

PROJECT EXAMPLES IN CROATIA

Project :

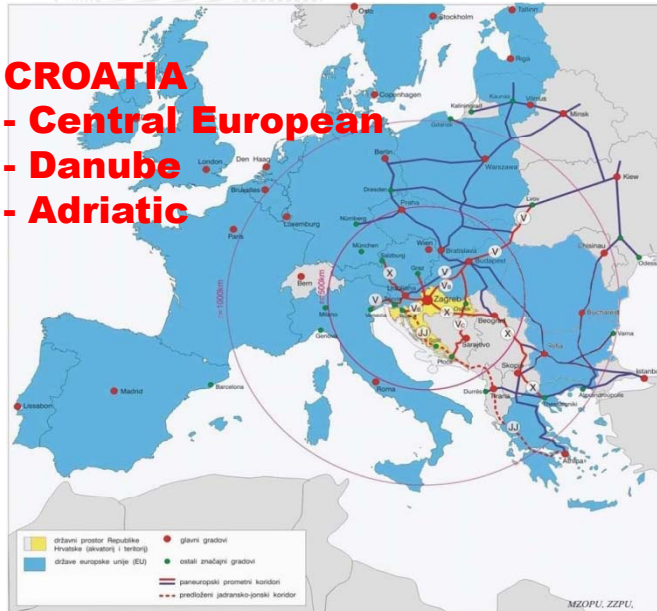
TEN-T 1 (PE X.) CORRIDOR MODERNISATION**

Symposium “ Modernisation of Railway infrastructure –
EU Strategy for Danube Region”,
Vienna, Oct. 2013.

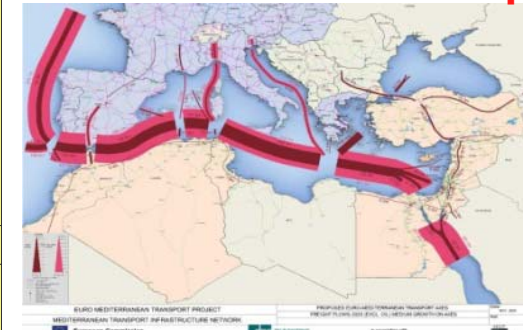
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REPUBLIC OF CROATIA GEOGRAPHICAL AND TRANSPORT POSITION

CROATIA
- Central European
- Danube
- Adriatic

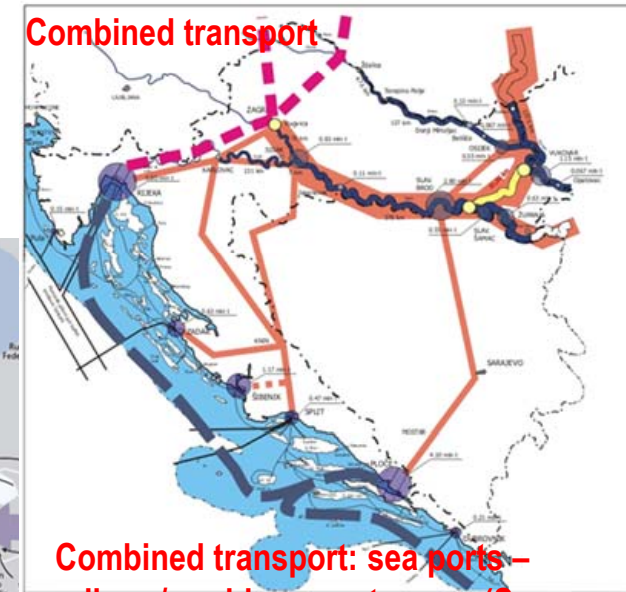


**Croatian ports are on the way from Suez canal to Middle Europe
X. Corridor is the land connection link**



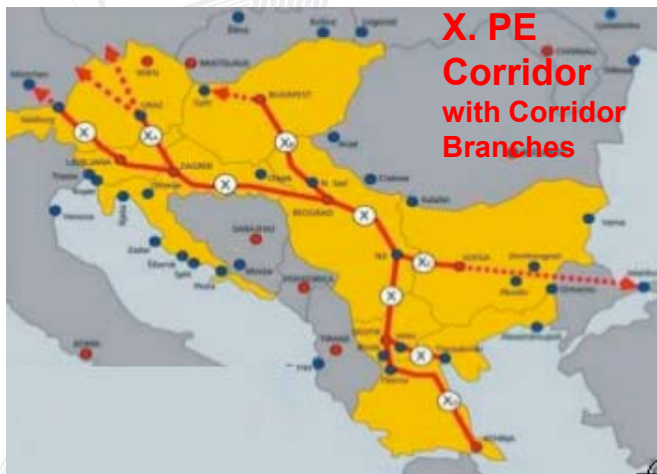
****1 TEN-T (X. PE) Corridor is the most suitable land link between Europe with Turkey and the Middle East**

Combined transport



Combined transport: sea ports – railway/road-inner waterway (Sava-Denub-Rhine-Main)

X. PE Corridor with Corridor Branches



X. PE The most suitable land link from Central Europe to Turkey



CORRIDOR POSITION IN RAILWAY NETWORK: EU TEN-T - (PE) CORRIDORS (transformation and state)

Transport network (road and railways) in Croatia involved in PE corridors and become part of the EU TEN-T network

Transformation



PE network



Transition period marks
PE to EU TEN-T

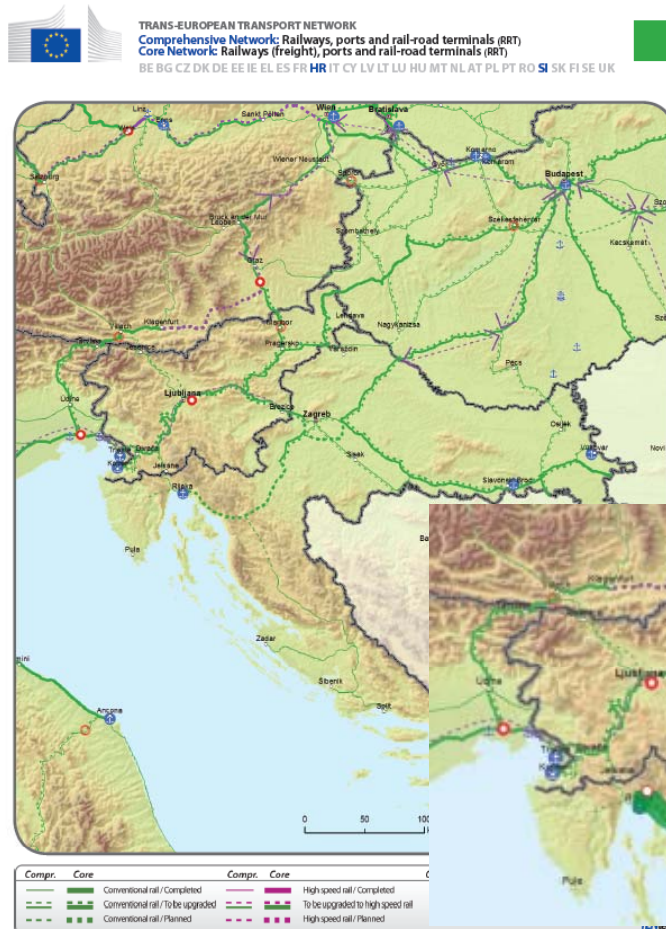
PE mark	TEN-T working mark
X.	**1, **1.3
V.b	**3
V.c	**4, **5
V.b1	**6, **6.1, **6.2
V.b2	**3.1



CORRIDOR POSITION IN RAILWAY NETWORK: EU TEN-T

Core Network: Railway (passengers) and airports
Comprehensive Network: rail and airports (June, 2013)

Core Network: Railway (freight) and airports
Comprehensive Network: rail and airports (June, 2013)

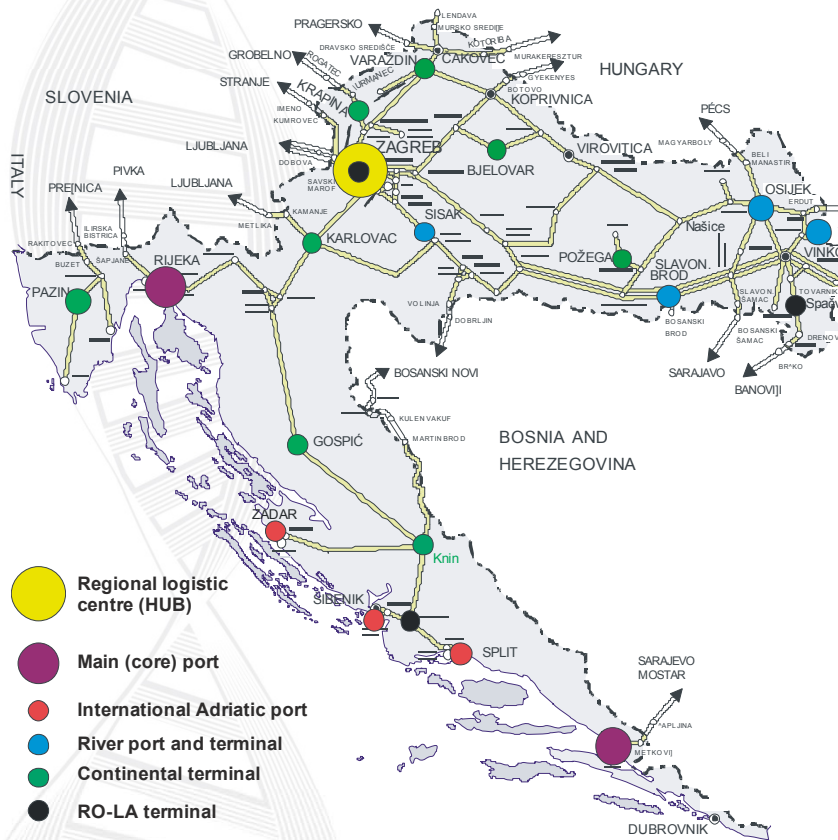


POSITION IN RAILWAY NETWORK: CROATIAN NETWORK DEVELOPMENT

CROATIAN TRANSPORT STRATEGY

Future Transport Terminals Network in Croatia

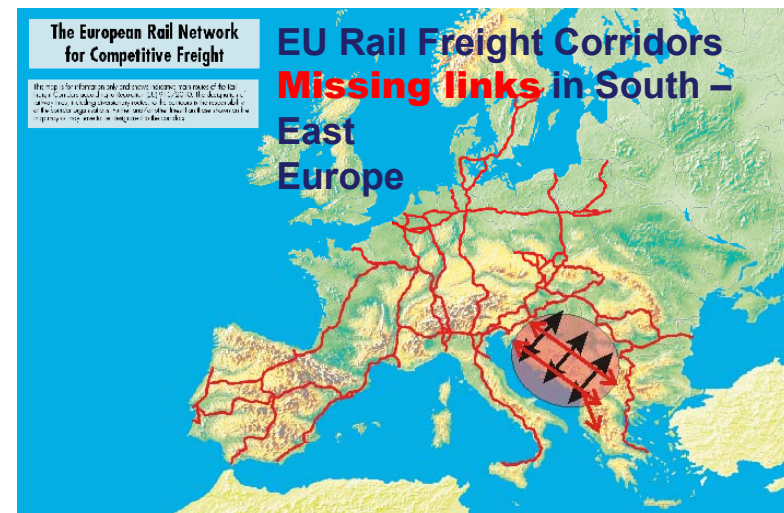
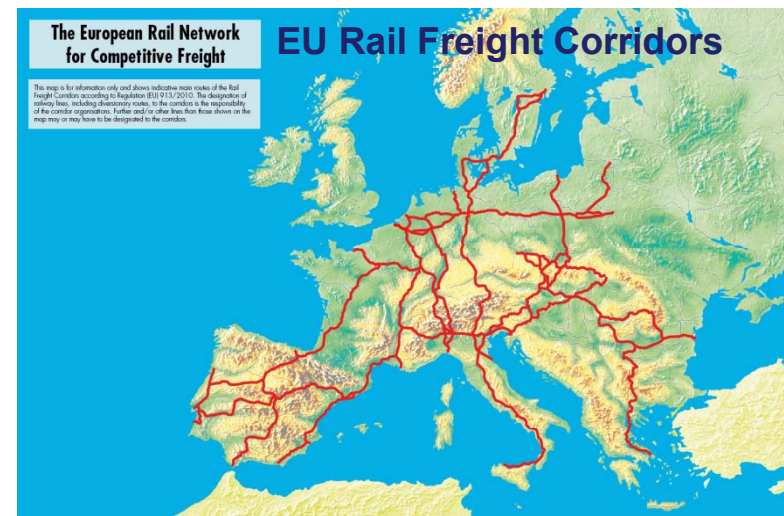
Proposed development of the railway network in Croatia in next 30 years



POSITION IN RAILWAY NETWORK: RAIL FREIGHT CORRIDORS (existing status: 9 rail freight corridors in EU)

Nine Rail Freight Corridors

	Rail Freight Corridor	ERTMS corridor	RNE Corridor
1	Rhine-Alp Corridor Zeebrugge-Antwerp/Rotterdam-Duisburg-[Base]-Milan-Genova	A Rotterdam – Genova	2
2	Benelux-France Corridor Rotterdam-Antwerpen-Luxemburg-Metz-Dijon-Lyon[Base]	C Antwerp – Basel – Lyon	5
3	Central North-South Corridor Stockholm-Malmö-Copenhagen-Hamburg-Innsbruck-Verona-Palermo	B Stockholm - Naples	1,4
4	Atlantic Corridor Sines-Lisboa/Leixões - Madrid-Medina del Campo/Bilbao/San Sebastian-Irun-Bordeaux-Paris/Le Havre/Metz Sines-Elvas/Algeciras	-	6 Western branch
5	Balt-Adria Corridor (Baltic-Adriatic Corridor) Gdynia -Katowice-Ostrava/Zilina-Bratislava/Vienna-/Klagenfurt - Udine- Venice/ Trieste/ • / - Bologna/Ravenna/ /Graz-Maribor-Ljubljana-Koper/Trieste	-	7
6	Mediterranean Corridor Almeria-Valencia/Madrid-Zaragoza/Barcelona-Marseille-Lyon-Turin-Milan-Verona - Padua/Venice - Trieste/ Koper-Ljubljana-Budapest-Zahony (Hungarian-Ukrainian border)	D Valencia – Lyon – Ljubljana – Budapest	8 6 Eastern branch
7	Orient Corridor - Bucharest-Constanta Prague-Vienna/Bratislava-Budapest Athens - Vidin-Sofia-Thessaloniki-	E Dresden – Prague – Budapest	9 10 Southern branch
8	Central East-West Corridor Bremerhaven/Rotterdam/Antwerp-Aachen/Berlin-Warsaw-Terespol (Poland-Belarus border)/Kaunas	F Duisburg – Berlin - Warsaw	3
9	Eastern Corridor Prague - Horni Lide* - Žilina-Košice• ierna nad Tisou - (Slovak/Ukrainian border)	-	7 central section



X.a PE CORRIDOR : NEW LEVEL LINE: ZAPREŠIĆ - KRAPINA – SB – - PRAGERSKO (SLOV.) (Missing link)

The total length of railway line Zaprešić - Krapina - DG - (Pragersko) is **71.3 km**. On the Croatian territory railway line is **52.6 km** long (74%), while in Slovenia **18.7 km** (26%).

Shorter connections to Central Europe for about 60 km. Railway line Zagreb - Krapina - Maribor - Linz-Nürnberg is characteristic of low level line (incline of railway axis 12.5 mm / m)

If the line will build as a double-track railway in the entire length, then it is estimated that the cost of building a part of line in Croatian exceed **EUR 670 million**

The first phase of modernization includes the reconstruction of the route for 120 km / h, modern signalling and safety equipment and electrification



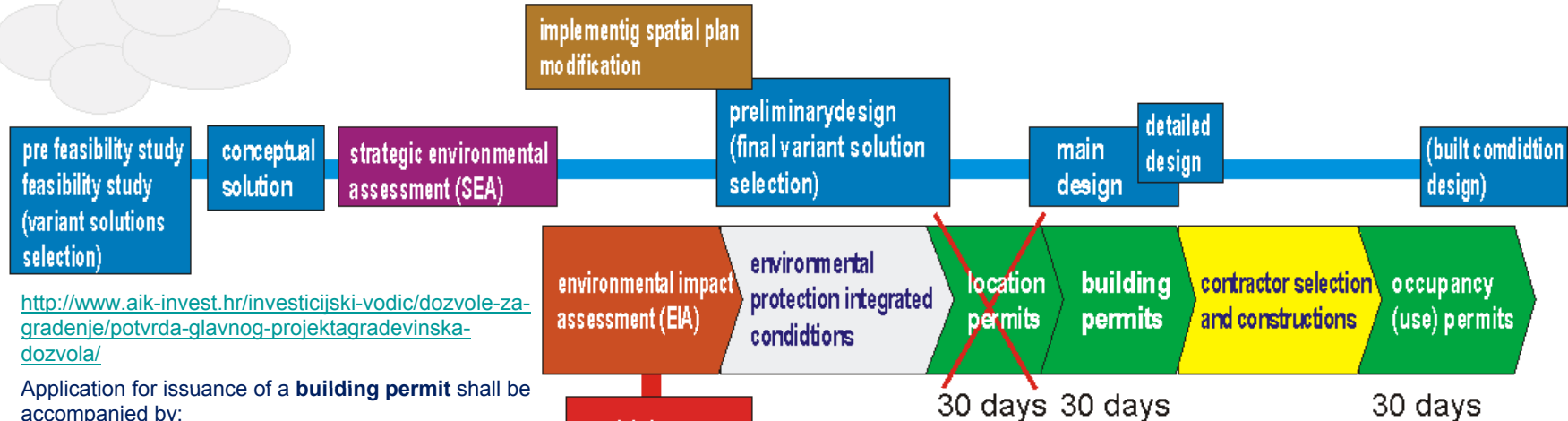
BASIC INFRASTRUCTURE PARAMETERS OF EUROPEAN TEN-T RAIL NETWORK AND NETWORK FOR COMPETITIVE FREIGHT

- a) maximum train length guaranteeing a flawless run along a whole section of a corridor (target value 750 m)
- b) axle loads (target values 22,5 - 25,0 t/ex)
- d) maximum gradient in both directions (target value 12,5 mm/m)
- f) theoretical and practical average path speed for freight trains, defined for a run along a whole section of a corridor (target values 100 -120 km/h,)
- g) Interoperable signalling and interlocking systems, ERTMS
- h) levels of deployment and compliance with TSI's
- i) railway lines and terminals on corridor
- j) high capacity line (double – track line)

*Note: in the process of modernization and construction of main (corridors) railway lines in Croatia **apply this parameters***

CONSTRUCTION PROCEDURES IN CROATIA (I)

Buildings and projects for which a license issued by the Ministry (interest of Croatian State)



Application for issuance of a **building permit** shall be accompanied by:

- Three copies of the detailed design with the bound copy of the text of the final building permits and special conditions which are an integral part of building permits,
- written report on the inspection of the main project,
- a written report and a certificate of validation, if the project has been made under foreign law,
- survey on geotechnical and other research works and technology, transport and other surveys, if the data from these surveys were used for the construction project,
- parcelation study verified by the body in charge of state survey and real estate cadastre and a certificate issued by the Ministry of planning permission, on compliance with the conditions of the location of the shape and size of the construction site,
- proof that he has the right to build on the parcel, within the scope of the project in the area, or on an existing building.

-The **competent Administrative body in the County** issued a building permit and a certificate of the detailed design for buildings outside the big cities, and the buildings on the territory of two or more units of local government, and the competent administrative body of the City of Zagreb and the big cities for the building in its area.

- The **Ministry of Spatial Planning and Construction** issued building permits for projects in the area, which the government determines the decree, and the intervention in the space that is planned in two or more counties, the City of Zagreb unless this Act stipulates otherwise.

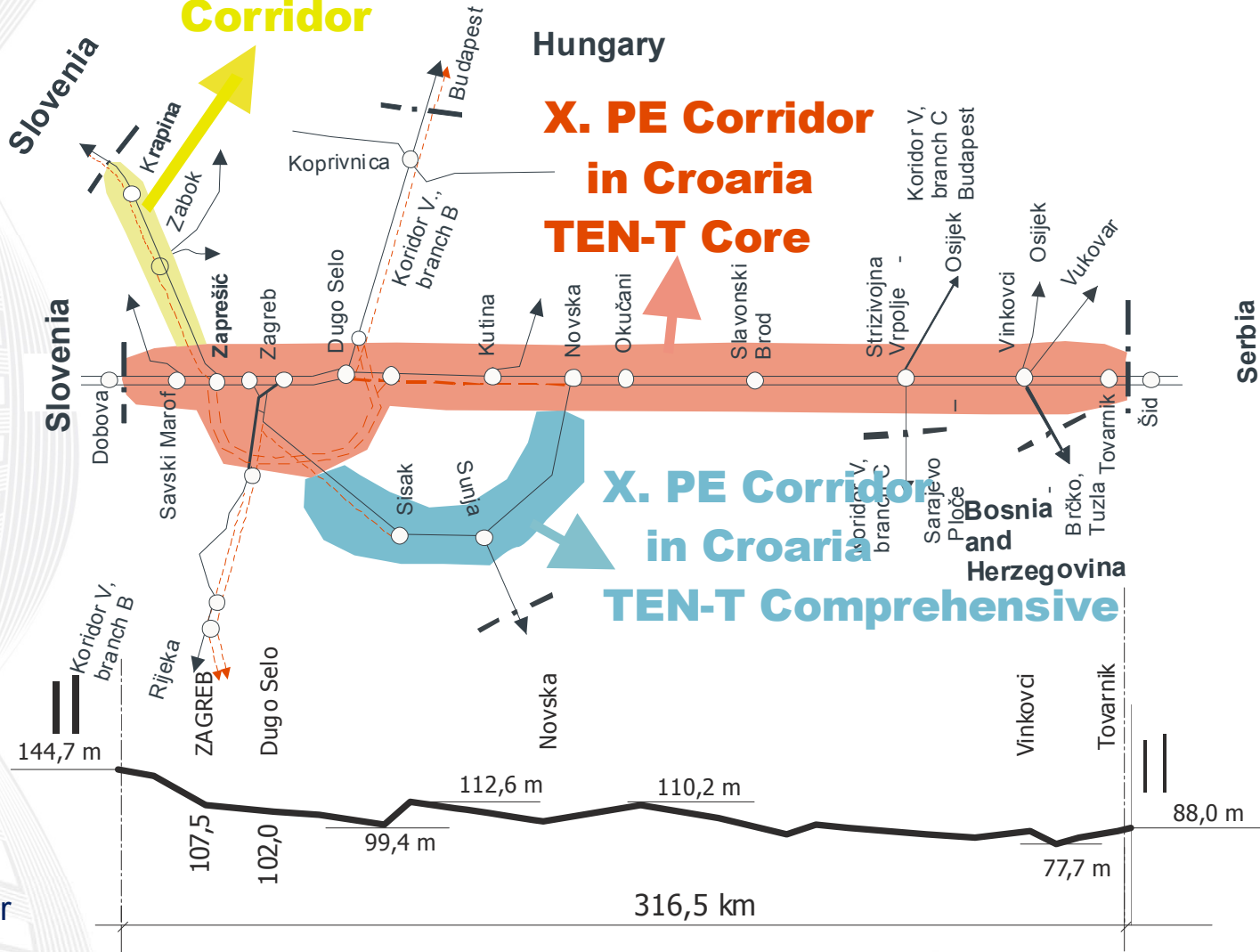
CONSTRUCTION PROCEDURES IN CROATIA (II)

Measures aimed to simplifying and accelerating the procedure in construction process :

- Issuance of construction permits haven't now going under the same conditions throughout the state. Objectives of the government is to make it exactly the same and because it was made the web application "e-license" ("e-dozvola"), in which it could be clearly seen where the demand for permit is standing and why (the weak points of the system will be detected and improved)
- three new laws will replace the existing Law of Spatial Planning and Construction. This will be a new law on spatial planning, new construction law and the new building inspection law,
- new law for the investment of national significance
- the decision on building conditions and confirmation of the project will be cancelled, as well as the location permit (which the Ministry will issued only for specific projects in the area which is of Croatia State interest).
- to speed up procedures and prescribe clearer rules. The location permit will be reversed and introduces as quick "e- licence - construction permits"
- inspections will intensify its activity

EU TEN-T **1 (PE X.) CORRIDOR IN CROATIA

**X.a PE
Corridor**



EU TEN-T **1 (PE X.) CORRIDOR IN CROATIA: (Use to be, 25 years ago)

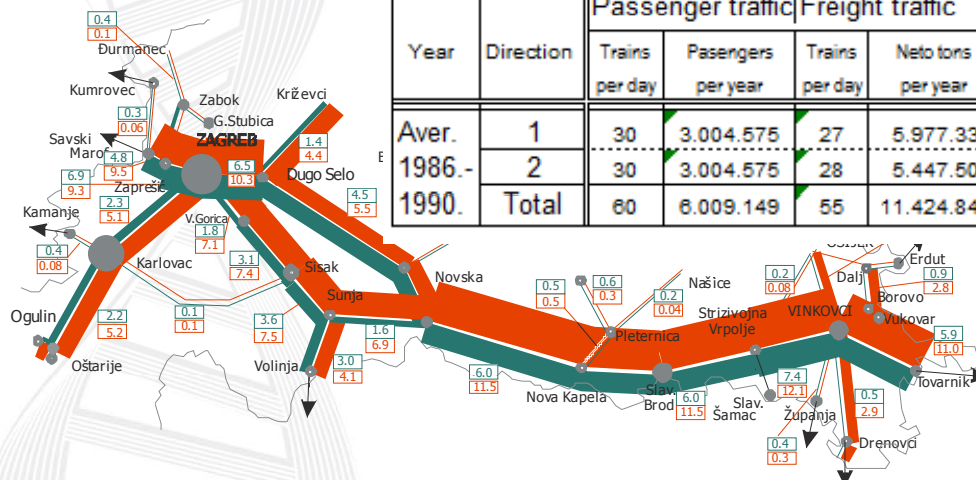
Level of service:

- Speed profile (Zagreb-Novska 130 km/g, Novska Vinkovci 160 km/h, Vinkovci – S.B. 120 km/h)
- Travelling (commercial) speed for fastest trains 110 km/h
- Section Novska – Slavonski Brod: 55 freight trains /day, 60 passenger trains/day (total 115 trains/day)
- 2.200 t, max. freight trains mass with one locomotive

Practically all rolling stock (for passenger's and freight traffic) had domestic origin (as a product of domestic industry)

Traffic volume , year 1990, average 1986-1990.:

Year	Direction	Passenger traffic		Freight traffic	
		Trains per day	Pasengers per year	Trains per day	Neto tons per year
Aver.	1	30	3.004.575	27	5.977.334
1986.-	2	30	3.004.575	28	5.447.507
1990.	Total	60	6.009.149	55	11.424.841



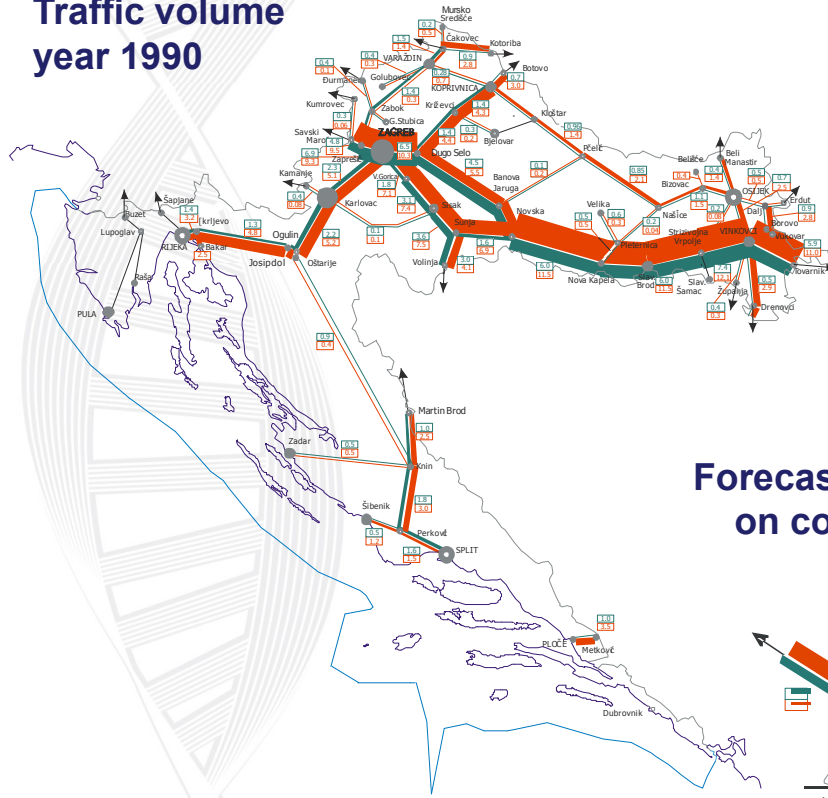
Line characteristics, equipment and devices:

- Maximum speed 160 km/h
- Allowed load 22 t/ex, 8 t/m¹
- Highest train resistance 6 dN/t (max. incline of line axis 6 mm/m)
- Stations length 650 m (highest standard in that time)
- Relay signalling and safety devices in stations on whole line, (Zagreb GK) – Novska, 104,9 km (Integra), S.B – S. Marof (Zagreb GK), Novska - Vinkovci – S.B., 26,8+185,1=211,9 km (SEL)
- ABS (duplex, in both sides)
- Auto - stop device on vehicles
- Radio dispatcher system (analog)
- Signalling and safety devices on level crossings

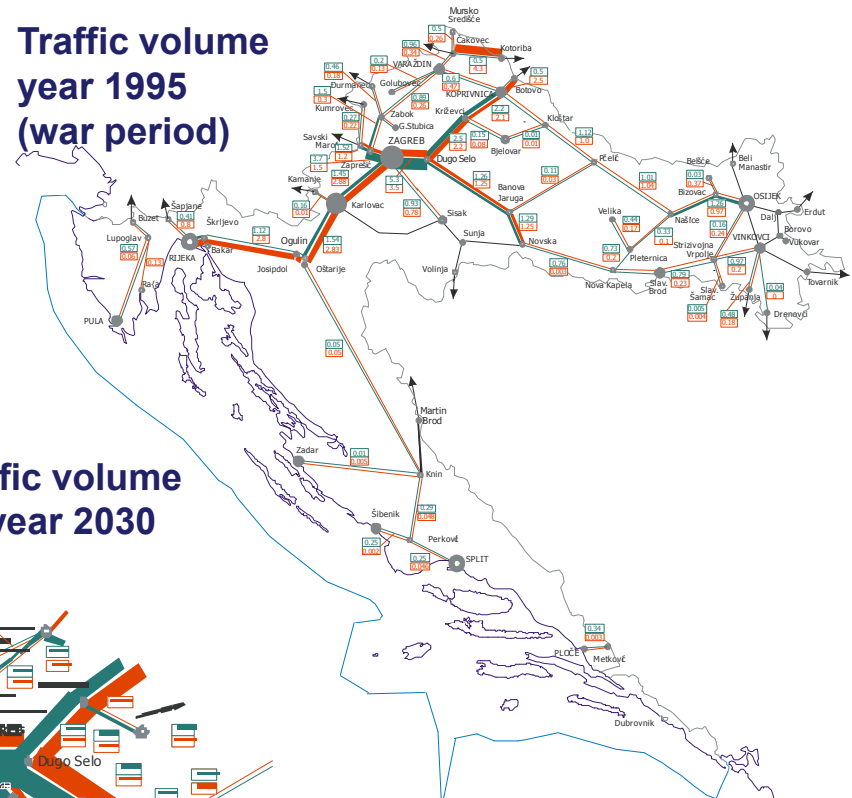
In period 1986 – 1988, in modernization of Sava Corridor (**1, X.) engaged local (domestic) contractors, built over 95 % of domestic origin materials, products, equipment and devices

EU TEN-T **1 (PE X.) CORRIDOR IN CROATIA (Traffic volume)

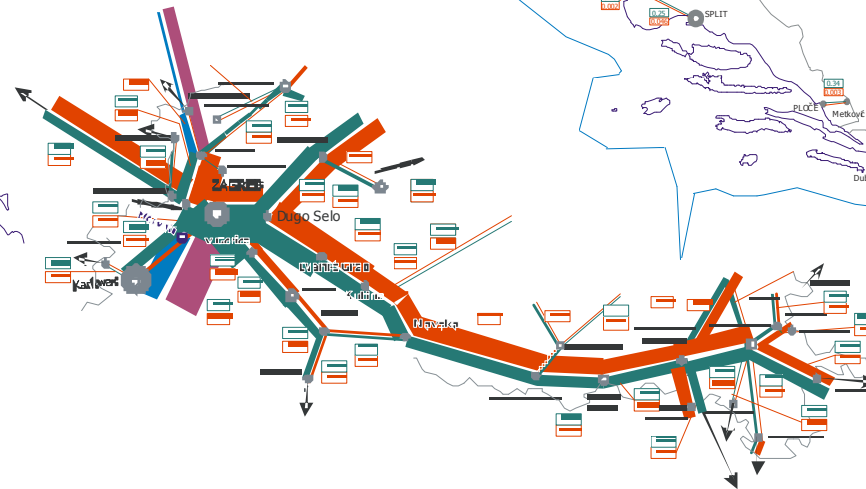
Traffic volume
year 1990



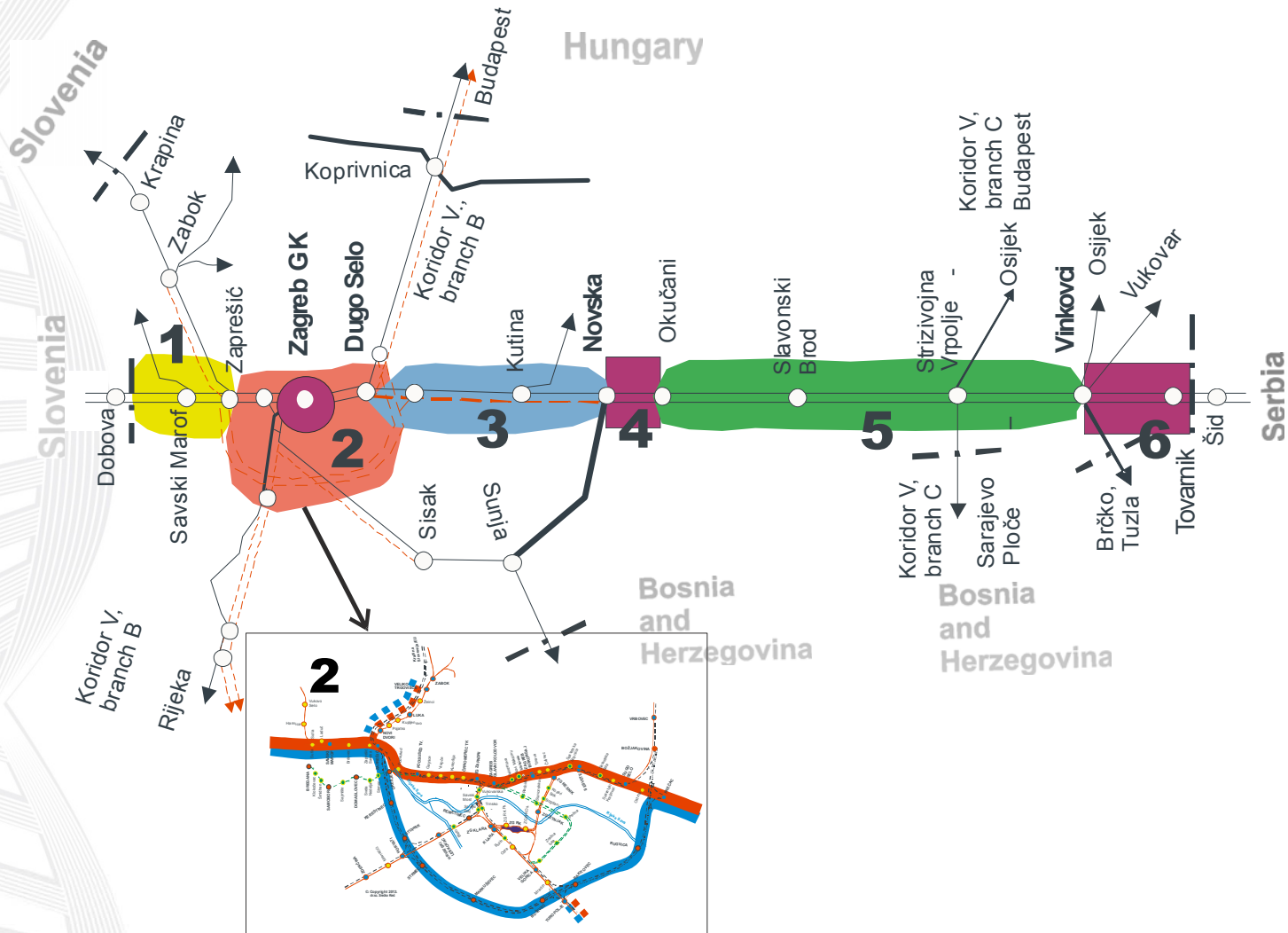
Traffic volume
year 1995
(war period)



Forecast of traffic volume
on corridor, year 2030



EU TEN-T **1 (PE X.) CORRIDOR PART IN CROATIA: 6 SECTIONS



1. COMPLETED RENOVATION PROJECT – SECTION 6

Vinkovci – Tovarnik – S.B

PROJECT HISTORY

- Project start: 2007
- Preparation phase: 2007 - 2008
- Commencement of work: 2008, May 14
- Completion of construction: 2011
- Start exploitation: 2012, Jan. 19
- Adjustment time: 2012, June

- Total value of investment: 75,7 mil. EUR
- Documentation: ŽPD Inc., Zagreb, Croatia
- Contractor: Salcef Construzioni Edili e Ferroroviare SpA and Bombardier Transportation Italy SpA,
- Supervision: TYPASA Consulting, Engineers & Architects, Spain
- Sources of finance: ISPA (38 %), Croatian State Budget (62 %)

DESCRIPTION OF PERFORMED WORK

- Length of line (Vinkovci – Tovarnik – S.B.) 33,5 km
- Double track line, track distance 4,0 m
- Renewal of railway track (UIC 60, concrete sleepers, 22,5 t/ax, 8 t/m¹, speed 160 km/h)
- Reconstruction of 3 stations, extension (750 m, platforms, underground passages, car parking places, other urban equipment)
- Extension of 7 stops (platforms 160 m, underground passages, car parking places, other urban equipment)
- Centenary reconstruction (speed 160 km/h)
- New signalling and safety equipment in station (electronic)
- ETCS L1 on track, existing Indusi 60, auto-stop device on vehicles
- RD (will be replaced with GSM-R)
- Duplex (in both sides) ABS
- 12 level crossings (signalling-safety equipment)
- Central traffic control (centre in Vinkovci)



2. COMPLETED RENOVATION PROJECT – SECTION 4 Novska – Okučani

PROJECT HISTORY

- Project start: 2010
- Preparation phase: 2010 - 2012
- Commencement of work: 2012, July 03
- Completion of construction: 2014, end
- Start exploitation: 2014/2015
- Adjustment time:

- Total value of investment: 40 mil. EUR
- Documentation: ŽPD Inc., Zagreb, Croatia
- Contractor: Salcef Construzioni Edili e Ferroroviare SpA and Bombardier Transportation Italy SpA,
- Supervision: DB International, Germany, GRANOVA P.I.c., Croatia
- Sources of finance: Pre ex. (85 %), Croatian State Budget (15 %)

DESCRIPTION OF PERFORMED WORK

- Length of line (Novska - Okučani) 19,9 km
- Double track line, track distance 4,0
- Renewal of railway track (UIC 60, concrete sleepers, 22,5 t/ax, 8 t/m¹, speed 160 km/h)
- Reconstruction of 1 station, extension (750 m, platforms, underground passages, car parking places, other urban equipment)
- Extension of 2 stops (platforms 160 m, underground passages, car parking places, other urban equipment)
- Centenary reconstruction (speed 160 km/h)
- New signalling and safety equipment in station (electronic)
- ETCS L1 on track, existing Indusi 60, auto-stop device on vehicles
- RD (will be replaced with GSM-R)
- Duplex (in both sides) ABS
- level crossings (signalling-safety equipment)
- Central traffic control (temporary centre in Novska)



3. COMPLETED RENOVATION PROJECT – SECTION 2

Signalling and interlocking device on Zagreb Railway Main Station

PROJECT HISTORY

- Project start: 2009
- Preparation phase: 2010
- Commencement of work: 2011
- Completion of construction: 2013
- Start exploitation: 2013
- Adjustment time: 2013/2014
- Total value of investment: 11,6 mil. EUR
- Documentation: ŽPD Inc., Zagreb, Croatia
- Contractor: Siemens AG Österreich i Elektrokem P.l.c., Croatia
- Supervision: Técnica y Proyectos S.A. (TYPSA), Spain
- Sources of finance: IPA (85 %),
Croatian State Budget (15 %)

Old rely device i Zagreb MS was from year 1938

DESCRIPTION OF PERFORMED WORK

- Setting signalling and interlocking device (electronic)
- Replacement of telecommunications equipment
- Minor track reconstruction
- Control centre building reconstruction



4. PROJECT IN PREPERATION – SECTIONS 1 and 2

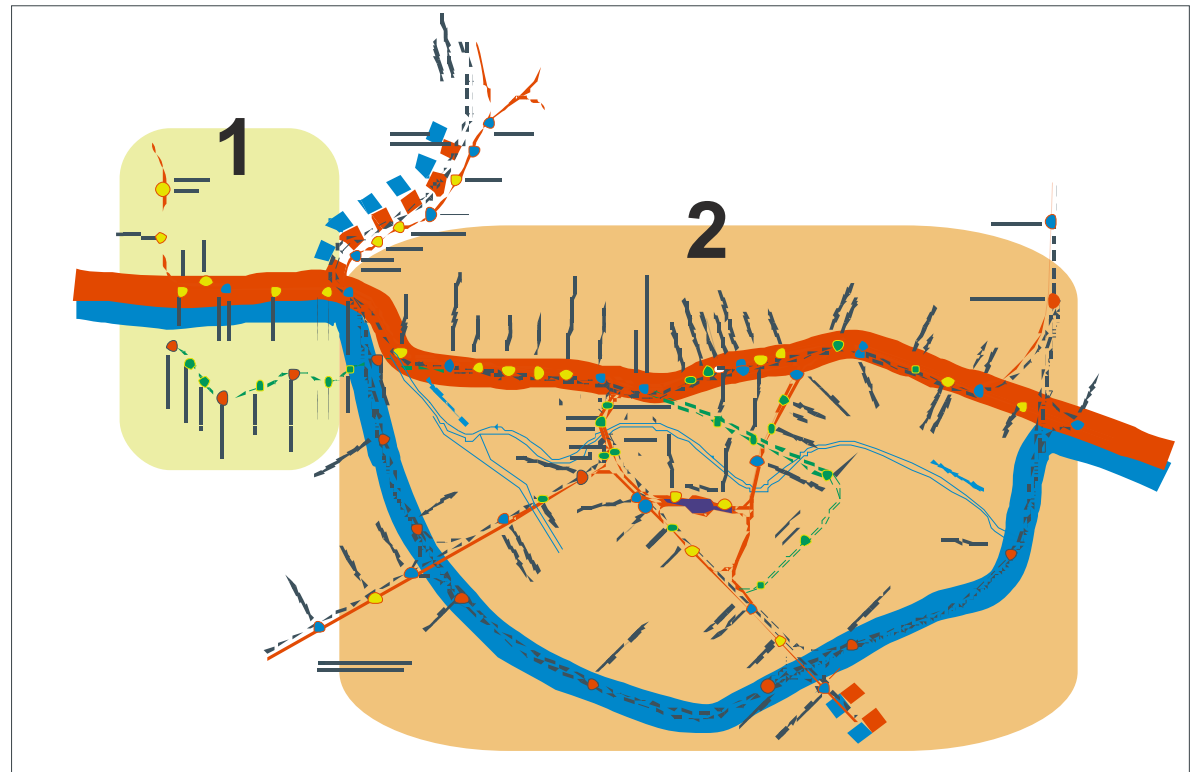
Sections: S.B. - Savski Marof – Zaprešić (1) and Zaprešić – Dugo Selo (2)

CURRENT SITUATION – SECTION1:

- Single line, 11,6 km long
- Projected speed 120 km/h
- Speed in operation 90 - 100 km/h
- Signalling system in stations - SEL
- Automatic block system Indusi (ABS) on line
- Auto-stop in railway vehicles
- Radio dispatch system, analog (RD)
- 25 kV/50 Hz AC
- 2 stations, 3 stops

FUTURE SITUATION- SECTION 1:

- Double track line, 131,1 km long
- New electronic interlocking in stations
- Projected speed 120 - 160 km/h
- Speed in operation 120 – 160 km/h
- Automatic block system (ABS) on line - Indusi and ETCS L1
- Auto-stop in railway vehicles and ETCS L1
- Radio dispatch system, analog (RD) or new digital system GSM-R (“voice” level)
- 25 kV/50 Hz AC
- 2 stations, 3 stops



SECTION 2 – NEW LINE

- **Red line** – TEN-T core line – passenger traffic trough Zagreb junction (Zaprešić – D. Selo), -Additional 1 or 2 track, reconstruction of 7 stations and 8 stops, 4 new stops
- **Blue line** – TEN-T core line - freight traffic trough Zagreb junction (Zaprešić – Horvati – Mraclin - Rugvica – (D. Selo), new indirect freight line, 3 new stations

5. PROJECT IN PREPERATION – SECTION 3

Modernisation and construction of a second track (Dugo Selo – Novska)

CURRENT SITUATION:

- Single line, 84,1 km long
- Projected speed 130 km/h
- Speed in operation 80 - 100 km/h
- Signalling system in stations – Integra Domino in stations Kutina Teretna and Novska - SEL
- Automatic block system Indusi (ABS) on line
- Auto-stop in railway vehicles
- Radio dispatch system, analog (RD)
- 25 kV/50 Hz AC
- 11 stations, 7 stops



FUTURE SITUATION:

- Double track line, 81,1 km long
- New electronic interlocking in stations
- Projected speed 160 km/h
- Speed in operation – 160 km/h
- Automatic block system (ABS) on line - Indusi and ETCS L1
- Auto-stop in railway vehicles and ETCS L1
- Radio dispatch system, analog (RD) or new digital system GSM-R (“voice” level)
- 25 kV/50 Hz AC
- 4 stations, 13 stops



6. PROJECT IN PREPERATION – SECTION 5

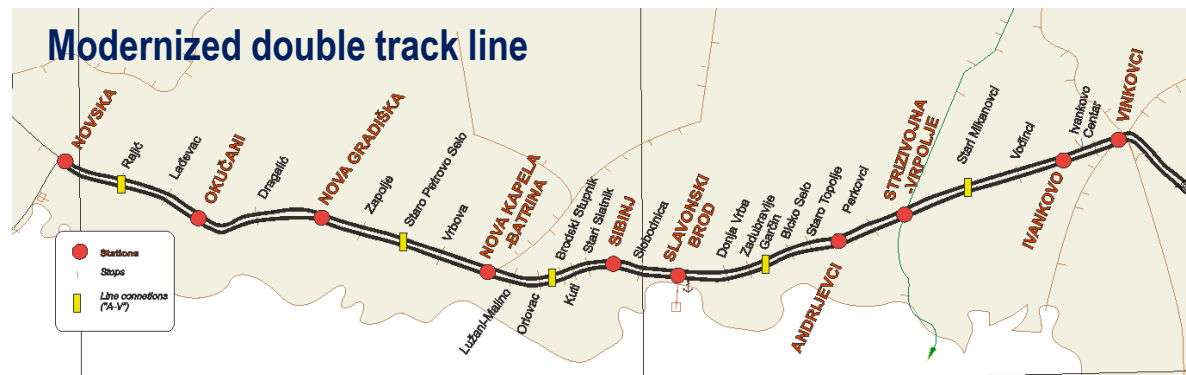
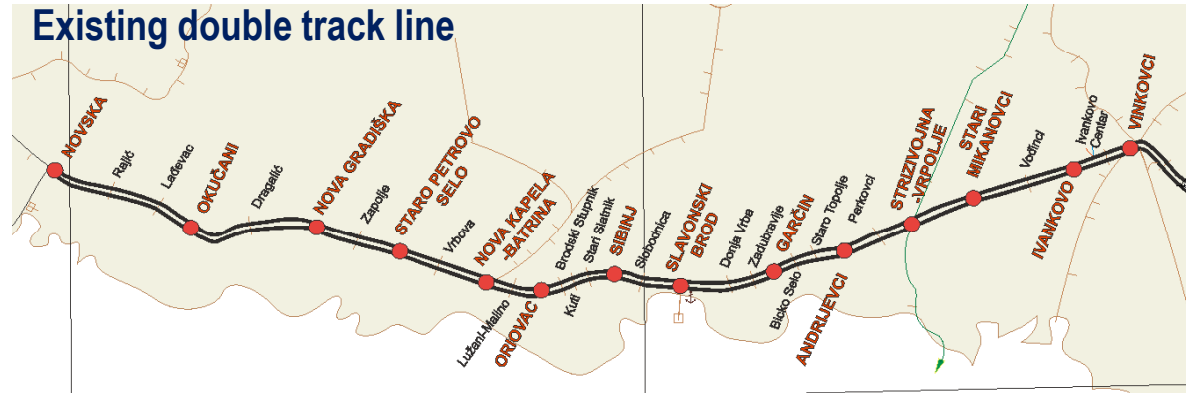
Modernisation of existing double track line (Okučani – Vinkovci)

CURRENT SITUATION:

- Single line, 13,1 km long
- Projected speed 160 km/h
- Speed in operation 90 - 140 km/h
- Signalling system in stations - SEL
- Automatic block system Indusi (ABS) on line
- Auto-stop in railway vehicles
- Radio dispatch system, analog (RD)
- 25 kV/50 Hz AC
- 12 stations, 17 stops

FUTURE SITUATION:

- Double track line, 131,1 km long
- New electronic interlocking in stations
- Projected speed 160 km/h
- Speed in operation – 160 km/h
- Automatic block system (ABS) on line - Indusi and ETCS L1
- Auto-stop in railway vehicles and ETCS L1
- Radio dispatch system, analog (RD) or new digital system GSM-R (“voice” level)
- 25 kV/50 Hz AC
- 8 stations, 21 stops



CONCLUSION

- After Croatian accession to the EU, corridor in river Sava valley (also known as X. PE corridor) became part of TEN-T core network (working mark **1 corridor)
- 25 years ago it was the main corridor in region, modernized and equipped with the "state of the art" generation equipment of that time, with maximum train speed of 160 km / h. During the war period corridor was devastated, and was not properly maintained all that time. After the war the necessary reconstruction was made
- In the accession process, the EU has helped in the reconstruction of war-damaged parts (sections: Vinkovci – S.B. and Novska – Okučani). In the procurement process, as the best bidders was selected companies from Italy (Salcef Construzioni Edili e Ferroroviare SpA and Bombardier Transportation Italy). In replacement of signalling safety device in Zagreb MS were rated as the best companies Siemens AG Österreich i Elektrokem P.I.c., Croatia. The documentation for this projects was developed by the company ŽPD Inc. from Zagreb, Croatia
- Modernization, renovation and construction of the railway infrastructure in Croatia will be carried out with the use of modern methods, procedures and application of European standards
- The financing sources for railway capacity modernization and construction will be the EU structural funds and Croatian national budget. The entire corridor **1 (X.) on Croatian territory entered in TEN-T core network funding program
- In order to speed up the investment preparatory activities, is preparing changes in the legislation that regulates this area
- In order to monitor, encourage and prepare investment at the state level are organizing various bodies and professional organizations
- Rail operator (HZ infrastructure) in order to facilitate the preparation and monitoring EU and other investment established specialized units, and for the realization of investments integrated the daughter companies engaged in the maintenance and construction of the entire railway infrastructure, which will be included in the program of modernization and construction
- In the realization of construction and modernisation plan of railway capacity in Croatia could include many construction operations which were ended program of building more than 1.000 km of motorways. In program activities may include manufacturers of railroad equipment and construction companies (construction of upper and lower rail structure, tunnels, bridges, signalling and safety systems, power supply and power transmission systems, steel and reinforced concrete construction, telecommunications and information systems, etc.).

THANKS FOR YOUR ATTENTION !

dr. sc. Srećko Kreč, dipl. ing.

*Šef Službe za razvoj i željezničke infrastrukturne
podsustave*

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