Metrolinx
Level Boarding - Part 1: Passive Protection

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Metrolinx,

an Agency of the Government of Ontario

Preface

This is the second edition of the Level Boarding - Part 1: Passive Protection standard. The changes include change in height of concrete curb and addition of a sketch to clarify OCS foundation dimensions.

This document is also the first part of the three-part series of standards for level boarding. The other two standards will be *Part 2 - New Stations* and *Part 3 - Existing Stations* where end state level boarding will be addressed for new build and existing conditions respectively.

The purpose of the Passive Protection standard is to provide functional requirements for immediate implementation on new and substantially renovated stations, to facilitate future level boarding. It provides project delivery teams with specific and performance requirements for fixed infrastructure elements to minimize rework associated with raising the platform in the future. All level boarding standards are intended to work with fleet level boarding standards that are in development.

Historically, GO Train stations were built without level boarding and the interface between rolling stock and platform was designed without consideration for level boarding. The accessible car is an exception that arose from meeting legislated (AODA) requirements, and provided a raised mini-platform for level boarding. Metrolinx is phasing in whole-platform level boarding, and passive protection for future level boarding is an interim solution for new stations (or platforms) that will be built ahead of the modified fleet. This will reduce future capital costs associated with a future level boarding modification.

Suggestions for revision or improvement should be sent to CPG Engineering & Asset Management, Attention: Manager, Facilities Engineering & Assurance.

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Appendices

Definitions

Term	Definition
Level Boarding	Level-boarding refers to having station platforms that are level with train interiors so that a passenger does not have to climb any steps to board the train. This allows people in wheelchairs to board quickly and easily without any special assistance.
Sloped walk	Sloped walks are the sloped surfaces where gradient is not steeper than as per Ontario Building Code (OBC) requirements.
PRESTO	A Metrolinx division which is responsible for the administration of the contactless smart card (presto card) fare payment system.

Abbreviations

Term	Definition
LB	Level-boarding
ATR	Above Top of Rail
PP	Passive Protection
OBC	Ontario Building Code
NFHB	Non-Freeze Hose Bib
CCTV	Closed Circuit Television
PA	Public address
I&IT	Information and Information Technology
OCS	Overhead Contact System
GFI	Ground Fault (Circuit) Interrupter

Functional Requirements

1 Station Platform Elements for Passive Protection

1.1 Currently GO platforms are built to 127 mm ATR (Above Top of Rail) height and station platform standards reflect this. Platforms of this height require customers to board/alight a rail vehicle by climbing two steps. However platform heights for level boarding will be 610 mm ATR (for details on dimensions for straight and curved platform, refer GO Track Standard (GTS) plan 3004).

1.2 Modification of platforms to 610 mm ATR will require some additional cost and scope in future. The requirements below are meant to reduce future costs through design provisions when building 127 mm ATR platforms.

1.3 All stations identified for passive protection for level boarding shall integrate the following requirements in this standard into design and construction

2 Stages of Construction and General Notes:

2.1 Stage 1 – Passive Protection Phase:

a) Top of platform shall be built to 127 mm Above Top of rail (ATR);

b) Design and construction of components shall make provisions for Stage 2, as detailed below and;

c) To completely understand the requirements of this Stage, Stage 2 provisions need to be read. If additional requirements for Stage 1 come out of Stage 2 descriptions, they shall be implemented in Stage 1.

2.2 Stage 2 – Level Boarding Implementation Phase:

a) Top of platform shall be built to 610 mm ATR. This will be referred to as the Level Boarding (LB) platform level;

b) Construction shall be completed as required to achieve the final build; and

c) Design and construction shall be coordinated in such a way that the result once complete shall appear on purpose, seamless and clean. It shall not be apparent that this was a retrofit intervention.

2.3 Applicability:

a) The provisions below are for the platform level component of the elements, unless specifically noted otherwise; and

b) All other Metrolinx Standards and requirements, and all other applicable codes standards are to be followed, unless specifically noted otherwise. This includes clearance envelope requirements specified by Metrolinx, Canadian National Railway, Canadian Pacific Railroad, and/or VIA Rail depending on the station/corridor.

c) Contractor is responsible to field verify existing platform fixtures and notify Metrolinx should any encroach on the required clearances.

2.4 Coordination:

a) Technical disciplines, including civil, structural, mechanical and electrical, are to be coordinated with and make provisions per requirements set out below.

3 Provisions for Passenger Access Areas and Station Building: (Refer to Diagram 6)

3.1 Stage 1 – Passive Protection Phase:

a) Passenger Access Areas and Station Buildings (or stand-alone modules) shall be designed and built to final LB platform level;

b) Ensure that access to the platform through or around Station Buildings or Passenger Access Areas shall be barrier free and where possible, ramp free;

c) Site infrastructure shall be designed, such that, in future there shall be no changes required to buildings adjacent to platforms during the process of raising platform level. The intention is to build platform adjacent structures at the LB platform level to eliminate end state changes.

d) Provisions shall be made to provide access to side platforms at 127 mm ATR until implementation of LB platform, via vertical accesses.

e) It is preferred that sloped walks are used in place of stairs and ramps. Sloped walks provide vertical access in a way that is easier for all customers to navigate and at the same time minimize infrastructure elements that may not be necessary when level boarding is implemented; and

f) Preference shall be given to end state LB design, which shall be made as seamless as possible, as it will be the long-term solution.

3.2 Stage 2 – Level Boarding Implementation Phase:

a) No change shall be required to Station Building and Passenger Access Areas;

b) Approaches to platform shall be made good and level;

c) Ensure that access to the platform through or around Station Buildings or Passenger Access Areas shall be barrier free and where possible, ramp free; and

d) Vertical accesses within Station Buildings and Passenger Access Areas shall be completed to the final LB platform height.

4 Station Site Works:

4.1 Site shall be designed with passive protection until fleet is modified and built to final LB platform level at all greenfield sites and all sites with significant renovation;

4.2 Consideration must be given through the station site design to accommodate the end state LB condition within the site footprint;

4.3 Site grading shall be designed to ensure that there are minimal level changes adjacent to Station Building or passenger accesses at LB height end state;

4.4 Existing stations shall be regraded and/or augmented to grant barrier free access to side platforms at LB height; and

4.5 As per item d above: modification of existing mechanical system serving station building may be required, i.e. NFHB installed at exterior wall, gas meter located outside adjacent to exterior wall, intake/exhaust louvres located at exterior wall, outdoor unit of heat pump system located outside adjacent to exterior wall, storm water leader c/w cleanout located outside against exterior wall, floor drain c/w cleanout located outside.

5 Provisions for Elevators: (Refer to Diagram 1: Elevator)

5.1 Stage 1 – Passive Protection Phase:

a) Elevator shafts and overruns shall be designed and built for final LB platform level (i.e. Providing Elevators that can be designed to accommodate future hoistway extension to match the future grade increase and future Canopy elevation without replacing the Elevator equipment or enclosures);

b) Elevator walls shall be designed and built for final LB platform level.

1) This includes the provision of a concrete wall base designed and built for the final platform level configuration at 300 mm above LB platform, or 783 mm above the 127 mm ATR platform. This includes both the elevator shaft and all vestibules.

2) Note that elevator height needs to coordinate with canopy soffit as described in the section on canopies below.

c) Elevator walls containing elevator doors shall be designed and built with a double level of door header structure:

1) Top structure receiving door frames (lintels) shall be installed both at the level corresponding to the 127 mm ATR platform and at the level corresponding to the LB platform; and

2) Provisions for installation of future bottom lintel and infill of wall between 127 mm ATR and LB platform shall be made.

d) Door and door frames shall be designed and built for the 127 mm ATR platform, with the following additional provisions:

1) Modification of the door wall enclosure shall be feasible in Stage 2 without significant impact to the elevator enclosure. (For example, a separate cladding panel to be provided above the elevator doors in Stage 1 at the correct size and height so that it can be removed in Stage 2 without impact to the entire elevation.)

2) Similar provisions for relocation of elevator controls in Stage 2 without significant impact to elevator enclosure shall be made. (For example an oversized cover plate may be provided in Stage 1 at the controls location).

e) The elevator shall be designed and commissioned with the ability to change the stop level from 127 mm ATR to the LB platform.

f) Elevator lobbies include Two-Way Intercoms - these devices will need to be adjusted to suit Stage 2 LB Phase

g) An elevator consultant must be engaged to coordinate details for all the above requirements.

5.2 Stage 2 – Level Boarding Implementation Phase:

a) No change shall be required to elevator shafts and overruns;

b) No change shall be required to elevator walls except as noted in items c and d, below;

c) Elevator walls containing elevator doors – the lower level of structure above the Stage 1 door shall be removed; structure shall be infilled below new doors as required;

d) Door and door frames shall be removed and replaced with new to match. The new door frames shall be installed into the second framing (lintel) provided in Stage 1.

e) Modifications to location of door operators will be required

f) Cladding modifications provided for in Stage 1 shall be implemented. No other significant elevator shaft and/or elevator cladding modification are to be required for door installation. Elevator stop level shall be adjusted to the LB platform level and elevator shall be recommissioned, as required.

g) Elevator control panel shall be relocated; provisions to be in place as per Stage 1 requirements to manage impacts to elevator enclosure.

h) An elevator consultant must be engaged to coordinate details and achieve efficiencies.

6 Provisions for Stairs and Stair Enclosures: (Refer to Diagrams 4 & 5: Stair Section and Plan)

6.1 Stage 1 – Passive Protection Phase:

a) Stairs shall be fully designed for the LB platform level. This includes treads, risers, landings, handrails, guardrails, vestibule sizes and concrete wall bases.

b) Stair enclosures shall be built to the final LB platform level:

1) This includes the provision of a concrete wall base designed and built for the final platform level configuration at 300 mm above LB platform, or 783 mm above the 127 mm ATR platform.

2) Note that enclosure height needs to coordinate with canopy soffit as described in the section on canopies below.

3) Provisions for stair enclosures shall be provided so as to maintain surge space as per Metrolinx Design Standards

c) Stair enclosure doors shall be built at the 127 mm ATR level. Provisions in the elevation shall be made to facilitate modification of this wall at a later date to receive a door at the LB level:

1) This shall include structure and cladding that can be modified or replaced in the future. Additional required structural or miscellaneous metals framing shall be provided in Stage 1 and infill panel shall be coordinated in size so that in Stage 2 only removal of a panel is required, without requiring a change in elevation.

2) Provisions for future relocation of all automatic door openers shall be made. (For example an oversized cover plate may be provided in Stage 1 at the required location).

d) Stair (treads, risers, platform lending, handrails and guardrails) shall be built to the 127 mm ATR platform.

6.2 Stage 2 – Level Boarding Implementation Phase:

a) Stair enclosure doors, door frames and cladding panels above doors shall be removed and replaced with new to match. Structural modifications shall be made as required to receive doors, frames and cladding panels. Modifications to location of door operators will be required. This shall be managed with minimal impact to enclosure and cladding. Once relocation is finished, it shall not be apparent that this has been a retrofit.

b) Stair (treads, risers, platform lending, handrails and guardrails) shall be filled in to the LB platform level. Fill-ins shall match original stair finishes and shall be designed so as to be as undetectable as possible.

1) Some minor modifications to existing stair elements may be required to facilitate a smooth and customer friendly transition. Particular care needs to be taken to accessibility concerns and smooth final handrails.

2) Due to slight variations on platform elevations in existing stations, stair landings may be designed to be feathered down to level boarding platform in order to maintain equal risers for the staircase. Ensure stairs remain at high point so the landing is sloping away from top of the stairs, to avoid precipitation collection at door thresholds and stairs.

7 Provisions for Canopies: (Refer Diagram 2: Canopy)

7.1 Stage 1 – Passive Protection Phase:

a) Canopies shall be fully designed for the LB platform level.

1) This includes the provision of bases designed and built for the final platform level configuration at 300 mm above LB platform, or 783 mm above the 127 mm ATR platform.

b) Underside of canopy is to be located at a 3483 mm clearance above 127 mm ATR platform or a 3000 mm clearance above LB platform.

1) This change is being implemented in order to manage protection from the elements (i.e. rain, snow, hail, etc) in Stage 1 and achieve an improved condition in Stage 2 over the existing.

2) This modification is based on the assumption that future digital signage may be achieved through the use of a shorter profile monitor, or will not be mounted to the underside of canopy.

3) In Stage 1, digital screens in landscape format can be mounted from the canopy.

7.2 Stage 2 – Level Boarding Implementation Phase:

a) Minimal changes are anticipated in this Stage.

b) If digital signage is canopy-hung, it shall be removed and replaced as per provisions under Signage and Wayfinding.

8 Provisions for Shelters: (Refer to Diagram 3: Shelter)

8.1 Stage 1 – Passive Protection Phase:

a) Shelters shall be fully designed for the LB platform level.
   1) This includes the provision of bases designed and built for the final platform level configuration at 300 mm above LB platform, or 783 mm above the 127 mm ATR platform.
   2) Note that enclosure height needs to coordinate with canopy soffit as described in the section on canopies above.

b) Shelter doors shall be built at the 127 mm ATR level. Provisions in the elevation shall be made to facilitate modification of this wall at a later date to receive a door at the LB level:
   1) This shall include structure and cladding that can be modified or replaced in the future. Additional required structural or miscellaneous metals framing shall be provided in Stage 1 and infill panel shall be coordinated in size so that in Stage 2 only removal of a panel is required, without requiring a change in elevation.
   2) Provisions for future relocation of any automatic door openers shall be made. (For example an oversized cover plate may be provided in Stage 1 at the required location).

c) The solid info walls shall be designed and constructed with provisions to raise the advertisements, maps and others to suit the LB platform. This shall include structural and cladding allowances to minimize impact.

d) Advertisements, maps and others are to be installed at 127 mm ATR platform level.

e) Benches inside standard GO Shelters are currently supported by structural beam welded to columns; it needs to be designed and constructed so that it does not look like a retrofit at Stage 2 LB phase

f) Consider digital (LCD info) screen mounted at LB height in this stage to eliminate future requirement to raise elevation

8.2 Stage 2 – Level Boarding Implementation Phase:

a) Shelter doors, door frames and cladding panels above doors shall be removed and replaced with new to match.
   1) Structural modifications shall be made as required to receive doors, frames and cladding panels.
   2) Modifications to location of door operators will be required. This shall be managed with minimal impact to enclosure and cladding.

b) Once relocation is finished, it shall not be apparent that this has been a retrofit.

c) Modifications to solid info walls are anticipated to raise the advertisements, maps and others to suit the future platform. Once relocation is finished, it shall not be apparent that this has been a retrofit.

9 Provisions for Signage and Wayfinding:

9.1 Stage 1 – Passive Protection Phase:

a) All overhead static signage shall be installed for final LB platform level.

b) Digital signage shall follow standards in effect at the time of design;

c) Provide signage hangers that allow a consistent mounting height to be maintained from the platform that meets Metrolinx Standards and to accommodate the future platform elevation for level boarding;

9.2 Stage 2 – Level Boarding Implementation Phase:

a) Minimal changes are anticipated in this Stage for static signage.

b) Digital signage shall be reviewed and adjusted to suit new standard in effect. Changes could include modification of existing enclosures, provision and installation of new equipment, or provision of new enclosures. All modifications shall be performed with minimal impacts and once relocation is finished, it shall not be apparent that this has been a retrofit.

10 Provisions for Other Elements:

10.1 Stage 1 – Passive Protection Phase:

a) All canopy-mounted elements, such as CCTV, public address (PA) and lighting shall be installed with canopy.

b) All CCTV placement and mounting as well as Two way Intercom devices shall be adjustable to accommodate LB platform level.

c) All public address systems (PA) shall be designed to accommodate both LB and 127 mm ATR platform levels. Mounting shall be at final LB platform level.

d) All lighting shall be designed to accommodate both LB and 127 mm ATR platform levels. Mounting shall be at final LB platform level.

e) All poles installed on platforms shall be designed and built to the LB platform level. This includes the provision of bases designed and built for the final platform level configuration at 300 mm above LB platform, or 783 mm above the 127 mm ATR platform.

f) I&IT hub rooms shall be designed to final LB platform level – coordination with required space is required with Metrolinx standards:

   1) This includes the provision of a concrete wall base designed and built for the final platform level configuration at 300 mm above LB platform, or 783 mm above the 127 mm ATR platform.

   2) If space permits, the floor shall be built at the final LB platform level and doors shall be provided at final LB height, to avoid future modifications – confirmation of acceptability shall be obtained from Metrolinx.

3) Provide new mechanical system to be installed at the current platform height and modified to suit the future level boarding platform elevation (if required), i e: floor drain, heater and indoor/outdoor units of heat pump system

4) Wall units mounted inside the Hub Rooms shall be mounted to acceptable working heights, within easy reach of worker for both Stage 1 as well considering for stage 2.

5) Include Metrolinx I&IT as part of the IT infrastructure related review

10.2 Stage 2 – Level Boarding Implementation Phase:

a) Minimal modifications anticipated to canopy-mounted elements installed with canopy.

b) Minimal to no modifications anticipated pole-mounted lighting and all other poles.

c) Re-adjustment of CCTV equipment and Two-way Intercom devices may be required,

d) Modifications to I&IT hub room are dependent on whether Stage 1 solution of raised floor and door can be implemented. If yes, modification will be minimal. If no, changes to enclosure and interiors are anticipated.

e) Review and modification of other minor elements may be required – e.g. pedestal-mounted door controls, PRESTO tap, or other not anticipated at this point.

11 Other Technical requirements

11.1 Provisions for future level boarding shall be provided which consists of a new standard platform height elevation 610 mm above top of rail. Provisions for level boarding include:

A) Constructing top of concrete foundations for electrical and communication pole bases, OCS foundation bases, and other column bases, to suit the future level boarding platform elevations at 300mm above future level boarding platform or 783mm above the 127mm above top of rail platform;

b) Constructing all above grade public facing walls that have interface with future level boarding and adjacent structures to suit the future level boarding platform elevations;

c) Pedestrian openings and doors that can accommodate a future level boarding platform elevation shall be installed to facilitate future accommodation for future level boarding platform elevation;

d) Vestibule bases shall be built at 300mm above the future level boarding platform or 783mm above the existing platform;

e) Provide cabling that can accommodate a future grade increase without having to replace the cables;

f) Adjust CCTV at the final level boarding elevation;

g) Demonstrate and implement the lighting level at the current and future level boarding condition meets Metrolinx Standards;

h) Locations of electrical receptacles shall take into consideration as per the future level boarding condition (Surface mounted convenient GFIs will need to be adjusted for future LB height);

i) Providing handwells and chambers for electrical and communications equipment that can accommodate a future platform elevation increase without having to replace handwells;

j) Building Structures and their structural components that can accommodate the loading and geometry resulting from the additional loads.

k) Provide light switches to be mounted at a height to meet Metrolinx Standards with a provision for additional wiring length to account for the current and future level boarding platform elevation requirement;

l) Provide heaters and its buttons in platform shelters to be installed with provisions for additional wiring and mounting that accounts for current and future level boarding requirement;

m) Provide door push button operator to be mounted at a height to meet Metrolinx Standards with provisions for additional wiring length to account for the current and future level boarding height requirement;

n) Provide fare system equipment to be installed with provisions for additional wiring length to account for the current and future level boarding platform elevation requirement;

o) Provide rainwater leader drain c/w clean out to be installed at the current platform height and modification to suit the future level boarding platform elevation;

p) Provide a snowmelt system that can accommodate a future grade increase for future platform level boarding with provision to:

1) abandon the existing snow melting piping in existing platform, and to be disconnected, capped, and labeled. Existing glycol solution shall be recovered. When future level boarding takes place, new snow melting piping will be installed at the new raised platform complete with insulation and mesh; and

2) provide manifold chambers that shall be extendable to accommodate the future level boarding grade increase. These provisions include manifold chamber wall extension, new angle frame, reusable manifold covers with soft closing and self-opening mechanism.;

q) Provide plumbing and drainage system which shall take into consideration the future level boarding condition and requirements including:

1) floor drain, sanitary and storm water piping cleanouts, platform drains; and

2) NFHB to be installed at proper height to accommodate future level boarding without replacement.

r) The placement of platform elements (canopies, elevators etc.) and clearance width for passenger circulation should be protected for future horizontal edge at 610 mm ATR (1753mm from track centreline); current standard for horizontal edge at 127 mm ATR platforms is 1632mm from track centreline. An accessible route and associated/supporting design requirements and station status on accessibility should be maintained when designing for passive protection

s) For each site that requires passive protection for future level boarding, the following shall be submitted for Metrolinx review:

1) Narrative of the approach and strategy to achieve level boarding provision; and

2) Drawings that illustrate the current planned platform height above rail that follow Metrolinx Standards and provisions for future level boarding consisting of a new standard platform elevation 610mm above top of rail.

3) An analysis needs to be done to see which grounding and bonding elements from the Electrification standards needs and can be implemented at the time of passive protection for future level boarding

Appendix A – Drawings

A.1 List of Drawings

a) Diagram 1 - Elevator
b) Diagram 2 – Platform + Canopy
c) Diagram 3 - Shelter
d) Diagram 4 – Stairs - Plan
e) Diagram 5 - Stairs - Section
f) Diagram 6 – Passenger Access Area
g) SKE-001 – Electrification Enabling Works – Provision for Level Boarding OCS foundation

DIAGRAM 1: ELEVATOR

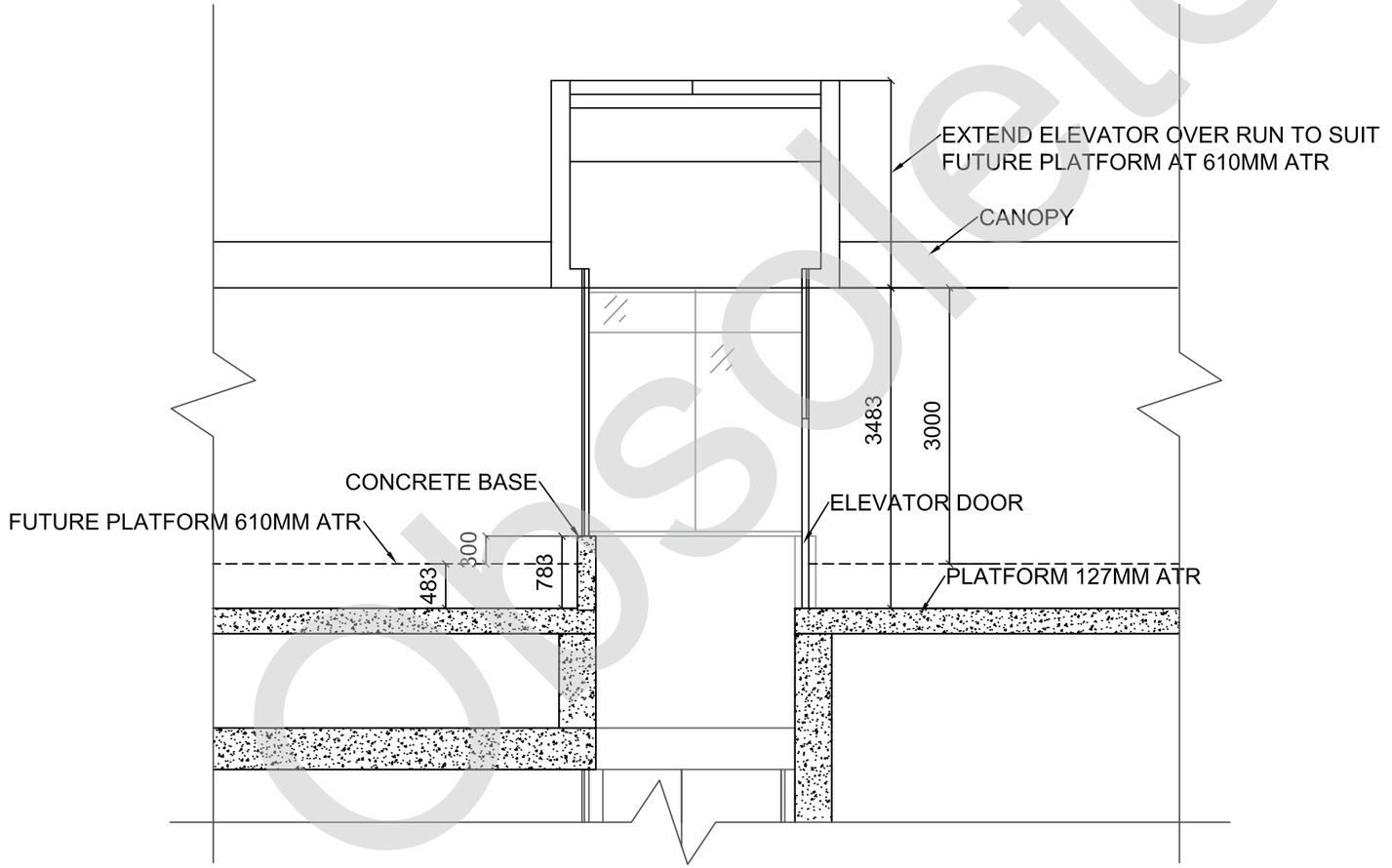


DIAGRAM 2: PLATFORM + CANOPY

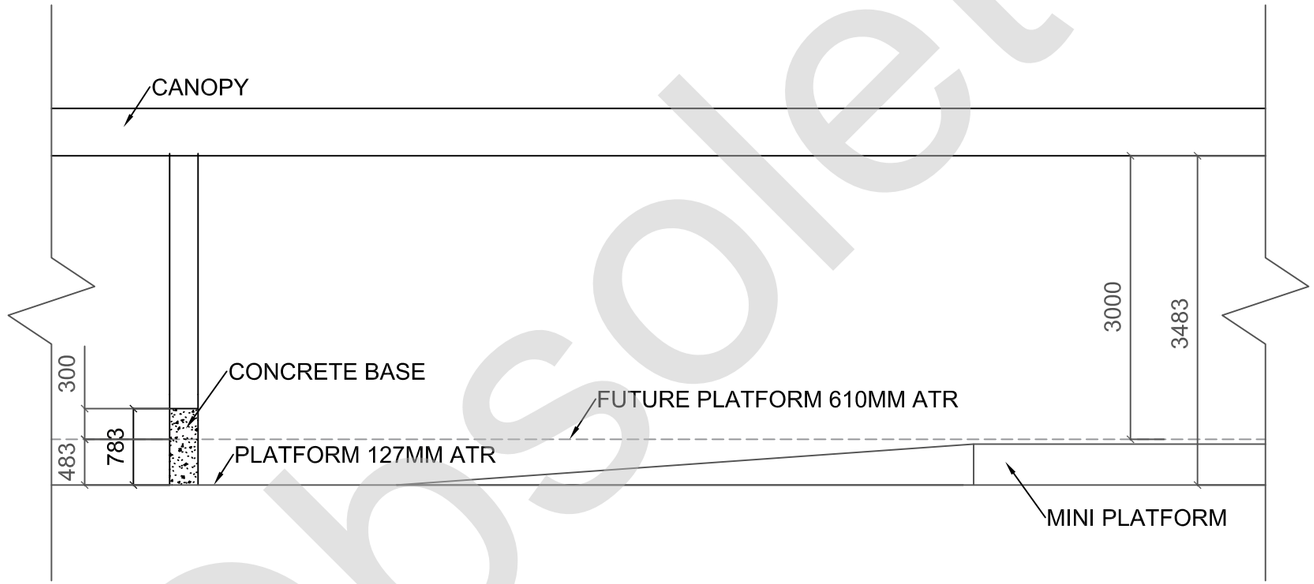


DIAGRAM 3: SHELTER

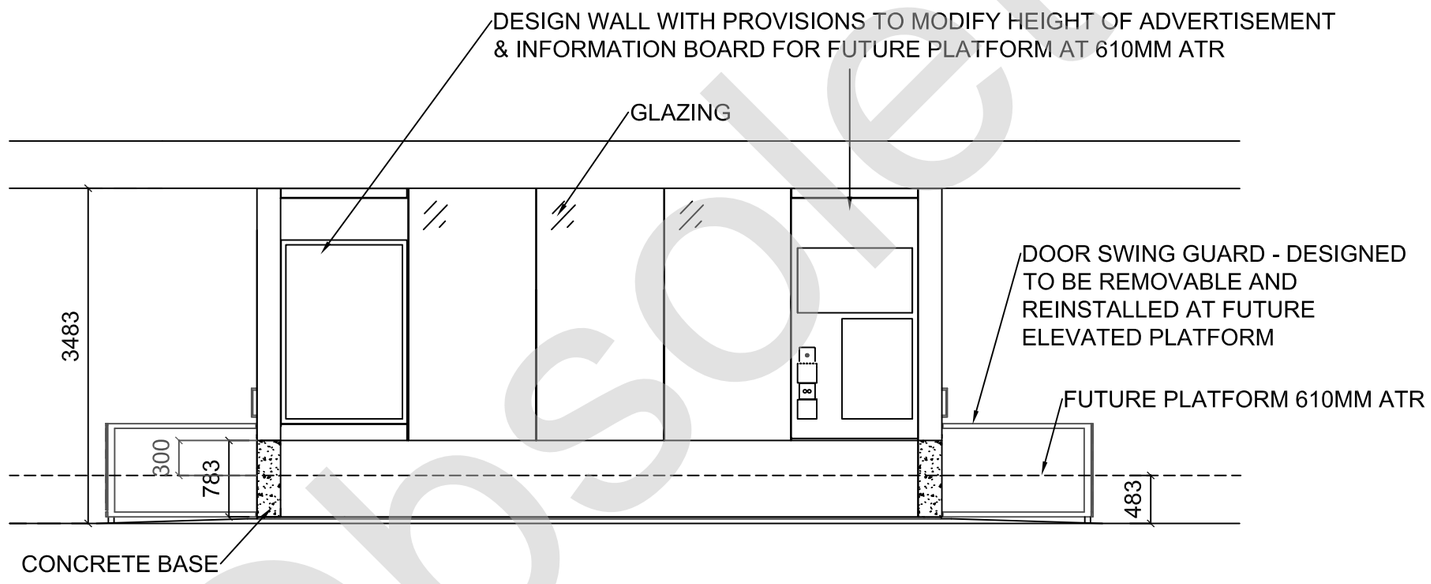


DIAGRAM 4: STAIRS - PLAN

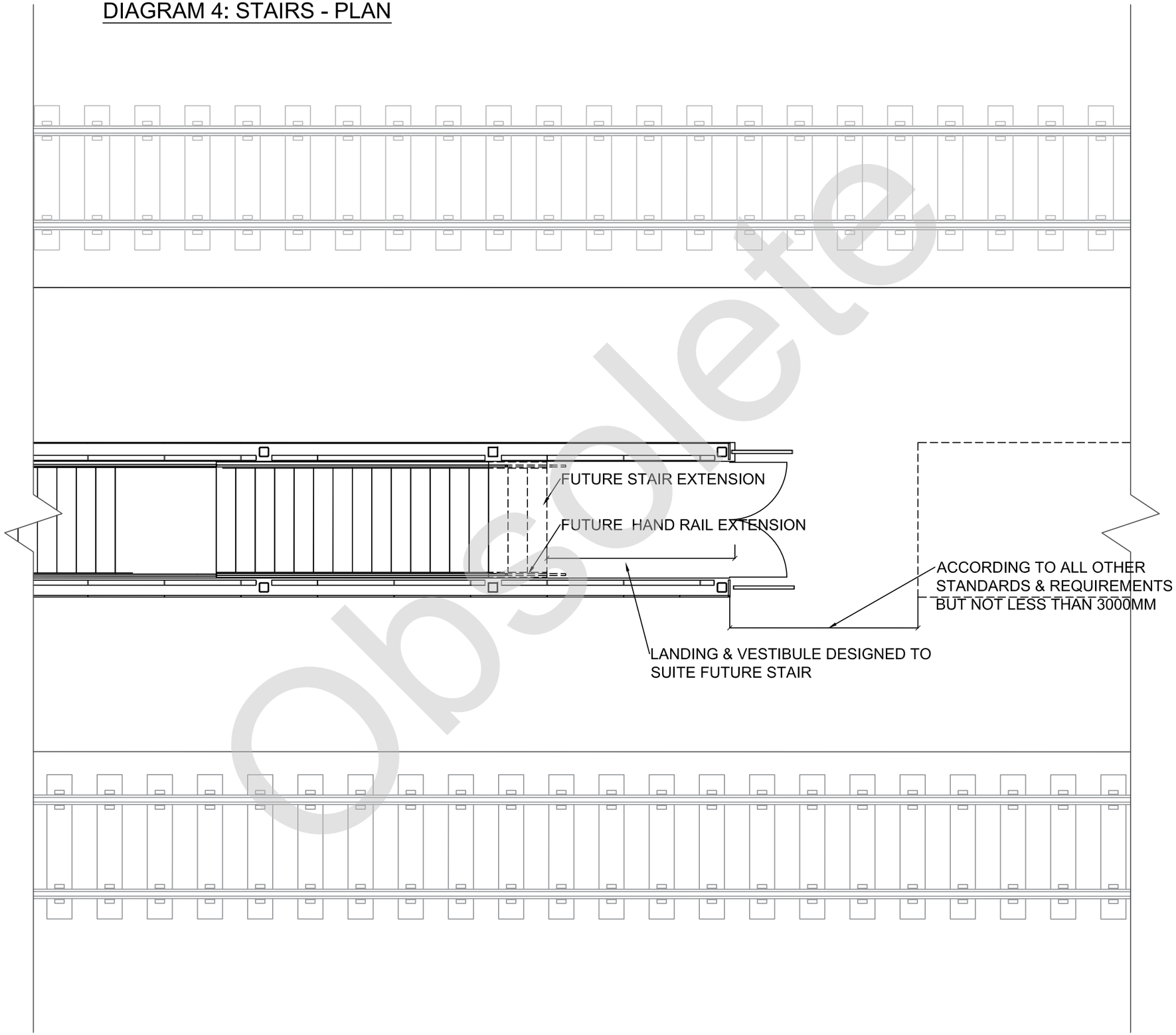


DIAGRAM 5: STAIRS - SECTION

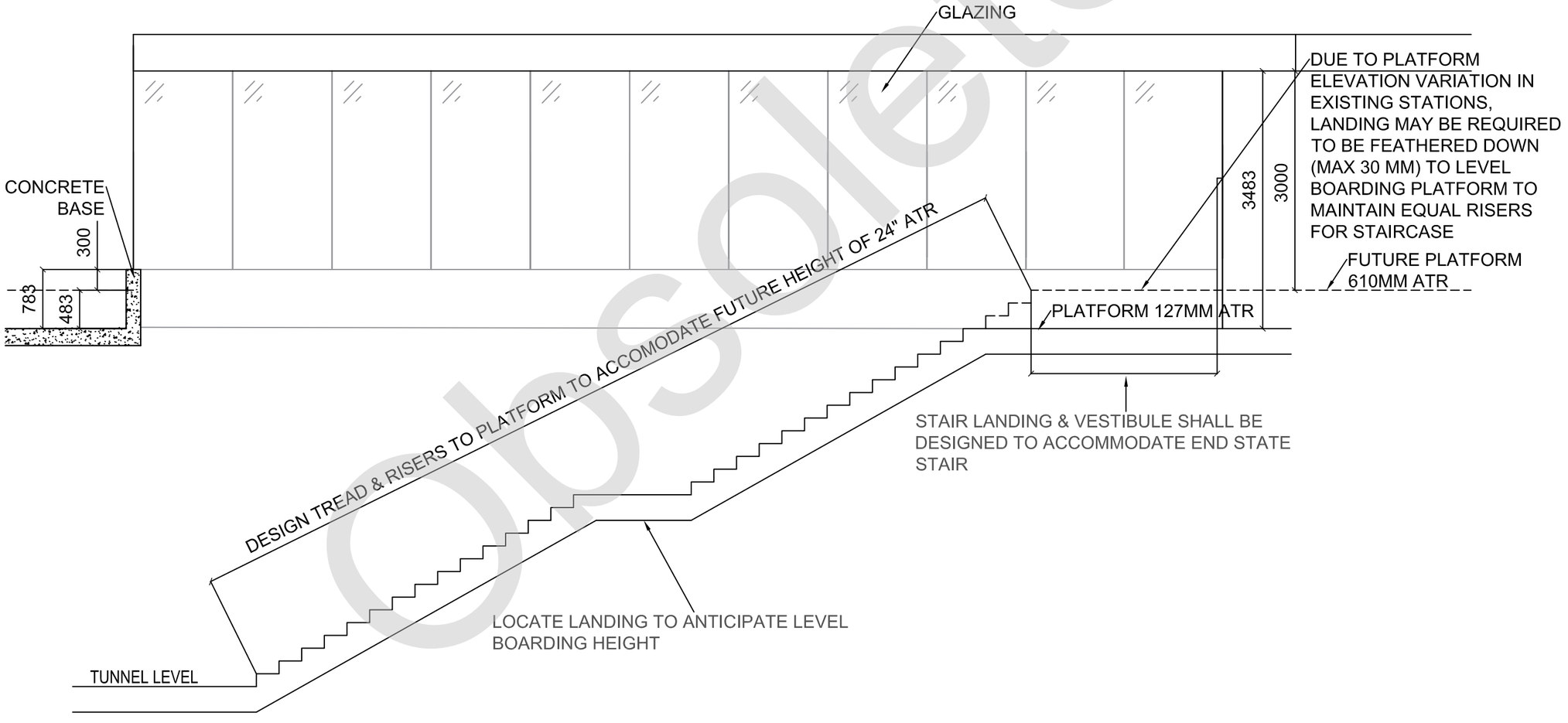
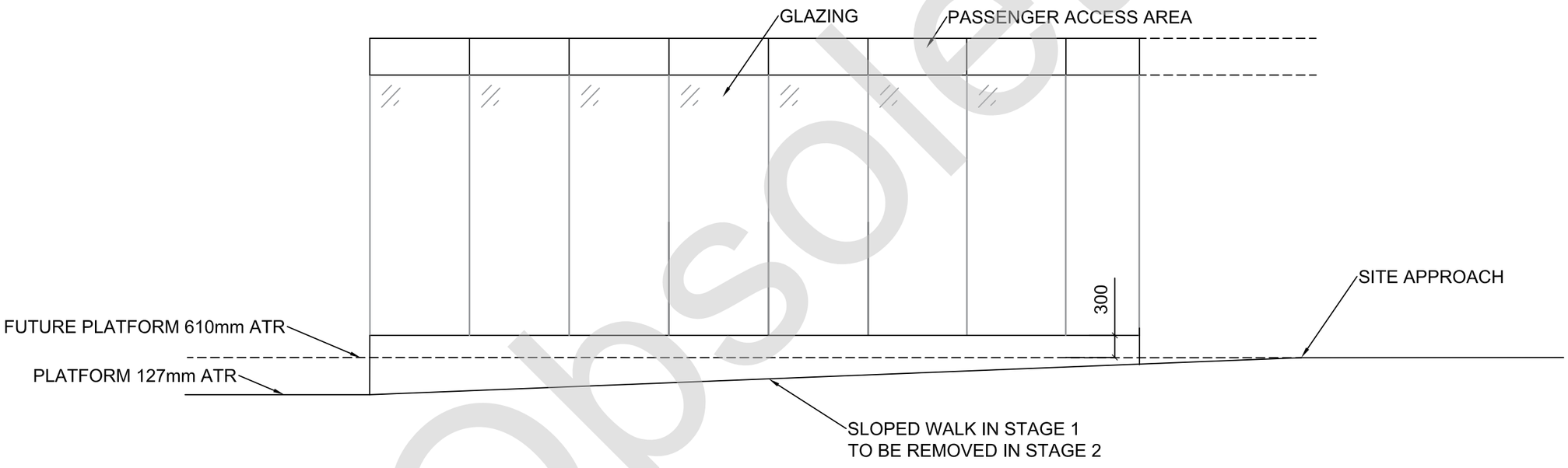
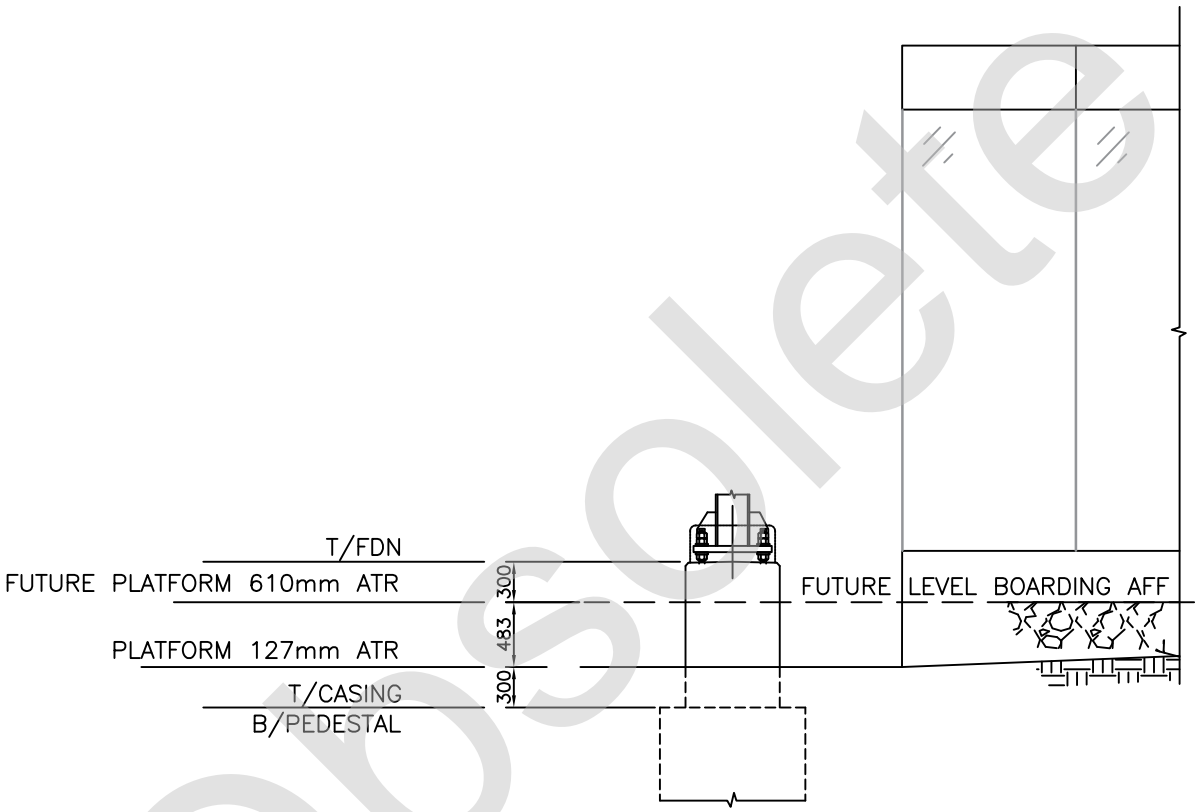


DIAGRAM 6: SIDE PLATFORM CONFIGURATION - ELEVATION
PASSENGER ACCESS AREA





NOTE: ALL DIMENSIONS SHOWN ARE IN METERS AND/OR MILLIMETERS UNLESS OTHERWISE NOTED.

Drawn: Dessin: SM/AD	Checked: Verification: SM/AD	ELECTRIFICATION ENABLING WORKS PROVISION FOR LEVEL BOARDING OCS FOUNDATION	
Scale: Echelle: 1 : XXX NTS	Date: 2020/05/22		
METROLINX		Drawing Number Dessin Numero SKE–001	REV0