



Interreg



Danube Transnational Programme
DIONYSUS

**Integrating Danube Region into Smart & Sustainable
Multi - Modal & Intermodal Transport Chains**

**Danube Ports Accessibility and
Connectivity Report (Country-based &
Summary)**

Summary Report

Version: 2

Date: 10/12/2021

[Status] FINAL

Author: AAOPFR PP11



Document History

Version	Date	Authorised
0.1 (Template)	26/07/2021	AAOPFR
0.2 (Template)	03/08/2021	AAOPFR
1	27/11/2021	AAOPFR
2 Final	10/12/2021	AAOPFR

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Table of Contents

1	Focus of the country report	6
2	Executive summary	7
3	Data collection base year 2019	13
4	Existing and status of the rail infrastructure connection and existing/possible services on the rail	14
4.1	Identification and presentation of the existing rail network connections to the ports.....	14
4.2	Identification and presentation of the existing rail services:	39
4.3	Conclusions on the existing rail infrastructure connections	54
5	Existing and status of the road infrastructure connection and existing/possible services on the road.....	59
5.1	Identification and presentation of the existing road network connections to the ports	59
5.2	Identification and presentation of the existing/possible road services:	76
5.3	Conclusions on the existing road infrastructure connections.....	82
6	Existing and status of the maritime infrastructure connection and existing/possible services	86
6.1	Identification and presentation of the existing maritime network connections to the ports.....	86
6.2	Identification and presentation of the existing/possible maritime services	100
6.3	Conclusions on the existing maritime infrastructure connections	103
7	Conclusions.....	108
7.1	Rail infrastructure and services.....	108
7.2	Road infrastructure and services	112
7.3	Maritime infrastructure and services.....	115

Table of Figures

Figure 1: Trans-European Transport Network – indicative extension to the Core Network Corridors	10
Figure 2: Transport corridors	11
Figure 3: TEN-T core ports in Austria Enns-shafen Port and Port of Vienna.....	14
Figure 4: Railway network within the city of Ruse	19
Figure 5: Railways Ruse-Gorna Oryahovitsa and Ruse-Varna	19
Figure 6: Rail connection of Port of Lom	20
Figure 7: Railways Lom-Brusartsi and Mezdra-Vidin.....	21
Figure 8: Port of Dunaújváros	23
Figure 9: Rail network Port of Constanta.....	26
Figure 10: Alpine-Western Balkan rail freight corridor.....	28
Figure 11: Railway Corridor X in Serbia	29
Figure 12: Port of Bogojevo	30
Figure 13: Port of Bačka Palanka.....	31
Figure 14: Port of Prahovo	33
Figure 15: Connection the Public Transport Network (port of Bratislava).....	35
Figure 16: Rail Infrastructure Capacity for Bulk Cargo (port of Bratislava)	35
Figure 17: Rail Infrastructure Capacity for Containers (port of Bratislava).....	35
Figure 18: Connection to the Railway Network (port of Komárno).....	36
Figure 19: Rail capacity (port of Komárno)	37
Figure 20: Rail Lengths in the Port Area – Current Condition (port of Komárno).....	37
Figure 21: Reni and Izmail ports area. Scheme of railway roads	38
Figure 22: Port of Reni rail and road connections.....	38
Figure 23: Gateway shuttle-services high-frequency port connections.....	40
Figure 24: Rails, Roads, and Waterways are our Elements	42
Figure 25: Depot	43
Figure 26: Railway traffic in the Freeport of Budapest 2009-2019	47
Figure 27 Road and rail connections Port Drobeta Turnu Severin.....	50
Figure 28: Network structure Enns-shafen port.....	59
Figure 29: Ruse - road connectivity to the hinterland	60
Figure 30: Lom - road connectivity to the hinterland.....	62
Figure 31: Road connections Port of Galati.....	66
Figure 32: Motorways network in Serbia.....	69
Figure 33: Port Communication in Winter port (port of Bratislava).....	73

Figure 34: Port Communication in Pálenisko basin (port of Bratislava).....	73
Figure 35: Road Infrastructure Capacity for Bulk Cargo (port of Bratislava).....	74
Figure 36: Road Infrastructure Capacity for Containers (port of Bratislava).....	74
Figure 37: Road Capacity (port of Komárno)	75
Figure 38: Roads map in the area of Reni and Izmail ports.....	76
Figure 39: Motor vehicle traffic in the Freeport 2012-2019.....	78
Figure 40: Inland Waterways and ports in the Republic of Serbia.....	92
Figure 41: Quantities of cargo transhipped at all Serbian ports.....	93
Figure 42: Quantities of transhipped cargo on rivers in Serbia, in tons.....	94
Figure 43: Cargo flows through Serbian inland ports.....	94
Figure 44: The most frequent transhipped goods on rivers in Serbia	95
Figure 45: The main rail, road, and water connections in and through Serbia	96

Table of Tables

Table 1: Overview of basic port's features.....	17
Table 2: Structural length of the lines within the network.....	27
Table 3: 2018 – 2020 traffic flows by mode.....	45
Table 4: Active rail operators Constanta Port.....	48
Table 5: Rail freight flows from and to Constanta Port, 2018	49
Table 6: Statistics of late arrival minutes Constanta Port, 2019	49
Table 7: Serbian rail freight market, key performance indicators, 2019-2020.....	51
Table 8: Goods transported by rail in Serbia 2018	51
Table 9: Rail infrastructure connection of agricultural ports and their existing services on the rail...56	
Table 10: Ruse – roads by type and length.....	61
Table 11: Lom - roads by type and length.....	63
Table 12: Motorway A1 Linz-Steinhäusl road section parameters	76
Table 13: Motorway A4 Ostautobahn road section parameters.....	77
Table 14: Serbian road freight market, key performance indicators, 2019-2020	79
Table 15: Existing road infrastructure connections.....	84
Table 16: Waterways included in the European Waterways (E-vp) system.....	88
Table 17: Classification of the current condition of waterways	88
Table 18: Port capacities.....	90
Table 19: Estimated potential Project Galați Multimodal Platform	106
Table 20: Estimated potential Project Galați Multimodal Platform	111

Abbreviations

Abbreviation	Explanation
A	ampere
C.N. A.P.M	Compania Națională Administrația Porturilor Maritime S.A. Constanța
DR	Danube Region
EA EMDR	Executive Agency for Exploration and Maintenance of the Danube River
EU	European Union
FIBC	Flexible Intermediate Bulk Container
IWT	Inland Waterway Transport
IWW	inland waterway
JSC	Joint Stock Company
PGA	Port Governance Agency
SPaP	Slovenská plavba a prístavy, a.s.
TEN-T	Trans-European Transport Network
TRACECA	Transport Corridor Europe-Caucasus-Asia
ÚNS	Central Freight Station
WB6	Western Balkans Six
ŽSR	Railways of the Slovak republic
ZSSK	Železničná spoločnosť Cargo Slovakia, a. s. / Railway Company Cargo Slovakia
ŽSR	Railways of the Slovak republic

1 Focus of the country report

Feasible and high performing hinterland connections are vital for enhancing port activities and connectivity with the mainland corridors and main production and/or consumption areas of interest.

In order to assess the rail, road and maritime connectivity of the DR ports, an analysis of the status-quo and mid-term perspective of road/rail/maritime infrastructure in Danube ports will be executed. A 3-pillar connectivity assessment i.e. (1) Rail connectivity, (2) Road connectivity and (3) Maritime connectivity will be carried out to assess ports connectivity to/from the main national and European transport corridors and main production and/or consumption areas.

The 3-pillar connectivity assessment will be performed to the **Danube Region ports** selected previously in the D_T1.1.1: Report on the selected Core & Comprehensive Network Sections and Nodes of the transport corridors on the Danube Region, based on the consultation with the PPs involved in DIONYSUS Project, as follows:

- ✓ AT: Ennshafen and Vienna
- ✓ SK: Bratislava and Komarno
- ✓ HU: Budapest, Dunaújváros and Baja
- ✓ HR: Vukovar
- ✓ RS: Bogojevo, Bačka Palanka and Prahovo
- ✓ BG: Lom and Ruse
- ✓ RO: Drobeta Turnu-Severin, Giurgiu, Galati and Constanta.
- ✓ MD: Giurgulesti
- ✓ UA: Reni and Izmail

2 Executive summary

BULGARIA

This report outlines the current status of the connectivity of two Bulgarian ports (Ruse and Lom) with the hinterland. A well-developed infrastructure is essential in achieving better connections of the Danube ports not only with the immediate surrounding area, but also with the Black sea region and the ports situated there. The development and modernization of the different means of transportation, such as road, rail and maritime, which are used to move cargo from its point of origin to its final destination, will improve the port accessibility in Ruse and Lom, which will be directly beneficial not only to these ports and the respective cities, but also for the country as a whole, as well as for the surrounding areas from the Danube region.

This way the two ports can emerge as sustainable regional multimodal and intermodal logistics hubs for both cargo and passenger transport, which are integrated into one big Danube region, comprising a network of all Danube states' ports and their road, rail and maritime links to the hinterland.

The information for this report was gathered by desk research. Several different methods were used - compiling information collected so far under project DIONYSUS, performing analysis of the available information from the latest General Development Plans for both the Ruse and Lom municipalities, as well as gathering additional statistical data from official sources.

CROATIA

The analysis of transport infrastructure refers to road, rail, air and inland waterways transport and infrastructure for performing public transport utility activities in Port of Vukovar and Vukovar-Srijem County in general. Until the Homeland War, the county was an important transport and logistics center, but due to war casualties and major damage suffered, primarily on the railway infrastructure that status has been lost.

Nevertheless, the potential of the County as a transport and logistics center still remains unquestioned. Favorable geolocation, superb connectivity and good international relationships contribute to the factors that this hub had a perspective but also still has and is putting constant effort into development of the existing infrastructure and superstructure. European transport corridors pass through the area of the county, the corridor VII (Danube) and Corridor X (Salzburg - Thessaloniki, with the section Zagreb passing through Croatia - Bajakovo). While road corridor X is in very good condition, further improvement in railway traffic is needed before its quality is at the level of European standards.

Road and rail network have their advantages as these modes of transport continue to be the most dominant strategy. Selection of transport modalities depend on various factors out of which the most important ones are end destinations and ways of transporting goods to those locations. Port of Vukovar has geographical advantage of being located on the bank of river Danube opposing to other Croatian river ports. This position ensures unobstructed port operations during the whole year. Work is being done on the electrification of railroad section connecting Vinkovci and Vukovar through several other municipalities ensuring long overdue modernization that is expected to improve connections with Vukovar. Access road to Vukovar port was recently finished which ensured a proper point of contact between two transport modalities.

There is an acute shortage of available space in present day port's area, especially in the part where cargo manipulation occurs and space between the water side and rails, as well as the traffic areas for arrivals and departures. Further work needs to be done, but effort can be seen with medium and long-term strategies on national level accompanied with projects already in the pipeline.

With the further port development, new jobs will be created in transshipment and forwarding sector, warehouses, transport and industrial plants. Employment opportunities also arise in companies specialized in trade and servicing the Vukovar and the Slavonian region.

All these segments, once certain criteria and longer-term goals are achieved, will help with Port of Vukovar's position in the regional hubs network. Reputation already exists from the pre-war era, but next step encompasses transition to sustainable business practices which mostly include better and more efficient connections with other ports and entities that will help with the achievement of desired growth.

HUNGARY

The Hungarian inland ports tranship approximately 6 million tons annually, mainly for export. The majority, 35-40% of goods handled in inland ports in Hungary are agricultural goods: grain, maize, corn, etc. Though bulk cargo is the most common type of goods handled in most of the Hungarian Danube ports, there are other types of goods as well: break-bulk cargo, dangerous goods, gasoline, liquid, heavy and oversized goods, container.

There are important international corridors going through Hungary both east-west and north-south directions. Below rail and road connections of the three largest inland ports are presented.

This report focuses on the Freeport of Budapest, the port of Dunaújváros and the port of Baja. These are the largest Hungarian Danube ports concerning their capacity and annual turn-over.

On railway, Hungary has 9 border crossing points toward Slovakia, 6 to Austria, 1 to Slovenia, 3 to Croatia, 2 to Serbia, 5 to Romania and 2 to Ukraine. Besides there are 16 organizer stations in the country.

However, the Freeport of Budapest is accessible on all the motorways and highways reaching the capital region due to the M0 ring-road, ports of Dunaújváros and Baja are not located as centrally. Still, Dunaújváros is accessible from highway M6 and M8 bridge, while Baja is 20 kilometres from M6 and it can also be reached via M9 motorway.

All the presented ports are strategically located on the Rhine-Maine-Danube international IWW corridor, therefore they have IWW connections both to the North Sea and the Black Sea. Hence, all the ports are benefiting from underutilized IWW in Central Europe.

Hungarian inland ports have two main export destinations via the before-mentioned Rhine-Maine-Danube international IWW corridor:

- ARA ports (Amsterdam, Rotterdam, Antwerp) and Western European inland waterways
- Constanta, Lower Danube and the Black Sea.

ROMANIA

The highest capacity for rail is shown by the Port of Constanta. The railway network of the Port of Constantza is in excellent connection with the national and European railway network system, the Port of Constantza being a starting and terminus point for the Pan-European Transport Corridor no. IV (Orient – Est Mediteranean) and Corridor Rhine – Danube. Round-the-clock train services carry high volumes of cargo to the most important economic areas of Romania and Eastern Europe, the Port of Constantza being also an important transport node of TRACECA Corridor, providing the connection between Europe, Caucasus and Central Asia.

Each and every port terminal has direct access to the railway system, ensuring a safe and efficient transport of cargoes. Every day shuttle trains provide fast transport of containers to the national destinations for just-in-time delivery. The total length of railways in the port amounts to 300 km.

Railway connection of the Port of Galati make possible the access to the Romanian national rail network at the European standard gauge, and also to the large gauge standard of Ukraine and Republic of Moldova, facilitating rail interconnection between Russia and the European Union via Ukraine by integrating two types of gauge (1435 and 1520 mm) into the terminal's operations. This is of strategic importance and can initiate new multimodal services between Europe and Russia, Ukraine and the Republic of Moldova

Railway connection of the Port of Calafat make possible the access to the Romanian national railway network, as well as the Port of Drobeta Turnu Severin.

However, rehabilitation of rail lines and increase of the capacity, as well as improvement of the rail access time, is hardly needed in the Port of Constanta and Port of Calafat.

New railway connection is needed in the Port of Giurgiu, and in the Western part of the Port Drobeta Turnu Severin.

Road connectivity

All ports have a good road connectivity to the national road network. However, only two ports are connected to high capacity and LOS – Level of Service road infrastructure, namely Port of Constanta who is very well connected to A2 motorway, and Port of Giurgiu connected to DN5 4 lanes express way Giurgiu – Bucharest.

The connection between national road no 6 and Western part of the Port Drobeta Turnu Severin is very poor.

Maritime connectivity

Maritime connectivity is ensured by the Port of Constanta, being the largest port in the Black Sea in terms of surface (approximately 4,000 hectares) and has the largest natural depths (8-19 m).

Ports of Galati, Tulcea and Braila have also maritime connectivity, which is limited to sea vessels up to max. 15,000 DWT. However, the capacity and draught of ships admitted to navigate on the Sulina Chanel and to reach the ports mentioned above are conditioned by the minimum depth at Sulina Bar (the entrance on Sulina Channel) The minimal depth recommended by the Danube Commission which should be insured is 7.01 m

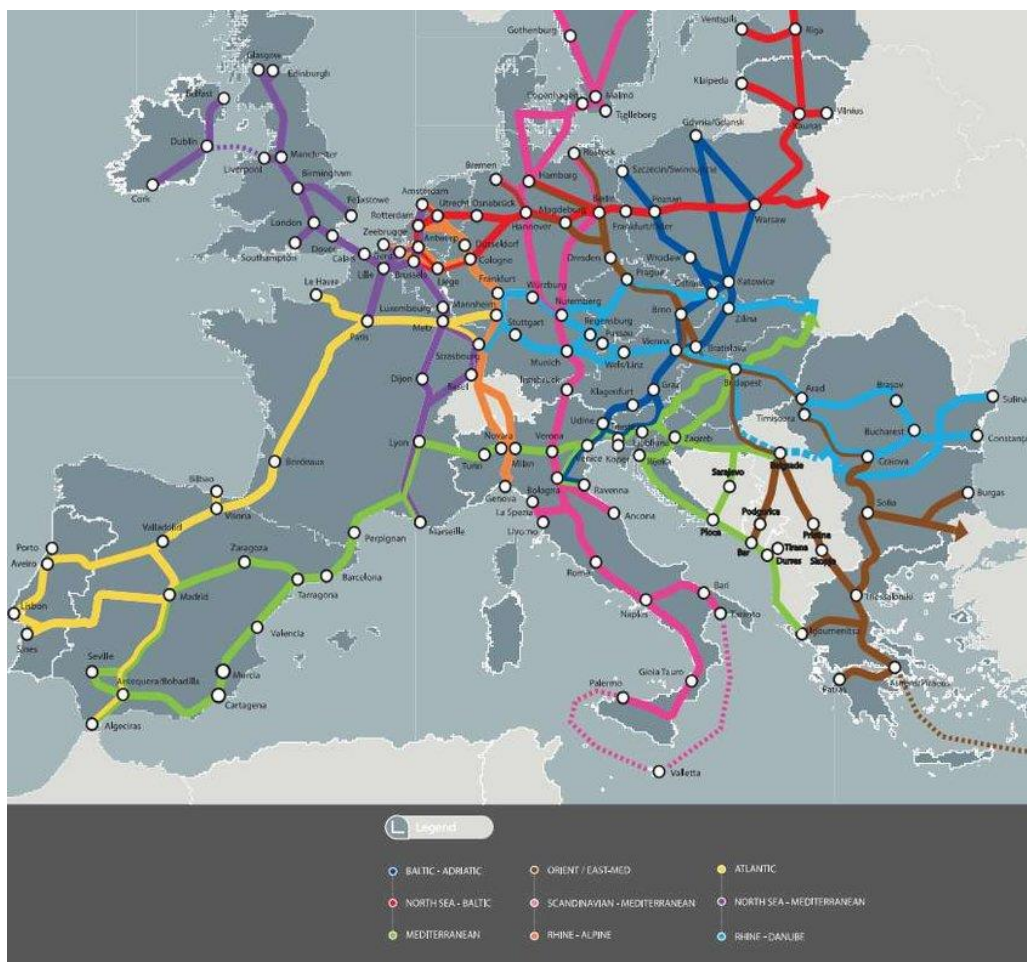
We should mention that Tulcea and Braila port have very good rail and road connection.

SERBIA

Serbia is a landlocked country situated at the crossroads of Central and Southeast Europe, in the middle of three geo-political entities: Danube macro-region, Adriatic-Ionian macro-region and Western Balkan 6 initiative. By analyzing and assessing the geostrategic and geopolitical comparative advantages of the Republic of Serbia in the wider European area, the main advantage of the Republic of Serbia is being the traffic connection of Western and Central Europe with Southeastern Europe and the Middle East, as well as the connection of Central European countries - the Middle Danube towards the South Adriatic, the Aegean and the Black Sea, or the Mediterranean.

Serbia is crossed by the two main transport corridors recognized as Pan-European Corridors X and VII. According to the European Union TEN-T classification and latest indicative extension of TEN-T network to Western Balkan, former Pan-European corridors are replaced by branches of Orient/East-Med Corridor and Mediterranean corridor as shown at following picture.

Figure 1: Trans-European Transport Network – indicative extension to the Core Network Corridors



Main transport infrastructure in Serbia makes sections of the main international corridors of the TEN – T core network (Corridor X, or Orient/East-Med Corridor and Mediterranean corridor and Corridor VII or Danube – Rhine – Main river corridor) and comprehensive network.

Road network in Serbia has an approximate total length of 45.000 km, including approximately 800 km of highways, 5.000 km of first-level state roads, 11.000 km of second-level state roads and over 25.000 km of local roads.

Railway network has approximate length of 5.000 km, out of which is only approximately 20% electrified and 10% double tracked. The railway network is mostly in poor condition with over 300 bottleneck spots, whose reconstruction is estimated to approximately 4 billion euros. However, at the moment, there is a great number of rehabilitations, re-construction and construction works on the network on-going.

Highest development potential has the inland waterway transport (IWT). The Danube is the most important element of the inland waterway system in Serbia. With the Sava and the Tisa rivers, it creates a 1,680 km long network of waterways. The Danube’s section in Serbia (588 km) is navigable

for all types of river ships. There are 7 international ports in the Serbian sector of the Danube: Bogojevo, Bačka Palanka, Beočin, Novi Sad, Pančevo, Belgrade, Smederevo and Prahovo.

In accordance with the Strategy on Development of Waterborne Transport of the Republic of Serbia for the period from 2015 to 2025, a list of the most important investments is defined and initialized including: construction and reconstruction of Serbian ports, eliminating all critical sectors for navigation on the waterway network, further improvement of intelligent waterway transport systems.

UKRAINE

The seaports of Reni and Izmail are important transport hubs in Ukraine, which connect sea, river, rail and motor roads. The optimal route from the Danube European countries to the Caucasus, Iran, the short route of delivery of goods from Turkey, Greece to the Baltic countries, Scandinavia passes through the ports of Reni and Izmail. The ports of Reni and Izmail are located on the maps of three international transport corridors: VII Danube Pan-European, IX International terrestrial, and international highway E-87 as well as of the international cooperation program TRACEKA and the trans European transport network TEN-T, see. Fig 2. Trans-European International Transport Corridor No. 7 Danube (water) connects Vienna with Ust-Danaisk port. The countries participating in this corridor are Austria, Hungary, Slovakia, Bulgaria, Romania, Moldova and Ukraine. Its length is 1600 km. The length of the Ukrainian section is 70 km.

Figure 2: Transport corridors



IX Trans-European International Transport Corridor, connects Helsinki, Klaipeda, Kaliningrad and Moscow with Greece. Finland, Russia, Ukraine, Belarus, Moldova, Romania and Greece participate in this 3400 km long corridor. It passes through the territory of Ukraine by rail and road. Transport corridor of the Black Sea Economic Cooperation: Reni - Izmail - Odessa - Nikolaev - Kherson - Melitopol - Berdyansk - Novoazovsk European route E 87 - 2030 km: Odessa - Izmail - Reni - Galati - Tulcha -

Constanta - Varna - Burgas - Malko Tarnovo - Derekei - Kirklareli - Babayeski - Havsa - Keshan - Gelibolu - Ayvalik - Izmir - Selcuk - Aydin - Denizli - Achypayam - Korkuteli - Antalya.

The priority of the ports of Reni and Izmail is to maintain the traffic of the 7th international transport corridor. Seaports of Reni and Izmail handle sea and river cargo vessels up to 150 m in length, 30 m in width with a draft of up to 7.0 m. The ports are equipped with an extensive network of railways, and have modern handling and lifting equipment. Near the ports there is an international highway M-15 Odessa-Izmail-Reni-Bucharest, connected with E-87. Near the ports of Reni and Izmail there is an international ferry crossing Orlovka-Isaccea, see Fig. 4.

The existing railway network makes it possible to move cargo traffic from the port of Reni to Moldova, Romania, European countries, and from the seaport of Izmail - to Moldova, Russia, Belarus, the countries of the Baltic region, Europe, Central Asia. The Reni port allows handling cargo weighing up to 250 tons, handling sea and river vessels of the Ro-Ro type.

3 Data collection base year 2019

(1) existing and status of the rail infrastructure connection and existing/possible services on the rail (specifications: categories of goods, frequency, transport time, quantity, type of train, time to the destinations, constraints and bottlenecks; and customers identification.

(2) existing and status of the road infrastructure connection and existing/ possible services by road (specifications: categories of goods, frequency, transport time, quantity, type of trucks, transport time to the destinations, constraints, and bottlenecks); and

(3) existing and status of the maritime infrastructure connections. Next, an analysis of rail/road/maritime service level connectivity of Danube ports, based on the service level of the hinterland and maritime connections of the ports will be carried out.

Specific attention will be paid to transport time and costs, size of the shipment, permitted load on various segments of hinterland infrastructure connections

Data sources for each data category available in the country and at international level]

4 Existing and status of the rail infrastructure connection and existing/possible services on the rail

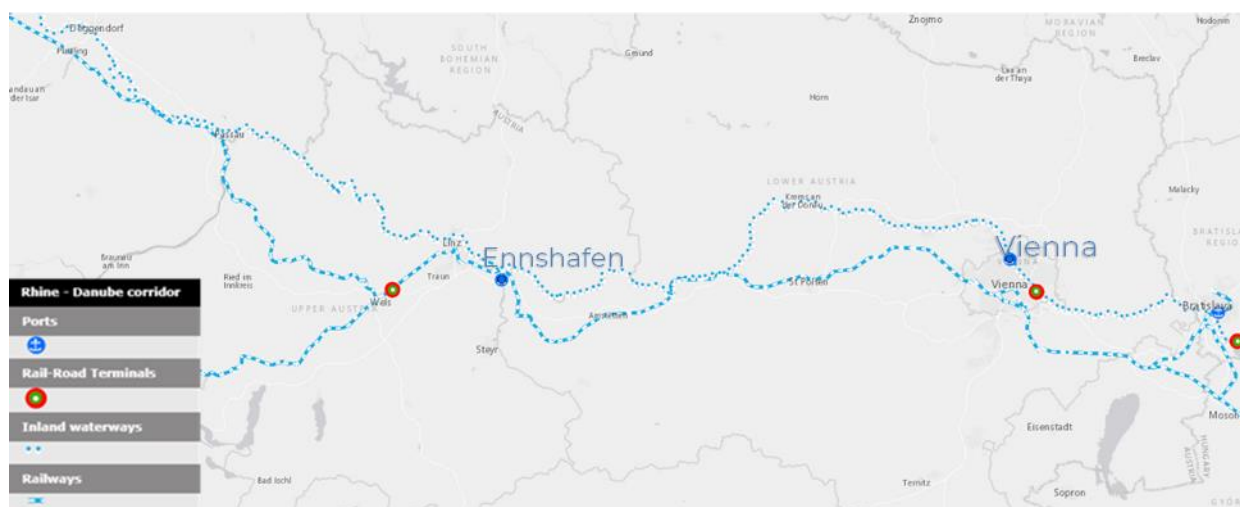
Based on the reports D.T 1.1.1., D.T 2.2.1. and D.T 3.2.3. the followings can be stated regarding the existing rail infrastructure connections of ports concerning how they are linked to the national and international network. Below, the currently available rail services are summarized.

4.1 Identification and presentation of the existing rail network connections to the ports

AUSTRIA

In this report the two TEN-T core ports in Austria Ennshafen Port and Port of Vienna are described below. Both ports benefit from their central location in Austria and indeed Europe, with direct access to the Trans-European Transport Network. It guarantees ideal conditions thanks to an efficient infrastructure, roads, quays, and railway systems.

Figure 3: TEN-T core ports in Austria Ennshafen Port and Port of Vienna



Ennshafen Port

Network structure

The whole port area has six road entrances, each with double lines. There are also two main rail entrances accessing the port area from two different sides. Within the port area, there is a system of internal rail network with about 30 km total length.

The Ennshafen Port is the main trimodal transport hub for the west to east and east to west arriving international cargo in the Rhine-Main-Danube waterway region and south to north and north to south arriving international cargo in the North Sea-Adriatic region by the railways. With its 6 road entrances, there is possibility of direct accesses to motorways and main roads that can boost international logistics operations and local businesses.

The Ennshafen Port has the access to the most important seaports through the river Danube. It is connected with the A1 west expressway (Wien-St. Pölten-Linz-Salzburg), A9 (Graz-Wels-Passau), B1 federal highway (Wien-Amstetten-Linz-Salzburg) and B309 (Enns-Steier) federal highway, what allows outstanding access to the international road network. The railway connections are directly derived from one of the most important Austrian lines – the West Railway (both normal line and high-speed line).

- Direct connection to the highway (A1 west expressway)
- Direct railway connection (west railway)
- Strategically favorable position on the Rhine-Main-Danube-waterway
- TEN-T Core Node
- Trimodal cargo handling
- Access to the neutral infrastructure

Infrastructure Railway system

Port Area: total 352 ha; 110 ha are owned by the port authorities (Ennshafen OÖ GmbH und Ennshafen NÖ GmbH) and 242 ha are owned by other private companies; actual in total about 50 ha are not covered with assets or other investments

- 2 basins (basin west-upper Austria, basin east-lower Austria) and several quays along the river side Enns
- Port service time 7/24 – 168h/w
- Cargo handling: over 1 mil t/a
- Container terminal: about 400.000 TEU/a with 4 gantry cranes (trimodal)
- Waterside terminals: 7 for block trains
- Heavy lift and out of gauge handling capacity is possible
- Total length of vertical quays 2780 m
- Max. number of vessels processed at the same time: 16
- Max. number of barges can be processed in waiting areas / undeveloped quays: 34
- Mooring area: 42.000 m²
- 6 road entrances, with double lines and two main rail entrances access
- 17 km rail tracks (rail network within the port area), many different users and owners
- Storage area with different dedication is available
- Special storage capacity for liquid cargo: 3000 m² for LPG, 6000 m³ for biodiesel and bio-oils, 600 units for cars (equivalent) near the RO-RO ramp
- Bunkering station vessel/barge

Type of rail

The whole port area has six road entrances, each with double lines. There are also two main rail entrances accessing the port area from two different sides. Within the port area, there is a system of internal rail network with about 30 km total length.

The railway connections are directly derived from one of the most important Austrian lines – the West Railway (both normal line and high speed line).

One railway corridor connects Ennshafen Port and Port of Vienna with 13 sections. All sections belong to the core TEN-T network and have been completed, except one from Amstetten to Sarling which is to be upgraded. Railway corridor network belongs to the following two TEN-T corridors: Baltic-Adriatic and Rhine - Danube.

Container terminal Ennshafen

As a multi-modal logistics hub, the Container Terminal Enns (CTE) is a major hinterland terminal for the big sea ports. Spanning some 275,000 square meters and with a capacity of 500,000 twenty-foot equivalent units (TEUs), it has some of the most modern transshipment infrastructure in Austria. Block train rail connections, modern gantry cranes, and a full range of services ensure optimum container handling.

- Type of rail / n.a.
- Electrified or not / electrified
- Single track or double track / single track
- Maximum train length / block train with 710m
- Maximum train load / carrying capacity up to 1.700 Tonns
- Maximum speed / at the connecting point 30km/h
- Restrictions / n.a.

Port of Vienna

Network structure

The Port of Vienna functions as a trimodal hub covering rail, road and river links. This hub is located at the western bank of the Danube River.

The Port of Vienna has freight rail tracks in use and provides transportation connections to Austrian railway network and therefore to other freight centers. Port location is accessed by rail through connection to shunting stations Donaukaibahnhof (3 km, through Donauuferbahn) and Kledering (8km, through Winterhafenbrücke) and the main Austrian railway network, all providing 3 railway accesses to the port with minimum three railway tracks.

Port of Vienna is already the largest port on the Danube in Eastern Austria and its diverse logistical capabilities and capacities continue to be enlarged. Although it is 2.000 km from the Black Sea and 1.500 km from the North Sea, it has the great advantage of being the largest trimodal logistics centre in Austria, bringing together road, rail and water transportation and making it the ideal place for the transportation of goods and for container storage, trade and management.

Port of Vienna is located on river km 1920 of the Danube, covering both left and right bank. Port has three different basins on three nearby locations: Freudenu, Albern and Lobau. In addition, Port of Vienna has a passenger terminal.

Infrastructure Railway system

The port area covers roughly 350 hectares of port land, in three cargo locations, accompanied by the area belonging to the passenger terminal and a marina for leisure and sport vessels.

Information on any port land available for the development of port-related activities was not available at the time of writing of this report. Nevertheless, based on the development projects that include the land reclamation from the waterfront areas within the port, it can be concluded that the port has no available space for development as it has to reclaim the space from the areas currently occupied by water surface of the port basins.

As mentioned earlier, the port has 3 port basins, providing for the maximum draft of 2,7 meters. Cargo handling capacity was not available at the time of writing this report, except in TEU/year, which reached 450.000 TEU/year.

Overview of basic port's features are given in the below table.

Table 1: Overview of basic port's features

Parameters	Explanation / Value
Port land owner (State, Region, Municipality, Private, Other)	City of Vienna – Wien Holding – Hafen Wien GmbH
Port authority name	Hafen Wien GmbH
Number of operators (concessionaires, lessors)	3 (Hafen Wien, Wiencont, Tsped)
Total port area (ha)	350 ha
Maximum draught (m) - natural or dredged	2,7 m
Total number of terminals	3
Heavy lift and out-of-gauge handling capacity (Yes/No)	Yes
Ability to handle full block train along the quay (Yes/No)	Yes
Ability to handle full block train in the port area (Yes/No)	Yes
Transshipment equipment for intermodal transport (Yes/No)	Yes
Total quay length (vertical + sloped) (m)	18 km of quays and river banks, but 5 km of quay walls are operational (used for transport operations)
Vertical quay length (m)	Vertical quays are with a total length of 10.500 metre
Sloped quay length (m)	Sloped quays with a total length of 7.600 metres
Undeveloped quay length (m)	n/a
Max number of vessels handled at the same time	Depends on the business case, approx. 11
Max capacity of anchorage or waiting area for barges (number)	71

Parameters	Explanation / Value
Storage capacity (m2)	100.000+
Storage capacity for liquid cargos (m3)	0
Storage capacity (TEU)	10000
Storage capacity (CEU - car equivalent unit, for Ro-Ro terminals)	7000
Bunkering facilities within the port area (Yes/No)	Yes
Shore-side power supply for vessels (Yes/No)	Yes
Road connection (Yes/No)	Yes
Rail connection (Yes/No)	Yes
Number of quay cranes of lifting capacity Q < 10 tons	n/a
Number of quay cranes of lifting capacity 10 < Q < 16 tons	1
Number of quay cranes of lifting capacity 16 < Q < 50 tons	1
Number of quay cranes of lifting capacity Q > 50 tons	1
Total number of quay cranes	n/a

BULGARIA

The railway connections of the Bulgarian Danube ports are important for their development as intermodal hubs and junctions. Well-developed railways can not only facilitate the cargo transportation in and out of the ports, but also help with raising the ports' competitiveness and economic prosperity.

Based on the conducted in-depth analyses of various aspects in the railway transport, gaps have been identified between the existing transport needs and the existing infrastructure, organisational and operational actions. There are not enough connections of seaports, inland ports and airports with the national railway network, in order to increase the potential for development of intermodality. The railway network in the North West region, where the port of Lom is located, is built better and is more homogeneously developed compared to the road network, but with indicators below the national average. The North Central region, which includes the port of Ruse, has the highest railway network density in the country (44.5 km/1000 km²) and railway electrification close to the average. At the same time, the share of double tracks in the region is the lowest in the country.

When it comes to railway connectivity to the hinterland, the ports in Ruse and Lom are still lagging behind the bigger Bulgarian Black Sea ports in Varna and Burgas, which is due to the fact the seaports manage, handle and process much more cargo and passengers, therefore their infrastructure is maintained more frequently because of the bigger volume of goods, passing through them.

Nevertheless, Ruse and Lom are the two biggest Bulgarian ports on the Danube and the condition of their infrastructure and connectivity to the hinterland and the neighboring regions directly reflects on

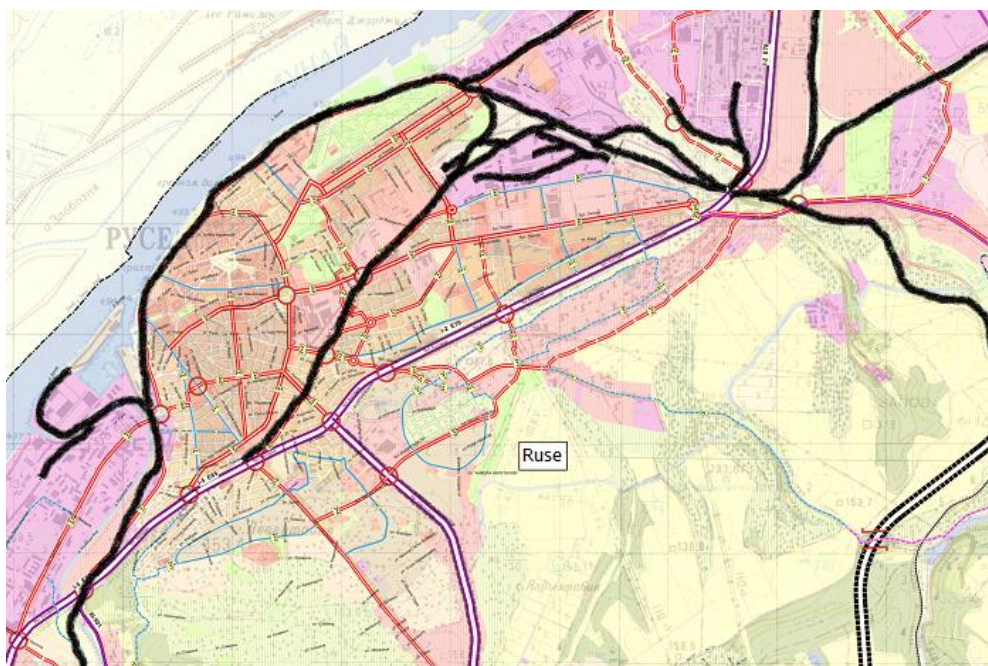
how much cargo they can handle. In order to attract more carriers, transport and forwarding companies, which can use the services of the ports in these two cities, investments in road and railway infrastructure are necessary from the respective port operators, as well as the state. The expanded connectivity would bring more traffic to the ports, as well as facilitate the current clients in using the ports' services to import or export their goods and cargo more frequently

Port of Ruse

Port of Ruse is the largest port on the Bulgarian part of the Danube - a multimodal transport hub, which serves as a junction between three different types of transport: waterway, road and railway. It is a public transport port of national importance. Port of Ruse is positioned along the Pan-European transport corridors №7 and №9 and it is also part of TRACECA (a transport corridor connecting Central Asia and the Caucasus region with Eastern Europe).

The main port terminal – Ruse-East, is situated at km. 490-489 and is directly connected to the national railway network via a link to the Ruse-sever railway station. The rails within the city go along the Danube and connect the port to the hinterland via an elaborated network of tracks.

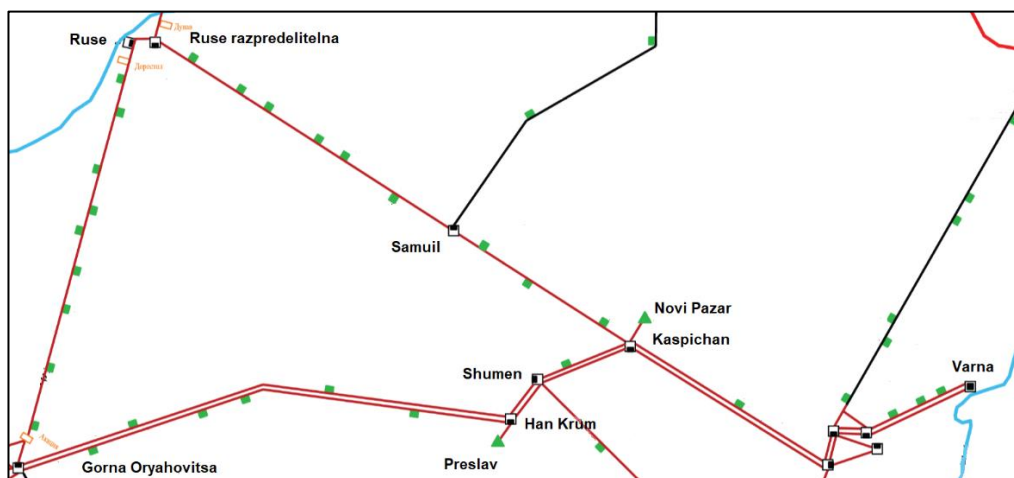
Figure 4: Railway network within the city of Ruse



Source: (<https://obshtinaruse.bg/>)

In general, the railway infrastructure on the territory of the Ruse municipality is well developed. That allows for a quick and reliable transportation of both cargo and passengers. In terms of railway connectivity to the hinterland, the two most important lines are Ruse-Gorna Oryahovitsa and Ruse-Varna.

Figure 5: Railways Ruse-Gorna Oryahovitsa and Ruse-Varna



Source: (<https://www.rail-infra.bg/>)

The railway between Ruse and Gorna Oryahovitsa is part of the core TEN-T network. It is a single track, electrified, with a standard track gauge (1435 mm). The maximum axle load falls within the standard - 22.5 tonnes. According to the latest available information (2019-2020), the maximum allowed speed for freight trains doesn't go over 70 km/h. In fact, for the most parts, it is kept at 60 km/h along the railway.

The rail track between Ruse and Varna is also single, with the exception of the Kaspichan – Varna section, where there is double track. The entire railway between the two port cities is fully electrified and also has a standard track gauge. The Ruse – Kaspichan section is part of the comprehensive TEN-T network and its total length is 142 km. The maximum axle load is also within the 22.5-ton standard. The allowed speed varies between 60 and 70 km/h.

The condition of the railway stops on the territory of the municipality can be described as good.

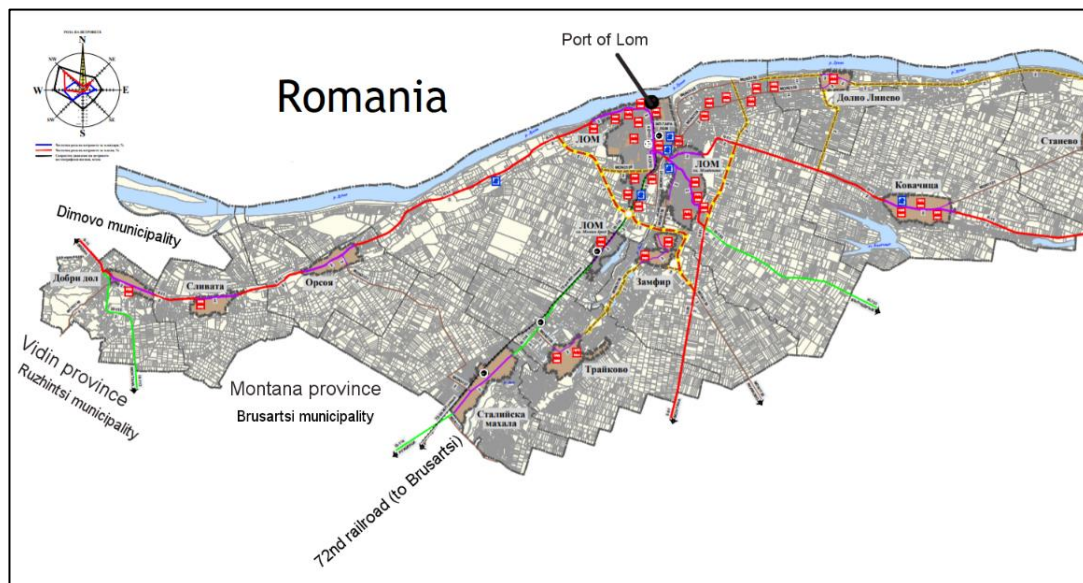
Port of Lom

The city of Lom is situated at the crossroads of two European transport corridors. The port itself is on the right bank of the Danube River on km.742-743, in the central part of the town of Lom. Because of that, Port of Lom is at the intersection of Corridor №7 - Rhine-Main-Danube, providing a transport connection between the Black and North Seas, and Corridor №4, connecting Central with Southeast Europe. The strategic location of Lom in relation to such key European transport arteries, as well as the presence of the Port of Lom, create favorable opportunities for the economic development of the municipality at a national and international level. The Port of Lom is the second largest Danube port in the country and it provides the shortest direct land connection with the Mediterranean port of Thessaloniki (460 km).

In terms of railway connectivity, a section of 72nd railway “Brusartsi-Lom” passes through the municipality and the city of Lom and connects the city's port with the hinterland and the national railway network (Figure 6). It is a single-track railway, completely electrified and the total length of the section is 13 465 m. As it exits the territory of the port, it travels south – southwest through the city and enters into the Brusartsi municipality in the Montana region.

Figure 4 below shows the placement of the railway within the city of Lom, as well as its connection to the neighboring municipality, from where it continues until it reaches the main railway network.

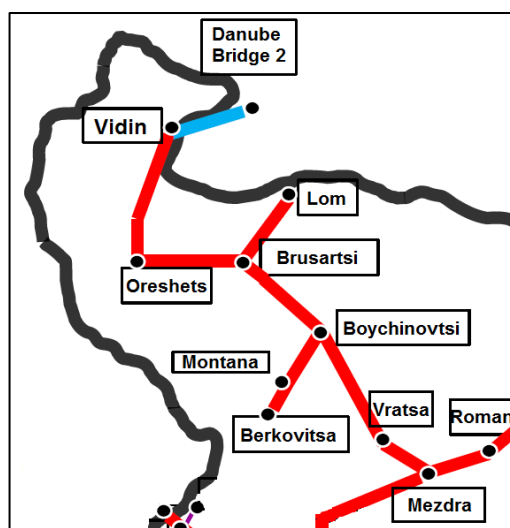
Figure 6: Rail connection of Port of Lom



Source: (<https://lom.bg/>)

The Brusartsi-Lom railway is basically a deviation of main railway line №7 – Mezdra-Vidin, the length of which is 192 km. The Mezdra-Vidin line is also a fully electrified, single-track railway. Both the main track and its deviation to Lom have a standard track gauge of 1435 mm.

Figure 7: Railways Lom-Brusartsi and Mezdra-Vidin



Source: (<https://www.rail-infra.bg/>)

According to the Ordinance for Categorization of the Railway Lines in the Republic of Bulgaria Included in the Railway Infrastructure, the Lom-Brusartsi railway belongs in the 2nd category, which means that the recommended and predominant speed for both passenger and cargo trains is 80 km/h. This railway section also has a maximum current of 500 A for the trains moving on it.

The technical condition of the railroad tie is satisfactory and it guarantees that the speeds, set in the trains' schedule, can be attained.

Besides Lom's main railway station, which has 17 rail tracks, the municipality also has 3 additional railway stops – in the Momin Brod neighborhood, as well as in the villages Staliyska Mahala and Traykovo.

It is necessary to mention that the National Railway Infrastructure Company, which is the state-owned company-owner of the railway infrastructure in the entire country, does not plan to perform any reconstructions or build any new railway sections on the territory of the Lom municipality at least until 2035. However, the company will still maintain the operational condition of the current railway infrastructure.

There are renovation activities planned by National Railway Infrastructure Company for the Mezdra-Vidin railway line – part of the core TEN-T network and the only connection of the Lom-Brusartsi line to the national railway network. Those activities are planned in the 2021-2024 period.

CROATIA

The favorable geographical position of the County enabled the rapid development of railway traffic and the development of Vinkovci as a passenger and freight hub. However, Vinkovci still have not reached pre-war importance despite progress and investment in infrastructure reconstruction. The European railway corridor X passes through the county. Considering the fact that significant investment in the reconstruction of the railway on the route of the corridor are planned, further growth in traffic is expected as well as strengthening of the county as a railway and logistics hub. This is deemed necessary in order to be able to contribute to the stronger integration of the railway and the use of the Danube for the transport of goods, i.e., intermodal forms of transport. It should also be noted about the existence of a RO-LA terminal (terminal for transport of truck tractors on railway wagons) in Spačva, which was opened by Croatian Railways in 2007. With the opening of the renovated Vinkovci - Osijek railway in 2008, rail transport quality further improved. Currently, railway traffic in the county is taking place on seven routes. Since there is no data on the share of railways in public transport on at the county level, it is difficult to assess the actual role of railways in total transport on that area. Nevertheless, it can be said with certainty that the railway is a significant factor in overall traffic of goods and passengers in the county, together with its comparative advantages - safety, comfort, speed, environmental friendliness and price.

The railway network shows the best construction work done along the Corridor X. Electrified, the double - track infrastructure of the track has a capacity of 250 trains (freight and passenger trains), which can be increased to 350 trains using better signaling and control techniques. The capacity of the electrified, single-track rail infrastructure is 60 trains per day, a by improving signaling technique, 100 trains per day could be achieved.

From the observed countries in the region, Croatia has the best equipped network of rails. Port of Vukovar, which has its own rail infrastructure within the port area (tension rails 3,000 meters long), and because of its proximity with very important railways of corridors X and Vc excellent form a geographical position every port dream of. The access lines are still crying out for modernization.

HUNGARY

Budapest

The Freeport of Budapest is located in Csepel Island, the south part of the capital of Hungary. Csepel is the 21st district of Budapest. The port is located in the Danube-Main-Rhine waterway on the Danube section crossing the continent north-west to south-east in the inland waterways of Europe, at the 1,640 km of riverbank.

The Freeport and Csepel Island are linked into the national railway networks by the Gubacsi bridge located on the north-eastern part of the island. The Freeport of Budapest has 15.47 km long railway network which is connected to the Budapest-Soroksár organizer station.

Gubacsi railway bridge – a new single-track railway bridge will be built 15 metres north of the existing bridge. The new bridge will be without piers and will be an arched bridge to accommodate the needs of the planned rowing course project. (Remote electrification have to be provided). In this case, it is not possible to use or modify existing plans and permits. A new environmental impact assessment and new permitting process will be required.

Baja and Dunaújváros are not directly connected with the Freeport of Budapest by TEN-T railway sections. Instead, they are directly connected to the Freeport of Budapest only to a certain extent meaning that there are just a few sections that belong to the TEN-T corridors along this way. Of course, there is more than one option heading from the Freeport of Budapest, but not towards the Dunaújváros port.

TEN-T railway corridor sections include: Budapest Kelenföld – Budapest Ferencváros, Pusztaszabolcs – Budapest Kelenföld (part 1), Pusztaszabolcs – Budapest Kelenföld (part 2) and Dombóvár – Pusztaszabolcs, all of conventional type. Budapest Kelenföld – Budapest Ferencváros belongs to Mediterranean, Orient/East – Mediterranean and Rhine – Danube TEN-T corridors. It is a new construction and belongs to the TEN-T core network. Other three sections belong to Mediterranean corridor and are to be upgraded. All three sections are also part of the Core Network.

Dunaújváros

The port is located on the right bank of the Danube, in the bay between 1580-1579 rkm, on the Szalki island. The closest port is Adony to the north, and Dunavecse to the south. Pusztaszabolcs main railway line links to the port.

The port of Dunaújváros is also connected on rail to the national and international network. There are industrial siding tracks, which are not electrified due to the crane tower.

Figure 8: Port of Dunaújváros



Source: hfip.hu

Port of Dunaújváros can be reached by train on line number 42, connecting Pusztaszabolcs and Dunaújváros. Railway No. 42 is a single-track railway line along the right bank of the Danube, electrified only as far as Dunaújváros, with a total length of 79 km. The line between Pusztaszabolcs and Dunaújváros has been in operation since 1951 and was extended to Paks in 1976.

The situation of the line is exceptional, mainly because of the Danube Railway and the Paks nuclear power plant. Dunaújváros station is in a prominent position among the stations of the major rural cities in terms of the volume of freight traffic. Although there are no major upgrades planned for the line, current track conditions are stable.

Downstream Danube, towards the Port of Baja, there are no railway and road links belonging to any of the TEN-T corridors. Port of Dunaújváros and Port of Baja are connected by inland waterway through the Budapest – Mohács port / Batina section of the Rhine – Danube corridor. Section is completed and is part of the TEN-T core network.

Baja

The Port of Baja is considered the second most important Hungarian port of the Rheine-Maine-Danube waterway system. The port is composed of the Public Port of Baja, located on the left bank of the Danube between rkm 1479 and 1480. It has four private ports that operate four terminals. It is designated as a National Public Port and has railway and road connections.

Baja is currently the southernmost freight port on the Danube in Hungary, 30 kilometres to the Hungarian-Serbian border. Baja railway station can be reached by an unelectrified, single-track railroad. The port is on the Bátaszék-Baja-Kiskunhalas railway line.

Baja railway station and Baja-Dunafürdő stop can be reached by the unelectrified, single-track Bátaszék-Baja-Kiskunhalas railway line 154.

The abolition of the Baja-Regőce-Zombor railway line and the Hungarian sections of the Baja-Bezdan-Zombor railway line (Baja-Gara and Baja-Hercegszántó) was ordered by the transport policy concept of 1968. Between the railway station and the Danube, it was to be branched off into the planned, but never built Dunapataj-Kalocsa-Baja railway line.

In mid-term, Szeged-Szabadka-Baja railway line can be constructed. The project aims to develop a railway line between Serbia and Hungary, with a length of almost 100 km, providing a direct link between important cities in the border regions of the two countries.

The infrastructure of the historic railway line is now severely degraded. The new modern railway line planned for the missing section between Szeged and Subotica will provide the opportunity for direct rail transport between the cities and improve border traffic between the two countries. The rehabilitation of the Subotica-Baja railway section will contribute to strengthening the economic links of the Baska border region. The new track will allow speeds of up to 160 km/h.

There are no railway and road TEN-T corridor links between the Port of Baja and the next downstream port i.e. Port of Bogojevo.

On the other side, there are four inland waterway sections belonging to the Rhine-Danube corridor that are running from the Port of Baja to the Port of Bogojevo. Therefore, all these sections belong to the Core TEN-T network and are considered to be completed.

Baja-Dunapart station is a service place without traffic personnel, on the Bátaszék-Kiskunhalas (No. 154), single-track, normal track gauge, non-electrified main line between Baja and Pörböly stations.

ROMANIA

Port of Constanta

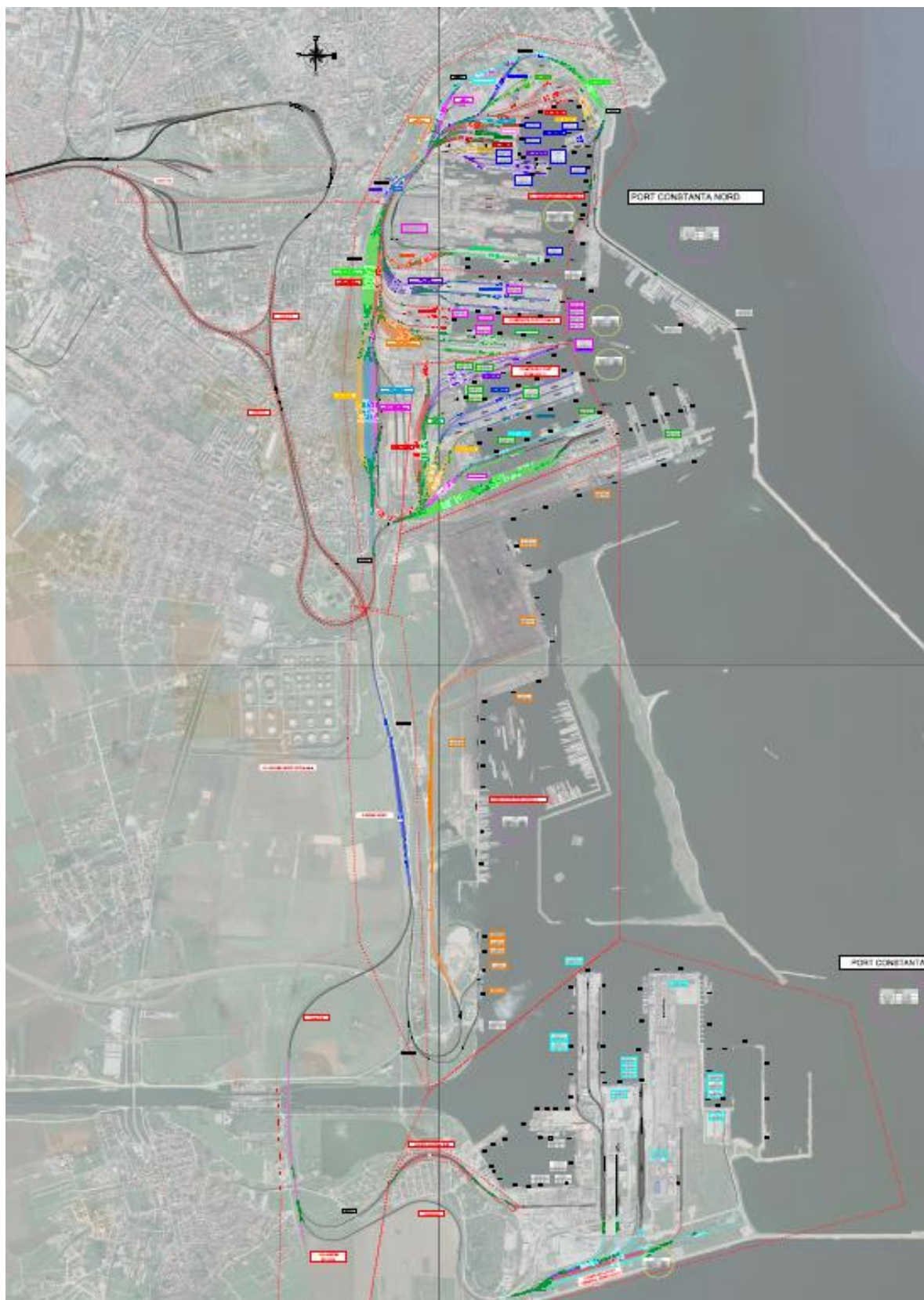
Currently, there are no rail regular services from Port of Constanta to the hinterland. However, there are rail transport services on demand.

The lines c.f. which serve the port area of Constanta Port are schematically represented in the figure below. They connect the rail stations from the port area and the national railway network. These are:

- line 814 – double electrified on the sections Palas – Post C-ța Vii – C-ta Port Zone B
- line 814B – double electrified on the sections Palas – Post C-ța Vii- C-ta Port Mol V
- line 814C – simple electrified Agigea Nord Oil Terminal – Agigea Nord
- the electrified double line Agigea Nord – Constanța Port Area C
- line 813 – double electrified on the sections Constanța – Agigea Nord and Agigea Nord – Agigea Ecluză
- line 813B – simple electrified Agigea Lock – Constanța Port FerryBoat
- simple non-electrified line AgigeaEcluză – Gr. Of Agigea Sud lines (maneuvering activity)

The double line 816 Palas – C-ta Port Zone A is closed, the double line tunnel of 490 m through which it passed, as well as the line c.f. requiring rehabilitation. This line has not been electrified and the tunnel has no double line electrification gauge.

Figure 9: Rail network Port of Constanta



The maximum speed of the freight trains is, according to the Freight Train Livret of the 2019/2020 freight trains, of 80 km / h on the line c.f. Valu lui Traian – Palas – Constanța and 50 km / h on the lines c.f. 813.813B, 814.814B, 814C.

Port of Galati

Railway connection of the Port of Galati make possible the access to the Romanian national rail network at the European standard gauge, and also to the large gauge standard of Ukraine and Republic of Moldova, facilitating rail interconnection between Russia and the European Union via Ukraine by integrating two types of gauge (1435 and 1520 mm) into the terminal’s operations. This is of strategic importance and can initiate new multimodal services between Europe and Russia, Ukraine and the Republic of Moldova.

Port of Giurgiu

There are not rail services as rail links have been taken out.

Port of Drobeta Turnu-Severin

It is a rail link connection to the Eastern part of the port, but a new rail link connection is needed for the Western part of the port.

SERBIA

The total structural length of the standard-gauge lines on the territory of Serbia network amounts 3.735,5 km, out of which 3.441,1 km of single-track and 294,4 km of double-track lines. 1.759 km of are the main tracks, 1251 regional, 538 km local and 187 km manipulative tracks. Totalling of km of 1.278,4 km of open track have been electrified, together with the main through tracks (985,0 km of single-track and 288,7 km of double-track lines). Maximum design speed is 120 km/h.

All above data relate to standard-gauge 1435 mm tracks.

General network information is given in Table no 2.

Table 2: Structural length of the lines within the network

Total network length	3.735,5 km
Single-track lines	3.441,1 km
Double track lines	294,4 km (7,88 %)
Narrow-gauge lines	22,5 km
Non-electrified lines	2.457,1 km
Electrified lines	1.278,4 km

The carrying capacity of the railway is between 12 and 22,5 tons per axle, as the maximum carrying capacity is 22,5 tons to a total of 1.886 mileages, or about 50 distant lines, which is limited capacity in case of need for increase in railway traffic.

“Infrastructure of Serbian Railways” JSC is a joint stock company for the management of public railway infrastructure, founded by the Republic of Serbia. Management of railway infrastructure is an activity of general interest.

„Infrastructure of Serbian Railways“ - JSC is a full member of RailNetEurope association from 2016. RailNetEurope association (hereinafter RNE) was established in January 2004 by virtue of an agreement between 12 Infrastructure Managers from the entire Europe, and their number is constantly rising. Through its members, RNE operates over 230.000 km long railway lines, including the important ferry lines, and cooperates with more than 120 railway undertakings in international traffic and with more than 300 railway undertakings that, for the time being, operate only in the domestic traffic of the members.

“Infrastructure of Serbian Railways” JSC, in cooperation with Ministry of transport, construction and infrastructure, participates in the initiative for forming and inclusion of new RFC 10 Alpine –West Balkan into the network of railway corridors (figure no 10).

Figure 10: Alpine-Western Balkan rail freight corridor



The railway network of the Republic of Serbia is connected with the railway networks of the following seven countries: Croatia, Hungary, Romania, Bulgaria, North Macedonia, Montenegro and Bosnia and Herzegovina. Traffic may be organized via ten border crossings (one of them is under the control of UNMIK railways).

Serbian railway network borders with the neighbouring railway networks are the following border stations: Subotica, Horgoš, Kikinda, Vršac, Bogojevo, Šid, Brasina, Preševo, General Jankovic, Vrbnica and Dimitrovgrad.

The track gauge remains unchanged at crossing the state borders.

The type of traction is changed only at the border crossing with Bulgaria, in the station Dimitrovgrad on the railway line Niš- Dimitrovgrad - State border.

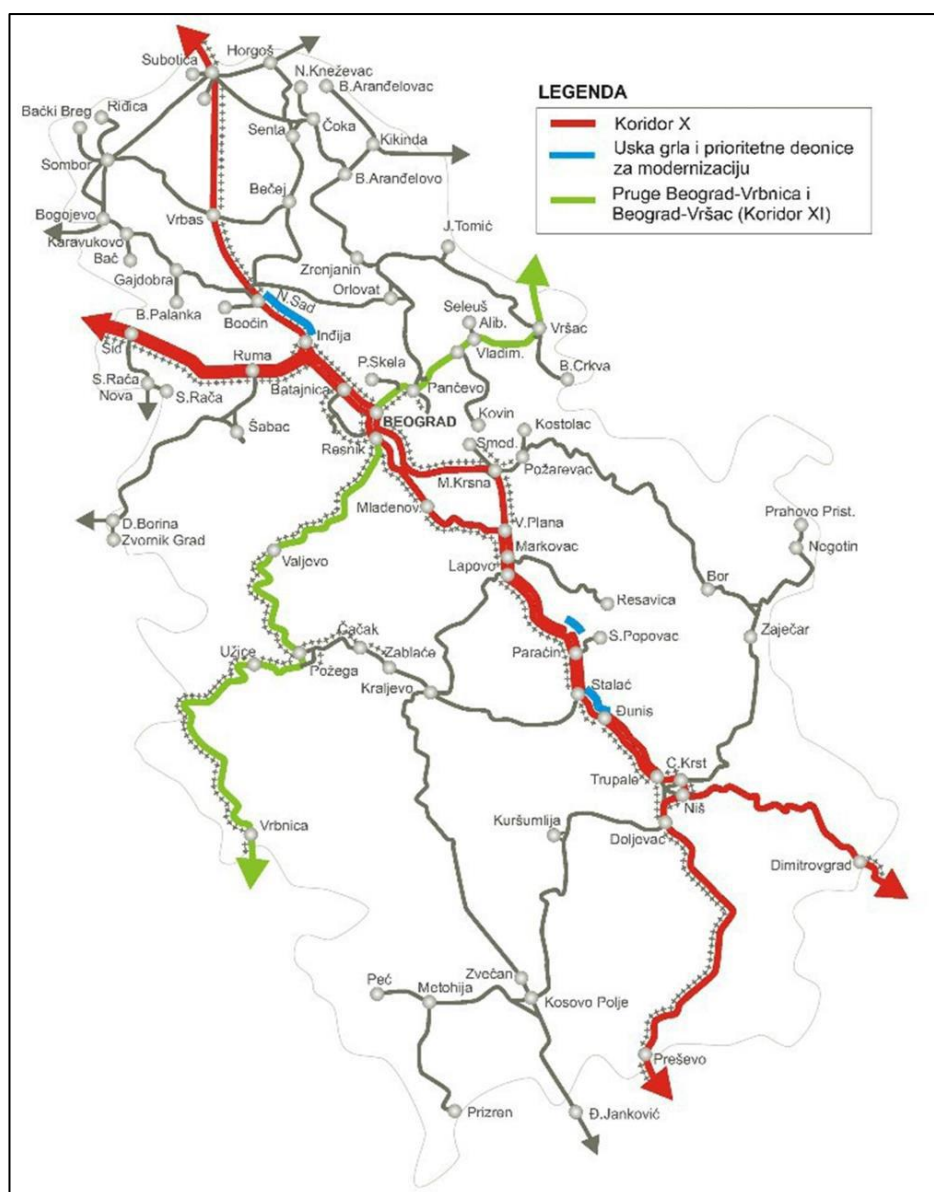
Corridor X with its branches – Xb (Belgrade–Budapest) and Xc (Nis–Sofia), represents the most significant road-railway route on the territory of the Republic of Serbia. It was established as a part of the Southeast multi-modal axis, linking Austria/Hungary, Slovenia/Croatia, the Republic of Serbia and Bulgaria/Macedonia/Greece and covers 760 km of railway lines in the Republic of Serbia.

Pan-European Corridor X stretching from Salzburg in Austria to Thessaloniki in Greece goes through the infrastructure network of “Infrastructure of Serbian Railways” JSC. On the territory of the Republic

of Serbia, on the network of “Infrastructure of Serbian Railways” JSC, Corridor X includes the following railway lines from Sid to Preševo:

- Belgrade – Šid – State border,
- Belgrade – Mladenovac – Niš,
- (Belgrade) – Rakovica – Jajinci – Mala Krsna - Velika Plana,
- Nis – Preševo – State border.
- The following branches connect to the primary route of the Corridor:
- Xb, (Budapest) – Novi Sad – Belgrade (the railway line (Belgrade) - Stara Pazova – Subotica), and
- Xc, Niš – Dimitrovgrad – (Sofia – Istanbul) (the railway line Niš – Dimitrovgrad – State border).

Figure 11: Railway Corridor X in Serbia



The goal is to improve the railway lines on Corridor X throughout Serbia by reconstructing the existing tracks and constructing the second track on the single-track sections in order to enable all corridor tracks for modern double track traffic and train speeds of 160 km/h.

The following types of terminals are distinguished: stations and transport forwarding, terminals for intermodal freight transport, port terminals.

Combined transport on railway network can be performed at terminals for combined transport and at port terminals.

Inland waterways port facilities connected to railway activities. The following ports are connected to public railway network: Belgrade, Novi Sad, Smederevo, Pančevo, Prahovo, Senta, Sremska Mitrovica and Šabac.

Port of Bogojevo

The port of Bogojevo is located on the left bank of the Danube from km 1366,73 to km 1367,42. The port is 40 km away from the E75 highway, in the direction Belgrade - Budapest, and it is not connected to the national railway network.

This port is located at a distance of 4 km from the village Bogojevo and 34 km downstream from the town of Apatin. The location of the port in Bogojevo has an extremely favourable position, both in relation to the settlement of Bogojevo and business entities in the West Bačka District (City of Sombor and the municipalities of Apatin, Odžaci and Kula), and in relation to the wider area- Mali Idoš in the North Bačka District, as well as the Municipality of Vrbas in the South Bačka District).

Total port area is 150,000 m², it has a covered storage area and it is equipped with a gantry crane, with the max. lifting capacity of 20 tonnes, and a conveyor belt.

Bogojevo is an open type of port with aquatory of 12 m deep. Total quay length is 210m, out of which vertical quay is approximately long 90m. Two vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 6 vessels. On the filled plateau behind the operational shore, a grain silo, a dryer, closed and open warehouses, a truck scale weighing system, an administrative building and gates were built.

The port has silo of 30,000 tonnes and 10,000m² of covered storage space available for port users. The main types of cargo handled in port are grains, chemical fertilizers, gravel and sand.

Figure 12: Port of Bogojevo



Mid-Term Perspective Assessment

In the port of Bogojevo there is no connection to the national railway network. Within the built capacities of the traffic infrastructure in the port zone, there is a manipulative railway no. 403, Bogojevo - Danube bank, with 3 industrial tracks in the port area.

It is planned that the industrial tracks that are being pulled out of the Bogojevo station, which is located on the main line no. 110, Subotica - Bogojevo - state border - (Erdut) and regional railway no. 207, Novi Sad - Odzaci - Bogojevo, across the manipulative railway no. 403, Bogojevo - Danube bank, provide access by rail to port terminals and facilities on the waterway.

It is necessary to reconstruct the manipulative railway from Bogojevo station to the entrance to the port area and segments of existing industrial tracks (to silos, operational shores), as well as the construction of new tracks initiated by dispositions of new terminals (tracks to container terminal, general and liquid cargo terminals).

Port of Bačka Palanka

The port of Bačka Palanka is located on the left bank of the Danube River, km 1,295 in the agrarian area of South Bačka.

Total port area is 740,000 m², it has an open and covered storage area, it's equipped with a gantry crane, with a max. lifting capacity of 12 tonnes, a mobile crane with a 9-tonne capacity, a floating crane with a 6 tonne capacity, a conveyor belt, pneumatic equipment and a Ro/Ro-ramp.

Total quay length is 322m, all of which is the vertical quay. Three vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 12 vessels.

The depth of water in the port basin ranges from 3.93m to 8.86m. The average size of the vessels reloaded in the harbour is 90m in length, 11m in width, with a capacity of 1,500 tonnes and freeboard of 2.5m. The port handles dry bulk and break bulk cargo. Storage facilities consists in 8,260 m² of open spaces and 650 m² closed spaces.

Figure 13: Port of Bačka Palanka



Port of Backa Palanka is characterized by an excellent strategic position thanks to the connection with Pan-European Corridor 7 (a river and canal system of the Rhine-Main-Danube Canal), which connects it with the countries from the North Sea to the Black Sea. The strategic position is contributed to by the immediate vicinity of the Novi Sad-Osijek-Sombor main road, closeness of the Belgrade-Subotica highway at a distance of 45km and the Belgrade-Zagreb highway, which is 30km away, as well as the railroad track which is just 5km from the port.

Mid-Term Perspective Assessment

The port is not connected to the national railway network but is distanced about 5 km from the regional railway Backa Palanka – Gajdobra which is connected with the Belgrade-Subotica railway and further with the Budapest.

According to the port development plans, it is planned that the industrial track for the port of Bačka Palanka starts from the open track of the railway Gajdobra – Bačka Palanka, in front of the level crossing with the main road (before the overpass from the direction of Gajdobra). The industrial track is brought to the port via a marshalling yard, which is located before the protective embankment of the port complex in Bačka Palanka.

The main track for connection to the port will be built with the use of TYPE 49 rails and with the basic spatial elements - (track radius of min 180m) and safety systems for breaking and turning.

The railway within the port of Bačka Palanka is spatially configured in the form of one access to two peripheral (connected) industrial tracks, i.e. with only one main track that serves all planned facilities.

Port of Prahovo

The port of Prahovo is located on the km 861, right bank of the Danube river. The port covers surface of approximately 6,7 ha. Port of Prahovo is an open type port with maximum available draft maintained at 4 meters. Total quay length is 677m, out of which vertical quay is approximately long 320m. Six vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 60 vessels.

Port of Prahovo has the following facilities and devices: conveyor belt, pneumatic equipment, Ro/Ro-ramp and 6 gantry cranes of 40 tonnes lifting capacity per each. When it comes to storage facilities, there is an open storage area, covered storage area and customs warehouse.

Northward, the Danube connects Prahovo to the countries of the Danube basin, all the way to Germany. Through the Rhine-Main- Danube Canal it is connected to Rotterdam and the North Sea, as well as Mannheim, one of the most important transport hubs and the centre of the European chemical industry.

Towards the east, Prahovo is connected by the Danube to the Black Sea and the Port of Constanta, an important international hub for maritime traffic.

Figure 14: Port of Prahovo



The port of Prahovo is located on the km 861, right bank of the Danube. The port is connected to the hinterland by roads and railways.

There is a well-developed rail infrastructure with several industrial tracks within the port, and the whole existing complex is connected to the Serbian Railways system and the international rail network.

The Prahovo industrial complex is also connected by rail to the Bor smelting basin, a producer of cathodic copper and an important producer of sulphuric acid, a basic raw material for many branches of the chemical industry.

The 971 m long industrial and railway track is connecting the port with the national railway network. The port is arranged with three parallel tracks, which gives the possibility of simultaneous processing of 160 wagons. Port of Prahovo has a connection with two railway sections: Crveni Krst-Zaječar-Prahovo pristanište section and Bor teretna-Prahovo pristanište section. Crveni Krst-Zaječar-Prahovo pristanište section connects port with Bulgaria, while Bor teretna-Prahovo pristanište section connects port with Belgrade and further with Hungary.

The location of the public railway infrastructure, according to the Plan of Detailed Regulation of the Port of Prahovo:

- Regional single-track non-electrified railway (Niš) - Crveni Krst-Zaječar-Prahovo pristanište in the length of about 1.04 km (from km 184 + 042 to km 185 + 079). On this line is organized public passenger and freight traffic;
- Railway station Prahovo Pristanište in km 184 + 577, with 11 station tracks and 10 industrial tracks, open for transport of passengers and things.

According to the assessment of the condition of the traffic infrastructure, the condition of the tracks of the railways in the Timok region is not satisfactory, which is indicated by the fact that the allowed speeds range from 40 km / h to 80 km / h, and that the lines are not electrified.

Mid-Term Perspective Assessment

In line with the Strategy for the development of Waterborne transportation of the Republic of Serbia, expansion of the port of Prahovo will include revitalization of existing and construction of new port infrastructure, as well as the construction of additional storage capacity and improvement of railway and road infrastructure.

According to the development plans of "Serbian Railway Infrastructure" a.d. and in accordance with the Spatial Plan of the Republic of Serbia ("Official Gazette of RS", No. 88/10), revitalization, modernization and electrification of the existing single-track railway (Nis) - Red Cross - Zajecar - Prahovo port is planned. This regional railway is very important for faster development of Prahovo as an industrial center.

At km 0 + 355.70, where the new road intersects with the railway tracks, the construction of a leveled intersection is planned, which will be done by the construction of a new AB bridge - overpass. A free profile which is 5.8 m high is provided under the bridge. The width of the free profile perpendicular to the tracks is 14.1m.

Since the condition of the railway tracks within the port area is not satisfactory, overhaul and modernization are planned, which will significantly increase the transport capacity.

The plan envisions the introduction of a new track that will serve warehouses in the hinterland of the port area.

If possible, the necessary safety distances between industrial tracks, plot boundaries and other infrastructure corridors must be observed. In addition to the tracks behind the silo, it is possible to envisage another track, so that the existing one would be used for loading and would not disrupt the transport of other cargo.

SLOVAKIA

Port of Bratislava is the second biggest railway node in Slovakia. Railway track, which is located in the port, is owned by SPaP, a.s., major port operator and private company independent to VPAS (port authority). It is connected to ŽSR (Railways of the Slovak republic) railway at railway station Bratislava ÚNS (Central Freight Station). The construction length of all siding tracks is 28 828,6 meters, including 69 turnouts. The siding is predominantly electrified, with the siding and track no. 101, 102, 103, 104 and 105 are under the traction line. The total length of traction line is 5 500 m, the other part of siding is not electrified.

The railway infrastructure of the port can be divided into the following integral parts:

connecting rail between the Port area and ŽST Bratislava ÚNS,

- a track group 100, which represents an entry / exit group to / from the port,
- railroad groups in Winter port: the main flow of the Danube, the North and South basin,
- railroad groups in the Winter port.

Port infrastructure coverage of the port is good, but in many segments, it is required to modernize it. The connection to the public railway transport network as well as the connection to roads outside the Port Bratislava is shown in the following figure.

Figure 15: Connection the Public Transport Network (port of Bratislava)

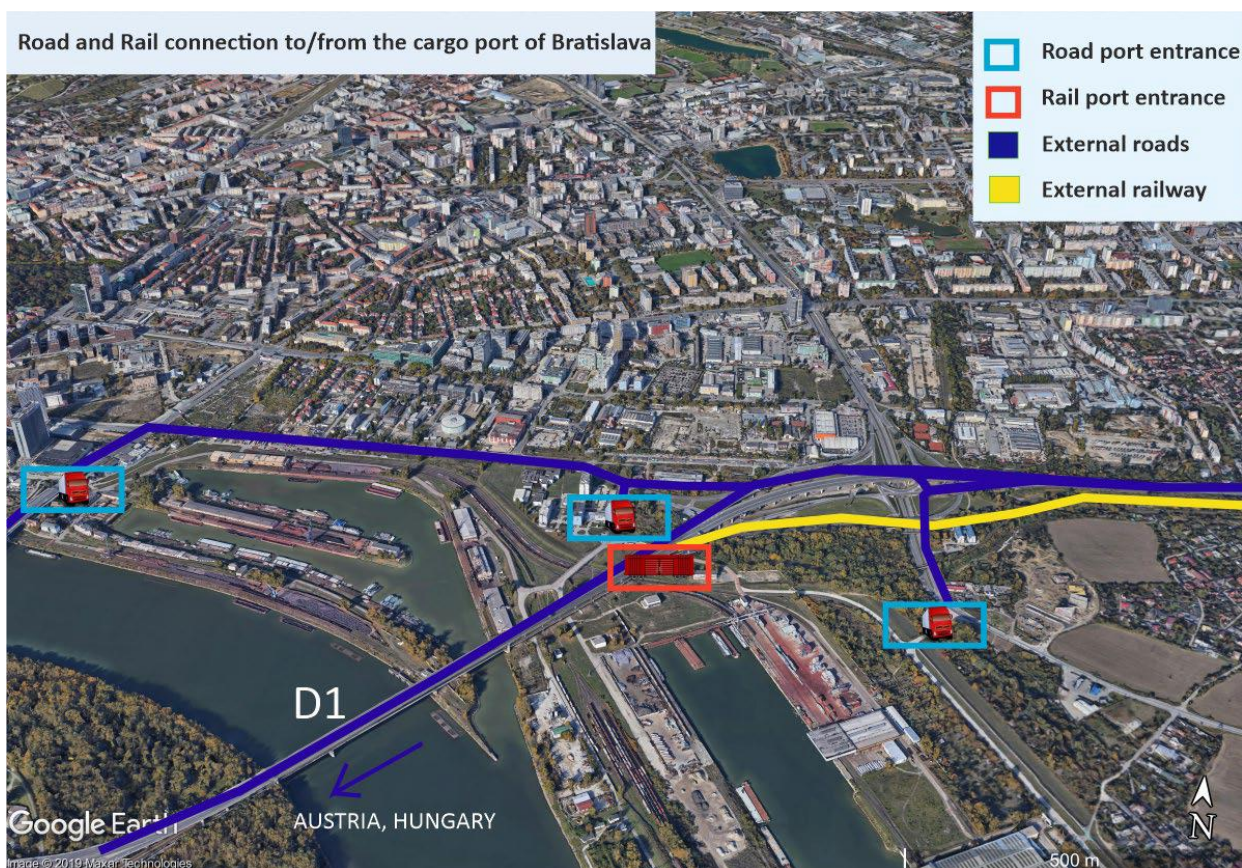


Figure 16: Rail Infrastructure Capacity for Bulk Cargo (port of Bratislava)

Parameter	Description	Value	Units
NT	Maximum number of trains per day	7	No.
TRL	Maximum capacity per train	2 440	t
WD	Number of working days per year	300	days
Annual rail capacity	$NT \times TRL \times WD$	5 124 000	t/years

Figure 17: Rail Infrastructure Capacity for Containers (port of Bratislava)

Parameter	Description	Value	Units
NT	Maximum number of trains per day	3	No.
TRL	Maximum capacity per train	80	TEU
WD	Number of working days per year	300	days
Annual rail capacity	$TEUs = NT \times TRL \times WD$	72 236,8	TEUs/year

Port of Komárno

Currently, the Public Port of Komárno is linked to the railway network by a siding, at track no. 131 Komárno Bratislava and no. 135 Komárno – Nové Zámky. These are standard gauge tracks, not electrified. The situation diagram with a connection to the railway network in the city of Komárno is shown below. The entrance is located on the western edge of the port near the Bratislava Gate – Bastion No. I near the intersection of the streets Dunajské nábrežie and Hviezdna. The total length of the rails at the VP Komárno area is 13.85 km.

The railway line at the Komárno railway station is of class D with maximum unit train load of 2,200 tonnes. It follows that the unit train can contain a maximum of 55 carriages at carrying capacity of 40–50 tonnes/carriage. The siding in the area is maintained by the SPaP, a. s. company, while the siding is operated and unit trains outfitted by the Železničná spoločnosť Cargo Slovakia, a. s. company (ZSSK Cargo) (Railway Company Cargo Slovakia). For operational reasons, there is no restriction on transshipment due to the capacity of the railway connection. The railway connection is of good quality and operationally satisfactory.

Figure 18: Connection to the Railway Network (port of Komárno)



Figure 19: Rail capacity (port of Komárno)

Parameter	Description	Value	Units	Remarks
NT	Maximum number of trains per day	1,5	number	<i>This should be based on the availability of rail infrastructure and the operational modalities</i>
TRL	Maximum capacity per train	1 600	t	<i>This should be based on operators' experience. Our calculations contains that train capacity is equal to the capacity of 1 boat i.e. 1600 tonnes, although the railway line in the Komárno railway station is classified as Class D with a maximum load of 2200 tonnes. It follows that a one train contains max. 55 wagons with load capacity of 40 - 50 tons / wagon.</i>
WD	Number of working days per year	213	days	
Annual rail capacity	Cap. = NT x TRL x WD	510 000	t/year	

Figure 20: Rail Lengths in the Port Area – Current Condition (port of Komárno)

rail no.	length (m)	rail no.	length (m)
1	1 145	15	598
3	1 006	17	566
3a	238	19	526
5	679	21	986
7	635	23	628
9	1 422	2	1 663
11	1 377	4	1 719
13	657		
total length of rails (km)			13,85

UKRAINE

The stevedoring companies of the Reni seaport, including SE “Reni Sea Merchant Port”, are serviced by the railway station “Reni-Nalyvna” and “Reni-Osnovna” of the Odessa railway. Currently, there is no direct connection between Reni station and Ukrainian railway stations. All rail transportation is carried out in transit through Moldova on sections of the State Enterprise “Railways of Moldova” Novasavytska - Etulia, through crossings on borders Kuchurgan (Ukraine) - Novosavytska (Moldova), and Etulia (Moldova) - Fricatei (Ukraine), and also through the self-proclaimed Republic of Prydvovny I, see fig. 21. The Giurgiulesti (Moldova) - Reni (Ukraine) border crossing connects with the Moldovan and Romanian railways. This has a significant negative impact on tariff rates and has a negative impact on the volume of cargo processing at the port of Reni, as the port has lost its logistics connection with Ukraine.

Figure 21: Reni and Izmail ports area. Scheme of railway roads



Port of Izmail

The seaport Izmail is served by a railway station with three railway entrances. The total length of the railway from Odessa to Izmail is 287 kilometres. From Odessa to Bilhorod-Dnistrovskiy the railway is electrified, then to Izmail, the trains are driven by diesel locomotives assigned to the locomotive depot at the Odessa-Sortirovochnaya station, but undergoing maintenance in the turnaround depot at Artsyz station, see fig. 21.

- Type of rail – 1520mm;
- Electrified just ~30% fragment – Bilhorod-Dnistrovskiy-Odessa;
- Single track;
- Maximum train length - 55 freight railroad wagons;
- Maximum train load – 3750t;
- Maximum speed – 70km/hour;
- Possible carriage turnover, units per year – 163520;
- Possible Maximum intensity of wagon processing per day - 448 units.
- Time to destination Odessa-Izmail ~6-7 hours.
- No restrictions.

Figure 22: Port of Reni rail and road connections



4.2 Identification and presentation of the existing rail services:

AUSTRIA

Ennshafen Port

Austria's second largest connecting railway is located in Ennshafen. Without any restrictions all kind of goods can be transported from and to the Ennshafen port via railway system. The operation time is around the clock so there are no limitations with regard to frequency.

Some of our settled companies have also private railway extensions e.g. Saw mill Rumplmayr that are handling with high amounts of wood as well as other cargo handling companies within Ennshafen port that handle with grains or other bulk goods, oil.

Therefor railway infrastructure in Ennshafen port is state of the art and well developed, open for seven days a week with regard to transport time.

The largest use of the rail infrastructure in terms of volume is the Ennshafen container terminal. Around two thirds of the containers are handled by rail. For this reason, the container terminal with regard of the usage of railway infrastructure is described in more detail below.

Container Terminal Enns GmbH

CTE is one of the most significant transport hubs for combined transport in Upper-Austria. The site is located directly at the TEN17 railtrack, connecting central Europe with the south and eastern European regions. CTE has an own motorway exit connection close to the junction of the A1. CTE therefore is the gateway for both the industry and trading companies in the region, and the Gateway for transit cargo with final destinations in Vienna, Graz, Linz and Salzburg.

The Container Terminal Enns GmbH is Austria's most modern transshipment infrastructure and provide accessibility to following European main ports: Hamburg, Bremerhaven, Wilhelmshaven, Trieste, Koper and Piraeus.

KPI – Volumes and Finance / Quantity

310.000 TEU in 2017 + 20% compared to year of founding

- 370.000 TEU in 2018 + 40% compared to year of founding
- 400.000 TEU in 2019 + 60% compared to year of founding
- 3000 trains per year in 2019
- 6000 container repairs per year in 2019
- 6000 containers in permanent storage
- 400 trucks per day is our handling capacity
- € 9,5 MIO annual sales turnover
- Total capacity today: 300.000 TEU after Extention: <500.000 TEU
- Total tonnage volumes 2019: 2.500.000 TONS

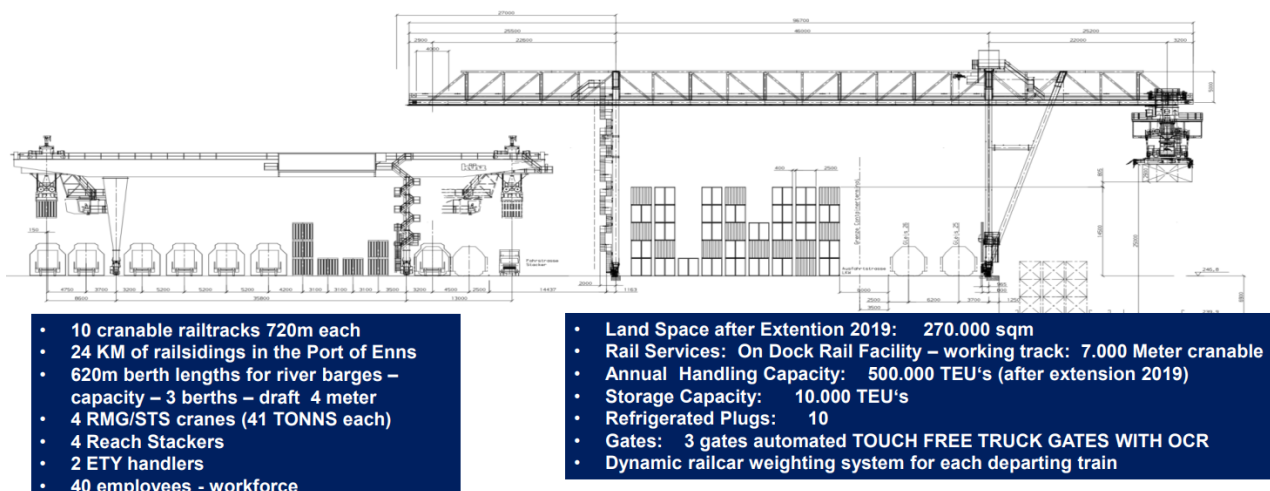
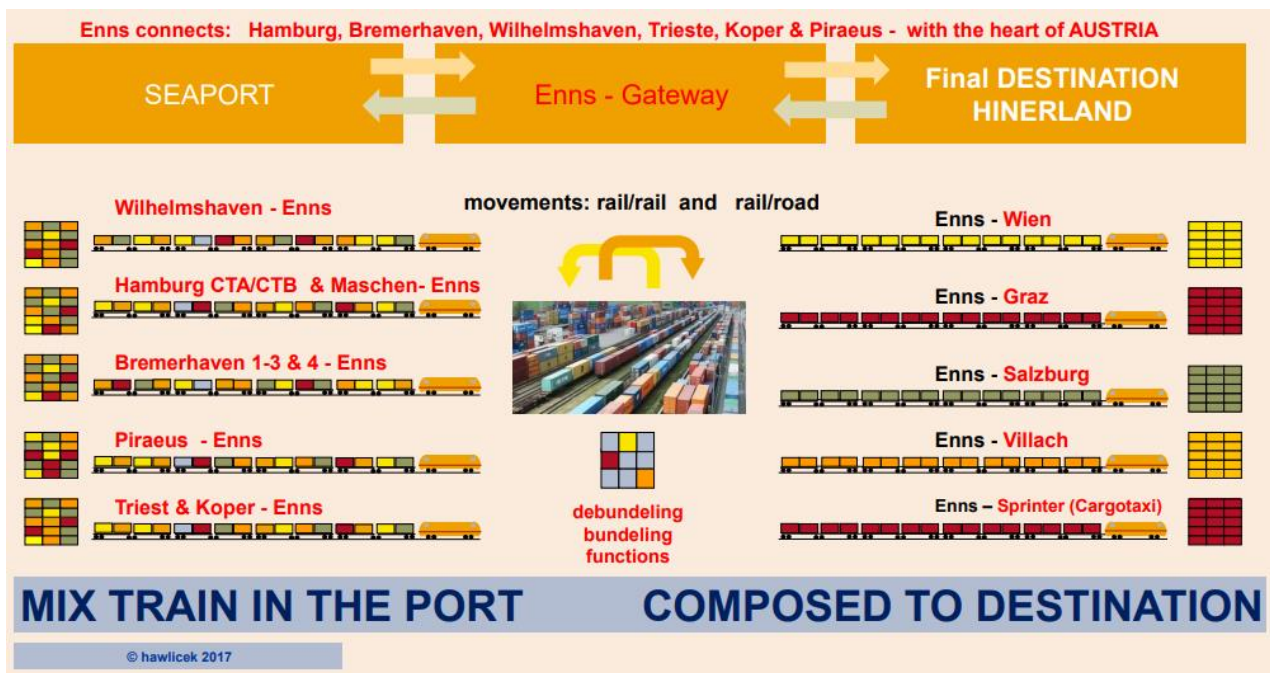
Serving all leading rail operators like:

Roland, TFG, TSA-ÖBB, Metrans, LTE-Group, IMS, STLB, SETG, WLC

Serving all leading ports like:

Antwerp, Bremerhaven, Hamburg, Koper, Trieste, Piraeus, Wilhelmshaven

Figure 23: Gateway shuttle-services high-frequency port connections



Frequency / Transport time / Quantity / Time to destinations

Maritime, inland waterway and rail liner and feeder services

Seagoing liner shipping services and Barge (IWW) shuttle services are not applicable for containers.

Some characteristic figures regarding rail shuttle services for CTE Enns are as following:

- 3000 trains per year in 2019
- 6000 container repairs per year in 2019
- appr. 6000 containers in permanent storage 2019 (2020 figures are not typical / Covid)
- about 10 rail operators in the terminal

- all leading seaports are served (Antwerp, Bremerhaven, Hamburg, Koper, Trieste, Piraeus, Rotterdam, Wilhelmshaven)
- appr 20 trains per day are serviced from the terminal
- typical travel times: Hamburg 17 hours, Koper 10 hours, Piräus 48 hours

Typical train connections Terminal Enns:

Enns – Hamburg 17 trains a week in each direction

Enns – Bremerhaven 5 trains a week in each direction

Enns – Koper 2 trains a week in each direction

Enns – Piräus 2-3 trains a week in each direction

Customer identification

Container terminal Enns is serving Austria's leading industry & trade.

Typical service customers are like following: BMW – Bayerische Motorenwerke, MAN – trucks and vehicles, Lenzing fibre – industry, Hofer – retail trade, IKEA – furnitures, Lutz – XXX Lutz furnitures, Fischer – sporting goods, Kaindl – woodworking industry, Schwaighofer – woodworking industry, Atomic – sporting goods, DOKA – leader in construction tools, Swarovsky – glas industry, Montanwerke Brixlegg AG, AMAG – metal, KTM – vehicles, RHI AG – mining, Egger – woodworking industry etc.

Port of Vienna

For 40 years, WienCont have been steadily on the move. The world is constantly changing its demands on us. The Answer is: With flexible service, reliable performance and state-of-the-art technology for more efficiency and sustainability at our location in Vienna in the heart of Europe.

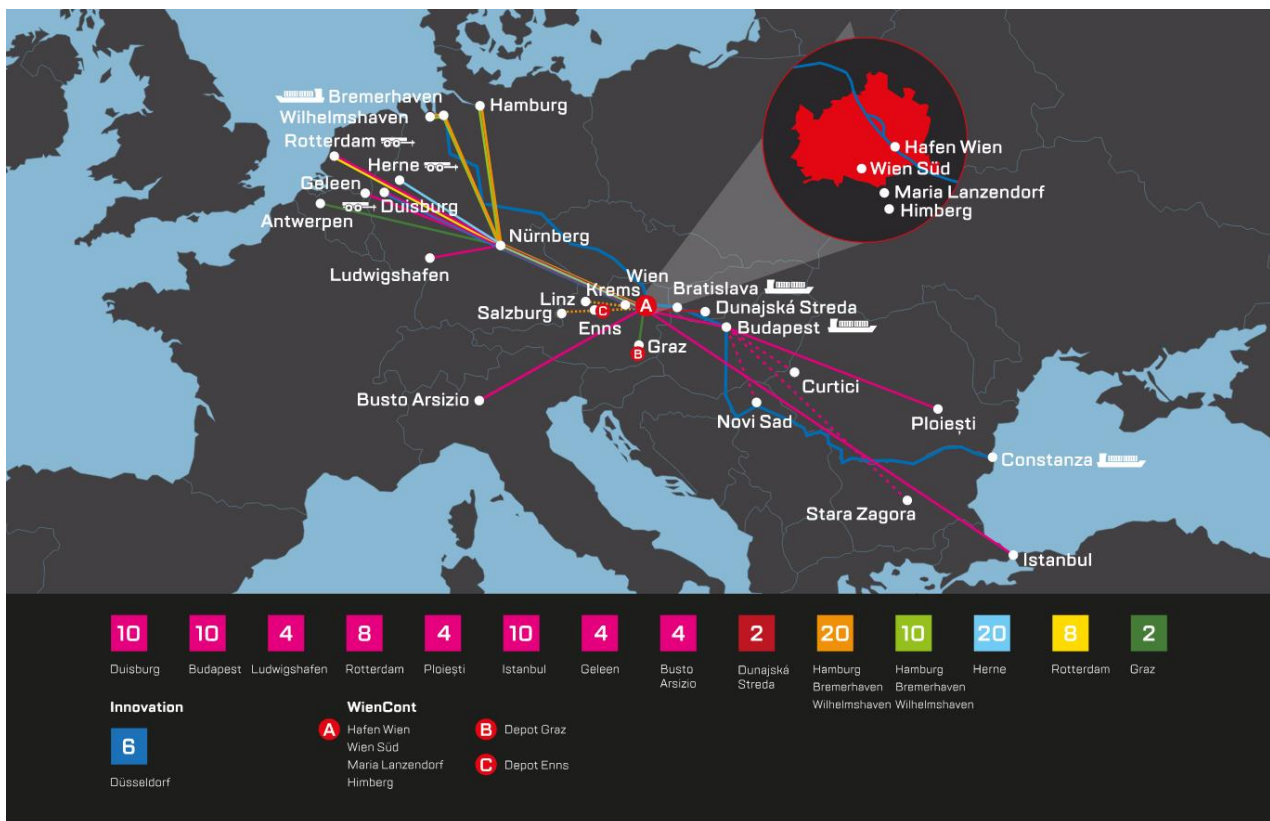
WienCont is:

THE TRIMODAL CONTAINER TERMINAL WITH THE HIGHEST THROUGHOUT VOLUME IN AUSTRIA.

Handling

The trimodal terminal at the location in Vienna is connecting the three key modes of transport rail, river and road. Located in the port of Freudenu, as a company of the Port of Vienna, we thus achieve a maximum of flexibility in terms of logistics, while saving the environment. Supported by state-of-the-art technology, a dynamic team and our unique entrance technique using only the momentum of the trains, enables us to handle all types of container/trailer transports for our partners and offer a distinctive service in Austria and Europe. With 10,000 TEU storage capacity combined with state-of-the-art technology and many years of experience, we handle more than 400,000 TEU per year with 3 gantry cranes and 15 container stackers on 170,000 m² of terminal.

Figure 24: Rails, Roads, and Waterways are our Elements



Partners – Operators and Railway Companies at WienCont:

Eccorail / Hupac / IMS / Lineas / PCC / RCO / Roland / Transfracht / Turkrail / TX

LTE / Metrans / ECCO Rail / RCA / RPA / WLC / Lokomotion / HELROM / LKW-Walter

Conditions Handling

- Handling on land/lift 34,40 € per Container
- Handling on water/lift 72,50 € per Container
- SOLAS-weighing 70,00 € per weighing

Depot

With an 8,000 TEU slot capacity at the empty containers depot, WienCont provides their partners with sufficient capacity for storage, checks and repairs. Internationally trained reefer experts are available to test and repair refrigerated containers according to current standards.

Figure 25: Depot



Reefer – Smith Holland Cooperation

Since mid-2018, Smith-Holland and WienCont have been cooperating in the reefer container segment in Austria. This unique partnership increased the quality level in the area of refrigerated containers and reduced the delivery time of spare parts.

Partners – Shipping Companies and leasing Companies

S: Beacon / Bertschi / Cargo Compass / CMA / Cosco / ECS / Eucon / Evergreen / Florens / Hapag Lloyd / Hyundai / Maersk Line / ONE / OOCL

L: Samskip / Tarros / Textainer / Titan / Touax / Triton / Tyco / Unifeeder / W.E.C. / YML / ZIM-Line

Conditions Depot

- Storage empty 20' container
 - 3.2 € per calendar day
- Storage empty 40' container
 - 6.4 € per calendar day
- Storage full 20' container 6.6 € per calendar day
- Storage full 40' container 13.2 € per calendar day

Services

For 35 years, WienCont has been trading with new and used containers and we also offer them for rent. Our trading department stands out by extensive know-how in the container sector. Flexibility is our strength.

Partners – Trade Clients and Major Companies

CHS / Flughafen Wien / BTG / Ing. Hiessberger / Implenia / Mobilbox / IMS Cargo Slovakia / Bundesheer

MAERSK / Rhenus Krems / HEY-U / Jandl Transporte / HeavyLog / Integral / Containo

Repair Service – Mobile and stationary Services for everyone

Two partners - one passion! A partnership with FTSC GmbH enables WienCont to offer stationary services as well as a mobile inspection and a repair service in the south-east of Vienna.

FTSC GmbH also offers consulting and CSC inspection.

Location Services

- One Location - Different Services
- Stuffing/stripping services by trained staff
- Warehouse logistics, hall and outdoor storage areas, block and high-rack warehouses, cold and deep-freeze warehouses
- Customs services through our sister company T-Sped <https://www.hafen-wien.com/en/logistics-storage/customs>

Pre- and onward carriage on the road

Last Mile - One Service Network. For the last kilometres, WienCont offers, together with its longstanding partners, pre-carriage and onward-carriage from the Vienna Freudenu location, to complement rail and waterway. Benefit from optimised routes with the market leader in used container trading.

Neutral Rail shuttle Vienna - Budapest

More than 90 train shuttles per week are connecting WienCont with various countries. The neutral Vienna-Budapest-Vienna rail shuttle with at least three weekly departures has been available since early 2019. Booking and handling are neutrally carried out by WienCont.

KPI – Volumes and Finance / Quantity

- 8000 Container REPAIRS PER YEAR – Repairs 2020
- 200 REEFERS PER MONTH – Depot
- 200 CONTAINERS ON STOCK – Depot
- 24 MINUTES PER TRUCK TRANSIT – Handling
- 428.000 TEU CONTAINER HANDLING 2020
- 10.000 TEU STORAGE CAPACITY 2020
- 122 CONNECTIONS PER WEEK - 2021

Table 3: 2018 – 2020 traffic flows by mode

2020	WCT:	Road	Rail	Water
		52,1%	47,8%	0,1%
Ton	2.053.000	1.069.613	981.334	2.053
2019	WCT:	Road	Rail	Water
		59%	41%	0%
Ton	1.810.000	1.071.520	738.480	-
2018	WCT:	Road	Rail	Water
		43,5%	56,4%	0,1%
Ton	1.660.000	722.100	936.240	1.660

BULGARIA

Port of Ruse

Ruse-east can handle block trains in the port area. According to published information, Ruse-east actually handles block trains with containers and trailers. The port terminal has the necessary machinery and equipment for transshipment of intermodal units.

Major customers of the port are forwarding companies, as well as direct importers and exporters. Particular companies, which use the services of Ruse-east, are KCM AD (mining, production and trading of concentrates, non-ferrous metals and alloys), Kaolin EAD (production of kaolin for the ceramics industry and different brands of silica sand for the glass, paper, foundry and construction industries) and Promet Steel EAD (production of a wide range of hot-rolled steel sections of ordinary and special steel).

The main final destinations for import cargoes transshipped on rail, which pass through the port of Ruse, are Plovdiv (324 km from Ruse) and Senovo (50 km).

The main export shipments arriving at the port on rail are originating in Burgas (280 km) and Senovo.

There is no available information regarding the quantities of cargo, transported from/to the port by rail.

Port of Lom

The latest available data for the Brusartsi-Lom railway (the only railway connection of the Port of Lom to the hinterland) is from 2016 and it states that 8 675 trains have passed through the section, which makes, on average, approximately 24 trains per day. The data is 5 years old as of 2021, but it provides an approximation of how much traffic this rail section sees annually.

Trains and cargo arrive at the port each day. There are a few types of rail wagons, which are used for cargo transportation to and from the port – Eaos-type open cargo wagons with 4 axles, Res-type platform wagons with 4 axles and Fals-type self-unloading tipping wagons with arched floor and 4 axles for the transportation of coal.

The majority of the port's clients are companies from Bulgaria, which comprise more than 98% of the overall client base. The rest of the companies are from Hungary, Switzerland and Ukraine (data for 2020). In 2019 the port also had clients from Germany and Romania. As for the types of companies, which use the port's services, they are mainly forwarding and industrial companies, which import/export production and materials. That includes importers of coal for both industrial and domestic use, importers of metal articles and fertilizers, as well as exporters of cereal.

CROATIA

The single-track railway M601 Vinkovci - Vukovar is separated from the railway at the Vinkovci station line M104 Novska - Tovarnik - SB - (Šid), and at the station Vukovar it is connected with the industrial track with Vukovar port on the Danube River. In this way, the railway M601 Vinkovci - Vukovar connects the railway traffic direction of Corridor RH1 (former X. Pan-European Corridor) and VII. Pan-European transport corridor (waterway Danube) in the territory of the Republic of Croatia.

At the Vukovar-Borovo naselje station on the M601 line, continues the railway line of importance for the regional traffic R104 - Vukovar-Borovo Naselje - Dalj - Erdut - SB. At the exit from Vukovar station, it continued on railway of importance for local traffic Vukovar - Stari Vukovar (out of traffic since 1991). From Vukovar station, the industrial track leads to the Port of Vukovar on the Danube River.

On the railway line M601, the maximum permitted speed (according to the Technical Conditions of the Construction Infrastructure timetable 2013/14) is 50 km/h, with occasional restrictions of 20 km/h and 40 km/h. The railroad is not electrified. Signal security and telecommunication devices were destroyed during the war and have not been rebuilt. During the war, some buildings in the railway belt were destroyed and damaged, which were recorded in the cadastral operatives, but in nature they do not exist today.

The traffic takes place at the station distance. The railway stopping line is 700 m. The M601 line at Vukovar station passes through the area of the port facilities of the Port of Vukovar. It is necessary to delimit the track capacities and land between the Port of Vukovar and Vukovar Station.

The single - track railway M601 Vinkovci - Vukovar has the status of another railway for international traffic and connects the railway Corridor RH1 (SB - Savski Marof - Zagreb - Dugo Selo - Novska - Vinkovci - Tovarnik - SB) and VII. pan-European transport corridor (waterway on the Danube) on the territory of the Croatian Republic. The railway will be electrified by an electric traction system of 25

kV, 50 Hz. All railway crossings with roads (except for two decommissioned LCPs) will remain level and will be provided with light and sound signals. The railway will be capable of $V_{max} = 120$ km/h (with existing restrictions at the exit from Vinkovci station (speed 50 km/h) and Vukovar Borovo Naselje (speed 95 km/h) and in the area of Vukovar station (speed 40-80 km/h).

HUNGARY

Nationwide rail loading and unloading in inland ports is 10% compared to transshipments in between other modes. In Dunaújváros it is even less. Types of trains are usually Tadgs and Eas. Cargo trains from Hungarian Danube ports go to Germany, The Netherlands, and even to Koper and Rijeka. In case of low water level, bad navigation conditions on the Lower Danube, cargo trains go even to Constanta.

Transshipment to rail in Hungarian inland ports has the lowest share, 10% compared to other modes. The most typical trains loaded in ports are Tadgs and Eas. The destinations of cargo trains from Hungarian Danube ports are Germany, The Netherlands to the west, Koper and Rijeka to the south and in case of low water level on the Lower Danube, Constanta to the east.

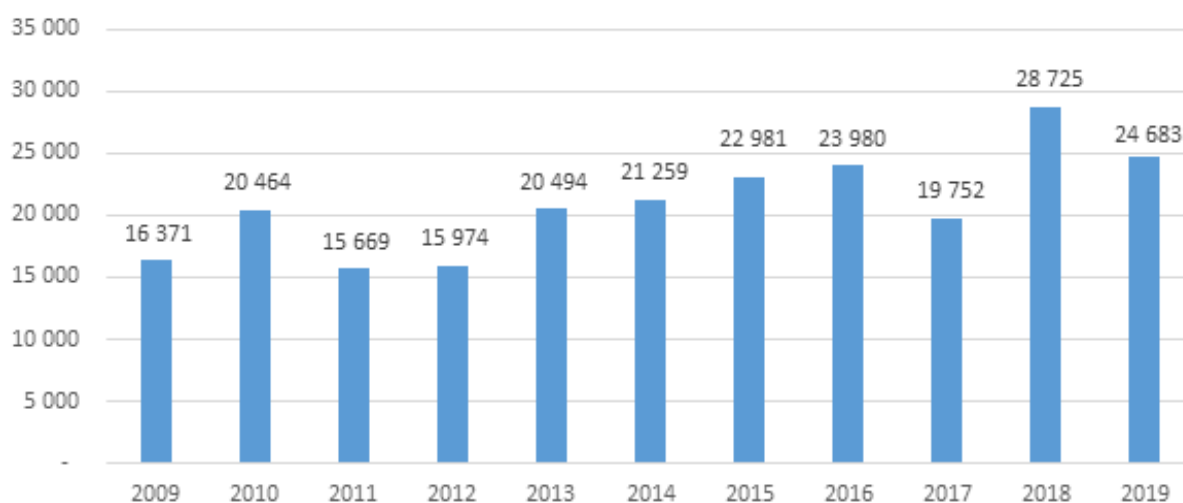
Budapest

The Freeport of Budapest has a 15 km-long railroad. The shipping traffic and the railway traffic are coordinated by the shipping service and the railway service respectively. Services:

- Loading and unloading goods transported by railway
- Service with internal railways
- Delivery of railway consignments to loading bays, sorting railway wagons
- Storage and minor repair of wagons

Railway traffic in the Freeport has been slowly but continuously growing in the last 10 years. This traffic is due to 3-4 major companies operating in the port, one of them is responsible for 80% of the railway traffic. Based on data provision by Budapest Freeport Logistics cPlc, 80% of all wagons is arriving and 20% is departing.

Figure 26: Railway traffic in the Freeport of Budapest 2009-2019



Source: Budapest Freeport Logistics cPlc statistical data provision

Dunaújváros

The port of Dunaújváros has 1,100-meter-long industrial sidings. The port is prepared for transshipping bulk and break-bulk cargo to and from open or closed but opening wagons.

One of the largest flow scales in Europe, with a throughput of 300 tons per hour certifies the current weight of the goods. Rail services are open for 24 hours a day on weekdays. Wagon sorting is handled with own equipment. There is an organizer railway station in the port of Dunaújváros and 2 pairs of railway tracks on the vertical shore wall with a total length of 563 m.

Baja

According to The Intermodal Development of the Port of Baja, recent rail traffic is volatile. Quantity of goods transported annually by rail is between 35,000 and 50,000 tons. The decisive part of the railway traffic is grain and logs sent by Gemenci Erdő és Vadgazdaság Zrt. (Gemenc Forestry). The port is a multimodal logistic centre equipped for loading and unloading to road and water. These modes account for a much larger share of loading.

The level of transshipment form rail to road and from road to rail is negligible compared to road-ship loading, approx. 13,000 tons annually.

ROMANIA

Port of Constanta

Rail services are secured by CFR Marfa, the state owned company, and by various private operators outside the Port area. In the port area the rail services are secured by rail operators who have a licence to operate within the port area.

The railway infrastructure facilitates allows the handling full block train in the port area as well as along the quay. Therefore, conditions for round-the-clock train services and every day shuttle trains are available. Unfortunately, the rail connections of the port to the hinterland lacks development and maintenance works within the Romanian rail network. The commercial speed is very low 20km/hour and as a result lacks predictability and efficiency affecting the attractiveness of Constanta Port.

A list of active port operators for year 2018 is presented below.

Table 4: Active rail operators Constanta Port

CN CFR SA
CARGOTRANS VAGON SA
CER-FERSPED
CFR MARFA
CONSTANTIN GRUP SRL
DB CARGO ROMANIA
Express Forwarding
GP Rail Cargo (M)
GRUP FERVIAR ROMAN SA
LTE RAIL ROMANIA
MMV RAIL ROMANIA

Rail Cargo Romania SRL (M)
TRANSFEROVIAR GRUP SA (M)
Tehnotrans Feroviar SRL
Tim Rail Cargo
UNICOM TRANZIT
VIA TERRA SPEDITION SRL
Vest Trans Rail SRL (M)

The rail freight flows from and to the port are presented in the table below for the year 2018.

Table 5: Rail freight flows from and to Constanta Port, 2018

<i>Station in the port</i>	<i>From the port, tonnes/year</i>	<i>To the port, tonnes/year</i>
Agigea Ecluza	680	251,223
Agigea Nord Oil	741,481	
Agigea Nord	478,037	332,000
Constanta Port Zona B	1,173,343	4,952,619
Constanta Port MOL 5	132,815	418,895
FERRY BOAT	742,411	2,909,625
TOTAL	3,268,767	8,864,362

It is not an established frequency of the freight trains, as it related to the demand from various port operators or forwarders.

Currently the rail accessibility in the port is not optimised, as there are observed delays and long time for freight trains accessing the port. An overview of the current access time by rail is presented below.

The record of stationing at the level of 2018 and 2019 shows that trains arriving in Port B, regardless of the final station serving the port operator Port B, Port A or Mol V, stop on average over 1000 minutes on the receiving lines, and in Port Terminal Ferry-Boat station they park on average 700 minutes.

In the table below are presented delays by port station.

Table 6: Statistics of late arrival minutes Constanta Port, 2019

Rail station.	Delay at arrival, min	No of delayed trains	No of total trains	Mintes delay / no of delayed trains	Mintes delay / no of total trains
C-ța Port Zona B	1641642	3304	5475	497	300
C-ța Port Mol V	113987	515	1095	221	104
Agigea Nord	244271	941	3428	260	39

Agigea Ecluză	34378	252	2883	136	12
C-ța Port Terminal Ferry- Boat	877445	2183	4015	402	219

It follows from these statistics that:

- 44% of arriving trains are delayed
- total duration of arrival delays: 6.1 years
- average delay time: 176 min / train
- average delay time: 403 min / delayed train

Galati

Rail services are secured on both standard European gage and large rail gauge lines, depending of the demand.

Giurgiu

Rail connection does not exist.

Drobeta Turnu Severin

Road and rail connections of the port are shown in the figure below.

Figure 27 Road and rail connections Port Drobeta Turnu Severin



It is observed that the port has quite good rail connections, but new rail connections to the main rail network are desired for the Western side of the port. Access by rail is thus possible to Bucharest (323 Km) and further to Constanta Port, and Timisoara (210 Km). From the national rail network access is secured to all destinations in Romania and in other countries.

SERBIA

According to the Statistical Office of the Republic of Serbia, 11.5 million tons of goods were transported on Serbian railway network, in 2019, totaling more than 2.86 billion ton-kilometers. Table 7 below shows the volume of goods transported for years 2019-2020, broken down by type of traffic.

Table 7: Serbian rail freight market, key performance indicators, 2019-2020.¹

Transport goods	2019	2020	2020/2019
Transported goods thousand tons	11506	10499	91.3
Domestic transport	3337	3062	91.8
Export	2775	2743	98.8
Import	2891	2301	79.6
Transit	2503	2393	95.6
Ton kilometers, million	2864	2746	95.9
Domestic transport	519	546	105.2
Export	553	523	94.6
Import	586	513	87.5
Transit	1206	1164	96.5

In 2018, 12.3 million tons of goods were transported on Serbian railway network, totaling more than 3.19 billion ton-kilometers. International traffic contributed about 80%. Table no 8 below shows the volume of goods transported in 2018, broken down by type of goods.

Table 8: Goods transported by rail in Serbia 2018

Type of goods	000 tons	%
Containers	1,374	11.5
Empty wagons	2,073	17.3
Cereals, products of the milling industry, grains, seeds and fruits	344	2.9
Oil and its derivatives	799	6.7

¹ Statistical Office of the Republic of Serbia, [Statistics of Transport and Communication](#), Number 166 Year LXXI, 25/06/2021

Vehicles	124	1
Metals	2,010	16.8
Bulk cargo, ore and	2,864	23.9
Chemicals	1,489	12.4
Sugar, residues and waste from the food industry, etc.	375	3.1
Wood, cellulose, paper	284	2.4
Building Materials	99	0.8
Others	128	1.1
Total 12,602	11,962	100

In 2018, the most frequently transported types of cargo were bulk cargo, ore and minerals (23,9%), followed by metal products (16,8%).

Unfortunately, there are no contemporary intermodal terminals in Serbia, but rather few bimodal container-handling terminals. Although, containers can be handled in some of the Serbian Railways marshaling stations as well as in the inland waterway ports on the Sava and Danube rivers. Currently only four terminals in Serbia have regular railway connections with the seaports in the region and are dedicated to the container handling on the daily basis.

The terminals are located in Belgrade, Dobanovci, Sremska Mitrovica and Pančevo: ŽIT Beograd, NELT Dobanovci, LEGET Sremska Mitrovica and DUNAV Pančevo.

ŽIT terminal in Belgrade represents the oldest road-rail terminal in Serbia. It is currently at the new location in the shipping park (park B) of the Belgrade railway station, the marshaling yard in Železnik. Although the new location now has only two tracks, ŽIT continued to service international container lines. In its current state, it can accommodate up to 4 trains a day. Currently, there is a problem with storage capacities, which handles only up to 1400 containers.

According to the estimates of the ŽIT terminal, the existing container terminal covers about 40% of the total number of containers transported by rail, which represents about 15% of all containers coming to Serbia. The terminal has the regular liner service with the ports Rijeka, Kopar and Bar. The distance of the port of Bar from the ŽIT terminal measured on the railway infrastructure is only 476 km, which makes this port the closest port to this container terminal.

NELT terminal is the central distribution and logistics center of the company NELT located in Dobanovci, near Belgrade. The terminal is connected by rail to all European ports and land terminals. The terminal is located 6 km of the intersection of the highways E-75 and E-70 and 10 km from the

Airport Nikola Tesla. It offers regular weekly railway transport of containers to and from the ports of Rijeka and Pireus.²

LEGET terminal is located in the Port of Sremska Mitrovica (75 km from Belgrade). It provides regular railway service to and from the port of Rijeka, several times a week. Considering that the terminal is located on the Sava river, theoretically it is possible to tranship containers to the inland waterway vessels, however, it is not a standard service. The terminal handles between 10.000 and 15.000 containers a year.³

DUNAV terminal is located in the Port of Pancevo. It started with its service in 2020. It is the first three modal terminal in Serbia. Its advantage in comparison to other terminals is its good traffic-geographical position, given that it is located at the intersection of two Pan-European corridors, Rhine-Main-Danube and road-railway corridor X, as well as at a distance of only 14 km from Belgrade. The current annual capacity of the terminal is 8,000 TEU with the possibility of expansion.⁴

The bottlenecks identified are the low speed on the existing railway infrastructure and the short length of the electrified line. The installed safety system has been in operation for over 40 years, which means that the devices are technologically outdated, and it is very difficult to find adequate spare parts. Due to the size of the network and the amount of necessary investment projects are listed according to their priority.

SLOVAKIA

All transportation, services and dispatch for both ports is being handled by SPaP, port operator by request.

UKRAINE

Port of Reni

The length of railway lines inside the port of Reni is 13.4 km. At the moment, the port handles 3-4 trains (160-220 wagons) per day. Since the railway is not electrified, the movement is provided by diesel locomotives. Time to the destination - marshalling yards of the Moldavian railway - 40 minutes (~ 20 km of tracks).

At the same time, the port of Reni can unload 600 wagons and load 100 wagons per day. The volumes of cargo transshipment of the Reni port are currently significantly reduced due to the reorientation of cargo flows of Russian oil products, chemical and mineral fertilizers to European ports, as well as uncompetitive tariffs for the carriage of goods by rail to the port, as, due to the lack of an access railway, goods are transported through the territories of Transnistria and the Republic of Moldova, which increases the cost of transportation by an average of \$5 per ton.

Port of Izmail

It is technically possible to provide an average Odessa-Izmail train's speed not less than 70 km/h. Station Artsyz, see fig. 2, currently - a junction on the line towards Izmail. There is a revolving

² [Intermodalni terminal | NELT](#)

³ [Container transport Leget \(Container transport Leget\)](#)

⁴ [Novi intermodalni terminal na Luci Dunav u Pančevu - Dry Port Terminals - logistikaitransport.com](#)

locomotive depot, in which mainline and shunting diesel locomotives are based, serving an almost 200-kilometer section of the non-electrified railway from Bilhorod-Dnistrovskiyi to Izmail with a dead-end branch to Berezino. The locomotive depot serves all diesel locomotives operating on the non-electrified section between Bilhorod-Dnistrovskiyi and Izmail. This is about 10-12 mainline diesel locomotives and the same number of shunting ones. In Soviet times, freight trains went through the Artsiz station towards the ports of Izmail and Reni, now it is mainly intermediate in the direction of cargo transportation towards the port of Izmail. In 1997, a section of the railway between Basarabeasca and Berezino was dismantled, the volume of traffic dropped sharply and the local locomotive depot became only "turnover". Currently, the station is served by only one passenger train - "Kiev - Izmail". "Odessa – Izmail" passenger express-train was launched in November 2021. Time of destination 4-4.5 hours.

Port of Izmail has 24 internal railways. Maximum intensity of wagon processing per day - 448 units. Carriage turnover - 163520 units per year. Wagons loaded with cargo enter the port through 4 railway posts with installed ramps to check the integrity of the cargo. Cargo security is carried out by officers of the maritime security service. Check-in of goods is carried out through 4 specially equipped railway posts. Port operators have railway scales for weighing, as well as parking and parking areas for railway wagons.

Ore accounts for about ~ 77% of the port of Izmail total cargo traffic, followed by metal products ~ 17%. Products are delivered by rail from the Poltava and Krivoy Rog region`s mining and processing plants to the Izmail port, where cargo are loaded onto barges and sent along the Danube to Romania, Serbia and Austria.

The main consignors of iron ore to the seaport of Izmail in 2020 were the iron ore enterprises of Krivoy Rog (stations Grekovataya and Terny - 541.9 thousand tons and 468.3 thousand tons, respectively) and the Poltava region (station Zolotnishino - 674.1 thousand tons).

The Izmail port receives barges with metal products from Zaporozhye along the Dnieper to the Black Sea, and then along the Danube to the port of Izmail. Previously, railroad transport was used to deliver goods from Zaporozhye. Steel products are sent both for export and for the domestic market.

4.3 Conclusions on the existing rail infrastructure connections

AUSTRIA

Ennshafen Port

According to the information given above one can say that the existing rail infrastructure in Ennshafen port is well developed and state of the art. Mid-term improvement measures are under consideration, therefore an interesting list of planned projects are in the pipeline to further improve the status-quo. Most of these projects deal with investments regarding future demands regarding alternative fuelling of cargo business, fulfilment of Green Deal approaches by modernisation of infrastructure and optimization of existing status both for railway and waterway transport. This project list is not finished, some projects are in detailed investigation now and will be developed or changed to upcoming new demands of decarbonizing and market developments.

One topic which has been described in project DAPhNE is „the connection of the Danube region in or near Austria“ with the developments of BRI (belt and road initiative / broad gauge railway) – some discussions are under development.

Port of Vienna

The above information leads to the following conclusion, that the existing rail infrastructure in the Port of Vienna is very well developed and state of the art in the means of technology and connectivity. In the medium term, an expansion of the container terminal will be realized. Another container depot will be built in order to be able to better represent the booming business of craneable trailers. In addition, various cooperation's are planned, as well as the participation in further national and international research projects. Focus on, international networking and renewable energies, as well as investments with regard to future requirements concerning the alternative fuelling of freight traffic, the fulfilment of green deal approaches through the modernization of the infrastructure and the optimization of the existing status quo. Some projects are currently under detailed study and will be further developed or adapted to upcoming new decarbonisation requirements and market developments.

BULGARIA

Both Ruse and Lom are generally well-equipped to handle cargo coming to/departing from the two cities (and their respective ports) by rail. Their connections to the national rail network are electrified, have a standard track gauge of 1435 mm and support an axle load of 22.5 tons, which meets most of the requirements set in Regulation (EU) 1315/2013.

The National Railway Infrastructure Company has set its goals for the 2019-2024 period, outlined in their Programme for the Development and Exploitation of the Railway Infrastructure. Some of the railway directions have been set as priority rail lines, for which the necessary actions will be performed in order to improve the rails and facilities that service them. A few of the priority railways are:

- 4th railway: Bulgarian-Romanian border – Ruse – Gorna Oryahovitsa – Stara Zagora – Dimitrovgrad – Podkova. This section is part of the core TEN-T network
- 7th railway: Mezdra – Vidin. This section is also part of the core TEN-T network in corridor Orient/East-Med and in direct connection with Lom
- 9th railway: Ruse – Kaspichan
- Regarding the planned renovations, the following activities are envisaged:
- The delivery of new heavy road and light railway machinery and equipment
- The implementation of heavy transport rails UIC60 (60E1) when renovating the railway
- Renewal of the railroad switches by implementing UIC60-type switches on the reinforced concrete railroad tie
- Starting a program for the improvement of the technical condition of railroad tunnels on the main railways

Some sections of the rail lines (among which is Ruse-Kaspichan) have exhausted their possibilities of preserving the movement speed of trains while guaranteeing safety and reliability. There are also other problems like the fact that many railways use second-hand rails, which don't meet the requirements as they are worn out and have defects, some sections have compromised rail fastening, others are highly corroded, have cracks, missing rivets etc. These are the problems, which need to be fixed in the next few years.

CROATIA

Existing railroad infrastructure enables port's everyday business flow smoothly but with certain limiting factors. These factors include lack of railroad infrastructure as well as lack of modernization incentives.

Approximately 60% of cargo transshipped in port of Vukovar is being transported via railroad connections. That amount of transportation by rail corresponds to a quantity of nearly 13,000 heavy trucks per year less on the roads around city of Vukovar. Port has three of its own tracks of 420, 445 and 483 meters long. They are located beneath the cranes and allow direct transshipment from ships to train and vice versa. For the purpose of manipulation on their own tracks, the Port of Vukovar has its own shunting locomotive and own trained machine and maneuvering staff. It can be seen from the above that the railway infrastructure is crucial for the work of the Port of Vukovar. Therefore, in the reconstruction of the tracks, 2.5 million kuna has been invested in the port itself in last couple of decades, and it is planned to invest another 2.5 million kuna soon. In the project of electrification of the Vinkovci – Vukovar line. another 500 million kunas is being invested.

One has to take into consideration the fact that Vukovar's port development hugely benefits the whole country, thus major capital investments in reconstruction and electrification are planned which would in turn ensure proper conditions for significant traffic growth as well as helping the county with positioning itself as a strong logistic and multimodal hub.

HUNGARY

The table below summarizes the rail infrastructure connection of agricultural ports and their existing services on the rail.

Table 9: Rail infrastructure connection of agricultural ports and their existing services on the rail

Port	Network infrastructure	Type of rail	Electrified or not	Single or double track	Max train length	Max train load	Max speed	Restrictions
Budapest	Connection to the branch from Budapest-Soroksári Road organizer railway station	industrial siding	not electrified	single and double tracks	700 m	60-65 tons / wagon	20 km / h	no wheelbase limit
Dunaújváros	Pusztaszabolcs – Dunaújváros – Paks line 42	industrial, siding, 1,1 km	not electrified	double track under portal cranes	6-12 wagons	60-65 tons / wagon	20 km / h	6-12 wagons can be loaded at once, due to the length of tracks
Baja	line: Bátaszék – Kiskunhalas (no. 154), sidetrack no 304 sidings: I.: 275 m II.: 275 m III.: 312 m IV.: 100 m	industrial siding	not electrified	single	350 m	210 kN	20 km/h to, 5 km/h in the port	1 train allowed to / at the loading place

Source: self-edited based on hfp.hu

ROMANIA

Port of Constanta

Currently, there are no rail regular services from Port of Constanta to the hinterland. However, there are rail transport services on demand.

The highest capacity for rail is shown by the Port of Constanta. The railway network of the Port of Constantza is in excellent connection with the national and European railway network system, the Port of Constantza being a starting and terminus point for the Pan-European Transport Corridor no. IV (Orient – Est Mediteranean) and Corridor Rhine – Danube. Round-the-clock train services carry high volumes of cargo to the most important economic areas of Romania and Eastern Europe, the Port of Constantza being also an important transport node of TRACECA Corridor, providing the connection between Europe, Caucasus and Central Asia.

Each and every port terminal has direct access to the railway system, ensuring a safe and efficient transport of cargoes. Every day shuttle trains provide fast transport of containers to the national destinations for just-in-time delivery. The total length of railways in the port amounts to 300 km.

The railway network of the Port of Constantza is in excellent connection with the national and European railway network system, the Port of Constantza being a starting and terminus point for the Pan-European Transport Corridor no. IV. The railway infrastructure comprises of six rail gates and nine rail tracks.

Port of Galati

Railway connection of the Port of Galati are quite good and make possible the access to the Romanian national rail network at the European standard gauge, and also to the large gauge standard of Ukraine and Republic of Moldova.

Port of Giurgiu

There are not rail services as rail links have been taken out. Rail connections would be needed.

Port of Drobeta Turnu-Severin

There are possible rail services on demand. However, new rail connections for the Western part of the port are needed.

SERBIA

The port of Bogojevo and port Bačka Palanka are not connected to the national railway network. Plans for the expansion of these two ports should include railway infrastructure, as well as their connection to the national railway network. Links could be made at the relatively close distance, in Bogojevo only 2,5km and in Backa Palanka 5km.

The port of Prahovo is connected to the national railways. There is a well-developed rail infrastructure with several industrial tracks within the port, and the whole existing complex is connected to the Serbian Railways system and the international rail network. The port is arranged with three parallel tracks, which gives the possibility of simultaneous processing of 160 wagons. Port of Prahovo has a connection with two railway sections: Crveni Krst-Zaječar-Prahovo pristanište section and Bor teretna-Prahovo pristanište section. Crveni Krst-Zaječar-Prahovo pristanište section connects port with Bulgaria, while Bor teretna-Prahovo pristanište section connects port with Belgrade and further

with Hungary. Though, reconstruction of port railway tracks should be considered, alongside with the ongoing projects of revitalisation of national railway magistral sections which are accessing port.

SLOVAKIA

Both port, port of Bratislava and port of Komárno were constructed to serve the purpose of hubs for intense transshipment what required sufficient connections to railway. However, decades of underfunding and only the most necessary maintenance result in the need for significant investment in order to develop ports in future. Both ports, Bratislava and Komárno are part of TEN-T Core Network, but the fact that rails inside ports are owned by private company restricts access to public / EU funding opportunities. For current level of transshipment provided, railways inside the port area serve their purpose.

UKRAINE

Port of Reni

- The only railway connection with Reni runs through Moldova (a section of more than 292 km), which means that the port is highly dependent on the tariff policy followed by Moldovan Railways. Moreover, the situation worsened during the period of tense relations between the authorities of Moldova and Transnistria, which in 2006, for example, led to interruptions in the delivery of goods to Reni from March to September, and as a result, to the introduction of an additional duty (up to \$1.5 US dollars per ton) for travel through Transnistria. The construction of a direct railway line connecting Reni with the Ukrainian rail network via Izmail is a priority task for the survival and future development of the port of Reni.

Port of Izmail

- The restoration of the railway from Izmail to Basarabeasca will open up a number of economic and geopolitical advantages for Ukraine and Moldova.
- The electrification of the Izmail-Belhorod-Dnistrovskyi railway will reduce the cost of transporting goods to/from Izmail port and reduce time of its delivery.

5 Existing and status of the road infrastructure connection and existing/possible services on the road

Based on the reports D.T 1.1.1., D.T 2.2.1. and D.T 3.2.3. the followings can be stated regarding the existing road infrastructure connections of ports concerning how they are linked to the national and international network. Below, the currently available road services are summarized.

5.1 Identification and presentation of the existing road network connections to the ports

AUSTRIA

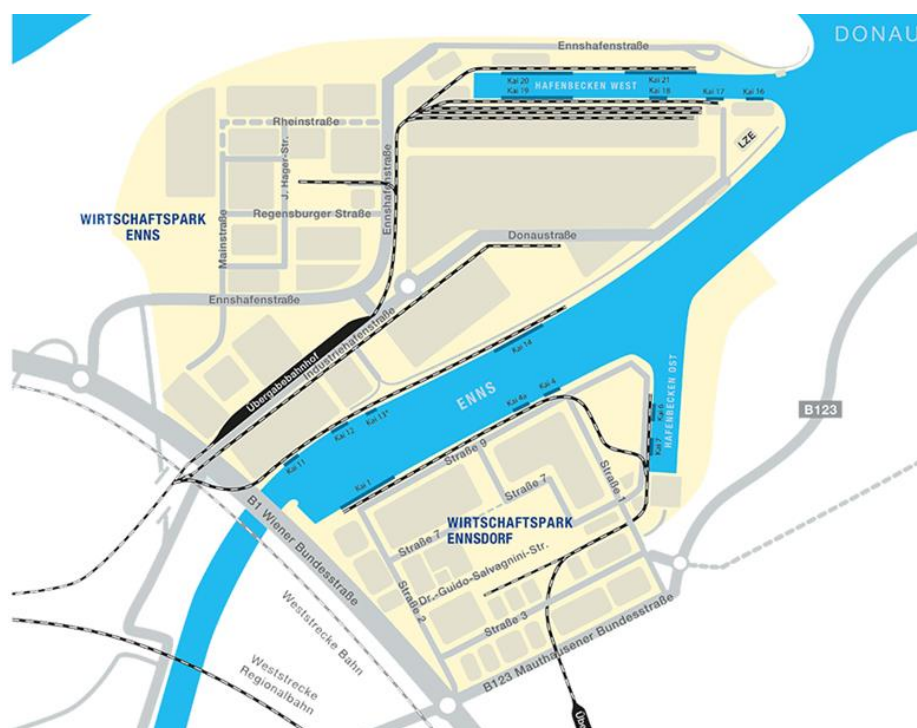
Ennshafen Port

Network structure Ennshafen port

The whole port area has six road entrances, each with double lines. There are also two main rail entrances accessing the port area from two different sides. Within the port area, there is a system of internal rail network with about 30 km total length.

With its 6 road entrances (double lines), there is possibility of direct accesses to motorways and main roads that can boost international logistics operations and local businesses.

Figure 28: Network structure Ennshafen port



Port of Vienna

Hafen Wien operates the largest free port in Austria. There are modern warehouses and well trained and equipped staff for the storage and handling of customs and domestic goods as well as a customs office for rapid clearance. The site is guarded round the clock and feeder roads are exempt from the night driving ban in Vienna. The three harbours on the Danube in Vienna are notable for their modern

handling facilities, excellent infrastructure and dependable, well trained workers, ensuring the reliable and rapid handling of all goods, be they building materials, containers, general cargo or bulk goods.

Connection via road between Port of Vienna and other freight terminals includes B14 Freudenuer Hafenstraße along the port, A4 Ost Autobahn (East Highway connection), S1 Wiener Außenring Schnellstraße; East and South and 3 km of A23 Südosttangente; North and West. Total number of road entrances to port is four (including a passenger terminal), with eight road lanes in total.

All other items regarding “road connections of Port of Vienna as well as loading/unloading equipment and infrastructure characteristics” are described in DIONYSUS D.T 2.2.1.

BULGARIA

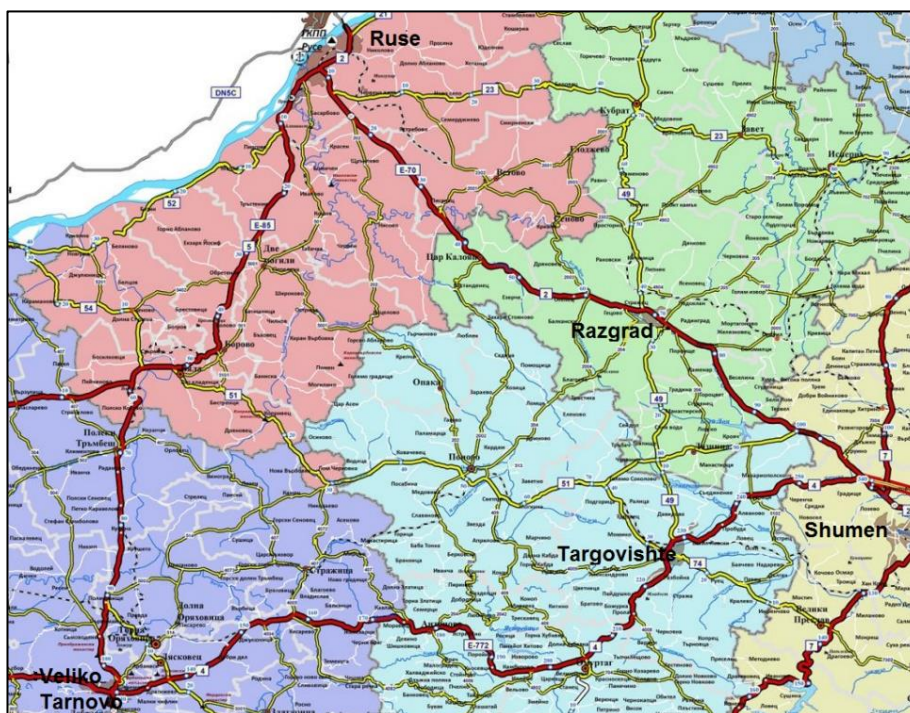
This section provides information on the current status of the road infrastructure near the ports in Ruse and Lom, as well as general information on the connectivity of the two cities and their respective ports to the hinterland. The availability of a well-developed road infrastructure is essential and is one of the main prerequisites to transforming a region into an intermodal hub. It is therefore important to establish which are the main road arteries that connect the ports in the two cities to other economic centers in Bulgaria, what their condition is, what traffic do they attract currently and what are the possibilities for the future.

The North Central region, where the Port of Ruse is located, has the highest overall density of the road network, which is due to the well-developed regional network, but it still has no finished highways. Transit flows move away from first-class roads and the regional road network often has to take over their functions as well. In the North West region, where the Port of Lom is located, the low amount of constructed roads is mainly due to the poorly developed high-class road network.

Port of Ruse

Ruse has several first-class, second-class, as well as third-class roads, which connect the port and the city with the rest of the country via the national road network.

Figure 29: Ruse - road connectivity to the hinterland



Source: (<http://www.api.bg>)

The status of the road connectivity is presented in the table below:

Table 10: Ruse – roads by type and length

Road	Type	Road code	Length within the borders of the municipality (in km.)
Border with Romania – Ruse – Tsar Kaloyan – Razgrad – Shumen – Varna	Republic road – first class	I-2 (E70)	17.400
Ruse – Byala – Veliko Tarnovo – bypass Debelets – Gabrovo – Shipka – Kazanlak – bypass Stara Zagora – Haskovo – Kardzhali – Makaza	Republic road – first class	I-5 (E85)	12.700
Ruse – bypass Tutrakan – bypass Silistra	Republic road – second class	II-21	12.810
Ruse – Tsar Kaloyan – Chervena Voda – Kubrat – Ispereh – Okorsh – Oven – bypass Dulovo – bypass Shumen	Republic road – second class	II-23	31.761
Ruse – Byala – Mechka – Novgrad – Svishtov – Nikopol	Republic road – second class	II-52	0.200
Ruse – Ivanovo – Dve Mogili – Byala	Republic road – third class	III-501	10.400
Chervena Voda – Semerdzhievo – Vetovo – Senovo – Prostorno – bypass Razgrad – bypass Kubrat	Republic road – third class	III-2302	10.580

Source: (<https://obshtinaruse.bg>)

There are two first-class, three second-class and two third-class roads connecting the Ruse region with the hinterland. The condition of these roads can vary, but most of them (including the first-class roads) are determined by the Road Infrastructure Agency to be between average and bad. The only road, whose condition is assessed to be entirely good, is road II-21. The condition of the others changes, depending on the section of the road.

The total length of the republic road network on the territory of the Ruse municipality is approximately 96 km. The municipal road network adds another 98.040 km. to the overall length of the roads in the Ruse region.

The two first-class roads, which cross the Ruse region, are Republic roads I-2 and I-5 and since they are the two major links of the region to the hinterland, it is beneficial to look at them in a bit more detail.

The Ruse-Makaza road, also known as Republic road I-5, is part of European road E85. In fact, I-5 follows the E85 road from Ruse to Haskovo. It is a first-class road. Since the road is essentially an “express highway”, the maximum allowed speed is 120 km/h. There is one lane in each direction – two overall. The maximum load per axle for trucks is 24 tons per axle.

The Ruse-Varna road, also known as Republic road I-2, is one of the major roads in Northeastern Bulgaria. It connects the city of Ruse with Varna and is part of the European road E70. Between Ruse

and Shumen the road has been expanded to a 3-lane single carriageway. From Shumen to Varna, it is a 2-lane road. When the road reaches the village of Belokopitovo, it starts running parallel to the Hemus motorway and intersects it on two occasions. Since the road is an express highway, the maximum allowed speed is 120 km/h. The maximum load per axle for trucks is 24 tons per axle.

These roads from the republican road network are essential for the Ruse municipality because they provide transport and communication links with the neighbouring municipalities, major regional cities - Varna and Veliko Tarnovo, as well as with the capital of the Republic of Bulgaria - Sofia. It is also very important for the connectivity of the region that the Danube Bridge between Ruse and Giurgiu links the municipal road infrastructure with the one in Romania, which is highly beneficial not only for the port in Ruse, but for the region as a whole.

There is a project, which is currently still in development, but once it is completed – it will be a step forward in increasing the region’s connectivity. The project in question is the construction of the Ruse – Veliko Tarnovo motorway. The section between these two cities is part of European transport corridor 9. The implementation of the project will contribute to the construction of the Rhine-Danube and Orient/Eastern Mediterranean trans-European Transport Corridors in the North-South direction.

With the implementation of the project, a highway with an approximate length of 133 km. will be built. The route is divided into 3 sections: Ruse-Byala; bypass of Byala; Byala - Veliko Tarnovo. The latest forecasts by the interim Minister of Regional Development are for the construction of the highway to begin in 2022 and to be finished in 2027. The technical project is still not completed in its final variant and has not been submitted in the Ministry of Regional Development and Public Works for attaining a building permit.

Port of Lom

Regarding the connectivity of Port of Lom with the country’s road infrastructure, the most direct connection of the port with the districts of Montana, Vidin and Sofia, as well as with the Danube Bridge 2, is realized through a second-class national road №81 to Sofia. The connection with international road E79 is made via a first-class road through the city of Montana. The port also has good connections with the other settlements in the Lom municipality. A new cargo entry for light and heavy vehicles into the territory of the port was built in 2018. Additional improvements included a big parking, a fence, a portal, a control checkpoint, etc.

The road connectivity of Lom with the neighboring municipalities, regions and the hinterland in general is done only via second- and third-class roads.

Figure 30: Lom - road connectivity to the hinterland



Source: (<http://www.api.bg>)

The different republic and municipal roads on its territory are listed in the table below:

Table 11: Lom - roads by type and length

Road	Type	Road code	Length within the borders of the municipality (in km.)
Vidin (Dobri Dol) – Lom - Kozloduy	Republic road – second class	II-11	40.633
Montana – Pishurka – Rasovo - Lom	Republic road – second class	II-81	11.973
Lom – St. mahala – Dondukovo - Vidin	Republic road – third class	III-114	12.700
Vratsa – Valchedram – Mokresh – II-81	Republic road – third class	III-133	7.749
Road node in Lom for Republic road II-11	N/A	N/A	1.636

Source: (<https://www.lom.bg/>)

The total length of the republic road network on the territory of the Lom municipality is approximately 75 km. The municipal road network adds another 56 km. to the overall length of the roads in the Lom region.

Although there are no motorways and first-class roads passing through the municipality of Lom, there is a second-class road (II-81), which connects Lom with the Bulgarian capital Sofia. Its length is 149 km. The II-81 crosses the European road E79 at the city of Montana.

Another road, which passes through the municipality of Lom (and through the center of the city as well), is II-11 – Vidin-Lom-Kozloduy. Its length is 216.9 km, which makes it the second longest second-class road in Bulgaria.

The majority of the roads, which connect the city of Lom to the neighboring settlements, are two-lane roads (one in each direction).

The main road in the area near Lom is Vidin-Kulata, also known as Republican road I-1, part of European road E79. It is a first-class road, which starts at Vidin and reaches the Greek border at the Kulata border checkpoint. This road does not pass through Lom, but the city is connected to it via the II-81 second-class road. Some parts of the road are interconnected with the Hemus and Struma motorways, therefore the maximum speed allowed in those parts is 140 km/h. Otherwise, the allowed speed in the other sections is 120 km/h. With the exception of the motorway interconnection, the road has two lanes – one in each direction.

There are a few roads, which are currently in the planning stages. If they are built, that would greatly reduce the traffic of heavy cargo vehicles in the city of Lom and instead move it to the republic roads.

The main suggestion is for a bypass to be built around the city of Lom, whose goal would be to accommodate the traffic to and from Vidin, Ruzhintsi, Montana, Yakimovo, Valchedram and Kozloduy.

CROATIA

Road infrastructure was mostly developed until the Homeland War, when Vukovar-Srijem County was an important transport and logistics center. In the Vukovar – Srijem County area there are four exits of the A3 motorway (Babina Greda, Županja, Vrbanja and Lipovac).

Cities Ilok, Otok, Vinkovci, Vukovar and Županja are interconnected by state roads, while other populated places within the county are connected by local and county roads and also some of them with state roads. Due to the relocation of heavy freight traffic, faster flow of vehicles in transit and increase in traffic safety segment, bypasses are needed around the towns of Vinkovci, Vukovar and Ilok (e.g., corridor of the state road D2 passes through the center of the city of Vukovar).

The projects are currently being prepared while some of the construction projects have already started, and some sections have already been built and are in use within the operations performing on public road networks. Corridor X has well-built highways. In addition, connections to the corridor X are well-built federal roads, so along Corridor X one can speak of good transport network. Corridor Vc is also a motorway, so a high standard and quality is ensured here as well. The Port of Vukovar is located near the intersection of Corridor X and Corridor Vc and thus benefits from well-built road infrastructure.

HUNGARY

Budapest

As regards road connection, Freeport is accessible on highways M1 from Austria, M7 from Croatia, Slovenia, M6 from the south, M5 from Serbia, Romania and M3 from the east, using the ring-road, M0 as well. Trucks can approach the port from the highways via either M0 – M51 – Ócsai Road/Grassalkovics Road/Helsinki Road (on the Pest side by the river) – Gubacsi bridge, or M0 – II. Ráckóczi Ferenc Road (through Csepel downtown) – Weiss Manfréd Road, or from the city through Kvassay Jenő Bridge.

The three presented ports are connected via two ways. Neither of them includes only sections belonging to the TEN-T corridors. Moreover, only one section per option belongs to TEN-T road corridors and they are the first in row of sections starting from Budapest in both options. Other sections are A and M motorways or local roads.

The closest north-west highway ports of Dunaújváros and Baja are connected to is M6. It is almost parallel with the Danube. East-west road connections are provided by M8 bridge near Dunaújváros and M9 motorway between Paks and Baja. Hence, destinations from the biggest ports are the eastern and western regions of the country and neighboring states.

The construction of the New Danube Bridge (in the area of Galvani Street) has the priority objective of promoting traffic calming in the city centre and the development of South Budapest as an area with significant potential, including large areas of brownfield sites.

As a result of the development, a 30% reduction in traffic is expected on Lánchíd, Erzsébet Bridge and Szabadság híd and a 10% reduction on Petőfi Bridge, which can be complemented by additional traffic calming measures under the responsibility of the Municipality of Budapest, thus allowing the bridge to relieve the city centre of up to 50 000 cars per day.

The planned technical parameters of the bridge:

- Length: 529 m
- Navigation: 180 m wide navigation clearance below the embankment opening, 9.5 m high navigation clearance above the maximum navigable water level

- Traffic lane: 2x 3.5 m wide traffic lane on both sides of the bridge, 2x 3.5 m wide bus/train lane, design speed 50 km/h
- Pedestrian lane: 2x 1.5m wide pedestrian lane on both sides of the bridge
- Cycle lane: 2x 2,6 m wide cycle lanes on both sides of the bridge

Csepel backbone infrastructure – Phase II:

The entire section of the backbone road will be designed by BKK Zrt. and the construction is expected to be carried out by NIF Zrt. The primary design criterion is that 40-tonne trucks should not approach the industrial and logistics areas of Csepel and the M0 ring road via the II. Rákóczi Ferenc Road, but via an unpopulated route. Preparatory work is currently underway, with the plan expected to be completed by 2023 and construction to start in 2024. The aim is to make transport more livable for Csepel residents, and some 12 transport interchanges and an intelligent transport system will be developed. BKK Zrt. has requested the Ministry of Innovation and Technology to include the development of the Csepel Spine Road among the national economic priority projects.

Dunaújváros

The port of Dunaújváros is 3-4 km away from the M6 highway and 70 km from Budapest on the right riverbank. East-West connection is provided by M8 motorway and Danube Bridge that is 12 km away.

On the road, it is affected by the M6 motorway and the constantly expanding M8 motorway, and it is also connected to important cities such as Székesfehérvár, via main road number 6. The M6 motorway runs south along the right bank of the Danube, connecting Budapest with Pécs, the capital of Baranya. The section between Budapest and Dunaújváros was opened in 2006 and the section between Dunaújváros and Bóly in 2010. Its current total length is 193 km. The main road 6 is a Hungarian first-class main road connecting Budapest with the southernmost region of Hungary, South Transdanubia (Dél-Dunántúl), with a total length of 262 km. The M8 motorway is currently a planned 2x2-lane (+ parking lane) motorway, with some sections under design and pre-construction, and a smaller part of the motorway will include the existing 2x2-lane sections of the existing Highway 8. The road will help to connect the country east-west, with two intended end points at Balatonfőkajár and Abony.

Development of the M8 between M7 – Dunaújváros and Dunavecse – Kecskemét:

The preparation of the M8 motorway between the M7 motorway - Dunaújváros (M6) junction and the Dunavecse - Kecskemét (M5) section is underway, which can be upgraded to a 2x2-lane motorway with a 20 m wide crown width and a dividing lane. This will also fulfil the planned function of the Pentele Bridge in Dunaújváros, connecting the east-west parts of the country.

Baja

The port of Baja is located on the left bank of the Danube, to the right from the city of Baja. The port's east-west connection is provided by main road 55, north-south connection is provided by main road 51. Main road 55 connects highway M6 in 20 km at Bátaszék, and links highway M5 at Szeged, 120 km away from Baja.

M9 motorway can be reached in 30 km on main road 51, while Budapest and the M0 motorway are 140 km away. Serbian border can be reached in 30 km on main road 51. The bypass road around the inner area of Baja connects the 51 and 55. The Danube Bridge on the main road is called Türr István Bridge. Port exploration IV. Károly quay was renovated in 2012 while Gránátos street was reconstructed in 2015.

Development of main road No. 51 between M9 motorway – Baja, with the construction of a bypass road between Sükösd and Érsekcsanád:

Reinforcement of the section of motorway 51 from the M9 motorway junction to the junction of motorways 55 – 551 to 115 kN axle load. Implementation of a 2 x 1 lane main road on a new route bypassing the municipalities of Sükösd and Érsekcsanád on the agreed preparatory study.

Development of the section of the main road No. 55 between Baja and Pörböly, with the construction of a parallel cycle path:

Reinforcement of the existing track of the main road No. 55 from the junction of roads No. 51 and 551 in Baja to the railway crossing in front of Pörböly, currently 9.6 km long, to a 115 kN axle load, and the renovation of the Türr István Danube Bridge in Baja without a permit.

Preparation of the Baja – Zombor – main road No. 51 Baja-Hercegszántó – border section:

For the southern bypass section of Baja, an Environmental Impact Assessment will be prepared, for the section of the main road 51 Baja - Hercegszántó - border the task is to prepare a Feasibility Study, Environmental Impact Assessment and permit plan.

The authorisation plan includes the reinforcement of the pavement of the main road No 51 for an axle load of 11.5 tonnes, the design of a new route for the bypass of Nagybaracska and the design of a cycle path parallel to the main road.

ROMANIA

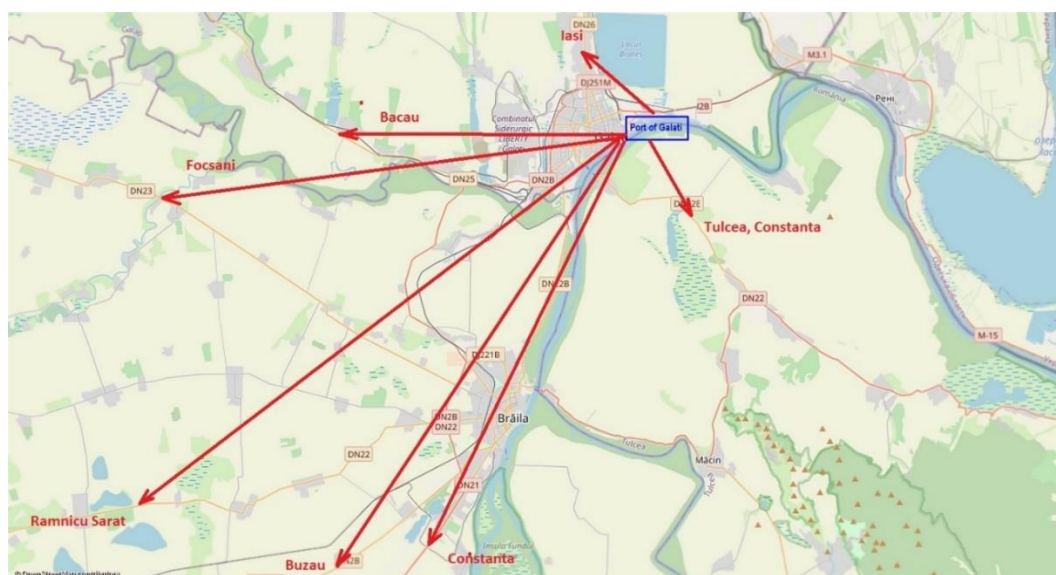
Port of Constanta

Road - The ten gates of the Port of Constantza are very well connected with the national and European road network. The connection with the Pan-European Transport Corridor no. IV has a strategic importance, linking the Port of Constantza with the landlocked countries from Central and Eastern Europe. The total length of roads in the port amounts to 100 km. The A2 motorway, nicknamed The Sun's Motorway ("Autostrada Soarelui" in Romanian), is linking Bucharest to city port Constanta and has a length of 203 km.

Port of Galati

Galati port is well connected to the national road network, with direct access on DN2B. The plot below shows the main road connections in Romania.

Figure 31: Road connections Port of Galati



The access to the Port of Constanta will be enhanced by the new bridge over the Danube in Braila, under construction.

All national roads are 2 lanes, thus the speed and capacity are under the motorway performance.

Port of Giurgiu

Road connections of the Port of Giurgiu are as follows:

- E 20 Bucuresti - Giurgiu - Russe
- DN 41 Giurgiu - Oltenita
- DN 5C Giurgiu - Zimnicea

Bucharest – Giurgiu road connection is a 4-lane express road, thus with a good capacity and access time.

Port of Drobeta Turnu Severin

Road connections of Drobeta Turnu Severin port are as follows:

- DN 6 /E 94 Bucuresti - Dr.Tr.Severin (339 Km) - Timisoara (219 Km)
- DN 67 Dr.Tr.Severin - Targu Jiu (85 Km)
- DN 56A Dr.Tr.Severin - Calafat (103 Km)

All national roads are 2 lanes, thus the capacity and speed are under the motorway performance.

SERBIA

Roads in Serbia are the backbone of its transportation system and an important part of the European road network.

Road network in Serbia has an approximate total length of 45.000 km, including approximately 800 km of highways, 5.000 km of first-level state roads, 11.000 km of second-level state roads and over 25.000 km of local roads.

On the territory Republic of Serbia there are 16.844 km of I and II category state roads:

I A category state roads (motorways) – 962 km (September 2019);

I B category state roads – 4.517 km;

II A category state roads – 7.903 km;

II B category state roads – 3.462 km.

Motorways are categorized as state roads, class IA, and are marked with one-digit numbers (the "A1", "A2", "A3" ... are designations coming from "autoput", the Serbian word for motorway). Currently there are five motorways in Serbia: "A1", "A2", "A3" and "A4" – 962 km of motorways in total. Motorways in Serbia have three lanes in each direction (including the hard shoulder), signs are white-on-green, and the normal speed limit is 130 km per hour.

Over 300 kilometres of new motorways have been constructed in the last decade. In addition, there are another 260 km of expressway and motorways under construction including: A5 motorway (from Pojate to Preljina), 30 km-long segment of A2 (between Čačak and Požega), 18 kilometres section

between Kuzmin and Sremska Rača, and 21 kilometres between Ruma and Šabac. Further plans include construction of 768 km of expressway and motorways.

The following European routes pass through Serbia:

- **E65:** Rožaje (Montenegro) – Tutin – Mitrovica – Pristina – Elez Han (Kosovo) – Skopje (North Macedonia).

- **E70:** Slavonski Brod (Croatia) – Šid – Belgrade – Vršac – Timișoara (Romania).

section between Belgrade and border with Croatia is built to motorway standards.

- **E75:** Szeged (Hungary) – Subotica – Novi Sad – Beška Bridge – Belgrade – Niš – Leskovac – Vranje – Preševo – Kumanovo (North Macedonia).

section from border with Hungary to border with Northern Macedonia is built to motorway standards.

- **E80:** Rožaje (Montenegro) – Peć – Priština, Kosovo – Prokuplje – Niš – Niška Banja – Pirot – Dimitrovgrad – Sofia (Bulgaria).

section between Niš and border with Bulgaria is built to motorway standards.

- **E662:** Subotica – Sombor – Bezdan – Osijek (Croatia).

- **E761:** Sarajevo (Bosnia and Herzegovina) – Užice – Čačak – Kraljevo – Kruševac – Pojate – Paraćin – Zaječar.

section between Pojate and Paraćin is built to motorway standards and connected with E75.

- **E763:** Belgrade – Čačak – Nova Varoš – Bijelo Polje (Montenegro).

section between Belgrade and Preljina is built to motorway standards.

- **E771:** Drobeta-Turnu Severin (Romania) – Zaječar – Niš.

PE "Roads of Serbia" performs management of I and II category state roads in the Republic of Serbia. Roads are state property and therefore state roads management is an activity of general interest.

Road Corridor X

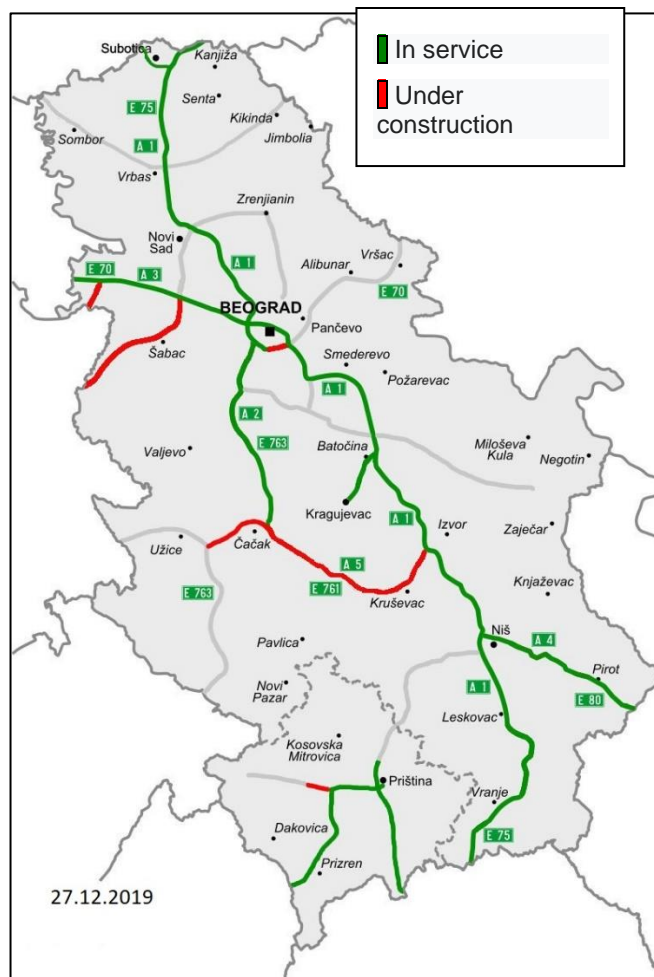
The total length of roads belonging to Corridor X running in the territory of the Republic of Serbia is 792 km.

Works on Corridor X running in the territory of the Republic Serbia are organized under 5 projects:

- Project North E-75 from border crossing Horgoš to Novi Sad, (including Y fork of 23,6 Km that runs from Kelebija towards Subotica South Loop,) of the length 108 km.
- Project Main axle of Corridor X E-70 section from Belgrade –Junction Bubanj potok to border crossing with Croatia, of the length of 121,1 km. and E-75 from Belgrade –Junction Bubanj potok to Nis of the length of 237,0 km.
- Project South E-75, south fork from Nis to the border with The Republic of Macedonia, Grabovnica – Levosoje, of the length of 74 km;
- Project East E-80, from Nis to the border with The Republic of Bulgaria 86.9 km;

- Project Belgrade Bypass Ring road to detour transit traffic from Belgrade Municipal Center by connecting existing highways and highways under construction and international roads leading from Belgrade to borders with Hungary, Croatia, Montenegro, Bulgaria, Macedonia and Romania in the length of 47 km, including six interconnecting junctions.

Figure 32: Motorways network in Serbia⁵



Port of Bogojevo

The micro-location of the existing port of Bogojevo is defined by the exit to the water body of the international waterway of the Danube River, with the existing infrastructure and superstructure capacities on the mainland part of the port.

On the northeast side, the micro-location is limited by the existing state road IIA row No. 107, Sombor - Apatin - Bogojevo, while on the southeast side there is a road and next to it a railway bridge over the Danube, towards the Republic of Croatia. State road No. 107 is located on the embankment and the defensive line from the flood waters of the Danube. Right next to the road bridge is the border crossing Bogojevo, with minimal capacities and facilities for control and transfer of passengers and freight

⁵ https://en.wikipedia.org/wiki/Motorways_in_Serbia

vehicles. The northwest side of the site of the port of Bogojevo is limited by an uncategorized road and the border of the municipality of Odzaci with the municipality of Apatin (cadastral municipality Sonta).

The port complex is surrounded by the main road Bogojevo-Erdut in the east, regional road Bogojevo-Senta in the north and local road in the west. The port is connected with the regional road Bogojevo-Apatin-Sombor-Subotica, as well as with the section Bogojevo-Odžaci-Sombor of the main road No. 3, which passes through Serbia.

Across the road bridge the port is connected to the section of road No. 3 Erdut-Dalj-Osijek in Croatia. The main road corridor is the main road that turns from the bridge from Croatia to the narrower city zone of Bogojevo, enters the center as a city road and then exits again as a main road in the northeast direction towards Odžaci.

The port is connected with the regional road Bogojevo – Subotica-state border Kelebia. Port of Bogojevo is connected to Kelebija with road IB. Roads categorized as state roads, class IB are 4,481 km in total length and are marked with two-digit numbers. They have one lane at the each direction, signs are black-on-yellow and the normal speed limit is 80 km/h. Mentioned regional road is divided into 3 sections: Section Bogojevo-Srpski Miletić is road No. 17 (Total length of road No. 10.984 km), section Srpski Miletić-Subotica is road No. 12. (Total length of road No. 12 is 276km) and section Subotica-Kelebija is road No. 11 (Total length of road No. 11 is 23.677km).

The port is 40 km away from the E75 highway, in the direction Belgrade-Budapest.

Mid-Term Perspective Assessment

The existing port area, defined by the Regulation on the determination of the port area in Bogojevo ("Official Gazette of RS", No. 1/20), covers an area of 9.05 ha, while the development plan envisages the expansion of the port area by another 9.52 ha, which in total is 18.57 ha.

By expanding the capacity of the port in Bogojevo, it is planned to build new silos for grain and oilseeds, warehouses for mineral fertilizers and open and closed storage space for bulk cargo (gravel and sand) and piece goods. Due to the growing trend of container transport in international transport (primarily grain), it is planned to build a container terminal of smaller capacity.

Within the traffic infrastructure, the construction of industrial tracks and their connection with the public railway infrastructure is planned. Also, the construction of internal roads, manipulative surfaces and parking lots for trucks, tanks and cars is planned.

According to the development plans the existing route of the state road is retained and the new intersection is formed. New intersection means that the port connection and the service traffic network (with parking space) will be located directly next to the state road.

The new intersection (stationing km 37 + 251) is planned as a classic surface intersection with the intersection of traffic flows (type 3A - connection), with geometric design of the intersection in accordance with applicable standards and regulations governing the subject matter. The existing intersection (stationing km 37 + 559) is retained / redefined as a crossroads - surface intersection with intersection of traffic flows (type 3A - connection) as an entrance / exit, with the possibility of changing the type of intersection during the implementation of phase II - final planning solution), and the realization of which is conditioned by the changes in the planning documentation, which defines the traffic solution of Master Plan Bogojevo, in accordance with the valid technical regulations and standards.

Port of Bačka Palanka

The port of Bačka Palanka is 30 km away from the E70 highway, direction Belgrade-Zagreb, and 45 km from the E75 highway, direction Belgrade-Budapest. The route of the E70 highway is Slavonski Brod (Croatia) - Šid - Belgrade - Vrsac - Timisoara (Romania) and route of the E75 highway is Szeged (Hungary) – Subotica – Novi Sad – Beška Bridge – Belgrade – Nis – Leskovac – Vranje – Preševo – Kumanovo (North Macedonia).

There are two state roads near the Port of Bačka Palanka of IB class which extend to the borders of Bosnia and Herzegovina and Romania: state road No. 19 connecting Port Bačka Palanka with Bosnia and Herzegovina at Sremska Rača (Neštin-Erdevik-Kuzmin-Sremska Raca) and state road No. 12 connecting Port Bačka Palanka with Romania (Subotica - Sombor - Odžaci - Bačka Palanka - Novi Sad - Zrenjanin - Zitiste - Nova Crnja - state border with Romania –border crossing Srpska Crnja). The port of Bačka Palanka is connected to Romania (border Srpska Crnja) with road No. 12 and belongs to IB.

Section Bačka Palanka – Neštin (State Road No. 12) is unconstructed, while Neštin – Erdevik section is planned to be fully constructed – currently there are 7.262 km of unconstructed part of this section.

Also, one road No. 108 is connecting Port of Bačka Palanka with Croatia: - Bačka Topola - Kula - Despotovo - Silbas - Gajdobra - Bačka Palanka – state border with Croatia (border crossing Backa Palanka). This road belongs to IIA State roads, class IIA, which are marked with three-digit numbers, with the first digit being 1 or 2. The total length of these roads is 7781 km. Allowed axle load for trucks it is not conditioned based on the road category but based on the number of axles on truck. For trucks with one axle it is allowed to load 10 tonnes, for trucks with 2 axles 9 tonnes, due to that the allowed axle load is the same on roads IIA and IB.

An important direction of regional and inter-municipal connection on the territory of the municipality of Bačka Palanka (to which Port of Bačka Palanka belongs) are also state roads of the IIB class order:

- No. 306: Gajdobra - Čelarevo (state road of IIB class with label 306).
- other roads of IIB class with the following directions:
- Bačko Novo Selo - Bac - Ratkovo - Silbas - Bački Petrovac- Novi Sad (No. 111);
- Odžaci - Pivnice - Despotovo - Zmajev - Sirig - Temerin – Žabalj (No. 112);
- (Croatian border) - Neštin - Susek - Beočin - Novi Sad (No. 119).

The existing crossing of road/railway infrastructure (bridge) with the corridor of the waterway E80 - Danube near Port of Bačka Palanka is the crossing Bačka Palanka -Ilok which is defined at km 1,297.

Mid-Term Perspective Assessment

The port of Bačka Palanka has a favourable spatial micro-location because it is directly connected to Corridor 10, i.e. with relevant traffic corridors in the vicinity of the E-75 highway (30-40km) and the E-70 highway (35km).

The port of Bačka Palanka is located in the south-eastern working zone within block 106 and it is currently connected to the environment via an access road - a collection road in the industrial zone. This traffic capacity connects port area with the state road of 2 rows - the main road Bačka Palanka - Novi Sad, which enables spatial connections with the environment and connects the port to network of roads of different hierarchical levels in Vojvodina. This access road, with its constant construction, enables accessibility to all road transport structures, and in the future, it will be in the same function of accumulating its internal traffic in this area.

Port of Prahovo

Prahovo is connected by about 50 km of road to Vidin in Bulgaria, and Calafat in Romania, both of which are important road and rail hubs on European Corridor 4.

A 150km highway also connects it to European Corridor 10, which links Serbia to other European countries.

State road of class IIB No. 400 connects Port of Prahovo with the State road 35 - Dušanovac - Border with Romania near Kusjak.

Mid-Term Perspective Assessment

The concept of traffic separation at the location of the Port of Prahovo is based on the permanent route of the State Road IIB-400, Negotin - Radujevac - Prahovo - Samarinovac.

Two connections of the port road to the state road are planned. In accordance with the plans, the existing main access road will represent one connection, while the other connection is planned at the beginning of the second access road, at km 16 + 689.00 (on the right side in the direction of stationary growth) of the state road IIB order number 400.

The planned concept of road and network in the port area is based on the following principles:

- reconstruction along the existing routes of roads and street routes on the primary network, which will enable greater functionality of the primary network;
- fitting the traffic matrix into the spatial development of urban zones and wholes, i.e. the planned purpose of the areas;
- planning of leveled intersections of road and railway traffic.

SLOVAKIA

Port of Bratislava

In the Winter port, asphalt and concrete road communications were built in 1965-1973. In Pálenisko basin, road communications were continuously built between 1983-1984 and 1990-1993. The current shape of road traffic is inadequate, since premise did not generate sufficient funds for the owner and maintenance was performed only in necessary / emergency cases. Maximum speed inside the port is limited to 30 km/h.

Figure 33: Port Communication in Winter port (port of Bratislava)



Figure 34: Port Communication in Pálenisko basin (port of Bratislava)

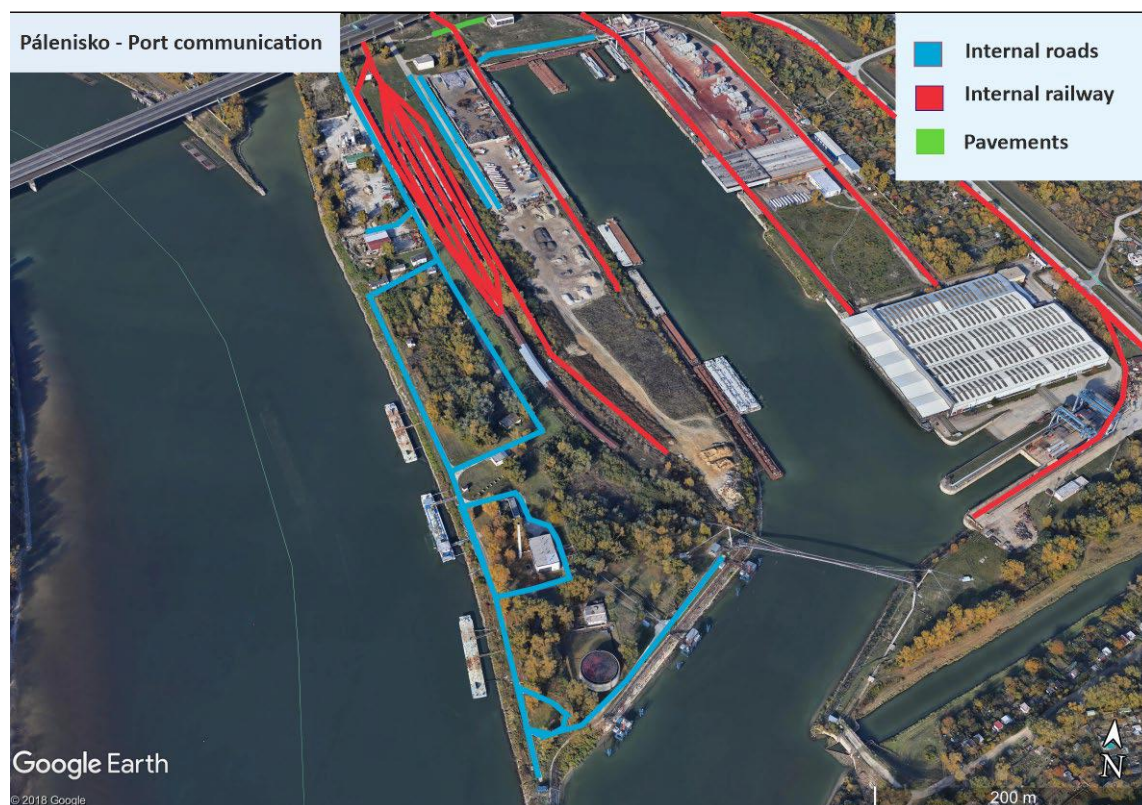


Figure 35: Road Infrastructure Capacity for Bulk Cargo (port of Bratislava)

Parameter	Description	Value	Units
NV	Maximum number of trucks per day	120	No.
TL	Maximum permissible mass of the combination (truck and semi-trailer)	40	t
WD	Number of working days per year	300	days
Annual road capacity	$NV \times TL \times WD$	1 440 000	t/years

Figure 36: Road Infrastructure Capacity for Containers (port of Bratislava)

Parameter	Description	Value	Units
NV	Maximum number of trucks per day	120	No.
TL	Maximum load per truck	2	TEU
WD	Number of working days per year	300	days
Annual road capacity	$TEUs = NV \times TL \times WD$	72 000	TEUs/year

Port of Komárno

Komárno is located on the intersection of the I/63 and I/64 roads of class I., enabling the connection of the district City of Komárno with the regional City of Nitra (road I/64), the capital city of SR Bratislava (I/63), and creating a connection to Hungary onto the M1 road (approx. 10 km from the City of Komárno). The rest of the network in the addressed territory constitutes of class II. and class III. roads and local thoroughfares. Directly in the City of Komárno, there is the Komárno – Komárom road border crossing point on road I/64. Operation on the crossing point is continuous. The border crossing point is between the states of Slovakia and Hungary, which belong into the Schengen Area, thereby setting the operation mode. Freight transport over the bridge across the Danube River is limited to 20 tonnes. Freight transport across the River Vah is limited to 25 tons. Maximum speed inside the port is limited to 30 km/h.

Transport connection of the City of Komárno with the rest of the territory of SR and the neighbouring states is secured by routes:

- In the east–west direction, it is route I/63 in the route of Bratislava – Komárno – Štúrovo, state border. Route I/63 in the stretch of Bratislava – Veľký Meder is part of the E575 European route, which starts in Bratislava, ends in Győr, and is approx. 100 kilometers long. Within Slovakia, it starts in Bratislava at the D1 crossroads (E 58, E 75, and E 571) with road no. 63 of class I. and continues through the cities of Šamorín, Dunajská Streda, and Veľký Meder, and from thereon along route I/13 to the Medved'ov border crossing point. Route I/63 as E 575 does not go through the City of Komárno.
- In the north–south direction, it is route I/64 in the route of the state border of SR/HR – Komárno – Nové Zámky – Nitra – Topoľčany – borders of NR/TN (Nitra region and Trenčín region), with connection to the D1 motorway.
- In the western part of the city, route II/573 of class II disconnects from route I/63 and connects to route II/563 in Kolárovo.

- On the outskirts of the City of Komárno, there are two routes of class III. Road III/1462 of class III and road III/1463 of class III.

Figure 37: Road Capacity (port of Komárno)

Parameter	Description	Value	Units	Remarks
NV	Maximum number of trucks per day	60	number	<i>This should be based on operators' experience. It depends on the appointment system for trucks, waiting time, loading/unloading time etc.</i>
TL	Maximum load per truck	40	t	
WD	Number of working days per year	212,5	days	
Annual road capacity	Cap. = NV x TL x WD	510 000	t/year	

The Road Inspectorate issued a heavy trucks ban in the residential area for heavy goods vehicles over 3.5 tons, in the neighborhood of which the Komárno cargo-freight port is located. On the basis of the stated ban, access to the western pool by heavy goods vehicles is diverted to a detour route around the residential area. Also, transshipment activity has been stopped in the evenings and at night and during public holidays due to noise and dustiness. A disadvantage of the port is its narrow and long territory of the port without possibilities for further development due to the close proximity to the already mentioned residential area, and the slanted, or semi-slanted riverside wall, which forces vessels to be moored at a greater distance from the bank at low water levels of the Danube.

UKRAINE

The major road of Ukrainian part of Danube river, is M-15 Odessa-Izmail- Reni road (to Bucharest). It coincides with part of the European route E-87 (Odessa - Constanta - Izmir - Antalya), part of the European corridor "Black Sea Economic Community".

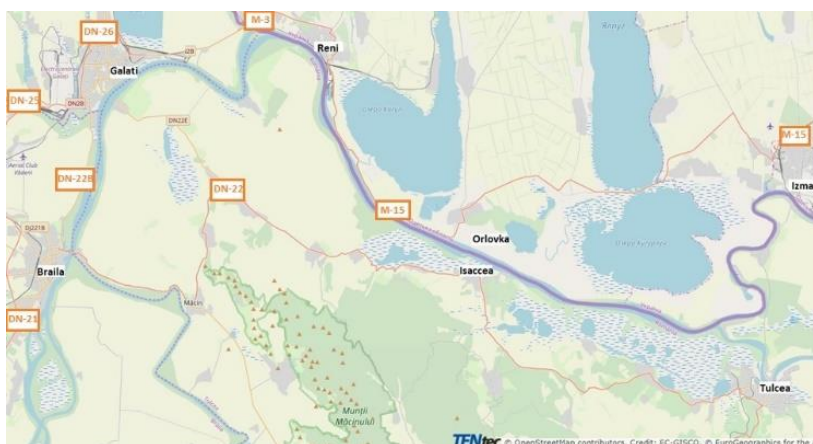
M-15 highway passes along the fence of Reni port, about 2km from the port of Izmail and from Ukrainian terminal of Orlovka – Isaccea international ferry crossing, see fig.4.

- Type of road - International Motorway M-15 Odessa-Izmail-Reni (Bucharest);
- Length, Odessa-Reni – 289 km;
- Number of lanes -2, in one direction;
- Maximum speed allowed- 90km/h;
- Axile load for trucks allowed- 10t/axile;
- Part of the M-15 motorway, which runs from Odessa to Izmail, Reni and Bucharest, and the E-87 motorway, which runs through Reni to the border with Moldova, require only routine maintenance. No bottlenecks, no restrictions

Port of Reni

The port of Reni has an extensive road network inside the port with the length- 6.2 km. The port's roads are connected to the Bucharest - Reni - Odessa highway, as well as the Reni - Chisinau highway, see fig 38.

Figure 38: Roads map in the area of Reni and Izmail ports



Port of Izmail

Port of **Izmail** is adjacent to the motorway leading to the international highway M-15 Odessa-Reni-Bucharest, see fig. 4, which is in good technical condition and requires only routine maintenance.

International highway M-15 Odessa-Reni-Bucharest is a part of international highway E-58 which runs through Ukraine, around the Black Sea and on to the Russian Federation. The M-15 motorway has of strategic importance for the economic development of Southern Ukraine, connects 5 ports on the Black Sea and serves as a transport corridor for heavy vehicles going to the international border crossing point of Giurgiulesti (Moldova).

5.2 Identification and presentation of the existing/possible road services:

AUSTRIA

Ennshafen Port

Since the A1 is the most important west-east connection in the Austrian road network, Asfinag has continuously expanded sections to six lanes. The goal was a six-lane expansion between the Steinhäusl node and the Voralpenkreuz node. With the completion of the renovation and widening of the section from Matzleinsdorf (km 85.9) to Pöchlarn (km 91.0), this project was completed at the end of April 2018. The Westautobahn (A1) connects the federal capital Vienna with Salzburg, where it meets the A8 from Germany at Walserberg. It is one of the most important motorways in Austria and provides the west-east connection.

Ennshafen Port is connected to the most important west east Motorway A1 in Austrians road network.

Table 12: Motorway A1 Linz-Steinhäusl road section parameters

Category / Section	Parameter	Value	Unit
Motorway A1 /Linz - Steinhäusl	Length	138,014	km
	Number of lanes (total, in both directions)	6	lanes
	Maximum speed allowed	130	km/h

Category / Section	Parameter	Value	Unit
	Axle load for trucks allowed	40.	t/axle

Port of Vienna

The Port of Vienna functions as a trimodal hub covering rail, road and river links. This hub is located at the western bank of the Danube River. Connection via road between Port of Vienna and other freight terminals includes B14 Freudenuer Hafenstr a e along the port, A4 Ost Autobahn (East Highway connection), S1 Wiener Au enring Schnellstra e; East and South and 3 km of A23 S udosttangente; North and West. Total number of road entrances to port is four (including a passenger terminal), with eight road lanes in total.

Beside the described A4 Ostautobahn, there are also A3 S udostautobahn and A2 S udautoabahn that are in the greater area of Vienna but in larger distance to the Port of Vienna and are not core parts of the Corridor.

Table 13: Motorway A4 Ostautobahn road section parameters

Category / Section	Parameter	Value	Unit
A4 Ostautobahn	Length	66	km
	Number of lanes (total, in both directions)	4	lanes
	Maximum speed allowed	130	km/h
	Axle load for trucks allowed	n.a.	t/axle

BULGARIA

When it comes to the transportation of goods by road vehicles, the situation for both the ports in Ruse and Lom is very similar. The main types of dry bulk cargo, transported to and from the ports by trucks on a daily basis, is agricultural products such as cereals and fodder, as well as fertilizers. General cargo, such as rolled metal sheets, machines and equipment, palletized cargo and cargo in big bags (FIBC) is also handled regularly.

There are certain constraints, which a vehicle must observe when using the national road network, no matter the region or the municipality. The vehicle must have a height of maximum 4 m., a width of maximum 2.55 m. and a length of maximum 12 m for sole vehicle, 16.50 m for a tractor with semitrailer and 18.75 m for a truck with one or more trailers. If the vehicle does not stay within any one of the above-mentioned restrictions, it will have to be labeled as "oversized" and move in accordance with special rules. Vehicles with gross mass exceeding 10 t must travel with on-board device for speed limitation.

CROATIA

There are good transport connections with the neighboring countries of Bosnia and Herzegovina, Hungary and Serbia. Vukovar is 16 km away from the town of Vinkovci which is the largest railway hub in Croatia. It is well connected by the state road D55 via Vinkovci with the 39 km distant junction  upanja on the highway A3 Zagreb-Lipovac. It is connected to Osijek, 33 km away, by the state road D2, via which Vukovar is connected to the Vc corridor (A6 motorway).

The position of Vukovar will become even more favorable with the implementation of regional spatial plans that include investments in regional transport infrastructure. Construction of a four-lane Vukovar bypass as part of a multimodal junction (railway-road-river), construction of expressways that will connect Vukovar with corridors X and Vc on the one hand, and with border crossings on these corridors on the other.

The city's location is extremely favorable for access to other markets within Central and South-Eastern Europe because it is located on or near the following trans-European corridors:

- Pan-European Transport Corridor VII - Danube River (Vukovar Port)
- Osijek International Airport → 16 km away
- Pan-European Transport Corridor X - railway → 14 km from Vinkovci junction (largest regional railway junction)
- A3 motorway (Croatia) → 42 km away
- European route E73 - railway and motorway A5 → 31 km away.

HUNGARY

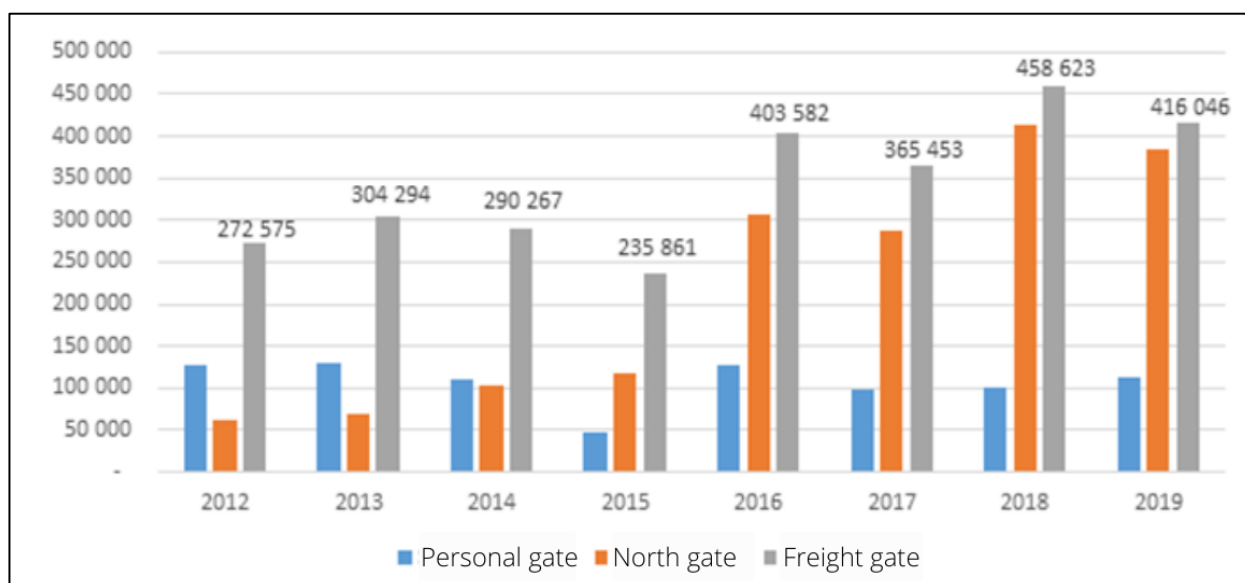
Type of trucks has changed a lot in the last 20 years. 20 years ago, trailers, tipping trucks were widespread. Since then, kippers have taken their places, as these trucks can handle 10-15% more with the same axle load.

This change in the field of trucks have had a big impact on port facilities and technologies adapted. Facilities for receiving bulk cargo have been developed to kippers, that can lift up to a level of a two-story house.

Budapest

Examining the motor vehicle traffic in the port, it can be seen that most of the traffic was and still is handled by the freight gate within the port. Additionally, the role of North gate has increased over the past 4 years based on statistics.

Figure 39: Motor vehicle traffic in the Freeport 2012-2019



Source: Budapest Freeport Logistics cPLc statistical data provision

Dunaújváros

The port of Dunaújváros is easily accessible via M6 highway. Though there is a limitation of the development of the port, namely the narrow-capacity road and railway tracks passing through Szalki Island cannot be expanded.

- Loading and unloading trucks
- Electronic road bridge scale: capacity 60 tons, length 18 m.
- Number of parking space for trucks: 30

Baja

Main road 55 has a Danube Bridge called Türr István Bridge, which provides a railway connection too. There is a speed limit of 50 km/h on the road, no weight limit and total weight limit. Exploration of the port is provided by IV. Károly quay and Gránátos street.

In the area of the port, trucks wait in parallel parking lots built along the roads or in case of heavy traffic, by occupying a lane on the road.

Due to the water-road and road-water transshipments at the loading site, daily average vehicle traffic gives 32,000 trucks per year.

ROMANIA

All types of trucks have access to the analysed ports. The services depend on the demand.

SERBIA

According to the Statistical Office of the Republic of Serbia, in 2019, 15.8 million tons of goods were transported on Serbian road network, totaling more than 8.17 billion ton-kilometers.

Table 4 shows the volume of goods transported in the period 2019-2020, broken down by type of traffic.

Table 14: Serbian road freight market, key performance indicators, 2019-2020 ⁶

	2019	2020	2020/2019
Transported goods, thousand tons	15858	15638	98.6
Domestic transport	8838	8876	100.4
Export	3212	3037	94.6
Import	3299	3155	95.6
Road cabotage transport	510	570	111.8
Of which: transit	89	126	141.6

⁶ <http://publikacije.stat.gov.rs/>

Ton kilometres, million	8175	7741	94.7
Domestic transport	1282	1239	96.6
Export	3260	3067	94.1
Import	3227	2998	92.9
Road cabotage transport	406	437	107.6
Of which: transit	30	35	116.7

The total volume of goods carried in road transport in 2020 was less than it was in 2019 by 1.4%, while the volume of performance in t-km went down by 5.3%.

Major bottlenecks along main international routes are the BCPs, where the delays there represent substantial percentage of the total travel time. There are several ongoing projects for the expanding of border crossings for road transportation which are identified as bottlenecks.

SLOVAKIA

Port of Bratislava

Port is open Monday to Friday from 8:00 to 17:00. Based on the analysed information, the 9 wide segments have been identified, according to the character of commodities, which were subsequently grouped into 3 fields by transhipments technology types.

9 identified segments:

- agriculture,
- metallurgy and steel industry²,
- chemistry and plastics, oil products
- automotive industry and mechanical engineering,
- wood,
- secondary raw materials,
- mineral resources (salt separately),
- containers,
- construction and civil engineering.

These segments were subsequently grouped according to the already mentioned transhipments technology, in the following way:

- Dry-Bulk materials – agriculture, fertilizers, salt, metallurgy and steel industry (iron ore pellets), mineral resources (mainly sinter ore), secondary raw materials,
- Liquid materials – oil products,
- Break-Bulk products – machines and automobiles, containers, civil engineering, wood, metallurgy, and steel industry (steel coils).

Port of Komárno

Based on the analysed information, 9 wide segments have been identified, according to the character of commodities, which were subsequently grouped into 4 fields by transshipments technology types.

9 following identified segments:

- agriculture,
- metallurgy and steel industry,
- chemistry and plastics,
- automobile industry and mechanical engineering,
- wood,
- secondary raw materials,
- mineral resources (salt separately),
- containers,
- construction and civil engineering.

These segments were subsequently grouped according to the already mentioned transshipment technology, in the following way:

- loose material – agriculture,
- granular material – synthetic fertilisers, salt, iron pellets,
- bulk material – wood, metallurgy and steel industry, mineral resources, building constructions, secondary raw materials (recyclable waste and mixed ordinary waste),
- piece material – machines and automobiles, containers.

All transportation, services and dispatch for both ports is being handled by SPaP, port operator by request.

UKRAINE

Port of Reni cooperates with Moldova`s grain traders who deliver grain to the port of Reni from the territory of Moldova by trucks within a radius of 300-400 km.

On the territory of Ro-Ro terminal, there is a guarded parking for trailers with an area of 12,000 m². The following services may be provided at the request of clients: cargo declaration, fumigation of contaminated cargo, loading and unloading operations and forwarding services, border and customs consultations, technical assistance.

Port of Izmail

The M-15 Odessa - Reni highway is located in the Odessa region (partly through the village of Palanca in the Republic of Moldova). The highway starts in Odessa, passes through the village of Palanka in Moldova (but the road belongs to Ukraine), Monashi, Sarata, Tatarbunary, Izmail, Reni (former P33 highway) and ends at the Reni checkpoint, which leads to Constanta in Romania. The length of the Odessa-Izmail-Reni (Bucharest) highway - 289.4 km. M-15 motorway runs about 2 km from the port of Izmail and from the Ukrainian terminal of the Orlovka - Isakcha international ferry crossing, see fig. 1 and 2. M-15 motorway has 2 lanes for each direction, the maximum permissible speed is 90 km, the permissible axle load of a truck is 10 tons. Distance by road Odessa-Izmail - 192 km. Automobile transportation - video maintenance and special systems that are equipped on vehicles. In the seaport of Izmail, all movement of goods is recorded by video support, by the department of the maritime security service around the clock. To extinguish fires in the port, there is a fire safety squad.

5.3 Conclusions on the existing road infrastructure connections

AUSTRIA

Ennshafen Port

According to the information provided above, one can say that the Road infrastructure and their surroundings of Ennshafen port are well developed now. Our access roads are state of the art and we can provide all services what is allowed to be transported on the road in Austria including high&heavy goods.

Most of the projects deal with investments regarding future demands regarding alternative fuelling of cargobusiness, fulfillment of Green Deal approaches by modernisation of infrastructure and optimization of existing status both for railway and waterway transport. This project list is not finished, some projects are in detailed investigation now and will be developed or changed to upcoming new demands of decarbonizing and market developments.

Port of Vienna

Hafen Wien GmbH is a member of Wien Holding, the Vienna Economic Chamber (Wirtschaftskammer Wien) has a 5 percent share in the company. Hafen Wien GmbH is the owner of the port facilities comprising real estate, buildings and wharf equipment and operates the harbours in Freudenu, Albern and Lobau. Hafen Wien is a multifunctional service company offering decades of experience and also the latest technologies. Thanks to its optimum rail, road and water links and the proximity to Vienna International Airport in Schwechat, it provides an important and practical interface for international trade and transportation.

Hafen Wien operates the largest free port in Austria. There are modern warehouses and well trained and equipped staff for the storage and handling of customs and domestic goods as well as a customs office for rapid clearance. The site is guarded round the clock and feeder roads are exempt from the night driving ban in Vienna. The three harbours on the Danube in Vienna are notable for their modern handling facilities, excellent infrastructure and dependable, well trained workers, ensuring the reliable and rapid handling of all goods, be they building materials, containers, general cargo or bulk goods.

BULGARIA

In general, the infrastructure in North Bulgaria is not as developed as the one in South Bulgaria. Various activities, related to the removal of certain limitations of the Bulgarian road network in the north, need to be carried out. The completion of the Ruse-Veliko Tarnovo motorway, which will supersede the I-5 road, at least in the section between those two cities, is of essential importance for improving the connectivity and development of cross-border connections in the region.

Another project, which needs to be completed, is the construction of the northern Danube road Vidin - Lom - Svishtov - Ruse - Silistra, which will improve transport accessibility to the coastal industrial zones. Ruse has two first-class road connections to the hinterland, but the same cannot be said about Lom, which only has two second-class and two third-class roads. This requires urgent repairs and modernization, with the aim of removing these bottlenecks. Both regions do not have a highway passing through their territory.

The road network in the Ruse region is almost completely built. The main problems are related to its constructive and technical parameters. The roads in the big cities have better characteristics in comparison to those in smaller settlements. In the cases of planned rehabilitation and repair activities in the region, it is important to first implement those projects, concerning the water supply and sewerage networks.

The main problems in Lom are the lack of first-class roads, the lack of a bypass, which would reduce the heavy cargo traffic in the city. Another problem is that, although the central part of the city is covered in long-lasting pavement, a big share of the roads in neighborhoods, which are further away from the center, as well as the villages in the region, are not asphalted.

CROATIA

International traffic routes, the Rhine-Danube corridor (TEN-T, former Pan-European Corridor VII) and the international road-rail route (Salzburg-Thessaloniki) Corridor X), with the Zagreb-Bajakovo section are all passing through Croatia). While the road direction is in an overall very good condition, the railway needs further improvement before its quality is at the levels required by the European standards.

In line with the initiative launched by Eastern and Southern European countries in the period 2015-2020, the EU will pay special attention to the development of the former Corridor X and the former Vc Corridor, which should give additional potential to the development of the sector and logistics in the County. For now, County is currently only on the Rhine - Danube corridor (according to the unique Trans - European Road network (Trans – European Network - Transport, TEN-T). The A3 motorway passes through the County, which has four exits (Babina Greda, Županja, Spačva, Lipovac).

Cities (Ilok, Otok, Vinkovci, Vukovar and Županja) are interconnected by state roads, and other settlements within the County are connected by state, county and local roads. In the county area 278,258 km of state roads are managed by the company Hrvatske ceste d.o.o.

According to the Vukovar-Srijem County Road Administration, which manages the classified public roads in its area, and in accordance with the Decision on the classification of public roads from 2016, the list consists of 40 county roads with a total length of 425,720 km and 42 local roads with a total length of 198,458 km.

Until 1998, all public roads in Croatia were managed by the Croatian Road Administration, which had priority of state road maintenance while county and local roads were neglected. Therefore, this resulted in a neglected network of county and local roads without project documentation, systematic drainage, insufficient width and load-bearing capacity of the pavement structure, and 60% of the network had to be repaired through reconstructions and extraordinary maintenance.

In the past period, the most significant investments in reconstruction and extraordinary maintenance were on shares CR 4170 Vinkovci - Cerna - Gradište - Županja, CR 4218 section B. Greda - Štitar - Županja, CR 4221 Cerna - B. Greda, CR 4224 Otok - Nijemci, CR 4167 Ivankovo - Retkovci - Prkovci -

Šiškovci, CR 4196 Berak - Čakovci - Mikluševci, CR 4137 Nuštar - Bogdanovci - Vukovar, and near local roads reconstruction LR 46028 Svinjarevci - Slakovci and LR 46053 Rajevo Selo - Gunja.

Pursuant to the Decision of the Government of the Republic of Croatia, i.e., the adopted Program for Reconstruction and Remediation of the Consequences of the Disaster in the area of Županjska Posavina in the past two years, a quality renovation of 19.5 km of county roads and 16.7 km of local roads occurred which will contribute to better transport connections.

space with other parts of the County.

In the projects of construction of county roads in the past period, it is worth mentioning the construction of the section CR 4172 from Otok to Spačva with access to the A3 motorway and construction of a bridge on the river Brežnica on the said section, then the construction of section CR 4150 from Petrovac to Stari Jankovci and section CR 4218 from B. Greda to Štitar.

HUNGARY

The table below summarizes the existing road infrastructure connections.

Table 15: Existing road infrastructure connections

Port	Network infrastructure	Type of road	Number of lanes	Maximum speed	Bottlenecks	Restrictions
Budapest	via ring-road M0 motorway: M1, M7, M6, M5, M3	asphalt-covered, suitable for truck traffic	2 lanes	20 km / h	-	
Dunaújváros	highway M6, main road 6	asphalt-covered, suitable for truck traffic	2 lanes	20 km / h	-	25-ton weight limit
Baja	main road 51 and 55, highway M6 is in 20 km, M9 motorway is in 30 km	asphalt-covered, suitable for truck traffic	Gránátos street: 2*1 lanes	20 km / h	-	-

Source: self-edited based on hfip.hu

ROMANIA

All analysed ports are well connected to national roads. However, only 2 main ports are connected to 4 lanes roads, Port of Constanta to A2 motorway and Port of Giurgiu to DN5 4-lanes express road.

Road connection is secured to all destinations in Romania and other countries. Level of Service and speed depends of the overall road traffic, being at a lower level in the summer season when traffic is increasing especially to the sea side, thus to Constanta.

SERBIA

The port of Bačka Palanka has a favorable spatial micro location because it is directly connected to Corridor 10, i.e. with relevant traffic corridors in the vicinity of the E-75 highway (30-40km) and the E-70 highway (35km).

The Port of Bogojevo port is 40 km away from the E75 highway, in the direction Belgrade-Budapest. The port is connected with the regional road Bogojevo-Apatin-Sombor-Subotica, as well as with the

section Bogojevo-Odžaci-Sombor of the main road No. 3, which passes through Serbia. Across the road bridge the port is connected to the section of road No. 3 Erdut-Dalj-Osijek in Croatia. The port is connected with the regional road Bogojevo – Subotica-state border Kelebia. Port of Bogojevo is connected to Kelebija with road IB.

Prahovo is connected by about 50 km of road to Vidin in Bulgaria, and Calafat in Romania, both of which are important road and rail hubs on European Corridor 4. A 150km highway also connects it to European Corridor 10, which links Serbia to other European countries. State road of class IIB No. 400 connects Port of Prahovo with the State road 35 - Dušanovac - Border with Romania near Kusjak.

SLOVAKIA

As mentioned in Chapter 4.3 Conclusions port of Bratislava and port of Komárno were constructed to serve the purpose of hubs for intense transshipment what required necessary road connections.

Situation is a little different for each port. Port of Komárno is literally inside the city center what brings some restrictions related to heavy traffic. Traffic flows through bridges that may be congested and , not to be forget, city of Komárno is not directly connected to any highway.

Port of Bratislava is located in direct vicinity of the city center, however there is direct connection to motorway in the city that directs either to Czech Republic (direction Brno), Hungary (direction Győr/Budapest) or Austria (direction Wien).

Both ports, Bratislava and Komárno are part of TEN-T Core Network, but the fact that roads inside ports are owned by private company restricts access to public / EU funding opportunities.

UKRAINE

- Existing road infrastructure connections of Reni and Izmail ports are in good technical condition at the moment, without constrains and bottlenecks.
- "Odessa-Reni Multimodal Corridor" concept presupposes connecting the transit capabilities of Ukraine to the 9th transport corridor TEN-T Rhine-Danube. To connect to the European railway network on the Odessa-Reni multimodal corridor, concept is offer to build a new section of 36 km railroad, with a total length of about 280 km, modernize the existing line to EU standards, and build three new rail and motorway bridges. But, there is no approved plans yet, for mid-term period concerning construction of new rail roads and motorways at the moment.

6 Existing and status of the maritime infrastructure connection and existing/possible services

Based on the reports D.T 1.1.1., D.T 2.2.1. and D.T 3.2.3. the followings can be stated regarding the existing maritime infrastructure connections of ports concerning how they are linked to seas.

6.1 Identification and presentation of the existing maritime network connections to the ports

AUSTRIA

Not relevant due to the fact Enns-shafen port and Port of Vienna are inland ports

BULGARIA

The Danube Region consists of 14 countries from Central and Southeast Europe with most of their economies experiencing high annual economic growth. Danube is connected via the Rhine–Main–Danube Canal with the Rhine River, which gives the countries and ports from the Lower Danube access to the ports and markets in Western Europe.

Ruse and Lom’s ports have the potential to become important transport junctions and intermodal hubs in the Lower Danube region. Both ports have strategic locations as part of major European transport corridors, which helps in bringing more traffic and clients and in establishing Ruse and Lom as intermediary stops for any potential cargo transfer from the Black sea to Central and Western Europe via the Danube River or vice versa.

The geographical position of Bulgaria offers good communication and transport connections. Bordering to the Black Sea to the East; Greece, Turkey and Northern Macedonia to the South; Serbia to the West and Romania to the North can be said that the Republic of Bulgaria is at the crossroads between Europe, the Middle East, Russia and the former Soviet republics. The strategic position of the country is strengthened by the relative proximity to the Adriatic Sea and the Aegean Sea.

The construction of quality adjacent road infrastructure to the ports on the territory of Bulgaria is of utmost importance. Maritime transport accounts the biggest share of the trade in the global economy.

Port of Ruse

The port of Ruse is the natural connection of Varna district with the Danube River. The communication between the Danube port of Ruse and the Black seaport Varna via a railway section, is part of a logistics system, which significantly shortens the route of goods in the direction Rhine - Main - Danube - Black Sea. This is a prerequisite for opportunities to attract more shippers, due to shortening the distance and reducing transport time.

Port of Lom

Through the Rhine-Main-Danube Canal, IWT routes from the North Sea can reach Lom. The existing railway network, after the appropriate modernisation, connects Port of Lom with Port of Thessaloniki – a big transport hub on the Mediterranean.

CROATIA

River transport has an advantage over other land transport modes given on the capacity and attractiveness of the transport price. However, it is equally important to fulfill shipper's expectations with regard to transport efficiency. This means ensuring reliability and service flexibility.

In this segment, river traffic lags too far behind, for example by road. To improve the reliability of river traffic it is very important for waterways to ensure navigation according to the requirements of the class, i.e., guaranteed values navigable gauge, to take into account the size of the "economic draft" when planning waterway maintenance, and to ensure quality service in ports.

The development strategy for the inland navigation sector is based on the Medium-Term Plan development of waterways and inland ports of the Republic of Croatia. In accordance with that plan the entire waterway development policy should be directed in two basic directions:

- Achieving a higher level of competitiveness and quality of the existing internal network waterways (through better maintenance, removal of bottlenecks, and technological modernization of marking and navigation signaling systems),
- achieving faster and more harmonious construction of waterways according to European standards, work within the TEN-T network, and in full accordance with the principles of European transport policy.

Inland ports are key elements of the entire inland transport system waterways on which the success of the complete transport process largely depends, from the places of production to places of final consumption – end users. At the same time, ports are also links of different modes of transport by which cargo or passengers are brought and taken to their final destinations. Inland waterway ports located on European network of waterways have a special meaning given the uniqueness of the transport and the overall economic market activity on which they operate.

There are two international waterways in the Vukovar-Srijem County - Danube and Sava. The Danube is navigable along its entire length through Croatia and is towards Europe agreement on major inland waterways of international importance (AGN) classified by buoyancy class VIc. The Danube is important for international, regional and local traffic. Local passenger traffic takes place between Vukovar and Bač, where by ferry passengers are transported between two small border crossings. The Sava is conditionally navigable, that is, with great restrictions, it is associated with an unregulated waterway (insufficient draft within individual sectors, critical points, unmarked waterway, etc.). Existing traffic depends on seasonal water level conditions and is mainly of local and regional character.

In practice, there are two separate subsystems with their own specific characteristics, so one can talk about two pools:

- a basin that includes the Danube waterway and the Drava waterway connected to the European waterway network,
- a basin that includes the waterway of the Sava, Kupa and Una, not connected to the European network waterways through the territory of the Republic of Croatia

The total length of current and planned waterways in Croatia is 866.7 km, of which 601.2 km is included in the network of European waterways of international importance. According to the AGN contract, the following waterways are included in the European Waterways (E-vp) system.

Table 16: Waterways included in the European Waterways (E-vp) system

Waterway marking	Waterway section	Required class according to AGN	Length in kilometers
E 80	River Danube from Batina to Ilok	VI c	137,5
E 80-08	River Drava to Osijek	IV	22,0
E 80-10	Future multipurpose channel Danube-Sava from Vukovar to Šamac	V b	61,5
E 80-12	River Sava from Račinovac to Sisak	IV	380,2
Total length according to AGN			601,2

From the existing Croatian international waterways Danube, Drava to Osijek and Sava downstream of Slavonski Šamac meet the classes declared in the AGN while the parameters the upstream part of the Sava River waterway do not correspond to the classes declared in the AGN. Other waterways in the Republic of Croatia are state or interstate, and not according to the AGN contract classified into an international waterway network.

The classification of the current condition of waterways is determined by the Ordinance on classification and opening of inland waterways and is shown in the following table.

Table 17: Classification of the current condition of waterways

River	Waterway - section	Length of waterway/km	Waterway class
DANUBE	1295+501 (Ilok) - 1433+000 (Batina)	137.5	Vlc class
SAVA	203+300 (Račinovci) – 305+700 (Sl. Šamac)	102.9	IV class
	305+700 (Sl. Šamac)– 330+200 (Oprisavci)	24.5	III class
	330+200 (Oprisavci)– 363+200 (Sl. Brod-grad)	33.0	IV class
	363+200 (Sl. Brod-grad)- 583+000 (Sisak)	219.8	III class
	583+000 (Sisak) – 651+000 (Rugvica)	68.0	II class
DRAVA	0+000(Ušće Dunava) – 14+050 (Osijek luka Nemetin)	14.0	IV class
	14+050 (Osijek luka Nemetin) –55+450 (Belišće)	41.4	III class
	55+450 (Belišće) – 198+600	143,2	II class
KUPA	0+000 – 5+900	5.9	I class
UNA	0+000 – 4+000	4.0	II class
	4+000 – 15+000	11.0	I class
TOTAL LENGTH OF EXISTING WATERWAYS		805,2	
TOTAL LENGTH OF WATERWAYS - INTERNATIONAL CLASSES		287.4	

Out of a total of 539.7 km of existing waterways that are included in the European waterway network roads, only 287.4 km meet the classification requirements for international navigation. The biggest the section is the Sava River, which in Croatia largely does not meet international requirements navigation.

Danube River

The basic hydrological characteristics of the Danube basin are: total area of 816,950 km², from what 2,120 km² is within the Republic of Croatia; total length of 2,857 km. The Danube is within its entire length through Croatia of 137.5 km an international waterway with free navigation for all flags. Waterway is marked and there is an international obligation of the Republic of Croatia for its maintenance. Current situation with maintenance measures meets the requirements of class VIc.

Drava River

The basic hydrological characteristics of the Drava basin are: total area of 41,238 km², of which 7,015 km² is within the Republic of Croatia; total length of 749 km, of which 330 km is within the Republic of Croatia. Drava river is navigable in 198.6 km out of total of 330 km. From the confluence with the Danube to 70.0 km, Drava is an international waterway with free navigation for all flags, where trade takes place to the international port of Osijek. From 70.0 km to 198.6 km (the mouth of the Ždralica) is the Drava interstate waterway between the Republic of Croatia and the Republic of Hungary. Navigation on this section is lesser in comparison to other sections. The waterway is marked and there is an interstate obligation of the Republic of Croatia for its maintenance.

On the section from the mouth to rkm 22.0 which is in the European network of waterways according to AGN, the existing condition of the waterway does not meet the full-length requirements for international navigation according to the contract. From the confluence with the Danube to rkm 14.0, the existing condition of the waterway is satisfactory with conditions of class IV, although there are frequent disturbances in navigation due to the reduced depth at low water levels, which requires intensive maintenance measures. From rkm 14 to rkm 22.0 existing condition corresponds to class III. Upstream from Osijek, i.e., from rkm 22.0 to Belišće, the waterway satisfies conditions of class III, and upstream to Ždralica class II. Possible class changes in the boundary the area needs to be coordinated with the competent authorities of neighbouring R. Hungary

Sava River

The basic hydrological characteristics of the Sava River Basin are: total area 95,712 km². Of the total length in the Republic of Croatia, the Sava River is navigable at 380.2 km, i.e., from Račinovac to Sisak, km 210.8 to km 591. It is possible to sail to Zagreb (Rugvica km 651) but in a small percentage of days of the year for the purpose of gravel exploitation, and sports and recreation. From the border with the Republic of Serbia, i.e., from Račinovac to Jasenovac, the waterway is in the border area with BiH in the length of 304 km. Upstream of Jasenovac, the Sava is completely in the territory of the Republic of Croatia.

The Sava is declared in the AGN contract as a class IV waterway from Račinovac to Sisak, km 210.8 to km 591. Analyses from the study “Preliminary design of the Sava waterway”, showed that the morphology of the existing Sava riverbed does not have a full-length IV class, but has the potential to reach it because of its curvature radius which does not meet standards in only 10 percent of the length of the river, and the navigable size of about 30% the length of the river. It follows that the morphological regulation of the existing riverbed is possible of reaching IV. waterway class.

Kupa River

The basic hydrological characteristics of the Kupa River Basin are: total area of 10,236 km², from what is 8,412 km² within the Republic of Croatia; the total length of 294 km along its entire length belongs to the Republic of Croatia. The 100 km long Kupa River forms the state border with neighbouring Slovenia. Kupa is navigable for the European standardized fleet from the confluence with the Sava to

the Sisak port in length of 5 km. According to its minimum dimensions of the fairway (width 35 m per rkm 3 + 300) and the width of the free profile on the masonry bridge rkm 3 + 350 of 37 m meets the requirements for I. buoyancy class. Sailing along the Kupa upstream from Sisak to Karlovac (km 137), given the numerous natural obstacles in the riverbed is not currently possible. However, the possibility of sailing should be explored for tourist and sports-recreational purposes.

Una River

The basic hydrological characteristics of the Una River Basin are: total area of 9,368 km², of which 1,686 km² is within the Republic of Croatia; total length of 212 km, of which 139 km within the Republic of Croatia and 130 km Una forms the state border. Una is a waterway 15 km long, of which 4 km is classified as class II and 11 km as class I. The voyage takes place for the purpose of excavation and transportation of gravel, and for sports and recreation in limited range.

Multipurpose Danube - Sava Channel

The future Multipurpose Canal Danube - Sava is declared in the AGN contract as a waterway V.b class. It is also included in the Strategy of Physical Planning of the Republic of Croatia, and the Strategy for River Development traffic in the Republic of Croatia (2008 - 2018). The canal is a multi-purpose water structure for water protection, irrigation and navigation, and thus belongs to the domain of water management.

HUNGARY

All the presented ports are strategically located on the Rheine-Maine-Danube international IWW corridor, therefore they have IWW connections both to the North Sea and the Black Sea. Hence, all the ports are benefiting from underutilized IWW in Central Europe.

Table 18: Port capacities

Ports	Loading capacity	Annual turn-over
Budapest	1,800,000 tons per year	1,000,000 tons per year
Dunaújváros	3,200,000 tons per year	1,200,000 tons per year
Baja	2,000,000 tons per year	800,000 tons per year

Source: self-edited based on hfp.hu and CEF Port Development Masterplan

ROMANIA

Constanta Port

- Network structure
 - o **Maritime port** - The Port of Constanta is located on the Western coast of the Black Sea, at 179 nM from the Bosphorus Strait and 85 nM from the Sulina Branch, through which the Danube flows into the sea. It covers 3,926 ha of which 1,313 ha is land and the rest of 2,613 ha is water. The two breakwaters located northwards and southwards shelter the port, creating the safest conditions for port activities. The present length of the North

breakwater is 9,400 m and the South breakwater is 5,560 m. Constanta Port has 156 berths, of which 140 berths are operational. The total quay length is 32 km, and the depths range between 8 and 19 meters.

- **River port** - The connection of the port with the Danube River is made through the Danube-Black Sea Canal, which represents one of the main strengths of Constanza Port. Due to low costs and important cargo volumes that can be carried, the Danube is one of the most advantageous modes of transport, an efficient alternative to the European rail and road congested transport. Important cargo quantities are carried by river, between Constanza and Central and Eastern European countries: Moldova, Bulgaria, Serbia, Austria, Slovakia and Germany.
 - **Road** - The ten gates of the Port of Constantza are very well connected with the national and European road network. The connection with the Pan-European Transport Corridor no. IV has a strategic importance, linking the Port of Constantza with the landlocked countries from Central and Eastern Europe. The total length of roads in the port amounts to 100 km. The A2 motorway, nicknamed The Sun's Motorway ("Autostrada Soarelui" in Romanian), is linking Bucharest to city port Constanta and has a length of 203 km.
 - **Railway** - The railway network of the Port of Constantza is in excellent connection with the national and European railway network system, the Port of Constantza being a starting and terminus point for the Pan-European Transport Corridor no. IV. The railway infrastructure comprises of six rail gates and nine rail tracks.
 - **Pipelines** - Petroleum terminal has 7 operational jetties. Jetties allow berthage of vessels up to 165,000 dwt. capacity. Connection between storage farms and jetties is done by a 15 km underground and overground pipelines network. Pipelines total length is 50 km. The Port of Constantza is connected to the national pipeline, therefore with the main Romanian refineries.
 - **Air** - M. Kogalniceanu Airport is the nearest airport to Constantza, located at 20 km distance from the Port of Constantza. It is an international airport and represents an air-gateway with high impact over regional development.
- Maximum size of the vessels
 - The characteristics of the port are comparable with those offered by the most important European and international ports, allowing the accommodation of tankers with capacity of 165,000 dwt and bulk carriers of 220,000 dwt.
 - Port capacity
 - The projected port capacity is 100 million tons total capacity

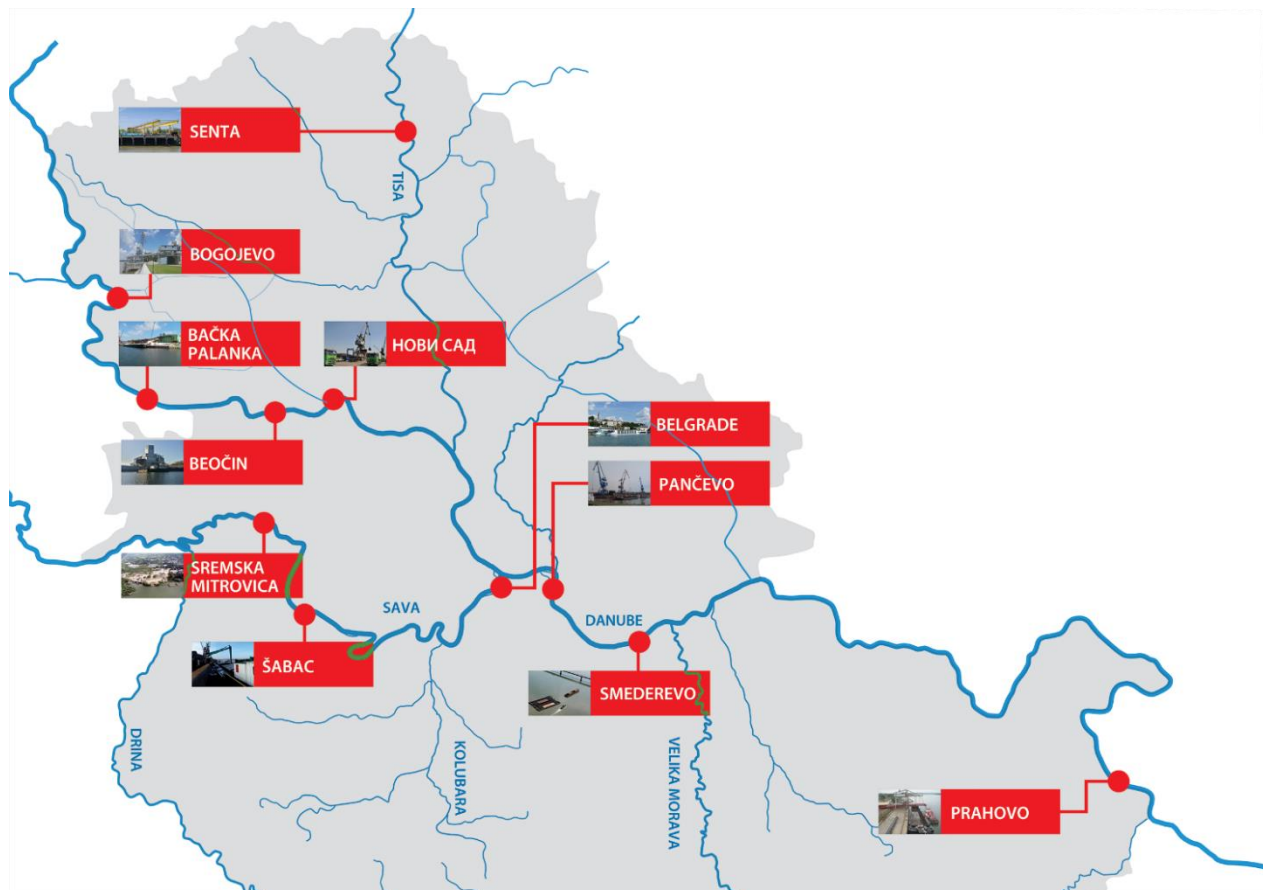
SERBIA

Serbia is a landlocked country situated at the crossroads of Central and Southeast Europe, in the middle of three geo-political entities: Danube macro-region, Adriatic-Ionian macro-region and Western Balkan 6 initiative. By analyzing and assessing the geostrategic and geopolitical comparative advantages of the Republic of Serbia in the wider European area, the main advantage of the Republic of Serbia is being the traffic connection of Western and Central Europe with Southeastern Europe and the Middle East, as well as the connection of Central European countries - the Middle Danube towards the South Adriatic, the Aegean and the Black Sea, or the Mediterranean.

In the following the inland waterways network is presented.

The total length of the navigable inland waterways in the Republic of Serbia is approximately 1.670 kilometers. In the Republic of Serbia there are 11 ports, 7 on Danube river: Bogojevo, Bačka Palanka, Beočin, Novi Sad, Pančevo, Belgrade, Smederevo and Prahovo, 2 on Sava river Šabac and Sremska Mitrovica and 1 on Tisa river - Senta.

Figure 40: Inland Waterways and ports in the Republic of Serbia⁷



The Danube River

Rhine-Danube Corridor is one of the nine European corridors of the TEN-T network, which is passing through the Republic of Serbia.

The Danube River as an international waterway in Serbia is 588 km long and represents 20% of the total River length. It enters Serbia from Hungary at km 1.433,1 and leaves for Bulgaria at km 845,5 near the Timok river confluence. There are two joint stretches of the river – with Croatia in the length of 137 km and with Romania over the length of 229,5 km.

Waterway of the Danube River on the stretch from km 845+500 to km 1170 has the category VII and on the stretch from km 1170 to km 1433+100 has the category VIc. The Danube River’s waterway is completely marked in accordance with the applicable international regulations.

⁷ PGA

The Sava River

The Sava River as international waterway on the entire length of the flow through Republic of Serbia, from km 0 to km 210+800.

Waterway of the Sava River on the stretch from km 0 to km 81 has the category Va, on the stretch from km 81 to km 176 has the category IV, on the stretch from km 176 to km 196 has the category III and on the stretch from km 196 to km 210+800 has the category IV.

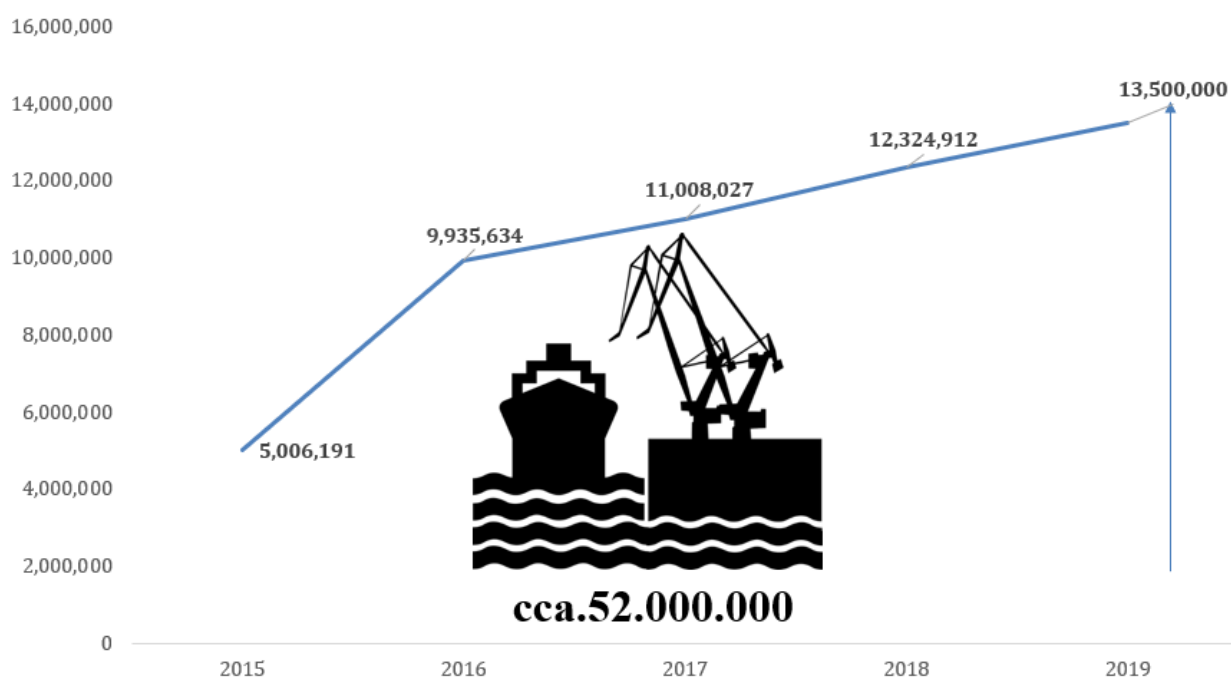
The Tisa River

The Tisa River as international waterway where international regime of navigation applies on the entire length of the flow through Republic of Serbia, from km 0 to km 164. Therefore, navigation on the Tisa River is free and open to vessels from all states regardless to the flag of vessels. Waterway of the Tisa River on the stretch from km 0 to km 164 has the category IV.

Cargo in Serbian ports

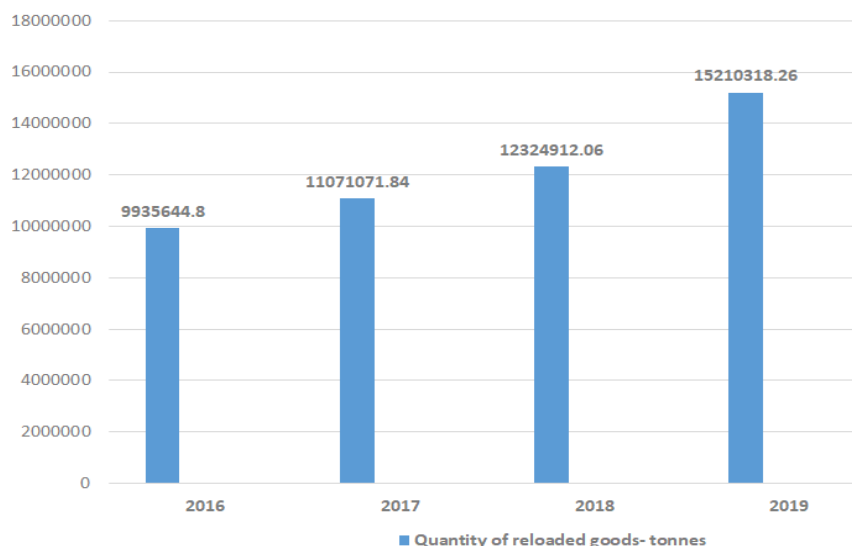
Transport of raw materials, agricultural products, oil and construction materials (sand, stone and gravel) remains major cargo in Serbian ports.

Figure 41: Quantities of cargo transhipped at all Serbian ports



According to the Port Governance Agency, in 2019, 15.2 million tonnes of cargo were transhipped on the rivers in Serbia, which represents a significant increase of 20 percent compared to the year 2018. The volume of cargo transport and transshipment that has increased by one fifth indicates a surge of economic activity in the Republic of Serbia, especially in the fields of chemical industry, energy, mining and construction.

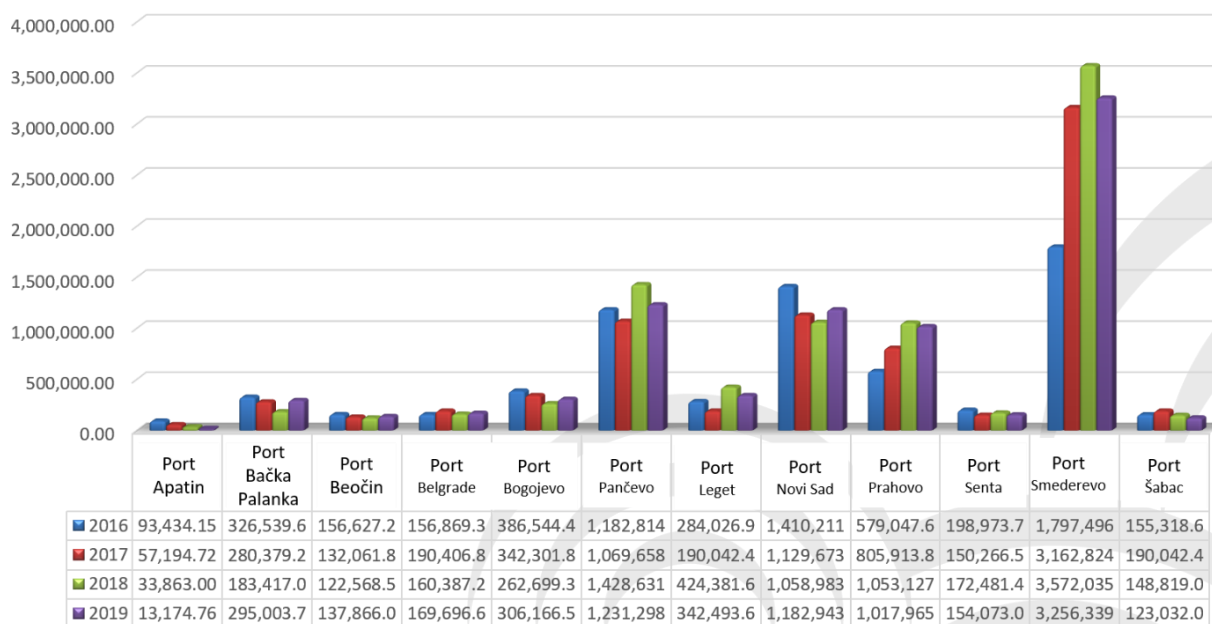
Figure 42: Quantities of transhipped cargo on rivers in Serbia, in tons



The data of the Port Governance Agency show that 10 out of the total 12 port areas in the Republic of Serbia recorded an increase in the cargo transshipment. The biggest growth was achieved by the port area in Smederevo, where a total of four million tonnes of cargo was transhipped, making the port in Smederevo one of the busiest ports on the whole Danube.

After the Port of Smederevo, the Port of Novi Sad and the Port of Pančevo have the highest cargo throughput (please see the Figure 43 below).

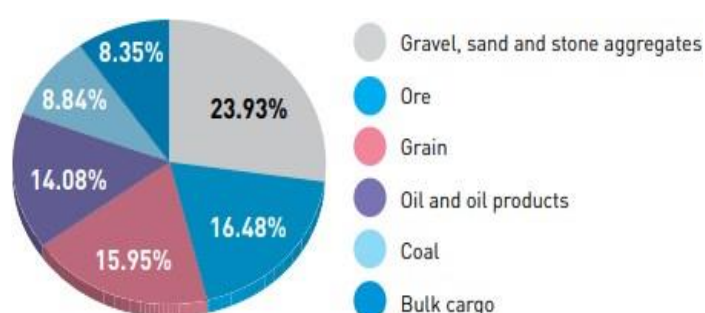
Figure 43: Cargo flows through Serbian inland ports⁸



⁸ Port Governance Agency

As before, the most frequently transshipped cargoes are gravel, sand and stone aggregates, which together account for 23.93 percent of total transshipment. Ores are in second place with a share of 16.48 percent, while grain is in third place with 15.95 percent. Oil and oil products ranked fourth with 14.08 percent. In addition to these, increased quantities of coal and bulk cargo were also recorded. Coal and bulk cargoes accounted for 8 percent of total river transshipment in Serbia in 2019. According to the Agency, the largest difference in the amount of the cargo transshipped was recorded for grain and oilseeds. Thanks to the improvement of the conditions on the international market for mercantile goods, 969,000 tonnes of more grain were recorded compared to the previous year.

Figure 44: The most frequent transshipped goods on rivers in Serbia



In case of low water levels, navigation is limited or in some cases no possible at all with ships complying with the European standards. The hectic change of the water level of the Danube affects the navigability of the river as well as the utilized capacity of the cargo vessels.

Bottlenecks have been identified in places where navigation is difficult due to low water levels. On the section from Belgrade to Djerdap II, there are no problems in terms of the navigation due to the effects of the construction of the HEPPs Derdap I and Djerdap II. On the other hand, several sections critical for navigation has been identified on the sector upstream from Belgrade and along the joint section with Croatia.

The project Hydrotechnical and dredging works on the critical sectors on Danube River in Serbia, between Bačka Palanka and Belgrade is underway. Project aim is to eliminate six critical sectors on the stretch of the Danube River between Belgrade and Backa Palanka, from km 1287 to km 1195, whereby the safety of navigation on Serbian inland waterways will be significantly improved. The main activities of the Project include construction of hydro-technical structures and dredging of fluvial sediments in compliance with the environmental protection requirements.

This project will contribute to the improving of the conditions and safety of navigation, which is of great importance for the Republic of Serbia, bearing in mind that in the classification of the main transport corridors of the EU, Danube is part of the Rhine-Danube Corridor and that 87% of the total volume of water transport is generated on the river Danube, and most of the transshipment is done in ports on the section between Bačka Palanka and Belgrade.

The critical sector with the Republic of Croatia is still unresolved.

Development and installation of the navigation monitoring and electronic fairway marking system the Danube River (ATONS) was finished.

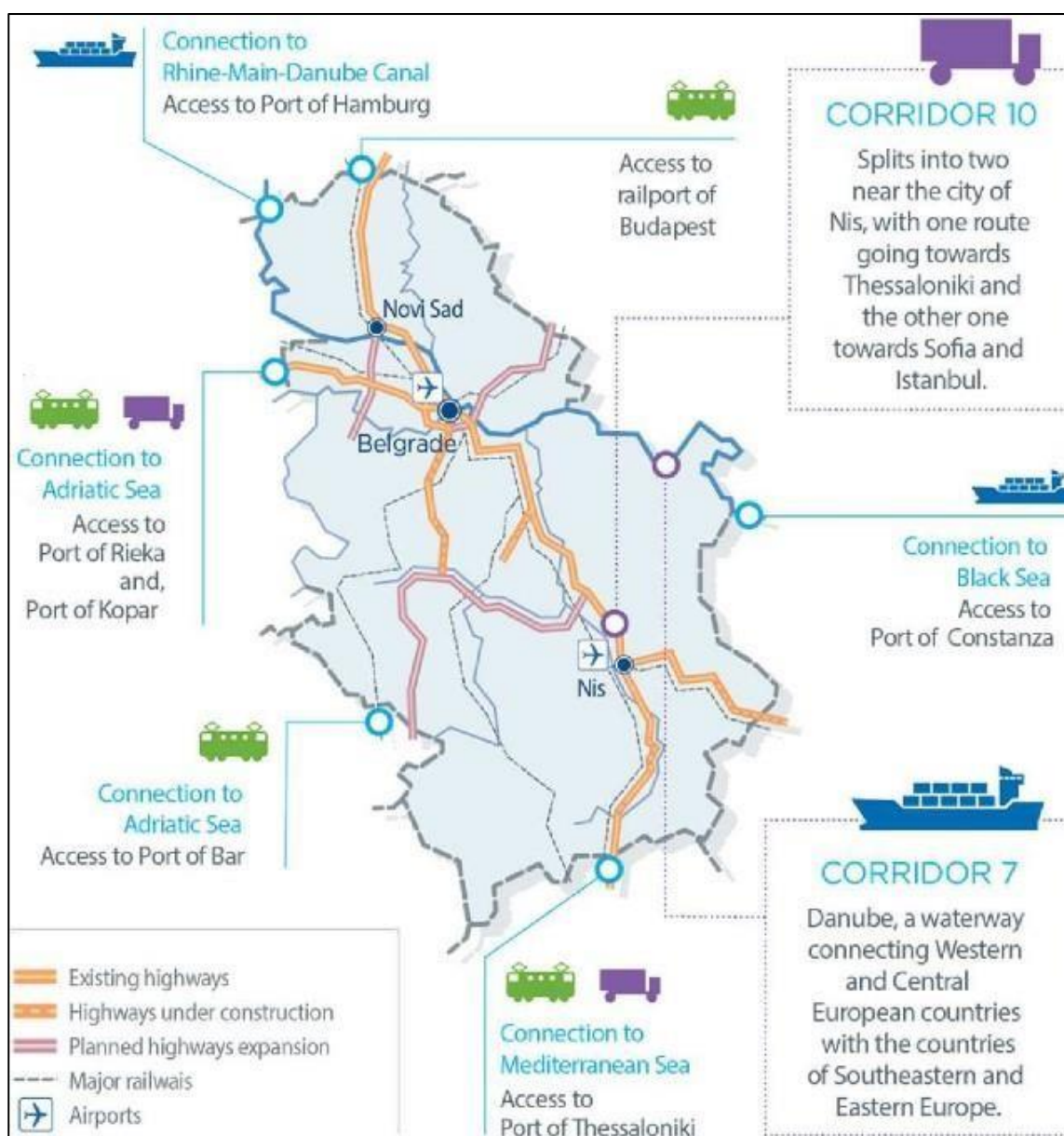
In order to eliminate bottlenecks due to insufficient capacity in the ports in the export season, projects have been started to expansion capacities in the ports Bogojevo, Prahovo, Smederevo, Sremska

Mitrovica and the construction of the new port of Belgrade. The total investments value in infrastructure is 200 million euros, while total investments value over 400 million euros.

Serbia is a landlocked country situated at the crossroads of Central and Southeast Europe, in the middle of three geo-political entities: Danube macro-region, Adriatic-Ionian macro-region and Western Balkan 6 initiative.

Figure 45 below presents a schematic overview of how railway network, road network and inland waterways are interconnected in Serbia and integrated into a larger European network.

Figure 45: The main rail, road, and water connections in and through Serbia



Note: The connection to Mediterranean Sea also provides access to Port of Piraeus. There is also possibility to reach Turkish ports, but this is not currently used due to congested Turkish railway infrastructure.
 Source: Compass Lexicon based on http://serbia-investment.com/optimal_geographic_location , last accessed on 9 October 2019

The most common choice for the majority of Serbian freight forwarders are the Northern Adriatic ports (Rijeka, Koper, Trieste) when it comes to for East Asian and North American imports goods. The choice of Northern Adriatic ports over Thessaloniki for East Asian and Rotterdam for North American shipments may be interpreted as a choice of cost savings over speed by freight forwarders. Shipments traveling from East Asia to Belgrade via the Suez Canal would arrive more than one day sooner if routed through Thessaloniki. Moving North American goods through Rotterdam to Belgrade would save three days of transit time.

Bogojevo

Total port area is 150,000 m², it has a covered storage area and it is equipped with a gantry crane, with the max. lifting capacity of 20 tonnes, and a conveyor belt.

Bogojevo is an open type port with aquatory of 12 m deep. Total quay length is 210m, out of which vertical quay is approximately long 90m. Two vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 6 vessels. On the filled plateau behind the operational shore, a grain silo, a dryer, closed and open warehouses, a truck scale weighing system, an administrative building and gates were built.

The port has silo of 30,000 tonnes and 10,000m² of covered storage space available for port users. The main types of cargo handled in port are grains, chemical fertilizers, gravel and sand.

Bačka Palanka

The port of Bačka Palanka is located on in the agrarian area of South Bačka.

Total port area is 740,000 m², it has an open and covered storage area, it's equipped with a gantry crane, with a max. lifting capacity of 12 tonnes, a mobile crane with a 9-tonne capacity, a floating crane with a 6 tonne capacity, a conveyor belt, pneumatic equipment and a Ro/Ro-ramp.

Total quay length is 322m, all of which is the vertical quay. Three vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 12 vessels.

The depth of water in the port basin ranges from 3.93m to 8.86m. The average size of the vessels reloaded in the harbour is 90m in length, 11m in width, with a capacity of 1,500 tonnes and freeboard of 2.5m. The port handles dry bulk and break bulk cargo. Storage facilities consists in 8,260 m² of open spaces and 650 m² closed spaces.

Prahovo

The port covers surface of approximately 6,7 ha. Port of Prahovo is an open type port with maximum available draft maintained at 4 meters. Total quay length is 677m, out of which vertical quay is approximately long 320m. Six vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 60 vessels.

Port of Prahovo has the following facilities and devices: conveyor belt, pneumatic equipment, Ro/Ro-ramp and 6 gantry cranes of 40 tonnes lifting capacity per each. When it comes to storage facilities, there is an open storage area, covered storage area and customs warehouse.

Northward, the Danube connects Prahovo to the countries of the Danube basin, all the way to Germany. Through the Rhine-Main- Danube Canal it is connected to Rotterdam and the North Sea, as well as

Mannheim, one of the most important transport hubs and the center of the European chemical industry.

Towards the east, Prahovo is connected by the Danube to the Black Sea and the Port of Constanta, an important international hub for maritime traffic.

SLOVAKIA

Port of Bratislava

Container terminal has a direct regular railway connection by means of container to shuttle trains: Bratislava – Mělník (CZ) and vice versa, Bratislava – Bremerhaven (DE) and vice versa, Budapest (HU) – Bratislava, Rostock (GER) – Bratislava, Koper (SLO) – Bratislava.

Port of Bratislava is connected with 3 maritime ports, port of Koper (SLO), port of Rijeka (HR) and port of Antwerp (NL). by regular rail shuttle service. Connection to port of Koper runs once per week (Saturday). Shuttle to Rijeka and Antwerp should have started in 2021. Unfortunately, exact statistics about number of containers / TEUs transhipped through the corridor are not yet available.

Port of Komárno

No regular maritime connection currently in operation.

UKRAINE

- **Road** – IX Trans-European International Transport Corridor, connecting Helsinki, Klaipeda, Kaliningrad and Moscow with Greece The countries participating in this corridor are Finland, Russia, Ukraine, Belarus, Moldova, Romania and Greece. Its length is 3400 km. It passes through the territory of Ukraine by rail and highways. Transport corridor the Black Sea Economic Cooperation: Reni - Izmail - Odesa - Mykolaiv - Kherson - Melitopol - Berdyansk - Novoazovsk European route E 87 - 2030 km: Odesa – Izmail – Reni – Galati – Tulcea – Constanta – Varna – Burgas – Malko Tarnovo – Dereköy – Kirklareli – Babaeski – Havsa – Keşan – Gelibolu – Ayvalık – İzmir – Selcuk – Aydın – Denizli – Acıpayam – Korkuteli – Antalya
- **Railway** - The existing railway network makes it possible to move cargo traffic from the port of Reni to Moldova, Romania, European countries, and from the seaport of Izmail - to Moldova, Russia, Belarus, the countries of the Baltic region, Europe, Central Asia.
- **Izmail International Airport** is now temporary not an operating airport in the Odessa region. In 1997 it received international status. Flights to Kiev, Istanbul and Varna were served. In 2007, there were 3 flights per week. In 2009, the airport was temporarily closed due to the crisis. By the end of 2021, it is planned to prepare design estimates for the reconstruction of the airport. In Izmail airport, ATR-42, ATR-72, AN-140, AN-148, AN-74 aircraft with a range of up to 1300 km will be able to serve. With the possibility of delivery to Kiev, Istanbul, Antalya, Venice, Vienna and other European cities.
- **Passenger`s complex of Izmail port** capability of serving- up to 0.15 mln. passengers a year.
- **Ferry crossing "Orlovka-Isaccea"** The Orlovka ferry complex is located on the left bank of the Danube, 4 km away with Orlovka town, Reni district (22km from Reni), Odessa region, 2 km from the international highway M-15 (E 87), 40 km from Izmail. It has a universal berth structure for all types of river ferries and sea and river vessels. The ferry has an international checkpoint

across the state border for ferry, passenger and freight traffic with daily capacity about 200 units of trucks, 500 units of light transport and a passenger traffic of about 1500 people.

- **Deep Water Fairway Danube - Black Sea** (hereinafter- DWF) is one of the elements of the program for the development of the national network of international transport corridors and its integration into the transport system of the countries of Europe, Asia, the Baltic and the Black Sea. The main advantage of DWF Danube - Black Sea, in addition to competitive tariffs, is the ability for two-way vessel traffic to operate around the clock throughout the year. The ship traffic safety management system complies with the standards of the European Union and other international norms. DWF was created as an alternative ship route, gave an outlet to the seaports of the Danube region (Izmail, Reni, Ust - Dunaisk) to the Black Sea, with the possibility of passage of ships, type and class of waterways, both internal and international routes. The section of the Kiliysky arm of the Danube, which is part of the State Agricultural Academy "r. Danube - Black Sea "is assigned to the highest VII class of waterways of category" E "according to the List of the main inland waterways of Europe (" Blue Book ") of the UNECE.

The Implementation Committee of the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) noted the progress of Ukraine in the development and submission of a draft detailed roadmap for bringing the project "Creation of a deep-water navigational route of the river Danube - Black Sea on the Ukrainian section of the delta "in full compliance with the provisions of the Espoo Convention.

6.2 Identification and presentation of the existing/possible maritime services

AUSTRIA

Not relevant due to the fact Enns-shafen port and Port of Vienna are inland ports

BULGARIA

In connection with Bulgaria's membership in the European Union and the integration of its transport infrastructure in the European transport infrastructure, considerable efforts are made for the introduction and implementation of European standards for modern, environmentally friendly and safe transport and actions are being taken to implement the relevant EU legislation. International norms and standards related to limiting the pollution from ships applies both in terms of vessels sailing under Bulgarian flag and for foreign vessels visiting the Bulgarian river and seaports.

The regions of Bulgaria bordering the Black Sea are Varna, Dobrich and Burgas. Port Burgas is the main port on the Black Sea, which operates gate traffic between Europe and Turkey. The other Bulgarian seaport is Varna, which oversees the northern part of the Black Sea.

The potential opportunities for building a ferry complex Varna – Port Kavkaz, as part of the strategic railway connection China - Kazakhstan - Russia - Bulgaria – EU, are examined by arch. Petar Dikov in some of his scientific works. The shortest route from East and Central China is through Kazakhstan and Russia to Europe. The presence of the ferry complex in Varna is a prerequisite, according to architect Dikov analysis, to move forward in that direction, because Varna's ferry complex handles cargo, 70% of which is from Port Kavkaz.

CROATIA

Water transport in the Republic of Croatia includes transport on inland waterways and maritime transport, where the ports through which the trade of the Republic takes place are located Croatia with other European countries. River traffic of the Republic of Croatia is a part of European transport system. With its largest rivers: the Danube, the Drava and the Sava, Croatia is connected with Western, Central and Eastern Europe, and combined transport with the Adriatic and thus other parts of Europe and the world. The Danube is international river, as well as the Drava from the mouth to Osijek. Such a wealth of waterways is good predisposition for developed river traffic, but the potential it provides, especially economically, has so far not been adequately exploited. Total length of existing waterways in Croatia is 804,1 km, of which 539,2 km are international and 264,9 km state and interstate waterways.

From international waterways 286,9 km meets the conditions for international waterways, i.e., conditions IV. class 2. Largest section is the Sava River, which in Croatia largely does not meet international requirements for navigability, given the size of the ships that can navigate it (from 650 to 1,000 tons load capacity) and is, therefore, for the most part classified in III. buoyancy class. River Drava is included in the network of European waterways, indirectly, across the Danube. From the mouth of the River to the Danube through Osijek, the use of intermodal transport is possible.

Croatian ports on the inland waterway system include four international ports (Sisak, Slavonski Brod, Osijek and Vukovar) and several current and future ports. The current situation is not high level due to technical and technological obsolescence and lack of capacity. Port of Vukovar and port Osijek are the largest Croatian river ports - according to the share in the total traffic realized in inland navigation of Croatia.

A large infrastructure project that could further develop traffic on inland waterways and bring the Ports of Sisak and Slavonski Brod closer to the European traffic area is the future Sava - Danube Canal. There are several planned variants for this channel, but the construction of a 61.5 km long multi-purpose canal that was to connect the Danube port Vukovar with the river Sava near Šamac. The Sava - Danube canal as a multipurpose project is also included in the Spatial Planning Strategy of the Republic of Croatia. This channel should perform irrigation function and would play a major role in relieving the riverbed during floods and reduced water levels. The basis of international transport corridors in inland waterway transport is The Pan-European Corridor VII which is also the main internal transport water corridor. It's also called The Danube waterway because it represents the course of the Danube, which is the second largest river in Europe and navigable at a length of almost 2.415 km. It connects ten countries: Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Moldova and Ukraine. In addition, it connects Western and Eastern Europe via the Rhine and Main rivers, and canals Rhine - Main - Danube, and the North Sea with the Black Sea.

HUNGARY

As regards arranging of transport, predictability is a key challenge in IWT. Hungarian Danube ports are willing to adapt maritime ports' practices considering the note of readiness. However, ETA (estimated time of arrival) is frequently not predictable due to the tons of unexpected environmental factors (weather, water level, navigability, ports' unequal price policy etc.).

ROMANIA

Constanta Port

The Port of Constanta covers 3.926 ha of which 1,313 ha is land area and the rest of 2.613 ha is water area. The total land area of 1.313 ha is shared between the North Port that occupies a land area of about 495 ha and the South Port with about 818 ha. Another 561 ha are included, according to the masterplan, in development project for short, medium and long term perspective.

The Port of Constanta is not an open shore port. Its infrastructure is basin type with two basins. The main tuning basin for the North Port of Constanta is located in front of the oil terminal having enough area to enable the maneuvering of the common vessels calling the North Port. The first is located at the port entrance, after passing the South breakwater, while the second is located at the exit from the port, in front of the basin between piers 1S and 2S. The standard berthing maneuverings require tug assistance and present a significant challenge, especially for berthing container vessels at the Constanta South Port terminal in which the navigation is limited to one-way traffic.

The Constanta Port has the maximum draught, natural or dredged, of 19 m and a minimum water depth of 7 m. Port service time is 56 hours per week. Considering the average number of non-operational days due to adverse weather conditions such as: rain, fog and heavy storm the number of weather working days (WWD) varies between 330 and 350 per year.

The port has ten terminals for bulk cargoes. The dry bulk cargoes (iron and non-ferrous ore, grain, coal, coke, cement, construction materials, phosphate etc.), are operated in specialized terminals located next to the river-maritime basin. There are specialized terminals that operate iron ore, bauxite, coal and coke have 13 berths. There is specialized terminal where fertilizers, phosphate, urea, apatite and other chemical products are operated.

The port is an important node in integrated logistics chains, offering through the five tri-modal terminal quick and safe access to port facilities from an inland transport system including inland water, railway system and road access. Currently there are a limited number of containers moving inland by water freight.

For oversized and over weighted cargoes in the Port of Constanta, private companies provide heavy lift cranes that facilitate the handling of heavy lift and out-of-gauge loads.

The railway infrastructure facilitates allows the handling full block train in the port area as well as along the quay. Therefore, conditions for round-the-clock train services and every day shuttle trains are available. Unfortunately, the rail connections of the port to the hinterland lacks development and maintenance works within the Romanian rail network. The commercial speed is very low 20km/hour and as a result lacks predictability and efficiency affecting the attractiveness of Constanta Port.

The port has an excellent road connection directly to highway A2 to Bucharest. Currently, the highway infrastructure is under development being focused on a continuous network to the north-west part of the country and the Romanian-Hungarian border. These road link will provide faster time of transit especially for containers and general cargo transiting Romania and Port of Constanta.

Port of Galati

The Galati port is the largest sea-river port, respectively the second largest port in Romania, with access to the Danube maritime sector and the Black Sea through the Sulina Chanell and the Danube-Black Sea Channel. Galati Port is located on the left bank of the Danube, from km 157 to km 144+900, is managed by the National Company Maritime Danube Ports Administration SA Galati; has a total of 56 operating berths. We mention that the access to the Port of Galati can be done by river and sea vessels (max. 15,000 DWT). However, the capacity and draught of ships admitted to operation and which may reach the port are conditioned by the minimum depth of the Danube recorded at Sulina Channel.

SLOVAKIA

In Slovakia, there are no regular barge feeder lines to/from any seaports. Connection between port of Bratislava and maritime ports is covered by rail shuttle service that is 100% dedicated to container transportation. Major constraint is in low demand for container transshipment in general.

UKRAINE

- Categories of main goods and quantity, see- Chapter 3 “Data collection base year 2019”.
- Annual port’s project capacity, mln. tons per year: Izmail - 8.5; Reni- 14.5.
- Maximum size of vessels of ports Reni and Izmail: length- up to 150 m; width- up to 30 m; draft- up to 7.2 m.

Ports of Reni and Izmail provide the following services:

loading and unloading works and cargo storage; fastening, binding, stacking and special loads with customer cargoes; freight forwarding; packaging work; marking and re-marking of goods; ordering railway carriages to send cargo from the port; ensuring safe handling of vessels; bunkering of ships

with water near berths and on raids; cleaning of vessels from oil-containing, pouring sewage and garbage; substitution team services; barge and other facilities; delivery by boats of commissions and agents; performance of services for the provision of floating cranes; delivery of cargo on the Lower and Middle Danube by the port fleet; inter-trip repair of non-self-propelled fleet and other activities.

Port of Reni

The main cargo of port of Reni is grain. Port cooperates with Moldovan grain traders who deliver grain to the port of Reni from Moldova due to the low water leveled Danube, loading barges in the port of Giurgiulesti and sending them to Reni for transshipment of grain to sea vessels. The distance between the ports of Giurgiulesti and Reni is ~8 km. Transshipment is carried out at the 2nd cargo area, specializing in the processing of: metal, scrap metal, grain, timber, oil products, general, bulk (pellets, coal, coke), phosphates (phosphorites), chemical cargo (potassium, chlorine, urea); The total length of the berths is 1960 m; Depths at berths - 3.6-7.5 m; The total area of open warehouses is 62,737 sq. m, covered - 5788 sq. m; Throughput capacity - 4 million tons per year; Maximum draft of accepted vessels - 7.2 m; The carrying capacity of the accepted vessels is up to 20 thousand tons.

Oil region specializes in transshipment of crude oil and oil products (crude gasoline, gasoline, diesel fuel, vacuum gas oil, gas condensate, fuel oil, coal tar).

The total length of the berths is 258 m; Depth at berths - 12 m; Maximum draft of accepted vessels - up to 10 m; Maximum length of serviced vessels - up to 170 m; Carrying capacity of accepted vessels - up to 20 thousand tons.

The normative intensity of the load of ship is 3000 ton/day, the intensity of discharge - simultaneously with 8 railway tanks. The production potential of the oil section allows processing more than 2 million tons of oil and oil products, as well as 250 thousand tons liquefied gas per year. The volume of one-time storage of dark and light oil products in the tanks of the oil section is 7000 cubic meters. The floating berths of the oil section are connected by a pipeline system with the reservoirs of the Reni oil depot, OJSC “Odesnefteprodukt”, which ensures the simultaneous storage of up to 60 thousand tons of oil and oil products.

Port of Izmail

Port of Izmail can operate with an intensity of up to 23288 tons per day. The actual intensity of the port is up to 40000 tons per day. The maximum possible number of processed vessels is 6070 units for a year. Gross intensity of processing of vessels with bulk cargoes – 5000 tons per day. The maximum intensity of processing of cars per day - 448 units; Carriage turnover –163520 units per year; Maximum deadweight of vessels handled at berths is up to 6,000 tons.

6.3 Conclusions on the existing maritime infrastructure connections

AUSTRIA

Not relevant due to the fact Ennshafen port and Port of Vienna are inland ports

BULGARIA

In order for Ruse and Lom to be recognized as important “stepping stones” for cargo, when it travels between Western/Central Europe and the Black Sea, it is essential for infrastructure investments to be made, the goal of which would be to improve port accessibility (reaching a bigger geographic area from the port within a certain time).

Periodic dredging activities will also need to be performed regularly in order to maintain or even increase the depth of the navigation channels. A step towards the achievement of that goal was made in the beginning of 2021, when the Bulgarian Executive Agency for Exploration and Maintenance of the Danube River (EA EMDR), which is the organization tasked with performing the dredging activities on the Danube, purchased a brand new cutter suction dredger, whose role would be to maintain the minimum targeted 2.5 m. depth of the fairway in the Bulgarian parts of the river. Additional equipment was also purchased and arrived at the company's headquarters in Ruse in the second half of 2021 – a pontoon, a barge and a set of pipelines. With that, the set of equipment needed to perform the necessary dredging activities is almost complete. The only thing missing is a manoeuvring vessel, which will also arrive in Ruse at the end of 2021 or the beginning of 2022. The vessel is currently being built in the Giurgiu shipyard.

CROATIA

Infrastructure facilities on waterways within Vukovar-Srijem County are few. In addition to the port of Vukovar and two passenger terminals (Vukovar and Ilok), there is also a loading dock in Ilok which is of a temporary nature and serves to service the needs of the local industrial facility.

Damage to security facilities was found on the Danube River in 23 out of a total of 87 facilities. The most critical places are in the part between rkm 1404.5 - 1402. Due to the formation of the embankment a double bed of the Danube was formed with a simultaneous erosion of the right bank with a tendency of water penetration of the Danube into Kopački rit and the movement of the river flow towards the right bank. On the left side, coastal erosion has damaged both existing protective structures and the coast.

The most important project related to the use of the potential of the Danube and Sava is the Multipurpose “Danube-Sava channel”, which would better connect the rivers Danube and Sava, shortened the waterway from Europe to the Mediterranean Sea and enabled the development of ports, harbors and ports in the interior counties along the route of the canal which would enable the development of the economy and other activities related to waterways and urban development, provision of water for irrigation in agriculture, forestry, environmental protection, etc. In addition, the project of arranging the Sava waterway and raising the class seaworthiness to category IV would re-establish international traffic to Sisak.

HUNGARY

Hungarian inland ports have two main export destinations:

- ARA ports (Amsterdam, Rotterdam, Antwerp) and Western European inland waterways
- Constanta, Lower Danube and the Black Sea.

ROMANIA

Port of Constanta

Port of Constanța is both river and maritime port with a geo-strategical position that favors the position of hub for this region.

Before 2009, the port was a container hub relying mainly on its road connections to the hinterland. After the economic crisis the hub moved to the ports in Istanbul region and later another hub appeared when Chinese investors bought the port of Piraeus.

Unfortunately, the road connection improved slowly. The highway network still does not offer a complete connection with Budapest or the North West part of Romania creating the premises to regain

the share of the markets lost after 2008. Construction works are underway and in the couple of years this connection will ensure better road connections to the hinterland.

Currently, the rail network is the main downside for the development of container traffic because of its low commercial speed. This situation favors ports like Koper and Hamburg that have developed regular railway services in this part of Romania.

Now, the port is a hub for agri-bulk cargoes, River Danube being the most efficient way for the transit of bulk cargoes towards Constanta port and its hinterland. It still needs predictability in order to attract other types of cargoes – containers, but also to improve its navigation conditions for the existing transiting cargo flows.

As conclusion, the maritime infrastructure of Constanta Port offers very good conditions for the transit of different type of cargoes. Its connections, especially railway connections, needs a strong development and improvement in order to use the entire maritime and river potential.

Port of Galati

The on-going project Project Galați Multimodal Platform aims the development of a multimodal platform with a capacity of 150,000 TEU/year in the port of Bazinul Nou (from the Galati port), is being implemented with a completion deadline of 2023, the first year of operation 2024.

Currently, the port infrastructure and its facilities are in an inadequate technical state. The substantial upgrading of existing infrastructure will eliminate bottlenecks in two ways.

Firstly, the port infrastructure will be upgraded, contributing to: (1) the increase of the efficiency of handling modern ships with higher capacities and the increase of the safety and security conditions; and (2) facilitating rail interconnection between Russia and the European Union via Ukraine by integrating two types of gauges (1435 and 1520 mm) into the terminal's operations. This is of strategic importance and can initiate new multimodal services between Europe and Russia, Ukraine and the Republic of Moldova.

The access in the port platform is performed directly from the European road E87 (on the road) and from CFR triage through a railway line. The upgrade of the existing public road infrastructure (by building a highway passage and a roundabout) is performed in order to streamline road traffic on the E87.

The implementation of the intermodal and IT & C facilities will enhance the capacity, efficiency, safety and security of the port operations. The upgrade of the terminal will provide a sustainable alternative to the road transport between the Central Europe and the Black Sea region, especially Turkey and Greece.

Currently, most freight transport on these routes is made by road. The efficient combination of the modes of shipping, river, rail and road will open up new possibilities for the multimodal services. Considering the draught limitations, it was taken into account the optimum scenario with a ship of 300 TEU, respectively of 8,000-9,000 dwt, considering all the containers loaded at capacity (an average of 28-30 tons/TEU).

In practice, the port-container ships transport both loaded and empty containers, generating an average of approximately 15 tons/TEU that would conduct to the possibility of the transportation of a higher number of TEU/ship. Depending on the proportion of empty and loaded TEU, the ships that will enter within the terminal can have a transportation capacity between 300 and 500 TEU, the

proportion empty/loaded being determined by the container line considering the weight and the maximum accepted draught mentioned above.

From the Traffic Study, the estimated potential is as follows:

Table 19: Estimated potential Project Galați Multimodal Platform

Potential	2024	2032	2037	2042
TEU's international OD relations	47871	144513	178429	216133
TEU's Moldavia RO, Republic of Moldavia, Ukraine (containers already from 2017)	18276	55172	68120	82515
TEU's Moldavia RO, Republic of Moldavia, Ukraine (non containers in 2017, 30% of the total in containers in the future)	11133	33608	41495	50263
Total TEU's	77280	233293	288044	348911

SLOVAKIA

Public ports in Slovakia are mainly focused on:

- transport / transshipment of iron pellets, fertilizers, and mineral oils (Bratislava)
- transport / transshipment of agricultural production (Komárno)

Mentioned sectors are not generally related to transcontinental / maritime transportation. Only sector that might be currently related to maritime transport is container transshipment. However current needs of container transportation are provided by road and railway.

UKRAINE

Port of Reni

Up to 95% of the total turnover of Reni port is transit cargo. More than 85% of transit cargoes is cargo (mostly represented by grain and other dry bulk cargoes) from Moldova to the Black Sea and Mediterranean basins countries, the Danube countries (Bulgaria, Romania, Serbia), North Africa (Tunisia, Morocco, Libya) and the East. The main cargo traffic in the port is represented by grain cargo from Moldova to Middle East, which is delivered by road within a radius of 300-400 km.

Port of Izmail

The main cargo flow of the port of Izmail is constituted by export and transit of bulk cargoes (coal, ore cargoes), bulk (grain and food) and liquid bulk (oil, gases). The traditional cargo for Izmail seaport is ore coming from the Poltava region - Poltava Mining and Processing Plant - the largest Ukrainian

exporter of iron ore pellets to Europe (Ferrexpo company - Poltava Mining), as well as from Kryvyi Rih and Zaporizhia. Iron ore exports to Austria, Bulgaria, Romania, Serbia, Hungary.

The largest share of imported goods was received from Romania, which were represented mostly by construction materials, chemical goods and oil products. Imported cargo from other countries coming from Serbia and Bulgaria (chemical and mineral fertilizers, general cargoes). The remaining import came from Austria, Moldova, USA, Turkey and Croatia. Total import from Danube countries was more as 95% of import's volume.

The largest share of export of Izmail port, transported to Serbia, which is mostly ore and ferrous metals, with exports to Romania (which is much lower share than import indicator for Ukraine from Romania) and is represented by different types of cargoes. Transit cargoes are mainly freight from the Russian Federation to other Danube countries (Bulgaria, Serbia, Romania, Hungary and Croatia). The share of such cargoes is largest among other transit cargoes. Chemical fertilizers, ferrous metals, coal, bulk cargoes and ore represent transit cargoes. Sunflower oil also becomes a traditional cargo in a range of Izmail sea port cargoes, vegetable oil, also was transported to Spain, Turkey, Italy.

Main factors affecting type of cargo and cargo volume in transportations of Izmail sea port:

- Transport indicators. The number of ships passing through the Ukrainian deep-water navigable route "Danube - Black Sea" have decreased significantly due to implementation of special tariffs on the Sulina Channel in 2010, because freight traffic was artificially re-oriented and seagoing vessels have been forced to use the Romanian Sulina Channel with higher charges. This is negatively affecting the number of vessels' calls to Izmail port (as well as to other Ukrainian ports on Danube).
- Changing the situation of the commodity market. Ukrainian and foreign metallurgical plants have recently reoriented their production for imported coal and iron ore raw materials.
- Termination of the flow of Danube transit to the Black Sea, because of a reorientation to the Romanian Danube – Black Sea Channel (Cernavodă - Constanța)

Deep Water Fairway Danube – Black Sea

- Navigation resumption on Deep water fairway Danube – Black Sea may become one of the most effective measures of the Eurointegration course, announced by Ukraine. Full development of the Danube - Black Sea Water Fairway with the Bystroe mouth opens up possibilities for unbounded expansion of logistic schemes of cargo flows on East – West vector, economical growth of Reni, Izmail ports and all Ukrainean Lower Danube region.

7 Conclusions

7.1 Rail infrastructure and services

AUSTRIA

The infrastructure and their surroundings of the two investigated ports in Austria are well developed now. Nevertheless, an interesting list of planned projects are in the pipeline to further improve the status-quo. Most of these projects deal with investments regarding future demands regarding alternative fuelling of cargobusiness, fulfilment of Green Deal approaches by modernisation of infrastructure and optimization of existing status both for railway and waterway transport. This project list is not finished, some projects are in detailed investigation now and will be developed or changed to upcoming new demands of decarbonizing and market developments. For both ports Ennshafen and Port of Vienna so far are no real gaps known, which are not covered by the project lists „on-going“ or „planned“ (DIONYSUS D.T 1.1.3). May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO₂-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).

So far no real additional „gaps“ are known for both port sides Enns and Vienna. One topic which has been described in project DAPhNE is „the connection of the Danube region in or near Austria“ with the developments of BRI (belt and road initiative / broad gauge railway ...) – some discussions are under development. May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO₂-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).

BULGARIA

The development of the railway infrastructure for intermodal transport for the purpose of building new terminals, as well as freight and logistics centres, will increase its competitiveness. The creation of efficient logistics chains requires an optimal combination of the different modes of transport (co-modality), the exchange of good practices to improve standardization and the interoperability between different modes of transport.

In accordance with the strategic vision for transport development, defined in the „Integrated Transport Strategy for the Period Before 2030“ and in accordance with the commitments set out in the Partnership Agreement, Bulgaria needs to transform its railway sector into a viable industry.

CROATIA

The favorable geographical position of the County enabled the rapid development of railway traffic and the development of the City Vinkovci as a passenger and cargo-shunting hub. However, Vinkovci has not yet reached pre-war levels importance despite progress and investment in infrastructure reconstruction. An international pass through the County railway corridor, and it is estimated that in 2015, around 311,000 passengers were dispatched from the station to Counties. Considering that

significant investments are being made and planned in the reconstruction of the railway on the route of the corridor, for further increase in traffic and strengthening of the County as a railway and logistics center is to be expected. Tome bi should also contribute to the stronger integration of railways and the use of the Danube for the transport of goods, i.e., intermodal forms of transport. It should also be noted the existence of a RO-LA terminal (truck transport terminal tractors on railway wagons) in Spačva, which were opened by the Croatian Railways in 2007.

The following railways were built through the County, which are buildings of importance for the Republic of Croatia and are classified, in accordance with the Decision on the Classification of Railways (Official Gazette, No. 3/14):

- Railway Corridor RH1 (former X. Pan-European Corridor) DG-Savski Marof-Zagreb-Dugo Selo-Novska Vinkovci-Tovarnik-DG (state border with Serbia), line mark M104 (Novska - Vinkovci - Tovarnik - State border - (Sid));
- Railway Vinkovci - Vukovar-Borovo naselje - Vukovar, line code M601, belongs to other railways for international traffic
- Railway Vukovar-Borovo Naselje - Dalj - Erdut - State border - (Bogojevo), mark line R104, belongs to railway lines of importance for regional traffic;
- Railway line Vinkovci - Drenovci - State border - (Brčko), line code R105, belongs to railways of importance for regional traffic;
- Railway line Vinkovci - (Gaboš) - Osijek, line code L208, belongs to the railway lines from importance for local traffic;
- Railway line Vinkovci - Županja, line code L209, belongs to the railways of importance for local traffic.

The opening of the renovated Vinkovci - Osijek railway in 2008 further improved the quality of the railway transportation. Currently, railway traffic in the County takes place in seven directions (Vinkovci Zagreb, Osijek, Vukovar, Tovarnik, Drenovci, Županja, Slavonski Šamac). Since there is no data on the share of railways in public transport at the county level, it is difficult to assess the actual role of railways in total transport in the area. The reconstruction of the main railway line Zagreb - Tovarnik on the section Vinkovci-Tovarnik-state border with Serbia in the length of 33.4 kilometers has been completed, in the reconstruction of which HRK 442 million invested. In the period from 2012 to 2015, investments were made in the reconstruction of railway infrastructure is HRK 80.5 million, which is HRK 362 million less than in the period from 2009 to 2012. In the plans of HŽ infrastructure by 2020 it is planned to invest 558 million kuna for modernization, reconstruction and electrification of the Vinkovci-Vukovar railway, as well as modernization and reconstruction of the Okučani-Vinkovci railway section.

The priorities in the County in terms of railway traffic are the reconstruction and electrification of the railway Vinkovci - Vukovar, reconstruction of Vinkovci station (revitalization of the former freight station), improving the level of rail passenger transport service both in the urban-suburban segment and regional traffic, modernization and renewal of local and regional railways with a special program with the aim of creating preconditions primarily for the development of integrated public transport, modernization of railway road and pedestrian crossings over the railway, construction of LDC (logistics-distribution center) Vinkovci Vukovar, construction of Cargo center Vinkovci-Vukovar, research of possibilities and spatial conditions for refurbishment and expansion of the existing Vukovar station in the function of freight transport, introduction of new ones combined transport technology on the built and reconstructed railway network in the existing corridors in accordance with the National Railway Infrastructure Program for the period from 2016 to 2020. year (OG 103/15) and its operational objectives.

Estimated travel time Vinkovci - Vukovar is 23 minutes, Vinkovci - Županja 26 minutes, Vinkovci - Ilok 59 minutes, Vinkovci - Otok 22 minutes, Vukovar - Županja 47 minutes, Vukovar - Ilok 38 minutes, Vukovar - Island 35 minutes, Županja - Ilok 1 hour and 22 minutes, Županja - Island 29 minutes and Ilok - Island about 1 hour.

HUNGARY

In this report the largest Danube ports and their rail, road and maritime infrastructure connections are presented.

Every type of cargo can be transhipped in the presented Danube ports. Baja is specialized to bulk cargo, agricultural goods, Dunaújváros handles mostly iron and break-bulk, while the Freeport of Budapest carries containers, agricultural products, iron and heavy goods too.

Ports presented above have direct or indirect connections to the national and international railway network. In the port area, rail is unelectrified due to the crane towers. The most typical bottleneck is the length of tracks within the port area which causes challenges when loading the wagons. It is time-consuming to shunt back and forth to fulfil the full capacity of trains.

ROMANIA

Constanta Port

Rail connections ensure the access by rail to all destinations in Romania and abroad. However, rail accessibility shall be improved as currently delays for trains accessing the port are quite high. The feasibility study on improving the railway connections and access time to the Port of Constanta is ongoing.

Once rail accessibility is improved, it is expected that traffic from road will be attracted on the hinterland connections of the port.

Galati Port

Galati port has good rail connections that make possible rail transport on standard European gauge and also on large gauge for Republic of Moldova and Ukraine. This is an advantage for rail – inland waterway transport in both directions.

The on-going project Project Galați Multimodal Platform aims the development of a multimodal platform with a capacity of 150,000 TEU/year in the port of Bazinul Nou (from the Galati port), is being implemented with a completion deadline of 2023, the first year of operation 2024.

Currently, the port infrastructure and its facilities are in an inadequate technical state. The substantial upgrading of existing infrastructure will eliminate bottlenecks in two ways.

Firstly, the port infrastructure will be upgraded, contributing to: (1) the increase of the efficiency of handling modern ships with higher capacities and the increase of the safety and security conditions; and (2) facilitating rail interconnection between Russia and the European Union via Ukraine by integrating two types of gauge (1435 and 1520 mm) into the terminal's operations. This is of strategic importance and can initiate new multimodal services between Europe and Russia, Ukraine and the Republic of Moldova.

The access in the port platform is performed directly from the European road E87 (on the road) and from

CFR triage through a railway line. The upgrade of the existing public road infrastructure (by building a highway passage and a roundabout) is performed in order to streamline road traffic on the E87.

The implementation of the intermodal and IT & C facilities will enhance the capacity, efficiency, safety and security of the port operations. The upgrade of the terminal will provide a sustainable alternative to the road transport between the Central Europe and the Black Sea region, especially Turkey and Greece.

Currently, most freight transport on these routes is made by road. The efficient combination of the modes of shipping, river, rail and road will open up new possibilities for the multimodal services

Considering the draught limitations, it was taken into account the optimum scenario with a ship of 300 TEU, respectively of 8,000-9,000 tdw, considering all the containers loaded at capacity (an average of 28-30 tons/TEU).

In practice, the port-container ships transport both loaded and empty containers, generating an average of approximately 15 tons/TEU that would conduct to the possibility of the transportation of a higher number of TEU/ship. Depending on the proportion of empty and loaded TEU, the ships that will enter within the terminal can have a transportation capacity between 300 and 500 TEU, the proportion empty/loaded being determined by the container line considering the weight and the maximum accepted draught mentioned above.

From the Traffic Study, the estimated potential is as follows:

Table 20: Estimated potential Project Galați Multimodal Platform

Potential	2022	2032	2037	2042
TEU's international OD relations	47871	144513	178429	216133
TEU's Moldavia RO, Republic of Moldavia, Ukraine (containers already from 2017)	18276	55172	68120	82515
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Total TEU's	77280	233293	288044	348911

Giurgiu

Rail connection needs to be reestablished, and rail network shall be rehabilitated in this respect, in order to make the connection to the national rail network, and to the main rail connection from Romania to Bulgaria. Enhancing the rail accessibility would have the effect of taking over freight traffic from road, in relation especially with Constanta Port.

Drobeta Turnu Severin

Drobeta Turnu Severin Eastern part of the port is connected to the national rail network. A new connection is desired for the Western part of the port in order to enhance the use of inland waterway – rail transport.

SERBIA

Railway network in the Republic of Serbia has approximate length of 5.000 km, out of which is only approximately 20% electrified and 10% double tracked. The railway network is mostly in poor condition with over 300 bottleneck spots, whose reconstruction is estimated to approximately 4 billion euros. However, at the moment, there is a great number of rehabilitations, re-construction and construction works on the network on-going.

The port of Bogojevo and port Bačka Palanka are not connected to the national railway network. Plans for the expansion of these two ports should include railway infrastructure, as well as their connection to the national railway network. Links could be made at the relatively close distance, in Bogojevo only 2,5km and in Backa Palanka 5km.

The port of Prahovo is connected to the national railways. There is a well-developed rail infrastructure with several industrial tracks within the port, and the whole existing complex is connected to the Serbian Railways system and the international rail network. The port is arranged with three parallel tracks, which gives the possibility of simultaneous processing of 160 wagons. Port of Prahovo has a connection with two railway sections: Crveni Krst-Zaječar-Prahovo pristanište section and Bor teretna-Prahovo pristanište section. Crveni Krst-Zaječar-Prahovo pristanište section connects port with Bulgaria, while Bor teretna-Prahovo pristanište section connects port with Belgrade and further with Hungary. Though, reconstruction of port railway tracks should be considered, alongside with the ongoing projects of revitalization of national railway magistral sections which are accessing port.

7.2 Road infrastructure and services

AUSTRIA

The infrastructure and their surroundings of the two investigated ports in Austria are well developed now. Nevertheless, an interesting list of planned projects are in the pipeline to further improve the status-quo. Most of these projects deal with investments regarding future demands regarding alternative fuelling of cargobusiness, fulfilment of Green Deal approaches by modernisation of infrastructure and optimization of existing status both for railway and waterway transport. This project list is not finished, some projects are in detailed investigation now and will be developed or changed to upcoming new demands of decarbonizing and market developments. For both ports Ennshafen and Port of Vienna so far are no real gaps known, which are not covered by the project lists „on-going“ or „planned“ (DIONYSUS D.T 1.1.3). May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO₂-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).

So far no real additional „gaps“ are known for both port sides Enns and Vienna. One topic which has been described in project DAPhNE is „the connection of the Danube region in or near Austria“ with the developments of BRI (belt and road initiative / broad gauge railway) – some discussions are under

development. May be that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO₂-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).

The following description does not refer to the roads which are physically connecting the port gate with the rest of the road network as they are assessed in deliverable D.T 2.2.1, but to the major and important road sections of different corridors passing close enough to the ports analysed in previous section to have an impact to those ports.



BULGARIA

Despite Bulgaria's membership in the European Union, the road infrastructure on the territory of the Black Sea and Danube regions is in an unsatisfactory operational condition, it meets neither the requirements of the market, nor the priorities set in the country's transport policy. The successful implementation of the approved programs and projects for the development of road infrastructure in these regions will result in the achievement of high technical standards, reduction of operating costs and ensuring the necessary safety in the transportation of goods.

CROATIA

Despite investments in the network of county and local roads in the past period, the quality of roads is still worse than in other more developed parts of Croatia, and it is necessary to build the remaining sections county and local roads to increase the share, i.e., the percentage of paved roads in the total length road networks in the County, and at the same time provide funds for investment in sections of paved roads that require reconstruction and modernization.

State roads also require the reconstruction and extraordinary maintenance of certain sections. The problem of the passage of state road corridors through city centers was previously emphasized, which led to increase in the traffic of trucks, so due to the faster flow of vehicles in transit and increased safety traffic it is necessary to relocate the route of state roads through the construction of bypasses of the cities of Vinkovci and Vukovar. Some sections of the bypass have already been built (mostly the

Southern bypass of the city of Vinkovci), some are ready for construction, and certain sections are in the phase of designing or obtaining the necessary documentation, that is, a building permit.

The problem is also the poor traffic connection of the peripheral parts of the County (especially the city of Ilok) with county centers and the highway, so the construction of expressways is needed (Srijem border transversals), which would reduce travel time, and at the same time represent bypasses of settlements in municipalities through which they pass.

In accordance with the condition of the road infrastructure in the area of VSC and the expressed need, it can be defined that there are priority projects in road transport construction of the following state roads:

- Srijem border transversal Ilok - Šarengrad - Bapska - Tovarnik - Germans - Lipovac - Strošinci,
- Podravska expressway Virovitica - Osijek - Ilok with determined connection route Osijek - Vukovar - Vinkovci - Županja and the section Nuštar - Vukovar,
- Vukovar bypass,
- relocation of the route of the state road D55 - Eastern bypass of the city of Vinkovci
- relocation of the route of the state road D46 - Southern bypass of the city of Vinkovci (continuation of construction),
- construction and reconstruction of the state road D537, section Slakovci - Otok.

Road connection in Vukovar suffices the port's needs for now, but if the development trend continues, and by all announcements it will, the roads will also have to follow. The potential is immense, but the port's capacity doesn't mean much if the adjacent infrastructure doesn't support the growth trends. A lot of work has been done recently, a two-way, two-lane road along the whole Priljevo area, the access road to Vukovar port with parking places. As long as the trend continues, Vukovar port will continue to have a bright future.

HUNGARY

The largest ports are easily accessible on road via highways or motorways and main roads. The Freeport of Budapest is accessible on highways M1 from Austria, M7 from Croatia, Slovenia, M6 from the south, M5 from Serbia, Romania and M3 from the east, using the ring-road, M0 too. M6 is the closest highway to the Danube to the south from Budapest where ports of Dunaújváros and Baja are located.

ROMANIA

All analysed ports are well connected to national roads. However, only 2 main ports are connected to 4 lanes roads, Port of Constanta to A2 motorway and Port of Giurgiu to DN5 4-lanes express road.

Road connection is secured to all destinations in Romania and other countries. Level of Service and speed depends of the overall road traffic, being at a lower level in the summer season when traffic is increasing especially to the sea side, thus to Constanta.

SERBIA

Road network in Serbia has an approximate total length of 45.000 km, including approximately 800 km of highways, 5.000 km of first-level state roads, 11.000 km of second-level state roads and over 25.000 km of local roads.

The port of Bačka Palanka has a favorable spatial micro location because it is directly connected to Corridor 10, i.e. with relevant traffic corridors in the vicinity of the E-75 highway (30-40km) and the E-70 highway (35km).

The Port of Bogojewo port is 40 km away from the E75 highway, in the direction Belgrade-Budapest. The port is connected with the regional road Bogojewo-Apatin-Sombor-Subotica, as well as with the section Bogojewo-Odžaci-Sombor of the main road No. 3, which passes through Serbia. Across the road bridge the port is connected to the section of road No. 3 Erdut-Dalj-Osijek in Croatia. The port is connected with the regional road Bogojewo – Subotica-state border Kelebia. Port of Bogojewo is connected to Kelebija with road IB.

Prahovo is connected by about 50 km of road to Vidin in Bulgaria, and Calafat in Romania, both of which are important road and rail hubs on European Corridor 4. A 150km highway also connects it to European Corridor 10, which links Serbia to other European countries. State road of class IIB No. 400 connects Port of Prahovo with the State road 35 - Dušanovac - Border with Romania near Kusjak.

7.3 Maritime infrastructure and services

AUSTRIA

Not relevant as Enns-shafen port and Port of Vienna are inland ports.

BULGARIA

The territory of the Black Sea and Danube region of Bulgaria has the necessary prospects to become a center for tourism, freight transport and implementation of modern transport and logistics services.

The development and improvement of the infrastructure of the country's Black Sea and Danube regions will contribute to the integration of the national transport system into the pan-European one, it will favor the strengthening of economic relations with neighboring countries and will create conditions for economic growth as a whole. That will lead to the building of a more competitive and sustainable transport system, better business environment, as well as the creation of preconditions for attracting of new business partners and cargoes to and from the Danube and Black Sea regions,

CROATIA

Inland ports located on European waterways have a special meaning given the uniqueness of the transport and the overall economic market in which they operate. There are two international waterways in the County - the Danube and the Sava. The Danube is navigable all over the length through Croatia and according to the European Agreement on Main Inland Waterways of International Importance (AGN) is classified as airworthiness class VIc. The Danube is of an importance for international, regional and local traffic. The Sava is conditionally navigable, i.e., with great restrictions it is connected with unregulated waterway (insufficient draft in certain sections, critical points, etc.). Existing traffic depends on seasonal water level conditions and is mainly suitable for local and regional sailing.

The most important project related to the use of the potential of the Danube and Sava is the strategic project of the Republic of Croatia, Multipurpose Danube-Sava canal. The realization of this project

could be of great importance for development of agriculture, drainage, irrigation, water management, flood defense, river and combined traffic. Furthermore, it would shorten the waterway from Europe to the Mediterranean Sea and made it possible for development of ports, harbors and piers in the interior of the County along the route of the canal, which would have an impact on an overall development of the economy.

HUNGARY

Due to the strategic locations on the Rheine-Maine-Danube international IWW corridor, all the presented ports have connections to the ARA ports (Amsterdam, Rotterdam, Antwerp) on the North Sea and to Constanta on the Black Sea via IWW.

ROMANIA

Port of Constanta

Port of Constanța is one of the largest ports in Europe and the largest on at the Black Sea. It has 38 port operators and its terminals can handle all main categories of cargoes: dry bulk, liquid bulk, general cargo, containers and RoRo. The capacity of the port is 100 million tons and the maximum throughput registered was 66.6 mil tons.

Currently, Port of Constanța is hub for agri-bulk cargoes, Danube connection being the main transport corridor for agri-bulk cargoes from Serbia and Hungary. The average volumes of cereals transited through the port being 20 mil tons/year.

Before the crisis in 2008 Port of Constant was hub for containers for Central and Eastern Europe maximum throughput being 1.4 mil TEUs.

The facilities of the port meet the requirements of market but its connections, especially rail connections, needs development. This gap needs to be resolved in order to attract more containerized goods and regain the share of the market lost after the economic crisis in 2008.

Port of Galati

The Galati port is the largest sea-river port, respectively the second largest port in Romania, with access to the Danube maritime sector and the Black Sea through the Sulina Chanell and the Danube - Black Sea Chanell.

The maritime connectivity which is limited to sea vessels up to max. 15,000 DWT. However, the capacity and draught of ships admitted to navigate on the Sulina Chanell and to reach the ports mentioned above are conditioned by the minimum depth at Sulina Bar (the entrance on Sulina Chanell) The minimal depth recommended by the Danube Commission which should be insured is 7.01 m

SERBIA

Republic of Serbia is a landlocked country.