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The “Engineer” publishes the most significant results of scientific and applied research carried out in universities of transport profile, as well as other higher educational institutions, research institutes, and centers of the Republic of Uzbekistan and foreign countries.

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Studying and analyzing the traffic intensity of vehicles

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Abstract: The study of vehicle traffic intensity plays an important role in the development of modern cities and infrastructure. Traffic intensity represents the distribution of traffic flow in time and space. Today, the increase in the number of vehicles in large cities and industrial centers leads to traffic congestion, environmental problems, and a decrease in logistics efficiency. Therefore, a deep analysis of the intensity of movement is necessary for the development of effective management measures. As a result of the research, the daily and weekly traffic intensity of vehicles, the hours of peak load were determined, and recommendations for optimal routing and signaling systems were developed. Based on the data obtained, it is possible to modernize traffic management systems, reduce traffic congestion, and improve the environmental situation. The study is also of practical importance in modeling the state of roads and traffic flow.

Keywords: traffic intensity, traffic congestion, analysis, logistics, routing, modeling, management

1. Introduction

One of the most important directions of the current conditions, socio-economic and political development of the republic, as well as the development of transport infrastructure, is the development of a network of main highways, on which domestic and transit links with neighboring states are carried out. Uzbekistan took a direct part in the UN program "Expanding trade through the development of cooperation in transit cargo transportation" and began to revive the "Great Silk Road." Uzbekistan's "Great Silk Road" is considered one of the central pillars of the ancient highway of interaction and cooperation between European and Asian countries [1,2].

It is necessary to distinguish between the work of road transport, the work of drivers, and the organization of traffic and pedestrian movement on the road. The first two issues are mainly handled by motor transport companies, while the latter are handled by road management, traffic safety departments, and government representatives. Based on the foregoing, the main goal of traffic organization is to ensure the safe passage of various vehicles at high speeds across different sections of the road in any weather conditions of the year [3].

The quality of transport routes and the provision of modern infrastructure will lead to an increase in the speed of cargo transportation and ultimately ensure the growth of the country's gross domestic product [4]. During the crisis in international financial markets and the resulting economic difficulties for developing countries, the practical implementation of the experience of developed countries in mobilizing temporarily unused labor resources in other sectors of the economy for the development of the country's transport infrastructure will lead to expected results. Therefore, we consider it expedient to further intensify large-scale work in the field of construction and operation of highways in our country at the expense of the existing road fund [5].

When organizing road traffic, the flow of vehicles is aimed at ensuring a safe traffic regime and high throughput capacity on various sections of the road, maximizing the use of the geometric dimensions of the road, which consists of a system of measures aimed at the efficient movement of vehicles. The principles of traffic organization are aimed at: correctly directing traffic flow, if necessary, grouping them by speed, establishing rational speeds for each section of the road, and timely informing drivers about the direction of movement and road conditions [6-8].

Pedestrians occupy a special place in road traffic. Their thorough knowledge of traffic rules and adherence to them allows them to ensure traffic safety in real road conditions.

In the organization of safe traffic, the study of indicators characterizing the movement of vehicles and pedestrians is a priority task. Below we will dwell on the basic concepts about them [9].

Traffic volume (intensity) - the number of vehicles passing through any cross-section of the road per unit of time (vehicles/day or vehicles/hour).

Traffic composition is an indicator that determines the ratio of different modes of transport in the traffic flow, measured in percentages or shares. This indicator has a great influence on the speed and density of the traffic flow.

2. Research methodology

K. Nagel and M. Schreckenberg's "Road Design" textbook is dedicated to exploration and road design. The first part describes the main requirements for road elements in plan and profile, methods for ensuring the stability of the roadbed, determining the thickness of the road surface and laying the axis of the road on the ground, and calculating small water-conducting structures [10].

U. Yuldashev and others wrote in the textbook "Labor Protection" based on the general rules of labor protection, industrial sanitation, equipment safety techniques, fire safety issues, as well as regulatory documents adopted in the Republic of Uzbekistan.

K.H. Azizov, S. Hoogendoorn and P. H. L. Bovy in the manual "Fundamentals of Organization of Traffic Safety," in the current period when Uzbekistan is moving towards the global economy, the leadership of our republic pays great attention to the "Problem of Ensuring Traffic Safety on Roads." The activities of the Commission for Ensuring Traffic Safety under the Cabinet of Ministers of the Republic

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of Uzbekistan are being shown. Based on the Commission's decision, leading scientists and specialists in this field in our country have developed the concept of "Improving Road Traffic Safety." Work is underway on a set of laws designed to ensure traffic safety. The ultimate goal is aimed at reducing road traffic accidents, the number of deaths and injuries, which are a negative consequence of motorization [2,11].

Due to the sharp increase in the number of cars in our region, the movement of vehicles is accelerating dramatically. Observations show that as a result of the increase in vehicles in the region, conflicts arise between pedestrians, vehicles, and passengers [13]. Additionally, numerous material and moral damages caused by road accidents include high noise levels in city streets and roads passing through populated areas, air pollution, blocking by parked vehicles on streets, vehicle delays, and sharp speed drops [14-16].

3. Results and Discussion

When studying the intensity of vehicles in the Andijan region, we can focus on the following.

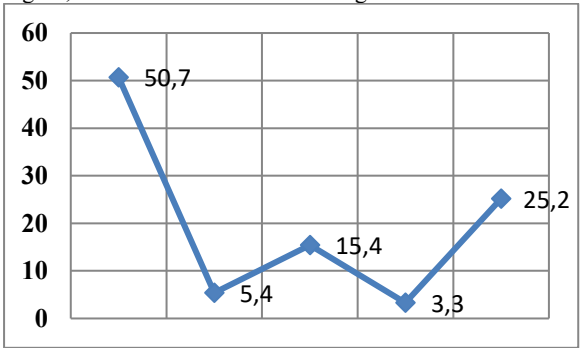

Diagram 1. Percentage of traffic flow during the day

As can be seen from the diagram above, cars make up 50.7%, trucks - 5.4%, buses and minibuses - 15.4%, cycling - 3.3%, pedestrians and children - 25.2%.

Traffic volume is a variable indicator in relation to years, months, hours of the day and days of the week, as well as sections of the road. Traffic volume varies depending on the importance of the highway and the economic development of the surrounding regions and districts.

The average daily traffic flow and pedestrian flow are given.

As can be seen from Diagram 2, during the daytime hours, the amount of movement has a high indicator, and at night, the amount of movement has significantly lower indicators.

Speed of movement is the main indicator of road traffic, which manifests itself in the form of the main goal of movement on the road. The most objective indicator on the route is a graph showing the change in traffic speed throughout the entire route. This creates certain difficulties in practice and in most cases is not feasible. Therefore, in practice, when organizing traffic, the ability to draw conclusions by measuring the instantaneous speed of vehicles on characteristic sections of the road has been developed.

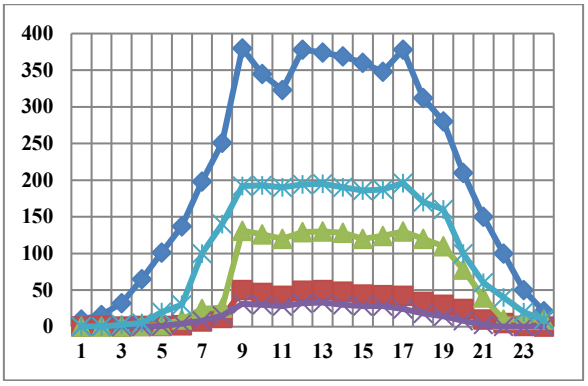

Diagram 2. Traffic volume of vehicles in motion during the day

In general, as mentioned in previous sections, the speed of movement of vehicles and the flow largely depends on the system, and the choice of speed is carried out according to two criteria: 1) minimum time expenditure; 2) ensuring traffic safety. In this case, of course, the driver's skill, work experience, psychophysical state, and purpose of movement influence the choice of speed. Also, the technical condition of the vehicle, the state of the environment, and pedestrian movement have a great influence on the change in speed.

4. Conclusion

We recommend making the following changes based on the results observed in the region:

- It would be advisable to install surveillance cameras in busy areas of the streets of the region, to install a speed-determining radar camera;
- In some areas of the region's streets, there is currently insufficient street lighting during evening walks, resulting in various accidents. For this, it is necessary to equip the street with modern lighting;

If drivers, pedestrians, and children follow the above rules, we can prevent accidents.

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