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TRANS TRITIA

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Report of increase capacity of the rail connections at TRITIA area

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Content

1. Introduction

Studie v první fázi zkoumá stávající kapacitní možnosti hlavních železničních tras na osách Opole-Ostrava-Žilina a Katowice-Žilina pro nákladní dopravu. Na základě zjištění stávajícího stavu a předpokladu zatížení hlavních os nákladní dopravou, kde se předpokládá navýšení dopravy, se pojmenovávají kapacitně nevyhovující místa a navrhují se úpravy na dosažení dostatečné kapacity.

1.1. Definition of the area of interest

The area of interest is TRITIA region, ie economically and hence transport - very exposed area of the border territory of the Republic of Poland, the Czech Republic and the Slovak Republic. This region has an area of **34 069 km^2** and has **7 885 000 inhabitants.**

There are two cities with about 300 thousand on its territory. The inhabitants - **Katowice** 312 thousand and **Ostrava** 294 thousand and other 15 cities with more than 80 thousand inhabitants - Częstochowa 227 thousand, Sosnowiec 222 thousand, Gliwice 197 thousand, Zabrze 189 thousand, Bytom 185 thousand, Bielsko-Biała 174 thousand, Ruda Śląska 145 thousand, Rybnik 141 thousand, Tychy 130 thousand, Dąbrowa Górnicza 129 thousand, **Opole** 128 thousand, Chorzow 114 thousand, Jaworzno 96 thousand, Jastrzębie Zdrój 94 thousand, **Zilina** 83 thousand. (headquarters of regions highlighted in bold).

Figure 1 – Region Tritia

1.2. Project aim

The aim of the project is to improve coordination among freight stakeholders in order to increase environmentally friendly multimodal freight solutions. Resources include improving awareness, planning and coordination between regional authorities, transport managers and freight transport stakeholders. The project focuses on cross-border, transnational and interregional cooperation with a view to strengthening economic and social cohesion in order to achieve the objectives defined in the Europe 2020 Strategy or the EU White Paper on Transport. The specific objective is to explore the possibilities, technical requirements and organizational prerequisites for the transfer of a significant part of the transport load from the transport of the products from the roads to the railway transport.

2. European railway network and donation policy

2.1. Current status of railway connections in TRITIA region within the TEN-T

For example, it is a paragraph (31): "The trans-European transport network should, by far, provide a basis for the large-scale deployment of new technologies and innovations, which can, for example, contribute to increasing the overall efficiency of the European transport sector and reducing its carbon footprint. From the point of view of purely transport, paragraph 32 can be mentioned: "The trans-European transport network must ensure efficient multimodality in order to enable passengers and goods to have a better and more sustainable choice between modes of transport and to allow the consolidation of large volumes transported over long distances.

TEN-T policy objectives foresee:

- completion by 2030 of the Core Network, structured around nine multimodal Core Network Corridors.
- completion by 2050 of the Comprehensive Network in order to facilitate accessibility to all European regions

TEN-T railway parameters

Railway infrastructure global network would be meets the requirements according to regulation TEN-T, article 13:

- ERTMS system;
- compliance with Directive 2008/57 / EC of the European Parliament and of the Council on the interoperability of the rail system within the EU;

- compliance with the TSI requirements adopted pursuant to Article 6 of Directive 2008/57 / EC;
- complete electrification of tracks;
- compliance with the requirements set out in Directive 2012/34 / EU as regards access to freight terminals;

<u>In addition, rail infrastructure in the core network (rail freight lines only) should also meet the requirements (see Article 45 of the TEN-T Regulation):</u>

- an axle load of at least 22,5 t, a line speed of 100 km / h and the possibility of operating trains of 740 m;

Figure 2 – TEN-T network

6.2. Globální síť: Železnice, přístavy a kombinované terminály železniční a silniční dopravy (RRT) 6

Hlavní síť: Železnice (nákladní doprava), přístavy a kombinované terminály železniční a silniční dopravy (RRT)

BE BG CZ DK DE EE IE EL ES FR HR IT CY LV LT LU HU MT NL AT PL PT RO SI SK FI SE UK

Supporting fund for TEN-T network is **CEF TRANSPORT** (Regulation 1316/2013).

CEF Transport focuses on cross-border projects and projects aiming at removing bottlenecks or bridging missing links in various sections of the Core Network and on the Comprehensive Network (link), as well as for horizontal priorities such as traffic management systems.

CEF Transport also supports innovation in the transport system in order to improve the use of infrastructure, reduce the environmental impact of transport, enhance energy efficiency and increase safety.

The total budget for CEF Transport is €24.05 billion for the the period 2014-2020. INEA is responsible for implementing €23.7 of the CEF Transport budget in the forms of grants during the same period.

The Transport Council of 3 December 2018 agreed a partial general approach on the proposal, excluding financial and horizontal issues, which are still under discussion as part of the EU budget for 2021-2027. The European Parliament adopted its negotiating position on 12 December 2018. Interinstitutional negotiations (trilogues) concluded on 8 March with a partial provisional agreement on the architecture of the future programme. Having been endorsed by Coreper and jointly by the Parliament's TRAN and ITRE committees, the agreement is due to be voted at first reading by Parliament in April. The remaining issues will have to be agreed at second reading. The proposal of total budget for CEF Transport is €27.15 billion for the the period 2021-2027.

Source: http://www.europarl.europa.eu/

2.2. Strategy for railway transport for 2030 & 2050 (White Paper)

The full title of the document is "Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system", COM (2011) 144 final.

The objectives set out in this document are primarily to minimize the environmental impact of transport. In particular, Europe's dependence on oil imports should be reduced, while carbon emissions in transport should drop by 60% by 2050 in the context of increasing transport and promoting mobility. From the point of view of the importance of railway transport to achieving these objectives, there is a substantial intention to transfer 30% of road freight over 300 km by 2030 to other modes of transport, such as rail or shipping, and by 2050 it should be more than 50 %.

2.3. Classification of the European railways

In 1985, the European Agreement on Main International Railway Lines, known as the **AGC**, was established. And in 1991 this agreement was elaborated and supplemented by the **AGTC** agreement, which deals with the most important international combined transport routes and related objects.

Table 1 – AGC railway lines parameters

INFRASTRUCTURE PARAMETERS FOR MAIN INTERNATIONAL RAILWAY LINES

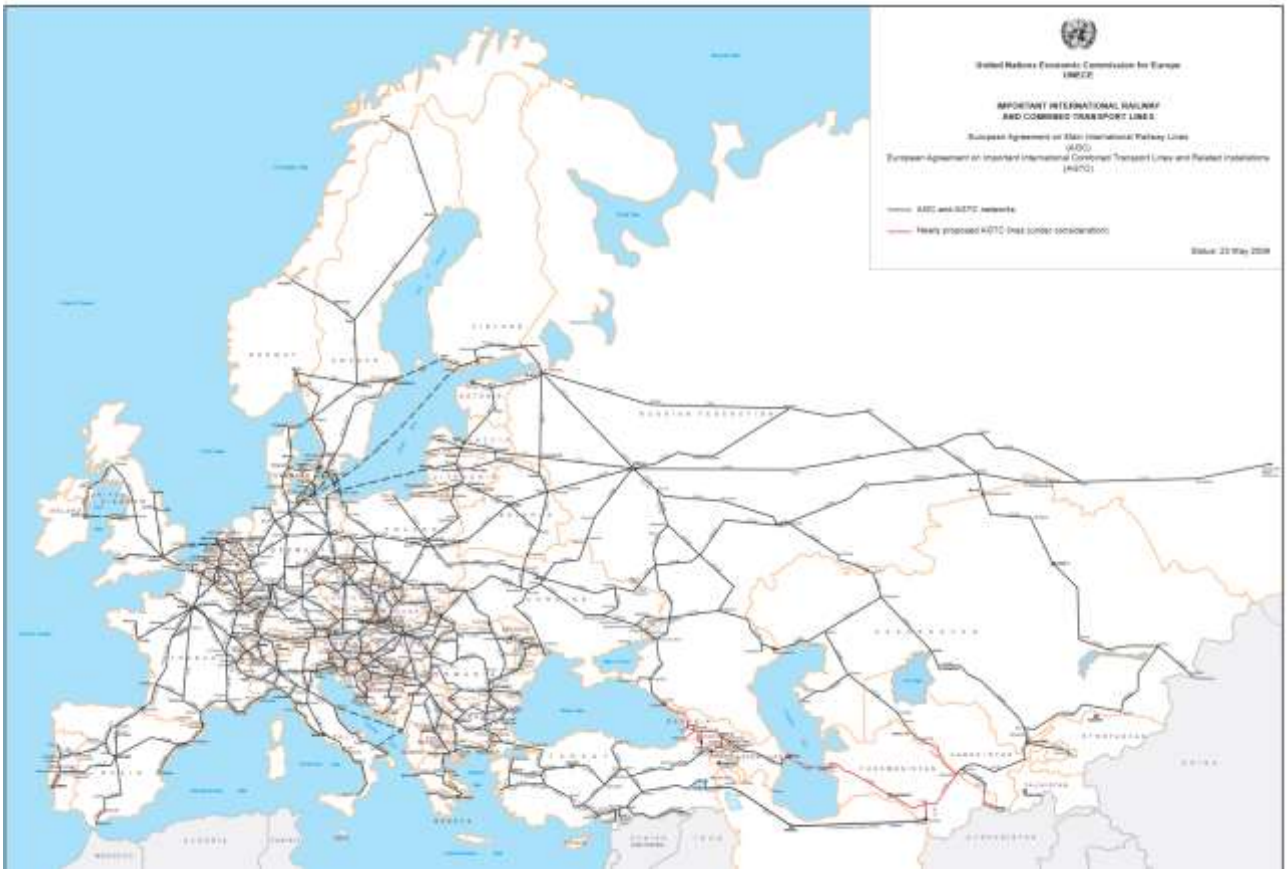
	A Existing lines which meet the infrastructure requirements and lines to be improved or reconstructed	B New lines	
		B1 For passenger traffic only	B2 For passenger and goods traffic
1. Number of tracks	-	2	2
2. Vehicle loading gauge	UIC* B	UIC C1	UIC C1
3. Minimum distance between track centres	4.0 m	4.2 m	4.2 m
4. Nominal minimum speed	160 km/h	300 km/h	250 km/h
5. Authorized mass per axle:			
Locomotives (≤200 km/h)	22.5 t	-	22.5 t
Rail cars and rail motor sets (≤300 km/h)	17 t	17 t	17 t
Carriages	16 t	-	16 t
Wagons ≤ 100 km/h	20 t	-	22.5 t
120 km/h	20 t	-	20 t
140 km/h	18 t	-	18 t
6. Authorized mass per linear metre	8 t	-	8 t
7. Test train (bridge design)	UIC 71	-	UIC 71
8. Maximum gradient	-	35 mm/m	12.5 mm/m
9. Minimum platform length in principal stations	400 m	400 m	400 m
10. Minimum useful siding length	750 m	-	750 m
11. Level crossings	None	None	None

* UIC: International Union of Railways.

Table 2 – AGTC railway lines parameters

	Existing lines		New lines
	Existing parameters	New parameters	
1. Number of tracks	not determined	not determined	2
2. Loadig weight of wagons	not determined	UIC B	UIC C1
3. Minimum axial distance between tracks	not determined	4,0	4,2
4. Minimum speed	100 km/h	120 km/h	120 km/h
5. Permissible axle load:			
100 km/h	20 t	22,5 t	22,5 t
120 km/h	20 t	20 t	20 t
6. Maximal longitudinal slope	not determined	not determined	12 ‰
7. Minimum useful track lenght	600 m	750 m	750 m

Figure 3 – AGC and AGTC network



PAN-EUROPEAN CORRIDORS

Map of ten corridors – parameters according to AGC (V=120 km/hod, UIC-GC, D4, 750m)

Figure 4 – Pan European network

The Pan-European Transport Corridors project was launched in 1991 at a conference in Prague. At the second Pan-European Transport Conference in Crete in March 1994, nine corridors were defined as the main transport axes between the European Union and the countries of Central and Eastern Europe, requiring first investments in the next ten to fifteen years. Its conclusions were clarified and supplemented at the third conference in Helsinki in 1997. Thanks to the end of conflicts between the countries of the former Yugoslavia, a tenth corridor was also proposed.
Therefore, these corridors are sometimes referred to as "Cretan corridors" or "Helsinki corridors" regardless of their location.

Nine corridors are railway, nine are corridors. The tenth, No. VII, is the water corridor - Danube river.
So far, these development corridors are different from the Trans-European Transport Network, which covers all the main routes in the European Union. There are proposals to merge the two systems.

Table 3 – Overview of Pan European corridors

Corridor	**L**enght
Corridor I Helsinki - Tallinn – Riga – Kaunas – Varszawa Branch: Riga – Kaliningrad – Gdaňsk	
Railway:	1655 km
Road:	1630 km
Corridor II Berlin – Warszawa – Minsk – Moskva – Nižnij Novgorod	
Railway:	2313 km
Road:	2200 km
Corridor III Dresden – Wroclaw – Lvov – Kyjev Branch: Berlin – Wroclav	
Railway:	1650 km
Road:	1700 km
Corridor IV Dresden – Praha – Bratislava/Wien – Budapest – Arad Branch: Norimberk – Praha Branch: Arad – Bukurešť – Constanta Branch: Arad – Craiova - Sofia – Istanbul Branch: Sofia – Soluň	
Railway:	4340 km
Road:	3640 km
Corridor V Venezia – Terst/Koper – Lublaň – Budapest – Užhorod – Lvov Branch: Rijeka – Zagreb – Budapest Branch: Ploče – Sarajevo – Budapest Branch: Bratislava – Žilina – Užhorod	
Railway:	3270 km

Road:	2850 km
Corridor VI Gdaňsk – Grudziądz/Warszawa – Katowice – Bielsko-Biala – Žilina Branch: Grudziądz – Poznaň Branch: Katowice – Bielsko-Biala – Ostrava – Břeclav/Brno	
Railway:	1800 km
Road:	1880 km
Corridor VII: Donau river	2415 km
Corridor X Drač – Tirana – Skopje – Sofie – Varna/Burgas	
Railway:	1270 km
Road:	960 km
Corridor IX Helsinky – Petrohrad – Pskov/Moskva – Kyjev – Ljubasevka – Chisinau – Bukurešť – Alexandroupolis Branch: Klaipėda/Kaliningrad – Vilnius – Minsk – Kyjev Branch: Ljubasevka – Oděsa	
Railway:	6500 km
Road:	5850 km
Corridor X Salzburg – Ljublana – Zagreb – Beograd – Niš – Skopje – Veles – Thessaloniky Branch: Graz – Maribor – Zagreb Branch: Budapest – Novi Sad – Beograd Branch: Niš – Sofia Branch: Veles – Florina	
Railway:	2528 km
Road:	2300 km

Note: Lines includes section within TRITIA region are underlined

EUROPEAN RAIL FREIGHT CORRIDORS (RFC)

The network is managed by RailNetEurope, based in Vienna.

In 2010, the European Parliament and the Council of the European Union set out the rules for the establishment of a European rail network for competitive freight, consisting of international freight corridors.

The aim is to achieve reliable and high-quality rail freight transport that could compete with other modes of transport. To this end, the coordinated development of rail infrastructure and the establishment of harmonized rules are necessary.

The main idea for the creation of Regulation 913/2010 / EU (hereinafter "the Regulation") was to improve the services of infrastructure managers ("IM") provided to international freight transport operators. Previous activities, in particular the first railway package, the Trans-European Transport Network (TEN-T) program, cooperation between Member States and the IM within the European Rail Traffic Management System and the development of the TAF TSI (Technical Specifications for Interoperability for Telematics Applications) in freight transport).

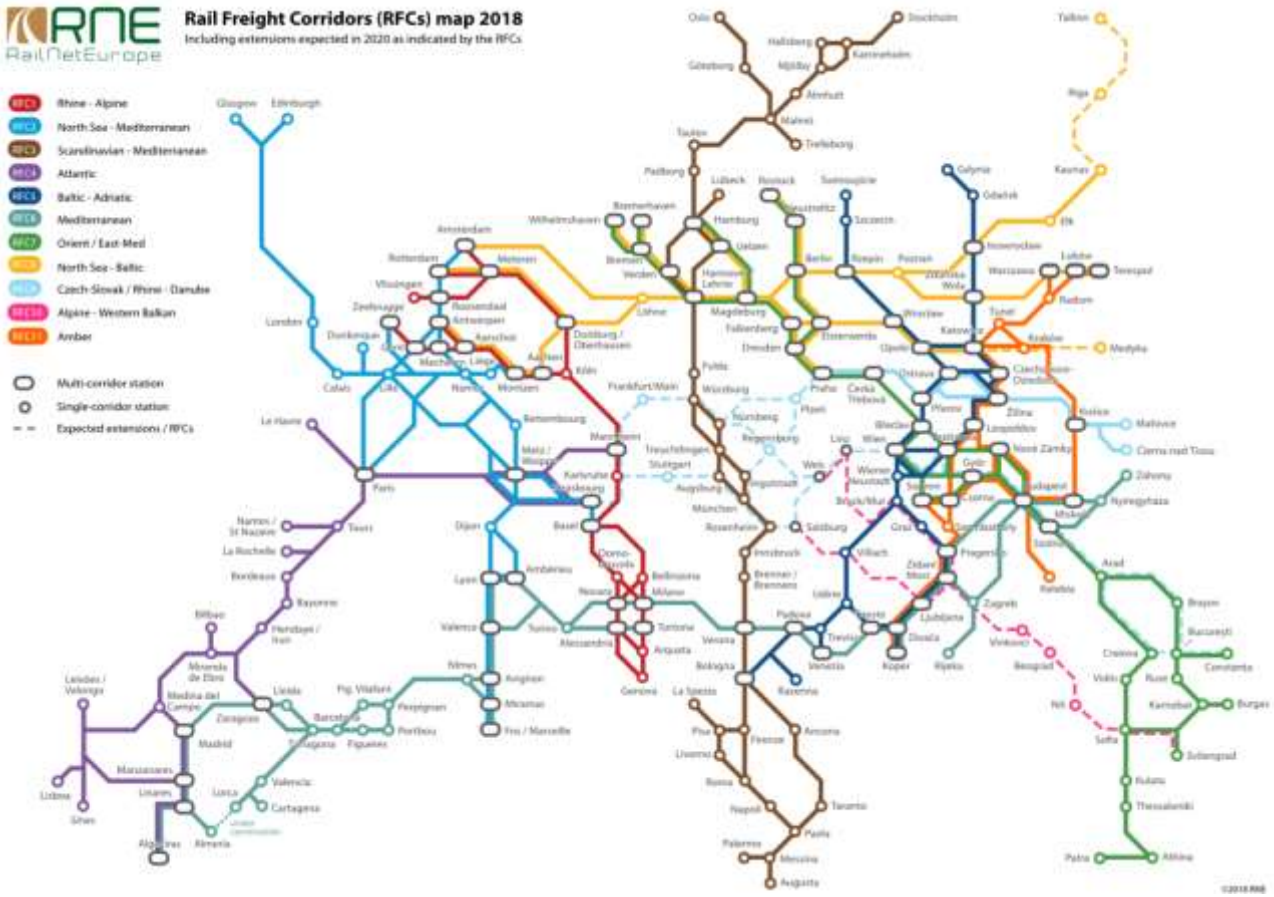
Through the Regulation, the European Union operates in the following main areas corresponding to the harmonization process:

- improving coordination between infrastructure managers,
- improving conditions for access to infrastructure,
- ensuring a sufficient priority for freight trains,
- improving intermodal transport on corridors.

To achieve these objectives, the European Union has identified 11 international rail freight corridors (RFCs) within its rail network. An updated description of each RFC (according to Regulation 913/2010 / EU, Annex II to Regulation 1316/2013 / EU and Commission Implementing Decision 1111/2015 / EU) is provided in the Track Declaration.

- The following of these corridors passes through the TRITIA region:
- RFC 5 „Baltic - Adriatic“,
- RFC 7 „Orient / East - Med“,
- RFC 8 „Nort Sea - Baltic“,
- RFC 9 „Czech – Slovak / Rhine - Danube“.
- RFC 11 „Amber“.

Figure 5 – RFC network



COMMISSION REGULATION (EU) No. 1299/2014 of 18 November 2014 on technical specifications for interoperability relating to the infrastructure subsystem of the rail system in the European Union - giving uniform parameters, but not for categories of lines.
This TSI applies to the following networks:

a) the trans-European conventional rail system network as defined in point 1.1 of Annex I to Directive 2008/57 / EC;
b) the trans-European high-speed rail system (TEN) network as defined in point 2.1 of Annex I to Directive 2008/57 / EC;
c) other parts of the Union rail network
and shall not apply to the cases referred to in Article 1 (3) of Directive 2008/57 / EC.
12.12.2014 L 356/2 Official Journal of the European Union EN

Performance parameters for freight transport

Traffic code	Vehicle outline	Axle load [t]	Line speed [km / h]	Train length [m]
F1	GC	22,5(*)	100–120	740–1050
F2	GB	22,5(*)	100–120	600–1050
F3	GA	20(*)	60–100	500–1050
F4	G1	18(*)	not applicable	not applicable
F1520	S	25(*)	50–120	1 050
F1600	IRL1	22,5(*)	50–100	150–450

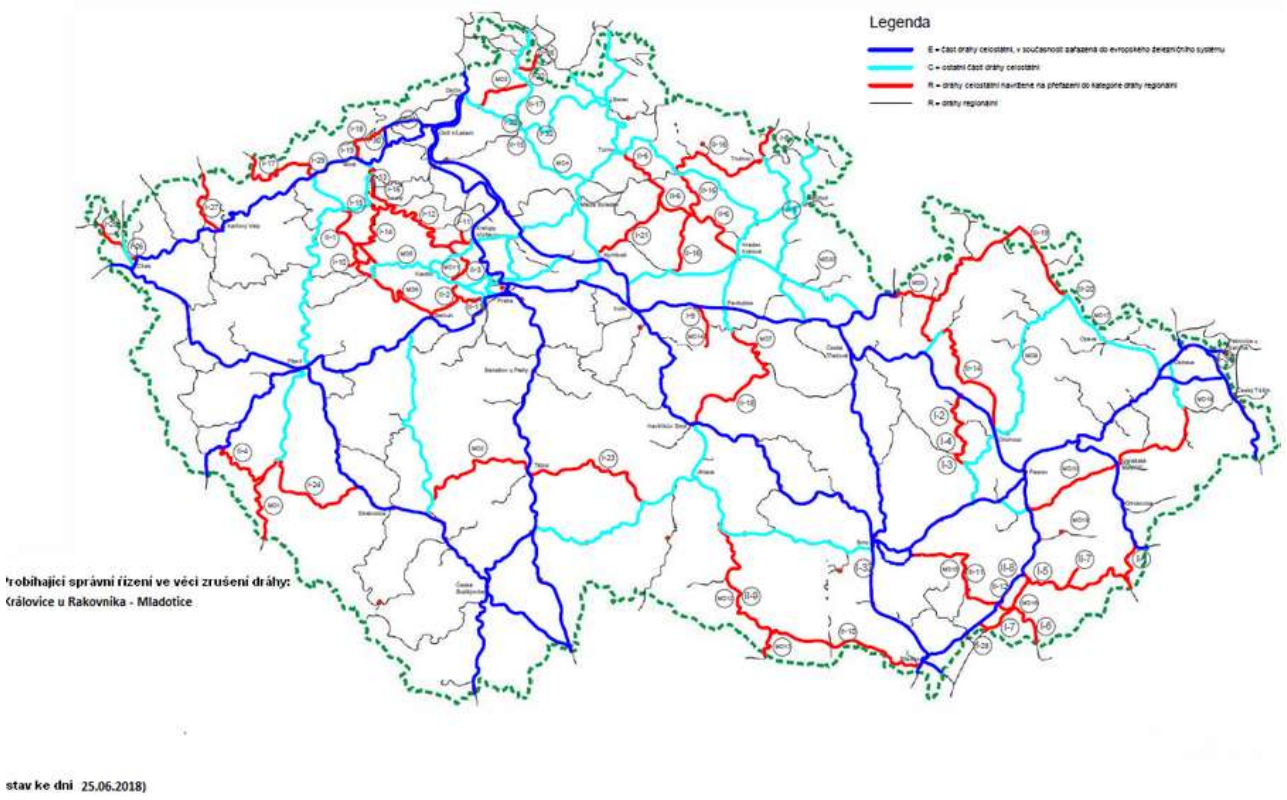
Source: https://eur-lex.europa.eu/legal-content/CS/TXT/PDF/?uri=CELEX:32014R1299&from=CS

2.4. Classification of the railways in Czech republic

a) national railway, which is a railway which serves international and national public railway transport and is designated as such,
b) a regional railway, which is a railway of regional or local importance that serves public rail transport and flows into a national or other regional runway,
c) a siding which is a railway which serves the operator's or other entrepreneur's own use and which flows into a national or regional runway or other siding;
d) a special railway, which serves mainly to ensure the transport services of the municipality.
Irrespective of the above criteria, the national railway category includes lines which meet at least one of the following criteria:
The line provides the main long-distance connection of regional cities, although there is no significant freight or long-distance service.
The track is a junction of two important tracks.
The line passes through the city, where significant rail transport is conducted along the bypass, or the line itself can serve as a bypass of the city.
The line is important for cross-border transport.
Connection to the long-distance passenger train line in the same clock.
Lines that do not meet either of these four criteria are categorized as regional runways.
The general condition in the design of line categorization is the assumption that the change of category can only be made at nodal points of the railway network, it is a so-called continuity condition.

Source: https://www.mdcr.cz/Dokumenty/Drazni-doprava/Zeleznicni-infrastruktura/Informace-o-kategorizaci-zeleznicni-site

Figure 6 – Czech railway network



Source: https://www.mdcr.cz/Dokumenty/Drazni-doprava/Zeleznicni-infrastruktura/Informace-o-kategorizaci-zeleznicni-site

2.5. Classification of the railways in Poland

Table 4 – Railway lines in Poland were divided according to operating parameters into 4 categories:

Lp.	Railway line category	Freight charge T [Tg/year]	Maximum speed V_{max} [km/h]	Maximum speed freight trains V_{max} [km/h]	Acceptable axle loads P [kN]
1	main (0)	$T \geq 25$	$120 < V_{max} \leq 200$	$80 < V_{max} \leq 120$	$P \geq 221$
2	primary (1)	$10 \leq T < 25$	$80 < V_{max} \leq 120$	$60 < V_{max} \leq 80$	$210 \leq P < 221$
3	secondary (2)	$3 \leq T < 10$	$60 < V_{max} \leq 80$	$50 < V_{max} \leq 60$	$200 \leq P < 210$
4	Local significance (3)	$T < 3$	$V_{max} \leq 60$	$V_{max} \leq 50$	$P < 200$

The infrastructure manager decides to qualify the railway line into the appropriate category or change the category.
Tracks on the railway lines as well as main and main tracks on the stations are qualified to one of six technical classes, hereinafter referred to as classes, to which the required standard is assigned. The qualification of tracks to one of six classes is determined by:
1) permissible speed of a particular type of train, due to technical and operational parameters required for a given line,
2) axle load of the locomotive on the train for which the permissible speed was adopted,
3) the pressure of the axles of wagons on the train for which the acceptable speed has been assumed,
4) traffic volume.
The classification criteria includes a table, where the parameter values should be taken according to the actual values of the train speed and the axes of the rolling stock rolling along the considered track.

Table 5 – Tracks categories in Poland

Track classes	Permissible train speed [km/h]	Permissible locomotion axle load [kN]	Permissible vagon axle load [kN]	Transport intensity [Tg/rok]
0	200	221	140	do 25
1	100 120 140 160	221 210 210 205	221 205 190 140	Not standardized
2	80 100 120	221 210 205	221 205 190	16 - 25
3	70 80	221 210	221 205	9 -15
4	60 70	221 210	221 205	4 - 8
5	30 40	221 210	221 205	do 3

In addition, staple categorization of lines was introduced. The category of railway line is determined for each section of the railway line highlighted in the attachment to the instruction "List of Id-12 lines (D-29)". The railway line category was determined on the basis of the admissible technical speed, taking into account permanent restrictions and average daily traffic volume of trains.
The category of railway line is determined separately for passenger or freight trains as rounded to the whole part of the number (ie "downwards") in the range <1.5> weighted average of:

- category resulting from the maximum speed for passenger or freight trains subject to fixed restrictions - weighting 60%,
- category resulting from the average daily traffic volume of passenger and freight trains per 1 km of track - weight 40%.

Table 6 – Parameters for determination of track categories in Poland

Parameter that affects the railway line category	1	2	3	4	5
Permitted technical speed for passenger trains	0<Vmax≤40	40<Vmax≤80	80<Vmax≤100	100<Vmax≤ 120	> 120
Permitted technical speed for freight trains	0<Vmax≤40	40<Vmax≤60	60<Vmax≤80	80<Vmax≤1 00	> 100
Average daily train traffic per km of track	0< N ≤6	6< N ≤10	10< N ≤20	20< N ≤40	> 40

2.6. Classification of the railways in Slovakia

The categorization of railway lines is one of the input data for the calculation of the infrastructure charge and is divided as follows:

Main lines:

- Category 1 - main lines of major economic and social importance, in principle double-track and single-track electrified railway lines of supra-regional importance, connecting railway lines in large hubs and their connection to border crossing point and corridors,
- Category 2 - other main railway with fast transport of interregional importance not included in category 1.

Minor lines:

- Category 3 – a regional railway that serves public rail transport and flows into a national or other regional runway

- Category 4 - secondary lines with simplified traffic management,
- Category 5 - narrow-gauge lines TEŽ (Tatra electric railway) and OŽ (cogwheel railway) with a gauge of 1 000 mm that serves public rail transport,
- Category 6 - a special railway TREŽ (Trenčín electric railway) with a gauge of 750 mm.

Source: https://www.zsr.sk/files/dopravcovia/zeleznicna-infrastruktura/podmienky-pouzivania-zel-infrastruktury/podmienky-pouzivania-zel-siete-2018/podmpouzivaniazelsietei2018-2.pdf

Figure 7 – Slovak railway network categorization

Source: https://www.zsr.sk/dopravcovia/infrastruktura/podmienky-pouzivania-zel-infrastruktury/

The following two maps shows the distribution of railway lines by speed. This categories resulting from the maximum speed for passenger or freight trains subject to fixed restrictions.

Figure 8 – Slovak railway network – maximum speed for passenger trains

Source: https://www.zsr.sk/dopravcovia/infrastruktura/podmienky-pouzivania-zel-infrastruktury/

Figure 9 – Slovak railway network – maximum speed for freight trains

Source: https://www.zsr.sk/dopravcovia/infrastruktura/podmienky-pouzivania-zel-infrastruktury/

3. National documents related to railway goods transport

3.1. Czech Republic

3.1.1. Transport policy ČR for period 2014-2020 with a view to 2050

- Approved transport policy (Government Resolution No. 449 of 12 June 2013) accepts all the decisive documents and intentions of the European documents. Therefore, all the considerations and calculations contained in the chapter on relevant European documents are fully compatible with the Czech Republic's Transport Policy.
- The following is the attention:
- Regulation of night road freight traffic;
- Inland waterway support under the Naiades and Naiades II programs;
- Ensure the operation of rail freight corridors - to modernize by 2030;
- Ensure the transit of large railway junctions;
- Expanding regular multimodal freight transport lines;

3.1.2. Internalize external costs as a source of transport infrastructure financing. Transport sectoral strategies 2. phase

The transport sectoral strategies of the 2nd phase were approved by Resolution of the Government of the Czech Republic No 850 on 13 November 2013. The strategy deals with scenarios of future development, transport forecasts, identification of measures for the development of transport infrastructure, financial possibilities and implementation of transport sectoral strategies.
In terms of the rail network, the document deals mainly with fast connections for passenger transport (RS). Specific measures to promote rail freight transport are not mentioned, only the priority to complete the TEN-T network is mentioned. (parameters TEN-T viz. chapter 2.1)
Investiční opatření jsou svojí povahou mezi modernizací a údržbou pro zachování normového stavu, nelze dohledat, zda se parametry TEN-T plní. Harmonogramy navržených rekonstrukcí již lze k letošnímu roku označit za neaktuální.

3.1.3. The concept of freight transport for the period 2017-2023 with a view to 2030

This document was adopted by the Government of the Czech Republic by its Resolution No. 57 of 25 January 2017. The text analyzes in detail the freight transport market, the preconditions for its further development and the implementation of the relevant European documents. The annexes also define suitable regions for the location of terminals for continental combined transport and the position of neutral (public) terminals of multimodal transport. From the point of view of the structure of the needs of freight transport, it also analyzes the assumptions for the objective set out in

the White Paper, namely the transfer of 30% of current road freight over 300 km in the EU to rail or water transport. It is noted that the Czech Government has also signed the European Commission's Decision No. 978/2015 to move 30% of road freight over 300 km to rail or water by 2030.

Selected measures:
• ensuring interoperability, charging harmonization;
• support for routes for oversized transport;
• support for multimodal transport and combined transport;
• prioritization of railway according to importance for freight trains;
• specification of strategic buildings;
• extension of selected track lengths to 740m with prediction to 850m;
• upgrade of capacity in Přerov – Ostrava section;
• connection for manufacturers of oversize products to river ports;
• internalization of externalities;
• liquefied gas in road and water transport;
• support for public transport combined terminals

3.2. Poland

3.2.1. Transport Development Strategy for 2020 (with a perspective until 2030) - Transport Development Strategy until 2020

The document which sets out the most important directions of transport development in Poland in the medium term is the Transport Development Strategy until 2020 (with a perspective until 2030). The strategy concerns all sectors of transport: road, rail, air, sea, inland waterways, urban and intermodal.
The document is one of the 9 integrated strategies and serves to achieve the objectives set out in higher level national documents. At the same time, it takes into account the priorities of the common transport, regional, innovation and environmental policy of the European Union. The main objective of the national transport policy is to increase territorial accessibility, improve the safety of traffic participants and the efficiency of the transport sector by creating a coherent, sustainable and user-friendly transport system in the national, European and global dimensions.
The above-mentioned objective of the Strategy refers both to the creation of an integrated transport system through investments in transport infrastructure, as well as to the creation of favourable conditions for the efficient functioning of transport markets and the development of efficient transport systems.

- Achievement of the main objective involves the achievement of five specific objectives specific to each mode of transport:
- the creation of a modern, coherent transport infrastructure network,
- improve the organisation and management of the transport system,
- improve the safety of traffic participants and goods transported,
- reduce the negative impact of transport on the environment,

- building a rational model of financing infrastructure investments

Due to the general nature of the document (defined in the Act of 6 December 2006 on the principles of development policy), it does not contain detailed information on the implementation of specific measures or investments. This area has been reserved for implementation and operational documents of the Strategies, including the Strategy Implementation Document and development programmes for particular transport branches.
Source: https://www.gov.pl/web/infrastruktura/strategia-rozwoju-transportu-do-2020

3.2.2. National development strategy (until 2020)

The National Development Strategy 2020 is an element of the new system for managing the country's development, the foundations of which have been defined in the amended Act of 6 December 2006 on the principles of development policy (Journal of Laws of 2009, No. 84, item 712, as amended) and in the document adopted by the Council of Ministers on 27 April 2009, Assumptions of Poland's Development Management System.

Objective II 7- Increasing transport efficiency

Poland's transport infrastructure is one of the weakest elements of the Polish economy. It is not adapted to the entrepreneurship of Poles, intensity of production and exchange and mobility of inhabitants. Current problems include in particular: high level of consumption of many elements of linear and point infrastructure, existence of bottlenecks and missing links, uneven regional distribution and availability of networks, lack of networks adapted to high traffic speeds, lack of continuity of technical class of connections between agglomerations, weak infrastructure elements and systems integrating different types of networks, nuisance of many network elements for inhabitants and the natural environment, few elements or lack of intelligent and innovative solutions. The high number of road accidents and deaths and injuries on the roads remains a serious problem. The long-term objective for Poland is to achieve the density and capacity of the network which corresponds to the development needs of the country and regions. On the one hand, this will facilitate the development of regions by increasing the territorial accessibility of peripheral areas, and on the other hand, it will make it possible to make the best use of the transit location of our country. The planned infrastructural investments will aim at creating an integrated and coherent transport system. This means defining a two-level structure: the core network, defined by identifying nodes and connections of key importance for our country, also taking into account the process of international integration, and Europe 2020: A resource-efficient Europe with 136 complementary networks to ensure territorial cohesion. The creation of a coherent transport network and the abolition of the peripheralisation of our economy are among the main determinants of Poland's development.

The priority over the next ten years will be transport investments in networks of national significance for all branches and on inter-branch nodes, aimed at improving the country's internal accessibility and effective economic exchange, including between the largest centers of economic growth and urban centers (metropolis network) and within their functional areas. At the same time, investments will be implemented to improve external access, taking into account the key role of the TEN-T network in creating an effective transport policy and a coherent infrastructure network in the European Union.

3.2.3. National Regional Development Strategy

It is a basic strategic document of the country's regional policy in the perspective until 2030. This strategy is a set of common values, principles of cooperation between government and self-governments and socio-economic partners for the development of the country and voivodeships. The document defines a systemic framework for conducting regional policy both by the government towards regions and intra-regional. It will play an important role in the process of programming public funds, including EU funds, in the coming years.

Objective 10 - Ensuring adequate transport and ICT infrastructure to support competitiveness and ensure territorial cohesion of the country.

Despite favourable geographical and natural conditions conducive to the development of both inland and maritime transport, the level of use of shipping in the country's economy is low. This is mainly due to the low competitive position of seaports related to the high ratio of obsolete fixed assets (from 40% to 70% in 2008), the underdevelopment of modern port services, poor communication links with land areas and the low share of navigable waterways with international parameters (only 205.9 km). Inland and maritime navigation and rail transport have been identified as environmentally friendly modes of transport requiring national and European support. In addition, inland waterways and maritime transport can be essential for regional development in the context of freight, passenger and water tourism, increasing the attractiveness of regions as places of economic activity, industry and residence. The development of maritime and inland waterway transport should be carried out in synergy with measures implemented at the central and regional level, and take into account the economic calculation of interventions resulting from the endogenous potentials of individual regions.

3.2.4. Strategy for responsible development (2017)

The development path leading to sustainable development of the country is based on economic development determined by: innovations and knowledge Intensive

investments and savings; fuller use of human resources and territorial potentials; quality of institutions and of the law to create optimal conditions for economic growth.

The Strategy defines a new model of development up to the year 2020 and in the perspective up to the year 2030. New development model increased responsibility of state institutions for designing economic, social and territorial processes. Main objective: Creating the conditions for the growth of income of the Poles with the increase in the social, economic and territorial cohesion.

Specific objective I. Sustainable economic growth based on the existing and new advantages.

Specific objective II. Socially and territorially sustainable development.

Specific objective III. Efficient State and economic institutions supporting the social and economic growth and inclusion Sectoral issues necessary to achieve the objectives of the Strategy: Human and social capital, Digitization, Transport, Energy, Environment, National security. Główny cel związany z projektem TRITIA:

Increasing transport accessibility and improving the conditions of providing services related to the transport of goods and passengers.

One of the priority actions until 2030 is to connect Poland with the TEN-T core network corridors: Baltic - Adriatic and North Sea - Baltic. The investments undertaken will concern all types of transport (road, rail, inland waterway, sea, air). In particular, this applies to:

• complete the construction of the motorway and expressway system;
• modernization of the railway network, including traction and level crossings;
• reconstruction of waterway transport capabilities (navigability class IV parameters) - on selected sections, economically and ecologically justified.

3.2.5. National smart specialization in Poland

The result of the National Smart Specialisation in Poland will be areas of smart specialization on the national level, along with a mechanism for reviewing and updating the selection in progress.; The document indicates 19 national smart specializations;

NSS 6. ENVIRONMENT FRIENDLY TRANSPORT SOLUTIONS

I. Innovative means of transport

II. Environment friendly constructional solutions and components in means of transport

III. Transport management systems

IV. Innovative materials in means of transport

3.2.6. National railway programme

National Railway Programme do 2023 roku (NRP) is a long-term programme, covering investments on railway lines, which are co-financed by the minister in charge of transport. This document implements the strategies adopted by the Council of Ministers, including the "National Development Strategy 2020" and the "Transport Development Strategy to 2020 with a perspective until 2030". The National Railway Programme remains in force until 2023, i.e. until the end of the possibility of co-financing projects under the financial perspective of the European Union for the years 2014-2020. The document defines the size and sources of financing (including EU funds and national funds), and constitutes the basis for ensuring financing of investments in accordance with the Act on Public Finances.

The NRP will serve to fulfil the national development plans in the field of transport and social development contained in the prepared strategic documents: Long-term National Development Strategy - Poland 2030. Third wave of modernity, National Development Strategy 2020, Concept of National Spatial Development 2030, National Regional Development Strategy 2010-2020: Regions, Cities, Rural Areas, Transport Development Strategy to 2020. (with a perspective until 2030).

The NPK pursues the primary objective of the Transport Development Strategy in the field of rail transport through the following (selected) activities: 1. consistent modernization and revitalization of the existing railway network, 2. revitalization and expansion of railway lines in the functional areas of cities and undertaking actions aimed at better integration of rail and road transport, 3. modernization of railway stops, 4. development of infrastructure systems to improve the management of passenger and freight transport; gradual implementation of the European Rail Traffic Management System (ERTMS) on the most important railway routes. In rail transport, the strategic task of the SRT is to strengthen the role of railways in the integrated transport system. This objective should be achieved by means of investment measures and organisational and technological changes that will improve the competitiveness of rail transport. Investments may include not only the construction of new lines or new tracks on the operated network, but also the modernisation of existing lines and the revitalisation of unused sections. A detailed description of the Strategy is the Implementation Document to the Transport Development Strategy until 2020. (with a perspective until 2030) (hereinafter: ID), which was adopted by Resolution No. 201/2014 of the Council of Ministers of 13 October 2014. It indicates the operational objectives, together with an indication of priority investments in the area of, inter alia, railway transport. The objectives to be achieved are consistent with the objectives set out in other strategic documents, headed by the TDS described above.

The following investment priorities correspond to the specific objectives adopted in the National Railway Programme:

Objective 1 - Enhancing the efficiency of rail transport: - improving the technical condition of the core and comprehensive TEN-T 44 network, including continuation of work on corridors C-E 30, E 20/C-E 20, E 59/C-E 59, E 65/C-E 65, E 75, as well as on corridors constituting international connections, 44 In accordance with Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013. In accordance with Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on EU guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU (Official Journal of the European Union L 348 of 20.12.2013, p. 1), the TEN-T network development strategy for 2030/2050 assumes a two-tier structure. The core network, separated from the comprehensive network, is to be established by 2030. It will constitute the foundation of the transport system within the single market, while the comprehensive network will be complementary at regional and national level, with its completion planned by 2050. As part of the process of creating a coherent TEN-T network, multimodal core network corridors of the TEN-T network will be developed, as defined in Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility. 26 improvement of line capacity within agglomerations, access to them and on sections where insufficient capacity has been identified, obtaining attractive travel time of trains in relation to road traffic, implementation of projects important for particular regional transport systems, investments within the "Eastern Magistral" 45: Rzeszów / Kielce - Lublin - Lublin - Białystok - Olsztyn;

Objective 2 - Increasing the safety of railway transport operations: - implementation of ERTMS/ETCS and ERTMS/GSM-R, improvement of offer quality and safety of infrastructure made available by PLK S.A. to railway undertakings;

Objective 3 - Improvement of quality in passenger and freight transport: - improvement of technical condition of railway lines forming the so-called freight corridors pursuant to Regulation No. 913/2010 of the European Parliament and of the Council of 20 October 2010. concerning a European rail network for competitive freight 46 , improvement of the infrastructure serving railway border crossing points at the junction of normal and broad gauge lines (1435 and 1520 mm) and sections of broad gauge lines located in these areas, improvement of Warsaw's connections with areas of importance for areas with the lowest transport accessibility, improvement of connections between provincial cities and, inter alia, important economic centres, ensuring efficient rail connections with seaports in order to integrate different modes of transport, improvement of the technical condition of lines of particular importance for freight traffic, including:ensuring avoidance of the Warsaw, Poznań and Upper Silesian agglomerations (Katowice), improving access to seaports in Gdańsk, Gdynia, Szczecin and Świnoujście, which are exits from other points generating the largest transport flows.

3.3. Slovak Republic

At present, the Slovak Republic does not have a specific plan for rail freight transport, but it exclusively deals with strategic documents at national level. This is due to the full liberalization of the rail freight market, leaving market development directly to the self-regulatory capacity of the market economy and providing rail market support through the strategic development of rail infrastructure.

3.3.1. Strategic Transport Development Plan of the Slovak Republic up to 2030 – Phase II

This document was published in December 2016 and is one of the most recent strategic publications related to the transport as whole.
General Objectives for Freight Rail Transport (primarily for Čadca - Žilina - Košice):

- Strengthen the role of rail as a carrier mode in the public transport system where justified,
- Increase the share of rail freight transport in total transport performance,
- Improve the safety, efficiency and sustainability of transport operations by strengthening new technologies,
- systematically reduce the negative socio-economic and environmental impacts of transport,
- To systematically increase the safety and security parameters of point and line elements of the transport system.
- Measures aimed at promoting rail freight transport:
- Completion of modernization of the main TEN-T lines, which are in a high stage of preparation: Púchov - Žilina, Žilina - Čadca - st. border,
- Modernization of the back track Žilina - Košice - Čierna nad Tisou,
- Modernization of the TEN-T line: Púchov - Horní Lideč,
- Periodic preparation of transport infrastructure maintenance plans.
- Measures to promote intermodal transport:
- Improving the conditions for combined transport and the operation of coherent freight trains and promoting the interoperability of freight vehicles (organizational, infrastructure and vehicles),
- Periodic preparation of transport infrastructure maintenance plans.

4. Railway bottlenecks at TRITIA area – status quo

4.1. Moravian-Silesian Region

Currently, the main limiting elements on the railway infrastructure in the Czech Republic, namely in the Moravian-Silesian Region are:

- low track capacity

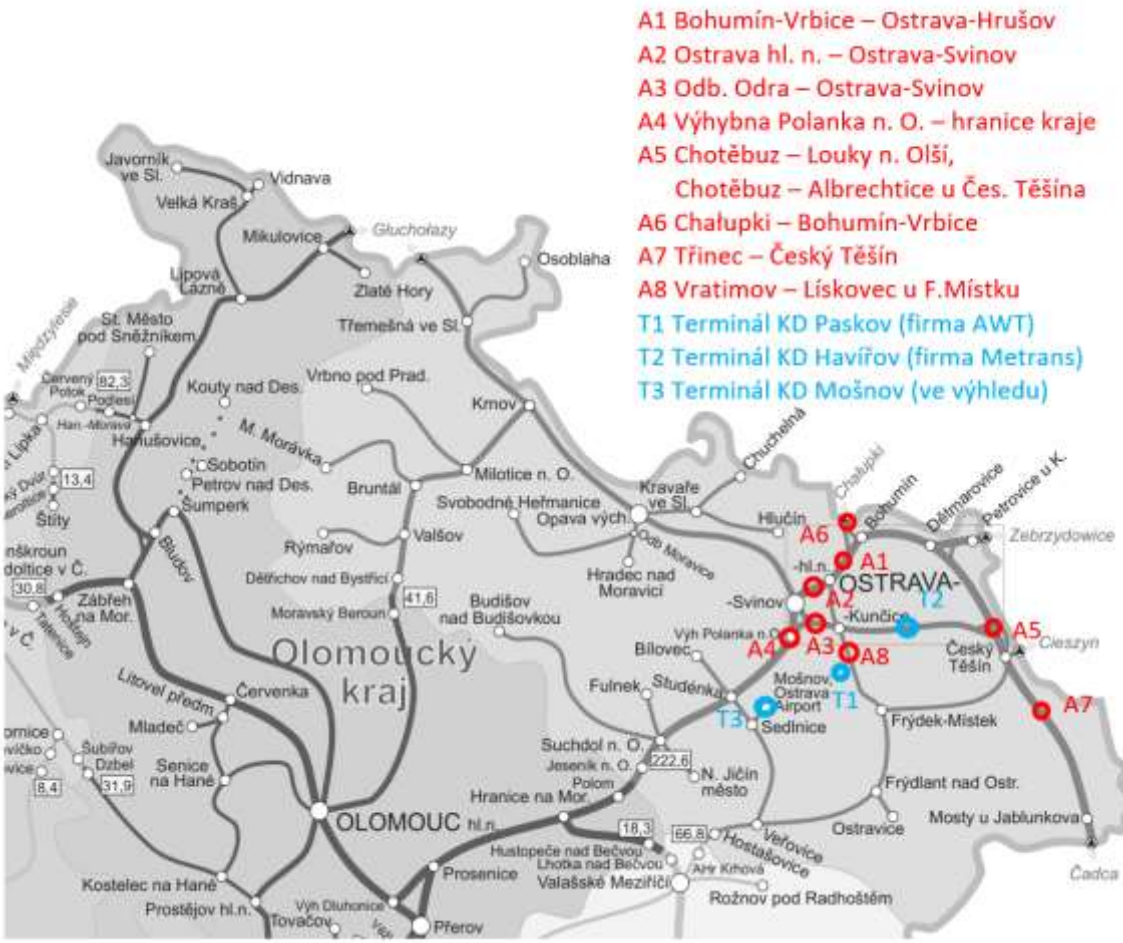
- insufficient intermodal transport terminals

The most loaded section in the monitored area is located at the railway junction Ostrava, where more lines connect and there is a relatively dense suburban transport. Two railway corridors meet here. These are Corridor II Zebrzydowice (PL) - Ostrava - Prerov - Breclav - (SK, A) and Corridor III (D) - Cheb - Prague - Prerov - Ostrava - Cadca (SK).
In the area of interest we can specify two limiting sections:

- Ostrava-Svinov - Ostrava-hl.n.
- Ostrava-Hrušov - Bohumin-Vrbice.

The total number of freight trains on the main corridor lines varies depending on the interstation sections. Moravian-Silesian region does not only serve as a transit territory in rail freight transport, but contains a number of starting and ending centers of traffic flows, which substantially change the number of trains on the train across the region. Currently, approximately 127 freight trains run through the Ostrava junction. With this amount of trains can transport up to 254 thousand tons of materials and goods.

Figure 10: Bottlenecks and container terminals in Moravian-Silesian region



The map above shows the individual bottlenecks on the SŽDC network. The most restrictive sections on the SŽDC network are points A1 and A2. At points T1, T2 the significant terminals KD are shown. The terminal in Mošnov (point T3) will be built in view.

A more detailed description of the restrictions on throughput per track:

Explanatory notes:
Kopt - degree of utilization of practical throughput in%
So - occupancy degree

Line 301A Mosty u Jablunkova - Bohumin (points A5, A7)

The most literally congested sections in terms of troughput are the Odb. Cottbus - Louky nad Olší (for 1st track Kopt = 117% / 24 h, 136% / 15 h, 106% at 2 h peak; So = 0,66 for 2 h peak) and Odb. Chotěbuz - Albrechtice u Č.T. (Kopt = 120% / 149% / 117%; So = 0.73 in 2 h peak). This section is part of line 301D. These sections no longer have reserves and free routes. There is a strong passenger transport in the section Český Těšín - Louky n. Olší / (Albrechtice u Č.T.) - the number of passenger trains is higher than freight trains.
Another heavily loaded section is the section Třinec – Český Těšín freight train station because there are many trains that supply Třinecké železárny with coal, iron and also trains with finished products leave here (for 1st rail track is Kopt = 78% / 77% / 95%; So = 0.59). Compared to neighboring sections, there are far fewer free routes.
The Dětmarovice - Bohumin section for the Bohumín - Dětmarovice direction (for the 2nd track) has higher Kopt values at 2 h during peak hours = 88% / 2 h (61% / 24 h), So = 0.55 for 2 h peak, for reverse direction Kopt = 77% / 2h peak, So = 0.48 per 2h peak (Kopt = 68% / 24h).

Line 301 D Český Těšín - Polanka n. O. - (Ostrava- Svinov) (points A3, A5)

The most loaded section is the Odb. Odra - Ostrava-Svinov (for the 1st track Kopt = 60% / 24 h, 77% / 71%, So = 0.49 in 2 h peak). The branch allows trains to travel either in the direction to Ostrava-Svinov (line 301 E) or in the opposite direction, ie to Jistebník and Přerov (line 301B).
In the section Ostrava-Bartovice - Ostrava-Kunčice for the 1st track achieves Kopt throughput = 70% in 15h, 64% / 2h peak; So = 0.40 / 2 h peak)
In the section Havířov - Ostrava-Bartovice for the 2nd track Kopt = 70% in 15 h, 63% / 2 h peak; So = 0.39 / 2 h peak
There are sufficient troughput reserves on this line.

Line 301G Ostrava uhelné VOK - O.Kunčice and line 302A O.Kunčice - Frýdek -Místek (point A8)

The Ostrava uhelné VOK section (part of Ostrava hl. n. lying on line 305B) - Ostrava střed is connected to the heavily loaded junction Ostrava hl.n.
The limit on line 302A in terms of throughput is the section Vratimov - Paskov (for the 1st track Kopt = 83% in 24 h, 110% / 15 h and 95% in 2 h peak, So = 0,59) and also the section Paskov - Lískovec near Frýdek-Místek (for the 1st track Kopt = 81% / 103% / 88%; So = 0,55). In these sections there are the least free routes (18 and 19 in 24 h).

This is due to Mn trains that carry loads from the AWT siding (the siding and the KD terminal connected to the Vratimov railway station) as well as the Biocel Paskov siding (connected to the Paskov railway station) and others.
In sections Vratimov - Paskov and Paskov - Líškovec u F.M. There are more passenger trains than freight trains - in the first section it is more than double and in the second section it is more than 2/3 of the total number of trains.

Line 305C Chałupki - Bohumin-Vrbice (point A6)
Throughput on this line is fully utilized and reaches limit values (for 1st track Kopt = 92% in 24 hours, 98% in 15 hours and 103% in 2 hours peak, So = 0.64 for 2 hours peak). Basically there are almost no reserves in throughput and free routes (only about 4 routes / 24 h). Currently there are 54 trains / 24 h. There are 52 trains on this line (9/10 Nex, 15/12 Pn, 3 Lv) to Poland and there are also 1 pair of Ex trains.

Line 301B Dětmarovice - Petrovice
Throughput in section Petrovice -Odb. The defect is used about half (for the 1st track track reaches Kopt = 48% / 70% in 2 hours peak, So = 0.43), in the section Odbočka Závada - Dětmarovice even less (for the 2nd track track Kopt = 44% / 65% in 2 h peak, So = 0.48. There are sufficient number of free routes - 59 (64 in the opposite direction) routes / 24 h.
Along this route, more than double the number of freight trains (87 trains) is maintained in the section Petrovice - Odbava. Compared to passenger transport (40 trains).
The freight trains are 24 Nex trains, 45 Pn trains, 6 Mn trains and 12 Lv trains - they continue in the direction of Dětmarovice, Bohumín. Out of this number of trains runs 20 loads trains (9/11) from the Odbočka Závada via Odbočka Koukolná to Karviná.

Line 305B Bohumin - Ostrava hl.n. - Studénka - Jeseník nad Odrou - (Přerov) (points A1, A2, A4)
On this track, the sections around the iron are very critical in terms of troughput uzlu Ostrava hl.n. to both directions - section Ostrava hl.n. entrance. vyh. - Ostrava-Svinov (where the largest number of trains run - in total 162/158) and the degree of utilization of practices is highly exceeded troughput in both directions - from Svinov to OV hl.n. (for 1st track Kopt = 118% / 24 h, 129% / 15 h, 118% in 2 h peak; So = 0.73) and for 2nd track in opposite direction Kopt = 116% / 137% / 113%; So = 0.71 for 2 h peak). There are no more free routes. The number of trains greatly exceeds the throughput. For this reason, the project of the Optimization of the passage through the Ostrava hl.n., which will address the possibility of improving the configuration of the yard, including the possibility of rail extension.
The Bohumín-Vrbice - Ostrava-Hrušov section is also very critical in terms of throughput, which is considerably exceeded (for 2nd track Kopt = 111% / 127% / 118%; So = 0.73, for 1st track Kopt = 108% / 112% / 102%; So = 0.63 for 2 h peak). There are no more free routes. The number of trains greatly exceeds the throughput.
There is a high proportion of passenger trains on this line, especially in the Ostrava hl.n. - Ostrava-Svinov is the highest (112/111 in total - of which 40 Ex pairs, 23 R pairs, 10/8 Sp, 29/30 Os), ie twice the number of freight trains. And also in the section

Ostrava-Svinov to the border of the Moravian-Silesian Region (in the direction to Přerov) there is a high number of passenger trains.
For this reason, the transfer of Ex and R trains to a new high-speed line is considered in the future.
The most trains run in sections Polanka nad Odrou - Jistebnik - Studénka (139/136), but there are still enough free routes.

Line 306A Studénka - Sedlnice - Veřovice and line 305H Sedlnice - Mošnov Airport
(assessment for forward-looking traffic in relation to the OAMP siding (Ostrava Airport Multimodal Park) and the KD terminal in Mosnov
The Kopt troughput coefficient is about 50%, there are enough free routes on both lines.

4.2. Opole and Silesia Voivodeship

Śilesia Voivodeship is characterized by the densest railway network in Poland, however, the condition of many sections of the line constitutes a barrier to efficient transport. The biggest problem is underinvested infrastructure, which results in very low speeds, exclusion from operation of individual tracks or entire sections of lines. Also excluded are sections which constituted points of stopping the rolling stock. As a result, freight and passenger traffic is concentrated on the main lines, which increases the risk of congestion. Low driving speeds are conducive to the theft of goods directly from travelling trains (e.g. coal mounds), and problems with passing through Upper Silesia reduce predictability and, consequently, the competitiveness of rail transport, especially intermodal transport. During a stakeholder meeting organised by the Office of Rail Transport in February 2014 in Katowice, carriers also reported the problem of numerous point speed limits and permissible axle load (culverts, bridges, crossings, worn out sleepers, turnouts).[1]

Considering: Corridor seaports - Silesia - southern border (in the Silesian - border section):[2]

● it is important to eliminate bottlenecks within the Upper Silesian conurbation. The most important seems to be the modernisation of the connection to the border with the Czech Republic, so it is worrying that the Katowice - Będzin - Tychy - Czechowice Dziedzice - Zebrzydowice route received funding from the CEF at a much lower level than originally assumed. Taking into account the intensive use of this section by

[1] Based on: Analysis of the demand for capacity at railway junctions in the Tri-City and Silesia, Office of Rail Transport, Warsaw 2014, p. 9;

[2] Increasing the role of railways in balancing freight transport in Poland. Challenges, proposals, good practices, Warsaw 2017, Office of Rail Transport, p. 15-16.

passenger trains, it is important to improve the Bytom - Mysłowice - Oświęcim - Czechowice-Dziedzice section at National Contact Point as an alternative route connecting Silesia with Czechowice-Dziedzice. The alternative route from the western side, i.e. line 151 Kędzierzyn-Koźle - Chałupki, also seems to be of key importance, especially as the renovated line 158 Rybnik - Chałupki is mostly single-track. This investment would be complementary to the planned modernisation of the section Kędzierzyn-Koźle - Toszek Północ, but it is on the reserve list in National Contact Point. In this context, the possibility of creating a corridor bypassing Silesia from the west should be considered, taking into account line no. 152 north of Toszek Północ.

● the modernisation of line 139 to the Zwardoń border crossing should be considered.

Table 7. Capacity problems on lines relevant for freight traffic

Nr	Line	Description
1	Railway line no 130 Tarnowskie Góry - Kalety	5. It is a 10 km line constituting formally the 4th track in this section, but line 129 constituting track no. 3 is partially out of operation. The speed on line 130 is 20-30 km/h, which limits the capacity of this section, improved thanks to revitalization, which is the two basic tracks of line 131, the so-called coal bus. The section in question is a common access and exit road from Silesia, which then branches in Kalety to the directions of Wielkopolska and Central Poland, and then to seaports. The largest marshalling yard in Poland is located in Tarnowskie Góry. Line no. 130 is located in the goods base network TEN-T.
2	Railway line no. 144 Tarnowskie Góry - Zawadzkie	Line 144 is an exit route from Silesia towards Opole and Wrocław, excluding the area of Gliwice and Kędzierzyn-Koźle. Therefore, it is used especially in case of difficulties and lack of capacity on the C-E/E30 bus. The possibility for freight carriers to use line 144 on the 35-kilometre section in question is limited by the opening hours of the line (7-15) and the removal of the overhead contact line.
3	Railway line no. 145 Chorzów Stary - Radzionków, section Jup - Radzionków	Operators indicate that the capacity of this single-track non-electrified line on the 8 km section used does not meet their needs.
4	Railway line 131 Chorzów Batory - Tczew between	On this 4km of CE65 there are significant speed limits on both tracks. The line on this section is also used by regional passenger trains.

	Chorzów Miasto and Chorzów Stary	
5	Railway line no. 161 Katowice Szopienice Północne - Chorzów Stary and railway line no. 654 Szabelnia - Katowice Szopienice Północne	Railway line no. 161 is a 12-kilometre line forming part of the northern ring road for the E30 line running through the centre of Upper Silesia. Its capacity is limited due to the poor condition of both tracks, which results in lowering the speed limit in places to 20 km/h. Line no. 654 is a 1.5-kilometre long single-track connection between line no. 161 and line no. 138 in the direction of Mysłowice. Trains can run on it at a speed of 30 km/h. Works on lines no. 161 and 654 constituting a part of the northern ring road of Silesia were included in the basic list of the NCP.
6	Railway link no. 657 Katowice Szopienice Północne - Katowice Muchowiec and railway links no. 652, 653, 706 and 707 from Katowice Muchowiec station	Railway line no. 657 is a nearly 10 km long connection between line no. 161 and line no. 171. The connection is single-track and its capacity is limited in places by poor track condition, resulting in a permissible speed of 20-30 km/h. Liaison no. 653, 706 and 707 ensuring exit from Muchowiec station to Katowice Ochojec station and further to Katowice Ligota station, as well as to Staszic station, are excluded from traffic. The works on railway siding no. 657 are planned in NCP as a part of the task together with works on lines no. 161 and 654, among others.
7	Railway line no. 171 Dąbrowa Górnicza Towarowa - Panewnik	The 42-kilometre line No. 171 is a part of the freight, southern bypass of the E30 and E65 buses running through the passenger stations in Silesia and the Basin. Its importance for freight traffic is therefore very important. One of the tracks is closed for 11.5 km between the Stawisko and Panewnik stations due to the poor condition of the viaduct. Capacity limitation is also a result of numerous speed limits up to 10-30 km/h. The NCP does not provide for works on the line no. 171.
8	Railway line no. 154 Łazy - Dąbrowa Górnicza Towarowa	It is a 20 km long railway line running through the western part of the Dąbrowa Basin to the Dąbrowa Górnicza freight station in the Katowice Steelworks area. One track on a part of the line is closed, the Okradzionów branch station has been removed, which results in one-

		track two-way traffic. There are also speed limits on the line, and the capacity is additionally limited by the insufficient number of active tracks at the Dąbrowa Górnicza Towarowa station.
9	Railway line no. 62 on the section Dąbrowa Górnicza Strzemieszyce - Sosnowiec Dańdówka	The discussed section of line no. 62, serving, among others, freight traffic between Kielce and Upper Silesian Industrial Region and within the Upper Silesian Industrial Region, is single-track, and the poor condition of tracks and engineering structures results in a speed limit of 20-30 km/h. PKP PLK has started renovation works on this section by the end of 2016, which is a continuation of works carried out on the section Sosnowiec Dańdówka - Sosnowiec Główny for over PLN 26 million.
10	Railway lines 666, 667 and 668	These are three approximately 2-kilometre long single-track connecting lines in the area of the Sosnowiec Maczki and Jaworzno Szczakowa junction stations, between lines 133 and 134. Poor condition of the tracks results in speed limits of 20-30 km/h.
11	Railway line no. 133 on the part Jaworzno Szczakowa - Balin	This section is a 10 km long section of the C-E/E30 line between Upper Silesian Industrial Region and Krakow. The limited capacity of the twin-track line results from the local speed limits to 10-20 km/h. The entire section of the core TEN-T trunk line between Sosnowiec and Krakow is in poor condition and was to be modernised from the perspective of 2007-2013, but the works are currently scheduled to be completed in mid-2019.
12	Railway line no. 93 Trzebnica - border between Oświęcim and Czechowice Dziedzice and border crossing in Zebrzydowice	The two-track railway line on the part of this 21 km section, which is intensively used for freight traffic, has a lowered track speed on both tracks to 20-30 km/h. The line is located in the comprehensive TEN-T network, works on the section Trzebinia - Czechowice-Dziedzice are on the basic list in NCP (PLN 438 million). Carriers also report an insufficient number of tracks at the border crossing point.
13	Railway line no. 138 Oświęcim -	Line 138 plays a key role in goods traffic, leads traffic from Silesia and the Zagłębie to the south

	Katowice on the Oświęcim - Mysłowice section	and southeast, runs through areas where many industrial plants have been located, including mines. The 25-kilometre section in question has a low permissible speed (30 km/h on long sections on both tracks), with many restrictions to 10 and 20 km/h. In the vicinity of the Mysłowice station the restrictions are caused by the poor condition of the tracks and the unrebuilt part of the viaduct. Works at line no. 138 were included in the basic list of projects in NCP as a part of the Gliwice-Bytom-Chorzów-Mysłowice-Oświęcim freight line. At the same time, Silesia Voivodeship planned to revitalize a section of line no. 138 between Nowy Bieruń and Oświęcim as part of the revitalization of the Orzesze - Tychy - Oświęcim connection.
14	Railway line no. 179 Tychy - Mysłowice Kosztowy on the Bierun Stary - Mysłowice Kosztowy section	This section is a single-track non-electrified line serving industrial plants in the region of Tychy, Bieruń and Lędzin. Due to mining damage, there are speed limits of 10-20 km/h, which lowers the throughput of the connection between Tychy and the Mysłowice and Jaworzno regions.
15	Railway line no. 142 Katowice Ligota - Tychy	The single-track 15-kilometre line is a freight alternative to the loaded line 139, as well as the connection of industrial plants and mines in the south of Katowice to the Tychy area. The line is subject to speed limits of 10-20 km/h due to the poor condition of the infrastructure.
16	Railway line no 141 Katowice Ligota - Gliwice section Katowice Ligota - Zabrze Makoszowy	Railway line no 141 is a southern goods bypass for the E30 bus running through the centre of the Upper Silesian conurbation. There are significant mining restrictions on the 16-kilometre-long section in question due to mining damage - the permissible speed is sometimes 30 km/h, with limits of 20 km/h.
17	Railway line no 651 Radoszowy - Gottwald	Line no 651 is a one-track, 3.5-kilometre-link between line no. 141 (Radoszowy station) and line no. 137 between Katowice and Chorzów Batory stations. The line is used to connect the coal bus with line no. 142 in the direction of Tychy. Due to the poor condition of the infrastructure, a speed limit of 10 km/h has been introduced.

18	Railway line no. 132 on the section Zabrze Biskupice - Bytom Bobrek and railway line no. 165 Bytom Bobrek - Bytom Karb.	It is a 4-kilometre-long section, allowing the exit from the western part of Silesia towards the coal main. In this area there are frequent attacks on trains, which results in stoppage of traffic.
19	Railway line 189 Ruda Chebzie - Zabrze Biskupice	It is a 7-kilometre long one-track, non-electrified line connecting lines 137 and 132. On the section Ruda Orzegów - Zabrze Biskupice the speed limit is 20 km/h. - Gliwice and harbour in Gliwice. Carriers pay attention to the poor condition of the track infrastructure within the Gliwice junction. Limited track length at harbour in Gliwice station makes it impossible to service long intermodal warehouses.
20	Railway line no. 149 Zabrze Makoszowy - Leszczyny on the section Knurów - Szczygłowice	It is a 7-kilometre section of a line connecting the Rybnik Coal Area with the Katowice railway junction. Since 2008, the discussed section has been completely impassable due to mining damage in the Szczygłowice mine area. Due to the works carried out in 2015 at the request of PKP PLK, traffic on one of the tracks has been restored in the rules of train path allocation within the timetable 2015/2016. However, the second track is still impassable, and there are also speed limits of 30 km/h on the line. According to the plans of the infrastructure manager, the second track is to be overhauled in 2016. In addition, hauliers draw attention to the lack of a sufficient number of tracks at Leszczyny station for trains servicing, among others, the power plant in Rybnik.
21	Railway line No. 140 Katowice Ligota - Nędza on the Leszczyna - Sumina section	Line no. 140 in this section connects Rybnik Coal Area with Zabrze, Katowice and Tych on the one hand, and with Racibórz and Kędzierzyn-Koźle through Rydułtowy on the other. The problem for carriers is the limited length of trains with coal (up to 510 m), which makes it necessary to run circular routes, as well as the lack of a sufficient number of active tracks at the Rybnik Towarowy station. In the area of Rybnik Paruszowiec there is a speed limit of 20 km/h. The works on line no. 140 on the Rybnik - Nędza/Turów section are on the

		basic list in NCP. At the same time, the revitalisation of the Rybnik Towarowy - Sumina section was included on the reserve list in the PRO of the Silesia Voivodeship.
22	Railway no. 151 Kędzierzyn-Koźle - Chałupki (border)	It is a 53-kilometre-long double track electrified railway line serving both freight and passenger traffic between the Kędzierzyn-Koźle railway junction and the border crossing with the Czech Republic in Chałupki/Bohumin. At the railway junction Tura/Nędza, the line to Rybnik departs from line 151. Many carriers pay attention to the numerous speed limits to 20 km/h and the deteriorating condition of the line, which performs key export functions from the Rybnik Coal Area, as well as in the communication between Poland and the Czech Republic, where there is still potential for development. At the same time, hauliers signal an insufficient number of tracks at the border crossing point and difficult entry to the Chałupki station. Line 151 is located in the TEN-T core network as an element of the C-E59 line. At NCP, works on the line are on the reserve list (PLN 183 million).
23	Railway no. 153 Toszek Północ - Rudziniec Gliwicki and railway no. 199 Rudziniec Gliwicki - Kędzierzyn-Koźle	It is a sequence of lines that leads freight traffic from the Rybnik Coal Area and the vicinity of Kędzierzyn-Koźle to the north, excluding the Katowice railway junction. The 20-kilometre-long railway line 153 connects line 137 (E30 trunk line between Kędzierzyn-Koźle and Gliwice) with line 152 Paczyna - Lubliniec in the direction of e.g. the coal trunk line. Track no. 1 on line no. 153 is closed on most of the line length, on track no. 2 there are speed limits up to 20 km/h. Line no. 199 on the 6.5-kilometre section Rudziniec - Sławęcice is closed, which increases the pressure on the E30 bus. A limited number of station tracks at the Rudziniec station additionally limits the throughput. Works on the line between Toszek Północ - Rudziniec Gliwicki - Stare Koźle were included on the basic list of projects in NCP (PLN 177 million).
24	Railway no. 137 Kędzierzyn-Koźle	On this approximately 8-kilometre long section of the two-track non-electrified line, track no. 1

	Zachodnie – Twardawa section	has been closed since 1997, which limits the capacity of the line connecting Silesian industrial districts with the southern part of the Opolskie and Dolnośląskie Voivodeships.
25	Railway no. 280 Opole Groszowice - Opole Główne	This 4-kilometre-long railway line allows for the separation of passenger and freight traffic on the section connecting traffic from line 132 on the Silesian side and line 136 on the Kędzierzyn-Koźle side. Its capacity is limited by the poor condition of the infrastructure, which means that the permissible speed is 20 km/h.
26	Railway no. 139 Żywiec – Zwardoń section	The problem in this 37-kilometre one-track section to the national border is the uneven driving times between the passes and the lack of simultaneous entries at most stations. This makes it difficult to construct a cyclic timetable and results in prolonged stops at the stations. In some cases, stops are extended even by several dozen minutes compared to the assumed ones. Track speed is only 50 km/h. These factors significantly reduce the attractiveness of the transport offer between Katowice and Zwardoń. It should also be remembered that the line to Zwardoń is an important corridor for the transport of goods in relations with Slovakia and countries south of Poland. Railway line 139 to Zwardoń is located in the passenger and freight core TEN-T network. Works on the line between Czechowice-Dziedzice - Bielsko-Biała - Zwardoń were included on the reserve list in NCP (PLN 352 million).
27	Railway no 148 Pszczyna - Rybnik Section : Pszczyna - Radostowice	It is a 7.5-kilometre section of a line that is one-track between Pszczyna and Żory. The bandwidth limit is due to the speed limit of 50 km/h. The line is used for both freight and passenger traffic; works on the line are on the reserve list in the ROP Śląskie Voivodeship (PLN 46 million). It is a 7.5-kilometre section of the line, which is one-track between Pszczyna and Żory. The capacity limitation results from the speed limit to 50 km/h. The line is used both in freight and passenger traffic; works on the line were included on the reserve list in the

		Regional Operational Programme Śląskie Voivodeship (PLN 46 million).
28	Tychy Station	Poor track condition within and around Tychy station makes it impossible to overtake trains going southwards. Poor track condition at the station combined with low speeds on lines no. 142 from Tychy to Katowice Ligota and no. 179 from Tychy Miasto towards Tychy Miasto station results in collisions between Bielsko-Biała - Katowice and Katowice - Tychy Miasto.
29	Railway lines 61 and 144 on the Lubliniec - Fosowskie - Opole section	The entire 56-kilometre section in question is one-track. Both lines have been revitalised in recent years in order to route on them the EIP trains connecting Warsaw with Wrocław. However, due to the poor condition of the Kraków - Katowice line, trains between Kraków and Wrocław are also being routed through the section in question. This situation results in limiting capacity, especially for regional and freight trains using lines 61 and 144 in case of difficulties in the area of Gliwice and Kędzierzyn-Koźle. After completion of the repair of the Kraków - Katowice section, trains from Kraków to Wrocław should return to line E30, however, an improvement in the capacity of the Lubliniec - Opole section may be advisable if more regional trains are launched on it than at present and if the Wrocław - Opole - Częstochowa - Łódź/Warsaw/Kielce/Lublin link is used more extensively.

Source: Analysis of sections of the railway network with limited capacity, J. Piotrowski, UTK, Warszawa 2016

Problems with point infrastructure capacity are a factor hampering freight transport. This is particularly important in areas that are sources of heavy traffic:
and in the region of Upper Silesia. Problems with point infrastructure capacity not related to ongoing modernization works are presented below.[3]

Border crossing points and border stations[4]:

[3] Report on the functioning of the rail transport market in 2017., UTK Warszawa 2018, s. 98

[4] Report on the functioning of the rail transport market in 2017., UTK Warszawa 2018, s. 98

● Chałupki: many carriers indicate a common problem with occupied tracks, which delays entry to the station;
● Zebrzydowice: frequent lack of free tracks.

Freight stations in the region of Silesia[5]:

● Dąbrowa Górnicza Towarowa: difficult entry to the station by insufficient number of tracks, many additional tracks are closed due to poor condition. Due to the increasing number of transports, trains are waiting to enter the station at the surrounding stations and routes. This problem is reported by many carriers and it is all the more important that the so-called Katowice Steelworks and the surrounding plants are one of the most important sources of railway traffic in Poland;
● Gliwice Łabędy: Carriers signal the need for an extension of the hoisting tracks;
● Katowice Muchowiec: hauliers postulate the reconstruction of station tracks (two basic and four additional ones) to service the Staszic Mine and trains in the direction of Zebrzydowice, Kraków, Dąbrowa Górnicza Towarowa and Gliwice.;
● Kędzierzyn-Koźle: it is necessary to extend the directional tracks up to a length of 750 m;
● Rudziniec Gliwicki: reconstruction of tracks no. 8 and 10 would increase the capacity of the renovated section Toszek Północ - Rudziniec Gliwicki.

[5] Report on the functioning of the rail transport market in 2017., UTK Warszawa 2018, s. 98

4.3. Žilina Selfgoverning Region

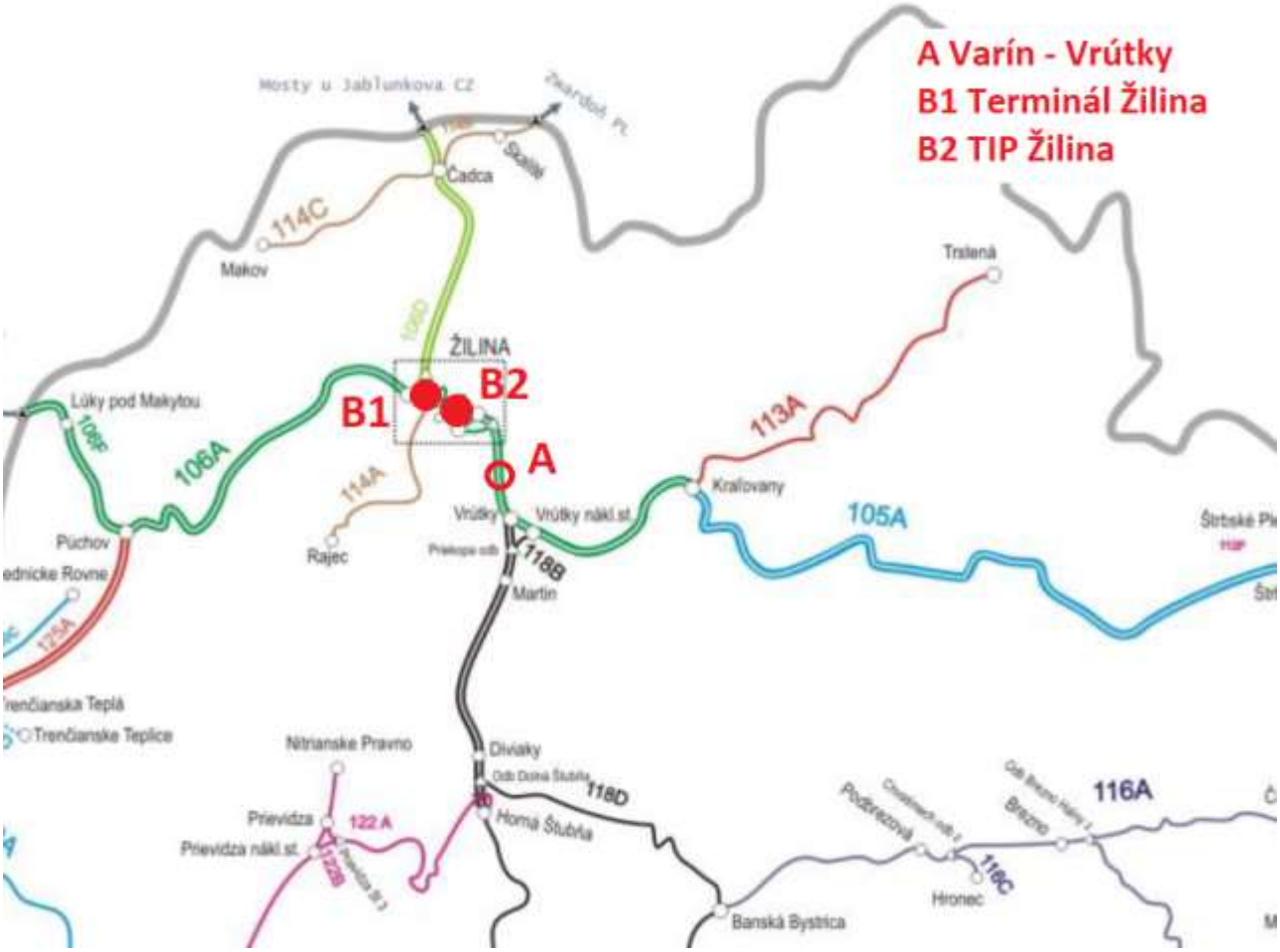
At present, there is one limiting railway section in the Žilina Region. From the point of view of intermodal transport, one terminal located directly in Žilina (B1) is operational, this situation changed two months before (Q2) when the terminal in Teplička nad Váhom (B2) was put into operation, which has a significant capacity due to installed two rails (length 750 m) and two gantry cranes. These parameters are in line with the AGTC agreement on upgraded lines and the construction of new intermodal transport terminals.

Terminal KD: The current terminal in Žilina is used primarily for the needs of the automotive industry, due to the proximity of the Kia production plant together with a significant number of subcontractors in the region. Due to its location, the terminal has limited capacities when the current two handling rails have a length of less than 500 m and therefore the division of a complete train is required, thus significantly prolonging the handling time. Another limiting element is the handling area, as the terminal is located in a built-up area and currently has no real possibilities of expanding storage space.

Narrow locations: The railway infrastructure in the Žilina Region is one limiting section, located between the stations Varín and Vrútky, where the east-west and north-east connections connect, thereby significantly increasing freight trains. This route is also important from the perspective of passenger transport on the routes between Košice-Bratislava and between Košice-Prague. These factors contribute to the significant utilization of the section concerned, whose throughput cannot be simply increased, as there are three tunnels (one double-track and two single-track) where capacity can only be increased if the third track is completed, as envisaged in 80 years of the twentieth century. For 2019, this section is mined to 67.60% in the even and 70.37% in the odd direction. These values express the regular traffic with 139 trains in even and 124 trains in odd direction. The available capacity is 21 trains in the even and 13 trains in the odd direction. It follows from the above that this section has limited opportunities for further growth under the current conditions. The high utilization of the section results not only from the high number of trains, but also from the geographically demanding conditions in which the track is run as it passes through a narrow valley surrounded by Malá Fatra. These conditions do not allow for the creation of shorter interstage sections that would allow shorter successive splits between trains, and a positive effect will also be the change in traction to alternating, which allows shorter electric splits due to the characteristics of the power supply system and in particular traction transformer stations.

The map below shows two significant terminals in the Žilina region and one limiting section on the infrastructure in the Žilina self-governing region. There are two terminals in the region, one in Ruzomberok and one in Trstenna. These terminals are not marked on the map as they are not currently in operation.

Figure 11: Marking of the position of the limiting railway section and important intermodal transport terminals in the Žilina self-governing region.



5. Railway bottlenecks at TRITIA area – 2030 prediction

5.1. Moravian-Silesian Region

Network in standard operation

In the outlook for 2030, it is possible to envisage increasing limiting sections beyond Chapter 4.1 due to insufficient line capacity. Within the increasing traffic in Moravian-Silesian, technical modifications of the railway infrastructure are proposed, which will eliminate the shortcomings of the line capacity (Ostrava Node and Přerov - Ostrava High-Speed Line).

In the outlook, freight transport is expected to increase. By 2030, it is envisaged to

convert 30% of road transport to rail and water transport according to the White Paper of the European Union. The expected number of freight trains going through the Ostrava junction would be 194 train routes with 388 thousand tons of goods. Currently, rail transport infrastructure would not be able to accommodate the envisaged scale of transport. The prospective rail transport is considering increasing the capacity of bottlenecks of the railway infrastructure (see study Node Ostrava) in the Moravian-Silesian Region.
The planned construction of VRT in 2030 along a line roughly copying the original line 305B in the section Přerov - Ostrava could significantly help relieve this rather capacity-loaded line.
There is a high proportion of passenger trains on this line, especially in the Ostrava hl.n. - Ostrava - Svinov, where their number is highest (112/111 trains in total - of which 40/40 are Ex trains, 23/23 express trains, 10/8 fast trains and 29/30 passenger trains, 10/10 trains). Their number is 66 - 68.7% compared to the number of freight trains in this section, ie the number of freight trains make up about one third of the total number of trains. Throughput is used to the maximum and there are no more free routes (rather they are minus). And in the section Ostrava-Svinov to the border of the Moravian-Silesian Region (in the direction to Přerov) there is a high number of passenger trains (a total of 84/85 trains - of which 42/42 Ex trains, 15/15 express trains, 25/25 passenger trains, 2/3 train trains), whose share in the total number of trains in the Polanka - Studénka section is approximately 54 - 57% and in other sections the share between the number of passenger and freight trains is approximately 50%.
If we thought that only Ex trains and express trains would be converted to VRT, ie. in section Ostrava hl.n. - Ostrava-Svinov 53/53 trains (ie about a third) and in the section Ostrava-Svinov - to the border MSK 57/57 trains (ie 37–41%), then the original line would lack about 50 routes for freight trains, if we assume that no new trains will generate space after the passenger trains are transferred to the high-speed line.
Given the possibilities of the planned capacity of the railway infrastructure, a significant amount of road freight transport cannot be guaranteed to be transferred to rail.

Network in standard operation

Main railway network in Moravian-Silesian region is about 10-20 year old without necessity of intesive maintenance. In 2030 network will be 25 year old on average and necessity of maintenance will be higher. Each section in maitenance will be bottleneck because of traffic flow. Maintenance sections have troughput three times lower on average and practically do not allow freight transport in daily hours from 5 to 22 o´clock.

5.2. Opole Voivodeship and Silesia Voivodeship

Due to the lack of available detailed quantitative data on the 2030 bottleneck forecast for the Śląskie and Opolskie Voivodeships, only general qualitative aspects for the whole country are presented below.

In the absence of adequate funding for the railway transport infrastructure, it should be assumed that the following points are presented in the table below 4.2 bottlenecks will be reinforced.

According to the assumptions of the Master Plan for Railway Transport in Poland until 2030, the most important actions to be undertaken are as follows:

1. With regard to freight transport:

- implementation of IT systems for tracking trains and loading units based on modern ICT tools, implementation of the TAF TSI on a network scale;
- implementation of tools for easy access to information related to the implementation of transport processes;
- the modernisation/adaptation of freight rolling stock for specific transport tasks;
- the modernisation and replacement of rolling stock, taking into account interoperability requirements;
- adaptation of diesel locomotives to the use of biofuels.

With regards of railway infrastructure:

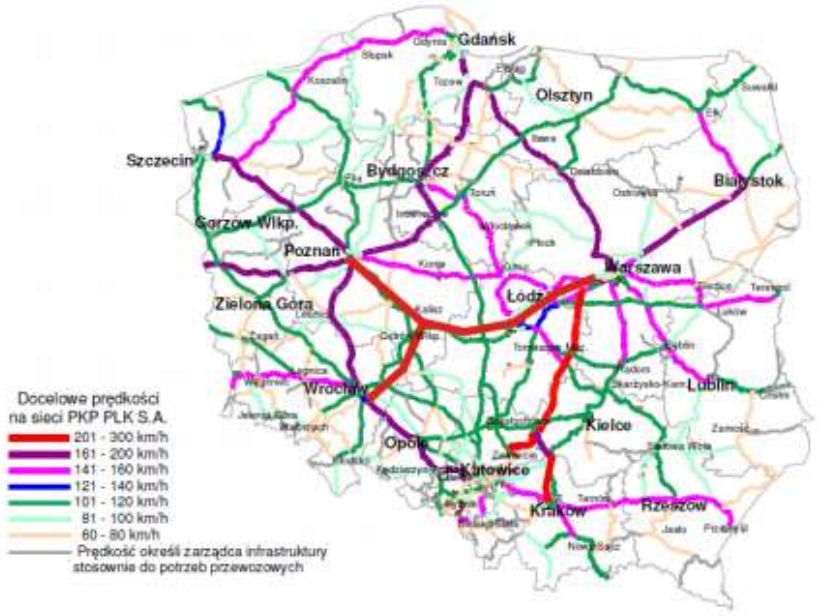
- upgrading of railway lines for passenger, freight or mixed traffic, taking into account TSIs and environmental standards;
- construction of high-speed railways, taking into account HS TSIs and environmental standards;
- implementation of ERTMS system;
- construction of short sections of lines connecting agglomerations with airports, taking into account environmental protection standards;
- replacement investments on loaded sections of degraded railway lines, taking into account environmental protection standards;
- elimination of unnecessary infrastructure, with reclamation of the recovered area of land, where it will be necessary;
- re-use of some of the materials recovered from railway lines undergoing comprehensive modernization;
- modernization of railway stations, with adaptation to the needs of people with reduced mobility and environmental protection requirements (reduction of the consumption of raw materials, energy, water), as well as conservation requirements for the renovation of monuments;
- renovation of historic buildings;
- construction of new stops;
- construction of transport hubs;
- modernisation of existing and construction of new transshipment terminals, in particular in seaports and track gauge change points.

Rail freight transport has a growth potential. The following factors have the greatest impact on the development prospects of these services [6:] demand for transport resulting from the development of the economy, structural changes in demand related mainly to the increase in demand for highly processed cargo, the level of charges for access to railway infrastructure. It is also important to gradually reduce the rates of charges for access to infrastructure; to modernise traction and wagon rolling stock, and to adapt it to the changing structure of loads and the growing requirements as to the duration and punctuality of transport, as well as to implement systems of supervision over shipments.

Within the framework of the planned directions of development of railway transport, it is assumed that [7]:

1. Increase of maximum crossing speeds - target maximum speeds on individual railway lines will result from the tasks performed by these lines within the railway network. In 2030, the most loaded relations will be served by high-speed trains running on lines, adapted to a minimum speed of 250-300 km/h and on sections of existing lines and upgraded to a speed of 200 km/h (fig. 12).

Figure 12: Planned velocities on the Polish railway network in 2030.

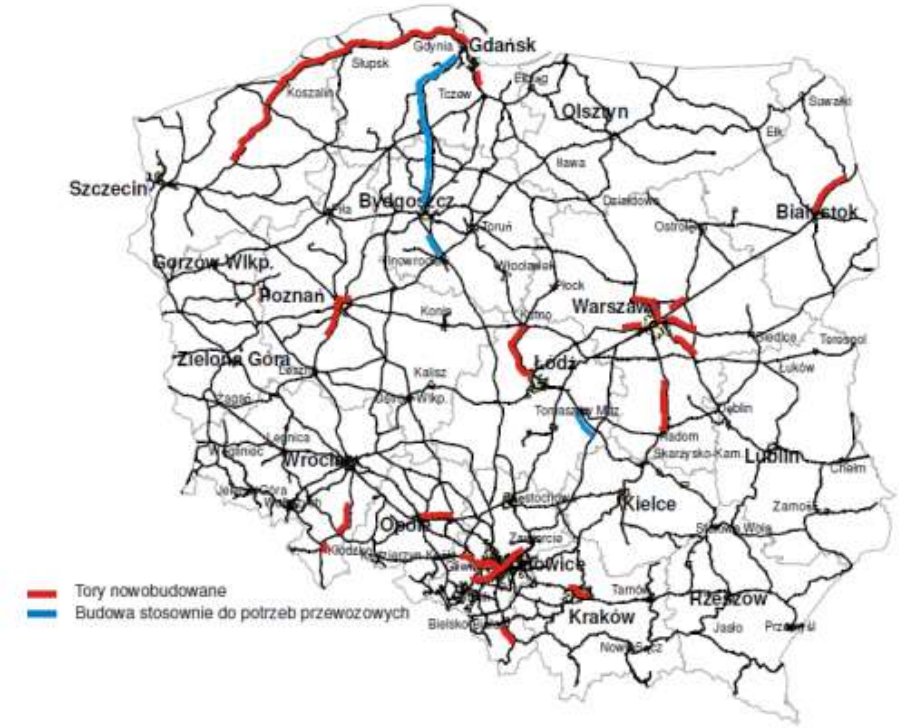


[6] MERKISZ-GURANOWSKA A., DASZKIEWICZ P., ANDRZEJEWSKI M., STAWECKA H., Perspektywy rozwoju transportu kolejowego w Polsce do roku 2030; Logistyka, 3/2015.

[7]Master plan dla transportu kolejowego w Polsce do 2030 roku, Ministerstwo Infrastruktury, Warszawa 2008.

2. Construction of new road sections - rail transport forecasts made, taking into account particular segments of the passenger and freight transport market, indicate that by 2030 there will be a significant increase in their growth. However, this growth will be uneven, especially in the area of passenger transport. The most important proposed locations for construction of new tracks also concern the area of Silesia and Opolskie Voivodeships (Fig. 2).

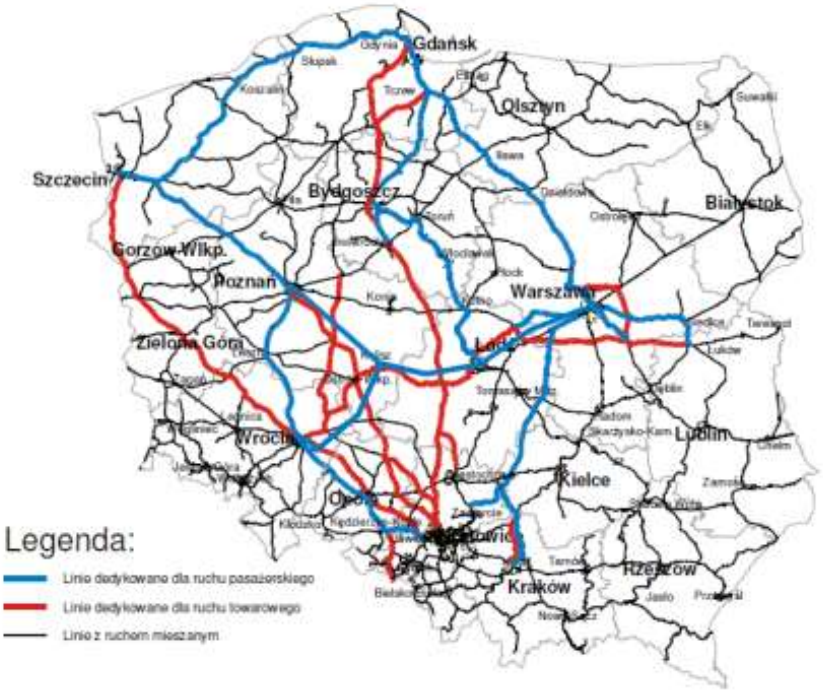
Figure 13: Map of newly built tracks in Poland planned – 2030



3. Specialisation of railway lines - in the case of European railways, there is a growing tendency to specialise railway lines, with separate lines with preference for

passenger transport and lines with preference for freight transport (fig. 3)..

Figure 14: Map of the planned line specialisation - 2030



4. Use of new technologies - the following technologies are assumed to be used in the process of modernisation and expansion of railway infrastructure:

- Surface constructions reducing noise and vibration (rail absorbers, rail systems in the lagging, anti-vibration mats, new spring fastening systems),
- supply of the overhead contact line in a 3 kV DC system with recuperation in order to reduce energy consumption,
- power supply of the overhead contact line in the 2 x 25 kV 50 Hz system on newly built sections of high speed lines,
- European Rail Traffic Management System (ERTMS) involving European Train Control System, (ETCS) and the GSM-R radio transmission system on the lines included in the National Implementation Plan for ERTMS,
- modern, centralised traffic control and management systems at large railway junctions, ensuring an increase in capacity and the elimination of bottlenecks,
- remote control systems (including radio control systems), in particular for light and medium loaded lines, reducing traffic costs,
- systems supporting transport process and resource management and information systems,

- telematic applications, ensuring the exchange of information between the infrastructure manager and carriers, both freight and passenger, in accordance with the TAF TSI and the TAP TSI.

5.3. Žilina Selfgoverning Region

Currently, a significant project is being prepared for the Node Žilina, which will shorten the time of passing the Žilina station in all directions in the future. This project is developing a traffic model based on updated data on expected development of traffic performance on all lines related to the node.

From the perspective of the region, the creation of new infrastructure bottlenecks is not foreseen, as at present all lines have sufficient capacity and at the same time sufficient margin to cover significant output growth. At the same time, a slight increase in capacity resulting from the modernization and introduction of the ETCS interlocking system at L2 level should be envisaged, which will bring better possibilities for the operation of interstation sections and shortening of subsequent intermediate times.

6. Existing plans to increase railway infrastructure within TRITIA region

6.1. Moravian-Silesian Region

Table 8. Short term planned buildings with impact to increase of capacity

Building No	Section No	Name of building	Predicted realisation	Costs prediction
T-02	301A	Optimalizace trati Český Těšín - Dětmarovice	12/2019 - No specify	2,80 mld. Kč
T-16	301A	ETCS Mosty u Jablunkova - Dětmarovice	No specify	200 mil. Kč
T-05	301A, 305B	Rekonstrukce zabezpečovacího zařízení v žst. Bohumín	02/2019 - No specify	480 mil. Kč
T-23	301A	Rekonstrukce R110kV na TNS Jablunkov	11/2019 - 12/2020	109 mil. Kč
T-01	305B	Modernizace železničního uzlu Ostrava	7/2024 - 12/2027	7,65 mld. Kč
T-15	305B	Výstavba R110kV na TNS Ostrava Svinov	04/2020 - 12/2020	284 mil. Kč
T-03	305B	Polom – Suchdol n. O., BC	11/2021 - 09/2024	3,35 mld. Kč
T-11	305B	Náhrada přejezdu P6501 v km 245,044 trati Přerov - Bohumín	07/2020 - 08/2021	694 mil. Kč
T-12	305B	Náhrada přejezdu P6508 v km 256,861 trati Přerov - Bohumín	01/2021 - 11/2022	250 mil. Kč

T-17	301A, 305B	ETCS Petrovice u Karviné - Ostrava - Přerov – Břeclav	12/2018 - No specify	707 mil. Kč
T-04	301B	Dětmarovice – Petrovice u K. – státní hranice PR, BC	03/2020 - 07/2022	2,95 mld. Kč
T-06	301D	Optimalizace traťového úseku Český Těšín (mimo) - Albrechtice u Českého Těšína (včetně)	03/2022 - 03/2023	1,50 mld. Kč
T-18	301D	Rekonstrukce TV v úseku Albrechtice u Č.T. – Havířov, 2. Kolej	08/2019 - No specify	67 mil. Kč
T-07	301D	Rekonstrukce žst. Havířov	06/2019?? - 04/2022	1,50 mld. Kč
T-08	301D	Optimalizace traťového úseku Ostrava-Kunčice (mimo) - Ostrava-Svinov/Polanka nad Odrou	No specify	1,80 mld. Kč
T-09	302A	Optimalizace a elektrizace trati Ostrava Kunčice-Frýdek Místek	08/2021 - 12/2023	4,69 mld. Kč
T-10	302A	Revitalizace a elektrizace traťových úseků Frýdek Místek (mimo) - Frenštát pod Radhoštěm město/Ostravice	No specify	3,52 mld. Kč
T-24	305A	Rekonstrukce chalupeckého zhlaví v ŽST. Bohumín Vrbice a traťové koleje Bohumín Vrbice - Chalupki	03/2022 - 10/2022	213 mil. Kč

Figure 15: Map of the short term planned buildings (in map are buildings with no impact to capacity also not included in table 8)

Detailed description is in text bellow

European Train Control System (ETCS)
ETCS stands for European Train Control System, which is part of the European Rail Traffic Management System (ERMS). It should ensure trouble-free cross-border traffic and gradually replace some 20 different national train protection systems, thus enabling trains to be managed throughout Europe without having to replace traction vehicles at the border or without having to equip the traction vehicles with different national systems.
The aim of introducing ETCS is not only to combine the control and safety of train movements and to bring these systems to the state of the art, but also to:
• Reduce maintenance and operation costs for the trackside
• Elimination of a number of national security systems and thus
• Enabling vehicle interoperability on European railways
• Increased throughput
• Increase line speeds
In the Czech Republic, it is necessary to ensure the transition from the use of a Class B national train protection system (LS type line train protection), or lines without a train protection part to the use of the Class A system (ETCS).
The launch of the ETCS system on the main lines of the Czech Republic, ie in the Moravian-Silesian Region within the TRITIA territory, should take place by 2025.

Power conversion
At its meeting on 20 December 2016, the Central Commission of the Ministry of Transport approved a study entitled “Concept of Switching to the Unified Power System in Relation to the Priorities of the 2014-2020 Programming Period and Meeting the ENE TSI Requirements”. This step also approved the long-term goal of unifying traction power systems in the Czech Republic.
The study demonstrates that switching to alternate traction will enable the following objectives to be met:
• Increase rail transport performance with more efficient power supply
• Increase energy efficiency by reducing line losses
• Reducing the costs of electrifying additional lines
• compatibility of high-speed line power supply with conventional rail network
• making train running more efficient by making better use of the traction features of modern traction vehicles
The study proposed a switchover schedule (2019 - 2037) was accepted as a recommendation.

Extension of useful track lengths in stations (bottlenecks)
It should be borne in mind that the main freight routes across the EU by 2030 will be modernized to allow the operation of at least 740 m trains, which is particularly useful

for intermodal trains as another important factor efficiency of freight transport. Regulation 1315/2013 / EU defines several requirements for railway infrastructure, including the requirement for the possibility of running trains of 740 m length on main networks.

Extension of track capacity
All reconstructions are considered as buildings with potential of increasing track capacity, because of higher speed, higher reliability, lower extraordinary time for maintenance and accidents.
Reconstructions with no impact to track capacity are reconstructions of buildings.

New planned lines or new tracks
Within area of Moravian-Silesian region are planned:

- Second track in Vratimov – Frýdek-Místek section
- New tracks in Ostrava node

6.2. Opole Voivodeship

An important freight project is works carried out on the section Toszek Północ - Rudziniec Gliwicki - Stare Koźle (on railway lines no. 153, 199, 681, 682, 872) - October 2018.

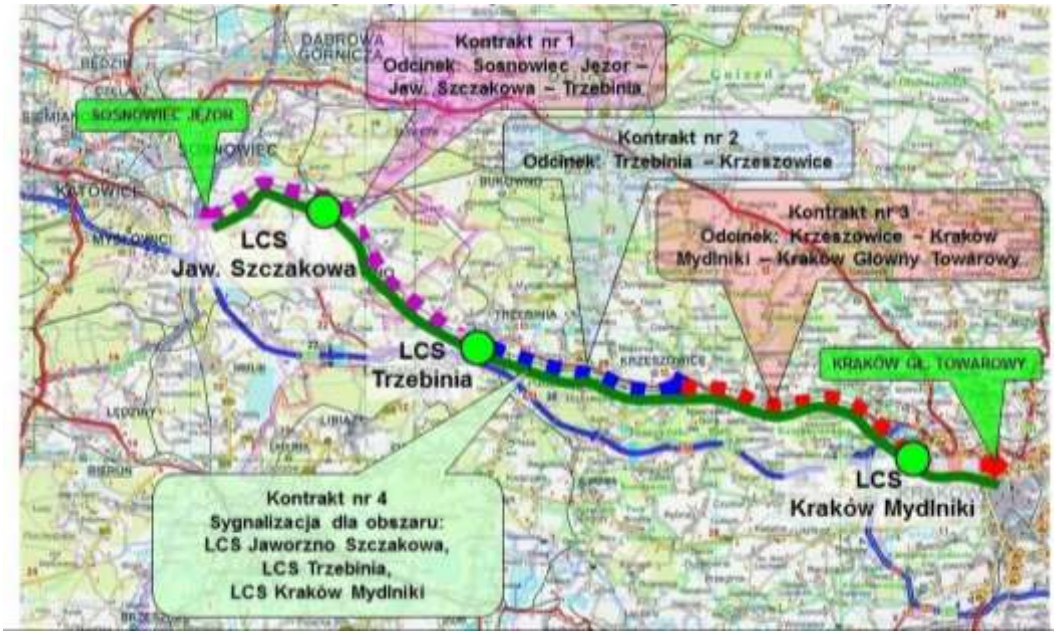
By doubling the speed to 75 km/h, the travel time for freight trains between Kędzierzyn-Koźle and Toszek Północ will be reduced by approx. 45 minutes. Cargo transport will be more efficient and the competitiveness of railways in freight transport will be improved. The National Railway Programme in the Opolskie Voivodeship provides for a total of 10 projects with a value of over PLN 1.7 billion from the basic and reserve list.

6.3. Silesia Voivodeship

a) Modernisation of railway line E 30, Zabrze - Katowice - Kraków section, stage II b
The investment consists of modernization of the E 30 railway line, in the scope of basic works on the section Jaworzno Szczakowa - Kraków Główny Towarowy and in the scope of signalling works on the section Sosnowiec Jęzor - Jaworzno Szczakowa - Kraków Główny Towarowy: LCS Jaworzno Szczakowa, LCS Trzebinia and LCS Kraków Mydlniki. The modernisation of the Sosnowiec Jęzor - Jaworzno Szczakowa - Kraków Główny Towarowy section is to adapt the E 30 line to the technical conditions resulting from the AGC (main international railway lines) and AGTC (main international combined transport lines) agreements. The line is designed for passenger trains operating at 160 km/h and freight trains operating at 120 km/h. The railway infrastructure in all areas will be modernised. This applies to the geometrical layout of

tracks, platforms, engineering structures, overhead contact line and environmental and other infrastructure protection measures in progress (to be completed by 2020).

Figure 16: 4 sections of modernization Zabrze – Katowice – Krakow



b) Work on railway line no. 1 on the section Częstochowa - Zawiercie

The project is on the Project List for the Operational Programme Infrastructure and Environment 2014-2020, under the number 5.2-6. The facilities covered by the contract are located within the area of activity of PKP Polskie Linie Kolejowe S.A. Zakład Linii Kolejowych in Częstochowa. The project includes works on line no. 1 Warsaw - Katowice on the Częstochowa - Zawiercie section, in km 229.245 - 273.262 located in the Silesian Voivodeship. The length of the modernised section is 44.017 km of the double track line. Works performed as part of the project:

1. Reconstruction (together with optimisation within the limits of the existing ground structures) of the track system with possible elimination of unnecessary track groups.
2. Adaptation of track gauge at stations to forecast transport needs (reduction in the number of tracks)
3. Optimalization of turnouts.
4. Use of all welded switches and non-contact surface on all tracks.
5. Replacement of Mine Restructuring Company equipment.
6. Replacement of the overhead contact line.
7. Repair of engineering structures to the extent necessary.
8. Adapting passenger premises to the needs of persons with reduced mobility.
9. Construction of telecommunications cables for PKP Polskie Linie Kolejowe S.A..

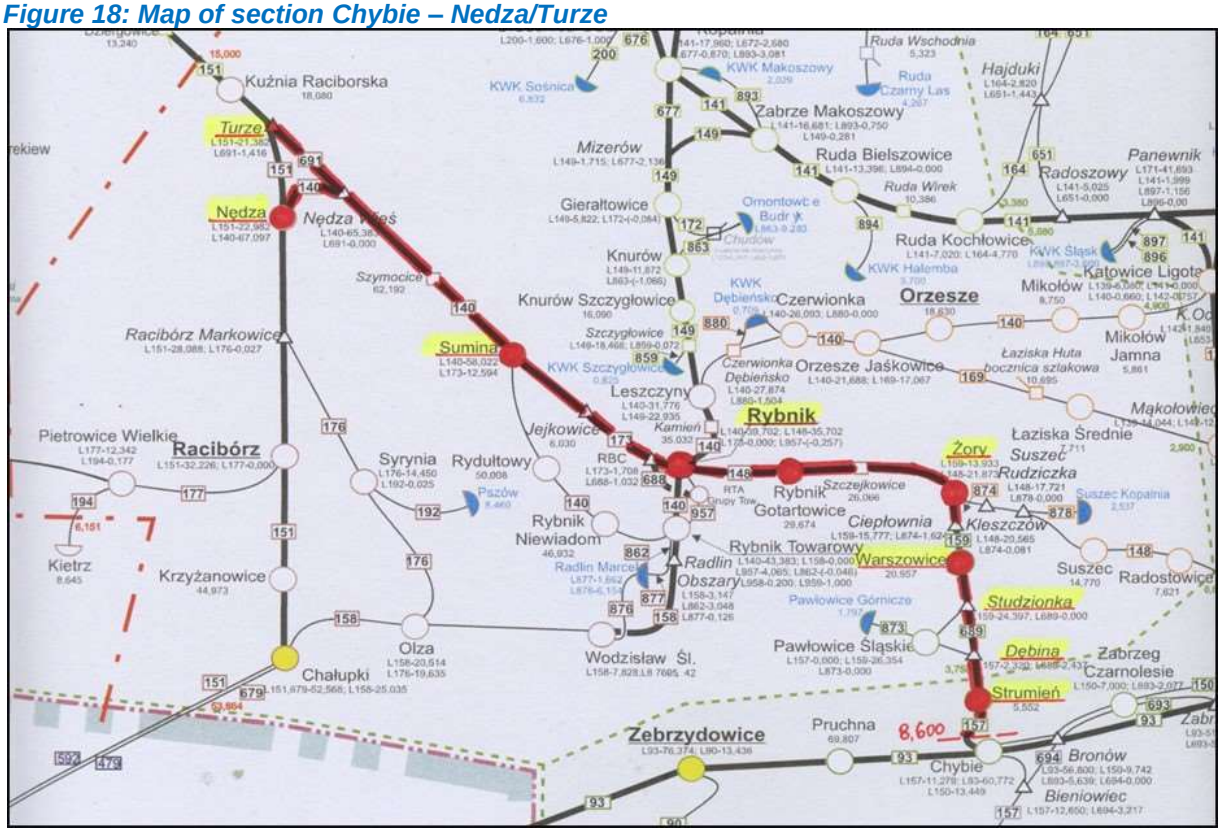
10. Replacement of obsolete wired and radio technology communication equipment.
11. Complete rebuilding of platforms at all stations and passenger stops in order to achieve the parameters specified in the TSIs.
12. Creation of digital monitoring systems and passenger information systems.
13. Adaptation of firebreaks to the requirements of the Regulation (Journal of Laws 2014, item 1227

Figure 17: Map of section Czenstochowa - Zawiercie

c) <u>Work on railway lines No. 140, 148, 157, 159, 173, 689, 691 on the section Chybie - Żory - Rybnik - Nędza / Turze</u>.
The project is on the Project List for the Operational Programme Infrastructure and Environment (OPI&E) for the years 2014-2020 with the reference number POIiŚ 5.2-5. It is also included in the National Railway Programme and in the Implementation Document to the Transport Development Strategy until 2020.
The investment is located in the area of the Katowice Railway Junction in the south-eastern part of the Silesian Voivodeship and runs through the area of ten communes: Nędza, Lyski, Gaszowice, Jejkowice, Rybnik, Żory, Pawłowice, Strumień Miasto, Strumień Obszar Wiejski, Chybie and is an important element of both local and European railway infrastructure in Poland. It is located within the area of activity of PKP Polskie Linii Kolejowe S.A. It is located within the area of activity of PKP Polskie Linii Kolejowe S.A. The company is located in Tarnowskie Góry and in Sosnowiec. Railway lines on the Chybie - Nędza/Tur section play an important role primarily in freight transport, as well as partly in regional passenger transport on the sections of the line from Nędza / Turów through Rybnik to Żory. The project involves a comprehensive exchange: - repair of the railroad surface together with repair of the substructure within the scope specified by the results of expert opinions and repair and unblocking of the railway line drainage system together with repair of

environmental protection equipment, switches, electrical heating equipment of switches, traction network equipment, external lighting equipment.

Figure 18: Map of section Chybie – Nedza/Turze



d) <u>Work on railway lines no. 153, 199, 681, 682 and 872 on the section Toszek Północ - Rudziniec Gliwicki - Stare Koźle</u>

Reconstruction of the section from Toszek Północ station to Stare Koźle provides much better conditions for the transport of goods, thus increasing the competitiveness of railways in relation to road transport. The revitalized section runs through the territory of two voivodships: Śląskie and Opolskie. The works are carried out on the length of almost 40 kilometres. The contractor will reconstruct the track and overhead contact line, install railway traffic control equipment and reconstruct 51 engineering structures such as viaducts, bridges and culverts. As a result, trains will speed up here to a maximum of 90 km/h. The project is included in the List of Identified Projects of the Infrastructure and Environment Operational Programme 2014-2020 under the number 5.2-13 and covers the Silesia Province, Gliwice and Strzelce Counties and the Opolskie Province, Kędzierzyńsko-Kozielski County.

Railway line no. 153 Toszek Północ - Rudziniec Gliwicki is covered by the AGTC agreement from km - 0.083 to km 19.657. The project will be implemented within the activity 5.2 Development of railway transport outside the TEN-T.

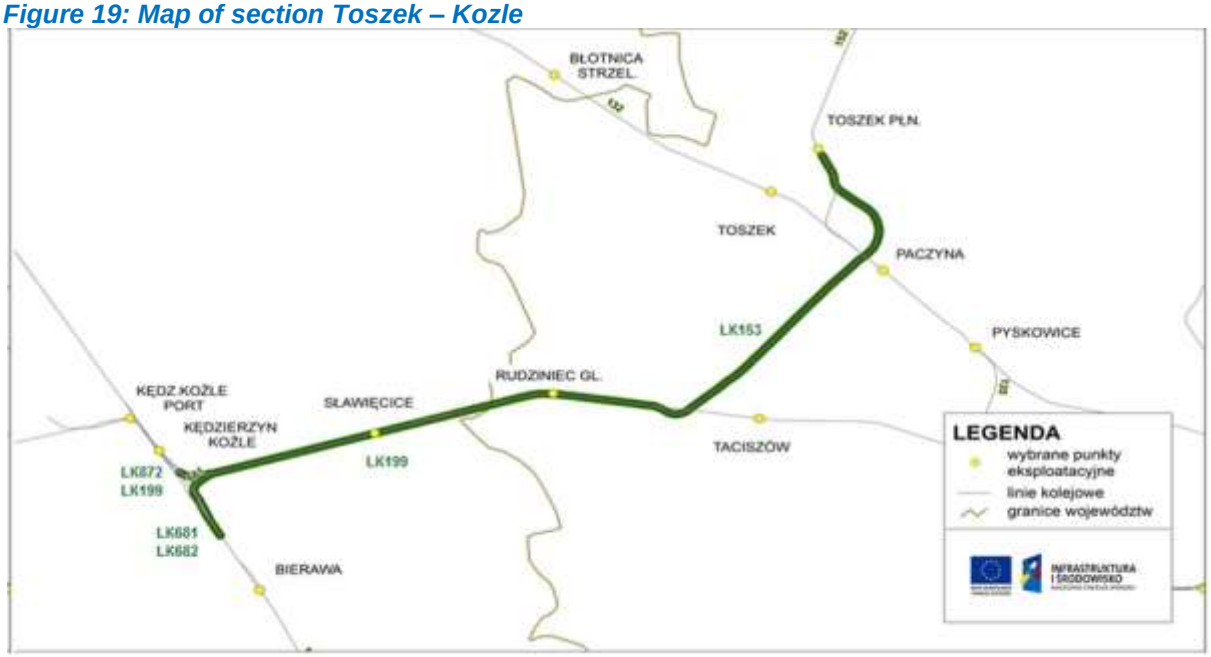
The project is implemented in 2017-2019 on the following railway lines:

1. 153 Toszek Północ - Rudziniec Gliwicki in km 0.300 - 19.400, number of tracks - 2, axle load - 221 kN, the planned speed - 90 km/h, km 1.811 - viaduct reconstruction, km 9.335 - viaduct demolition, km 11.688 - bridge reconstruction, Toszek Północ station reconstruction, Rudziniec Gliwicki, Sławięcice..
2. 199 Rudziniec Gliwicki - Kędzierzyn Koźle KKA in km 49.100 - 61.600, number of tracks - 1, axle load - 221 kN, the planned speed - 80 km/h, km 55.343 - bridge repair, km 59.274 - demolition and construction of a new bridge.
3. 681 Nowa Wieś - Stare Koźle in km 0,000 - 3,400, number of tracks - 1, axle load - 221 kN, the planned speed of 60 km/h, km 2,208 - viaduct reconstruction, km 2,388 - dismantling and viaduct construction.
4. 682 Nowa Wieś - Kędzierzyn Koźle KKB in km 0,000 - 2,500, number of tracks - 1, axle load - 221 kN, the designed speed - 60 km/h, km 2,194 - viaduct reconstruction
5. 872 Nowa Wieś - Kędzierzyn Koźle KKC in km 61,600 - 63,000, number of tracks - 1, axle load - 221 kN, the designed speed - 80 km/h, km 62,816 - viaduct renovation.

The following works are being carried out as part of the project:

1. Comprehensive replacement of the surface together with repair of the track bed within the scope defined by the results of expert opinions and repair and unblocking of the railway line drainage system together with repair of environmental protection equipment, switches, electrical heating equipment of switches, traction network equipment, external lighting equipment..
2. Reconstruction of level crossings and their adaptation to the required standards.
3. repairs or alterations to civil engineering structures, including bridges, viaducts and culverts, track crossings.
4. Comprehensive replacement of external railway traffic control equipment with electrical centralization of switches in mechanical and electromechanical actuators with replacement of cable network and repair of existing relay railway traffic control equipment with possible adaptation to the changed track system.
5. renovation of chosen cubature facilities.
6. Environmental protection work

Figure 19: Map of section Toszek – Kozle



6.4. Žilina Selfgoverning Region

In terms of infrastructure construction, ŽSR does not plan to expand and build new railway lines in the Žilina self-governing region. This situation is caused by the existing coverage of the region by rail transport, which ensures the connection of all major settlements and production centers, it is possible to expect only the connecting of new enterprises created in new industrial parks, respectively connecting of new intermodal transport terminals (an example is to build a 1.8 km long Lužianky terminal connection to the Lužianky railway station).

It is currently planned on the core network, exclusively the modernization of the infrastructure, combined with routing optimization, replacement of safety equipment and electrification. These measures do not directly address the increase in freight capacity, which usually reaches a maximum speed of 120 km h, even if the line speed is increased to 160 km / h, this will not have a significant impact on freight transport. The main benefit of increasing speed and changing traction lines is shortening the sequence of two consecutive trains as the alternating voltage system allows them to cut the electrical split while at the same time the higher line speed of passenger trains ensures a shorter stay in interstate sections and thus speeds up the release of the train path for subsequent train running. Alternating traction is more efficient and more controllable when running a train compared to direct traction, and shows higher fuel efficiency, resulting in lower traction costs.

All projects implemented in the future on the corridor between Žilina and Košice will take into account the plan of modernization of the power system from the current 3kV DC to 25kV AC. Upgrading of these sections may lead to the situation that even after the modernization of smaller sections, the traction line will still be operated in 3kV DC mode and the transition to AC traction will occur after completion of longer complete logical units which will be more economical. and the entire distribution network. Current technologies allow the use of a 25kV AC traction system for 3kV DC operation while performing a simple modification of the insulators. Such modification can be easily changed subsequently to the required system of 25 kV AC after completion of longer sections and replacement of traction power stations.

All projects concerning the Žilina - Košice line are based on the document “Feasibility study - update, section Žilina - Košice - Čierna nad Tisou št. hr. ”, in which three solutions are proposed for each section, which differ in tracing, which is aimed at eliminating the speed steps, and on which the cruising speed subsequently depends on the section concerned. Given the several options proposed, the projected costs for individual projects are not given as they may still develop significantly during the preparation of the project documentation.

The following projects are under preparation or under consideration in the Žilina Region by 2030:

Žilina node (2019 – 2021; 340 mil.€):
As part of this project, a complete reconstruction of the Žilina station with adjacent infrastructure will be implemented. The main benefit will be the increase of line speed to the level up to 160 km / h, change of traction from 3kV DC to 25kV AC, modernization of the signaling equipment to ECTS L2 level.
The change of the power system will affect the wider area, when the project will change the voltage system on the whole section between the stations Púchov and Žilina, on the whole section Žilina - Čadca - State border of the Slovak Republic and on the section between Žilina and Strečno.
The project is currently in the process of preparing for public procurement and the estimated cost of the projects and the expected timetable for the works are already known.

Krásno nad Kysucou – Čadca (2022 – 2025):
The project envisages modernization of the entire infrastructure, including an increase in line speed to 160 km / h, on sections where local conditions allow it, and no significant additional costs will be required and there will be no significant impairment of nature protection.
At present, the GSM-R communication network has been built on this section, which is intended for rail transport needs and will be part of the ETCS L2 line signaling equipment in the future.

Východná – Liptovský Hrádok (2025 – 2028):

The original design of this project is currently being modified to reduce the expected line speed from the original 160 km / h to 140 km / h and 120 km / h, respectively, according to local conditions. This design change is based primarily on the requirement to reduce project implementation costs, as the original design of the section between Liptovsky Mikulas and Poprad counted on shifting the track by up to 2 km southwards. The main reason for this technical solution was the leveling of the alignment, as the highest railway station in Štrba is located in this section and it was necessary to create conditions to mitigate the impact of the cant on the performance of traction vehicles. A reduction in line speed in favor of a reduction in total costs is foreseen in the latest religibility study for the Žilina - Košice - Čierna nad Tisou section.
The main objectives are to increase the line speed, eliminate speed jumps, change the traction line to 25kV AC and build a safety device at least at the level of ETCS L2.

Liptovský Hrádok – Liptovský Mikuláš (2020 – 2023):
Like Východná - Liptovsky Hradok, the routing has changed and the project documentation is currently being developed.
The main objectives are to increase the line speed, eliminate speed jumps, change the traction line to 25kV AC and build a safety device at least at the level of ETCS L2.

Liptovský Mikuláš – Ružomberok (2024 – 2025):
The main objectives are to increase the line speed, eliminate speed jumps, change the traction line to 25kV AC and build a safety device at least at the level of ETCS L2.
The specificity of this section is a proposal to change the route of the railway line near Liptovska Mara and the town of Liptovsky Mikulas with the location of the station outside the city center. All other parts of the trace are routed in the current track body or do not deviate significantly.

Ružomberok – Turany (2026 – 2029):
The main objectives are to increase the line speed, eliminate speed jumps, change the traction line to 25kV AC and build a safety device at least at the level of ETCS L2.
This section has two major main routes of the future route, one is to maintain the current direction and the other is to shorten the route bypassing the Kraľovany side. The main disadvantage of shortening the route and increasing the line speed is the necessity to build new tunnels (up to 7 km long), due to the demanding local conditions, as the route is run in a narrow valley with difficult geological conditions (difficult conditions for tunnel construction).

Turany – Vrútky (2024 – 2025):
Hlavnými cieľmi sú zvýšenie traťovej rýchlosti, odstránenie rýchlostných skokov, zmena trakčného vedenia na 25kV AC a vybudovanie zabezpečovacieho zariadenia minimálne na úrovni ETCS L2.
Modernizácia trate má byť vedená v súčasnom trasovaní a nebude si vyžadovať významné zmeny. Využitie súčasného vedenia vyplýva z toho, že trať je vedená v doline s pozvoľnou zmenou nivelety a bez náhlych zmien smerovania.

Vrútky – Varín (2026 – 2028):
The main objectives are to increase the line speed, eliminate speed jumps, change the traction line to 25kV AC and build a safety device at least at the level of ETCS L2.
This section is planned as the last one, as the reconstruction was carried out in 2015, as the section was already in unsatisfactory condition and the reduced line speed negatively influenced the overall throughput.
Within the section, two basic routes are proposed as part of the modernization, one primarily in the current body, the other counting on the construction of new tunnels that would increase throughput by shortening the distance on the Vrútky - Varín section. h at 140 km / h and 160 km / h, respectively, according to local conditions. From a financial point of view, such a solution would require significant investment, but this may be justified by the current trend of increasing rail traffic in this sector. Given the current growth, however, there may be a significant change in routing, primarily aimed at an average increase in permeability of the entire section and to eliminate the bottleneck caused by local geomorphological conditions.

7. Potential to increase railway infrastructure within TRITIA region

7.1. Moravian-Silesian Region

From the above chapters 4, 5 and 6 it can be stated:

- At least in the section Přerov - Ostrava there are significant capacity problems for rail freight transport;
- The plans to increase the capacity of the railway infrastructure will bring partial improvements, but only in the Ostrava junction will the capacity for freight transport be significantly increased. The **planned high-speed line** will take over only part of the existing long-distance passenger service and will not cover the capacity increase requirements in rail freight transport
One of the main ideas that would increase capacity is to build a **separate rail or freight rail parallel to the current corridors**. Depending on geographical and ownership conditions, this line could be in two parts run double-track and, if possible, in parallel with the existing line, as proposed for example in the reconstruction of the Ostrava junction. The separation of passenger transport from freight transport eliminates undesirable effects on individual modes of transport, where freight transport needs a continuous journey at speeds of 100 to 120 km / h, while passenger transport stops at a speed of 160 to 200 km / h. Freight transport would operate independently of passenger transport and there would be no delay and possible delay in the departure of the freight train caused by the passenger train. (Insufficient space for freight train path).
- A great potential for freight transport is to build a **railway link between line 305B and line 306A**. At present, line 306A is connected to line 305B from North, ie from Ostrava at the Studénka station. According to the planned construction of the container terminal

in Mošnov it is necessary to increase the capacity of the line section in the section Studénka - Sedlnice - Terminal Mošnov. This capacity can be carried out by the construction of a rail link, which will allow a smooth entry of trains from the station Suhdol nad Odrou - Sedlnice - Terminal Mošnov. This investment will increase the throughput of this section and thus allow better conditions in inter-state intermodal transport in the Moravian-Silesian Region.

In order to increase the capacity of the **line 305C Bohumín-Vrbice - Chałupki**, which continues to Poland and is mainly used for freight transport, the Žesnad Association proposes to renew the Bohumín-Pudlov branch. This track is already used to its maximum (Kopt = 98%). Currently, freight trains run from Bohumín-Vrbice to Chałupek on one track (line 305C) in both directions. The track line of line 305A, which runs from Bohumín - passenger station to Chałupki, is again used for passenger transport in both directions. Both tracks - both from the railway station in Bohumín and from Bohumín-Vrbice to Chałupki were previously connected by switches in the Bohumín-Pudlov area and it was possible to use the wrong track to Poland. However, this connection was canceled, which actually caused congestion of line 305C in terms of throughput (Kopt = 98%) and low utilization of line throughput of 305A (Kopt = 23%). The 305A line is not so busy because there are only 23 passenger trains per 24 hours. There are sufficient reserves that could be used for freight. The layout of the railway at Chałupki railway station was also adapted to one-sided operation - connection to one track. Switches between tracks were removed approximately in 2004 as part of the modernization of the Bohumín railway station, which was completed in 2005. At that time SŽDC considered that the capacity of the line was sufficient for the volume of cross-border freight transport. At present, and also in relation to the prospective traffic volume, the capacity of the line is insufficient. The new solution would require both re-insertion of switches between line tracks and, moreover, above all a modification of the safety. facilities at Chałupki Station.

7.2. Opole Voivodeship

Projects on the main list of NCP:

1. revitalization of railway line no. 287 Nysa - Opole (Regional Operational Programme)
2. revitalization of railway lines no. 301 and no. 293 between Opole and Kluczbork (Regional Operational Programme)
3. Revitalization of railway line no. 288 Nysa - Brzeg (Regional Operational Programme)
4. modernisation of the bridge structure on line 143 on Kluczbork St. in km 69.749 (national funds)
5. unblocking the basic export routes from Upper Silesia - two tasks will be implemented within the projects:
    - Work on the E-59 railway line between Kędzierzyn Koźle and Chałupki (state border (national funds))

- Works on railway line no. 272 on the section Kluczbork - Poznań Gł. (national funds)

Projects on the KPK reserve list:
1. works on the E 30 railway line between Kędzierzyn Koźle and Opole Zachodnie (CEF) - the project is applying for co-financing in the third CEF competition
2. work on the C-E 30 railway line between Opole Groszowice - Jelcz - Wrocław Brochów (CEF)
3. works on railway line no. 143 on the section Kluczbork - Oleśnica - Wrocław Mikołajów (POIiŚ)
4. work on the E-59 railway line between Kędzierzyn Koźle and Chałupki (state border) (CEF).

7.3. Silesian Voivodeship

First of all, projects that should be implemented, which in the current programmes (National Railway Programme, Territorial Contract for the Silesian Voivodeship) were the reserve positions (conditional) and for various reasons have not entered or will not enter into implementation by 2023. - including: (names of projects according to NCP) :

- Works on railway line 139 on the section Czechowice Dziedzice-Bielsko-Biała-Zwardoń (state border);
- Works on the basic passenger routes (E30 and E65) in Silesia, stage III: line E30 Chorzów Batory - Gliwice Łabędy;
- Revitalization of railway line no. 90 Zebrzydowice - Cieszyn;
- Revitalization of railway line 117 Kalwaria Zebrzydowska Lanckorona - Bielsko - Biała Główna on the section of the voivodeship border - Bielsko - Biała Główna;
- Revitalization of railway line no. 140 Katowice Ligota - Nędza on the Rybnik Towarowy - Sumina section;
- Revitalization of railway line no. 140/169/179/885/138 of the connection: Orzesze Jaśkowice - Tychy - Baraniec -KWK Piast - Nowy Bieruń - Oświęcim.

Projects for the construction of new sections of railway lines in agglomeration and metropolitan areas, where they can significantly increase the areas of gravity served by rail transport, are particularly justified.
In the Silesian Voivodeship, by rebuilding inactive or disassembled sections of railway lines, supplemented by the addition of relatively short sections of lines in a completely new track, the service to large cities: Jastrzębie Zdrój (Pawłowice - Jastrzębie Zdrój - Rybnik line) and Jaworzna (Sosnowiec Jęzor - Jaworzno - Chrzanów line) will be ensured. Projects for the construction of connecting lines between existing railway lines, which significantly shorten travel time on regional and supra-regional routes, should be considered particularly effective. In many cases, the construction of a link is a prerequisite for the sensible use of modernised sections of lines. Therefore, in Silesian Voivodeship the following liaisons should be particularly indicated as potentially effective:

- Railway siding Świebodzice - Stanowice in the area of Jaworzyna Śląska station between line no. 274 Wrocław - Zgorzelec and line no. 137 Katowice - Legnica - ensuring the movement of freight trains from the Wałbrzych region to the north with the exclusion of the Wrocław Railway Junction,
- Railway siding Żywiec between line 139 Katowice - Zwardoń and line 97 Skawina - Żywiec - ensuring a faster connection between Katowice and Bielsko Biała and Zakopane,
- reconstruction of railway line no. 132 on the section Zabrze Biskupice - Pyskowice, with simultaneous construction of a railway siding near Zabrze Biskupice, the railway siding would make it possible to connect the rebuilt line no. 132 with line 147, which would make the export route from the Rybnik Coal District and from the Knurów and Budryk mines to the north-west direction without the Gliwice railway junction unobstructed.

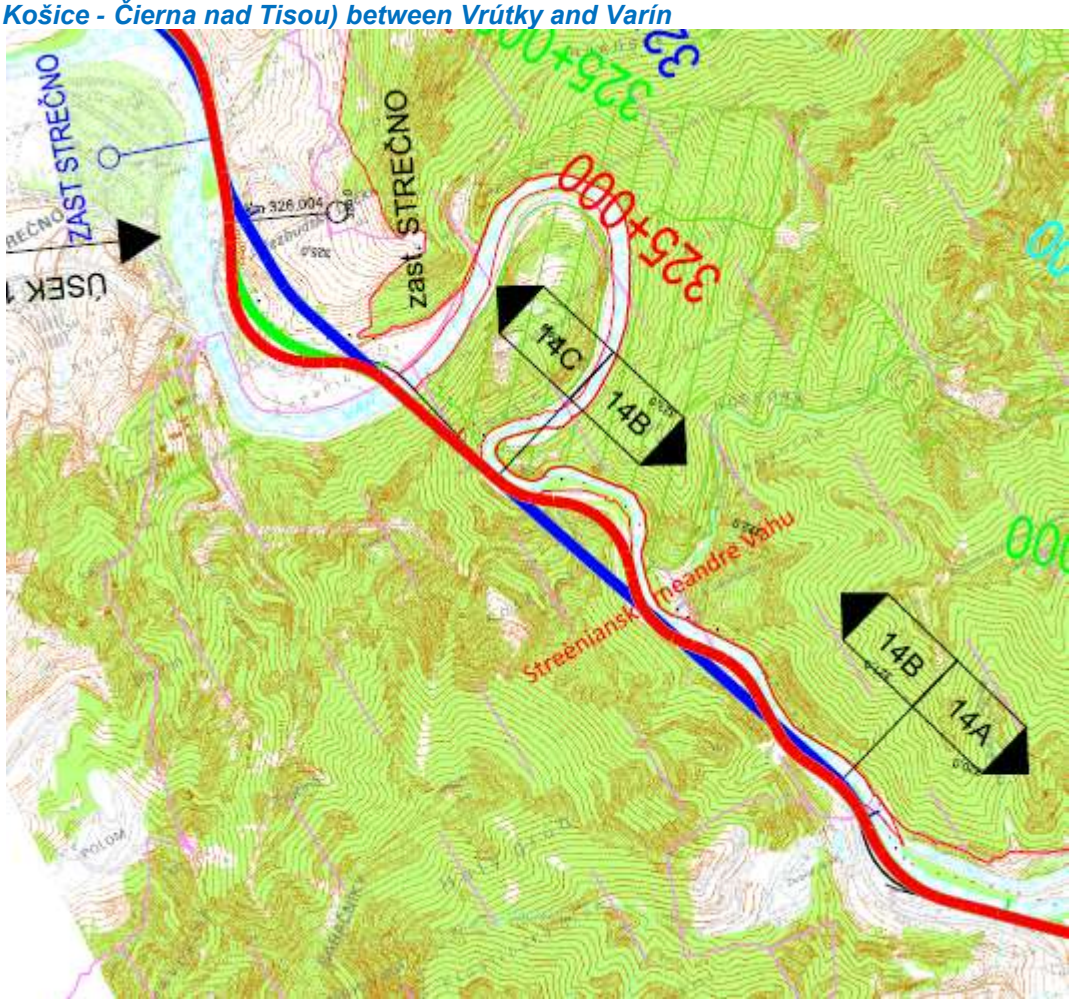
In the EU funding period 2014-2020, investments consisting in the development of ETCS and GSM-R systems on the lines covered by the National Implementation Plan for ERTMS were planned. Due to the fact that not all lines included in the Plan have been equipped by 2023, it will be necessary to continue the programme, both in the form of line projects (related to specific sections to be upgraded) and network projects - multi-localization.

7.4. Žilina Selfgoverning Region

The modernization of the railway infrastructure in the Žilina self-governing region is aimed at changing the traction power supply to 25kV AC, eliminating speed steps, increasing the line speed (while maintaining reasonable investment costs) and mainly creating railway infrastructure that will comply with the TSI in all areas. The transition to AC traction is an important area, which will bring, in addition to homogenizing the traction power supply with most EU countries, a reduction in transmission system costs as AC can be more easily distributed. Simple distribution results from the elimination of the need to build booster stations, as is the case with DC traction, since the DC current exhibits significant losses as the distance from the power station increases. At the same time, alternating current can be more easily transformed to the required level (according to the technical specification busy for multiple power systems) and at the same time it has better performance characteristics after the train starts. The only major disadvantage of alternating traction is the lower instantaneous power required when starting the train from a stationary state (the deficiency is solved by changing the wiring of the excitation part of the electric traction unit of the traction vehicle of dependent traction).
A change in the traction power supply system also involves extending the life of the superstructure, since unidirectional traction is more susceptible to the negative effects of stray currents and switching to alternating traction will reduce the corrosion of the metal parts of the superstructure and increase the overall life.

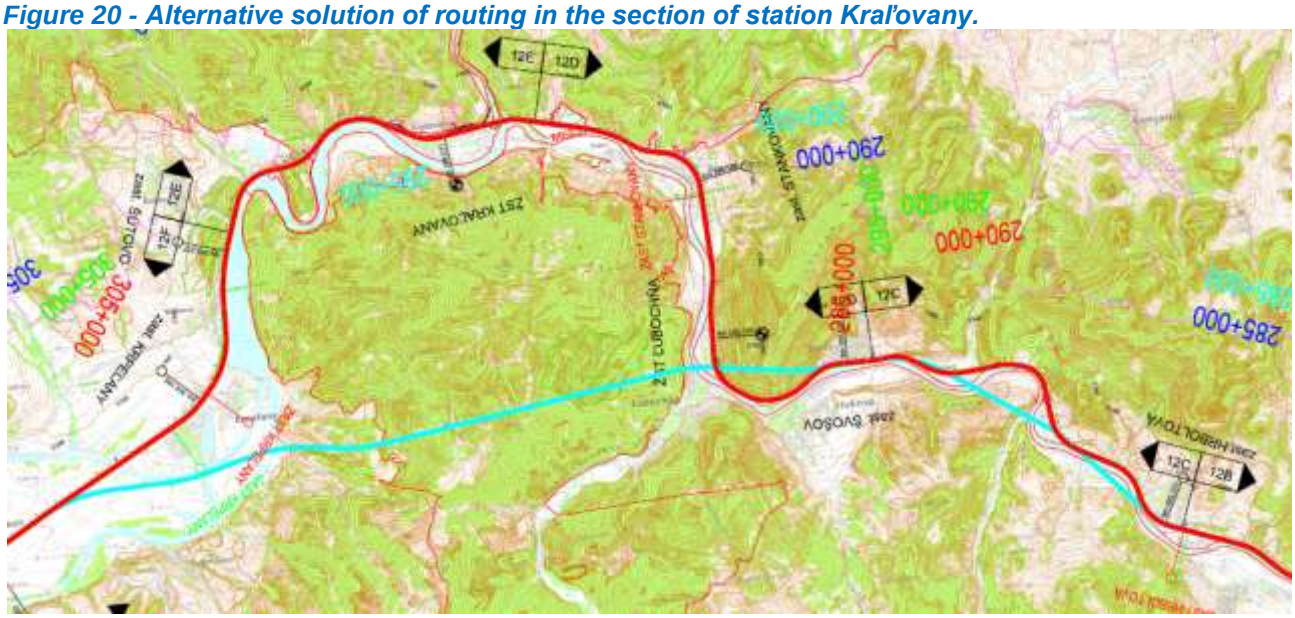
From the point of view of increasing the capacity of the network, there are significant sections where one of the alternative solutions is the construction of tunnels, which actually shorten the transport distance, straighten the leveling, reduce speed jumps and increase travel speed on the covered section. These are mainly the intermediate sections of Varín - Vrútky, Turany - Ružomberok, Liptovské Vlachy - Liptovský Hrádok (dam Liptovská Mara, surroundings of Liptovský Mikuláš). The real design of these sections is not yet established and, as a result, the line can be maintained in the current corridor, thus limiting the throughput of the sections as a result of the elimination of speed jumps, partial arc straightening and the deployment of modern interlocking equipment with train protection.

Figure 21 - Alternative solution of line modernization (from feasibility study for corridor Žilina - Košice - Čierna nad Tisou) between Vrútky and Varín



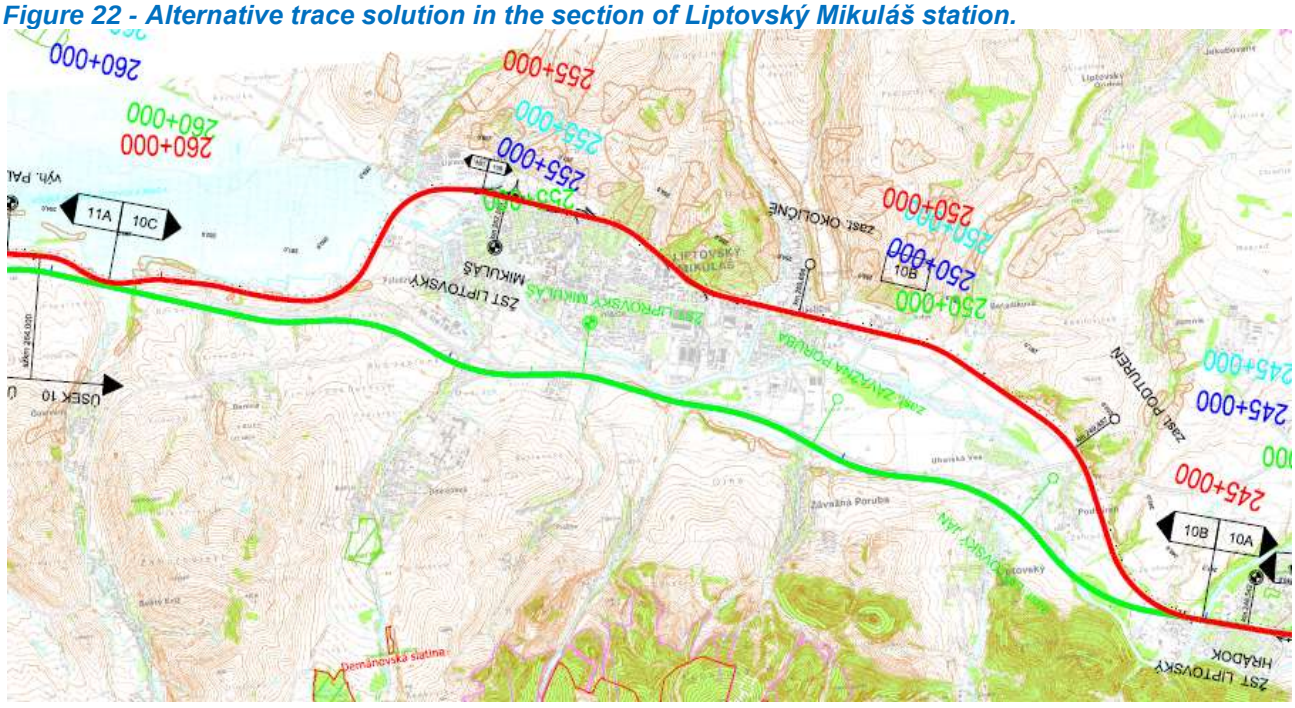
The figure shows the proposed route of the modernized line. The red route follows the current route, the blue represents the solution with the highest line speed and the greatest distance reduction.

Figure 20 - Alternative solution of routing in the section of station Kraľovany.



The blue route represents the solution with the highest line speed and the greatest time savings, the disadvantage of this solution is the necessity to build several tunnels, where the longest tunnel is more than 7 km long. The red variant copies the current trace.

Figure 22 - Alternative trace solution in the section of Liptovský Mikuláš station.



The proposed solution marked in green line, which will bring the highest line speed and at the same time the greatest shortening of the travel distance. This option proposes to move the railway station Liptovský Mikuláš out of the city center. The red line indicates the current route guidance in this section.