МЕЖДУНАРОДНОЕ ТРАНСПОРТНОЕ ПРАВО

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Меры, необходимые для предотвращения дорожно-транспортных происшествий (на примере автотрассы М1 Ереван-Гюмри-Бавра-граница Грузии)

Аннотация. В данной статье представлено исследование вопросов безопасности дорожного движения на межгосударственных автомобильных дорогах в границах населенных пунктов. Рассмотрены действия, определенные пятью столпами безопасности дорожного движения, рекомендованными Организацией Объединенных Наций (ООН) всем странам, и принятыми документом правительства РА «Национальная стратегия безопасности дорожного движения». Важной профилактической мерой обеспечения безопасности дорожного движения являются мероприятия по улучшению дорожного движения или реконструкции дорог с целью устранения «черных точек» – аварийно-опасных участков дорог. Анализ причин дорожно-транспортных происшествий показал, что в населенных пунктах, имеющих придорожные объекты и не имеющих остановочных и стояночных площадок, аварий происходит больше, чем в тех, которые не имеют придорожных объектов. Настоящее исследование проведено на наиболее аварийном участке межгосударственной автодороги М1 (Ереван-Гюмри-Бавра-граница Грузии) (1,0-6,0 км), проходящем через населенные пункты. Были обнаружены «черные точки», установлены причины аварий и разработаны долгосрочные, среднесрочные и краткосрочные меры по их предотвращению. В документе представлены краткосрочные меры, которые будут способствовать повышению безопасности дорожного движения.

Ключевые слова: шоссе; автомобиль; безопасность; «черная точка»; проезжая часть.

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Measures necessary to prevent road transport accidents (on the example of M1 Yerevan-Gyumri-Bavra-Georgia border highway)

Abstract. The current paper has presented the study of the traffic safety issues of interstate highways within the borders of settlements. There have been considered the actions defined by the five pillars of road safety encouraged by the United Nations (UN) to all countries, adopted by the RA government's "National Road Safety Strategy" document. An important preventive measure for ensuring road traffic safety is traffic improvement or road reconstruction measures to eliminate "black spots", being accident-prone sections of roads. The analysis of the accidents' causes has shown that there are more accidents in the settlements that have roadside facilities and do not have stopping and parking areas than in those that do not have roadside facilities. The current study has been made on the most accident-prone section of the M1 (Yerevan-Gyumri-Bavra-Georgia border) interstate highway (1.0-6.0 km) passing through settlements. There have been found "black spots", determined the reasons of the accidents, and developed long-term, medium-term and short-term measures to prevent them. The paper has presented the short-term measures that will contribute to increasing traffic safety.

Keywords: highway; automobile; safety; "black spot"; carriageway.

Introduction

The assessment of the level of traffic safety on highways is important for road operation and traffic management services for the purpose of identifying dangerous areas and developing measures, their reconstruction or improving traffic conditions.

The rapid development of automobile transport has presented several complex and urgent problems that require an urgent solution. One of such problems is increasing the traffic safety of the roads passing through the settlements.

Properly collected traffic accident data and the data system is the cornerstone of all road safety processes, playing an important role in the analysis and monitoring of accident studies and road safety activities. Data system reporting and management is essential for developing strategy, identifying risks, taking necessary interventions, and evaluating strategy performance.

Due to the above, to achieve the highest level of highway safety, the "Zero Vision" policy was adopted by the RA government, which implies the implementation of the UN "Safety Systems Approach", five pillars and principles of strategic development goals.

Materials and methods

Interstate highways, on which the cars traveling is mainly transit, are considered the most dangerous in the borders of settlements.

Operational practice has shown that road closures in residential areas are characterized by many traffic accidents. Traffic flow is complicated by vehicles traveling at lower local speeds, construction and agricultural vehicle traffic, pedestrians crossing the road anywhere, and vehicles parked on the side of the roadway, etc.

The United Nations (UN) encourages all countries, within the legal framework of national and local authorities, to implement actions defined by the five pillars of road safety:

Pillar 1: Road safety management.

Pillar 2: Safer roads and safer traffic.

Pillar 3: Safer vehicles.

Pillar 4: Safer Road users.

Pillar 5: Post-accident response.

For each pillar, the global road safety plan sets a target that Armenia must achieve by 2030, to reduce the number of fatal accidents by 50%.

By the RA government in 2023 The "National Road Safety Strategy of Armenia" was adopted, by which the presented actions are aimed at 2023-2033 to increase traffic safety on RA highways.

It is possible to achieve the effective implementation of the road safety system because of the identification of the problems of the sector, the implementation of operations and the coordination and management of works aimed at achieving the specified goals.

An important preventive measure for ensuring road traffic safety is traffic improvement or road reconstruction measures to eliminate accident-prone sections of roads, "black spots". For this purpose, the research conducted for the detection, analysis, and elimination of "black spots" is an important tool for all road users, including vulnerable groups of road users.

Since the causes of accidents and the contributing factors are different, the best solution to reduce their number is effective road safety management (Pillar 2).

After the implementation of improvement measures for the elimination of "black spots" — accident-prone sections, then, because of gaining relevant experience, it will be possible to move to universal and implemented action plans for all roads. Detailed research and analysis of "black points" are more than relevant and urgent for improving the safety of highways in our country.

Results and discussion

The analysis of road accidents shows that about 32.6% of the accidents that occurred on interstate roads occurred in settlements or in their influence zone. In the last 10 years, an average of 9.6 accidents occurred in 1 km road sections in residential areas, and 4.6 (about 2 times more) in road sections, which confirms the attention paid to the issue of traffic safety in residential areas.

The analysis of the causes of accidents showed that more accidents occur in settlements that have roadside facilities than in settlements that do not have roadside facilities (Fig. 1).
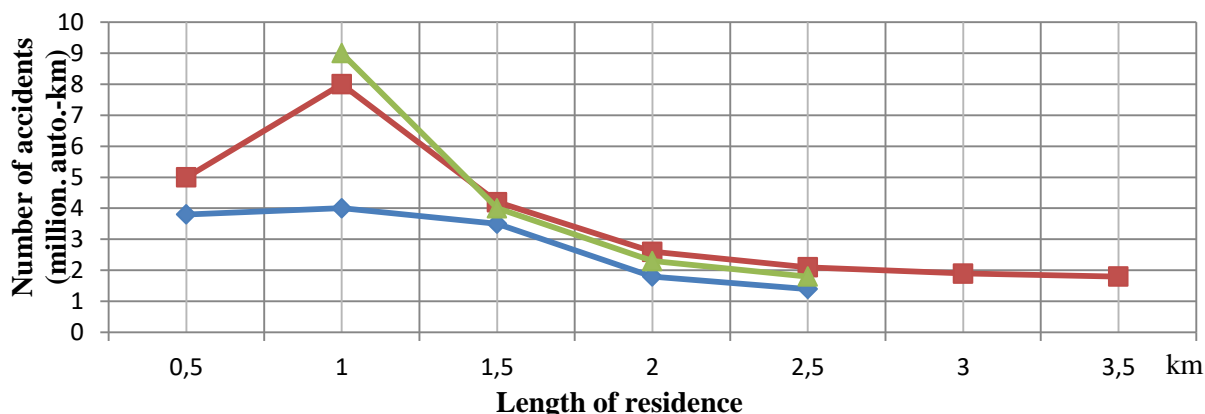

Fig. 1. **The influence of the length of the residence on accident rate**

- residences, roadside facilities without guts
- settlements, roadside objects
- settlements, including roadside objects according to V.F. Babkov's data

The relative number of accidents in settlements depends on their length. In the smallest settlements, drivers pass without changing speed, ignoring the complications of road conditions. In longer residential areas, drivers reduce their speed and drive more cautiously. Practice has shown that in settlements close to each other, when there is no speed limit in the section between settlements, drivers driving at high speed in that section enter the next settlement and often cause accidents.

There has to be considered one of the similar sections, the 1.0-6.0 km section of the M1 interstate highway (the 1st km according to the road traffic cards filled out by the police is calculated after the end sign of the "Yerevan" settlement) where Kasakh and Proshian settlements.

This section is the most accident-prone section of RA highways in 2019-2023 (the current period) there were 121 accidents, because of which 16 people died and 106 people received physical injuries of various degrees (accidents with material damage were not considered) (al. 1).

Table 1

The "black spots" of the M1 highway (1-st in the 6-th km)

Km	1	2	3	4	5	6
Accident	27	17	18	20	24	15

As a result of experimental studies, it was found that accidents occurred in the following situations.

• On both sides of that section of the road (1-6th km) there are many roadside objects, which are close to the roadway, do not have parking spaces,

intersections, gas stations do not have loitering braking zones. As a result, a car parked on the side or on the edge of the roadway, or leaving gas stations, does not correspond to the speed of the flow, at low speed, sometimes also suddenly enters the roadway, dramatically complicates the traffic conditions, and the created emergency situations often end with serious consequences, an accident (Fig. 2).
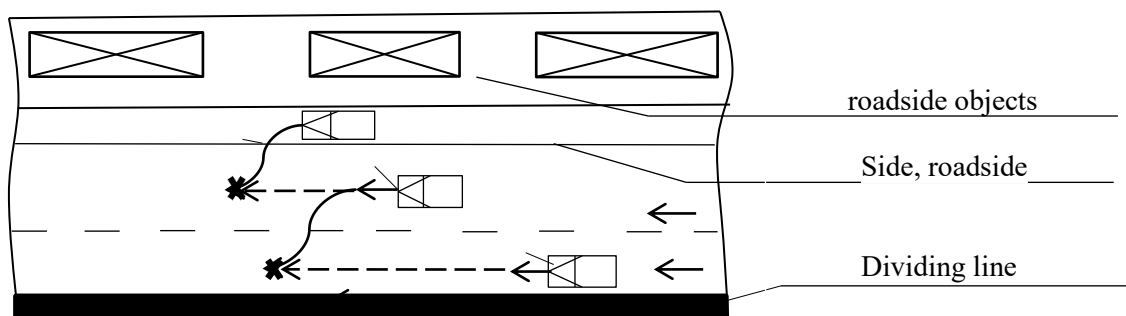

Fig. 2. **The probability of an accident due to wrong maneuvers on the M1 highway**
(1) A car standing near a roadside object immediately appears in the right side lane of the road, has a low speed, (2) a car traveling at the prescribed speed must brake sharply to avoid hitting 1 or maneuver to the left lane without overestimating the prescribed speed (3) the speed of a speeding car. Such maneuvers often lead to accidents with serious consequences

• There are quite a lot of return places in this area. Since there is no deceleration and entrance lane for these turning places, the original 6.3.1 «turning place» sign on the right side of the carriageway is not visible to drivers of vehicles traveling in the left lane in heavy traffic and is often a vehicle entering the turning place. collision type accidents occur.

• On both sides of the road in the settlements of Proshyan and Kasakh, intense housing and other construction works have been going on for the last decade, due to which the pedestrian crossing on the roadway has become more active, as a result, pedestrian collisions have also increased.

Conclusion

Long-term, medium-term, and short-term measures have been developed to reduce traffic accidents and increase traffic safety on the (1.0-6.0) km of the M1 highway, of which the short-term measures have been approved and will be implemented in the UN "development programs" which includes:

• To organize the passage of pedestrian flows through the carriageway.

• To repair, regulate and put into operation the underground pedestrian crossings located at the 0.7th and 3.9th km.

• In the 2nd km (near the canning factory) and 5.1 km (G: Chaushi district) introduce new pedestrian crossings with light calling equipment. Since the main cause of accidents are the illegal drivers who exceed the speed of the traffic, by the way, these traffic lights will restrain them, forcing a relative reduction of the speed.

• 1.0 km set the permitted traffic speed of 60 km/h in both directions of the 6.0 km section, as this section passes through settlements and there is a 2.7 km section, which is fully developed, lying from Proshyan settlement to the Yerevan city entrance sign (there are 3 return places) and the permitted speed is 90 (100) km/h.
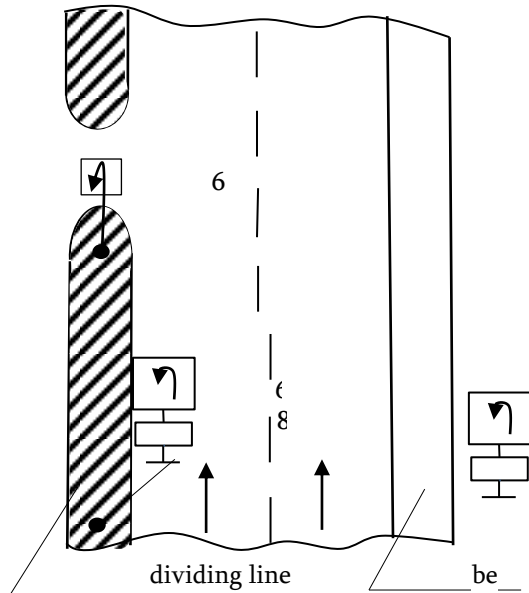
• It is recommended that preliminary sign 6.3.1 "turning place", taking into account the safety of traffic with continuous dense flows, to be visible to the drivers of cars traveling in the left lane by placing it also in the dividing zone (sign 6.3.1 8.1.1 "distance to the object" sign) (Fig. 3).

Fig.3. **Repetition of initial sign in the dividing zone**