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## WAYS OF IMPROVING THE QUALITIES OF THE ARCHITECTURAL ENVIRONMENT OF THE RESIDENTIAL STRUCTURES

**Abstract.** The modern city is a complex socio-economic organism. The state of the environment is one of the most pressing economic, scientific-technical and social problems. Architectural environment of the city residential structures is in continuous development. It is manifested in changes in population size, the shape, size and intensity of use of the mastered territories, to enhance the technical capacity and the complicating of the information field of the city. These factors of development, mobile and rapidly evolving, artificially created material environment, often come into conflict with the nature.

**Keywords:** the housing environment, optimization of residential environment, comfortable housing.

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## ПУТИ УЛУЧШЕНИЯ КАЧЕСТВА АРХИТЕКТУРНОЙ СРЕДЫ ЖИЛЫХ РАЙОНОВ

**Аннотация.** Современный город — это сложный социально-экономический организм. Состояние окружающей среды является одной из наиболее актуальных экономических, научно-технических и социальных проблем. Архитектурная среда города находится в непрерывном развитии. Это проявляется в изменении численности населения, формы, размера и интенсивности использования освоенных территорий в целях повышения технического потенциала и усложнения информационного поля города. Факторы развития искусственно созданной материальной среды часто вступают в конфликт с природой.

**Ключевые слова:** жилая среда, оптимизация жилой среды, комфортное жилье.

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### Introduction

Sovereign Kazakhstan in its development based on strategic priorities, among which rightly highlighted the improvement of living conditions of the population of Republic. The harmonious development of the architectural appearance of the city systematically associated with the expressiveness of the building, orientation in the urban environment, the transformation of the landscape and mix of development with the natural environment, the choice of modes of transport, the nature of the expressiveness of architectural forms, styles, characterizing the time preferences of the residents.

Investigation of theoretical and applied nature of the organization and formation of the architectural structure of the residential structures in the urban environment, taking into an account specific local circumstances and prospects of development in market conditions on the territory of Kazakhstan, in particular in the capital city of Astana, still not been carried out.

Scientific novelty of the results of the study are as follows:

- developed theoretical basis for the formation of

architectural patterns of residential units in the structure of the major cities of modern Kazakhstan;

- developed practical recommendations for optimizing architectural structure of the residential units in the city of Astana and other cities of Northern Kazakhstan.

Ongoing research will identify of factors and trends shaping residential structures, taking into an account local climatic, social, ethnic and environmental conditions, and to develop a theoretical model of the comfort of the living environment.

The aim of the research is to develop ways to improve the architectural patterns of residential units on the basis of in-depth analysis of the regional characteristics of the formation residential structures in urban space and to determine ways to create a comfortable living environment in the regional conditions.

### 1. Scientific research methods

#### 1.1. Research Methods

Research methodology is based on a comprehensive and detailed examination of solving the problem, the

study of objects and their special features in the diversity of relationships and relative independence.

Research methods:

- method of field survey to assess the peculiarities of forming architectural patterns of residential complexes in the urban environment;
- analytical method for the detection of formative factors and trends shaping the residential units in the urban environment in the regional conditions;
- systemic-structural method to estimate the compositional techniques of architectural and planning formation of the residential units in the regional conditions.

### 1.2. Study of the living environment

In the post-industrial or information age, in the context of the modern pace of life, development of communications and information technologies, increasing urbanization, the achievements of post-industrial society in conjunction with the increased mobility of the population of large cities, symptomatic is the change of views and existential criteria for evaluating qualities of the living environment.

The concept of living environment goes far beyond material values and the local space of a living cell, becoming increasingly complex and broad at different structural levels. Problems and the patterns of design consciousness lead to the necessity of finding alternative ways and problem-oriented approaches to the reevaluation of values in the organization of the living environment, improve its spatial characteristics, the increasing demands for its qualities from the position “anthropomorphism”, “humanity” in the context of aggressive external factors and constraints.

The study of the living environment through the prism of the spatial characteristics of traditional residential structures, issues of connection and influence of the spatial characteristics of the living environment and human research possible areas of humanization of the living environment through the prism of the principles and guidelines of the formation is a complex problem, which determines the necessity of taking into account the results of research in several areas and related areas of scientific knowledge. In the framework of modern architectural theory there is no single model that comprehensively describes the interdependence of living and social environment. However, there are a number of independent studies and works in related to scientific fields such as cognitive psychology, sociology, medicine, video-ecology, proxemics. With all the variety of existing scientific works and the abundance of existing design solutions, insufficient regularities of the spatial correlation characteristics of the residential environment, the theoretical concepts and principles in the process of evolution, in the context of the shift of the main historical periods under the influence of external and internal factors. There is no comprehensive methodology and criteria for evaluat-

ing the qualities of the living environment, including on a quantitative level. Insufficiently disclosed values of the spatial characteristics of traditional residential structures. There is no complex scientific principles, techniques and methodologies of forming a living environment that meets the social, psychological, visual, and behavioral needs of the inhabitant.

## 2. The formation of the spatial characteristics of the living environment

In the current situation, when the spatial characteristics of the residential environment are formed mainly on the basis of the needs of the “market” seems to be relevant and appropriate to the study of spatial characteristics, formed more extent, based on the needs of “inhabitant”. In view of this, it is advisable to refer to the values of the spatial characteristics of “traditional” residential structures formed spontaneous, natural, natural historical way, without prior planning based on solely the needs of the resident and climatic conditions. The quality of the spatial characteristics of the residential environment in the aspect of impact on residents, architectural planning and spatial development principles depend on a complex of external and internal factors.

### 2.1. The amount of solar energy aspects

The amount of solar energy factor is related to the angle of the sun’s rays, providing insolation areas and residential wells within days. When forming the spatial characteristics you must consider the normalized time insolation. For each geographic region has its own regulations. For example, the Northern territories of Kazakhstan continuous insolation adjoining areas should be provided within 3 hours. Basic element of insolation is the angle of incidence of sun rays. The angle of incidence in different time periods affect the spacing between the buildings, height and planimetric the character development. For example, in the Central historical district of the city of Astana, with the characteristic of high-density development and the limited territorial resources, the height of residential development, the dimensions of residential units, inset from the red lines and spacing between buildings must be taken to ensure the insolation first floor of the opposite building, both from the side yard and street side. In the case of infill development, the amount of solar energy aspect affects on the geometry, planimetric position in the coordinate system, the profile and the spatial structure of residential structures.

### 2.2. Urban factor

Urban factor associated with the location of the development area in the city structure, including the following categories: location in the layout of the city; the size of the plot; the system of town planning regulation of land use and development, depending on the location in the layout of the city; the noise impact. Traditionally, in the historical city there are the following planning zones:

the Central zone is generally coincident with the historical city centre; the middle zone is characteristic for the territory of industrial enterprises; the peripheral zone is characteristic for sleeping areas [2]. The location in the layout of the city, depending on the size of the plot, through a system of town-planning regulations defines the parameters of density, elevation, maximum elevation and percent gastrointesti plot. Conditions high-density development and limited territorial resources inherent in the Central areas of the city, cause a number of key issues of formation, aimed at solving the problems associated with a low percentage of green areas, semi-private and public spaces; viewable apartments opposite residential units; low pedestrian and visual permeability; a number of issues related to ensuring insolation living cells; high noise levels (over 120 decibels, when normalized to 40 decibels) and opacity to the first floor opposite buildings. Including, it is important to note that the limited territorial resources impoverishes spatial planning characteristics generated residential environment, mean concentrations of total area in a single volume. An important aspect in the case of location in a historic building, is related to the existing urban fabric. One of the advantages of the Central areas are developed infrastructure, easily accessible, due to the compactness and small size of the residential blocks. Basic issues in the formation of spatial characteristics of the living environment in residential areas are functional intensification courtyard spaces in the conditions of reconstruction, privacy, recognition and architectural and typological diversity of the living environment; the number of issues associated with low infrastructure development, the abundance of homogeneous spatial and physical surfaces, hypertrophic courtyard spaces, low walking accessibility and permeability, excessive intervals between residential units and the private horizon courtyard spaces. However, one of the advantages is the high percentage of green areas, distance from highways, low noise, plenty of forested areas, cleaner environment. Large areas create a more flexible spatial planning variability, allowing to form various combinations of group homes.

### 2.3. Technical and economic aspect

Technical and economic factor is related with the restricted defined by technical requirements. System of normative documents affect on the spatial characteristics, through a system of regulations fire breaks between buildings, topping platform fire truck, largely determines the intervals between the buildings, the provision of travel and entrance to the building for evacuation of residents. Among the important aspects of the impact of technical specifications for the humane spatial characteristics of the living environment, the following parameters: total aboveground area (on the external contour of the exterior walls) affects the density, the percentage and character of the building area, height, geometry residential voids; General residential sellable area (on the internal con-

tour of the exterior walls); the number of living units (apartments), determines the economic efficiency of the project. To identify and evaluate indicators humane living environment, it is necessary to examine the effects of architecture spatial environment: to explore aspects of the perception of the visible environment, the effects of geometry residential “void” on the spatial distance communication, interaction and mutual influence of spatial forms and forms of human behavior. In view of this, the methodology applies “expert assessments”, aimed at the study and systematization of theoretical and empirical data related scientific fields including: medicine, cognitive psychology, video-ecology, sociology and proxemics [3]. The study, in the framework of system interaction “inhabitant-spatial” characteristics, the combination of theoretical and empirical data classified in three basic aspects of perception: a social-psychological aspect of the perception of the living environment; the visual aspect of the perception of the visible environment; behavioral aspect the perception of the living environment.

## 3. Creating a comfortable living environment

### 3.1. Criteria for comfort

Currently, Kazakhstan is experiencing a construction boom, under the influence of new social conditions and physical capabilities of people, under the influence of emerging technology and scientific and technical progress change man’s view of his home, his evaluation from the point of view of comfort, satisfaction of one or another solution. Affect housing and its assessment and lifestyle of the person, his social status, place of residence, climatic conditions, national and household traditions. Before urban residents were satisfied that they were moved from the barracks in “Khrushchev”. Now it is a new time, when everyone wants not just homes, but one that would meet his ideas of comfort. To meet comfort conditions you must meet certain criteria. The main ones are: security square meters of housing per person; the number of rooms per person, aggregate household facilities; the location of Parking lots, driveways in the yard; landscaping, playgrounds; the level of security elements of social and engineering infrastructure; placement in the system the city, the density of the population residing in the unit area for different levels of needs and opportunities. It is also worth noting the generally accepted laws to reduce noise, more light apartments. Basically, all these criteria are governed by certain regulations and must be satisfied. Creating a comfortable home for a person is closely connected with regard to urban planning, urbanization residential environment. With the increasing size of cities, changing environmental conditions change and the nature of the communication home — environment. Not to consider this when creating projects for housing and environmental design today is totally unacceptable. The worsening housing problem in modern society has ad-

vanced to the foreground is the solution of the following tasks: to develop the full criteria for the assessment of comfort of the person; selection criteria the levels of comfort by the formula of settlement in the living cell, residential house, residential complex, neighborhood, district and city, according to real needs, population, demographic characteristics, family structure, and the purchasing power of different groups in terms of the housing market and the parameters of social and engineering infrastructure; criteria for the allocation of financial flows.

### 3.2. Problems of formation of the living environment in urban conditions

Qualitative tasks will lead to a higher level architecture of the dwelling — means spatial, space-planning, compositional, structural, technical, aesthetic, technological and functional solutions of the living cell, a dwelling house (flat), and the city as a whole. Urbanization and the associated environmental quality can be properly understood as a system of “human-society-living environment”. One of the main tasks of this system should be considered consideration of continuous and increasing urbanization and growing impact on the natural environment. In these conditions it is necessary to know the progress of urbanization, to study the development of anthropogenic factors on the environment. Focusing on a limited area of the modern city large quantities of equipment, transport, buildings, people, means that urban residential environment quality differs significantly from the natural environment. Modern urban planning includes environmental issues and social psychology. This means that the study of social psychology to architecture is as important as knowledge of the structures and laws of visual perception. While design is important, first of all, the spatial organization of social processes, i. e. shape, size, orientation, functional equipment of various parts of the living environment, designed for different activities. The mechanism linking the location and activity, the spatial organization of the environment and the behavior of people got the name of socio-spatial patterns.

### Implementation of the environmental approach in designing

#### 4.1. Environmental approach in designing

You can view the residential environment as an external, additional part of the actual dwelling, covering not only in the immediate vicinity of the house, but the squares, streets, lanes, which are implemented everyday and recreational needs of the population [4]. This definition blurs the boundaries of the residential environment and makes us re-evaluate its place in the city, social functions and methods of formation. The implementation of the environmental approach in the design means the transfer of the author’s position on the material research and design — nature, society, man and the assessment of the quality of the generated environment from the per-

spective of ecological, socio-cultural processes, subjective personal views of the consumer architecture.

The spatial organization of the home caused by a combination of biological and social needs of individuals, families, and groups. The evolution of these needs will determine whether changes in spatial organization as a living cell, and external living environment [5].

#### 4.2. Practical recommendations of formation of the living environment

Practical recommendations for the design are in compliance identified as a result of the study of the principles of formation of the living environment. Modern architectural principles of formation of the living environment:

- the principle of polycentric system;
- the principle of singularity and autonomy in the location of residential units — readability development (orthogonal perimeter, orthogonal, diffuse discrete);
- the principle of regulation of the areas of responsibility of housing units in the conditions of reconstruction;
- functional and typological intensification courtyard spaces;
- the principle of modularity;
- the principle of archipelagos high-density residential units.

The quality of the residential environment is a set of spatial characteristics, formed as a result of the principles and methods of forming dictated by external and internal factors. Thus, improving and expanding the boundaries of creative concepts of the architect, the engineer and the town planner will create conditions for the development of a harmonious living environment and bring all housing to the modern requirements and levels of comfort.

### Conclusion

The results of the study can be seen in the economic, social and architectural plans. In the economic aspect is saving money by optimizing architectural structures residential structures. The development of environmentally and energy efficient housing. In the social aspect provides a self-contained model the existence of the structural elements of the architectural environment of residential units with internal and external links, providing comfortable conditions for the population. In the architectural aspect — harmonized architectural environment of the residential units will give expressive architectural effect. Research on the improvement of the architectural structures residential structures and architectural environment can be implemented in stages in the process of urban planning and design of residential buildings and complexes. The results of scientific research on the improvement of the architectural structures residential structures and architectural environment in the regional conditions can be implemented on the territory of any residential cities of Kazakhstan, near and far abroad.

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