Possibilities of Transformation of Public Space in Multi-Family Housing Estates in Polish Conditions – Case of the Bajka Estate in Bydgoszcz-Fordon

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Abstract. Multi-family housing estates created in the above mentioned over a period of time they were characterized by very modest use of public space and underdevelopment of basic equipment with parking spaces and social, cultural and recreational infrastructure. The main activity of investors was the construction of apartments, and the development of housing estates was considered as secondary. It should be noted that in their housing estates residents spend a significant part of their lives and public spaces in housing estates should be friendly to residents and meet the needs of all residents. The methodology for developing the concept consisted of analyzing the current state of knowledge, collected source materials and documents related to the area. Analysis of the existing state was carried out in the field of: public space development, transport service and infrastructure, road safety, types of property, greenery and spatial composition, which indicated the spatial and program conditions and possibilities of transformation. To find out the residents’ needs, a survey was conducted, the results of which were guidelines for the assumptions of the proposed project. The results of the survey showed that the public space of the Bajka (Fairly) Housing Estate needs a variety of activities that would increase its functional and aesthetic value, and improve the living environment, taking into account the needs and mobility of all age groups residents. Respondents consider it necessary to supplement the development of public space with elements of small architecture. Existing undeveloped areas in the housing estate were used to transform the public space of the estate and was divided into 3 areas: a. In Area A, which was envisaged as an area with a dominant recreational, sports and social function, The Socio-Cultural Pavilion as a year-round place for meetings and integration of residents as well as the development of technical and social facilities of existing tennis courts, as well as a playground and an outdoor exercise area. b. In Area B, new development was designed in the form of a housing estate square and a water reservoir that would serve the rest of the residents. c. Area C, which connects Areas A and B, creates Fairytale Trail - a pedestrian path along which the brass figurines of Polish fairy tale heroes were designed. In the aspect of the spatial composition, this pedestrian route is at the same time a compression element for Areas A and B. In the transportation service aspect, a traffic calming zone was developed by implementing technical solutions limiting speed and the possibilities of converting existing surface parking lots and garages into cubature solutions located outside the housing estate are shown. Presented case showed the possibilities of implementing various outdoor and cubature development, which can significantly improve the living environment, as well as the aesthetics and quality of public space.
1. Introduction

The problems of shaping housing estates and public spaces in these areas are one of the most important issues of urban planning and architecture. Residential areas are one of the largest spatial development functions and care for their quality in terms of living conditions of residents is a challenge for managers and designers. The issue of shaping public spaces was widely discussed in the manifestos of urban planners from the turn of the 20th and 21st centuries [1,2] and literature in the field of architecture and urban planning, including [3-12].

According to Wejchert [3] “The space surrounding a man should be a kind of work of art, because it can affect his mental state, giving him peace, joy, stimulating his comprehensive development.” to a large extent due to the surrounding public spaces”.

Lynch [5] distinguishes several important features of the city's form, which can be useful in identifying the inhabitant with the urban space, ie: “uniqueness, simplicity of form, domination, continuity, legibility of connections, directional diversity, field of view, movement awareness, time series and meanings”.

For most people, the space that accompanies housing development and its immediate surroundings is a place where, next to your own apartment or house, most of your life is spent. One of the main activities in shaping public space in housing estates is to ensure mutual contact of all age and cultural groups by enabling the use of public spaces with priority for pedestrian traffic and the development of an appropriate network of services and infrastructure. Shaping a high aesthetic level of fragments of the housing structure, gives the estate a unique character and image. At present, contemporary shaping of public space is adapting to every user, including disabled people with varying degrees of restrictions.

Factors determining accessibility and friendliness are, among others: available parking lots and bushes, low curbs at road crossings, sound signaling, appropriate ramps, ramps and ramps to buildings, appropriate materials of pavement and ramp surfaces, available means of public transport, etc. Currently notice many activities aimed at improving the accessibility of public spaces for people with disabilities. This is connected with the introduction of such spatial elements as: various types of ramps, elevators, sound signaling, special surfaces that determine the main directions of pedestrian routes and crossing the streets [6].

“The creation of safe and accessible public spaces attractive for all users is an important goal of modernization. These spaces testify to the quality of the living environment. Public spaces in housing estates need to be defined and enriched by: limiting their range, introducing new service buildings or changing the function and architectural design of buildings already existing, introducing urban detail in the form of functional elements or enhancing aesthetic and information values. The expansion of local services means not only to enrich the program offer, but also to create places that give residents a sense of identification with the estate” [7].

Modernization of housing estates helps to improve the living environment and housing conditions, helps to solve social problems by adapting the utility values of existing buildings to the needs of users. It contributes to creating a better social climate in the living environment.

Modernization problems consist mainly in its financing. It is believed that the expenditure incurred for modernization purposes can reach up to 80% of the cost of building new apartments. The main problems of modernization of housing estates according to Chmielewski and Mirecka [7] include:

- "lack of cooperation between the cooperative and the public sector (often conflict relations or indifference)"
problem of social structure - young people are moving to new settlements, new residents of these settlements (blocks of large slabs) do not care about the environment, they treat it as a temporary situation and are not interested in changing and improving the environment

- lack of a coherent concept for the development of the entire area
- cooperatives and communities are not able to carry out comprehensive remedial actions, and funding is only available for selected space repair
- limiting the acquisition of additional funds paves the way for fast and the necessary increase in the standard of living in old housing estates, this leads to a deepening of negative phenomena and the rise of conflicts at many levels of life and functioning of housing estates, which also prevents the implementation of corrective measures

- inadequate development of areas around housing estates leads to the disappearance of social life
- no walking paths, bike paths, playgrounds, small services (cafe)
- lack of division into public spaces.

The role of social participation is also important in shaping public space. Participation in planning and decision-making processes through public consultation is important. For this participation to be significant, local authorities should encourage residents to participate and discuss [8].

An extremely important factor in shaping public space in housing estates is greenery. Striving for constant contact with nature is seen today, especially in a situation of increasing population and environmental degradation. Currently, in most European cities, the amount of green space is decreasing relative to built-up areas. The desire to be among the greenery is realized by introducing it to areas with residential and public functions, among others: squares, squares, parks, promenades and water banks as well as local streets with lots of greenery. The green areas have a positive impact on the local climate and the landscape of the estates.

The aim of the paper is to show the possibilities of transforming public space on a selected example of the Bajka Housing Estate in Bydgoszcz-Fordon, which can be considered a typical multi-family residential development completed at the turn of the seventies and eighties of the twentieth century in Poland.

2. Methodology of analysis
The methodology for developing the topic of the possibility of transforming the public space of a housing estate in Polish conditions on the example of the Bajka Housing Estate in Bydgoszcz Fordon was based on multilateral analyzes, which were included in the work [9]. The methodology for performing this work was:

- studies of literature and analysis of examples of functioning public spaces in housing estates and in park areas situated in intensive housing development and formulation of conclusions regarding the subject of analyzes performed,
- developing a form and conducting a survey among residents of the analyzed housing estate.

The assessment of the state of public spaces was made on the basis of the results of photographic inventory, a detailed analysis of the development elements affecting the state of space in the Bajka estate, including: functional layout, communication system and technical infrastructure, greenery layout and spatial composition.

The results of analyzes of planning documents [10-12] and source statistical data [13-16], field vision, photo-inventory and survey were used to formulate conclusions from the diagnosis of the condition of the existing development of the housing estate, assumptions for the design concept and the designed concept transforming public spaces in the analyzed housing estate in terms of its
functionality, responding to the identified needs of residents and improving the aesthetic and landscape values.

3. Results and discussion

3.1. The condition of public spaces and the need for their transformation in the opinion of residents

The survey conducted regarding the state of development of the Bajka Housing Estate among the residents (sample - 100 people surveyed) confirms that the inhabitants are rated poorly equipped with elements of small architecture (45%). 42% of respondents assess the state of greenery in the housing estate as satisfactory, and only 13% assess it as good.

In the scope of missing elements of the housing development, the inhabitants point to:
- lack of developed recreational and leisure places (41%),
- poor condition of small architecture (34%),
- poor condition of pedestrian and road surfaces (16%),
- no pedestrian lighting (8%).

According to the survey, residents consider the creation of a square-square-social garden (36%) and a furnished place of neighbors meeting (pavilion, cafe, etc.) as the places needed in the Bajka housing estate (33%). Next, it is considered necessary to create an outdoor gym - outdoor (14%), climbing wall (10%) and playground (7%).

In summary, the results of a survey made survey shows that public space settlements fairy tale needs a variety of activities, which would increase its functional values and aesthetic and improved the living environment.

3.2. Characteristics of development and transport service for the selected housing estate

The Bajka Housing Estate is located in the north-eastern part of the city of Bydgoszcz, in the Fordon district (figure 1) and was built in the 1980s. village. The estate is limited by streets are the basic road and street system: one-way two-way streets of the main and collective class. The layout of internal streets has a calmed traffic character and is isolated from the external layout. These are two-way streets in the form of limited-speed traffic zones up to 30 kph and residential zones where speed is allowed up to 20 kph.

The Bajka Housing Estate is administered by a local housing association (FSM) and is inhabited by 3,713 people. The majority of inhabitants are middle-aged (30-49 years). The estate consists of 53 multi-family residential buildings, including 49 buildings are 5-storey buildings and 4 12-storey buildings (height dominants). The 11 buildings in plan view are solved in the shape of the letter "L". The buildings are made mostly of big boards. The layout of buildings is varied. The spatial structure of the housing estate can be distinguished: meandering, linear and dorsal. Within the estate, public utility facilities are located: the Social Insurance Institution, the District Social Assistance Center and the Post Office as well as educational facilities (2 kindergartens and a unit of schools), as well as cultural facilities (Branch of the Provincial and City Library) and a specialist medical clinic.

In the vicinity of the buildings there are commercial and service facilities that meet the basic needs of residents. The area of land within the resources of the FSM at the Bajka Housing Estate is 27.08 ha, including 18.56 ha of green area, 2.32 ha of property development and 6.2 ha of road infrastructure. In terms of ownership, the lands of the Bajka Housing Estate are owned by the municipalities of the city of Bydgoszcz with perpetual use and without perpetual use - under service facilities, natural persons - dominate under buildings [12].
The number of existing parking spaces in Bajka housing estate is estimated at 1116 parking places, which consist of free-standing parking garages, parking spaces and parking bays along housing estates. Ok. 100 vehicles are parked in prohibited places, which is about 10% of all inventoried places. This means that the index of individual motorization (number of passenger cars/1000 inhabitants) is about 330 vh/1000 inhab and 0.68 vh/1 apartment, which is quite high and difficult to handle in the absence of multi-storey car parks and this is not conducive to proper shaping public spaces in the estate. Reduction of parking space in the housing estate and elimination of "wild parking" outside designated areas can only occur by constructing multi-storey multi-level car parks.

The public transport service of the Bajka housing estate is carried out by 4 tram lines and 3 daytime bus lines and 1-night bus line, as well as by the basic urban street system located on the streets. For the majority of residents, the distance from public transport stops does not exceed 500 m, which is why they willingly use these means of transport. The above lines ensure connection of the housing estate with other parts of the Fordon district, as well as with the whole of Bydgoszcz.

Performed analyzes confirm the low risk of road safety, especially in the internal street system of residential area [13], which is an insulated system from general city traffic, and the existing form of solution of the bypass and ejector system functioning as a calm traffic system (zone 30 or residential zone) ensures safety all road users, including pedestrians, cyclists and motor vehicles [14]. To improve road safety and the state of public space, increase the number of traffic calming measures, including raised shields at intersections, and resolve entrances/exits to the estate.

Residential buildings in Bajka Housing Estate are equipped with all utilities, i.e. plumbing, electricity, gas, central heating, central hot water, RTV antennas, telephone divisions, heating substations. There is a transformer station, water supply devices and the area of power devices on the estate.

3.3. Evaluation and conclusions to the concept of transformation of public spaces
The Bajka housing estate is built in large-panel technology based on building standards. The architectural form of the buildings is characterized by the repetition of windows, balconies, logos, staircase entrances and a lack of detail. These are typical solutions that characterize large-panel construction. In the Bajka Housing Estate there are no separate common spaces that integrate residents. Two basic types of space can be distinguished - private (garden) and semi-public (recreational areas belonging to the given quarter of development). The quality of the public space development is much worse. The high value of the estate is a large amount of greenery. It constitutes
68.5% of the entire area of the housing estate. There are playgrounds within the estate, but they are very poorly equipped with play equipment. Older children and adolescents use the playgrounds at the school and tennis courts. There are no recreational places for the elderly. The estate can be distinguished by a spatial dominant, which gives the opportunity to develop a common public space. It is an undeveloped and unused area in the middle of a forest area where tennis courts are located. Particularly severe is the lack of recreational facilities for the elderly.

The following conclusions from the survey with residents and the analyzes developed:

- the housing development has five functional and one spatial dominants;
- there is a large amount of greenery throughout the estate;
- areas around forest wasteland are possible to develop;
- there are no places for recreation and rest, especially for the elderly;
- there is a lack of adequate public space within the estate, which, regardless of the season, would create conditions for integration and meetings of residents (no housing center);
- there is a lack of adequate facilities for sports activities, despite the existence of tennis courts within the estate;
- insufficient number of parking spaces in the housing estate causes the phenomenon of "wild parking" in areas that are not adapted for this purpose;
- within the estate there are objects that disharmonize space, including garages, garbage cans, outbuildings that should be obscured by high greenery to reduce their negative impact. Existing garages (single-level boxes) should be demolished and in their place multi-level garages should be built, which would increase the number of car parking spaces and the aesthetics of the estate.

In the area of public housing development of the housing estate, the following activities are proposed:

- development of socio-cultural development (housing estate pavilion) together with an attractive and aesthetic public space surrounding,
- development of educational space for children (fairy tale trail),
- development of recreational and sports facilities,
- concentrating transformations of public space in indicated, available areas and along the route connecting these areas.

In terms of road and street layout and parking in the Bajka Housing Estate, the following activities are proposed:

- implementation of physical traffic calming measures at the entrances to the housing estate and on sections of internal streets other than the existing release thresholds;
- in the event of a further increase in the level of motorization, construction of multi-level cubature car parks;
- improving the technical condition of the road surface and pavements;
- development of infrastructure for cyclists, including bicycle paths along Academic Street, pedestrian and bicycle paths through the forest area to the recreation and sports zone (tennis courts) and to the planned Social and Cultural Pavilion as well as places (stands for stands) for parking bicycles.

As a result of the above conclusions and adopted assumptions, a functional model of recreation and sports zones was developed in the aspect of improving the image of public space in the Bajka housing estate.

Due to the insufficient number of recreation zones, the following five zones are planned for the existing sports field. The starting point is a reference to the urban fabric of the housing estate, which are the districts in which the existing recreation and sports zones are entered.
3.4. The concept of transformation of public space in the Bajka Housing Estate
The concept of transformation of public space in the Bajka estate consisted in the division of the estate into 3 design areas A, B and C (figure 4) and the design of new development elements that would significantly increase the quality of space.

3.4.1. Area A development concept
Area A is located in the western part of the Bajka Housing Estate (figure 4). The concept of developing this area consists in transforming the space into a recreation, sports and cultural park. This area is located south of the existing tennis courts and is currently an unused area. This area is surrounded mainly by a coniferous forest (figure 4). The area was divided into 5 zones shown in figure 3. In the 3rd zone (recreation and integration) the Social and Cultural Pavilion is being designed. Within the tennis courts it is also planned to build a sports warehouse with social facilities.

The Social and Cultural Pavilion was designed on the connection of the existing two main pedestrian routes located south of the existing tennis courts, which residents most often use (figure 5). As a result of their merger, a socio-cultural center of the housing estate (Pavilion) was created as a recreational and integration place for the local community. From the southern side, a designed square with a fountain is visible, a square with a spatial form of a small estate amphitheatre. Further to the north is the Bajka housing area Socio-Cultural Pavilion and a playground (slide, climbing wall for children, etc.). Area A is closed from the north by tennis courts with a planned sports magazine with social facilities.
The concept of the Social and Cultural Pavilion is an integral element of the transformation of public space in the Bajka housing estate. The idea of creating a housing pavilion results from a survey conducted among residents and from the need to create a place of integration and neighbourhood meetings.

The pavilion was designed on a plan of two circles (figure 6). One of them is a closed part. It is developed for a public building. The second circle is an open part based on reinforced concrete columns with wooden elements protecting from the wind. Both parts of the districts are connected by
a common roof. The main hall of the closed part of the Pavilion is an available space for meetings, exchange of thoughts and building relationships among residents. It is assumed that life in the pavilion will center around the bar area with the exhibition area in the center of the facility. Reservoir. the surrounding pavilion is an element that will positively affect the climate and the spatial composition of the interior. The Pavilion's concept assumes year-round access for residents. The concept uses a "green roof" that residents can use as an observation deck.

An additional attraction of the designed Area A are footbridges; thanks to which you can get to the terrace. An external elevator is provided for the disabled. In the central part of the roof a glass dome was designed based on glued wood trusses, through which natural light will pass.

An integral element of the transformation concept is the sports magazine with social facilities located in the vicinity of the tennis courts. A terrace is available for residents on the "green roof" of the building.

### 3.4.2. Area B development concept

It resulted from the need to create an attractive public space gathering the most important functions, education, culture and health. The area is located in the middle of the estate (figure 7) and is surrounded by:

- from the north and south side 2 preschools facilities (private and public);
- from the east with the building of the District Social Welfare Center;
- from the west by the School Unit No 35.

The main assumption of the transformation of the public space of Area B was to create a common space for all of the above. function and place, as well as integration and recreation of residents, and making the space more attractive by introducing elements of landscape architecture.

![Figure 7. Bajka housing estate Bydgoszcz-Fordon - Area B - visualization of the concept of public space transformation - view from the North-East](image)

### 3.4.3. Area C development concept

One of the assumptions used in the Bajka estate is the idea of the fairy tale trail concept inspired by the "Lodz Fairy Tale Trail" [15]. The concept assumes that fairy tale monuments in the form of small bronze sculptures will appear along the pedestrian route connecting the designed Areas A and B. This area in the form of a pedestrian route, performs the function of coupling two public spaces A and B will bring together a greater number of sculptures, which will be a form of arrangement of the transition from one space to another.

### 4. Conclusions

This article confirms that public space in the housing estate is an important role in the lives of residents. It contributes to the creation and maintenance of neighborly bonds in a housing estate. It strengthens social interactions and builds a sense of satisfaction in both individual and collective
dimensions. Improving the state of use of public spaces is a very important problem of national importance, because public spaces in multi-family housing estates built at the end of the 20th century in large-panel technology from the beginning of its creation, were usually implemented very modestly developed, did not favor the living environment of many thousands of people. The development of public spaces and their aesthetics deviated from European standards.

The analyzes of various aspects of the functioning of spatial development and research on the inhabitants of transport services and infrastructure, types of property properties, greenery and spatial composition, indicated spatial and program conditions and possibilities of transformation.

The concept of transforming the public space of the Bajka Housing Estate in Bydgoszcz Fordon showed the possibilities and directions of introducing various activities of cubature and outdoor facilities, which can significantly improve the living environment, as well as the aesthetics and quality of public space in Polish conditions.

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