

New types of urban formations modeling in the framework of educational design

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Abstract. The article is devoted to new approaches to the urban areas design for Russia, focused on achieving modern criteria for the quality of the urban environment. It is highlighted that in spite of the attempts made in recent years in introducing new urban development standards in urban planning legislation aimed at increasing the density of development and multifunctional use of territories, the diversity of living environment types, the actual practice of constructing new areas differs little from what was developed in Russia 30 years ago. Therefore, it is very important to bare an adequate understanding of the processes and methods of forming a full-fledged urban environment in the city in architect students' minds. The article discusses the concept of organizing a multifunctional district of the city of Saratov, developed as part of the graduate design by a group of students. The projected area acts as a self-sufficient urban unit, in the process of modeling of which criteria were developed and methods for creating a multifunctional urban environment meeting modern quality criteria were worked out.

1. Introduction

Currently, in many European countries such concepts of spatial development as “Compact City” [1, 2, 3], “Smart Growth” [4, 5, 6] are being developed at the state level. These concepts involve the use of a wide range of tools to improve the quality of citizens' lives: effective urban governance; restriction of the city territorial growth; building density optimization; multi-functional land use, functional balance of the city districts by population, number of jobs and services; low energy consumption, the use of renewable energy sources; improving the public transport system, encouraging cycling, increasing the length of pedestrian zones; the development of ecological framework, the development of urban agriculture; resource efficient and green building; efficient methods for collecting and recycling garbage.

In the planning aspect, a compact city implies not only the high density of residential development, but also the quarterly nature of its organization. The advantages of quarterly development are: clear separation of private / semi-private (courtyard) and public (street) spaces, which is an essential component of a high-quality and safe living environment; the small size of the quarters (75-100 to 125-350 meters - traditional for the historical development of the city), providing a more frequent grid of streets, dispersal of traffic flows and limiting the number of stores; the possibility of saturating the ground floors with social functions, places of employment, which stimulates pedestrian traffic and activates social contacts.

In large Russian cities the integrated construction of districts in accordance with the above principles is not common. Examples of super-dense multi-story and high-rise “monofunctional” residential development with almost complete absence of public services infrastructure (trade, food, parking and social infrastructure) dominate. Such construction is beneficial to the developer, but is in



conflict with the tasks of creating a comfortable urban environment. Recently mono-functional residential complexes being built are an example of extremely negative practice. No one calculates the results of this practice: how the load on transport networks will change, how the residents of new high-rise buildings will be serviced and where their children will go to study, how the silhouette of the city will change.

Recently, two new large construction sites have appeared in the city of Saratov, resulting from the removal of civil and test aerodromes. Both of them are within a 15-20 minute access to the city center and have a number of obvious advantages: the area, location on elevated well-ventilated areas and adjoining to highways of citywide significance. There is a rare chance of a comprehensive territory development and the creation of modern residential areas on the principles of the Smart City, and this chance should not be missed.

The diploma thesis¹ developed at the Architecture Department of Saratov State Technical University demonstrates an alternative approach to the development of new territories, proposing the creation of new urban areas as self-sufficient formations with a complete set of elements needed to realize the most diverse needs of the population and create a comfortable and urban environment.

2. Materials and methods

The Zavodskoy district of the city of Saratov, stretching along the Volga for 13 km, historically developed in the 30-40 years of the twentieth century as an industrial area with residential settlements for workers (Figure 1). After the collapse of the USSR a significant part of industrial facilities have degraded, was gradually redeveloped or liquidated, as did the Aviation Plant, which owned the site chosen for design. As a result, we currently have a loose, insufficiently structured urban fabric where new residential groups spontaneously arise.



Figure 1. Location of the district in the structure of the city of Saratov

- Central area of the city
- Designed area
- Industrial and communal areas
- Residential areas
- Forest park

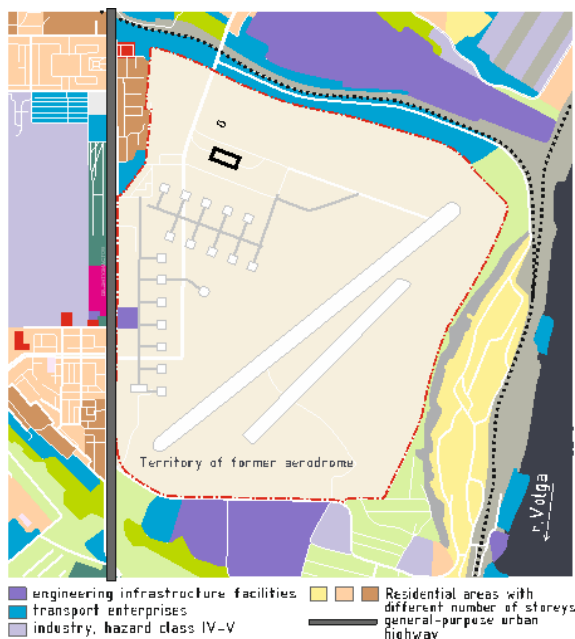


Figure 2 The boundaries of the design

area and the environment

- Engineering infrastructure facilities
- Industrial enterprises of the IV-V class of harmfulness
- Transport enterprises
- Residential areas of different floors
- Highway of city significance

1. The authors of the project: D. Kuzmina, A. Novikova, A. Meller. Heads: L. Tarasova, S. Dyadchenko

The territory of the former test aerodrome is located on the high bank of the Volga River. The relief is mostly calm, mainly with a slope of 1-10%. In the direction of the Volga River, the slope increases and reaches 20%, that provides a nice view of the water, and a panoramic view of the area is created. On the west side the section is limited to one of the main transport arteries of the Zavodskoy district by Entuziastov Avenue, from the east, from the north and north-east the district is surrounded by a railway line (Figure 2).

3. Main provisions of the project

The aim of the project was to develop an effective model for the development of a territory significant for the city, which may further contribute to the emergence of new development vectors for the Zavodskoy district and the city as a whole.

A post-industrial society presents a much wider range of requirements for the quality of the urban environment than an industrial society, where the main requirement for a living environment was to provide conditions for the restoration of vitality for the next cycle of work. The needs of a modern person include self-development, the realization of one's potential and the choice of various life scenarios, its brightness, and fullness. "Human capital" is currently one of the most important components of the successful socio-economic development of each city, and the appropriate environment is important for its replenishment [7, 8].

Three spheres of human life were identified that can be influenced by means of architecture:

- leisure - culture, creativity, travel, entertainment;
- education and work - training, work on oneself, profession, employment;
- housing - friends, family, neighbors, staff.

In accordance with these aspects, the design decision is based on the idea of three interconnected subsystems, for each of which one of the authors of the project was responsible: *a housing subsystem; subsystem of the social and business sphere (places of employment); subsystem of social and recreational sphere* (Figure 3).

The basic principles for developing a modern, successful, comfortable and safe urban education are identified:

- a variety of lifestyles and types of living environments;
- convenient combination of housing, work and leisure, choice;
- development of service and communication centers at various levels;
- frequent street grid, communication with the communication frame;
- proximity to nature, the continuity of the intra-district gardening system, the presence of an agricultural complex;
- developed network of pedestrian and bicycle links;
- rich content, a variety of impressions;
- artistic image, information content, aesthetics of the urban environment [9, 10, 11, 12].

The residential subsystem includes two extremely different life models: the urbanized "gorodskaya" and the "prigorodnaya" close to the natural environment. The planning structure consists of 4 types of quarters: central, urban (2 subtypes) and suburban (3 subtypes). The main axes of the quarter planning are defined by the relief of the territory and the preserved runways directions of the airfield.

The core of the planning structure is *urban-type quarters*, likely of historical buildings. They are predominantly residential with public services on the ground floors and pedestrian priority streets (Figure 4). Quarters of *the central type*, stretched along the main highway and are developed predominantly by social and business functions. *The suburban types* of neighborhoods are located in the peripheral part of the district, on the edge of the plateau, and are close to the natural environment. Here, the advantage is given to individual and blocked types of development (Figure 5). In the modern world the possibility of choice matters much, with everyone can choose a place of residence that corresponds to one's lifestyle. *The central scenario* is suitable for people who need to travel (walk) to work every day, to be in the center of events, to actively spend their leisure time. *The urban scenario*

is optimal for families with children: proximity to schools, kindergartens, green areas, predominantly walking. *The suburban scenario* is characterized by a measured life in individual houses with personal plots of land. The residents of the suburban environment appreciate the spacious areas both inside the house and outside, prefer a quiet outdoors pastime (Figure 6).

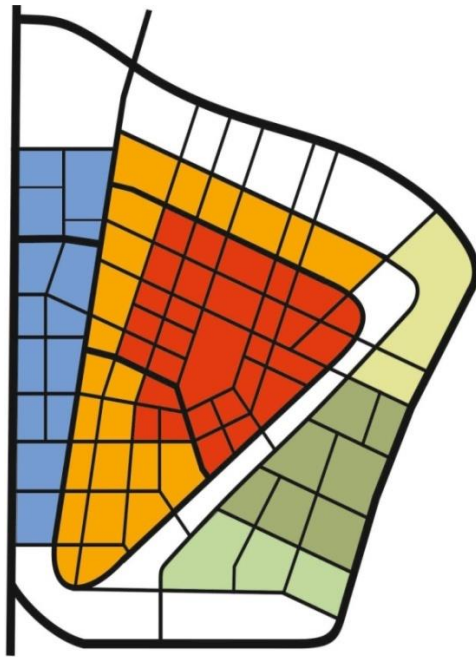


Figure 3. Quarterly typology proposed

- Central (multifunctional) type of quarters
- ■ Urban types of neighborhoods
- Suburban types of neighborhoods

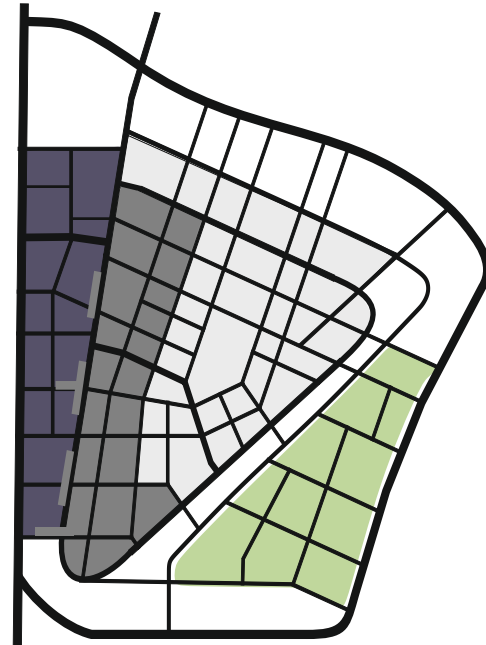


Figure 4. Localization in the space of the district for various lifestyles

- Mostly young people with a career in mind and active use of public services
- Middle-aged people, actively developing professionally, with children
- Families leading a full-fledged household, appreciating the comfort and safety of the environment, the availability of educational institutions
- People focused on a calm measured lifestyle and proximity to nature

Subsystem of public business sphere.

The main objects of this sphere working both for the district and the city are located along the main highway with active public transport traffic, have communication with the large industrial enterprise of the city. At the same time, this zone is a kind of buffer for a residential area.

The social and business center consists of several parts with various functions:

- shopping, entertainment and business center (with developed spaces for coworking);
- techno park (production facilities, laboratories, exhibition facilities, rental housing for workers with common areas for recreation);
- the educational center has a campus structure (branches of universities, a school of the second level, a scientific center, a library and sports facilities).

All areas include accommodation: apartments, hotels or rental apartments.

The agricultural center is located somewhat away from the highway and is a high-tech agricultural complex, where there may be permanent places of employment and temporary practices of students and schoolchildren, retired.



Figure 5. Spatial interconnection of various life spheres

Places of application of labor and social life:

- business and commercial functions
- science, education.
- Residential quarters;
- Recreation area



Figure 6. The concept of recreational subsystem development

- Active areas: sports, gaming events
- Event areas: lectures, festivals, concerts
- Zones of quiet relaxation: walks, contemplation
- The main directions of walking

All areas are strung on a footpath with small cozy green areas and are well connected. Part of the business and commercial functions are dispersed within the district along the main streets of the City Quarters.

The subsystem of social and recreational sphere is a system of parks, boulevards and squares, green pedestrian streets. In the northern part near the main city highway there is an extreme sports park in the building of the former aviation hangar, aimed also at visitors living outside the district. North-eastern junction - an observation deck on the Volga River and event spaces for various forms of social interaction; the wide boulevard separating the city and suburban areas is a place for walking and everyday relaxation. The boulevard leads to the agricultural complex located at its end in the sanitary protection zone. Here, greenhouses, vertical gardens, scientific research activities are assumed. The centers of public life are two squares located in the City and Suburban neighborhoods.

Each of the subsystems has its own figuratively-meaningful content and features of the spatial organization - housing is predominantly quarter buildings with the opposition of private and public spaces: yard-street with large-scale characteristics close to the prevailing historical building morphotypes. Social and business - intra-quarter public space - a pedestrian street with a scenic elaboration of a system of spatial staging areas - squares, squares, entrance areas, etc. Recreational

subsystem - landscapes with the necessary infrastructure facilities with a system of disclosures into the space of the Volga River (Figure 7).



Figure 7. District layout

4. Conclusion

Modeling of new urban entities in the educational process allows focusing on the most significant relevant systemic aspects of this issue. Here, the most important thing is to achieve a balance between the implementation of conceptual ideas about modern multifunctional urban education and the search for solutions that preserve and develop the originality of the city of Saratov with its scale and the features of its planning structure, building morphotypes, methods of interaction with the natural environment. It also seems important to realize the figurative, semantic and natural potential of the territories.

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