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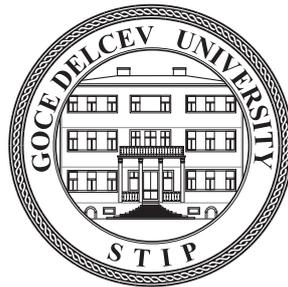
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LANDSCAPING OF THE STREET NETWORK AND ENVIRONMENTAL PROTECTION IN URBAN INFRASTRUCTURE PLANNING

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Abstract

The street network as an element of urban planning of settlements forms the skeleton of a settlement and creates conditions for orientation in the general urban landscape.

The plantations along the streams, for traffic and pedestrian traffic, serve as a means for architectural planning and spatial organization of the urban territory and are one of the main elements of the “green system”.

The connection of squares and streets with the surrounding natural and urban environment can be done when the terrain, the existing high and low vegetation, water surfaces, and rock formations are properly designed.

Key words: *park, street, green system*

INTRODUCTION

The terrain plays a particularly important role in tracing streets and street networks.

The compliance of the architectural and artistic composition of the street and square spaces with the climatic features is also a kind of a connection with the natural environment. This is done by adapting the open and semi-open spaces to the peculiarities of the climate and by creating closed spaces, independent of the external climatic conditions [1].

Our practice shows the widespread use of open and semi-open spaces, while in the northern countries more closed and air-conditioned spaces are used.

However, street spaces are formed by buildings. Depending on the ratio between the width of the street and the height of the buildings that shape it, the visual impression of it will be different. Experience shows that at a maximum vertical angle of perception on opposite sides of the street, less than 30°, its space is perceived as wide, and vice versa - at a greater angle of perception the street looks narrow [2].

Observations show that if the street is too wide, it gives the impression of an “empty” space in which one does not feel comfortable. In addition, the visual connection between the two sides of the street is lost and its space disintegrates.

Excessively reducing the width of the street can cause feelings of anxiety and depression. Therefore, once the functional width of the street has been determined, the location and height of the buildings can be made proportionate to the space to obtain a suitable aesthetic impact.

The spatial impact of the existing streets that are too wide can be improved by upgrading the surrounding buildings, adding ground floors or dividing the street space with tall vegetation. Excessively narrow existing streets can be widened by drilling the ground floors and building covered colonnades and arcades.

The length of the street space is also determined for functional reasons, but its visual perception may change when changing the longitudinal axis of the street. Practice shows that the limit of the visual perception of a straight street under normal conditions is about 3000m [3].

A straight and very long street seems monotonous and boring. Conversely, crooked and broken streets are constantly changing their perspective, intriguing the viewer and provoking a desire to be discovered, but there is a danger of losing orientation in them.

The different combinations of streets in the settlements provide the street network. In the practice of urban planning and development, there are several schemes of street networks.

In general, they can be divided into two groups:

- With the correct geometric shape or the correct street network,
- With irregular geometric shape or incorrect street network.

The historically formed basic geometric schemes of the street network are radial, radial-circular, rectangular, rectangular-diagonal, triangular and free, and each of these systems has its positive qualities for different settlements.

MATERIAL AND METHODS

The research is based on our own research, some foreign research, and literature sources.

In order to achieve the main goal and solve the set tasks, they require the application of a system of Mathematical and Statistical Methods - collection, processing, systematization and interpretation of the statistical data from: The National Statistics of the Republic of Macedonia; information about the park structure of the street network of a part of the street network in the Republic of Macedonia; literature sources with data on natural factors and their characteristics and conditions; urban plans and park development projects and methods of field survey - visual analysis of the street network.

RESULTS AND DISCUSSION

Landscaping of the streets.

A detailed plan regulates the street avenues, the type of trees, the mutual distance of seedlings and the equipment. . The trees are planned on streets whose sidewalks have a width of not less than 3m. The axis of the road is at least 0.70m from the edge of the road.

If the planting site is square, the opening in the pedestal area has the dimensions from 0.90 / 0.90 to 1.20 / 1.20m and, if it is round, its diameter is from 0.90 to 1.20m [4].

Within the construction areas for the construction of buildings with a plan, a percentage of the greenery of the construction land can be provided, which the developer in each construction plot must decorate according to the gardening decision.

Landscaping is used to cover the dividing edges, as well as for decorative and hygienic purposes. They are also important as insulators.

Streets are one of the main elements of a settlement, where green areas are widely used. They are used as separate and insulating edges. Both high and low vegetation is used.

Landscaping used on the streets has a decorative and hygienic purpose.

The decorative purpose of landscaping is expressed in the artistic and aesthetic effect of well-selected and properly distributed woody vegetation.

In order to fulfill their artistic and aesthetic effect, tree species must meet many requirements, among which the size and physical properties of their crown (linden, plum, cedar, poplar, etc.) are of great importance.

As for hygiene purpose, vegetation helps reduce noise from vehicles, it purifies the air from harmful glare, preserves dust, reduces wind strength, protects from heat and more.

One of the big problems in cities is street noise. Normal noise load is 55dB. One of the most commonly used noise protection devices is green screens. To have an effect, they must be created from suitable woody vegetation [5].

The choice of trees and shrubs must be correct, i.e., the influence of the soil, climate, wind direction, etc. must be considered.

Landscaping on the streets depends on the width of the street towel and sidewalks. For landscaping, the width of the sidewalk should be at least 3m. When using a small width of the sidewalk, the vegetation used should be with a small canopy.

The park development in the scope of the traffic performs urban planning, bioclimatic, sanitary, and communication technical tasks. The greenery penetrates the settlement in a ribbon-like way, as an interconnected system, built on the basis of natural resources and the requirement to connect residential areas with places of work and trade, central urban green areas and recreation and entertainment centers [6,7].

Green connections frame the main transport arteries and separate the adjacent terrains of the settlement from the harmful effects of traffic, providing protection from dust, noise, wind, and overheating.

Green plantations built along traffic and pedestrian traffic are imposed as a concept of “transport greenery”. It creates conditions for safe and comfortable movement of pedestrians and cyclists, as well as places to rest and wait. The reduction of the harmful effects of transport can also be achieved with the help of landscaping embankments or through excavations, as well as through appropriate terrain modeling (environmental noise protection screens) [8,9].

Current and future planning decisions for development and renewal of urban areas will increasingly take into account the structure of traffic, as well as the composition, selection, and species composition of greenery accompanying transport.

The system of green areas and plantations is an important spatial-structural and functional part of urban and rural areas. With the help of the green system, a number of tasks are solved to improve the environment, the aesthetics of the settlements, the recreation of the population and the connection with the natural environment [8].

As a component of the cultural landscape, the skillfully structured green areas and plantations have a great reclamation significance for the settlements, and this is especially true for the big cities with aggravated microclimatic conditions. They affect the composition, purity, humidity, and ionization of the air. Built and connected in a certain urban-spatial scheme, their main task is to improve the urban microclimate by:

- contributing to the improvement of the urban territory and improving its architectural and planning organization;
- increasing the artistic qualities of buildings and facilities;
- giving originality and expressiveness to architectural ensembles
- reducing the adverse effects of strong winds;
- complementing and assisting anti-noise devices to provide a comfortable living environment;
- protecting people from the effects of emissions of harmful substances (EBB) in populated areas,
- regulating the temperature-humidity and radiation regime in a settlement;
- providing the recreational needs of the population.

The delineation of the settlement macrostructure requires the green plantations to meet a number of conditions:

- to design and build in the process of the complex settlement structure;
- if possible, to be spatially and organizationally connected in a single system on the principle of uniformity and continuity;
- to create a favorable biological, social, and aesthetically sustainable environment for people;
- to meet the modern normative quantitative and qualitative indicators.

Environmental protection in defense infrastructure planning

Modern dynamic socio-economic development follows the intensive construction of space. In it, man performs both technique and technology and thus transforms the natural into a cultural environment [10,7].

Today, among the biggest polluters that directly or indirectly threaten, pollute, or degrade the human environment are population growth, air pollution, water pollution, soil pollution, increase in solid waste, noise, increase in radioactivity, increase in the content of food waste, imbalance in ecological ecosystems, bad attitude to everything that a people create with their work in their own environment etc.

All the listed negative phenomena and changes appear in space, which is why they are of special interest for research, but also for the process of spatial planning.

Destruction or deterioration of the environment can be territorial and branch.

Territorial deterioration of the environment occurs as a result of the size of the settlement, the type of settlement or the nature of the region itself (mining, industrial, etc.).

Environmental disturbances are the result of human activity in an industry, such as mining, traffic, construction, forestry and similar.

This deterioration of the environment is mainly due to economic, technical, and social development.

Economic progress allows more and more usage of natural resources, greater concentration of activities in individual points or regions, greater consumption and therefore greater need for human movement

due to the opportunities arising from the increased standard of living. This creates a transformation of space and its degradation, a phenomenon that necessarily requires more editing and equipment.

The technological progress is conditioned by the techno-technological revolution. It is increasingly looking for new raw materials, more raw materials, new and even greater concentration of population and activities, and thus new spaces for construction work. All this disturbs the balance of the pillars in space, which makes it necessary to plan ahead.

Social progress is mainly the result of the process of urbanization, raising the educational and cultural level and others. All this requires a new adaptation of the environment to the new way of life.

From this it can be concluded that environmental pollution is a result of the processes of urbanization (concentration and movement of people) and industrialization (concentration of industry on the consequences of this concentration).

This means that the process of growth and development worsens the environment, but it should not be understood that the connection must be broken or that nature must be preserved for the future, but the result of such a situation must be looked for in the background, the new environment created by technical development and the economy must be humanized. This means that new technical developments and the economy must be geared to the normal satisfaction of human needs, and not to expansion at all costs.

For these reasons, the protection and improvement of the environment in the development plans are identified as key components of planning.

In spatial planning, one of the types of dismissal of the overall issue of environmental protection and promotion is in the request and provision of models for the use of space, which will be able to ensure a harmonized use of space for business and non-profit activities.

In this way, the natural (conditional) sources and the comparative values and advantages of individual candidates (criteria for the use of space) must be observed as much as possible.

Therefore, spatial planning creates favorable frameworks for comprehensive treatment of environmental problems and nature conservation in general, because each spatial plan is a plan that makes a proper distribution of the given living space and its conservation, i.e., that every proper distribution and good organization of the universe means its basis for protection and promotion [5].

In territorial planning, one of the types of dismissal of the overall issue around the protection and promotion of the environment is in the request and provision of models for the use of space, which will be able to ensure harmonized use of space for business and non-profit activities.

In this way, the natural (conditional) sources and the comparative values and advantages of individual candidates (criteria for the use of space) must be observed as much as possible.

With this or through the planning process, development can be achieved positively, i.e., it can be done by:

- using more natural resources more evenly;
- increasing the degree of rationality of the use of technologies, economy, and organization of space;
- objectively resolving possible collisions in space between nature, man and the activities caused by the inadequate use of the common natural and spatial amenities;
- allowing all irrationalities in the use and utilization of space, etc.
- Due to the complexity of this topic in the development plan, the problems of protection and improvement of the environment are treated as a specialist separate segment of the plan. This segment of the development plan mainly covers:
 - protection and promotion of nature and natural rarities;
 - protection and improvement of the environment (air, water, soil, solid waste, noise, radiation);
 - protection and promotion of cultural and historical heritage;
 - protection from natural influences and natural disasters;
 - other types of protection (urban standard, standard of living, working environment, protection of the workplace, etc.).

With regard to the establishment and renewal of the previous balance, and if it is already disturbed in space. The following measures need to be taken:

- revitalization (by engaging and intervening to correct non-compliant requirements);
- prevention (taking actions to prevent the impact on the environment);

- protection (in the sense of preserving and preventing any changes in certain parts of the environment that are of particular importance);
- changes that will make the environment in line with modern needs, which will correspond to modern actions but also to modern needs.

CONCLUSION

All activities in the process of spatial planning are aimed at removing sources of pollution from polluters in the fight to prevent the creation of new sources of pollution and to promote the area itself, which is subject to planning. Such solutions can also be achieved by implementing existing pre-established and adopted organizational, legislative, and technical measures.

The system of green areas and plantations is an important spatial-structural and functional part of urban and rural areas. With the help of the green system, a number of tasks are solved to improve the environment, the aesthetics of the settlements, the recreation of the population, and the connection with the natural environment.

The construction of roads in our country is in a stage of development; the speed with which we build the infrastructure is also growing rapidly. At the same time, we must protect the environment as an important task and a powerful guarantee.

We can combine function and landscape to create a road that meets the needs of modern life. Then we can make the road to have the main function of modern transport, and at the same time to be perfect art.

REFERENCES

1. Кулелиев Й., Парково устройство на уличната мрежа в населените места в Р. България. реабилитационен труд, София 1994
2. Ковачев А., Градоустройство. Част 1. Основи на теорията и практиката на градоустройството. PENSOFT, София – Москва 2003
3. Щилянков Г., Строителство на автомобилни пътища. София 1980
4. Колева В., Зелените площи покрай градските магистрали и районите артерии. КНИПИТУГА 1986
5. Despot, Katerina and Sandeva, Vaska (2018) Ecological and aesthetic parameters of park art as a factor for street landscaping in cities. Innovation and Entrepreneurship, 6 (3). pp. 154-166. ISSN 1314-9253
6. Глухаров И., Проучване на екологическите фактори в малките селища за отдих, Техническа мисъл, 1979/ бр.5
7. Арсовски Т., „Човекот и животната средина“, анализа и мерки за заштита на животната и работната средина во град Скопје. Скопје 1975
8. Sandeva, Vaska and Despot, Katerina (2019) Art principles in park art as a factor for street landscaping in cities. IXth International scientific conference on architecture and civil engineering ArCivE . ISSN 2367-7252
9. Димитријевик Ј., Животна средина, Скопје 1998
10. Каракашев К., Кънчева М., Добрев П., Проблеми и тенденции в организацията на зелените системи при териториално и градоустройствено проектиране с цел създаване на оптимални градоустройствени условия. КНИПИТУГА, София 1988 32.

УРЕДУВАЊЕ НА УЛИЧНАТА МРЕЖА И ЗАШТИТА НА ЖИВОТНАТА СРЕДИНА ВО ИНФРАСТРУКТУРНОТО ПЛАНИРАЊЕ

Васка Сандева^{1*}, Катерина Деспот²

Резиме

Уличната мрежа како елемент на урбанистичкото планирање на населените места го формира скелетот на населбата и создава услови за ориентација во општиот урбан пејзаж.

Насадите покрај потоците, за сообраќај и пешачки сообраќај, служат како средство за архитектонско-планска и просторна организација на урбаната територија и се еден од главните елементи на „зелениот систем.

Поврзувањето на плоштадите и улиците со околната природна и урбаната средина може да се изврши кога теренот, постојната висока и ниска вегетација, водни површини и карпести формации се правилно проектирани.

Клучни зборови: *парк, улица, зелен систем*