Rail Baltica

RBDG-MAN-025-0108

Design guidelines

Infrastructure facilities

06-05-2025

Co-funded by
the European Union

Table of Contents

1 Stations

1.1 General requirements

To cope with the expected traffic, their frequencies and the different service provided, three types of stations are defined:
Regional station used only for regional passenger services;
Passenger and freight loop station for international freight and passenger services;
Freight loop dedicated to freight train overtaking (passing loops).

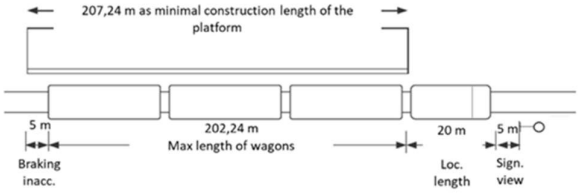
Platforms characteristics:

- INF TSI 4.2.1 states that "the length of the platforms shall be 200 – 400 m." **400 m shall be used as design length and 200m as physical length for Rail Baltica line's International Stations, all Regional Stations platform length shall be at least 100m and according to TSI requirements** .
- Height and width: UIC741 point 2.1 and INF TSI 4.2.9.2. states that "the platforms' characteristics shall be compatible with the boarding arrangements of the interoperable rolling stock and two values are allowed for platform height: 550 and 760 mm". **760 mm shall be used for Rail Baltica line** .
- A 12-meter-wide is usually planned on island platform and 6 to 9 meters on lateral platforms (see passenger platforms requirements for details).

The platform offset shall be calculated according to TSI INF 4.2.9.3.

1.1.1 Length of platforms

The usable length of platform defines the length of platform edge for serving the longest rolling stock type. For this reason the minimal construction length of the platform shall include reserve of 5 m for braking inaccuracy, see Figure below. The nominal construction length of the platform shall be rounded to the next multiple of 5.



The nominal values for platform construction length are provided in the table below:

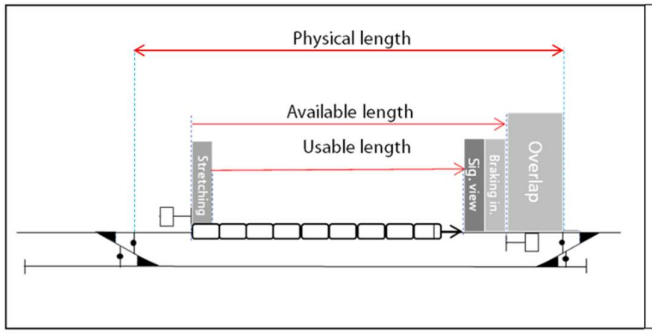
Platform nominal construction length, m
405
210

1.1.2 Usable length of station tracks

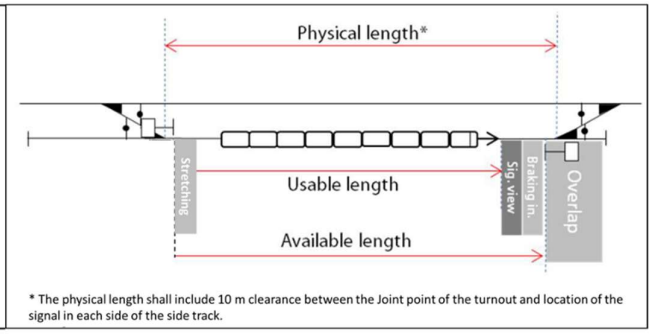
The usable length of station tracks is the track part on which arriving trains shall be stopped, parked, loading operations take place or pulling out of waggons is planned.

Designer shall secure that the usable track length of 1050 m for freight trains is achieved considering required reserves for operations and signaling, described below.

The physical track length is generally limited with adjacent turnouts located in each side of the track, as depicted in Figure below.



1. Main line main track



2. Main line side track

The available track length is defined considering the signalling system planned to be installed. For main tracks, the available track length is defined as a distance between the ETCS marker board or start signal for the specific direction and the ETCS marker board or start signal for the opposite direction.
For the determination of the available track length on the basis of the physical track length, following reserves shall be considered (please refer to Figure above):

Shunting limits of adjacent turnouts.

Comment: Shunting limit defines the safe distance between two converging tracks thus prohibiting simultaneous usage of two converging track sections from the Shunting limit to the Heel Joint of the turnout.

Signalling system planned to be installed and how it implements operational requirements, e.g. ensures specific entering speed by means of overlap protection.

Comment: Overlap is applied for safety reasons as a free track section behind the target ETCS marker board or signal to the following danger point (e.g. Shunting limit or Joint point of the turnout). The Overlap for trains under ETCS-supervision does not exceed 70 m according to the European practice and this value shall be used as the nominal value.

For the determination of the usable track length based on availible track length, further operational reserves shall be considered:
train stretching,
braking inaccuracy,
signal view.

The reserve for train stretching compensates the stretching of a cargo train. Shrinking of the cargo train occurs during the braking and remains when the train stops. When it starts again, wagons are stretched into the opposite direction. The maximal distance of the train stretching depends on the train length and the gradient of the track. Considering train length of 1050 m and the European practice, the length of protection sections shall be at least:

Negative track gradient, ‰	Protection section length, m
0	5
1	6
1,5	7
2 - 3	9
4 - 5	10

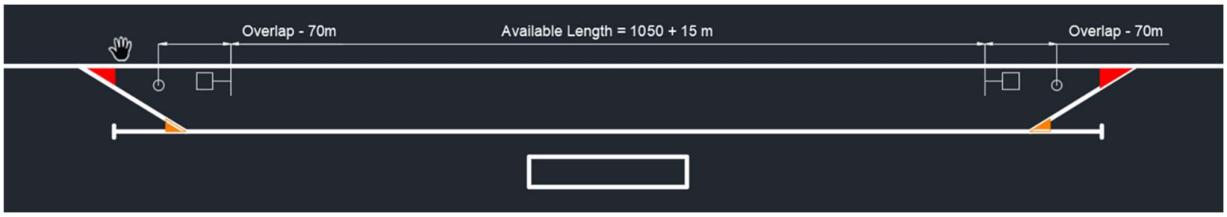
6 - 7	11
8 - 11	13
≥ 12	15

The reserve for braking inaccuracy shall consider possible inaccuracy of the end position of the train after braking. The distance of 5 m represents the regular value according to the European practice.

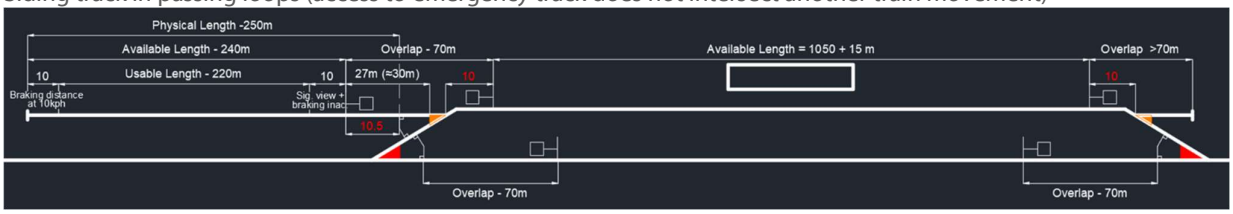
The reserve for signal view is required in front of the ETCS marker board or signal. It allows the train driver to see the respective indication and identification marking. The distance of 5 m represents the regular value according to the European practice and shall be considered by designer.

Implementation on typical track layouts
Figures below provide implementation of above rules applied on typical layouts with track at 0 ‰ gradient

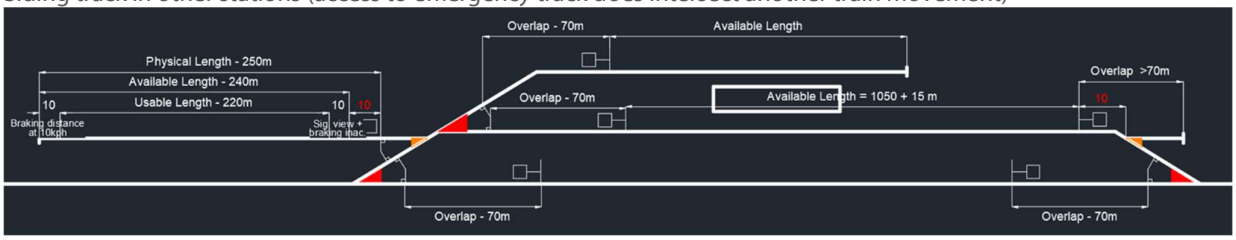
Main lines



Siding track in passing loops (access to emergency track does not intersect another train movement)



Siding track in other stations (access to emergency track does intersect another train movement)



1.1.3 Overhead Contact System (OCS)

The locations of OCS poles and anchoring foundations shall be determined by the System designer.

In the case that the System designer is not available the structural designer (responsible for INF) shall prepare a conceptual OCS layout. The conditions for this conceptual design are described in RBDG-MAN-019. The conceptual OCS design shall cover the following design solutions:

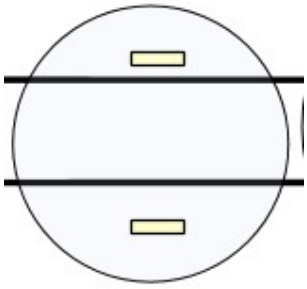
- Catenary wiring;
- OCS foundation / pole (including anchors) locations;

- Portals (where needed);
- Cross-sections of critical interfaces to civil structures;
- Additional feeder and/or return current wiring;

OCS anchoring can be integrated (where needed) in the facility structures.

1.2 Regional station – platform on the main line (limited traffic)

The regional station is the simplest way to serve an area. It is formed with two platforms located on each side of the main tracks with underground or footbridge for passengers not to cross the main tracks. Length of platform could be limited to the length of the servicing rolling stock (and to secure the future maximum length of these services). Public address and public information systems shall be provided in these stations with no additional facilities.



In order to provide safety on passengers standing on platforms while a passing through train could be running it is recommended for unmanned station, even if not mandatory, to install platform fences as it is currently done in Germany and Japan. Another option could be to always retain people from accessing to the platform with gates provided at the access and to allow the access once the calling train will arrive. This needs staffing inside the station.

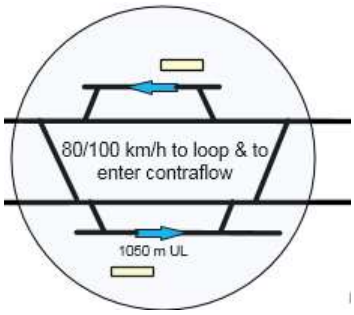
As these stations are reducing the possible operations on the Main line, the use of such layout is recommended for a limited number of trains per day with no impact on the operations at peak hours.

In Japan, such stations, where HS trains pass without stopping, have fences fitted along the platform at about 2-meter distance from the edge to prevent passengers being sucked off the platform by the vortices.

Location of these stations will be defined at a later stage by RB Rail.
Specific requirements for passenger platforms are defined in RBDG-MAN-026 Stations and passenger platforms.

1.3 International freight and passenger station

This station will propose two through tracks able to be operated at the maximum speed limits and two platform loops able to provide the ability for passenger trains to serve these stations (regional and international services). The access to the loops is designed for international and national services to call at station and the 80/100 km/h speed limited junction is matching with the 1050m usable length of the loops for freight trains. Higher speed such as 120 or even 160 km/h could be planned on turnout. 200 m long platforms are located at the end of the loop in order to allow the highest speed on the turnout. As said above, there is a need to secure 400 m at the design stage in order to be able to extend the platforms in the future.



It shall be noted that this schematic allows to retain 1050m long freight trains on both the platform loops and on the passing through tracks for being overtaken by an international passenger train serving or even not serving the station. Station are fully designed on a symmetrical basis to provide the same easiness of operation when trains are running on the reverse side.

Additionally, two 80/100 km/h speed limited junctions are provided to be able to operate service on the wrong side for maintenance purposes or in case of train or equipment failure. Such turnouts will not be used on a daily basis and 80 km/h seems consistent with the needs. The exact requirements for speed in turnout shall be defined by the operation plan.

A complete crossover can be done on each side of the station to allow passenger trains to always serve the normal platform, but this is usually dedicated for high level passenger traffic and is consequently not our preferred option.

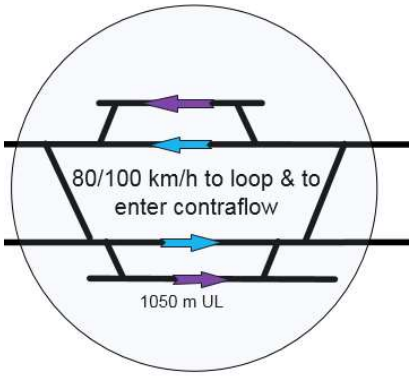
Specific requirements for passenger platforms and passendger stations are defined in RBDG-MAN-025 Passenger platforms.

2 Passing loops

Once international and regional stations are clearly located, there is a need to provide facilities to allow easy overtaking and change of main tracks. In order to do so, a mix of passing loops and crossovers shall be used with as a minimum one crossover every 25 km approximately and one cross over with sidings one upon two crossovers. Passing loops detailed below could replace both types of crossovers and shall be placed approximately every 50km.

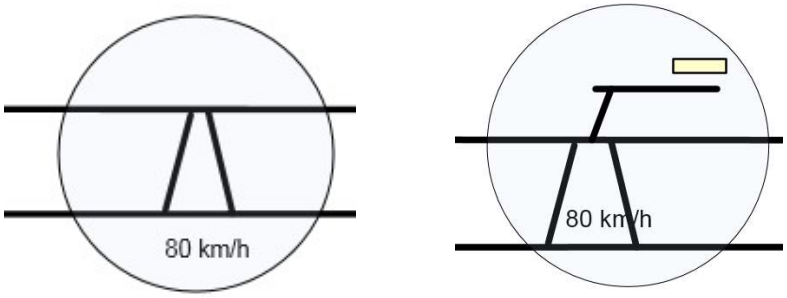
The passing loops will be used for the overpass of a slow train by another train to be compliant with the timetable. They can also be used as crossovers in order to reduce the investments. The proposed layout is with the passing loops on each side of the main line with more flexibility for the operations.

The exact requirements for speed in turnout shall be defined by the operation plan.



3 Crossovers – Crossover with emergency sidings

All high-speed lines are double track workable in both directions, allowing trains to operate at full speed, irrespective of the direction on either track. This concept is mandatory to be able to operate high speed services even during a blockade on one track and to quickly recover after incidents. This arrangement also facilitates possessions and maintenance works on tracks.



As a consequence, crossovers between the Down and Up tracks are designed every 25 km approximately to provide the ability to divert trains from one track to another at reduced speed (80 km/h on the crossover – increase to 100 km/h is possible but not mandatory). The exact requirements for speed in turnout shall be defined by the operation plan.

Crossovers with emergency sidings shall be spaced about 50 km apart. As an option, some crossovers (one upon two) could also be equipped with an additional platform track accessible from both main tracks for emergency purposes. This will allow to park a failed train to free the main lines and to allow passengers to get out from the train. Usable length shall be 1050 m.

4 At grade or flyover junctions

Depending on the future traffic based only on passenger express and freight trains (14 Fr + 12 Exp conflicting with 15 Fr + 10 Exp per day), the different junctions (Vilnius, Riga, Kaunas, Tallinn) are planned at grade at a 120 km/h or 170 km/h maximum speed on the diverted route. Nevertheless, this does not take into account some regional traffic that could be expected but is not yet assessed.

The exact requirements for junctions (at grade or flyover) shall be defined by the operation plan.

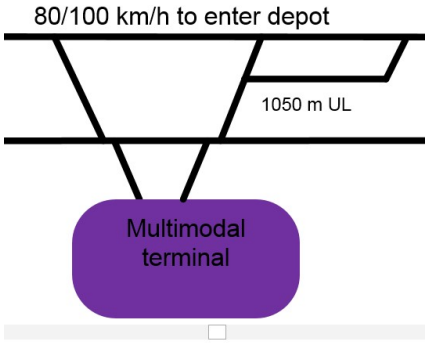
The two types of junctions possible are:

At grade junction

Flyover junction

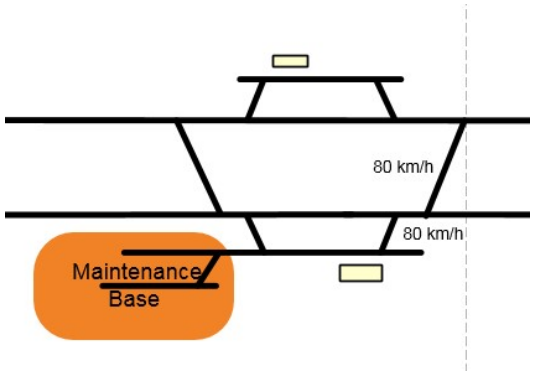
5 Access to RS Maintenance depot & multimodal terminals

According to the limited level of traffic, providing flyover to access or exit from the depot seems costly. Consequently 80 or 100 km/h at grade junction with sufficient length to allow the freight train to brake after having freed the main tracks is recommended. 80 km/h means that the yard (RS depot or multimodal) has at least one internal track able to be operated at 80 km/h. The exact requirements for speed in turnout shall be defined by the operation plan.



6 Access to Maintenance Base

According to the limited level of traffic, providing flyover to access or exit from the depot is not mandatory. 80 or 100 km/h at grade junction to reach the loop is recommended. Then entering the maintenance base at 30 km/h is an agreed standard. The exact requirements for speed in turnout shall be defined by the operation plan.



7 Numeration principles of railway infrastructure

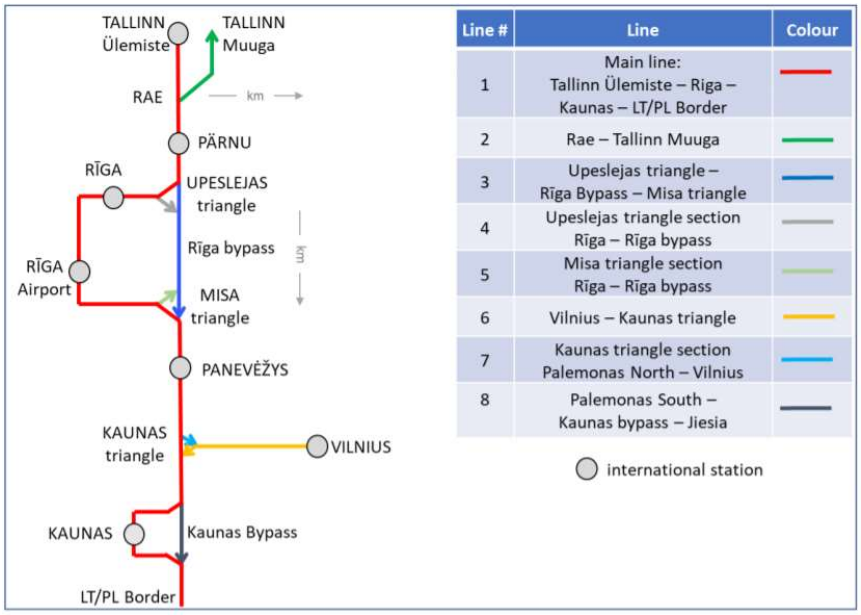
7.1 General requirements

Numeration principles[1] of Rail Baltica tracks, platforms, turnouts[2] and operational points[3] shall ensure that designers apply unified numbering system and technical drawings are consistent and include information required for its qualitative review by RB Rail experts and usage by railway system designers.

In justified specific cases, reasonable deviations from principles stipulated below are possible after approval of the RB Rail.

7.2 Tracks and platforms

Numeration of Rail Baltica line tracks shall be applied according to the line concept depicted in the figure below. This concept defines that km-direction for the main line from Tallinn Ülemiste to LT/PL border is from the North to the South and for branch lines the chainage starts at the connection point to the main line (beginning of the turnout = 0+000,000 km) with one exception for the line #6 from Vilnius to Kaunas triangle.



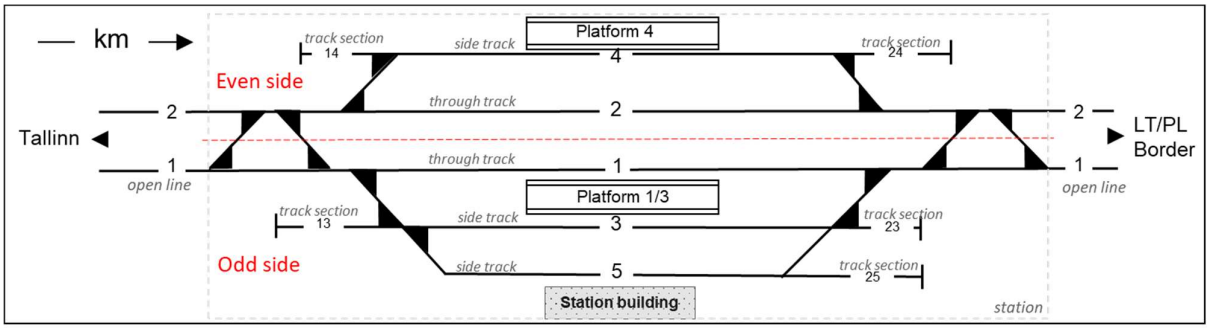
Tracks on open line[4] shall be numbered with one-digit Arabic numerals. The regular operation track in km-direction shall be numbered as track 1 and the track against km-direction – as track 2, please refer to the drawing below.

[1] Numeration principles define numeration for Master design and Detailed Technical Design stages, however, do not exclude later adjustments at the stage of putting the infrastructure in operation to align it with the rules of future Infrastructure Managers.

[2] Including turnouts, crossings and derailers

[3] Operational points, see Section 7.4

[4] Open line is a section between two stations



Tracks in station shall be numbered with up to three-digit Arabic numerals, however zero in the beginning of the number shall not be spelled. Station through tracks (from/to open line) shall keep its "open line" numbers, i.e. 1 or 2. Side tracks on the odd side of the station (side of the track 1) shall receive odd numbers, i.e. 3, 5, 7, etc. Side tracks on the even side of the station (side of the track 2) shall receive even numbers, i.e. 2, 4, 6, etc.

In case of complex track layout or operational necessity, side tracks could be divided into separate track sections: tracks for regular parking of vehicles, tracks for arrival/departure of short trains or tracks with specific operational function, e.g. for turnaround of vehicles. Numbering of these track sections shall use up to three-digit Arabic numerals. The first digit shall describe location of the track in km-direction and increase with it, e.g. 1, 2, 3, 4, 5, etc. The last two digits describe the location of the track in relation to the station track.

Examples:

track 14 is located in the station side with the lower km and is a continuation of the track 4;

track 25 is located in the station side with the higher km and is a continuation of the track 5.

Platforms (platform edges) shall receive the numbers which correspond to the tracks served from the respective platform edge. This shall ease communication between railway local personnel on station and train personnel (train driver and on-board crews)

Side platforms (platforms with one edge) shall be numbered with one-digit Arabic numeral according to the number of the served track, e.g. Platform 4 serves track 4.

Island platforms shall be numbered with two one-digit Arabic numberals divided with the slash, e.g. Platform 1/3 serves tracks 1 and 3.

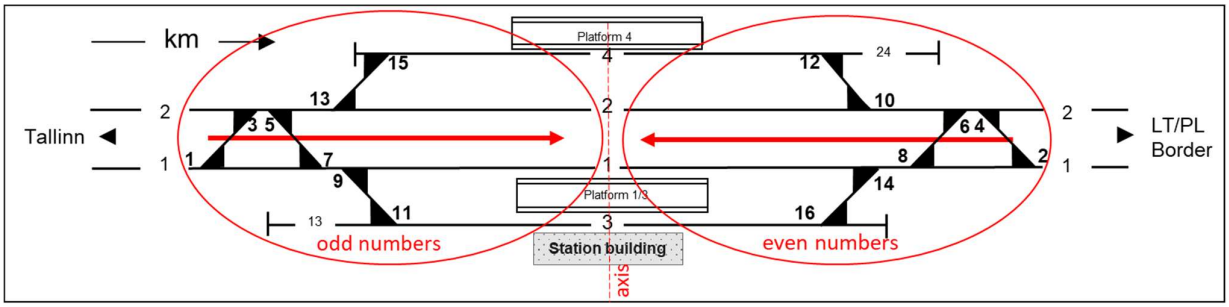
For stations with both 1435 mm and 1520 mm gauge tracks and platforms, the designer shall propose the unique numbering of all tracks and platforms in order to avoid misinterpretation by passengers, operational and maintenance personnel. For this purpose, station tracks shall be preferably numbered starting from the main entrance of the station building, e.g. 1, 2, 3, 4, etc. If no main entrance or station building is available, tracks shall be numbered from right to left when looking in the km-direction.

7.3 Turnouts, crossings and derailers

Numeration of turnouts, crossings and derailers shall provide general information on location of the element for maintenance personnel defining station side with the higher or with the lower km and approximate distance to the element from the station axis. Turnouts, crossings and derailers shall be numbered with up to three-digit Arabic numerals (zero in the beginning of the number is not spelled) and structured as follows:

Odd numbers shall be assigned to elements in the station side with the lower chainage (e.g. 1, 3, 5, 7, etc) starting from the first turnout in km-direction;

Even numbers shall be assigned to elements in the station side with the higher chainage (e.g. 2, 4, 6, 8, etc) starting from the first turnout against km-direction, as depicted in the figure below.



Turnouts of the crossover in station shall be numbered with two consequent numbers, e.g. 10 and 12 or 13 and 15. When spelling a crossover number, a slash symbol shall be used: 10/12 or 13/15.

Numbers for crossovers and turnouts which are designed on conceptual level and shall be implemented in time horizon 2036-2056 shall be reserved in Detailed Technical Design and not used in order to keep numeration of stations and passing loops with typical layout as homogenous as possible.

Single crossover on open line shall be typically numbered with 1/3, but double crossover with 1/3 and 2/4. Exceptions are allowed in case if later implementation of turnouts is already planned, as described above.

For turnouts in triangles the following rule shall apply:

Each turnout shall receive a unique number;

Turnouts located on the main line Tallinn Ülemiste – LT/PL Border (see Chapter 7.2) shall be numbered as follows:

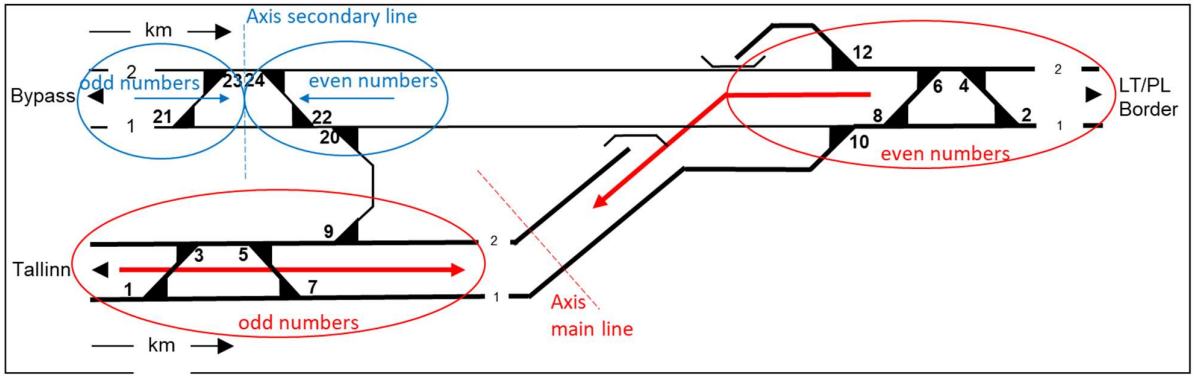
Odd numbers shall be assigned to turnouts in the triangle side with the lower chainage (e.g. 1, 3, 5, 7, etc) starting from the first turnout in km-direction;

Even numbers shall be assigned to turnouts in the triangle side with the higher chainage (e.g. 2, 4, 6, 8, etc) starting from the first turnout against km-direction, as depicted in the figure below.

Turnouts located on the secondary line shall be numbered starting from 20, numbering shall be based on km-direction and overall number of turnouts:

Odd numbers shall be assigned to turnouts with the lower chainage (e.g. 21, 23, etc) starting from the first turnout in km-direction;

Even numbers shall be assigned to turnouts with the higher chainage (e.g. 20, 22, 24, etc) starting from the first turnout against km-direction, as depicted in the figure below.



The number of the turnout, on the drawing which covers more than one station, shall be spelled with the abbreviation of the station, passing loop or crossover (talking code) which the turnout belongs to.

Exmple: turnout 2 in Skulte station shall be spelled as SKU02, thus providing a unique identifier to each element. For this purpose, RB Rail operational department will elaborate the list of station abbreviations and distribute it to designers.

Chainage of the beginning of the turnout and its shunting limit shall be indicated for each turnout on the technical drawing. For turnouts wich are connecting two lines (please refer to the line concept described above), at the beginning of the turnout shall be indicated chainages of two lines.

For stations with both 1435 mm and 1520 mm turnouts, there shall be unique numbering of all turnouts in order to avoid misinterpretation by operational and maintenance personnel. For this purpose, turnout numbering shall be divided in blocks assigned to 1435 mm and 1520 mm tracks depending on the overall number of turnouts: i.e. 1-50 for turnout numbers in 1435 mm network and 51-100 for turnout numbers in 1520 mm network. In each case designer shall consider already existing numeration of 1520 mm turnouts.

7.4 Operational Points

7.4.1 Operational points definition

Operational Points (OP) are:

Type of OP	Definition
Station	Passenger and/or Freight station
Halt	Section of main tracks equipped with passenger platforms, servicing passengers
Passenger units stabling area	Area for stabling passenger units
Freight terminal	OP dominantly serving for loading and unloading of freight trains
Junction	An arrangement of tracks and turnouts in which a line is joined by another one
Rolling Stock Maintenance Facilities	Group of tracks and related facilities used by depot or workshop for RST maintenance;
Infrastructure Maintenance Facilities	Group of tracks and related facilities for infrastructure maintenance (incl. workshop with storage of material, machnines and other ecquipment, etc)
Train technical service facility	Group of tracks for servicing trains (parking, washing, etc.).
Road Vehicle Loading Area	Station or yard, where road vehicles can be loaded / unloaded to / from trains

Type of OP	Definition
Turnout	Mechanical installation enabling railway trains to be guided from one track to another
Crossovers	An arrangement of corresponding turnouts providing a connection between two parallel tracks
Border point	Located in the point where a border between Member States meets a railway line;
Shunting yard	Group of tracks used for shunting trains, mostly related to freight traffic;
Technical change point	OP, where CCS system, electrification system or track gauge is changing
Private siding	OP that describes the embranchment connected to the main line that leads to the private siding

7.4.2 Location codification of Operational Points

The location codification of Operational Points shall be unique and consists of a two-capital letter code that allows each Operational Point to be identified.
The "unique code" must allow intuitive interpretation and prevent misinterpretations of the Operational Point's geographic location (e.g. it is not allowed to use same code SA for Salacgrīva and Salaspils; SC to be used for Salacgrīva and SA for Salaspils).

7.4.3 Characterization of the type of Operational Points

The following abbreviations will be used to characterize the different types of Operational Points.

TABLE 1 CODIFICATION OF TYPE OF OPERATIONAL POINTS

Type of OP	Code for OP type
Station	S
Halt	H
Passenger unit stabling area	P
Freight terminal	F
Junction	J
Rolling Stock Maintenance Facilities	D
Infrastructure Maintenance Facilities	M
Train technical service facility	T
Road Vehicle Loading Area	L
Turnout	U
Crossovers	O
Border point	B
Shunting yard	Y
Technical change point	C
Private siding	R

7.4.4 Codification of the location and type of Operational Points

The codification of the location and type of Operational Points consists of the two-letter code of the location and a letter indicating the type of the Operational Points.

If there are **many Operational Points in the same geographic location** the location will be the same but the third letter for the type of the Operational Point will provide the unique code.

Next table is providing some codification examples:

TABLE 2 CODIFICATION EXAMPLES

Location of Operational Point	Code
Skulte (Code: ST)	
Skulte Station	STS
Skulte Freight Terminal	STF
Skulte Infrastructure Maintenance Facility	STM
Salaspils (Code: SA)	
Salaspils Halt	SAH
Salaspils Freight Terminal	SAF
Panevėžys (Code: PV)	
Panevėžys station	PVS
Panevėžys infrastructure maintenance facility	PVM
Panevėžys cargo terminal	PVF
Panevėžys passenger stabling area	PVP