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URBAN REGENERATION AND HERITAGE RESTORATION FROM A MULTISCALE PERSPECTIVE IN THREE MODERN HOUSING COMPLEXES IN VALPARAÍSO, CHILE

REGENERACIÓN URBANA Y REHABILITACIÓN PATRIMONIAL DESDE LA MULTIESCALARIDAD EN TRES CONJUNTOS HABITACIONALES MODERNOS DE VALPARAÍSO-CHILE

REGENERAÇÃO URBANA E REABILITAÇÃO DO PATRIMÔNIO A PARTIR DA MULTIESCALABILIDADE EM TRÊS CONJUNTOS HABITACIONAIS MODERNOS DE VALPARAÍSO, NO CHILE



Figure 0. Historical view of the Márquez Neighborhood in 1958. Source: Prepared by the Authors.

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ABSTRACT

This paper analyzes the links between urban regeneration processes and the rehabilitation of modern housing heritage in the city of Valparaíso, a relationship manifested in complex topographies and highly deteriorated urban landscapes. Its objective is to propose a methodology that integrates both components, comprising a multi-scale intervention matrix that considers the Macro Urban-Landscape Scale, the Intermediate Housing Complex-Neighborhood Scale, and the Micro Housing Unit Scale. Based on a selection of three relevant modern housing complexes in Valparaíso, drawn from state agency records of the city's topography between 1936 and 1976, the research combines bibliographic and historical-documentary analysis with on-site data collection. It concludes that, under this approach, the city's modern collective housing complexes can constitute an effective tool for residential repopulation, the revitalization of urban functions, and the strengthening of social cohesion among residents in deteriorated heritage contexts.

Keywords: urban regeneration, architectural rehabilitation, modern heritage, collective housing, Valparaíso - Chile

RESUMEN

Este trabajo analiza los vínculos existentes entre los procesos de regeneración urbana y las operaciones de rehabilitación del patrimonio habitacional moderno en la ciudad de Valparaíso, relación que se manifiesta en topografías complejas y en paisajes urbanos altamente deteriorados. Su objetivo es plantear una metodología que integre ambos componentes, compuesta por una matriz de intervención multiescalar que considera las Escalas Macro Urbana-Paisaje, Intermedia Conjunto Habitacional-Barrio y Micro Unidad Habitacional. A partir de una selección de tres conjuntos relevantes del patrimonio moderno de Valparaíso, levantados por organismos estatales en la topografía de la ciudad entre 1936 y 1976, la investigación cruza un análisis bibliográfico y histórico-documental con un relevamiento de información en terreno. Se concluye que, bajo este enfoque, los conjuntos de vivienda colectiva moderna de la ciudad pueden constituir una herramienta eficaz para el repoblamiento residencial, la revitalización de las funciones urbanas y el fortalecimiento de la cohesión social de los residentes en contextos patrimoniales deteriorados.

Palabras clave: regeneración urbana, rehabilitación arquitectónica, patrimonio moderno, vivienda colectiva, Valparaíso - Chile

RESUMO

Este artigo analisa os vínculos entre os processos de regeneração urbana e as operações de reabilitação do patrimônio habitacional moderno na cidade de Valparaíso. Essa relação se manifesta em topografias complexas e em paisagens urbanas altamente deterioradas. O objetivo é propor uma metodologia que integre essas duas dimensões por meio de uma matriz de intervenção multiescalar, considerando as Escalas Macro-Urbana-Paisagem, Intermediária (Conjunto Habitacional-Bairro) e Micro (Unidade Habitacional). A pesquisa parte de três conjuntos relevantes do patrimônio moderno de Valparaíso, construídos por órgãos estatais na topografia da cidade entre 1936 e 1976. Ela combina análise bibliográfica e histórico-documental com levantamento de dados em campo. Conclui-se que, sob essa abordagem, os conjuntos habitacionais coletivos modernos da cidade podem constituir uma ferramenta eficaz para o repovoamento residencial, a revitalização das funções urbanas e o fortalecimento da coesão social entre os moradores em contextos patrimoniais deteriorados.

Palavras-chave: regeneração urbana, reabilitação arquitetônica, patrimônio moderno, habitação coletiva, Valparaíso - Chile

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INTRODUCTION

MULTISCALARITY IN THE INTERVENTION OF THE MODERN HOUSING HERITAGE OF VALPARAÍSO

A large portion of the modern housing heritage in Valparaíso was built by the Caja de la Habitación Popular and the Housing Corporation (CORVI) between 1936 and 1976. The geographical context of the city in which this housing has been developed is likened to an amphitheater-like basin, defined by a system of ravines, terraced hills, and an urban plan historically extended through the artificial filling of old beaches (Figure 1). The condition of a port city, exposed to this complex geography, determined a diversity of locations on the flat section, on the plateaus of the hills, and on the slopes of the urban ravines, which motivated the development of a wide repertoire of architectural types with rich morphological and spatial variations. Among them, it is worth highlighting modern large-scale expressions, such as collective block systems, neighborhood units, and housing tower systems with ground-floor businesses (Figure 2).

During this period, the city acted as a laboratory, where modern collective housing not only managed to transform the morphology of urban centers, but also consolidated housing landscapes marked by the intersection of the concept of well-being promoted by the State, the demands of working-class social groups and the middle class, and the design innovation exercised by the architects of the period (Ferrada Aguilar, 2024). During much of the 20th century, the development of modern housing architecture in Valparaíso was shaped by the growth and transformation of the amphitheater-like geography through artificial backfilling on the urban plain and the conquest of the historic ravines and hills associated with the ring road.

The precarious social conditions increased with migration from rural areas to the port and industrial center of Valparaíso, creating an ostensible demand for housing among working-class families and middle-class groups. The improvised and unhealthy solutions of the shanty and the tenement gave way from the 1920s to the first Model Neighborhoods, and later, until the 1970s, to complex collective solutions managed by savings banks and the State (Ferrada Aguilar & Jiménez, 2007). In this process, linked from the beginning to social demands, modern collective housing became an instrument of political struggle and, above all, a cultural space for developing relations based on solidarity, through which the notion of collective space was consolidated at the urban, neighborhood, and architectural levels.

However, despite the heritage legacy these buildings represent from historical, social, urban, and architectural perspectives, a large part of these complexes is not adequately protected by regulations and lacks management systems, with their architectural retrofitting often addressed as part of urban regeneration actions in their surroundings. Of the documented cases, these are only recognized as Historical Conservation

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Figure 1. Panoramic view of Valparaíso's landscape, from the Puerto neighborhood to the El Almendral neighborhood. Source: Prepared by the Author in 2020.

Figure 2. Repertoire of collective housing types in Valparaíso. Source: Prepared by the Authors.

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Properties and/or included in a Historical Conservation Area within the Communal Regulatory Plan (Art. 60 of the General Law of Urban Planning and Constructions), without recognition under Law 17.288 on National Monuments.

At the management level, retrofitting in medium- and high-density housing complexes has declined, partly due to a lack of methodological support. Despite this, in 2015, the Ministry of Housing and Urban Planning implemented the Housing Complex Regeneration Program (MINVU), which was complemented in 2017 by Supreme Decree 18, which regulated the Program's management model (Chateau Gannon et al., 2020). Thus, the management of modern housing has resulted in specific initiatives focused mainly on the physical-constructive dimension (upkeep and repair), neglecting the regeneration and revitalization actions in their neighborhood environments.

The systematic deterioration of the surroundings and the urban roles of Valparaíso, where a large part of the modern housing complexes is located, adds to these problems. Within the framework of the persistent depopulation process of the last 40 years, the progressive loss of the resident population, the decrease in economic activities, the structural and constructive deterioration of buildings, the underuse of architectural capacity, and the weakening of urban dynamics (services, commerce, and public spaces) can be seen.

In this context, the modern housing heritage of Valparaíso is often relegated to a state of legal and material vulnerability, lacking the operational tools needed to facilitate its recovery and integration into the city's contemporary dynamics. The sustained crisis of habitability and the socio-economic and urban deterioration that the port city of Valparaíso is going through provide the opportunity to build a new approach, in which its housing architectural heritage is valued and managed as part of a complex environmental system, where the scales of housing, collective space, and the city coincide. In the case of modern collective housing, originally conceived as an efficient response to the densification and the social problems of the 20th century, it is currently underutilized, undervalued, and disjointed across these three scales.

The knowledge currently available about this problem is incipient because much of the literature produced at national and local levels has focused mainly on the historical and physical-constructive aspects of historicist and eclectic architecture of the late 19th and early 20th centuries. The modern housing expressions of the 20th century built in Valparaíso have not attracted the same attention, and only in the last 20 years has there been interest in valorizing them and exploring their contributions to housing and socio-urban development.

Faced with this scenario, the relationship between modern heritage retrofitting and urban regeneration strategies has gained renewed

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institutional interest to reverse housing decline and spur development in Valparaíso. For example, the Valparaíso World Heritage Site Management Plan has established housing guidelines to address the obsolescence of this use in the area (Municipal Corporation for the Administration of the World Heritage Site [CSPM], 2025). Other initiatives are the Fair Cities Plan and the Housing Emergency Plan, implemented by the Ministry of Housing and Urban Planning, which address the rehabilitation of old and heritage housing and neighborhood development through housing subsidies, under SD 27. The academic field has highlighted the feasibility of converting pre-existing architectural structures to increase the housing supply and attract new residents to the consolidated urban areas of Valparaíso (Undurraga, 2024).

The rehabilitation of modern housing in Valparaíso also faces tensions between the different scales and logics of action of the institutional, social, and professional stakeholders involved in urban regeneration. For Cáceres (2019), while the Ministry of Housing and Urban Planning, the Housing and Urban Planning Service, and the City Hall act on the regulatory instruments and housing subsidies applied to social housing standards, organized neighborhood communities defend the conservation of their residential habitat and effective participation in the face of the processes of elitization and touristification that usually follow the heritage protection of their neighborhoods (Muñoz & Goecke, 2025). For architects, urban planners, and urban managers, a divide is evident between heritage experts and proponents of real estate development plans. Bringing these actors together represents a modern-day challenge, aimed at promoting sustainable urban regeneration at different scales and decision-making levels, preserving existing heritage resources, and achieving socio-housing equity.

The complex context of challenges posed by modern Valparaíso housing to urban revitalization has a knowledge gap: rehabilitation methodologies for expressing modern residential heritage, integrally connected to urban regeneration plans, have understood this binomial as a pending conservation and development task for the urban heritage of Valparaíso, but have not yet been systematized.

To contribute toward solving this problem, the main objective of this research is to analyze the virtuous connections that, at a methodological level, could be generated between modern housing heritage rehabilitation and urban regeneration processes in deteriorated areas of the city of Valparaíso, to reactivate the residential vocation and neighborhood identity. For this, the multiscale nature of urban regeneration processes has been considered, in which the relationships of the macro scale (collective housing in the city), the intermediate scale (the collective space of the housing complex), and the micro scale (the inhabited unit) are implied.

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With this objective in mind, this work has selected three housing complexes representative of the architectural modernity developed between the 1930s and the 1970s. It has assessed their adaptation to the topography and the presence of signs of physical and functional deterioration in their urban environments. Without pretending to have studied the whole city, the selection has been made from a larger universe of cases, on the premise that each is an example of that universe and meets the specified criteria. Due to their scale, extension, morphology, and the presence of collective spaces that interact at the city, complex, and inhabited-unit scales, these cases present opportunities for urban rehabilitation and regeneration.

The examples considered are the following complexes: a) Márquez Neighborhood (stages 1 and 2), located in the Historical Port Area of Valparaíso, declared a World Heritage Site in 2003, b) José Ignacio Zenteno, built on Lecheros Hill to the northeast of the city, and c) the Torres Brasil Neighborhood Unit, built on a flat section of the El Almendral neighborhood. A historical, urban, architectural, and heritage analysis is conducted, and an integrated intervention matrix is developed. This aligns with the urban rehabilitation and regeneration actions in heritage contexts.

METHODOLOGY

The research was conducted using a historical, descriptive, and experimental approach, focusing on the potential methodological articulation between rehabilitating Valparaíso's modern housing heritage and the challenges of urban regeneration. For this purpose, a preliminary survey of 76 cases of modern collective housing in Valparaíso, carried out by the State of Chile (Caja de la Habitación Popular and Corporación de la Vivienda) between 1936 and 1976, identified three standout examples (Table 1). The selection criteria were: a) their status as a manifestation of modern heritage in the city, b) their location in topographic situations typical of Valparaíso, and c) the prevalence of urban deterioration around each complex. Three stages of analysis were then undertaken.

The first involved studying documentary records held by the Historical Archive of the Valparaíso City Hall, namely 76 original work permit files for collective housing, including planimetry and technical specifications. A planimetric and photographic field survey was also conducted, whereby the historical, urban, and architectural characteristics of each complex, their heritage values and attributes, and the current state of deterioration at the urban-architectural level were determined.

The second, an analytical-propositional type, focused on designing the terms and conditions for a rehabilitation-regeneration methodology for modern housing heritage, as represented in the three cases of analysis, and was summarized in a Multiscale Integral Matrix (MIM). The design of the matrix took into account the principles of sustainable development, the

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RELEVANT COLLECTIVE HOUSING COMPLEXES OF VALPARAÍSO							
N°	CASE	GEOGRAPHICAL SITUATION	MANAGING BODY AND YEAR OF CONSTRUCTION	PLANNER	ARCHITECTURAL TYPE	NUMBER OF BLOCKS AND DWELLINGS	HEIGHT
1	MÁRQUEZ NEIGHBORHOOD (STAGE 1)	Ravine-slope	Caja de la Habitación Popular (1944-1946)	Technical Office of the Caja de la Habitación Popular (Engineer Pedro Goldsack)	Set of collective blocks	5 Blocks (214 dwellings)	4-6 floors
	MÁRQUEZ NEIGHBORHOOD (STAGE 2)	Ravine-slope	Corporación de la Vivienda (1959-1960)	Architect - Hermógenes Pérez Saavedra	Set of collective blocks	3 blocks (180 dwellings)	4-6 floors
2	JOSÉ IGNACIO ZENTENO COMPLEX	Hillside	Corporación de la Vivienda (1961-1962)	Architect - Oscar Zaccarelli M. (CORVI preliminary projects competition)	Neighborhood Unit housing-equipment	11 blocks (185 dwellings)	4-6 floors
3	TORRES DE BRASIL COMPLEX	Urban plain	Corporación de la Vivienda (1966-1967)	Jorge Aguirre Silva, Pablo Burchard A., and Peter Burchard A. (CORVI preliminary projects competition)	Neighborhood Unit housing-equipment	3 blocks (200 dwellings)	16 floors

Table 1. Selection of relevant cases in the modern collective housing of Valparaíso (1936-1976). Source: Prepared by the Authors.

multi-scale perspective of urban regeneration, and recommendations for conserving modern heritage.

Finally, at the exploratory level, an experimental application stage of the matrix was conducted for the same three cases, in which the interrelations among values-attributes, rehabilitation criteria, and urban regeneration strategies became apparent. From this, it is possible to extract methodological results, lessons, and gaps to be considered in further studies on the topic.

URBAN REGENERATION AND REHABILITATION OF MODERN HOUSING HERITAGE: A MULTISCALE APPROACH

The international debates on urban regeneration in historically significant areas coincide in the need to look beyond the intrinsic focus on the architectural object to understand it as an urban piece articulated across the social, environmental, landscape, and architectural dimensions that make up the city. It is argued that the long-term sustainability of these areas critically depends on the conservation,

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development, and balance of the traditional residential role (Troitiño Vinuesa, 2003).

Urban regeneration is defined as an intervention in an urban area, based on an integrated vision and action, aimed at reversing urban deterioration that affects the economic, physical, social, and environmental dimensions. However, in historical-urban areas, characterized by their heritage values (historical, social, cultural, urban, landscape, and architectural), regeneration is not conceived as the simple physical renewal of the old fabric (Roberts & Sykes, 2000). It is fundamentally a process of socio-spatial reactivation, in which pre-existing housing serves as an active form of social and cultural capital, ensuring the continuity and revitalization of traditional urban roles.

In urban regeneration, the recovery of the modern housing legacy poses an important challenge for preserving its values and attributes. For Gutiérrez (2007), in the Latin American continent, this legacy is often treated as 'a heritage of oblivion', suffering from the lack of necessary social recognition and appropriate institutional protection. Despite their traditional role as a social cohesifier and their undeniable heritage attributes, most collective complexes are perceived as segregated enclaves, far from the dynamics of the contemporary city and, to varying degrees, face multidimensional obsolescence (García Vázquez, 2015).

In this line, housing complexes embedded in the built city can become dynamic development resources and potential centers of centrality, capable of counteracting functional and material obsolescence and collaborating with the repopulation of consolidated urban areas (Carrión, 2001). When it comes to modern residential heritage, this challenge acquires greater complexity, as housing complexes have also been designed as functional solutions to the urban problems of their time. Thus, according to Tostões & Ferreira (2014), in the diversity of expressions of modern collective housing, the rehabilitation intervention requires a delicate balance between the preservation of their attributes (formal, spatial, constructive and original identity) and the current demands of urban integration, improvement of habitability, thermal comfort, and technological adaptation.

Far from forming isolated structures, the scale and characteristics of the modern housing complex, essentially defined by its collective spatiality, constitute an ideal laboratory of urban reactivation, which makes it possible to optimize the pre-existing architectural support and thus improve the living conditions of their inhabitants (Druot, Lacaton & Vassal, 2007). As Montaner (2015) states, the residential areas erected in the 20th century revalidate their validity as first-order urban systems, where their three constituent scales: public, collective and intermediate space, function as articulators of community life, social cohesion and the validity of neighborhood morphology.

Other arguments put forward by Feilden (2003) to reactivate the city through housing resources address the issue not only from the

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historical, formal, and spatial perspectives of modern housing, but also from the perspective of environmental sustainability. The reuse of pre-existing structures allows minimizing environmental impact compared to new construction. Similarly, authors such as Druot et al. (2007) reject systematic demolition, describing it as a waste of resources and a denial of history, defending instead the sentence 'never demolish, always transform'. In this line, the refunctionalization of operations is advocated over demolition and/or reconstruction, making modern residential heritage a key factor in mitigating the effects of climate change in the city (Kohler & Hassler, 2012).

Studies focused on the socio-political dimension of modern urbanism also argue that the particular configuration of modern collective housing, generally based on the rational reorganization of the block, achieved through large-scale, high-density and open layouts, requires a conceptual and methodological re-reading, tending to reestablish a new relationship with the urban context.

Despite the progress made by the aforementioned approaches, questions remain that shape the frontiers of research in this field. At the social and urban levels, there are questions about the effects that urban regeneration of collective housing would have on the heritage processes and architectural requalification of residential complexes. Although urban regeneration connected to the rehabilitation of pre-existing housing complexes can promote the attachment of the population, questions arise as to how this process can be sustained over time, without activating negative collateral dynamics, such as gentrification and the displacement of lower-income populations that have traditionally inhabited the consolidated city (Lees, Bang Shin & López-Morales, 2016).

In a key aspect of heritage, Choay (2007) establishes that rehabilitation is both a project and a strategy of "social regeneration", constituting a multidimensional process that transcends the physical to reinterpret the work as a testimony of identity and urban memory. Rehabilitation actions constitute an ethical and pragmatic alternative to the trends of museification and tourism of the historical city, to unjustified demolition processes, and to the demands of its inhabitants for social housing. Recent experiences show that rehabilitated housing in the consolidated city is the primary driver of change and vitality. Thus, as Solà-Morales (2003) states, the true preservation of a historical-urban area must be considered a living organism that is constantly renewed and adapted. For Jacobs (2011), housing refunctionalization is a process that protects the historical urban fabric and promotes coexistence networks among its inhabitants.

From this perspective, modern collective housing can simultaneously achieve preservation and updating and serve as a key support for defining a multi-scale intervention methodology. Secchi (2014) points out that a current trend in heritage rehabilitation and urban regeneration processes is provided by the multiscale concept, defined as the ability to operate simultaneously in the micro and daily dimension of the inhabitant and in the macro dimension

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of the urban territory, thus eliminating the classic boundaries between urbanism and architecture. In turn, Ortega Valcárcel (1998) warns that in the residential complexes of the city's historical areas, a multi-level structure coexists.

In a multilevel structure, architectural rehabilitation (micro scale) loses effectiveness if it ignores its connections to the requalification of collective space (intermediate scale) and to the preservation of urban morphology and functionality (macro scale). On the contrary, through multiscale, the community space functions as an articulator that grades and expands daily life through its plots, from the limits of the architectural complex to other places in the city, articulating the three scales referred to.

It could be said that, in the contemporary city, the lack of dialogue between housing and the role it is called to play in urban dynamics stems from the fracture of this multi-level structure. This fact is paradoxical if we consider that during the 20th century, modern housing planning was defined as a radical attempt to rationally integrate the room, public spaces, recreational areas, connection spaces, services, and work. Thus, given the intrinsically multiscale design logic of modern housing complexes, their obsolescence could not be solved by sectoral and fragmentary approaches, but by interventions that tend to the rearticulation between the minimum housing cell, collective spaces, and connection networks with the city.

This was to such an extent that the multi-scale articulation inscribed in the process of regeneration and rehabilitation of modern housing would constitute one of the conceptual, technical, and methodological challenges of the most important current in contemporary interventions in modern architectural heritage. Through multiscale approaches, it is possible to interrelate in unison: a) the micro scale of the inhabited unit, b) the intermediate scale of the complex and its collective and intermediate spaces, and c) the macro scale of the complex with the urban fabric. While the territorial planning instruments and their norms usually operate at the macro scale and the rehabilitation criteria at the micro scale, there are still methodological doubts about how to act at the intermediate scale, as well as about how to parameterize, in an integrated way, a coordinated relationship among the three. It is precisely in this gap that this research establishes a methodological proposal grounded in the phenomenon's multiscaling, since none of the three scales functions properly in isolation.

MODERN HABITATIONAL HERITAGE OF VALPARAÍSO: FROM TOPOGRAPHICAL ADAPTATION TO THE CONSOLIDATION OF THE COLLECTIVE SPACE

In the emergence and development of the modern housing heritage of Valparaíso, the geographical conformation of the urban landscape is a fundamental factor in shaping its solutions and typologies. The city

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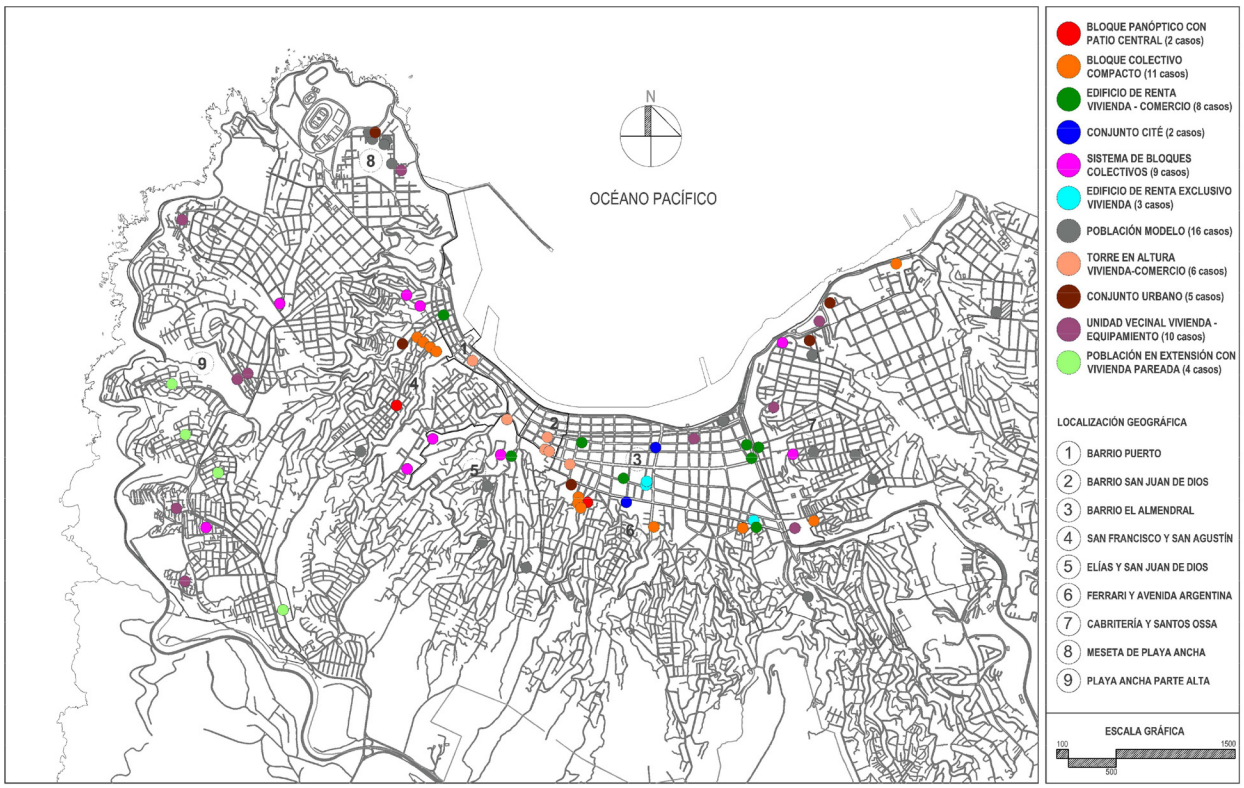


Figure 3. Cartography of the geographical distribution of the various types of collective housing in Valparaíso (1906-1976). Source: Prepared by the Authors.

represented an exceptional case in Chile, where geography put the usual techniques of architectural resolution in crisis (Torrent, 2012). The persistent symbiosis between nature and human action, promoted by the working and middle classes for inhabiting the amphitheatral basin, combined with the new architectural-urban layouts of modernity, enabled this housing to transform the built environment.

In the dynamics of housing implementation, the doming works on the channels, the extension of the urban plain through successive backfills to the beach, the urbanization works, the provision of services in the hills (sewerage and drinking water), and the layout of the road network were of special relevance. On the other hand, the permanent shortage of flat ground and the difficulties in conquering the slope meant that the canons of modern architecture, applied without problems in other cities of Chile, had to be modified to respond locally with their own solutions of great landscape ingenuity.

Under the idea that the historical-urban layout resulting from this process constitutes one of the main heritage attributes of Valparaíso (Waisberg, 1994), it can currently be observed that this housing heritage is organized differently in a system comprising the urban plain (Puerto, San Juan de Dios and El Almendral neighborhoods), 39 ravines and 42 hills. In each of these geographical situations, the types of residential complexes are a particular expression of adaptation to the soil and the slope, and of their relationship with the rest of the city, while also giving their identity to the neighborhoods where they are located (Figure 3).

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Faced with the precarious and improvised workers' housing in Valparaíso during the late 19th century and the first decades of the 20th century, the tenement became a lucrative business for rentiers, configuring the geography and the imaginary of urban poverty of the time (Urbina, 2002). Since the 1910s, these unhealthy solutions began to be replaced by the offer of sanitized neighborhoods offered by the Mortgage Credit Fund, the National Savings Bank, and other entities that organized the port's working-class families (Ferrada Aguilar & Jiménez, 2007). Only from 1936 did the action of the Caja de la Habitación Popular, and then, from 1953, the Housing Corporation (CORVI), lead to the emergence of a properly modern housing architecture. The developed typological configuration revealed differentiated ways of rationally organizing collective, intermediate, and intimate spaces, thereby achieving integration with the urban environment.

La Caja de la Habitación was a pioneer with the first Model Neighborhoods and Collective Blocks, where planning and design were set on the plateau of the urbanized hills and ravines, close to the plain. According to Ferrada (2024), in the construction of Valparaíso's landscape, housing was linked to the public space through the excavation of the hillside, the creation of an intricate network of routes and community spaces, and the construction of retaining walls, stairs, and funiculars. The vision of the Caja was translated into a "comprehensive transformation of the existing city, as a testimony of the role of the urban in the territorial system, and as an affirmation of the city in the economy and in the modern society that was aspired" (Torrent, 2012).

Subsequently, CORVI emphasized the rationalization, both urban and architectural, of collective Neighborhood Unit-type complexes and neighborhoods based on semi-detached housing, whose large size, density, and scale were appropriated mainly from the highest part of the city and the strategic centers of the urban plain. The anthropization of the natural support through these complexes necessitated the implementation of challenging urbanization processes, the activation of service networks, the design of green areas, and the replacement of the traditional closed-block morphology with open layouts featuring greater spatial-functional porosity—namely, the CORVI residential complexes.

Between 1936 and 1976, thanks to the work of the Caja de la Habitación Popular and CORVI, and amid the constant improvement of public policies and the increasing demands of socio-political organizations, mass housing was consolidated as a paradigm of change and at the center of families' daily lives. Through its architectural resolution, the "collective space" became the protagonist of the modern city and the symbol of the metropolis (Bonomo & Feuerhake, 2017). Responding to economic requests and different geographical conditions (ravines, hills and urban plain), five architectural types stood out in Valparaíso: a) Model Neighborhoods, b) High-rise towers, c) Urban complexes, d) Collective blocks and e) Neighborhood Units. The latter, equipped with services, worked as an urbanizing instrument that activated the provision of infrastructure in peripheral areas (Figure 4).

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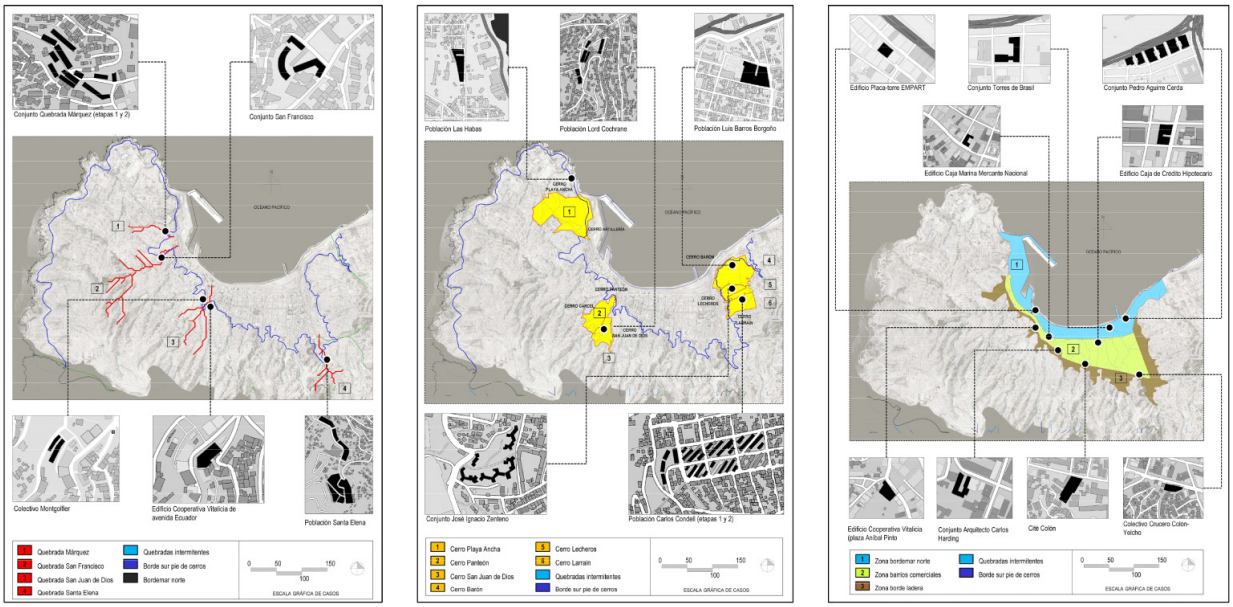


Figure 4. Geographical conditions where the modern collective housing in Valparaíso is developed (ravines, hills, and urban plan). Source: Prepared by the Authors.

Regardless of the architectural type of the housing, the consolidation of the collective housing space between 1936 and 1976 (both existential and material) is expressed in a multiscale relationship, which compromises the complex geographies of the city, the very conformation of the housing complex with its intermediate spaces, and the relationships between the inhabited units. This triple tension, mainly in the landscape, indicates that, to varying degrees, the complexes remain in force today, despite the deterioration of their surrounding urban areas. The existing spatial patterns between the networks of community and private spaces manifest as signs of social organization and as supports for high-value community relations today. However, the multiscale nature of collective spatiality in the modern housing architecture of Valparaíso not only plays a significant role in the formal, spatial, and functional relationships of its location, but also serves as an intermediary between the work and its representations and neighborhood imaginaries (Ferrada Aguilar, 2024).

VALUATION AND THE CURRENT SITUATION IN THREE RELEVANT EXAMPLES OF THE MODERN HOUSING HERITAGE OF VALPARAÍSO

Márquez Neighborhood Complex: Constructing the ravine's landscape through collective living (Figures 5, 6, and 7)

The first stage of the Márquez Neighborhood is the first large-scale housing project managed by the Technical Department of the Caja de la Habitación Popular in Valparaíso between 1946 and 1949, under the leadership of the engineer Pedro Goldsack. The second stage of the complex was developed by the Housing Corporation between 1959 and 1960, according to the project of the architect Hermógenes Pérez Saavedra. Although each complex has its own characteristics, both are expressions of modern housing and act as

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Figure 5. View of the Márquez Neighborhood Complex (1946-1949) located at the bottom of the namesake ravine. Source: Prepared by the Authors.

Figure 6. Historical view of the Márquez Neighborhood in 1958. Source: Prepared by the Authors.

configuring factors in the landscape of the Márquez Ravine, a historical and transversal basin of the original area of Valparaíso. The complexes belong to the "Collective Block System" type, are part of the Typical Historical Area of Valparaíso, and are located within the buffer zone of the UNESCO World Heritage Site (2011). From the perspective of heritage protection, stages 1 and 2 of the Márquez Neighborhood are Historical Conservation Buildings (ICH, in Spanish) and are located within the Historical Conservation Area of the Foundational Lots (ZCHLF, in Spanish) of the Communal Regulatory Plan.

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Figure 7. Planimetry of the Márquez Neighborhood. Source: Prepared by the Authors.

The fundamental historical value of Stage 1 lies in representing an advanced solution to the serious housing problems experienced by the working and middle classes in the city, being considered at the time as an example of progress and sanitation, in the face of the precarious and unhealthy conditions offered by the tenements and shanty towns that abounded in the hills and ravines. The attributes of urban-landscape value are manifested in a unique adaptation on the hillside of its 5 blocks (4-6 floors high), forming terraces parallel to the contour lines. The ravine in the background serves as a multifunctional articulating heart: an urban avenue, a community courtyard, and an entrance hall.

The circulation is handled through passageways and stair towers that serve as viewpoints and nodes for social interaction. Perpendicular to the ravine, each block sits on its own terrace, producing a staggering effect on the facing slopes. The real star is the ravine's large collective and urban space, contained on both sides by the housing blocks. Straight communal balconies and staircase towers open onto this space. At the rear of the blocks, there are more intimate common yards that run up the hillside, serving as backyards and domestic work areas (laundry and small gardens).

Architecturally, the complex stands out for its continuous, austere morphology of medium- and high-density housing (4 to 6 floors), with housing units measuring 38.18 and 52.4 square meters (originally intended

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for dock workers' families). The organization of the interior layout denotes a clear rationalization and spatial economy. Unlike the collective block systems of the first decades of the 20th century, the dwellings in the Márquez Neighborhood show a direct correspondence between form, function, and spatial economy, which hierarchizes the rooms for family interaction, with those of greater intimacy (bedrooms and bathrooms) prioritized.

The lack of conservation and investment in the Historical Area of Valparaíso has led to ongoing depopulation and degradation of public spaces and urban activities, a situation that persists despite its status as a World Heritage Site. One of the effects of this phenomenon has been the loss of the resident population and the disconnection of the Márquez Complex from the urban scale, weakening the network of collective spaces at both the urban and complex levels. Despite protection regulations (National Monuments Law and Communal Regulatory Plan), the heritage conservation of the place where the complex is located has been affected by the absence of management instruments, which is currently being reversed by the implementation of a Management Plan (2025-2034) by the UNESCO Site Administration Corporation, created in 2022.

José Ignacio Zenteno Complex: Collective living on the hill's terraced landscape (Figures 8, 9, and 10)

The complex is one of the largest and most impactful housing operations carried out by the Housing Corporation between 1961 and 1962, aimed at meeting the needs of groups of workers' and employees' families affiliated with the Private Employees' Fund. Designed by the architect Óscar Zaccarelli M., the work refers to the housing type "Housing-equipment Neighborhood Unit". It is located on the plateau of Lecheros Hill, between the La Calaguala and La Palma ravines, to the northeast of the El Almendral neighborhood. In the Communal Regulatory Plan, its heritage protection is determined by its inclusion in the Historical Conservation Zone of the Founding Lots (ZCHLF), without the protection afforded by the National Monuments Law (Figures 7 and 8).

The complex represented a key moment in the re-reading of the rationalizing principles of early-20th-century modern architecture. As a reaction to the criticism that the Modern Movement had received at the international and national level for the excessive standardization it gave to collective housing, the Housing Corporation considered it advisable that the Zenteno Complex be designed under the Neighborhood Units plan and that, in its spatial-functional organization, the geographical, climatic, and socio-cultural conditions typical of Valparaíso and Lecheros Hill be considered.

The complex's fundamental historical value lies in representing a moment of growth and urbanization of the city towards the upper part of the hills, even towards the outskirts, 300 meters above sea level. It is an example of the great housing achievements promoted in Valparaíso through the National Housing Policy of 1959, corresponding to the Ten-year Plan

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Figure 8. José Ignacio Zenteno Housing Complex (1961-1962). Source: Prepared by the Authors.

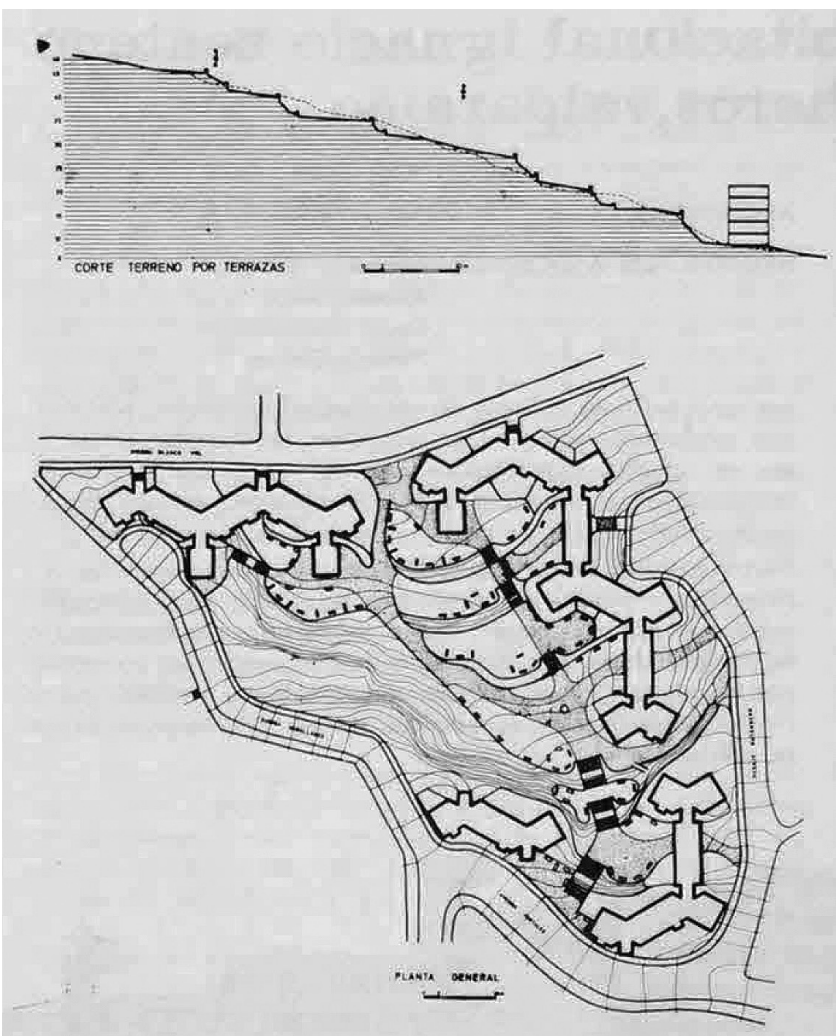


Figure 9. Site plan of the José Ignacio Zenteno Complex project in 1968. Source: Zacarelli et al. (1968, p. 40).

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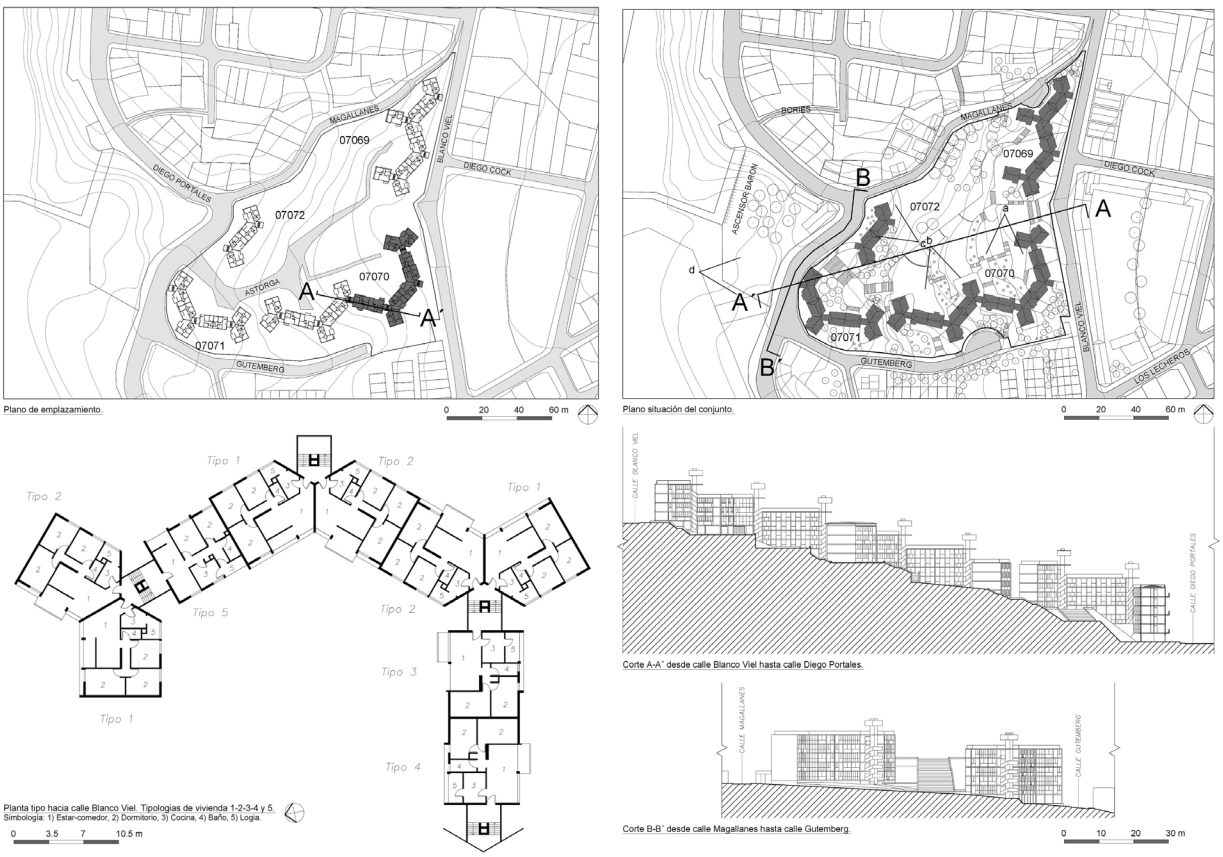


Figure 10. Planimetry of the José Ignacio Zenteno Housing Complex. Source: Prepared by the Authors.

implemented by the government of Jorge Alessandri Rodríguez. Faced with the local and regional housing reality, the Zenteno complex meant an unprecedented state commitment to deliver mass housing within the consolidated urban radius of Valparaíso.

Its attributes of urban value are reflected in a housing architecture that makes a significant contribution to the landscape, whose modern features are conditioned by the laws of the hill's topography, environmental conditions, and views to and from the city. The four blocks that make up the complex (between 4 and 6 floors each) are set on a staggered hexagonal plot, producing terraced platforms for community use for residents and for pedestrians who climb the hill. With these staggering strategies, the dwellings in the complex vary flexibly both vertically and horizontally, capturing daylight and offering a privileged orientation toward the bay of Valparaíso (northeast).

The complex, in its spatial, formal, and urban search, captures the features of traditional port housing, which has long been shaped by challenging geography. In this sense, the work could not be solved with continuous, rigid collective blocks, nor with isolated apartment towers that required elevators beyond the users' economic means. In this way, the system of terraces that the old Astorga neighborhood of Lecheros Hill had occupied served as community spaces.

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The architectural value attributes are expressed in the versatile articulation of three housing types (185 units in total) and in their spatial integration with the vertical staircases and the commerce on the first floors. The building system creates a network that twists and turns with the slope's gradient to capture sunlight and urban views. In this volumetric game, the rotation creates intermediate spaces that serve as access for the staircases. The interior architectural program of the housing units hierarchizes the living-dining room and the kitchen, which conveniently separate the most intimate areas (3 bedrooms and one bathroom). Most of the apartments have a balcony that showcases views to the south-west (urban and maritime landscapes).

Despite the relevant architectural presence at the urban-neighborhood scale and the Zenteno Complex's values, its immediate surroundings exhibit cumulative physical and functional deterioration and reduced residential use, both of which are prevalent throughout much of the El Almendral neighborhood. The lack of investment in urban improvements in the hills alongside Av. Argentina has contributed to the neglect of public spaces and to a high percentage of abandoned and underutilized buildings, all of which have reduced the quality of the urban environment and the sector's landscape. The gradual loss of collective space, increasing insecurity, and the weak articulation between the flat part of El Almendral and the upper hills to the east of this neighborhood are also added to this.

Torres de Brasil Neighborhood Unit: The open block in El Almendral's urban landscape (Figures 11, 12, and 13)

The Complex was developed between 1966 and 1967 by the Housing Corporation as part of the Housing Plan of the government of Eduardo Frei Montalva in the El Almendral neighborhood plan. It consisted of a unique residential project at the time, intended for middle-class families, including employees and others who paid into the National Merchant Marine Provident Fund. The "Housing-Business Neighborhood Unit" type became a prevailing trend in collective housing in the 1960s; it was designed by architects Jorge Aguirre Silva, Pablo Burchard Aguirre, and Pedro Burchard Aguirre, who were awarded the project competition organized by the Housing Corporation (Figures 9 and 10).

The complex is located on a flat section to the northeast of the El Almendral neighborhood. It occupies a quadrangular block bounded by Brasil Avenue and by Yungay, Simón Bolívar, and Morris streets. Built on a 4,200-square-meter plot, it comprises 3 towers of 16 floors each (A, B, and C), totaling 23,012 square meters of built area, with 190 apartments organized into 3 types.

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Figure 11. Torres de Brasil Complex (1966-1967). Source: Prepared by the Authors.

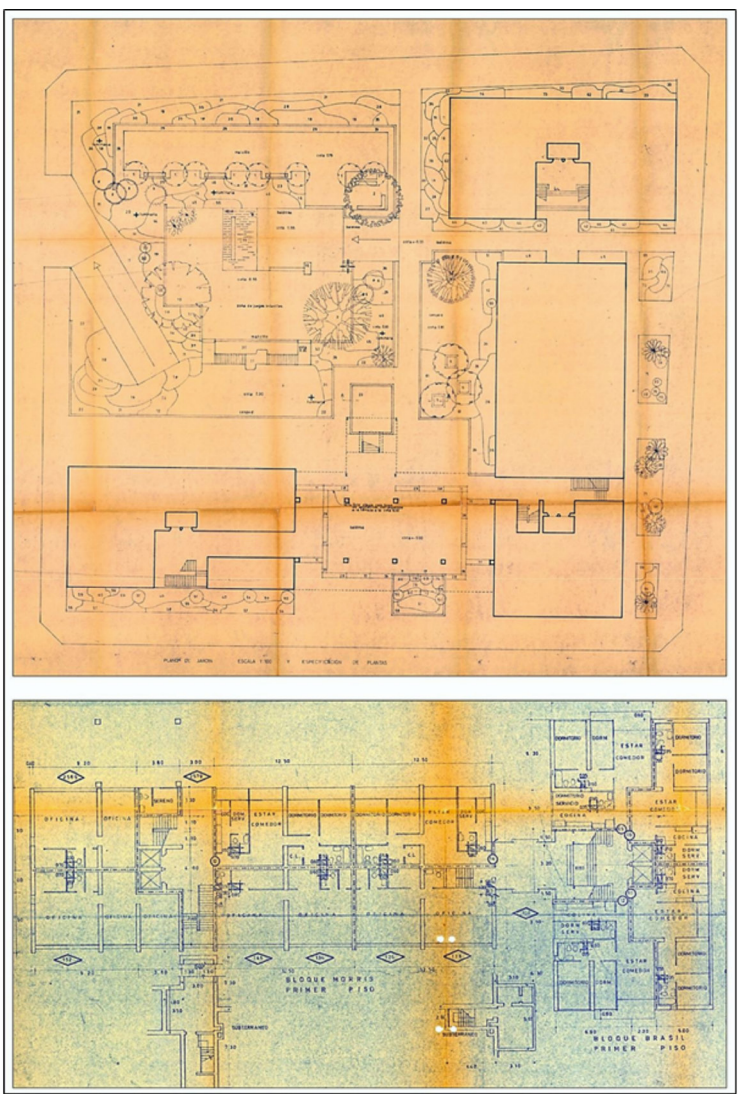


Figure 12. Plan of the original project for the Torres de Brasil Complex, built by the Housing Corporation between 1966 and 1967. Source: Ministry of Housing and Urbanism Archive (MINVU, 2025).

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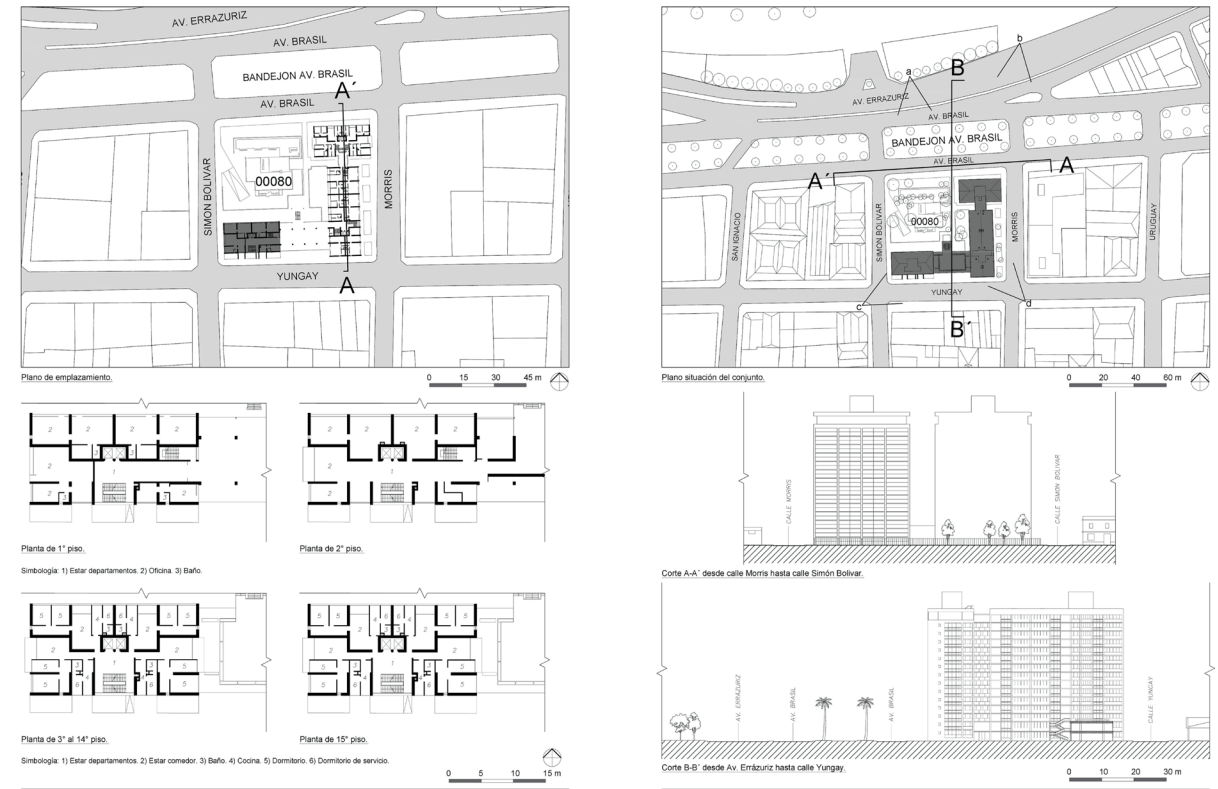


Figure 13. Planimetry of the Torres de Brasil Housing Complex. Source: Prepared by the Authors.

The Complex's historical value lies in being the first major housing project of modern architecture, built on the flat part of El Almendral, whose size and high-density spatial conception reinterpret the neighborhood's traditional block, characterized by continuous medium-density buildings. The Complex reflects the State's will of the time, which, along with satisfying the need for social housing, played a pivotal role in the city's renovation and urban redensification, addressing the physical-functional deterioration of the El Almendral neighborhood through the mixture of housing, commercial, and tourist uses.

Its status determines the Complex's urban attributes as a high-rise landmark in the sector's landscape and as a semi-porous block layout that houses three 16-floor towers, freeing up spaces for community use and open to both residents and adjacent urban uses (local commerce and El Cardonal Market). The Neighborhood Unit's composition rethinks the traditional closed neighborhood block by integrating its common areas into Avenida Brasil's activity and the commercial area of El Almendral.

The architectural attributes fully respond to the principles of functional, spatial, and formal rationality of modern architecture of the 1960s, adapting to local conditions and enabling the materialization of new habits of community life within a vertical, high-density system. The residential program, deployed across its three towers, connects the first urban level to the houses via stairwells and elevators. Each floor is organized around

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two longitudinal bays, making it easier for each inhabited unit to face the streets or the central courtyard. Each apartment clearly distinguishes the common areas from the bedrooms through a spacious living-dining room with its own small terrace-balcony.

Currently, the Torres de Brasil Complex is located in a highly central area of the El Almendral neighborhood, close to the intense commercial and transport activity generated around Pedro Montt and Uruguay Avenues, Argentina Avenue, and the El Cardonal market, the city's main supply center. The intense public-space occupation dynamics, the presence of street trade on the sidewalks, the abandonment and/or destruction of buildings by regular fires, and the poor upkeep of urban infrastructure are the causes of the weakening of the quality of the urban landscape, which ostensibly limits the neighborhood's habitability.

RESULTS

CONSTRUCTION OF THE MULTISCALE INTERVENTION MATRIX

The current demand for solutions that address the multiscale conditions of collective housing in Valparaíso invites consideration of intervention methodologies that articulate urban regeneration with the challenges of heritage rehabilitation. This research does not address all the management elements and instruments that a methodology such as the one indicated should include, as it mainly focuses on one of its constituent elements: the preparation of a Multiscale Intervention Matrix (MIM). In this sense, it is an exploratory exercise conducted in a small selection of three housing complexes, not intended to be validated as an instrument for the entire modern housing heritage of Valparaíso. On the contrary, its objective is to introduce a new methodological approach to intervention that can be adapted, improved, and expanded upon in similar situations.

The matrix's construction required doing the following beforehand: a) Making a documentary review of the analyzed cases, which considered recognizing the qualities of the work in its historical, urban, architectural, socio-cultural, and regulatory contexts; b) Identifying the values-attributes in each work, based on the existing documentation; and c) Determining the urban deterioration and risks in each project's urban surroundings.

To prepare the matrix, modern housing heritage intervention models in complex urban contexts, as well as documents that provide guidelines for connecting urban regeneration strategies and housing rehabilitation actions within a multiscale framework, were reviewed and operationalized. Among them, it is worth highlighting the Madrid Document on Criteria for the Conservation of Modern Heritage of the 20th Century (International Council on Monuments and Sites [ICOMOS], 2011), the Valletta Principles (International Council on Monuments and

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Sites [ICOMOS]- International Committee on Historic Towns and Villages [CIVVIH], 2011) for the conservation of the historic city against the goals of sustainable urban development, the UNESCO Recommendation on the Historic Urban Landscape (2011), and those put forward by Druot et al. (2007), whose studies promote the transformation and rehabilitation of modern collective social housing complexes without resorting to demolition.

The proposed matrix considers the three levels of the multiscale regeneration-rehabilitation process of housing complexes: a) Urban-Landscape Macro Scale; b) Housing Complex-Neighborhood Intermediate Scale (with its collective and intermediate spaces); and c) Housing Unit Micro Scale (Table 2). Urban regeneration strategies and intervention criteria (heritage retrofit) are defined at each scale. By overcoming the obvious typological, heritage, and configuration differences in the topography when the matrix is applied, it is understood that these actions are complementary and incidental across the three scales of each housing complex.

Table 2. Multi-scale intervention matrix for the modern housing heritage of Valparaíso, in which urban regeneration strategies are correlated with rehabilitation criteria. Source: Prepared by the Authors.

MULTI-SCALE INTERVENTION MATRIX OF MODERN HOUSING HERITAGE		
SCALAR LEVEL	URBAN REGENERATION STRATEGIES	HERITAGE REHABILITATION CRITERIA
URBAN/ LANDSCAPE MACRO SCALE	INTEGRATION TO THE URBAN TERRITORY AND LANDSCAPE Housing as a piece to connect the historical urban landscape, linked to the city's socio-economic and ecological dynamics (UNESCO, 2011)	PROTECTION OF THE ENVIRONMENT AND VISUAL RELATIONS Preserving relationships of scale, topographic implementation, and urban silhouette (ravine/hill/plain) typical of modernity in Valparaiso (ICOMOS, 2011; UNESCO, 2011).
	BALANCE BETWEEN CONSERVATION AND SUSTAINABLE DEVELOPMENT Housing integrated into contemporary urban dynamics as a repopulation instrument of the historical city (Principles of Valletta, 2011)	PROMOTING INTEGRATED PLANNING OF HERITAGE AS A SUSTAINABLE RESOURCE Incorporating housing heritage into urban planning instruments as active cultural and social infrastructure (Valletta Principles, 2011).
	SOCIO-SPATIAL REACTIVATION AND COHESION Housing as a mitigation factor of urban obsolescence and a resource for reactivating urban historical areas (Lacaton & Vassal, 2007; UNESCO, 2011)	PARTICIPATORY AND INCLUSIVE MANAGEMENT OF RESIDENTS Involving inhabitants and local actors in heritage governance to ensure the permanence of the original population (Valletta Principles, 2011).
	REACTIVATION OF URBAN ECONOMY (SERVICES-EQUIPMENT-TRADE) The residential role and its rehabilitation as a factor to activate the place and encourage socio-economic activities to benefit the inhabitant (Valletta Principles, 2011)	CONSERVATION OF HOUSING USE SCALES, DENSITIES AND LOADS Preserving original housing densities and improving interior housing conditions allows protecting the social dimension of the heritage (Lacaton & Vassal, 2004)

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MULTI-SCALE INTERVENTION MATRIX OF MODERN HOUSING HERITAGE		
SCALAR LEVEL	URBAN REGENERATION STRATEGIES	HERITAGE REHABILITATION CRITERIA
INTERMEDIATE SCALE HOUSING COMPLEX-NEIGHBORHOOD	**REACTIVATION OF INTERMEDIATE SPACES AND INTERCONNECTIVITY** Revaluing passageways, galleries, squares and collective facilities as key devices of community life and social cohesion (Lacaton & Vassal, 2007)	**PRESERVATION OF THE AUTHENTICITY AND INTEGRITY OF THE COMPLEX** Respecting the original volumetric composition, modern language and collective spatiality without extemporaneous additions (ICOMOS, 2011).
	SOCIO-FUNCTIONAL SUSTAINABILITY AND NEIGHBORHOOD REVITALIZATION Renovating commercial premises and community spaces to strengthen the local economy and collective security (Valletta Principles, 2011).	**CONSERVATION OF STRUCTURE, CONSTRUCTION SYSTEMS AND MATERIALS** Prioritizing repair and consolidation of concrete/ masonry structures over their replacement (ICOMOS, 2011).
	ENVIRONMENTAL ADAPTATION OF THE COMPLEX Improving the microclimate, soil permeability and passive resource management conditions at a complex scale (UNESCO, 2011; Lacaton & Vassal, 2007).	**ADAPTIVE REHABILITATION FOR NEW RESIDENTIAL NEEDS** Applying surface area addition or conditioning strategies without altering the essence of the original design (Lacaton & Vassal, 2007).
	PROMOTION OF DIVERSITY AND ACTIVE SOCIAL PARTICIPATION Promoting diversity and active social participation strengthens social ownership and inclusive and sustainable heritage management (ICOMOS, 2011; UNESCO, 2011).	**PRESERVATION OF THE COMPLEX'S IDENTITY IN THE URBAN-NEIGHBORHOOD CONTEXT** The preservation of the complex's identity requires maintaining the relationship between modern heritage and its urban, landscape, and social context, and preserving the values that define its character and territorial integration (ICOMOS, 2011; UNESCO, 2011).
MICRO SCALE (HOUSING UNIT)	**FOSTERING ADEQUATE LIVING CONDITIONS AND THE RIGHT TO HOUSING** Guaranteeing contemporary standards of dignity, lighting and ventilation, avoiding gentrification or demolition (Lacaton & Vassal, 2007; UNESCO, 2011).	**RESPECT FOR HOUSING TYPOLOGIES AND INTERIOR SPACE-FORM ORGANIZATION** Maintaining the layout logic and the characteristic elements of modern living (ICOMOS, 2011).
	ENCOURAGING SUITABLE RESPONSES TO THE DIVERSE TYPES OF HOUSEHOLDS Allowing internal spatial flexibility to respond to the changing dynamics of contemporary families (Lacaton & Vassal, 2007).	**MAINTENANCE AND UPDATING OF FACILITIES AND SERVICES** Replacing or modernizing service networks (water, electricity, sanitation) with reversibility and minimum intrusion criteria (ICOMOS, 2011).
	FUNCTIONAL SPACE CONDITIONING AND ENERGY EFFICIENCY Implementing bioclimatic improvements without altering the housing comfort of existing residents (Lacaton & Vassal, 2007).	**VALORIZATION OF REUSE ACTIONS OVER DEMOLITION OR RECONSTRUCTION** Prioritizing adaptive reuse and a substantial improvement of the inhabited space without removing original elements (Lacaton & Vassal, 2007; ICOMOS, 2011).
	REVITALIZING THE RELATIONSHIP BETWEEN HOUSING UNITS - INTERMEDIATE SPACES - COLLECTIVE SPACES The relationship between the housing unit and collective spaces preserves the spatial and social values of modern heritage (ICOMOS, 2011; UNESCO, 2011).	**REHABILITATION OF SOCIO-SPATIAL RELATIONS FOR COEXISTENCE AMONG RESIDENTS** The rehabilitation of socio-spatial relations strengthens coexistence and social cohesion in the modern housing heritage (ICOMOS, 2011; UNESCO, 2011).

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URBAN SCALE OF THE COMPLEX:

The first urban regeneration strategy consists of "Territorial integration and the Historical Urban Landscape", understanding the housing complex as an articulating element of the urban landscape and as a link to the socio-economic dynamics and geographical and natural conditions of the place (UNESCO, 2011). The second one addresses the "Balance between conservation and sustainable development", aiming to ensure that the complex integrates contemporary urban functions and promotes repopulation without altering the identities of the historical area in which it is inserted (ICOMOS-CIVVIH, 2011). The third strategy aims at "Reactivation and socio-spatial cohesion in the neighborhood" through a mixture of uses and public accessibility to avoid urban obsolescence and the expulsion of residents (Druot et al., 2007; UNESCO, 2011).

At the same time, the "Protection of the environment and functional and visual relationships" is considered as a part of the rehabilitation criteria, an aspect that aims to preserve the relationships of scale, topographic implementation and urban silhouette (ravine/hill/plan) typical of modernity in Valparaiso (ICOMOS-CIVVIH, 2011; UNESCO, 2011). As a second criterion, the "Integrated planning of sustainable heritage" is established to incorporate housing heritage into urban planning and management instruments as active cultural and social infrastructure (ICOMOS-CIVVIH, 2011). The third criterion is "Participatory and inclusive management", which involves local inhabitants and actors in heritage governance to ensure the permanence of the complex's original population (ICOMOS-CIVVIH, 2011).

INTERMEDIATE SCALE OF THE COMPLEX AND ITS COLLECTIVE AND INTERMEDIATE SPACES

The regeneration strategy "Reactivation of the intermediate space and interconnectivity" is aimed at revaluing and reactivating the complex's internal fabric, where the different degrees of collective space prevail, consisting of the network of passageways, stairs, corridors, yards, squares and equipment that act as substantial elements of community life and the social cohesion of the residents (Druot et al., 2007). The second strategy is the "Socio-functional sustainability and urban vitality of the complex", whose purpose is to rehabilitate the relationship of housing, community spaces, and the area's facilities to strengthen the local economy and collective security (ICOMOS-CIVVIH, 2011). The third strategy, "Environmental adaptation of the complex", focuses on improving the microclimate conditions, the complex-topography relationship, soil permeability, and passive resource management at a complex scale (UNESCO, 2011; Druot et al., 2007).

On this scale, the first rehabilitation criterion aims at the "Preservation of the authenticity and integrity of the complex", which respects the volumetric composition, the modern language and the original collective spatiality without extemporaneous additions (ICOMOS, 2011), in the same way as the "Conservation of materials and structural systems", by prioritizing

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the spatial re-functionalization and consolidation of the original building structures over their replacement (ICOMOS, 2011). The third criterion is the "Principle of minimal intervention and spatial addition", which aims to ensure that extensions (horizontal and vertical) derived from use needs do not alter the original architectural design (Druot et al., 2007).

MICRO SCALE OF THE INHABITED UNIT

For this scale, the first strategy considers the "Quality of habitability and the right to housing", an aspect that aims at ensuring that the inhabited unit and its complexes have the minimum surface area per inhabitant, lighting, ventilation, and services standards, which prevents changes of use or demolition (Druot et al., 2007; UNESCO, 2011). The second strategy, "Response to the social diversity of households", seeks to allow the dwelling's internal spatial flexibility to respond contemporaneously to changing family composition. The second strategy aims at the "Conditioning and energy efficiency" of each unit in the complex through bioclimatic improvements without altering the comfort of existing residents (Druot et al., 2007).

The first criterion of heritage rehabilitation consists of "Respect for the typology and interior spatiality", which focuses on maintaining the layout of the housing program and the characteristic elements of modern living (ICOMOS, 2011). A second criterion establishes the "Technical and facilities update" to modernize the service networks (water, electricity, gas), with criteria for reversibility and minimal intrusion into the original architectural configuration (ICOMOS, 2011). The third rehabilitation criterion seeks the "Refunctionalization of the inhabited unit" over reconstruction or demolition, prioritizing adaptive reuse interventions and improvements to the dwelling without substantially altering its characteristic elements (Druot et al., 2007; ICOMOS, 2011).

The matrix was applied to three representative cases of modern housing heritage in Valparaíso (1936-1976), drawn from a larger universe of 76 registered and documented cases. Without trying to address the complexity of the problem, and with an essentially exploratory purpose, the following have been privileged in the choice of the cases: a) typological representativeness, b) heritage relevance, c) urban regeneration and multi-scale rehabilitation potentials, d) geographical location (ravine, hill and plain), and e) presence of signs of deterioration in the urban surroundings.

The three examples from the application of these criteria are: a) Márquez Neighborhood Stage 1, built by the Caja de la Habitación Popular between 1946-1949 in the ravine of the same name (Collective blocks complex); b) José Ignacio Zenteno Complex, built by the Housing Corporation (CORVI) between 1961-1962 on Lecheros Hill (Neighborhood Unit housing-equipment); and c) Torres de Brasil Complex, also built by CORVI between 1966-1967 in the northeast area of the plain in the El Almendral neighborhood (Neighborhood Unit housing-

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equipment). The urban surroundings of these complexes currently face serious problems of physical and functional deterioration, a weakening of residential use and commercial services, and a disconnect from the urban landscape.

ANALYSIS AND DISCUSSION

APPLICATION OF THE MULTI-SCALE INTERVENTION MATRIX

A summary of the main results obtained by applying the Multiscale Intervention Matrix (MIM) to the three cases is provided below. In its application, the matrix demonstrates that the critical approach across the three modern housing heritage scales should primarily link the structure and shape of urban geography, the heritage value attributes of each complex, and the daily experience of its inhabitants in the neighborhood they occupy, in such a way that overcoming urban deterioration in each case and the need for its reactivation would result from the complementarity between the Urban Regeneration Strategies and Heritage Rehabilitation Criteria, identified for each Complex.

Urban-Landscape Macro Scale (Table 3)

At this scale, integrating the analyzed complexes into the landscape of which they are part is an unavoidable dimension of mitigating urban degradation (physical, social, and functional). In the Márquez Neighborhood, a modern project representative of the advanced hygienist period (1946-1949), a close correlation is observed between its urban regeneration strategies, focused on protecting the urban configuration staggered on the slope, and the articulation of collective living of the historical basin of Márquez, with the rehabilitation criteria focused on consolidating the repopulation in the Buffer Zone of the World Heritage Site, as well as in the recovery of the weakened collective space system.

Analysis of the matrix shows that the urban regeneration of the El Puerto neighborhood depends on following the rehabilitation criteria to re-signify the Complex as an active socio-cultural infrastructure within the territorial planning and management instruments. This would reverse the current disconnect between housing and commercial facilities and services in the sector and activate pedestrian flows through the ravine and, more broadly, to the Complex.

In the José Ignacio Zenteno Complex (1961-1962), conceived as a response to the standardized trend of modern collective housing of the time, the intervention criteria are oriented to revaluing the conquest of the hill's topography and its role as an interface between the Lecheros hill and the northeastern area of the El Almendral neighborhood. In this case, the identified urban regeneration strategies seek to preserve the system of visual cones towards the city and to restore the commercial relationship with the neighborhood, and with Argentina Avenue in particular. Following these regeneration actions, the rehabilitation criteria are summarized as reactivating the Lecheros Hill plateau as a place for pedestrian travel

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and as an interface space between the neighborhood's public uses and the Complex's collective uses. In this way, the rehabilitation decisions for this residential heritage would constitute an effective mechanism for repopulating the sector and reactivating the system of terraces as urban viewpoints.

In contrast to the previous cases, the urban renewal strategies defined for the Torres de Brasil Complex (1966-1967) aim to consolidate its status as a landmark by reaffirming its role as an articulator between the housing and associated commercial and community uses (typical of the Neighborhood Unit typological layout). A complementary strategy aims to promote the Complex as an element of economic reactivation at the urban scale by linking the semi-open block to the urban fabric, Brasil Avenue, the coastal edge, the Baron sector, and the services of the El Cardonal

Table 3. Application of the matrix for the three complexes on the Macro Urban-Landscape Scale. Source: Prepared by the Authors.

URBAN/LANDSCAPE MACRO SCALE		
HOUSING COMPLEX	URBAN REGENERATION STRATEGIES	HERITAGE REHABILITATION CRITERIA
MARQUEZ NEIGHBORHOOD COMPLEX	• Landscape articulation between the ravine, the Complex, and the system of the Puerto neighborhood.	• Protection of visual relationships and the Complex's ravine-hill urban silhouette on the slope.
	• Consolidation of the World Heritage Site buffer zone as a brake on the center's urban obsolescence and repopulation.	• Reactivation of the transversal relationship through the Complex, looking to enhance the slopes and the spaces for community use.
	• Socio-spatial and functional reactivation, by improving pedestrian flow and commercial activities related to the housing.	• Recognition of the Complex as an active socio-cultural infrastructure in the territorial planning instruments (TPI) with participatory governance.
JOSÉ IGNACIO ZENTENO COMPLEX	• Recovery of the relationship between urban, commercial, and services activity of Argentina Avenue and the entrance to the Complex	• Preservation of the clear visual cone of the Complex towards the Bay of Valparaíso from the terrace of Barón Hill.
	• Reactivation of Lecheros Hill as a place of passage, pedestrian route and urban viewpoint between the plain and hill.	• Recovery of the system of terraces and space for collective use for the Complex's community and the hill's pedestrians.
	• Repopulation and re-densification of existing housing in the El Almendral neighborhood.	• Recovery of the Complex's commercial uses and community services to support those of the hill.
TORRES DE BRASIL COMPLEX	• Socio-economic reactivation of the sector through a mixture of uses and facilities of urban and interurban scale.	• Protection of the Complex as a volumetric-spatial landmark of modernity in the landscape of the El Almendral neighborhood.
	•Consolidation of residential use and services in the northeast section of the El Almendral neighborhood, taking advantage of the Brasil Avenue intersection. Connection of the Complex with the coastal edge (Baron strip).	• Recovery of the Complex's central square and the terrace on the top floor as spaces for public use available to residents and pedestrians of the neighborhood. Connection with El Cardonal Market and commercial uses.
	• Re-densification of the El Almendral neighborhood through the rehabilitation of pre-existing buildings.	• Recognition of the Complex as an active socio-cultural infrastructure in the territorial planning instruments (TPI) with participatory governance.

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Market. Analysis of the matrix shows that the urban regeneration of the area surrounding the Complex is fundamentally dependent on the re-densification and recovery of the pre-existing buildings, validating their installed capacity as an urban catalyst.

Housing Complex-Neighborhood Intermediate Scale (Table 4)

At the neighborhood level, across the three complexes, the spatial and formal configuration of collective relations is established as the primary strategic resource for urban regeneration. This is understood as the landscape connection between the blocks and/or towers of the complex and their intermediate spaces and the topographic supports, through which flows, porosities of use, permanence, and visual cones with the environment occur.

In the Márquez Neighborhood, regeneration strategies focus on creating greater differentiation among public, semi-public, and community spatial systems (especially in the transversal sense of the ravine-slopes). It is observed that the strategies require specific rehabilitation actions at the ground level of the blocks intended for local commercial uses and community services, as well as the recovery of open places for sports use.

In the Zenteno Complex, the regeneration strategies indicate the need to reactivate the terraces that connect the hexagonal arrangement of the housing blocks, recovering them as an extension of residents' social life. This fact is consistent with one of the rehabilitation criteria aimed at improving the quality of the Complex's boundaries, increasing social control and the security of the inhabitants in relation to external users. The heritage rehabilitation should balance the semi-open vocation of the Complex's Neighborhood Unit layout with the provision of nearby community facilities at the neighborhood scale to satisfy the needs of the resident community.

In the case of the Torres de Brasil Complex, whose attributes lie mainly in its semi-porous configuration, which rethinks the original closed block of the El Almendral neighborhood, urban regeneration strategies aim to recover the permeability that connects community uses associated with housing to those of the immediate urban context. This strategy is consistent with the rehabilitation criterion that aims to open the community yard on the first level as a semi-public crossing space, re-functionalize the bridge between towers A and B as socio-cultural equipment, and improve the commercial options in the ground floor premises facing the perimeter streets. In this way, the correlation between urban regeneration and rehabilitation actions shows that careful management of the Complex's common areas can be an effective means of improving parts of the El Almendral neighborhood and the habitability of the residential complexes.

Micro Unit-Housing Scale (Table 5)

In the most limited, interior, and intimate dimension of the complexes, it is evident that the relationship between urban regeneration strategies and heritage rehabilitation criteria must not overlook the adaptability of the

HOUSING COMPLEX-NEIGHBORHOOD INTERMEDIATE SCALE		
HOUSING COMPLEX	URBAN REGENERATION STRATEGIES	HERITAGE REHABILITATION CRITERIA
MARQUEZ NEIGHBORHOOD COMPLEX	• Opening and reactivating the collective corridors in the system of blocks that look towards the Márquez ravine.	• Conservation of the original volumetric composition and recovery of the crisscross system of pedestrian routes (ravine – slopes).
	• Reactivation of the ground level for community and commercial services at the ravine and at the urban use level.	• Rehabilitation of the ravine as the heart of the Complex (meeting space and urban-neighborhood services).
	• Recovery of spaces for open sports use on the slopes of the Complex (court).	• Repair and structural consolidation of the walls and slabs system based on reinforced concrete (measures against environmental salinity).
JOSÉ IGNACIO ZENTENO COMPLEX	• Reactivation of the terraces system as community and public spaces for the Complex's residents and the hill's pedestrians.	• Rehabilitation of the Complex's value attributes as a manifestation of the Neighborhood Unit type (formal, functional and spatial relationships).
	• Improvement of the security system on the edges and access points of the Complex.	• Rehabilitation of the ties between housing blocks and the terraces-yard for community use (routes and places to sit).
	• Plan to improve the Complex's community facilities and local commerce, as a complement to the neighborhood's urban services.	• Redefinition of the programs for public, community and private use of the Complex.
TORRES DE BRASIL COMPLEX	• Reactivation of the system of spaces for public-community use (playground and terrace on the top level).	• Recover the conditions of the Complex's Neighborhood Unit through the controlled opening of its perimeters, which links community uses with urban uses.
	• Improvement of the system of commercial premises facing the Complex's perimeter streets.	• Rehabilitation of the bridge between towers A and B, to return its role as social and cultural facilities for the Complex and the neighborhood.
	• Approach of the Complex as a place of urban crossing between Brazil Avenue and the coastal edge to the north of the neighborhood.	• Repair and maintenance of the housing units' balconies, to improve their conditions of sunlight, ventilation, and viewpoint towards the city.

Table 4. Application of the matrix for the three complexes in the Housing Complex-Neighborhood Intermediate Scale. Source: Prepared by the Authors.

houses to contemporary uses, without distorting the essential typological characteristics that confer formal-spatial unity on each grouping.

In the Márquez neighborhood (Figure 14), whose habitable units exhibit a highly rationalized spatial economy (with houses measuring 38.18 and 52.4 square meters), the regeneration strategies would consist of promoting a repopulation plan for the buffer zone of the UNESCO Site through a diversified housing offer to help retain the resident population. This measure correlates with the criterion aimed at increasing the spatial and programmatic versatility of the dwellings in the Márquez Complex through reversible interventions. However, these actions should protect the unitary

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HOUSING UNIT MICRO SCALE		
HOUSING COMPLEX	URBAN REGENERATION STRATEGIES	HERITAGE REHABILITATION CRITERIA
MARQUEZ NEIGHBORHOOD COMPLEX	• Promotion of the Complex as an example of repopulation in the Puerto neighborhood, by offering apartments in different typologies.	• Protection of the visual openings towards the landscape to maintain the geographical integration of each inhabited unit.
	• Consolidation of the Complex as a spatial support for intergenerational cohabitation dynamics that maintain the social cohesion of the neighborhood.	• Promotion of spatial versatility and constructive reversibility in any new interior subdivision.
	• Activation of the public-private threshold (galleries and balconies) to promote the natural view of the ravine.	• Conservation of the spatial configuration of the balconies as transitional and intermediate elements between the public and the private.
JOSÉ IGNACIO ZENTENO COMPLEX	• Promotion of visual permeability from the interior to common yards to strengthen neighborhood security.	• Conservation of the modulation and proportions of the original spans and their relationship to the outside.
	• Adaptation of the indoor facilities for the development of work or domestic microeconomies that revitalize the sector.	• Promoting the harmonization of the new technological and habitability insertions, with respect to the dwelling's original composition.
	• Reversal of functional obsolescence to attract new residents without removing the existing community.	• Improving the habitability and distribution between public (living-dining room) and intimate areas (bathrooms and bedrooms).
TORRES DE BRASIL COMPLEX	• Housing plan proposal, which considers the installed capacity in the El Almendral neighborhood and the diversity of current family groups.	• Preservation of the typological design of the apartments and common spaces as an identity element of the Complex.
	• Adaptation of habitability for intergenerational occupation in the Complex, which stops the depopulation of historical residents.	• Material differentiation of contemporary networks and installations added in relation to the original composition of the Complex.
	• Authorization of acoustic insulation to mitigate urban pollution generated by the intense traffic activity of the surroundings.	• Improvement of the thermal and acoustic insulation conditions, safeguarding the original design of the carpentry and window frames on the facades.

Table 5. Application of the matrix for the three complexes on the Housing Unit Micro Scale. Source: Prepared by the Authors.

layout of the collective corridors and the separation between common and private use spaces.

In parallel, in the Zenteno Complex (Figure 15), where the original architectural design was concerned with hierarchizing the premises according to their implementation in the plateau's topography and orienting the blocks for correct light and visual capture, one of the most important urban regeneration strategies is related to reactivating the relationship between the blocks and the terraced outdoor community spaces. However, overcoming this functional obsolescence also requires applying heritage rehabilitation criteria that allow reopening commercial and community premises, as well as adapting the houses' interior spaces for domestic microeconomies, while harmonizing these changes with the original planimetric structure.

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Figure 14. View of the Márquez Neighborhood with the ravine as the protagonist of the multiscale. Source: Prepared by the Authors (2024).



Figure 15. Aerial view of José Ignacio Zenteno Complex and the system of terraces for collective use. Source: Joaquín Galecio (2025).

In the case of the Torres de Brasil Complex (Figure 16), the clear tower-commercial premises organization of the Neighborhood Unit, with associated complementary services, serves as an effective support for urban regeneration strategies to focus on promoting a housing repopulation plan in the flat part of El Almendral, which would meet the needs of diverse family groups and remedy the urban degradation of the sector. Nevertheless, such strategies depend on the application of architectural rehabilitation criteria, such as spatial and functional adaptation that respects the typological composition of the apartments and the improvement of their thermal and acoustic insulation conditions. The analysis concludes that this functional and intergenerational adaptation could be successful if it were possible to reconstitute, at the urban, neighborhood, and architectural scales, the original characteristics of the Complex as a Neighborhood Unit to address the problems evidenced in the El Almendral neighborhood.

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Figure 16. Aerial view of the Torres de Brasil Complex with its characteristic opening of the block towards Av. Brasil. Source: Joaquín Galecio (2025).

Comparative synthesis between cases

The application of the Multiscale Intervention Matrix shows that the main similarity between the three complexes consists in the urgency of reconciling the social, economic, and spatial reactivation of the urban area where they are located with the preservation of their housing identity, by using multiscalarity as an operational bridge in planning, management, and conservation actions. However, the substantial difference, which would vary both the regeneration strategies and the rehabilitation criteria, is graphed in the geographical and topographical conditions and project composition present in each Complex.

While the Márquez Neighborhood and the Zenteno Complex sustain their potential in the adaptation of a steep topography, which uses the ravine and the hill's plateau as connectors of the community space, the Torres de Brasil Complex must subject regeneration to the reinterpretation and reactivation of the block on a flat plot of the El Almendral neighborhood. In all three cases, integration into the landscape is consecrated as the fundamental transversal dimension, since it allows linking the macro-urban scale to the intermediate scale of the Complex within the neighborhood. This shows that the territorial insertion of the dwellings analyzed is the primary attribute to be rehabilitated to ensure the sustainability of each complex's urban-housing vitality.

The main challenge identified in the correlation between urban regeneration strategies and rehabilitation criteria lies in the constant tension between the complex's levels of heritage conservation and the necessary

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adaptation of the dwellings to the requirements of contemporary use by resident families. In the Housing Complex-Neighborhood Intermediate Scale, the three cases face the challenge of reactivating their spaces for public and collective use by promoting controlled urban permeability, an objective that could conflict with the demands of security and control between public and private spaces.

In the Housing Unit Micro Scale, the comparative challenge is unanimous since, in general, the interventions must consider varying degrees of constructive reversibility and technological adaptation to meet the demands of intergenerational use and new types of families, without altering the spatial and formal modulation that gives each complex its heritage values and attributes.

CONCLUSIONS

The challenge of comprehensively recovering urban heritage, with its social, territorial, and environmental consequences, depends largely on the conjunction between the city's sustainable regeneration and the reimpowerment of the values and attributes that collective housing entails across its various modalities. In the case of the city of Valparaíso, the vast repertoire of modern residential architecture, built by State agencies (1936-1976), constitutes a tool related to this purpose, not only for its intrinsic attributes, but, above all, for its vocation of rearrangement of the neighborhoods where they are located, under complex geo-topographic appropriations.

The examples respond to pioneering efforts of modern Valparaiso architecture, undertaken by the Caja de la Habitación Popular (Márquez Neighborhood Complex) and the Housing Corporation (José Ignacio Zenteno Complex and Torres de Brasil Complex). Among them, important similarities and differences are evident in their design composition, their topographic adaptation, the degree of impact they experience from surrounding urban deterioration, and the system of collective spaces they promote for their residents. Due to this, the multi-scale integration of urban regeneration and heritage rehabilitation criteria is fundamentally subject to the planning and management model that the authorities implement, under the imprint of the participation that the inhabitants and residents have in a long-term process, which requires economic resources (private and public), technical capacity, and evaluation over time.

As stated in this paper, a multiscale approach to this problem, whose complexity transcends the architectural object and encompasses the urban planning and management of heritage, would act holistically and complementarily at the macro- and intermediate urban scales of the housing complex and the micro scale of the housing unit. In this sense, methodological efforts at the time of the intervention intensify when urban regeneration confronts the dynamics of deterioration and degradation in key areas of the city, and when the need for repopulation

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prompts consideration of the re-functionalization of existing modern housing.

To this end, the proposal of a multiscale integral matrix applied to three examples of the collective housing heritage of Valparaíso constitutes a first effort that in no way exhausts the possibilities of the instrument provided. The results from the matrix empirically demonstrate that the rehabilitation of the analyzed housing heritage can serve as a tactical tool that positively impacts urban regeneration when approached in a multiscale way, especially in weakened or degraded areas. Thus, the intervention in collective housing is not merely an act of architectural conservation of monumental elements but an effective means of repopulating the city and reactivating its historical-urban fabric.

However, to perfect this instrument and enable its replicability across other manifestations of modern collective housing, it is important to incorporate additional analytical variables that have not yet been considered. For example, it would be necessary to integrate specific indicators related to institutional management models that provide technical and financial viability and ensure the sustainability of actions in the medium and long term. In the same way, since the effectiveness of the rehabilitation of the complexes varies drastically according to the type of ownership of the property, i.e., individual ownership, co-ownership, lease, etc., it would be necessary to include indicators in this line when considering the capacity of neighborhood organization of the residents for the management and financing of the operations. Another aspect would be to provide the matrix with indicators related to seismic risk and the structural and constructive vulnerability of buildings, so that this architecture continues to function as a safe and active support for contemporary living. Furthermore, on the scale of the complex's intervention, include indicators that measure energy savings during rehabilitation and/or transformation rather than demolition.

In this framework of actions, urban regeneration and the heritage retrofit of housing lose their effectiveness if they are reduced to technical interventions that are unrelated to the stakeholders involved in the process. For this reason, it is essential to highlight the active role of the inhabitants-residents, neighborhood councils, public organizations, municipalities, private actors, and the professional and technical sector. The absence of participatory governance in decision-making in each instance of intervention allows overcoming the traditional top-down management of residential heritage, facilitating co-management mechanisms in both planning proposals and the periodic evaluation and improvement of their outcomes.

Whether by adapting to the slope of the hills or by re-densifying the plain, the analyzed cases transcend the architectural object by integrating private and collective life with public space. The rehabilitation operations,

together with the preservation of their integrity and authenticity, would allow complexes to serve as devices that link the housing unit to the neighborhood scale and the urban structure, using the "collective space" (terraces, corridors, and open blocks) as a connecting and revitalizing fabric.

In short, the recovery of the modern housing heritage in Valparaiso depends on the ability to link the "heritage conservation project" with "sustainable urban development". The sustainability of these complexes depends on their recognition as motors of repopulation and recovery of residential centrality. In the meeting of both challenges lies the possibility of increasing social cohesion, re-signifying existing resources, and implementing the collective housing space as a reactivation scenario for the contemporary city.

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