

OLD VS. NEW RESIDENTIAL BUILDINGS - CASE STUDY OF OSIJEK

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ABSTRACT

Residential areas reflect the growth and development of cities over time. For this reason, the morphological image of the residential area and the quality of the housing it offers to its users are important. This paper presents the results of the analysis of the two residential areas of Osijek, Croatia, their apartment types, the typology of the buildings, the morphological image, the construction, and the materials from which they were built. Naselje Vladimira Nazora is an older settlement located within the city block on the west side of the wider city center built in 1979 as part of the city's rapid expansion. Retfala Nova, is a new settlement that was built as part of the planned urban expansion in the south-western part of the city. The settlements are of different typologies, both containing different types of apartments in several building types. Retfala Nova contains five building types and Naselje Vladimira Nazora has four types. The analysis results show that the settlements differ in all characteristic, including the number of floors, the number of apartments per floor, the building material and, above all the spatial organization. The analysis shows that there is a difference in the morphology of the settlement and its surroundings, as well as in the purpose of the buildings. The Retfala Nova is used exclusively for residential purposes, while the Naselje Vladimira Nazor has commercial spaces in some buildings. This paper highlights the advantages and disadvantages of the two settlements so that the quality information can be used for future research.

KEYWORDS _ *Residential buildings, Apartment typology, Spatial organization, Morphology, Osijek*

INTRODUCTION

Residential areas reflect the growth and development of cities over time. For this reason, the morphological image of the residential area and the quality of the housing it offers to its users are important. The morphology of a settlement refers to its built structure and its organization. It is the relationship between built and unbuilt or open areas and includes the layout of streets, the positioning of buildings and open spaces and affects the quality of life in that area (Topcu and Southworth 2014). The typology of residential areas plays a great role in urban planning, and also affect quality of life (Mouratidis, 2021). In apartment buildings, the spatial organization of apartment, orientation, apartment outdoor areas, circulation impact comfort, and overall housing quality (Brkanić Mihić and Koški, 2024). Additionally, the materials that are used for constructing apartment buildings ensure structural quality and define visual character (Mishra and Das, 2014.). The morphology, typology, spatial organization, and construction materials of apartment buildings are interconnected factors that shape both the physical appearance and functional quality of housing and with people spending around 90% of their time indoors and 45% in their homes (Jara-Baeza et. al. 2023) the issue of housing environment quality has become more important than ever. Thoughtful planning and design are fundamental to fostering resilient, attractive, and liveable communities.

This paper presents the results of the analysis of two residential areas in Osijek, the centre of Osijek-Baranja County in the east of the Republic of Croatia. The study examines the Vladimira Nazor housing estate which was, built in the late 1970s, and the Retfala Nova housing estate which was, built in the early 2000s, in terms of their morphological appearance, the typology of the buildings, the types of apartments, the construction method and materials from which they were built, and the internal organization of the buildings and apartments. In this study, a two-room apartment is considered as an apartment consisting of a living room and a bedroom. A small apartment that has a living room and a kitchen in one room is defined as a studio apartment. The abbreviation *gf* is used for ground floor.

The research presented in this paper was conducted as a preliminary analysis and serves as a starting point for a more comprehensive study of the Osijek residential area and apartment buildings, focusing on their morphological structure, building typology, apartment layouts, construction methods and materials, in order to understand how these factors, influence housing quality and urban liveability.

METHODOLOGY

The design documents for Naselje Vladimira Nazora are available in the city archives, while the information for Retfala Nova comes from documents obtained from the director of the company that built the settlement and from the apartment catalogue (Škojo grupa). The floor plans of the apartments taken from the project documents were digitally redrawn using the AutoCAD 2024 software package. Parallel to the procurement of the building documents and prior to the analysis of the settlements, residential buildings and apartments, a database of their characteristics was created in the form of a Microsoft Office Excel 2023 spreadsheet into which the data was to be entered. The following data was provided: i) on the settlements: settlement morphology, access roads, parking areas, green areas, number of buildings in the settlement; ii) on the residential buildings: building type, number of floors, number of apartments in the building and per floor, orientation, type and material of load-bearing construction and partition walls; iii) on the apartments: spatial organization, orientation, net enclosed area and total net area including outdoor areas and apartment size in relation to the number of rooms.

In addition to the analysis of project documentation and building catalogues, an on-site survey of the residential area was carried out, supplemented by photographic documentation and in-situ spatial analyses of the location. As this research is a preliminary study, the sample included only two settlements with a total of 504 apartments.

RESULTS

Naselje Vladimira Nazora

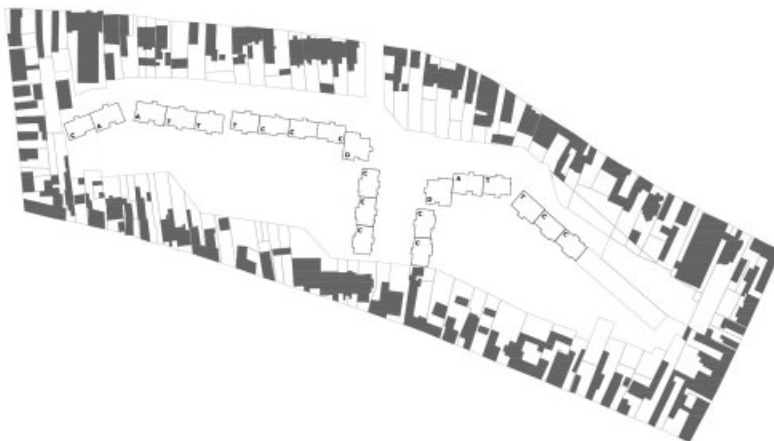


Figure 1: Site plan of the settlement Naselje Vladimira Nazora

Naselje Vladimira Nazora (Figure 1) is an older settlement located within the city block on the west side of the wider city center, and was built in 1979 as part of the rapid expansion of the city. Naselje Vladimira Nazora has only one entrance for pedestrians and vehicles, which is located on the north side of the settlement via Ilirska Street. The analysis shows that the settlement Naselje Vladimira Nazora utilized the already formed space resulting from the already defined structure of the city and was built into an existing block of low single-family houses. The Naselje Vladimira Nazora settlement is primarily intended for residential purposes, with two buildings (type D) have a premises intended for commercial facilities. The orientation of the buildings in the settlement is predominantly north-south (N=16), while the remaining buildings are oriented east-west (N=5). The settlement has a lot of greenery and there is a tree-lined walkway in front of the buildings throughout the settlement. At the back side of the apartment buildings there is a tenant courtyard with lots of low and high greenery. Car traffic is handled by a T-shaped street flanked by parking spaces (N=249) and a sidewalk along the entire length of the street.

Most of the apartment buildings in the settlement have apartments with a double or single-sided orientation, except for two buildings, which have apartments oriented on three sides. There are four building types and a total of 21 apartment buildings in the settlement: Type A (N=3), Type C (N=11), Type D (N=2) and Type T (N=5). There are detached and semi-detached apartment buildings, and in all buildings the apartments are arranged around a central staircase. Three building types (types A, C and T) have five storeys (gf+4), while type D has seven storeys (gf+6). The number of apartments in the buildings varies between 15 and 22 apartments per building (between 2 and 4 apartments per floor). Naselje Vladimira Nazor has 344 apartments in total.

An analysis of the project documents revealed that the load-bearing walls of the apartment buildings in Naselje Vladimir Nazor settlement are made of 15 cm thick, reinforced concrete with a 3 cm thick layer of thermal insulation and a 12 cm thick layer of façade bricks. The partition walls in the settlement are 7 and 12 cm thick and made of bricks (Figure 2).

The apartments in all buildings are arranged around a central corridor (Figure 2). The analysis of the apartments shows that in Naselje Vladimira Nazor settlement there are apartments with a net area of 26.45 m² to 76.12 m². The total area of the apartments, including the outdoor areas is between 43.03 m² and 86.12 m². The smallest apartment is a one-room apartment (26.45 m²), while the largest is a three-room apartment (86.12 m²).

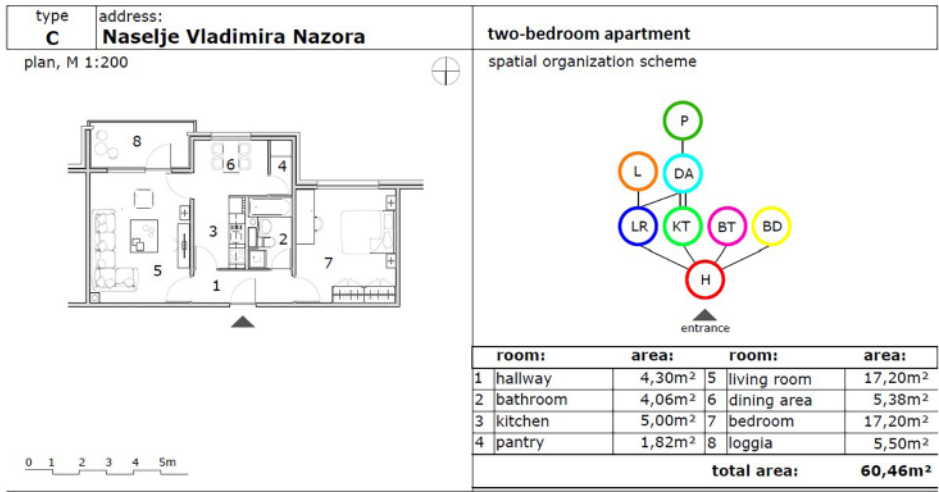


Figure 2: Two-room apartment in Naselje Vladimira Nazora

Naselje Vladimira Nazor settlement has one-room, one-and-a-half-room, two-room, three-room apartments and studios, making a total of 344 apartments in the settlement. The outdoor areas of the apartments are in the form of a loggia. The analysis of apartments shows that the largest number of apartments built in Naselje Vladimira Nazora settlement are two-room apartments (from 45.58 m2 to 69.31 m2 net total area) (Figure 2). There are a total of 177 apartments in the entire settlement, and the smallest number of apartments built are studio apartments (26.45 m2), of which there are a total of 25 in the settlement. The average apartment size in the settlement is 59,19 m2.

Retfala Nova

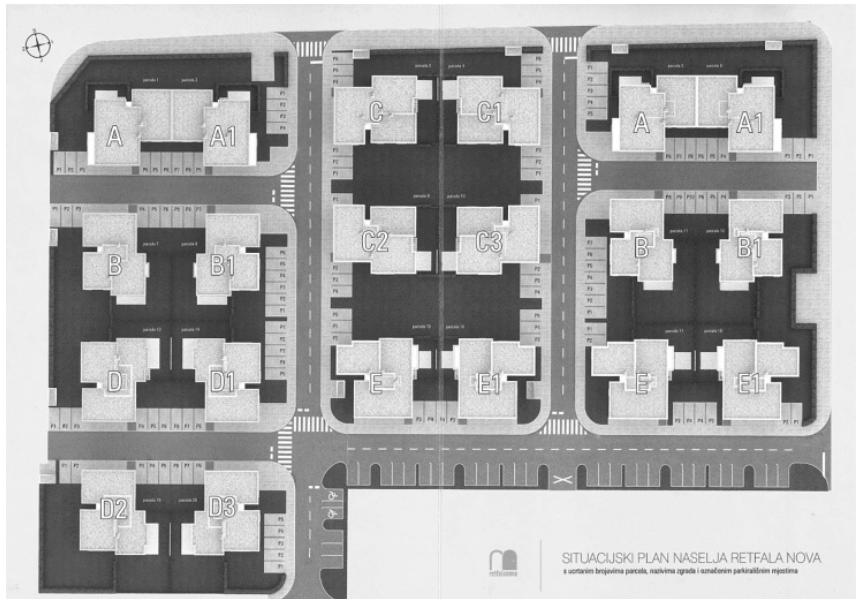


Figure 3: Site plan of the settlement Retfala Nova (Škojo grupa. 2004. Retfala Nova katalog stanova. Osijek: ibl.doo)

Retfala Nova (Figure 3.) is a new settlement that was built as part of the planned urban expansion in the south-western part of the city. The settlement was built according to a grid system with three access roads for vehicles and pedestrians, two of which are on the north side and one on the east side. The better accessibility is due to the fact that the settlement was built on an open space that is not constricted by the surrounding buildings. The buildings in Retfala Nova serve residential purposes and have four-sided orientation (N=20). The greenery of the settlement consists of individual trees next to the parking lot, the rest of the high and low greenery is located in the courtyards of the tenants of the ground floor apartments. Traffic in the settlement is solved in a grid system with parking spaces (N=34). Further parking spaces are located along the street on the ground floor (N=123) and in the garages of the individual buildings (N=60).

All buildings in the settlement have apartments with one-sided, two-sided and three-sided orientation. There are five building types in the settlement, type A (N=4), type C (N=4), type C (N=4), type D (N=4) and type E (N=4), making a total of 20 buildings in the settlement. The settlement has the typology of free-standing buildings, and in all buildings the apartments are arranged around a central staircase. Three building types (type A, B and C) have four storeys (gf+3), while type D and type E have three storeys (gf+2). The number of apartments in the buildings varies between 7 and 9 apartments (between 1 and 3 apartments per floor). The total number of apartments in the settlement is 160.

An analysis of the project documents for the residential buildings revealed that the majority of the construction is made of reinforced concrete. These are ceiling slabs and walls made of reinforced concrete. Most of the reinforced concrete walls are located in the stairwells. The rest of the walls consist of a frame construction: masonry walls bounded by horizontal and vertical bracing elements. The load-bearing walls are 20 cm thick with a 10 cm layer of thermal insulation and a layer of finishing plaster. The partition walls are 8 and 10 cm thick and made of plasterboard (Figure 4).

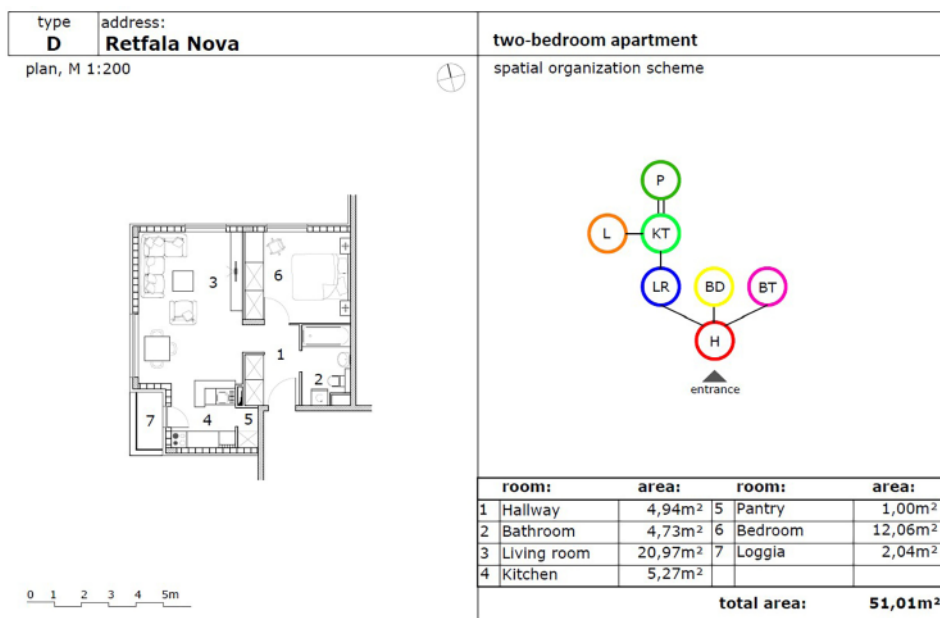


Figure 4: Two-room apartment in Retfala Nova

The apartments in all buildings in Retfala Nova are arranged around a central living room (Figure 4). The analysis of the apartments shows that there are apartments with an enclosed net living area of 34.00 m² to 109.11 m². The total area of the apartments, including the outdoor areas is between 36.81 m² and 138.47 m². The smallest apartment is a one-room apartment (36.81 m²), while the

largest is a four-room apartment (138.47 m²). Retfala Nova has one-room, two-room, two-and-a-half-room, three-room and four-room apartments. The outdoor areas of the apartments are designed in the form of a loggia and a terrace. All apartments on the ground floor have a garden. In Retfala Nova, most of the apartments have been built with two-rooms (from 47.02 m² to 69.59 m²) (*Figure 4*), and there is a total of 52 of such apartments in the entire settlement. The smallest number of apartments are four-room apartments (from 116.13 m² to 138.47 m²), of which there are a total of 16 in the settlement. The average apartment size in the settlement is 68,88 m².

CONCLUSIONS

The results of the analysis show that the settlements differ in all characteristics, including the number of floors, the number of apartments per floor, the building material and, above all, the spatial organization.

The results of the settlements analysis show that the settlements are different typologies, each containing different types of apartments in several building types. There are five building types in Retfala Nova and four types in Naselje Vladimira Nazora. The results also show that there is a difference in the morphology of the settlement and its surroundings, as well as in the purpose of the buildings. Unlike in the Naselje Vladimira Nazora, the apartment buildings in the settlement of Retfala Nova are used exclusively for residential purposes. While the Naselje Vladimira Nazora settlement was limited and defined by the surrounding family houses, the planners of Retfala Nova had the opportunity to design the settlement independently of the surrounding development.

The differences in the organization of traffic, are also influenced by the surrounding buildings and the location of the settlement itself. As the Naselje Vladimira Nazor settlement is built within a block, pedestrian and vehicular access to the residential buildings is only possible via a road that cuts through the surrounding block of family houses. In contrast, the Retfala Nova settlement is accessed by three roads for traffic and pedestrians.

There are also differences between the method of organization and the number of parking spaces. Since Retfala Nova is newly planned and is located on a large plot of land, there is a parking space for every apartment in the settlement, while Naselje Vladimira Nazora does not have enough parking spaces for all the apartments in the settlement. The reason for this is the lower urban planning standard in the 1980s, which means that the parking spaces in this settlement do not meet the needs of users today.

When looking at the apartment buildings and the apartments, the considerable differences in the construction methods, materials and design of the apartments become clear. There is a visible change in the spatial organization of the apartment, which corresponds to the changes in the family and the way the apartment is used. In the Naselje Vladimira Nazora settlement, the apartments are primarily organized with separate rooms around central corridor, while in the apartments of the Retfala Nova settlement there is a central living room. Looking at the apartment catalogues of both settlements, it is noticeable that the apartment buildings in the Retfala Nova settlement have the advantage of larger apartments and more private space, such as private gardens and garages on the property. Freestanding buildings offer space that can be used for more public greenery. Although the use of new techniques for plasterboard partitions in the new settlements allows for more flexibility, brick is the higher quality and more durable material choice for both the partitions and the building envelope which contributes to the quality of the older, Naselje Vladimira Nazora settlement.

The research presented in this paper was conducted as a preliminary analysis and serves as a starting point for a more comprehensive study on the Osijek residential area and apartment buildings, focusing on their morphological structure, building typology, apartment layouts, construction methods and materials, in order to understand how these factors, influence housing quality and

urban liveability. It highlights the advantages and disadvantages of the two settlements so that the quality information can be used for future research. As this is an initial study, this fact also highlights certain shortcomings of the research, namely a small sample of housing settlements that does not cover a larger period from which general conclusions could be drawn. Future research will include a larger number of housing settlements and apartment buildings over a longer period of time in order to identify changes and indications of new trends in the construction of apartment buildings and to determine the quality of housing in the city of Osijek.

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