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Sustainability of Development of Prefabricated Housing Estates – Model Solution of Housing Estate Devínska Nová Ves, Bratislava

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Abstract. The regeneration of prefabricated housing estates is particularly topical issue in Slovakia. Of the total number of 1.78 million dwellings, more than 600,000 are located in prefabricated panel buildings, representing a third of all dwellings in Slovakia. Large prefabricated housing estates were built in the period 1960 – 1990, which means that many of them have already exceeded the projected 50-year life span. Ensuring the sustainable development of prefabricated housing estates and the architecture of prefabricated panel buildings is not only a professional theoretical challenge, but also a current topic of present practice.

Introduction

Definitions of the terms sustainability, sustainable construction, sustainable architecture, guide us primarily to adopt a philosophy of sustainability as a philosophy of a certain model of behavior and consequently a lifestyle. This means rethinking many of our environmental attitudes and behaving in such a way that our needs do not conflict with the needs of future generations. It is primarily the redefinition of needs, interests and demands that are placed on the contemporary architecture. In relation to the architecture of prefabricated housing estates, it is not only necessary to realize the fundamental aesthetic and architectural values of the original apartment buildings, or whole housing estate, but also the opportunities that this type of housing can offer in relation to the current demands of its users. Therefore, it is necessary to examine the actual condition of existing prefabricated architecture for adaptation to the current demands.

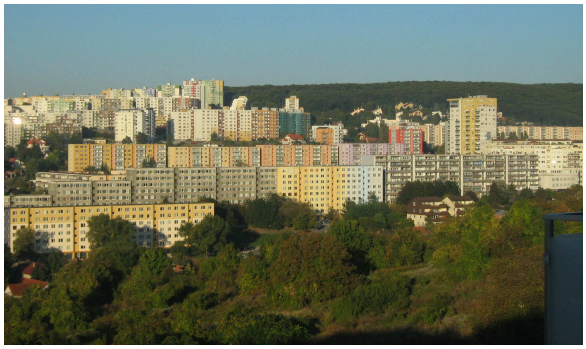


Fig. 1, Fig. 2: Prefabricated housing estate Dlhé diely in Bratislava, Slovakia. Photo: Andrea Bacová.

Prefabricated housing estates were built in the period 1960-1990 as a direct effect, or a part of the significant industrialization of cities. The growing industry caused the influx of population from rural areas to cities, which in turn prompted an acute shortage of housing in the cities. Large housing estates with prefabricated panel buildings responded to these needs by its urban concept, architecture, operation and construction technology. Centralized management of society meant centralized planning of housing estates with all its advantages and disadvantages. More than half a century of operation of these residential structures entitles us to objectively evaluate it and take a professional attitude on *how to further ensure the functioning of the prefabricated housing estates and its prefabricated buildings?* Results of the long-term research that has been carried out by the

Institute of Architecture of Residential Buildings at Faculty of Architecture STU in collaboration with the Faculty of Civil Engineering and the Austrian Academy of Sciences confirm the need for a complex renovation. Under the term "complex renovation" we understand *such structural, technical and architectural changes that lead to an increase in the architectural value of a prefabricated building and overall more aesthetic environment. The objective of complex renovation is an extension of life span of prefabricated buildings and housing estates within the sustainable development.*

In addition, it is necessary to acknowledge and preserve its values because: "prefabricated housing estates are an important part of the European cultural heritage that represent ideas of modern architecture and modern urbanism of the second half of the 20th century with all advantages and disadvantages." [1] They are an indispensable symbol of housing culture for a large population. Also for this reason, it is necessary to approach the renovation of prefabricated housing estates in a way that the original architectural values are not only maintained but also positively developed in the whole process. "Effective and proven form of sustainable development is the concept of a compact city, which is associated with the intensification of the existing urban structure, the use of available space within the built-up area and the limited scope of new development outside urban areas." [2]

Urban and architectural values of prefabricated housing estates

Urban concepts of majority of housing estates followed the principles of the Athens Charter, distances between buildings were designed in order not to overshadow each other and amenities were designed according to the technical-economic indicators. Besides the apartment buildings, kindergartens, schools and the necessary green spaces were built. Sufficient free space between buildings allowed for public green areas in many places, which is seen as a positive element in hindsight. These moments can be considered as the positive signs and urban value of these residential structures.

Architecture of prefabricated apartment buildings was created in the process of search for a universal building, which would meet housing requirements of broad social layers. Its principal features and values are: simplicity, moderation, proportionality, tectonic balance (ratio of solid walls and window openings, vertical and horizontal elements), color clarity and appropriate rhythm of windows. Later, separate architectural elements were developed - balconies, loggias and entrance canopies - also in a very simple, minimized form. More significant enrichment of new architectural elements occurred in the 80s of the 20th century according to the postmodern principles. These trends were reflected in the fragmentary position in prefabricated housing estate Dlhé Diely in Bratislava (T.Gebauer, P.Paňák, L.Kušnír et al.). *Values of prefabricated panel architecture lie in its minimalistic volume expression that matched the requirements of universality, standardization and prefabrication of construction.* The floor plans of prefabricated apartment buildings also fulfilled the requirements of versatility and flexibility in an excellent way. The layout of 3 bedroom apartment on the area of approximately 75m^2 fulfilled the needs of a family of 4 with the minimal requirements on the size of individual rooms. At present, 1 or 2 bedroom apartments are being built on the same area.

Urban concept with optimal density and plenty of green spaces, architectural moderation along with practicality and versatility of layouts constitute essential values of prefabricated housing estates.

And the future…

At present, only the basic technical renovation of prefabricated buildings is carried out, which is mainly focused on thermal insulating, replacement of windows, renovation of roofs and other technical components of the buildings. The mentioned form of renovation is subsidized by the State Housing Development Fund, which offers favorable long-term loans. Although this type of renovation has undeniable positive effects, it cannot be considered as complex. In the process of a

complex renovation, from an architectural perspective, the focus is on that part of the renovation, which will contribute to the restoration and enhancement of the architectural values of a prefabricated apartment building. This concerns in particular facades, window openings, balconies, loggias, entrance spaces and connection of ground floor with street. The unique opportunity and potential for altering the architectural expression of prefabricated apartment buildings lies in the roof superstructures as well as additional constructions of gable walls.

The optimal situation for such an approach is when the prefabricated apartment buildings are temporarily uninhabited and thus allow for more radical interventions. But in our conditions, this is a rare situation. Such a unique renovation was recently carried out in Rimavská Sobota, where the prefabricated apartment building was completely renovated (2013 GutGut).


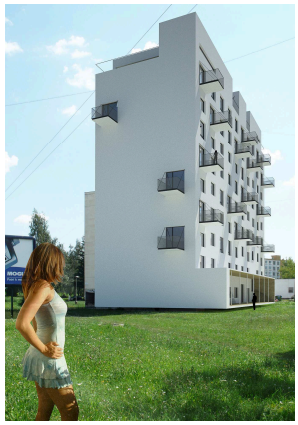


Fig. 3, Fig. 4, Fig. 5: Completely renovated prefabricated apartment building in Rimavska Sobota, Slovakia. Photo and visualizations: GutGut.

If we want to contribute to the improvement of the process of complex renovation in our conditions, it is necessary to adjust the process of a complex renovation for specific conditions. Private ownership (more than 90% of apartments) complicates the situation in the sense that it is necessary to come to an agreement with more entities and for this reason it is necessary to have good management for preparation of investment. Setting up the financial plan and the progress of renovation is the most important step in order to successfully meet the requirements of sustainable development.

The process of renovation should be focused on *such construction, technical and architectural changes that lead to an increase in the architectural value of prefabricated apartment building and an overall more aesthetic environment.* These are also the requirements of the above defined complex renovation. Prefabricated panel architecture can be considered as a sustainable only if the process of its renovation is focused on the restoration of architectural values.

Positive interventions

Therefore, let us concentrate on the essential positive interventions that appropriately affect the renovation process. Within the research Regiogoes we verify new models of living in the border region of Bratislava with spatial overlap to Austria. Part of the research is also the revitalization of the prefabricated housing estate Devínska Nová Ves, whose potential we follow in two basic levels - urban and architectural.

Urban characteristics of the housing estate Devínska Nová Ves allow for improvement of existing living conditions by addition of new residential structures that will provide the environment with higher spatial, functional and operational quality. In our research project we focus on intervention that contributes to the humanization of wider environment by forming segmented and differentiated exterior spaces. The concept of applied research begins at urban level - by designing public, semi-public and semi-private spaces and continues to architectural level - in the form of newly designed apartment buildings with generously dimensioned loggias, terraces and balconies.

Researched locality - housing estate Devínska Nová Ves is designed around basic compositional axis - Eisnerova street, which forms the core street space and spatial backbone of the entire housing estate. In this section, two research sites were selected - Entrance Gate and Meeting Point, both of them create endpoints of Eisnerova street. *Entrance Gate* is a gateway to the housing estate Devínska Nová Ves. At present, this area is occupied by a petrol station and heating plant. The area is deteriorated and unused and in addition it is also affected by the proximity of railway line.

The role of the feasibility study in this locality was to create a progressive urban structure, which will impress residents and visitors by its attractiveness, eliminate the negative effects of the railway line and create spaces for meeting. The designed apartment building shields the exterior residential areas from the noise from railway by its shape and location, while at the same time, it provides a number of semi-private spaces within its volume for adequate social interaction. It is the semi-private spaces that create a good structural basis for the formation of social ties. Its quality is reflected in good neighbor relations, which have a significant impact on the participatory care of common areas. Research has verified that the good architectural concept can be a springboard for the creation of social ties, which will form the basis of voluntary activities that improve common residential environment.

In addition, it can be assumed that these activities are naturally extended to the original structure of existing housing estate, where there is enough space around the apartment buildings. Although this process requires an urban regulation, we assume that for its successful fulfillment it is necessary to use primarily the means of social participation.

Fig. 6, Fig. 7: The overall visualization and detail of the apartment building in the Eisnerova Street in Devínska Nová Ves - architectural study. Author: Dominika Podolská, Consultant: Branislav Puškár, Institute of Architecture of Residential Buildings, FA STU.

The second researched locality *Meeting point* forms the border between the old village Devínska Nová Ves and the prefabricated housing estate. Here meets the original area of traditional family houses with an extensive structure of higher prefabricated apartment buildings. Public spaces for cultural and social activities are absenting here. The subject site is bounded by apartment buildings, family houses, a cemetery and a department store. In this position, the center of the whole housing estate Devínska Nová Ves was proposed already in the original zoning plan of the 80's of 20th century. But it has never been built. The areas in the housing estate are lacking a square as a strategic public space.

In the feasibility study for the site Meeting point, we focused on choosing proper scale of new buildings which contributed to the elimination of negative impact of large impersonal spaces of housing estate structure. We focused on sensitive accenting and defining of the square, which creates sufficiently human space, integrated into the area of existing housing estate. Research confirms that the formation of a common joint space enhances the feeling of home, identification with place and also increases the representativeness of the whole area. An important factor in design of the site Meeting point was to maintain the visual contact with the natural environment of Devínska Nová Ves. This fact distinguishes it from other housing estates in Bratislava and creates an important added value for living that can also positively influence mental and health state of its residents: “Man is inherently part of the natural environment and its normal and natural state is to

be healthy. Therefore, each of us has its self-healing mechanisms whose functioning is dependent on the natural aspects.“ [3]

The proposed urban concept uses strictly diagonally defined urban structure that visually distinguishes the new space. Diagonal deployment of the structure creates a sharply defined boundary between the new "prefabricated" and the old "brick" part of Devínska Nová Ves by using different scale, features and differentiation of common areas. Ground floors are designed higher, taking the space of the first two floors. Above this level, attractive semi - private spaces are designed that encourage the formation of social interaction among residents. The roof of the plateau is covered with vegetation, which makes it more pleasing for high-rise views. The abundant supply of apartments, which allows for selection of a variety of single and multi-storey apartments for different social groups (singles, young families, seniors, business travelers) contributes to the social differentiation.

Fig. 8, Fig. 9: Urban concept and scheme of distribution of functions in the new multifunctional residential building in Eisnerova Street in Devínska Nová Ves in the area of Meeting point. Author: Barbora Beláková, Consultant: Andrea Bacová, Institute of Architecture of Residential Buildings, FA STU.

Conclusion

Architectural intervention in the areas of prefabricated housing estates is often adapting to its environment, thereby creating compromise solutions. But prefabricated housing estates are a vital and dynamic part of cities and therefore they require innovative housing solutions. The question remains how to ensure the sustainable development of housing estates and architecture of prefabricated buildings. The solution may lie in such concepts in the areas of housing estates that will cleverly take into account the social aspects of living for different minority groups of residents. Designing human common areas, suitable for social adaptation to the environment, will create strong social ties over time. Not only in relation to the environment, but also in positive interaction among its residents. These will evidently be the driving force for the sustainability of new ideological and architectural concepts of housing.

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