Guidelines for integration

Generic station design for Lota 1

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BL100-ULA-IDA-DE-00002

BORGARLÍNAN

ARTELIA | GOTTLIEB PALUDAN ARCHITECTS | YRKI | HNIT

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Introduction

1.1 - Purpose of the document

Readers guide

The purpose of this document is, to provide the advisors, responsible for designing the sections along Borgarlínan Lota 1, with the information necessary to design the integration of the generic stations design in the specific location. The generic station design comes in three types: standard canopy, extended canopy and narrow canopy. Equally, the platforms come in three sizes: standard, long and narrow. The document provides an overview of the number of each type used along the corridor.

The generic stations are designed to be robust and able to fit into a wide range of locations. However, there is a need to adjust some parts of the design to integrate the stations. The scope of the adjustments is described in the document.

In the generic design a standard location is defined as a station in a street with general traffic lanes behind, a closed fence with 0.5m space behind the fence to ensure clearance towards the traffic. This area is also where rainwater from the platform is collected in gullys via a gutter. The stations that have either a pedestrian path or a bike path behind may require a different solution in drainage and a simplified version of the fence as is shown in this document.

The street advisor is responsible for the final design of the platforms, the fence, the utilities and the installation of the station elements. The station elements themselves will be supplied by the client. See Fig. 1 on the following page.

In this document, can be found, schematics that are either extracted from the technical drawings or created to be informative. All schematics are accompanied by descriptive text. In addition to this document a whole set of drawings and models will be delivered to the street designers.

A specific portion of the text is under the headline “Alignment for street designer” giving information about changes, alignments and adjustments that the street designer needs accommodate for in the final design.

Schematics, texts, drawings and models should be considered as a whole and together provide the necessary information for the street designer to implement the station in his design and adjust it to the surroundings.

When the generic design is to be implemented into the specific section, this is to be done in close collaboration with PMO

The Design Manual – Landscape should accompany this document to provide the street designers with comprehensive information about how to integrate Borgarlínan into the city and ensure a cohesive visual appearance of the streetscape.

1.2 - Responsibilities & information

Interface between Client, Street Contractor, Street Advisor and Street Operator

The Client will supply the following elements to the Street Contractor who will install them:

- *Granite kerbstone and tactile tiles*
- *Lightpoles*
- *Canopy with technical cabinet (without internal components)*
- *Digital information screens*
- *Pylon*
- *Benches*
- *Waste bins*
- *Assembly & installation manual*

The Street Contractor will supply and install the following for the station according to the technical specifications:

- *Foundation, formwork, concrete and rebar*
- *All drainage material*
- *All plumbing material for the heating system*
- *All conduit material for the electrical system*
- *All cables and wires for the electrical system*
- *Paving and build-up for the platform, ramps and the area behind the steel edge*
- *Fence*
- *Steel edging behind the platform paving*
- *Steel plates under glass panels shaped according to local gradients and adjusted for each station*
- *Internal components for the technical cabinet:*
    - *Electrical components and wiring*
    - *Plumbing components and pipes*
    - *All IT equipmnet and connecting material*

The Street Advisor is responsible for ensuring the integration of the following elements in relation to the stations:

- *Platform, incl. foundations and glue anchors*
- *Fence*
- *Steel plate under glass panels*
- *Utilities*
- *Drainage*
- *Assembly/mounting of elements on the stations incl kerbstones*

To inform the Street Advisor of the their responsibility and scope of adaptation when integrating the stations in the street, they will be provided with the following material:

- *Guidelines for integration of stations (this document)*
- *Drawing set of the generic design of platform, foundations, utilities and drainage to adapt into their tender material based on the guidelines explained here.*
- *Technical descriptions of the generic design*
- *BIM models of the generic design*
- *Information document with the overall intentions of the design and the principles for assembly*

The Street Operator will provide input and supply the following elements:

- *Ticket validator*
- *Graphic design for the logo at the top of the pylon*
- *Graphic layout for the analogue information panel*
- *Specifications for all screens*

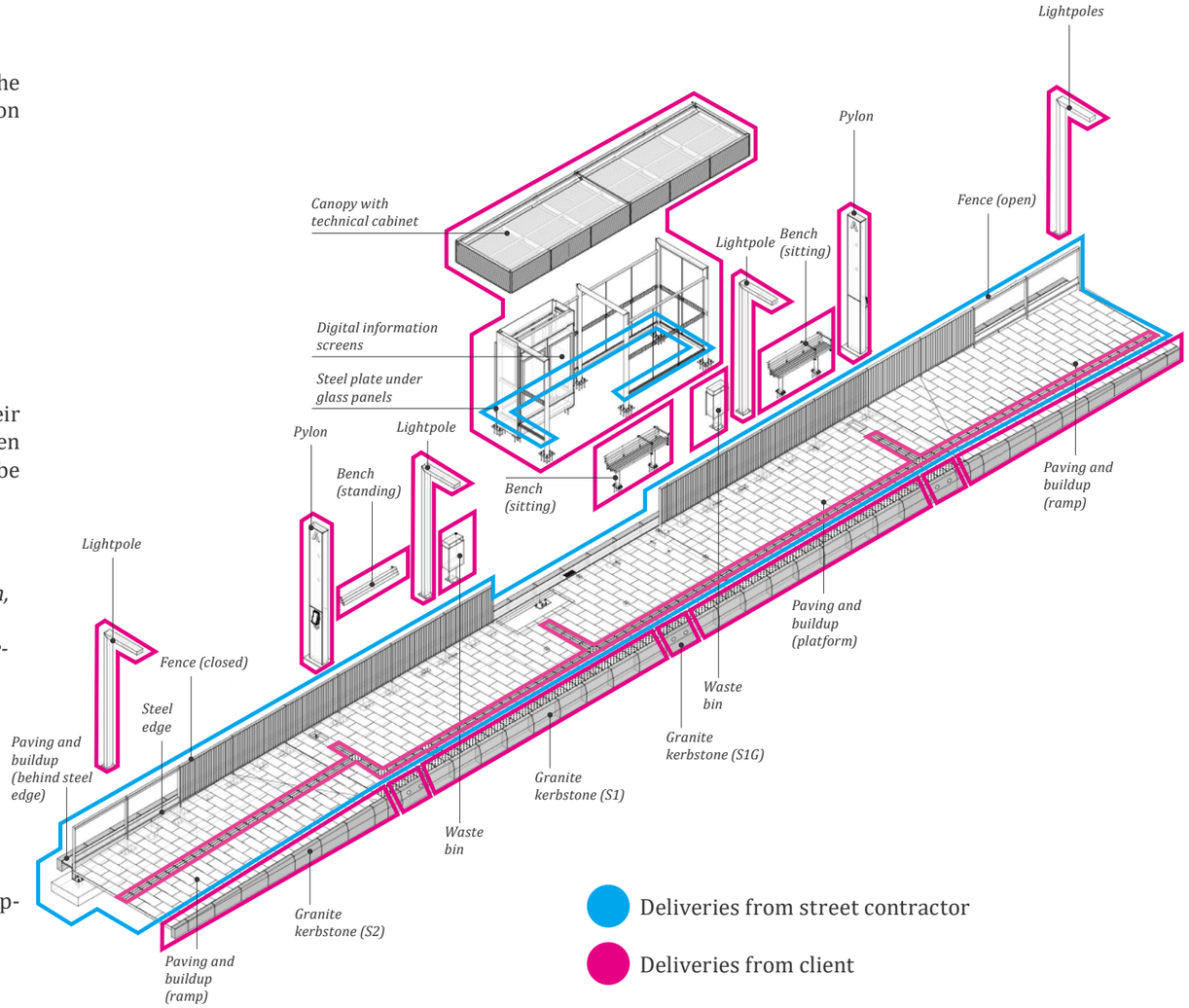


Fig. 1 - Standard station. Overview of the split between what the Street Contractor is expected to deliver and what will be delivered by the Client and will be assembled or mounted by the contractor

1.3 Overview of stations on Lota 1

Overview of stations

The overview shows the stations in each section, their name, expected passengers, general information on the platforms, canopy, pylon, ticket validator and ramps.

Point 1.4 shows the expected range of longitudinal slopes of the station areas based on the design. The slope of the street has an impact on the design of the ramp. The maximum promille is 50 and the generic design defines the length of a ramp as 7,2 m. For some stations it may be necessary to extend the ramp, the principles for this are described in chapters 2.6 and 2.7.

According to this overview there is only one station where the slope is between 25-30, here is should be investigated if the ramps need extending. Additionally, none of the long stations have a promille above 15-20 promille.

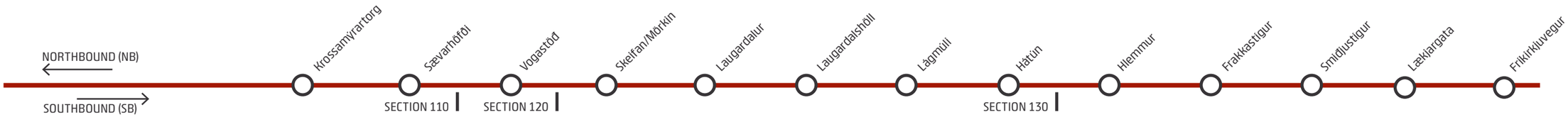
The generic stations design can be adapted in the foundations and fixtures to handle slopes up to 30 promille.

There are currently no slopes identified greater than this but if that specific requirement should arise a dialogue is necessary.

Alignment with street advisor

During the detail design phase of each station, it should be evaluated in dialogue with PMO whether the indicated platform size should be reassessed according to the latest mobility model. This is particularly important for the stations of Frikikjuvegur and Miklatorg.

Due to maintenance reasons, all stations have



			110.1	110.2	120.2	130.2	130.3	130.3	130.4	130.5	140.1	140.2	140.2	140.3	140.6
	Station	*Unit*	*Krossamýr-artorg*	*Sævarhöfði*	*Vogastöð*	*Skeifan/ Mörkin*	*Laugardalur*	*Laugardal-shöll*	*Lágmúli*	*Hátún*	*Hlemmur*	*Frakka-stigur*	*Smiðjustígur*	*Lækjargata*	*Frikikjuvegur*
1. General															
1.1	*Passengers, boarding (2034)*	*ps/day*	*3.750*	*5.000*	*6.850*	*1.250*	*850*	*1.900*	*1.650*	*1.250*	*5.000*	*1.400*	*3.050*	*5.000*	*2.050*
1.2	*Platform length*	*m*	*39.6* / *39.6*	*39.6* / *39.6*	*39.6* / *39.6*	*19.8* / *19.8*	*19.8* / *19.8*	*19.8* / *19.8*	*19.8* / *19.8*	*19.8* / *19.8*	*39.6* / *39.6*	*19.8* / *19.8*	*19.8* / *19.8*	*39.6* / *39.6*	*19.8* / *19.8*
1.3	*Platform width*	*m*	*3.5* / *3.5*	*3.5* / *3.5*	*3.5* / *3.5*	*3.5* / *3.5*	*3.5* / *3.5*	*3.5* / *3.5*	*3.5* / *3.5*	*3.5* / *3.5*	*3.5* / *3.5*	*3.0* / *3.0*	*3.0* / *3.0*	*3.5* / *3.5*	*3.5* / *3.5*
1.4	*Longitudinal slope*	*promille*	*5-10*	*15-20*	*(TBD)*	*15-20*	*0-5*	*0-5*	*20-25*	*0-5*	*0-5*	*(0-5)*	*(0-5)*	*(0-5)*	*(0-5)*
1.5	*Number of busses at station at once*	*pcs*	*2* / *2*	*2* / *2*	*2* / *2*	*1* / *1*	*1* / *1*	*1* / *1*	*1* / *1*	*1* / *1*	*2* / *2*	*1* / *1*	*1* / *1*	*2* / *2*	*1* / *1*
3. Canopy size															
3.1	*Standard 1375-3500 ps*	*pcs*	*1* / *1*	*-* / *-*	*-* / *-*	*1* / *1*	*1* / *1*	*1* / *1*	*1* / *1*	*1* / *1*	*-* / *-*	*-* / *-*	*-* / *-*	*-* / *-*	*1* / *1*
3.2	*Extended 3500+ ps*	*pcs*	*-* / *-*	*1* / *1*	*1* / *1*	*-* / *-*	*-* / *-*	*-* / *-*	*-* / *-*	*-* / *-*	*1* / *1*	*-* / *-*	*-* / *-*	*1* / *1*	*-* / *-*
3.3	*Narrow*	*pcs*	*-* / *-*	*-* / *-*	*-* / *-*	*-* / *-*	*-* / *-*	*-* / *-*	*-* / *-*	*-* / *-*	*-* / *-*	*1* / *1*	*1* / *1*	*-* / *-*	*-* / *-*
4. Platform															
4.3	*Ramps (pr. station)*	*pcs*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*2*	*4*	*4*
4.4	*Pylons and Ticket validators (pr. station)*	*pcs*	*4*	*2*	*4*	*2*	*2*	*4*	*4*	*2*	*4*	*4*	*4*	*4*	*4*

Fig. 2 - Overview of stations on Lota 1 (continues on the following page)

two ramps for each platform. During the detail design phase it should be assessed whether one of these ramps should not be used by pedestrians and how to indicate it using elements like paving, fencing and vegetation that are already part of the design manual for landscape (BL100-ULA-IDA-RP-01013).

For each platform, the ramp slope must be adapted to the local site conditions. If the resulting gradient does not comply with accessibility standards, the ramp length should be adjusted accordingly.

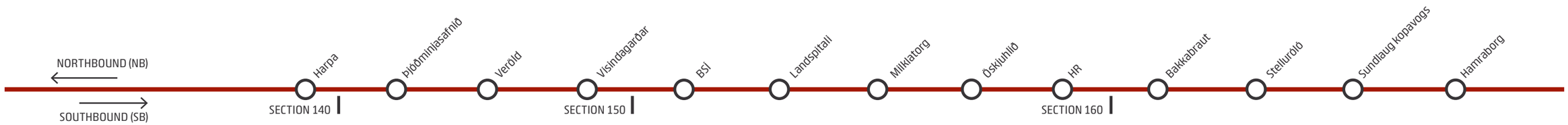
Each station can accommodate either 1 or 2 pylons and ticket validators per platform, resulting in a total of 2 or 4 pylons/ticket validators per station. The total number of pylons and ticket validators for each station is shown in the Fig. 2 table, under point 4.4.

Where only 1 pylon per platform is installed (i.e., 2 pylons in total), it should in principle be positioned on the primary access side of the platform, typically the one associated with the signal-regulated pedestrian crossing. However, it is the adviser's responsibility to recommend the placement side and coordinate it with the PMO, depending on station-specific conditions such as access conditions, site context, number of passengers, and other relevant factors.

Please note this document illustrates only the 2 pylon per platform solution, for a total of 4 pylons per station.

Legend

- *Narrow platform and canopy*
- *Long platform*
- *Large canopy*
- *Standard platform*



			140.4		*150.1*		*150.1*		*150.2*		*160.1*		*160.2*		*160.3*		*160.4*		*160.6*		*180.9*		*180.2*		*180.3*		*180.3*		
	Station	*Unit*	*Harpa*		*Þjóðminjas-afnið*		*Veröld*		*Vísindagar-ðar*		*BSÍ*		*Landspítali*		*Miklatorg*		*Öskjuhlíð*		*HR*		*Bakkabraut*		*Stelluróló*		*Sundlaug kopavogs*		*Hamraborg*		*SUM*
1. General																													
1.1	*Passengers boarding (2034)*	*ps/day*	*TBD*		*1.850*		*1.150*		*1.550*		*1.000*		*5.600*		*1.650*		*1.000*		*850*		*900*		*100*		*200*		*2.950*		*-*
1.2	*Platform length*	*m*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*39.6*	*39.6*	*39.6*	*39.6*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*19.8*	*39.6*	*39.6*	*-*
1.3	*Platform width*	*m*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*TBD*	*TBD*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*3.0*	*3.0*	*3.5*	*3.5*	*3.5*	*3.5*	*-*
1.4	*Longitudinal slope*	*promille*	*(TBD)*		*(0-5)*		*(0-5)*		*(0-5)*		*(TBD)*		*(TBD)*		*(TBD)*		*15-20*		*0-5*		*5-10*		*5-10*		*25-30*		*(TBD)*		*-*
1.5	*Number of busses at station at once*	*pcs*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*2*	*2*	*2*	*2*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*2*	*2*	*-*
3. Canopy size																													
3.1	*Standard 1375-3500 ps*	*pcs*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*-*	*-*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*-*	*-*	*1*	*1*	*1*	*1*	*36*
3.2	*Extended 3500+ ps*	*pcs*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*1*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*10*
3.3	*Narrow*	*pcs*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*1*	*1*	*-*	*-*	*-*	*-*	*6*
4.3	*Ramps (pr. station)*	*pcs*	*4*		*4*		*4*		*4*		*4*		*4*		*4*		*4*		*4*		*4*		*4*		*4*		*4*		*102*
4.4	*Pylons and Ticket validators (pr. station)*	*pcs*	*2*		*2*		*2*		*2*		*(TBD)*		*4*		*4*		*2*		*2*		*4*		*2*		*2*		*(TBD)*		*76-80*

2

Assumptions and requirements

2.1 Vertical and horisontal elements

Diagram A

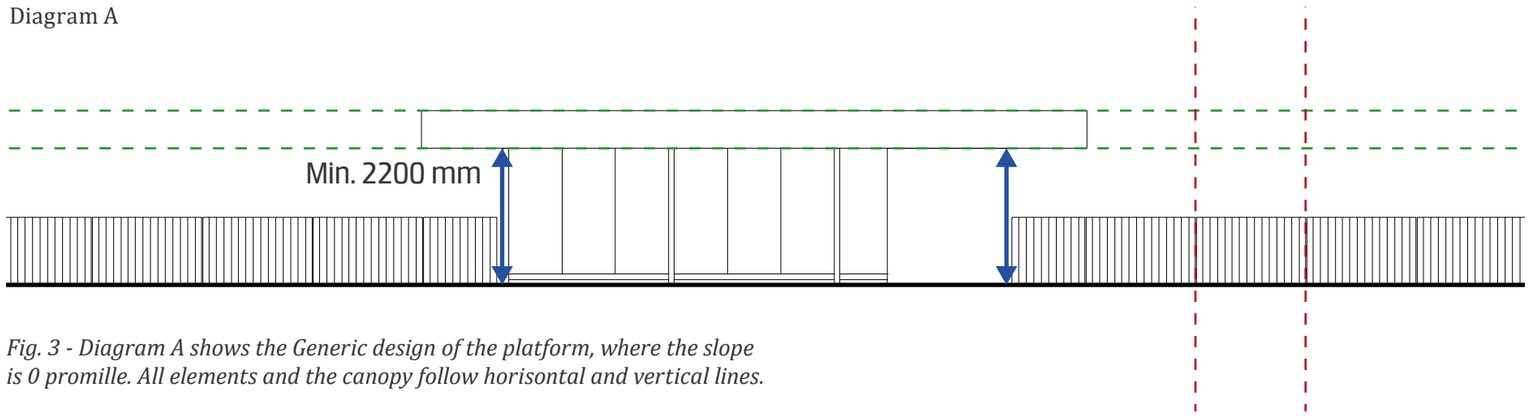


Fig. 3 - Diagram A shows the Generic design of the platform, where the slope is 0 promille. All elements and the canopy follow horisontal and vertical lines.

Diagram B

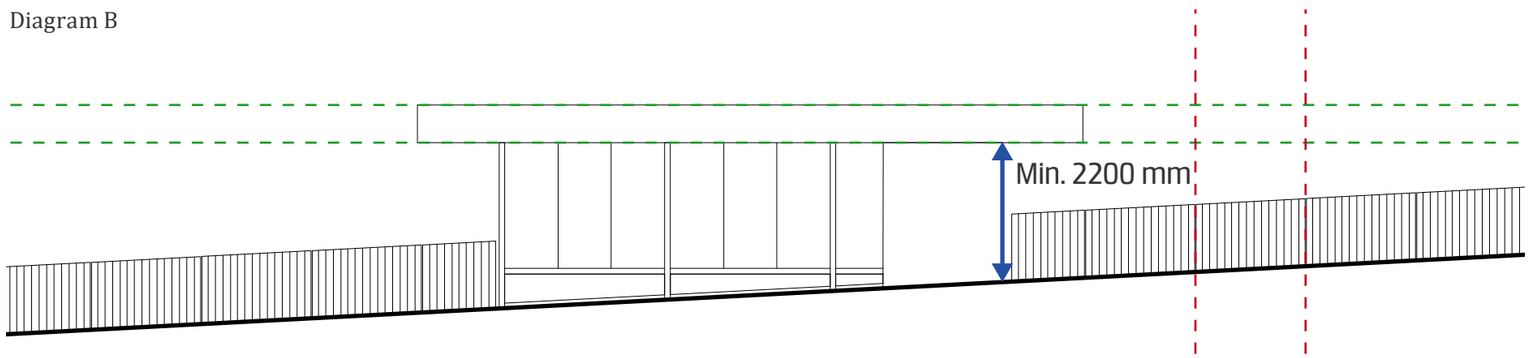


Fig. 4 - Diagram B shows the platform when the slope is 30 promille. All elements and the canopy keeps their vertical alignment, but the fence and a steel profile under the canopy glass follow the slope and not the horisontal direction. See further explanation about the steel profile in section 2.3.

General rule
In general, all vertical elements remain vertical, the horisontal elements will vary depending on function.

Fence
The Fence uprights should always appear vertical. The top of the railing on the fence is very long element and will follow the slope of the platform and street. See the following page where the principles for the slope of the fence is explained.

Canopy
The Canopy follows horisontal and vertical lines even though there is a slope. The height of the Canopy from underside of the roof to the platform surface is minimum 2200 mm. That means on a slope, the 2200 mm distance will be a minimum and the height increases from this point.

Smaller elements
Smaller elements, such as benches and waste bins, will remain horisontal.

Alignment with street advisor
It is the street design advisors responsibility to follow the above guidelines when designing the platform and planning for the installation of the station elements.

2.2 Fence types

Fence types
There are two types of fence - an open fence and a closed fence. An 'open fence' is used on stations where there is lighter traffic behind station, for example pedestrian and bicycle paths. Closed fences must be used in all cases where there are general traffic lanes behind the platforms.

Alignment with street advisor
It is the street designer who defines the slope of the fence so that the balusters appear vertical while the top of the fence follows the slope of the platform.

Street advisor needs to update all technical descriptions according to his own design.

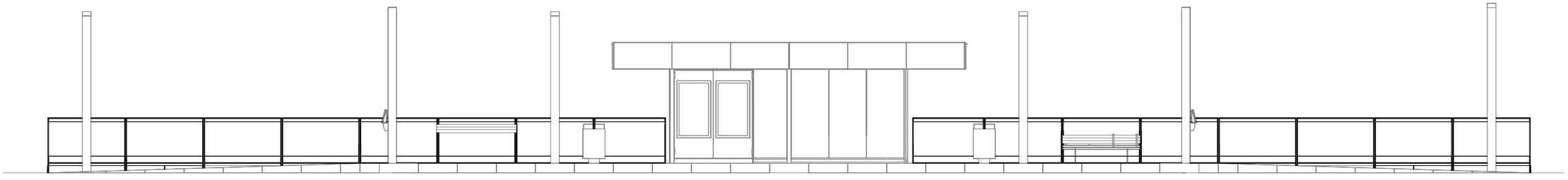


Fig. 5 - Open fence

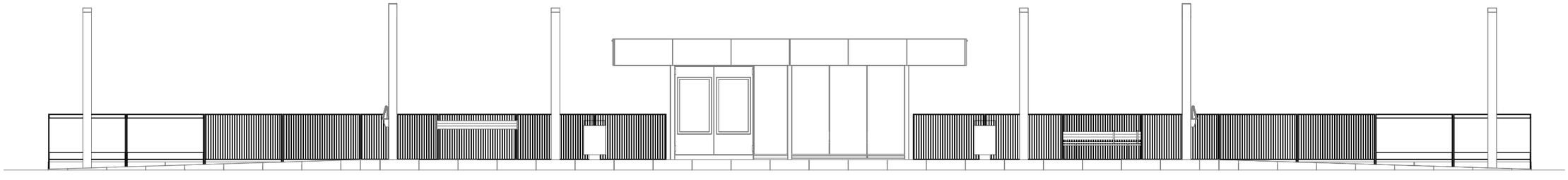


Fig. 6 - Closed fence

2.3 Bespoke steel plate under glass

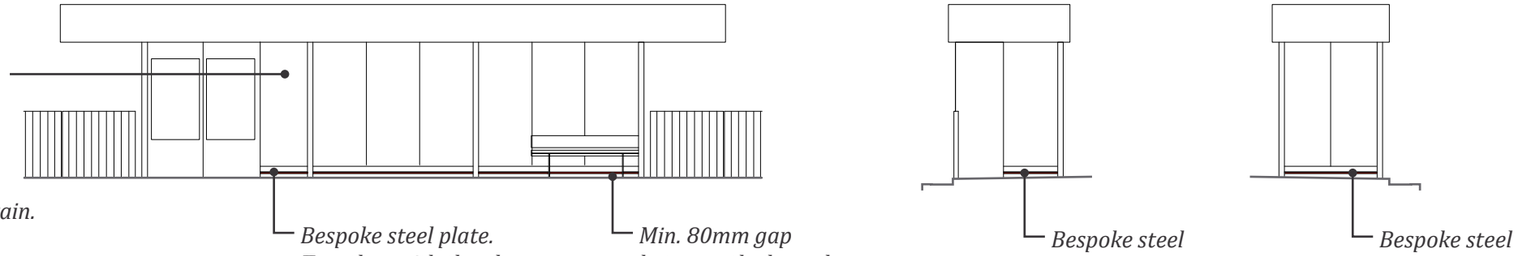


Fig. 7 - A canopy on close to flat terrain.

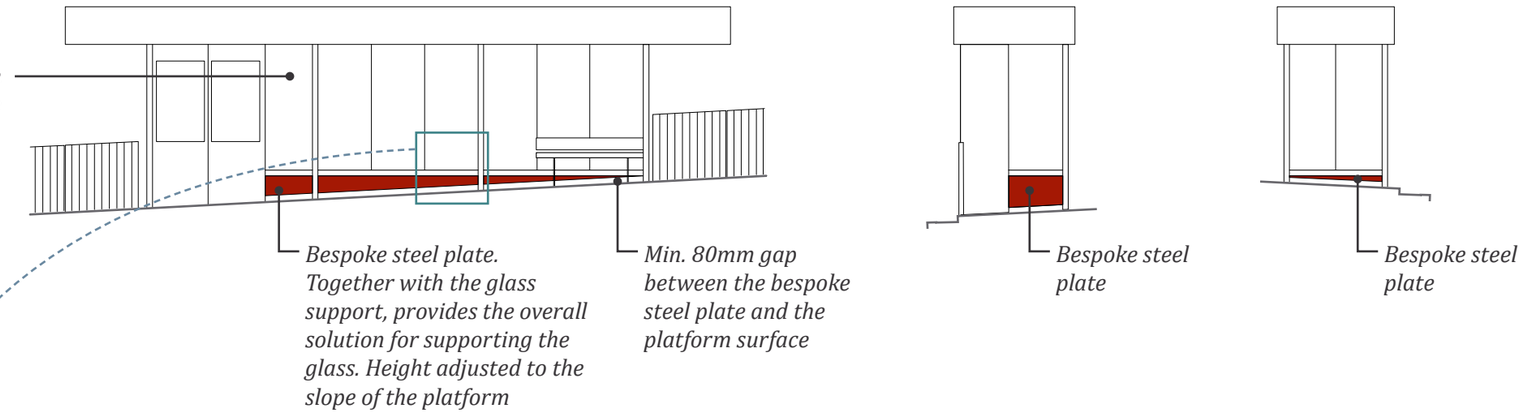


Fig. 8 - A Canopy on sloping terrain. Slope is exaggerated

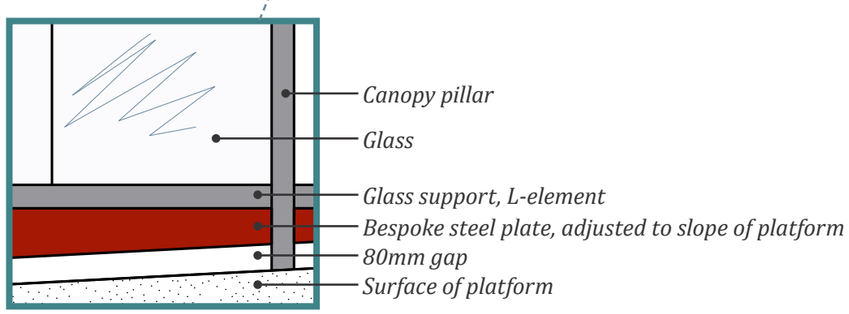


Fig. 9 - Steel element, zoomed in

Alignment with street advisor
It is the street designer who finally designs the bespoke steel plate and provides the street contractor with information about the necessary steel element dimensions. It is the street contractor who delivers and mounts this element.

Street advisor needs to update all technical descriptions according to his own design.

2.4 Fence on ramp guideline

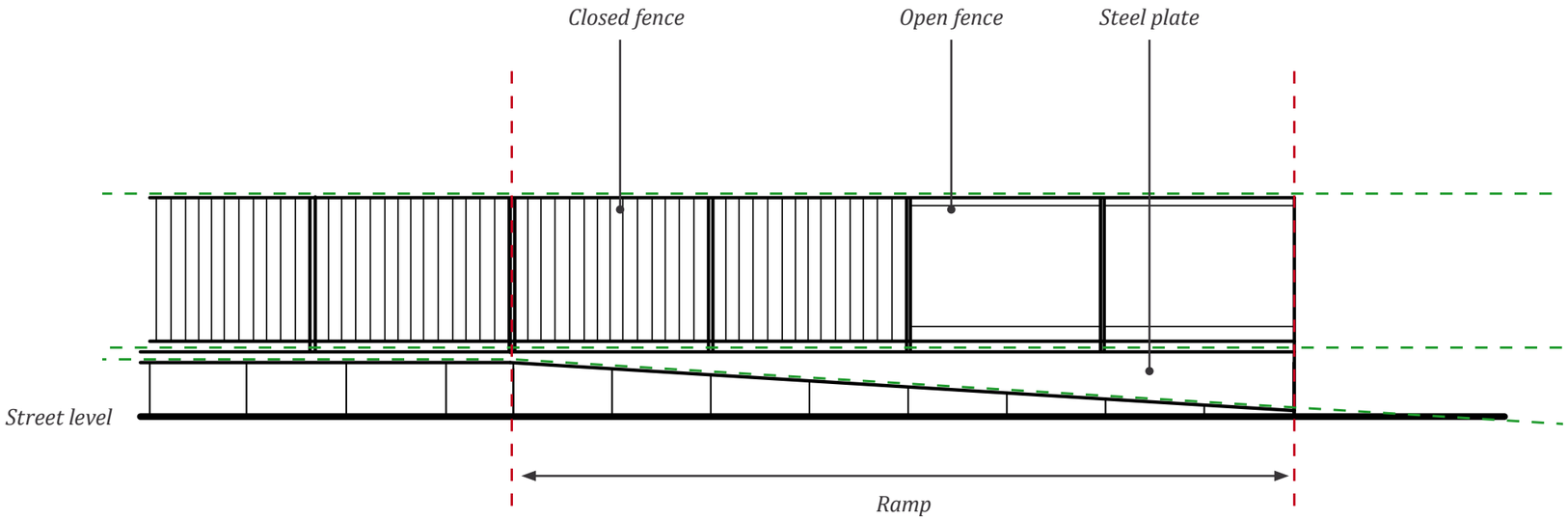


Fig. 10 - Illustration showing fence in the ramp area. In the bottom of the fence is a steel plate, which acts as a backing plate for the paving, and used to level out the height difference in the ramp.

Fences in ramp area

In stations where the "closed fence" is used, the ramp area consists of two closed fence modules, and two open fence modules. This creates the necessary protection and barrier against the road along the length of the station, at the same time as the two open fence modules provides an clearer line of sight and overview towards the street crossing.

No handrail is required according to Icelandic accessibility standards as the slope does not exceed 5% and the height of the ramp is less than 25cm. Ref: Hönnun_fyrir_alla_Algild_hönnun_utandyra_Handbók

Steel plate

As the fence continues straight, parallel to the BRT-street and the ramp is sloping downwards, a level difference between the bottom of the fence and surface of the ramp will appear. The vertical steel plate, which runs along the back of the platform, will be used to even this difference out, as shown in the illustration and create a visible steel surface towards the platform.

Alignment with street advisor

It is the street design advisors responsibility to adapt the design of the fence and steel plate needed according to the stated guidelines and to include it in the street contractor tender.

Street advisor needs to update all technical descriptions according to his own design.

2.5 Min. heights - platform vs elements

Element heights

The stations will be placed in a variety of terrain situations and the platforms will slope with the street.

Design elements should be placed according to the fixed measurements illustrated in the figures to the left.

All elements on the platform will no matter the slope keep their vertical and horisontal direction. With exception of fence and steel plate under the canopy glass, whose horisontal lines follow the slope.

Alignment with street advisor

The street adviser needs to adjust the foundations and the fixation of footplates for elements heights. The glue anchors are provided by the street contractor and the foundations under the foot plates can be adjusted to accomodate for these height differences.

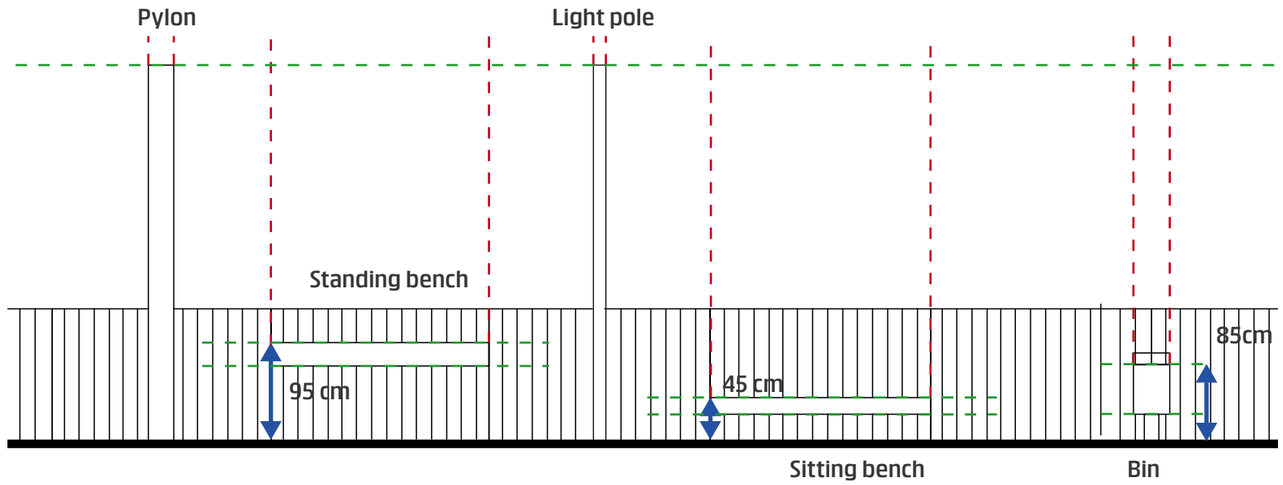


Fig. 11 - Example of a close to flat platform. Highest point of the standing bench is at 95cm. Lowest point of the sitting bench is at 45 cm

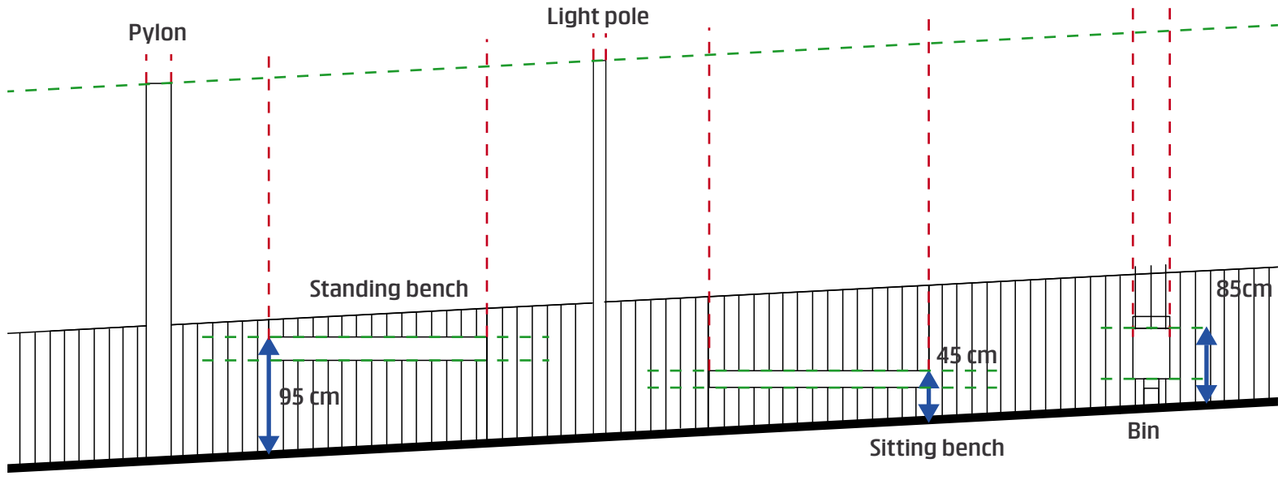


Fig. 12 - Heavily sloping platform example (Slope exaggerated). Highest point of the standing bench is at 95cm. Lowest point of the sitting bench is at 45cm

2.6 Principle for ramps

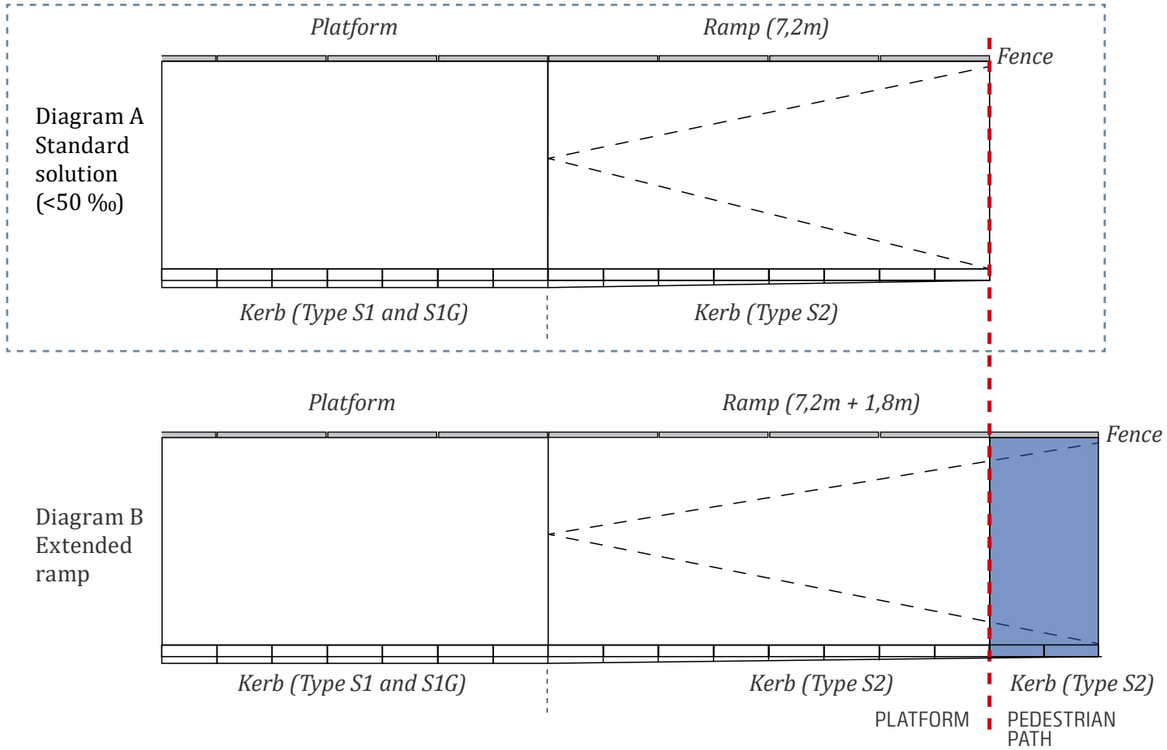


Fig. 13 - Diagram A-B showing how the standard ramp (Diagram A) can be extended by sections of 1.8m (Diagram B) depending on the slope of the street.

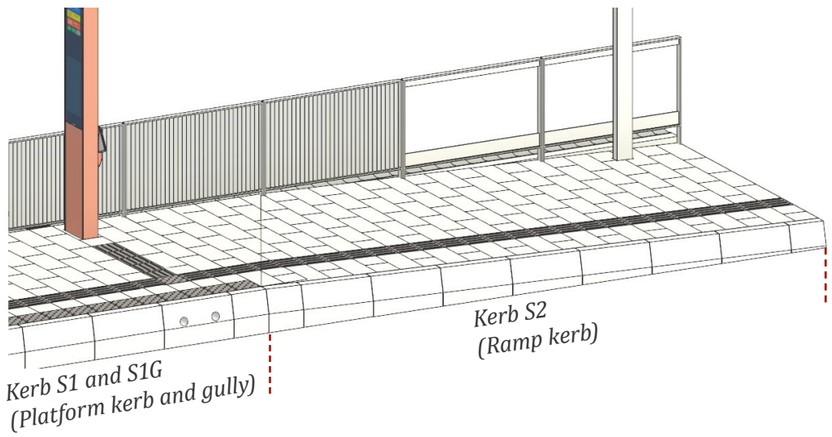


Fig. 14 - Example of how the kerb stone can be adjusted along the ramp. In this solution each S2 type kerbstone is designed individually. Note that Kerb S2 could also be the same if the slope allows for it. Kerbstone S1 (on the platform) is always the same.

Platform ramp

The basic concept of the ramps is that they need to comply with accessibility standards in Iceland. Furthermore ramps should generally slope downward from the platform, and their slope should not exceed the accessibility standards. The lenght of the ramps should always be minimum 7,2m.

The fence and kerbstone material will also have a minimum length of 7,2m. This makes the outer boundary of the stations platform uniform in most cases. This ensures coherence for all stations. However, there will be a small number of stations where the terrain will require a longer ramp. If the ramp is extended, the fence and kerbstone material will be extended along with it for safety reasons. Equally, there will be a couple of stations where one of the ramps will have a slope of 0 promille or even fall backwards if the ramp is 7,2m long. The level at the bottom of the ramp will be either 2 cm or 10 cm above street level depending on the type of crossing. If a crossing is signalised the pedestrian area will be lowered to 2 cm above street level. If it is not signalised the clearance above the street will be 10 cm. This has an impact on the slope of the ramp.

Kerbstone elements

Along the ramp a kerbstone elements with a custom geometry will be used (S2). The geometry of these elements manage the seamless transition between the platform kerbsone (S1) and the standard street kerbstone. Note that changes in the ramp lenght or slope will affect the geometry of these kerbstones (S2). If a stone is cut, the street contractor needs to match the surface finish of the cut as the one that came from the manufacturer.

Alignment with street advisor

The street adviser needs to adjust the ramp slope for each station. The slope must not be greater than 50 promille. If a ramp need to be longer than 7,2m as described in the generic design, it is possible to extend the ramp by 1,8m modules to fit with the module size of the fence. Every kerbstone on the ramps may need to be individually designed by the street advisors to fit with the local longitudinal slope.

2.7 Ramp slope

Ramp slope - assessing need for break line

Due to different transversal slopes on the top and the bottom of the platform, tiles must be placed to even this slope difference out, within an acceptable tolerance to be defined by the street advisor. See the Design Manual - Landscape for more information about tile dimensions and appearance.

If possible, it is recommended to avoid break lines in the tile surface on the ramp. See diagram A.

In some situations, if the slope difference is too large to be taken up in the tolerance between the tiles, there needs to be introduced a break line in the tiles. See diagram B.

In some scenarios, when both slopes are going in each direction, it might be necessary to introduce two break lines. See diagram C

Where to break tiles

When a break line is necessary, tiles should be cut according to principle described in fig 16 to avoid too many small cut tiles.

Alignment with street advisor

The street advisor needs to define the tolerances for tile paving, both in elevation and joint width. The Design Manual - landscape provides more information about the tiles. This information is necessary to define tolerances.

The street advisor also needs to assess which solution is most appropriate at each ramps (see diagrams A-C).

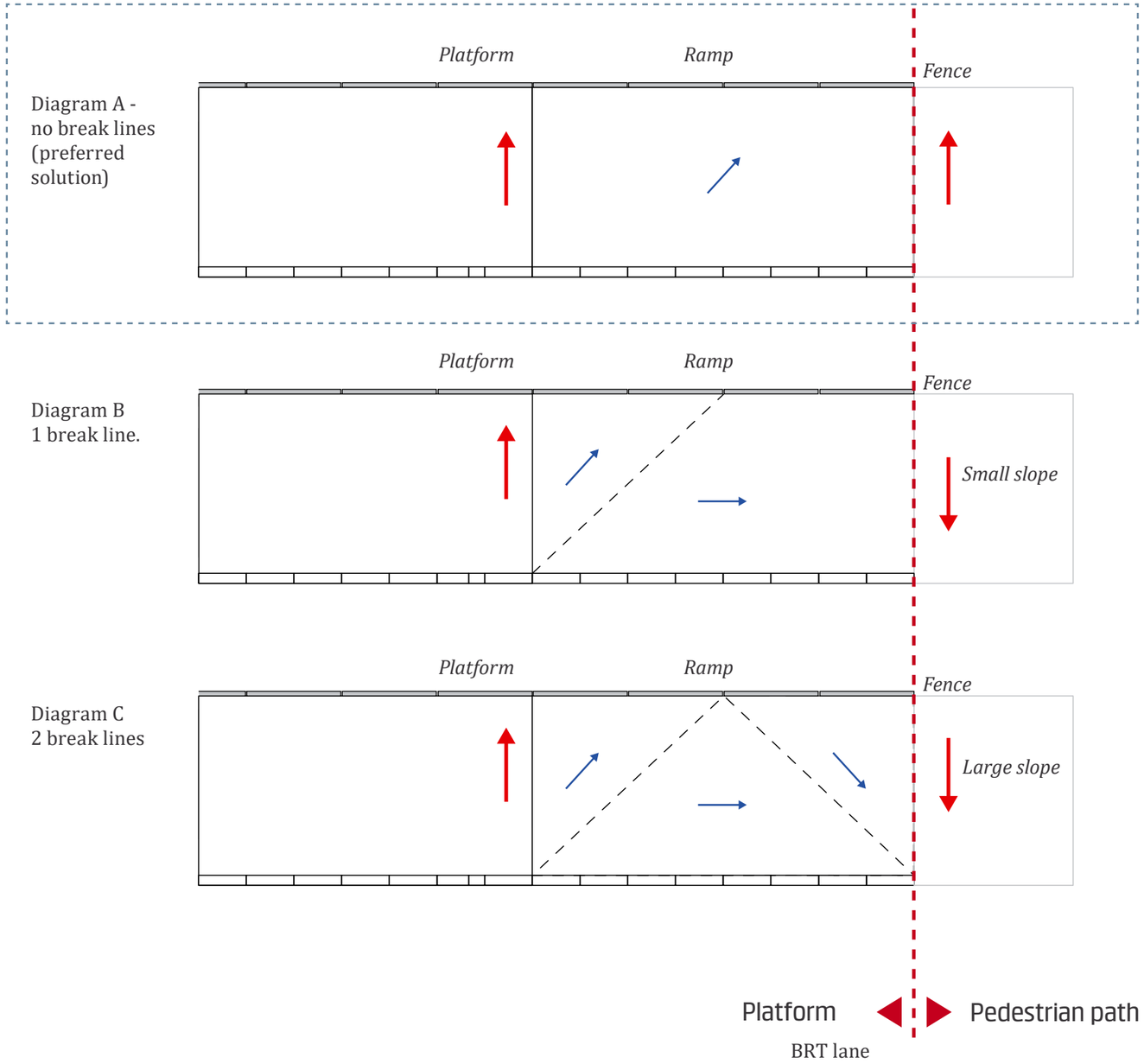


Fig. 15 - Ramp slope diagrams A-C. If there is a break line it should always make the kink towards the back of platform where the steel plate will hide this. The fence is not effected by this.

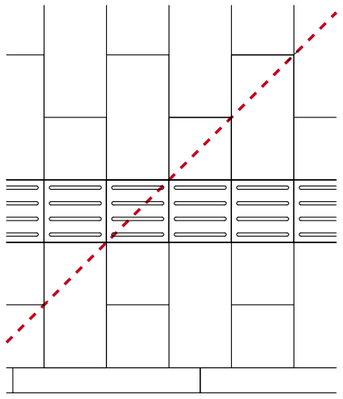


Fig. 16 - Breakline example. Tiles should be cut to avoid small pieces

2.8 Foundations - frames

Canopy frames and foundation

As the canopy is horizontal and the concrete foundation plate follows the slope of the terrain the distance between the concrete plate and the foot plates will vary as indicated on figure 17. The possible vertical range of the foot plates is 17cm as shown on figure 18, where the foot plate is shown at its lowest position. Figure 19 shows an elevated position of a foot plate. This means that for Standard stations the maximum slope of the terrain can be 30‰ and for Extended stations the maximum slope can be 20‰. Similarly for the Narrow stations the maximum slope of the terrain can be 12‰ (due to different type of fastening of the steel structure to the concrete plate).

Alignment with street advisor:

The street adviser will need to adjust and finalise the design of the foundations for the frames to make sure the height of the frames will allow for a horisontal canopy.

Street advisor needs to update all technical descriptions according to his own design.

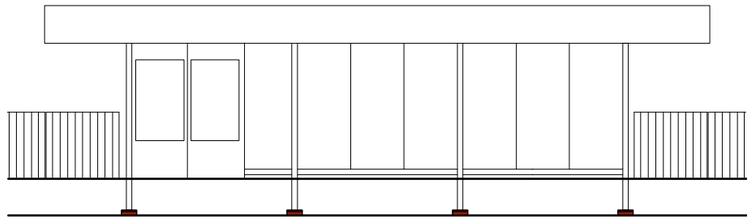


Diagram A

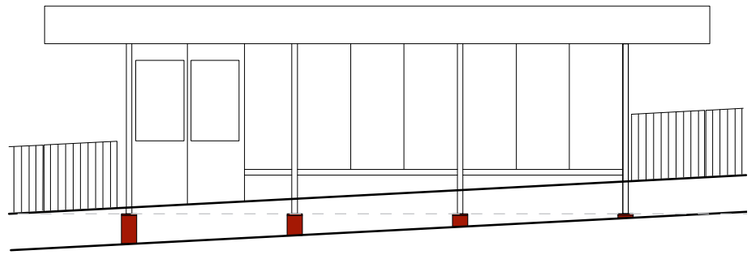


Diagram B

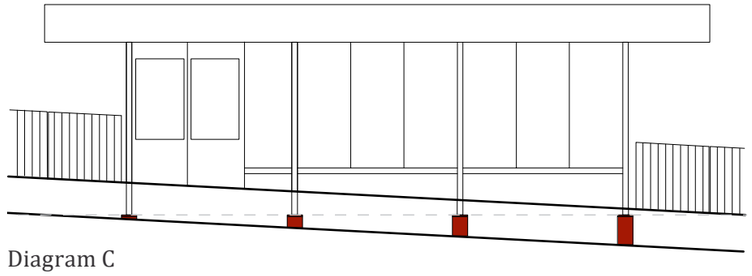


Diagram C

Fig. 17 - The canopy is horizontal while the concrete plate follows the slope of the terrain why the distance between the foot plates and the concrete plate varies. Slope of platform and height of foundations are exaggerated for illustrative purposeses.

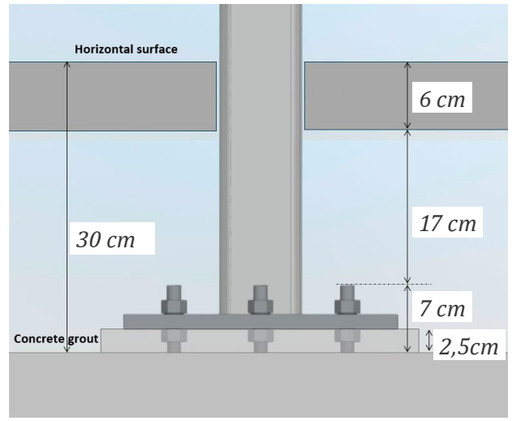


Fig. 18 - Fastening of a foot plate to concrete plate at its lowest position. Min 2,5cm concrete foundation

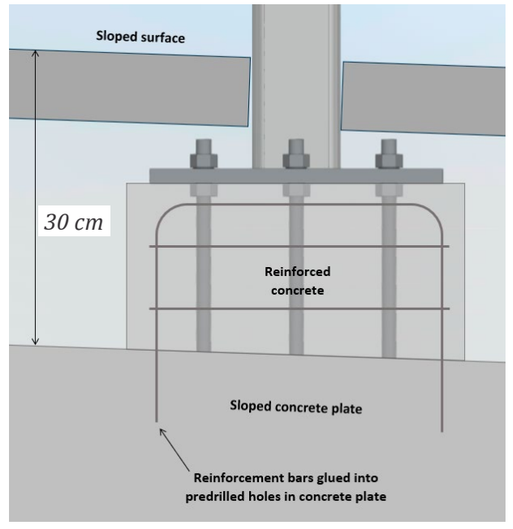


Fig. 19 - Fastening of a foot plate in an elevated position. max 19,5cm concrete foundation

2.9 Fastening principles

General information

Concrete foundation with steel reinforcements

All steel construction is bolted to the concrete slab. All bolts are glued bolts

Space for levelling joint shall be in accordance with manufacturer specifications

Alignment with street advisor

Height and slope needs to be adjusted to surroundings

Slope of foundation should be according to the slope of BRT lane

Street advisor needs to update all technical descriptions according to his own design.

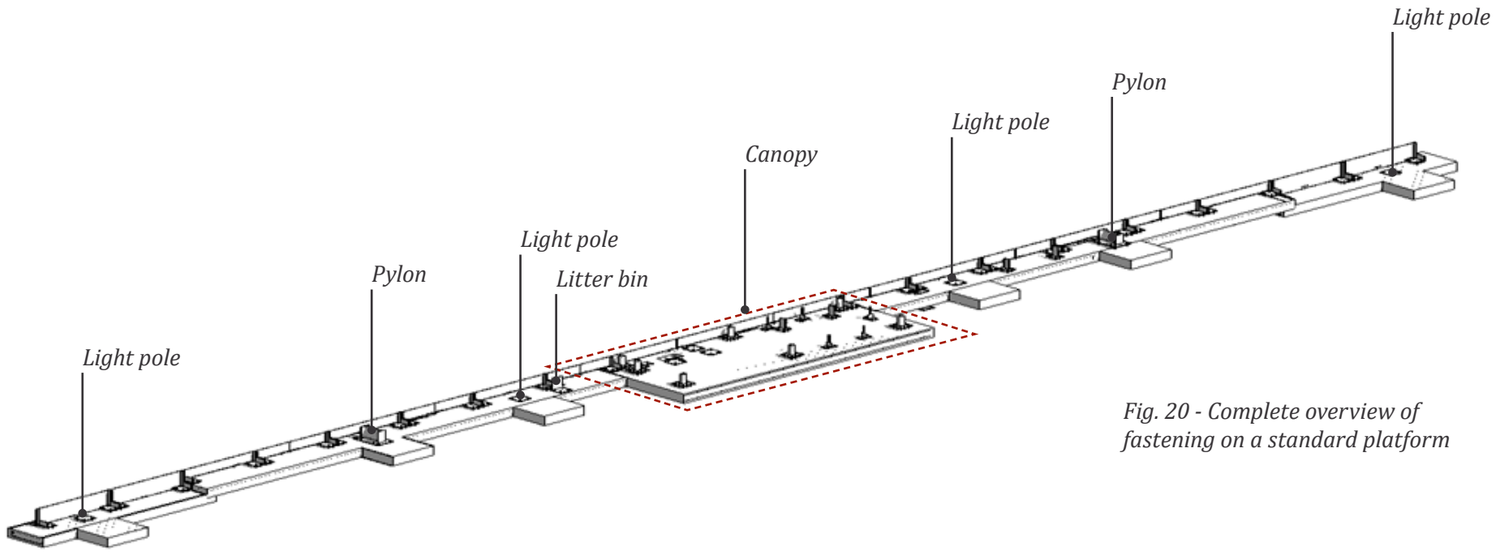


Fig. 20 - Complete overview of fastening on a standard platform

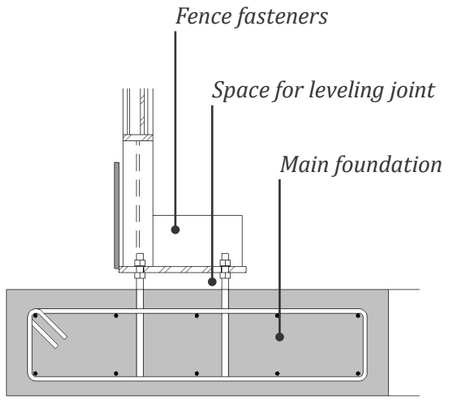


Fig. 21 - Fence fastening

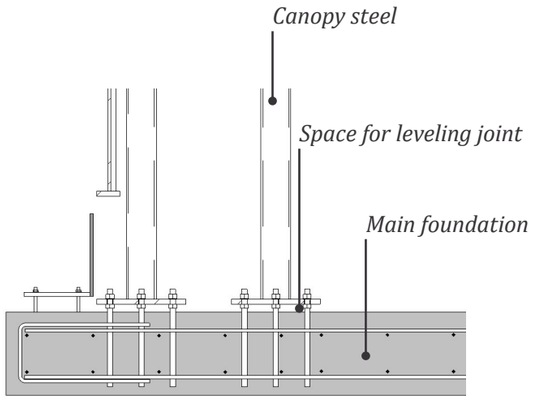


Fig. 22 - Canopy fastening

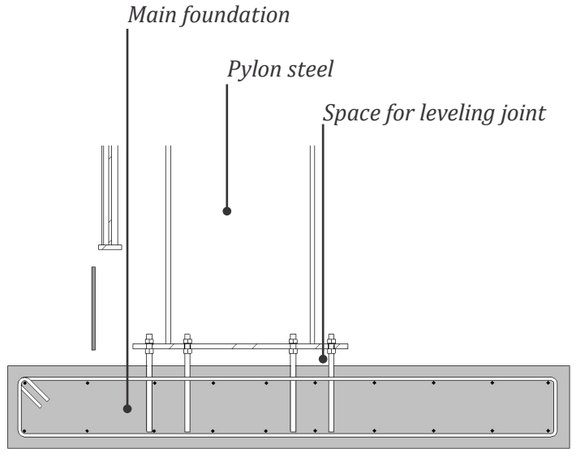


Fig. 23 - Pylon fastening

2.10 Foundation principles

General information about foundations

Concrete foundation with steel reinforcements

Requirements for earthworks below foundations:

The material's friction angle shall be 42° or more.

The earth fill shall be drained so no frost lifting will occur below the foundation slab.

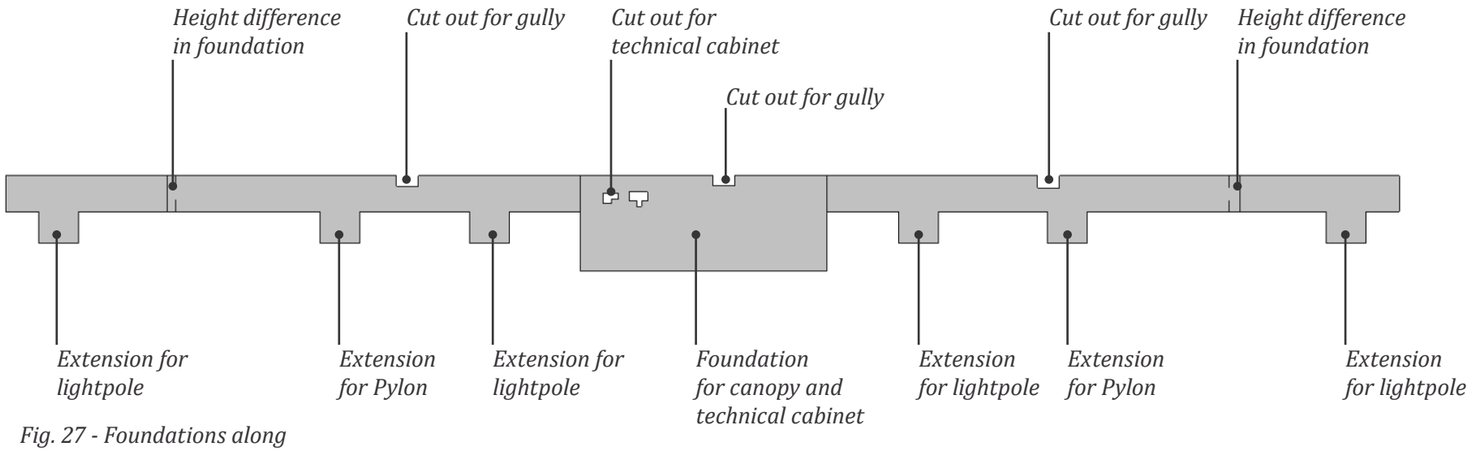


Fig. 27 - Foundations along the platform, plan view

Station kerbstone foundations

The kerb stones are laid in moist dry concrete and adjusted in level while the concrete is workable. For support of the kerbstones a reinforced concrete beam(vibrated) is cast in-situ behind the kerbstones.

Alignment with street advisor

Height and slope needs to be adjusted to surroundings.

Slope of foundation should be according to the slope of BRT lane.

The earth fill below the foundation slab under the canopy, fences and other items belonging to the stations, shall have a frost free filling and depth should be defined by the street designer.

Street advisor needs to update all technical descriptions according to his own design.

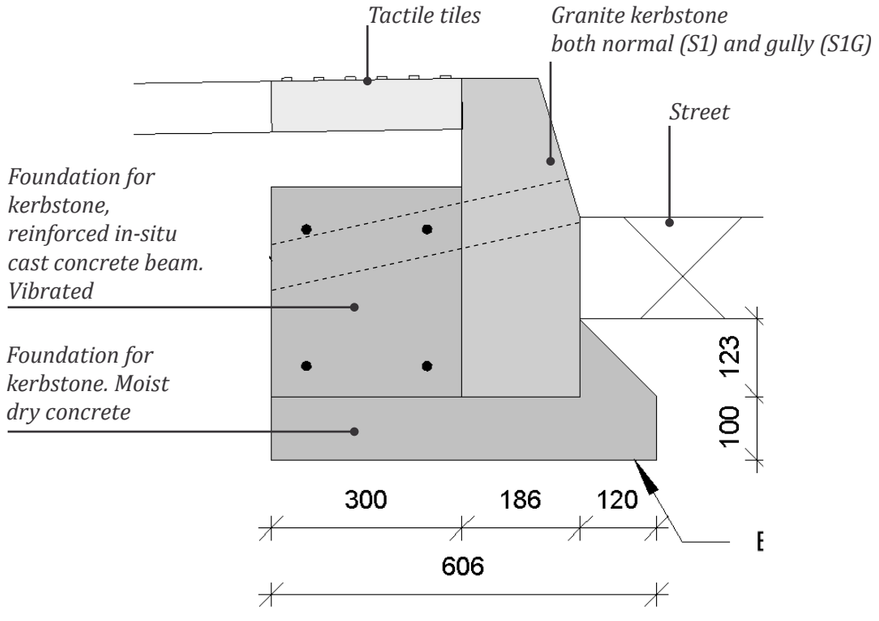


Fig. 28 - Kerbstone foundation

2.11 Drainage principles

General information

Drainage elements will be placed both in the kerbstone and at the back of the station.

Gullies elements in the kerbstone will be a client delivery with street contractor installation. Gullies in the back of the stations are standard gullies.

In the drawing below, blue arrows show the water flow to the gullies. Pipes are all plastic, gullies in kerbstone are granite and the gullies in the back are cast iron.

Alignment with street advisor

Drainage system can be run in either direction depending on the slope of the surroundings. Back gullies should be adjusted both in location and numbers to the terrain on the back of the station, the station will drain water to the back and there must be a receptor for it. Designers can decrease the number og gullies if possible. General design is for a station with a street behind it.

Front gullies are designed for a BRT lane with minimum longitudinal slope (a scenario showing maximum number of gullies). Designers can decrease the number of gullies if the BRT lane slope flows the water away from the station.

Street advisor needs to update all technical descriptions according to his own design.

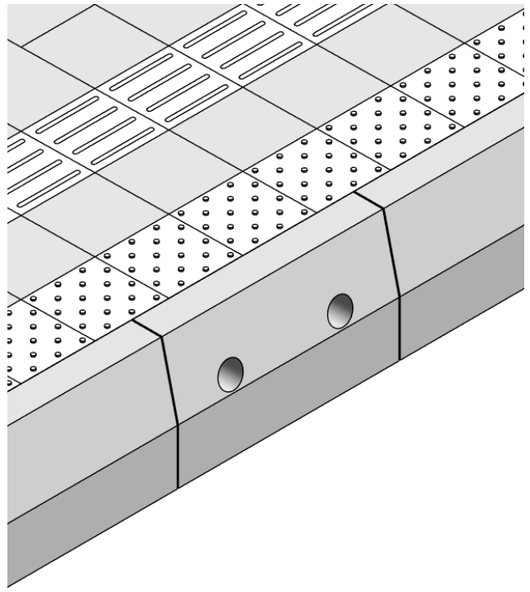


Fig. 30 - Gully kerbstone (S1G)

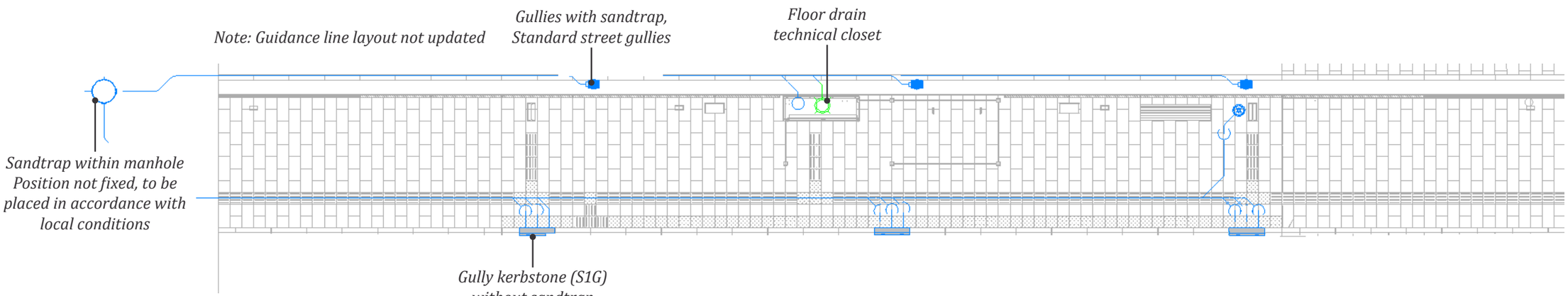


Fig. 29 - Drainage principle of street and platform

2.12 Technical cabinet

General information

Technical cabinet is the connection between stations electrical and heating systems and Veiturs distribution network.

The technical cabinets comes in pairs and one is for the connection for district heating the other for electrical connection.

The technical cabinet will be manufactured by the station supplier.

The street contractor will supply, place and connect all equipment and cables into the technical cabinet.

Cutouts in the concrete foundation are for mains connection and the connecting pipes between technical cabinets.

Alignment with street advisor

Connecting the cabinet to mains.

Possible connection to fiber optic loop from lightpoles.

Sides and front cover should be covered by paving stones.

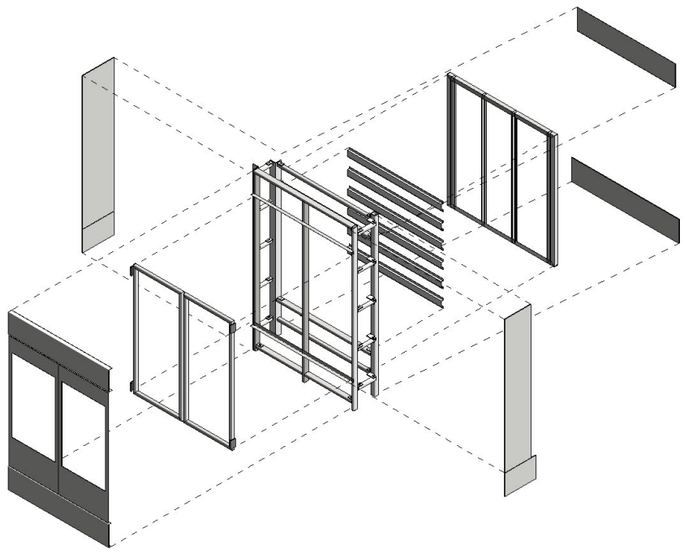


Fig. 31 - Cabinet, Exploded view

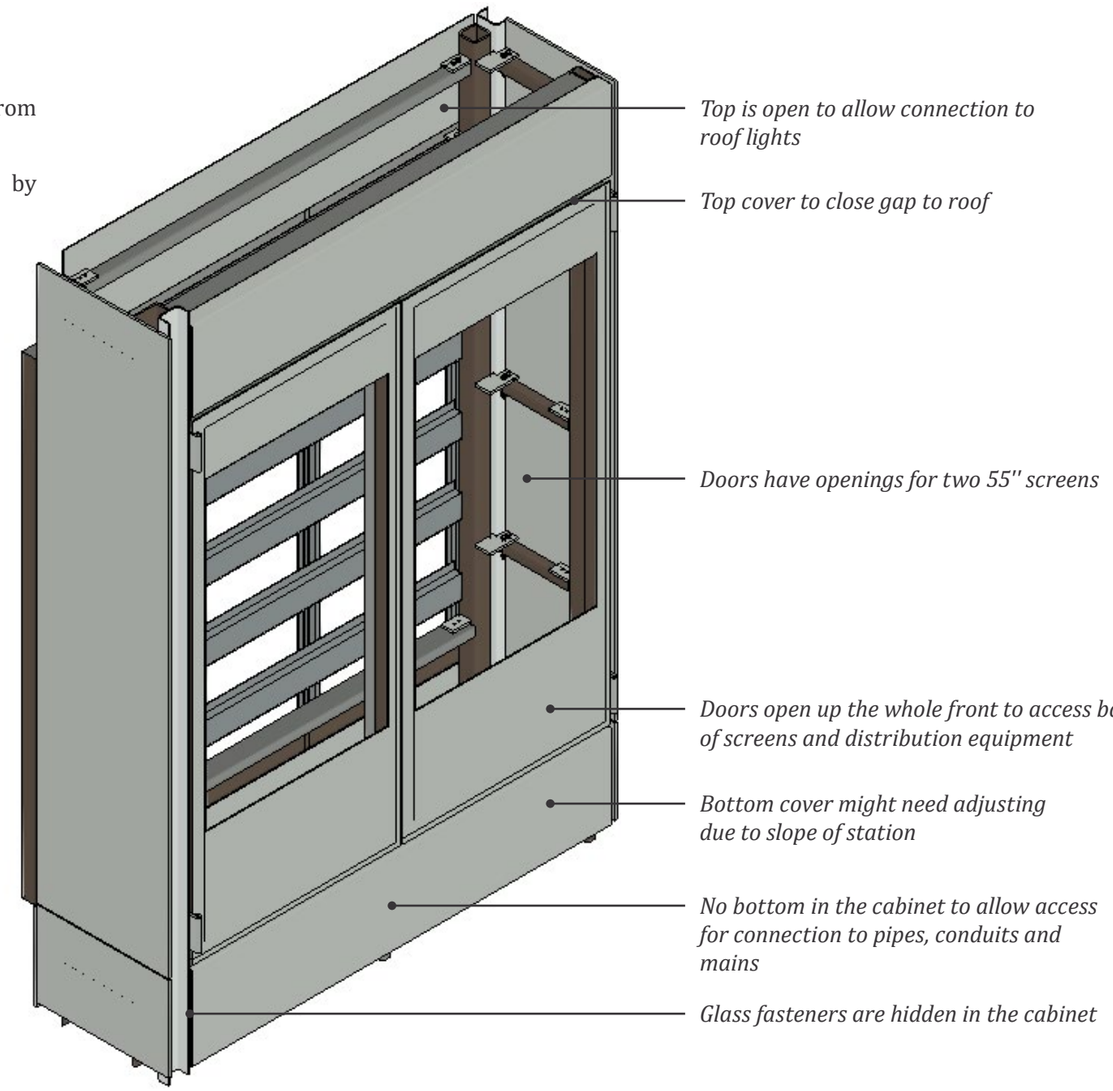


Fig. 32 - Technical cabinet

2.13 Electricity in technical cabinet

General information

Both technical cabinets have a distribution box and extra connection boxes.

One technical cabinet has the connection to the mains, the other cabinet is connected through connection pipes.

The heating cabinet has a distribution box for the station it is positioned in.

Extra connection boxes are estimated for future usage by CCTV or soundsystem.

Extra conduit is placed between the cabinet and the pylon and lightpoles to facilitate future connections.

Alignment with street advisor

Connections to the mains.

Tender documents need to be made for supplying and installing all equipment inside the cabinet, including all the necessary connection and wire diagrams.

Connections to equipment supplied by client needs to be included in tender. Equipment is pylon, screens, lightpoles etc.

Street advisor needs to update all technical descriptions according to his own design.

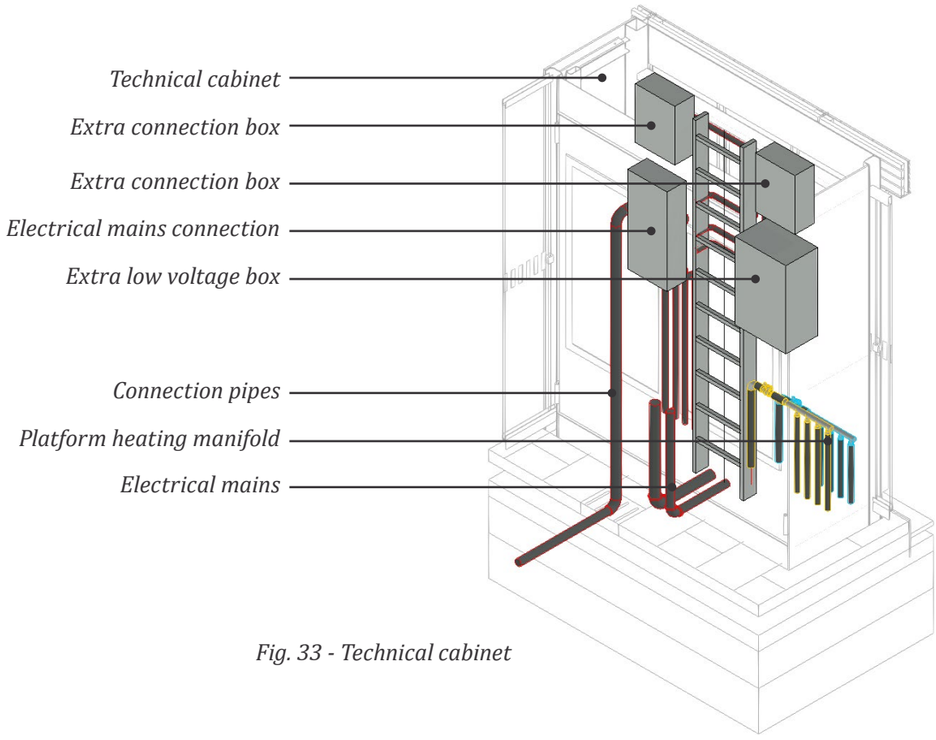


Fig. 33 - Technical cabinet

Note: Guidance line layout not updated

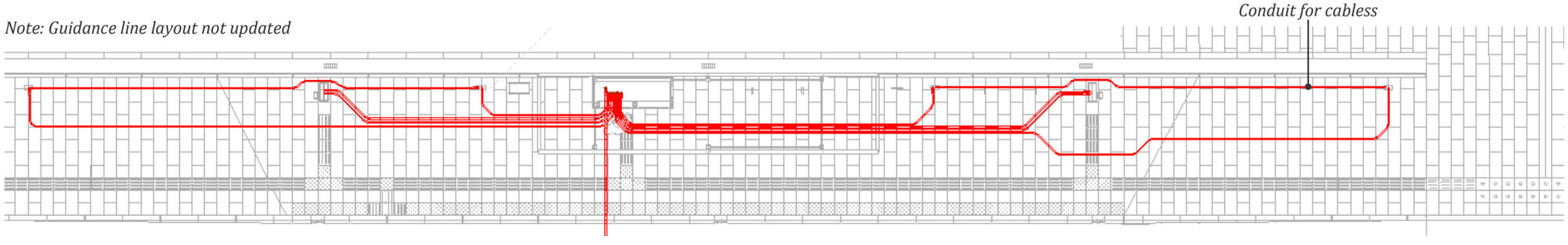


Fig. 34 - Electrical conduit

2.14 Heating in technical cabinet

General information

Both technical cabinets have a heating manifold and a connection to heating pipes.

One technical cabinet has the connection to the mains, the other cabinet is connected through connection pipes.

The heating cabinet has a distribution box for the station it is positioned in.

Connection to the district main is through a metered connection.

Alignment with street advisor

Connections to the mains.

Tender documents need to made for supplying and installing all equipment and pipes inside the cabinet.

Supply of hot water can be directly from the district heating mains, designer can also adjust the system to run on district heating backwater or connect to existing pavement heating system run by the municipality.

Heating pipes need to be adjusted to the length of ramp on either side.

Areas in front of ramps that lead to a pedestrian crossings need to be heated. This should be included in the design and has to be aligned by the street contractor.

Street advisor needs to update all technical descriptions according to his own design.

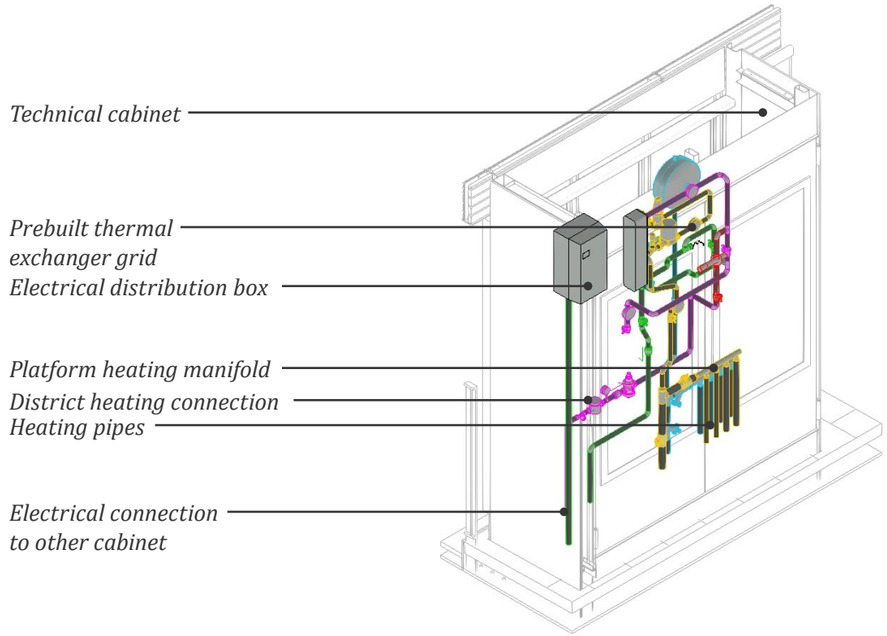


Fig. 35 - Technical cabinet, Heating

Note: Guidance line layout not updated

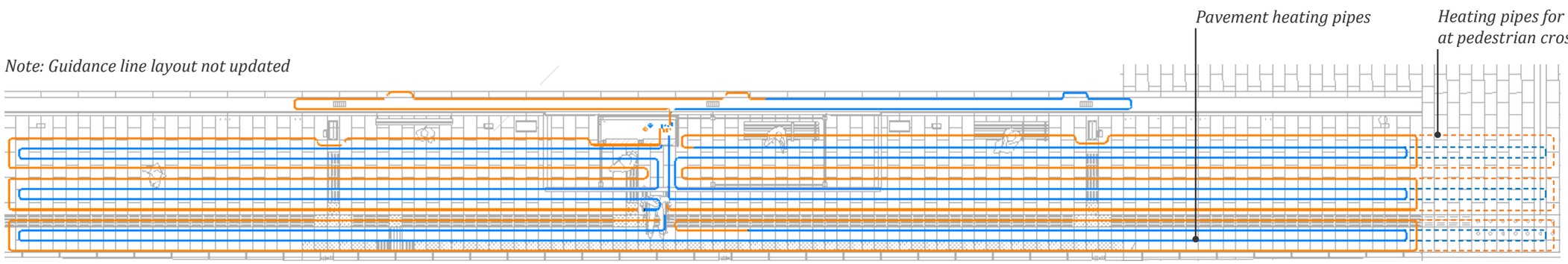


Fig. 36 - Heating layout

2.15 Connection to public utility networks

General information

Technical cabinet is the connection between stations electrical and heating systems and Veiturs distribution network.

The technical cabinets comes in pairs and one is for the connection for district heating the other for electrical connection.

Design requires 8 x connecting pipes for both water and electrical connections.

Some connecting pipes are for future usage.

Connecting pipes should be at least 1.0m below the surface of the BRT lane.

Alignment with street advisor

Depth and size of connecting pipes.

Connections to the electricity distribution system and district heating distribution system.

Size of connections based on distance from mains.

Connection should be outside the BRT Lane.

Street advisor needs to update all technical descriptions according to his own design.

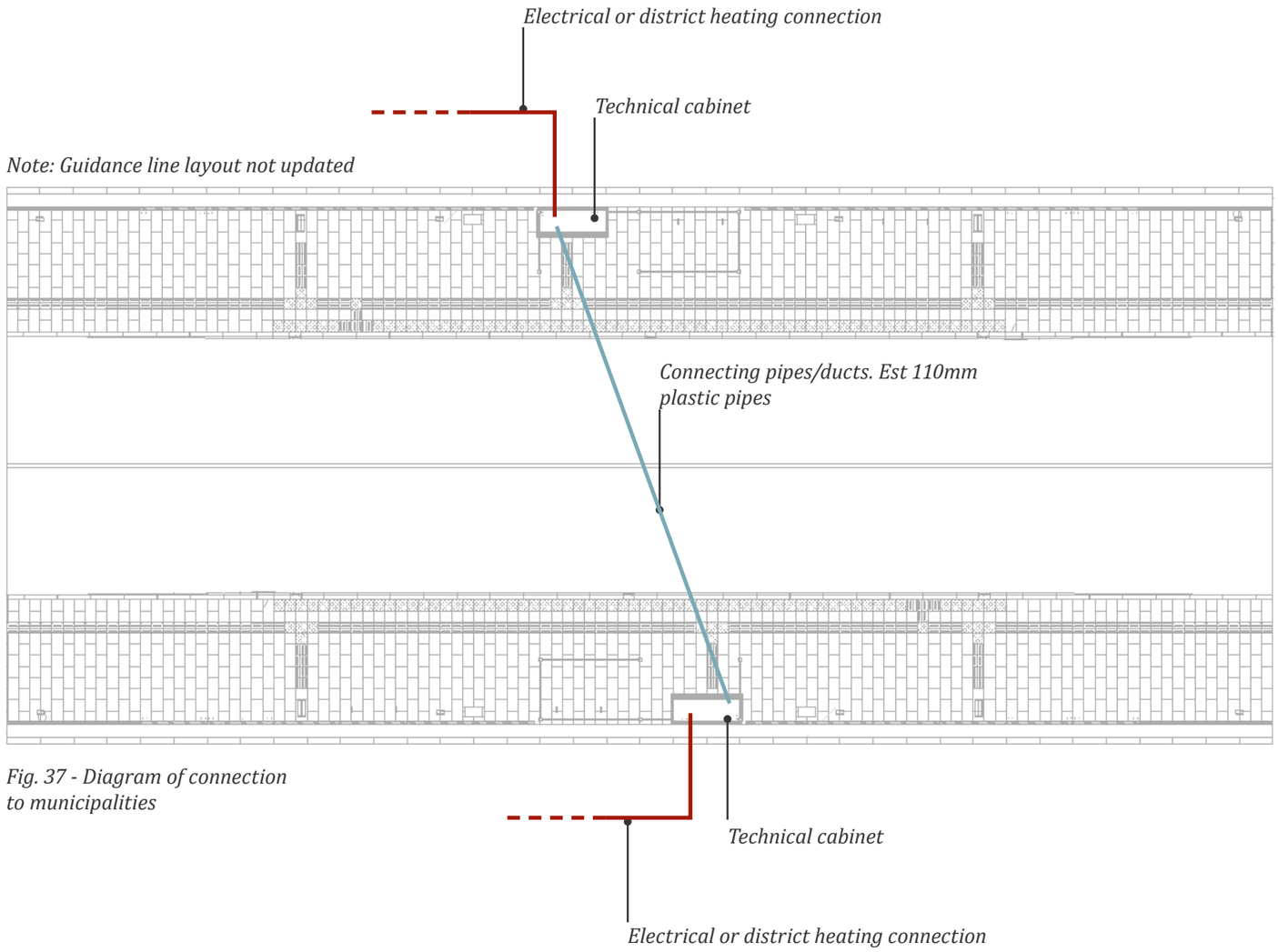


Fig. 37 - Diagram of connection to municipalities

2.16 Tiles temporary position

General information

When the stations are built and ready for operation, the new BRT fleet will not yet be available. This means that the existing bus types will be used until the new fleet arrives. However, these buses have a different door position compared to the future fleet.

To ensure the best possible passenger flow and accessibility on the platform with the current bus fleet, the tiles marking the bus entrance must be placed in a slightly different position than originally planned for the future fleet. When the new fleet arrives, these tiles will be relocated to their intended position.

The following drawings illustrate the type and location of the tiles until the new BRT fleet has arrived (temporary position) and their final placement in the future (permanent position).

Alignment with street advisor

Street designer is responsible to check if at the moment of construction the new BRT fleet has arrived, and wheter to use the temporary or permanent placement of the tiles.

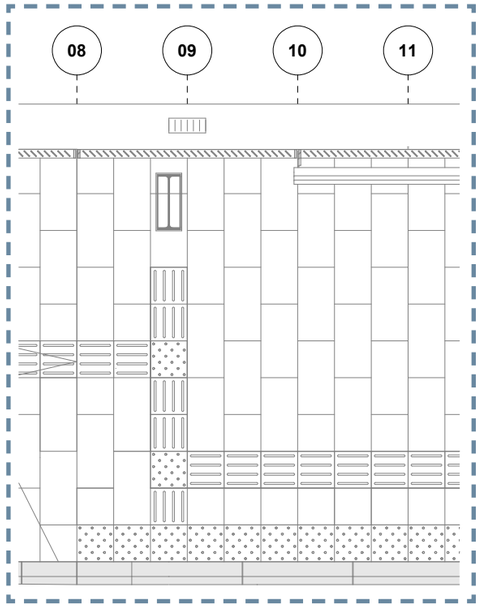


Fig. 40 - Standard platform
Tiles temporary position

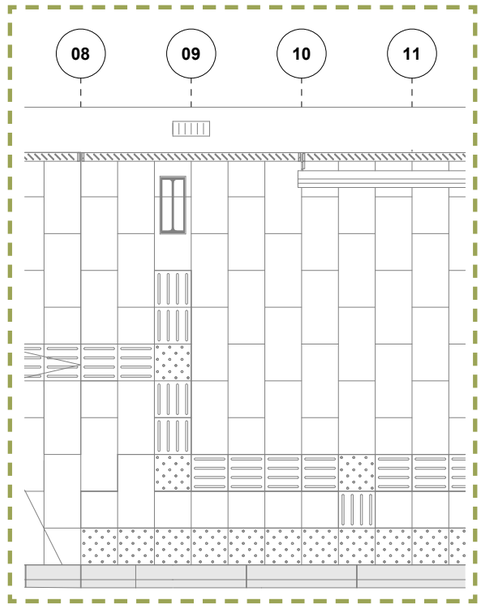


Fig. 41 - Standard platform
Tiles permanent position

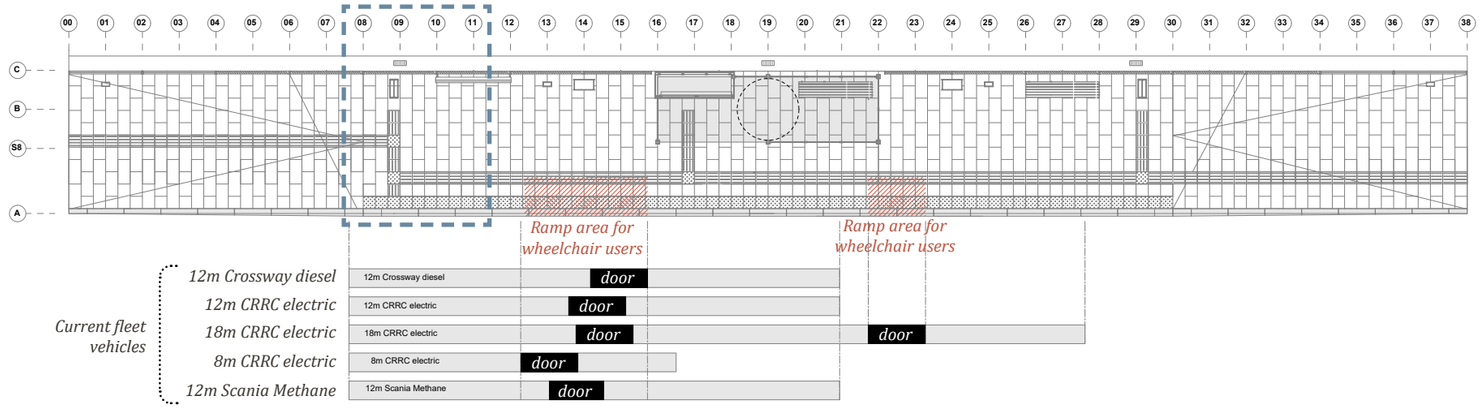


Fig. 38 - Standard platform - Tiles temporary position

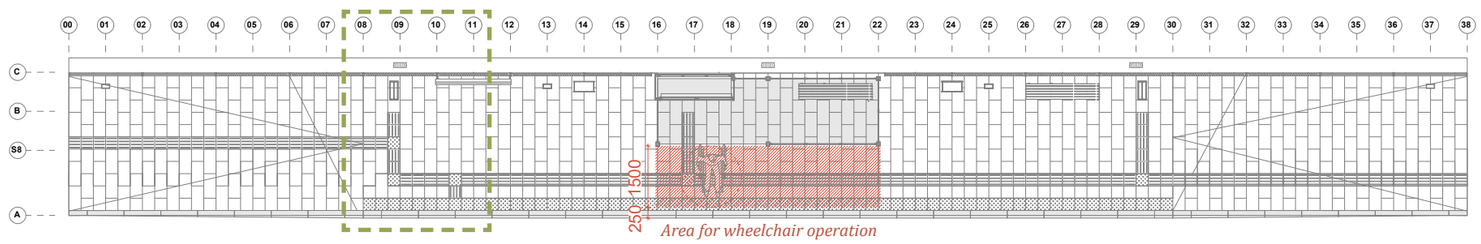


Fig. 39 - Standard platform - Tiles permanent position

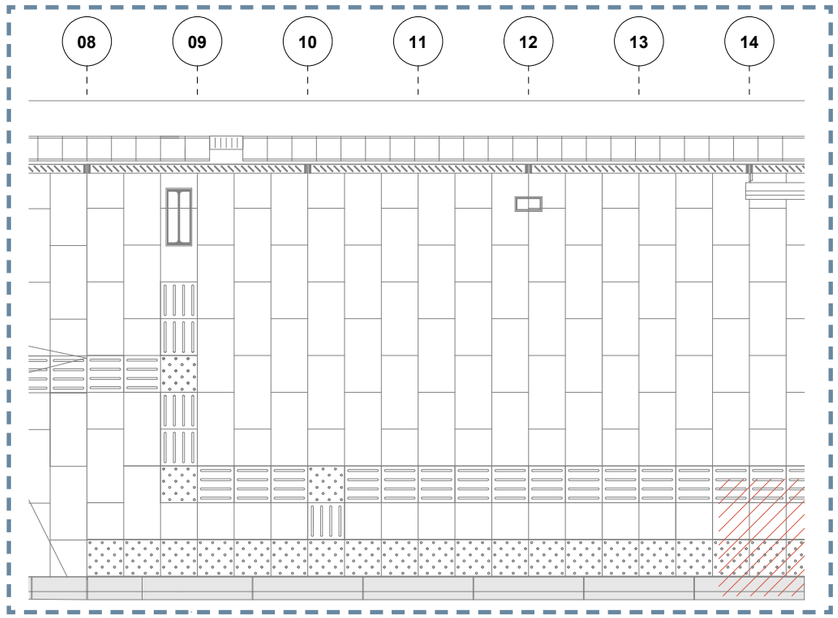


Fig. 44 - Long platform
Tiles temporary position

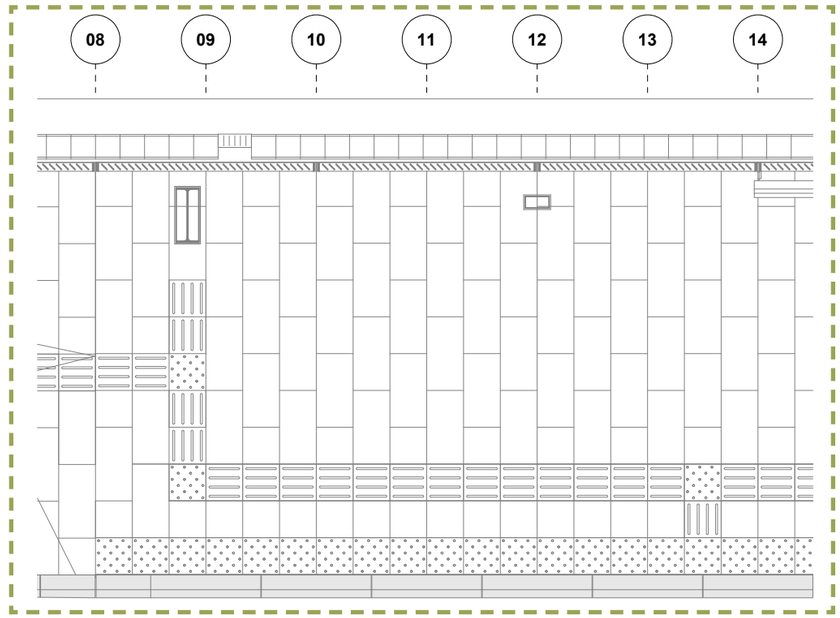


Fig. 45 - Long platform
Tiles permanent position

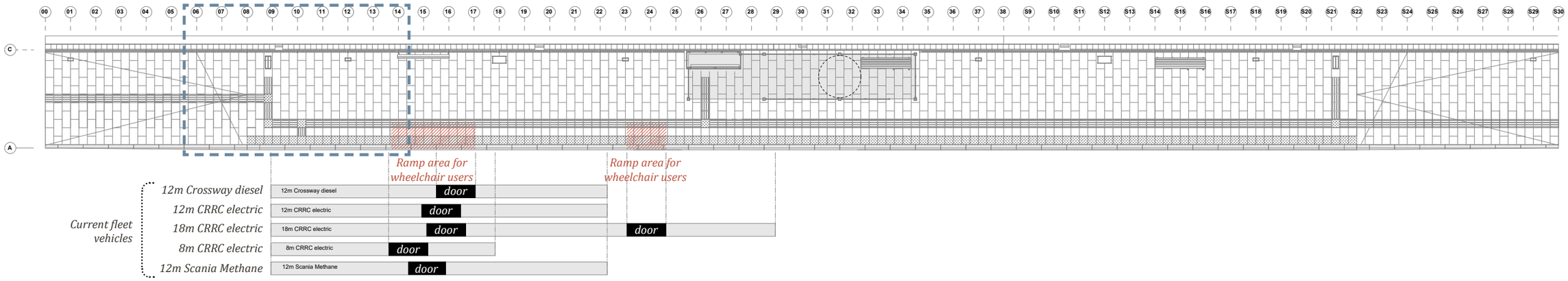


Fig. 42 - Long platform - Tiles temporary position

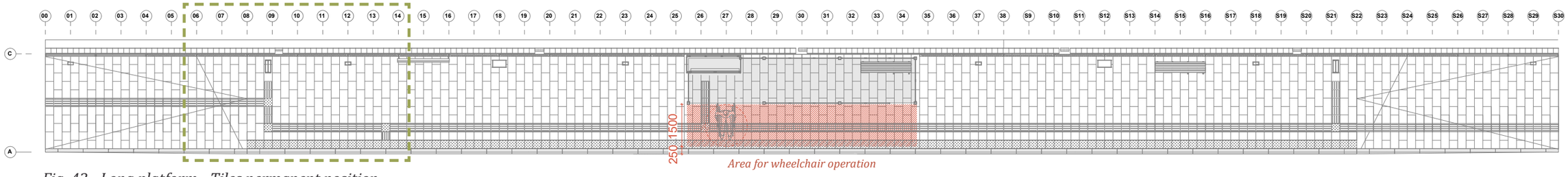


Fig. 43 - Long platform - Tiles permanent position

2.17 Tactile guidance line layout at ramps

General information

The BRT stations are located in varying urban contexts, which means the areas immediately beyond the station ramps differ from place to place. In some locations, a formal pedestrian crossing marked by crosswalks, road signs, or traffic lights may be present. In others, no official pedestrian-crossing facility exists. As a result, the elements found after the ramps (such as read signs or traffic lights) may or may not be present, and the layout of the tactile guidance line must be adapted accordingly. Two design solutions have been developed:

- Solution 1: The tactile guidance line along the ramps is aligned directly with the platform's guidance line. This solution is used when no formal pedestrian crossing is located after the ramps and when no physical obstacles such as road signs or traffic lights are positioned close to the guidance line.

- Solution 2: When a formal pedestrian crossing is located after the ramps, a road sign or traffic light could be present. In this case, this alternative layout must be used to ensure that visually impaired users are guided at a safe distance from these elements.

Alignment with street advisor

Street designer is responsible to check what layout of the tactile guidance line suits the local conditions best, and design the ramps accordingly.

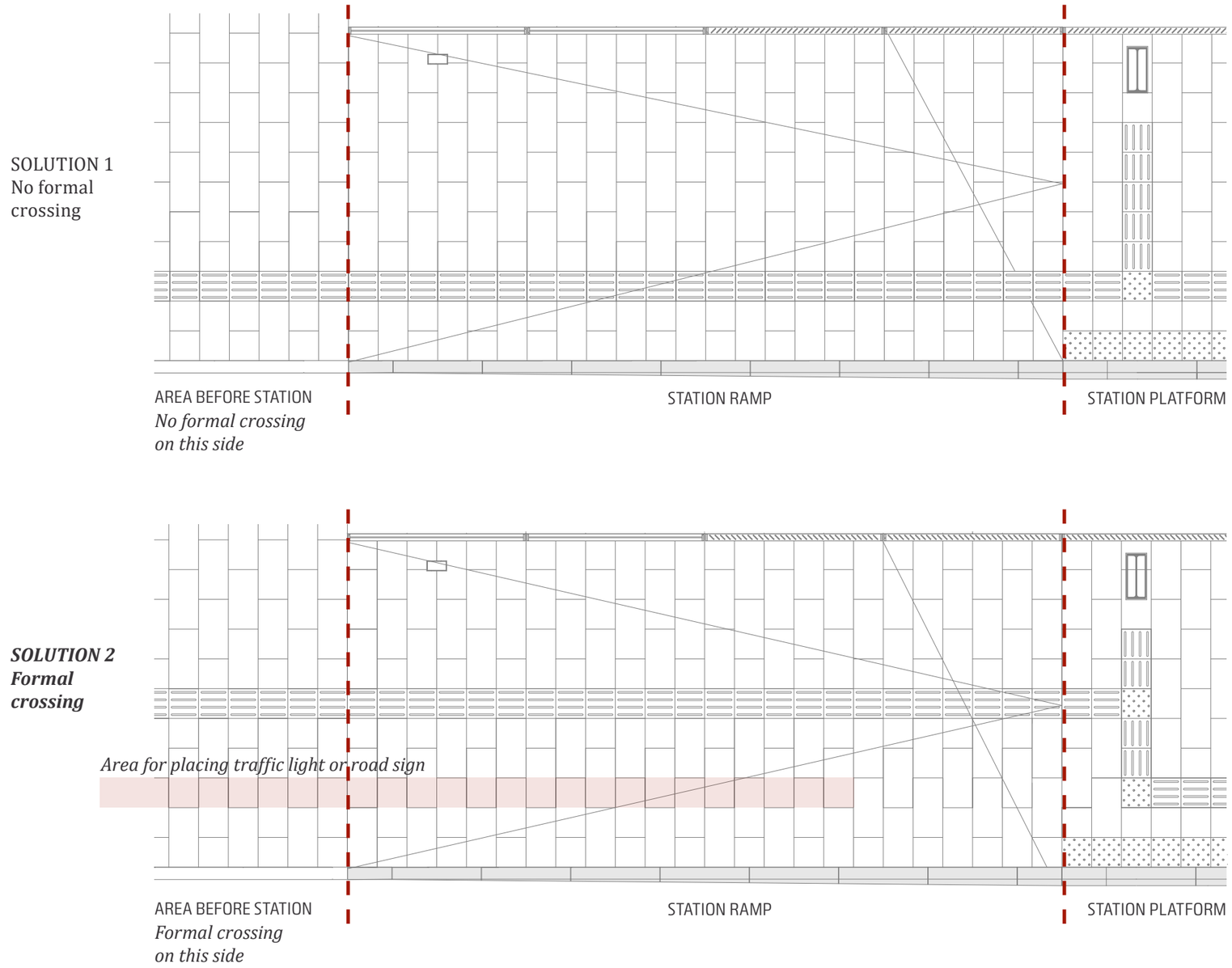
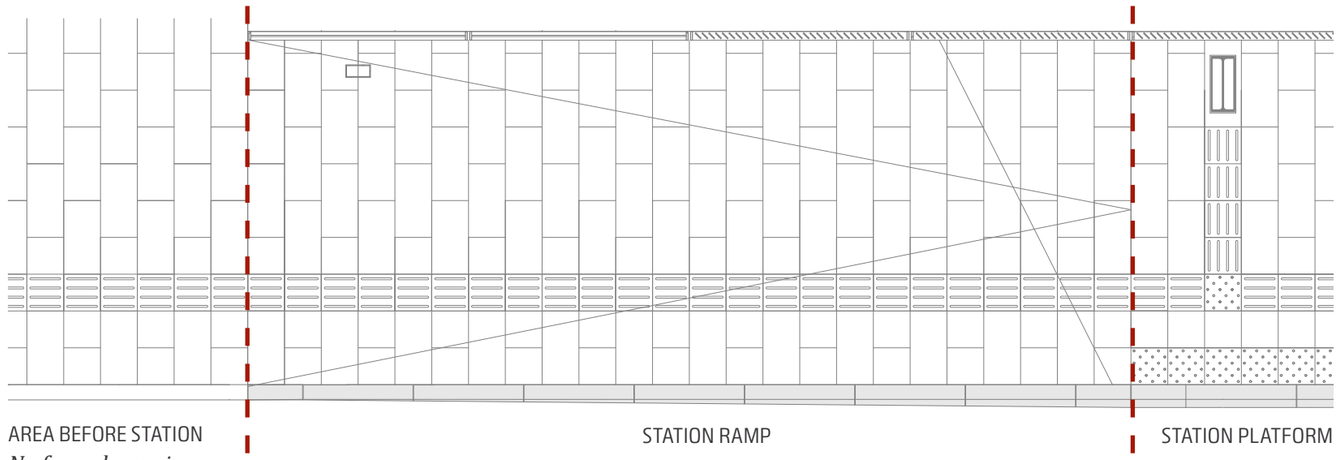


Fig. 46 - Solution 1 and 2 on Standard and Long platform

SOLUTION 1
No formal
crossing



SOLUTION 2
Formal
crossing

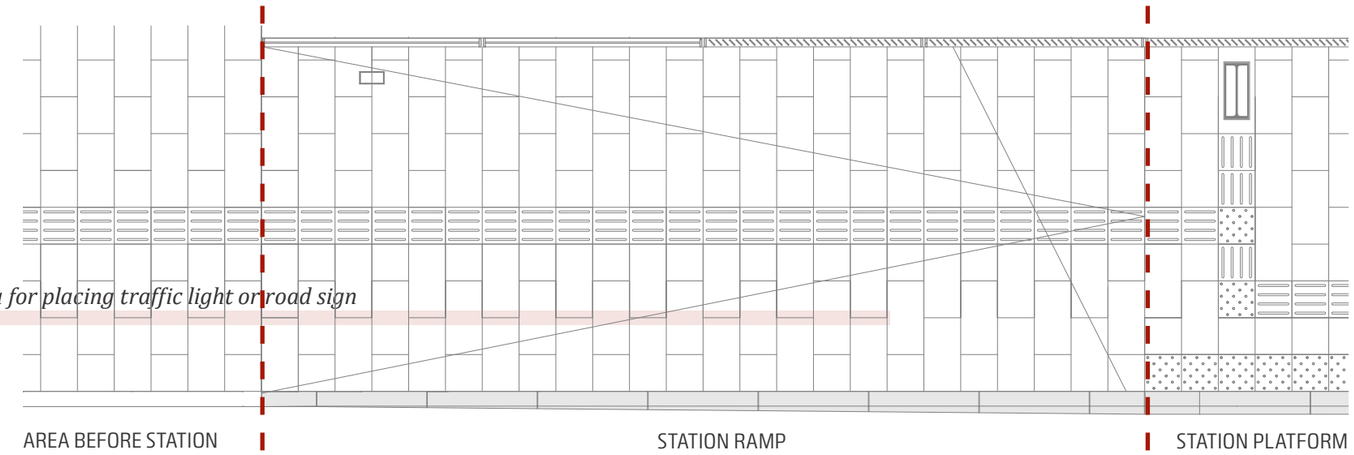


Fig. 47 - Solution 1 and 2 on Narrow platform

2.18 Width of station platform

General information

The width of the station platform when measured from the outer edge of the street kerbstone in the back-of-station safety area to the outer break point (kink) at the top of the station kerbstone is 400.0cm for standard and long platforms, and 350.0cm for narrow platforms (see the blue dimension line in Fig. 48 and 49).

When measured between the outer edges of the street kerbstones on both sides of the platform, the width is therefore 403.0 cm for standard and long platforms and 353.0 for narrow platforms (see the red dimension line in Fig. 48).

Alignment with street advisor

The street designer is responsible for allocating and designing the platform area in accordance with these guidelines, ensuring a coordinated transition between the street kerbstone elements and the platform kerbstone elements.

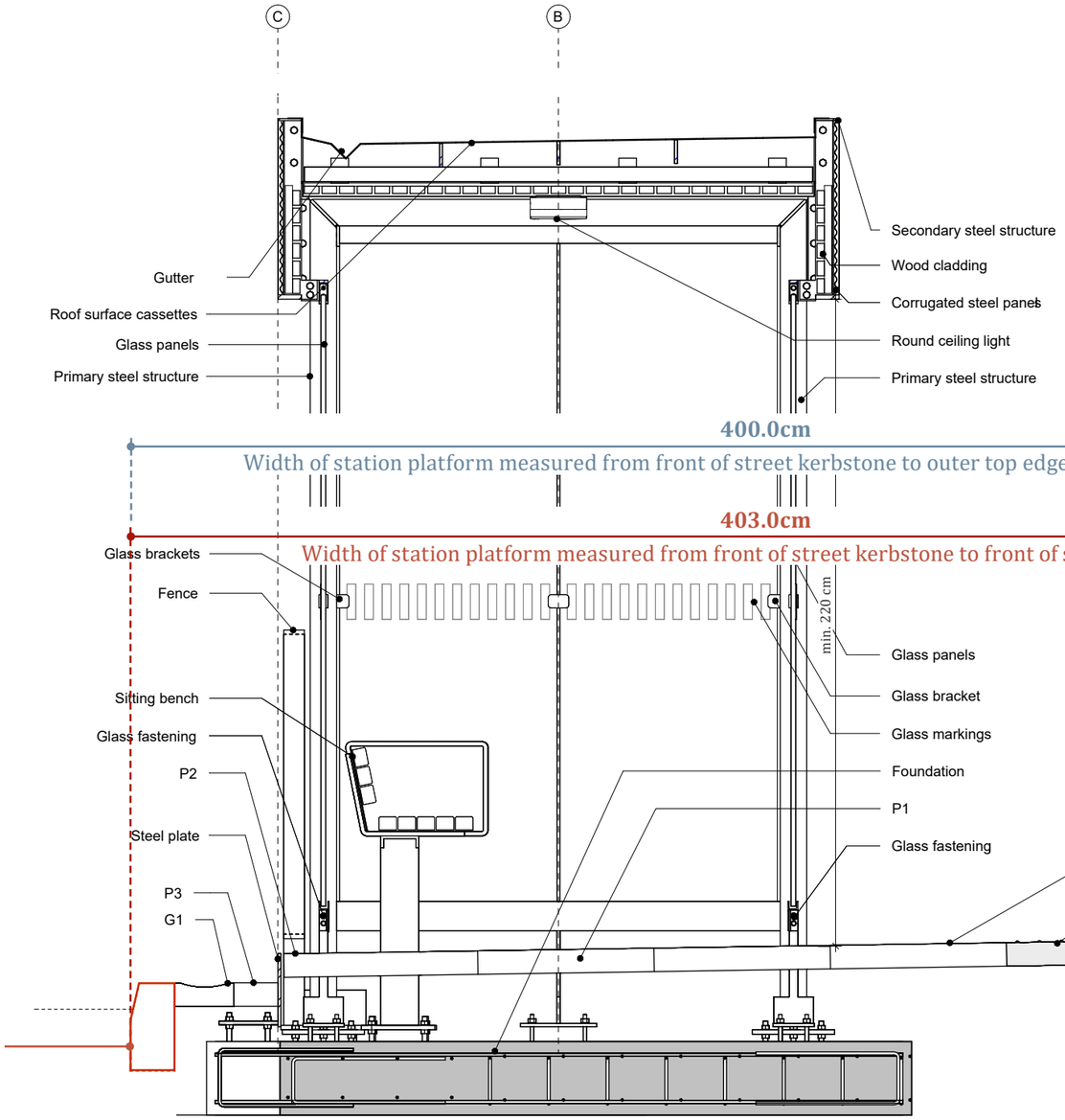


Fig. 48 - Cross section - Standard and long platform

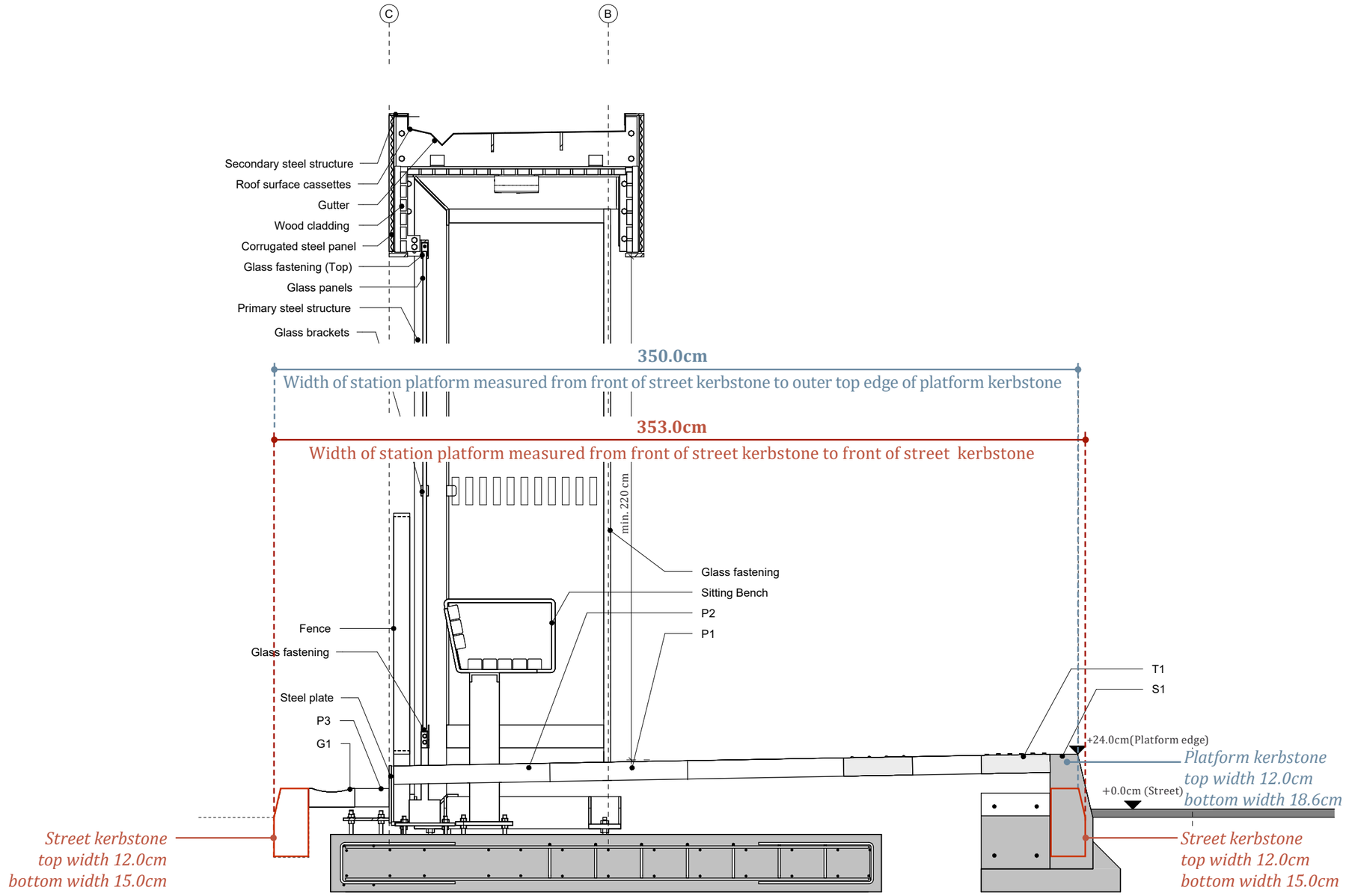


Fig. 49 - Cross section - Narrow platform