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THE IMPORTANCE OF GEO INFORMATION SYSTEMS IN THE DIGITALIZATION OF ROADS

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Abstract: This article covers issues such as the implementation of the highway layout project and the development of cadastral data, the development of transport infrastructure , and the search for solutions to problems related to the use of geoinformation technologies in managing the real estate cadastre of highways.
Keywords: transport , real estate, cadastre, management, highways , road infrastructure , digital maps , real estate .

The layout and effective management of highways is an essential element of any country's transportation system today. This process is especially important at a time when urbanization is increasing, economic activity is accelerating, and modern technologies are developing rapidly. Although highway planning was once based on simple approaches, today this field has become much more complex and includes connections with many other areas.

Abstract. This article covers issues such as the development of transport infrastructure, the implementation of the highway layout project and the formation of cadastral data, the search for solutions to problems associated with the use of geoinformation technologies in the management of the real estate cadastre of highways. Keywords: transport, real estate, cadastre, management, highways, road infrastructure, digital maps, real estate. There are a number of principles in the planning and management of highways. First of all, the location of the road and its importance play a central role in managing and increasing the efficiency of transport flows. The correct location of roads provides optimal movement of vehicles and makes a significant contribution to the economic and social development of cities. When planning road networks, national and regional plans, the state of the existing transport network, economic centers and the logistical needs of transport are taken into account. This approach achieves an economically efficient use of resources.

In recent years, information technologies have been widely introduced to improve the efficiency of road management. Geographic information systems (GIS) provide a cartographic visualization of road and infrastructure data, which greatly helps in planning and monitoring traffic. For example, GIS can provide information on road density, traffic jams, accidents, and other situations. This information allows for effective traffic management and planning. GIS technologies allow state and municipal governments to plan roads more effectively and evaluate existing and planned projects. This system is also used to assess the efficiency of existing infrastructure in specific areas through special programs.

Environmental and social issues are also important in the design of highways. This process includes many provisions such as environmental protection, reducing air pollution, preserving green areas. At the same time, road infrastructure should also be aimed at ensuring human safety. From the point of view of urban planning, the proximity of roads to residential areas and the presence of elements such as pedestrian walkways and bicycle paths are important factors in improving the quality of life of the population. By taking such elements into account in highway projects, public interests are ensured and the sustainability of the infrastructure is ensured.

The creation and use of databases is a prerequisite for effective road management. These databases contain information on vehicle movement, road accidents, road conditions and much more. They allow you to monitor the current state of the road, accident statistics and vehicle flows. The data collected in this way plays an important role in planning road infrastructure and optimizing roads.

The combined application of these principles and modern technologies will significantly increase the efficiency of road planning and management. Thus, efforts aimed at sustainable operation of the transport system, reduction of road accident rates, resource efficiency and environmental protection will be strengthened. Planning and management of roads based on modern approaches is one of the important factors in strengthening the national economy, ensuring the well-being of the people and increasing the level of urbanization.

The creation and use of databases is an important tool for the effective management of highways. These databases collect information on traffic flows, road conditions, traffic accident statistics, and much more. This information plays an important role in the optimization and development of road networks. For example, by monitoring road conditions and traffic jams, problems on the roads are identified and special strategies are developed to eliminate them. At the same time, the information in the databases is of great help in preparing analytical reports on highways and in the future optimization of roads.

In general, the planning, management and accounting of highways is based on modern technologies, social and environmental principles, traffic flow analysis and many other factors. Due to the complexity and versatility of this process, new approaches and technologies are constantly being introduced to more effectively manage road infrastructure. Research and experiments in this area are of great importance for further improving the highway system and sustainable development of transport infrastructure in the future. Thus, the efficiency of highways not only ensures economic growth, but also serves to increase the well-being of the population and protect the environment.

The issue of collecting cadastral data and managing infrastructure based on them in the development of a project for the placement of internal highways is a complex and comprehensive process. The regulation and management of highways is one of the main tasks of the state, and these roads play an important role in the transport and economic sectors. Therefore, the formation of a thorough cadastral system for internal highways, the creation of accurate and up-to-date data are necessary for the development of the state and increasing the efficiency of the transport system.

The cadastral system is the main source of information for determining the general map of highways and their technical condition. The main task of this system is to collect detailed information on the width, length, type of pavement, connections between road networks, traffic flows and safety elements. The road infrastructure database helps the state in road planning, construction of new roads or expansion of existing roads. Cadastral data allows state authorities to determine approaches to infrastructure and formulate a strategy for the development of the future transport system. This information also plays an indispensable role in attracting the private sector and international partners to infrastructure projects.

Modern technologies play an important role in the formation of the cadastral system. Through geographic information systems (GIS), road infrastructure is reflected on digital maps and allows for comprehensive analysis. As a result of the use of GIS software, it becomes easier to obtain accurate data when monitoring the condition of roads and analyzing them, and to use data when planning road infrastructure. At the same time, it is possible to form cadastral data using modern drones and GPS technologies. With the help of these technologies, information about road networks is collected with high accuracy and updated in real time. In this case,

technologies such as satellite data and 3D scanning serve to enter up-to-date and accurate information into the cadastral system. Managing road infrastructure based on digital mapping technologies not only increases the efficiency of the transport system, but also plays an important role in ensuring the economic efficiency of planned projects.

In the management of internal highways, there is a need to constantly update cadastral data. Because transport infrastructure is an ever-changing environment. To maintain the relevance of the database and monitor it in real time, artificial intelligence and automated monitoring systems are introduced. Surveillance cameras and real-time sensors are used to monitor changes in traffic flows, any defects in road networks, the need for maintenance, as well as statistical data on road accidents. The data collected through such systems is automatically entered into the cadastral database, which provides operational assistance in making decisions regarding the infrastructure.

The implementation of the internal highway layout project and the formation of cadastral data are of fundamental importance for the development of transport infrastructure, and this process requires long-term planning, effective management and technological development. By creating an effective and accurate cadastral system in this area, the state will be able to more effectively manage transport and road infrastructure, constantly monitor the technical condition of the road network, make accurate decisions on the construction of new roads, renovation and repair of existing ones. The cadastral system requires accurate reflection of information on every aspect of roads - technical characteristics, territorial boundaries, types of pavement, road accidents and other indicators. This information plays an important role in meeting the transport needs of society and ensuring road safety in urban and rural areas.

Geographic Information Systems (GIS) technologies are an important tool in the design and management of transport infrastructure, and they are also widely used in the layout of highways. With the help of GIS systems, it is possible to collect, analyze, store and visualize geographic data, which facilitates optimal decision-making during the road construction process. The role of GIS technologies in road layout is very large, as they can be used to create the most efficient and sustainable road network, taking into account several factors, including traffic flows, environmental factors, economic factors and social needs. In this process, it is very important to take into account the specific characteristics of each territory, collect information about its natural resources, population, economic activities and transport needs.

The development of a single real estate complex system of roads and facilities represents a new approach to managing transport infrastructure and its components. The main purpose of this system is to manage, monitor and optimize the road network and all related facilities through a single platform. The single real estate complex system allows you to store all information on roads and facilities in one place and easily access them. This system effectively manages road construction, repair, operation, ensuring transport safety and many other processes.

The Unified Real Estate Complex System provides several advantages of integrating road infrastructure and related facilities into a single system. Firstly, all data is collected in one center, making it much easier to access and analyze them. This allows you to save resources, reduce time, and make the decision-making process more efficient. Secondly, the system allows you to constantly monitor and track the state of the transport network. Real-time data is collected about roads and facilities, which allows you to identify potential problems in road construction and repair in advance. Another advantage of the unified system is that it clearly shows the relationships between roads and facilities. For example, the system displays information about which parts of the road need to be repaired from time to time, which facilities need to be updated. In this way, all data is continuously updated through the system, and accurate and reliable information about the state of the transport infrastructure is obtained.

The technological basis for creating a single real estate complex system requires extensive and modern technologies. The information and technologies necessary to create the system make it possible to collect and store all the information about the transport infrastructure. The information necessary for such systems may include: the condition of the road, the need for repair and modernization, road covering materials, environmental safety of the road, its impact on external factors, etc. All this is collected in the system, allowing them to be analyzed at the right time. The technologies used to create the system mainly include geographic information systems (GIS), remote sensing, IoT (Internet of Things) technologies, databases and cloud technologies. With the help of GIS systems, information about roads and objects is collected and displayed in the form of maps and diagrams. This helps system users to understand the state of the transport infrastructure at a glance.

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