Principles of social housing development in Spain

Kutsalo Oleksii¹

¹ Postgraduate student; Kyiv National University of Construction and Architecture; Ukraine

Abstract. The issue of social housing has always been a vital concern for most countries, given its crucial role in ensuring a dignified life for citizens. Each country has a unique history and approaches to the development of social housing, reflecting distinct social, economic, and cultural requirements. Spain's practice in this area, developed over a long period, is particularly appealing and can be beneficial for Ukraine, which seeks to improve its own standards of social housing construction. This article examines the architectural features of social housing formation in Spain, based on the analysis of both historical and contemporary projects. Successful examples such as the Caño Roto housing complex, a symbol of modernism and high social experience, and the contemporary housing quarter Vivazz in Asturias, emphasizing their contribution to the transformation of the urban environment and creation of comfortable spaces for different population segments, are highlighted. Special attention is given to architectural innovations, energy efficiency, and the use of public spaces as centers of social interaction. The conclusions emphasize the importance of adapting social housing to changes in requirements and the social environment, highlighting its impact on improving the quality of life and forming communities.

Keywords: Social Housing Caño Roto Vivazz Residential Quarter Affordable Housing Spain Ukraine
Ukraine is currently undergoing significant challenges due to military actions, leading to the destruction of housing infrastructure and massive population migrations. These circumstances create an urgent need for effective and rapid restoration of the housing stock. It is expected that, following the cessation of military activities, special attention will be given to the construction of social housing in large volumes to meet the needs of displaced and internally displaced persons. In this context, researching and analyzing international experience in designing and implementing social housing becomes relevant. Spain is one of the significant examples in this field, where historically successful practices of social housing construction have been formed. Analyzing this experience can provide valuable guidance and solutions for Ukraine in addressing current problems in housing construction.

The industrialization processes of the 19th century triggered unstoppable migration from rural areas to cities, both in Europe as a whole and in Spain. The significant population increase in cities over a short period led to overcrowding in urban outskirts and a deterioration of living conditions for the working class.

In 1911, the enactment of the Law on Affordable Housing [1] played a pivotal role and marked the beginning of the development of social housing in Spain. These regulations defined affordable housing as construction for low-income individuals and set standards for the quality of materials and living conditions to improve housing conditions and hygiene.

As early as 1850, Henry Roberts proposed prototypes of worker's housing with high ceilings, efficient ventilation, and proper living conditions. He suggested houses with three rooms, limiting the living room area to 14 m² and the main bedroom to 9.5 m². However, the implementation of social housing in Spain took half a century.

In December 1921, the Second Law on Affordable Housing was adopted in Spain, allowing cooperatives, charitable or commercial societies to initiate projects. This law established strict hygienic and technical requirements, such as limiting the height to 3 meters for the first floors and...
2.8 meters for all others, requiring bathrooms in each house, and restricting room sizes for cost-saving and standardization purposes. It contributed to the rationalization of social housing and defined three types of construction: single-family housing, collective housing, and garden cities.

Between 1921 and 1924, only 1,290 buildings were constructed in major Spanish cities, which led to criticism of the system's inefficiency at the National Building Conference [2]. In response, during the dictatorship of Primo de Rivera, the Third Law on Affordable Housing was enacted, which, while not introducing architectural changes, expanded the categories of subsidized housing. Starting in 1927, new decrees were issued aimed at expanding subsidized categories, including houses for the middle class, such as "Houses for Civil Servants" and "Houses for Military Personnel". However, assistance was discontinued in 1929.

With the advent of the Republic in Spain in 1931, building activity declined, but in 1935, the Salmon Law was passed, aimed at supporting the construction of rental housing and reducing unemployment levels. This law changed the development of the peripheral areas of large cities to medium-rise blocks. After the Civil War in 1939, which left the country in ruins, there was a need for rapid housing construction, but the lack of resources limited construction to only 50 houses per province annually.

In 1939, the Law on Protected Housing [3] was enacted with the aim of building housing for the underprivileged population. The National Institute of Housing (INV) developed rules and regulations, setting strict standards for construction. In 1949, at the National Assembly of Architects, housing problems were discussed, defining the foundations of social housing. The following year, INV commissioned the Households Union Organization (OSH) to develop and implement a plan to build 10,000 units of social housing annually, limiting the area to 42 m² and the maximum budget to 25,000 pesetas (approximately 628 USD at the 1950 exchange rate). A second plan was also developed to build 20,000 "houses with minimal and reduced income levels," ranging from 35 to 100 m² with set prices per square meter (800-1000 pesetas).
Considering the historical context, the aim of this study is to analyze the characteristics of the development of social housing architecture in Spain to identify advantages in the formation of architectural and public space and their impact on people's social lives compared to the standards of such housing types in Ukraine. The object of study is architectural projects of social housing in Spain, including historical and contemporary buildings, such as the Caño Roto housing complex and the Vivazz residential quarter. The subject of scientific research includes architectural, social, and environmental aspects of social housing, encompassing the analysis of architectural innovations, methods of ensuring energy efficiency, the role of public spaces in shaping social interaction, and their impact on the quality of life of residents and the development of urban territories. The research is based on historical-comparative analysis methods of architectural design practice and its impact on the social and urban environment.

Figure 1
Caño Roto Housing Estate. Aerial view, 1960. (Source: Centro de Documentación de Medio Ambiente y Ordenación del Territorio de la Comunidad de Madrid)
ARCHITECTURE, CONSTRUCTION AND DESIGN

Firstly, let's consider the Caño Roto housing complex (Fig. 1), which was realized in the 1950s, incorporating modernism into Spanish architectural practice. It serves as an example of high social experience, possessing both historical and architectural value [4]. The development of the complex occurred in two stages: the first being the actual design and construction of the complex, and the second, its rehabilitation considering new conditions of comfort and expressiveness.

Julián Laguna, an architect and head of Madrid's Urban Planning Department, favored young architects for their energy and round-the-clock dedication to the project (it is known that he scheduled meetings at two in the morning), lack of prejudice, and readiness to start work immediately, improvising as necessary. At his initiative, architects José Luis Íñiguez de Onzoño and Antonio Vázquez de Castro, experienced specialists who had participated in many architectural competitions [8], were invited to the Caño Roto project. Their project represented an innovative architectural and urbanistic solution for its time. The complex, consisting of 1,606 residential buildings and public purpose facilities on an area of 19.46 hectares, was implemented as a unified spatial complex, taking into account both the local environment and the needs of the residents.

Figure 2
General plan and situation of the building typologies.
Drawing by the author
The placement of buildings on a complex site was chosen to achieve harmony with the natural landscape. The complex reflected contemporary trends in its architecture, ensuring compliance with local conditions through a variety of forms and uniformity of materials. The construction had a mixed structure, including 43 linear blocks (680 apartments), 27 towers (324 apartments), and 602 terraced houses (single-family apartments) (Fig. 2). The linear blocks on six floors were located in the peripheral and external areas, protecting public spaces from the external environment. The terraced houses formed compact groups within the complex, with visible perspectives ranging from four-story blocks, representing an intermediate scale, to six-story towers creating a panoramic backdrop.

The arrangement of this variety of buildings formed several intermediate spaces with open plazas, contrasting with narrow pedestrian streets, maintaining a harmonious connection between the sizes of the buildings and the open spaces. These areas, referred to as "measured open spaces" by Antonio Vázquez de Castro [5], are dynamic spaces of variable size, partially bounded by different types of buildings and materials. The young architects set up their office on-site, aiming to involve future residents - their official clients - in the development of apartment prototypes, although, ultimately, as Vázquez de Castro noted, "whatever you proposed, they were satisfied with."

This housing complex became a typological laboratory that brought the brightest innovations in housing construction not only for complexes but also for public housing projects of that time. The diversity of housing unites functional schemes that maximize space with others aimed at comfort and leisure. Structurally, these buildings meet basic quality standards, adhering to cost-effectiveness and rationality within technological norms. This also facilitated the use of traditional construction systems instead of modern technologies to enable construction with the participation of low-skilled labor.

From 1994 to 2004, the urban housing estate of Caño Roto [6] underwent rehabilitation, declared a zone of preferential rehabilitation. The initiative for the commencement of works
arose from the residents, as well as through constant protests, particularly from the Neighbors' Association, which escalated in the 1990s. Residents combined socio-economic and urbanistic demands with requirements arising from living conditions in the buildings.

In the 1980s, the spread of marginal settlements in adjacent areas became a serious factor in urban isolation due to their association with criminal and illegal activities, creating an atmosphere of significant danger. Among the population in a precarious position, there was a high percentage of pensioners and young people under 30 years of age with low levels of training and limited access to the labor market.

The vulnerability of the complex was manifested in the deterioration of public spaces, neglect, and a decrease in commercial and local business activities, limiting access to basic goods and interaction among residents. It was also found that there was a lack of infrastructure, such as medical facilities, recreational and cultural centers, as well as public safety services.
The limited budget with which the complex was built, coupled with a lack of proper technical maintenance, led to its significant decline in the 1970s, which eventually turned into a critical emergency state by the 1990s. Considering the poor condition of the buildings and the demands of the residents, the Madrid Housing Institute initiated two technical surveys, which confirmed the need for rehabilitation, including the replacement of three blocks. According to the classification of the estate according to the 1985 Urban Land Act as "urban land regulated by zone standard 3, with building services" [7], a special plan (Estudio de Detalle) was developed. This plan aimed to improve...
accessibility and expand the built-up area of high-rise buildings, and also provided for the replacement of destroyed buildings while maintaining their location, area, and purpose.

The rehabilitation of single-family homes was carried out following the 1997 law, which allowed interventions such as conservation, typological restoration, conditioning, and demolition, aiming to comply with historical values. The work covered the entire estate, including 1594 residential buildings, except for a tower that had been replaced earlier. The process began with an information campaign and economic forecasting of the works. Although 1165 multi-story buildings and 30% of single-family homes were involved in the renovation, conducting preliminary studies in the case of single-family homes was challenging due to structural damage. Funding was implemented through a mixed model involving state, regional, and local administrations, covering about 50% of the investments. The management of the process was jointly carried out between the Administration and representatives of the homeowners, led by a private company, ensuring participation and communication among homeowners' associations.

Most interventions were conditioned by two main factors. The first was the importance of carrying out the process without the forced relocation of residents during the interventions. The second factor concerned the need to modernize the buildings in a way that they would meet the standards of new construction as much as possible.

Improving accessibility to multi-story buildings was achieved by arranging entrances for residents with limited physical abilities and installing elevators in six-story buildings, in accordance with the wishes of the residents (Fig. 3). However, the reconstruction, which improved functionality and accessibility, also led to an increase in green plantings without proper care and changed the materials used, losing the connection with the avant-garde character of the original complex.

During this process, the functional principles, which were closely monitored by the residents, proved to be more important than the proposals of the Main Directorate of
Architecture of the Regional Administration (DGA), which, along with the architects who worked on the original project, sought to focus on architectural aspects.

Based on the above, the following architectural features of the Cano-Roto social housing complex can be highlighted:

### Table 1

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location and Accessibility</strong></td>
<td>The placement of buildings on a challenging site, considering harmony with the natural landscape.</td>
</tr>
<tr>
<td><strong>Building Quality</strong></td>
<td>Construction using traditional systems with consideration of cost-effectiveness and basic standards.</td>
</tr>
<tr>
<td><strong>Social Isolation</strong></td>
<td>The growth of marginal settlements led to urban isolation due to security issues and neglect.</td>
</tr>
<tr>
<td><strong>Apartment Planning</strong></td>
<td>The complex had a variety of apartment layouts due to a large number of building types and on-site architect work. The rehabilitation process, which included improving accessibility and living conditions, was focused on meeting the functional needs and preferences of the residents while maintaining structural integrity.</td>
</tr>
<tr>
<td><strong>Architectural Expressiveness</strong></td>
<td>A unique project that reflects contemporary trends and expresses a high level of architectural experience.</td>
</tr>
<tr>
<td><strong>Social Infrastructure</strong></td>
<td>The presence of infrastructure was limited, with the absence of medical facilities and cultural centers. The complex’s rehabilitation occurred based on the demands of the residents, including improvements in infrastructure.</td>
</tr>
</tbody>
</table>

Considering the Cano-Roto housing complex, created in the 1950s, it can be identified as a symbol of high social experience and architectural value. The project demonstrated innovation of its time, combining diverse forms and uniform materials with consideration of local conditions. The placement of buildings took into account the natural landscape, and the architects worked based on residents' feedback, striving to align their needs with the construction concept.

The complex itself became a laboratory of innovation in residential construction, considering functionality, comfort,
and cost-effectiveness of structures. However, over time, problems associated with the increase in marginal settlements, infrastructure inadequacy, and deterioration of public spaces emerged, leading to the necessity of rehabilitation. This process led to improved accessibility and functionality of the buildings; however, the changes also brought certain problems related to the alteration in materials used, losing connection with the original concept.

Thus, the Cano-Roto complex is an example of successful architectural innovation of its time, but also notable for its evolution and adaptation to changes in requirements and social environment.

In the current architectural reality, social housing projects play a crucial role in creating comfortable and accessible living conditions for various population strata. One interesting example of such a social housing quarter can be found in Asturias, an autonomous industrial region of Spain (Fig. 5). The local authorities were tasked with announcing an architectural competition to select the best project. The primary goal of the competition was not only to provide the local population with affordable housing but also to change the face of the city, previously associated only with coal mines (the region is famous for its coal basin).

Figure 5
Exterior view of the Vivazz, Mieres Social Housing / Zigzag Arquitectura. © Roland Halbe
Architects from Zigzag Arquitectura, who won the competition, described the entire building creation process in the city of Mieres (Fig. 6). They used a simple rectangle with an inner courtyard as the starting point. To ensure light and fresh air for all residents, the architects "cut off" various parts from this form. As a result, a complex of buildings emerged, looking like they were "glued" to one another: some with sloping roofs (with various angles of inclination), others with flat roofs, some tall, and others with only two floors.

Figure 5
The process of molding the expanse of the residential area of the Vivazz, Mieres Social Housing. Drawing by the author
The initial volume of the building was clad in wood, and from the courtyard side, movable shutters were made from planks (Fig. 7), which could freely move within one floor. The integrity of the complex was enhanced by asymmetrical windows of various sizes, which perfectly fit into the composition.

“Opening up the quarter was another one of our priorities, and we managed to avoid turning the inner space into a forgotten back area, making it a center for social meetings of its residents, and also a place worth seeing,” explain the project's authors. [9]

The housing units share both urban and rural visions of the project. They feature dual orientation, ensuring cross-ventilation and expansive views. The homes are organized around a central core of bathrooms, dividing them into day and night spaces. The daytime areas face the inner square and have large windows to benefit from the valuable sunlight in Asturias, while the nighttime areas, with more controlled
openings and equipped with blinds, face the city. The housing units were formed by stacking sequential modules of 2.60 meters, accommodating one, two, three, and four bedrooms, thus responding to various types of required apartments. A one-meter deep terrace acts as a visual and spatial extension of the apartment. It is designed to serve as an external gallery made of wooden planks, bordering the entire inner perimeter of the building. A central heating system with individual distribution of heat, complemented by a simple home intercom system, among other features, allows for object control. The building also harnesses solar energy through panels installed on flat roofs for partial hot water production. The structural underground system consists of a large foundation slab and a construction of concrete walls and columns. Above ground, the system is mixed, based on unilateral concrete slabs on standardized tubular supports and steel ties, which allowed for faster implementation, as well as greater economy and spatial cleanliness [10].

Figure 7
Planning structure of the complex and internal pedestrian space of the social residential complex of the Vivazz, Mieres Social Housing.
Drawing by the author
Based on the social housing quarter Vivazz, the following features can be identified:

Table 2

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location and Accessibility</td>
<td>Located in a convenient place, close to the city center and major transport junctions. Access to housing is good, as it is served by several bus routes and there is parking available.</td>
</tr>
<tr>
<td>Building Quality</td>
<td>Meets high standards of quality and safety. The building is made of high-quality materials such as concrete, brick, and wood.</td>
</tr>
<tr>
<td>Social Isolation</td>
<td>Does not contribute to social isolation. The building is situated among other residential buildings and close to public amenities such as schools, kindergartens, shops, and restaurants. This facilitates interaction and participation in community life for the residents.</td>
</tr>
<tr>
<td>Apartment Planning</td>
<td>Thoughtful and comfortable apartment layout. The building has spacious apartments equipped with all necessary amenities. There are also communal areas in the building, such as a terrace, garden, and playground.</td>
</tr>
<tr>
<td>Architectural Expressiveness</td>
<td>Modern and original in design. The building has pleasant colors and an interesting shape, making it attractive and distinctive in its surroundings.</td>
</tr>
<tr>
<td>Social Infrastructure</td>
<td>Social infrastructure that provides residents with access to necessary services. The building has a social center offering consulting, education, and leisure services. There is also a kindergarten and a school in the building.</td>
</tr>
</tbody>
</table>

Analyzing the example of the Vivazz social housing quarter in Asturias, it can be determined that the main goal of the project was not only to provide affordable housing but also to transform the city's image. The architects who won the competition used a simple rectangle with an inner courtyard and successfully employed it to create a variety of buildings. The application of different roof shapes, heights, and asymmetrical windows created the impression of a complex where
the buildings appear to be "stuck" to each other. The use of wood and movable blinds contributed not only to the aesthetic appearance but also to the functionality of the buildings.

The residential units were designed taking into account both urban and rural visions of the project, ensuring double orientation for cross ventilation and viewing. The structural underground system and the use of solar panels indicate an attempt to ensure ecological and energy-efficient aspects.

An important aspect, as noted by the authors of the project, is the need to open the quarter and use it as a center for social meetings for residents. This reflects a careful consideration of public space and social interaction aspects.

Overall, the analysis of the project indicates that modern social housing projects can be not only a means of providing housing but also a tool for transforming the urban environment, creating aesthetically attractive and functional spaces, and promoting social interaction among residents.

Conclusions. Social housing in Spain reflects the multifaceted nature of its development. Starting with innovative projects of the past, such as the Canyo-Roto residential complex, and concluding with contemporary architectural solutions, it is evident that social housing in Spain is evolving to address issues related to population growth and its needs.

Among the main principles of this evolution are attempts to provide comfortable and accessible housing, taking into account the diversity of forms and materials, as well as the aesthetic and functional aspects of the space. However, these achievements are also linked to problems such as the increase in marginalized areas, insufficient infrastructure, and the deterioration of public spaces.

Overall, contemporary social housing projects in Spain demonstrate a desire for innovation and adaptation to societal needs, while also emphasizing the need for continual improvement in addressing urban life problems and social aspects of public spaces.

It can be concluded that studying the development of social housing architecture in Spain opens broad prospects for applying the acquired knowledge and practices in Ukraine.
ARCHITECTURE,
CONSTRUCTION AND DESIGN

Considering the aspects studied, the following principles can be effectively integrated into the strategy for the development of social housing:

1. **Architectural Expressiveness:** The architecture of social housing should be not only functional but also visually appealing. Using innovative, creative architectural solutions that reflect the cultural identity and aesthetic values of the region can enhance the quality of living spaces and positively impact the mood and well-being of residents.

2. **Creation of Courtyard Pedestrian Spaces within the Quarter:** The arrangement of safe, accessible, and green pedestrian zones within quarters provides space for relaxation and social interaction. Such spaces not only enhance the aesthetic appeal of the residential environment but also contribute to creating safe and healthy living conditions.

3. **Energy Efficiency and Sustainability:** Developing housing projects with high levels of energy efficiency and using renewable energy sources helps reduce negative environmental impacts and lower operational costs.

4. **Consideration of Historical Context:** The restoration and adaptation of existing historical buildings for social housing allows for the preservation of cultural heritage and local identity.

5. **Integration with the Urban Environment:** Harmoniously combining social housing with the urban landscape helps create balanced urban spaces.

6. **Community Participation in Planning:** Involving residents in the planning and development of social housing projects helps to consider their needs and desires.

7. **Flexibility in Planning:** Creating adaptive housing solutions that can be easily changed or modernized helps to meet the changing needs of residents.

8. **Improving Infrastructure and Access to Services:** Developing infrastructure within the social housing project ensures access to education, health care, transportation, and other essential services.

9. **Economic Accessibility:** Providing economically affordable housing for different population strata offers housing opportunities for the most vulnerable and low-income groups.
The application of these principles in Ukraine can contribute to creating a more comfortable, aesthetically attractive, and environmentally sustainable living environment, improving living conditions and social interaction among residents.

References: