The best housing estate in Czechoslovakia

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Abstract. The Brno housing estate Lesna is undoubtedly an important achievement of Czechoslovak urbanism and architecture of the 1960s. It was built on the southern slopes north of Brno in 1962–1970 according to a project by a team of architects Frantisek Zounek, Viktor Rudis, Miroslav Dufek and Ladislav Volak. Although it was a standard housing construction made of prefabricated components, the architects did not want to hide its technical expression. They also fully copied it into the very urban arrangement of long blocks, which contributed to the fulfillment of the vision of the garden city. Close cooperation between the supplier, investor and designer was ensured already in the phase of elaboration of the project task. The architecture of residential buildings is based on the diligent efforts of the whole team to promote the use of a lightweight facade of a prefabricated house using parapet panels and strip glazing in the B 60 construction system. The unusually high-quality solution of the public space in the Lesna housing estate was mainly due to the time of its creation. Political liberalization in the 1960s allowed architects to come up with a generous plan for a free stop and thus perfectly fulfill the vision of a garden city. The population density of the Lesna housing estate, less than two hundred inhabitants per hectare, was multiplied by up to four hundred inhabitants per hectare in other housing estates of the “president Gustav Husak” era due to tightening economic indicators. Public greenery respecting the natural elements of the rugged relief required a different professional approach due to the extent of the exterior design. It was common practice that landscaping were carried out on residential complexes with a delay of several months and years after the first inhabitants moved in. The architects managed to reverse this common practice, so the first inhabitants moved to finished houses with access sidewalks, planted greenery and functioning residential amenities. This could not have been imagined by its inhabitants in the later realizations of housing estates. That is why the Brno housing estate Lesna is rightly called the best.

1. Introduction
Urbanization of cities after the Second World War in Czechoslovakia is undoubtedly connected with the phenomenon of socialist construction in the field of housing – housing estates. The industrialization of the construction industry and the effort to speed up the construction of flats led to gradual prefabrication and standardization, which became an integral part of future mass construction. Although the housing estate can also be called post-war residential complexes built in the traditional masonry way, for a large part of the population, this concept remains associated exclusively with panel technology. These panel housing estates significantly influenced the appearance of Czechoslovak cities and indelibly inscribed themselves in their panoramic views. Often before their construction, the original settlement had to be demolished and destroyed.
In the 1960s, housing estates were established in Czechoslovakia, in which architects focus primarily on the quality of the living environment. This quality was also given to almost 20,000 inhabitants of Brno, who had the opportunity to live in the first large Brno housing estate “behind the Tisnovka railway“, later known as “Lesná“ (Figure 1). The Brno housing estate Lesná is undoubtedly an important achievement of Czechoslovak urbanism and architecture of the 1960s. It was built on the southern slopes north of Brno in 1962–1970 according to a project by a team of architects František Zounek, Viktor Rudis, Miroslav Dufek and Ladislav Volak. The whole housing estate thus managed to imprint a cultivated architectural expression creating a valuable residential complex. In addition, complemented by outdoor works of art by important Czechoslovak artists.

Unfortunately, there was no interest in other similar avant-garde housing estates located in the countryside in the following years. The realization of Lesná thus became not only a premiere, but also a finale at the same time.

2. Construction after World War II in Czechoslovakia
From the interwar times, the architects tried to implement mass housing construction, which should be cheap, fast and should meet the standard of modern living [2]. This was to be supported by large, prefabricated parts, which were only to be assembled on site.

Post-war housing estates can be divided into several generations. The first generation of housing estates can be defined at the end of the Second World War in 1945 and the Czechoslovak February communist coup in 1948. The solution to the housing issue in the post-war period depended mainly on the availability of building materials and construction machinery. Settlements were established in Litvinov, Ostrava or Frydek-Mistek. The "Elbe Basin" in Hradec Králové became a remarkable post-war realization. The first major complex on which typing was applied was Prague's Solidarity (Figure 2).

Although the construction was carried out using traditional construction technology, large format reinforced concrete elements (columns and ceilings) were used here, which were manufactured directly on the construction site.

The second generation refers to housing estates built after February 1948 in the spirit of socialist realism. This period ends with the success of Czechoslovak architects at the EXPO world exhibition in Brussels in 1958. Socialist realism as a method of architectural creation was implanted for us at a time when local architectural thinking was much further in its development and was therefore a step backwards. During this period, the new towns of Havirov (Figure 3) and Poruba were established.

The third generation of housing estates can be used to describe the period when the mass construction of prefabricated houses was put into practice. It was a period of liberalization in architecture abruptly ended by the Soviet occupation of Czechoslovakia in 1968. These new socialist settlements are characterized by quality urban design and especially architectural detail, which was strongly neglected in the following period. An integral part of the experimental construction were the expositions of
furnished flats. The public had the opportunity to get acquainted with the appropriate type of furniture and get an idea of life in the new space. Between 1958 and 1968, many housing estates were built, which have not yet surpassed the quality of housing. These are mainly ensembles at the Prague Invalidovna (Figure 4), in Kladno-Sitna (Figure 5) or just at Brno's Lesna.

With the last generation, called the president Husak era, the construction of housing estates in Czechoslovakia is coming to an end. The number of flats built and the size of housing estates from this period is much larger than ever before. Compared to the previous generation, the emphasis on architectural detail declined and quantity, economics of construction and one-sided rationality were preferred to the place of quality in favor of industrialized construction and supply companies. Undoubtedly, the largest realizations include Prague's South Town for 80,000 inhabitants or Bratislava's Petrzalka housing estate for 100,000 inhabitants.

3. Competition and inspiration
Stavoprojekt Brno as a project organization was given the task of designing a new city district for 20,000 inhabitants. Due to time constraints, in the summer of 1960 only an in-house anonymous competition for the urban design of the housing estate was announced [7]. The work of architects Radek Cerny, Ivan Ruller and Mojmir Kyselka Jr. was selected as the winning design by an expert jury (Figure 6). The design surprised especially with the unusually large number of densely distributed slab houses around the perimeter of the housing estate with a significantly relaxed center of the Devil's Gorge intended for
rest. The slab houses are almost mechanically located and only in some places respect the topography of the terrain.

Stavoprojekt's Technical Council has approved Ivan Ruller to become the lead designer of the housing estate. Opposite was Otakar Oplatek, with whom Ivan Ruller worked at the new theater. František Zounek, who led the housing construction studio, was therefore appointed chief designer. The basic ideas of the winning design of Černý, Ruller and Kyselka were further developed during the elaboration of a detailed zoning plan. The design of a new residential area in Brno was published in 1961 in the seventh issue of the magazine “Architektura ČSSR”.

The departure from the architecture of socialist urbanism culminated in 1959 with international competitions in socialist countries for a residential complex and an experimental house in Moscow. Its contribution was to be new ideas in the socialist conception of housing estates. This consisted of a good technical and organizational solution of urban complexes. The main task of the architects was to think about life in them and organize them to suit both socialist and communist societies. Brno's Lesna is often compared to the Finnish town of Tapiola.

Due to its environment, Tapiola can be called a forest city rather than a garden city. The idea, which was inspiring for many other housing estates, was to respect nature. The park areas were left in their original natural state. It consisted of meadows, fields, pine forests or rocks. The construction of Tapiola was the first example of working with the landscape on such a large scale. The real inspiration for the design of the Brno housing estate was the southern slopes of the local forests themselves and especially the conclusions of nationwide interdisciplinary discussions on housing in the late 1950s, which ended in 1960 with a large survey of the Research Institute of Construction and Architecture (VÚVA) [8]. The authors of Lesna were confronted with the deplorable quality of the settlements built so far, which warned them of imminent real and moral wear and tear and wanted to change that.

4. Urbanism

The spatial composition of the housing estate is defined by natural conditions, the needs of society and technical progress. The urbanism of the housing estate is based on the surrounding nature and the architecture of the houses on technology [9]. The architects tried to design the housing estate logically to the natural environment with a clear and simple operating structure. It is based on the arrangement of most residential amenities from schools, shopping malls to medical and sports facilities around the natural formation of the Devil's Gorge (Figure 7). The idea of not splitting the housing estate into districts, but of creating a compact unit around a green gorge intended for rest, had a significant effect.

Figure 6. Lesna in the competition design, project and realization (source: archive of Adam Guzdek)
The architects' assumption that it was necessary to use the most progressive techniques in the design led to them not fighting against construction technology but respecting it and making it a priority. In addition, with this approach, they have contributed to the prefabrication of buildings that have hitherto been built using traditional technology, such as shopping malls and schools. That is why the idea of a unified construction for the entire residential amenities of the Lesna housing estate arose in the Brno Stavoprojekt. The architects designed a minimum number of large residential houses that corresponded to the possibilities of construction production. Lesna thus definitively rejected traditional compact urbanism and offered a new spatial experience. While most residential amenities are located around Devil's Gorge, residential areas are approaching the outer edge of the housing estate. It is mainly formed by nine-storey slab blocks of houses arranged along the contour lines forming the horizontal line of the settlement structure.

![Figure 7. Model of the Brno housing estate Lesna before implementation (source: archive of Viktor Rudis)](image)

The architects tried to enrich the structure of the housing estate formed primarily by the horizontals of slab houses with a vertical component with the help of high-rise buildings and, conversely, with low flat buildings. Three trio of thirteen-storey residential houses are intentionally located on terrain ridges, while low four-storey point houses locally thicken the space between the slab houses. This creates a completely unique spatial composition. In addition to these three basic residential elements, the entire housing estate is supplemented on the eastern edge by four-storey fan-shaped houses along an arched street and three fourteen-storey panel houses delimiting the centre and the "entrance gate" to the housing estate. The architects were already aware during the design that if the housing estate is not to be just a "dormitory", it is necessary to create job opportunities in the place of residence. Therefore, the area north of the housing estate towards Sobesice village was reserved for light industry and research institutes to increase employment, especially for women [10].

5. Structural system
Efforts to accelerate mass housing construction in Czechoslovakia after the Second World War led from traditional construction technologies to gradual prefabrication, mainly due to elemental and volume
typing. In Gottwaldov (today Zlín), the first panel systems of the G-type (40, 55, 57) with spans of 3.2–3.8 meters have been developed since 1948. At the turn of the 1950s and 1960s, the G-57 type became the most widespread type of apartment building built in Czechoslovakia.

At the beginning of the 1960s (at a time when new types of residential houses were being prepared but not yet introduced into production), many design institutes modified the existing type of G-57 house. A development "group B 60" composed of production and design workers was established in Brno. The task was to develop prefabricated house projects, especially by modifying the G-57 type. The change in layout compared to the G-57 type was mainly in the new solution of the entrance floor and staircase space, which made it possible to place an elevator shaft. The biggest benefit of the modifications can be considered a significant expansion of the offer of various sizes of flats. A modified second variant B 60 (Figure 8) with a panel parapet cladding was used for the Lesna housing estate. It was a transverse load-bearing system with a load-bearing wall modulus with a span of 3.6 meters.

Figure 8. Construction of a slab house in the structural system B 60 (source: repro Adam Guzdek [11], 2018)

The skeletal system KPO (Figure 9) with hidden beams was used for residential equipment (primary and kindergartens, shopping centers). Great span of 7.2 meters is achieved by expanding the plate beam width of 1.2 meters using standard ceiling panels have a length of 6.0 meters. The extended beam thus made it possible to place the ceiling panels in a place where there was no maximum bending moment. Concrete columns with a cross-section of 400 × 400 millimeters were mounted on precisely placed prefabricated concrete foundation pads. An indisputable advantage of the KPO skeleton was the flatness of the ceiling thanks to hidden gutters in the plane of the ceiling structure with a thickness of only 25 centimeters. This resulted in a reduction in the construction height of the objects. The flatness of the ceiling made it possible to replace traditional masonry partitions with prefabricated or relocatable ones, which fully met the requirement for space variability.

6. Architecture
Although it was a type building site from prefabricated parts, architects no desire to hide its technicist expression. They also fully copied it into the very urban arrangement of long blocks, which contributed to the fulfillment of the vision of the garden city (Figure 10). While in the case of apartment buildings, the architects had to reach for the currently used type, in the case of residential facilities, their authorial invention could be fully manifested.

The architecture of the buildings is based on the diligent efforts of the entire team to promote the use of a lightweight facade of a prefabricated house using parapet panels and strip glazing in the B 60
construction system. The architects thus strived for a true expression corresponding to the construction principle of the building. For the higher comfort of the individual flats, the architects designed loggias in an ornamental grid on the southern façade of the panel houses. Plasticity had 220-meter-long houses fit into the natural environment. Architect Frantisek Zounek has already pushed for the exclusion of flats from the ground floor in his earlier experimental houses, and even here he placed only house equipment here [12]. This automatically increased the price of one apartment, which was strictly in the whole of Czechoslovakia in the amount of a maximum of 57,000 CSK. The architects therefore had to decide what they preferred. Architects found the requirement for storage space and lightening of houses more important than insisting on maintaining overhanging loggias. The apartments were therefore equipped only with a small balcony the width of the balcony door (Figure 11).

By combining sections into long slab houses, the laboriousness of construction production was reduced in the first phase of construction, which gave the architects a financial reserve, which in the next phase they used for the implementation of at least suspended balconies from the side. The architects thus partially succeeded in fulfilling the idea of a plastic facade. In addition to the true expression of the construction principle of the house, the architects also sought to use durable materials. Architect Frantisek Zounek, for example, managed to promote the production of panels with a surface treatment of marble crumb. The window inserts were to be covered with mosaic. Unfortunately, the Ministry of Construction limited the use of mosaics on apartment buildings, and architects were forced to replace the mosaic with paint. The architects tried to use in the parts of the buildings where people meet the material, the kind of material that is aesthetically pleasing and does not wear out. Parts of the ground floor of residential houses and residential facilities, for example, were covered with ceramic tiles.

![Figure 10. A trio of three high-rise buildings (source: © City Museum in Brno, [1])](source: © City Museum in Brno, [1])

![Figure 11. The first inhabitants move to a slab house (source: © City Museum in Brno, [1])](source: © City Museum in Brno, [1])

7. Public space
The unusually high-quality solution of public space in the Lesna housing estate was mainly due to the time of its creation. Now the turn of the 50s and 60s, when he led a nationwide debate on the issues of housing and living environment appearance, allowed architects to come up with a generous plan of building a free and fulfill perfectly the vision of the garden city. During the eight years of gradual liberalization was allowed architects to what in the following decades could only dream of. The population density of the Lesna housing estate, less than two hundred inhabitants per hectare, was
multiplied by up to four hundred inhabitants per hectare in other housing estates of the "President Gustav Husak" era due to tightening economic indicators.

![Image](image.jpg)

**Figure 12.** Solution of a public space near one of the 18 slab houses with small balconies near a decorative wall made of prefabricated components (source: archive of Adam Guzdek)

The architects' concept of creating public greenery on an area of 80 hectares, respecting and at the same time developing natural elements of rugged natural relief, required a completely different, much more professional approach than the one applied until then. It was common practice that landscaping was carried out on housing estates with a delay of several months and years after the first inhabitants moved in. The modification of the surroundings of the new residential complex was then dependent on the interest and collective commitment of its new inhabitants. Architect Zounek was aware of this risk of an unfinished housing estate and, together with the investor, managed to enforce in the first phase of construction that all landscaping will be made as an investment in a supplier manner [7]. To ensure the lasting quality of the living environment, an irrigation system [13] was also designed as part of the landscaping. A central forest park was created from the natural formation of Devil's Gorge, which was fully equipped with asphalt sidewalks with benches and park lighting, which guaranteed safety and all-day accessibility [7].

The housing estate was complemented by works of art in full accordance with the statement "Culture for the people". Political liberalization at the turn of the 1950s and 1960s although gave space to art more abstract, but their names for the approval of artistic commissions often remained in the spirit of socialist realism. The architects invented the use of large decorative walls, which helped to divide large spaces. An open-air gallery was created in the Lesna housing estate, where individual walls (Figure 12) by important Czechoslovak artists (Matal, Kafka, Kubicek, Lacinova, etc.) still form a creative background for children's games (Figure 13).
8. Conclusion
The problems of the Lesna housing estate after the Velvet Revolution in Czechoslovakia in 1989 are comparable to other housing estates. The pressure from developers led to the extension of slab houses and the conversion of shopping malls into apartment buildings. Car park capacities are no longer sufficient, although the population has declined with age. The houses were insulated, and the original technical expression of the concrete panels and striped, black windows turned into a strangely colorful scenery. Despite all the inhabitants of the settlement through all these changes they are still proud to live in this once best settlement. Architecture does completely changed, but the quality of urban design in the form of large open green park areas between the long slab houses still remain. It turns out that the Czechoslovak retain settlements in the 21st century high-quality housing and not become ghettos of excluded groups.

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