

The main problems of the transport system of the city of nukus and recommendations for their elimination

Asadulla Toshtemirovich Khotamov¹, Dauletbay Maratovich Jumabaev, Fitrat Abdikhalilugli Abdikhalilov

Tashkent university of architecture and civil engineering, Department of Urban construction and economy, Tashkent, Uzbekistan

Abstract. Nukus is the object of observation. Currently, 312.4 thousand inhabitants live here. The official date of its formation is considered to be 1860, although a withdrawal was revealed that Nukus is a city with an older collection. On its territory from the south, the northern rows of canals pass, which are located in irrigation functions in the northern and northeastern regions of the Republic. The Dustlik Canal (old name - Kyzketken) opens the city into two parts (the old one is to the west, the new one is to the east and southeast). On the territory of the city there is residential development with a grid of small blocks and a predominance of local type buildings. There are several blocks of modern individual buildings that have brought some order to this part of the city. The new city was built according to the master plans of 1936, 1953, 1964 and 1982, and it owes it a regular rectangular system of city blocks. This article analyzes the current state of the transport system of the city of Nukus and the main problems in its operation. Questions on elimination of analyzed problems are considered.

Keywords: Vehicles, passenger transportation, passenger turnover, freight transportation, freight turnover, road transport indicators.

1 Introduction

The problem of the Aral Sea today is an environmental and humanitarian catastrophe on a planetary scale. It has already led to grave consequences for the gene pool, life and health of the population of the Aral Sea region. The groundwater level dropped, and the process of desertification of the area accelerated. The remaining springs are not suitable for drinking due to the high content of pesticides (which were washed away from the cotton fields into the Amu Darya). As of 2011, from Muynak about 100 km to the western (deep) part of the South Aral Sea and about 180 km to the eastern (shallow) part. The eastern part of the sea (due to relatively shallow depths) most rapidly receded from Muynak: back in the

¹ Corresponding author: loyiha_ks@mail.ru

mid-1990s, it was at a distance of 45 km from the city, and in the early 2000s, at a distance of 100 km [8]. In 2008, Petro Alliance carried out exploration work to search for oil and gas on the former bottom of the Aral Sea; result 144 was positive. The gas here is of high quality, with a minimum content of hydrogen sulfide. Since the mid-2000s, the city began to attract tourists from all over the world. The flow of tourists to Muynak increased dramatically after 2016.

In large cities of the Republic of Uzbekistan, the transport infrastructure is being improved, in particular, the development of urban passenger transport, as well as freight transport. 36-the goal of the development strategy for 2022-2026. The New Uzbekistan is aimed at "Developing a unified transport system in conjunction with all modes of transport, creating conditions for the possibility of daily trips on scheduled transport routes between major cities [1], in particular:

- improvement of the public transport system and development of its infrastructure in the city of Tashkent and the regions;
- increasing the attractiveness of intercity and suburban railway routes;
- development of the market of transport and logistics services and infrastructure, bringing the level of electrification of railway infrastructure to 60 percent and accelerated development of the highway network;
- expansion of "green corridors" and transit opportunities in the transport system for foreign trade, as well as an increase in the volume of transit cargo turnover to 15 million tons.

2 Materials and methods

The main indicators of motor transport in the Republic of Karakalpakstan are given in Table No. 1. Figures 1-4 provide information on transported cargo, cargo turnover and passenger transport in the Republic of Karakalpakstan.

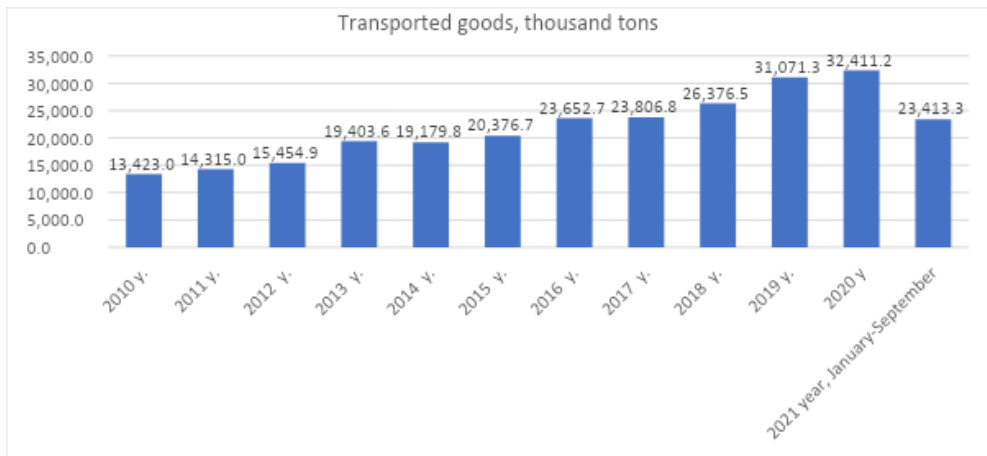


Figure 1. Transported goods.

Table No. 1 provides information on the number of cars issued by the corresponding license cards of the enterprise that provide services for the transportation of passengers and cargo to districts and cities in the Republic of Karakalpakstan on January 1, 2023 [5].

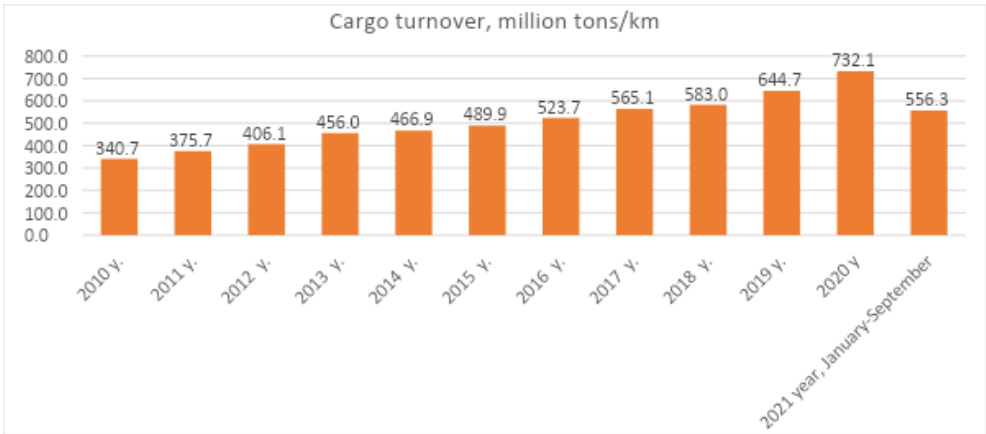


Figure 2. Cargo turnover

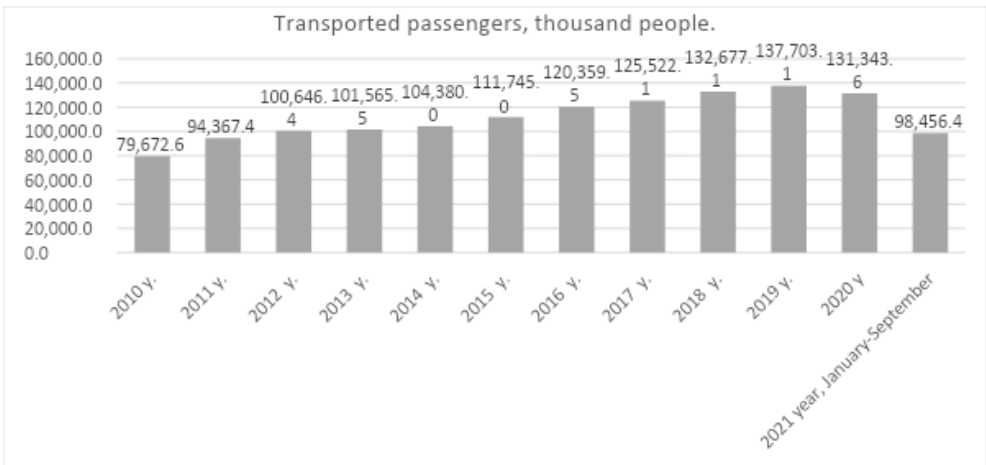


Figure 3. Transported passengers

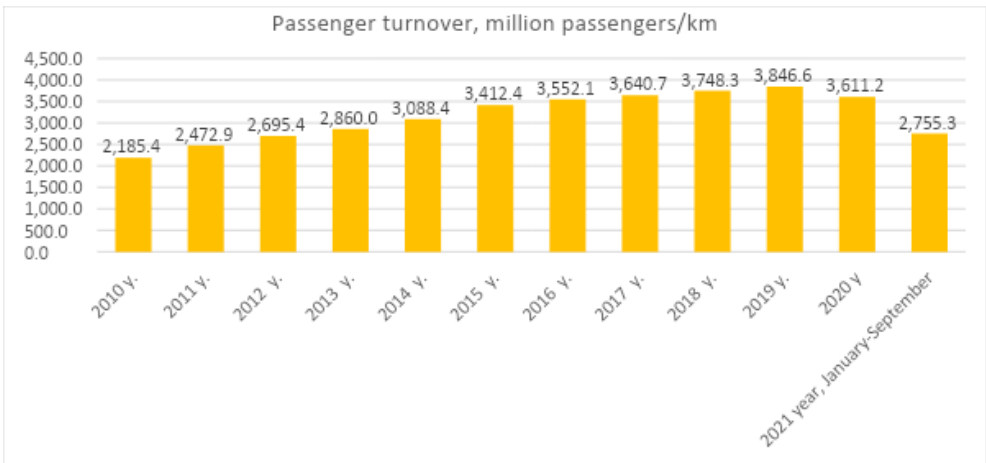


Figure 4. Passenger turnover

Table 1. The number of cars issued the corresponding license cards of the company that provide services for the transportation of passengers and cargo to districts and cities in the Republic of Karakalpakstan

Number of cars, total	Of these: Buses	Minibuses	Passenger cars	Of these, the brand "Damas"
2313	40	144	2129	1486

On the territory of the city of Nukus, there are currently almost all types of modern transport: air, rail, road. Water transport, due to the low water content of the Amu Darya River, practically does not work.

The International airport "Nukus" is a structural division of the National Airline "Uzbekistan Airways", located in the northern part, within the city of Nukus. There are regular passenger flights from the airport, both to domestic and international destinations, as well as charter cargo transportation.

The airfield belongs to class "B" and is capable of receiving almost all types of aircraft, from small aircraft (AN-12, AN-24, AN-26, etc.) to large airliners such as: Airbus A310, Airbus A319, Airbus A320, ATR 42, ATR 72, Boeing 737, Boeing 757, Boeing 767, as well as other types of 3-4 class aircraft and helicopters.

The length of the artificial runway for Class 1-4 aircraft is 3000 meters, the width is 45 meters, modern lighting equipment corresponding to the ICAO category I is installed along it. There is modern aeronautical meteorological equipment that meets international standards.

The artificial (asphalt concrete) runway of the airfield, built in the 1960s, had a length of 1900 m (now it is used as a taxiway); in the 1980s, a new concrete runway with a length of 2500 m was built parallel to it, and in the early 1990s it was lengthened to 3000 m, which made it possible to take IL-86 airbuses.

As of 2019, a number of AN-2 aircraft used for aviation operations in the territory of Karakalpakstan are based at the Nukus airfield.

Uzbekistan Airways and Ural Airlines operate regular flights to Moscow. On June 20, 2011, a large-scale reconstruction of the runway was launched. Within 110 days, asphalt concrete pavement was laid on a 3000 m long section. In addition to the reconstruction of the runway, the airport underwent major repairs of the apron and parking lots for aircraft.

Geographically, the airport is conveniently located. Other airlines' aircraft can land here or use it as a refueling point for cargo IL-76s flying to Germany, the Netherlands, France, other European cities and back to Afghanistan or China.

The capacity of the terminal is 200 people/hour. The airport complex consists of two terminals, which include halls for servicing departing and arriving passengers, baggage handling, mail and cargo of international and local destinations.

Currently, another terminal has been built at the Nukus Airport. The terminal will also significantly increase its capacity from the current 200-250 to 400 passengers per hour. At the same time, the preflight control zone will expand and the number of check-in counters will increase. When developing the design of the building, modern architectural trends and traditions of the national art of Uzbekistan were taken into account.

The railway station "Nukus" is located in the southeastern part of the city and is a Class I junction station. It serves the city of Nukus and surrounding areas. The station is located on a single-track section of the Nukus-Takhiatash railway line, 18.2 km from junction 179. Adjacent to the station tracks are a number of access roads serving various enterprises,

warehouses and bases of the city. The station has a freight yard and a train station with a platform for receiving and departing passenger trains.

During the reporting year 2018, the cargo turnover of the station amounted to 1,092 tons of national economic cargo, including loading-261 tons, unloading – 831 tons. Most of the loading and unloading operations are carried out on access roads. At the station "Nukus" their number is 10 units. [5]

During the year, 504 passengers were sent from the station, including long-distance -244, local -236 and suburban -24. The construction of the station territory was carried out according to approved projects and for the period since the completion of construction, the allotment of land for railway facilities has not changed and no changes are expected in the future (188.5 hectares).

For the period of the design period, the station "Nukus" will retain its main purpose with the following operations:

- reception and dispatch of passenger trains;
- boarding and disembarking of passengers;
- passing transit trains without processing, maintenance, inspection and troubleshooting;
- formation and disbandment of through precinct and combined trains;
- change of locomotives and train crews;
- loading and unloading of goods in public areas and access roads of the clientele.

Road transport is of great importance in the transportation of goods and passengers. The existing highway allows the development of the transport network of Nukus with its nearby territories and other regions of the Republic of Uzbekistan.

The total length of highways within the city limits is 224 km. [7].

The total length of highways within the city limits is 224 km. Including: highways of international significance – 33 km, republican significance – 126 km, local significance – 31 km.

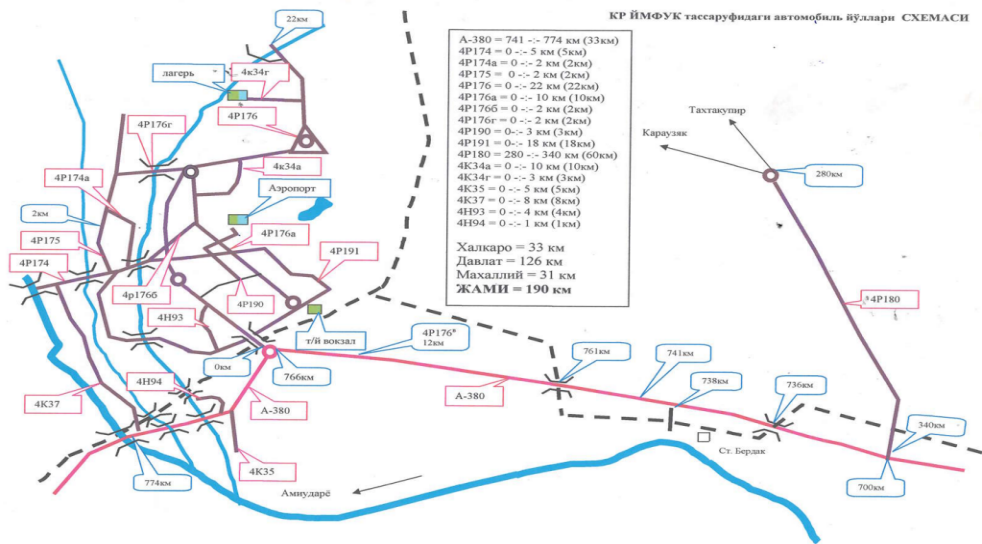


Figure 5. The scheme of highways inside the city [7]

Currently, there are three bus stations in the city: north, south and west.

The northern bus station "Nukus Arka batys trans" of the Ministry of Emergency Situations is located in the northern part of Nukus at the entrance to the city from the side of the Chimbay direction from the eastern side of the highway 4P-176a. The number of employees is 15 people, the territory is -1.3 hectares. The bus station mainly serves the northern zone of the Republic with a total number of routes -35, of which: 24 bus routes, 6-minibuses, 5-passenger taxis. A total of 179 vehicles are involved on the routes [2].

The southern bus station "Nukus bus stations" of the Ministry of Emergency Situations is located in the southern part of the city behind the railway in the Turtkul direction. It is considered central with an area of 3.9 hectares. The number of employees is 19 people. The bus station serves 10 routes, of which 4 are bus, 2 are shuttle taxis and 4 are passenger taxis. During the reporting period, the volume of passenger traffic at the bus station amounted to 285.5 thousand passengers per year. [2].

The western bus station "Deck Oil Petrol" of the Ministry of Emergency Situations is located in the western district of the city at the entrance from the Khojaly direction a/d 4R-174 on Abdambetov Street. Its territory is 1.2 hectares, the number of employees is 10 people. 30 transport routes are served by the cities of Akmangit, Shumanoy, Kanlikul, Muynak and D.R. [2]. The main indicators of Nukus road transport are presented in Table 2.

Table 2. The main indicators of Nukus road transport

	2019- year	2020- year	2021- year
Transported goods, thousand tons	x	x	x
Republic of Karakalpakstan	31 071,3	32 411,2	33 262,4
Nukus City	10 201,4	7 426,8	8 062,3
Share in the Republic of Karakalpakstan, %	32,8	22,9	24,2
Cargo turnover, million tons/km	x	x	x
Republic of Karakalpakstan	644,7	732,1	861,9
Nukus City	341,9	150,2	203,1
Share in the Republic of Karakalpakstan, %	53,0	20,5	23,6
Transported passengers, thousand people.	x	x	x
Republic of Karakalpakstan	137 703,1	131343,7	137 468,7
Nukus City	69 406,0	46 217,7	49 287,4
Share in the Republic of Karakalpakstan, %	50,4	35,4	35,9
Passenger turnover, million passengers/km	x	x	x
Republic of Karakalpakstan	3 846,6	3 611,2	3 985,4
Nukus City	2 083,0	949,2	1 195,7
Share in the Republic of Karakalpakstan, %	54,2	26,3	30,0

External passenger transportation is carried out by a fairly large number of existing public and private automobile enterprises, whose fleets number 1,390 units. motor transport, including: [5].

- buses - 80 units.
- minibuses-172 units.
- passenger cars-1138

Basically, all previously applied methods and theoretical studies were reduced to the use of static methods without taking into account the dynamics of suburban passenger transportation processes. In order to increase customer orientation and more efficient organization of suburban passenger transportation in urban agglomerations, it is necessary to use methods that allow taking into account the dynamics of the processes of generation, promotion and repayment of passenger flows [4].

The required number of rolling stock required for the development of the project external passenger traffic is calculated by the formula:

$$W_{\text{ИВБ}} = \frac{A \times l \times \alpha}{365 \times V_{\text{э}} \times h \times m \times s \times k}$$

where

A -s the annual volume of passenger traffic by this transport;

Z - the length of the transport network;

l - the average distance of the trip;

α -is the coefficient of seasonal unevenness;

" $V_{\text{э}}$ " - operational speed;

h - the number of hours of work on the line;

m - the capacity of each type of transport;

"s" - average filling ratio;

k- is the utilization factor of the park [3].

3 The results and discussion

As of January 1, 2022, the number of enterprises working in the field of transport is 318, which is 30.7% of the total number of enterprises and organizations working in the service sector in the city. This indicator amounted to 321 enterprises and had a share of 32.2% in the same period last year (Fig. 6).

In 2021, the passenger turnover of all types of motor transport in the city is 1195.7 million people. passengers/km, an increase of 126.0% compared to the same period last year. Its share in the Republic of Karakalpakstan was 30.0% (Fig. 8, a).

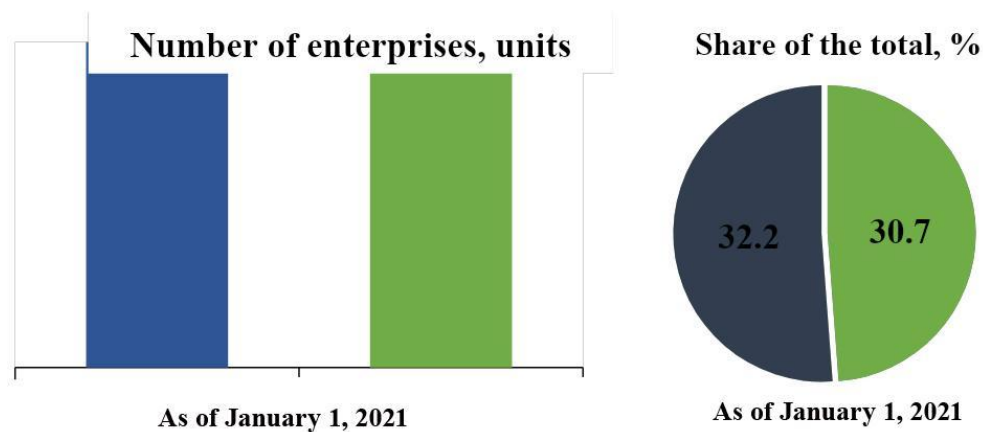


Figure 6. Comparison of the number of enterprises and organizations working in the field of transport [6].

In 2021, 8062.3 thousand tons of cargo were transported by all types of motor transport in the city, the growth rate compared to the same period last year was 108.6%. Its share in the Republic of Karakalpakstan was 24.2% (Fig. 7, a).

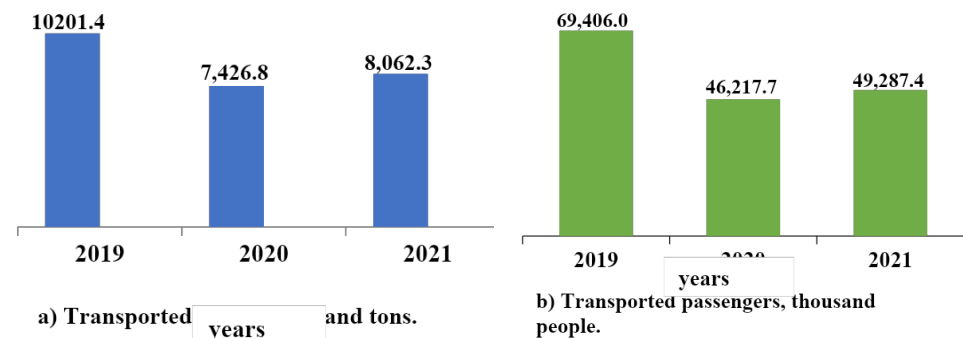


Figure 7. Comparison of goods and passengers transported by road [6].

In 2021, 49,287.4 thousand passengers were transported by all types of motor transport in the city, which is 106.6% more than in the corresponding period of the previous year, and the share in the Republic of Karakalpakstan was 35.9% (Fig. 7, b).

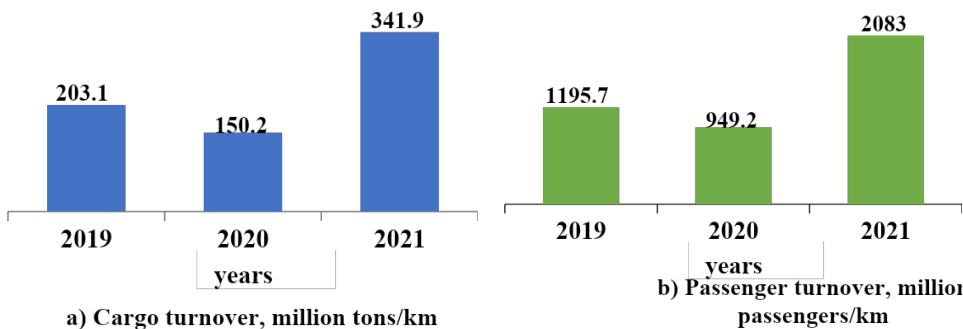


Figure 8. Comparison of cargo turnover and passenger turnover in road transport [6].

The main problems that have arisen in the work of the transport complex of the current city of Nukus can be interpreted as follows:

1. A lot of time is spent on traffic:
 - traffic jams on the road network;
 - the movement of public transport at lower speeds.
2. The fact that public transport facilities are at a low level (as we all know, almost 50% of the city's residents are public transport users):
 - long intervals in the movement of public transport;
 - overload during busy times;
 - the unsuitability of the route network, that is, the lack of vehicles on popular routes.
3. Unsolved problem of storage of personal vehicles:
 - lack of space in parking lots intended for permanent storage, especially on the territory of service areas;
 - lack of parking spaces for permanent storage in most areas;
 - lack of parking spaces for temporary storage, especially in urban centers and densely populated areas;
 - insufficient efficiency of paid parking of a temporary nature.
4. Safety of the transport system:
 - high level of traffic accidents, especially involving pedestrians;
 - high level of harmful effects on the environment.

4 Conclusion

The study of the world experience in solving the above problems, familiarity with comprehensive measures aimed at solving the problems of transport infrastructure of various megacities of the world are important for the development of the industry; Republican roads passing through the territory of the city of Nukus should be transformed into main streets and in the future, according to the norms and recommendations of the building codes and regulations, use roads of this level in cities, provided that residential buildings should not be closer than 50 m to them.

Further development of the suburban highway network with the reconstruction of their dimensions and carriageway in accordance with the prospective traffic intensity and required technical indicators;

Further increase of transport mobility of rural and urban population in external directions;

The number of passengers transported in suburban and local traffic during the billing period, as well as technical and operational indicators of the suburban area of the city of Nukus with the adjustment of the population of the city and district in accordance with the draft layout;

Development of scientifically based schemes for long-term planning of the street and road network of the city of Nukus, according to which optimal planning of urban passenger transportation, organization of transport hubs based on best practices in improving the city's links with external transit roads, etc.

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