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SOCIAL HOUSING NEIGHBOURHOODS IN THE 1950S IN GENOA AND MADRID: The Beginnings of a Different City

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ABSTRACT

In Italy and Spain, post-war industrialisation prompted significant migration from rural areas to cities, resulting in the extensive construction of social housing during the 1950s. This study presents a comparative analysis of key social housing neighbourhoods: the INA-CASA quartieri in Genoa and the INV's guided settlements in Madrid. It highlights the synergies between the housing policies implemented in response to the housing crisis in both countries, alongside the architectural and urban solutions that embody a modernity in their design. The innovative mix of uses and experimental typologies, which include the Caño Roto duplexes and Bernabò Brea's single-person dwellings, represent a crucial chapter in the history of 20th-century architecture. These developments have creatively transformed both cities, placing significant emphasis on public space.

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1. Introduction

Following their respective wars, Italy and Spain experienced a substantial exodus from rural areas to cities, largely influenced by the late industrialisation of the countryside. This migration resulted in a considerable shortage of adequate housing and the proliferation of shanty towns on the peripheries of urban centres. During this crisis, both countries implemented housing plans aimed at providing suitable living conditions and job opportunities. Consequently, this led to urban expansion and transformation, characterised by new social housing developments on the outskirts of cities. Today, the challenge lies in regenerating these urban areas, ensuring they meet contemporary needs while also preserving their architectural integrity. This necessitates an acknowledgment of and respect for the heritage values that distinguish these significant examples of 20th-century design.

The primary objective of this research is to highlight the relationship between the solutions employed by Italy and Spain in response to the severe housing crisis of the 1950s. It seeks to identify the differences and synergies in their strategies, exploring whether they align with common comparative analysis parameters.

Firstly, this study reviews Italian and Spanish housing policies of the 1950s, focusing on planning and management, and examines potential influences of the Italian experience on the Spanish context. Secondly, the urban structure of the new settlements, or quartieri, is analysed with particular emphasis on the mixed-use design of neighbourhoods aiming for self-sufficiency and the creation of human scale public spaces. This analysis considers factors such as topography, dwelling orientation, and the integration of vegetation. Thirdly, we investigate the construction systems, which predominantly utilise traditional methods to create jobs and boost employment. This section also assesses whether this choice contributes to a technological lag in industrialisation in both countries compared to the rest of Europe. Lastly, we examine the domestic scale, focusing on various innovative experimental housing typologies that seek to adapt imported modern influences on the specific local contexts of each settlement and meet the needs of their residents. This process involves architectural competitions in both countries, engaging top professionals, predominantly young architects, working alongside more seasoned colleagues. Together, they transform the city into a laboratory of constructed models, where the neighbourhood unit and resident participation, including some self-building, cultivate a genuine sense of identity.

This study employs a methodology based on comparative analysis of selected cases, drawing parallels between Spain and Italy across various scales, from housing policies to urban and domestic levels. The case studies were chosen for their relevance, aiming to compare two distinct solutions: the directed village of Caño Roto in Madrid, constructed primarily with traditional brick methods featuring 'personal provision' or self-construction, and Bernabò Brea in Genoa, where emerging prefabrication methods are integrated with vernacular architecture.

The selected cases are Villa Bernabò Brea in Genoa, designed by Daneri, Zappa, and Grossi Bianchi, and is noted for being the "the most spectacular residential complex of the second INA-Casa period" (Tafuri, 1989, p. 61). In Madrid, Caño Roto by Vázquez de Castro and Íñiguez de Onzoño is regarded as "one of the few really important works that Spanish architecture has produced in recent decades" (Tafuri, 1989, p. 61; Flores, 1964, p. 35). Both projects were extensively featured in international magazines such as *Baumeister*, *Zodiac*, *L'Architecture d'Aujourd'hui*, *Werk*, and *Casabella*. This exposure contributed to their recognition for the urbanistic and typological quality of their rational and contemporary architecture.

The sources used include bibliographic materials such as books, magazines, and websites, ranging from the time of construction to the present. This ensures the validity and relevance of these representative cases. In addition to these sources, the study incorporates legislative analysis, fieldwork conducted in the various settlements, and interviews with architects Grossi Bianchi and Íñiguez de Onzoño, who contributed to both housing districts. This multifaceted approach significantly enriches the research.

2. INA-Casa Plan (Italy) and INV National Housing Plan (Spain)

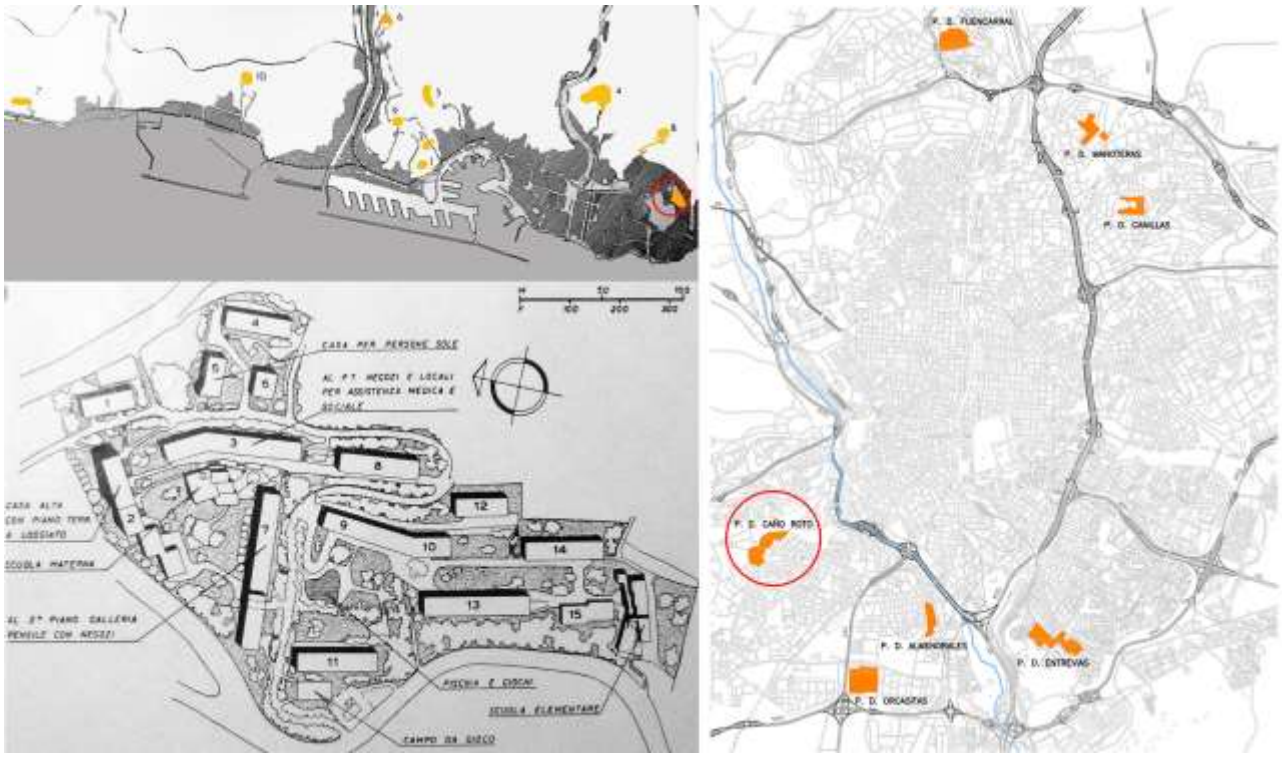
2.1. National Insurance Institute (INA) and National Housing Institute (INV)

After the Second World War, on 24 February 1949, Parliament approved the "Bill to Increase Employment," known as the "Fanfani Plan." This initiative was promoted by Amintore Fanfani, a member of the Christian Democrats and Minister of Labour and Social Security (1947-1950), who later served as Prime Minister five times. The plan, initially intended to be completed in seven years, was subsequently expanded and led to the creation of the INA-Casa Plan (National Insurance Institute) between 1949 and 1963, this plan resulted in the construction of over 20,000 neighbourhoods and more than 350,000 dwellings (Capomolla & Vittorini, 2003, p. 13) to mitigate unemployment in the construction sector, which affected more than two million individuals in the country.

As Di Biagi notes, families housed before the INA-Casa Initiative often lived in dire conditions, such as barracks, caves, cellars, or shared accommodations with others (Marín Vega, 2010, p. 48). Substandard housing, similar to the situation in Spain (e.g., Madrid, Bilbao, Barcelona), proliferated on the outskirts of major cities, as illustrated in the film *Il Tetto* (De Sica, 1956), which is set in the outskirts of Rome. The INA-Casa Initiative produced notable examples of quality architecture in Italy, including Tiburtino by Ridolfi in Rome, Cesate by Ignazio Gardella in Milan, and Tuscolano by Adalberto Libera in Rome, among many others.

In Genoa, chosen as a case study, several INA-Casa projects were carried out, as shown in Fig. 1. The first three projects were executed by Daneri and other architects: Mura degli Angeli (1 and 2), Bernabò Brea (3), which is the focus of this analysis, and the following projects: Forte Quezzi (4), Granarolo (5), Rivarolo (6), Prá (7), Camaldoli (8), Sampierdarena Belvedere (9), and Sestri Virgo Potens (10) (Christien, 1958, p. 89).

Figure 1. Left: Social housing in the 1950s in Genoa and location plan by Bernabò Brea. Right: Directed settlements in Madrid.



Sources: Left: Modified by the author from (Christien, 1958, p. 89); Right: Author's elaboration (2024).

In Spain, during the late post-war industrialisation, a massive exodus from the countryside to the cities resulted in a significant deficit of decent housing and the proliferation of shantytowns on the periphery (López Díaz, 2002, p. 298). Families, predominantly from rural areas, lived in rented

accommodations, often crammed into a single room or in self-built shacks in the shantytowns on the outskirts. The Franco regime in the 1950s, which operated within a context of autarky and economic scarcity following the civil war, implemented a housing policy aimed at eradicating shantytowns in the Madrid beltway while simultaneously creating housing and employment opportunities.

The Second National Housing Plan of 1955 was introduced, which included the law on limited income housing (Law 15/07/1954) and designated minimum, absorption and directed settlements (Decree 8/03/1957). Specifically, the seven directed settlements in Madrid (Fig 1) are Entrevías, Caño Roto, the focus of this analysis, Orcasitas, Manoteras, Canillas, Fuencarral and Almendrales ("Los poblados de Madrid," 1971).

Both Spain, with the INV (National Housing Institute), and Italy, with the INA, experienced significant advances in the field of experimentation and construction of social housing during the 1950s. In Spain, this period drew on the theoretical and practical framework of the Italian Fanfani Plan, which had facilitated the large-scale construction of social housing and included the novel concept of controlled self-construction by the beneficiaries (Lopera Arazola, 2021, p. 170). In Italy, and shortly thereafter in Spain, the goal was to improve access to housing through the construction of low-cost homes and active community participation. Self-building allowed families to engage directly in the process of constructing their homes, which not only helped to reduce costs but also fostered a sense of community and belonging. Furthermore, the plan provided financial incentives and technical assistance to assist groups in this undertaking. Overall, it was an innovative strategy aimed at addressing the housing shortage in a context of rapid urban growth. Self-building or personal provision was employed in Spain, marking one of the most unique aspects of Madrid's managed settlements.

The INA-Casa Plan aimed for centralised management and a unified concept. The projects were executed by independent architects, which added richness and variety to the outcomes. The action committee was led by Filiberto Guala, who oversaw the supervision and general control of the entire plan. He also drafted regulations, distributed funds, and issued commissions (Marín Vega, 2010, p. 48). Foschini, the director of the body responsible for INA-Casa, which handled the architectural and urban aspects, organised a series of competitions to achieve higher quality projects within the INA-Casa framework. In the first competition held in 1949, only one out of ten registered architects participated. Among those selected, a significant majority were young, recently graduated architects, "72% of INA-Casa's projects were formed by young graduates after 1941" (Nicoloso, 2001, p. 93), who collaborated with established architects such as Libera, Ridolfi, De Renzi, Muratori, Ponti, Quaroni, Daneri, and others.

Although all INA-Casa projects underwent supervision, each neighbourhood maintained its own identity, shaped by the diversity of architects and the geographical characteristics of Italy's various regions. As Di Biagi notes (2001), advisory guides were developed with suggestions, guidelines, and examples that did not aim for homogenisation but instead provided a framework of principles within the formal freedom granted to architects. There was a clear emphasis on humanising architecture, with special attention given to the urban environment. The design criteria established by the technical office of the plan critiqued the rigid functionalist perspective that had prevailed in architecture and urban planning during the interwar period (Del Cid Mendoza, 2019, p. 118).

In Spain, planning was also centralised, with Minister Arrese at the head, who promoted the creation of a country of "owners, not proletarians". This is undoubtedly the most significant difference between the two countries. In Spain, the focus was on encouraging home buying, while in Italy, the prevailing housing acquisition model was renting, occasionally with an option to buy. However, the cost of purchasing property in Italy was, on average, higher and required payment over a shorter period compared to Spain (Colella, 2016, p. 60). Management in Madrid was the responsibility of the INV (National Housing Institute), led by Luis Valero, the COUAM (Urban Planning Commission of Madrid), directed by Julián Laguna, and the Obra Sindical del Hogar (OSH). Each managed settlement had the autonomy to operate independently, which significantly expedited construction. Laguna relied on young architects who, through their travels and exposure to foreign magazines, were well-versed in international architecture. Today, Oíza, Sierra, Alvear, Corrales y Molezún, García de Paredes, Vázquez de Castro, Romany, and Cubillo are recognised as prominent architects of the 20th century. They played a multifaceted role, serving not only as architects but also as “managers, builders, user representatives, and social workers” (Fernández-Galiano et al., 1989, p. 37). Both technicians and politicians, after

visiting Italy and learning about the Fanfani Plan, regarded the INA-Casa experience as a model (Sambricio, 2000, p. 83). It is worth noting that many of them had received scholarships in Italy: Vázquez de Castro in Rome, and Vázquez Molezún, Carvajal, and García de Paredes at the Academy of Fine Arts in Rome. In addition, an experimental housing competition was held in Spain in 1956, titled "Competition for the Construction of Experimental Housing convened by the National Housing Institute", which served as a clear precedent and a source of architects for the construction of the settlements.

In Italy, the financing of INA-Casa was sourced from the State as well as from builders and workers through a reduction in their monthly salaries. As Nicoloso (2001, p. 48) notes, this constituted a system of national solidarity, urging all workers to contribute to the construction and financing of an essential good: housing. The majority of the labour force was unskilled and primarily comprised immigrants from rural areas. Poretti (2003, p. 10) states that this model assigned the sector the task of absorbing unskilled labour transitioning from agriculture to industry.

In Spain, financing was initially public during the first phase of the directed settlements. n addition to the interest-free payment facilities offered by the INV for a duration of 50 years and tax rebates, successful bidders were provided with urbanised land, technical management of the project, materials, and project plans. At this stage, private capital was not involved. Furthermore, speculation was prohibited in this initial phase of the directed settlements. As Leoz and Ruiz Hervás (1961) point out, "It should be borne in mind that in these settlements there was no real estate profit whatsoever".

2.2. Architecture and Urban Planning of the INA-Casa Plan (Italy) and the INV National Housing Plan (Spain)

The architecture of the Italian INA-Casa Plan and the Spanish INV Plan reflect influences from Anglo-Saxon organic urban planning and Scandinavian neighbourhoods, highlighting the creation of autonomous and communal cores. However, a key difference exists between the Scandinavian urbanisations, which serve as the foundation for urban development, and their Italian and Spanish counterparts, which are positioned as satellite communities on the periphery. In Italy, as Paola Di Biagi points out, public space is conceived as a place for "meeting and community that helped to provide these neighbourhoods with a certain self-sufficiency and gave rise to a sense of social belonging" (Marín Vega, 2010, p. 50). Di Biagi (2001) characterises the INA-Casa Plan as a "social and moral reconstruction of Italy." Fanfani's primary aim was to generate employment, as he noted in his capacity as Minister of Labour, "The family could not be born without work and without a home, as these are the pillars of society founded on Christian values" (Colella, 2016, p. 55).

In Spain, similar emphasis is placed on public space, which fosters neighbourhood unity and a sense of identity within the settlement. The legislation encompasses not only the construction of housing but also the provision of complementary buildings and the urbanisation of land (Decreto 24/06/1955, 1955, p. 4301). However, the reality of the social emergency in Madrid during the 1950s was that, in many cases, services and public areas were constructed after the dwellings, or were sometimes never built at all (Moya González, 1983), resulting in communities that were not self-sufficient.

The architecture of INA-Casa, influenced by Italian modernity of the 1930s and directed villages in Spain, clearly reflects Scandinavian models. It is characterised by simplicity and homogeneity, with some regional differences. In Italy, although prefabrication was promoted in the regulations, construction largely remained traditional to generate more employment. This reliance on traditional methods led to technological stagnation in the sector. "It definitively cuts off the debate on prefabrication" (Poretti, 2003, p. 10). It "uses construction in a subordinate function to the sectors that promote the economy, leaving it at a pre-industrial level... it makes public intervention a support for private intervention" (Tafuri, 1989, p. 22, quoted in Colella, 2016, p. 58).

A similar contradiction emerged in Spain, where legislation (BOE num. 197, 16 July 1955, Section 70) also promoted prefabrication. However, it simultaneously required the creation of provisions that prioritised the workforce (Oíza et al., 1963, p. 10), enabling the system of personal provision. In this system, successful bidders were exempted from paying 20% of the cost of housing in exchange for their work on Sundays and holidays.

In Italy, the arrival of GESCAL (Management of Housing for Workers) in 1963 marked a shift toward prioritising technological development and prefabrication, contrasting with the approach of the Fanfani

Plan. In Spain, the first-phase managed settlements were described as "the modern chimera" by Fernández-Galiano et al. (1989), a fleeting promise that was extinguished with "the influx of private capital following the implementation of Franco's 1959 Stabilisation Plan" (López Díaz, 2007, p. 126).

3. Quartiere Bernabò Brea (Genoa) vs. Caño Roto (Madrid)

3.1. Background and History of the Settlements (Quartieri)

In 1951, the INA-Casa Institute commissioned architects Luigi Carlo Daneri, Luciano Grossi Bianchi, and Giulio Zappa to design the residential complex in Genoa, which was ultimately approved by the Ministry in 1957. The quartiere di Villa Bernabò Brea (Fig 2) is situated within a park and is described as "the first example in Italy of a new development built in a pre-existing park" (Villa Bernabò Brea, 1955, p. 44).

This quartiere occupies an area of 4.5 hectares, with 3.6 hectares dedicated to extensive green space, compared to only 0.9 hectares set aside for buildings. The neighbourhood can accommodate 1,800 residents in 371 dwellings of 17 different typologies, with no single-family houses, resulting in a density of 82.44 dwellings per hectare. It is now fully integrated into the urban fabric, boasts a high market value, and is well connected. Located near Via Sturla, it benefits from the tramway that links Bernabò Brea to the city centre.

This complex stands out from neighbouring residential areas due to its proportion of green spaces relative to urban density and is undoubtedly one of the "most successful interventions" (Patrone, 1982, p. 107) in the field of social housing, The integration of buildings with nature, along with the existing vegetation of the park, is one of the complex's greatest strengths. A recent book on the Daneri Quartieri in Genoa brilliantly captures the essence of Bernabò Brea in its title: *Inhabiting the Landscape: Luigi Carlo Daneri 1900-1972. Abitare il paesaggio* (Boeri, 2024).

Figure 2. *Quartiere di villa Bernabò Brea*

Sources: *L`architettura, cronache e storia* nº56 (1960, p. 94).

Regarding the directed settlement of Caño Roto in Madrid in 1956, the INV and COUAM initially commissioned the project to Durán Cortés, a builder-developer for whom Vázquez de Castro worked. However, Cortés decided to decline the commission, leaving Vázquez de Castro and Íñiguez de Onzoño, who had recently graduated, to take over the project. "We got it because it was rejected by another" (Vázquez de Castro, 1989, p. 180), and "they were the first houses we ever built in our lives" (J. L. Íñiguez de Onzoño, personal communication, 2013). The land where Caño Roto was constructed lacked a defined urban planning framework. The density of dwellings was 72.28 per hectare, based on a total of 1,606 units. This total included 1,004 collective dwellings and 602 single-family homes within a settlement area of 22.22 hectares, approximately half of which was built upon. The area of Caño Roto is nearly five times larger than that of Bernabò Brea. However, despite the lush pre-existing vegetation in Bernabò Brea, the housing density there is higher than in Caño Roto, which primarily includes single-family dwellings.

In contrast to Bernabò Brea, the land for Caño Roto is on the outskirts of Madrid, it was not urbanised, and it lacked a park. Nonetheless, efforts were made to create numerous green landscaped areas interspersed among buildings of varying heights, resulting in a less crowded environment compared to other regions of Madrid. The landscaped public spaces, formed by the buildings themselves, are oriented both north-south and east-west, featuring abundant vegetation that "improves the climatic conditions of both the squares and the dwellings themselves, as it not only provides shade and coolness in the open spaces but also offers protection for the facades from the sun and wind" (Calvo del Olmo, 2013, p. 160). However, as Calvo (2013) notes, the environmental quality has deteriorated following the removal of nearly all vegetation during what he describes as a "more than questionable integral rehabilitation that it underwent between 1996 and 1997" (p. 161).

Conversely, the system of personal provision played a crucial and decisive role as a foundational element for the project. Due to the high demand, a total of 465 third category and social housing units were built under this system, although initially only 114 were planned to be built. In exchange for the entrance fee, between 20% and 25% of the value depending on the type of housing, the successful bidders worked on Sundays and holidays for an average of two years. The time varied depending on the type of housing and the performance of each team (Flores, 1964, p. 21).

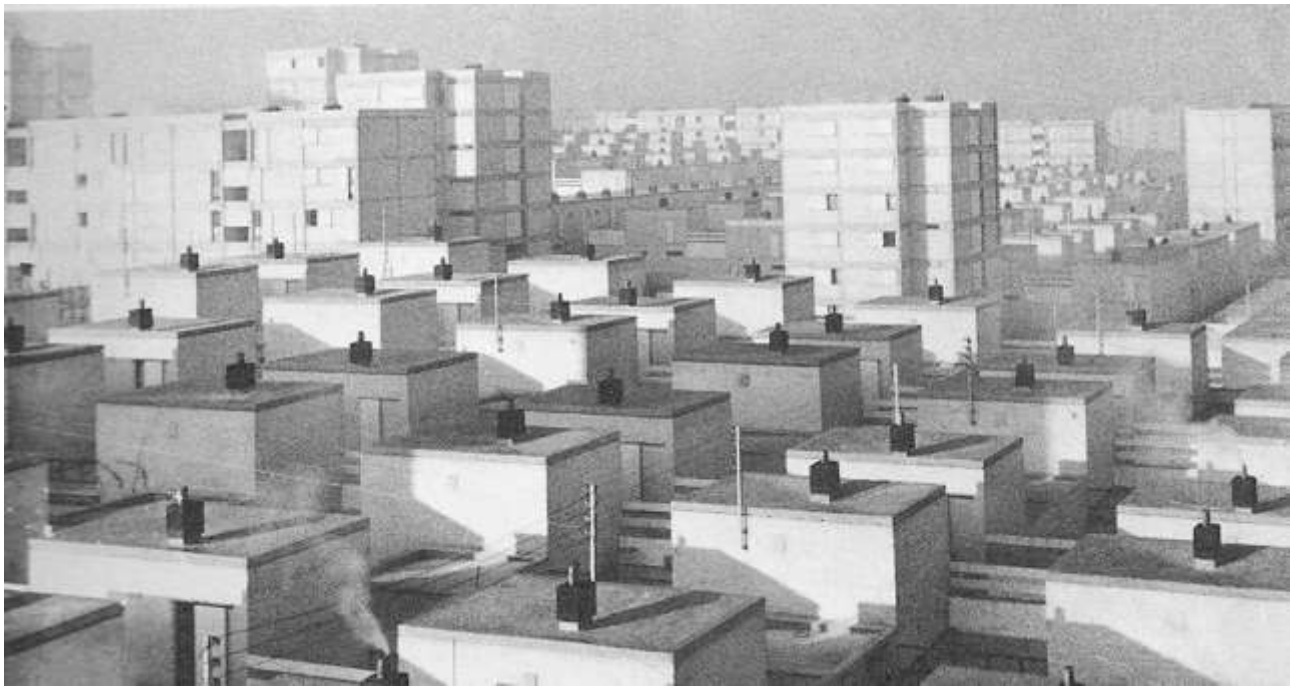
3.2. Situation of Settlements (Quartieri)

The INA-Casa Bernabò Brea is located to the east of Genoa, outside the historic centre of the city. Unlike other INA-Casa interventions in the city, which remain isolated due to inadequate transportation links despite years of urban development, Bernabò Brea is now integrated into the urban fabric. The locations of these INA-Casa neighbourhoods, such as the Forte Quezzi Quartiere, faced criticism for their remoteness and lack of services, which hindered connectivity and led to communication issues.

One of the fundamental characteristics of the quartiere is its adaptation to the topography (Fig 2). As Selem (1956, p. 92) notes, "The layout follows a criterion of coherence with the relief of the terrain, respecting as much as possible the existing groves of trees." Situated on a hill, it offers an interesting panoramic view. The draft legislation proposed in 1959 by Italian politician Giuseppe Togni included a stipulation for the allocation of between 2 and 3 square metres of green space per inhabitant in new neighbourhoods within the General Plan. In his weekly article for *L'Espresso*, Bruno Zevi highlights that Bernabò Brea, built within a pre-existing park, already exceeds this criterion, as it is "one of the rare buildings in which the problem of greenery has been solved" (Zevi, 1959, p. 8). The architects paid special attention to the existing vegetation during the implementation of the residential complex, "transplanting certain specimens or finding a new home for them" (Feliz Ricoy, 2022, p. 569).

The directed settlement of Caño Roto was constructed on the outskirts of Madrid to the southwest of the M30 boundary, near National Road V and the Paseo de Extremadura, with Carpetana Road to the south. Today, it is integrated into the urban fabric as the city has expanded and absorbed these settlements. Similar to Bernabò Brea in Genoa, Caño Roto is notable for its adaptation to the topography (Fig 3), consistently prioritising the optimal orientation of the dwellings. The natural terrain was employed as a means of urban articulation, with the staggered arrangement of single-family homes contributing to a dynamic intimate space within the proposal (Blanes Pérez, 2013, p. 57). The site had a height difference of 24 metres, yet the architects successfully created flat, habitable, and well-connected spaces. "The architect left his studio and walked over the land many times before deciding on its layout" (Flores, 1964, p. 36). The arrangement of the buildings was purposeful, and the architects meticulously designed both the filled and empty spaces of the village, enhancing the value of the streets and squares through thoughtful floor planning. As noted by Flores, "these layouts never lose the human scale" (Flores, 1964, p. 31).

Figure 3. P.D. Caño Roto, Madrid (1958)

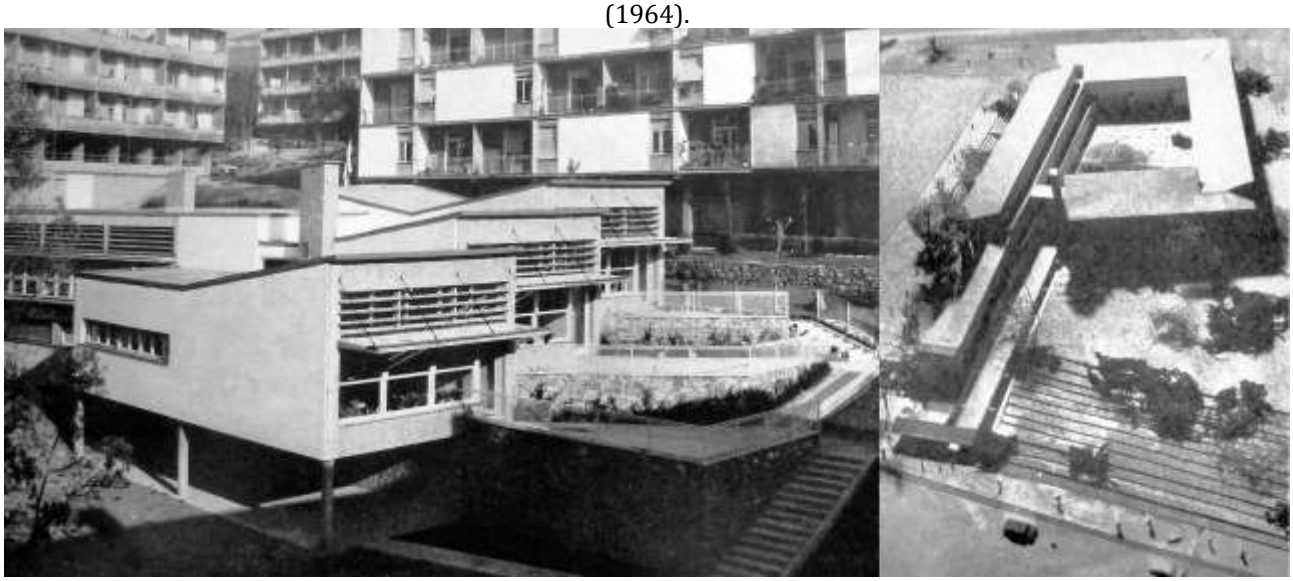


Sources: Photograph provided by architect José Luis Íñiguez de Onzoño (J. L. Íñiguez de Onzoño, personal communication, 2013).

2.3. Urban Structure and Land Use

The Bernabò Brea neighbourhood is designed to be self-sufficient, incorporating not only residential use but also plans for various services within the blocks themselves. For instance, there is commercial space on the first floor of one of the buildings located to the north of the complex. Additionally, an isolated building was proposed for the central area, featuring offices, shops, and other tertiary uses on the ground floor, along with a swimming pool. Public facilities were also integrated into the neighbourhood, including a medical clinic, a community centre, a nursery school (Fig 4), a library, a sports area, primary schools (although the latter was planned but never constructed), a social care centre, a swimming pool, and children's playgrounds.

Figure 4. Left: Maternal school built in Bernabò Brea, Genoa. Right: School group photo P.D. Caño Roto, Madrid (1964).



Sources: Left: L`architettura, cronache e storia nº56 (Selem, 1960, p. 94) ; Right: Archivo Ministerio de la Vivienda. Madrid, Spain

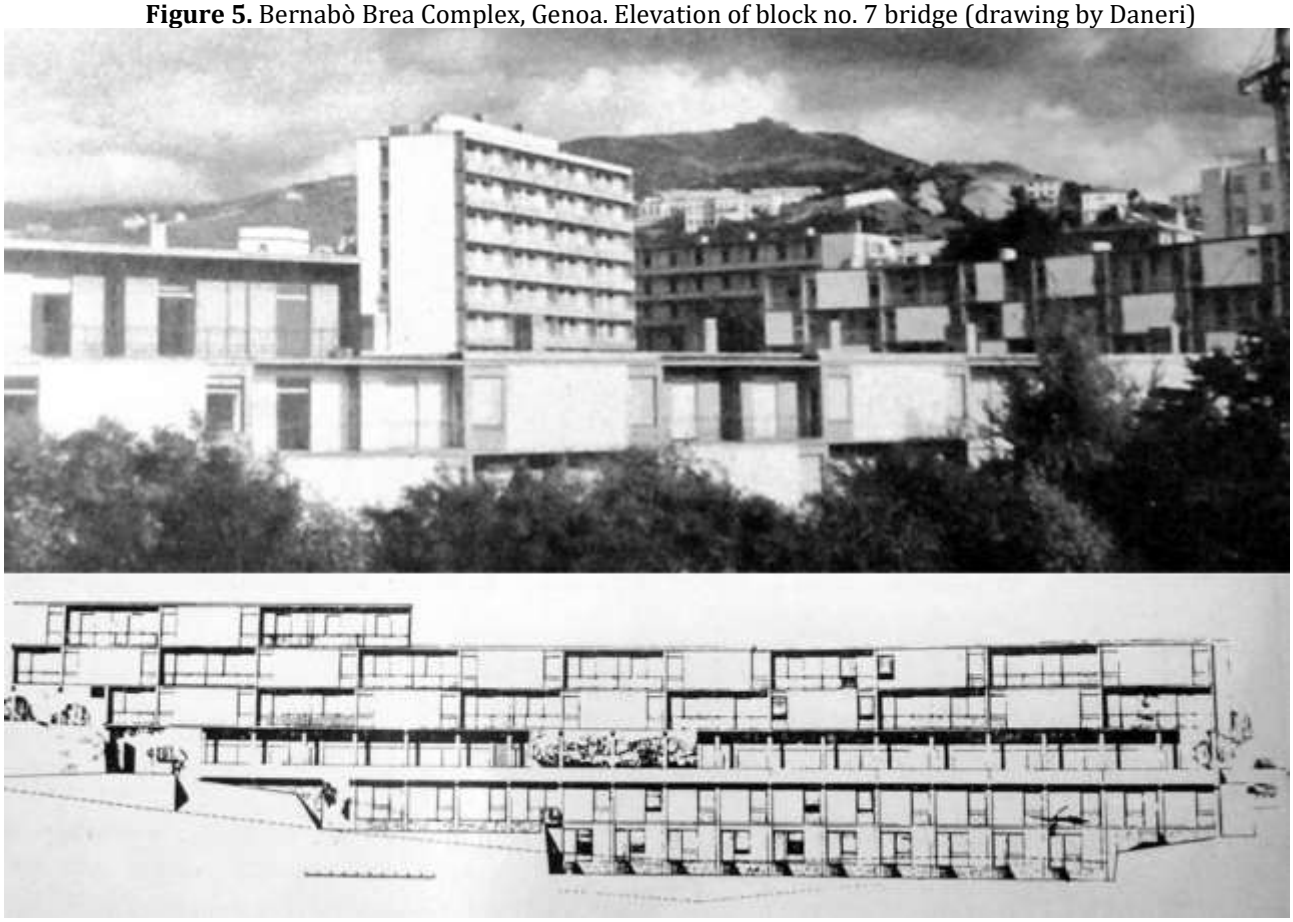
Drawing a parallel with the directed settlement of Caño Roto, we can confirm that, like Bernabò Brea, it was designed to be self-sufficient. The legislation included protections for land development as well as for complementary buildings. However, while these facilities were planned, their construction lagged behind the housing. For example, the school was not completed until 1964 (Fig 4). The service buildings are concentrated in the centre of the settlement, serving as its nerve centre. The planning for the blocks included ground-floor market and commercial premises, as well as small commercial spaces, either freestanding or attached to the dwellings, distributed throughout the settlement. This arrangement is similar to those found in other directed settlements in Madrid, such as Fuencarral, Orcasitas, or Almendrales (Guillem González-Blanch, 2024, p. 1249). This mix of uses revitalises the life of the neighbourhood.

In Bernabò Brea, the 14 buildings, which include 13 residential units and 1 kindergarten, are harmoniously integrated into the existing park. It has urban design centres around blocks of collective housing, with no single-family dwellings as seen in Caño Roto. The residential blocks range from 3 to 5 storeys in height and are oriented east-west, except for one longer block, measuring 93 metres and oriented north-south, which is 9 storeys high and features a lift. The 17 planned housing types include two-bedroom flats and units for individuals.

The west-facing facades have elongated terraces that extend the living areas and some of the bedrooms. The blocks are shorter and lower compared to those of Forte Quezzi or Mura degli Angeli, contributing to a more human scale in this neighbourhood. It is clearly designed with a "reasoned composition of elements modelled to suit man and his environment" (Gentili, 1954, p. 49). The architects ingeniously adapt the different buildings to the topography while maintaining a modern architectural identity that unifies the complex.

The ground floors of the blocks are elevated on pilotis, which provide space currently used as car parks. In contrast, the targeted settlements in Madrid frequently lacked designated parking areas, leading to the conversion of planned communal and green spaces between blocks into makeshift car parks.

Figure 5. Bernabò Brea Complex, Genoa. Elevation of block no. 7 bridge (drawing by Daneri)



Sources: Left: L`architettura, cronache e storia nº56 (Selem, 1960, p. 93)

In Bernabò Brea, a clear rhythm is emphasized in the composition of the elevations, which highlight the floor slabs and extend the openings to their full height. Daneri anticipated certain qualities of later works, such as "the porticoed ground floor, the materiality of volume, and the distribution of the housing units" (Feliz Ricoy, 2022, p. 569). Grossi Bianchi, a co-author with Daneri on the Bernabò Brea Project, mentioned in an interview (L. Grossi Bianchi, personal communication, 2012) that in the Forte Quezzi Quartiere, a free intermediate floor was constructed. He described it as being useless, as it was empty and closed off to prevent vandalism. This design was a strategy employed by Daneri to circumvent regulations that prohibited such tall buildings in that area, leading to the construction of two stacked structures within the same structure.

A similar approach was taken in the longest building of Bernabò Brea, where Daneri and his collaborators implemented a base with a distinctly different order. This design helped to manage the height variations created by the park's topography, allowing the residential structure to rise from the height of the base (Fig 5). In an interview, Grossi Bianchi affirmed that "Daneri was very Corbusian," noting that a magazine featuring the new Ronchamp Chapel was circulating in the studio when Daneri was designing the church in the Quezzi Complex, which ultimately was never built.

The architects of Caño Roto also focused on the human scale of the complex, designing an urban structure (Fig 3) in which various types of housing are interconnected. They paid careful attention to the interstitial spaces between buildings to ensure that the blocks and towers did not obstruct sunlight from the single-family homes (Calvo del Olmo, 2014, p. 156). The design features an orthogonal urban grid with a strict north-south orientation, incorporating 12 different housing types within four- and six-storey blocks, small six-storey towers, and various forms of two-storey terraced housing. These elements are combined and staggered to create an urban layout that is well adapted to the topography (Fig 6). Access routes and green areas are thoughtfully integrated, and the orientation of the dwellings is carefully considered.

As Vázquez de Castro points out, "Caño Roto has a great typological richness because we worked in that direction from the beginning. At the same time, we were under a lot of pressure not to delay the process. There was great political urgency" (Vázquez de Castro, 2011). Unlike Bernabò Brea, Caño Roto includes plans for single-family dwellings, suitable for the personal service system, with each unit featuring its own private garden or patio.

Figure 6. P.D. Caño Roto (Madrid). Staggered single-family dwellings on a slope (1957-2012).

Sources: Left: (Fernández-Galiano et al., 1989, p. 119) ; Right: Author's elaboration (2013).

The architectural design of Caño Roto is distinguished by its remarkable variety in typology and careful volumetric gradation. The terrain served as a testing ground for the architects, allowing them to experiment with built models:

> "In two or three months, we developed numerous typological series to determine which designs were most accepted. We aimed for low density but sought a certain compactness and efficient land

use. While the Modern Movement emphasized large open spaces, we chose to diverge from that approach. Although the ideas presented in the CIAMs and the Athens Charter were still influential, we pursued a different path that ultimately contributed to the success of the settlements" (Vázquez de Castro, 2011).

The landscaped and wooded areas of Caño Roto are generally well dimensioned and oriented. As Isasi notes, "surely the most accurate layout is that of Caño Roto. The open spaces have been arranged with great sensitivity, making them better spaces that are better oriented and visually more pleasing and proportionate than those in the other settlements" (Fernández-Galiano et al., 1989, p. 114). During a visit to Caño Roto, it's evident that the public spaces are neither undefined nor excessively large, as seen in other settlements, which are described as "of disputed utility" (Esteban Maluenda, 1999, p. 74). These spaces are considered "measured free spaces," in words of Vázquez de Castro (Blanes Pérez, 2013) "to avoid creating a large square that lacks dominance." This design arises from a careful study of Spanish popular culture, where the square maintains appropriate proportions in relation to the nearby houses (p. 57).

The spaces between buildings, the public areas, and the wooded zones have a distinct vernacular and popular character (Tuñón, 2003, p. 108). As Íñiguez de Onzoño mentioned in a personal interview (2013), the paving is laid out in a pattern reminiscent of the rural landscape, effectively defining and delimiting the landscaped areas. The architects succeeded in linking the dwellings to these spaces, making them more human-centred and fostering a sense of community among residents, encouraging their involvement in the conservation and maintenance of these areas.

In summary, the Caño Roto intervention exemplifies how "its public spaces managed to mediate between the rural origin of its inhabitants and their inevitable urban destiny" (Cánovas Alcaraz et al., 2021). Therefore, Caño Roto achieves a balance between avant-garde architecture, the specific needs of its beneficiaries, and the socio-political context of the country, which was undergoing periods of scarcity and autarky. "The complex is in a continuous balance between the traditional and the contemporary, the utopian and the realist, and the public and the private" (Mosquera Casares, 2013, p. 97).

3.4. Construction Systems

Unlike Caño Roto in Madrid, the Bernabò Brea complex incorporates prefabrication (Fig 7). As noted in international journals, the use of prefabrication is considered a symbol of advancement and progress in construction. This approach was not typical in INA-Casa interventions, where traditional construction methods were predominant, primarily to create employment opportunities.

Figure 7. Photographs of the buildings of the Bernabò Brea Complex (Genoa) on pilotis. Genoese finishing technique on the façade.

Sources: Author's elaboration (2012)

In the French magazine *L'Architecture d'Aujourd'hui* from 1956, the "extensive use of prefabricated elements in concrete, as well as exposed materials; the adoption and combination of different signals

inserted in the structural grid; the concealed use of colour; and the arrangement of open grassy spaces" is discussed. These concepts were echoed years later by Selem in the Italian magazine *L'architettura, cronache e storia* (1956, p. 92).

The modularity of the façade is evident in the use of prefabricated fair-faced concrete components, parapet slabs, panels, and pillars, as well as the alternation of balconies and glazed surfaces, creating a façade reminiscent of a chessboard (Fig 7). This design features openings, sunken balconies, and coloured render on the recessed surfaces of the terraces, described as "façades in multicoloured terracotta" (Gentili, 1954, p. 49). The protruding elements of the façade are adorned with bright white stucco, an ancient Genoese technique. Originally, the north façade was covered with slate, but it is now plastered. The doors and windows are framed with parapets finished in prefabricated, reinforced concrete panels and boulders.

The materials and construction systems used in the Madrid directed settlement differ significantly, as the primary criterion for building the dwellings was the optimisation of resources due to their scarcity and the limited budget available. This situation was heavily influenced by the autarky the country faced at the time, along with the system of personal benefits outlined in the law. Consequently, for Caño Roto and the other villages in the first phase, simple and feasible construction systems for self-construction were selected. Light-coloured sand-lime brick was chosen to conceal any potential defects. "The result was a wall in which elements and joints disappeared behind the chromatic unity. Forgetting any superficial decoration, constructive sincerity was embraced as a valid means of achieving the expressiveness of each block" (Pozo, 2010, p. 46).

Although low-income housing legislation advocated for the prefabrication of construction systems, this approach was incompatible with self-construction or personal provision (Guillem González-Blanch, 2024, p. 1252). In Caño Roto, the successful bidders primarily engaged in bricklaying. As stated in the *Hogar y Arquitectura* magazine of 1964, "The units of work to be carried out with personal services should avoid prefabrication as much as possible, and the auxiliary means should also be mechanised as little as possible, in order to emphasise the contribution of labour in the overall cost and thereby increase the promoter's input" (Flores, 1964, p. 21).

3.5. Household Scale

3.5.1. Quartiere Bernabò Brea, Genoa

Among the varied typologies designed to meet the needs of different users, the single-person homes in block 5 stand out. These flats feature a single room compartmentalised by a wardrobe that separates the living area from the dining space with an integrated kitchen. The only enclosed room in the flat is the bathroom, which is accessed from the hallway. Duplexes are also planned, with the living room and kitchen located on the ground floor and the bedrooms on the upper level.

The rental system employed by INA-Casa in Italy, as opposed to the purchase system used by INV in Spain, likely contributes to these dwellings being seen as transitional rather than permanent. Consequently, the typologies differ from those in Spain.

In the nine-storey block number 2, the communication cores with lifts serve two dwellings per floor. The principle of minimising circulation surfaces, which is a key focus for many architects of the Spanish villages, is evident in Bernabò Brea, where there are no corridors. In many cases, the entrance hall is eliminated, allowing direct access to the living room. "The floors, simplified to the maximum by eliminating distribution spaces, lead directly from the entrance into the living room through a bi-fold door " (Lagomarsino, 2004, p. 103). However, this economy of space is not reflected in the flat for single occupants (block number 5), where a disproportionate amount of space is allocated to the entrance hall leading to the bathroom (Fig 8).

Both the dwellings in block 5 and those in tower 2 feature a terrace that spans the entire length of the façade, providing formal freedom in the composition of the elevation, regardless of how the openings onto the terrace are arranged. This design element is also utilised in the directed settlements of Madrid by Cubillo, particularly in the towers of Canillas.

Block 7 (Fig 5 and 8), referred to as "the bridge," is the only block perpendicular to the slope, resulting in a significant height difference between its two ends. It features a stepped base composed of a distinct architectural order and consists of duplex dwellings with independent entrances and terraced gardens.

Above this base, the ground floor of the residential building is supported by pilotis, where the vertical communication cores are located. The duplex dwellings on the basement level form a cohesive unit with the terraced housing and are designed symmetrically (Fig 8). In this arrangement, the upper floor, which contains the bedrooms of one dwelling, is located above the ground floor of the adjacent unit, accommodating the living room and kitchen. This design strategy is similarly observed in the Orcasitas and Caño Roto housing estates in Madrid, where various typologies and combinations of dwellings are explored.

Figure 8. Bernabò Brea complex (Genoa). Left: ground floor flat for single people (block no. 5); Centre: photograph of block 7; Right: façades of block with terrace.

Sources: Left: L'Architecture d'Aujourd'hui nº66 ("Unité Residentielle Ville Bernabò Brea à Gênes, Italie", 1956, p. 49); Right: Author's elaboration (2012)

3.5.2. Caño Roto Directed Settlement, Madrid

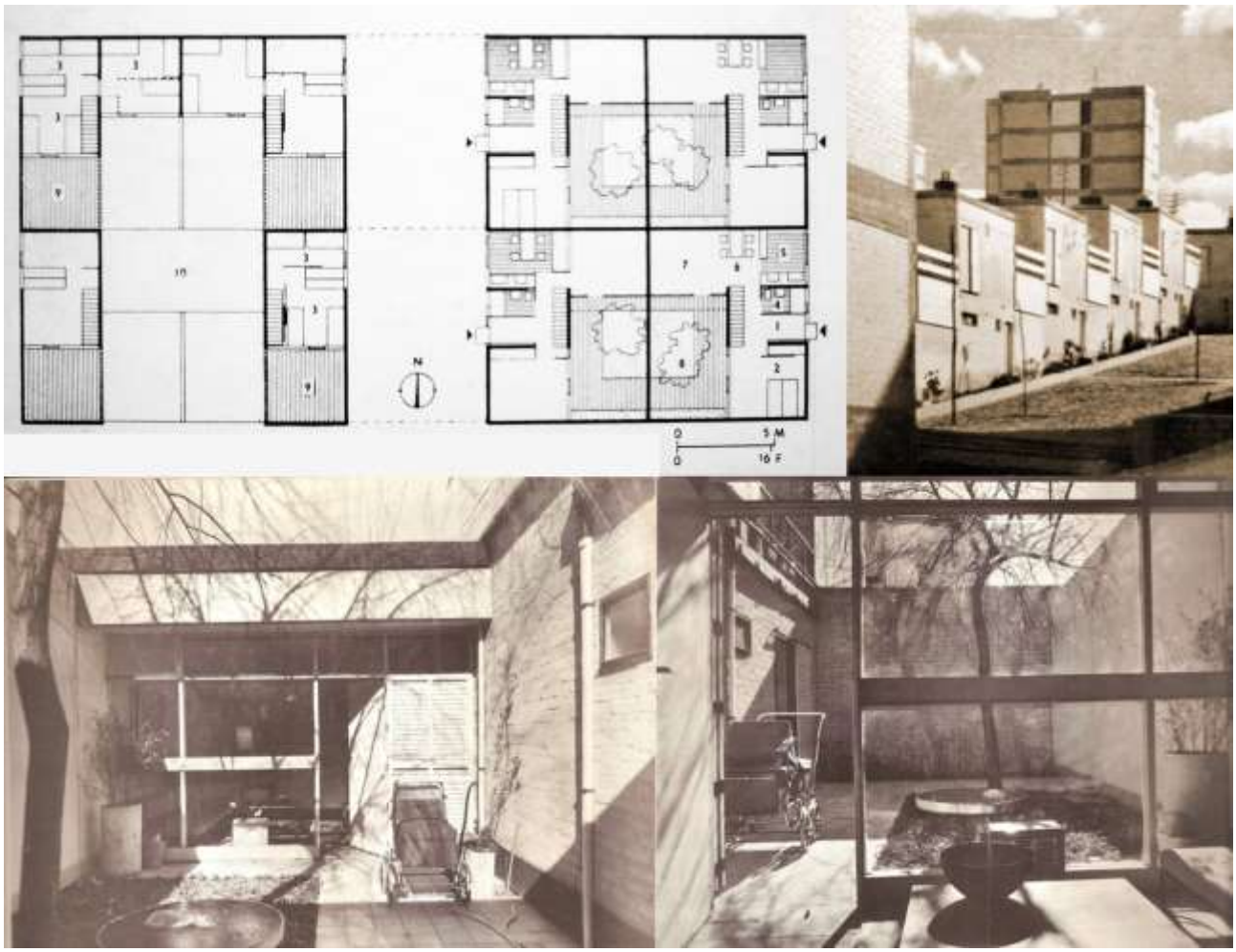
The experimentation and research with various typologies make Caño Roto, alongside Orcasitas, some of the most innovative settlements, effectively serving as a laboratory for built models. Solutions were developed to address the different needs of users coming from rural backgrounds. While there are projects for two, three, and even four-bedroom homes, there are no one-person dwellings as found in Bernabò Brea. The policy favours home ownership over renting, promoting a family-oriented model. In most typologies, the kitchens are integrated into the living and dining areas, creating larger spaces that benefit from natural light coming from multiple orientations. The architects have also incorporated essential storage areas in both kitchens and bedrooms. Íñiguez de Onzoño and Vázquez de Castro achieved solutions that were well received by the residents, humanising modern architecture characterised by pure and rigid geometric forms, which are softened unpredictably by the inclusion of vegetation.

The duplex typology employed by the architects in the 1DEFG collective housing block is notable for its originality. This typology is also present in Bernabò Brea, where, similar to the Genoese quartiere, the spaces within the same dwelling do not always align vertically. Residents enter through more public areas, such as the living-dining room, and then ascend or descend to the more private areas, which include the bedrooms. A distinctive feature of this block is its circulation design. A circulation gallery is planned for every three floors, and the stairwells, which are perpendicular to the façade, provide access only to the second and fifth floors. This arrangement limits access to the dwellings to two galleries, optimising the use of circulation and distribution spaces, however, it results in a reduced proportion of floor area for the interior rooms.

Adaptation to the terrain directly influences the dwelling typologies and, along with optimal orientation, is a key element of the project. A clear example is the block comprising flats 1EFG and 1A, where commercial premises are situated on the ground floor to accommodate the height difference between the opposing façades. The rows of single-family dwellings 2B2C are also aligned perpendicular to the hillside slope, incorporating flat terraces on the first floor to create a staggered arrangement. Furthermore, they feature an interior courtyard (Fig 9) that allows the living-dining room to face south, even if the main façade faces east or west. This courtyard humanises the architecture and serves as the

heart of the home, enclosed by high, blind walls. The façades facing the courtyard are designed to be more permeable (Fig 9), while the main façades facing the road are more solid to ensure privacy. Over time, it is common for residents to enlarge existing windows or even create new ones in the bedrooms, often without concern for visual contact with passers-by or loss of privacy.

Figure 9. Staggered single-family dwelling with interior courtyard type 2B2C. P.D. Caño Roto, Madrid.



Sources: Top left floor plan Aujourd'hui Art + Architecture nº85 ("Caño Roto", 1959, p. 62) . Above right and below photographs provided by the architect (J. L. Íñiguez de Onzoño, personal communication, 2013).

The structure of the houses in the villages featured brick load-bearing walls perpendicular to the façades in the single-family homes, while the blocks utilised a reinforced concrete framework. The enclosures were constructed with sand-lime brick, and wooden shutters, more typical of northern climates, were incorporated rather than those typically found in Spain. The construction system was influenced by the self-construction aspect of the single-family dwellings. As with other settlements, the work carried out by the allottees on Sundays and holidays mostly involved bricklaying and related tasks. Other trades, along with the construction of the blocks, were contracted to small construction firms. This distinguishes Caño Roto from other villages, where larger and more experienced construction companies managed the entire process, excluding the participation of allottees in what is known as personal provision for construction work.

4. Conclusions

Spanish and Italian housing policies in the 1950s, despite differences in geopolitical contexts and approaches, shared a common objective, which was the creation of decent housing and employment. In

Spain, the focus was on eradicating shantytowns, while in Italy, the emphasis was on generating employment. After their respective wars, late industrialisation in both countries triggered significant migration from rural areas to urban centres. This resulted in a substantial housing shortage in major cities. The construction sector absorbed unemployed individuals, providing unskilled labour oppotunities and serving as a bridge between rural and industrial lifestyles.

Similarities in the legislation, housing plans, and strategies employed are not coincidental. Throughout the research, it is clear that the housing policy implemented in Italy by Fanfani was closely observed and adapted by Valero in Spain. This collaboration contributed to one of the most remarkable periods in 20th-century architecture, particularly in social housing design. Although the targets for the number of dwellings constructed in the two housing plans were not fully realised, eradicating shantytowns in cities such as Madrid and Rome remained an ongoing challenge.

In Italy, the INA (National Insurance Institute) was established, while in Spain, the I and II National Housing Plans (1954 and 1955 respectively) of the INV (National Housing Institute) were introduced. These plans included the Limited Income Housing Law and specifically addressed targeted settlements during the first phase under study (1956-1959), among other initiatives. The Italian strategy focused on generating employment through the INA-Casa Plan (1949-1963), which aimed to build housing for workers while also providing aid and subsidies for the unemployed. This involved collaboration among employers, the administration, and the workers themselves, who contributed a percentage of their salary.

It is important to note that the Spanish strategy within the INV's II National Housing Plan (1955) relied on self-construction, a concept that had already been incorporated into the Italian INA-Casa proposal. In the case of the supervised settlements, this system involved personal provision by the tenants, who would become the future residents of the dwellings. They contributed their labour on Sundays and holidays, effectively offsetting a portion of the capital required to purchase their homes, fixed at 20% of the property's value. Although this self-construction system aimed to enhance community involvement, it often slowed the construction process and presented practical challenges, as the executor of the work was also the future owner.

The most significant difference between the two strategies was the approach to acquire social housing. Italy preferred a rental system, often with an option to buy, however, the aid and subsidies were not as favourable as those in Spain. As Arrese noted, Spain aimed to be "a country of owners and not of proletarians." From the outset, the purchase regime was promoted for low-income housing, with the administration facilitating interest-free payment instalments over 50 years.

In Italy, a significant advancement was the engagement of independent professionals instead of relying solely on the technical office of the central administration to prepare all projects. This strategy was also adopted by Valero in Spain. The decision fostered a richness and variety in designs, resulting in singular and plural solutions. While the control of actions was centralised, management remained local in both countries. This approach expedited construction and enabled more specific actions, allowing for quicker, more efficient, and contextually relevant responses.

Competitions were held in both countries to select architects, beginning with the 1949 competition in Italy, followed by Spain's first and only competition for experimental housing in 1956. In both instances, a higher percentage of young, recent graduates, referred to as "new blood", were interested in foreign architecture. Alongside more experienced architects, they formed a collaborative partnership that generated a new and significant experience in rationalist social housing with modern architecture. The architects aimed to humanise the designs, breaking away from rigidity and severity. Additionally, there was a focus on the investigation of materials and colours, as exemplified by the studies of Bernabò Brea and Caño Roto. Furthermore, the remarkable typological variety of the proposed dwellings should be emphasised. In both cases, each settlement or quartiere became a laboratory of built models.

Cultural media played a pivotal role during this period, acting as a catalyst for avant-garde architecture abroad. Architects engaged in trips, conferences, and exhibitions, including the Milan Triennials, Venice Biennials, and CIAM Congresses. Furthermore, books and magazines introduced a wave of second modernity to architectural studios, reflecting developments being made in Europe that were slowly making their way into Spain and Italy, thus continuing pre-war experiences.

The resulting architectures of INA-Casa and INV reflect a blend of modernity and tradition. In many cases, forms akin to the Modern Movement were sought, while simultaneously efforts were made to

preserve vernacular architecture, incorporating 'nods' to the rural world and tradition, as noted by the architects we interviewed. However, there exists a contradiction in the approach to construction systems. Although legislation promoted the industrialisation and prefabrication of construction processes, the necessity to create jobs in Italy's construction sector and to encourage self-construction in Spain necessitated the use of traditional, non-industrialised methods. This situation curtailed the intentions behind technological progress in both countries, leading both Spain and Italy to lag behind other European nations in terms of industrialisation and economic development.

In both cases, the city was conceived as a laboratory or field of experimentation. The quartieri and settlements of Genoa and Madrid were intended to be self-sufficient. However, as discussed throughout this study, this goal was not realised due to the lack of services and infrastructure, most of which were planned but never constructed. Although both neighbourhoods were built on the outskirts of their respective cities, the significantly different geographical conditions in Genoa, characterised by the presence of the sea and mountains, have resulted in the Genoese Quartieri remaining isolated and poorly connected, while those in Madrid have been absorbed into the urban fabric.

In the studied cases of Bernabò Brea in Genoa and Caño Roto in Madrid, the designs are masterfully adapted to the topography, addressing the orientation of the dwellings and the needs of the users in the proposed typologies.

This comparison provides an opportunity to reflect on social housing, its policies, and architectural solutions, highlighting the strategies employed by both countries. Italy, as the pioneer, sought to address issues of unemployment and the shortage of decent housing. Furthermore, fieldwork reveals that in the quartieri of Genoa, the original structures are better preserved and less altered than in Madrid, where many settlements have become unrecognisable due to numerous volumetric changes. This situation opens a timely debate regarding the recognition of heritage value and the conservation of 20th-century heritage, a discussion that is gaining momentum in Italy and other European countries but remains underdeveloped in Spain.

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