

Criteria of Architectural Composition Design in Residential Courtyards

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Abstract. The totalitarian times of the 50s-80s of the 20th century have brought the building of high-rise residential blocks in Latvian cities, characterized by an uninteresting solution of standard buildings and the alien scale which does not meet the regional features. During the above period, areas of the residential courtyards have not been addressed. The conclusion of the research is that today the courtyards of the high-rise residential houses have become a stagnant, functionally irrelevant area that forms a depressing nature of the outdoor living space. The uncharted area of courtyards is not being used fully which highlights a wide range of issues that applies to car parks, recreation areas, and the green areas. With the development of the urban infrastructure, the creation of high-rise parking facilities and separate car parks are insufficiently addressed. Consequently, the implementation of improvements in courtyards of high-rise residential houses is not possible if the above issue on the removal of the car load from courtyards is not solved. Many building districts are characterized by the same compositional, architectural-spatial structure which even more influences and causes discomfort in these areas to stay. In recent years, the solution to the above issue is sought by the municipal authorities of Latvia to create a new courtyard zoning. It applies to the project development and construction works. In the research, courtyards of the city of Jelgava are analysed and evaluated which from the qualitative point of view demonstrates and is a vivid example where the issues of the research are readable. The city of Jelgava, located 45 km away from Riga, is an expressed satellite city and serves for the agglomeration of Riga as a huge high-rise residential district. Consequently, the research includes separate courtyards of high-rise residential buildings of the city of Jelgava and their study is carried out from the point of view of the architectural composition and the functional point of view of courtyards.

1. Introduction

The idea of neighborhoods, in the ground of which lies the idea of large-scale residential areas, was first announced in 1929 by a sociologist and planner Clarence Perry. Clarence Perry devoted his ideas and actions to immigrant and their children integration processes. His actions were supported and promoted by Clarence Stein, Henry Wright, and Thomas Adams who propagated the neighborhoods as the ground for urban development [1]. Peter Hall and Ulrich Pfeifer in their book „Urban Future 21” present the „ideal” description of the local neighborhood complex: the local neighborhoods have to be friendly and attractive to their inhabitants – with clean air, trees and green areas, sufficient amount of sunlight, gardens, public outdoor territory, low noise and pollution level. The authors emphasize that these requirements have to be rational instead of overwhelming – at the utopian level [2]. The researches



were also performed on the Modern Movement ideas that originated in the 20's and 30's, because they have a great influence on the 20th century housing theory. Lately, there have been defined various conditions and principles that introduce new ways to urban development. A requirement to provide a high quality sanitary hygienic and insolation conditions has occurred, and it is a difficult, often impossible task to fulfill in the dense perimeter housing of the big city. To confront this, a Swiss architect Le Corbusier (1887–1965) proposed a new urban housing principle – large-scale residential buildings surrounded with greenery, and with easy accessible fresh air and sunlight [3]. Whereas, the Danish architect and urban planner Jan Gehl has performed several significant researches from the perspective of functionality and aesthetics on the public outdoor territory design and improvement that covers the transport traffic and pedestrian orientation in the cities [4]. In Latvia the most significant researches on the territory planning and urban construction have been made by such architects as prof. Janis Brinkis, prof. Olgerts Buka, prof. Janis Krastins, and prof. Ivars Strautmanis. Professor Ivars Strautmanis in his book „Dialogue with the room” encourages evaluating the importance of the organization and aesthetics of the surrounding spatial environment [5]. Comprehensive studies on the environmental development of housing construction, quantitative and qualitative housing developments in Riga have been conducted by prof. Sandra Treija. The evaluations of the surrounding environment are considered also when studying the living conditions of inhabitants. In such researches the emphasis is placed on the housing quality, negative environmental factors and the evaluation of safety level [6]. Several analysis of the spatial composition was carried out in certain Latvian cities. One of such researches is „The Development of the Spatial Composition in Riga” by an architect Andris Roze [7]. According to the author, „a good image of the city can be achieved only, if the city means something to its inhabitants, and if in the urban environment there are elements that cause positive or negative feelings and associations to its inhabitant, because they are a significant part of him as an individual and as a member of society.”

In Latvia there have been performed several studies on the urban spatial composition [8]. The perception of space and the composition are two separate groups of concept that up to now have very few common problems, researches, and fields of study. On one hand there is the human psychophysiology, and on the other hand – the objective environment with its traditional elements of composition – shape, proportion, colour, rhythm, nuances etc. In any case, the principle of the community structure is not able to provide the social and aesthetic requirements for the inhabitants. This reason in particular over the last several years in different countries leads to thinking about finding new ways of spatial and functional organization of residential housing [9]. Consequently, the aim of the research is as follows: to study the planning principles of courtyards of high-rise residential houses in the urban environment in order to determine the outdoor living space of an aesthetically and functionally high quality. The research carried out so far has demonstrated the novelty of this topic, and based on the data of the previously carried out research it is necessary to evaluate the outdoor living space of courtyards of high-rise residential houses from the point of view of planning techniques and principles of creation of the architectural composition.

2. Materials and methods

The study of the architectural composition in residential courtyards was carried out in the period from November 2016 to February 2017. To achieve the aim scientific research literature was studied, including the analysis of publications and electronic resources. According to the aim of the study relevant information was collected and analysed residential courtyards in city of Jelgava. All analysed residential courtyards territories are located in three places in Jelgava: Satiksmes street, Meiju road and Zvejnieku road, Māras street and Loka road, where are fixed and analysed existing situation, see Figure 1.

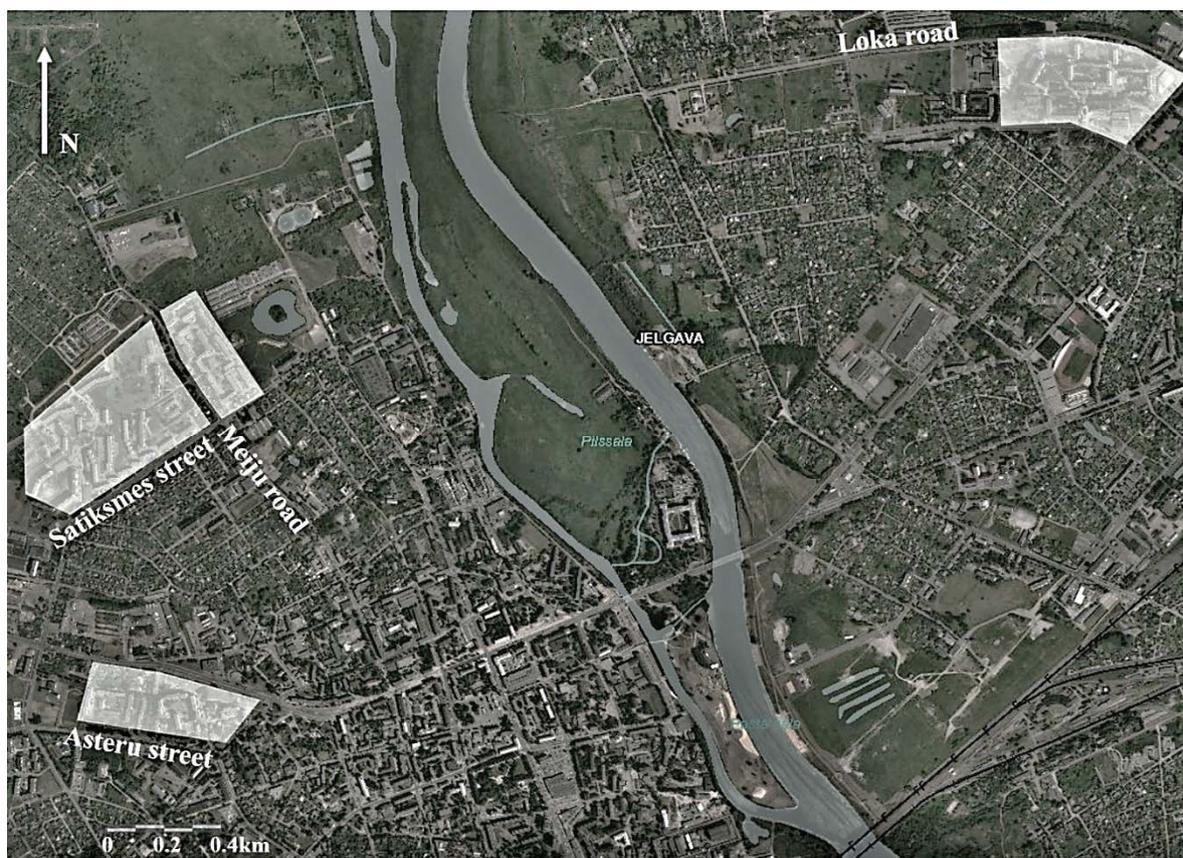


Figure 1. Analysed and evaluated courtyards of high-rise residential buildings of the city of Jelgava

To obtain the results a monographic or descriptive method was applied, which was based on the scientific findings and specific processes found to have been applied in the courtyards of the residential area in city of Jelgava.

3. Results and discussions

Starting with the beginning of the 1960 apartment building in cities of Latvia has been concentrated in big housing estates, using free planning principle in the building location. They are mainly connected with standard building meridional orientation to cardinal directions regardless to the street building front [10]. Building of the large-scale residential buildings in Latvia, also in Riga, started in the end of the 50's and continued in large quantities till the beginning of the 90's. Large-scale residential areas in their gigantic amounts are the phenomenon of the Soviet time, which creation and development were determined by political, social, and economic factors [11]. Residential area takes the main part of the urban territory, where residential buildings, administrative and social buildings and other institutions are located, as well as gardens, streets and fields [12]. Free planning principle in 50's–60's became the prevailing in the residential area projecting; also the large-scale residential areas of Riga mostly are planned on the free planning principle. The term “free planning”, in the contrary to the traditional circumferential building compositional methods, comprises different kinds of planning systems, which structure is determined both by natural conditions – orientation to the cardinal directions, natural relief, existing green blocks, water courses and water reservoirs, and urban environment structure – existing street network and building. Pretty often objective factors are combined with the architects' intended geometrical ornamental schemes [13]. As one of the features of that time in the cities of Latvia was the location of the residential areas close to the industrial plants/factories (in Jelgava – RAF factory, in Valmiera – Glass fibre factory, in Olaine – Chemical factory, etc.).

In 70's, taking into consideration that there were few free land plots left in for the building in the central part of the city, new territories in the peripheral part of the city were provided for the residential building. Residential building was carried out by department principle assuming, when a number of the largest industrial plants and institutions were determined their building area, where for the resources of these organizations they had to build out engineering communications, driveways, improvement and, of course, residential buildings [14]. Looking in mind through the residential buildings built in the last years and trying to summarize their typical features, clear and simple solhouette of the building emerges in front of eyes – building freely located, with white silex bricks decorated large-scale residential building [15]. Compositional analysis of the new residential area building indicates that, even implementing new type of building series in the state, it is still not achieved sufficiently marked building complex originality, as well as nature and architecture harmonious interaction [10]. The similar kind of residential building according to the type projects in that time widely developed also in other states, where building amount often was bigger. Consequently, the spatially uniform building was created, what we can observe in almost every city of Latvia [16].

In expanding the structure of the existing urban planning and the compositional structure, the location of the historical roads and functional zones have been on the account. After burning down the city of Jelgava in World War II, its new residential quarters centered around the historical center. In the 50s of the 20th century, in the northern part of the city where the historic road led to the former Lapskalna and Meiju manors a regular street network with its building were created. Mostly, they were mansion quarters with gardens which created a regular green structure on the canvas of the urban space. It concluded building of Zvejnieku street and Meiju road which brought the first 2-3 story residential masonry buildings.



Figure 2. The compositional structure of the residential quarter at Zvejnieku street – Meiju road in the 50s–70s of the 20th century

They are located parallel to the longitudinal center line at Meiju road, in turn, at Zvejnieku street – located obliquely. Beside them, the inner courtyard space was open to the vast meadows or pasture areas of the former manors. In the postwar time of the 50s of the 20th century, the concept of improvement of courtyards of multi-family houses did not exist. Only a gravel driveway was built and a single pedestrian trail along the buildings to meet the elementary functional requirements. More than half a century ago, there was no transport load and the wide playground zone at the houses was not included as the so-called landscaping in the living outdoor space was created by the adjacent natural beauty - extensive meadows and the bank of the Lielupe river 300 m away from it. In the 70s of the 20th century, 5-story residential buildings were built adjacent to these buildings. Their constructive solution is based on the bearing wall

of reinforced concrete panels with a high surface part or a cap. The high groundwater level in Jelgava does not permit to build basements below the ground floor, therefore, in order to ensure that the building foundations do not freeze through, the soil was filled back. Together with the confluence of the number of the technical requirements of the building and the solution of the compositional positioning, the compositional and functional quality of the southern part of the residential quarter is reduced which has been contributed by: the urban geomorphological situation; taking into account the conditions of freezing through of building foundations; back filling of the soil, creating a slope which is located adjacent to the building of the 50s; due to the difference (2.0 m) in the soil filling levels, a compositional disproportion is formed as the back filling line is raised to the 2nd-floor windows adjacent to the existing residential building; the slope created by the soil back filling is difficult to be maintained; there is an issue with the surface water discharge from the buildings built in the 50s of the 20th century as the so-called bowl effect is created.



Figure 3. Fixing of the difference of the building land levels by rows of trees along Meiju road



Figure 4. Zig zag type building line along Zvejnieku street. The 50s of the 20th century

In assessing the above, it can be concluded that the densely located residential buildings are too large, causing a number of the above-mentioned issues. In designing the building, in the 70s of the 20th century an important economic condition was considered – if the building is denser, shorter is the length of the underground utility network, lesser power consumption, heat loss in transit routes, lesser financing for the installation of the underground communications. In the long-term light of the above, the size of the area of the inner courtyard in proportion to the number of the population is unable to provide a comfortable outdoor space. By increasing the courtyard area, the land tax charges increase, so again

encouraging to think about two important categories - the aesthetic quality of the living space and the financial expression.



Figure 5. The compositional solution of the residential quarter at Satiksmes street – Meiju road in the 70s-80s of the 20th century

The residential quarter built in the 70s-80s of the 20th century within the boundaries of Satiksmes street - Meiju road in the distance 100 m away is compositionally and functionally more successfully addressed. Within the area of approximately 12 hectares, distancing, the compositional axes of the location, the character of the planning structure are successfully found for the 5-story and 9-story residential houses. The context of the building structure is found in the adjacent wide area of mansions in the southern part of Satiksmes street. The mansion gardens complement the total harmony. In turn, the northern side of the multi-family building area is occupied by continuous longer volumes which in their composition bring an unwieldy accent, separating one courtyard from the other one. Due to the lack of funding, the construction of another 5-story residential building was not started in the 80s of the 20th century. In the current situation, this area consists of a wide green zone, which fits well in the landscape and in the perspective, it is possible to build it as a landscaped green leisure space. Atmodas street adjacent to the northern part of the building area will be reconstructed in a few years and it will serve as the city's ring road where the two banks of the Lielupe river will be connected by the so-called Northern Bridge. Thus, the mentioned free green area would serve as an extra sound-proof area. On the western and eastern side of the quarter, kindergarten areas are located.



Figure 6. The compositional solution of Satiksmes street

The distancing of the residential buildings is sufficient for creating vast landscaped green areas. Transport parking in the living area under consideration is open for solutions, causing chaotically located parking on the lawn. The creation of a new and spacious parking space is possible if dismantling of the adjacent garage massive in the area of 3 ha is done. The expressiveness of the sight lines to the garage building is not attractive which should be considered when constructing the new transit highway. Along the building line of Satiksmes street, a birch plantation row is created which protects the building from noise and dust. The tree line hasn't got a typical even planting rhythm, it comprises a number of interruptions, bringing in the character of chaos. In the context with the zig zag line of the building, the line of the northern side of the street starts to look clumsy in its compositional character. By choosing a birch plantation belt, the character of the drooping fragile twigs of the birch tree should be considered which creates an additional linden tree plantation line along the driveway. It is not a successful solution for the overall image of the street. The street width allows thickening of the tree plantation belt.



Figure 7. The building structure of Asteru - Māras - Puķu streets in the 70s of the 20th century

A multi-family living quarter is located 500 m away adjacent to Asteru – Māras - Puķu streets built in the 70s of the 20th century. The planning in its composition is similar to the above area - Satiksmes street - Meiju road. In the planning, the difference is brought by mixed-located 9-story and 5-story construction volumes, bringing in separate 1-story residential buildings with gardens, the external appearance of which is sought to look similar to the standard panel high-rise buildings, by the construction of combined roofs which give the stylistic tonality of cubism to the buildings. Right next door, 2-story residential buildings alternate with pitched roofs. Such a peculiar game of building heights adds a mosaic character to the residential area. Lanes between the residential buildings divide the inner courtyard areas into 3 different spaces where each of them has its own compositional solution. In the middle part of each courtyard, a 9-story building is built, which creates a large shading and adds heaviness to the inner courtyard. By contrast, the location of the adjacent zig zag 5-story building along the street edge creates a chiaroscuro game and visually quenches, and loosens the monotonous nature of the building. Currently, the large green area in the northern part of the residential area adds a tinge of romanticism despite the fact that the dense building of the city center is located nearby. According to the urban development plan, the free area is provided for public building, forming a continuous dense belt. Undoubtedly, it will reduce the intimacy of the above residential quarter, the expressiveness of which is increased by separate groups of birch trees. There are many tree planting groups and individual rows of trees in the residential quarter. The trees have reached the tallness of a 5-story house and the vast space around the buildings is sinking in the shade during the summer time. Such illogical and exaggerated tree density destroys the compositional harmony of the residential building. A thorough

inventory of each tree group or row is required to build proposals to solve both the issue of insulation for the residential area and increasing the visual-aesthetic quality.



Figure 8. Clusters of trees along the buildings at Māras street



Figure 9. The diversity of the building height brings a unique mosaic nature in the living zone

The improvement of the residential building compositional and artistic quality has important role in the common urban spatial planning and composition. Residential area building creates unique urban building ensemble background, but inhabitants' daily life passes within the area courtyard. Therefore, residential outdoor territory must correspond with not only functional, but also aesthetical requirements [10]. High landscape aesthetic quality is particularly important in urbanized landscape, because it is both living, and working and recreation environment for people, who continuously from different angles and aspects evaluate, perceive this residential outdoor territory [17].

The analysed RAF residential territory in Jelgava to proves otherwise aspects. This research area is too large with big open space, where are very high load of private transports. Compositional solution of buildings is connected with Loka road and are partly open courtyards, see Figure 10. Most part of courtyards are not so sunny, what give negative aspects in outdoor space for inhabitants.

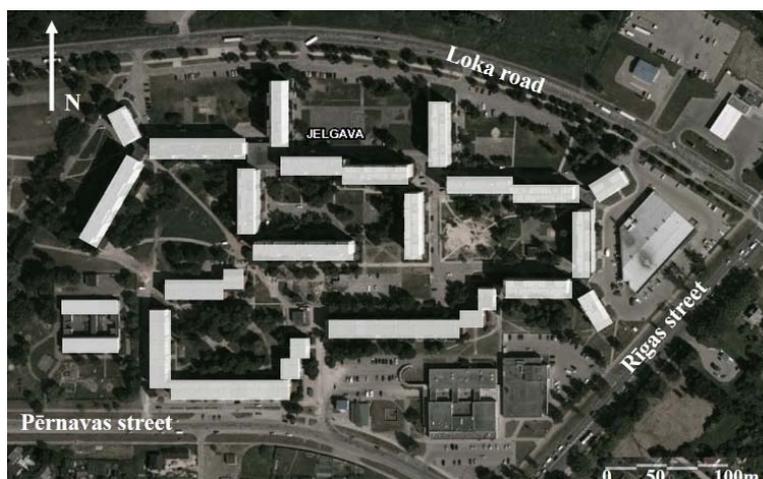


Figure 10. Building structure in Loka road

The renovation of the degraded territories is of great state importance, because it affects economic growth and development of the cities and regions [18]. Urban territorial development is rather multiform; therefore, there occur various rather different main area mutual arrangements determined by the size of the city and its economic profile [10].

4. Conclusions

The research clearly shows that the compositional and functional level of quality of residential areas is largely determined by the density and height of the building which affects the financial indicators, posture to sunlight, and the quality of the outdoor green recreation. As one of the key aspects is a long-term maintenance of the aesthetic and economic indicators of high-rise residential areas. By assessing the architectural and compositional solutions of inner quarters, compliance with the functional provision should be carefully subordinated to it. This applies both to the dendrological characteristics of the green plantations and compliance with the functional provision of the underground communications. A desire has been expressed to densely hide large-scale high-rise residential buildings by woody plants. By choosing the inadequate material of woody plants, in ten years, it is exaggeratedly tall. As a result, not only the level of exposure to sunlight of residential building but also utilities, exterior fittings of buildings, etc., suffer which disrupt the compositional scale and balance of the inner courtyards. The research points to the fact that close cooperation of urban planners with landscape architects and communication specialists should exist at the project level.

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