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IMPROVEMENT OF SAFETY OF ROAD INFRASTRUCTURE AND TRANSPORT NETWORKS

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Abstract. The aim of the work: consists of significantly reducing the number of road disasters. The objectives of the investigation: to outline the causes that generate serious traffic accidents on Stefan cel Mare Boulevard, to make rational analysis and planning of measures to improve the situation, to unveil the existing problems on local level, the composition of traffic flows, as well as skills of specialists in the realm, to develop a strategy on road accidents resulting in casualties aiming to reduce the number of traffic accidents with injuries, to promote measures aiming to protect participants in traffic, to developing a set of procedures and functions which would provide, in a network of certain streets, the size and structure of traffic flows, areas (major and minor intersections, streets) where there is an increased risk of accidents; to identify possible solutions aiming to increase road safety, specific peculiarities of Chisinau city.

Keywords: transport networks, road accidents, road users, traffic flows.

1. Introduction

Road transport is an integral part of our lives. Whether we are driving a motorcycle or a bicycle, traveling in public transport or are simple pedestrian, we

are all participants in traffic, every day, we spend a considerable time moving from one place to another. The need to move has grown so much, and road transport has become so common that we often do not realize how much time we spend in traffic, or what risks we are facing every time we go out on the street. In developing countries, road traffic is often perceived as a general chaos, as a race to reach its destination quickly, as a permanent struggle between traffickers or between them and traffic police. In traffic, people are not partners or colleagues, but especially competitors or adversaries. Agglomeration, traffic jams, jammed intersections, aggressiveness, young rebels driving, unintentional pedestrians, noise pollution, paralyzed cars, all define contemporary traffic in which no one seems to respect the rules anymore. Unfortunately, all these problems are reflected in the very high number of road accidents.

Road traffic crashes cause over 1.27 million deaths a year. They are predicted to rise to the fifth leading cause of death by 2030, resulting in an estimated 2.4 million fatalities per year, about three-quarters (74%) of whom were men and boys. Injuries claimed 4.9 million lives in 2016. More than a quarter (29%) of these deaths were due to road traffic injuries. Low-income countries had the highest mortality rate due to road traffic injuries with 29.4 deaths per 100 000 population – the global rate was 18.8. Road traffic injuries were also among the leading 10 causes of death in low, lower-middle- and upper-middle-income countries.

More than half of all road traffic deaths are among vulnerable road users: pedestrians, cyclists, and motorcyclists.

93% of the world's fatalities on the roads occur in low- and middle-income countries, even though these countries have approximately 60% of the world's vehicles.

Road traffic injuries are the leading cause of death for children and young adults aged 5-29 years. (World Health Organization)

These aspects highlight the need for research in this area to identify the causes of serious traffic accidents and to develop methods to determine the most appropriate methods for improving traffic safety and reducing the risk associated with road traffic

2. Study of the causes of road accidents on Stefan cel Mare Boulevard

Movements in the downtown is at the limit of capacity of the streets and in nearby bus stations, central market, the National Square and other areas such as market in the street. Pushkin is conducted with frequent congestion. During rush hours, the situation is complicated considerably, traffic jams occur almost on all street linking the outskirts with the downtown Chisinau. As a result of the considerable increase in the number of transport means in the city (3 times in the last decade), the burden on the road network was increased 2-fold. Such traffic

flow situation is very acute in the historical center and requires considerable efforts and concentration to solve it. (Onceanu Vasile, 2006)

The boulevard Stefan cel Mare is located in the center, with the passage in Buiucani sector. It is between Liberty square and square Dimitrie Cantemir. It has a length of 3.8 km, being the largest urban highway, the main axis of Chisinau, along which are placed the most important objects of the social and political, economic as well as urban cultural life of the city. Width of the bd. Stefan cel Mare is 18.5m. from street Metropolitan Bănulescu Bodoni to the square Dimitrie Cantemir and 18.0m. from the street the Metropolitan Bănulescu Bodoni to the Liberty Square. The highway is designed in three lanes in each direction, the bandwidth being 3.0m. The longitudinal profile varies from 0.5% - 5.3%, the cross-sectional profile is 2%. At rush hour the intensity for a lane is 1,460 vehicles/hour. (Bologan Mihai, 2007)

Stefan cel Mare Bd., being the Highway of City Interest, the boulevard generates the largest flow of pedestrian and freight traffic, because it focuses on an impressive number of objects with massive attendance.

On the Ismail Street, Ciuflea Street, Piata Libertatii Street, pedestrian crossings are multi-leveled, which is very welcome because the pedestrian flow is very high. At the other intersections, the pedestrian crossings are at the level creating injuries because the pedestrian flow is high and the flow transportation is high and pedestrians fail to cross. The situation is very difficult, especially at the intersection with Armeneasca Street, Tighina Street, because these streets are located on the Central Square, therefore the pedestrian flow is very high, the pedestrians fail to cross the green traffic light, the traffic flows start and the traffic conflict situation. There is still a problem while the pedestrians cross Stefan cel Mare Blvd., On Armeneasca Street, the cars turn to the right on Stefan cel Mare Blvd., so there are two streams at the same point; pedestrians and cars. In addition, immediately next to the intersection, there is trolley bus stop, 2-3 trolleybuses stop. They stop in such a way that they block the intersection with Armeneasca Street, and when the traffic light phase changes the pedestrians on Armeneasca Street fail to pass, because of the traffic jam formed on Stefan cel Mare Blvd., and when on Stefan cel Mare Blvd. the green light is turned on, the flow is stopped because of the traffic jam formed on Armeneasca Street, so the streams get confused but among them the pedestrians. Such situations are at the intersections with A. Pushkin and V.Pircallab Streets.

There were measurements along the boulevard, and it was established the intensity of traffic between intersections during 2015. They are counted all transport means moving on the boulevard during an hour, in different directions, at different hours, in different days and in different directions. From the results it was done the analysis of selected data. See below a graph of the difference in traffic levels during the day.

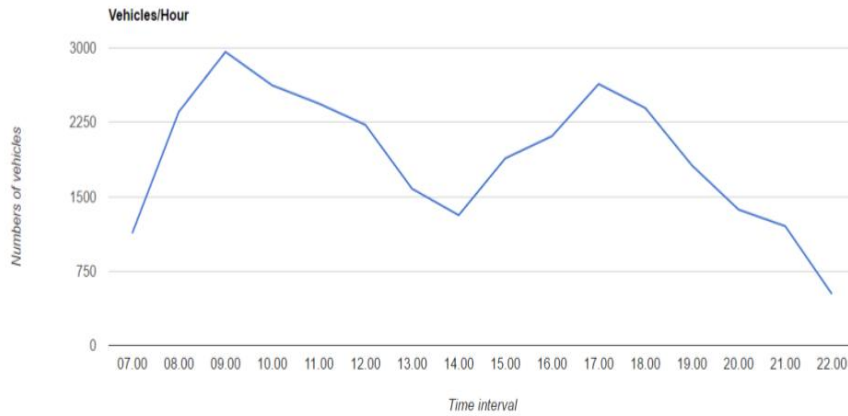


Fig. 1 – The changing intensity of traffic during the day.

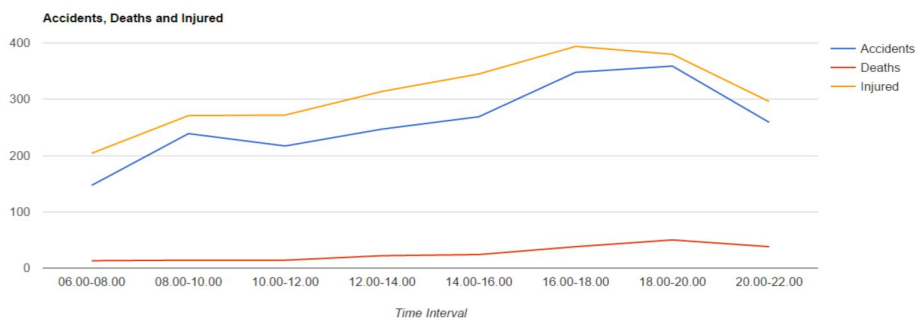


Fig. 2 – The changing intensity of traffic during the day.

The graph above shows traffic accidents depending on the time of day.

Making an analysis of these two graphs, we see that the intensity of traffic increases between 08:00 and 09:00 and 16:00-18:00 and frequency of road accidents grows from 08:00-09:00 and from 16:00-18:00 which gives us proof that it is the frequency of road accidents depends of the traffic intensity.

The frequency of road accidents in Moldova. The frequency of road accidents. During 2015 (12 month), they were recorded 2,527 traffic accidents with 297 fatalities and 3,021 injured people. The frequency of road accidents. During 2015 (12months), police recorded 2,527 traffic accidents with 297 fatalities and 3,021 injured people. (Biroul National de Statistica)

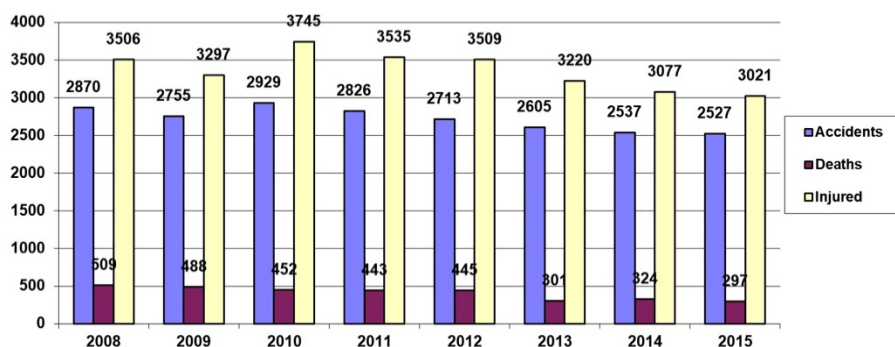


Fig. 3 – Frequency of road accidents (2008-2015).

3. Conclusions

Taking into account the increase in the degree of self - motorisation, the changes in the structure of public transport, the increase of the interurban commuter traffic, it becomes clear that the existing street network (with technical parameters and insufficient traffic capacity) can no longer meet the modern requirements. The situation is also complicated by the lack of alternatives on the orientation of road links, which causes the occurrence of 50% of intra-urban flows in the central area. At the same time, the city center functions as a hub in the structure of public transport, being the most important point of arrival and departure of passengers. It can be concluded that the main streets of the central area, intended for connection with other urban areas, do not honor their tasks and require reconstruction with the compliance of the technical parameters with the normative ones.

Under the same issue, the problem is bd. Stefan cel Mare si Sfânt în Chişinău. Being the main artery of the city, the boulevard generates the largest flow of pedestrian and freight traffic, having an overwhelming number of objects with massive attendance. Other urban streets such as Bănulescu - Bodoni, Bucuresti, Puskin, Ismail, Albişoara, V. Alecsandri, etc. are characterized by a slightly lower level of road traffic.

Taking into account the above mentioned and the considerations of preserving the city's identity, the construction of the new boulevards, which will cross the historic center, should be avoided. To reduce the number of accidents involving both cars and other types of motor vehicles, the following road safety measures are required:

- the main direction of the development of the road network is to become the transit center release and the time limitation of the transport in the central part.
- the rational development of the municipal public transport network, with the priority being ecological and speed transportation;

- improving the organization of road traffic;
- rationalizing the regular public transport network;
- the development of road infrastructure;
- monitoring and inspection of road sections, implementation of an Accident Commission for better and close cooperation between Road Police and Road Administration at local level to conduct road safety inspections and deciding which low-budget measures can be taken at the level by locality or district.
- setting up a research center to play an incentive role in the adaptation and development of road safety techniques, the training of specialized personnel, and in innovation and evaluation activities.

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ÎMBUNĂTĂȚIREA SIGURANȚEI INFRASTRUCTURII RUTIERE ȘI A REȚELELOR DE TRANSPORT

(Rezumat)

Scopul lucrării constă în reducerea semnificativă a numărului dezastrului rutiere, începând cu decesele, apoi persoanelor rănite grav, terminând cu cele ușor rănite. Obiectivele cercetării: evidențierea cauzelor care generează accidente rutiere grave pe Bulevardul Ștefan cel Mare, analiza rațională și planificarea măsurilor de îmbunătățire a situației, dezvăluirea problemelor existente la nivel local, compoziția fluxurilor de trafic, precum și competențele specialiștilor în domeniul dezvoltării unei strategii privind accidentele rutiere care au ca rezultat pierderi de vieți omenești, cu scopul de a reduce numărul de accidente rutiere cu leziuni, de a promova măsurile care vizează protecția participanților la trafic, de a dezvolta un set de proceduri și funcții care, în rețeaua unor străzi, ar arata dimensiunea și structura fluxurilor de trafic, zonele (intersecții majore și minore, străzi) în care există un risc sporit de accidente, identificarea posibilelor soluții care vizează creșterea siguranței rutiere, particularități specifice a orașului Chișinău.