Network Elements

F

Structure elements

F0

F0.1 Matrix

F0.2 Geometry

F0.3 Materials

Matrix

F0.1

Identity Matrix

Please note, that chapter F0 Structure elements provides the design of elements which are applicable to railway bridges, road overpasses and pedestrian overpasses. Details of the design should be selected based on type of the bridge or overpass.

Material

Geometry

Modularity

Color

Vegetation

	N	C	R
Railway bridge			

Geometry

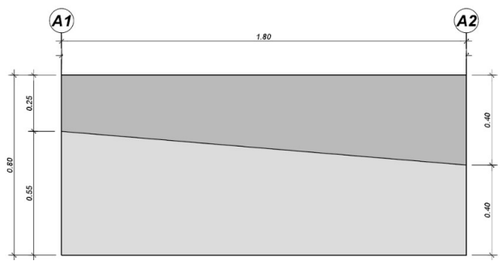
F0.2

Composition of the elements of Bridges

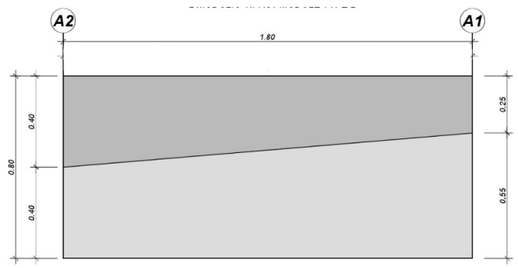
In order to replicate the correct shape on the Basic and Landmark Bridge elevation, bridges should be composed of four modules (module types 1 to 4).

For Basic Type Bridges edge beam non-pigmented concrete are used. For Landmark Type Bridges color of pigmented concreted should be selected in accordance to country identity color.

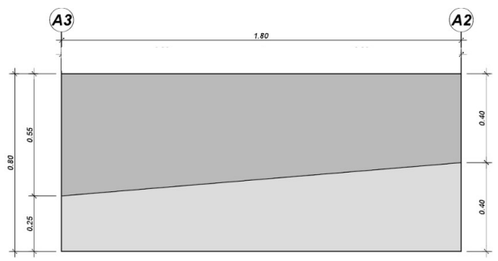
The design for edge beam can be adapted keeping visual appearance for outer shape of edge beam as per indicative solution. The dimensions of modulus should be scaled proportionally, if from technically reasonable aspects same design cannot be implemented. The standardization of elements should be considered. The solutions and dimensions shall be defined during design process.



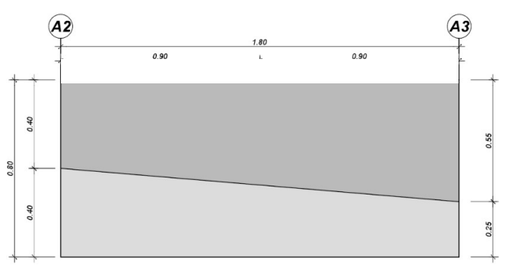
Module type 1



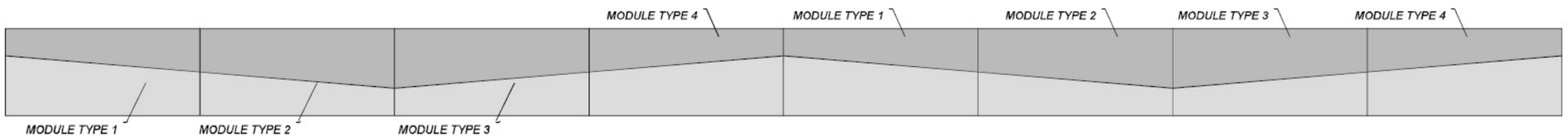
Module type 2



Module type 3



Module type 4



Geometry

F0.2

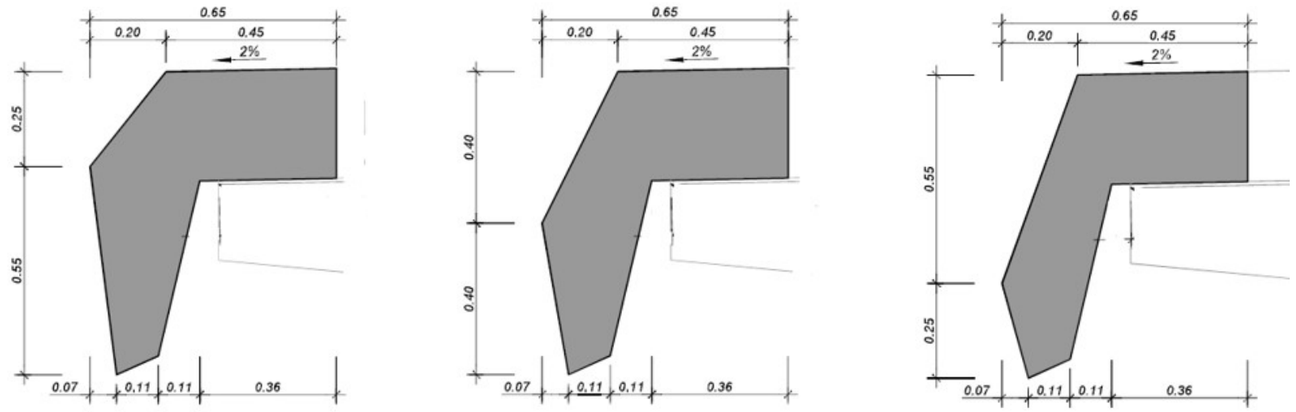
Edge Beam

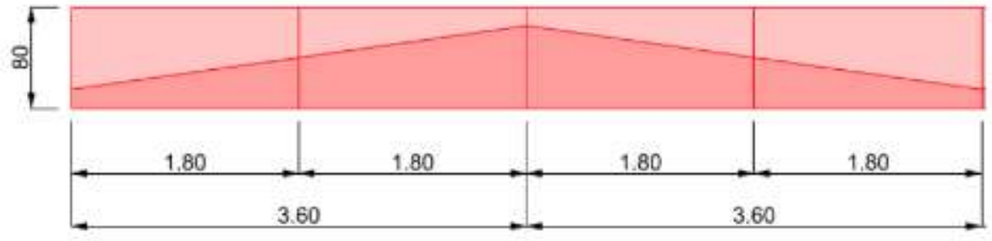
The Edge beam geometry could be composed of four precast modules of 1,80 meter long and 80 cm height, which may be easily replicated to create the final shape.

The edge beam architectural geometry should be introduced for visible surface in outer side of the edge beam. The dimensions of modulus should be scaled proportionally, if from technically reasonable aspects same design cannot be implemented. The geometry of edge beam can be introduced by using the pre-fabricated elements or cast-in-place. In case of pre-fabricated elements, modular design could be used to standardize the edge beam elements.

Considering the site specific aspects, pigmentation of edge beam to country identity color could be considered in compliance with the approval of the Client.

The concept presented is indicative and should be detailed during the design process.





Commented [DJ1]: Pictures are changed based on EDO/IDOM poposals

Geometry

F0.2

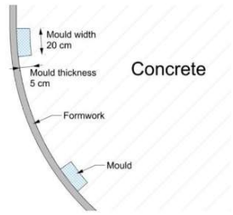
Piers

The preferred pier type concept is cylindrical. Nevertheless, the final concept of the piers shall be defined during the design process considering the site-specific conditions.

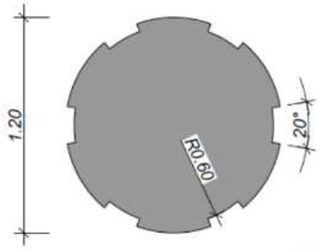
Lamellar pier shapes have vertical ribs only on the round parts, this will provide the advantage of having two lateral formworks which can be used on every pier, and a central flat part which makes it is easy to cast. The lamellar shape will also provide good hydrodynamic behavior in or next to watercourses and will eliminate the risk of floating debris getting stuck in the pier's section.

Cylindrical pier shapes designs are recommended for typical railway bridges. Cylindrical pier design proposal is based on a clear and smooth rib hexagonal pattern with vertically aligned ribs drawn on the concrete surface with a total depth of 3-5 centimeters and 20º degrees wide.

For basic type of piers ribs/ grooves could be avoided. Final shapes and forms of piers for unified design are only recommendation. Piers design shall be selected after structural assessment.



LAMELLAR PIER SHAPE



CYLINDRICAL PIER SHAPE

Geometry

F0.2

Railing

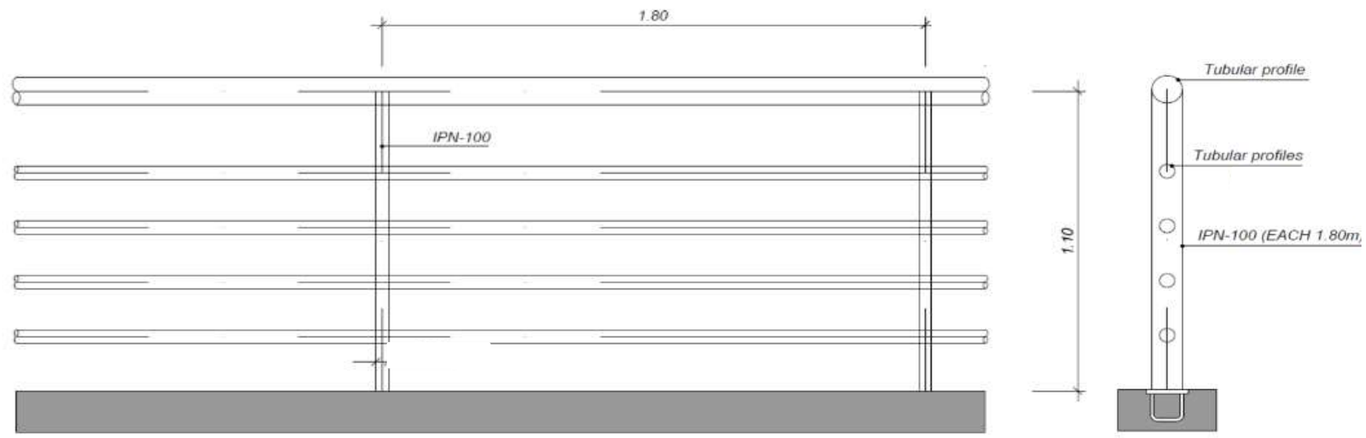
This kind of railing is an element used to give more identity to a basic bridge making it become a standard bridge. The basic railing is made of painted steel composed of straight newel posts every 1,80 meters (IPN-100 profile), joined by four round bar horizontal rails, using a round bar as a bannister. The color will be grey in all countries with a typical total height of 1,10 m. Steel elements will have corrosion protection. Final railing design solution shall be determinated following a CSM-RA analysis for each location, based on applicable hazards (e.g., ballast projection, ice and snow accumulation and fall, intrusion by snow removal equipment, etc.)

Landmark railing design is only to be used in a special location of high level of identity. The Landmark design is made of painted steel composed of straight newel posts every 1,8 meters, joined by three round bar horizontal rail, using round bar as banister. As the edge beam, the railing color will be different depending on the country.

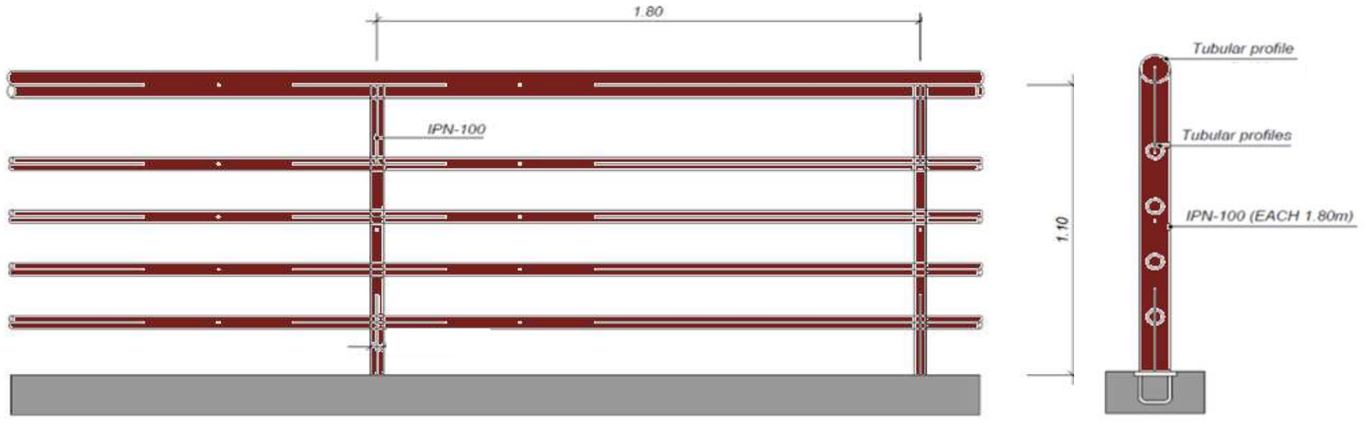
Parameters of railing:

- Typical railing height according to the standards;
- IPN-100 profile posts every 1,8 m;
- Welding on site after galvanization is not acceptable;
- The geometrical parameters shall follow local legislation and requirements;
- For basic railing no color shall be applied;

Railing dimensions are indicative. Designed solutions shall comply with the regulations and standards of each Baltic country, Technical conditions from Affected parties, and European regulations.



BASIC TYPE BRIDGE RAILING



LANDMARK TYPE BRIDGE RAILING

Geometry

F0.2

Abutment Logo

The logo shall be made from concrete and is not intended to be painted or pigmented. Letters have a Myriad Pro BOLD font and are embedded 10 mm from surface.
The logo can be implemented using the following methods:

• Option 1 - Create a logo mold on the surface of the formwork;
• Option 2 - Install standalone panel before the casting of the concrete (attached to the formwork);
• Option 3 - Place it as a panel into abutment after the concrete casting.

Concrete cover must be ensured behind the embedded letters and logo. The geometry of the logo panel is indicative and should be scaled considering the site-specific conditions during the design process.

• The space in the structure can be up to 2 cm larger than the panel, measured from each side;
• Gaps between the structure and the panel must be unified after installation;
• The gap between the panel and the structure must be filled with grout, ventilation must be ensured behind the panel.

Geometry

F0.2

Overhead Catenary Protection System

Structures which are spanning over the electrified railway line shall have Overhead Catenary Protection System (further – OCPS) foreseen.

OCPS shall be in accordance EN 50122-1 and conform to a degree of protection IP3X as defined in EN 60529. Final OCPS design solution shall be determined following a CSM-RA analysis for each location, based on applicable hazards (e.g., ice and snow accumulation and fall, intrusion by snow removal equipment, etc.)

OCSP should be made from transparent panels and fixed with steel post to the overpasses. For road overpasses, OCPS shall be vertical and installed on the horizontal surface of the deck. In case of pedestrian overpasses, OCPS can be also horizontal.
For vertical OCPS transparent panels should be considered which can be manufactured from polycarbonate or methacrylate. The use of methacrylate panels is recommended because it results better behavior than polycarbonate regarding the loss of transparency.
For horizontal OCPS panels in case of pedestrian overpasses, alternative materials can be foreseen (e.g. steel panels) with 1.80m long, with a slight slope in order to avoid rubbish at its top. Country identity color should be considered during design, considering the unified image to the fence.

The handrail shall be fixed directly to the steel posts of the OCPS, and transparent panels shall include anti- bird-collision measures.

Geometry

F0.3

Materials

The material of the following visual elements should be considered for landmark type railway, road and pedestrian structures:
- Piers: plain concrete;
- Railing: Steel and national identity color;
- Edge beams: architectural elements with pigmentation.

		Network	Estonia	Latvia	Lithuania
PIERS	Materials				
RAILING	Materials				
	Colors		RAL 5014	RAL 3011	RAL 6011
EDGE BEAM	Materials				
	Colors		RAL 5014	RAL 3011	RAL 6011

Commented [EO2]: Color row in the table should be removed

Railways Bridge

F1

F1.1 Matrix

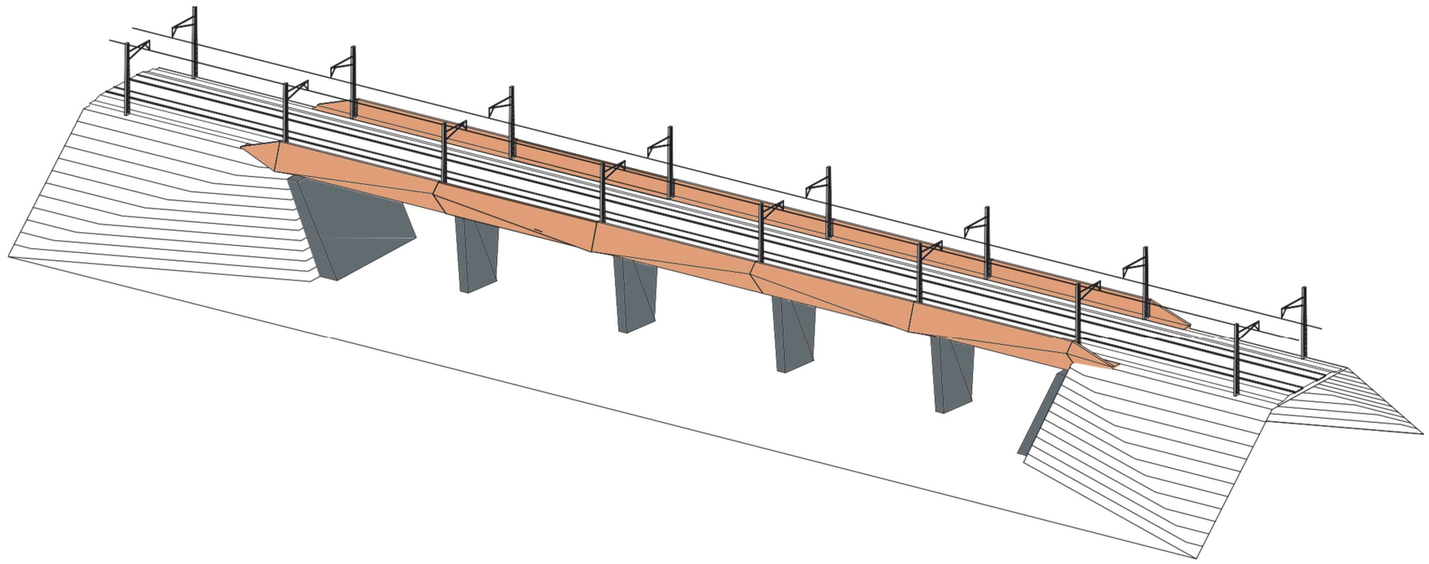
F1.2 Concept Design

F1.3 Design Strategy

Matrix

F1.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

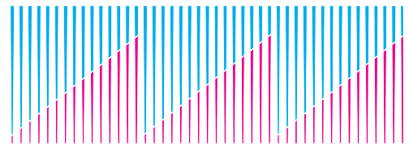
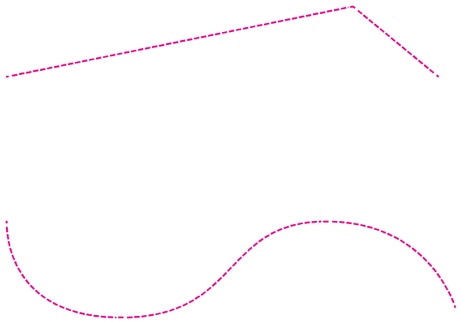
	N	C	R
Railway bridge			

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

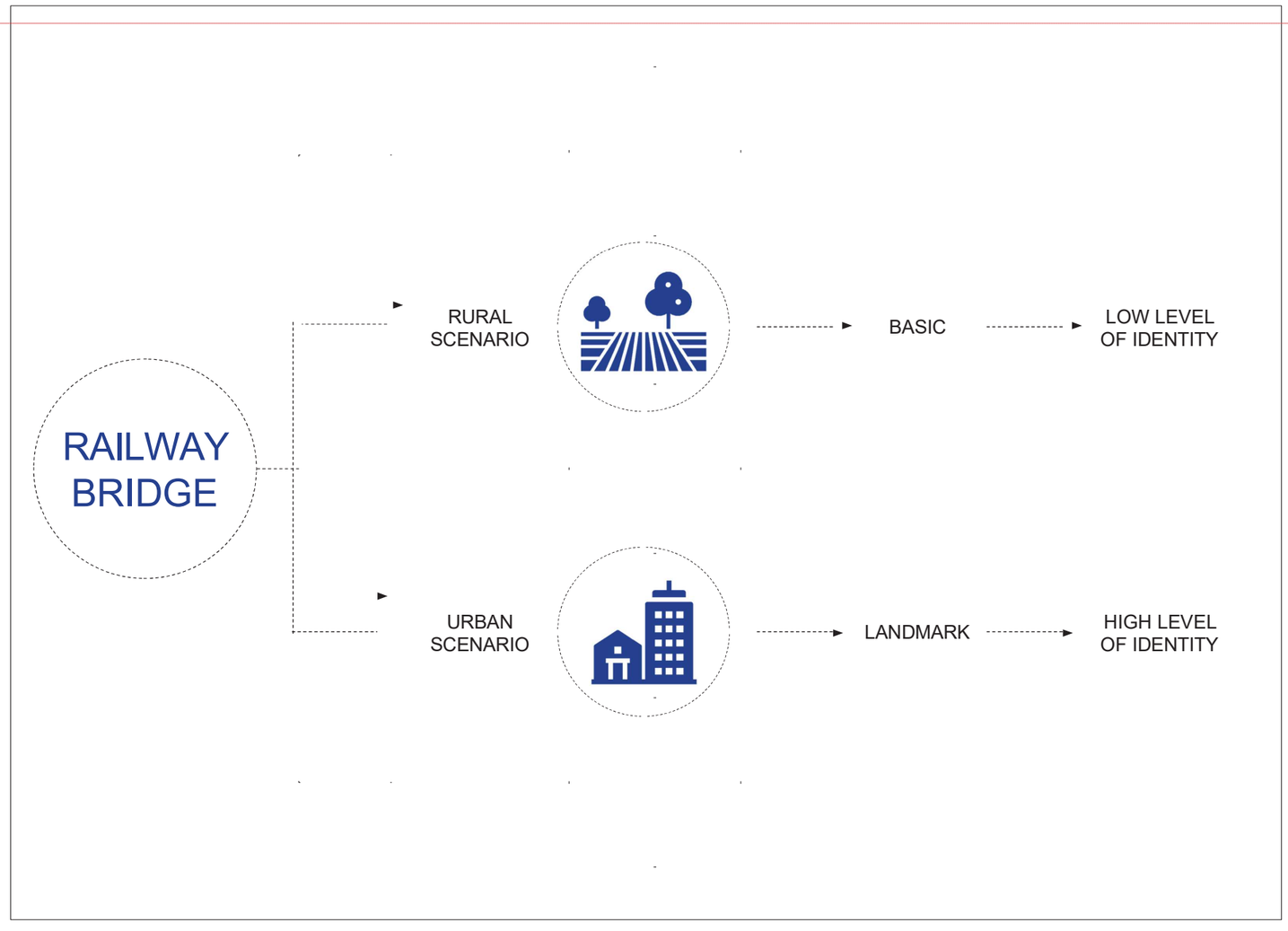
The Railway Bridges will be located along the entire Rail Baltica line, thus crossing different types of scenarios.

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.

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

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

Types of structures should be identified as per location by Designer and coordinated with the Client.



Commented [DJ3]: Standart type was eliminated after agreement

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.

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	BASIC	LANDMARK
EDGE BEAM	✓	
RAILING	✓	✓
ABUTMENT DESIGN	✓	
PIERS	✓	✓
NOISE BARRIER	✓	

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.

For the edge beam non pigmented concrete should be used. Geometry of edge beam should follow the requirements, provided in chapter F0.2 – Geometry. Edge beam.

Piers shape for the Basic Railway bridge should follow requirements, provided in chapter F0.2 – Geometry. Piers

Railings for basic Railway bridge should be applied. Desing of railings should follow the requirements, provided in chapter F0.2 – Geometry. Railing.

Abutment logo – one abutment logo per each abutment should be applied.

Designer can propose other technical solution if technically and feasibly justified but the same outer appearance should be kept as defined in Architectural, Landscape and Visual Identity Design Guidelines. For small portal frame structures (span up to 20m) edge beam can be replaced with simple cast in-situ solution without country identity color.

Commented [EB4]: Chapter shall be complemented with remark: - DTD Consultant can propose other technical solution if technically and feasibly justified, but the same outer appearance shall be kept as defined in ALG
- For small portal frame structures (span up to 20m) edge beam can be replaced with simple cast in-situ solution without country identity color

Commented [EB5]: Proposal to include remark:
- DTD Consultant can propose other technical solution if technically and feasibly justified, but the same outer appearance shall be kept as defined in ALG
- For small portal frame structures (span up to 20m) edge beam can be replaced with simple cast in-situ solution without country identity color

Commented [DJ6]: Adjusted picture from EDO proposal

Commented [EB7]: Proposal to include remark:
- DTD Consultant can propose other technical solution if technically and feasibly justified, but the same outer appearance shall be kept as defined in ALG
- For small portal frame structures (span up to 20m) edge beam can be replaced with simple cast in-situ solution without country identity color

Commented [EB8]: What does it mean: "free concrete"?

Commented [EO9R8]: I believe pigment-free is meant

Commented [DJ10R8]: Yes, Edgars understood correctly, but thank You for noticing this, corrected into non-pigmented

Commented [EO11]: Would suggest that "shall" is replaced with "should", because we have also small frame structures, where cast in-situ edge beams are designed with different appearance. I would suggest to do the same modifications for other elements, piers, railings and logo.

Commented [DJ12]: Pasitikrinti cia should, nes puslapio trikampio reiksme should, ar shall

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 edge beam is foreseen. The edge beam color should be selected based on country identity. The edge beam geometry should follow the requirements, provided in Chapter F0.2 – Geometry. Edge beam.

Requirements for piers is provided in chapter F0.2 – Geometry. Piers.

Railings for landmark type bridge shall be applied. Requirements for railings is provided in chapter F0.2 – Geometry. Railings

Abutment logo per each abutment shall be applied.

Designers can propose alternative technical solution in case it is technically and feasibly justified. Nevertheless the same outer surface geometry should be kept as defined in ALG

- For small portal frame structures (span up to 20m) edge beam can be replaced with simple cast in-situ solution without country identity color

LANDMARK RAILWAY BRIDGE

Commented [DJ13]: This page will be deleted at all as Standart Railway Bridge is eliminated

Commented [EB14]: Proposal to include remark:
- DTD Consultant can propose other technical solution if technically and feasibly justified, but the same outer appearance shall be kept as defined in ALG
- For small portal frame structures (span up to 20m) edge beam can be replaced with simple cast in-situ solution without country identity color

Commented [DJ15]: Adjusted pictures from EDO proposal

Commented [EO16]: Here requirement is softer than for basic bridges, but should be opposite.

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

Additional elements such as i.e. noise Barriers, Fences and overhead catenary protection system etc., shall be assessed case-by-case basis.

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)	✓	✓	✓
LANDMARK TYPE BRIDGE (ITB)	✓	✗	✓

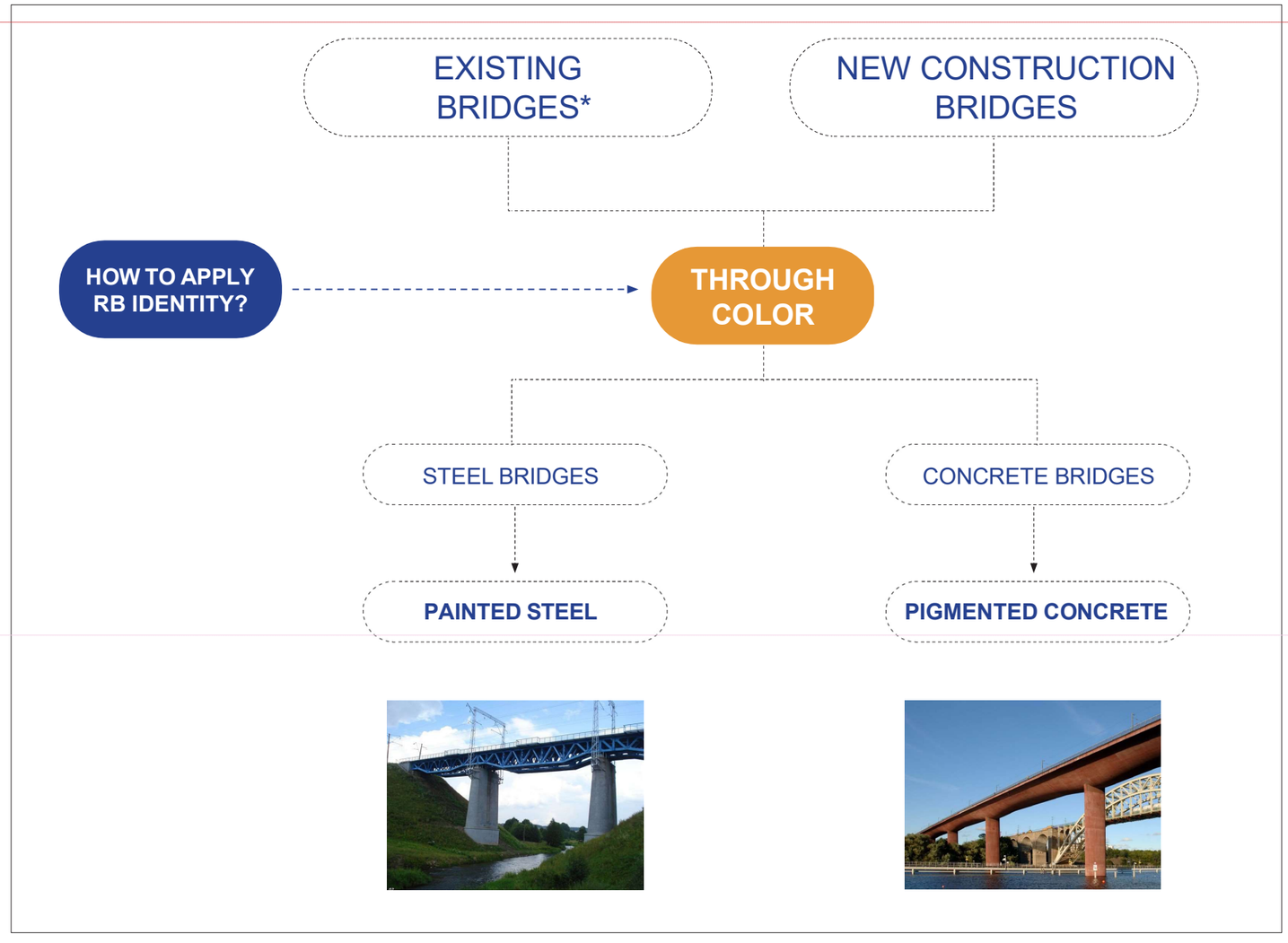
Existing and New Construction Railways Bridges

All along the RB Rail line it will not always be possible to use the two 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 cases it's possible to identify existing bridges by applying the RB identity through the use of color, such measure shall be considered only if it is economically feasible:

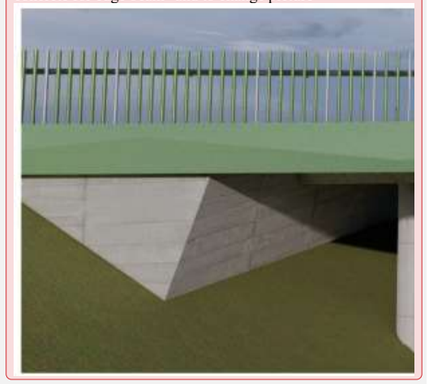
- Painted steel, in presence of steel bridges;
- Pigmented concrete for edge beams, in presence of concrete bridges.



Note:
* Measures for the existing bridges shall be planned only if they are economically feasible.

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

Commented [DJ17]: Proposal to change into "pigmented concrete for edge beam" and to change picture



Commented [EO18]: For existing bridges pigmented concrete is not very feasible.

Embankment & Cut

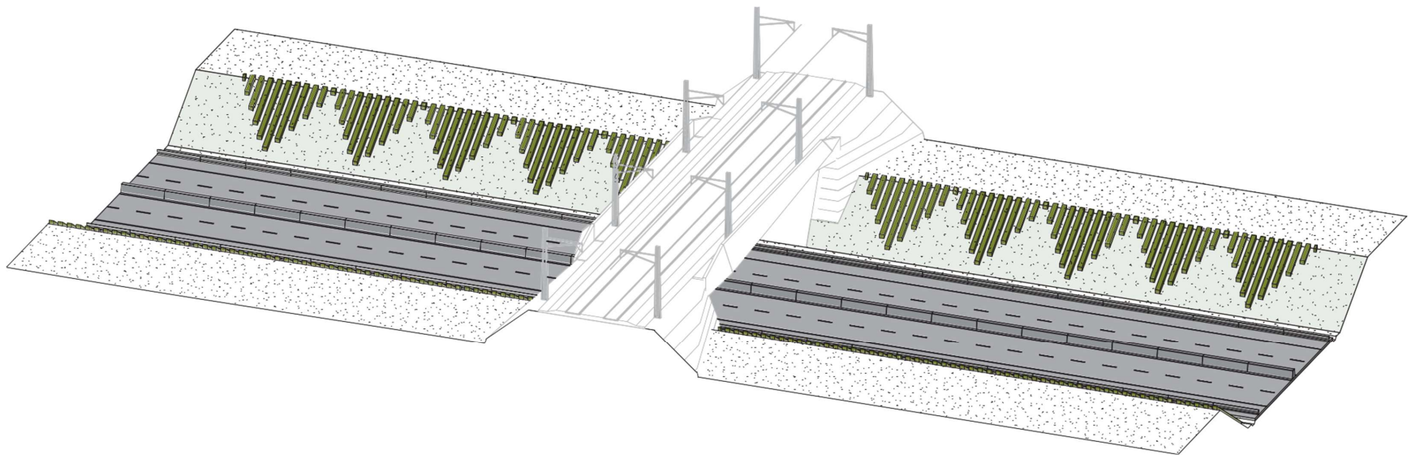
F2

Embankment & Cut

Matrix

F2.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

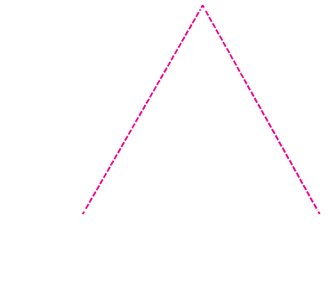
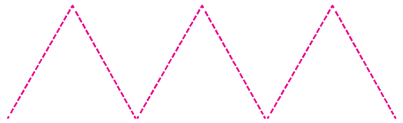
	N	C	R
Embankment & Cut			

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*

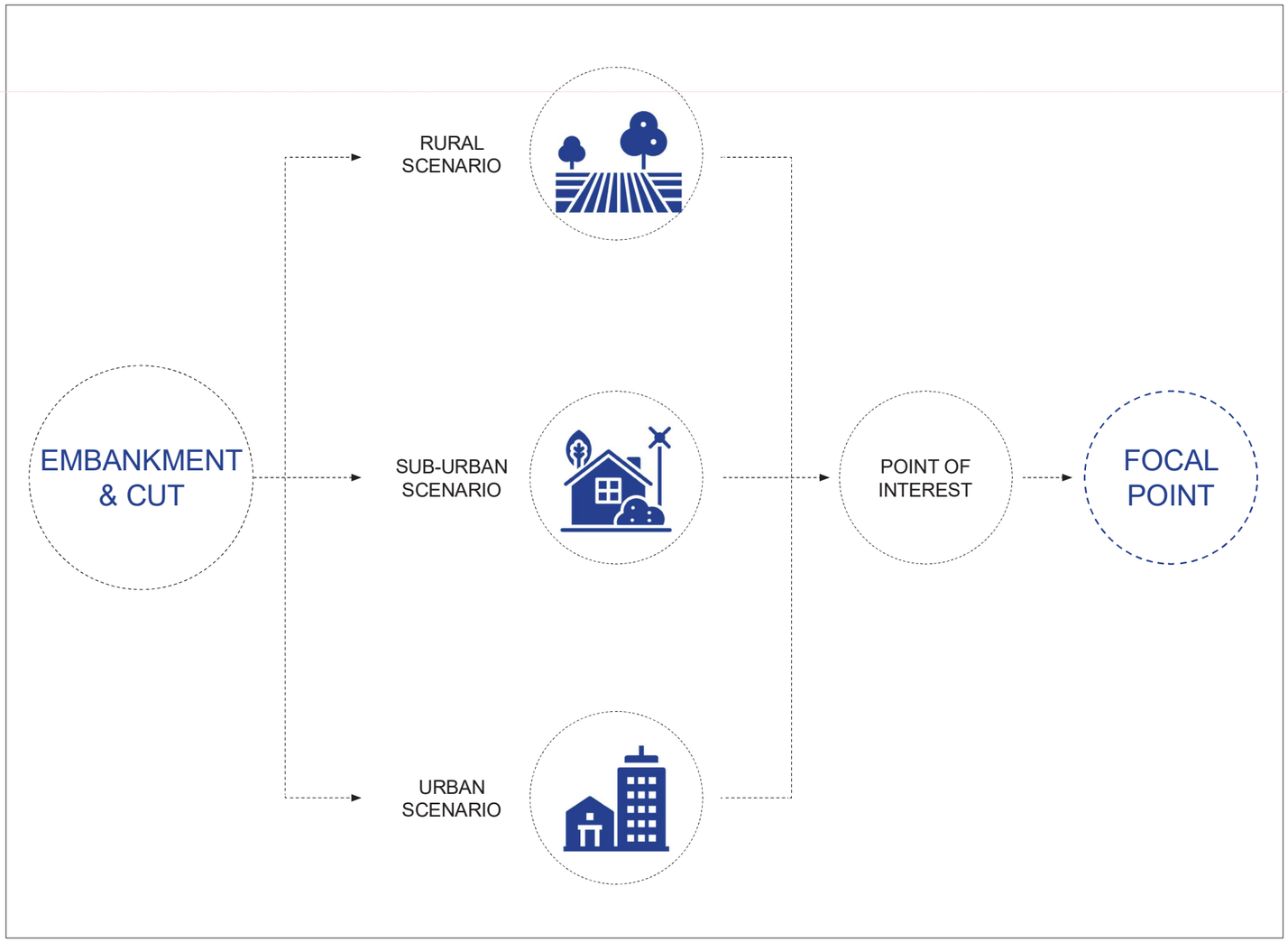
Design Strategy

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 should consider two scenarios:
• All along rail line;
• Focal points

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



Commented [EO19]: Some visual issue with the picture for rural scenario.

Design Strategy

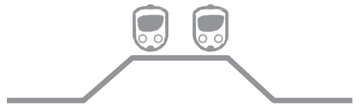
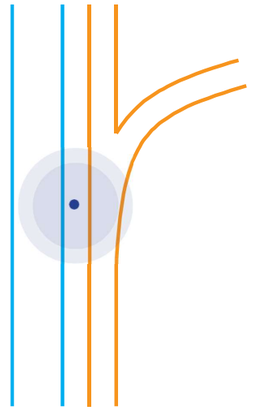
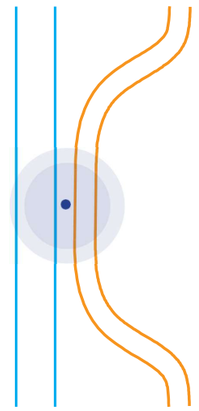
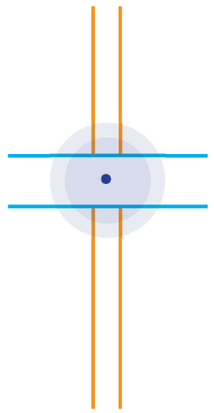
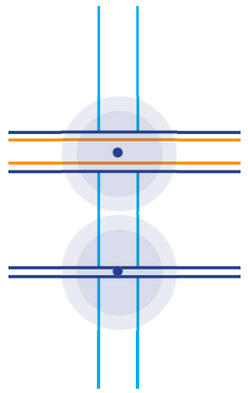
F2.3

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

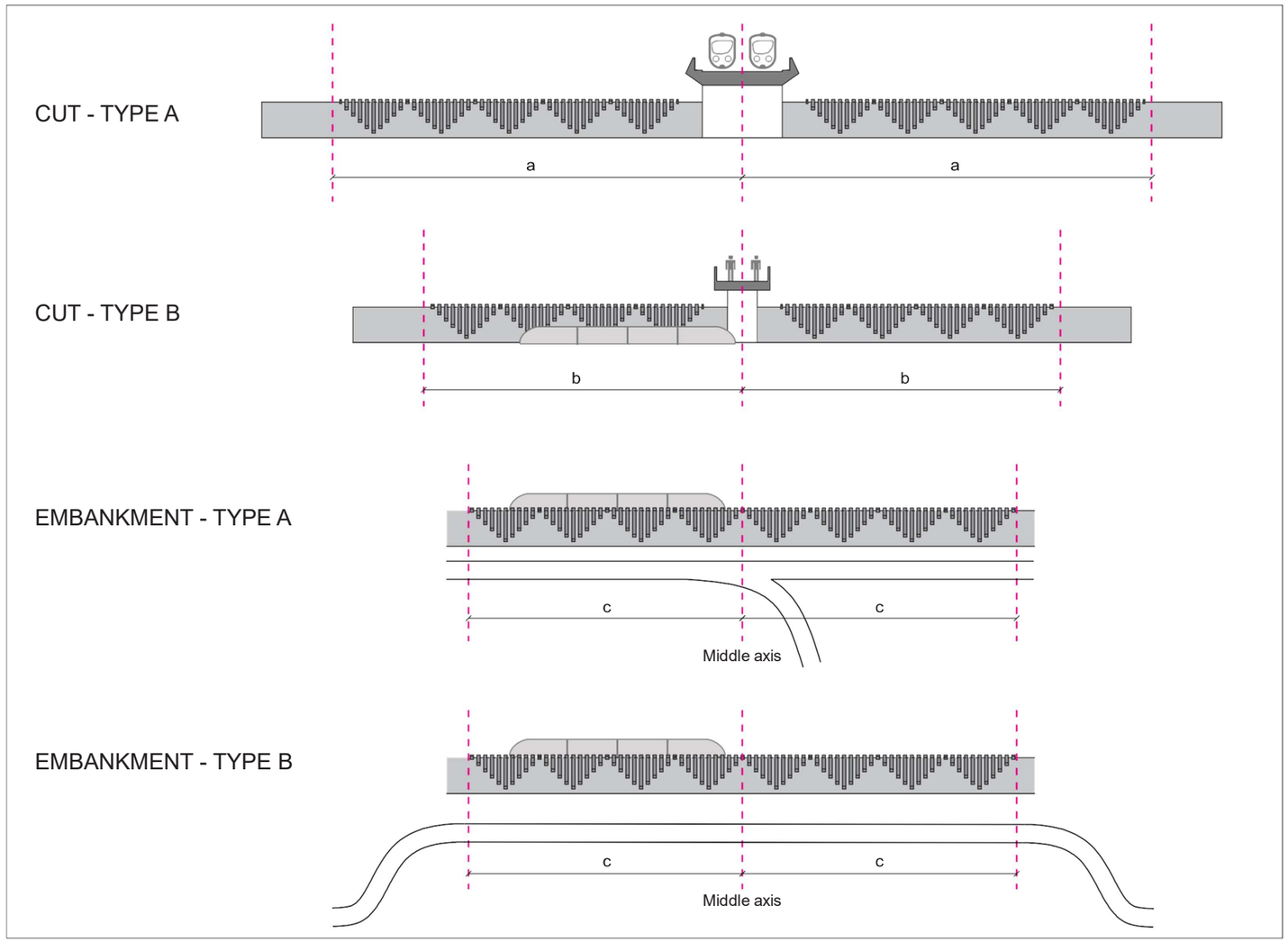
Extensions

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



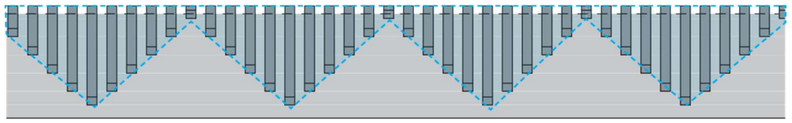
Design Strategy

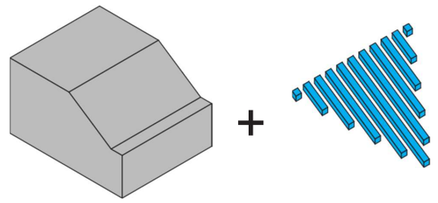
F2.3

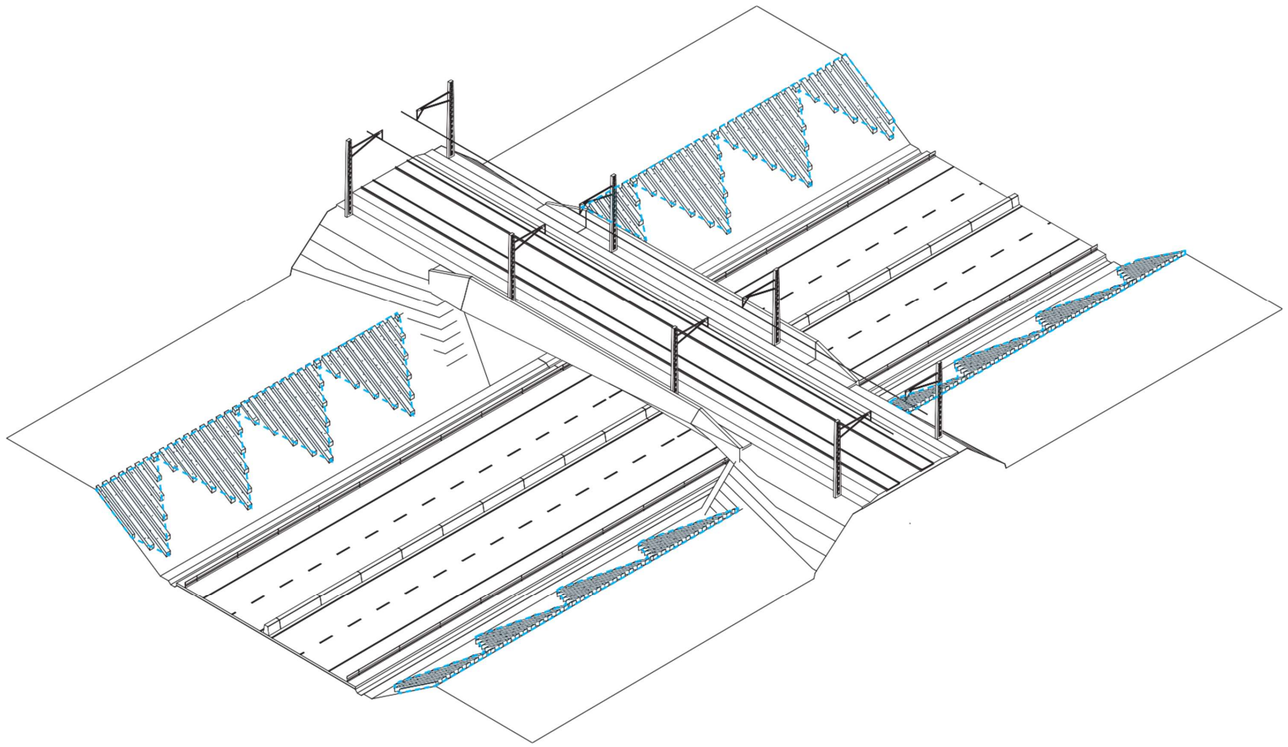
Both the embankments and the cuts are elements regulated by the Architectural, Landscaping and Visual Identity Design Guidelines and characterized

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

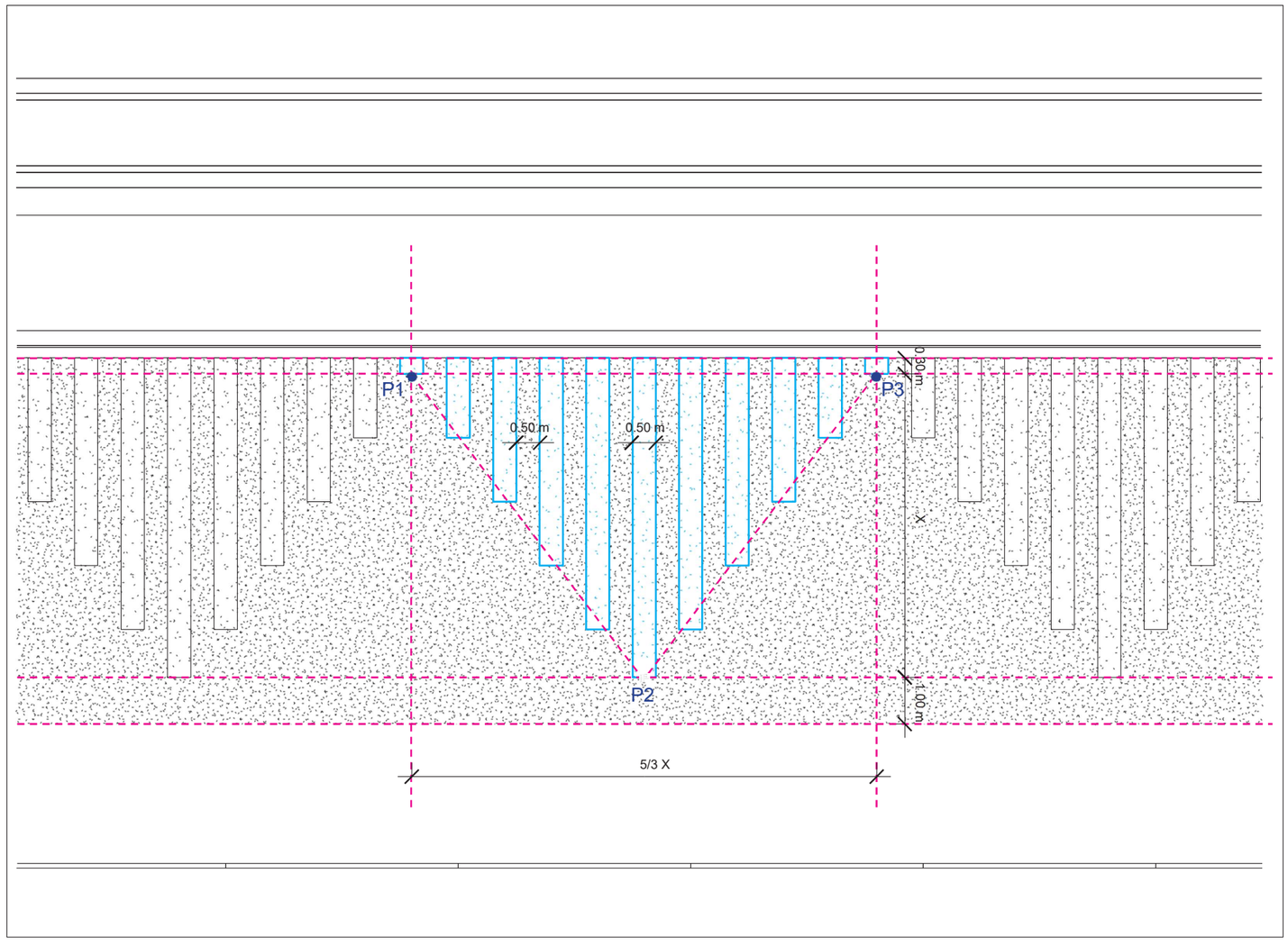
F2.4

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

The vertex P2 of the triangle should 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 should have the width of around 0.50 m.



Geometry

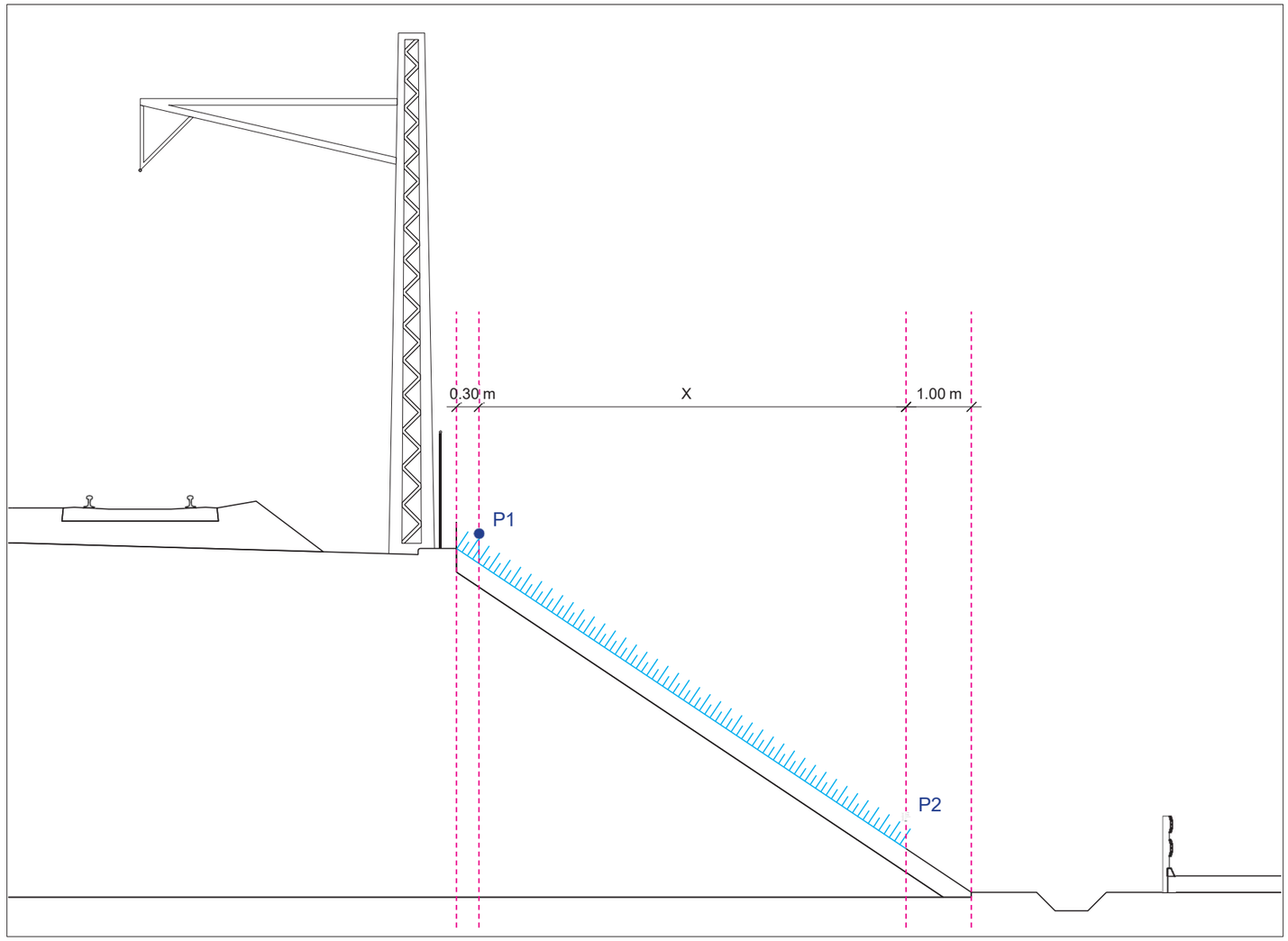
F2.4

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

The vertex P2 of the triangle should 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 should be 1.00 m maximum.



Materials and Vegetation

F2.5

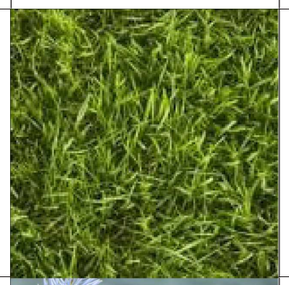
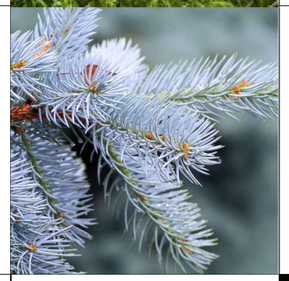
Overview

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.

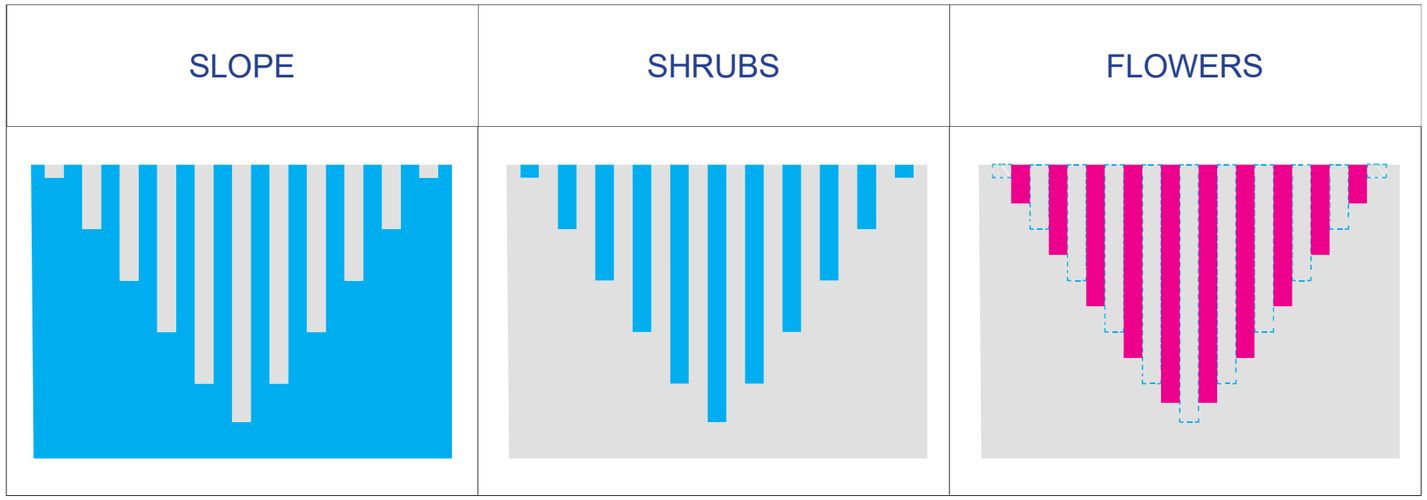
	Network Identity	Country identity		
		Estonia	Latvia	Lithuania
SLOPE				
SHRUBS				
FLOWERS				

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.



Road Overpass

F3

F3.1 Matrix

F3.2 Concept Design

F3.3 Design Strategy

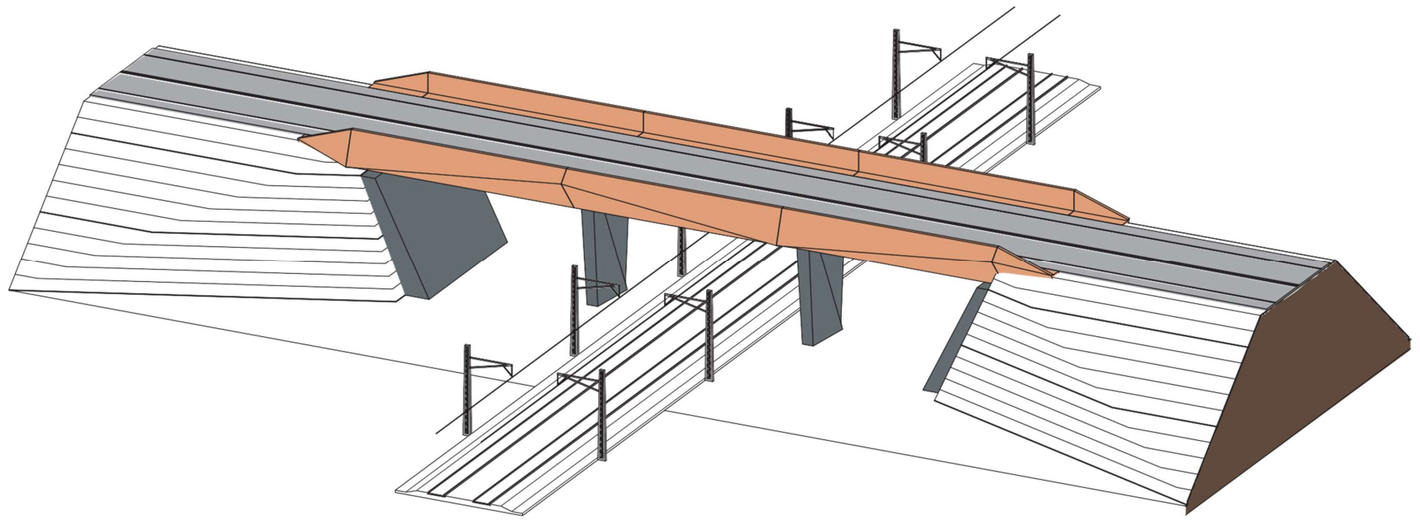
Commented [EB20]: All chapter shall be amended in analogy to Chapter F1. reference to consideration of third parties requirements shall be included.

Road Overpass

Matrix

F3.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

	N	C	R
Road Overpass			

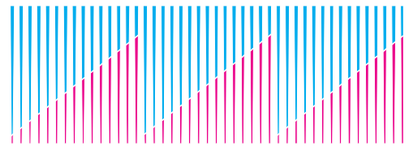
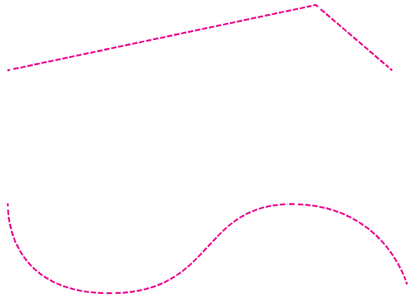
Commented [EO21]: Is the symbol correct here?

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.

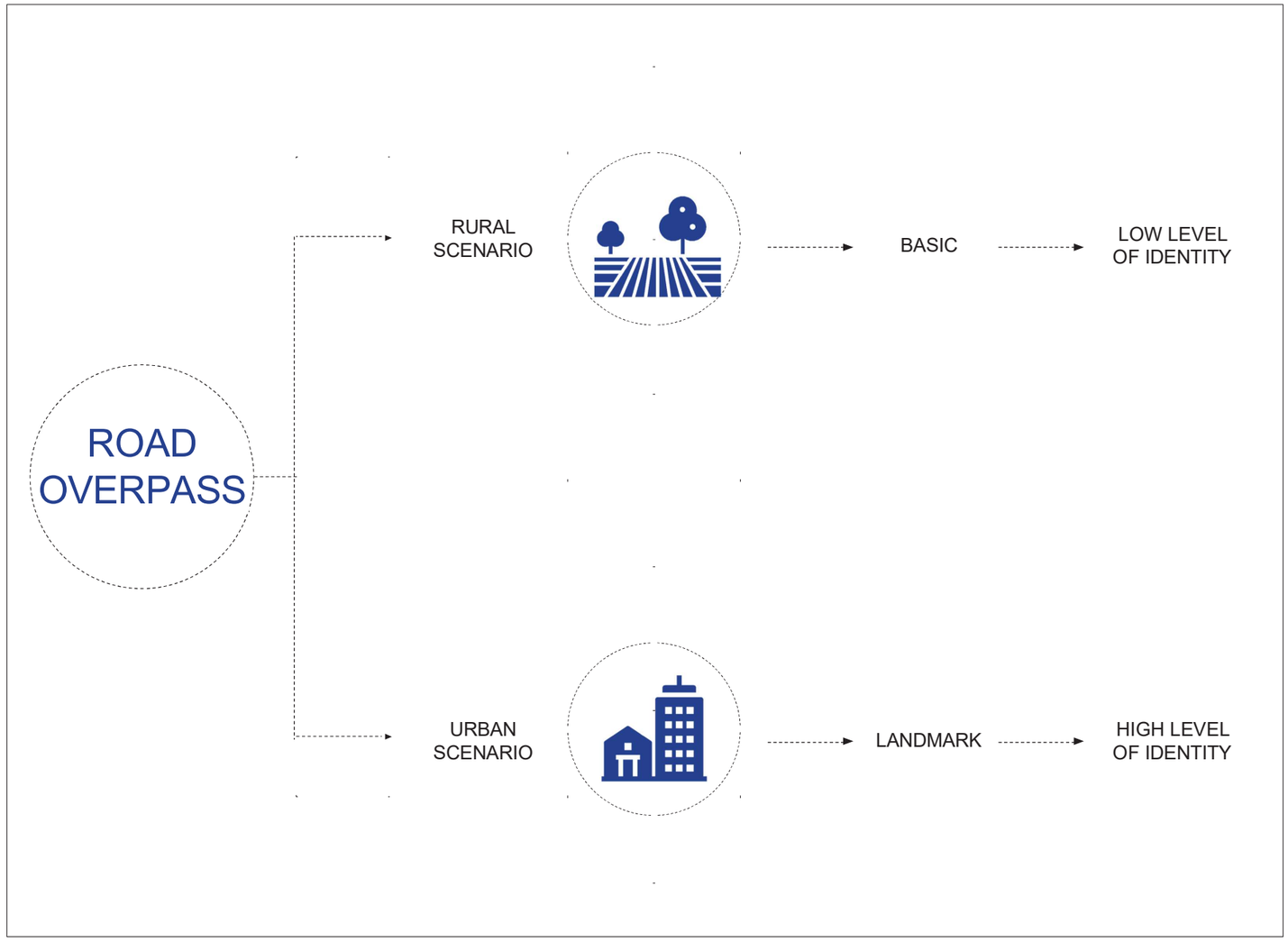
These different surroundings give the need to place different types of bridges along the line, perfectly adapting to the context but respecting and preserving the identity of the Rail Baltica network.

Two different levels of identity were then defined:

- Low level of identity
- High level of identity

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

- Basic 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.

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	BASIC	LANDMARK
EDGE BEAM	✓	
RAILING	✓	✓
ABUTMENT DESIGN	✓	
PIERS	✓	✓
OVERHEAD CATENARY SYSTEM (OSC)	✓	

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. For edge beam non pigmented concrete shall be applied. Geometry of edge beam is provided in chapter F0.2 – Geometry, Edge beam. Plain geometry of piers design is strongly recommended.

Railings for basic road overpasses shall be applied. Desing of railings shall follow the requirements provided in chapter F0.2 – Geometry. Railings.

Abutment logo per each abutment shall be applied.

For overhead catenary protection system (OCPS) transparent methacrylate solutions should be used in accordance with the EN 50122 (Railway applications – Electrical safety) and EN 60529 (Degrees of protection). Handrail and OCPS solutions should be integrated.

Designers can propose other technical solution if technically and feasibly justified but the same outer appearance should be kept as defined in Architectural, Landscape and Visual Identity Design Guidelines. For small portal frame structures (span up to 20m) edge beam can be replaced with simple cast in-situ solution without country identity color.

BASIC ROAD OVERPASS

Commented [DJ22]: Picture taken from IDOM proposal. Nevertheless its not the best choice - logo is not placed on the abutment

Commented [EO23R22]: Agree, also for basic structure edge beam is not pigmented.

Design Strategy

F3.3

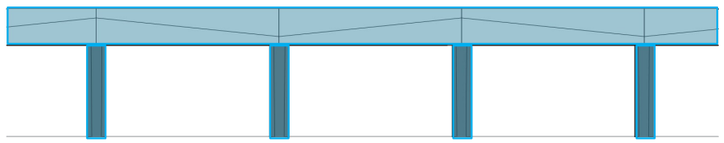
Landmark Road Overpass (LTO)

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

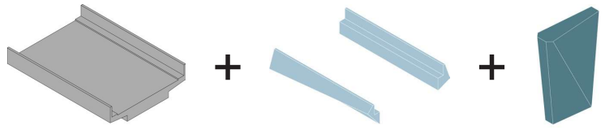
The design of the deck can be to the discretion of the designers but the application of the edge beam is required. The Edge beam geometry is provided in chapter F0.2 – Geometry. Edge beam. . The usage of the pigmented concrete or colors should be used to assign the country identity to the overpass.
The design of the piers is recommended for the landmark overpass if it is compatible with heights and dimensions of the site location.

Railings shall be applied for landmark road overpass. Geometry of railings is provided in chapter F0.2 – Geometry, Railings.
Abutment logo shall be applied per each abutment.
For overhead catenary protection system (OCPS) transparent methacrylate solutions should be used in accordance with the EN 50122 (Railway application - electrical safety) and EN 60529 (degrees of protection). Handrail and OCPS solutions shall be integrated.

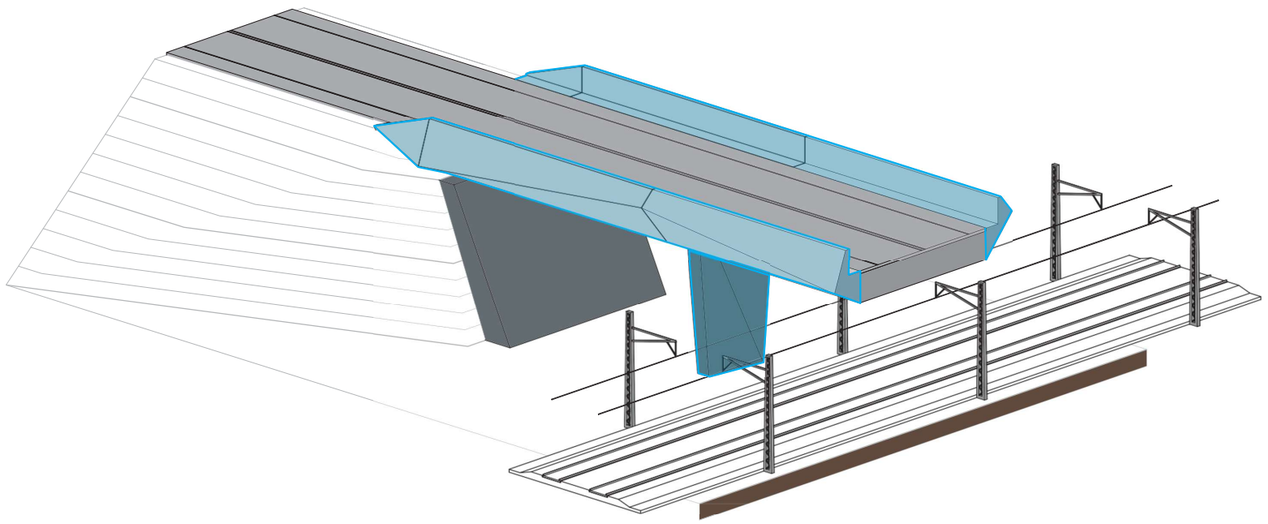
Designers can propose other technical solution if technically and feasibly justified but the same outer appearance should be kept as defined in Architectural, Landscape and Visual Identity Design Guidelines. For small portal frame structures (span up to 20m) edge beam can be replaced with simple cast in-situ solution without country identity color.



LANDMARK ROAD OVERPASS



STRUCTURE + CLADDING + PIERS



Commented [DJ24]: Lacking picture of this type overpass with abutment logo

Commented [EO25R24]: If not already within the documents provided, then I have doubt that we have it. I will take this into consideration, and look what we have.

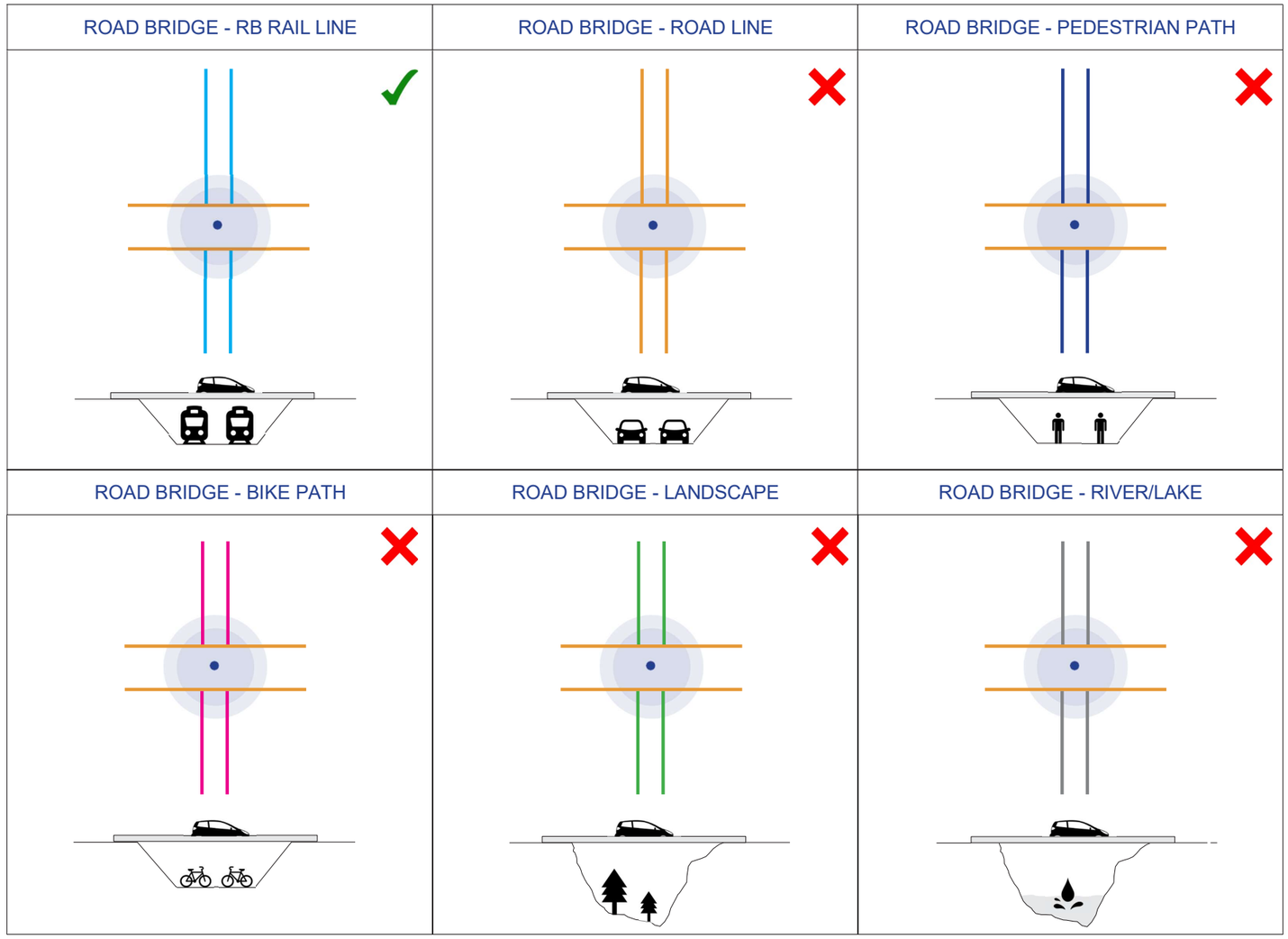
Design Strategy

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.



Legend

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

Materials

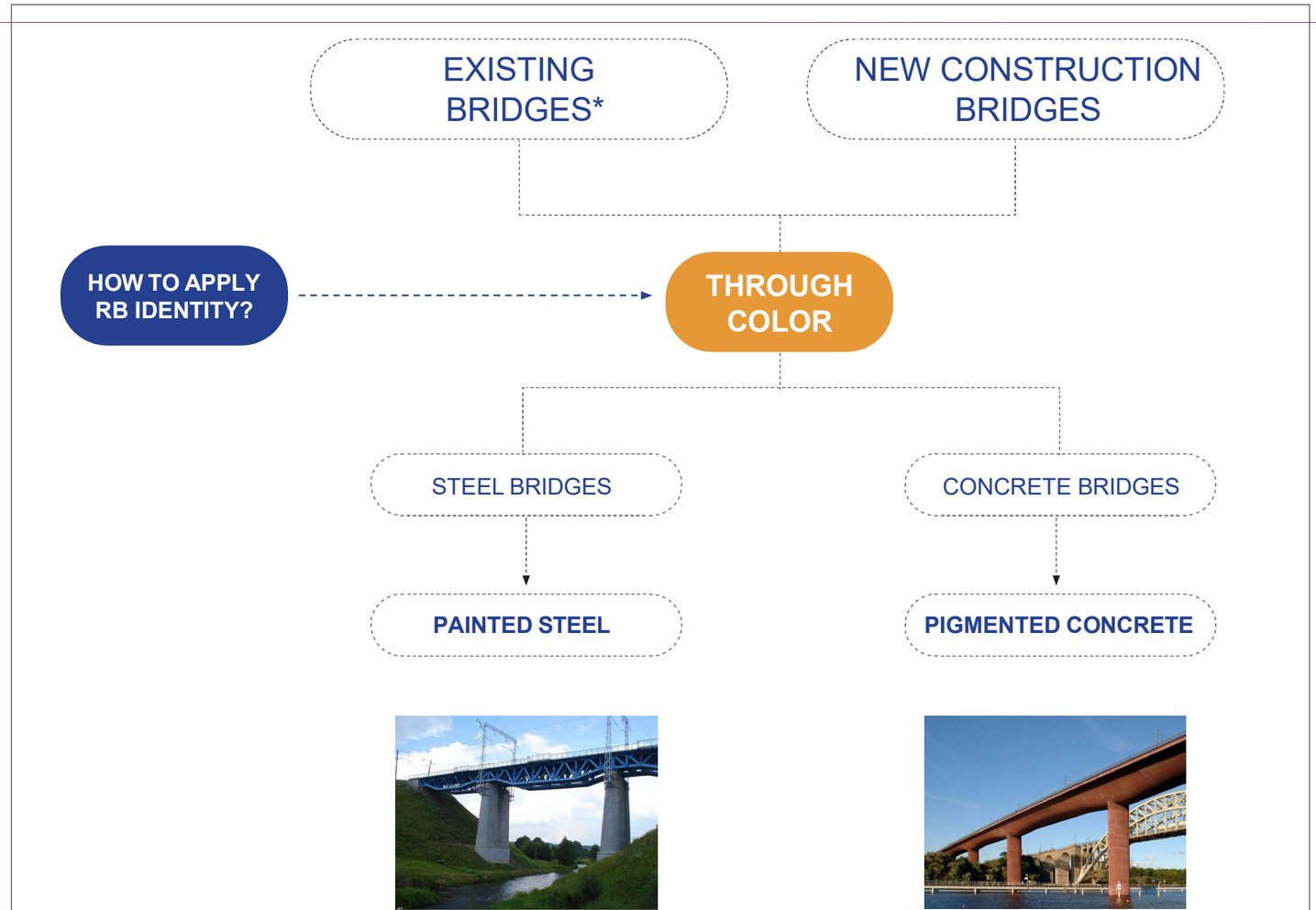
Existing and New Construction Road Overpass

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 cases it's possible to identify existing bridges by applying the RB identity through the use of color, such measure shall be considered only if it is economically feasible:

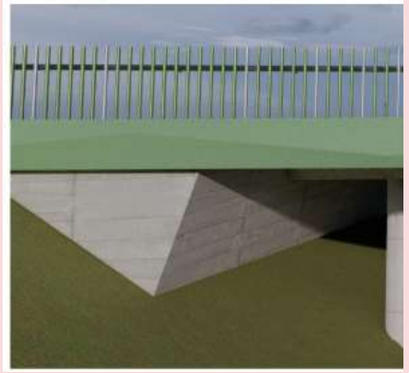
- Painted steel, in presence of steel bridges;
- Pigmented or painted concrete for edge beam, in presence of concrete bridges.



Note:
* Measures for the existing bridges shall be planned only if they are economically feasible.

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

Commented [DJ26]: Proposal to change into "pigmented concrete for edge beam" and to change picture



Commented [EB27R26]: Same comments as in F1. I doubt we would be painting existing structures 😊

Noise Barrier

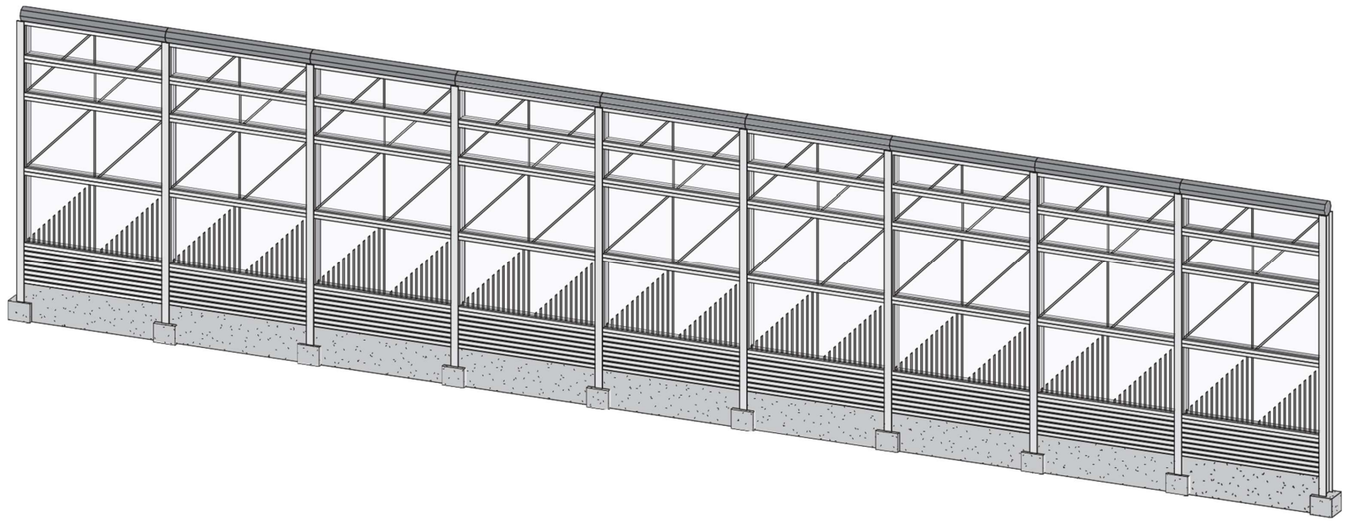
F4

Noise Barrier

Matrix

F4.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

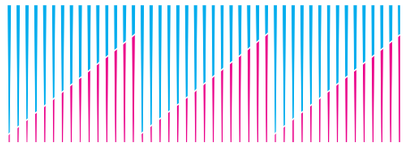
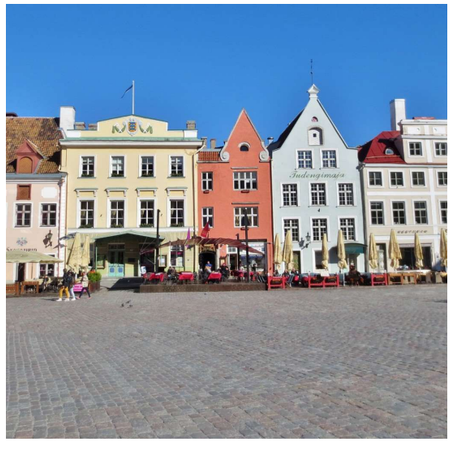
	N	C	R
Noise Barrier			

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

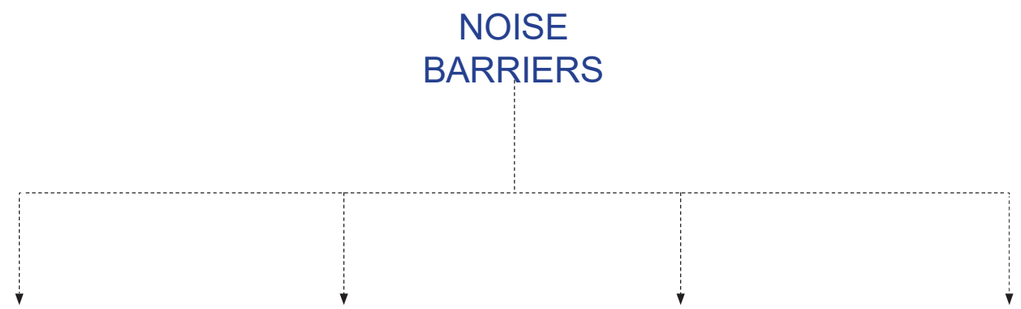
Overview

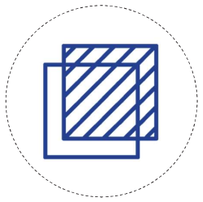
The Noise Barriers will be located in areas where is required according to national legislation, crossing different types of scenarios.

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.

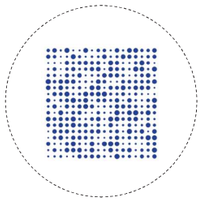
Four different types of noise barriers are defined:

- Transparent
- Absorbing
- Earth
- Wooden

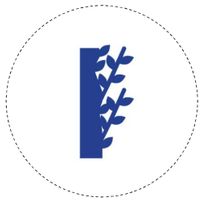




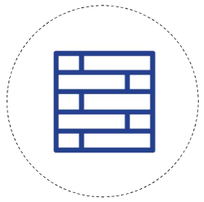
Transparent



Absorbing



Earth



Wooden

Design Strategy

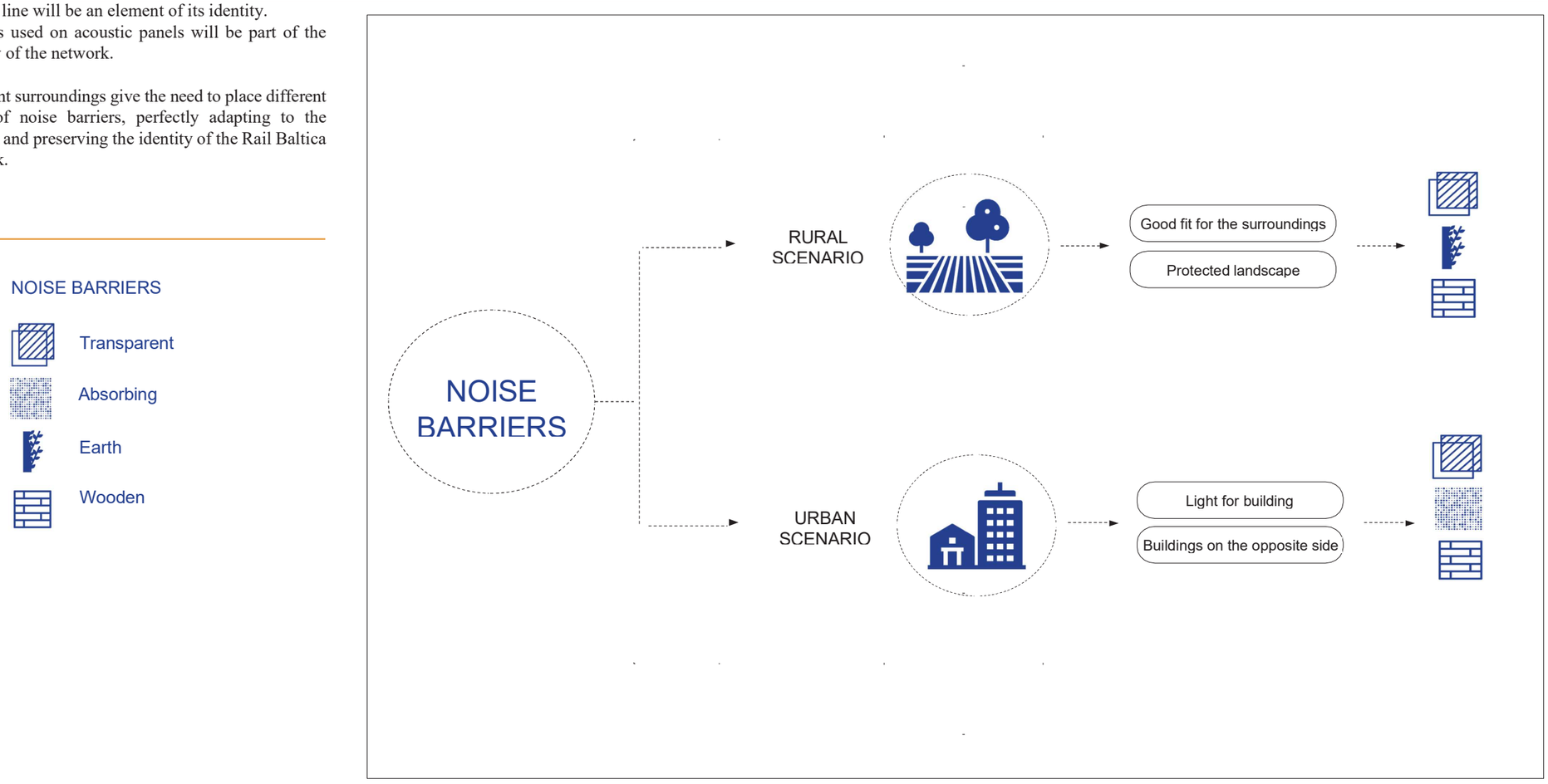
F4.3

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.

Commented [DJ28]: Sub - urban scenario pictograms were deleted



Design Strategy

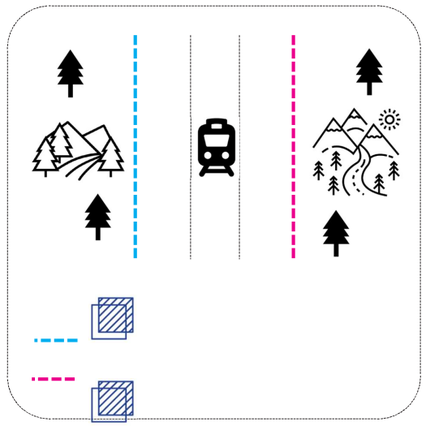
F4.3

Noise Barriers and Scenarios - examples

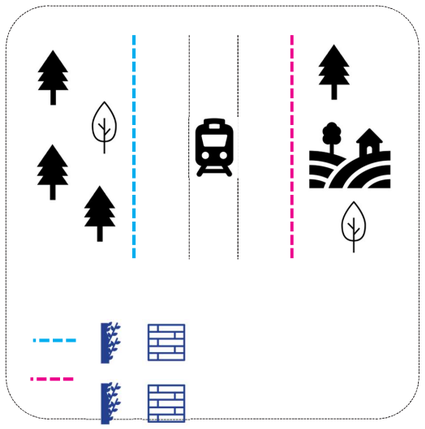
In places where there are buildings on both sides of the railway line, one should not use transparent barriers on one side of the railway line. Barriers of this type reflect sound, which can worsen acoustic conditions on the opposite side of the railway line. A good solution in these situations are absorbing 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.

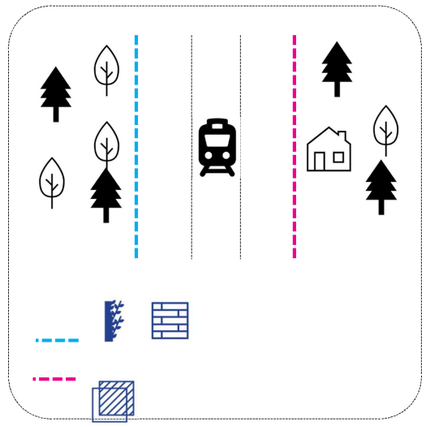
Protected landscape



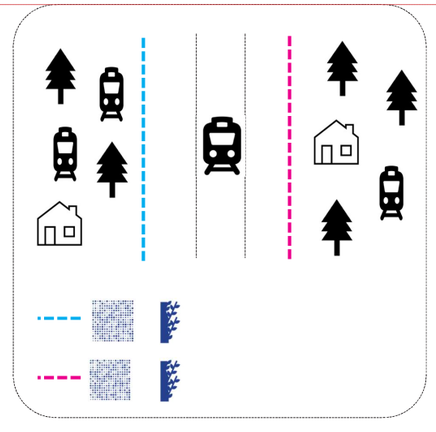
Rural areas, forests



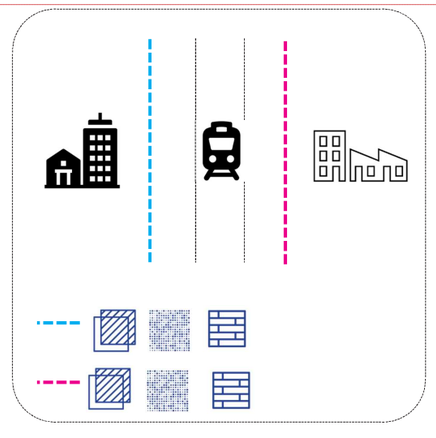
Light for buildings



Buildings on the opposite side



Urban scenario

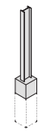
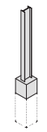
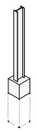
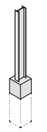
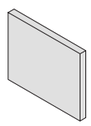
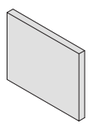
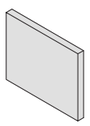
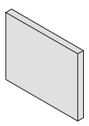
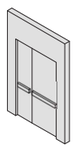
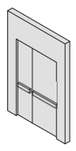
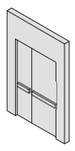
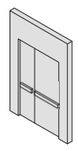
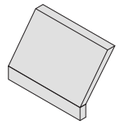
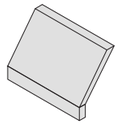
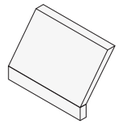
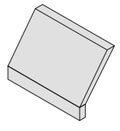
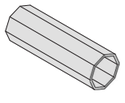
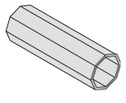
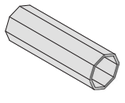
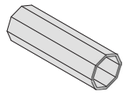


Commented [DJ29]: Sub - urban scenario pictogram was deleted

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

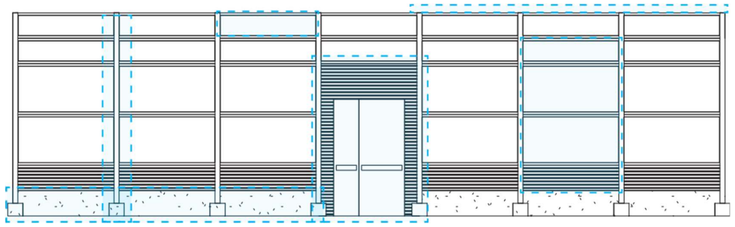
Transparent noise barriers can be used in all types of areas - urban, suburban and rural. On the one hand, their features assure access to light for buildings, and on the other, enable to view valuable landscapes for people traveling by rail. They can also be used in conjunction with other types of acoustic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

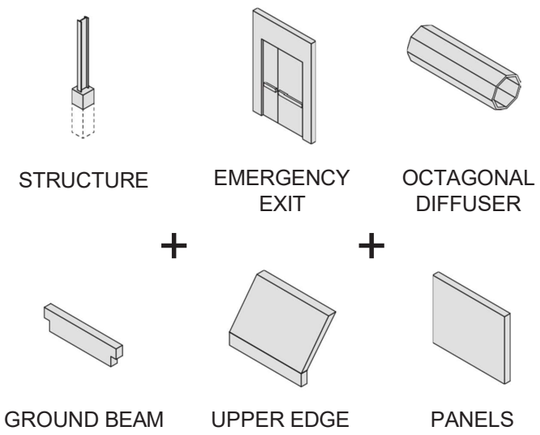
In some situations, it is advisable to combine transparent barriers with sound diffusion barriers. The decision about the necessity to apply such a solution should be made after consulting with an acoustic engineer.

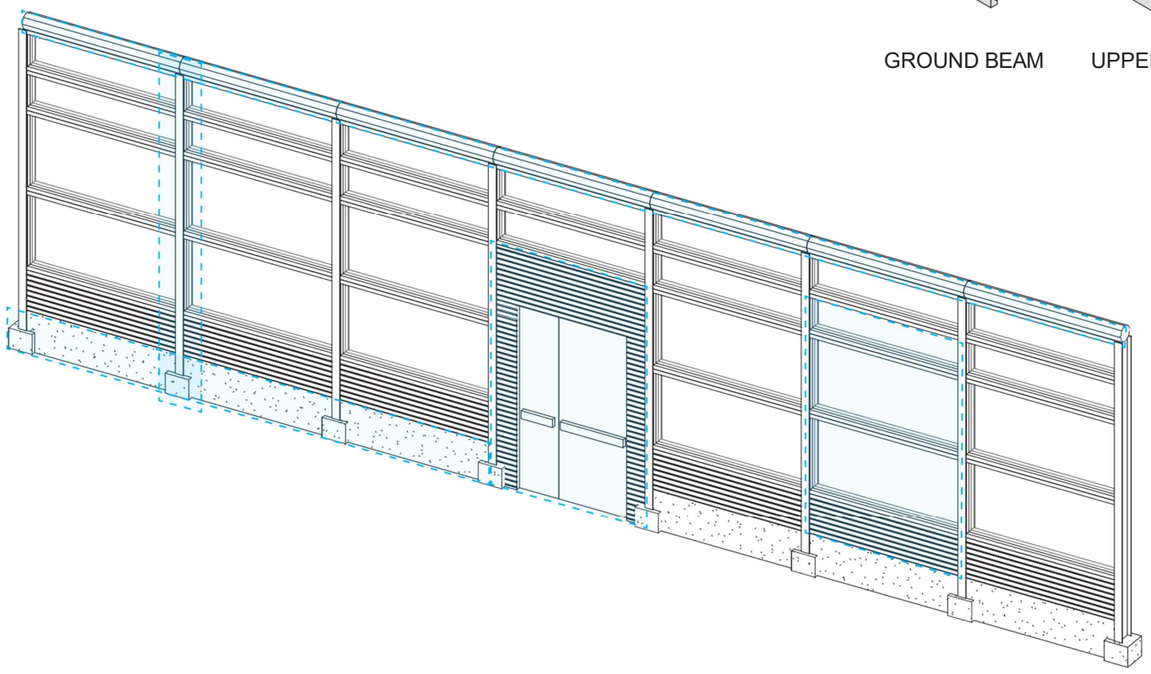
Transparent Noise Barriers are composed by:
- Supporting structure
- Ground beams
- Plexiglass panels
- Sound dampening panels
- Emergency exits
- Upper edges (if necessary)
- Octagonal diffuser (if necessary)

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

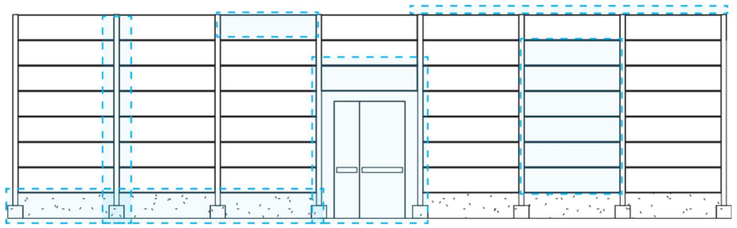
Sound absorbing barriers should be used in places where there are buildings or areas on the opposite side of the railway line that should be protected against noise. This type of screens is particularly well suited for narrow urban areas. It can be used also in suburban areas. The screens may have a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

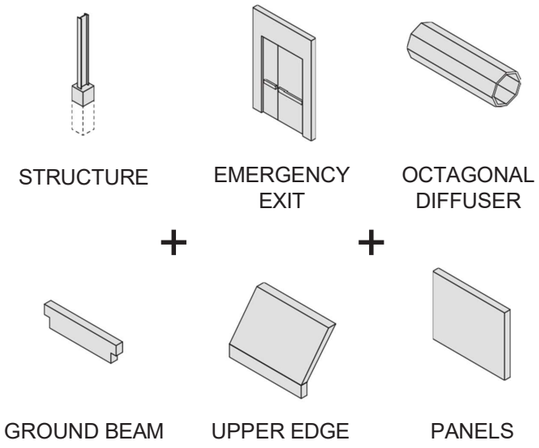
Absorbing Noise Barriers are composed by:

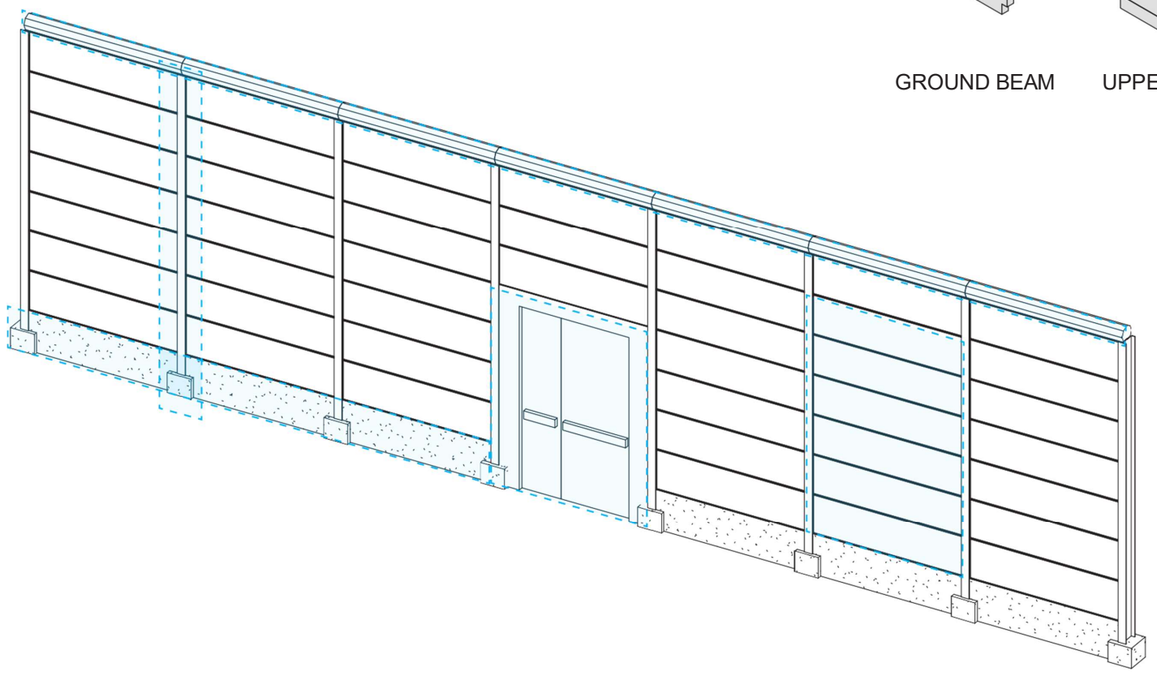
- Supporting structure
- Ground beams
- Metal perforated absorptive panels
- Emergency exits
- Upper edges (if necessary)
- Octagonal diffuser (if necessary)

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.







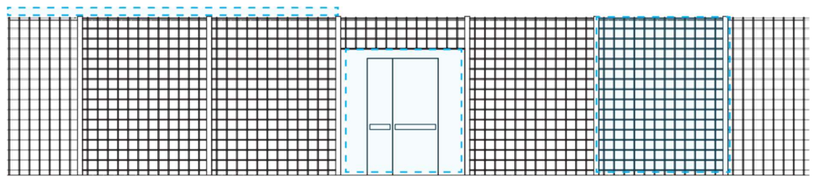
Design Strategy

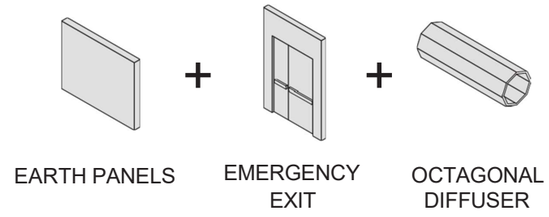
F4.3

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.

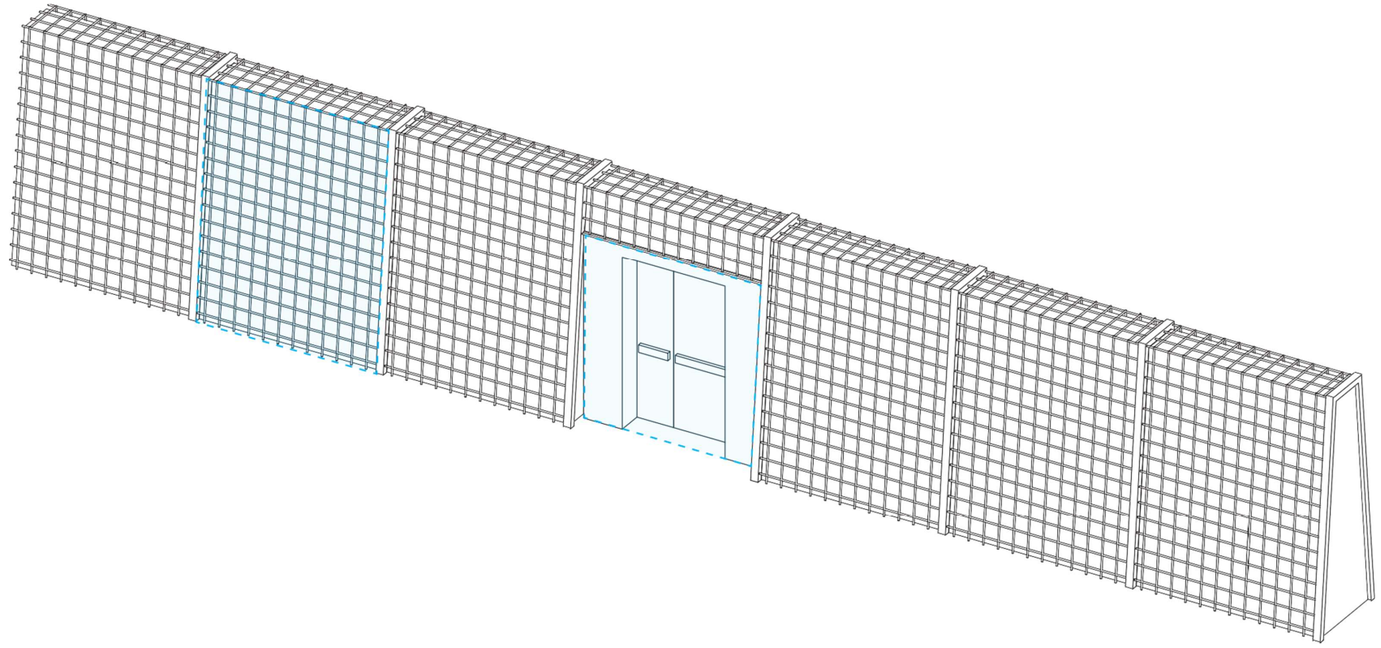
Earth Noise Barriers are composed by:
- Earth panels with vegetation
- Emergency exits
- Octagonal diffuser (if necessary)





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

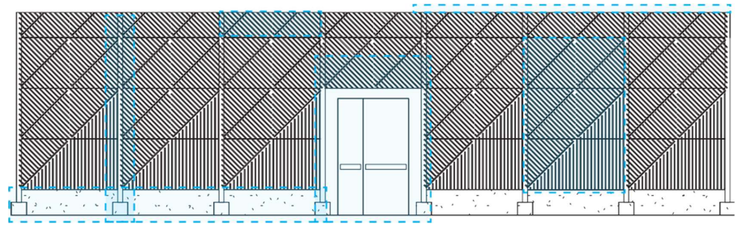
Wooden Noise Barriers

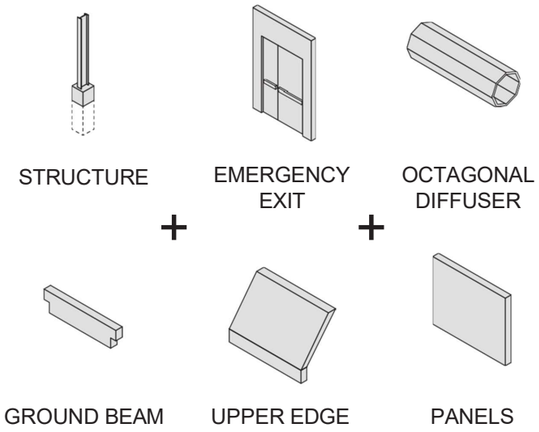
Wooden noise barriers fit very well with the regional landscape of the Baltic countries. These devices should be used in the rural areas. The natural appearance of wood makes these devices look good in such surroundings. They can harmonise well with other types of acoustic screens.

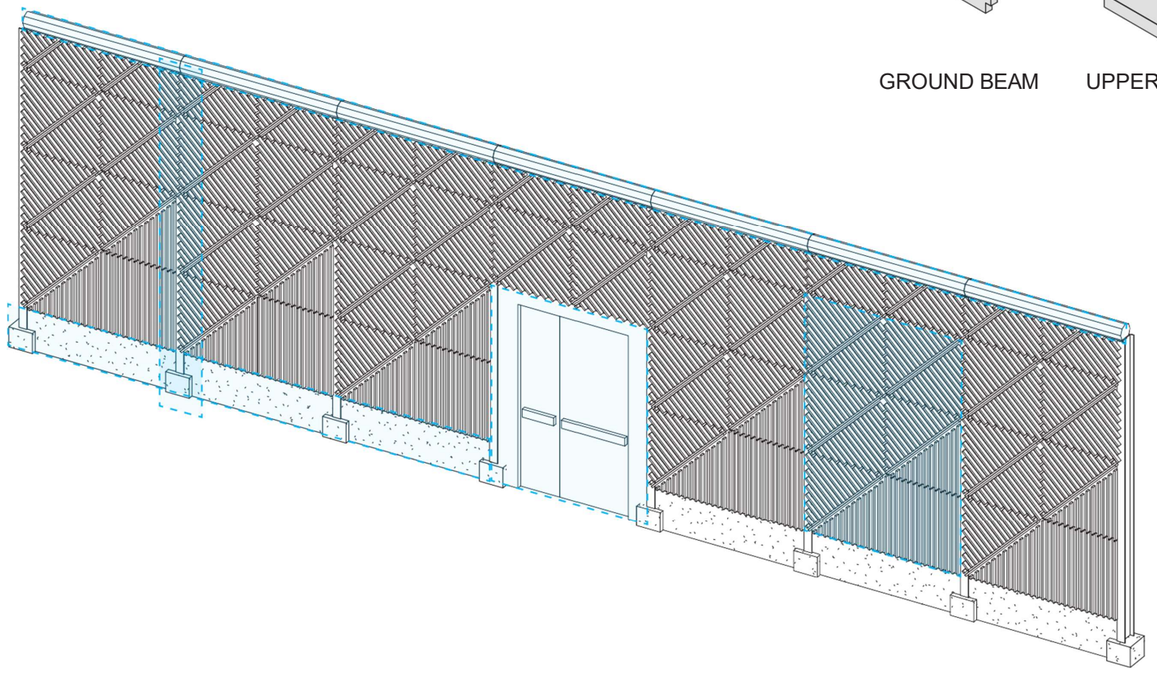
Wooden Noise Barriers are composed by:
- Supporting structure
- Ground beams
- Wooden panels
- Emergency exits
- Upper edges (if necessary)
- Octagonal diffuser (if necessary)

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

. 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 should adapt to the context, preserving the identity of Rail Baltica, the additional elements should 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

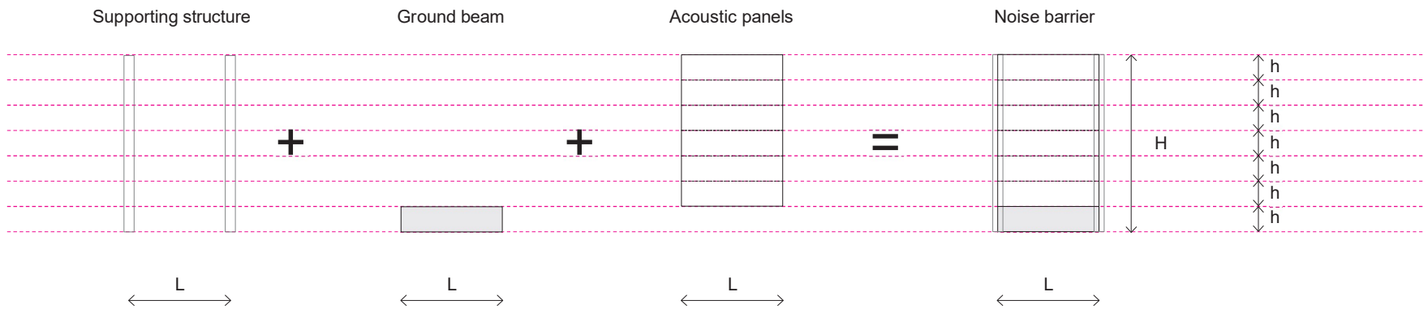
The height of noise barriers is determined on the basis of specialist acoustic calculations.

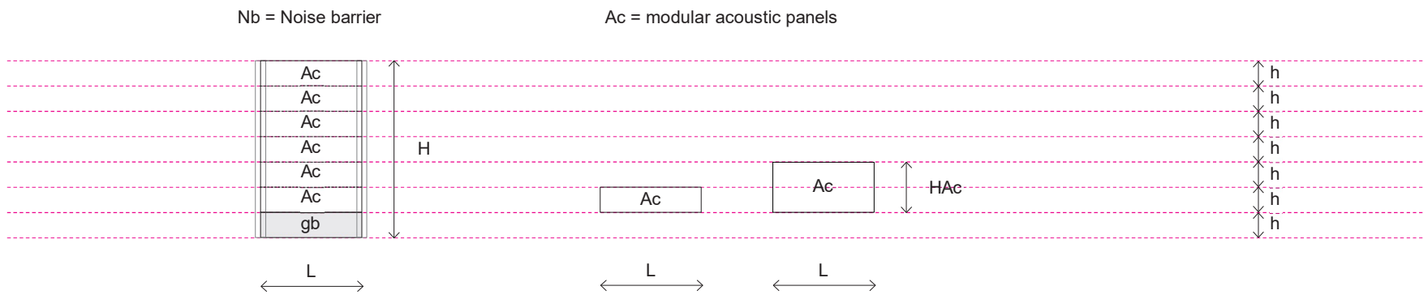
It depends on the size of the train traffic, their speed and type, as well as the terrain, location and height of protected buildings.

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 should 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^i 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 = $0,5^i$ m
i - Parameters are indicative.

Geometry

F4.4

Typologies

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

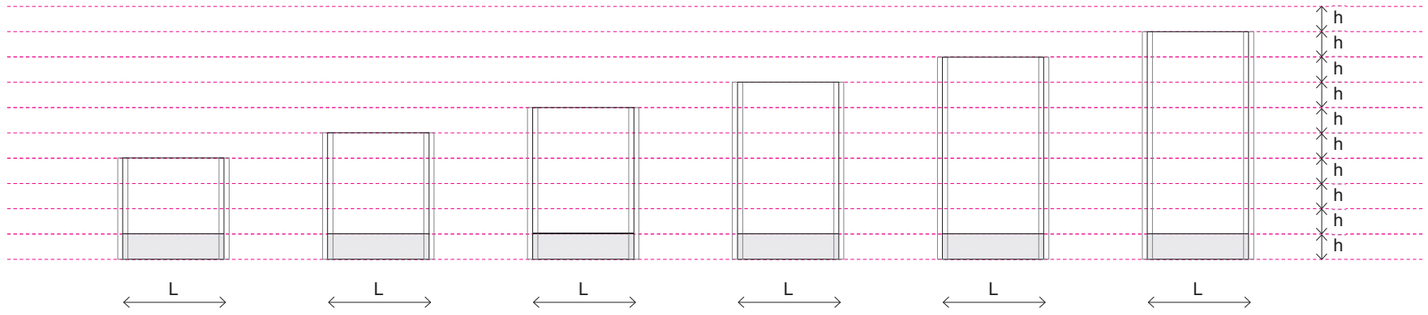
- Standard barriers, without bending the upper edges;
- Barriers with bends or arcs on the upper edges

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

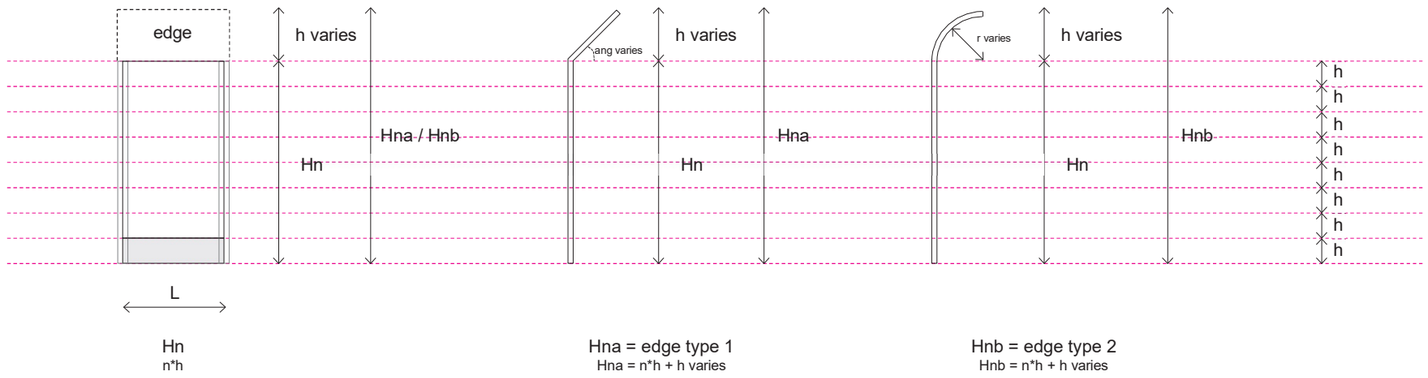
For standard barriers, one starts from the lowest barrier, the H0 type, increasing the height for each type by one module, (H1, H2...Hn).

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

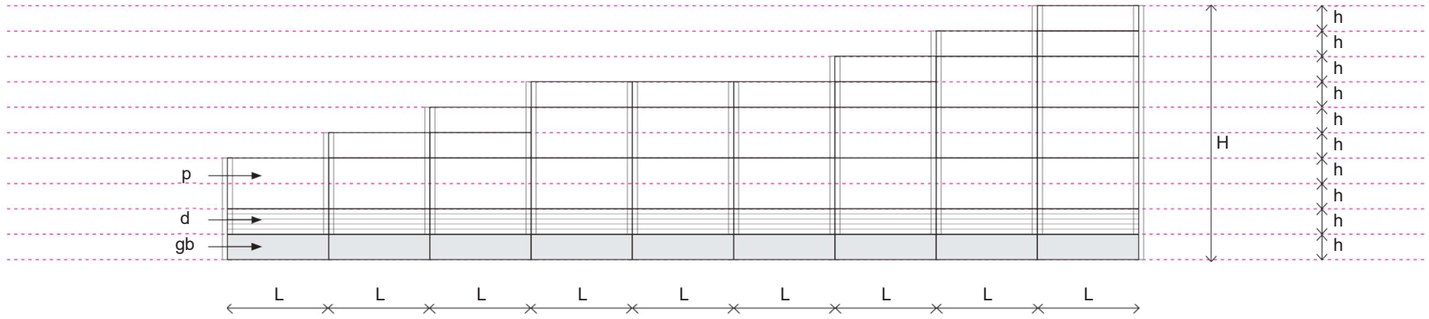
Composition and Gradation - Transparent Noise Barriers

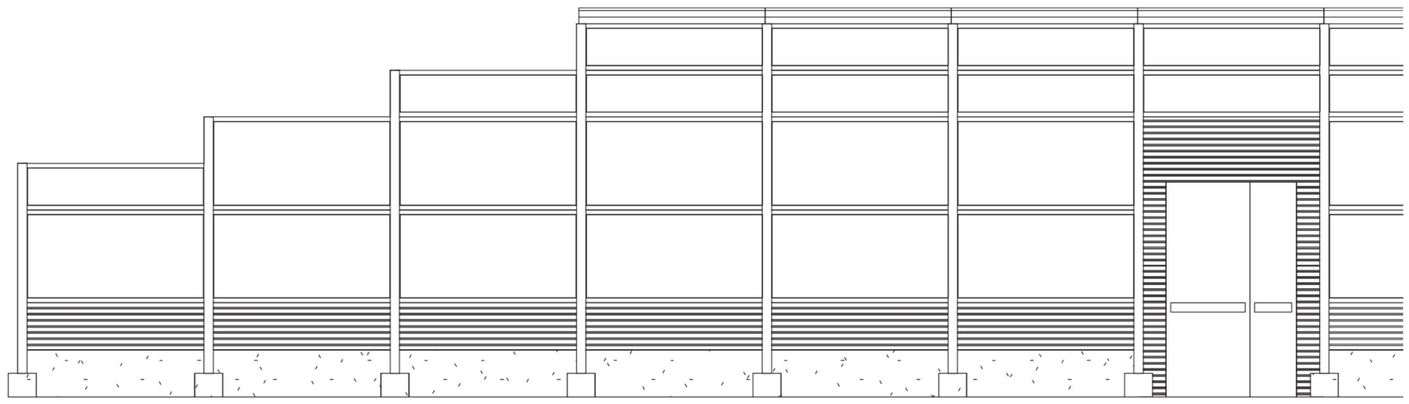
Noise barriers can have different heights. It depends on many parameters (number of trains, height of buildings, location of barriers, etc.). An acoustic engineer shall decide on the height of the barrier. As a rule, noise barriers used on railway lines have a height of 2 to 4 m, with the possibility 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
Parameters are indicative.

Geometry

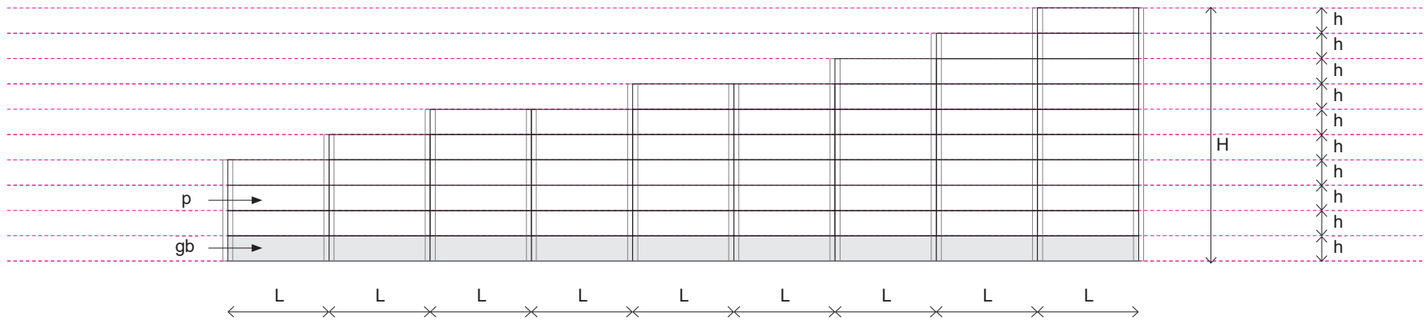
F4.4

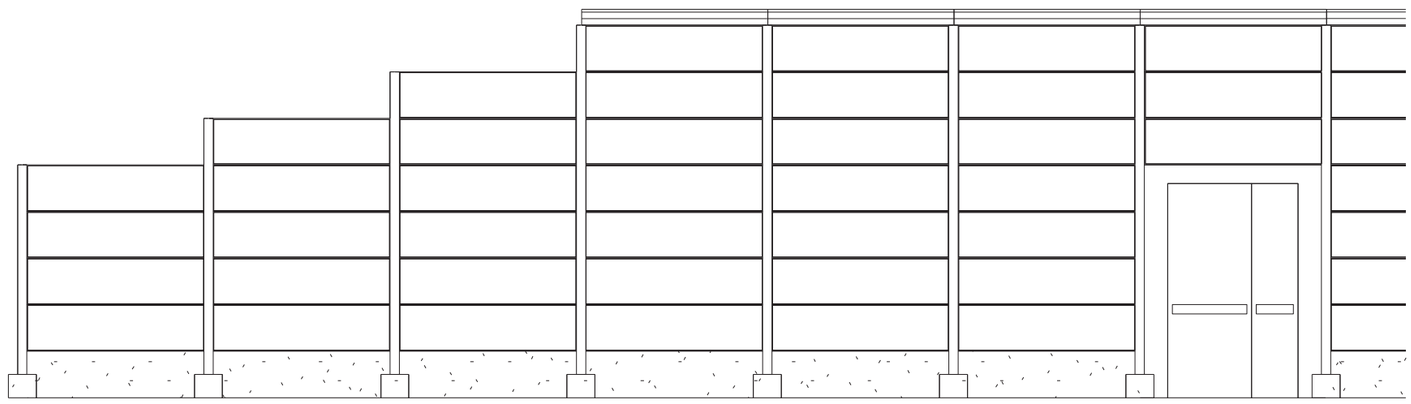
Composition and Gradation - Absorbing Noise Barriers

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
Parameters are indicative.

Geometry

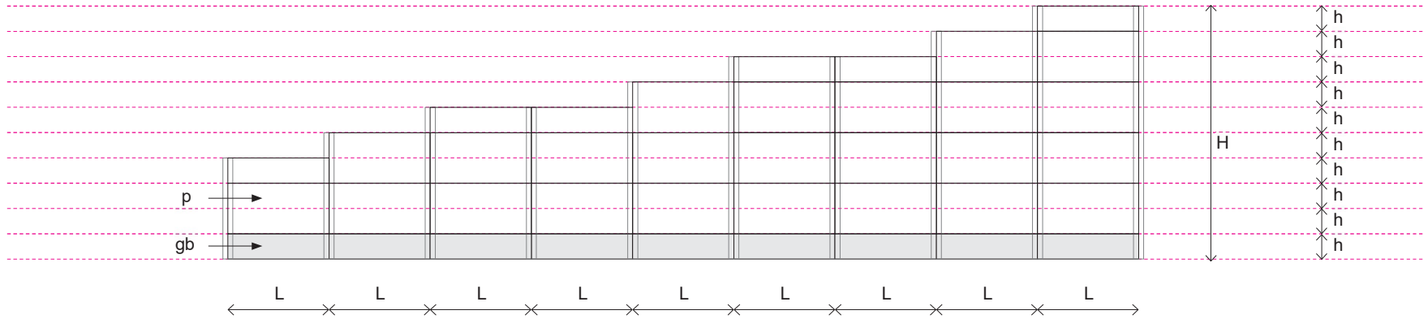
F4.4

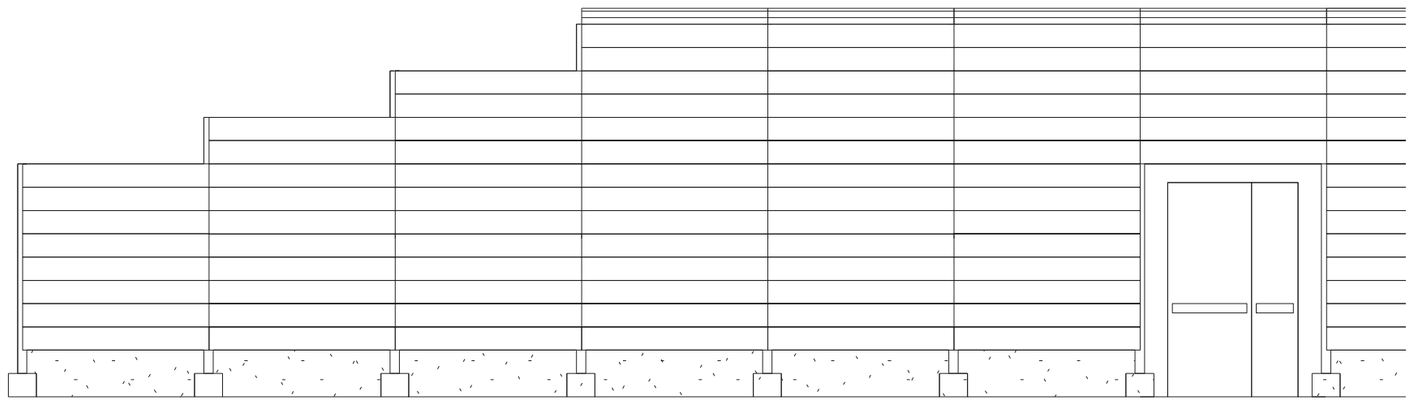
Composition and Gradation - Wooden Noise Barriers

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 should 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
Parameters are indicative.

Geometry

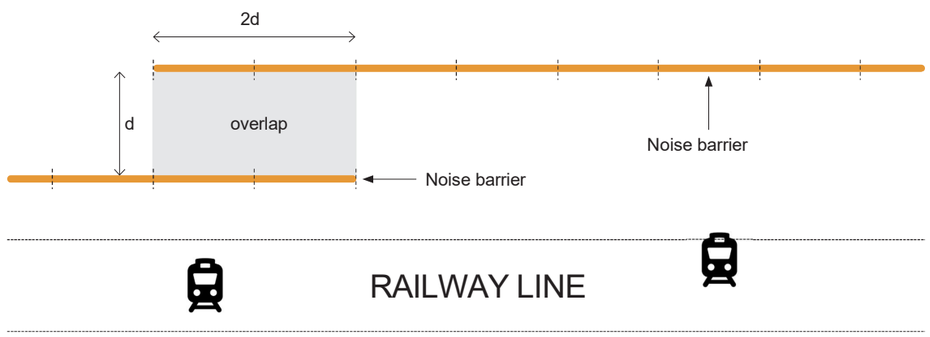
F4.4

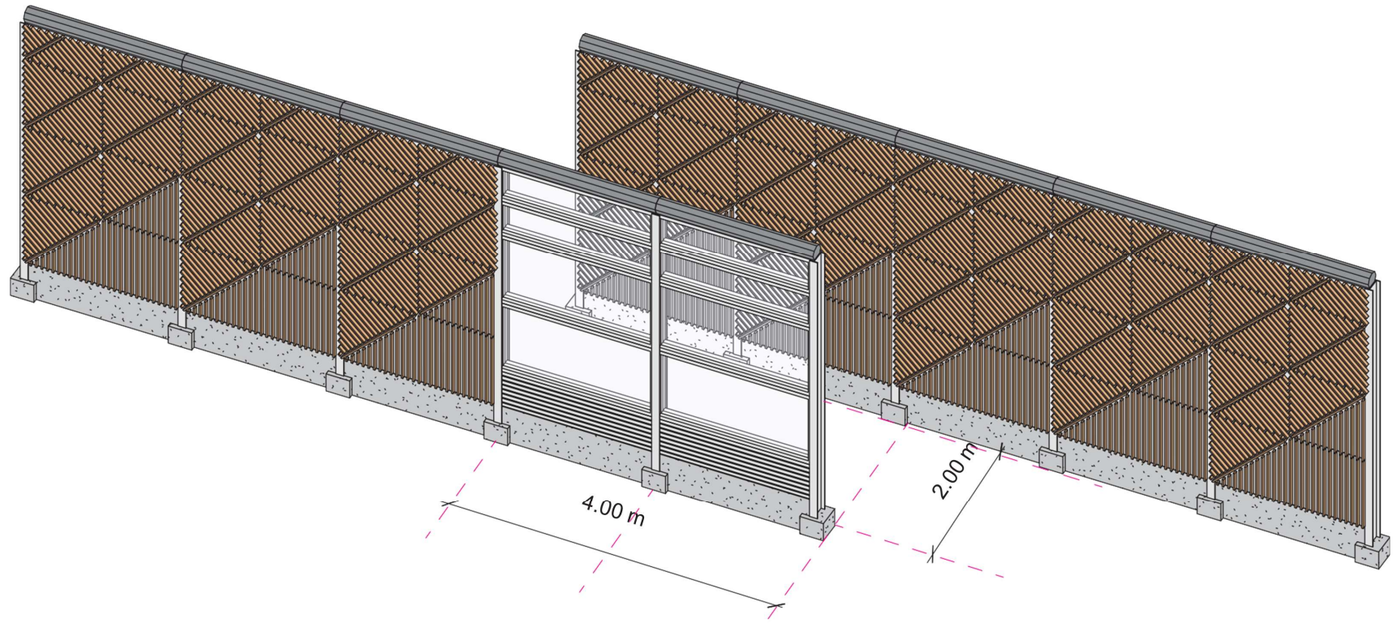
Overlaps

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

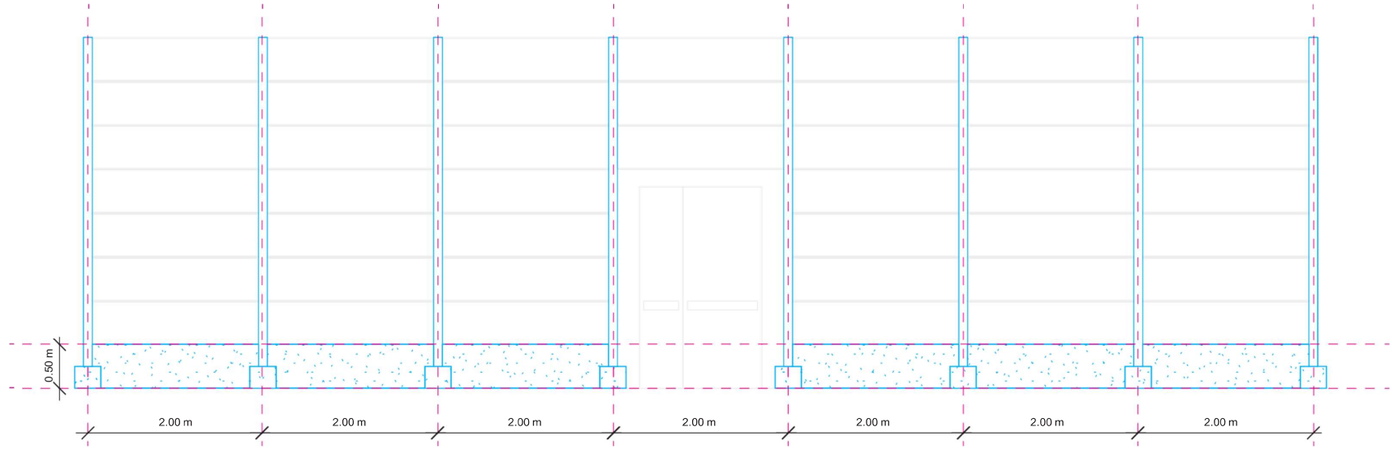
The noise barrier support structure consists of two main elements:

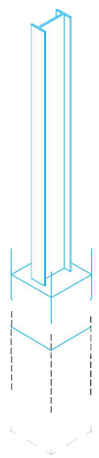
- Steel poles;
- Ground beam.

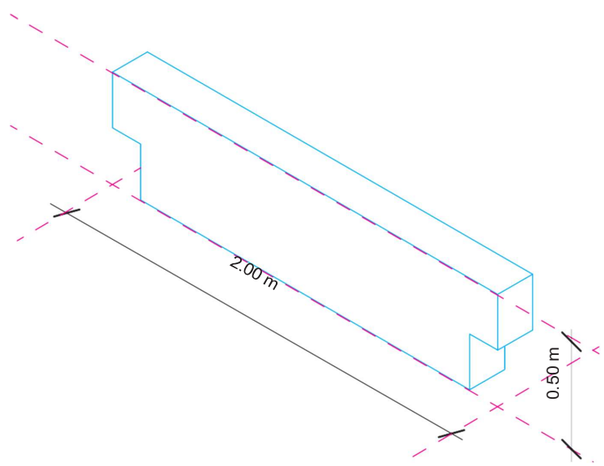
The columns are fastened to underground foundations. The foundation depth should be determined by the designer. It depends on the height of noise barriers and the specificity of the ground.

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.







Note:
Parameters are indicative.

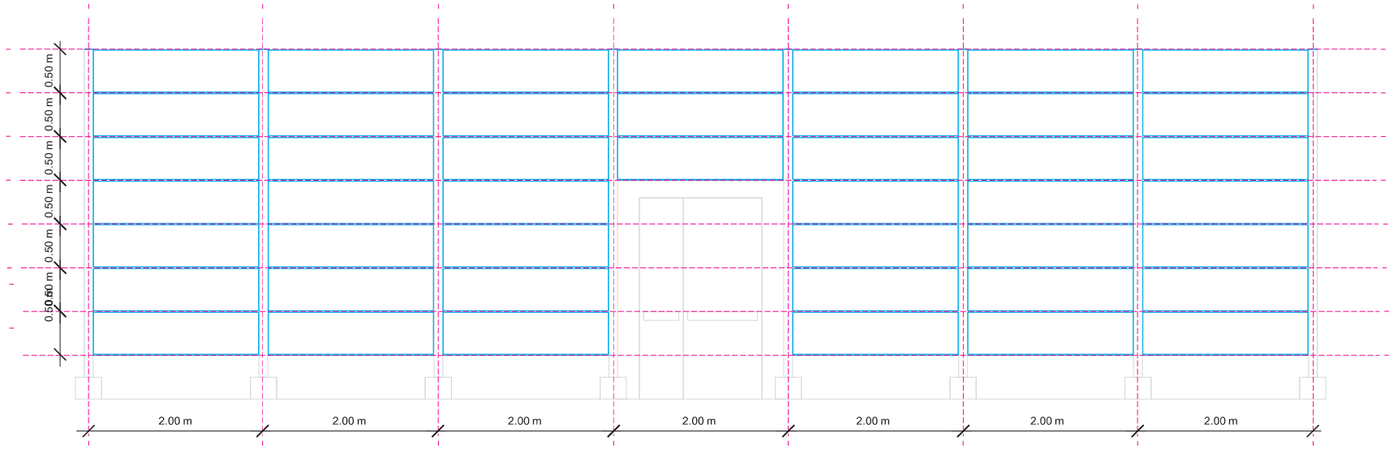
Geometry

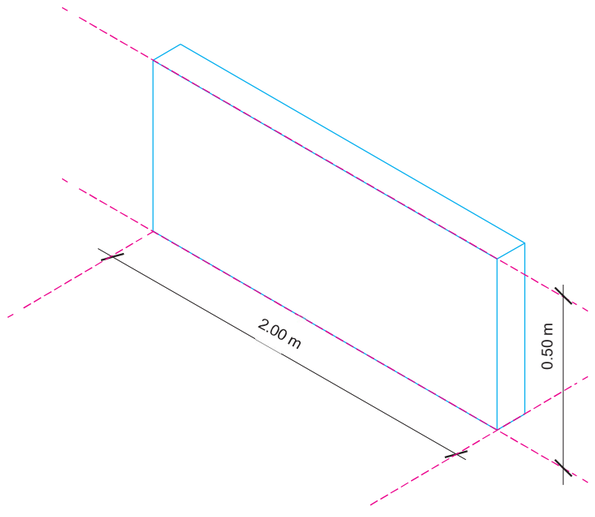
F4.4

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.





Note:
Parameters are indicative.

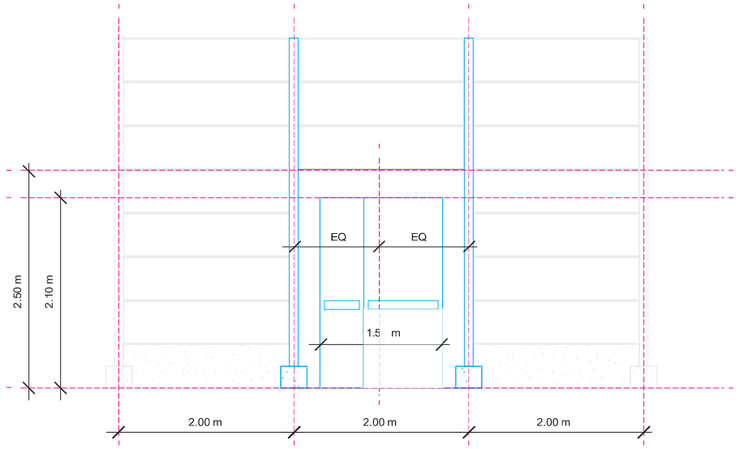
Geometry

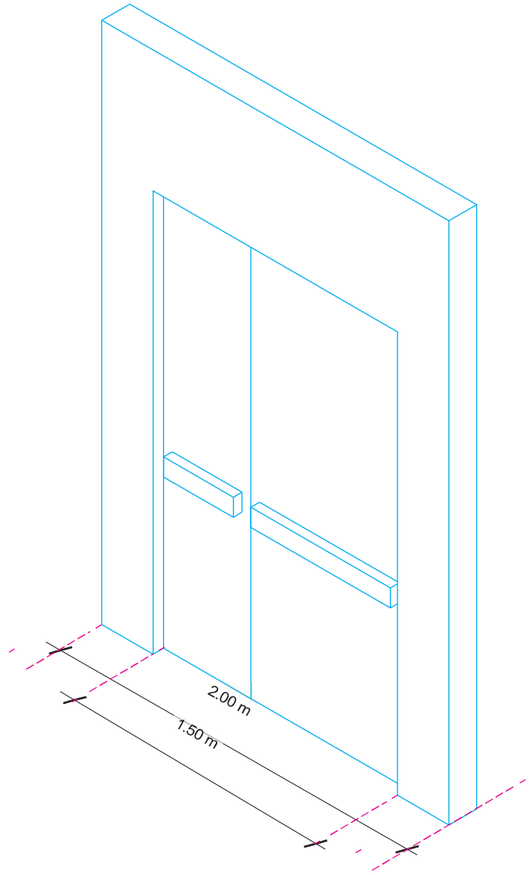
F4.4

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. Doors parameters shall comply with EN 179:2008.





Note:
Parameters are indicative.

Geometry

F4.4

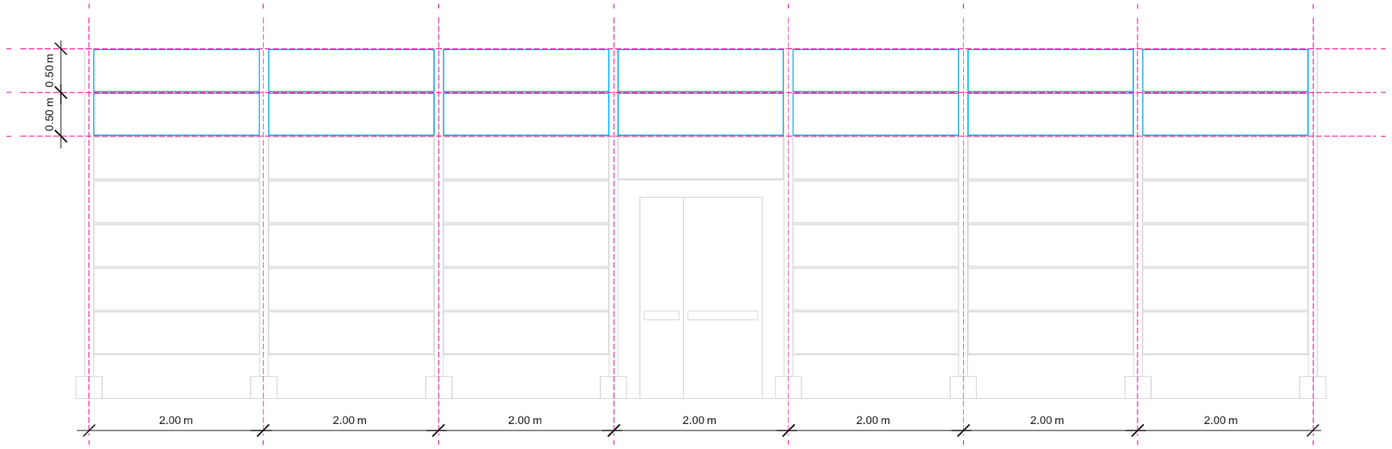
Upper Edge

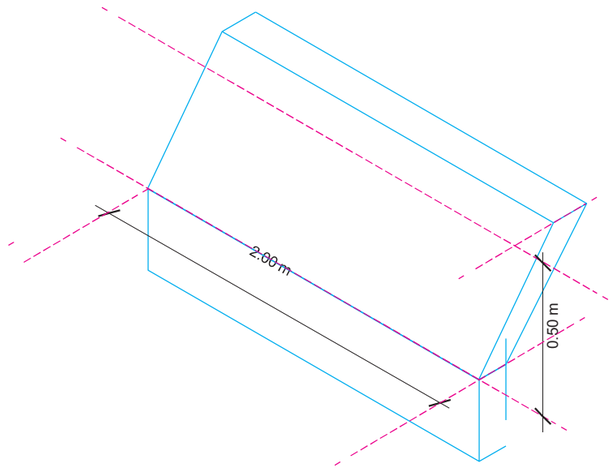
The sound wave falling on the edge of the noise barrier is deflected. This phenomenon reduces the area of acoustic shadow necessary for the effective protection of buildings. Appropriate shaping of the edges of acoustic screens can favourably increase the protected space. Applying kinks of the upper 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.





Note:
Parameters are indicative.

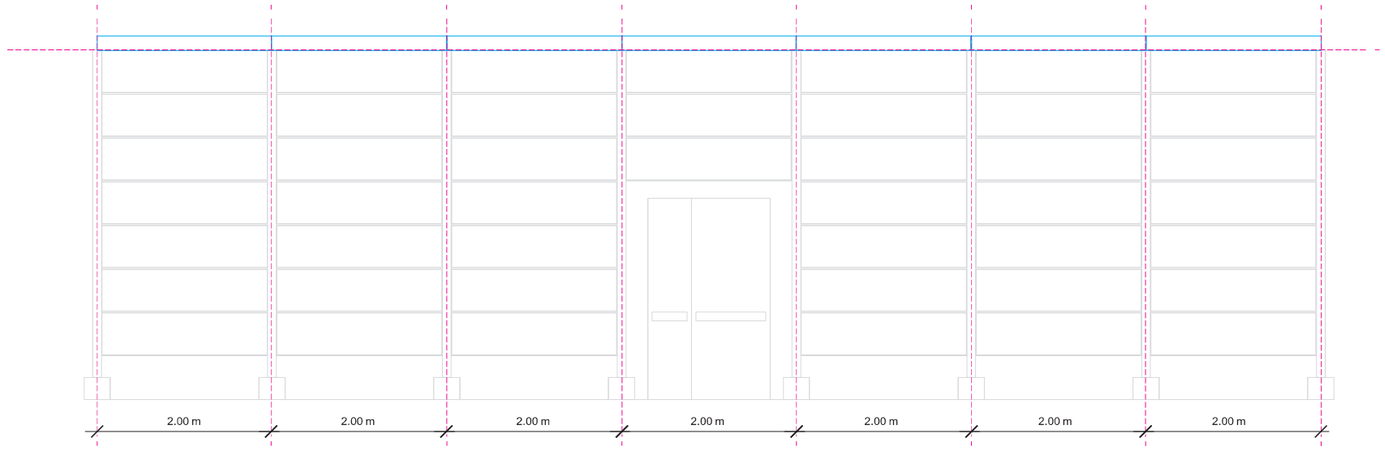
Geometry

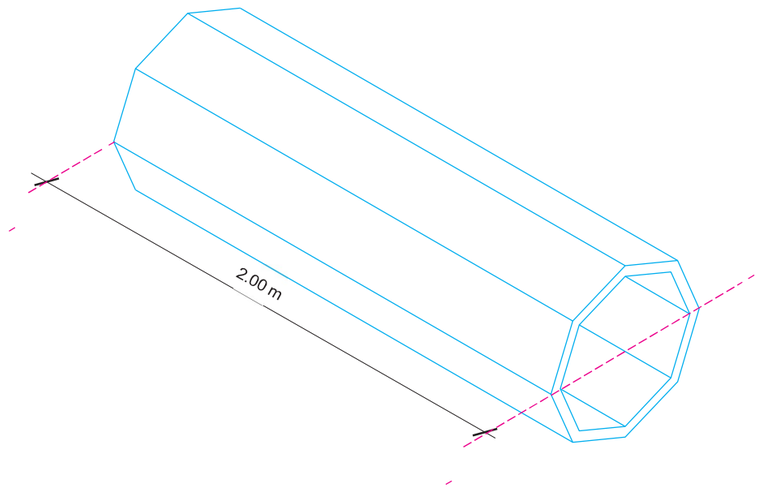
F4.4

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.





Note:
Parameters are indicative.

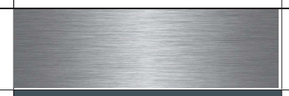
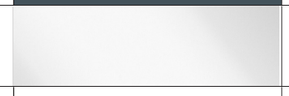
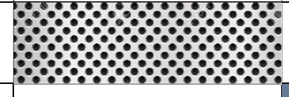
Materials

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

The visual aspect of the Noise Barrier on the bridges or overpasses shall be according to RBDG-MAN-031F. Alternative materials and dimensions of those specified in RBDG-MAN-031F with a least same technical features can be used, if functionally and economically justified.

Commented [EB30]: Additional remark shall be foreseen regarding Noise barriers on Bridges: The visual aspect of the Noise Barriers shall be according to RBDG-MAN-031F. Alternative materials and dimensions to those specified in RBDG-MAN-031F with at least same technical features can be used, if functionally and economically justified.

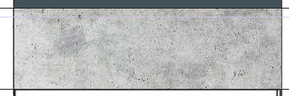
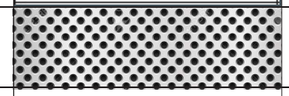
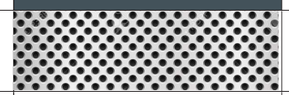
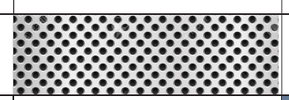
Materials

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

The visual aspect of the Noise Barrier on the bridges or overpasses shall be according to RBDG-MAN-031F. Alternative materials and dimensions of those specified in RBDG-MAN-031F with a least same technical features can be used, if functionally and economically justified.

		Network	Estonia	Latvia	Lithuania
SUPPORTING STRUCTURE	Material				
	Color	RAL 7016			
GROUND BEAM	Material				
	Color				
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

Commented [EB31]: Additional remark shall be foreseen regarding Noise barriers on Bridges: The visual aspect of the Noise Barriers shall be according to RBDG-MAN-031F. Alternative materials and dimensions to those specified in RBDG-MAN-031F with at least same technical features can be used, if functionally and economically justified.

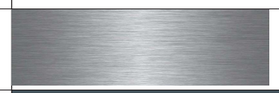
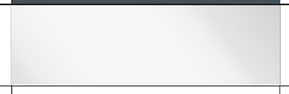
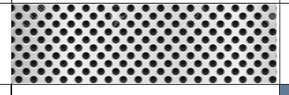
Materials

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.

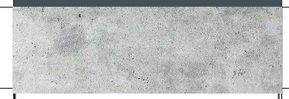
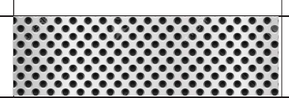
		Network	Estonia	Latvia	Lithuania
SUPPORTING STRUCTURE	Material				
	Color	RAL 7016			
FILLING	Material				
	Color				
EMERGENCY EXIT	Material 1				
	Color 1	RAL 7016			
	Material 2				
	Color 2				
OCTAGONAL DIFFUSER	Material				
	Color		RAL 5014	RAL 3011	RAL 6011

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				
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

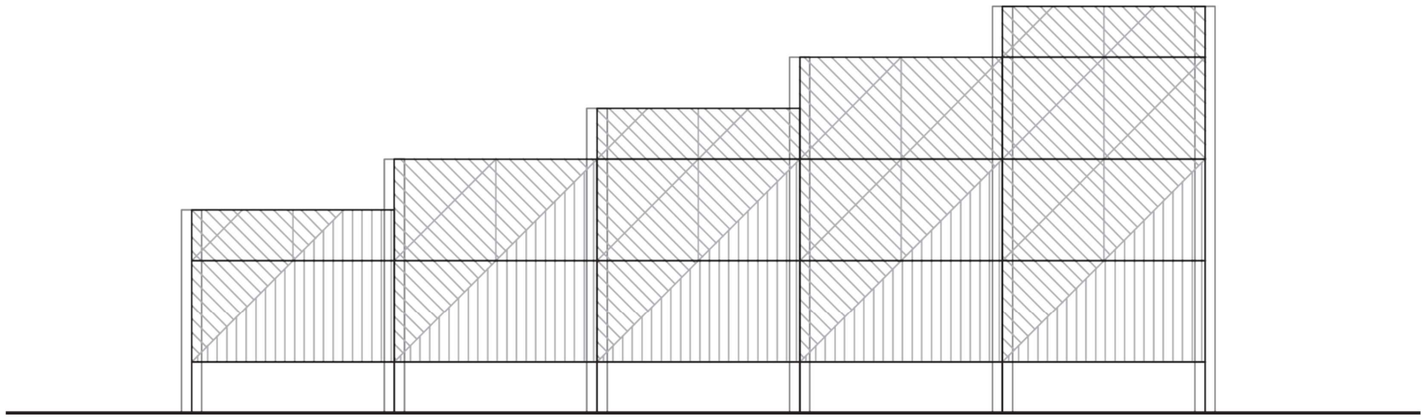
F4.6

Schemes

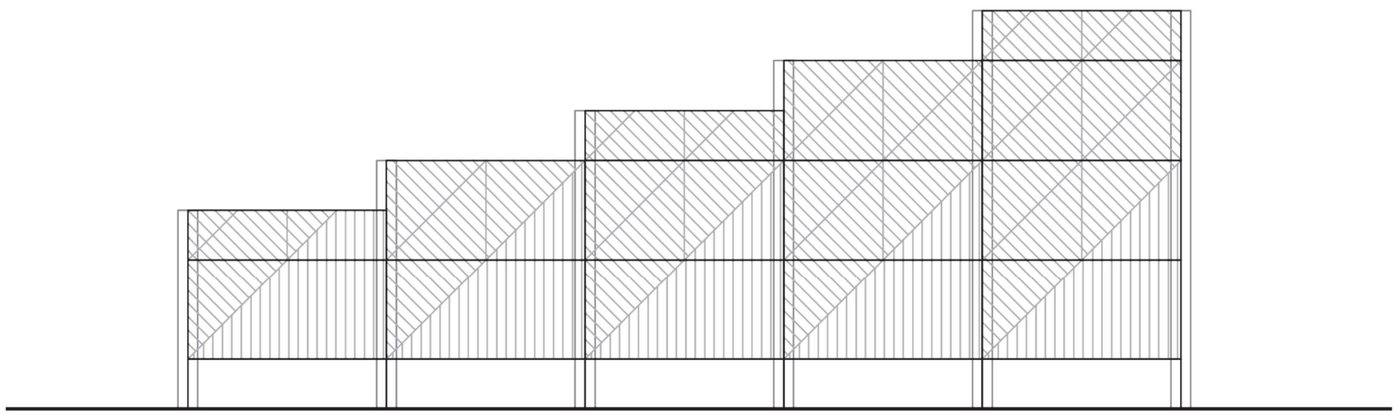
The network identity is defined by the use of Rail Baltica patterns on acoustic screens and emergency exits. The figures show how they should be implemented both on transparent and wooden noise barriers.

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.

For the transparent 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) should be placed a colored stripe. On all the vertical lines between control points the stripes should be interrupted.

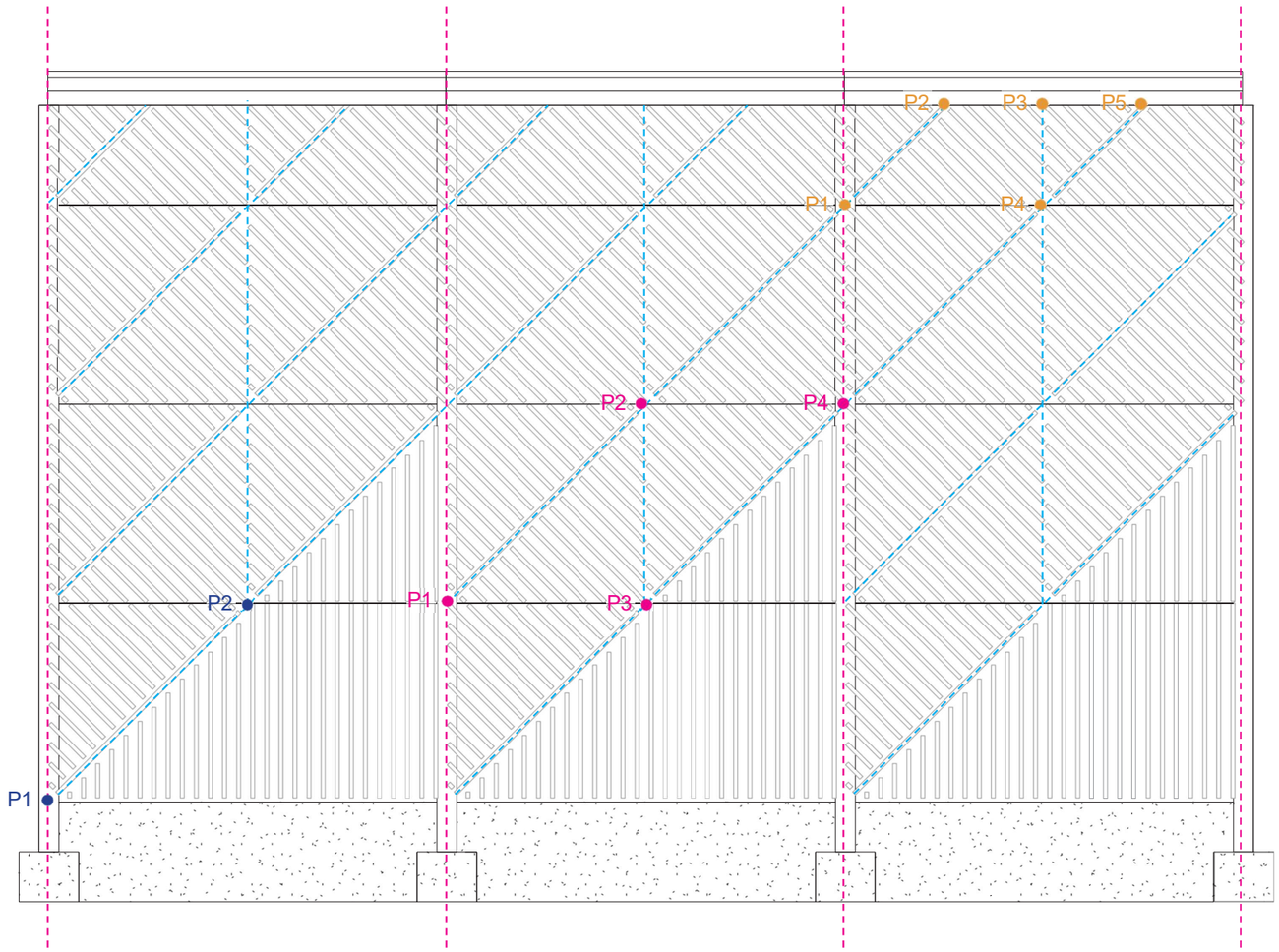
Other stripes should be placed perpendicular to the ones placed on the diagonal lines between control points. The stripes under the line between the blue control point P1 and the magenta control point P4 should be vertical oriented.

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

The silk-screen printing will be of two type:

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

Diagonal pattern marking strips should be in light grey colour and pattern shall follow the recommendations of COST 371: Marking strips should be 2 cm wide with a distance between the strips of a maximum of 10 cm. All transparent noise barriers shall be marked in order to avoid or reduce birds collisions.



Branding Implementation

F4.6

Wooden Noise Barrier

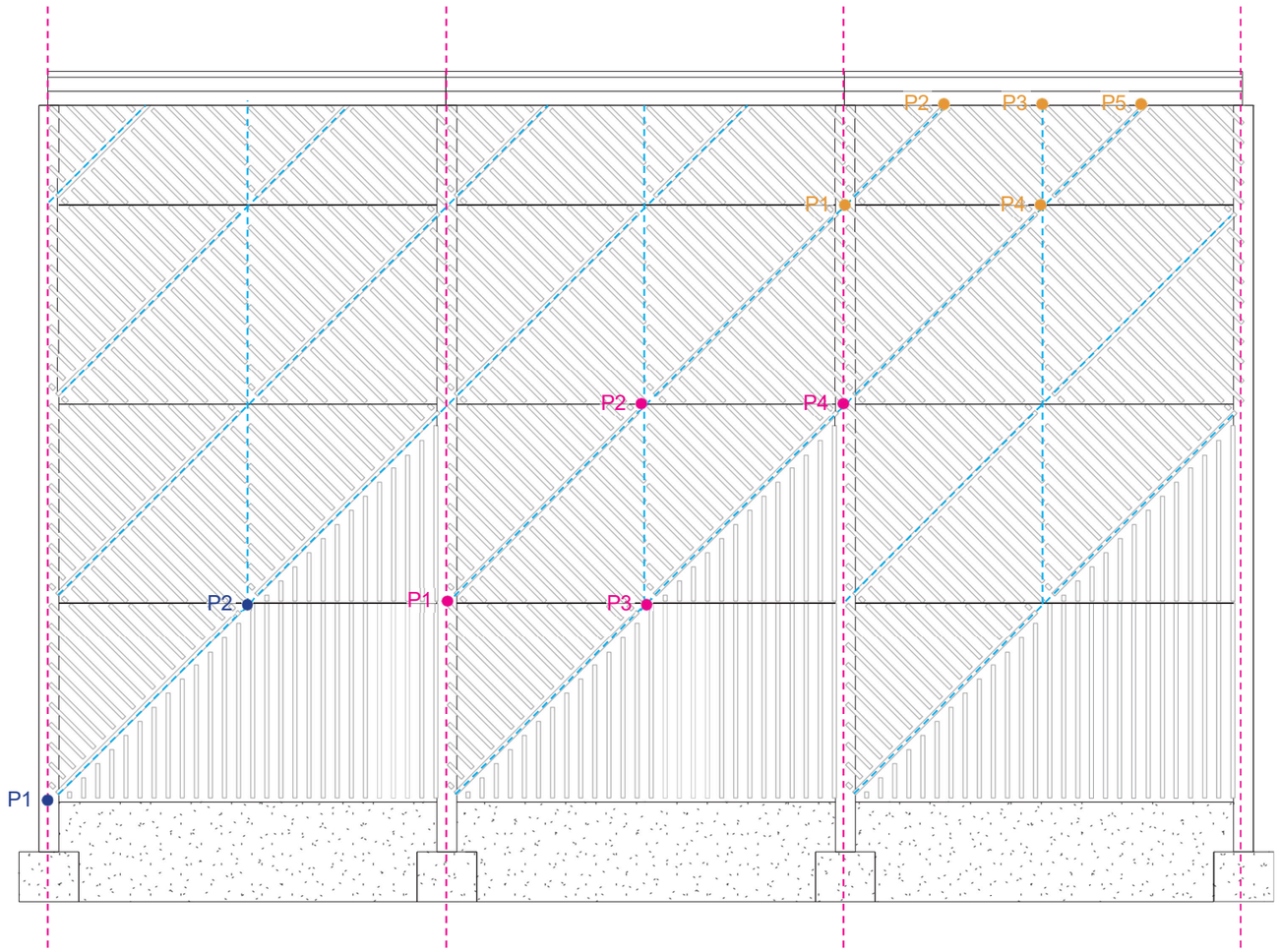
The pattern used to assign identity to the Rail Baltica Network elements are lines that define Right Triangles.

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) should be placed a wooden plate. On all the vertical lines between control points wooden plates should be interrupted.

Other wooden plates should 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 should be vertical oriented.

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



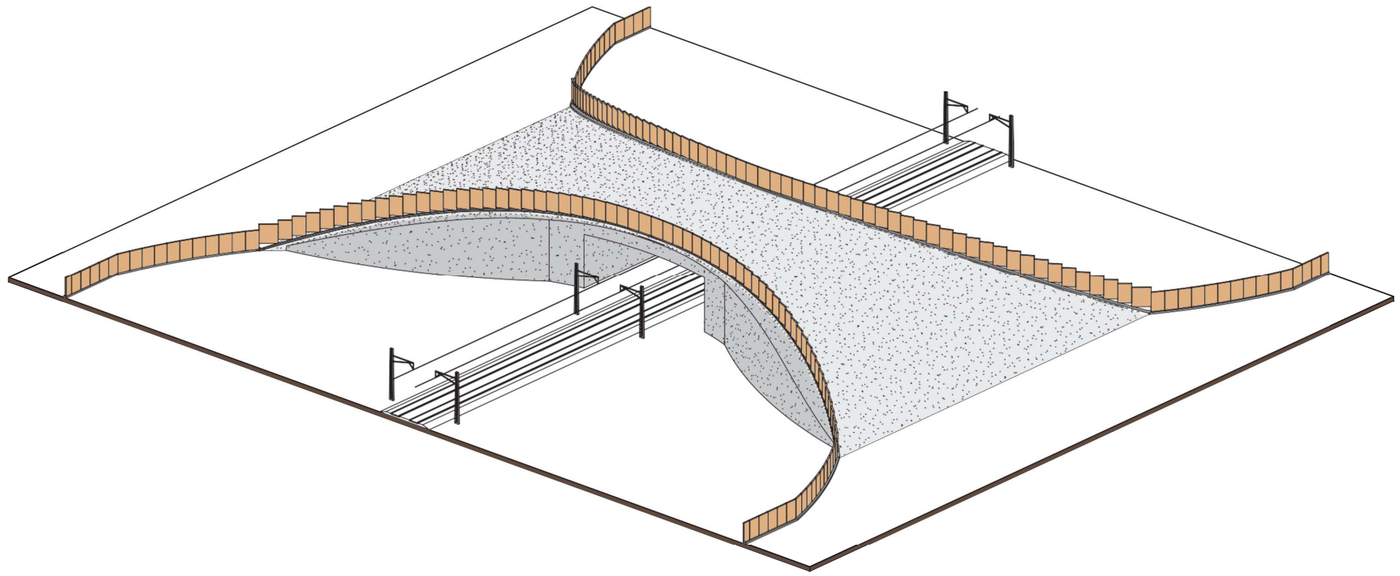
Animal Passage

F5

Matrix

F5.1

Identity Matrix



Material

Geometry

Modularity

Color

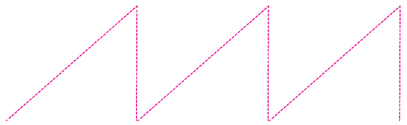
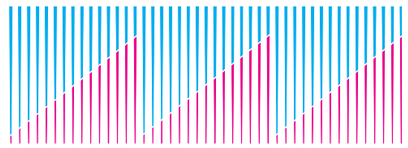
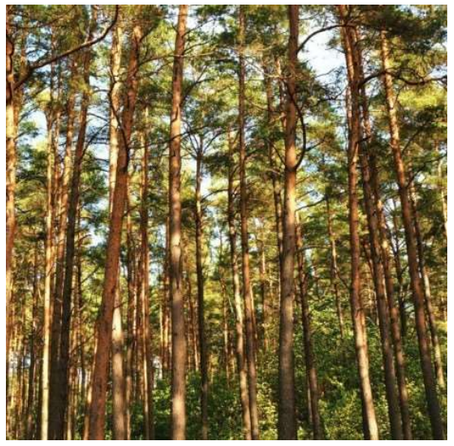
Vegetation

	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*

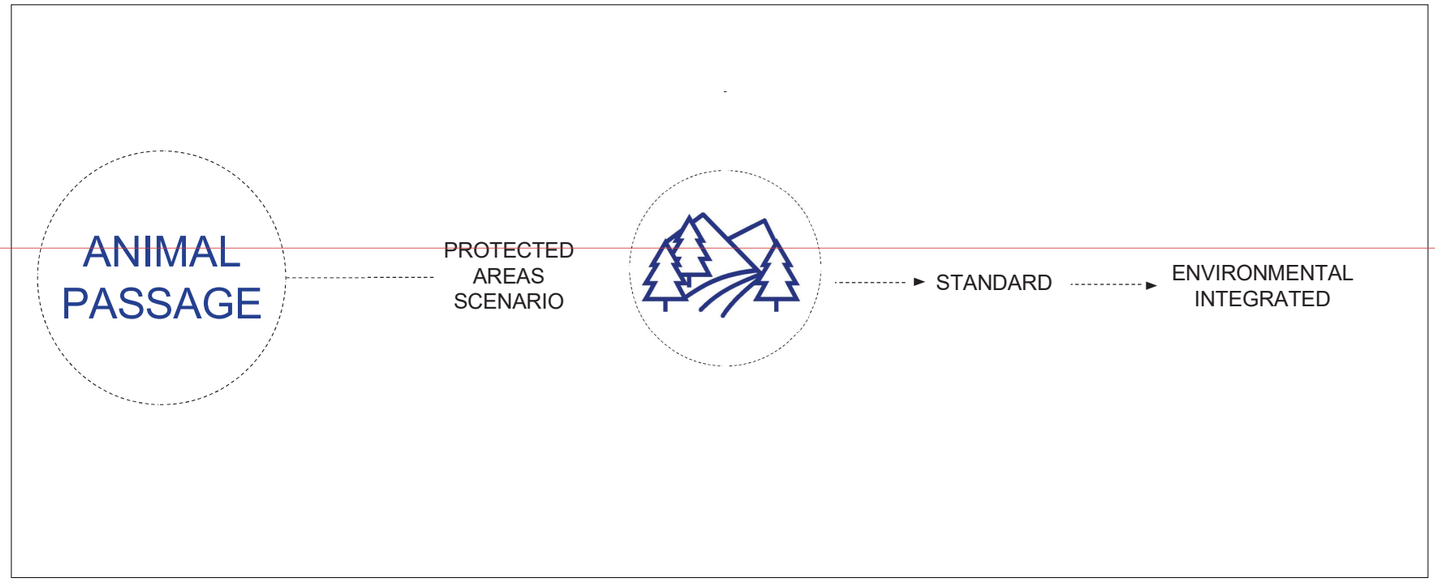
Design Strategy

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.

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



Commented [DJ32]: This paragraph will be deleted, as one type of passage remains

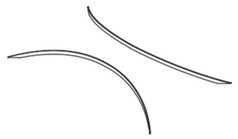
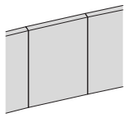
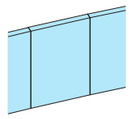
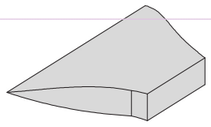
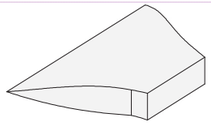
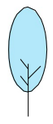
Design Strategy

F5.3

The Standard Type Animal Passage (STAP) is a passage without specific design assigned presented in used materials natural colours.

- Cladding – no requirements for cladding are defined;
- Fence - Standard type fence should be applied, Geometry and outer appearance shall follow RBDG-MAN-031F chapter F5 requirements. Fences will be overgrown by vegetation.
- Abutment - no requirements for abutment are defined.
- Abutment logo - Abutment logo is not required but can be applied in exceptional cases for solutions with wingwalls or front walls (requirements for abutment logo are defined in chapter F0.2).
- Vegetation – RBDG-MAN-031F chapter F5 requirements are applicable.

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.

ELEMENTS	STAP
CLADDING 	
FENCE 	
ABUTMENT 	
VEGETATION 	

Commented [DJ33]: Column ITAP will be deleted

Commented [EB34R33]: I propose to include description for each element:
STANDARD ANIMAL PASSAGE
• Cladding – no requirements for cladding are defined
• Fence – standard type fence shall be applied. Geometry and outer appearance shall follow RBDG-MAN-031F chapter F5 requirements
• Abutment – no requirements for abutment are defined
• Abutment logo – abutment logo not required but can be applied in exceptional cases for solutions with wingwalls or front walls (same as in parts F1 and F3)
• Vegetation – RBDG-MAN-031F chapter F5 requirements are applicable

Design Strategy

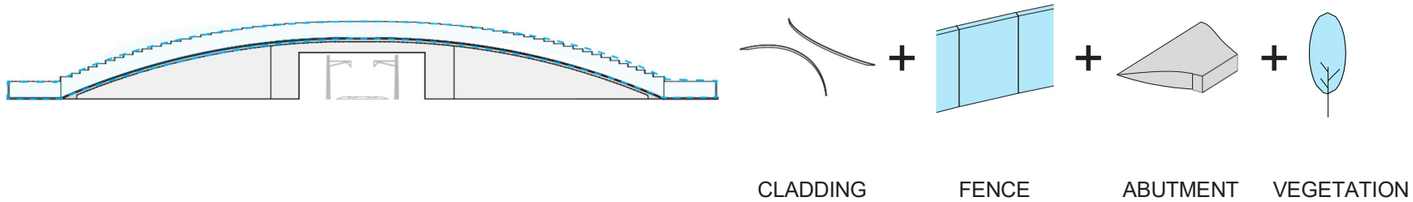
F5.3

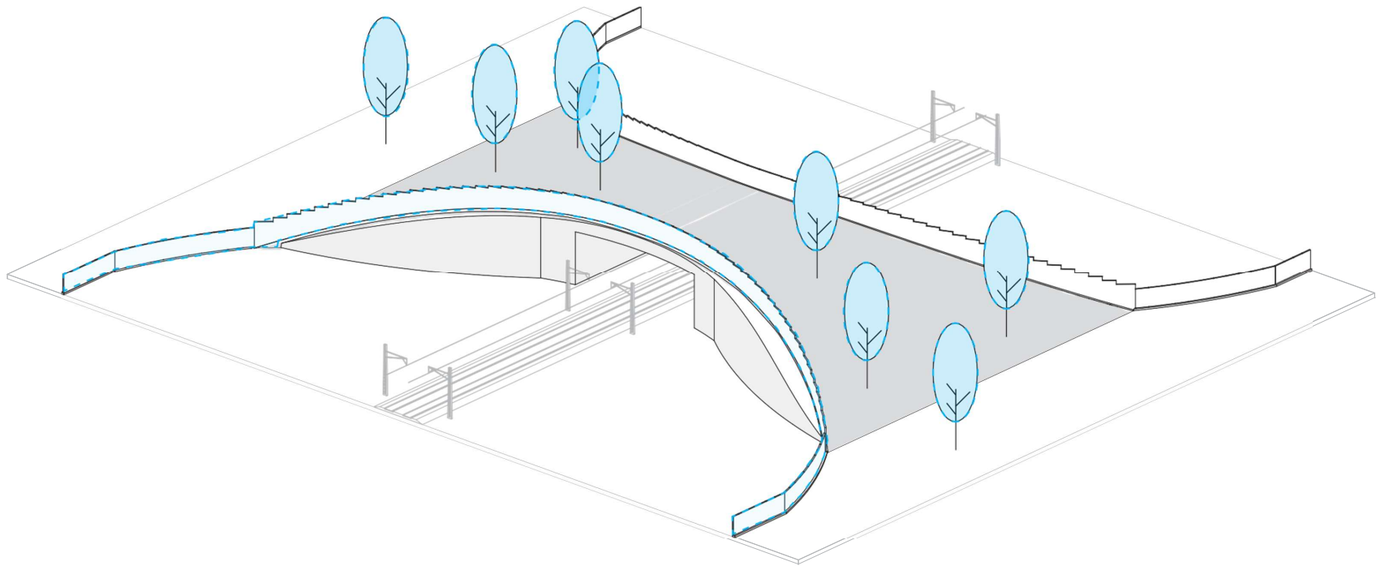
Standard Type Animal Passage (STAP)

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 and recognisable but due to location in precious nature or landscape areas can't play a 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.

Geometry

F5.4

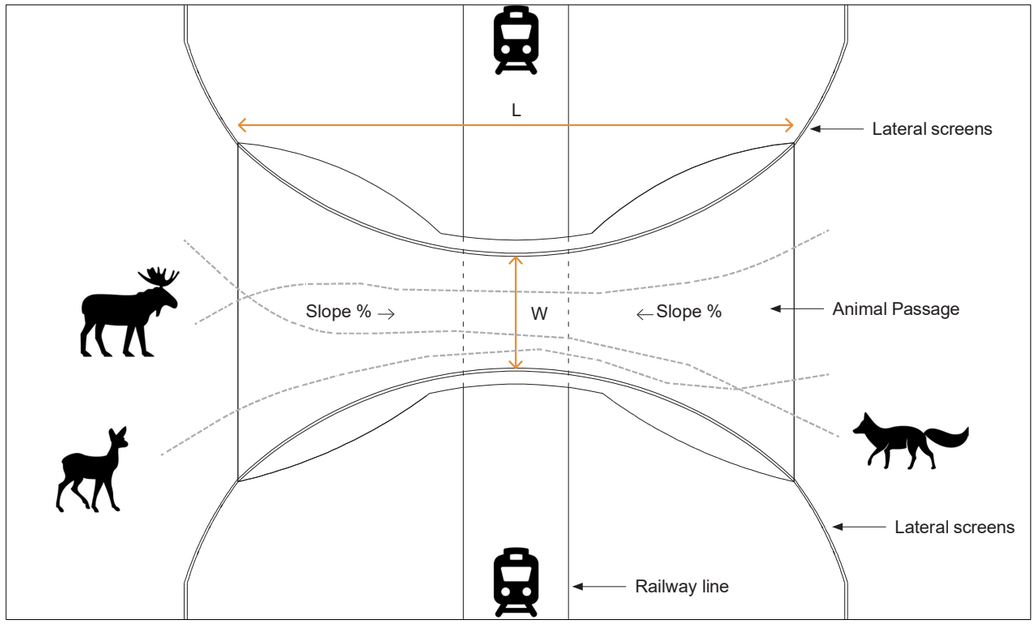
Overview

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.



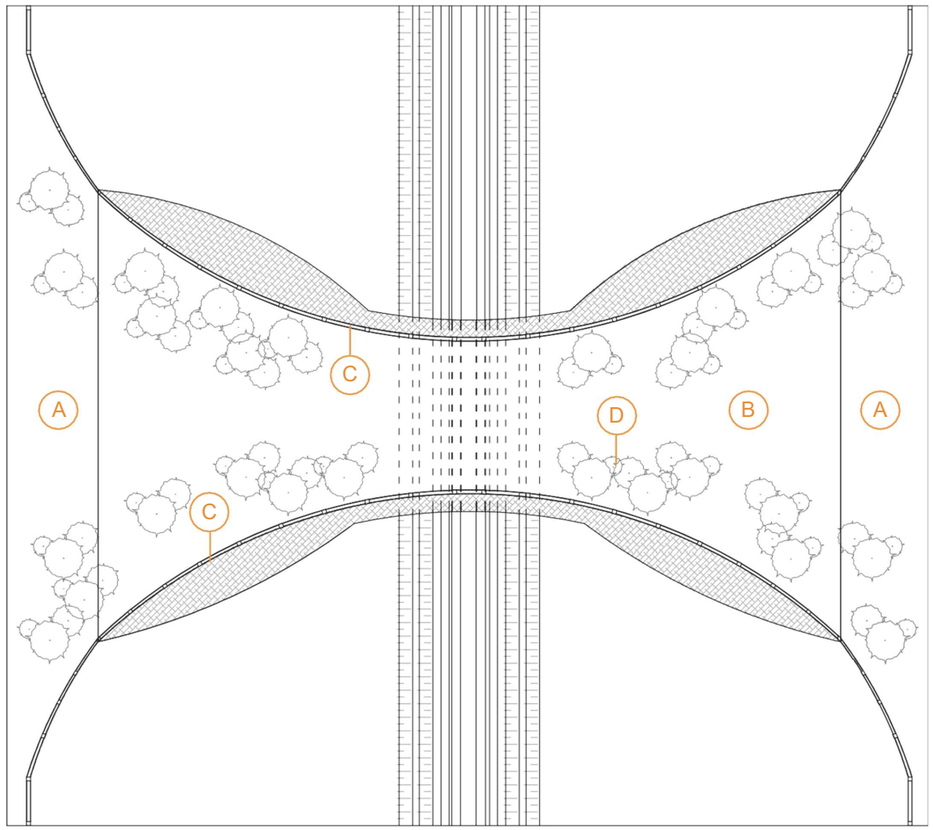
Legend

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



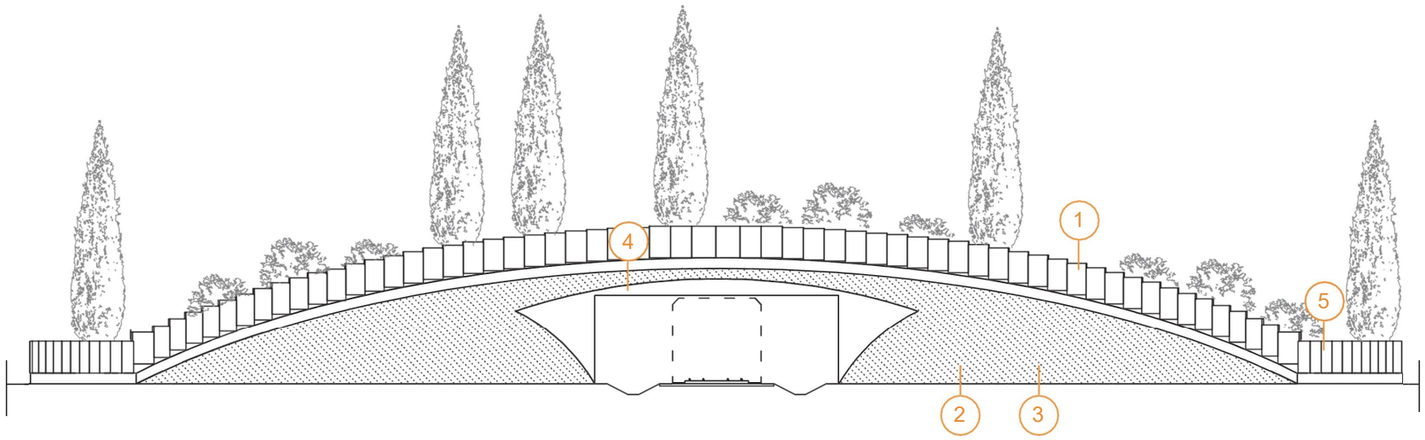
Legend

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

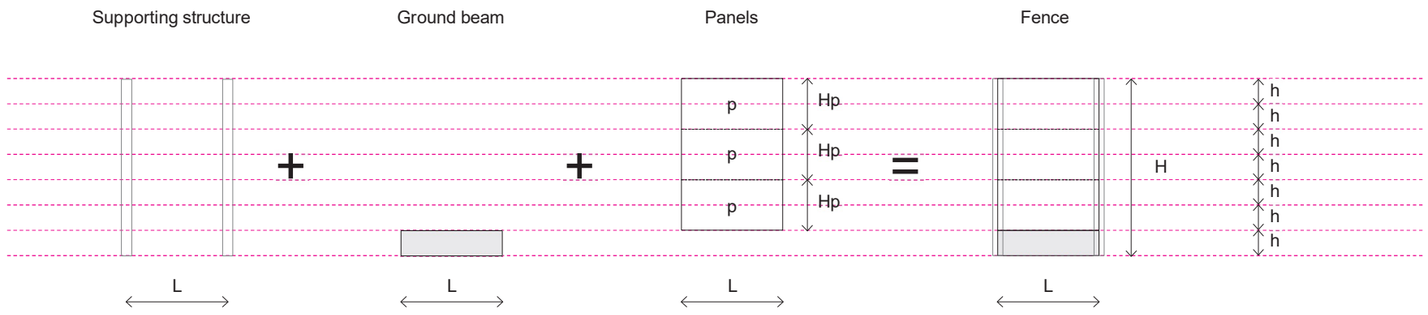
F5.4

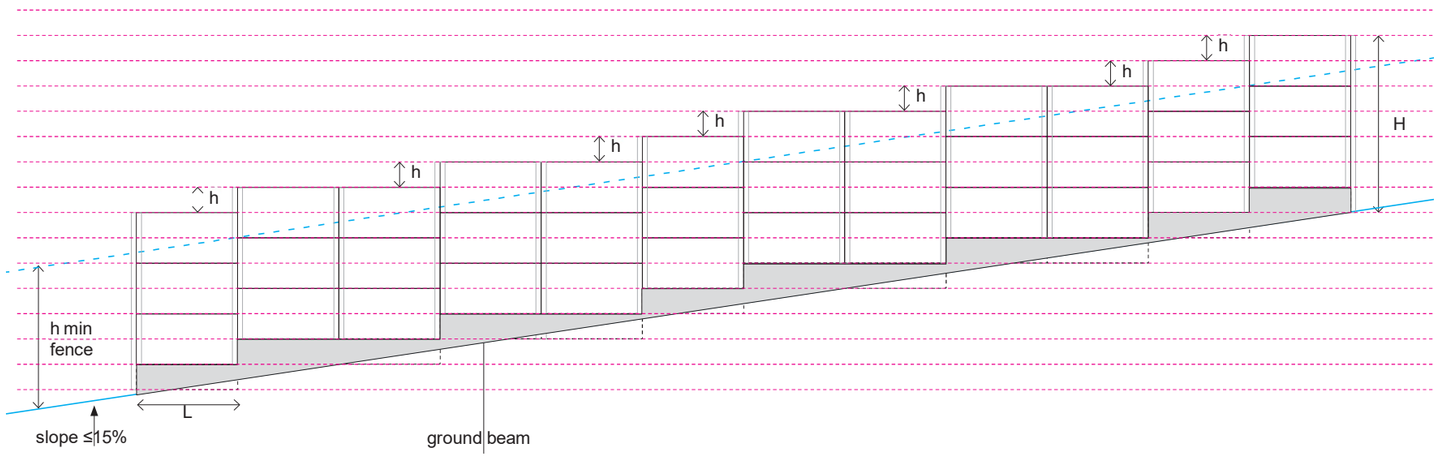
Composition - Fence

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

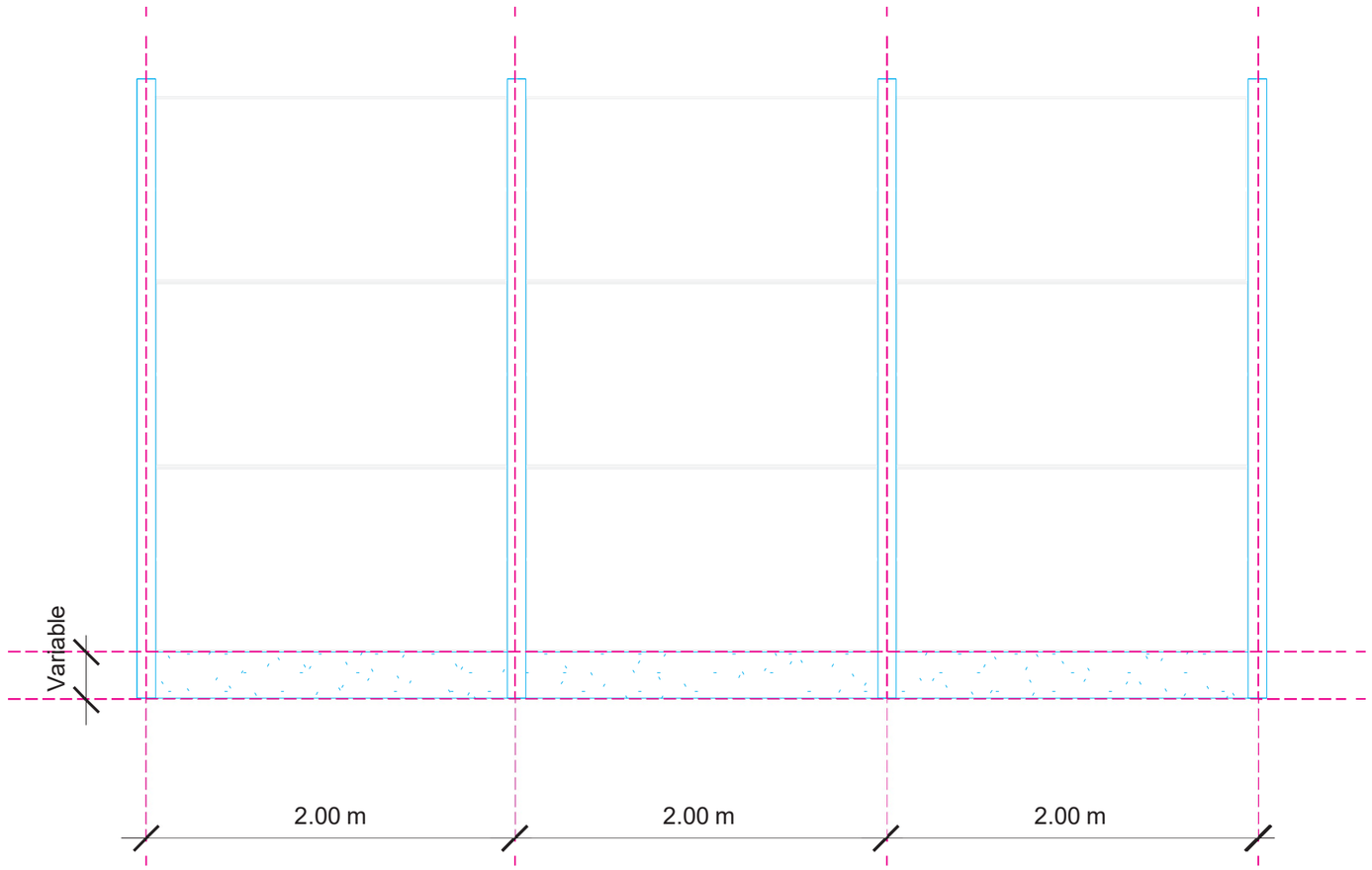
Geometry

F5.4

Structure

The structure of the panels should be placed every two meters and should 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.

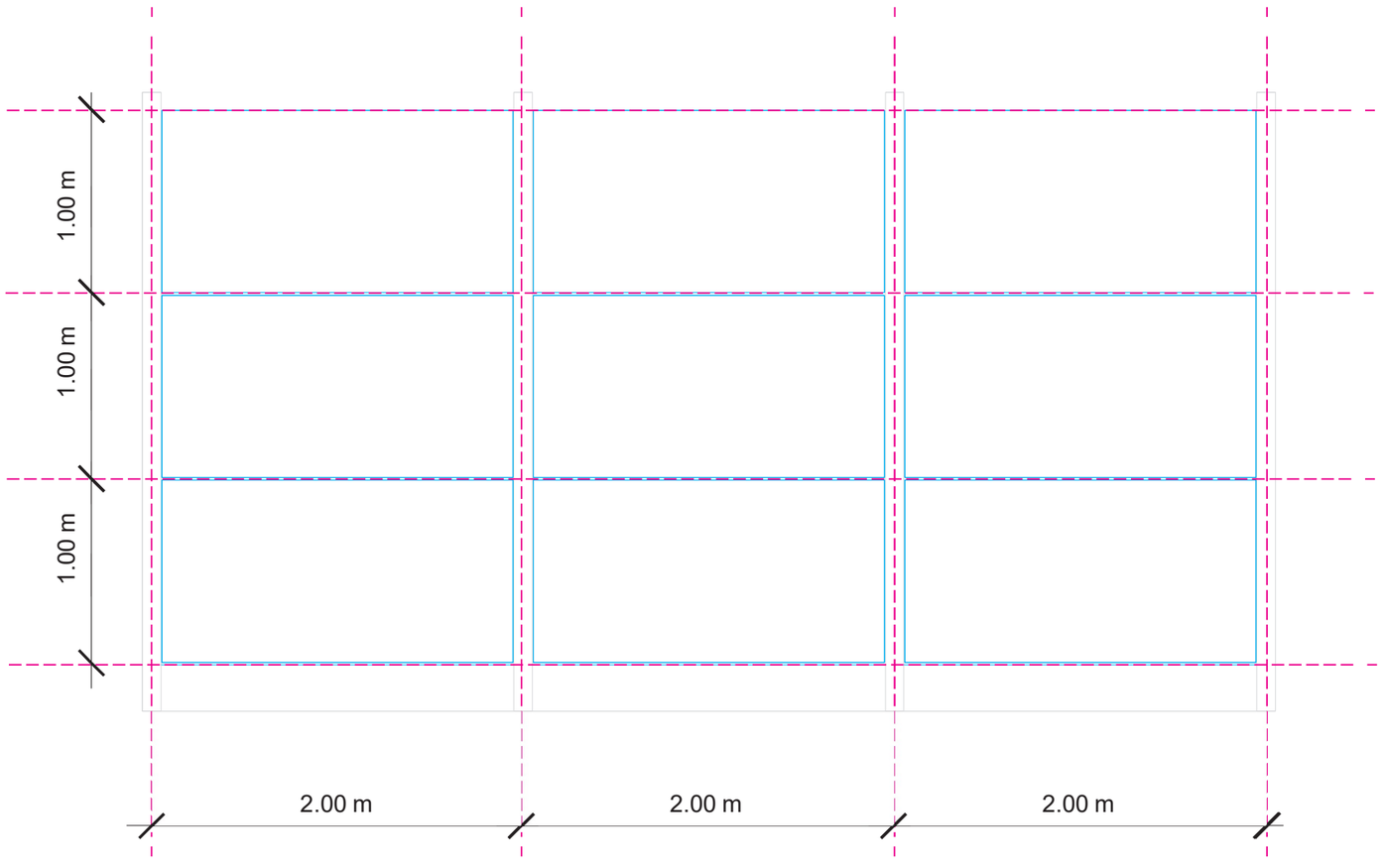


Geometry

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.

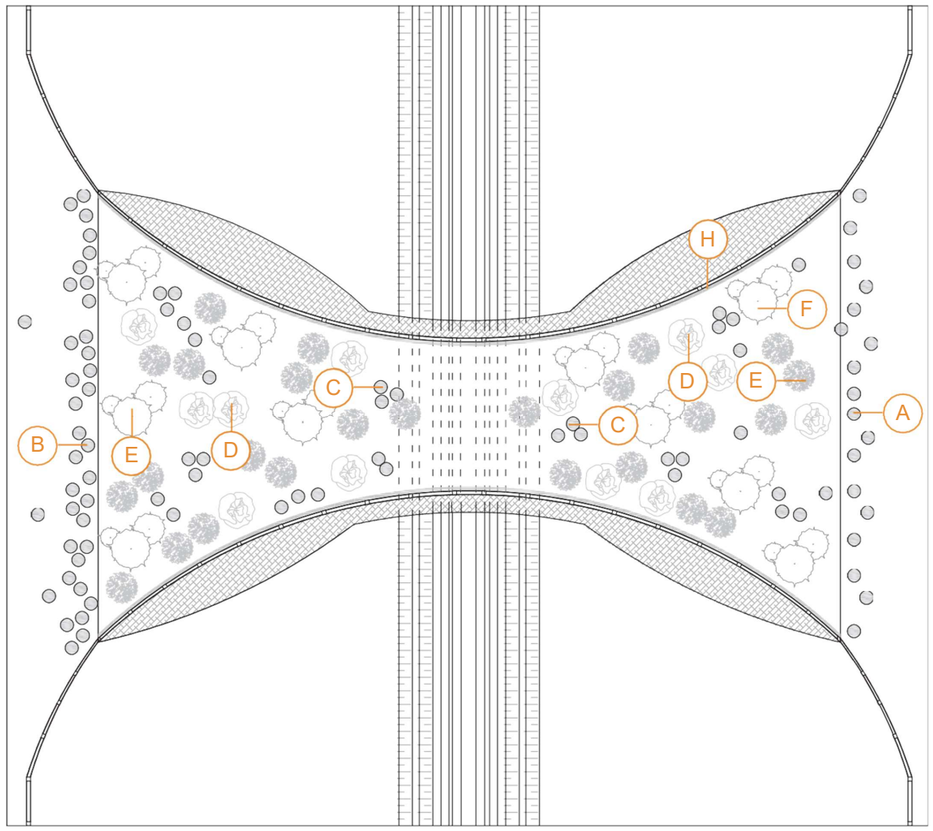
		Network	Estonia	Latvia	Lithuania
ABUTMENT	Material				
	Color				
CLADDING	Material				
	Color				
FENCE	Material				
	Color				

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

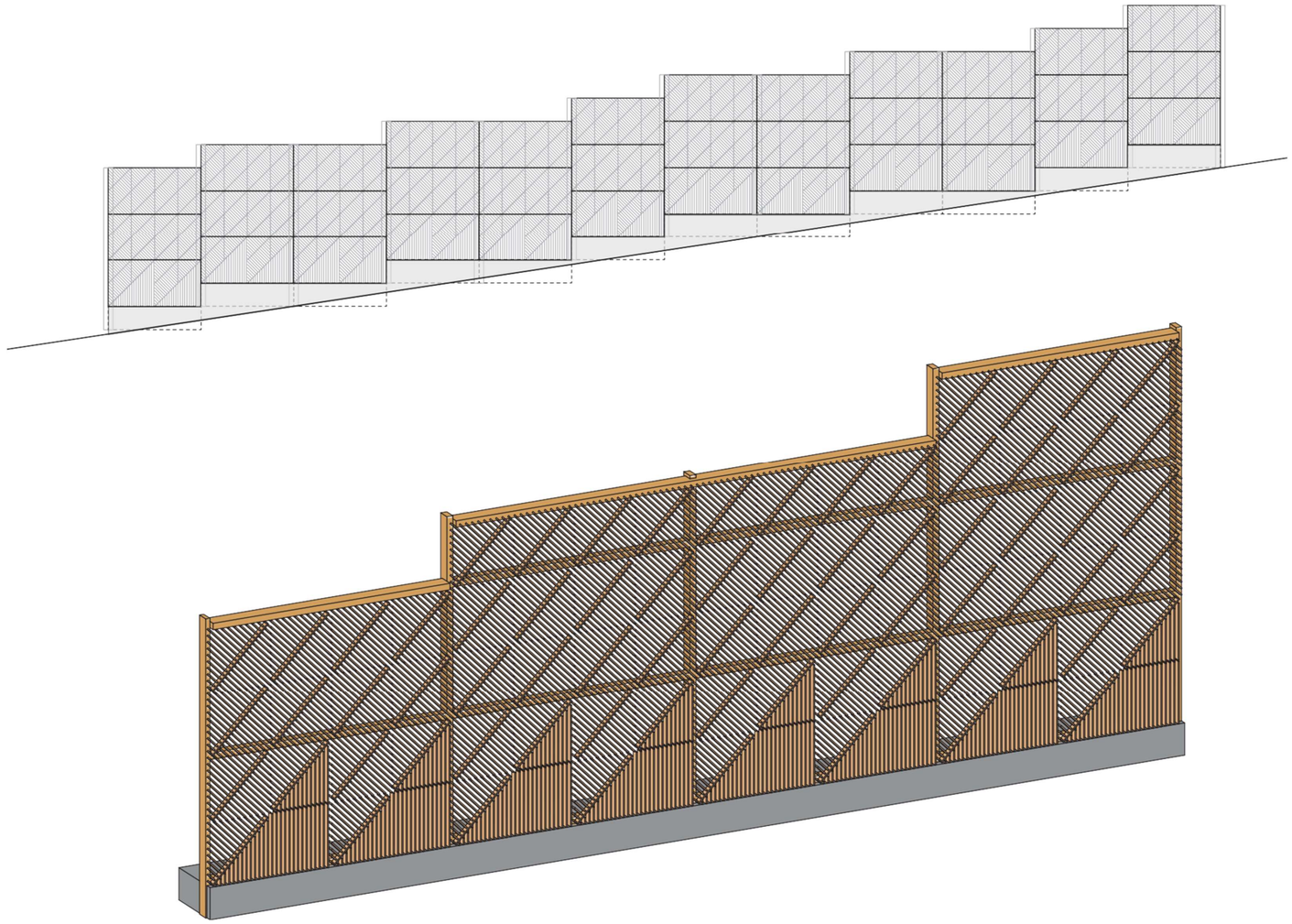
F5.6

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

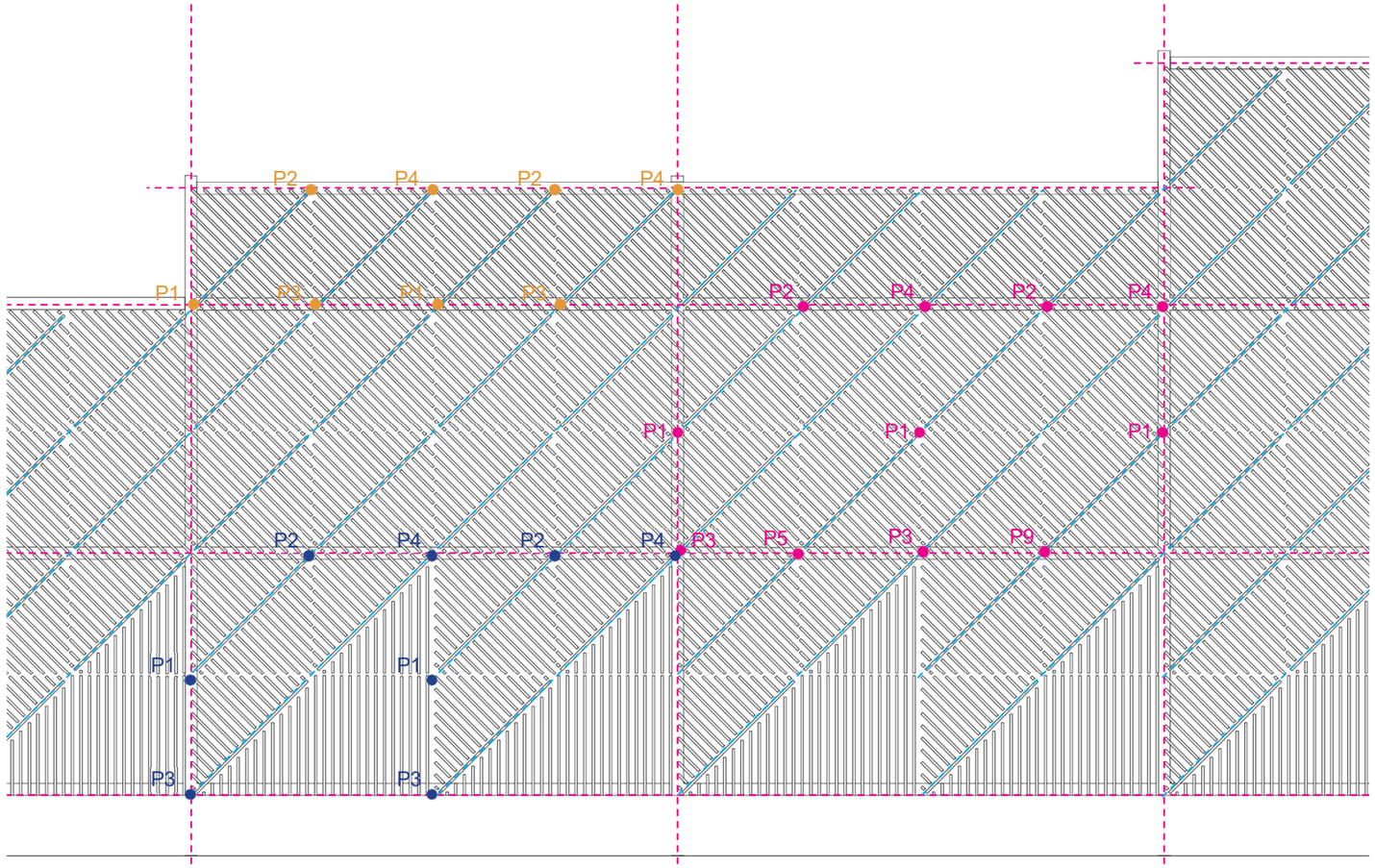
The pattern used to assign identity to the Rail Baltica Network elements are lines that define Right Triangles.

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) should be placed a wooden plate. On all the vertical lines between control points wooden plates should be interrupted.

Other wooden plates should 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 should be vertical oriented.

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

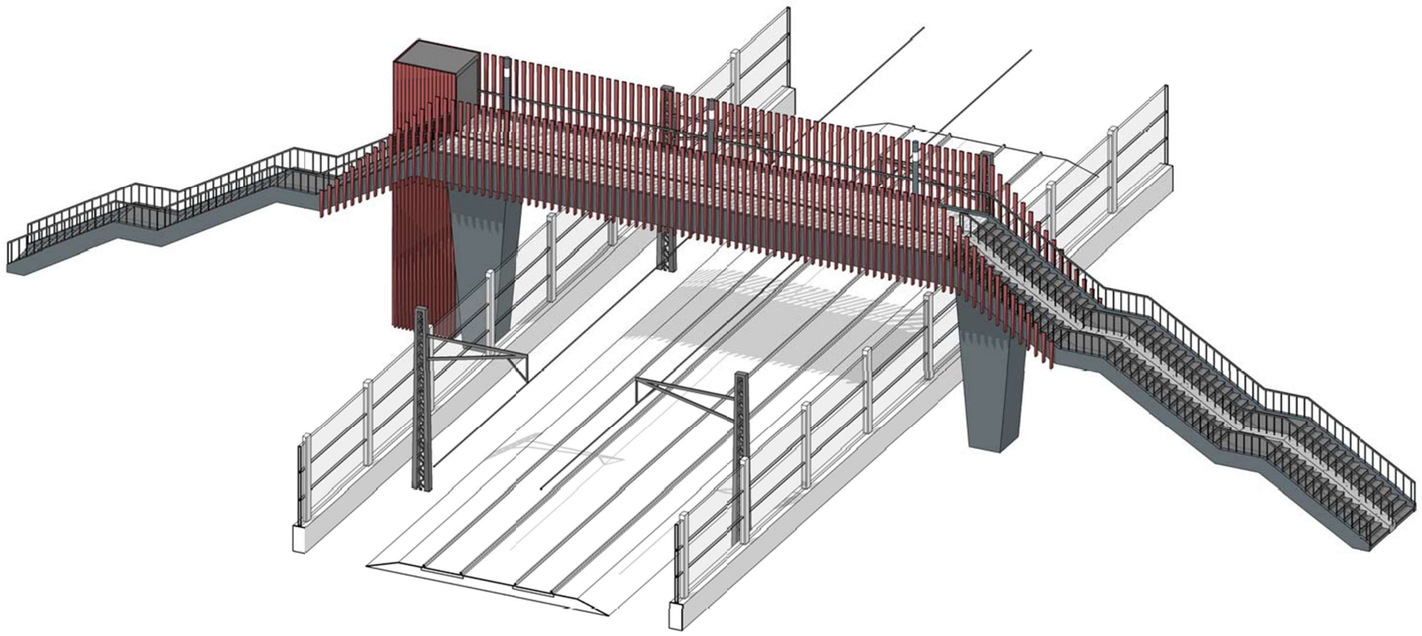


Pedestrian Overpass F6

Matrix

F6.1

Identity Matrix



Material

Geometry

Modularity

Color

Vegetation

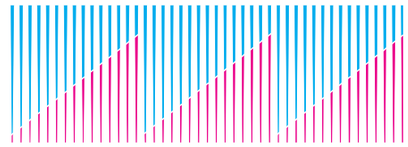
	N	C	R
Pedestrian Overpass			

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.

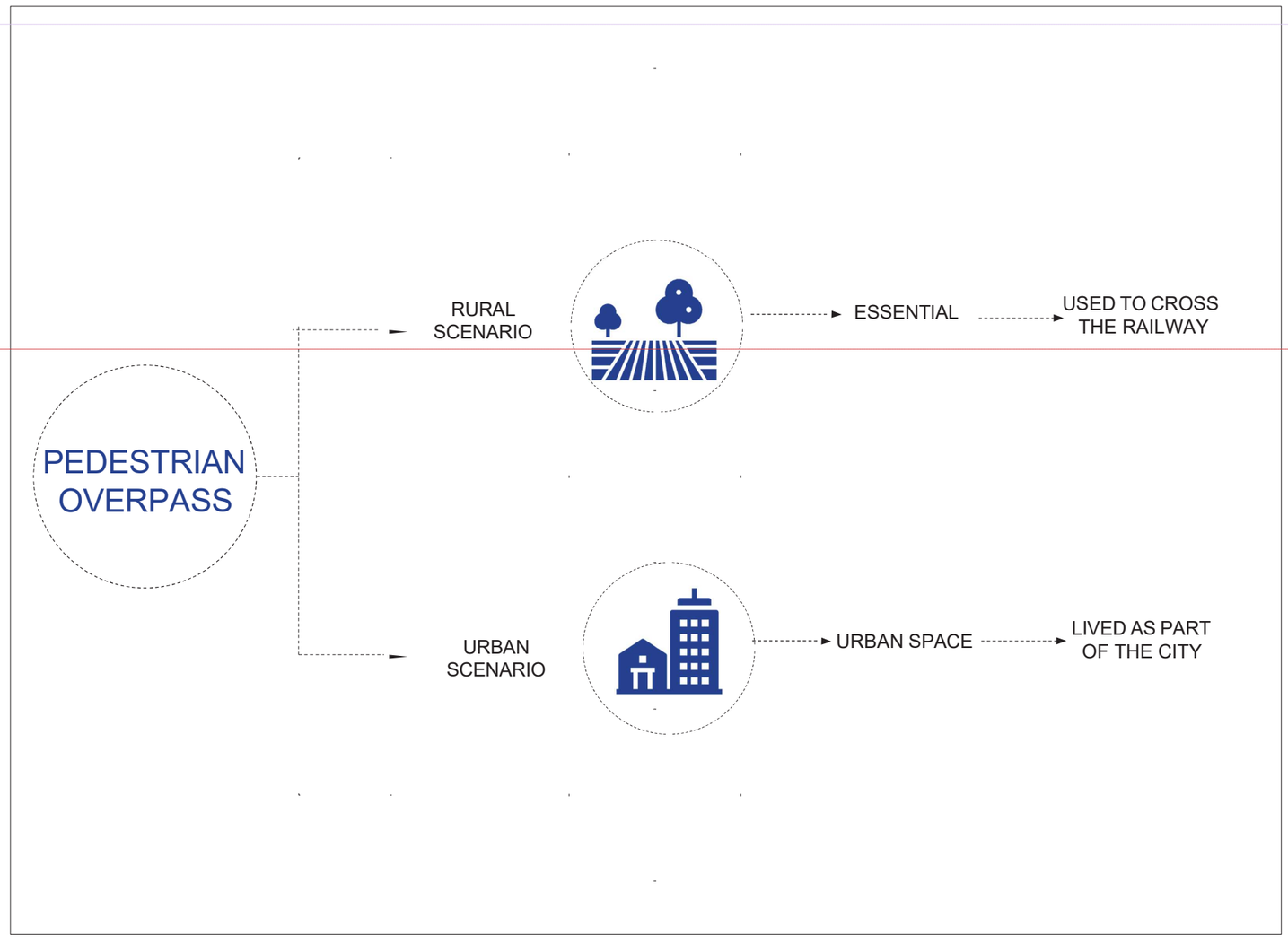
These different surroundings give the need to place different types of overpasses along the line, perfectly adapting to the context but respecting and preserving the identity of the Rail Baltica network.

Two different type of pedestrian overpass were then defined:

- Essential Pedestrian Overpass
- Urban Space

ESSENTIAL PEDESTRIAN OVERPASS
The Essential one (type 1) is a Pedestrian Overpass that must contain all the elements ruled by the Architectural, Landscape and Visual Identity Design Guidelines but the designers can choose to use only one functional stripe and one pedestrian stripe.

URBAN PEDESTIRAN OVERPASS
The Urban Space (Type 2) is a Pedestrian Overpass that must contain all the elements ruled by the Architectural, Landscaping and Visual Identity Desing Guidelines and provide an adequate aggregation of modules of functional stripe and pedestrian stripe.
The first one is just a pedestrian overpass used by people to cross the railway line, the second is an expansion of the city where the people can walk and cycle in order to live it as part of the city.



Commented [EO35]: Symbol for rural scenario is corrupted.

Commented [EB36]: Description might be complemented:
ESSENTIAL PEDESTRIAN OVERPASS
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.
URBAN PEDESTRIAN OVERPASS
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.

Picture shall reflect description.

Commented [DJ37]: Sub-urban scenario is eliminated form the picture

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 pedestrian stripe. (Minimum dimensions 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 pedestrian stripe. (Minimum dimensions are defined in following pages)

For pedestrian passages truss type structures can be considered. Trusses are an efficient way to span long distances whilst minimizing the amount of material used with all required elements implemented. Truss type can be implemented for both types of pedestrian overpass – for Essential and for Urban space after structural assessment.

Railing does not have any specific architectural, or visual design requirement. As a part of accessibility element railing geometry shall follow requirements of accessibility standard "COMMISSION REGULATION (EU TSI No. 1300/2014 of 18 of November 2014 on the technical specifications for interoperability relating to accessibility of the Union's rail system for persons with disabilities and persons with reduced mobility".

Overhead Catenary Protection System geometry is described in chapter F0.2. Requirement from chapter F0.2 should be followed in the design of Overhead Catenary Protection System on Pedestrian passages.

ELEMENTS	TYPE 1	TYPE 2
PEDESTRIAN STRIPE	✓	
FENCE	✓	
RAILING	✓	
OVERHEAD CATENARY PROTECTION SYSTEM	✓	

Commented [DJ38]: Adjusted table of elements, by eliminating pictograms

Commented [EO39]: In previous page there are three types.

Commented [DJ40R39]: Issue solved, two types remain in previous page too

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.

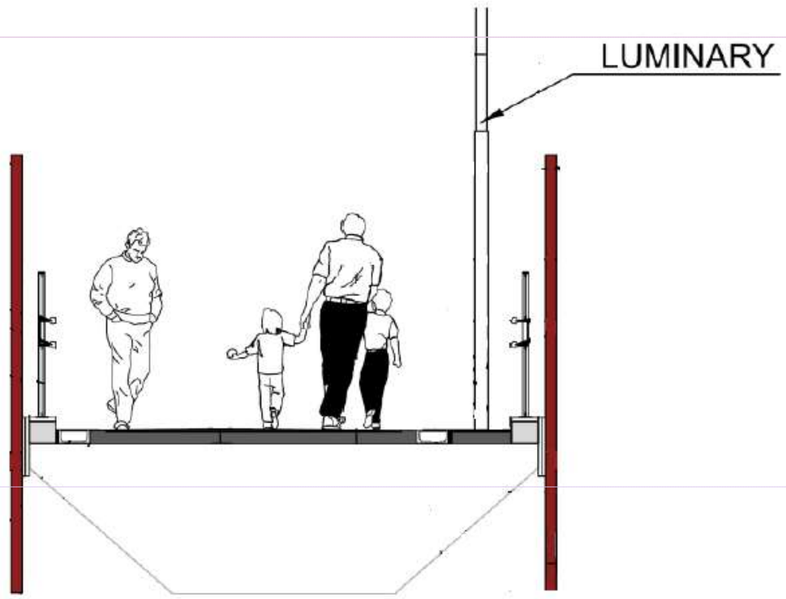
The fence geometry is also highly recommended and

should be colored with the country color.

Railing – vertical barriers that avoids falling – is highly recommended.

Double handrail – steel tubular-profiled element for accessibility. Double handrail is required according to TSI standards.

Elements of Overhead Catenary Protection Systems (OCPS) are preferable on both types of the pedestrian overpasses (Type 1 and Type 2) Orienation of elements shall follow requirements provided in RBDG-MAN-017.



Commented [DJ41]: Picture from IDOM proposal

Commented [EB42R41]: I propose to add picture with less details and less descriptions.

Commented [EB43]: Horizontal OCPS contradicts RBDG requirements in RBDG-MAN-017

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.

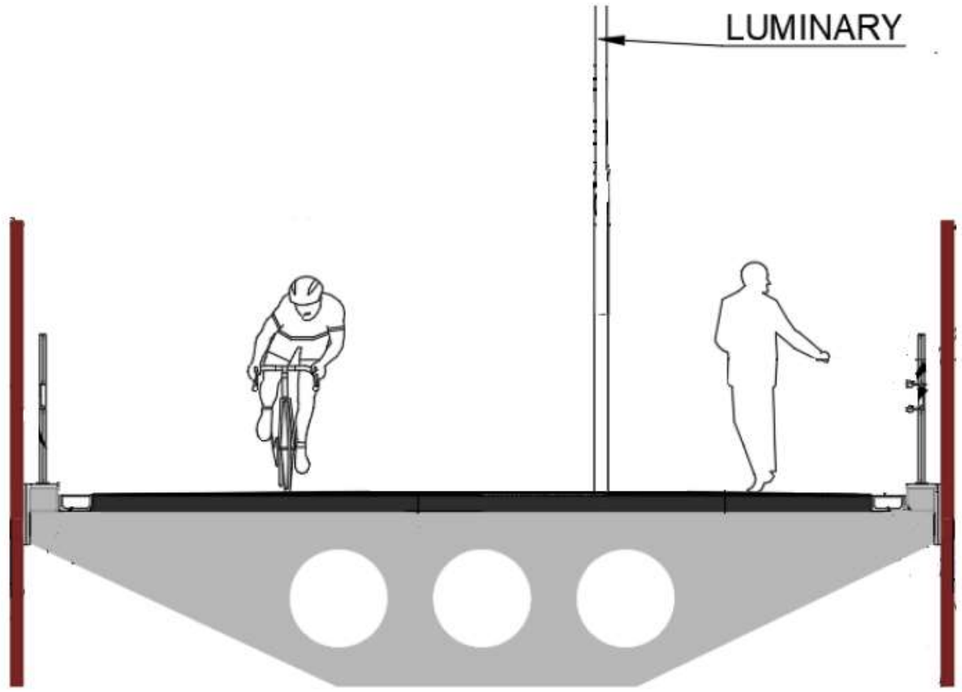
The structural design will be to the discretion of the designers but the application of the cladding is highly recommended and must cover the beam.

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

Railing – vertical barriers that avoids falling – is highly recommended.

Double handrail – steel tubular-profiled element for accessibility. Double handrail is required according to TSI PRM standards.

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



Commented [EB44]: Same comments regarding drawing as in previous page.

Commented [DJ45]: Picture from IDOM proposal

Commented [EO46R45]: Picture includes resting area, but in first Design strategy page (97) resting area is crossed out. Does this picture comply with what was agreed in ALG working group?

Commented [EB47R45]: Edgars, these elements hall be eliminated.

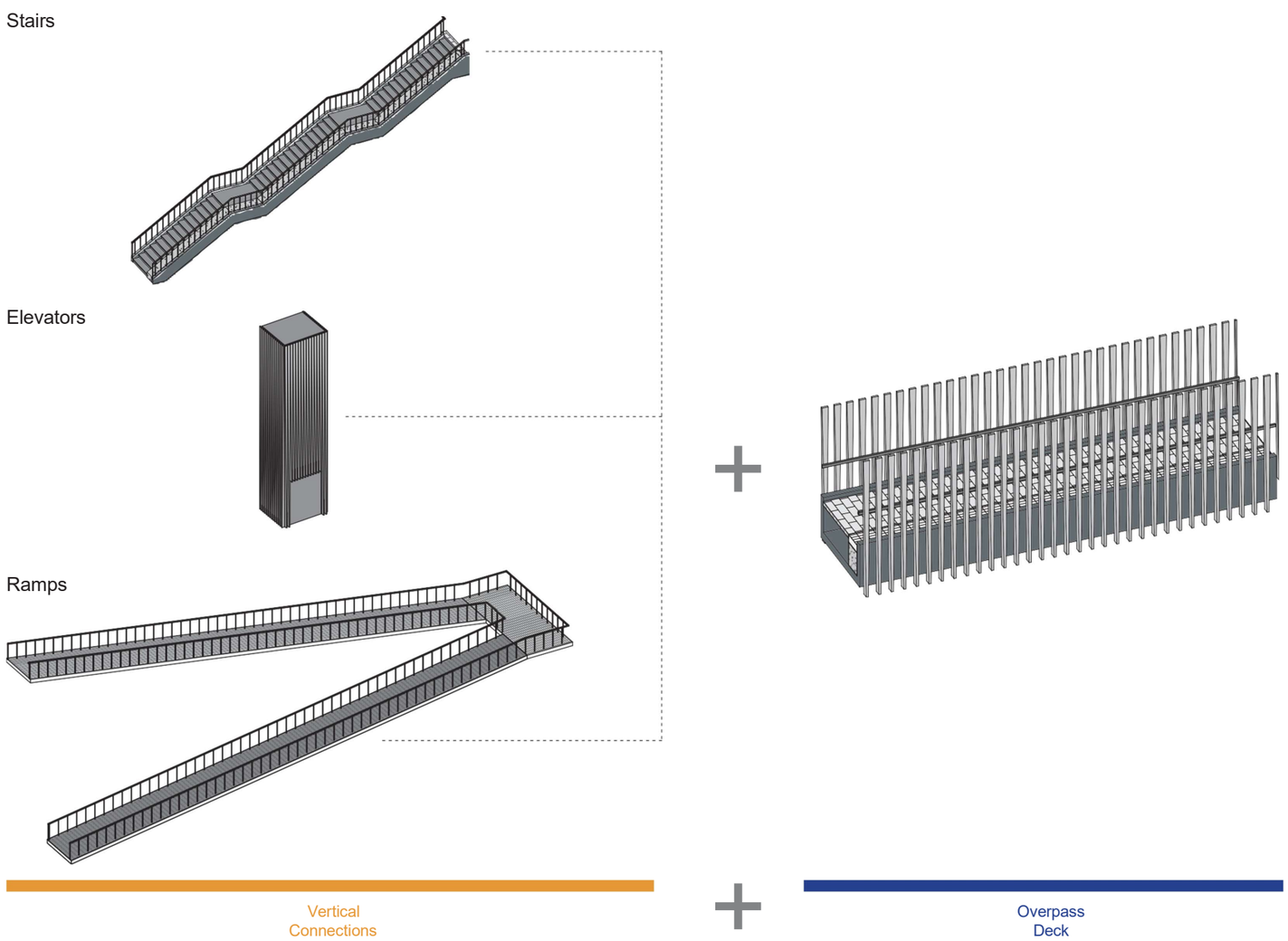
Design Strategy

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.
All elements (stairs, ramps, elevators) shall be Obstacle- free route and comply with requirements of COMMISION REGULATION (EU) No. 1300/2014 of 18 November 2014 on the technical specifications for interoperability relating to accessibility of the Union's rail system for persons with disabilities and persons with reduced mobility.



Geometry

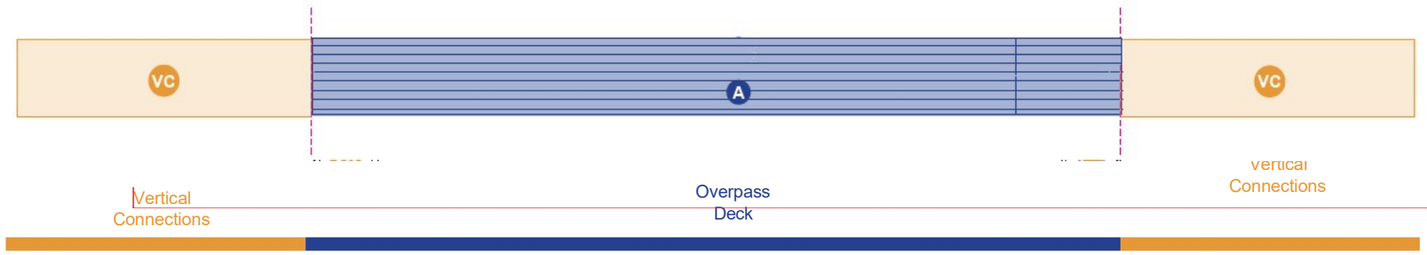
F6.4

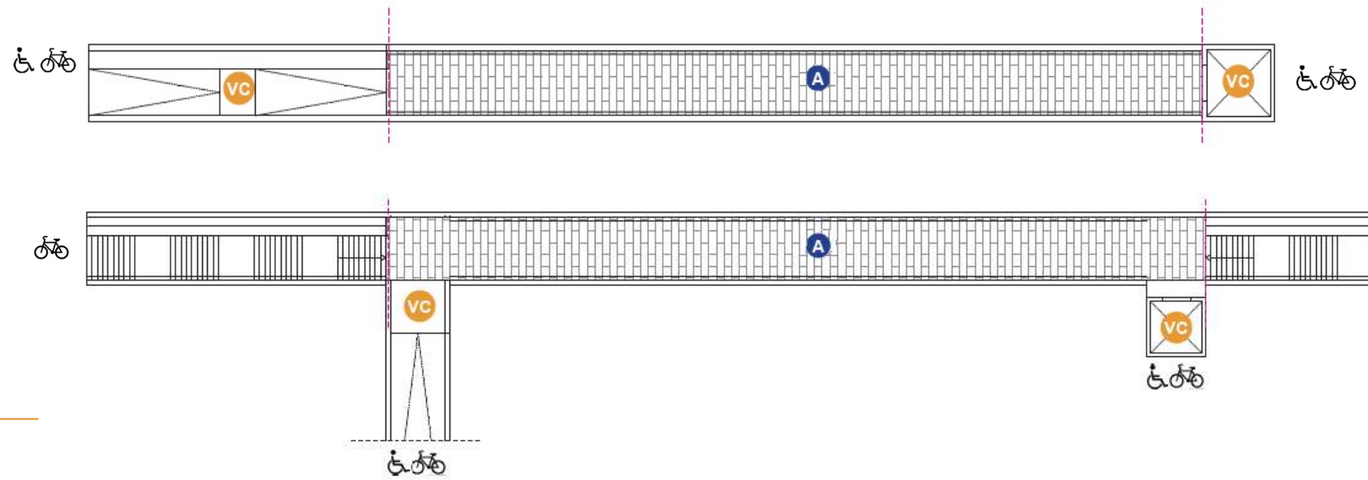
Composition Type 1

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

TYPE 1:
The Essential one, only one pedestrian stripe;

Please notice that vertical connections typologies will be defined depending on the site conditions.
All elements shall follow Accessibility Standard "COMMISSION REGULATION (EU TSI No. 1300/2014 of 18 of November 2014". All accessibility standards shall be confirmed by National and Local Standards.





Legend

- A = Module A = Pedestrian stripe
- VC = Module VC = Vertical Connections

Commented [DJ48]: Functional stripes were eliminated from the drawings

Geometry

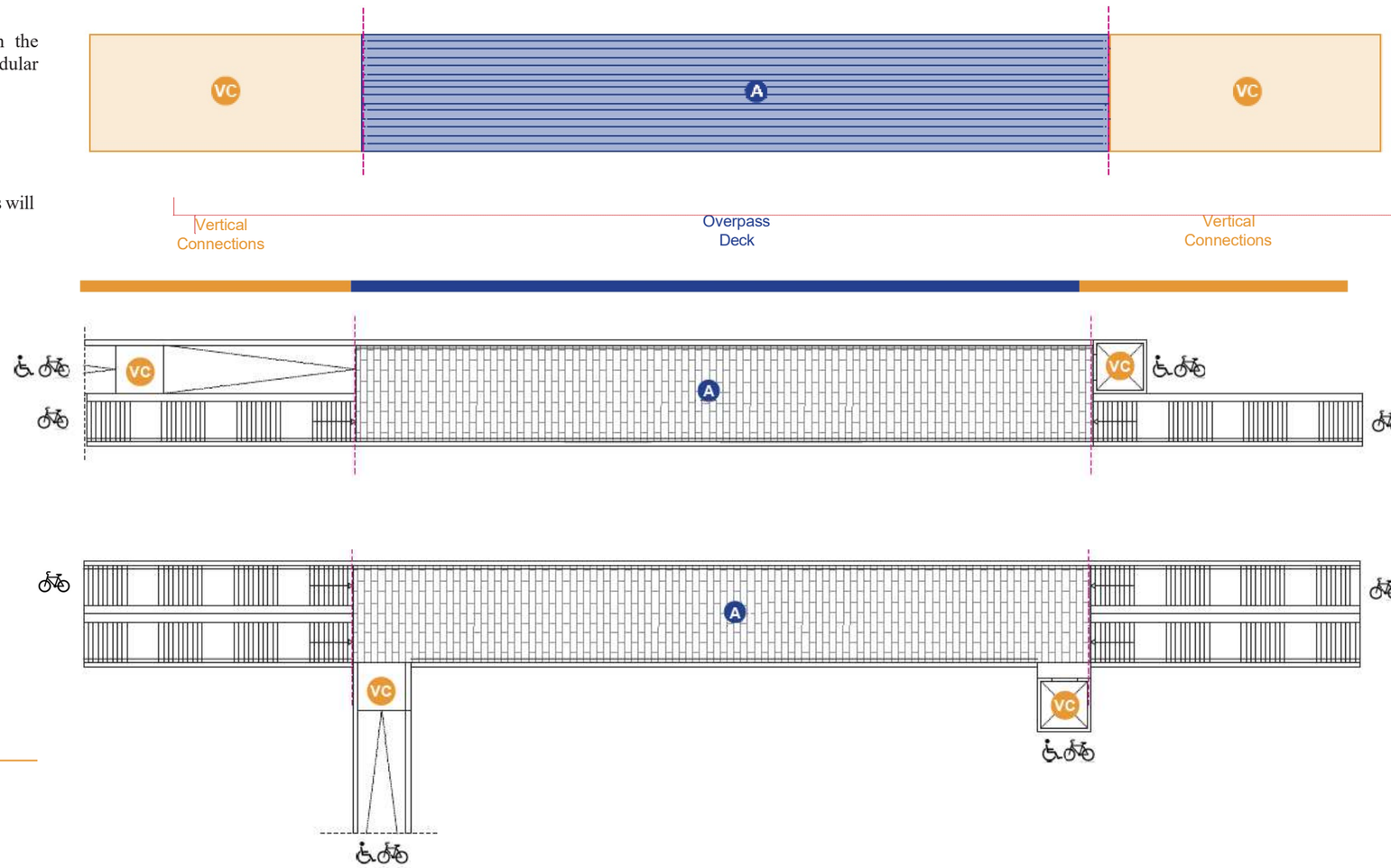
F6.4

Composition Type 2

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

TYPE 2:
The Basic Urban Space, two pedestrian stripe.

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



Legend

A Module A = Pedestrian stripe

VC Module VC = Vertical Connections

Commented [DJ49]: Functional stripes were eliminated from the drawings

Geometry

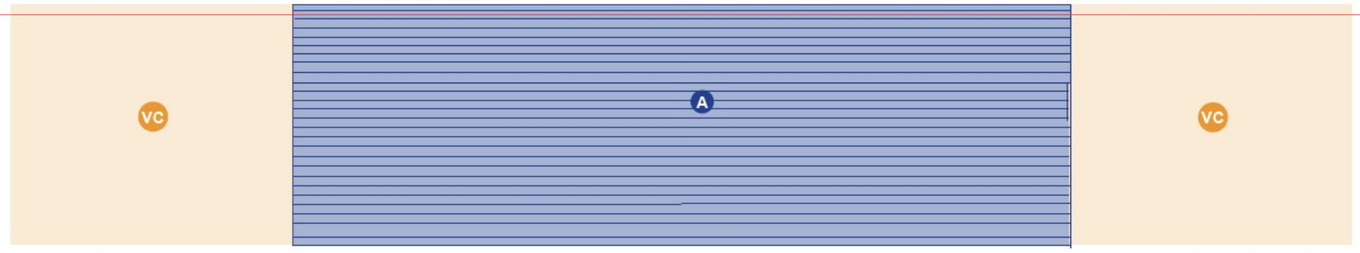
F6.4

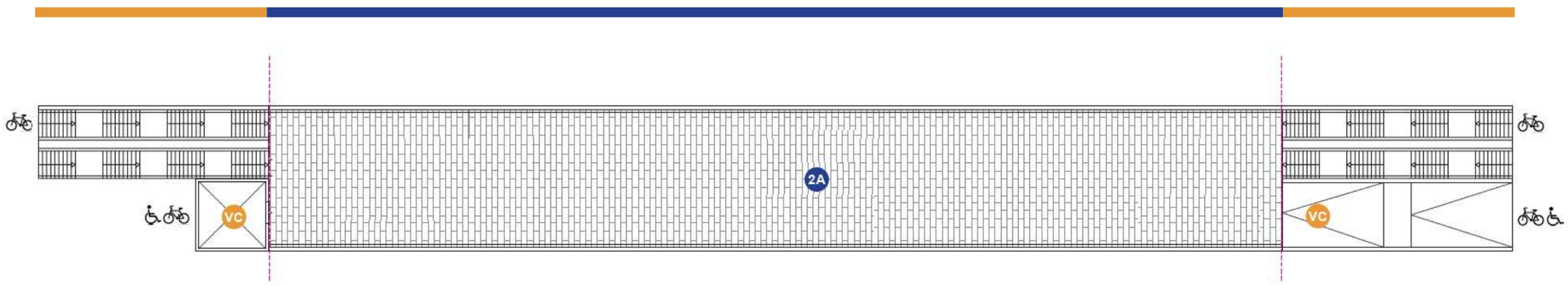
Composition Type X

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 o create an advanced urban space.

TYPE X: n*Module A
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

VC Module VC = Vertical Connections

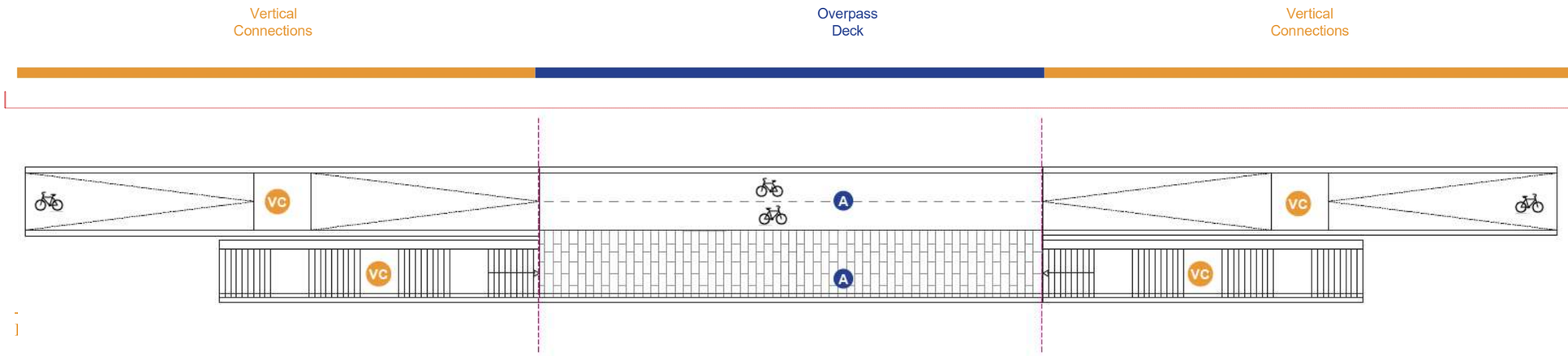
Commented [DJ50]: Functional stripes are eliminated from the drawings

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.



A Module A = Pedestrian stripe / Bike line

VC Module VC = Vertical Connections

Commented [DJ51]: Functional stripe eliminated from the picture

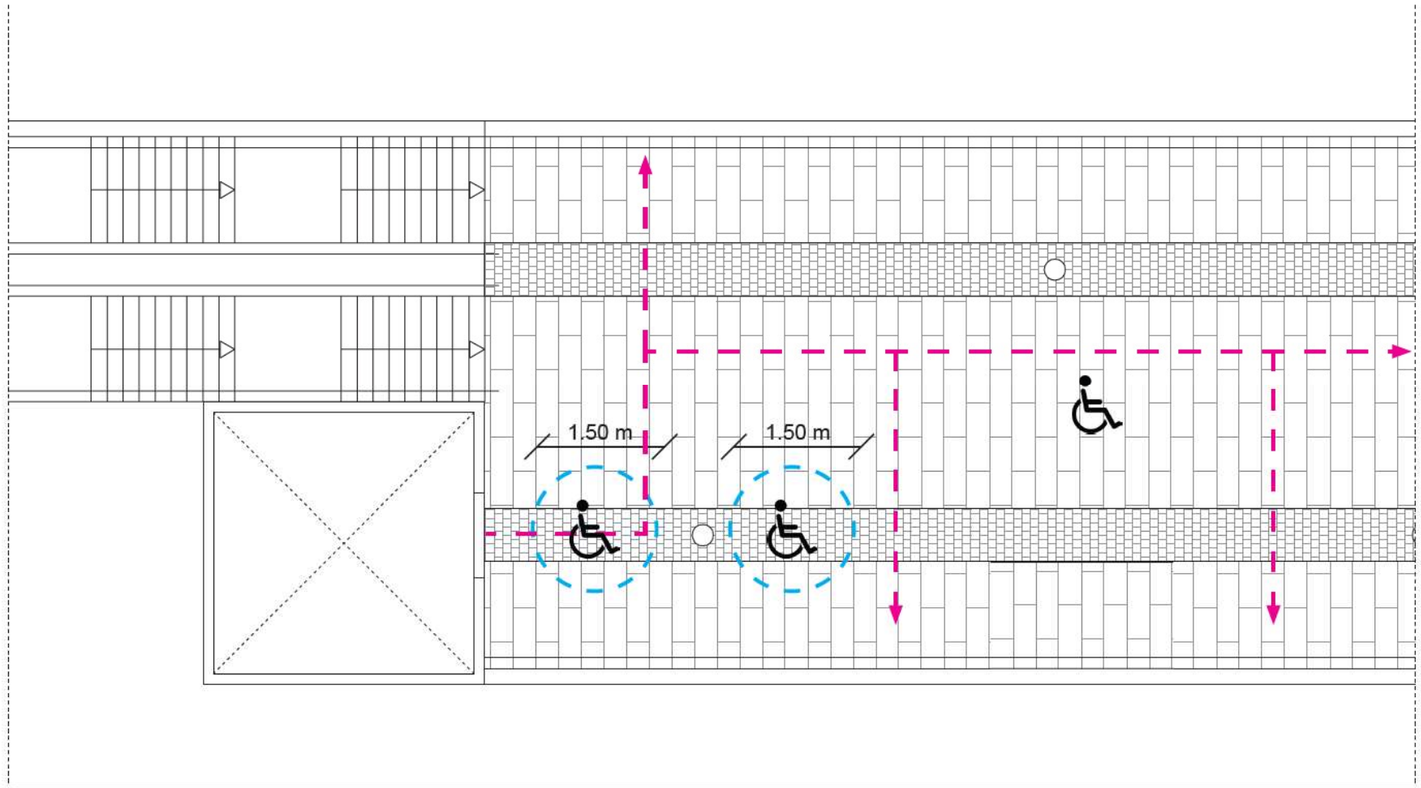
Geometry

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. Paths dimensions shall be designed according to European, National and Local Standards, in order to have accessible infrastructures.

More detail description of PRM requirements implementation is provided in books B chapters B1.10 and B3.8, book D chapter D1.12.



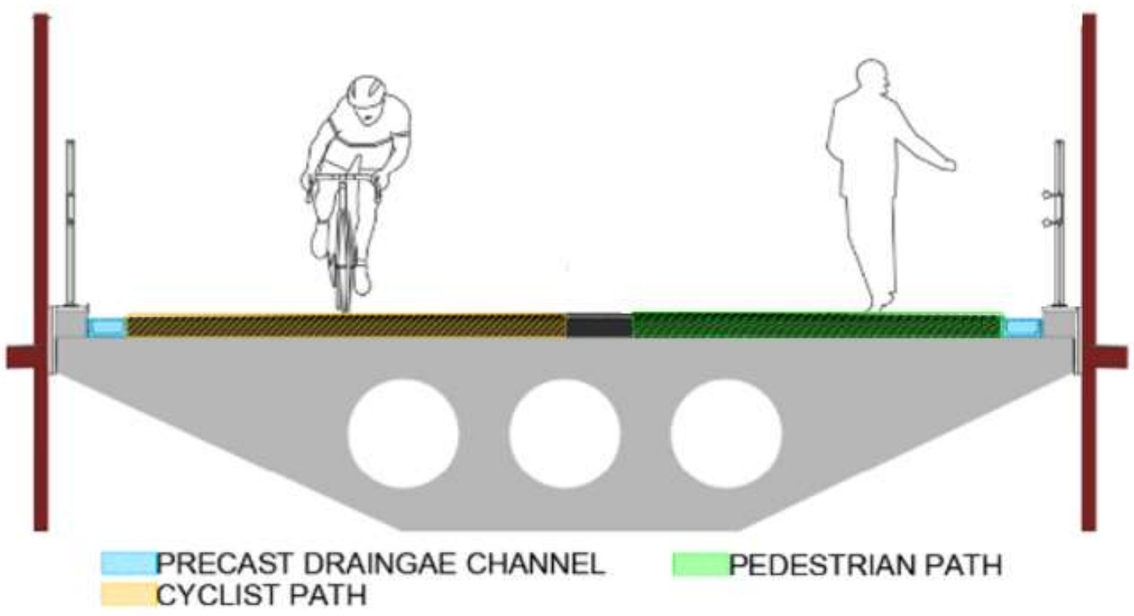
Geometry

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.
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).
− Precast Drainage Channel: A reservation length or drainage channel, with approximated dimensions that must be defined in further phases of the project, according to estimated level rainfalls in the zone.
− Cyclist path: For Cyclist flow, according to Standard requirements with security separations to the left and the right;
− Pedestrian path: For pedestrian flow and according to European Standards (ETI 1300/2014) and Local standards



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

Commented [EB52]: Functional stripe shall be eliminated.

Commented [DJ53]: Picture from IDOM proposal

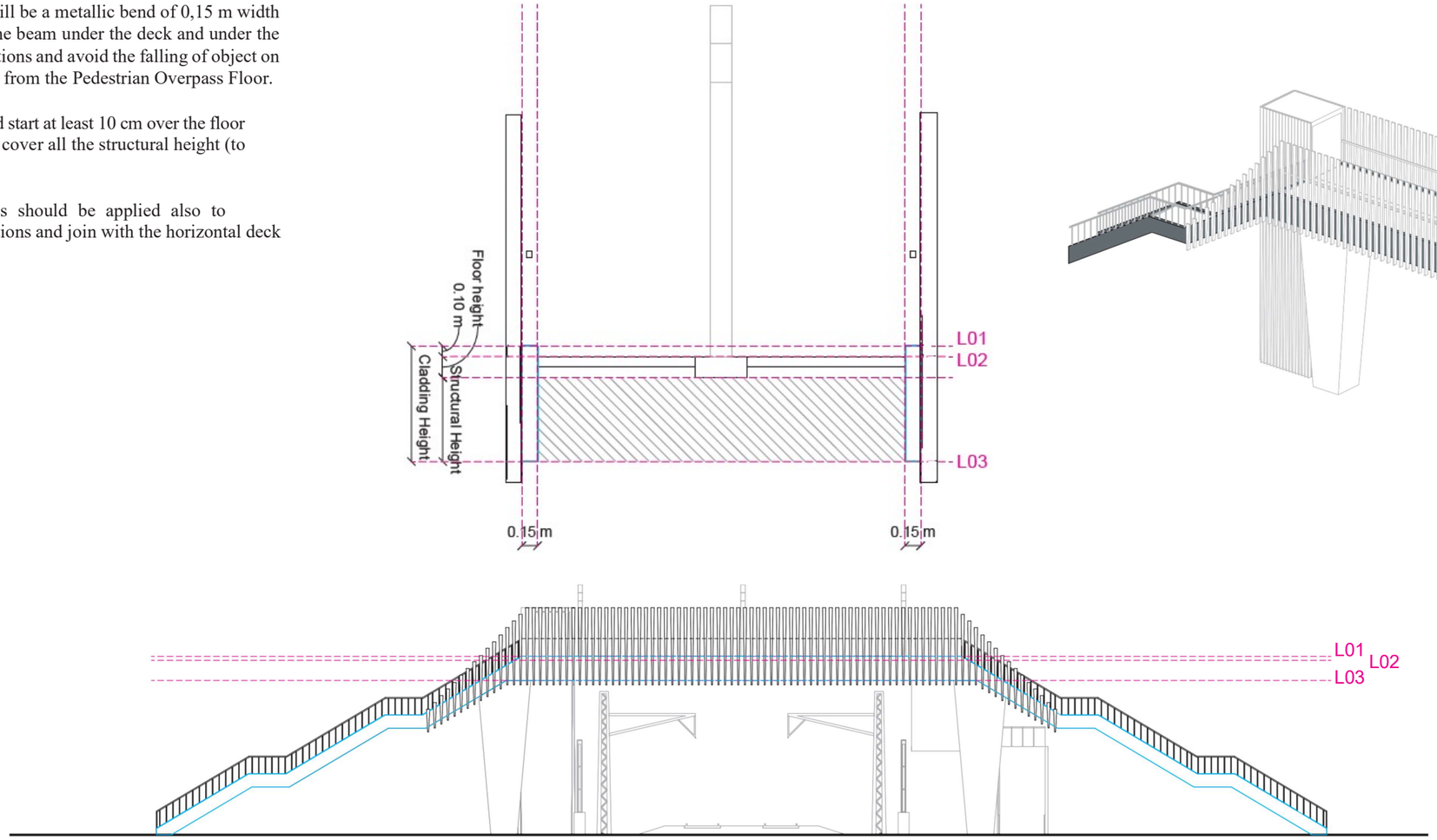
Geometry

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

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



Geometry

F6.4

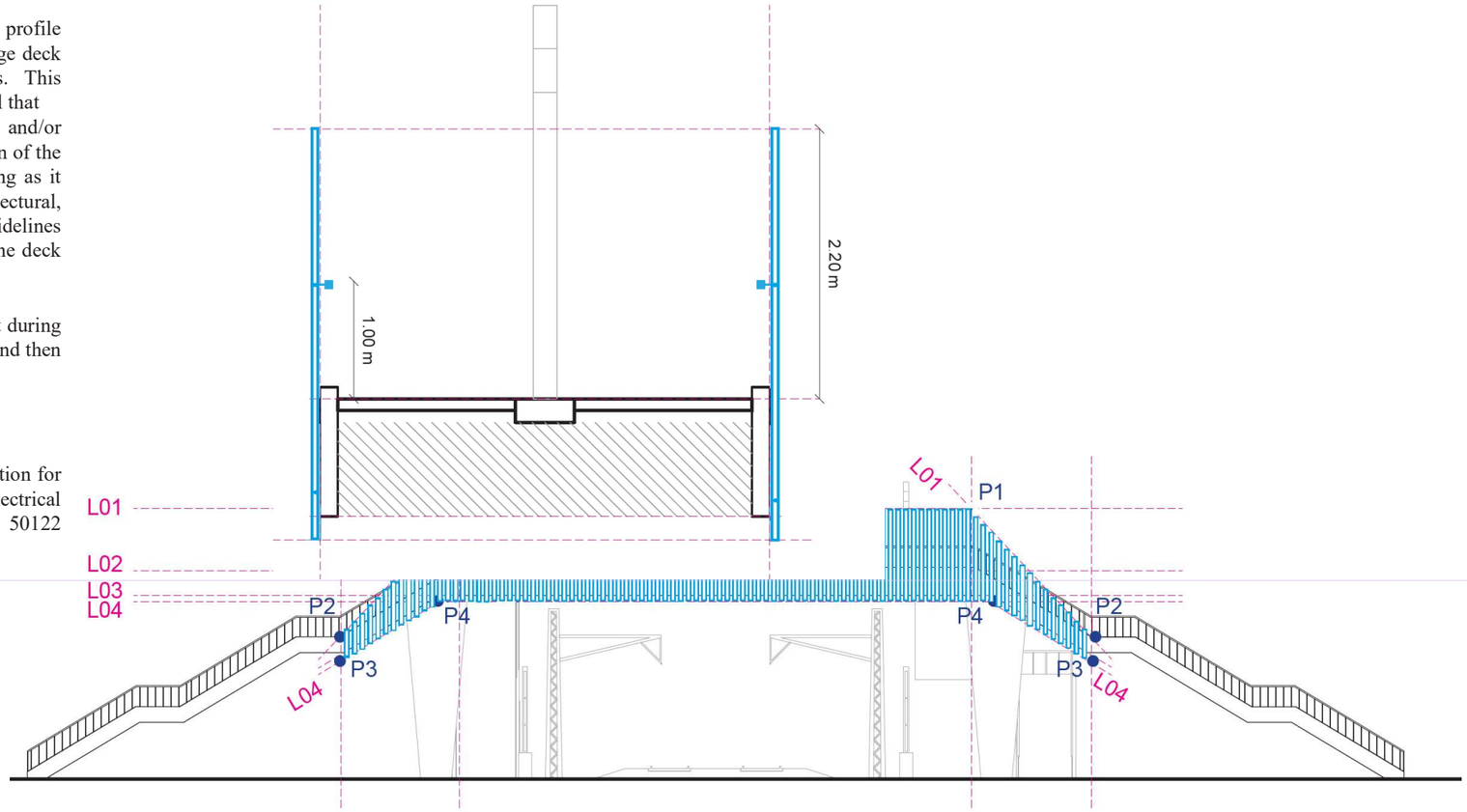
Fence

The fence is composed by a rectangular profile welded to a steel plate embedded in the bridge deck concrete. separating handrails and fences. This decision is due to create a continuous handrail that goes from vertical communication (Stairs and/or ramps) to the deck of the overpass. 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 should include also the handrail during the deck part.

Fence is not installed in all the path, it is just during the deck and has a constant height (2.20cm) and then it degrades its height to a lower point..

).

Fence height should be aligned with the solution for Overhead Catenary Protection System. Electrical safety shall be ensured by following EN 50122 standard.



Commented [EdgarsOg54]: Information about fence geometry for one individual element is missing, in previous version there was some kind of ratios and principles given. Is it removed on purpose to leave it more open, or by mistake?

Commented [DJ55R54]: It was eliminated on purpose, as the suggestion is to simplify the element and to install simply rectangular profile (without turning 90 degrees on another angle)

Commented [EB56]: Horizontal OCPS contradicts RBDG requirements in RBDG-MAN-017

Geometry

Piers

ESSENTIAL OVERPASS (EPO):
− Pier geometry: 2:1 ratio is maintained transversely and 1:1/3 longitudinally. Designer can propose adjustments for the pier shape based on technically feasible justification.
− Pier ramp: there are no ramp piers, as EPO structures are used to connect platforms.
− Pier light: piers are not illuminated.

URBAN SPACE (US):
− Piers Pedestrian Overpass geometry: with the top width double than the bottom width;
− Pier Ramps geometry: For variable depth decks in ramps the following two types of piers are proposed.
Pier light: Consultant proposes that edges of piers will be illuminated with country identity colors.

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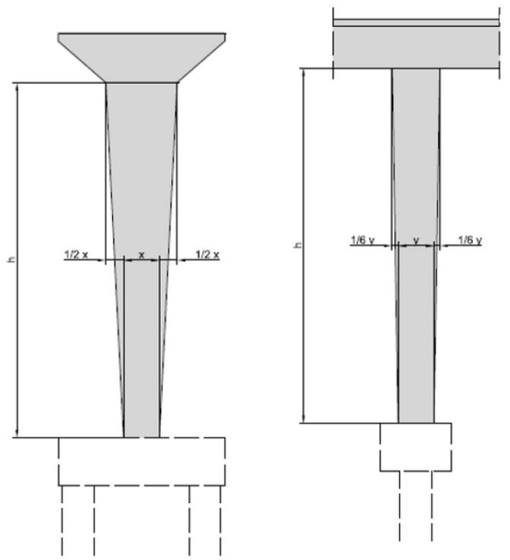
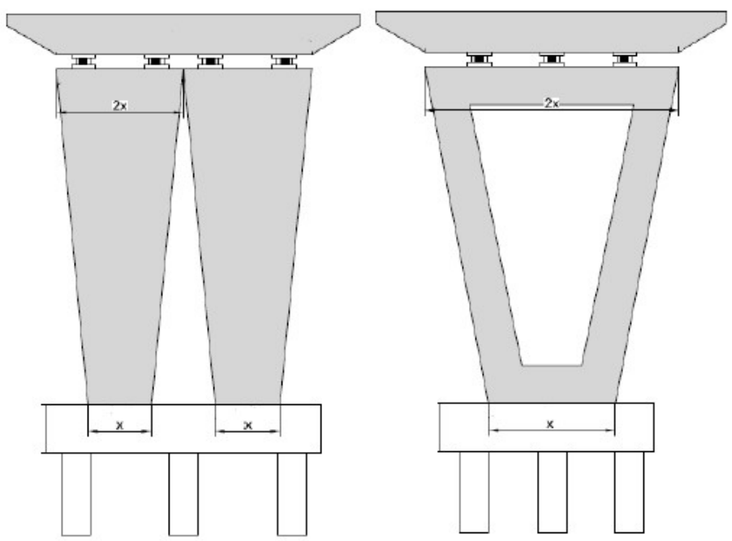
Note:
certain shapes and forms of piers for unified design are only recommendation. Piers design shall be selected after structural assessment.



ESSENTIAL OVERPASS



URBAN SPACE OVERPASS

Commented [DJ57]: Pictures from IDOM proposal

Materials

F6.5

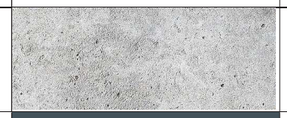
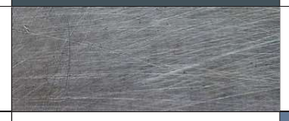
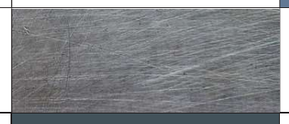
Pedestrian Overpass are mainly a composition of five visual elements:

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
PEDESTRIAN STRIPE	Materials				
	Colors				
PIERS	Materials				
	Colors	RAL 7016			
FENCE	Materials				
	Colors		RAL 5014	RAL 3011	RAL 6011
CLADDING	Materials				
	Colors	RAL 7016			

Branding Implementation

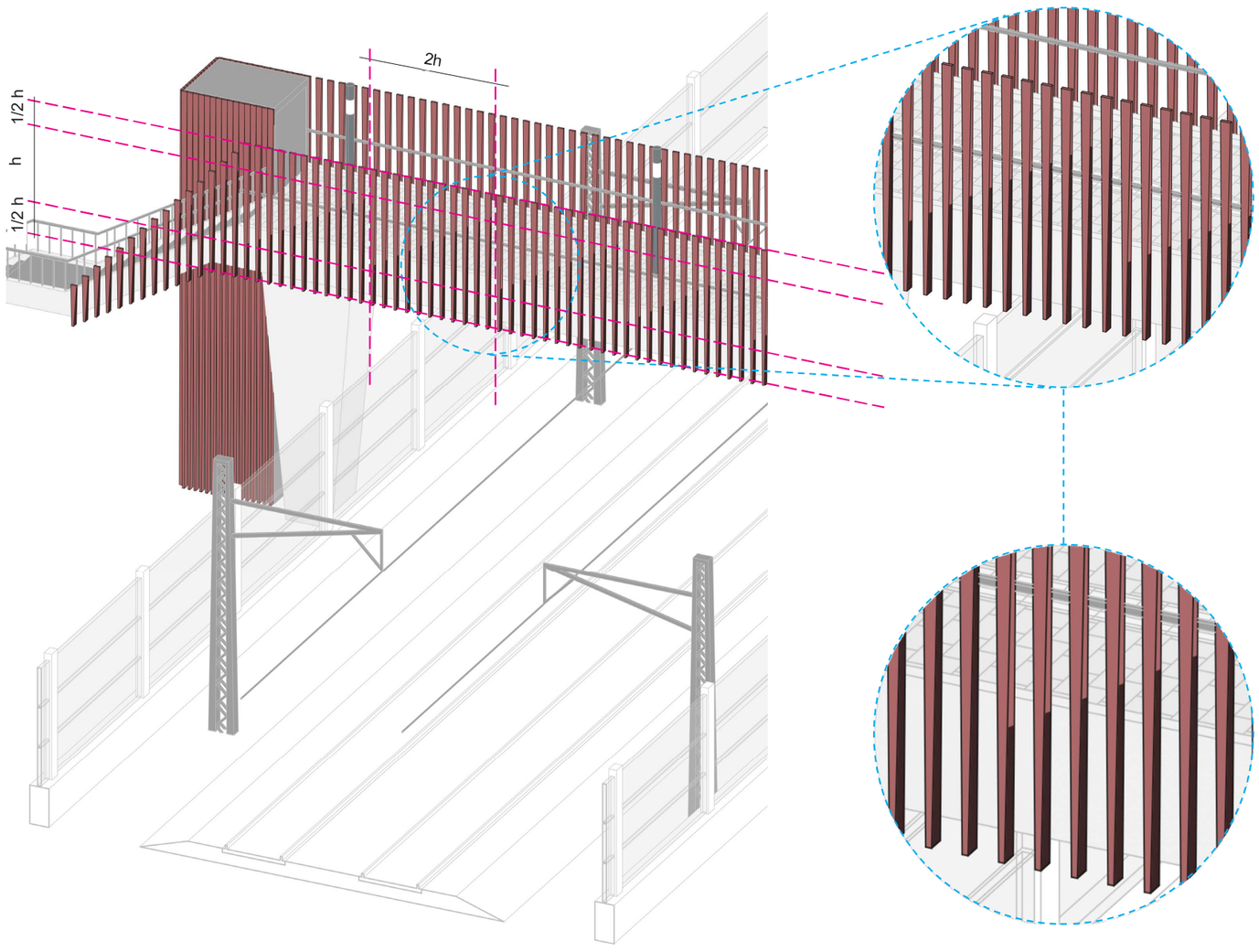
F6.6

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.



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Rail Baltica Network Element

ARCHITECTURAL, LANDSCAPING AND VISUAL IDENTITY DESIGN GUIDELINES FOR RAIL BALTICA

RB Rail AS