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REHABILITATING J. L. ROMANY'S SOCIAL HOUSING IN THE 21ST CENTURY

Jorge Gallego Sánchez-Torija[1], María Antonia Fernández Nieto[2], Jesús García Herrero*[1]

[1] Polytechnic University of Madrid
Avda. Juan de Herrera 4, 28040 Madrid, Spain

[2] Polytechnic School, Architecture. Francisco de Vitoria University
Carretera Pozuelo a Majadahonda, Km 1.800, 28223, Madrid, Spain

*Corresponding author: jesus.garciah@upm.es

Abstract

Introduction: The modern heritage of 20th century Spanish architecture, particularly in the city of Madrid, includes an extensive range of high-quality social housing that, due to its peripheral location and economic restrictions, can be lost without public policies to preserve it. Updating this housing to meet the current habitability requirements, as well as enhancing and transforming it into high-quality 21st century residential buildings, is a task that cannot be postponed. **Purpose of the study:** The issues of energy efficiency, habitability and accessibility are very salient today, so it seems pertinent to recover relevant examples of 20th century architecture and investigate to what extent the parameters with which they were designed are still valid. **Methods:** This paper reviews housing case studies in two neighborhoods, Poblado Dirigido de Fuencarral and Colonia Juan XXIII de Carabanchel, comprehensively analyzing the original buildings and their current rehabilitation. This includes comparing the buildings' energy efficiency before and after the intervention carried out. **Approach:** This study verified that in both cases, an attempt was made to recover several elements of the original design during rehabilitation. **Results:** We found that both projects were originally committed to creating an open, pedestrian-friendly city with abundant vegetation, which is still a valid value today. Despite the economic restrictions at the time of construction, both projects used advanced energy strategies, such as the passive design offered by cross ventilation, the unusual thermal insulation envelope, or the efficient district heating. Novelty: In addition, this paper aims to incorporate the heritage of the great mid-20th century architect José Luis Romany, author of both projects, into modern Spanish architecture.

Keywords

modern heritage; Madrid social housing; residential rehabilitation; energy efficiency; Poblado Dirigido de Fuencarral; Colonia Juan XXIII.

Introduction

Social housing in the mid-20th century was one of the main experimental revival areas after the Spanish Civil War. Even though there were a few attempts to make something different from the official architecture during the late 1940s (Obra Sindical del Hogar, mainly by Cabrero and Aburto), it was during the second half of the 1950s that social housing truly emerged. Many of the architects who are currently considered masters started their professional activity during those years, joining what Baldellou aptly defined as a "furious investigation" (Baldellou, 1998).

In Madrid, it was the public sector that dominated social housing construction until the arrival of the Housing Ministry in 1957 allowed for supporting and promoting private initiatives. That said, charities and non-profit associations also contributed to residential construction during those years, following the contemporary low-income housing rules. One such organization is the Constructora Benéfica del Hogar del Empleado (CBHE). Its Technical Office gathered a group of young architects who would subsequently play a major role in the development of the Poblados Dirigidos de Renta Limitada, or neighborhoods for limited-income residents (1956–1957). The neighborhood of Entrevías was designed by Oiza and Sierra together with Alvear. Whereas Cubillo and Romany were in charge of Canillas and Fuencarral respectively. They won first place in the Experimental Houses Competition organized by the Housing Ministry in 1956.

Another active team consisted of Vázquez de Castro, Iñiguez de Onzoño, Leoz and Ruiz Hervás. After designing the Poblado de Absorción de San

Fermín, the architects received the order to create the famous neighborhood of Poblado Dirigido de Caño Roto. Leoz and Ruiz Hervás were assigned to Orcasitas. The Bretón de los Herreros team — Corrales, Molezún, and García de Paredes, together with Carvajal — designed the Poblado Dirigido de Almendrales. Corrales and Molezún collaborated with Cano Lasso, under Gutierrez Sotos' direction, in section G of Gran San Blas (Gutierrez Sotos').

These high-quality interventions in the social housing environment continued during the 1960s. Romany continued to collaborate with the CBHE. Carlos Ferrán and Eduardo Mangada joined the group as well.

The Unidad Vecinal de Absorción de Hortaleza (UVA) neighborhood, built in 1963, was recognized by Le Corbusier and Louis Kahn as the most human-friendly design among the 2300 worldwide projects presented at the X Congress of the UIA (Industrial Union of Argentina) in Buenos Aires in 1969 (Araujo Armero and Seco, 1994). The neighborhood was the work of Espinosa, Higueras, Cabrera, Miró, Weber and Crespi.

Some of the members of this generation of professionals even lived in the neighborhoods that they had designed, to demonstrate their personal involvement. Vazquez de Castro lived in the Poblado Dirigido de Caño Roto, while Oíza and Romany hosted their first promotion of the Covadonga Colony in the Hogar del Empleado. Lucho Miquel, another member of Romany's, lived in a house of his own design as well.

Despite the unquestionable quality of the projects, many of the architects listed in this quick summary (for photos of the architects, see Fig. 1) fell into the obscurity. One of them is José Luis Romany, eclipsed by the renown of Oíza. The two architects shared the National Architecture Prize for designing the Chapel in the Camino de Santiago neighborhood, in collaboration with the sculptor Jorge Oteiza.

A humble architect without a media presence, Romany knew how to mix his extraordinary sensitivity with a remarkable rigor in his construction projects during the time we are studying.

The problem to be addressed is of a dual nature.

On the one hand, we want to assess whether the quality of José Luis Romany's work deserves this lack of attention, or whether, on the contrary, he is just as remarkable as some of his better-known colleagues.

In addition to this, we must face another problem. We want to determine if social housing, built more

Fig. 1. Photograph of some of the architects who designed social housing in Madrid in the mid-20th century (Baldellou, 1995)

than 50 years ago, may be considered architectural heritage that can be both preserved and adapted to the modern times through enhancing the original work's strengths, which will make it habitable for another half-century. In the current context, where the issues of energy efficiency, habitability and accessibility are becoming relevant, it seems pertinent to investigate what measures can be taken to ensure that the original project corresponds to society's new demands. The incorporation of energy efficiency parameters into existing social housing is far from simple (Trebilcock, 2011).

Matherials and methods

In order to highlight José Luis Romany's work, we will analyze two of his most significant projects: Poblado Dirigido de Fuencarral and Colonia Juan XXIII, both located in Madrid.

These are two examples of social housing designed by the same architect, the first on his own and the second in collaboration with other two architects. These projects were also created at roughly the same time. They date back to the mid-20th century, with less than six years between them.

Firstly, we shall study the most relevant data from both projects, as well as the context in which they emerged. Subsequently, we shall analyze both cases at different levels: the neighborhood level, the building level, and the housing level.

We shall examine two interventions in multi-family residential buildings in order to see if social housing of the mid-20th century can be adapted to today and whether the original values need enhancing:

- Poblado Dirigido de Fuencarral by b102 arquitectura (b102arquitectura, 2022).
- Colonia Juan XXIII by g+f arquitectos (g+f arquitectos, 2022).

Finally, we shall compare the energy efficiency of the original and the refurbished state. The purpose of this study was to assess the difficulty of adapting Jose Luis Romany's work to present needs. The software used, CE3, is officially authorized in Spain to obtain energy certification for buildings.

Results

1 Poblado Dirigido de Fuencarral and Colonia Juan XXIII

As mentioned before, we chose Poblado Dirigido of Fuencarral and Colonia Juan XXIII for this case study. The data for both projects is provided in Table 1.

In the middle of the 20th century there was a pressing issue on Madrid's periphery: the growth of shanty towns (Esteban Maluenda, 1999). The 1950s saw a huge migration from the countryside to the city, quantified at an average of 229,000 people per year over the course of the decade (Oteiza et al., 2018). The existing residences in Madrid could not meet the demand for housing, which caused an uncontrolled spread of self-constructed settlements. The projects selected for this study were part of various efforts to curb the situation.

The neighborhood of Fuencarral (see Fig. 2 for its aerial photograph) was targeted by a series of unusually innovative projects, known as "Poblados Dirigidos", promoted by the Urban Planning Station of Madrid under the guidance of Julián Laguna (Fernández-Galiano et al., 1989). As many as 10,925 homes were built during the project's first stage, between 1959 and 1962 (Guillem González-Blanch, 2013).

Colonia Juan XXIII (Fig. 3 shows the neighborhood's model) was promoted by a non-profit organization, Hogar del Empleado, created to support young workers who would come to the city and start new families there. From 1952 to 1966, 6000 homes were built (Fernández Nieto, 2006).

Romany divided his days between working in a shed at Fuencarral in the mornings and then joining his crew of architects from Hogar del Empleado at his studio home in Colonia Covadonga, one of the first neighborhoods established by the association, in the evenings (Fernández-Galiano et al., 1989).

2 Neighborhood level

At a time of frenetic construction activity, issues of such magnitude called for urgent solutions. When land was expropriated, housing was built quickly. The legalization of urban planning could wait (Betrán Abadía, 2002).

This way, the architect would get assigned to create not just a residential building, but an entire neighborhood or settlement. In just one project the

Table 1. **Data for the projects selected**

	Fuencarral	**Juan XXIII**
Architects	José Luis Romany	José Luis Romany, Eduardo Mangada and Carlos Ferrán
Project date	1956	1962
Implementation date	1959–1960	1963–1966

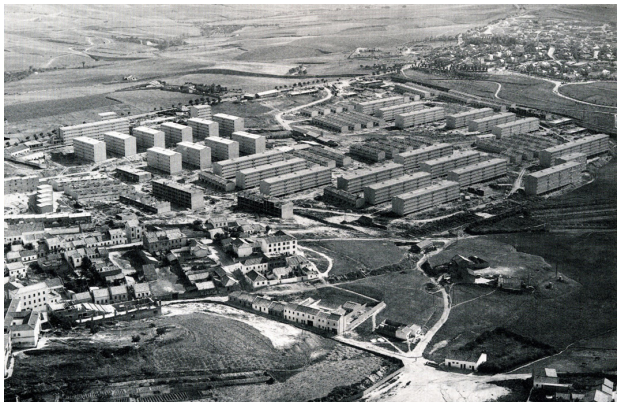

Fig. 2. Aerial photograph of Poblado Dirigido in the neighborhood of Fuencarral (Fernández-Galiano et al., 1989)

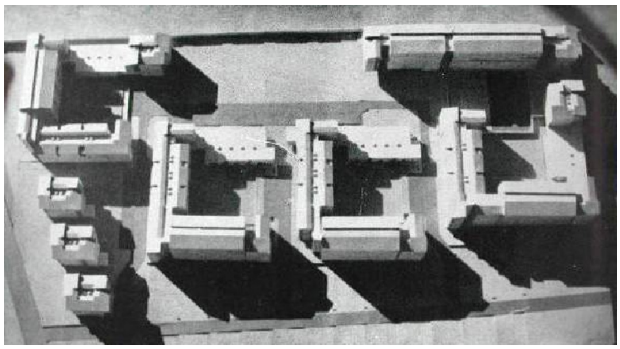

Fig. 3. Model of Colonia Juan XXIII (Fernández Nieto, 2006)

architect had to consider the neighborhood as a whole, including traffic circulation, free spaces, infrastructure and links to the rest of the city, block scaling and groupings, and the orientation and size of living spaces. The architect approached the assignments with coherence, complexity, experimentation, and boldness. The principal urban parameters for both projects are demonstrated in Table 2.

The Fuencarral area borders the coastal road in the south, the Poblado de Absorción Fuencarral A in the east, the now defunct Unidad Vecinal de Absorción of Fuencarral in the north, and the railway in the west (Moya González et al., 2017a). Linear blocks and rows of one-family homes are built with north-south and east-west orientation. The buildings, as observed in Fig. 4, are organized around a one-way road encircling the settlement.

A line of buildings is positioned along the outer perimeter of the road, while the rest are grouped within the inner perimeter. Access to the inner buildings is provided by little branching paths with no way out (Guillem González-Blanch, 2013). As the traffic only moves in one direction, this bars the road from being used by non-residents and prevents vehicles from reaching high speeds. This layout is very pedestrian-friendly. The inner public space

Table 2. **Urban parameters of both projects (COAM, 1964; Fernández Nieto, 2006; Instituto Nacional de Estadística, 2016; Moya González, 1983)**

	Fuencarral	**Juan XXIII**
No. of residential buildings	1839	502
Implementation area	20,758 ha	3230 ha
Construction density	89 blg/ha	155 blg/ha
Residential buildings	27%	29%
Non-residential buildings	3%	0%
Free private zones	6%	30%
Free public zones	59%	30%
Road traffic	5%	11%
Average income per household (AIH) (2016)	28,255 € 71% of AIH in Madrid	26,520 € 67% of AIH in Madrid

is made exclusively for pedestrians and features multiple green zones.

Free spaces between blocks are stacked into terraces adapted to the land topography. There is no pavement, except for the road and pedestrian paths. The abundant construction-free land is mostly covered with deciduous trees, hedges, and grass. In the center of the settlement are the non-residential buildings: a public school, a parish, and markets.

The Juan XXIII area is bordered by other residential development areas in the northwest and southeast. The southeast boundary was once a wall of a vast land plot occupied by the Marianistas' school, and before that, by Count de Campo Alange's retreat. Today, a street has been built here, with a housing block and a sport center on the other side, which has shrunk the school's outer land

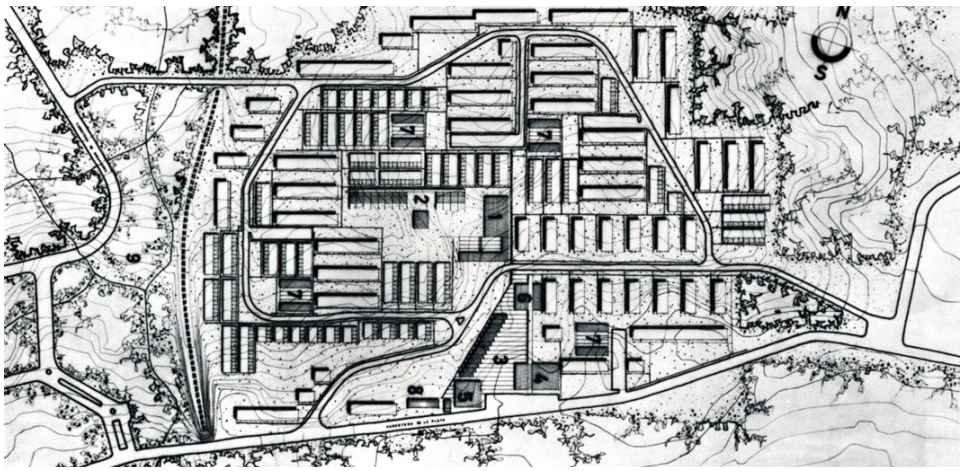

Fig. 4. Plan of Poblado Dirigido de Fuencarral (Fernández-Galiano et al., 1989)

plot. The northeast boundary is the neighborhood's only link to the city, through Joaquin Turina Street, formerly Camino de los Cuatro Vientos.

Four U-shaped blocks are placed along the perimeter. The first U-shaped block stretches from the approach to Joaquin Turina Street to the southeast boundary, leaving space for 3 rectangular blocks that offer greater connectivity with the city.

The rest of the U-shaped blocks are grouped close to the northeast boundary. The space near the southeast boundary is occupied by a linear block at the very end, leaving a vast free plot in the center, as seen in Fig. 5.

The traffic follows a U-shaped road. The road accesses, and exits into, San Deogracias Street, previously Antonio Bueno, running beyond the northeast section. The one-way traffic and the road's 90º turns reduce vehicle speed, prioritizing pedestrians against cars.

Large arcades are provided, where small shops are integrated into the residential buildings, all connecting with the large central free space, which could also function as a playground for the local children. Currently, this space has become a parking lot. On an intermediate scale, each U-shaped block has a central courtyard that is landscaped, as are the edges of the arcades. Notably, very little remains of this vegetation today.

There are no buildings with other uses, except for a small thermal power plant that produces heat for the whole neighborhood. Its sculpted chimney is an eye-catching landmark. The implementation of this solution, which is considered advanced from the energy efficiency standpoint, counts on a limited range of factors, some of which are as important as the thermal power plant of the University City (Torroja, 1943).

3 Block level

In Fuencarral, residential buildings are arranged into 4- and 5-level linear blocks. At the core of each block, there is a staircase of minimal dimensions, without an elevator, giving access to two residences per level. This typology allows for cross-ventilation throughout the buildings.

As observed in Fig. 6, the blocks face each other and form groups between 2 and 6 blocks (in very few cases, they may stand alone). The block selected for this study is part of a group of 4 blocks, with 40 residences in total. Half of these residences have 4 bedrooms each, while the other half have 3 bedrooms each. The shape factor is 0.21 m^{-1}.

The load-bearing structure, as shown in Fig. 7, is formed by walls perpendicular to the façade, opening up the living room and much of the kitchen. The principal façade forms a one-meter enclosure with glass terrace railings. This creates a lightweight sensation, more common of the Nordic architecture. At the time, it was difficult to build reinforced concrete portico structures, and therefore, the structural solutions for load-bearing walls were becoming more intelligent and efficient. The most common material was brick, although in the case of Fuencarral, the supply of the unusually light-colored brick chosen by Romany eventually ran out, which was why in some buildings, including the one reviewed here, the load-bearing walls were instead made of concrete blocks lined with ceramic tiles.

The back façade, where the bedrooms are, features landscape-format openings, 50 cm in height and practically as wide as the entire room (García

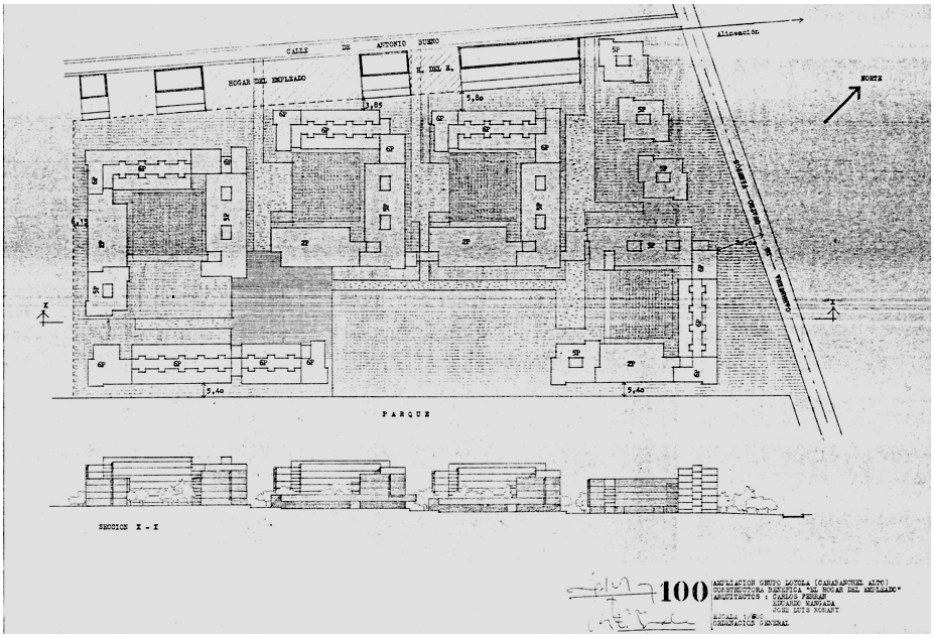

Fig. 5. Plan of Colonia Juan XXIII (Fernández Nieto, 2006)

Fig. 6. View of a group of blocks in Fuencarral (Fernández-Galiano et al., 1989)

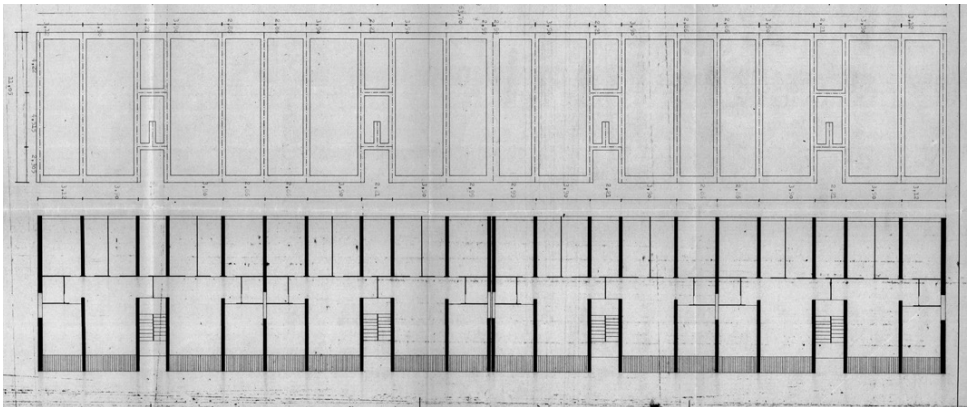

Fig. 7. Block layout in Fuencarral (Romany, 1957)

Herrero, 2013). Despite the fact that it is a more blind enclosure, the existence of continuous gaps affirms that it is not a load-bearing element.

In the Juan XXIII neighborhood, the residences are arranged into three types of blocks. The type of block selected for our case study is the most recurring. It is a U-shaped block with a central courtyard. As seen in Fig. 8, one side of the U-shape has two height levels. The ground floor opens to several porticoes, from where residents can access 5 commercial stores. The residences themselves are located on the first floor. This block's low height allows the sunlight to reach the community courtyard and the other sides of the building.

Starting from the second floor, the blocks form an L-shape with southeast and southwest "arms", ensuring appropriate sunlight exposure. One of the "arms" has 5 floors, while the other has 6. The block comprises 83 residences of 6 different types, with two, three or four bedrooms. The blocks are isolated, as shown in Fig. 9, although the commercial porticoes do create some continuity within the street layout. The shape factor is 0.18 m^{-1}.

The block we are studying in the Juan XXIII neighborhood is 15% more compact than its Fuencarral counterpart, due to its large size and height.

The depth of the block in this case exceeds 12 m, which is the standard dimension of the Spanish dwelling with two orientations. This is achieved through introducing interior galleries that change the section of the block and the residences.

A single elevator provides access to most of the residences through spacious galleries. Some of the residences have windows along a single façade, while others open into two opposite façades. These are the residences located at the end and in the middle of the galleries. This typology, called the "scissors maisonette", has been imported from the London County Council (London County Council, 1962).

In this section, one house goes above the central gallery while the adjoining house goes below it. This creates a scissor-like layout, as seen in Fig. 10. This way, only one gallery is needed at every two floors, and one elevator is sufficient.

The load-bearing structure consists of walls parallel to the façade, allowing the different interior

Fig. 8. View of the group of blocks in the Juan XXIII neighborhood (González Amezqueta, 1973)

levels of the residences to pass through the central gallery. This constructive solution creates a "blind wall" appearance. The front is widened to avoid contact with the load-bearing walls of the façade, as well as to allow for window openings and spacious terraces that connect to the lounge and the kitchen.

The large exposed brick panels were inspired by the English residential architecture of the time, including, for example, the Ham Common apartments of Stirling and Gowan, where brick is featured both outside and inside the block (Arnell and Bickford, 1993), as well as by Ridolfi's neo-realist buildings in Italy (Benévolo, 1974).

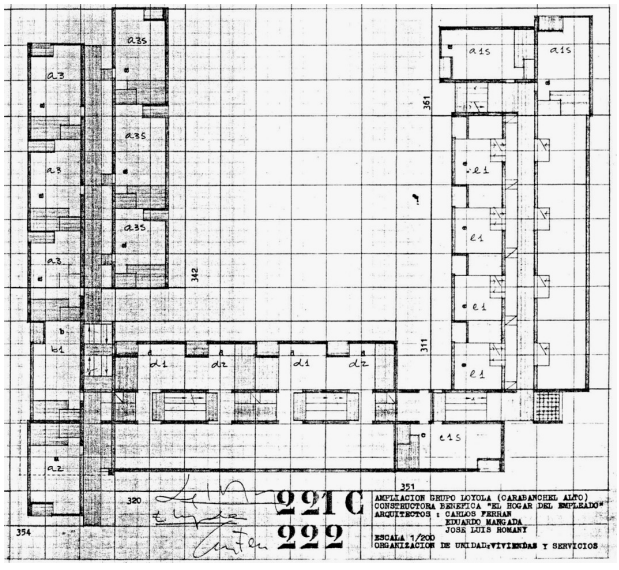

Fig. 9. Juan XXIII block structure (Fernández Nieto, 2006)

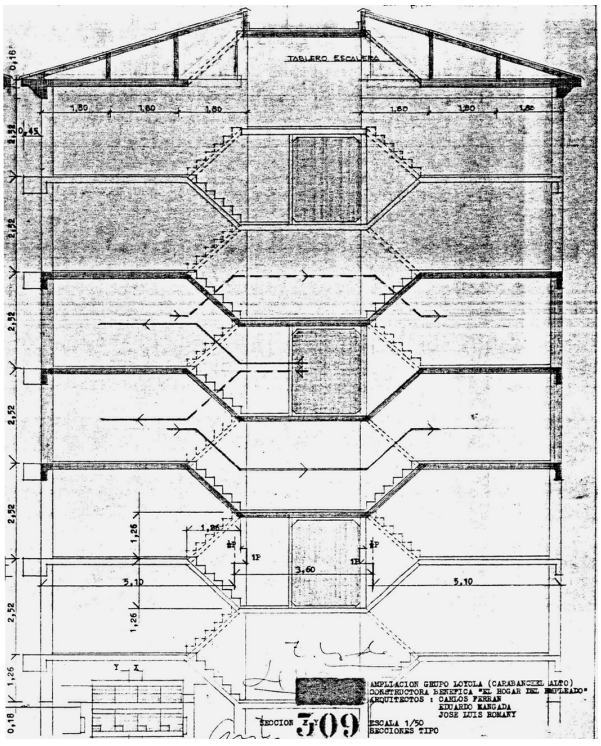

Fig. 10. Cross section of a block in the Juan XXIII neighborhood (Fernández Nieto, 2006)

4. Housing level

In each of the projects, we chose to review a four-bedroom apartment. These apartments were rehabilitated at a later time.

In the residence in Fuencarral (see floor plan in Fig. 11), the bedrooms face north, while the living room and the kitchen face south. It is a middle-

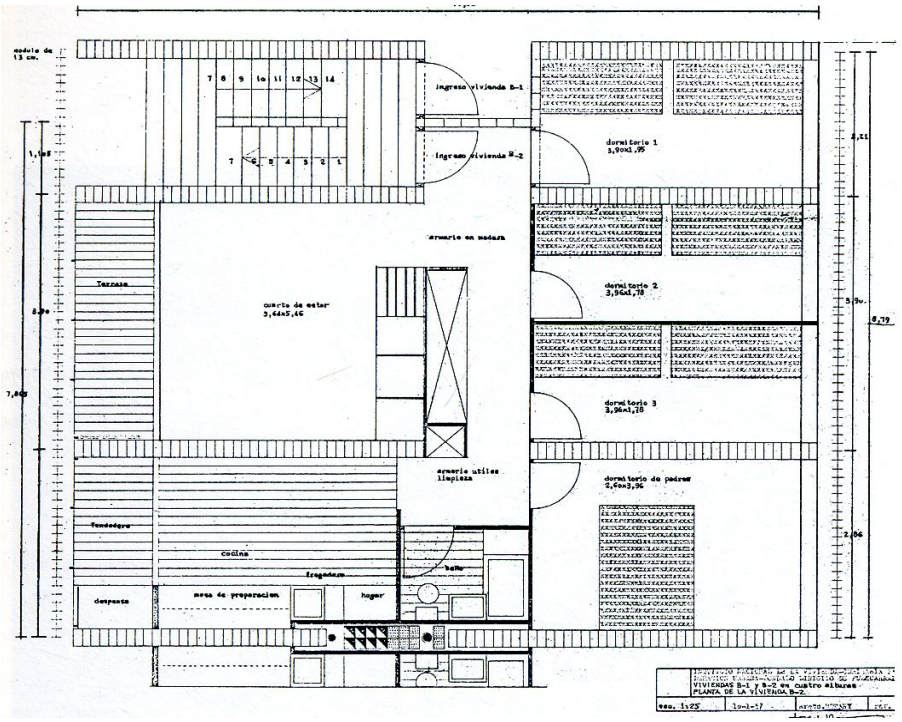

Fig. 11. Fuencarral apartment floor plan (Fernández-Galiano et al., 1989)

floor apartment, with three 11.05 m long corridors perpendicular to the façade. The first corridor, 2.21 m long, leads to the bedroom and the vestibule, and can be accessed from the core of the staircase. The second corridor, 3.90 m long, connects to two more bedrooms, the central area, and the living room. The third corridor, 2.86 m long, leads to the master bedroom, the kitchen, and the bathroom (without a gap in the façade). The total width of the façade is 8.97 m.The residence we shall examine in the Juan XXIII neighborhood is a through apartment located on the top floor, which consists of three corridors parallel to the 7.20 m front façade. The outer corridors are 5.10 m wide, while the central corridor is 3.60 m wide, resulting in a total width of 13.80 m.

The residence has several different levels. The hall, which is not represented in Fig. 12 where the rest of the floor can be seen, is at the same level as the gallery that provides access to the different residences. To reach the living room and the kitchen, which are oriented to the southeast and open onto the terrace, one has to go up half a floor. By moving half a floor in the opposite direction, one enters the access gallery. This level contains the bathrooms, which are ventilated by a shaft, and a bedroom that opens into the northeast, this being the first apartment in the gallery. Finally, going down half a floor will take one to the remaining three northwest-facing bedrooms.

Table 3 illustrates the usable space size in each room and the total size of each residence. According to Moya's classification (Moya González et al., 2017b), these residences can be classified as large. In Moya's time, only 9% of all social housing fit that category.

The constructive features of the thermal envelope are shown in Table 4. It is remarkable that the residences in Poblado Dirigido de Fuencarral have thermal insulation despite the limited budget and the absence of regulations that would have called for it (the first such regulations would not be set up until 23 years later).

5. 21st century rehabilitation

It has now been 50 years, and the context has changed. The once peripheral neighborhoods are now inside the city. In the early 21st century, Madrid implemented new urban intervention programs, or Programas de Intervención Urbanística (PAU), following a very different scenario. Today's streets have been taken over by private vehicles. This urban layout means that residential development has broken apart into autonomous plots, which are closed around the perimeter, at the cost of the city's permeability (Fernández Nieto, 2012).

At the beginning of the 21st century, two architectural studios discovered the potential offered by Romany's achievements in the mid-20th century. They began to refurbish one apartment each, trying both to respect the legacy and focus on energy efficiency and habitability.

Utilizing the one-use city concept, they take on the challenge of the modern lifestyle, with each of the studios refurbishing the respective apartment for personal use. Table 5 lists basic information on these rehabilitation projects.

These teams are similar in many ways. They share an appreciation for the urban and architectural qualities of these 20th century heritage sites, have

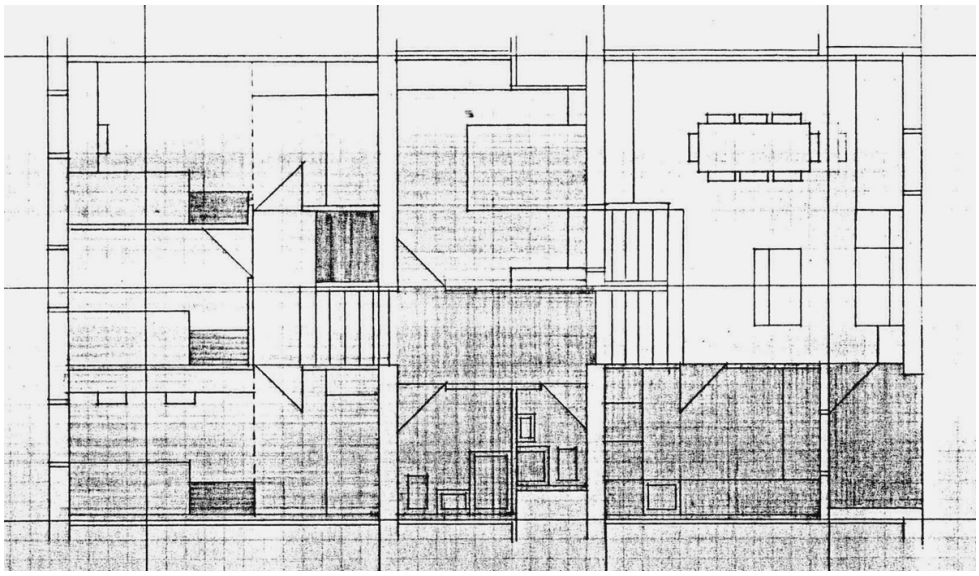

Fig. 12. Juan XXIII apartment floor plan (Fernández Nieto, 2006)

refurbished the residences for themselves to live in, and show the same enthusiasm towards Romany's work. The intervention projects' respect for the original concept has earned them two COAM awards: g+f arquitectos' work in Colonia Juan XXIII received the award in 2019 (COAM, 2019) and a similar project by b102 arquitectura in Poblado Dirigido de Fuencarral, in 2016 (Fundación arquitectura COAM, 2017).

During the rehabilitation of the Fuencarral residence, an attempt was made to return to the previously modified elements of the original project. The closed-off terrace and kitchen terrace were restored, and their glass elements were recreated according to the original model, as can be seen in Fig. 13.

With regard to the layout, Fig. 14 shows that the two bedrooms in the center were joined to create a study area that opens onto the living room, while the bathroom was divided into two parts, allowing for an additional toilet.

The wardrobe between the living room and the hall did not originally reach the ceiling, thus a second wardrobe was created above it. A door was installed between the living room and the hall. Both elements were demolished, restoring the original status with

Table 3. **Usable space and total space**

	Fuencarral	**Juan XXIII**
Hall	14.7 m^2	19.9 m^2
Kitchen	8.8 m^2	7.8 m^2
Bedroom 1	10.3 m^2	12.1 m^2
Bedroom 2	7.7 m^2	11.0 m^2
Bedroom 3	7.0 m^2	10.0 m^2
Bedroom 4	7.0 m^2	5.6 m^2
Bathroom 1	3.0 m^2	4.2 m^2
Bathroom 2	-	2.2 m^2
Lobby	1.7 m^2	3.7 m^2
Corridor	7.3 m^2	7.7 m^2
Stairs	-	4.2 m^2
Terraces	3.8 m^2 / 2.8 m^2	3.3 m^2
Total usable space	74.1 m^2	91.7 m^2
Total space	87.3 m^2	103.7 m^2

Table 4. **Constructive features of the thermal envelope**

	Fuencarral	**Juan XXIII**
Façade	2 cm brick panel 8 cm double-cavity brick 3 cm glass wool Air chamber 4 cm single-cavity brick	11.5 cm exposed brick Air chamber 8 cm double-cavity brick
Roof	Fiber-cement board 2 cm insulation Concrete slab False ceiling plaster	Flat tile Double brick board Brick wall Concrete slab
Window frame	White painted wood	Steel with prefabricated concrete frame
Window glass	Simple 3 mm	Simple 3 mm
Sun protection	Folding wooden shutters in the living room	Unprotected

Table 5. **Rehabilitation project overview**

	Fuencarral	**Juan XXIII**
Architects	b102 arquitectura: Jesús García Herrero and Inés Patiño Mejide	g+f arquitectos: Jorge Gallego Sánchez Torija and Mª Antonia Fernández Nieto
Year	2005	2018

Fig. 13. Living room in the rehabilitated residence in Fuencarral

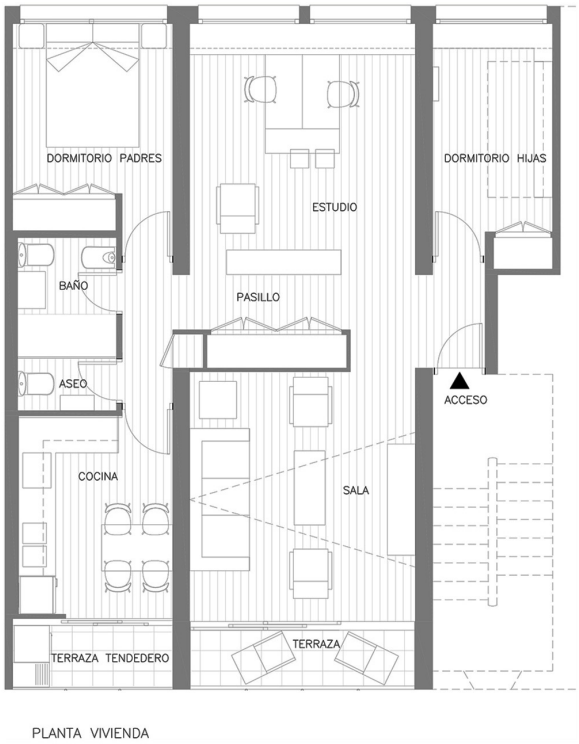

Fig. 14. Plan of the rehabilitated residence in Fuencarral

visual continuity between the hall and the entrance. The space was also filled with more light.

In the bedrooms, interior blinds were chosen to regulate sunlight, while in the living room and kitchen, exterior sun-screen blinds were installed, flush with the façade. The original shutters of the living room were not recovered. Instead, the architects opted for glazing the entire front of the room. This returned it to its original recess position, a solution that was also applied to the kitchen.

As part of rehabilitating the residence in the Juan XXIII neighborhood, the terrace was enlarged to give it bigger dimensions and to add space to the living room, while slightly downsizing the kitchen, as can be seen in Fig. 15.

To achieve spatial continuity between the residence's two opposite façades, as shown in Fig. 16, the external partition of the central bedroom was demolished to create a study area incorporated into the central space. The partition closing off the bedroom next to the bathrooms was demolished as well. In order to maintain the bedroom's use for its intended purpose, it was closed off with glass for visual continuity and opaque fabric for privacy and dimming the light.

For energy efficiency purposes, the improvements reflected in Table 6 were incorporated into the thermal envelope.

Table 7 shows the residences' thermal transmittance values, as well as their energy consumption, before and after their rehabilitation. Measurements were made with the CE3 software.

6. Energy features

In its original state, the Juan XXIII residence had a 33% higher energy consumption rate per square meter than the Fuencarral residence. Although the Juan XXIII residence has more compact proportions

Table 6. **Improvements incorporated into the thermal envelope**

	Fuencarral	Juan XXIII
Façade	–	4 cm expanded polystyrene 1 cm laminated plaster
Roof	–	4 cm mineral wool
Window frame	Black aluminum without a thermal bridge break (TBB) on the north façade Black aluminum with a TBB on the south façade	White aluminum with a TBB in the living room, kitchen and bathrooms Unchanged
Window glass	Low-emission double glazing 4/8/6 on the south façade	Double glazing 4/16/6
Sun protection	Sun screen exterior blind on the south façade	Thermal aluminum blind

Figure 15. Living room, with terrace and kitchen at the back, in the rehabilitated residence in the Juan XXIII neighborhood

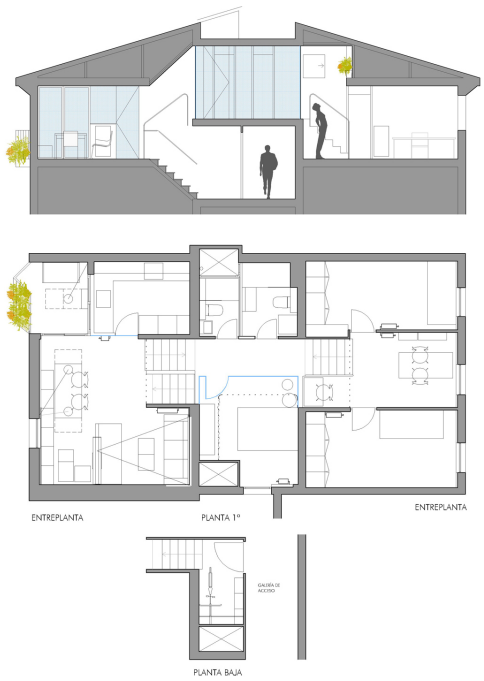

Fig. 16. Section plan of the rehabilitated residence in the Juan XXIII neighborhood

(façade: 1, depth: 1.9) than its Fuencarral counterpart (façade: 1, depth: 1.2), their façade surface area is similar due to the presence of the terrace and the lateral façade in the Juan XXIII residence, which is located at the corner of the U-shaped block.

On the other hand, the proportions of the façade openings are not similar. They take up 44% in the Fuencarral residence and merely 26% in the Juan XXIII residence. The presence of thermal insulation in the Fuencarral residence reduces the thermal transmittance of the walls by 50% and that of the roof, by 20%. The woodwork in the Fuencarral residence also falls 6% behind the Juan XIII residence steelwork in terms of thermal transmittance.

The greater opening size in the Fuencarral residence is compensated for by the enhanced

Table 7. **Thermal transmittance and energy consumption values before and after rehabilitation**

	Fuencarral	Juan XXIII
Façade	0.91/0.91 W/m^{2}K	1.72/0.60 W/m^{2}K
Roof	0.92/0.92 W/m^{2}K	1.14/0.54 W/m^{2}K
Windows	5.35/3.14 N; 2.39 S W/m^{2}K	5.70/2.95 NO; 2.75 SE W/m^{2}K
Energy use	131.4/106.9 kWh/m^2	198.7/168.8 kWh/m^2

properties of the enclosure. Therefore, difference in energy consumption can mainly be attributed to the fact that the Juan XXIII residence is located on the top floor of its building. If this residence was on one of the middle floors (as is the case with the Fuencarral residence), it would have consumed 6% less energy.

During the Fuencarral residence rehabilitation, work on the thermal enclosure was limited to replacing the woodwork. Even though the façade was designed in 1956, its transmittance values comply with those required by both the NBE-CT-1979 and the CTE-2006 standard. The renovation has reduced the residence energy consumption by 19%.

In the case of the Juan XXIII residence, the entire thermal envelope was affected by the rehabilitation process. The façade is now insulated, achieving a 30% lower transmittance compared to the Fuencarral residence. The roof is also insulated, and its properties slightly exceed those required by the CTE-2006. Likewise, the woodwork has been renewed in some spots and replaced with glass throughout the rest of the residence. This rehabilitation has reduced the residence energy consumption by 15%.

The consumption drop is more modest than in the other residence due to the large size of the roof surface area compared to the rest of the envelope. As the wall original condition was worse, renovating this element has saved more energy than improving the roof. If the Juan XXIII residence was located on the middle floor, its renovation would have reduced energy consumption by 25%.

The Juan XXIII residence is more compact and has a lower opening proportion, which means that its energy performance could have been better if it were not for the thermal load on the roof, which requires extra energy to compensate for.

Since this residence is located underneath the roof, energy consumption was 34% higher before the renovation and is 37% higher now.

Discussion

The interventions studied in this paper took place in socio-economically disadvantaged neighborhoods, where incomes are currently about 30% below the city average.

The two interventions differ notably in terms of approach. The Fuencarral project, which was publicly promoted, managed to achieve density parameters that are currently considered sufficient for escaping

a diffused, overcrowded cityscape (Rueda, 2000). At the same time, 90% of the area's free spaces are intended for public use.

The Juan XXIII project, by contrast, was promoted by a private organization, and the neighborhood density not only exceeds reasonable values, but is, in fact, fairly high, which is compensated for by the Las Cruces Park, a vital part of the area. The free spaces, located in each block, are divided equally between those for public use and those for private use.

In both cases, it is remarkable how little space is taken up by road traffic. Priority is given to pedestrian routes on the neighborhood level, while transport infrastructure is implemented on the district and city level.

The blocks prioritize a comfortable layout, although this is not a mandate. Some flexibility is granted in the interests of building a better neighborhood. Some blocks or certain parts of them are reduced in favor of configuring unique exterior spaces and laying down streets with an open block typology, which can become diluted on a larger city scale.

With all costs taken into consideration, cross ventilation in residences is the favored method. At a time when air conditioning was not available, this passive strategy was fundamental in maintaining comfortable conditions in Madrid's summer climate. Sometimes it was achieved through ingenious typology, like the "scissors masionettes" in the Juan XXIII neighborhood. This type of housing also addresses the low economic profitability of placing an elevator in a linear block to serve two apartments per floor (Guajardo, 2017). A single elevator serves 88 apartments.

The houses' design is set apart by its simplicity, clarity and rounded corners. It was quite advanced for the time period, especially thanks to incorporating thermal insulation in the Fuencarral neighborhood. In the case of the Juan XXIII neighborhood, what made the design innovative was the heating installation that served the needs of the whole area.

The rehabilitation projects carried out by different teams of architects have a few traits in common: their respect for, and enhancement of, the original project's values, combined with creating more open spaces, which is possible due to the smaller number of people living in the houses today.

Conclusions

We have studied two brilliant works of architecture exemplifying mid-20th century social housing in Madrid. Despite the projects' urgency and the scarce resources available, the two works go beyond expectations in the context where they were produced.

Their recognition, however, leaves much to be desired. The Poblado Dirigido project in the Fuencarral neighborhood is, perhaps, better known, as there were other projects, the Poblados de Absorción (Absorption Towns), previously carried out in Fuencarral by Sota and Oíza, two well-known architects. In addition, there were a number of important studies made regarding the Poblados Dirigidos housing for limited-income families.

This is not true of the Colonia Juan XXIII neighborhood, which is less-studied, despite the uniqueness of its housing type and the fact that it was publicized in magazines of the time (Ferrán et al., 1973; González Amezqueta, 1973). To date, José Luis Romany has not been given the recognition he deserves, like so many other architects who introduced modern concepts in Spain.

While other renowned architects of the time focused on building luxury residences with a surface area of over 300 m^2 (Carbajal-Ballell, 2017), Romany contributed to two outstanding social housing projects that contain important values.

Both projects are committed to creating an open city, with abundant vegetation and a pedestrian-friendly street layout. These are values that today's cities would benefit from, as they seek to become healthier by integrating vegetation and turning the streets more walkable.

Both projects use advanced energy strategies: passive design with cross ventilation, incorporation of thermal insulation into enclosure at a time when thermal regulations did not exist, and efficient heating for the whole neighborhood.

In Spanish, there is a saying, "dar gato por liebre", "pass off a cat as a hare", used for talking about fraudsters that try to sell a low-value object under the guise of something precious. But as Alejandro de la Sota notes, architects are the only ones capable of doing the reverse, of passing off a valuable hare as a modest cat (De La Sota, 2002). This is quite evident in both projects.

In the 21st century, four architects have made a personal commitment. In the face of the new, recently built atomized city, they choose to re-inhabit modernity.

The prizes awarded to the rehabilitation projects by the Association of Architects can serve as roundabout way of acknowledging the architect to whom we owe these buildings, José Luis Romany. Let this text serve as a tribute to him.

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