



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



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# EXPLORATION

of new opportunities in the field of traffic management and safety measures in the cross-border  
area Giurgiu – Borovo

under the project "B-TEN – Improved nodes Giurgiu-Byala for better connection to TEN-T infrastructure" with reference No ROBG-442, co-financed by the European Regional Development Fund through the INTERREG V-A Romania-Bulgaria Programme 2014-2020 under Grant Agreement 92993/13.08.2018 and National Co-financing Agreement No RD02-29-376/12.10.2018

Veco Computers Ltd., 2020



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ЕВРОПЕЙСКИ СЪЮЗ  
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БЪЛГАРСКО ПРАВИТЕЛСТВО



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## CONTENT

|   |    |
|---|----|
| 1. INTRODUCTION   | 3  |
| 2. LOCAL TRANSPORT, INFRASTRUCTURE AND CONNECTIVITY IN NUMBERS: DEVELOPMENT, ROUTES, PRICES AND CONDITIONS              | 4  |
| 2.1. Connectivity of the region through land road infrastructure  | 5  |
| 2.2. Connectivity and status of water transport infrastructure  | 17 |
| 2.3. Connectivity through railway infrastructure  | 23 |
| 2.4. Connectivity via air transport   | 26 |
| 2.5. Analysis of the state of transport infrastructure  | 29 |
| 3. EXISTING TRAFFIC MANAGEMENT AND TRAFFIC SAFETY CONDITIONS  | 35 |
| 3.1. Analysis of traffic safety on road infrastructure in the cross-border area - Bulgaria                              | 38 |
| 3.2. Analysis of traffic safety on road infrastructure in the cross-border area of Romania                              | 48 |
| 3.3. Analysis of the safety of rail, air and river transport on the Danube in the cross-border area Bulgaria-Romania    | 51 |
| 4. S.W.A.T. TRAFFIC SAFETY ANALYSIS IN THE AREA   | 55 |
| 4.1. Analysis of the risk related to the optimization of transport conditions in the cross-border region Borovo-Giurgiu | 57 |
| 4.2. Overview of applicable regulations   | 58 |
| 4.3. Analysis of good practices for optimizing traffic safety in Bulgaria   | 62 |
| 4.4. Analysis of good practices for optimizing traffic safety in the European Union                                     | 67 |
| 4.5. Analysis of population attitudes   | 79 |
| 5. OPPORTUNITIES AND RECOMMENDATIONS FOR THE DEVELOPMENT OF SAFETY MEASURES IN THE CROSS-BORDER AREA                    | 89 |
| 5.1. Opportunities for development of measures in settlements   | 89 |
| USED LITERATURE   | 92 |



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

## 1. INTRODUCTION

The study of the possibilities in the field of traffic management and safety measures in the cross-border area Giurgiu - Borovo was conducted as a result of a contract awarded to Veko Computers Ltd. for implementation No 066 / 26.05.2020 with the subject – "Study of new opportunities in the field of traffic management and safety measures" under the project "B-TEN – Improved nodes Giurgiu-Byala for better connection to TEN-T infrastructure" with reference No ROBG-442, co-financed by the European Regional Development Fund through the INTERREG V-A ROMANIA-BULGARIA 2014-2020 Programme under Grant Agreement 92993/13.08.2018 and National Co-financing Contract No RD02-29-376/12.10.2018. The main objective of the project is to make an in-depth analysis of traffic conditions inside and outside the settlements of the area, to study traffic flows and connections and to assess the situation from the point of view of traffic safety, Based on the results of the study, a proposal was made for a set of measures to increase the level of safety of local and international traffic.

The study examines the state of transport infrastructure in the cross-border region, identifies affected areas, a SWOT analysis of the current situation, a risk analysis related to the optimization of transport conditions in the cross-border region of Borovo - Giurgiu, a review of the applicable regulatory framework in Bulgaria and Romania defining the institutional responsibilities of the authorities regarding transport conditions and traffic safety and analyzing their role in the whole process. An analysis of good practices for optimizing transport conditions within the transport network in Europe and around the world is also made, and these practices are commented on in the light of their applicability in the cross-border region.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

## 2. LOCAL TRANSPORT, INFRASTRUCTURE AND CONNECTIVITY IN NUMBERS: DEVELOPMENT, ROUTES, PRICES AND CONDITIONS

The transport systems of Bulgaria and Romania continue to occupy last places in European rankings in connectivity, mobility and intermodality, despite the progress made by the two countries in this direction since their accession to the EU in 2007 and despite the high degree of harmonization of national strategic documents with European relevant policies and regulations. The two countries share a common river border, which is subject to European transport policies and actions, as it is part of the EU's central transport network – Rhine-Main-Danube corridor 7. From a spatial point of view, the cross-border territory provides access by air, land, river and sea, connecting the Central Pentagon of the European Union with Asia. In order to be able to use the geographical location, investments are needed to complete the 4th corridor providing the connection in the European space between Vienna to the west and Istanbul to the east, with a continuation of the TRACECA network to Georgia and Azerbaijan and the section of the 9th corridor, which connects the north and south of the European space and Romania in particular, Bulgaria and Greece. The high modal potential of the cross-border region Borovo - Giurgiu makes it a territory with favorable conditions for the development of intermodal transport and the successful combination of modes of transport.

The main problems related to road safety and transport conditions in the cross-border area are the worn and non-compliant with modern conditions transport infrastructure, the lack of motorways, the presence of old and worn vehicles and last but not least the non-compliance with road traffic rules and unsatisfactory control in this regard.

In order to ensure road safety and improve transport conditions for all modes of transport, concerted action is needed from both countries Romania and Bulgaria in several main areas:

- Rehabilitation and modernisation of transport infrastructure (road infrastructure, railway and port infrastructure);
- Construction / completion / of motorways;
- Building intelligent transport systems (ITS);
- Strengthening control activities on the thoroughfares mostly through passive measures through control equipment.

A problem with a cross-border nature that has an additional negative impact on traffic safety and transport conditions is the fact that the available transport network in the cross-border area Borovo - Giurgiu does not provide



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

sufficient connectivity both between the two countries and the border areas to the two TEN-T corridors connecting Central and Northern Europe with the southeastern part of the continent and the Middle East.

The connectivity of the regional transport infrastructure with the main national corridors is also insufficient. This leads to congestion and rapid wear of the existing connecting infrastructure and increases the risk of accidents and other transport incidents.

In this regard, in order to improve connectivity and increase the level of transport safety in the region, joint efforts of the two countries in the following priority areas are needed:

- Construction of new alternative transit routes to provide higher throughput capacity, as well as to provide alternative routes in road accidents;
- Improving the bandwidth at the border checkpoint between Bulgaria and Romania at Danube Bridge "Ruse - Giurgiu";
- Improvement of navigation on the Danube;
- Construction of bike lanes in the cities of Giurgiu and Borovo to provide the opportunity to move to and from the workplaces of part of the employed population;

In order to ensure road safety and optimize transport conditions in the cross-border region, concerted and coordinated actions are needed by Romania and Bulgaria to shape and implement policies in the transport sector at national, regional and local level. Such targeted joint efforts will reduce the number of road accidents, build and develop modern transport infrastructure and increase the attractiveness of the region.

## 2.1. Connectivity of the region through land road infrastructure

The cross-border region of Borovo-Giurgiu is accessible to the main European corridors thanks to the navigable Danube River, which is part of the VII Pan-European Transport Corridor, which through the Black Sea Canal connects the port of Constanta with the industrial centers in Western Europe and the port of Rotterdam. In turn, it is crossed by two TEN-T corridors connecting Central and Northern Europe with the southeastern part of the continent and the Middle East. The Danube represents, on the other hand, a dense border between the two countries due to the lack of natural infrastructure for crossing the river, which hampers cross-border cooperation and socio-economic integration of the territory.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Inland ports facilitate the combination of transport modes - inland waterways, roads and railways operating as multimodal logistics chains. Rail and road transport act as partners of water transport for the transfer of goods and passengers before and after ports acting as the main interface. Over the past few decades, ports on the Danube have undergone a substantial transformation from conventional inland ports to modern logistics centres. In addition to their main function as congesting centers and storage sites, today ports offer a wide range of logistics services, including commissioning, distribution and project logistics. Due to the fact that they serve as production sites as well as freight collection and distribution centres, they are extremely well integrated into regional economies and contribute significantly to economic growth and employment creation. The three most important port areas in terms of quantities transshipment of the Danube are Izmil (Ukraine), Linz (Austria) and Galati (Romania). The port of Constanta in Romania occupies a special place. It is connected to the Danube via the Danube-Black Sea Canal and plays an important role as a gateway for cargo transport to the Black Sea, thus facilitating trade with Asia, the Middle East and the Black Sea region.

The total length of the roads in the cross-border area is almost 7700 km (3890 km for Giurgiu District and 232 km for the Municipality of Borovo), including streets, regional and municipal roads. The average density of paved public roads is 38 km/100<sup>km2</sup>, which is very small, compared to the European Union average of 110 km/100 km<sup>2</sup> territory. Road density in the area is far below the national level. The secondary and tertiary networks are lagged all along the zone and poorly maintained, taking into account a high risk of accidents. Furthermore, certain roads are prone to flooding, to a greater extent those on the Romanian side of the Danube. Many roads have insufficient capacity, leading to congestion and, accordingly, increasing travel time, vehicle operating costs, accidents and environmental damage.

The density of the functioning railway network is approximately 46.1 km per 1000 km<sup>2</sup> in Romania and 38.9 km per 1000 km<sup>2</sup> in Bulgaria, which is below the average of the EU countries (65 km/1000 km<sup>2</sup>), thus placing them in the last two places among the networks in the European Union. The main connection of the railways between Romania and Bulgaria crosses the Danube River on the Giurgiu-Ruse Bridge, and the other railway line between Negru Voda and Kardam reports reduced traffic (freight and passenger trains only).

The analysis of the quality of road and rail infrastructure and transport services in the two administrative units shows that they are further behind in the European ranking, although surface transport has the largest share in both Romania and Bulgaria.

The region is served by 4 international airports in Romania: "Constanta" (important during the summer season, when it accepts flights from Paris, Strasbourg, Luxembourg, Bergamo, Pisa, etc.), "Craiova" (flights from London, Cologne/Bonn, Bergamo, etc.), "Bucharest-Otopeni" and "Aurel Vlaicu", located closest to the border. In Bulgaria, the



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

nearest airports are in Sofia and Varna, but a large part of the population in the Bulgarian border region often regularly uses the airport in Bucharest.

The available transport network does not provide good connectivity between the two countries, nor does it provide easy access for border areas to the TEN-T corridors and the main national corridors. In fact, only one motorway "Bucharest – Constanta" (220 km) passes through the cross-border territory. This hinders the development of intermodal nodes that are vital for exploiting the potential of the Danube for navigation and for the economic development of the area.

The border between the two countries is 610 km long, of which 470 km is the water border along the Danube. The border between Romania and Bulgaria is located between Pristol (Mehedinți County, Romania) to the west and (Constanta County, Romania) to the east, at a distance of 631.3 km.

*The river border* is the inland waterway along the section of the Danube with a length of 470 km (from kilometer 845,650 to kilometer 374,100), bounded between the right bank of the river and the demarcation line of the border between the Republic of Bulgaria and Romania, determined in accordance with the Convention on the Determination of the River Boundary between Bulgaria and Romania of 1908. respectively Calafat and Calarasi (Romania). The Danube River creates great opportunities for the development of water transport. It is the largest international river route through which Bulgaria connects with the countries of Western and Eastern Europe. This creates conditions for lively trade links with these countries, great opportunities for tourism, as well as other economic activities. In the studied region is the important corridor for economic development Bucharest-Giurgiu-Ruse-Veliko Tarnovo, which should be used. There are also pairs of cities on both sides of the Danube: Vidin - Calafat, Becket - Oryahovo, Turnu Magurele - Nikopol, Calarasi - Silistra, which can significantly contribute through their cooperation to the achievement of the regional development goals, following the established example of cooperation between Giurgiu and Ruse. Additional benefits for the region can also be derived from its cultural and territorial diversity. The cross-border region of Borovo-Giurgiu is accessible mainly through the navigable Danube River, which is part of the VII pan-European transport corridor, which through the Black Sea Canal connects the port of Constanta with industrial centers in Western Europe and the port of Rotterdam. In turn, it is crossed by two TEN-T corridors connecting Central and Northern Europe with the southeastern part of the continent and the Middle East. The Danube represents, on the other hand, a dense border between the two countries Bulgaria and Romania, due to insufficiently developed infrastructure for crossing the river, which hampers cross-border cooperation and socio-economic integration of the territory.

*The land border* is 139.1 km long, passing through Dobrudzha, between Calarasi – Silistra and the Black Sea, separating the county of Constanta (Romania) from the districts of Silistra and Dobrich (Bulgaria) between the Danube





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

and the Black Sea. It starts from the town of Silistra and ends next to the Romanian village of Vama Veche, located on the Black Sea coast. The flat relief of Dobrudzha allows the construction of road and rail roads. This border is crossed by the railway line "Razdelna - Kardam - Medgidia - Ungheni" /the shortest road between Bulgaria and the CIS/ and the road "Istanbul - Burgas - Varna - Constanta". A power line from Ukraine and a gas pipeline from Russia pass here.

*The maritime border is 22.2 km long, covers a strip of coastal waters with a width of 20 km. The development of the maritime border is also associated with a number of problems. First of all, this is the severe ecological condition of the Black Sea, caused by the large rivers Danube, Dnieper, Dniester and others. A significant share in pollution has also the waste coastal waters. Due to the limited purification capacity of the sea, fish wealth has greatly decreased, And changes in biocenosis are of threatening proportions. In addition, the transport links in the Bulgarian part with the interior of the region are insufficient, which leads to insufficient use of coastal lands.*

There are three types of infrastructure for border crossing: river, land and air (Table 1).

A serious barrier on the way of cooperation is the absence of border crossing points. Along these 470 km on the Danube there are two land bridges, one of which is rail, and most crossing points are by ferry.

| Connection                       | Mode of transport      |
|----------------------------------|------------------------|
| Vidin - Calafat                  | Bridge (automotive)    |
| Break - Growth                   | Ferry                  |
| Oryahovo – Beckett               | Ferry                  |
| Nikopol/Somovit – Turnu Măgurele | Ferry                  |
| Svishtov - Zimnicea              | Ferry                  |
| Ruse - Giurgiu                   | Bridge (road and rail) |
| Tutrakan - Oltenitsa             | Ferry                  |
| Silistra - Calarasi              | Ferry                  |





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

| Connection  | Mode of transport  |
|---|--|
| Kardam – Negru Voda   | Land crossing points are located along the Black Sea coast |
| Durankulak – Vama Veche, as well as south of the Danube, between Silistra and Ostrov. |  |
| Constanta, Mihail Kogalniceanu International Airport                                  | Air transport  |
| Craiova International Airport   | Air transport  |
| Gorna Oryahovitsa International Airport   | Air transport  |
| Ruse, Municipal Airport   | Air transport  |

Table 1. Infrastructure projects for crossing the border between Bulgaria and Romania

Apart from the four international airports on the Romanian side, a good regional development prospect is represented by Tuzla Airport in the county of Constanta. There is potential for development in both airports operating in the Bulgarian part of the cross-border region – Gorna Oryahovitsa and Ruse.

Data related to passenger movements and frequency of crossing at checkpoints report moderate levels, with less than 61% of those crossed the border of Romanian or Bulgarian origin. The exceptions are on the Ruse-Giurgiu Bridge and the Vidin-Calafat Bridge over the Danube River, which are the most used points for crossing the border by Romanian, Bulgarian and international traffic.

During the pre-accession period, improvements of border crossing facilities have been carried out with the support of the PHARE CBC Fund (1999-2004). Rehabilitation of the railway infrastructure and activities related to the safety of the infrastructure of the bridge "Giurgiu-Ruse" was carried out. Two mirror projects have been implemented on both sides of the border to improve connectivity through ferry connections and the border crossings Nikopol (Bulgaria) - Turnu Magurele (Romania) and Silistra (Bulgaria) - Calarasi (Romania).

In the 2007-2013 programming period, common Romanian-Bulgarian projects related to improving mobility and accessibility in the region were implemented. As a result of the implementation of the Romania-Bulgaria Cross-Border



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Cooperation Programme 2007-2013, mobility and interconnection has been increased in the cross-border region - 169 km of built/modernized roads serving about 500,000 people. An example of such a project is "SMART" - "Sustainability, mobility, accessibility in the cross-border region Constanta - Dobrich - transport infrastructure". The activities are aimed at the renovation of road sections in Dobrich and the delivery of road equipment in Constanta. The Municipality of Dobrich reconstructs completely important road sections that have the role of a transport entrance-exit of the city in the direction of Constanta.

Although the Danube has the function of the main artery of the European transport system, it is less important than expected in the economy and in transport in the cross-border region. Currently, only 10-15% of its transport capacity is used. Important for the development of the river transport axis "Rhine/Maas - Maine - Danube" (Priority axis TEN-T), which is a major route for the transport of goods, connecting the port of Rotterdam from the North Sea with the Black Sea (especially Constanta and the Bulgarian ports), as well as the river ports located along the inland waterway.

A major problem is the throughput at the border checkpoints between Bulgaria and Romania, especially at the Ruse-Giurgiu Danube Bridge, most often for the outgoing and incoming from and to the Republic of Bulgaria traffic of freight, not rarely passenger vehicles. According to a file of the Bulgarian-Romanian Chamber of Commerce and Industry (BRCCI), it is necessary to take measures to expand the border checkpoint at Ruse and to open a new checkpoint on the Bulgarian side of the bridge. There are opportunities to be analyzed to open new ferry lines that could partially take away traffic from the Danube Bridge at Ruse – Giurgiu. BRCCI has information about the existing interest and readiness of investors, but coordination is needed to investigate the opportunities and organize the checkpoints.

As a result of the long-term operation, the road infrastructure directly in the area of the Danube Bridge border checkpoint is in extremely poor condition and needs both repair and complete reorganization of traffic, aestheticization of the surrounding spaces, construction of parking lots, placement of horizontal and vertical marking and signaling. The bridge itself is in dire need of overhauling the road part and upgrading the lighting. The connecting infrastructure is as follows:



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово



Figure 1. Danube Bridge and Road Infrastructure in the region of the town of Vidin Ruse and Fr. Giurgiu

*Bulgaria: first-class road I-5 (E85: Ruse - Veliko Tarnovo), first-class road I-2 (E70: Ruse - Varna), second-class road II-21 (Ruse - Silistra), second-class road II-23 (Ruse - Kubrat) and third-class road III-501 (Ruse - Dve Mogili - Borovo), as they are entrance and exit in the Republic of Bulgaria through the border checkpoint "Danube Bridge".*

*Romania:*

Road DN5 – Danube Bridge – Giurgiu – Daya – Uzun – Bucharest;

The railway connection between Bulgaria and Romania in the cross-border region is implemented through the railway border crossing "Ruse - Giurgiu-North" with a common border station for freight trains Ruse distribution and passenger trains Ruse, and with border station "Giurgiu-North";

Giurgiu County



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Giurgiu County has a system of public roads formed by state (national) roads – 310 km, county roads – 538 km, municipal roads – 336 km, respectively 34 bridges along the routes of district roads (with a length of 2 210 m) and 20 bridges along the routes of municipal roads (1 054.81 m).

The county's road infrastructure is made up of:

- DN5 (E70, E85) (Bucharest - Giurgiu Customs – Bulgaria);
- DN6 (Bucharest - Alexandria - Craiova – Timisoara);
- E81 (A1: Bucharest – Pitești);
- DN5B (Giurgiu – Gimpac);
- DN61 (Gaješ – Gimpac);
- DN5C (Giurgiu – Zimnicea);
- DN41 (Giurgiu – Ploșșoru – Oltenița);
- DN5A/DN5 (Adunaci Kopachen – Gradišcia – Mironěšč – Hotarele);
- DN41 (Gryaka).

The proximity to Bucharest provides quick access to Otopen and Benyasa airports. The length of the railway lines that cross the county is 47 km and the electrified part of the railway line is 24 km long, providing the connection of Teleorman (Videle) with Bucharest and Ruse.

The most important public roads that cross Giurgiu County and make a connection between the most important points of state and European roads are presented in Table 2.

| Road      | View     | Sector                             | Length sector | Quality   |
|-----------|----------|------------------------------------|---------------|-----------|
| E70 (DN6) | European | Prunaru – Mihaileșch               | 32.3km        | Good      |
| E85 (DN5) | European | Giurgiu-Ruse – Adunatsi – Kopachen | 47.7km        | It's cool |



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

| Road   | View     | Sector                         | Length sector | Quality |
|--------|----------|--------------------------------|---------------|---------|
| DN5C   | National | Giurgiu – Pjetrushu            | 35 km         | Good    |
| DN5B   | National | Gimpac – Giurgiu               | 40 km         | Bad     |
| DN41   | National | Plopsoru – Hotarele            | 42.1km        | Good    |
| DN5A   | National | Adunaci - Kopatseni - Hotarele | 34 km         | Bad     |
| DJ504  | District | Gogoshar – Hodivoya – Giurgiu  | 34.1km        | Good    |
| DJ504A | District | Gogochar – Vijeru – Giurgiu    | 31.8km        | Bad     |
| DJ503  | District | Stanești – Giurgiu             | 9.2km         | Good    |
| DJ503A | District | Izvoarele – Stanesch           | 15.2km        | Good    |
| DJ507  | District | Gostinu – Giurgiu              | 19 km         | Bad     |
| DJ413  | District | Mihai Bravu – Banyasa          | 11.4km        | Bad     |
| DJ412  | District | Radurя Blaž – Kornu            | 8.1km         | Good    |
| DJ411  | District | Kalugaren – Hotarele           | 30 km         | Bad     |

Table 2. Important public transport roads passing through Giurgiu County

According to existing studies, the road network and bridges in Giurgiu county need modernization, repairs and rehabilitation as follows:

- County roads: modernisation – 136.62 km, repair and rehabilitation – 133.863 km;
- Municipal roads: modernisation – 130.761 km, repair and rehabilitation – 55.686 km;



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- Out of a total of 846.315 km of county and municipal roads, 267.381 km are in need of modernisation and 189.549 km are in need of repairs and rehabilitation.
- Of the 34 bridges in the county, 11 need capital repairs;
- The technical condition of DN5A is unsuitable for absorbing traffic flows;
- The railway bridge over the Argeş River has been severely damaged since the destruction of safety facilities in a crash in 2008.

In Giurgiu County as of 31.12.2017, 79.39% of the network of public roads was modernized – 940 km, and the network of district and municipal roads was modernized to 73.11% of the total length (639 km). County and municipal roads have light road surfaces at 73 km (according to the latest official information from 2015), on gravel are 86 km. and on earth are 30 km. (information from NSI, Romania as of 31.12.2017) Public transport services are provided only in the municipality of Giurgiu, and for the remaining 6 districts in the region of South Muntenia, public transport is represented by 18 urban systems (UAT).

### Ruse Region

The most important elements of the road infrastructure in Ruse District (where the Municipality of Borovo is located) of them are first-class road I-5 (E85: Ruse – Veliko Tarnovo), first-class road I-2 (E70: Ruse – Varna), second-class road II-21 (Ruse – Silistra), second-class road II-23 (Ruse – Kubrat) and third-class road III-501 (Ruse – Dve Mogili – Borovo). All of them are entrance and exit in the Republic of Bulgaria through the border checkpoint "Danube Bridge".

| Road      | View         | Sector                |
|-----------|--------------|-----------------------|
| I-5 (E85) | Top-notch    | Ruse – Veliko Tarnovo |
| I-2 (E70) | Top-notch    | Ruse – Varna          |
| II-21     | Second-class | Ruse – Silistra       |
| II-23     | Second-class | Ruse – Kubrat         |





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

|         |             |                            |
|---------|-------------|----------------------------|
| III-501 | Third-class | Ruse – Dve Mogili – Borovo |
|---------|-------------|----------------------------|

Table 3. Important roads in Ruse Region

The total length of the national road network in Ruse District is 512 km, of which 110 km first class, 155 km second and 247 km third class. Second-class roads occupy a significant share of the national road network and form 11.3% of them in the region or 3.8% of the national ones. Third class roads and road connections and junctions have a relative share of 7.3%. For the period from 2012-2017 there is no change in the length of the roads of the Republican road network.

| Ruse region roads from the RPM,<br>according to the type of road         | By year |      |      |      |      |      |
|--|---------|------|------|------|------|------|
|  | 2012    | 2013 | 2014 | 2015 | 2016 | 2017 |
| First-class  | 110     | 110  | 110  | 110  | 110  | 110  |
| Second-class   | 155     | 155  | 155  | 155  | 155  | 155  |
| Third-class roads and road connections<br>at intersections and junctions | 247     | 247  | 247  | 247  | 247  | 247  |
| Roads - total  | 512     | 512  | 512  | 512  | 512  | 512  |

Table 4. Ruse Region - RPM roads, according to the type of road by years

For the most part, the national road infrastructure is in good operational condition. The busiest and with the highest number of road accidents is the first-class road I-5 (E85: Ruse - Veliko Tarnovo) in the section "Ruse - Borovo", which connects the directions "Ruse - Sofia" and "Ruse - Svilengrad". The density of the road network is higher than the national average of 18.4/100 km<sup>2</sup> of territory. However, the quality of roads in the district was low and the share of roads in good condition decreased in 2015, reaching 26.0% (vs. 40.7% nationally).

A significant problem is the extremely poor condition of the road infrastructure directly in the area of the Danube Bridge border checkpoint, which needs both repair and complete reorganization of traffic, aestheticization of the surrounding spaces, construction of parking lots, placement of horizontal and vertical marking and signaling.





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

An opportunity to solve the problems is through the construction of a second Danube bridge between Ruse and Giurgiu. A significant contribution to improving the state of transport connectivity is the development of the railway connection "Thessaloniki - Kavala - Alexandroupolis - Burgas - Varna - Ruse", for which a Memorandum of Understanding between Bulgaria and Greece has been signed. The document regulates the preparatory works and the joint management of the corridor by the two countries. The project envisages the connection of the Danube, Black and Aegean Seas with a high-speed rail corridor, as well as the development of ports that are part of the TEN-T core network. The construction of a double electrified railway line with an implemented ERTMS rail traffic management system is included.

An important element of the transport (railway and road) infrastructure is the Ruse-Varna connection for the socio-economic development of Ruse District. The studies of a number of consulting companies with experience in the development of combined transport show the prospects and cost-effectiveness of the construction of a combined transport link "Danube River (port of Ruse) - railway (car) - Black Sea (port of Varna)". The main advantages of such a transport connection are the reduction of transport time by about 2 days and the cost of canal and other charges in the lower reaches of the Danube. A problem for the realization is the unsatisfactory condition of the railway line and the road connection between Ruse and Varna first-class road I-2 (E70: Ruse – Varna).

In recent years, medium and major repairs have been carried out on the sections in the worst condition of the roads I, II and III class:

- Repair and construction of the road junction and the bridge of the Yantra River near the town of Yantra. White, characterized by dangerous slope and serious road accidents in recent years.
- The bridge over the Danube River (Danube Bridge) - overhaul of the road part, modernization of the lighting.
- Projects under Operational Programme "Regional Development" in execution: LOT 20: road III-202 (I-2) Shtraklevo - Popovo km 12+000 to km 16+300; road III-2102 (II-21) Slivo pole – Chereshevo km. 11+500 to km. 15+500; road III-5102 New Town - Dzhulyunitsa – Piperkovo; LOT 46: road III-202 (I-2) Shtraklevo – Popovo km 0+000 to km 6+893 and from km 9+362 to km 12+000.

However, this does not entirely solve the problems with the state of the road infrastructure in Ruse District. Municipal roads (former IV class) play an extremely important role in socio-economic development at the local level. The total length of the municipal roads on the territory of Ruse District is 569.05 km, of which 450.7 km are former fourth-class and 118.35 km - local roads. The established municipal (fourth-class) road network on the territory of Ruse District continues to be in unsatisfactory condition.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

## 2.2. Connectivity and status of water transport infrastructure

The Danube is the second longest river (2,845 km) on the territory of the European continent and is of paramount importance for the countries through which it passes: Germany, Austria, Slovakia, Hungary, Romania, Bulgaria, Croatia, Serbia, Ukraine and parts Switzerland, Poland and Moldova. As part of the Rhine-Main-Danube navigable canal, the river facilitates international trade from the Black Sea to the North Sea.

Depending on the navigation conditions, the Danube is divided into three main sections:

- Upper Danube – from the springs to Vienna – the riverbed is not wide, but it is sufficient for navigation. In this section the river is deepest between May and August, and the lowest water levels are recorded between October and March;
- Middle Danube – from Vienna to Iron Gates. The river is deepest during the months of April and March, and low water is observed between August and October;
- Lower Danube – from Iron Gates to Sulina. Fluctuations in the water level of this section are observed during the same periods of the year that are typical for the Middle Danube.

With the opening of the navigable channel "Rhine – Main – Danube", the importance of the river for the cross-border region grew because the country has the opportunity for direct connection by water with the countries of Western and Northern Europe. The Danube is characterized by a complex regime of navigation. The rules for its use are governed by special international treaties, conventions and agreements that guarantee the free navigation of all countries subject to certain security rules.

In order for a relevant water section to be considered navigable, it is necessary that it meets certain requirements, such as fairway depth; width of the riverbed; number, density and permeability of bridges; number of gateways, etc. On the basis of these indicators, the European Council of Transport Ministers has adopted a decision according to which Europe's navigable inland waterways are classified into different categories in order to determine what types of vessels (depending on their technical and operational parameters) can be used in freight transport.

According to the categorization of Europe's inland waterways, the Bulgarian section of the Danube falls into Class VII – with a draught depth of more than 2.50 meters and a bridge clearance length of 9.10 meters. The technical parameters of the water sections falling under categories VI and VII can ensure safe navigation conditions for the movement of ships carrying oversized, heavy and bulky cargo, as well as containers stacked on three and four levels.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

In addition to the listed technical parameters and quantitative indicators characterizing the density and category of Danube inland waterways, there are also such factors that affect their throughput, namely:

- Navigation to take place at any time during the intended navigation period;
- The navigation period may be shorter than 365 days a year only in cases where the condition of the river section is affected by climatic conditions and the formation of ice is possible.

The qualitative condition of the river roads and their adjacent facilities is therefore essential for the regular and safe implementation of freight transport, as it serves to determine:

- The maximum permissible speed and dimensions of vessels;
- Permissible draught depth directly related to the type and volume of goods carried;
- The permissible width of the fairway, on which the safety of navigation depends.

The study of the dependence between the state and peculiarities of inland waterways and ground facilities, and the technical-operational characteristics of vessels, is an important prerequisite for improving the productivity of the river fleet. The indicators load capacity and the load capacity utilisation factor have a direct impact on the productivity of transport operators and indirectly on the size of variable costs.

The conditions of navigation on the Danube inland waterways are also influenced by seasonal fluctuations in the river level (high water, low water and the formation of ice) and the presence of narrow sections along the waterway. Controlling these phenomena in a number of cases is impossible and negatively affects shipping. During certain periods of the year, the level of the Danube fluctuates to varying degrees in different sections due to the characteristic features of climatic and geological conditions.

There are significant fluctuations in the permissible depth of draught of vessels in the Bulgarian section of the Danube. There are periods when restrictions in shipping are extremely long, which leads to outflow of cargo flows to and from Bulgaria and redirection of freight transport by other modes of transport. Between 12% and 18% of the days in the year the Bulgarian section of the Danube is unsuitable for safe navigation during the research ten-year period.

The presence of low water during the summer months of the year in certain places necessitates transshipment of river vessels in order to reduce their depth of draught, which in turn prolongs the delivery times of cargo and makes transport services more expensive.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

The formation of ice is another phenomenon that negatively affects the rhythm and efficiency of freight transport. The occurrence of such force majeure is accompanied by an increase in the amount of variable costs of river operators and a decrease in consumer demand due to an increase in the price of transport services.

Another weakness of a section of the Danube in the translatlateral region is the presence of narrow sections. Those waterways of international importance which belong to the European inland waterway system and whose parameters do not correspond to those approved for classification in the relevant category shall be defined as bottlenecks. The presence of narrow sections along the Danube is a sign of the unsatisfactory quality of waterways and difficult navigation. The insufficient depth of the fairway limits the rational use of the lifting capacity of vessels, therefore only certain types of cargo are possible, which is directly related to the loss of market positions by inland waterway transport and a decrease in consumer demand.<sup>1</sup>

In the field of inland waterway transport, the ongoing maintenance of the waterway, incl. The navigational and traffic situation on the Danube River is carried out by the Executive Agency "Exploration and Maintenance of the Danube River" (EACE) under the rules of the Convention on the Regime of Navigation (State Gazette No. 112/1949) and the 1955 Agreement between the Governments of the Republic of Bulgaria and the Republic of Romania pursuant to Art. 39 of the Convention and according to art. 77, 82 and 83, para. 2 of the Law on Maritime Spaces, Inland Waterways and Ports of the Republic of Bulgaria. According to the Convention, no fees are established for the transit of ships, and the cost of maintenance is financed by the Republican budget.

#### *Romania - city Giurgiu*

The National Management Company of Danube River Ports AD Giurgiu (APDF) acts as a port authority for 18 ports from Bazajas to Cernavoda. The port of Giurgiu is located in the area of km 494 – km 491, and is developed in three sites, according to information published by APDF. Access to the port network is provided by the street network of the city of Giurgiu through connections with roads DJ504, DJ507, DN5, DN5B, DN5C and railway connections provided by inversion of the lines to four sectors from Giurgiu railway station to the regional railway network.

The port is of river type, allowing the unloading of barges up to a maximum of 2 000 tonnes. The total area of the port premises is 59 ha, of which the built-up area is 70 000 sq.m, with a capacity of 2 305 thousand. t/y. The port is electrified, water-supplied and channelled. In the free zone of Giurgiu there is a terminal for containers. Main operators

<sup>1</sup> Inventory of Main Standards and Parameters of the E Waterway Network, "Blue Book", second revised edition, UNECE, 2012, стр. 3



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

are SCAEP Giurgiu Port, SC DUNAPREF SA, CNF GIURGIU NAV SA, and the goods handled are bulk, general goods, cereals, petroleum products.

At Giurgiu Port there are three port cargo sections:

- Ramadan Sector with the possibility of mooring on the Danube River with a length of about 750 m;
- Planteller basin, where mooring fronts with a total length of 740 m are located.
- Chain Pool, which houses an important shipyard, with a syncrolift for ships with a capacity of up to 5,000 tons, a quay, production halls and repairs, equipment, etc.

#### *Bulgaria – Ruse*

On the territory of Ruse region operate the following ports, which are of national importance: port terminal "Ruse-East" for general, bulk and RO cargoes; "Ruse-West" for general, bulk cargoes and passenger terminal "Ruse-Center" for passengers. Ruse Port Complex is the largest port in the Bulgarian section of the Danube River. It is also the largest port in the port complex and occupies a key position in the Pan-European Transport Corridors. The port is a developed multimodal center, which connects three main modes of transport - water, road and rail. On its territory are located road connections with the central road network of Bulgaria and railway tracks, It connects it to the country's railway network.

**Port of Ruse is defined as a node of the main TEN-T network on the territory of the Republic of Bulgaria.**

The following ports are of regional importance:

- Port "Ruse - oil terminal Arbis" for processing tankers with liquid fuel, which has 1 berth for cargo handling. The quay front is 60 m and the depth is 2.6 m, equipped with a pumping installation.
- Port "Port Bulmarket - Ruse" for general, bulk cargoes and petroleum products, ship bunkering and supply of ships with electricity, which has 7 berths for cargo handling. The quay front is 650 m and the depth is 1 m. The port has storage facilities with an area of 15,000 square meters and an open area of 1,440 square meters, as well as silos – 9,798 cubic meters. It is equipped with three electric gantry cranes and one pneumatic aggregate for loading and unloading grain.
- Port "Ruse - Duty Free Zone" for handling bulk cargo, has 1 berth. The quay front is 100 m and the depth is 2 m. It has a pumping installation and tanks – 40 000 cubic meters.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- Port "Double Ve Co - Ruse" for handling bulk and general cargo has 1 berth. The quay front is 135 m and the depth is 3 m. It has an open storage area of 1 500 sq.m and 2 gantry cranes – 5 tons.
- Port "Danube Dredging Fleet - Ruse" for bulk and general cargoes, with 3 berths. The quay front is 280 m and the depth is 2.5 m. The open storage area is 10,000 sq.m. It is equipped with 3 gantry cranes.
- Pristis Port, for passenger service, ship stay and supply and bunkering, has 10 service berths and 1 for passenger ships. The quay front is 100 m and the depth is 2.5 m. The open storage area is 485 sq.m, and the tanks have a volume of 80 cubic meters. It has 10 pcs. Pontoons 70/11/3; 70/10/5.
- Port terminal "TPP - Svilosa" for handling bulk cargoes – coal, has 1 berth. The quay front is 172 m and the depth is 2.5 m. The open storage area is 15 250 sq.m, equipped with 2 pcs. gantry cranes.
- Port terminal "Svilosa" for handling general and bulk cargoes, with 1 berth. The quay front is 130 m and the depth is 2.5 m. The open storage area is 7470 sq.m, equipped with 1 portal crane 10 tons.

Port of Ruse is defined as a node of the main TEN-T network on the territory of the Republic of Bulgaria.

Port complex "Ruse" is the largest transport center in the Bulgarian section of the Danube with a total area of 920,000 sq.m. The main element of this logistics scheme is the railway section "Varna - Ruse", which is a segment of transport Corridor VII and shortens the road of freight on the line "Rhine - Main - Danube - Black Sea".

Redirecting traffic from Sulina to the railway section "Ruse-Varna" creates opportunities to attract a larger number of shippers due to shortening the distance and travel time. The shortest route for Central Europe's trade with the Middle East is the one that passes through Ruse on the Danube River and Varna on the Black Sea. Port Complex Ruse EAD connects to the port of Varna through the railway section "Ruse-Varna", which could provide good opportunities for attracting transit cargo flows and the implementation of multimodal transport in the directions Europe - Near and Middle East and the Caucasus.

The railway section "Ruse - Varna" is electrified and has a length of 232 km. It consists of two sections: "Ruse – Kaspichan" – railway line first category – 97 km and "Kaspichan – Varna" – 135 km, road, part of highway railway line No 2. The current state of infrastructure facilities creates difficulties for the regional and national transport system. The weighted average speed of freight trains is 62 km/h.





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

With regard to railway connections, the port complex "Ruse" also falls within the scope of the border transition with the Republic of Romania through "Ruse – Giurgiu-North" with a common border station for freight trains Ruse distribution and passenger trains Ruse and with border station "Giurgiu-North".

**Port Terminal "Ruse-East" has a total area of 825,533 m<sup>2</sup>**, with the possibility of expansion and development. Currently, about 470,000 m<sup>2</sup> of the entire area has been utilized. The terminal handles mainly bulk cargoes, containers, Ro-Ro and liquid cargo. The terminal has 14 berths, as well as a Ro-Ro terminal for handling cars and trucks. The port is equipped with 14 electric gate port cranes with a capacity of 32 tons, lifters and pneumatic devices that are of average age between 30 and 40 years. On the territory of the port terminal "Ruse-East" are built open (190 500 m<sup>2</sup>) and closed (15 800 m<sup>2</sup>) storage areas. The terminal is equipped with its own railway line with a total length of 4.7 km, and the distance to the nearest road is 2 km. It has an artificial firth with a vertical quay wall, facilitating loading and unloading at low waters of the Danube.

Currently, the operator is "Port Infrastructure" Company. Port terminal "Ruse-East" is under preparation for concession in two sites:

- Port terminal "Ruse-East - 1" (including berths from No 1 to No 8) part of the port for public transport of national importance Ruse;
- Port terminal "Ruse-East - 2", (including berths from No 9 to No 14) part of a port for public transport of national importance Ruse.

**Port Terminal "Ruse-West" has a total area of 117,000 m<sup>2</sup>** and is specialized in the processing and storage of bulk and refined petroleum products. It has open (27,600 m<sup>2</sup>) and indoor (8,900 m<sup>2</sup>) storage areas. The loading equipment consists of 9 electric loading cranes with a total lifting capacity of between 5 and 10 tons. Port "Ruse-West" is equipped with its own railway line, (a) the estimated quantity of cargo that can be handled per year is 491 000 tonnes of cargo. Currently, the operator is "Port Infrastructure" Company. Port terminal "Ruse-West" is currently preparing for granting a concession.

**Port terminal "Ruse-Center" has a total area of 11 799 m<sup>2</sup>**. Located in the western part of Ruse and is located about 600 m from the central town square "Freedom" and about 400 m from the old town center. It has 3 berths, only one of which is operated and is intended for accumulating passenger ships; 1 pontoon – for servicing passenger ships. For tourist purposes (for the passenger and the tourist) the connection between the terminal and the city center (the tourist and commercial part) is developed and two boulevards and several streets lead to it.





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

In terms of quality of port infrastructure for 2016, Bulgaria ranks 70th and Romania – 98th place among 137 countries, according to the Global Competitiveness Report 2016-2017.

Within the European Union, the two countries in the cross-border region and among the EU member states - Bulgaria and Romania rank among the last in terms of quality of port infrastructure.

According to Eurostat data, the estimate received by Romania for the period 2013-2014 is 3.39; 2014–2015 is 3.42 and for 2015-2016 it is 3.36, which determines the last place in the ranking of Romania.

Bulgaria is located just before Romania, and there is a deterioration in its indicators. The grades he received are: 2013–2014 – 4.18, for 2014–2015 – 3.91, for 2015–2016 – 4.01.

The density of the existing port infrastructure in the cross-border area is high and free port capacity is available. However, most of the ports were built at the beginning of the last century, which negatively affects their technical condition. The main problems for the development of ports are related to the lack of sufficient investment for maintenance and development of port infrastructure in previous years, obsolete basic mechanical and transshipment facilities, poor condition of the piers.

Ports have sufficient handling capacity for general, bulk and bulk cargo, container and Ro-Ro units. Currently, about 60% of the infrastructure capacity is used in the available congestion equipment.

The trend of development of ports is related to their concession and market positioning of port services taking into account the needs for improvement of the technical conditions of port infrastructures and waters.

## 2.3. Connectivity through railway infrastructure

### *Romania – Giurgiu County*

Giurgiu is crossed by the pan-European railway highway, which starts from Ostend (Belgium), passes through Berlin, Prague, Budapest, Bucharest, Giurgiu, Ruse, Sofia, Istanbul or through Thessaloniki makes a connection with Athens.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

After an analysis of railway transport at Giurgiu County level, there is less and less traffic. Among the factors influencing the railway transport in Giurgiu is the lack of direct railway transport "Giurgiu - Bucharest", as well as the short distance between the city and the capital, a distance that stimulates transport by buses and minibuses.

The railway system in Giurgiu County has a length of 47 km, of which 36 km is electrified, through which the connection between the county and Bucharest, Ruse (Bulgaria) through a bridge and Videl  (Teleorman County) is carried out. The railway lines are: "Bucharest – Giurgiu", "Giurgiu – Videle". The railway network in Giurgiu has 2 specialized stations: Giurgiu-City Station (main passenger station in the direction of Bucharest – Videle) and Giurgiu-North Station (passenger and freight transport, as well as control of trains crossing the border with Bulgaria). Giurgiu-Grad station provides transport of goods through a commodity group port – south. Railway transport within Giurgiu is carried out through a system of railways, stations and elements of infrastructure (depot, etc.).

Giurgiu County is crossed by the following railway lines:

- International train 460/461, with starting station "Bucharest – North" to Sofia and back, through "Videl  - Giurgiu - north - Ruse - Gorna Oryahovitsa – Pleven – Mezdra – Sofia";
- International train 480/481, with initial station "Budapest-Keleti" to Sofia and back, passing through "Szolnok – Mesotur – Gioma – Mezobereni – Bekeszaba – Kategihaza – Lokoshaza – Kurtic – Arad – Timisoara-North – Lugoj – Caransebes – Baile Herculane – Or ova – Drobeta–Turnu Severin – Strehaia – Fila  – Craiova – Golents – Vidin – Dimovo – Brusartsi – Bozhinovtsi – Krivodol – Mezdra – Sofia–North".
- Giurgiu has an advantage over its neighbourhood to Ilfov and Bucharest, especially the easy access to Henri Coand  International Airport from Bucharest, with distances ranging from 20–78 km. This transport infrastructure is a prerequisite for facilitating the access of potential investors to the county.

#### *Bulgaria – Ruse Region*

The manager of the railway infrastructure of the Republic of Bulgaria is the State Enterprise "National Railway Infrastructure Company" (SE "NRIC"). The railway network of SE "NRIC" is connected to the railway networks of the Republic of Romania through the railway border crossing "Ruse - Giurgiu-North" with a common border station for freight trains "Ruse-Distribution" and for passenger trains Ruse, and with border station "Giurgiu-North". The other railway border crossings are "Kardam – Negru Voda", with exchange border station "Negru Voda" and border station "Kardam", as well as railway border crossing "Vidin - Calafat" with common border stations "Vidin-Passenger" for passenger trains and "Vidin-Freight" for freight trains on the territory of the Republic of Bulgaria and border station "Golenci" on Romanian



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

territory. The railway network of SE NRIC gives access to the railway vehicles to the neighboring railway networks, to ports and to industrial branches of private companies and enterprises. The ports of Bulgaria with connection to the railway network of SE "NRIC" in Ruse Region are "Ruse-North" and "Ruse-West".

The possibilities for passing railway vehicles across Danube Bridge are related to the restrictions on the permissible axle load and the load gauges for the railway sections and lines of the railway infrastructure, defined in Order No 2165 / 25.10.2016 of the Director General of SE NRIC. The permissible maximum load for this section is limited to 22 tonnes per axle for locomotives and to 22,5 tonnes per axle for wagons. The existing restrictions would create a prerequisite for the impossibility of transporting some intermodal cargo units on these sections.

The average technical speed for passenger trains in Bulgaria is one of the lowest in Europe, which is the reason for the low quality of the service offered. The permissible maximum speeds by rail in the train running schedule (BFG) 2016/2017 vary according to different sections within the following limits: for freight trains from 15 to 120 km/h, for passenger trains from 40 to 160 km/h.

Increased permissible speeds to 160 km/h for passenger trains and up to 120 km/h for freight trains in railway sections where rehabilitation or modernisation projects are implemented cannot improve the rail service unless the technical characteristics of the rolling stock of railway operators are improved. Capacity is determined by technical speeds, and these depend on rolling stock.

The electrified railway lines of the railway network of SE NRIC are 747 km, which is over 70% of the total length of the railway network. The power supply system for traction needs of the rolling stock is built through an overhead line operating with a nominal voltage of AC 25kV and a frequency of 50Hz. To provide the power supply to the system, there are 53 stationary traction substations on the territory of the Republic of Bulgaria.

According to the "Technical Specification for Interoperability" for the energy subsystem, the infrastructure manager declares feeder zone restrictions with a maximum train current of 500A for connecting lines and 600A for upgraded lines.

The management, control and safety of train traffic on railway infrastructure is ensured by security equipment (signaling), telecommunications, electricity supply and energy control. The safety equipment controls the location of the rolling stock on the track by: track chains or axle counters; control and management of the elements of the railway infrastructure (traffic lights and switches) through station centralizations (MCC, MRC, EC-M, EMC and others) and interstation systems (auto-lock, semi-automatic interlock); control and management of the speed of movement of trains through the ETCS system (ALS) and centralized train traffic dispatch (DC). The signalling system shall permit the movement



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

of trains on the rail network by giving light signals. In the railway network of SE "NRIC" are operated the following systems and devices of the security equipment in the stations: station insurance installations; centralized dispatching systems for management and control; automatic level crossing devices; ERTMS/ETCS (European railway traffic management system/European train control system). The safe passage of trains through level crossings is carried out by automatic level crossing devices (ADFs). To ensure the safety of train traffic in the interstation is used: relay semi-automatic interlock (PAB); track chains to detect the presence of a train; systems with axle counters.

The railway network on the territory of Ruse District covers sections of the 4th main line "Ruse - Stara Zagora - Podkova", which is an element of Trans-European Corridor No 9 and the 9th main line "Ruse - Varna". The railway lines on the territory of Ruse District include the stations and stops in the sections along the 4th main line from Ruse to Polish Kosovo and the 9th line from Ruse-Distribution to Senovo. There are a total of 21 railway stations, stops and separation posts on the territory of the district.

The total length of the railway lines through the district, according to data of the National Statistical Institute as of 31.12.2017, is 155 km, of which 154 km (99%) are electrified. There are no double lines in the area. The railway lines on the territory of Ruse District represent 3.8% of the railway network of Bulgaria and 24.7% of the railway network in the North Central Planning Region. The density of the railway network in the district is 55 km / 1000 km<sup>2</sup>. The population of the district with a railway network amounts to 6.9 km / 10,000 people.

The railway section "Ruse – Gorna Oryahovitsa" on the 4th main railway line has a load gauge GB and the railway section "Ruse Distribution – Kaspichan" on the 9th line has a load gauge GC. The railway sections "Kaspichan – Sindel – Varna" on the 2nd main line and "Sindel – Varna-Ferryrna" have a load gauge GC. The permissible axle load of the rolling stock on the 9th railway line in the section "Ruse Distribution – Kaspichan" as well as the railway section "Kaspichan – Sindel – Varna" and "Sindel – Varna-Ferryrna" is 22 t/axle for locomotives and 22.5 t/axle for wagons.

The railway sections of the extended scope of the study: "Goritsa – Kaspichan – Sindel – Varna" on the 2nd main line "Sofia – Gorna Oryahovitsa – Varna", "Spacious – Kaspichan" on the 9th main line "Ruse-Distribution – Kaspichan", "Samuil – Todorovo" on the 91st line "Samuil – Silistra" and "Razdelna – Botevo" on the 28th line "Razdelna – Kardam" have a load gauge GC and a limit on axle load of the rolling stock 22 t/axle for locomotives and 22.5 t/axle for wagons.

## 2.4. Connectivity via air transport

### *Bulgaria – Ruse Region*



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Ruse Airport is located 17 km from the town of Ruse. Ruse, near the village of Shtraklevo. The location of the airport is strategic for Ruse, with the possibility of combining rail, land, water and air freight transport. The airport was built as a military airfield. Since the 1970s, it has also been used by civil aviation.

In this period for constructed the reception building, platform for servicing civil aircraft and other facilities. The airport ceased operations in 1999 for both military and civilian flights. By a decision of the Council of Ministers of 28.02.2005, the airport was transferred to the Ministry of Transport.

In December 2014, by a decision of the Council of Ministers, the airport in Shtraklevo was provided to Ruse Municipality. Currently, it is 100% municipal property of Ruse Municipality. In December 2016, Ruse Airport received a license for a flight site for small aircraft.

The opportunities for development of Ruse Airport are in the following directions:

- Passenger service: passenger ships on the Danube; service of low-cost airlines; restoration of the direct line "Ruse - Sofia"; use by private jet owners; charter transport for events on the territory of the city of Ruse; visiting hunting tourists.
- Handling of cargo: export of agricultural and special produce; temporary importation; construction of a congested centre. The remoteness of the airport from large settlements and the cleanliness of the approaches allow its use throughout the day.

- Establishment of a training centre.

The possibilities of using the airport are:

- Internal line: "Ruse – Sofia" (about 700 people travel every day on this route by bus or car);
- External airlines also served by low-cost companies;
- Cargo flights;
- Charter lines served by cruise ship companies along the Danube River (over 200 cruise ships per year);
- Refuelling centre (possibility of round-the-clock use due to airport remoteness from populated areas);
- Pilot training;



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- Maintenance and inspection of aircraft.

Ruse Airport allows for the separation of cargo from passenger activities, as well as for the smooth performance of both types of services. Depending on the size of the aircraft, it is possible to need partial reconstruction of the runway. It is necessary to build a connection between an intermodal terminal with the port of Ruse-East and Shtraklevo Airport; High-speed railway line "Ruse - Varna", airport complex "Shtraklevo", new road connections. Ruse Airport has the potential to become a strategic logistics hub.

The airport has 2,000 acres of adjacent land and its runway is 2,500 meters long. The airport has a passenger terminal, but there is also the possibility of building a cargo terminal for servicing cargo aircraft. Nearby there is an industrial railway branch for unloading fuels and oils, located about 10 km from the airport and occupying an area of 40,000 sq.m. Extensive properties around the airport are owned by the state (former military units) and can be converted into a logistics center, etc.

At present, the location of the facilities at Ruse Airport allows the separate servicing of passenger and freight flow, as the approaches to the two zones are independent and do not cross the runway. Passenger service can be carried out on the north side of the runway. Cargo service can be separated from the south side of the track. Warehouses of different nature — for transshipment, under customs supervision, for training purposes, etc. — can be built in this area (Table 5).

|   |   |
|---|---|
| <b><i>ATA code:</i></b>                         | ROU   |
| <b><i>ICAO reference code:</i></b>              | LBRS  |
| <b><i>Runway / landing characteristics:</i></b> | Concrete runway: 2.5 km long, 50 m wide (in the past served the following types of aircraft - An-24, An-12, Tu-134, Tu-154 and Il-76) |
| <b><i>Geographical coordinates:</i></b>         | Ширина: N-43° 41'45"<br><br>Дължина: E-26° 03' 29"<br><br>Altitude: 187 m   |
| <b><i>Terminals:</i></b>                        | 1 passenger   |



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

**Equipment:**

Reception building; drinking water supply; telephone lines with copper wires; fiber optic communication cable running 0.8 km from the airport; secured power supply; garage for aircraft service equipment; air traffic control tower.

Table 5. Technical data of Ruse Airport, Bulgaria

## 2.5. Analysis of the state of transport infrastructure

The potential of the cross-border region Bulgaria-Romania to become an eastern gateway to the European Union can be exploited by connecting this territory with European corridors, by developing river and maritime transport (providing connections with the Black Sea) and providing land transport infrastructure for all towns and villages. Also, there is a need to connect the designated third-tier transport nodes with the TEN-T network, as well as strengthen the available ones and create new intermodal nodes.

The accessibility to the settlements in the region of Giurgiu County, Ruse District and Borovo Municipality, in particular is determined both by their connectivity with the TEN-T corridors and by the continuity of the road transport network from the border to the interior. In this sense, the only counties that are connected to the national territory by high-speed roads (motorways) are: Giurgiu, Constanta and Calarasi, the latter having the largest motorway length: 104 km (2012). In the Bulgarian part of the cross-border region, the Hemus Motorway, which is under construction, is an important project with a strong limiting impact on connectivity and transport.

Land transport (road and rail) has the largest share in both countries both in the cross-border region and at national level. The series of common indicators regarding transport infrastructure reflects the fact that in both countries the development and modernisation of the transport sector is a priority.

### Road

In the crossborder region, the roads from the RPM are underdeveloped. Transport plays a key role in the development of any modern society, as a means of economic development and a precondition for achieving social and regional cohesion. The transport sector is of great importance for increasing the competitiveness of the national economy and for serving the population. The development of the transport sector is essential for the establishment of foreign trade relations and tourism.





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Forecasts for a significant increase in traffic on the main road transport directions can be achieved only with well-established transport infrastructure. It is therefore important to make the necessary connections both between different categories of roads and between different modes of transport. Particularly important is the qualitative improvement of the road running parallel to the Danube, connecting cities and ports. Creating the necessary prerequisites for the development of intermodality will directly contribute to better conditions for the complex use of the potential of the Danube for the development of the economy in coastal areas.

The effective and sustainable integration of the national road infrastructure into the European goals of increasing cohesion and improving the connections between the Republic of Bulgaria and the other EU member states, while at the same time posing new challenges in terms of its completion, maintenance and optimization, including the construction of new transport links (bridges over the Danube) between Bulgaria and Romania.

### *Water transport*

The density of existing port infrastructure is high and free port capacity is available. However, most of the ports were built at the beginning of the last century, which negatively affects their technical condition. The main problems for the development of ports are related to the lack of sufficient investment for maintenance and development of port infrastructure in previous years, obsolete basic mechanical and transshipment facilities, poor condition of the piers.

The trend of development of public ports is related to their concession and the liberalization of port services taking into account the needs for improvement of the technical conditions of port infrastructures and waters.

In recent years, modern logistics, navigation and information systems for the Danube River have been built, which contributes to improving navigation conditions and reducing the risk of accidents.

The main risks for navigation on the Danube are unsatisfactory parameters of the waterway, poor navigation conditions (fog, low water levels and other obstacles), non-compliance with navigation restrictions imposed due to low water standing or other reasons. The problems are related to erosion of banks and islands and entanglement of certain sections of the river, which leads to a decrease in depths. Improving the depth in critical sections will reduce the probability of occurrence of incidents of a similar nature. In these circumstances, it is necessary to take measures to improve the parameters of the waterway and the strengthening of coasts and islands accompanying this objective.

The existing hydrological and climatic conditions along the only inland waterway of the country – the Danube River require measures to improve navigation conditions and ensure a minimum depth of 2.5 m for all or most of the year required for ships up to 3,000 tons.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Ports have sufficient handling capacity for general, bulk and bulk cargo, container and Ro-Ro units. Currently, about 60% of the infrastructure capacity is used in the available congestion equipment. The weak points of ports are:

- The unsatisfactory condition of the port facilities (piers) and transshipment equipment that does not meet the current trends in the structure of the cargo turnover;
- The lack of proper equipment for grain processing and storage;
- The unsatisfactory condition of the connections with the road and railway infrastructure of the country;
- The shortage of modern logistics and information systems at the ports;
- Underdeveloped pollution control facilities.

#### *Rail*

The Bulgarian part of the cross-border region Borovo - Giurgiu is characterized by relatively high values of railway network density, compared to the average for Bulgaria.

According to the indicator "density of passenger stations" according to the territory, the leading place in the study area occupies the district of Ruse. This is also the case with the indicator "distribution of the number of passenger stations in relation to the population". The values of these indicators, in addition to being higher than the values for Giurgiu County, are also higher than the national average.

The existing restrictions on load gauge GB in the sections "Ruse - Gorna Oryahovitsa - Debeleets" on the 4th main railway line and in the railway junction "Gorna Oryahovitsa" create a prerequisite for the impossibility of transportation of some intermodal cargo units on these sections if such terminals are built.

Railway facilities (bridges and tunnels) have a high degree of depreciation, such as in the direction "Ruse - Varna". A large part of the insurance, telecommunication and power supply systems are obsolete (commissioned in the period 1965-1985) and at a technological level that does not meet the modern requirements for interoperability.

The main identified problems in the cross-border region Romania-Bulgaria are related to the development of railway transport:

- Unsatisfactory condition of the railway infrastructure and rolling stock, which is a prerequisite for the relatively low speed and level of service of passenger and freight transport;



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- Insufficient integration of the rail network into the European rail network and the need to adapt the technical characteristics of the main directions to the requirements of art. 39 of Regulation (EU) No 1315/2013;
- Lack of ubiquitously put into operation modern signaling and telecommunication systems - ERTMS system and GSM-R network to achieve interoperability in the direction of the core and extended trans-European rail network;
- Insufficient connections of sea and inland ports with the national railway network, insufficiently developed connections of sea and inland water ports and airports with the national railway network to achieve increased intermodality, insufficient infrastructure (bridges) for crossing the Danube.

The improvement of the technical and operational condition of the basic railway infrastructure will have a positive effect on the efficiency of transport and in the coming years is expected to contribute to the growth of domestic demand for passenger travel and freight transport by rail, as well as to the successful integration of the Bulgarian transport system into the European and the change in the distribution of international flows, passing through the country, by mode of transport in favour of sustainable rail transport. Through the modernisation and renewal of the railway infrastructure, European standards and full interoperability with the European rail network can be achieved. Due to the insufficient development of railway connections with neighboring countries, it is necessary to build continuous and consistent transport networks with the same performance characteristics, which will ensure fast and safe movement over longer distances from and through Bulgaria.

The Ruse-Giurgiu railway connection has potential for future development after a joint intention expressed at a meeting of the Bulgarian-Romanian Committee to carry out a study for the rehabilitation of the railway line "Bucharest - Giurgiu - Ruse - Gorna Oryahovitsa", and the discussions on planning and defining the technical parameters will continue in the future.

#### *Air transport*

The operating airports within the Romania-Bulgaria cross-border region are the international airports, of which two are in Romania (Craiova Airport and Mihail Kogălniceanu, Constanta) and one in Bulgaria (Gorna Oryahovitsa Airport). In the Bulgarian part of the cross-border region Romania-Bulgaria, the existing air transport infrastructure is not enough, but at the moment there is potential for development only at Gorna Oryahovitsa International Airport, Balchik Airport and Ruse Municipal Airport.

#### *Transport network available*



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ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

The available transport network does not provide sufficient connectivity between the two countries, nor does it provide easy access for border areas to the TEN-T corridors and the main national corridors.

It is necessary the cross-border connections between Bulgaria and Romania in the region of Giurgiu County and Ruse Region to be significantly improved. Preliminary studies have been carried out for the construction of new bridges over the Danube, feasibility projects to improve the condition of the railway and road infrastructure.

Priority directions should be:

- Construction of bridges over the Danube, as a priority is the construction of a third bridge on the Danube at Ruse-Giurgiu, as well as reconstruction of the existing bridge at Ruse - Giurgiu;
- Construction, reconstruction and modernization of ferry connections;
- Construction and reconstruction of the port infrastructure;
- Improving navigation on the Danube;
- Construction of "Danube Panoramic Road" - reconstruction and repair of parallel road sections from Vidin to Silistra (Bulgaria) and improvement of the infrastructure in the Romanian part of the road infrastructure;
- Construction of a cycle route and bike lanes along the coastline from Vidin to Silistra – Danube cycle path (part of the trans-European bicycle lane along the Danube).

The improved transport infrastructure will favour the development of agriculture, tourism, industrial production, trade and quick and easy access of people to the administrative centre of the area and municipalities.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Obviously, only with the funds allocated from the state budgets, the problems with the state of the road network cannot be solved. The opportunity is to implement joint Bulgarian-Romanian investment projects that improve the connectivity between the two countries.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

### 3. EXISTING TRAFFIC MANAGEMENT AND TRAFFIC SAFETY CONDITIONS

Road safety is measured by indicators of road accidents (crashes) and related causes and consequences. In EU countries, national statistical offices provide certain standardised information on road safety, which was used in the survey to analyse the situation at European level.

In 2019, the number of deaths across the EU decreased by 2%. In the 27 EU Member States, 22 800 road deaths were recorded. This is almost 7,000 fewer deaths than in 2010, a decrease of 23%. In 2018, the decline is again 2%. Although the underlying trend remains downward, most countries have seen a slowdown since 2013 and therefore the EU's target of halving the number of road deaths by 2020 (compared to the 2010 baseline) will not be met. However, 2020 may be different in this regard, as there are first indications that the number of road deaths is likely to fall significantly as a result of measures to tackle the coronavirus. However, this will not be enough to achieve. Although road safety in the EU has significantly improved in recent decades (and EU roads are the safest in the world), the number of deaths and injuries is still too high. That is why the EU has adopted the Vision Zero and Safe System approach to eliminate deaths and serious injuries on European roads by working closely on road safety with the authorities in its member states. The EU seeks to build on national initiatives, setting targets and addressing all factors that play a role in crashes (infrastructure, vehicle safety, driver behaviour, emergency response).

This is done by passing laws, supporting public education campaigns, helping member states and other road safety actors share relevant experiences and provide funding for this purpose.

In Romania, there is a longer statistical order of basic information on road accidents, killed and injured, their causes, etc. It starts from 1997-1999, while in Bulgaria such information has been published since 2006.

In Romania, road safety information at regional level covers only a few indicators – the number of crashes and road fatalities – the total, killed and injured. In Bulgaria, these indicators are more and besides those indicated for Romania they also contain data on the number of victims at municipal level, distribution of road accidents at district level by settlements, types of settlements – cities and villages, outside settlements, months and days of the week, etc., and of the victims by age structure, by day of the week, etc.

However, it should be borne in mind that the scales in the two countries of the TPR are different. In 2017, the population in the eight districts of Bulgaria was 1,376,170 people, while in Romania the seven regions of the TGC had a population of 3161902, which is about 2.5 times more. In addition, the share in the national level is different.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Unlike most European countries, neither Bulgaria nor Romania is geocoding of road accidents. This means that the coordinates of the crash are not recorded, but only the road section on which it happened is indicated. This makes the analysis of the relationship between traffic structure and intensity on the one hand and the frequency and extent of damage - on the other if not impossible, then at least very difficult.

According to the National Strategy for Improving Road Traffic Safety of the Republic of Bulgaria for the period 2011 - 2020: "The safety of the transport system is a function of the responsible behavior of road users, combined with the expert qualities and diligence of the designers and engineers of the road infrastructure, the safety of the vehicle fleet, the quality of pre-medical and specialized medical care

Safe participation in the movement is the joint responsibility of its creators, organizers and users. Road safety policy should also be implemented through sectors such as energy, environment, health, science and education, new technologies, insurance, trade, etc. Shared responsibility requires concrete actions by state institutions, regional and municipal authorities, non-governmental organizations, the private sector and civil society.

| Година                     | 2010      | 2011      | 2012      | 2013      | 2014      | 2015      | 2016      | 2017      | 2018      |
|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>България, население</b> | 7 504 868 | 7 327 224 | 7 284 552 | 7 245 677 | 7 202 198 | 7 153 784 | 7 101 859 | 7 050 034 | 7 000 039 |
| ПТП                        | 6 609     | 6 639     | 6 717     | 7 015     | 7 018     | 7 225     | 7 015     | 6 888     | 6 684     |
| Убити                      | 776       | 657       | 601       | 601       | 661       | 708       | 708       | 682       | 611       |
| Ранени                     | 8 078     | 8 301     | 8 193     | 8 775     | 8 639     | 8 971     | 8 552     | 8 680     | 8 466     |

|                               |         |         |         |         |         |         |         |         |         |
|-------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| <b>Област Русе, население</b> | 246 670 | 233 767 | 231 580 | 229 784 | 227 685 | 225 674 | 223 489 | 221 336 | 218 556 |
| ПТП                           | 292     | 330     | 330     | 371     | 357     | 422     | 403     | 512     | 330     |
| Убити                         | 30      | 28      | 13      | 29      | 28      | 26      | 29      | 17      | 15      |
| Ранени                        | 355     | 410     | 437     | 479     | 464     | 505     | 511     | 438     | 419     |

|                           |       |       |        |       |       |       |       |        |        |
|---------------------------|-------|-------|--------|-------|-------|-------|-------|--------|--------|
| <b>Отношение Б-я/Русе</b> |       |       |        |       |       |       |       |        |        |
| ПТП България/Русе         | 25,61 | 35,82 | 35,29  | 40,04 | 37,85 | 45,99 | 45,22 | 57,76  | 36,76  |
| Убити България/Русе       | 14,98 | 25,14 | -46,97 | 34,28 | 25,37 | 14,10 | 23,17 | -25,95 | -27,18 |
| Ранени България/Русе      | 25,21 | 35,41 | 40,40  | 41,90 | 41,14 | 43,96 | 47,33 | 37,78  | 36,91  |

Table 6. Relative share of the cross-border area (Ruse district) in the road traffic accident of Bulgaria, in percentage

Given the high share of people killed in road accidents in the cross-border area, a special analysis has been made on this indicator, with the number of people killed being attributed to 1 million. e. The dynamics of this indicator show that there is a deterioration. While in the first years of the period the distribution of districts in the cross-border area was equal for the national average, at the end of the period Ruse District was below the national average.





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

As seen from Table 6. Ruse District had a much higher percentage of road accidents, killed and injured compared to the national average almost all years. However, it should be noted that in 2017 and 2018 there was a trend in a significant decrease in the number of deaths compared to the national average. This is most likely due to the measures taken by the institutions regarding intensive transit traffic and local high-risk locations, such as the roundabout of the town of Borovo, for example.

On the following table it can be noticed that apart from Greece (which has made significant progress in the last few years), Bulgaria and Romania are the countries with a much higher number of people killed in road accidents per million inhabitants, which is a really worrying statistic:

| State          | 2010 | 2015 | 2016 | 15/16 | 10/16 |
|----------------|------|------|------|-------|-------|
| Belgium        | 77   | 65   | 56   | -13%  | -24%  |
| Bulgaria       | 105  | 98   | 99   | 0%    | -9%   |
| Czech Republic | 77   | 70   | 59   | -16%  | -23%  |
| Denmark        | 46   | 31   | 37   | 18%   | -18%  |
| Germany        | 45   | 43   | 39   | -7%   | -12%  |
| Estonia        | 59   | 51   | 54   | 6%    | -10%  |
| Ireland        | 47   | 36   | 40   | 13%   | -11%  |
| Greece         | 112  | 73   | 75   | 2%    | -35%  |
| Spain          | 53   | 36   | 37   | 2%    | -31%  |
| France         | 64   | 54   | 54   | 0%    | -13%  |
| Croatia        | 99   | 82   | 73   | -12%  | -28%  |
| Italy          | 70   | 56   | 54   | -5%   | -21%  |
| Cyprus         | 73   | 67   | 54   | *     | -23%  |
| Latvia         | 103  | 95   | 80   | -16%  | -28%  |
| Lithuania      | 95   | 83   | 65   | -22%  | -37%  |
| Luxembourg     | 64   | 64   | 52   | *     | -6%   |
| Hungary        | 74   | 65   | 62   | -6%   | -18%  |
| Malta          | 36   | 26   | 51   | *     | 69%   |
| Netherlands    | 32   | 31   | 33   | 4%    | 3%    |
| Austria        | 66   | 56   | 49   | -11%  | -23%  |
| Poland         | 102  | 77   | 79   | 2%    | -23%  |
| Portugal       | 80   | 57   | 54   | -10%  | -40%  |
| Romania        | 117  | 95   | 97   | 1%    | -19%  |
| Slovenia       | 67   | 58   | 63   | 8%    | -6%   |
| Slovakia       | 65   | 57   | 50   | -12%  | -22%  |
| Finland        | 51   | 49   | 45   | -6%   | -8%   |
| Sweden         | 28   | 27   | 27   | 2%    | -1%   |



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

|                   |           |             |           |            |             |
|-------------------|-----------|-------------|-----------|------------|-------------|
| United Kingdom    | 30        | 28          | 28        | 1%         | -4%         |
| <b>EU average</b> | <b>63</b> | <b>51,5</b> | <b>50</b> | <b>-2%</b> | <b>-19%</b> |

Table 7. Crash deaths per million inhabitants for the European Union in 2016

The situation is similar in Giurgiu County, which is located near the most affected in this respect Ilfov County, where the capital of Romania – Bucharest is located.

### 3.1. Analysis of traffic safety on road infrastructure in the cross-border area - Bulgaria

In order to compare the situation with the Borovo-Giurgiu region, an analysis of the entire cross-border area with Romania covering the administrative areas bordering the Republic of Romania is made for some indicators. This is a better way to see the trends and problems in terms of traffic safety and road infrastructure, both in the region as a whole and in Ruse District, where Borovo Municipality falls. Only in this way can a well-founded assessment be made of where the Municipality of Borovo and Giurgiu County are located according to the road safety indicators as part of the cross-border area.

In terms of road accidents with casualties, the trend for the cross-border area is to reduce their total number in 2017, 2018 and 2019. While at the beginning of the period the average for the region was 193, in 2017 they were 165, for the 11 months of 2018 – 154, and on average for the period in the entire cross-border area – 166. For the municipality of Borovo, these figures are, respectively: 28 people for 2015, 24 for 2016, 21 for 2017, 18 for 2018 and 22 for 2019. With the exception of two districts – Montana and Silistra, all other districts have a decrease in the number of accidents with casualties at the end of the period compared to its beginning. The trend is alarming in Montana District, where from 68 crashes with casualties in 2006 they reached 132 in 2017 and 127 in the first 11 months of 2018. These crashes in the district increased particularly sharply after 2015. Although less - from 92 in 2006 to 107 in 2017 and 99 in the first 11 months of 2018, these accidents are also increasing in the Silistra region.

The dynamics of this indicator for the cross-border area, and in particular for the municipality of Borovo, can be divided into three subperiods. From 2006 to 2011, the trend is towards a steady decrease in the number of accidents with casualties, and after this year there is a stabilization within 20-30 crashes on average, per year.

The number of people killed in road accidents in the cross-border area is also decreasing. In 2006, this number was 254, while in 2017 it was 166, and in the first 11 months of 2018 it was 136 people. The best in this indicator is the condition in the district of Vidin, with an average number of people killed for the period – 12 people. In 2017, this district achieved the lowest value for all districts – 6 people. Montana districts with 15 people. average for the period and Silistra



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

with 18 people per year are also among the districts with the best values. At the other end are the districts of Pleven and Ruse – with an average value of 28 people per year. Above the average for the cross-border area of 21 killed per year for the period are the districts of Dobrich and Veliko Tarnovo – with 25 people, Vratsa – with 24 people.

In the municipality of Borovo, these figures are 1 victim in 2015 and two victims in 2017, and in other years only accidents with injured and material damage were registered.

Unlike previous indicators, the dynamics of the number of slightly injured in road accidents is relatively stable during the period. From an average per year of the district of 166 slightly injured in 2006, this number increased slightly in 2017 to 171 people. The total number of slightly injured people in the cross-border area decreased from 1,497 people at the beginning of the period to 1,443 people in 2017. For the municipality of Borovo they are within about 20 people per year.

The distribution on this indicator by districts is as follows. The lowest number of injured in road accidents is on average for the period in the districts of Vidin - 46 people per year, Montana - 52 people and Silistra - 81 people. At the other end is the district of Ruse - with 345 people per year, the district of Pleven - with 247 people and the district of Veliko Tarnovo - with 193 people. Close to the average for the cross-border area is the district of Dobrich - with 151 people, while the district of Vratsa has lower values than 129 people on average per year.

The trend for the entire cross-border area under this indicator is one of persistence with a small fluctuation around the average of 149 people slightly injured per year. The statistics on the number of seriously injured in road accidents in the cross-border area are positive. Their number decreased from 729 in 2006 to 422 in 2017, with the exception of 2016, when this number reached 576 people. Similar is the state by average. While at the beginning of the period there were 81 people seriously injured in road accidents in one district per year, in 2017 they were 47 people. The districts of Vidin – with 33 percentage points on average for the period and 14 seriously injured in 2017, Silistra – with 31 people on average for the period and 26 people in 2017, Montana – 40 people on average for the period and 37 people in 2017, Dobrich – 49 people on average for the period and 26 people in 2017. The district of Ruse stands out with the worst values with an average of 126 people per year (Borovo municipality participates in this statistic with 17 people per year) seriously injured for the period and 136 people in 2017. There, the number of seriously injured in road accidents per year for the period is 85 people, but only 46 people were injured in 2017.

Based on a summary of available information by districts, a summary of the share of the cross-border area in the number of people killed in road accidents with different vehicles at national level is made (Table 8).

The most serious condition is in cyclists. The cross-border area has a share in the national level from 23% in 2013 and 2016 to 53% in 2011. Here the level of annual values is in the range of 30-40% with some exceptions.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Between 18 and 27% is the contribution of the cross-border area to those killed in car accidents. Close to the share of the population is the contribution of the cross-border area to those killed by motorcycle. It is about 20-22% for the period. The lowest is the participation in the number of people killed in bus accidents, which is within 2 people for the entire periodus.

|  | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|--|------|------|------|------|------|------|------|------|------|------|------|
| killed in a car crash                      | 20%  | 18%  | 27%  | 26%  | 27%  | 24%  | 22%  | 23%  | 25%  | 27%  | 22%  |
| killed in a truck crash                    | 40%  | 25%  | 17%  | 24%  | 23%  | 14%  | 47%  | 44%  | 21%  | 6%   | 33%  |
| killed in a bus crash                      | 25%  | 0%   | 0%   | -    | -    | 100% | 0%   | 0%   | -    | 0%   | 0%   |
| killed in a motorcycle accident            | 17%  | 21%  | 16%  | x    | 17%  | 20%  | 17%  | 27%  | 9%   | 22%  | 15%  |
| killed in a bicycle accident               | 33%  | 31%  | 38%  | x    | 53%  | 39%  | 23%  | 48%  | 29%  | 23%  | 36%  |
| killed in an accident with another vehicle | 36%  | 14%  | 33%  | X    | 57%  | 21%  | 50%  | 50%  | 0%   | 63%  | 14%  |

Table 8. Share of people killed in the cross-border area in accidents with different vehicles at national level

The number of people killed in a car crash is the highest of all other vehicles. With the exception of Vidin District, where the number of people killed in car crashes varies between 2 and 6 people, with an average value for the period of 3 people during the analyzed period, the level in the other districts of the cross-border area is much higher. In the lowest group are the districts of Montana, Silistra and Vratsa with respectively an average value for the period of 5, 6 and 7 people.

The highest number of people killed on average for the period in a car crash is in the districts of Ruse and Veliko Tarnovo - 9 people, and Dobrich and Pleven with 10 people each. A total of 66 people lose their lives on an annual basis for the entire cross-border area in this way 66 people lose their lives. The dynamics of this indicator in 2007-2017 are relatively stable and fluctuate in the range between 48 and 87 people.

The number of victims in truck accidents is significantly less than in passenger cars. On average, 5 lives are lost per year in the cross-border area. The distribution on this indicator by districts is quite even. On average, for the period per year, we are talking about 1 or 2 people per district. Such are the annual values by districts, with the exception of Veliko Tarnovo District in 2008, when this value was 3 people.

More serious than the victims of trucks is the condition of a motorcycle accident. On an annual average for the entire cross-border area, 8 lives are lost in this way (Table 9). The distribution of victims by districts is even, with most of them



registering an average of 1 victim per year, with the exception of Pleven District, where the average level is 2 people and Silistra District with an average level of 0 people. In two periods – 2009-2011 and 2015 and 2016, there is a small improvement in the results of this indicator. while in the other years of the period, they deteriorate.

|                         | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Average over the period |
|-------------------------|------|------|------|------|------|------|------|------|------|------|------|-------------------------|
| Veliko Tarnovo          | 2    | 2    | 0    |      | 1    | 0    | 3    | 2    | 0    | 2    | 1    | 1                       |
| Vidin                   | 1    | 0    | 3    |      | 1    | 0    | 0    | 2    | 0    | 1    | 1    | 1                       |
| Vratsa                  | 1    | 5    | 1    |      | 0    | 0    | 2    | 0    | 2    | 2    | -    | 1                       |
| Dobrich                 | 1    | 2    | 1    |      | 1    | 1    | 1    | 0    | 1    | 1    | 2    | 1                       |
| Montana                 | 0    | 0    | 0    | 0    | 0    | 2    | 1    | 2    | 0    | 0    | 1    | 1                       |
| Pleven                  | 1    | 2    | 1    |      | 1    | 4    | 1    | 3    | 0    | 2    | 0    | 2                       |
| Ruse                    | 1    | 1    | 1    |      | 1    | 0    | 0    | 3    | 1    | 1    | -    | 1                       |
| Silistra                | 0    | 1    | 0    | 0    | 0    | 2    | 0    | 0    | 0    | 0    | 1    | 0                       |
| Total cross-border area | 8    | 14   | 7    | 0    | 5    | 10   | 11   | 12   | 4    | 9    | 6    | 8                       |

Table 9. Number of people killed by districts of the cross-border area in motorcycle accidents Source: NSI.

Statistics of bicycle fatalities show that on average 10 lives are lost per year in the cross-border area (Table 10). On average, this is 1-2 people per year. The positive in these statistics is the tendency to reduce the number of people killed in bicycle accidents, as from 16 people at the beginning of the period, they drop to 8 people – at the end of it. This dynamic copies the national level, so that the share of deaths from the cross-border area compared to the national level remains at the beginning and end of the period – 35-36%.

|                | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Medium |
|----------------|------|------|------|------|------|------|------|------|------|------|------|--------|
| Veliko Tarnovo | 3    | 2    | 1    | X    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 1      |
| Vidin          | 4    | 0    | 1    | X    | 2    | 1    | 3    | 3    | 1    | 2    | 0    | 2      |
| Vratsa         | 1    | 0    | 1    | X    | 1    | 2    | 0    | 2    | 0    | 2    | 3    | 1      |
| Dobrich        | 2    | 3    | 1    | X    | 0    | 1    | 0    | 3    | 3    | 0    | 1    | 1      |
| Montana        | 2    | 0    | 1    | X    | 1    | 0    | 0    | 1    | 2    | 0    | 1    | 1      |
| Pleven         | 1    | 3    | 2    | X    | 1    | 2    | 1    | 1    | 0    | 2    | 2    | 2      |
| Ruse           | 2    | 1    | 2    | X    | 4    | 4    | 1    | 3    | 0    | 2    | 0    | 2      |
| Silistra       | 1    | 2    | 2    | X    | 0    | 2    | 1    | 1    | 2    | -    | 1    | 1      |



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



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|---------------|--------------|----|----|----|---|---|----|---|----|---|---|---|----|
| Total<br>area | cross-border | 16 | 11 | 11 | x | 9 | 12 | 7 | 14 | 8 | 8 | 8 | 10 |
|---------------|--------------|----|----|----|---|---|----|---|----|---|---|---|----|

Table10. Number of people killed by districts of the cross-border area in a bicycle accident

The statistics of those killed in road accidents with another vehicle deserve attention, not so much for their scale as for their share at national level. On average, 2.4 lives per year are lost in the cross-border area (Table 6). For the entire period, 4 people have died in such accidents in the districts of Veliko Tarnovo, Montana and Silistra. Only 1 hour died during the period in the district of Dobrich and two in the region of Ruse. Three dead were registered in the districts of Vidin, Vratsa and Plevna.

|                                 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Общо |
|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Общо за страната                | 11   | 7    | 9    | x    | 7    | 14   | 4    | 2    | 6    | 8    | 7    | 75   |
| Велико Търново                  | 2    | 0    | 1    | x    | 0    | 0    | 0    | 0    | 0    | 1    | 0    | 4    |
| Видин                           | 0    | 0    | 1    | x    | 1    | 0    | 0    | 0    | 0    | 1    | 0    | 3    |
| Враца                           | 1    | 0    | 0    | x    | 1    | 0    | 0    | 0    | 0    | 1    | 0    | 3    |
| Добрич                          | 0    | 0    | 0    | x    | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 1    |
| Монтана                         | 0    | 0    | 1    | x    | 0    | 1    | 1    | 1    | 0    | 0    | 0    | 4    |
| Плевен                          | 0    | 0    | 0    | x    | 2    | 0    | 1    | 0    | 0    | 0    | 0    | 3    |
| Русе                            | 0    | 0    | 0    | x    | 0    | 1    | 0    | 0    | 0    | 1    | 0    | 2    |
| Силистра                        | 1    | 1    | 0    | x    | 0    | 1    | 0    | 0    | 0    | 1    | 0    | 4    |
| Общо<br>трансграничния<br>район | 4    | 1    | 3    | x    | 4    | 3    | 2    | 1    | 0    | 5    | 1    | 24   |
| в % към страната                | 36%  | 14%  | 33%  | x    | 57%  | 21%  | 50%  | 50%  | 0%   | 63%  | 14%  | 32%  |

Table11. Number of people killed by area of the cross-border area in case of accidents with another vehicle

Another distribution monitored by the statistics is by place of road accidents. We will also look at the statistics of those killed inside and outside the settlements by districts of the cross-border area. As a share of accidents and killed locally at national level, the cross-border area has a lower share than its population only in the indicator road accidents in settlements. The values for this indicator are in the order of 17-19%, which is lower than the share of the population in the total population in the country (Table 11). Accidents outside populated areas fluctuate between 20-24%.

The highest share of the cross-border area is among those killed in settlements, reaching 28% in 2017. The share of accidents outside settlements is also high. Its values range between 17-27% during the period.

Problematic is the increase in the relative shares in road accidents outside settlements and in those killed in settlements at the end compared to the beginning of the period.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

|                                   | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Accidents in populated areas      | 19%  | 19%  | 19%  | 17%  | 17%  | 17%  | 17%  | 16%  | 19%  | 19%  | 18%  |
| Accidents outside populated areas | 22%  | 21%  | 22%  | 21%  | 21%  | 22%  | 20%  | 21%  | 25%  | 23%  | 24%  |
| Killed in settlements             | 19%  | 20%  | 21%  | 20%  | 24%  | 21%  | 23%  | 23%  | 19%  | 23%  | 28%  |
| Killed outside populated areas    | 23%  | 17%  | 24%  | 25%  | 26%  | 23%  | 23%  | 26%  | 23%  | 27%  | 20%  |

Table 12. Share of road accidents and deaths in populated and non-populated areas in the cross-border area at national level

By the number of accidents in settlements, the "leader" in the cross-border area is Ruse District with an average of 261 for the period compared to a total of 108 cases per year for the cross-border area. The second place is also unconditionally occupied by the district of Pleven with an average of 167 cases per year. About 100 accidents in settlements occur on average per year in the districts of Veliko Tarnovo, Dobrich and Vratsa. In the other districts, the average level is between 41 for Vidin District and 52 crashes for Silistra District. The general trend is towards a continuous decrease in the number of accidents in the settlements of the cross-border area, with the exception of 2015 and 2016, when they are rising.

In case of accidents outside populated areas, the first place is also occupied by Ruse District, but with an average of 107 cases per year. V. Tarnovo ranked second in this indicator with 86 cases, while Pleven District ranked third with 81 road accidents. The districts of Vidin with an average of 30 cases per year, Montana – 37 and Silistra – 45 are the most successful in road accidents outside settlements. The other districts have between 53 (Vratsa district) and 66 (Dobrich district) accidents outside the settlements per year.

The trend on this indicator during the period under study can be divided into two subperiods. In 2007-2013, there was a decrease in road accidents, while after that they rose sharply to 631 crashes in 2017 with a starting value of 608 crashes.

The average number of people killed in road accidents in settlements in the cross-border area is 66 people per year. Most often this happens in the districts of Ruse – 12 people and Vratsa – 11 d, followed by Ruse – 9 people and Dobrich – 8 people per year. The least accumulation of this indicator is in the district of Vidin – 4 people on average per year and Silistra – 5 people. The other two districts – Veliko Tarnovo and Montana occupy an average position with 7 people and 6 people respectively. The trend for The cross-border area is towards a reduction in casualties in settlements, but slower than the contraction at national level.





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Outside populated areas, most of the victims of accidents occur. On average, for the cross-border area this is 126 people on average per year, which is nearly twice as many as those killed in settlements. Four districts – Pleven, Veliko Tarnovo, Ruse and Dobrich – have an average of 17-18 victims per year. The next places are occupied by the districts of Silistra - 13 people, Vratsa - 11 people and Montana - 9 people.

The general trend for the cross-border area is to reduce the number of victims of accidents outside the settlements, so that from 143 people at the beginning of the period, they become 108 people at the end of the period.

In cities, the share of accidents and victims in the cross-border area at national level is equivalent to the size of the cross-border area and is in the range of 15-21%. This is not the case with these indicators the cross-border area in the villages. In terms of crashes, their share varies between 24-33% in different years of the observed period. The situation is even worse for the victims on the road. For example, in 2017, they accounted for 55% of all victims in the country. The average level for the period is 36% and the minimum contribution is in 2011 within 21%.

Six months of the year - from May to October accumulate the highest number of accidents in the cross-border area (Table 13). Their number fluctuates between 124 and 147 pcs. Monthly. At national level, this period was increased by one month at the beginning and two months at the end of the period.

The share of the cross-border area in road accidents by month corresponds in general terms to its scale. Peaks by month in the cross-border area are repeated in all its areas.

|                           | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Средно за периода |
|---------------------------|------|------|------|------|------|------|------|------|------|------|------|-------------------|
| Общо                      | 16%  | 13%  | 11%  | 14%  | 9%   | 11%  | 10%  | 10%  | 9%   | 9%   | 8%   | 11%               |
| В. Търново                | 12%  | 17%  | 13%  | 22%  | 17%  | 7%   | 40%  | 13%  | 7%   | 20%  | 22%  | 16%               |
| Видин                     | 25%  | 17%  | 8%   | 17%  | 40%  | 20%  | 22%  | 27%  | 0%   | 22%  | 0%   | 18%               |
| Враца                     | 37%  | 26%  | 15%  | 7%   | 5%   | 18%  | 34%  | 22%  | 9%   | 10%  | 0%   | 16%               |
| Добрич                    | 15%  | 13%  | 14%  | 15%  | 0%   | 0%   | 0%   | 12%  | 13%  | 14%  | 12%  | 11%               |
| Монтана                   | 9%   | 20%  | 0%   | 75%  | 17%  | 17%  | 10%  | 7%   | 36%  | 0%   | 30%  | 16%               |
| Плевен                    | 8%   | 19%  | 14%  | 16%  | 10%  | 15%  | 19%  | 21%  | 3%   | 29%  | 19%  | 15%               |
| Русе                      | 7%   | 10%  | 3%   | 6%   | 20%  | 5%   | 0%   | 0%   | 5%   | 10%  | 5%   | 7%                |
| Силистра                  | 11%  | 5%   | 44%  | 30%  | 15%  | 13%  | 11%  | 8%   | 5%   | 4%   | 21%  | 13%               |
| Общо трансграничния район | 14%  | 16%  | 12%  | 15%  | 12%  | 13%  | 18%  | 16%  | 9%   | 13%  | 14%  | 14%               |

TABLE 13. ROAD ACCIDENTS BY MONTH AND DISTRICT FOR THE PERIOD 2007-2017

The highest number of victims from road accidents in the cross-border area occurs during the summer months – from July to September (Table 14). A total of 17 to 21 lives are lost per month. In terms of comparison with national level, the highest share of the cross-border area is in September – 27%, February – 26% and October – 25%.



|                                | I        | II        | III       | IV        | In        | WE        | VII       | VIII      | IX        | X         | XI        | XII       |
|--------------------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Total</b>                   | 45       | 44        | 50        | 57        | 63        | 54        | 80        | 78        | 75        | 70        | 65        | 57        |
| Veliko Tarnovo                 | 2        | 2         | 2         | 2         | 2         | 1         | 3         | 2         | 4         | 3         | 1         | 2         |
| Vidin                          | 0        | 1         | 1         | 1         | 1         | 1         | 2         | 1         | 1         | 1         | 1         | 1         |
| Vratsa                         | 1        | 1         | 1         | 2         | 2         | 3         | 2         | 2         | 3         | 2         | 2         | 2         |
| Dobrich                        | 1        | 2         | 1         | 2         | 1         | 1         | 3         | 2         | 4         | 3         | 2         | 2         |
| Montana                        | 0        | 1         | 1         | 1         | 1         | 1         | 1         | 2         | 1         | 2         | 2         | 1         |
| Pleven                         | 2        | 2         | 2         | 1         | 2         | 1         | 3         | 3         | 4         | 3         | 2         | 2         |
| <b>Ruse</b>                    | <b>2</b> | <b>1</b>  | <b>2</b>  | <b>1</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>4</b>  | <b>2</b>  | <b>2</b>  |
| Silistra                       | 1        | 1         | 1         | 1         | 1         | 2         | 3         | 3         | 2         | 1         | 1         | 1         |
| <b>Total cross-border area</b> | <b>9</b> | <b>11</b> | <b>10</b> | <b>10</b> | <b>13</b> | <b>12</b> | <b>19</b> | <b>17</b> | <b>21</b> | <b>18</b> | <b>14</b> | <b>13</b> |
| in % to country                | 21%      | 26%       | 20%       | 18%       | 20%       | 22%       | 23%       | 22%       | 27%       | 25%       | 22%       | 22%       |

Table14. Number of people killed in road accidents by month and district

The age structure of the accident victims is presented in Table 15. The share of the cross-border area is high in all age groups except children from 6 to 9 years old. Compared to the national level, this share is in the order of 23%, which is more than the share of the cross-border area in the country by population. This share is particularly high – 24% of the economically active population in the range of 25 years to 64 years.

|                           | I   | II  | III | IV  | V   | VI  | VII | VIII | IX  | X   | XI  | XII |
|---------------------------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|
| Общо                      | 45  | 44  | 50  | 57  | 63  | 54  | 80  | 78   | 75  | 70  | 65  | 57  |
| Велико Търново            | 2   | 2   | 2   | 2   | 2   | 1   | 3   | 2    | 4   | 3   | 1   | 2   |
| Видин                     | 0   | 1   | 1   | 1   | 1   | 1   | 2   | 1    | 1   | 1   | 1   | 1   |
| Враца                     | 1   | 1   | 1   | 2   | 2   | 3   | 2   | 2    | 3   | 2   | 2   | 2   |
| Добрич                    | 1   | 2   | 1   | 2   | 1   | 1   | 3   | 2    | 4   | 3   | 2   | 2   |
| Монтана                   | 0   | 1   | 1   | 1   | 1   | 1   | 1   | 2    | 1   | 2   | 2   | 1   |
| Плевен                    | 2   | 2   | 2   | 1   | 2   | 1   | 3   | 3    | 4   | 3   | 2   | 2   |
| Русе                      | 2   | 1   | 2   | 1   | 2   | 2   | 2   | 2    | 2   | 4   | 2   | 2   |
| Силистра                  | 1   | 1   | 1   | 1   | 1   | 2   | 3   | 3    | 2   | 1   | 1   | 1   |
| Общо трансграничния район | 9   | 11  | 10  | 10  | 13  | 12  | 19  | 17   | 21  | 18  | 14  | 13  |
| в % към страната          | 21% | 26% | 20% | 18% | 20% | 22% | 23% | 22%  | 27% | 25% | 22% | 22% |

TABLE15. NUMBER OF PEOPLE KILLED IN ROAD ACCIDENTS BY DISTRICT AND AGE IN 2007-2017

On Fridays, as well as on weekends, the most casualties occur – 27-29 people in the cross-border area within a year (Table16). On Wednesday, the share of the cross-border area in the national statistics on this indicator was the highest – 24%.

|                  | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Week |
|------------------|--------|---------|-----------|----------|--------|----------|------|
| National average | 104    | 93      | 90        | 99       | 122    | 127      | 126  |



|                                   |     |     |     |     |     |     |     |
|-----------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Veliko Tarnovo                    | 4   | 3   | 3   | 3   | 4   | 3   | 5   |
| Vidin                             | 2   | 2   | 1   | 2   | 3   | 3   | 2   |
| Vratsa                            | 3   | 4   | 4   | 3   | 3   | 4   | 4   |
| Dobrich                           | 3   | 4   | 4   | 2   | 5   | 4   | 4   |
| Montana                           | 2   | 3   | 3   | 2   | 2   | 3   | 3   |
| Pleven                            | 5   | 3   | 4   | 4   | 5   | 5   | 5   |
| Ruse                              | 4   | 4   | 4   | 3   | 4   | 5   | 5   |
| Silistra                          | 3   | 3   | 2   | 3   | 3   | 3   | 3   |
| Average for the cross-border area | 24  | 22  | 21  | 21  | 28  | 29  | 27  |
| in % to country                   | 23% | 23% | 24% | 21% | 23% | 23% | 21% |

Table16. Number of killed, broken down by days of the week and districts, average over the period

The distribution of road accidents, deaths and injuries by municipalities in 2017 is presented in Table 17. It is typical that the regional centers concentrate most of these events, with some exception of the municipality of Dobrich. The reason for this is that it is the only one in the cross-border area, which includes only the town of Dobrich, but not the neighboring villages. If you add to it the data for the municipality of Dobrich-rural the differences in concentration will disappear.

The second feature of these distributions is that there is a high concentration of road accidents, dead and injured in the municipalities through which busy roads pass. In this way, drivers and PTS road accidents and accompanying problems are brought by external to the municipality.

The main causes of crashes are extremely concentrated around various driver errors of the vehicles (Table 17). Their share is about 95-96% of all causes of accidents in 2016-2017. Other reasons beyond those listed in the table contribute to about 2-3% of road accidents, and pedestrian violations - about 1-1.5%.

|                             | 2016 |      |      |      |         |      | 2017 |      |      |      |         |      |
|-----------------------------|------|------|------|------|---------|------|------|------|------|------|---------|------|
|                             | PTP  |      | Died |      | Injured |      | PTP  |      | Died |      | Injured |      |
|                             | Pc.  | %    | Pc.  | %    | Pc.     | %    | Pc.  | %    | Pc.  | %    | Pc.     | %    |
| Total                       | 7404 | 100  | 708  | 100  | 9374    | 100  | 6888 | 100  | 682  | 100  | 8680    | 100  |
| Wrong actions of the driver | 7166 | 96.7 | 672  | 94.9 | 9117    | 97.3 | 6548 | 95.1 | 629  | 92.2 | 8322    | 95.8 |
| Pedestrian Violation        | 82   | 1.1  | 7    | 1    | 77      | 0.8  | 102  | 1.5  | 18   | 2.6  | 87      | 1    |
| Violation of the passenger  | 4    | 0.1  | -    | -    | 4       | 0    | 4    | 0.1  | 1    | 0.1  | 3       | 0    |
| Degraded road conditions    | 6    | 0.1  | -    | -    | 6       | 0.1  | 33   | 0.5  | 2    | 0.3  | 40      | 0.5  |
| Technical failure           | 9    | 0.1  | -    | -    | 10      | 0.1  | 5    | 0.1  | -    | -    | 6       | 0.1  |
| Another reason              | 137  | 1.9  | 29   | 4.1  | 160     | 1.7  | 196  | 2.7  | 32   | 4.8  | 222     | 2.6  |

Table17. Main causes of crashes in 2016-2017



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
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The main violations of drivers are systematized in the following table. Previously, two of the concepts used in it must be defined. A first driver is a driver whose violation is considered to be the main one for the occurrence of a traffic accident. A first offence is an offence which is considered to be the main cause of the occurrence of a traffic accident. Excessive and inappropriate speed leads to nearly a third of the crash, 40% of the victims and 30% of the injured (Table 18). Improper maneuvers contribute to nearly 20% of road accidents, 15% of the dead and 20% of the injured on the road. Taking away pedestrian advantages and another advantage are the next risk factor, generating 13 and 14% of crashes, 7 and 5% of loss of life and 10 and 15% of injured, respectively. Entering oncoming traffic causes nearly 5% of road accidents, 16% of casualties and 7% of injuries in the country.

The following table shows the most common type of crashes, which are also the most dangerous (Table 18). Hitting a pedestrian is the most common accident on the road and is typical for nearly 27% of accidents in 2017, resulting in 23% of life losses and 20% of injured. Head-on collisions between vehicles cause 7% of crashes, but lead to 21% of the victims and 1% of the injured in 2017. They concentrate nearly 7% of road accidents, 7% of victims and injured. Bumping into a tree, though not as common as a crash count, is very deadly. It resulted in 12% of road casualties and 5% of the injured.

| Type of accidents                    | Accidents |      | Died  |      | Injured |      |
|--------------------------------------|-----------|------|-------|------|---------|------|
|                                      | count     | %    | count | %    | count   | %    |
| Bumping a pedestrian                 | 1847      | 26.8 | 157   | 23   | 1801    | 20.7 |
| Bumping a cyclist                    | 304       | 4.4  | 22    | 3.2  | 293     | 3.4  |
| Rollover of vehicles off roadway     | 472       | 6.9  | 44    | 6.5  | 629     | 7.2  |
| Bumping into a roadside facility     | 228       | 3.3  | 23    | 3.4  | 271     | 3.1  |
| Bumping into a tree                  | 359       | 5.2  | 79    | 11.6 | 452     | 5.2  |
| Collision between vehicles obliquely | 425       | 6.2  | 24    | 3.5  | 671     | 7.7  |
| Collision between vehicles head-on   | 485       | 7    | 146   | 21.4 | 914     | 10.5 |
| A Friend of the View                 | 418       | 6.1  | 33    | 4.8  | 530     | 6.1  |

Table 18. Road accidents killed and injured in 2017 by type of accident

The highest number of accidents killed and injured occurred on the first-class, second- and third-class roads of the country (Table 19). Conversely, at least these events are on motorways. The least used roads such as forestry, agricultural and off-road roads do not generate accidents in practice.

On municipal roads outside the settlements, about 13-15% of the accidents and 10-12% of the road deaths are registered.



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|                  | 2016  |      |       |      |         |      | 2017  |      |       |      |         |      |
|------------------|-------|------|-------|------|---------|------|-------|------|-------|------|---------|------|
|                  | PTP   |      | Died  |      | Injured |      | PTP   |      | Died  |      | Injured |      |
|                  | count | %    | count | %    | count   | %    | count | %    | count | %    | count   | %    |
| Total            | 2603  | 100  | 470   | 100  | 3719    | 100  | 2462  | 100  | 482   | 100  | 3525    | 100  |
| Motorway         | 256   | 8.4  | 42    | 13.7 | 371     | 8.8  | 301   | 12.3 | 62    | 12.9 | 424     | 12   |
| Top-notch        | 771   | 30.7 | 157   | 36.9 | 1151    | 32.3 | 723   | 29.4 | 175   | 36.3 | 1072    | 30.4 |
| Second-class     | 589   | 23.1 | 114   | 18.7 | 872     | 23.3 | 518   | 21   | 100   | 20.8 | 746     | 21.2 |
| Third-class      | 651   | 24.7 | 96    | 20.5 | 905     | 23.7 | 525   | 21.3 | 87    | 18   | 737     | 20.9 |
| Municipal        | 330   | 13.1 | 60    | 10.2 | 412     | 11.9 | 381   | 15.5 | 58    | 12   | 525     | 14.9 |
| Forest           | -     | -    | -     | -    | -       | -    | 1     | 0    | -     | -    | 3       | 0.1  |
| Agricultural     | 2     | 0    | -     | -    | 2       | 0    | -     | -    | -     | -    | -       | -    |
| Off road network | 4     | 0    | 1     | 0    | 6       | 0    | 13    | 0.5  | -     | -    | 18      | 0.5  |

Table 19. Road accidents killed and injured outside populated areas by road class in 2016-2017

### 3.2. Analysis of traffic safety on road infrastructure in the cross-border area of Romania

Over the years (2000-2020), the main summary indicators for road safety of the cross-border area, measured as relative shares, are stable and all increase by 1 percentage point. p. On the basis of this information, it can be concluded that there are no significant improvements, but there is a slight deterioration in the road safety situation compared to the state in the country.

The picture is quite different if starting and ending data are compared in absolute terms. With the exception of the number of people killed in road accidents, which at the beginning and the end have the same value - 349 people, compared to an average of 358 people for the period 1999-2017, the other summary indicators are growing rapidly in absolute terms. The number of all accidents in the cross-border area increased more than 4 times – from 1171 pcs. at 4609 pcs., with average values of 3003 pcs.

The number of accidents with casualties increased even more – from 1389 pcs. at 6419 pcs., with an average value of 4042 pcs. The number of people injured in the crash is from 1,040 people to 6,070, compared to an average of 3,683 people.

Another significant conclusion is that the cross-border area in both the Bulgarian and Romanian parts is a stable representative sample of the state in the country, which means that the average values on this topic for the country are also highly valid for the cross-border area. This is a facilitation that will be used in the absence of road safety data at district level.



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In 1999, the number of victims of road accidents was 1 million. There were 110 people, up from 115 in 2017. For the country, these values range from 108 people at the beginning of the period to 88 people at the end of the period.

Giurgiu County is above the average for the period – 125 people. In a more favorable position are the other counties of the cross-border area – Dolj – 89 people, Teleorman – 90 people and Olt – 96 people.

The dynamic curve of the cross-border average values can be divided into three periods. The first covers the time from 1999 to 2003. This was followed by the period from 2004 to 2009, when the trend was increasing. Then there is a decline and stabilization of the number of these victims.

The largest number of accidents with injuries is in the districts of Constanta – 1200 pcs. in 2017 and Dolj – 944 pcs. Well behind them is Olt County with 571 pcs. The other counties have values from 459 to 494 and are below the average level of the cross-border area for the year. The county of Constanța holds the first place in this indicator and throughout the analyzed period with an average value of 933 pcs. It was followed by Dolj County with 505 counts, while the other counties had more modest scores that ranged from 246 to 360 counts. It is interesting to note that the county of Constanța has a very close dynamic curve of this indicator with the total for the country. Giurgiu is in the average.

The number of people killed in road accidents in the cross-border area is between 295 pcs. in 2016 (lowest value) to 478 people in 2008 (highest value).

Annually average for the period the most lost lives are in the county of Constanța - 88 people, as well as the county of Dolj - 64 people. All other districts are lower than the average of 51 people for the period. The lowest figure is for the districts of Giurgiu – 36 people, Mehedinti – 37 and Teleorman – 38 people

The dynamics of the average values of this indicator for the cross-border region have a smoother change compared to the curve in total for the country. It has a parabolic form with a peak in 2008 and equal starting and ending values of 50 people per county per year.

The data provided by the statistical institute in Romania does not divide the injured into severe and mild cases. Statistics on the number of injured in road accidents in the cross-border area show a relative change of only 1 percent, but in absolute terms it has increased more than 5 times for the period. The number of injured people increased from 1040 people in 1999 to 6070 people in 2017. On average for the period in the cross-border area the injured were 526 people, while in 1999 they were 149 people

There was a decrease in the values of this indicator for the cross-border area in 2001-2004, after which they increased sharply and maintained a tendency to increase annually. A similar trend is followed by all counties. The county of Constanța has a dynamic in this indicator, which is closest to the national one. This area has the most injuries in road accidents in the cross-border area. The average for the period the number of annually injured there is 1159 people, and





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for the last year of the period - 1559 people. Above the average values for the cross-border area is also the county of Dolj with 602 injured per year for the period and 1246 people in 2017.

The other counties are below the average for the cross-border area. The fewest injuries were in Giurgiu County – 288 people on average per year for the period and 575 people in 2017, followed by Mehedinti County with an average value for the period – 387 people and 721 people in 2017.

In the same way as for Bulgaria, by dividing the number of killed and injured by the number of crashes, the probability of the presence of victims or injured in road accidents is calculated. The results obtained are presented in the following two graphs. The results are how dangerous accidents are for humans.

By type, accidents with injured people are grouped into crashes between vehicles, vehicles and pedestrians and with only one vehicle. The predominant category with a share of 46% on average for the period are crashes with more than one vehicle. In second place are the accidents with the participation of pedestrians, which have a share for the period of 33%. At least there were accidents with one vehicle injury. The average for the period is 21%.

These ratios are almost unchanged after 2008. In the first two years of the period there were relatively fewer crashes with casualties with one vehicle at the expense of pedestrian accidents.

The safest traffic conditions are created on motorways in Romania. On average, 1% of accidents occur with injuries. This share is constant throughout the period.

Local roads dominate the accident with casualties, which account for 83% of these cases on average for the period. In 1999, they concentrated over 90% of the accidents with casualties.

In the third category of roads, which cover roads outside motorways and local roads, on average about 16% of all road accidents with injured people occur. This share has grown rapidly, given that at the beginning of the period it reached 7%.

By months, the distribution of accidents with victims varies between 6 and 10% on average for the period. These ratios are maintained for the whole period. The safest months of the year are January and February, which account for 6% of road accidents. In March, this share was 7% and increased to 8% in April and 9% in May. In the summer months to October, the share of road accidents by month is 10%. In the last two months of the year there is a slight decrease in this indicator to 9%.

Romanian statistics provide grouped crash data by days of the week. This period of time is divided into four parts. The first part covers the days from Monday to Thursday and the next parts are for each day from Friday to Sunday





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On average, 56% of accidents with injuries occur between Monday and Thursday. On Friday, there are 16% of accidents with injuries, while on Saturday and Sunday they are 14%. For the weekend, 28% of accidents with injuries are due. Such a distribution of relative shares is characteristic of the whole period years studied

In 2017, about 70% of accidents with casualties in Romania occur during daylight hours, and only 7% at night. In low light conditions become about 20% of the accidents with injured people in the country. These ratios are almost constant after 2005. Before this year, between 24-37% of all accidents have occurred in night crashes, and those in low light – 7-10%.

### 3.3. Analysis of the safety of rail, air and river transport on the Danube in the cross-border area Bulgaria-Romania

According to Eurostat data, in 2008-2018 the peak of accidents in Bulgarian river transport, which exists only in the TWG, was in 2012 with 5 incidents (Table 20). In the close to this year 2014 and 2010 were recorded respectively 4 and 3 incidents. With the exception of 2015, when 1 accident occurred during the entire other observed period in the river transport of the country, not a single accident was noted or information about this does not exist.

While by this indicator our country is the best performing among the countries placed in the table below, Romania is at the other pole. For the period 2008-2016, an average of 53 accidents per year was found. This level is very high compared to the other "record holders" in accidents Austria and Hungary with respectively 19 and 13 incidents on average per year.

|          | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|----------|------|------|------|------|------|------|------|------|------|------|------|
| Bulgaria | :    | :    | 3    | 0    | 5    | 4    | 0    | 1    | :    | :    | :    |
| Czechia  | 10   | 11   | 7    | 9    | 3    | 7    | 6    | 12   | 20   | 11   | 21   |
| Croatia  | 2    | 0    | 3    | 1    | 2    | 2    | 1    | 2    | 3    | :    | 0    |
| Hungary  | 2    | 8    | 38   | 13   | 21   | 4    | 5    | 6    | 20   | :    | :    |
| Austria  | :    | 18   | 19   | 14   | 12   | 25   | 19   | 28   | 17   | :    | :    |
| Poland   | :    | 8    | 9    | 5    | 5    | 12   | 10   | 8    | 4    | 6    | 4    |
| Romania  | 30   | 51   | 32   | 34   | 80   | 81   | 41   | 75   | 53   | 56   | :    |
| Slovakia | :    | :    | 16   | 9    | 5    | 9    | :    | :    | :    | :    | :    |

Table 20. Number of river transport accidents in EU countries in 2008-2017



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Борово

The severity of the accident problem in Romania becomes even more significant if accidents with cargo are taken into account. For the same period in Romania they are the most compared to the same countries in the above table – 7. In Bulgaria there was only one such case in 2013.

The conclusion that can be drawn from the brief analysis of river transport accidents is that they are concentrated in the Romanian side. Although a small part of them concerns the transport of dangerous goods, which could lead to serious damage in the cross-border area. Therefore, it is necessary to make more serious and thorough studies on the causes and scale of this phenomenon.

For rail transport, data are only at national level. If we use the approach applied to land transport, we can assume that the cross-border area in Bulgaria is responsible for one fifth of all accidents in the country, which is proportional to the share of the population of the cross-border area in the country (Table 21).

**Table 21. Type of accidents in the railway transport of the Republic of Bulgaria, 2012-2018**

| Name of indicators                                     | 2012           |           |           | 2013           |           |           | 2014      |           |           | 2015      |           |           | 2016      |           |           | 2017      |           |           | 2018      |           |           |
|--|----------------|-----------|-----------|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|  | P <sup>R</sup> | In the    | R         | P <sup>R</sup> | In the    | R         | See       | In the    | R         | See       | In the    | R         | See       | In the    | R         | See       | In the    | R         | See       | In the    | R         |
| <b>Total</b>   | <b>47</b>      | <b>21</b> | <b>39</b> | <b>33</b>      | <b>24</b> | <b>42</b> | <b>58</b> | <b>23</b> | <b>45</b> | <b>48</b> | <b>20</b> | <b>24</b> | <b>40</b> | <b>22</b> | <b>48</b> | <b>47</b> | <b>16</b> | <b>28</b> | <b>42</b> | <b>18</b> | <b>29</b> |
| Collision  | 3              | 1         | 5         | 2              | -         | -         | 4         | -         | -         | 3         | -         | 2         | 3         | -         | 0         | 1         | -         | -         | 1         | -         | 3         |
| Derailment   | 3              | -         | -         | 2              | -         | -         | 6         | 1         | 8         | 6         | -         | -         | 6         | 7         | 29        | 5         | -         | -         | 1         | -         | -         |
| Accidents at level crossings                           | 15             | 7         | 15        | 11             | 6         | 24        | 11        | 6         | 16        | 6         | 2         | 7         | 5         | 5         | 5         | 11        | 5         | 9         | 5         | 4         | 6         |
| Accidents involving persons caused by a moving railway | 26             | 13        | 19        | 17             | 18        | 18        | 37        | 16        | 21        | 33        | 18        | 15        | 24        | 10        | 14        | 29        | 11        | 19        | 33        | 14        | 20        |
| Fire in rolling stock                                  | -              | -         | -         | -              | -         | -         | -         | -         | -         | -         | -         | -         | 2         | -         | -         | 1         | -         | -         | 2         | -         | -         |
| Other  | -              | -         | -         | 1              | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |

P - accidents

In - kill

R - injured

p - revised data

The total number of railway accidents in 2018 decreased, although in 2013-2017 its level was high. The same trend is observed for the victims and injured in this type of transport.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

In terms of the distribution of accidents by type, the largest share is occupied by accidents with people caused by a moving railway, and the next place is occupied by accidents at level crossings. The least accidents are due to collision, derailment and fire in the rolling stock.

Due to the absence of data on railway accidents, Eurostat data were used in Romanian statistics. They allow comparisons to be made with other newly admitted EU countries.

In the cross-border area Romania, the population of the country represents 14% of the total population of the republic. Therefore, it can be assumed that such is the share of the cross-border area in the railway accidents of the country. In contrast to Bulgaria, in Romania railway accidents systematically decreased in 2008-2017 (Table 22). However, their number is about three times higher than the corresponding value in Bulgaria and respectively occupies the second or third place in the newly admitted countries, for which it "competes" with Hungary.

**Table 22. Total number of railway accidents in EU countries, 2008-2017**

|                   | 2008 | 2009 | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  |
|-------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| EU - 28 countries | :    | :    | 2,292 | 2,224 | 2,069 | 1,980 | 2,076 | 1,805 | 1,787 | 1,855 |
| Bulgaria          | 65   | 48   | 39    | 74    | 48    | 33    | 58    | 48    | 40    | 47    |
| Czechia           | 133  | 113  | 125   | 99    | 97    | 91    | 105   | 94    | 87    | 97    |
| Estonia           | 26   | 19   | 31    | 28    | 20    | 15    | 15    | 12    | 15    | 19    |
| Croatia           | :    | :    | 45    | 39    | 42    | 33    | 33    | 27    | 23    | 33    |
| Latvia            | 61   | 30   | 41    | 35    | 25    | 26    | 22    | 25    | 18    | 24    |
| Lithuania         | 68   | 55   | 44    | 33    | 26    | 24    | 16    | 13    | 20    | 27    |
| Hungary           | 155  | 180  | 142   | 147   | 152   | 186   | 190   | 156   | 162   | 160   |
| Poland            | 889  | 523  | 449   | 488   | 379   | 328   | 313   | 307   | 265   | 252   |
| Romania           | 411  | 304  | 271   | 217   | 215   | 180   | 185   | 141   | 184   | 145   |
| Slovenia          | 65   | 19   | 21    | 11    | 14    | 13    | 15    | 14    | 11    | 11    |
| Slovakia          | 217  | 236  | 85    | 84    | 96    | 94    | 113   | 87    | 60    | 65    |

: - lack of data

For air transport, no accident data are available in both countries and the crossborder area. Therefore, they are not discussed in the report.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

#### 4. S.W.A.T. TRAFFIC SAFETY ANALYSIS IN THE AREA

The analysis of strengths, weaknesses, opportunities and threats (SWOT analysis) systematizes in matrix form the analysis made in the above part (Table 88). It includes the most important characteristics of the state of transport conditions in the cross-border region, as well as the specifics of the external environment, which are presented as opportunities and threats.

The strengths of the analyzed site are related to the participation of the cross-border area in the trans-European network and the Connecting Europe Facility (CEF) in the field of transport, the availability of strategic documents for the development of the cross-border area, including its transport connectivity, improving traffic safety, implemented projects for integrated urban transport and utilized financial resources under projects for development of transport infrastructure and connectivity in cross-border area.

The weaknesses stem from the worn and irrelevant to modern conditions transport infrastructure of the cross-border area, including the lack of highways, the problems and low connectivity between the road, railway, water and air transport networks, the availability of old and worn vehicles, as well as the lack of a road network dimensioned to modern traffic parameters and the new requirements for its safety.

The opportunities identified concern the existence of strategic European, national and supranational documents for the development of transport systems in the cross-border area, financial resources under European programs and projects for the development and modernization of transport infrastructure, the development of public transport, increased public sensitivity to traffic safety issues.

The threats to the development of river transport infrastructure come from a possible restructuring of EU structural and cohesion funds in the next programming period and a reduction in public spending on investment, connectivity and maintenance of existing transport infrastructure. Other threats are the failure to reach a political consensus on the development of transport infrastructure, the depopulation of large territories, etc.

| Strong points  | Weaknesses   |
|--|--|
| <ul style="list-style-type: none"> <li>Participation of the cross-border area in the trans-European transport network (TEN-T) and the Connecting Europe Facility (CEF) in the field of transport.</li> </ul> | <ul style="list-style-type: none"> <li>Large losses of human capital and material resources from road accidents, killed and injured in the cross-border area.</li> </ul> |



|  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Strategic geographical location of the cross-border area in terms of ensuring connectivity between the Middle East and Asia with northern parts of Europe.</li> <li>• Implemented integrated transport project in Sofia. Ruse</li> <li>• Availability of strategic documents for the development of transport connectivity between Bulgaria and Romania.</li> <li>• Availability of strategic documents to improve traffic safety.</li> <li>• Availability of financial resources that are allocated for the implementation of projects for the development of transport infrastructure and connectivity in the cross-border area.</li> </ul> | <ul style="list-style-type: none"> <li>• Insufficient coverage with motorways (There are no such coverage in Ruse District at all)</li> <li>• Poor condition of most of the road network, especially third-class roads</li> <li>• Poor state of railway infrastructure and rolling stock in both areas of interest</li> <li>• Low connectivity between road, rail, water and air transport networks and lack of intermodal terminals</li> <li>• High degree of physical and moral wear and tear of river transport infrastructure.</li> </ul> |
| <b>Opportunities</b>   | <b>Threats</b>  |
| <ul style="list-style-type: none"> <li>• Use of Public Private Partnership to attract private investment in the construction of transport communications and their use.</li> <li>• Restriction of the use of old and insecure vehicles.</li> <li>• Use of CBC funds and initiatives to improve road safety, shipping and rail transport conditions.</li> </ul>   | <ul style="list-style-type: none"> <li>• Possible restructuring of the objectives, formation, allocation and use of EU structural and cohesion funds.</li> <li>• Failure to reach consensus between the governments of the two countries on development and financing of future joint transport projects.</li> <li>• Depopulation of large parts of the cross-border area.</li> </ul>   |



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

|  |   |
|--|---|
| <ul style="list-style-type: none"> <li>Increased public sensitivity to traffic safety issues.</li> </ul> | <ul style="list-style-type: none"> <li>Slow decision making to build new connecting infrastructure</li> <li>Lack of policy on old and worn vehicles.</li> </ul> |
|--|---|

Table 23. Matrix on SWOT analysis

#### 4.1. Analysis of the risk related to the optimization of transport conditions in the cross-border region Borovo-Giurgiu

The risk factors for infrastructure optimization are shown in the table:

| Risk factors                                     | Problems and manifestations   |
|--|---|
| Transport Park                                   | <ul style="list-style-type: none"> <li>Obsolete, depreciated and often failing rolling stock</li> <li>High average age of the vehicle fleet</li> <li>Poor management of loading and unloading activities</li> </ul>   |
| Transport infrastructure                         | <ul style="list-style-type: none"> <li>Available transport infrastructure cannot take transit traffic safely</li> <li>Insufficient resources to maintain transport infrastructure</li> <li>Presence of critical sections with high risk for road accidents in the cross-border area (e.g. Borovo-Dve Mogili section)</li> <li>Unbuilt transport corridors along the TEN-T and difficult connectivity in the cross-border area</li> <li>Almost complete lack of bike lanes</li> <li>Lack of intermodal connectivity</li> </ul> |
| Transport Traffic Management Information Systems | <ul style="list-style-type: none"> <li>Lack of intelligent information systems to notify travelers in case of traffic problems, traffic conditions, road repairs, route deviations, etc.</li> <li>Lack of traffic management plans at regional level in Borovo municipality and Giurgiu county</li> </ul>   |





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Table 24. Risk factors related to the optimization of transport conditions in the cross-border region

These risk factors concentrate many problems that require concentration of efforts in planning measures to optimize transport conditions in the cross-border region. The vast majority of problems are related to investments that should be combined with "soft" measures aimed at the subjective factor.

The highest risk exists in ensuring the safety of traffic and transport infrastructure. Priority should be given to efforts in local and government institutions to ensure the safe passage of people and goods.

Lower priority is given to factors related to transport factor management information systems. Their measures should focus on reducing the impact of risk factors while maintaining the low probability of the event happening. In the medium term, taking into account the impact of digitalization and artificial intelligence as elements of the Fourth Industrial Revolution, this risk factor will become increasingly important.

| Risk factors                                     | Probability | Impact | Overall assessment |
|--|-------------|--------|--------------------|
| Ensuring traffic safety                          | 2           | 3      | 4                  |
| Transport Park                                   | 2           | 2      | 2                  |
| Transport infrastructure                         | 2           | 3      | 4                  |
| Transport Traffic Management Information Systems | 1           | 2      | 2                  |

Table 25. Risk assessment results

#### 4.2. Overview of applicable regulations

The legal framework in the field of transport of the **Republic of Bulgaria** consists of the following basic laws, as well as the relevant sub-normative documents to them:

##### Road

- The Roads Act, which regulates the ownership, use, management, management, construction, repair, maintenance and financing of national and local roads.
- The Road Traffic Act, which regulates the traffic rules open for public use, the requirements for vehicles, as well as the legal capacity of the drivers of vehicles, the rights and obligations of the traffic participants and the relevant services and officials, the coercive measures that are applied and the penalties for violation of the provisions.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- The Road Transport Act, which regulates the terms and conditions for public domestic and international transport of passengers and goods by cars carried out by Bulgarian or foreign carriers, own-account transport, control over the transport operations, as well as the special rules for contracts for the carriage of passengers and goods.

### Rail

- The Railway Transport Act, which defines the terms and conditions for the construction, maintenance, development and use of the railway infrastructure, the requirements for access to it, the basic rules for train movement, as well as the relations between carriers and customers in the provision of transport services in accordance with the international treaties and agreements to which the Republic of Bulgaria is a party.

### Water transport

- Law on Maritime Spaces, Inland Waterways and Ports of the Republic of Bulgaria, which regulates their legal regime and control over its observance.
- Merchant Shipping Code, regulating the public relations that arise in connection with merchant shipping and control over it, the requirements for the Bulgarian belonging of ships, the requirements to ship and transport documents, the rights and obligations of masters and crews, contracts for the carriage of cargo, passengers and baggage, rights in rem over ships, ship rental contracts, ship and cargo insurance contracts, ship accidents, rescue at sea and river, and other relationships related to navigation and its safety.

### Air transport

- Civil Aviation Act, which regulates the conditions for civil aviation and ensuring its safety and security.

All Bulgarian normative documents are harmonized with the law of the European Union.

The legal framework in the field of transport in the **Republic of Romania** consists of the following main laws, as well as the relevant sub-normative documents to them:

### Road

PN No 27/2011 on road transport defines road transport as defining through its provisions that the road transport of goods and persons in Romania and related activities will be carried out in accordance with the basic principles, the main ones being: priority protection of human life and the environment.

### Water transport

PN No 42/1997 on water transport, defines water transport and all activities related to it concerning vessels, property and property rights, their registration, deregistration, flags (here is the place to note that the legal regime of the



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

means of transport is subject to different laws, depending on whether or not they have a flag. (a) Vessels shall be subject to the law of the flag of the lex pavilionis in question; (b) For means of transport which do not have a flag, the law of the organic status of the transport undertaking of which these vehicles are a part) shall apply.

### Rail

The Ordinance of the Government No 12/1998 defines railway transport as any movement of people, goods and goods carried out by the transport operators of railway transport on the infrastructure of Romanian railways with rail vehicles. The Ordinance defines the operators of railway transport, activities and related services.

### Air transport

PN No 29/1997 on the Aeronautical Code incorporates legal rules into its provisions on general matters relating to national airspace and its legal regime, thus creating a legal framework for the conduct of air transport.

PN No 29/1997 on the Air Code regulates air transport including all civil aviation activities carried out by natural or legal persons in national airspace.

In addition, the activity of civil aviation on the territory and in Romanian airspace benefits from legal regulation: through the Aviation Code, through domestic regulations in this field, as well as from the Convention on International Civil Aviation signed in Chicago or other international conventions and agreements of which Romania is a part, Romania having full and exclusive sovereignty over national airspace, under the conditions of public property.

PN No 107/2000 approved by Law No 14/20011 on the ratification of the Convention for the Unification of Certain Rules for International Carriage by Air, signed in Montreal on 28 May 1999 (the Convention applies to the international carriage of passengers, baggage or cargo performed by aircraft for remuneration and free of charge by aircraft performed by an air transport undertaking).

The applicable regulations in the transport sector in the Republic of Romania and the Republic of Bulgaria shall determine the following responsible authorities and their institutional responsibilities for the formulation and implementation of policies in the transport sector, including traffic safety measures:

| Type               | Responsible authorities  | Institutional responsibilities   |
|--------------------|--|--|
| Central government | <b>Bulgaria</b> <ul style="list-style-type: none"> <li>Ministers</li> <li>the Ministry of Transport, Information Technology and</li> </ul> | Responsible for national policies, regional and local development policies |



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

| Type                        | Responsible authorities  | Institutional responsibilities                                      |
|-----------------------------|--|---|
|                             | <p>Communications;</p> <ul style="list-style-type: none"> <li>Ministry of Regional Development and Public Works;</li> <li>Ministry of Environment and Water;</li> <li>Ministry of the Interior;</li> <li>Ministry of Economic Affairs;</li> <li>Basin Directorate – Danube Region;</li> <li>NC "Railway infrastructure";</li> <li>Road Infrastructure Agency;</li> <li>State Agency for Road Traffic Safety</li> <li>Bulgarian Ports Infrastructure Company;</li> <li>EA "Railway Administration";</li> <li>Executive Agency "Exploration and Maintenance of the Danube River";</li> <li>Directorate General Civil Aviation Administration.</li> </ul> <p><b>Romania</b></p> <ul style="list-style-type: none"> <li>the Ministry of Regional Development, Public Administration and European Funds;</li> <li>Ministry of Transport;</li> <li>Ministry of Environment and Climate Change;</li> <li>Ministry of Economic Affairs;</li> <li>Ministry of Public Finance;</li> <li>Ministry of Agriculture and Rural Development;</li> <li>The South East Regional Development Agency.</li> </ul> |   |
| <b>Regional authorities</b> | <p><b>Bulgaria</b></p> <ul style="list-style-type: none"> <li>Regional development councils;</li> <li>Regional Inspectorates of Environment and Water at the Ministry of Environment and Water;</li> <li>Regional governors.</li> </ul>  | Responsible for strategic directions at regional and district level |



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

| Type                                   | Responsible authorities  | Institutional responsibilities  |
|--|--|---|
|  | <b>Romania</b> <ul style="list-style-type: none"> <li>The Regional Development Agency of the South-West Regions participate;</li> <li>District Councils.</li> </ul>  |   |
| <b>Local authorities</b>               | <b>Bulgaria</b> <ul style="list-style-type: none"> <li>Municipal administrations;</li> <li>City Councils.</li> </ul> <b>Romania</b> <ul style="list-style-type: none"> <li>County administrations;</li> <li>City administrations.</li> </ul>   | Responsible for local development   |
| <b>Intergovernmental organizations</b> | <ul style="list-style-type: none"> <li>The Danube Commission (DK) with headquarters in the town of Vidin. Budapest;</li> <li>The International <i>Commission</i> for the Conservation of R. Danube;</li> <li>Joint Bulgarian-Romanian Commission for the Danube River;</li> <li>Joint Technical Commission for Verification of the Technical Condition of the Danube Bridge between Ruse and Giurgiu;</li> <li>Joint Bulgarian-Romanian Technical Commission on the Condition of the Danube Bridge at Vidin - Calafat</li> </ul> | Responsible for implementing sectoral policies at intergovernmental level |

Table 26. Responsible authorities and institutional responsibilities

#### 4.3. Analysis of good practices for optimizing traffic safety in Bulgaria

The review of good practices in the European Union and around the world has considered only the most adequate opportunities for the cross-border area, which can be at least partially applied here.

##### Bulgaria



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ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

In Bulgaria, periodic road safety inspections are carried out during the day and at night. The inspection monitors the visibility of road signs and horizontal road markings. As defects in visibility of the horizontal marking are marked only sections where the road marking has a brightness factor for dry surface below the minimum values for the respective road class. As defects in the visibility of road signs are marked only those road signs where visibility is equal to or less than 10 years. If a defect is identified, according to the degree of safety endangerment, the place shall be secured within 24 hours, one week or 30 calendar days.

- Removal or securing of permanent obstacles in the roadside area;
- Limitation of the maximum permissible speed of movement and increased implementation of such restrictions at local level;
- Improving visibility in different weather conditions and illumination;
- Improvement of roadside restraint equipment by means of road restraint systems;
- Improving coherence, visibility and recognizability, as well as appropriate placement of road markings, road signs, light signals and other means of signaling;
- Securing against landslide of stones, earth and snow masses, as well as against snowdrift;
- Improvement of the operational condition of the pavements;
- Redesign of road restraint systems;
- Provision of new and/or improvement of existing facilities, incl. located in the middle dividing strip of the road; anti-blinding devices, signs, etc.;
- Changes in the traffic organization in sections allowed for overtaking;
- Improvement of intersections, including level crossings;
- Change of the route of the road;
- Change the width of the road by adding hard banquets;
- Installation of traffic management and control systems;



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- Reducing potential conflicts with vulnerable road users;
- Alignment of the road with current road design standards;
- Restoration or replacement of pavements;
- Use of road signs with changing messages;
- Deployment and improvement of intelligent transport systems and telematics services for interoperability as well as emergency alerting purposes.

The prescribed measures should be aimed at eliminating the identified or suspected cause(s) of the occurrence of road accidents. Individual measures of predominant characteristics or types of crashes should form a complete solution. If the study has identified deficiencies in the design features, they must be eliminated. This is achieved through a combination of constructive (physical) measures and measures to improve visibility. Physical measures have a direct impact on freedom of movement with a view to route choice behaviour or manoeuvre. Visual measures (horizontal marking, restraint systems, vegetation, etc.) usually have an ancillary function and therefore exert an indirect (psychological) impact on the behaviour of road users.

Road infrastructure is one of the main factors influencing road safety. Well-secured road infrastructure contributes to reducing fatalities and injuries to road users.

*Measures that are applied outside the settlements are:*

1. Twice a year before the summer active season and the onset of the autumn-winter season, a "revision" of the Republican roads should be carried out. Weaknesses identified should be addressed as soon as possible;
2. Construction of artificial lighting of intersections and road sections located on roads with intensive traffic and prevailing fog-degraded road conditions.
3. Securing level crossings on roads by fences and traffic lights indicating when it is safe to pass through the crossing.
4. Construction of facilities for securing dangerous sections of long-distance roads as safety railings.
5. Cutting vegetation around dangerous bends for better visibility when moving.
6. Construction of safe parking areas near highways and main arteries.

*The measures in the settlements are as follows:*

1. Construction of modern artificial lighting of intersections and road sections located on streets with intensive traffic and prevailing fog-degraded road conditions.
2. Creating an organization to improve the management of traffic on the streets in cities by introducing new traffic lights, roundabouts, inflows and outflows of traffic flow.





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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
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РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

3. The securing of pedestrian crossings and sidewalks according to the requirements.
4. Securing the areas around kindergartens and schools, places with intensive mixed traffic, public transport stops, pedestrian crossings, intersections, road junctions and other areas of increased danger.

*In the zones of the horizontal curves:*

1. Improving visibility and signalling in order to provide timely information to drivers of road vehicles about the nature of the curve through the use of the so-called. Changing road signs.
2. Maintenance of road markings in the areas of dangerous curves.
3. Maintenance of road markings in the areas of dangerous curves.
4. Placing driver warnings on curves with multiple serious traffic accidents recorded.
5. The construction of the so-called. "shaking runways."

*In the junction areas*

1. Construction of a raised roadway at separate intersections in order to reduce the speed of passage, mainly in settlements;
2. Construction of secure auxiliary islands to ensure safe crossing of the traffic roadway by pedestrians;

*Measures to ensure road safety*

1. Organizing and conducting national campaigns to protect the life and health of pedestrians in traffic, to form respect and tolerance for pedestrians, adults, children and students and to improve pedestrian-driver contact.
2. Construction of , school zones, pedestrian zones, raised pedestrian crossings and intersections, artificial bumps, sidewalk constrictions, etc.

*To prevent crashes in trees are applied:*

- Construction of suitable and durable guardrails to the road to minimize the consequences of a crash.
- Indicative signs of a distinctive color (usually bright yellow and/or red) warning of a tree near the road. The signs were placed both on the tree itself and 50 meters before the danger.

*To prevent crashes due to driver falling asleep:*

- On some first-class roads or highways, an artificial bump is created on the road, both on the right, where the road ends, and halfway between the two lanes. Thus, when the driver falls asleep, he will feel the vibrations and will immediately react to return to the road.

*To limit the conflict "pedestrian – driver" shall apply:*

- Pedestrian "islands" are created that are raised on the road so that pedestrians can be safer when crossing a wide two-lane road.
- Pedestrian crossings are indicated both by road signs and painted in white or yellow color to distinguish with the naked eye from afar.



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- Around pedestrian crossings, "pegs" are placed so that pedestrians are safer while waiting for a green signal to pass.

Some pedestrian crossings are placed on the so-called "lying policeman" in order to reduce the speed of cars and mopeds before passing through them and increase the safety of pedestrians.

- In the vicinity of schools and / or kindergartens are placed distinctive road signs with the inscription "Children do not have brakes". Thus, the driver is warned to be more careful when passing into the vicinity.

- At the beginning of the pedestrian crossings, inscriptions were made "look to the left". This is how pedestrians are reminded to look around before crossing.

*To control compliance with traffic laws*

- Installation of cameras to monitor compliance with the restrictive speed.

- Strengthening police control by doing tests for alcohol use and drug abuse with breathers.



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

### Sweden – Vision "Zero"

In 1997 . Sweden's parliament has adopted Vision Zero, a new and bold road safety policy based on four principles:

- **Morality:** human life and health are most important; They take precedence over mobility and other objectives of the road transport system.
- **Chain of responsibility:** suppliers, professional organisations and professional road users are responsible for the safety of the system. Road users are responsible for compliance with the rules and regulations. If road users do not comply with the rules and regulations, responsibility is transferred to the system providers.
- **Safety philosophy:** people make mistakes; Road transport systems must minimise the possibility of error and damage caused when errors are made.
- **Changing the mechanisms in place:** suppliers and control bodies of the road transport system must make every effort to ensure the safety of all citizens and each participant must be ready to change in order to achieve safety.

The Swedish Road Administration (SRA) has overall responsibility for road safety in the road transport system. According to the principles of Vision Zero, all other stakeholders in the road transport sector also have responsibilities for ensuring and improving road safety.

#### Benefits and costs

Vision Zero is expected to achieve a possible reduction in the number of deaths by a quarter to a third within ten years (1). The adoption of "Vision Zero" in Sweden has helped further studies on the development and implementation of a new type of system . It helped to carry out the conversion of single-lane roadways into roads with 2+1 lanes with central cable barriers to protect drivers from oncoming traffic.

More information can be found on the official website of the program:

[http://publikationswebbutik.vv.se/upload/1723/88325\\_safe\\_traffic\\_vision\\_zero\\_on\\_the\\_move.pdf](http://publikationswebbutik.vv.se/upload/1723/88325_safe_traffic_vision_zero_on_the_move.pdf) , as well as [www.visionzeroinitiative.com](http://www.visionzeroinitiative.com) .

## 4.4. Analysis of good practices for optimizing traffic safety in the European Union

### *Sustainable safety*



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ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

In the European Union, the so-called principles of sustainable safety apply and apply. The most important qualities of sustainable road safety are, on the one hand, the detection and elimination of hidden errors in the transport structure (gaps in the structure that lead to human errors and crash-causing violations), and on the other – to create such a road infrastructure where safety depends minimally on the decisions of individual road users. This principle defines certain indicators on the basis of which it is determined whether a road section meets these principles or not. They are:

1. Functionality of the road - Some roads have a precisely established function such as transit roads, marshalling roads or access roads, structured in a hierarchical sequence.
2. Homogeneity of masses and/or velocities - Uniformity in speeds, directions and masses of vehicles.
3. Predictability of traffic directions and behavior of participants through clearly identifiable road infrastructure – This is such road infrastructure that, combined with appropriate behavior of road users, assists in making timely and correct decisions in various situations and reduces the risk of road accidents.
4. Tolerance as part of the functions of road elements and road users - Limiting the severe consequences of road accidents through such elements of the road that allow road users to correct their mistakes in a timely manner within the limits of human abilities and anticipate the behavior of the participants.
5. Correct assessment of the actions of the participants in the traffic - The ability of the individual road user to correctly assess the behavior of others and to perform the given maneuver safely.

Another method of traffic safety control in developed Member States is the use of intelligent transport systems (ITS) to manage traffic and better respond to incidents. These are software systems that inform the driver in a timely manner about the possibility of dangerous situations occurring. In this regard, their main function can be defined as providing a high level of awareness to the road user, regardless of his preparation. The system represents the optimal use of road, traffic and travel data, e.g. to enable users to plan their trips. Fundamentally, these systems provide:

- continuity of ITS traffic and freight management services (services that are continuous when trucks cross borders);
- ITS applications for road safety and security (i.e. hazard warnings due to reduced visibility or for people, animals and waste on the road);
- connecting vehicles to transport infrastructure, i.e. equipping vehicles with data or information exchange devices.



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
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БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

### *The pan-European eCall service*

If there is a serious traffic accident, eCall automatically selects Europe's single emergency number 112 and communicates the vehicle's location to the emergency service. A telephone connection is then established with the appropriate emergency call centre (or emergency call centres (CPS)) and details are sent to the rescue services regarding the accident, including the time of the accident, the exact location of the vehicle hit and the direction of travel. The system can also be operated manually. eCalls should reduce emergency response times by up to 60% in urban areas and by up to 50% in rural areas, saving hundreds of lives in Europe every year.

If you buy a **new car model** approved for production after **March 31, 2018**, it must have an eCall system based on the number 112 installed. This rule applies to vehicles with no more than 8 seats and to light commercial vehicles. If you have a car that is already registered, you are not obliged to install an eCall device, but this can be done if your vehicle meets the technical requirements. The measure involves owners and manufacturers of cars, medical centres and national governments.

*What are the benefits and costs?* According to a Finnish study based on an analysis of actual crash data for the period 2001-2003, the eCall system will reduce road fatalities by 5 to 10 % and all road fatalities in Finland by 4 to 8 %. The costs of an automatic emergency call system will be borne mainly by car owners and medical emergency services. It is not yet clear whether the benefits outweigh the costs.

### *Safety of pedestrians and cyclists*

In sustainable safe traffic, these vulnerable road users must be separated from other traffic as far as possible. Where this is not possible, the "safe speed" of 30 km/h (homogeneity). In order to limit serious injuries, it is necessary to adapt vehicles (tolerance). Sustainable safety offers many measures (preventive and reducing the severity of accidents) with a positive effect on pedestrian safety. Such examples are:

- Physical separation of vehicles with large differences in mass, speed and directions;
- Measures to restrict the movement of mopeds only in the traffic roadway;
- Introduction of zones at 30 and 60 km/h;
- Mandatory measures to prevent new trucks from entering under the body;
- Design of pedestrian- and cyclist-proof front bumpers.



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ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

### *Safety at intersections*

Intersections are a potential danger point in the road network. Each intersection must meet certain design requirements:

- Recognizability: if the types of intersections are limited and their characteristics are unified, road users will be able to recognize the situation faster and it will meet its expectations;

- Visibility distance: the intersection must be visible, distinctive and clearly identifiable in a timely manner. In order to be able to see something from a distance, it must be at least of a certain size that attracts attention and perception. Contrast, color, shape and movement are important factors. The information boards must be placed in logical, visible places in the field of view of the participants;

- Field of vision: when approaching an intersection, road users must have visibility on it and part of the approaching roads and their traffic;

- Intelligibility of traffic organisation: an intersection is understandable to road users when perceptions shape, size, signs, markings and road restrictions are interpreted quickly, correctly and unambiguously;

- Fluency: the individual elements connect smoothly, which makes the passage through the junction smooth. The elements themselves are easily surmountable;

- Balance: a balanced junction structure means that the individual design elements and the organization of the movement must form a single whole;

- Completeness: in order to have completeness, an intersection must pass the traffic passing through it in all possible and desired directions.

### *Traffic lights and roundabouts*

The application of traffic lights in single-lane roads is not advisable. In such cases, it is more appropriate to apply one or two-lane roundabouts due to:

- Road safety: the roundabout is about 60% safer than intersections with a traffic control system;



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
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РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- The total waiting time: in case of less than the intended load, the waiting time at roundabouts is considerably shorter.

- Capital value (capital inputs, maintenance and depreciation): the value of a roundabout is significantly lower.

-When it comes to two-lane roads, it is possible that the roundabout is not of sufficient capacity. In such cases, it is necessary to install a light-regulated system with a 24-hour operating mode.

-Great care should be taken when reassessing the effect of the system on road safety. Often at these intersections the following accidents occur:

1. Rear crashes due to different reaction to yellow and red light.
2. Crashes caused by drivers ignoring the red light;
3. Traffic accidents as a result of conflict in regulation.

Accidents caused by some drivers ignoring the red light are reduced by:

- Providing sufficient throughput (avoiding transport inhibitions);
- Speed limitation before the intersection;
- Installation of cameras for recording violations;
- Providing visibility to the lights.
- Cleared visibility to the traffic light system is extremely important for road safety. Both the traffic light itself and its lights must be visible and clearly identifiable in all climatic conditions. Depending on the speed of travel, the distance from which the traffic light system must be visible is also determined so that drivers have sufficient time to react to decelerating or stationary vehicles.

- It is desirable to always have light systems above the traffic lanes.

*Principles of positioning of traffic lights and their location:*

- In case of more than two lanes, there must always be a traffic light body above the traffic roadway;





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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
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РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- On distribution streets, there must always be at least one body above the traffic roadway;
- In case of more light fixtures, each must be centrally located above the lane to which it applies;
- When the steering lanes are not adjusted without conflict, the body above the belt is not enough, it is necessary to place a third body to the left of the road or above the turning lane for visibility reasons.
- Where the right-hand winding traffic stops before the highest placed light body is illuminated, it is necessary to place an additional low body;
- At two consecutive junctions that are light-adjusted, their systems need to be synchronized in order to minimize the risk of the driver responding to the signals of the wrong traffic lights;

Land use and network planning constitute the basis of safe road infrastructure. Attention-requiring elements are the distance between place of work and housing and the location of places for everyday services, such as schools, nursing homes, medical centers and commercial areas relative to residential areas.

In addition, it is important for longer and more frequent journeys that the fastest route coincides with the safest, i.e. that the required distance of the more dangerous roads of a lower category is limited in favour of safer roads of a higher category.

#### *Low speed zones in populated areas*

For safety, low speeds are crucial when motor vehicles use the same space as pedestrians and cyclists. In many countries, low-speed zones have been introduced in populated areas, near schools and shopping centers. In Europe, the most common zones are limited to 30 km/h. In residential areas, the maximum speed limit is even lower: 10-15 km/h. In both cases, it is insufficient to put only a speed limit sign. Low speeds are provided by physical measures such as road narrowing, artificial bumps and bends. Areas of low speeds may be part of more general measures to calm movement. Traffic calming aims not only at low speeds, but also at reducing motorized traffic in individual areas or throughout the settlement by impeding transit traffic and encouraging pedestrianism, cycling and public transport.

In EU countries, the initiative to introduce residential or restricted areas of up to 30 km/h is taken by the city (road) services. Involving citizens in the planning process increases public support. Increasingly, initiatives for low-speed zones are also being taken by the local population itself. Road safety organisations may provide guidance on the necessary procedures.



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

What are the benefits and costs? The results of a study in the UK showed that areas with a speed limit of up to 30 km/h reduced accidents by 27%, resulting in road accidents by 61% and serious crashes by 70%. Other benefits are an increase in pedestrian and cycling traffic and improved access for people with mobility disabilities. The cost of application and maintenance depends on the size of the area and the installed fixtures. The environmental costs of carbon emissions can be reduced by avoiding the need to accelerate and reduce speeds several times and reduce the use of passenger cars as a result of obstacles to transit traffic.

### *Characters with variable content*

The adoption of speed limits and the giving of warnings through variable content signs (SMP) depending on traffic, weather and road conditions has been successfully implemented by several Member States, mainly on clogged or high risk of motorway accidents. Dynamic speed limits can help harmonise traffic flow and increase the throughput of congested areas. Many of these systems have been applied to the solution of a particular problem, e.g. 'fog warning systems' or 'congestion warning systems'. Observations show that warning texts alone do not have a major impact on speed, while speed limits justified by warnings or explanations give significant results. Typically, road services at national and regional level are responsible for the implementation, operation and maintenance of signs with variable content. The designation of the relevant plots is usually carried out in cooperation with safety experts and a database from safety committees or national statistical offices.



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РУМЪНСКО ПРАВИТЕЛСТВО



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Figure 2. Full-frame information constructions with active information boards

What are the benefits and costs? Despite the methodical shortcomings in many of the assessment studies on different types of SMP, there is a strong case for concluding that the SMP helps to reduce the number of crashes with injuries and to harmonise the transport flow. According to the evaluations carried out by the ROSEBUD project for the systems in Norway, Sweden and Finland, the cost-benefit ratio varies between 0.65 and 1.45.

#### *Alcohol Ignition Immobilizer (Alcolock)*

It is estimated that alcohol contributes to 20 to 25 percent of crashes with severe and fatal injuries. An alcohol ignition immobilizer or Alcolock is an electronic device that prevents the vehicle from being put into motion if the driver has drunk more than is permissible. To determine the concentration of alcohol in the blood, the driver must blow into the analyzer before starting the car and then at random intervals while driving the car. Typically, this device is used to prevent people who have been sanctioned for driving after consuming alcohol from committing a new violation. In these cases, the blocking device (Alcolock) is often part of a broader prevention program involving medical and psychological assistance. These devices are also used in professional transport. They were created outside Europe (USA, Australia, Canada). From European countries, Sweden introduced the Alcolock device more than 10 years ago. Recently, there have



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

been pilot projects in a number of European countries, including Belgium, Norway and Spain. Other countries, such as the United Kingdom, are also planning such projects.

Who's in charge? Programs for the introduction of Alcolock-type devices need legislative measures, an organization for the installation of the device and a "reading" of measurement data and an organization for the evaluation and provision of medical and psychological assistance to drivers.

What are the benefits and costs? The risk of accidents with injuries in vehicles equipped with an Alcolock locking device is reduced by about 50%. In addition, these devices are believed to lead to a 40 to 95% drop in relapses in drivers sanctioned under the influence of alcohol. The costs of the Alcolock programme for offenders include input costs (administration, medical examination and installation, about €400), running costs for one year (Alcolock device rental and four medical examinations, about €2,000) and dismantling costs (around €100).

#### *Recorders (black boxes)*

Event Data Recorders (EDRs) or "black boxes" monitor a number of variables related to driving behavior, such as speed, inertial forces of acceleration and braking, use of lights, speeds, safety belts, etc. There are two main types of EDR. The crash data recorder collects data for a limited period immediately before and after the crash, and the daytime data recorder collects all data during driving. The device for recording crash data is usually used to reconstruct an accident. The daytime data recorder is usually used to feedback drivers, informing them of how they are driven from an environmental, safety or both perspective, often combined with an incentive programme. Black boxes are most often used in trucks, vans and company cars, but more and more often in private cars. Discounts in insurance premiums are the most common incentive for private car drivers.

Recorders for trucks, vans and company cars are usually introduced by enterprises and companies or leasing companies, for example as part of the Safety Culture programme. The use of black boxes in private cars may be encouraged by insurance companies.

What are the benefits and costs? As it appears, EDR recorders have a preventive impact. It is estimated that black boxes in trucks and vans lead to an average reduction of 20% in road accidents and damage, 5.5% in fatalities and 3.5% in serious injuries. According to another study, the cost-benefit ratio for companies is 20 for the day's data recorder and 6 for the crash data recorder. A fleet owner can expect a return on investment within a year.



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

### *Emergency vehicles on the motorway network in the Netherlands*

The essence of the measure is the agreement between the insurance companies and the Ministry of Transport emergency vehicles to be sent to the scene immediately after receiving a report of the accident. In cases of false alarm, the bill is paid by the Ministry of Transport. In all other cases, the costs are covered by the insurance company. Thanks to this measure, the response time was shortened by an average of about 15 minutes. The measure is fully implemented in the Dutch motorway network and partially introduced into the regional network.

The measure is based on a formal agreement between the Ministry of Transport and insurance companies.

What are the benefits and costs? The benefits are reduced costs for faster assistance to victims, prevention of secondary crashes and avoidance of traffic jams. For the Dutch national motorway network, the reduction of time spent in traffic jams due to road accidents is estimated at 5 to 15 minutes for one crash and vehicle, which adds up to 2 to 4 million hours per year. The annual cost of this measure to the Dutch government is estimated at €650,000 (6,500 false alarms). The cost-benefit ratio ranges from 27.8 (based on 5 minutes less delay of the emergency vehicle) to 76.3 % (with 15 minutes less delay).

### *Emergency traffic jam lanes in Germany and Switzerland*

A law has been established in Germany and Switzerland. It means that if there is a traffic jam and an emergency vehicle (ambulance) has to pass, the traffic is obliged to form a free lane in the middle of two lanes. If there are more than two lanes, all cars on the outermost left lane should be shifted to the left and all others to the right. The free lane enables all emergency vehicles to provide quick and efficient assistance in traffic jams.

Who's in charge? The government should develop a law on the behaviour of drivers in the event of an accident and inform drivers about this law.

What are the benefits and costs? The benefits are that in the event of traffic jams, emergency vehicles can get to the scene faster. The costs are mainly reduced to disclosure costs when the new law is introduced. Although there are no precise estimates, the cost-benefit ratio will be in all likelihood favourable.

### *Speeding and alcohol offences monitored in Switzerland*

The Swiss system of indicators monitors trends in the field of speeding and driving under the influence of alcohol. The indicators include the level of police checks, the proportion of violations, sanctions, fatal crashes, as well as drivers' views on the relevant safety rules and their controls. The survey is conducted once every three years through telephone



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

surveys of around 6,000 drivers. Data on the other indicators are collected continuously. The data is stored centrally. They are not available electronically, but some of the data can be found on the Internet.

*Who's in charge?* The Swiss Federal Statistical Office is responsible for implementing the system of indicators. The data is provided through the police, courts and administrative authorities. The survey is conducted by a sociological research firm.

*What are the benefits and costs?* The indicator system provides an indication of driver behaviour, control and trends, and can also be used for research purposes. In Switzerland, investment costs were 50,000 euros; maintenance and administration costs are 200,000 euros per year and require 1.5 man-years. A survey costs 70,000 euros.

#### *Intelligent Speed Assistance (ISA)*

Excessive and inappropriate speeds have been found to account for about a third of all fatal and severe crashes. ISA is the general designation for a system whose purpose is to improve compliance with speed limits. In general, ISA systems establish the position of a vehicle and compare its speed with the speed limit introduced or with the recommended safe speed in the specific section of the road. In case of speeding, the system notifies the driver of the current speed limit or even reduces the speed of the vehicle according to the current limit. There is a wide variety of ISA systems that differ in the level of assistance offered and in the way of driver feedback.

*Who's in charge?* Mandatory systems require national or European legislation. The voluntary use of speed warning systems (such as Speed Alert) can be encouraged through publicity campaigns and/or financially through reductions in taxes or insurance premiums.

#### *Random samples of exhaled air*

Random samples of exhaled air aim to identify drivers who exceed the legally permissible blood alcohol concentration. At these checks, drivers are stopped and tested for alcohol by the police, whether they are suspected of driving under the influence of alcohol or not. They are common in many European countries. Finland has the highest level of random breath samples in Europe, with a population proportion of 34 %; Sweden is second with 17%.

*Who's in charge?* Random samples of exhaled air are usually answered by the police.

*What are the benefits and costs?* Swedish law allows police to check drivers involved in road accidents, those caught violating traffic rules or accidentally at pre-planned roadside checks. The proportion of accidents with injuries in





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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
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which the vehicle was driven under the influence of alcohol decreased from 14% to 9% after the introduction of random samples of exhaled air.

In Finland, since the introduction of these samples towards the end of the seventies, alcohol consumption and vehicle kilometres have doubled. During this period, the proportion of drivers driving under the influence of alcohol first halved and then remained close to 0.2 % after the early eighties. The number of deaths involving drivers driving by the effects of alcohol has remained close to 80 over the past ten years the same as in 1970.

In the Netherlands, every doubling of random breath samples since 1986 has been accompanied by a 25% drop in alcohol-driving offenders, and between 1985 and 2005 the proportion of these offenders has been reduced by two-thirds.

After 2003, all drivers in Denmark undergoing a routine police check (e.g. speed checking or the use of safety belts) are also checked for alcohol. The number of alcohol-related accidents fell by more than a quarter in the two years following the introduction of this measure.

Estonia introduced the random samples of exhaled air in 2005. In the same year, 180,000 drivers were checked. The proportion of drivers driving under the influence of alcohol decreased from 1.86% in 2004 to 1.19 in 2005.

Expenditure shall include the value of the checks carried out and the administrative costs. The benefits consist in reducing the costs associated with road accidents. According to one Norwegian study, tripling the number of random exhaled air samples would lead to a 3% drop in fatal crashes, with benefits outweighing costs by a ratio of 1:2.





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово



Figure 3. Breathalyzer for registration of alcohol in drivers.

#### 4.5. Analysis of population attitudes

In order to better understand the problems of road traffic, traffic safety and transport infrastructure in the municipality, an online survey was made among the residents of Borovo Municipality on these issues. It shows the attitudes of the population and their usual behavior when moving within the boundaries of the municipality. The survey is available for completion at: <https://forms.gle/tco2FzgFW9h53vjZ6>

Below are commented the results of this survey, which also defined some of the proposed measures afterwards.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



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Колко важен е всеки от посочените показатели за Вас, като жител на общината?

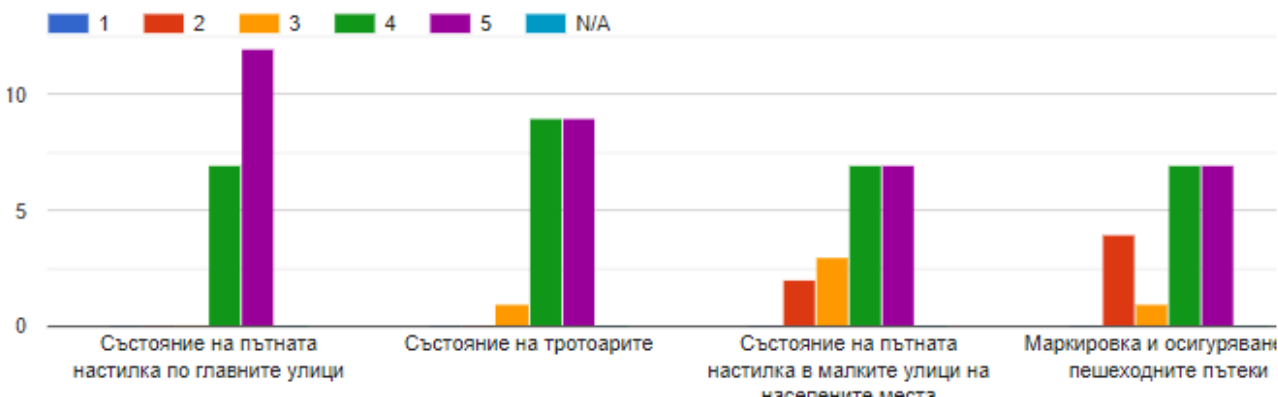


Figure 4. Significance of indicators of the state of the road infrastructure in Borovo Municipality

As seen in Figure 4, the most important for the residents of the municipality are the condition of the road surface and sidewalks for safe and easy movement of pedestrians. This is normal, given that these are the most used elements of the road infrastructure in any settlement. A characteristic feature is that through the town of Borovo there is almost no transit traffic – the busiest road in this respect in the region is far beyond the boundaries of the municipal center or the other settlements. In this situation, the state of the road infrastructure outside the settlements is important, but it is not the most important for the road users.

Какво е Вашето мнение за състоянието на пътната инфраструктура в Община Борово?

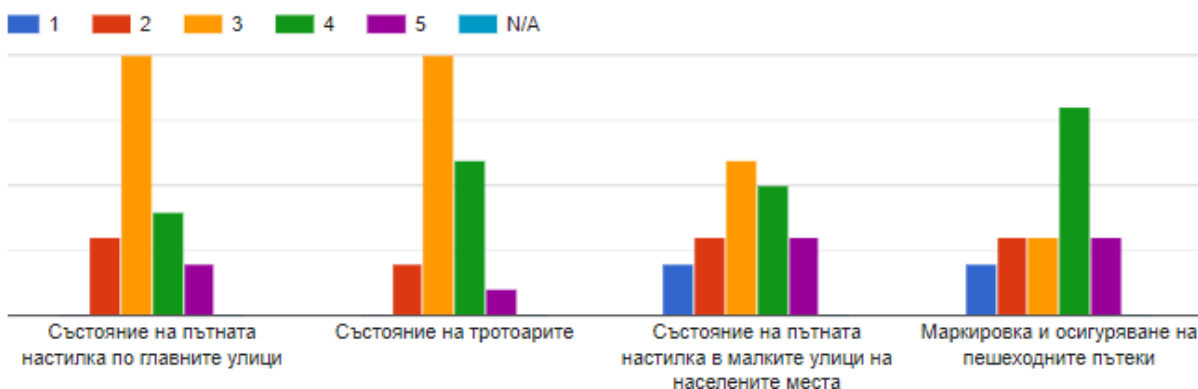


Figure 5. Assessment of the state of the road infrastructure

According to this indicator, the most for all types of infrastructure are the positions 3 and 4 – these are average assessments of its condition. The residents of Borovo Municipality believe that the main streets in settlements and



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

sidewalks are most in need of repairs. This also defines some aspects of road safety and measures to improve it. In the villages of the municipality often the busiest streets are in the worst condition because of the large period (sometimes over 15 years) between two major repairs. Most of the streets were last renovated more than 20 years ago and the asphalt is in poor condition. Patches give only a temporary effect, and usually after winter new and many problems appear. In addition, the sidewalks are at a good technical level mainly in the town of Borovo. In the villages, most of them are already grassed and are difficult to use. This is confirmed by the results of the survey. However, people are relatively satisfied with the condition of pedestrian crossings and street lighting.

За кои услуги, според Вас би трябвало да се увеличи бюджетът, за да получите по-добри услуги?

19 responses

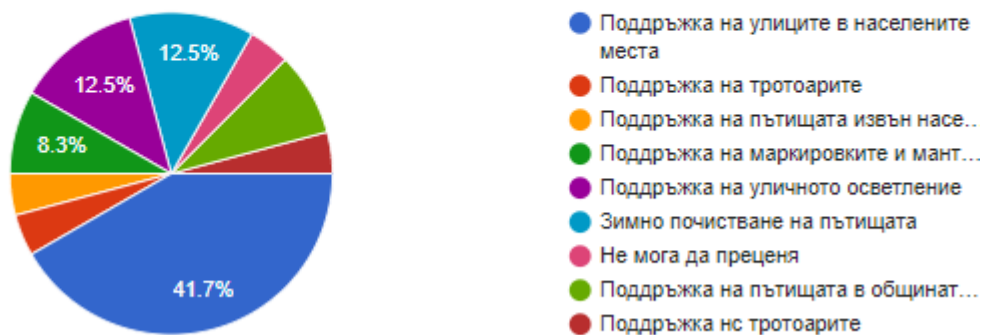


Figure 6. Assessment of the importance of the provision of road infrastructure maintenance services and its elements.

To this question, as expected, there are the most answers about the maintenance of streets in settlements. They are used daily by all residents and are the most visible problems in them. If we add the percentages of this answer with the response rates "Winter road cleaning" we will see that over 50% of respondents actually consider this to be the most important indicator at the municipal level.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Мислите ли, че градът има нужда от ремонт на включването на ул. Горна манастирица към път I-5?

19 responses

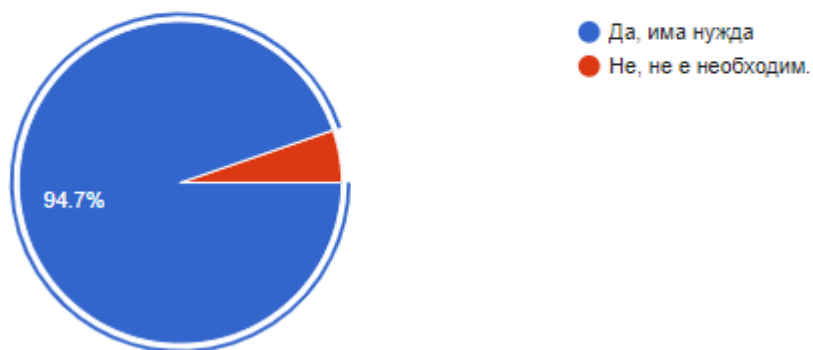


Figure 7. Polling a specific problem – a new connection to route I-5.

Almost all respondents point to securing the connection to the international road I-5 as an important and significant problem for the city, as through it a large part of the residents of the town of Borovo travel to the regional center - Ruse and Romania. This is an intersection of both great importance and a huge risk to traffic safety, as it is not secured and there are very serious accidents.

Мислите ли, че сте добре информирани, по отношение на общинските разходи за пътна инфраструктура?

19 responses

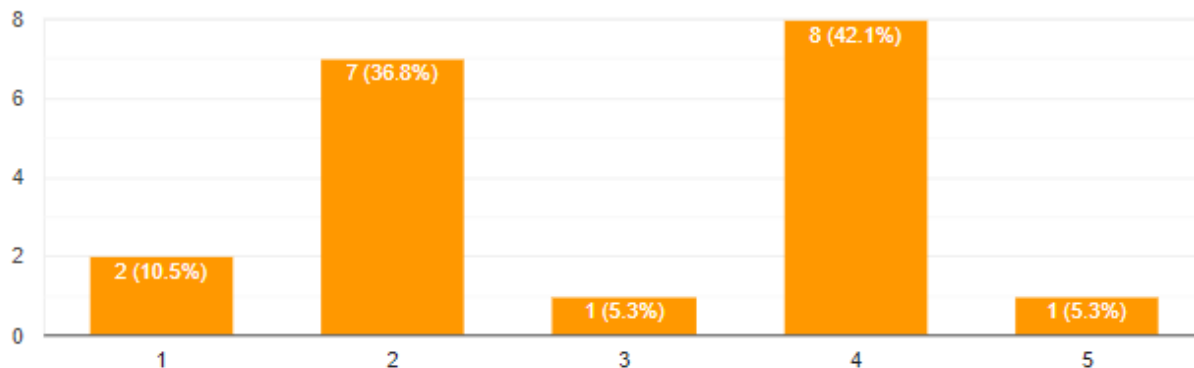


Figure 8. Attitudes on the awareness of the population regarding the spending of municipal funds for repair and maintenance of infrastructure.



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ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Here the consumers surveyed are divided into two groups - half of them are considered well informed and the other - insufficiently informed. This is determined by the profile of the respondents- most of them are employees of the Municipality of Borovo and they belong to the second group. Surely both in this municipality and in any other municipality the need for more awareness on this issue is there and deserves the attention of municipal administrations.

#### Използвате ли мобилния си телефон, докато се разхождате на улицата?

19 responses

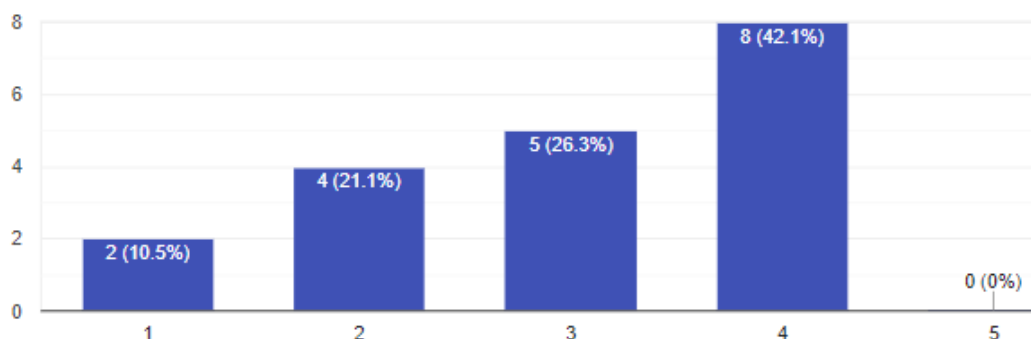


Figure 9. Road safety – usability of mobile phones while moving.

Typical for our modern information society – most users often or constantly use their mobile phones while moving. Most of them talk on the phone, but not a small percentage of those who view content on them - mainly from social networks such as Facebook. This implies serious involvement of the attention of pedestrians and some of the drivers. It is this phenomenon that has caused an increase in road accidents with pedestrians in settlements over the past few years.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Като пешеходец, колоезач, обучаващ се шофьор или шофьор, кой е предпочитаният от Вас източник за получаване на обща информация за пътната безопасност и трафика?

19 responses

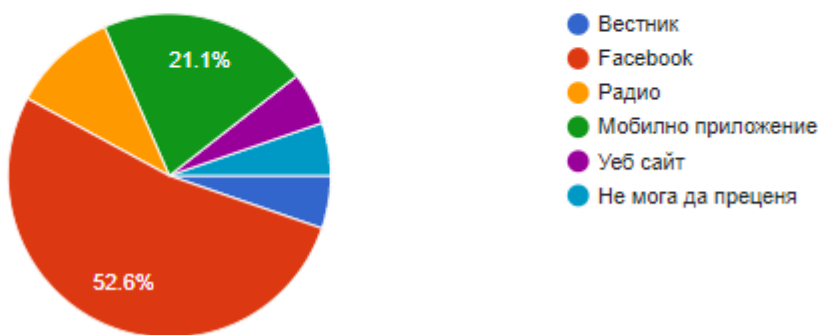


Figure 10. Usability of individual information channels to obtain information

Кои проблеми на пътната инфраструктура в общината са най-спешни за решаване, според вас?

19 responses

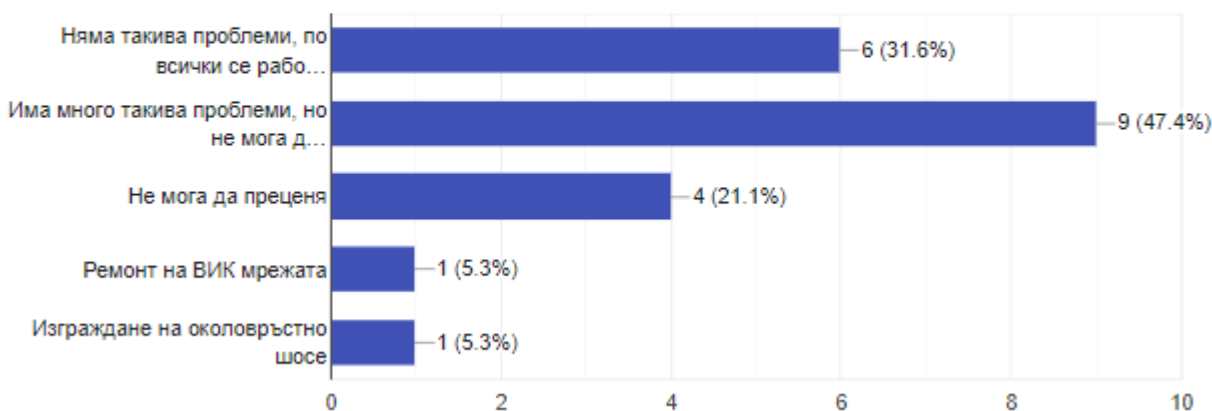


Figure 11. General query to indicate specific problems (open answer)

In a similar way, they refer to the question of what exactly are the problems, if they see any. Although most believe that there are such problems, they still cannot name them precisely (with one or two exceptions). However, most



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

of the respondents definitely think that the railway line passing through the city is not sufficiently secured (in the figure below):

Мислите ли, че градът има нужда от ремонт на включването на ул. Горна манастирица към път I-5?

19 responses

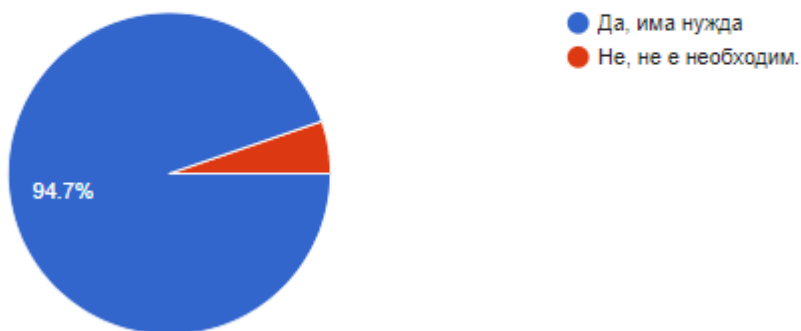


Figure 12. Inquiry on a specific problem regarding infrastructure repair

It is noteworthy that when the question is asked specifically, the answers are more explicit and citizens tend to express their opinion more easily.

Според вас добре ли е обезопасена ж.п линията, която минава през град Борово?

19 responses

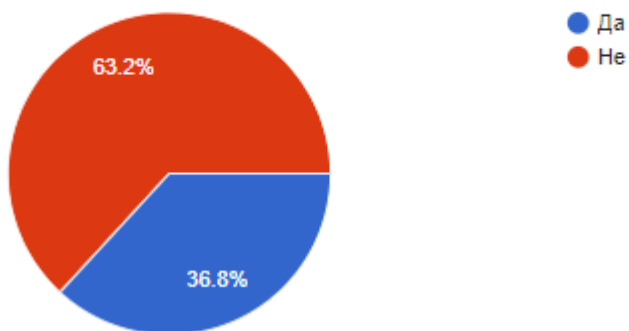


Figure 13. A specific question about the passage of the railway line through the city and its safety.





ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

When it comes to the railway, most respondents do not take into account the fences and markings made, perhaps because the line is not completely insulated with a fence and give the answer that it is not safe enough. It is true that there is no complete partitioning of the line itself, but on the other hand the trains pass through the city very slowly and in specific time intervals, which makes the passage predictable. In addition, the line itself does not have sections with reduced visibility and pronounced turns, which to a certain extent protects pedestrians from errors. The fact is that train accidents in the town of Borovo for very little (2-3 for the last 20 years), which nevertheless speaks of this problem as a potential danger.

The majority of the surveyed users use and receive information about both road safety and all other issues from social networks, which shows the great importance of pages with specialized content (road safety, traffic, repairs, etc.) for the awareness of the residents of the municipality. This is an important sign for the municipal leadership to pay more attention to the publication of such content for better prevention of road safety.

Мислите ли, че пътищата в населените места са достатъчно обезопасени, осветени и маркирани с цел осигуряване на безопасност на движението?

19 responses

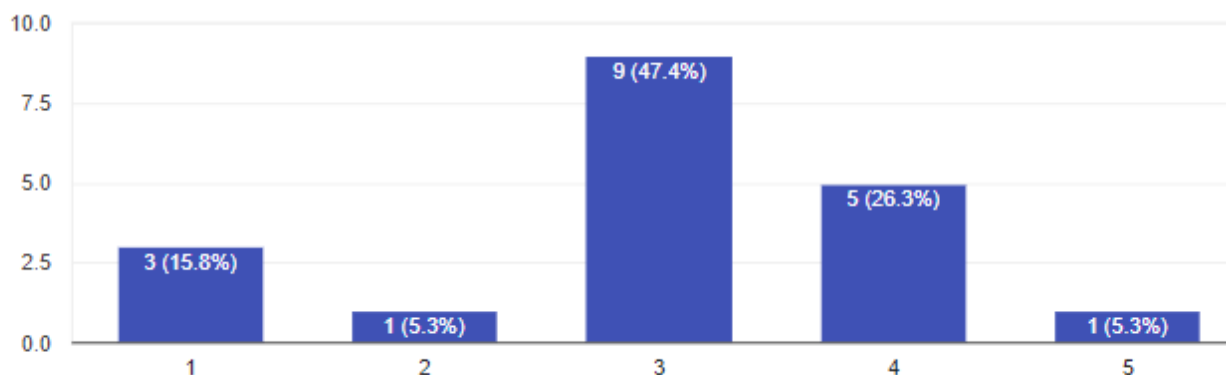


Figure 14. Road safety attitudes.

Most respondents are moderate in their assessment of road safety in the Municipality of Borovo. The large percentage of 47.4 % believes that there is more to be desired, but still much has been achieved in terms of roads in the municipality.

When asked which source of information they prefer, most locals are answered by social networks and mobile applications. They are most likely to use mainly their mobile phones, which have since established themselves as a universal means of obtaining information about the surrounding world. Older residents still prefer radio, but such news



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

can only be received there is a local radio, which does not exist in the town of Borovo, which is why this channel of communication is inaccessible, at least as far as events related to local events and problems are concerned.

The small percentage of disinterested people who answer "I can't tell" is impressive. Such users are simply not interested in such information, but they are only about 8% of respondents. To both this and the question "What would make you visit a road safety website Facebook page / Twitter page for young drivers?" the main answer is to get information directly about specific events.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



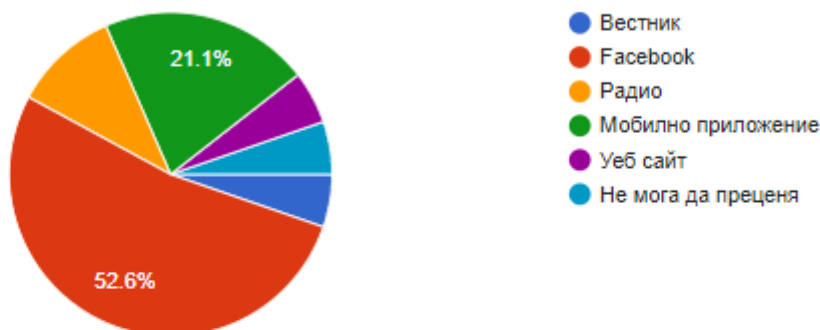
БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

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19 responses



Ако имаше на разположение Ръководство за пътна безопасност, което да четете, в какъв формат бихте предпочели да бъде?

19 responses

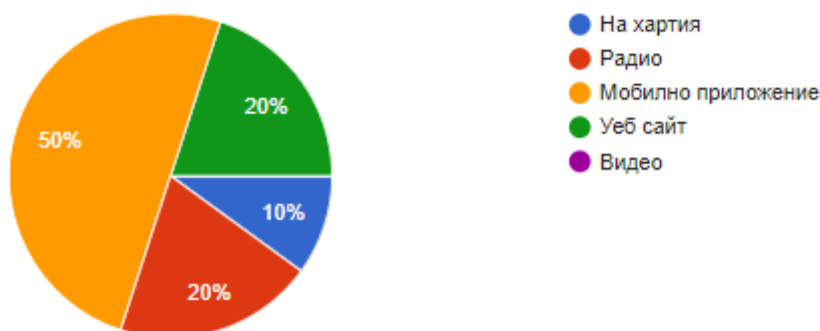


Figure 15. Attitudes of respondents regarding sources of information

In conclusion, in the Municipality of Borovo the main problems on the issues discussed are related to the state of the road infrastructure. Traffic in the municipality is not intense, except on road I-5 and this implies a low concentration of road accidents.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

## 5. OPPORTUNITIES AND RECOMMENDATIONS FOR THE DEVELOPMENT OF SAFETY MEASURES IN THE CROSS-BORDER AREA

In the light of all the above facts and analyses, the possibilities for development of safety measures in the cross-border area of Borovo-Giurgiu can be divided into two logically autonomous parts- for settlements and beyond.

### 5.1. Opportunities for development of measures in settlements

Borovo municipality consists of eleven settlements:

| Location                                | 2011 census | Land area(in km <sup>2</sup> ) | Population density per km <sup>2</sup> |
|---|-------------|--------------------------------|--|
| <a href="#">G. Borovo</a>               | 2045        | 37                             | 55                                     |
| <a href="#">Obretenik village,</a>      | 1410        | 39                             | 36                                     |
| <a href="#">v. Exarch Joseph.</a>       | 605         | 38                             | 16                                     |
| <a href="#">v. Batin,</a>               | 596         | 39                             | 15                                     |
| <a href="#">Gorno Ablanovo village,</a> | 1081        | 63                             | 17                                     |
| <a href="#">Brestovitsa village</a>     | 269         | 20                             | 13                                     |
| <a href="#">Volovo village.</a>         | 168         | 15                             | 11                                     |

Table 27. Statistics on settlements in Borovo municipality

Borovo municipality has a main settlement the town of Borovo, which in population and organization of the movement resembles the town of Giurgiu, although it is smaller in population and area. The city of Giurgiu has very similar indicators in quality and infrastructure development as those of the town of Borovo, but with a population of 54,655 people in 2011 it is closer to the city of Ruse as demographics. However, some general regularities can be derived, according to the spatial location of road accidents, and their distribution by type and frequency.

#### Recommend the following measures to ensure traffic safety:

- Organizing and conducting enhanced municipal and police control over the implementation of parking regulations and compliance with the priority in the stops of vehicles for public transport of passengers in order to increase pedestrian safety and public awareness;



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- Regulation and marking with horizontal and vertical road marking of conflict zones, especially those in which traffic is daily cyclical for access to workplaces and vice versa, as well as access to schools;
- Construction of a Danube first-class road between Svishtov and Ruse, which will significantly reduce the time and distance between the two cities and will eliminate a significant part of the traffic on road I-5, where the main part of the road accidents in the municipality of Borovo belong.
- Improvement of the regulatory framework at local level and maintaining in constant working order the signaling, lighting and marking of the existing pedestrian crossings and sidewalks;
- New design and reconstruction of the intersection of road I-5 with Gorna Manastiritsa Street. The intersection is constantly used at the exit from the northern part of the city and is very dangerous due to the lack of any road markings and markings. It is necessary after the rehabilitation of the street. Gorna Manastiritsa to make an extension of the street when it is included in road I-5 so as to provide lanes for a turn to the left. It is also necessary to build an extension of road I-5 with the provision of lanes for conflict-free entry from the international road to Gorna Manastiritsa Street. Speed limit road signs should also be placed in the area of the intersection.
- Conducting awareness campaigns about the dangers of pedestrian traffic in the area of the two cities;
- Improving visibility between pedestrians and drivers of vehicles at identified problematic locations, especially in the immediate pedestrian crossing areas;
- Establishment of an organization to raise public awareness of the dangers to pedestrian traffic, the mechanism of road accidents involving pedestrians over 65 years of age;
- Conducting information campaigns and other forms of training of older pedestrians;
- Development of a system of measures to build an adequate transport system to ensure mobility for people with disabilities;
- Increasing the usability of reflective elements by pedestrians for better visibility in the dark part of the day;
- Implementation of intelligent transport systems with video surveillance and interactive systems for road announcement - type information boards;
- Conducting analysis and preparation of programs for securing railway crossings on roads in populated and outside settlements;
- Encouraging movement by bicycles, scooters, incl. electric through the development of bicycle lanes;
- Construction of alternative routes (or, if available, repair and expansion of road sections) for part of the transit traffic, in order to provide opportunities for the separation of freight and passenger traffic;
- Installation of speed control cameras on the busiest areas with accidents;
- Building a system for instant reporting of road violations and their sanctioning by serving fines and acts by law enforcement authorities (for example, teams that monitor the presence of vignettes);



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

- Construction of pedestrian restriction corridors of fittings at three locations in the southern part of the city in places where there is frequent passage of the railway line by citizens and the placement of automatic light and sound alarm without barriers

All these measures can only have an effect if they are implemented in a planned and consistent manner, with the participation of all stakeholders in the cross-border area.



ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

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ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

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ЕВРОПЕЙСКИ СЪЮЗ  
ЕВРОПЕЙСКИ ФОНД ЗА РЕГИОНАЛНО РАЗВИТИЕ  
ИНВЕСТИРАМЕ ВЪВ ВАШЕТО БЪДЕЩЕ!



РУМЪНСКО ПРАВИТЕЛСТВО



БЪЛГАРСКО ПРАВИТЕЛСТВО



Община  
Борово

Regional Development Strategy of Pleven District 2014–2020

Regional Development Strategy of Ruse District 2014–2020

Regional Development Strategy of Veliko Tarnovo District 2014–2020

Regional Development Strategy of Dobrich District 2014–2020

Regional Development Strategy of Silistra District 2014–2020

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Date: 30.11.2020 Signature and seal:.....