Network Elements

F

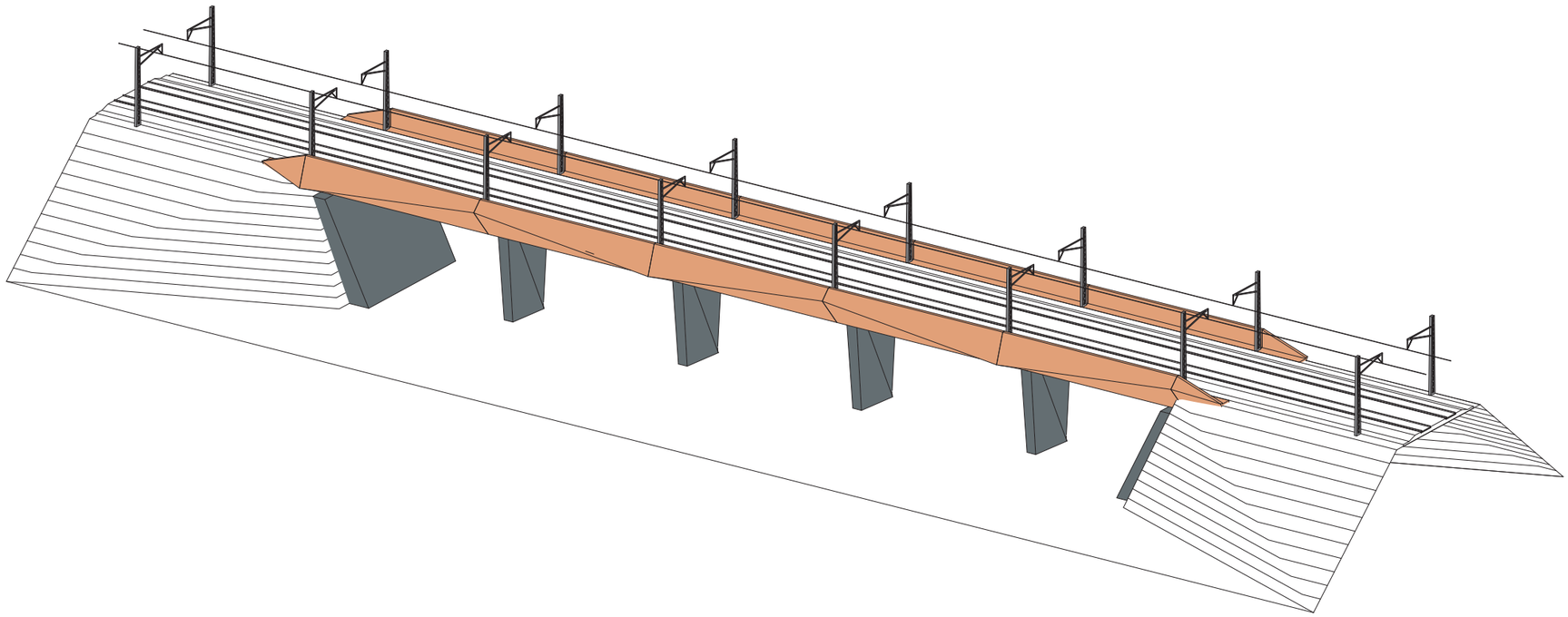
Railways Bridge

F1

Matrix

F1.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

	N	C	R
Railway bridge			

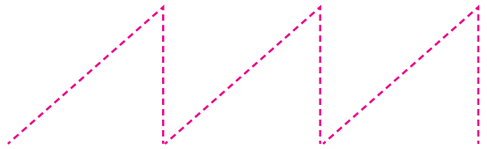
Concept Design

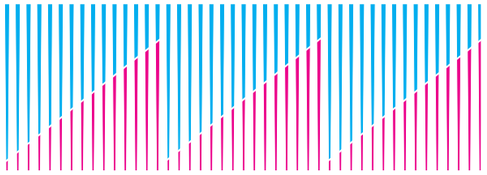
F1.2

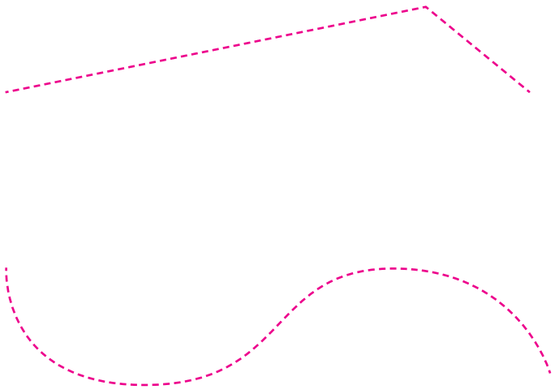
The concepts behind the Railway Bridges design come from:

- The shapes of the traditional roofs
- The geometries of the contemporary nordic architecture
- The repetition, that takes inspiration from the Sea.

Reference	Shapes	Design







Pictures
From above:
Image 1 - *Credits: SBS Engineering*
Image 2 - *Credits: Juozas Kamenskas*
Image 3 - *Credits: Michal Trnka*

Design Strategy

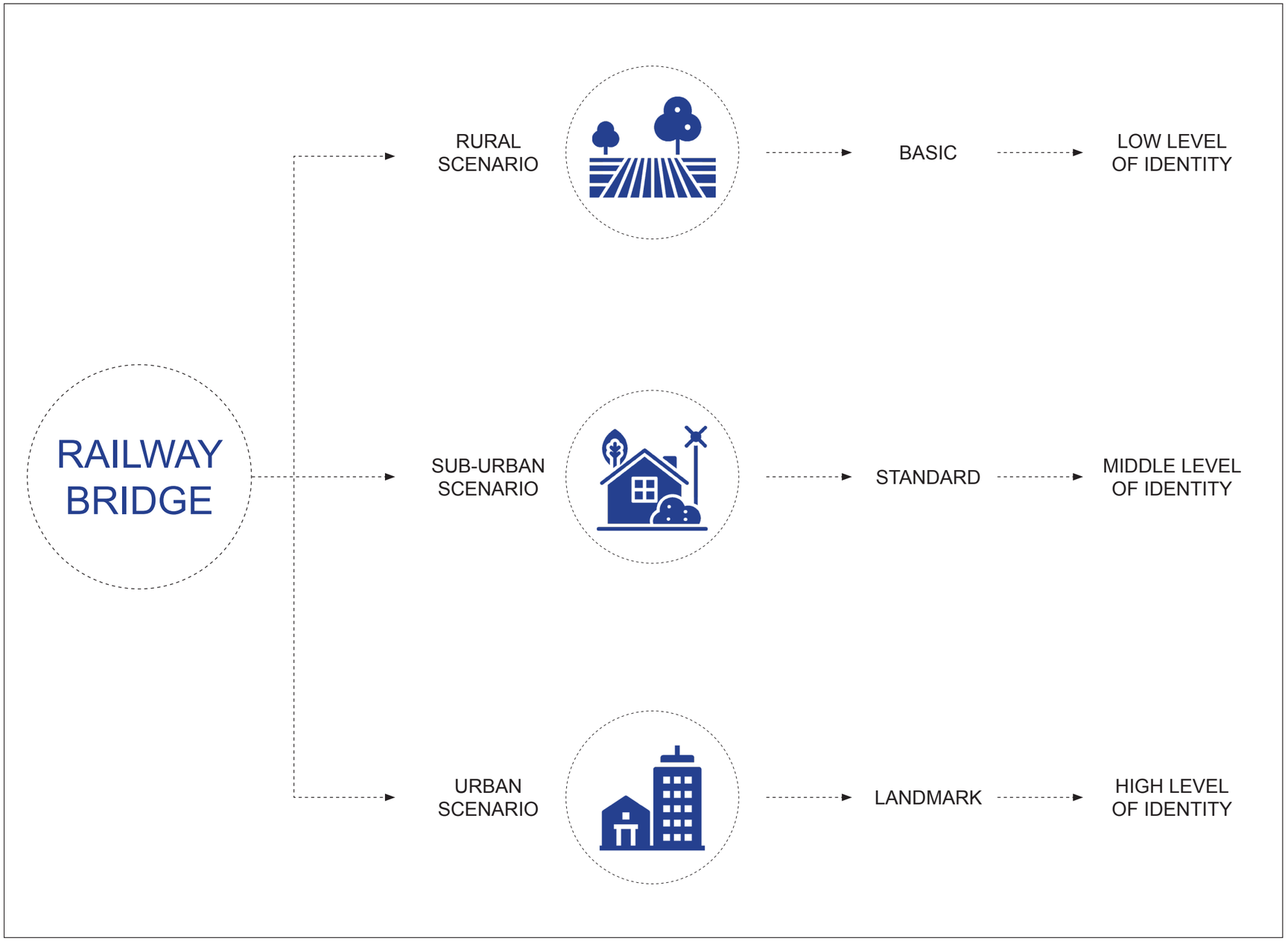
F1.3

The Railway Bridges will be located along the entire Rail Baltica line, thus crossing different types of scenarios.

These different surroundings give the need to place different types of bridges along the line, perfectly adapting to the context but respecting and preserving the identity of the Rail Baltica network.

Three different levels of identity were then defined:
- Low level of identity
- Middle level of identity
- High level of identity

For each of these levels a bridge type has been assigned, respectively:
- Basic type
- Standard type
- Landmark type



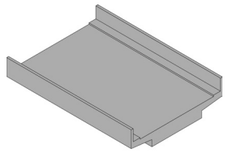
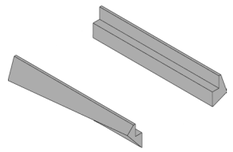
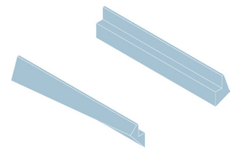
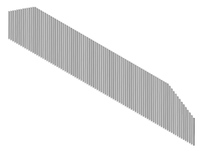
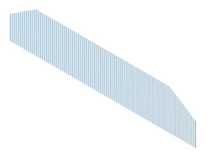
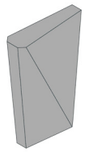
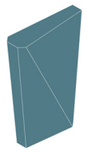
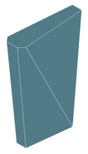
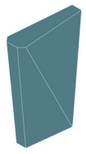
Design Strategy

F1.3

The Basic Type Bridge (BTB) is a bridge without a specific design assigned which, upon design by the Designer and RBR, it can be completed with the design of the piers provided by the Architectural, Landscaping and Visual Identity Design Guidelines.

For the design of the Standard Type Bridge (STB) please refer to the indications provided in the Basic Type Bridge, but with the addition of a fence that assigns identity to the bridge itself.

The Landmark Type Bridge (LTB) consists of a cladding that can be added / included in the design of the deck of the bridge, giving a geometric rhythm to the bridge elevation. The design of the piers is recommended for the landmark bridge if it is compatible with heights and dimensions of the specific locations.

ELEMENTS	BTB	STB	LTB
STRUCTURE 			
CLADDING 			
FENCE 			
PIERS 			

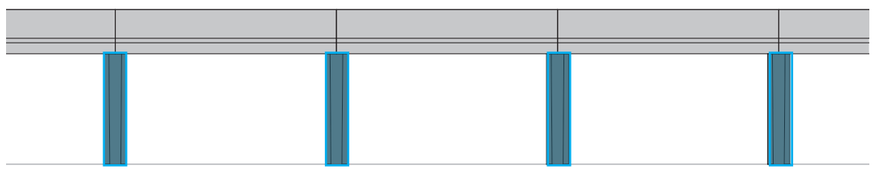
Design Strategy

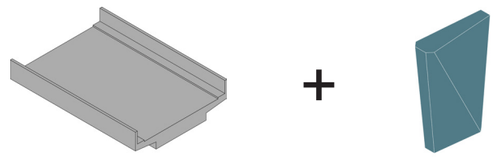
F1.3

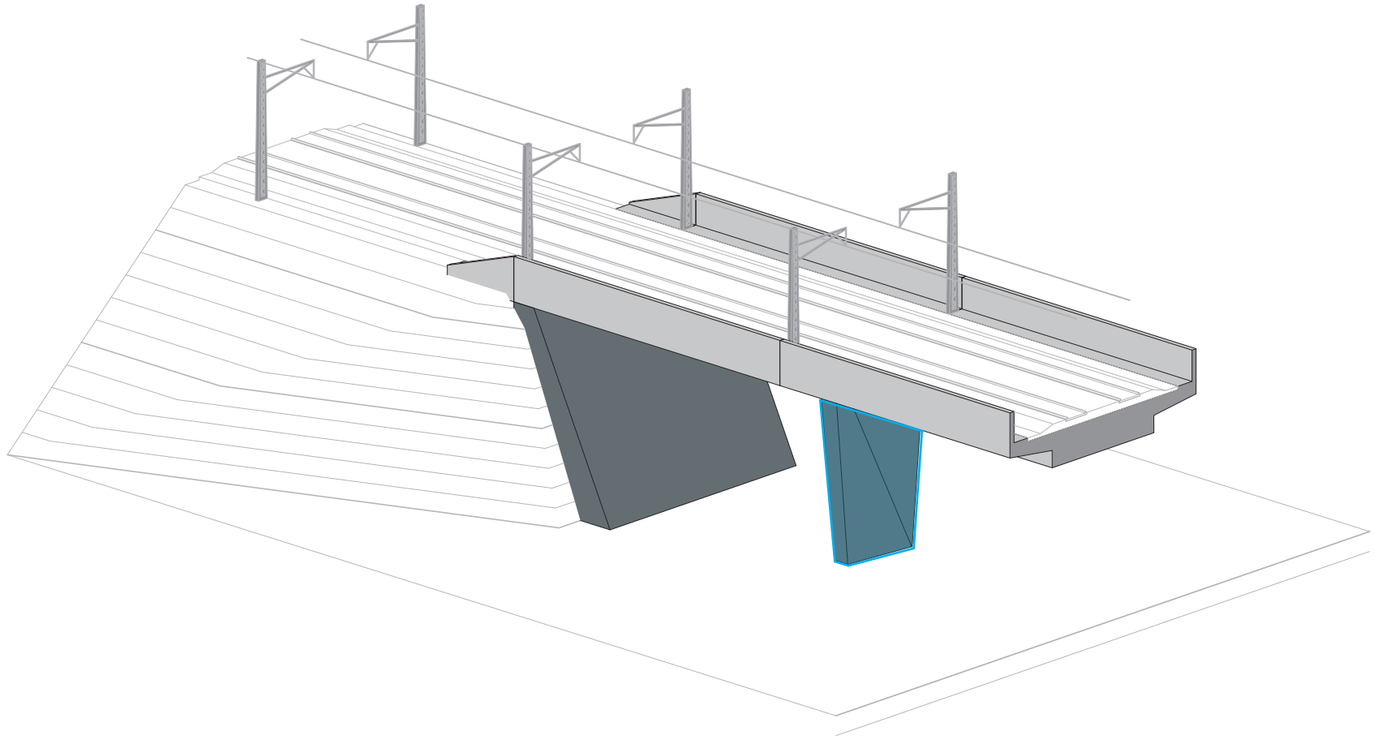
Basic Railway Bridge (BTB)

This type of bridge will be used where the bridge does not require a specific recognizability due to its position (rural scenarios) or the opinion of RBR.

The design of the deck can be to the discretion of the designers. The usage of the pigmented concrete or colors can be used to assign the country identity to the bridge. Even the application of the piers design is to the discretion of the designer sand RBR but is strongly recommended.







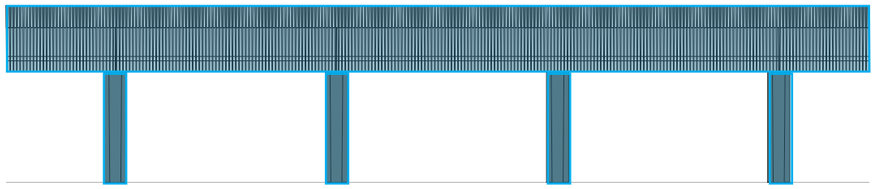
Design Strategy

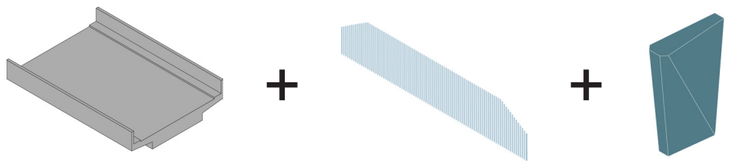
F1.3

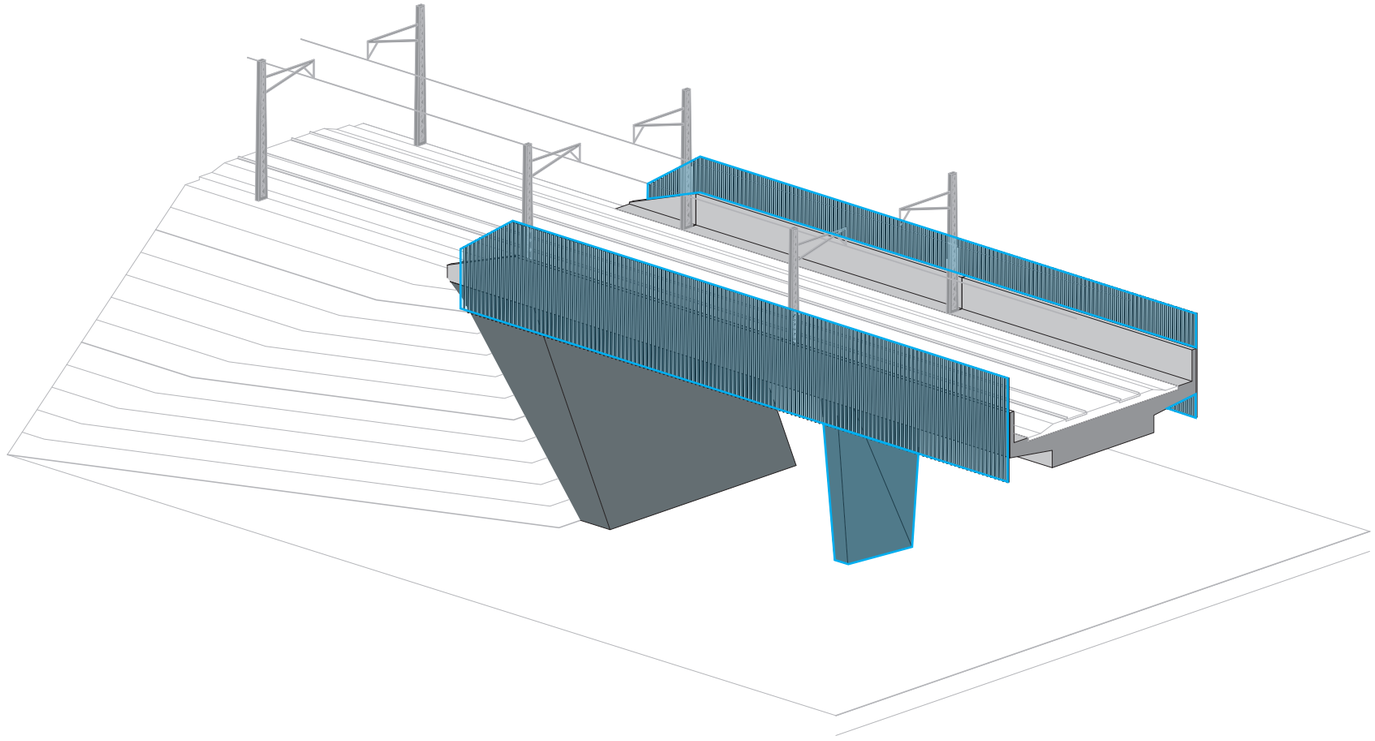
Standard Railway Bridge (STB)

The standard type bridge will be placed where it must be visible and recognizable but not placed in an landmark location.

The design of the deck can be to the discretion of the designers. The application of a coloured fence should be used to assign the country identity to the bridge. Even the application of the piers design is to the discretion of the designers but is strongly recommended.







Design Strategy

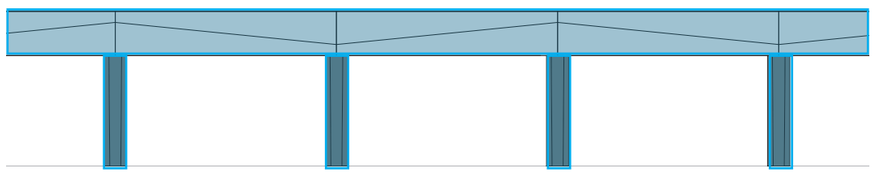
F1.3

Landmark Railway Bridge (LTB)

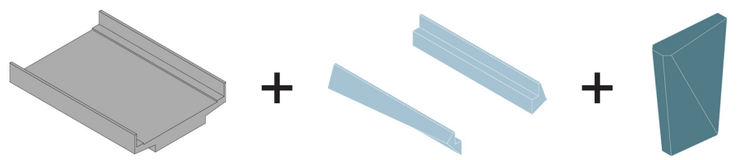
The Landmark Type Bridge is the most recognizable bridge and should be placed in very visible locations.

The design of the deck can be to the discretion of the designers however the application of the cladding is recommended. The cladding geometry is also recommended and can be applied as an addition to the structural deck or integrated into it. To assign the country identity to the bridge it should be used a colored cladding, compliant with the three primary colors set for the three Baltic Countries.
The design of the piers is recommended for the landmark bridge if it is compatible with heights and dimensions of the site location:

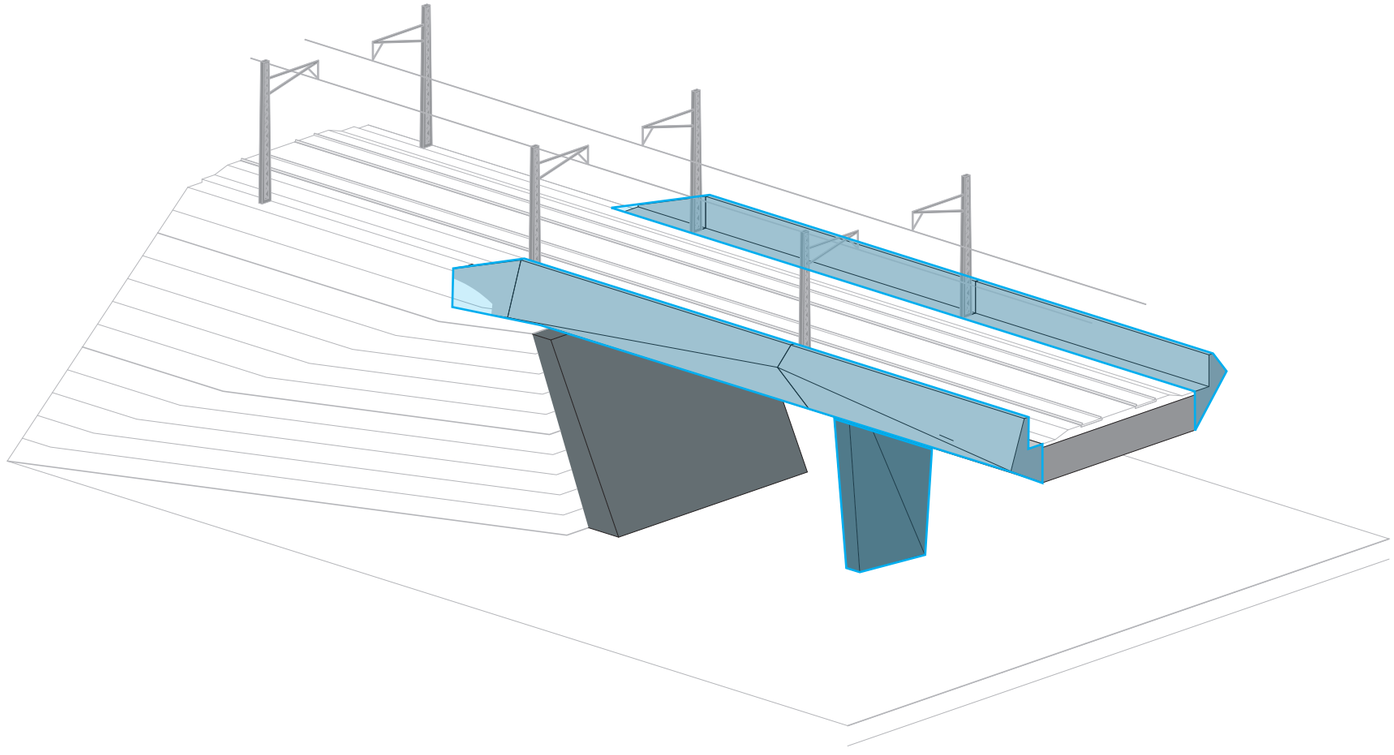
- Piers max height: 12 meters
- Piers must have all the same height



LANDMARK RAILWAY BRIDGE



STRUCTURE + CLADDING + PIERS



Design Strategy

F1.3

Elements Relation

In some situations it should be necessary to add some elements to the railway bridge:

- Noise Barrier
- Fence
- Net

The use of an additional element must follow the instruction given in the table.

If railings or/and overhead catenary protection system is placed on the bridge, same visual design principles as for bridge fence shall be applied.

	NOISE BARRIER	FENCE	NET
BASIC TYPE BRIDGE (BTB)	✓	✓	✓
STANDARD TYPE BRIDGE (STB)	✓	✓	✓
LANDMARK TYPE BRIDGE (ITB)	✓	✗	✓

Geometry

F1.4

Composition of the Landmark Railway Bridge

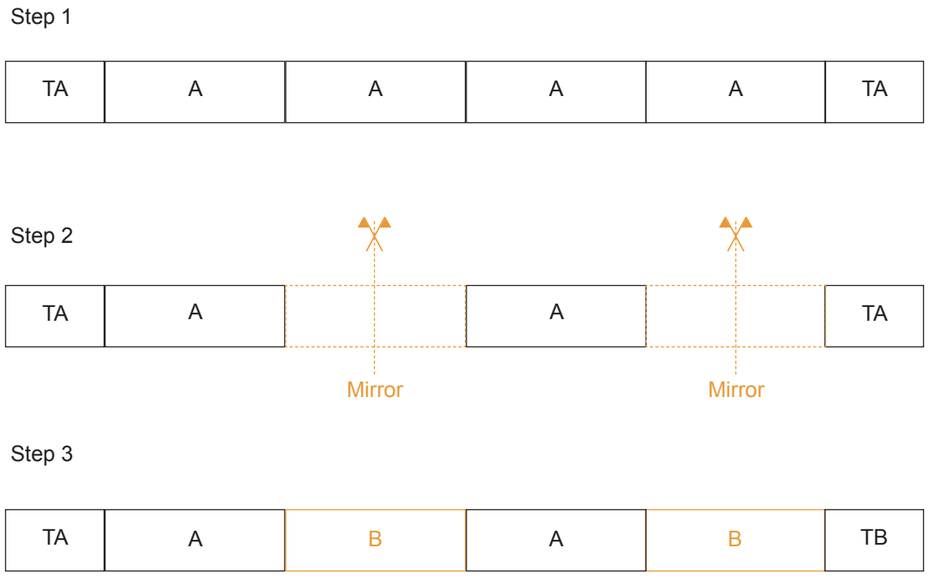
In order to replicate the correct shape on the Landmark Bridge elevation, this bridge should be composed of two modules (A and B).

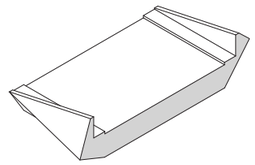
Step 1:
Module A is repeated and terminate with a special ending module.

Step 2:
Module B is generated mirroring the Module A along its transversal axis. The lengths of the module is fixed and only the termination modules length can be variable.

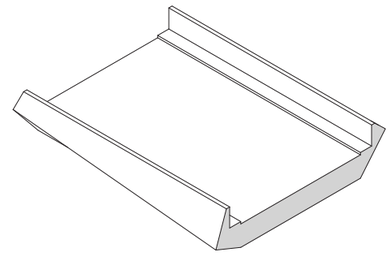
Step 3:
The termination modules should continue the elevation geometry of the previous module and fade it to the track level.

Modulation process

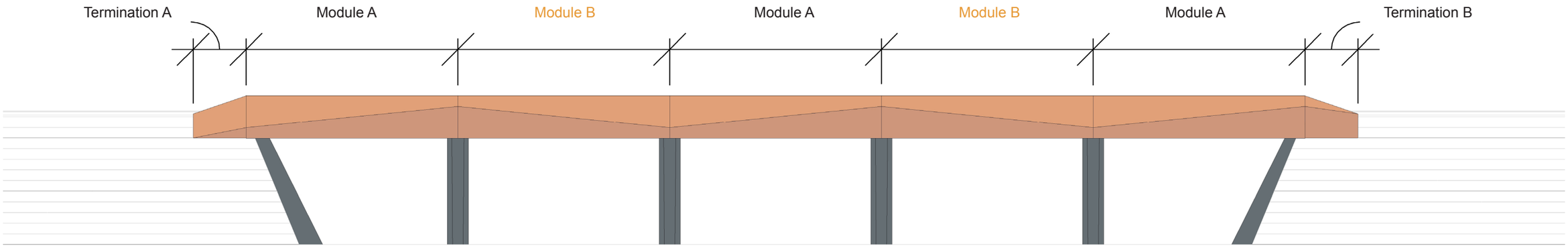




TA / TB = Termination Module



A / B = Deck Module



Geometry

F1.4

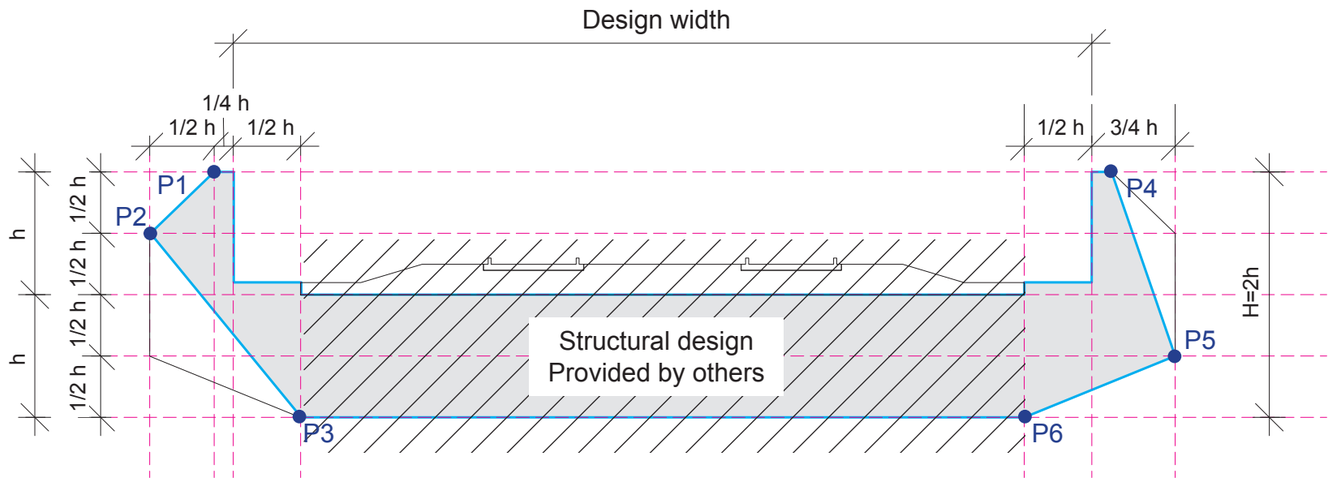
Cladding

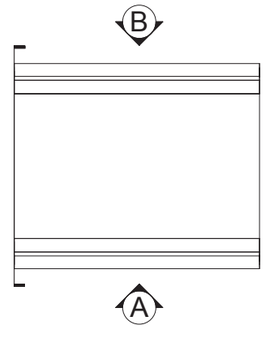
The Cladding geometry is made by the union of the control points shown in the images on the side.
Each elevation of the cladding will be characterized by two trapezoids with the greater side in common (line from P2 and P5).

Trapezoid 1 - Control points:
P1 - P2 - P5 - P4

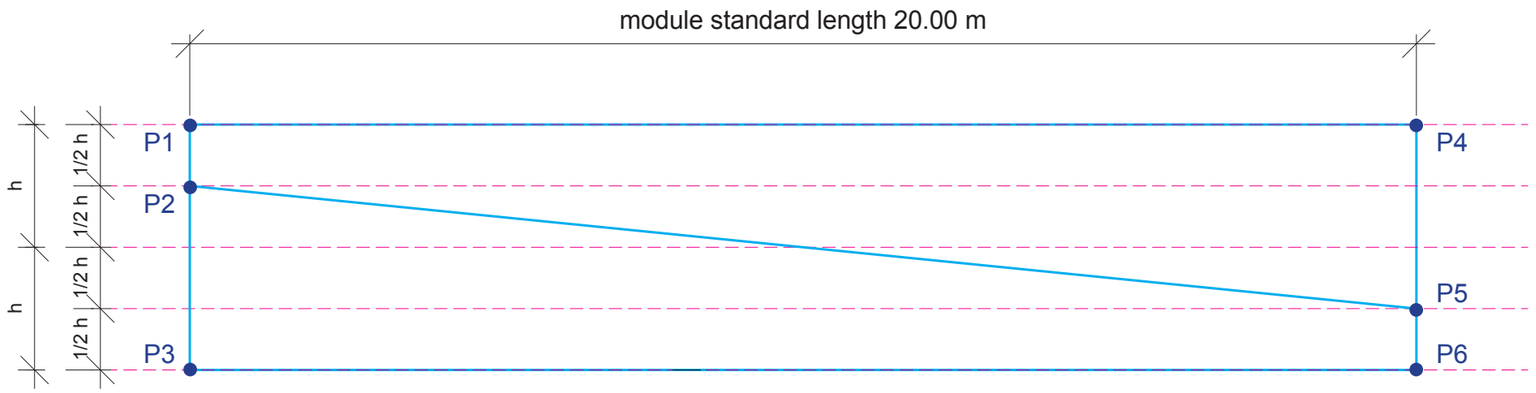
Trapezoid 2 - Control points:
P2 - P3 - P6 - P5

Future designers can define the most suitable substructure respecting the visual identity of the cladding.





Section



Elevation A / Elevation B

Geometry

F1.4

Cladding - Terminations

The Cladding geometry of the termination is made by the union of the control points shown in the images on the side.
Each elevation of the cladding will be characterized by a trapezoid and a triangle with a side in common (line from T1 and P2 / T3 and P5).

ELEVATION A

Trapezoid - Control points:
T1 - T2 - P2 - P3

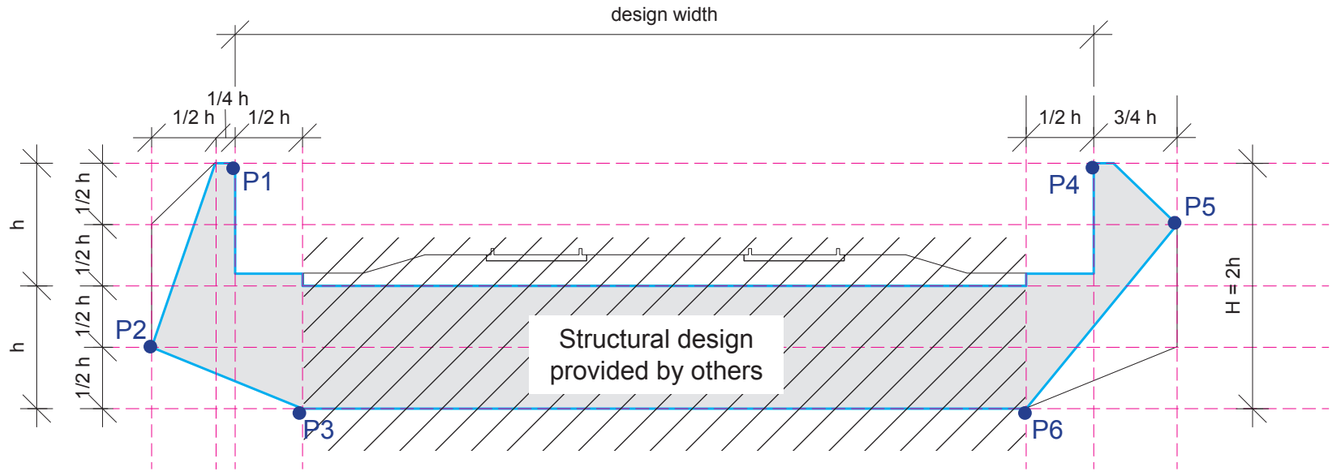
Triangle - Control points:
T1 - P2 - P1

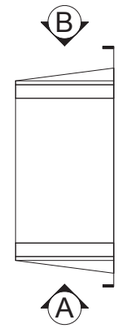
ELEVATION B

Trapezoid - Control points:
T3 - T4 - P5 - P6

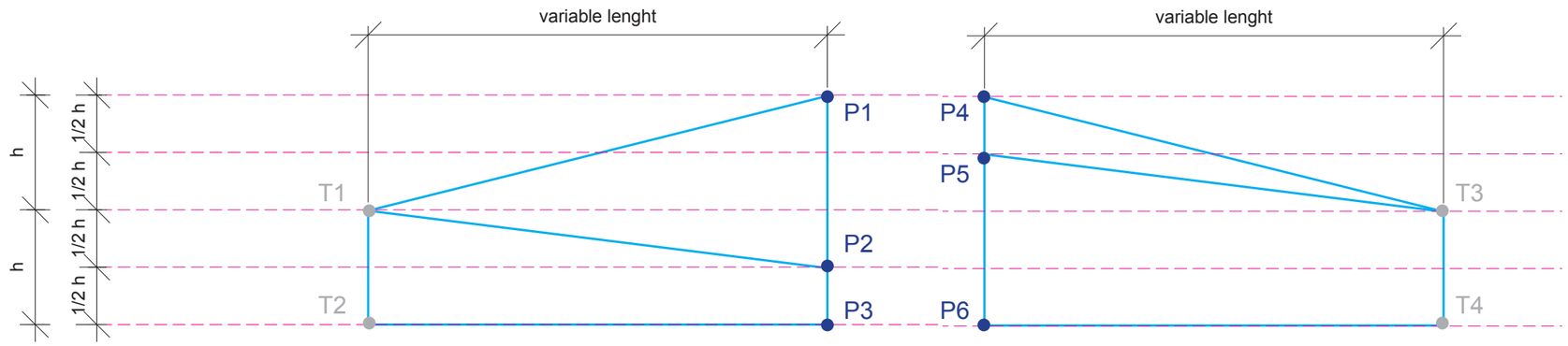
Triangle - Control points:
T3 - P4 - P5

Future designers can define the most suitable substructure respecting the visual identity of the cladding.





Section



Elevation A

Elevation B

Geometry

F1.4

Piers

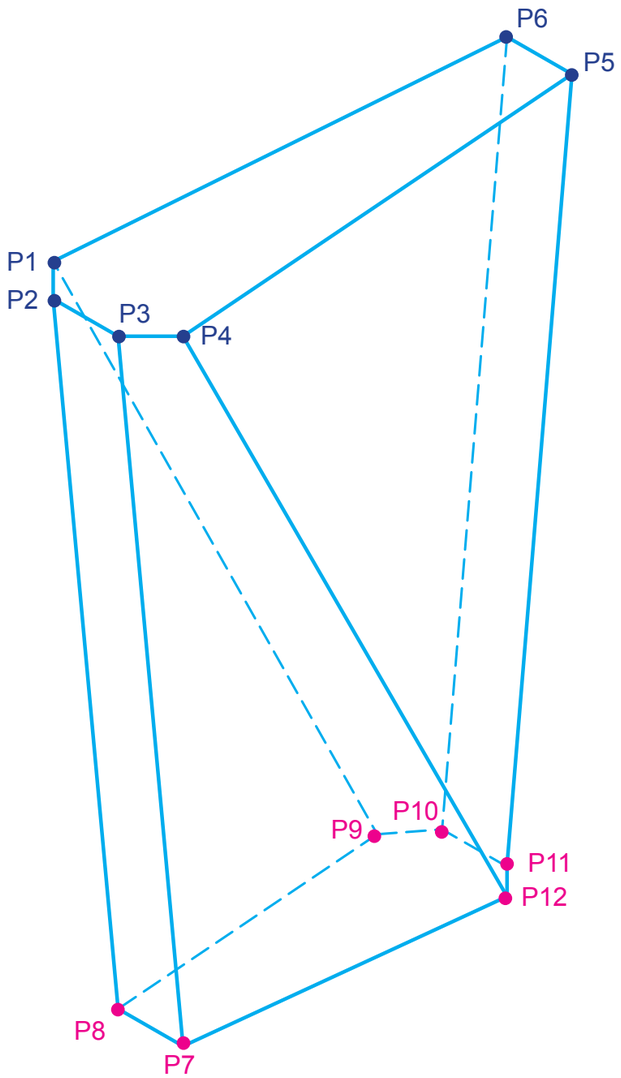
The shape of the piers comes from the join of the vertices of the basic geometric figure with the one on the top, as shown in the images on the side.

The control point in blue are related to the top, the magenta ones are related to the base.

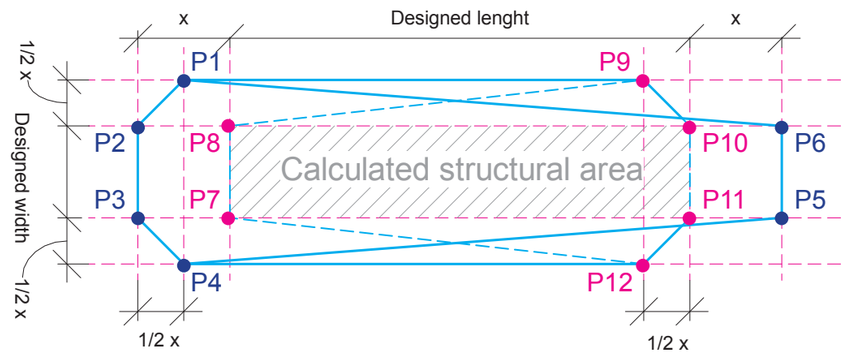
The position of these control points are ruled starting from the a rectangular piers based on structural calculation.

The geometry of the piers can be done as a cladding added to a basic pillar or cast in place.

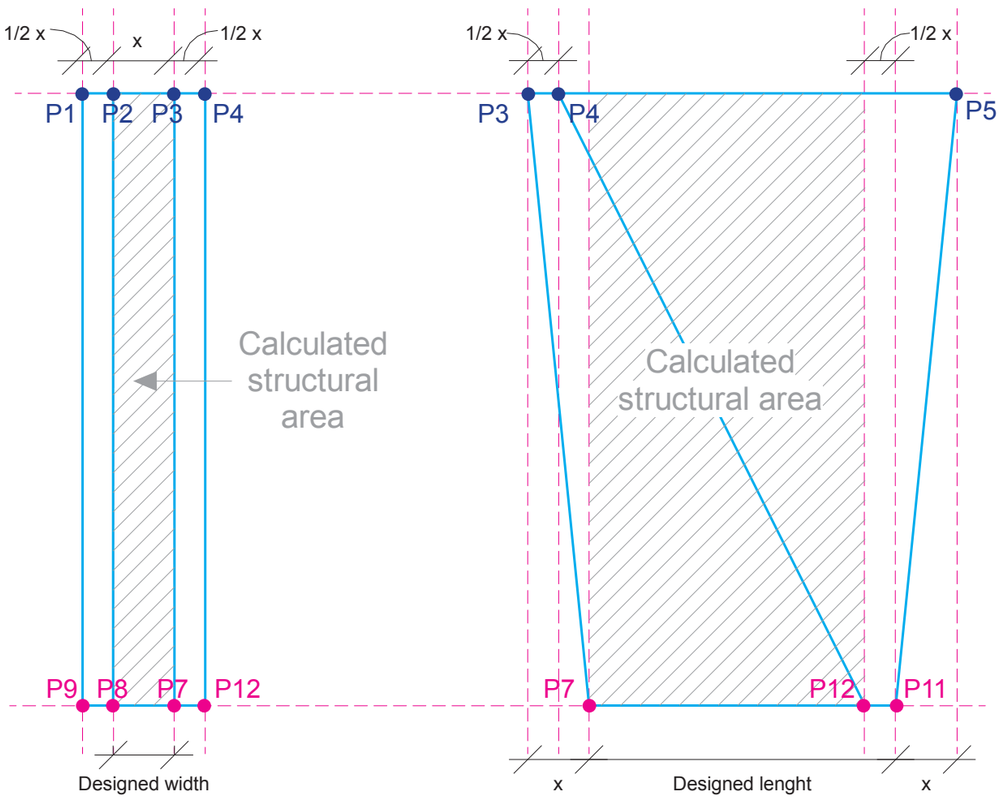
Future designers can define the most suitable substructure respecting the visual identity of the cladding.



Plan



Elevations



Geometry

F1.4

Fence

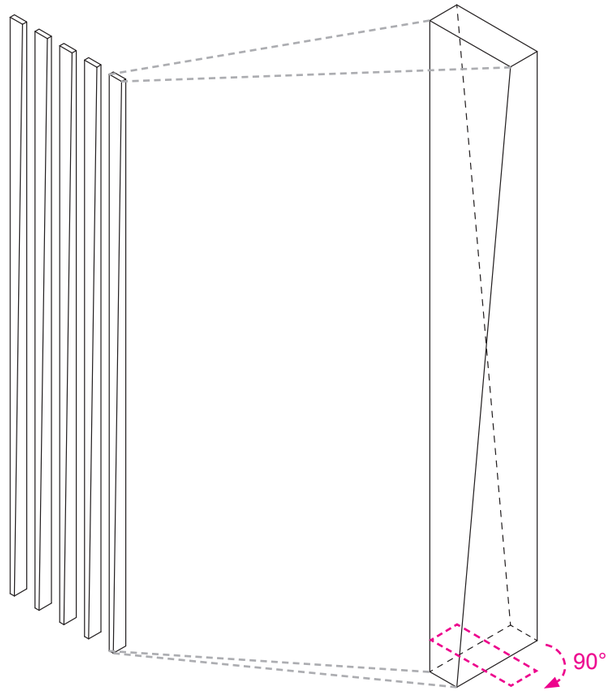
This kind of fence is an element used to give more identity to a basic bridge making it become a standard bridge.

Is composed by a series of boxed element twisted of 90° from the top to the base. The rotation must be uniform along all the element.

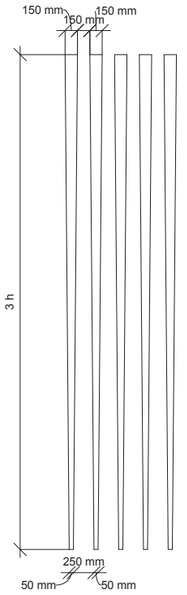
The design of the substructure is entrusted to the designer as long as it respects the visual rules of the Architectural, Landscaping and Visual Identity Design Guidelines.

The height is not standard and depending from the height of the bridge, as shown in the image below.

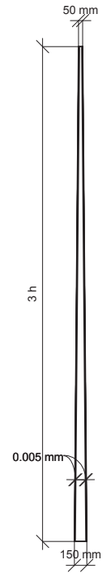
The fence has a constant height during the central modules of the bridge and will degrades starting from the terminal modules, according to the rules defined in the image below.

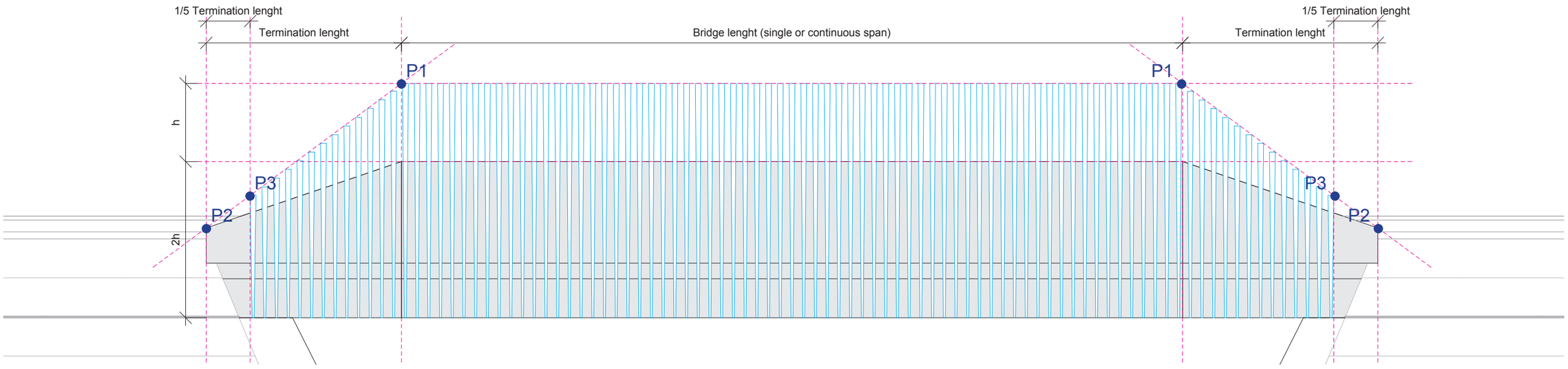


Elevation



Section





Materials

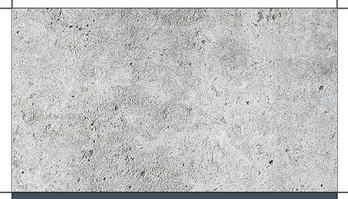
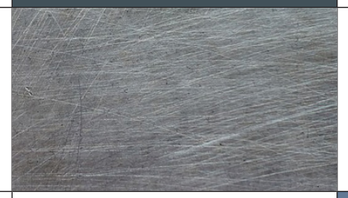
F1.5

Railway Bridges are a composition of three visual elements:

Piers: bare concrete, pigmented concrete or painted concrete, using the network color.

Fence: Glazed metal using the identity colors.

Cladding: pigmented concrete or painted concrete, using the identity colors.

		Network	Estonia	Latvia	Lithuania
PIERS	Materials				
	Colors	RAL 7016			
FENCE	Materials				
	Colors		RAL 5014	RAL 3011	RAL 6011
CLADDING	Materials				
	Colors		RAL 5014	RAL 3011	RAL 6011

Materials

F1.5

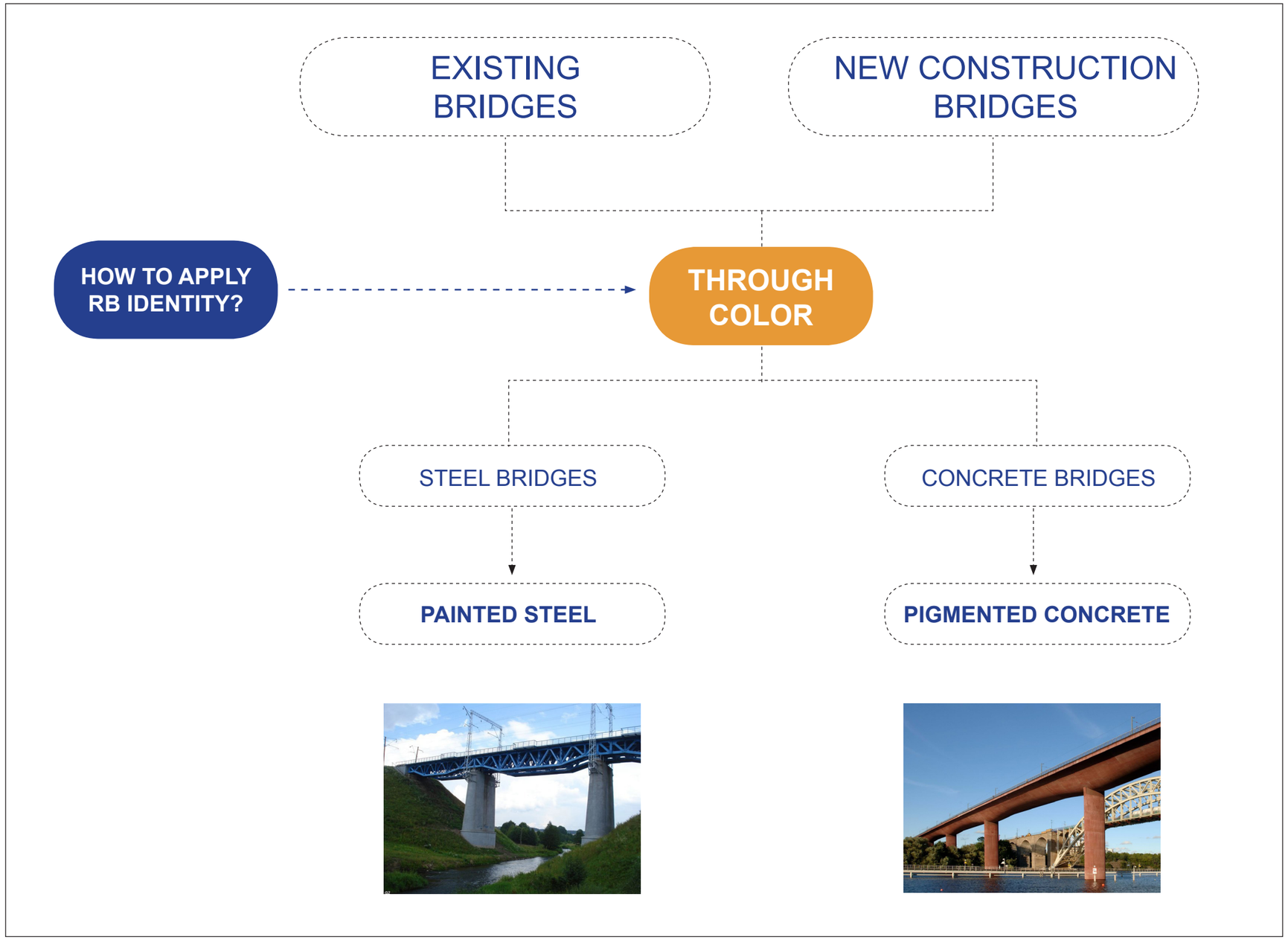
Existing and New Construction Railways Bridges

All along the RB Rail line it will not always be possible to use the three types of railway bridges previously proposed.
RB rail line could pass over other two different types of bridges:

- Existing Bridges
- New Construction Bridges (no standardised bridges)

In these cases it's possible to identify them by applying the RB identity through the use of color:

- Painted steel, in presence of steel bridges;
- Pigmented or painted concrete, in presence of concrete bridges.



Pictures
From left:
Image 1 - *Credits: miestai.net*
Image 2 - *Credits: fosterandpartners.com*

Branding Implementation

F1.6

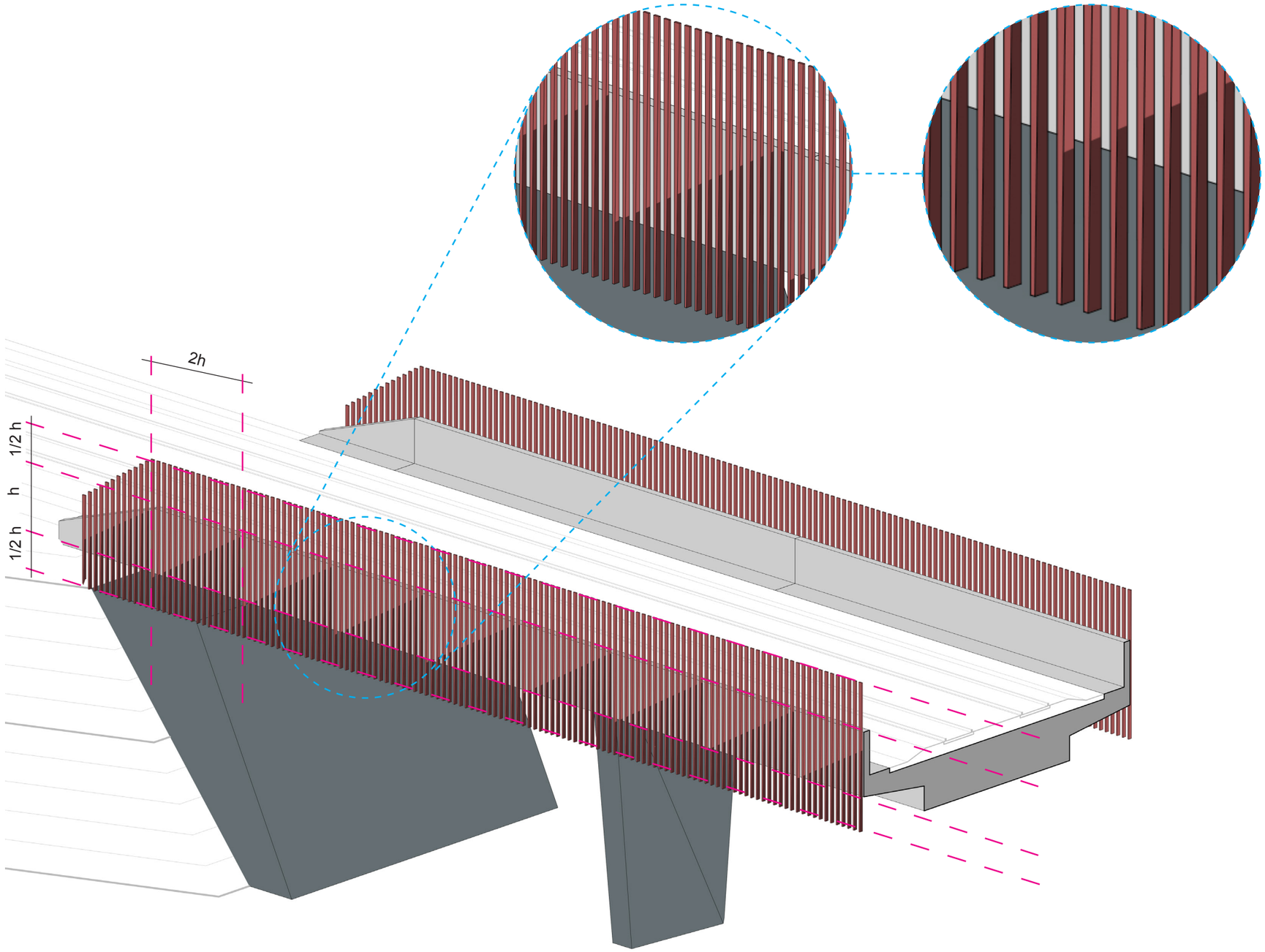
To add more identity to a standard bridge is possible to modify the fence element creating the “Traditional Baltic House” pattern, painting the side of the boxed element as shown in the images to the side.

The colors to use to apply the RB pattern in the railway bridge’s branding implementation are:

- RAL 5004 and RAL 5014 for Estonia
- RAL 3007 and RAL 3011 for Latvia
- RAL 6009 and RAL 6011 for Lithuania

If the fence is not implemented on the railway bridge, following branding and visual identity alternatives shall be applied:

- Bridge edge beam coloring which follows pattern of these guidelines
- Bridge stamp/logo on bridge abutment



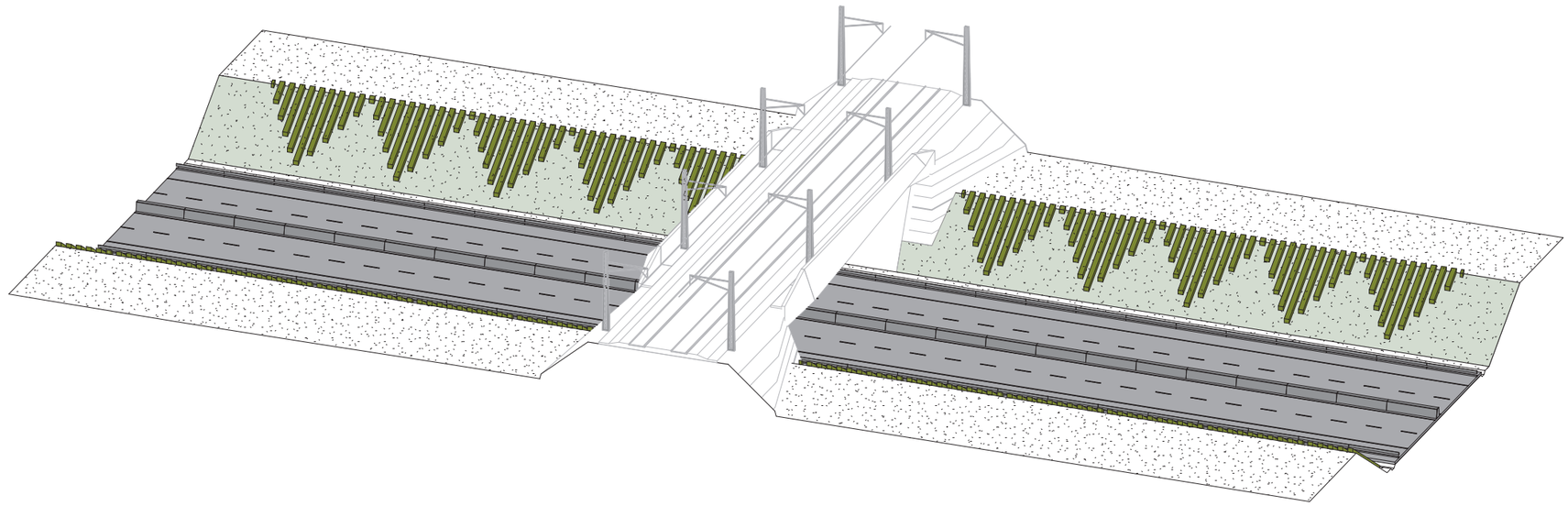
Embankment & Cut

F2

Matrix

F2.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

	N	C	R
Embankment & Cut			

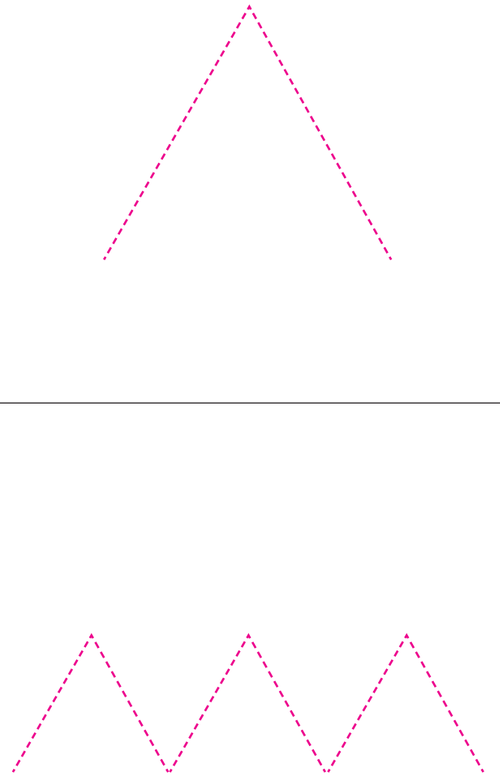
Concept Design

F2.2

The concepts behind the Embankment and Cut design come from:

- The shapes of the traditional roofs
- The repetition of the houses in the cities

Reference	Shapes	Design



Pictures
From above:
Image 1 - *Credits: SBS Engineering*
Image 2 - *Credits: Wake and Wander*

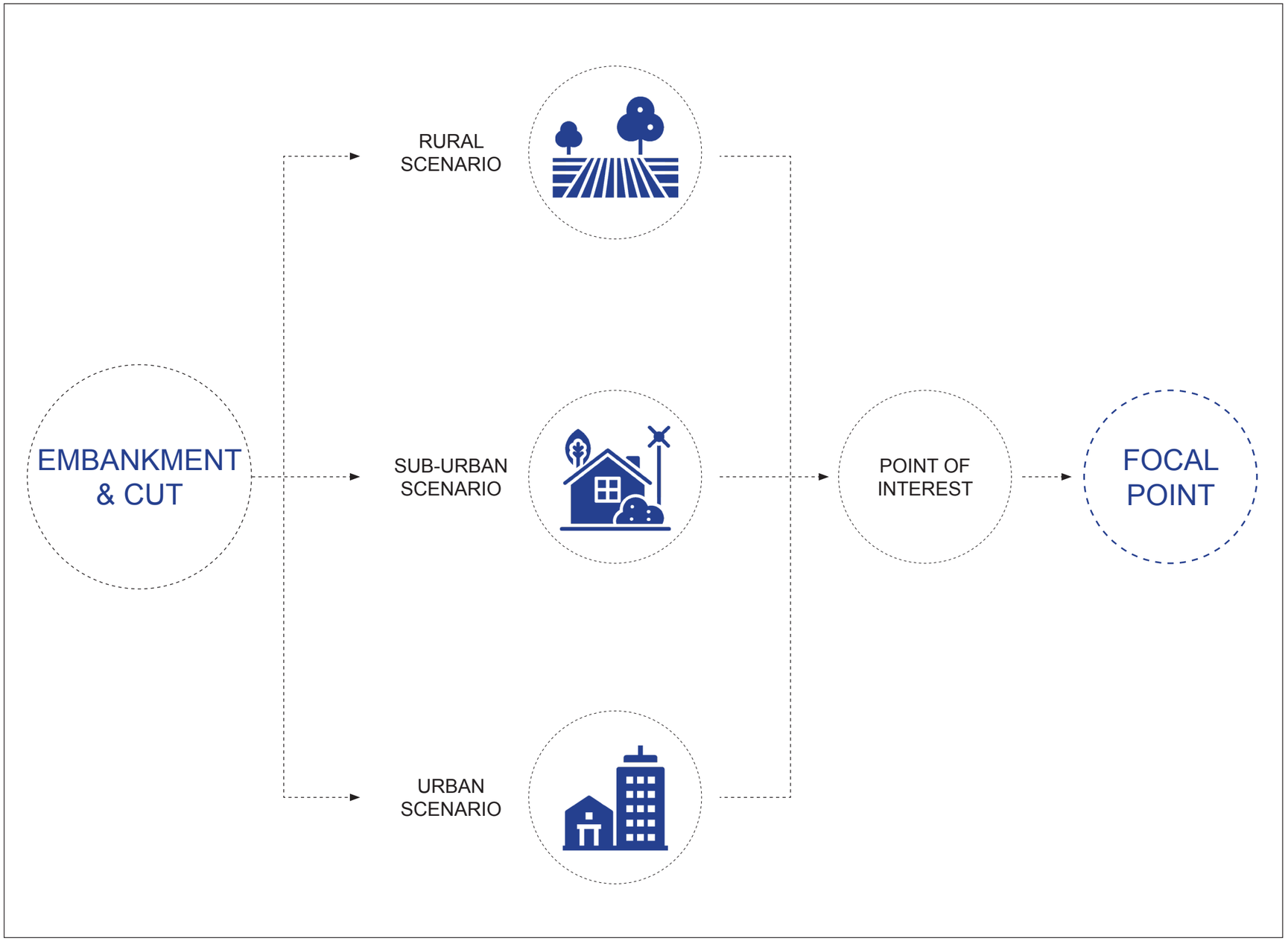
Design Strategy

F2.3

Due to the length of the railway line, strategic point of interest is defined in order to characterize only specific part of the embankment and cuts along the entire railway line.
Embankment and cut design should be evaluated case by case and if decided that it is applicable proposed Design strategy shall be used.

Based on this approach designers shall consider two scenarios:
• All along rail line;
• Focal points

Focal points are areas/elements of interest on which the attention is focused.



Design Strategy

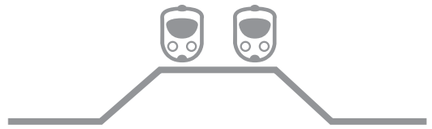
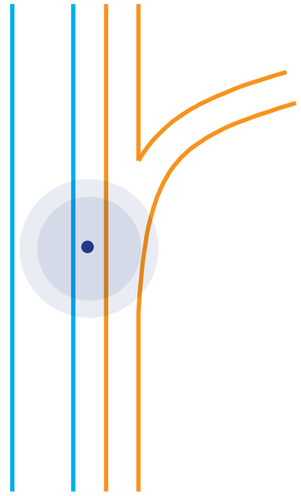
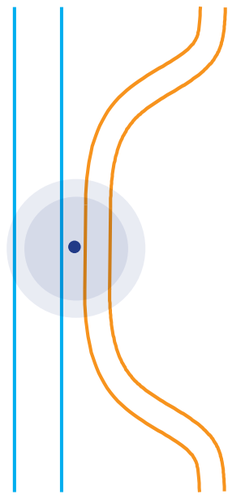
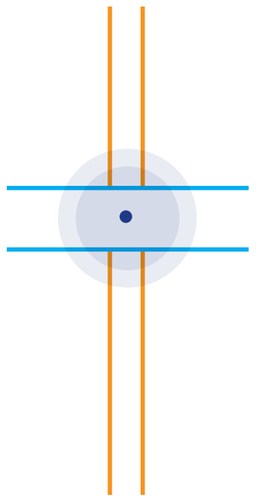
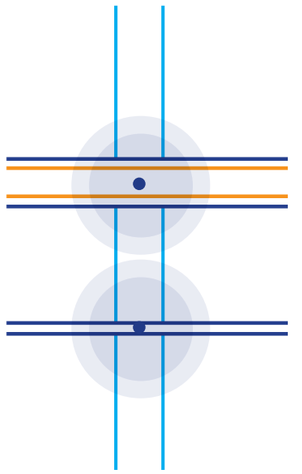
F2.3

Focal Points

Focal points are areas/elements of interest on which the attention is focused.
The following are the situation when a focal point is identified:

RAILWAY LINE IN EMBANKMENT
Type A
When the railway line in embankment position approaches a relevant road intersection.
Type B
When the railway line in embankment position approaches a relevant road.

RAILWAY LINE IN CUT
Type A
When a road is crossed by a Rail Baltica Railway bridges.
Type B
When the railway line in cut position is crossed by a pedestrian overpass or a road overpass with pedestrian path.

EMBANKMENT	TYPE A	TYPE B
		
CUT	**TYPE A**	**TYPE B**
		

Legend

- Railway line
- Road Overpass
- Pedestrian Overpass

Design Strategy

F2.3

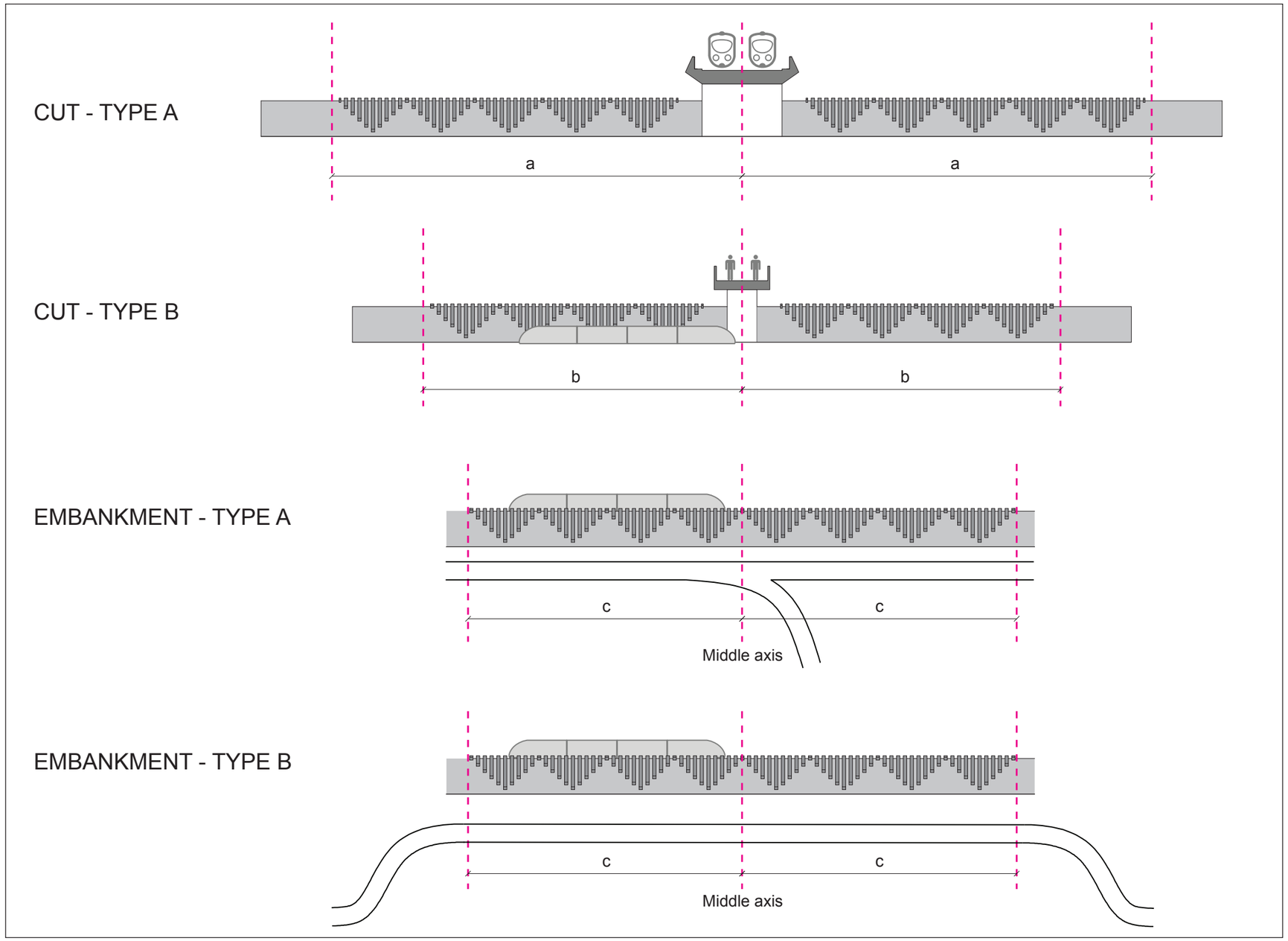
Extensions

The lengths of the focal points will vary depending on the type:

CUT
TYPE A minimum length:
a = 250 meters

CUT
TYPE B minimum length:
b = 100 meters

EMBANKMENT
TYPE A/B minimum length:
c = 250 meters



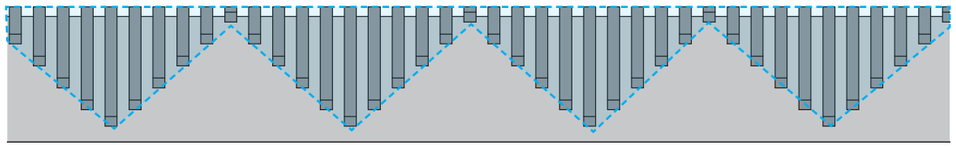
Design Strategy

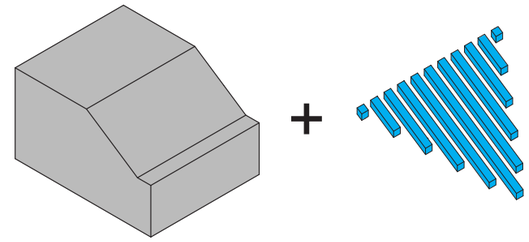
F2.3

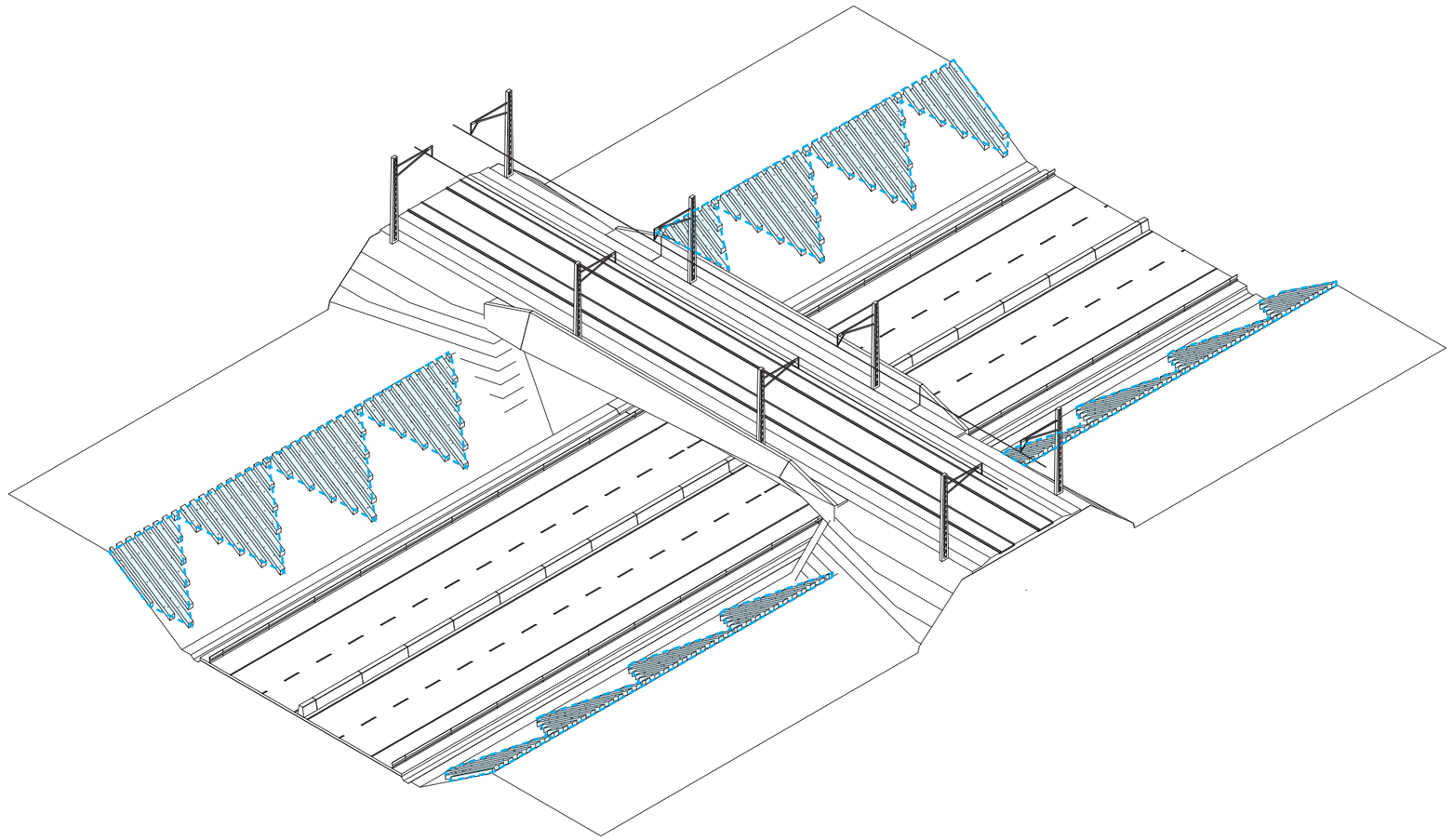
Both the embankments and the cuts are elements regulated by the Architectural, Landscaping and Visual Identity Design Guidelines and characterized by regular planting of coniferous shrubs.

The shrubs shall be planted in rows following the shape of triangles.

The dimensions of the triangles varies according to the height of the embankment/cut.







Geometry

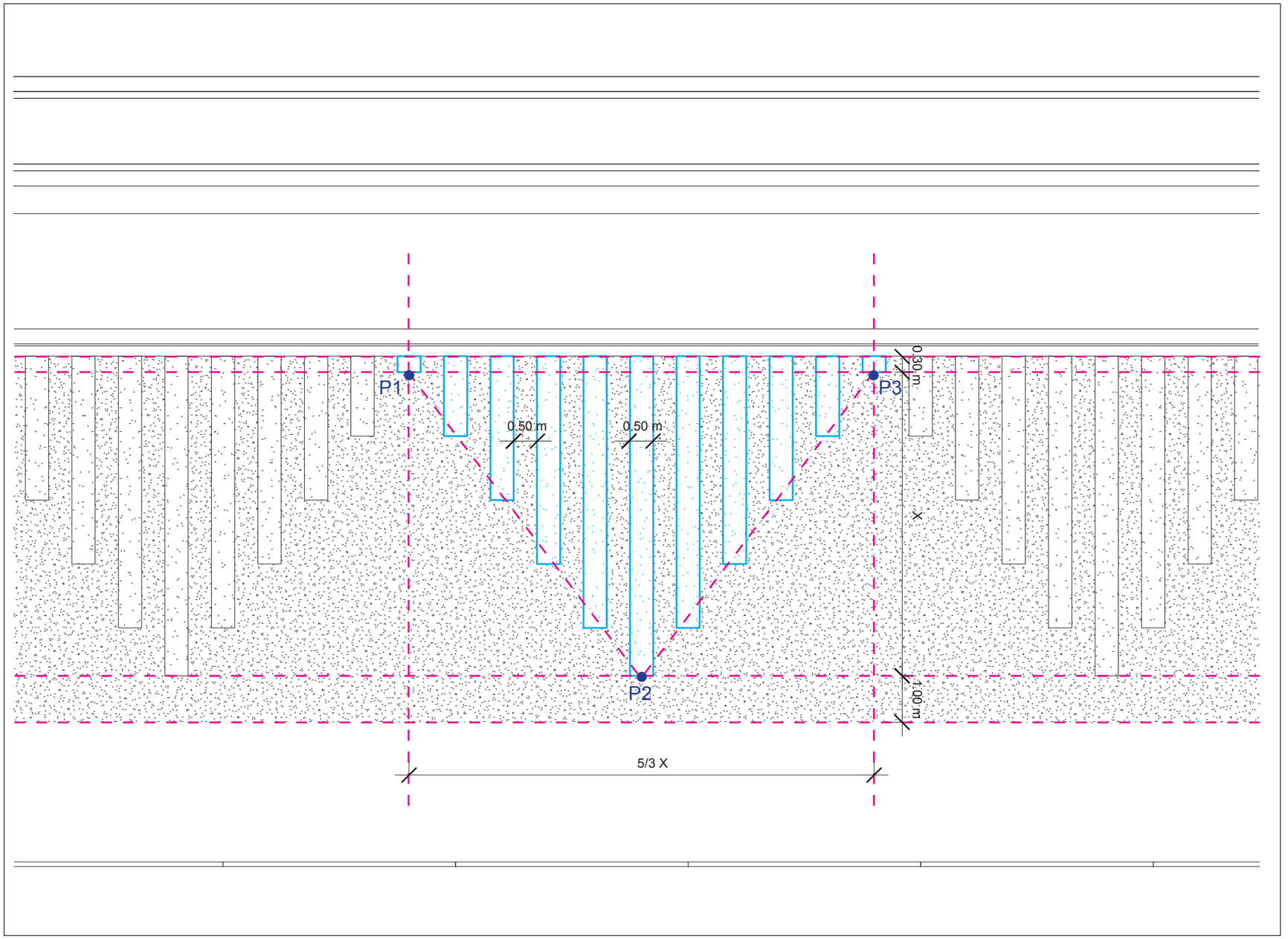
F2.4

The shape of the triangles comes from the height of the embankment/cut.

The vertex P2 of the triangle shall be 1 meter from the base of the embankment/cut and the vertices P1 and P3 at least 0.30 m from the peak.

The inclination of the sides of the triangle will vary when the height of the embankment varies.

Rows with shrubs and empty rows shall have the width of around 0.50 m.



Geometry

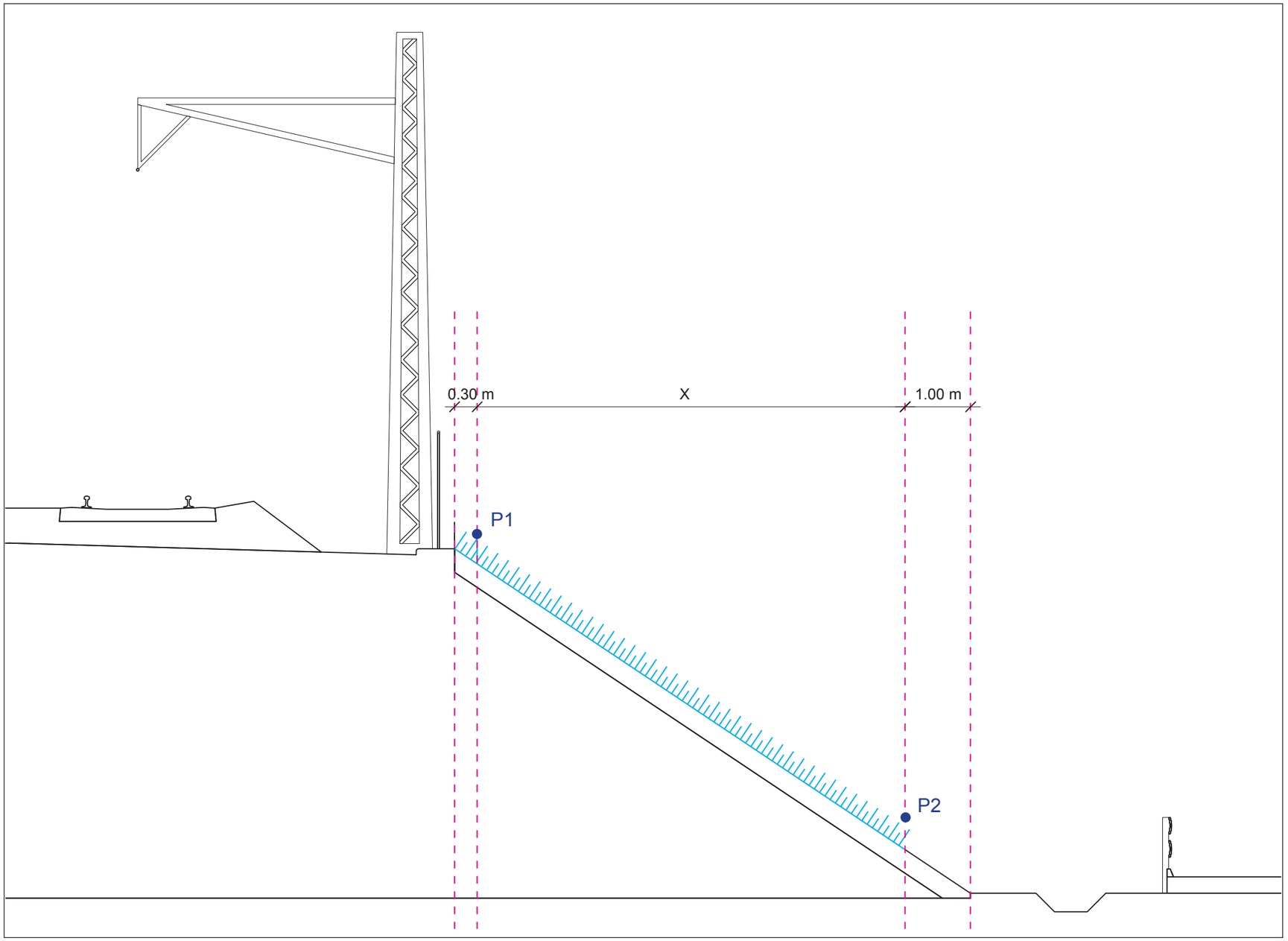
F2.4

The shape of the triangles comes from the height of the embankment/cut.

The vertex P2 of the triangle shall be 1 meter from the base of the embankment/cut and the vertices P1 and P3 at least 0.30 m from the peak.

The inclination of the sides of the triangle will vary when the height of the embankment varies.

The height of the shrubs shall be 1.00 m maximum.



Materials and Vegetation

F2.5

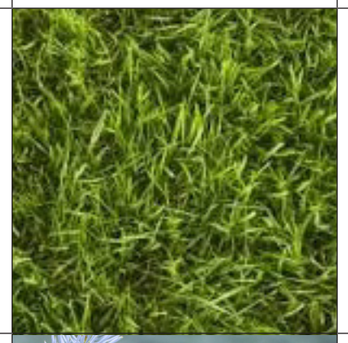
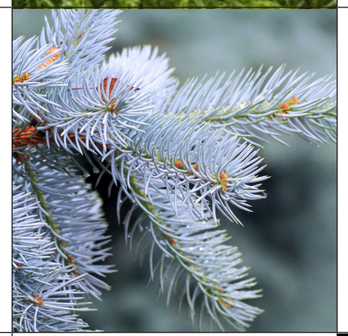
Overview

Embankments and cuts are a composition of three visual elements:

Slope: grass or stabilized soil.

Shrubs: conifers (*Pinus sylvestris* or similar).

Flowers: no specific flower is defined for Embankments and cut, the only indication is to respect the country color.

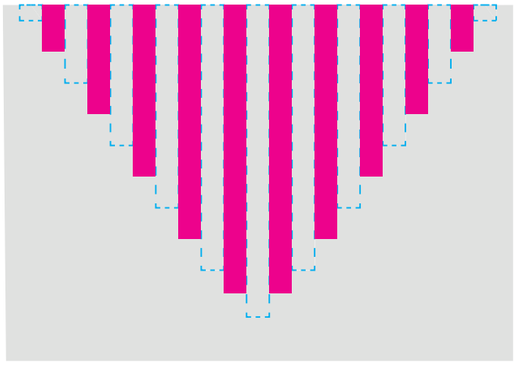
	Network Identity	Country identity		
		Estonia	Latvia	Lithuania
SLOPE				
SHRUBS				
FLOWERS				

Materials and Vegetation

F2.5

Country Identity

If the municipality deems it appropriate to assign a country identity to a specific trait, rows of flowers can be inserted between the rows of shrubs, respecting the triangles.

SLOPE	SHRUBS	FLOWERS
		
		
		
		

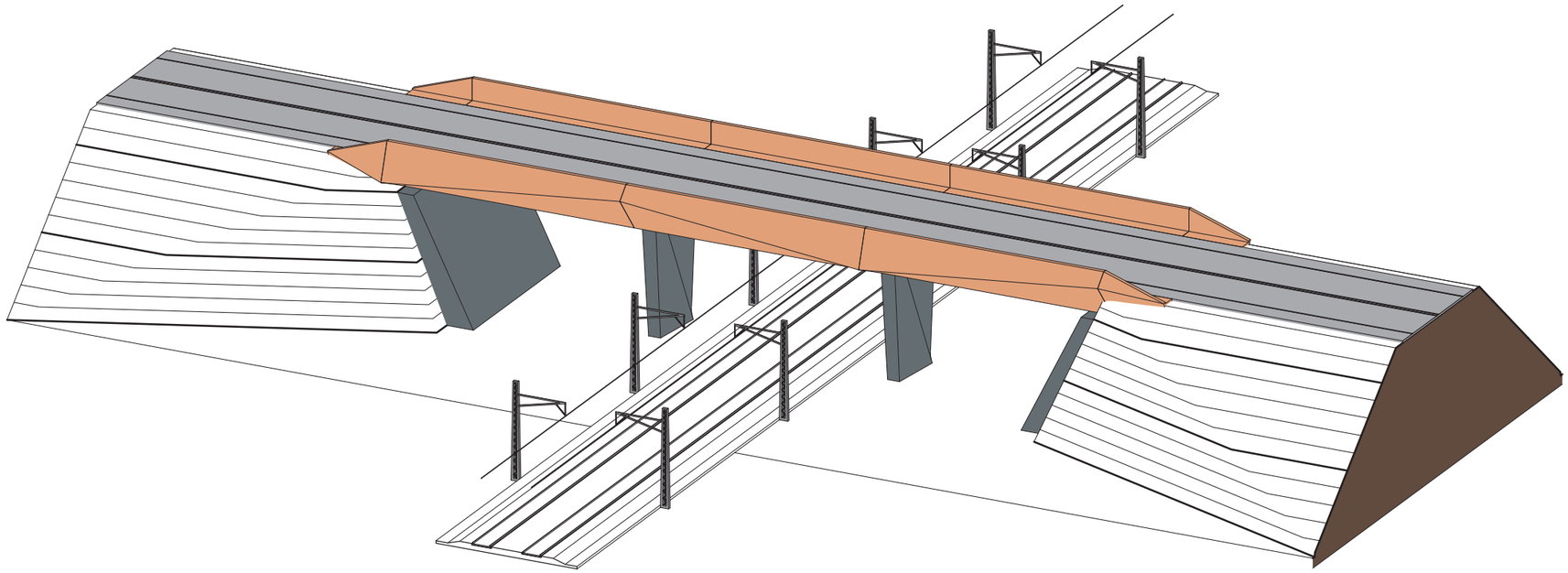
Road Overpass

F3

Matrix

F3.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

	N	C	R
Road Overpass			

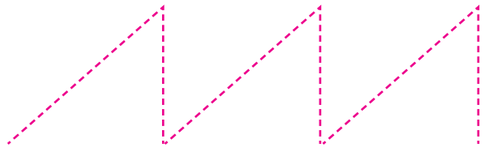
Concept Design

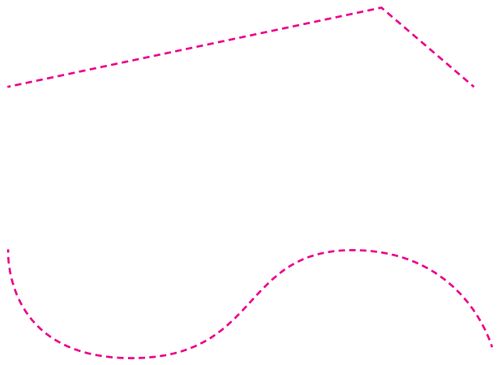
F3.2

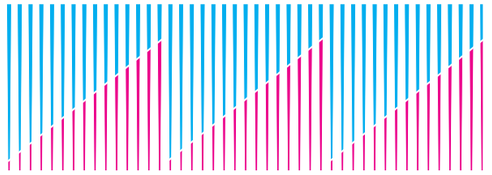
The concepts behind the Road Overpass design come from:

- The shapes of the traditional roofs
- The geometries of the contemporary nordic architecture
- The repetitiveness, that takes inspiration from the Sea.

Reference	Shapes	Design







Pictures

From above:

Image 1 - *Credits: SBS Engineering*

Image 2 - *Credits: Juozas Kamenskas*

Image 3 - *Credits: Michal Trnka*

Design Strategy

F3.3

The Road Overpass will be located along the entire Rail Baltica line, thus crossing different types of scenarios.

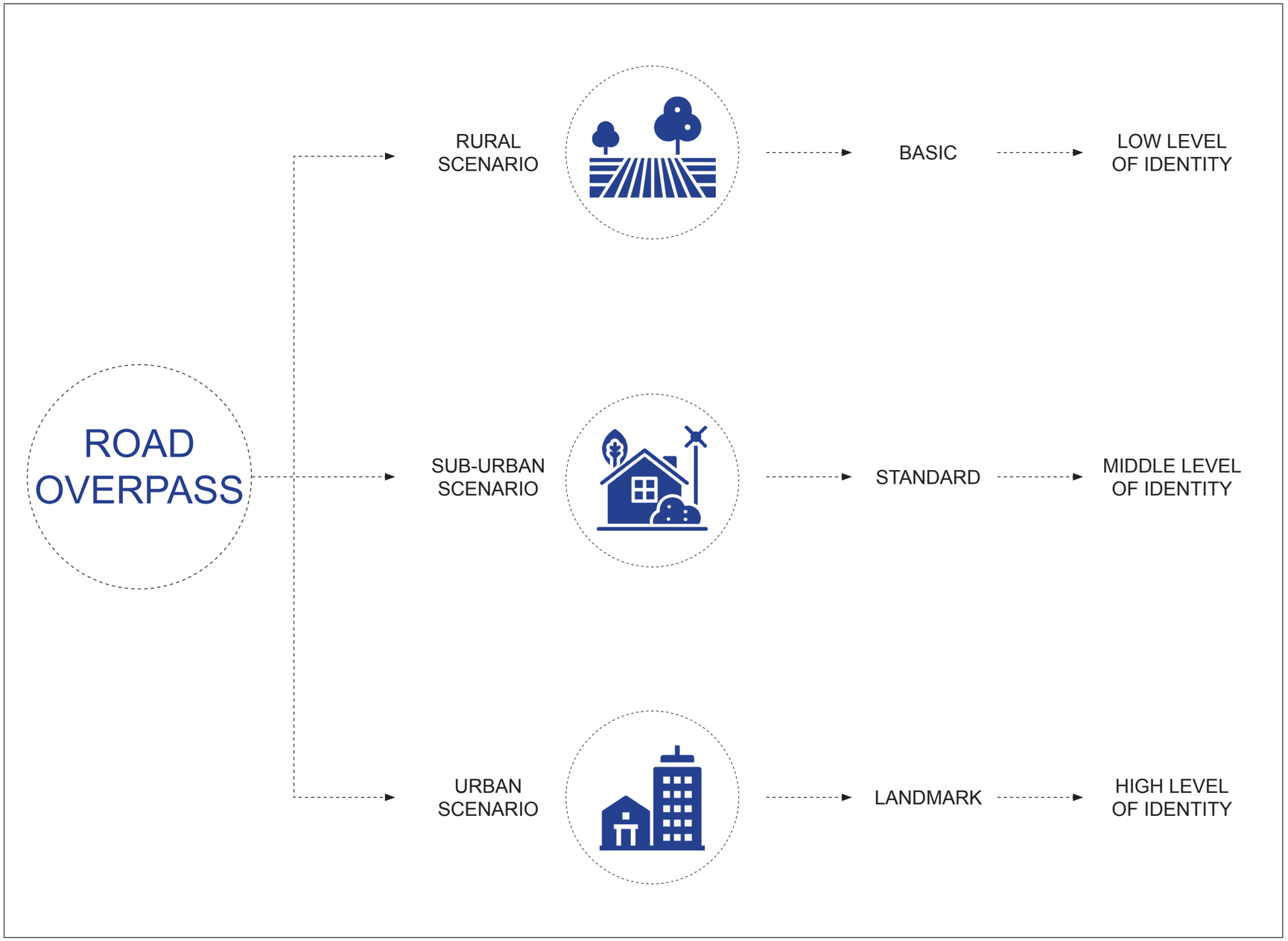
These different surroundings give the need to place different types of bridges along the line, perfectly adapting to the context but respecting and preserving the identity of the Rail Baltica network.

Three different levels of identity were then defined:

- Low level of identity
- Middle level of identity
- High level of identity

For each of these levels a bridge type has been assigned, respectively:

- Basic type
- Standard type
- Landmark type



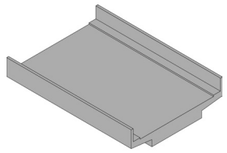
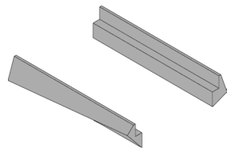
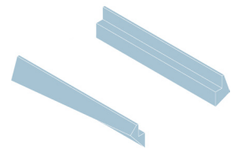
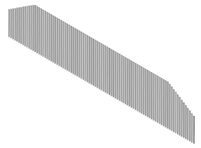
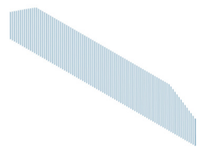
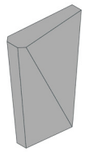
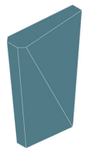
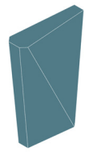
Design Strategy

F3.3

The Basic Type Overpass (BTO) is a bridge without a specific design assigned which, upon design by the Designer and RBR, it can be completed with the design of the piers provided by the Architectural, Landscaping and Visual Identity Design Guidelines.

For the design of the Standard Type Overpass (STO) please refer to the indications provided in the Basic Type Overpass, but with the addition of a fence that assigns identity to the bridge itself.

The Landmark Type Overpass (LTO) consists of a cladding that can be added / included in the design of the deck of the bridge, giving a geometric rhythm to the bridge elevation. The design of the piers is recommended for the landmark bridge if it is compatible with heights and dimensions of the specific locations.

ELEMENTS	BTO	STO	ITO
STRUCTURE 			
CLADDING 			
FENCE 			
PIERS 			

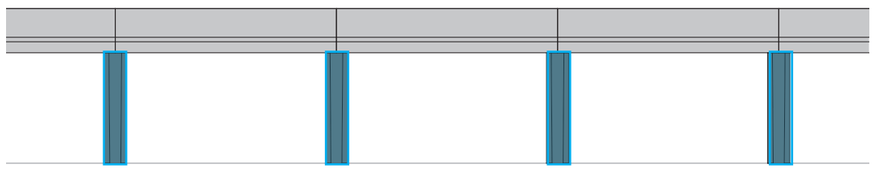
Design Strategy

F3.3

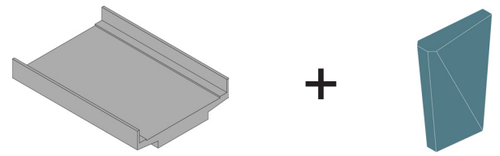
Basic Road Overpass (BTO)

This type of overpass will be used where the overpass does not require a specific recognizability due to its position (rural scenarios) or the opinion of RBR.

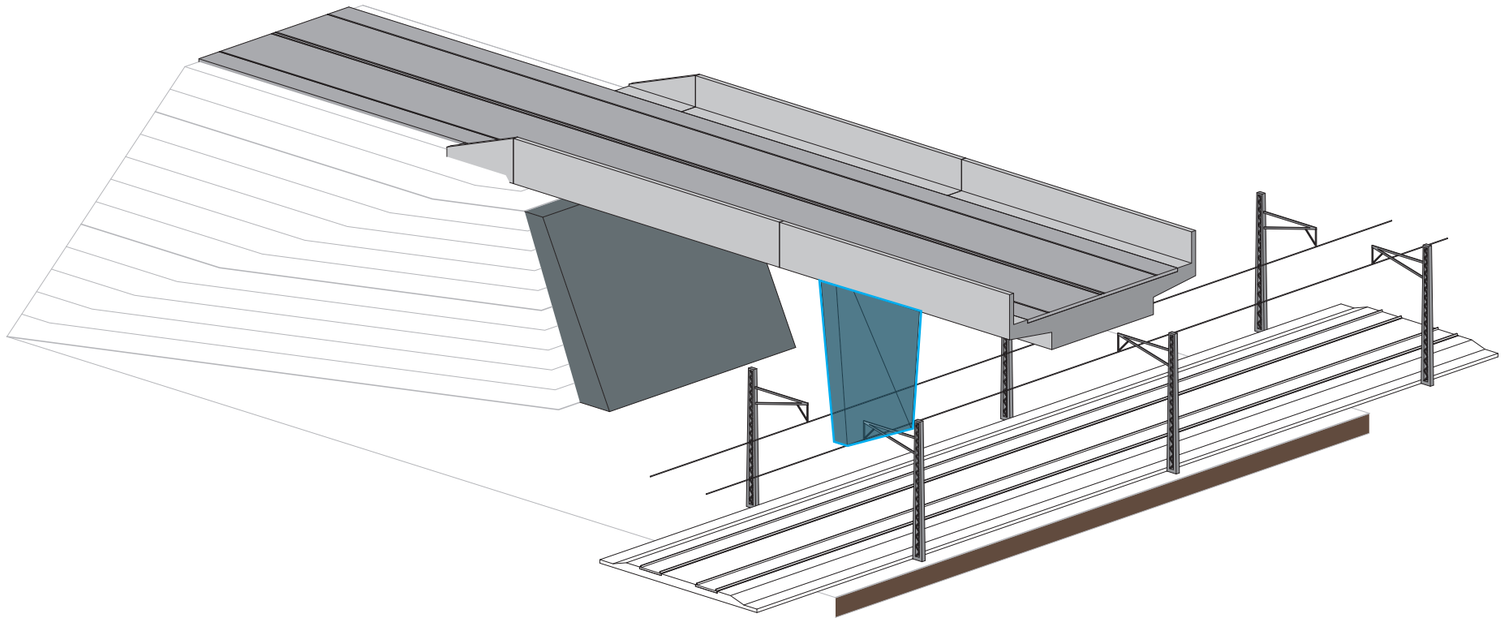
The design of the deck can be to the discretion of the designers. The usage of the pigmented concrete or colors should must be used to assign the country identity to the bridge. Even the application of the piers design is to the discretion of the designers but is strongly recommended.



BASIC ROAD OVERPASS



STRUCTURE + PIERS



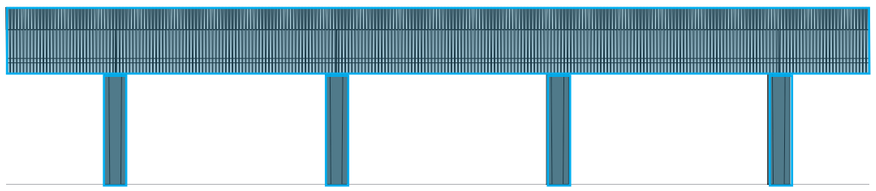
Design Strategy

F3.3

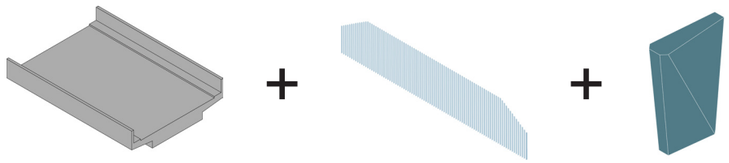
Standard Road Overpass (STO)

The standard type overpass will be placed where it must be visible and recognizable but not placed in an landmark location.

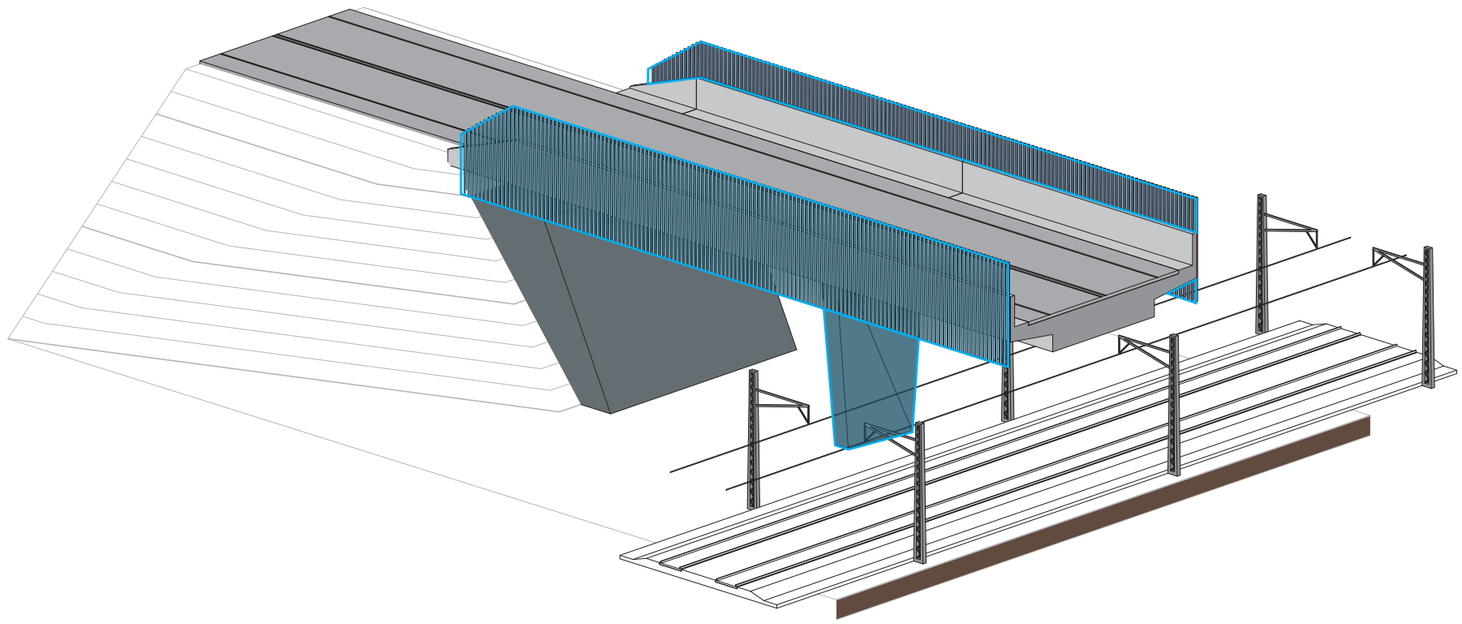
The design of the deck can be to the discretion of the designers. The application of a coloured fence should be used to assign the country identity to the overpass. Even the application of the piers design is to the discretion of the designers but is strongly recommended.



STANDARD ROAD OVERPASS



STRUCTURE + FENCE + PIERS



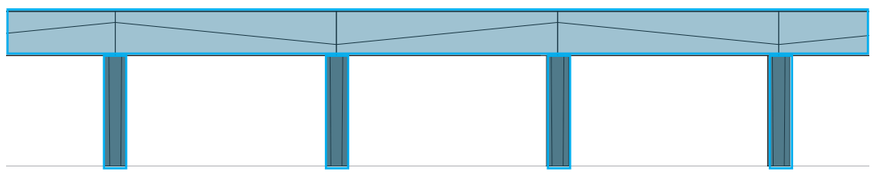
Design Strategy

F3.3

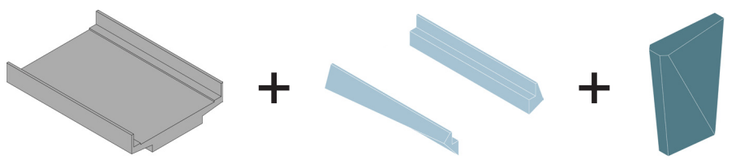
Landmark Road Overpass (LTO)

The Landmark Type Overpass is the most recognizable bridge and should be placed in very visible locations.

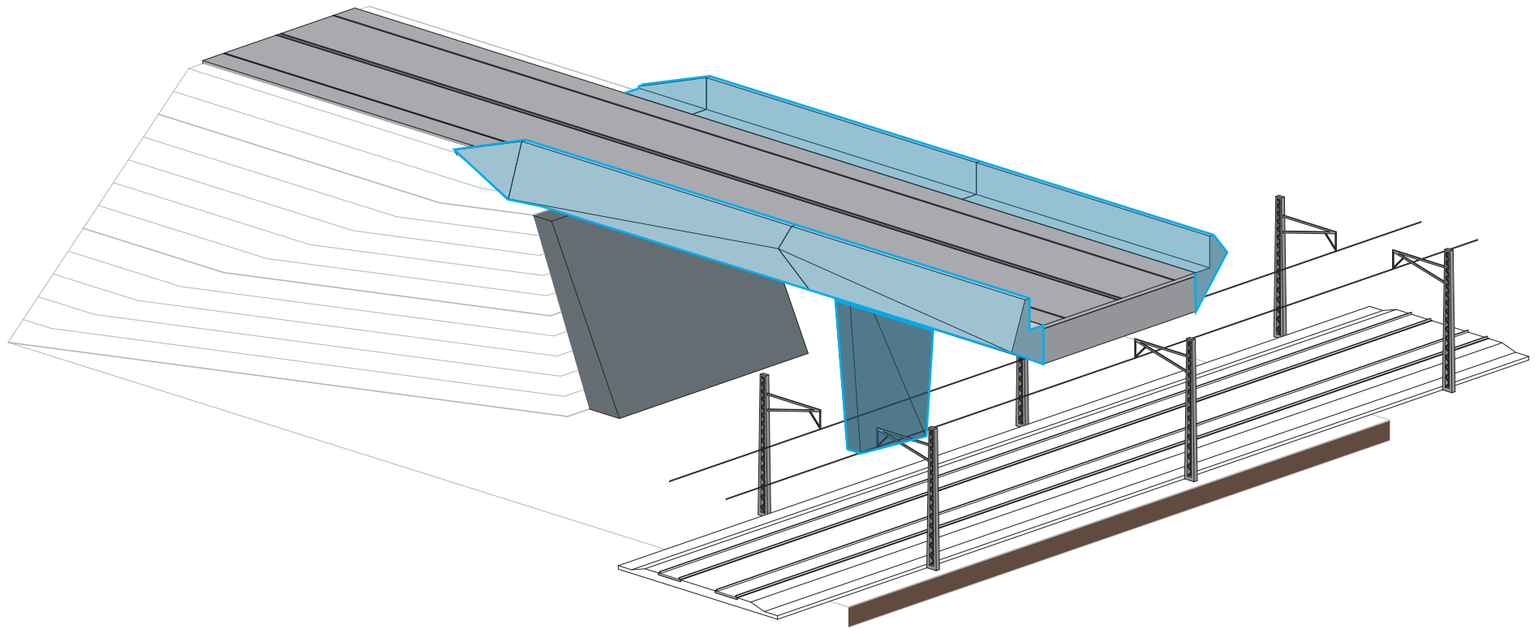
The design of the deck can be to the discretion of the designers but the application of the cladding is recommended. The cladding geometry is also recommended and can be applied as an addition to the structural deck or integrated into it. The usage of the pigmented concrete or colors should be used to assign the country identity to the overpass.
The design of the piers is recommended for the landmark overpass if it is compatible with heights and dimensions of the site location.



LANDMARK ROAD OVERPASS



STRUCTURE + CLADDING + PIERS



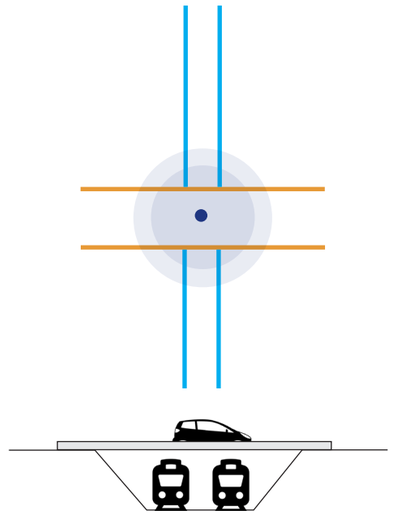
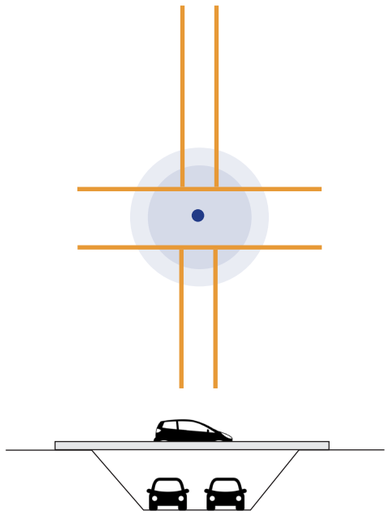
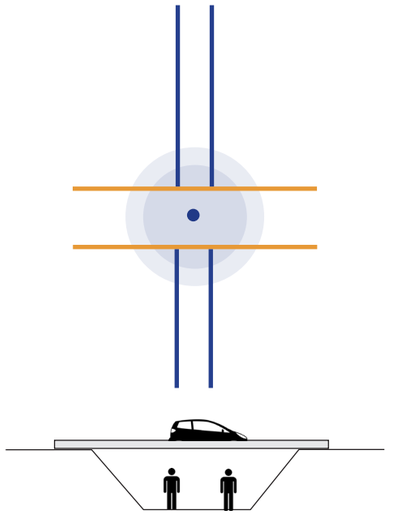
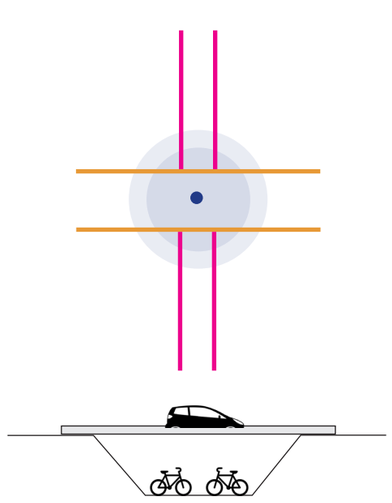
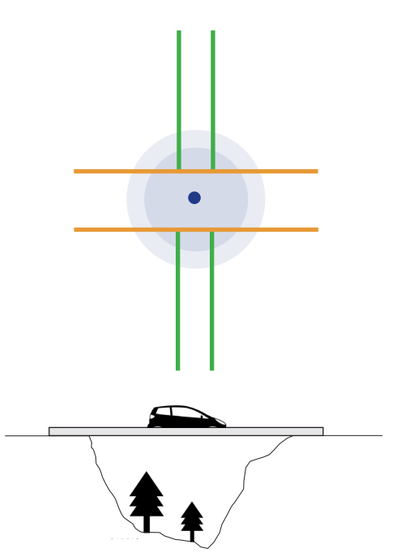
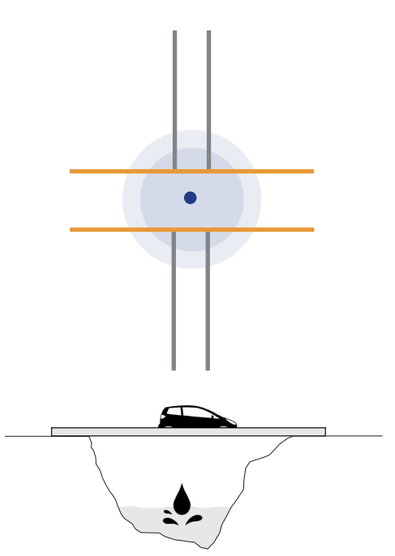
Design Strategy

F3.3

Elements Relation

Road Overpasses are to be considered Rail Baltica elements only when they intercept and cross the RB railway line.

In all the other cases, for example when the overpass crosses a pedestrian or bicycle path, it will not be treated as a RB element.

ROAD BRIDGE - RB RAIL LINE	ROAD BRIDGE - ROAD LINE	ROAD BRIDGE - PEDESTRIAN PATH
		
ROAD BRIDGE - BIKE PATH	**ROAD BRIDGE - LANDSCAPE**	**ROAD BRIDGE - RIVER/LAKE**
		

Legend

- Railway Line
- Road Line
- Pedestrian Path
- Bike Path
- Landscape
- River/Lake

Geometry

F3.4

Composition of the Landmark Road Overpass

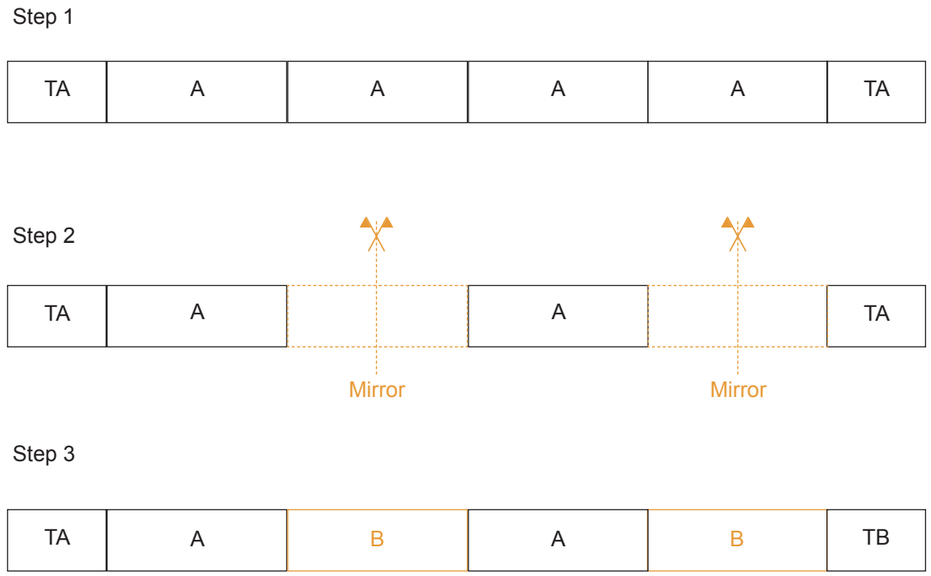
In order to replicate the correct shape on the Landmark Overpass elevation, this bridge should be composed of two modules (A and B).

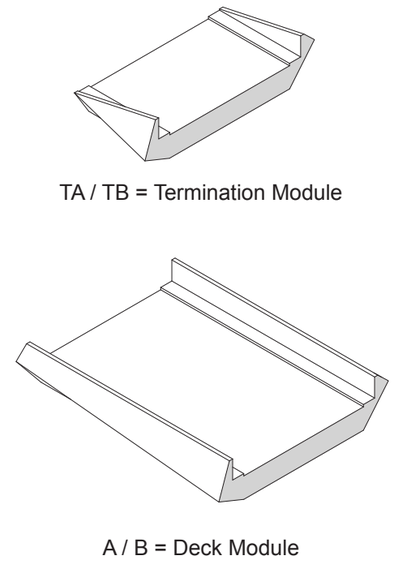
Step 1:
Module A is repeated and terminate with a special ending module.

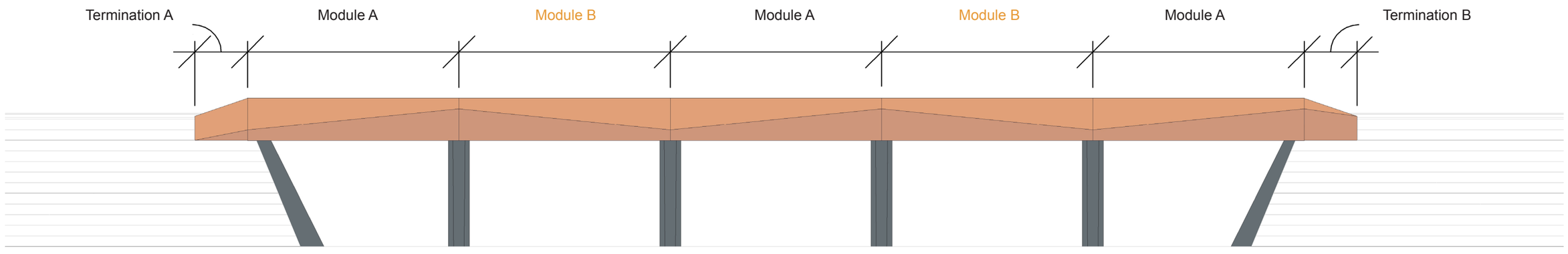
Step 2:
Module B is generated mirroring the Module A along its transversal axis. The lengths of the module is fixed and only the termination modules length can be variable.

Step 3:
The termination modules should continue the elevation geometry of the previous module and fade it to the track level.

Modulation process







Geometry

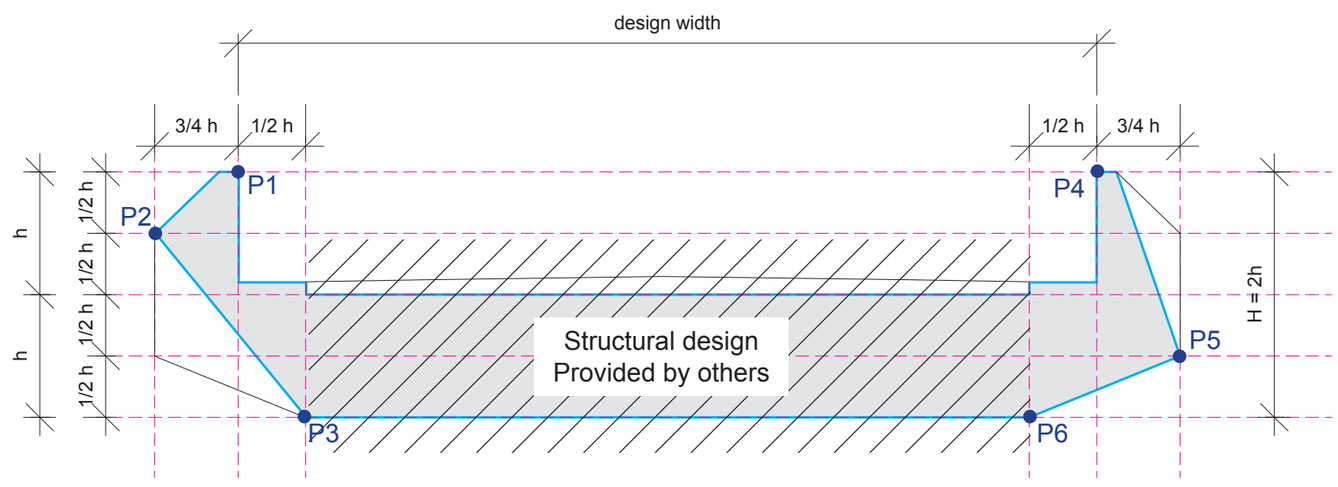
F3.4

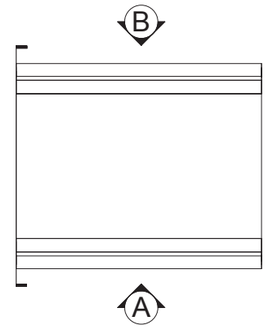
Cladding

The Cladding geometry is made by the union of the control points shown in the images on the side.
Each elevation of the cladding will be characterized by two trapezoids with the greater side in common (line from P2 and P5).

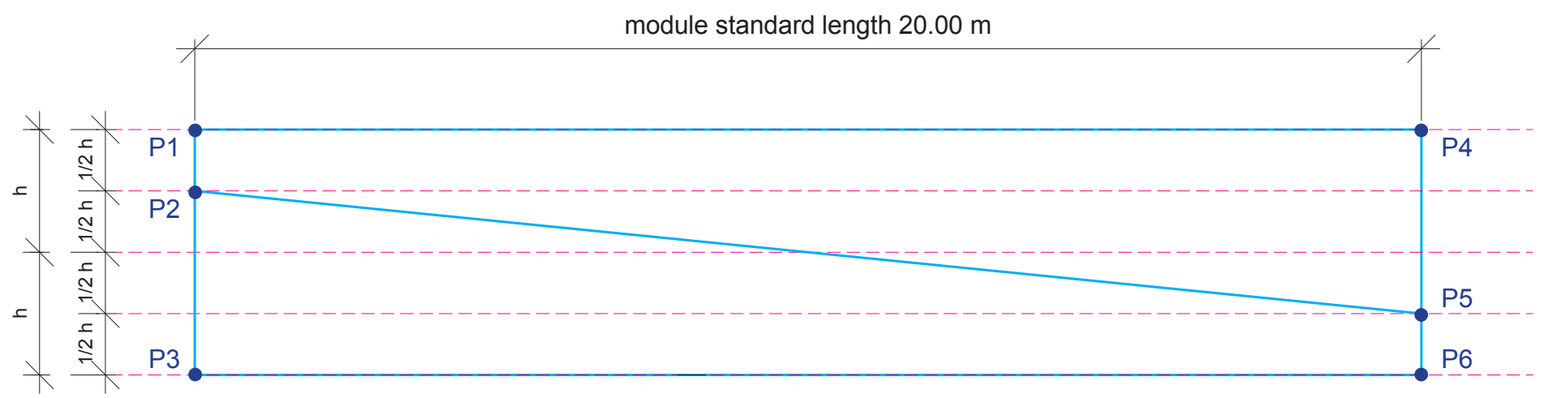
Trapezoid 1 - Control points:
P1 - P2 - P5 - P4

Trapezoid 2 - Control points:
P2 - P3 - P6 - P5





Section



Elevation A / Elevation B

Geometry

F3.4

Terminations

The Cladding geometry of the termination is made by the union of the control points shown in the images on the side.
Each elevation of the cladding will be characterized by a trapezoid and a triangle with a side in common (line from T1 and P2 / T3 and P5).

ELEVATION A

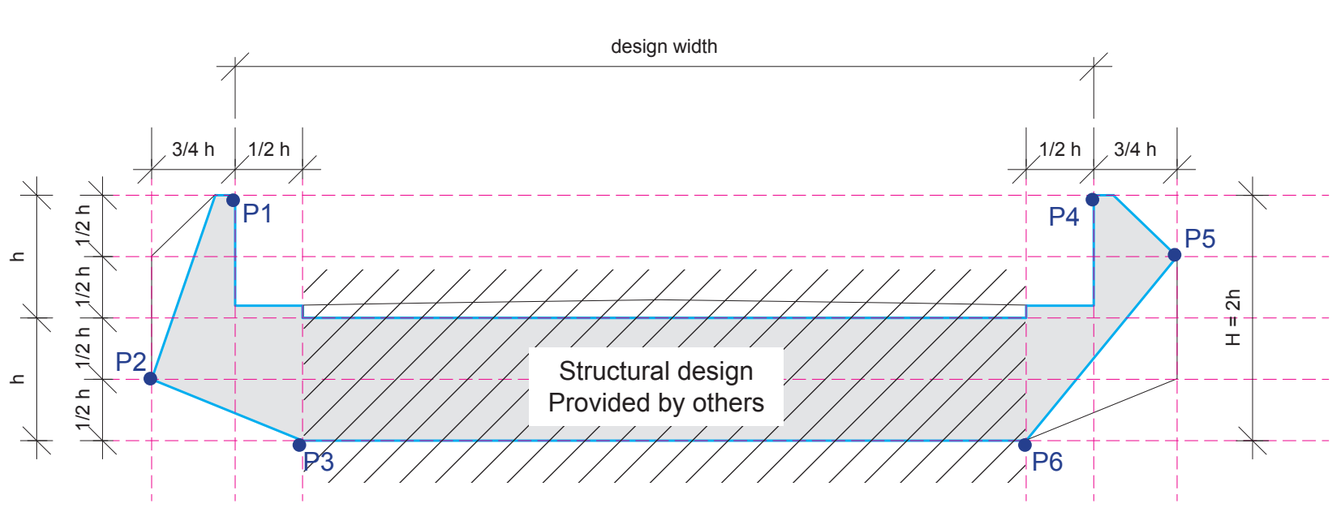
Trapezoid - Control points:
T1 - T2 - P2 - P3

Triangle - Control points:
T1 - P2 - P1

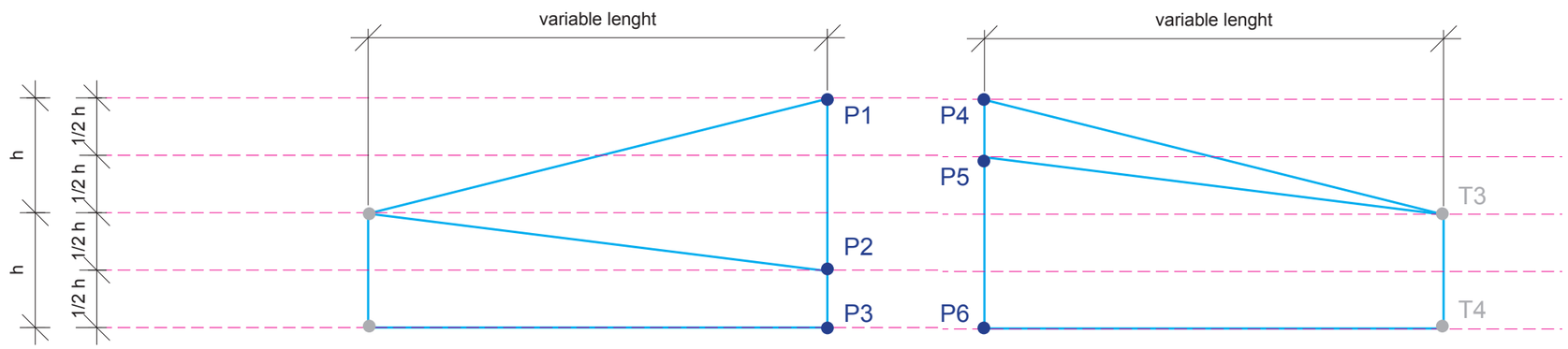
ELEVATION B

Trapezoid - Control points:
T3 - T4 - P5 - P6

Triangle - Control points:
T3 - P4 - P5

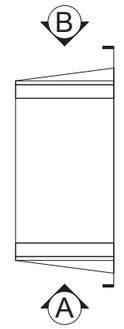


Section



Elevation A

Elevation B



Geometry

F3.4

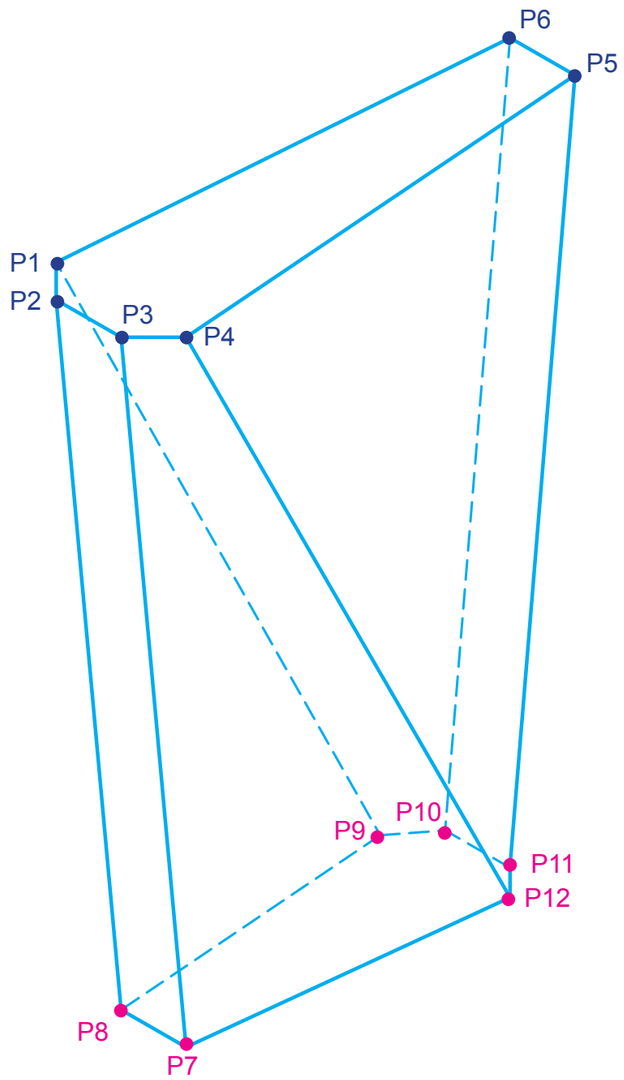
Piers

The shape of the piers comes from the join of the vertices of the basic geometric figure with the one on the top, as shown in the images on the side.

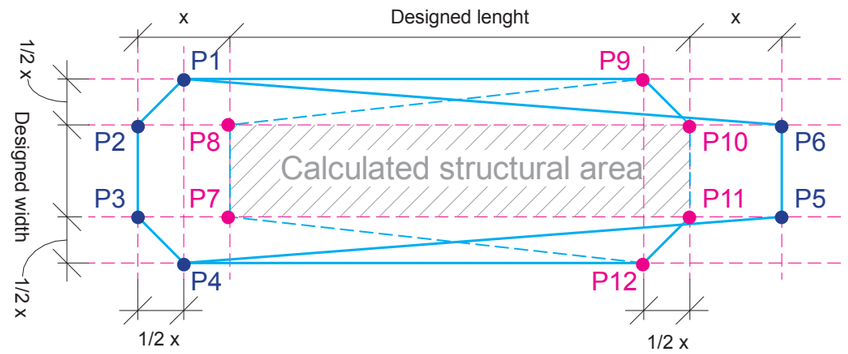
The control point in blue are related to the top, the one in magenta are related to the base.

The position of these control points are ruled starting from the a rectangular piers based on structural calculation.

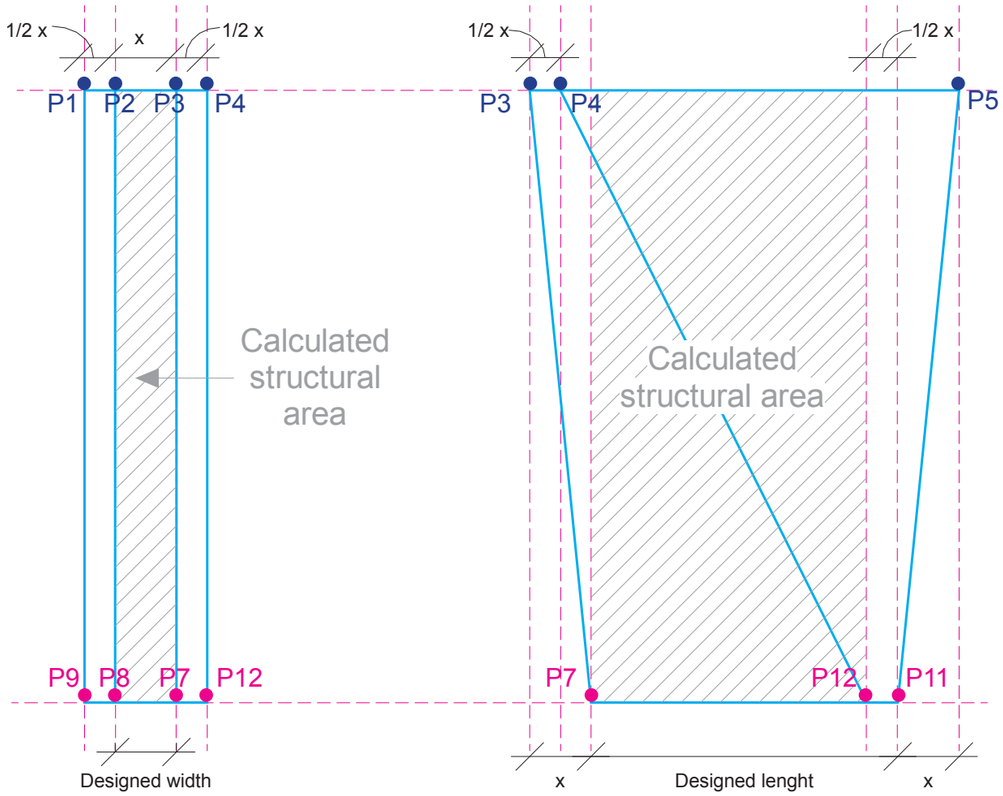
The geometry of the piers can be done as a cladding added to a basic pillar or cast in place.



Plan



Elevations



Geometry

F3.4

Fence

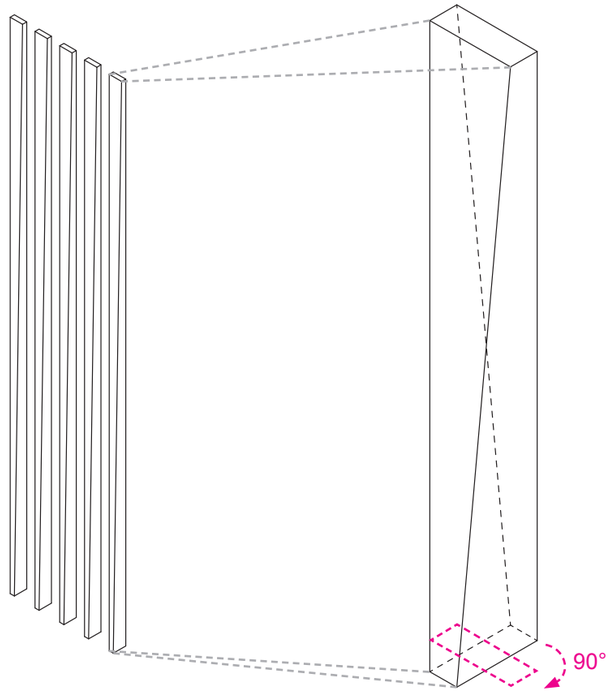
This kind of fence is an element used to give more identity to a basic overpass making it become a standard overpass.

Is composed by a series of boxed element twisted of 90° from the top to the base. The rotation must be uniform along all the element.

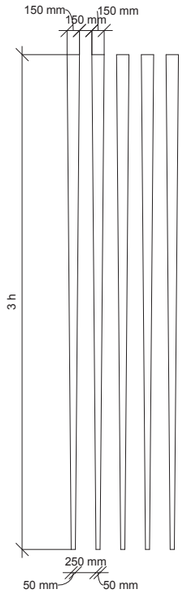
The design of the substructure is entrusted to the designer as long as it respects the visual rules of the Architectural, Landscaping and Visual Identity Design Guidelines.

The height is not standard and depending from the height of the bridge, as shown in the image below.

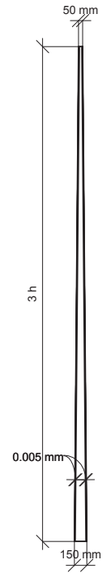
The fence has a constant height during the central modules of the bridge and will degrades starting from the terminal modules, according to the rules defined in the image below.

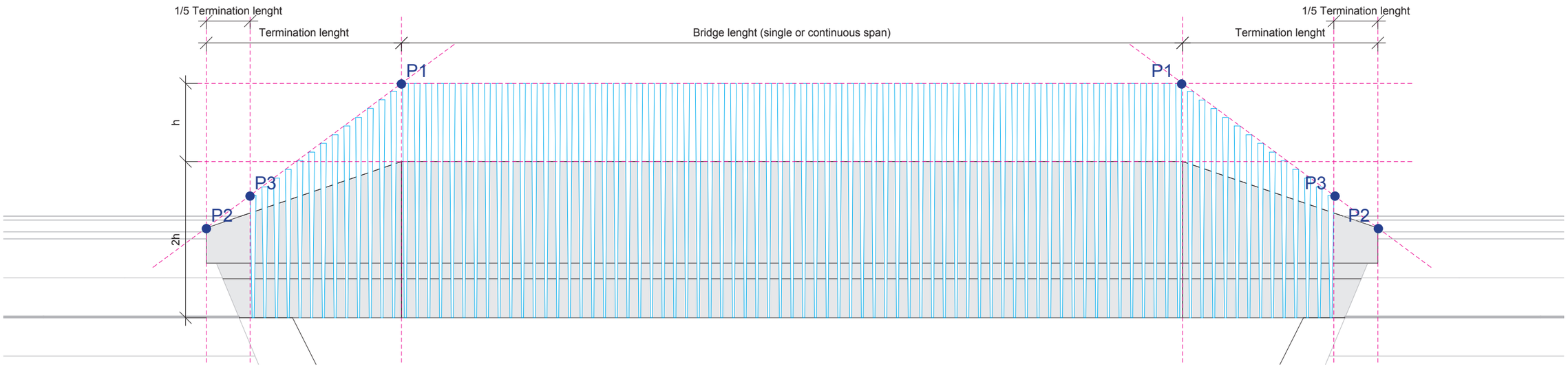


Elevation



Section





Materials

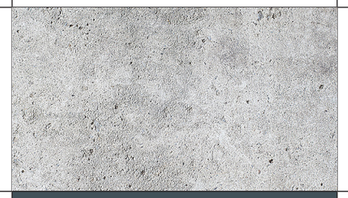
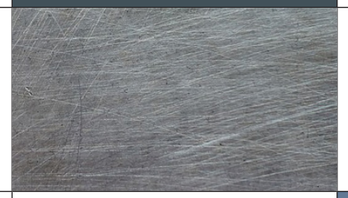
F3.5

Road Overpasses are a composition of three visual elements:

Piers: bare concrete, pigmented concrete or painted concrete, using the network color.

Fence: Glazed metal using the identity colors.

Cladding: pigmented concrete or painted concrete, using the identity colors.

		Network	Estonia	Latvia	Lithuania
PIERS	Materials				
	Colors	RAL 7016			
FENCE	Materials				
	Colors		RAL 5014	RAL 3011	RAL 6011
CLADDING	Materials				
	Colors		RAL 5014	RAL 3011	RAL 6011

Materials

F3.5

Existing and New Construction Road Overpass

All along the RB Rail line it will not always be possible to use the three types of road overpass previously proposed.
RB rail line could pass over other two different types of bridges:

- Existing Road Overpass
- New Construction Road Overpass (no standardised)

In these cases it's possible to identify them by applying the RB identity through the use of color:

- Painted steel, in presence of steel bridges;
- Pigmented or painted concrete, in presence of concrete bridges.

Pictures
From left:
Image 1 - *Credits: miestai.net*
Image 2 - *Credits: fosterandpartners.com*

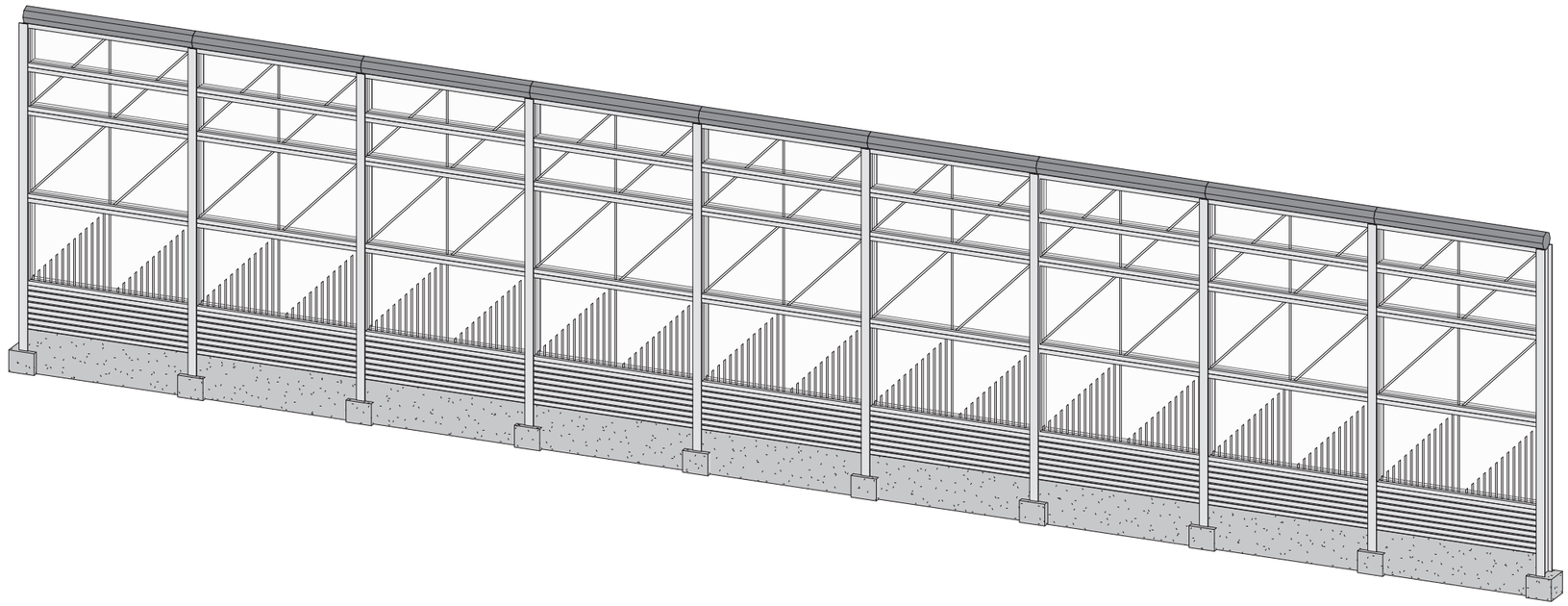
Noise Barrier

F4

Matrix

F4.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

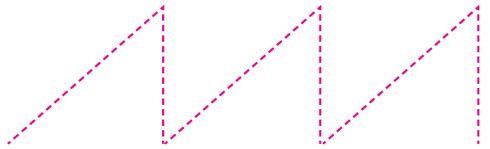
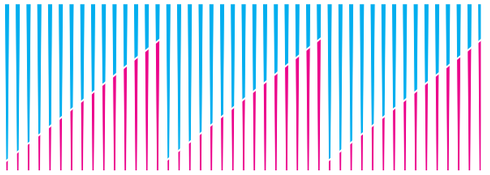
	N	C	R
Noise Barrier			

Concept Design

F4.2

The concept behind the noise barrier design comes from:

- The shapes of the traditional roofs
- The modularity of repeated elements

Reference	Shapes	Design
		
		

Pictures
From above:
Image 1 - *Credits: SBS Engineering*
Image 2 - *Credits: Wake and Wander*

Design Strategy

F4.3

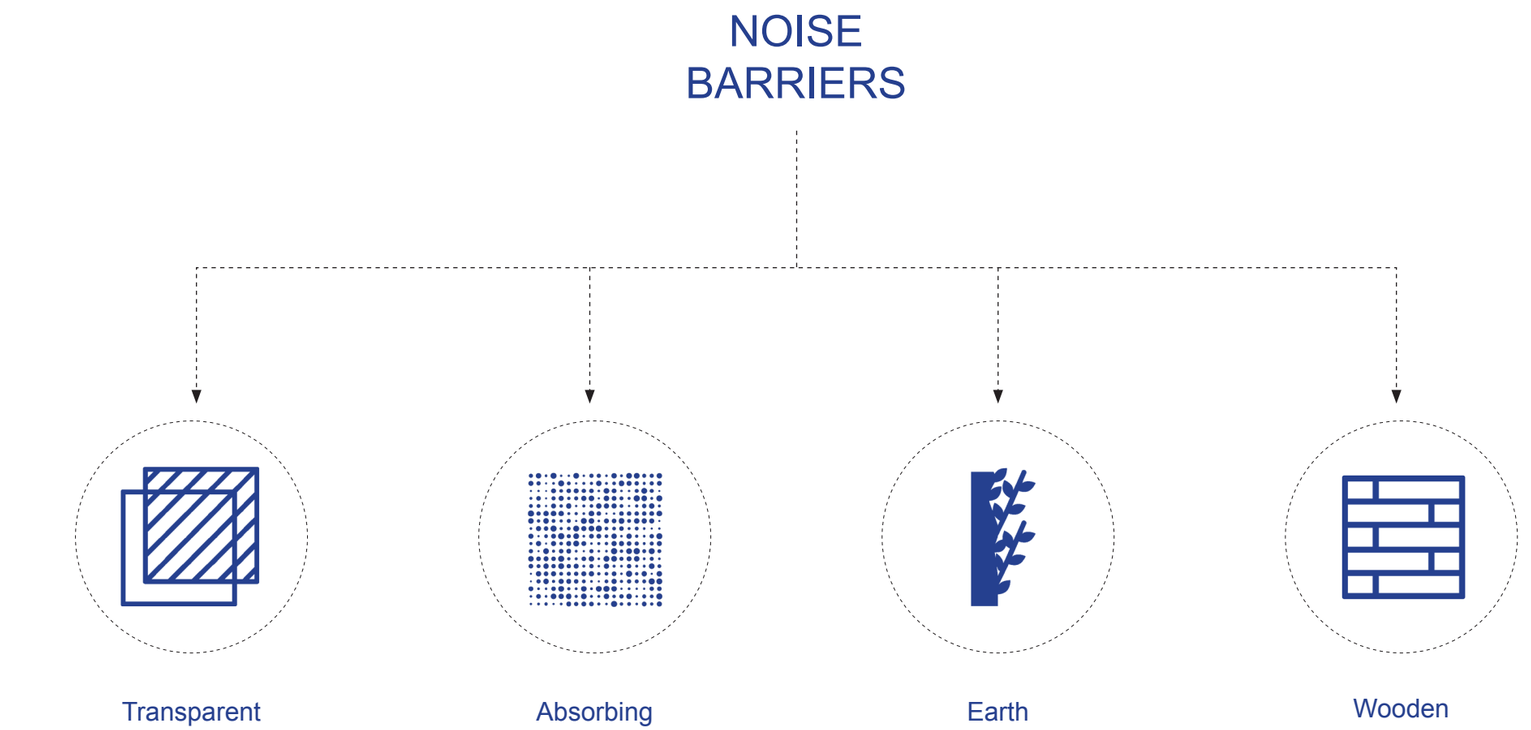
Overview

The Noise Barriers will be located along the entire Rail Baltica line, crossing different types of scenarios.

The division of devices is made on the basis of the types of materials. Depending on area, specific types of noise barriers should be used.

Four different types of noise barriers are defined:

- Transparent
- Absorbing
- Earth
- Wooden



Design Strategy

F4.3

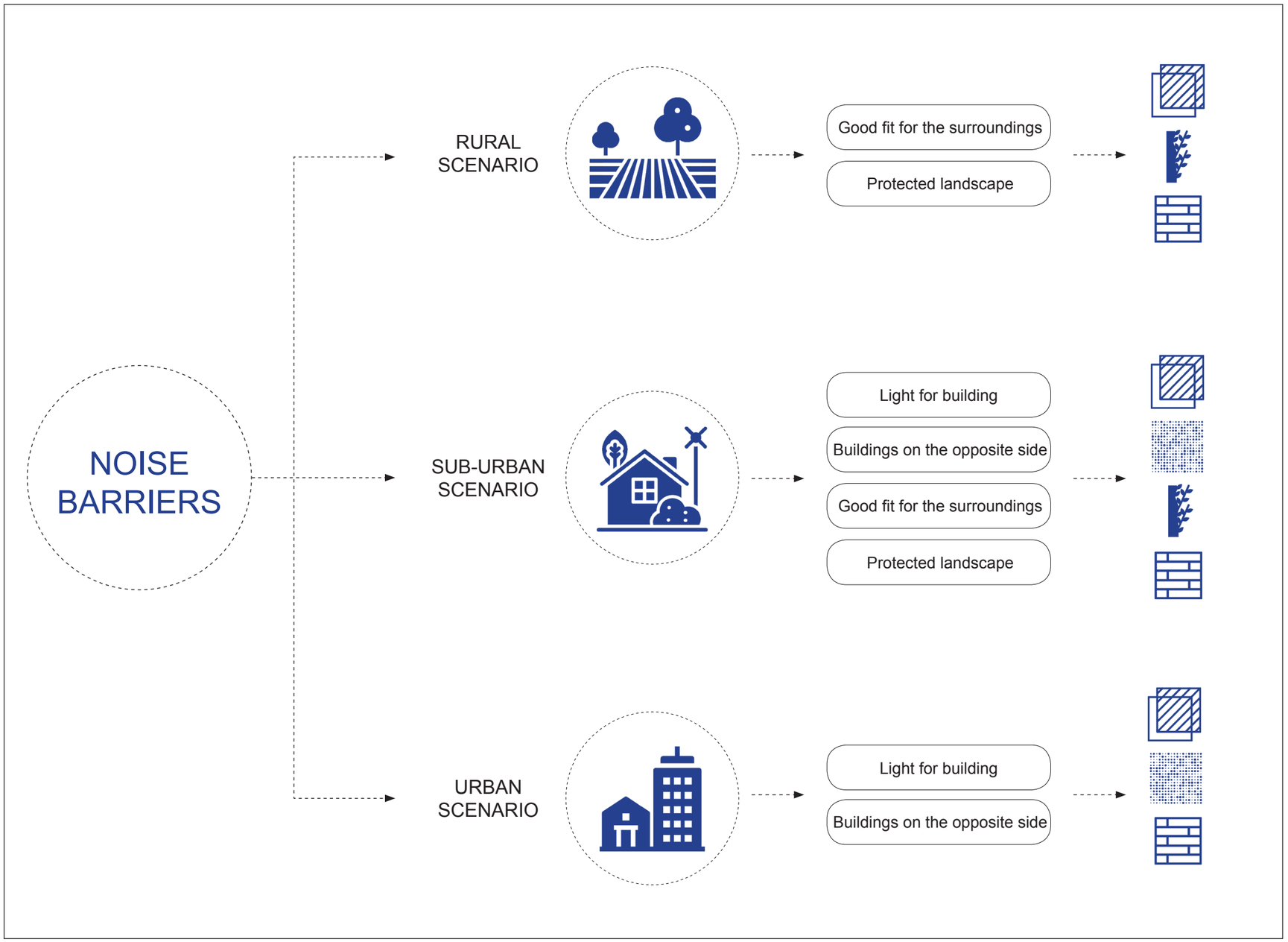
Noise Barriers and Scenarios

Acoustic screens used in the vicinity of the Rail Baltica line will be an element of its identity.
Patterns used on acoustic panels will be part of the identity of the network.

Different surroundings give the need to place different types of noise barriers, perfectly adapting to the context and preserving the identity of the Rail Baltica network.

NOISE BARRIERS

- Transparent
- Absorbing
- Earth
- Wooden



Design Strategy

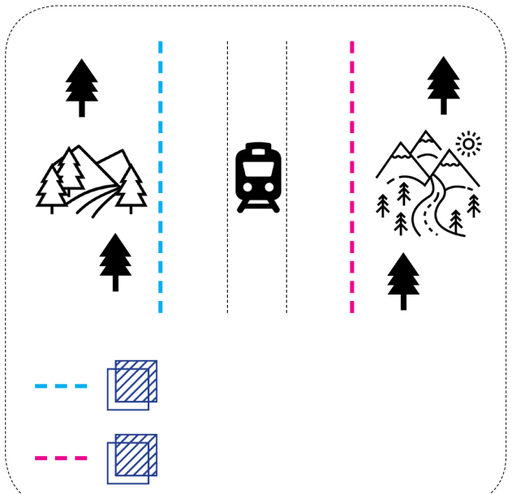
F4.3

Noise Barriers and Scenarios - examples

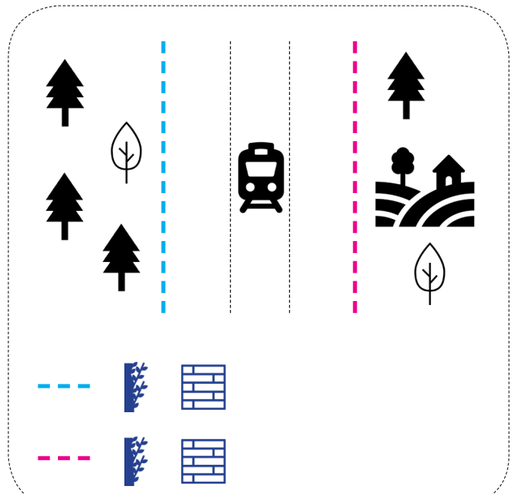
In places where there are buildings on both sides of the railway line, one should not use transparent barriers on one side of the railway line. Barriers of this type reflect sound, which can worsen acoustic conditions on the opposite side of the railway line. A good solution in these situations are absorbing or earth barriers.
However, transparent barriers are applied in areas of protected landscape and in order to provide light to buildings (if the building is located close to the railway line).

In rural areas and forest only the use of earth and wood barriers shall be well suited to the surroundings.

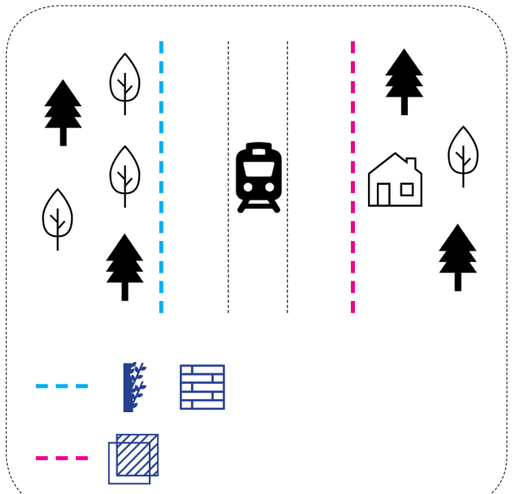
Protected landscape



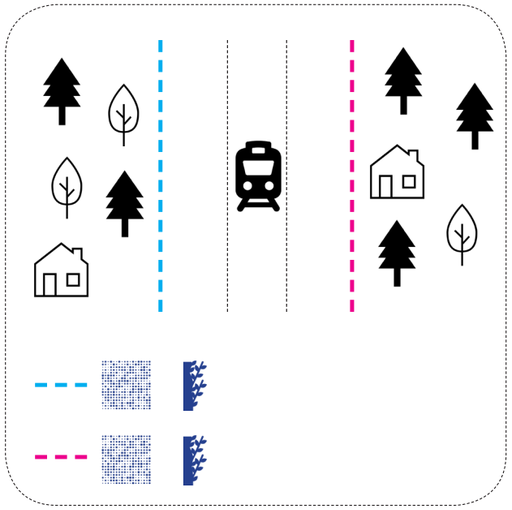
Rural areas, forests



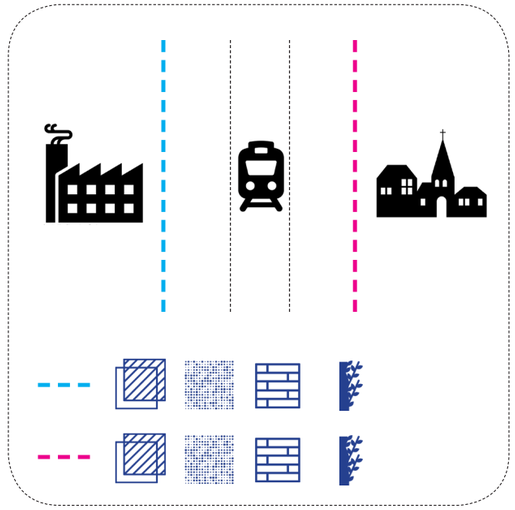
Light for buildings



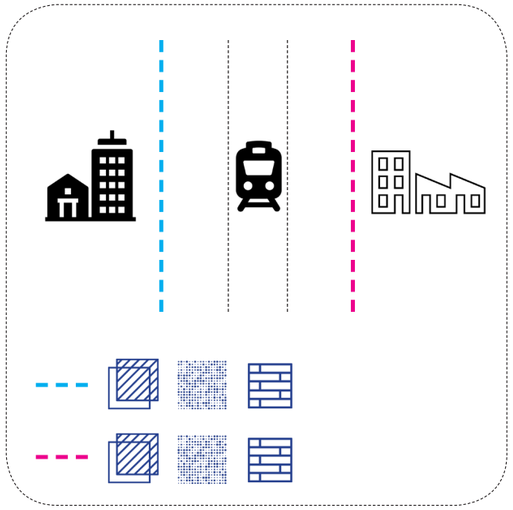
Buildings on the opposite side



Sub-urban scenario



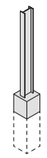
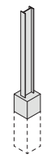
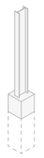
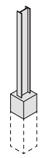
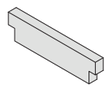
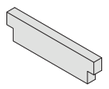
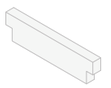
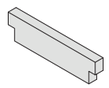
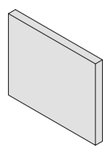
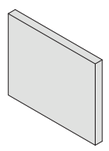
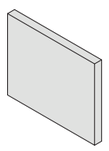
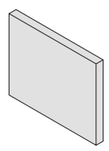
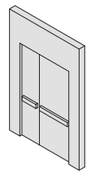
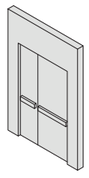
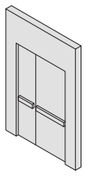
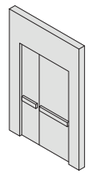
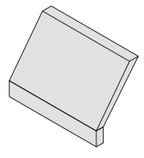
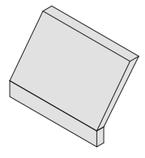
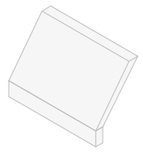
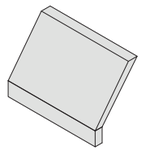
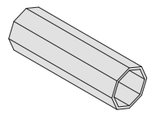
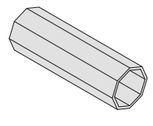
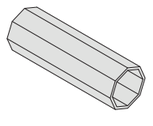
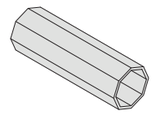
Urban scenario



Design Strategy

F4.3

In the side table are shown the combinations of the elements for the different types of Noise Barriers.

ELEMENTS	TRANSPARENT	ABSORBING	EARTH	WOODEN
SUPPORTING STRUCTURE				
GROUND BEAM				
PANEL				
EMERGENCY EXIT				
UPPER EDGE				
OCTAGONAL DIFFUSER				

Design Strategy

F4.3

Transparent Noise Barriers

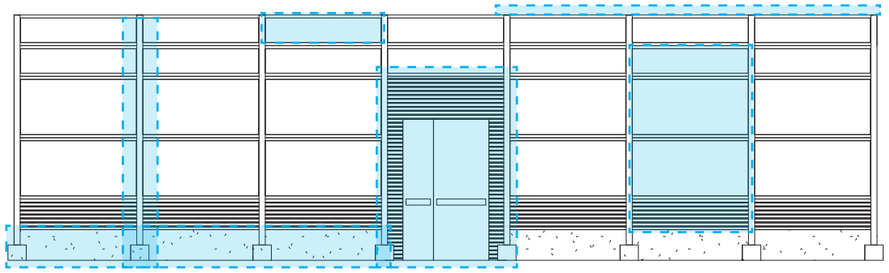
Transparent noise barriers can be used in all types of areas - urban, suburban and rural. On the one hand, their features assure access to light for buildings, and on the other, enable to view valuable landscapes for people traveling by rail. They can also be used in conjunction with other types of acoustic screens.

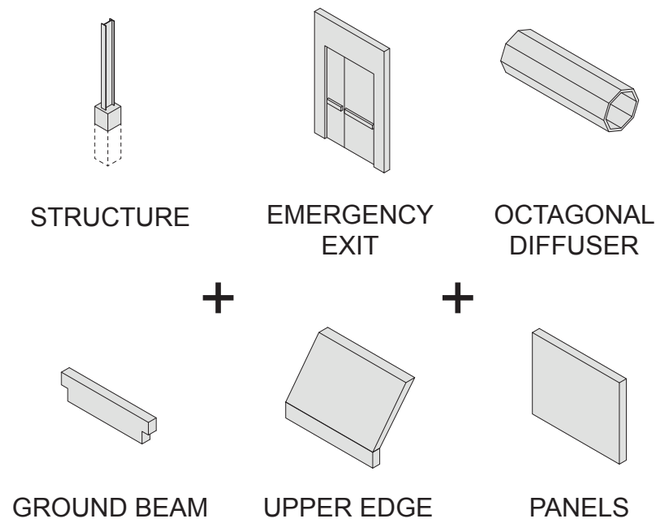
In some situations, it is advisable to combine transparent barriers with sound diffusion barriers. The decision about the necessity to apply such a solution should be made after consulting with an acoustic engineer.

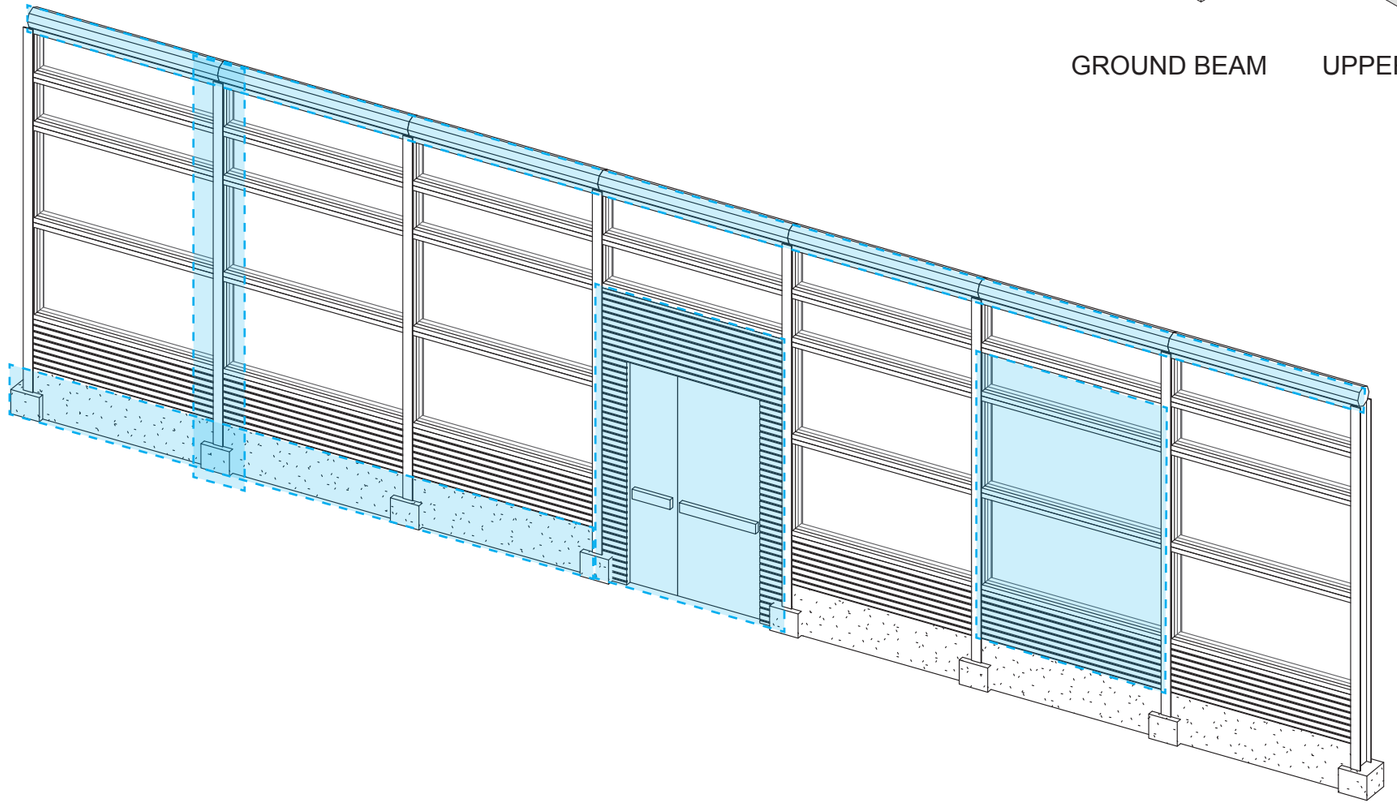
Transparent Noise Barriers are composed by:
- Supporting structure
- Ground beams
- Plexiglass panels
- Sound dampening panels
- Emergency exits
- Upper edges (if necessary)
- Octagonal diffuser (if necessary)

Plexiglass Panel:
Dimensions (0,50 m x 2,00 m / 1,00 m x 2,00 m)

Each panel must have an aluminium frame of 5 cm.







Design Strategy

F4.3

Absorbing Noise Barriers

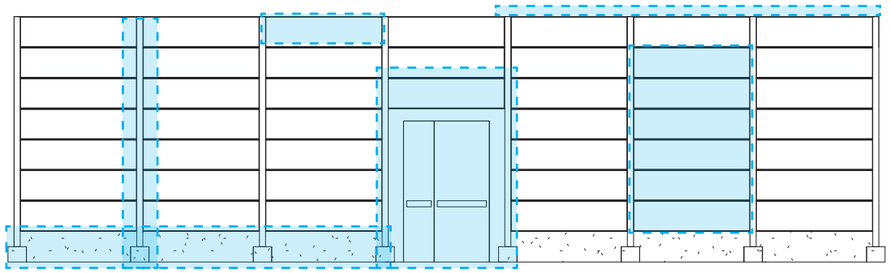
Sound absorbing barriers should be used in places where there are buildings or areas on the opposite side of the railway line that should be protected against noise. This type of screens is particularly well suited for narrow urban areas. It can be used also in suburban areas. The screens may have a different color, which should be adapted to the environment

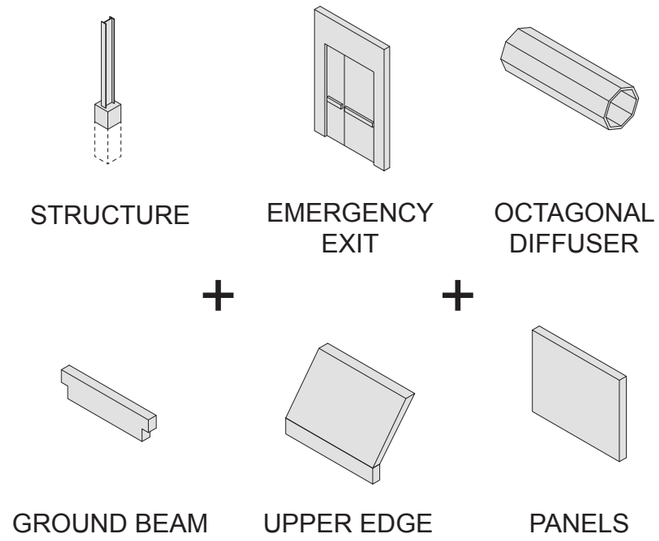
Absorbing Noise Barriers are composed by:

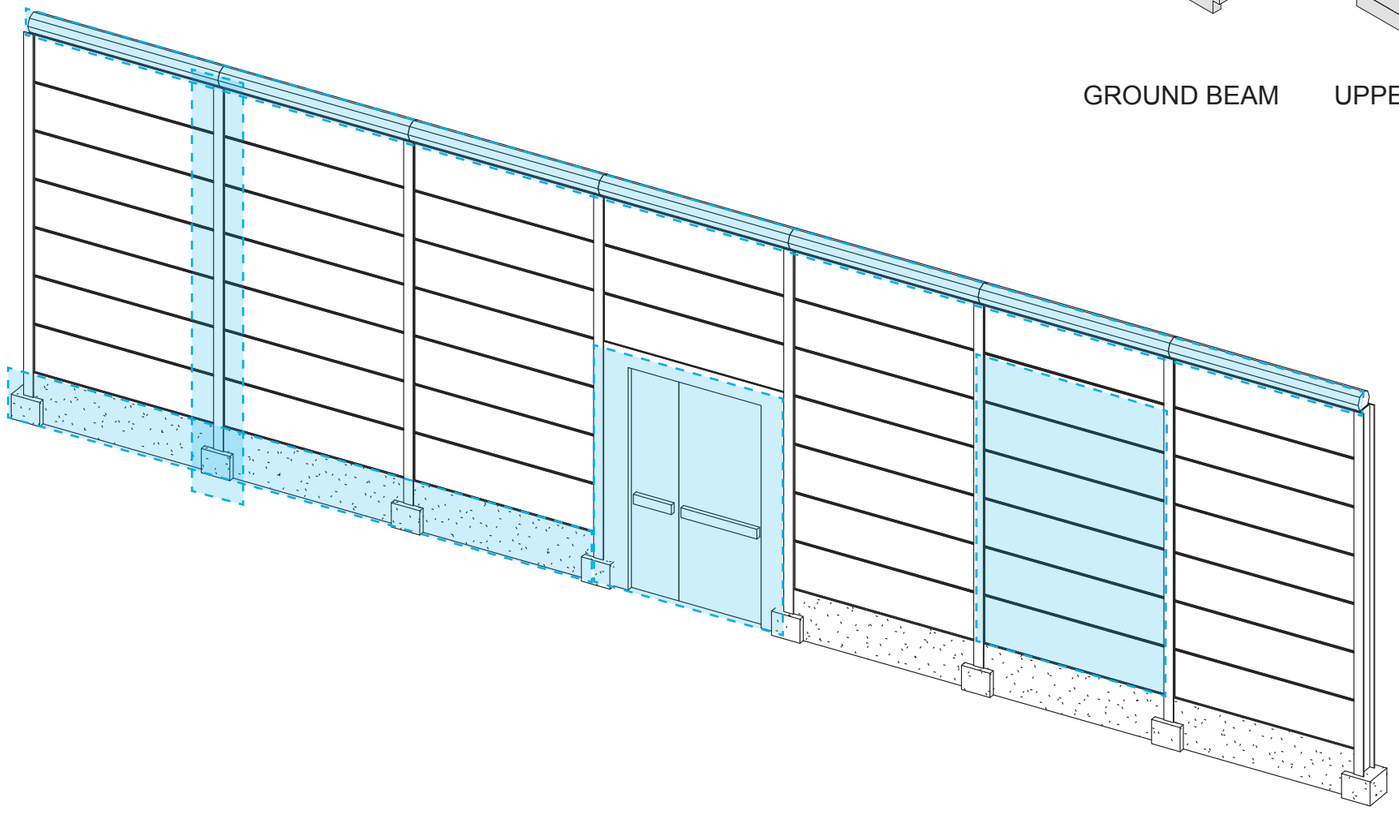
- Supporting structure
- Ground beams
- Steel perforated absorptive panels
- Emergency exits
- Upper edges (if necessary)
- Octagonal diffuser (if necessary)

Perforated Metal Panel:
Dimensions (0,50 m x 2,00 m)

Each panel must have an 50% of open percentage. Holes must be circles of 1 cm diameter maximum.





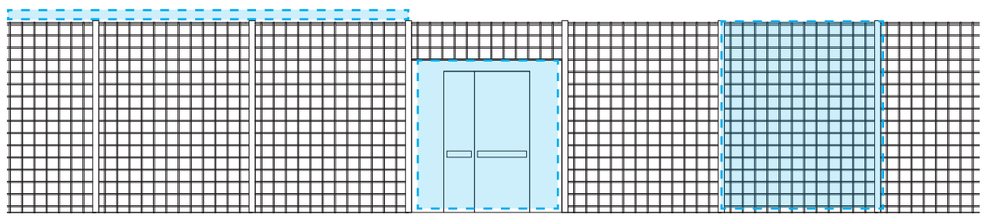


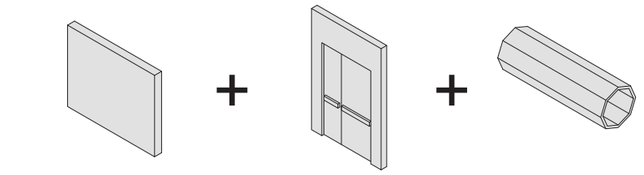
Design Strategy

F4.3

Earth Noise Barriers

Earth noise barrier are characterized by very good acoustic insulation. This is ensured due to the large mass of earth. A big advantage of this type of screens is fitting into the landscape due to the natural look of walls. They may be overgrown with greenery which will additionally improve their fit into the surroundings. Screens of this type should be used mainly in rural areas.

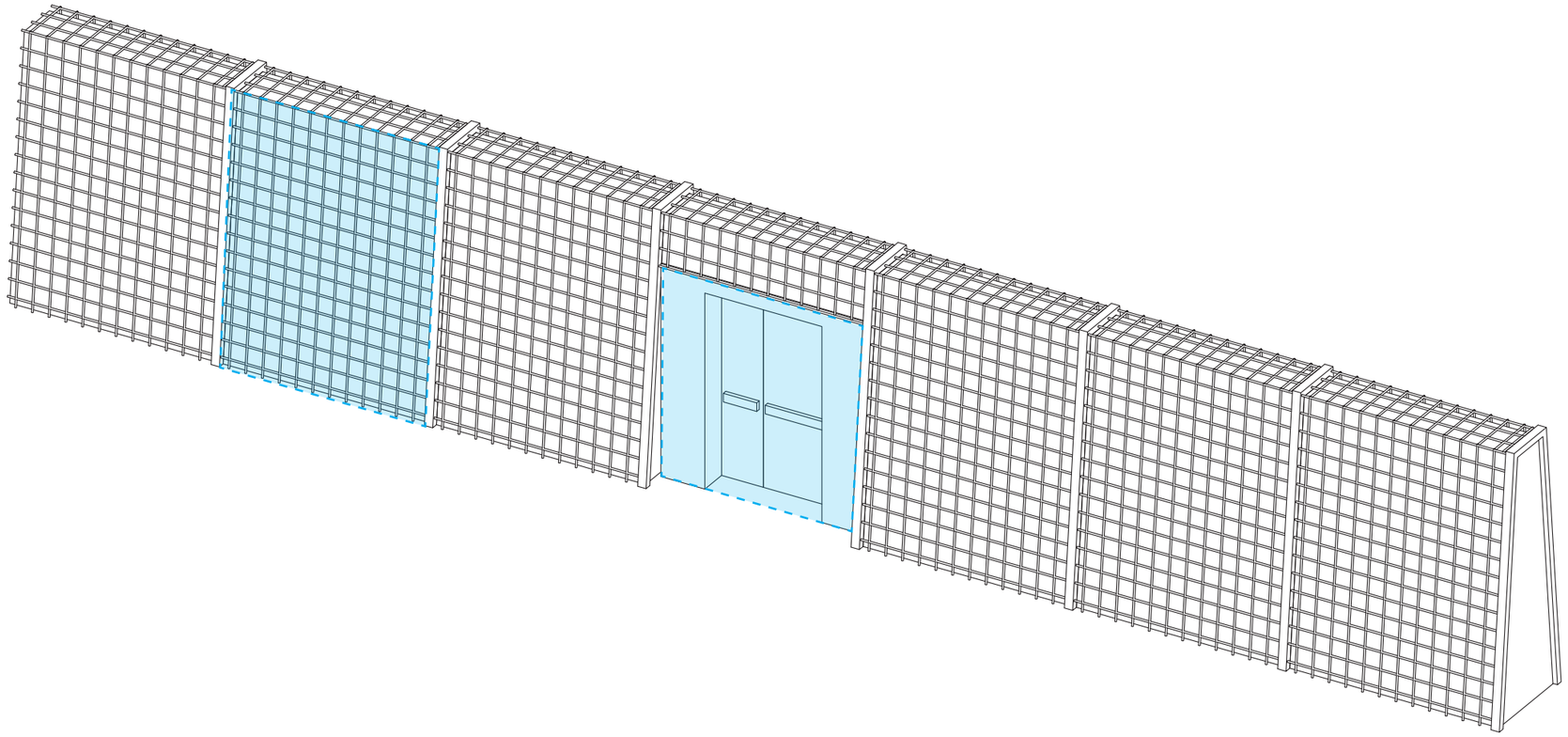




Earth Noise Barriers are composed by:
- Earth panels with vegetation
- Emergency exits
- Octagonal diffuser (if necessary)

Earth Panel:
Geometries and dimensions of the earth noise barrier must be decided as per site conditions.

Each panel must be covered with local vegetation.
A grid will be used to contain the earth and the gravel.



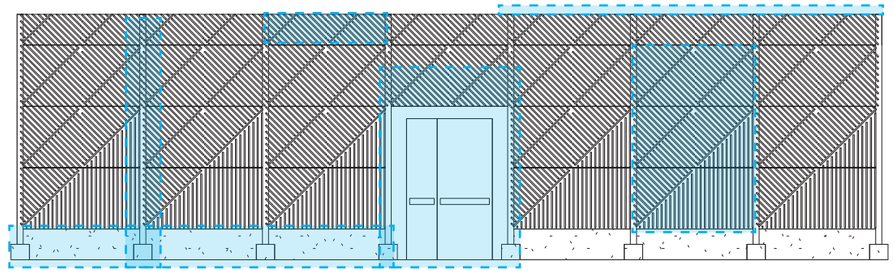
Design Strategy

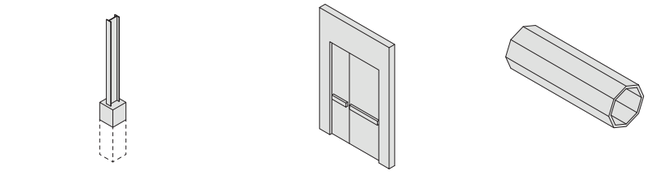
F4.3

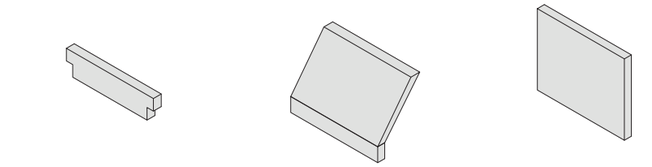
Wooden Noise Barriers

Wooden noise barriers fit very well with the regional landscape of the Baltic countries. These devices should be used in the rural areas. The natural appearance of wood makes these devices look good in such surroundings. They can harmonise well with other types of acoustic screens.

Wooden Noise Barriers are composed by:
- Supporting structure
- Ground beams
- Wooden panels
- Emergency exits
- Upper edges (if necessary)
- Octagonal diffuser (if necessary)

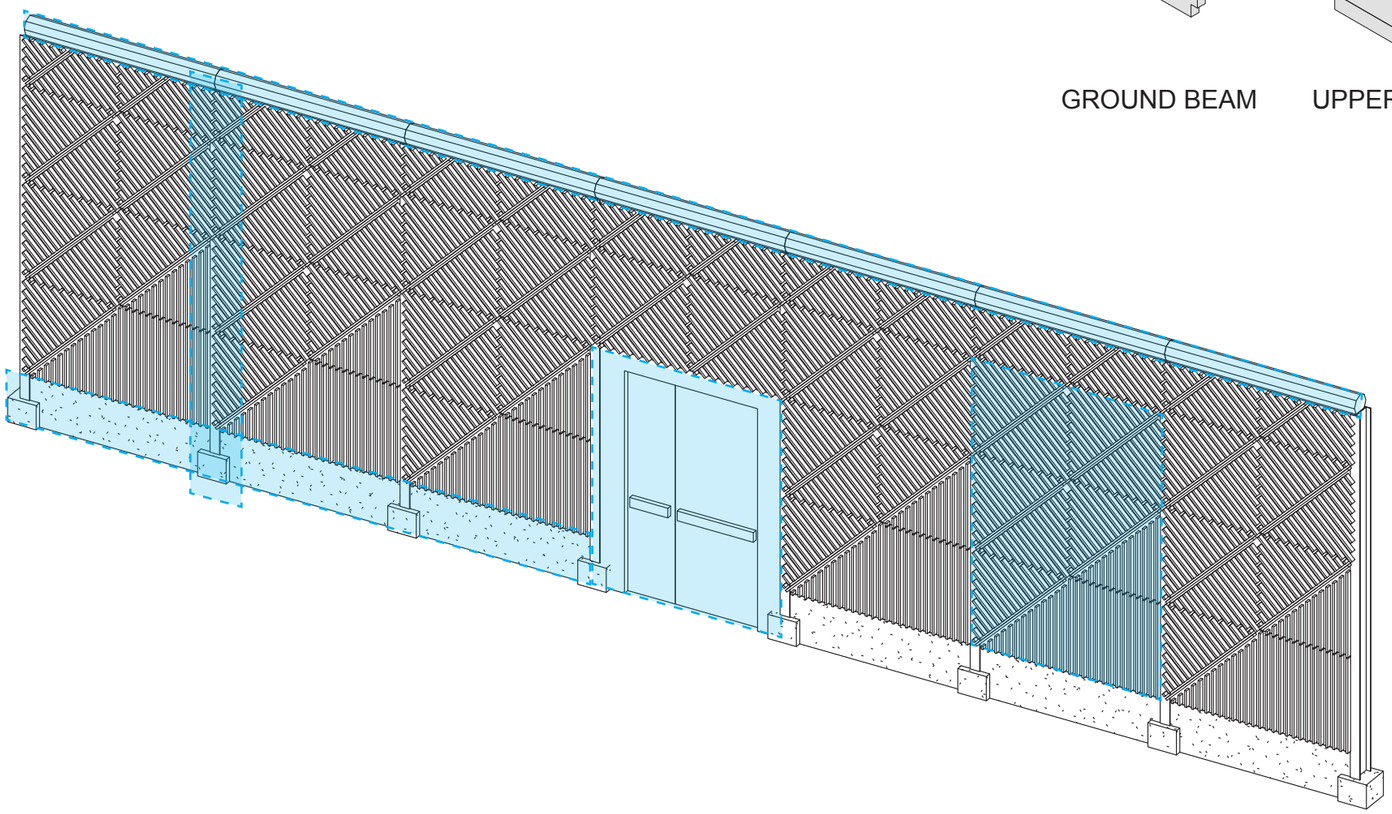






Wooden Panel:
Dimensions (0,50 m x 2,00 m / 1,00 m x 2,00 m)

Panels must be composed with slats of local birch. Slats can be applied on the barrier with a flat pattern or following the pattern suggested for the branding implementation.



Design Strategy

F4.3

Elements Relation

Since noise barriers must adapt to the context, preserving the identity of Rail Baltica, the additional elements must also be compliant to the requirements.

The following table shows as the four types of noise barrier can be used in relation with the other RB elements:

- Railways Bridge
- Embankment & Cut
- Road Overpass
- Animal Passage
- Pedestrian Overpass

	RAILWAYS BRIDGE	EMBANKMENT & CUT	ROAD OVERPASS	ANIMAL PASSAGE	PEDESTRIAN OVERPASS
TRANSPARENT NOISE BARRIER	✓	✓	✓	✗	✗
ABSORBING NOISE BARRIER	✓	✓	✓	✗	✗
EARTH NOISE BARRIER	✗	✓	✗	✓	✗
WOODEN NOISE BARRIER	✗	✓	✗	✓	✗

Geometry

F4.4

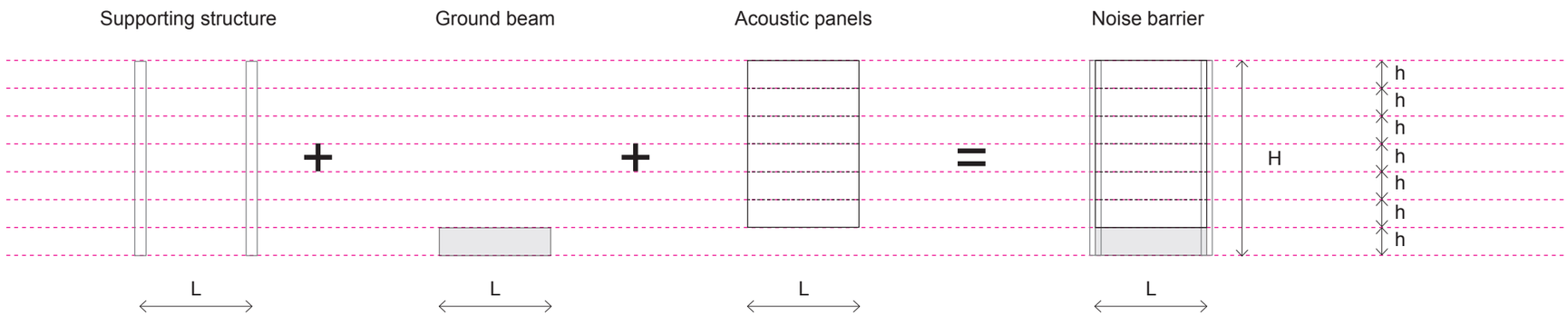
The height of noise barriers is determined on the basis of specialist acoustic calculations.

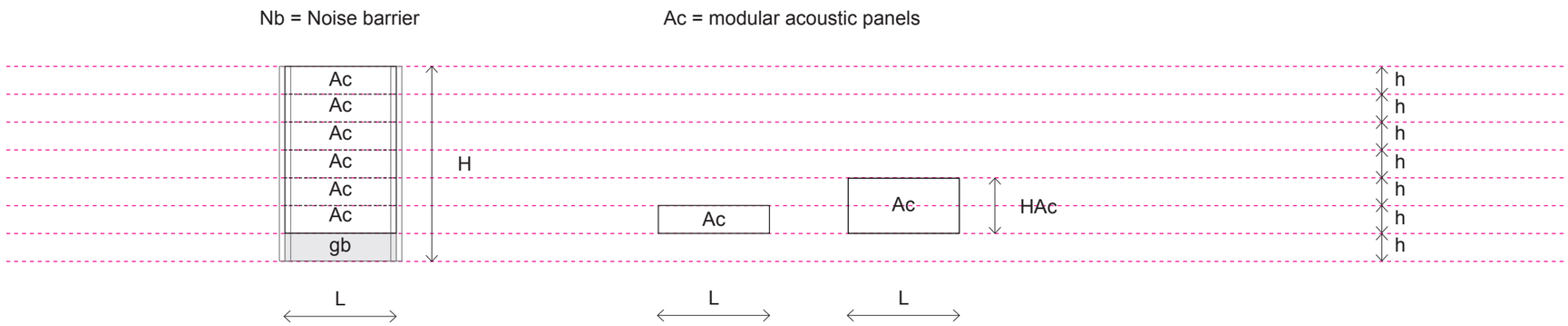
It depends on the size of the train traffic, their speed and type, as well as the terrain, location and height of protected buildings.

The height of noise barriers shall be calculated from the ground level. It includes the height of the ground beam (if applicable) and the sum of the heights of all acoustic panels, including those forming the upper edge, if used.

All the elements of the noise barriers shall be modular, to allow a branded composition and preserving the identity of the Rail Baltica network.

Modulation process





Legend

Nb = Noise barrier
L = noise barrier length, standard 2 m
H = noise barrier height = n*HAc + h ground beam
Ac = Acoustic panel
HAc = acoustic panel height = n*h
gb = modular ground beam
h = module standard, height = 0,5 m

Geometry

F4.4

Typologies

Different typologies of noise barriers have been identified for the Rail Baltica line, based on their height and shape:

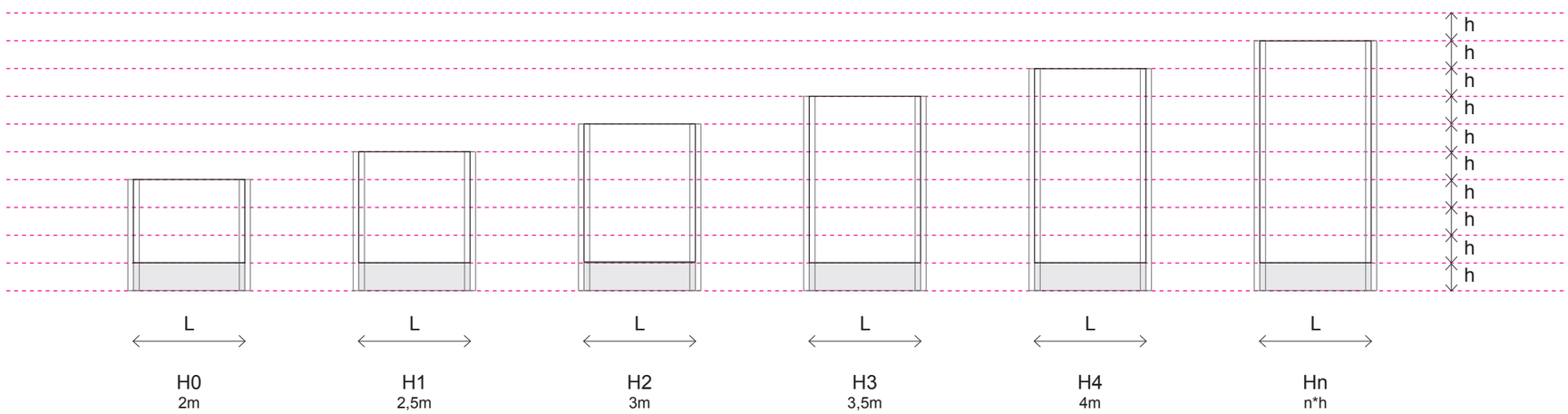
- Standard barriers, without bending the upper edges;
- Barriers with bends or arcs on the upper edges

An acoustic engineer should decide which one of them should be used specifically.

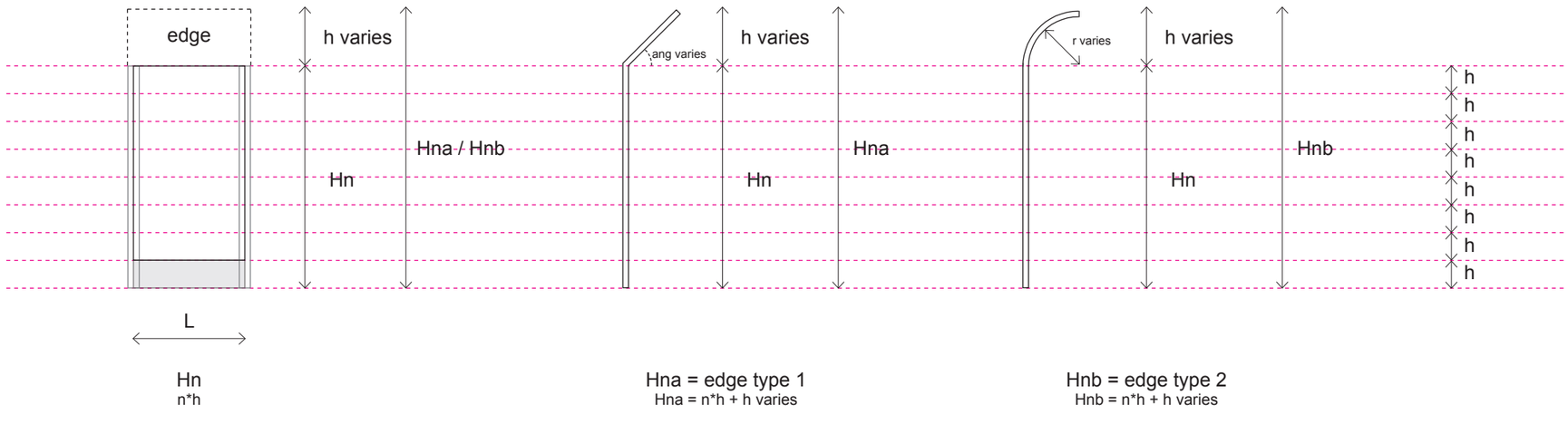
For standard barriers, one starts from the lowest barrier, the H0 type, increasing the height for each type by one module, (H1, H2...Hn).

According to the need, it is also possible to add an upper edge. In this case two types of noise barriers are identified, Hna type and Hbn type, based on the shape of their upper edge, as shown in the figure.

Standard



Upper edge



Geometry

F4.4

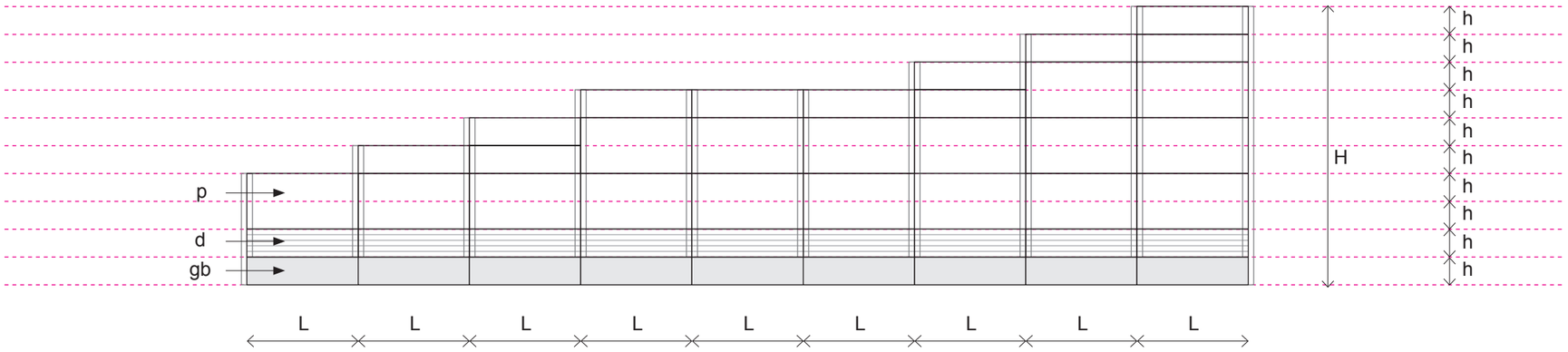
Composition and Gradation - Transparent Noise Barriers

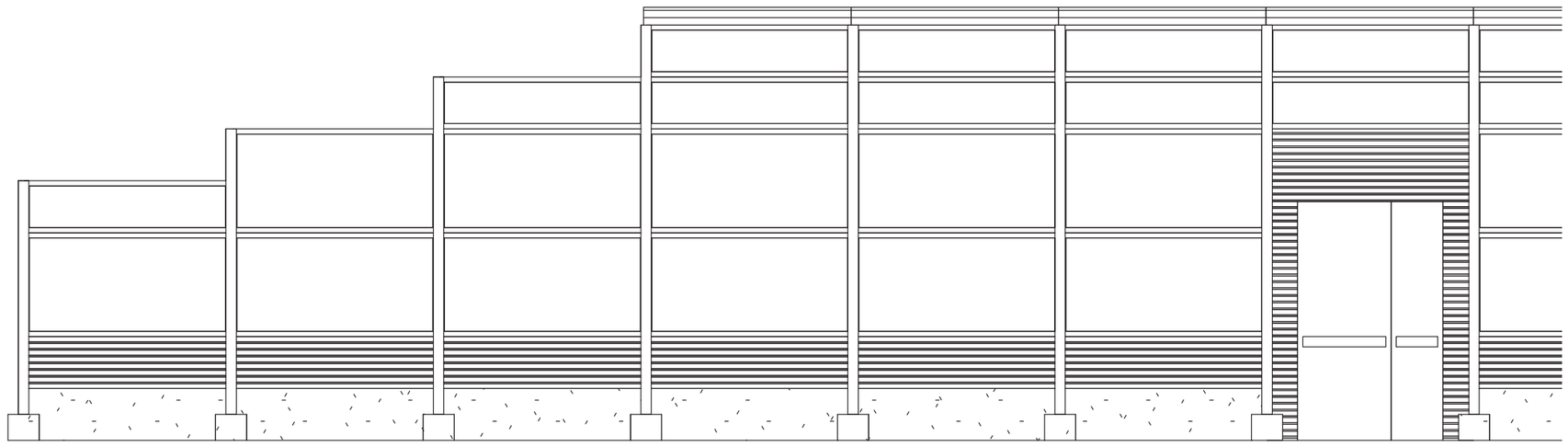
Noise barriers can have different heights. It depends on many parameters (number of trains, height of buildings, location of barriers, etc.). An acoustic engineer shall decide on the height of the barrier. As a rule, noise barriers used on railway lines have a height of 2 to 4 m, with the possibility that they are even higher. Variable height also affects the visual side of device design.

The drawings show how the arrangement of acoustic panels should be used for different heights of transparent noise barriers.

The height difference between one barrier and another should be always modular. Smallest panels should be placed at the top, as shown in the figure.

For transparent noise barriers, Rail Baltica brand was used as described in more detail in the last chapter.





Legend

L = noise barrier length, standard 2m
H = noise barrier height = n*Hp + h ground beam
p = plexiglass panel
Hp = plexiglass panel height, standard 0,5 - 1 m
d = sound dampening panel
gb = ground beam
h = module standard, height = 0,5m

Geometry

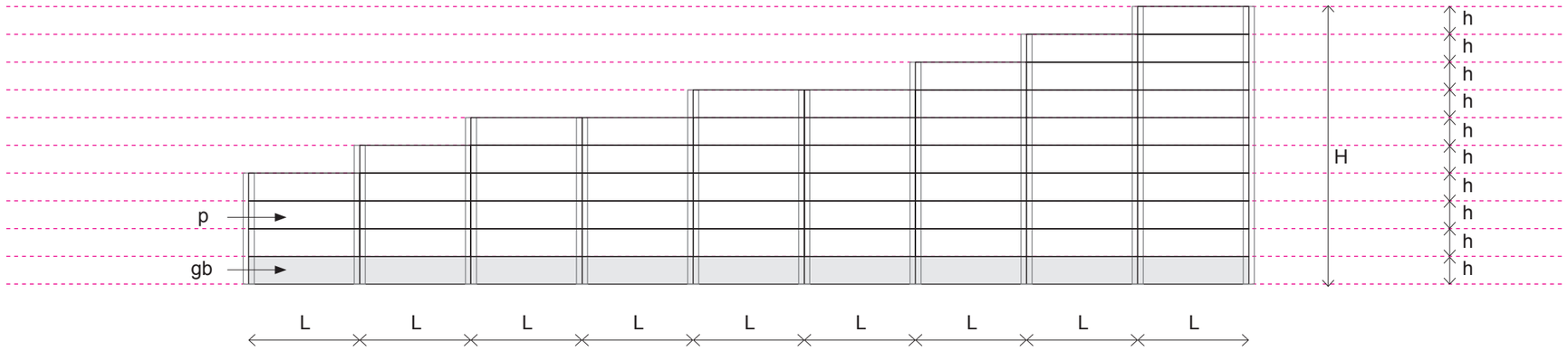
F4.4

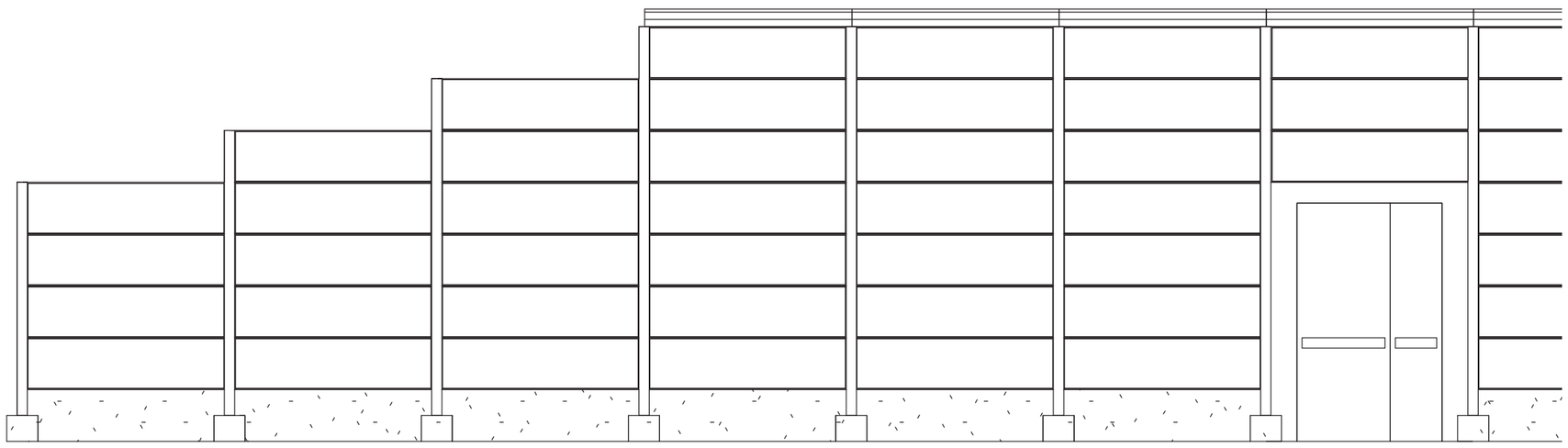
Composition and Gradation - Absorbing Noise Barriers

Absorbing noise barriers are also graduated, as shown in the following drawings.

In case of absorbing noise barriers, the height is equal to the sum of the heights of the acoustic panels, which usually have a height of 0.5 m.

The height difference between one barrier and another should be always modular.





Legend

L = noise barrier length, standard 2m
H = noise barrier height = n*Hp + h ground beam
p = absorptive panel
Hp = absorptive panel height, standard 0,5 m
gb = ground beam
h = module standard, height = 0,5m

Geometry

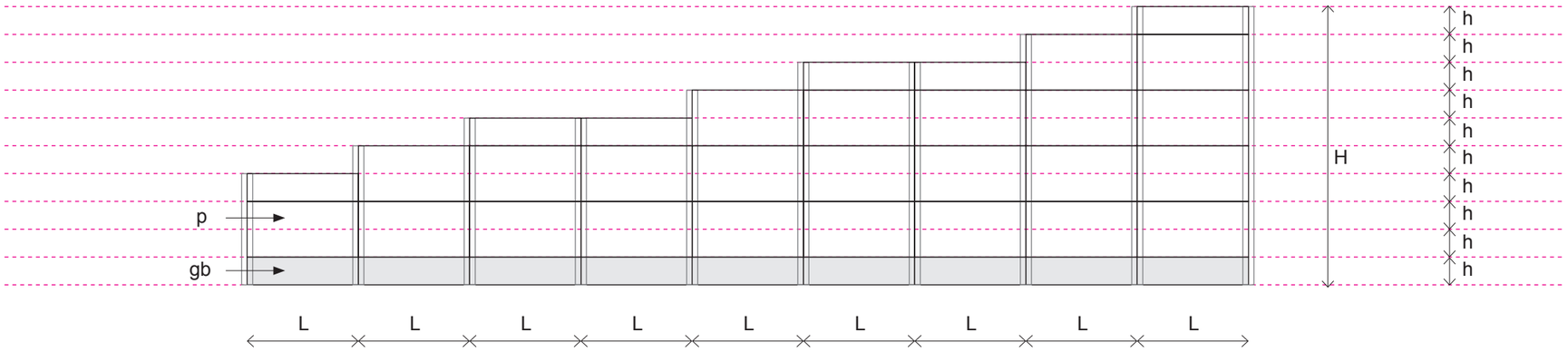
F4.4

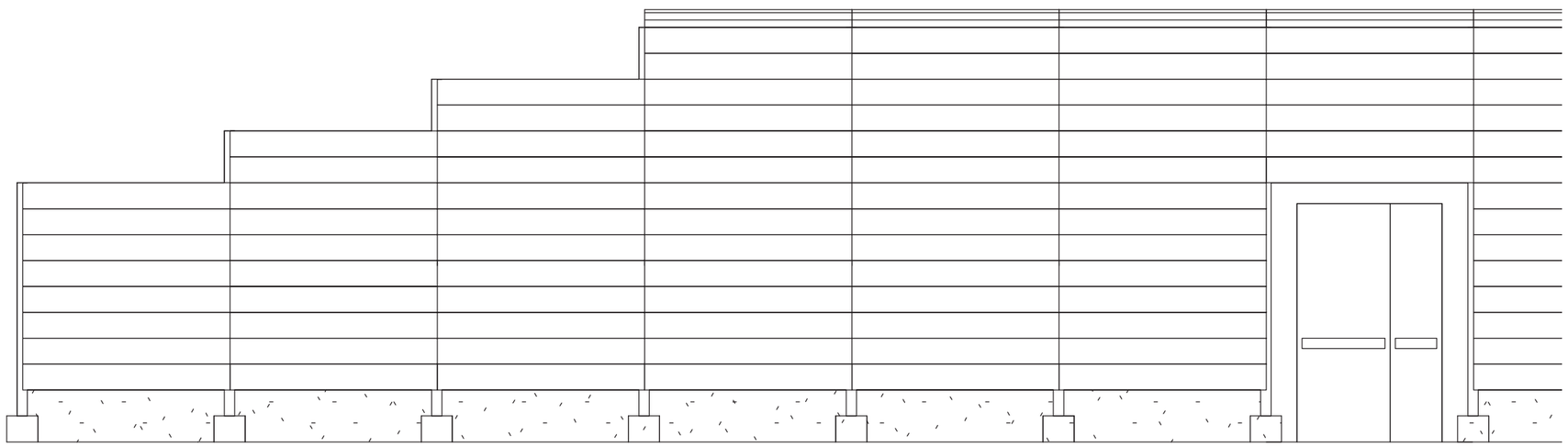
Composition and Gradation - Wooden Noise Barriers

The gradation of wooden noise barriers is applied on the same principles as transparent and absorbing barriers.

The height difference between one barrier and another should be always modular. Smallest panels shall be placed at the top, as shown in the figure.

Also in this case the Rail Baltica brand was used, as described in more detail in the last chapter.





Legend

L = noise barrier length, standard 2m
H = noise barrier height = n*Hp + h ground beam
p = wooden panel
Hp = wooden panel height, standard 0,5 - 1 m
gb = ground beam
h = module standard, height = 0,5m

Geometry

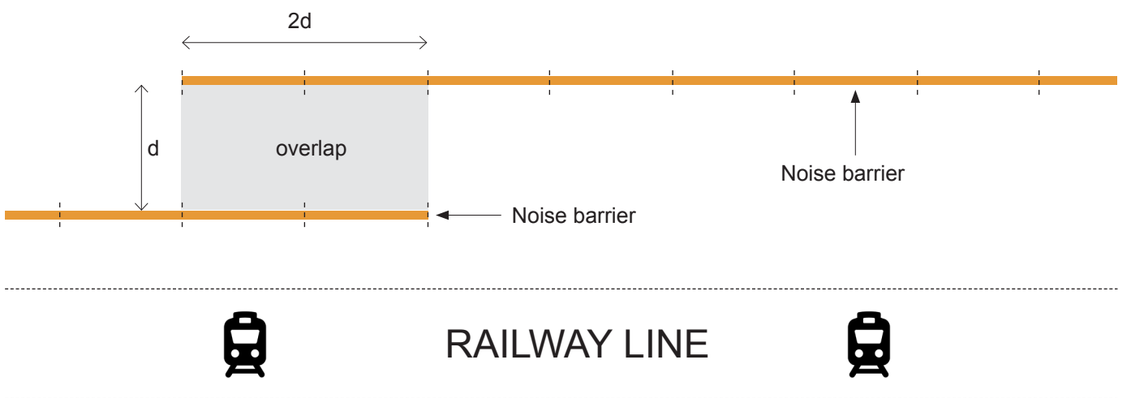
F4.4

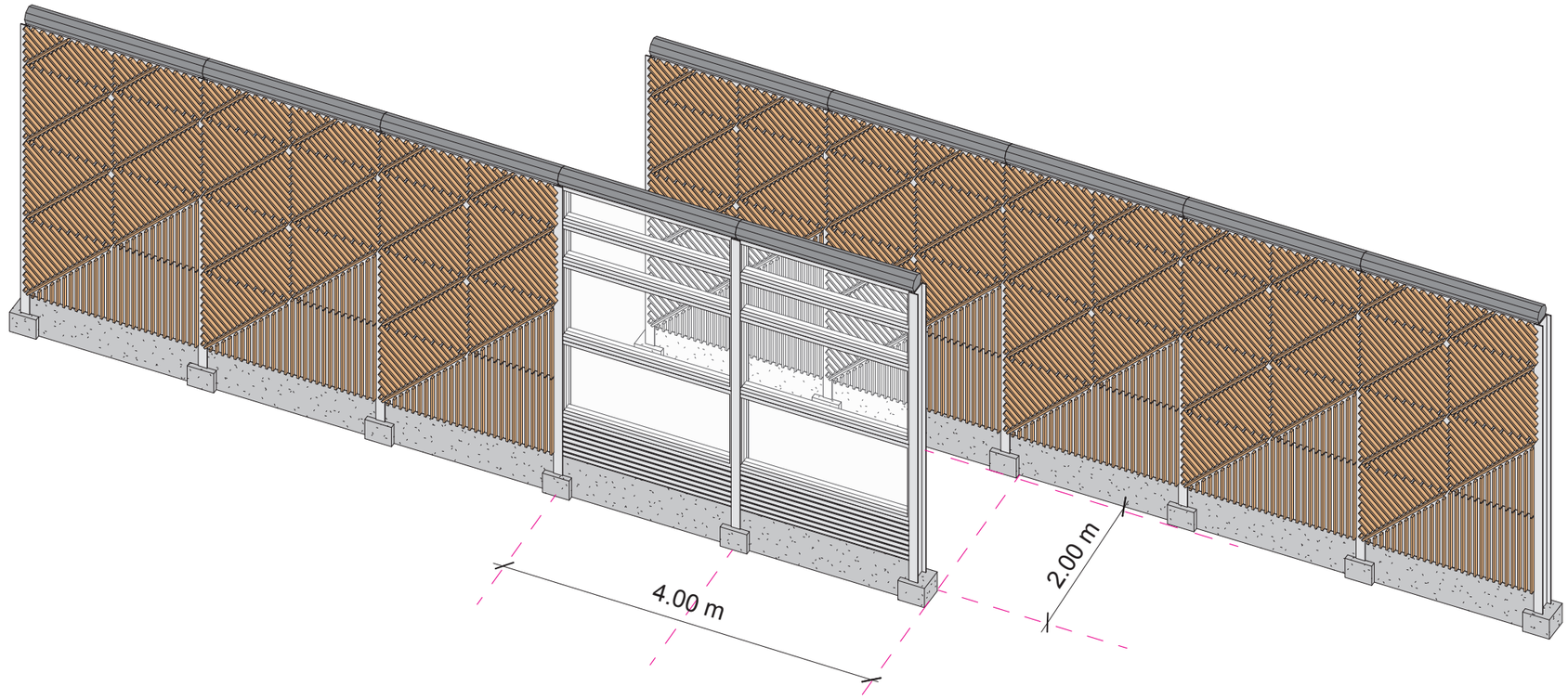
Overlaps

When designing noise barriers, designers shall also remember about proper gaps in these objects. They may be necessary, for example, due to providing an access to stops and railway stations for passengers or because of the safety issues and evacuation of the track. In such situations, gaps in screens should be designed for the so-called “overlap”. Only in this case adequate acoustic efficiency of the noise barrier can be ensured.

It have to be remembered that the length of the overlap shall be at least twice as large as the gap between barriers, as shown in the diagram.

Visualizations show the correct way to locate noise barriers in a situation when it is necessary to provide access to the railway line. It is advisable that at least one of the parts of the acoustic barriers is transparent. This will ensure greater security for travelers, because space between non-transparent barriers can be a dangerous place due to the increased possibility of committing crimes such as theft.





Geometry

F4.4

Structure

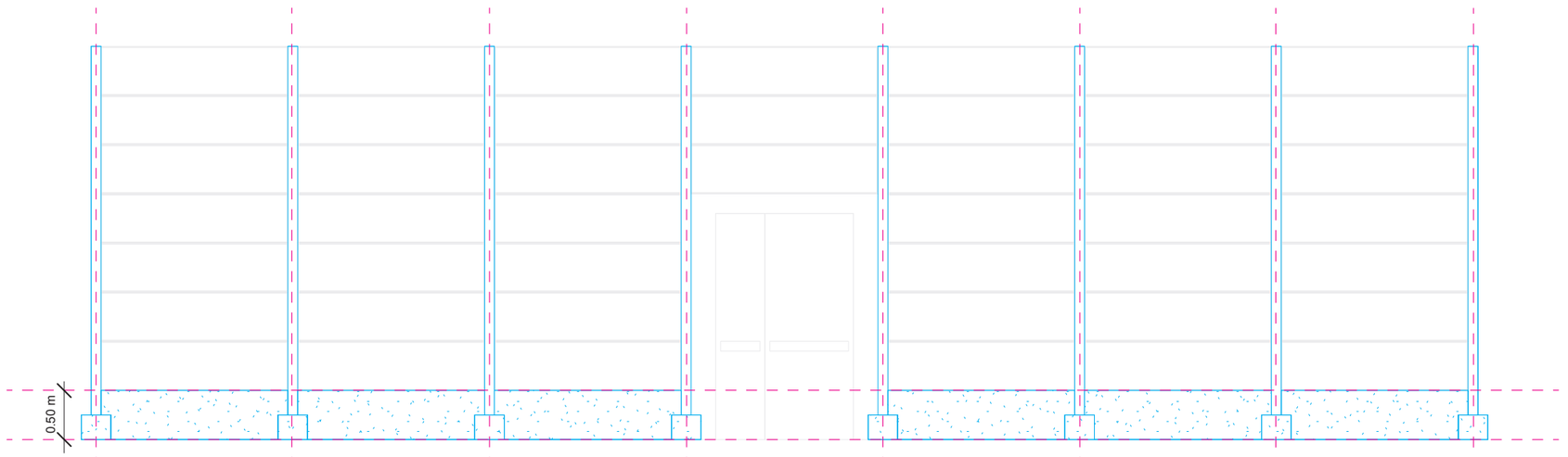
The noise barrier support structure consists of two main elements:

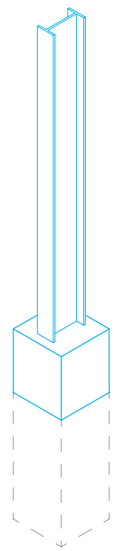
- Steel poles;
- Ground beam.

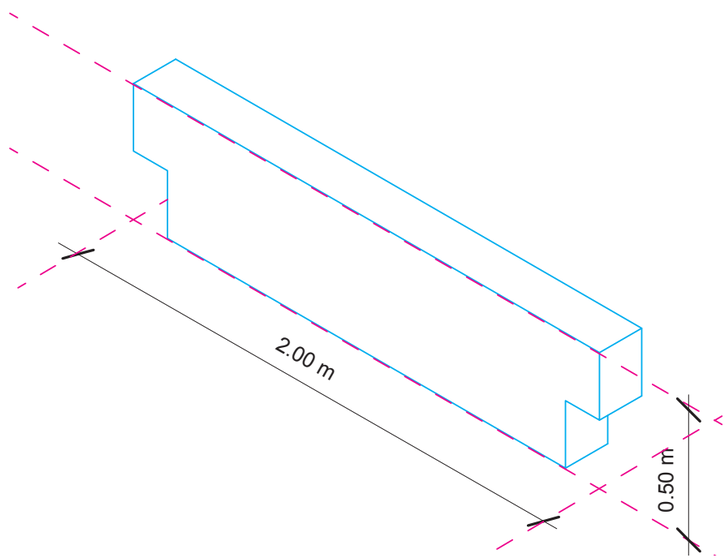
The columns are fastened to underground foundations. The foundation depth should be determined by the designer. It depends on the height of noise barriers and the specificity of the ground.

The ground beam is used to stabilize structures and acoustic panels. From an acoustic point of view, it is important that these elements are connected to the acoustic panels in a tight manner. Only in this case the noise barriers will retain their acoustic effectiveness.

This solution does not apply to earth barriers, the construction of which is different - it consists of filling with earth, stabilized by means of appropriate meshes.







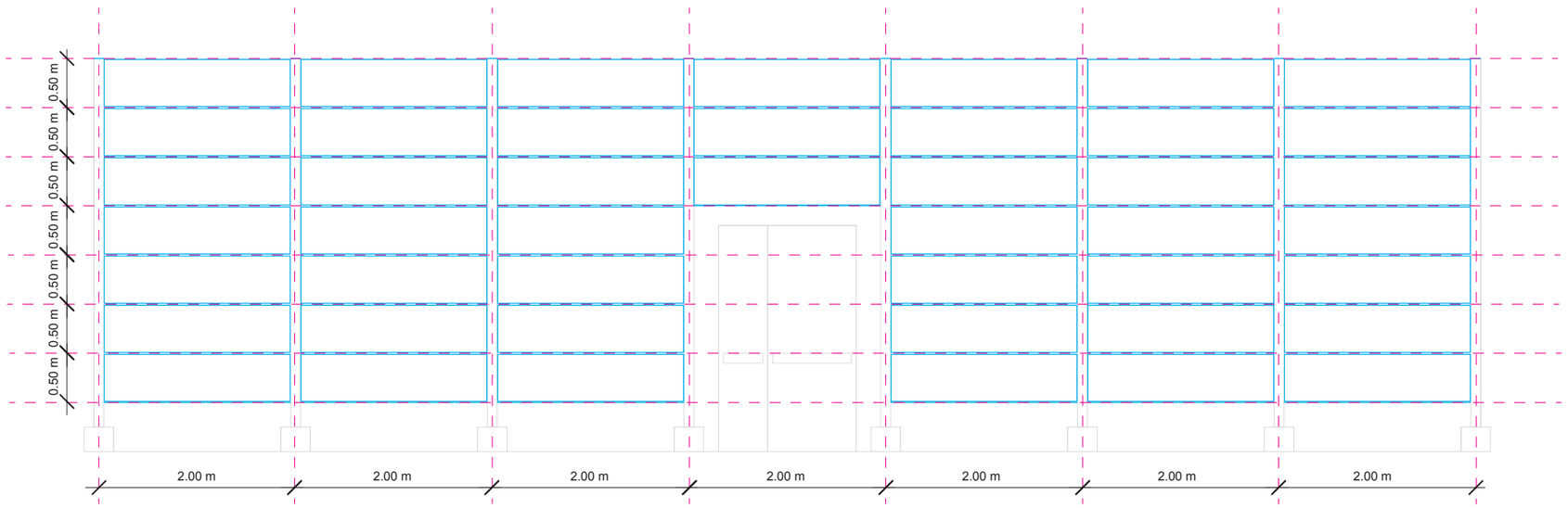
Geometry

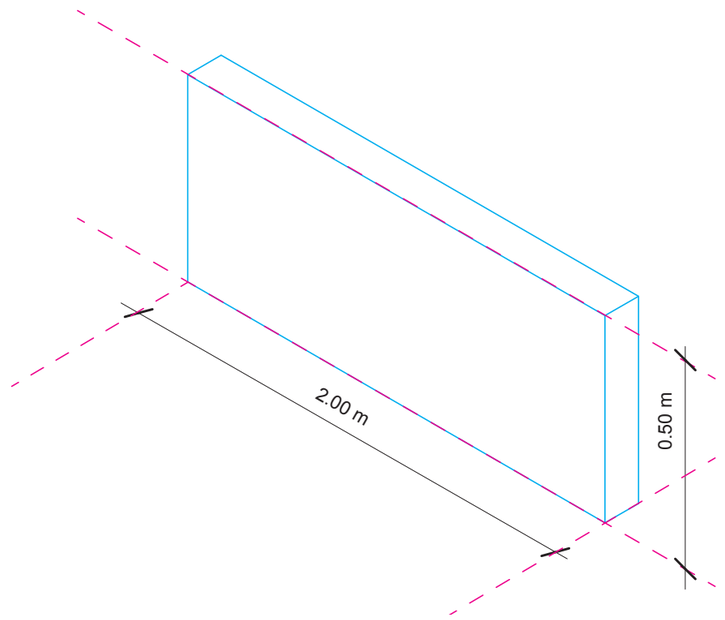
F4.4

Panels

Acoustic panels used in noise barriers are the most important element. Proper shaping of the acoustic climate in zones that are subject to noise protection depends on the proper specification of these elements. The acoustic engineer decides what acoustic panels are to be used.

Typical dimensions of acoustic panels for each type of noise barriers and the way they are used when grading barriers are described in previous chapters of the guidelines.





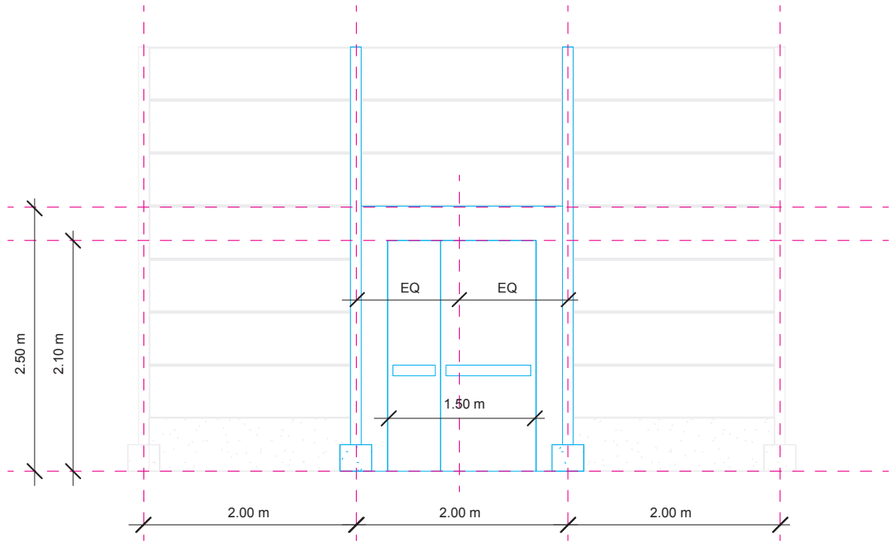
Geometry

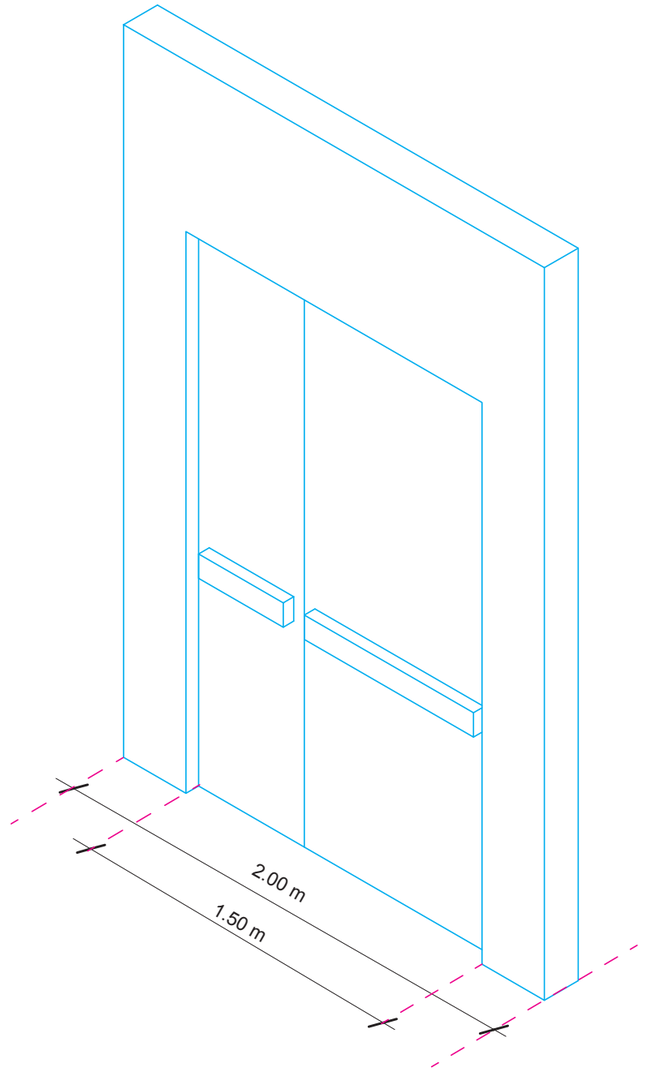
F4.4

Emergency Exit

Another way to ensure access to the railway line are emergency exits. Safe evacuation can also be ensured by using this kind of doors. The condition, however, is the easy opening of the doors in emergency situations. In standard usage the doors shall be closed so that they do not reduce the effectiveness of noise barriers. The loss of efficiency of the acoustic barriers can be large even with a small share of gaps in noise barriers. Therefore, noise barriers should be designed in such a way that they are free from gaps that significantly reduce their effectiveness, regardless of type, type of filling, geometric parameters and location.

Doors axis shall be placed in the middle of the panel.





Geometry

F4.4

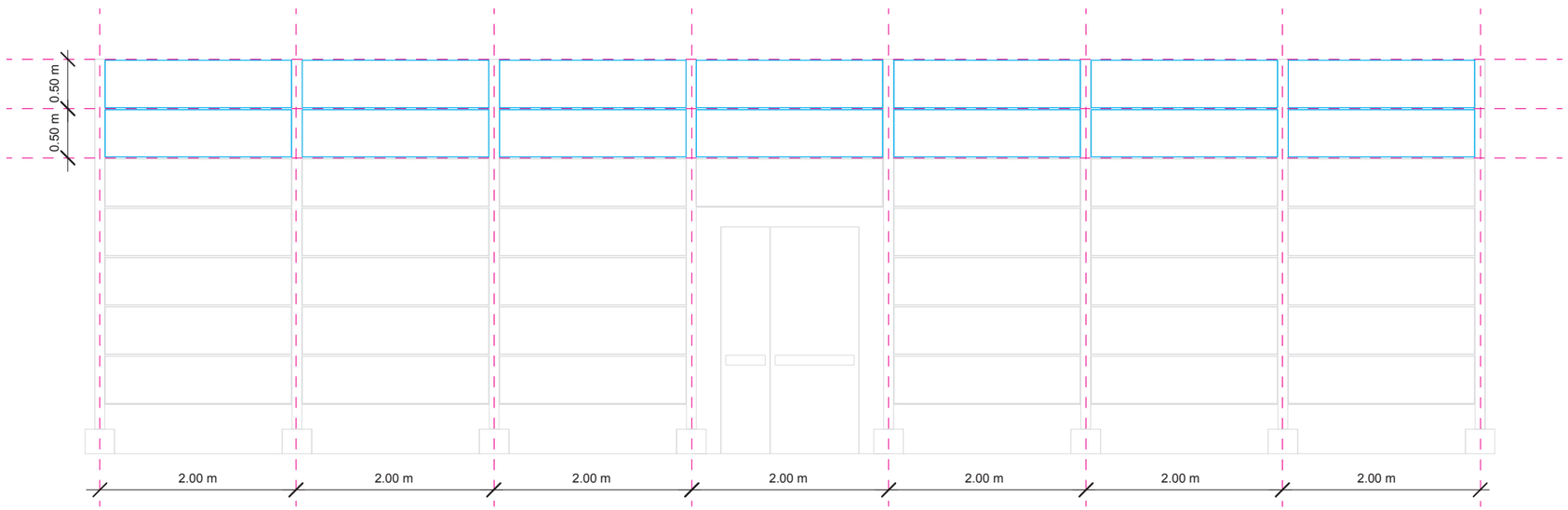
Upper Edge

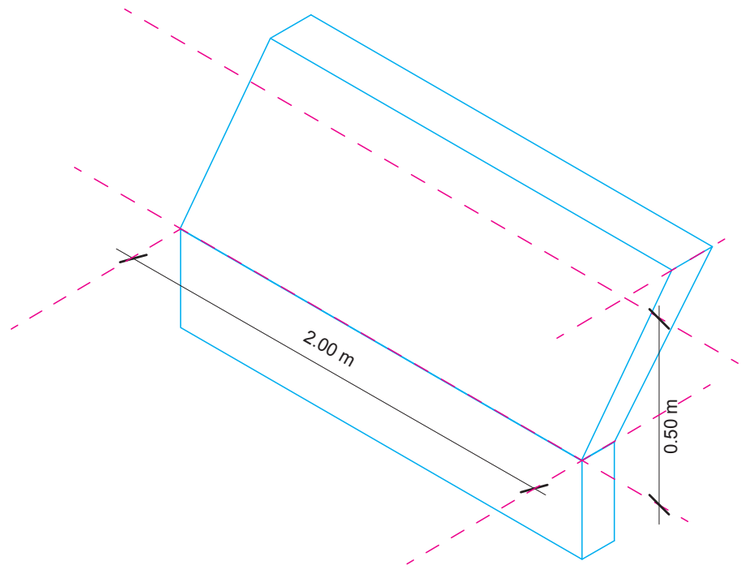
The sound wave falling on the edge of the noise barrier is deflected. This phenomenon reduces the area of acoustic shadow necessary for the effective protection of buildings. Appropriate shaping of the edges of acoustic screens can favourably increase the protected space. Applying kinks of the upper edge of the noise barrier will additionally reflect the sound generated by the passing trains back towards the track.

These solutions can be used on all types of noise barriers used at Rail Baltica with the exception of earth barriers.

Another way to curve the noise barrier can be the use of a rounded shape. This solution is as effective as a simple breakdown. The use of this type of endings of the upper edges of noise barriers should be consulted with an acoustic engineer.

These solutions can be used on transparent noise barriers used at Rail Baltica.





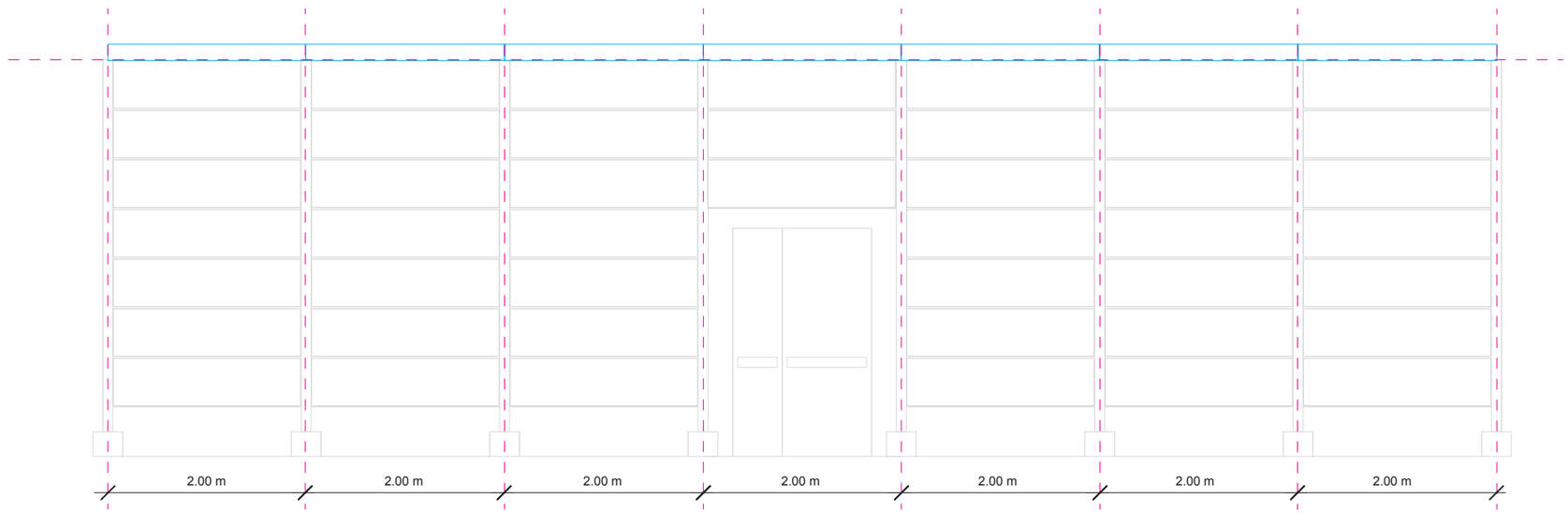
Geometry

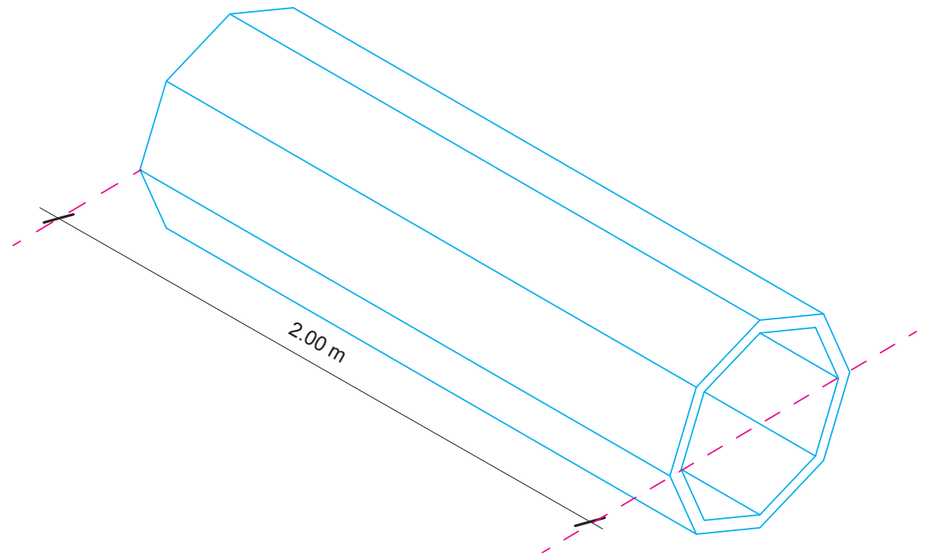
F4.4

Octagonal Diffuser

The phenomenon of reducing the acoustic shadow resulting from the sagging of acoustic waves can be prevented by using octagonal reducer (devices filled with a sound absorbing material) or by appropriate shaping of the upper edge of the screen.

Octagonal diffusers can form part of the national Rail Baltica identity. For this purpose, different colors are used for particular Baltic countries - Lithuania, Latvia and Estonia.





Materials

F4.5

Transparent Noise Barrier

Noise barriers can be made of various materials. Each of them has different acoustic properties. While selecting the material that the acoustic barriers is to be made of, other parameters not related to acoustics should be taken into account. These include: resistance to aging and corrosion, stone impact resistance, fire resistance and resistance to color loss.

Glass and acrylic are transparent materials that can be used as noise barriers. They enable to illuminate the buildings. This is very important in case of inability to ensure an appropriate distance between the protected object and an acoustic screen. Transparent panels can also be used in combination with other materials. Using them in the upper part of the screens also eliminates the negative effect associated with the use of very high walls. Transparent materials should also be used in places where there is a valuable landscape. Transparent noise barriers provide both access to this landscape and acoustic protection. The disadvantage of this solution is the impact on the mortality of birds which do not see these obstacles on the path of their flight. This can be prevented by using appropriate belts. Glass and acrylic are materials with sound reflecting properties. While using them, one should remember about the influence of the reflected wave on the opposite side of the track. Another disadvantage of the transparent screens is their low resistance to destruction (e.g. by aggregate raised into the air by a passing train) and vandalism. These noise barriers are also more expensive compared to other materials. Their advantage is a small mass, which enables their construction on bridges and viaducts.

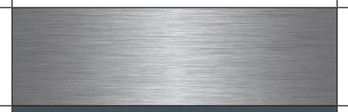
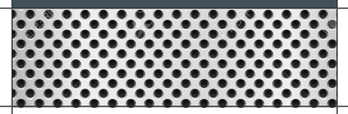
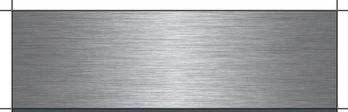
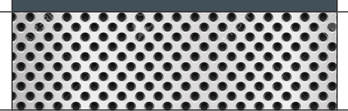
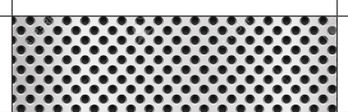
		Network	Estonia	Latvia	Lithuania
SUPPORTING STRUCTURE	Material				
	Color	RAL 7016			
GROUND BEAM	Material				
	Color	RAL 7016			
PANEL	Material				
	Color				
EMERGENCY EXIT	Material 1				
	Color 1	RAL 7016			
	Material 2				
	Color 2				
OCTAGONAL DIFFUSER	Material				
	Color		RAL 5014	RAL 3011	RAL 6011

Materials

F4.5

Absorbing Noise Barrier

In case of aluminium or steel noise barriers, mineral wool or glass fibers are the materials that can be used inside a profile. Such a construction, using a perforated sheet, is characterized by good sound absorption properties. The advantage of this solution is also the fact that acoustic panels of this type are generally available and relatively cheap. Panels made of metal are, however, susceptible to damage and corrosion

		Network	Estonia	Latvia	Lithuania
SUPPORTING STRUCTURE	Material				
	Color	RAL 7016			
GROUND BEAM	Material				
	Color	RAL 7016			
PANEL	Material				
	Color				
EMERGENCY EXIT	Material 1				
	Color 1	RAL 7016			
	Material 2				
	Color 2				
OCTAGONAL DIFFUSER	Material				
	Color		RAL 5014	RAL 3011	RAL 6011

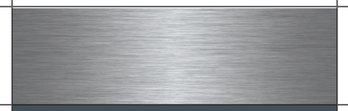
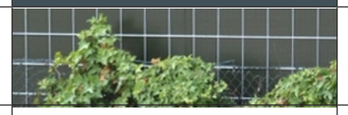
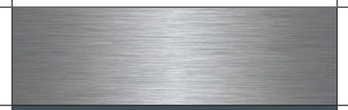
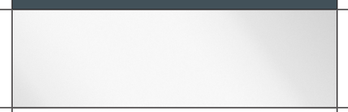
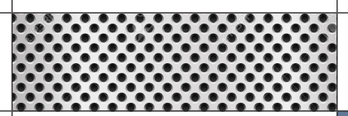
Materials

F4.5

Earth Noise Barrier

In order to reduce the sound passing through the noise barrier, materials which are characterized by increased insulation are used (the heavier they are, the greater the reduction of the passing wave). However, it should be noted that when using acoustic barriers in the environment, this parameter does not have to be as high as in the case of noise barriers used, for example, in production halls. This is due to the significant share of direct and bent sounds at the edges of the screens, the levels of which are higher than the sounds passing through the screen.

Earth barriers are a very interesting solution in the case of the construction of a new railway line and problems with surplus earth. It can be used to fill noise barriers or form berm walls, which are also one of the types of acoustic barriers. These devices adapt very well to the local topography of the area and fit well the landscape. Some systems enable to use of noise barriers without the need for foundation construction. The big advantage of such a solution is a quick disassembly and reassembly of the device. They can easily be overgrown with vegetation, which is an additional aesthetic value. They also have sound absorption properties and good sound insulation.

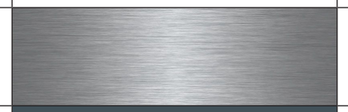
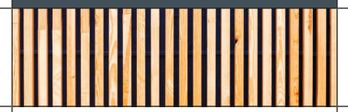
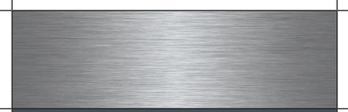
		Network	Estonia	Latvia	Lithuania
SUPPORTING STRUCTURE	Material				
	Color	RAL 7016			
FILLING	Material				
	Color				
EMERGENCY EXIT	Material 1				
	Color 1	RAL 7016			
	Material 2				
	Color 2				
OCTAGONAL DIFFUSER	Material				
	Color		RAL 5014	RAL 3011	RAL 6011

Materials

F4.5

Wooden Noise Barrier

Wooden materials were among the first used in noise barriers. They have the advantage of being relatively cheap and easy to use as well as very flexible, so they can be modified on site. Their disadvantage is that they do not have a long lifespan and are susceptible to fire. These devices should be used in those places where there is no immediate fire hazard. In terms of aesthetics, wooden barriers look very good especially in suburban areas (loosely built-up areas) and rural areas. It is important to avoid breaks in the construction of screens, which can seriously reduce the insulation of these devices.

		Network	Estonia	Latvia	Lithuania
SUPPORTING STRUCTURE	Material				
	Color	RAL 7016			
GROUND BEAM	Material				
	Color	RAL 7016			
PANEL	Material				
	Color				
EMERGENCY EXIT	Material 1				
	Color 1	RAL 7016			
	Material 2				
	Color 2				
OCTAGONAL DIFFUSER	Material				
	Color		RAL 5014	RAL 3011	RAL 6011

Branding Implementation

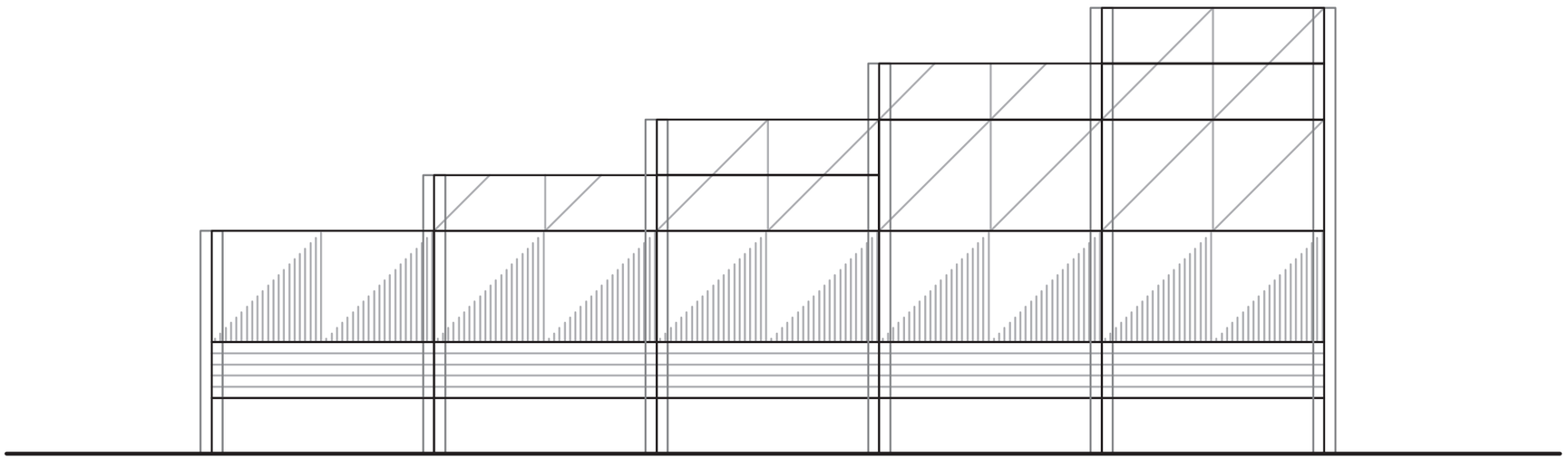
F4.5

Schemes

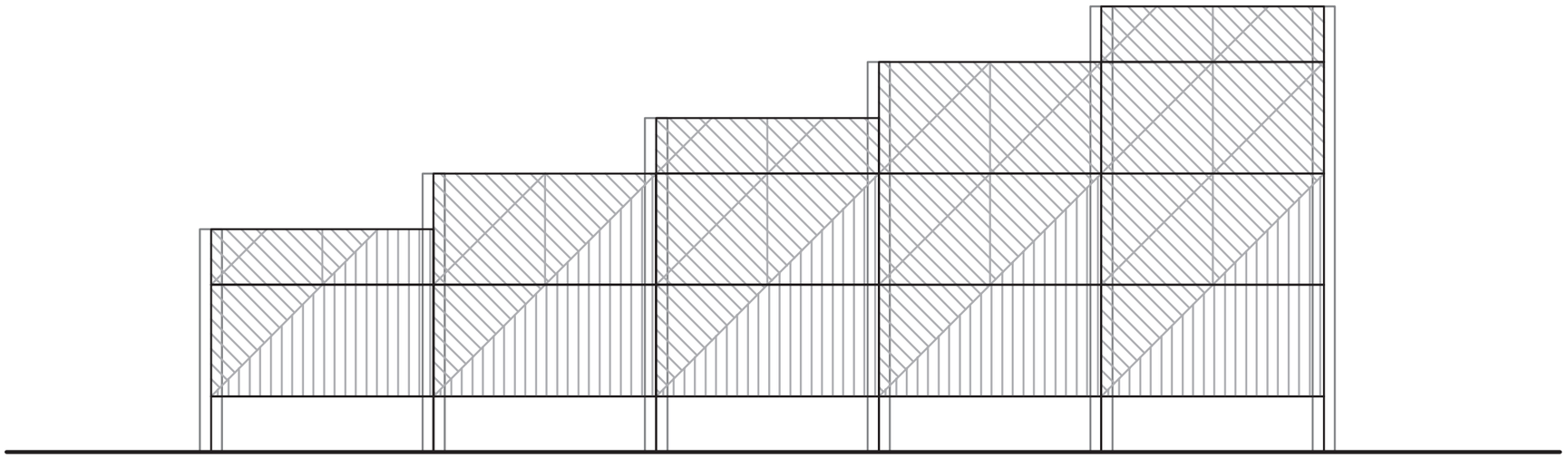
The network identity is defined by the use of Rail Baltica patterns on acoustic screens and emergency exits. The figures show how they should be implemented both on transparent and wooden noise barriers.

An additional benefit of using this solution in transparent noise barriers is protection against bird mortality that does not recognize transparent acoustic panels.

Transparent noise barrier



Wooden noise barrier



Branding Implementation

F4.6

Transparent Noise Barrier

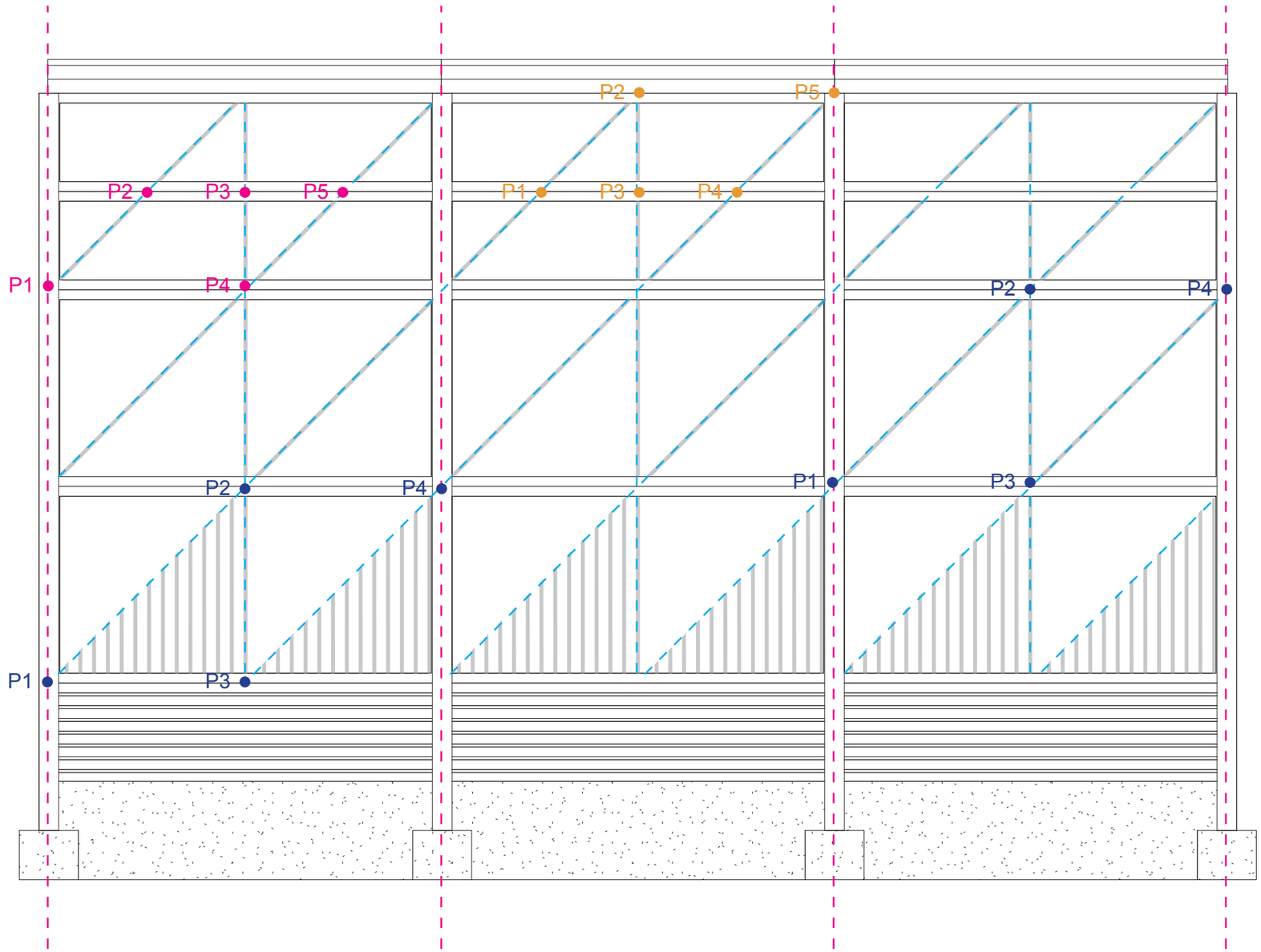
The pattern used to assign identity to the Rail Baltica Network elements are lines that define Right Triangles.

In the panels with the heights of 1.00 meter will be placed 2 right triangles with the hypotenuse align to 45°.
Geometry is defined by the blue points (P1-P2-P3-P4).

In the panels with the heights of 0.50 meters the same pattern used for the 1 meter panel will be applied on 2 modules.
Geometry is defined by the magenta points (P1-P2-P3-P4-P5) in the lower modules and by the orange points (P1-P2-P3-P4-P5) in the upper modules.

The silk-screen printing will be of two type:

- on the lower row panels must have vertical lines defining the right triangle, as shown in the side image .
- on all the others row panels must have lines joining the control points.



Branding Implementation

F4.6

Wooden Noise Barrier

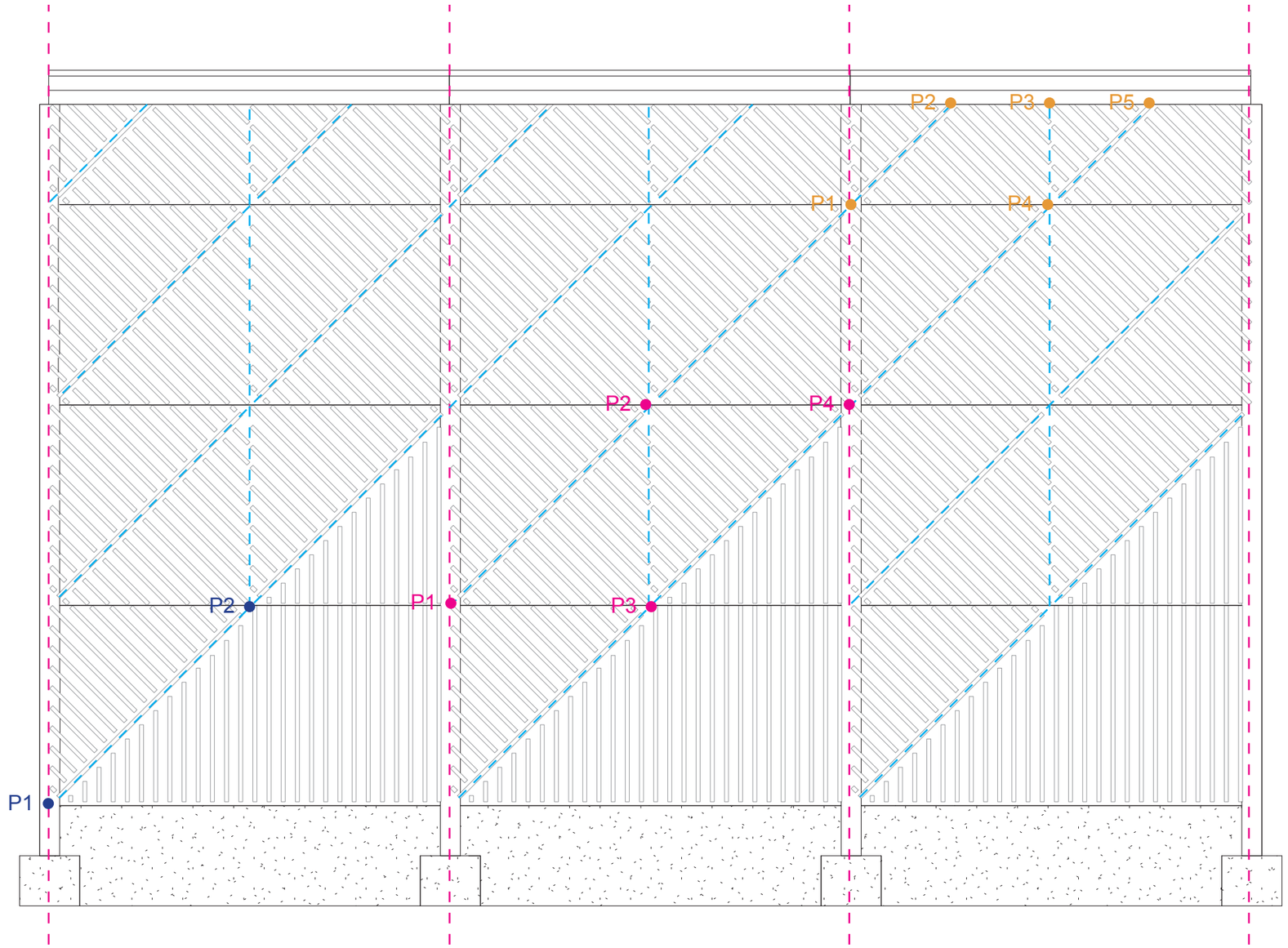
The pattern used to assign identity to the Rail Baltica Network elements are lines that define Right Triangles.

For the wooden noise barrier the pattern starts with a 2 meters height right triangle that covers first two rows panels of 1.00 meter height.
On the others rows the modulation will be adapted on 1.00 meter height panels.

On all the diagonal lines between two control points (blue, magenta or orange) must be placed a wooden plate. On all the vertical lines between control points wooden plates must be interrupted.

Other wooden plates must be placed perpendicular to the wooden plates placed on the diagonal lines between control points.
The wooden plates under the line between the blue control point P1 and the magenta control point P4 must be vertical oriented.

For the 0,50 meters height modules the same rules must be followed referring to the orange control points.



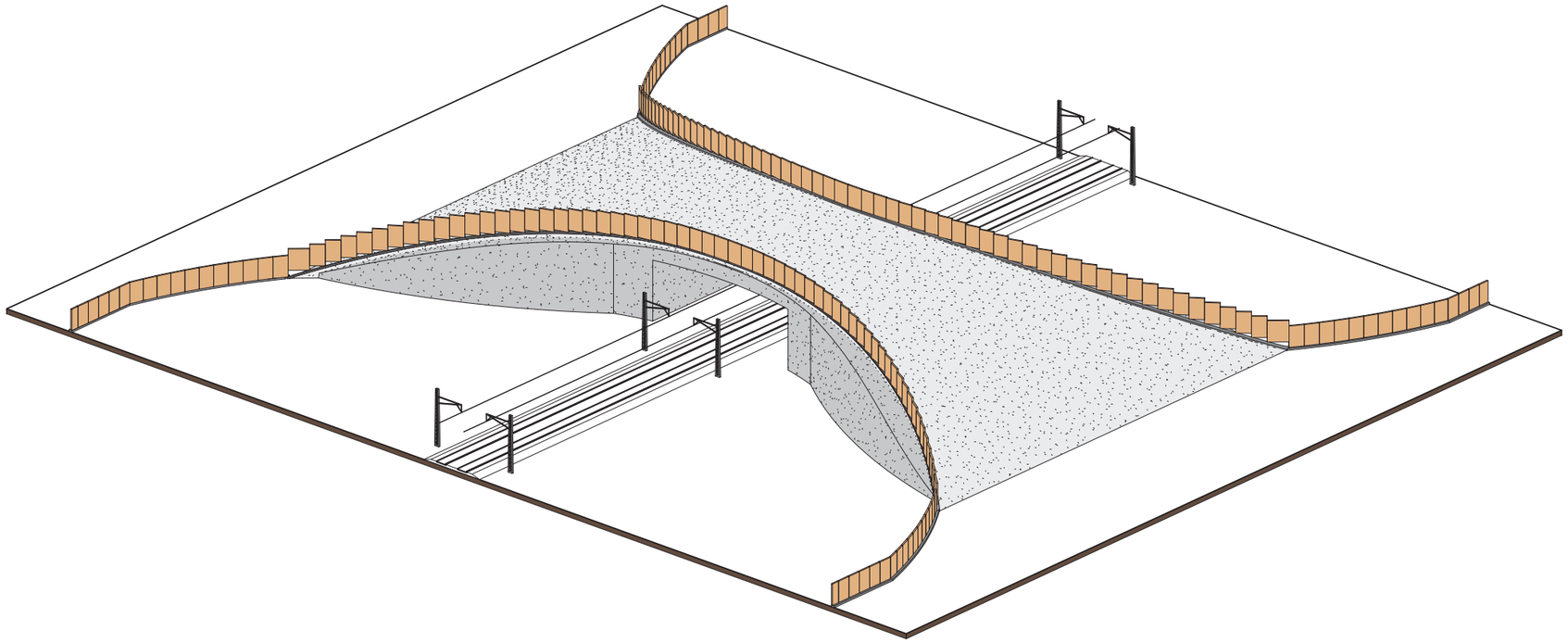
Animal Passage

F5

Matrix

F5.1

Identity Matrix



Material

Geometry

Modularity

Color

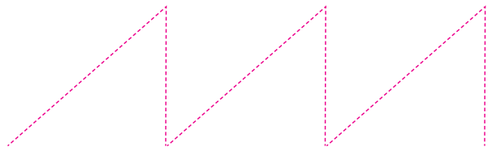
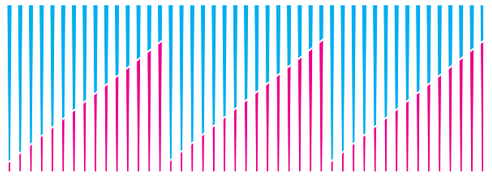
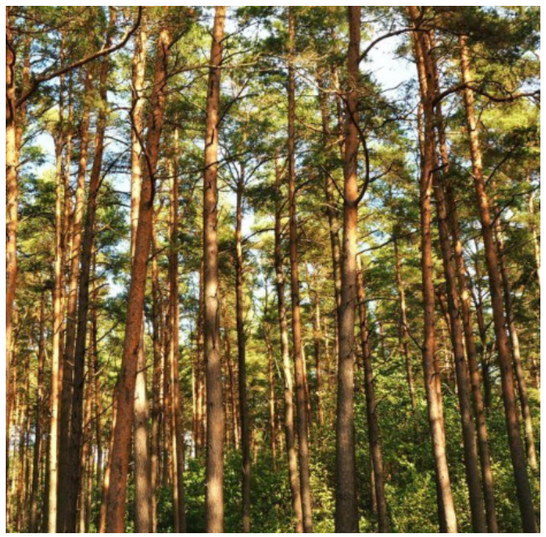
Vegetation

	N	C	R
Animal Passage			

Concept Design

F5.2

The concepts behind the Animal Passages design come from natural forests of Baltic countries and the shapes of coniferous trees.

Reference	Shapes	Design
		
		

Pictures
From above:
Image 1 - *Credits: timberindustrynews.com*
Image 2 - *Credits: Angela Cottingham*

Design Strategy

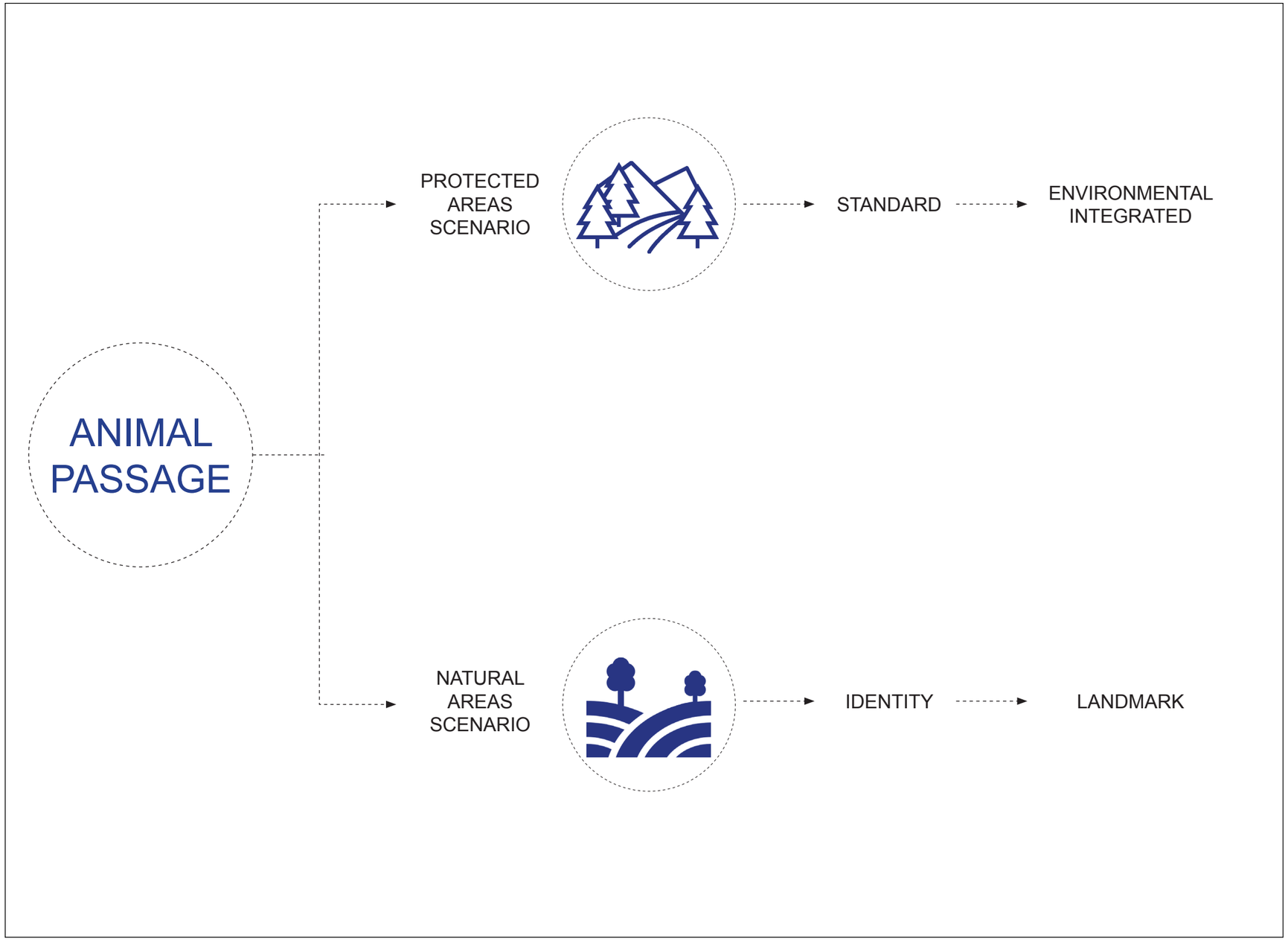
F5.3

The Animal passages will be located along the entire Rail Baltica line where animal migratory routes will be identified.
Animal migratory routes pass through non-urbanized areas mainly in natural landscape, this crossing different types of scenarios.

Within or in the vicinity of protected areas or places with important landscape status appropriate less expressive solutions should be introduced.
These different surroundings give the need to place different versions of external appearance of animal passages along the line, adapting to the context but respecting and preserving the identity of the Rail Baltica network. Only such an approach ensures implementation of Rail Baltica idea – specific identity of objects respecting the environment and the landscape.

Two different levels of identity were then defined:
- Environmental integrated
- Landmark

For each of these levels an animal passage type has been assigned, respectively:
- Standard type
- Identity type

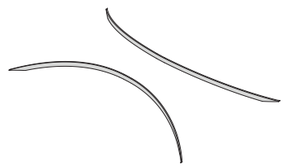
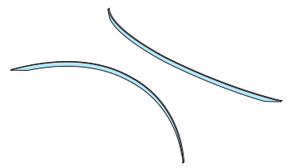
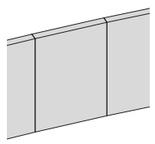
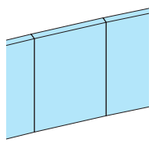
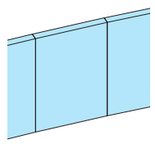
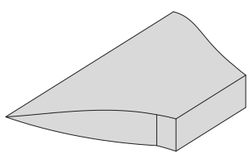
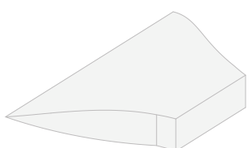
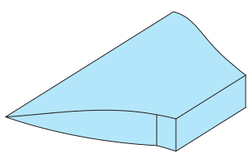
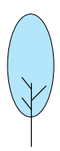
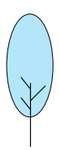


Design Strategy

F5.3

The Standard Type Animal Passage (STAP) is a passage without specific design assigned presented in used materials natural colours. Fences will be overgrown by vegetation.
Vegetation should be composed of array of local species adapted to local habitat conditions. Set of species should be as similar as possible to surrounding vegetation of precise animal passage location.

The Identity Type Animal Passage (ITAP) is a passage with the network colour applied on the abutments and cladding. Fences will be in wood. Planted vegetation should consists of local species which fit to neighbour habitat.

ELEMENTS	STAP	ITAP
CLADDING 		
FENCE 		
ABUTMENT 		
VEGETATION 		

Design Strategy

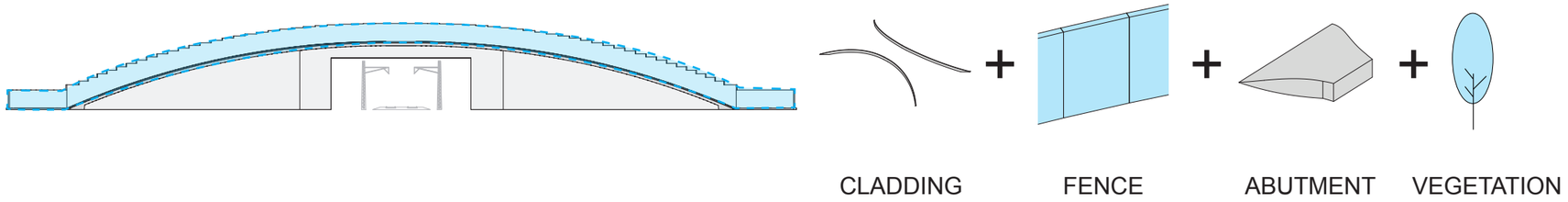
F5.3

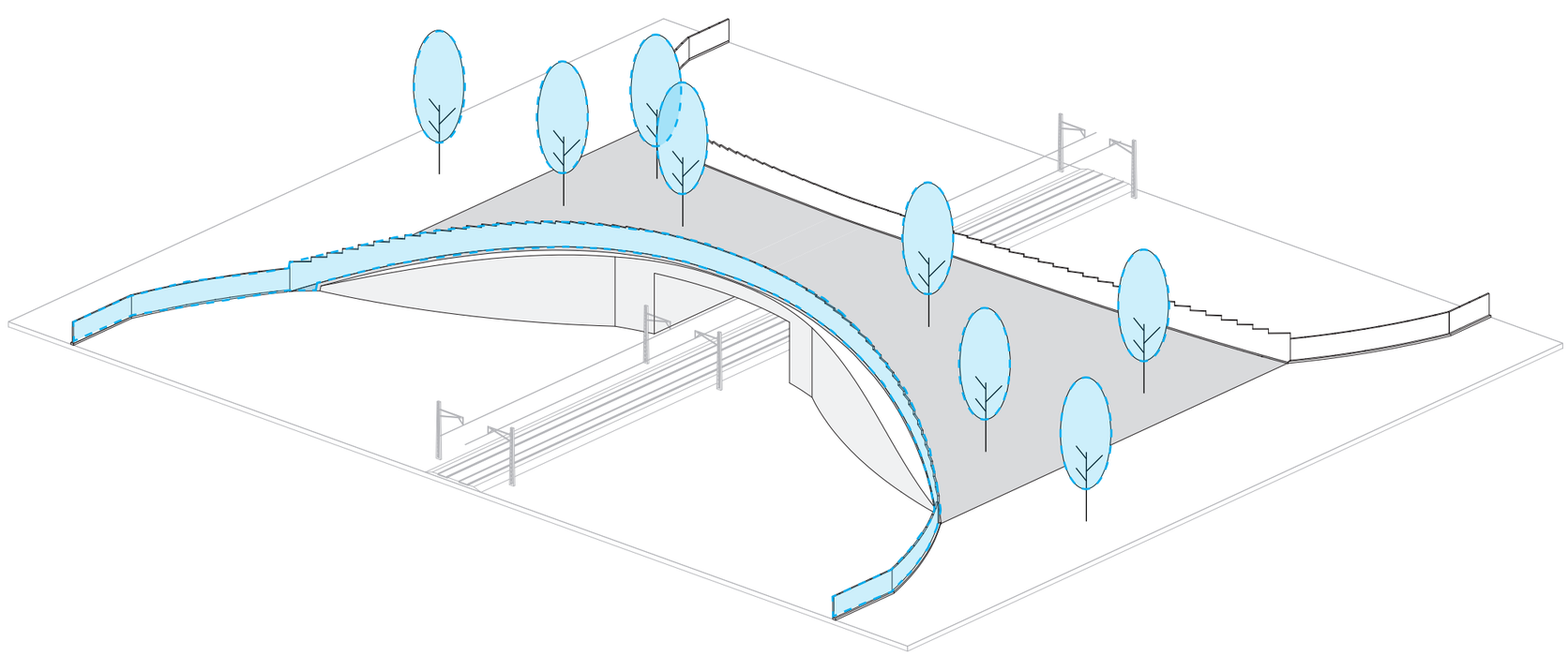
Standard Type Animal Passage (STAP)

The Standards Type Animal Passages will be placed within or in the vicinity of protected areas – places with important landscape status where appropriate less expressive solutions should be introduced. Where it must be visible an recognisable but due to location in precious nature or landscape areas can't play dominant role in landscape.

Fences will be covered with the appropriate layers of vegetation in order to be safe for people and for animals.

As protected areas should be treated all precious grounds protected within Natura 2000 sites, National and Landscape Parks, Reserves etc.





Note

Were needed, fences for standard type of animal passages can be replaced with earth noise barriers, ensuring better acoustic comfort in the surroundings. For earth noise barriers design strategy, please refer to Book F - Chapter F4.

Design Strategy

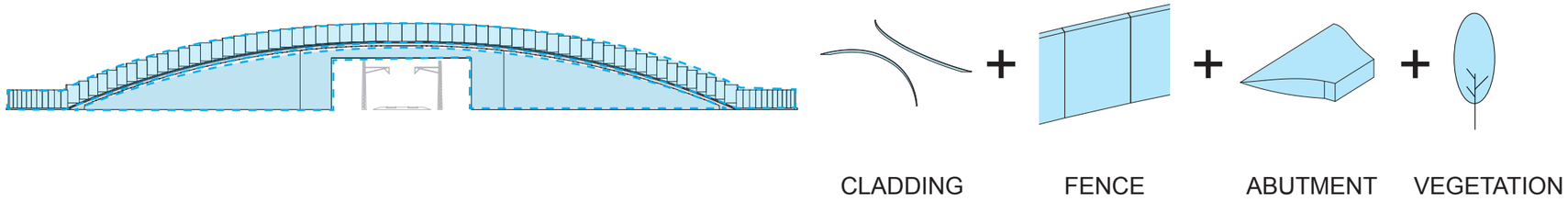
F5.3

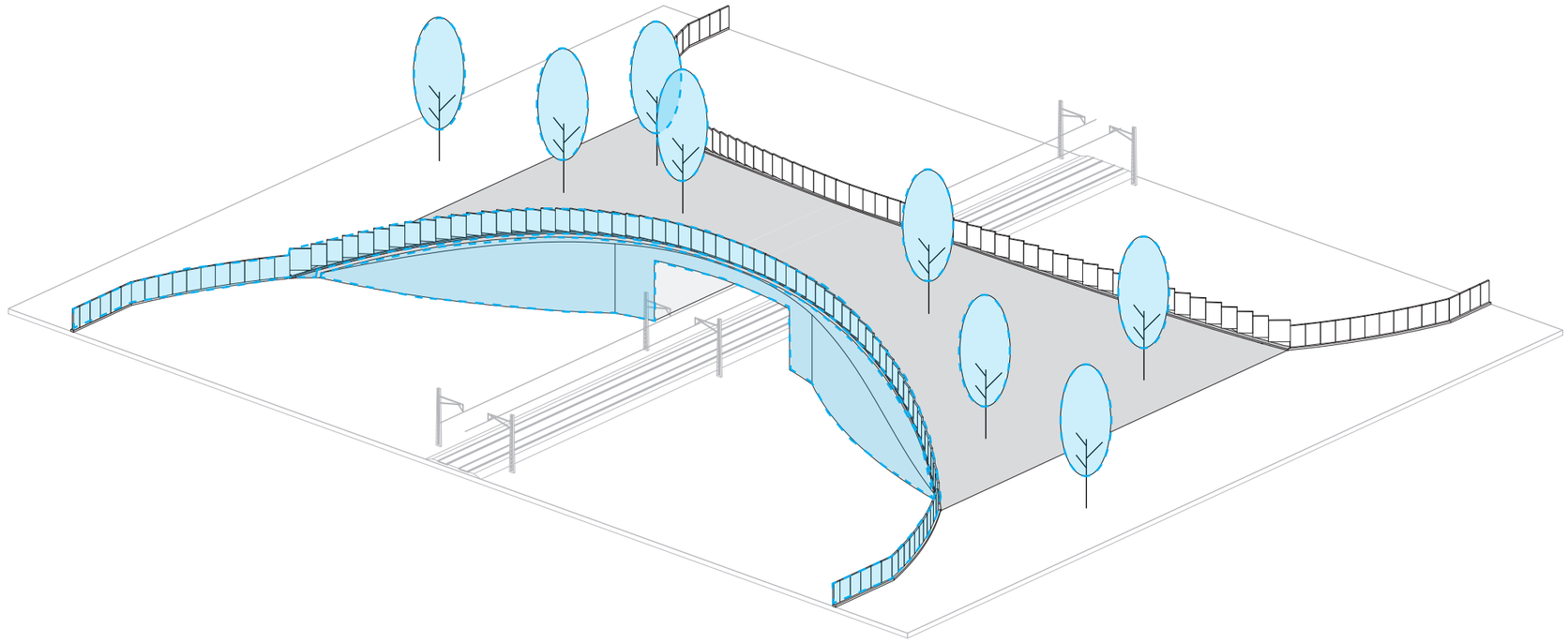
Identity Type Animal Passage (ITAP)

The Identity Type Animal Passage is the most recognizable passage and must be placed in visible locations along natural areas.

The network color should be visible on the cladding and on the abutments.

Fences will be in wood in order to assign identity but still be environment integrated.





Note

Were needed, fences for identity type of animal passages can be replaced with wooden noise barriers, ensuring better acoustic comfort in the surroundings. For wooden noise barriers design strategy, please refer to Book F - Chapter F4.

Geometry

F5.4

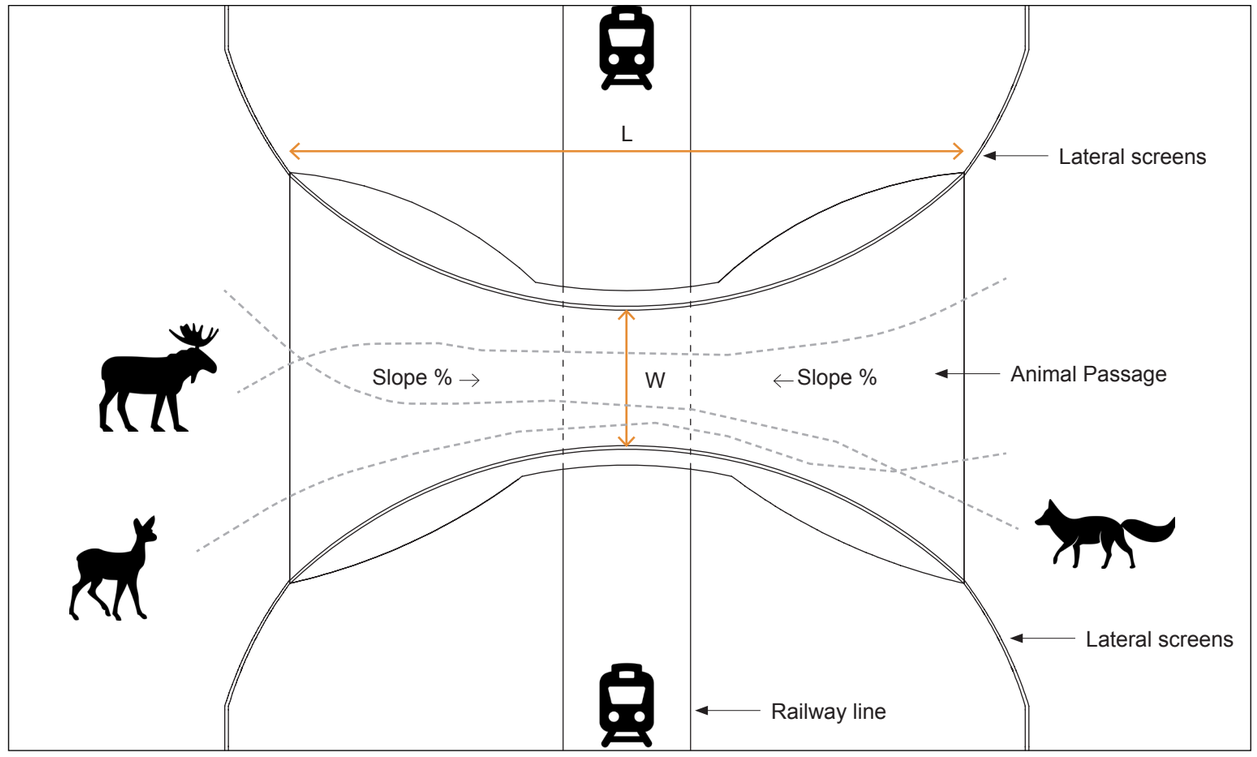
Overview

Animal passages should be adapted to the local environment, linked up surrounding nature and be designed according to specific requirements of the target animal species.

Dimensions of wildlife passages:

- Minimum width: 20 m and width/length ratio greater than 0.8 (if the aim is only to provide a movement corridor for not very sensitive species such as roe deer or where the topography has a channelling effect leading the animals directly onto the crossing)
- Recommended width for overpass is 40-50 m and width/length ratio greater than 0.8
- Recommended width for landscape bridges is > 80 m
- Lateral screen height: 2.2 m (to moose movement recommended height should be 2.6 – 2.8 m).
- Minimum topsoil depth for herbaceous plantations: 0.3 m; for shrub plantations: 0.6 m; for trees 1.5 m
- The angle of expansion of the passage surface and run-off areas ≤15%

Local SEA/EIA requirements shall be mandatory.



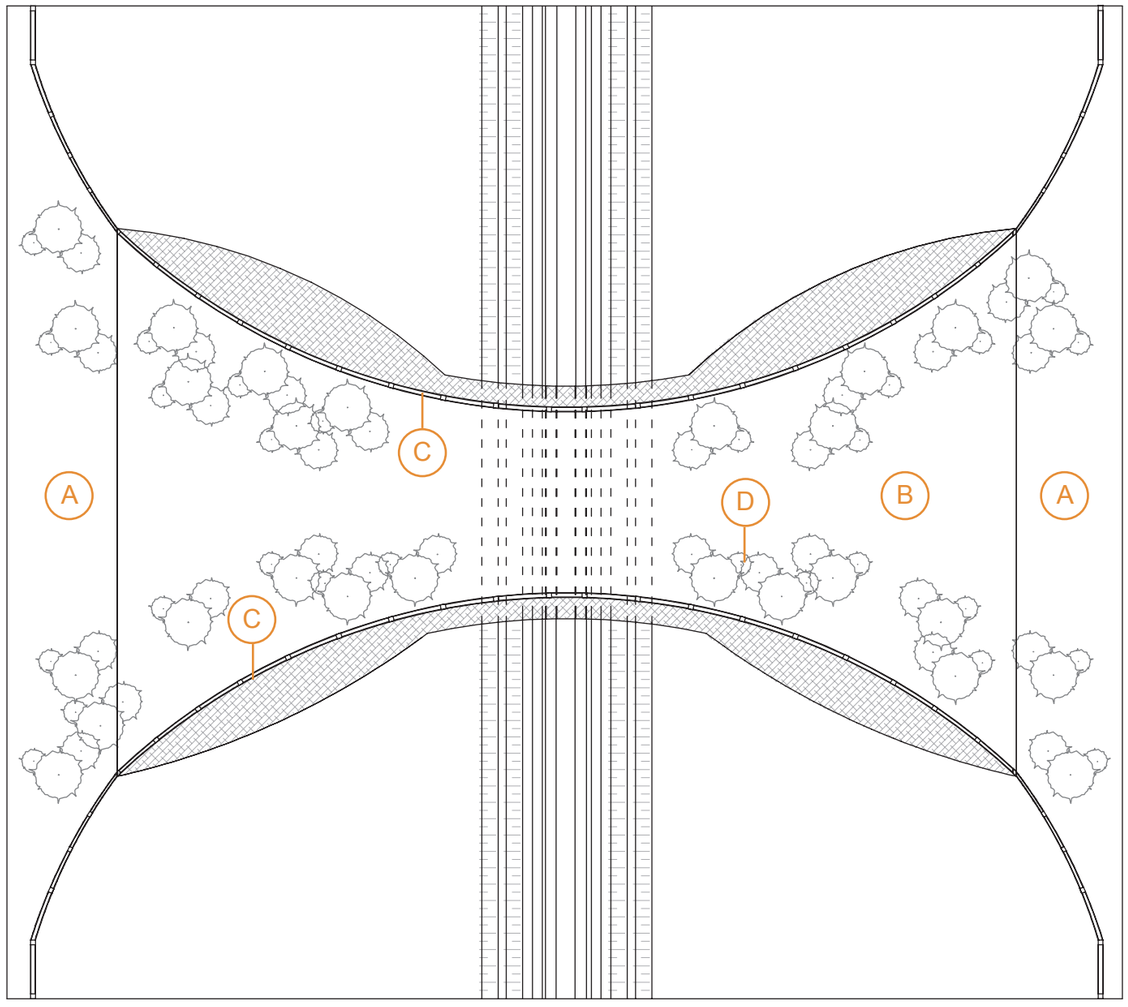
Legend

W = min 20 m, recommended 40-50 m
W / L ratio > 0.8
Lateral screen height= 2.2 m, 2.6-2.8 m for moose
Slope ≤15%

Geometry

F5.4

Overview



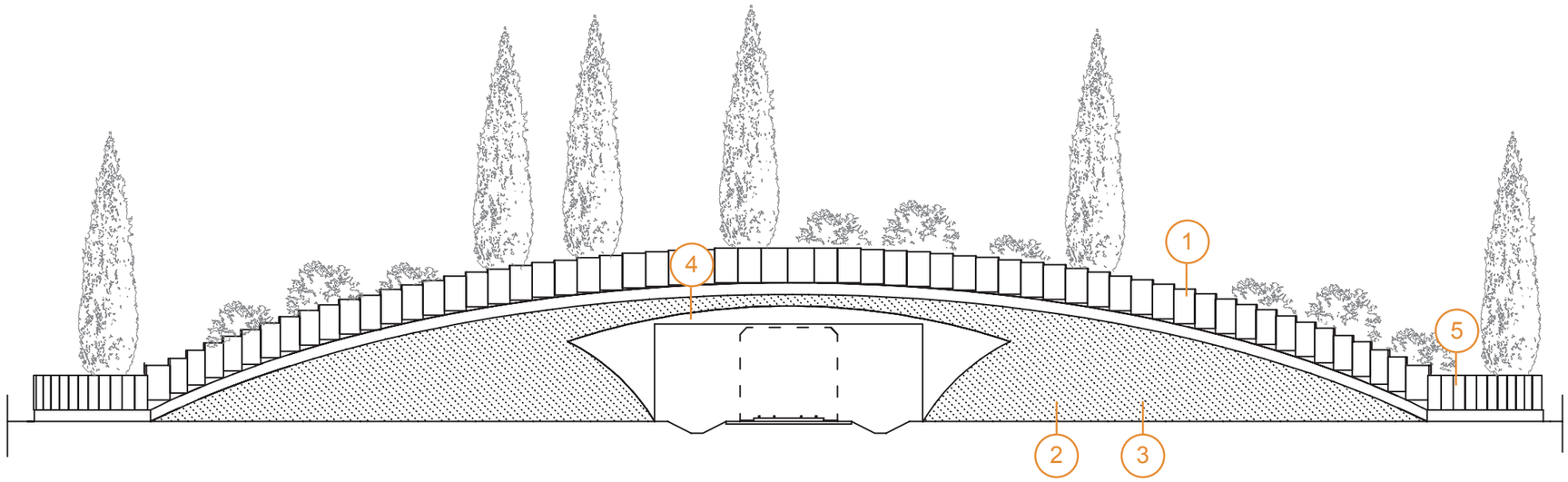
Legend

A - embankments - earth embankments connecting the crossing surface with the surroundings
B - passage surface - the area within the range of the overpass structure intended (and accessible) for animal movement
C - variant 1: anti-glare screen - vertical structure (usually in the form of fences/ wooden fences) limiting the level of artificial lighting (from vehicle traffic) on the passage surface
- variant 2: noise barrier - vertical construction limiting the level of noise intensity and artificial lighting (from vehicle traffic) on the passage surface
D - protective and guiding vegetation - plants to insulate the passage surface from traffic emissions to protect the structural elements of the passage surface and to encourage animals to penetrate the area and its surroundings.

Geometry

F5.4

Overview



Legend

1. Fence (timber or earth noise barrier) covering the entire surface of the passage min. height: 2.2 m (to moose movement recommended height should be 2.6 – 2.8 m).
2. Reinforcement of embankment slopes with the use of geosynthetics
3. Excavation slope
4. Exemplary shape of the structure of the passage
5. Protective fences passage min. height: 2.2 m (to moose movement recommended height should be 2.6 – 2.8 m).

Geometry

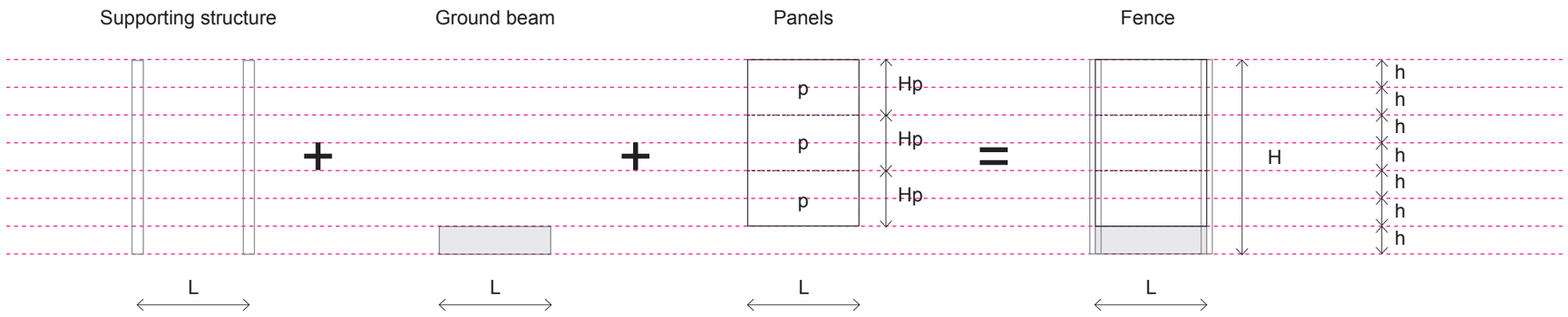
F5.4

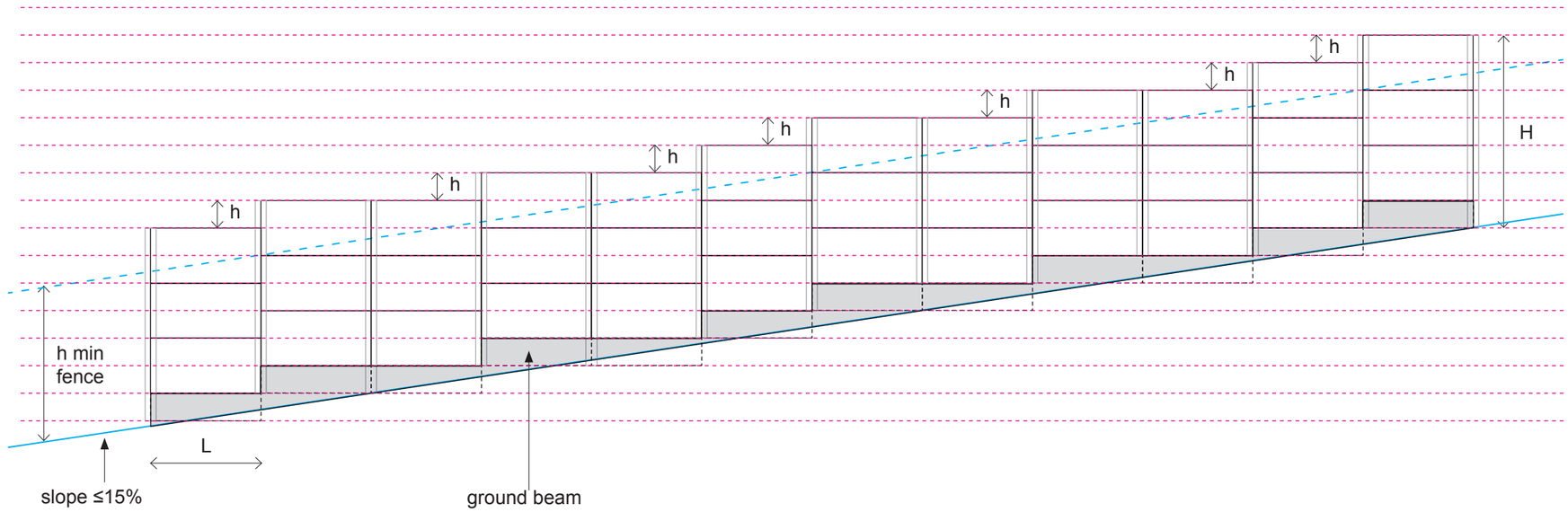
Composition - Fence

Fences are composed by structure, ground beam and panels.

For the wooden fences the composition on sloped surfaces should follow scheme as shown in the figure. The height difference between one fence and another should be always modular.

The height of the ground beam should be studied according to the slope to allow a modular composition of the above panels.





Legend

L = fence length, standard 2m
H = fence height = n*Hp + h ground beam
p = panel
Hp = panel height = n*h, standard 1m
h = module standard, height = 0,5m

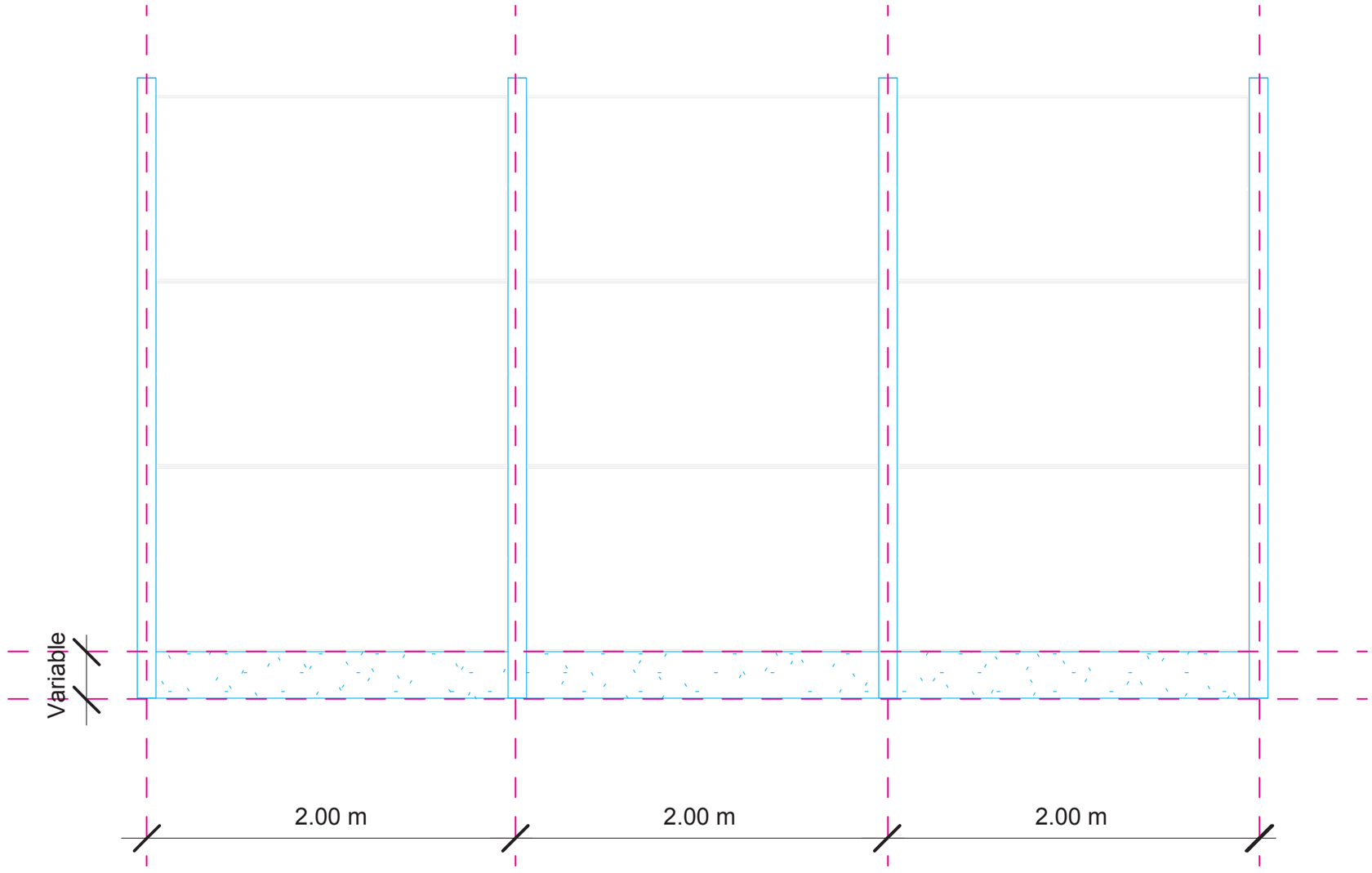
Geometry

F5.4

Structure

The structure of the panels should be placed every two meters and must be hide on the front side by the panels.

The ground beam height can be variable, according to the slope. The height should be studied according to the slope to allow a modular composition of the above panels.

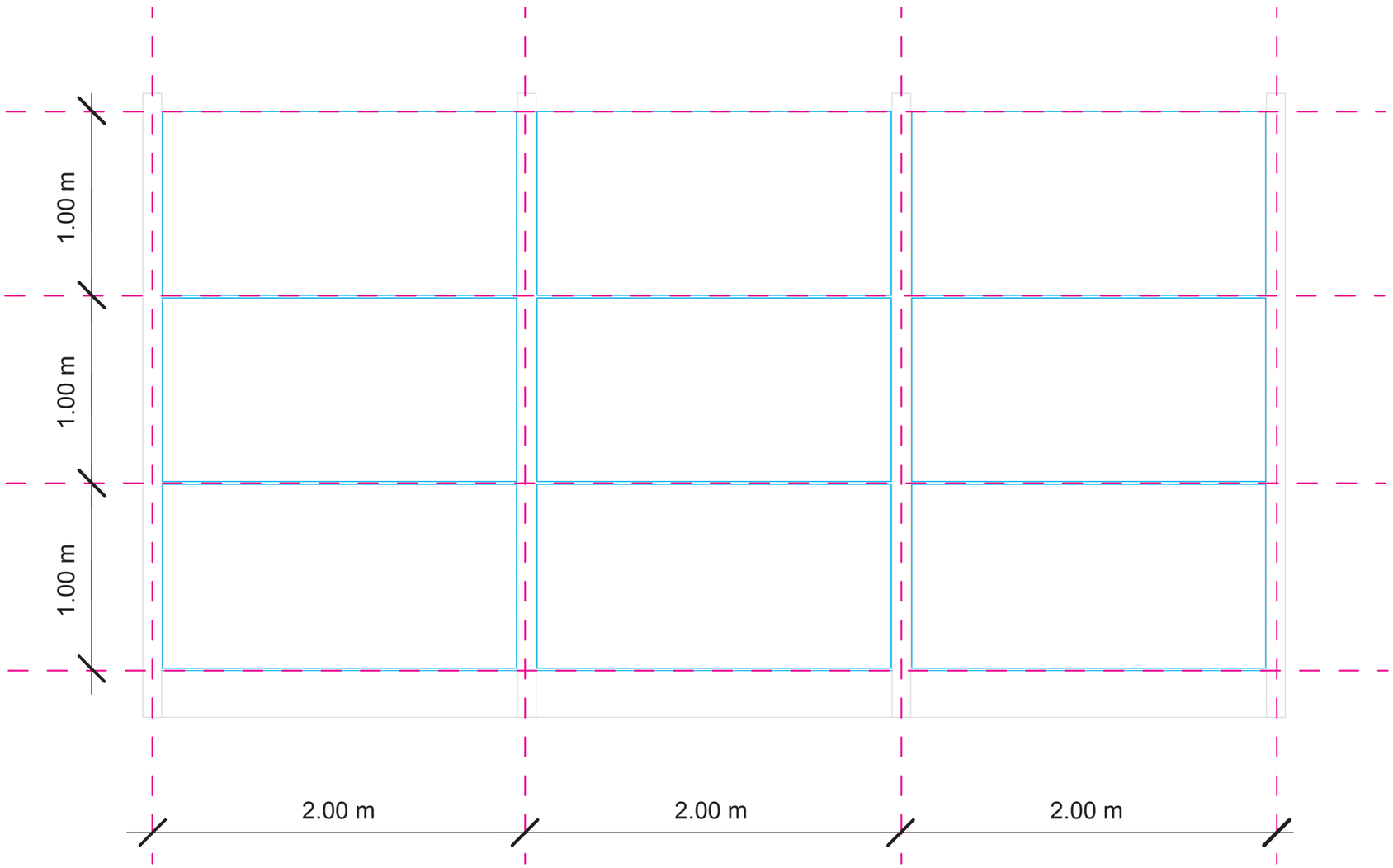


Geometry

F5.4

Panels

Wooden panels height should be 1 meter, the panels must be continuous, covering the structure from the front side.



Materials

F5.5

Standard Type

The Rail Baltica Standard Animal Passages are a composition of three visual elements:

Abutment: cast in place concrete.

Cladding: cast in place concrete.

Fence: panels covered with vegetation

The elements are used in their material's natural colours.

		Network	Estonia	Latvia	Lithuania
ABUTMENT	Material				
	Color				
CLADDING	Material				
	Color				
FENCE	Material				
	Color				

Materials

F5.5

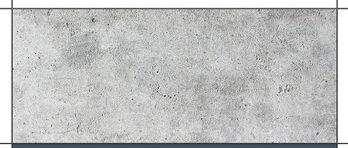
Identity Type

Identity type Animal Passages are a composition of three visual elements:

Abutment: pigmented concrete or painted concrete, using the network color.

Cladding: pigmented concrete or painted concrete, using the network color.

Fence: timber panels with eventually the external part painted or metal covered with country colour

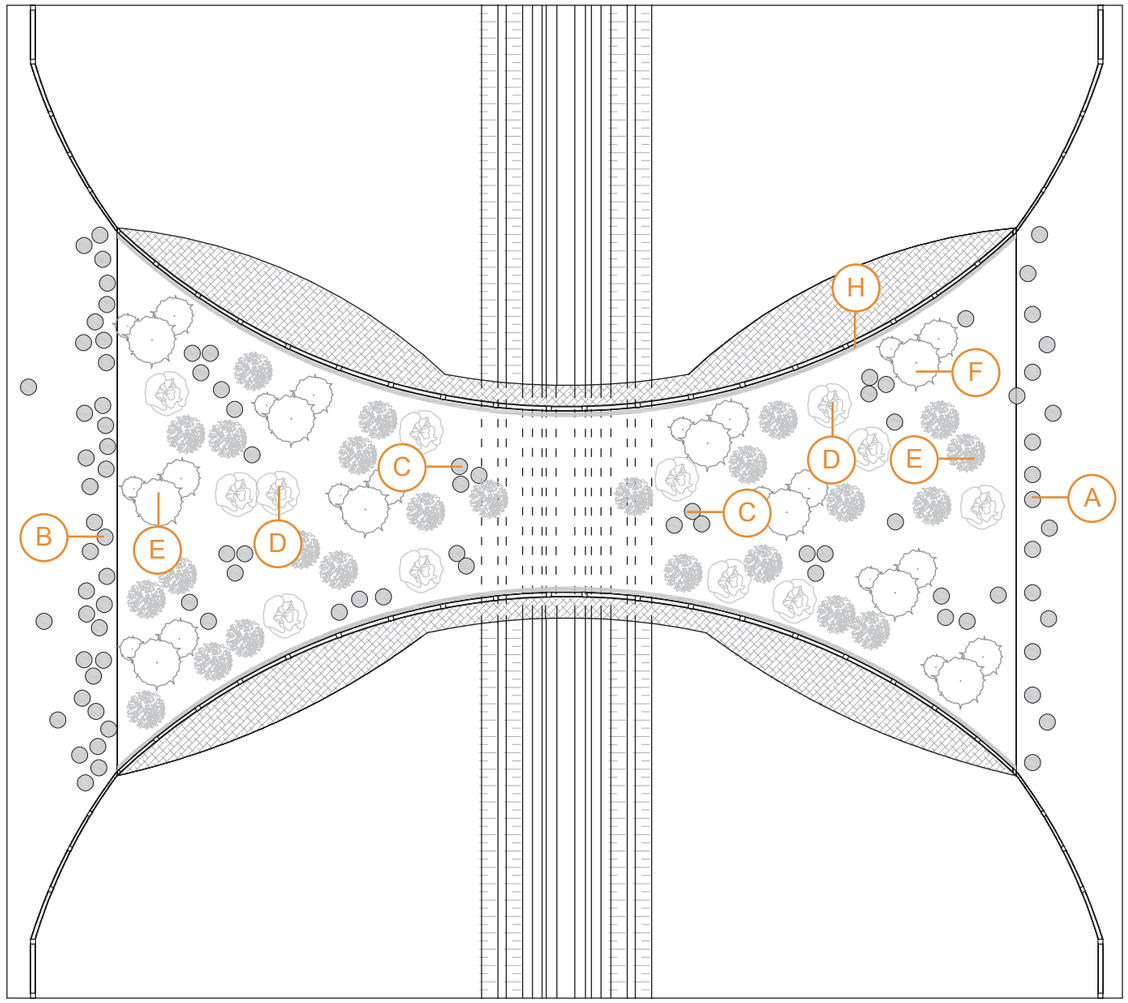
		Network	Estonia	Latvia	Lithuania
ABUTMENT	Material				
	Color	RAL 7016			
CLADDING	Material				
	Color	RAL 7016			
FENCE	Material				
	Color		RAL 5014	RAL 3011	RAL 6011

Vegetation

F5.5

Overview

According to the regional identity, vegetation used to encourage animals to use animal passages should be composed of array of local species adapted to local habitat conditions. Set of species should be as similar as possible to surrounding vegetation of precise animal passage location.



Legend

A. boulders to prevent crossing - single-row system
B. boulders to prevent crossing - multi-row system
C. small clusters of borders with habitat-forming functions
D. tree roots, piles of branches, dead logs
E. deciduous shrubs
F. thorny bushes
G. track
H. narrow strips exclusively covered with grass or a mixture of grasses and flowering plants

Branding Implementation

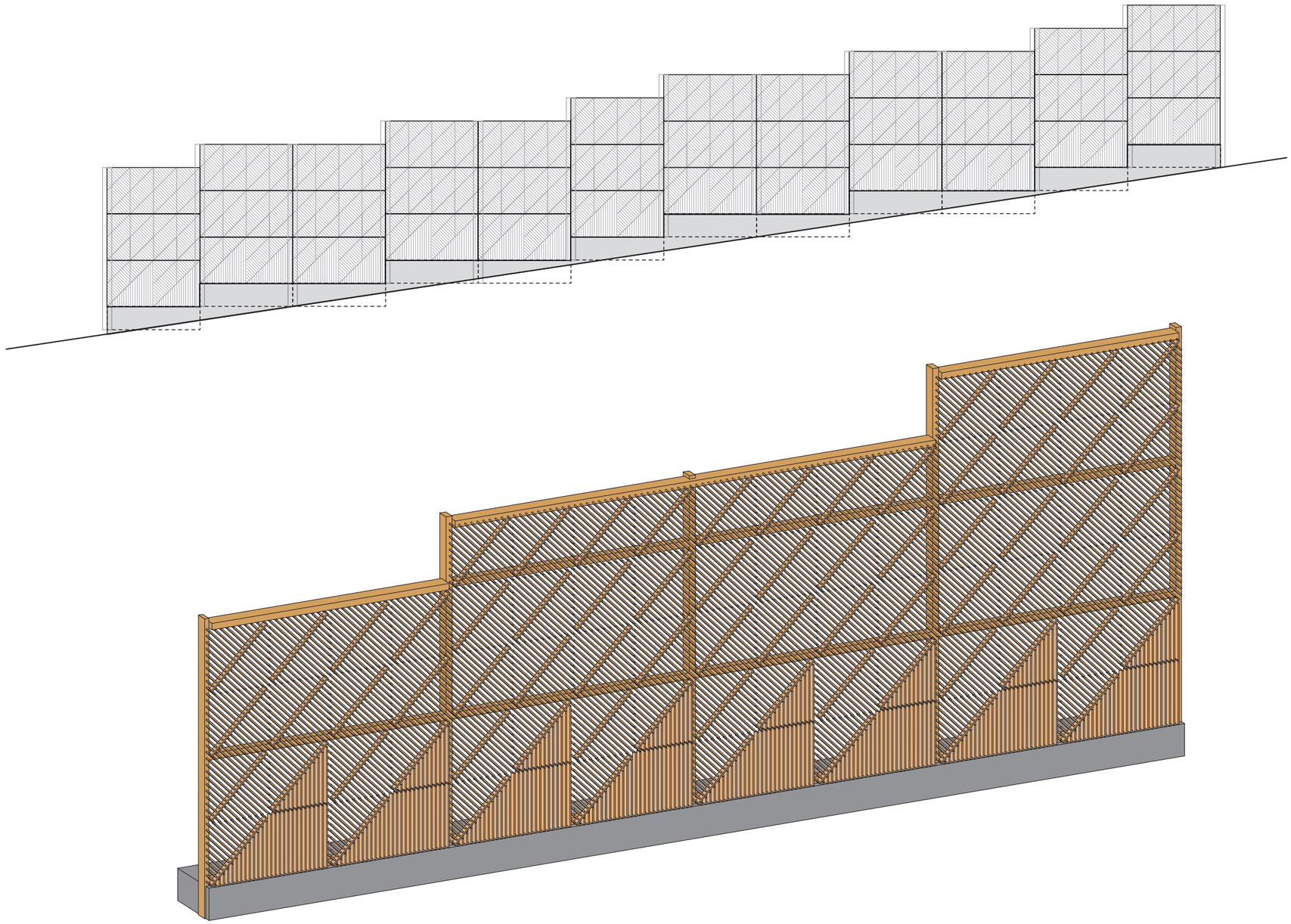
F5.6

Wooden Fences - Scheme

The network identity is defined by the use of Rail Baltica patterns on the wooden fences. The figures show how they should be implemented.

The juxtaposition of modular elements allows for a continuous design, also in the case of sloping elements.

If the use of noise barriers instead of fences is required, please refer to dedicated chapter for branding implementation.



Branding Implementation

F5.6

Wooden Fences

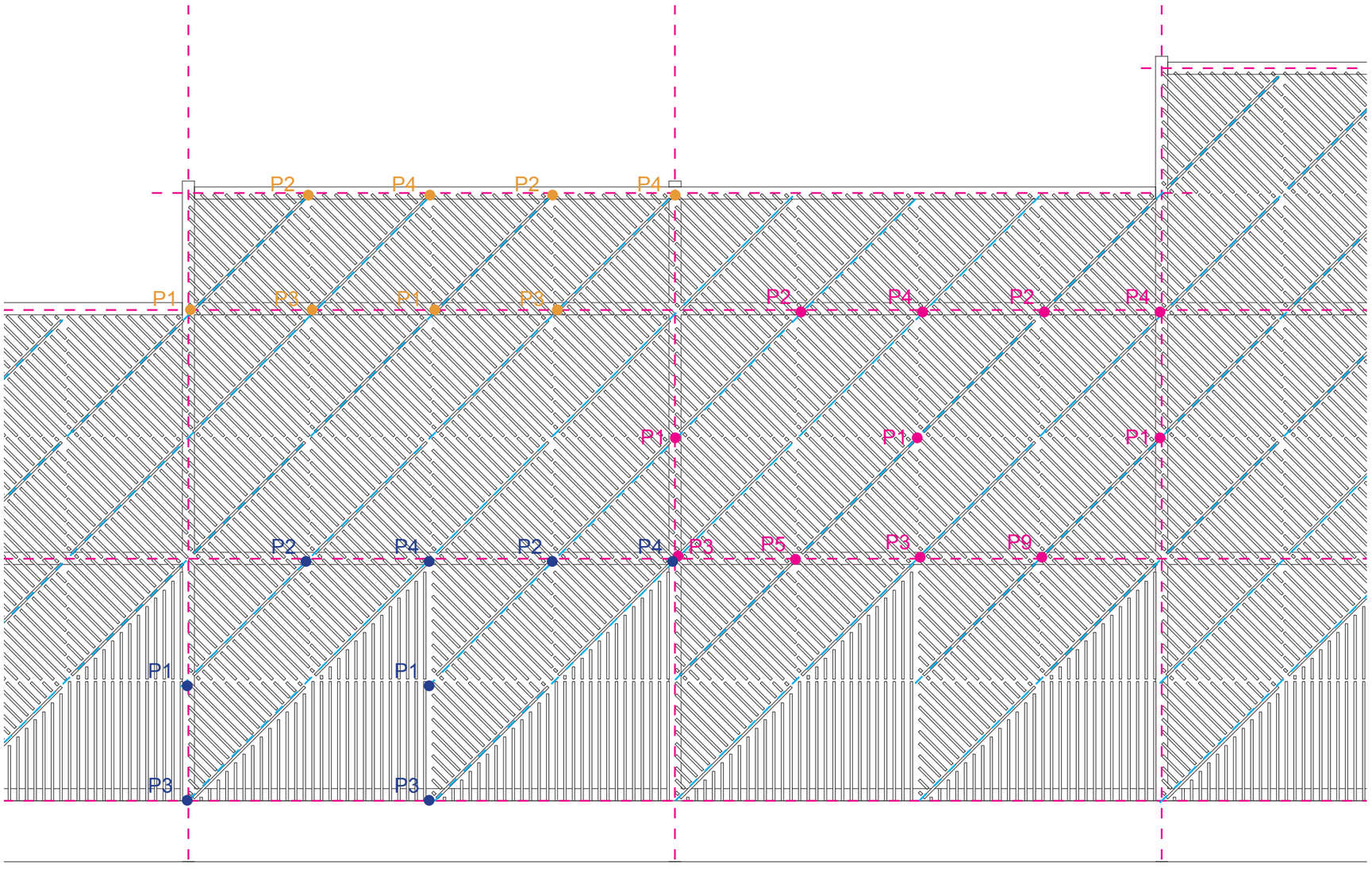
The pattern used to assign identity to the Rail Baltica Network elements are lines that define Right Triangles.

For the wooden fences the pattern starts with a 1 meters height right triangle that covers lower row panels of 1.00 meter height.
On the others rows the modulation will be adapted on 0.5 meters.

On all the diagonal lines between two control points (blue, magenta or orange) shall be placed a wooden plate. On all the vertical lines between control points wooden plates must be interrupted.

Other wooden plates shall be placed perpendicular to the wooden plates placed on the diagonal lines between control points.
The wooden plates under the line between the blue control points P3-P4 must be vertical oriented.

For the 0,50 meters height modules the same rules shall be followed referring to the orange control points.



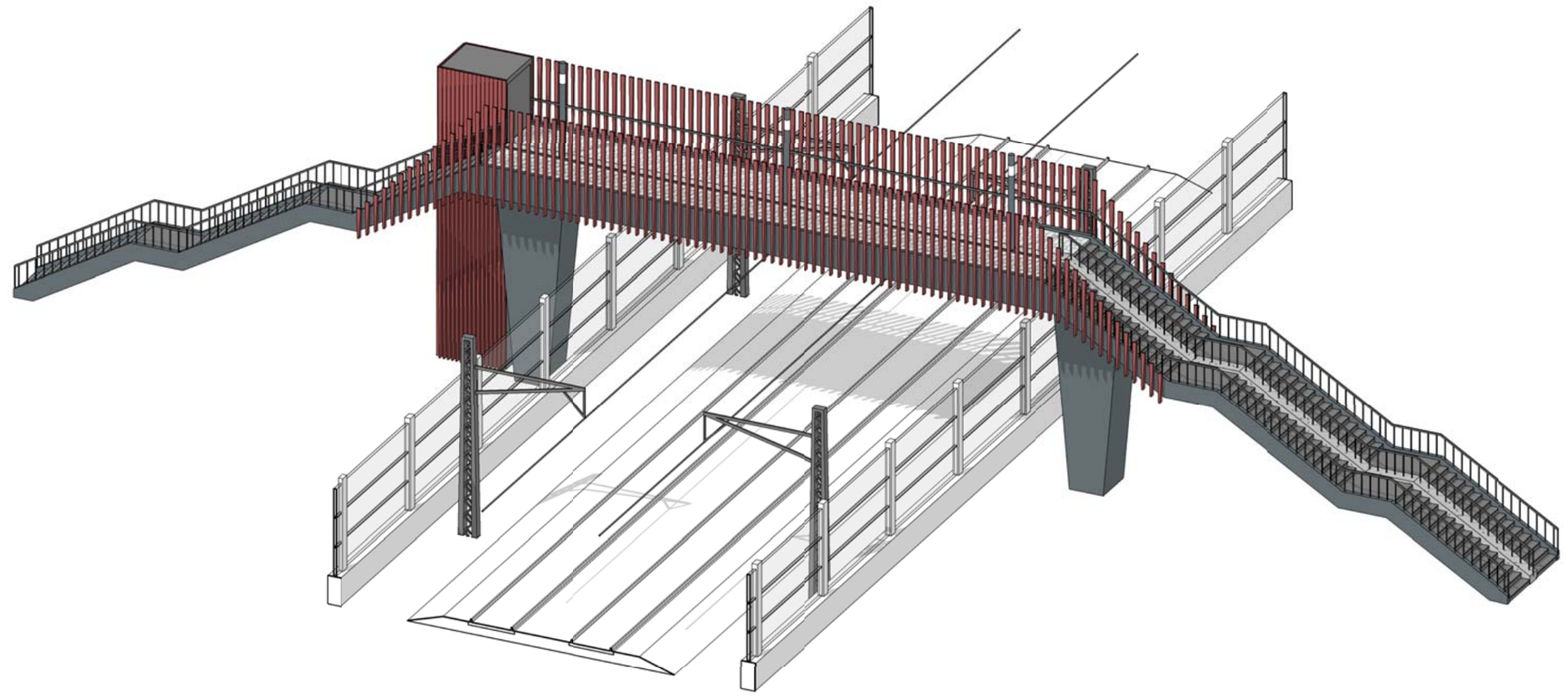
Pedestrian Overpass

F6

Matrix

F6.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

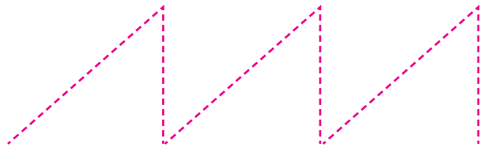
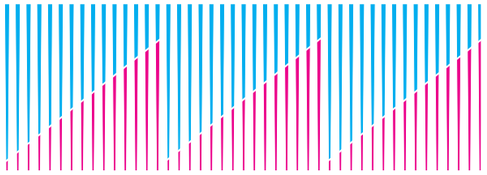
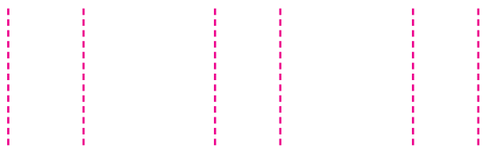
	N	C	R
Pedestrian Overpass			

Concept Design

F6.2

The concepts behind the pedestrian overpass design come from:

- The shapes of the traditional roofs
- The modularity of repeated elements

Reference	Shapes	Design
		
		

Pictures
From above:
Image 1 - *Credits: SBS Engineering*
Image 2 - *Credits: Wake and Wander*

Design Strategy

F6.3

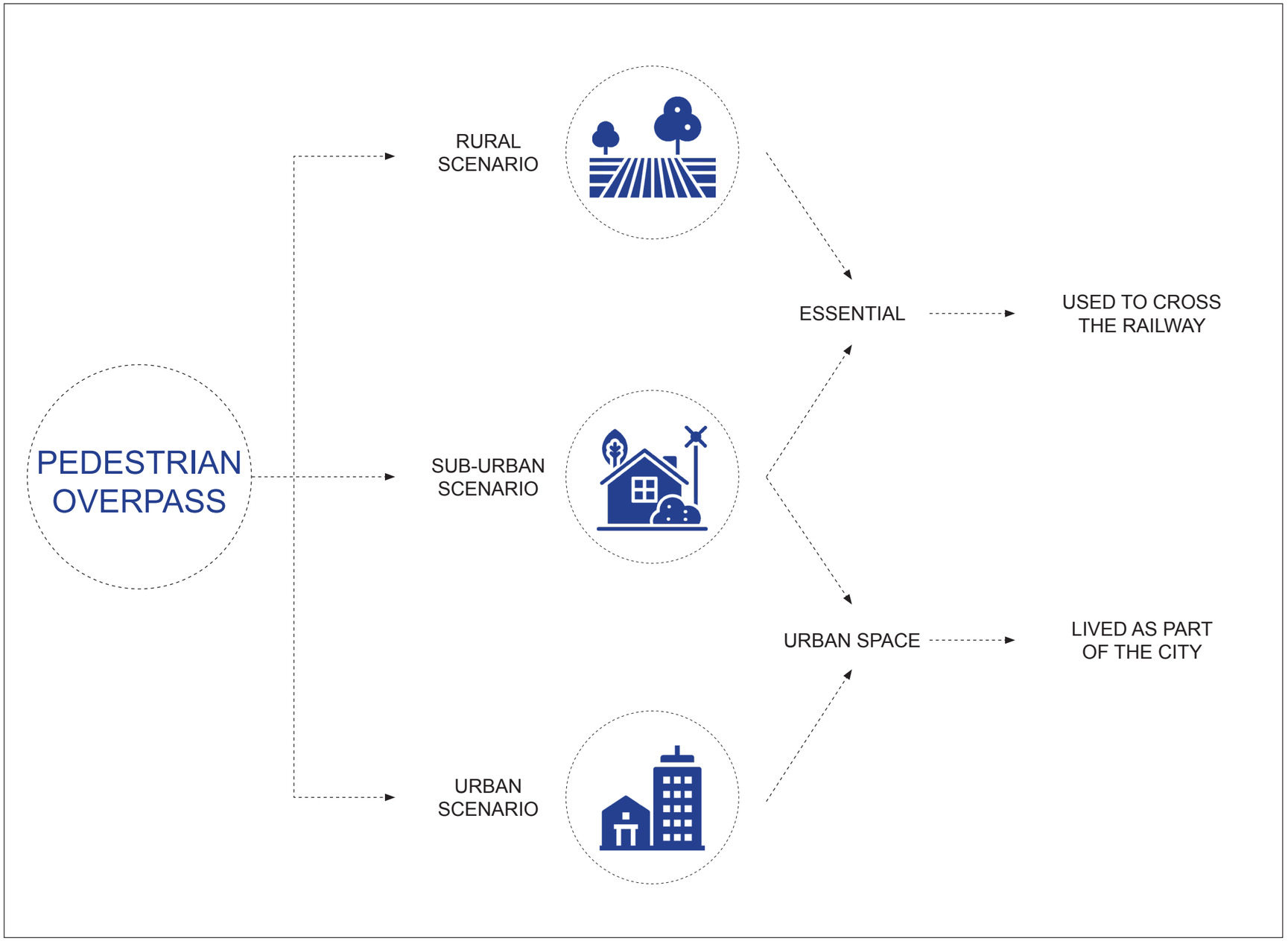
The Pedestrian Overpass will be located along the entire Rail Baltica line, thus crossing different types of scenarios.

These different surroundings give the need to place different types of overpass along the line, perfectly adapting to the context but respecting and preserving the identity of the Rail Baltica network.

Two different type of pedestrian overpass were then defined:

- Essential Pedestrian Overpass
- Urban Space

The first one is just a pedestrian overpass used by people to cross the railway line, the second is an expansion of the city were the people can stay, rest or just walk in order to live it as part of the city.

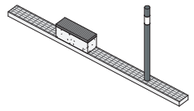
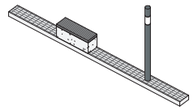
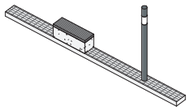
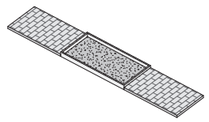
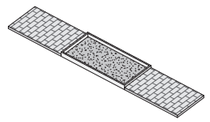
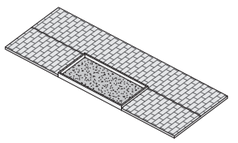
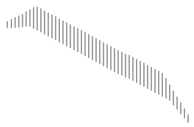
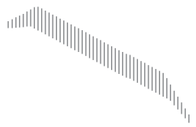
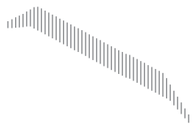
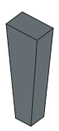
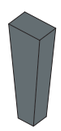
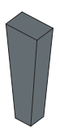


Design Strategy

F6.3

The Essential one (Type 1) is a Pedestrian Overpass that must contain all the elements ruled by the Architectural, Landscaping and Visual Identity Design Guidelines but the designer can choose to use only one functional stripe and one pedestrian stripe. (Minimum dimension are defined in following pages)

The Urban Space (Type 2) is a Pedestrian Overpass that must contain all the elements ruled by the Architectural, Landscaping and Visual Identity Design Guidelines and provide an adequate aggregation of modules of functional stripe and pedestrian stripe. (Minimum dimension are defined in following pages)

ELEMENTS	TYPE 1	TYPE 2
FUNCTIONAL STRIPE (Module A) 		
PEDESTRIAN STRIPE (Module B) 		
FENCE 		
PIERS 		
VERTICAL CONNECTIONS 		

Design Strategy

F6.3

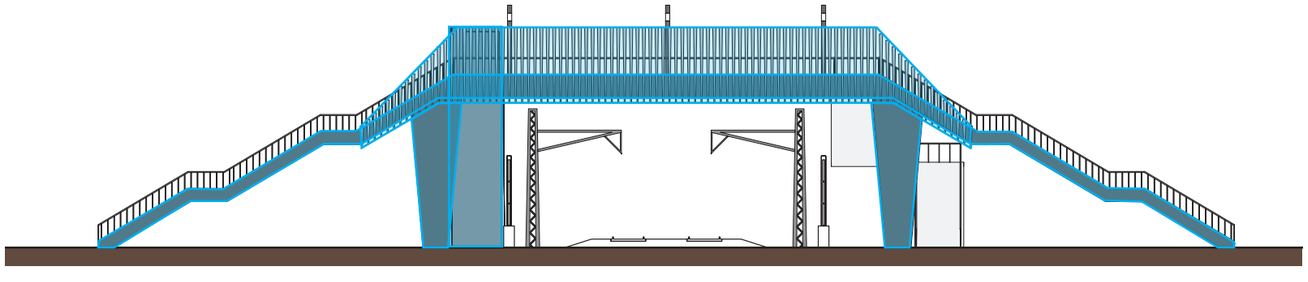
Essential Pedestrian Overpass - Type 1

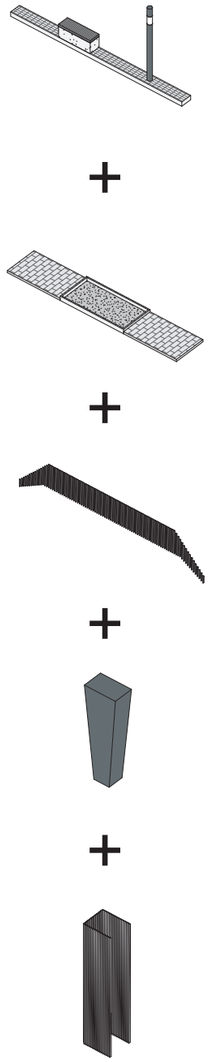
The Essential Pedestrian Overpass is the one that will be placed usually in rural areas, along pedestrian or cycling routes.

The structural design will be to the discretion of the designers but the application of the cladding is highly recommended and must cover the beam.

The fence geometry is also highly recommended and must be colored with the country color.

The design of the piers is highly recommended if it is compatible with heights, dimensions and local conditions of the site location.





Design Strategy

F6.3

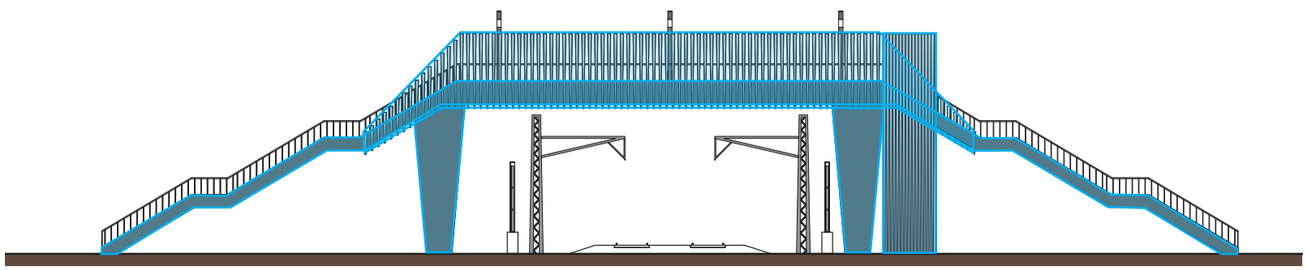
Urban Space - Type 2

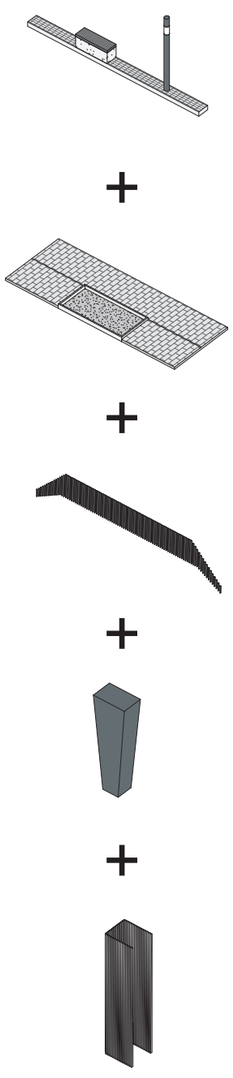
The Urban Space is a Pedestrian Overpass that will be placed usually in urban areas, to join parts of the cities separated by the railway line.

The structural design will be to the discretion of the designers but the application of the cladding is highly recommended and must cover the beam.

The fence geometry is also highly recommended and must be colored with the country color.

The design of the piers is highly recommended if it is compatible with heights and dimensions of the site location.





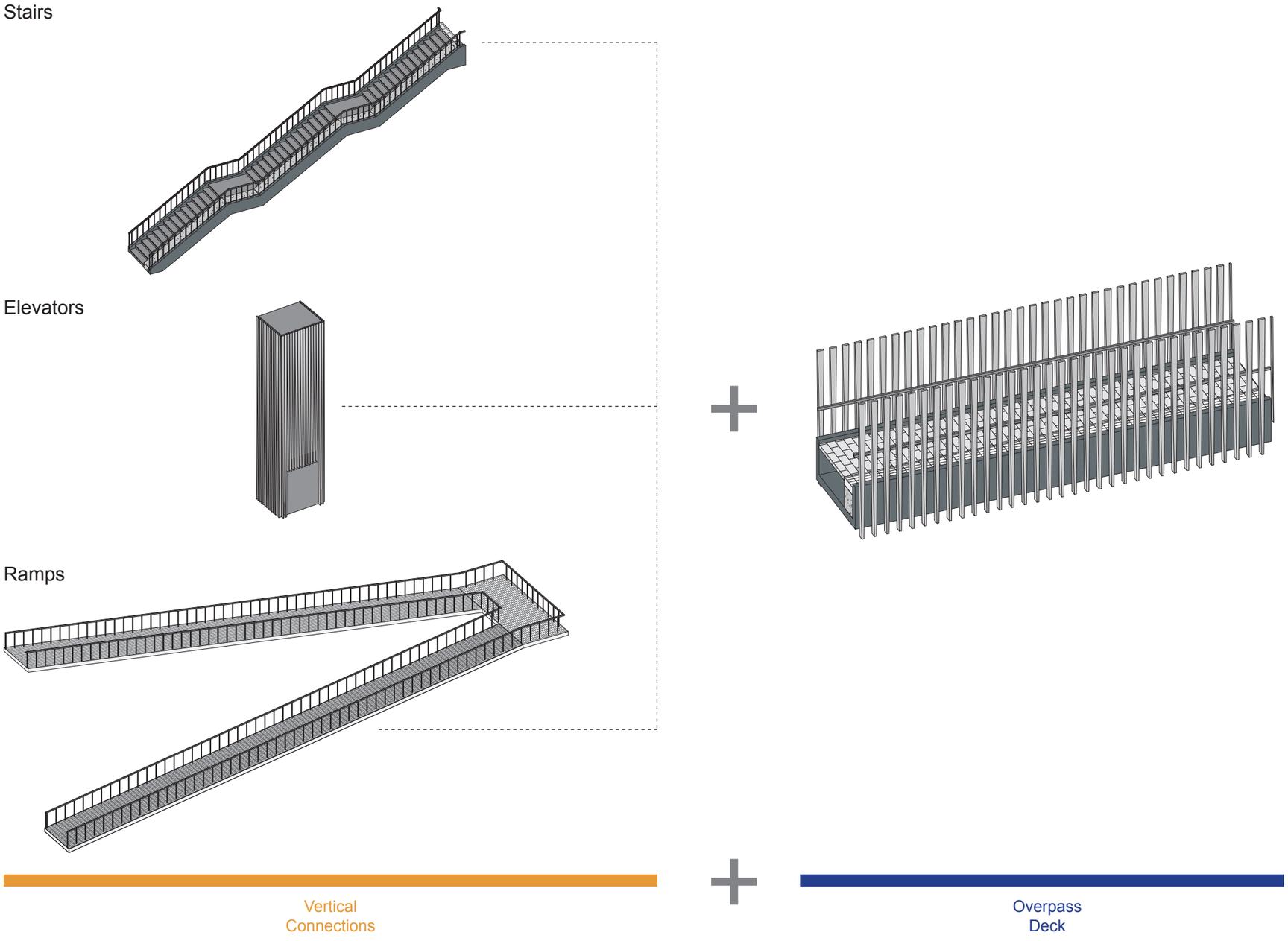
Design Strategy

F6.3

Vertical Connections

The Pedestrian Overpasses have been designed in order to be adaptable in each site conditions.

Stairs, ramps or elevators can be placed as per site conditions, following the visual rules on the side.



Geometry

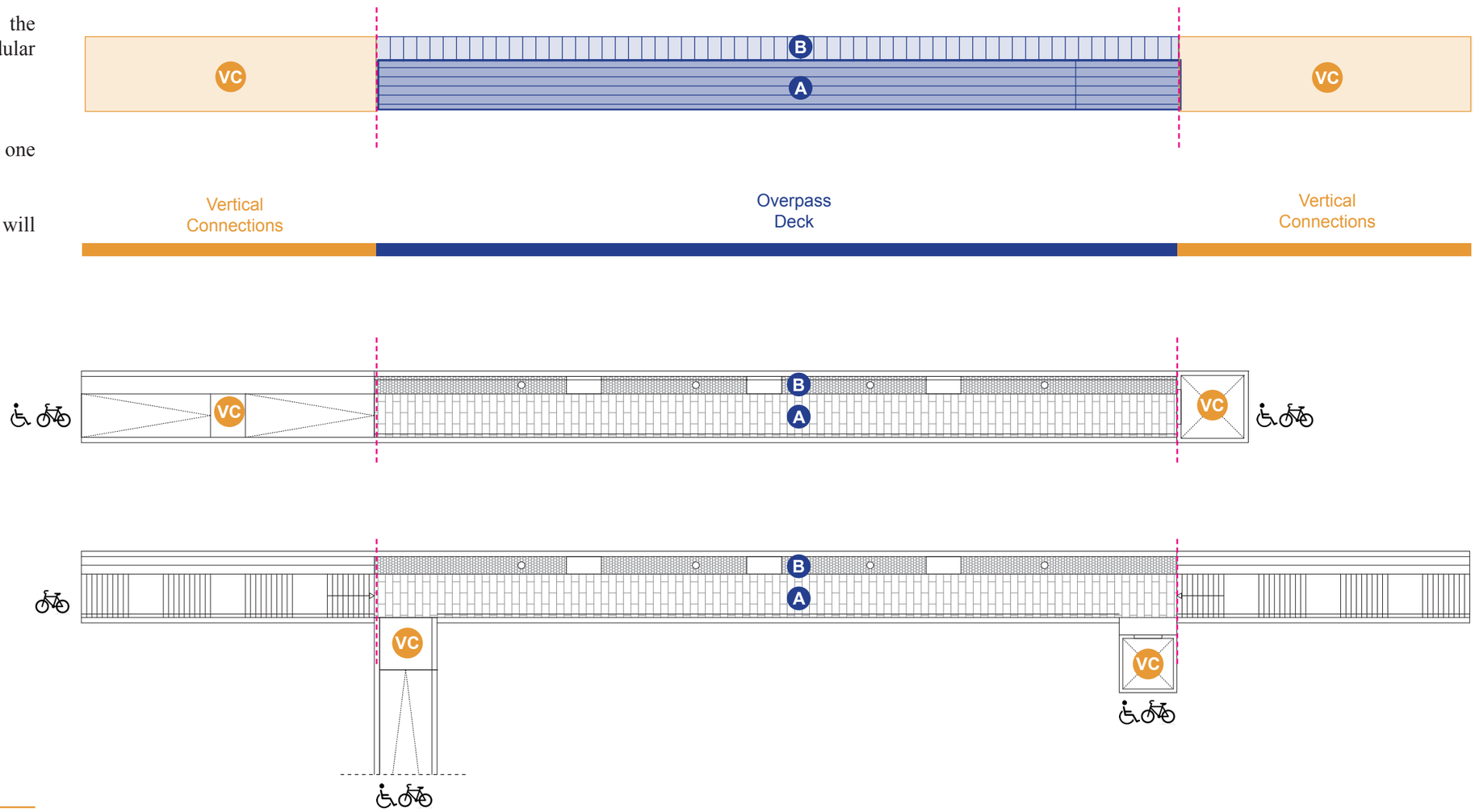
F6.4

Composition Type 1

In order to replicate the correct assembly for the two proposed types, here are shown the modular composition for:

TYPE 1: Module A + Module B
The Essential one, only one pedestrian stripe and one functional stripe;

Please notice that vertical connections typologies will be defined depending on the site conditions.



Legend

- A Module A = Pedestrian stripe
- B Module B = Functional Stripe
- VC Module VC = Vertical Connections

Geometry

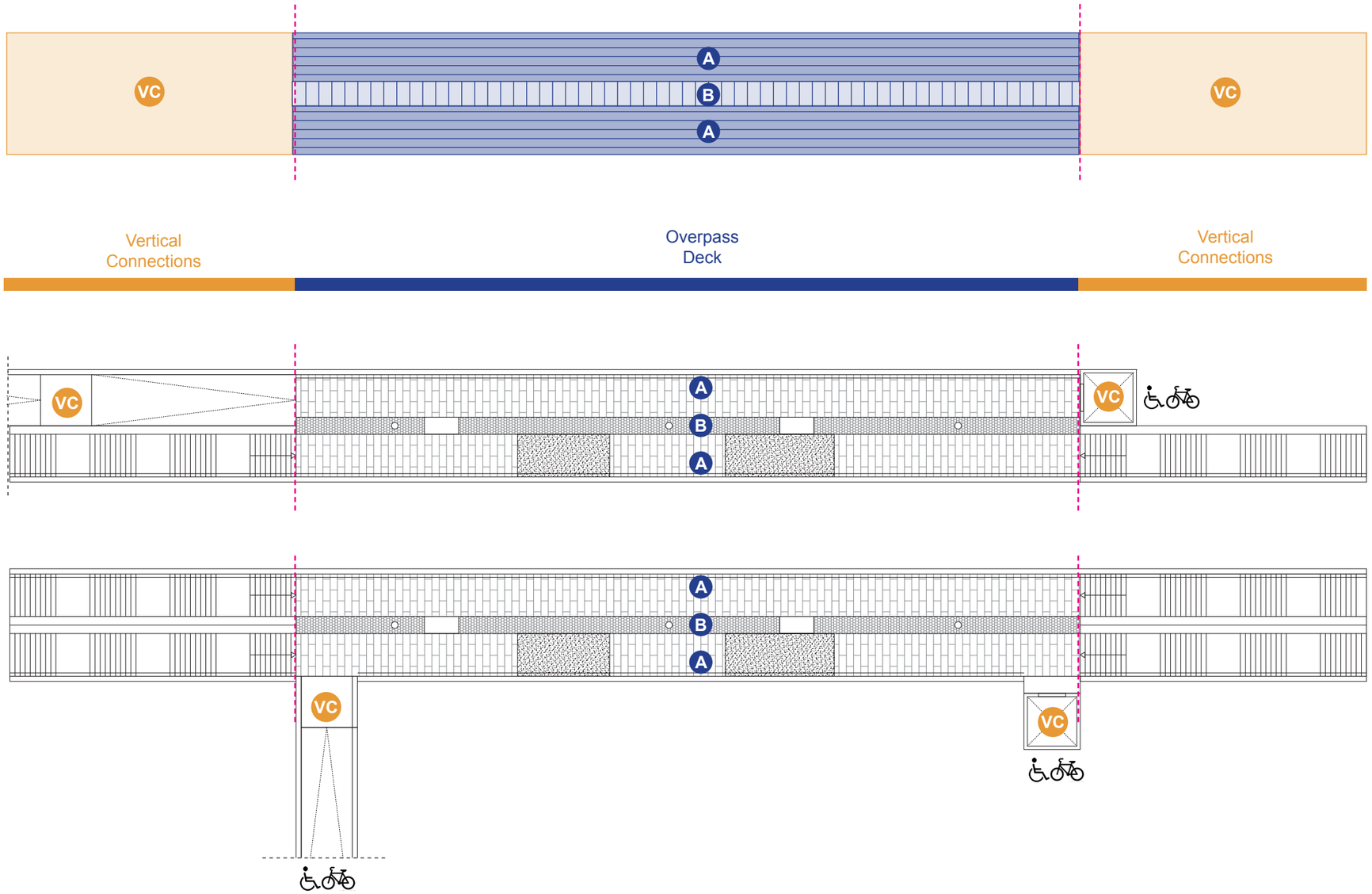
F6.4

Composition Type 2

In order to replicate the correct assembly in the two proposed types, here are shown the modular composition for:

TYPE 2: Module A + Module B + Module A
The Basic Urban Space, one functional stripe and two pedestrian stripe.

Please notice that vertical connections typologies will be defined depending on the site conditions.



Legend

- A Module A = Pedestrian stripe
- B Module B = Functional Stripe
- VC Module VC = Vertical Connections

Geometry

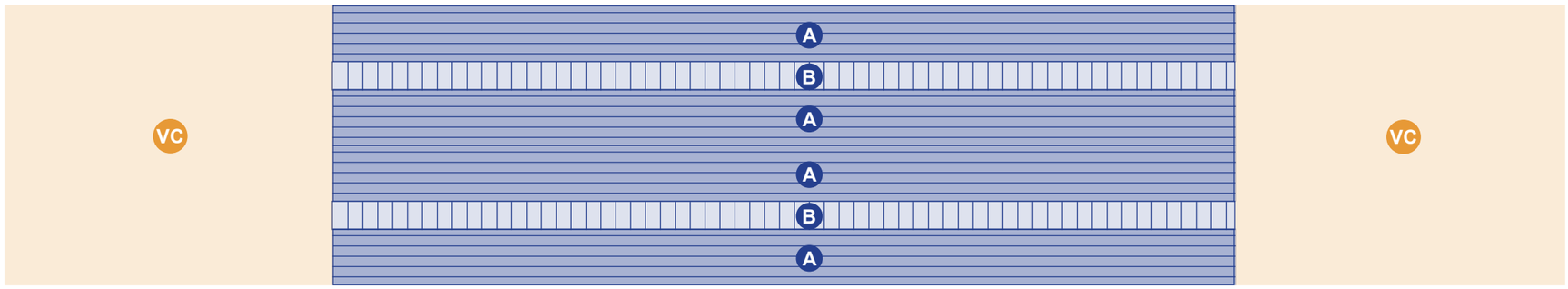
F6.4

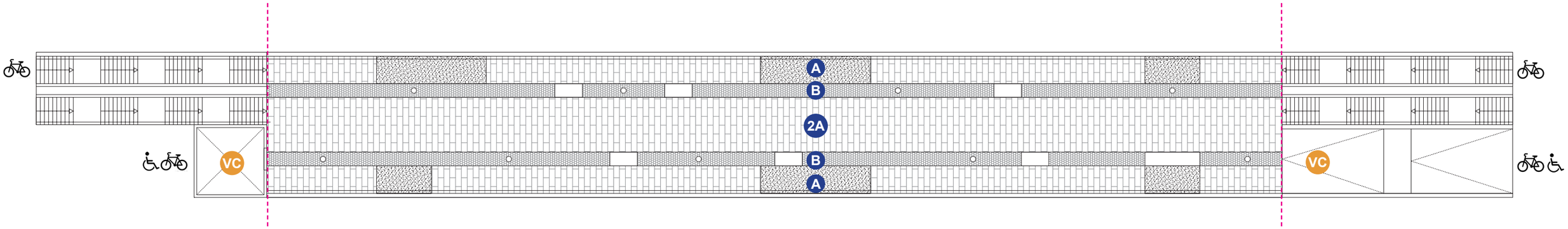
Composition Type X

Since pedestrian overpass is made up of modular elements it could be assembled according to the needs and the conditions of the site. The following case is a example of how modular elements can be put together to create an advanced urban space.

TYPE X: n*Module A + n*Module B
The Advanced Urban Space is composed by n*modules in order to fit the required design.

Please notice that vertical connections typologies will be defined depending on the site conditions.





Legend

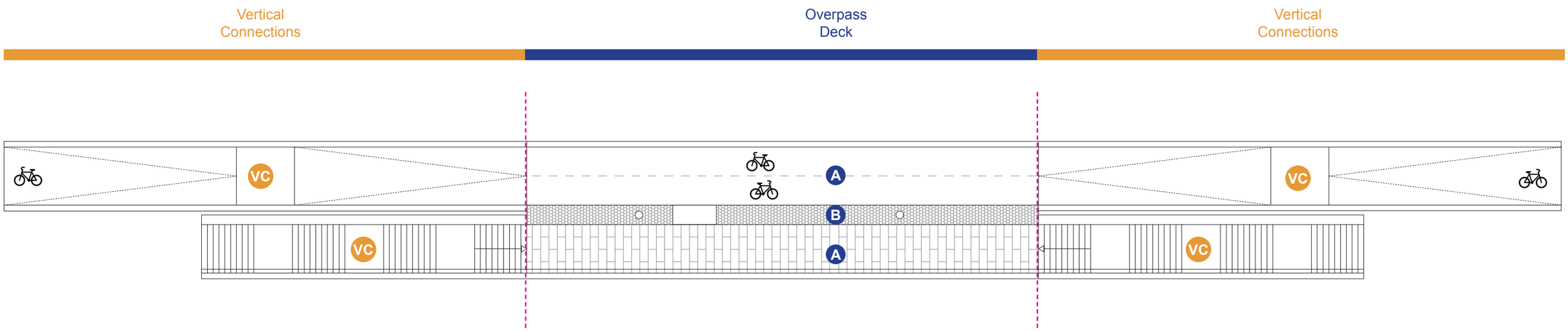
- A Module A = Pedestrian stripe
- B Module B = Functional Stripe
- VC Module VC = Vertical Connections

Geometry

F6.4

Bike Usability

If a bike line have to cross the rail, a ramp shall be provided to ease the access to cyclist and one (or more) “module A” can be adapted to be more suitable to cyclist.



Legend

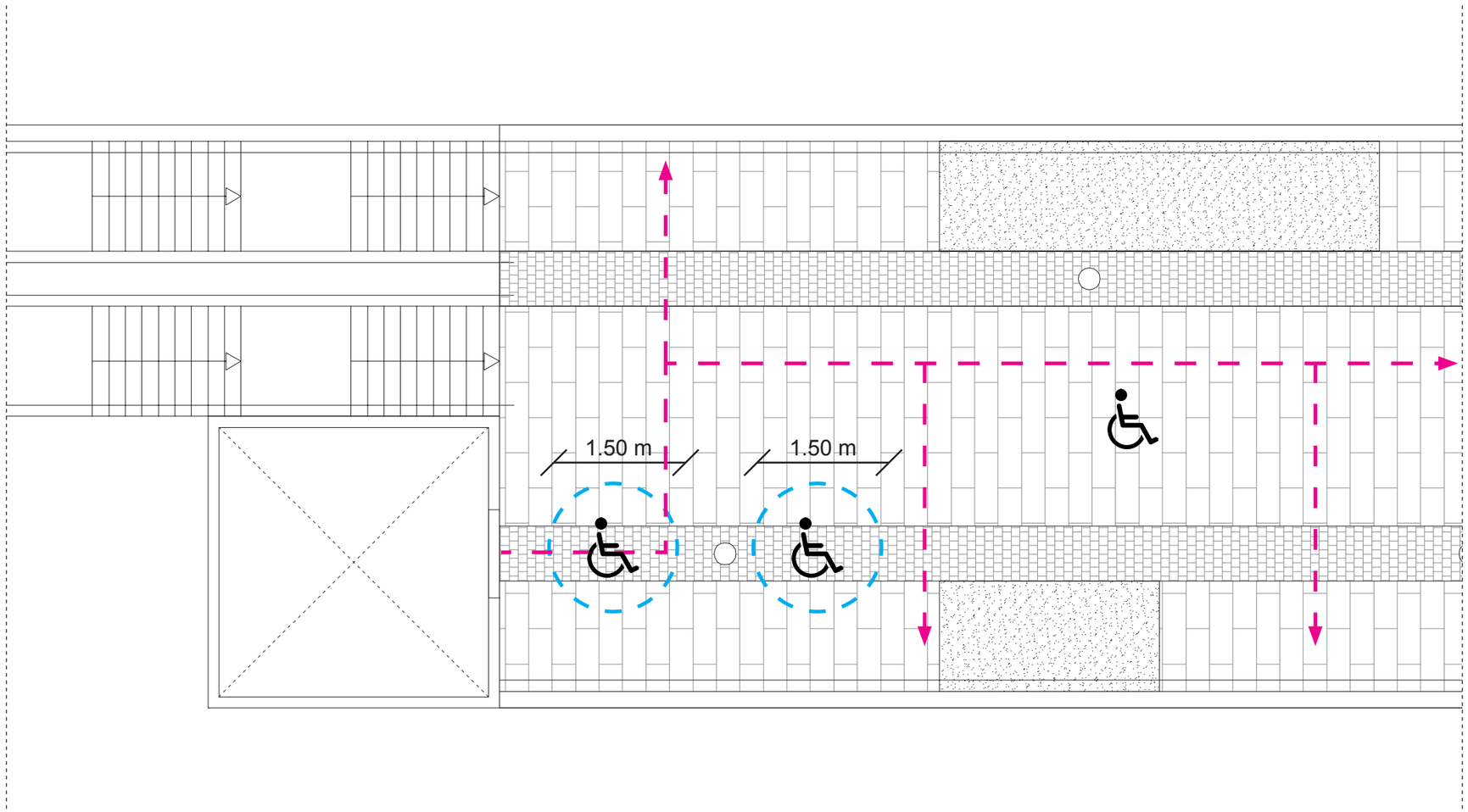
- A Module A = Pedestrian stripe / Bike line
- B Module B = Functional Stripe
- VC Module VC = Vertical Connections

Geometry

F6.4

PRM

Future designers must pay close attention to paths dimensions and to the location of the elements in order to respect the accessibility requirements and to allow PRM to go through the pedestrian overpass easily.



Geometry

F6.4

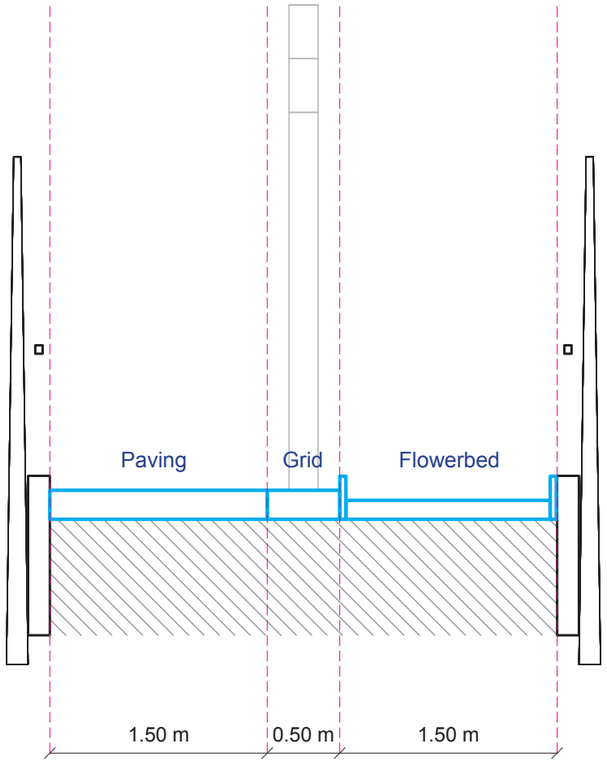
Stripes

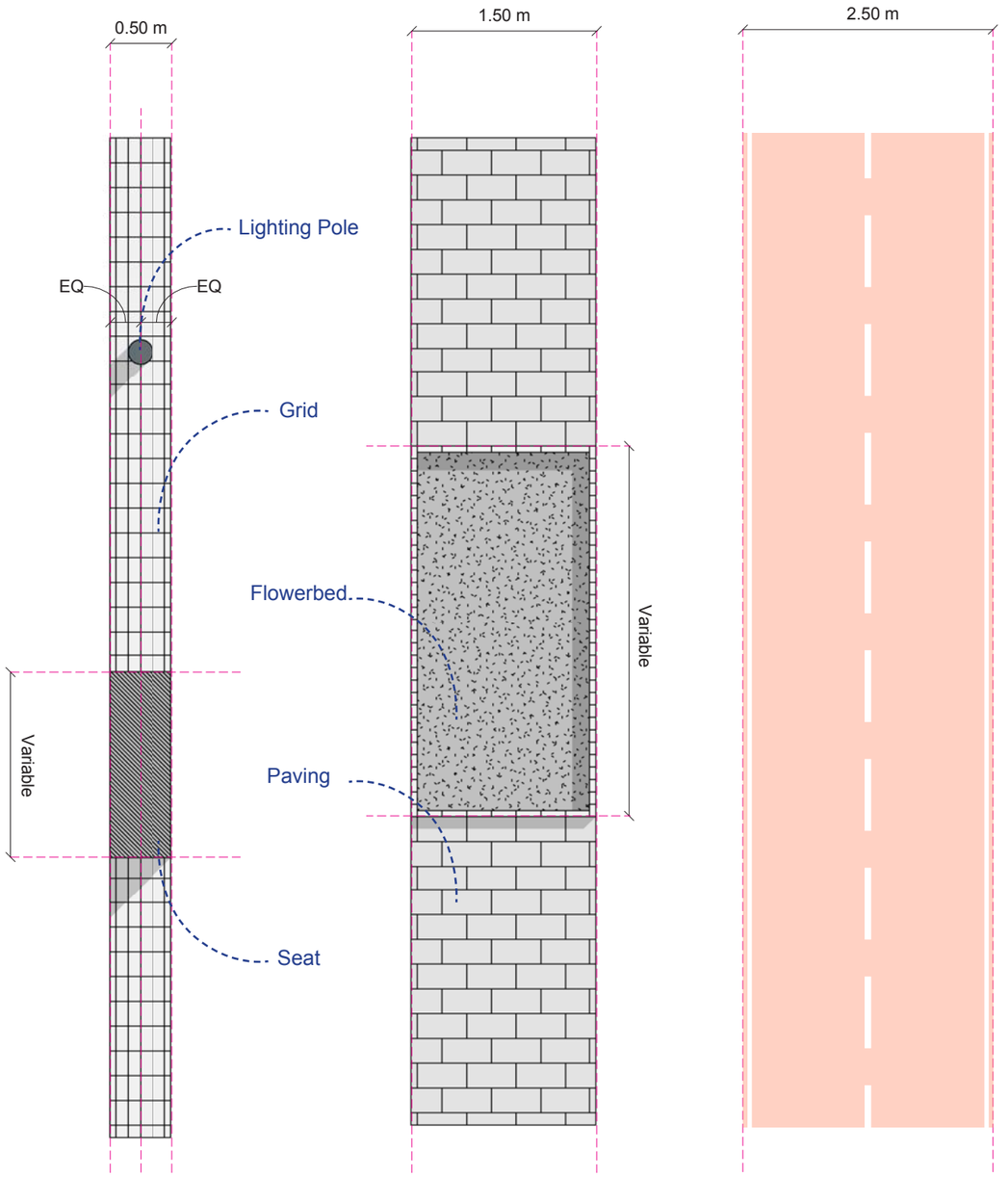
Pedestrian stripe (module A):
Suggested minimum width of 1,50 m.

This stripe will be the pedestrian area of the pedestrian overpass. In the Essential cases the stripe will be all paved with concrete blocks, in the Urban Space cases in this zone can be placed also flowerbed according and respecting the pedestrian flows.
If a bike line have to cross the rail, a “module A” can be replaced with a bike path (Suggested minimum width of 2,50 m).

Functional stripe (module B):
Suggested minimum width of 0,50 m.

On this stripe will be located all the lighting pole and the seats. In all cases this stripe will have also technical functions and will be paved with a metallic grid,gutters and ducts will pass under it.





Note:
In order to guarantee the lack of any architectural barrier, the pedestrian strip must be designed considering PRM requirements, especially in the positioning of flowerbeds.

Geometry

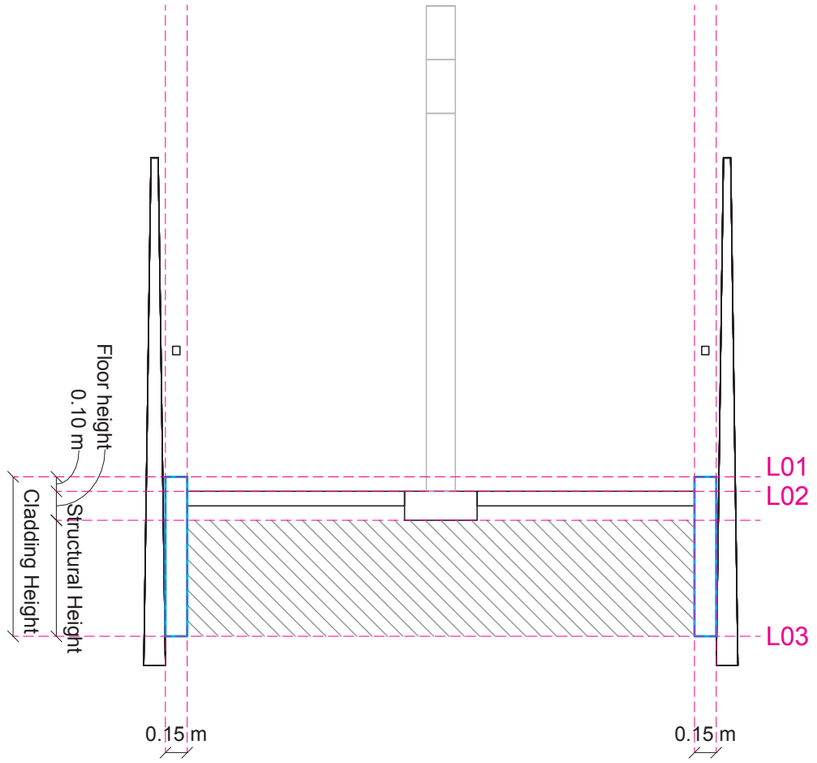
F6.4

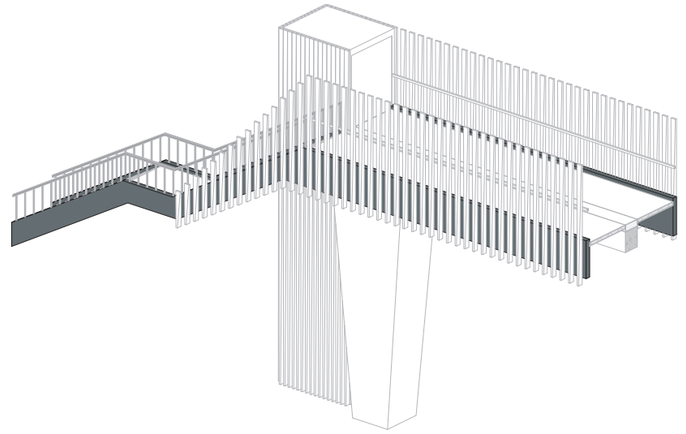
Cladding

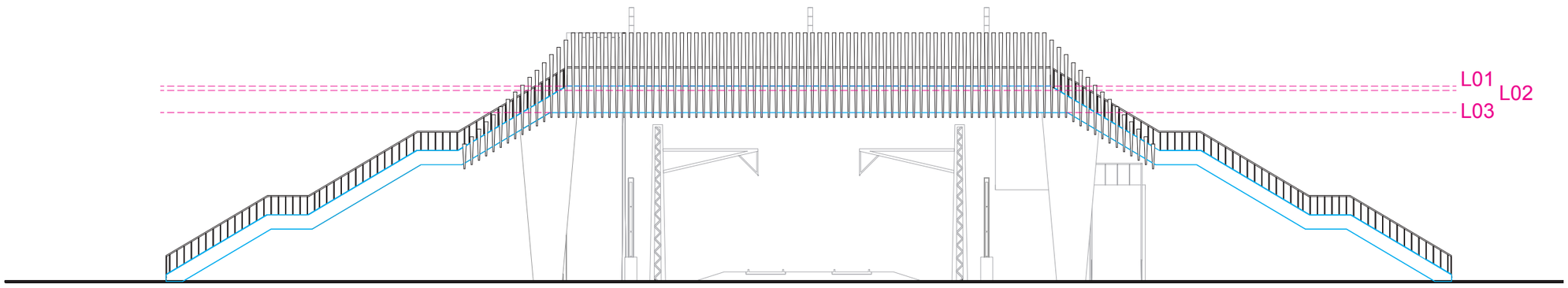
The cladding will be a metallic bend of 0,15 m width used to cover the beam under the deck and under the vertical connections and avoid the falling of object on the railway line from the Pedestrian Overpass Floor.

Its height must start at least 10 cm over the floor (from L01) and cover all the structural height (to L03).

The same rules must be applied also to vertical connections and join with the horizontal deck part.







Geometry

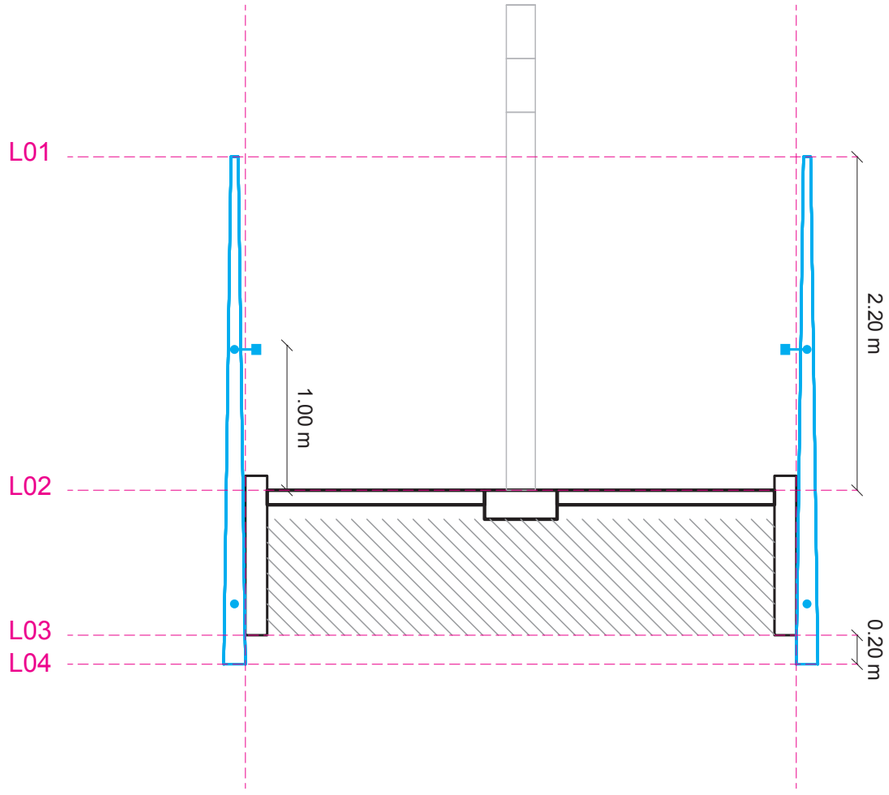
Fence

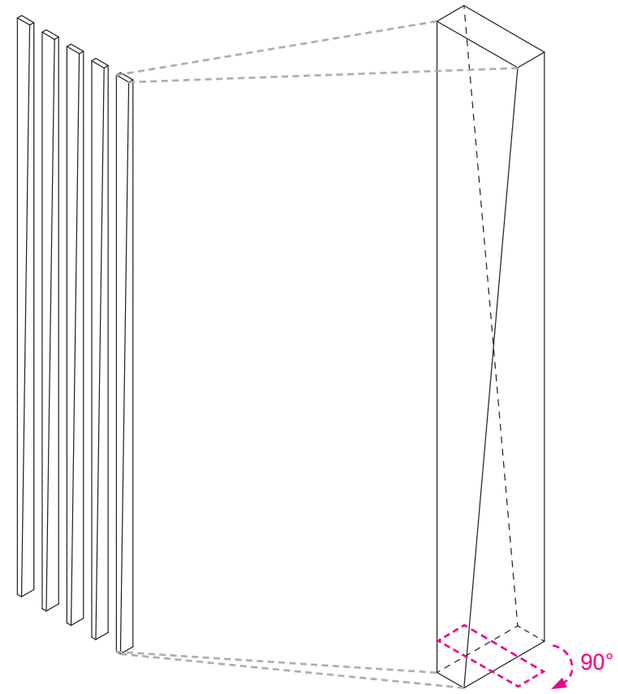
The fence is composed by a series of boxed element twisted of 90° from the top to the base. The rotation must be uniform along all the element.

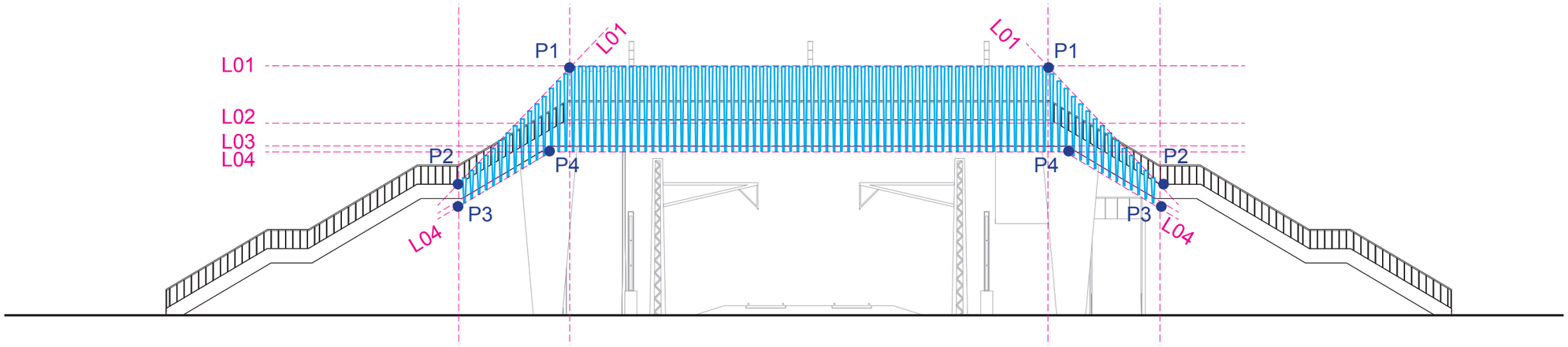
The design of the substructure is entrusted to the designer as long as it respects the visual rules of the Architectural, Landscaping and Visual Identity Design Guidelines and must include also the handrail during the deck part.

The height is not standard and depending from the height of the bridge, as shown in the side image. The total height must be 2,20 m over the floor line (from L01 to L02), 0,20 m under the cladding line (from L03 to L04) and the structural height of the beam.

The fence has a constant height during the central modules of the bridge and will degrades starting from the end of the deck to the first landing, according to the rules defined in the image below (from P1 to P2).







Geometry

F6.4

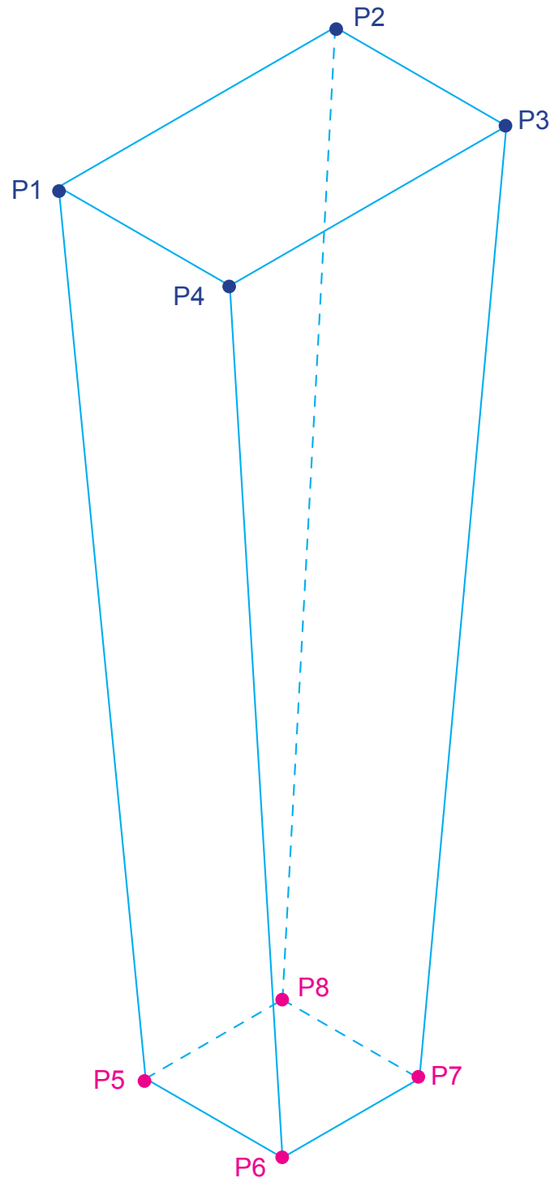
Piers

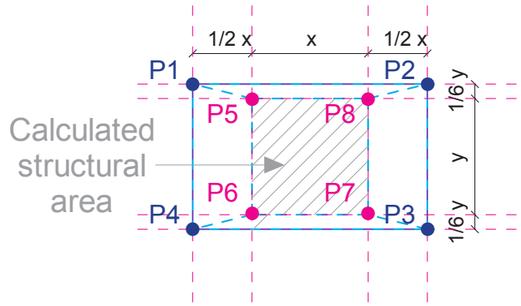
The shape of the piers comes from the join of the vertices of the basic geometric figure with the one on the top, as shown in the images on the side.

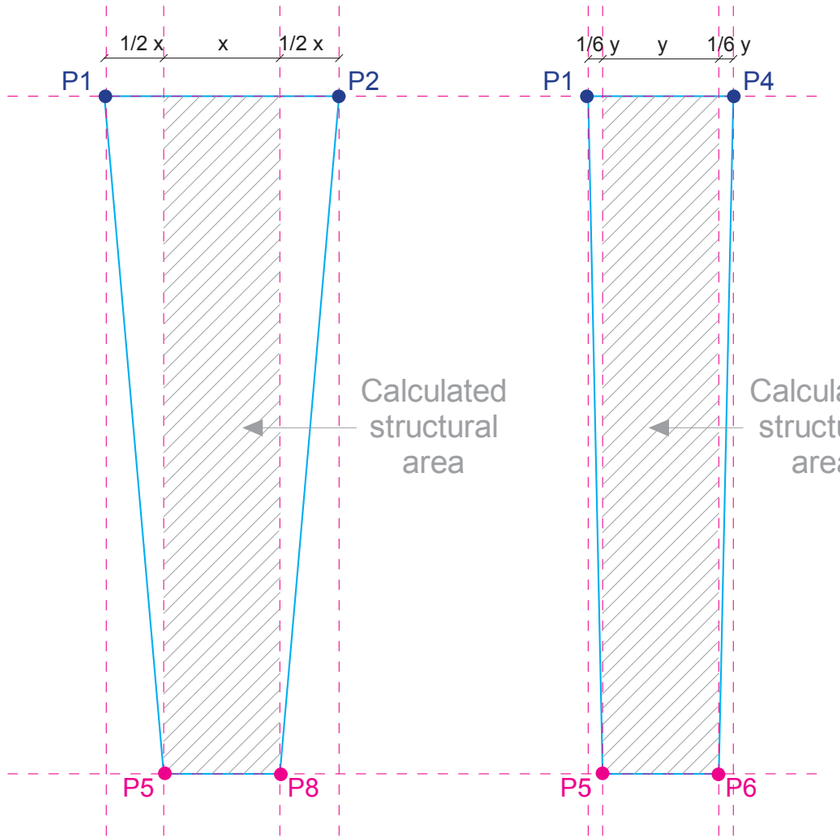
The control point in blue are related to the top, the ones in magenta are related to the base.

The position of these control points are ruled starting from the a rectangular piers based on structural calculation.

The geometry of the piers can be done as a cladding added to a basic pillar or cast in place.







Materials

F6.5

Pedestrian Overpass are mainly a composition of five visual elements:

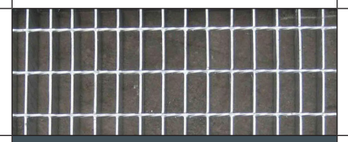
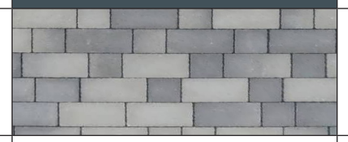
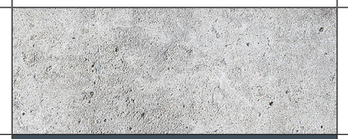
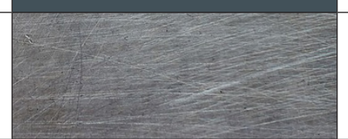
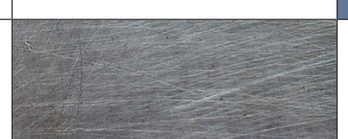
Functional Stripe: Metal grid, coated with the network color.

Pedestrian Stripe: Paved with concrete blocks.

Piers: pigmented or painted concrete, using the network color.

Fence: Glazed metal using the identity colors.

Cladding: pigmented casting concrete or panels of pigmented concrete, using the identity colors.

		Network	Estonia	Latvia	Lithuania
FUNCTIONAL STRIPE	Materials				
	Colors	RAL 7016			
PEDESTRIAN STRIPE	Materials				
	Colors				
PIERS	Materials				
	Colors	RAL 7016			
FENCE	Materials				
	Colors		RAL 5014	RAL 3011	RAL 6011
CLADDING	Materials				
	Colors	RAL 7016			

Materials

F6.5

Furniture

On the Functional Stripe will be placed the furniture elements such as:

- Seats: the width of the seat must be the same of the Functional strip, the length can be decided according to the final design.
- Lighting poles: the pole used can be the same of the station public area, but must be placed along the longitudinal axis of the Functional Stripes.

For detailed dimensions of the lighting pole please refer to RBDG-MAN-031D.

Materials

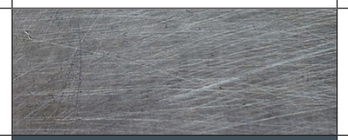
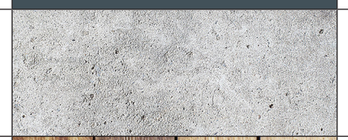
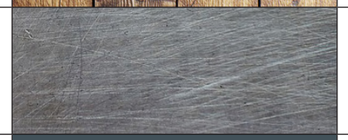
F6.5

Furniture

Flowerbed border:
Metal strip coated with the network color.

Seat:
Concrete block with wood slats on the top.

Lighting pole:
Glazed metal using the identity colors.

		Network	Estonia	Latvia	Lithuania
FLOWERBED BORDER	Materials				
	Colors	RAL 7016			
SEAT	Material 1				
	Material 2				
LIGHTING POLE	Materials				
	Colors	RAL 7016			

Branding Implementation

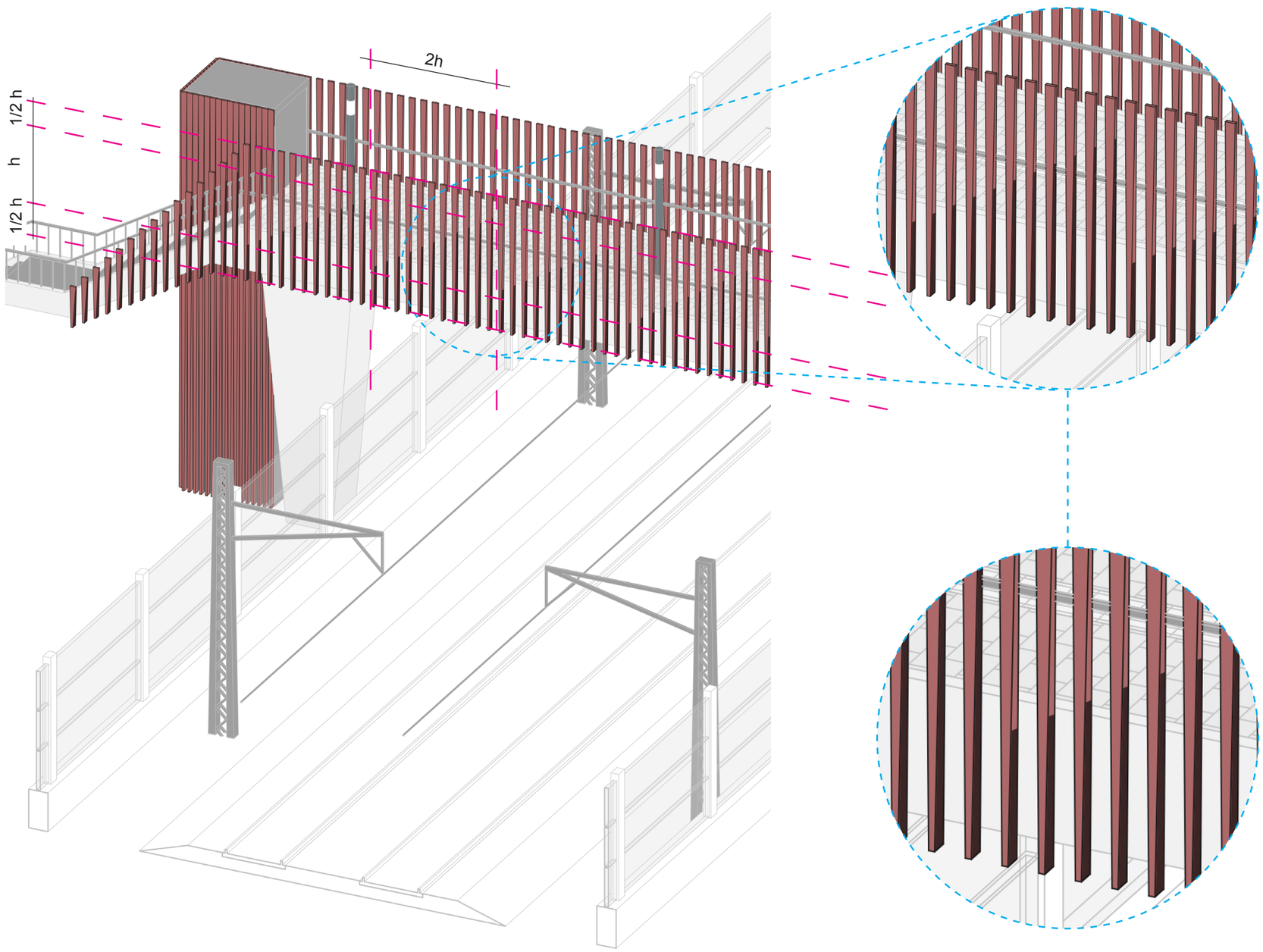
F6.6

To add more identity to a Pedestrian Overpass is possible to modify the fence element creating the "Traditional Baltic House" pattern painting the side of the boxed element as shown in the images to the side.

The colors to use to apply the RB pattern in the pedestrian overpass' branding implementation are:

- RAL 5004 and RAL 5014 for Estonia
- RAL 3007 and RAL 3011 for Latvia
- RAL 6009 and RAL 6011 for Lithuania

Other materials and technical solutions might be used in order to reach the same visual effect without changing visual dimensions.



F

Rail Baltica Network Element

ARCHITECTURAL, LANDSCAPING AND VISUAL IDENTITY DESIGN GUIDELINES FOR RAIL BALTICA

RB Rail AS