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ORGANIZATION OF TRANSPORT FLOW THROUGH EXTERNAL ROUTES PASSING THROUGH THE CITY CENTER (using the example of Samarkand)

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Abstract
In this article, the necessity and mechanisms for organizing the movement of vehicles to the city of Samarkand without entering the city center (from 1075+590 km of the M-39 "Almaty - Bishkek - Tashkent - Shakhrisabz - Termez" highway) along external bypass roads (from 0 km of the R-48 highway) were developed. In particular, foreign experience in this area was analyzed, and proposals suitable for the city of Samarkand were selected. Traffic jams occurring in the city, their causes have been identified, and modern solutions have been developed to prevent them. The necessity of introducing an automated digital control system on the main access roads located within the city limits, directing traffic through bypass roads, and developing a digital monitoring system is scientifically substantiated.

Keywords: Bypass roads, excessive traffic congestion, traffic congestion, urban infrastructure, traffic intensity, intelligent transport systems.

Introduction
The population growth of the 21st century, the increase in the number of vehicles, the expansion of tourism and trade - all this has significantly increased the traffic load in large cities. The city of Samarkand, which is especially important in tourism and economic terms in Uzbekistan, is at the center of this problem. Today, international highways passing through Samarkand, in particular, the section between 1070-1095 km of the M-39 Almaty - Bishkent - Tashkent - Termez highway, in the direction of Samarkand, create a large load at the entrance to the city center. As a result, such negative consequences as traffic jams, environmental pollution, and rapid deterioration of road infrastructure are observed. As a solution to these problems, the need to organize a system of bypass roads without entering the city has become a pressing issue.

Studying the above world experience, the number of vehicles in Samarkand, one of the largest cities in our country, is also increasing. This is causing traffic jams, especially in the city center. Therefore, scientific research is being conducted on directing the main flow of cars entering the city through external bypass roads, without entering the city center. With the rapid development of cities Today, the increase in the number of vehicles in large cities causes traffic jams on the main roads entering the city center. This process has its own peculiarities, especially in the city of Samarkand, which is a historical and tourist center. Therefore, the effective organization of traffic at city entrances is one of the important issues.

Access roads to the central part of cities are important for traffic, urban infrastructure, and public safety. Therefore, the implementation of modern technologies to optimize traffic flow, the development and improvement of road infrastructure, and the traffic flow through the main roads leading to this city are increasing year by year. [1]

On the 0-km section of the M-37 highway passing through the city of Samarkand, traffic flows to Navoi - Bukhara - Khorezm and the Republic of Karakalpakstan.

Today, large international conferences are being held in the city of Samarkand on a global scale, which, in turn, leads to traffic congestion in the city. Therefore, in this article, one of the urgent problems is the management of the traffic flow of vehicles moving to Navoi - Bukhara - Khorezm and the Republic of Karakalpakstan through external bypass roads ***(from 0 km of the R-48 highway)*** on the section of the international highway passing through the city of Samarkand ***(from 1075+590 km of the M-39 "Almaty - Bishkek - Tashkent - Shakhrisabz - Termez" highway).***

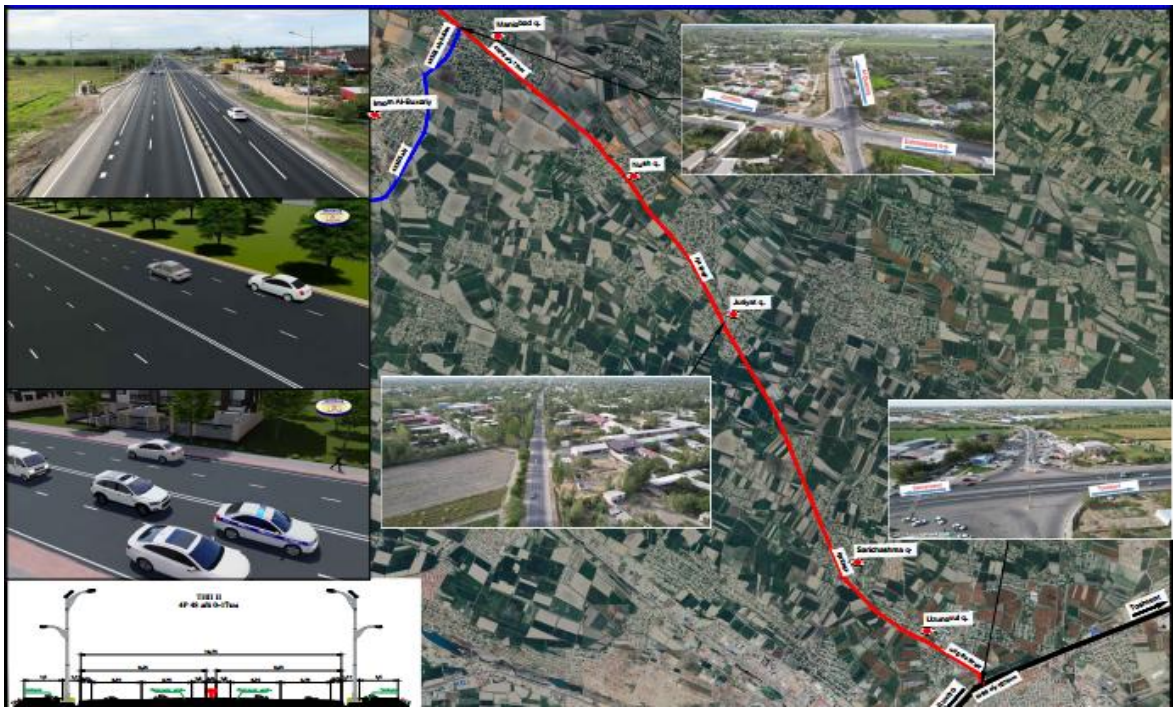


Figure 1 design proposal.

The proposed design solution describes a certain section of the small ring road of the city of Samarkand. Directions A and B are shown in two different versions on the map. In option 1, from route A to route B (green line) - a continuous traffic flow along the small ring road of the city with a length of 32.0 km, in which more than 30,000 vehicles move in one direction per day. Of these, about 10,000 are vehicles entering the city of Samarkand, and the remaining 20,000 are vehicles traveling to Navoi - Bukhara - Khorezm and the Republic of Karakalpakstan. Variant 2 - the distance from direction A to direction B (white line - settlement), which is short (28.5 km) and connects to the small ring road of the city of Samarkand. This direction is 1. [2]

[1] *"Yo'l harakatini boshqarishda intellektual transport tizimlarining roli". Toshkent Transport Universiteti ilmiy jurnali, 2023 y X. H. Bobomurodov.*

[2] *"Samarqand shahridagi yo'l harakati tizimini optimallashtirishning zamonaviy yondashuvlari".*

If we distribute the traffic flow in option 1, and direct the traffic flow to Navoi - Bukhara - Khorezm and the Republic of Karakalpakstan in the direction of option 2, we will optimize the traffic flow and prevent traffic jams Fig. 2. [3]

In this figure, option 1, the distance from route A to route B is much longer, and the traffic flow passes through the city. Scientific research shows that there are 11 traffic lights in this direction, which leads to unnecessary stops, time losses, a sharp increase in fuel consumption, and an increase in the amount of CO2 emitted into the environment by 15-20%.

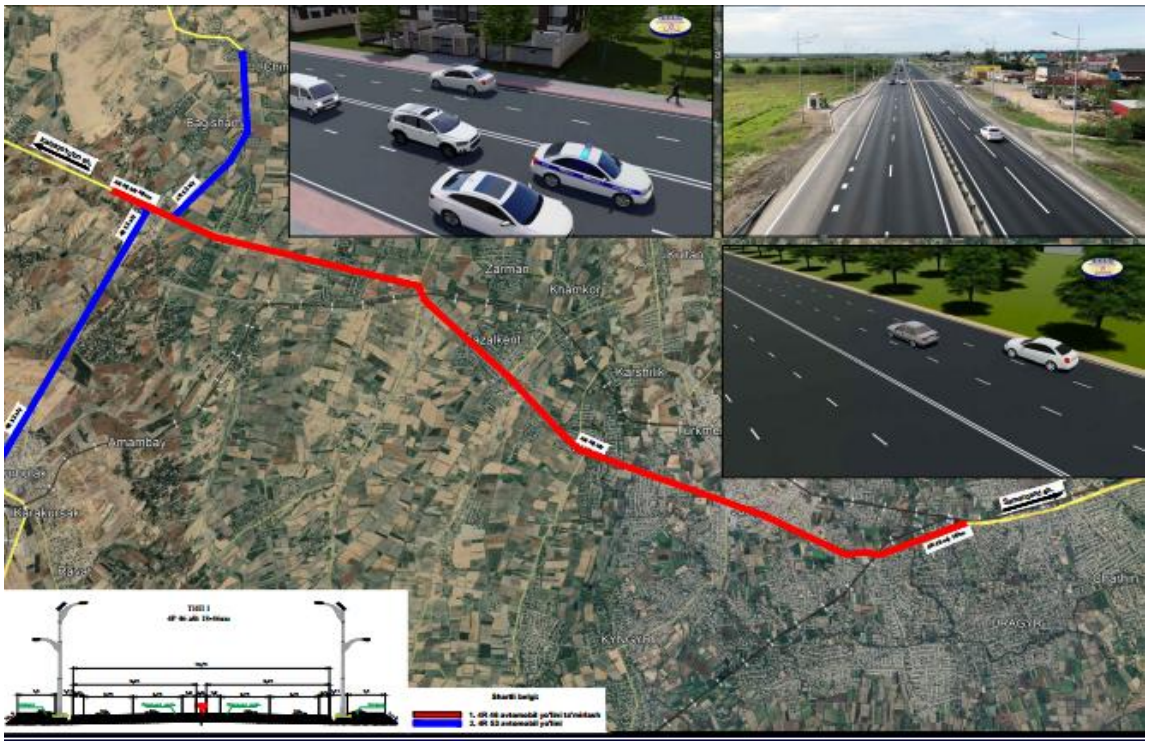


Figure 2 shows the appearance of the project proposal.

Option 2 The distance from direction A to direction B reduces the distance by a more straight path. If we compare the main indicators of both directions in the table below (the average speed is taken as 60 km/h), Table 1.

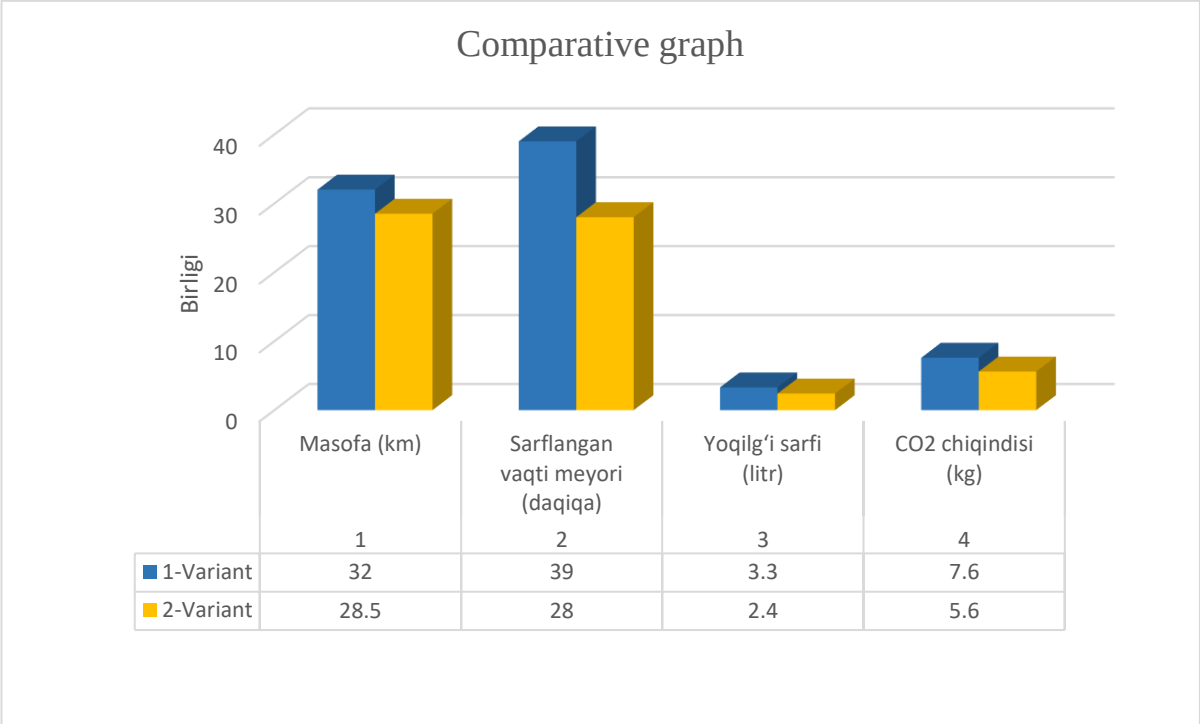
Table 1

Indicator	**Option 1**	**Option 2**
Distance (km)	32,0	28,5
Time spent norm (minutes)	39,0	28,0
Fuel consumption (liters)	3,3	2,4
CO2 emissions (kg)	7,6	5,6

As can be seen from the table above, the distance of the 1st variant is ~25% shorter than the 2nd variant, which allows saving 11 minutes of time during one trip. Also, about 0.9 liters of fuel will be saved per car, which means no more than 2 kg of CO2 will be released into the atmosphere. The graph below clearly illustrates these differences:

[3] *"Yo'l harakatini boshqarishda intellektual transport tizimlarining roli".Toshkent Transport Universiteti ilmiy jurnali, 2023 y X. H. Bobomurodov.*

From this it can be seen that due to the shortening of the distance in direction B, the travel time is reduced by almost 11 minutes, and fuel consumption is reduced by ~0.9 liters. This shows savings of about 25% of expenses per trip. [4]



Graph 1 comparison of travel time (upper graph) and fuel consumption (lower graph) by routes in options 1 and 2.

For example, if 100,000 vehicles save 10 minutes of time and 0.9 liters of fuel each per day, then on a societal scale, 16.6 thousand hours of time and 90,000 liters of fuel per day will be saved (about 180 tons of CO2 emissions will be reduced). This gives a very large economic effect. [5]

This increases the economic efficiency of transport flow and is evaluated as follows.

- traffic congestion will be reduced by up to 40%.
- the norm of time spent is reduced by up to 25%.
- fuel consumption decreases by 10%.
- emission of exhaust gases into the environment is reduced by 22%.

LIST OF REFERENCES

1. O'zbekiston Respublikasida transport va yo'l harakati xavfsizligini ta'minlash bo'yicha konferensiya materiallari 2022 y. S. X. Raxmonov, B. O. Sobirov.
2. "Samarqand shahridagi yo'l harakati tizimini optimallashtirishning zamonaviy yondashuvlari".
3. "Samarqand shahrida yo'l harakatini boshqarishning innovatsion texnologiyalari". Samarqand davlat universiteti ilmiy asarlari, 2022 y.
4. "Yo'l harakatini boshqarishda intellektual transport tizimlarining roli".

Toshkent Transport Universiteti ilmiy jurnali, 2023 y X. H. Bobomurodov.

5. Sobriev R. A., Usmonov F. M. (2020). Shahar transport tizimlarini boshqarish asoslari. – Toshkent: TTU nashriyoti.

[4] *Sobriev R. A., Usmonov F. M. (2020). Shahar transport tizimlarini boshqarish asoslari. – Toshkent: TTU nashriyoti.*

[5] ***http://top.rbc.ru/society/29/10/2010/490092.shtml.***

6. Ahmedov Sh. B. (2021). Transport infratuzilmasini rejalashtirishda GIS texnologiyalarining o‘rni. – Toshkent: Oliy ta’lim nashriyoti.
7. https://yandex.uz/maps/10335/tashkent/?ll=69.279737%2C41.311151&z=12
8. http://top.rbc.ru/society/29/10/2010/490092.shtml.