.

   i. 1000 millimetres (measured horizontally) from vertical circulation, especially escalators.

d) At platform level, feature walls shall be installed for the full length of the wall.

   i. Where possible, feature walls at platform level shall be installed outside of easy reach but shall be easily visible to a customer in the train approaching the station.

e) Wall and ceiling surfaces suitable for feature treatments shall include planes that are uninterrupted and directly visible to the customer on approach to platform and/or approach to exit along main circulation path.

f) When feature element materials transition from interior to exterior, materials shall appear consistent while ensuring materials are suitable to their respective environments and the conditions with which they will be exposed/subject to.

g) In some cases, feature walls may be proposed to occur in spaces where they are 'within reach' where it is proven to be an ideal location to aid in intuitive wayfinding. This includes zones from the finished floor up to 2500 millimetres and within 1000 millimetres (measured horizontally) from vertical circulation for example. In these cases, the following shall apply:

   i. materials other than WF5A and WF5B-ALT may be used; they shall meet material finish criteria in Section 4.10.

   ii. large format high performance porcelain tile (WF1) in the appropriate feature colour(s) or in a material that meets the same performance criteria as WF1 may be used.

   iii. Alternate material choices shall be reviewed and approved by the owner of this standard.

4.10.5.6 Feature Walls and Ceilings: Acoustics

a) Acoustic requirements such as Noise Reduction Coefficient (NRC) ratings shall meet levels as per Section 4.7 Acoustics.

4.10.5.7 Feature Walls and Ceilings: Pattern

a) Patterns shall be unique to each station whereby no two station are the same.

b) Custom textural patterns shall be used to reinforce movement and direction to support intuitive wayfinding.

c) If the feature wall material selected is perforated metal panels, the panels shall be of equal size, organized in a modular rectangular format. Refer to image Figure 4-56: Perforated metal panel.

d) Pattern-making shall be achieved through custom perforations in metal panels with acoustic backing, utilizing different sizes of perforation openings, spaces between openings, density, and gradations.

e) Physical relief of feature element materials shall not protrude from the wall surface more than 100 millimeters.

f) Where vertical wall planes transition to horizontal ceiling planes, materiality shall be continuous to support a continuous approach.

4.10.6 Elevator Enclosure

a) where fire separation is not required, laminated glass shall be provided for ease of maintenance, durability and replaceability

b) Where fire separation is required, mitigations shall be provided. Wired glass will not be accepted.

c) Alternate solutions to achieve the look and feel described in Section 4.6.6 Passenger Elevators may be pursued on a case by case basis as described in the Project Agreement. In this scenario:

   i. the design intent shall be demonstrated to and approved by Metrolinx;

   ii. the proponent shall be responsible for securing applicable approvals of the Authority Having Jurisdiction (AHJ).

d) Elevator shafts that are on raised platforms or in stations where significant solar gain is experienced through adjacency to a southwest exposure on an exterior wall shall provide additional frit patterning that aligns with CPTED and is in keeping with the architectural design of the facade in order to mitigate heat gain.

e) Elevator shaft glazing shall be modules within its material family and standardized throughout the site to ensure ease of inventory management, replacement and repair, particularly in the high contact zone (below 2500 millimetres).

f) Vandal proof or no-break solutions shall be considered for all glass elements of elevator enclosures from FF to 2500mm.

g) All glazing used in safety sensitive areas such as the Station Building, Platform Access Buildings or Pedestrian Bridges as well as the Rail Platform shall be tempered and laminated glass. When stressed, glazing should shatter but remain in place as a safety requirement.

4.10.7 Platform Edge Doors (PED's)

a) All PEDs and fixed glazed panels aligned with PEDs, shall be required to include a high colour contrast (minimum 50%) distraction pattern along the full length of all platforms, including all doors and shall follow requirements as per DS-02 Universal Design Standard.

b) Amount of glazing shall be proven to be maximized to promote transparency and visibility for customers.

c) Horizontal sign band shall be continuous and integrated within PED assembly and appear as a consistent element. Integrated digital information signage shall be located above all PED doors. Static internally illuminated station identity signage shall be integrated and provided between digital signage.

d) Horizontal sign band to facilitate integrated (Closed Circuit Television) CCTV and Public Address (PA) speakers where all infrastructure is concealed and colour of exposed elements shall match to sign band colour. Provide access panels for maintenance/repair. Colour of access panels to match adjacent finishes. All fasteners to be concealed and tamperproof.

e) Where at / above grade platforms occur, projecting and continuous rain canopies shall be integrated into building platform architecture to eliminate intrusion of rain /snow through gaps between train doorways and PED's.

f) Design doors at platform level to withstand 2 kPa pressure suction/pulse created when train approaches/departs station.

4.10.8 Finishes Schedule

4.10.8.1 Finishes Schedule: Exterior

Note:

1. To be read in conjunction with Section 4.10 Finishes and Materials
2. All finishes and materials shall comply with DS-02 Universal Design Standard.
3. The materials and finishes outlined in this document present a kit of parts for a consistent experience for transit customers. In some cases the Project Agreement (PA) may suggest alternate materials and finishes. In scenarios such as where adjacency to heritage structure occures, another material may be more appropriate. As such, where an alternate material or finish is proposed, the material or finish shall meet the performance requirements of the material that is being replaced according to requirements included in this document. All alternate materials and finishes shall be reviewed and approved by Metrolinx.
4. * Asterix denotes alternate finish/condition.

ELEMENT	CODE	DESCRIPTION	LOCATION(S)	SELECTION RATIONALE
CURTAIN WALL SYSTEM	CW	• Capless, glazed aluminum structural silicon joint wall system with ceramic frit pattern (for glare, heat gain, and bird deterrent). • Internal Frame colour: Light Grey • CW-1 – Vision glass with the minimum ceramic frit pattern required to meet bird friendly requirements; • CW-2 – Gradient Fritted Vision Glass - Same as CW-1 with gradient ceramic frit on surface #2, 20% - 80% consistent gradient to bridge CW-1 and CW-3; • CW-3 – Fritted Glazed Spandrel Panel – Same as CW-1 with 80% ceramic frit on #2 surface, and back painted white on #3 surface • Distraction pattern shall be required.	Above grade station building envelope.	Demonstrated maximum transparency to ensure CPTED;access to daylight and views; fritted glass aids in light and heat gain control.

Table 4-2: Exterior Finishes and Materials Schedule

ELEMENT	CODE	DESCRIPTION	LOCATION(S)	SELECTION RATIONALE
EXTERIOR SHADING SYSTEMS	ES1	• Perforated aluminum panels • Colour: White • Pattern and % of opening: Variable • Finish: 20-70 units gloss at 60 degree angle.	Above grade station wall shade system, EEB's, MSF's, Ancillary buildings.	Lightweight, modular panels for ease of installation, repair and replacement. Variation in perforation pattern and % opening for sun/light, heat gain control. Rust and weather resistant.
OPAQUE CLADDING	EW1A	• High performance sintered / porcelain tile • Pattern: Rectilinear • Colour: White/Light Grey • Size: Large format (305mm x 1220mm min.)	Station cladding	Durable, long term life span, modular for ease of repair, replacement; thru and thru material; UV and weather resistant.
	EW1B	• Prefinished composite metal panels • Pattern: Rectilinear • Colour: White/Light Grey	Station wall shade system, EEB's, MSF's, Ancillary buildings.	Durable, modular for ease of repair, replacement; proven cladding material; UV and weather resistant.
	*EW1C	• Precast and cast in place concrete panels • Pattern: Rectilinear • Colour: Light Grey	EEB's, MSF's, Ancillary buildings.	Durable, modular for ease of repair, replacement; proven cladding material; UV and weather resistant.
	*EW1D	• Terra cotta • Pattern: Rectilinear • Colour: Light Grey	Station building cladding Used in Heritage conditions.	Durable, scratch and dent resistant; concealed fixing; non combustible, UV and weather resistant.
SOFFIT CEILING	ECF3	• Metal ceiling panels • Custom size • Colour: White	Entry soffit ceiling	Durable, proven cladding material; UV and weather resistant, dent resistant, accessible for maintenance.

ELEMENT	CODE	DESCRIPTION	LOCATION(S)	SELECTION RATIONALE
WALL BASE	EWB1	• Granite Wall Base •Size: 400mm high •Format: Rectangular •Colour: Medium Gray	Exterior base of main subway building.	Natural material, durable, proven material, low maintenance.
	EWB2	• Concrete Base •Size: 400mm high •Finish: Clear sealer	Base of all non customer facing building exteriors including EEB's, MSF's, and Ancillary Buildings.	Durable, cost effective, low maintenance.
FACADE BAFFLES	FB1	• Vertical metal shade baffles •Colour: Light grey	Station entry, southern exposure	Multi purpose sun shade and station identity element; durable
PLATFORM EDGE DOORS	PED	• Door and mullion frame colour: Dark grey • Transom colour: Black	Platform edge, PED louvers	Safety, transparency
CANOPIES	*CAN1	• Cantilevered metal building integrated canopy • Colour: Light Grey	Above grade station where recessed entry/exits with identity canopy proven not technically feasible.	Year round weather protection
	CAN2	• Metal stand alone canopy • Colour: Light Grey	Bicycle storage areas	Year round weather protection

ELEMENT	CODE	DESCRIPTION	LOCATION(S)	SELECTION RATIONALE
DOORS	DR1	• Exterior sliding doors • Frame finish: Anodized aluminum frame • Glazing: Safety glass with distraction pattern as per OBC.	Main station entry / exit doors	Durability, contactless, transparency
	DR2	• Exterior swing doors • Frame finish: Anodized aluminum frame • Glazing: Safety glass with distraction pattern as per OBC.	Station entry exit doors	Durability, transparency
	DR3	• Exterior hollow metal doors and frames • Colour to match adjacent wall finish	Exterior doors accessing service rooms/ back of house doors at stations, EEB, FSC, Ancillary Buildings.	Durability, functionality.
MECHANICAL LOUVERS	LV1	• Exterior metal louvers at mechanical rooms integrated into building walls, rooftop screening • Colour: Match adjacent exterior wall finish	Main station, EEB's, Ancillary Buildings, with half-height PEDs at platforms.	Durability, functionality.

4.10.8.2 Finishes Schedule: Interior

Note:
1. To be read in conjunction with Section 4.10 Finishes and Materials
2. All finishes shall comply with DS-02 Universal Design Standard.
3. The materials and finishes outlined in this document present a kit of parts for a consistent experience for transit customers. In some cases the Project Agreement (PA) may suggest alternate materials and finishes. In scenarios such as where adjacency to heritage structure occures, another material may be more appropriate. As such, where an alternate material or finish is proposed, the material or finish shall meet the performance requirements of the material that is being replaced according to requirements included in this document. All alternate materials and finishes shall be subject to being reviewed and approved by Metrolinx.
4. * Asterix denotes alternate finish.

ELEMENT	CODE	DESCRIPTION	LOCATION(S)	SELECTION RATIONALE
FLOORS	FL1/FL1A	• Non slip poured terrazzo with zinc strips. • Colour: Light grey • Finish: Non slip, with required slip resistance • Stairs (rise, run, curbs, ramps) • Colour: Dark grey • Finish: Non slip, with required slip resistance • Terrazzo samples shall be provided to Metrolinx and shall be approved based on overall acceptable colour; aggregate size, type, and colour; proportion of agregate to matrix; trim divider finish; sealer finish	All customer facing floor areas including entry, unpaid and paid zones, pedestrian tunnels, pedestrian bridges, washrooms, platform.	Durable, Monolithic material, long lasting, non slip.

Table 4-3: Interior Finishes and Materials Schedule

ELEMENT	CODE	DESCRIPTION	LOCATION(S)	SELECTION RATIONALE
FLOORS	*FL1B	• Large format, rectangular, non slip high performance porcelain tile. • Size: Large format (Minimum 305mm x 1220mm) • Colour: Light Grey • Finish: Non slip, with required slip resistance • Stairs: High performance porcelain tile with preformed treads, nosing and risers with integral cove to comply with OBC.	Same as above	Durable, low maintenance,thru and thru material,long lasting,non slip, easy repair/replacement.
	*FL2	• Granite slab/tile • Colour: Dark Grey • Finish: Non slip, with required slip resistance • Stairs: Granite preformed treads with nosing and risers with integral cove to comply with OBC	Stairs and ramps only	Durable,thru and thru material,non slip
	TWSI	• Tactile Walking Surface Indicators: Attention and guidance Indicators • Type: Attention - Integral with truncated domes; Guidance - Integral with parallel flat topped elongated bars	• Attention: Platform edge where platform edge door openings occur; full width of door opening • Attention: Top of all stairs, ramps; full width of door opening • Guidance: Located starting at main station entry continuous to elevators, escalators, DWA	Safety, durable, less labour intensive than discreet type

ELEMENT	CODE	DESCRIPTION	LOCATION(S)	SELECTION RATIONALE
FLOORS	FL3	• Hardened Concrete • Colour: Light Grey	For At Grade Platforms	Durable, long lasting, non slip
FLOORS GRILLES	FL4	• Recessed metal floor pan with foot grille flush with finished floor • Floor grille with integral floor drain as per Project Agreement (PA) and to be confirmed with maintenance and operations. • Tread insert: Serrated stainless steel. • Size: Minimum width of all entry/exit doors; length as per Section 4.0 Sustainability.	Interior of all entry / exits	Durable, long lasting, non slip
WALL BASE	WB1	• Terrazzo Wall Base • Height: 150 millimeter high with integral cove • Colour: Medium Grey • To be used in combination with terrazzo floor	Throughout all public facing areas	Durable, easy maintenance, continuous

WALL BASE	*WB2	• Wall Base porcelain tile • 150mm high • Colour: Medium Grey • To be used in combination with porcelain tile floor	Throughout all public facing areas	Durable, easy maintenance
	*WB3	• Granite base • 150mm high • Colour: Medium Grey	Throughout all public facing areas.	Durable, easy maintenance
GENERAL WALL TILE	WF1	• Large format high perfromance porcelain tile on wall framing system. • Size: Minimum 610mm x 1220mm • Pattern: Modular, rectilinear, stacked • Colour: Medium Grey • Finish: Matt	All customer facing wall areas including entry, unpaid and paid zones, pedestrian tunnels, pedestrian bridges, washrooms, platform, stairs	Durable, dent and scratch resistant, thru and thru material, replaceable if damaged
	WF2	• Large format high perfromance porcelain tile on wall framing system. • Size: Minimum 610mm x 1220mm • Pattern: Modular, rectilinear, stacked • Colour: Dark Grey • Finish: Matt	Recess at advertising niches	Durable, dent and scratch resistant, thru and thru material, replaceable if damaged
	WF3	• Large format high perfromance porcelain tile on wall framing system. • Size: Minimum 610mm x 1220mm • Pattern: Modular, rectilinear, stacked • Colour: TBC with the owner of this standard • Finish: Matt	Recess at self serve hub	Durable, dent and scratch resistant, thru and thru material, replaceable if damaged
GENERAL WALL FINISH	WF4	• Painted extreme impact resistant drywall • Colour: Off white	Washoom ceiling, miscelaneous walls and ceilings	Durable, dent resistant, enhanced moisture, mold, and sound transmission resistance

ELEMENT	CODE	DESCRIPTION	LOCATION(S)	SELECTION RATIONALE
FEATURE WALLS	WF5A	• Metal panels on wall framing system • Size: Minimum 610mm x 1220mm • Colour: Varies • Pattern: Solid and perforated • Solid metal panel below 2750mm datum; Perforated metal above 2750mm datum	• Located at vertical circulation areas including stairs, escalators • Co-located with feature ceilings • Co-located with exterior cladding	Durable, modular for easy replacement/repair, solid or perforated, acoustic opportunities, versatile substrate to receive colour and perforation pattern options, semi transparent or opaque, access to daylight
	WF5B	• Back painted low iron glass • Size: Minimum 610mm x 1220mm • Colour: Varies	• Located at vertical circulation areas including stairs, escalators • Co-located with feature Ceilings • Co-located with exterior cladding	Modular sizing, true colour renditioning
	WF1	• Large format high perfromance porcelain tile on wall framing system. • Size: Minimum 610mm x 1220mm • Colour: Varies	• Feature wall areas	Durable, dent and scratch resistant, thru and thru material, replaceable if damaged

ELEMENT	CODE	DESCRIPTION	LOCATION(S)	SELECTION RATIONALE
GENERAL CEILING	CF1	• Suspended acoustic metal ceiling panels with integrated linear lighting • Linear plank or rectangular panels • Size: Minimum 610mm x 1220mm format • Colour: White • Acoustic properties: NRC 0.7 • Anchor to suspended grid/frame	• Located throughout all customer facing areas	Durable, dent resistant, accessible for maintenance, concealed, acoustic properties, linear direction to support wayfinding
	CF2	• Suspended acoustic metal ceiling panels with integrated linear lighting • Linear plank or rectangular panels • Size: Minimum 610mm x 610mm format • Colour: White • Acoustic properties: NRC 0.7 • Anchor to suspended grid/frame	• Station Ambassador Office, back of house areas	Durable, dent resistant, accessible for maintenance, concealed, acoustic properties, linear direction to support wayfinding
BALUSTRADE	BL1	• Tempered glass balustrade with stainless steel vertical stantions. • 150mm high base • Stainless steel handrail • Protective balustrade at escalators	All Escalator and stair balustrades	Transparent aids in safety and wayfinding, clean, modern
DOORS	DR4	• Interior aluminum door frame with demonstrated minimal frame dimension and safety glass vision panel • Finish: Anodized aluminum • Glazing: Safety glazing with distraction pattern	Station ambassador	Transparent aids in safety and wayfinding, clean, modern, slim profile
	DR5	• Hollow metal door and frame • Colour: to match adjacent wall finish	Doors within public areas to back of house/service areas	Durability, replaceability
GLASS	GL1	• Laminated safety glass	Station ambassador office	Safety and security, durability
FILM	FLM	• Privacy film • Frosted semi transparent film	Station ambassador office, curtain wall glazing	Safety and security, replaceability

FINISHES AND MATERIALS: EXTERIOR

Figure 4-60: Finishes palette

Note: Visual references to be read in conjunction with 4-2, 4-3 Finish schedules; Section 4.10 Finishes and materials

EXTERIOR SHADING SYSTEM (ES1)

Material: Perforated aluminum panels

Colour: White

Pattern: Variable

Location: Exterior cladding on Station

GLASS CURTAIN WALL (CW)

Material: Glazed aluminum wall system

Colour: Light grey

Location: Main entry/exits

LOUVERS (LV1)

Material: Aluminum slats

Colour: To match building facade

Location: Exterior stations, EEB's, Ancillary Buildings

FACADE SUN BAFFLES (FB1)

Material: Aluminum baffles

Colour: Light grey

Location: Exterior facade with southern exposure

OPAQUE CLADDING (EW1A)

Material: High performance porcelain/ceramic panels

Colour: Light grey

Finish: Matte

Location: Exterior cladding stations

OPAQUE CLADDING (EW1B)

Material: Prefinished composite metal panels

Colour: Light grey

Finish: Smooth

Location: Exterior cladding stations

OPAQUE CLADDING (EW1C)

Material: Precast and cast in place concrete

Colour: Light grey

Location: Exterior cladding on Ancillary buildings, EEB's

GLASS FRIT/MARKER (CW-1,2,3)

Material: Ceramic frit

Colour: White

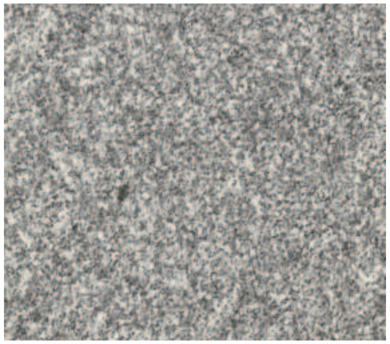
FINISHES AND MATERIALS: EXTERIOR (CONT.)

CANOPY (CAN1)

Material: Steel

Colour: Light grey

Location: Station exterior entry/exits



GRANITE BASE

Material: Granite 400 millimetres base height

Colour: Medium grey

Location: Exterior station

FINISHES AND MATERIALS: INTERIOR GENERAL

FLOORING (FL1)

Material: Poured Terrazzo
Colour: Light grey
Finish: Smooth with anti-slip
Location: Throughout all public areas

FLOORING ACCENT (FL1A STAIRS/ACCENT)

Material: Poured Terrazzo
Colour: Medium grey
Finish: Smooth with anti-slip
Location: Stairs

FLOORING (FL1B - ALTERNATE)

Material: High performance porcelain tile
Colour: Light Grey
Finish: Matte with anti-slip
Location: All public areas

COVE WALL BASE (WB1)

Material: Terrazzo
Colour: Medium grey
Finish: Smooth with anti-slip
Location: All public areas

WALLS (WF1)

Material: Porcelain tile
Colour: Medium grey
Finish: Matte
Location: All public areas

CEILINGS (CF1, CF2)

Material: Perforated acoustic metal ceilings
Colour: White
Finish: Matte
Location: All public areas

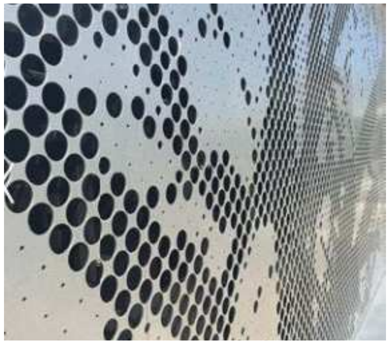
FLOOR GRILLES (FL4)

Material: Stainless steel tread insert
Finish: Anti slip coating
Location: Interior side of all entry/exits

TACTILE FLOORING (TWSI)

Material: Integral attention and guidance indicators
Colour: Yellow
Finish: Anti-slip
Location: Platform edges; top of stair/ramps; wayfinding path

FINISHES AND MATERIALS: INTERIOR FEATURE ELEMENTS



FEATURE WALLS (WF5A)

Material: Perforated aluminum panels

Colour: Variable

Pattern: Variable

Finish: Smooth

Location: Vertical circulation, platform

FEATURE WALLS (WF5B - ALT.)

Material: Back painted glass, low iron

Colour: Variable

Pattern: Variable

Location: Vertical circulation, platform

FEATURE CEILING (CF4)

Material: Perforated acoustic metal panels

Colour: Variable

Pattern: Variable

Location: Ceiling(s) at vertical circulation

FEATURE CEILING (CF4 – ALT.)

Material: Solid and perforated aluminum panels

Colour: Variable

Pattern: Variable

Location: Ceiling(s) at vertical circulation

FINISHES AND MATERIALS: COMPONENTS


LEANING RAILS


WASTE RECEPTACLES


SEATING


ELEVATORS

FARE VENDING MACHINES


PLATFORM EDGE DOORS


BICYCLE RACKS


ESCALATORS/HANDRAILS WITH INTEGRATED LIGHTING


FARE GATES


SKYLIGHTS


CLOCK

4.10.9 Material Selection and Performance

4.10.9.1 Material Selection Principles

a) Safety and Security

i. Materials shall be selected so as to reduce the risk of hazard to customers, transit and maintenance personnel.

ii. All finishes and materials shall be non-combustible and meet all Ontario Building Code (OBC) and National Fire Protection Association (NFPA) requirements.

iii. Shiny surfaces shall be prevented as these produce glare and reflection which can disorientate customers. The Unified Glare Rate (UGRL) shall not exceed 25 for circulation areas as per DS-02 Universal Design Standard.

iv. Ensure color and tonal contrast between surfaces follows levels outlined in DS-02 Universal Design Standard to assist the visually impaired.

v. Secure finishes and materials using proper fasteners and bond strength to eliminate hazards from dislodgement due to temperature change, vibration, wind, seismic forces, aging, and vandalism.

vi. All fastenings shall be concealed and tamper proof.

vii. Ensure non-abrasive finishes where passengers are likely to brush against such as stairwells, elevator cars, and customer passageways.

viii. Use colours to complement standard safety colours and enhance lighting levels.

ix. Combustible materials that produce toxic fumes and /or smoke such as plastics, resins, fabric, synthetic materials, shall not be used.

b) Durability and Performance

i. Carefully account for finish and material value engineering aspects and life cycle costs.

ii. Provide building and finish materials of proven high quality with excellent wear, strength, and weathering qualities while accounting for both initial and replacement costs.

iii. Provide colorfast building materials that maintain good appearance throughout their useful service life and are engineered for cold weather climate.

iv. Materials shall maintain their good appearance throughout their useful life and shall have a minimum 30 year lifecycle.

v. For ceiling and canopy finishes/systems and their application, materials shall allow for commissioning, adjustment, and future retrofitting of subsystems such as CCTV and public address systems

vi. Waste during construction and regular operations to be diverted from landfill back to the manufacturing process and reused.

vii. All finishes and materials shall be selected with respect to costs by balancing initial material costs against long-term maintenance costs.

viii. All finishes and materials shall be easily replaced/repaired, such as including a wear surface separate from the structural slab to facilitate replacement when a floor is in a heavy wear area.

ix. All finishes and materials shall be selected, where appropriate, with reference to the potential need for access to service ducts, etc.

x. All finishes and materials shall be chemically inert, acid and alkali-resistant, dense, non-porous and non-staining.

xi. Materials shall be able to withstand corrosion, uphold their intended use and function, and maintain their good appearance (no rusting or fading in colour) throughout their useful life and shall have a minimum 30 year lifecycle.

xii. All finishes and materials in public areas that are within a vertical 2500 millimeter touch zone shall be resistant to vandalism including hammer blows, felt markers, spray paint, burning, and scratching.

xiii. Requirements shall be developed using CSA S478 as a guideline.

xiv. Eliminate maintenance costs using standard materials that, if damaged, are easily repaired or replaced with little or no impact on station operations.

xv. Provide materials and details that are difficult to deface, damage, or remove, and operational and maintenance strategies that discourage vandalism.

xvi. Provide public areas finishes allowing common maintenance methods to readily remove casual vandalism.

c) Maintenance and Cleaning

i. Finish and materials selected shall have matching replacement stock available for the expected life of the material.

ii. Finish and materials shall be selected for ease of cleaning, repair, or replacement.

iii. Finish and materials in public areas must withstand and not be damaged by the rigors of regular cleaning, washing and high-pressure water spray. The cleaning process shall require only a one step operation.

iv. Finish and materials shall resist soiling and be cleanable with commonly used equipment and environmentally benign cleaning agents.

v. Access to windows for cleaning shall not be obstructed except where absolutely necessary such as a required structural member.

vi. Windows above ground level shall be placed such that they can be accessed from below using a lift and shall not require the use of scaffolding on stairs or escalators to maintain. Accessing windows for cleaning shall not require getting into traffic or onto tracks.

vii. All fasteners of finishes and materials shall be concealed.

viii. Removal and replacement of damaged materials shall be easily accessible without damage occurring to adjacent areas.

ix. Select materials which have proven maintenance procedures.

x. All finish and materials shall not be located in areas where access for purposes of maintenance/repair is difficult or unsafe.

xi. Provide a minimum number of small, non-absorbent, flush joints to reduce potential maintenance issues.

xii. Correctly designate and space control expansion joints fit for purpose in floors and walls.

xiii. Ensure secure access to roof for maintenance/repairs.

d) Unit Size

i. Units shall be large enough to reduce the number of joints yet small enough to facilitate replacement if damaged.

ii. Monolithic materials may be used that are easily repaired without being noticeable.

iii. Standardized grids shall be designed to accommodate for standardized glazing for windscreens and vertical elements of shelters.

e) Installation and Application

i. All finishes and materials shall be detailed and specified to be installed in accordance with industry standards and manufacturers printed directions for long life, low maintenance, and compliance with warranty requirements.

ii. All finishes and materials shall be installed using tested and proven methods, in accordance with established trade standards.

iii. All finishes and materials, hardware, and fasteners shall be able to withstand the anticipated pressures of ground-borne vibration, as well as air pressure changes generated by wind and by the passage of the transit vehicle.

iv. Reduce dislodgement hazards due to temperature change, vibration, air pressure changes generated by wind and by the passage of the transit vehicle, seismic forces, aging, vandalism or other causes using secure mechanical attachment systems, fasteners, and bonding materials. For bonding strength, materials shall be required to meet a bonding strength or peel strength of 20 pounds per square inch (psi).

v. All finishes and materials shall be secured in a manner which deters and prevents tampering and vandalism.

vi. Installation of finishes and materials shall generally facilitate their removal without affecting the integrity of adjacent materials.

f) Colour, Pattern, Tonal Contrast and Texture

i. Highly patterned flooring surfaces shall be prevented.

ii. Pattern and tonal contrast shall comply with DS-02 Universal Design Standard.

iii. Textures shall not conflict with those used in the information and guidance system.

iv. Materials with staining and colour shall have through-colour properties and non-fading characteristics.

v. Finishing of steel shall be appropriate to the location of the material, i.e. exterior vs. interior.

vi. Ensure metal anchor material and metal fastener materials are not dissimilar or provide separation in order to prevent galvanic corrosion.

vii. Finishing of steel in the field shall be kept to a minimum by designing structures that can be shop fabricated in sections, primed, and finished off-site, and bolted together on site.

viii. The need for field welding shall be prevented.

ix. Field painting on site shall be limited.

g) Contact Zones: High and Low

i. High Contact Zone

1) Shall include areas within normal passenger reach within interior and public realm areas, and extends from the floor/grade, up to 2500 millimetres above the floor.

2) Ceilings less than 3000 millimetres shall also be treated as high contact zones.

3) The selection of materials for use in this zone shall reflect outstanding durability, especially in and around passenger circulation routes or public amenities.

4) Finishing and materials used in the lowermost 500 millimetres of this zone must be unaffected by salt and slush, and shall be capable of being quickly and easily cleaned.

5) Edges of finishing materials shall be reinforced where vulnerable to damage. This shall include platform edges, stair nosings, outside corners and projecting sills.

6) Paint and / or sealers applied to walls and ceilings shall be graffiti-resistant.

7) Hardware and fastenings in this zone shall be designed to be tamper proof.

ii. Low Contact Zone

1) This zone is less susceptible to public contact and extends up from 2500 millimetres above the finished floor.

2) Materials in the low contact zone are subject to less convenient service access, and are still vulnerable to vandalism, dirt, and grime.

h) Bird-Friendly Design

i. Interior and exterior elements designed with projecting horizontal surfaces where birds can roost shall be discouraged.

i) Acoustics

i. Provide public area sound absorbing materials where appropriate to reduce noise levels, echoes and reverberation that can cause interference with station Public Address (PA) systems.

ii. Provide building elements such as doors and windows to prevent transmission of noise between various public and non-public areas.

iii. Typical locations for implementing sound absorbing materials include ceilings, under platform edge, platform ceilings, trainway walls, and walls out of public reach.

iv. Provide public area ceiling and wall acoustic treatment 2500 millimetres minimum above finish floor.

v. Provide prefabricated panel or spray-on coating acoustic treatment materials as per NFPA and OBC cleaning, durability, and fire rating requirements.

j) Use

i. Provide finish elements that will provide durability and perform in a very heavy use environment throughout the year.

ii. Design finish elements on the basis that such elements are not protected from the exterior environment and are expected to accommodate a minimum lifespan of 30 years when properly maintained.

k) Moisture and Frost Resistance

i. Provide waterproofing and moisture control for structures including stations and associated facilities. At vehicular and pedestrian traffic bearing locations, the waterproofing/traffic topping system shall be skid and traffic wear resistant. The system shall be impervious to water and common chemicals, providing protection against de-icing salts, incidental vehicle fluid spills, and UV rays. Waterproofing membrane shall have crack-bridging properties

ii. Provide assemblies to prevent condensation, water, and frost damage.

iii. Control moisture and water penetration through building envelopes to prevent:

1) Dimensional change of materials;

2) Surfaces corrosion and staining;

3) Decay of materials;

4) Flooding of pedestrian areas and service rooms;

5) Breakdown of system roofing and finished walls;

6) Efflorescence of masonry surfaces;

7) Surface spalling by freezing;

8) Equipment damage; and

9) Condensation.

iv. All materials and finishes to withstand temperature fluctuation of non condition spaces.

v. Shall comply with Facilities Civil Engineering Standards.

l) Appearance

i. Provide finish elements on the basis that such elements are not protected from exterior elements and that they have the capability of maintaining a consistent appearance and level of performance throughout all four seasons and their respective temperature variations.

ii. Finish elements shall not fade, degrade or wear prematurely throughout their useful life and shall have a minimum 30 year lifecycle.

iii. Material integrity shall not be broken, cracked, scratched, damaged, dented, deformed, or contain any visual defects such that they are detectable from a distance of 3000 millimetres. Any materials that show any form of damage or defection as per above, shall not be acceptable.

m) Joints

i. Joints are to be straight, true and consistent in width and appearance.

ii. Vertical joints shall not provide a lip and both sides of the joint shall be in the same plane.

iii. Horizontal joints shall not provide a lip or trip hazard and both sides of the joint shall be in the same plane.

iv. Provide joints that are weatherproof.

n) Exposure

i. Station elements will be exposed to all four seasons and their respective climatic conditions and temperature variations as indicated in the OBC including but not limited to the following:

1) Design temperature: January 1%, July 2 1/2%.

2) Hourly wind pressures: 1 in 100 year occurrence.

3) UV exposure: as per Environment Canada year-to-date UV index Graphs.

o) Abrasion Resistance

i. Station elements to provide excellent resistance to abrasion caused by friction due to rubbing, scraping, leaning, and contact with other materials.

ii. Design station elements to resist wear due to abrasion caused by passengers.

p) Ease of Replacement

i. Provide station elements that are readily available locally.

ii. Design station elements to allow for ease of maintainability with easy removal and replacement of individual components within the same system and plane without having to remove several adjoining components.

iii. Design station elements capable with "plug and play" technology for ease of replacement.

q) Shrinkage Resistance

i. Eliminate cracking due to shrinkage and expansion with the use of control joints and expansion joints.

r) Constructability

i. Design stations that are easily constructed using materials that are part of the system standard kit of parts.

ii. Complicated designs with facades that are rounded, complex and atypical shapes or incorporate acute angles shall not be permitted.

s) Roofs

i. For low slope roofs, the minimum slope shall not be less than two percent (2%).

t) General

i. Station-specific colours shall not be neon/fluorescent, black, or metallic tones.

ii. provide waterproofing and moisture control for all structures including stations and associated facilities.

iii. Louver framing shall not be exposed or visible to public.

iv. Thresholds shall be beveled to accommodate different floor materials.

v. Sprinklered floor areas and those containing plumbing fixtures or water lines or are subject to weather penetration shall be sloped and drained.

vi. Large surfaces areas such as walls, floors, columns and furniture shall achieve Light Reflective Value (LRV) points difference with their surrounding surfaces

vii. Flooring shall be low moisture absorption, require minimal demonstrated maintenance, non-staining, non-cracking, chemical and salt resistant, and abrasion and wear resistant

viii. Wall finishes shall be a hard and durable surface, low moisture absorption, require minimal demonstrated maintenance, washable, cleanable, non-staining, non-cracking, chemical resistant, scratch and graffiti resistant, and abrasion and wear resistant

ix. Provide easy access to ducts and equipment above ceiling and ensure exposed ceiling infrastructure is screened from public view.

x. All public facing doors and door finishes shall be durable, low maintenance, non-combustible, dent resistant, washable, cleanable, non-staining, and non-corrosive, vandal proof, contain sound attenuation, and allow for ease of repair and/or replacement.

4.10.9.2 Material Performance Requirements

a) Glazed Aluminum Curtain Wall System (CW)

i. The glazed aluminum wall system to be designed as a 2-sided, capless, structurally glazed system, utilizing structural silicone for bonding and sealing.

ii. Nominal wall thickness of framing system: 3 millimetres min.

iii. Thermally broken framing to have complete separation of interior/exterior components with no bridging by fasteners permitted. Use of fiberglass pressure plates to achieve performance ratings will not be accepted.

iv. Structural: Tested in accordance with ASTM E330. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.

v. Air Infiltration: Tested in accordance with ASTM E283 for air infiltration: maximum air leakage of 0.2 L/s*m² at a static-air-pressure differential of 300 Pa.

vi. Water Penetration: Tested in accordance with ASTM E547 or ASTM E331 for water penetration: at 720 Pa.

vii. Float glass: to CAN/CGSB-12.3.

viii. Tempered glass: to CAN/CGSB-12.1.

ix. Laminated glass: to CAN/CGSB-12.1.

x. Insulating glass units: hermetically sealed, argon filled, double glazed insulating glass units to be IGMAC certified, incorporating approved black stainless steel warm edge spacer. Dual seal with a black PIB primary seal and black silicone secondary seal.

xi. Ceramic frit: ceramic enamel frit fused to glass substrate to provide a homogeneous glass substrate. Solid or pattern as indicated. Where frit is applied, glazing shall consist of low iron glass. Glass alternates to low iron glass that can be shown to not perceptibly tint the appearance of the frit from true white from all viewing angles may be accounted for if the comparative testing and mock-ups that are provided are acceptable to Metrolinx, subject to review and approval by the owner of this standard.

xii. Finish: Fluoropolymer conforming to AAMA 2605.

xiii. All glazing shall include distraction pattern on glass as per requirements found in DS-02 Universal Design Standard.

xiv. Design exterior glazing units and interior glass feature wall as a 2 sided capless structurally glazed system.

b) Sintered Tile (EW1)

i. 6 millimeter thick minimum, faced modular wall system conforming to the following minimum criteria:

ii. Moisture expansion (C370 American Society for Testing and Materials (ASTM)): less than 0.1%.

iii. Water absorption capacity (ASTM C373): 0.2% maximum.

iv. Thermal shock (ASTM C484): No defects or damage.

v. Chemical resistance (ASTM C650): Class A.

vi. Resistance to freeze-thaw cycling (ASTM C1026): No visible damage, 0.02% weight loss maximum.

vii. Resistance to deep abrasion (ASTM C1027): 105 millimetres^3 maximum.

viii. Surface burning characteristics of materials (ASTM E84): FS: 7; SD 36.

ix. Fire test of exterior wall assemblies (Underwriters Laboratories of Canada - CAN/ULC S134): Non-combustible.

c) Natural Granite (EWB1)

i. Exterior base for all main subway station buildings: 19 millimeter thick natural granite having the following criteria:

1) Density (ASTM C97): 2867.3 kg/m3.

2) Modulus of rupture (ASTM C99): 12.88 MPa.

3) Compressive strength (ASTM C170): 152.53 MPa.

4) Flexural strength (ASTM C880): 20.2 MPa.

d) Aluminum Panel (EW1B)

i. 3 millimeters thick minimum.

ii. Aluminum: Aluminum association alloy 3003-H14, paint quality, tensioned levelled sheet. Fluoropolymer conforming to American Architectural Manufacturers Association AAMA 2605.

iii. Surface burning characteristics of materials (ASTM E84).

iv. Fire test of exterior wall assemblies (CAN/ULC S134).

e) Exterior Shading Systems: Perforated Aluminum Panels (ES1)

i. Aluminum: Minimum 3 millimeters thick, Aluminum association alloy 3003-H14, paint quality, tensioned levelled sheet.

ii. Finish: Fluoropolymer conforming to AAMA 2605. Finish to be applied after panel has been cut and perforated.

iii. Perforation open area: 50%.

iv. System to be designed to allow for window cleaning operations.

v. Cutting of prefinished panels on site shall not be acceptable.

vi. To demonstrate minimum potential for "oil canning" and "dished" panels, maximum deflection of panels measured normal to the panel surface after application and removal of the design loads, must not exceed L/800 of distance between supported edges of panel or distance between stiffeners where stiffeners are used. Stiffeners, where used, shall not deflect more than L/180 of span under load.

f) Facade Baffles (FB1)

i. Design feature shading system independent of glazed aluminum wall system.

ii. Design shading system with adjustable vertical fins that shall project perpendicular or at an angle to the glazing plane.

iii. Shading system support system to tie back to structural building elements.

iv. Shading system support system to be thermally broken and to have complete separation of interior/exterior components with no bridging by fasteners permitted.

v. Nominal wall thickness of tubular fins to be minimum 3 millimeters.

vi. Finish: Fluoropolymer conforming to AAMA 2605

g) Precast and Cast In Place Concrete (EW1C)

i. Design members and their connections to withstand, within acceptable deflection limitations as specified, their own weight, the weight of loads imposed by the motion of operable elements, minimum design loads and combinations of loads, due to pressure and suction of wind and internal pressures and seismic loads.

ii. Inserts, hardware and connections: Stainless steel, ASTM A167, Type 304 stainless steel.

iii. Design exposed surfaces of concrete consisting of concrete with a smooth glass like finish and a consistent and uniform colour and appearance. Colour of concrete shall be white. There shall be no visible tie holes, panel joints, or other visible defects visible from a distance of 1500 millimeters.

iv. Formwork shall be plywood overlaid with a bonded phenolic resin that does not transfer grain or defects to provide a smooth glass finish.

v. Portland Cement shall be white, Type GU in accordance with CAN/CSA-A23.1/A23.2.

vi. Aggregates shall be white or light coloured in accordance with CAN/CSA-A23.1/A23.2.

vii. Pigments shall be white non-staining, non-bleeding, non-fading, titanium dioxide.

viii. Material integrity of structural elements such as precast concrete panels and steel shall not be broken, cracked, scratched, damaged, dented, deformed, or contain any visual defects such that they are detectable from a distance of 3000 millimetres. Any precast concrete panels or steel that do show any form of damage or defection as per above, shall not be acceptable.

ix. All coatings such as anti-graffiti coatings shall be non-sacrificial such that it will not change the appearance of the base material.

x. Concrete for use in Ultra High Performance Concrete (UHPC) shall be self consolidating.

h) Terracotta (EW1D)

i. Extruded through body colour terracotta clay tile elements with natural finish shall have the following minimum criteria:

ii. Pore size in clay body shall not exceed 1.0 millimetre.

iii. Diagonal flatness: Deviation of the tile flatness shall not exceed 0.25% of the diagonal measurement.

iv. Straightness: Deviation shall not exceed 0.25% of total module size.

v. Water absorption (ASTM C67): Absorption by submersion shall not exceed 5 percent average, 6 percent individual specimen.

vi. Water absorption (ASTM C67): Absorption by boiling shall not exceed 7 percent average, 8 percent individual specimen.

vii. Freezing and thawing (ASTM C67): No sample to lose more than 0.5 percent of its original dry weight. Samples to show no signs of cracking, crumbling or fracturing and shall conform to approved colour range samples before and after testing.

viii. Modulus of rupture (ASTM C67): Not less than 2500 lb/inch 2.

ix. Thermal shock resistance (ASTM C484): Samples to pass minimum of 2 cycles.

x. Efforescence (ASTM C67): Samples to be rated “No effervescent”.

i) Hardened concrete (FL3)

i. For shared platforms where both exterior and interior conditions occur, floor finish shall be hardened concrete and shall use a surface hardener to establish a durable and long wearing surface.

ii. This broadcast-applied surface hardener shall combine natural emery aggregates, cement and special wetting agents providing the most durable finish available using mineral aggregates.

iii. This product shall be broadcast into the wet concrete and forms an integral floor surface. Installation requirements shall be applied to the surface in 2 or 3 broadcasts, each being floated using power equipment. The surface shall then be power-troweled and hand-troweled to meet the coefficient of friction requirements as set out in this standard.

j) Vertical Circulation: Elevator Enclosure

i. Fire-rated, glazed, stainless steel elevator enclosure complete with self supporting supplementary support framing.

ii. Stainless steel sheet, channels, shapes, etc.: Type 316 in accordance with ASTM A269 and ASTM A666. Finish AISI No. 4. Material to match Station escalators.

iii. Structural steel: CAN/CSA-G40.20/G40.21, Grade 350W.

k) Vertical Circulation: Escalator Balustrade

i. Stainless steel sheet, channels, shapes, etc.: Type 316 in accordance with ASTM A167 and ASTM A279.

ii. Glass: Safety glass: to CAN/CGSB-12.1.

iii. Glazed escalator handrails to be cantilevered from escalator framing system. Joints in glazing to be maximum 12 millimeters and sealed with structural silicone. Mounting system to be concealed.

iv. Escalator LED lighting to be provided under handrail.

v. Additional protective balustrades shall be stainless steel type 304 and safety glass as per vertical circulation balustrades.

l) Vertical Circulation: Balustrades

i. Stainless steel sheet, channels, shapes, etc.: Type 316 in accordance with ASTM A167 and ASTM A279.

ii. Glass: Safety glass to CAN/CGSB-12.1.

iii. Glass sealant: Dry gasket type.

iv. Glazed balustrades to be cantilevered from escalator framing system. Joints in glazing to be maximum 12 millimeters and sealed with structural silicone. Mounting system to be concealed.

v. Balustrade mounting system, handrails, and all components to be fabricated from stainless steel.

m) Automatic Exterior Sliding Aluminum Doors (DR1)

i. Heavy duty clear anodized aluminium automatic sliding doors with laminated tempered glass in aluminum frame where doors are required to be accessible and controlled by emergency ventilation system.

ii. Design automatic door equipment to accommodate traffic loading of 100,000 cycles.

iii. Nominal wall thickness of framing system: 3 millimeter minimum.

iv. Thermally broken framing to have complete separation of interior/exterior components with no bridging by fasteners permitted. Use of fiberglass pressure plates to achieve performance ratings will not be accepted. Exterior doors shall be insulated.

v. Glazing: Safety glass to CAN/CGSB-12.1. All doors shall demonstrate maximum transparency/visibility.

vi. Finish: Clear anodized to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes. AA-M12C23A41. Clear anodized aluminum finish shall be Architectural Grade 2 Finish for greater durability.

n) Manual Exterior Swing Aluminum Door (DR2)

i. Heavy duty clear anodized aluminum proven high quality door with laminated tempered glass in aluminum frame. The aluminum frame must sit on a concrete/masonry curb of 150 millimetres minimum when exposed to weather conditions and salt.

ii. Aluminum extrusions and channels: to ASTM B211 and ANSI H35.1 AA6063 alloy, T6 temper.

iii. Reinforcements and anchors: ASTM A167, Type 304 to AISI No. 2B finish.

iv. Glazing: Safety glass to CAN/CGSB-12.1. Wire meshed glass shall not be permitted.

v. Stiles to be approximately 88 millimeters (3 ½”).

vi. Door hardware including door pulls, push bars, kick plates, hinges to be stainless steel and suitable for heavy use.

vii. Clear anodized aluminum finish shall be Architectural Grade 2 Finish for greater durability.

o) Manual Hollow Metal Door and Frames (DR3)

i. Provide doors and door frames in accordance with requirements of Canadian Steel Door and Frame Manufacturing Association (CSDMA) and Hollow Metal Manufacturers Association (HMMA).

ii. Doors and frames to be heavy duty, fully welded, steel stiffened doors in accordance with CSDMA requirements.

iii. Face sheets and frames: Tensioned levelled steel in accordance with ASTM. A924/A924M. Galvanized in accordance with ASTM A653/A653M, Commercial Steel (SC), Type 6. Minimum coating designation, ZF75 (A25) for internal use and ZF180 (A60) for exterior use.

iv. Glazing: Safety glass to CAN/CGSB-12.1.

v. Colour of all door and door frames shall match adjacent wall finish colour. Paint for doors and frames to be a DURANAR XL fluoropolymer coil coating. Finish: Powder coating meeting the requirements of AAMA 2605.

vi. Fire rated doors and door frames to be label and listed in conformance with CAN4/ULC-S104M and CAN4/ULC-S105M.

p) Mechanical Louvers (LV1)

i. Provide stormproof louvres with center watershed in blade and concealed mullions to limit water and snow penetration.

ii. Aerodynamic performance: Minimum 46% free area when tested in accordance with Air Movement and Control Association (AMCA requirements).

iii. Limit deflection of louver members to not more than 1/180 of span between supports when subjected to wind load of 1 kPa applied horizontally to louvre face.

iv. Blade: ASTM B209, 1.7 millimetres thick minimum; maximum blade length 1500 millimetres.

v. Frame and mullion: ASTM B211, AA 6063-T5, extruded, minimum wall thickness 2.06 millimeters.

vi. Finish: Fluoropolymer conforming to AAMA 2605.

vii. Colour: To match adjacent wall finish.

viii. Where perforated panel occurs in front of louver, required minimum open area percentage shall be achieved.

q) Floors: General Requirements

i. Where flooring is being applied to structural substrates with a deflection of l/360 or greater, provide an anti-fracture membrane as part of the flooring system to ensure flooring will not crack due to substrate deflection.

ii. Epoxy grout shall be used for all washroom tile floors and base. Sanded grout shall be used for all other flooring tile areas. Grout colour to match floor tile colour. Maximum floor grout size shall be 3.175 millimeters (1/8").

iii. Floors shall be non-slip where dynamic coefficient of friction (ASTM C1028) of floors to be: 0.70 (dry); .060 (wet).

iv. Shiny surfaces shall be prevented as these produce glare and reflection which can disorientate customers. The Unified Glare Rate (UGRL) shall not exceed 25 for circulation areas.

v. Floor drains shall be screened and capped flush with finished floor.

r) Terrazzo (FL1A): Technical Requirements

i. Terrazzo system to consist of 22 millimeters underbed and 16 millimeters topping matrix in accordance with the TTMAC 09 66 00 Terrazzo Specification guide.

ii. Marble chips: Uniform, sound and abrasion resistant, graded in accordance with TTMAC standards, free from flats and flakey particles.

iii. Slip resistant aggregate: White aluminum oxide (AL203) 36 grit.

iv. Provide a chemical resistant sealer for terrazzo used in washroom facilities.

v. For radius of inside and outside terrazzo corners refer to TTMAC 09 66 00 Terrazzo Specification Guide.

s) Floor Tile and Base (FL1B): Technical Requirements

i. Unglazed, dry-pressed, single fired, porcelain tile conforming to ANSI A137.1, Class P1 and meeting the following:

1) Slip resistance: Provide materials having a minimum DCOF 0.5 dry/wet, when tested in accordance with ANSI A137.1 with the BOT 3000 Digital Tribometer.

2) Water absorption (ASTM C373): 0.3%

3) Resistance to Deep Abrasion (ASTM C1243): 150 millimetres^{3} max.

4) Chemical resistance (ASTM C650): Class A

5) Combustibility (CAN/ULC S114): Non-combustible.

6) LRV: 23%

ii. Interior base: meeting the same criteria as floor tile complete with nominal 100 millimetres high vertical let and internal radius of nominal 12 millimetres from vertical to horizontal.

iii. Tactile, wayfinding, and platform edge tile: Shall comply with ISO 23599.

iv. Tile setting beds and grouts: Setting beds: salt resistant, non-polymer, 100% aluminate cement, having the following criteria: Grout: salt, chemical, and stain resistant.

t) Natural Granite (WB3,FL3)

i. 10 millimetre thick minimum, fiberglass backed, faced modular wall system conforming to the following criteria:

ii. Density (ASTM C97): 2867.3 kg/m3.

iii. Modulus of rupture (ASTM C99): 12.88 MPa.

iv. Compressive strength (ASTM C170): 152.53 MPa.

v. Flexural strength (ASTM C880): 20.2 MPa.

u) Walls: General Requirements

i. All finishes and materials to be composed of non-designated substances defined in Occupational Health and Safety Act (OHSA).

ii. Flame spread ratings for wall and ceiling finishes are as per NFPA 130 and OBC.

iii. For wall bracing system installation, use invisible fixation system continuously vertically and horizontally to allow for easy installation, repair, and replacement.

iv. Wall finish shall be smooth, non-glossy, and non-abrasive.

v. Thresholds higher than 10 millimetres from the finished floor shall be beveled to a 30 degree angle.

vi. Provide protection for outside corners and ease of maintenance for inside corners.

vii. Shiny surfaces shall be prevented as these produce glare and reflection which can disorientate customers. The Unified Glare Rate (UGRL) shall not exceed 25 for circulation areas.

viii. Wall finishes shall be non-combustible, and non-toxic when exposed to flame.

ix. Wall base to be Integral 150 millimetre high base tile.

x. Wall systems at platform level to be secured in place to meet 2 kPa pressure suction/pulse created when train approaches/departs station.

xi. Light reflectance of wall surfaces shall be 50% reflective.

v) Walls: Technical Requirements

i. Sintered ceramic tile: 6 millimetres thick minimum, faced modular wall system conforming to the following minimum criteria:

1) Moisture expansion (ASTM C370): less than 0.1%.

2) Water absorption capacity (ASTM C373): 0.2% max.

3) Thermal shock (ASTM C484): No defects or damage.

4) Chemical resistance (ASTM C650): Class A.

5) Resistance to freeze-thaw cycling (ASTM C1026): No visible damage, 0.02% weight loss max.

6) Resistance to deep abrasion (ASTM C1027): 105 $millimetres^3$ max.

7) Surface burning characteristics of materials (ASTM E84): FS: 7; SD 36.

8) Fire test of exterior wall assemblies (CAN/ULC S134): Non-combustible.

ii. Porcelain tile: Unglazed, dry-pressed, single fired, porcelain tile conforming to ANSI A137.1, Class P1 and meeting the following:

1) Water absorption (ASTM C373): 0.3%

2) Resistance to deep abrasion (ASTM C1243): 150 $millimetres^3$ max.

3) Chemical resistance (ASTM C650): Class A

4) Combustibility (CAN/ULC S114): Non-combustible.

w) Feature walls: Technical requirements

i. Aluminum: Minimum 3 millimetres thick, Aluminum Association alloy 3003-H14, paint quality, tensioned levelled sheet. Perforation open area: 50%

ii. Finish: Fluoropolymer conforming to AAMA 2605. Finished after perforating.

iii. Perforation Open area: 50%.

iv. System to be designed to allow for window cleaning operations.

v. Backing panel: Galvanized steel in accordance with ASTM A653/A653M, Z275 zinc coating or aluminum sheet conforming to ASTM B209, T6 Temper.

vi. Acoustic insulation: ASTM C665, Paperless, semi-rigid, spun stone wool fibre.

vii. Acoustic backing material as required to achieve specified minimum 0.70 NRC performance.

x) Ceilings: General Requirement

i. Flame spread ratings for wall and ceiling finishes are as per NFPA 130 and OBC.

ii. Provide interior wall and ceiling acoustic finishes to achieve a minimum Noise Reduction Coefficient (NRC) per ASTM Test Method C423.

iii. Ceiling substrate and finishes shall be a hard and durable surface, dent resistant, low moisture absorption, requiring minimal demonstrated maintenance, washable, cleanable, scuff resistant, non-combustible, non-staining, and non-corrosive.

iv. Shiny surfaces shall be eliminated as these produce glare and reflection which can disorientate customers. The Unified Glare Rate (UGRL) shall not exceed 25 for circulation areas.

v. All ceiling tile at platform level to be secured/clipped in place to meet 2kpa pulse created when train approaches/departs station.

y) Ceiling systems: Technical requirements

i. Metal: Acoustic panel system conforming to the following:

ii. Galvanized steel: ASTM A653/A653M, Z275 zinc coating.

iii. Aluminum sheet: ASTM B209, T6 Temper.

iv. Acoustic material: Factory adhered non-woven fiber mat with minimum 0.70 NRC.

v. Surface burning characteristics of materials (ASTM E84).

z) Manual Interior Swing Aluminum Door (DR4)

i. Highly visible public facing doors such as door to station ambassador, shall be a thin profile aluminum frame with laminated tempered glass in aluminum frame.

ii. Aluminum extrusions and channels: to ASTM B211 and ANSI H35.1 AA6063 alloy, T6 temper.

iii. Extrusion finish: Clear anodized to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes AA-M12C22A41.

iv. Reinforcements and anchors: ASTM A167, Type 304 to AISI No. 2B finish.

v. Glazing: Safety glass to CAN/CGSB-12.1. Wire meshed glass shall not be permitted.

vi. Low profile door frame where stiles shall have the following maximum dimension:

1) Door thickness: 45 millimetres.

2) Vertical stiles: 55 millimetres.

3) Top rail: 60 millimetres.

4) Bottom rail 100 millimetres.

vii. Design interior doors to demonstrate maximum glazing.

viii. Wall thickness of door framing: 2 millimetres min.

ix. Door hardware including door pulls, push bars, kick plates, hinges to be stainless steel and suitable for heavy use.

x. Clear anodized aluminum finish shall be Architectural Grade 2 Finish for greater durability.

xi. Where power-assisted doors open into a barrier free route of travel, cane detectable guardrails shall be provided or other form of barrier(s) at right angles to the wall containing the door.

xii. Controls for power assisted doors and automatic doors shall conform to the DS-02 Universal Design Standard.

xiii. All other door requirements including clear opening dimensions, contrast, distraction patterns on glass, opening force, shall follow requirements outlined as per DS-02 Universal Design Standard.

aa) Foot Grilles

i. Foot grille with recessed pan shall be depressed flush with floor finish at all interior public entry / exit doors. Width of foot grille shall align with width of door opening as a minimum. Length of foot grille shall be a minimum of 3000 millimetres. Where space allows, extending length of foot grill to meet requirements outlined in Section 2.0 Sustainability may contribute towards additional LEED score credits. Pans requiring integrated drains are a maintenance and operations decision, and are based on a project by project basis.

ii. Stainless steel sheet, angles, shapes, etc.: Type 316 in accordance with ASTM A167 and ASTM A279.

iii. Frame and Grid: recessed, level base frame complete with 1.5 millimetre drain pan, minimum 46 millimetre deep by area indicated. Tread rails joined mechanically by key lock bars.

iv. Drain: 50 millimetre I.S.P PVC drain complete with stainless steel strainer.

v. Finish: Exposed: AISI No. 4 finish. Concealed: Mill finish.

vi. Tread insert: Serrated stainless steel.

ab) Tactile Walking Surface Indicators (TWSI): Technical requirements

i. Tactile Walking Surface Indicators (TWSI) shall be provided for both attention indicators and guiding indicators. TWSI specifications for dimensions, arrangement and height shall be according to ISO 23599 assistive products for blind and vision impaired persons. Functionality and application of TWSI systems shall be according to ISO 21542, Annex B and CSA B651. In addition, TWSI shall follow requirements including spacing, dimensions, colour contrast as outlined in the DS-02 Universal Design Standard.

ii. Tactile, wayfinding, and platform edge tile shall conform to AODA and CSA B651 requirements including requirements for truncated domes.

iii. Both guiding and attention indicators shall be integral type. Discrete type TWSI's shall not be permitted.

ac) Paint and Caulking: Technical Requirements

i. Perform painting work to Master Painter Institute (MPI) requirements for premium grade first line products.

ii. All materials including but not limited to, primers, stains, and paints are to have low VOC content limits. Refer to Section 2.0 Sustainability.

iii. Provide paint products meeting MPI "Green Performance Standard GPS-2-12.

iv. All paint to be scuff resistant.

v. Ensure demonstrated minimum amount of caulking due to concerns around vandalism.

vi. All exterior painted surfaces shall have a gloss level from 20-70 units at 60 degrees.

5.0 Unpaid Transaction Zone

5.1 UNPAID TRANSACTION ZONE

Note: This section shall be read in conjunction with:
DS-02 Universal Design Standard,
DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual

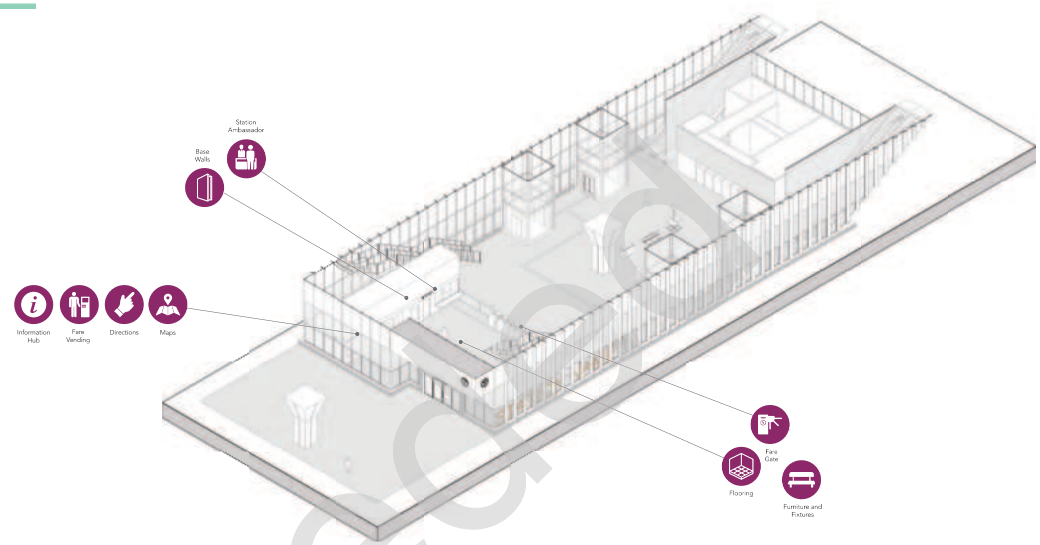


Figure 5-1: Touch point diagram: Unpaid transaction zone

Figure 5-2: Unpaid Transaction Zone: Interior View

5.1.1 Overview

The unpaid transaction zone is the area of greatest customer traffic convergence that must deal simultaneously with the needs of passengers entering and exiting the station, fare purchase and gate access using the PRESTO Fare Handling System, trip planning information, waiting, and security. It is the crucial in between place that must orient people into the station and out to the surrounding vicinity. The conflicting demands of accommodating large pedestrian traffic flows while centralizing these activities of fare purchase, information gathering, waiting and orienting require a thorough and sensitive design response for the customer.

5.1.2 Adjacencies

The key design elements are organized as a kit of parts that are all integral to one another. These elements all have a direct relationship with one another, and it is important to understand the synergies and adjacencies in all station conditions.

The key unpaid transaction zone design elements are:

a) self serve hub, including the Fare Vending Machines (FVM's) and Information Hub (maps and journey planning information);

b) fare gates;

c) station ambassador.

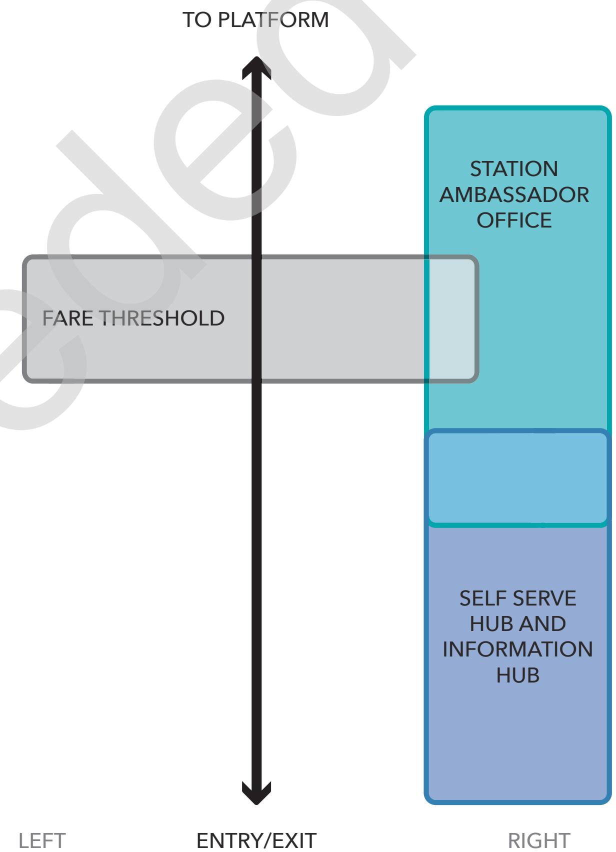


Figure 5-3: Self serve hub: Adjacencies

5.1.3 Planning Requirements

The arrangement and sequence of how a customer interfaces at each of these elements is required to be consistent at all main entry/exit points while ensuring familiarity and provide a user-friendly experience for the customer.

Upon entry to the station, the sequence of elements is critical to ensure efficient customer flow while minimizing circulation conflict with other customers.

a) The sequencing of actions are in order as follows:

   i. journey planning;

   ii. fare purchase (if required);

   iii. assistance at/from the station ambassador (if required);

   iv. continue through fare gates to paid access area towards platform/transit connection(s).

b) The self serve hub and station ambassador shall be co-located.

c) The self serve hub, and station ambassador shall be located on the right-hand side as the customer enters the station to align with right hand circulation. Refer to Figure 5-3: Self serve hub, station ambassador and fare threshold – Adjacencies. Any deviation from this arrangement/co-location requirements shall be presented to Metrolinx for review/approval.

d) A minimum of one Passenger Assistance Intercom (PAI) is required within the unpaid transaction zone and shall be wall or floor mounted. For further information, refer to Section 2.4.3 Two way communication for Passenger Assistance Intercom (PAI).

5.1.4 Configurations

There are specific requirements of how these elements are to be arranged with preferred approaches. In each case, these elements are to be integrated within the architecture and form a cohesive solution. Below are examples of potential configurations that show acceptable and unacceptable configurations. Refer to Figure 5-4: Self serve hub, station ambassador and fare threshold – Configurations.

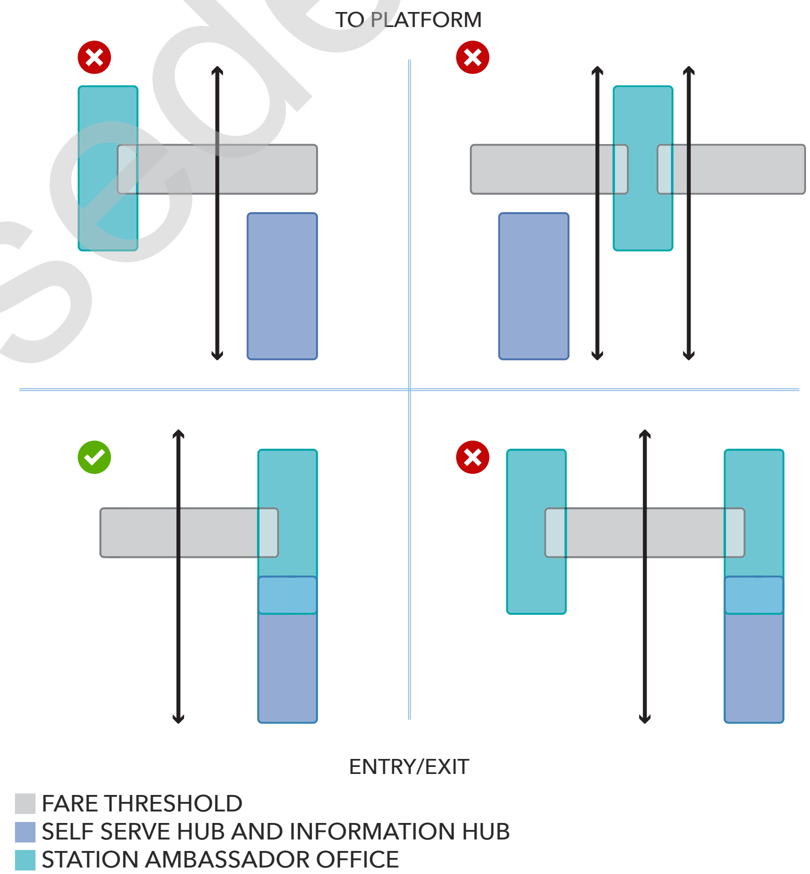


Figure 5-4: Self serve hub, station ambassador, and fare threshold: Configurations

5.2 SELF SERVE HUB

5.2.1 Overview

While the positioning and exposure of the self serve hub is critical, this key element is required to be recognizable and familiar to all customers. The sequencing of these elements, including their location, configuration, adjacencies, and clearances, are all critical to ensure a consistent customer experience. Planning one's journey and performing any fare related interactions occurs using digital media channels or with the static information provided at the self serve hub. The experience shall be accessible and easy to understand for all customers, allowing them to access services safely and independently with ease.

The end goal is to ensure the customer was able to plan their journey, purchase their fare, receive information in order to continue their journey safely, quickly, and efficiently.

As the nature of fare payment will evolve in the future, it is likely that fare thresholds will transition to a contactless system, where the FVM's within the self serve hub may be reduced to a single FVM, or potentially, no longer be required. However, regardless of whether FVM's are reduced or are removed, journey map information will remain and be required to support the journey planning needs of the customer.

In this scenario, when and if space becomes available due to future removal of FVM's, empty conduit shall be provided to support power and data cabling infrastructure requirements for potential non-fare revenue services such as retail and advertising and/or other transit or community-oriented functions at Metrolinx discretion.

Where coordination, supply, install and commissioning of fare systems is provided and coordinated by the same entity that builds the station, a recessed and fully integrated approach to fare machines may be pursued subject to Metrolinx review and approval, and in line with the Project Agreement (PA) and in consultation with operator.

5.2.2 Description

The self serve hub is a modular integrated element combining a self-automated fare system and real-time information wall that provides the necessary data for customers to plan their journey. This element is required to be consistent and highly visible and recognizable within the unpaid transaction zone.

The self serve hub can be found at the station entry points within the unpaid transaction zone, as well as within paid access area for interchange and intermodal stations where GO Transit and subway connections occur.

The elements that make up the self serve hub include:

a) Information Hub including journey planning represented in the form of static maps (this includes information related to "Regional Transit", "Buses from Here", "Facility Map". Refer to DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual

b) Provide a minimum of 2 FVM's adjacent to the station ambassador at a stations primary entrance. Provide a minimum of 2 FVM's at the secondary station entrance. Any additional FVM's required at entrances other than the primary or secondary entrances, is site specific and shall be determined on a project by project basis. Note: The purpose of including a second FVM at primary or secondary entrances is for redundancy in the event one of the FVM's is not operating.

c) Identity and digital signage displaying information such as vehicle departures and arrivals, system delays, elevator outages with touch screen technology.

d) Waste receptacle and recycling unit(s).

5.2.3 Information Hub

Note: DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

Information Hubs are the first stage in the customer journey where information is provided in a series of static visual maps for customer context and journey planning. However, with future advances in digital technologies, power and data infrastructure including empty conduit for future digital screen and audible technology shall be provided.

There are typically three maps that make up the Information Hub:

a) Overall Regional Transit Map;

b) “Buses from Here” Map; and

c) Facility Map.

The intent of indicating all subway lines and extensions within the Regional Transit Map is important to show context, allowing the customer to plan the end to end journey, showing transfers, and any other integrated fare payments scenarios. Refer to Figure 6-5: Information Hub - Journey map types.

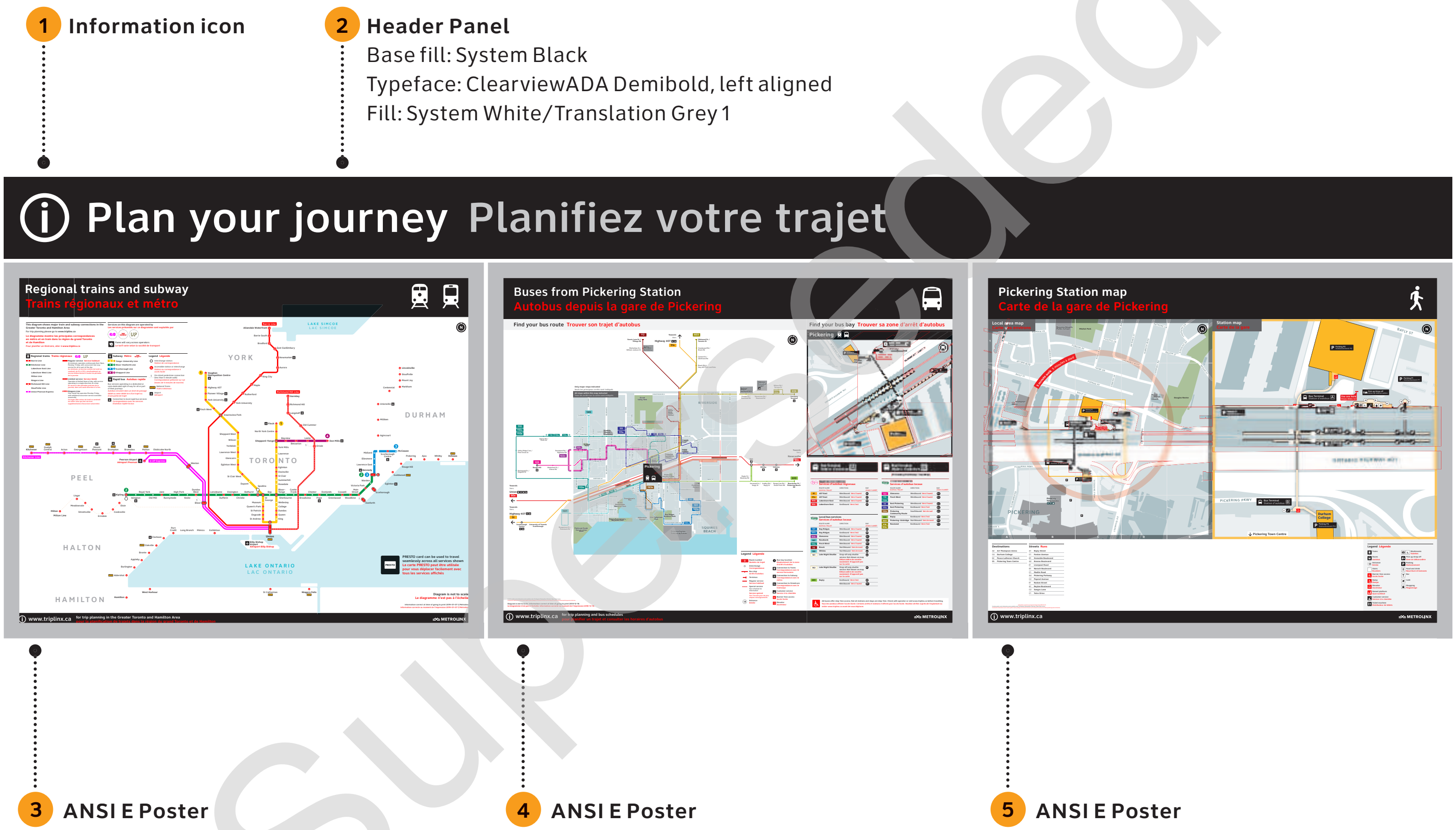


Figure 5-5: Information Hub: Journey map types

5.2.4 PRESTO Overview

These standards are based on PRESTO information available at the time of release. It is essential, therefore, that the latest information is accessed and a full understanding of the current PRESTO standards and relevant equipment is obtained to inform planning decisions and ensure required clearances are achieved.

As future demand for on site fare purchases may increase or decrease depending on ridership numbers, user demand, or off-site fare purchases, it is imperative that flexibility within the unpaid transaction zone be planned for to allow for potential additional and/or removal of FVM's to suit specific sites.

The self serve hub is connected to the PRESTO Fare Handling System, a smartcard-based fare payment system designed to support the use of one common fare system for fare payment on various participating public transit systems. The PRESTO Fare Handling System is directly linked to the equipment that make up the self serve hub. PRESTO equipment is proprietary, and supplied and installed by the appropriate contractor.

There are a variety of FVM's that have a specific function within the range of PRESTO equipment. In this standard, FVM's are referenced as a generic terminology for all fare related machines and equipment. The following is a partial list of machines under the PRESTO Fare Vending Machine umbrella:

a) Fare Vending Machines (FVMs);

b) SPOS (Station Point of Sale) located on service counters if applicable;

c) SFTP (Station Fare Transaction Processor) if applicable;

d) Inspection device for Inspector / Fare Enforcement if applicable;

e) Self-serve Reloading Machine (SSRM) if applicable.

Refer to PRESTO Service Standard for required PRESTO System Equipment and installation details. PRESTO shall provide this Service Standard currently under development.

5.2.5 Branded Modular System

The self serve hub shall be a consistent and easily identifiable branded element for customers across the customer journey. This element maintains planning flexibility in a modular design and is intended to be adaptable to suit all station configurations. Space required surrounding these elements shall accommodate for future expansion in the event a FVM is required to be added, repaired, and/or removed.

Recessed wall niche type - The layout of Fare Vending Machines (FVM's) at the self serve hub, shall be recessed within a wall niche and serve as the base type, where all sides of FVM's and wall niche finishes are visible. Wall niche depth to measure 600 millimetres. Customer facing wall finish material and colour within wall niche to be provided for review and approval by the owner of this standard.

Flush type - Alternatively, a flush mount wall condition shall be incorporated where FVM's are recessed within the wall niche, and made flush with wall finish and align with wall plane. Customer facing infill / surround wall finish material and colour to be consistent within the self serve hub. All niches and voids shall be enclosed for safety and orderliness. Customer facing wall finish material, colour, and graphics to be provided for review and approval by the owner of this standard. Infill panels shall be designed to be modular and removeable in the event FVM's are required to be accessed for maintenance and/or replaced in future. If size/dimensions of future FVM's changes, new infill / surround shall be fabricated to accommodate and ensure a custom fit. All hardware and fasteners shall be concealed.

5.2.6 Self Serve Hub: Planning Requirements

Clearances outlined below shall be the minimum requirements. With the recent impacts of the global Covid 19 pandemic, ensuring minimum 2000 mm clearances with regards to maintaining social distancing, shall be highly advisable to proactively address virus related outbreaks in the future.

The following requirements are to be read in conjunction with Figure 5-6: Self serve hub, station ambassador, and fare gates – Detail drawings

a) Self serve hub and supporting fare equipment shall be located on the right side of the passenger flow as a customer enters/exits the station. All other configurations shall be presented to Metrolinx for review/approval.

b) Self serve hub shall be:

  i. visible from the entrance door;

  ii. located where there is a high volume of passengers;

  iii. provide a direct line of sight to the station ambassador office;

  iv. located at all entry points.

c) Location of FVM's and related fare equipment shall provide clear unobstructed access and egress in the event of an emergency.

d) While queue space in front of FVM's is expected to be a demonstrated minimum dimension, queue space shall be provided as follows:

  i. provide clear queue space for a minimum of three (3) people standing perpendicular in front of each machine;

  ii. allow queue space of 1400 millimetre per person as per National Fire Protection Association (NFPA). Where dimensions are in conflict, the most stringent shall be implemented;

  iii. queue space for three people shall not interfere with egress/path of travel/or other fare gate queue space. In scenarios when more than three (3) people are queuing directly behind one another, it is allowable for FVM queue space to overlap with fare gate queue space.

e) Queuing space shall be increased based on historical peak station demand information provided by Metrolinx.

f) The number and type of fare devices required within the self serve hub will be determined in accordance with project-specific scope within the PA.

g) FVM's shall be provided at all stations within the unpaid transaction zone adjacent to the station ambassador office. For all interchange and end of line stations, FVM's including supporting infrastructure shall be provisioned for in the paid access area adjacent to the station ambassador office.

These machines shall allow customers to tap-out, load funds or purchase fares. FVM's shall be located outside the required fare gate queue space, as customers enter/exit. Fare system to be co-ordinated with fare procurement strategy and /or PA.

h) For all FVM's, provide required infrastructure including power/data and ensure conduit is concealed from view.

i) FVM's shall be equally spaced along the length of the wall, with a clear turning space of 2000 millimetres, centered on the target (device) to accommodate a clear turning space for wheeled mobility device users. When multiple devices are adjacent to each other, the clear turning space of 2000 millimetres may overlap. Devices shall be equally spaced along the length of the wall, centered at 1700 millimetres on the mid-point of each FVM as per DS-02 Universal Design Standard.

j) FVM's shall be located at least 1000 millimetres from adjacent inside corners and return walls.

k) FVM's shall comply with the requirements under the Metrolinx Accessible Self-Service Kiosk (MASK) checklist.

l) Power and data connections shall be provided for all FVM's and self serve hub while ensuring they are mechanically protected. Conduit for power and data cabling shall stub up from floor into electrical floor box and shall be concealed. Provide 1000 millimetres of power and data cable slack for final termination of equipment by others. Conduit infrastructure for future power and data cabling shall be roughed in to allow for future flexibility/expansion of services in response to future requirements. Power and data to FVM's shall be on emergency battery power.

m) FVM's shall mount directly to finished floor, where no special base is required.

n) Depth of area or gap behind FVM's and partition, shall accommodate specific maintenance and operations requirements as determined by operator.

o) Where FVM's are placed in front of a glass curtain wall, power access shall be from floor and gap behind FVM shall be clear and easily accessible for maintenance.

p) All station elements shall be anchored securely to prevent from being stolen, damaged or used as a weapon. All fasteners shall be concealed and be vandal proof.

q) One (1) waste receptacle and recycling unit shall be provided adjacent to each self serve hub and Information Hub.

r) Infrastructure provisions for future digital signage shall be planned for at the self serve hub. This future digital information will enhance the customer journey by providing live information such as time of arrival/departure/delays/closures of train and bus networks. Location of signage shall be placed closest to the path of travel. Placement of digital departure screens shall conform to DS-02 Universal Design Standard. For further information specific to digital signage, refer to DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

s) A second FVM shall be provided for redundancy in event of power failure.

t) A minimum of one Passenger Assistance Intercom (PAI) is required within each unpaid transaction zone. Refer to Figure 5-6: Self serve hub, station ambassador, and fare gates – Detail drawings. For details specific to PAI, refer to Section 2.4.3 Two way communication for Passenger Assistance Intercom (PAI).

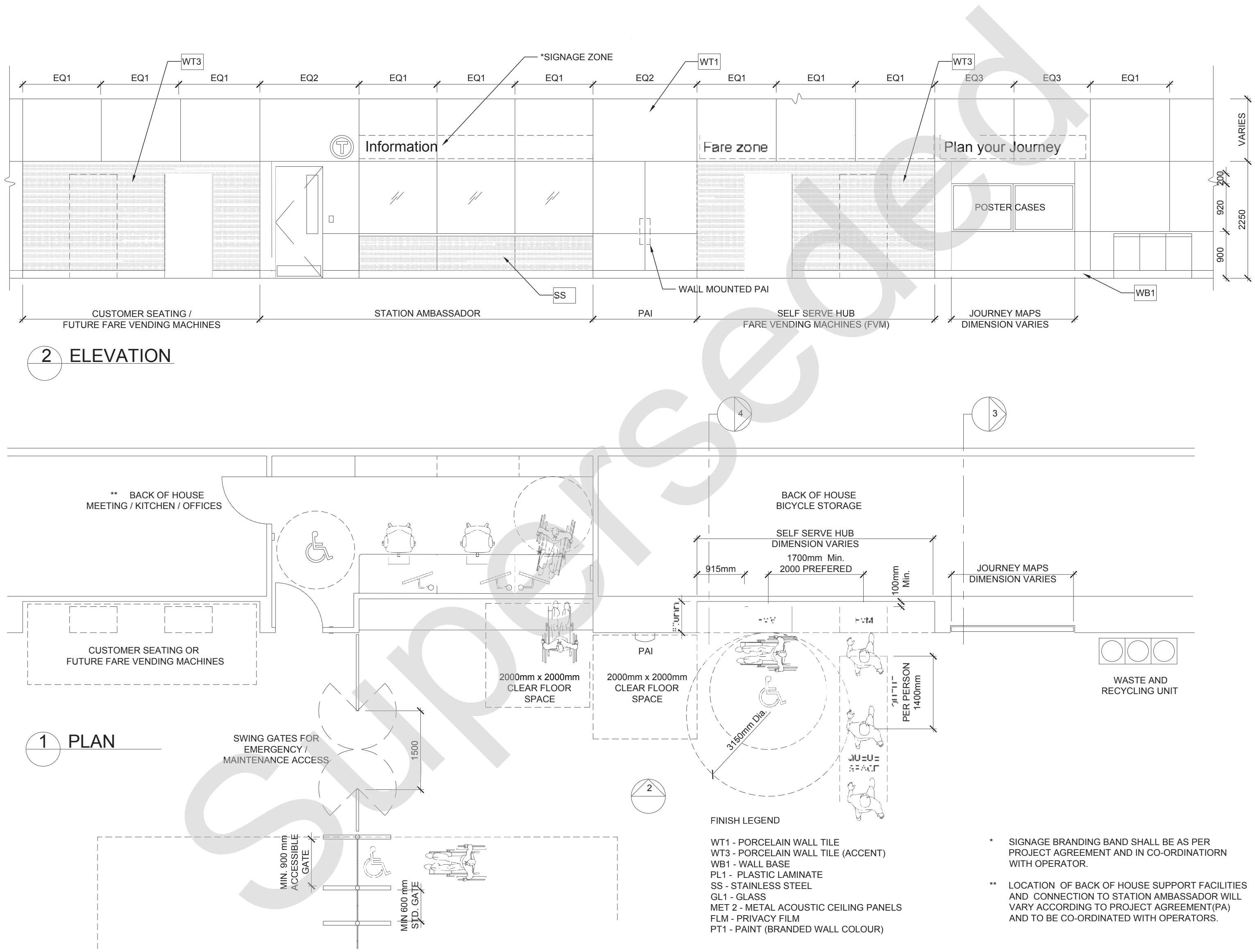
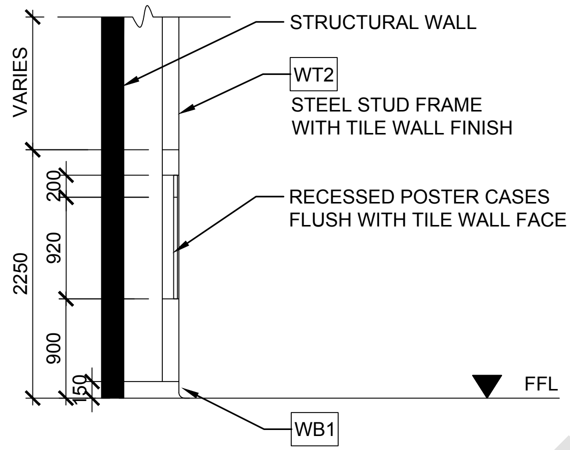
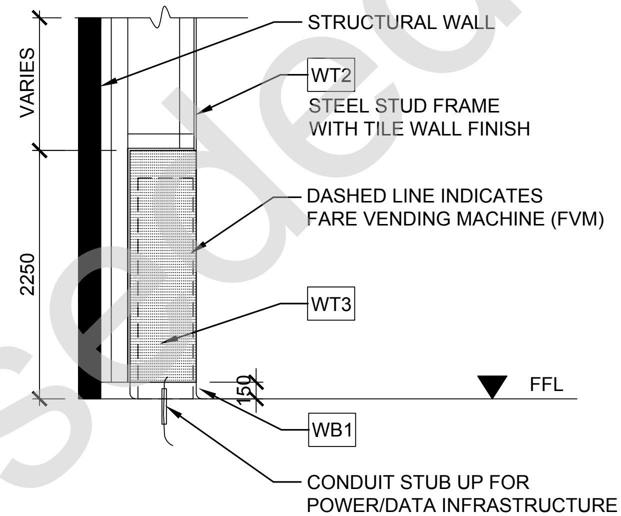


Figure 5-6: Self serve hub, station ambassador, and fare gates: Detail drawings



3 SECTION



4 SECTION

FINISH LEGEND

WT1 - PORCELAIN WALL TILE
WT3 - PORCELAIN WALL TILE (ACCENT)
WB1 - WALL BASE
PL1 - PLASTIC LAMINATE
SS - STAINLESS STEEL
GL1 - GLASS
MET 2 - METAL ACOUSTIC CEILING PANELS
FLM - PRIVACY FILM
PT1 - PAINT (BRANDED WALL COLOUR)

Figure 5-7: Self serve hub and Information Hub: Sections

5.3 FARE GATES

5.3.1 Overview

Fare gates, also known as the fare threshold, serve as a necessary demarcation and control point for all paying customers allowing them to easily enter and exit through, while eliminating potential customer fare evasion. The fare threshold shall accommodate all customers and not discriminate based on physical ability. These controlled access points shall be barrier free and safe for all customers.

5.3.2 Description

The fare threshold is a linear control point designed to allow paying customers access to the station by using the PRESTO fare system. Automatic gates open and close to allow access in and out of the station as customers continue their journey. In addition, fare gates are able to determine the number of passengers that enter and exit, helpful to determine customer flows during special events and or emergency situations.

In the case of future contactless / open payment, where fare gates and readers are no longer required at station entry points, the flooring strategy shall be designed to be future ready, flexible to accommodate for the removal and replacement of flooring material at the fare gates such that an uninterrupted monolithic approach is maintained.

5.3.3 Fare Gate Arrangements

All fare gate arrangements shall be organized in a continuous linear manner, perpendicular to the path of travel at all entry / exit points. The linear configuration is the most common approach and shall be applied in all station conditions.

When a linear approach is technically proven not feasible, other acceptable configurations are illustrated as per Figure 6-8: Fare gate configurations. Where site conditions are such that deviations from those shown are technically proven not feasible, alternative scenarios are to be presented to Metrolinx for review/approval.

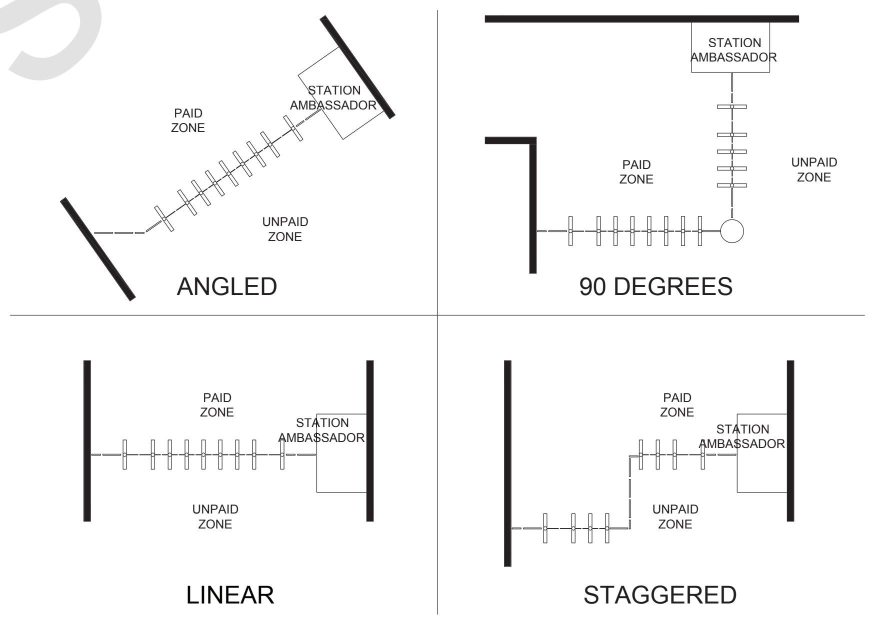


Figure 5-8: Fare gate configurations

5.3.4 Functional Design Requirements

The following requirements are to be read in conjunction with Figure 5-9 Fare gates: Layout and clearances.

a) Fare gates and associated fare gate equipment shall be located at all entry's and/or exits prior to descent/ascent to platform. In scenarios where a third party connection from development to platform occurs, a separate fare threshold shall be required.

b) Fare gates shall be aligned directly with entry to provide a clear and linear passenger journey.

c) Fare gates shall be organized in a continuous linear manner, perpendicular to the path of travel. Any alternative scenarios shall be presented to Metrolinx for review/approval.

d) Fare gates, station ambassador, and self serve hub shall be co-located within close proximity of one another.

e) The fare gates shall be sized:

   i. to accommodate the peak demand in the a.m. and p.m. peak periods;

   ii. to meet the required egress capacity for station emergency. Number of fare gates for each station shall be determined on a project by project basis;

   iii. to a minimum of 600 millimetres clear width for all standard fare gates.

f) The fare threshold shall provide a minimum of 5000 millimetres of queuing space on both sides from the fare threshold line.

g) In the event that any fare gate(s) are to be repaired, removed and/or replaced, a demonstrated minimum area of flooring shall be easily removed/replaced at the site of repair. Replacement of flooring material shall match existing flooring to ensure a continuous and monolithic colour, texture, and finish is achieved. In the event that fare fates are not required in the future due to contactless payment, flooring to be replaced at the fare threshold shall match the existing floor material on both sides of the threshold, creating an uninterrupted, monolithic floor surface without visible seams.

h) In the event of power loss or fire alarm activation, the fare collection area including fare gates shall automatically permit unrestricted egress. In other scenarios where customers require access through fare threshold, fare gates shall be able to be opened by operator intervention to permit unrestricted access.

i) All additional fare gates and related equipment that is in excess of the minimum, shall be determined through discussion with Revenue Operations.

j) Where fare gates consist of swing gates, doors shall open flush and swing open away from the customer and in the direction the customer is traveling.

k) When fare gates are fully glazed, doors shall include distraction patterns or a continuous opaque strip that shall:

   i. be visually contrasting to the background of the door;

   ii. be at least 50 millimetres high; and

   iii. extend the full width of the door.

l) Provide in floor electrical/data raceway below location of fare threshold to allow for easy access when fare gates require repair/replacement/ or additional gates. Provide flush access plates and conceal such that they don't impede traffic flows.

m) Power and data connections shall be provided for all fare gates while ensuring they are mechanically protected. Power and data conduit and wiring to be concealed from customer view. Provide 1000 millimetres of power and data cable slack for final termination of equipment by others. Power and data infrastructure rough in shall be provided to allow for future flexibility/expansion of services in response to future requirements. Power and data to fare gates shall be on emergency battery power.

n) Provide PRESTO fare gate equipment as per PRESTO equipment provided by third party.

o) Emergency crash gates within a section of the fixed railing shall be provided closest to station ambassador to allow access such as for emergency personnel, maintenance equipment, and oversized scooters. Clearance required shall be between 1300 millimetres – 1500 millimetres. Swing gates shall be manually operated and shall open beyond 90 degrees.

5.3.5 Accessibility

a) Fare gates shall follow requirements found in DS-02 Universal Design Standard.

b) All fare control lanes shall accommodate a minimum of two (2) accessible barrier free fare gates (Accessible gates). Any additional gates will be dependent on station/ project specific requirements.

c) One of the two accessible fare gates at a fare control lane shall be adjacent to the station ambassador office.

d) All accessible barrier free fare gates shall:

   i. be located along the accessible path of travel;

   ii. be identified with the International Symbol of Access (ISA).

e) An accessible fare gate shall have a minimum clear width of 900 millimetres when open to allow for the safe pass-through of customers in a wheelchair, scooter, as well as customers with bicycles, strollers, or other large items.

f) Each accessible fare lane is required to have one reader, where the horizontal centerline of the reader shall be positioned no more than 900 millimetres above the floor. When a second reader is provided, the reader shall be positioned 750 millimetres above the floor. Reader shall provide visual and audible feedback for successful tap for easy identification by all users and readers shall indicate which gate they open.

g) All accessible fare lanes shall meet the requirements of the Metrolinx Accessible Self-Service Kiosk (MASK) checklist and include a digital screen and reader.

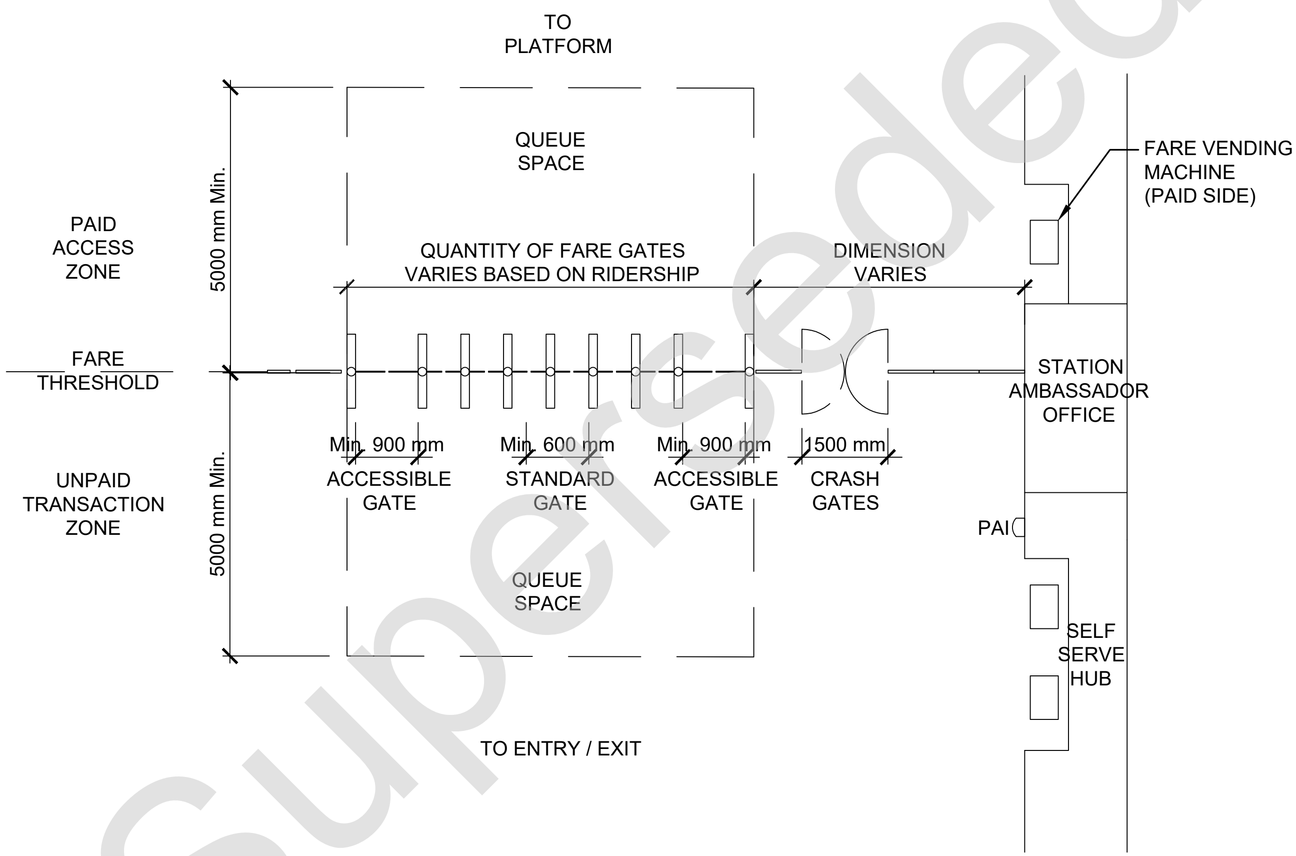


Figure 5-9: Fare gates: Layout and clearances

5.4 STATION AMBASSADOR

5.4.1 Overview

The station ambassador shall be a consistent branded element along the customer journey, and shall be easily identifiable by the customer as a zone with which to receive information with transit personnel. The station ambassador resides within the station ambassador office while also acting as a roaming station agent outside the office. In either scenario, transit personnel are able to provide the customer with support and security.

5.4.2 Description

The station ambassador office shall be designed as a flexible and modular component to accommodate future changes and staffing needs, advances in technology and customer service demands. While the current model is based on an enclosed type, design shall be flexible to be able to adapt to an open transaction space between station ambassador's and customers.

The station ambassador office is supported by co-locating back of house areas including a meeting room/lunch room and small kitchen area. Other back of house areas including supporting office areas for staff shall be co-located with the meeting room and small kitchen. When this is proven not technically feasible due to spatial restrictions, office spaces shall be located in areas identified as back of house and within close proximity of the station ambassador office.

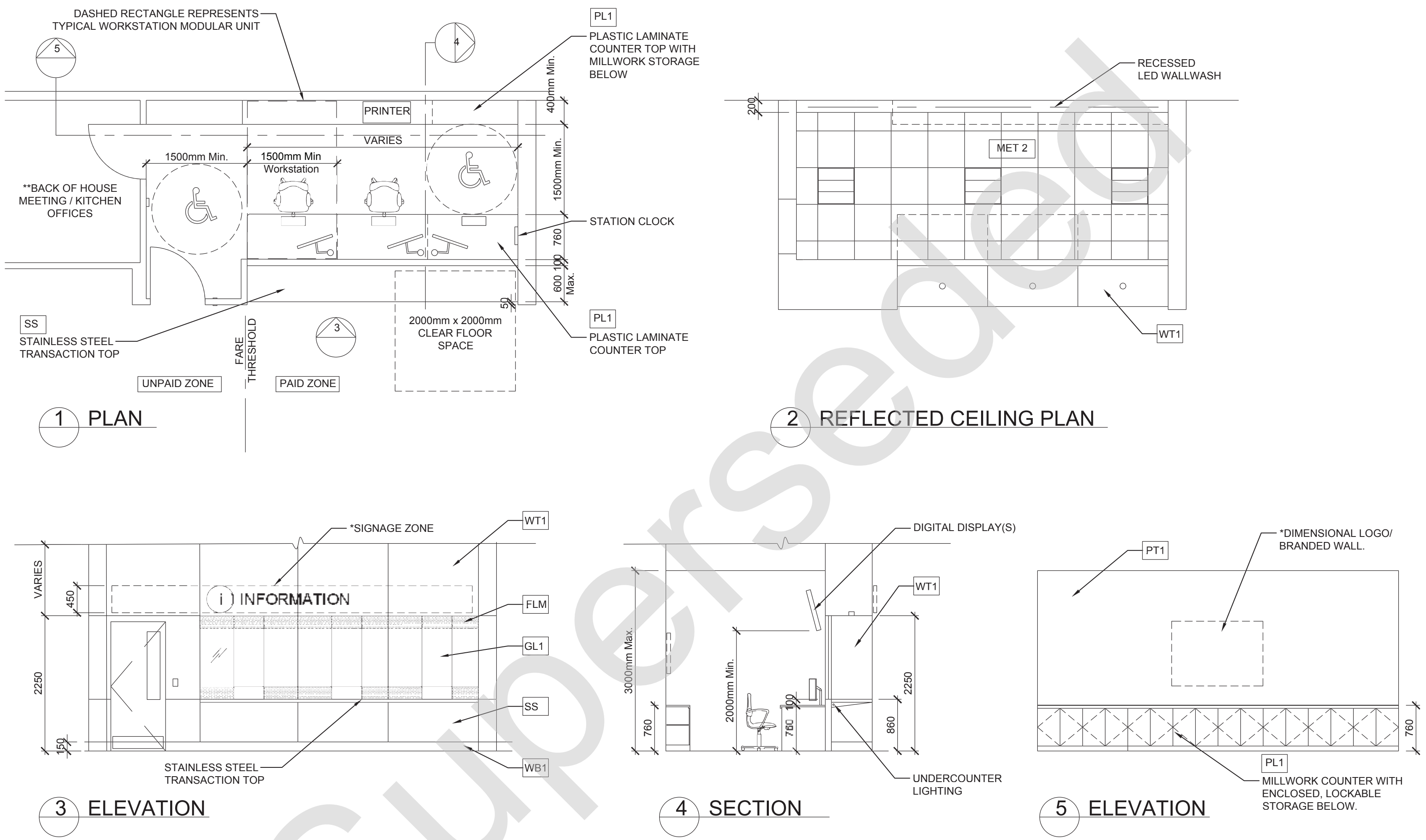
5.4.3 Flexibility and Modularity

There are design elements within the station ambassador office that shall be consistent; other elements that shall be flexible to meet requirements as outlined in each Project Agreement (PA) and in co-ordination with the operator. The elements that shall be determined as flexible and may vary on a case by case basis and include as indicated below.

a) Quantity of each staff workstation where each workstation module is to be a consistent length and width dimension that includes the same area of worksurface and circulation space as per Figure 5-10 Station ambassador office. Number of workstations to be determined as per the PA and co-ordinated with operator.

b) Relationship of the fare threshold with respect to the station ambassador may vary due to a variety of unknown site and spatial restrictions.

c) Adjacencies and connections from the station ambassador office to back of house staff related support spaces such as break rooms, lockers, and offices.



FINISH LEGEND

WT1 - PORCELAIN WALL TILE
WT2 - PORCELAIN WALL TILE (ACCENT)
WB1 - WALL BASE
PL1 - PLASTIC LAMINATE
SS - STAINLESS STEEL
GL1 - GLASS
MET 2 - METAL ACOUSTIC CEILING PANELS
FLM - PRIVACY FILM
PT1 - PAINT (BRANDED WALL COLOUR)

* SIGNAGE BRANDING BAND SHALL BE AS PER PROJECT AGREEMENT AND IN CO-ORDINATIORN WITH OPERATOR.

** LOCATION OF BACK OF HOUSE SUPPORT FACILITIES AND CONNECTION TO STATION AMBASSADOR WILL VARY ACCORDING TO PROJECT AGREEMENT(PA) AND TO BE CO-ORDINATED WITH OPERATORS.

Figure 5-10: Station ambassador office: Plan, reflected ceiling plan, elevations, section

5.4.4 Functional Design Requirements

Refer to Figure 5-10 Station ambassador office – Plan, Reflected Ceiling Plan, Elevations, Section

a) Station ambassador office is designed as a series of modular elements and shall be sized to accommodate a maximum of 3 transit personnel. Number of personnel to be confirmed in the PA and co-ordinated with operator.

b) The station ambassador office shall be located:

   i. adjacent to the fare gates and self serve hub to provide customer assistance, surveillance and customer related support;

   ii. to have uninterrupted site lines/views of the self serve hub and station interior;

   iii. at all entries;

   iv. such that seating is in close proximity to the station ambassador office, in close proximity of staff door access, and does not impede path of travel, queue space, or customer movement, and is not positioned in a blind spot such that the station ambassador is not able to see seated customer.

c) Station ambassador office shall be ventilated and conditioned (heat only) in accordance with the relevant project specific requirements and is subject to coordination with the operator. Temperatures shall be maintained as follows: Minimum winter temperature = 22 degrees Celsius; Maximum winter temperature = 24 degrees Celsius; Outdoor airflow per occupant = 33 L/s.

d) Station ambassador office shall be an element of continuity across all new line subway stations.

e) Station ambassador office shall be located on the right side as customer enters primary station entry. Where this is proven not technically feasible, provide alternative design solution for Metrolinx review/approval and ensure station ambassador office and self serve hub are co-located and configured to prevent cross-circulation.

f) Station ambassador office shall meet all accessibility and barrier free access requirements for all staff and customers, as per Accessibility for Ontarians with Disabilities Act (AODA), Ontario Building Code (OBC), and DS-02 Universal Design Standard.

g) Power and data connections shall be provided for the number of operable workstations required while ensuring they are mechanically protected. Power and data conduit and wiring shall be concealed from view. Provide 1000 millimetres of power and data cable slack for final termination of equipment by others. Power and data infrastructure rough in shall be provided to allow for future flexibility/expansion of services in response to future requirements. Power and data to all workstations shall be on emergency battery power. Station ambassador office to be designed “future ready” and include supporting infrastructure for future power and data demands.

h) Door location to station ambassador office shall be designed to be accessible on either the paid or unpaid side where location shall be confirmed in the PA and co-ordinated by the operator. All doors accessing the station ambassador office shall include glazing for increased visibility and shall incorporate auto door operators with push to open door buttons. Door(s) to office shall be secure and equipped with form of authorized access.

i) A communication box/hands free intercom at one location within the station ambassador office and wired through the counter shall be provided to enable customers to communicate with staff.

j) A built-in hearing induction loop intercom system shall be installed at all service counters to aid in communication for customers who are hard of hearing. Hearing induction loops shall meet the requirements of the IEC 60118-4 Standard. Service counters equipped with hearing induction loops shall be clearly identified with the ISO international T-Coil Symbol.

k) Station ambassador office is to be a recognizable branded element for customers where the interior identity wall, wall finishes, datums, physical form, and signage are consistent across across all new line stations.

l) Station ambassador office shall be constructed as a glass and stainless steel clad enclosure. Glazing shall be impact resistance with anti-scratch coating.

m) Public facing and interior office finishes and dimensions shall be as per Figure 5-10 Station ambassador office. Branded wall within station ambassador office and public facing exterior finishes, shall be consistent across the new line wide stations and shall be determined by PA and co-ordinated by operator.

n) A camera outside the station ambassador office shall be provided to cover the office, connected to CCTV system and operating 24/7. Interior camera shall be provided to cover facing customers, connected to CCTV system and operating 24/7.

o) Digital screens for security purposes shall be positioned and integrated above the counter, visible to all staff, but screened from public view. Where rear of screens are visible to customers, provide privacy film on glazing in a continuous horizontal band to conceal from customer view.

p) Lighting shall include: under counter LED lighting to highlight panel below counter and provide definition; recessed LED lighting located above the information transaction surface; internally illuminated “information” signage recessed flush with front face.

5.4.5 Detailed Design Requirements

Note: Refer to DS-02 Universal Design Standard for all reach and spatial requirements.

For detailed drawing information, refer to Figure 5-10 Station Ambassador Office – Plan, Reflected Ceiling Plan, Elevations, Section

The purpose of the station ambassador office is to provide customer service, ticket selling, information, and assistance at all stations. The following requirements shall be accommodated for transit personnel and customers.

a) Provide center glass opening for unassisted audible communication; lockable sliding glass panel for security.

b) Provisions for combination intercom and audio loop systems to be included as alternate means of communication when glass is in closed position, as well as speak through device with spit guard.

c) Optional individually controlled variable direction and volume airflow below attendant's work surface for individual comfort control.

d) Provide concealed storage below counters for all staff computer related equipment such as CPU's, and cabling. Ensure all equipment is accessible for maintenance and clear of operator and causing no interference.

e) Provide back storage with counter top. Storage to be concealed with doors and/or drawer fronts. Hardware to be discreet door pull hardware or hidden push latch. All doors/ drawers to be lockable and keyed alike. Millwork doors in excess of 600 millimetres in width to have heavy duty hardware.

f) Provide gable supports as required at midpoint of each shelf to prevent warping / deflection when loaded with supplies.

g) Cabinet width to be a minimum of 400 millimetres, with shelving and drawers, to store extra supplies and specific devices such as: Multifunctional Printer (MFP on counter top); courier box (outgoing and interoffice mail); First Aid Kit (270 millimetres x 400 millimetres x 70 millimetres); Intercom AI phone (mounted in cabinetry); translation phone (requires power for charge station); flashlights (requires power for recharging of batteries); small storage area for lost & found items; drawers for storage.

h) Provide and install grommets where required for direct cabling access and monitor support arms for maximum user adjustability.

6.0
Paid Access Area

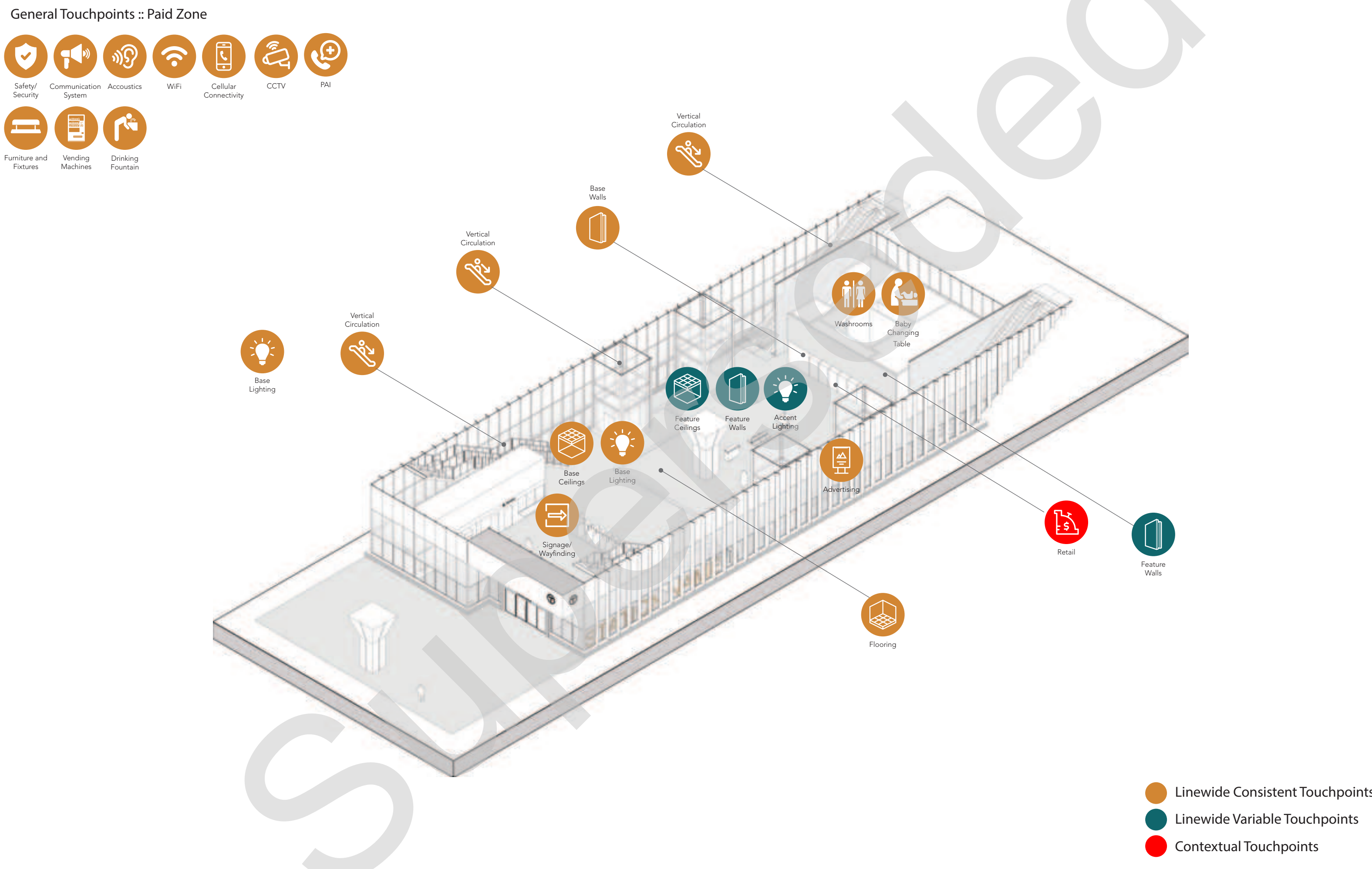


Figure 6-1: Touch point diagram: Paid access area

6.1 RETAIL

Note: Section to be read in conjunction with the following reference documents:

DS-02 Universal Design Standards

6.1.1 Customer Experience

Retail is an important element within the development and function of a station, and provides an important amenity for customers, while offering additional revenue and added security.

Successful retail depends on a number of critical factors including a well-planned mix of retail, quality offerings and responding to customers retail needs.

Retail trends are moving from traditional product-based goods towards more relevant services where digital technology and smart devices offer quick and easy purchase options along the customer journey. New emerging technologies such as virtual vending, are proving highly successful in transit environments using proven demonstrated minimum footprints and maximizing new retail synergies, creating a fast, convenient purchasing experience.

6.1.2 Description

The retail zone is intended to be a consistent and integrated amenity in all stations. Retail offerings are primarily "service based" and shall include:

a) retail vending with potential for future ready virtual vending;

b) kiosks/pop-up retail;

c) leased tenant retail.

The retail strategy may include short term pop-ups, "Grab and Go", or long term leased retail space within and outside the station environment. While the current strategy is to locate all retail within the paid access area, further retail expansion within the unpaid transaction zone will be dependent on spatial capacity and existing site conditions. Retail vending or leased tenant retail shall be programmed within the paid access area, but not both.

6.1.3 Functional Design Requirements: Retail Vending Hub

To be read in conjunction with Figure 6-4: Visual elements strategy: Below grade, and Figure 6-5: Visual elements strategy: Elevated.

a) Retail vending hub shall be strategically located within the paid access area along the main circulation path in areas of high visibility and shall not obstruct:

   i. station circulation and/or wayfinding signage;

   ii. sightlines to and from public areas, to aid safety, egress and uninterrupted circulation;

iii. or block views;

iv. access to daylight.

b) Retail vending hub shall maintain clear and unobstructed view of station ambassador office.

c) Retail vending hub shall be located along main circulation routes to prove demonstrated maximum customer awareness, particularly at grade from within and outside the station environment.

d) Retail vending hub shall maintain clear and unobstructed view of station ambassador office. No retail storage shall be provided on site; storage for Pop-up retail is the only exception.

   i. Where demonstrated not possible, retail vending shall be located in an area that can be easily supervised through direct line of sight by a roaming station ambassador and be captured by CCTV coverage.

e) Retail vending hub shall be located along main circulation routes to prove demonstrated maximum customer awareness, particularly at grade, which is accessible both from within and outside the station environment.

   i. Retail vending shall not be located in dead-end corridors.

f) Retail vending hub shall be integrated into the station architecture, eliminating placement where the rear of vending machines is visible to the customer.

g) All retail vending machines shall be a minimum horizontal distance of 5000 millimetres from any exit doors, stairs, escalators, or elevators.

h) A minimum of one waste and one recycling unit shall be located within 3000 millimetres of a retail vending hub.

i) Retail vending hub footprint as per Figure 6-2 Retail vending hub - Layout and clearances shall be typical in most stations and shall:

   i. be 7 meters long;

   ii. accommodate approximately 4 to 5 vending machines;

   iii. allow 3500 millimetres - 4500 millimetres of uninterrupted queue space perpendicular to front of the vending machines.

j) Where site conditions allow, consolidate customer amenities including retail vending machines to prevent visual clutter where customer traffic is greatest.

k) Clearances for maintenance of vending machines, and inventory access from the front, shall allow for 150 millimetres from the back wall and 50 millimetres on either side, unless otherwise specified by the equipment manufacturer. The most stringent requirements shall take precedence.

l) Provide power and data rough-in for retail vending areas. Provide conduit and additional power/data infrastructure to be future ready to allow for future retail expansion. All infrastructure including conduit and power and data cabling shall be concealed. All retail vending power feeds shall be equipped with individual revenue grade metering.

   i. Retail vending shall be located where there is access to Wi-Fi and cellular service.

m) Where specified, retail space shall be provided with a dedicated fire suppression system.

n) Provide a minimum 60 amps dedicated electric service with sprinkler system fire protection and smoke and heat detectors hard-wired to station ambassador office and Operations Control Center (OCC) annunciation panels. Amp requirements to be coordinated with retail space vendor.

o) Full retail to be provided as part of Transit Oriented Communities (TOC). Retail strategy to be provided by Metrolinx.

p) Vending machines shall conform with forward and side reach range requirements as per the DS-02 Universal Design Standard.

q) All retail vending hub areas shall include floor drain(s) and shall be located flush with floor finish and shall not obstruct path of travel.

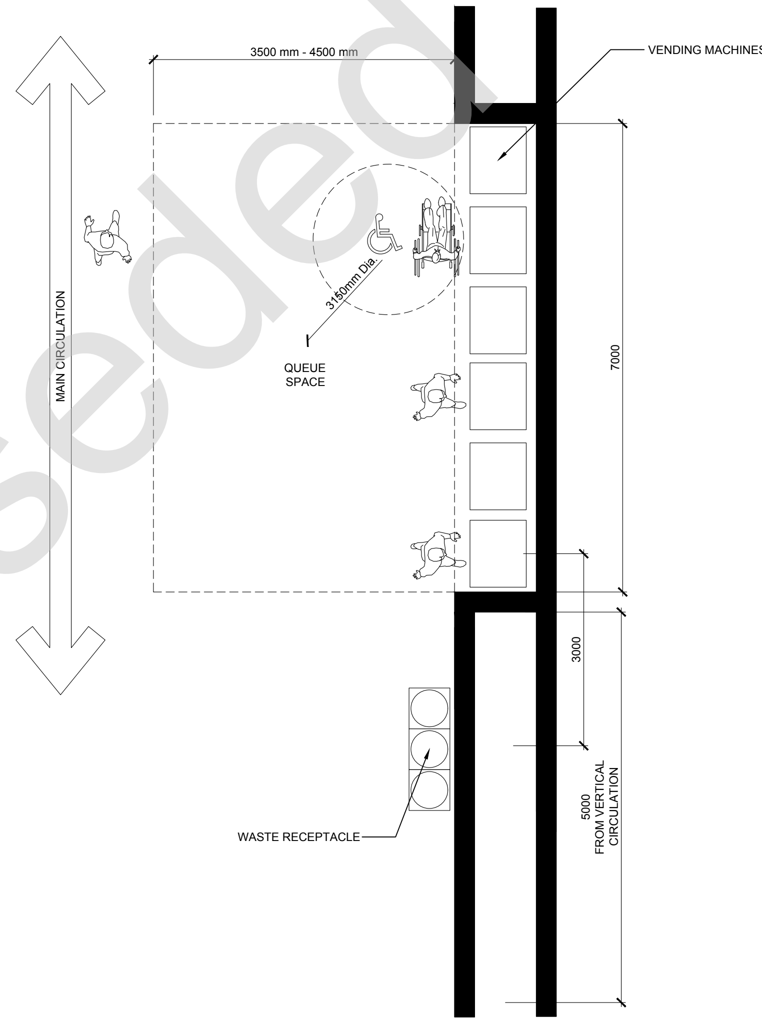


Figure 6-2: Retail vending layout: Layout and clearances

6.1.4 Functional Design Requirements: Leased Retail/Kiosk

a) This section to be read in conjunction with requirements established in Section 6.1.3

b) Leased retail areas including queue space shall be located to permit uncongested passenger movement and safe exiting.

c) Leased retail areas shall have direct sightlines and access to daylight to and from public areas for enhanced customer and leased area employee safety.

d) Leased retail / kiosk areas shall be located in the paid access area at grade and in close proximity of the station ambassador office.

e) Where leased retail is located adjacent to exterior glazed perimeter walls, the architectural expression of the architectural facade shall include opaque or translucent materials to visually mask exposed retail millwork and equipment.

f) Area requirements for customers being served or waiting in front of leased areas shall follow queing requirements as per Figure 6-2: Retail vending hub - Layout and clearances.

g) Minimum horizontal distances shall be maintained between edge of retail areas and:

   i. edge of platform: 10.00 metres;

   ii. exit doors, stairs or escalators: 5.00 metres;

   iii. Station Ambassador and self serve hub: 5.00 metres

h) Leased retail shall have a minimum clearance of 3500 mm to underside of ceiling.

i) Allow for shared retail Pop-up retail unit with a minimum 3050 millimetres x 3050 millimetres footprint in the unpaid transaction zone where conditions and space allows. Position in high traffic area without impeding traffic flow and ensure required clearances are maintained. Provide power / data and ensure all conduit/infrastructure is concealed. Where Pop-up retail is provided, include a storage area approximately 2440 millimetres x 2440 millimetres within close proximity to station ambassador office to accommodate promotional material and/or retail cart.

j) Design of all leased areas shall comply with the Ontario Building Code (OBC) for construction type, interior finish flame spread, and separation from public circulation areas.

k) All retail tenancies shall be built according to 'Schedule B' of the Construction Guidelines of the Retail Standard Lease Agreement.

l) Leased areas shall have walls that extended to the underside of the structural slab so they are separated with a fire separation from the remainder of the station floor area. Openings in the fire separation shall be protected in accordance with the OBC.

m) Walls shall be extended to the underside of the structural ceiling to provide vertical fire separation from the remainder of the station floor area.

n) Finishes shall be consistent with all aspects of surrounding station finishes and be subject to Metrolinx review/approval.

o) The roofs of any leased area containing stand-alone fixtures with no salesperson (e.g. banking machines) shall:

   i. be constructed to provide a minimum vertical clearance of 900 millimetres to sprinkler heads;

   ii. sustain a live load of 1.91 kN/m2, as well as inhibiting dirt accumulation.

p) Design shall prove a demonstrated maximum use of transparent materials in order to provide clear sightlines to and from public areas.

q) Provide power/data infrastructure as required for each tenant. Provide conduit and additional power/data infrastructure to be future ready and allow for future retail expansion. All retail and concession power feeds shall be equipped with individual revenue grade metering.

r) Leased areas for food and beverage tenants shall be provided with hot and cold water supply and drainage systems.

s) Capped mechanical service connections including plumbing, drainage, natural gas and ventilation systems shall be provided for future fit-out of retail tenants.

t) Retail signage shall not confuse or interfere with wayfinding information and guidance. In all situations, wayfinding signage shall take precedence.

u) Distinction between leased areas and station areas shall be maintained in terms of both station identity and operations.

v) All retail store front signage shall be submitted to Metrolinx for review/approval prior to installation.

w) Design shall comply with Metrolinx requirements for standardization of signage at all locations as per DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual.

x) All retail elements shall meet requirements as per DS-02 Universal Design Standards.

6.2 PUBLIC WASHROOMS

Note: Section to be read in conjunction with:
Section 2.0 Sustainability,
DS-02 Universal Design Standards,
Table 6-1: Washroom fixture quantities matrix
Figure 6-3: Public washroom layouts

6.2.1 Overview

Cleanliness, safety and accessibility of public washrooms are important in the context of customer experience. Washrooms shall be designed to serve all user groups and meet the requirements set out in DS-02 Universal Design Standards and the Ontario Building Code (OBC). Account for implementing gender-neutral washrooms to uphold transparent, inclusive and forward-thinking principles.

6.2.2 Description

Public Washrooms shall be highly visible, safe, accessible, durable and easy to maintain. They shall be placed within the paid access area, in visual proximity of the station ambassador, and co-located with waiting areas. Washrooms shall be planned for at all interchange and terminal stations.

6.2.3 Functional Design Requirements: General

a) Public amenities shall include gendered men's and women's washrooms, a universal / gender neutral washroom, janitor's closet and drinking fountains/bottle filling stations. This is a consistent module and shall include all elements as a cohesive unit.

b) All washrooms shall be ventilated and conditioned (heat only) in accordance with the relevant project specific requirements and is subject to coordination with the operator. For Washrooms, a minimum temperature of 22° Celsius shall be achieved. In the summertime, maximum or minimum temperatures will fluctuate in line with the adjacent station temperatures.

c) Washrooms shall be provided at all interchange and terminal stations within the paid access zone, and in close proximity to the station ambassador office. At shared platform or interchange station scenarios where washrooms have the potential to be located in either the paid access area or unpaid transaction zone while meeting the requirements as per this section, location to be determined on a project by project basis and shall be reviewed and approved by Metrolinx.

d) All gendered washrooms shall have a clear opening with a lockable steel shutter door that can be closed during regular cleaning or maintenance intervals. Door to be a swing door or sliding door concealed from view within a recessed pocket. Door pocket with door shall be secure and tamperproof such that when door is within recess or pocket, recess is sealed with lockable pocket door.

e) Where doors are required at washrooms, incorporate doors requiring a vertical bar power door operator that allows the door to be operated by hand, arm, crutch, cane, wheelchair footrest, foot, or hip as per DS-02 Universal Design Standard

f) Eliminate a direct line of sight into washrooms.

g) For calculating washroom fixture and accessory quantities, including water closets and lavatories, refer to Table 6-1: Washroom fixture quantities matrix. All fixtures and accessories not included within table, shall comply to OBC requirements at a minimum. For Women's washrooms, additional water closets shall be accommodated where space allows. In larger stations where walking distances are greater, washroom facilities shall be located within 100 metres of each other.

h) Fixtures containing operable devices shall be accessible in design to the full range of users and shall meet all forward and side reach requirements outlined in the DS-02 Universal Design Standard.

i) Design shall account for proven demonstrated minimum maintenance and operations requirements.

j) All plumbing fixtures, fittings, and washroom accessories shall be standardized throughout the transit system.

k) Dedicated maintenance access to a concealed pipe chase/ space serving all washroom facilities with a full height access door, shall be provided outside washrooms or in adjoining janitor closet.

l) Floor drains shall not be located in pedestrian or wheelchair paths and shall not interfere with toilet partitions.

m) Universal washroom and accessible washroom stall shall be provided in accordance with OBC and CSA B651. Where requirement is in conflict, the most stringent takes precedence.

n) For all washroom materials and finishes, refer to Table 4-3 Interior finish and materials schedule.

o) Passenger Assistance Intercom (PAI) shall be provided in all universal washrooms.

p) Refer to Section 2.5 Lighting and reflected ceiling plan drawings with Appendix A-1 for information related to washroom lighting.

q) Janitor closet shall be fire separated as per OBC.

ALLOCATION OF PUBLIC WASHROOM FIXTURES

DS-09 SUBWAY DESIGN STANDARD

Notes: Quantities of washroom related fixtures and / or accessories not captured in this table, shall comply to minimum requirements as per Ontario Building Code (OBC).

FIXTURE TYPE	WASHROOM				
	A	B	C	D	E
Water Closet (Number to include one barrier free stall)	4	3	4	3	1
Urinal**	2	2			
Washbasin	3	2	3	2	1
Elecric Hand Dryer	2	2	2	2	1
Liquid Soap Dispenser	3	2	3	2	1
Toilet Paper Dispenser	4	3	4	3	1
Feminine Napkin Dispenser			1	1	1
Mirror (Number shall include one barrier free mirror at accessible lavatory)	3	2	3	2	1
Vanity Shelf			1	1	1
Feminine Napkin Disposal			4	3	1
Waste Receptacle (Recessed)	1	1	1	1	1
Baby Change Table	1	1	1	1	1
* Adult Change Table					1
Universal Washroom (All required universal washroom fixtures and accessories including Adult Change Table, to comply with OBC. **Urinals are permitted to be substituted for water closets in male washrooms and may be counted as water closets so long as a minimum of one barrier free stall and one typical stall is provided.	Shall provide one dedicated Universal Washroom in close proximity to gendered female and male washrooms.				

WASHROOM DESIGNATION:

A: Men's public washrooms at stations serving greater than 50,000 persons/day.

B: Men's public washrooms at stations serving less than 50,000 persons/day.

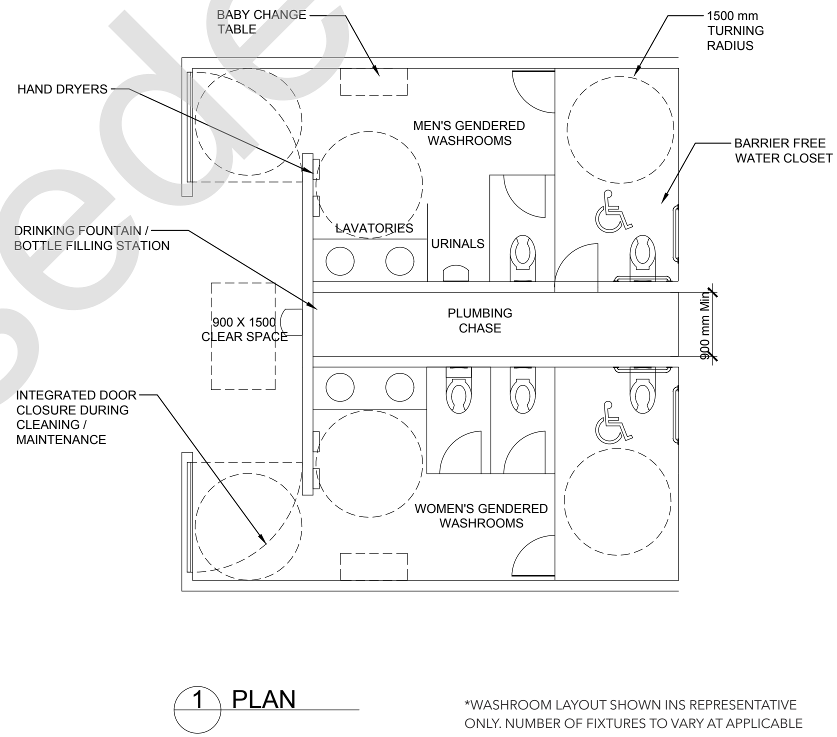
C: Women's public washrooms at stations serving greater than 50 000 persons/day.

D: Women's public washrooms at stations serving less than 50 000 persons/day.

E: Public universal washroom for male and female passengers where public washrooms are provided.

*A space for Adult Change Table (810mm x 1830mm) to be provided for future installation.

Table 6-1: Washroom fixture quantities matrix



*WASHROOM LAYOUT SHOWN INS REPRESENTATIVE ONLY. NUMBER OF FIXTURES TO VARY AT APPLICABLE STATIONS PENDING CATEGORY OF CUSTOMERS BEING SERVED PER DAY AND AS PER ONTARIO BUILDING CODE (OBC) REQUIREMENTS.

Figure 6-3: Public washroom layouts

6.2.4 Functional Requirements: Fixtures and Partitions

a) Fixtures for all public washrooms shall be equipped with OBC compliant sensor modules for electronic no-touch operation and boxes containing sensor modules shall be vandal proof.

b) All piping shall be concealed behind finished surfaces. Any exposed plumbing drain lines that emerge from finished surfaces shall be chrome-plated or stainless steel and comply with OBC.

c) All plumbing fixtures shall be white vitreous china and located on interior walls. Seats to be CSA compliant, non-combustible, composite material with antimicrobial properties.

d) Water closets and urinals shall be wall hung with touchless flush valve.

e) Required number of lavatories shall be wall hung / mounted and shall include barrier free access as per OBC. All lavatories shall meet all forward and side reach requirements outlined in the DS-02 Universal Design Standard.

f) All water faucets shall be touchless, robust, reliable, and commercial grade, where material finish is easily cleanable and durable to withstand harsh cleaning products.

g) In multi-use public washrooms and maintenance facilities, toilet partitions shall be embossed stainless steel as a strategy to dissuade vandalism. Toilet partitions shall be ceiling mounted.

h) Where more than one urinals are co-located, provide a wall-mounted privacy screen partition between to match toilet partitions. Grab bars to be provided for barrier-free urinals.

6.2.5 Functional Requirements: Washroom Accessories

a) All hand dryers shall be accessible to the full range of users and shall meet all forward and side reach requirements as outlined within the DS-02 Universal Design Standards.

b) All hand dryers shall be touchless / hands free operation, and contain HEPA filter than can be easily accessed and maintained. Paper towel dispensers shall not be specified. Recessed or semi-recessed stainless steel waste receptacles shall be required.

c) All hand dryers shall be high speed dryers versus standard warm air dryers, based on less energy use and improved life-cycle performance.

d) All hand dryers shall be robust, reliable, and commercial grade, fabricated using durable materials such as stainless steel for easy maintenance and cleaning.

e) Provisions shall be made for an Adult Change Table (810 millimetres x 1830 millimetres) future ready for installation. Engineered structural support shall be integrated within adjacent wall assembly to support change table under load. Provisions shall include electrical rough-ins.

f) Provide one (1) baby change table in each men's, women's and universal washroom. Engineered structural support shall be integrated within the adjacent wall assembly to support the table under load.

g) One electric hand dryer shall be provided for every two lavatories, located close to sinks to prevent dripping onto floors. In situations where there is one lavatory only, one electric hand dryer shall be provided.

h) Toilet paper dispensers shall be surface mounted, commercial grade stainless steel, lockable, and a multi-roll vertical type.

i) Soap dispensers shall be wall-mounted, commercial grade, battery operated and touchless.

j) One coat hook at barrier-free height shall be provided per accessible washroom stall and universal washroom as per OBC and CSA B651.

k) Tilt mirrors shall accommodate the needs of customers who use wheelchairs, children, and those who have small stature. Mirror frame shall be stainless steel.

6.3 DRINKING FOUNTAINS / BOTTLE FILLING STATION

Note: Section to be read in conjunction with:
DS-02 Universal Design Standards.

6.3.1 Overview

Access to safe drinking fountains and water bottle filling stations is an essential convenience provided at all stations to support the comfort, health and well-being of transit customers. The amenity is required to serve all users, including children, elderly citizens and those with physical disabilities, and shall be easy to find, safe and simple to use.

6.3.2 Description

The fountain station is defined as a fully integrated dual functioning water fountain and bottle filling station and shall be conveniently located along the customer route. It is required to be durable, vandal-proof and easy to maintain.

6.3.3 Functional Design Requirements: General

a) A minimum of one (1) fountain station/bottle filling station shall be provided at all stations.

b) A fountain station/bottle filling station shall be located in clear public view, off the main circulation path and adjacent to public washrooms. At stations where public washrooms are not provided, fountains shall be co-located according to the following hierarchy:

   i. Along a barrier-free path of travel,

   ii. At a location that has practical access / proximity to plumbing (e.g. staff washrooms),

c) Co-located with other services for customers.

d) Drinking fountains shall comply with forward and side reach requirements as per DS-02 Universal Design Standard and at heights suitable for both standing and seated users. Controls shall be centrally positioned at the front of the unit or, if at the side, on both sides, not more than 180 millimetres from the front.

e) Design of the fountain station shall specify exterior finish materials such as stainless steel for long term durability and ease of maintenance and conform to CSA-S478 "Guideline on Durability in Buildings".

f) Operation of unit shall be touchless, sensor activated for safe easy use.

g) Fountain stations shall be recessed into the wall to allow for uninterrupted circulation space beyond.

h) All fixtures shall be securely anchored with tamper-proof hardware and secured to the wall.

i) Water fountains shall be composed of impervious material which is easily maintained and cleaned. The installation shall be robust with resistance against vandalism, oxidation and corrosion.

j) To protect against water contamination, the fountain station shall have an internal removable water filter, efficient drains to prevent accumulation of water in the bowls, a slanting jet nozzle and protective guard, a steady flow rate and water pressure optimized to reduce the likelihood of customers mouth and nose coming into close proximity with the nozzle.

k) Allowance for queuing space in front of the fountain station shall be based on National Fire Protection Association (NFPA) Standards and ensure path of travel is not interrupted.

6.4 NON-FARE REVENUE ADVERTISING

All advertising shall follow requirements as per DS-02 Universal Design Standard.

6.4.1 Overview

Advertising complements the customer journey and requires careful integration to ensure information is presented clearly without conflict or confusion to other messaging.

6.4.2 Description

Stations shall be designed to incorporate varying forms of advertising and form an integral part of the architecture and appearance of the station without compromising passenger safety or journey planning. The current advertising format uses both static and digital advertising formats. With continuous advances in digital technology and changing dimensional sizes of advertising products, the design strategy developed identifies strategic advertising locations, with built-in flexibility, integrated within the architectural environment, while ensuring critical wayfinding elements including signage and feature elements are not compromised.

6.4.3 Non Fare Revenue / Advertising: Typologies

Below is a list of current advertising products supplied.

a) Static back-lit advertising display panels – approx. 1220 millimetres x 1830 millimetres; portrait format.

b) Digital advertising panels - approx. 1220 millimetres x 1830 millimetres; portrait format.

c) “55” inch landscape digital screens, large format media matrix video walls (2′ x 2′, 3′ x 3′).

d) Large format indoor or outdoor LED (Light emitting diode) boards.

e) Infotainment screens - must not be located within 2000 millimetres, distance from any digital or wayfinding signage.

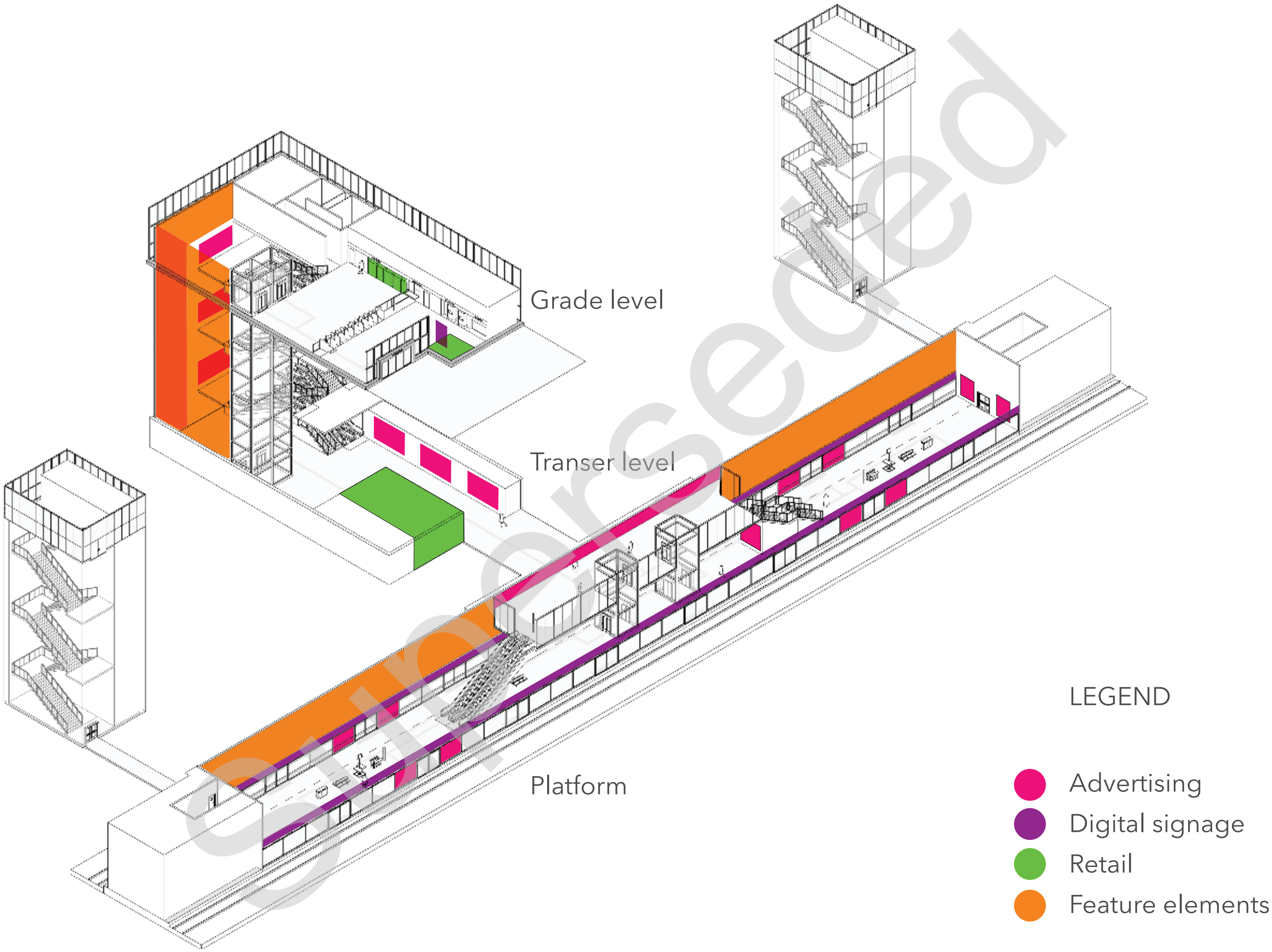


Figure 6-4: Visual elements strategy: Below grade axonometric

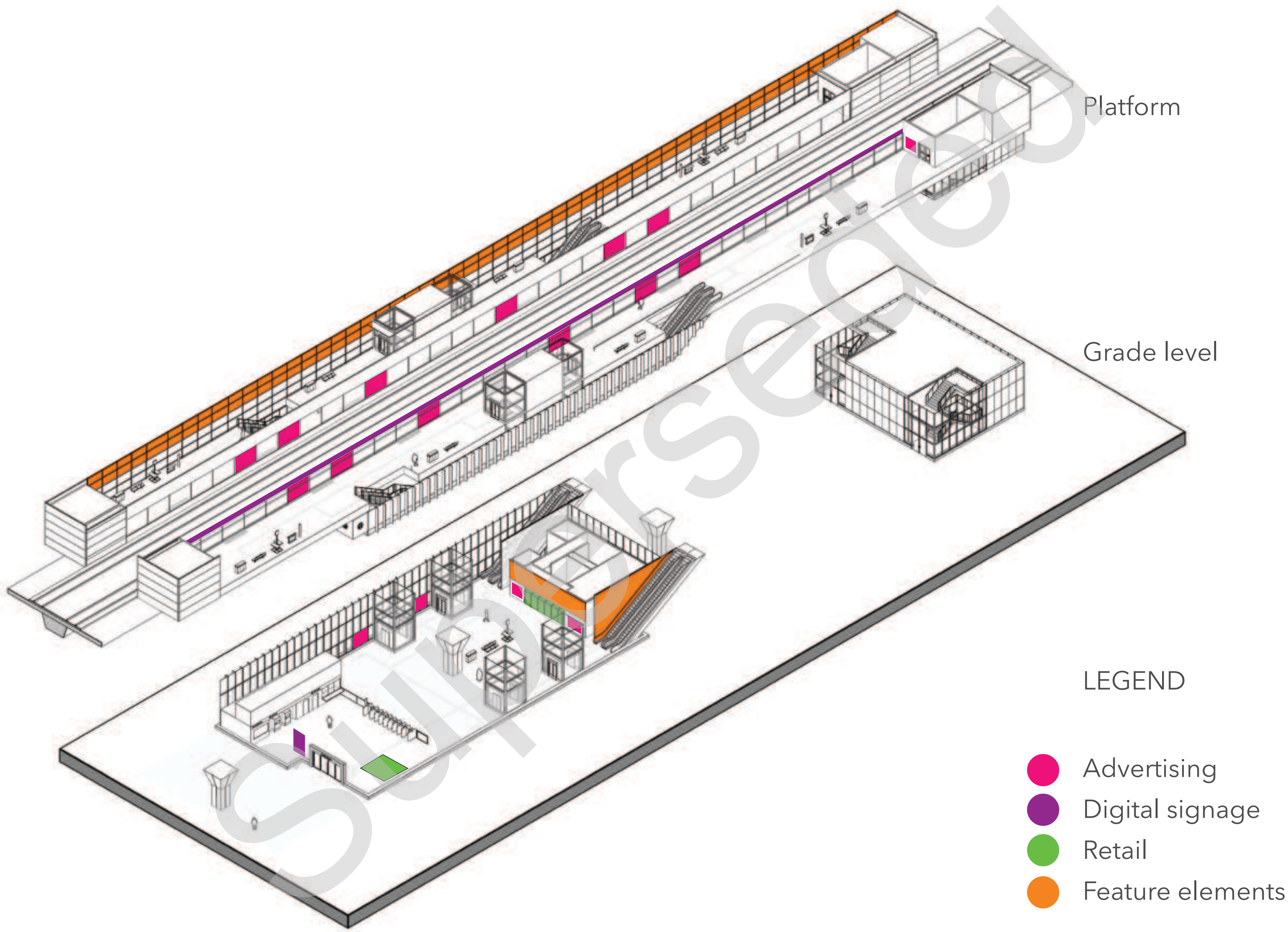


Figure 6-5: Visual elements strategy: Elevated axonometric

6.4.4 Functional Design Requirements: General

a) Third party advertising shall be located in public-facing areas, specifically in high-traffic and in high-dwell time areas within the paid access area. These include areas of vertical circulation, waiting areas, transfer levels, pedestrian tunnels, pedestrian bridges, shelters, and shall be incorporated at strategic locations within glazing segments along Platform Edge Doors (PED's). Floor mount, free standing third party advertising on all platforms shall not be permitted.

b) Placement of static third party advertising applied to glazing beside PED's shall be spaced along platform to demonstrate proven minimum impacts to views and to promote Crime Prevention Through Environmental Design (CPTED). All advertising integrated or applied to PED glazing shall be factored on a case by case basis and reviewed and approved with Metrolinx and operational groups. Specific advertising locations are pre-determined and shall follow those zones as identified as per Figure 9-4: Visual Elements Strategy: Below Grade and Figure 9-5: Visual Elements Strategy: Elevated. Clear glazing shall be required on both sides of static advertising, where advertising is integrated within full glass segment of PED extending to vertical and horizontal mullions. Advertising shall not extend beyond one PED glass segment bound by mullions. Ensure backside of advertising facing rail corridor is opaque, where colour and material is selected purposefully and consistent with station colour, finishes, and materials.

c) Third party advertising shall be permissible in unpaid transaction zones, only in areas that do not conflict within the fare transaction zone as this may interfere or distract customers from performing fare transactions or wayfinding. All proposed locations of third party advertising within unpaid zones shall be presented to Metrolinx for review on a case by case basis.

d) Both static and digital wayfinding signage shall always take precedence over all forms of advertising in all areas within the station and along the customer journey.

e) Advertising shall not be located within a 2000 millimetres radius of key transactional points, or within a 2000 millimetres radius of key decision making points, and shall not obstruct or impede sight lines or access to Designated Waiting Areas (DWA) or Passenger Assistance Intercom (PAI). These include:

   i. key transactional points including where fare purchase and fare payment information, equipment and devices are located;

   ii. key decision making points, where static and digital signage and wayfinding is the primary visual que, and shall not be a competing element that impacts a customer's ability to successfully navigate throughout the station. Key decision making points include where directional information is provided prior to access to platforms, where service and schedule information is provided, and adjacent to elevators.

f) Non-fare revenue advertising shall not obstruct or impede minimum corridor width, floor to ceiling clearances, main paths of circulation, or egress in emergency.

g) Advertising panels and screens shall be surface mounted on opaque vertical tiled surfaces within dedicated wall niches and shall not project greater than 100 millimetres and shall comply with OBC and DS-02 Universal Design Standard (refer to Figure 7-8: Advertising – Wall Applications. All wall mounted advertising elements shall be integrated and flush within the wall assembly and not protrude causing a hazard to customers.

h) Where advertising display panels are installed adjacent to each other, each panel shall require 130 millimetres minimum of ventilation space on all sides.

i) Typical wall niches dedicated for advertising shall:

   i. be recessed 100 millimetres where display does not protrude further than 100 millimetres;

   ii. have a continuous base that is flush with the main wall assembly;

   iii. have a running length in equal increments of 1220 millimetres to suit extent of advertising media. Where longer wall run dimensions occurs such as pedestrian tunnels, ensure niches are equally spaced where niches are a minimum of 1220 millimetres apart;

   iv. be a minimum of 2610 millimetres high with a minimum opening dimension 2460 millimetres high;

   v. ensure all corners and return surfaces are protected with a stainless steel edge trim;

   vi. be installed within an active partition type (see 6.4.4 m) where wall tiles are consistent in size as general wall tile and are designed to be removeable to access services,

   vii. have continuous raceway to access to power and data connections.

j) All wall mounted advertising product shall be mounted:

   i. 300 millimetres above finished floor;

   ii. a minimum of 1200 millimetres from nearest inside and/or outside corner;

   iii. a minimum 1200 millimetres and equally spaced from adjacent advertising product(s), especially in pedestrian tunnels.

k) In consultation with the Metrolinx "Non-fare sales team", all final locations of advertising shall be positioned at the discretion of Metrolinx.

l) Power and data conduit shall be located to all advertising locations in order to be future ready for all digital advertising. Electrical and data cables to advertising screens and panels shall be concealed and accessible from behind wall assemblies. Exposed conduit running from floor or ceiling to advertising is not acceptable.

m) Active walls with an integrated wall cavity as defined in Section 4.10.3.2 d) General Walls, shall be provided where advertising is located and shall accommodate the depth of advertising elements and access to supporting infrastructure.

n) Communication racks and infrastructure required to support the advertising content management system shall be provided within a separate third-party communications room within the services module.

o) Where floor mount, free-standing advertising occurs, floors shall have a in-floor raceway with conduit concealed from view, ready to pull power/data. Any exposed cover plates shall be flush with finished floor and off the main path of circulation. Power and data infrastructure shall be provided in advance to support future advertising needs and locations. Note: Floor mount, free-standing advertising shall not occur on all platforms.

p) Power and data infrastructure shall be provided for non-fare revenue advertising and charging stations. Locations shall be determined in consultation with the Metrolinx "Non-fare sales team". Note: Across all subway types, Wi-Fi shall be provided in all stations, where empty conduits and associated shell space will be provided for in tunnels.

q) Non-fare revenue advertising shall not be applied/displayed to:

   i. any floor surfaces including pylon advertising on platforms;

   ii. stair runs or risers;

   iii. on or in front of glazing, glass balustrades or glass doors. Note: The exception to this rule is on PED's, customer side, only in strategic locations where stair, escalator, and/or elevator landings occur;

   iv. feature walls where it will interfere with the intent or on ceilings. Refer to 4.10.3 for additional requirements.

   v. along escalator inclines

r) Advertising shall not obstruct other design elements and station infrastructure such as benches, garbage receptacles, light fixtures.

s) All non-fare revenue advertising, enclosures, and screens shall be low reflectivity and shall not exceed the Unified Glare Rate (UGRL) as per DS-02 Universal Design Standard.

t) All non-fare revenue advertising shall be durable and easily maintainable.

u) All non-fare revenue advertising shall be securely fastened using concealed, tamper-proof fasteners.

v) All non-fare revenue advertising shall incorporate suitable mounting heights for all customers and conform to DS-02 Universal Design Standard.

w) All forms of advertising shall be silent.

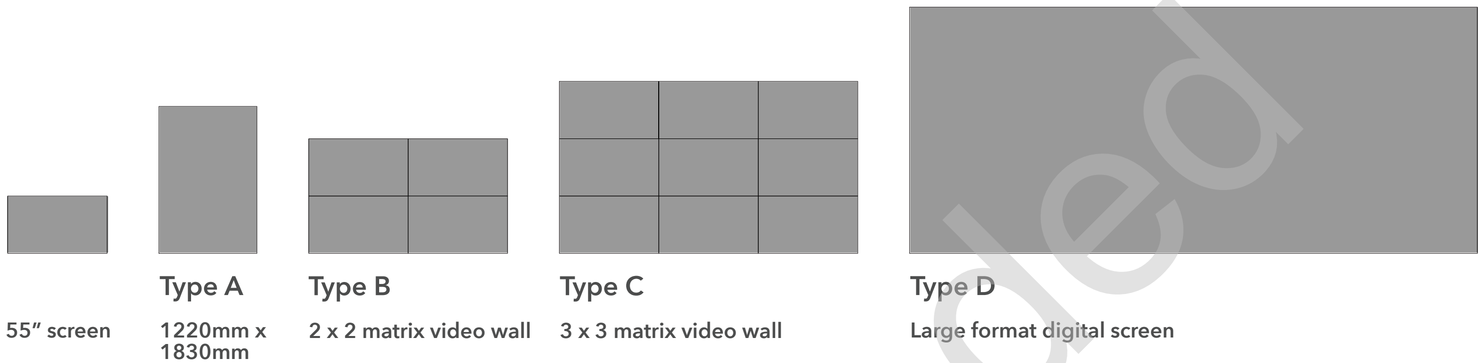


Figure 6-6: Advertising: Typical sizes

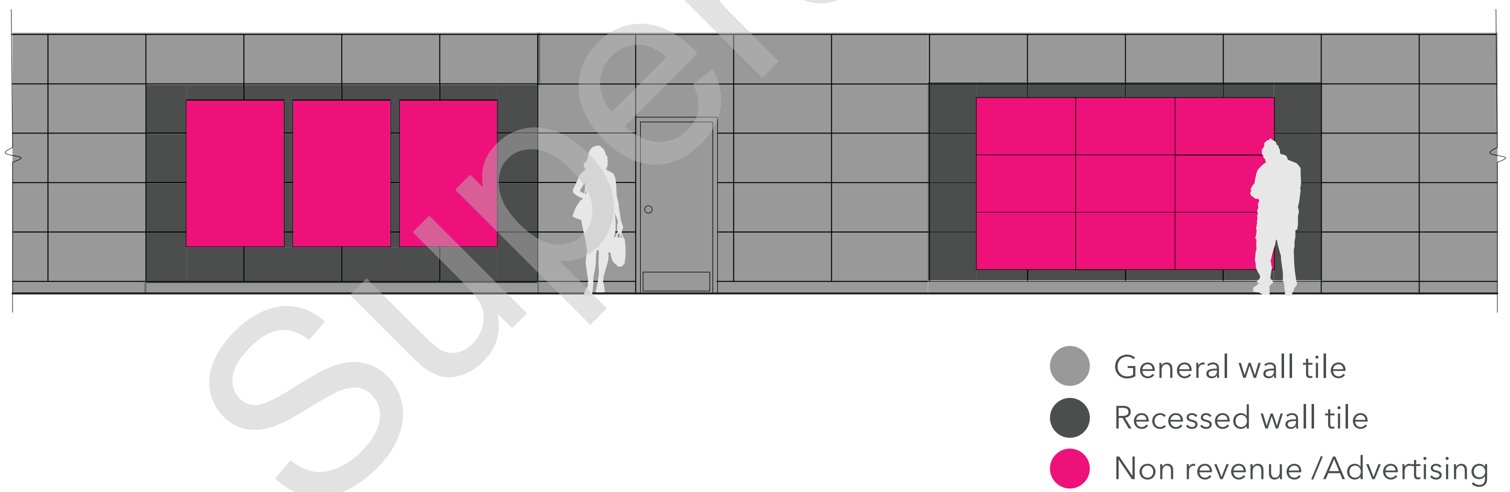


Figure 6-7: Advertising: Integration

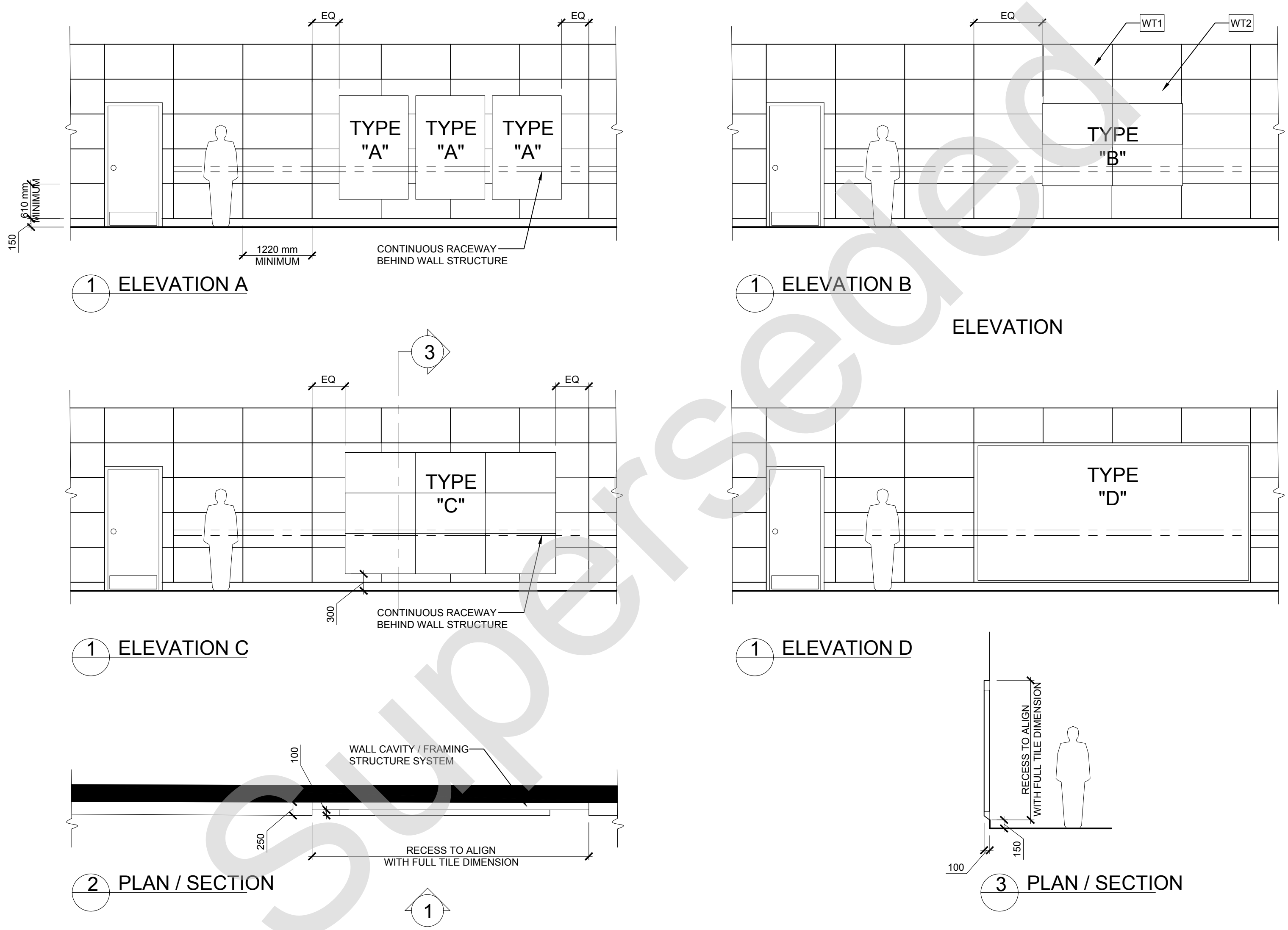


Figure 6-8: Advertising: Wall application

Figure 6-9: Advertising: Future directions

Precedent image demonstrating the relationship between advertising, digital signage and architecture, Elizabeth Line - Transport for London

6.5 CUSTOMER SUPPORTING ELEMENTS

a) For all interchange and terminal stations, Fare Vending Machines (FVM's) including supporting infrastructure shall be provisioned for in the paid access area adjacent to the station ambassador office. These machines shall allow customers to tap-out, load funds or purchase fares. FVM's shall be located outside the required fare gate queue space, as customers enter/exit. Fare system to be co-ordinated with fare procurement strategy and /or Project agreement (PA). All FVM's shall be installed to meet side and front approach requirements as per DS-02 Universal Design Standards.

b) For all FVM's, provide required infrastructure including power/data and ensure conduit is concealed from view.

c) Digital Signage - Real-time arrival information shall be available within the station building and visible from or within the paid access zone to allow customers to use in-station amenities (e.g. washrooms, vending machines, etc.) before they navigate to their destination. Read in conjunction with Section 2.6 Digital Signage.

7.0 Platform

7.1 PLATFORM DESIGN

7.1.1 Overview

Transit projects are highly engineered projects, where the platform within any transit system provides significant real estate with many customer-facing elements. Efficient planning of the platform while maximizing transparency and flexibility are key factors that shall be accounted for during the early planning stages. In planning the back of house, mechanical and electrical spaces, the priority shall be amplifying the area assigned to the customer and implementing CPTED requirements. When above or at-grade, platform architecture shall always respect and integrate within the surrounding site context and development.

The critical design elements specific to the platform, that need to be incorporated, have a direct relationship with one another, and it is essential to understand these synergies and adjacencies to allow for maximum efficiencies when planning. The platform design elements are:

a) platform access (vertical and horizontal);

b) platform customer area and Designated Waiting Area (DWA) and circulation space;

c) Platform Edge Doors (PEDs) and interface with train;

d) space for amenities such as leased areas;

e) platform back of house (M&E, service rooms, and exit stairs);

f) platform Information Hub;

g) platform furniture and fixtures;

h) platform third-party advertising.

Figure 7-1: View from the below grade platform typology demonstrating the relationship between the feature walls, platform edge doors, digital signage, DWA area and overall look and feel of the platform. Renders are representational only.

Figure 7-2: View from the elevated platform typology demonstrating the relationship between the feature ceilings, platform edge doors, digital signage and overall look and feel of the platform. Renders are representational only.

7.1.2 Description

Platforms are a critical component to the station, where customers enter and/or exit subway trains to continue their journey. Customer safety and security are paramount where passenger flow shall be designed to be efficient and easy to navigate, and shall avoid pinch points and bottleneck scenarios. Integrated transit information including journey maps, live digital signage capturing train arrival times in combination with an audible public address system, all aid towards enhancing the customer journey . Platform edge doors (PED) are intended to provide a safe and secure customer experience, while improving air quality by minimizing exposure to harmful air particles. Minimizing the gap between platform and trains ensures the safety for all customers.

Level of comfort, design quality, and overall customer experience is to be designed to be consistent in all areas of the subway, including the platform. DWA's offer customers additional safety and security where accessible seating, enhanced lighting, and passenger assistance technologies are available consistently at all platforms.

Aesthetically, the platform is the where the branded experience is most highly visible, enhancing the customer journey as a memorable experience.

7.1.3 Design Approach

Among the three station typologies as outlined below, the design shall represent the subway brand look and feel. While at the same time, the platform shall reflect the local community context by creating its own individual character, while integrating within the surrounding development.

This design standard is built around a kit of parts approach, aimed at creating a modular and flexible approach specific to platform planning and design. The result is to deliver a clear, efficient, and minimalistic solution where a consistent architectural character is integrated within a harmonized transit system.

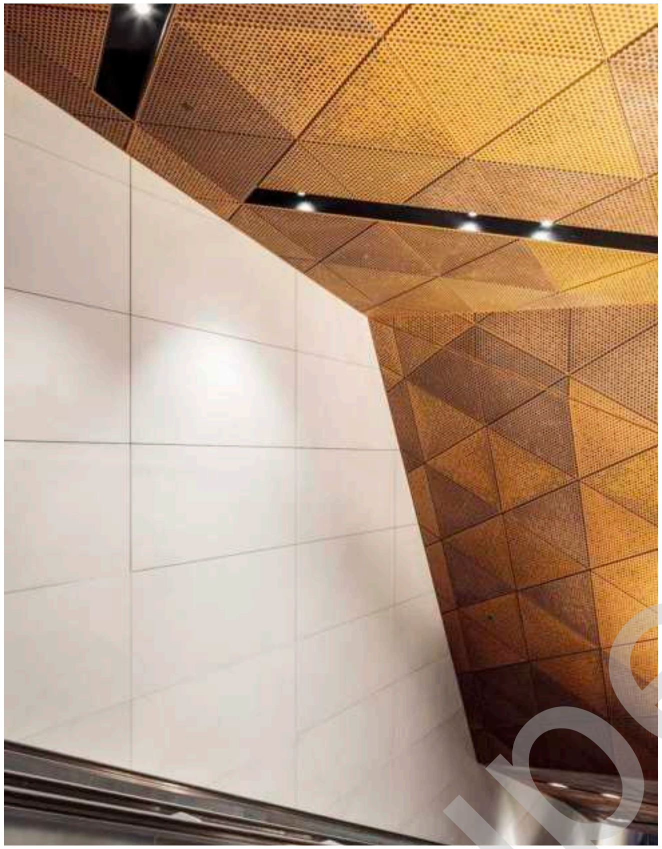


Figure 7-4: Precedent image demonstrating the relationship between the feature elements and base finishes

University Metro Station

ALA Architects + Esa Piironen Architects - Finland

7.1.4 Typologies

The main platform typologies include:

a) below grade;

b) elevated above grade;

c) at grade.

The varying platform typologies above are required to be fully functional while maintaining a consistent look and feel based on a kit of parts approach across the transit network. The elements that make up the "kit of parts" include vertical circulation, DWA, PED's, general walls and ceilings, and feature walls and ceilings. For existing stations, the requirement for PEDs shall be reviewed with existing condition analysis and structural and mechanical consideration.

Information such as ridership, exit surges, queuing areas and site-specific requirements related to platform detailed design will inform platform sizing. Other design scenarios such as center platforms, side platforms or stacked platforms can occur within all three scenarios. Center platforms are preferred over side platforms as they allow a more efficient utilization of vertical circulation, offer convenient cross-platform transfer where required, and accommodate higher capacity of surges in traffic flow especially during service interruptions. Center platforms also provide more flexibility for planning queuing to get off/on stairs, escalators and elevators and pedestrian circulation. Side and stacked platforms may be used where the right of way considerations or other constraints do not allow for center platforms.

7.1.5 Design Requirements: Planning

a) Platforms shall be designed to provide clear sightlines and maximize transparency to aid in visibility for security purposes.

b) Back of house spaces shall be planned based on a minimal footprint in order to maximize customer facing areas on platforms while avoiding creating blind spots.

c) Vents, mechanical elements, and electrical/IT cabinets located at the platform area, shall be screened from public view using a consistent screen material and colour.

d) Transparent materials for centrally located elements including elevators shall be specified to enhance visibility from all areas of the platform.

e) Platform floor finish material and colour shall be consistent through all the station platforms.

f) General walls and ceiling finishes to follow finishes as outlined in Section 4.10 Finishes and Materials.

g) Designated areas of feature walls and ceilings within the platform, shall be unique to each station. Refer to Section 4.10 Finishes and Materials.

h) Feature walls shall not obstruct or interfere with integrated digital information and or wayfinding signage.

i) Digital and static wayfinding shall be integrated with the architectural design of the platform.

j) All forms of advertising shall not interfere with wayfinding and information elements. Refer to Section 5.4 Non-Fare Revenue Advertising

k) Special signage shall be provided for Designated Waiting Areas (DWA). Refer to DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual

l) A minimum of 2500 milimetre passenger circulation clearance shall be maintained from platform edge.

m) Minimum clear exit widths shall be provided per most stringent criteria of OBC, NFPA 130 and AHJ (refer to code section 8.0.6)

n) Surge, queuing and run-off space shall be provided for vertical or horizontal circulation elements so as not to block pedestrian circulation and allow for changes in circulation direction or mode.

o) Where intermodal or interchange stations allow for cross-platform access, FVMs shall be included on the shared platform

7.1.6 Functional Design Requirements: Electrical

Platform occupant load calculation, sizing, travel time calculation and exit strategy shall be determined based on Level of Service requirements and projected passenger flows provided by Metrolinx in the PA. Exiting requirements will need to meet OBC section 3.13 at a minimum.

Electrical Communications

a) Tested, reliable, full Wi-Fi coverage shall be provided at the platform.

b) Wi-Fi signal strength throughout the station shall have a minimum signal strength of 67dBM and a minimum Signal to Noise Ratio (SNR) of 25dB in order to have wireless signal strength for voice applications.

c) Two (2) Power over Ethernet (PoE) outlets shall be provided for each Wi-Fi antenna utilizing the horizontal cabling solution being deployed (i.e. Cat6A).

Active Distributed Antenna System (DAS)

a) Full Active DAS coverage shall be provided at the platform.

b) The solution shall accommodate all the major cellular providers and shall be a multi-carrier solution that can be shared with the Wi-Fi infrastructure.

c) The Active DAS systems shall be easily expandable and adaptable to be 5G ready

7.1.7 Functional Design Requirements: Mechanical

Platforms shall be provided with the following mechanical systems:

a) Ventilation

  i. Ventilation shall be designed in accordance with the relevant project specific requirements and is subject to coordination with the operator.

  ii. For above grade and at grade typologies, the use of platform edge doors may mitigate the transfer of contaminants directly to the platform area but shall not obstruct the airflow inducted by the motion of the subway train. The upper portion of the platform enclosure may be louvered to allow for air flow between the train corridor and the platform. The louver design shall suit the design of the facility. Passive ventilation shall be provided with solutions including but not limited to the piston effect of the moving subway train.

  iii. For below grade typologies, platform edge doors are recommended to be full height and provide a complete seal between the platform enclosure and the train corridor. Mechanical ventilation shall be provided for fully enclosed platforms.

  iv. Emergency fire/smoke ventilation systems shall be designed in accordance with NFPA 130.

b) Heating and Cooling

  i. The platform shall not be conditioned. The Subway Ventilation System (SVS) shall be designed and utilized in a manner that improves occupant comfort. Please refer to section 2.11 for thermal comfort requirement.

c) Plumbing

  i. At least one hose bib, centrally located, shall be provided for each platform area.

ii. Hose bibs, complete with integral vacuum breakers, shall be provided with lockable, key-operated, recessed boxes. Associated piping shall be concealed (furred-in).

iii. Hose bibs shall be located in accordance with the relevant project specific requirements and is subject to coordination with the operator.

iv. Piping shall be heat traced.

d) Sanitary Drainage

i. Drains shall be installed at platform areas, located along the edge of the platform wall, and not at the platform edge.

ii. For drain in central platforms, drains shall be installed near the center line of the platform away from the platform edge.

iii. Drains shall be located in accordance with the relevant project specific requirements and is subject to coordination with the operator.

iv. Drainage piping shall be heat traced.

v. Platforms shall slope 0.75 % minimum away from platform edges into either continuous trench drains or area drains, and platform slope shall not exceed 2% outdoors and 1% indoors.

vi. Drain covers shall be Non-Corrosive, Anti-Slip Cover and designed to support the same live loads for which surrounding construction is designed.

vii. Trench drains shall be galvanized steel gratings, with cast in angles, with 30mm maximum bar spacing.

viii. Trench gratings shall be removable

ix. Gratings shall be fixed into position to prevent movement and vibration, and gaps around the edges shall be sealed to prevent standing water and build-up of dirt.

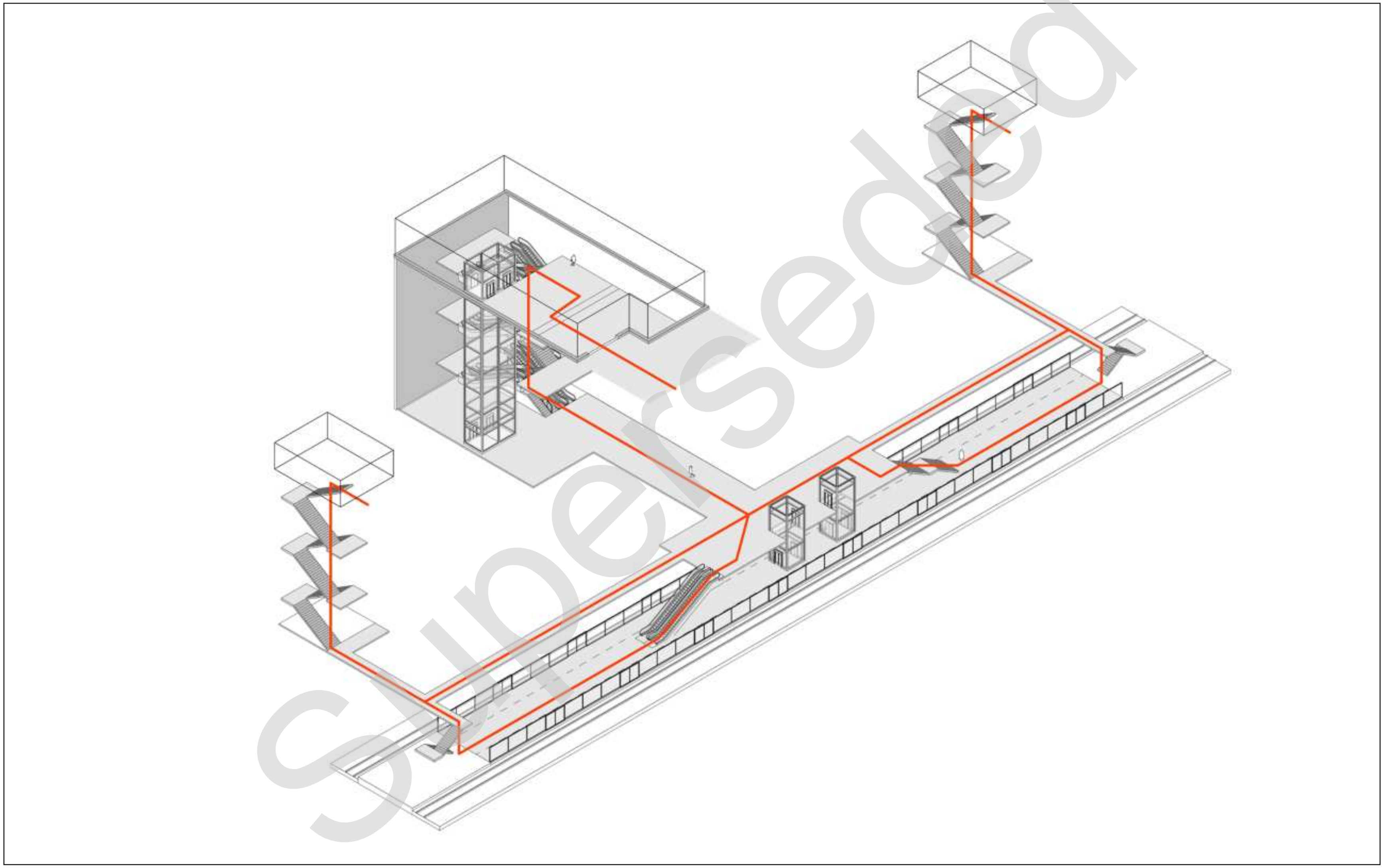


Figure 7-3: Diagram demonstrating the relationship between vertial transportation systems, platform and station entrance in one entrance scenario. Renders are representational only.

7.1.8 Functional Design Requirements: Means of Egress

a) Means of egress from a platform in a rapid transit station shall comply with the OBC and NFPA 130.

b) Egress facilities serving platforms may include corridors, ramps, stairs, fare gates, escalators and doors.

c) Escalators forming part of a required means of egress shall not comprise more than one-half of the required egress capacity from any one level.

d) Each platform in a rapid transit station shall be served by no fewer than two means of egress from the platform to the exterior of the station that are independent of, and remote from, each other.

e) At the platform level, the distance separating the egress facilities shall be the greater of one car length or 25 meters.

f) The maximum permitted travel distance of a platform area served by one means of egress (dead-end condition) is 25 meters.

g) The maximum travel distance on the platform to a point at which a means of egress route leaves the platform, shall not exceed 100 meters (325 ft) or as per NFPA 130. The more stringent requirement to apply.

h) The capacity and distribution of means of escape to accommodate emergency conditions shall be calculated in accordance with the OBC and where required NFPA 130.

7.1.9 Functional Design Requirements: Area of Refuge

a) Refer to DS-02 Universal Design Standard for area of refuge requirements.

7.1.10 Finishes and Materials

Refer to Section 4.10 Finishes and Materials.

7.2 PLATFORM EDGE DOORS (PED)

7.2.1 Overview

The implementation of Platform Edge Doors (PEDs) will significantly enhance the customer experience and ensure the safety of both customers and patrons. Where in scope, the intent for all new subways stations, is to incorporate the provision for the installation of continuous PEDs through the use of partial or full platform enclosure with the mechanical louvers. Existing site condition analysis and technical review of mechanical, structural and architectural systems, is required for legacy stations and tunnels to address potential PED technical implications.

Platforms design shall meet the latest technology and customer communication systems in hand. The intent is to use the PED's for all the stations, both for new lines and extensions and allows the opportunity to integrate information regarding the direction of travel, next train(s) , and real time dynamic information and alerts on digital displays located above the platform doors. Dynamic displays may also provide important operational information and serviceability messages.

Clear signage for the entrance doors shall be provided on the platform floor finish. Signage shall also be identified at all boarding areas specific for special need passengers.

Figure 7-5: Precedent image demonstrating the relationship between platform edge doors, information, digital signage and lighting
Elizabeth Line - Transport for London

7.2.2 Functional Design Requirements: Planning

a) When Automated Train Control (ATC) is installed, PEDs shall be provisioned continuously along all subway platform edges at all the new stations.

b) All PEDSs being specified shall meet CSA standards.

c) Door positions along the PED partition shall correspond with subway vehicle doors.

d) Leveling between platform and train shall be provided. Refer to DS-02 Universal Design Standard.

e) PED provisions and installation shall meet applicable code requirements. PEDs shall be installed with 610milimetres wide platform safety edge and a horizontal gap between the platform edge and stationary vehicle shall be no more than 76.2 milimetres (3 inches).

f) A slab recess shall be provided at platform edge to receive PEDs in the new station design.

g) PEDs shall be constructed of:

   i. maximum amount of glazing;

   ii. stainless steel.

7.2.3 Functional Design Requirements: Code

Horizontal sliding platform screens or PEDs shall be provided to separate the platform from the trainway in stations as opposed to guards in compliance with NFPA 130 requirements, and shall meet the following criteria:

i. the doors shall permit emergency egress from the train to the platform regardless of the stopping position of the train;

ii. the doors shall provide egress when a force not exceeding 220 N (50 lb.) is applied from the train side of the doors;

iii. the doors shall be designed to withstand positive and negative pressures caused by passing trains.

7.2.4 Functional Design Requirements: Lighting & Electrical

a) Where PED's are installed, the areas around the doors shall have a higher level of illumination with a gradual reduction towards the platform area while maintaining the minimum illumination standards. Refer to Section 2.5 Lighting.

b) An enhanced two-way intercom shall be provided at DWAs for the purpose of accommodating customers who are deaf, hard of hearing or deafened. Enhanced two-way intercoms shall include the following functionality:

   i. localized induction loop system to support telecoil wireless technologies for the benefit of hard of hearing customers;

ii. visual display and input device (keyboard) to support text communication (text input and output) for the benefit of customers who are deaf, hard of hearing and non-verbal;

iii. PAI shall meet the forward and side reach requirements under the DS-02 Universal Design Standard.

7.2.5 Functional Design Requirements: Mechanical

Platform Edge Doors shall be designed to resist the pressures created by the movement of the subway train.

Figure 7-6: View from the elevated platform typology demonstrating the relationship between the platform edge doors, digital signage and lighting. Renders are representational only.

7.3 PLATFORM ENCLOSURE

7.3.1 Overview

At minimum, partial platform enclosures are recommended when ATC is installed. For some specific projects full platform enclosure may be required.

7.3.2 Functional Design Requirements: Planning

a) Partial enclosure platform includes an assembly dividing the platform from the tracks that is full height with a horizontal louver allowing for air flow; a full height assembly is a completely sealed enclosure that does not include louvers. Partial enclosure platforms shall be designed with kit of parts approach as demonstrated in Section 1, kit of parts figure 1-2, 1-3.

b) When center platforms are below grade maximum ceiling height shall be designed above the platform customer area for innovative design opportunities.

c) Information and wayfinding shall be integrated with architecture in all the platforms. Refer to DS-03 Wayfinding Design Standard & DS-03 P2B Sign Implementation Manual

d) When integrated in the interior walls static information and digital displays shall be located 255 millimetres above grade.

e) A consistent base wall material shall be used for all the platforms and includes a base and consistent datum for base wall height. Refer to Section 4.10 Finishes and Materials.

f) Where platforms are not fully enclosed and are exposed to the elements, snow melt for platforms is required. Snow melting system design and classification shall be dictated by the specific application. Snow melting systems shall be classified based on the application, the climatic conditions, overhead enclosures, corresponding HVAC systems and any other criteria that could influence temperatures and conditions of the slab. Each project shall be uniquely evaluated based on the above mentioned criteria and the extent of the snow melting system shall be confirmed with the stakeholders. The use and type of snow melting system shall be verified with the operators of the specific facilities. The operators will be consulted to confirm if snow melting is preferred or if operators will undertake snow cleaning in lieu of snow melting. The source of heat generation for the snow melting system shall be evaluated on a project by project basis by evaluating available sources of energy, the extent of snow melting required and the sustainability / energy performance requirements of the specific site.

7.3.3 Functional Design Requirements: Lighting & Electrical

a) Both vertical and horizontal wiring and conduits shall be concealed and integrated within the structure. Wiring and conduit are not to be visible by passengers.

b) Where spare conduits are required to be embedded into, or placed under the platform, access panels shall be provided every 30 metres including the start and end of the conduit runs.

7.4 DESIGNATED WAITING AREA (DWA)

7.4.1 Overview

The designated waiting area at subway stations is a consistent element across all platform typologies and shall be designed to ensure the safety and security of all customers within the platform. The key design elements in this specific area shall include seating (including short journey and long journey types), waste receptacles, information points, digital screens, CCTV and PAI systems. The design approach for the DWA shall integrate both interior and architectural design elements.

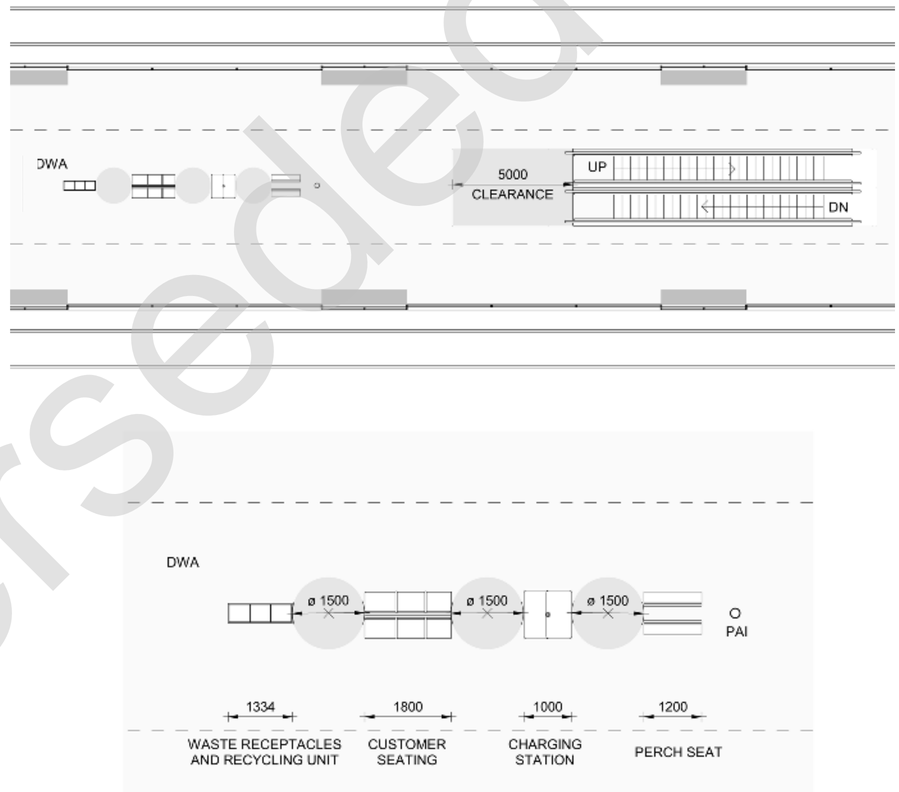


Figure 7-7: Diagram demonstrating the clearances required for DWA and the relationship between the interior elements

7.4.2 Functional Design Requirements: Planning

Read requirements below in conjunction with DS-02 Universal Design Standards.

a) DWAs shall be provided on all platforms according to requirements in the DS-02 Universal Design Standard.

b) One DWA shall be provided for each platform.

c) When platform is at grade, DWAs shall be weather-protected.

d) DWAs shall include seating (minimum of 2 benches) and waste receptacles. Refer to Section 2.5 Seating and Waste Receptacles.

e) DWAs shall incorporate unobstructed clear space adjacent to seating and be clear of circulation routes, to accommodate mobility devices such as wheelchairs, scooters and strollers. Refer to Section 2.5 Seating and Waste Receptacles for clearances.

f) CCTV cameras, PAI, and standardized signage shall be located in all DWAs.

g) Where Project Agreements require payphones the following shall apply:

   i. Provide 450mm clearance, free of any obstruction from the centre of the phone to either side of the phone,

   ii. Payphones shall be wheelchair accessible.

7.4.3 Functional Design Requirements: Lighting & Electrical

a) The Designated Waiting Area (DWA) shall be illuminated to a higher level than the general waiting area, to delineate the emphasized area. The luminaires shall be selected and located to demonstrate minimum glare to passengers and the Closed- Circuit Television (CCTV) cameras in particular.

b) Lighting will visually assist the passenger along the preferred circulation paths. The unpaid area lighting emphasizes system graphics, informational messages, fare vending equipment, and fare gates. The paid area lighting directs the passenger to the elements of circulation which leads to the platform.

c) PAIs to be designed per the relevant project specific requirements and is subject to coordination with the operator.

d) DWA CCTV cameras shall be of fixed type and mounted from the ceiling.

7.5 END OF PLATFORM PROTECTION

7.5.1 Overview

For customer safety, the ends of platforms shall be protected and clearly demarcated to persons with a disability by installing a physical barrier.

7.5.2 Functional Design Requirements: Planning

a) Ends of platforms shall be protected and clearly demarcated to all customers including people with disabilities by implementing a railing located within the detection range of a visually impaired person using a cane. Persons using a cane have the ability to detect objects in their line of travel if their lowest leading edge is at or below 680 milimetres from the floor.

b) A blue light fixture will be located at the platform end walls near the tunnel entrance to clearly identify the Emergency Alarm Station (EAS).

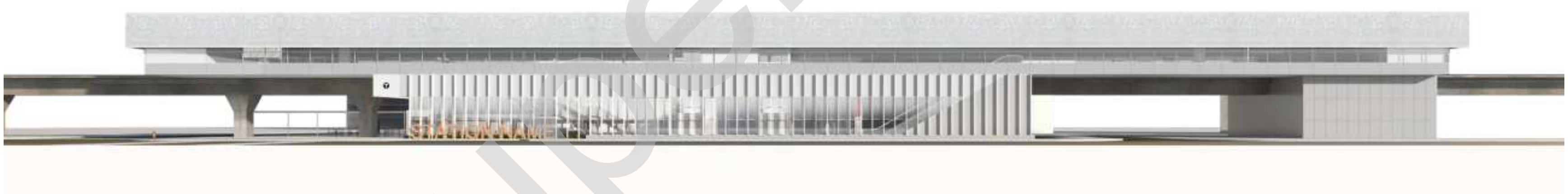


Figure 7-8: View from the elevated platform typology demonstrating the relationship between the elevated platform, entrance of the station and TOC. Renders are representational only.

7.6 PLATFORM CLEARANCES (ACCESSIBILITY)

7.6.1 Overview

This section outlines requirements specific to barrier free paths of travel and universal design requirements for circulation specific to the customer journey. Refer to DS-02 Universal Design Standard. Refer to Section 4.6 Vertical Circulation.

7.6.2 Functional Design Requirements: Code

a) A minimum unobstructed width of 2500 millimetres, including a 610 milimetres warning strip at the platform edge, shall be provided between the platform edge and any obstruction including walls, benches, garbage receptacles, etc. to comply with requirements of the OBC.

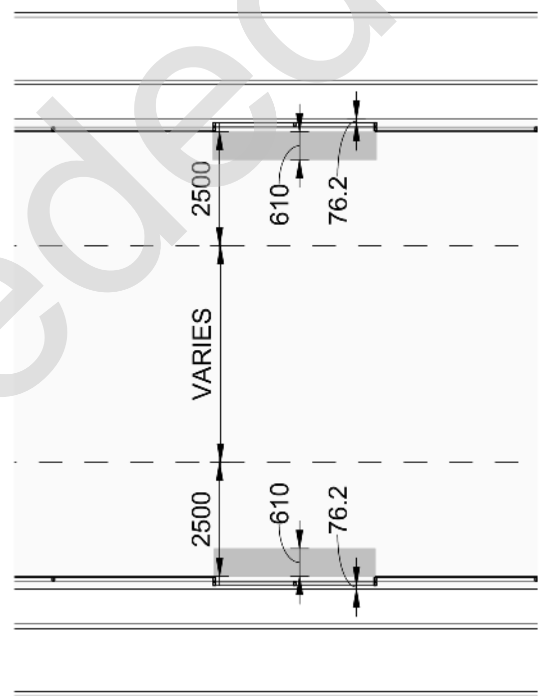


Figure 7-9: Diagram demonstrating the clearances required for platform circulation and barrier free access

7.7 TACTILE WALKING SURFACE INDICATORS / TACTILE ATTENTION INDICATORS

For information regarding Tactile Walking Surface Indicators (TWSI) including both attention indicators and guiding indicators, refer to Appendix F and DS-02 Universal Design Standards.

8.0
List of Figures and Tables

8.1 FIGURES

8.2 TABLES

SUBWAY STATION ARCHITECTURE DESIGN STANDARD

APPENDIX D

LEED REQUIREMENTS

Note: Previously within Section 4

D.1 LEED AT STATIONS

The following tables list mandatory credits, optional credits, and credits which are not to be pursued.

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
30	72	8		110
0	**1**	**0**	INTEGRATIVE PROCESS (IP)	**1**
0	1	0	Integrative Process	1
0	**14**	**2**	LOCATION AND TRANSPORTATION (LT)	**16**
0	1	0	Sensitive Land Protection	1
0	2	0	High Priority Site	2
0	5	0	Surrounding Density and Diverse Uses	5
0	5	0	Access to Quality Transit	5
0	0	1	Bicycle Facilities	1
0	0	1	Reduced Parking Footprint	1

Table D-1: LEED Credit Requirements at Stations

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
30	72	8		110
0	**1**	**0**	INTEGRATIVE PROCESS (IP)	**1**
0	1	0	Integrative Process	1
0	**14**	**2**	LOCATION AND TRANSPORTATION (LT)	**16**
0	1	0	Sensitive Land Protection	1
0	2	0	High Priority Site	2
0	5	0	Surrounding Density and Diverse Uses	5
0	5	0	Access to Quality Transit	5
0	0	1	Bicycle Facilities	1
0	0	1	Reduced Parking Footprint	1
0	1	0	Green Vehicles	1

Table D-1(continued): LEED Credit Requirements at Stations

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
30	72	8		110
3	**7**	**0**	SUSTAINABLE SITES (SS)	**10**
Prequisite			Construction Activity Pollution Prevention	
0	1	0	Site Assessment	1
0	2	0	Site Development - Protect or Restore Habitat	2
0	1	0	Open Space	1
0	3	0	Rainwater Management	3
2	0	0	Heat Island Reduction	2
1	0	0	Light Pollution Reduction	1
5	**6**	**0**	WATER EFFICIENCY (WE)	**11**
Prerequisite			Outdoor Water Use Reduction	
Prerequisite			Site Assessment	
Prerequisite			Site Development - Protect or Restore Habitat	
1	1	0	Outdoor Water Use Reduction	2
3	3	0	Indoor Water Use Reduction	6
0	2	0	Cooling Tower Water Use	2
1	0	0	Water Metering	1

Table D-1(continued): LEED Credit Requirements at Stations

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
30	72	8		110
8	**21**	**4**	ENERGY & ATMOSPHERE (EA)	**33**
Prerequisite			Fundamental Commissioning and Verification	
Prerequisite			Minimum Energy Performance	
Prerequisite			Building-Level Water Metering	
Prerequisite			Outdoor Water Use Reduction	
6	0	0	Enhanced Commissioning	6
0	18	0	Optimize Energy Performance	18
1	0	0	Advanced Energy Metering	1
0	0	2	Demand Response	2
0	3	0	Renewable Energy Production	3
1	0	0	Enhanced Refrigerant Management	1
0	0	2	Green Power and Carbon Offsets	2

Table D-1(continued): LEED Credit Requirements at Stations

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
30	72	8		110
5	**6**	**2**	MATERIALS & RESOURCES (MR)	**13**
Prerequisite			Storage & Collection of Recyclables	
Prerequisite			Construction Waste Management Planning	
0	3	2	Building Life-Cycle Impact Reduction	5
1	1	0	BPDO: Environmental Production Declarations	2
1	1	0	BPDO: Sourcing of Raw Materials	2
1	1	0	BPDO: Material Ingredients	2
2	0	0	Construction Waste Management	2

Table D-1(continued): LEED Credit Requirements at Stations

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
30	72	8		110
8	**8**	**0**	INDOOR ENVIRONMENTAL QUALITY (EQ)	**16**
Prerequisite			Minimum Indoor Air Quality Performance	
Prerequisite			Environmental Tobacco Smoke (ETC) Control	
0	2	0	Enhanced Indoor Air Quality Strategies	2
3	0	0	Low-Emitting Materials	3
1	0	0	Construction IAQ Management Plan	1
2	0	0	Indoor Air Quality Assessment	2
0	1	0	Thermal Comfort	1
2	0	0	Interior Lighting	2
0	3	0	Daylight	3
0	1	0	Quality Views	1
0	1	0	Acoustic Performance	1

Table D-1(continued): LEED Credit Requirements at Stations

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
30	72	8		110
1	**5**	**0**	INNOVATION (IN)	**6**
0	5	0	Innovation	5
1	0	0	LEED Accredited Professional	1
0	**4**	**0**	REGIONAL PRIORITY (RP)	**4**
0	4	0	Regional Priority Credit	4

Table D-1(continued): LEED Credit Requirements at Stations

D.2 LEED AT MSF

The following tables list mandatory credits, optional credits, and credits which are not to be pursued.

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
41	64	5		110
0	**1**	**0**	INTEGRATIVE PROCESS (IP)	**1**
0	1	0	Integrative Process	1
1	**14**	**1**	LOCATION AND TRANSPORTATION (LT)	**16**
0	1	0	Sensitive Land Protection	1
0	2	0	High Priority Site	2
0	5	0	Surrounding Density and Diverse Uses	5
0	5	0	Access to Quality Transit	5
0	1	0	Bicycle Facilities	1
0	0	1	Reduced Parking Footprint	1
1	0	0	Green Vehicles	1

Table D-2: LEED Credit Requirements at MSF

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
41	64	5		110
3	**7**	**0**	SUSTAINABLE SITES (SS)	**10**
Prerequisite			Integrative Process	1
0	1	0	Site Assessment	1
0	2	0	Site Development - Protect or Restore Habitat	2
0	1	0	Open Space	1
0	3	0	Rainwater Management	3
2	0	0	Heat Island Reduction	2
1	0	0	Light Pollution Reduction	1
8	**3**	**0**	WATER EFFICIENCY (WE)	**11**
Prerequisite			Outdoor Water Use Reduction	
Prerequisite			Indoor Water Use Reduction	
Prerequisite			Building-Level Water Metering	
1	1	0	Outdoor Water Use Reduction	2
6	0	0	Indoor Water Use Reduction	6
0	2	0	Cooling Tower Water Use	2
1	0	0	Water Metering	1

Table D-2 (continued): LEED Credit Requirements at MSF

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
41	64	5		110
15	**16**	**2**	ENERGY & ATMOSPHERE (EA)	**33**
Prerequisite			Fundamental Commissioning and Verification	
Prerequisite			Minimum Energy Performance	
Prerequisite			Building-Level Water Metering	
Prerequisite			Fundamental Commissioning and Verification	
6	0	0	Enhanced Commissioning	6
7	11	0	Optimize Energy Performance	18
1	0	0	Advanced Energy Metering	1
0	2	0	Demand Response	2
0	3	0	Renewable Energy Production	3
1	0	0	Enhanced Refrigerant Management	1
0	0	2	Green Power and Carbon Offsets	2

Table D-2 (continued): LEED Credit Requirements at MSF

MANDATORY	OPTIONAL	NOT TO BE PURSUED	CERTIFIED: 40-49 POINTS SILVER: 50-59 POINTS GOLD: 60-79 POINTS PLATINUM: 80 POINTS AND ABOVE	AVAILABLE POINTS
41	64	5		110
5	**6**	**2**	MATERIALS & RESOURCES (MR)	**13**
Prerequisite			Storage & Collection of Recyclables	
Prerequisite			Construction Waste Management Planning	
0	3	2	Building Life-Cycle Impact Reduction	5
1	1	0	BPDO: Environmental Production Declarations	2
1	1	0	BPDO: Sourcing of Raw Materials	2
1	1	0	BPDO: Material Ingredients	2
2	0	0	Construction Waste Management	2

Table D-2 (continued): LEED Credit Requirements at MSF

D.3 FIGURES AND TABLES LIST

SUBWAY STATION ARCHITECTURE DESIGN STANDARD

APPENDIX E

TTC REFERENCES

Note: These are TTC references that were previous included throughout the standard. They have been maintained as a reference in the Appendix

DS-09 REFERENCES TO TTC DM

References to the TTC Design Manual (TTC DM) in DS-09 were removed or updated to reduce any conflict or confusion. If additional information is required from the TTC DM, below is a comprehensive list of the previous references and their location in DS-09.

3.0 FUNDAMENTAL REQUIREMENTS

3.1 Life and Safety and Security
3.1.1.1 Life Safety and Fire Protection
- TTC DM-0401-01 General Criteria – Principles
- TTC DM-0102-02 - Fire Life Safety - Station Facilities

3.2 Barrier Free Access / Universal Design
3.2.6 Travel Distances & Accessible Path of Travel
- TTC Design Manual DM-0405-00 Section: Barrier Free Access, Subject: General

5.0 PRINCIPLE ELEMENTS THROUGHOUT

5.2 Security
5.2.1 CCTV
- TTC DM-0803-05 CCTV

5.2.2 Audio / Speakers
- TTC DM-0803-06 – Communications: Public Address System

5.5 Lighting: Exterior and Interior
5.5 Lighting: Exterior and Interior
- TTC DM 0701-05 Electrical Systems - Lighting

5.7 Acoustics
5.7.7 Reverberation Time
- f) TTC DM-0803-06

5.9 Thermal Comfort
5.9.3 Functional Requirements
- a) TTC DM- 0601-02- Ventilation - Design Parameters for Normal Operations

5.10 Plumbing
5.10.3 Functional Requirements
- a) TTC DM-0602 - Plumbing and Drainage - Plumbing, TTC DM-0602-03 - Plumbing and Drainage - Drainage and DM-0208-00 Storm Drainage - General

5.10.4 Design Requirements
- c) TTC design manuals DM-0103-05 General - Subway System Safety, DM-0102-02 - Fire Life Safety - Station Facilities, DM-0102-05 - Fire Life Safety - Communications, DM-0102-06 - Fire Life Safety - System Procedures.

6.0 PUBLIC REALM

6.0.3 Common Elements
- TTC Guidelines DM-0408-02, Landscaping – Design Criteria
- DM-0408-03, Landscaping – Site
- DM-0408-04, Landscaping – Design Elements,
- DM-0405-00 Barrier Free Access,
- DM-0412-01 Associated Surface Facilities.

6.7 Street Elements and Connections

6.7.1 Street Elements

- f) TTC DM 0412-01 Associated Surface Facilities-General
- g) TTC DM 0412-01 Associated Surface Facilities – General

6.7.5.2 On Site Protection

- h) TTC DM 0412-01 Associated Surface Facilities

6.7.8 Parking Requirements

- c) Where there is parking, hierarchy of access shall be informed by the MTO Transit Supportive Guidelines, and the TTC DM. The following is the consolidated approach to hierarchy of access:
  1. Pedestrian and bicyclists.
  2. Buses, streetcars, light rail vehicles (LRV), and specialized transit vehicles.
  3. Passenger pick-up and drop-off (including taxis).
  4. Park-and-ride.
- d) For Maintenance parking refer to TTC Design Manual.
- e) For Global minimum service parking refer to TTC Design Manual.

7.0 ARCHITECTURE

7.4 Entrances / Exits

7.4.8 Emergency Exit Buildings

- TTC DM-0102-03 Fire Life Safety – Trainway Facilities

7.4.8.5 Lighting Requirements

- c) Refer to TTC DM-0701-05 – Electrical Systems – Lighting for further details on emergency lighting requirements.

7.4.8.6 Mechanical Requirements

- c) TTC DM-0102-02 Fire Life Safety - Station Facilities.
- d) TTC Design Manual: DM-0602 - Plumbing and Drainage - Plumbing
- e) TTC Design Manual: DM-0602 - Plumbing and Drainage - Plumbing, and DM-0602-03 Plumbing and Drainage - Drainage.

7.5 Circulation

7.5.1 Circulation Overview

- This section includes excerpts from the TTC DM 0402 Station Planning. Exterior circulation is covered in Section 6 - Public Realm.

7.7 Pedestrian Tunnels

7.7.9 Design Requirements: Mechanical

- h) TTC design manual DM-0602-03 Plumbing and Drainage - Drainage.

7.9 Rail Corridor Architecture Elements

7.9 Overview

- Refer to TTC Design Manual DM-0303 Elevated Structures and Section 3.4 Elevated Trackway of DM-0209 Control of Access for detailed requirements concerning functional requirements, operational and fire-life safety requirements, and design loads.

7.9.4.3 Planning Requirements

- Section 7.9.4.3. includes excerpts from TTC DM-0607-01 Subway Ventilation System (starting at item h).

7.10 Finishes and Materials

Note: Section to be read in conjunction with:

- TTC Reference Standards DM-0409-01 & DM-0409-02

7.10.3.2 General Walls

- TTC DM 0409-01 for Minimum Dimensional Allowances

7.10.5.13 Automatic Exterior Sliding Aluminum Doors (DR1)

- g) All hardware as per TTC technical specifications

7.10.5.14 Manual Exterior Swing Aluminum Door (DR2)

- h) All hardware as per TTC technical specifications

7.10.5.15 Manual Hollow Metal Door and Frames (DR3)

- g) All hardware as per TTC technical specifications

7.10.6.3 Floor Tile and Base (FL1B): Technical Requirements

- b) Slip resistance: Provide materials having a minimum DCOF 0.5 dry/wet, when tested in accordance with ANSI A137.1 with the BOT 3000 Digital Tribometer. Note that this slip resistance requirement supersedes any/all previous requirements within the current TTC Master Specifications.

7.10.6.10 Manual Interior Swing Aluminum Door (DR4

- n) All hardware as per TTC technical specifications

8.0 UNPAID TRANSACTION ZONE

8.1 Unpaid Transaction Zone

Note: This section shall be read in conjunction with:

- TTC Guidelines DM-0402-06, Station Planning – Pedestrian Circulation,
- DM-0405-00 Barrier Free Access,
- DM-0803 - Communications.

8.4 Station Ambassador

8.4.2 Description

- TTC DM-0401-05 Staff Rooms

8.4.4 Functional Design Requirements (Station Ambassador Office)

- c) TTC DM-0601-02 Ventilation - Design Parameters for Normal Operations.

9.0 PAID ACCESS AREA

Note: Section to be read in conjunction with the following reference documents:

- TTC DM-0406-01 Concessions

9.2 Public Washrooms

9.2.3 Functional Design Requirements: General

- b) TTC DM-0601-02 Ventilation - Design Parameters for Normal Operations.
- j) Refer to TTC Master Specifications

10.0 PLATFORM

10.1 Platform Design

10.1.8 Functional Design Requirements: Mechanical

Platforms shall be provided with the following mechanical systems:

- a) Ventilation
  i. TTC DM-0607-01 - Subway Ventilation - Subway Ventilation System.
- c) Plumbing
  iii. TTC Design Manual: DM-0602 - Plumbing and Drainage - Plumbing
- d) Sanitary Drainage
  iii. TTC Design Manuals DM-0602 - Plumbing and Drainage - Plumbing, and DM-0602-03 Plumbing and Drainage - Drainage.

10.2 Platform Edge Doors (PED)

10.2.5 Functional Design Requirements: Mechanical

- TTC DM-0607-01 Subway Ventilation - Subway Ventilation System and DM-0301-02, Paragraph 3.3.4.1 Transitory Wind Pressures at Confined Spaces.

10.4 Designated Waiting Area (DWA)

10.4.2 Functional Design Requirements: Planning

- Read requirements in conjunction with TTC Design Manual.

10.4.3 Functional Design Requirements: Lighting & Electrical

- c) PAI's to be designed per TTC Design Manual - DM-0803-10 - Communications - Passenger Assistance Intercom.

10.6 Platform Clearances (Accessibility)

10.6.1 Overview

- TTC Design Manual DM-0405-00 Section: Barrier Free Access, Subject: General

10.6.2 Functional Design Requirements: Code

- b) Platform dimensions shall be as per TTC DM-0402-06.

SUBWAY STATION ARCHITECTURE DESIGN STANDARD

APPENDIX F

TACTILE WALKING SURFACE INDICATOR REQUIREMENTS

Note: These are the Tactile Walking Surface Indicator requirements that were previous included throughout the standard. They have been maintained as an Appendix for future inclusion in DS-02 Universal Design Standard.

DS-09 - Tactile Walking Surface Indicator Requirements

The following requirements have been pulled into an appendix of DS-09 for incorporation into a future DS-02 Universal Design Standard Update.

Tactile Walking Surface Indicators (TWSI)

Previously Section 3.2.8

Planning Requirements

a) Tactile attention indicators shall:

   i. meet the technical, functional and application requirements under DS-02 Universal Design Standard;

   ii. be included across the entire width of the hazard with a depth of 610 millimetres;

   iii. have one side against the edge of the hazard, unless otherwise indicated in this Standard;

   iv. be located:

      1. at the top of stairs;

      2. At the leading edge of landings where a doorway opens onto stairs;

      3. at curb ramps;

      4. at an entry into a vehicular route or area where no curbs or other elements separate the vehicular route from a pedestrian route;

      5. across the full length of the platform edge and where platform edge doors are provided, be across the width of the platform edge door opening to indicate location of the subway vehicle doors.

b) Tactile direction indicators shall:

   i. be provided within the paving up to the accessible station entrance doorway(s).

   ii. A continuous tactile direction (walking surface) indicator path shall be provided from the accessible station entrance(s) to the elevator, along the continuous accessible path of travel to the station platform.

   iii. Where more than one entrance doorway is provided within the same entrance structure, a tactile direction indicator path shall be provided. Where possible, the separate indicator paths shall come together prior to passing through the fare gates. Only one tactile direction path shall pass through each fare line and it shall use the accessible fare gate providing the most accessible, direct, and convenient path of travel.

   iv. Prior to crossing the fare lane, the Tactile Direction Indicator path shall branch out to the self-serve hub and the Passenger Assistance Intercom).

   v. Where a transfer concourse level exists, the tactile direction indicator path shall be provided between elevators only. When vertical access points are side by side, catchment areas can be shared and treated as one area.

vi. At platform level, the tactile direction indicator path shall be increased to 600mm wide along the length of the Designated Waiting Area (DWA) to help identify its location.

vii. At platform level the tactile direction indicator path shall lead to the Area of Refuge tactile signage at the door immediately serving the Area of Refuge.

viii. For centre platforms, the tactile direction indicator path shall be consistently offset closer to the northbound and westbound platforms to passively indicate platform service direction.

ix. For all platform typologies a tactile direction indicator path shall be provided along the full length of the platform and lead to each vertical circulation element.

Design Requirements

c) The tactile direction indicator path shall be 300 millimetres in width, except on bus platforms leading to bus boarding points and Designated Waiting Areas (DWA) of the rail platforms shall be at least 600 millimetres wide.

d) To assist with tactile differentiation, a minimum 600 millimetres smooth and clear (obstruction-free) floor walking surface shall be provided on both sides of the path.

e) At turns and decision-making points along tactile direction indicator routes, the direction tiles shall stop on either side of a 600mm by 600mm level and unobstructed ground or floor area.

f) The design of tactile direction indicator tiles shall comply with the DS-02 Metrolinx Universal Design Standard and the most current version of CSA B651 (Accessible Design for the Built Environment).

g) The tactile direction indicator path shall provide catchment areas at locations such as vertical access points, to help ensure that customers will locate the main path. These catchment areas shall be shaped like a "lower case h" in order to provide 90-degree turns at decision points and shall be clear of any furnishings or obstructions.

h) The number of decision points along the tactile direction indicator path shall be kept to a minimum in order to simplify the wayfinding experience.

i) Tactile direction indicators shall have a luminance-contrast of at least 50% with the surrounding or adjacent surfaces. To enable tactile direction indicator to be easily distinguishable from the surrounding adjacent surfaces, the prescribed visual contrast shall be maintained between the tactile direction indicator and any adjacent surfaces on either side of the tile within a minimum of 600 millimetres.

j) The tactile direction indicator shall not be yellow.

For additional information regarding Tactile Walking Surface Indicators (TWSI) including both attention indicators and direction indicators, refer to Sections 4.10.6.12 Tactile Walking Surface Indicators (TWSI): Technical requirements, and the DS-02 Universal Design Standard.