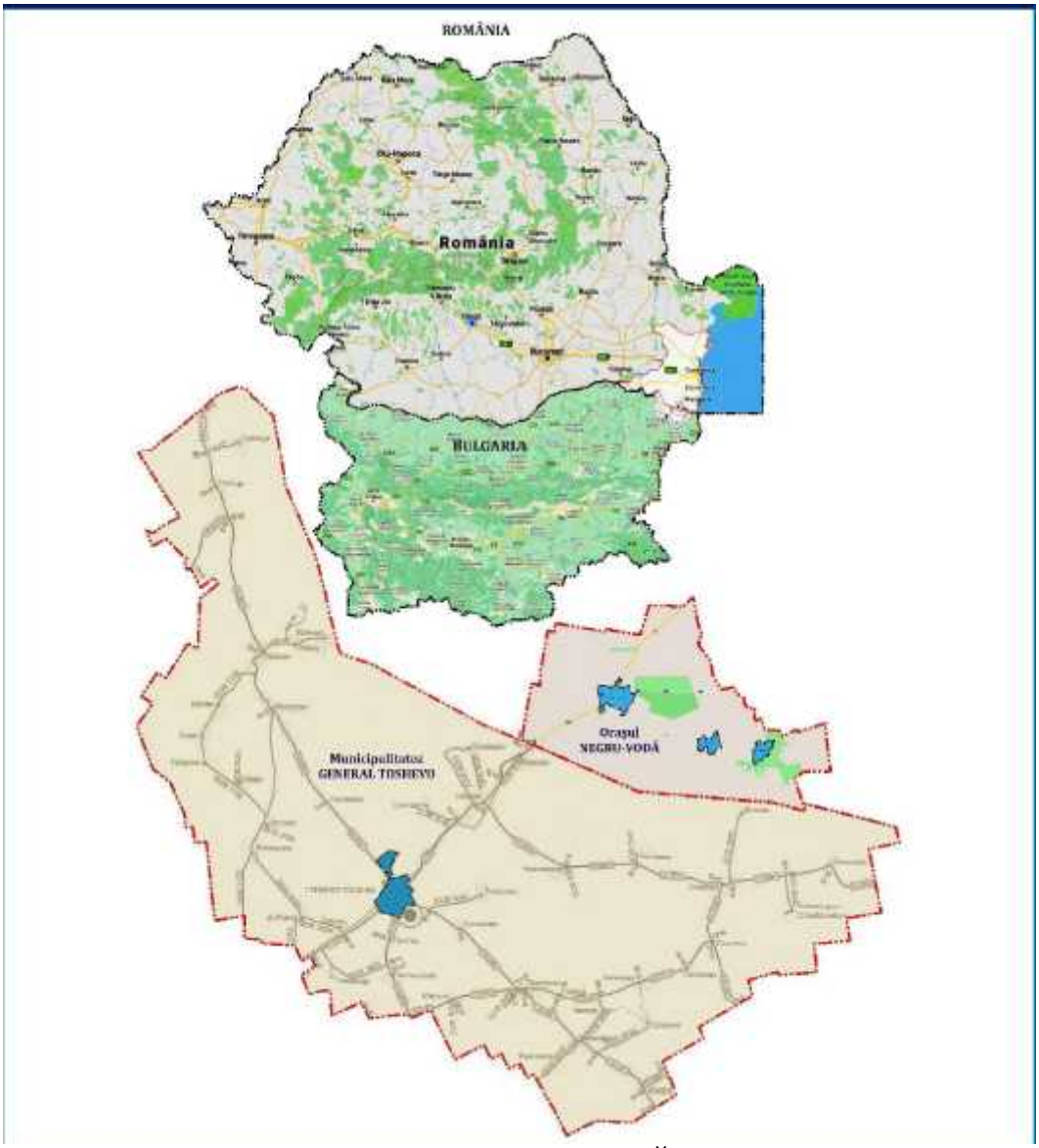
ADMINISTRATIVE-TERRITORIAL UNIT/
UAT NEGRU VODĂ TOWN

TRAFFIC MANAGEMENT STUDY

WITHIN THE PROJECT

"INCREASING ACCESSIBILITY TO THE TEN-T IN THE BORDER AREA NEGRU VODĂ - GENERAL TOSHEVO"



Recipient: UAT **NEGRU VODĂ TOWN**

Designer: **SIGMA MOBILITY ENGINEERING**

2021

TRAFFIC MANAGEMENT STUDY

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"INCREASING ACCESSIBILITY TO THE TEN-T IN THE BORDER AREA NEGRU VODĂ - GENERAL TOSHEVO"

Service Contract No. 182 / 14.01.2020

Recipient: UAT NEGRU VODĂ TOWN

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1. INTRODUCTION

1.1. The aim and function of the documentation

The work **«Traffic management study within the project "Increasing accessibility to the TEN-T in the border area Negru Vodă - General Toshevo"»** aims to analyze the current situation regarding road traffic in the town ofNegru Vodăin Romania and in the town of General Toshevo in Bulgaria and to solve the problems of all the streets in the studied area.

In the European context, the main objective of European transport policies is to create a transport system that supports economic progress, strengthens competitiveness and provides high-quality mobility services, while ensuring a more efficient use of the resources and a much lower impact on the environment, as set out in the "*ResourceEfficient Europe*" initiative presented in the Europe 2020 Strategy.

The "White Paper on Transport"[1], drawn up by the European Commission, is the key document of the European Union which addresses mobility. According to it: "*Infrastructure shapes mobility. No major change in transport will be possible without the support of an adequate network and more intelligence in using it. Overall, transport infrastructure investments have a positive impact on economic growth, create wealth and jobs, and enhance trade, geographical accessibility and the mobility of people. It has to be planned in a way that maximises positive impact on economic growth and minimises negative impact on the environment*".

As an integral part of the European Union and as a full member of the European Commission, Romania must comply with the "Transport Policies", as well as with the "Regional Policies and Instruments for the Structural Funds". Interventions in transport systems are planned in such a way as to maximize economic development and minimize the impact on the environment.

Considering the process of urban development, mobility has become one of the main challenges for local governments. Currently, transport covers about 20% of global energy demand, accounting for about 25% of CO_2 emissions from energy consumption. The negative effects associated with high traffic volumes, such as pollution, traffic safety

[1]White Paper on Transport, European Commission, 2011.

problems and noise, are the main dysfunctions which require rapid interventions in order to improve citizens' mobility.

The project **"Increasing accessibility to the TEN-T in the border area Negru Vodă - General Toshevo"**- in which the study is conducted, aims to improve the connection to the TEN-T network for the communities of the two towns and for traffic participants in the border region.

The traffic study area is represented by the territory of the town of Negru Vodăin Romania and the town of General Toshevo in Bulgaria. The analyses regarding the interaction with the major traffic network will take into account the potential associated with the national and county roads that go through the urban territory (figure 1.1).

1.2. Correlationwith regional and local strategic documents

The existing documents at regional level covering the areas related to mobility and transport for the two analyzed townsare the following:

- → South-East Regional Development Plan2014-2020;
- → Integrated Strategy for Sustainable Tourism Development in Constanța County 2019 – 2028;
- → Development Strategy for the Dobrich District 2014-2020

South-East Regional Development Plan2014-2020

The South-East Regional Development Agency elaborated in 2014 the South-East Regional Development Plan 2014-2020, aiming at regional development. The vision of the South-East Regional Development Plan is to maintain the region's attractivity with the help of a stable economy.

The general objective at regional level is: *Promoting sustainable development and improving the quality of the population's life, so that it becomes a long-term competitive and attractive for investment region, capitalizing on environmental heritage, highly qualified human resources, creating new employment opportunities and a significant increase in regional GDP by 2020, up to 90% of the national average.*

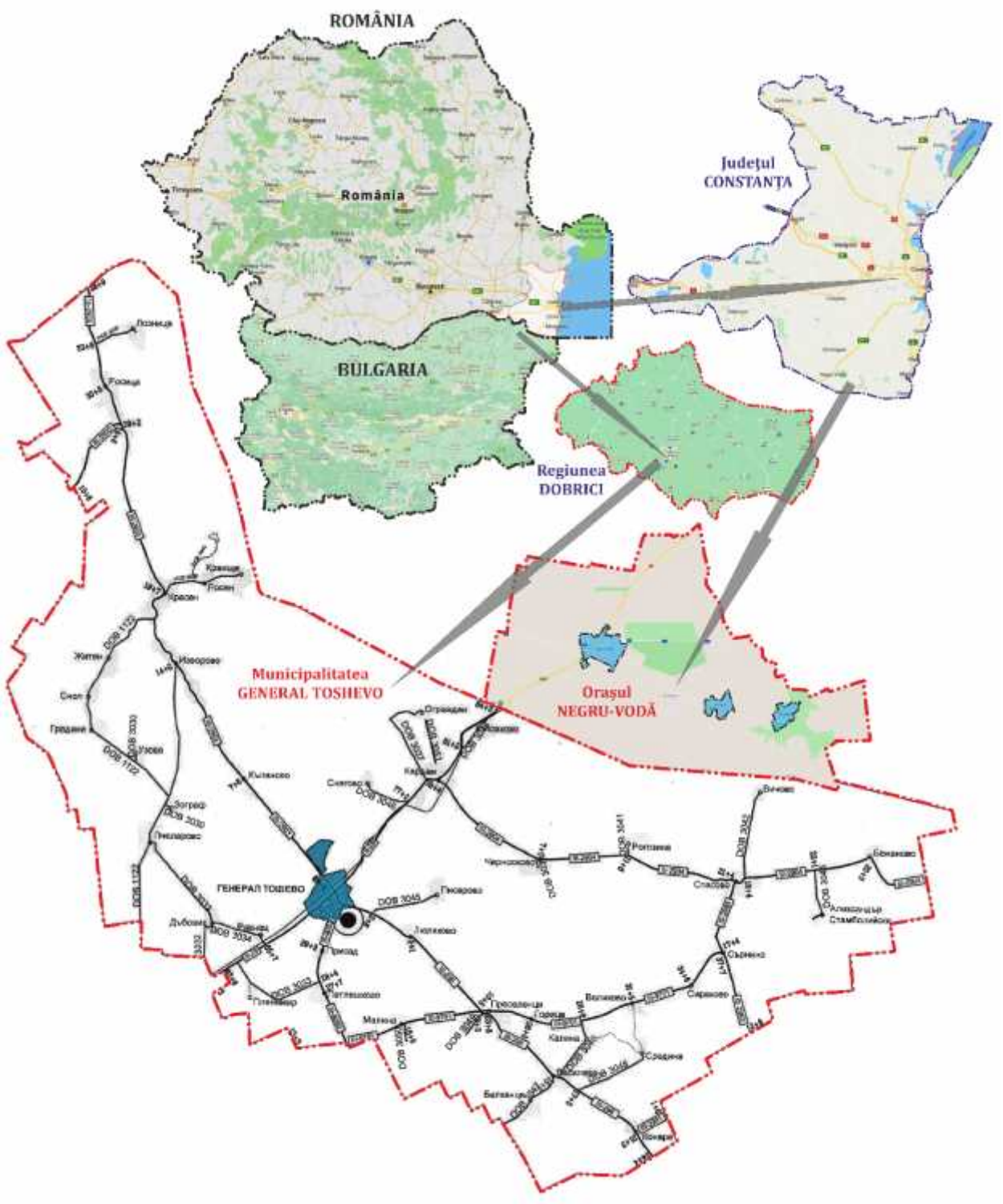


Figure 1.1.*The studied area.*

In order to achieve the general objective, a series of specific objectives(O.S.) have been proposed, as follows:

- **O.S. 1.1.** *Increasing the attractiveness and competitiveness of urban areas in order to preserve, protect and develop the historical and cultural heritage for the development of the region;*

- **O.S. 1.2.** *Improvingthe living conditions, the public spaces, the quality of the environment in urban areas and developing an ecological urban public transport;*
- **O.S.2.1.** *Improving accessibility, mobility and regional connectivity, by developing a road transport system based on the principles of sustainability, innovation and security, capable of ensuring fast and efficient connections with international markets;*
- **O.S. 2.2.** *Improving accessibility, mobility and regional connectivity by developing a competitiveharbour transport system;*
- **O.S. 2.3.** *Improving accessibility, mobility and regional connectivity by developing a competitive air transport system;*
- **O.S. 3.1.** *Development of RDI (Research, Development and Innovation) infrastructure and of synergies between enterprises and these centers, by using innovative products and processes;*
- **O.S. 3.2.** *Supporting the development of companies in order to increase regional competitiveness and create new jobs;*
- **O.S. 4.1.** *Increasing the level of promotion and the degree of economic capitalization of the local tourist potential (recreational, scientific, educational, hunting and fishing, balneary and treatment, cultural, oenological and gastronomic tourism, etc.);*
- **O.S. 4.2.** *Improving the specific tourism infrastructure in order to increase the attractiveness of the region as a tourist destination;*
- **O.S. 5.1.** *Efficient and sustainable capitalization of the natural heritage by creating / modernizing the necessary infrastructure in order to ensure the supply of drinking water to the population and to collect and treat wastewater in order to increase the quality of life;*
- **O.S. 5.2.** *Protecting the environment by strengthening and expanding integrated waste management systems, supporting investments that promote the prevention of waste generation, the reuse, including their use as secondary raw materials / by-products in order to increase the efficiency of natural resources' use and the decontamination of contaminated sites;*
- **O.S. 5.3.** *Preventing and reducing the impact of climate change by implementing measures to protect the environment and to prevent environmental risks and to develop and strengthen professional and voluntary emergency services and rapid response centers;*
- **O.S. 5.4.** *Conservation and restoration of natural ecosystems by maintaining / improving the state of environmental factors and by the sustainable management of protected areas;*
- **O.S. 6.1.** *Improving the energy efficiency of buildings in the residential sector and capitalizing on renewable resources for the production of electricity and thermal energy;*

- **O.S. 6.2.** *Improving the energy efficiency of buildings in the public sector and of the public lighting system and capitalizing on renewable resources for electricity and thermal energy production;*
- **O.S. 7.1.** *Increasing the participation rate of the population in the education system by improving education services and the infrastructure of the education system;*
- **O.S. 7.2.** *Increasing the quality of medical services and of the infrastructure in order to improve the health of the population;*
- **O.S. 7.3.** *Increasing the quality of social services and of the social service infrastructure in order to fight poverty and for social inclusion;*
- **O.S. 7.4.** *Reducing the degree of poverty by ensuring improved living conditions for disadvantaged communities, as well as providing basic services - medical, educational, social - in order to increase employment and social inclusion;*
- **O.S. 8.1.** *Diversifying the rural economy by increasing the number of enterprises, including thosein the non-agricultural sector, encouraging the maintenance and development of traditional activities in rural areas;*
- **O.S. 8.2.** *Increasing the competitiveness and sustainability of the fisheries sector;*
- **O.S. 8.3.** *Increasing the quality of life in rural areas through the development of rural infrastructure, including through the conservation, protection and development of historical and cultural heritage;*
- **O.S. 9.1.** *Improving the performance of human resources through investments in infrastructure;*
- **O.S. 9.2.** *Improving public services, promoting partnerships at regional / local level and creating a modern, flexible, inclusive regional labor market in order to meet the needs of the market;*
- **O.S. 10.1.** *Supporting the development of companies so as to implement projects in the field of cross-border and interregional cooperation in order to increase competitiveness and to create new jobs;*
- **O.S. 10.2.** *Reducing risks in the cross-border area by identifying, assessing, monitoring and addressing disaster risks and strengthening early warning;*
- **O.S.10.3.** *Improving the capacity for cooperation and the efficiency of public administrations in the context of the CBC.*

Integrated Strategy for Sustainable Tourism Development in Constanța County 2019 - 2028

The Integrated Strategy for Sustainable Tourism Development in Constanța County 2019 – 2028Phase II was developed in 2019 by the National Institute of Research and Development in Tourism, proposing the following vision: "*In 10 years Constanța County will be a competitive tourist destination at European level, developed on sustainable principles, attractive for 365 days per year, with a wide range of attractions and tourist experiences*

offered, spread in a balanced manner throughout the entire area. Tourism, as a basic economic activity in Constanțacounty, will create new opportunities for employment and for improving the quality of life of the local population".

The specific principles for the sustainable development of tourism in Constanța County are:

- *Tourism development brings economic and social benefits to the local community;*
- *Tourism development contributes to the conservation, rehabilitation and capitalization of cultural heritage and has a minimal negative impact on local culture;*
- *The development of tourism contributes to maintaining a clean natural environment, and tourism activities have a minimal negative impact on it;*
- *Tourism development meets the needs of tourists.*

The general objectives for the development of tourism are:

I. Reducing tourism seasonality and positioning of Constanța County as a 365-day tourist destination;
II. Territorially balanced tourist development at county level so that the economic benefits generated by tourism spread from the coast to the interior of the county;
III. Improving the tourism attractiveness of the destination in order to increase the competitiveness of the tourism product.

In order to achieve the 3 general objectives, the following specific objectives were identified:

- **O.S. 1.***Improving the management-marketing tourist activity at the destination level by creating specific structures and instruments;*
- **O.S. 2.***Improving accessibility, in order to increase the mobility of visitors towards and within the tourism destination;*
- **O.S. 3.***The restoration, protection and sustainable capitalization in tourism of the cultural and natural heritage of Constanțacounty;*
- **O.S. 4.***The creation / modernization of the tourism infrastructure in order to increase the attractiveness and competitiveness of the destination;*
- **O.S. 5.***The development of a varied palette of tourism products, attractive for different segments of tourists, which would contribute to the improvement of the tourist experience, the diminution of the seasonality and the directing of the tourist flows towards the interior of the county;*
- **O.S. 6.***Ensuring labor resources in the tourism sector ofConstanțacounty, both in terms of quantity and of quality;*
- **O.S. 7.***Increasing the degree of satisfaction and safety of tourists, offering a quality tourism product, recognized as such and reducing the negative impact that economic activities in tourism and related activities have on the environment, cultural and natural heritage;*

- **O.S. 8.***Consolidating the image of the destination and achieving a unitary promotion of the destination.*

Dobrich District Development Strategy 2014 - 2020

The objectives and priorities formulated in the Dobrich District Development Strategy 2014-2020 reflect the expectations and challenges for implementing regional policy in Bulgaria and in the EU, taking into account the responsibilities and capacity of regional authorities and partners to effectively plan, coordinate, monitor and evaluate district development.

According to the proposed vision, as a result of the implementation of the Strategy, the level of economic development and living conditions in the localities in the area will increase significantly, aiming to reach the average level of socio-economic development in the EU, using smart, sustainable, inclusive and ecological resources. The proposed development will be based on the specific potential of the area by promoting traditional industry and taking advantage of the strategic geographical location on the border with Romania and the Black Sea.

Vision 2020: *Dobrich District, a territorial unit in sustainable development, attractive for investments, in which the local community will live and work in a harmonious natural, social and business environment.*

The general development objective 2020 proposed for achieving the vision is: *The Dobrich District will continue to develop on the basis of its comparative advantages, dynamically developing the local economy, effectively absorbing funds from the national budget and the European funds.*

In line with the proposed vision and general objective, the following strategic objectives have been formulated in the Strategy:

1. Increasing the potential of the human resources, increasing the level of employment, of income and achieving social integration of disadvantaged groups;

2. Creating conditions for increasing the competitiveness for a dynamic development of the district, while reducing the differences both within it and in relation to the neighboring districts;

3. Stimulating balanced territorial development by establishing appropriate models of territorial organization, improving ecological conditions, efficient use of cross-border and interregional cooperation mechanisms.

The sectoral strategic document at local level for ***Negru Vodă Town*** is **the *Sustainable Development Strategy 2015-2020 of Negru Vodă Town*.**

The Sustainable Development Strategy 2015-2020 of Negru Vodă Town was drawn up within the project "Developing the capacity for strategic planning at the level of local public administration authorities of cities in Romania, SMIS code 27520", having as general

objective:*Strengthening the administrative capacity of central and local public administration authorities*.

With regard to the transport sector, a series of projects have been identified within the strategy, as follows:

- Establishment and execution of sidewalks in Negru Vodă town and Darabani and Vâlcelelevillages;
- Increasing the accessibility to the TEN-T network in the cross-border area (asphalt work on 13 km of the streets inNegru Vodă town and the DC 14 road which connects Negru Vodă town and Vâlcelele village);
- Asphalt work on streets in Darabani and Vâlcelelevillages;
- Execution of Negru Vodă town's ring road for the diversion of heavy traffic at the border with the Republic of Bulgaria;
- Asphalt work on streets belonging toDarabani's Section.

The sectoral strategic document at local level for General Toshevo Town is the ***Integrated Development Plan for the General Toshevo Municipality for the period 2021-2027***.

The vision of the development of the General Toshevo municipality proposed in the Plan has a perspective beyond the year of 2027 and is formulated as follows: General Toshevo Municipality - *agricultural border region integrated with fertile agricultural land, a good standard of living and a competitive economy , an attractive place for investments and innovations with highly educated human capital, developed communications and in an environment of nature, culture and preserved traditions.*

This is in line with the vision of the Municipal Development Plan for 2014-2020 period, the vision of the Integrated Territorial Development Strategy for the Northeast region and the vision of the National Development Program „Bulgaria 2030".

To achieve the proposed vision, the innovations must be developed and implemented in all sectors of the local economy, while investing in human capital education and training. The cultural and natural resources of the municipality must be used responsibly and sustainably to attract investments in tourism development.

The municipality must integrate at a global level through the existence of accessible and quality roads, of accessible and convenient high-speed fiber optic connections, confirming its position in the region and taking advantage of its cross-border geographical location. Citizens must play an active role in the future of their municipality and have many opportunities for personal and professional development.

In order to implement this vision, it is necessary to use the most economically efficient and advantageous means and to encourage behavior that leads to development that is successful and in harmony between man and nature. To achieve the vision, the focus will be on local resources and potential, which with the help of attracted investments and EU financial instruments, will become a competitive advantage for the municipality.

The integrated development plan for the General Toshevo municipality for the period 2021-2027 sets the following strategic objectives:

- *Strategic Objective 1: Accelerated economic development, attracting investment, innovation and new technologies to increase competitiveness;*
- *Strategic Objective 2: Population growth, promotion of education, social inclusion, spiritual development, preservation of traditions and cultural heritage;*
- *Strategic Objective 3: Integrated territorial development and reduction of inequalities, through comprehensive improvement of transport infrastructure and of digital connectivity and accessibility, infrastructure renewal, energy efficiency and environmental protection.*

For the development of the action plan in accordance with the strategic objectives, five priorities have been identified, each of which will be implemented through a set of measures and activities. The limited number of key priorities reflects the chosen focus and specificity of the development. The priorities will be implemented in the form of specific projects, provided with human, financial and technical resources and in accordance with theirimplementation capacity and possibilities.

The key priorities of the Integrated Development Plan (IDP) for the General Toshevo municipality in the 2021-2027period:

- *Priority 1 - Strengthening the competitive position of the municipality, ensuring sustainable, innovative and intelligent economic growth based on local resources, improving the business environment and encouraging entrepreneurship;*
- *Priority 2 - Promoting green and blue investments, circular economy, clean environment, adaptation to climate change, prevention and risk management;*
- *Priority 3 – Good education, professional development and new knowledge for successful achievement, employment, high standard of living and population growth;*
- *Priority 4 – E-government, close to the citizens administration and provision of quality and accessible public services - administrative, health, social and cultural;*
- *Priority 5 – Accessibility and connectivity by improving infrastructure, mobility, telecommunications, digitization and integrated development for all types of territories.*

The fifth priority is complex and is mainly related to the construction and rehabilitation of technical infrastructure, which has a direct impact on the state of the environment. There is a lack of infrastructure in the region, including transport, water and energy, which have a negative impact on the state of the air, water and soil, and environmental protection is a priority in all national and European strategic and program documents.

The projects and activities included in the fifth priority are related to large investments and are expected to be funded by the Strategic Plan for Agriculture and Rural Development, the Environment Program, the Cross-Border Cooperation Programs, the Operational Program "Transport Connectivity", EMEPA , the Road Infrastructure Agency, the Water Supply and

Sewerage Company, Energy Companies, Telecommunication Companies and Other Sources. One of the sub-measures provided for in Priority 5 is *Measure 5.1 - Improving accessibility and connectivity to transport*, for which the following activities are proposed:

- *Improving the state of the national road network;*
- *Improving the communal road network;*
- *Improving the road and sidewalk network in thelocalities;*
- *Development of integrated ecological public transport.*

Overall, in a common framework within which the two towns fall, for the next programming period, it is proposed that cohesion policy interventions in the 2021-2027 period should focus on five investment objectives, as follows:

- **A smarter Europe**– innovative & smart economic transformation, with the following investment objectives:
  - *enhancing research and innovation capacities and the uptake of advanced technologies;*
  - *reaping the benefits of digitalization for citizens, companies and governments;*
  - *enhancing competitiveness of SMEsand internationalization.*
- **A greener, low-carbon Europe**, with the following investment objectives:
  - *promoting energy efficiency measures and renewable energy;*
  - *climate change adaptation, risk prevention and disaster resilience;*
  - *sustainable water management;*
  - *transition to a circular economy;*
  - *enhancing biodiversity, green infrastructure in the urban environment, and reducing pollution.*
- **A more connected Europe** – regionalmobility and ICT[2] connectivity, with the following investment objectives:
  - ***sustainable, climate change resilient, smart, and intermodal Trans-European transport networks, including ensuring improved access to Trans-European transport networks, national, regional and cross-border mobility;***
  - ***promoting multimodal urban mobility;***
  - *enhancing digital connectivity.*
- **A more social Europe** – implementing the European Pillar of Social Rights, with the following investment objectives:
  - *improving access to the labor marketthrough active policies in the field of the labor market, anticipating skills needs and supporting the transitions and mobility of the labor market;*

[2]ICT - Information and Communications Technology.

- *improving the quality, effectiveness and relevance of education and training systems for the labor market;*
- *fostering active inclusion, in order to promote the socio-economic integration of the Roma community, to strengthen access to quality services, to tackle material deprivation and to invest in housing, healthcare and long-term care infrastructure.*

- **A Europe closer to citizens**– sustainable and integrateddevelopment of urban, rural and coastal areas through local initiatives, with the following investment objectives:
  - *promoting integrated development in urban areas, especially in the county seat cities;*
  - *supporting local integrated social, economic, cultural and environmental development and security.*

In carrying out this study, the investment objectives mentioned were taken into account, as well as the planned guidelines, in particular those related to the development of transport networks and the fostering of sustainable urban mobility.

1.3. The concept of the study

In the strategic context presented above, the traffic management study will address the prospects for the evolution of road traffic taking into account the development of the Trans-European TEN-T transport network and road traffic in the area, given that the region is a key point for the transit of goods coming from Asia (via Turkey), arriving in Bulgaria, General Toshevotown, then crossing Kardam and being transported to Romania, via Negru Vodă, then following the route to the A2 motorway in order to be distributed throughout the country. This ensures the connection with the European 4 PAN corridor: Dresden / Nürnberg– Prague - Vienna - Bratislava - Győr - Budapest - Arad - Bucharest - Constanța / Craiova - Sofia - Thessaloniki / Plovdiv - Istanbul.

From the point of view of road traffic and systematization, the results of the study will be highlighted both in terms of the analysis stage of the current situation (year 2020) and in the forecast stage (year 2030) and in the proposals.

To this end, a traffic model has been created which is based on a division of the analyzed territory into traffic areas. This involves grouping different attraction- traffic generating centers from the modeled territory into traffic areas.

The advantages of using a traffic model at the level of the road network are:

→ the possibility to manage the data and the results of the simulation of the traffic flows according to the objective pursued at adequate levels of detail of the studied

road network. Providing the necessary details for the micro-modeling required at different stages of the study;

→ the adaptability of the traffic model to the subsequent needs to update the study during its development.

The traffic intensity between the tertiary nodes within the TEN-T network represented by the towns of Negru Vodă and General Toshevo is analyzed based on the traffic volumes recordedin the DN 38 connecting arteries on the territory of Romania and II-29 on the territory of Bulgaria.

2. ANALYSIS OF THE CURRENT SITUATION

2.1. The socio-economic context, identifying population densities and economic activities

2.1.1. Demographic data

The demographic variation in the territorial profile recorded in the last 18 years (since the 2002 population census) highlights the reduction by 4.3% in the number of inhabitants with permanent residence in Negru Vodă Town, a variation trend similar to the one recorded at national level (- 2.5%), however a much more pronounced one.

Figure 2.1 shows the variation in the number of inhabitants in the 2002 - 2019 period for Romania, Constanţa county and the urban localities in this county. The extreme values are given by the increase in the population by 17.5% in Eforie Town, respectively the pronounced decrease recorded in Mangalia Municipality (-8.3%). During this period, in the Municipalities of Constanţa and Medgidia decreases in the number of inhabitants by 6.6%, respectively 7.9%have been recorded.

The data regarding the total number of inhabitants available for 2019 are presented in table 2.1.

***Table 2.1**. The number of inhabitants, year 2019.*

Locality	Number of inhabitants	Source
Negru Vodă Town	5,704	National Institute of Statistics/INS, TEMPO On-line
	5,620	Directorate for Persons Record and Databases Management, Ministry of Internal Affairs

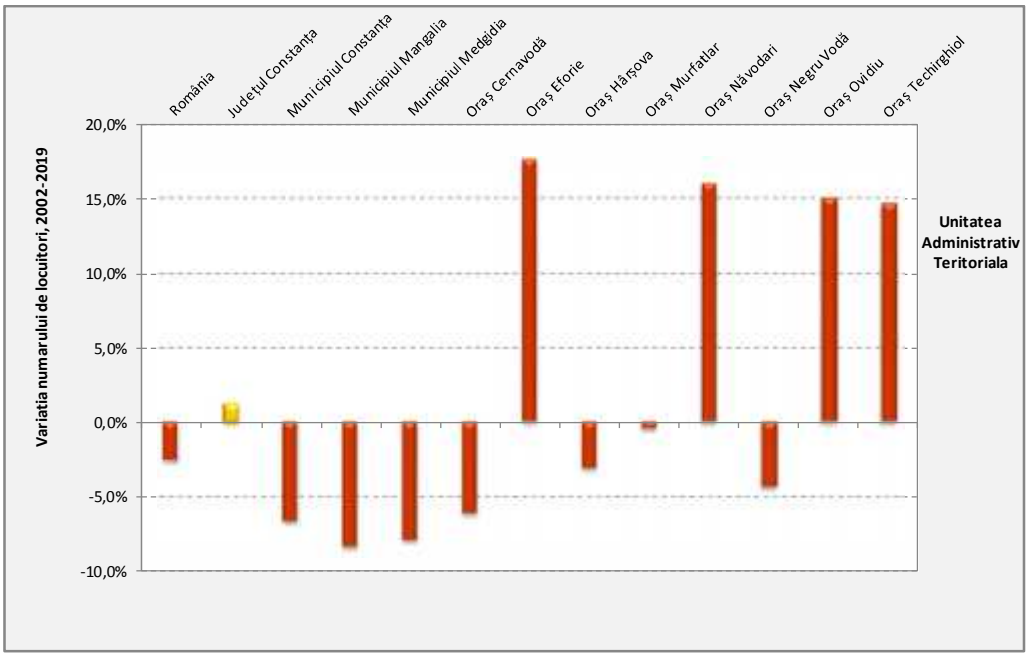


Figure 2.1.*The variation in the number of inhabitants in the 2002 – 2019 period, Constanța County's built-up areas.*
Data source: INS, TEMPO On-line.

Variația numărului de locuitori, 2002 – 2019 = The variation in the number of inhabitants, 2002 – 2019
România=Romania
Județul Constanța=Constanța County
Municipiul Constanța=Constanța Municipality
Municipiul Mangalia=Mangalia Municipality
Municipiul Medgidia=Medgidia Municipality
Oraș Cernavodă=Cernavodă Town
Oraș Eforie=Eforie Town
Oraș Hârșova=Hârșova Town
Oraș Murfatlar=Murfatlar Town
Oraș Năvodari=Năvodari Town
Oraș Negru Vodă= Negru Vodă Town
Oraș Ovidiu= Ovidiu Town
Oraș Techirghiol= Techirghiol Town
Unitatea Administrativ Teritorială=Administrative-Territorial Unit

The analysis of the distribution of the annual shares represented by the main age groups during the analyzed period (figure 2.2) reveals a 28% decrease in the share of the young population, aged between 15 and 24, simultaneously with the sharp increase in the percentage of the inhabitants over the age of 65 (by 41%), an aspect which reflects the phenomenon of population ageing. In general, these persons are characterized by a reduced mobility, requiring facilities related to the increase in the accessibility of the transport system.

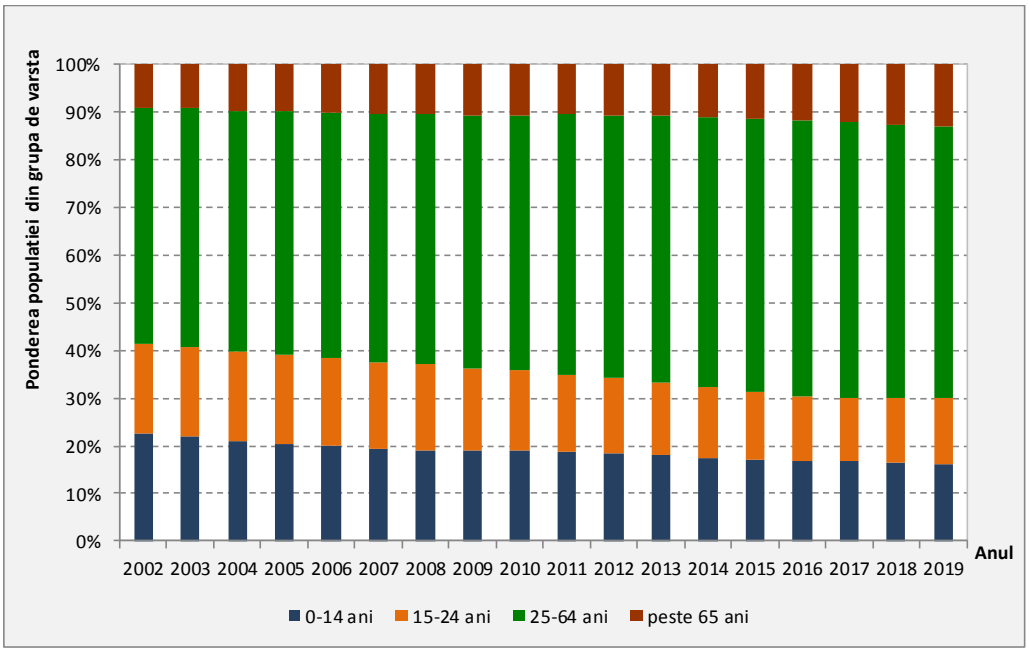


***Figure 2.2**. The share of the population from the main age groups, 2002-2019 period.*
Data source: INS, TEMPO On-line.

Ponderea populației din grupa de vârstă=The share of the population from the age group
Anul=Year
0-14 ani=0-14 years
15-24 ani=15-24 years
25-64 ani=25-64 years
Peste 65 ani=over 65 years

Following the request from Negru Vodă Town, the Directorate for Persons Record and Databases Management (DEPABD) within the Ministry of Internal Affairs made available the situation of the total number of inhabitants with permanent residence and non-residents in Negru Vodă Town recorded at the end of 2019. The data have been broken down by address (street, number, block of flats).

Since for the development of the transport model (Chapter 3), within the travel generation stage, it is necessary to divide the population according to traffic areas[1], from now on the values provided by the Directorate for Persons Record and Databases Management will be taken into account. The distribution by age groups of these data (figure 2.3) has been made respecting the proportion held by each group in 2019, according to the data published by the National Institute of Statistics.

[1]Within the transport model pertaining to the mobility plan (Chapter 3), the territory has been divided into 31 traffic areas, 26 internal areas and 5 external areas representing the travel potential of the localities they serve in relation to the national, county and communal road studied area which cross this territory.

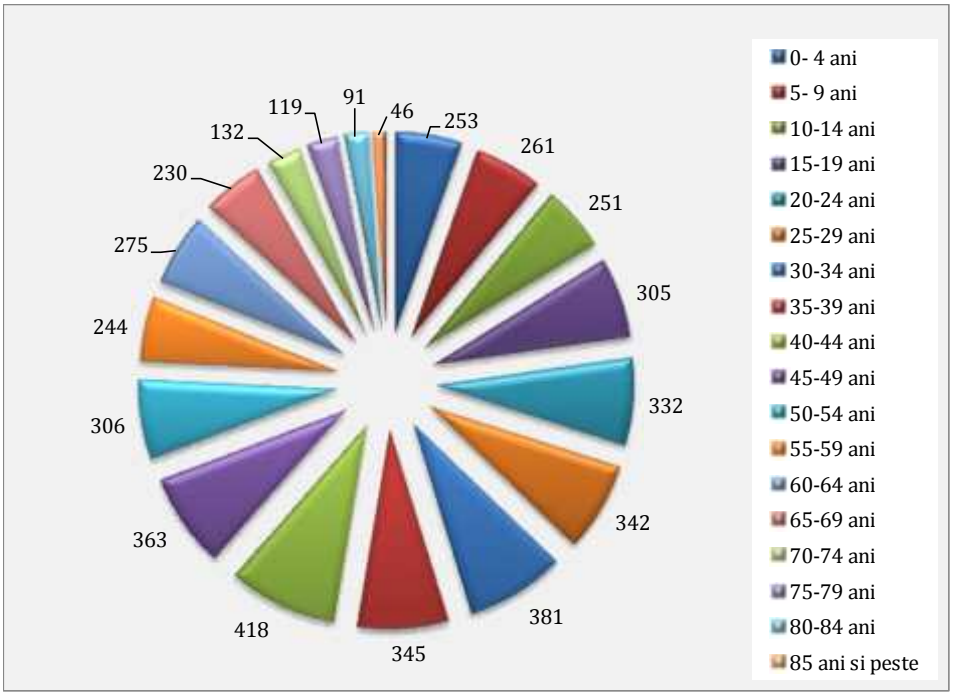


***Figure 2.3**. Distribution of the population recorded in 2019 by age groups, Negru Vodă Town. Data source: DEPABD; INS, TEMPO On-line.*

0-4 ani=0-4 years
5-9 ani=5-9 years
10-14 ani=10-14 years
15-19 ani=15-19 years
20-24 ani=20-24 years
25-29 ani=25-29 years
30-34 ani=30-34 years
35-39 ani=35-39 years
40-44 ani=40-44 years
45-49 ani=45-49 years
50-54 ani=50-54 years
55-59 ani=55-59 years
60-64 ani=60-64 years
65-69 ani=65-69 years
70-74 ani=70-74 years
75-79 ani=75-79 years
80-84 ani=80-84 years
85 ani şipeste=80 years and more

According to the current statistical data (National Institute of Statistics, TEMPO On-line), the territory within the built-up area of Negru Vodă Town is 633 ha. From the total number of inhabitants in relation to the surface of the territory within the built-up area it follows that the population density at the level of 2019 is 901 persons / km^2.

The spatial distribution of the number of inhabitants is a factor with a significant impact in the field of urban mobility. In this context, it is essential to analyze demographic data in terms of the following indicators: *total population and population density.*

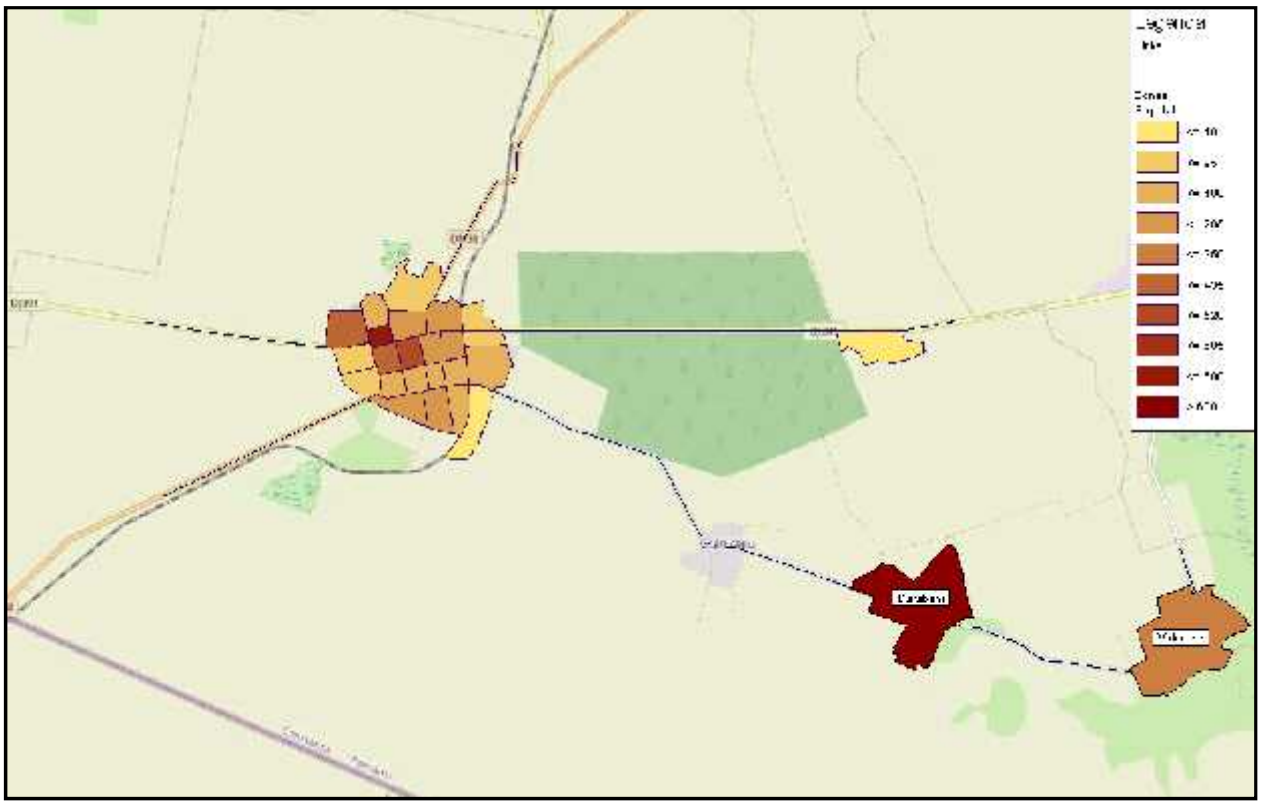


***Figure 2.4**. Territorial distribution of the population. Data source: DEPABD*

Legenda=Annotation; Populație=Population

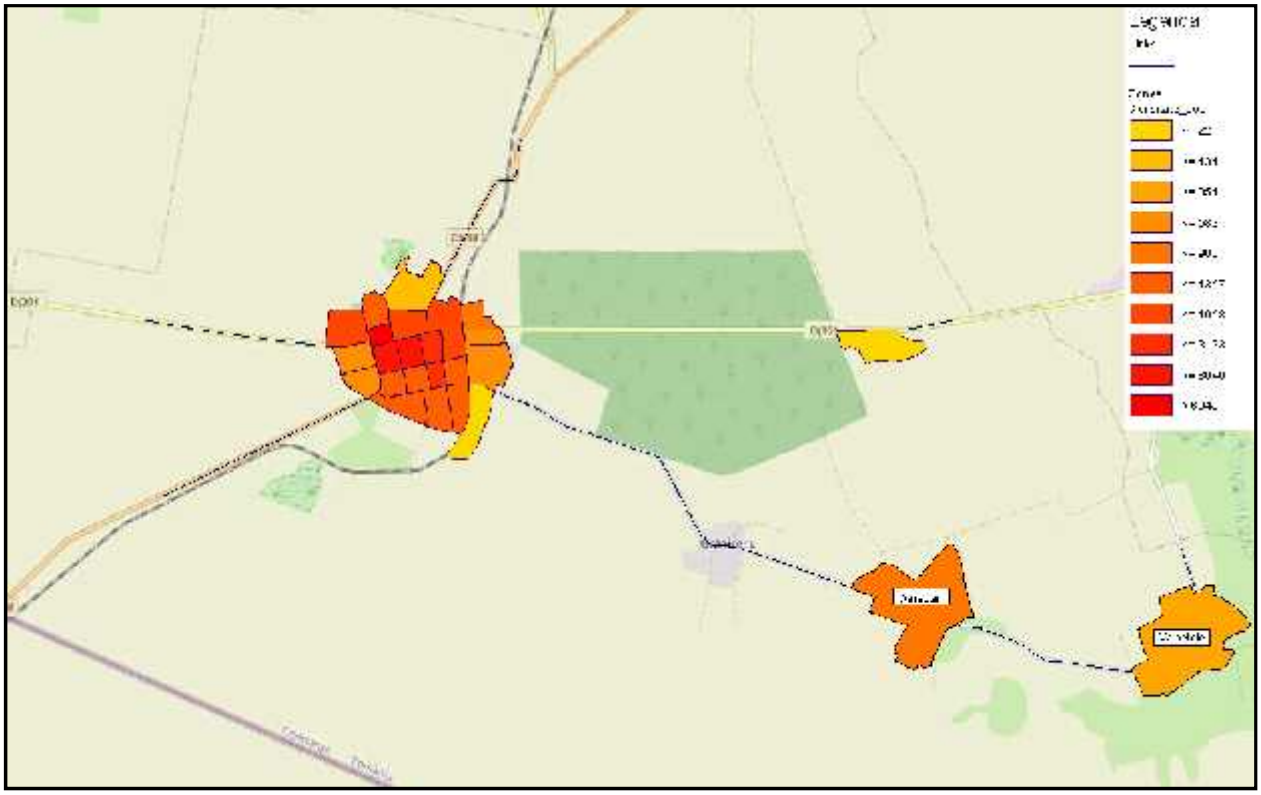


***Figure 2.5**. Population density at the level of traffic areas (inhabitants / km²). Data source: DEPABD*

Legenda=Annotation; Densitate populație= Population density

General Toshevo Town is part of the district bearing the same name, which is part of Dobrich county. According to the data provided by General Toshevo Town Hall, during the period 2002-2020, the number of inhabitants in the town of General Toshevo decreased by 21%, from 8,900 in 2002 to 7,075 in 2020. Regarding the territory of the Municipality of General Toshevo, the variation was 24%, the number of inhabitants decreasing from 21,024 in 2002, to 15,897 in 2020 (figure 2.6). The distribution by age groups of the population in the General City of Toshevo in 2019 is presented in figure.

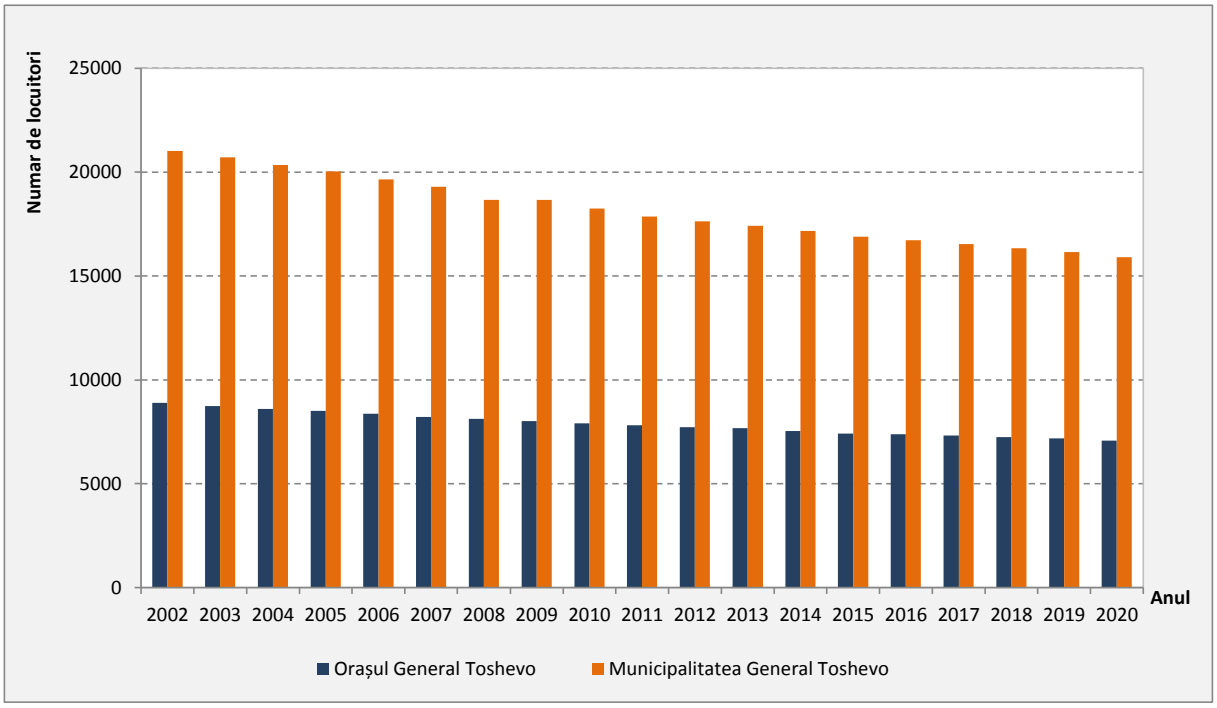


Figure 2.6.*Variation in the number of inhabitants between 2002 and 2020, General Toshevo. Data source: General Toshevo Town Hall.*

Numar de locuitori= Number of inhabitants
Anul=Year
Orașul General Toshevo=General Toshevo Town
Minucipalitatea General Toshevo= General Toshevo Municipality

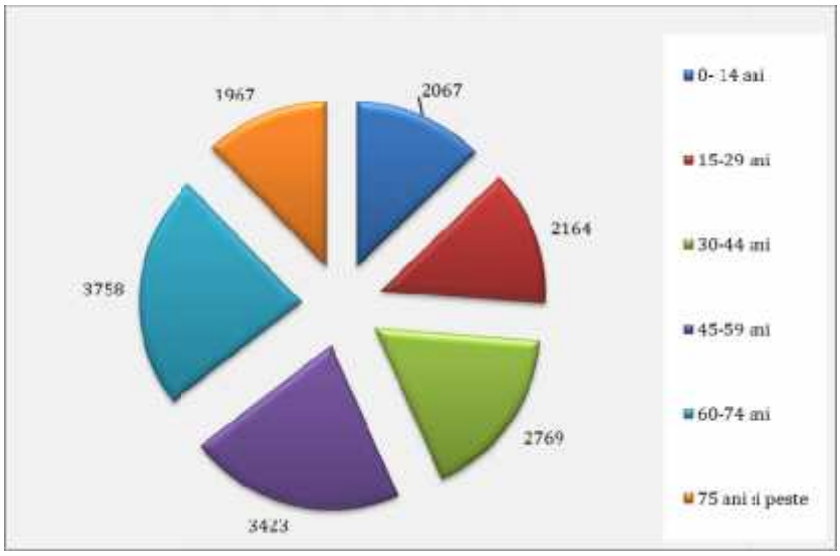


***Figure 2.7**. Distribution of the population registered in 2019 by age groups, General Toshevo Town. Data source: General Toshevo Town Hall.*

0-14 ani=0-14 years
15-29 ani=15-29 years
30-44 ani=30-44 years
45-59 ani=45-59 years
60-74 ani=60-74 years
75 ani și peste=75 years and more

From the territorial analysis, it is found that at the level of the locality there are uniform distributions of the population density, except for the central area where there are collective dwellings, where the density is higher.

2.1.2. Economic activities

Performing economic activities involves the need for travel with an important share in the case of both passenger transport and freight transport (by ensuring the flow of raw materials, finished materials and products).

According to the current statistical data, in 2018 (the most recent - published by the National Institute of Statistics, TEMPO On-line database), in Negru Vodă Town 655 active employees were recorded, working in public institutions and in the 236 economic units based in this locality.

At the level of the analyzed territory, the share of the employed population represents 11% of the total number of inhabitants, while at the county level this indicator's value is 23% (table 2.2).

***Table 2.2**. Share of the employed population, year 2018. Data source: INS, TEMPO On-line.*

Administrative-Territorial Unit	Number of employees	Number of inhabitants	The share of the employed population
Negru Vodă Town	655	5,747	20%
Constanţa County	175,863	768,049	31%

The main employers, a category in which those with more than 10 employees are considered, make up 49% of the total number of jobs occupied at the locality level (table 2.3). The main employers are engaged in agriculture (cultivation of cereals,legumes and oilseed plants).

***Table2.3**. The main employers, Negru Vodă, year 2019. Data source: www.topfirme.com.*

Employer	Main object of activity	Type of ownership	Number of active employees
S.C. LEGAM AGRO S.R.L.	Cultivation of cereals (excluding rice), leguminous plants and oilseed plants	Private	19
S.C. GABRIS IMPEX S.R.L.	Retail sale in non-specialized stores, mainly selling food, beverages, and tobacco	Private	18
S.C. TISGAL S.R.L.	Other support service activities for enterprises n.e.c./not elsewhere classified	Private	15
S.C. RINOLTSAND S.R.L.	Cultivation of cereals (excluding rice), leguminous plants and oilseed plants	Private	13
S.C. AVIA-AGRO-PLANT S.R.L.	Cultivation of cereals (excluding rice), leguminous plants and oilseed plants	Private	11

Figure 2.8 shows that most jobs are concentrated in the Center area of the urban territory (on both sides of DN 38). The concentration of jobs in compact areas implies mobility problems, i.e. the creation of poles that attract and generate travel.

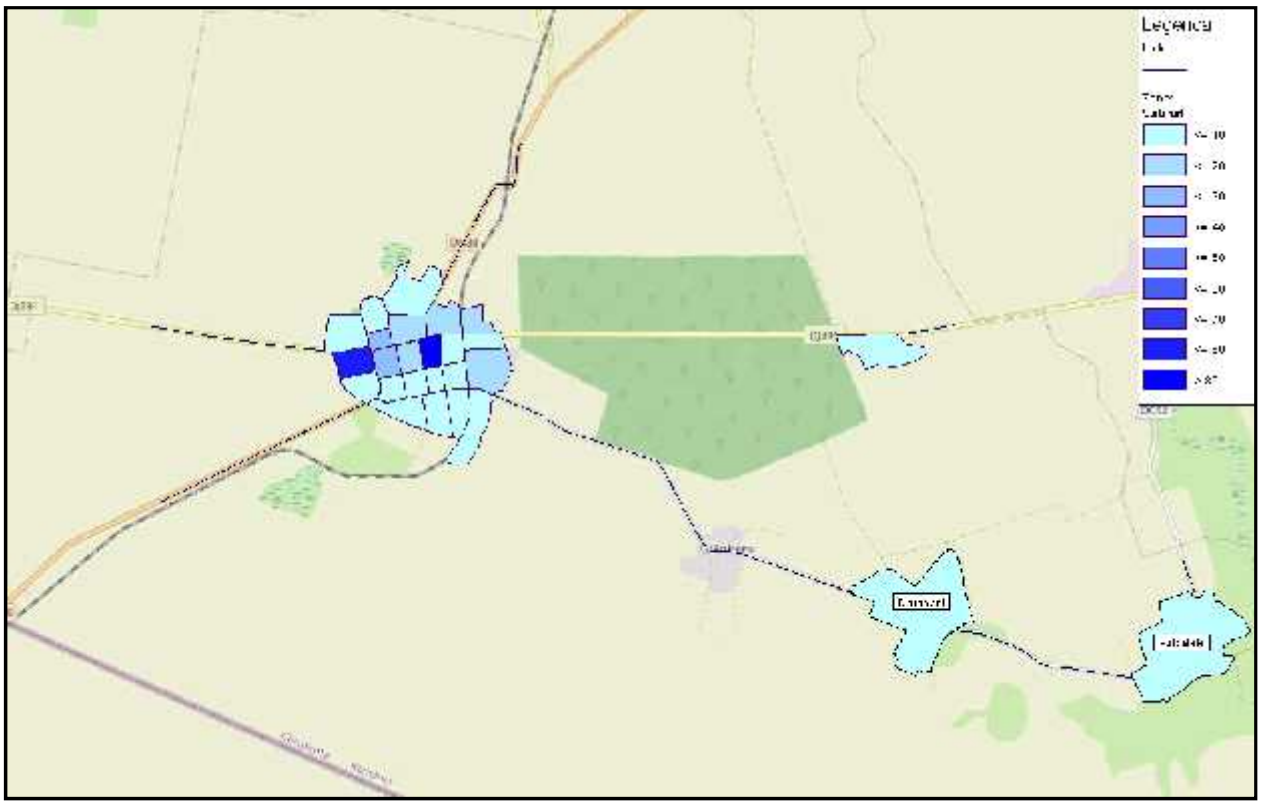


***Figure 2.8**. Territorial distribution of jobs.Data source: ITM Constanța*

Legenda=Annotation;
Salariați= Employees

Based on the current statistical data, the dynamics of the number of employees at local and county level in the last 17 years has been studied (figures 2.9 and 2.10). The results indicate an insignificant decrease in the share of the number of employees in Negru Vodă Town from the total number of those recorded at county level, from 0.5% in 2002 to 0.4% in 2018.

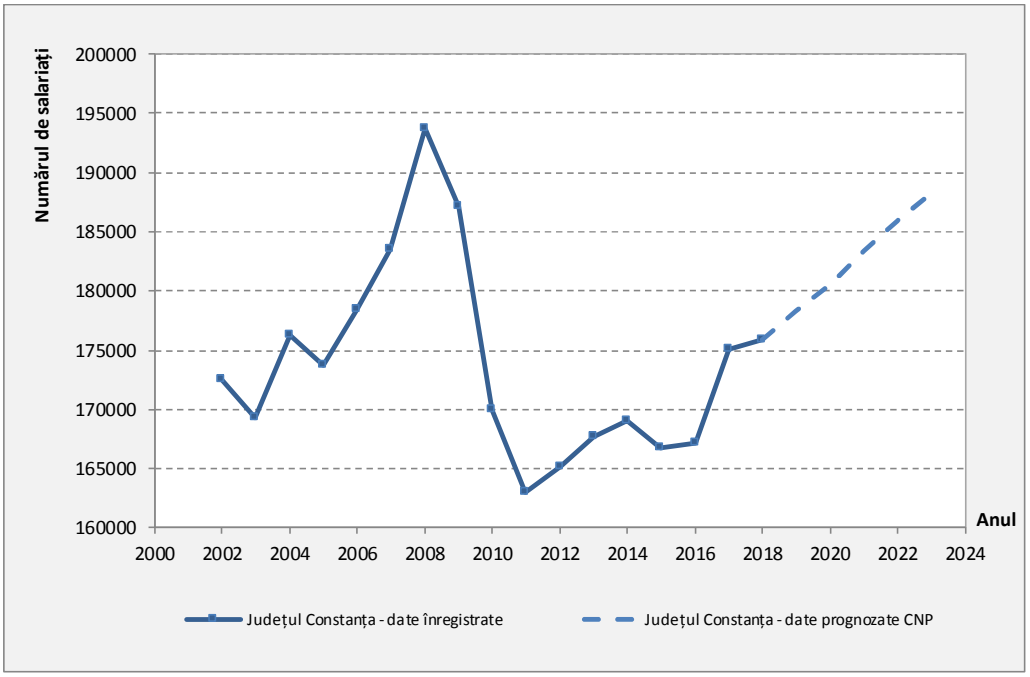


***Figure 2.9**. Variation in the number of employees - Constanța County, period 2002 -2018; 2019-2023.*
Data source: INS, TEMPO On-line; National Forecast Commission (CNP).

Număr de salariați=Number of employees
Județul Constanța-date înregistrate=Constanța County - recorded data
Județul Constanța-date prognozate CNP=Constanța County - forecast data CNP
Anul=Year

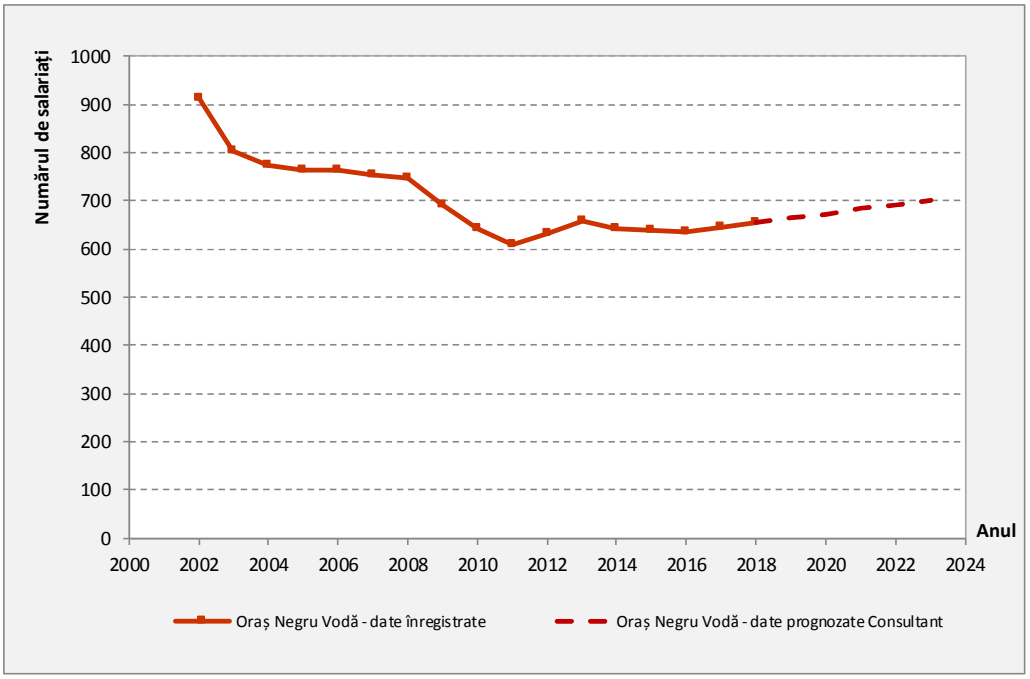


***Figure 2.10**. Variation in the number of employees –Negru Vodă Town, period 2002-2018; 2019-2023.*
Data source: INS, TEMPO On-line; National Forecast Commission (CNP).
Număr de salariați=Number of employees
Oraș Negru Vodă - date înregistrate=Negru Vodă Town - recorded data
Oraș Negru Vodă -date prognozate Consultant= Negru Vodă Town - Consultant forecast data
Anul=year

Knowing the historical data about the number of employees recorded at county and local level in the last 17 years and the forecast data[2]of this indicator for Constanța county (National Forecast Commission), the annual number of employees in Negru Vodă Town in the 2019-2023 periodhas been estimated. One can observe an increasing trend, which leads to a 7% increase in the number of employees in Negru Vodă Town in 2023 compared to the value recorded in 2019.

1,403 employees were registered in General Toshevo Municipality, of which 611 in General Toshevo Town. With the exception of the public sector, in which the administration of General Toshevo Municipality has 184 employees and the Dobrudja Agricultural Institute has 270 employees, the main employers are engaged in the fields of agriculture and animal husbandry. Table 2.4 shows employers with more than 10 employees.

***Table 2.4**. Main employers, General Toshevo, year 2019.*

[2]National Forecast Commission, *Projection of the main economic and social indicators in the TERRITORIAL PROFILE until 2023*, December 2019.

Data source: General Toshevo Town Hall.

Employer	Object of activity	Form of organization	Number of employees	Address
AGRI SS	Agriculture and transport	LLC(limited liability company)	80	General Toshevo, postal code 9500, 2 V. Aprilov street
AGRO SIP	Animal husbandry	LLC	55	Kapinovovillage
SKITYA 1 GT	Production and trade with industrial goods	LLC	41	General Toshevo Town
DIMITAR KATRANDZHIEV	Agriculture, restaurants, hotels	AP (Authorized person)	30	Spasovovillage
GLORIA GT	Fuel trade	LLC	27	General Toshevo town
KINOV-AM-ANGEL MIHAILOV	Agriculture	AP	26	Spasovovillage
STAN – 1	Agriculture	LLC	26	Vasilevovillage
BRATYA ALEXIEVI	Agriculture	LLC	25	Krasenvillage
SHTARK	Agriculture	LLC.	23	Kardam
GEOTERM	Agriculture and fuel trade	JSC (Joint-stock company)	23	General Toshevo Town
LEVAL	Agriculture	LLC	22	Jiten
COOPERATIV "DEMOKRATIA"	Agriculture	Agricultural cooperative	22	General Toshevo Town
DOBROGEA EXPORT - GEORGI BALABANOV	Agriculture	AP	22	General Toshevo Town
ROLES	Animal husbandry	LLC	22	Kardam village
ARH - GEORGI KATRANDZHIEV	Agriculture	AP	22	Spasovo village
TOVARNI PREVOZI – GT	Transport	JSC	20	General Toshevo Town
SLAVOV-ROSITSA	Animal husbandry	LLC	19	Rositsa
EVRO HOLTZ	Manufacture of other products of wood	LLC	18	General Toshevo Town
SILVENA – KOSTADIN KOSTOV	Agriculture	AP	17	Pchelarovo village
COOPERATIV "LYULYAK"	Agriculture	Agricultural cooperative	16	Lyulyakovo village
BOJUR – ENCHO STOYANOV	Agriculture	AP	15	Kraishte village
BELDAS	Agriculture	LLC	15	Kapinovo village

Employer	Object of activity	Form of organization	Number of employees	Address
ALBENA KATRANDZHIEVA	Agriculture	AP	15	Spasovo village, poştal code 9561
POLA-ILIA STOYANOV	Agriculture	AP	14	Kardam
PETROV – AGROPRODUCT	Agriculture	LLC	14	General Toshevo Town
AC	Agriculture	LLC	14	Zograf village
KARDAM ZAPAD - PETAR STOYANOV	Agriculture	AP	13	Kardam village
KALOYAN KALCHEV - JIKAMA-YA	Agriculture	AP	13	Preselentsi village
COOPERATIV "YORDAN YOVKOV"	Agriculture	Agricultural cooperative	13	Izvorovo village
AGRO-ROLES	Agriculture	LLC	13	Varna / working point - Kardam village
ESTER OIL NACHEVI	Production of essential oils	LLC	12	General Toshevo Town
„AGROCOMERS – IVAN PAVLOV„	Agriculture	AP	11	General Toshevo, Vasil Aprilov street
COOPERATIV „ISKRA„	Agriculture	Agricultural cooperative	11	Kapinovo village
COOPERATIV "PLODORODIE"	Agriculture	Agricultural cooperative	11	Malina village

The economic units for production and storage are concentrated at the periphery of the urban area (South-East and North areas), with access to the main transport network through county roads 296, 9002, 2903 and national road 29.

Moreover, the analysis has processed data regarding the variation in the number of the unemployed recorded at the level of Negru Vodă Town, which has shown, in the analyzed 2010-2019 period (the one for which statistical data are published), a decreasing trend in the number of people in this category(figure 2.11). In the hypothesis of translating these persons into the category of employees, we can conclude that in recent years there has been an increase in commuting from domicile to workplace.

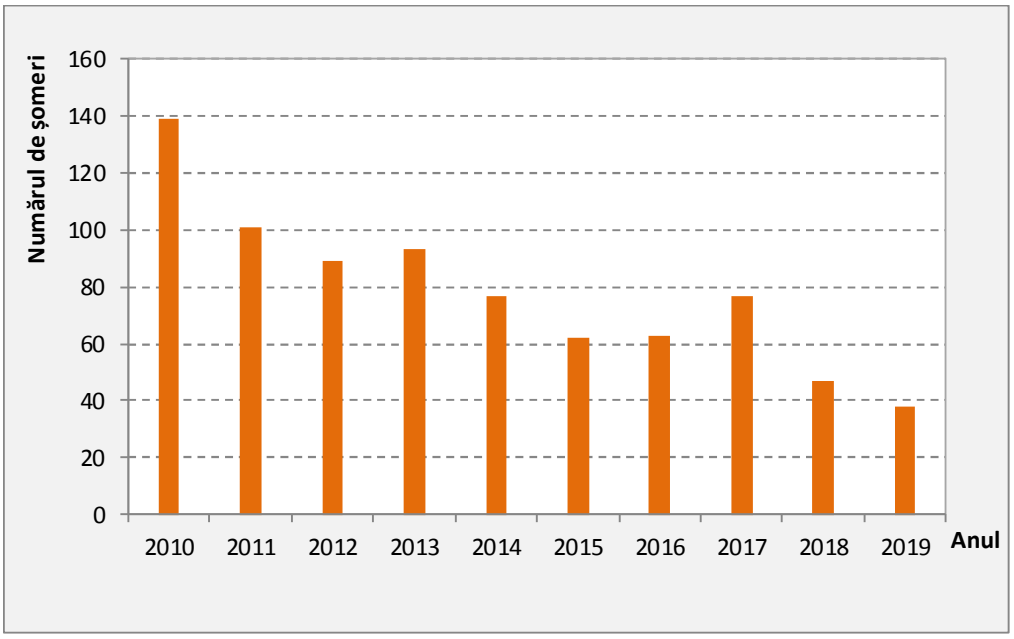


***Figure 2.11**. Variation in the number of unemployed, 2010-2019perioad.*
Data source: INS, TEMPO On-line.

Numărul de șomeri=Number of unemployed
Anul=Year

Regarding the causes of unemployment in Negru Vodă Town, these are the classic ones: the low number of jobs, imbalances between the professional training of the available labor force (the unemployed usually come from collective or individual layoffs, being persons who have lost the job due toa restricted activity) and the specificrequirements of the jobs that make up the offer, the ratio between the minimum wage level for which the population is willing to work and the level of social benefits provided by the state. In order to support the development of economic activities, an action which brings social benefits as a result of reducing unemployment in the analyzed area, measures will be proposed to improve the accessibility and efficiency of the urban transport system.

In the area of General Toshevo Municipality there was also a downward trend in the number of registered unemployed, from 1394 in 2015 to 650 in 2019 (table 2.5).

***Table 2.5**. Variation in the number of unemployed, General Toshevo, 2015 - 2019.*
Data source: General Toshevo Town Hall.

Indicator	Year				
	2015	2016	2017	2018	2019
Average number of registered unemployed	1394	1286	1049	833	650
Unemployment rate%	25,79%	23,79%	19,41%	15,42%	12,03%

The areas where commercial activity takes placerepresent poles of interest for local travel. In Negru Vodă town these objectives are connected to the main traffic arterial street -

Constanţei Road. A similar location, along the main traffic artery (DN 29 – Dimitrar Blagoev Street) is also found in the town of General Toshevo.

The educational institutions represent poles of attraction / generation of travel at the level of a locality, to which special attention must be paid from the point of view of accessibility and traffic safety.

In total, 865 pupils and preschoolers are enrolled in the educational institutions of Negru Vodă Town (Figure 2.12).

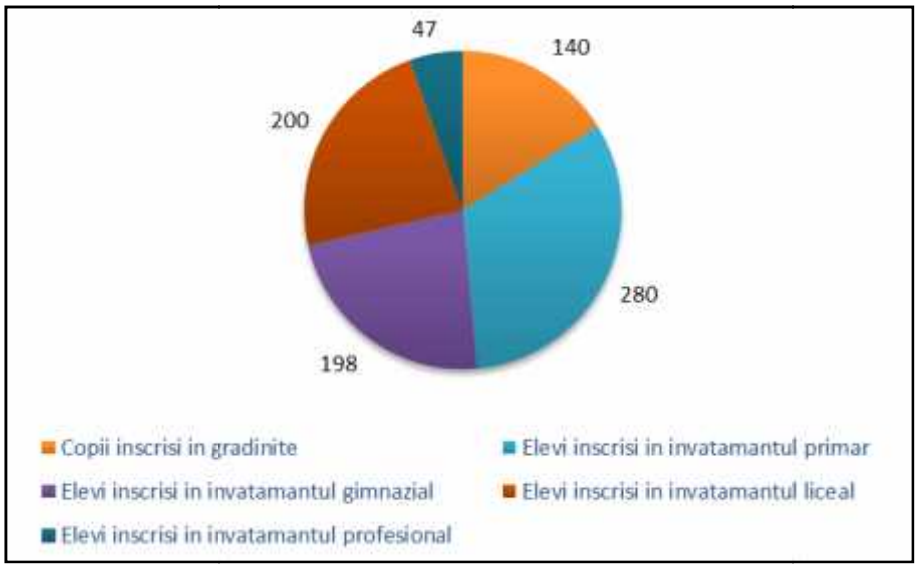


***Figure 2.12**. School population by education levels –Negru Vodă Town, 2018*

Copii înscrişi în grădiniţe=Children enrolled in kindergartens
Elevi înscrişi în învăţământul gimnazial=Pupils enrolled in middleschool education
Elevi înscrişi în învăţământul profesional= Pupils enrolled in vocational education
Elevi înscrişi în învăţământul primar= Pupils enrolled inprimary school education
Elevi înscrişi în învăţământul liceal= Pupils enrolled inhigh school education

The analysis of the school population, based on current statistics, reveals a reduction in the number of pupils. A special situation is encountered in the case of vocational education, which was dissolved in 2006 and which would resume in 2017. During the analyzed period, a sharp reduction is recorded among middle school education pupils (figure 2.13).

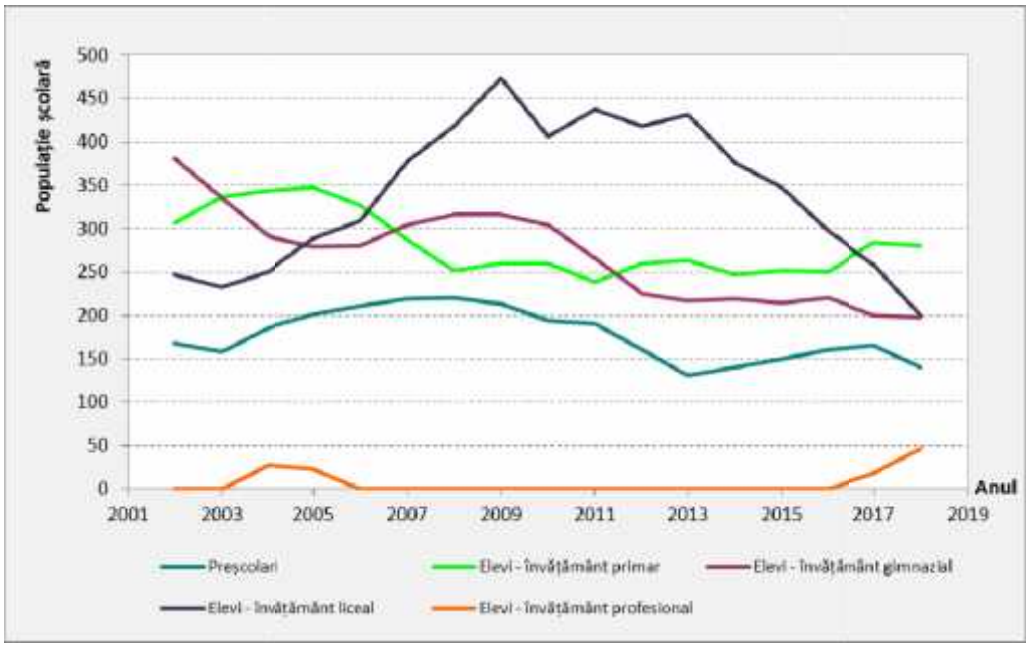


***Figure 2.13**. Variation of school population in Negru Vodă Town, 2002-2018.*

Populația școlară=School population
Preșcolari=Preschoolers
Elevi-învățământ liceal= Pupils-high school education
Elevi-învățământ primar= Pupils-primary school
Elevi-învățământ profesional= Pupils-vocational education
Elevi-învățământ gimnazial= Pupils-middle school
Anul=Year

Knowing the variation trend in the number of pupils, based on historical data recorded in the 2002-2018 period and taking into account the forecast of population's evolution at national level by 2060[3] (a forecast based on the stable population according to sex and age groups recorded in the October 2011 census and the demographic phenomena: birth rate, death rate and external migration from the current statistics), short-term decreases in the number of pupils in the pre-university education have been estimated.

[3]National Institute of Statistics, *Designing the Romanian population by 2060*, ISBN: 978-606-8590-01-1, 2013.

In the General City of Toshevo in 2020 were enrolled 1186 students, structured by levels of education according to the representation in figure 2.14.

During the analyzed period, the number of pupils was reduced by 13%. The most sharp decrease of 25% is among pupils in grades I-IV. The variations specific to each education level of are highlighted in Figure 2.15.

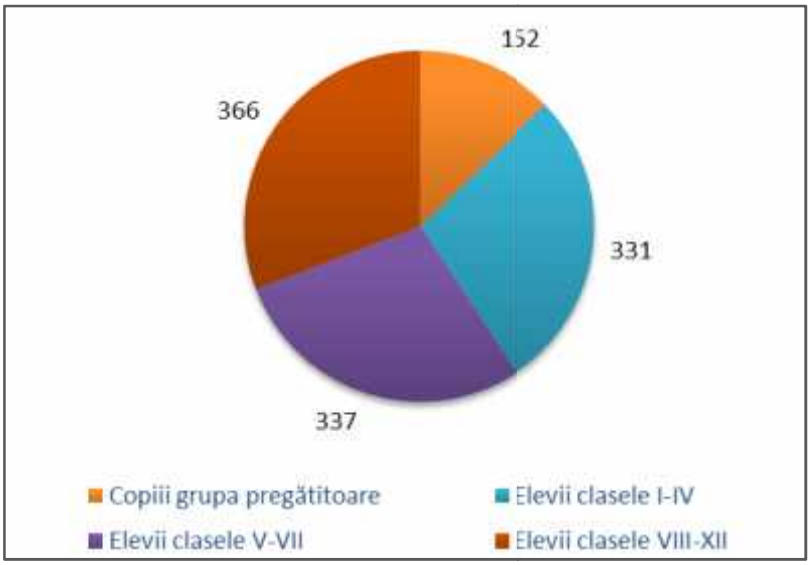


***Figure 2.14**. School population by education levels - General Toshevo Town, 2020.*

Copiii grupa pregătitoare=Children preparatory group
Elevii clasele I-IV=Pupils from grades I-IV
Elevii clasele V-VII= Pupils from grades V-VII
Elevii clasele VIII-XII= Pupils from grades VIII-XII

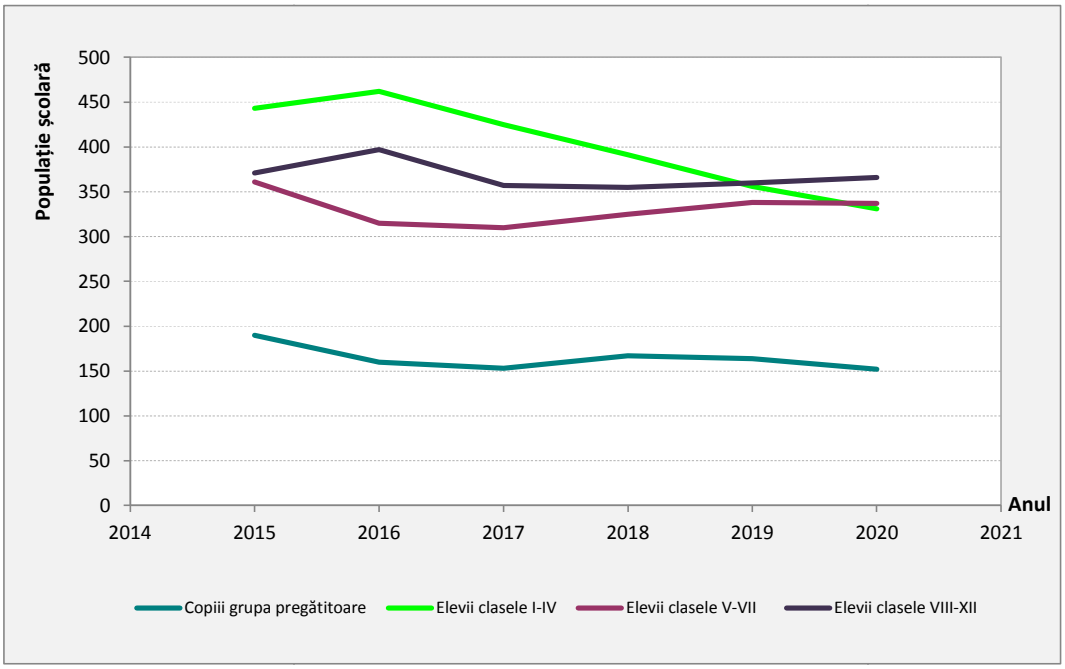


***Figure 2.15**. Variation of school population in General Toshevo Town, 2015-2020.*

Populația școlară=School population
Copiii grupa pregătitoare=Children preparatory group
Elevii clasele I-IV=Pupils from grades I-IV
Elevii clasele V-VII= Pupils from grades V-VII
Elevi iclasele VIII-XII= Pupils from grades VIII-XII
Anul=Year

2.1.3. Monitoring index

The motorization index represents an indicator used in the assessment of the economic development of an administrative-territorial unit. Its value expresses the number of vehicles owned by groups of 1,000 inhabitants.

Figure 2.16 shows the value of the motorization index recorded in 2019 in Negru Vodă Town, Constanța County and at national level.

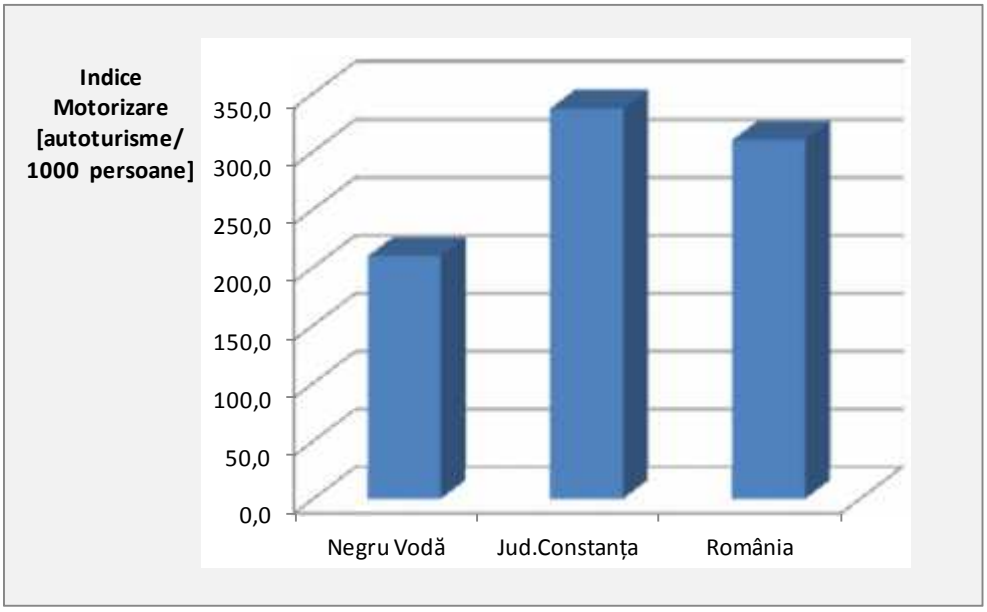


***Figure 2.16**. Motorization index, 2019.Data source: DRPCIV, INS, TEMPO On-line.*

Indice Motorizare (autoturisme/1000 persoane) Motorization Index (vehicles / 1,000 people)
Jud. Constanța=Constanța County
România=Romania

One can noticethat the number of vehicles owned by 1,000 inhabitants of Negru Vodă Town is 38% lower than the national average value, respectively 32% lower than the county average value. The low availability of vehicles in Negru Vodă Town can be offset by the use of environmentally friendly modes of transport - pedestrian and bicycle.

Of the total number of vehicles, 54.5% are powered by diesel and 45.5 by petrol (figure 2.17). In the last 5 years, the number of diesel-powered vehicles has increased by 170%.

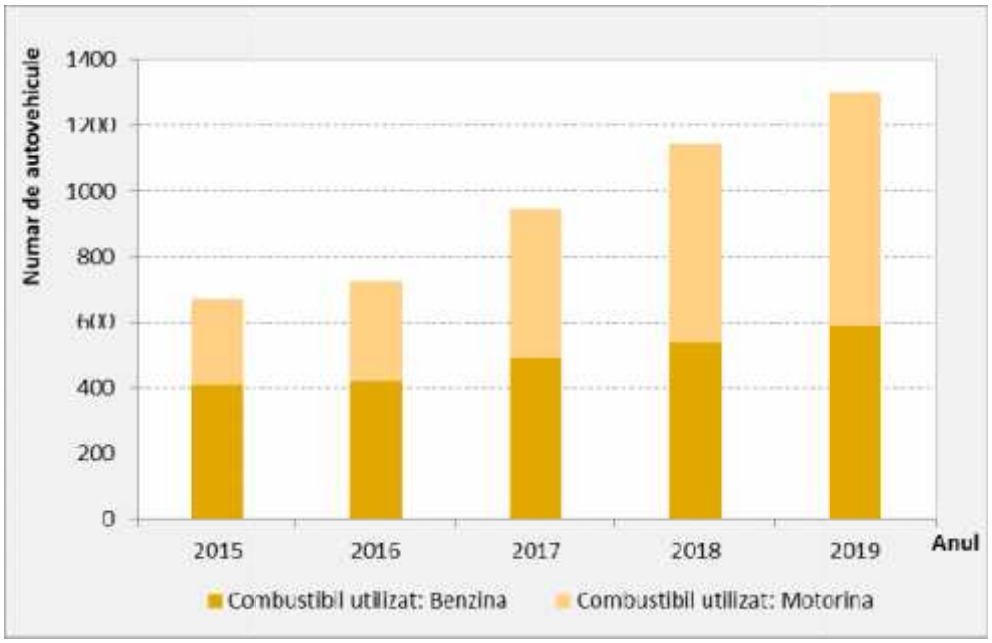


***Figure 2.17**. The situation of the carfleet inventory according to the fuel used – Negru Vodă.*
Data source: Directorate for Driving Licenses and Car Registration, Bucharest.

Număr de autovehicule=Number of vehicles
Combustibil utilizat: Benzina = Fuel used: Petrol
Combustibil utilizat: Motorina=Fuel used: Diesel
Anul=Year

The distribution of vehicles by age groups reveals that 67% of the means of transport registered in Negru Vodă Town are over 15 years old. Vehicles younger than 5 years represent only 4.4% of the total fleet (figure 2.18).

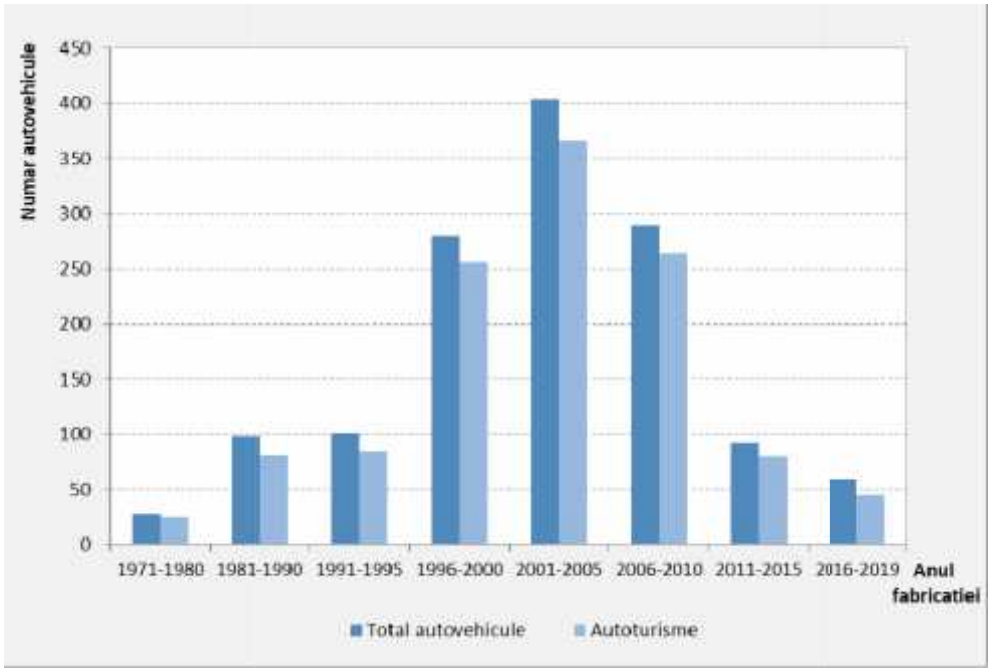


***Figure 2.18**. The structure of the car fleet according to the manufacturing year-Negru Vodă, 2020.*
Data source: Directorate for Driving Licenses and Car Registration, Bucharest.

Număr autovehicule=Number of vehicles
Total autovehicule= Total vehicles
Autoturisme=Cars
Anu fabricației= Manufacturing year

In the partner town, General Toshevo, 6.707 vehicles are registered, of which 85% are owned by individuals and 15% by legal entities.

Figure 2.19 shows the variation of the motorization index for General Toshevo Municipality during the 2015-2019 period. It is observed that in the analyzed period the value of this indicator has increased by 31%, from 263 cars / 1000 inhabitants in 2015, to 344 cars / 1000 inhabitants in 2019.

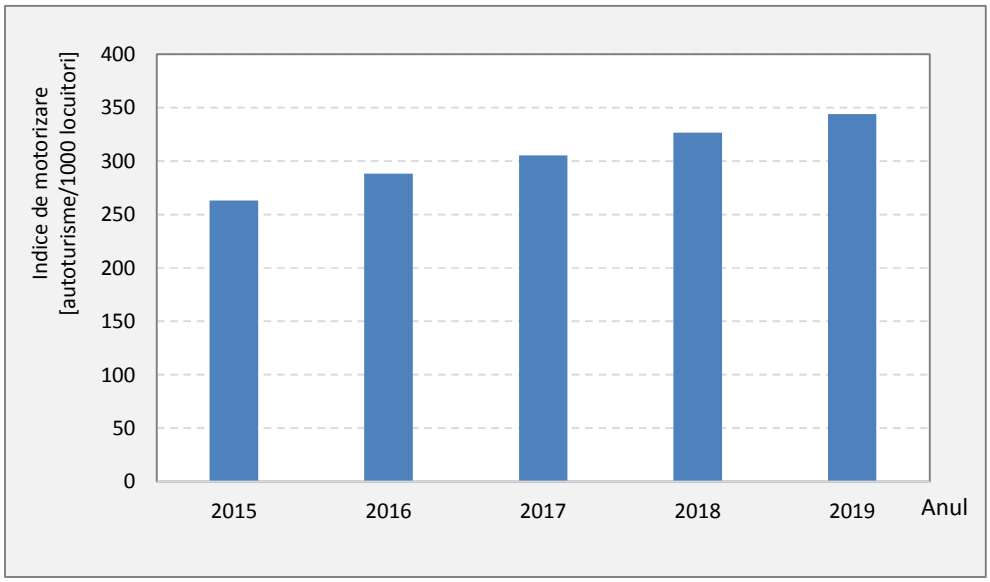


***Figure 2.19**. Variation of motorization index, 2015-2019.*
Data source: General Toshevo Town Hall.

Indice Motorizare (autoturisme/1000 persoane) Motorization Index (vehicles / 1,000 people)
Anul=Year

83% of the total number of vehicles registered in 2019are cars (figure 2.20).

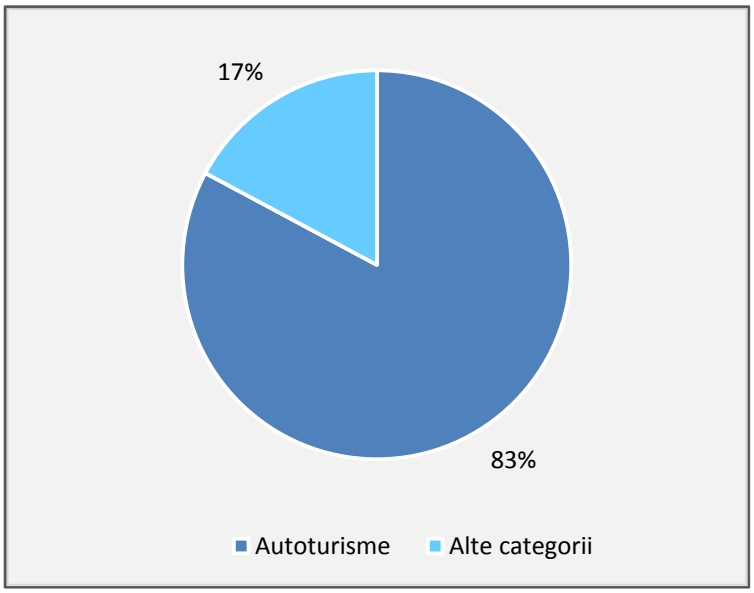


***Figure 2.20**. The structure of the car fleet, 2019.*
Data source: General Toshevo Town Hall.

Autoturisme=cars
Alte categorii= Other categories

In 2019, the car fleet had the following structure according to the fuel used : 43% petrol, 55% diesel and 2% LPG. In the last 5 years, the number of diesel vehicles has increased by 53%. The annual variation of the fleet structure is highlighted in the following figure.

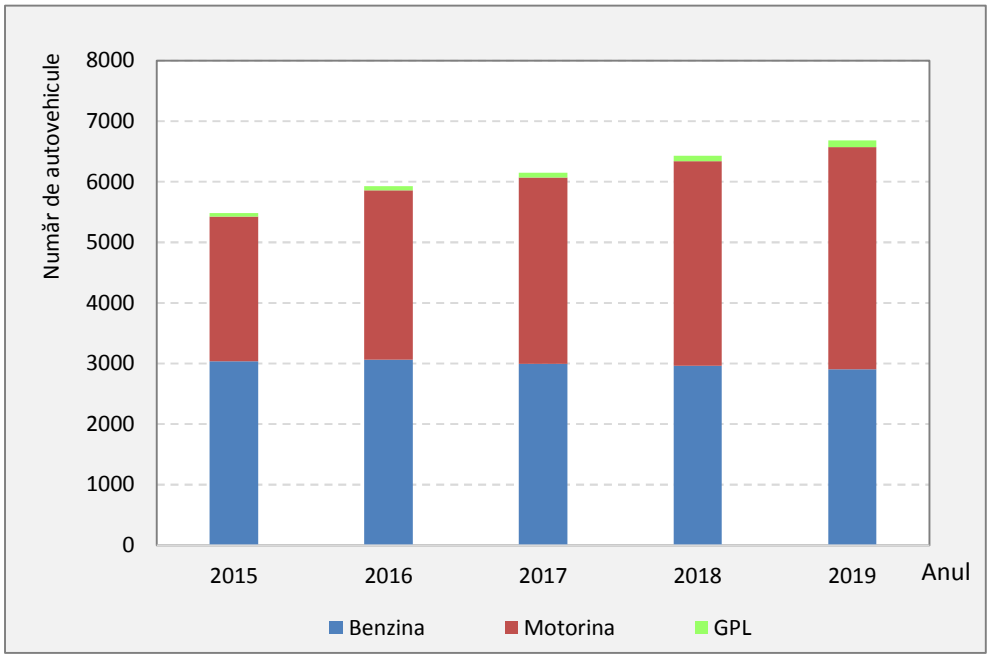


***Figure 2.21**. The situation of the carfleet inventory according to the fuel used– General Toshevo, 2015-2019.Data source: General Toshevo Town Hall.*

Număr de autovehicule=Number of vehicles
Benzina =Petrol
Motorina= Diesel
GPL=LPG
Anul=Year

From the analysis of the data on the age of the motor vehicles, it is found that in the period 2015-2019 the share of vehicles older than 20 years has increased from 42% in 2019 to 60% in 2019. The same trend of variation was registered for the vehicles that are between 10 and 20 years old. The variation of the number of vehicles according to age is shown in the following figure.

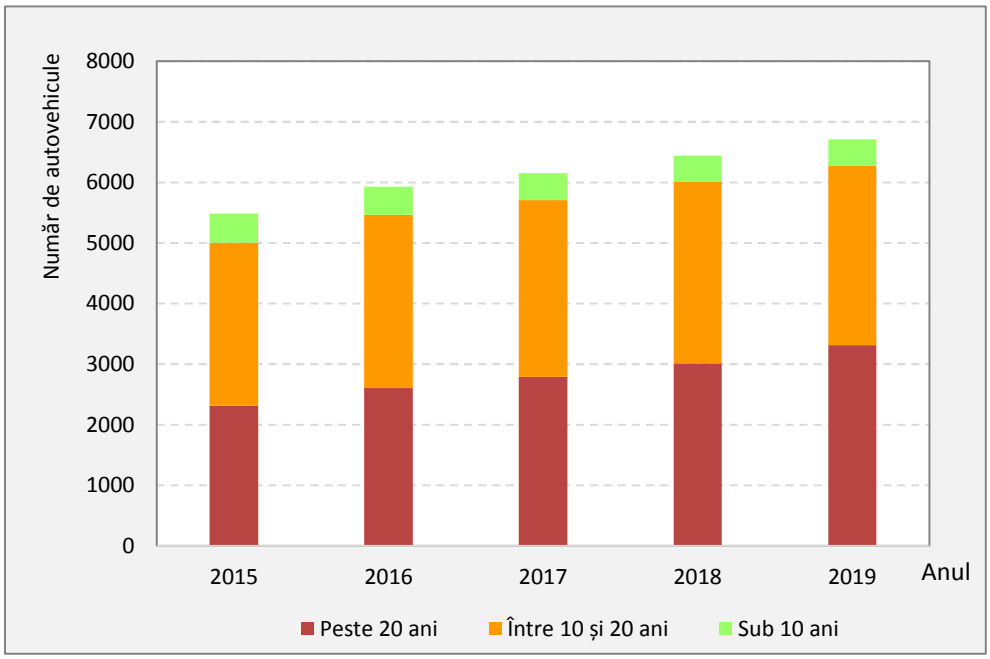


***Figure 2.22**. Variation of the car fleet inventory according to vehicle age – General Toshevo, 2015-2019.Data source: General Toshevo Town Hall.*

Număr de autovehicule=Number of vehicles
Peste 20 ani=Over 20 years
Intre 10 și 20 ani= Between 10 and 20 years
Sub 10 ani=Under 10 years
Anul=Year

2.2. The road network

At the level of the global road transport network, the towns of Negru Vodăand General Toshevo are connected by DN 38 (E675) to the Trans-European Main Transport Network (TEN-T Core) (figure 2.23).

Figure 2.23.*The TEN-T road network in Negru Vodă and General Toshevo Towns' area.*
Source: European Commission, 2020.

The major road infrastructure in the area of Negru Vodă Town consists of the routes of national and county roads which ensure the connection with the neighboring territory (table 2.6, figure 2.24). The road sections which are also a part of county road routes are the most strained in terms of traffic and, at the same time, those on which traffic events resulting in victims are frequently recorded.

Table 2.6*. The road network which ensures the connection to the neighboring territory.*

Road	Origin	Destination	Route
DN 38	Km 0+000, Agigea (DN 39)	Km 53+817, Bulgaria Border	Agigea (DN 39) - Techirghiol - Moviliţa - Topraisar - Negru Vodă– Bulgaria Border
DJ 391	Km 0+000, DN 39	Km 129+000, Tuzla	Albeşti – CotuVăii – Negru Vodă – Cerchezu – Viroaga – Negreşti – Cobadin – Ciobăniţa – Osmancea –

Road	Origin	Destination	Route
			Mereni – Topraisar – Biruinţa

***Figure 2.24**. The major traffic network in the area of Negru Vodă Town.*
Legenda=Annotation;
Rețeaua de drumuri europene/naționale, județene, comunale= European / national, county, communal road network
Drum European/national= European / national road
Drum județean= County road
Drum communal= Communal road
Limita intravilan= Built-up area limit

The major deficiency of the road network in the area of Negru Vodă Town is generated by the lack of adetour road, which would lead to the total elimination of transiting goods

vehicles from the urban traffic network, thus reducing the externalities borne by the residents.

The railway network sections the built-up territory of Negru Vodă Town on the East side, leading to the reduction of the connectivity of the urban road network (the number of possible connections between the nodes of the road network) on the East-West relations. DJ 391, which ensures the connection with the neighboring localities and with Mangalia Municipality and DC 14 (Cerealelor Street), which ensures the connection with the adjacent Darabani and Vâlcele villages, is performed at the same level, being characterized by the very poor quality of the crossing infrastructure.

According to the current data in the INS Tempo Online database, the road network ofNegru Vodă Town has a length of approximately 38 km.

Lately, the improvement of the technical condition of the road surface has been a local objective to which special attention has been given. The project "***Increasing accessibility to the TEN-T in the border area Negru Vodă - General Toshevo***" was implemented - the component related to Negru Vodă Town which had as objective the modernization of 33 streets within Negru Vodă town and of the DC14 communal road. The total length of the modernized roads and communal road is 17.50 km. The infrastructure sections in this category are centralized in table 2.7. Their graphic representation is found in figure 2.25.

Table 2.7*. Roads modernized within the project"Increasing accessibility to the TEN-T in the border area Negru Vodă - General Toshevo". Data source: Negru VodăTown Hall.*

Current no.	Street name	Length (m)	Observations
1.	1 Sănătăţii Street	843	
2.	2 Sănătăţii Street	482	2 Sănătăţii Street is made up of: - SănătăţiiStreet2.1 with a length of 388 m - SănătăţiiStreet2.1 with a length of 94 m
3.	Morii Street	841	Morii Street is made up of: - 1 Morii Street with a length of 107 m - 2Morii Streetwith a length of 737 m
4.	Morii Access road	85	
5.	Depozitelor Street	1,176	Depozitelor Street is made up of: - 1Depozitelor Streetwith a length of 313 m - 2 Depozitelor Street with a length of 700 m - 3 Depozitelor Street with a length of 163 m
6.	1 Depozitelor Access road	43	
7.	2Depozitelor Access road	73	
8.	Gării Street	628	Gării Street is made up of: - 1 Gării Street with a length of 308 m - 2 Gării Street with a length of 320 m
9.	Gării Access road	87	

Current no.	Street name	Length (m)	Observations
10.	1 Vicinal road	135	
11.	Mangaliei Access road	42	
12.	Cerealelor Street	796	Cerealelor Street is made up of: - 1 Cerealelor Street with a length of 434 m - 2 Cerealelor Street with a length of 370 m
13.	Triunghiului Street	433	
14.	Scurtă Street	185	
15.	Fundăturii Street	116	
16.	Teilor Street	1,377	Teilor Street is made up of: - 1 TeilorStreetwith a length of 556 m - 2 Teilor Street with a length of 718 m - 3 Teilor Street with a length of 63 m
17.	Merilor Street	1,036	
18.	Prunilor Street	848	
19.	Crinului Street	1,324	Crinului Street is made up of: - 1CrinuluiStreetwith a length of 218 m - 2 Crinului Street with a length of 340 m - 3 Crinului Street with a length of 313 m - 4 Crinului Street with a length of 336 m - 5 Crinului Street with a length of 117 m
20.	Pieţei Street	975	Pieţei Street is made up of: - 1Pieţei Streetwith a length of 41 m - 2 Pieţei Street with a length of 113 m - 3 Pieţei Street with a length of 444 m - 4Pieţei Streetwith a length of 377 m
21.	Platformei Street	1,187	Platformei Street is made up of: - 1 Platformei Street with a length of 747 m - 2Platformei Streetwith a length of 440 m
22.	Şcolii Street	297	Şcolii Street is made up of: - 1Şcolii Streetwith a length of 182 m - 2 Şcolii Street with a length of 115 m
23.	Văii Street	668	Văii Street is made up of: - 1Văii Streetwith a length of 422 m - 2 Văii Street with a length of 246 m
24.	Viilor Alley	218	
25.	Viilor Street	881	Viilor Street is made up of: - 1 Viilor Street with a length of 533 m - 2 Viilor Street with a length of 348 m
26.	Stadionului Street	146	
27.	Nordului Street	126	

Current no.	Street name	Length (m)	Observations
28.	Salcâmilor Street	90	
29.	Constanței Road	315	
30.	Platformei Alley	111	
31.	Constanței no. 1 Access road	187	
32.	Gladiolelor Alley	95	
33.	Constanței 2Road	20	
34.	DC 14	1,600	

***Figure 2.25**. Modernized roads. Data source: Negru Vodă TownTown Hall.*

Plan de ansamblu=Overall plan
Scara=Scale
Beneficiar U.A.T. ORAȘ NEGRU VODĂ=Beneficiary Administrative-Territorial Unit Negru Vodă Town
PROIECTANT GENERAL=GENERAL ENGINEERING DESIGNER

Proiectat=Designed
Şef proiect=Project manager
Verificat=Certified
Data=Date
Ing.=Eng.
CREŞTEREA ACCESIBILITĂŢII LA TEN-T ÎN ZONA DE FRONTIERĂ NEGRU VODĂ – GENERAL TOSHEVO=INCREASING ACCESSIBILITY TO THE TEN-T IN THE BORDER AREA NEGRU VODĂ - GENERAL TOSHEVO
Componenta aferentă oraşului Negru Vodă=The component related to Negru-Vodă Town
Titlul Planşei=Sheet title

Following the implementation of the project with a very high coverage of the road network, there is a significant improvement in the quality of the urban environment. In the figure below Florilor Street and Cerealelor Street are presented comparatively, before and after being modernized. Similar situations are encountered on most of the streets which have been modernized within the project.

Judeţul Constanţa=Constanţa County
Anul 2012=Year 2012

***Figure 2.26**. Modernized Florilor Street.*

Anul 2020=Year 2020

Anul 2012=Year 2012

***Figure 2.27**. Modernized Cerealelor Street.*

Anul 2020=Year 2020

Traffic safety has been analyzed in relation to the accidents recorded at the level of the transport network in the 2014-2018 period, data found in the database of Negru Vodă Town, obtained at the request of Negru Vodă Town. In 2018, there was a reduction in the number of accidents compared to the previous year. The annual variation in the number of accidents is found in figure 2.28. During the entire analyzed period, 32 people lost their lives in traffic accidents, the highest value being recorded in 2017, when there were 8 deaths as a result of being involved in traffic accidents. Compared to the situation encountered in 2014, at the end of the analyzed period there was a 29% decrease, with 5 deaths being recorded. This further motivates the actions for reducing the number of victims associated with urban traffic. Another category in which the victims of accidents are classified, depending on seriousness, is that of the injured. The annual variation related to this category of victims follows the trend manifested in the variation in the number of accidents, the maximum value reaching 14 cases in 2015 (figure 2.29).

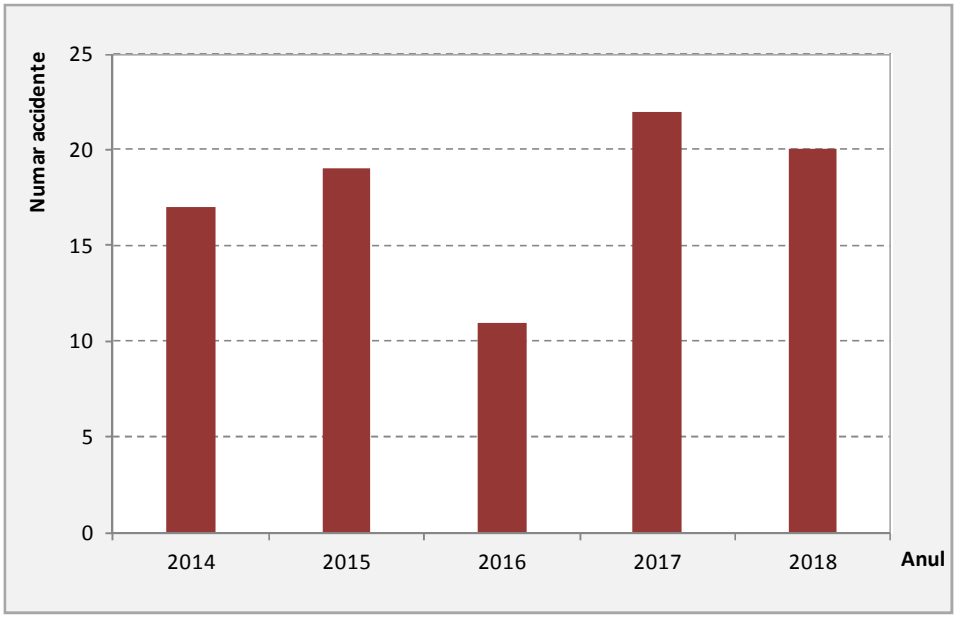


Figure 2.28.*Variation in the number of accidents, 2014-2018.*
Data source: Negru Vodă Town's Police.

Număr de accidente=Number of accidents
Anul=Year

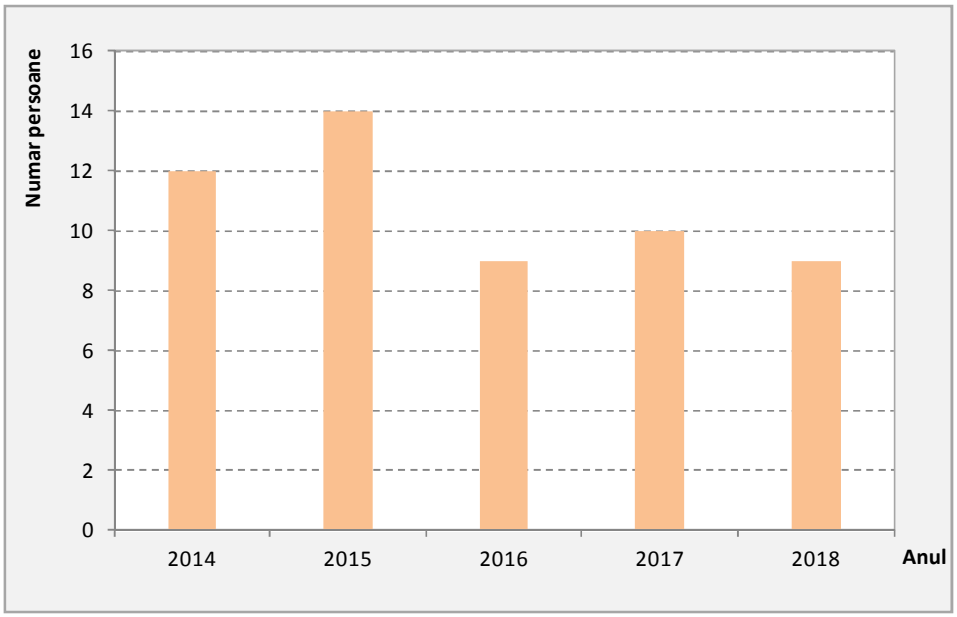


Figure 2.29.*Variation in the number of victims, 2014-2018.*
Data source: Negru Vodă Town's Police.

Număr persoane=Number of persons
Anul=Year

Of the total number of accidents, those involving pedestrians and cyclists account for 22% of them (figure 2.30). Pedestrians and cyclists are high-vulnerability traffic participants who should be given major priority in the traffic safety improvementproposals. These accidents are mainly caused by not granting priority to pedestrians by the drivers and the reckless behavior of pedestrians and cyclists (jaywalking).

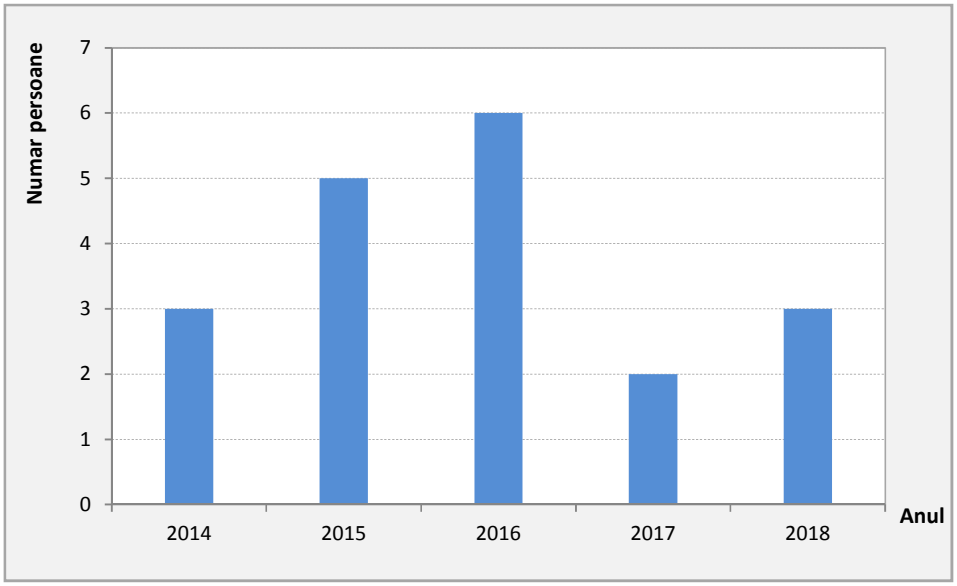


Figura 2.30.*Variation in the number of pedestrians and cyclists involved in traffic accidents, 2014-2018. Data source: Negru Vodă Town's Police.*

Număr de persoane=Number of persons
Anul=Year

The segments of the road network characterized by a high frequency of traffic accidents are represented by the main arterial streets,where there are high values of traffic flows, especially during peak hours (Chapter 3).

The overlapping road sections along the DN 38 route, where traffic safety issues are concentrated, are transited, on average, during a working day, by approximately 280 heavy goods vehicles and 190 light goods vehicles.

Traffic flow problems are associated with the interaction between pedestrians, cyclists and heavy goods vehicles, especially in the central area (Constanța Road, the section between Stadionului Street and Mangaliei Road), where vehicles parked on the roadside or in its vicinity are also found.

The freight transport on the road network of Negru Vodă locality takes place without restrictions on the arterial streets overlapping the routes of the national, county and communal roads. In the absence of a detourroad, which would take over the transit traffic, respectively the penetration traffic, which is associated with serving the areas where grain storage spaces are set up (silos, receiving warehouses), in the urban Negru Vodă area one comes across the situation where heavy goods vehicles cross residential neighborhoods and vulnerable areas, such as the central area, where we find a high density of pedestrians and cyclists, therefore constituting a negative aspect in terms of the quality of life (figure 2.31).

The presence of goods vehicles generates severe negative effects, such as air and noise pollution, CO_2 emissions, increases in travel time and related to traffic safety. Moreover, the circulation of heavy goods vehicles on the streets whose road structure has not been sized for this purpose leads to the rapid degradation of the road surface.

***Figure 2.31**. Presence of heavy goods vehicles in the central area.*

The organization and control of the traffic at the level of the road network of Negru Vodă Town is done based on horizontal and vertical signaling. The signage for the regulation of trafficis present, the signaling and orientation indicators are properly located and are in good condition, especially on the network sections which have recently been rehabilitated / modernized (figure 2.32).

Smart traffic management systems are not used at the level of the studied area, and traffic data cannot be recorded automatically in real time. There is a center for monitoring the public space, including the traffic, but it does not have traffic management functions.

***Figure 2.32**. Traffic regulation sign (Exemple).*

The major road infrastructure in the area of General Toshevo Town consists of national and regional road routes that ensure the connection with the neighboring territory (figure 2.33): II-29 (Dobrich - General Toshevo - border with Romania), 296 (Cavarna - General Toshevo), 9002 (DN 9 - Tsaricino - General Toshevo) and 2903 (General Toshevo - DJ 2932). The street sectors on which the county road routes are superimposed are the most

requested in terms of traffic and, at the same time, those on which traffic events with casualties are frequently recorded.

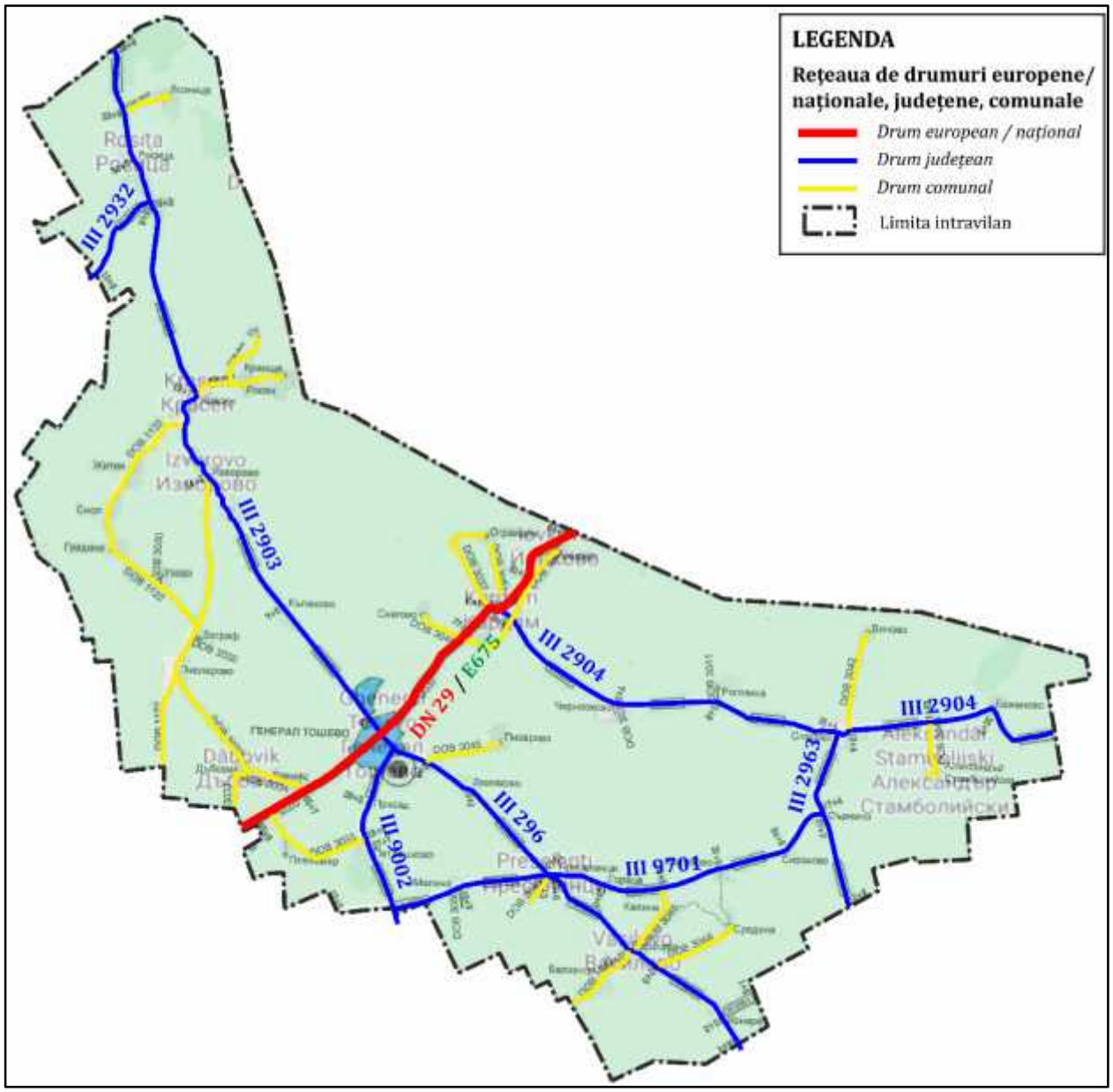


***Figure 2.33**. The major traffic network in the area of General Toshevo Town.*
Legenda=Annotation;
Rețeaua de drumuri europene/naționale, județene, comunale= European / national, county, communal road network
Drum European/national= European / national road
Drum județean= County road
Drum communal= Communal road
Limita intravilan= Built-up area limit

As in the case of Nergu Vodă Town, the major deficiency of the road network in the area of the General Toshevo Town is generated by the lack of a detour, which would lead to the total elimination of goods vehicles in transit from the urban network of traffic, thus reducing the externalities borne by the inhabitants.

The railway network sections the built-up territory of General Toshevo Town in the SW-NE direction on the west side, leading to the reduction of the connectivity of the urban road network (the number of possible connections between the nodes of the road network) on the SE-NW relations. 2903 Road which ensures the connection with the neighboring localities is performed at a level, generating additional travel times.

Lately, the improvement of the technical condition of the road surface has been a local objective to which special attention has been given. Table 2.8 mentions the modernized street sectors starting from year 2016.

***Table 2.8**. Modernized streets 2016-2019. Data source: General Toshevo Town Hall.*

Year	Street	Source of funds
2016	General Toshevo Town, Dobrudzha street	own funds
2016	General Toshevo Town, Staraplanina street	own funds
2016	General Toshevo Town, Nikola Vaptsarov street	own funds
2017	General Toshevo Town, V. Komarov street	own funds
2017	General Toshevo Town, Todor Rachinski street	own funds
2017	General Toshevo Town, Chernomroe street	own funds
2017	General Toshevo Town, Elin Pelin street	own funds
2017	General Toshevo Town, Parvi may street	own funds
2017	General Toshevo Town, DimitarDanchev street	own funds
2018	General Toshevo Town, Ogosta street	own funds
2018	General Toshevo Town, Vasil Levski street	own funds
2018	General Toshevo Town, Anton Strashimiro street	own funds
2018	General Toshevo Town, Al. Gichev street	own funds
2018	General Toshevo Town, Pirinplanina street	own funds
2018	General Toshevo Town, YordanYovkov street	own funds
2018	General Toshevo Town, Tundzha street	own funds
2019	General Toshevo Town, Nezavisimos tstreet	own funds

In the last 5 years the project "***Increasing accessibility to the TEN-T in the border area Negru Vodă - General Toshevo***" was implemented - the component related to General Toshevo Town which had as objective the modernization of the roads within the two localities. The total length of the modernized streets in General Toshevo Towns is 7,95 Km. The infrastructure sections in this category are highlighted in Figure 2.34.

***Figure 2.34**. Roads modernized withing the Project. Data source: General Toshevo Town Hall.*

After the implementation of the project, there is a significant improvement in the quality of road infrastructure on the connecting roads between the urban area and the adjacent villages. In the figures below the sectors included in the project (DOB 3032 and DOB1047) are presented comparatively, before and after being modernized. Similar situations are encountered on most of the streets which have been modernized within the project.

DO 3032Road (II-29 Dobrich – Gen. Toshevo) – Dabovik from km 0 + 000 to 3 + 900 (the end of Dabovik village) and 10th str. from km 0 + 000 (the entrance from Ravnets) to km 0 + 450 (the center of Dabovik).

DOB3032 Road is part of the road network of General Toshevo Municipality, located in the Dobrich region. The section of analyzed DOB3032 road connects Dabovik with II-29 road from the republican road network. 10th street makes the connection between the central area of Dabovik and Ravnets village (figure2.35).

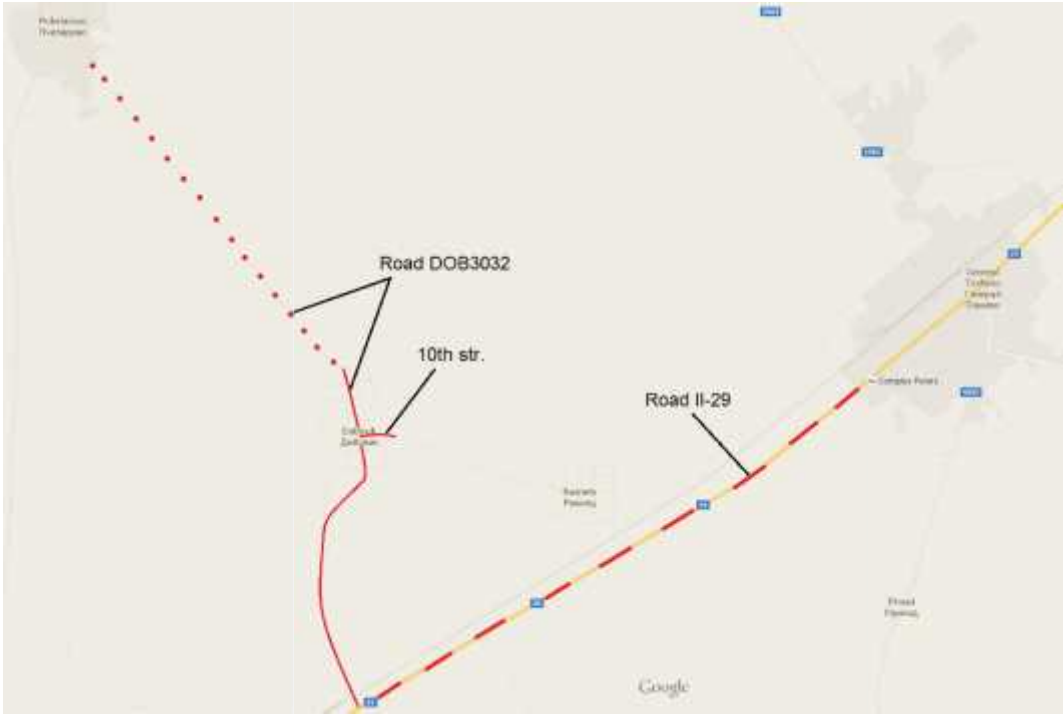


***Figure 2.35**. Territory location of the DOB3032road and 10th Street in Dabovik. Data source: General Toshevo Town Hall.*

DOB3032 Roadis used by the following villages:

Villages served by DOB3032	Number of inhabitants
Dabovik	142
Pchelarovo	555
Ravnets	240
Total:	**937**

The following figures highlight the characteristics of the infrastructure before and after the modernization.

Figure 2.36.*The state of the infrastructure of DOB3032 road and 10th Street in Dabovik before the modernization.*

Figure 2.37. *The state of the infrastructure of DOB3032 road and 10th Street in Dabovik after the modernization.*

The DOB1047road is part of the road network of General Toshevo Municipality, located in the Dobrich region. The section of DOB1047 road between Vasilevo – Balkantsi connects those villages with III-296 road – part of the republican road network.

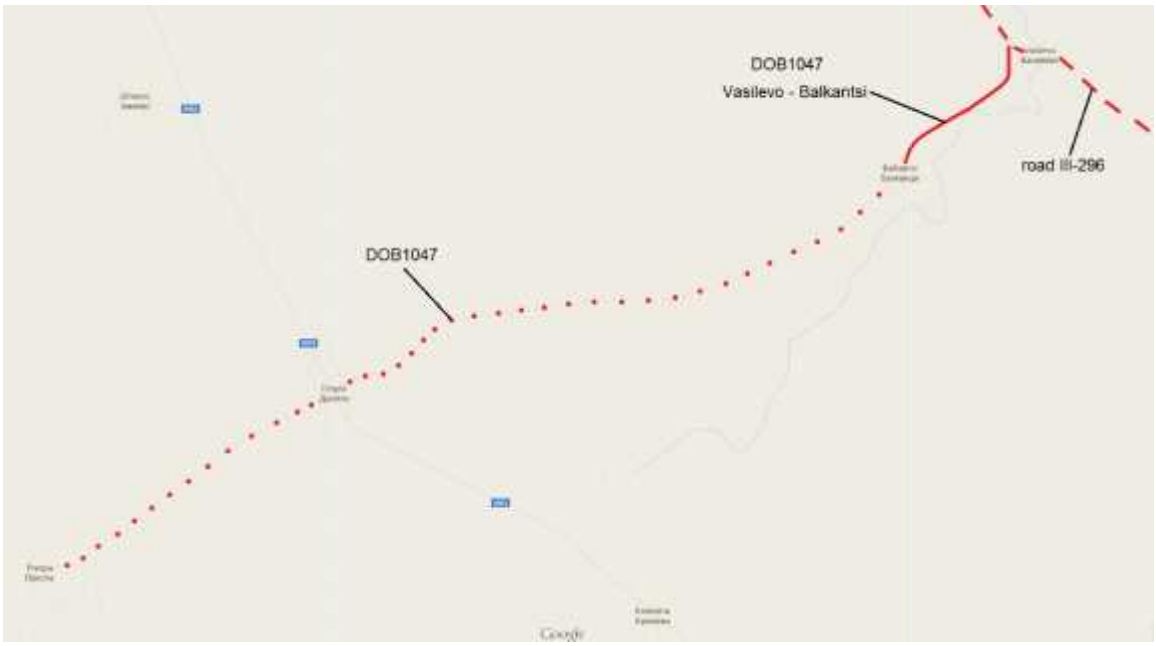


***Figure 2.38**. Territory location of DOB1047road.*
Data source: General Toshevo Town Hall.

DOB1047 Road is used by the following villages:

Villages served by DOB3032	Number of inhabitants
Vasilevo	358
Balkantsi	60
Dropla	280
Prespa	237
Vasilevo	935
Total:	358

The following figures highlight the characteristics of the infrastructure before and after the modernization.

Figure 2.39.*The state of the infrastructure of DOB1047roadbefore the modernization.*

Figure 2.40.*The state of the infrastructure of DOB1047roadafter the modernization.*

Within the project, in addition to the road infrastructure modernization works, in each sector of the roads DOB3032 and DOB1047, investments were also made regarding the organization of the traffic - horizontal markings and vertical signaling.

Traffic safety has been analyzed in relation to the accidents recorded at the level of the transport network in the 2014-2018 period, data received from the General Toshevo Town Hall. In 2018, there was a reduction in the number of accidents compared to the maximum of the analyzed period. The annual variation in the number of accidents is found in figure 2.41. During the entire analyzed period, 6 people lost their lives in traffic accidents, the

highest value being recorded in 2018, when there were 2 deaths as a result of being involved in traffic accidents. This further motivates the actions for reducing the number of victims associated with urban traffic. Another category in which the victims of accidents are classified, depending on seriousness, is that of the injured. The annual variation related to this category of victims emphasizes the registration of the maximum number reached in 2018 (figure 2.42).

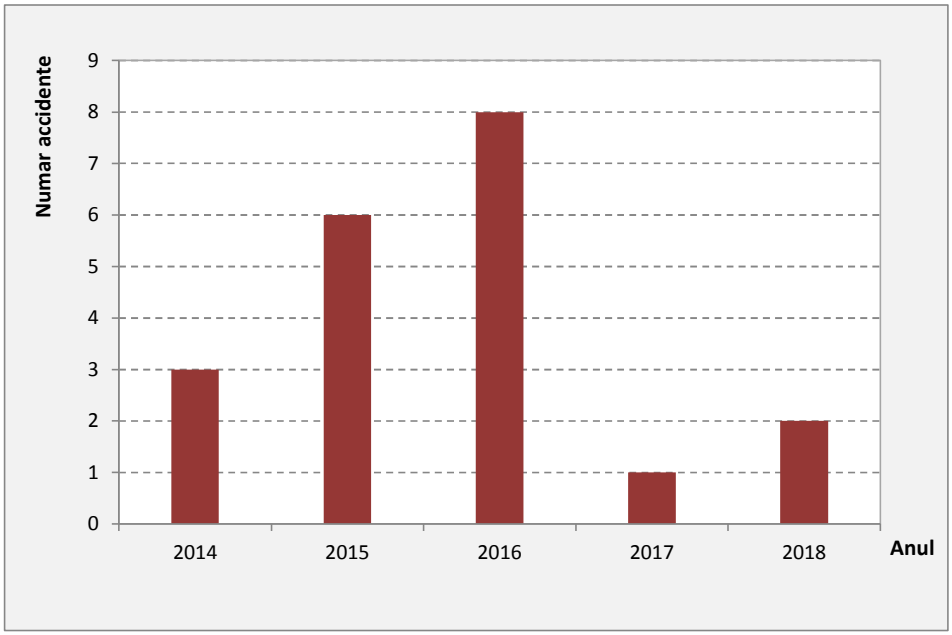


Figure 2.41.*Variation in the number of accidents, General Toshevo, 2014-2018.*
Data source: General Toshevo Town Hall.

Număr de accidente=Number of accidents
Anul=Year

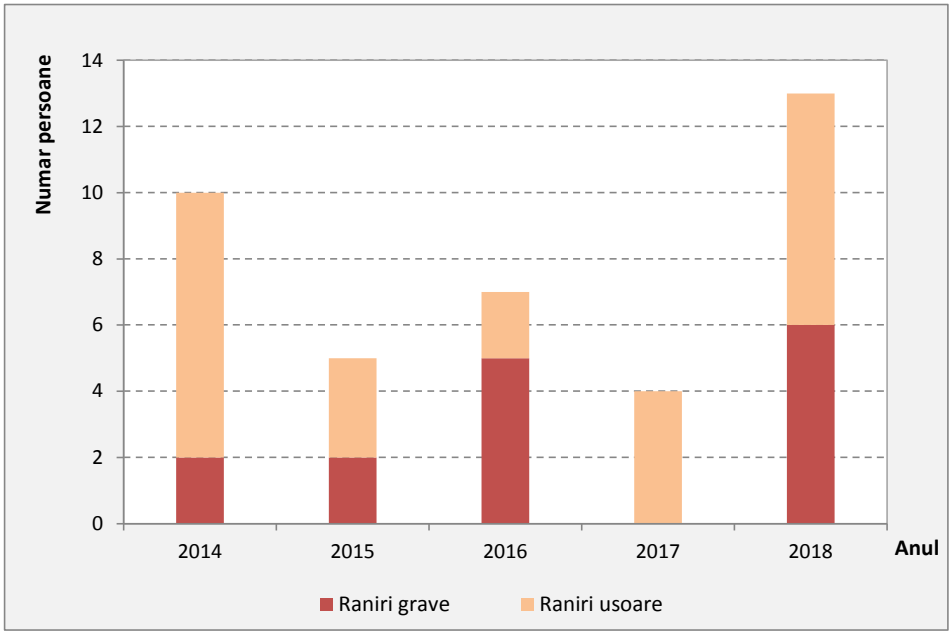


Figure 2.42.*Variation in the number of victims, General Toshevo, 2014-2018.*
Data source: General Toshevo Town Hall.

Număr persoane=Number of persons

Anul=Year
Raniri grave=Major injuries
Raniri usoare=Minor injuries

Of the total number of accidents, in each year of the analysis period, collisions between cars represent the type of cases that were the most registered (table 2.9) .

***Table 2.9**. Types of accidents 2014-2018, General Toshevo.*
Data source: General Toshevo Town Hall.

Type of road accident	Year				
	2014	2015	2016	2017	2018
Collisions between cars	5	7	25	11	8
Collision with a tree	4	4	3	0	4
Collision with a pole	3	3	1	1	0
Collision with a crash barrier	3	2	8	1	1
Collision with parked cars	5	5	2	3	9
Collision with cyclists	1	2	0	1	1
Collision with pedestrians	2	1	1	1	1
Overturning the car off the road	1	0	4	2	2
Other	6	8	11	8	14

With regard to the causes of the accidents, speed not adapted to road conditions and non-compliance with priority stand out (table 2.10).

***Table 2.10**. Causes of accidents 2014-2018, General Toshevo.*
Data source: General Toshevo Town Hall.

Type of road accident	Year				
	2014	2015	2016	2017	2018
Driving after consuming alcohol	2	0	7	0	0
Not-adapted speed (Speeding)	12	20	10	0	1
Incorrect overtaking	1	0	0	0	1
Non-compliance with priority	1	0	12	11	7
Incorrect maneuvers	3	1	6	0	3
Loss of control over the vehicle	2	6	2	5	9
Non-compliance with the regulatory distance	0	0	3	4	3
Driving without a legal right	0	0	3	0	0

Other	9	5	12	9	14

The segments of the road network characterized by high incidence of traffic accidents are represented by the main road arteries, on which there are high values of traffic flows, especially at peak hours (Chapter 3).

Traffic flow problems are associated with the interaction between pedestrians, cyclists and heavy goods vehicles, especially in the central area (Dimitar Blagoev street - DN 29), where there are also vehicles parked on the road or in its vicinity.

There is detour road for the transport of goods on the road network in the town of General Toshevo. Heavy goods vehicles are directed to Dobri Orlov Street. In the absence of a detour road, which would take over the transit traffic, respectively the penetration traffic, which is associated with serving the areas where grain storage spaces are set up (silos, receiving warehouses), in the urban General Toshevo area one comes across the situation where heavy goods vehicles cross residential neighborhoods and vulnerable areas, therefore constituting a negative aspect in terms of the quality of life (figure 2.43).

The presence of goods vehicles generates severe negative effects, such as air and noise pollution, CO2 emissions, increases in travel time and related to traffic safety. Moreover, the circulation of heavy goods vehicles on the streets whose road structure has not been sized for this purpose leads to the rapid degradation of the road surface.

***Figure 2.43**. Presence of heavy goods vehicles in the residential area, General Toshevo.*
Sursa: Google Maps.

In the Dimitar Blagoev street sector, between Georgi Rakovski Street and DJ 296 the access of vehicles with a maximum total authorized mass over 3.5 tons is forbidden.

The organization and control of the traffic at the level of the road network is done based on horizontal and vertical signaling. The signage for the regulation of traffic is present, the signaling and orientation indicators are properly located and are in good condition, especially on the network sections which have recently been rehabilitated / modernized.

Smart traffic management systems are not used at the level of the studied area, and traffic data cannot be recorded automatically in real time. There is a center for monitoring the public space, including the traffic, but it does not have traffic management functions.

2.3. Public transport

In the studied area, public passenger transport is provided by the county public transport through regular services. From 2018, the rail transport has been suspended.

The county public transport system through regular services is found within the analyzed territory operating rides that have their origin / destination in Negru Vodă Town. This public transport service is managed by Constanța Municipal Council, having private operators.

According to the transport program published by Constanța Municipal Council for the 2014 – 2019 period, during a working day the total number of rides serving the transport demand generated / attracted by Negru Vodă Town is 41, distributed between 6 routes (table 2.11).

***Table 2.11**. County public transport routes. Data source: Constanța Municipal Council.*

Current no.	Route code	Locality of origin	Intermediatelocality	Destination locality	Route's length [km / direction]	No. Rides/ day	Minimum transport capacity [seats]
1	029	Mangalia	Albești	Negru Vodă	38	19	≤22
2	030	Mangalia	Negru Vodă	Independenței	62	3	≤22
3	064	Constanța	Negru Vodă	Dumbrăveni	90	3	≤22
4	065	Constanța	Chirnogeni	Negru Vodă	67	4	≤22
5	066	Constanța	Tătaru	Negru Vodă	67	4	≤22
6	067	Constanța	Comana	Negru Vodă	60	8	≤22

From the data presented in the table above, one can notice that the most frequently circulated routes are Mangalia - Albești- **Negru Vodă** and Constanța – Comana – **Negru Vodă**.

The hourly distribution of the transport offer provided on these routes on working days is shown graphically in figures 2.44 and 2.45. One can notice that the highest frequency is of 4

vehicles per hour, an offer found between 05:00-08:00 along the Mangalia - Albeşti – **Negru Vodă** route.

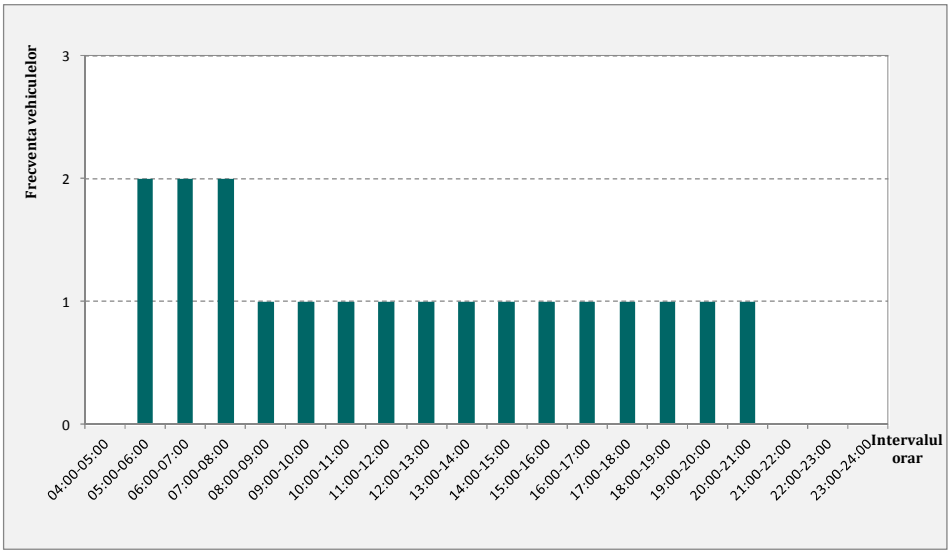


***Figure 2.44**. Number of rides per hour, route Mangalia - Albeşti - Negru Vodă.*
Data source: Constanța Municipal Council.

Frecvența vehiculelor =Vehicle frequency
Intervalul orar=Timeline

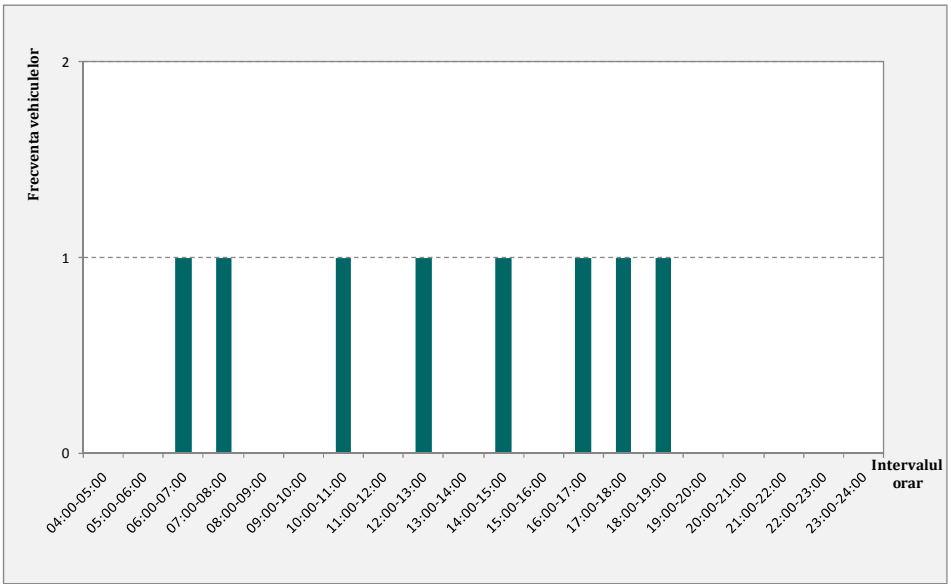


***Figure2.45**. Number of rides per hour, route Constanța - Comana - Negru Vodă.*
Data source: Constanța Municipal Council.

Frecvența vehiculelor =Vehicle frequency
Intervalul orar=Timeline

According to the data received from the Constanța Municipal Council, the routes included in the County Transport Program transiting Administrative-Territorial Unit Negru Vodă are served by the following transport operators:

- S.C. Darocrim S.R.L. for routes 029 and030;
- S.C. Emanuel Trading S.R.L. for routes064, 065, 066, 067.

Public transport infrastructure is deficient. There are stations set up, but they do not correspond to the current needs (figure 2.46).

***Figure 2.46**. County public transport station which is not set up / improperly set up.*

Deficiencies in public transport infrastructure are also found in the adjacent villages.

General ToshevoMunicipality does not have a public transport service. The town hall provides daily transport of children to schools through school buses. Also, every Saturday, the mayor's office provides residents with a minibus on the route downtown - cemetery.

The connection between the localities within the radius of ATU General Toshevo is made through the regular transport routes of some private operators.The routes that served the urban area in 2019 and 2020 and their characteristics are listed in the following table.

***Table 2.12**. Public transport routes General Toshevo.*
Data source: General Toshevo Town Hall.

Year	Route	Timetable			
2019	General Toshevo – Dobrich-Varna-Shumen-Targovishte –Omurtag - VelikoTarnovo-Sofia	1:10-1:41-2:45-4:17-5:20-5:51-7:17-11:00 Daily			
2019	Sofia - VelikoTarnovo - Omurtag – Targovishte – Shumen – Varna - Dobrich - General Toshevo	15:00-18:53-20:11- 20:42 – 21:45- 23:20-0:21 Daily			
2019	Dobrich – General Kolevo-General Toshevo – Kardam - Chernookovo – Rogozina–Spasovo - Bejanovo-Duranculac- Granichar	17:30 - 17:51 – 18:10- 18:21-18:29 – 18:37 – 18:45- 18:56-19:09– 19:14 *Monday - Friday*	8:00-8:21-8:40-8:51-8:59-9:09-9:14		

Year	Route	Timetable			
2019	Granichar– Duranculac– Bejanovo– Spasovo – Rogozina– Chernookovo – Kardam – General Toshevo – General Kolevo– Dobrich	6:30 – 6:36 - 6:49 – 7:00 – 7:08 – 7:16 – 7:24 – 8:10 – 8:26 *Monday - Friday*			
2019	Dobrich – General Kolevo- General Toshevo – Kardam - Chernookovo – Rogozina– Spasovo	8:00-8:21-8:40-8:51-8:59-9:07-9:14 Daily	14:30-15:05-15:20-15:28-15:36-15:44 Daily		
2019	Dobrich – IPS – Preselentzi– Vasilevo – Konare – Krupen – Vranino – Belgun – Krapets – Duranculac– Granichar	9:00– 9:36 – 9:47 – 9:55 – 10:03 – 10:08 – 10:15ч – 10:26– 10:55 – 11:10 – 11:15 *Seasonal*			
2019	Granichar– Duranculac– Krapets – Belgun – Vranino – Krupen – Konare – Vasilevo – Preselentzi– IPS – Dobrich	14:45 – 15:01 – 15:16 – 15:45 – 15:56 – 16:03 – 16:08 – 16:16 – 16:24– 16:35 – 17:10 *Seasonal*	17:10 – 17-16– 17:31 – 18:00– 18:11– 18:18 – 18:23– 18:31 – 18:39 – 18:50– 19:25 *Seasonal*		
2019	Spasovo – Rogozina– Chernookovo- Kardam – General Toshevo- General Kolevo- Dobrich	16:30-16:36-16:47-16:55-17:20-17:35 – 17:55 *Monday - Friday*	10:00-10:08-10:16-10:24-11:00 -11:15-11:26 Daily		
2019	Dobrich – Pobeda- Metodievo- IPS- Malina- Preselentzi– Vasilevo	8:30- 8:38-8:47-8:56 – 9:00-9:05 – 9:10 *Monday - Friday*	15:30-15:37-15:47-15:56-16:00-16:05-16:10 *Monday - Friday*		
2019	Vasilevo – Preselentzi– Malina – IPS – Metodievo – Pobeda – Dobrich	9:15 -9:21 -9:26 -9:30 -9:39 - 9:48 -9:55 *Monday - Friday*	16:15 -16:21 - 16:26 -16:30 - 16:39 -16:48 - 16:55 *Monday - Friday*		
2019	Dobrich – Stefan Karagea- General Kolevo– IPS – Ravnets – General Toshevo	7:40- 7:49 – 7:55 – 8:00-8:05- 8:10 *Daily*	10:15-10:24-10:30-10:35-10:40-10:43 *Daily*	15:00-15:09-15:14-15:19-15:24-15:28-15:30 *Daily*	12:00-12:09-12:15-12:20-12:25-12:30 *Daily*
		17:00-17:09-17:15-17:20-17:25-17:30 *Daily*	19:00-19:09-19:15-19:20-19:25-19:30 *Daily*		
2019	General Toshevo – Ravnets – IPS – General Kolevo– Stefan Karagea – General Toshevo	6:50-6:56-7:00-7:06-7:11-7:20 *Daily*	6:30-6:36-6:41 - 6:46-6:52-7:00 *Daily*	11:15 -11:21 - 11:26 -11:31 - 11:37 -11:45 *Daily*	16:00 -16:06 - 16:11 -16:16 - 16:22 -16:30 *Daily*
		17:00 -17:06 - 17:11 -17:16 - 17:22 -17:30 *Daily*	18:00 -18:06 - 18:11 -18:16 - 18:22 -18:30 *Daily*		

Year	Route	Timetable			
2019	General Toshevo – Ravnets– General Kolevo– Stefan Karagea - Dobrich	9:00 -9:06 -9:15 -9:21 -9:30 *Dailywithout Sunday*			
2019	Dobrich – Stefan Karagea - General Kolevo– Ravnets – General Toshevo	11:20 -11:29 - 11:35 -11:45 - 11:50 *Without Sunday*			
2019	Dobrich – Stefan Karagea - General Kolevo– Plenimir – Ravnets – General Toshevo	18:30 - 18:39 – 18:45 – 18:56 – 19:00 – 19:07 *Daily*	9:00-9:09 -9:15- 9:26 -9:30-9:37 *Daily*		
2019	General Toshevo – Ravnets – Plenimir – General Kolevo– Stefan Karagea – Dobrich	13:00-13:08- 13:12 -13:23 - 13:29 -13:37 *Daily*			
2019	General Toshevo – Prisad – Plenimir – Petleshkovo – General Kolevo– Stefan Karagea – Dobrich	9:30 -9:38 -9:42 -9:49 -10:00 - 10:06 -10:14 *Daily*			
2019	General Toshevo – Prisad – IPS – Malina – Zmeevo – Dropla – Kremena – Momchil – Balchik	8:00 -8:06 -8:12 -8:21 -8:30 - 8:36 -8:42 -8:48 -8:55ч *Seasonal – Saturday and Sunday*			
2020	General Toshevo – Dobrich-Varna-Shumen-Targovishte –Omurtag - VelikoTarnovo-Sofia	1:10 -1:41 -2:45 -4:17 -5:20 - 5:51 -7:17 - 11:00 *Daily*			
2020	Sofia - VelikoTarnovo - Omurtag – Targovishte – Shumen – Varna - Dobrich - General Toshevo	15:00 -18:53 - 20:11 - 20:42 – 21:45 - 23:20 - 0:21 *Daily*			
2020	General Toshevo – Kardam – Spasovo – Sarneno – Sirakovo – Velikovo – Kalina – Goritsa – Preselentzi– Lyulyakovo– Pisarovo– General Toshevo	6:50 -7:04 -7:35 -7:49 -7:55 - 8:03 -8:11 -8:19 -8:30 -8:41 - 8:51 *Monday - Friday*	14:00 -14:14 - 14:45 -14:53 - 14:59 -15:05 - 15:13 -15:21 - 15:29 -15:40 - 15:51 -16:01 *Monday - Friday*		
2020	General Toshevo – Lyulyakovo– Preselentzi– Vasilevo – Konare – Sredina – Balkantzi – Vasilevo – Preselentzi– Malina – Petleshkovo – Prisad – General Toshevo	6:40 -6:49 -6:58 -7:09 -7:18 - 7:32 -7:46 -7:52 -8:03 -8:11 - 8:22 -8:26 -8:33 *Monday - Friday*	13:30 -13:39 - 13:48 -13:59 - 14:08 -14:22 - 14:36 -14:42 - 14:53 -15:01 - 15:12 -15:16 - 15:23 *Monday - Friday*		
2020	General Toshevo – Kardam – Spasovo – Sarneno – Sirakovo – Velikovo – Kalina – Goritsa –	6:50 -7:04 -7:35 -7:49 -7:55 - 8:03 -8:11 -8:19 -8:30 -8:41 -	14:00 -14:14 - 14:45 -14:53 - 14:59 -15:05 - 15:13 -15:21 -		

Year	Route	Timetable			
	Preselentzi– Lyulyakovo– Pisarovo– General Toshevo	8:51 *Monday - Friday*	15:29 -15:40 - 15:51 -16:01 *Monday - Friday*		
2020	General Toshevo – Lyulyakovo– Preselentzi– Vasilevo – Konare – Sredina – Balkantzi – Vasilevo – Preselentzi– Malina – Petleshkovo – Prisad – General Toshevo	6:40 -6:49 -6:58 -7:09 -7:18 - 7:32 -7:46 -7:52 -8:03 -8:11 - 8:22 -8:26 -8:33 *Monday - Friday*	13:30 -13:39 - 13:48 -13:59 - 14:08 -14:22 - 14:36 -14:42 - 14:53 -15:01 - 15:12 -15:16 - 15:23 *Monday - Friday*		
2020	General Toshevo –Pastir – Kapinovo – Goren Izvor – DolenIzvor – Dobromirtzi – Krasen – Rositsa– Krasen – Росен – Krasen Dobromirtzi – DolenIzvor – Goren Izvor – Kapinovo – General Toshevo	6:50-6:54-7:07-7:22-7:32-7:52-8:13-8:19-8:25-8:36-8:49-8:53-9:00 *Monday, Tuesday, Thursday and Friday*	12:30-12:34-12:47-13:02-13:11-13:32-13:53-13:59-14:05-14:16-14:29-14:33 -14:40 *Monday, Tuesday, Thursday and Friday*		
2020	General Toshevo – Pastir – Kapinovo – Goren Izvor – DolenIzvor – Dobromirtzi – Krasen – Rositsa – Loznitsa – Rositsa- Krasen - Dobromirtzi – DolenIzvor – Goren Izvor – Kapinovo – General Toshevo	6:50-6:54-7:07-7:22-7:32-7:52-8:13-8:19-8:25-8:36-8:49-8:53-9:00 *Wednesday*	12:30-12:34-12:47-13:02-13:11-13:32-13:53-13:59-14:05-14:16-14:29-14:33-14:40 *Wednesday*		
2020	General Toshevo – Yovkovo – Kardam – Snyagovo – General Toshevo	7:10 -7:31 -7:39 -7:47 *Monday - Friday*	13:00 -13:21 - 13:29 -13:37 - 13:52 *Monday - Friday*	17:10 -17:31 - 17:39 -17:47 - 18:02 *Monday - Friday*	
2020	Dobrich – Stefan Karagea- General Kolevo– IPS – Ravnets – General Toshevo	7:40 - 7:49 – 7:55 – 8:00 - 8:05 - 8:10 *Daily*	10:15 -10:24 - 10:30 -10:35 - 10:40 -10:43 *Daily*	15:00 -15:09 - 15:14 -15:19 - 15:24 -15:28 - 15:30 *Daily*	12:00 -12:09 - 12:15 -12:20 - 12:25 -12:30 *Daily*
		17:00 -17:06 - 17:11 -17:16 - 17:22 -17:30 *Daily*	19:00 -19:09 - 19:15 -19:20 - 19:25 -19:30 *Daily*		
2020	General Toshevo – Ravnets – IPS – General Kolevo– Stefan Karagea – General Toshevo	6:50 -6:56 - 70:00 -7:06 - 7:11 -7:20 *Daily*	6:30 -6:36 -6:41 -6:46 -6:52 - 7:00 *Daily*	11:15 -11:21 - 11:26 -11:31 - 11:37 -11:45 *Daily*	16:00 -16:06 - 16:11 -16:16 - 16:22 -16:30 *Daily*
		17:00 -17:06 - 17:11 -17:16 - 17:22 -17:30 *Daily*	18:00 -18:06 - 18:11 -18:16 - 18:22 -18:30 *Daily*		
2020	General Toshevo – Ravnets – Plenimir – General Kolevo– Stefan Karagea – Dobrich	18:30 -18:39 – 18:45 – 18:56 – 19:00 – 19:07ч *Daily*	13:00 -13:08 - 13:12 -13:23 - 13:29 -13:37 *Daily*		

Year	Route	Timetable			
2020	Dobrich – Stefan Karagea - General Kolevo– Ravnets – General Toshevo	11:20 -11:29 - 11:35 -11:45 - 11:50 *Dailywithout Sunday*	9:00 -9:09 -9:15 -9:26 -9:30 - 9:37 *Daily*		
2020	General Toshevo – Ravnets– General Kolevo– Stefan Karagea - Dobrich	9:00 -9:06 -9:15 -9:21 -9:30 *Dailywithout Sunday*			
2020	General Toshevo – Prisad – IPS – Malina – Zmeevo – Dropla – Kremena – Momchil – Balchik	8:00 -8:06 -8:12 -8:21 -8:30 - 8:36 -8:42 -8:48 -8:55 *Seasonal – Saturday and Sunday*			
2020	Balchik – Momchil – Kremena – Dropla – Zmeevo – Malina – IPS – Prisad – General Toshevo	18:30 -18:38 - 18:44 -18:50 - 18:56 -19:02 - 19:11 -19:17 - 19:25 *Seasonal – Saturday and Sunday*			
2020	General Toshevo – Prisad – IPS – Malina – Zmeevo – Dropla – Kremena – Momchil – Balchik	8:00 -8:06 -8:12 -8:21 -8:30 - 8:36 -8:42 -8:48 -8:55 *Seasonal – Saturday and Sunday*			
2020	Balchik – Momchil – Kremena – Dropla – Zmeevo – Malina – IPS – Prisad – General Toshevo	18:30 -18:38 - 18:44 -18:50 - 18:56 -19:02 - 19:11 -19:17 - 19:25 *Seasonal – Saturday and Sunday*			
2020	General Toshevo – Prisad – Plenimir – Petleshkovo – General Kolevo– Stefan Karagea – Dobrich	9:30 -9:38 -9:42 -9:49 -10:00 - 10:06 -10:14 *Daily*			
2020	Dobrich – General Kolevo- General Toshevo – Kardam - Chernookovo – Rogozina– Spasovo - Bejanovo- Duranculac- Granichar	17:30 - 17:51 – 18:10 - 18:21 - 18:29 – 18:37 – 18:45 - 18:56 - 19:09 – 19:14 *Monday - Friday*	8:00 -8:21 -8:40 -8:51 -8:59 - 9:09 -9:14		
2020	Granichar– Duranculac– Bejanovo– Spasovo – Rogozina– Chernookovo – Kardam – General Toshevo – General Kolevo– Dobrich	6:30 – 6:36 - 6:49 – 7:00 – 7:08 – 7:16 – 7:24 – 8:10 – 8:26 *Monday - Friday*			

Year	Route	Timetable			
2020	Dobrich – General Kolevo- General Toshevo – Kardam - Chernookovo – Rogozina– Spasovo	8:00 -8:21 -8:40 -8:51 -8:59 - 9:07 -9:14 *Daily*	14:30 -15:05 - 15:20 -15:28 - 15:36 -15:44 *Daily*		
2020	Spasovo – Rogozina– Chernookovo- Kardam – General Toshevo- General Kolevo- Dobrich	16:30 -16:36 - 16:47 -16:55 - 17:20 -17:35 – 17:55 *Daily*	10:00 -10:08 - 10:16 -10:24 - 11:00 - 11:15 - 11:26 *Daily*		
2020	Dobrich – Pobeda- Metodievo- IPS- Malina- Preselentzi– Vasilevo	8:30- 8:38-8:47- 8:56 – 9:00- 9:05 – 9:10 *Monday - Friday*	15:30-15:37- 15:47-15:56- 16:00-16:05- 16:10 *Monday - Friday*		
2020	Vasilevo – Preselentzi– Malina – IPS – Metodievo – Pobeda – Dobrich	9:15-9:21-9:26- 9:30-9:39 9:48-9:55 *Monday - Friday*	16:15-16:21- 16:26-16:30- 16:39-16:48- 16:55 *Monday - Friday*		
2020	Dobrich – IPS – Preselentzi– Vasilevo – Konare – Krupen – Vranino – Belgun – Krapets – Duranculac– Granichar	9:00 – 9:36 – 9:47 – 9:55 – 10:03 – 10:08 – 10:15 – 10:26 – 10:55 – 11:10 – 11:15 *Seasonal*			
2020	Granichar– Duranculac– Krapets – Belgun – Vranino – Krupen – Konare – Vasilevo – Preselentzi– IPS – Dobrich	14:45 – 15:01 – 15:16 – 15:45 – 15:56 – 16:03 – 16:08 – 16:16 – 16:24 – 16:35 – 17:10 *Seasonal*	17:10 – 17-16 – 17:31 – 18:00 – 18:11 – 18:18 – 18:23 – 18:31 – 18:39 – 18:50 – 19:25 *Seasonal*		

2.4. Alternative mobility systems

Towns, especially those where frequent short trips are made, are an environment conducive to the use of non-motorized modes of transport, thus contributing to a sustainable mobility. In this sense, it is necessary to set up the public space in a way that encourages citizens to travel on foot or by bicycle, ensuring:

- *generous pedestrian spaces;*
- *marking / indicating the pedestrian routes towards the main points of interest;*
- *road safety (public street lighting, signaling pedestrian crossings, setting up uneven passages);*
- *accessibility for people with disabilities (semi-buried curbs at pedestrian crossings, access ramps, tactile marking at pedestrian crossings);*

- *setting up bicycle lanes to ensure travel safety;*
- *bicycle parking in the vicinity of the main points of interest (extra-urban public transport stations, commercial areas, public institutions, schools, recreational areas).*

In the current situation, in Negru Vodă Town there are deficiencies regarding the pedestrian infrastructure. On the local function streets, the sidewalks are missing (figure 2.47), and on the main arterial street there are accessibility problems (figure 2.48). Such situations make it difficult for people with reduced mobility to travel (people with disabilities, the elderly, people with children, etc.).

Figure 2.47.*Lack of sidewalks, Example Negru Vodă.*

Figure 2.48*. Improper, difficult to access sidewalks, Example Negru Vodă*

Figure 2.49*. Improper, difficult to access sidewalks, ExampleGeneral Toshevo.*
Source: Google Maps.

With regard to bicycle infrastructure, no such set up is currently identified in neither of the towns which are subject of the study. In Negru Vodă Town, as well as in General Toshevo Town, there is a demand for this mode of travel, the circulation of bicycles taking place on the roadway, on the traffic lanes intended for vehicles, an aspect which endangers traffic safety for all traffic participants (figures 2.50 and 2.51).

Figure 2.50. *Bicycle traffic on the roadway, Example Negru Vodă*

Figure 2.51. *Bicycle traffic on the roadway, ExampleGeneral Toshevo.*
Source: Google Maps.

3. ROAD TRAFFIC FLOWS

3.1. Traffic flows at the level of the baseline year 2020

The analysis of traffic conditions at the level of the baseline year 2020 is based on the traffic flows determined with the help of the transport model developed at the level of the analyzed territory.

The transport model within the Traffic Management Study allows the formalization of the transport system user's choices regarding (four steps):

- *the decision whether or not to travel for a certain reason or purpose;*
- *the destination of the trip;*
- *the mode of transport used;*
- *the itinerary covered in a reference time interval.*

The modeling is performed at MZA (Annual Daily Average) level following the recommendations of the guide published by JASPERS in this field "The Use of Transport Models in Transport Planning and Project Appraisal: JASPERS: 2014". From a geographical point of view, the transport model is elaborated at the level of the administrative territory of NegruVodă Town.

The results obtained within the modeling were used to quantify the indicators regarding the performance of the transport system, such as: the intensity of passenger and freight traffic, travel times at the network level, transport flows (origin-destination relations), modal share of travel, emissions of pollutants, greenhouse gas (CO_2) emissions, etc.

3.1.1. Traffic volume data

The volume and structure of traffic flows specific to the transport system which is the object of the study represent output elements within a transport model. The calibration and validation of such a model requires the knowledge of a data set characteristic of the *ex-post* transport demand, regarding these parameters, as representative as possible from the point of view of the considered sample and of the recording accuracy.

The metering stations were placed in key points within the road network, as can be seen in Figure 3.1. Monitoring was performed in 5 intersections. The monitoring of the number of vehicles by types took place in 2020 (before the onset of the Coronavirus pandemic), for 13 hours (between 06:30 and 19:30). The vehicles in the composition of the traffic flows were classified into 10 main categories (table 3.1).

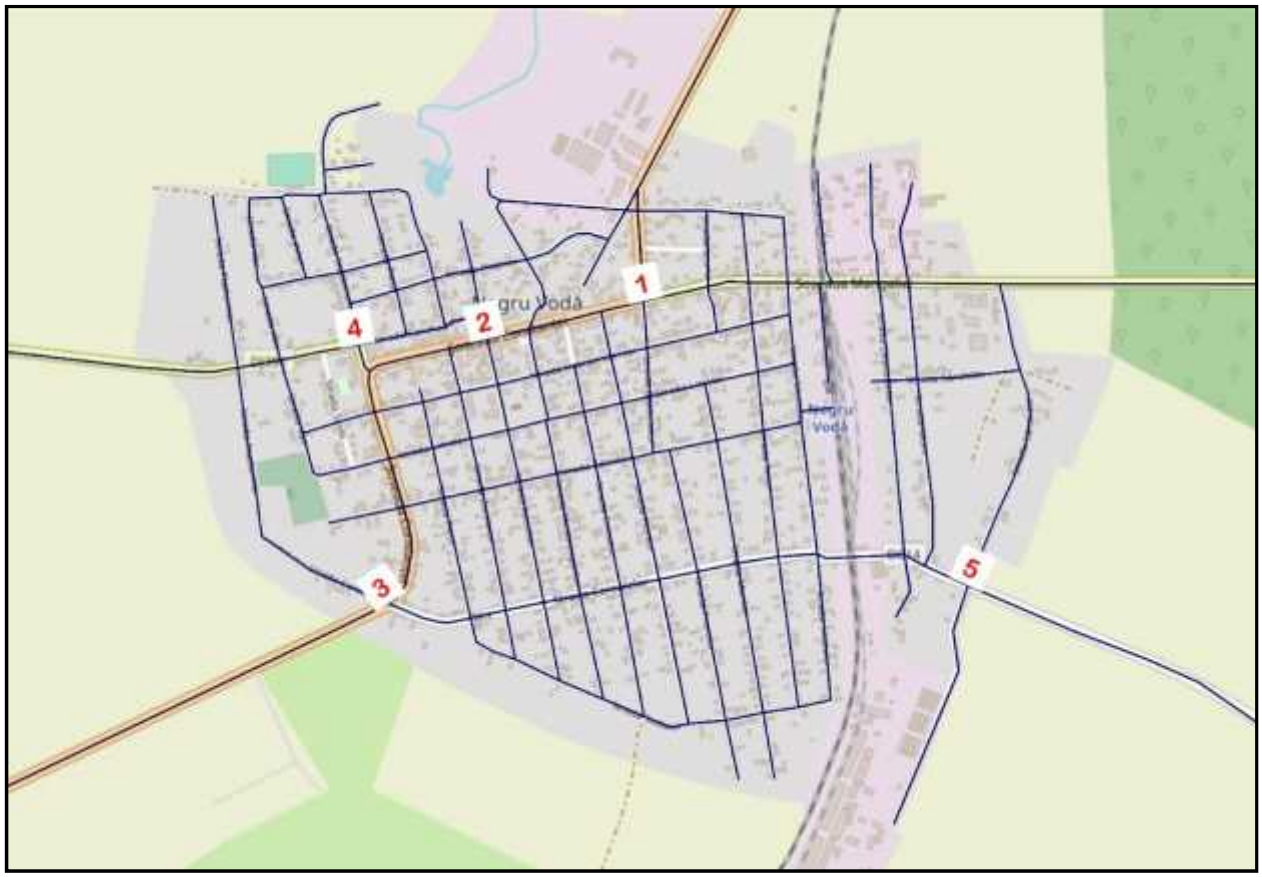


***Figure 3.1**. Location of the traffic analysis stations.*

In order to accomplish the correlationwith the traffic values characteristic of the major transport network in the studied area, the values of traffic flows recorded on national and county road sectors during the general traffic census conducted by CESTRIN - CNAIR / ConstanţaMunicipal Council in 2015 were used:

- → DN 38, station 772 (km 34+934) and station 74 (km 46+000);
- → DJ 391, station 1400 (km 28+000) and station 1399 (km 34+000);

Data on the intensity of traffic on the road section which ensures the connection with the partner city in Bulgaria, II-29 - Dobrich - General Toshevo - Kardam - Border with Romania have been provided by General Toshevo Town Hall. In the analysis station located at km 53 + 970 (before St. Karadnzha village) the annual daily average value of 4,500 vehicles was recorded.

***Table 3.1**. Categories ofmonitored vehicles.*

Current no.	Category	
1./ 1'.		Bicycles /Motorcycles, scooters, etc.
2.		Cars
3.		Passenger minibuses
4.		Pick-ups andtrucks with Gross Vehicle Weight <=3.5 tons
5.		Trucks and derivatives with 2 axles
6.		Trucks and derivatives with 3 or 4 axles
7.		Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
8.		Buses and coaches
9.		Tractors with / without trailer and special vehicles
10.		Truckswith 2, 3 or 4 axles with trailer (road train)

Figures 3.2-3.20 show the temporal distributions of the number of monitored vehicles, by sector and category, recorded in the 5 analysis stations in NegruVodă Town (Constanţei Road - Mangaliei Road - Gladiolelor Street Intersection, Constanţei Road - Recoltei Street Intersection, Constanţei Road - Cerealelor Street Intersection, Cherchezului Street - Stadionului Street Intersection, DC 14 - Sănătăţii Street Intersection) and in the 1 station in General Toshevo Town (Dimitar Blagoev street- 296 Road –2903 Road). The distribution of traffic volumes according to turning movement, monitored at intersections, over an interval of 13 hours and corresponding to traffic rush hour is highlighted in Figures 3.21-3.28.

STATION 1. Constanţei Road –Mangaliei Road - Gladiolelor Street Intersection

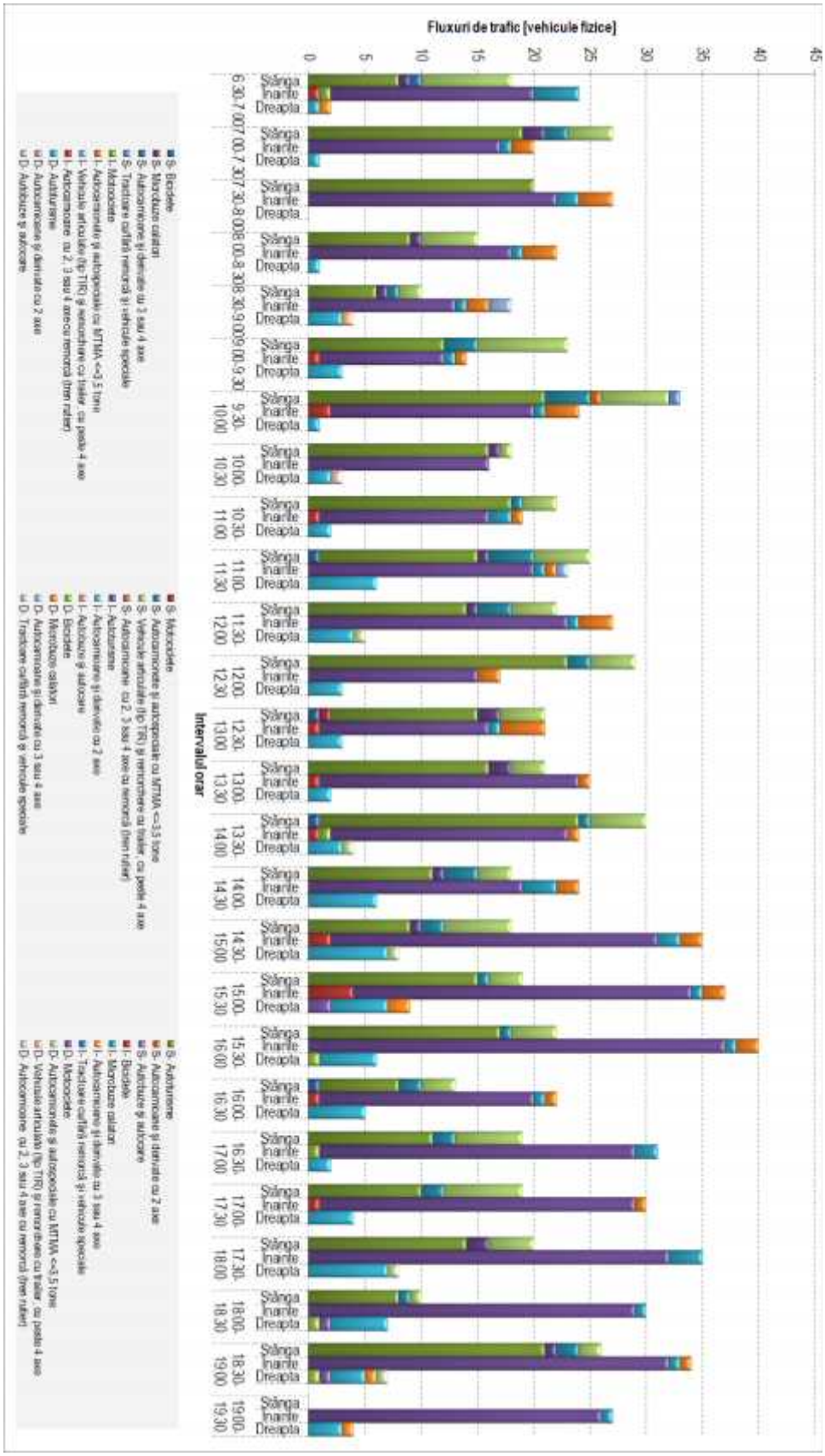


***Figure 3.2**. Traffic volume distribution. Station 1_1, Section – Constanţei Road (rotated figure).*

Fluxuri de trafic (vehiculefizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane şi derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă şi vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete şi autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) şi remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane şi derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze şi autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete şi autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) şi remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane şi derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze şi autocare= Buses and coaches
D-Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D-Autocamioane şi derivate cu 3 sau 4axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă şi vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S-Autocamioane şi derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze şi autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane şi derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă şi vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D-Autocamionete şi autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D-Vehicule articulate (tip TIR) şi remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

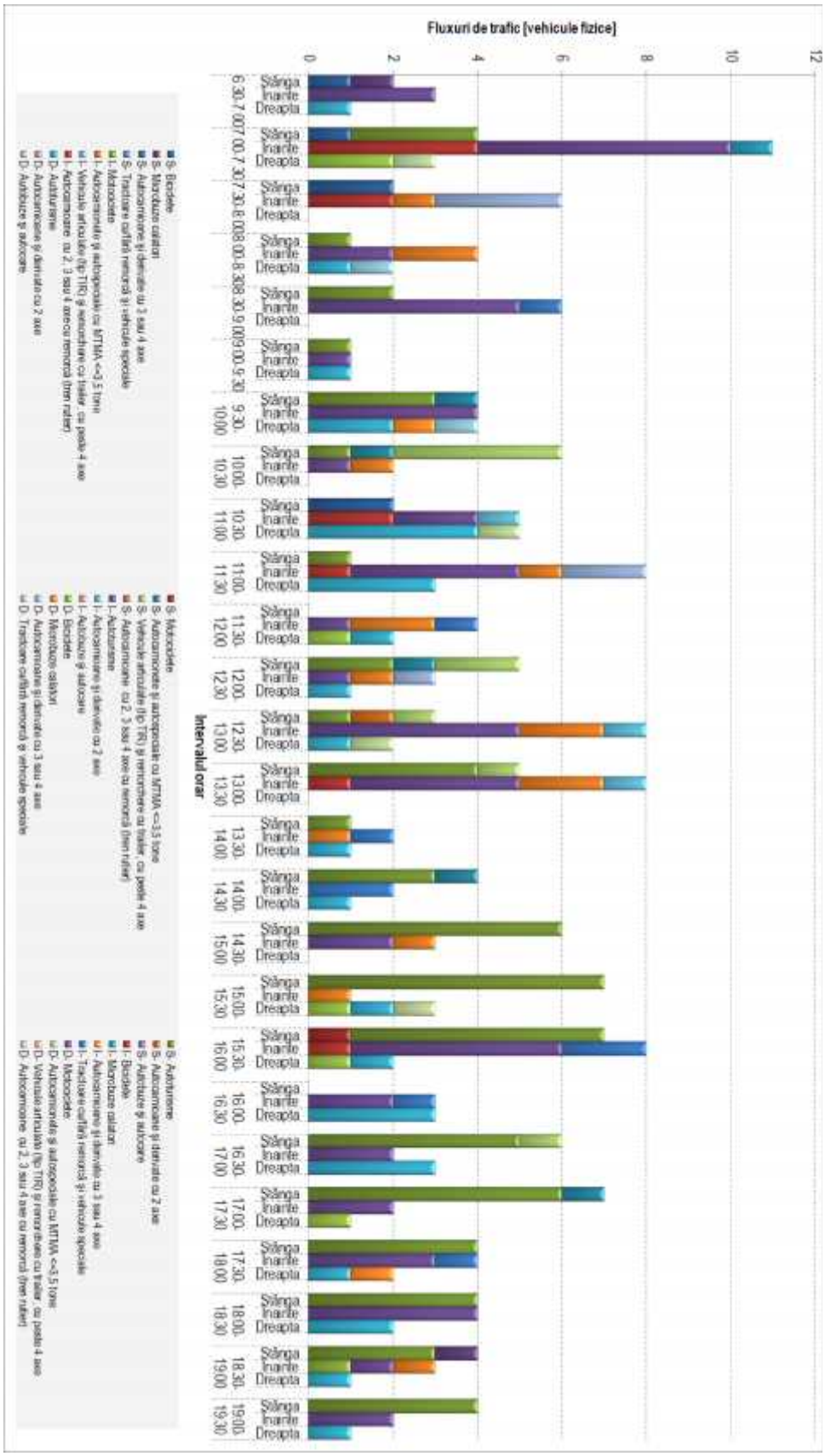


***Figure 3.3**. Traffic volume distribution. Station 1_2, Section – Gladiolelor Sud Street(rotated figure).*

Fluxuri de trafic (vehiculefizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

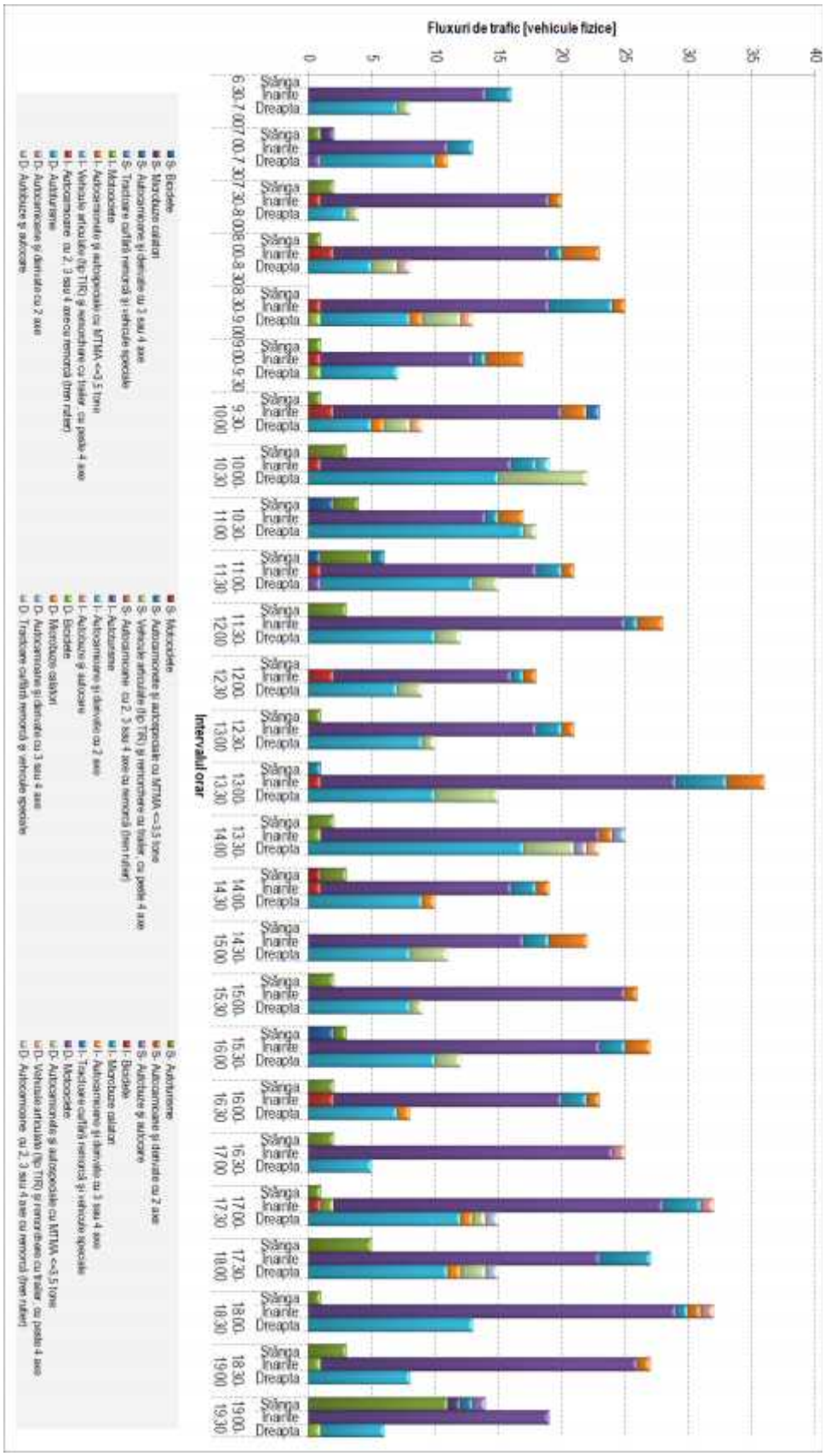


***Figure 3.4**. Traffic volume distribution. Station 1_3, Section – Mangaliei Road (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

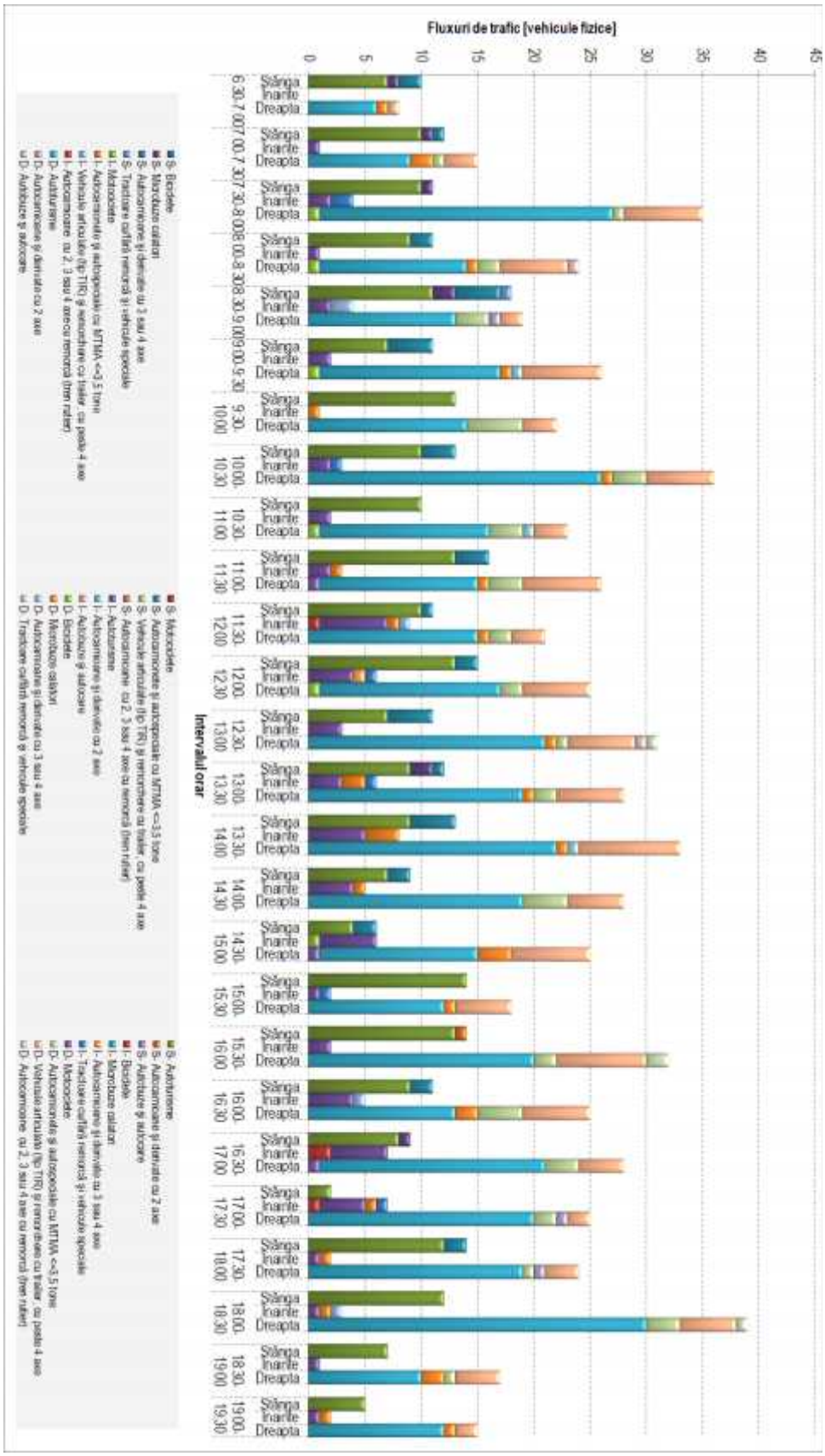


***Figure 3.5**. Traffic volume distribution. Station 1_4, Section – Gladiolelor Nord Street (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

STATION 2. Constanţei Road–Recoltei Street Intersection

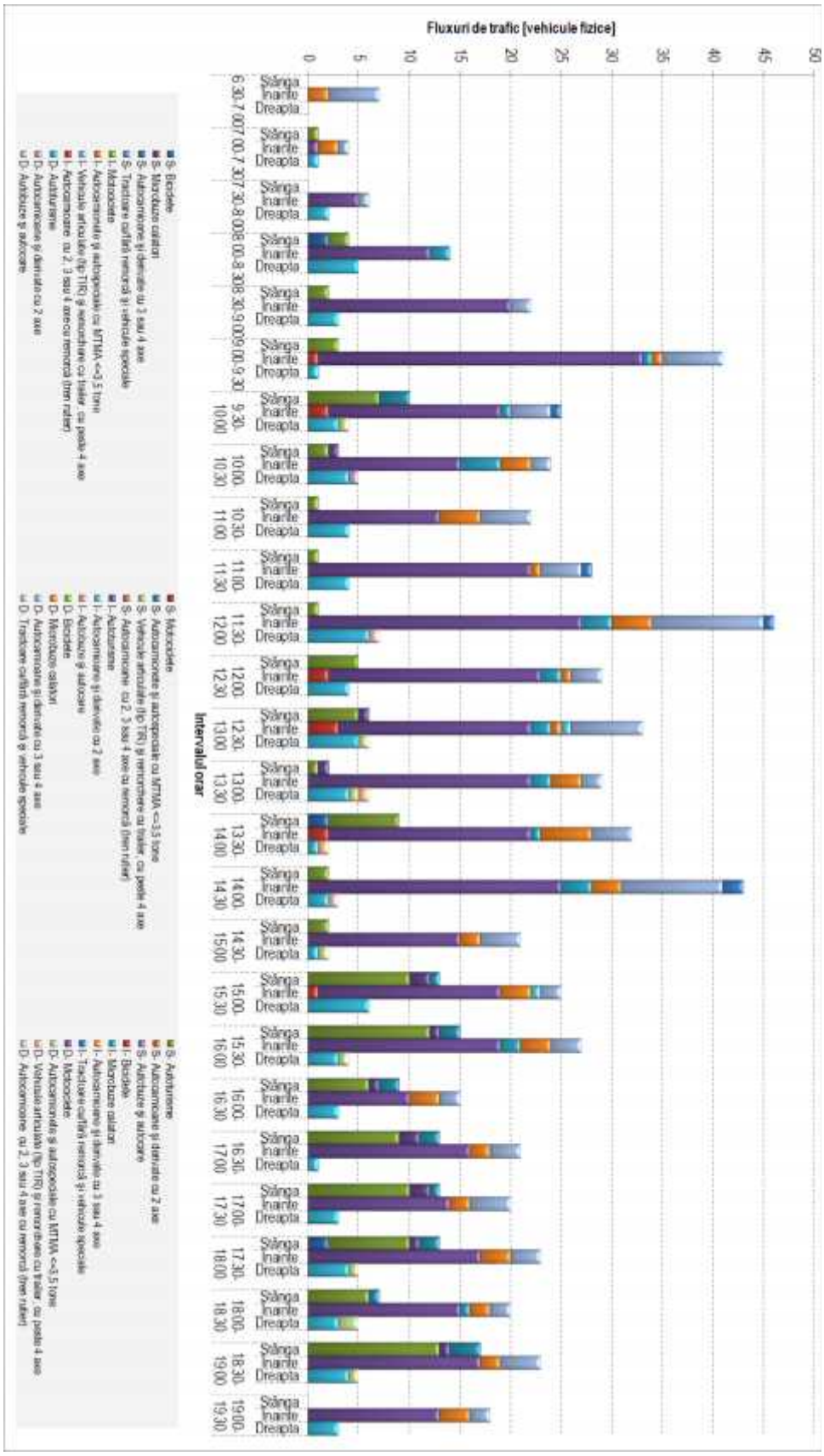


***Figure 3.6**. Traffic volume distribution. Station 2_1, Section – Constanţei Vest Road (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

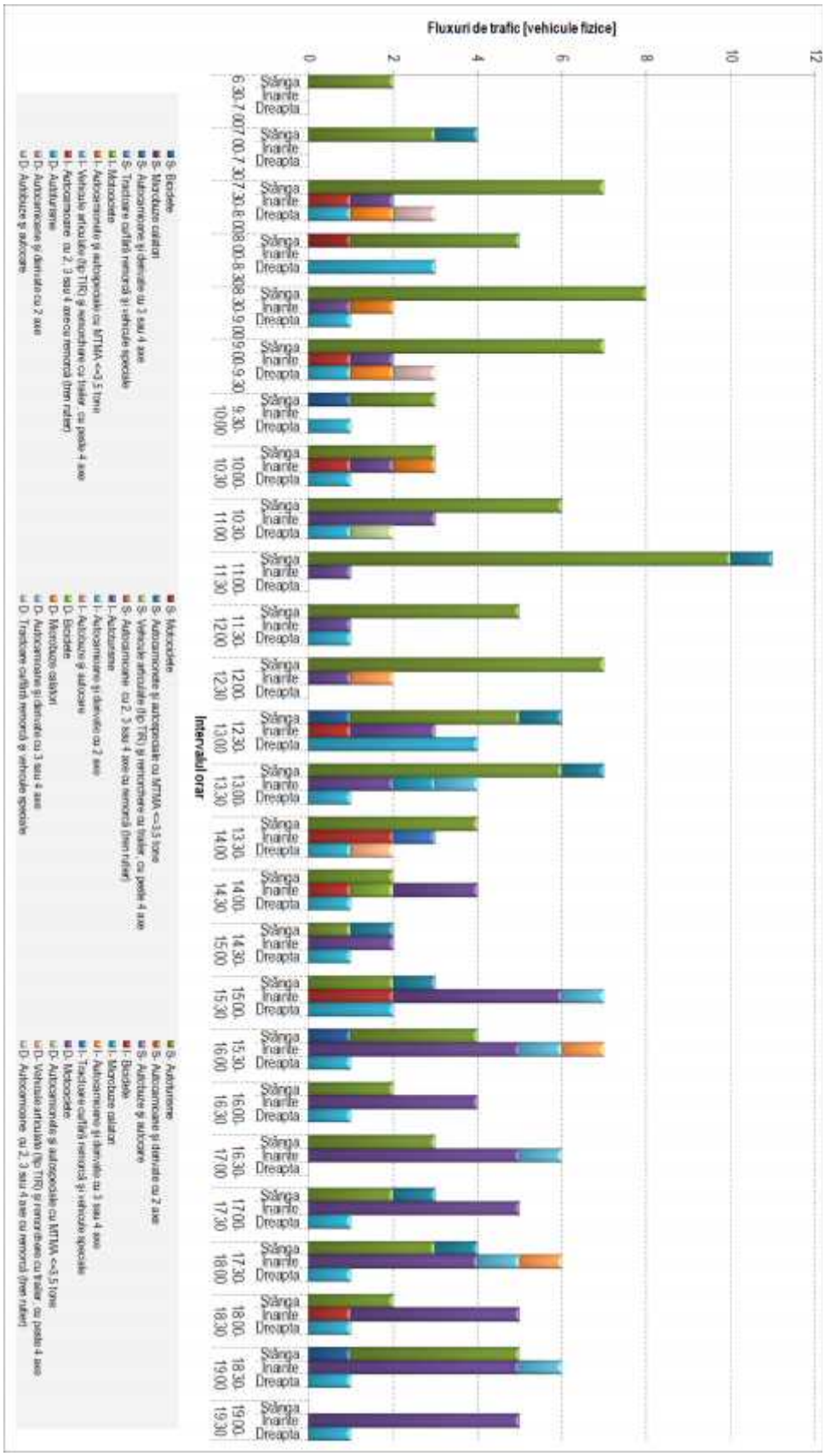


***Figure 3.7**. Traffic volume distribution. Station 2_2, Section – Recoltei Sud Street (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

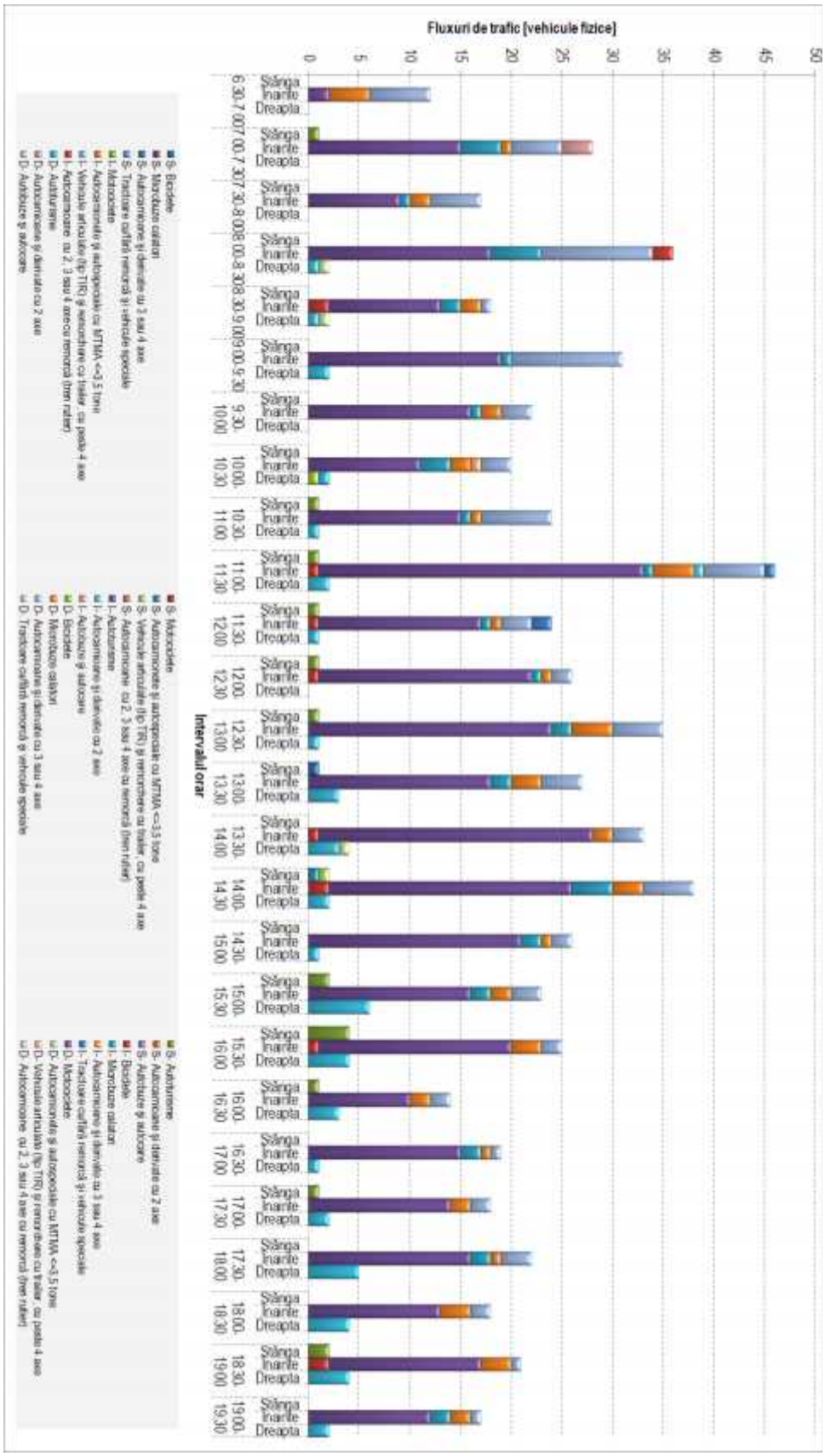


***Figure 3.8**. Traffic volume distribution. Station 2_3, Section – Constanței Est Road (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

STATION 3. Constanţei Road –Cerealelor Street Intersection

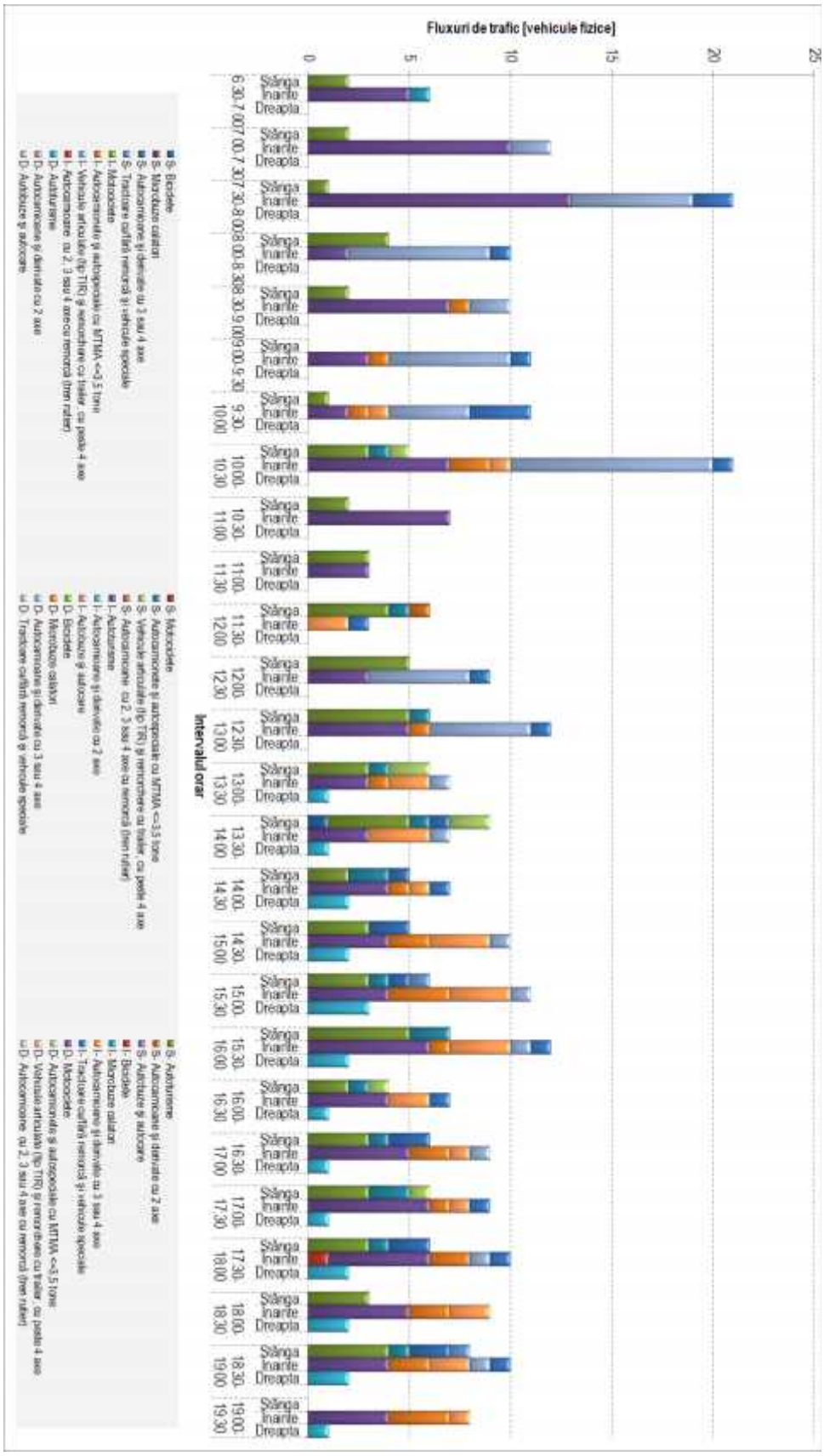


***Figure 3.9**. Traffic volume distribution. Station 3_1, Section – Constanţei Road (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

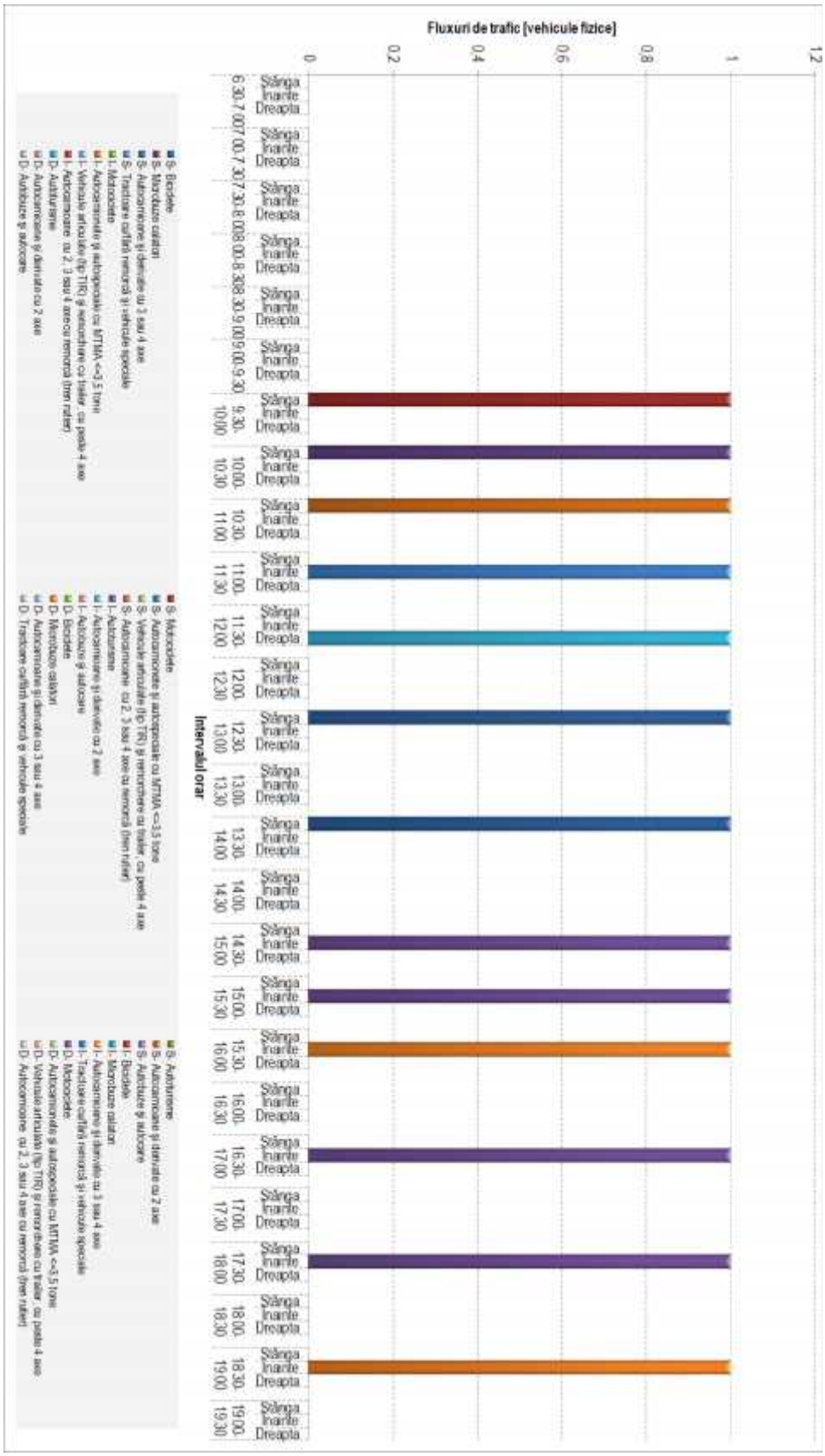


***Figure 3.10**. Traffic volume distribution. Station 3_2, Section - DC14 (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

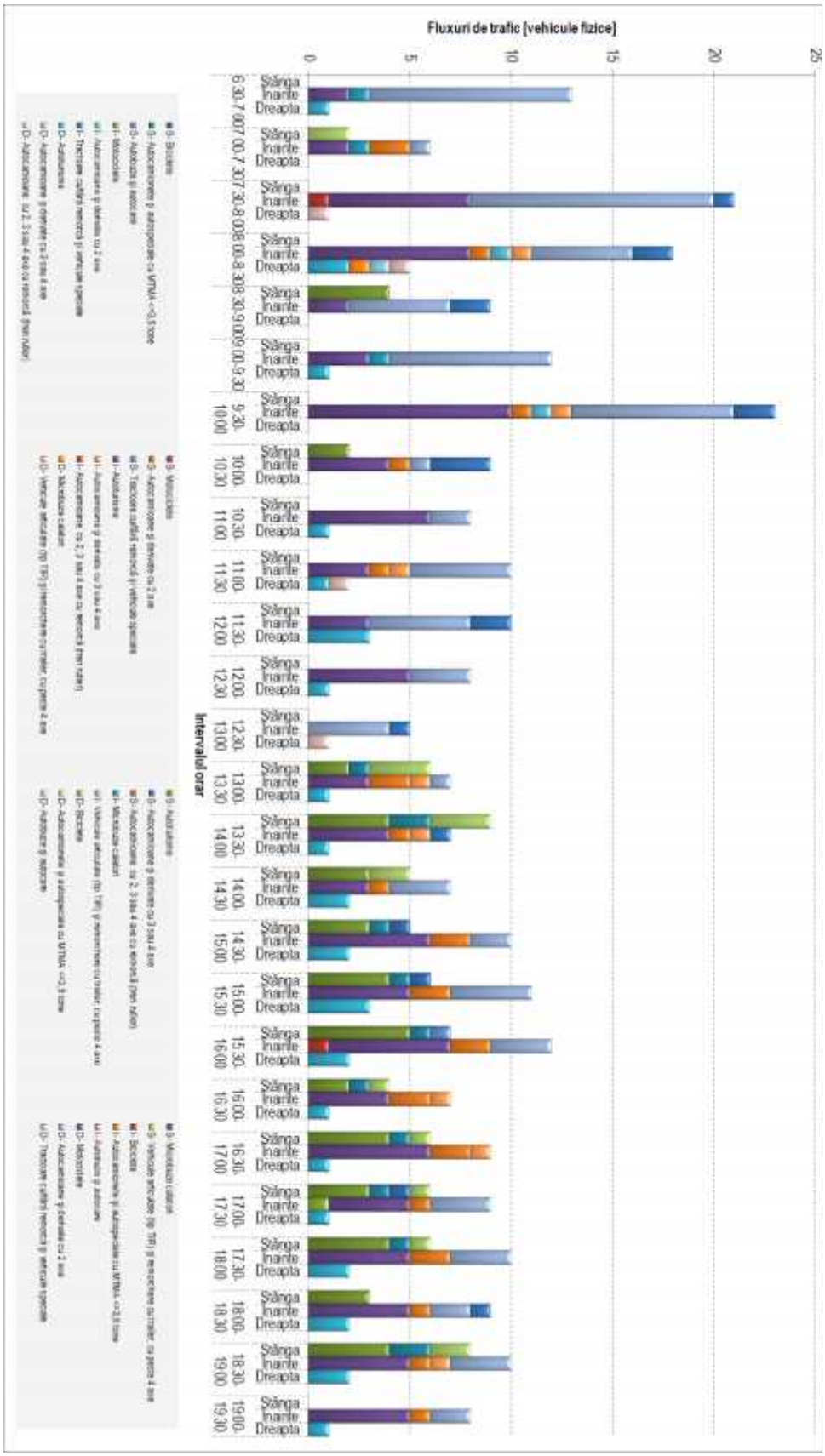


***Figure 3.11**. Traffic volume distribution. Station 3_3, Section – Cerealelor Street (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

STATION 4. Cherchezului Street–Stadionului Street Intersection

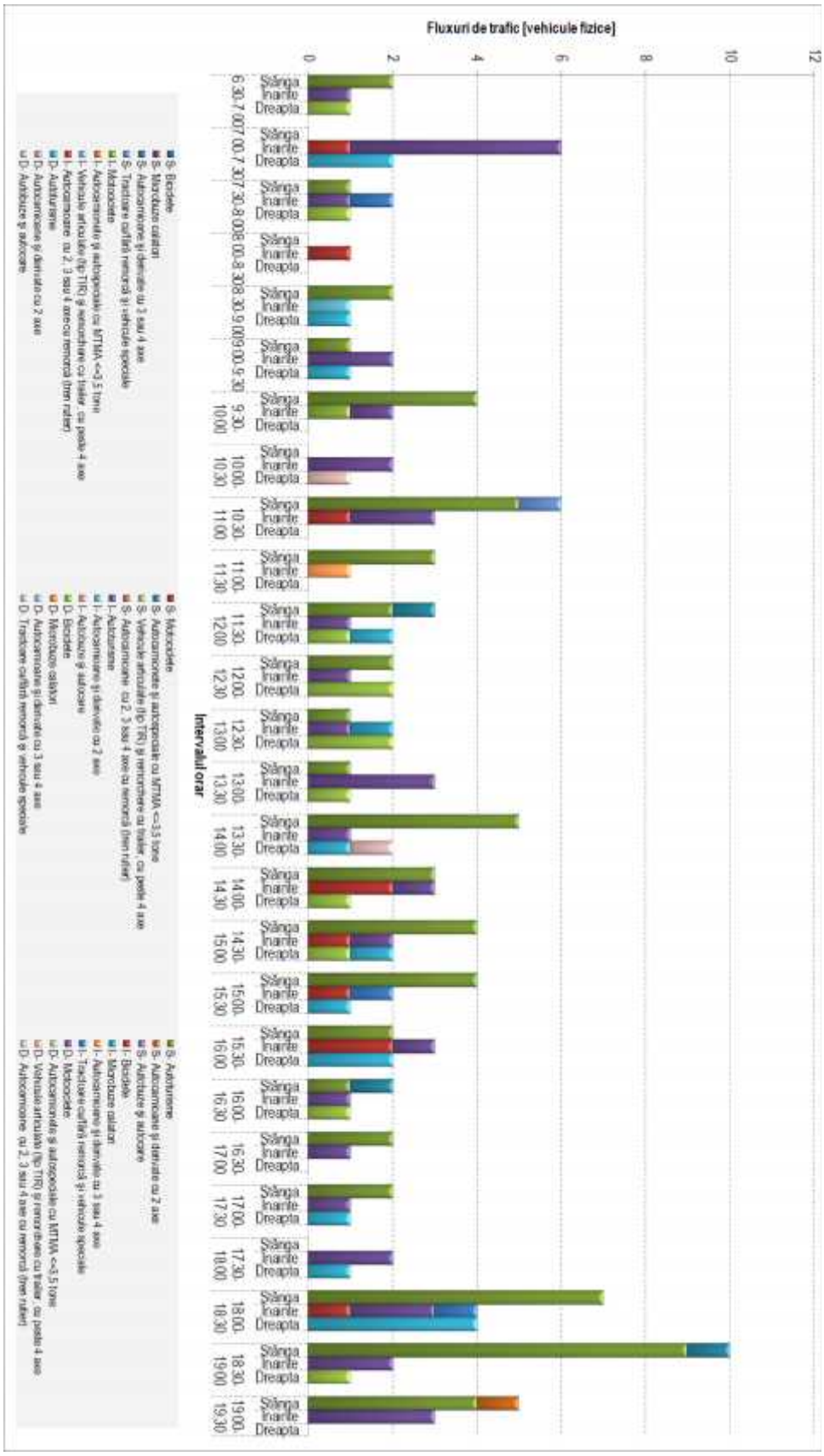


***Figure 3.12**. Traffic volume distribution. Station 4_1, Section -Cherchezului Vest Street (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

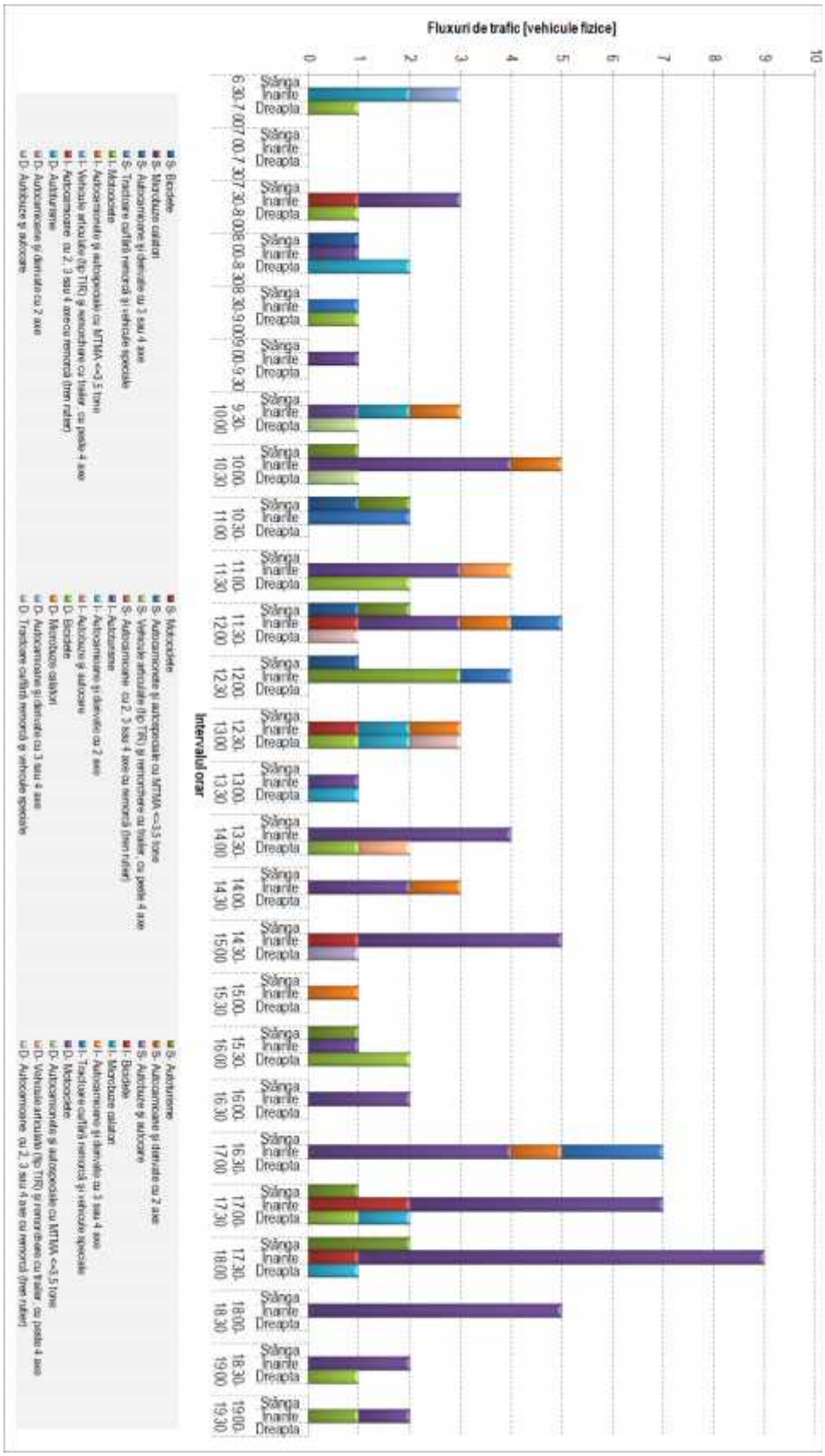


***Figure 3.13**. Traffic volume distribution. Station 4_2, Section -Stadionului Sud Street (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

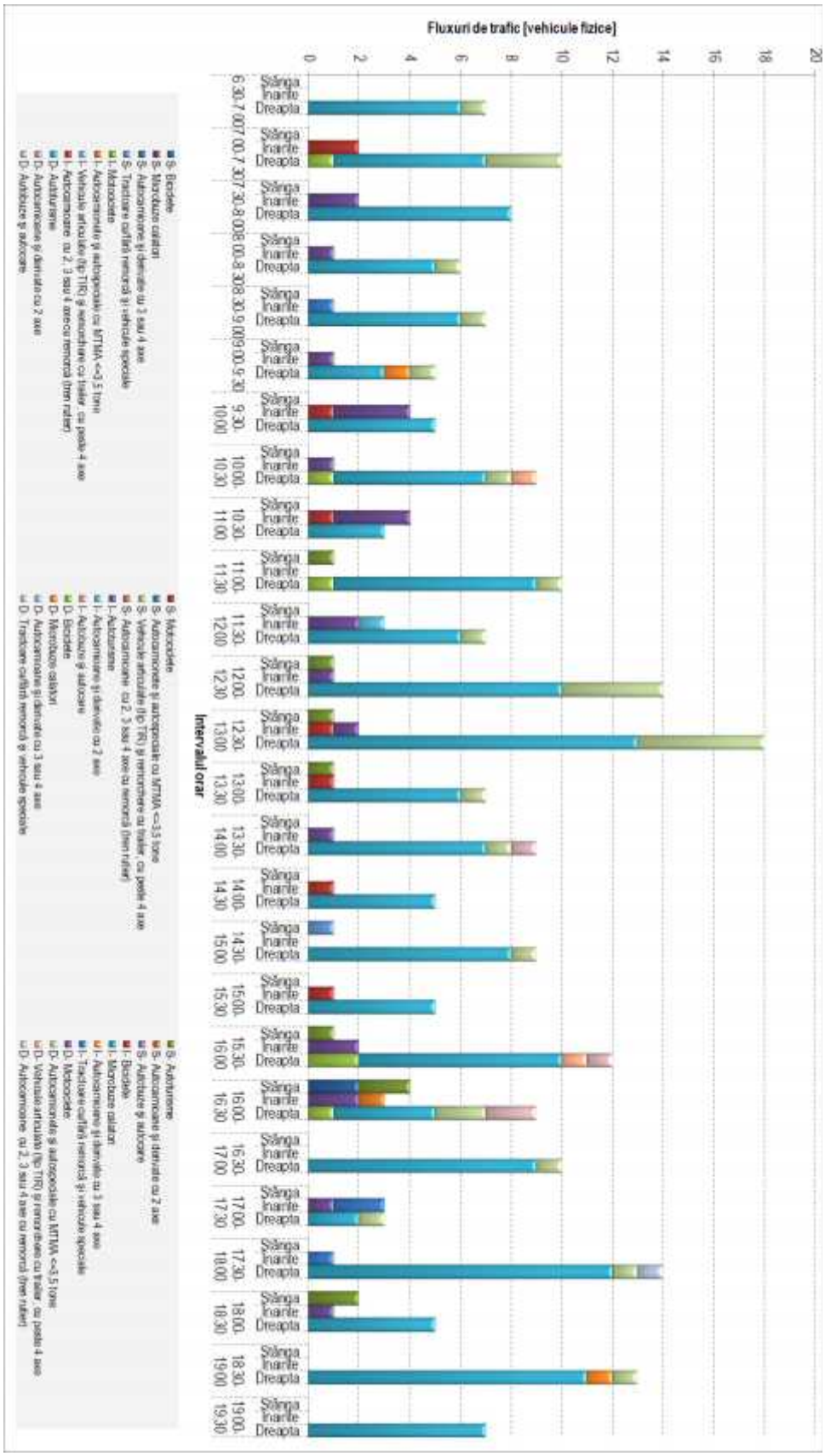


***Figure 3.14**. Traffic volume distribution. Station 4_3, Section - Cherchezului Est Street (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane şi derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă şi vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete şi autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) şi remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane şi derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze şi autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete şi autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) şiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane şi derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze şi autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane şi derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă şi vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane şi derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze şi autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane şi derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă şi vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete şi autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) şi remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

STATION 5. DC 14 –Sănătăţii Street Intersection

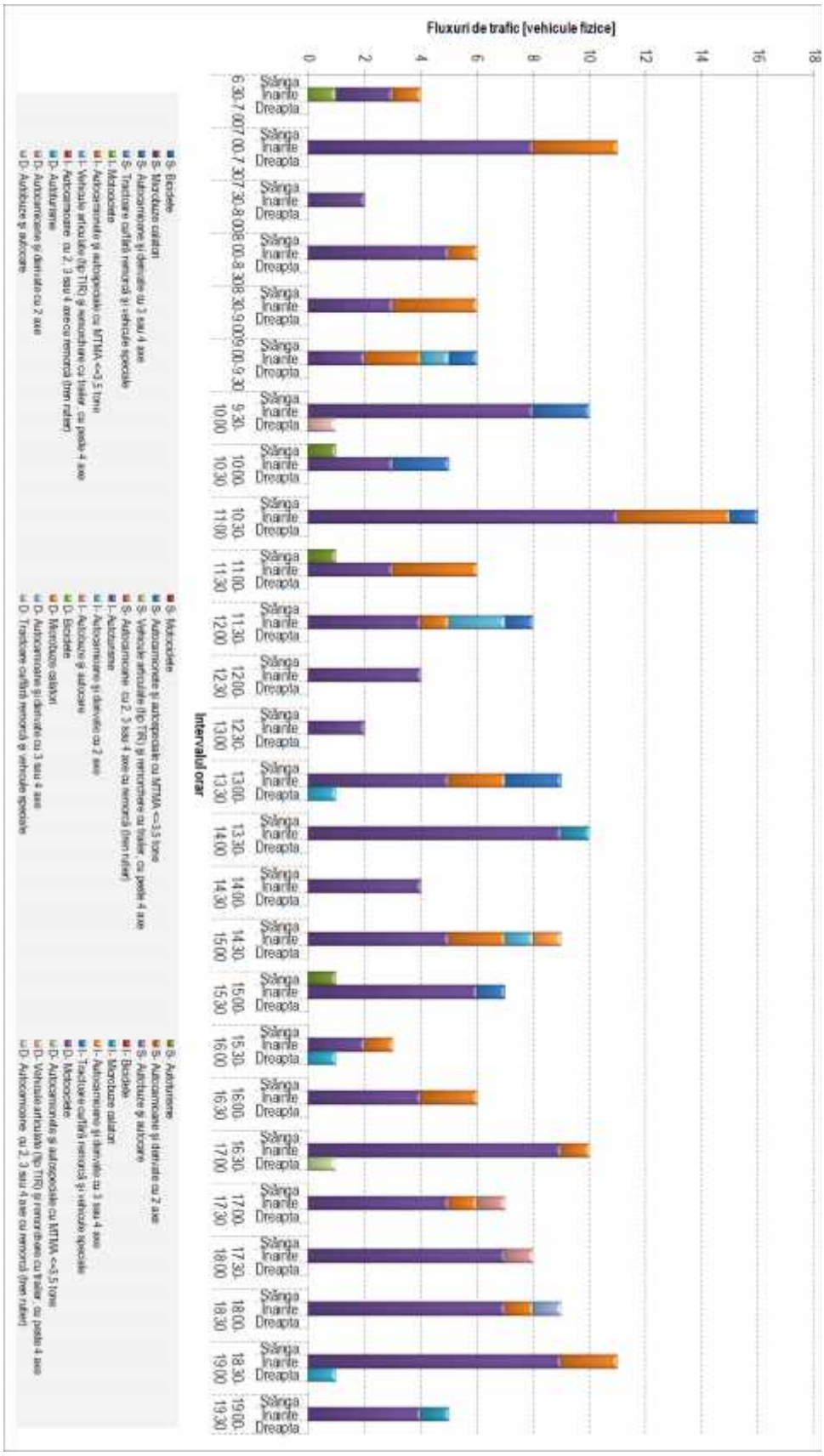


***Figure 3.15**. Traffic volume distribution. Station 5_1, Section - NV DC14 (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

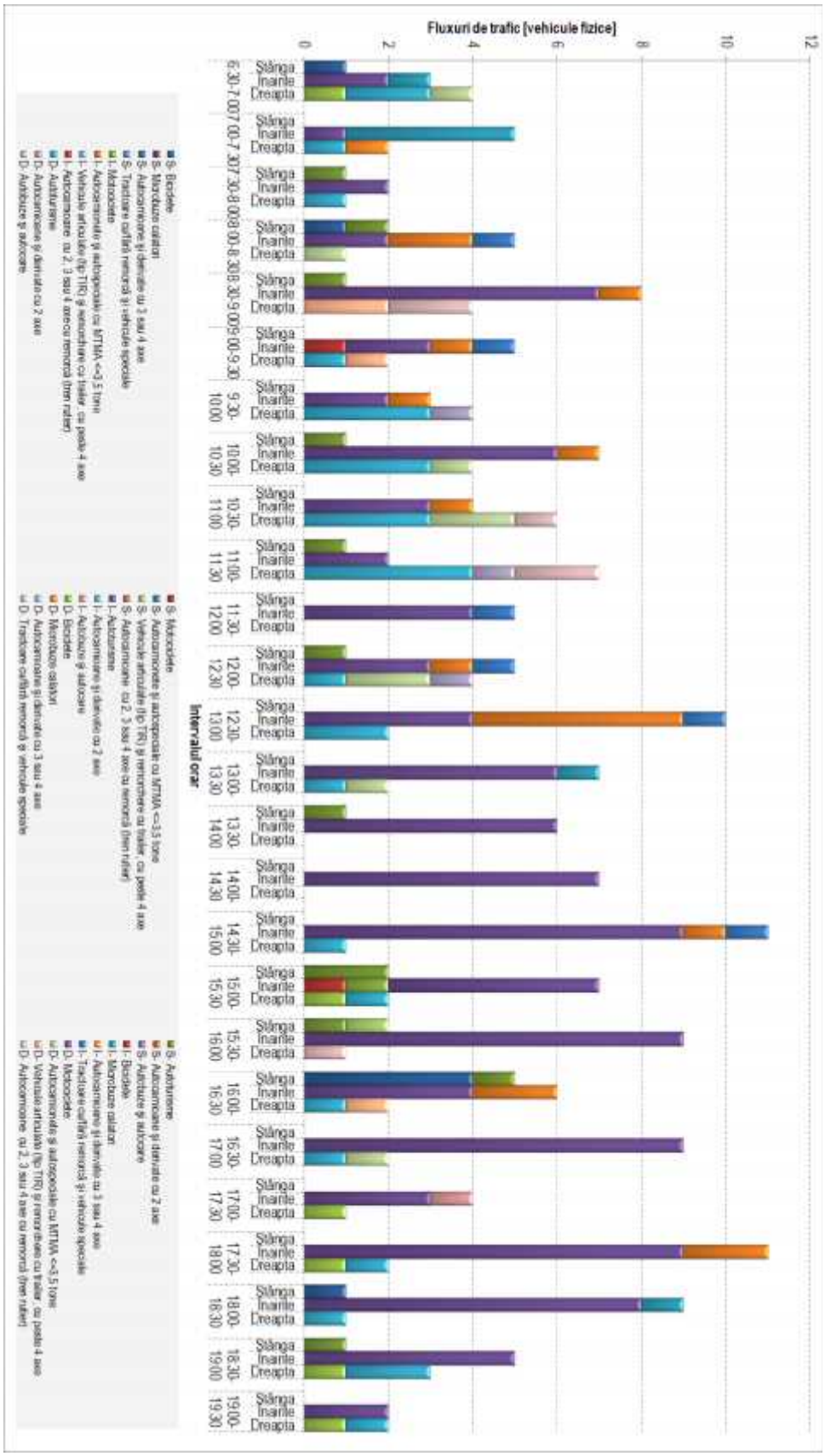


***Figure 3.16**. Traffic volume distribution. Station 5_2, Section - SE DC14 (rotated figure).*

Fluxuri de trafic (vehicule fizice)=Traffic flows (physical vehicles)
Stânga=Left
Înainte=Forward
Dreapta=Right
Intervalul orar=Time frame
S-Biciclete=Bicycles
S-Microbuze călători=Passenger minibuses
S-Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
S-Tractoare cu/fără remorcă și vehicule speciale=Tractors with / without trailer and special vehicles
I-Motociclete=Motorcycles
I-Autocamionete și autospeciale cu MTMA<=3,5 tone=Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
I- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe=Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
I-Autocamioane cu 2,3 sau 4 axe cu remorcă (tren rutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
D-Autoturisme=Cars
D-Autocamioane și derivate cu 2 axe= Trucks and derivatives with 2 axles
D-Autobuze și autocare=Buses and coaches
S-Motociclete=Motorcycles
S-Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
S- Vehicule articulate (tip TIR) șiremorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
S- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)=Trucks with 2, 3 or 4 axles with trailer (road train)
I-Autoturisme=Cars
I- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
I- Autobuze și autocare= Buses and coaches
D- Biciclete= Bicycles
D-Microbuze călători=Passenger minibuses
D- Autocamioane și derivate cu 3 sau 4 axe =Trucks and derivatives with 3 or 4 axles
D- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
S-Autoturisme=Cars
S- Autocamioane și derivate cu 2 axe=Trucks and derivatives with 2 axles
S- Autobuze și autocare= Buses and coaches
I- Biciclete= Bicycles
I- Microbuze călători=Passenger minibuses
I- Autocamioane și derivate cu 3 sau 4 axe=Trucks and derivatives with 3 or 4 axles
I- Tractoare cu/fără remorcă și vehicule speciale= Tractors with / without trailer and special vehicles
D-Motociclete= Motorcycles
D- Autocamionete și autospeciale cu MTMA<=3,5 tone= Pick-ups and trucks with Gross Vehicle Weight <=3.5 tons
D- Vehicule articulate (tip TIR) și remorchere cu trailer, cu peste 4 axe= Articulated lorries (semi trailer type) and trucks with a trailer, over 4 axles
D- Autocamioane cu 2,3 sau 4 axe cu remorcă (trenrutier)= Trucks with 2, 3 or 4 axles with trailer (road train)

STATION 1. Constanţei Road –Mangaliei Road –Gladiolelor Street Intersection

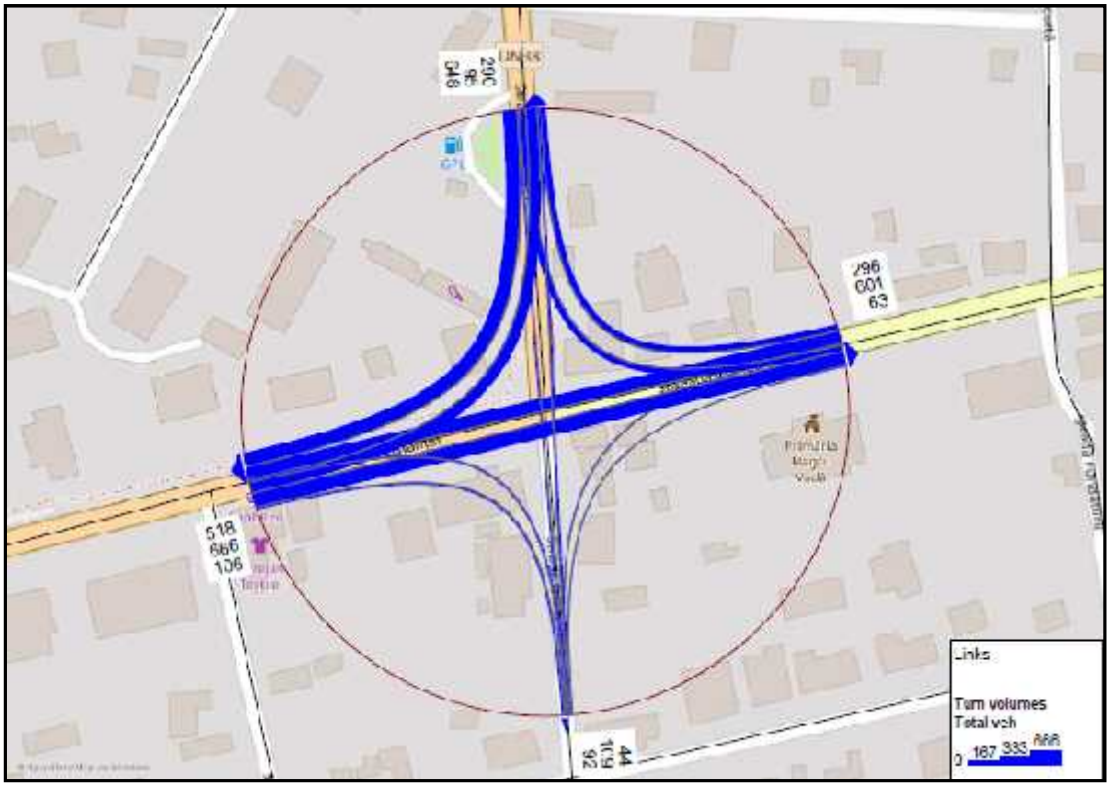


***Figure 3.17**. Measured values (physical vehicles) Station 1, time interval 06:30 - 19:30.*

***Figure 3.18**. Measured values (physical vehicles) Station 1, traffic rush hour.*

STATION2. Constanţei Road –Recoltei Street Intersection

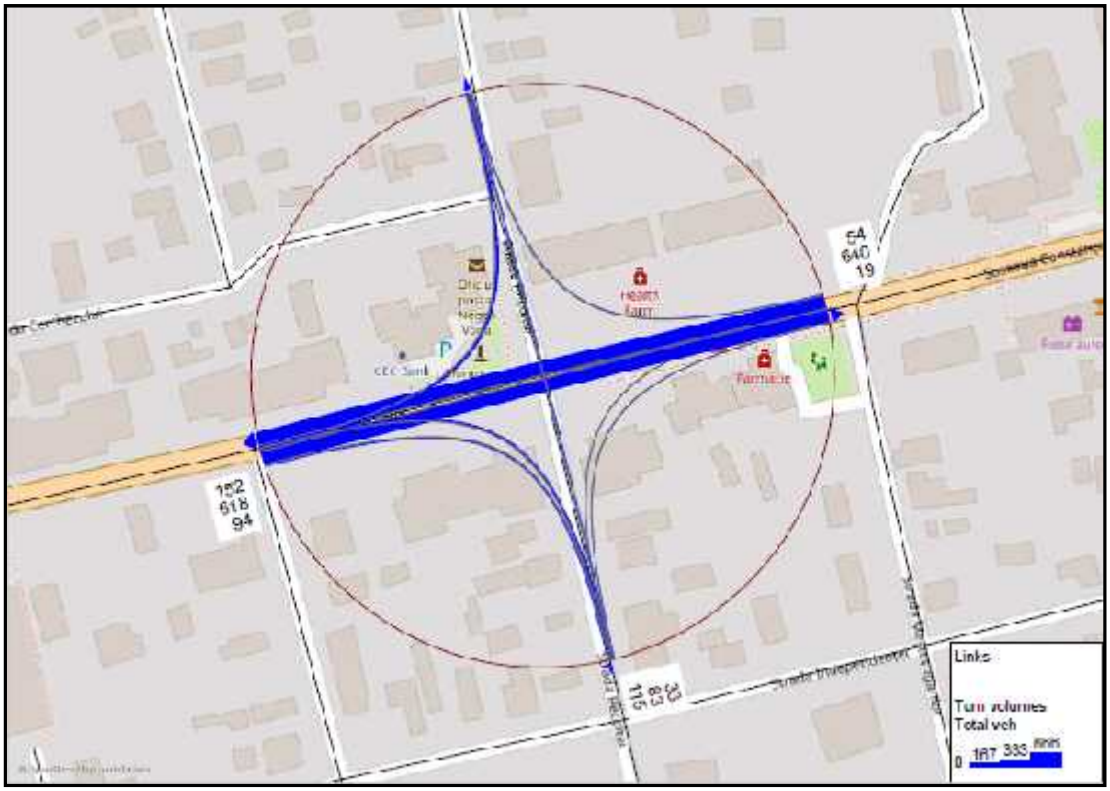


***Figure 3.19**. Measured values (physical vehicles) Station 2, time interval 06:30 - 19:30.*

***Figure 3.20**. Measured values (physical vehicles) Station 2, rush hour traffic.*

STATION 3. Constanţei Road–Cerealelor Street Intersection

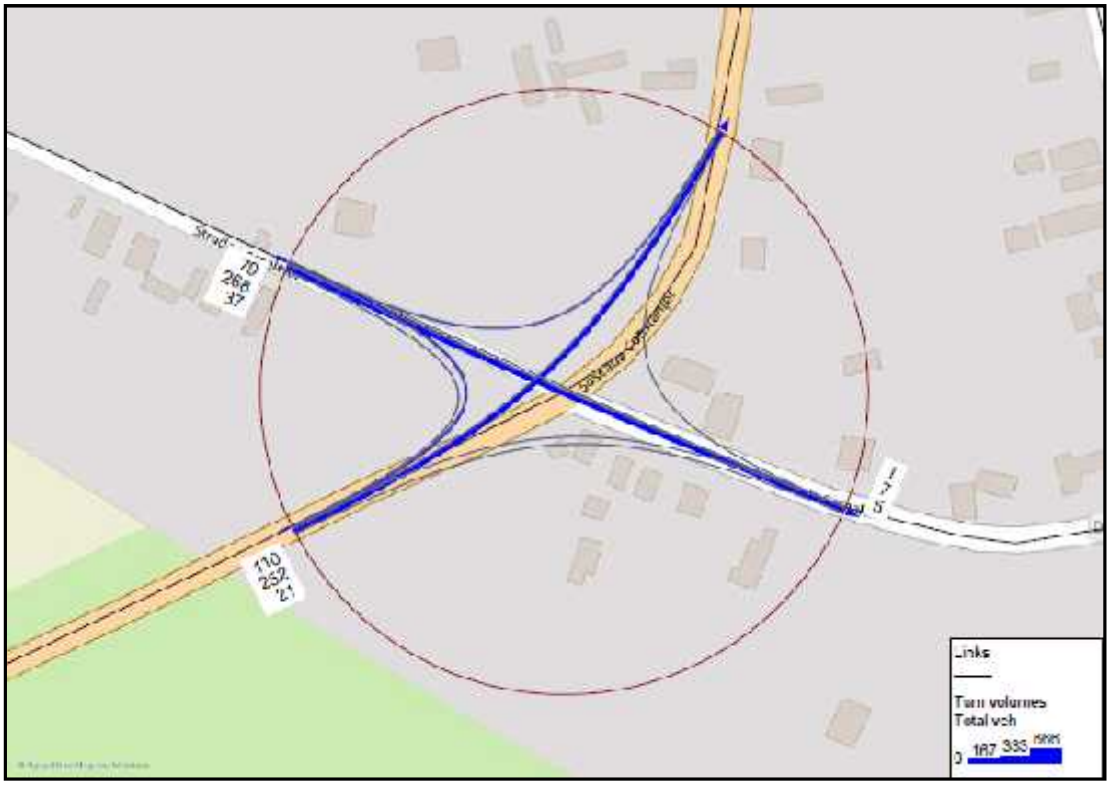


***Figure 3.21**. Measured values (physical vehicles) Station 3, time interval 06:30 - 19:30.*

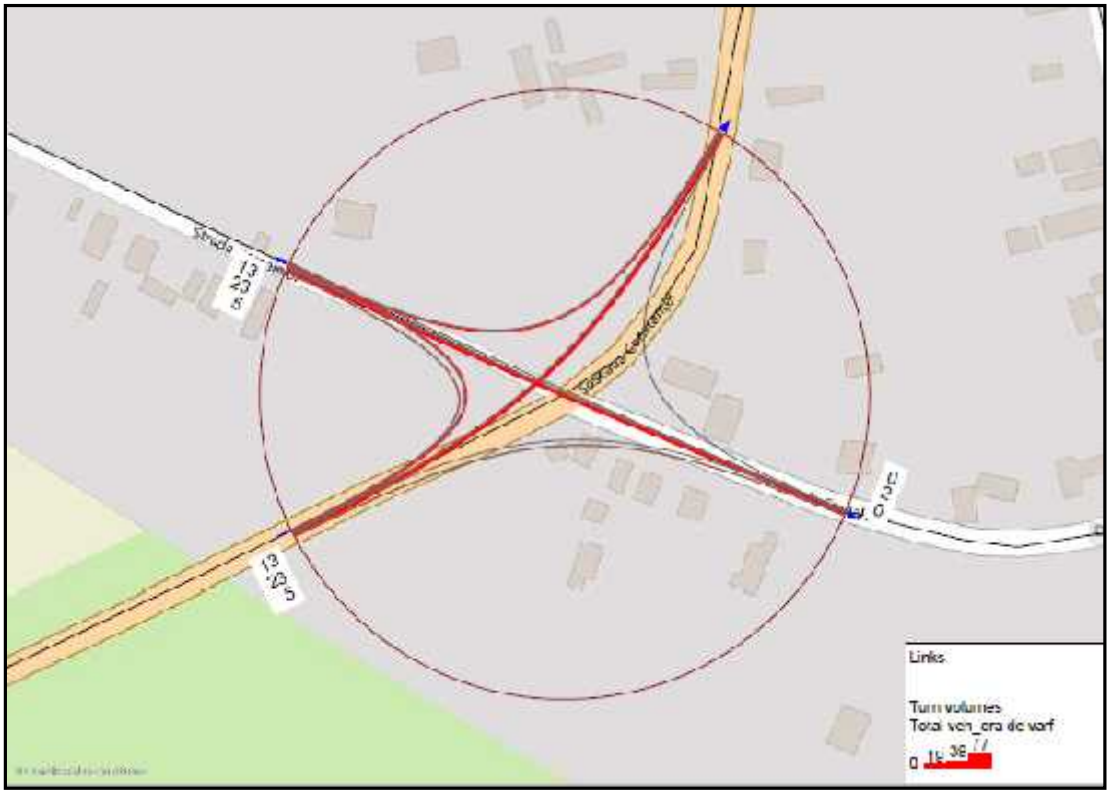


***Figure 3.22**. Measured values (physical vehicles) Station 3, rush hour traffic.*

STATION 4. Cherchezului Street –Stadionului Street Intersection

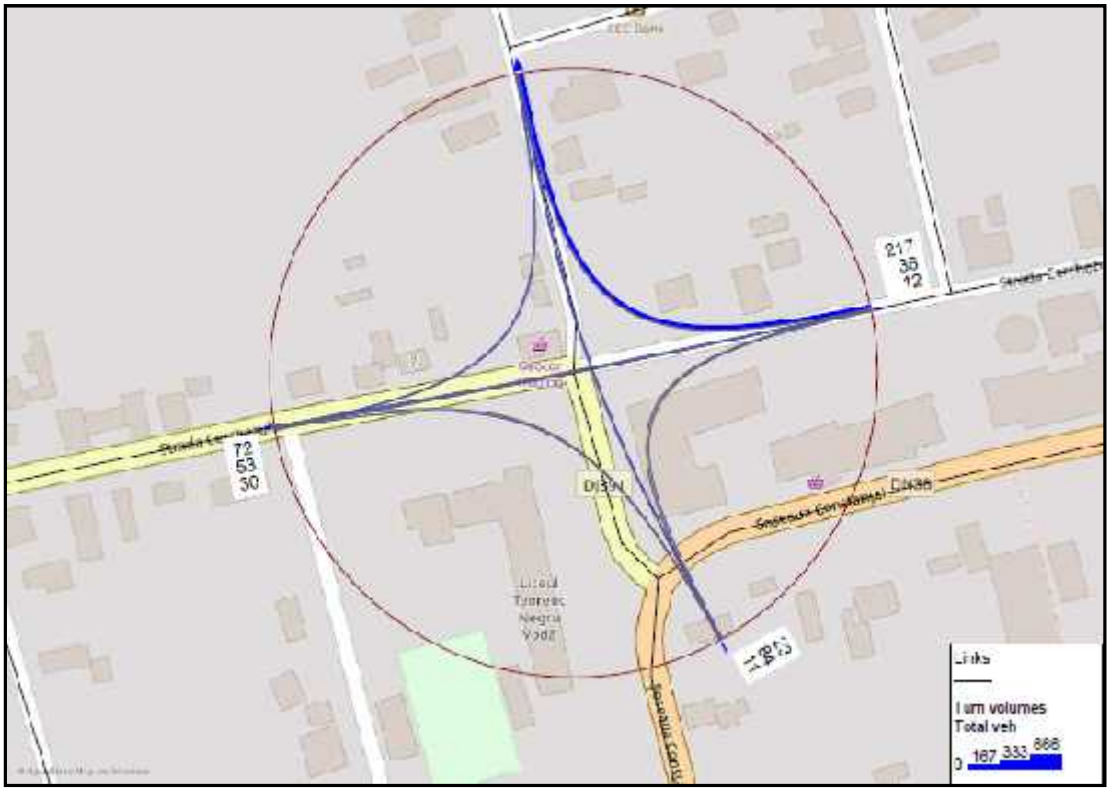


***Figure 3.23**. Measured values (physical vehicles) Station 4, time interval 06:30 - 19:30.*

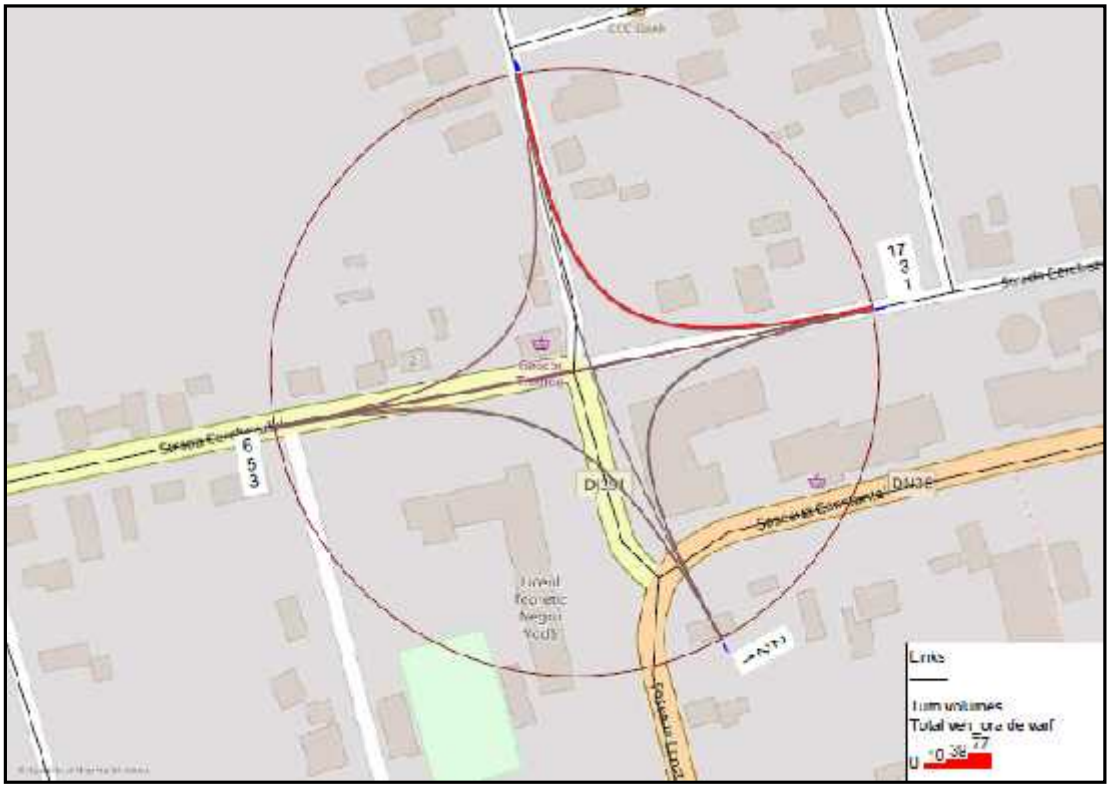


***Figure 3.24**. Measured values (physical vehicles) Station 4, rush hour traffic.*

STATION 5.DC 14 –Sănătăţii Street intersection

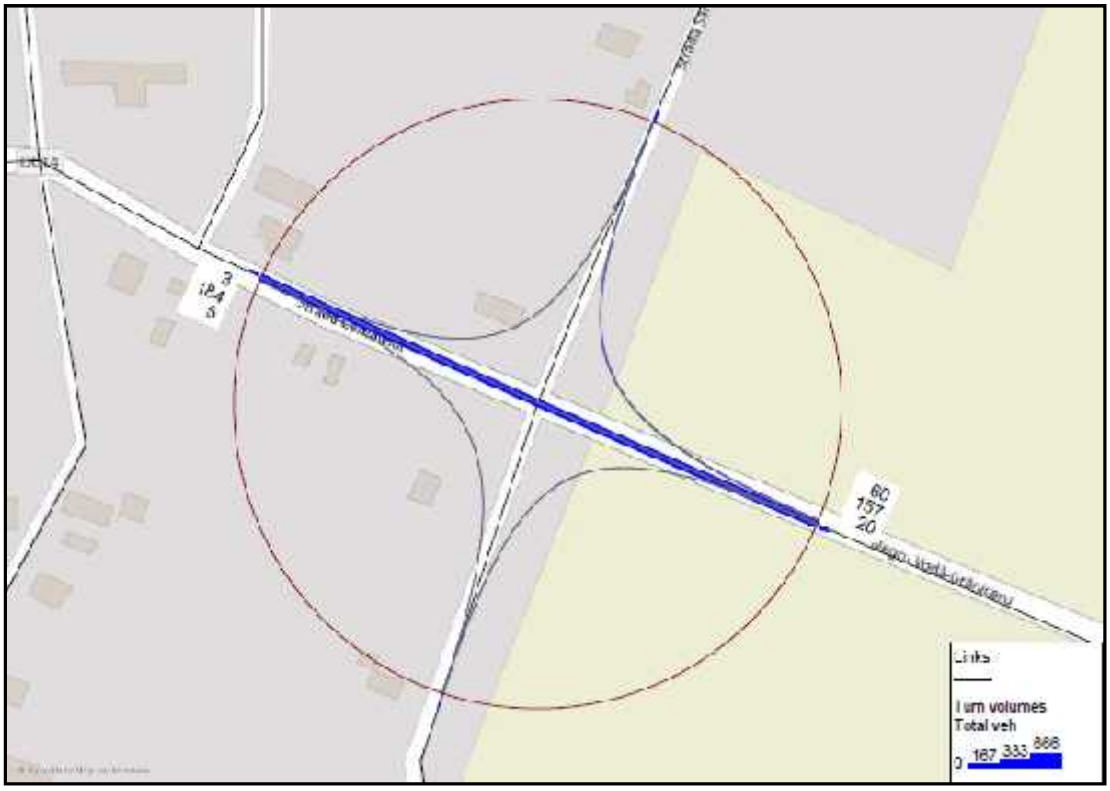


***Figure 3.25**. Measured values (physical vehicles) Station 5, time interval 06:30 - 19:30.*

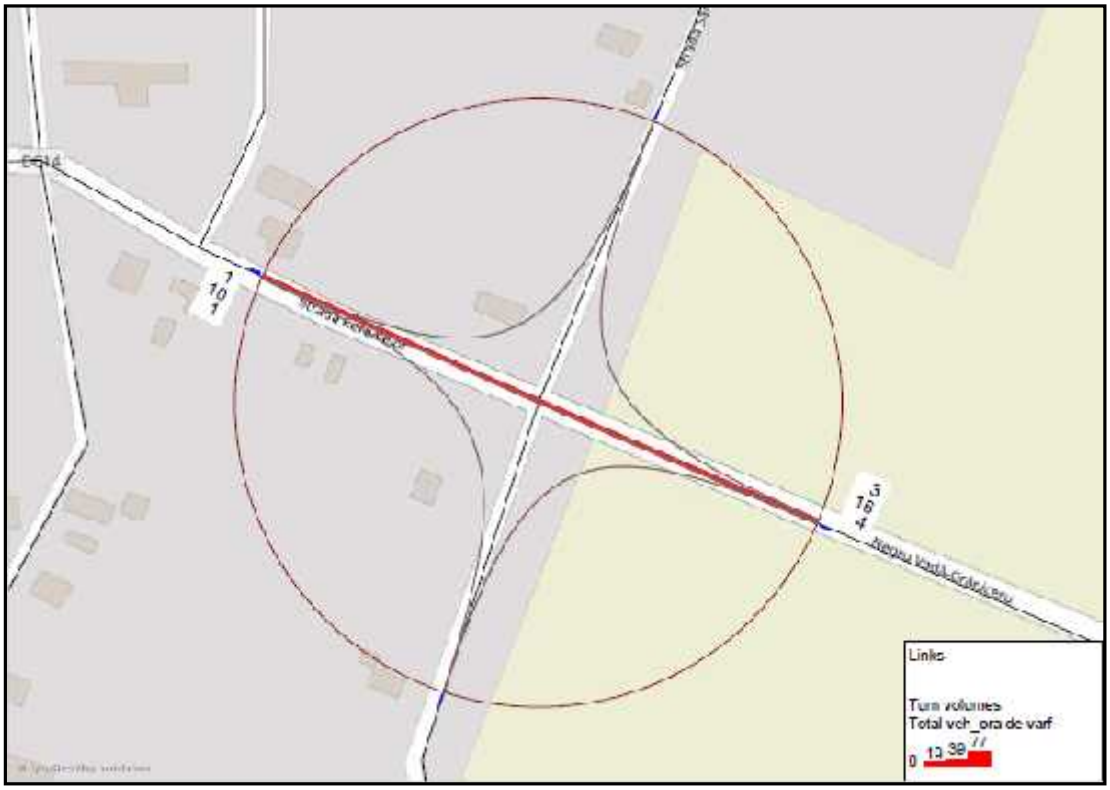


***Figure 3.26**. Measured values (physical vehicles) Station 5, rush hour traffic.*

STATION 1. **General Toshevo** Dimitar Blagoev Street –296 Road –2903 Road

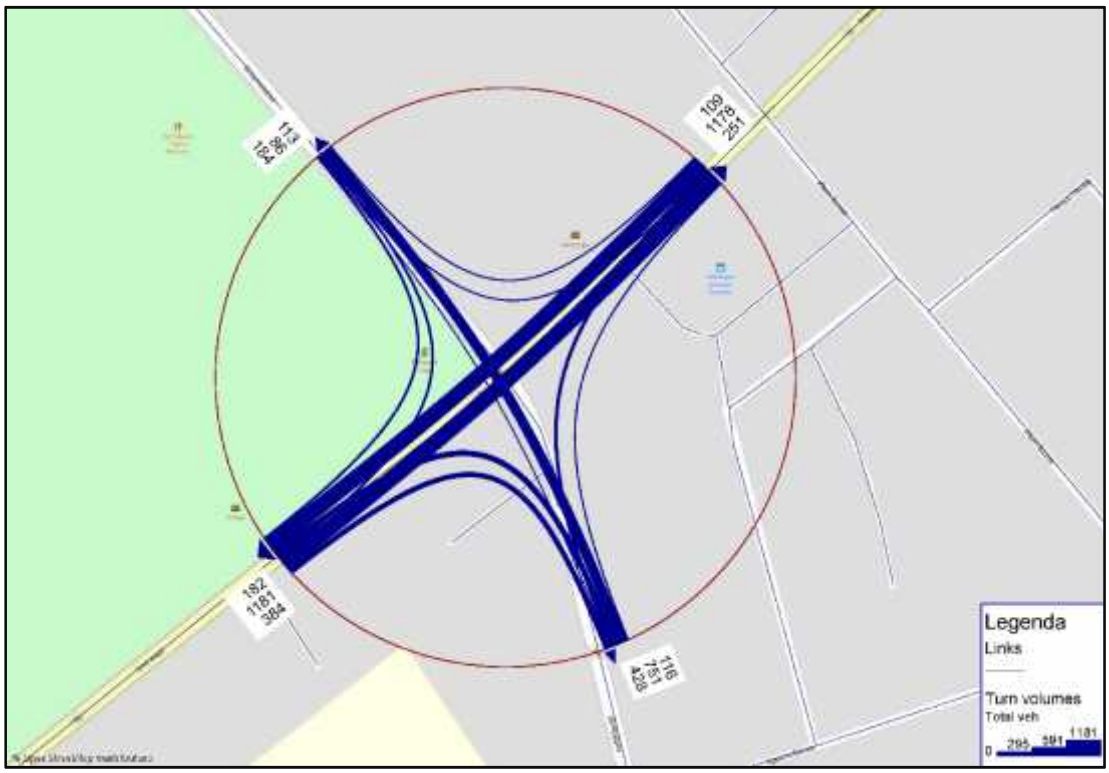


Figure 3.27. *Measured values (physical vehicles) Station 1, time interval 06:30 – 19:30.*

Figure 3.28. *Measured values (physical vehicles) Station 1, rush hour traffic.*

The traffic intensity on border area Negru Voda – Kardam – General Toshevo, according with the information received from Ministry of Internal Affair – General Inspectorate of Border Police

➢ **În anul 2019**

- Volumul traficului

P.T.F.	INTRARE		IEȘIRE		TOTAL	
	PERSOANE	MIJLOACE TRANSPORT	PERSOANE	MIJLOACE TRANSPORT	PERSOANE	MIJLOACE TRANSPORT
P.T.F. Negru Vodă	485.516	161.638	469.856	156.027	955.372	317.665
P.T.F. Vama Veche	1.298.584	312.751	1.405.043	335.259	2.703.627	648.010

- Tipologia traficului

	TIP MIJLOC TRANSPORT	INTRARE	IEȘIRE	TOTAL
P.T.F. Negru Vodă	Autocar	1.768	1.707	3.475
	Autoturism	101.596	101.778	203.374
	Camion	51.508	45.839	97.347
	Microbuz	6.442	6.386	12.828
	Motocicletă/Motoretă	322	316	638
	Bicicletă	2	1	3
	Total	**161.638**	**156.027**	**317.665**

	TIP MIJLOC TRANSPORT	INTRARE	IEȘIRE	TOTAL
P.T.F. Vama Veche	Autocar	6.404	6.846	13.250
	Autoturism	292.247	315.615	607.862
	Camion	7.557	5.771	13.328
	Microbuz	5.293	5.600	10.893
	Motocicletă/Motoretă	1.020	1.212	2.232
	Bicicletă	230	215	445
	Total	**312.751**	**335.259**	**648.010**

P.T.F.	2019	
	Treceri persoane	Treceri mijloace
PTF Vama Veche(rutier)	2.703.627	648.010
PTF Negru Vodă(rutier)	955.372	317.665
PTF Negru Vodă(feroviar)	795	121
Total	3.659.794	965.796

Traffic volume

Crossborder point	Entrance		Exit		Total	
	Persons	Transport vehicles	Persons	Transport vehicles	Persons	Transport vehicles
Negru Voda	485.516	161.638	469.856	156.027	955.372	317.665
Vama Veche	1.298.584	312.751	1.405.043	335.259	2.703.627	648.010

Types of traffic

Crossborder point	Transport vehicle type	Entrance	Exit	Total
Negru Voda	Coach	1.768	1.707	3.475
	Car	101.596	101.778	203.374
	Truck	51.508	45.839	97.347
	Minibus	6.442	6.386	12.828
	Motorcycle / scooter	322	316	638
	Bicycle	2	1	3
	Total	161.638	156.027	317.665

Crossborder point	Transport vehicle type	Entrance	Exit	Total
Vama Veche	Coach	6.404	6.846	13.250
	Car	292.247	315.615	607.862
	Truck	7.557	5.771	13.328
	Minibus	5.293	5.600	10.893
	Motorcycle / scooter	1.020	1.212	2.232
	Bicycle	230	215	445
	Total	312.751	335.259	648.010

3.1.2. Travel time data

In order to calibrate the transport networks, formalized by graphs with arcs and nodes, within the transport models, it is necessary to know the average travel times of vehicles for different segments of the modeled transport networks, as well as their lengths.

During the modeling of the traffic at the level of the studied area (NegruVodă Town), records were made of the average travel distances and travel times on different routes of the network, in case of traveling by car.

The 3 routes on which travel time measurements were made are described in table 3.2.

***Table 3.2**. Travel time data.*

No. Route	Route			Parameter		
	From	To	Via	Duration [min: sec]	Distance [km]	Average speed [km/h]
1.	DN 38 –SV limit of NegruVodă Town Intersection	DN 38 – North limit of NegruVodă Town Intersection	Constanţei Road	3:09	2.2	41.9
2.	DJ 391 – West limit of NegruVodă Town Intersection	DJ 391 – East limit of NegruVodă Town Intersection	Constanţei Road	4:15	2.3	32.5
3.	DC 14 – DN 38 Intersection	DC 14 – SE Limit of NegruVodă Town Intersection	Cerealelor Street	3:20	1.7	30.6
Oraşul General Toshevo						
1.	II-29 Road (SV limit of the locality)	II-29 Road (NE limit of the locality)	II-29/ DimitarBlagoev Street	4:45	2,6	32,8
2.	II-29 Road (SV limit of the locality)	2903 Road (NV limit of the locality)	Vitosha Street	6:20	4,2	39,8
3.	2903 Road (SV limit of the locality)	296 Road (NE limit of the locality)	II-29/ 296	5:00	2,7	32,4

3.1.3. Development of the transport network

One of the preliminary stages necessary for the realization of a transport model is the formalization of the considered transport network, through the graph theory. The transport network modeled at the level of the towns of NegruVodăand General Toshevo contains the public road network, the configuration and type of control of the intersections and the public transport network.

The modeling of the major transport network involves a complex process of analysis of the physical parameters of each street, of the functionality within the network and of traffic regulations.

The urban network includes a level of particularization appropriate to a 4-step demand determination model, being connected to the major transport network consisting of European, national and county roads which interact with the analyzed territory (Figures2.24 and 2.33).

Regarding the major transport network, the connection with the infrastructure elements modeled within the national transport model developed within the General Transport Master Plan of Romania (sectors represented by the external areas) was taken into account. Thus, the modeled network consists of infrastructure elements with functions of major arterial streets (penetration arterial street, transit corridors) and infrastructure elements with the role of collecting and spatial distribution of traffic at the neighborhood level, respectively supplying the major traffic corridors. The public transport network uses both sectors of the major arterial streets and sectors of the neighborhood infrastructure, having a collecting role.

The characteristics of the network, such as traffic capacity, number of lanes / direction, free speed, maximum allowed speed, modes of transport to which access is granted, existence of lateral parking lots, traffic regimes (one way, two way),banned turns, have been introduced on each element of infrastructure based on the data collected from the field and the technical specifications corresponding to the categories of streets according to the regulations in force.Within the transport model of the Road Traffic Management Study, the traffic capacity of the elements of the transport network was established in accordance with the provisions of "STAS 10144 / 5-89 regarding the *Calculation of Road Traffic Capacity".*

The graph of the transport network, drawn up taking into account the technical and functional aspects, is presented in figures3.29 and 3.30.

In the case of General Toshevo Town, the connections between the urban area and the villages in the municipal area are represented by roads II-29, 296, 9002 and 2903.

***Figure 3.29**. Graph of the network in the analyzed area-NegruVodă Town.*

Zonă externă=External area

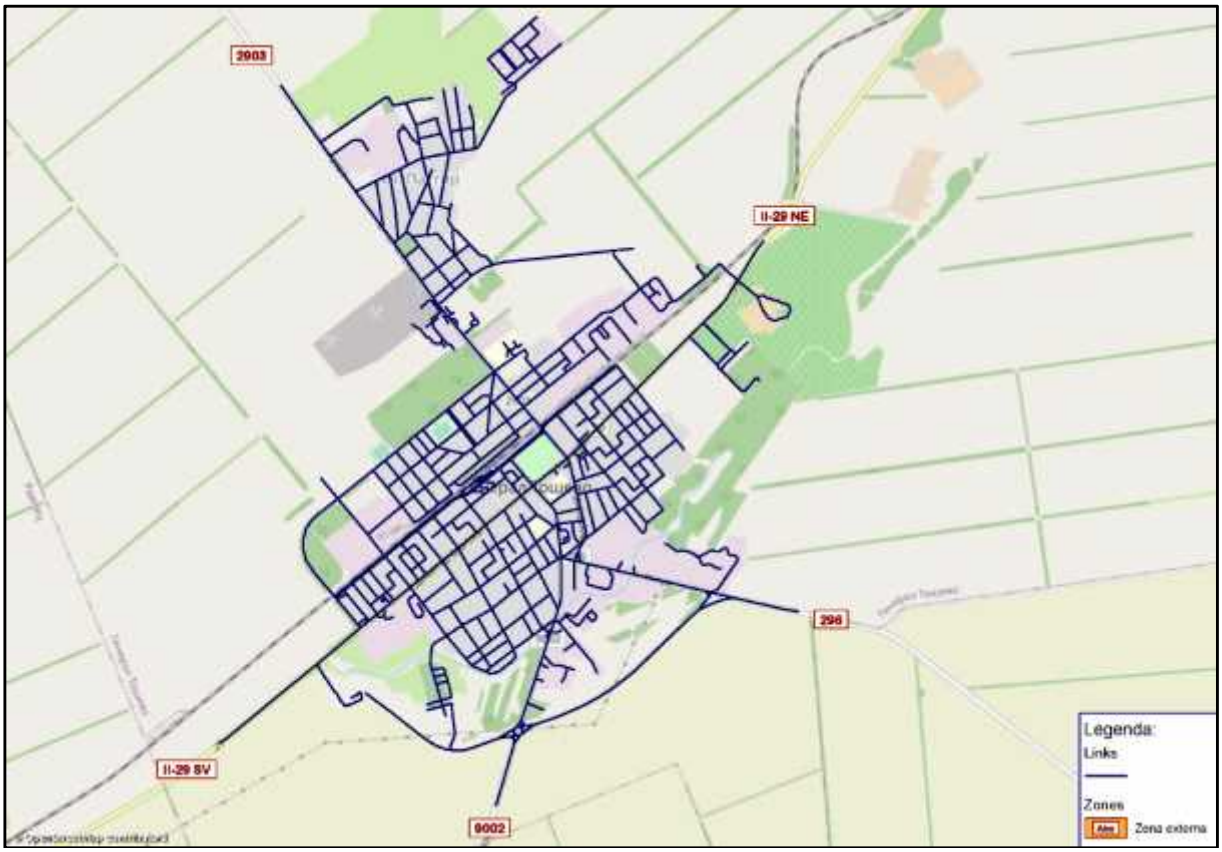


***Figure 3.30**. Graph of the network in the analyzed area-General Toshevo Town.*

3.1.4. The transport demand

A preliminary step in the estimation of the transport demand is setting up traffic analysis areas. Within the process of zoning the territory, the general principles recommended by the literature were taken into account, considering at the same time the constraints generated by the available data.

In the case of NegruVodă it started from the zoning system / the urban regulations considered in the General Urban Plan/PUG (figure 3.31). Thus, within the transport model related to this study, the territory was divided into 31 traffic areas, 26 internal areas in NegruVodă Town and 5 external areas representing the travel potential of the localities served in relation to the studied area of national and county roads which cross this territory.

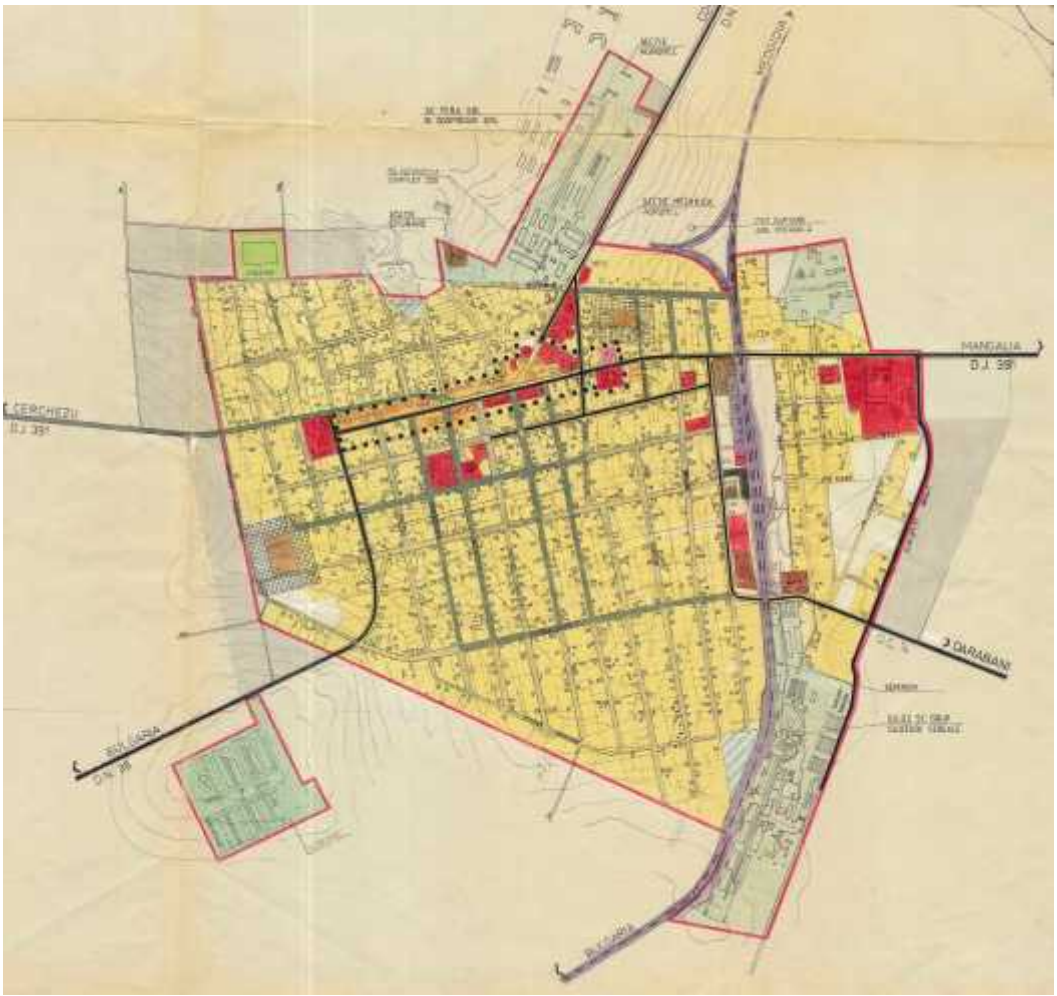


***Figure 3.31**. Functional areas, NegruVodă Town PUG*

LEGENDA=ANNOTATION
Limite=Limits
Limita teritoriului intravilan existent=Built-up territory current limit
Zonificare funcțională=Functional zoning
Zona central și alte zone cu funcțiuni complexe de interes public=Central area and other areas with complex functions of public interest
Zona de locuințe și funcțiuni complementare= Housing area and complementary functions
Zona unități agricole= Agricultural units area
Zona gospodărie comunală/cimitir= Communal household area / cemetery
Zona unități industriale= Industrial units area
Zona căi ferate și construcții aferente=Railway and related construction area
Zona cu destinație specială= Special destination area
Terenuri libere=Free land
Terenuri solicitate a fi introduse în intravilan= Land required to be introduced in the built - up area
Drumuri cu îmbrăcăminți definitive=Roads with definitive blankets
Drumuri cu îmbrăcăminți provizorii=Roads with temporary blankets
Drumuri de pământ=Dirt roads
Disfuncționalități, priorități= Deficiencies, priorities
Intersecții ce necesită amenajări=Intersections which require improvements
Surse de poluarece nu depășesc limite admise= Sources of pollution not exceeding the permitted limits
Zone necesar a fi protejate=Areas which need to be protected
Zonă protecție sanitară/cimitir=Sanitary protection area / cemetery
Stație tratare apă=Water treatment plant
Terenuri ce necesită protecție împotriva inundării=Land which requires protection against flood

The zoning system related to the created transport model is presented in the following figure.

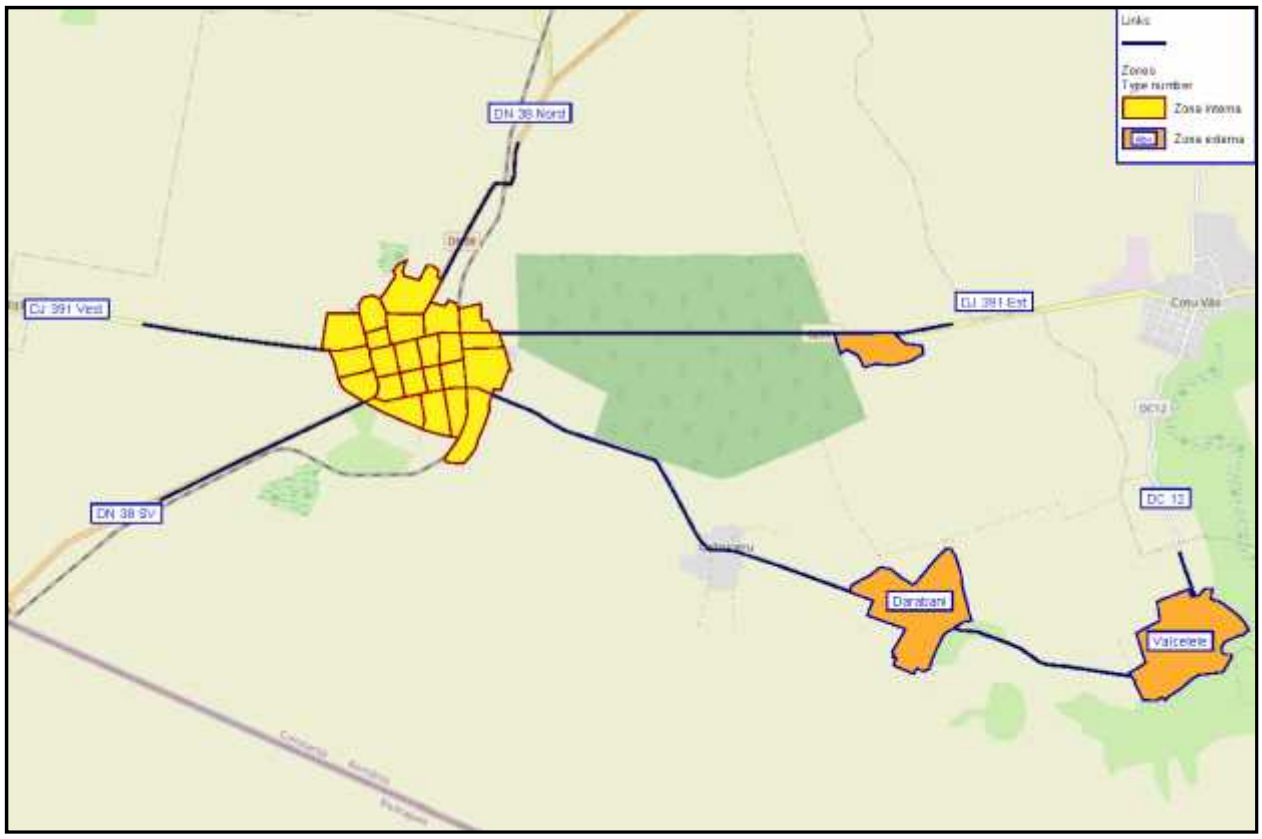


***Figure 3.32**. Traffic areas created within the transport model for NegruVodă Town.*
Zona internă=Internal area
Zona externă=External area

In the case of the General Toshevo Town, the territory was divided into 26 traffic zones, of which 21 internal zones and 5 external zones representing the travel potential of the localities, served in relation to the study area, of roads II-29, 296, 9002 and 2903, which penetrate this territory.

The zoning system related to the created transport model is presented in the following figure.

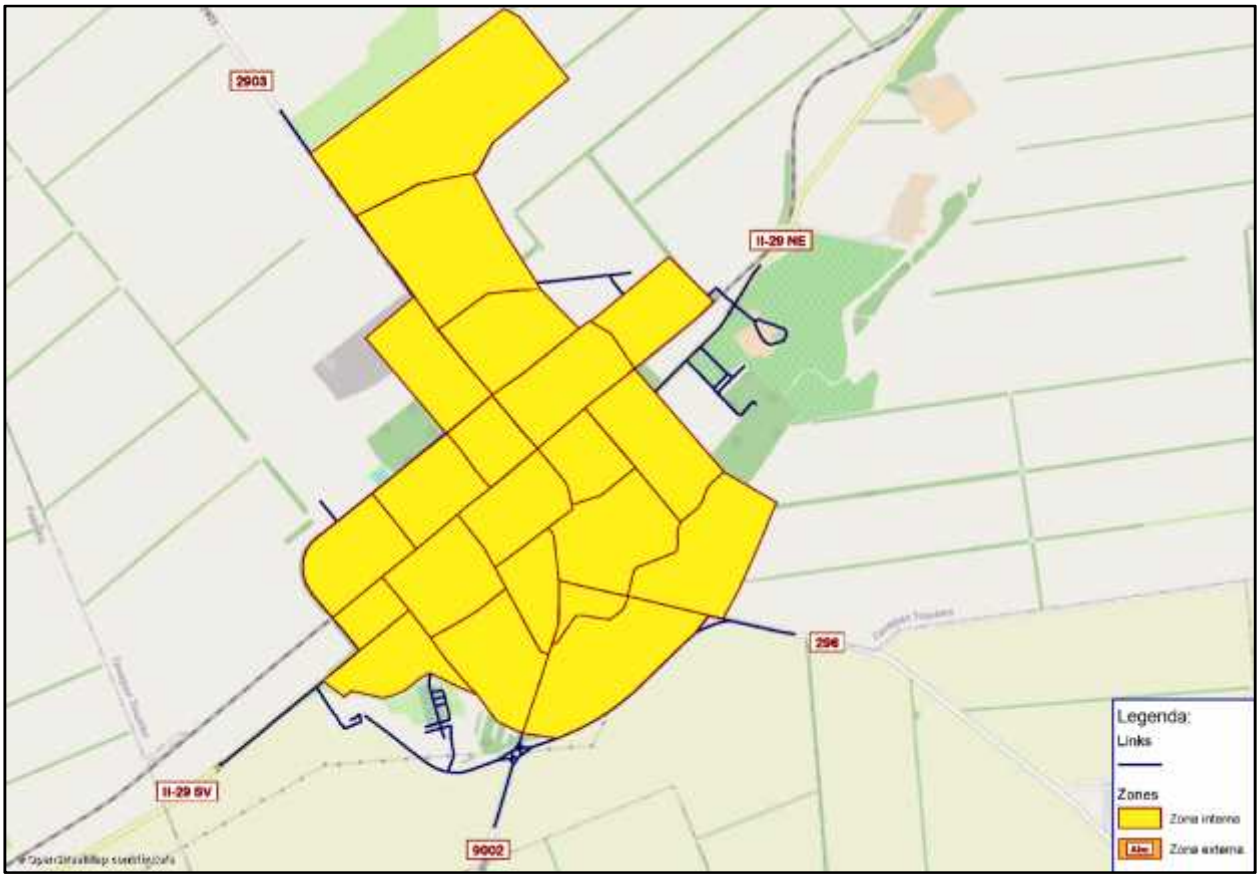


***Figure 3.33**. Traffic areas created within the transport model for General Toshevo Town.*
Zona internă=Internal area
Zona externă=External area

The calibration of the traffic values was performed based on the traffic data described in Chapter 3.1.2.

Subsequently, the traffic volumes recorded within the entire modeled network are presented, at the **level of the annual daily average** (MZA), for the following categories of vehicles (figures 3.34 - 3.42):

- *cars;*
- *light goods vehicles;*
- *heavy goods vehicles;*
- *standard vehicles - car;*

From the analysis of the traffic flows represented in the figures below, one can notice theyconcentrate on the main traffic arterial streets. The streets with a local function, which supply the residential neighborhoods take on substantially reduced traffic volumes compared to the main ones, which is why in the graphic representation the width of the lanes associated with them does not offer a high degree of visibility.

In Negru Vodă Town the axis of the road network,which ensures the connection in the NE-SW direction and crosses areas with administrative, commercial and residential functions, consists of infrastructure sectors which attract at the level of an annual average day

maximum values of approximately 1,900 standard vehicles / direction, representing both local travel, whose origin and destination are in NegruVodă Town, as well as penetration travels (with the origin or destination in the urban area) and of transit (with the origin and destination outside the urban area).

In the partner city in Bulgaria, the axis of the road network also provides the connection in the NE-SW direction and crosses areas with administrative, commercial and residential functions. It consists of infrastructure sectors which attract at the level of an annual average day maximum values of approximately 2,300 standard vehicles / direction, representing both local travel, whose origin and destination are in General Toshevo Town, as well as penetration travels (with the origin or destination in the urban area) and of transit (with the origin and destination outside the urban area).

***Figure 3.34**. Traffic flows, cars – NegruVodă Town, MZA 2020.*

LEGENDA=ANNOTATION
Fluxuri de trafic (vehiculefizice)=Traffic flows (physical vehicles)
Autoturisme=Cars
Rețearutieră=Road network
Zone externe=External areas

***Figure 3.35**. Traffic flows, light goods vehicles – NegruVodă Town, MZA, 2020.*

LEGENDA=ANNOTATION
Fluxuri de trafic (vehiculefizice)=Traffic flows (physical vehicles)
Vehiculeușoare de marfă= Light goods vehicles
Rețearutieră=Road network
Zone externe=External areas

***Figure 3.36**. Traffic flows, heavy goods vehicles - NegruVodă Town, MZA, 2020.*

LEGENDA=ANNOTATION
Fluxuri de trafic (vehiculefizice)=Traffic flows (physical vehicles)
Vehiculegrele de marfă=Heavy goods vehicles
Rețearutieră=Road network
Zone externe=External areas

***Figure 3.37**. Traffic flows, standard vehicles - NegruVodă Town, MZA, 2020.*

LEGENDA=ANNOTATION
Fluxuri de trafic (vehiculestandard)=Traffic flows (standard vehicles)
Vehicule etalon=Standard vehicles
Rețearutieră=Road network
Zone externe=External areas

***Figure 3.38**. Traffic flows, standard vehicles - NegruVodă Town, MZA, 2020 - urban area particularization.*

LEGENDA=ANNOTATION
Fluxuri de trafic (vehiculestandard)=Traffic flows (standard vehicles)
Vehicule etalon=Standard vehicles
Rețearutieră=Road network

***Figure 3.39**. Traffic flows, cars – General Toshevo Town, MZA 2020.*

LEGENDA=ANNOTATION
Zone externe=External areas

***Figure 3.40**. Traffic flows, light goods vehicles – General Toshevo Town, MZA, 2020.*

LEGENDA=ANNOTATION
Zone externe=External areas

***Figure 3.41**. Traffic flows, heavy goods vehicles – General Toshevo Town, MZA, 2020.*

LEGENDA=ANNOTATION
Zone externe=External areas

***Figure 3.42**. Traffic flows, standard vehicles – General Toshevo Town, MZA, 2020.*

LEGENDA=ANNOTATION
Zone externe=External areas

3.2. Traffic flows at the level of the forecast year 2030

Traffic forecasting is the process of estimating the number of vehicles or people that will use a specific transport facility at a given time. In the present study, it is necessary to estimate the traffic flows at the 2030 forecast horizon.

Having at disposal a transport model valid for the baseline year for which the analysis was performed, as well as the forecast of the main socio-economic and demographic indicators specific to the studied area, the transport demand at the level of different forecast horizons could be estimated. The need for future mobility was determined by the projected values of the socio-economic, demographic and land use indicators.

In order to determine the future mobility need, the trend of evolution of the main socio-economic and demographic indicators which determine the mobility characteristics of people and goods was estimated: *gross domestic product, number of inhabitants, motorizationindex, annual average travel distance ofvehicles.*

- ***National and county Gross Domestic Product (GDP)***

Periodically, the National Forecast Commission draws up forecasts regarding the economic and social development of Romania in the short, medium and long term, in correlation with the provisions of the Government Program, the national, sectoral and regional strategies, as well as based on national and world economy trends. In this study the latest trends in the long and medium term of Constanţa County GDP were used. The evolution trend of the analyzed indicator until 2030 is represented in figure 3.43.

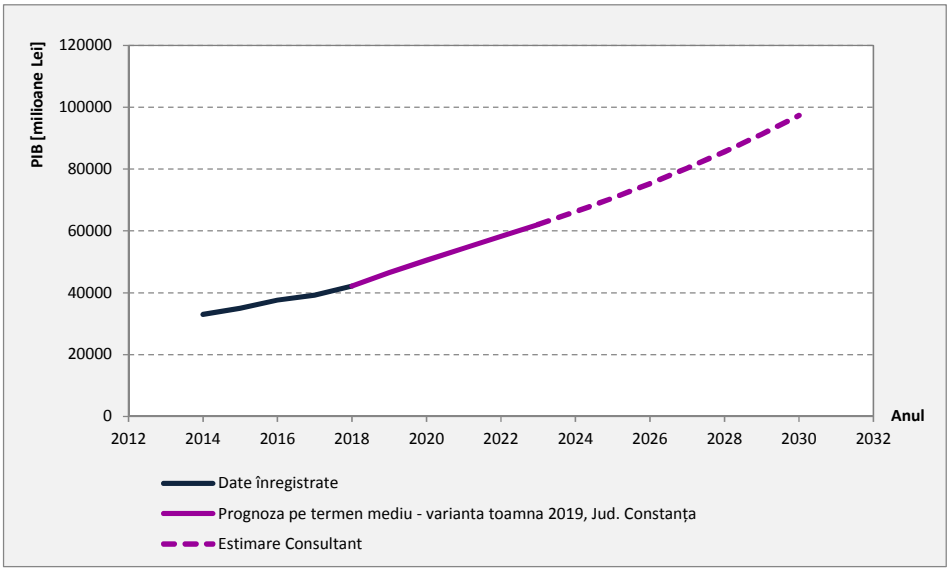


Figure 3.43.*Constanţa County GDP forecast. Source: National Forecast Commission*

PIB (milioaneLei)=GDP (millions Lei)
Date înregistrate=Recorded data
Prognoza pe termen mediu-variantatoamna 2019, Jud. Constanţa=Medium term forecast - autumn 2019 version, Constanța County
EstimareConsultant=Consultant's Estimation
Anul=Year

The most recent, medium-term forecast predicts the evolution of GDP until 2023. Based on these data, the evolution trend of the analyzed indicator was estimated until 2030.

In the case of the General Toshevo Town, the GDP forecast was considered by reference to the target value of the indicator "GDP per capita in PPS compared to the EU average,%" established in the document National Development Program BULGARIA 2030.

(https://www.eesc.europa.eu/ceslink/en/press-and-media/news/the-bulgarian-esc-proposes-the-national-development-programme-bulgaria-2030-to-have-a-basic-integral-goal).

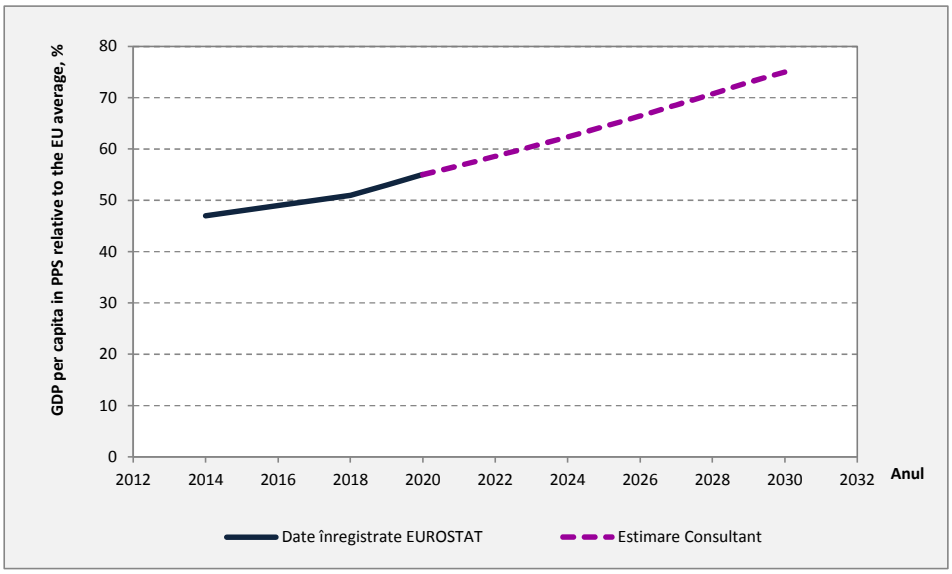


Figure 3.44.*Bulgaria GDP forecast.*
Source: EUROSTAT, National Development Programme BULGARIA 2030.
Date înregistrateEUROSTAT =Recorded dataEUROSTAT
EstimareConsultant=Consultant's Estimation
Anul=Year

ì *Number of inhabitants at the level of the studied area*

Specialized studies indicate that there is a close correlation between the characteristics of travel (number, time distribution, mode of transport used) and the characteristics of the resident population in a studied area (number of inhabitants, age, income).

In this sense, for the analysis of the future mobility needs, the estimation of the evolution of the number of residents at the level of the two analyzed towns was also taken into account. Thus, based on the number of inhabitants registered in NegruVodă Town in 2019 (5,704 inhabitants, according to data published by the National Institute of Statistics, TEMPO-Online), the value of this demographic indicator in 2030 was estimated at 5,542 inhabitants.

The graphical representation of the predicted values is made in figure 3.45. The variation trend in the number of inhabitants ofNegruVodă Town is a slightly decreasing one.

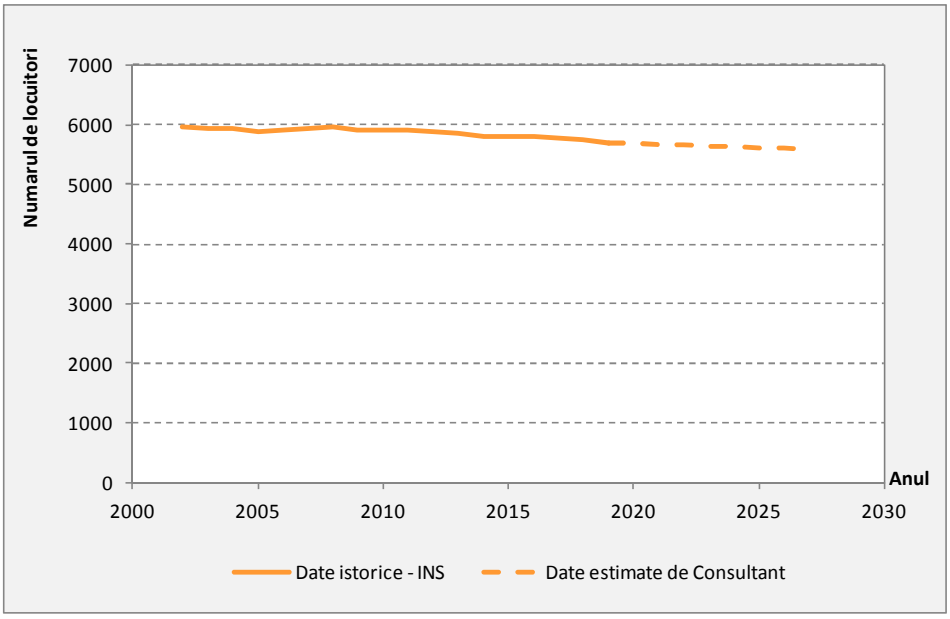


Figure 3.45.*Number of inhabitants forecast – NegruVodă Town.*

Număr de locuitori=Number of inhabitants
Date istorice-INS=Historical data-INS
Date estimate de Consultant=Data estimated by the Consultant
Anul=Year

In the case of the studied area in Bulgaria, historical data on the variation of the population of the General Toshevo Town and Municipality, registered in the period 2002-2020 (provided by the General Toshevo Town Hall) were used. Thus, it was estimated that in 2030 the population will be 6321 inhabitants in General Toshevo Town and 14,099 in the large area represented by the General Toshevo Municipality (figure 2.46).

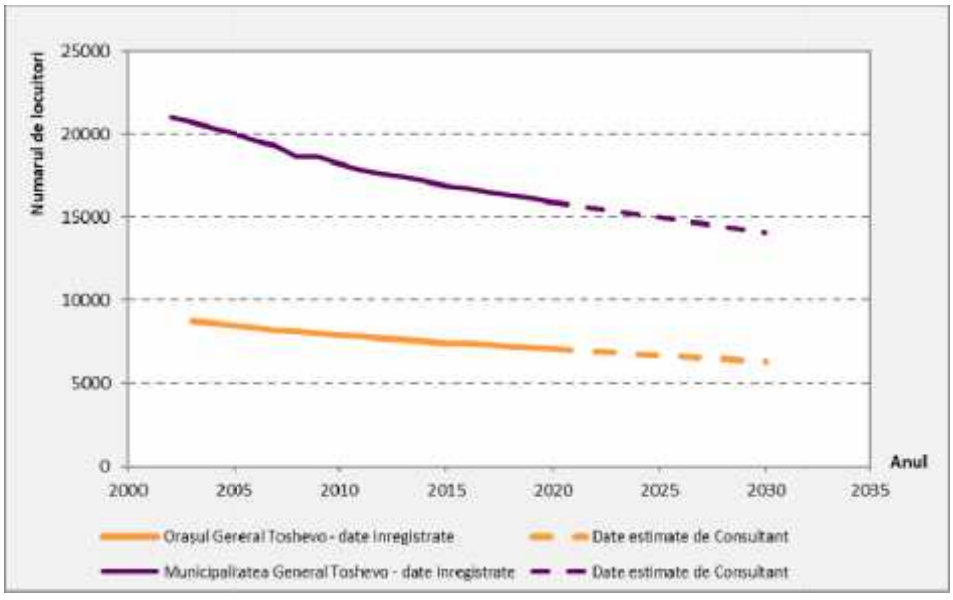


Figure 3.46.*Number of inhabitants forecast –General Toshevo Town.*

Număr de locuitori=Number of inhabitants
Orașul General Toshevo – date înregistrate=General Toshevo Town - recorded data

Municipalitatea General Toshevo – date înregistrate=General ToshevoMunicipality - recorded data
Date estimate de Consultant=Data estimated by the Consultant
Anul=Year

ì *Motorization index at the level of the studied area*

The motorization index is one of the factors which directly influences the number of travels generated at the level of a studied area. Taking into account the variation tendency of the motorization index determined on the basis of historical values, the county GDP forecast tackled above and the international policy of reducing the degree of individual transport use, the annual values of the motorization index were estimated until the 2030 forecast horizon (figures 3.47 and 3.48).

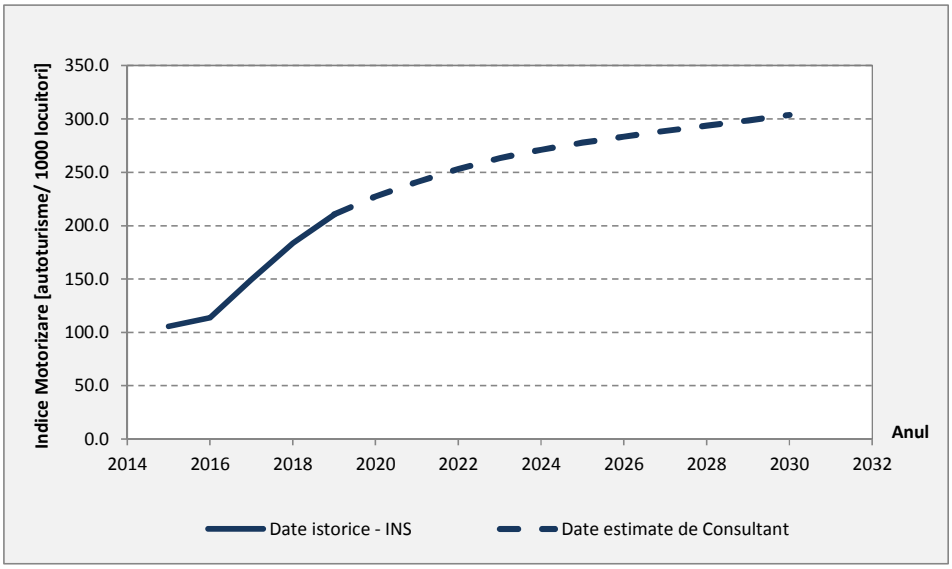


Figure 3.47.*Motorization index forecast–NegruVodă Town.*

IndiceMotorizare (autoturisme/1.000 locuitori) =Motorization Index (cars/1,000 inhabitants)
Date istorice-INS=Historical data-INS
Date estimate de Consultant=Data estimated by the Consultant
Anul=Year

Starting from the value of the motorization index of 211 cars / 1,000 inhabitants in 2019 in NegruVodă Town, forthe year2030 an average value of 304 cars / 1,000 inhabitants is estimated.

In the case of the General Toshevo area, the increase of the motorization index from 344 cars / 1000 inhabitants in 2019, to 499 cars / 1000 inhabitants in 2030 is estimated.

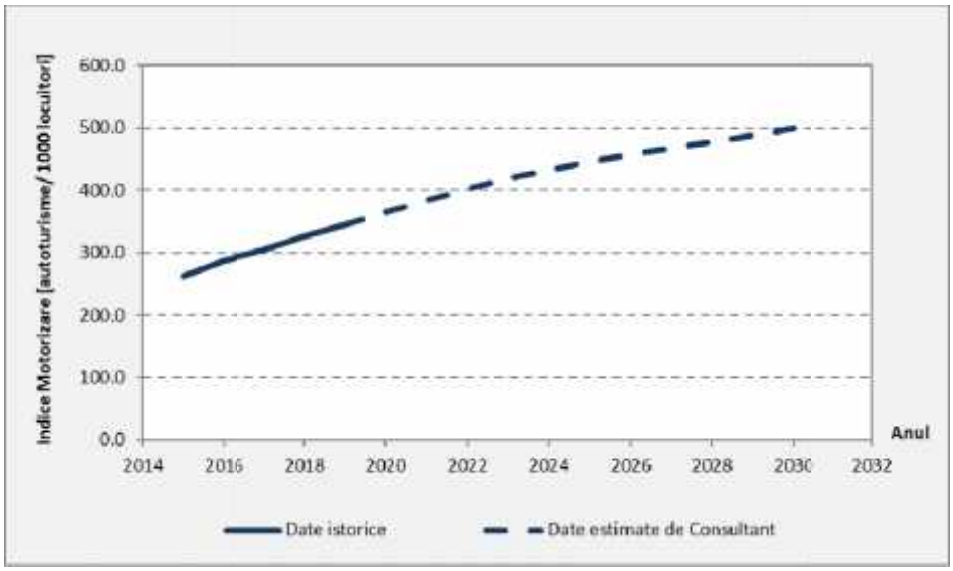


Figure 3.48.*Motorization index forecast–General Toshevo Town.*

IndiceMotorizare (autoturisme/1.000 locuitori) =Motorization Index (cars/1,000 inhabitants)
Date istorice =Historical data
Date estimate de Consultant=Data estimated by the Consultant
Anul=Year

- ***Annual average travel distance of vehicles at national level***

The annual average travel distance of road vehicles represents the expression of the transportdemand related to the road mode, a mode of transport with a significant share in the transport of passengers and goods in Romania. Starting from the values measured in 2010, CNAIR - CESTRIN provided estimates of this indicator until the forecast horizon 2035. For this study, the consultant extracted the data estimated for the years 2015 - 2030 based on which he determined the variation coefficients of the annual average travel distance, expressed as the distance travelled by all vehicles, respectively as a product between the total number of vehicles and the distance traveled by them (by category), having as baselinetheyear 2010 (figures 3.49 and 3.50).Given the short distance between the two localities, similar variations were considered for these indicators in the Bulgarian study area as well.

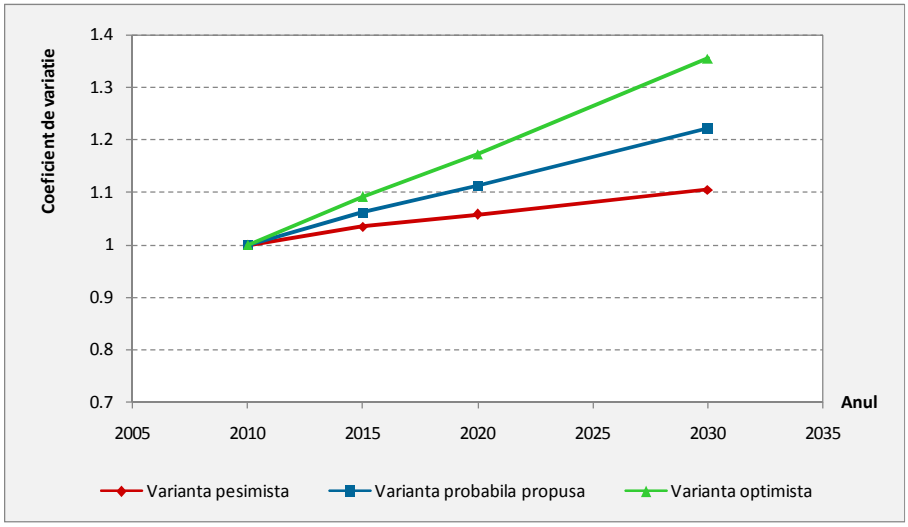


Figure 3.49.*Variation coefficients-average annual travel distance [km]. Source: CESTRIN, 2010.*

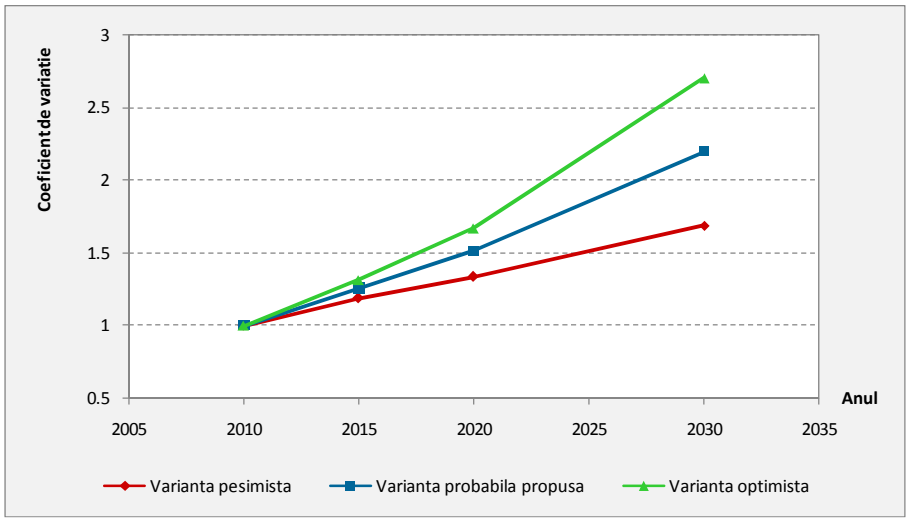


Figure 3.50.*Variation coefficients-average annual travel distance [vehicles*km]. Source: CESTRIN, 2010.*

Coeficient de variație=Variation coefficient
Variantapesimistă=Pessimistic version
Variantaprobabilăpropusă=Proposed probable version
Variantaoptimistă=Optimistic version
Anul=Year

Taking into account the forecast of socio-economic and demographic indicators previously described, the forecast of the transport demand for people and goods at the level of 2030 was made.

3.2.1. The baseline scenario

The reference mobility scenario specific to the 2030 analysis period highlights the result of the interaction between the forecasted transport demand and the future transport network which considers as completed a series of committed projects (adapting the technical characteristics to the transport model, where applicable), ongoing projects or agreed for implementation by the local authority, as follows:

- *Landscaping in NegruVodă Town*

The general objective of the project is the restoration of the central and adjacent public space, ensuring a coherent connection between the two poles of interest in NegruVodătown, namely the "Multifunctional Center for Youth" and "Social Housing Complex". The target objectives are:

- Facilitating the access of the users of the urban space having the facilities provided by implementing the project "Green space arrangement in NegruVodă Town, Constanţa County", namely the Square on Cerchezului Street and the squares on Silozului Street;
- Creating an attractive center, between Crucea(The Cross)- the Monument of Heroes and the Cinema Plaza;
- The rehabilitation of traffic in such a way as to achieve the necessary access and the connection to pedestrian crossings, in order to allow the movementwithinthe space by elderly or disabled people;
- Achieving a green area easy to maintain in a state of utility and with an appearance as attractive as possible;
- The appropriate endowment of the urban space with urban furniture, economic lighting system and high-performance video surveillance system (CCTV).

The included streets which are the object of the project are the following (figure 3.51):

- Platformei Street, the sector between Abatorului Street and Cerchezului Street;
- Cerchezului Street, the sector between Platformei Street and Stadionului Street;
- Constanţei Road, the sector between Stadionului Street and Gladiolelor Street;
- Gladiolelor Street, the sector between Constanţei Road and Triunghiului Street;
- Mangaliei Road, the sector between Gladiolelor Street and Sănătăţii Street;

NegruVodă Town has obtained external financing in the amount of 3,580,343 Lei for the implementation of the project within POR 2014-2020 (ROP / Regional Operational Program), Investment Priority 5.2. The total value of the project is 3,814,516.46 Lei.

Landscaping related to the streets included in the project also involves the construction of sidewalks and infrastructure for bicycles (lanes and racks). It also includes the construction of public transport stations.Thus, on the sectors covered by the project, the quality of the public space is significantly improved, the deficiencies regarding non-motorized mobility identified in the analysis of the current situation being addressed.

.

Figure 3.51.*The area of the project "Landscaping in NegruVodă Town".*

ì *Modernization of roads inside the localities of Darabani Village and Vâlcelele Village U.A.T. NegruVodă*

The project consists of the modernization of the road infrastructure of local interest in the adjacent Darabani and Vâlcelevillages, as follows:

- Darabani Village: Şcolii Street, Bisericii Street, Agricultorilor Street, Eternităţii Street, Lungă Street, Văii Street, Măceşului Street, Salciei Street, Brazdei Street, Prunului Street, Teiului Street, Castanului Street, Salcâmului Street, Mărului Street;
- Vâlcelele Village: Principală Street, Ghioceilor Street, Iasomiei Street, Tufănelelor Street, Bisericii Street, Albăstrelelor Street, Narciselor Street, Iederei Street, Lalelelor Street, Crăiţelor Street, Bujorului Street.

For the implementation of the project, financing was obtained from government funds amounting to 13,509,705 Lei.

Taking into account the above mentioned, configurations of traffic flows within the entire network were obtained, at the level of 2030, in the baseline scenario. The estimated traffic flows for an annual daily average(MZA) expressed in standard vehicles are shown in Figures3.52 and 3.53.

***Figure 3.52**. Traffic flows, standard vehicles – NegruVodă Town, Baseline Scenario_MZA 2030.*

LEGENDA=ANNOTATION
Fluxuri de trafic (vehiculestandard)=Traffic flows (standard vehicles)
Vehicule etalon=Standard vehicles
Rețearutieră=Road network
Zone externe=External areas

***Figure 3.53**. Traffic flows, standard vehicles – General Toshevo Town, Baseline Scenario_MZA 2030.*

LEGENDA=ANNOTATION
Zone externe=External areas

4. REORGANIZATIONS PROPOSALS OF THE TRAFFIC FLOW MANAGEMENT

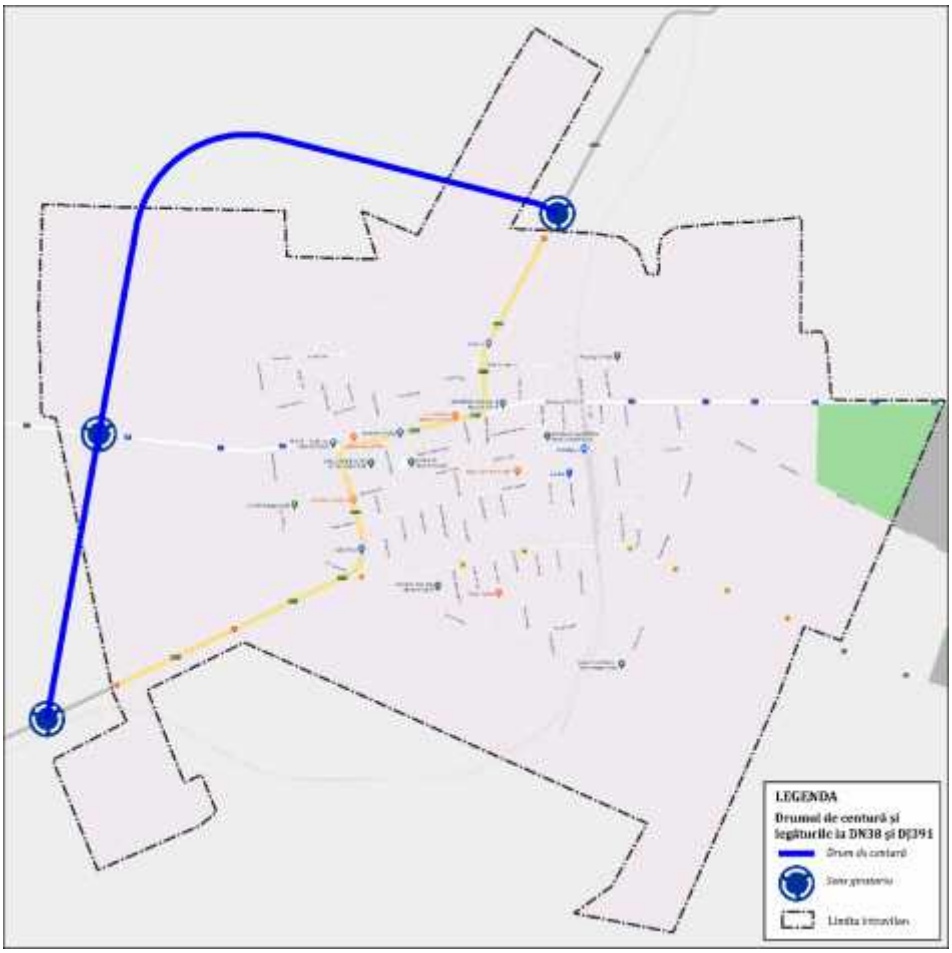
4.1. The proposed scenario for 2030

The proposed mobility scenario is defined by a number of projects identified in order to reduce the specific dysfunctions of the basic situation and the orientation towards sustainable mobility:

- The execution of theBelt road in the urban areas Negru Vodă and General Toshevo;
- Development of theroutes for freight traffic in the Eastern Part of the road network in Negru Voda City; Arran
- Rehabilitation of streets in the localities belonging to General Toshevo Municipality;
- Rehabilitation of the road network on sector II-29– Dobrich – General Toshevo – Plenimir – Petleshkovo DOB3033;
- Development of a multi-annual plan for the maintenance / upkeep of the pedestrian / street network in the cities of Negru Vodă and General Toshevo;
- Development of the traffic management system in the cities of Negru Voda and General Toshevo;
- Development of a network of bike lanes in the cities of Negru Voda and General Toshevo;
- Development of pedestrian infrastructure in the cities of Negru Voda and General Toshevo;

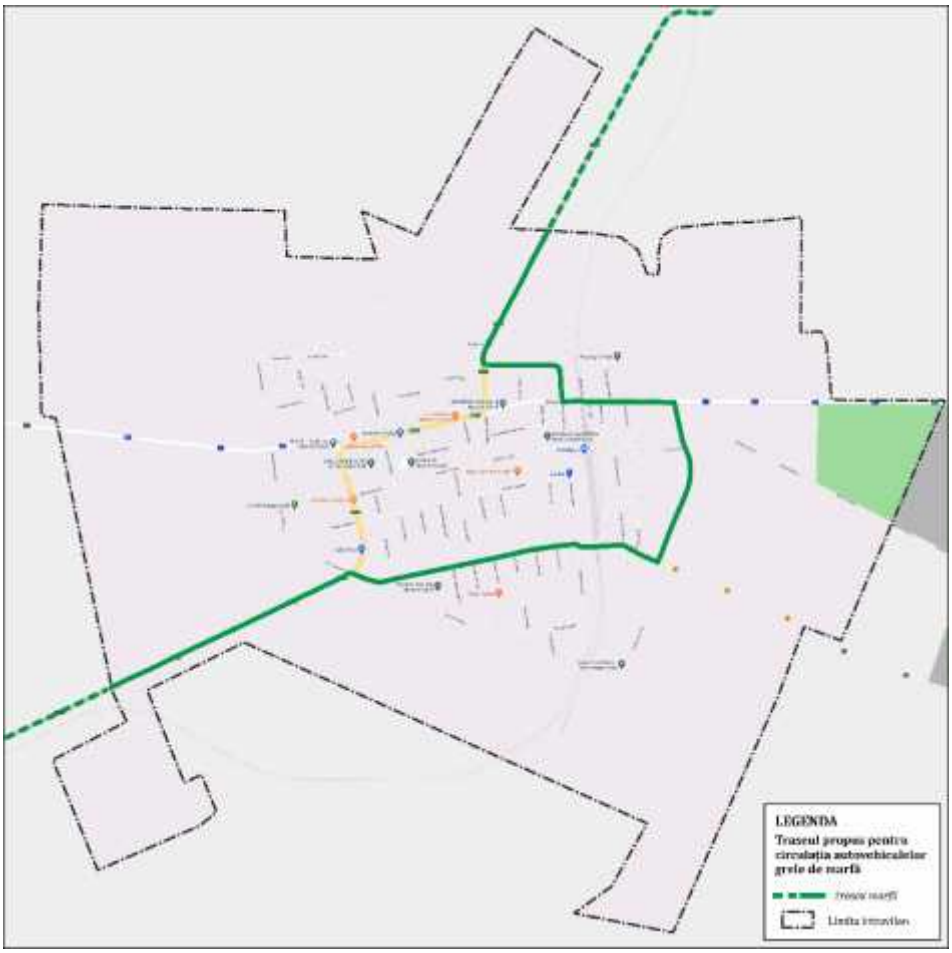
The main features of the above proposals are detailed in the project sheets, which are presented below.

I. Proposals for Negru Voda City

1. The execution of the Belt road in the urban areas Negru Vodă and General Toshevo;	
Sector	Road infrastructure
Problems it adresses	The current situation identifies significant values of transit traffic and penetration of heavy good vehicles. They mainly use the DN 38 route, which crosses the city through the central area. In addition to the adverse effects on the environment (air pollution, noise pollution), the presence of heavy good vehicles in the urban area where flows of pedestrians and cyclists are found causes traffic safety problems.
Description of the investment	The proposal aims to achieve a belt route to take over transit traffic (figure 4.1), including the component made up of goods vehicles.  ***Figure4.1**.Route of belt road proposed – Negru Voda City* In view of the constraints of the development of the road network on the

	Eastern side of the intravilan territory, associated with the existence of the railway line, it is proposed to carry out the belt road in the Western part of the city. Therefore, the new infrastructure will connect DN 38 and DJ 391 (the sector between Negru Vodă and Cerchezu). It is proposed to establish intersections at the level of all 3 intersections, by developing roundabouts.
The current stage	Identified route
Preparation period	2021-2023
Implementation period	2024-2027
Estimated budget	6.250.000 Eur (approximately 5 km)
Possible sources of funding	▪ European non-reimbursable funds 2021-2027 (Operational Transport Programme, Regional Operational Programme, Romania-Bulgaria cross-border Cooperation Program); ▪ Government funding; ▪ Local budget.

2. Development of the routes for freight traffic in the Eastern Part of the road network in Negru Voda City	
Sector	Road infrastructure
Problems it adresses	Currently, there are no regulations in place regarding the access of goods vehicles (vehicles whose maximum total authorized mass - M.T.M.A exceeds 7.5 tons). It is found that there are cereals storage facilities located at the South-East and North-East extremities of the urban territory, in the vicinity of the railway, with access from Sănătăţii Street, Depozitelor Street and Morii Street. These infrastructure sectors were recently modernized within the project "Increasing accessibility to the TEN-T network in the border area Negru Vodă - General Toshevo", but the resistance structure was not scaled for freight traffic. Therefore, the use of heavy vehicles will cause rapid deterioration of the modernized infrastructure. Another problem created by the free movement of goods vehicles is the disruption of the urban environment. Currently, streets that serve residential neighborhoods are crossed by freight vehicles, generating negative effects such as noise, vibrations in homes and air pollution.

Description of the investment	The proposal aims at arranging routes on which the access of vehicles with M.T.M.A. greater than 7.5 tonnes is allowed, by sizing the road structure in accordance with the axle load that can be achieved in the case of these vehicles. It is also being considered to regulate traffic by horizontal and vertical signaling in accordance with the restrictions described above. The proposed route for serving the eastern part of the urban locality is highlighted in the following figure (Cerealelor Street, Sănătăţii Street, Mangaliei Driveway, Silozului Street, Triunghiului Street).  ***Figure4.2**.Proposed heavy goods route – Negru Vodă Street.*
The current stage	Proposal
Preparation period	2021-2023
Implementation period	2024-2026
Estimated budget	1.500.000 Eur (approximately 3 km)
Possible	European non-reimbursable funds 2021-2027 (Operational Transport Programme, Romania-Bulgaria cross-border Cooperation

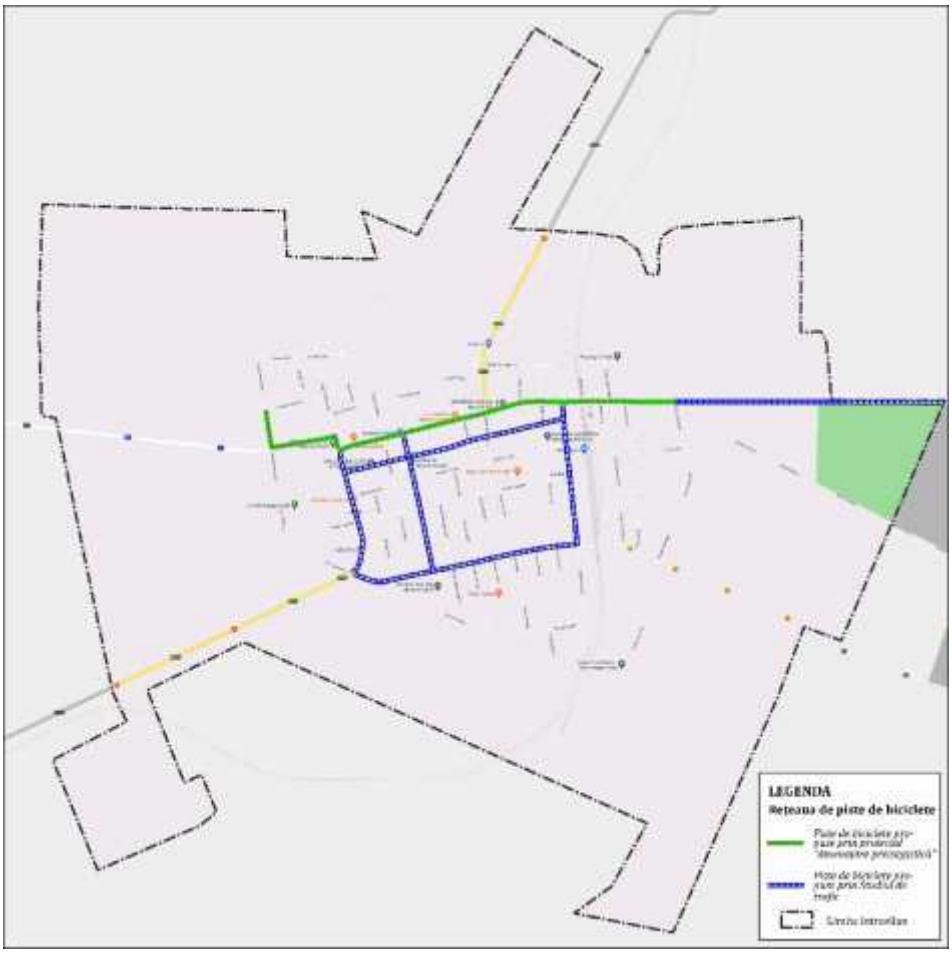
sources of funding	Program); - Government funding; - Local Budget.

3. Development of a multi-annual plan for the maintenance / upkeep of the pedestrian / street network in the city of Negru Vodă	
Sector	Road infrastructure
Problems it adresses	Considering the recently received road infrastructure modernization projects and the projects that will be implemented in the next period (until 2023 - *"Landscaping in Negru Vodă"* and *"Road modernization inside Darabani Village and Vâlcelele Village ATU Negru Vodă"*) identifies the need to carry out a rigorous planning of the necessary works for the maintenance / upkeep of the road network and sidewalks, with prioritization depending on the area, complexity and necessary financial resources.
Description of the investment	In order to maximize the effects of road infrastructure investments, it is proposed that their planning be carried out in a multi-annual plan.
The current stage	Proposal
Preparation period	2023
Implementation period	2024-2030
Estimated budget	20.000 Eur
Possible sources of funding	- Local budget

4. Development of the traffic management system in the city of Negru Voda	
Sector	Traffic management
Problems it adresses	In the current situation at the level of the urban area, a video monitoring system of the public space is implemented, which also includes the main traffic arteries, capturing the road traffic. This system does not allow the registration of the number of vehicles by

	categories or their speed of movement, variables that constitute input data in the analyzes regarding the traffic management.
Description of the investment	The proposal aims to develop the video monitoring system by adding modules to facilitate the monitoring of traffic flows (number of vehicles per category, speed). The functions described are essential for monitoring the degree of compliance with the measure regulating the access of heavy goods vehicles. Also, in the field of traffic management activities is included the activity of renewal of the horizontal and vertical signaling system which regulates the traffic on the public road network in the locality. This measure will help to improve traffic safety.
The current stage	Proposal
Preparation period	2021-2022
Implementation period	2023-2030
Estimated budget	200.000 Eur
Possible sources of funding	European non-reimbursable funds2021-2027 (Operational Transport Programme, Romania-Bulgaria cross-border Cooperation Program); Local budget.

5. Development of a network of bike lanes in the city of Negru Voda	
Sector	Non-motorized travel infrastructure
Problems it adresses	In order to guide the population towards sustainable mobility, it is necessary to provide facilities that support the use of environmentally friendly modes of transport. Currently, there are no cycle paths arranged in the current Negru Voda street network. Through the Project *"Landscaping in Negru Voda"* Platformei Street, Cerchezului Street, Stadionului Street, Constanței Driveway, Mangaliei Driveway. In the project area, there will be rakes for parking bicycles.
Description of	In order to establish a continuous network of cycle paths, serving both high population density areas and areas with socio-economic and leisure

the investment	objectives, it is proposed to develop cycling infrastructure by developing the following sectors (Figure 4.3): ▪ Constanței Driveway, between Stadionului Street and Cerealelor Street; ▪ Cerealelor Street, between Constanței Driveway and Silozului Street; ▪ SilozuluiStreet, between Cerealelor Street and Mangaliei Driveway; ▪ IndependențeiStreet, between Constanței Driveway and SilozuluiStreet; ▪ RecolteiStreet, between Cerealelor Street and Constanței Driveway; ▪ Mangaliei Driveway/DJ 391, between SănătățiiStreet and the recreation area (forest).  ***Figure4.3**.Proposed bicycle lane network – Negru Voda city.*
The current stage	Proposal
Preparation period	2021-2022

Implementation period	2023-2024
Estimated budget	1.500.000 Eur (approximately 6 km)
Possible sources of funding	European non-reimbursable funds 2021-2027 (Regional Operational Programme, Romania-Bulgaria cross-border Cooperation Program); Local Budget.

6. Development of pedestrian infrastructure in the city of Negru Voda	
Sector	Non-motorized travel infrastructure
Problems it adresses	In recent years, significant progress has been made in the field of modernization of street infrastructure in the city of Negru Voda. These interventions did not include sidewalks. Therefore, in the current situation, frequent cases are identified in which pedestrians are forced to move on the road, endangering traffic safety.
Description of the investment	In order to support non-motorized travel at the local level, it is proposed to arrange pedestrian infrastructure to allow safe travel. The proposed arrangements will be complementary to those that are the subject of the project *"Landscaping in Negru Voda* recently launched, in which such infrastructures will be built on the West - East axis: Platformei Street, Cerchezului Street, StadionuluiStreet, Constanței Driveway (between StadionuluiStreetand Mangaliei Driveway), Mangaliei Driveway.
The current stage	Proposal
Preparation period	2021-2022
Implementation period	2023-2025
Estimated budget	3.000.000 Eur
Possible sources of funding	European non-reimbursable funds 2021-2027 (Regional Operational Programme, Romania-Bulgaria cross-border Cooperation Program); Local budget.

The distribution of traffic flows resulting from the simulations performed considering the impact of the proposed projects is shown in Figure 4.4.

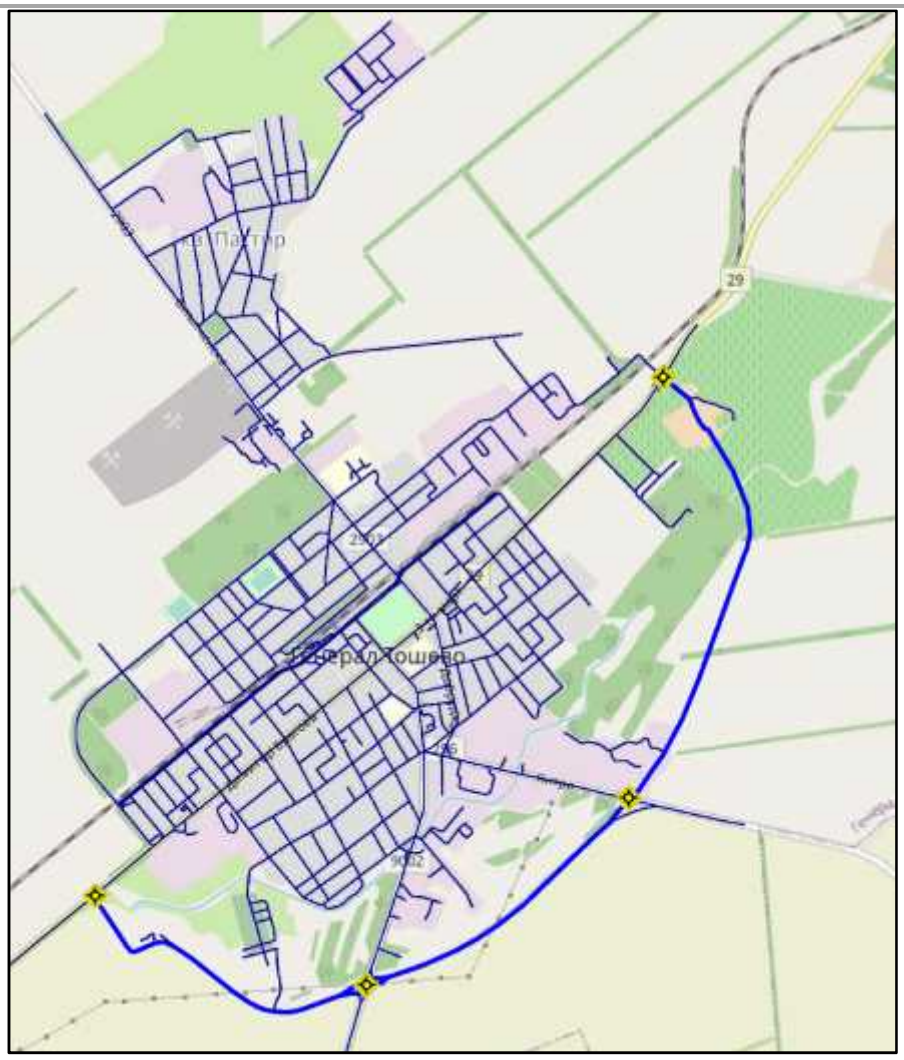
The major impact is associated with the construction of the belt road. Figure 4.5 highlights the relocations of traffic flows at the level of the road network in the proposed Scenario, which includes the construction of the belt road in the western part of the locality. There is a significant volume of traffic that will relieve the road network, respectively the SV-NE axis (flows represented in green). These represent transit and penetration flows at the locality level. The existence of a bypass allows the restriction of the access of heavy goods vehicles through the central area (Constanţei Driveway). Therefore, significant improvements are made regarding the quality of the urban environment.

***Figure4.4**. Traffic flows, standard vehicles –Negru Vodă City, Proposed scenario_MZA 2030.*

***Figure4.5**. Redistribution of traffic flows – Negru Vodă city, physical vehicles, Proposed scenario_MZA 2030.*

II. Proposals for General Toshevo City

1. The execution of the Belt road in General Toshevo City;	
Sector	Road infrastructure
Problems it adresses	Currently, significant values of transit and penetration traffic consisting of heavy goods vehicles are identified. They mainly use inhabited areas. In addition to the negative effects produced on the environment (air pollution, noise pollution), the presence of heavy goods vehicles in the urban area where there are flows of pedestrians and cyclists, generates traffic safety problems.
Description of the investment	The proposal aims at creating a belt road to take over transit traffic (figure 4.6), including the component consisting of goods vehicles.

	 ***Figure4.6**.Proposed Belt Road Route – General Toshevo City.* Considering the constraints of the development of the road network on the western side of the urban territory, associated with the existence of the railway line, it is proposed to build the ring road in the eastern part of the locality. Therefore, the new infrastructure will connect II-29 the SW area of the locality, road 9002, road 296, returning to II-29 the SW area of the locality in the NE area of the locality. It is proposed to make level intersections in all 4 intersections, by arranging roundabouts.
The current stage	Identified route
Preparation period	2021-2023
Implementation period	2024-2027
Estimated	6.250.000 Eur (approximately 5 km)

budget	
Possible sources of funding	▪ European non-reimbursable funds 2021-2027 (Operational Transport Programme, Regional Operational Programme, Romania-Bulgaria cross-border Cooperation Program); ▪ Government funding; ▪ Local budget.

2. Rehabilitation of streets in the localities belonging to General Toshevo Municipality	
Sector	Road infrastructure
Problems it adresses	Even though some streets have been modernized, there are many others that need rehabilitation because they are in a very precarious technical condition - with many cracks in the asphalt, simple and or in the form of a network, as well as a large number of potholes on the tread. . There are sections of streets where there has been a significant sinking, due to weak soil foundation), where local reconstruction is necessary with the complete removal of the entire construction of the pavement. Longitudinal and transverse slopes are deformed and thus the water on the pavement surface is not removed, which leads to further damage. The gutters are in poor condition, the upper part being covered with vegetation, and the ditches are filled with earth. With regard to horizontal markings and vertical signage, they are missing or incomplete, with the safety of road traffic being endangered.
Description of the investment	It is proposed to carry out road infrastructure rehabilitation works, including in terms of traffic safety, by investing in horizontal and vertical signage.
The current stage	Proposal
Preparation period	2023
Implementation period	2024-2030
Estimated budget	8.000.000 Eur
Possible sources of funding	▪ European non-reimbursable funds2021-2027 (Regional Operational Programme, Romania-Bulgaria cross-border Cooperation Program); ▪ Local budget.

3. Rehabilitation of the road network on sectorII-29 – Dobrich – General Toshevo – Plenimir – Petleshkovo DOB3033	
Sector	Road infrastructure
Problems it adresses	This is one of the main roads in the Dobrich district, ensuring the connection of several localities with the border crossing points. There are sections with significant submergence (caused by the weak foundation of the soil), where local reconstruction is necessary, with the complete removal of the entire construction of the pavement. Longitudinal and transverse slopes are deformed and thus the water on the pavement surface is not removed, which leads to further damage. The gutters are in poor condition, the upper part being covered with vegetation, and the ditches are filled with earth. With regard to horizontal markings and vertical signage, they are missing or incomplete, and road traffic safety is endangered. In villages, pedestrian movements are difficult because curbs and sidewalks are missing or destroyed. Lack of adequate signage poses an additional risk to the safety of pedestrian traffic.
Description of the investment	It is proposed to carry out road infrastructure rehabilitation works, including in terms of traffic safety, by investing in horizontal and vertical signage. In order to promote non-motorized modes of transport, it is proposed to arrange bicycle lanes in the rehabilitated sector.
The current stage	Proposal
Preparation period	2023
Implementation period	2024-2030
Estimated budget	4.000.000 Eur
Possible sources of funding	European non-reimbursable funds2021-2027 (Regional Operational Programme, Romania-Bulgaria cross-border Cooperation Program); Local budget.

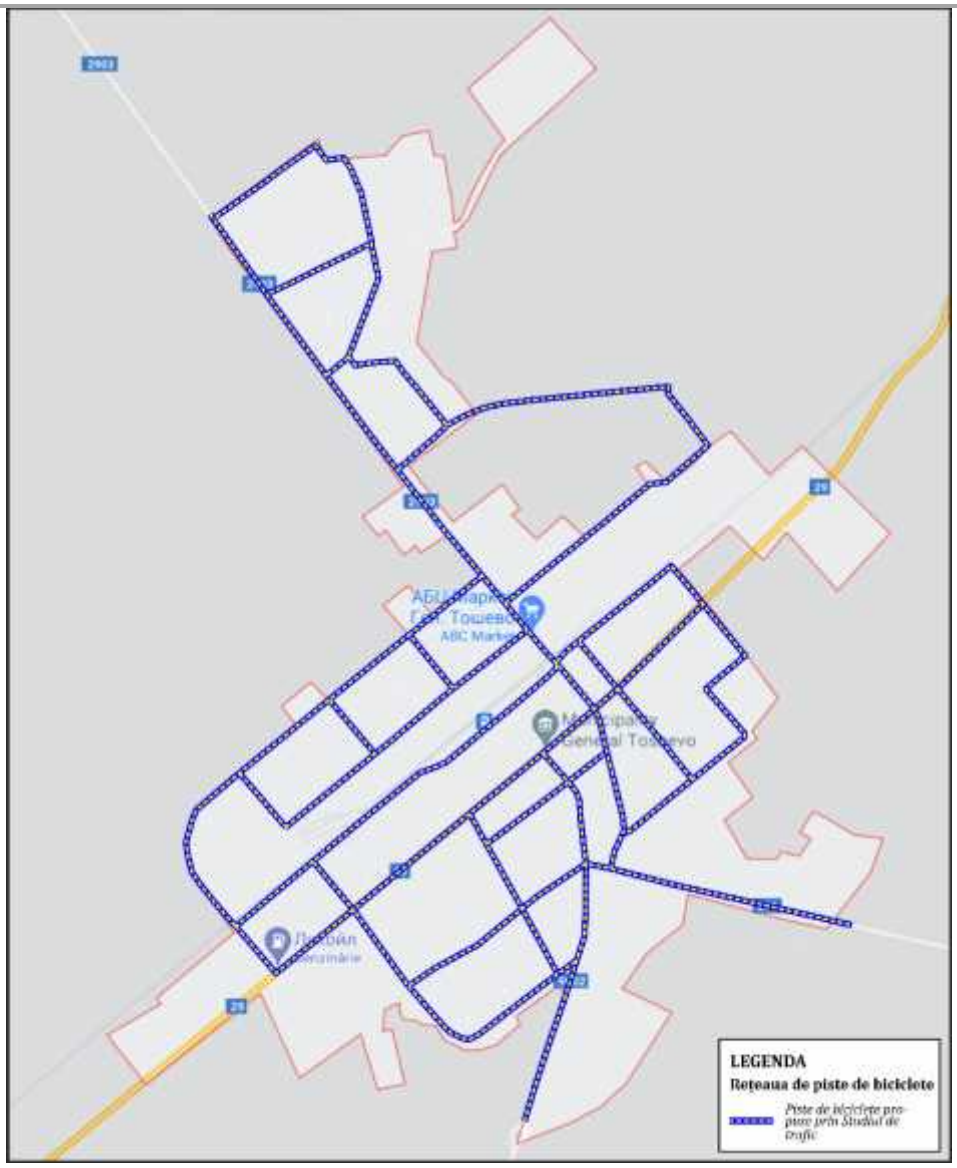
4. Development of a multi-annual plan for the maintenance / upkeep of the pedestrian / street network in the city of General Toshevo

Sector	Road infrastructure
Problems it adresses	Considering the recently received road infrastructure modernization projects ("Increasing accessibility to the TEN-T in the border area Negru Voda - General Toshevo", "Roads rehabilitation / modernization in Negru Voda and General Toshevo", "Responsible Use of Nature Resources and Encouragement of Sustainable Development of Alternative Forms of Tourism ","" Cross-border region General Tosevo - Negru Voda - Unknown tourist destination ") and the projects that will be implemented in the next period, the need for a rigorous planning of the necessary maintenance works is identified. / maintenance of the road network and sidewalks, with prioritization according to area, complexity and necessary financial resources.
Description of the investment	In order to maximize the effects of road infrastructure investments, it is proposed that their planning be carried out in a multi-annual plan.
The current stage	Proposal
Preparation period	2023
Implementation period	2024-2030
Estimated budget	20.000 Eur
Possible sources of funding	Local budget.

5. Development of the traffic management system in the city of General Toshevo;	
Sector	Traffic management
Problems it adresses	In the current situation at the level of the urban area, a traffic management system is not functional. The organization of traffic is regulated by orientation indicators, classic elements of horizontal and vertical signaling.
Description of the investment	The proposal aims to develop a traffic management system, with dynamic signaling and video monitoring modules, which will facilitate the monitoring of traffic flows (number of vehicles per category, speed).

	The functions described are essential for monitoring the degree of compliance with the measure regulating the access of heavy goods vehicles. Also, in the field of traffic management activities is included the activity of renewal of the horizontal and vertical signaling system which regulates the traffic on the public road network in the locality. This measure will help to improve traffic safety.
The current stage	Proposal
Preparation period	2021-2022
Implementation period	2023-2030
Estimated budget	200.000 Eur
Possible sources of funding	• European non-reimbursable funds2021-2027 (Operational Transport Programme, Romania-Bulgaria cross-border Cooperation Program); • Local budget.

6. Development of a network of bike lanes in the city of General Toshevo	
Sector	Non-motorized travel infrastructure
Problems it adresses	In order to orient the population towards sustainable mobility, it is necessary to provide facilities that support the use of environmentally friendly modes of transport. In the current situation at the level of the street network of the General Toshevo city there are no bicycle lanes. At the local level, it is intended to build bike path routes that allow travel to several points of interest in the locality.
Description of the investment	In order to achieve a continuous network of bicycle lanes, serving both high-density areas and areas where socio-economic and recreational objectives are found, it is proposed to develop infrastructure for bicycle traffic, by arranging the sectors represented in figure 4.7.

	 ***Figure4.7****.Proposed bicycle lane network –General Toshevo City.*
The current stage	Proposal
Preparation period	2021-2023
Implementation period	2024-2030
Estimated budget	6.000.000 Eur (approximately 26 km)
Possible sources of funding	- European non-reimbursable funds 2021-2027 (Regional Operational Programme, Romania-Bulgaria cross-border Cooperation Program); - Local budget.

7. Development of pedestrian infrastructure in General Toshevo city	
Sector	Non-motorized travel infrastructure
Problems it adresses	Significant progress has been made in recent years in modernizing road infrastructure in the city of General Toshevo. These interventions did not include sidewalks. Therefore, in the current situation, frequent cases are identified in which pedestrians are forced to move on the road, endangering traffic safety.
Description of the investment	In order to support non-motorized travel at the local level, it is proposed to arrange pedestrian infrastructure to allow safe travel. We will consider, first of all, the areas where socio-economic objectives are located that attract important flows of pedestrians and the areas where there are traffic safety problems.
The current stage	Proposal
Preparation period	2021-2022
Implementation period	2023-2025
Estimated budget	3.000.000 Eur
Possible sources of funding	European non-reimbursable funds2021-2027 (Regional Operational Programme, Romania-Bulgaria cross-border Cooperation Program); Local budget.

The distribution of traffic flows resulting from the simulations performed considering the impact of the proposed projects is shown in Figure 4.8.

The major impact is associated with the construction of the belt road. Figure 4.9 highlights the relocations of traffic flows at the level of the road network in the proposed Scenario, which includes the construction of the ring road in the western part of the locality. There is a significant volume of traffic that will relieve the road network, respectively the SV-NE axis (flows represented in green). These represent transit and penetration flows at the locality level. The existence of bypass allows restricting the access of heavy goods vehicles through the urban area, which crosses residential neighborhoods. Thus, significant improvements are made regarding the quality of the urban environment.

***Figure 4.8**. Traffic flows, standard vehicles –General Toshevo city, Proposed scenario_MZA 2030.*

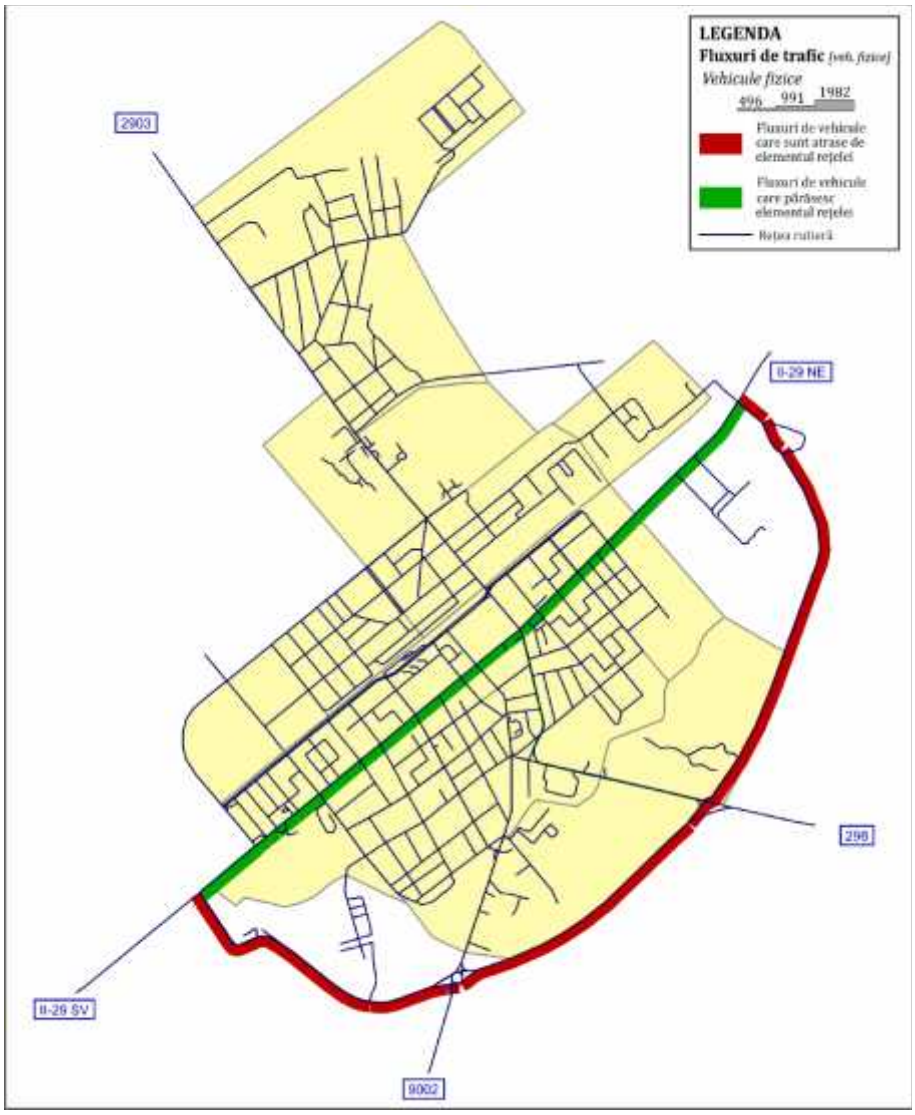


***Figure 4.9**. Redistribution of traffic flows –General Toshevo city, Standard vehicles, Proposed scenario_MZA 2030.*

4.2. Impactof the proposals

According to a report by the European Environment Agency, the substances in the urban atmosphere that raise short-term air quality problems are nitrogen dioxide, suspended particulate matter and ozone. At the same time, carbon monoxide occurs among the substances emitted by vehicles.

The amount of emissions specific to each emission factor, discharged into the atmosphere by motor vehicles in circulation, varies according to the characteristics of the fleet vehicles (cylinder capacity, age, depollution rate, type of fuel used), average travel speed, volume and structure of traffic flows. An integrated method has been applied to calculate these

indicators, which takes into account the emission change equations developed within the CORINAIR (European Environment Agency) project.

Climate change is one of the greatest challenges facing mankind in the years to come, rising temperatures, melting glaciers, droughts and floods are all signs that climate change is really happening. The risks to the entire planet and to future generations are enormous, so urgent action is needed. Modeling climate phenomena and the economic impact of climate change are concerns of major global interest. The central issue in assessing the impact of all sectors of activity on climate change is the realistic quantification of carbon prices. The effects of transport influencing climate change and global warming are mainly caused by greenhouse gas emissions, the most important of which is carbon dioxide (CO2).

The amount of CO2 equivalent released into the atmosphere by vehicles in circulation varies depending on the characteristics of the vehicle fleet (cylinder capacity, age, depollution rate, type of fuel used), average speed, volume and structure of traffic flows. An integrated method has been applied to calculate these indicators, which takes into account the emission variation equations developed under the CORINAIR (European Environment Agency) project. Quantities of greenhouse gases (GHGs) calculated on the entire network in the area of the Black City of Voda based on the calculation model published in Annex 6a, b - JASPERS (Transport) Assessment Guide, Tool for Calculating Greenhouse Gas Emissions from the Transport Sector of the Framework Document for the implementation of sustainable urban development.

Therefore, taking into account the particularities of the car fleet and the characteristics of traffic flows (categories of vehicles in their composition, average travel speed, etc. - results from the transport model) were calculated the quantities of emissions of pollutants and greenhouse gases (CO2 equivalent) in the study area, at the level of an average day of the year in both the baseline scenario and the proposed scenario. In order to assess the environmental impact of the transport activity, the following indicators are proposed for analysis:

- Emissions of polluting gases - The amount of pollutant emissions associated with the transport activity, expressed in [kg] - NO2, PM, HC, CO;
- Greenhouse gas emissions - The quantity of greenhouse gases associated with the transport activity, expressed in [tonnes].

The results for the two areas studied for each emission factor analyzed are presented below.

Table 4.1. *Indicators - environmental impact assessment, Negru Vodă city.*

Indicator		Baseline scenario 2020	Baseline scenario 2030	Proposed scenario 2030
Pollutant gas emissions, kg	NO_2	12,82	15,28	12,08
	PM	0,41	0,47	0,41
	HC	3,31	3,86	3,45
	CO	28,44	33,18	29,66
Greenhouse gas emissions, tonnes		4,37	4,60	3,45

There is an increase in the estimated negative impact of the baseline scenario in 2030 compared to 2020. The increases in emissions from motor vehicles range from 15% for particulate matter to 19% for nitrogen dioxide. For carbon monoxide and hydrocarbon emissions, there were increases of 17% between the two baseline scenarios. In the case of greenhouse gases, it is estimated that emissions will increase by 5% by 2030.

By implementing proposals to reorganize the management of road traffic flows, which consist of major infrastructure projects for the road, pedestrian and bicycle traffic, as well as traffic organization, it is estimated to significantly reduce the negative effects of transport activity in urban areas. All emission factors show reductions in the project scenario compared to the baseline scenario 2030. Nitrogen dioxide is detached, for which the reduction is estimated at 21%. The reduction associated with material particles is 13%. In line with changes in traffic volumes and average speeds, carbon monoxide and hydrocarbon emissions were estimated to be reduced by 11%. The development of the proposed projects achieves a significant reduction of greenhouse gas emissions, the amount estimated in the scenario with proposals, being 25% lower than in the specific scenario, at the same forecast horizon. Mainly, these benefits are due to the relocation of transit traffic outside the urban area, by building the belt road.

In the case of the General Toshevo city, the impact generated by the implementation of the proposals is highlighted in the following table.

Table 4.2. *Indicators - environmental impact assessment, General Toshevo city.*

Indicator		Baseline scenario 2020	Baseline scenario 2030	Proposed scenario 2030
Pollutant gas emissions, kg	NO_2	12,04	14,53	10,96
	PM	0,46	0,55	0,41
	HC	4,83	5,64	4,25
	CO	41,31	49,16	37,16
Greenhouse gas emissions, tonnes		4,53	4,62	3,46

There is an increase in emissions of pollutants and CO2 in the baseline scenario 2030 compared to the specific situation in 2020. Increases in emissions from motor vehicles range from 17% for hydrocarbons to 21% for nitrogen dioxide. For carbon monoxide emissions there were increases of 19%, and for those of material particles of 20%. In the case of greenhouse gases, it is estimated that emissions will increase by 2% by 2030.

By implementing proposals to reorganize the management of road traffic flows, which consist of major infrastructure projects for the road, pedestrian and bicycle traffic, as well as traffic organization, it is estimated to significantly reduce the negative effects of transport activity in urban areas. All emission factors show reductions in the project scenario compared to the baseline scenario 2030. With the exception of carbon monoxide, for which the reduction is estimated at 24%, in all other cases the reduction is 25%. Mainly, these benefits are due to the relocation of transit traffic outside the urban area, by building the ring road.

5. CONCLUSIONS

The traffic management study carried out within the project "Increasing the accessibility to TEN-T in the border area Negru Vodă - General Toshevo" followed the analysis of the existing situation regarding the road traffic in Negru Vodă and General Toshevo and solving the problems found for all the streets in the study area.

The analysis of the traffic conditions at the level of the base year 2020 and of the forecast horizon 2030 was performed based on the traffic flows determined with the help of the transport model developed at the level of the Cities of Negru Vodă and General Toshevo. The calibration and validation of the transport model was performed based on the traffic data collected in the main intersections identified at the level of the road network. The measurements were performed over a period of 13 hours, between 06: 30-19: 30, during the working days.

In the case of General Toshevo area, the analysis of traffic volumes was based on the census carried out by CLRB (Central Road and Bridge Laboratory of ERA (Executive Road Agency)) in stations D904 and D903 located at km 60 + 300 and km 65 + 700 on road II -29 and in stations D1542 and D1543 located at km 11 + 600 and km 21 + 670 on road 296.

The model specific to the base year 2020 reflects the situation regarding the technical condition of the road infrastructure registered as a result of the implementation of the project "Increasing the accessibility to TEN-T in the border area Negru Vodă - General Toshevo".

The model specific to the base year 2030 takes into account the implementation of the measures provided in the projects "Landscaping in the Black City of Voda" and "Modernization of roads inside the localities of Darabani Village and Vâlcelele Village U.A.T. Negru Vodă ", which were started recently.

The results obtained by modeling were used to quantify the indicators on the performance of the transport system such as: intensity of passenger and freight traffic, travel times on the network, transport flows (origin-destination relations), modal share of travel, emissions of pollutants , greenhouse gas (CO2) emissions, etc.

In order to reduce the identified dysfunctions and, at the same time, to support sustainable urban mobility, solutions have been proposed to reorganize road traffic flows, which consist of:

Realization of the ring road in the urban areas Negru Vodă and General Toshevo;

Arrangement of routes for freight traffic in the Eastern area of the road network in the Black City of Voda;

Rehabilitation of streets in the localities belonging to General Toshevo Municipality;

Rehabilitation of the road network on sector II-29 - Dobrich - General Toshevo - Plenimir - Petleshkovo DOB3033;

Realization of a multi-annual plan for maintenance / upkeep of the pedestrian / street network in the cities of Negru Vodă and General Toshevo;

Development of traffic management system in the cities of Negru Voda and General Toshevo;

Development of a network of bicycle tracks in the cities of Negru Vodă and General Toshevo;

Development of pedestrian infrastructure in the cities of Negru Voda and General Toshevo.

For each of the above proposals, project sheets have been prepared which address issues such as: the issues to which the investment responds, its description, current status, preparation period, implementation period, estimated budget, possible sources of funding.

The identified proposals are in line with the prospects for the development of road traffic in the context of the development of the trans-European TEN-T transport network and road traffic in the area, given that the region is a key point for the transit of goods from Asia (via Turkey).), arrive in Bulgaria, General Toshevo locality, then cross Kardan and are transported to Romania, via Negru Vodă, then following the route to the A2 motorway to be distributed in the country.

Following the inclusion in the principles of sustainable development, in addition to the analysis of the distribution of traffic flows at the level of the urban network, it was considered to quantify the benefits on environmental impact brought by the implementation of the proposals. Thus, it was determined that the proposed scenario achieves a significant reduction in greenhouse gas and nitrogen dioxide emissions in the two study areas (Table 5.1).

Indicator – la nivel MZA		Discount in the proposed 2030 Scenario compared to the 2030 Basic Scenario	
		The city of Negru Voda	**The city of General Toshevo**
Pollutant gas emissions, kg	**NO_2**	21 %	25 %
	PM	13 %	25 %
	HC	11 %	25 %
	CO	11 %	24 %
Emisii de gaze cu efect de seră, Greenhouse gas emissions, tonnes		25 %	25 %

Mainly, these benefits are due to the relocation of transit traffic outside urban areas, on the proposed ring roads in the two cities.

By creating the proposed ring roads, an alternative to the DN 38 route that crosses the central area of Negru Vodă City, respectively an alternative to route II-29 that crosses the central area of Toshevo General City, will ensure the improvement of traffic conditions in urban areas Negru Vodă and General Toshevo in the conditions of the development of the major traffic network, which facilitates the access to the TEN-T network, both in Romania and in Bulgaria.