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Residential districts of the socialist realism period in Poland (1949–1956). Analysis, comparison and protection

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Abstract: The article analyzes four residential districts from the period of Socialist Realism in Poland: Marszałkowska Residential District in Warsaw, Kościuszkowska Residential District in Wrocław, residential Nowa Huta in Cracow and Downtown Residential District in Szczecin. These districts are analyzed in terms of urban layout, architectural forms, building intensity, and green areas. Common features of these housing complexes, characteristic for socialist realism architecture in Poland, were also examined. The authors also consider the protective methods of individual housing complexes. Each of the examined residential districts is considered in two aspects – the urban layout and architecture as well as the form of protection and it condition of the present day. For each analyzed housing complex, a map was prepared showing the scale of the urban layout and the percentage share of pre-war buildings, buildings from the period under study, and buildings erected in later years.

Keywords: residential architecture, socialist realism architecture, socialist realism urban planning, polish socialist realism, residential urban planning, post war architecture

Introduction

After World War II, a new style of architecture was created in the countries dependent on the Union of Soviet Socialist Republics, as a result of communist ideas. It was called socialist realism, and was based on Soviet architecture. Architectural and urban projects in the countries of Eastern Europe were subordinated to political ideology, but also to the means of its implementation. The leaders of the camp countries of the so-called "people's democracy" were aware of this. The ideology of the communist party was realized through new forms of architecture and urban planning implemented in many war-ravaged and newly-built cities. The features of this architecture and urban solutions were created on elements of classical palace architecture, which were adapted to the urban arrangements of many housing estates intended for workers. The buildings were to show the superiority of the new communist architecture over the modernist realizations of the interwar period. In many buildings, architectural solutions implemented were based on palace patterns, also numerous decorative elements, typical of Classicist architecture, were applied, enriched with themes of national architecture style. The urban systems created monumental spatial arrangements (Fig. 1), often connected with industrial plants – steelworks, factories.

Fig. 1. Example of socialist realism in Czech Republic – Arch Building in Poruba, house settlement of Ostarava, by Evžen Šteflíček,1954, photo: authors, p. 1

Architecture and urban forms of socialist realism in Poland

The period of socialist realism in Poland covered the years 1949–1956, when the country, ruined by World War II, was under Soviet occupation. The enormous destruction of cities allowed the construction of entire urban complexes in the spirit of socialism. During this period, many new districts were created in the cities built for the "working class" in connection with the planned development of industry in the country. Such implementations as Nowa Huta near Cracow. Workers' districts in most major cities and industrial cities were also created at that time, such as: Marszałkowska Housing District ([*pl.] Marszałkowska Dzielnica Mieszkaniowa – MDM*) in Warsaw, Kościuszkowska Residential District ([*pl.] Kościuszkowska Dzielnica Mieszkaniowa – KDM*) in Wrocław or Downtown Residential District ([*eng.] Śródmiejska Dzielnica Mieszkaniowa – ŚDM*) in Szczecin.

In architecture, this trend was manifested primarily by monumentalism, which was to instill respect for the power of the new communist authorities. The construction industry of that period was neither economical in terms of materials and costs, nor functional. Architecture of this period was defined as "socialist in content and national in form". Impressive spaces provided an excellent backdrop for official state ceremonies. Urban systems of housing estates were characterized by axial and symmetrical spatial solutions. The buildings were located around large squares and along wide avenues. The facades located by the main communication routes were given a representative appearance, while at the same time the utility values of the apartments were neglected.

Socialist propaganda in architecture consisted not only of the construction of new buildings, districts or even entire cities, but also removing structures associated with the rejected "bourgeois" ideas. Prime example of such approach is the construction of a workers' district Marszałkowska Housing District (MDM) in Warsaw, built on ruins located on the main street of Warsaw – Marszałkowska Street. The construction of the workers' district in this place became a symbol of the reconstruction of the capital of Poland in accordance with the spirit of the new system. Designed by the architecture studio under the direction of Józef Signalin, the MDM district was to implement social justice and equality of citizens in a classless society. Apartments of the same high standard, were designed for tens of thousands of members of the working class [Lorek, 2007]. Similar districts, although built on a smaller scale, were also constructed in other Polish cities. New housing estates built at a dizzying pace were to confirm the power of socialism, and also to introduce the working class to the city centers – an area once reserved for higher social classes [Lorek, 2007].

Marszałkowska Residential District (MDM) in Warsaw

MDM was the main investment of Warsaw, realized in the years 1949–1955, is still a subject of discussion today. Its construction in the heart of the well-preserved southern city centre required the demolition of many surviving, after WWII, tenement houses. And so, by the end of 1954, almost all of the buildings from the interwar period, between the Union of Lublin Square and Aleje Jerozolimskie street in Warsaw, have disappeared.

The authorities were particularly interested in the construction of MDM from the very beginning. Due to the great importance of the project, it was commissioned to the team that had already worked together on the construction of the East-West route in Warsaw, enthusiastically received by the authorities of the regime and considered to be a model of modern technology solutions. The MDM was to be the residence of approximately 45,000 inhabitants of Warsaw. The investment involved the construction of approximately 6,000 new flats, most of which were designed as 2 – and 3-room apartments of a high standard and larger area than in other housing estates in Warsaw. MDM's flats were initially intended for workers building the estate itself. However, the prestigious buildings located in the centre of the capital were quickly handed over to high-ranking party activists.

Architecture and urban plan

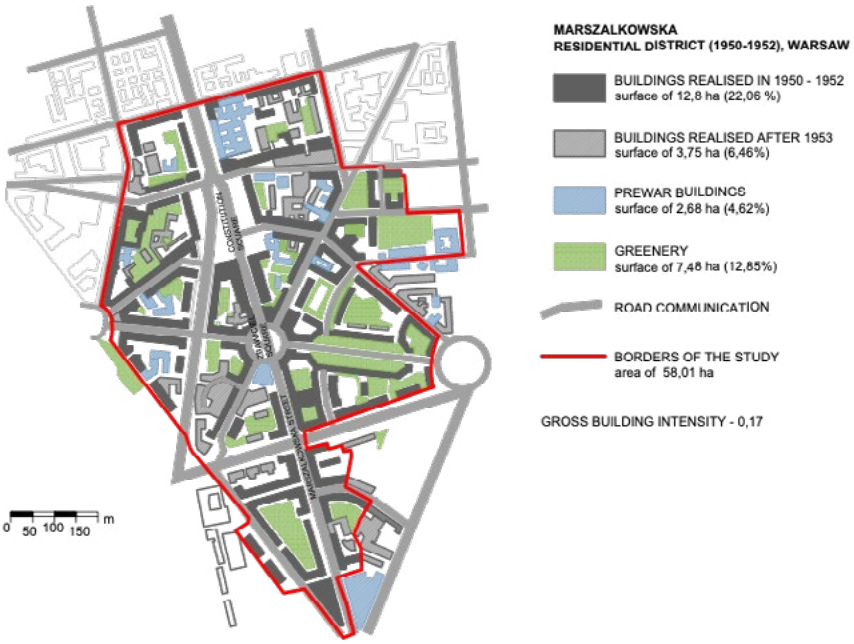

Fig. 2. Plan of Marszałkowska Residential District (MDM), Warsaw, source: authors, p. 3

The axis of the MDM urban plan was Marszałkowska Street (Fig. 2), which was to be almost three times wider than before the war. The centre of the district was to be a rectangular square (there were nearly 50 tenement houses in its place before the war), surrounded by high blocks of flats with arcades on the ground floor, where service premises were located [2]. Marszałkowska Residential District was designed comprehensively, providing residents with comfort and access to various services. The MDM's functional program included: kindergartens, primary schools, health care facilities, indoor swimming pool and sports fields, district community centre, cinemas, theaters, petrol stations, underground car parks, catering infrastructure and other service outlets. Taking care of the high aesthetics of the MDM housing estate, all small service units, kiosks and street booths have been designed according to a uniform pattern and integrated into the body of residential buildings [*Stolica*, 1950].

The designed residential development of the District was to be equipped with central heating, bathrooms with gas stoves, gas kitchens, high-speed elevators, garbage chutes, garages for prams, laundry and drying rooms in the attics, as well as telephone and radio nodes. The housing estate's blocks of flats are designed mainly as 6–8 storeys, on main streets and squares, and 5–6 on side streets. The ground floor of the buildings along the main streets was made of ferroconcrete in order to obtain large window openings – shop windows. The high ground floor (up to a height of 7 m) was enriched with arcades and colonnades, with terraces,

decorative entrances with elements of sculptures or mosaics. In the design of the facades, especially the front elevations, the three-division principle[1] was applied through the use of cornices, material differentiation, scaling of details or tectonic differentiation of the building [Baraniewski, 2010]. The MDM buildings were finished with expensive, precious materials: the plinth part was made of sandstone or granite, the upper parts in fine plaster of various colours or prefabricated facing bricks, while stone was used to finish window openings, cornices or facade details [Baraniewski, 2010]. The high standard and aesthetics of the housing estate's space and the residential buildings themselves were to compensate for a serious shortcoming of the entire urban planning concept – the lack of high greenery, squares or a nearby park[2].

MDM under protection

Fig. 3. Marszałkowska Residential District, Constitution square, Warsaw, 2015; source: [15], p. 3

Today, the apartments located at the representative Constitution Square are occupied by offices or rented to tourists. Architects did not manage to create a friendly and healthy residential environment (Fig. 3). Nonetheless Marszałkowska Residential District in Warsaw was first entered in the Register of Historical Monuments on April 27, 2015. The entry was intended to protect the values of the socialist realist urban layout and architecture style. However, some building owners and housing associations appealed against the decision of the conservator, alleging that the conservator did not specify the boundaries of the monument and did not specify the criteria for separating the area from the complex of all buildings. After a few months, the Ministry of Culture overturned the decision to enter MDM in the register of monuments. The case went to the provincial conservator of monuments. The decision to re-enter MDM in the monuments register was to allow for more effective fight against illegal advertising, inadequate insulation of buildings or replacement of woodwork with plastic. It was only in March 2017 that the urban layout and architecture of MDM were finally entered in the register of monuments by the Provincial Conservator of Monuments, in a slightly reduced area.

1 The three-division principle referred to the building tradition of Warsaw from the interwar period and the frontage design of tenement houses. The tree-division of the façade separated horizontally three parts of the façade: the plinth (ground floor and mezzanine or 1st floor), the main body (3rd, 4th, 5th, 6th floor) and the top (top floor, cornice, attic or balustrade).

2 MDM has the lowest percentage of green areas among all examined residential districts in the article, which reaches 12,85 %.

Kościuszko Residential District (KDM) in Wrocław

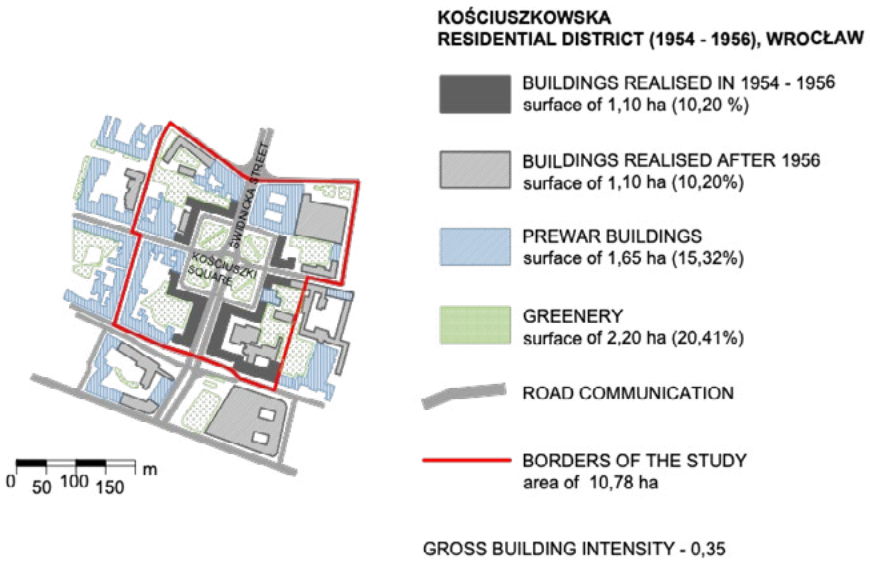

Fig. 4. Plan of Kościuszko Residential District, Wrocław, source: authors, p.4

The largest and most comprehensive urban and architectural project of the socialist realist period in Wrocław is the Kościuszko Residential District ([*pol.] Kościuszkowska Dzielnica Mieszkaniowa* – KDM) (Fig. 4) for 4,000 inhabitants, which was implemented between 1954 and 1956 on the site of 19th century buildings destroyed during World War II [6]. The project of KDM was selected through a competition organized in 1953 by the Wrocław Branch of SARP (Association of Polish Architects). Its author was the design team of the Wrocław office Miastoprojekt.

Architecture and urban plan

The design concept corresponded to the style of Warsaw's Marszałkowska Housing District (MDM), but on a much smaller urban scale. KDM was also characterized by attention to the right proportions of buildings – more friendly to residents, as well as a much more modest standard of trimmings. Like the Warsaw MDM, the Kościuszko District was a propaganda project. The government's idea was to show, through it, the strength of the growing, on Polish land, new Wrocław.

All arrangements concerning the final shape of the investment had to be approved by the Committee of Urban Planning and Architecture in Warsaw. The new architectural concept preserves the pre-war urban layout of the square, which is located in the centre of the complex and was originally designed by the French engineer H. Blein in 1807 and built on consistently until the 1920s. The square in the middle of KDM, with orthogonally departing streets is surrounded by residential buildings. The junction of the streets in the central part of the square was decorated with a rounded island, which is also the site of an earlier monument. After the war, only three buildings from the former development survived[3], and were incorporated into the new estate. In the interwar period, Tauentzienplatz[4] served as a kind of prestigious salon for the city [Prętczyński, 2014]. After the war the architects wanted to restore this place to the same prestige. The urban design of the new residential district of Wrocław also included the adjacent streets. The residential buildings included in the complex were designed as five-storey, with a high ground floor in the arcade, which was an analogy to the buildings of the MDM housing estate (Fig. 5).

3 They were: The Savoy Hotel, the former headquarters of the Dresden Bank branch – now the headquarters of Santander Bank and the Warenhaus Wertheim shopping center – now Renoma shopping center, that closes the urban complex from the north.

4 Tauentzienplatz – the German name for Kościuszko Square, which functioned until Festung Breslau in 1945.

Fig. 5. Kościuszki Residential District, aerial view, 2005, photo: www.fotopolska.eu, p. 4

The facade design also applied the three-division principle, clearly separating part of the ground floor with wide arcades covered with sandstone slabs, finished with a cornice just below the window openings of the second floor. The main part (2–5 floors) was finished in mineral plaster, with sandstone bands only around the high French windows, while the crowning was a wide sandstone cornice and a steep roof with oval dormers. The corners of the buildings are accentuated by wide stripes of sandstone slabs running from the plinth to the main cornice and by the corner attic walls in the form of balusters made of stone. The design of the apartment was spacious, accessible from staircases on the side of green courtyards [Prętczyński, 2014].

KDM under protection

Today, KDM is considered to be one of the best post-war projects in Wrocław. Its architectural qualities and urban layout were highly valued from the beginning. Already in 1994, KDM was entered in the Wrocław register of monuments[5]. It protects the urban layout and architecture of individual buildings included in the KDM complex.

Nowa Huta Housing Estate in Cracow

Works on the project of the city of Nowa Huta (Fig. 6) began immediately after the WWII in 1948. It was Poland's first post-war city built entirely from scratch. Today it is a district of Cracow. Nowa Huta terrain was an industrial center, which was a gigantic employee base for the emerging metallurgical plant. The residential part c was designed by Tadeusz Ptaszycki, an architect born in St. Petersburg, though already educated in Poland. Part of the (old) Nowa Huta erected during the socialist realism period fulfilled many of the rules in force at that time regarding the shaping of the urban fabric [Sumorok, 2014].

5 Register of monuments of the city of Wroclaw (state for the 17.01.2011), register number: A/1491/543/Wm. Available online: https://tumw.pl/wp-content/uploads/2011/01/rejestr_zabytkow_pdf-17–01–2011.pdf (10.11.2019)

Fig. 6. Plan of Nowa Huta Housing Estate, Cracow, source: authors, p. 5

Architecture and urban plan

Nowa Huta and its successive housing estates were established over a period of several dozen years, representing urban architectural concepts typical of the socialist realism period up to late modernism. Over the years, the character of the housing, its intensity and the quality of the new buildings have changed. Apart from the obvious care for recreational areas and greenery during planning, Nowa Huta's concept was first of all in keeping with Howard's idea thanks to its clear urban network with a clearly separated green centre, extensive residential complexes and wide communication arteries in the form of avenues planted with trees. The designed principles of green housing estate combined elements of the historical style of the city (rows of trees, with the conceptions of interwar functionalism)[Sumorok, 2014, Komorowski, 2017]. The first part of the housing estates (1949–1950) was located closest to the plant – the Lenin Steelworks, which was built according to the first, classicist plan. They had an intimate scale and a traditional form, modelled on the pre-war residential districts. The next stage of construction of the housing estate (1950–1956) was already implemented in accordance with the styles of socialist realism intensively promoted at that time [Komorowski, 2017]. This caused a departure from the concept of a garden city. In addition, due to the expanded metallurgical plant and the increased number of target residents of the Nowa Huta estate, it was necessary to increase the number of flats. The original building design was modified in the spirit of the idea of socialist realism. Tadeusz Ptaszycki's team created a new design of the Central Square and adjacent buildings. This huge square (today named after Ronald Reagan) was part of the idea of propaganda architecture. In the next, third stage of expansion of the Nowa Huta housing estate, the symmetrical assumptions of housing complexes began to diverge. During this period, the Town Hall Square was created, which stood in opposition to the axial and symmetrical development of Róż (*eng. Rose*) Avenue (Fig. 7). The creation of closed urban interiors, similar to the quarterly residential development, was ceased, and more free, open inter-block spaces were started to be created.

Fig. 7. Nowa Huta Housing Estate, Rose Avenue, 2018; photo: Authors, p. 5

The city's political history is lined with an ironic thread, because "the first socialist city" in the 1980s became one of the "fortresses" of Solidarity[6]. Local protests and street demonstrations were an important element in the fight against the political regime in Poland.

Nowa Huta under protection

In the following years, after 1959, Nowa Huta was expanded with new housing estates. Some of them irreversibly affected the disharmony of the Central Square panorama and further caused the depreciation of the urban composition of the center of Nowa Huta [Komorowski, 2017]. The oldest part of Nowa Huta was entered in the register of monuments only in 2004. The entry only referred to the protection of the urban layout of the oldest building complex. It did not concern architecture, which should be subject to special conservation protection, and effectively protect buildings against modernization and destructive renovations, the architectural details of Nowa Huta buildings and the original form of development. The urban layout of Nowa Huta is a closed, though infinite, work. It is a testimony of a bygone style era, governed by different rules than today. Regardless of the aesthetic assessment, it should be respected as a historical value. For these reasons, it is protected by a legal provision that generally does not allow major changes. In April 2015, the Provincial Conservator of Monuments decided to enter in the register of monuments, buildings located around the central square. Ronald Reagan.

In 2017, the analysis of the introduction of the Cultural Park in Nowa Huta began. This action would facilitate and deepen conservation protection of the area of old Nowa Huta. In 2017, extensive social consultations were held with the residents and owners of Nowa Huta on the protection plan of the Nowa Huta Cultural Park [Myczkowski, 2017]. On November 20, 2019, the Krakow City Council adopted a resolution on the creation of a cultural park under the name Nowa Huta Cultural Park. The resolution was adopted to protect the cultural landscape, monuments and the historical urban layout of Nowa Huta, for the sake of a proper image of the City, in order to preserve and shape the cultural landscape and the historical nature of public space in this area.

Downtown Residential District (ŚDM) in Szczecin

The Downtown Housing District in Szczecin ([*pol.*] *Śródmiejska Dzielnica Mieszkaniowa – ŚDM*) project covered the area of three squares: Grunwaldzki, Lotników, and Żołnierza Polskiego, where it was planned to rebuild the destroyed buildings that qualified for this, and to erect new buildings in the place of those demolished (Fig. 8).

6 A nationwide trade union founded in 1980 to defend employee rights. Until 1989 also one of the main centers of opposition against the government of People's Poland and communism, headed by Lech Wałęsa.

The project of several dozen buildings covered a significant area of the downtown area and was completed in the years 1952–1962. The new district aimed at cleaning up the destroyed downtown area – merging scattered fragments of buildings that survived the war bombardment and providing accommodation for about 60,000 people resettled to Szczecin from former eastern Poland.

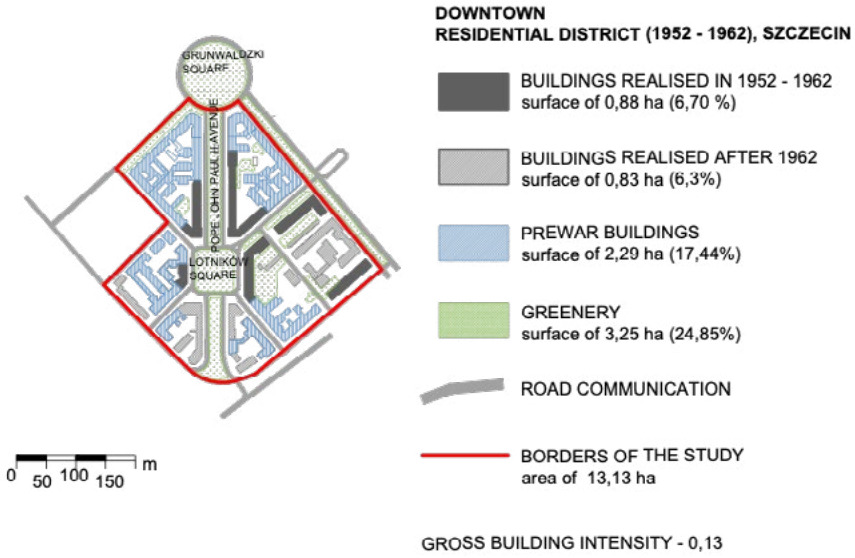

Fig. 8. Plan of Downtown Residential District, Szczecin, source: authors, p. 6

Architecture and urban plan

Fig. 9. Residential buildings of ŚDM, nearby Grunwaldzki square, Szczecin, 2019; photo: Authors, p. 7

The Downtown Housing District was to be the first pillar of the city's reconstruction after World War II. New buildings, created in the spirit of social-modernist architecture, made it possible to create better living conditions

than pre-war solutions, which were assessed negatively by the creators of the new housing estate [Łopuch, 2011]. The downtown buildings of pre-war Szczecin were mainly tenement houses from the turn of the 19th and 20th centuries, with poor hygiene and sanitary standards. The new housing estate, like the MDM, was to take care of all the needs of the residents. A whole range of services, schools, kindergartens, nurseries, clinics, shops and green recreation areas were provided within the estate. In this respect, the housing estate was part of the 'Athens Charter' adopted in 1933, which shaped a new urban thought precisely in terms of a modern housing estate ensuring the availability of basic services, set hygienic and sanitary standards for the flats themselves and treated the healthy housing environment with access to greenery and recreation facilities.

The urban layout of ŚDM included the use of existing and well-preserved road infrastructure and a network of sanitary facilities. The newly designed buildings (Fig. 9) reflected the original line of development, incorporating the preserved buildings into the new urban fabric. The ŚDM buildings were supposed to close the existing nineteenth-century quarters, making them more functional – through larger courtyards with greenery.

ŚDM under protection

The development of the Downtown District is protected by the provisions of the Local Development Plan 'Centrum – Plac Odrodzenie' in Szczecin in 2008. The provisions strictly define potential possibilities of introducing changes to existing buildings[7]. In addition, the buildings of the Downtown Housing Development complex were included in the goods of modern culture in Spatial Development Plan of the West Pomeranian Voivodeship in 2010 [Kozłowska, Rek-Lipczyńska, 2017].

Conclusions

The new districts of post-war Poland were linked by the fact that they were created in a centralized supervision system, traditional approach to both urban planning and architecture, as well as by the representativeness and monumentalism of the external appearance of the buildings. This aspect connects all four residential districts studied. Despite the fact that each of them has a different scale – starting from the largest Nowa Huta in Cracow, which is a town-district, and ending on the Wrocław Kościuszko Residential District with an area of approx. 10 ha, they have a similar urban composition, based on the axial or radial layout with centrally located squares (Fig. 10).

Additionally, all of the researched housing complexes have a very low gross building intensity coefficient[8], which for most districts is less than 0.2. This factor for buildings up to 7 floors, can be up to 0.55 [Chmielewski, 2010]. This allows the arrangement of wide and comfortable communication routes with high plantings and provides large inter-block spaces that light up the interiors of the apartments well.

An important aspect of maintaining this building in an unchanged and well-preserved conditions is its adequate protection. However the principles of protection are implemented at various levels. Some of them protect the urban layout, not individual buildings (this applies to the Nowa Huta housing estate in Krakow). Others are protected only by the provisions of the local development plan, which specifies the nature of new buildings arising in the surrounding area, and changes to existing buildings (Śródmiejska Residential District in Szczecicno). However, this protection is not as strict as that concerning objects covered by conservator's protection (Kosciuszkowska District of Housing or Marszałkowska District of Housing).

Most of the analyzed housing complexes have only been covered protection over the last few years. Unfortunately, for most of them it is too late, and earlier changes or modernizations of existing buildings irreversibly changed the character of historical buildings. Such late protection of these urban complexes results from the

7 Resolution NR XXIII/596/08 Szczecin City Council , June 16, 2008, Regarding the Local Spatial Development Plan "Centrum – Plac Odrodzenie" in Szczecin

8 This is the quotient of the built-up area and the total area of the district (including transport routes).

fact that the socialist realism architectural style has been poorly associated for years. Moreover, immediately after the end of the socialist realism period, this trend was criticized by the architects[9].

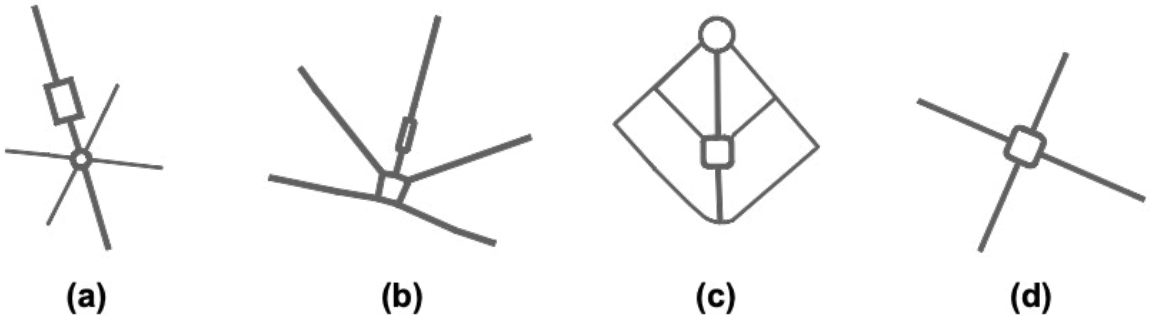

Fig. 10. (a) diagram of the urban layout of the MDM district in Warsaw. It is an axial arrangement with the main axis of Marszałkowska street and main squares – Constitution Square and Zbawiciel Square; (b) diagram of the urban layout of Nowa Huta residential district. The plan is implemented in a radial arrangement, with centrally located Ronald Reagan Central Square and outgoing five communication routes, including the main, centrally located, Roses Avenue; (c) diagram of ŚDM district in Szczecin implemented on an axial plan with the main axis of John Paul II Avenue and two squares – Grunwaldzki Square and Lotników Square; (d) diagram of the urban layout of KDM district in Wrocław. Implemented as a central arrangement with Kościuszki Square located in the center and two communication routes crossing in the center of the foundation; p. 7

Due to the so-called top-down management of architecture, uncritical imitation of examples of Soviet architecture and erroneous theoretical assumptions in this period, the utility of architecture was devalued and crushed by pompous forms incompatible with the humanistic assumptions of socialism [Sumorok, 2014]. Design reality reveals a number of paradoxes. The most obvious ones relate to the collision of imposed, political and real space, existing in some way individualized. However, this architecture is a testimony of a certain period that deserves to be remembered.

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9 Socialist realism in architecture was negatively evaluated at the National Architects' Conference held in Warsaw on 15–17 March 1956 where it was claimed that direction of urban planning and architecture in the years 1949–1955 was fundamentally wrong [8]. Socialist realism in Poland ended after the Polish National Council of Architects in 1956.

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Architecture of Polish water sports facilities located in parks in the interwar period

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Abstract: In the interwar period, many sports and recreation facilities were built in Poland. Some of them were located in unique spaces with significant aesthetic and environmental values. One of the examples of such facilities are open swimming pools in the city of Wisła, Ciechocinek and Lviv. Examples of these objects show thoughtful compositional and urban solutions. Such a location of the facilities surrounded by nature was conducive to rest and practicing sports undisturbed by city noise. The location of water sports facilities in parks had many advantages which resulted in better conditions for practicing sports.

Keywords: architecture, water sports, interwar period, Lublin

General conditions of water sports architecture

During the interwar period the trend to locate sports facilities and swimming pools in sports, recreational parks can be observed. These buildings were located in green areas arranged in the form of alleys and squares creating the character of a park space. Additional elements in these spaces were also playing fields, running tracks and gastronomic pavilions. The parks had a good location due to their proximity to the city center. This location made it possible for many residents to reach the park and swimming pool on foot, which encouraged the use of these facilities through easy public access[1].

Architecture of water sports faclities on the example of Lublin

Ciechocinek

One of the most interesting, both architecturally and technically swimming pool built in the interwar period located in the health resort is the brine and thermal swimming pool in Ciechocinek. Based on the example of the construction of a brine and thermal swimming pool in Ciechocinek, which started in 1931 and was put into operation in 1932, the construction methods and construction techniques used in the interwar years can be characterized.

Buildng design in Ciechocinek was created in 1931 by Romuald Gutt and Aleksander Szniolis. A changing room with rounded corners and an arch-shaped roof over the entrance was proposed. The changing room is divided into separate entrances for women and men. Supplementing the spa offer with a sports infrastructure with a bathing area, sports fields, beaches, a brine pool and a small kitchen for children was to complement its attractiveness and generate even more tourists[2].

1 Pawlikowska-Piechotka A., Piechotka M., *Dzieje obiektów sportowych w Europie*, Podręcznik akademicki, AWF, Warszawa 2017.
2 J. Kordiak, *Szklane domy, wizje i praktyki modernizacji społecznych po roku 1918*, Zachęta – Narodowa Galeria Sztuki, Warszawa 2018. s. 77.

The main structure of the building was a reinforced concrete skeleton filled with silicate blocks and partly with clinker bricks. The floors in men's and women's changing rooms were made of terracotta. The windows were made of steel and the doors as paneled ones in iron frames. Internal, partition walls the toilets are made of glazed bricks. The lower terraces were laid out of concrete slabs with dimensions of 2×2 m divided by strips of clinker bricks. The dance hall is finished with terracotta.

The pool was designed with dimensions of 100×40 m and in the shallowest point its width was reduced to 32 m. Around the pool there is a paddling pool with a width of 1.30–2.00 m. The pool is completely divided into three main parts depending on the depth. The shallowest one, intended for children, 0.15–0.90 m deep and 32×20 m, for adults 0.90–1.50 m deep and 60×40 m, and for players and athletes, 1.50–3.50 m deep. dimensions 40×20 m. There were steps leading to the pool, 4 m wide, and there were ladders to the outside every 20 m. In the vicinity of the deepest part of the pool there is a jump with a reinforced concrete structure 3.0 m high and two additional trampolines suspended at the level of 1.0 m. Additional elements were reinforced concrete slides, two for children and one, 5 meters for adults. The entire basin was made of reinforced concrete. The bottom is 15 cm thick and made of reinforced slabs 10×10 m in size. Around the perimeter of the swimming pool there is a rounded end that allows water to overflow into shallower pools. Water with impurities and suspended solids was discharged through separate channels to the sewage system.

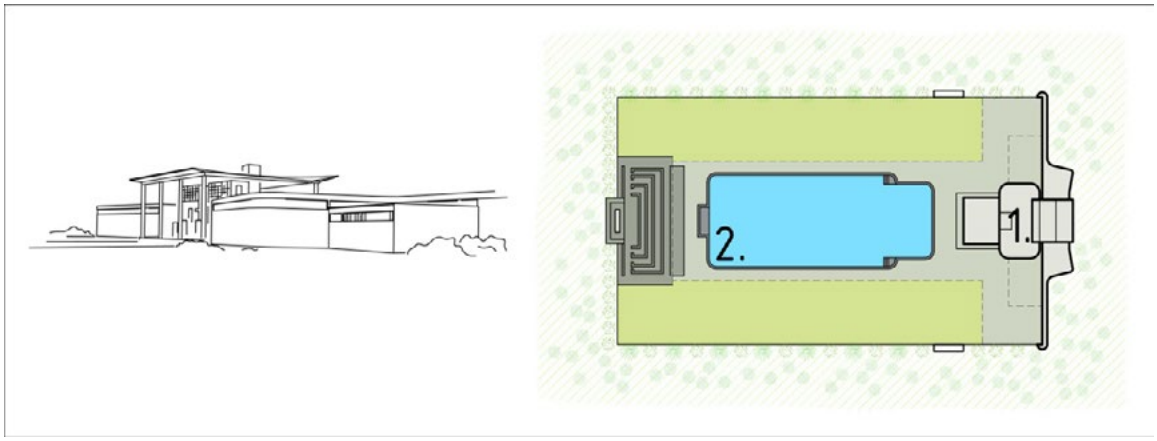

Fig. 1. Situation plan and architecture scheme of Ciechocinek swimming pool, 1. Main building, 2. swimming pool.

Wisła

An example of modern solutions of sports architecture in the style of modernism was the sports park in Wisła. The architects of the building were E. Zaczyński and S. Tworkowski. The complex included an open-air swimming pool 50×50 m, a shallow pool 30×30 m, paddling pools for children, tennis courts used in winter as ice rinks, restaurants, changing rooms and toilets. A similar facility was also the Medical Center for the Application of the Sun, Air and Movement in Druskininkai. The designers of the building were Edgar Norwerth and Jan Jabloński. Construction plans were also prepared for the Open Air Baths Institute in Katowice, designed by Lucjan Sikorski and Tadeusz Łobos[3].

The sports park in Wisła, the assumption of the investment, was to strengthen tourism and recreational values, especially when the rank of the village increased after the construction of the President's residence. Wisła, as a city, was developing every year due to the influx of more and more amount of tourists. The infrastructure was systematically expanded and the railway connection was under construction. In the years 1930–1934, a swimming park was created with a reinforced concrete basin and a jumping tower, wooden changing rooms, tennis courts, a beach and a cafe building that also served as an administrative facility and a back room with

3 Pawlikowska-Piechotka A., Piechotka M., *Dzieje obiektów sportowych w Europie, Historia architektury sportowej od czasów starożytnych do współczesności*, Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie, Podręcznik akademicki, Warszawa, 2017. s. 261.

changing rooms for hockey players using the basin in winter. The author of this complex was Stefan Tworkowski. The proper use of the site intended for the construction of the facility was an element that united the sports plan. The two-storey pavilion with lots of glazing and arcades on the ground floor was rated as one of the best examples of the 1930s architecture.

Taking the example of the swimming park in Wisła, it is possible to demonstrate the care for segregating sports and recreational functions in the spatial arrangement of the urban layout. The parks are located along the Vistula River. In the southern part there was a cloakroom complex with the main entrance. The building is divided into three segments connected by a corridor in the northern part of the building. The cloakroom facility is divided into a section for women and men. After leaving the cloakroom to the park, the first area was the areas intended for children. The central part of the park was widened to the east with green areas and a beach. On the west side, by the river, there were open swimming pools divided into a shallower part for non-swimmers and a deeper part for swimmers. In the northern part of the complex, there were tennis courts surrounded by stands on three sides. The function of this court area in winter was turned into an ice rink. In the northernmost part there was an archery track.

In the years of 1934–1936, expansion of the cloakroom facility was planned with additional cloakroom rooms and a cafe.

Among the designed facilities related to water with the function of a swimming pool, open swimming pools were most often designed. At the beginning of the 1930s, about 150 such facilities were built annually, and each year their number was systematically growing. In 1939, more than 350 swimming pools were designed[4]. A large number of such facilities resulted from the relatively high availability in terms of their implementation. They were not cheap and simple in terms of execution, but then their implementation was justified due to the great interest of the public. The indispensable elements of the open-air swimming pools were the pool basin and properly ensured water circulation. The stands were additional elements.

The architecture of the pavilion was designed in a modernist style. The horizontal lines of the building were emphasized by horizontal stripes of windows, cornices and stripes of different façade finishing, both in terms of color and material.

The façade also features a module highlighted by pilaster strips and window divisions. The central part of the building, where the main entrance is located, has been accentuated by a local elevation in relation to the eastern and western wings of the building.

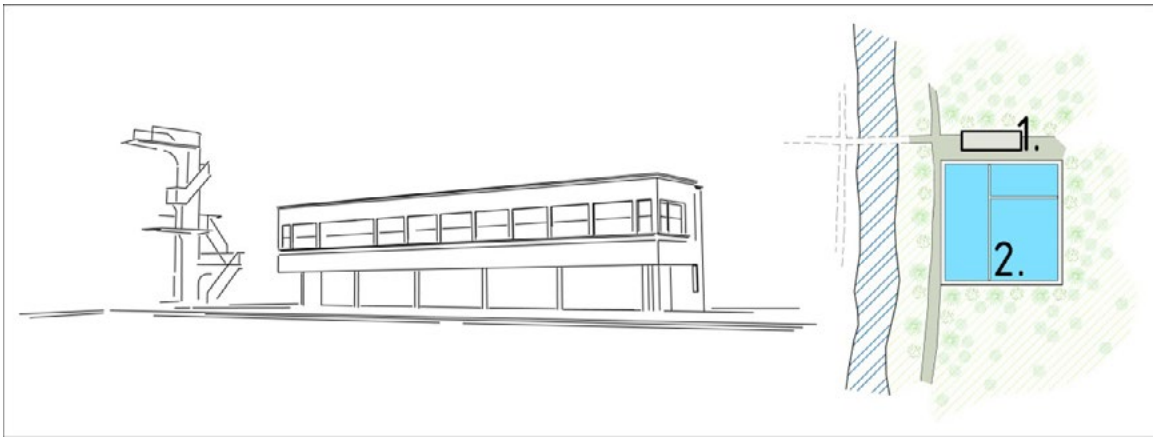

Fig. 2. Situation plan and architecture scheme of swimming pool in Wisła, 1. Main building, 2. swimming pool.

4 *Mały Rocznik Statystyczny 1939*, Główny Urząd Statystyczny Rzeczpospolitej Polskiej, Rok X, Warszawa 1939, s. 20.

Lviv

In the neighborhood of Lviv, the Żelazna Woda park was created, in which there was access to iron-rich waters. In part of the site there was a natural pond called the Kamiński pond[5]. In the years 1935 – 1938 a swimming pool was built there according to the design of architect Karasiński and architect Kozakiewicz[6].

On the example of the Dynamo basin located in the Żelazna Woda Park, one can be observe the characteristic urban layout of individual compositional elements of the larger sports and water facilities. The first element was a cubature building of cloakroom and sanitary facilities, which also had restaurant or cafe rooms. The building was designed as a one-story building with a part of the main hall with increased height. The height was not only different inside, but was also accentuated in the façade, in which glazing with a modular division of several meters was used.

The roof in the central part is designed as hipped, envelope roof, and in the lower part – shed or flat. The second, main element of the complex were the swimming pools divided into users: children, adolescents, amateurs and sportsmen. The basins for various purposes differed in terms of accessibility, method of entry and depth. One of the pool elements that appeared in almost every facility of this type was the jump. The jump was designed and built in a wooden spatial truss structure. In larger swimming pools, the jumps were erected in a reinforced concrete structure. The third compositional element of the park and swimming pool layout were the stands. The seats were designed as wooden benches on brick steps. Currently, the facility is neglected and out of use.

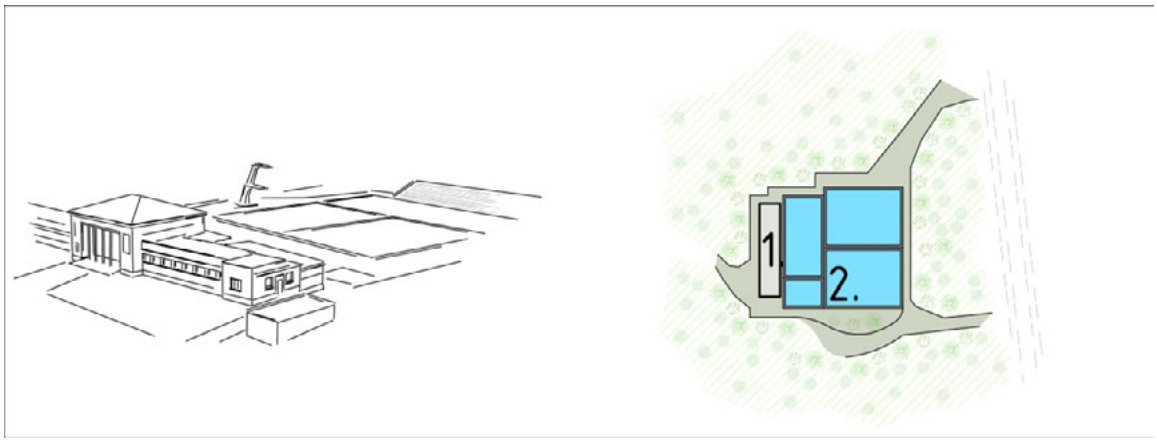

Fig. 3. Situation plan and architecture scheme of Lviv swimming pool, 1. Main building, 2. Swimming pool.

Conclusions

The location of the swimming pool facilities in sports parks was an opportunity for many residents to use them due to the good location and easy access. Thanks to the location of the pools surrounded by green areas, it created extremely valuable aesthetic values and enriched the impression of being in contact with nature. The location of sports facilities in park areas had many advantages. The area covered with trees, shrubs and grass along with a specially designed arrangement of alleys and public spaces made it possible to rest and created a healthy environment for sports. The examples of projects from Ciechocinek, Wisła and Lviv are one of the most recognizable sports and recreation facilities of the interwar period in the field of water sports.

5 *www.lwow.info*, odczyt: 22–08–2019.

6 W skład założenia kąpielowego wchodziły m.in.: brodzik dla dzieci, baseny o różnych głębokościach z trampolinami oraz plaża.

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The Truth in Architecture as a Synthesis of Material and Ideas – Brick Architecture of Białystok

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Abstract: In contemporary architecture, the problem of the truth and lies can be considered in several aspects – form, idea, material, also in terms of beauty and aesthetics. The aim of this article is to show that the truth in architecture can be interpreted as a kind of synthesis of material and ideas. Such synthesis occurs, inter alia, in the architecture of buildings with brick facades. The author of the text carries out the case studies analysis on the example of the brick architecture of Białystok from the 19th and 20th centuries – among which several outstanding works of architecture can be identified. The result of the research is the confirmation of the thesis put at the beginning and the presentation the evolution of the forms of brick architecture in Białystok in the 19th and 20th centuries.

Keywords: brick, architecture, truth, Białystok

Introduction

Architecture has a long tradition in searching for the truth. The truth is timeless. In philosophy, mathematics, and other sciences – truths are permanent, they last for years, sometimes centuries. Sometimes the truth changes as a result of scientific discoveries or civilization changes, and the evidence and claims are updated. How to understand the concept of truth in contemporary architecture? This issue is complex and ambiguous. It is not always possible to state in a specific case of an architectural thing that we are dealing with the truth or a lie. There is truth, there are half-truths, and there is also the truth that is not fully told – the untold truth is not the same as saying untruth. Contemporary architecture is dominated by untruth, in all its diversity with many conflicts between nature and culture, tradition and modernity, form and function, form and structure, form and meaning, universalism and regionalism [Włodarczyk, 2009]. These conflicts occur simultaneously on many levels and make it much more difficult to understand contemporary architectural works, thus making it difficult to find the truth in architecture. Artists believe in the existence of truth in art, also in architecture. In the past, the issue of truth played a significant role, trends in architecture were based on a certain ethics, the architectural form resulted from certain ideological assumptions and was related to the adopted type of aesthetics, with a specific canon of beauty. According to many authorities, the truth can be found in ancient architecture, in the architecture of the Gothic and Renaissance periods, but also in the architecture of modernism, brutalism, etc.

It seems that one of the criteria for the existence of truth is also the time, which verifies the aging process of architecture. It is the influence of time that causes the architecture of some buildings to deteriorate prematurely, they become kitsch, only construction. How is it today? Can it even talk about the existence of the truth in architecture?

Today, architecture is expressed as originality, and original forms are mainly created thanks to the sophisticated design methods used by some architects. The search for a sophisticated form results from the fact that nowadays it is the form that has become the most important. In this article, the author will attempt to analyze

the thesis that the truth in architecture can be found in brick architecture – it is timeless, there is a synthesis of material and ideas (understood as a way of manipulating material, as a vision of form, a reference to tradition, a way of shaping a detail) , etc.). The author's analysis is based on the example of selected buildings of brick architecture in Białystok from the 19th and 20th centuries.

Brick as a material for creating architecture has been known for centuries, made of clay, shaped by human hands – friendly and healthy. „Holy brick" – as professor Konrad Kucza-Kuczyński writes [Kucza-Kuczyński, 2012], and he immediately adds „brick ... is a symbol of eternity in architecture" [Kucza-Kuczyński, 2012], which means that brick architecture can be timeless and honest. We can find brick buildings in different periods of architectural development, in antiquity and in the Middle Ages, they were commonly built of brick for many centuries in Scandinavian countries, in Netherlands, Germany, brick facades were also designed by famous architects of the 20th century – e.g. Alvar Aalto, Mario Botta and others [Tietz, 2001; Gossel, Leuthauser, 2012]. Many buildings made of brick can also be found in Poland, including the Podlasie region, where, thanks to the clay deposits, this material has also been used quite widely for many years.

The development of brick architecture in Białystok at the turn of the 19th and 20th centuries

The development of brick architecture in Podlasie and Białystok on a large scale can be noticed in the 19th century. Although the foundations for this development were probably created by the Military School of Construction and Engineering, founded in 1745 in Białystok by Jan Klemens Branicki, who from 1752 held the highest military function in 18th-century Poland – the Grand Hetman of the Crown. The school, which existed until 1771, as the only one in Poland at that time, educated about 300 engineers. The lecturers were civil officers and professors, mostly foreigners, because the country lacked senior staff. Typically military subjects as well as technical and general subjects were taught, including civil and military architecture, surveying, melioration, mathematics, geometry, history, foreign languages, military exercises. Practical classes were held at nearby construction sites. The school existed for 25 years, education lasted 3 years, and its graduates, leaving its walls with a military rank, chose the military service or work as administrators, officials and architects. But it was in the nineteenth century that political and economic changes took place in Podlasie, which caused the dynamic development of construction. Apart from wooden buildings, brick buildings, faced with yellow and red bricks, began to be built in Białystok and the region. Brick architecture can also be found in other Polish and European cities from this period, but many such facilities have been built on Podlasie. The oldest of them come from the 19th century. At that time, Białystok, after the third partition of the country, was under Prussian occupation, and from 1807 – by Russia. An administrative customs border was introduced between the Kingdom of Poland and the territories incorporated directly into Russia – this initiated the development of industry in Białystok and its vicinity. Industrialists began to arrive to the city, from Łódź and other Polish cities, investments were started by capital in the hands of Jewish and German manufacturers. The first textile factories started to appear, goods were exported mainly to the East. In addition to industrial facilities, military facilities were also built – garrison buildings. The development of Białystok in the nineteenth and early twentieth centuries was dominated by three factors: industry, army and trade.

The architecture of the first industrial and military buildings in Białystok was quite austere, massive, simple forms were erected with very reduced detail. These buildings were built of industrial-scale red brick, and over time, yellow bricks also appeared in use. Initially, brick objects were monochromatic, with time, expressive details began to be used in the facades: pilasters, cornices, decorative door and window frames, attics and pedestals, projections, entrances and corners were decorated. Triangular tympana was made of brick, the windows were crowned with decorative arched details with a characteristic keystone. All this required great brickwork and masonry skills, careful grouting of the walls, precision, perfect – for those times, the composition of the facade and the arrangement of the geometry of details. This architecture was genuine and honest, leaving no room for error. An example of an implementation from that period is, among others: the factory complex of Eugeniusz Becker Society of Białystok Manufacture at Świętojańska Street. Some buildings from this assumption have survived to this day – also the most outstanding of them, the so-called Mercury building, they were incorporated into the revitalization project of the factory into the shopping mall Alfa (2007–2008, design by architect

M. Kuryłowicz) [Tokajuk, Tokajuk, 2019]. The first factory buildings were built in 1883, but the so-called Mercury building was built as a finished goods warehouse in 1911. Preserved to this day, it was the most representative building of the factory, situated along Świętojańska Street. The three-storey building is made of red brick and has outstanding architectural value. The horizontally stretched multi-axis facade has a rich brick detail. The symmetrical facade is divided with cordon cornices and crowned with a crowning cornice. The central avant-corps are decorated with delicate arches, vertical blendes, pilasters, cornices, and topped with a sculpture of Mercury. The historicizing arcades in the gable made of brick form a kind of Neo-Romanesque quadrophorium. (Fig.1)

Fig. 1. The Mercury building from the factory complex of the Eugeniusz Becker Society of Białystok Manufacture at Świętojańska Street – the current state. Photo: Andrzej Tokajuk

Fig. 2. The building of the former Juliusz Flaker textile factory (now a technical telecommunications building, Kościelna Street – two-story building represents outstanding architectural values, built of red brick, with the use of yellow brick only in the eaves cornice – present condition. Photo: Andrzej Tokajuk

The development of the brick architecture of the city took place in the second half of the nineteenth century, two colors of bricks were used on the facades at the same time, with yellow bricks for facing the walls, and red – for decorative elements. There was even an administrative order to use two types of bricks on the facades of public buildings in Białystok in 1861 (in the terms of the tender for the renovation of municipal guard facilities). The development of this type of brick construction in Białystok region and in the city itself was

contributed by the establishment of several brickyards in the vicinity of the city – in Horodniany (in 1884) and in Księżyno (late 19th century), producing for local needs.

Examples of the one-color brick architecture of Białystok from the turn of the 19th and 20th centuries include building of the former Juliusz Flaker textile factory – currently a technical telecommunications building, Kościelna Street (Fig. 2), barracks buildings, industrial buildings (e.g. factory complexes of Chana Marejn and Wolf Zilberblatt at Częstochowska and Włókiennicza Streets, residential and industrial complex of Izaak Sztejn at Poleska Street, etc.), the building of the Zinaida Chwoles female gymnasium at Pałacowa Street 3 (now the location of the National Health Fund), etc. [Dolistowska, 2009]. The single-color buildings were built until the outbreak of World War I.

Fig. 3. House at Staszica Street – the present state (on the left). Photo: Andrzej Tokajuk

Fig. 4. House at Grunwaldzka Street – the present state (on the right). Photo: Andrzej Tokajuk

Over time, the local population began to get richer and the owners – investors – began to use facing bricks to build single-family houses and multi-family tenement houses. Examples of architecture of such buildings include: residential houses at Staszica, Poprzeczna, Mazowiecka, Grunwaldzka Streets and in other places (many

of such buildings have been ruined). The forms of brick single-family houses were modeled on the forms of wooden architecture, the houses had residential attics, the gables were finished with stepped finials, the elevations were decorated with cornices, etc. (Fig. 3 & 4)

At the end of the nineteenth century, yellow and red facades made of veneer bricks can be found in buildings with the following functions: residential, farm, villas, tenement houses, public utility buildings, industrial and factory facilities, barracks, and churches. (Fig. 5) After about a hundred years – at the beginning of the 21st century – the brick buildings of Białystok from the end of the 19th and the beginning of the 20th century and the way of using the facing bricks on their facades were called the Białystok Brickwork School [Turecki, 2003].

Fig. 5. Jewish religious school in the Talmud Tory school complex, Lipowa Street – the current state. The characteristic facade is made of two-color brick. Photo: Andrzej Tokajuk

The development of brick architecture in Białystok at the beginning of the 20th century – neo-styles

In the brick architecture of Białystok at the beginning of the 20th century, we can find most of the stylistic trends that appeared in the first decades of this century in Polish and European architecture. Among the buildings built at that time, a few very valuable works of architecture should be emphasized, such as: the Neo-Gothic cathedral church of Assumption of the Blessed Virgin Mary, the Neo-Romanesque Evangelical-Augsburg church of St. John the Baptist (now the Roman Catholic Church of St. Adalbert), the Neo-Renaissance building of the Board of the Society of Białystok Manufacture „Eugeniusz Becker and Co." at Świętojańska Street, the Neo-Renaissance Hasbach Palace in the district of Dojlidy. The Neo-Gothic cathedral church was built in years 1900–1905, based on a design by Józef Pius Dziekoński from 1896 [Jabłoński, 2008; Kłopotowska, Kłopotowski, 2015]. The church was designed in the so-called a great cathedral form, referring in style to the Gothic, which in Poland under the partitions became the quintessence of Polish national architecture. The two-tower, three-nave basilica was built of red brick with the addition of stone. The fragmented body was reinforced with buttresses with buttresses, a soaring turret was placed at the intersection of the transept and the nave, the walls of the transept are crowned with stepped gables with pinnacles. The building has two towers, and its main facade is decorated with three pointed portals. Brick details were also designed inside the church, incl. in the form of brick ribs of vaults, framing of inter-nave arcades as well as window and door openings. Undoubtedly, the synthesis of the material materializes perfectly in the ideas of this neo-gothic building – as a result, we get an architecture that has an element of truth in it. (Fig. 6)

Fig. 6. Neo-Gothic cathedral church of Assumption of the Blessed Virgin Mary – present state. Photo: Andrzej Tokajuk

Another very expressive example of honest architecture with high architectural value is the neo-Renaissance seat of the Society of Białystok Manufacture „Eugeniusz Becker and Co.". It is a renaissance-style building, two-storey, on a rectangular plan with a tower in the corner. The building has facades faced with red brick, with the division of the facade made in plaster imitating sandstone. The architectural qualities of the building are emphasized by: an asymmetrical body with a mansard roof, a rich neo-Renaissance detail (banquets, cabochons, dormers, eye crop, etc.). Similar solutions known as the „French costume" can be found, among others in the palace at Foksal Street in Warsaw. It is a very expressive architecture, honestly expressing the ideas of the Neo-Renaissance through a masterful handling of materials and details. (Fig. 7)

Fig. 7. Neo-Renaissance seat of the Society of Białystok Manufacture „Eugeniusz Becker and Co.", Świętojańska Street – present state. Photo: Andrzej Tokajuk

Among the buildings erected in Białystok in the beginning of the 20th century, architecture with Ruthenian-Byzantine influences should also be noted – on the example of the garrison church at ul. View (now the Church of St. Stanislaus the Bishop), as well as buildings in the modernist trend: the military warehouse complex at Węglowa Street and buildings of the Fajwel Janowski tobacco factory at Modlińska – Warszawska Streets.

The most numerous, however, are objects that do not show clear features of belonging to any of the varieties of historicism. The architectural divisions of their elevations are used to emphasize the tectonics of the building, cornices and friezes divide the elevations into storeys, pilasters and pilaster strips (usually in a small order) – they introduce alignment. Details, sometimes rich, were introduced into such frames, emphasizing the corners of the buildings. On the other hand, buildings in the modernist spirit are characterized by smooth, ascetic facades, emphasizing the functionalistic character of such architecture. In this case, there is no room for decorative details. (Fig. 8)

Fig. 8. One of the preserved buildings in the complex of the former Fawel Janowski tobacco factory – present condition. Currently it serves residential functions. Object after renovation. Photo: Andrzej Tokajuk

The second wave of brick architecture in Białystok in the end of the 20th century

The outbreak of World War II, followed by the advent of socialist realism, meant that for almost 50 years no significant architectural object was built in Białystok, the construction of which would use facing bricks in the facades. All architectural achievements at the turn of the nineteenth and twentieth centuries were halted, there was a departure from this style. Nationalization after World War II destroyed the craft tradition, and from the end of the 1960s, the construction industry was marginalizing the creative freedom of architects. The development of prefabricated technologies and the construction of large housing estates using industrialized methods have limited the artistic and individual approach to architecture. Sticking to a brick has become a symbol of resistance to industrialized building technologies. Brick played a great role in preserving the ethos of building craftsmanship and individual architecture. Brick requires use in accordance with the canons of art, but also allows you to work on details. Clay – earth shaped by a human hand and burnt in fire – becomes in the 1980s a symbol of the relationship with nature, landscape and the region, and brick buildings constitute the identity of architecture in a given place. The use of brick in architecture design in the end of the 20th century signaled an attachment to tradition, and it became fashionable again among some architects, especially those who reluctantly looked at the covers of architectural magazines, full of concrete or glass facades. It turned out that brick architecture became an important trend again. This also applies to Białystok's architecture. In the end of the 20th century, some architects began to design using facade bricks – important public buildings, churches, and houses with brick facades and details began to be built, it happened also in Białystok. Some outstanding works of architecture on a European scale have been created – including The Orthodox Church of St. Spirit, designed by architect Jan Kabac and The Orthodox Church of God's Wisdom – Hagia Sophia, designed by

architect Michał Bałasz. There are more examples, but these two churches clearly prove the correctness of the thesis that the truth and honesty of architecture is a synthesis of material and ideas.

The first of the above-mentioned objects – The Orthodox Church of St. Spirit is the largest Orthodox Church in Poland, it was designed to commemorate the 1000th anniversary of the baptism of Eastern Christianity. Its construction began in the 1980s, the author of the design is one of the most outstanding architects from Białystok – Jan Kabac. The temple is unique in terms of architecture, it has become – next to the Branicki Palace and the Church of St. Roch – the most recognizable building in Białystok. The symbolism of the church architecture refers to the summoning of the church. Designed on a central plan, its walls and domes have the shape of tongues of fire, in the form of which the Holy Spirit descended on the apostles. The five domes refer to Jesus and the four evangelists. The nave of the church has an octagon plan with an area of 800 square meters, and the total area is 2,250 square meters. The temple can accommodate 2,500 believers. Elevations of the church of St. Spirit are made of sand-yellow facing bricks, the framing of walls is also made of bricks – tongues of fire, walls of different heights surrounding the central dome. It causes the effect of growing, piling up and dynamics of the form. Already in the 21st century, a bell tower was built next to the church (also using clinker bricks). The outstanding object was created, where the material and idea (eastern canons) found their synthesis. (Fig. 9)

Fig. 9. The Orthodox Church of St. Spirit in Białystok – a view. Photo: Andrzej Tokajuk

Conclusion

The analysis carried out by the author of the text clearly confirms the thesis put forward in the beginning, that brick architecture contains an element of truth, continuity, humanism, and in combination with the idea it gives a great effect of the spirit of place and continuation of identity. In today's world of contemporary architecture with smooth facades and often incomprehensible forms – brick architecture is timeless. Objects built of brick in Białystok in various times – despite the passage of time, changing ideas and stylistic tendencies – give a sense of the identity of place, the truth of forms and details. And although the brick architecture of Białystok from the 19th century did not leave many outstanding implementations – it became a great foundation for historicising objects from the beginning of the 20th century and for works of architecture in the end of the 20th century. Undoubtedly, the analysis of the architectural values of buildings constructed in Białystok in the last decade of the 20th century and first years of the 21st century, buildings with brickwork in elevations, requires – due to the scope of the issue – a separate study and further research.

It seems that brick can also be an inspiring material for the idea of sustainable development in the 21st century. According to professor Konrad Kucza-Kuczyński: „Brick is: eternal – free – alive – eco and sustainable"

[Kucza-Kuczyński, 2012]. But the 21st century architecture, in the times of savings on the construction process, widespread use of concrete and designing cheap external walls of buildings – has brick architecture a chance to continue and survive?

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Adaptation and embedding of modern military objects on the example of the Kłodzko Fortress

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Abstract: The issue of adaptation and modernization of fortifications is very important nowadays. Military objects have lost their original purpose and have largely been left alone. Recently there has been a constant increase in interest in the military. This causes that more and more such objects are being adapted to the new function. This is the only way to protect them from degradation. An excellent example of this type of objects is the Kłodzko Fortress, which belongs to the best preserved and most impressive Silesian fortifications and is a unique example of military architecture on a Polish scale. After it was abandoned by the military, the technical condition of the object significantly deteriorated. The reason for that were attempts to introduce new functions to it. Currently, works are being carried out in order to remove some of the secondary layers. However, in order for the object to function properly nowadays it is necessary to create a plan for its modernization, which would cover the whole Fortress. Gradual changes would ensure efficient functioning and its development in the future.

Keywords: fortress, fortifications, military object, the Kłodzko Fortress, adaptation

Introduction

The growing interest in the history of the art of war and the military, is the reason for the development of various forms of cultural tourism around the world. Poland, as a result of its exceptionally turbulent history, has a huge stock of military objects originating mainly from the period of the Republic of Poland and the partitions. All Polish fortifications from the pre-partition period and from the period of the Duchy of Warsaw: Prussian, Austrian and Russian fortifications come from one European trunk. They have their specificity and they are monuments of the European military art.[1]

The fortifications, due to constant modernization, connected with the evolution of war technology, have irretrievably lost their military importance and thus became a cultural monument. Knowledge of military objects and fortifications until the 1970s was very limited, as information was largely classified by the military. The first works on the objects took place in the interwar period. Relatively recently, research work on a larger scale has begun.

After 1989, as a result of system changes, these objects were demilitarized and the military began to leave the fortifications. This resulted in a sudden transformation of ownership of the post-war areas, which in turn made it necessary to issue conservation decisions relating to further actions and use of these objects.[2] The greatest devastation of the historic matter took place after the army left the fortifications, as the later chaotic attempts to introduce new functions caused the technical condition of the facility to gradually degrade.

1 Małachowicz E., *Nowożytne fortyfikacje Śląska europejskim dziedzictwem kultury*, Fortyfikacja tom XII, Warszawa 2000 r., s.
2 Małachowicz M., *Zabytki fortyfikacji nowszej, specyfika zasobu, a metody ochrony*, Giżycko 1997 r.,

The Kłodzko Fortress

The Kłodzko Fortress, which is the subject of this study, belongs to the continuation of the Sudetenland fortification belt. Together with the auxiliary fort, the Owcza Góra, next to the Fortress in Srebrna Góra, is the most impressive and best preserved of the Silesian fortifications.[3] It is also a remarkable example of the military architecture. It was built on a rocky peak called the Forteczna Mountain. It was created as a result of reconstruction of a medieval castle. Thanks to such a location, it has been equipped with a variety of original solutions, including mineral corridors, which reflect the development of defensive art related to the period of artillery domination.

Currently, the Kłodzko Fortress is one of its greatest attractions. It consists of about 30 defensive works, created as a result of many historical transformations. The fortification and spatial structure of the town, apart from the Fortress itself, also includes the Owcza Góra Fort, which closes the Nysa River valley from the east. The fortifications of Kłodzko also include numerous town fortifications erected around the town, outlining the original settlement, and a fortified camp, which complemented the town defense system from the southern side.

This object is undoubtedly the largest and most dominant point of the city landscape. It also has an extremely complex military layout. From the side of the city, the multithreaded character of the Fortress can be seen, and the multi-level defensive ramparts, stacked on the slope of the mountain, show the huge scale of the Fortress. The crowning point of the Kłodzko Fortress is the Donjon, a building with a ticked shape, which is the redoubt, the last point of defense.

Fig. 1. The Kłodzko Fortress from the bird's eye view, source: https://www.polskieszlaki.pl/twierdza-klodzka.htm, author: Kamil Glaz

The entire urban complex of the Kłodzko Fortress has been preserved almost entirely until the 1940s. The greatest damage was done in the post-war period. It is the result of the destructive activity of various institutions using the building. Some of the damage was also caused by negligence related to the maintenance of vegetation. The damage mainly concerned filling in the moats, demolishing parts of the object and the aforementioned greenery damage.

3 Małachowicz M., *Zasoby fortyfikacji nowszej i problemy ich ochrony na obszarze Dolnego Śląska*, Giżycko – Twierdza Boyen, 1997 r.

Historical background

The original development of the Kłodzko hill, on the western side of the Nysa Klodzka River, was a medieval castle, existing in the 14th century, and then rebuilt in the 16th century.[4] Works on the fortifications of the Kłodzko castle began already during the stationing of the Czech king Frederick V together with the army in 1620.[5] The siege of the town in 1622 combined with an artillery bombardment forced the Austrians to start renovation and modernization work on the castle.[6] Kłodzko gained a modern fortress in the shape of a typical citadel.

The breakthrough for the history of the Kłodzko castle was the year 1742, when Frederick II conquered the fortress – the Kłodzko citizens were forced to surrender the town due to the insufficient level of fortifications. This resulted in the appearance of General Gerard Kornelius Walrave (1692–1773) as the main designer of the reconstruction of the Kłodzko Fortress.[7]

After the Austrians took over the Fortress in 1760, many modernization works began, including the creation of Donjon. The castle, located at the top of the mountain, was completely demolished, and in its place there was a huge three-storey defensive redoubt with an observation tower.

The Fortress, over the years of its operation, has repeatedly changed its purpose. In 1944 the AEG armaments factory operated on its premises. Among other things, parts for the V-1 bullets were manufactured.[8] After the war, the building was taken over by the local army, which was stationed here until 1957. In later years, attempts were made to adapt the fortress for various types of economic activities, such as fish and egg headquarters, mushrooms, reinforced concrete plants, or the Rosvin Wine Cellars known in the region.[9]

The Kłodzko Fortress – analysis of historical values

The Kłodzko Fortress is one of the most valuable and longest functioning defense teams in Poland. The first mention of the existing castle dates back to the second half of the 10th century. Rebuilt in the Middle Ages and the Renaissance, it received its final form in the eighteenth century. The fortress has a nearly 1,000-year-old shell of layers created in connection with key events in Polish and European history. "This historic defensive ensemble (...) is a creation of European martial art created from centuries-old layers of different fortification systems and schools: Italian, Dutch, Austrian, French and Prussian, and the creative concepts of famous fortificators."[10] It is a document of the past, and therefore has great scientific value and significant historical value that should be protected.

The destructive economic activity conducted after the 1950s significantly devastated individual areas of the Fortress. A part of the curtains was demolished, the historic shape was destroyed, the moats were concreted and buried, and new buildings, halls and warehouses were built in the moat before the Crown work. The Poterna, which connected the square between the Donjon and Wielki Kleszcz with Lukasinskiego St., was also destroyed. A chimney and a technical building were built on it, and a road in a not very aesthetic form was laid nearby. All works related to the adaptation of this facility to the previous activities were performed in a chaotic way, without respect for the historical fabric.

The basic and most important monumental value is the form of the object, which directly results from the function that the Kłodzko Fortress used to have. As far as the function is concerned, one should focus on its logic. Military objects are an exceptional case, where the function determines all elements of the building, and its diversity is a significant element in the context of numerous transformations. Accumulated historical and

4 Information on the architectural outline of the Kłodzko castle based on: B. Guerquin, *Zamki Śląskie*, Warszawa 1957; Broniewski T., *Kłodzko* [w:] Śląsk w zabytkach sztuki, Wrocław 1963.

5 Dziewulski W., *Zarys rozwoju przestrzennego Kłodzka od czasów najdawniejszych do drugiej wojny światowej*, T.III, Kłodzko 1959, s. 36.

6 Triller E., O Lisowczykach w Ziemi Kłodzkiej, [w:] Rocznik Ziemi Kłodzkiej 1958, T.III, Kłodzko 1959, s. 139.

7 Bukal G., Gerhard Cornelius Walrave i holendersko-pruska fortyfikacja na ziemiach polskich, Warszawa 1995 r.

8 www.dawnekłodzko.pl, access date: 15.01.2018 r.

9 www.zamkipolskie.pl, access date: 24.01.2018 r.

10 Małachowicz M., Karnicki R., Podruczny G., Plan ochrony parku kulturowego dla Fortecznego Parku Kulturowego – Twierdza Kłodzko w Kłodzku, Wrocław – Kłodzko V 2007 r., s. 5.

architectural layers make it so unique. Multi-level defensive ramparts, spread out in steps along the slope of the mountain, are a characteristic feature of this type of architecture.

The Main Fortress also has a number of utility values. There are many places with different adaptations. The aforementioned economic activity on the military facility and the use of it for storage purposes did not improve the conditions for the survival of the fortifications. Due to a series of limitations that the rooms have, and due to the functional deficiencies, such buildings become troublesome and they lack appropriate care. Users treat them as temporary and are not aware of their great aesthetic and historical values.

Also very important are the historical-architectural elements, which have been preserved in the current form of the object. These include historical examples of wall ties, unique window and door joinery, preserved wooden gates, shooting ranges, windows and grilles in shooting ranges, former ventilation telescopes, structure and layout of the ramparts with heights, as well as the spouts located around the main Donjon Square.

Characteristics of the current functioning of the Kłodzko Fortress

Although the Kłodzko Fortress is an unique example of military architecture, its tourist potential is not fully exploited. This is due to the low degree of access to tourist purposes and the lack of financial resources allocated for its development. The object itself is very well preserved, however, its original form has not been fully preserved due to later reconstructions. Lack of use and exposure of the Fortress to weather conditions caused it to lose its aesthetic values.

Currently, there are no economic and industrial activities in the Fortress area. The remains of previous users are slowly being demolished and the area is being cleaned up and restored to its original state if possible. Thanks to these actions, it is possible to make the object available in the future on a much larger scale than before. At present, it is only 10% accessible for tourist purposes.[11]

The tourist route leading to the Main Fortress includes both underground mazes and a tour of the upper part. Over a kilometer of counter-mining sidewalks located under the battle slope of the Fortress are accessible from the several-kilometer-long underground route network. An additional attraction is the possibility to hear an artillery salute.

For the visitors there is also an offer enriched with a night tour of the Fortress. This is an unprecedented form of cognitive tourism, which enriched with acting performances of the Fortress employees, sound effects, and light illumination makes the tourist move into the atmosphere of old times. The facility also hosts various cultural and entertainment events. Night military maneuvers, demonstrations of historical drill, staging of the siege of the Fortress with the use of cannons, as well as fictional tours are the elements that appear on the annual Days of the Fortress. The cyclical ballistic reconstructions are also organized by the historical regiment group – the 47th Prussian Infantry Regiment.

On the basis of data provided in 2017 by the Fortress Manager – Mr. Sławomir Małachowski, it can be concluded that the interest in the Kłodzko Fortress is constantly growing. In 2015 the facility was visited by about 130 484 people, while in 2016 this number increased to 150 650 people. In 2020 there are already about 200,000 tourists. This gives a good forecast for the development of the city of Kłodzko, because it shows that the interest of tourists in such facilities is growing.

In mid-2017, Kłodzko received funds for a project concerning the reconstruction of the historical path covering the spaces and facilities of the Kłodzko Fortress. The works started in 2018 with the cutting of invasive greenery on the eastern slopes of Forteczna Mountain. The didactic path starts from Czeska Street, in the reconstructed historical garden of the Commander, located in the outer part of the Fortress. It continues on the outside of the walls on the eastern slope and inside the military facility (Fig. 2). Along the route there are elements of small architecture, i.e., benches, lighting, information boards describing fragments of soldiers' lives in the Fortress.[12]

11 www.twierdzaklodzko.pl, access date: 25.01.2018.

12 www.kłodzko.pl, access date: 2.03.2018.

Fig. 2. The didactic path along the walls of the Fortress

Fig. 3. View of renovated spaces on the Fortress

In connection with obtaining EU funds, several rooms of the Fortress were adapted for cultural, exhibition and educational purposes. The necessary facilities for the stage were also created. The cultural and exhibition offer was extended by innovative, multimedia solutions, i.e., mapping, presented in a renovated pen (Fig. 3). The walls, vaults and slope were renovated and secured along the whole path.[13] Works aimed at clearing the ramparts of self-seeders and vegetation threatening the construction of the walls are also being gradually carried out.

The Kłodzko Fortress – analysis and research

The problem of looking for a way to use and develop the Fortress is extremely topical. Conclusions drawn from the research carried out on the object are the basis for carrying out conservation and adaptation works.

Since 2016, the Kłodzko Fortress has been hosting student internships under the supervision of academic staff of the Faculty of Civil Engineering and Architecture at the Lublin University of Technology. Until one year, during field trips, inventory works are carried out on the facility. The result of these works is the first in the history of the Kłodzko Fortress measurement-drawing inventory of the object.

At each of the stages, a number of tests were also carried out, which consisted of measurements of the moisture condition of the walls, their condition and a general assessment of the technical condition of the object. Samples of the walls were also taken, on the basis of which more detailed tests of moisture and salinity were later performed. Additionally, the photographic documentation and a 3D scan of the Fortress was created.[14]

The research papers prepared by students from the Lublin University of Technology became the subject of their master's theses on the field of civil engineering. They touched upon, among other things, the subject of adaptation of a fragment of casemates, analysis of layers and damage to the wall, projects of replacing the surface of the Donjon courtyard, repairing walls or improving the operation of the dike drainage system.

Based on the inventory of the object and the local vision, the diploma and master's theses in architecture were also created. Based on multi-faceted analyses, the students developed a functional-spatial plan for the Fortress. This made it possible to incorporate a number of many functions into such a complex historical complex as the Kłodzko Fortress.

In 2017, the Master thesis was completed entitled "Revitalization of the Kłodzko Fortress with an adaptation of the Donjon". The main goal of the project was to reconcile the preservation of the character of the object with the introduction of new functions. The design concept included both the adaptation of the existing rooms, as well as a proposal for new cubatures and the creation of recreational spaces within the fortress. The designed elements were developed in such a way that they clearly distinguish themselves both in material and form from the existing fortress walls (Fig. 4).

13 www.naszesudety.pl, access date: 2.03.2018.

14 Zob.: Gleń P., Krupa K. *The use of secondary build-up in historical fabric based on the donjon of Kłodzko Fortress*, E3S Web of Conferences, 2018, vol. 49, s. 1–10.

Fig. 4. Visualization of the Donjon elevation, proposal of introducing new elements, authors K. Drobek, K. Knap, K. Tkaczyk

The project was based on the idea of a tourist path, which would be led in such a way that almost the entire route the tourist, who becomes somehow a spectator, is stimulated at every step. Appropriate arrangement of various types of attractions would allow to experience the essence of the monument. It was also proposed to create public spaces, which would constitute areas adapted to the needs of tourists of different ages. Recreation zones complement the proposed functional plan of the Fortress and, similarly to the cubature objects, emphasize the value of the object, using the best features of the physiognomy of a military work.[15]

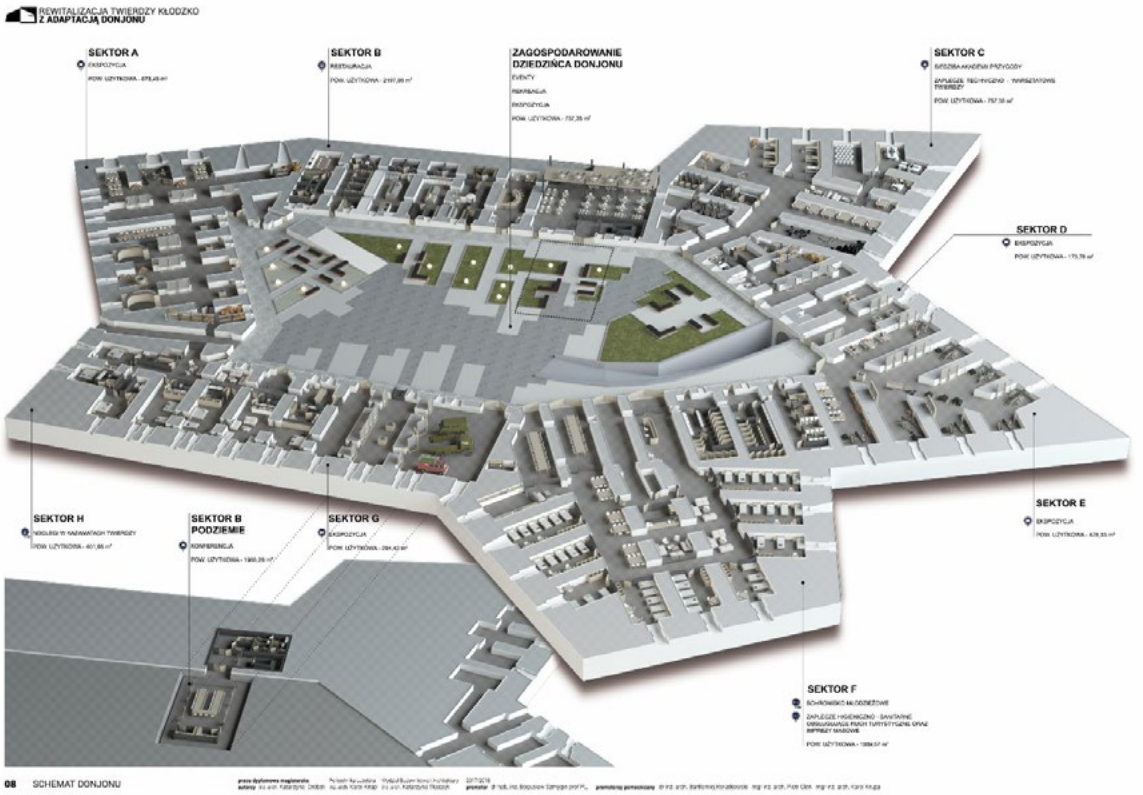

Fig. 5. The Donjon scheme – the adaptation proposal, authors K. Drobek, K. Knap, K. Tkaczyk

15 Drobek K, Knap K. Tkaczyk K , *Rewitalizacja Twierdzy Kłodzko wraz z adaptacją Donjonu*, praca dyplomowa magisterska obroniona na Wydziale Budownictwa i Architektury Politechniki Lubelskiej w 2017 roku, promotorzy: prof. dr hab. inż. Bogusław Szmygin, dr inż. arch. Bartłomiej Kwiatkowski.

The focus was largely on the Donjon adaptation. It was divided into 8 sectors with different functions. Among other things, it was proposed to create a catering function in place of one of the halls, located in the western curtain, an exhibition function with different themes, an accommodation, a conference function, and a place for the headquarters of the Adventure Academy (Fig. 5).

The diploma project assumes that thanks to the changes proposed by the authors to the Kłodzko Fortress, the facility will cease to be a one-time visiting point and will become a place to which tourists, as well as Kłodzko residents themselves, will return.

In 2019, two more works related to the object, during which the students focused on two entrance zones for the Fortress, were completed at the Lublin University of Technology. The first project was made by Kostiantyn Pinkovskyi, entitled "Revitalization of the Kłodzko Fortress with adaptation of the entrance to the underground route" covered the area of the fortification from the side of the town. The new cubature was located in the place of the existing entrance to the Underground Tourist Route, which was incorporated into the designed object. The pavilion proposed to create an exposition related to the history of Lower Silesia and Kłodzko. There was also a café with a rest zone for tourists and an additional underground parking lot. The designed object fits in well with the terrain, thanks to dividing it into two separate blocks differentiated by levels (Fig. 6).[16]

Fig. 6. Visualization of the new pavilion on the Czeska Street, author K. Pinkovskyi

The second work entitled "Adaptation of the entrance zone of the Kłodzko Fortress" done by Pavlo Lozovskyi was aimed at improving the northern part of the fortification to serve tourist traffic, i.e., creating a new entrance pavilion and increasing the number of parking spaces for coaches and cars. Additionally, the project of adaptation of the Field Ravelin for exhibition purposes was carried out. The materials used in the concept are consistent with other ideas for the use of the Fortress and perfectly match the historic character of the object (Fig. 7).[17]

Fig. 7. Visualization of the new pavilion on the Czeska Street, author K. Pinkovskyi

16 Pinkovskyi K., *Rewitalizacja Twierdzy Kłodzko z adaptacją wejścia do trasy podziemnej,* praca dyplomowa inżynierska obroniona na Wydziale Budownictwa i Architektury Politechniki Lubelskiej w 2018 roku, promotor: dr inż. arch. Bartłomiej Kwiatkowski.

17 Lozovskyi P., *Adaptacja strefy wjazdu Twierdzy Kłodzko,* praca dyplomowa inżynierska obroniona na Wydziale Budownictwa i Architektury Politechniki Lubelskiej w 2018 roku, promotor: dr inż. arch. Bartłomiej Kwiatkowski.

Adaptation possibilities

Adaptation of post-fortress facilities is extremely problematic. Due to huge costs, design restrictions and conservation restrictions, investors are effectively discouraged from trying to adapt fortifications and invest in them.

First of all, it should be remembered that any interference in the object is necessary to stop its destruction. The management of historical sites is a threat to the degradation of their cultural values, but it is also a chance for their survival. This is possible if the development is carried out in accordance with the conservation concept. The basic condition, which would result in effective protection of the monument, is its continuous use, because it forces current repairs and conservation. The commercial use, on the other hand, allows the objects to gain funds for its maintenance.[18]

It is worth remembering, however, that the adaptability of an object is strongly limited due to its structural and material features, resulting primarily from the specificity of its function. It is a characteristic feature of military works, where small rooms, scaled thicknesses of construction elements, limitation of the number and size of window openings strictly resulted from their original purpose. These are the essential properties that are a key obstacle in attempting to adapt the object for new functions, taking into account the applicable laws and technical standards.

The main goal of the changes carried out at the Kłodzko Fortress should be to increase tourist's awareness of the monument. It is important to carry out such activities, thanks to which the Kłodzko Fortress could be made available on a larger scale and perform better didactic functions. The building itself, with its architectural form and unusual character of the place, is able to attract many people not interested in the military on a daily basis. Thanks to the increased offer of services, the facility should start to generate more profits, which will contribute to its economic independence.

At the very beginning, one should consider increasing the didactic offer, understood in a slightly broader context than the museum functions themselves. Various active forms of knowledge transfer about historical, scientific and artistic values should be provided, which would provide access to the exhibition for a wide range of visitors. Various presentation techniques, such as all kinds of mock-ups, information boards, multimedia presentations, museum exhibitions or interactive forms of sightseeing would certainly improve the reception of the object. Introducing historical scenery into the open air would make the didactic path more attractive.

With the expansion of the didactic offer and the introduction of new services related to the tourism sector, it is appropriate to introduce the accommodation function also on the Kłodzko Fortress. The rapidly growing tourist sector increases the demand for new accommodation, so a good option is to use this type of facilities for hotel functions. The unique character of the fortress facilities is able to provide an unusual experience.[19] And the casemate interiors on the first level of the Donjon, are a suitable place to adapt them for hotel purposes or for a youth hostel.

All of the above mentioned adaptation proposals are combined with the introduction of support functions. A catering, exhibition function and improved technical and communication infrastructure will make the facility not only an interesting option for tourists to visit, but also a place visited by Kłodzko residents.

The introduction of accommodation and organization of cultural events while locating the restaurant function would attract a much larger number of tourists who could stay in Kłodzko and the Fortress itself for more than one day.

Conclusions

Kłodzko is the most important town in the Kłodzko Valley, and a good starting point. Within a radius of 30 km from the town there are many health resorts, and the region itself abounds in various tourist attractions. In the area there is also a local trail of military objects – the "Giant Complex". Such a location and the surroundings of the cities increase its attractiveness and possibilities of attracting tourists to it. The moment of increasing

18 Molski P., Kozarski P., *Zagospodarowanie i konserwacja zabytkowych budowli, Poradnik*, Warszawa 2001 r., s. 7.

19 Cudny W., Rouba R., *Hotelarstwo jako sposób na rewitalizację zabytkowych obiektów militarnych pochodzących z XIX i XX w.*, Ochrona Zabytków nr 3–4, 2012 r, s. 109.

tourist availability and expanding the range of services offered at the Fortress, the rank of the city itself and the facility will increase. Therefore, it is necessary to carry out comprehensive adaptation and renovation works on the Kłodzko Fortress.

This building is a unique example of a military architecture, distinguished by unique historical and cultural values. It has an extraordinary potential, which is not utilized at the moment. The student projects presented in the paper are the basis for the future of the Kłodzko Fortress and its consideration on a global level, as one great assumption. On the object works are constantly carried out in order to increase its touristic accessibility. However, without creating a single plan containing a multi-faceted analysis of the Fortress development possibilities and design concept, this fortification will not work properly. The introduction of new functions would have a significant impact on its development. On the other hand, the continuous functioning of the Fortress complex would primarily contribute to stopping the degradation of the facility, but could also ensure further development in the future.

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Comparative method with the use of laser scanning as a starting point for the assessment of the state of preservation of the face of the walls in the Kłodzko Fortress

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Abstract: This article presents architectural studies of the state of preservation of the face of the wall of the Kłodzko Fortress on the basis of the surveying works performed since 2016. These works include measurement of the entire fortress with the use of laser scanning. The analysis was carried out on the face of the wall, gradually degrading due to external factors and incorrect protection of the masonry. For detailed analysis, clouds of points from the period of 2 years (2017–2018) were used, taking into account the discussed northern part of the wall of the Great Tenaille (Wielkie Kleszcze). The paper explains the importance of the surveying process for the conservation works aiming at protection of the historical tissue from further degradation.

Keywords: fortress, Kłodzko, survey, fortification, 3D scanning, cloud of points

Introduction

The aim of the studies conducted by the research team from the Lublin University of Technology is a detailed survey of the fortification complex of the Kłodzko Fortress with the use of laser scanning (Fig.1). With this measurement technology, a database of spatial information in the form of a cloud of points is obtained [1]. Laser scanning allows to obtain spatial data regarding existing structures. The use of scanners in surveying works has many advantages, making them more and more commonly used worldwide [2]. Due to this, the subsequent processing of the measurement material becomes possible in most of the programs used for creating survey documentation in the 2D form. It is an important starting point for further conservation activities concerning the protection of historic monuments. The acquired database enables a detailed assessment of the technical condition of the analysed structure. An important argument in favour of using laser scanning technology in conservation works is a very precise presentation of the existing state of a building with maximum measurement accuracy. Collected measurement data in the form of a cloud of points can be used in many ways, from a 2D survey to the formation of three-dimensional reconstructions or analyses of degradation of the elements of a facility. The authors of the paper focus on a comparative analysis of performed scans of a part of the wall of the Kłodzko Fortress, which underwent significant degradation. The documentation resulting from the annual research works carried out at the Kłodzko Fortress allows to analyse the progress of degradation of the

face of the wall caused by external factors such as invasive greenery, weather conditions or inadequate protection of endangered elements.

Fig. 1. Scan of the Kłodzko Fortress generated with the use of *Leica Cyclone* program – authors' own elaboration

The authors of the article present, on the example of the Kłodzko Fortress, the dangers associated with brick slopes and building facades. The proposed protective measures are aimed at stopping further degradation of the discussed part of the wall.

The Kłodzko Fortress

The town of Kłodzko is situated in the Lower Silesian Voivodship, in the Kłodzko Poviat. The Kłodzko Fortress was founded in the 17th century. The state of preservation of this fortress as a whole fortification complex gives it a unique character in Poland [3]. The fortress itself was built on the site of a medieval castle erected in the 14th century. During the Second World War the SS headquarters were located there [4]. After the war, it was the site of the AEG armaments factory and then, it became the property of the army that was stationed in the fortress [5]. In 1960, the facility was entered in the Register of Historic Monuments [6]. At present, it is partly available for tourist and museum purposes.

Following the example of the Srebrna Góra Fortress, in 2005 the City of Kłodzko passed a resolution on the creation of the Kłodzko Fortress Cultural Park [7]. It is one of the best preserved fortifications in Poland. That is why the authors of the article draw particular attention to the aspect of protection of the historic fortress by proper conservation activities. A detailed survey of the fortress is the starting factor for this research.

Comparative analysis with the method of laser scanning

The basic material needed during the conservation works is to carry out a detailed survey of a historic building. The survey of historic buildings should be carried out meticulously, taking into account all the architectural details and available historical information indispensable to analyse the historical tissue. Terrestrial laser scanning allows the implementation of complex studies and analyses, which have not been available so far for any of the measurement techniques [8]. Thanks to the detailed survey note, a comprehensive analysis of a degraded tissue is possible that is necessary for further conservation works related to the protection of a historic monument. In the analysis of the face of the wall, laser scanning technology was used in order to assess the technical

condition as accurately as possible. The scan of the building was made with the Leica C10 device. This measurement allows to obtain very accurate data including dimensions, geometry and structure of a measured site [9]. This is the best surveying method used for historic buildings [10]. The studied part of the wall is located in the northern part of the Kłodzko Fortress (Fig. 2).

Fig. 2. Overview map with the location of developed part of the wall – authors' own elaboration

Laser scanning is currently one of the most accurate measurement techniques used in works related to the survey of historic buildings [11]. Research carried out on the facility since 2016 enables, among other things, gradual conservation works related to the assessment of the technical condition of selected elements showing signs of progressive degradation. This is important during the evaluation of conservation works and preparation of a cost estimate for the repair of degraded elements. The measurements carried out annually by the research team from the Lublin University of Technology allow comparative analysis of selected parts of the fortress walls. By analysing the survey material, it is possible to assess the level of damage and growth of invasive greenery over the years in which the measurement was carried out.

Hazards and recommendations related to masonry slopes and building facades

The façade of the Great Tenaille (Wielkie Kleszcze), subjected to comparative analysis, located in the northern part of the Kłodzko Fortress, was surveyed with the use of a laser scanner. The scanning includes annual measurements from 2016. Measurements from 2017 and 2018, during which the face of the wall significantly subsided, were analysed. The authors of this study draw attention to the critical condition of the wall: in the central part of the façade, a significant sliding of the face of the wall was visible (Fig. 3). Point but deep rock losses have been observed. A significant part of the façade was overgrown with invasive greenery: grass, moss, and bushes. On the ¼ of the façade, the face of the wall was visibly bulging. There was noticeable lack of cornice on the length of 7.5 m, and the condition of the cornices was alarming. The face of the wall is assessed as being in bad technical condition, i.e. the structure was in critical condition, with the urgent need for reinforcement, renovation or replacement; it constitutes a direct threat to the health and life of people in the building or its vicinity. Immediate intervention is required regarding safety works based on conservation guidelines. The reason for the collapse of the face of the wall was probably poor protection of the defect that had occurred

earlier. The authors conclude that the reinforcement in the form of a concrete layer (Fig. 4) was not properly anchored to the original brickwork layer, which resulted in further corrosion of the brickwork material and, as a consequence, the significant part of the brickwork slipped. After comparing the measurement carried out in 2017 (Fig. 5.) with the measurement carried out in 2018 (Fig. 6.), a secondary reinforcement is visible in the place of the loss in the masonry, which resulted in separation from the original masonry material and, as a result, sliding of both the supplementary material and the further part of the original masonry element. After generating a cloud of points from the *Leica Cyclone* program showing a horizontal cross-section at the point where the layer of masonry slipped, the depth of the cavity was determined to be up to 0.5 m (Fig. 7).

Fig. 3. Photograph showing the wall face (2018) – authors' own photograph

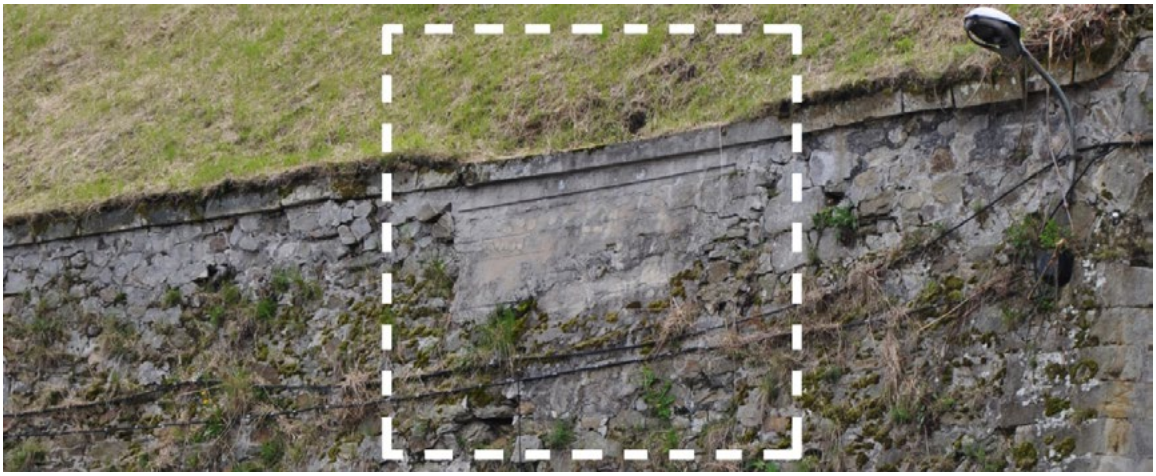

Fig. 4. Photograph showing secondary concrete filling of the face of the wall (2017) – authors' own photograph

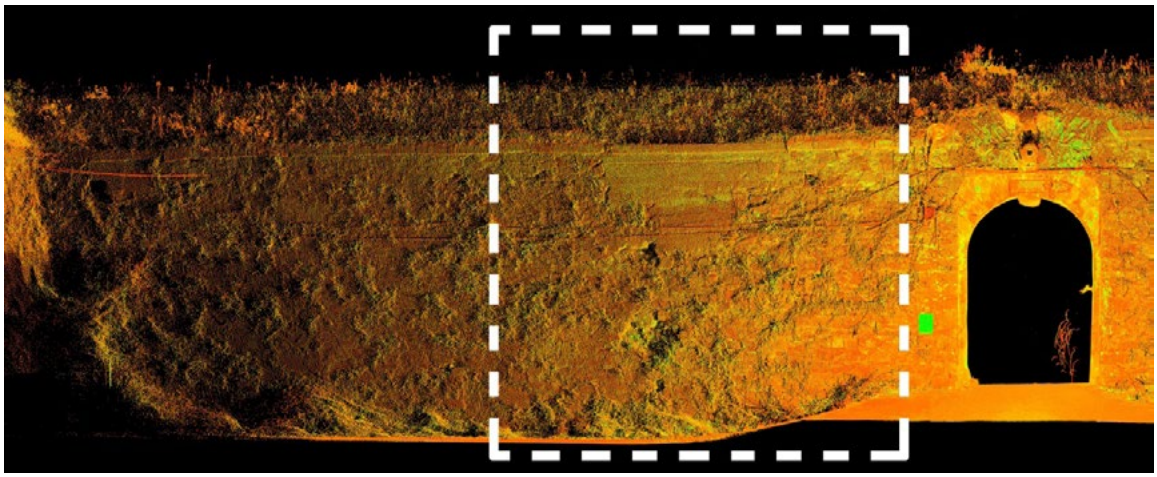

Fig. 5. Scan of the face of the wall with a marked place of the slide (2017) – authors' own elaboration

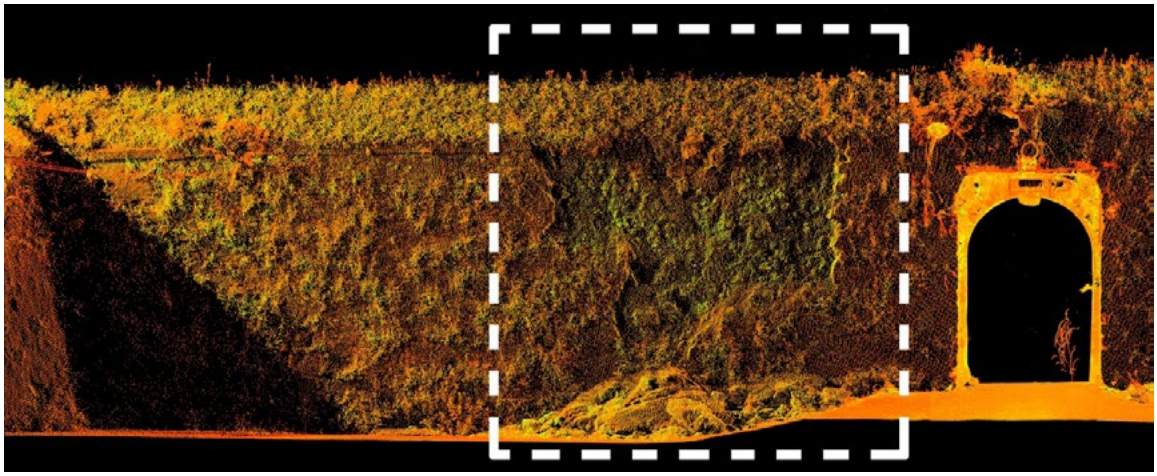

Fig. 6. Scan of the face of the wall with a marked place of the slide (2018) – authors' own elaboration

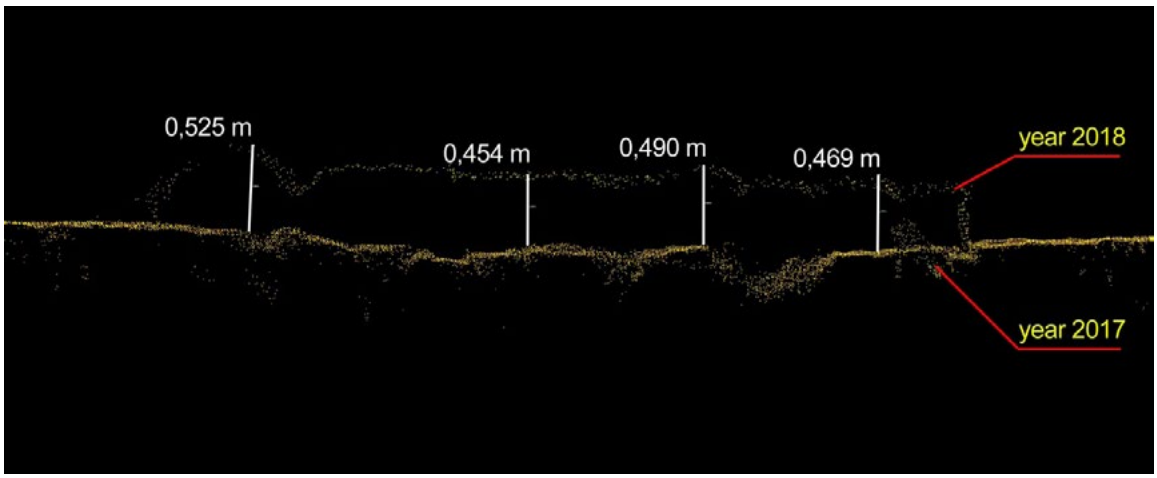

Fig. 7. Plan of walls from 2017 (before the wall slided) and 2018 (after the wall slided) – authors' own elaboration

The table below shows a list of damages occurring in the structure of the northern face of the Great Tenaille wall. The authors describe the cause of the phenomenon and the far-reaching consequences of lack of protection and further corrosion of the wall.

Table 1. Description of observed phenomena occurring in the masonry – authors' own elaboration

	Description	Reason	Results
1	local damage and cavities in the face of the wall	high humidity, occurrence of lichens, moss and grass on the surface, poor condition of the mortar, lack of ongoing maintenance, faulty drainage system	deep weakening and flushing out of the welds, favouring weakening of the face layer of the wall and, as a consequence, loosening and falling out of the building material, creates good conditions for seed setting and development of shrubs and trees and, as a consequence, weakening of the deep structure of the wall, weakening of the construction of the wall
2	flushing out of the mortar on the surface	high humidity, occurrence of lichens, moss and grass on the surface, poor condition of the mortar, lack of ongoing maintenance, lack of waterproofing of the coping	deep weakening and flushing out of the welds, favouring weakening of the face layer of the wall and, as a consequence, loosening and falling out of the building material, creates good conditions for seed setting and development of shrubs and trees and, as a consequence, weakening of the deep structure of the wall, weakening of the construction of the wall
3	point cavities and damage to the coping	occurrence of shrubs and trees on or along the coping, poor condition of the mortar, lack of ongoing maintenance, lack of waterproofing of the coping	weakening of the construction of the wall creates good conditions for seed setting and development of shrubs and trees and, as a consequence, weakening of the deep structure of the wall under the damaged part of the coping
4	occurrence of shrubs and trees on the slopes and coping of slopes	high humidity, occurrence of lichens, moss and grass on the surface, local occurrence of shrubs and trees on the slopes and copings of escarps, lack of ongoing maintenance	deep weakening of the structure of the wall causing penetration of water and, as a consequence, loosening and falling out of the construction material, blowing up the deep structure of the wall
5	deep cavities in the slope construction layer with landslides	high humidity and salinisation, occurrence of trees and shrubs on slopes and slope copings, lack of ongoing maintenance, mechanical damage e.g. due to explosion	weakening of the wall structure, the building falling into ruin
6	surface damage and cavities in the face of the wall		
7	bursts and crevices		

8	linear damage to the wall	occurrence of shrubs and trees on or along the crown of the wall, poor condition of the mortar, lack of ongoing maintenance, lack of waterproofing of the coping	weakening of the structure of the wall creates favourable conditions for seeds setting and for the development of shrubs and trees, and as a further consequence weakening of the deep structure of the wall below the damaged part of the coping, the building falling into ruin
9	occurrence of lichens, moss and grass on the surface	high humidity, shading, no ongoing maintenance	retention of humidity in the wall, superficial damage to brick and stone, weakening and washing out of welds creates favourable conditions for seed setting and the development of shrubs and trees and, as a further consequence, weakens the deep structure of the wall

During the research work, a graphic survey of the northern face of the Great Tenaille wall was made in 2018 (Fig. 8). In the drawing presented below, the face of the wall is marked with numerous loss of material, welds, biological corrosion, demolition, contamination, greenery, displacement of construction material and landslides. The condition of the wall was then assessed as critical. Thanks to this study it is possible to make a detailed estimate of repairs necessary to stop the process of degradation.

Fig. 8. Graphic survey – source: Archives of the Department of Conservation of Built Heritage, Faculty of Civil Engineering and Architecture, Lublin University of Technology

Currently, we can observe progressive degradation of the wall, further slipping of layers of stone and cornices, as well as continuous growth of invasive greenery and numerous lichens and moss (Fig. 9).

Fig. 9. Photograph showing further degradation of the wall (2020) – authors' own photograph

In order to prevent further corrosion and to repair the existing condition of the analysed part of the wall, it is necessary to take strict conservation measures. It is essential to:

- clean the wall from degrading greenery,
- complete the welds,
- replenish the cavities,
- in the case of minor cavities, protect the existing condition,
- complete the wall structure on the basis of technical expertise,
- supplement or reinforce the wall structure on the basis of technical expertise.

Conclusions

In the case of works related to historic buildings, such as fortifications, it is necessary to continue works aimed at protecting the buildings against devastation, to carry out surveying and cleaning works, to mark and describe each of the buildings of fortifications and equipment on the premises [12]. Therefore, continuous surveying works is the basis for the proper protection and maintenance of a historic monument.

This study provides an example of the possibilities offered by laser scanning in the process of survey, technical condition assessment, and architectural and conservation analysis. Thanks to the architectural research, it was possible to accurately assess the technical condition of the studied facility and to perform a comparative analysis of the process of degradation of the historic tissue. Systematic documentation of the degraded element makes it possible to assess the degradation progress and then formulate recommendations for further works related to securing the endangered structure of the wall.

These are necessary actions to ensure the durability of the historic substance. As far as the protection of cultural assets is concerned, the architectural survey together with detailed technical expertise is the basis for further actions taken by administrative authorities taking into account conservation recommendations.

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Architecture in the public space – streets and squares under the conditions of urban globalization

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Abstract: This article is the result of the research carried out by the author in creating new public spaces and shaping contemporary urban-forming trends in the conditions of globalization. In his research (through literature criticism and in situ field research) the author analyzes selected contemporary architectural realizations in Poland over the last decades, comparing them with similar works around the world, assessing their impact on shaping the cities' build environment. The comparison is made through the analysis of such factors as: the construction of the form, elements of architecture and construction affecting the location, visibility, perception and created relations between the building and the surroundings.

Keywords: architecture, city, public space, streets, squares, globalisation

Introduction

The main aim of this article is an attempt to define the factors shaping architectural objects within urban space, in the conditions of ubiquitous globalization. Awareness of creating the urban development of cities and human settlements from the earliest times predisposed architects to the creators' elite. The sense of creating space, by giving it the characteristics of a place, was to justify individual, sometimes sublime forms. The buildings and constructions that have been created for centuries had not only to fulfill utilitarian and structural functions, but also, by influencing the imagination, they stimulated aesthetic impressions. A specific dialogue between the creator and the recipient of the work – the user, which has been taking place in front of our very eyes for several thousand years, aimed at forcing to give architecture a new dimension, a philosophical dimension. The philosophical "techne" becomes part of the creator's communication with the addressee of the work and influences the interactions between human cultures. It was believed that when people talk to each other, they use their knowledge more often. By seeking a balance between the "techne" and the "arche", the fleeting metaphysical strength of the created object was to give it additional value. This value should come from the sensitivity of the creator, exhibited in the culture of the created form of expression and the sense of the specificity of the conditions of incorporation into the city's urban environment. [*Shepard J., Gregory J.; Jeffrey St. John; Theodore G.2006*]

Contemporary globalised urban environment – benefits or social disapproval

The progressive urbanization of cities is not limited to the creation of monstrous tower blocks estates. It was quickly understood that the organization of urban space must have its reflection in the growing needs of residents. This was noticed already in 1933 in the postulates of the Athenian Charter, which for many years set

the direction for change. According to research, we spend more than half our lives outside the home. In the workplace and on the way to it, in restaurants, cinemas, museums, during walks in the park, going into public institutions and the church, or on the way home. All the places visited are within public space. [*Czarzasty; Szymańska 2016*]

Nowadays, it is on the Asian continent that the largest urbanization processes take place. Rapidly emerging cities in Asia (in areas of the fastest industrial and economic development), had to quickly respond to the requirements that were set for them in order to meet the residential needs of society. Shaped living environment in Asian countries has undergone a kind of evolution from nameless spaces in the city's dormitories to organized places with individual characteristics and influencing the standard of living. [Gawel 2017] According to many designers and scientists, the negative effects of globalization in the creation of cities will consist in the emergence of increasingly similar (nameless) public spaces, and thus architectural objects themselves. This happens when the dialogue between the designer and the space user is no longer possible. Rapid and uncontrolled process of economic development of cities has deprived residents of the feeling of social satisfaction, acceptance and joy of staying within crowded, busy squares and streets. People began to flee to parks and squares looking for a sense of security and rest. [Gawel 2018] The search for breathing room and relaxation in public spaces is very often done by resting among familiar forms, gentle light and related calm color patterns. The feeling of contentment (according to psychologists) [Bańka 1997] with being in a given space can be obtained by:

- the use of liquid and round shapes of objects,
- a combination of contrasting forms, large and small, within the scale readable to people,
- introducing moving and dynamic elements into the urban interior,
- application of repetitive rhythms,
- designing objects expressing common and understandable creative ideas (eg expressionism, symbolism or functionalism).

These general remarks can be seen in many design solutions. However, the clarity and simultaneously allowing individual expression of urban space is associated with the use of specific styles and patterns. The general international style created before World War I was described as innovative. In turn, immediately after the war, as a result of chaos appearing in the life of city dwellers, new trends in urban planning (Le Corbusier or Garnier) and architecture began to be sought. The new international style began to be prosocial, creating more and more repetitive patterns. In the following years, the ideas of modernism quickly penetrated into social life, hence it did not encounter social resistance and disapproval, undergoing further transformations. [9]

The street and the square as the object insertion site

In the course of the conducted research, it was attempted to identify characteristic places in the urban public space for the location of architectural objects. Various functions of objects have been noted, being at the same time a contribution to their location within districts or cities themselves. (Tab.1) However, the basic source of guidelines deciding on the place of incorporation was data resulting from the current provisions of spatial development plans. In its content, it specified the parameters and building lines, taking into account social expectations. The evolution in planning consisted in abandoning norms, abandoning the respect of official urban documents, taking into account the new spatial policy, in line with the expectations of the inhabitants. [*Chyłowa-Heczko E.* 1999] In the course of the conducted research, three basic locations were distinguished, within the built environment of cities: historical (cultural) and landscape surroundings, urban squares, streets (including corners).

Historical (cultural) and landscape surroundings

Creating historical urban layouts very often began with squares, streets or parcel divisions. In time, the area grew in new buildings, generating a residential environment that is necessary for living. The origins of most

historical urban systems can be found in medieval times. The traditional historical layouts of streets, quarters, and existing plots that have survived to the present are the backbone of the future urban structure. The unique value of a place shaped for many centuries includes its undeniable cultural value. Nowadays, the values and the social acceptance of a city or district are determined by the ways and conditions of preserving the historical environment, including its authenticity. The awareness of renovating buildings requires carrying out the necessary research, studies and preliminary projects. Supplementing the structure through contemporary architecture also requires a specific compromise between cultural values and the present. The aim of such actions is to preserve the living organism serving the modern needs of life with the maximum preservation of the cultural heritage contained in the urban complexes. [Małachowicz 2007].

The urban square

In their realizations, the creators more often chose locations related to the possibility of displaying the work, which is why they are more often squares. In immemorial times, with the appearance of sacral and burial architecture, humanity sought to concentrate the most important architectural objects within the squares. In the Mediterranean culture, they had their beginnings as agora and forums, with time transformed into urban markets. They have always been places gathering the largest number of inhabitants and also vital elements of the city structure. As human settlements increased due to the change in the way of life of their inhabitants, they began to multiply reaching the character of urban nodal points. The architecture created in these places has a chance for a better presentation, access to light or complementation through the urban detail. At the same time, the requirements related to its housing enforce many conditions. It is about the organization of rest areas and the creation of a coherent spatial composition with a drawing of the floor.

Table 1. Analysis of world's examples contemporary architecture in urban space – the author's elaboration (urban characteristics)

No.	Object	City	Location	Surroundings	Environment
	1	2	3	4	5
Urban, historic and landscape environment					
1	**Shakespeare Theater**	Gdansk	square	tenements & highway	historical district
2	**The Louvre Pyramid**	Paris	square	fountains & Louvre buildings	monuments
3	**Philharmonic**	Szczecin	street	tenements & greenery	historical district
Urban environment – square					
4	**Dongadeum**	Seoul	square	commercial centers	commercial district
5	**Heydar Alijew Center**	Baku	square	greenery	residential district
Urban environment – street					
6	**Dancing house**	Prague	corner street	tenements	residential district
7	**Bonjour Tristesse**	Berlin	corner street	tenements	residential district

The street

Analyzing the presented objects, it can be stated that the designers do not treat the street location as the right place for the construction of an architectural object (supplementing the buildings). Disapproval probably results from the conditions of neighboring buildings or limitations resulting from the lack of space for creating

a building with the appropriate function and scale. The street has never been appreciated by designers as a place to build. With the rapid development of transport and urban infrastructure, the street has become an insignificant place. The sidewalk itself can only mean something in connection with the building. [Jacobs 2014] Streets and sidewalks seem to be the main public spaces of cities that should serve other purposes than just vehicular traffic. A slightly different situation appears in the case of the location of objects on street corners. This location with the created "pseudo" square, under certain conditions, may allow for the display and presentation of the building.

The object form and the contemporary global architecture trends

The creation of modern architecture in a built environment requires its creators to sign in to the current trends and styles of urban development. The lack of a strictly defined dominant direction in the field of creating space and objects connected with it resulted in liberalism starting to be perceived as the key to the encroaching economy. That is why ,,sustainable development" as a direction began to be perceived in terms of freedom, supported by acceptance and social dialogue (with the user) with integration into greenery in the surrounding landscape. At a time when the whole world creates ever higher objects outdoing one another with more and more new technologies allowing for juggling between "concrete, steel and glass", Europe focuses all its creative attention around revitalization and modernization of what has already been created. Giving the artist individual characteristics is needed and even advisable to emphasize the character of the transformed public space. The issue is appearing when architecture begins to fight the very space. It manifests itself in taking over the urban space, determining it, while giving certain features. Deconstructivism and blobitecture [10] have become the directions that best fit into the kind of emptiness created after postmodernism. These directions were fresh and bold in their message.

The modern technical possibilities of using computers have allowed designers to create (the highest possibility of creating) forms of organic and oval objects, often with rounded and soft shapes. This type of object looks more like a sculpture, a work of an artist which requires proper exposure and framing. When analyzing these modern objects in terms of function, it should be noted that multifunctional buildings are being built all the time, with sometimes monumental open communal spaces. Transparent glazing of entire planes allow space to penetrate, without using the wall as a partition. Another important element of the building is the window, or its elimination. The introduction of reduced windows in the form of their elimination or reduction of the separation of storeys and rhythms allows for the determination of new divisions of planes. Walls that are there but they aren't there, windows that are there but aren't, and as a consequence, there is only a roof – large, rounded, wavy in many places and at the same time consistently the same. These modern architectural trends are often referred to as controlled chaos. It creates a new way of perceiving a building in urban space.

The architectural object in an urban environment – an analysis of selected

The ever present rivalry of many cities around the world in the field of erecting new buildings, whether through organized competitions or other forms of creator competition, led to the creation of projects combining many challenges. Modern objects not only exert aesthetic impressions, but more and more often combine new functionalities such as: energy efficiency, ecology or mobility of shaping the structure. The buildings analyzed here are positive examples of modern architecture, with their distinguishing features. (Tab.2.)

The location of buildings in a historic surrounding

Completely different problems are experienced by designers of new facilities in the historical environment, in the immediate vicinity of historic buildings. One can not speak here about planning or landscape dominants, the creators concentrate more on the simplicity of the message, logical, clear forms, or even poetics. Some theorists define a space for design in such conditions as a theatrical one, a spectacle that takes place before

our eyes between modernity and cultural features. [Hastrup 2004] This was not the case with the Shakespearean Theater in Gdansk. The building has been a source of controversy since its inception. It was believed that it boldly interferes with the historical urban panorama. [Stiasny 2014] Through the use of dark façade solutions, as well as simple geometrical shapes, it was bravely announcing a breakthrough in design in the vicinity of monuments. This approach must have been objectionable. In time, it was accepted by the residents, not as a form of a "massive casket" (with a closed roof serving as a form of a lid), but as a building with sacral accents. [Kuzlanik 2014] This was perceived as a local feature, because in the Western tradition, artists created a gap between religion and art. [Newling 2007] Sacral motifs can also be seen in another project – the entrance to the Louvre, in the shape of a glass pyramid. From a spatial point of view, the design has been exceptionally refined, by separating into different directions underground in the interior and using water as a mobile element (which is also an external barrier that prevents access). After analyzing the scheme of location guidelines, from the western elevation of the Louvre to the Place d'Etoile in Paris, one can find links between the sharp edges of the prism of the glass pyramid and the strong form of the urban axis. [Żurawski 1962] Yet another approach is represented in the case of the Szczecin Philharmonic. The building is seen by some as a towering iceberg, by others as a connected space of the tops of tenement houses. The medium of expression used by the creators of the object was light and monochromatic architectural message. The building is admired for combining a rather harsh modest external form and sparing but soft shapes inside, characterized by exceptional acoustics, which is its additional asset.

Fig. 1. Seoul – Dongadeum, a, b – general views from the square, c. greenery at the back, d. site detail. Fot. author 2017

The location of buildings within squares

The following two buildings, although they are products of the same design studio, function in completely different realities of the city square and the function they serve. The Dongadeum building for the residents of Seoul is a hub node where 3 metro lines cross. The space availability causes that despite the complex shape, it has become part of the urban landscape. Modernity of the metallic outer housing solution, combined with the merger of the building plan, makes users view and treat this place as a meeting point. The location of the square allowed for the creation of an interesting green square in the city center as a place of rest for the residents.

The Center of Haydar Aliyev in Baku, due to its proportions, its round shape and its fluid form became, next to the Fire Towers, a symbol of the capital and even a symbol of Azerbaijan. However, the location – detached from the center – resulted in the object's even further perception as a monumental form. The oblong shapes of both objects and the free form of the projection translated into the shaping of the mass and the interiors. Created as spatial dominants in the city, they perform extremely different functions. Despite the economic successes in Azerbaijan, the country is not fully open to the West, which can be manifested in the way in which space is treated.

Table 2. Analysis of world's examples contemporary architecture in urban space – the author's elaboration (architecture characteristics)

No.	Object	City	Style	Function	Form	Fasades
	1	2	3	4	5	6
	I. Urban, historic and landscape environment					
1	**Shakespeare Theater**	Gdansk	modern building	theater	monumental	black brick
2	**The Louvre Pyramid**	Paris	post-modernism	gate to museum	monumental regular form	glass
3	**Philharmonic**	Szczecin	modern & smart building	philpharmonic	monumental regular form	semi trans-parent panel illuminated
	II. Urban environment – square					
4	**Dongadeum**	Seoul	deconstruc-tionism	exhibition center	free form irregular & round shape	aluminium panel
5	**Center of Heydar Alijew**	Baku	deconstruc-tionism	exhibition & museum center	free & fluid form	glass aluminium panel
	III. Urban environment – street					
6	**Dancing house**	Prague	deconstruc-tionism	office	multielement free form	glass
7	**Bonjour Tristesse**	Berlin	modernism	housing	monument al regular form	wall plaster window rhytm

Street location

In the case of street (corner) locations, both the Dancing House in Prague and the Bonjour Tristesse in Berlin are located in residential districts. Their creators' approach to the implementation was extremely different. The Berlin residential building is an orderly form with regular levels and risers, identical windows, and a slightly undulating elevation. The gently emphasized corner of the street, by applying the waving peak line of the facade, closes the whole. [Gregotti V .; Frampton K .; Wang W. 1989] As a consequence, this piece was treated as a dignified building, in which the designer achieved his goal thanks to the simplicity of the message. The

Prague building is completely different, it has a dynamic multi-element form of seemingly conflicting shapes. It is a contradiction to order, rhythm, staggering with its uneven shape, permeating structures and a glass façade. The buildings connect with the neighboring buildings creating a quarter closing. Both projects, despite the use of extremely different means of artistic expression, have become works of architecture, inspiring admiration in ordinary passers-by and visitors to these places. Noteworthy are the corner locations, as a special highlight of the street location.

Conclusions

Conclusions from the analysis of examples of architecture and urban-forming trends that appear in many cities can be summarized by formulating the following comments:

Contemporary cities and the places and public spaces shaped in them require an individual approach from their creators. By defining a place, the designer does not only take on himself, but also accepts the evaluation from other users. The factors that influence the success and acceptance of the object by the recipients are: scale, form, location, exhibition or the surrounding of the place (its character, described as individual features within the built environment). [8]

Architecture created in public places through its individual values (of the created object with the appropriate aesthetic culture) becomes a symbol of sorts. Bestowing the value of a public space to an area is usually done through architectural objects and other elements of urban composition, allowing a sense of harmony, security and integration with others. The role of objects of urban detail, greenery or the combination of walls and the floor of an urban interior should also be mentioned here.

As is apparent from the analysis carried out, the location within city squares is the most frequently chosen one fora more favourable reception of architecture. This can probably be explained by the larger and more impressive display of the object within an open space. However, it seems equally important to supplement the building as an architecture that fills urban structures.

Along with the creation of more and more impressive examples of architecture, the informal separation of space through the creation of barriers and fences is more frequently noted. This phenomenon can be dangerous enough that it sometimes leads to social divisions.

Some of the objects created take on the character of multifunctional buildings. This is most often due to the need for economic utilisation of their cubage in terms of ensuring appropriate and cost-efficient use. The multifunctionality of a building imposes on designers the necessity of combining many different related functions, allowing the creation of complexes corresponding to contemporary social needs.

The avant-garde architecture created in urban spaces is also often verified with time. The object, known and accepted by the residents, is no longer offending in its aesthetics, after a few, and more often after several dozen years (e.g. Galeria Solpol in Wroclaw). A project that is not understood but recognizable can become "art" through architectural, urban and compositional features (e.g. the Katowice Spodek or the Szczecin Philharmonic). A structure created with strong architectural culture (with a suitably built form and aesthetic values), but not accepted, can defend itself in the context of the passing time.

Globalization in the conditions of functioning of cities as a negative phenomenon should be perceived in terms of creating repetitive objects and places that generate indifferent relations in urban structures. This is not only a phenomenon noted in Polish conditions, but a trend with an international dimension. Repeatability, economics of production, unification, unification of patterns or the pace of life can result in often experiencing a "déjà vu" of sorts in the perception of public space for leisure, housing and work.

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Architektura w przestrzeni publicznej – ulice i place w warunkach globalizacji miast

Streszczenie: Artykuł jest wynikiem kontynuacji badań prowadzonych przez autora w zakresie tworzenia nowych przestrzeni publicznych i kształtowania współczesnych trendów miastotwórczych w warunkach globalizacji. W swoich badaniach (poprzez krytykę literatury i badania terenowe „in situ") autor dokonuje analizy wybranych współczesnych realizacji architektonicznych w Polsce na przestrzeni ostatnich kilkudziesięciu lat, porównując je z dziełami światowymi, oceniając ich wpływ na kształtowanie środowiska zbudowanego miast. Porównanie dokonywane jest poprzez analizę takich czynników jak: budowa formy, elementy architektury i konstrukcji wpływające na lokalizację, wyeksponowanie, postrzeganie oraz wytworzone relacje pomiędzy budynkiem a otoczeniem.

Słowa kluczowe: architektura, miasto, przestrzeń publiczna, ulice, place, globalizacja

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Badania wybranych obszarów w Lublinie z uwzględnieniem typoszeregów budynków

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Streszczenie: W ramach przeprowadzonej inwentaryzacji do badań wybranych obszarów osadniczych przyjęto kryteria oceny obiektu wg: wieku, własności, technologii wykonania i źródła zasilania w ciepło. Następnie dokonano oceny energetycznej wybranych typoszeregów budynków.

Słowa kluczowe: technologia wykonania, źródło energii, budynki eksploatowane

Wstęp

Rozpoznanie stanu technicznego i energetycznego budynków wydaje się mieć niezmiernie istotny wpływ na efekt planowanych działań projektowych architekta. W szczególny sposób dotyczy to poprawy możliwości funkcjonalnej i energetycznej budynków oraz wpływu na estetykę modernizowanych budynków i obszarów z nimi związanych.

Tabela 1. Podział ilościowy w przyjętych strefach ogrzewania ze względu na czas realizacji budynku wg przyjętej skali wieku w Lublinie

Wiek	Liczba budynków		
	Strefa energetyczna		
	czerwona	żółta	zielona
Do 1985 roku	7	26	9
1986–1992	0	1	2

W ramach inwentaryzacji aktualnego stanu, niezbędnej do przeprowadzenia badań wybranego osiedla wytypowano miasto Lublin w zakresie 7 dzielnic: Kalinowszczyzna, Czechów Północny, Czechów Południowy, Śródmieście, Wieniawa, Czuby Północne i Abramowice oraz znajdujące się w tych dzielnicach osiedla mieszkaniowe.

Następnie wyspecyfikowano typoszeregi budynków na wybranych do analizy obszarach, spośród których wyróżniono 4 typy budynków: miejskie osiedla mieszkaniowe z budynkami w zabudowie jednorodzinnej i wielorodzinnej, użyteczności publicznej z obiektami biurowymi i przemysłowymi. Analiza dotyczyła potrzeb w zakresie uzupełnienia funkcji technicznych.

Do badań wybranych obszarów dzielnic i znajdujących się na ich terenie budynków przyjęto kryteria oceny wg 4 kryteriów: wiek, własność, technologia wykonania i źródło zasilania w ciepło.

Następnie przyjęto najbardziej charakterystyczne dla Lublina typoszeregi budynków, w wyniku czego wybrano obiekty w 3 przedziałach czasowych: do 1985, od 1986 do 1992 i od 2009. W trakcie analizy stwierdzono, że najbardziej reprezentatywną grupę w Lublinie stanowią budynki w 2 przedziałach, tj. z lat: do 1985 i od 1986 do 1992. Z uwagi na fakt urozmaicenia sposobu ogrzewania w poszczególnych typoszeregach budynków, w podanych dwóch przedziałach czasowych, do dalszej analizy przyjęto zbadane na terenie Lublina wybrane budynki, poddając je szczegółowej ocenie jako najbardziej charakterystyczną zabudowę (Tabela 1).

Wybór typoszeregów budynków

W określonym kryterium wieku (Tabela 1) wyselekcjonowano spośród wszystkich zainwentaryzowanych budynków na terenie Lublina, następujące typoszeregi (Tabela 2):

1. Prywatne – jednorodzinne miejskie (w zabudowie szeregowej i bliźniaczej).
2. Publiczno-prywatne i publiczne – mieszkalne wielorodzinne, w tym poniżej podane typy kategorii budynków, do których należą głównie: klatkowy (niski i wysoki), punktowy (niski z galeriami wewnętrznymi), korytarzowy (niskie i wysokie) oraz galeriowy (niski z galeriami zewnętrznymi).

Tabela 2. Zestawienie danych dotyczących liczby zbadanych (audytowanych lub monitorowanych) budynków w stosunku do rozpoznanych (info.) wg kryterium własności w Lublinie

Własność badanych budynków	Lublin
Budynki komunalne [szt.]	1 zbadano z 222 bud.
Budynki wspólnot mieszkaniowych	24 zbadano z 68
Budynki spółdzielcze [szt.]	12 zbadano z 75
Budynki budżetowe [szt.]	49 przedszkoli zbadano spośród 67; 5 budynków szpitalnych z 8; 3 przemysłowe z 5 na terenie szpitala (1 zespół szpitalny na 7 w Lublinie)
Budynki prywatne	4 mieszkalne jednorodzinne
Suma audytowanych i monitorowanych budynków	50 / * A-42, M-46

3. Użyteczności publicznej, w tym budynki oświatowe, głównie przedszkola z funkcją biurową i zespół szpitalny z obiektami biurowymi oraz przemysłowymi służącymi obsłudze wybranego obszaru zamkniętego (stolarnia, stacje trafo, kotłownia, pralnia, kuchnia i inne).

Wybrane typoszeregi budynków, na obszarze Lublina, są reprezentantami budynków zrealizowanymi w technologii:

1. Tradycyjnej – murowana, stropy drewniane lub stropy ogniotrwałe (np. Kleina lub gęstożebrowy typu: Ackerman lub Teriva), więźba dachowa drewniana.
2. Częściowo-uprzemysłowiona (mieszana) – tradycyjna murowana ze stropami ogniotrwałymi (gęstożebrowy typu: DMS, DZ-3 prefabrykowane kanałowe lub Żerań), ze stropodachami lub więźbą dachową.
3. Uprzemysłowionej – wielkoblokowej (WBLŻ), wielkopłytowej (OWT-67 i W-70).

Oszacowanie jakości energetycznej budynków

Jakość energetyczną budynku charakteryzują wskaźniki (zwykle oznaczane literą „E" z odpowiednimi indeksami), których wartości otrzymuje się po podzieleniu przez kubaturę lub powierzchnię pomieszczeń rozpatrywanego budynku, energii netto, brutto (dostarczonej) lub energii pierwotnej koniecznej do zapewnienia wymaganego

poziomu ogrzewania, chłodzenia, wentylacji pomieszczeń, podgrzania wody i oświetlenia w budynku, w przyjętym przedziale czasowym.

Dla wyszczególnienia stref ogrzewania w projekcie przyjęto, w zależności od źródła ogrzewania, 3 strefy:

I. Czerwoną – ogrzewanie na nieodnawialne paliwo stałe (węgiel, miał koks), do której należą budynki z kotłowniami na paliwo stałe. W Lublinie wybrano 2 budynki w dzielnicy Śródmieście i 3 w dzielnicy Wieniawa.
II. Żółtą – ogrzewanie z sieci miejskiej na nieodnawialne paliwo stałe lub ciekłe (węgiel lub gaz ziemny), do której należą budynki zasilane zdala czynnie przez Lubelskie Przedsiębiorstwo Energetyki Cieplnej (LPEC). Spośród nich wytypowano w sumie 27 budynków w dzielnicach: Śródmieście 1, Wieniawa 14, Czechów Południowy (cześć zachodnia) 1, Czechów Północny (część południowo-zachodnia) 9, Kalinowszczyzna 1 i Czuby Południowe (cześć północna) 1.
III. Zieloną – ogrzewanie na nieodnawialne paliwo płynne (gaz ziemny), do której należą budynki z kotłowniami na paliwo ciekłe (gaz ziemny). W Lublinie wybrano 11 budynków znajdujących się w dzielnicach: Ponikwoda 1, Czechów Północny (północno-wschodnia część) 1, Czechów Południowy (północno-zachodnia część) 1 i Abramowice 7.

Spośród 3 stref do dalszych badań wybrano, jako reprezentatywne dla Lublina wybrano 38. budynki o różnym przeznaczeniu, technologii i konstrukcji (Tabela 3 i 4).

Tabela 3. Zestawienie liczby budynków z podziałem na strefy energetyczne, wg kryterium technologii

Liczba budynków [szt.] wg technologii wykonania w strefie energetycznej:	LUBLIN Tradycyjna / Uprzemysłowiona / Mieszana
Czerwonej	4 / 0 / 0
Żółtej	16 / 10 (WBLŻ, OWT-67,W-70) / 0
Zielonej	6 / 2 (WBLŻ, W-70) / 1

Tabela 4. Zestawienie liczby budynków z podziałem na strefy energetyczne wg rodzaju konstrukcji

Liczba budynków [szt.] wg konstrukcji w strefie:	LUBLIN Podłużny / Poprzeczny / Mieszany
Czerwona	2 / 2 / 0
Żółta	7 / 10 / 9
Zielona	5 / 0 / 4

Analizę 38 ogrzewanych, spośród pięćdziesięciu wybranych budynków, zestawiono wraz z termogramami w Załączniku nr 2 (Zestawienie danych audytowych – maszynopis autorki).

Tabela 5. Zestawienie liczby budynków w strefie wybranych do badań budynków na terenie Lublina w poszczególnych przedziałach czasowych

Rok budowy	<1985	1986–1992	1993–1997	1998–2008	Od 2009
Strefa czerwona	4	*	*	*	*
Strefa żółta	24	1	*	*	*
Strefa zielona	7	2	*	*	*
Suma	35	3			

W sumie, spośród wszystkich zbadanych obiektów w samym Lublinie, wybrano do dalszych badań liczbę 38. budynków, która może być jeszcze zweryfikowana w przypadku stwierdzenia budynków powtarzalnych lub mniej istotnych w skali zużycia energii po przyjęciu budynków modelowych, w następujących strefach na terenie Lublina (Tabela 5).

W tabeli 8 zestawiono wyniki oceny stanu technicznego budynków inwentaryzowanych w Lublinie.

Tabela 6. Zestawienie oceny stanu technicznego budynków inwentaryzowanych (audytowanych i monitorowanych) w poszczególnych strefach wg skali WACETOB i kryterium wieku budynków oraz stref energetycznych – zależnych od sposobu ogrzewania

Kryterium wieku	Czerwona Stan techniczny: Bdb / Zadowalający / Dostateczny / Zły / na liczbę budynków	Żółta Stan techniczny: B/Z/D/Zły / na liczbę budynków	Zielona Stan techniczny: B/Z/D/Zły / na liczbę budynków
Do 1985 roku	B / Z-4 / D-3 / Zły	B /Z-19/D-8 /Zły	B/Z-3/D-6/Zły
1986–1992	0	B/Z-1/D-/Zły	B/Z-1/D-1/Zły
Od 2009	B-1 / Z / D / Zły	0	0

Na podstawie przyjętej czterostopniowej skali podanej przez WACETOB[1] stwierdzono, że na terenie Lublina budynki znajdują się ogólnie w zadowalającym stanie technicznym (ponad 56%), jednak niewiele mniej budynków było w stanie technicznym dostatecznym (nieznacznie ponad 52%) i tylko jeden budynek w stanie technicznym bardzo dobrym.

Ponadto wyniki przeprowadzonych badań termowizyjnych potwierdziły, że w niektórych budynkach proces wieloletniego przemarzania ścian ma znaczenie w ocenianym stanie technicznym (tab.7).

Tabela 7. Zestawienie oceny stanu energetycznego w aspekcie analizy strat ciepła przez elementy przegród zewnętrznych w skali standard wg kryterium wieku budynku i stref energetycznych

Wiek	Czerwona Stan energetyczny: Bdb / Zadowalający / Dostateczny / Zły / na liczbę budynków [szt.]	Żółta Stan energetyczny: B/Z/D/Zły / na liczbę budynków [szt.]	Zielona Stan energetyczny: B/Z/D/Zły / na liczbę budynków [szt.]
Do 1985 roku	B / Z-1 / D-3 / Zły-3	B / Z-11 / D-8 / Zły-7	B / Z-3 / D /Zły-6
1986–1992	0	B / Z /D-1 / Zły	B /Z-1 / D / Zły-1

Na podstawie przeprowadzonych analiz stanu technicznego (Załącznik KARTA BUDYNKU – maszynopis autorki[2]) i energetycznego (załącznik KEB – maszynopis autorki[3]) stwierdzono (tab. 7), że stan techniczny budynku po ujawnieniu „niedomagań" termicznych jest gorszy w tej samej skali oceny WACETOB, którą przyjęto w metodologii oceny stanu technicznego. Fakt ten potwierdzają termogramy a w kilku przypadkach, stan techniczny budynku, po uwzględnieniu wyników badań termograficznych spadł nawet o dwa stopnie.

Poddając analizie zużycie paliwa na cele ogrzewcze i c.w., na podstawie kwerendy audytów, świadectw energetycznych i obliczeń własnych oszacowano energię końcową w budynkach wielorodzinnych i wynikający stąd stan techniczny wybranych do badań budynków. W analizie wyników uwzględniono aspekt ucieczki ciepła

1 Skala podana przez WACETOB, Warszawa, wrzesień 2001 r., cytowaną w: Podejście kosztowe *w* wycenie nieruchomości: Metodologia; Zużycie obiektów; Przykłady, WAECTOB, Warszawa 2010, s. 19 – tablicę kryterium podano poniżej.

2 KB – karty danych budynku załączono w Zestawieniu zbiorczym danych inwentaryzacyjnych budynków w Lublinie – maszynopis.

3 KEB – karty danych energetycznych załączono w Zestawieniu zbiorczym danych audytowych budynków w Lublinie, wraz z aktualnymi termogramami – maszynopis.

przez poszczególne elementy obudowy wynikający ze złego zaprojektowania bądź wykonania. W analizie nie uwzględniano zużycia prądu wspólnego ze względu na mały udział w kosztach na wybranych budynkach wielorodzinnych.

Tabela 8. Zestawienie oceny stanu energetycznego w aspekcie średniego zużycia energii pierwotnej w audytowanych budynkach w poszczególnych strefach energetycznych wg kryterium wieku budynków – $\overline{EP}$ – średnia przed termomodernizacją

Wiek	Strefa energetyczna		
	Czerwona liczba budynków / $\overline{EP}$ [kWh/m^2]	Żółta liczba budynków / $\overline{EP}$ [kWh/m^2]	Zielona liczba budynków / $\overline{EP}$ [kWh/m^2]
Do 1985 roku	7 / 426,30	26 / 214,10	9 / 562,48
1986–1992	brak	1 / 190,78	2 / 369,10

Dokonano analizy średniego zużycia energii przed (Tabela 8) i po (Tabela 9) termomodernizacji i stwierdzono, że zużycie energii spadło nawet o 50%. Natomiast budynki oddane do 1992 r. do użytkowania, mimo lepszego spełnienia obowiązujących wymagań ochrony cieplnej budynków, zawartej w rozporządzeniu[4], nie są energooszczędne. Nie spełniają też podstawowych wymagań dotyczących poziomu zużycia energii do celów ogrzewczych, ponieważ prawo[5] nie jest respektowane przez uczestników procesu budowlanego.

Tabela 9. Zestawienie oceny stanu energetycznego w aspekcie średniego zużycia energii pierwotnej w audytowanych budynkach w poszczególnych strefach wg kryterium wieku budynków – $\overline{EP}$ – średnia po termomodernizacji

Wiek	Czerwona liczba budynków / $\overline{EP}$ [kWh/m^2]	Żółta liczba budynków / $\overline{EP}$ [kWh/m^2]	Zielona liczba budynków / $\overline{EP}$ [kWh/m^2]
Do 1985 roku	7 / 332,88	26 / 143,37	9 / 310,81
1986–1992	brak	1 / 122,53	2 / 258,70

Najczęstszą przyczyną problemów w takich budynkach są mostki termiczne, które psują estetykę odbioru budynku w otoczeniu. Powstają one często w wyniku braku odpowiednio opracowanych detali w projektach budowlanych[6], ale też z nieuzasadnionych „oszczędności" właściciela, dewelopera lub zarządcy i wreszcie błędów wykonawczych. W analizowanych budynkach stwierdzono też brak skutecznej wentylacji (mimo odpowiedniej ilości przewodów), zbyt duże uszczelnienie przegród w budynku i jednoczesny brak nawiewu powietrza do pomieszczeń oraz zbyt szybkie oddawanie do użytkowania budynków/lokali – „stan deweloperski") i brak odzysku ciepła ze zużytego powietrza (np. przez rekuperator – szczególnie istotne i opłacalne w budynkach wielorodzinnych) powoduje duże zużycie energii na cele ogrzewcze.

Poprawę tego stanu można zrealizować, m.in. przez: zmianę źródła ciepła na kocioł gazowy kondensacyjny, alternatywny sposób ogrzewania – instalację fotowoltaiczną, kominek na biomasę z rozprowadzeniem ciepła albo z płaszczem wodnym.

4 Rozporządzenie Ministra Transportu,Budownictwa i GospodarkiMorskiej z dnia 6 listopada 2012 r. zmieniające rozporządzenie w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie.

5 Prawo wymaga określonego poziomu jakości energetycznej.

6 W Polsce wystarczają one do uzyskania pozwolenia na budowę.

Oszacowanie wielkości i struktury potencjału zwiększenia efektywności energetycznej

Na podstawie analizy uzyskanych danych stwierdzono, że największym i jedynym dystrybutorem energii cieplnej w Lublinie jest Lubelskie Przedsiębiorstwo Energetyki Cieplnej, które obecnie dystrybuuje ciepło wytworzone przez inne spółki. Wytwarzaniem energii cieplnej w Lublinie zajmują się dwie niezależne elektrociepłownie Wrotków (PGE GiEK SA) i Lublin-Megaterm, które są zasilane w systemie kogeneracji, głównie gazem. Analizując strukturę sieci LPEC stwierdzono, że obecnie jest ona bez możliwości podłączenia pętlowego innych alternatywnych dostawców ciepła, choć istnieje możliwość na niektórych odcinkach sieci zasilanie z obu wymienionych źródeł elektrociepłowni. Sieć LPEC w wybranych obszarach badawczych Lublina zasila większą część budynków, o wszystkich funkcjach usługowych. Nie oznacza to, że struktura sieci jest wystarczająca dla potrzeb tak dużego miasta, jakim jest Lublin.

Już teraz na obrzeżach miasta powstają indywidualne kotłownie zarówno w skali osiedli, jak i pojedynczych mieszkań, najczęściej zasilane gazem. Najbardziej jest to rozpowszechnione u deweloperów, którzy nie dostrzegają problemu w przyszłym zarządzaniu, ponieważ ich to już nie dotyczy (np. potrzebą corocznej kontroli wielu pieców c.o. w budynku). Eksploatacja wynikająca z przepisów ustawy prawo budowlane wymaga, bowiem co roku obowiązkowych przeglądów służących ocenie stanu technicznego urządzeń gazowych. W Lublinie są też już zrealizowane nowoczesne, w pełni zautomatyzowane kotłownie gazowe służące obsłudze, np. dwóch budynków, co na obrzeżach miasta wydaje się być bardziej ekonomiczne niż rozbudowa sieci LPEC do ich zasilenia. W przypadku rozbudowy sieci miejskich należy uwzględnić fakt, że w samym centrum Lublina jest wiele urządzeń w przewadze zasilanych węglem lub prądem, należy zatem rozważyć rozbudowę istniejącej struktury sieci w tym kierunku. Ostatnio na lata 2008–2020 LPEC przyjął strategię rozwoju, mającą na celu poprawę efektywności energetycznej systemu ciepłowniczego oraz redukcję emisji CO_2. W Lublinie są to obecnie realizowane działania służące ograniczeniu zużycia ciepła w mieście.

Racjonalne gospodarowanie energią jest jednym z najważniejszych celów stojących przed firmami zajmującymi się jej produkcją i dystrybucją. LPEC od wielu lat prowadzi systematyczną modernizację systemu ciepłowniczego, korzystając z najnowszych dostępnych na rynku technologii, starając się przy tym minimalizować negatywny wpływ rozwoju na otaczające nas środowisko. Działania te polegają, m.in. na wymianie wyeksploatowanych i wystarczająco nieocieplonych rurociągów, na preizolowane o znacznie lepszych parametrach termoizolacyjnych, likwidacji lokalnych kotłowni i pieców węglowych oraz zastąpieniu nieefektywnych węzłów cieplnych nowoczesnymi węzłami wymiennikowymi, wyposażonymi w automatykę pogodową.

Inwentaryzacja wybranych charakterystyk technicznych poszczególnych budynków[7] na wybranej do analizy przestrzeni modelowej Lublina, pozwoliła ustalić systematykę zestawienia danych.

Na podstawie wnikliwej analizy potencjału energetycznego dotyczącego zabudowy badanego terenu Lublina stwierdzono, że do strefy:

I. **Czerwonej** zaliczone zostanie głównie śródmieście Lublina, gdzie występują urządzenia grzewcze mieszane, jednak ze znaczną przewagą węglowych. Zwłaszcza w budynkach wybudowanych do 1939 roku w technologii tradycyjnej;
II. **Żółtej** zaliczone zostaną dzielnica Wieniawa i obrzeża Śródmieścia Lublina zabudowanych budynkami zrealizowanym w latach 1920–1963 w technologii tradycyjnej, a także dzielnicę Czechów Północny, Czechów Południowy i Czuby Południowe zabudowanych budynkami zrealizowanymi w latach 1978–1988 w technologii uprzemysłowionej wielkopłytowej i wielkoblokowej;
III. **Zielonej** zaliczone zostaną fragment dzielnicy Czechów Południowy i oddaloną od centrum (z możliwością zasilania przez w ciepło przez LPEC) Zespół Samodzielnego Szpitala Neuropsychiatrycznego w Lublinie przy ul. Abramowickiej zabudowany budynkami zrealizowanymi w latach 1963–1973 w technologii tradycyjnej murowanej i uprzemysłowionej wielkoblokowej w dzielnicy Dziesiąta-Abramowice oraz

7 Kwerendę danych zaczerpnięto z materiałów archiwalnych zarządców, m.in. na podstawie wykonanych w ostatnich latach audytów energetycznych (32), audytów remontowych (4) i świadectwa charakterystyki energetycznej (1), których autorami byli, m.in. (szczegóły w bibliografii): dr inż. Anna Życzyńska i mgr inż. Grzegorz Dyś [2.2, 2.3, 2.4, 2.6, 2.7, 2.9, 2.15, 2.22, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.11]; dr inż. Aleksander Panek [2.5]; mgr inż. Grzegorz Polkowski [1.1, 1.2, 1.3, 1.4, 2.1, 2.8, 2.10, 2.11, 2.12, 2.13, 2.14, 2.16, 2.17, 2.27]; mgr inż. Jarosław Kozub [2.18, 2.19, 2.20, 2.21, 2.25, 2.26]; mgr inż. Anna Woroszyńska-Burzak [1.8]. Wykorzystano też dane o zużyciu mediów, uzyskane w wywiadzie bezpośrednim u zarządców i mieszkańców.

zabudowę indywidualną szeregową i bliźniaczą w dzielnicach Czechów Górny i Kalinowszczyzna, gdzie źródło zasilania ciepła jest gazowe (lokalne kotłownie).

Analiza wyników badań potwierdziła, że w każdej ze stref istnieje duży potencjał do wprowadzenia zmniejszenia zużycia energii. Jest to możliwe chociażby ze względu na rozwój odnawialnych źródeł energii, co mimo konieczności poniesienia kosztów może się szybko zwrócić. Dlatego w planowaniu zwiększania potencjału oszczędności energetycznych w aspekcie energii cieplnej należy brać pod uwagę zarówno skuteczną likwidację mostków termicznych w projektowaniu architektonicznym, jak i zastosowanie OZE.

Podsumowanie

1. W planach miejscowych brakuje zapisów dotyczących wymagań stawianych efektywności energetycznej budynków i terenu.
2. Brakuje wytycznych służących określeniu wymaganej jakości efektywności energetycznej użytkowanych i nowoprojektowanych instalacji czy też budynków.
3. Analiza średniego zużycia energii cieplnej w wytypowanych strefach energetycznych Lublina, określona na podstawie audytów, daje uzasadnienie do większego wykorzystania możliwych już dziś działań energetycznych i osiągnięcia planowanej efektywności energetycznej poprzez ukierunkowanie celu na większe zastosowanie rozwiązań OZE.
4. Wydaje się, że opracowany system badań, oparty na wielokryterialnej ocenie techniczno-energetycznej, może być przyjęty do planowania dalszych działań skierowanych na analizę obszarów miejskich lub wiejskich, i to zarówno w zakresie budynków od lat eksploatowanych, jak i budynków nowo wybudowanych, o różnej kwalifikacji kryteriów wyboru, co do: strefy, wieku budynku, technologii i przeznaczenia.
5. Kolejnym etapem prac powinno być opracowanie synergicznego modelu sposobu efektywnego zarządzania i oszczędzania energii w jednostce urbanistycznej, jaką jest miasto Lublin.

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[2] Rozporządzenie Ministra Transportu, Budownictwa *i* Gospodarki Morskiej *z* dnia 6 listopada 2012 r. zmieniające rozporządzenie *w* sprawie warunków technicznych, jakim powinny odpowiadać budynki *i* ich usytuowanie.
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[38] Życzyńska A., Dyś G.: Audyt energetyczny [3.11] Lublin, ul. Organowa 2, budynek mieszkalny.

Surveing housing districts of Lublin: building types and energy performance

Summary: The paper presents a survey on energy efficiency of the housing stock of the city of Lublin. The following criteria were adopted for the examination of selected estates: age of buildings, ownership structure, construction methods, and type of heat source. Results of energy audits of representative buildings were extrapolated to assess whole housing areas.

Keywords: building type, construction methods, energy source, buildings in use

8 Numery [2.2] oznaczają karty – KB i KEB – do której wykorzystano dane z audytów lub certyfikatu. Na podstawie rozporządzenia w sprawie audytów i algorytmu sporządzenia audytu energetycznego dla budynku zgodnie, a także algorytmu oceny opłacalności przedsięwzięcia termomodernizacyjnego przeprowadzono kwerendę danych dla miasta Lublina, którą wykonano na materiałach archiwalnych zarządców lub właścicieli nieruchomości, m.in. na podstawie dokumentacji archiwalnej, wykonanych w ostatnich latach audytów i certyfikatu. Wyniki zamieszczono w załącznikach opracowanych dla miasta Lublina: Inwentaryzacji i Danych Audytowych z podziałem na strefy, a budynki opisano odrębnie w Karcie Budynku i Karcie Energetycznej Budynku.

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Architektoniczne metody ochrony istniejącej zieleni wysokiej w mieście. Studium przypadku

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Streszczenie: W pracy przedstawione zostały metody ochrony zieleni wysokiej w mieście. Na podstawie studium przypadku zespołu zabudowy mieszkaniowej wielorodzinnej w Lublinie na dawnych terenach wojskowych przy ul. Kraśnickiej w Lublinie opisane zostały metody budowlane oraz projektowe mające na celu ochronę cennej, istniejącej zieleni wysokiej w kontekście zamierzenia inwestycyjnego polegającego na maksymalizacji powierzchni użytkowej.

Słowa kluczowe: zieleń wysoka, drzewo w architekturze, zieleń w mieście, ochrona przyrody, Lublin

Wstęp

Wraz z terytorialnym rozwojem miast, a tym samym oddaleniem się terenów niezurbanizowanych od centrum miast i dostępnością tych terenów dla mieszkańców miast, zieleń w sąsiedztwie miejsca życia nabrała szczególnego znaczenia jako element poprawiający standardy higieniczno-sanitarne miasta oraz komfortu mieszkańców.

Rola i funkcja zieleni w mieście zmieniała się w zależności od stopnia rozwoju cywilizacyjnego społeczeństw. Bolesław Szmidt stwierdza, że zieleń w środowisku zabudowanym jest „miernikiem cywilizacji"[1]. Zdaniem Szmidta oprócz roli utylitarnej, roślinność pełni funkcję kulturotwórczą – jest – przejawem możliwości, aspiracji i potrzeb człowieka w zespoleniu z naturą.

Współcześnie, wraz ze wzrostem świadomości ekologicznej społeczeństwa, zieleń, szczególnie wysoka, zaczyna odgrywać znaczącą rolę przy podejmowaniu decyzji inwestycyjnych. Coraz częściej lokalne społeczności podejmują oddolne inicjatywy mające na celu ochronę istniejących w mieście form zieleni. Aktywiści przytaczają argumenty odnoszące się przede wszystkim do systemów ekologicznych w mieście, w tym ochrony bioróżnorodności oraz zachowania standardów klimatycznych, w tym roli i znaczenia zieleni w redukcji zanieczyszczeń powietrza. Często poruszany jest również aspekt związany z estetyką miasta i samym funkcjonowaniem zieleni jako elementu identyfikującego czy tworzącego tożsamość danej przestrzeni.

Rola zieleni wysokiej w mieście i architekturze oraz metody ochrony drzew – przegląd literatury

Współczesne badania dotyczące zieleni w kontekście środowiska zabudowanego odnoszą się przede wszystkim do zagadnień systemów zieleni w mieście. Agata Zachariasz wskazuje na zagadnienie roli zieleni wysokiej

1 B. Szmidt, O kompozycji zieleni, cz. I – Rys historyczny: w poszukiwaniu motywów w epokach ubiegłych, [w:] Biuletyn Techniczny Centralnego Zarządu Biur Projektowych Budownictwa Miejskiego, nr 10/53, Warszawa 1953, s. 4.

jaką pełni ona w procesach miastotwórczych między innymi jako element wyróżniający w krajobrazie miasta (Zachariasz 2006, s. 5). Jako najczęstsze funkcje i znaczenie zieleni w mieście wymienia: ekologiczne i biologiczne – oddziaływanie na klimat oraz znaczenie estetyczne i wynikający z nich wpływ na zdrowie i komfort życia mieszkańców.

Zachariasz zwraca również uwagę, że funkcja i rola zieleni zależna jest od sposobu użytkowania i funkcji, której dana roślinność towarzyszy. W swojej pracy skupia się niemal wyłącznie na terenach zieleni zorganizowanej – parkowej. Według Zachariasz zieleń może pełnić role: estetyczne, rozumiane także jako walor krajobrazu, a nawet wyróżnik w krajobrazie czy element tożsamości miejsca[2]; funkcje ekonomiczne jako element podnoszący wartość miejsca; ekologiczną, poprzez wpływ zieleni na klimat, temperaturę i wilgotność, a także ochronę przed erozją gleby; funkcje izolacyjną przed hałasem, wiatrem lub słońcem; funkcjonalną, jako miejsca rekreacji i wypoczynku; funkcje poprawiające jakość życia mieszkańców, w tym ich stan zdrowia.

Na funkcję zieleni w mieście w kontekście jej roli ograniczającej negatywne skutki klimatyczne zwraca uwagę Katarzyna Fabijanowska (Fabijanowska, 2001). Fabijanowska zwraca uwagę w szczególności na rolę szaty roślinnej w ograniczaniu efektu wyspy ciepła, powstającego na skutek większych temperatur nagrzanych powierzchni utwardzonych i dłuższego czasu oddawania ciepła przez te nawierzchnie w porównaniu do terenów zieleni. Według Fabijanowskiej różnice temperatur w lecie mogą sięgać nawet 10°C pomiędzy temperaturą powietrza a temperaturą powierzchni utwardzonych, podczas gdy różnica pomiędzy temperaturą powietrza a terenami zieleni różnić się będzie nieznacznie[3]. Zjawisko to wynika z cienia rzucanego przez zieleń wysoką oraz zjawiska transpiracji wody przez rośliny.

O korzyściach wynikających z obecności drzew w terenach miejskich pisała Halina B. Szczepanowska (Szczepanowska, 2007). Na podstawie badań przeprowadzanych w Stanach Zjednoczonych oraz krajach europejskich stwierdza, że oprócz pozytywnych aspektów społecznych i estetycznych, zieleń wysoka w mieście może mieć również znaczenie ekonomiczne, rozumiane jako oszczędności energii oraz poprawy stanu zdrowia mieszkańców. Jedną z kluczowych ról jaką odgrywa zieleń wysoka w środowisku zurbanizowanym wg Szczepanowskiej jest oddziaływanie roślin na klimat w mieście. Korzyści wynikające z tego oddziaływania przekładają się przede wszystkim na redukcję zanieczyszczeń powietrza oraz gazów cieplarnianych, a także przechwytywanie zanieczyszczeń pyłowych. Istotną rolą zieleni w mieście, zwłaszcza w kontekście środowiska mieszkaniowego jest również izolacyjność akustyczna[4]. Szczepanowska zwraca jednak uwagę, że skuteczną ochronę przed hałasem zapewniają dopiero pasy o szerokości 70–100 metrów. Mniejsze szerokości pasów zieleni do 10 metrów, zapewniają ograniczenie hałasu o maksymalnie 2dB[5]. Należy zwrócić jednak uwagę, że wyciszenie na poziomie 2 dB oznacza zmniejszenie poziomu dźwięku prawie 1,6-krotnie.

Poprawa jakości powietrza, ograniczenia gazów cieplarnianych, regulacja temperatury, aspekt estetyczny zieleni w mieście wpływa bezpośrednio na stan zdrowia fizycznego i psychicznego mieszkańców. Wynikające z oszczędności energii oraz regulacji wód opadowych, korzyści z szaty roślinnej mogą mieć bezpośrednie przełożenie na korzyści materialne nie tylko mieszkańców, ale także zarządów nieruchomości czy administracji miejskiej. Szczepanowska (Szczepanowska 2007), podobnie jak Zachariasz (Zachariasz 2006)), zwraca również uwagę na większą wartość nieruchomości zlokalizowanych w sąsiedztwie zieleni miejskiej.

Zagadnieniom metod ochrony zieleni w środowisku zabudowanym powierzonych zostało wiele prac badawczych, większość dotyczy przestrzeni przyulicznych, możliwości i technik nowych nasadzeń zieleni wysokiej lub stanu gleby i jego wpływowi na system korzeniowy.

Cennym źródłem wiedzy o ochronie drzew w inwestycjach miejskich są opracowania Marzeny Suchockiej odnoszące się między innymi do właściwej organizacji procesu budowy w sąsiedztwie drzew i ochrony ich strefy korzeniowej. Suchocka (2011) wskazuje na niedostateczną świadomość projektantów i wykonawców w zakresie ochrony zieleni wysokiej. Zwraca również uwagę na szereg czynników wpływających negatywnie na

2 A. Zachariasz Zieleń jako współczesny czynnik miastotwórczy z uwzględnieniem roli parków publicznych, Politechnika Krakowska, Kraków 2006, s. 5.

3 K. Fabijanowska, Zieleń w mieście – aspekty przyrodnicze, [w:] Architektura krajobrazu a planowanie przestrzenne, Pawłowska K. (red.), Politechnika Krakowska, Kraków 2001, s. 171–178.

4 H.B. Szczepanowska, Ekologiczne, społeczne i ekonomiczne korzyści z drzew na terenach zurbanizowanych, [w:] Człowiek i środowisko, t. 31 (3–4), 2007, s. 16.

5 Ibidem.

stan zdrowia roślin, w tym stresu wodnego – niedostatecznego nawodnienia roślin, kompresji gleby – niedostatecznego natlenienia systemu korzeniowego, uszkodzeń mechanicznych korzeni oraz zanieczyszczenia gleby[6].

W opracowanych przez Marzenę Suchocką *Kartach informacyjnych do ochrony stanu drzew w inwestycjach Wrocławia7* przedstawiony został szereg rozwiązań odnoszących się przede wszystkim do organizacji budowy w terenach zieleni, w tym między innymi zakazy oraz zasady organizacji placu budowy w strefach ochronnych drzew.

Zagadnienie technicznych rozwiązań mających na celu zapewnienie właściwych warunków do rozwoju zieleni wysokiej w przestrzeniach miejskich podejmują Elżbieta Szopińska oraz Justyna Zygmunt-Rubaszek (Szopińska, Zygmunt-Rubaszek, 2009). Zwracają uwagę przede wszystkim na istotę zabezpieczenia systemu korzeniowego drzew przed nadmiernym naciskiem oraz zapewnieniem właściwego nawodnienia i natlenienia korzeni. Poruszają również zagadnienie dotyczące regulacji przebiegu systemu korzeniowego[8]. Możliwości kontrolowania kierunku rozrostu korzeni pozwala na wyprowadzenie go na tereny przepuszczające wodę, a także podziemnych sieci infrastruktury miejskiej.

Na przykładzie rozwiązań z miast europejskich Natalia Przesmycka przedstawia techniczne możliwości poprawy warunków bytowych drzew przyulicznych (Przesmycka 2017). Przesmycka zwraca uwagę, że szacowany czas życia zieleni wysokiej w mieście ulega skrócenia w wyniku pogarszających się warunków rozwoju roślin. W kontekście idei zrównoważonego rozwoju w urbanistyce według Przesmyckiej zieleń miejska stanowi zasób infrastrukturalny miasta[9]. Ze względu na krótszy czas życia zieleni w mieście powinno się podejmować działania mające na celu poprawę warunków zadrzewienia oraz zachowanie możliwie dużej ilości okazów dorosłych przy planowaniu nowych inwestycji.

Oprócz znaczenia i funkcji zieleni w mieście oraz sposobów ochrony drzew, niemniej istotnym zagadnieniem w kontekście środowiska zabudowanego jest relacja pomiędzy elementami natury a obiektami architektonicznymi. Na wątki przenikania się zasad wynikających z natury w architekturze współczesnej wskazuje Barbara Widera (2018). W badaniach zwraca uwagę na motywy pochodzące z natury, w tym również z zieleni wysokiej, przenikające się do form architektonicznych zarówno w aspekcie motywów dekoracyjnych jak i struktur budowlanych (Widera 2018). W pracy porusza również kwestie związane z bioklimatycznością relacji architektury z naturą w kontekście architektury ekologicznej.

Marta Leśniakowska wskazuje, że wprowadzenie architektury na formy dojrzałej zieleni, może być interpretowane na wiele sposobów (Leśniakowska 2018). Jedną z takich interpretacji jest archetyp drzewa w architekturze, rozumianej jako próbę zrozumienia praw natury przez człowieka i wykorzystanie ich do własnych celów – budowlanych. W takim kontekście drzewo staje się pierwowzorem kolumny. Leśniakowska na przykładzie różnych obiektów, w których budynek „oplata" istniejącą zieleń, przedstawia interpretację takiego zjawiska jako próbę zapanowania nad naturą przez człowieka[10].

Przegląd współczesnych form ochrony drzew w mieście

Na najważniejsze czynniki mogące szkodzić zieleni w mieście wskazuje Tadeusz Baranowski. (T. Baranowski, 2009). Pierwszym czynnikiem jest czynnik abiotyczny – nieinfekcyjny, który Baranowski dalej dzieli na: czynniki klimatyczne – naturalne, takie jak nadmierne wiatry, mrozy, nasłonecznienie[11]; czynniki glebowe – niewłaściwe

6 M. Suchocka, Wpływ zmiany warunków siedliskowych na stan drzewostanu na terenach inwestycji, [w:] Człowiek i Środowisko, nr 35 (1–2), 2011, s. 73–91.

7 M. Suchocka, Karty informacyjne do ochrony stanu drzew w inwestycjach Wrocławia, źródło: https://www.zzm.wroc.pl/userdata/karty/155652796642.pdf (dostęp: 15.12.2020 r.).

8 E. Szopińska, J. Zygmunt-Rubaszek, Rozwiązania techniczne w projektowaniu i realizacji zieleni wysokiej w krajobrazie zurbanizowanym, [w:] Zieleń miast i wsi, Drozdek M., Wojewoda I, Purcel A. (red.), Wydawnictwo PWSZ w Sulechowie, Sulechów-Kalsk, 2009, s. 22.

9 N. Przesmycka, Współczesne europejskie trendy architektoniczne a możliwości techniczne nasadzeń drzew przyulicznych, [w:] Roślinność pasów przydrożnych Lublina, Trzaskowska E. (red.), Urząd Miasta Lublin, Lublin, 2017, s. 138.

10 M. Leśniakowska, Zamieszkać z drzewem, czyli architektura w ogrodzie ekokrytyki, [w:] Architektura jest najważniejsza. Drzewa, EMG, Kraków 2018, s. 46.

11 T. Baranowski, *Ochrona drzew w mieście*, [w:] *Zieleń miast i wsi*, Drozdek M., Wojewoda I., Purcel A., (re.), Wydawnictwo PWSZ w Sulechowie, Sulechów-Kalsk, 2009, s. 26–27.

nawodnienie, brak substancji odżywczych, niewłaściwa struktura glebowa[12]; czynniki antropogeniczne – wynikające z szkodliwej działalności człowieka na środowisko[13], w tym zanieczyszczenia powietrza oraz gleby. Drugim rodzajem czynników szkodliwych wg Baranowskiego są czynniki biotyczne, czyli szkodniki biologiczne, takie mikroorganizmy – wirusy, bakterie, grzyby oraz inni szkodniki drzew.

Najczęstszymi przyczynami problemów stanu zdrowia zieleni w środowisku zabudowanym jest niewłaściwe utrzymanie strefy systemu korzeniowego drzew. W kontekście środowiska miejskiego głównymi zagrożeniami są niedostateczne nawodnienie lub brak tlenu w systemie korzeniowym. Zjawiska te najczęściej wynikają z nadmiernego utwardzenia powierzchni lub niekorzystnego dla zieleni użytkowania terenu w sąsiedztwie drzewa, np. jako samowolne miejsca postojowe. Dlatego jednym z najważniejszych elementów ochrony szaty roślinnej powinna polegać na ochronie lub zapewnieniu odpowiednich warunków systemom korzeniowym.

Jednym ze sposobów jest stosowanie systemów antykompresyjnych, mających na celu ograniczenia nacisku na korzenie, a także nadmiernemu zagęszczeniu gleby. Przykładem mogą być podłoża strukturalne stanowiące mieszaninę gleby i kruszywa – kamienia. Inną metodą jest stosowanie komórek glebowych, stanowiących rodzaj ażurowej konstrukcji wypełnionej glebą, wzmocnionej stalowymi prętami. Konstrukcja w formie zestawu skrzynek zapobiega zagęszczaniu się gruntu pomiędzy elementami konstrukcji. Ze względu na konieczność wymiany gruntu tego typu systemy mogą być efektywne w przypadku nowych nasadzeń lub w przypadku znacznej degradacji gleby przy drzewie. Tadeusz Baranowski wskazuje również na możliwości montażu systemu napowietrzająco-odpowietrzających, mających na celu zapewnienie odpowiedniej ilości tlenu w systemie korzeniowym[14].

Oprócz bezpośredniej ingerencji w glebę przy zadrzewieniu dostępne są również metody mające na celu redukcję nacisku na system korzeniowy. W tym celu można wykorzystywać systemy podwieszonych nawierzchni twardych, takich jak chodniki, drogi, tarasy, przenoszących obciążenia na grunt w sposób liniowy lub punktowy. Realizacja nawierzchni utwardzonych wymaga dodatkowego przygotowania nawierzchni gruntowej, poprzez jej zagęszczenie. Takie utwardzenie znacząco ogranicza dostęp wody opadowej do systemu korzeniowego. Na rynku dostępnych jest szereg rozwiązań materiałowo-technologicznych mających na celu zwiększenie przepuszczalności wody do gruntu. Jednym z najpopularniejszych i zapewniających stabilne utwardzenie nawierzchni jest system oparty na bazie kruszywa utwardzonego żywicą.

W przypadku gdy nie jest możliwe zastosowanie nawierzchni przepuszczalnych lub innego systemu zapewniającego wilgoć w systemach korzeniowych, zastosować można rozwiązania polegające na nakierunkowaniu systemu korzeniowego. Tworzy się tym samym rodzaj korytarzy, prowadzący korzenie w kierunkach gruntów wodoprzepuszczalnych[15]. Inną metodą jest wprowadzenie systemu nawadniającego podziemnego. Tego typu rozwiązanie może wykorzystywać system retencji wód opadowych, tym samym ograniczając inny problemem wynikający z nadmiernego utwardzenia powierzchni w terenach – przeciążenia systemu kanalizacji deszczowej, szczególnie w dużych miastach Polski.

W cennych obszarach zieleni miejskiej niezmiernie istotnym aspektem jest stan i kondycja szaty roślinnej. Formą ochrony roślinności w mieście jest stosowanie zabiegów pielęgnacyjnych, mających na celu zapewnienie możliwie najlepszych warunków rozwoju najbardziej wartościowym okazom flory. Zabiegi pielęgnacyjne odnoszą się do regulacji korony drzew, która ma za zadanie między innymi zapewnienie większego dostępu światła słonecznego. Innym zabiegiem jest usunięcie (wycinka lub przesadzenie) mniej pożądanych roślin, w tym chorych lub martwych. Celem takiego działania jest zapewnienie większych zasobów wody i składników mineralnych gruntu (ograniczenie zjawiska wyjaławiania się gruntu) rośliną o większej wartości.

Wymagającymi najmniejszych nakładów finansowych, a przynoszącymi najlepsze efekty są sposoby ochrony zieleni wysokiej przygotowywane w trakcie procesów budowlanych – projektowych i wykonawczych. Na etapie projektu należy uwzględnić potrzeby drzew i konieczność ochrony korzeni poprzez dobór systemów budowlanych, ograniczających ingerencję w grunt w sąsiedztwie roślin. Przykładem takiej rozwiązań jest zastosowanie zbiorczych kanałów technologicznych dla infrastruktury technicznej. Jak wskazuje Marzena Suchocka[16], w procesie budowlanym należy unikać prowadzenia prac budowlanych w obrębie strefy ochronnej drzew (SOD).

12 Ibidem, s. 27.

13 Ibidem, s. 28.

14 Ibidem, s. 27.

15 E. Szopińska, J. Zygmunt-Rubaszek, op. cit. s. 22.

16 M. Suchocka, op. cit.

W tym celu prace przy instalacjach zewnętrznych należy w miarę możliwości prowadzić bez wykopu, stosując przewierty jako sposób prowadzenia sieci. W przypadku konieczności wykonania robót budowlanych w wyznaczonej i zabezpieczonej strefie ochronnej drzewa, wg Suchockiej należy: wykonywać prace ręcznie, unikać zmiany poziomów gruntów – nasypów lub wybierania gruntów, nie należy składować materiałów lub odpadów budowlanych.

Studium przypadku „Kraśnicka Residence" w Lublinie

Omawiany przypadkiem, w którym zastosowane zostały systemy ochrony zieleni wysokiej, jest zespół zabudowy wielorodzinnej z usługami przy Alei Kraśnickiej w Lublinie (proj. T. Jabłoński, M. Jabłońska, 2019, inwestor: Wikana S.A., początek realizacji 2020)[17]. Inwestycja zlokalizowana została na dawnych terenach wojskowych w gęstym zadrzewieniu, stanowiącym strefę izolacyjną zespołu koszar i poligonu tzw. Obozu Zachodniego[18]. Sam teren inwestycji pozostawał wolny od zabudowy, zagospodarowany był jedynie utwardzonymi placami i podziemną częścią niedokończonego budynku.

Obecnie teren stanowi formę izolacji pomiędzy terenami i zabudowaniami wojskowymi a zespołem zabudowy Wydziału Artystycznego UMCS. Zgodnie z bieżącą polityką przestrzenną miasta, w rysunku Studium uwarunkowań i kierunków zagospodarowania przestrzennego miasta Lublina teren przeznaczony został na obszary budownictwa mieszkaniowego, jednak dla działki nie został opracowany miejscowy plan zagospodarowania terenu. Obszar zespołu obozu zachodniego został ujęty w gminnej ewidencji zabytków, jednak kwerenda archiwalna wykonana w ramach badań Biura Miejskiego Konserwatora Zabytków nie wykazała historycznej lub planowanej zabudowy na obszarze inwestycji[19]. Elementami objętymi ochroną prawną, w tym bezwarunkowym zakazem zbliżania się zabudowy, jest grupa pięciu buków przy alei Kraśnickiej, stanowiących pomniki przyrody.

Głównym założeniem inwestycyjnym była maksymalizacja powierzchni użytkowej przy jednoczesnym zwiększeniu ilości lokali mieszkalnych lub usługowych. Takie wytyczne inwestorskie oznaczały konieczność możliwie maksymalnego wykorzystania powierzchni terenu pod zabudowę wraz z koniecznością zapewnienia odpowiedniego zaplecza komunikacyjnego. Główne założenia projektowe, oprócz uwzględnienia założeń inwestycyjnych, opierały się na maksymalnym wykorzystaniu potencjału miejsca – gęstego starodrzewia, w kształtowaniu architektury z zachowaniem *genius locci* miejsca. Zachowanie dużej ilości drzew podyktowane było również aspektem ekonomicznym – wzrostem wartości nieruchomości w sąsiedztwie terenów dojrzałej zieleni.

W procesie projektowym, w pierwszej kolejności określony został stan zachowania zieleni wysokiej na terenie inwestycji oraz usunięte zostały drzewa znajdujące się w złej kondycji zdrowotnej, całkowicie obumarłe, nie posiadające walorów przyrodniczych (samosiewki) lub stanowiące zagrożenia dla bezpieczeństwa ludzi lub mienia. Po określeniu najcenniejszych okazów zieleni wysokiej opracowane zostało wielowariantowe studium stref zabudowy w celu optymalizacji koniecznej wycinki w stosunku do zamierzeń inwestycyjnych. Strefy zostały wyznaczone poprzez naniesienie stref ochronnych drzew, wyznaczonych jako okap korony powiększony o jeden metr.

17 Projekt budowlany Budowa zespołu budynków mieszkalnych wielorodzinnych „B1" i „B2" z funkcją usługową i mieszkaniami na wynajem w parterach budynków i garażami podziemnymi ze zjazdami wraz z instalacjami wewnętrznymi: wod.-kan., c.o., wentylacji mechanicznej, elektrycznymi i teletechnicznymi, odgromową, zewnętrznymi instalacjami: kanalizacji sanitarnej, kanalizacji deszczowej ze zbiornikiem retencyjnym, oświetleniem terenu, utwardzonymi wewnętrznymi dojściami i dojazdami do budynków, schodami terenowymi, murami oporowymi, zjazdami z al. Kraśnickiej na części działki nr 2/70 obręb 26 Rury Brygidkowskie ark.5, jako I ETAP wieloetapowego zadania inwestycyjnego polegającego na budowie zespołu budynków mieszkalnych wielorodzinnych „B1, B2, B3 i B4" z mieszkaniami na wynajem oraz lokalami usługowymi w parterach i garażami podziemnymi na działce nr 2/70 obręb 26 Rury Brygidkowskie ark. 5, Kategoria obiektu XIII, proj. JPA – Jabłoński Pracownia Architektoniczna, główny projektant arch. T. Jabłoński, inwestor: Wikana S.A., ul. Cisowa 11, Lublin, Lublin 2019.

18 Obóz Zachodni jest obszarem przyłączonym do terenów wojskowych koszar świętokrzyskich w 1858 r. Pierwotnie, obszar Obozu Zachodniego rozciągał się wzdłuż szosy Warszawskiej pomiędzy terenami dawnego zakonu dominikanów obserwantów (obecnie KUL) a al. Kraśnicką. W latach 90. XIX wieku na jego terenie u zbiegu alei Kraśnickiej i Racławickich wzniesione zostały koszary. W latach 20. XX wieku tereny wojskowego Obozu Zachodniego uznawane były znaczącą przeszkodę w rozwoju Lublina. Po II wojnie światowej część terenów oraz obiektów wojskowych przekazanych zostało Uniwersytetowi Marie Curie-Skłodowskiej. Źródło: N. Przesmycka, *Lublin – przeobrażenia urbanistyczne 1815–1939*, Politechnika Lubelska, Lublin, 2012.

19 Wnioski oparto na podstawie planu obozu zachodniego opracowanego w czasach okupacji niemieckiej podczas II wojny światowej, źródło: Pismo MKZ-IN-I.4120.674.2017 z dnia 29 sierpnia 2017 r.

Ryc. 1. Zespół zabudowy mieszkaniowej „Kraśnicka Residence": Budynek „B1" i „B2" w budowie. (fot. autor, grudzień 2020)

Ryc. 2. Zespół zabudowy mieszkaniowej „Kraśnicka Residence": studialne analizy możliwości zabudowy działki w zależności od zachowanych i chronionych drzew. (autor: M. Jabłońska, 2017, źródło: materiały archiwalne JPA)

Istotnym zagadnieniem, mający niebagatelne oddziaływanie na systemy korzeniowe była komunikacja wewnętrzna na terenie inwestycji. Jednym z podstawowych problemów projektowych było zagadnienie przebiegu dróg kołowych stanowiących jednocześnie drogi pożarowe o wymaganej nośności minimalnej 100 kN oraz drogi obsługujące służby komunalne. W obliczu dużego nacisku wywoływanego na system korzeniowy, drogi w miarę możliwości zostały poprowadzone poza obrysem strefy ochronnej drzew (SOD). Miejsca, w których drogi nie dało się poprowadzić po SOD zaprojektowany został system estakady o punktowym posadowieniu w celu ochrony systemu korzeniowego zarówno w trakcie realizacji dróg jak i w trakcie dalszego użytkowania terenu. W zaprojektowanym systemie estakad nacisk na grunt oraz jego zagęszczenie w siedlisku zostaje ograniczone do minimum, tym samym zachowując możliwości natlenienia systemu korzeniowego. W przypadkach, w których nie było konieczności stosowania systemu nadwieszonych dróg zaprojektowano nawierzchnie wodoprzepuszczalnych z wskazaniem na nawierzchnie żywiczne.

W celu redukcji stresu systemu korzeniowego nie zaprojektowano terenowych miejsc postojowych. Wymagany program parkingowy zapewniony został w kondygnacjach podziemnych w systemie dwukondygnacyjnych miejsc postojowych. Tym sposobem powierzchnia kondygnacji podziemnych ograniczona została do obrysu zewnętrznego kondygnacji nadziemnych w celu ochrony systemów korzeniowych drzew przed nadmiernym uszkodzeniami (wg Suchockiej dopuszcza się przycinanie korzeni o średnicy mniejszej niż 3 cm[20]).

20 M. Suchocka, op. cit.

Ryc. 3. Zespół zabudowy mieszkaniowej „Kraśnicka Residence": Schemat zagospodarowania terenu etap I inwestycji (autor: T. Jabłoński, M. Jabłońska, 2019, źródło: materiały archiwalne JPA)

Nie mniej istotnym problemem projektowym było ograniczenie ilości wykopów przy realizacji sieci infrastruktury technicznej całego zespołu zabudowy. W miarę możliwości przyjmowane było założenie stosowania zbiorczych kanałów instalacyjnych. W uzasadnionych przypadkach, w sąsiedztwie systemów korzeniowych, prace instalacyjne planowane są jako przewierty.

Wnioski

Przyjęte w omawianym zespole zabudowy rozwiązania projektowe zostały uwarunkowane możliwościami realizacyjnymi na terenie gęstego zadrzewienia. Ze względu na niewielki stopień skomplikowania prac budowlanych wynikający z przyjętych form ochronny zieleni wysokiej, następuje również ograniczenie koniecznych nakładów inwestycyjnych. Ochrona roślin nie musi się wiązać ze skomplikowanymi technologiami, gdy równie efektywne mogą okazać metody polegające na minimalizacji zagrożeń stanu oraz kondycji drzew.

Rozwiązania przedstawione w studium przypadku wymagają oceny w perspektywie czasu z uwzględnieniem różnych czynników wpływających na stan zieleni wysokiej, w tym czynników niezależnych od podjętego zamierzenia budowlanego. Powinna być prowadzona również bieżąca dokumentacja stanu roślin.

Bazując na przedstawionych w pracy podstawowych formach ochrony zieleni wysokiej, przede wszystkim systemów korzeniowych, już na etapie projektu koncepcyjnego powinno się uwzględniać konieczność ochrony drzew poprzez zaplanowanie obiektów budowlanych i niezbędnej infrastruktury im towarzyszącej w sposób bezkolizyjny ze strefą ochrony drzew. Należy zwrócić uwagę, na fakt, że dobrze przeprowadzony proces budowlany poprzedzony projektem uwzględniającym konieczność i potrzeby ochrony zieleni ma również niebagatelny wpływ na bezpieczeństwo użytkowania terenu i samego budynku. Osłabienie systemu korzeniowego drzewa może grozić utratą równowagi drzewa, a co za tym idzie zagrożenia zdrowia i życia oraz mienia.

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Dokumenty

Projekt budowlany: Budowa zespołu budynków mieszkalnych wielorodzinnych „B1" i „B2" z funkcją usługową i mieszkaniami na wynajem w parterach budynków i garażami podziemnymi ze zjazdami wraz z instalacjami wewnętrznymi: wod.-kan., c.o., wentylacji mechanicznej, elektrycznymi i teletechnicznymi, odgromową, zewnętrznymi instalacjami: kanalizacji sanitarnej, kanalizacji deszczowej ze zbiornikiem retencyjnym, oświetleniem terenu, utwardzonymi wewnętrznymi dojściami i dojazdami do budynków, schodami terenowymi, murami oporowymi, zjazdami z al. Kraśnickiej na części działki nr 2/70 obręb 26 Rury Brygidkowskie ark.5, jako I ETAP wieloetapowego zadania inwestycyjnego polegającego na budowie zespołu budynków mieszkalnych wielorodzinnych „B1, B2, B3 i B4" z mieszkaniami na wynajem oraz lokalami usługowymi w parterach i garażami podziemnymi na działce nr 2/70 obręb 26 Rury Brygidkowskie ark. 5, Kategoria obiektu XIII, proj. JPA – Jabłoński Pracownia Architektoniczna, główny projektant arch. T. Jabłoński, inwestor: Wikana S.A., ul. Cisowa 11, Lublin, Lublin 2019

Architectural Methods of Protecting the Existing Trees in the City. Case Study

Abstract: The paper presents methods of protecting trees in the city. Based on a case study of a multi-family housing complex in Lublin in the former military area at Kraśnicka Avenue in Lublin, constructional and design methods how to protect the valuable, existing trees in the context of the investment project in maximizing the usable area are described.

Key words: high vegetation, tree in architecture, greenary in the city, ochrona przyrody, natrue conservation, Lublin

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Selected determinants of multi-family housing in Katowice in the 2030 perspective

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Abstract: The article deals with the subject of selected conditions of multi-family housing in Katowice, which the author includes: city documents indicating the prospective directions of the city's development, demographic analyzes and other factors such as: the image of the city in general public opinion and the state of the air. The aim of the article is to take a general look at the indicated factors in Katowice and to use them to determine the approximate housing forecast for the city. The research methodology is based on literature analyzes and the author's long-term observations.

Key words: multi-family housing, city documents, demographic, smart city

Introduction

The basis for housing construction, especially multi-family housing – because it is most dependent on various types of criteria, are (or should be) conditions: strategic, demographic and other specific for a given region.

The strategic determinants of the author include mainly city documents, which indicate the prospective directions of development of the city and the region in terms of housing.

Demographic determinants appear in the study of the development of a given city, Central Statistical Office (Polish: GUS) statistics and research conducted by various research centers. For Katowice, the most significant are the long-term analyzes carried out by prof. Jerzy Runge with a team from the Department of Economic Geography of the University of Silesia.

Other factors that may influence the housing issue in a given city are e.g. labor market (economic factors), urban attractiveness, legal considerations (e.g. land ownership), air condition and many others. The aim of the article is to take a general look at the indicated factors in Katowice and to use them to determine the approximate housing forecast for the city.

Strategic conditions – main city documents

The most important strategic conditions for the city of Katowice are the City Development Strategy „Katowice 2030" and Katowice. Study of the conditions and directions of spatial development.

The City Development Strategy „Katowice 2030"

The City Development Strategy Katowice 2030 was adopted by the Katowice City Council by Resolution No. XIX / 365/15 on December 17, 2015 and is currently the most promising document for city planning and plays a superior role for other city documents. At the same time, the earlier document, ie the resolution, became invalid from 2005 on the same issue[1]. The provisions of the strategy are also in line with the goals of the 2023 National Urban Policy[2]. In the current Strategy, several most important points of gravity can be mentioned, which are defined in the form of interconnected strategic fields, they are the following elements: quality of life, metropolitan and inner-city areas, entrepreneurship and economic development, transport and urban logistics.

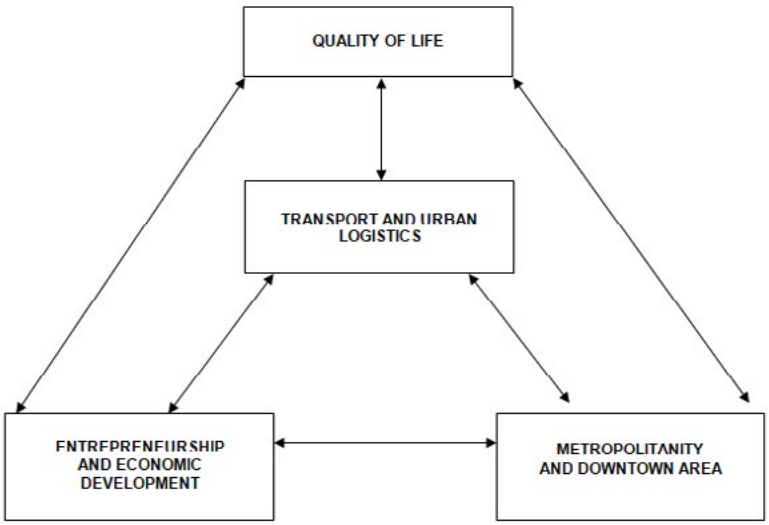

Fig. 1. Center of gravity in the development of the city of Katowice

Source: Own study based on the City Development Strategy „Katowice 2030"

Table 1. Strategic fields and their structure

Strategic fields	Components of strategic fields			
Quality of life	Housing	Public services		Social and natural living environment
Metropolitanity and city area	Activities, events and metropolitan products	Metropolitan infrastructure and cooperation networks	Metropolitan public and business spaces and residential	Agglomeration accessibility of the downtown area
Entrepreneurship and economic development	New economy, environments and innovative networks	Business support institutions	Activity of young people in creating a new economy	Local entrepreneurship and crafts
Transport and urban logistics	Transport networks ensuring connectivity at various scales and spatial ranges	Infrastructure of multifunctional transport systems and city logistics		Intelligent management of transport and logistics systems

Source: City Development Strategy „Katowice 2030"

1 Resolution No. LII / 1068/05 of the Katowice City Council of December 19, 2005. on the development strategy of the city of Katowice.

2 City Development Strategy „Katowice 2030" https://bip.katowice.eu/Lists/Dokumenty/Attachments/95384/1450771333.pdf, page 3, accessed: 19/11/2020.

Housing, i.e. the issue discussed in this article, is part of the strategic field of the quality of life. As we read further in the document under discussion, the strategic principle of the development policy of the city of Katowice in relation to the quality of life should focus on the specialization of the functions of urban districts and the decentralization of the service system for residents[3], where the priority is to increase the attractiveness of the living environment. This will allow Katowice to transform into a city with a balanced functional and spatial structure in relation to the city center area and districts[4].

High-quality housing standards in districts and reduced spatial spans in living conditions should be implemented through the development and modernization of housing construction and energy reconstruction of the city[5]. It is also worth adding that the general vision of the city's development is based on the so-called **4 i**, that is: intelligence, innovation, integration and internationalization. Supporting intelligent development will create, among others intelligent systems of housing construction, service provision (including public) and environmental management[6].

In detail, the vision of the quality of life should focus on:

- providing attractive and high-tech housing for current and new residents,
- guaranteeing freedom of choice to all residents and access to the sphere of services increasing their diversity, improving living conditions in a manner corresponding to modern civilization standards,
- fostering civic activity ensuring public safety and ecological and improving the environmental and technical quality of public spaces[7].

As can be inferred from this document, quality of life is not focused in it only in providing housing, but also at their technological level, it also applies to high-quality public services and spaces, public safety and environmental protection.

Katowice. Study of the conditions and directions of spatial development

The study of the conditions and directions of spatial development for the city of Katowice was adopted by the Resolution of the City Council No. XXI / 483/12 of April 25, 2012. According to the Study, the areas of multi-family housing cover 875.04 ha, which is 5.31% of the city's area, and are occupied by the following districts – northern: Śródmieście and large estates: Tysiąclecia, Witosa and Paderewskiego. They also clearly stand out in Szopienice – Burowiec, Ligota – Panewniki, Piotrowice – Ochojec (housing estate Odrodzenia) and Brynów – Załęska Hałda.

In 2005–2007, 57% of all flats put into use in Katowice were multifamily housing. At the same time, both in the city and the entire metropolis there was a slower increase in new flats than in Warsaw and other regional centers, which can be explained by the high number of flats per 1000 inhabitants.

In the long-term perspective (15 years), the Study recommends the following steps aimed at diversifying the structure of the housing offer:

- increasing the offer of new apartments focused on the needs of young people,
- maintaining relatively lower housing prices,
- supporting the development of housing estates characterized by the highest quality of urban and architectural solutions [8].

In turn, the following are considered negative trends in the development of the housing structure in the document:

- compacting the buildings of the existing multi-family housing estates, thus reducing their resources of green areas,

3 Ibidem, p. 8.
4 Ibidem, p. 13.
5 Ibidem, p. 15.
6 Ibidem, p. 9.
7 Ibidem, p. 12.
8 Katowice. Study of the conditions and directions of spatial development p. 238, accesed: 23.11.2020.

- introducing housing investments in the valleys,
- excessive intensification of buildings, leading to inefficiency of communication systems
- location of investments in areas endangered with noise, e.g.. next to busy traffic routes[9].

On the basis of the conducted analysis, it can be concluded that in terms of quality of life, and in particular housing in the broad sense, both documents are consistent.

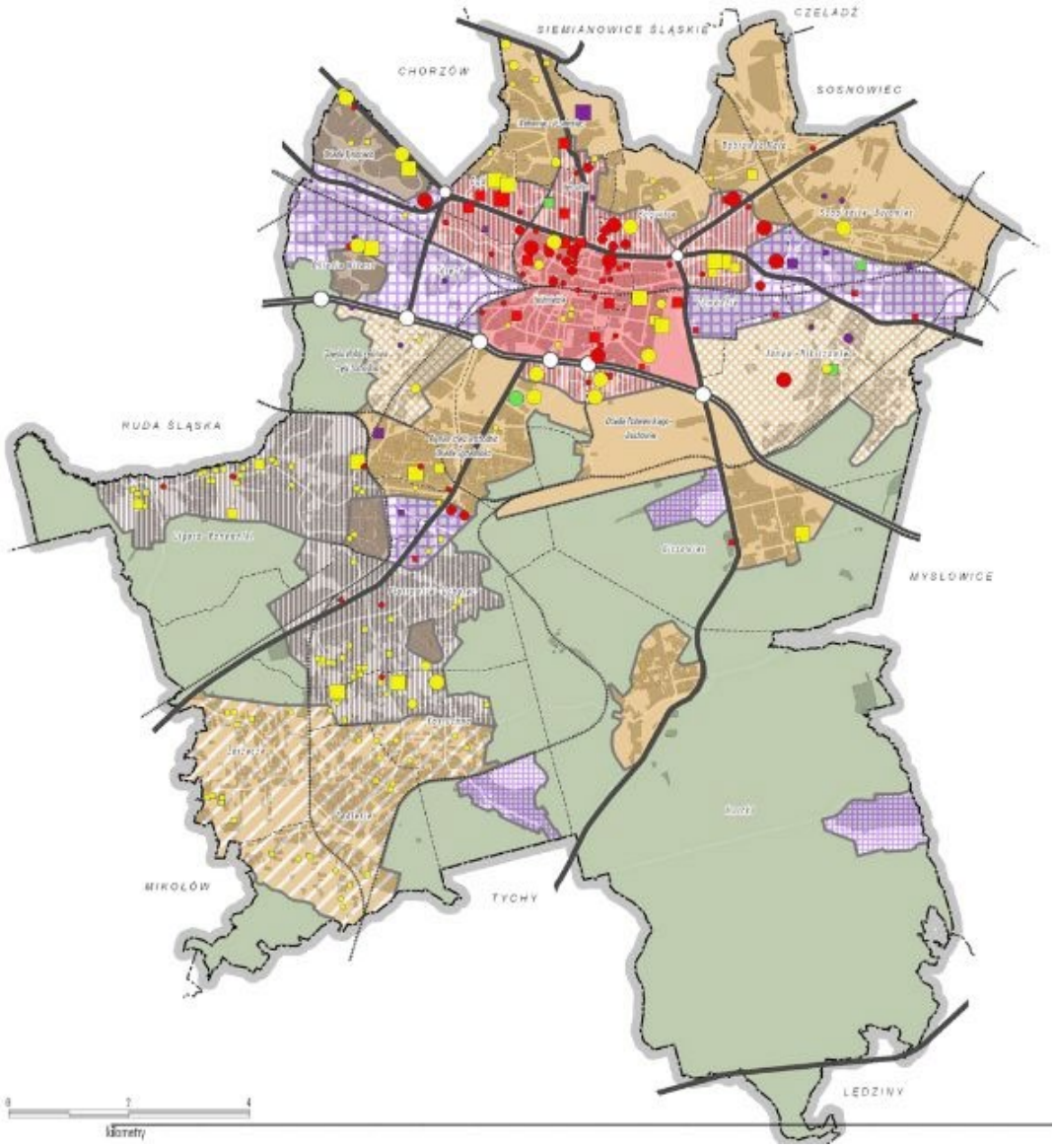

Fig. 2. Main elements of the city structure, markings:

- areas of shaped multi-family housing estates,
- significant residential and service investments in progress (investment rank determined by the square size)
- potential housing and service investments (investment rank determined by the size of the circle)

Source: Katowice. Study of the conditions and directions of spatial development

9 Ibidem, p. 238.

Demographic conditions

In the 20th century, Katowice was the city with the largest population growth within the agglomeration[10]. In 1991, the historic maximum population was reached in the Śląskie Voivodeship. Unfortunately, since 1992 a decrease in the number of people has been observed, and now Katowice has lost 80 thousand people[11]. In 1988, the capital of Upper Silesia had 367,000 inhabitants, in 2009 – 309 thousand, and by 2030 their number is to drop to 229 thousand. – This is a very high demographic decline – emphasizes prof. Jerzy Runge, quoted by Marlena Nykiel. He adds that Katowice is losing because it still offers little. On the local labor market, new jobs are still being created at a too slow pace, and without that, young Katowice residents will not be encouraged to stay in the city, not to mention attracting residents from outside the voivodeship[12].

According to the Study, a very strong factor influencing the city's population level is the attractiveness of the living environment, the generally low assessment of the quality of Katowice's space may be a significant factor in the decision to leave the city by residents[13]. As it seems, the demographic forecasts for the city are not very favorable.

Other factors determining multi-family housing

Among other factors influencing the development of housing in Katowice there are, for example, air quality. In Katowice, large industrial plants have been shutting down for many years, but the improvement of air quality is a long-term process, also associated with soil reclamation, increasing awareness of residents and the use of ecological heat sources also in households.

Unfavorable values of this factor are not conducive to the increase in the city's population. As Marlena Nykiel writes[14], this factor also has an impact on the emergence of developer apartments in Katowice. However, this does not mean a stagnation on the primary housing market. In 2015, developers launched nearly 20 new phases of projects within the city limits, in which an unprecedented number of over 1.3 thousand was introduced for sale. premises. This is over 126% more than in 2014.

Flats that could be purchased with credit predominated with an additional payment in the „Flat for young people" program. The president of REAS – a consulting company that tracks development investments – Kazimierz Kirejczyk believes that the basic barrier to the development of the primary market in Katowice is the unfavorable relationship between the costs of building a new building and the prices of premises on the secondary market.

The long-term research carried out by the author in the Tysiąclecie estate has also shown another phenomenon, namely the exodus of people from older blocks to new housing estate investments. This was indicated by both the developer Activ Investment and J.W. Construction Holding S.A., responsible for the construction of new residential buildings on the estate[15].

Another factor that has a positive impact on the development of housing in Katowice is the creation of the Metropolis GZM[16], as pointed out by prof. Runge already in 2016[17], mainly due to the development of transport, communication and services and their concentration in one entity. The promotion of the region may also be important, aimed at breaking public opinion with stereotypes such as: contaminated natural environment, low quality of life, and outdated economy.

10 Ibidem, p. 44.

11 J. Runge, Tendencies of depopulation and demographic aging in the Silesian Voivodeship and the model of the new re-urbanization of the region [in]: Gasidło K., Klasik A., Muster R., New urbanization on the old substrate, Publishing House of the University of Economics, Katowice 2019, p. 102–112.

12 M. Nykiel, Developers do not want to build in Katowice. Why ?, Gazeta Wyborcza, 27/07/2016.

13 Katowice. Study... p. 53.

14 M. Nykiel, ibidem.

15 Focus interview with a developer at Activ Investment on November 10, 2011. and B. Komar, Interview with developer J.W. Construction Holding S.A, on November 18, 2020.

16 Regulation of the Council of Ministers of June 26, 2017 on the establishment of a metropolitan union in the Silesian Voivodeship under the name Metropolis GZM (Journal of Laws of 2017, item 1290).

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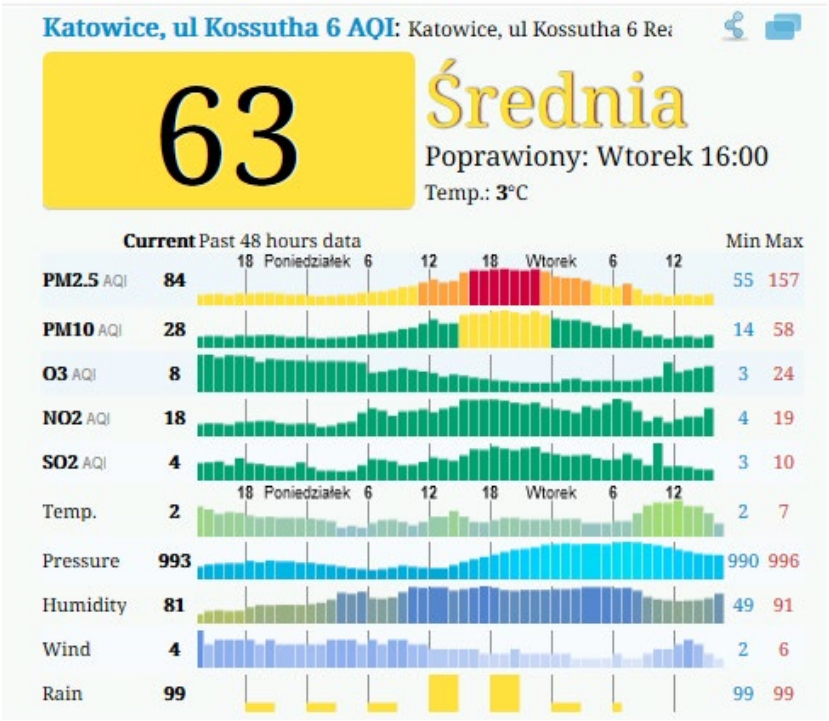

Fig. 3. Katowice. Air quality index values, data as of November 24, 2020, red color means unhealthy air

Source: Air pollution in Katowice: https://aqicn.org/map/katowice/pl/

Fortunately, the Report on Metropolises for the city of Katowice prepared by PwC, showing the state of affairs for 2015[18], indicates that the city's situation is not as bad as one might suppose. The report addresses the following issues: people, quality of life, image, institutions, infrastructure, finances, investments. The conclusion of the report is as follows – strengths of the city: excellent location, well-developed infrastructure and labor market, a large number of graduates of technical and science faculties, healthy finances; weaknesses: unfavorable image of the city, difficult demographic situation, low level of obtained European funds per capita.

According to the author, the image of the city has improved significantly, mainly due to the functioning of the Culture Zone (2015) and the creation of a new city market (2016), i.e. places that are the actual showcase of the city. At the time of writing, these investments were still waiting for implementation.

Fig. 4. Katowice. Market, view from the 1970s

Source: Internet

Fig. 5. Katowice. Market, a contemporary view

Source: katowice24.info

18 Report on metropolises: Katowice. The Silesian diamond needs a better cut, PwC, 2015, https://www.pwc.pl/pl/pdf/miasta/raport-o-metropoliach-katowice-2015.pdf, accessed on: 24, 25/11/2020. The 2020 report is currently still under preparation.

Examples of investments in the field of multi-family housing in Katowice

Developers and still housing cooperatives are responsible for the contemporary shaping of the multi-family housing market in Katowice.

Cooperative enterprises

The main housing cooperatives in the city are Katowice Housing Cooperative (Polish: KSM), SM Piast and SM Paderewski. KSM (operating since 1957) has 17 housing estates in its resources and these investments were systematically implemented by several houses – not focusing on entire estates – in different districts of the city, thus ensuring an even development of the entire urban fabric. At the same time, along with the development of the housing estates, the communication network of the city and the region was built. The estates built at that time were shaped on the basis of the regulations forcing the creation of housing estate infrastructure and urban standards defining the size of a residential unit[19].

Currently, KSM is not only focused on the exploitation of its resources, but also tries to expand them or even build new housing estates. Such undertakings include the following:

- Świerkowe Estate , Katowice-Panewniki,
- Zielony Zakątek Housing Estate, Katowice, Daszyńskiego St.
- 8 buildings in the Zawodzie housing estate, Bohaterów Monte Cassino St.
- Murcki Estate, Domeyki St., 1 building with 20 apartments – Recreational Valley – Small Pond, Recreational Valley – Big Pond, Graniczna Estate – Graniczna-Puławskiego St.
- in prospective plans:
- the Ligota housing estate, Ligocka St.– 1 building
- the Szopienice estate, Moravia St. – Osiedlowa St. – 4 buildings with 50 apartments, Morawa St. (Sosnowiecka St.) – Residential complex for seniors with care and medical facilities –1 building with 60 apartments[20].

The space of its estate was decided differently by SM Piast (operating since 1983), which sold some of its undeveloped land to the developer Activ Investment, and within the borders of Tysiąclecia Estate, an investment called Parkowa Strona Miasta (2 buildings) and the Cztery Wieże housing estate (4 buildings) were created. The Nowe Tysiąclecie investment is also currently being completed (5 objects), developer J.W. Construction Holding S.A. There is a clear difference between the investing KSM and the operating SM Piast, which results primarily from the scope of activities (SM Piast 1 estate, KSM 17 housing estates) and related financial possibilities. In general, it can be said, based on many years of observations carried out by the author, that the situation of housing cooperatives on the Polish housing market is not easy, there is a lack of economic solutions, positive legal solutions, and friendly lending that would allow for larger construction projects.

Katowice development market – selected examples

There are currently over a dozen development companies operating on the Katowice development market, to mention only the following: Activ Investment Sp. z o.o. (housing estates: Parkowa Strona Miasta, Cztery Wieże), Murapol S.A. (housing estate: Mała Skandynawia), Geo Grupa Deweloperska (housing estate: Atrium Geo), ATAL S.A. (housing estates: Ligota Park, Apartamenty Grunfeld), MK Inwestycje (housing estate: Zagajnik and apartment building Widok), J.W. Construction Holding S.A. (housing estate: Nowe Tysiąclecie), TDJ Estate (housing estate: Franciszkańskie).

19 B. Komar, The contemporary quality of the cooperative housing estate in the light of the principles of sustainable development on selected examples, Publishing House of the Silesian University of Technology, Gliwice, 2014.

20 KSM, Directions for the development of economic, social and cultural activities of the Katowice Housing Cooperative for 2020.

Fig. 6. Nowe Tysiąclecie Estate
Source: Photo taken by the author

Projects for this type of construction have a properly calculated price, which increases with the increase in the investment standard, and thus the price of the apartment increases. Taking this into account, the developer must skillfully navigate in a given price group so as not to exceed his own funds and those entrusted by clients or banks. It is also associated with the use of such building materials that correspond to a given price group. Acquisition of land for real estate by a developer may take place through tenders or through direct purchase of land from their owners. In Katowice, which is also confirmed by the research of Professor J. Runge[21], the southern areas are considered the most attractive. The size of a housing estate is related to the developer's financial resources.

In the times of the Polish People's Republic, when large housing estates were built, these matters were approached in a different way, but the result was similar. The projects of the estates included schools, broadly understood services, infrastructure, but as a result of the unrelenting hunger for housing, mainly apartment blocks were built, and only after a few years the estates were equipped with services and efficient communication. The concept of a shopping center was not yet known, so smaller services were built in the estates. Today, it is enough to build one shopping center outside of residential areas to provide access to services for several estates. The estates that are currently under construction are mainly closed ones, focused on living and recreation not trade, which could cause people not living on the estate to appear on the estates, which could have a negative impact on the sense of security in the neighborhood. As you can see, modern investors are in favor of segregating the housing and service functions. They focus primarily on the profitability of their investments. Enclosing housing estates also allows you to enrich the infrastructure with such elements as: playgrounds, walking paths, fountains, tennis courts, spas and even swimming pools. Therefore, it is very important to know the preferences of the inhabitants of the future housing estate. For this purpose, an analysis of the competition is carried out (i.e. what is being built around the investment area, what flats are checked), interviews, surveys are made, and if the company has been operating on the market for a long time, it draws on the experience of previous construction sites . An important element is also participation in development fairs, which inform about trends on the real estate market[22].

21 J. Runge., Socio-economic and spatial manifestations of suburbanization in the Silesian Voivodeship [in]: Słodczyk J. (ed.) Processes of suburbanization in selected Polish cities, Urban Studies volume 3, Publishing House of the University of Opole, Opole 2011.

22 B. Komar, Interview with the developer J.W. Construction Holding SA, 18/11/2020.

SWOT analysis for the conditions of multi-family housing in Katowice

On the basis of the conducted research, the following SWOT analysis can be constructed, Table 2.

Table 2. SWOT analysis for conditions of multi-family housing in Katowice

SWOT analysis for conditions of multi-family housing in Katowice	
S – strength ■ Notations in the City Development Strategy „Katowice 2030" ■ Notations in the Study of Conditions and directions of development spatial ■ Housing investments of SM, especially KSM ■ Development investments ■ Good condition of the city in terms of economy ■ Perfect location ■ A large number of graduates of technical and science faculties	W – weaknesses ■ Depopulation ■ An aging population ■ Air condition
O – opportunities ■ Establishment of the Metropolis GZM ■ Improving air quality ■ New municipal investments improving the image of the city ■ Depopulation	T – threats ■ Low evaluation of Katowice's image in the general public ■ No influx of new residents

Source: Own study

Conclusion

The analyzes carried out indicated the following conditions for multi-family housing in Katowice: strategic provisions in city documents, defining the direction of investment, demographic problems, i.e. primarily depopulation and aging of Katowice's society, problem with the city's image in the context of the settlement of new residents and thus the problem with the increase in demand for new apartments. In the presented SWOT analysis, the issue of depopulation appeared both as a weakness and an opportunity (chances). Weakness, because the depopulation of the city, especially its downtown, may lead to an even greater deterioration of its image and the collapse of local properties, an opportunity, as a smaller population may soon become a saturation of the housing market. However, this problem requires further research. At the same time, both cooperative and development investments are being carried out in the city, both types well thought-out, but in different aspects: KSM – in the context of a long-term construction strategy, conditioned by the economic situation of the cooperative, the city and the region, the developer – in the context of quick profit and sale of apartments, also to clients from large-block housing estates as part of internal urban migration.

The most important factor for the situation of multi-family housing will be the well-thought-out implementation of city strategies, resulting from planning documents.

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Adaptation of form based code method in the Polish spatial planning system

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Abstract: This paper aims to present a problematic issue of the spatial planning system in Poland in the context of landscape protection. In his research, the author proves that statutory spatial planning tools fail to be efficient in the area of aesthetic and spatial order. The author has analysed the provisions of the local laws on an example of a selected Polish municipality to answer the question whether local laws effectively protect local natural and cultural landscape that is a major factor for the development of sustainable tourism (a strategic aspect of the business activity in the municipality).

Keywords: spatial planning, urban form, spatial order, place identity

The Polish system of spatial planning – problematic issues

A multi-layered and complex urban structure (town) often assumes a form that is amorphous, deformed and non-homogeneous. Analysing the development of modern housing estates, we can see that, despite a number of attempts and efforts, they are never ideal spatial structures. Principles of shaping urban space set forth in the laws and technical regulations do not sufficiently protect urban landscape. Nevertheless, they can help to minimise the adverse effects of some disadvantageous aspects of investment projects [Jopek, 2015].

The Polish system of spatial planning faces a number of problems that have been discussed in numerous publications, research works and reports.[1] One of them is improper wording of provisions, which e.g. allow for different interpretations thereof or in generally fail to define basic terms. As an example we can refer to terms concerning development that give rise to a great number of legal disputes, namely such terms as: freedom of development, good neighbourhood, continuation of functions or continuation of development. In a three year time span (2013–2016) at least one of the aforementioned terms was referred to in court decisions, respectively: freedom of development – 2851 times, good neighbourhood – 3504 times, continuation of functions – 6096 times and continuation of development 4787 times [Kowalewski 2019].

The system of spatial planning in Poland is continuously evolving, however, none of the amendments of the Law of 27 March 2003 on spatial planning and development have introduced any major changes that might effectively protect spatial order and prevent excessive urban sprawl.

Among a number of different criteria of spatial order, proper representation of factors related to composition and aesthetics is one of the biggest problems in the urban planning practice because provisions fail to be unambiguously worded. The issues of building aesthetics seem to be of little interest to the legislator passing the Law on spatial planning and development. In practice this means that the administrative authority obliged to introduce regulations guaranteeing proper spatial order and sustainable development should first of all set forth the principles of shaping aesthetic order in the form of a general clause, effective outside the legal system. Only thereafter these norms should be transposed onto the statutory spatial planning tools and defined more precisely. [Woźniak, 2015]

1 Among others: KPZK 2030, Urban Planning and Construction Code 2015, Sustainable Development Strategy 2017.

Unfortunately such a planning model is not in-line with an integrated, sustainable way of organisation of an urban planning process. Another problem arises due to zoning plans being adopted with no regards for the issues of aesthetics and composition. In 2015 the so-called Landscape Act was passed. Under the Act the issue of spatial forms in spatial planning was separated from the zoning plan issue, which as a result largely undermined the role of zoning plans in the shaping of spatial and aesthetic order.

Form-based Code

The main idea of New Urbanism envisages designing compact, mixed-use, vibrant and multi-functional spatial structures that pedestrians or cyclists can easily move within. The innovative approach in planning here is the discontinuation of the commonly used modern functional zones and adoption of the transect composed of a series of zones that transition from sparse rural development to the dense urban core.

Form-based code, is a planning tool allowing the designer to arrive at specified spatial development forms in compliance with the principles of sustainable development and spatial order. The main objective of FBC is to foster predictable spatial results and to create high quality public space by concentrating on the relationships between various spatial elements rather than on the functional purpose of a given area. [Duany, Plater – Zyberk, 2006].

Fig. 1. A scheme of distribution of spatial structures in accordance with the transect idea[2] [source: cnu.org]

FBC can be a useful planning tool for any acts aimed at the protection of spatial values of an area that is subject to relevant regulations. Traditional tools, such as the local zoning plan offer insufficient options of defining the desirable spatial forms and their interrelations. Problems stem from the fact that it is difficult to unambiguously and legibly word the provisions of the zoning plan in the sphere of defining architectural forms, construction materials to be used or the colour scheme to be applied.

FBC may prove to be a useful tool in reaching consensus in Polish conditions – in accordance with the principle of involvement of local communities in the planning process – in the context of spatial, social and economic effects of adopting a plan. The issue of involving local communities in the planning process underlies the concepts of the Form Based Code and sustainable planning, for that reason graphical representation of the set forth regulations facilitates a constructive dialogue between all the parties involved.

The key element in a discussion on sustainable development, being an alternative to dispersed development and urban sprawl, (which is often omitted in any public debates) is the presently applicable system of codes and standards governing the social development, which assumes (be it with or without purpose) the division

2 An urban transect is a tool for listing components and structures of spatial development. It consists in field observation of selected points along a straight or broken line whose opposite ends are located in two extremely divergent areas.

of space in view of the area intended purpose. Such a system not only fails to render desirable spatial effects but largely contributes to profiteering and excessive exploitation of the existing resources [Jędraszko 2005].

Table 1. Author's own elaboration Sarasota Country FBC by Dover, Kohl & Partners and Spikowski Planning Associates

Form Based Code	Local Zoning Plan
Priorities to be defined: form, function, administration	Priorities to be defined: function, administration, form
all the functions are allowed in every zone, except for those causing nuisance	Mono-functional zones or zones with a predominant function and permissible supplementary functions
regulation concerning the location of the building on the lot	the line of development (and technical conditions) make up the only regulation
regulation concerning the manner of shaping public space	the road lane width makes up the only regulation
allows for implementation of concepts of local communities	secures the interests of individual investors

Sustainable tourism in the municipality of Złoty Stok

The municipality of Złoty Stok is situated in the southern part of Lower Silesia, in ząbkowicki poviat. It is 20 km away from Ząbkowice Śląskie and about 90 km away from Wrocław. Despite the fact that it is located near some of well-known tourist resorts in the area of the Kłodzko Valley (Polish: Kotlina Kłodzka), it is not so often visited by the tourists[3]. The sustainable development of the municipality based on tourism, agriculture and forestry as basic sectors of local business activity is the main concept of the Development Strategy for the municipality of Złoty Stok for the years 2017–2023. Assurance of the development of sustainable tourism in the municipality of Złoty Stok is extremely important because it is closely interrelated with the outstanding, though underappreciated, landscape values. The adopted document lists the following as the basic purposes of the development of the municipality: improvement of the quality of life of the inhabitants, revaluation of historical heritage, boosting local economy, improvement of the urban space quality, a more positive image of the town.

The strategic goals have been appropriately worded as they converge with the general principles of sustainable tourism, i.e.

- development of tourism is adapted to the types and quality of natural resources and may not contribute to their degradation,
- local community shall participate in all tourism-related activities undertaken in the area they inhabit,
- a range of tourist services shall be based on local natural and human resources and small local facilities adjusted with their scale to the surroundings,
- development of tourism is integrated with local business development and renders ethical, social and economic benefits for the local community. [Gołębski, 2009]
- However, is proper wording of the strategic goals sufficient to obtain the desirable spatial, social and economic effects in the sector of sustainable development?

The development of sustainable tourism encompasses the idea of protection of unique features of cultural landscape. Cultural differences of a given place are closely correlated with the local natural conditions, which is demonstrated through the shape of development and the applied construction materials. This affects the specifics and the genius loci reflected in the cultural and territorial differences. Unique features of landscape

3 The Development Strategy for Ząbkowicki poviat until 2022.

translate into a phenomenon formed naturally within the on-going processes over the time span of several centuries. Such unique features shall, therefore, be protected before they perish [Pawłowska, 1996].

Fig. 2. Lack of expressly worded provisions concerning the nature of new development translates into erection of misfitted forms of development in the landscape of the municipality of Złoty Stok. [photo from google.maps]

From the perspective of cultural heritage, historical spatial layouts of the village and town of Złoty Stok, together with the preserved architecture, typical of that part of Lower Silesia, shall be of high value. Lack of excessive investment pressure has to a large extent prevented the landscape from being marred with any atypical, ill-suited forms of development, on the other hand, economic stagnation let the technical condition of the existing historical facilities largely deteriorate. Some of them require heavy repairs and renovation but some have been irretrievably changed in the course of construction works completed contrary to professional building practice.

Designing and promoting tourist products which focus on spatial order – in particularly in the perspective of aesthetics and landscape – is of key importance for the development of sustainable tourism as such products constitute a vital determinant for the decisions made in favour of space that is coherently and clearly organised. One of the key factors of spatial order is the aesthetic order because it affects the perception of space by the inhabitants and tourists, attracts investors and determines the attractiveness of a given area.

The temporary period of bear market, due to adverse economic transformations, on the one hand, negatively affected spatial development – here we can name deficiencies in social and technical infrastructure as well as migration of the inhabitants to larger towns to seek employment, yet, on the other hand, it also prevented certain adverse phenomena that arise alongside a dynamic growth of newcomers (e.g. sprawl with no clear borderlines) and a dynamic growth of tourism (new development prevailing to the detriment of regional

forms of architecture). The key assets of the natural and cultural landscape of the municipality have remained unspoilt, yet require effective protection.

Case Stude – FBC for Złotego Stoku

The first stage of the research was intended to provide the answer to the question whether current planning documents to a sufficient extent guarantee the protection of natural and cultural landscape assets. For that purpose, a multiple-criteria analysis covering the provisions of the Study of Land Use Conditions and Directions of Spatial Development of the Municipality and the Local Zoning Plan was carried out. The students of the Faculty of Architecture of Poznan University of Technology[4] have compared the Study of Land Use Conditions and Directions of Spatial Development with the local zoning plan, with all its changes, to find out the areas where hypothetically land development transformations could be observed. Another task was to compare the identified areas with the areas of inconsistencies between a plan drawing and an orthophotomap. This analysis has identified 26 areas whose landscape assets have failed to be effectively protected by the provisions of the local zoning plan.

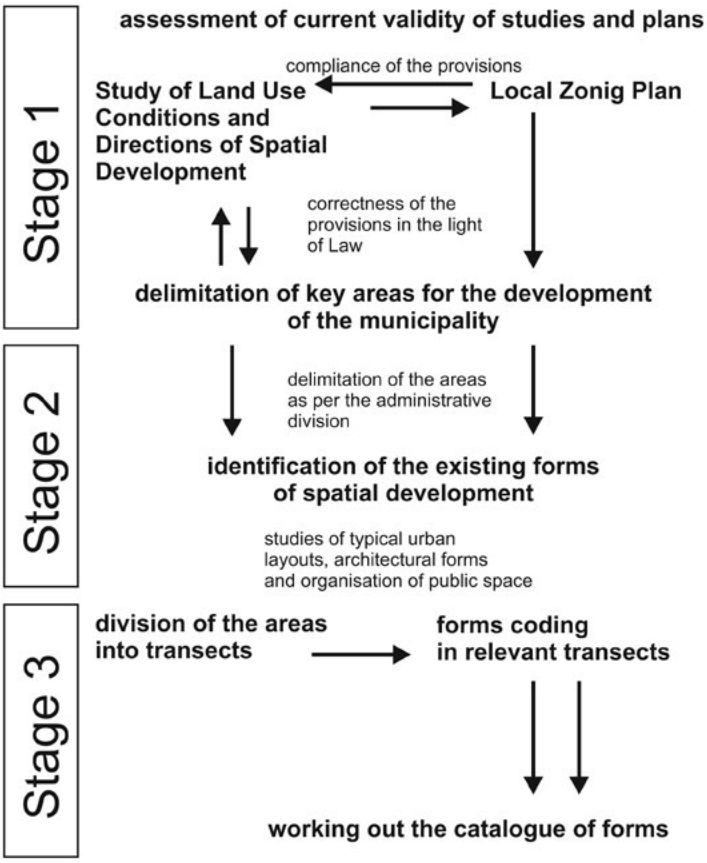

Fig. 3. Scheme of the research [author's own elaboration]

The analysis of the provisions of the local zoning plan has shown that the provisions concerning the principles of shaping development, delimitation of visual landscape protection zones, location of small architecture facilities and advertisements in public space, protection of the local, unique features of buildings as well as securing land strips for the technical and road infrastructure fail to be precisely worded. This stage of the research

4 The studies were conducted within the framework of Spatial planning taught by the author in the academic year 2018/2019.

was concluded with the thesis that regulations that clearly and unambiguously define the scope and manner of completing investments in the municipality need to be introduced.

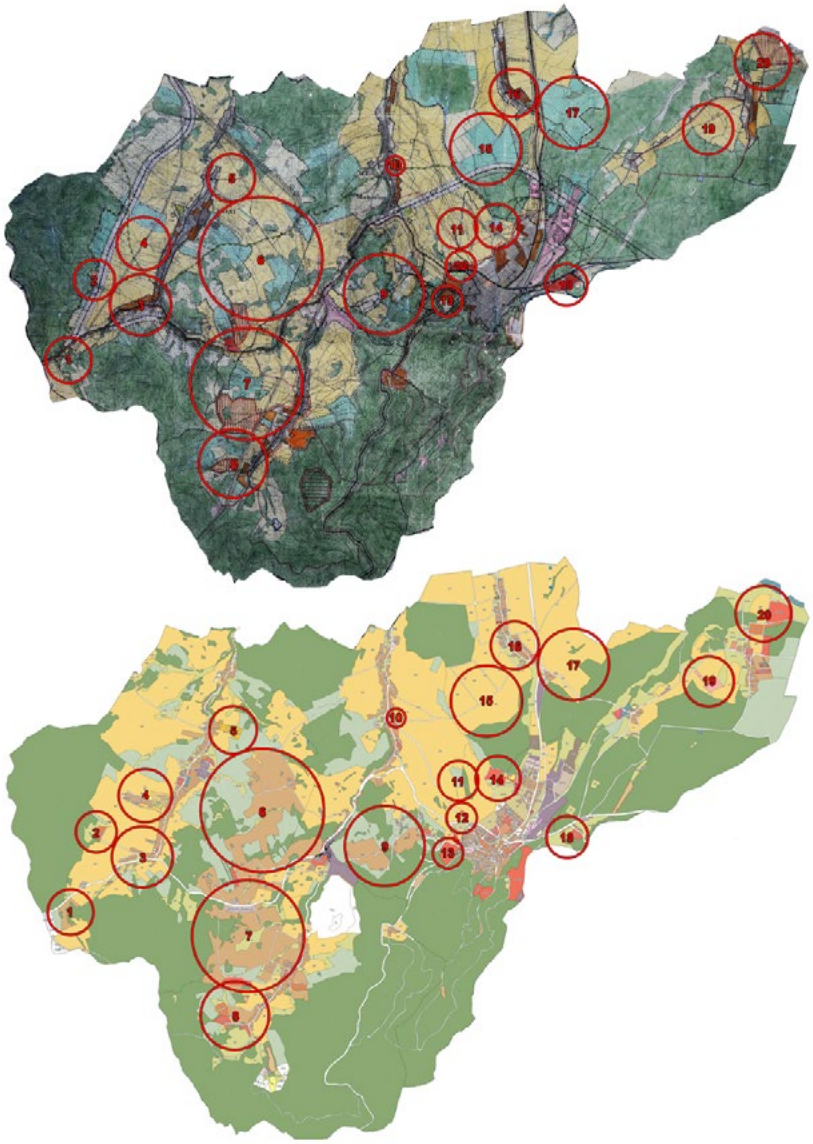

Fig. 4. Identification of key areas in the municipality of Złoty Stok [elaboration of the students of the Faculty of Architecture of Poznan University of Technology]

The next stage of the research was to identify the existing forms of spatial development to obtain information on architectural archetypes.

The field studies carried out by the students have allowed me to verify the actual status of the land use, to list the building complexes and single buildings being the most valuable assets and to identify the most urgent needs as regards organisation of public space. Urban planning inventory and photographic documentation were made for each of the administrative units of the municipality: the town of Złoty Stok and five villages. Having analysed the collected information, it was noted that the villages had to a large extent a similar structure and can be divided into transects from T1 to T4 and in two cases – to industrial zone. The town of Złoty Stok was the only settlement structure in the municipality with a clearly formed centre T5.

Fig. 5. Defined transects for the town of Złoty Stok [elaboration of the students of the Faculty of Architecture of Poznan University of Technology]

Finally, within the framework of the third stage of works, we have prepared relevant regulations in the form of a written catalogue. It has been decided that each village shall be individually approached as only such an approach would guarantee precise determination of forms of development in line with the needs of the local community and their aspirations.

Conclusions

The so drawn-up analysis has been presented to the Town and Municipality Council for further discussions as it has been prepared with no participation of the local community but with the use of the expert method. A resolution of Złoty Stok Town and Municipality Council on joining FBC could trigger extensive activities aimed at better opportunities of development of sustainable tourism therein. The resources of the municipality can be in particularly enthreatened in view of designing tourist infrastructure components. Regulations introduced under FBC can prove an effective tool in counteracting adverse spatial phenomena. Owing to the presentation of the catalogue we have succeeded in drawing the attention of the inhabitants and officials to some vital aspects that might constitute good practice in working out local laws in future.

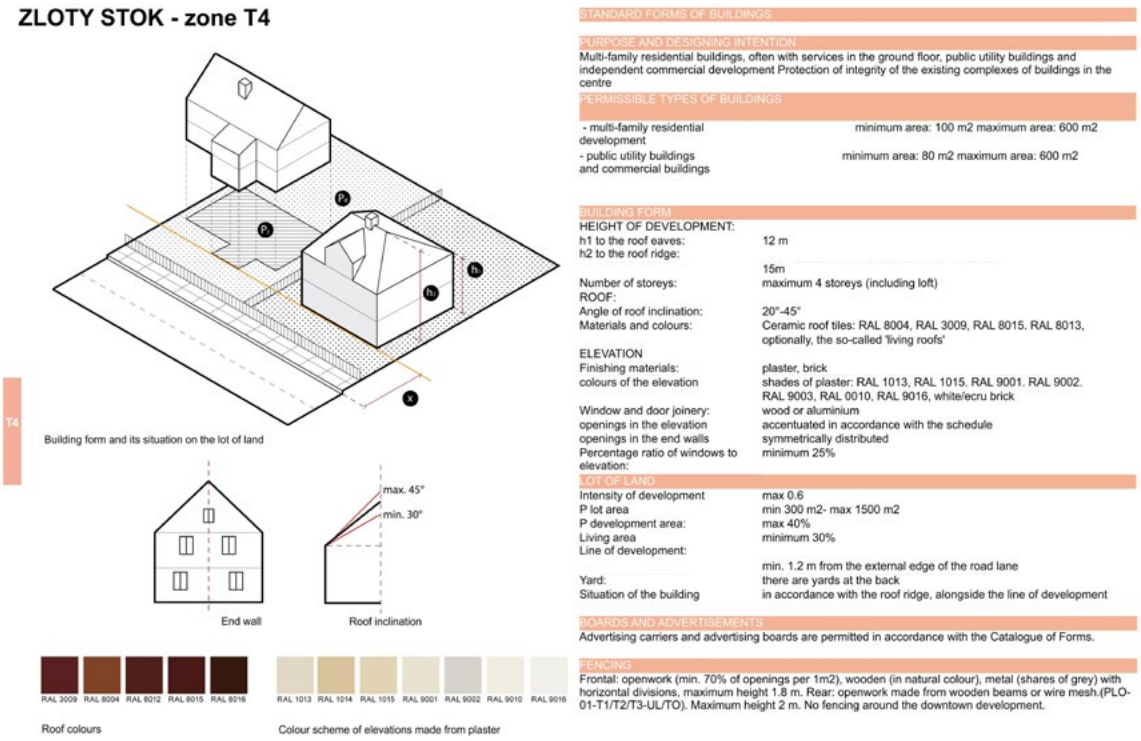

Fig. 6. Fragment of the catalogue of forms concerning private space in the town of Złoty Stok [elaboration of the students of the Faculty of Architecture of Poznan University of Technology]

Firstly, problems related to interpretation in the procedure of the issuance of a building permit in the Poviat Starosty must be eliminated. That is why the provisions of the local zoning plan shall clearly and unambiguously define the principles of shaping the development. Secondly, graphical appendices to the resolution on the local zoning plan, that graphically represent complex provisions thereof, should be so prepared that they were understandable not only for the professionals. Thirdly, the provisions of the zoning plan should equally concern private areas as well as public space because aesthetic and spatial order is one whole, with no division into property titles. Finally, land purpose should be demonstrated through interrelated and compact structures, whose borderlines are easy to be clearly defined.

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