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The study of the effect of vehicles on the deformation of modified asphalt: Concrete coatings

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Abstract

In this paper the study of the impact of the vehicle on the deformation of modified asphalt - concrete coatings, future movement intensity of the vehicle flow are discussed.

Key words: deformation, condition, strength, stiffness, bending, impact of intensity and weight, car flow, asphalt concrete coating, resistance strength, special additives.

Introduction

The main body: In accordance with the long - term plan for the development of roads of the Republic of Uzbekistan, regular researches are being conducted to improve transport and operational quality of existing roads. This, in turn, depends on the improving the quality of road surfaces.

Today the construction of road surfaces suitable for any climatic conditions is a key factor in the field of Road Construction. Among such studies, the most common are modified asphalt – concrete coatings. Improving the resistance of these coatings to deformation in any climatic conditions is one of the most urgent issues.

To date, we can see the growth of the public road network in the Republic of Uzbekistan from year to year. This is evidence of the fact that in the future improving of the road network, mainly the construction of highways and roads bypassing major cities, in this country.

The main goal of our research is to create modified asphalt – concrete coatings resistant to any climatic conditions – rain, snow, hail, temperature, as well as to develop and analyze methods to take into account the impact of the vehicle intensity and weigh on these roads.

Roads are divided into categories, depending on the intensity of traffic (the number of cars passing through a section of road per unit of time) and their position in the overall road network.

In determining the calculated traffic intensity, other types of vehicles are conditionally converted to light vehicles are obtained.

Table 1: This is as follows:

Light vehicles	1,0	Truck load carrying capacity in tonns:	
wheelchair motorbikes	0,75	2 т	1,5
Motorbikes and bikes	0,5	6 т	2,0
Buses	2,0	8 т	2,5
Trams	2,5	more than 14 t	3,5
Trolleybuses	3,0	The ability of road trains to carry loads in tonns:	
		12 т	3,5
		20 т	4,0
		30 т	5,0
		more than 30 t	6,0

The one day flow of all categories of roads can be seen in the graph below we can see from the fact that the number of cars is increasing dramatically day by day , which in turn indicates the increasing demand for road surfaces.

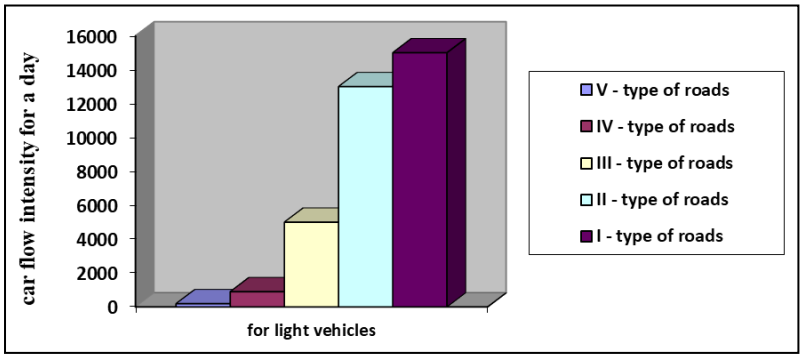

Fig 1: Car flow intensity for a day

$$N_{\frac{ўил}{2}} = \frac{N_{ўил}}{m_{ўил}} m_{\frac{ўил}{2}} \quad (1)$$

$$N_p = f_{пол} \times Y \quad (2)$$

$$\sum N_p = 0.7 \times N_p \frac{K_c}{q^{(T_{сл}-1)}} \times T_{рдг} \times k_n \quad (3)$$

Based on these formulas, we can determine the calculated traffic intensity of light vehicles. Furthermore we can create a graphical view of the future computational intensity of traffic, knowing that the number of cars in our country is growing today.

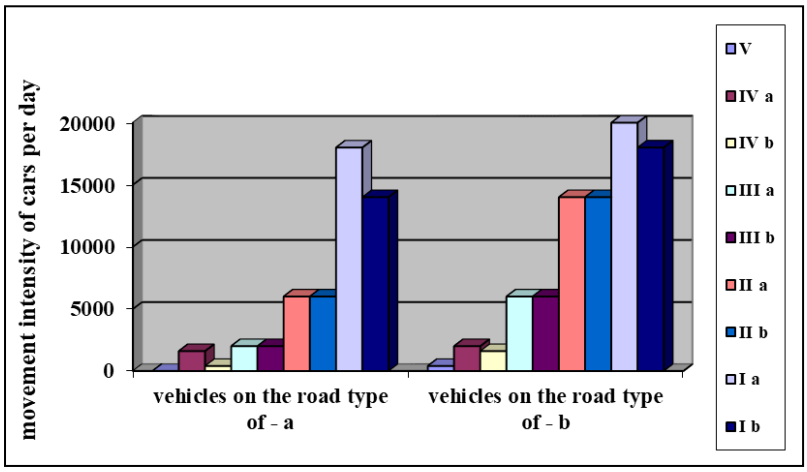

Fig 2: The future movement intensity of the car flow

All parts of the road at each level must be calculated taking into account the different natural climatic conditions for the calculated vehicle, but in this project, we determine the main normative parameters of the road based on SHNQ 2-05- 02- 95.

In addition, we can also determine the calculated traffic intensity of heavy trucks based on the following formulas. Because it is clear that, the number of heavy trucks in our country is growing dramatically today, so we can determine their intensity of movement.

$$\sum N_p = \sum N_p^{\text{unloaded}} + \sum N_p^{\text{loaded}} + \sum N_p^{\text{trailer}} \quad (4)$$

We can determine the intensity of motion in any layer from the following formula.

$$\sum_{t=1}^{t_{кам}} N_p = f_{пол} \times \sum_{m=1}^{n} (N_{1m} \times K_c \times T_{ргд} \times 0{,}7) \times S_{тсум} \times K_n \quad (5)$$

We find this $S_{\text{тсум}}$ by the following formula.

$$S_{тсум} = \sum_1^m S_n = \left(\sum_1^m \frac{Q_n \times K_Д 95\%}{Q_{хисоб}} \right)^{4.4} \quad (6)$$

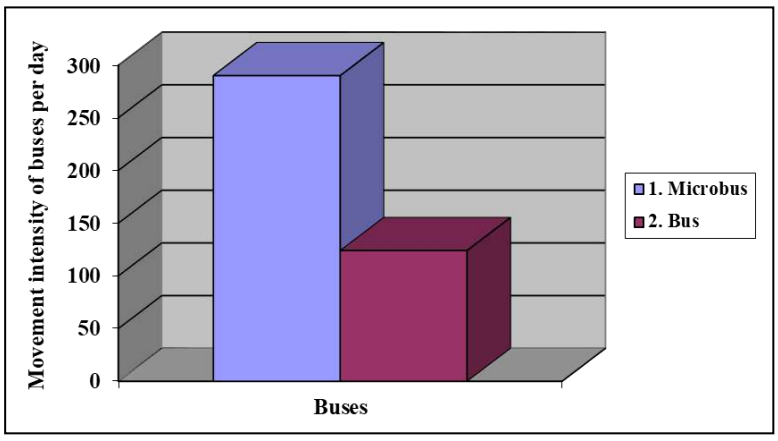

Fig 3: Daily intensity of bus flow

We know from a car course that, a moving car is affected by a number of forces. These are: gravitational force, vibration resistance force, lifting force, air resistance force, tensile force and inertial force. The gravitational force is one of the important of them, so we can also know the weight of the car and see how this weight distributed on the coating. Because the deformation of the road surface is formed under the influence of these indicators, the reparation of these deformation – resistant coatings is one of the main tasks.

Special additives have been added to these modified asphalt – concrete coatings. This,in turn, led to an increase in the strength of coatings, improvement of long – term durability, deformation work and an increasement in the level of resistance to the external environment of the Republic of Uzbekistan by 15 – 20 %.

In this study, several types of special asphalt concrete coatings were created, and it was found that the properties of asphalt concrete coatings resistant to large deformations we offer are competitive with the foreign – made works and have good performance in all physical and mechanical parameters. These parameters were tested experimentally using a new device created.

Conclusion

Compared with theoretical studies, the results of the research showed that the strength of modified asphalt – concrete coatings of roads with high deformation resistance increased by 17 – 20 %.

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