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Development of road transport infrastructure in the regions of the Russian Federation using digital technologies

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Abstract. The article studies the problems of road transport infrastructure in the regions of the Russian Federation on the basis of the use of digital technologies. The parameters of the national project “Safe and high-quality roads” (BKA D) are analyzed and the prospects of its implementation by 2024 in the regions of Russia, in which the largest amount of road repair work is planned, are determined. Such regions are Nenets Autonomous Okrug, Kalmykia, Kirov and Kostroma regions, Altai Republic and Tomsk region. By 2024 roads in the Arkhangelsk and Saratov regions will be repaired least of all. Identified regions in which the repair of roads will not change during the period of 2017–2024 are Krasnoyarsk Krai, Voronezh oblast, Chukotka, etc. The data are presented Rosavtodor to equip highways and introduce intelligent transport systems using modern digital technology in 2021 and 2024; the program of measures on the national project BCAD is intended for 2019–2024. The implementation of the presented measures will contribute to the safety of road conditions, the system of assistance to victims of road accidents, and reduce negative emotional stress.

1. Introduction
A key problem for many regions of Russia is the problem of roads, which consists both in their lack and in their rather poor condition. In this regard, the national project "Safe and quality roads" was developed in 2018. It is aimed at solving the problems of road transport infrastructure on the basis of the introduction of modern digital technologies, which, in turn, should improve both the condition of roads and lead eventually to a decrease in road accidents, which is important in modern realities.

Every year on the roads of the country killed so many people that can be equated to the population of a small town. In addition, the implementation of this national project will link the regions with new roads and increase the speed of delivery of goods and passengers throughout the country.

2. Problem statement
In the regions there is a high need to update the territorial socio-economic infrastructure» [1]. In the last 15 years, those regions where there are prospects for development for the population have been actively built up. However, the construction of new residential neighborhoods and office buildings was often chaotic, due to the crisis of the current system of spatial planning. Over the past 30 years, the role and importance of the master plan decreased, as a result, it lost the status of a strategic document [2]. «Some large cities are trying to make high-quality master plans today, but the average
plans have a number of drawbacks. They have no goal-setting and vision of the future, they are not based on reliable data, which are often absent, or on the results of research» [2].

As a result – attractive settlements have huge building without competently thought-out construction of roads. This leads to the congestion of the existing road infrastructure, and this, in turn, causes discontent of the population and motorists, increases the process of delivery of goods and transportation of passengers, causes irritation in the population, and adversely affects the health and well-being, while worsening the efficiency of people's work. We can say that «The existing problems in the modern road sector of the country are one of the limiting factors of economic progress» [3].

3. Materials and Methods
The passport of the national project «Safe and quality roads» was developed by the Ministry of transport pursuant to the Decree of the President of the Russian Federation, May 7, 2018 No. 204. «On the national goals and strategic objectives development of the Russian Federation for the period up to 2024». It includes 4 of the Federal projects: «Road network», «System-wide measures for the development of road facilities», «Road Safety» and «Roads of the Ministry of defense of Russia». These projects should be fully completed by 2024. This year, the first stage of the launch of the national project began and already in the regions of the Russian Federation there were questions about the availability of funds for the implementation of these projects and their real implementation. The project «Safe and quality roads» is largely based on regional funds.

In 2019, the share of regions in its financial support is 74 %, and by 2024 it will grow to 95 % [4]. Excise taxes should become a source of funds for the implementation of the national project, that is, from the sale of excisable fuels and lubricants, more and more funds will flow to regional budgets, and by 2024, 100 % of excise taxes on fuel and lubricants will go there. Nevertheless, the amount of expenses for this national project is significant, and, therefore, there is a risk of default [4].

4. Results and Discussion
To understand the implementation of the national project «Safe and quality roads» (hereinafter BCAD), we turn to the targets and indicators of spending on it and other national projects. The target indicators of the national project of BCAD are: increase in the share of regional roads in the standard state, from 43 to 50.9 %; the share of roads of urban agglomerations in the standard state, from 42 to 85 %, that is, almost 2 times. The construction of new roads is not included in this national project [5].

With regard to the expenditure of funds for this national project, the situation is as follows. According to experts of the Analytical credit rating Agency (ACRA), most of the costs in the regions are accounted for by roads – 4.1 trillion rubles, or 84.5 %.

For comparison: «Health» accounts for 265 billion rubles or 5.4 % of the amount funded by the regions (Fig. 1).

As for BCAD, to a greater extent it is based on regional means. The total amount of financing of the national project is 4.77 trillion rubles, 93 % of which will go to road works, while 4.1 trillion rubles will be provided by the budgets of the subjects of the Federation. 299 billion rubles during the first 3 years will come from the Federal budget. Funds from the Federal budget to the regions will give the rate of 12.7 million rubles for 1 km of road requiring repair.

The volumes of expected repair work in the regions are shown in Fig. 2; data for regions where road conditions are almost unchanged are presented in Fig. 3 [5].

As seen in Fig. 2 by 2024 the roads in the Nenets Autonomous Okrug should be repaired – 63.3, 50 % of repaired roads are expected in Kalmykia, Kirov region, Kostroma region, Altai Republic and Tomsk region, 42.7 % in the Ryazan region. By 2024 the roads in the Arkhangelsk region will be repaired least of all – 29.1 % and in the Saratov region – only 24.8 %.
Figure 1. Comparative assessment of expenditures on national projects «BKAD» and «Health»

Figure 2. Data on the regions of Russia, where the most roads will be repaired by 2024

Figure 3. Data for regions where road conditions will be almost unchanged by 2024
Based on Fig. 3 it follows that in the presented regions for 8 years (from 2017 to 2024) the volume of work on road repair will not change, that is, the values of 2017 and 2024 differ slightly. However, the largest volumes by 2024 will be made in Krasnoyarsk region – it is expected that 73 % quality of roads in the Voronezh region – 69,6 %, on Chukotka – 63,9 %, in Kursk region – 51 % and in the Republic of Komi, 50,3 per cent.

According to experts, the stated values may not be fully realized, and this is due to the fact that «in the medium term, the financial performance of the regions may deteriorate due to the declining growth of tax and non-tax revenues and growing pressure on the expenditure side of the budget» [4]. Of course, the situation over these 5 years can change for the better; a lot depends on the market situation and the appropriate attention of both Federal and regional authorities to the implementation of this national project.

With the active introduction of digital technologies, the question arises as to how this will affect the transport infrastructure. According to Rosavtodor, the situation on the equipment of roads, the introduction of intelligent transport systems, including those focused on the automation of traffic control processes is shown in Table 1 [6].

**Table 1.** Data of Rosavtodor on equipment of highways and introduction of intelligent transport systems in 2021, 2024

| No. | Name                                                                 | 2021 | 2024 |
|-----|----------------------------------------------------------------------|------|------|
| 1   | Equipping road sections and artificial structures of regional importance with elements of intelligent transport systems focused on automation of traffic management processes (number of sections), % | 20   | 60   |
| 2   | Implementation of intelligent transport systems, providing automation of traffic management processes in urban agglomerations with cities with a population of over 300 thousand people, % | 28   | 64   |
| 3   | Equipping sections of roads and artificial structures of Federal importance with elements of intelligent transport systems focused on automation of traffic control processes (number of sections), % | 40   | 120  |

As can be seen from table 1 equipping road sections and artificial structures of regional importance with elements of intelligent transport systems aimed at automating traffic management processes in the number of sections in 2024 will increase 3 times from 20% to 60%. Implementation of intelligent transport systems that provide for automation of traffic management in urban areas with cities with the population over 300 thousand persons, growth is projected 2.3 times, i.e., from 28% to 64%. A significant increase is expected in the equipment of sections of roads and artificial structures of Federal importance with elements of intelligent transport systems, namely from 40% to 120%, that is, 3 times.

Most regions of Russia are also interested in that other activities will be carried out within the framework of the national project «Safe and quality roads». The programme of activities is presented below.

**Table 2.** The program of activities of the national project BCAD in 2019–2024

| No. | Name                                                                 | Period   |
|-----|----------------------------------------------------------------------|----------|
| 1   | It is planned to create and implement a Register of new and best technologies, materials and technological solutions for reuse. | End 2019 |
| 2   | Adoption of regulatory legal acts aimed at strengthening the responsibility for some of the most dangerous offenses in the field of traffic. | End 2020 |
| 3   | Adoption of legal acts aimed at improving the system of professional training of drivers. | End 2021 |
| 4   | It is planned to introduce and ensure the functioning of the information system for monitoring the formation and use of road funds at all levels (SKDF) and the annual updating of the data included in it. | End 2024 |
In addition, the system of traffic management of vehicles and pedestrians will be developed, the safety of road conditions will be increased; the system of assistance to victims of road accidents will be developed [7].

5. Conclusion
The implementation of these measures will solve many problems that are taking place today. High-quality and safe roads will reduce accidents and the number of accidents that will save lives, accelerate the delivery of goods and passengers, both in the regions of the Russian Federation and between them. «To address existing shortcomings in the system of road funds and increasing the efficiency of funds necessary to create an effective system of control over the quality of work for the expenditure of funds in the road sector, to devise and implement a system of personal responsibility for the proper and efficient use of funds road funds» [3].

This problem is one of the most important, and the implementation of the national project BCAD will have a positive impact on the road transport infrastructure of the country, increase the efficiency of enterprises and reduce the emotional stress of the population, all of this will improve the lives of Russians.

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