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LANDSCAPE ARCHITECTURE OF HIGHWAY TUNNELS UZBEKISTAN

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Annotation. This paper examines the features of the landscape architecture of highway tunnels in Uzbekistan. Modern trends and approaches to the landscape design of tunnel complexes are analyzed, taking into account the natural and climatic conditions of the region.

Special attention is paid to the issues of environmental safety, conservation of biodiversity and creation of a favorable environment for fauna in the tunnel zones. Innovative solutions for landscaping and landscaping of adjacent territories are proposed, aimed at increasing aesthetic attractiveness and improving the microclimate.

Keywords: Landscape, Uzbekistan, highway, design, landscaping, tunnel**.**

Introduction. Highway landscaping has a positive effect on relaxing the psyche of passengers, focusing on driving and improving traffic conditions. Also, road landscape design covers many fields, including: environmental science, psychology, behavioral science, engineering and art [1]. Traditional highway landscaping lacks analysis of public aesthetics, legal expertise, and a lack of research into visual characteristics and occupant cognitive rules. With the lack of attention to landscape design when designing construction projects, the culture of mutual relations between the population is not sufficiently formed.

In order to further develop landscape design in the Republic of Uzbekistan, improve the architectural and artistic appearance of the republic, the Cabinet of Ministers of the Republic of Uzbekistan adopted a Resolution dated 08/13/2013. No. 223 “Program for the development of landscape design in the Republic of Uzbekistan” [1].

A resolution of the President of the Republic of Uzbekistan “On measures to improve the landscaping system and architectural and landscape design of highways” was also adopted. The resolution commented on the increase in the level of architectural and artistic design of highways, the formation of a unified systematic and integrated approach to the placement of green spaces and the improvement of roadside strips along the highways of the republic in close coordination with modern requirements for ensuring road safety and environmental protection [2].

Main part: The entrance to a road tunnel is not only the open part of the tunnel construction, but also an integral part of the highway.

In connection with ensuring the safety of the tunnel entrance, it is important to realize the unity of safety and practical "stability" and landscape greening, the "beauty" of the expressway tunnel through the reasonable aesthetic design of landscape greening.

This paper presents data from a scientific approach to landscape design for plant landscaping at the entrance to a highway tunnel with reference to successful landscaping experience, and puts forward requirements for landscape and technological landscaping in accordance with the provisions of relevant regulations.

The quality of landscape design directly affects the quality of the entire tunnel, and even the entire highway. With the development of the economy, the tunnel not only has the sole function of traffic, but also serves the advertising function of cities and its scenic spots. These new features improve the condition of the tunnels and the landscaping design plays an important role in enhancing regional value.

The results of the study advance the principle of application of the construction process and the key points of landscape decoration and planting, the technology of restoration of the entrance area of the tunnel, and provide recommendations for the design of landscape planting, construction and study of the entrance to the road tunnel.

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The landscape design of the tunnel entrance must be based on the safety of vehicles for drivers and passengers. The effect of "black and white space" when entering and exiting a tunnel should be reduced and temporary visual impact caused by shading should be avoided. Color perception refers to the response of different wavelengths of light to the retina and the human brain. The color of the landscaping material in the area can be chosen as a cool color to create a cool atmosphere. In a word, the scientific and rational use of color sense can make the landscape structure of the highway more harmonious.

Dark adaptation refers to the process by which visual sensitivity gradually increases so that surrounding objects can be distinguished when strong light enters the darkness.

On the contrary, due to the strong light, at the first moment there is a feeling of blindness and the inability to see surrounding objects. Tall trees can be planted at a certain distance from the tunnel entrance, which can play a role in softening the light or mitigating the dark adaptation effect.

Figure 1 shows a parabola of the spectral sensitivity of the eye, called the relative luminous efficiency curve or visibility curve. The eye is most sensitive to green color. This curve is nothing more than the efficiency of the human eye. It is easy to determine from it which color that enters the eye is “beneficially used” to create the sensation of light.

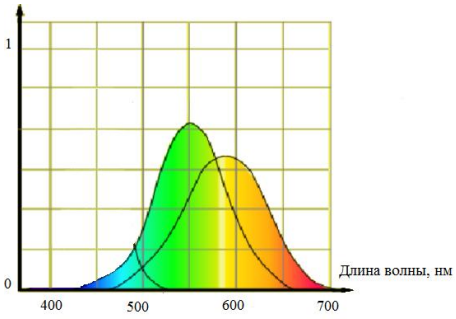

Рис.1. Спектральная чувствительность глаза

It has been experimentally established that among radiations of equal power, the greatest light sensation is caused by monochromatic green-yellow radiation with a wavelength of 555 nm [3].

Therefore, there is a need, using vertical gardening methods, to provide a role in softening the light or mitigating the effect of adaptation by darkness.

The road we are designing along Turkestan Street is a transport tunnel. Highway tunnels are horizontal or inclined underground structures that reduce the travel time of overground vehicles at road junctions.

It is well known that there are problems with lighting transitions when vehicles enter and exit a tunnel during the day. Well-designed tunnel landscaping provides visual adaptation by providing a gradual light transition at the tunnel entrance, which is good for safe driving.

Uzbekistan is a sunny country, where the sun shines brightly 300 days a year; accordingly, the light-dark effect at the entrance to and exit from the tunnel is more contrasting.

The "black-and-white space" effect when entering and exiting a tunnel should be reduced, and temporary visual impact caused by the light-dark contrast effect should be avoided.

To solve this problem, it is advisable to use vertical gardening (Fig. 2).

Vertical gardening is a very accessible and expressive type of landscaping; it is a system of various plant compositions that differ in style and type, compositional solution, geometric configuration and design, plant life cycle, color scheme, emotional impact, etc. [4, 5].

Fig. 2. a - before the landscape project, b - elements of landscape design, c - the proposed method of vertical gardening to play a role in softening the light.

Considering the climatic conditions of Uzbekistan, landscaping requires a comprehensively thought-out approach [6]. Properly selected trees and shrubs should be used by landscapers strictly according to the rules of plant growth and maintenance (for harsh climatic conditions, drought-resistant, light-loving, frost-resistant, etc.), for hot and

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dry climatic conditions and decorative features (openwork of the crown, fruits, smells and etc.) [7,8].

You should carefully select only those types of plants that enrich the air with oxygen. These include, for example: pine, spruce, oak, elm, chestnut, birch. And those that negatively affect human health and the environment by distributing harmful substances must be abandoned.

Coniferous trees, characterized by high phytoncidal activity, perform sanitary and hygienic functions in urban plantings, contributing to the formation of microclimatic conditions favorable for humans. This explains the high popularity of coniferous trees and shrubs in green building.

Specialists from the botanical garden of the Academy of Sciences of Uzbekistan, forestry, as well as private entrepreneurs are engaged in growing elite tree species suitable for climatic conditions and enriching the landscape of Tashkent. For example, the capital's enterprise "Picturesque Gardening and Floriculture" grows rare ornamental trees, flowers and shrubs that adorn many park areas of the capital. The company's specialists have identified and adapted plants to our climate: Crimean pine, tulip tree, Indian lilac, etc.

Conclusion: Landscape design of highway tunnels in Uzbekistan is an important task aimed at improving the aesthetics, environmental sustainability and safety of transport structures. The following measures can effectively integrate tunnels into the surrounding landscape:

Aesthetic Appeal: The use of local materials, landscaping and landscaping help to minimize the visual impact of tunnels and enhance their aesthetic appeal.

Environmental sustainability: The implementation of water collection and treatment systems, as well as the planting of local plant species, helps to preserve natural biocenoses and reduce negative impacts on the environment.

Safety: Providing good lighting, adequate ventilation and clear signage helps drivers feel safe and facilitates trouble-free operation of tunnels.

Social significance: Landscaping can serve as places of rest and contemplation for road users, creating a pleasant and comfortable environment.

Regional integration: Consideration of regional architecture and the use of traditional elements help to integrate the tunnels harmoniously into the local context.

Implementing landscape design principles for highway tunnels not only improves their appearance and environmental sustainability, but also increases the safety and social significance of these structures. This contributes to the creation of a more balanced and attractive transport network that meets the aesthetic, environmental and functional requirements of Uzbekistan.

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