ARCHITECTURAL MATERIALS AND FINISHES DESIGN STANDARD

MX-FAE-STD-A101

Facilities Architecture & Engineering
Version 1.0
December 2025

METROLINX

Metrolinx Design Standards
Metrolinx Architectural Materials and Finishes Design Standard
Publication Date: December 2025

an Agency of the Government of Ontario

Amendment Record

Version No.	Publication Date	Remarks
1.0	December 2025	First publication.

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1 INTRODUCTION

1 INTRODUCTION

1.1. PREFACE

This is the first edition of the Architectural Materials and Finishes Design Standard (MX-FAE-STD-A101).

This standard is applicable to all Metrolinx projects and provides architectural and urban design requirements for stations, facilities, stops, and associated customer-facing infrastructure.

The Architectural Materials and Finishes Design Standard was developed by the Metrolinx Facilities Architecture and Engineering team within the Asset Management and Maintenance Division.

This Standard is available for external users to download via the Metrolinx public download site at:

https://www.metrolinx.com/en/metrolinx-technical-standards/engineering-and-architectural-standards/stations-and-facilities

Suggestions for revision or improvements, as well as inquiries for additional information, can be sent to the Owner of this Standard, Metrolinx Facilities Architecture and Engineering, Attention: Director.

Internal Metrolinx team members may submit lessons learned or suggestions for improving our Standards at the following:

https://forms.office.com/r/fVQ03G9scg

1.2. PURPOSE

The purpose of this Standard is to support designers by providing material and finish performance criteria in a centralized document that supports the individual design requirements described in the Metrolinx Modal Design Standards.

This document does not dictate the scope within projects, but provides requirements where the scope is included as part of project agreements.

1.3. HOW TO USE THIS DOCUMENT

Metrolinx Design Standards follow metric measurements unless specifically noted otherwise. Measurements in this standard are indicated in millimetres (mm) for instances less than 10,000 mm, and in metres (m) for values of 10 m or greater. Where imperial measurements are provided, instances will be noted in inches (in) unless greater than 12 in, then measurements will be indicated in feet (ft).

Appendix A – Material and Finish Schedule is a comprehensive list of all materials and finishes as described in this document, complete with their descriptions, abbreviations, typical sizes, colours, finishes, and locations.

1.3.1. Relationship with Metrolinx Standards

The Metrolinx Design Standards are set up hierarchically. The Front End Design Standard is the first tier of Metrolinx Design Standards, as it includes overarching context and information on the suite of standards. Mode-specific Design Standards, also referred to as the Modal Design Standards, are the second tier, such as the GO Station Architecture Design Standard, Subway Station Architecture Design Standard, LRT Architecture Design Standard, and BRT Architecture Design Standard.

Modal standards set design requirements for each specific mode and specify materials to be used in projects, but refrain from prescribing performance requirements and qualitative characteristics. The Architectural Materials and Finishes Design Standard is part of the third tier of standards that support Asset-specific Requirements. It provides additional information to support the elaborative design process and the selection of materials, allowing for a system to analyze any proposed substitutions or alternatives.

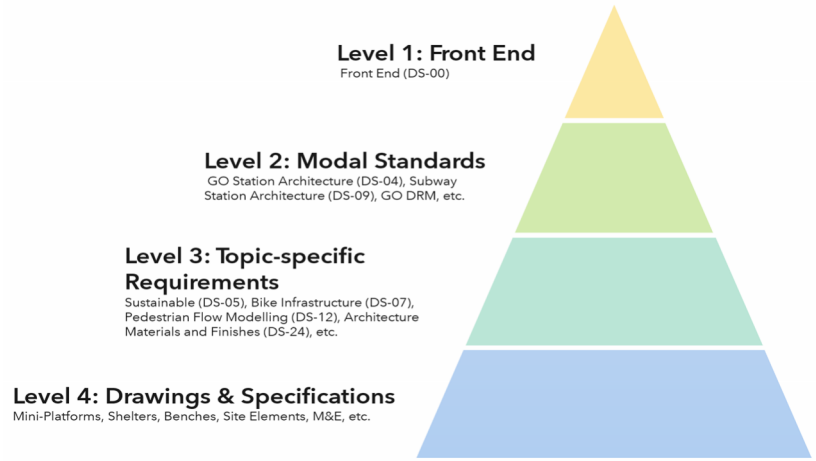

Figure 1.3.1: Hierarchy of Metrolinx Design Standards

This Standard does not prescribe the exact locations where materials are applied, but rather generally acceptable locations, such as exterior versus interior. Specific location requirements are contained within the Metrolinx Modal Design Standards. Those Standards prescribe the specific colours and dimensional requirements of materials, while this Standard provides a generally acceptable range across the different modes. It is important to note that this Standard does not dictate the scope of projects, but rather, provides performance and prescriptive requirements for individual materials and finishes and does not include full envelope assemblies.

This document shall be read in conjunction with other Metrolinx Standards, including respective bulletins, as well as in conjunction with Municipal Standards and Bylaws to ensure coordination.

1.3.2. Project Responsibilities

This standard shall be applied together with the project contract documents. This standard provides supplemental requirements to the OBC and is not intended to override or replace legislative codes and standards.

This Standard sets out the minimum performance requirements for materials and finishes. Project Designers shall develop and document additional materials and finish details within their specifications as required to meet these baseline requirements. They shall align with project-specific conditions and design intent.

The Designers of Record shall conduct due diligence and retain ultimate responsibility for their designs, ensuring compliance with all applicable laws, codes, and regulations relevant to the specific project site. This framework ensures consistent design practices, regulatory compliance, and architecture that is durable, maintainable, and suited for long-term service, while allowing the Designers of Record to exercise their professional judgement.

Any reference to 'Engineers' or 'Engineers of Record' within this Standard shall be understood as referring to Professional Engineers licensed to practice in the Province of Ontario, as required by the Professional Engineers Act.

Refer to Metrolinx Front End Design Standard for material sample and mock-up requirements. They may be used to verify the final product installed on-site.

1.3.3. Conflicts

The hierarchy of codes and standards is generally noted in contracts and project agreements relating to governance. In the absence of that structure or where conflicts arise between legislative codes and standards, the more stringent requirement shall apply. Designers shall use their professional judgment to discern which requirement is more stringent.

The Designer of Record shall provide a recommendation to address any conflicts between relevant codes and applicable Standards that are incompatible, for the review and approval by the Owner of this Standard.

1.3.4. Alternatives and Substitutions

Alternate finishes, textures, shapes, and colours may be proposed for materials on a project-specific basis and shall be submitted to the Owner of this Standard for review and approval.

1.3.5. Terminology and Abbreviations

Refer to the Metrolinx Front End Design Standard for the complete list of terminology and abbreviations.

TERM	ABBREVIATION
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
AODA	Accessibility for Ontarians with Disabilities Act
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASTM	American Society for Testing and Materials
CGSB	Canadian General Standards Board
CSA	Canadian Standards Association
ISO	International Standards Organization
MPI	Master Painter Institute
NAFS	North American Fenestration Standard

TERM	ABBREVIATION
NBC	National Building Code of Canada
NFPA	National Fire Protection Association
OBC	Ontario Building Code
OESC	Ontario Electrical Safety Code
TGS	Toronto Green Standards (City of Toronto)
TTMAC	Terrazzo Tile and Marble Association of Canada
ULC	Underwriters Laboratories of Canada

2 GENERAL REQUIREMENTS

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2.1. PRINCIPLES FOR MATERIAL SELECTION

General principles for material selection shall include the following:

a) Customer Experience and Design Intent;
b) Performance, Durability, Operations, and Maintenance;
c) Safety and Security;
d) Life Cycle Costs; and
e) Sustainability.

2.1.1. Customer Experience and Design Intent

The end-to-end customer experience shall cater to the diverse needs and abilities of all travellers, regardless of age, gender, income, or familiarity with the system, providing an integrated, convenient, and safe experience for all customers. Material selection is informed by principles that support customer experience and station identity, aligning with overall performance and durability that support the operation and maintenance of stations and facilities. Refer to Front End Design Standard for additional information on design principles.

2.1.1.1. Identity Considerations

Standardized and appropriate material requirements promote a recognizable identity while increasing the quality and efficiency of station buildings. To allow for project-specific flexibility and to facilitate integration with site context, the application of identity at stations shall:

a) adopt a 'gradient' approach, with increased consistency further into the station environment and closer to transit vehicle boarding areas;
b) be maintainable to ensure long-term suitability and alignment with the overall design goals and aesthetic requirements of the project; and
c) use a consistent and recognizable palette of materials and finishes across the network while allowing for distinction between stations to support wayfinding and station identity.

2.1.1.2. Colour and Finish

Material finishes impact the development of a holistic environment, where visual, tactile, and audible experiences within transit spaces are essential in supporting the customer's use of the space. Appropriate colour selection should help customers orient and navigate themselves through the station. The selection of colours, textures, and finishes shall minimize hazards and safety concerns, maintaining an actual and perceived safe environment. Specific prescribed colour and finish requirements can be found in the Metrolinx modal standards. The following overarching requirements shall apply:

a) Materials used shall be integral and homogeneous throughout, maintaining uniformity with consistency in colour, texture, and pattern across similar elements to create a cohesive look;
b) Colours shall be resistant to fading;
c) Colours and textures shall not conflict with those used for wayfinding, including information and guidance systems;
    i. Station-specific colours shall not include neon, fluorescent, black, or metallic tones.
d) Colour and tonal contrast between surfaces shall follow levels to assist the visually impaired. Refer to the Universal Design Standard. The colours selected shall complement standard safety colours and enhance lighting levels;
    i. Material selection shall allow for high visual contrast between walls and adjacent floors to facilitate the

differentiation of surfaces by visually impaired individuals, together with general principles of wayfinding design; and

ii. Some materials or elements, such as doors, walls, floors, columns, and furniture, require luminance contrast measured on the Light Reflective Value (LRV) scale to differentiate them from their surrounding surfaces. Refer to the Universal Design Standard for details.

e) Shiny surfaces shall be avoided, as they produce glare and reflections that can disorient customers. The Unified Glare Rate (UGRL) shall not exceed the requirements as per Metrolinx Design Standards. Refer to the Universal Design Standard;

f) Where noted in this Standard or other Metrolinx Design Standards, colour references shall be a neutral tone and in alignment with the following targeted Pantone colours:
   i. White – Pantone 11-0601 TPG;
   ii. Light Grey – Pantone 20-0082 TPM;
   iii. Warm Grey – Pantone PQ-400C;
   iv. Slate Grey – Pantone 16-5804 TPG;
   v. Medium Grey – Pantone 2333 C; and
   vi. Charcoal Grey – Pantone 19-4008 TPG.

Figure 2.1.1.2: Standard Reference Colours

g) Where colours are not identified in Modal Standards or specified in this Standard, the above selection shall be the acceptable range of colours.
   i. Alternate colours proposed shall be submitted to the Owner of this Standard for review and approval.
   ii. Custom colours, such as those used for feature elements, shall be determined on a project-specific basis.

2.1.1.3. Accessibility, Universal Design, and Wayfinding

Public-facing station environments, including passenger interaction areas and vertical circulation elements, shall be designed to be equitable and accessible to all users. This is supported through material and finish considerations, a designated material palette, colour schemes, tonal contrast, and other requirements. Wayfinding shall be supported and emphasized through the selection of materials integrated with the overall design of the station, thereby reducing reliance on signage and promoting intuitive wayfinding. Refer to the Universal Design Standard and Wayfinding Design Standard for additional requirements.

2.1.1.4. Integrated Stations

For stations that serve more than one transit mode, are operated by more than one service provider, or are integrated with third-party developments, material selections may differ from those explicitly defined in Metrolinx Standards. To ensure system coherence, resolve design conflicts, and maintain a consistent passenger environment, the following requirements shall apply:

a) The strategic use of materials that signify various modes of transportation and possibly different operators shall be used where appropriate; and

b) Station environments shall be designed to resolve conflicts between modes, promote safety and reliability, and consider the needs of various users.

2.1.2. Performance, Durability, Operations and Maintenance

2.1.2.1. Performance and Durability

Performance-based requirements for each material and finish help support reliable operation over the expected life cycle by setting criteria that allow for a standard level of quality. Materials shall be selected to minimize the risk of hazards to patrons and maintenance staff.

The durability of materials is determined by their ability to withstand deterioration from use, environmental factors, mechanical, chemical, and other stresses over time, while maintaining a serviceable condition, structural integrity, and aesthetic quality. Materials used in transit applications are often in high-contact environments and require products that are specifically designed to function in these scenarios. This encompasses factors such as weather resistance (including UV exposure, moisture, and temperature fluctuations), wear and tear (abrasion resistance), aging, vandalism, and maintenance procedures.

Additional qualities that are considered include mechanical properties (tensile and compressive strength, impact resistance), chemical stability (resistance to corrosion, oxidation, chemical exposure), thermal performance (expansion, contraction, and heat resistance), as well as service life expectancy and frequency of use. To ensure that materials meet the expected performance and durability requirements, the following requirements shall apply:

a) All materials shall uphold their intended use and function, and maintain a good appearance throughout their projected life. They shall withstand degradation, including but not limited to corrosion, abrasion, delamination, and cracking;
b) Station elements shall resist wear due to abrasion caused by the rubbing, scraping, and leaning from passengers and staff, as well as contact with other materials;
    i. Non-abrasive finishes shall be used where passengers are likely to brush against, such as stairwells, elevators, and customer passageways; and
    ii. Materials shall be through-colour to minimize the visual impact of damage from scratches and abrasion.
c) All materials, finishes, hardware, and fasteners shall be secured and able to withstand the anticipated factors, including but not limited to ground-borne vibrations, temperature and humidity fluctuations, air pressure changes, seismic forces, aging, and vandalism;
    i. All cladding panels at platforms shall be engineered to remain in place, complying with the specified pulse loads created when transit vehicles approach and depart the station; and
    ii. Mechanical attachment systems, fasteners, and bonding materials shall be provided to ensure performance is maintained over the expected life of the product and minimize dislodgement. Designers shall also refer to the manufacturer's specifications and requirements for additional requirements.
d) All material thicknesses shall be verified by the Designer of Record to ensure that performance capabilities suited for the intended use and location of the material are achieved to reduce the possibility of failure;
e) Materials and finishes shall be resistant to moisture absorption and meet the required absorption rates specific to each material;
    i. Materials and finishes shall not warp due to fluctuations in moisture content and temperatures, or shrink and expand past the designed and intended tolerances.
f) Materials shall be resistant to fading due to exposure to UV rays and designed to maintain their integrity and appearance;

g) Unless noted otherwise in Metrolinx Standards, materials shall be chemically inert, acid and alkali-resistant, non-staining, and have specified maintenance procedures; and
h) Material performance and durability shall conform to CSA S478, Durability in Buildings.

2.1.2.2. Metal Finishes

The following requirements shall apply:

a) The 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 in the shop, and then assembled on site;
b) Designs and specifications shall minimize the need for site finishing and touch-up galvanizing;
    i. All steel components requiring galvanization shall be hot-dipped galvanized with a Z275 zinc coating.
c) Designs shall include mitigation measures for different types of corrosion, such as uniform corrosion and galvanic corrosion;
    i. Where there is a potential for galvanic corrosion between dissimilar metals, mitigations may include, but are not limited to, protective coatings, films, insulating membranes, rubber gaskets, pads, silicone sheeting, and bituminous paint. Refer to the galvanic series for the nobility of metals; and
    ii. Where there is potential for uniform/atmospheric corrosion, mitigations may include, but are not limited to, the use of a zinc-rich primer.
d) Welds shall appear continuous and smooth with seams minimized or hidden from view. Visible spot welding shall not be acceptable;
    i. Welding shall be performed by a certified and licensed welder in accordance with industry requirements and qualified procedures to ensure that the quality, structural integrity, and reliability of the product are achieved; and
    ii. Surfaces shall be suitable for painting or other applied finishes.
e) Coatings and paint-finished surfaces shall achieve a smooth, uniform, and blemish-free appearance suitable for well-lit and close-up viewing conditions;
    i. Surfaces shall be free of visible imperfections such as rust, grease, mill scale, and other contaminants; and
    ii. The quality and consistency of finishes shall reflect a controlled factory application environment. Site-applied finishes shall not be acceptable.
f) All finish steel, such as handrails and door hardware, unless noted otherwise, shall be:
    i. grade 304 stainless steel for interior conditions;
    ii. grade 316 stainless steel for exterior conditions, wet or high-moisture areas, or within high-contact zones; and
    iii. site verified as requested by the Owner of this Standard. Testing methods, such as the Stannous Chloride Test, shall be incorporated into project requirements to ensure that the quality of the installed steel complies with Metrolinx Design Standards requirements.
g) Exterior conditions, including but not limited to humidity resistance, alkali resistance, and salt spray resistance, shall be considered when specifying and detailing finished materials, such as aluminum;
h) Structural steel exposed to view requiring a fire resistance rating shall not use Sprayed Fire-rated Resistive Material (SFRM), including but not limited to sprayed-applied cementitious or fibrous insulation; and
i) Fasteners shall be specified for their intended use and be concealed or hidden to deter vandalism.

2.1.2.3. Modularity and Unit Sizing

The materiality strategy shall be modular, adaptable, and repeatable while following a kit-of-parts approach with simple

installation methodologies. This ensures that replacement, when required, can be easily procured, reducing the asset's downtime. Designs shall emphasize the alignment of joints and materials, provide contrast where appropriate, repeat elements, and maintain human-scale proportions. The following criteria shall apply:

a) Units shall be fabricated to the largest practicable dimensions in order to minimize the number of joints, while remaining within the size and weight constraints that can be safely managed by operations and maintenance personnel;
    i. Requirements noted above do not apply to structural framing members, which shall be determined by the Engineer of Record.
b) Standardized grids shall be used whenever possible to accommodate unitized systems, including but not limited to glazing and cladding panels;
    i. Unique and non-modular components, such as complicated designs that are rounded, complex, atypical shapes, or incorporate acute angles, shall be avoided;
    ii. The spacing and dimensional width of joints shall be equal to achieve consistent repetition of unit sizes;
    iii. The Designer of Record shall size components according to industry standards, manufacturer requirements, and dimensional requirements in Metrolinx Design Standards, to reduce the possibility of failure; and
    iv. Replacement and repair work shall be considered, avoiding unit sizes that would result in unnecessary complexity and cost.
c) To reduce potential maintenance issues, a minimum number of small, non-absorbent concave joints, such as caulked joints with backer rods, shall be provided to allow for expansion and contraction.

2.1.2.4. Installation and Application

Materials shall be detailed and specified for installation in accordance with industry standards and the manufacturer's requirements. Design and installation requirements shall be included in project specifications, including but not limited to the following:

a) The detailing of all materials and finishes shall allow for a clean delineation from adjacent materials, facilitate replacement capabilities, and ensure the alignment of joints;
    i. Detailing shall be consistent and carefully resolved at material intersections, connections, and transitions;
    ii. Joints shall be straight, true, and consistent in width and appearance; and
    iii. Vertical and horizontal joints shall not provide a lip or trip hazard, and surfaces on either side of the joint shall be co-planar.
b) Surface finish shall be free from defects and shall not be broken, cracked, scratched, damaged, dented, deformed, discoloured, or contain any visual defects such that they are detectable or observable;
    i. Any materials that display any form of damage or defection shall not be acceptable and shall be remediated or replaced to the satisfaction of the Owner of this Standard.
c) Fastener patterning shall be designed, taking into account unit sizing and material selections, and shall not detract from the overall design intent of the selected material;
d) The assembly and combined performance of materials shall be considered when selecting a system. This applies to new builds, additions, or renovations that incorporate existing materials;
    i. The layering and sequencing of materials, inter-compatibility, compartmentalization, adhesion, differential movement, and use of primers shall also be considered.

e) Control joints and expansion joints shall be provided and spaced to eliminate cracking due to shrinkage and expansion;
f) Where materials overlap, they shall be detailed to manage water run-off and mitigate standing water and water ingress; and
g) Joints within systems shall be designed to accommodate structural movement, weather resistance, material replacement, and be of uniform appearance.

2.1.2.5. Exterior Conditions

It is essential that selected materials maintain their design characteristics, such as appearance and level of performance, throughout the full spectrum of local weather conditions, including temperature and humidity variations, as well as UV exposure. The following requirements shall apply:

a) Moisture and water penetration shall be controlled through building envelopes to prevent decay of materials, corrosion and staining of surfaces, flooding of occupied areas, equipment damage, material deterioration, surface spalling, condensation, and efflorescence;
    i. Building envelope assemblies and materials shall prevent water ingress, frost damage, and withstand temperature fluctuations;
    ii. Exterior joints shall be weather-resistant;
    iii. The finish materials for public areas shall limit moisture absorption and conform to the requirements and ratings appropriate to the product specified and intended use; and
    iv. Surfaces and assemblies shall be designed to prevent water from pooling by providing adequate drainage.
b) Waterproofing shall be provided for enclosed or occupied structures where water ingress may impact performance or user experience, including but not limited to stations, service rooms, and below-grade spaces;
    i. Other structures, such as retaining walls and parking garages, or where water ingress and moisture would damage or degrade the substrate material, shall incorporate appropriate moisture management and durability measures suited to their exposure.
c) Materials, notably glazing, shall conform to municipal standards, where applicable, such as the Toronto Green Standard (TGS) and CSA A460:19, Bird-friendly Building Design;
d) Elements designed with projecting horizontal surfaces where birds can roost shall be discouraged. Designers shall not rely on bird spikes as a form of mitigation;
e) Fasteners located in exterior conditions or exposed to the elements shall be corrosion-resistant and sized to suit the substrate and application; and
f) Material and systems shall be selected to prevent:
    i. dimensional changes of materials;
    ii. surface corrosion and staining;
    iii. decay of materials;
    iv. water and moisture damage, including mould;
    v. damage or loss of performance caused by freeze-thaw cycles and frost;
    vi. efflorescence on porous materials such as concrete, masonry and stone; and
    vii. spalling and scaling, including when caused by freeze-thaw cycles or chemical reactions.

2.1.2.6. Vandalism

The following requirements shall apply:

a) Materials and finishes shall be graffiti-resistant, scratch-resistant, and easy to clean using standard maintenance methods;
   i. All materials and finishes shall be resistant and easily maintained against the following, including but not limited to, intentional and accidental impact, permanent markers, spray paint, burning, and engraving; and
   ii. Reference industry standards may include:
      1. ASTM D6578 Standard Practice for Determination of Graffiti Resistance;
      2. ASTM D4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser;
      3. ASTM C650 Standard Test Method for Determination of Resistance to Chemical Substances; and
      4. ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
b) Systems shall be secured in a manner which deters and prevents tampering, removal, defacement, or damage;
c) Fasteners shall be concealed and inaccessible to the public. Where fasteners are necessary to be exposed, they shall be vandal-resistant and accessible only by authorized personnel; and
d) Materials and finishes shall be finished with non-sacrificial, clear protective coatings that do not alter the appearance of the underlying material;
   i. Coatings shall be applied to a minimum height of 3,000 mm above the finished floor datum of all public-facing walls, including retaining walls; and
   ii. At vertical circulation elements (VCE), such as public stairs and escalators, coatings on adjacent wall surfaces shall be applied horizontally across the full length and height of the VCE to meet defined architectural datums.

2.1.2.7. Acoustics

Sound-absorbing materials help reduce noise levels, echoes, and reverberation that can interfere with the station's Public Address (PA) systems. Typical interior locations for implementing sound-absorbing materials may include ceilings, under platform edges, and walls outside of high-touch zones. The following requirements shall apply:

a) Ceiling and wall acoustic treatments and panels, where required in public areas, shall be located outside of high-contact zones;
b) The total acoustic environment shall be considered to minimize reverberation while meeting the other design and performance criteria of the materials;
c) Building elements such as doors and windows shall be provided to prevent the transmission of noise between various public and non-public areas;
d) Prefabricated panels and spray-on acoustic treatments shall comply with NFPA and OBC requirements for combustibility, fire rating, flame spread, and smoke development; and
e) The perforation size in acoustic elements shall be designed to perform as required by an acoustic report.

2.1.2.8. Operations and Maintenance

Operation and maintenance are significant factors in the life cycle and costs of an asset. Materials selected need to consider the ease of maintenance, cleaning, repair, and replacement. Factors to consider include replacement time, accessibility, available stock, costs, labour or skill required, and any interruption or impact to service or function. Designers shall select materials, finishes, and systems that reduce operational and maintenance costs, and the following requirements shall apply:

a) Materials shall be selected to allow for convenient access to services behind the surface finish by authorized personnel;
    i. Access shall be provided through methods such as hinged or removable panels for inspections, maintenance, and repair work; and
    ii. Ceiling and canopy finishes shall allow for the commissioning, adjustment, and future retrofitting of systems.
b) All fasteners for finishes and materials shall be concealed to reduce visual clutter;
c) Materials shall resist staining, soiling, and allow for routine cleaning and maintenance without degradation, discolouring, or be damaged from repeated cleaning cycles, as demonstrated by manufacturer testing;
    i. Maintenance practices shall not require specialized procedures, tools, or personnel and can be maintained by general staff.
d) Elements shall be capable of localized or individualized replacement without needing to remove adjoining components. Examples such as a progressive interlocking system shall be avoided; and
e) Standard materials and sizes that can be easily repaired or replaced shall be selected with minimal impact on operations, such as effort, time, and costs, while ensuring continued functionality.
    i. Materials and parts shall be available locally within a reasonable time, suitable to the application and level of disruption anticipated. Consider delivery and lead time(s) and costs associated;
    ii. Materials and parts shall have matching stock available for the expected life of the material; and
    iii. Strategies for material overstock and spare parts shall be discussed and agreed upon with Operations, asset owners, and other third-party operators to be included in the Project Agreements.

2.1.3. Safety and Security

2.1.3.1. Crime Prevention Through Environmental Design

Crime Prevention Through Environmental Design (CPTED) design principles address topics such as visibility, lighting, access control, security hardware, landscaping, vandal resistance, and ease of maintenance. Materials chosen shall consider CPTED principles to help facilitate a safe environment for customers, including:

a) maximizing transparency and prioritizing natural surveillance to ensure safe travel for pedestrians and cyclists by highlighting the entry and customer path of travel;
b) establishing clear, unobstructed routes with enhanced visibility, minimizing opaque elements such as walls and fences that may obstruct views; and
c) constructing ancillary structures such as bicycle storage using transparent materials to maintain visibility and enhance security.

2.1.3.2. Fire Safety

All materials and finishes shall comply with applicable codes and regulations for the project, including but not limited to the use of combustible and non-combustible materials, flame-retardant and smoke-generation requirements, and appropriate fire-resistance ratings. To ensure the safety of passengers and staff in the event of a fire, materials that produce dangerous quantities of toxic gas, toxic fumes and/or toxic smoke shall be avoided. Where such materials are utilized in the design, appropriate mitigation measures shall be developed to ensure the safety and wellness of customers and staff.

2.1.3.3. Grounding and Bonding

Due to electrification, considerations for grounding and bonding metallic and/or conductive materials are necessary to ensure the safety of passengers and staff in proximity to live wires. The following requirements shall apply:

a) Materials requiring grounding and bonding work shall be designed to meet the requirements of the Ontario Electrical Safety Code (OESC) and other applicable codes, standards, and bylaws as required by project-specific agreements and Authorities Having Jurisdiction;
b) The design of grounding and bonding works shall include both new and existing materials and systems, including but not limited to the materials and finishes specified in this document, and shall minimize the aesthetic impact of each on the overall design;
c) Grounding and bonding components shall be concealed within each material assembly and shall not be visible or accessible to the public;
    i. Where concealment of grounding and bonding elements of existing materials and systems is not possible, design and locate exposed systems in a manner that does not detract from the aesthetics of the material; and
    ii. Fasteners shall match the selected material, where possible, to ensure a homogeneous composition for the grounding and bonding process.
d) Grounding and bonding systems shall be designed using vandal-resistant fastening and encasement methods, but shall be accessible by Metrolinx staff and/or third-party operators for service and maintenance.

2.1.4. Life Cycle Costs

Consideration of life cycle costs, including capital costs, Operation and Maintenance (O&M) costs, as well as end-of-life replacement costs, is essential as they contribute to the overall cost of the asset and influence decisions regarding material choices. Materials and finishes shall be selected to minimize life cycle costs, balancing the

value of reduced upfront capital costs against the long-term costs and benefits. Long-term costs include those associated with operation, maintenance, repair, and replacement, which are often the highest costs in an asset's life cycle.

2.1.5. Sustainability

Materials and finishes should be selected based on sustainable performance criteria to minimize environmental impact and support life cycle efficiency while aligning with municipal green standards.

Refer to the Metrolinx Sustainable Design Standard for sustainability requirements.

2.2. MATERIAL SELECTION ALONG THE CUSTOMER JOURNEY

The Customer Journey contains touchpoints where customers interact with a Metrolinx product, service, system, or facility. Material and finish selection in these areas shall consider functional requirements related to customer use.

2.2.1. Exterior and Interior Circulation

The composition of elements and their visual hierarchy reinforce a sense of order, helping customers navigate their way along the journey. The selection of materials and finishes in these areas informs customer decision-making regarding circulation routes throughout the site. The following requirements shall apply:

a) Flooring shall be intended for heavy-duty use and high traffic, have low moisture absorption, and require minimal demonstrated maintenance;
   i. Flooring shall be non-staining, non-cracking, and designed to avoid warping and unintended movement; and
   ii. All materials and finishes shall be resistant to chemicals, salt, abrasion, and wear.
b) Floor areas and spaces that are sprinklered, contain plumbing fixtures or water lines, or areas subject to weather exposure shall be designed to prevent water accumulation. Refer to Metrolinx Standards for maximum slopes;
c) Gutters shall be connected directly into drainage systems and shall avoid discharging at, near, or cross circulation paths to prevent slip hazards; and
d) Floor drains shall be screened and capped flush with the surrounding floor finish to prevent tripping hazards.

2.2.1.1. Feature Walls and Ceilings

Feature walls and ceilings are variable design elements that may provide a unique identity, allow for differentiation between stations and stops, and support intuitive wayfinding. For example, a treatment or colour that highlights the path between the station entry and the platform may be specific to a station, stop, and/or a line. The following requirements shall apply:

a) All materials and finishes that are part of a feature wall or ceiling and used as part of a building, structure, or asset shall conform to Metrolinx Design Standard requirements, including details in the modal standards;
b) Where elements extend between an interior and exterior condition, they shall be suitable for both conditions, including the selection of materials and finishes that meet the requirements for moisture control and thermal cycles; and
c) Materials and finishes that are part of external elements not connected to a building and used to support station identity, such as plaques, shall also be suitable for intended use, including exterior conditions.

2.2.2. Unpaid and Paid Zones

The unpaid transaction zone materials and finishes shall prioritize the customer's needs while addressing the high traffic and heavy use of the space. Key design elements in this area are organized as a kit of parts and are predominantly visible to customers, utilizing materials that stand out from the other areas of the station, while ensuring familiarity and providing an intuitive experience.

The paid zone(s) of the station include access to the transit platform(s), boarding and alighting, and circulation. Materials and finishes in these spaces are often in close proximity to vehicles, and have additional considerations related to the forces applied by vehicle movement and/or the effects of brake dust on long-term maintenance and cleaning.

2.2.2.1. Self-Serve Hub, Amenities and Support Areas

The Self-Serve Hub requires a consistent and highly recognizable design with materials and finishes that are suitable for both interior and exterior environments. It may require conformance to specific colour themes, depending on the project agreement's requirements. Specific colours may be used to identify these areas within the larger station area.

Refer to Metrolinx Design Standards for specific design requirements.

2.2.2.2. Waiting Areas and Seating

Waiting areas located within and outside station buildings need to allow for adequate visibility, accessibility, and maintain visual connections to amenities, including but not limited to the passenger pick-up and drop-off area (PUDO), public washrooms, connecting modes (such as bus platforms), and Station Ambassador areas, where in scope. Acoustic mitigating designs should be considered when selecting floor, wall, ceiling, and soffit finishes in the waiting areas.

2.2.2.3. Public Washrooms

Materials, finishes, and the overall design shall address CPTED concerns and prevent unintended use, such as entrapment. Cleanliness, safety, and accessibility of public washrooms are prioritized in the following requirements:

a) Washrooms shall be designed to serve all user groups and meet the requirements set out in codes and regulations such as the OBC;

b) Public washrooms shall use materials that are highly visible upon approach to promote safety and reduce misuse in the station environment;
c) Materials and finishes used in these areas shall be vandal-resistant, moisture-resistant, and suitable for use in a high-traffic public washroom environment, requiring minimal maintenance to ensure a long service life;
d) Design elements, materials, and finishes which require frequent repair and/or replacement due to heavy use and misuse shall be avoided;
e) Materials and finishes shall allow for frequent cleaning procedures without degradation of the aesthetics or quality over time; and
f) Fixtures, vanities, and partitions shall be wall or ceiling-mounted to allow easy visibility, access below, and floor cleaning as required.

2.2.3. Non-Fare Revenue

Station design may support various forms of non-fare revenue, such as retail and third-party advertising, as part of the overall integrated architectural expression. Advertising zones shall be identified early in the design process to allow for flexibility and appropriate planning for requirements such as material, power, data, and structural supports. Key station elements, such as signage, egress paths, circulation, and station features, shall remain unobstructed and visually prominent. Retail spaces may utilize a distinct material palette to meet tenant branding requirements. Proposed materials shall align with Metrolinx standards for ease of maintenance, replacement, and durability suitable for a transit environment.

2.2.4. Contact Zones

Transit stations and facilities are high-touch environments that receive continuous use and are in service most of the year, resulting in limited time for repairs and maintenance. Materials and finishes shall be designed to function in transit applications, ensuring they are suitable and safe. All materials and finishes shall be specified to suit the expected level of foot and hand traffic anticipated for each area of the proposed station.

2.2.4.1. High Contact Zones

High Contact Zones, also referred to as 'Touch Zones', include areas within passenger reach that extend from the floor elevation up to 2,500 mm above the finished floor. Ceilings and soffits less than 3,000 mm above finished floor are also treated as High Contact Zones. High contact zones extend 1,000 mm horizontally, measured from vertical circulation elements, such as stairs and escalators. These areas have increased wear and tear due to close proximity to pedestrian traffic and require additional considerations. The highest areas of contact are typically those along circulation routes and public amenities. The following requirements shall apply:

a) Edges of materials shall be reinforced or protected to reduce damage. Examples include but are not limited to platform edges, stair nosing, outside corners, and projecting sills; and
b) Materials and finishes up to 600 mm above finished floor within this zone shall be resistant to salt and slush, and be easily cleanable.

2.2.4.2. Low Contact Zones

This zone is less susceptible to public contact and extends up from 2,500 mm above the finished floor. Materials in the Low Contact Zone are subject to less convenient accessibility for servicing, cleaning, and maintenance, and may still be vulnerable to vandalism and the accumulation of dust, dirt, and grime. Considerations shall be made to limit or simplify access and service.

2.2.4.3. Parking Garages

The following requirements shall apply:

a) Selected materials and finishes shall be tied architecturally to the station building material palette, where applicable;
b) When a drop or change in level occurs, provide measures to prevent users from jumping or throwing items between levels, such as a mesh or guard; and
c) Refer to the GO Design Requirements Manual (DRM) and Facilities Civil Engineering Standards for requirements.

2.3. EXISTING AND HERITAGE CONDITIONS

Additional requirements may be applied to projects that involve the renovation or restoration of existing assets. Complexities associated with the characteristics and performance at the integration of existing/historic materials and new materials, such as variable expansion and contraction rates, need to be considered when selecting materials and finishes. Colour-matching of existing materials, especially when being cleaned or otherwise rehabilitated, may require project-specific details. General requirements include the following:

a) Material and finish choices integrated with or adjacent to heritage properties shall either clearly delineate the original heritage asset from the typical material palette used in new portions or be purposefully integrated within the new asset material palette;
b) Additions and modifications shall be designed to use materials and finishes that complement the architectural language of the heritage building;
c) Materials selected shall be proven compatible with historic materials and shall not contribute to the premature deterioration of existing materials, such as the utilization of lime mortar versus cementitious mortar;
d) The consultation of a heritage specialist when restoring, renovating, or adding onto historic properties and structures shall be considered;
e) Building materials, finishes, and other components that are part of a provincial heritage property shall be repaired or conserved, rather than replaced; and

f) Where it is proven that existing materials must be removed, all effort shall be made to salvage existing materials, where possible, for:
   i. reuse elsewhere in the Project;
   ii. diversion from landfills; and/or
   iii. incorporation into heritage interpretation features.

2.4. BACK-OF-HOUSE AND MAINTENANCE AREAS

Materials and finishes used in back-of-house and maintenance areas shall be suitable for the higher wear and tear associated with their function, including material degradation resulting from activities conducted in these spaces. For example, in Maintenance and Storage Facilities (MSF), some interior spaces are frequently exposed to water and other chemicals used for cleaning and maintenance of vehicles.

These spaces often require performance and resistance characteristics that are specific to their use and will be informed by project-specific requirements and other Metrolinx Standards.

3 FLOORS AND BASES

3 FLOORS AND BASES

This Section applies to interior and exterior floor and base finishes, including platforms. Refer to Section 9.7 Site Elements for exterior paving and hard landscaping requirements.

General Requirements

a) Floor finishes shall provide a consistent look and feel across various stations to support consistent performance and identity along the transit line and network.
b) Material selection shall prioritize options that perform under heavy-use transit conditions, respond to site-specific operational requirements, and accommodate future upgrades, lifecycle needs, and code and standard requirements, such as grounding and bonding.
c) Floors shall be levelled to prevent tripping hazards and shall be designed to accommodate different floor material thicknesses as required to align with adjacent surroundings and to create a visually continuous surface.
    i. Thresholds shall be flush with the finished floor and bevelled where required to accommodate different floor materials, safety and accessibility requirements. Refer to the Universal Design Standard.
d) Joints shall be coordinated with structural grids and thresholds to minimize cracking and maximize unit sizing.
e) Floor systems shall include a wear layer distinct from the structural substrate to facilitate replacement in high-use areas. Damaged sections shall be replaceable locally, without impacting adjacent materials or necessitating full system replacement.
f) Floors shall be rated as non-slip and retain their slip resistance under both wet and dry conditions. General floors shall have a minimum Dynamic Coefficient of Friction (DCOF) of:
    i. exterior: 0.55;
    ii. interior: 0.42; and
    iii. stairs, ramps, and sloped walkways: 0.8.
g) Where possible, reflective surfaces shall not be specified as these produce glare and reflection, which can disorientate customers with sensitive vision. Refer to the Universal Design Standard for the Unified Glare Rate (UGRL) criteria.
h) All materials shall have low Volatile Organic Compounds (VOC) content limits.
i) Floors and base finishes shall have surface characteristics that are cleanable and maintainable, subject to coordination and verification with the operator and/or maintainer's standard cleaning procedures.
j) Refer to Facilities Civil Engineering Standards for exterior paving requirements.

3.1. CONCRETE

Figure 3.1: Concrete Flooring

Location: Exterior and Interior

Composition

a) Concrete floors shall conform to CAN/CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete, for all material and construction methodology requirements.
b) The Engineer of Record shall determine the dimensions, thickness, structural design, and structural performance of the concrete.

Finish, Texture, and Colour

c) Colour, texture, and appearance shall be consistent and uniform across the material. Refer to each type of concrete finish for specific requirements.
d) Pigments shall be non-staining, non-bleeding, and non-fading.
e) Acceptable colours for standard floors shall be within a range from light grey to medium grey.

Dimensions, Thickness, and Installation

f) Concrete floors shall be flat and levelled to prevent uneven surfaces and tripping hazards.
    i. Completed surfaces shall not vary by more than 6 mm over a distance of 3,000 mm from dead level, except where slopes and areas sloped to drains are required or where additional floor flatness and floor levelness are required for finishes.
g) Material finish shall not be broken, cracked, scratched, damaged, dented, deformed, or contain any visual defects such that they are detectable or observable.
h) Concrete shall be finished to a uniform appearance. Damaged concrete shall be replaced with materials of the same function and performance. Remediate affected areas to ensure they are fit for use and achieve the same uniform finished appearance.
    i. Honeycombing and rock pockets shall not be accepted.
    ii. Remediate patched openings and other irregularities in the concrete, including where shoring was removed and any concrete injection chute locations.
    iii. Reinforcing steel (rebar) embedded within a concrete slab shall not be visible or noticeable on the surface of the slab, ensuring sufficient coverage is achieved.

Accessories

i) All coatings, such as anti-graffiti coatings, shall:
    i. be non-sacrificial;
    ii. not affect the appearance of the material or finish underneath; and
    iii. minimize the darkening effect on the protected surface.
j) Stainless Steel inserts, hardware, and connections shall be Grade 304 for interior conditions and Grade 316 for exterior conditions.

3.1.1. Sealed Concrete

a) Concrete flooring shall be finished with a clear breathable sealer at locations where dust control, stain resistance, or surface hardening is required.
   i. Where a vapour barrier is installed below the slab, only breathable (vapour-permeable) sealers shall be used to avoid moisture entrapment.
   ii. Suspended concrete slabs subject to vehicular traffic shall receive a designated traffic coating system and not a standard sealer.
   iii. Surface sealers shall not be applied where flooring systems incorporate their own waterproofing or vapour-impermeable membranes.
b) Hardened concrete floors shall use a surface hardener to establish a long-wearing surface.

3.1.2. Brushed Concrete

a) Brushed concrete shall have a consistent, fine, and even textured finish in one direction.

3.1.3. Sandblasted Concrete

a) Sandblasted concrete shall be free of visible defects, including laitance, loosened aggregate, or damaged concrete at the surface.
b) Degree of sandblast finish shall be light, as required to rectify and reduce the appearance of imperfections, to the satisfaction of the Owner of this Standard.

3.1.4. Concrete Bases, Knee Walls and Curbs

a) The Engineer of Record shall design load-bearing concrete to minimize impacts to the finish, such as cracking.
b) Concrete shall be finished with a clear sealer and fully sealed joints at vertical elements.
c) Concrete bases shall be a minimum height of 400 mm unless noted otherwise in Metrolinx Design Standards.
d) Where exposed, concrete corners shall have 13 mm x 13 mm chamfered edges.
e) Concrete shall avoid exposed tie holes. Refer to Section 4.1 Concrete for tie hole and panel joint requirements.
f) Exposed concrete surfaces shall achieve a smooth, uniform finish with minimal patterning, free from noticeable defects such as transferred grain, cracks, or knots greater than 13 mm. Design documents shall specify form-facing materials that support this level of finish quality.
g) The form-releasing agent shall have low to no VOC content and shall not stain the concrete or impair the subsequent application of finishes or coatings to the surface of the concrete.

3.2. TILING

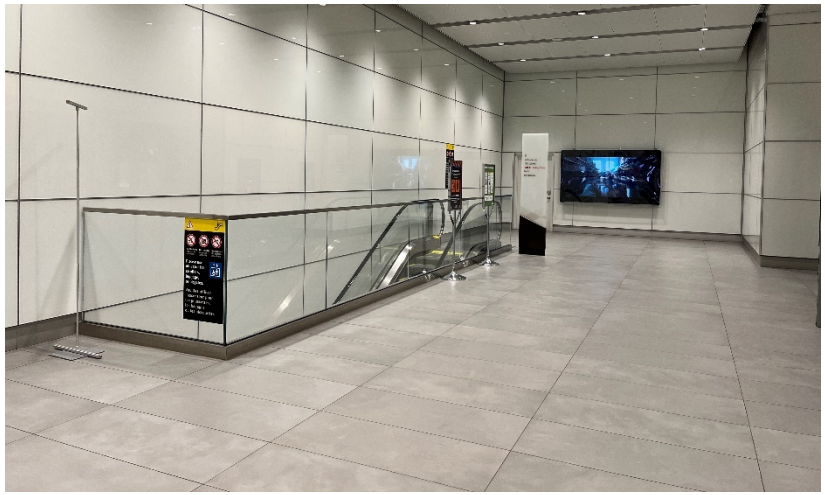

Figure 3.2: Tile Flooring

Location: Interior

Composition

a) All tile products, trade associations and memberships, standards of workmanship, and remedial processes shall be in accordance with the Terrazzo Tile and Marble Association of Canada (TTMAC).

b) Floor tiles shall be a faced modular system made of compact materials with minimal open spaces between particles and shall conform to ANSI A137.1, Standard Specifications for Ceramic Tile.
   i. Breaking Strength shall be a minimum of 250 lbf (1,112N).
   ii. Water Absorption capacity shall be a maximum of 0.5%.
   iii. Abrasion Resistance shall be a minimum of Class IV to accommodate heavy traffic.

c) Deflection due to uniformly distributed loads shall conform to ANSI A108, A118, and A136.1, Installation of Ceramic Tile.

Finish, Texture, and Colour

d) Floor tiles shall be unglazed, uniform, through-body colour, with a matte finish.

e) All tiles shall have rectified edges to ensure consistent sizing and precise installation.

f) Acceptable colours for standard floors shall include neutral tones, including white, light grey, slate grey, and medium grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

g) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of acceptable ranges across various modes, should variances from modal requirements be necessary:
   i. Large Format shall be:
      1. Maximum size: 610 mm x 1,220 mm; and
      2. Minimum size: 305 mm x 610 mm.

      Note: Due to the increased susceptibility of Large Format tiles to lippage, installation shall be carried out in accordance with the maximum allowable lippage tolerances as specified in the TTMAC guidelines, to ensure a level and visually acceptable finish.
   ii. Small Format shall be:
      1. Maximum size: 305 mm x 380 mm; and
      2. Minimum size: 152 mm x 305 mm.

h) Minimum thickness shall be:
   i. Wall base: 6 mm; and
   ii. Floors: 10 mm.

i) Where used as a base, it shall be a minimum height of 100 mm and a maximum height of 150 mm, unless noted otherwise in Metrolinx Design Standards.

j) Interior bases shall have an internal radius of 12 mm from the vertical to the horizontal.

k) Layout and installation shall be true to line and level, and square to adjacent walls and platform edges where applicable.
   i. Vertical tolerance shall be ±5 mm at the two furthest points within the installation area.
   ii. Horizontal tolerance shall be ±5 mm to the set-out point at the furthest point within the installation area.
l) Control joints shall be aligned with changes in the type of substrate to prevent cracking.
   i. They shall be a minimum width of 6 mm, spaced between 3,660 mm to 7,320 mm O.C. Refer also to the manufacturer's requirements.

Accessories

m) The appearance of grout shall be minimized by using a suitable composition, colour selection, and appropriate widths.
   i. Grout shall be resistant to salt, chemicals, and stains.
   ii. Epoxy grout shall be used for all wet areas, such as washrooms.
   iii. Grout colour shall match the tile finish selected from the manufacturer's full range.
   iv. The grout size shall be consistent across the entire floor area with minimal variations, and have a maximum width of 6 mm.
n) Preformed treads, nosing, and risers with integral cove shall be provided at stair locations.
o) Inside and outside corners shall conceal the edge of the tile by using preformed tiles or metal trims.

3.3. RESILIENT FLOORING

Figure 3.3: Resilient Sheet Flooring

Location: Interior, back-of-house

Composition

a) Resilient flooring and accessories shall be installed using tools, materials, methods, and sequence of work in accordance with the National Floor Covering Association of Canada (NFCA) Floor Covering Reference Manual.
b) Materials shall be resistant to staining and degradation from common and anticipated cleaners, and shall conform to the manufacturer's polishing requirements, including expected cleaning cycles.

Finish, Texture, and Colour

c) Acceptable colours for standard floors shall include white, light grey, and medium grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.
d) Surface polish shall have a smooth, matte finish of commercial floor quality.

Dimensions, Thickness, and Installation

e) Refer to each type of resilient flooring below for dimensional requirements.
f) Minimum thickness shall be 3 mm.
g) Appropriate substrate conditions and other manufacturers' requirements shall be confirmed prior to installation, including relative humidity, moisture content, and surface flatness.

3.3.1. Resilient Tile Flooring

a) Vinyl composite tile shall conform to ASTM F1066, Standard Specification for Vinyl Composition Floor Tile, and shall be:
   i. Type I, regular performance tile for light foot traffic areas; or
   ii. Type II, with higher binder content for moderate to heavy foot traffic areas.
b) Solid vinyl tile shall conform to ASTM F1700, Standard Specification for Solid Vinyl Floor Tile, and shall be:
   i. Class I, monolithic of uniform colour and composition for moderate to heavy foot traffic and high-abuse areas; or
   ii. Class II, through pattern with a clear wear layer on top for light foot traffic areas.
c) Rubber tile shall conform to ASTM F1344, Standard Specification for Rubber Floor Tile, and shall be:
   i. Type I, a homogenous single layer of uniform composition and colour for moderate to high foot traffic areas; or
   ii. Type II, laminated top bonded to backing for light foot traffic areas.
d) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of acceptable ranges, should variances from modal requirements be necessary:
   i. Minimum tile size shall be:
      1. Square: 305 mm x 305 mm; and
      2. Plank: 152 mm x 1,220 mm.
   ii. Maximum tile size shall be:
      1. Square: 610 mm x 610 mm; and
      2. Plank: 305 mm x 1,220 mm.

3.3.2. Resilient Sheet Flooring

a) Sheet vinyl with backing shall conform to ASTM F1303, Standard Specification for Sheet Vinyl Floor Covering with Backing, and shall be:
   i. Type of Sheet Vinyl Flooring:
      1. Type I, monolithic (homogenous) of uniform colour and composition for moderate to heavy foot traffic areas; or
      2. Type II, composite (heterogeneous) of multiple layers for light foot traffic areas.
   ii. Grade of Sheet Vinyl Flooring:
      1. Grade 1, commercial use with a minimum wear layer thickness of 0.508 mm (0.020 in).
   iii. Wear Layer Type:
      1. Type A, clear wear layer over printed design for visual depth and wear resistance.
b) Rolls shall be in maximum practical lengths and widths with a minimum width of 1,830 mm (6 ft).
c) Prefabricated cove bases shall be of the same material and dye lots in maximum practical lengths for visual continuity and cohesive performance.
   i. Where used as an integral base, it shall be a minimum height of 100 mm and a maximum height of 150 mm, or as noted in Metrolinx Design Standards.
   ii. A continuous base cap shall be provided for adhesive installation.
   iii. Continuous preformed cove strips shall be installed to provide support backing along the length of the base.

3.4. TERRAZZO FLOORING

Figure 3.4: Terrazzo Flooring

Location: Interior

Composition

a) Terrazzo systems and materials, preparation, and application shall be in accordance with the Terrazzo Tile and Marble Association of Canada (TTMAC) 09 66 00 Terrazzo Specification Guide and the Terrazzo Technical Manual.
   i. Cementitious terrazzo and epoxy terrazzo shall use appropriate binders for each type.
   ii. Aggregates shall be clean, hard, and slip-resistant, such as white aluminum oxide AL203, with colour to match marble chips.
   iii. Chips, such as quartz, granite, and marble, shall be uniform, sound, abrasion-resistant, and free from flat and flaky particles.
   iv. Pigments shall be non-fading minerals in selected colours.
   v. Sealers shall be chemical-resistant, especially in wet areas such as washroom facilities.
   vi. Divider strips shall be corrosion-resistant, maintain appearance and colour over time, and shall not oxidize or deform.

b) The terrazzo system shall allow for localized repair work to be isolated in specific areas and integrated with the surrounding existing floors to achieve a continuous finish without affecting adjacent sections.

Finish, Texture, and Colour

c) Acceptable general colours for standard floors shall include white, light grey, medium grey, or charcoal grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.
d) Where new terrazzo finishes are meant to match existing terrazzo finishes, whether as adjacent work or for patching and repairs, the new work shall match the existing in colour, aggregate, pattern, accessories, and finish.

Dimensions, Thickness, and Installation

e) The composition shall consist of an underbed and topping with minimum thicknesses in accordance with TTMAC 09 66 00 Specification Guide.
f) Where used as a base, it shall be a minimum height of 100 mm and a maximum height of 150 mm, or as noted in Metrolinx Design Standards.
g) Bases shall have an integral cove and an internal radius of 12 mm from the vertical to the horizontal.
h) Divider strips shall be a minimum of 3.2 mm thick.
   i. For floors, strips shall be a minimum depth of 32 mm.
   ii. For bases, strips shall be a minimum height of 100 mm and a maximum height of 150 mm with a 100 mm leg.
i) Installation shall be true to line and level, and square to adjacent walls and platform edges where applicable.

3.5. FLUID-APPLIED EPOXY FLOORING

Figure 3.5: Epoxy Flooring

Location: Interior

Composition

a) Fluid-applied epoxy flooring system shall conform to ASTM C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete, and shall:
   i. be a heavy-duty, trowel-applied, multi-component epoxy system with a smooth texture;
   ii. be slip-resistant to liquids such as water, oils, solvents, fuel, acids, and cleaning agents;
   iii. additives, including non-slip aggregates (such as silica sand or glass beads) and colour pigments, shall not compromise bonding strength, curing, or stability;
   iv. demonstrate high wear resistance from foot traffic and equipment, and shall not delaminate from the substrate below; and
   v. be complete with an integral cove base C/W cove accessory as required.

b) Primer shall be as recommended by the corresponding manufacturer.

Finish, Texture, and Colour

c) Acceptable colours for standard floors shall include clear, light grey, and medium grey selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

d) Coatings shall withstand expected loads, usage, and meet the manufacturer's specification requirements.

e) Upturn bases shall be a minimum height of 100 mm and a maximum height of 150 mm, or as noted in Metrolinx Design Standards.

f) All substrates shall be cleaned and prepared for complete prior to the full installation of fluid-applied epoxy flooring.

g) Finish surfaces shall be level or straight where sloped to drains.
   i. Tolerance shall be within 1.5 mm in 3,000 mm, and not vary more than 0.8 mm in any 300 mm run.

3.6. CARPETING

Figure 3.6: Carpet Tile Flooring

Location: Interior, back-of-house

Composition

a) Carpet physical properties shall conform to CSA A247, Standard for Evaluation of Carpet, and minimum requirements published by the Carpet and Rug Institute (CRI).
   i. Carpets shall be of a low pile for ease of maintainability.
   ii. Colourfastness shall be a minimum rating of 4 for commercial applications.
   iii. Carpets shall not delaminate from the substrate below.
   iv. Appearance Retention Rating shall be a minimum rating of 3.0 for moderate use.
   v. Tile backing shall be fully bonded, integral, and moisture-resistant (such as reinforced thermoplastic or closed-cell PVC).
   vi. All materials shall be of low volatile organic compound (VOC) emissions.
b) Carpet classification shall conform to ISO 10874, Resilient, Textile and Laminate Floor Coverings – Classification.
   i. Types of Use shall be Commercial (3) or Industrial (4).
   ii. Intensity of Use shall be Moderate (2) or Heavy (3).
c) Carpet base, where integrated, shall be of the same material, colour, pattern, and texture as the adjoining sheet carpeting.
   i. Provide a cove strip and a cap strip to accommodate the carpet base thickness.

Finish, Texture, and Colour

d) Acceptable colours shall include light grey, medium grey, and charcoal grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

e) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of the ranges acceptable across modes, should variances from modal requirements be required:
   i. Square tiles shall be:
      1. Minimum: 610 mm x 610 mm; and
      2. Maximum: 915 mm x 915 mm.
   ii. Rectangular tiles shall be:
      1. Minimum: 305 mm x 1,220 mm; and
      2. Maximum: 762 mm x 1,220 mm.
   iii. Carpet sheet widths shall be laid out using the largest rolls practical for the space they are intended for, and in maximum lengths to minimize seams.
f) Minimum thickness shall be 6.3 mm.
g) Materials within one visual area shall be from the same dye lot, ensuring a match in colour, pattern, and texture.
h) Carpet tiles shall be laid with butt seams.

i) Installation of carpeting shall conform to the Carpet and Rug Institute (CRI) Standard for Installation of Commercial Carpet (CRI 104), latest edition.

Accessories

j) Adhesives shall be water-resistant and appropriate for the intended location and assembly to prevent delamination.
k) Concrete floor sealer or moisture barrier shall be provided for concrete substrates.
l) Primer shall be in accordance with the manufacturer's recommendations for the surface conditions.
m) Edge and transition strips shall provide an accessible design between various floor finish thicknesses.

3.7. GRANITE FLOORING

Figure 3.7: Granite Floor Finish at Stairs

Location: Exterior (bases only) and Interior

Composition

a) Granite tiles, slabs, and bases shall be a fibreglass-backed modular system in accordance with ASTM C615, Standard Specification for Granite Dimensions Stone, and National Building Granite Quarries Association Inc. (NBGQA) Specifications for Architectural Granite, and shall:
   i. be uniform in colour and pattern;
   ii. be free from cracks, seams, or excessive pitting;
   iii. have low porosity for resistance to freeze-thaw cycles and staining, and a maximum water absorption of 0.4%;
   iv. withstand high loads for flooring in high-traffic areas and a minimum compression strength of 19,000 psi (131 MPa); and
   v. have a minimum abrasion resistance index of 25.

Finish, Texture, and Colour

b) Acceptable finishes shall include honed and flamed only. Polished granite shall not be used.
c) Cut and vein orientation shall align with the established design intent and be coordinated with existing patterns.
d) Acceptable colours shall include light grey, medium grey, and charcoal grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

e) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of the ranges acceptable across modes, should variances from modal requirements be required:
    i. Minimum: 610 mm x 610 mm;
    ii. Maximum: 1,220 mm x 1,220 mm; and
    iii. Where used at stair locations, dimensions shall suit tread depth and riser height.
f) Minimum thickness shall be:
    i. Wall base: 10 mm; and
    ii. Floors: 20 mm.
g) Interior granite bases shall be a minimum height of 100 mm and a maximum height of 150 mm, or as noted in Metrolinx Design Standards.
h) Exterior granite bases shall be a minimum height of 400 mm, or as noted in Metrolinx Design Standards.
i) Outer corners shall be mitred to conceal the edge of the stone.
j) Granite flooring and base shall be installed in accordance with the Terrazzo Tile and Marble Association of Canada (TTMAC) Tile Installation Manual Specifications Guide 09 30 00.

Accessories

k) Preformed treads, nosings, and risers with integral cove shall be provided at stair locations.

3.8. ACCESS FLOORING

Figure 3.8: Access Flooring

Location: Interior, back-of-house

Composition

a) Acceptable materials shall include:
   i. galvanized steel panels with lightweight high-strength concrete fill and steel top sheets ready to receive the specified finish; or
   ii. reinforced cementitious panels ready to receive the specified finish.
b) The system shall allow for the integration of new panels for expansion capability without reconfiguring the entire floor surface.
c) Pedestals shall be of a steel assembly and permit adjustment up to 38 mm.
d) Floor panels shall be capable of supporting the weight of live and dead loads, without sagging or breaking, to be confirmed by the Engineer of Record.
e) Panel weight shall facilitate ease of removal by one staff member.

Finish, Texture, and Colour

f) Surface finish shall be non-slip, selected from the manufacturer's standard available finishes.
g) Colour shall be charcoal grey, selected from the manufacturer's available range.

Dimensions, Thickness, and Installation

h) The standard size shall be 610 mm x 610 mm unless noted otherwise. Refer to Metrolinx Design Standards for specific dimensions and location requirements.
i) The overall panel thickness shall be a minimum of 25 mm.
j) Gaps between surface finish panels shall be a maximum of 10 mm.
k) The surface of the finished floor shall be flushed with adjacent floor finishes to prevent trip hazards. Level tolerance shall be a maximum of ±2 mm across adjacent surfaces to maintain flatness.

3.9. NON-INTEGRATED WALL BASE

3.9.1. Rubber & Resilient Wall Bases

Figure 3.9.1: Non-integrated Rubber Wall Base

Location: Interior, back-of-house

Composition

a) Resilient wall bases shall conform to ASTM F1861, Standard Specification for Resilient Wall Base.
   i. Resilient bases in light to moderate-use areas shall be:
      1. Type TP (thermoplastic vinyl) or TS (thermoset rubber); and
      2. Grade 1 (standard) or 2 (heavy-duty).
   ii. Resilient bases in heavy-duty areas shall be:
      1. Type TS (thermoset rubber); and
      2. Grade 2 (heavy-duty)
   iii. Refer to Metrolinx Design Standards for specific type and location requirements.
b) All materials shall be of low volatile organic compound (VOC) emissions.

Finish, Texture, and Colour

c) Colour shall contrast with the wall finish colour, selected from the manufacturer's full range. Acceptable colours include warm grey, slate grey, medium grey, charcoal grey, and black.

Dimensions, Thickness, and Installation

d) Base material shall be installed in maximum lengths to minimize seams.
e) Base height shall be a minimum height of 100 mm and a maximum height of 150 mm, or as noted in Metrolinx Design Standards.
f) Minimum thickness shall be 3 mm.
g) Base shall be installed straight and levelled.
h) Base joints shall be aligned with other building materials and finish joints.
i) All inside corners shall be cut and coped using purpose-made coping tools.

Accessories

j) Bases shall be provided with manufactured end stops and pre-moulded external corners.
k) Metal transition and edge strips shall be provided and installed between flooring materials and around unprotected edges.
l) Adhesives shall cover 90% of the back of the base, and the type shall be as recommended by the flooring manufacturer for each substrate.

3.9.2. Stainless Steel Wall Bases

Figure 3.9.2: Stainless Steel Wall Base

Location: Interior

Composition

a) Stainless steel wall bases shall consist of 16-gauge stainless steel, Grade 304 at a minimum. They shall be prefabricated and assembled on site as required.
b) Where a substrate is required, it shall be fire-retardant and treated to perform in wet and temperature-fluctuating conditions.
c) Refer to Metrolinx Design Standards for specific composition, application, and location requirements.

Finish, Texture, and Colour

d) Stainless steel shall be a No. 4 brushed finish.
e) Treated plywood backing shall be painted black.
f) All edges identified as sharp shall be smoothed using appropriate methods, such as deburring, grinding, or sanding.

Dimensions, Thickness, and Installation

g) Base material shall be in maximum allowable lengths to minimize the number of joints, and at a minimum shall be in continuous lengths of 2,440 mm.
h) Base height shall be a minimum height of 100 mm and a maximum height of 150 mm, or as noted in Metrolinx Design Standards.
i) The thickness of the backing, where required, shall accommodate the alignment of the finished face of the base material so that it protrudes a minimum of 10 mm beyond the adjacent wall finish, providing protection to the wall surface.
j) Base shall be installed straight and levelled.
k) Base joints shall be aligned with other building materials and finish joints.

Accessories

l) Provide matching preformed accessories such as corner pieces, connectors, and end caps as required to suit the design.

3.10. FLOOR GRILLES AND MATS

Figure 3.10: Vestibule Floor Grille

Location: Interior

Composition

a) Materials shall be rust-resistant, such as aluminum members and/or stainless steel members. Refer to Metrolinx Design Standards for the specified type and location required.
b) Frame and grid shall be recessed and flush with adjacent floor finishes and a level base frame.
c) Tread rails shall be mechanically interlocked for stability.
d) Floor grilles and pans shall be designed to be removable for cleaning by one person, unaided.

Finish, Texture, and Colour

e) Aluminum shall have an anodized or fluoropolymer finish.
f) Stainless steel shall be No. 4 brushed where exposed, or mill finished where concealed.
g) Refer to Metrolinx Design Standards for the specified type required. Tread inserts shall be closely spaced and of the following types:
    i. serrated stainless steel;
    ii. profile bar with fabric or carpet; or
    iii. profile bar with anti-slip coating.

Dimensions, Thickness, and Installation

h) Frames shall accommodate a removable drain pan, where required.
i) Drain pans shall:
    i. have a minimum recessed depth of 46 mm;
    ii. be composed of a material with a minimum thickness of 1.5 mm; and
    iii. be directly connected to sanitary lines with an integral floor drain, complete with a stainless steel strainer.
j) Floor grid shall be considered high heel safe and be a minimum of 19 mm deep with a maximum of 4.75 mm gap between bars.
k) Minimum width of the overall floor grille or mat shall match the corresponding entry and exit door width unless noted otherwise in Metrolinx Design Standards.
l) Minimum length of the overall floor grille or mat shall be 3,000 mm in length unless noted otherwise in Metrolinx Design Standards.
m) The surface of the floor grille or mat shall be flush with adjacent floor finishes to prevent trip hazards.

4 WALLS AND VERTICAL SURFACES

4 WALLS AND VERTICAL SURFACES

This Section applies to exterior and interior walls and vertical surfaces.

General Requirements

a) Wall finishes shall provide a consistent look and feel across various stations to facilitate a recognizable aspect along the transit line and network.
b) Material selection shall prioritize functional, relevant, and adaptable options designed to meet the station's full-service life and site-specific design considerations for the future, such as grounding and bonding requirements.
c) Colour selection shall provide contrast between floor and wall surfaces for accessibility.
d) Station-specific colours shall not be neon, fluorescent, black, or metallic tones.
e) Wall finishes shall be smooth, non-glossy, and non-abrasive. Shiny surfaces shall be avoided, and the Unified Glare Rate (UGRL) shall conform to Metrolinx Design Standards. Refer to the Universal Design Standard.
f) Wall finishes shall be a hard surface that requires minimal maintenance, is cleanable, non-staining, non-cracking, chemically resistant, scratch- and graffiti-resistant, and abrasion- and wear-resistant.
g) Wall finishes shall be non-combustible and non-toxic when exposed to flame. Flame spread ratings for wall finishes shall conform to NFPA 130 and OBC requirements.
h) All finishes and materials to be composed of non-designated substances defined in the Occupational Health and Safety Act (OHSA).
i) Mounting systems shall be concealed and continuous to allow for easy installation, adjustment, repair, and replacement.
j) Outside corners shall be designed to be protected and reduce the frequency of impact and abuse, and prevent personal injury. Examples include, but are not limited to, corner guards, corner trims, and prefabricated corner pieces.
k) Wall bases shall be a minimum height of 100 mm and a maximum height of 150 mm unless noted otherwise. Refer to Metrolinx Modal Design Standards for specific requirements.
l) Wall systems at the platform level shall consider pressure from suction and pulse loads created when a train approaches and departs the station.
p) Materials shall be non-porous or have appropriate limits to water absorption.
q) All materials shall have low Volatile Organic Compounds (VOC) content limits.
r) All exposed-to-view structural steel members and non-stainless steel miscellaneous metal elements shall be paint finished.

4.1. CONCRETE

Figure 4.1: Concrete Walls

Location: Exterior and Interior

Composition

a) Concrete walls shall conform to CAN/CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete, for all material and construction methodology requirements.
b) The Engineer of Record shall determine the dimensions, thickness, structural design and structural performance of the concrete.
c) The form-releasing agent shall not stain the concrete or impair the subsequent application of finishes or coatings to the surface of the concrete.
d) Concrete shall have adequate coverage over steel rebar to protect against damage, including freeze-thaw damage and corrosion-induced spalling.
e) Where required, water-repellent sealants or coatings shall be applied to protect surfaces from water ingress.
    i. Exterior concrete shall be sealed in locations requiring a vapour barrier.
    ii. Sealer shall be of a permeable type where waterproofing or other vapour impermeable material is present in the wall assembly.
f) Concrete surfaces shall allow for the shedding of water.

Finish, Texture, and Colour

g) All exposed public-facing concrete surfaces shall be finished to ensure a consistent and uniform colour, texture, and appearance.
    i. Pigments shall be non-staining, non-bleeding, and non-fading. Concrete shall be free of staining or discolouration from release agents.
    ii. Colour of aggregates shall match the overall colour range of concrete.
h) Acceptable colours for standard walls shall be within a range from light grey to medium grey.
i) Architectural concrete exposed to view shall be of a quality finish that minimizes the need to 'make good' or require further finishing work when forms and liners are stripped.
j) Exposed concrete surfaces shall achieve a smooth, uniform finish with no visible form defects, grain transfer, or surface irregularities.
k) Sandblasted concrete exposed to view shall be of uniform appearance and free of visible defects, including laitance, loosened or exposed aggregate, or damaged concrete at the surface.

Dimensions, Thickness, and Installation

l) There shall be no visible tie holes or panel joints unless required by construction methodology.
    i. Exposed tie holes shall be arranged in an orderly, regular, and intentional pattern with capped button inserts.
    ii. Tie holes exposed to view shall be capped to maintain a consistent and visually clean appearance.

iii. Exposed control joints shall have a 13 mm x 13 mm chamfered edge. Reglets shall be avoided due to imperfections from the formwork.

m) Material finish shall not be broken, cracked, scratched, damaged, dented, deformed, or contain any visual defects such that they are detectable or observable.

n) Concrete shall be finished to a uniform appearance. Damaged concrete shall be replaced with materials of the same function and performance. Remediate affected areas to ensure they are fit for use and achieve the same uniform finished appearance.
   i. Honeycombing and rock pockets shall not be accepted.
   ii. Remediate patched openings and other irregularities in the concrete, including where formwork was removed and any concrete injection chute locations.
   iii. Reinforcing steel (rebar) embedded within a concrete wall or column shall not be visible or noticeable on the surface of the concrete, ensuring sufficient coverage is achieved.

Accessories

o) All coatings, such as anti-graffiti coatings, shall:
   i. be non-sacrificial;
   ii. not affect the appearance of the material or finish underneath; and
   iii. minimize the darkening effect on the protected surface.

p) Stainless steel inserts, hardware, and connections shall be Grade 304 for interior conditions and Grade 316 for exterior conditions.

4.1.1. Precast Concrete

a) Precast concrete elements shall be fabricated by a manufacturing plant certified by the Canadian Standards Association in the appropriate categories according to CSA A23.4, Precast Concrete - Materials and Construction/ Qualification Code for Architectural and Structural Precast Concrete Products.
   i. The precast plant certification shall be maintained throughout the entire fabrication and erection process.

b) Concrete units shall be designed to withstand all dead or live loads as per the Engineer of Record.

c) Panel face surfaces shall be smooth, dense, even, and free of defects such as honeycombing, voids, and loss of fines. Exposed top, bottom, and back surfaces shall match the face surface finish.

d) Patching and repair work of damaged precast concrete shall not be acceptable. The precast concrete unit shall be replaced.

e) Precast concrete units shall be designed to accommodate expansion and contraction resulting from moisture and anticipated temperature fluctuations in accordance with the Ontario Building Code climatic design criteria, for exterior, unconditioned, or semi-conditioned spaces. They shall maintain performance and aesthetics over the expected lifecycle.

f) All joints between precast panels shall be sealed to prevent the ingress of water when acting as a separation between exterior and interior spaces.

g) Where applied as a wall cap, the top surface shall be sloped to prevent the pooling of water and other substances.

4.1.2. Fibreglass Reinforced Concrete Panel

a) Fibreglass-reinforced concrete wall panels shall be designed to withstand all dead or live loads as per the Engineer of Record, withstanding deflection under the system's own weight plus wind load (positive and negative) acting normal to the plane in accordance with the Ontario Building Code Climatic Data.

b) Panels shall be designed to accommodate expansion and contraction resulting from moisture and anticipated temperature fluctuations in accordance with the Ontario Building Code climatic design criteria, for exterior,

unconditioned, or semi-conditioned spaces. They shall maintain performance and aesthetics over the expected life cycle.

c) Panel face surfaces shall be sandblasted or brushed smooth. The application of a water-resistant surface may be included as required, but shall not affect the appearance of the concrete.

d) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of the ranges acceptable across modes, should variances from modal requirements be required:
   i. Minimum panel size: 610 mm x 610 mm; and
   ii. Maximum panel size: 1,220 mm x 2,440 mm.

e) Minimum panel thickness shall be 13 mm.

4.2. MASONRY

Figure 4.2: Exterior Brick Cladding

Location: Exterior and Interior

Composition

a) Masonry shall be determined based on its location, whether as an exterior cladding application forming part of a rainscreen wall assembly, or as an interior wall finish or partition. Refer to each Subsection for requirements.

Finish, Texture, and Colour

b) Acceptable colour shall be of a neutral tone selected from the manufacturer's full range.
   i. Where tying into existing, the colour shall match the existing masonry to remain.
   ii. Designs shall consider the limitations in masonry product selection and the variability in batch production.
   iii. Mitigations, such as utilizing the same manufacturer and batch, shall be included to ensure uniform colour throughout the wall and adjacent wall areas.

Dimensions, Thickness, and Installation

c) Sizes shall be metric modular unless specified to match existing heritage conditions.
d) Units shall not vary more than ±1.5 mm to ±3 mm in dimensional tolerances for uniform appearance and consistency.
e) Where various masonry products are located adjacent to other masonry products, coursing shall best align in an intentional pattern with matching horizontal datums.
f) Masonry shall be installed plumb, level, and true to plane. Masonry shall be in a running bond or stack bond configuration.
g) Mortar joint thickness shall be nominal 10 mm.
h) Joints shall be uniformly concave and raked where exposed.
i) Cut masonry shall not be used at edge and corner conditions.
j) Where possible, design wall lengths to accommodate full masonry lengths and reduce the amount of cut units required.

Accessories

k) Specialty shapes may be used as required and shall be reviewed and approved by the Owner of this Standard.
l) Control joints shall be engineered to the expected movement of the wall based on size and expected loads.

4.2.1. Clay Masonry Unit

a) Clay Masonry Units, or Clay Bricks, shall conform to CAN/CSA A82, Fired Masonry Brick Made from Clay or Shale. Units shall:
   i. not crack or collapse and have a minimum compressive strength of 8.6 MPa (2,500 psi); and
   ii. not display spalling, mould, or efflorescence, and have freeze-thaw durability with a maximum moisture absorption of 17%.
b) For exterior brick veneer wall applications, a rainscreen design with a continuous air cavity behind the veneer shall be incorporated to facilitate drainage and drying. The cavity shall be compartmentalized to limit air pressure differentiation and moisture movement.
   i. Weep holes shall be installed at the base of the walls and above openings and/or flashing to allow moisture to escape, maintaining consistent spacing of a maximum of 610 mm apart.
   ii. Through-wall flashing shall be incorporated to direct water out of the drainage cavity. They shall be located at the base of the walls, above openings, and at transitions such as shelf angles.
   iii. Flashing shall extend beyond the face of the veneer to form a drip edge.
   iv. Mortar nets shall be installed behind the base course to prevent weep holes from being blocked.
   v. High-quality mortars shall have adequate strength and flexibility for bonding adjacent materials and have good freeze-thaw resistance.

4.2.2. Concrete Masonry Unit

a) Concrete Masonry Units, or Concrete Blocks, shall conform to CSA A165 series, Standards on Concrete Masonry Units. Units shall:
   i. not crack or collapse and have a minimum compressive strength of 13.8 MPa (2,000 psi); and
   ii. not display spalling, mould, or efflorescence, and have freeze-thaw durability with a maximum moisture absorption of 15%.
b) The Designer of Record shall select the appropriate materials for both load-bearing and non-loadbearing concrete masonry unit walls.
c) Concrete blocks may have various project-specific finishes, including but not limited to sealers, block fillers, and paints, or may support furring and other cladding options.

   i. Where walls are paint-finished, colour shall be uniformly applied and determined based on project-specific requirements.

d) Sizes shall be in accordance with the Ontario Concrete Block Association (OCBA) metric modular system. Imperial sizes shall only be used where tying in with existing conditions that use imperial blocks.
e) Where concrete block walls are required as fire separations, they shall conform to the National Building Code and Ontario Building Code with respect to equivalent thickness and type of concrete.

4.2.3. Architectural Block

a) Architectural block finishes shall be consistent, specific to each project, and shall be easy to clean and maintain.
   i. Acceptable face finishes shall include polished, smooth, split face, ground face, or shot blast.
   ii. Face finishes such as scored, fluted, or ribbed shall be avoided.
b) Acceptable colours shall be of a neutral tone, including white, light grey, medium grey, or charcoal grey, selected from the manufacturer's full range.

4.2.4. Acoustic Block

a) Acoustic blocks shall be located above 2,750 mm to minimize the risk of vandalism.
b) Acoustic blocks shall be purpose-made to provide the acoustical characteristics specified. Refer to Metrolinx Design Standards and specific project requirements.
   i. The Noise Reduction Coefficient (NRC) rating shall be a minimum of 0.80.
c) Units shall be face-finished with the manufacturer's standard slotted-face penetrating block cavity.
d) Sound insulation shall be non-combustible, such as semi-rigid mineral wool insulation.

4.3. METAL AND ALUMINUM WALL PANEL

Figure 4.3: Prefinished Aluminum Panel Cladding

Location: Exterior and Interior

Composition

a) Panels shall be fabricated free from twists, warps, kinks, dents, and other imperfections affecting appearance or serviceability.
   i. Panels shall minimize visible distortions, such as oil canning and dishing. Any deformation shall be minimal to preserve a smooth and uniform surface.
   ii. Stiffeners, when used, shall support the panel without noticeable deflection to maintain the intended appearance.

b) Panel shall be galvanized steel with Z275 zinc coating, or aluminum alloy AA3000 series.
   i. Exposed surfaces of aluminum shall be free of dye marks, scratches, blisters, or other blemishes.
   ii. Preformed folded corners shall be welded and ground smooth prior to factory finishing.
   iii. Concealed steel or aluminum support systems shall be isolated where required to prevent electrolysis where dissimilar metals are present.

c) Acoustic backing material, where required, shall achieve a minimum Noise Reduction Coefficient (NRC) rating of 0.70.

d) Fire performance and surface burning characteristics shall conform to NFPA 130 and OBC requirements.

e) Grounding and Bonding of metal and aluminum panels shall conform to the Ontario Electrical Safety Code (OESC).

Finish, Texture, and Colour

f) Panels shall be post-formed and shop-painted. On-site painting shall not be acceptable.
   i. The fluoropolymer-coat finish shall be a factory-applied, two-coat system consisting of a prime coat and a colour coat.
   ii. Panels shall conform to the American Architectural Manufacturers Association AAMA 2604 High Performance or AAMA 2605 Superior Performance.

g) Cutting of prefinished panels on site shall not be acceptable.
   i. When perforations are required, the panel shall be coated after perforation cuts have been made to avoid exposed untreated surfaces.

h) Panels shall have a smooth texture and be matte finished.

i) The outer surface shall be coated with a finish to provide UV resistance, colour stability, and protect against the elements.

j) Acceptable colour shall be a neutral tone, including white, light grey, medium grey, charcoal grey, anodized, or wood patterning selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

k) Spline, track, and trim colour shall match panel colour.

Dimensions, Thickness, and Installation

l) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of acceptable ranges across various modes, should variances from modal requirements be necessary:
   i. Square panels shall be:
      1. Minimum: 610 mm x 610 mm; and
      2. Maximum: 1,220 mm x 1,220 mm.
   ii. Rectangular panels shall be:
      1. Minimum: 610 mm x 1,220 mm; and
      2. Maximum: 1,220 mm x 2,440 mm.
   iii. Linear planks shall be:
      1. Minimum: 152 mm x 1,220 mm; and
      2. Maximum: 305 mm x 1,220 mm.
   iv. Where larger panels are required to accommodate the design, they shall have sufficient rigidity and support to prevent warping; and
   v. Cladding panels shall be a size and weight that can be removed and reinstalled by a single staff member.

m) Minimum material thickness shall be 1.5 mm.

n) Corners shall be smooth and have a maximum radius of 3 mm.

o) Panel joints and reveals shall allow for flexible design options to align with adjacent building materials and finishes.
   i. Reveals shall be a maximum width of 10 mm.

p) Maximum perforation open area shall be 50%. Refer to Metrolinx Design Standards for the required area.
   i. Panels below 2,750 mm AFF shall be solid.
   ii. Panels above 2,750 mm AFF may be perforated.

q) Access panels shall be flush and integrate with the surrounding cladding and shall:
   i. be hinged with concealed hinges or be removable with concealed fasteners.
   ii. be the same colour and finish as the surrounding cladding.

r) Product tolerances shall be within acceptable ranges as per manufacturer specifications.
   i. Panels shall be formed to specified dimensions with tolerances to accommodate expansion and contraction between panels and the support system.

Accessories

s) All fasteners shall be concealed and tamper-resistant.

t) Where fasteners must be exposed, they shall be capped, and the finish colour shall match the panel finish.

4.3.1. Prefinished Metal Composite Panel / Aluminum Composite Panel

a) Composite panels shall consist of two sheets of steel or aluminum sandwiching a solid core formed in a continuous process and shall not delaminate.

b) The panel core shall be fabricated from solid, fire-resistant, extruded material, free of voids and/or air spaces, and shall not contain combustible material.

c) Face sheets shall have a minimum thickness of 1 mm.

d) Overall panel shall have a minimum thickness of 5 mm.

4.4. CERAMIC AND PORCELAIN WALL PANEL

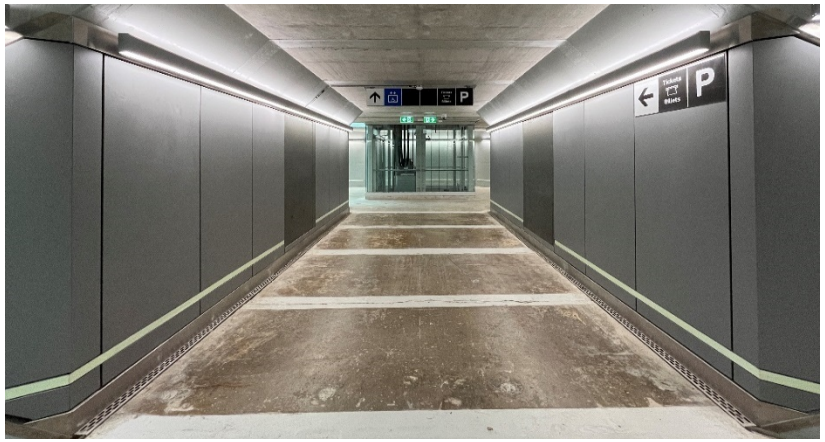

Figure 4.4: Porcelain Tile Wall Panels

Location: Exterior and Interior

Composition

a) All tile products, trade associations and memberships, standards of workmanship, and remedial processes shall be in accordance with the Terrazzo Tile and Marble Association of Canada (TTMAC).

b) Wall tiles shall be a faced modular system made of compact materials with minimal open spaces between particles and shall conform to ANSI A137.1, Standard Specifications for Ceramic Tile.
   i. Water absorption capacity shall be a maximum of 3.0% for tiles located in exterior conditions and wet areas.

c) Cladding systems and finishes shall be designed to accommodate expansion and contraction resulting from moisture and anticipated temperature fluctuations in accordance with the Ontario Building Code climatic design criteria, for exterior, unconditioned, or semi-conditioned spaces. They shall maintain performance and aesthetics over the expected life cycle.

d) Deflection due to uniformly distributed loads shall conform to ANSI A108/A118/A136.1, Installation of Ceramic Tile, and not exceed L/360.

Finish, Texture, and Colour

e) Wall tiles shall be unglazed, uniform, through-body colour, with a matte finish.

f) All tiles shall have rectified edges to ensure consistent sizing and precise installation.

g) Acceptable colours for standard walls shall include white, light grey, medium grey, slate grey, and charcoal grey selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colours, locations, and feature wall requirements.

Dimensions, Thickness, and Installation

h) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of the ranges acceptable across modes, should variances from modal requirements be necessary:
   i. Large Format shall be:
      1. Minimum size: 610 mm x 610 mm; and
      2. Maximum size: 1,220 mm x 2,440 mm
   ii. Small Format shall be:
      1. Minimum size: 152 mm x 305 mm; and
      2. Maximum size: 305 mm x 305 mm

i) The minimum tile thickness shall be 5 mm.

j) The face of panels shall be flush with the surrounding finishes.

k) The design of exterior systems shall allow drainage of water away from the building envelope.

Accessories

l) All fasteners shall be concealed and tamper-resistant.

m) The appearance of grout shall be minimized by using a suitable composition, colour selection, and appropriate widths.
   i. Grout shall be resistant to salt, chemicals, and stains.
   ii. Epoxy grout shall be used for all wet areas, such as washrooms.
   iii. Grout colour shall match the tile finish selected from the manufacturer's full range.
   iv. Grout size shall be consistent across the wall surface with minimal differences and have a maximum width of 6 mm.
n) Trims shall be selected and provided to protect exposed tile edges in all public areas.
   i. Trims shall be pre-formed with extruded straight-edge strips and perforated anchoring legs.
   ii. Height shall be suitable for tile installation, with maximum lengths to minimize the number of seams.
   iii. Finish shall be clear satin anodized aluminum or stainless steel, Grade 304 for the interior and Grade 316 for the exterior or areas exposed to water and moisture.

4.5. TERRACOTTA PANEL

Location: Exterior

Composition

a) Terracotta shall be extruded terracotta clay tile with a natural finish with no signs of cracking, crumbling, or fracturing.
b) Terracotta panels shall have a low water absorption of less than 3% to prevent water ingress and minimize freeze-thaw damage and staining.
c) Terracotta panel system, including tracks, clips, gaskets, isolators, and all components, shall be sourced from a single manufacturer to ensure compatibility and consistency.

Finish, Texture, and Colour

d) Wall tiles shall be unglazed, uniform, through-body colour, with a matte finish.
e) Acceptable colours shall be a neutral tone, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colours and locations.

Dimensions, Thickness, and Installation

f) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of the ranges acceptable across modes, should variances from modal requirements be necessary:
   i. Maximum size: 1,220 mm x 2,440 mm; and
   ii. Minimum size: 610 mm x 610 mm.
g) The minimum tile thickness shall be 38 mm.
h) The face of panels shall be flush with the surrounding finishes.

Accessories

i) Flashing, trims, and other accessories shall be shop-fabricated, corrosion-resistant, and designed to allow adjustments of the system prior to permanent fastening.

4.6. STONE PANEL

Figure 4.6: Stone Wall Panels

Location: Exterior and Interior

Composition

a) Natural stone slabs and composite stone panels shall be in accordance with ASTM C615, Standard Specification for Granite Dimensions Stone, and National Building Granite Quarries Association Inc. (NBGQA) Specifications for Architectural Granite, and shall:
   i. be medium-grained and uniform in colour and pattern;
   ii. be free from cracks, seams, or excessive pitting;
   iii. be suitable for exterior use and have low porosity for resistance to freeze-thaw cycles and staining, and a maximum water absorption of 0.4%; and
   iv. have a minimum abrasion resistance index of 25.

b) Composite stone panels shall be a fibreglass-backed modular system.

c) Material shall be sourced from the same production run for each contiguous area to achieve consistent quality in appearance and physical properties.

Finish, Texture, and Colour

d) Acceptable finishes shall include honed and flamed only. Polished finish shall not be used.

e) Cut and vein orientation shall align with the established design intent and be coordinated with existing patterns.

f) Acceptable colours shall include light grey, warm grey, medium grey, and charcoal grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

g) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of the ranges acceptable across modes, should variances from modal requirements be required:
   i. Minimum: 610 mm x 610 mm; and
   ii. Maximum: 1,220 mm x 2,440 mm.

h) Minimum thickness of the stone veneer shall be 10 mm, or as noted by the Designer of Record.

i) Minimum thickness of natural stone slabs and system shall be engineered and confirmed by the Designer of Record.

j) Outside corners shall be mitred to conceal the edge of the stone.

k) Granite cladding shall be installed in accordance with the Terrazzo Tile and Marble Association of Canada (TTMAC) Tile Installation Manual Specifications Guide 09 30 00.

Accessories

l) Support framing systems shall be non-corrosive, and anchors shall be galvanized or stainless steel.

m) Sealants shall be non-sag and non-staining to the stone.

4.6.1. Sintered Stone

a) Sintered stone panels shall be composed of natural minerals fused under high pressure and heat, without the use of polymer resins.
b) Sintered stone shall have:
   i. a minimum compression strength of 19,000 psi;
   ii. a maximum water absorption of 0.1%, impervious;
   iii. a minimum modulus of rupture of 6,000 psi (41 MPa);
   iv. a minimum abrasion resistance index of 200;
   v. a minimum bond strength of 150 psi;
   vi. a thermal shock resistance passing 10 cycles;
   vii. a minimum breaking strength of 250 lbf for tiles, and 1,000 lbf for panels; and
   viii. a freeze-thaw resistance with no visible defects after 15 cycles.
c) Panels shall be a maximum size of 1,220 mm by 2,440 mm.
d) Minimum thickness shall be 13 mm, or as noted by the Designer of Record.

4.7. FINS AND BAFFLES

Figure 4.8: Exterior Aluminum Fins

Location: Exterior

Composition

a) Aluminum extrusions shall be corrosion-resistant, 6063-T6 Alloy.
b) The system shall be independent of any glazed curtain wall system, complete with adjustable vertical fins that project perpendicular or at an angle to the cladding/glazing plane.
c) Shading system supports shall tie back to the structural framing elements and be thermally broken with no bridging by fasteners.
d) Fins shall run vertically, the full height of the glazed wall system, where integrated.
e) Designer shall consider the provision of access for maintenance and cleaning.

Finish, Texture, and Colour

f) Elements shall be shop-formed and factory-finished.
   i. The fluoropolymer-coat finish shall be a factory-applied, two-coat system consisting of a primer coat and a colour coat.

ii. Elements shall conform to the American Architectural Manufacturers Association AAMA 2604 High Performance or AAMA 2605 Superior Performance.

g) Colour shall match the overall façade colour scheme or curtain wall mullions.

Dimensions, Thickness, and Installation

h) Nominal thickness of tubular fins shall be a minimum of 3 mm.

i) Refer to Metrolinx Design Standards for the required depth of the fin.

j) Grounding and Bonding of metallic fins and baffles shall conform to the Ontario Electrical Safety Code (OESC).

4.8. GYPSUM WALL BOARD AND PLASTER

Figure 4.9: Gypsum Wall Board

Location: Interior

Composition

a) Cores shall be regular gypsum core unless noted otherwise. Additives may be used as required to enhance performance. Refer to each type of gypsum board for specific requirements.

b) Boards shall have square cut ends and tapered edges.

Finish, Texture, and Colour

c) Provide levels of gypsum board finish in accordance with Gypsum Association GA 214, Recommended Specification: Levels of Gypsum Board Finish as follows:

i. Concealed areas, such as ceiling plenums, shall receive a Level 1 finish, except where a higher level of finish is required to comply with fire resistance and acoustic ratings;

ii. Gypsum board substrate behind tile finishes shall receive a Level 2 finish, with tool marks and ridges removed;

iii. Gypsum board surfaces intended for textured or applied coatings, such as plaster, shall receive a Level 3 finish; and

iv. Finished gypsum board surfaces to receive paint shall receive a Level 4 finish.

d) Completed installation shall be smooth, level, and plumb, free from waves and other defects, and ready for surface finish.
e) Typical paint finish sheen shall be eggshell unless noted otherwise. Refer to Metrolinx Design Standards for the specific finish prescribed.
f) Typical paint finish colour shall be white unless noted otherwise. Refer to Metrolinx Design Standards for specific colours prescribed.

Dimensions, Thickness, and Installation

g) Standard sheet sizes shall be 1,220 mm x 2,440 mm to cover the entire wall area as per the design.
h) Standard thicknesses shall include 13 mm, 16 mm, 19 mm, and 25 mm.
i) Access panels shall be installed flush with the face of gypsum board, where required by the design.

Accessories

j) Fasteners shall be corrosion-resistant.
k) Trims shall be provided as required by the design.
l) Acoustical sealants, fire stop, and smoke sealants shall be provided as required by the design.

4.8.1. Impact and Abuse-Resistant Gypsum Wall Board

a) Panels shall have a glass fibre-reinforced core, produced to have greater resistance to surface indentation and penetration compared to standard gypsum boards.
b) Panels shall have a minimum thickness of 16 mm.

4.8.2. Moisture and Mould Resistant Gypsum Wall Board

a) Panels used in wet or damp areas shall have a water-resistant treated core and face finish consisting of fully embedded glass fibre mats on both sides with a polymer-modified gypsum surface and an acrylic face coating.
b) Panels shall be mould-resistant and shall not support microbial growth.
c) Panels shall be a maximum of 1200 mm wide by maximum practical lengths and a minimum thickness of 16 mm.

4.8.3. Fire-Rated Gypsum Wall Board

a) Panels shall be Type X with tapered edges.
b) Panels shall have a minimum thickness of 16 mm.

4.9. PAINTING AND COATING

Location: Exterior and Interior

Composition

a) Primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, and all other painting materials, preparations, and workmanship shall conform to the latest edition of the Master Painter Institute (MPI) standards and shall:
   i. be from a single manufacturer for each system used;
   ii. only include paint manufacturers and products listed under the Approved Products List by the MPI; and
   iii. conform to the MPI Green Performance Standard.

b) All materials, including but not limited to primers, stains, and paints, shall be lead-free and mercury-free and have low VOC content limits.

c) Coating materials shall be compatible with the designated application surface and other materials, such as the substrate, fasteners, supports, and adjacent finishes, to enhance service life.

d) Paint applied to customer-facing areas within high-contact zones shall be graffiti-resistant.

e) Paint finishes in wet areas shall be moisture, mould, and mildew resistant.

f) Exterior and semi-conditioned spaces shall use exterior-grade paint that is UV and weather-resistant, and able to withstand temperature fluctuations and moisture to maintain performance and aesthetics over the expected life cycle.

Finish, Texture, and Colour

g) Typical sheens for various applications shall be as follows, unless noted otherwise in Metrolinx Design Standards:
   i. Flat: ceilings;
   ii. Eggshell: walls, doors, and frames; and
   iii. Satin: doors, frames, and trims.

h) All exterior painted surfaces shall have a gloss level between 20-70 units at 60°C.

i) Colours shall be as noted in Metrolinx Design Standards.

Application

j) Surfaces to receive painting and coatings shall follow the paint and/or coating manufacturer's requirements as they relate to surface preparation and environmental conditions. Application shall be as per the manufacturer's instructions.

k) Adjacent finishes shall be free of defects and deficiencies from painting operations, including but not limited to overspray, spills, and splatters.

l) Damaged or unsatisfactory work shall be repaired or replaced to match the original intention. Remedial work shall extend over the entirety of the surface area or to a reasonable architectural terminus.

m) Structural steel and metal fabrications shall be shop-applied paint finish for protection from elements and corrosion.
   i. On-site painting shall be limited to the minimum area necessary and is permitted only when it is demonstrated that the work cannot be shop-applied.
   ii. Where touch-ups are required, the application shall not result in a difference in appearance across the element.

4.9.1. Anti-Graffiti Coating

a) Coatings shall be non-sacrificial, breathable, intended for use over properly prepared surfaces, clear, and non-yellowing. They shall not affect the appearance of the material or finish underneath and shall minimize the darkening effect on the protected surface.

b) There shall be no appreciable colour difference to the coated surface when compared to the non-coated surface.

c) Porous surfaces, such as concrete, brick, and stone, shall:

   i. receive a clear primer or sealer prior to the application of the anti-graffiti coating to ensure proper adhesion; or
   ii. receive an anti-graffiti coating with self-priming properties.

d) Non-porous surfaces shall receive factory-applied anti-graffiti coating(s).
e) Coatings shall be applied to a minimum height of 3,000 mm above the finished floor datum of all public-facing walls, including retaining walls. Refer to Metrolinx Design Standards for specific location requirements.
f) Coatings shall follow the manufacturer's requirements and withstand graffiti removal, such as power washing. There shall be no visible signs of streaking, cracking, pinholing, discolouration, fading, chipping, flaking, or other coating degradation caused by graffiti removal methods.
g) Refer also to Metrolinx DGL-03 Design Guideline Graffiti Management for additional guidance.

4.10. JOINT SEALANTS

Location: Exterior and Interior
Composition

a) All materials utilized in a sealant system and the joint condition shall be compatible and non-staining.
b) Sealants shall provide thermal and moisture protection, prevent air infiltration, and maintain structural integrity as required.
c) Sealants and joints in exterior and semi-conditioned spaces shall be made with materials that are environmentally resistant and intended for exterior use.
d) Acceptable types of sealants shall include silicone, polyurethane, latex, and acrylic.
   i. Exterior conditions and high-moisture areas shall consider using silicone and polyurethane sealants. When other materials are used, they shall be intended for exterior use and meet a similar level of durability and weather resistance.
   ii. The Designer of Record shall select the type of sealant based on project requirements as it relates to:
      1. movement capabilities;
      2. adhesion to substrates and adjacent materials;
      3. environmental resistance, including temperature, moisture, water, freeze-thaw damage, UV, weather, and chemical exposure; and
      4. compatibility with solvent migration in the sealant and resulting degradation.
e) A backer rod shall be provided to control sealant depth and joint movement. The type shall be selected based on the joint condition, exposure, and the sealant manufacturer's recommendation.
   i. Closed-cell backer rods shall be used in exterior or wet environments to prevent moisture absorption.

ii. Open-cell backer rods shall be used in interior, dry applications where moisture curing is required for the sealant.

Finish, Texture, and Colour

f) Joints shall be finished smooth and free from ridges, wrinkles, air pockets, and embedded foreign materials. Surface of joints shall be tooled to a slightly concave profile.
g) Colour of caulked joints shall match adjacent materials and finishes.
h) Where two different materials are on either side of joints, acceptable colours shall include white, light grey, medium grey, slate grey, charcoal grey, and black, selected from the manufacturer's full range.

Dimensions, Thickness, and Application

i) The Designer of Record shall determine the depth and width of the sealant to accommodate the joint profile and comply with the manufacturer's requirements.
    i. Exterior joints shall have a maximum width of 25 mm.
    ii. Interior joints shall have a maximum width of 10 mm.
    iii. Where the manufacturer or structural movement requires a larger joint, it shall be reviewed and approved by the Owner of this Standard.
j) Joint sealants shall be installed straight, true, and consistent in width and appearance.
    i. Vertical joints shall not provide a lip, and both sides of the joint shall be flush in the same plane.
    ii. Horizontal joints shall not provide a lip or trip hazard, and both sides of the joint shall be flush and level in the same plane.
k) Sealants shall not cover adjacent surfaces outside of the joints.
l) Joints shall be coordinated with structural grids and thresholds.
m) All materials and work performed shall be in strict accordance with the manufacturer's instructions and with all warranty requirements.
n) Regular inspection and maintenance shall be prescribed to ensure the ideal performance of the sealant.
o) The demonstrated minimum amount of caulking shall be provided to mitigate concerns around vandalism.

4.10.1. Expansion Joints

Composition

a) Exterior expansion joints exposed to the elements shall be water-tight, airtight, dust-resistant, sound-resistant, and resilient to exterior conditions. They shall facilitate expansion and contraction, accommodate temperature ranges and local climate, and address anticipated surface temperature and humidity fluctuations.
b) Metal expansion joints, where visible to the public, shall be an extruded aluminum or stainless steel frame with a continuous elastomeric seal.
    i. Aluminum shall be an anodized or fluoropolymer finish.
    ii. Stainless steel shall be Grade 304, No. 4 brushed finish.
c) A continuous fire barrier shall be provided to achieve fire separation ratings as required by the design, and shall conform to CAN/ULC-S101, Standard Methods of Fire Endurance Tests of Building Construction Materials.

Dimensions, Thickness, and Application

d) Units shall accommodate joint widths as required, including alignment variations in adjacent surfaces.
e) Units shall be provided in the longest practicable length to minimize the number of end joints.
f) Where the joint changes direction or abuts other materials, mitred corners shall be provided.

g) Expansion joints shall be installed so that surfaces are flush with adjacent materials. Where installed on floor surfaces, they shall not pose a tripping hazard.
h) Fasteners shall be countersunk, tamper-resistant, and match the expansion joint cover frame.

4.11. FIBREGLASS-REINFORCED PLASTIC WALL PANEL

Location: Interior, back-of-house

Composition

a) Panels shall be extruded rigid plastic with fibreglass reinforcement, and thermoset polyester or epoxy resin binder.
b) Panels shall resist scratches, dents, and punctures from impacts.
c) Panels in wet and humid areas shall have low water absorption and prevent the growth of mould and mildew.
d) Panels in heavy-duty use areas shall resist chemicals such as cleaning agents, common acids, alkalis, and solvents with no visible degradation.
e) Panels shall be securely adhered to the substrate to prevent delamination due to poor adhesive bonding.
f) All materials and components shall have low VOC content.

Finish, Texture, and Colour

g) Acceptable finishes shall be either a smooth, dimpled, or embossed surface.
h) Acceptable colours shall include white or light grey selected from the manufacturer's full range.

Dimensions, Thickness, and Installation

i) Panels shall be a maximum size of 1,220 mm by 2,440 mm.
j) Panels shall have a minimum thickness of 2.3 mm.

Accessories

k) Adhesives shall be specified by the panel manufacturer for compatibility.
l) Thermoformed panel trim mouldings shall include gaskets, edge mouldings, joint mouldings, and corner mouldings as required by the panel manufacturer to complete the system.

4.12. FIBRE CEMENT SIDING/PANELS

Location: Exterior and Interior

Composition

a) Fibre-reinforced cement board shall be free from asbestos fibres in accordance with ASTM C1186.
   i. Grade I – High Performance in heavy-duty areas and exterior applications.
   ii. Grade II – Moderate Performance in light to moderate-use areas.

Finish, Texture, and Colour

b) Fibre cement siding and panels shall be prefinished with factory-applied coatings.
c) Acceptable colours shall be of a neutral tone selected from the manufacturer's full range.
d) Fibre cement siding and panels utilized across each project shall be fabricated by the same manufacturer and be of the same batch, uniform in colour, to avoid a gradient across the surface.
e) Fibre cement siding and panels shall be factory-finished with prefinished acrylic.

Dimensions, Thickness, and Installation

f) Panels shall be a maximum size of 1,220 mm by 2,440 mm.
g) Panels shall have a minimum thickness of 13 mm.

Accessories

h) Substructure and fastening shall be thermally broken with a corrosion-resistant fastening system.

5 SOFFITS AND CEILINGS

5 SOFFITS AND CEILINGS

General Requirements

a) Soffits and ceilings shall provide a unified and consistent appearance, incorporating effective lighting strategies and clear signage to facilitate navigation and safety.
b) Ceiling substrate and finishes shall be of a hard surface, dent-resistant, with low moisture absorption, requiring minimal demonstrated maintenance, washable, cleanable, scuff-resistant, non-combustible, non-staining, and non-corrosive.
c) Easy access to ducts and equipment above the ceiling shall be provided.
d) Exposed ceiling infrastructure, including ceiling framing and suspension systems, and exposed building services shall be screened from view or finished black.
e) Flame spread ratings for ceiling finishes shall conform to NFPA 130 and OBC requirements.
f) Interior ceiling acoustic finishes shall achieve a minimum Noise Reduction Coefficient (NRC) of 0.50 unless noted otherwise.
g) All ceiling finishes at platform level shall be secured and/or clipped in place to meet a 2 kPa pulse created when the transit vehicle train approaches and departs from the station.
h) Shiny surface finishes shall not be allowed. Refer to the Universal Design Standard.
i) Soffit designs shall provide adequate ventilation and airflow through adjoining spaces while blocking and deterring all pests.
j) Soffits and ceilings requiring grounding and bonding work shall meet the requirements of the Ontario Electrical Safety Code, and applicable codes and by-laws as required by the Authority having Jurisdiction.
k) Ceiling panel weight shall facilitate ease of removal by one staff member.
l) Exterior soffits shall be designed and confirmed to resist wind uplift through appropriate engineering, detailing, and load verification by the Designer of Record.

5.1. METAL AND ALUMINUM SOFFIT/CEILING PANEL

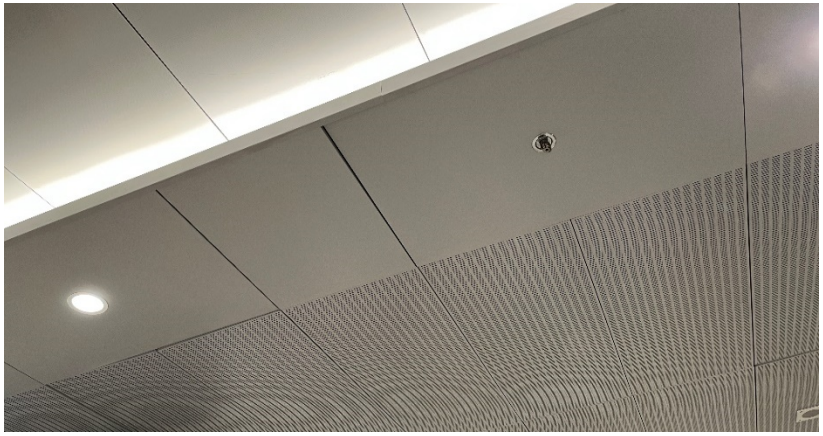

Figure 5.1: Aluminum Ceiling Panels

Location: Exterior and Interior

Composition

a) Panels shall be fabricated free from twists, warps, kinks, dents, and other imperfections affecting appearance or serviceability.
    i. Panels shall minimize visible distortions, such as oil canning and dishing. Any deformations shall be minimal to preserve a smooth and uniform surface.
    ii. Stiffeners, when used, shall support the panel without noticeable deflection to maintain the intended appearance.
b) Panels shall be galvanized steel with Z275 zinc coating, or aluminum alloy AA3000, AA5000, or AA6000 series.
    i. Exposed surfaces of aluminum shall be free of dye marks, scratches, blisters, or other blemishes.
    ii. Preformed folded corners shall be welded and ground smooth prior to factory finishing.

iii. Concealed steel or aluminum support systems shall be isolated where required to prevent electrolysis where dissimilar metals are present.

c) Acoustic backing material, where required, shall achieve a minimum Noise Reduction Coefficient (NRC) rating of 0.70.
   i. Where acoustic backing material is used above a perforated ceiling panel, the system shall be designed to resist wind uplift, including forces from train or vehicle movement.

d) Fire performance and surface burning characteristics shall conform to NFPA 130 and OBC requirements.

e) Grounding and Bonding of metal and aluminum panels shall conform to the Ontario Electrical Safety Code (OESC).

Finish, Texture, and Colour

f) Panels shall be pre-formed and shop-finished. On-site painting shall not be acceptable.
   i. The fluoropolymer-coat finish shall be a factory-applied, two-coat system consisting of a prime coat and a colour coat.
   ii. Panels shall conform to the American Architectural Manufacturers Association AAMA 2604 High Performance or AAMA 2605 Superior Performance.

g) Cutting of prefinished panels on site shall not be acceptable.
   i. Where perforations are required, the panel shall be coated after perforation cuts have been made to avoid exposed untreated surfaces.

h) Panels shall have a smooth texture and be matte-finished.

i) The outer surface shall be coated with a finish to provide UV resistance, colour stability, and protect against the elements.

j) Acceptable colours shall be a neutral tone, including white, light grey, medium grey, charcoal grey, anodized, or wood patterning selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

k) Spline, track, and trim colour shall match panel colour.

Dimensions, Thickness, and Installation

l) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of acceptable ranges across various modes, should variances from modal requirements be necessary:
   i. Square panels shall be:
      1. Minimum: 610 mm x 610 mm; and
      2. Maximum: 1,220 mm x 1,220 mm.
   ii. Rectangular panels shall be:
      1. Minimum: 610 mm x 1,220 mm; and
      2. Maximum: 1,220 mm x 2,440 mm.
   iii. Linear planks shall be:
      1. Minimum: 152 mm x 1,220 mm; and
      2. Maximum: 305 mm x 1,220 mm.
   iv. Where larger panels are required to accommodate the design, they shall have sufficient rigidity and support to prevent warping; and
   v. Cladding panels shall be a size and weight that can be removed and reinstalled by a single staff member.

m) Minimum thickness shall be 1.5mm.

n) Corners shall be smooth and have a maximum radius of 3 mm.

o) Panel joints and reveals shall allow for flexible design options to align with adjacent building materials and finishes.
   i. Reveals shall be a maximum width of 10 mm.

p) Maximum perforation open area shall be 50%. Refer to Metrolinx Design Standards for the required area.
   i. Panels located 2,750 mm or less above finish floor level shall be solid.
   ii. Panels located more than 2,750 mm above the finish floor level may be perforated.

q) Access panels shall be flush and integrate with the surrounding finish and shall:

   i. be hinged with concealed hinges on one side to allow for safe and effective access to equipment, or be removable with concealed fasteners for future service access; and
   ii. be the same colour and finish as the surrounding cladding.

r) Product tolerances shall be within acceptable ranges as per manufacturer specifications.
   i. Panels shall be formed to specified dimensions with tolerances to accommodate expansion and contraction between panels and the support system.

Accessories

s) All fasteners shall be concealed and tamper-resistant.
t) Where fasteners must be exposed, they shall be capped, and the finish colour shall match the panel finish.
u) Bug screens shall be provided at all soffits and ceilings with ventilation openings, including slots and continuous soffit vents.

5.2. CEMENTITIOUS BOARD

Location: Exterior and Interior

Composition

a) Material shall be a non-combustible, mould and moisture-resistant cement board, with an aggregated Portland cement core wrapped in polymer-coated glass fibre mesh, and conform to ASTM C1186, Standard Specification for Flat Fibre-Cement Sheets. Panels shall:
   i. be moisture-resistant and exhibit no visual deterioration or loss of strength when exposed to water and humid conditions;
   ii. be impact-resistant with a minimum Class IV rating, suitable for high-traffic and vandal-prone zones; and
   iii. achieve a minimum Noise Reduction Coefficient (NRC) of 0.55, where acoustic performance is required.

Finish, Texture, and Colour

b) Finish shall be a minimum three-coat acrylic stucco exterior finish system and consist of:
   i. polymer-based base coat with fibreglass reinforcing mesh;
   ii. colour-tinted primer coat; and
   iii. 100% acrylic finish coat.
c) Acceptable colours shall be a neutral tone, including white, light grey, medium grey, or charcoal grey selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

d) Boards shall be maximum practical lengths of 2,440 mm wide sheets to minimize joints.
e) Boards shall have a minimum thickness of 13 mm.
f) Access panels shall be flush and integrate with the surrounding finish and shall:

i. be hinged with concealed hinges or be removable with concealed fasteners; and
ii. be the same colour and finish as the surrounding cladding.

Accessories

g) Fasteners shall be corrosion-resistant.
h) Trims shall be provided as required by the design.
i) Bug screens shall be provided at all soffits and ceilings with ventilation openings, including slots and continuous soffit vents.

5.3. GYPSUM BOARD AND PLASTER

Location: Interior

Composition

a) Refer to each type of gypsum board for specific requirements.
b) Additives may be used as required to enhance performance.
c) Boards shall have square cut ends and tapered edges.
d) Ceiling boards shall have more sag resistance than wall-type gypsum boards.

Finish, Texture, and Colour

e) Provide levels of gypsum board finish in accordance with Gypsum Association GA 214, Recommended Specification: Levels of Gypsum Board Finish as follows:
   i. Concealed areas, such as ceiling plenums, shall receive a Level 1 finish, except where a higher level of finish is required to comply with fire resistance and acoustic ratings;
   ii. Gypsum board substrate behind tile finishes shall receive a Level 2 finish, with tool marks and ridges removed;
   iii. Gypsum board surfaces intended for textured or applied coatings, such as plaster, shall receive a Level 3 finish; and
   iv. Finished gypsum board surfaces to receive paint shall receive a Level 4 finish.
f) Completed installation shall be smooth, level, and plumb, free from waves and other defects, and ready for surface finish.
g) Typical paint finish sheen shall be flat unless noted otherwise. Refer to Metrolinx Design Standards for the specific finish prescribed.
h) Typical paint finish colour shall be white unless noted otherwise. Refer to Metrolinx Design Standards for specific colours prescribed.

Dimensions, Thickness, and Installation

i) Standard sheet sizes shall be 1,220 mm x 2,440 mm to cover the entire ceiling area as per the design.

j) Standard thicknesses shall include 13 mm, 16 mm, 19 mm, and 25 mm.
k) Access panels shall be installed flush with the face of gypsum board, where required by the design.

Accessories

l) Fasteners shall be corrosion-resistant.
m) Trims shall be provided as required by the design.
n) Acoustical sealants, fire stop, and smoke sealants shall be provided as required by the design.

5.3.1. Impact and Abuse-Resistant Gypsum Board

a) Panels used in areas expecting higher impact and abuse shall be rated for moderate or high abuse, and produced to have greater resistance to surface indentation and penetration compared to standard gypsum boards.
b) Panels shall have a minimum thickness of 16 mm.

5.3.2. Moisture and Mould Resistant Gypsum Board

a) Panels used in wet or damp areas shall have a water-resistant treated core and face finish consisting of fully embedded glass fibre mats on both sides with a polymer-modified gypsum surface and acrylic face coating.
b) Panels shall be mould-resistant and shall not support microbial growth.
c) Panels shall be a maximum of 1200 mm wide by maximum practical lengths and a minimum thickness of 16 mm.

5.3.3. Fire-Rated Gypsum Board

a) Panels shall be Type X with tapered edges.
b) Panels shall have a minimum thickness of 16 mm.

5.4. ACOUSTICAL CEILING TILE (T-BAR)

Location: Interior, back-of-house

Composition

a) Acoustic ceiling tiles shall conform to ASTM E1264, Standard Classification for Acoustical Ceiling Products.
    i. Acoustic ceiling tile systems shall achieve a minimum Noise Reduction Coefficient (NRC) of 0.70.
    ii. Ceiling Attenuation Class (CAC) shall have a rating between 35 to 40.
    iii. Light Reflectance (LR) shall have a range between 75 to 95.
    iv. Fire resistance shall be Class A.
    v. The acoustic ceiling tile system, including the suspension grids, perimeter trims, and tiles, shall be rigid and shall not sag over the expected life cycle of the product.
    vi. All materials shall have low VOC content and may be composed of recycled content where possible.
b) Ceiling tiles used in wet or damp areas shall be moisture and mould-resistant and shall not support microbial growth.

Finish, Texture, and Colour

c) Ceiling tiles shall be factory-applied paint-finished. On-site painting shall not be acceptable. Panels selected and installed shall not result in a difference of appearance across the ceiling plane.
d) Ceiling tiles shall be white unless noted otherwise. Refer to Metrolinx Design Standards for specific colour and location requirements.
e) Standard grids and trims shall be white or light grey.

Dimensions, Thickness, and Installation

f) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of sizes across various modes, should variances from modal requirements be necessary:
   i. Square tiles: 610 mm x 610 mm; and
   ii. Rectangular tiles: 610 mm x 1220 mm.

g) Tiles shall have a minimum thickness of 12 mm.

5.5. SPECIALTY AND FEATURE CEILINGS

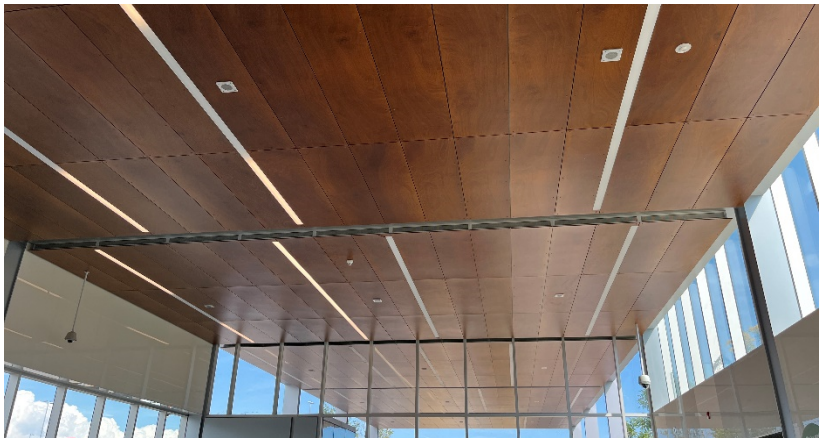

Figure 5.5: Wood Veneer Composite Ceiling Panels

Location: Interior

Composition

a) Materials incorporated with feature ceilings shall:
   i. be consistent and maintain its appearance over time;
   ii. be resistant to moisture absorption and not shrink, expand, or warp due to fluctuations in temperature and humidity;
   iii. be resistant to fading and UV-resistant;
   iv. be non-combustible and meet fire rating requirements as required by the OBC; and
   v. be vandal-resistant with a sacrificial or non-sacrificial type scratch and graffiti-resistant coating that does not affect the appearance of the material or finish underneath, and shall minimize the darkening effect on the protected surface.

b) Soft materials, such as cloth, shall not be used due to their tendency to tear or puncture.

c) Ceiling materials shall be factory-finished with minimal site work required. Where touch-ups are necessary, they shall not affect the intended appearance or performance of the material.

d) Ceiling materials shall be non-corrosive, non-staining, and mounted using mechanical fasteners.
e) Ceiling materials shall conform to all fire and life safety requirements as specified in the OBC and other applicable codes and regulations.
f) Where acoustic properties are required, panels shall achieve a minimum Noise Reduction Coefficient (NRC) rating of 0.70.
g) Acceptable materials for specialty and feature ceilings shall include:
    i. High Gloss Lacquered Panel.
    ii. Prefinished Metal Grille and Baffles.
    iii. Additional proposed materials shall be submitted for review and approval by the Owner of the Standard.

Finish, Texture, and Colour

h) All ceiling finishes shall be non-glare and shall not exceed the Unified Glare Rate (UGRL) as per Metrolinx Design Standards. Refer to the Universal Design Standard.
i) All finishes shall be smooth and free of sharp edges and corners.
j) Acceptable colours shall be selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.
    i. Colours shall be employed to promote intuitive wayfinding and unique identification and differentiation between stations.

Dimensions, Thickness, and Installation

k) Refer to each type of feature ceiling for size requirements.
l) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of acceptable ranges across various modes, should variances from modal requirements be necessary:
    i. Maximum panel size: 1,220 mm x 1,220 mm unless noted otherwise; and
    ii. Minimum panel size: 305 mm x 305 mm.
m) Panel weight shall facilitate ease of removal by one staff member, with a maximum panel weight of 10 kg.
n) Perforation size in acoustic feature elements shall achieve a minimum open area of 20% and be:
    i. Minimum diameter: 3.175 mm (1/8 in); and
    ii. Maximum diameter: 100 mm.
o) Access panels shall be flush and integrate with the surrounding finish and shall:
    i. be hinged with concealed hinges on one side to allow for safe and effective access to equipment, or be removable with concealed fasteners for future service access; and
    ii. be the same colour and finish as the surrounding cladding.
p) Feature ceilings shall be co-located with feature walls. Refer to Metrolinx Design Standards for exact location requirements.
q) Specialty and feature ceilings shall be located outside high-contact zones to minimize vandalism.

5.5.1. High Gloss Lacquered Panel

a) Panels shall be constructed of exterior-grade core, finished with multiple coats of lacquer and polished to achieve a high gloss finish.
    i. The core shall maintain its performance integrity in unconditioned spaces. The use of a high-density particleboard may be considered.
b) Maximum size shall be 1,220 mm x 2,440 mm. Panel sizes allowing a single individual to manoeuvre the panel are recommended.

5.5.2. Prefinished Metal Grille and Baffles

a) Panels shall have a smooth texture and be matte-finished.
b) Sheets shall be a minimum of 0.6 mm thick, with smooth square edges.

c) Profile size shall be a minimum of 25 mm wide x 50 mm high, with a minimum reveal spacing of 19 mm.
d) Grille length shall be a minimum of 915 mm and a maximum of 4,880 mm to reduce the number of joints.
e) Engineering systems above the open grille and baffles, where visible from below, shall be painted black.
f) Where acoustic treatments are required above, they shall also be of a black finish.

6 ROOFING

6 ROOFING

General Requirements

a) Refer to the Metrolinx Design Standards and GO DRM for the performance and design requirements for roof assemblies.
b) Roofing materials shall provide a waterproofing system that may include continuous impervious membranes, overlapping tiles, or interlocking metal sheets. The choice of material shall be dependent on the configuration of the roof.
c) Work and material shall conform to Roofing Specifications published by the Canadian Roofing Contractors Association (CRCA).
d) Work shall be performed by a company that is a member in good standing of the Ontario Industrial Roofing Contractors Association (OIRCA) and has a minimum of five (5) years of proven satisfactory experience.
    i. Work shall follow the OIRCA, Good Practice and Minimum Standards Code No. GP-67-1, latest revision, where higher application standards are not specified.
e) Fasteners shall be heavy-duty and corrosion-resistant in exterior conditions, with lengths as specified by the manufacturer.
    i. Nails, bolts, screws, and rivets shall be concealed and comprised of galvanized steel, stainless steel, or the same metal as the material to be fastened.
f) Refer to Facilities Civil Engineering Standards for low-slope (flat) roofing systems, materiality, and assembly requirements.
g) All other systems not specifically described in this Standard shall be subject to review and approval by the Owner of this Standard.

6.1. FLASHING AND SHEET METAL

Figure 6.1: Metal Cap Flashing

Location: Exterior

Composition

a) Materials and work shall conform to the Canadian Roofing Contractors Association (CRCA) Roofing Manual.
b) Sheet metal shall be factory-finished, commercial quality, and:
    i. Zinc-coated (galvanized) or zinc-iron alloy-coated (galvannealed) steel sheets with Z275 zinc coating; or
    ii. Aluminum-zinc alloy-coated steel sheets.
c) All joints shall be equally spaced a maximum of 2,440 mm and permit thermal movement to account for the expansion and contraction of materials.
d) Surfaces shall be free from buckling, warping, waves, dents, oil canning, or other defects.
e) Corners shall be square, and surfaces shall be straight in true planes.
f) Separation shall be provided between dissimilar metals to avoid galvanic corrosion, designed for the life of the assembly.

Finish, Texture, and Colour

g) Acceptable colours shall be selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.
h) Finished coating thickness shall be a minimum of 22 micrometres and be resistant to accelerated weathering.
i) Panels shall be post-formed and shop-painted. On-site painting shall not be acceptable.
    i. The fluoropolymer-coat finish shall be a factory-applied, two-coat system consisting of a prime coat and a colour coat.
    ii. Panels shall conform to the American Architectural Manufacturers Association AAMA 2604 High Performance or AAMA 2605 Superior Performance.

Dimensions, Thickness, and Installation

j) Base metal shall have a minimum thickness of 0.6 mm.

6.2. CANOPIES

Canopies in this Section refer to exterior canopies, including but not limited to rail platforms, bus platforms, walkways, and entrances.

Location: Exterior

a) Refer to Metrolinx Design Standards for design and location requirements. Canopies may be:
    i. opaque or transparent; and
    ii. freestanding, integrated, or incorporated into the overall building massing.
b) All exposed steel framing, anchors, clips, and angles shall be corrosion-resistant, such as stainless steel or paint-finished galvanized steel.
    i. Stainless steel shall be Grade 316, No. 4 brushed finish.
c) Canopy finishes and materials shall allow for the maintenance and removal of systems concealed behind them. It shall enable commissioning, adjustment, and future retrofitting of systems such as CCTV and public address systems.
d) Where lighting is integrated with canopies, they shall be recessed and flush with the surface of the soffit.
e) Canopies shall be designed with minimal joints between panels, to create a monolithic appearance.
f) Overall canopy dimensions shall be scaled proportionally to ensure passenger protection from the elements.
g) Integrated canopies shall utilize materials and finishes that align with the overall building cladding strategy to maintain a consistent design language. Refer to Metrolinx Design Standards for specific requirements.
h) Freestanding canopies shall use a consistent design language throughout to achieve a unified approach.

7 OPENINGS

7 OPENINGS

General Requirements

a) All public-facing doors and door finishes shall be low-maintenance, non-combustible, dent-resistant, washable, cleanable, non-staining, non-corrosive, vandal-resistant, contain sound attenuation (where required), and allow for ease of repair and/or replacement.
b) Exterior doors and frames shall be:
   i. thermally broken, foam closed, and caulked at the frame base with clear silicone;
   ii. coated with corrosion-resistant coatings such as epoxy-based coatings or rust-inhibiting paints; and
   iii. equipped with hardware to provide a weathertight seal.
c) All doors shall have heavy-duty commercial-grade hardware for heavy use, including but not limited to hinges, automatic door openers, closers, doorstops, holders, locks, pulls, push bars, kick plates, and handles.
   i. Doors and frames shall be reinforced as required to suit the installation of door hardware.
d) Glazing shall be provided for CPTED purposes where required.
   i. Public area doors shall be fully or partially transparent and designed to maximize glazing.
e) Service access hatch doors (such as sump pit) shall be heavy-duty and corrosion-resistant.
f) Keying and access control shall comply with Station Facility Operations requirements. Doors shall have the options of:
   i. being locked and unlocked locally or remotely; and
   ii. being in a permanently open position as determined and controlled by staff.
g) All other door requirements, including clear opening dimensions, contrast, distraction patterns on glass, and opening force, shall comply with the requirements outlined in Metrolinx Design Standards. Refer to the Universal Design Standard.

7.1. SWING DOORS AND FRAMES

a) Doors and frames shall be heavy-duty and shall be made by the same manufacturer unless noted otherwise.
b) All metals shall be isolated from direct contact with dissimilar metals, concrete, and masonry. Isolation coating shall be alkali-resistant.
c) Exterior doors shall have a restriction on opening beyond 90-degrees unless noted otherwise.
d) Doors shall be designed to provide maximum transparency, promoting natural surveillance and CPTED.
e) Where power-assisted doors open into a barrier-free path of travel, and cane-detectable guardrails or other forms of barrier(s) shall be provided perpendicular to the wall.
f) Controls for power-assisted doors and automatic doors shall conform to Metrolinx Design Standards. Refer to the Universal Design Standard.
g) Door material at hardware connection points shall be of acceptable thickness to prevent warping of the material caused by the forces acting upon it.
h) All swing doors shall be equipped with heavy-duty, commercial-grade hardware, including hinges, locks, handles, push bars, door stops, and door closers. Exterior doors shall be equipped with extra heavy-duty commercial-grade hardware.
i) Public-facing washroom doors shall be undercut.
j) Where non-public doors are required to have an air transfer grille, dimensions shall be coordinated with the HVAC Consultant.
k) Fasteners shall be tamper-resistant with countersunk flat heads.
l) Refer to Section 7.7 Hardware for door hardware requirements.
m) Refer to Section 7.8 Glazing for glazing requirements.
n) A distraction pattern shall be required on all glazing that extends to the ground. Pattern shall be prescribed by Metrolinx. Refer to the Wayfinding Design Standard.

o) Exterior doors shall be equipped with a locking mechanism, such as, deadbolt, to provide a means for staff to secure the space.

7.1.1. Aluminum Doors and Frames

Figure 7.1.1: Aluminum Swing Doors

Location: Exterior and Interior

Composition

a) Aluminum doors and frames shall be heavy-duty and corrosion-resistant.
   i. Aluminum extrusions shall be AA 6063-T6 Temper, conforming to ANSI H35.1, American National Standard Alloy and Temper Designation Systems for Aluminum.
b) Structural steel reinforcements shall be provided as required.
c) Joints shall be tightly fit, reinforced, and secured mechanically.

Finish, Texture, and Colour

d) Doors and frames shall be factory-finished and conform to the American Architectural Manufacturers Association AAMA 2604 High Performance or AAMA 2605 Superior Performance. Site modifications shall not be accepted. Acceptable finishes include:
   i. anodized, Class I for exterior, Class II for interior; or
   ii. fluoropolymer minimum two-coat system consisting of a prime coat and a colour coat.
e) Acceptable colours shall include white, anodized, or charcoal. Refer to Metrolinx Design Standards for specific colour and location requirements.
f) Exposed surfaces shall have a smooth texture, be satin-finished, and be free of dye marks, scratches, blisters, or other blemishes.

Dimensions, Thickness, and Installation

g) Minimum material extrusion thickness shall be 3 mm.
h) Door panels shall have:
   i. A minimum door thickness of 45 mm; and
   ii. The following minimum dimensions:
      1. Door stiles: 60 mm wide (±6 mm);
      2. Top rail: 60 mm wide (±6 mm); and
      3. Bottom rail: 100 mm wide (±6 mm).

Accessories

i) Glazing stops shall be interlocking snap-in types for dry glazing.
   i. Exterior glazing stops shall be vandal-resistant and tamper-resistant.
   ii. Colour and finish shall match the door and frame material.
   iii. Glazing stops shall be designed to demonstrate maximum glazing while maintaining sufficient bite on the glazing.
j) Door bumpers shall be single-stud rubber or neoprene type.
   i. Colour shall be grey or black.
   ii. Three (3) shall be provided per door.
k) Fasteners shall be aluminum and concealed. Where exposed, finish shall match door and frame material.
l) Sealants shall be vinyl with closed ends, colour to match the adjacent material.

7.1.2. Hollow Metal Doors and Frames

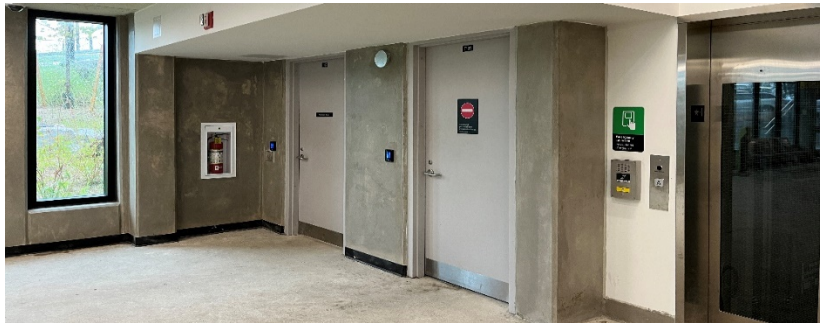

Figure 7.1.2: Hollow Metal Swing Door

Location: Exterior and Interior

Composition

a) Doors and door frames shall conform to the Canadian Steel Door and Frame Manufacturing Association (CSDMA), Hollow Metal Manufacturers Association (HMMA), and ANSI/SDI A250.8 Specifications for Standard Steel Doors and Frames.
b) Hollow metal doors and frames shall be heavy-duty, fully welded, steel-stiffened, and constructed with commercial steel (CS), class B.
c) Materials for fire-rated doors shall conform to ULC and NFPA requirements, be labelled, and be listed.
    i. Cores shall be tested as part of a complete door assembly.
d) Exterior doors shall be thermally separated with a minimum thermal resistance R-value as determined by project performance requirements.

Finish, Texture, and Colour

e) Doors and frames shall be hot-dip galvanized and conform to ASTM A653/AS653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, with Z275 zinc coating and primed, ready for site painting. Primer shall be rust-inhibitive.
f) Acceptable colours shall match adjacent materials unless noted otherwise to achieve colour contrast requirements. Refer to Metrolinx Design Standards.
g) Paint sheen shall be satin or eggshell for doors and frames.

Dimensions, Thickness, and Installation

h) Face sheets shall have a minimum base metal thickness of 1.6 mm unless noted otherwise. Doors and frames shall have a minimum thickness of:
    i. 3.5 mm at hinge hardware locations; and
    ii. 2.8 mm at the door closer and holder hardware locations.
i) Door panels shall have:
    i. A minimum door thickness of 45 mm.
    ii. The following minimum dimensions:
        1. Door stiles: 100 mm wide (±6 mm);
        2. Top rail: 100 mm wide (±6 mm); and
        3. Bottom rail: 300 mm wide (±6 mm).
j) Frames shall be installed plumb, level, rigid, and aligned in accordance with ANSI/BHMA A156.115 Hardware Preparation In Steel Doors And Steel Frames.

Accessories

k) Glazing stops shall be finished to match the door and frame.
l) Door bumpers shall be single-stud rubber or neoprene type.
    i. Colour shall be grey or black.
    ii. Three (3) shall be provided per door.
m) Fasteners shall be stainless steel and concealed. Where exposed, colour shall match adjacent material.
n) Sealants shall be vinyl with closed ends, colour to match adjacent material.

o) Stainless steel push plates and kick plates shall be provided at all hollow metal swing doors. Kick plates shall have a minimum height of 254 mm.

7.1.3. Stainless Steel Doors and Frames

Figure 7.1.3: Stainless Steel Swing Doors

Location: Exterior and Interior

Composition

a) Doors and door frames shall conform to the Canadian Steel Door and Frame Manufacturing Association (CSDMA) and ANSI/SDI A250.8 Specifications for Standard Steel Doors and Frames.
b) Doors and frames shall be heavy-duty, fully welded, steel-stiffened, and constructed with commercial-grade stainless steel, tensioned and levelled.
c) Stainless steel shall be Grade 304 for interior doors and Grade 316 for exterior doors.
d) Exterior doors shall be thermally separated with a minimum thermal resistance R-value as determined by project performance requirements.
e) Doors and frames in fire-rated separations shall conform to ULC and NFPA requirements, be labelled using aluminum plates, and be riveted to the door and frame. Fire labels shall not be painted.
    i. Cores shall be tested as part of a complete door assembly.

Finish, Texture, and Colour

f) Acceptable finishes shall be No. 4 brushed or No. 9 bead-blasted to prevent stains and smudges.

Dimensions, Thickness, and Installation

g) Face sheets shall have a minimum base metal thickness of 1.6 mm unless noted otherwise. Doors and frames shall have a minimum thickness of:
    i. 3.5 mm at hinge hardware locations; and
    ii. 2.8 mm at the door closer and holder hardware locations.
h) Door panels shall have:
    i. a minimum door thickness of 45 mm; and
    ii. the following minimum dimensions:
        1. Door stiles: 100 mm wide (±6 mm);
        2. Top rail: 100 mm wide (±6 mm); and
        3. Bottom rail: 300 mm wide (±6 mm).
i) Frames shall be installed plumb, level, rigid, and aligned in accordance with ANSI/BHMA A156.115 Hardware Preparation In Steel Doors And Steel Frames.

Accessories

j) Glazing stops shall be finished to match the door and frame.
k) Door bumpers shall be single-stud rubber or neoprene type.
    i. Colour shall be grey or black.
    ii. Three (3) shall be provided per door.
l) Fasteners shall be stainless steel and concealed. Where exposed, colour shall match adjacent material.
m) Sealants shall be vinyl with closed ends, colour to match adjacent material.

7.1.4. Wood Doors and Frames

Location: Interior, back-of-house

Composition

a) Wood doors and frames shall conform to the Architectural Woodwork Manufacturers Association of Canada (AWMAC) and the Architectural Woodwork Institute (AWI).
b) Wood doors shall be hollow core, solid core, or solid wood.
    i. Face panels, where applicable, shall be a wood veneer minimum 0.7mm thick, veneer grade, and conform to AWMAC/AWI, Grade AA.
c) Wood doors and frames shall use matching wood species and have matching finishes.

Finish, Texture, and Colour

d) Acceptable finishes shall include stain or paint-finished and shall be factory-applied. Site modifications shall not be accepted.
e) Acceptable colours shall include:
    i. paint finish to match adjacent wall colours; or
    ii. stain finish to showcase the natural wood patterning.

Dimensions, Thickness, and Installation

f) Door panels shall have:
    i. a minimum door thickness of 45 mm; and
    ii. the following minimum dimensions:
        1. Door stiles: 100 mm wide (±6 mm);
        2. Top rail: 100 mm wide (±6 mm); and
        3. Bottom rail: 300 mm wide (±6 mm).

Accessories

g) Glazing stops shall be square and finished to match the door and frame.
h) Through-bolting of hardware or accessories shall not be permitted. Specific location for hardware shall be coordinated between the frame and door manufacturers if different.

7.2. SLIDING ALUMINUM DOORS AND FRAMES

Figure 7.2: Aluminum Sliding Doors

Location: Exterior and Interior

Composition

a) Aluminum sliding doors shall be heavy-duty and corrosion-resistant.
   i. Aluminum extrusions shall be AA 6063-T6 Temper, conforming to ANSI H35.1, American National Standard Alloy and Temper Designation Systems for Aluminum.
b) Material and work shall conform to CAN/CGSB-69.26, Power Operated Pedestrian Doors.
c) The system shall be:
   i. automatic, operated with a motion detector control device;
   ii. programmed to open the doors when motion is detected on either side of the door;
   iii. programmed to close the doors within an adjustable duration of time if no motion is detected on both sides of the door;
   iv. single or double sliding doors with fixed sidelites;
   v. equipped with emergency release hardware allowing active leafs and sidelites to swing out a minimum of 90-degrees in the direction of egress. Breakaway pressure shall be field adjustable to meet building code requirements; and
   vi. designed to accommodate traffic loading of a minimum of 100,000 cycles.
d) Structural steel reinforcements shall be provided as required.
e) Automatic operators shall be:
   i. concealed, overhead, and fully adjustable without the removal of the doors;
   ii. capable of key switch control, mounted at a concealed location to prevent tampering;
   iii. equipped with operators with back pressure sensing for emergency stop and permit manual operation; and
   iv. provided with manual operation when the power is off.
f) Exterior doors and frames shall be insulated and thermally broken with separation of interior and exterior components and no bridging by fasteners. The use of fibreglass pressure plates to achieve performance ratings shall not be accepted.
g) All sliding doors shall be tested and approved for the GGHA climate based on conservative climate projections for the lifespan of the asset.
h) Flame spread and fire rating shall achieve project-specific design requirements.

Finish, Texture, and Colour

i) Doors and frames shall be factory-finished and conform to the American Architectural Manufacturers Association AAMA 2604 High Performance or AAMA 2605 Superior Performance. Site modifications shall not be accepted. Acceptable finishes include:
   i. anodized, Class I for exterior, Class II for interior; or

ii. fluoropolymer minimum two-coat system consisting of a prime coat and a colour coat.

j) Acceptable colours shall include white, anodized, or charcoal. Refer to Metrolinx Design Standards for specific colour and location requirements.

k) Exposed surfaces shall have a smooth texture, be satin-finished, and be free of dye marks, scratches, blisters, or other blemishes.

Dimensions, Thickness, and Installation

l) Minimum material extrusion thickness shall be 3 mm.

m) Door panels shall have:
   i. a minimum door thickness of 45 mm; and
   ii. the following minimum dimensions:
      1. Door stiles: 60 mm wide (±6 mm);
      2. Top rail: 60 mm wide (±6 mm);
      3. Intermediate rail: width to accommodate integrated panic hardware; and
      4. Bottom rail: 100 mm wide (±6 mm).

Accessories

n) Glazing stops shall be security type, tamper-resistant, and shall be finished to match the door and frame.

o) Door bumpers shall be single-stud rubber or neoprene type.
   i. Colour shall be grey or black.
   ii. Three (3) shall be provided per door.

p) Fasteners shall be aluminum and concealed. Where exposed, finish shall match door and frame material.

q) Sealants shall be vinyl with closed ends, colour to match the adjacent material.

r) A distraction pattern shall be required on all glazing that extends to the ground and shall conform to Metrolinx Standards, and other codes and references. Pattern shall be prescribed by Metrolinx. Refer to the Universal Design Standard and Wayfinding Design Standard.

s) Exterior sliding doors shall be equipped with a locking mechanism, such as a deadbolt, to provide a means for staff to secure the space.

7.3. COILING AND FOLDING DOORS

Location: Exterior and Interior

Composition

a) Pre-coated sheet steel shall be commercial grade, structural quality, corrosion-resistant, hot-dip galvanized, and conform to ASTM A653/AS653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, with Z275 zinc coating and factory finished.
b) Aluminum shall be AA 6063-T6 Temper, conforming to ANSI H35.1, American National Standard Alloy and Temper Designation Systems for Aluminum.
c) All coiling and folding doors shall be equipped with a locking mechanism to provide a means for staff to secure the space.
d) When in the open position, provide either an overhead housing unit or wall pocket to conceal the entirety of the coiling or folding door from view.

Finish, Texture, and Colour

e) The finish of all parts shall be the same finish as indicated for the curtain section.
f) Aluminum, when used, shall be in a mill finish or anodized.
g) Acceptable colours shall include white, light grey, medium grey, anodized, or charcoal. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

h) Overall dimensions shall suit opening requirements to be determined by the Designer of Record.
i) Sheet steel shall have a minimum base metal thickness of 0.759mm unless noted otherwise.

Accessories

j) Cylinders shall be standard 25 mm mortise cylinders. All cylinders per grille shall be keyed alike.

7.3.1. Overhead Coiling Doors

Overhead coiling doors roll up into an overhead drum above the door opening. As the door opens, it forms a coil and is typically stored within a housing unit.

Requirements

Location: Exterior and Interior

a) The system shall consist of prefinished metal sections and frames. Insulation, where required, shall be semi-rigid mineral fibre processed from rock, slag, or glass.
b) Brackets shall be fabricated from galvanized steel with a minimum thickness of 6 mm and bolted with fasteners of a minimum diameter of 13 mm.
c) The barrel shall be made of steel tubing with a diameter of not less than 102 mm.
d) The hood housing shall be constructed of a minimum 22-gauge thick galvanized paint-finished steel with a waterproof baffle to control air infiltration.
e) Rolling fire doors shall have UL/ULC rating labels as determined by fire ratings.

7.3.2. Counter Coiling Door

Location: Interior

a) The curtain shall consist of interlocking, 32 mm wide flat slats of 22-gauge primed and painted galvanized steel fitted with end locks to hold the curtain in alignment.
b) The bottom of the curtain shall have a bottom bar of a single primed angle, provided with a lift handle and slide bolt lock at each end of the bottom bar on the coil side. The bottom bar shall have a continuous vinyl bumper to seal against the countertop.
c) The frame shall be primed and painted, galvanized steel to suit adjacent wall thickness, consisting of 16-gauge jambs, head,

fascia, and 14-gauge sill. Provide grooves formed into the sides of the frame for retaining the curtain.

d) The hood housing shall be paint-finished galvanized steel. Additional support shall be provided for openings wider than 4,000 mm.

e) Operation shall be a manual push-up with automatic closure where required.

7.3.3. Side Folding Doors and Grilles

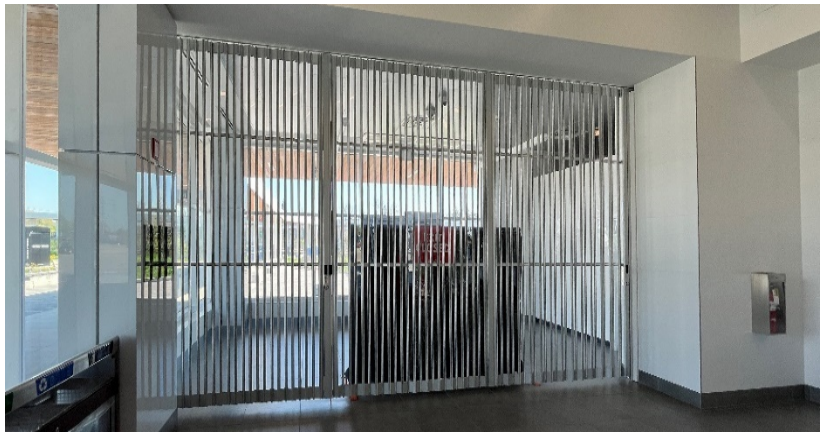

Figure 7.3.3: Side Folding Grille

Location: Interior

a) The slats shall be a minimum width of 148 mm suspended from roller assemblies, spanning full height from the ceiling-mounted track to the sill or floor level. Each section shall be fabricated using solid or perforated panels as required by the programming.

b) The overhead track shall be fabricated from extruded aluminum, accept nylon trolley wheels, and carry the weight of the complete curtain.

c) Tracks shall have a minimum curvature of 355 mm radius where required.

d) The lead locking post shall be equipped with a deadlock, operable from both sides, engaging a full-height wall jamb.

e) Intermediate locking posts shall:
   i. be equipped with concealed locking devices operable from both sides;
   ii. utilize a steel pin engaging into a spring-loaded, dust-resistant floor socket, which automatically retracts with a key; and
   iii. be located at all curves or at intervals not exceeding 3,000 mm.

f) The floating end post shall be self-locking at the top and bottom.

7.4. CURTAIN WALL AND GLAZED ASSEMBLIES

Figure 7.4: Aluminum Curtain Wall Assembly

Location: Exterior and Interior

Composition

a) The curtain wall system shall conform to AAMA CW-DG-1, Aluminum Curtain Wall Design Guide Manual, and be a compartmentalized, pressure-equalized, and drained rainscreen system with primary and secondary seals.

b) The curtain wall system, including but not limited to the glass, framing, clips, supports, and sealants, shall be designed by the Designer/Engineer of Record in accordance with relevant codes and standards, and shall meet the following performance criteria:
   i. Glazing and framing deflection shall be limited to prevent perceptible distortion, system damage, or failure of adjacent finishes. The deflection criteria shall be determined by the Engineer of Record;
   ii. The system shall limit air infiltration under specified pressure differentials to maintain interior comfort and energy performance requirements;
   iii. The system shall prevent water penetration that could damage interior finishes or assemblies;
   iv. Thermal performance shall comply with applicable requirements for the project's climate zone, as defined by the Ontario Building Code (OBC) and the National Energy Code of Canada for Buildings (NECB); and
   v. Structural design and loading criteria shall be determined by the Engineer of Record.

c) Thermally broken framing shall have complete separation of interior and exterior components.
   i. Bridging by fasteners shall not be permitted.
   ii. The use of fibreglass pressure plates to achieve performance ratings will not be accepted.

d) Acceptable curtain wall system types shall include stick-built or unitized, and the following requirements shall apply:
   i. The curtain wall system shall be designed as one of the following:
      1. A fully captured system, where all four edges of infill units are mechanically secured with pressure plates and caps;
      2. A two-sided Structural Silicone Glazing (2SSG) system, where the vertical edges of each infill unit are mechanically secured using pressure plates and caps, and the horizontal edges are structurally glazed to the framing using silicone sealant; or
      3. A four-sided Structural Silicone Glazing (4SSG) system, where all four edges of infill units are adhered to the framing using structural silicone sealant.
   ii. The selected glazing system shall be applied consistently across each elevation;
   iii. Capped perimeter framing shall be provided, including vertical mullions and horizontal rails, around the entire curtain wall system, regardless of the selected glazing method, to ensure proper integration with adjacent materials and finishes; and
   iv. Transition membranes shall be tied in, sealed, and secured to glazing units for envelope continuity.

e) Refer to Metrolinx Design Standards for the specified spandrel panel material. Acceptable materials shall include heat-strengthened back-painted glass and prefinished aluminum panels.
f) Spandrel back pans shall:
    i. incorporate an interior finish to match the adjacent curtain wall frame in colour and finish where exposed to view from occupied interior spaces. This may include the use of an interior aluminum closure or liner panel; and
    ii. be filled using insulation to meet thermal separation requirements. Insulation shall be semi-rigid mineral wool insulation and conform to CAN/ULC S702, Standard for Mineral Fibre Thermal Insulation for Buildings, Type 1 and non-combustible.

Finish, Texture, and Colour

g) Aluminum curtain wall systems shall be factory-finished and conform to American Architectural Manufacturers Association AAMA 2605 Superior Performance, unless noted otherwise. Site modifications shall not be accepted.
    i. Interior conditions, at a minimum, shall conform to AAMA 2604 High Performance.
h) Acceptable finishes shall include:
    i. anodized, Class 1 for exterior, Class 2 for interior; or
    ii. fluoropolymer minimum two-coat system consisting of a prime coat and a colour coat.
i) Acceptable colours shall include white, anodized, and charcoal grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.
j) Exposed surfaces of aluminum shall be free of die marks, scratches, blisters, or other blemishes.
k) Prefinished aluminum panels shall be factory-finished with a smooth texture and a matte finish.
    i. On-site painting shall not be acceptable.
    ii. Cutting of panels on site shall not be acceptable.

Dimensions, Thickness, and Installation

l) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of the ranges acceptable across modes, should variances from modal requirements be required:
    i. vertical mullions shall have a maximum spacing of 1,500 mm O.C.; and
    ii. horizontal mullions shall have a maximum spacing of 2,440 mm O.C.
m) Glazing systems shall extend the full height of enclosures with minimal horizontal joints.
    i. Horizontal mullions shall align to maintain consistent architectural datums, including but not limited to sills, T/O doors and portals, and U/S of soffits. Refer to Metrolinx Design Standards for key dimensions.
n) Minimum material extrusion thickness shall be 3 mm.

Accessories

o) Double and triple-glazed units, where selected, shall meet thermal separation requirements as per OBC SB-10.
p) Refer to Metrolinx Design Standards for specific glazing type, thickness and location requirements. Refer to Section 7.8 Glazing for minimum glazing thickness requirements.
q) Glazing gaskets shall be extruded, closed-cell or dense elastomer. Colour shall be black.
t) Fasteners shall be heavy-duty, corrosion-resistant, and concealed. Where exposed, they shall be tamper-resistant, and the finish shall match the frame material.
r) Door adapters and other components shall be provided by the same curtain wall manufacturer as required by the design.

s) A distraction pattern shall be required on all glazing that extends down to the ground without a curb or object in front, such as a guard or railing. The pattern shall be as prescribed by Metrolinx. Refer to the Wayfinding Design Standard.

7.4.1. Capped Framing Members

a) Caps shall match the mullion and rail colour and finish unless noted otherwise.
b) Caps shall be manufactured to the maximum length to minimize the number of joints required.
c) Joints shall be aligned strategically at intersections of perpendicular mullions and rails.
d) Caps shall be rectilinear and low-profile unless noted otherwise. Special profiles may be considered but shall be reviewed and approved by the Owner of this Standard.
e) Special shapes, including corner mullions, shall be provided to suit design requirements. Refer to Metrolinx Design Standards for additional requirements.

7.4.2. Structural Silicone Glazing

a) The Designer of Record shall design structural silicone glazing (SSG) using structural silicone for bonding and sealing. Joints shall be sized for the specified design load.
b) The structural silicone sealant shall be proven compatible with other sealants and materials with which it comes into contact.

7.4.3. Storefronts and Glazed Screens

a) Storefront and screen frames shall be extruded aluminum with centre-aligned glazing.
b) Profiles shall have consistent dimensions across the entirety of the screen.
    i. The minimum profile dimensions shall be 51 mm x 114 mm.
c) Glazing stops for storefronts and glazed screens shall match the framing colour and finish, and shall be security-type and tamper-resistant.
d) Glazing adapters shall be provided to suit the glass thickness as required.
e) Perimeter framing shall be provided around the entire screen to ensure proper integration with adjacent materials and finishes.

7.4.4. Sloped Glazed Systems

Design and performance should align with Fenestration and Glazing Industry Alliance (FGIA) guidelines for glazing, water penetration, and durability.

a) Sloped glazed systems shall be engineered by the Designer or Engineer of Record. Where accessible by staff and/or the public, they shall act as guards as required by the OBC and shall be clearly denoted on contract documents and shop drawings.
b) Where sloped glazed systems are implemented, the design shall incorporate access solutions that enable maintenance activities to be carried out without the use of temporary staging, scaffolding, or lift equipment, and without adversely affecting customer circulation, safety, or station operations.
c) Sloped glazed systems located within areas accessible to the public shall be protected and separated using physical barriers, such as landscaping, and shall not impede access for maintenance purposes.
    i. Where the system remains accessible to customers and staff, it shall be designed to support all structural loads, including but not limited to pedestrians, cyclists, vehicular, and snow loads where required.
d) Sloped glazed systems located within vehicular areas shall be protected and separated using physical barriers, such as bollards, and shall not impede access for maintenance purposes.

7.5. WINDOWS

Location: Exterior and Interior

Composition

a) Window systems shall conform to AAMA/WDMA/CSA 101/I.S.2/A440, North American Fenestration Standard/Specification for windows, doors, and skylights.

b) System design shall be determined by the Designer of Record.
   i. Maximum deflection shall be L/175 for glazing and L/240 for framing.
   ii. Air leakage shall be minimized under specified pressure differences.
   iii. The system shall resist water penetration, causing damage to interior finishes.
   iv. Thermal performance shall meet the building requirements specified in the climate zone as per the Ontario Building Code (OBC) and the National Energy Code of Canada for Buildings (NECB).
   v. Structural performance shall be determined by the Engineer of Record.

c) Frames, sashes, and all components shall be corrosion-resistant, UV-resistant, and impact-resistant, and shall be of the same finish and colour for consistency.

d) Windows shall be strategically located to maximize efficiency, operability, and maintainability while allowing natural light to enter the interior space.
   i. Profiles shall be designed to support a minimal profile to increase the amount of natural light through the window.
   ii. Access to windows for cleaning shall not be obstructed except where necessary, such as for a structural member.
   iii. Windows above ground level shall be located 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, repairs, or replacement shall not require entering traffic or within rail corridors.
   iv. Space for window washing shall be provided between columns, guardrails, and glazing.

e) Exterior window systems shall be thermally broken. Window systems, including double or triple-glazed units where selected, shall meet thermal separation requirements as per OBC SB-10.

f) Where windows are operable, they shall have limiters and be lockable from the interior.

g) Operable windows shall be equipped with an insect screen mesh netting with a removable extruded frame. The finish shall match the overall window system. The screen shall be secured and can only be removed by authorized staff.

Finish, Texture, and Colour

h) Aluminum window systems shall be factory-finished and conform to the American Architectural Manufacturers Association AAMA 2604 High Performance or AAMA 2605 Superior Performance. Site modifications shall not be accepted. Acceptable finishes include:
   i. anodized, Class 1 for exterior, Class 2 for interior; or
   ii. fluoropolymer minimum two-coat system consisting of a prime coat and a colour coat.

i) Acceptable colours shall include white, anodized, and charcoal grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

j) Exposed surfaces of the window frame shall be free of die marks, scratches, blisters, or other blemishes.

Dimensions, Thickness, and Installation

k) Refer to Metrolinx Design Standards for specific dimensions and location requirements.

l) Window sills shall have a minimum height of 600 mm above the finished floor.

Accessories

m) Refer to Metrolinx Design Standards for specific glazing type, thickness and location requirements. Glazing shall be engineered to suit project and site conditions. Refer to Section 7.8 Glazing for minimum glazing thickness requirements.
n) Glazing stops shall be security type, tamper-resistant, and shall be finished to match the window frame.
o) Glazing gaskets shall be extruded, closed-cell or dense elastomer. Colour shall be black.
p) Fasteners shall be heavy-duty, corrosion-resistant, and concealed. Where exposed, they shall be tamper-resistant, and the finish shall match the frame material.
q) All hardware shall be corrosion-resistant and tamper-resistant.
r) Weather stripping and seals shall be provided at all operable sashes.

7.6. SKYLIGHTS

This Section is specific to factory-assembled unit skylights.

Location: Exterior

Composition

a) Skylights shall be factory-assembled and conform to AAMA/WDMA/CSA 101/I.S.2/A440, the North American Fenestration Standard/Specification for windows, doors, and skylights.
b) System design shall be determined by the Designer of Record, including all loading requirements.
c) Skylights shall be thermally broken and provide thermal separation between exterior and interior spaces.
d) Skylights shall have proven water and air-tightness performance characteristics in both heated and unheated spaces. They shall be designed and installed with adequate flashing to ensure proper water shedding and reduce the risk of leakage.
e) Skylights shall incorporate access solutions that enable maintenance activities to be carried out without the use of temporary staging, scaffolding, or lift equipment, and without adversely affecting customer circulation, safety, or station operations.
f) Skylights located within areas accessible to the public shall be protected and separated using physical barriers, such as landscaping, and shall not impede access for maintenance purposes.
g) Skylights located within vehicular areas shall be protected and separated using physical barriers, such as bollards, and shall not impede access for maintenance purposes.
h) Refer to Section 7.4 Curtain Wall and Glazed Assemblies for sloped glazed systems.

Finish, Texture, and Colour

i) Aluminum components shall be factory-finished and conform to the American Architectural Manufacturers Association AAMA 2604 High Performance or AAMA 2605 Superior Performance. Site modifications shall not be accepted. Acceptable finishes include:
   i. anodized, Class 1 for exterior, Class 2 for interior; or
   ii. fluoropolymer minimum two-coat system consisting of a prime coat and a colour coat.

j) Acceptable colours shall include white, anodized, and charcoal grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

k) Refer to Metrolinx Design Standards for specific dimensions and location requirements.

Accessories

l) Refer to Metrolinx Design Standards for specific glazing type, thickness and location requirements. Glazing shall be engineered to suit project and site conditions. Refer to Section 7.8 Glazing for minimum glazing thickness requirements.
   i. All glazing shall meet thermal separation requirements as per OBC SB-10.
   ii. Overhead glazing shall be safety laminated glass.

m) Glazing stops shall be security type, tamper-resistant, and shall be finished to match the window frame.

n) Glazing gaskets shall be extruded, closed-cell or dense elastomer. Colour shall be black.

o) Fasteners shall be heavy-duty, corrosion-resistant, and concealed. Where exposed, they shall be tamper-resistant, and the finish shall match the frame material.

p) All hardware shall be corrosion-resistant and tamper-resistant.

7.7. HARDWARE

Figure 7.7: Door Hardware

Location: Exterior and Interior

a) All hardware shall be heavy-duty, tamper-resistant, corrosion-resistant, and suitable for high usage in a transit environment.

b) All metal finishes shall be free from defects, clean, unstained, and of a uniform colour for each type of finish required.

c) Hardware shall be easily operable with one hand, requiring limited strength and dexterity.

d) All hardware shall be of a non-handed design for simple installation and stocking.

e) Door hardware shall generally be rectilinear with eased edges and corners to avoid sharp surfaces.

f) All stainless-steel hardware shall conform to ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
   i. All interior stainless-steel hardware shall be Grade 304 unless noted otherwise.

ii. All exterior stainless-steel hardware shall be Grade 316 unless noted otherwise.

g) All fasteners shall be concealed. If proven circumstances do not allow it, fasteners shall be tamper-resistant, using uncommon drive types to discourage vandalism. Slotted heads shall not be permitted.

h) All fasteners shall have a minimum thread depth of two times the thread diameter embedded into the receiving material. Provision for thread-locking fluid shall be used for fasteners in areas of extra-high usage.

i) All exterior doors shall be fitted with complete perimeter weatherstripping, bottom sweeps, and thresholds.

j) Fire-rated assemblies shall:
   i. use hardware selected and installed in accordance with applicable codes and regulations, including NFPA-80, and approved by the Ontario Fire Marshal;
   ii. use ULC-labelled hardware for fire-rated doors with written certification of conformance to ULC requirements submitted for each type of hardware; and
   iii. use locksets and latchsets on fire-rated doors with a minimum throw of 19 mm.

k) Exterior doors shall have restrictions on opening beyond 90-degrees unless noted otherwise.

l) Where required, door guards shall be installed and shall be of metal construction.

m) All exterior swing doors shall be equipped with extra heavy-duty commercial-grade frame hinges, locks, handles, push bars and door closers.

n) All interior swing doors shall be equipped with heavy-duty commercial-grade frames, hinges, locks, handles, push bars and door closers.

o) Threshold designs shall prevent the accumulation of debris and be easy to maintain.

p) Hardware installers shall be qualified and certified by the manufacturer.

7.7.1. Hinges

a) Hinges shall be ANSI Grade 1.

b) Hinges shall be one continuous hinge or multiple butt hinges.
   i. Continuous hinges shall conform to ANSI/BHMA A156.26 Continuous Hinges.
   ii. Butt hinges shall conform to ANSI/BHMA A156.1, Butts and Hinges.

c) Hinges shall be corrosion-resistant. Acceptable materials include:
   i. aluminum 6063-T6, anodized finish; or
   ii. stainless steel, No.5 satin finish, Grade 304 for interior conditions, and Grade 316 for exterior conditions.

d) A minimum of three butt hinges shall be provided on doors up to 2,200 mm in height and an additional hinge for each additional 760 mm or fraction thereof.
   i. Doors above 950 mm in width shall use a 5 in x 5 in hinge.
   ii. Butt hinges shall have a non-removable pin (NRP) where the hinge barrel is exposed on the secured side of the door.
   iii. Butt hinges shall be a minimum of 127 mm in length with a minimum of 4 screw holes per leaf.

e) Doors weighing more than 150 lb shall use a continuous hinge.
   i. Continuous geared hinges shall evenly distribute the door's weight along the full length of the frame.

f) Fasteners shall be flat-head, flush, and tamper-resistant.

7.7.2. Exit Devices

a) Exit devices shall conform to ANSI/BHMA A156.3, Exit Devices, Grade 1.

b) Horizontal 'panic' push bars shall function as an exit in accordance with OBC requirements.
   i. Exit devices installed on exterior doors shall have deadlocking latch bolts to ensure tamper-resistant security.
   ii. Cross-bar exit devices shall not be accepted.

c) Strikes shall be securely fastened to the frame using tamper-resistant fasteners.

d) Vertical rods, where required, shall be concealed.
e) Cylindrical dogging shall be preferred over hex key dogging. Dogging shall be provided where operationally required.
f) Exit devices shall be ULC-certified for use on all fire-rated doors.

7.7.3. Closers, Holders, and Stops

a) All doors within the public path of travel shall have extra heavy-duty commercial-grade overhead door stops. All other doors shall be equipped with heavy-duty commercial-grade door stops.
b) Closers shall conform to ANSI/BMHA A156.4, American National Standard for Door Control-Closers, Grade 1.
c) Overhead closers, holds, and stops shall be concealed.
d) Cylinders shall be cast iron with a heat-treated piston.
e) Arms shall be solid, single-piece, heat-treated, corrosion-resistant, and forged to withstand bending and breaking. Parallel or concealed arms shall be preferred to limit the exposure of the arm.
f) Acceptable materials include:
    i. stainless steel, No.5 satin finish, Grade 304 for interior, and Grade 316 for exterior; and
    ii. aluminum hardware, where used, shall be powder-coated in standard colours to match the adjacent door and frame.
g) The hydraulic system shall utilize an all-weather fluid for consistent performance throughout every season, regardless of temperature fluctuations.
h) Provide a matching metal cover where surface mounting is required to conceal all operable mechanisms.
i) All closers, holders, and stops shall be ULC-certified for use on all fire-rated doors.
j) Wall door stops shall consist of a brushed stainless steel cover with a protruding concave rubber bumper and concealed fasteners.
k) Floor door stops shall consist of a cast brass body with a brushed chrome finish and a rubber bumper.

7.7.4. Push and Pull Bars

a) Bars shall conform to ANSI/BHMA A156.6, Architectural Door Trim, Grade 1.
b) Bars shall be heavy-duty, continuous, made of solid bar stock or casting, and may be straight or offset depending on locking and access requirements.
c) Bars shall be corrosion-resistant. Acceptable materials include:
    i. aluminum 6063-T6, anodized finish; or
    ii. stainless steel, No.5 satin finish, Grade 304 for interior, or Grade 316 for exterior.
d) The diameter shall be a minimum of 19 mm.
e) Mounting hardware shall be heavy-duty and concealed.
f) The fixing screw or bolt shall have a minimum thread depth of two times the thread diameter embedded into the bar.

7.7.5. Latches

a) All access-controlled exterior doors shall be equipped with a latch guard to prevent tampering with the latch.
b) Latch guards shall be made of 12-gauge steel or 13-gauge stainless steel, with no exposed fasteners on the secured side of the door.
c) Latch size for rated doors shall be a minimum:
    i. 13 mm for single doors; and
    ii. 19 mm for double doors.

7.7.6. Protective plates

a) Push plates and kick plates shall be stainless steel.
b) Plates shall be mechanically fastened to the door.
c) All swing doors shall be equipped with a 254 mm (10 in) tall kickplate to improve durability.

7.7.7. Mullions

a) Mullions may be fixed or removable to suit design requirements.
b) Mullions shall be finished to match the fenestration frame.
c) Removable mullions shall be equipped with a cylinder to prevent unauthorized removal.

7.7.8. Automatic Door Operator

Figure 7.7.8: Automatic Door Operator

a) Automatic Door Operators (ADO) shall be heavy-duty, CSA-approved, and conform to ANSI/BHMA A156.19, Power Assist and Low Energy Power Operated Doors.
b) All components of the operator and actuator shall be corrosion-resistant, vandal-resistant, and weather-resistant.
c) The header shall be self-contained, complete with full housing, and the finish shall match the door frame finish.
d) The non-handed cylinder body shall have a minimum 38 mm piston diameter, a 17.5 mm double-treated shaft, and a solid forged steel main arm.
e) The system shall be a dual-access type that permits the door to be opened by either the activating device or manually.
f) Each operator shall accommodate doors weighing up to 700 lbs per operator.
g) Actuators and controls shall consist of an extended vertical wall plate switch power door operator, 914 mm in height and 152 mm in width, providing an activation area along the entire span of the vertical bar.
h) Actuators shall be anchored to the receiving surface with fasteners to resist lateral impact.
i) Automatic Door Operators shall be ULC-certified for use on all fire-rated doors.
j) Automatic door operators shall be designed and selected with consideration for prevailing wind forces to address the stack pressure compensation for air pressure management.
k) Locations of ADOs shall conform to the requirements of the Ontario Building Code (OBC) and Metrolinx Design Standards.
l) Auto door operators shall have on, off, and hold open capabilities controlled using a keyed switch.
m) Opening and closing speeds shall be a minimum of 4 seconds.
n) During a power failure, the doors shall return to the closed position and retain the ability to act as a normal door closer until the electrical power supply is restored.

7.8. GLAZING

Figure 7.8: Exterior Glazing with Bird-Friendly Frit and Distraction Pattern

Location: Exterior and Interior

Composition

a) Float glass shall conform to CAN/CGSB-12.3, Flat, Clear Float Glass.
b) Tempered glass shall conform to CAN/CGSB-12.1, Tempered or Laminated Safety Glass, and shall have a factory-applied permanent impression visible in one corner identifying each pane as tempered.
c) Where required for CPTED, vision glazing shall be low-iron for high visibility with minimal green or blue tint.
d) Glazing shall have smooth ground edges with no chips, cracks, or imperfections.
e) Exterior glazing separating a conditioned or semi-conditioned interior space from an exterior space, where solar and thermal performance is required, shall have solar heat gain mitigation strategies, such as having a low-emissivity (Low-E) coating.
    i. The surface of the Low-E coating application shall be determined on a project-by-project basis, based on project-specific performance requirements and the building's orientation on the site.
    ii. Insulated Glass Units (IGUs) shall have a soft (sputtered) Low-E coat on either surface 2 or 3 for improved solar and thermal performance.
    iii. Single-paned glazing where solar heat gain mitigation is required, such as elevator shaft enclosures, shall have a hard (pyrolytic) coat for better durability.

Dimensions, Thickness, and Installation

f) Refer to Metrolinx Design Standards for specific dimensions and location requirements. The following is an aggregate of acceptable ranges across various modes, should variances from modal requirements be necessary:
    i. Maximum width shall be 1,220 mm; and
    ii. Maximum height shall be 2,440 mm.
g) Unit sizes shall be large enough to reduce the number of joints yet small enough to facilitate replacement if damaged.
h) Glazing thickness shall suit lateral loads, wind loads, and air pressure changes where generated by high-speed trains, vehicles, and vibrations and shall be:
    i. minimum thickness of 6mm for each pane in IGUs and laminated assemblies; and
    ii. minimum thickness of 10 mm for single-paned glazing unless noted otherwise.

Accessories

i) A distraction pattern shall be required on all glazing that extends down to the ground without a curb or object in front, such as a guard or railing. The pattern shall be as prescribed by Metrolinx. Refer to the Universal Design Standard and Wayfinding Design Standard.

7.8.1. Laminated (Safety) Glass

a) Laminated glass shall conform to CAN/CGSB-12.1, Tempered or Laminated Safety Glass.
b) Laminated glass shall be constructed as required for the intended installation, and as a minimum, be two layers of heat-strengthened glass, with a 1.5 mm clear polyvinyl butyral (PVB) interlayer. Each layer of glass shall be a minimum of 6 mm thick.
c) Laminated glass for balustrades shall consist of two layers of minimum 8 mm thick heat-strengthened glass with a 1.5 mm PVB interlayer. The flexural strength of glass shall conform to OBC SB-13 requirements.
d) Safety glass shall be permanently marked with the manufacturer's certification label. The label shall indicate the manufacturer's name, type of glass, thickness, and the safety glazing standard with which the glass complies.

7.8.2. Fire-Rated Glass

a) Fire-rated glass shall conform to NFPA 80 and specified fire performance ratings, and shall be tested and marked with a permanent, non-removable label indicating the fire performance information.
b) Fire-rated glass shall pass the hose stream test when tested in accordance with CAN/ULC S101, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
c) Fire-rated glass shall pass the fire rating requirements and be capable of maintaining a temperature rise on the non-fire side to the maximum target listed under glass products when tested in accordance with CAN/ULC S104, Standard Method for Fire Tests of Door Assemblies and CAN/ULC S106, Standard Method for Fire Tests of Window and Glass Block Assemblies.
d) Wired glass shall not be permitted.

7.8.3. Spandrel Glass

a) Spandrel glass shall be back-painted low-iron tempered glass.
b) Back-painted glass shall be non-glare and have low reflectivity with a Unified Glare Rating (UGRL) as per Metrolinx Design Standards. Refer to the Universal Design Standard.
c) Spandrel glass shall have a minimum thickness of 10 mm. The minimum thickness may be 6 mm when fully supported on a substrate.
d) Acceptable colours shall include white, light grey, warm grey, slate grey, medium grey, and charcoal grey, selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.
    i. Custom colours, such as those used for feature walls and ceilings, shall be determined on a project-specific basis.
e) Shadow boxes may be considered where concealment is required, but the appearance of continuous glazing shall be maintained. The proposed product shall be reviewed and approved by the Owner of this Standard.
    i. The opaque backing finish shall match the overall glazing system.
    ii. Spandrel glass shall be designed with ventilation to the exterior to minimize thermal stress and prevent condensation build-up within the curtain wall cavity.

7.8.4. Insulated Glass Unit

a) Insulating Glass Units (IGUs) shall conform to CAN/CGSB-12.8-M, Insulating Glass Units, ASTM E2190, Standard Specification for Insulating Glass Unit Performance and Evaluation, and Insulating Glass Manufacturers Association of Canada (IGMAC) requirements.
    i. To comply with IGMAC labelling requirements to be considered certified. Materials, excluding the glass, shall be from the same manufacturer as those employed for the certification of the insulating glass units.
b) IGUs shall be hermetically sealed, argon-filled, and incorporate a thermally separated, approved black stainless steel warm-edge spacer.

c) IGUs may be double or triple-glazed units, depending on the project's performance requirements and shall meet thermal separation requirements as per OBC SB-10.

7.8.5. Ceramic Frit

a) Ceramic frit shall include, but is not limited to, bird control, solar control, privacy, and safety fritting.
b) Distraction patterns created by ceramic enamel frit fused to the glass substrate shall be solid or patterned as indicated in Metrolinx Design Standards.
c) Where frit is applied, glazing shall consist of low-iron glass. Glass alternates to low-iron glass proven not to perceptibly tint the appearance of the frit from true white from all viewing angles may be considered if the comparative testing and mock-ups provided are acceptable to Metrolinx, subject to the review and approval by the Owner of this Standard.
d) Ceramic frit shall be applied to surface 1 of all exterior glazing.
e) Ceramic frit shall conform to CAN/CSA A460 Bird Friendly Building Design.
f) Bird Collision Deterrence shall effectively decrease the mortality of migratory birds resulting from collisions with glass surfaces, as tested and labelled in accordance with the Authority Having Jurisdiction.

7.8.6. Films

a) Translucent glazing film shall be a single layer with a pressure-sensitive ultraviolet-resistant adhesive and a scratch-resistant coating.
    i. When applied to its substrate, films shall not show any signs of creases, air bubbles, or defects.
b) Films shall be clear and shall not affect the tint of the glazing.
    i. Where graphics are required for accessibility or decorative purposes, they shall be computer-generated for review and approval by Metrolinx.
    ii. Vinyl films shall be non-glare.
c) All vinyl films shall be of exterior-grade cast vinyl and shall be compatible with the material or substrate to which they are applied.
d) Anti-graffiti film products shall be supplied by a certified installer who is licensed or otherwise qualified by the film manufacturer.
e) Thermal and optical performance of the film shall conform to the requirements in the ASHRAE Handbook.
f) Where film is required on safety glass, it shall be incorporated with the interlayer to prevent delamination.

7.9. LOUVRES AND VENTS

Figure 7.9: Exterior Louvres

Location: Exterior and Interior

Composition

a) Louvres shall be architectural-style fixed prefinished aluminum louvres. Materials shall conform to ASTM B209/B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

b) Louvres shall appear as a continuous linear horizontal element and be flush with the façade cladding.

c) Louvre framing shall not be exposed or visible to the public.

d) Where screening in front of the louvre is required, it shall:
   i. unify them into the overall architectural expression using perforated metal screening from the architectural kit-of-parts;
   ii. blend and match adjacent finishes, consistent in sizing with the overall modular dimensions of the surrounding façade elements;
   iii. maintain the required minimum open area percentage as required by the enclosed equipment behind, and shall not impede louvre function or air flow; and
   iv. Utilize oversize louvres with blank-off panels to match adjacent cladding panel sizing where required.

e) The aerodynamic performance and free area shall be determined by the Designer or Engineer of Record based on proven calculations.

f) Limit deflection of louvre members to not more than 1/180 of the span between supports when subjected to a wind load of 1 kPa applied horizontally to the louvre face.

g) Stormproof louvres shall:
   i. have the AMCA Worldwide Certified Ratings seal;
   ii. have a center watershed in the blade and concealed mullions to limit water and snow penetration;
   iii. be rated for 'Water Penetration', 'Air Performance' and 'Wind Driven Rain';
   iv. possess a Class-A rating at 50mph (80 kph) in accordance with the ANSI/AMCA 500-L standard, Laboratory Methods of Testing Louvres for Rating; and
   v. be self-draining and be made to withstand a wind load of not less than 1.44 kilopascals.

Finish, Texture, and Colour

h) Fluoropolymer-coated louvres shall have a factory-applied minimum 2-coat system consisting of a prime coat and a colour coat, in conformance with American Architectural Manufacturers Association AAMA 2605, Superior Performance.

i) Acceptable colours shall match adjacent wall finish material, selected from the manufacturer's full range, unless noted otherwise. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

j) Minimum depth shall be 150 mm.

k) Frame and mullion shall be extruded with a minimum wall thickness of 2.06 mm.

l) Louvre blades shall have a minimum thickness of 1.7 mm and a maximum blade length of 1,500 mm.

Accessories

m) Insect and bird screens shall consist of crimped 1.6 mm diameter aluminum wire mesh secured to two layers of 2.2 mm thick extruded aluminum U-frame mitered at the corners. The mesh shall have a spacing between 5 mm to 12.7 mm O.C.
   i. Dimensions shall be determined based on minimum airflow requirements and shall prevent the intrusion of insects, rain, and snow.

n) Anchors and fasteners shall be stainless steel, Grade 316. Non-conductive separations, including but not limited to plastic washers, nylon spacers, and rubber gaskets, shall be provided to minimize galvanic corrosion.

o) Snow stopper, insect, and bird screens shall be non-flammable, UV-resistant, flexible, non-conductive, and serviceable.

8 VERTICAL CIRCULATION ELEMENTS

8 VERTICAL CIRCULATION ELEMENTS

8.1. METAL STAIRS AND LADDERS

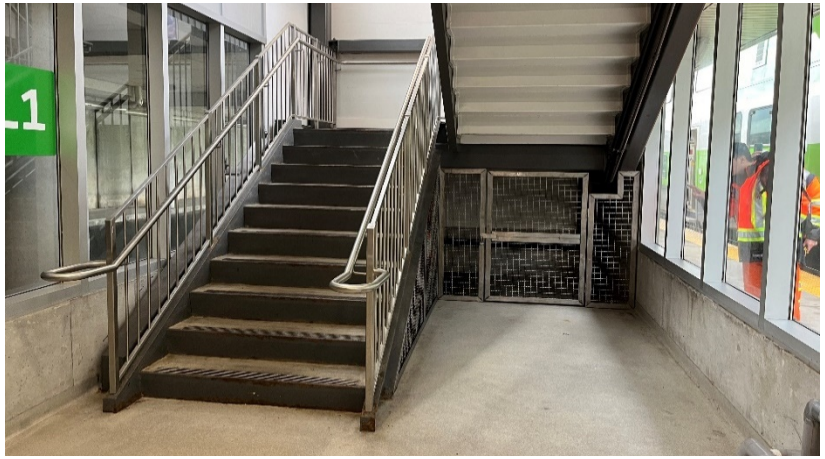

Figure 8.1: Steel Stairs with Concrete Treads

Location: Exterior and Interior

Composition

a) Metal fabrications, including but not limited to rolled steel sections and plates, steel sheet pans, hollow structural steel sections, structural tubing, and steel piping, shall be corrosion-resistant throughout their expected life cycle.
b) Stainless steel members shall conform to ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
    i. Interior stainless steel shall be Grade 304.
    ii. Exterior stainless steel shall be Grade 316.
c) Grated stair treads, where used in BOH areas, shall be welded hot-dip galvanized steel complete with colour-contrasting non-slip nosings.
    i. Contrast nosing shall be installed such that the contrasting edge is visible in both the rise and run of the stairs.
    ii. The nosing shall have a non-slip finish embedded within the run and shall not be surface-applied.
d) Materials and methods shall minimize distortion and ensure the strength and corrosion resistance of the base materials.

Finish, Texture, and Colour

e) Colour shall be generally uniform across the material.
    i. Exposed non-stainless steel members and components shall be paint-finished.
    ii. Stainless steel shall be a No. 4 brushed finish.
f) Concrete shall be slip-resistant and match the adjacent concrete finishes and colour; and
g) Acceptable colours for standard stairs shall be within a range from light grey to medium grey.

Dimensions, Thickness, and Installation

h) Surface finish of metal elements shall not be broken, cracked, scratched, damaged, dented, deformed, or contain any visual defects such that they are detectable or observable.
i) Damaged materials shall be replaced with materials of the same performance.

Accessories

j) Welded connections shall be utilized over bolted connections. Connections shall be welded unless reviewed and accepted by Metrolinx.
    i. All welds shall be continuous and ground smooth to receive the specified finish. Spot welding shall not be acceptable.
k) Fasteners shall be heavy-duty, corrosion-resistant, tamper-resistant, and concealed where possible.

8.2. CONCRETE STAIRS

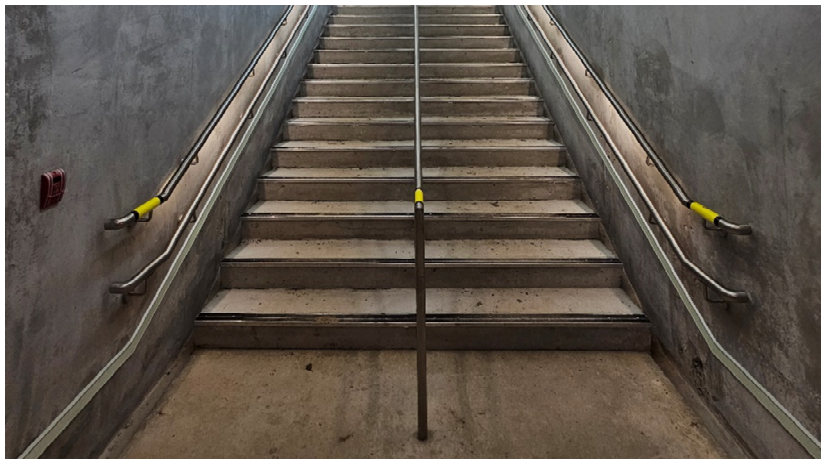

Figure 8.2: Concrete Stairs with Stainless Steel Handrails

Location: Exterior and Interior

Composition

a) Concrete stairs shall be either cast-in-place or precast stairs. Refer to Section 3.1 Concrete for material requirements.
   i. Colour, texture, and appearance shall be consistent and uniform across the entire stair.
b) Concrete coverage over steel reinforcement (rebar) shall be a minimum thickness of 50 mm, to be confirmed by the Engineer of Record. Anchorage of guards and handrails shall not interfere with the placement of reinforcement.
c) Precast elements shall be fabricated and conform to CSA A23.4, Precast Concrete - Materials and Construction.
   i. Precast elements shall be marked with the casting date and identification code corresponding to the layout to facilitate element identification.
d) A 10 mm chamfer shall be provided at the back edge interface between treads and risers.
e) Where stairs exist adjacent to a vertical surface, no ledge shall be permitted for the collection of dust, dirt, and debris.
f) Stair treads shall be complete with colour-contrasting non-slip nosings.
   i. Precast concrete stair treads with insert nosings shall be provided in accordance with the technical requirements within the DRM and other Metrolinx Design Standards.
g) Where dictated by other Metrolinx Design Standards, a 100 mm wide continuous channel shall be provided and incorporated with the stair.
   i. The channel shall be located beneath handrails to facilitate water runoff, ease of cleaning, and bicycle access.
   ii. The channel shall not decrease the required usable egress width of the stair.
   iii. The channel shall typically be aligned with the back edge of the treads. Where dedicated for bicycles, they shall align with the front edge of the treads.

Finish, Texture, and Colour

h) Surfaces shall be free of cold joints and honeycombing.
i) Risers and the underside of stairs shall be finished smooth where exposed to view.
j) Acceptable colours for standard stairs shall be within a range from light grey to medium grey.

Dimensions, Thickness, and Installation

k) Concrete treads shall be levelled, evenly spaced, and shall not create any tripping hazards.

Accessories

l) Stair guards and handrails shall not produce safety hazards.
m) Treads and landings shall be finished with a non-slip finish to meet current industry accessibility standards.

8.3. GUARDS AND HANDRAILS

Figure 8.3: Galvanized Steel Guard and Handrail

Location: Exterior and Interior

Composition

a) Handrails shall be tubular pipe rails with welded rods and mounting flanges.
   i. Where wall-mounted, sufficient anchorage shall be provided to the brackets to withstand vertical and horizontal loading.
   ii. Where floor-mounted, support posts shall be spaced equally to withstand vertical and horizontal loading.
   iii. Where integrated with the guard, connections shall be spaced equally to withstand vertical and horizontal loading.
b) All materials shall be corrosion-resistant throughout the expected lifecycle.
c) Refer to Facilities Civil Engineering Standards.

Finish, Texture, and Colour

d) Refer to each type of guard and handrail for finish and colour requirements.

Dimensions, Thickness, and Installation

e) Dimensions, thickness, and installation methodology shall be determined by the Designer of Record and conform to all codes and regulations.
f) Datums shall be continuous to meet design requirements. Refer to Metrolinx Design Standards, Drawings, and Specifications.
g) Guard assemblies shall be designed, fabricated, and installed to conform to the performance requirements in the Ontario Building Code.
h) Site finishing shall be kept to a minimum.
   i. All joints shall be welded and made smooth.
   ii. Integrated lighting shall be modular and easily replaceable.
i) All edges identified as sharp shall be smoothed using appropriate methods, such as deburring, grinding, and sanding.
j) All screws, bolts, and fasteners shall be tamper-resistant.

8.3.1. Metal Guards and Handrails

a) All components, including but not limited to inserts, anchorage plates, flush plates, and connections, shall be hot-dipped galvanized steel with Z275 zinc coating.
b) All holes in galvanized pipe rails shall be sealed to prevent the ingress of elements and pests.
c) Typical acceptable colour shall be metallic grey. Where metal is powder-coat finished, the colour shall be black unless noted otherwise within Metrolinx Design Standards.

8.3.2. Stainless Steel Guard and Handrails

a) Stainless steel members shall conform to ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip. The following shall apply:

i. All exterior stainless steel components, as well as interior stainless steel components within high-contact zones, shall be Grade 316; and
ii. All remaining interior stainless steel shall be Grade 304.

b) Stainless steel shall be a No. 4 brushed finish where exposed and shall be uniform, directionally textured, polished finish, free of cross scratches.

8.3.3. Glazed Decorative Metal Railings – Balustrades

a) Glazing shall be laminated safety glass and conform to CAN/CGSB 12.1, Safety Glazing.
   i. Glazing joints shall be a maximum of 12 mm wide and shall be sealed with structural silicone.
   ii. Glazing shall be transparent and laminated with a clear polyvinyl butyral (PVB) interlayer.
   iii. Glazing gasket shall be of the dry type, EPDM rubber roll-in, purpose-made to suit glazing size and weight. Colour shall be black.
b) Balustrade mounting system, handrails, closures, trims, and all metal components shall be stainless steel, refer to Section 8.3.2. for requirements.
   i. Stainless steel U-channel caps shall be provided in maximum lengths available to minimize the number of joints
   ii. Pre-fabricated corners and end caps shall be provided.
c) All balustrades shall be mounted on a raised integral base with a minimum height of 150 mm.

8.3.4. Wire or Mesh Decorative Metal Railings

a) Refer to Section 8.3.2 for stainless steel requirements. Galvanized finish shall not be accepted.
b) Spacing of wire mesh shall be:
   i. Minimum: 50 mm O.C.; and
   ii. Maximum: 100 mm O.C.

8.4. ELEVATORS

Figure 8.4: Glass Enclosure Around Elevator Shaft

Location: Interior

Composition

a) Refer to the GO Design Requirements Manual (DRM) and Metrolinx Elevator Specification 14 20 06 for additional elevator requirements.
b) All structural steel shall be designed by the Engineer of record:
   i. Where fire rating is required, all exposed structural steel shall be finished with white intumescent paint.
c) All interior elevator enclosures shall be mounted on a raised concrete upstand or curb around the perimeter of the shaft, with a minimum height of 150 mm. Exterior elevator enclosures shall incorporate a concrete base, refer to Subsection 3.1.4.
d) The elevator enclosure shall:
   i. have a self-supporting supplementary framing system;
   ii. be fire-rated and provide a separation between the elevator shaft and surrounding spaces as required;

iii. provide maximum transparency to promote natural surveillance and CPTED;
   1. Where glazing does not provide transparency into the gap or through the elevator shaft, it may be replaced with opaque panels to match adjacent materials;
   2. To protect elevator hoistways from vandalism and reduce solar heat gain, glazing in front of the mechanical systems is not required; and
   3. For areas with direct solar exposure, mitigations to reduce solar heat gain shall be provided.

iv. have an aluminum or stainless steel base around the elevator enclosure.

e) The elevator cab shall:
   i. be sized to conform to Metrolinx Design Standards. Refer to the GO Design Requirements Manual (DRM), Elevator Specification 14 20 06, and Universal Design Standard requirements.

f) Glazing shall be transparent and laminated with a clear polyvinyl butyral (PVB) interlayer.
   i. Where a fire separation is required, glazing shall be fire-rated as per OBC requirements. Wired glass shall not be accepted.

Finish, Texture, and Colour

g) All exposed-to-view metal components shall be stainless steel and conform to ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip, minimum Grade 304.
   i. Stainless steel Grade 316 shall be provided for areas exposed to exterior conditions and high-contact zones.

h) Stainless steel shall be a No. 4 brushed finish where exposed and shall be uniform, directionally textured, polished finish, free of cross scratches.

i) The elevator cab side wall materials shall be selected and designed to promote passenger safety and security, considering principles of CPTED. The Designer shall apply best practices for visibility, elevator reliability, and resistance to vandalism, coordinated with adjacent architectural and environmental conditions.

j) The elevator cab flooring shall be porcelain tile and:
   i. be light grey to match adjacent concrete; or
   ii. match adjacent floor finish colour.

Accessories

k) Vertical access ladders shall be provided in elevator pits.
   i. Ladders shall be secured to walls using high-strength bolts.
   ii. The final location of the ladders shall be coordinated with the elevator manufacturer.
   iii. Ladders shall be constructed of a corrosion-resistant material (i.e., hot-dipped galvanized steel).

l) For waterproofing requirements, refer to Facilities Civil Engineering Standards.
   i. Continuous waterproofing shall be applied on the exterior face of walls and footings around the elevator pit.
   ii. Blind-side waterproofing shall be applied under the slab at the base of the elevator pit.

8.5. ESCALATORS

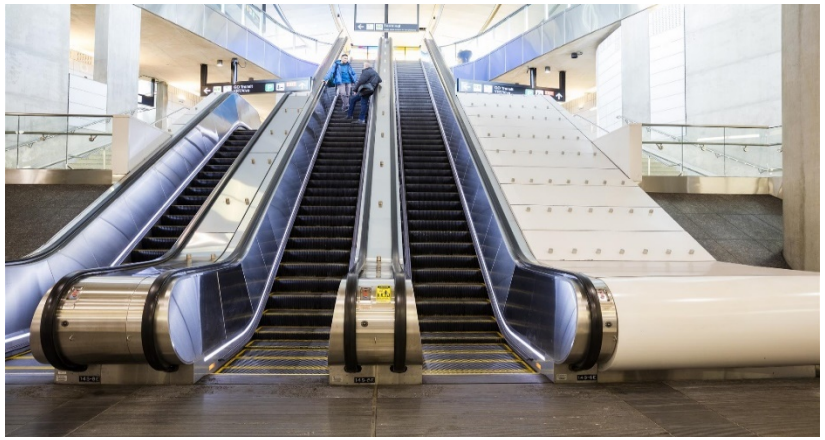

Figure 8.5: Stainless Steel Escalators

Location: Interior

Composition

a) Escalator categorization shall be of a heavy-duty type for use in mass transit environments.
b) Glazing shall be safety glass and conform to CAN/CGSB 12.1, Safety Glazing.
    i. Glazing joints shall be a maximum of 12 mm and shall be sealed with structural silicone.
    ii. Glazing shall be transparent and laminated with a clear polyvinyl butyral (PVB) interlayer.
    iii. Glazing mounting system shall be concealed to prevent vandalism but accessible for maintenance work.
c) Escalator LED lighting shall be provided under the handrail.

Finish, Texture, and Colour

d) Stainless steel sheets, channels, and shapes shall conform to ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip, and shall be at a minimum of Grade 304.
e) Stainless steel shall be a No. 4 brushed finish where exposed and shall be uniform, directionally textured, and polished finish, free of cross scratches.

Accessories

f) Additional protective balustrades shall consist of stainless steel and/or safety glass to match vertical circulation balustrades. Refer to Metrolinx Design Standards for specific material requirements and their locations.

9 SPECIALTIES

9 SPECIALTIES

9.1. MILLWORK AND CASEWORK

Location: Interior

Composition

a) Wood materials shall conform to the Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI).
   i. Lumber for finished work exposed to view shall be grade AA (premium) or A (custom). Grade B (economy) shall not be accepted.
   ii. There shall be no visible defects on exposed surfaces.

b) Panels shall be free from core defects, have no plugs or patches on all faces, be free from voids, and produce a natural finished exposed veneer edge.

c) Particleboard shall conform to ANSI A208.1, Particleboard, industrial grade. Extruded particleboard with loose cores and voids shall not be accepted. Particleboards shall be:
   i. Grade M-2 for interior use; or
   ii. Grade M-3 for countertops and shelves.

d) Medium Density Fibreboard (MDF) and Melamine Composite Panel (MCP) shall conform to ANSI A208.2, Medium Density Fibreboard (MDF) for Interior Applications, premium grade.

e) High-Pressure Decorative Laminate (HPDL) and Fibre Reinforced Laminate (FRL) shall conform to ANSI/NEMA LD3, High-Pressure Decorative Laminates, Class 1.

f) Materials and products shall meet specified fire test characteristics as indicated by CSA, ULC, or other testing and inspecting agencies acceptable to AHJ.

Finish, Texture, and Colour

g) Acceptable colours shall be selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

h) Panels shall have a minimum thickness of 13 mm.

i) Cabinetry units shall have a minimum width of 400 mm.

j) Millwork and casework doors exceeding 600 mm in width shall be equipped with heavy-duty hardware.

k) Gable supports shall be provided at a maximum spacing of 1,220 mm O.C. to prevent warping or deflection.

Accessories

l) Hardware shall:
   i. meet or exceed the requirements of ANSI/BHMA A156.9, Cabinet Hardware;
   ii. be corrosion-resistant; and
   iii. be concealed to prevent vandalism and unauthorized access. Where concealment is not possible, they shall be discreet and prevent access by non-staff personnel.

m) All millwork and casework shall be lockable unless noted otherwise.

n) Grommets shall be provided and installed where required to support user requirements.

9.2. COUNTERTOPS AND SURFACES

Figure 9.2: Quartz Countertop

Location: Interior

Composition

a) There shall be no visible defects on exposed surfaces.
b) Colour consistency shall be uniform throughout for solid-coloured surfaces. Minor variations shall be acceptable for non-homogeneous surfaces.
c) Countertops and surfaces shall have low VOC content.

Finish, Texture, and Colour

d) Slabs shall be polished, non-reflective, with a low-glare finish. Refer to the Universal Design Standard.
e) Acceptable colours shall be selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

f) Slabs shall have a minimum thickness of 13 mm.
g) Slabs shall be fabricated in maximum dimensions to minimize seams and joints.

9.2.1. Simulated Stone

a) Engineered quartz surfaces shall:
   i. consist of a minimum of 93% crushed quartz combined with polyester resins and pigments;
   ii. be non-porous and stain-resistant;
   iii. be UV-resistant for daylight-exposed applications;
   iv. be abrasion-resistant with a minimum hardness rating of 7 on the Mohs scale; and
   v. have dimensional stability with a tolerance of ±1.5 mm per metre.
b) Slabs ranging in colour and/or texture shall be evenly distributed over the entire installation to avoid patches or streaks and to produce a homogeneous blending of all units.
c) If an acceptable pattern or grain direction is apparent, units shall be installed so that the pattern or grain is in one direction.

9.2.2. Solid Surfacing

a) Solid surfacing shall:
   i. be thermoformed and cast to allow for integral backsplash, sidesplash, and curved edges where included;
   ii. have a through-body colour and be repairable through sanding and refinishing;
   iii. Have seamless joints bonded with colour-matched adhesives;
   iv. be non-porous and stain-resistant; and
   v. be abrasion and impact-resistant.
b) Homogeneous acrylic, not coated or laminated, shall be repairable by sanding and polishing to a maximum depth of 0.25 mm for any superficial damage.

9.2.3. Stainless Steel

a) Stainless steel sheet and plate shall conform to ASTM A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip, Grade 304, No. 4 brushed finish.
b) Stainless steel sheet shall be laminated to exterior-grade plywood using acceptable laminating adhesives.

9.2.4. Plastic Laminate

a) High-pressure laminate surfaces shall:
   i. conform to ANSI/NEMA LD3, High-Pressure Decorative Laminates;
   ii. be wear, scratch, and impact-resistant to ensure durability over the expected life cycle;
   iii. be stain-resistant and easily cleaned by common non-abrasive cleaners; and
   iv. be heat-resistant and shall not delaminate or blister when exposed to heat.

9.3. WASHROOM PARTITIONS

Figure 9.3: Stainless Steel Washroom Partitions

Location: Interior

Composition

a) Metal partitions shall be stainless steel, Grade 304.
b) Plastic partitions shall be solid high-density polyethylene (HDPE) with through-body colour.
c) Partition systems shall be designed by the Designer or Engineer of Record to provide stability and impact resistance.
   i. Supplementary anchorage and reinforcement shall be provided to support intended loads from washroom partitions, accessories, and grab bars, as indicated by a professional engineer.
d) Partitions shall be non-combustible and conform to the National Fire Protection Association (NFPA).
   i. Front-of-House areas shall be Class A; and
   ii. Back-of-House areas shall be a minimum of Class B.
e) Non-barrier-free stall doors shall default to an open-in position unless closed and locked by an occupant, indicating availability, increasing traffic flow, and deterring vandalism.
   i. For public-facing multi-stall washrooms, refer to the Universal Design Standard for the clear width requirement

of doors for barrier-free stalls. For other barrier-free stall requirements, refer to the OBC.

Finish, Texture, and Colour

f) Stainless steel shall be texture-finished to protect against graffiti and vandalism, concealing dents, scratches, and scuff marks, and be:
   i. diamond finish;
   ii. embossed finish; or
   iii. brushed finish.

g) Acceptable colours shall be selected from the manufacturer's full range. Refer to Metrolinx Design Standards for specific colour and location requirements.

Dimensions, Thickness, and Installation

h) Doors, panels, and pilasters shall have a minimum thickness of 25 mm.

i) Toilet partitions shall be ceiling-mounted with an engineered structural or miscellaneous metal framing system to support and resist gravitational and lateral loads.

Accessories

j) Fittings and attachments shall be stainless steel Grade 304, No. 4 brushed finish unless noted otherwise.

k) Door pulls, stops, keepers, coat hooks, and door castings shall be zinc die-castings with a No. 4 brushed finish.

l) Fasteners shall be stainless steel with vandal-resistant security-head screws.

m) Hinges shall be gravity-activated, heavy-duty, self-lubricating with nylon bushings, and adjustable to hold the door open at any angle up to 90-degrees.

n) All doors shall include a surface-mounted slide latch with a combination stop and emergency access keeper. They shall meet barrier-free requirements conforming to the Ontario Building Code.

o) Latches shall allow emergency access from the stall's exterior.

p) Grab bars shall not be fixed to partitions and shall be installed on the adjacent walls.

9.4. WALL AND DOOR PROTECTION

9.4.1. Corner Guards

Location: Exterior and Interior

Composition

a) The material shall be at minimum 16-gauge stainless steel Grade 316, No. 4 brushed finish.

Dimensions, Thickness, and Installation

b) Corner guards shall be surface-mounted, 90-degrees, with a minimum width of 25 mm legs.
c) The height shall be a minimum of 1,220 mm, as determined by project requirements.

9.5. EXTERIOR SPECIALTIES

9.5.1. Pest Control Devices

Location: Exterior

Composition

a) All architectural elements that provide a ledge or horizontal surface that allows for bird roosting shall incorporate mitigation that is integrated with the building details.
b) Bird spikes, where used, shall:
   i. be stainless steel Grade 316;
   ii. have a minimum thickness of 1 mm;
   iii. have a base strip a minimum of 13 mm wide by 0.5 mm thick, with lengths as required to accommodate the area to be covered; and
   iv. have no less than 120 wire points per 300 mm length with a full 180-degree wire pattern coverage.
c) Materials shall be fully annealed for flexibility, safely bent to 360 degrees, easily strip-cut, and exhibit surface shape memory.
d) Mounting hardware shall be corrosion-resistant.

9.6. FURNITURE, FIXTURES, AND EQUIPMENT

9.6.1. Seating

Figure 9.6.1: Freestanding Benches

Location: Exterior and Interior

Composition

a) Customer seating shall include a finished seat surface and may include back lumbar support.
   i. The seat and back panel materials shall be wear-resistant, weather-resistant, corrosion-resistant, and UV-resistant.
   ii. Where a back is provided, a gap shall be incorporated between the seat and back panel to allow for easy maintenance and drainage.
b) Seating shall include a variety of sizes and types, with one, two, three, or four seats, to provide flexibility and respond to individual customer needs, abilities, and challenges.
c) Seating design shall conform to accessibility requirements. Refer to the Universal Design Standard and relevant codes and regulations, including the OBC.
d) Where continuous horizontal surfaces are designated as seating, mitigation strategies shall be included to discourage skateboarding, such as the use of aluminum edge guards or other integrated deterrent elements.
   i. Guards shall be vandal and tamper-resistant.
e) The seat frame shall be welded, and armrests shall be interchangeable on both sides.
f) The design shall eliminate opportunities for items to be concealed from view.
g) Bench frame shall be galvanized steel or aluminum conforming to AAMA 2605.
   i. The colour shall match RAL 9006 White Aluminum.
   ii. The minimum coating thickness shall be 350 microns.
   iii. Frames shall not be embedded in concrete or asphalt. Base plates shall be fastened down mechanically using anchors.
h) All fasteners shall be stainless steel, concealed, and vandal-resistant.
i) For GO projects, refer to Metrolinx Standard Drawings and Specifications – GO Transit Suite of Benches for material and dimensional requirements.
j) For Rapid Transit projects, refer to the respective Metrolinx Design Standards for material and dimensional requirements.

Dimensions, Thickness, and Installation

k) Bench seating shall be either floor or wall-mounted.
   i. Where benches are wall-mounted, anchoring shall be coordinated during early design planning with the structural engineer to ensure the wall structure and anchoring are firmly secured, preventing damage due to vandalism.
   ii. For floor mount, the design shall reflect a clean and minimalist approach, allowing for easy maintenance.

9.6.2. Leaning Rails

Location: Exterior and Interior

Composition

a) Leaning rails shall include a horizontal support member to support the forces applied by customers leaning on them.
b) The horizontal rail shall be wear-resistant, weather-resistant, corrosion-resistant, and UV-resistant. Acceptable finishes include:
   i. stainless steel shall be Grade 304, No. 4 brushed finish;
   ii. aluminum shall be powder coat finish, light and medium grey; or
   iii. wood shall be stained with a clear anti-graffiti protection coat.
c) Vertical supports shall be stainless steel or aluminum.
d) A horizontal guardrail integrated with the base shall be provided for visually impaired individuals using cane detection. Refer to the Universal Design Standard for additional requirements.
e) All fasteners shall be stainless steel, concealed, and vandal-resistant.
f) Refer to Metrolinx Design Standards for additional design requirements for leaning rails and integration with other elements.

Dimensions, Thickness, and Installation

g) Leaning rails shall be mounted where the bottom height of the horizontal rail is 700 mm above the finished floor and the top height is 840 mm above the finished floor.
h) The minimum length of leaning rails shall be 1,200 mm.
i) Vertical supports shall be spaced a maximum of 1,200 mm O.C. Where three or more supports are required, they shall be evenly spaced.
j) Leaning rails shall be either floor or wall-mounted.
   i. Where leaning rails are wall-mounted, anchoring shall be coordinated during early design planning with the structural engineer to ensure the wall structure and anchoring are firmly secured, preventing damage due to vandalism; and
   ii. For floor mount, the design shall reflect a clean and minimalist approach that allows for easy maintenance.

9.6.3. Waste and Recycling Receptacles

Figure 9.6.3: Exterior Waste and Recycling Receptacle

Location: Exterior and Interior

Composition

a) The design shall not require customers to touch or operate the waste receptacle.
b) Consistent signage, graphics, and colours shall be used to identify the various waste and recycling streams, along with examples of typical items that belong in each stream.
c) Access for depositing waste and recyclable materials shall be from the top or the front.
d) Materials shall be weather-resistant, corrosion-resistant, and non-combustible. Acceptable materials include:
   i. stainless steel shall be Grade 304, No. 4 brushed finish; or
   ii. aluminum shall be powder coat finish, light and medium grey.

e) Waste and recycling receptacles shall be securely anchored to the floor or wall using tamper-resistant hardware.
f) Fasteners shall be tamper-resistant and/or concealed.
g) Waste and recycling receptacles shall be visible on all sides with a transparent outer covering fabricated using materials that allow for visibility of the contents within. They shall be removable by staff for replacement.
h) Waste and recycling receptacles shall not contain horizontal flat surfaces to discourage objects from being placed on top.
i) Refer to Metrolinx Standard Drawings and Specifications - GO Standard Waste Bin drawing CA-296-S for specific material and dimensional requirements.

9.6.4. Interior Bollards

Location: Interior, Back-of-House

Composition

a) Interior bollards shall be:
   i. 20 MPa concrete-filled 6 mm thick stainless steel pipe, Grade 304, with a satin finish in areas requiring higher safety requirements or at customer-facing locations; or
   ii. 20MPa concrete-filled galvanized steel pipe, finished with a 3 mm thick high-density polyethylene (HDPE) 'safety yellow' coloured cover, only at non-customer-facing locations.
      1. Steel pipe shall conform to CSA G40.20/G40.21, General requirements for rolled or welded structural quality steel, Grade 350W, Class H.
b) Interior bollards shall have at a minimum one 50 mm tall contrasting reflective band around the circumference of the bollard located 80 mm below the top datum.
c) Bollards shall be finished with a crown top to prevent standing water from collecting on flat surfaces.
d) Metrolinx Facilities Civil Engineering Standards for exterior bollard requirements.

Dimensions, Thickness, and Installation

e) Interior bollards shall:
   i. be a minimum diameter of 150 mm unless noted otherwise;
   ii. be installed a minimum of 300 mm below grade, cast with a welded plate and four anchors into the concrete slab; and
   iii. project between 1,000 mm and 1,200 mm above grade. All bollards in non-customer-facing locations shall have a height of 1,200 mm.

9.7. SITE ELEMENTS

General Requirements

a) Paving shall have colour contrast, reflective qualities, and abrasive (non-slip) characteristics. Refer to the Universal Design Standard.
b) Paving material palette shall integrate visual and functional durability.
c) Hardscaping and softscaping shall align with the applicable maintenance regime and practices for each station.
d) Pavers shall be suitable for heavy-duty applications, tested and proven to resist vandalism, accommodate freeze-thaw cycles, winter maintenance, and emergency and service vehicular access.
e) Pavers shall be resilient to accommodate regular winter maintenance, including snow removal, based on requirements, practices, methods, and materials as outlined in each project agreement.
f) Where the application connects with the public Right-of-Way (ROW) in a plaza condition or similar urban form, they shall apply the following:
    i. Materiality shall reinforce a coherent, continuous pedestrian space to facilitate place-making; and
    ii. Pavers shall be coordinated with the relevant municipal Authority Having Jurisdiction to confirm acceptable paver specifications.
g) Refer to Facilities Civil Engineering Standards for pavement assembly and joint requirements.

9.7.1. Bicycle racks and shelters

Figure 9.7.1: Bike Shelter and Racks

Location: Exterior and Interior

Composition

a) Materials shall be weather-resistant, corrosion-resistant, UV-resistant, and non-combustible. Acceptable rack materials shall include:
    i. carbon steel – galvanized;
    ii. carbon steel - powder coated, colours white, grey, or black;
    iii. carbon steel - thermoplastic wrapped, colours white, grey, or black; or
    iv. stainless steel - Grade 304 or 316, No. 4 brushed finish.
b) Refer to Metrolinx Bike Infrastructure Design Standard for additional requirements, including but not limited to the quantity, acceptable rack designs, dimensional spacing and clearances, shelter requirements, and other relevant details.

10 MECHANICAL, ELECTRICAL, AND PLUMBING

10 MECHANICAL, ELECTRICAL, AND PLUMBING

General Requirements

a) This document shall be applicable to all modes.
b) For GO projects, this standard shall be read in conjunction with other Metrolinx Standards, Drawings, and Specifications for additional GO-specific requirements.
c) All alternates proposed shall be reviewed and accepted by the Owner of this Standard.

10.1. FIRE SUPPRESSION

10.1.1. Sprinkler System

Location: Interior

a) All Fire Department Connections (FDC) shall be polished brass clapper-type dual inlet with two 65 mm diameter inlets threaded to Fire Department hose requirements and equipped with caps and chains.
b) Fire Department Connection faceplates shall be polished brass and complete with 'AUTO-SPKR' and 'STANDPIPE' cast-in raised lettering.
c) All other exposed metal parts of the fire department connection shall be chrome-plated.
d) Sprinkler body shall be die-cast, with a hex-shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.
    i. For locations where corrosion-resistant coatings are required, the body shall be coated with ULC-listed and FM-approved anti-corrosion VC-250 coating (silver colouring).
e) Recessed sprinkler heads in finished areas shall be chrome-plated unless noted otherwise.
f) Concealed sprinkler head cover plates shall match the ceiling finish colour.
g) Where exposed pendent heads occur in areas with suspended ceilings, they shall be complete with chrome-plated escutcheon plates.
h) Sidewall heads with concealed piping shall be complete with chrome-plated escutcheon plates.
i) Sprinkler heads in exposed areas where they are at risk of being damaged shall be complete with chrome-plated wire guards.

10.1.2. Fire Hose and Extinguisher Cabinets

Figure 10.1.2: Fire Hose Cabinet

Location: Interior

a) Cabinets shall be recessed or semi-recessed except where existing site conditions do not allow for it.
b) All Fire Hose cabinet (FHC) and Fire Extinguisher Cabinet (FEC) covers shall be Grade 316 stainless steel, No. 4 brushed finish, with safety glass panel, flush stainless steel door latch, and semi-concealed piano hinge designed to permit 180-degree door opening.
c) All cabinets shall be corrosion-resistant, baked enamelled steel tubs. Colour shall be selected to reduce visual clutter.
d) All fasteners shall be concealed and tamper-resistant.
e) All metal edges shall be rounded to eliminate any sharp hazards.
f) Where fire extinguishers are supplied without the cabinet, a wall mounting bracket shall be provided.

10.2. PLUMBING FIXTURES

Location: Interior

a) All vitreous china, porcelain enamel, and acrylic finished fixtures shall be white unless noted otherwise.
b) All fixtures and fittings located in public and staff washrooms shall be vandal-resistant.
c) Fixtures shall conform to ANSI/ASME Standard A112.19.2, Ceramic Plumbing Fixtures, and CAN/CSA B45, Plastic Plumbing Fixtures, requirements.
d) Fixture dimensions shall conform to the Ontario Building Code, Section 3.8 when installed.
e) Refer to Metrolinx Standards and Specifications for additional plumbing fixture requirements.

10.2.1. Toilets

a) Toilet fixtures shall be vitreous china, wall-mounted unless noted otherwise.
b) Fixtures shall be high efficiency with siphon jet flushing action with a maximum 1.28 gpf (4.8 lpf) or greater, and an elongated front rim with 38 mm (1-1/2 in) top spud.
    i. For retrofit projects, fixtures shall have a minimum 1.28 gpf (4.8 lpf).
c) For barrier-free applications, installation of the toilet shall be at a height suitable for barrier-free use. When installed, the top of the seat shall be at a minimum of 432 mm above the finished floor.
d) The seat shall:
    i. be graded for extra heavy-duty institutional and industrial use;
    ii. be chemically resistant, white solid plastic, open front, no cover for elongated bowls, integrally moulded bumpers, concealed check hinge, and a stainless-steel post; and
    iii. be posture-contoured body design.
e) Support carriers shall be complete with Dura-coated cast iron fitting with 51 mm (2 in) vent, adjustable gasketed face plate,

universal floor-mounted foot supports, corrosion-resistant adjustable ABS coupling with integral test cap, fixture bolts, trims, and stud protectors and bonded 'Neo-Seal' gaskets.
   i. For single toilets, carriers shall be adjustable with 4 or 5 hub and spigot connections.
   ii. For back-to-back toilets, carriers shall be adjustable with four no-hub connections.

f) Carriers shall be rated for 450 kg (1,000 lb) for toilets in public washrooms, and 225 kg (500 lb) for toilets in staff washrooms.
g) Fittings and accessories shall be cast iron, gasket wax, bolts with chromium-plated cap nuts and washers.
h) Internal seals shall be made of chloramine-resistant materials.
i) Toilets in staff washrooms shall have:
   i. a quiet diaphragm-type, chrome-plated, flushometer valve with a polished exterior complete with dual seal diaphragm with a clog-resistant filtered by-pass;
   ii. a valve that is OBC compliant with a non-hold open and no leak handle feature, high back pressure vacuum breaker, one-piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection;
   iii. the flush valve handle located on the side of the toilet that provides the most open space for maneuvering; and
   iv. control stop that has internal siphon-guard protection, a vandal-resistant stop cap, a sweat solder kit, and a cast wall flange with a set screw.
j) Toilets in public washrooms shall have:
   i. touch-less hard-wired flush valve, quiet diaphragm type, chrome plated, flushometer valve with a polished exterior complete with motorized actuator;
   ii. integral infrared convergence type proximity sensor and a manual push-button override into an all-metal, polished chrome-plated housing;
   iii. sensor range that automatically adjusts to its environment at power up and is powered by a 7.6 VDC power converter, where each power converter can accommodate up to eight flush valves;
   iv. valve that is complete with a high back-pressure vacuum breaker, one-piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection;
   v. control stops with internal siphon-guard protection, vandal-resistant stop cap, sweat solder kit, and a cast wall flange with set screw; and
   vi. hardwired power converter to power up to eight sensor urinal and/or closet flush valves or up to eight hardwired sensor faucets. The converter shall be integrated within a 119 mm x 119 mm x 54 mm (4-11/16 in x 4-11/16 in x 2-1/8 in) electrical enclosure, and the low-voltage connections shall be performed at the terminal block mounted externally on the box cover.

10.2.2. Urinals

a) Urinals shall be wall-mounted vitreous china.
b) Urinals shall have a 356 mm (14 in) extended rim
c) Urinals shall be assembled with a vandal-resistant outlet stainless steel strainer.
d) Urinals shall have touchless flush valves in public washrooms, and manual flush valves in staff washrooms.
e) Support carriers shall be adjustable height, dura-coated steel stanchions with welded feet, adjustable support plates, and mounting bolts and trim.

10.2.3. Sinks

a) Sinks shall be vitreous china.
b) Sinks in staff washrooms shall:
   i. be countertop-mounted or wall-mounted with a self-rimming front overflow design; and
   ii. have manual faucets, polished chrome-plated widespread with adjustable centres with a centerline rigid or swing gooseneck spout, 102 mm (4 in) vandal-resistant colour-coded metal wrist blade handles, furnished with an 8.3L

pressure compensating aerator to conform to ANSI A112.18.1, Plumbing Supply Fittings, for flow.

c) Sinks in public washrooms shall:
   i. be wall-mounted with a rear overflow design. Barrier-free lavatories shall have a front overflow design;
   ii. be provided with a concealed arm carrier system, A.R.C. coated steel stanchions with welded feet, steel sleeves, cast iron headers and arms, alignment truss, and mounting bolts and trim;
   iii. be installed to suit barrier-free requirements as per the OBC and other codes and regulations; and
   iv. have touchless faucets that conform ANSI A117.1, Accessible and Usable Buildings, hardwired 12VDC electronic sensor for retrofit and new construction.
      1. Faucets shall incorporate a hardwired, infrared convergence-type proximity sensor.
      2. Faucets shall be cast brass with a polished chrome-plated exterior.
      3. Faucets shall be furnished complete with a sensor module, spout module, inline filter, a 1.5 gpm vandal-resistant aerator, connecting the wire to the power converter, an inlet for a 13 mm ball riser and a single supply hose.
      4. Sensor range is factory set for optimized performance.
      5. Thermostatic mixing valve for single faucets shall be included.
d) Sinks shall have the following accessories: grid strainer, P-trap with 1.5 mm clean-out, basin supplies with offset flex, risers, stops, escutcheons, and offset open grid strainer cast brass 32 mm.
e) Where a combination of a water tap and an electric hand dryer unit is selected, it shall be surface-mounted on the sink and be Grade 304 stainless steel with a No. 4 brushed finish.

10.2.4. Drinking Fountains and Bottle Filling Stations

a) Bottle filling station and single ADA cooler filtered refrigerated model shall have a minimum chilling capacity of 8.0 gph.
b) Fixture shall have an electronic bottle filler sensor with an electronic front and side push bar for fountain activation.
c) Fixture shall be wall-mounted for indoor applications.
d) Finishes shall include grey plastic components and stainless steel.
e) Features shall include antimicrobial, filtered, hands-free, visual filter monitor, automatic filter status reset, and energy-saving mode.
f) Green Ticker shall display the number of 20 oz plastic water bottles saved from waste.
g) Laminar flow feature shall provide a clean fill with minimal splash.
h) Real drain system shall be used to eliminate standing water.

10.2.5. Drains

a) All drains and grates shall be slip-resistant, corrosion-resistant, tamper-resistant, heel-proof, and integrated with the drainage system.
b) All drains located within unconditioned spaces shall be heat-traced to avoid ice build-up and promote resiliency.
c) Floor drains, area drains, linear drains, and hub drains shall:
   i. be vandal-resistant; and
   ii. be screened and capped flush with the finished floor.
d) Cast iron floor drains shall:
   i. have a trap seal primer connection;
   ii. be factory-finished with latex-based paint coating; and
   iii. have a round grate, except where located in floor areas with a tile or sheet vinyl finish, a square grate shall be used instead.
e) Roof drains shall have a cast iron body, unless specified otherwise, with aluminum domes. Cast iron components shall be factory-finished with latex-based paint coating;

f) Trench frames and grating shall:
   i. be welded, hot dipped galvanized carbon steel angle frame with anchor straps and lengths as required, and baked epoxy coated cast iron slotted grating in 600 mm long sections; and
   ii. conform to ASME A112.6.3/CSA B79.3 Floor drains, where the grating is susceptible to loading.
g) Trench drains shall:
   i. be a modular, pre-sloped design, composed of interlocking drainage channel sections with overlapping joints;
   ii. be fabricated from corrosion-resistant materials;
   iii. include drain pipe connection outlets as required, along with end caps and covers suitable for the application, and integral anchor tabs for grate anchoring and trench levelling; and
   iv. be provided with heavy-duty steel angle top frames and heavy-duty slotted grates, fabricated from corrosion-resistant materials, each supplied in 600 mm long sections.
h) Interior catch basin frames and covers shall:
   i. be typically a minimum of 508 mm x 508 mm, but sized to design requirements; and
   ii. be heavy-duty, baked epoxy-coated cast iron, non-removable, hinged slotted grate with coated steel frame and concrete anchors.

10.3. HEATING, VENTILATION AND AIR CONDITIONING

Location: Interior

a) The look and finish of access doors shall be consistent on projects and be selected according to the wall finish;
b) Access doors shall be sized accordingly to suit the concealed work for which they are supplied and shall be of standard size for all applications.
   i. Minimum size shall be 300 mm x 300 mm for hand entry.
   ii. Minimum size shall be 600 mm x 600 mm for body entry.
c) Metal access doors shall be 12-gauge steel, flush type with concealed hinges, positive locking, and anchor straps, rust-resistant, complete with factory prime coat and paint finished to match adjacent finishes.
d) Access panels in gypsum board and/or plaster surfaces shall be flush with adjacent wall material and have a concealed frame with a dish-shaped door and welded metal lath ready to receive gypsum board or plaster. They shall be painted to match the adjacent finish.
   i. A plastic grommet shall be provided for door key access.
e) Access panels in glazed tile walls shall be 12-gauge, Grade 304 stainless steel, No. 4 brushed finish, with recessed frame secured with stainless steel countersunk flush-head fasteners.
f) Where access doors are located on surfaces where special finishes are required, they shall be of a recessed door type capable of accepting the finish in which they are to be installed to maintain the final building surface appearance throughout.
g) Access doors in fire-rated ceilings, walls, partitions, and structures shall be ULC-listed and labelled with a rating to maintain fire separation integrity.

10.3.1. Diffusers, Registers and Grilles

a) Diffusers, registers, and grilles shall:
   i. be flush-mounted using a vandal-resistant system with tamper-resistant fasteners;
   ii. be of type, size, capacity, finish, and arrangement as shown on drawings and in accordance with drawing schedules; and
   iii. be equipped with all required mounting and connection accessories to suit the mounting location and application.
b) Acceptable materials shall include:
   i. pre-painted metal;
   ii. aluminum; or
   iii. stainless steel.
c) Diffuser face shall be perforated, laminar flow face constructed of aluminum with quarter-turn fasteners for removal and access to fan motor and filter.
d) Plenum slot diffusers shall:
   i. be constructed of a minimum of 24-gauge galvanized steel;
   ii. have a slot face constructed of double metal thickness to provide rigidity and a pattern controller of adjustable type; and
   iii. have blank-off baffles to be utilized for inactive sections where required.
e) Supply and return bar grilles shall:
   i. be of extruded aluminum construction, nominal 3 mm wide bars with 0-degree deflection, on maximum 6 mm centres, or as scheduled;
   ii. be butted together using keyed splices for precise alignment where continuous grilles are over 1,800 mm in length; and
   iii. have blank-off baffles to be utilized for inactive sections of grilles as required.
f) Egg-crate return and exhaust grilles shall be of aluminum construction, including an extruded aluminum border;
g) Sidewall adjustable supply register shall:
   i. have mitred corners, double deflection adjustable blades and horizontal front blades.
h) Low wall return and exhaust registers shall:
   i. have mitered corners, fixed blades, horizontal front louvres; and
   ii. be constructed of a minimum 8-gauge aluminum or 12-gauge steel for rugged use.
i) Air curtains shall:
   i. have a cabinet constructed of welded stainless steel suitable for vertical or horizontal wall mounting or horizontal suspension;
   ii. be complete with removable panels for access to interior components;
   iii. have a perforated stainless steel air intake with a stainless steel filter and frame; and
   iv. have required stainless steel mounting accessories for mounting as indicated.

10.3.2. Radiant Heating Fixtures

a) Covers shall be finished in stainless steel, aluminum, or factory-finished pre-painted metal.
b) Covers shall be finished with a sloped top surface where they are not recessed or flush with adjacent surfaces to prevent the collection of debris, garbage, and water.
c) Electric unit heaters shall:
   i. be epoxy-polyester powder coat finished. Colour shall match adjacent finish colours where possible, using an acceptable range of colours; and
   ii. be a heavy-duty 18-gauge steel cabinet with adjustable louvres and protective screens.
d) Hydronic unit heaters shall be constructed of high-quality, die-formed, cold-rolled steel, degreased, phosphatized, etched, and finished in an aluminum semi-gloss finish.

e) Wall-mounted electric forced flow heaters shall:

i. be constructed of a stainless steel 20-gauge steel cabinet and an 18-gauge steel grille, finished in an epoxy-polyester finish coat; and
ii. be installed wall-mounted, recessed, or surface-mounted with a surface adapter.

f) Wall-mounted hydronic forced flow heaters shall:
i. be constructed of heavy 16-gauge furniture steel with removable fronts to provide access; and
ii. have cabinets that are rust-resistant and finished with a prime coat followed by a factory enamel finish.

g) Electric baseboard heaters shall:
i. be finished in top quality 100% polyester paint, baked enamel, and glossy finish, with colour as selected from the manufacturer's full colour range;
ii. have a casing constructed of 22-gauge steel casing able to support 22 kg in its center and 16-gauge steel connection boxes at each end; and
iii. have steel end caps with soft and rounded corners.

h) Hot water baseboard heaters shall:
i. be made of quality cold-rolled steel, 16 gauge, formed and reinforced with top supports, degreased, phosphatized, and coated inside and out with a corrosion-resistant tan primer;
ii. have panels manufactured in lengths of 600 mm to 2,400 mm in 150 mm increments;
iii. have an enclosure complete with components for wall-to-wall installation, following the contour of the wall, complete with end caps, wall trim, concealed joiners, inside corners, outside corners, access doors and pipe covers as required;
iv. have recessed joints and filler pieces; and
v. be supported rigidly at the top and bottom, on wall-mounted brackets.

10.4. ELECTRICAL EQUIPMENT

Location: Exterior and Interior

a) All equipment shall be factory fabricated, assembled, and finished:
i. All electrical components shall be factory fabricated, including supports, plates, and hardware. All hot-dip galvanizing shall be performed in the factory;
ii. Field welding of fabricated components shall not be permitted. Bolting or clamping shall be used instead;
iii. All protective coatings shall be applied at the factory of origin. Coatings applied on-site shall not be accepted; and
iv. Cut sections shall be touched up with cold galvanizing zinc coating as required.

b) Equipment mounting heights shall:
i. be measured from the finished floor to the vertical centerline of equipment unless specified or indicated otherwise;
ii. be verified with the Owner of this Standard before proceeding with installation, if the mounting height of the equipment is not indicated; and
iii. be at the following heights above finished floors, unless noted otherwise:
1. Local switches: 1,200 mm, vertical orientation;
2. Wall receptacles: 400 mm typically, vertical orientation, 1,000 mm in Electrical, UPS, LAN, MCC and Mechanical rooms; 850 mm in office areas;
3. Telephone outlets: 850 mm;
4. Data outlets: 850 mm;
5. Fire alarm stations and handsets: 1,050 to 1150 mm;
6. Intercom stations: 1,500 mm;
7. Wall-mounted speakers: 300 mm below the finished ceiling;
8. Locate receptacles above the counter backsplash and below the upper cabinet. Verify site conditions before installation.

c) Electrical equipment finish shall:
   i. adhere to the following painting procedures;
      1. Surfaces of electrical equipment requiring painting shall be prepared and cleaned to SSPC SP3 for rust and SSPC SP1 for oil, grease, dirt and other contaminants;
      2. Apply one coat of primer and two coats of finish paint. Colour shall be the manufacturer's standard ANSI grey, except as specified otherwise. Paint all electrical equipment to EEMAC standards; and
      3. Apply paint in accordance with the manufacturer's instructions regarding application methods, coating thicknesses, equipment, temperature, and humidity conditions.
   ii. surfaces scratched or marred during shipment and installation shall be cleaned and touched up to match the original paint finish;
   iii. Exposed hangers, racks and fasteners shall be cleaned, primed, and painted to prevent rust; and
   iv. Provide touch-up paint as required.

10.4.1. Electrical Receptacles

a) Receptacles shall be extra heavy-duty industrial type unless noted otherwise.
b) Except where unique cover plates are required, including but not limited to wall box dimmers, surface raceways, and occupancy sensors, cover plates for switches and receptacles shall be manufactured from high-quality stainless steel Grade 304, No. 4 brushed finish.
c) Exterior receptacles shall be provided with a weather-resistant lockable cover.
d) Publicly accessible interior receptacles for maintenance use shall be provided with a lockable cover.

10.5. LIGHTING

Location: Exterior and Interior

a) Light sources shall have good colour rendering, a minimum Colour Rendering Index (CRI) of 80, and correct colour temperature to support comfort and well-being.
b) All fixtures shall provide diffused light, individual diodes shall not be visible. Diffuser lens shall be a snap-in type and frosted.
c) Lighting systems shall require minimal maintenance, be energy efficient and readily accessible, and be designed for passenger safety and security.
   i. Lighting fixtures and ballasts shall ensure ease of access for servicing and maintenance.
   ii. All luminaires shall be serviceable and replaceable without the use of specialized tools.
   iii. Except for fixtures located in double-height spaces, luminaires shall not require constructing special means to access the fixture.
d) Lighting fixtures shall have an extruded aluminum profile combined with die-cast end caps, an aluminum body, and a heat sink.
e) Trims shall match adjacent material colour and finish to the best of the manufacturer’s ability.
f) Exit signs shall be fully self-contained and low-energy LED type.
   i. They shall be CSA and/or ULC listed, green Running Man-type exit signs.
   ii. All exit signs shall have universal mounting capabilities for wall, side, or ceiling mounting and require no specialized tools for installation or maintenance.
g) Enclosed stairs to bridges and tunnels shall have lighting integrated into side walls.
h) All stairs to bridges and tunnels shall have lighting integrated into handrails where noted.
i) Occupancy sensors shall be heavy-duty, specification-grade, and incorporated with the adjacent ceiling or soffit materiality. Wall-mounted occupancy sensors shall not be used.

j) The illumination systems shall be compatible with CCTV systems. Luminaires shall not present a source of glare to surveillance cameras.
k) Where accessible by the public, light fixtures shall be vandal-resistant.
l) Suspended luminaires and exit signs shall be pendant-mount supported from swivel hangers. Provide the pendant length required to suspend the luminaire at the indicated height. Pendant finish shall be metallic.
m) Surface-mounted luminaires and exit signs shall be installed plumb and adjusted to align with building lines and with each other. Fixtures shall be secured to prevent movement and installed per the manufacturer's instructions.
n) Fixtures shall be rated a minimum of IP20. Fixtures in wet areas (such as washrooms) shall be rated a minimum of IP67.

10.5.1. Exterior Lighting

Location: Exterior

a) All exterior light fixtures shall be LED with a maximum colour temperature of 3,000K unless noted otherwise, and shall be confirmed through testing with site materials.
b) Exterior luminaires shall be weather-resistant and have CSA or ULC wet location labels.
c) Outdoor motion sensors shall be rated and labelled for outdoor conditions and operations, and be impervious to the effects of ultraviolet rays and wet conditions.
d) Building luminaires in public areas shall be integrated with the architecture.
e) Site lighting controls, including sensors and timers, shall be provided for all site element lighting where appropriate, and shall be integrated into the station building automation system.
f) There shall be no interference with railroad signal or operation systems due to glare.
g) Luminaire selection and placement shall account for:
    i. light pollution, glare, and light trespass;
    ii. traffic and pedestrian hazards;
    iii. vandalism prevention;
    iv. dark spots and shadows for personnel security and effective operation of security devices;
    v. BUG (backlight, uplight, and glare) for Dark Sky compliance,
    vi. ease of maintenance and accessibility by fixture selection (tool-less maintenance and repair);
    vii. minimum light loss due to occasional lamp burnout; and
    viii. lens for uniformity of light colour.

10.5.2. Interior Lighting

Location: Interior

a) All interior light fixtures shall be LED with a colour temperature of 3,500K unless noted otherwise and shall be confirmed through testing with site materials.
b) The discomfort glare rating shall have a visual comfort probability (VCP) of 65% or greater for interior lighting.
c) LED lighting recessed in coves above washroom stalls shall be a perimeter slot system with reflectors suitable for damp locations.
d) Lighting controls, including sensors and timers, shall be provided for lighting elements where required, and shall be integrated into the station building automation system.

ARCHITECTURAL MATERIALS AND FINISHES DESIGN STANDARD

APPENDIX A

MATERIALS AND FINISHES SCHEDULE

APPENDIX A – MATERIALS AND FINISHES SCHEDULE

The following table provides a comprehensive list of all materials and finishes described in this document, including their descriptions, abbreviations, typical sizes, colours, finishes, and locations.

Standard Section	Tag	Description	Size (Length x Width/Height x Thickness)	Colour & Finish	Location (Exterior/ Interior)	Type	Notes
3.1.	FF1	Concrete Floor		Colours: Light Grey, Medium Grey	E & I	Floor	
3.1.1	FF1A	Sealed Concrete Floor		Colours: Light Grey, Medium Grey	E & I	Floor	
3.1.4	WB1	Concrete Base	Height: 400 mm	Colours: Light Grey, Medium Grey	E & I	Base	
3.2.	WB3	Porcelain Tile Base	Min height: 100 mm* Max height: 150 mm* Min thickness: 6 mm	Colours: White, Light Grey, Slate Grey, Medium Grey Finish: Matte	I	Base	*Unless noted otherwise, refer to modal standards for specific height requirement
3.2.	FF3	Porcelain Floor Tile	Min dimensions: 152 mm x 305 mm Max dimensions: 610 mm x 1,220 mm Min thickness: 10 mm	Colours: White, Light Grey, Slate Grey, Medium Grey Finish: Matte	I	Floor	
3.3.1	FF8A	Resilient Tile Flooring	Min dimensions: 305 mm x 305 mm Max dimensions: 610 mm x 610 mm Min thickness: 3 mm	Colours: White, Light Grey, Medium Grey	I	Floor	
3.3.2	WB8	Integral Resilient Sheet Base	Min height: 100 mm* Max height: 150 mm* Min thickness: 3 mm	Colours: White, Light Grey, Medium Grey	I	Base	*Unless noted otherwise, refer to modal standards for specific height requirement
3.3.2	FF8	Resilient Sheet Flooring	Min width: 1,830 mm Min thickness: 3 mm	Colours: White, Light Grey, Medium Grey	I	Floor	
3.4.	WB4	Integral Terrazzo Base	Min height: 100 mm* Max height: 150 mm*	Colours: White, Light Grey, Medium Grey, Charcoal Grey	I	Base	*Unless noted otherwise, refer to modal standards for specific height requirement
3.4.	FF4	Poured Terrazzo Flooring	Min thickness: 38 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey	I	Floor	
3.5.	WB5	Integral Fluid-Applied Epoxy Cove Base	Min height: 100 mm* Max height: 150 mm*	Colours: Clear, Light Grey, Medium Grey	I	Base	*Unless noted otherwise, refer to modal standards for specific height requirement
3.5.	FF5	Fluid-Applied Epoxy Flooring	Min height: 100 mm* Max height: 150 mm*	Colours: Clear, Light Grey, Medium Grey	I	Floor	
3.6.	FF7	Tile Carpeting	Min dimensions: 610 mm x 610 mm Max dimensions: 915 mm x 915 mm Min thickness: 6.3 mm	Colours: Light Grey, Medium Grey, Charcoal Grey	I	Floor	
3.6.	FF7A	Sheet Carpeting	Min thickness: 6.3 mm	Colours: Light Grey, Medium Grey, Charcoal Grey	I	Floor	
3.7.	WB2	Granite Base	Min height: 100 mm* Max height: 150 mm* Min thickness: 10mm	Colours: Light Grey, Medium Grey, Charcoal Grey Finish: Honed, Flamed	E & I	Base	*Unless noted otherwise, exterior granite bases shall be a minimum height of 400mm, refer to modal standards for specific height requirement
3.7.	FF2	Granite Floor Tile	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 1,220 mm Min thickness: 20mm	Colours: Light Grey, Medium Grey, Charcoal Grey Finish: Honed	I	Floor	
3.8.	FF9	Access Flooring	Std dimensions: 610 mm x 610 mm	Colours: Charcoal Grey	I	Floor	
3.9.1	WB7	Rubber Base	Min height: 100 mm* Max height: 150 mm* Min thickness: 3 mm	Colours: Warm Grey, Slate Grey, Medium Grey, Charcoal Grey, Black	I	Base	*Unless noted otherwise, refer to modal standards for specific height requirement
3.9.1	WB7A	Resilient Base	Min height: 100 mm* Max height: 150 mm* Min thickness: 3 mm	Colours: Warm Grey, Slate Grey, Medium Grey, Charcoal Grey, Black	I	Base	
3.9.2	WB6	Stainless Steel Base*	Min height: 100 mm* Max height: 150 mm*	Stainless Steel: No. 4 Brushed	I	Base	*16-gauge, Grade 304, on 2 layers of 16mm treated plywood paint finished. **Unless noted otherwise, refer to modal standards for specific height requirement
3.10.	FF6	Recessed Floor Grille	Min length: 3,000 mm Min width: match entry/exit door width Min depth: 46 mm		I	Floor	
4.1.	WF1	Concrete Wall		Colours: Light Grey, Medium Grey Finish: Architectural Concrete	E & I	Wall	
4.1.1	WF1A	Precast Concrete		Colours: Light Grey, Medium Grey Finish: Architectural Concrete	E & I	Wall	

Standard Section	Tag	Description	Size (Length x Width/Height x Thickness)	Colour & Finish	Location (Exterior/ Interior)	Type	Notes
4.1.2	WF15	Fibreglass Reinforced Concrete Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 13 mm	Colours: Light Grey, Medium Grey	E & I	Wall	
4.2.1	WF11	Clay Masonry Unit (Brick)		Colours: Neutral Tone	E & I	Wall	
4.2.2	WF12	Concrete Masonry Unit (Block)			E & I	Wall	
4.2.3	WF13	Architectural Masonry Unit (Block)		Finish: Polished, Smooth, Split Face, Ground Face, Shot Blast	E & I	Wall	
4.2.4	WF14	Acoustic Masonry Unit (Block)			I	Wall	Located above 2,750 mm datum
4.3.	WF4	Aluminum Wall Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 1.5 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Wall	
4.3.	WF4-P	Aluminum Perforated Wall Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 1.5 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Wall	
4.3.	WF5	Metal Wall Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 1.5 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Wall	
4.3.	WF5-P	Metal Perforated Wall Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 1.5 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Wall	
4.3.1	WF6	Aluminum Composite Wall Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 4 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Wall	
4.3.1	WF7	Metal Composite Wall Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 4 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Wall	
4.4.	WF3	Porcelain Wall Tile	Min dimensions: 152 mm x 305 mm** Max dimensions: 1,220 mm x 2,440 mm** Min thickness: 5 mm*	Colours: White, Light Grey, Medium Grey, Slate Grey, Charcoal Grey Finish: Matte	E & I	Wall	*minimum thickness unless noted otherwise, refer to modal standards **Refer to large and small format sizes
4.5.	WF18	Terracotta Wall Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 38 mm	Colours: Neutral Tone	E & I	Wall	
4.6.	WF2	Granite Wall Tile	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 10 mm	Colours: Light Grey, Warm Grey, Medium Grey, Charcoal Grey Finish: Honed,	E & I	Wall	
4.6.1	WF8	Sintered Stone Wall Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 10 mm	Colours: Light Grey, Warm Grey, Medium Grey, Charcoal Grey Finish: Honed,	E & I	Wall	
4.7.	WF9	Aluminum Fin / Baffle System	Min thickness: 3 mm	Colour: TBD*	E	Wall	*Refer to modal standards and project requirements
4.8.	WF10D	Plaster*		Colour: TBD*	I	Wall	*Plaster finish to match existing only
4.8.	WF10	Gypsum Wall Board	Thickness: 13 mm/16 mm/19 mm/25 mm*	Colour: TBD Finish: Paint, Eggshell	I	Wall	*Refer to modal standards and project requirements
4.8.1	WF10A	Gypsum Wall Board - Impact and Abuse Resistant	Min thickness: 16 mm*	Finish: Paint, Eggshell	I	Wall	*Refer to modal standards and project requirements
4.8.2	WF10B	Gypsum Wall Board - Moisture and Mould Resistant	Min thickness: 16 mm*	Finish: Paint, Eggshell	I	Wall	*Refer to modal standards and project requirements
4.8.3	WF10C	Gypsum Wall Board - Fire-Rated (Type X)	Min thickness: 16 mm*	Finish: Paint, Eggshell	I	Wall	*Refer to approved fire-rated construction assemblies and project requirements
4.9.	PT	Paint		Colour: TBD*	E & I	Finish	*Refer to modal standards and project requirements for specific location requirements
4.9.1	AGC	Anti-Graffiti Coating		Finish: Clear	E & I	Finish	
4.10.	CJ	Caulked Joint Sealant	Max interior width: 10 mm Max exterior width: 25 mm	Colour: Match adjacent material/finish	E & I	Accessory	
4.10.1	EJ	Expansion Joint	As required	Colours: White, Light Grey, Medium Grey, Slate Grey, Charcoal Grey, Black	E & I	Accessory	
4.11.	WF16	Fibreglass Reinforced Plastic Panel	Max dimensions: 1,220 mm x 2,440 mm Min thickness: 2.3 mm	Colours: White, Light Grey Finish: Smooth, Dimpled, Embossed	I	Wall	
4.12.	WF17	Fibre Cement Panel	Max dimensions: 1,220 mm x 2,440 mm Min thickness: 13 mm	Colours: Neutral Tone	E & I	Wall	
5.1.	CF1	Aluminum Soffit/Ceiling Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 1.5 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Ceiling	

Standard Section	Tag	Description	Size (Length x Width/Height x Thickness)	Colour & Finish	Location (Exterior/ Interior)	Type	Notes
5.1.	CF1-P	Aluminum Perforated Soffit/Ceiling Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 1.5 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Ceiling	
5.1.	CF2	Metal Soffit/Ceiling Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 1.5 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Ceiling	
5.1.	CF2-P	Metal Perforated Soffit/Ceiling Panel	Min dimensions: 610 mm x 610 mm Max dimensions: 1,220 mm x 2,440 mm Min thickness: 1.5 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey, Anodized, Wood Patterning	E & I	Ceiling	
5.2.	CF9	Cementitious Boards	Min. width: 2,440mm Min. thickness: 13 mm	Colours: White, Light Grey, Medium Grey, Charcoal Grey	E & I	Ceiling	
5.3.	CF10D	Plaster*		Colour: TBD*	I	Ceiling	*Plaster finish to match existing only
5.3.	CF10	Gypsum Board Ceiling	Thickness: 13 mm/16 mm/19 mm/25 mm*	Colours: White, Light Grey Finish: Paint, Flat	I	Ceiling	*Refer to modal standards and project requirements
5.3.1	CF10A	Gypsum Board - Impact and Abuse Resistant	Min thickness: 16 mm*	Finish: Paint, Flat	I	Ceiling	*Refer to modal standards and project requirements
5.3.2	CF10B	Gypsum Board - Moisture and Mould Resistant	Min thickness: 16 mm*	Finish: Paint, Flat	I	Ceiling	*Refer to modal standards and project requirements
5.3.3	CF10C	Gypsum Board - Fire-Rated (Type X)	Min thickness: 16 mm*	Finish: Paint, Flat	I	Ceiling	*Refer to approved fire-rated construction assemblies and project requirements
5.3.3	CF4	Acoustical Ceiling Tile (T-Bar)	Min dimensions: 610 mm x 610 mm* Max dimensions: 610 mm x 1,220 mm* Min thickness: 12mm	Colour: White	I	Ceiling	*Unless noted otherwise, refer to modal standards for specific dimensional requirement
5.5.1	CF6	High-Gloss Lacquered Panel**	Max dimensions: 1,220 mm x 2,440 mm	Colour: TBD*	E & I	Ceiling	*Refer to modal standards and project requirements **Exterior grade solid surfacing for exterior conditions
5.5.2	CF5	Prefinished Metal Grille Ceiling	Min profile: 25 mm (W) x 50 mm (H) Min length: 915 mm Max length: 4,880 mm	Colour: TBD* Finish: Matte	I	Ceiling	*Refer to modal standards and project requirements
6.1.	FL	Flashing and Sheet Metal	Min thickness: 0.6 mm	Colour: TBD*	E	Roof	*Refer to modal standards and project requirements for specific location requirements
7.1.1	DR2	Aluminum Door and Frame		Colours: White, Anodized, Charcoal	E & I	Doors	
7.1.2	DR3	Hollow Metal Door and Frame		Finish: Paint, Satin or Eggshell	E & I	Doors	
7.1.3	DR4	Stainless Steel Door and Frame		Finish: No. 4 Brushed, No. 9 Bead-blasted	E & I	Doors	
7.1.4	DR5	Wood Door and Frame		Finish: Paint or Stain	I	Doors	
7.2.	DR1	Sliding Aluminum Door and Frame		Colours: White, Anodized, Charcoal	E & I	Doors	
7.3.1	DR6	Overhead Coiling Door		Colours: White, Light Grey, Medium Grey, Anodized, Charcoal	E & I	Doors	
7.3.2	DR6A	Coiling Counter Door		Colours: White, Light Grey, Medium Grey, Anodized, Charcoal	I	Doors	
7.3.3	DR7	Side Folding Door		Colours: White, Light Grey, Medium Grey, Anodized, Charcoal	I	Doors	
7.4.1	CW1	Curtain Wall System - Fully Captured System		Colours: White, Anodized, Charcoal	E & I	Curtain Wall	
7.4.2	CW2	Curtain Wall System - Two-Sided Structural Silicone Glazing		Colours: White, Anodized, Charcoal	E & I	Curtain Wall	
7.4.2	CW3	Curtain Wall System - Four-Sided Structural Silicone Glazing		Colours: White, Anodized, Charcoal	E & I	Curtain Wall	
7.4.3	SCR	Storefront Glazed Screen		Colours: White, Anodized, Charcoal	E & I	Openings	
7.4.4	SGS	Sloped Glazed System		Colours: White, Anodized, Charcoal	E & I	Openings	
7.5.	WIN	Metal Window		Colours: White, Anodized, Charcoal	E & I	Openings	
7.6.	SKL	Skylight		Colours: White, Anodized, Charcoal	E	Openings	
7.7.	HDW	Door Hardware			E & I	Hardware	
7.7.8	ADO	Automatic Door Operator	Height: 914 mm Width: 152 mm		E & I	Hardware	
7.8.	GL3	Tempered Glass	Max dimensions: 1,220 mm x 2,440 mm Min thickness: 10 mm	Clear	E & I	Glazing	

Standard Section	Tag	Description	Size (Length x Width/Height x Thickness)	Colour & Finish	Location (Exterior/ Interior)	Type	Notes
7.8.	GL4	Heat Strengthened Glass	Max dimensions: 1,220 mm x 2,440 mm Min thickness: 10 mm	Clear	E & I	Glazing	
7.8.	GL2	Float Glass	Max dimensions: 1,220 mm x 2,440 mm Min thickness: 10 mm	Clear	E & I	Glazing	
7.8.1	GL5	Laminated (Safety) Glass	Max dimensions: 1,220 mm x 2,440 mm Min thickness: 13 mm*	Clear	E & I	Glazing	*Two 6mm thick w/ clear PVB interlayer, bevelled edges
7.8.2	GL7	Fire-Rated Glass		Clear	E & I	Glazing	
7.8.3	GL6	Back-Painted Low-Iron Spandrel Glass	Max dimensions: 1,200 mm x 2,440 mm Min thickness: 10mm*	Colours: White, Light Grey, Warm Grey, Slate Grey, Medium Grey, Charcoal Grey**	E & I	Glazing	*Min thickness may be 6mm when installed on a substrate ** Custom colours determined on a project-specific basis
7.8.4	GL1A	Insulated Glass Unit (Vision Glass) - Low-E Coating on Surface #2 or #3	Max: 2400mm x 1200mm x 25mm* Min: 300mm x 300mm x 25mm*	Clear, bird-friendly frit (if applicable) on Surface #1	E & I	Glazing	
7.8.4	GL1B	Insulated Glass Unit (Gradient Fritted Vision Glass) - Low-E Coating on Surface #2 or #3	Max: 2400mm x 1200mm x 25mm* Min: 300mm x 300mm x 25mm*	Clear, gradient white ceramic frit (20% to 80%) on Surface #1	E & I	Glazing	
7.8.4	GL1C	Insulated Glass Unit (Fritted Vision Glass) - Low-E Coating on Surface #2 or #3	Max: 2400mm x 1200mm x 25mm* Min: 300mm x 300mm x 25mm*	Clear, white ceramic frit (80%) on Surface #1	E & I	Glazing	
7.8.4	GL1D	Insulated Glass Unit (Fritted Spandrel Glass) - Low-E Coating on Surface #2 or #3	Max: 2400mm x 1200mm x 25mm* Min: 300mm x 300mm x 25mm*	Back-painted on Surface #4, white ceramic frit (80%) on Surface #1	E & I	Glazing	
7.8.5	CF	Ceramic Frit	Bird-friendly frit min dimension: 5 mmØ, Max spacing: 50 mm x 50 mm O/C	Colour: White	E & I	Glazing	
7.8.6	FLM	Film			E & I	Glazing	
7.9.	LV1	Prefinished Architectural Louvre		Colour: Match adjacent material/finish	E & I	Louvre	
8.1.	ST2	Concrete-Filled Metal Pan Stairs		Colours: Light Grey, Medium Grey*	E & I	Stairs	*Stringers to be paint-finished Charcoal Grey
8.2.	ST1	Cast-In-Place Concrete Stairs		Colours: Light Grey, Medium Grey	E & I	Stairs	
8.2.	ST1A	Precast Concrete Stairs		Colours: Light Grey, Medium Grey	E & I	Stairs	
8.3.1	GRD1	Steel Guard Railing*		Colour: Metallic grey, Black	E & I	Guard	*Hot-dipped Galvanized
8.3.1	HND1	Steel Handrail*		Colour: Metallic grey, Black	E & I	Handrail	*Hot-dipped Galvanized
8.3.2	GRD2	Stainless Steel Guard Railing*		Finish: No. 4 Brushed	E & I	Guard	*Type 304 Interior, Type 316 Exterior
8.3.2	HND2	Stainless Steel Handrail*		Finish: No. 4 Brushed	E & I	Handrail	*Type 304 Interior, Type 316 Exterior
8.3.3	GRD3	Glazed Decorative Metal Railing*		Clear	E & I	Guard	*Glazing shall be LGL
8.3.4	GRD4	Wire/Mesh Decorative Metal Railing	Min wire mesh spacing: 50 mm O/C Max wire mesh spacing: 100 mm O/C	Finish: No. 4 Brushed	E & I	Guard	
8.4.	ELEV	Hydraulic Elevator		Finish: No. 4 Brushed, Clear Glazing	I	Elevator	
8.4.	ELEV	Machine Roomless Elevator		Finish: No. 4 Brushed, Clear Glazing	I	Elevator	
8.5.	ESCL	Escalator		Finish: No. 4 Brushed, Clear Glazing	I	Escalator	
9.1.	MW1	Millwork / Casework	.		I	Millwork	
9.2.1	CT1	Simulated Stone (Quartz) Countertop			I	Countertop	
9.2.2	CT2	Solid Surfacing Countertop		Colours: Light Grey, Warm Grey, Slate Grey, Medium Grey, Charcoal Grey	I	Countertop	
9.2.3	CT3	Stainless Steel Countertop		Finish: No. 4 Brushed	I	Countertop	
9.2.4	CT4	Plastic Laminate		Colours: Light Grey, Warm Grey, Slate Grey, Medium Grey, Charcoal Grey	I	Countertop	
9.3.	TP1	Metal Toilet Partitions		Finish: Diamond, Embossed, or Brushed	I	Washroom	
9.3.	TP2	High-Density Polyethylene (HDPE) Toilet Partitions			I	Washroom	

Standard Section	Tag	Description	Size (Length x Width/Height x Thickness)	Colour & Finish	Location (Exterior/ Interior)	Type	Notes
9.4.1	CG	Corner Guard		Finish: No. 4 Brushed	E & I	Accessory	
9.5.1	PCD	Pest Control Device*			E	Accessory	*Type 316 Exterior
9.6.1	BEN	Exterior Seating/Bench		Seat Finish: Pagwood Veneer, Wire Mesh Frame Finish: White RAL 9006	E	Furniture	
9.6.1	BEN	Interior Seating/Bench		Seat Finish: Pagwood Veneer, Wire Mesh Frame Finish: White RAL 9006	I	Furniture	
9.6.2	LR	Exterior Leaning Rail			E	Furniture	
9.6.2	LR	Interior Leaning Rail			I	Furniture	
9.6.3	WRR	Exterior Waste and Recycle Receptacles			E	Furniture	
9.6.3	WRR	Interior Waste and Recycle Receptacles			I	Furniture	
9.6.4	BOL	Interior Bollard		Colour: Safety Yellow	I	Furniture	
9.7.	BIC	Bicycle Rack			E	Furniture	
10.1.1	SPRK	Sprinklers			I	Fixture	
10.1.2	FEC	Fire Extinguisher Cabinet		Finish: No. 4 Brushed	I	Fixture	
10.1.2	FHC	Fire Hose Cabinet		Finish: No. 4 Brushed	I	Fixture	
10.2.1	WC	Water Closet / Toilet		Colour: White	I	Fixture	
10.2.2	UR	Urinal		Colour: White	I	Fixture	
10.2.3	LAV	Lavatory / Sink		Colour: White	I	Fixture	
10.2.4	DF	Drinking Fountain and Bottle Filling Station			I	Fixture	
10.2.5	AD	Area Drain			E & I	Fixture	
10.2.5	FD	Floor Drain			E & I	Fixture	
10.2.5	RD	Roof Drain			E	Fixture	
10.3.1	DIF	Diffuser			I	Fixture	
10.3.1	RET	Return			I	Fixture	
10.3.2	RAD	Radiator			I	Fixture	
10.3.2	CUH	Cabinet Unit Heater			I	Fixture	
10.3.2	FFH	Force Flow Heater			I	Fixture	
10.4.1	REC	Exterior Receptacle (Cover)*			E	Fixture	*Weather-resistant lockable cover
10.4.1	REC	Interior Receptacle (Cover Plate)		Finish: No.4 Brushed	I	Fixture	
10.5.1	LF	Exterior Light Fixture			E	Fixture	
10.5.2	LF	Interior Light Fixture			I	Fixture	