

# Schengen railway border of European community and connection points

Flaviu Ioan Nica<sup>1\*</sup>

<sup>1</sup>Lacul Tei Bdv., no. 122 – 124, District 2, Bucharest, Technical University of Civil Engineering Bucharest, Romania

**Abstract.** The paper aims to study and present the actual railway connections along the West and South Romanian border, being also the East European Community border and Eastern European Community Schengen border, with neighbours Hungary, Serbia and Bulgaria. In the introduction of the paper, are presented the two corridors designed in Strategy for Mobility and Transport of European Community: Orient/East – Mediterranean Corridor and Rhine – Danube Corridor, that are passing thru Romania. The second part of the paper is allocated to the punctual railway connections that existed and exists along the western and southern border that are active, can be activated and used as gates and passing points for freight and passengers trains using a high capacity of transport on a green transport infrastructure that is more and more used for all medium long and long routes. Finally, the campaign that Romanian Railway Administrator (CFR S.A) is developing on border points is taken into account.

## 1 Introduction

The Romanian border is also the Schengen border of the European Community and from the point of view of transportation, on road or rail, it generates a gap. The high volumes of transport that need to be delivered around the European Community has a higher time of transportation because every truck or train needs to stop at the border and be checked or other formalities needs to be done.

The present paper takes into account the West and South border, with neighbours Hungary, Serbia and Bulgaria, analysing the rail transport connections and capacities. Before were analyzed the European Community border with Moldova and Ukraine countries, being also the North and Est Romanian borders [1].

To have a better understanding of what does it mean, the Schengen Area is the border free that guarantees free movement for more than 400 million EU citizens, for work, travel or living in a European country without other controls or border formalities. [2]

The Romanian neighbours can be divided into three main categories (Fig. 1) depending on their membership to the European Union and Schengen Area with the following length of land border:

- The European Union member of the Schengen area, neighbour, Hungary with length border of  $\approx 448.00$  kilometres  $\approx 15\%$  (Fig. 2);

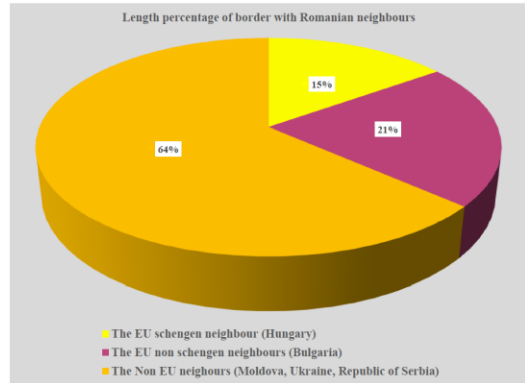
---

\* Corresponding author: [flaviu.nica@utcb.ro](mailto:flaviu.nica@utcb.ro)

- The European Union member, non-Schengen area member, neighbour, Bulgaria with length border of  $\approx 631.30$  kilometres  $\approx 21\%$  (Fig. 2);
- The Non-European Union members, non-Schengen area members, neighbours: Moldova, Ukraine and Republic of Serbia, with length border of  $\approx 1877.10$  kilometres  $\approx 64\%$  (Fig. 2);



**Fig. 1.** Romania and neighbours



**Fig. 2.** Length percentage of border with Romanian neighbours divided by EU membership

The main neighbour for Romania remains Hungary, taking into account that it is the only neighbour that is a European Union member and also a Schengen Area member, even if we can see that the border length of land is one of the smallest.

From the point of view of transport corridors Romania, according to Trans-European Transport Network (TEN-T) is crossed by two rail corridors (Fig. 3):

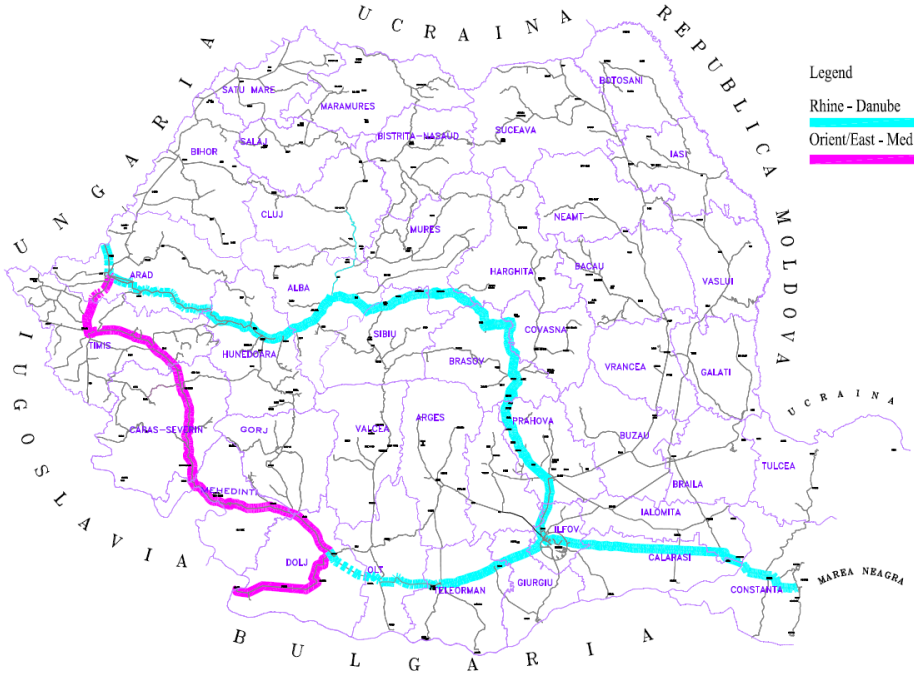
- Rhine – Danube, starting in Strasbourg - France and finishing in Sulina – Romania;
- In Romania has the following rail route: Arad – Brasov or Craiova – Bucuresti – Constanta.
- Orient/East – Med, starting in Hamburg - Germany and finishing in Patras – Greece.
- In Romania has the following rail route: Arad – Timisoara – Craiova – Calafat.

## 2 Railway connections with south and west Romanian neighbours

Depending on their membership to the European Union and Schengen Area with the classification made above, needs to be improved with the number of connections for each member in order to have the entire picture of the importance for each country.

According to Romanian Railway Administrator – CFR S.A [3] and the map presented in Fig. 4 we have a total of 17 rail land connections with our neighbours. The distribution (Fig. 5) of railway connections correlated with the neighbours are:

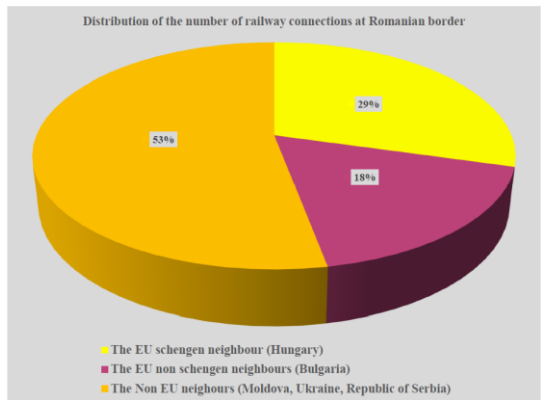
- The European Union member of the Schengen area five railway connections meaning  $\approx 29\%$  from total and a share of 1.12 connection to each 100 km of border;
- The European Union member, Non-Schengen area member three railway connections meaning  $\approx 18\%$  from total and a share of 0.44 connection to each 100 km of border;
- The Non-European Union members, Non-Schengen area members nine railway connections meaning  $\approx 53\%$  from total and a share of 0.48 connection to each 100 km of border;



**Fig. 3.** Rail corridors along Romania



**Fig. 4.** Number repartition of railway connections at south and west Romanian border



**Fig. 5.** Distribution of railway connections with Romanian neighbours divided by EU membership

### 3 Hungary railway existing connections

The five present railway connections at the Hungarian border are:

- a. Episcopia Bihorului, Bihor County, Romania – Biharkeresztes, Hungary, Fig. 6, with a total railway connection length of about 12.34 kilometres, distributed for about 6.40 kilometres in Romania and 5.94 kilometres in Hungary;

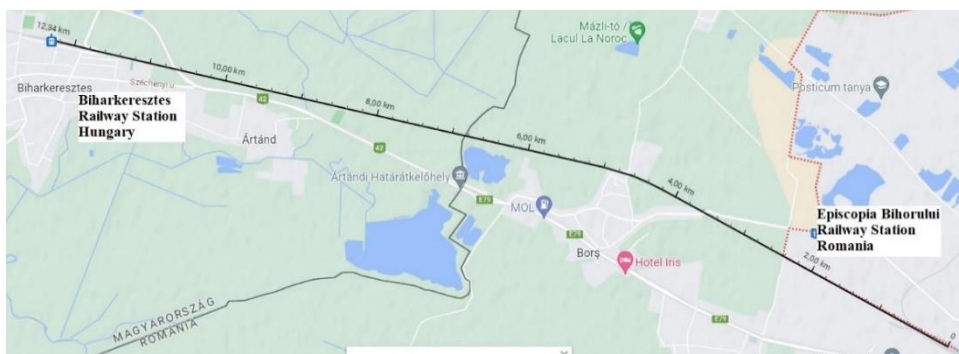
The railway line is simple track and non-electrified, can circulate both passengers and freight trains, the railway gauge is normal gauge – 1435 mm.

The Romanian Railway Administrator – CFR S.A has signed the design and execution contracts for the entire section between Cluj Napoca station and Episcopia Bihorulului station - border, for about 166.42 km, divided in four subsections, with a total value of 7.680.697.042,80 lei: [4]

- Subsection 1: Cluj Napoca train station – Aghireş trains station, total length of 30.41 kilometres and the value of 1.611.475.802,43 lei excluding VAT;
- Subsection 2: Aghireş train station – Poieni trains station, total length of 36.53 kilometres and the value of 1.535.202.975,30 lei excluding VAT;
- Subsection 3: Poieni train station – Alesd trains station, total length of 52.74 kilometres and the value of 2.117.167.899,08 lei excluding VAT;
- Subsection 4: Alesd train station – Episcopia Bihorulului trains station – Border (Hungary), total length of 46.74 kilometres and the value of 2.416.850.365,99 lei excluding VAT;

Also, all contracts for consultancy and supervision are signed for all subsections, with a total value of 104.232.713,18 lei: [5]

- Subsection 1: Cluj Napoca train station – Aghireş trains station, total length of 30.41 kilometres and the value of 13.383.766,55 lei excluding VAT;
- Subsection 2: Aghireş train station – Poieni trains station, total length of 36.53 kilometres and the value of 15.758.546,63 lei excluding VAT;
- Subsection 3: Poieni train station – Alesd trains station, total length of 52.74 kilometres and the value of 19.588.700,00 lei excluding VAT;
- Subsection 4: Alesd train station – Episcopia Bihorulului trains station – Border (Hungary), total length of 46.74 kilometres and the value of 22.501.700,00 lei excluding VAT;



**Fig. 6.** Railway connection, Episcopia Bihorulului, Romania –Biharkeresztés, Hungary

- b. Salonta, Bihor County, Romania – Kotegyan, Hungary, Fig. 7, with a total railway connection length of about 13.72 kilometres, distributed for about 13.50 kilometres in Romania and 0.22 kilometres in Hungary;

The railway line is simple track and non-electrified, can circulate only passenger's trains and the railway gauge is normal gauge – 1435 mm.



**Fig. 7.** Railway connection, Salonta, Romania –Kotegeyan, Hungary

- c. Valea lui Mihai, Bihor County, Romania – Nyirabraný, Hungary, Fig. 8, with a total railway connection length of about 8.99 kilometres, distributed for about 7.95 kilometres in Romania and 1.04 kilometres in Hungary;

The railway line is simple track and non-electrified, can circulate both passengers and freight trains, the railway gauge is normal gauge – 1435 mm.



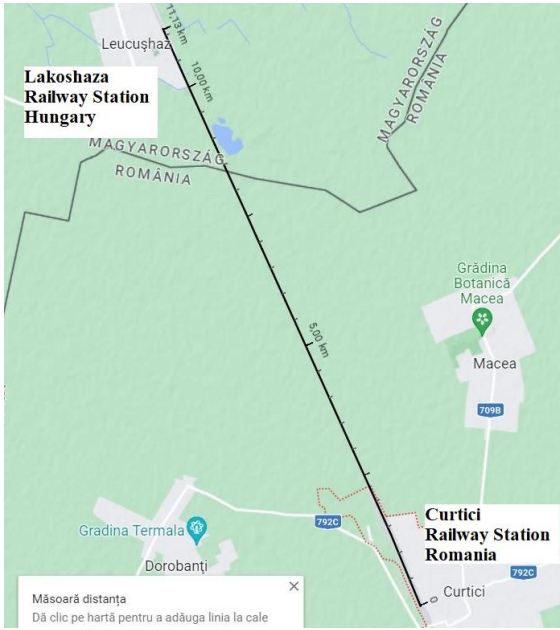
**Fig. 8.** Railway connection, Valea lui Mihai, Romania –Nyirabraný, Hungary

- d. Curtici, Arad County, Romania – Lakoshaza, Hungary, Fig. 9, with a total railway connection length of about 11.13 kilometres, distributed for about 8.40 kilometres in Romania and 2.73 kilometres in Hungary;

The railway line is simple track and electrified, can circulate both passengers and freight trains, the railway gauge is normal gauge – 1435 mm.

- e. Carei, Satu Mare County, Romania – Agerdomajor, Hungary, Fig. 10, with a total railway connection length of about 16.22 kilometres, distributed for about 10.50 kilometres in Romania and 5.72 kilometres in Hungary;

The railway line is simple track and non-electrified, can circulate both passengers and freight trains, the railway gauge is normal gauge – 1435 mm.



**Fig. 9.** Railway connection, Curtici, Romania – Lakoshaza, Hungary



**Fig. 10.** Railway connection Carei, Romania – Agerdomajor, Hungary

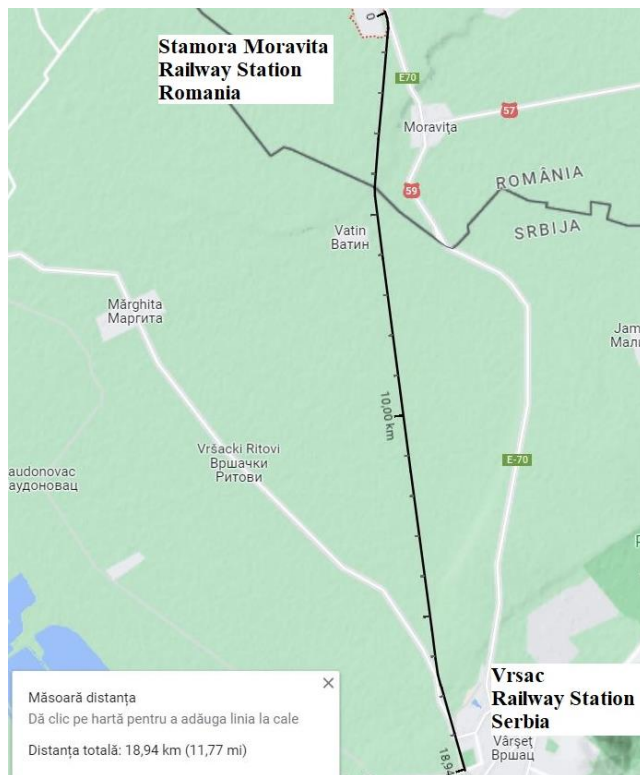
The total length of railways connections between Romania and Hungarian stations is approximately 62.40 kilometres, single railway track, distributed 74.92% Romanian territory and 25.08% Hungarian territory. At the present moment only 23.72% of Romanian railway is under modernization projects for doubling and electrification of track.

#### 4 Republic of Serbia railway existing connections

The two present railway connections at the Serbian border are:

- a. Stamura Moravita, Timis County, Romania – Vrsac, Serbia, Fig. 11, with a total railway connection length of about 18.94 kilometres, distributed for about 4.30 kilometres in Romania and 14.64 kilometres in Serbia;

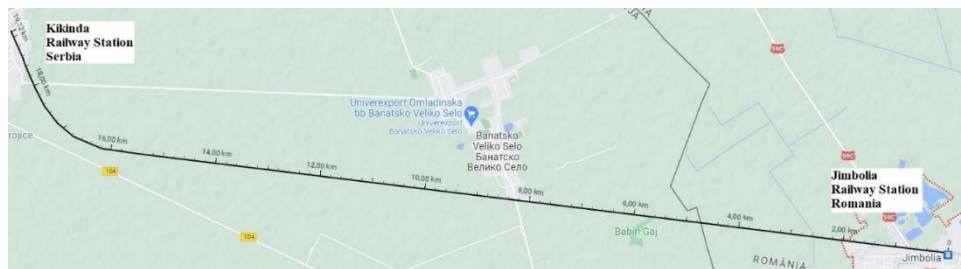
The railway line is simple track and non-electrified, can circulate both passengers and freight trains and the railway gauge is normal gauge – 1435 mm.



**Fig. 11.** Railway connection, Stamora Moravita, Romania –Vrsac, Serbia

- b. Jimbolia, Timis County, Romania – Kikinda, Serbia, Fig. 12, with a total railway connection length of about 19.12 kilometres, distributed for about 4.85 kilometres in Romania and 14.27 kilometres in Serbia;

The railway line is simple track and non-electrified, can circulate both passengers and freight trains and the railway gauge is normal gauge – 1435 mm.



**Fig. 12.** Railway connection, Jimbolia, Romania –Kikinda, Serbia

The total length of railways connections between Romania and Serbian stations is approximately 38.06 kilometres, single railway track, distributed 24.04% Romanian territory and 75.96% Serbian territory. At the present moment we have no works under modernization projects for doubling and electrification of track.

### 5 Bulgaria railway existing connections

The three present railway connections at the Bulgarian border are:

- a. Giurgiu Nord, Giurgiu County, Romania – Ruse, Bulgaria, Fig. 13, with a total railway connection length of about 16.11 kilometres, distributed for about 5.50 kilometres in Romania and 10.61 kilometres in Bulgaria;

The railway line is simple track and non-electrified, can circulate both passengers and freight trains and the railway gauge is normal gauge – 1435 mm.

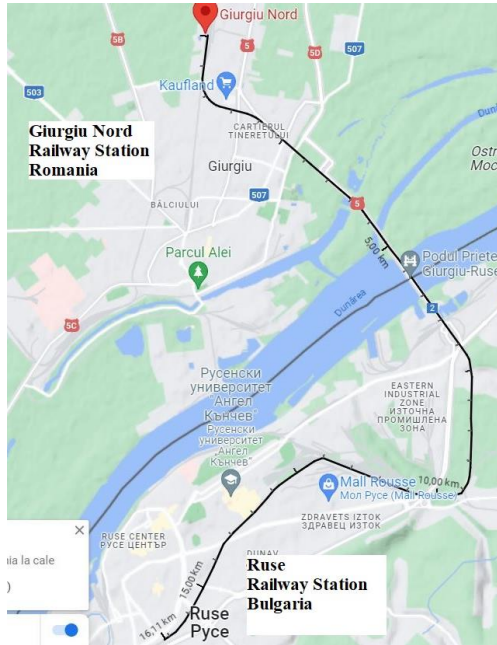


Fig. 13. Railway connection Giurgiu Nord, Romania – Ruse, Bulgaria

- b. Golenti, Dolj County, Romania – Vidin, Bulgaria, Fig. 14, with a total railway connection length of about 23.17 kilometres, distributed for about 10.20 kilometres in Romania and 12.97 kilometres in Bulgaria;

The railway line is simple track and non-electrified, can circulate both passengers and freight trains and the railway gauge is normal gauge – 1435 mm.

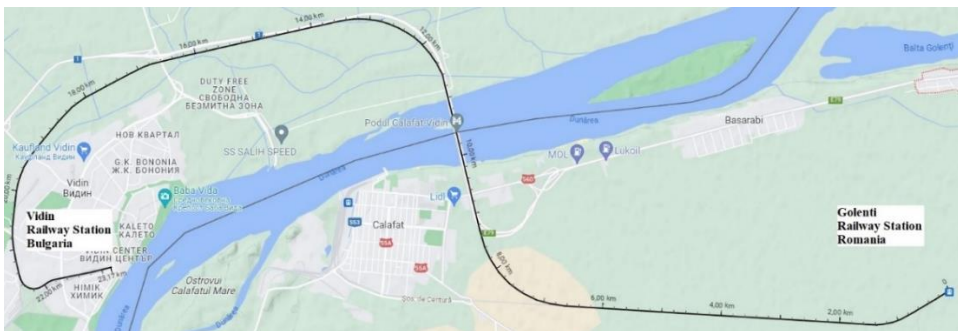


Fig. 14. Railway connection, Golenti, Romania – Vidin, Bulgaria

- c. Negru Vodă, Constanta County, Romania – Kardam, Bulgaria, Fig. 15, with a total railway connection length of about 12.84 kilometres, distributed for about 7.80 kilometres in Romania and 5.04 kilometres in Bulgaria;
- The railway line is simple track and non-electrified, can circulate both passengers and freight trains and the railway gauge is normal gauge – 1435 mm.



**Fig. 15.** Railway connection, Negru Vodă, Romania – Kardam, Bulgaria

The total length of railways connections between Romania and Bulgarian stations is approximately 52.12 kilometres, single railway track, distributed 45.09% Romanian territory and 54.91% Bulgarian territory.

## 6 Conclusion

The Romanian neighbour’s presented above from the west and south border from the point of view of length land neighbouring, membership to the European Union and membership to the Schengen area correlated with the rail infrastructure connections can create a better image of the potential of our country. More than half of our land border – 51.61% and our rail connections 54.99% are with the south and western neighbours, considering even the Black Sea.

The connection with the Hungarian neighbour and also, the European Union is strong, we have 27.28% from all connections and a share of 1.12 connection for each 100 km, but these connections aren’t enough utilized, at high capacity because only 20% of them are electrified and all are with only single track.

For medium-term and long-term future, Romania does not need absolutely to build new or more connections to our neighbours but should maintain them and properly develop the existing ones. Developing means at least double railway track and electrification.

Also, the maintenance and the rehabilitation/modernization of the works should be summarized in a national strategic plan that needs to be correlated with the similar documents of the European Commission, with priority lists well justified with analysis and veridical data sets from technical, financial, operational point of view. All should be aggregated in one clear

and coherent vision correlated with a realistically horizon of implementation sustained by economical capacities of Romania for at least next 10 – 15- 20 years.

From the technical point of view Romania has all the instruments and necessary know-how to implement integrated investments, letting to the decision factor to sustain projects from the financial-administrative point of view. When we say technical capacities we consider design instruments, analysing instruments, qualified staff, construction materials, etc.

We consider that we do not need to do a benefit development of some project implementation, thanking us with listing of some major advantages for the entire Romanian society with the application of the projects like: higher freight capacities, green transport, safer transport.

Finally, we have between all Romanian railway stations and west and south neighbours (Hungarian, Serbian and Bulgarian) railway stations a total of approximately 152.61 km of single railway track, distributed in 51.44% Romanian and 48.56% foreign territory. If we make an average, considering the modernization and electrification between Cluj Napoca station and Episcopia Bihorului station, with only € 750 million we would have modern double track railway connections.

Also, the fact that we are outside the Schengen area contributes to the general gap that accumulates with each day.

The authorities must do bigger and quicker steps for developing the rail infrastructure, the European community should support the country to join the Schengen area.

## References

1. F. I. Nică ” Romanian railway heritage and unfinished railway route in South Development Region”, AIP Conference Proceedings Volume 2928, Issues 1, 7th World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium – WMCAUS 5-9 September 2022, Prague, Czech Republic, <https://doi.org/10.1063/5.0170530>
2. Home-affairs [Online]. Available at: [https://home-affairs.ec.europa.eu/policies/schengen-borders-and-visa/schengen-area\\_en](https://home-affairs.ec.europa.eu/policies/schengen-borders-and-visa/schengen-area_en), accessed 01.05.2023.
3. CRF.ro [Online]. Available at: <https://cfr.ro/files/ddr/en%202023/Annex%206%20.pdf>, accessed 01.05.2023.
4. CRF.ro [Online]. Available at: <https://cfr.ro/wp-content/uploads/2023/02/Prezentare-Cluj-Episcopie.pdf>, accessed 01.05.2023.
5. Mobilitate.eu [Online]. Available at: <https://mobilitate.eu/cfrsa-contracte-cluj-bihor/>, accessed 01.05.2022.