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MODERN TRENDS IN DESIGNING RESIDENTIAL COMPLEXES

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Abstract: The article examines modern trends in the design of residential complexes, reflecting changes in the requirements for the urban environment and social demands. Particular attention is paid to such key aspects as flexibility and adaptability of spaces, environmental sustainability, integration of high technologies, as well as social and public integration. Conclusions are made that modern residential complexes strive to create a sustainable and comfortable urban environment that can adapt to changes and meet the needs of residents.

Keywords: city, residential areas, residential complex, sustainable architecture, autonomous architecture, adaptive architecture, living environment, residential buildings.

Introduction: As cities grow in size, the practice of strict zoning into residential, industrial and commercial areas is losing its relevance. This leads to uneven development of territories and increases the load on transport systems. Modern socio-economic changes have required a revision of approaches to the organization of residential areas. In response to these challenges in urban planning, there is a need to improve the organization of the urban environment, ensure more efficient use of space and create closer connections between public and residential areas [1].

In Soviet cities, the planning of residential areas was based on zones structured according to the principles of multi-level distribution and a unified KBO system. Over time, this model led to the creation of two large spatial segments: the central business area and peripheral residential areas. The business center, being a complex multifunctional structure, has lost its activity over time, and microdistricts began to experience various social difficulties [2].

In modern conditions, it is especially important to create and develop buildings that combine several functions, such as trade, offices, housing, entertainment, sports and others. These structures play a key role in long-term urban planning, promoting the even distribution of population during the day and the optimal use of transport and parking resources. The market dictates its own rules for the formation of the architectural space of residential complexes. Today, the priority tasks from the standpoint of economic efficiency have become: intensification of the use of urban areas, acceleration of design and implementation. Changing needs of society as a whole and each consumer individually

have led not only to difficulties in communicating with the market and the customer, but also, often, to distortion of information.

The origin and development of concepts related to the creation of multifunctional urban spaces has deep historical roots. Various ways of integrating residential functions with other activities can be observed since the emergence of the first cities. Thus, in ancient Greek and Roman buildings, residential, commercial and industrial functions were often combined. Premises located at street level were used for workshops and retail outlets. With the increase in commercial activity and industrial production, the density of development increased, which contributed to the transition from private houses to apartment buildings.

Medieval buildings of artisans and merchants often had internal spaces used as workshops and retail outlets. Some of these buildings reached 4-5 floors, which was typical for the urban architecture of that time.

With the development of industry and the increase in production capacity, cities began to expand rapidly. Industry had a significant impact on urban planning, population structure and the distribution of buildings in cities. The arrival of workers from rural areas caused a shortage of affordable housing. In the late 19th and early 20th centuries, the expansion of residential areas occurred mainly on the outskirts of cities, where industrial facilities were located. At this time, the building type known as the tenement house, which appeared in the first half of the 19th century, was rapidly developing [3]. In the 1970s and 1980s, housing construction became inextricably linked with the organization of social and household services. In the USSR, methods for designing residential complexes with different service systems were developed. Residential complexes began to include not only residential buildings, but also cultural and household facilities, such as children's institutions, stores, and sports facilities. This integrated approach to design has shown its advantages in creating a comfortable living environment and improving engineering infrastructure [4, 6].

In the 1990s, projects for high-rise residential complexes with modern social and domestic infrastructure began to appear in Russia. These complexes became mainly available to people with high incomes, while housing for the middle and low classes remained unaffordable. High functional saturation and efficient use of urban land made multi-story residential complexes with services especially popular during this period.

Modern trends in the design of residential complexes: Over time, people's needs and space requirements change, causing the need to transform architectural solutions in accordance with current social trends. This has led to the development of adaptable, flexible and multi-purpose architecture. Instead of designing rooms with a specific function, architects are increasingly creating spaces that can perform a variety of tasks. This explains the popularity of solutions such as open kitchens or modular designs that allow a hybrid lifestyle. Modern homes often include bedrooms that can be used as home offices, bathrooms combined with laundry rooms, or kitchens that also serve as dining

rooms. Unlike traditional housing with a rigid layout that limits the use of space, hybrid buildings are able to combine multiple functions related to both work and leisure [5].

In the XXI st century, sustainable development and ecological high-tech architecture have become key areas in design.

This strategy is aimed at improving the quality of life and solving such pressing problems as environmental changes, aging society, employment and food shortages. Sustainable architecture includes various aspects, adapting to natural, climatic and technological conditions, combining stable and changing elements in the designed objects. An important aspect is compliance with natural conditions, using mathematical modeling to design buildings, taking into account factors that affect their durability and functionality [2, 3, 5].

An excellent example of sustainable architecture is the Jonathan Diamond project in Ontario, which uses an external system of corridors surrounding a central courtyard. The corridors create social spaces where residents can interact with their neighbors, and also allow sunlight into the apartment layout and provide cross-ventilation.

Photo 1. *Jonathan Diamond project in Ontario. Canada.*

The project is the first in Canada to use radiant ceiling tiles for heating and cooling, a system that, when combined with the CREE Building model, provides high sustainability and cost effectiveness [7].

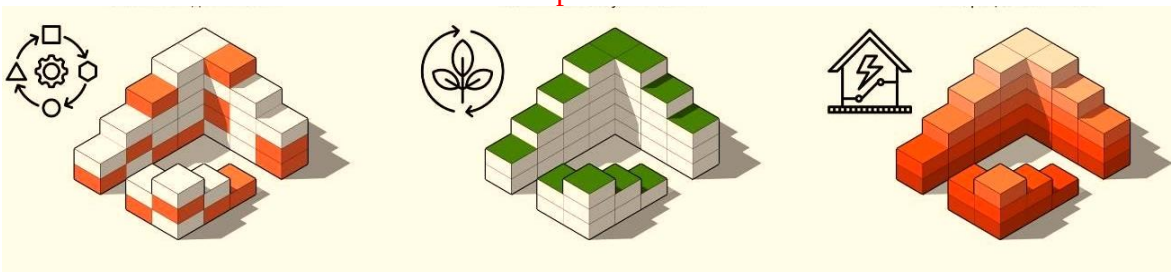
Photo 2. *"Bhindi Bazaar" in Mumbai, India.*

Another notable example is the Bhindi Bazaar mixed-use development in Mumbai, India. The project spans 16.5 hectares and includes 2,500 residential and commercial units. It is designed with Indian architectural traditions in mind and uses innovative technologies to improve the quality of life for its residents [7].

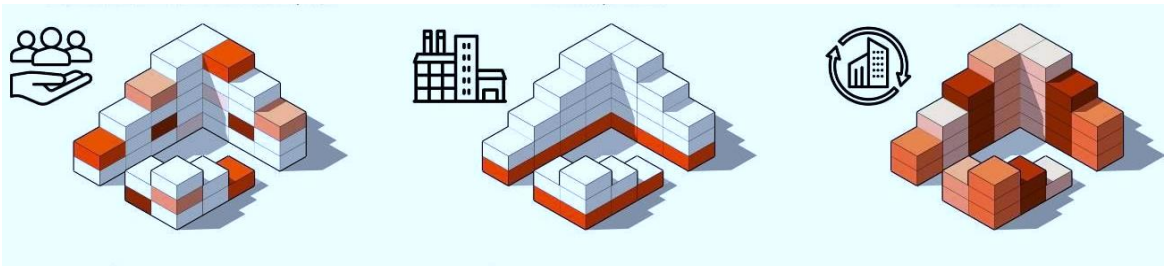
Thus, the most noticeable trends in the design of residential complexes are *flexibility and adaptability, environmental sustainability, integration of technologies, as well as social and community integration (Fig. 1).*

Other modern trends in formation are also identified [2]:

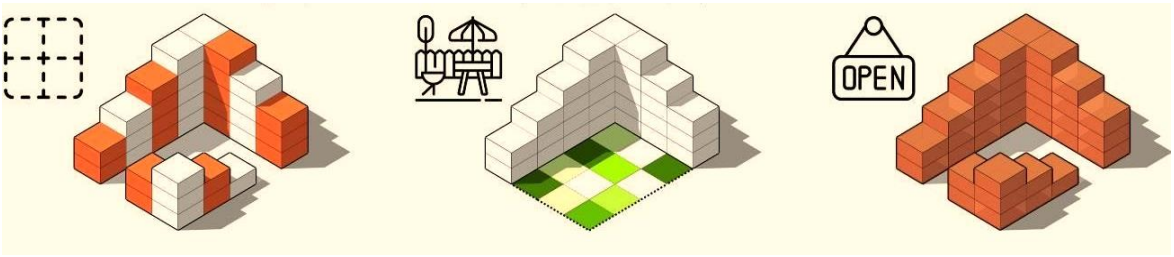
- Introduction of business functions into the residential environment, which creates a variety of spaces and functions (*polycentricity*).
- Ensuring local functional diversity and availability of all necessary services, as well as the development of energy-efficient and autonomous systems (*autonomy*).
- Definition and clear delineation of areas of responsibility of various housing units, which is especially important in complex multifunctional complexes (*regulation of boundaries*).
- Increasing the intensity of use of courtyard spaces to meet the needs of people of different age groups (*intensification of courtyard spaces*) [2, 8].
- Creation of an open and accessible complex of spaces for all residents (*the concept of openness and transparency*).



Flexibility and adaptability *Environmental sustainability* *Technology integration*



Social and public integration *Polycyntricity* *Autonomy*



Regulation of boundaries *Functional-typological* *Principle of openness* *of responsibility of residential units* *intensification of courtyard* *spaces and transparency*

Fig. 1. *Modern trends in the design of residential complexes.*

Conclusion: The study revealed such modern trends in the design of multifunctional residential complexes as flexibility and adaptability, environmental sustainability, integration of technologies, as well as social and public integration, in addition, polycentricity, autonomy, regulation of boundaries, intensification of courtyard spaces, the concept of openness and transparency.

The identified trends allow us to conclude that in our time, multifunctional residential complexes strive to create a more sustainable and convenient urban environment that can adapt to changing conditions and the needs of residents. These principles not only improve the quality of life, but also contribute to a more uniform development of cities, improving the social structure and increasing the efficiency of using urban areas.

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