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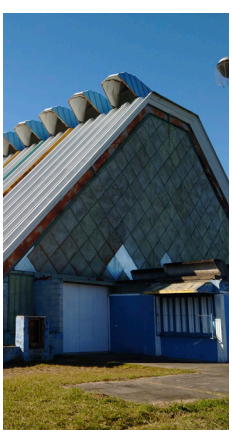
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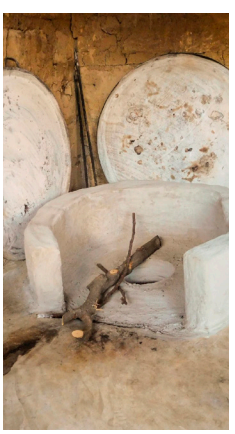
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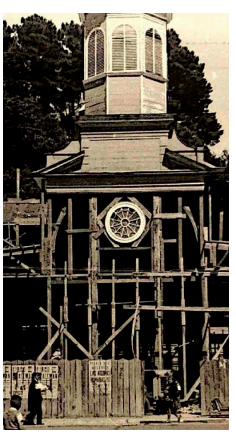
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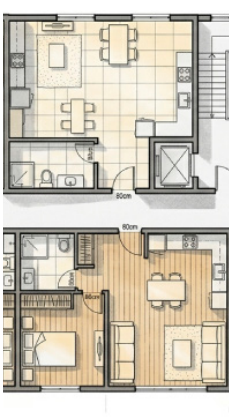
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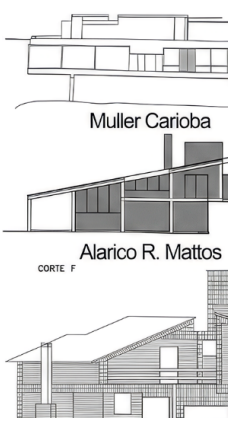
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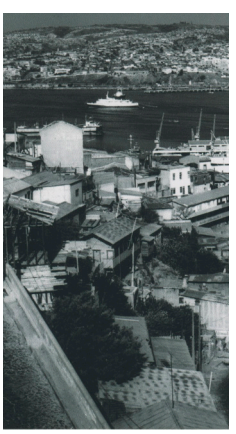
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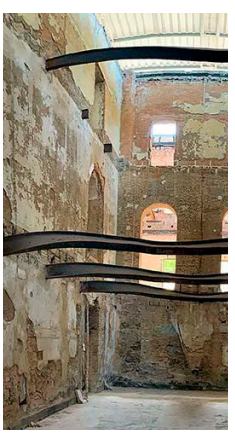
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Un mundo nuevo

Los recientes acontecimientos políticos que han sacudido las políticas internacionales en estos últimos tiempos dejan a la arquitectura como un factor aparentemente ajeno a los cambios estructurales a los que el mundo se ve sometido. Tales cambios se ven reflejados en guerras, invasiones, ocupaciones, la mayoría de las veces omitiendo -o derechamente transgrediendo- lo que pomposamente se ha llamado el "orden mundial". El optimismo social por un mundo que respetaba la ley y los acuerdos entre los países, amparados en aparatosos organismos internacionales, parecía que, además, podía trasladar sus soluciones a la arquitectura, de modo que la disciplina en los últimos años nunca fue más internacional y más variada, más fastuosa y, también en casos memorables, más discreta. Ha sido realizada en directa y simple relación a los avances tecnológicos, acarreando nuevos desafíos impuestos por el cambio climático, la sustentabilidad, los nuevos medios de producción, y, sobre todo, ante el agotamiento energético tradicional ha buscado nuevas fuentes; las nuevas exploraciones indagan ahora sobre nuevos tipos de energía cuyos recursos naturales -litio, tierras raras- despiertan los más voraces apetitos políticos y económicos.

La pobreza, el hambre, la miseria de buena parte del planeta, alojados en los países menos desarrollados, no fueron flagelos suficientes para imitar, adherir, o simplemente habitar, lo que llamamos "el desarrollo". En este lado de la vereda, el dibujo de esta situación, se solidificaba extendidamente en el tiempo. Dicho de otra manera, no se alcanzaba el desarrollo a la cabeza del tren, pero se viajaba con cierta costumbre y comodidad en el vagón de cola.

La habitual división -esquemática, por cierto- entre un polo liberal versus un polo socialista, que después de la Segunda Guerra Mundial se transformó en un constructo compartido, luego de siete décadas parece derrumbarse víctima de su propia somnolencia.

La democracia, la gran ganancia originada por el desarrollo social del siglo XIX y consolidada en el XX, había conseguido mantenerse en pie como un mástil al que aferrarse como garante de un mundo, acaso más ilusionado y optimista en su manera de gestionar sus derroteros. Cada país, cuál más, cuál menos, había conseguido en buena ley, o a veces con muecas y quizá con escepticismo, invocar sus virtudes para establecer sus estrategias y participar en el drama del desarrollo moderado y continuo. El mundo occidental, parecía dar lecciones al resto del mundo, al validar para todo un modo aparentemente mejor, ya que, por lo demás, era el nuestro.

¿Han retornado los imperios? La olvidada práctica del golpe en la mesa, de la tirada del mantel en la cena de las transacciones del poder, ha pasado a definir que ya no habría dos, sino al menos tres comensales que hoy esperan repartir el pastel que queda. Al poder estadounidense y al ruso, hoy se le allega a la mesa el chino. Se trata de un invitado del que poco se conoce, pero con el que mucho se comercia. Como sea, cada uno tiene parte en la comida; sus apetitos son insaciables. Sus propias acciones desmedidas justifican las del

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contrario, de modo que "si tú lo haces yo también tengo el derecho". No hay oposición, hay solo delimitación del territorio de la acción, "yo aquí y tu allá, sigamos negociando".

De una u otra manera, los dogmas caen, y en la prensa puebla la desinformación y el desconcierto.

Se ha defendido con persistencia unas maneras que la cultura occidental ha validado. La arquitectura, ha aislado en un sitio aparte lo que las cabezas de sus propios poderes han considerado como la "buena arquitectura", en desmedro de "otras arquitecturas", seguramente más fáciles de enjuiciar, pero menos de comprender. Si el orden mundial se ha defendido, hoy parece que en realidad se ha protegido algo que eventualmente nunca ha existido. Este desencanto ya se ha instalado como un patrimonio mundial.

Latinoamérica ha sido, sin querer, parte de estas nuevas tensiones. Su viaje a la upa del péndulo de la izquierda a la derecha más extrema, presa de paganos y santones -algunos dictadores y otros ególatras-, no termina de ceder a la estabilidad que promete la democracia. La invasión, una palabra que parecía olvidada en el pasado, ha retrotraído a un estado de perplejidad, enojo, estupefacción y desconcierto. Nadie tiene el asiento asegurado, ni menos un futuro cierto. La arquitectura, en este ambiente, podría fácilmente entrar a reflejar la falta de certezas y peor aún, la desvergüenza. Ese es un riesgo permanente. Sin embargo, desde Arquitecturas del Sur, la insistencia sobre alternativas propias de la arquitectura, un modo cultural extendido por el territorio y la academia desde las últimas cuatro décadas, sigue resistiendo obstinadamente. Ahí seguimos, en un mundo nuevo.

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BRAZILIAN AND ARGENTINIAN SOCIAL HOUSING (1960-1980): POLITICS, ARCHITECTURE, AND URBANSCAPE

HABITAÇÃO SOCIAL BRASILEIRA E ARGENTINA (1960-1980): POLÍTICA, ARQUITETURA E CIDADE

VIVIENDA SOCIAL BRASILEÑA Y ARGENTINA (1960-1980): POLÍTICA, ARQUITECTURA Y CIUDAD



Figure 0. Presidente Castelo Branco Housing Complex. Source: Negrelos (2021, p.263).

CAPES - Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior

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ABSTRACT

State-funded housing production in Latin America underwent significant changes in the mid-20th century, driven by changes in the global political and economic landscape. Since the 1930s, architecture and the state had worked together to adapt modern design to the local context, but in the 1960s, new governmental actions in urban, social, and economic development, marked by a clear reduction of modern ideals, were established and remained in place until the 1980s. This research aimed to compare, from a transnational perspective, the social housing in São Paulo and Buenos Aires, the largest cities in Brazil and Argentina, between the 1960s and 1980s, to unravel the socio-spatial implications of housing policies during that period in the two metropolises. In addition to analyzing morphological similarities and differences, it is interesting to record the relationships between politics and architecture in those contexts, recognizing that they affected not only the formal aspects of social housing but also the population's lifestyles. The research revealed similarities, such as the close relationship between governments and large construction companies, the main entities responsible for building mega-housing projects during that period. At the same time, significant differences were also revealed, especially regarding housing projects: in the Brazilian case, based on extensiveness and horizontality; in the Argentinian case, on intensive and vertical occupation; and on the issue of project authorship, attributed to promoting entities in the former and to architectural firms in the latter. The conclusions indicate that, at that time, state housing production prioritized economic development over social issues.

Keywords: Buenos Aires, housing complexes, dictatorships, housing policy, São Paulo

RESUMO

A produção habitacional estatal na América Latina experimentou transformações substanciais em meados do século XX, impulsionadas pela mutação do panorama político-econômico global. Desde a década de 1930, a Arquitetura e o Estado atuaram conjuntamente na adaptação do projeto moderno ao contexto local. Todavia, nos anos 1960, novas ações governamentais voltadas ao desenvolvimento urbano, social e econômico – com acentuado declínio do ideário moderno – estabeleceram-se e perduraram até a década de 1980. O objetivo desta pesquisa foi comparar a habitação social em São Paulo e Buenos Aires, as maiores metrópoles do Brasil e da Argentina, entre as décadas de 1960 e 1980, visando elucidar as implicações socioespaciais das políticas habitacionais do período sob uma perspectiva transnacional. Além de analisar convergências e divergências morfológicas, interessa registrar as interlocuções entre a política e a arquitetura naqueles contextos, sob a premissa de que tais dinâmicas impactaram não apenas o aspecto formal da habitação social, mas também os modos de vida da população. A pesquisa evidenciou semelhanças, como a proximidade entre governos e grandes construtoras, principais responsáveis pela execução dos megaconjuntos habitacionais do período. Simultaneamente, detectaram-se disparidades significativas, sobretudo quanto aos projetos habitacionais, baseados, no caso brasileiro, na extensividade e horizontalidade, e, no caso argentino, na ocupação intensiva e verticalizada. Essa divergência estendeu-se, igualmente, à autoria dos projetos, atribuída aos órgãos promotores no primeiro contexto e a escritórios de arquitetura no segundo. As conclusões indicam que, no período em questão, a produção habitacional estatal priorizou o desenvolvimento econômico em detrimento das demandas sociais.

Palavras chaves: Buenos Aires, conjuntos habitacionais, ditaduras, política habitacional, São Paulo

RESUMEN

La producción de vivienda estatal en América Latina experimentó cambios significativos a mediados del siglo XX, impulsados por transformaciones en el panorama político y económico mundial. Desde la década de 1930, la arquitectura y el Estado habían trabajado para adaptar el diseño moderno al contexto local, pero en la década de 1960 se implementaron nuevas acciones gubernamentales en materia de desarrollo urbano, social y económico, con una clara reducción de los ideales modernos, que se mantuvieron hasta la década de 1980. El objetivo de esta investigación fue comparar la vivienda social en São Paulo y Buenos Aires, las ciudades más grandes de Brasil y Argentina, entre las décadas de 1960 y 1980, con el fin de dilucidar las implicaciones socioespaciales de las políticas de vivienda en ambas metrópolis, en el contexto latinoamericano, desde una perspectiva transnacional. Además de analizar las similitudes y diferencias en el diseño, se registran las relaciones entre la política y la arquitectura en dichos contextos, entendiendo que estas impactaron no solo el aspecto formal de la vivienda, sino también el estilo de vida de la población. La investigación reveló similitudes, como la estrecha relación entre los gobiernos y las grandes constructoras, las principales entidades responsables de la ejecución de megaproyectos de vivienda durante ese período. Al mismo tiempo, se evidenciaron diferencias significativas, especialmente en lo que respecta a los proyectos de vivienda: en el caso brasileño, basados en la extensión y la horizontalidad; y en el caso argentino, en la ocupación intensiva y vertical, así como en la cuestión de la autoría del proyecto, atribuida a los organismos promotores en el primer caso y a los estudios de arquitectura en el segundo. Las conclusiones indican que, en aquel entonces, la producción estatal de vivienda priorizaba el desarrollo económico en detrimento de las cuestiones sociales.

Palabras clave: Buenos Aires, conjuntos habitacionales, dictaduras, política de vivienda, São Paulo

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INTRODUCTION

This work is based on research investigating state housing production from a historical perspective to clarify the current understanding of the housing issue in Latin America. The research is set within transnational historiography and adopts a comparative approach (Bloch, 1998; Barros, 2014; Weinstein, 2015), a methodological strategy justified by the premise that the housing issue transcends national borders, especially in the context of Latin American dictatorships. As suggested by Devoto and Fausto (2008), the potential of comparative research between Brazil and Argentina has already been confirmed, especially in the field of politics, with studies on Vargasism and Peronism. Due to their spatial proximity and parallel historical development, the two societies are influenced by the "same great causes [...] that go back at least in part to a common origin" (Bloch, 1998, p.123). The dictatorships of the two countries in the second half of the 20th century, although rooted in their respective national histories, are situated within the broader context of the Cold War and the regional and international dynamics it produced. The trend of military intervention in politics was justified by combating the "communist threat"; in this scenario, authoritarian governments, consolidated through coups, violently repressed dissent, aligning themselves with developmental interests.

The dictatorial regimes devised new policies, bodies, and models for housing production. There is the construction of massive housing complexes, linked to the nature of the (re)settlement of precarious occupations and aligned with the valorization of private capital through the construction industry. The Brazilian case was analyzed in the studies of Pulhez (2014) and Negrelos (2021), while the Argentine case was examined by Yujnovsky (1984) and Ballent (2018). In the collection they organized, which compares the Argentine and Brazilian dictatorships, Lvovich and Motta (2023) include a chapter on housing, written by Samuel Oliveira and Gabriela Gomes. The latter also published an article comparing the housing policies of the Brazilian and Argentine dictatorships between 1964 and 1973 (Oliveira & Gomes, 2021). This text is based on key research and advances, analyzing two cases to highlight, through a comparison of selected housing complexes, how the relations between politics and architecture established by dictatorships are embedded in housing production and the configuration of urban space. For this work, we take São Paulo and Buenos Aires, the largest metropolises in their respective countries, as Case Studies.

The analysis transcended the morphological evaluation, aiming to understand the relationship among politics, architecture, and society in the two cities. In both cases, dictatorial regimes used housing as a tool of legitimization, social control, and ideological expression. The analysis highlighted how housing policies have affected society – including issues of housing access and socio-spatial segregation-and the long-term effects on the configuration of cities. In addition to analyzing project convergences and divergences, it is interesting to examine how architecture indirectly strengthened or questioned political power, and to reveal the limits and possibilities of planning in those contexts. We consider that the analysis helps situate these groups within the political, economic, and social context of each

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country and contributes to discussions about the role of the state in the production of urban space in Latin America.

In Brazil, the ideology of homeownership, assumed by the state and intrinsically linked to the commodification of housing, sought to establish an identity between the worker-owner and capital, aiming to disarticulate popular organization. By basing the urban housing policy on a banking institution, the regime boosted civil construction, with the expectation of generating jobs and strengthening the economy. However, the priority given to the construction of large housing complexes, often in peripheral areas and with insufficient infrastructure, has led to serious social and urban problems. Urban development, in this context, tended to "skip" areas not yet allotted, valorizing the intermediate arable land by extending infrastructure to the complexes (Negrelos, 2021). Within the scope of space production, this same logic was manifested in the way the workforce itself sought to address the housing issue (the triad of own house–self-construction–working-class lotting), since access to state housing was restricted, thereby marginalizing a large portion of the population.

In Argentina, the right to the city and citizenship, which Peronism had guaranteed to workers, was put in check by dictatorships. These, in defining who was worthy of living in the capital, demanded that they "deserve" housing in the housing complexes promoted by the authoritarian state. This ideological and strategic vision conceived the capital as the "showcase of the country " – a place for "decent people" – and that it should express order, cleanliness, and the absence (or concealment) of poverty and its reflections, such as crime, subversion, and popular unrest (Oszlak, 2019). Urban remodeling in Buenos Aires adopted a metropolitan logic, prompting the construction of large complexes in areas historically neglected by the real estate market, thereby ensuring the valorization of urban land (Lvovich & Motta, 2023). Many of these complexes were erected where slums once stood, which were eradicated, with their residents being compulsorily displaced outside the capital.

THEORETICAL FRAMEWORK

Latin America gained prominence in the Western scenario during the Cold War, a period marked by the convergence of several factors that shaped the reality of the region's countries, with an emphasis on diverse forms of assistance and institutional support from, above all, the United States[1]. In this context, the "Latin American city" was understood as the *locus* of development, associating urban modernization with economic growth (Gorelik, 2024). However, this modernization reduced demand for rural labor, which, combined with other factors, drove the rural exodus in several countries.

The ideology of "developmentalism" advocated active state intervention to foster industrialization as a means of overcoming underdevelopment. It is not surprising, therefore, that such a doctrine has been articulated and found support in authoritarian regimes. In this scenario, in nations such as Brazil and

1 The Economic Commission for Latin America (ECLAC), the Inter-American Center for Housing and Planning (CINVA), and the Inter-American Planning Society (SIAP) stand out. Also noteworthy are the actions and works promoted by the Alliance for Progress and the Inter-American Development Bank (IDB).

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Argentina, housing policy prioritized an economic bias in development, often to the detriment of urban or social issues, establishing a strategic partnership between military governments and big finance capital and civil construction (Yujnovsky, 1984; Campos, Brandão, & Lemos, 2020).

After 1960, amid a new political, social, and economic landscape, the architectural field gradually began to question the repertoire that had produced housing complexes based on modernist ideology between 1930 and 1960. Subsequent discussions in the field focused on topics such as urban reform, agrarian reform, *favela* rehabilitation, identity and regionalism, and criticism of the modernist ideology itself. New ways of inhabiting and producing urban space were needed. It was seen that, contrary to expectations, technological, industrial, and social development lagged behind the advanced urbanization process, indicating that the city could not be merely an instrument of modernization.

Urbanization and housing production in São Paulo and Buenos Aires

Intense countryside-to-city migration accelerated urbanization from the 1960s onward. Capitals and large urban centers became magnets, registering unprecedented population growth. This urban expansion, often rapid and disorganized, combined with ineffective public policies, has led to the proliferation of precarious settlements, especially in the peripheries, exposing deep social disparities. The 1960 Census revealed that São Paulo was already the most populous city in Brazil, with 3,825,351 inhabitants; by 1970, its metropolitan area covered 37 municipalities and totaled 8,139,730 inhabitants. The Argentine Census of 1960 recorded 2,966,634 inhabitants in Buenos Aires and a population almost three times larger in the 24 municipalities of Greater Buenos Aires.

If, in the 1940s, population growth boosted the supply of labor for the industries that developed in São Paulo and Buenos Aires, from 1960, this dynamic changed significantly. In São Paulo, the continued expansion of the industrial sector failed to absorb the vast "reserve army" of migrant workers. In Buenos Aires, the crisis of the industrialization model and the welfare state resulted in massive unemployment. Not by chance, amid accelerated urbanization and growing demand for infrastructure, the governments of both countries saw civil construction as a strategic solution. This sector was intensively supported to absorb part of the surplus labor concentrated in urban areas. Thus, housing policies had a dual objective: to combat the housing shortage and, simultaneously, to serve as a motor of industrialization, a job bank, and an instrument for managing social pressures (Azevedo & Andrade, 2011). In Brazil, the ideology of "*casa propia* or own house" ensured that the worker-owner prioritized his family security over the class struggle; in Argentina, the policy of aggrandizing the federal capital resulted in the accommodation of part of the population in the "*Ciudad modelo* or model city". However,

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it imposed a massive displacement – about 200,000 people–, especially of the "*villera*" population, out of that area (Lvovich & Motta, 2023).

The construction of "mega-complexes" marks the 1960-1980 period, representing the state's response to a multifaceted crisis of employment, housing, social conflicts, and unorganized urbanization. According to Negrelos (2021, p.69), the "megacomplexes" arise from an interpretation of the modern movement, adopting its principles "in the sense of the extreme rationalism of construction, "[...] to achieve maximum economy, that is, rather than conceptual rationalism, budget efficiency". In this analysis, the term "megacomplex" will be used to designate projects with more than 1,000 housing units. However, the "interpretation of the modern movement" has taken quite different forms in Buenos Aires and São Paulo. In Buenos Aires, constructive rationalism aligned with conceptual rationalism and new formal propositions, allowing some groups of the time to be visualized in the panorama of postmodern architecture. In São Paulo, constructive rationalism reached its peak, characterized by the extensive use and repetition of housing typologies.

Political instability characterizes the broad period between the decline of Peronism in 1955 and 1983 in Argentina, marked by the alternation of authoritarian and democratic regimes. In this context, the housing issue was addressed by an institutional complex that stood out for implementing several "plans". The problem of favelas - the *villas miseria* or *villas de emêrgencia*- began in 1958 with the Immediate Action Plan and persisted throughout the period; through the PEVE – Emergency Village Eradication Plan (Law 16.601 of 1964) – and the VEA -Viviendas Económicas Argentinas Plan between 1969 and 1973 (Riera, 2021), when Buenos Aires' megacomplexes were built. The VEA plan became the instrument that supported the construction industry, favoring large construction companies and a more concentrated industrial sector, by using the state as an economic dynamizer (Oliveira & Gomes, 2021). The promotion of tenders under the "project and price" system, through which those responsible for the design and implementation of state-funded complexes were selected, favored the connection between architectural firms and construction companies (Yujnovsky, 1984). At the same time, the construction of large housing complexes entailed an overvaluation of urban land.

After the 1964 coup in Brazil, the Varguista institutional complex was replaced by a new state apparatus focused on housing production. This was primarily structured around the National Housing Bank (BNH) and Housing Companies (COHABs), while the construction of the complexes was left to private initiatives. The COHABs formed "land banks" by acquiring arable land, often still rural, and boosting its value through infrastructure built to accommodate the complexes and through speculation. The "BNH housing complexes" used standard housing units developed by COHABs, adaptable to different construction processes and spaces. The responsibility for the executive project and

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for implementing the complexes through bidding was left with the contracted construction companies. The Companhia Metropolitana de Habitação de São Paulo (COHAB-SP), the main promoter body in the municipality during the period, was created in 1965. Added to this production is the action of the Caixa Estadual de Casas para o Povo (CECAP). With a diverse structure, CECAP was in charge of the project (prepared by a technical team) and the marketing of housing units on donated land (Negrelos, 2021).

METHODOLOGY

> "[...] in our domain, what is comparable? It is unquestionably this: to choose in one or more different social circles two or more phenomena which seem, at first sight, to present certain analogies to each other, to describe the curves of their evolution, to find the similarities and the differences, and, as far as possible, to explain the one and the other. (Bloch, 1998, p. 120)

Comparative history offers the possibility of a "reciprocal illumination" between distinct phenomena, allowing, when confronting two realities, to highlight the essential characteristics of one and show aspects of the other, and, simultaneously, identify the absence of elements in both (Barros, 2014). Studying Brazil and Argentina between 1960 and 1980 allows us to analyze diverse responses to similar contexts and processes, shedding light on the relations between politics and architecture in Latin America. The discrepancies in housing policies and in the possibilities for action within the architectural field have resulted in markedly different productions, whose urban and social impact on the population has been documented by historiography (Yujnovsky, 1984; Negrelos, 2021) and can be observed contemporaneously, even in current housing guidelines.

The case studies were selected because they showed the desired comparative aspects. Although they share similarities, such as peripheral location, they are distinguished in Argentine projects by the impact of architects' participation, often alienated from Brazilian production. In Buenos Aires, in complexes of single-family units, the Garden-City referent persists; in São Paulo, such an urban paradigm is suppressed. In the verticalized complexes, Buenos Aires highlights the referential of the superblock/ neighborhood unit and a search for identity expressed in architecture, while São Paulo resorts to the repetition of typologies, without any formal connection to the notion of identity.

The analyzed material comprises secondary and iconographic sources, whose summarized results will be presented in a textual narrative, with the contribution of images, and from a comparative and transnational perspective.

DEVELOPMENT

Between 1955 and 1983, 36 housing projects were promoted in Greater Buenos Aires, totaling 35,188 units. Of this total, ten have between 1,000 and 10,000 housing units. In the 1960s, almost all of the capital's territory was occupied. However, most of the complexes were built in this area, especially

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Figure 1. Location of housing projects in Greater Buenos Aires (1955-1983). Source: Prepared by the author.

on land near the southern administrative boundary along the Matanza-Riachuelo River (Figure 1). This was the least urbanized area of the capital, consisting mainly of floodplains that, nevertheless, had been occupied since the 1940s by migrants from the country's interior in search of employment in Buenos Aires' industry. Many of these occupations were "replaced" by housing developments as part of eradication plans. Most of them are mixed complexes, with *pavilions* (blocks with up to four floors), *monoblocks* (vertical), and towers, prioritized.

In 1962, the occupied area of São Paulo largely exceeded the municipal limit to the southeast, following coastal connecting roads and, in the east, expanded into neighboring municipalities. It was in these vectors, where new industries had been established since the 1940s, that most of the 27 large housing complexes produced by COHAB-SP were concentrated, totaling 84,386 units (Figure 2). Of this total, 16 projects have more than 1,000 housing units, three of which have more than 10,000. In 1972, CECAP delivered a single mega-complex in Guarulhos, in the metropolitan area. As for the typologies, the complexes are mainly mixed, comprising single-family units and blocks.

In both cases, socio-spatial segregation processes are evident (Aravecchia-Botas et al., 2026). In Buenos Aires, the various plans to eradicate *favelas* have disarticulated the *villeras* organizations and reclaimed land from the capital in a proposal for urban redevelopment, which resulted in the construction of complexes considered "*model cities*" in areas hitherto neglected by the real estate market, guaranteeing their valorization (Oliveira & Gomes, 2021). The prioritization of access to housing for middle-income segments of the population implied that a large portion of

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Figure 2. Location of housing projects in Greater São Paulo (1964-1986). Source: Prepared by the author.



Figure 3. City of General Belgrano. Source: Catenazzi and Boselli (1999, p.44).

the poor population was excluded from benefits in São Paulo, resulting, by the end of the period, in the deepening of social inequalities and the intense growth of *favelas* (Negrelos, 2021).

In both cities, some projects recover the modern identity of housing and the city, particularly from the blocks' complexes (Ferrari, 2018), but above all from the urban project. In Buenos Aires, the urban referential of the garden-suburb appears in the conception of "Park-neighborhoods". This is the case of General Belgrano (1965-72, 3,024 units), built on 107 hectares in La Matanza, in the metropolitan area, with support from the IDB. The aesthetic (and ideological) referential of the Peronist chalet was abandoned, prioritizing unadorned construction, while maintaining the park as an urban foundation, incorporating extensive green areas and collective equipment (Figure 3). The project, led by architect César Ferrari, is authored by the Municipal Housing

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Figure 4. City of Tiradentes.
Source: Instituto Bixiga (n.d.)

Commission.

In the case of São Paulo, Comas (1986, p.127) records "two design formulas used alone or in juxtaposition", where one can recognize and consider the "BNH housing complex as an architectural standard". The first "is not distinguished from a modest urbanization of detached single-family houses, except for the repetitiveness of fiber cement roofs [...] that make up entire and long blocks" (Figure 4). The single-family houses of the city of Tiradentes (1984, 3,346 units**2**) are repeated throughout the 286-hectare plot and have a simple plan and reduced area, designed by COHAB-SP itself. The Garden-City reference, found in complexes built between 1930 and 1960 (Ferrari, 2018), is abandoned in favor of the "corridor" layout, which is associated with extensive earthworks and is common to several complexes of the period.

Comparatively, in addition to the dimensions of the occupied areas, the discrepancy in urban design and in the implementation of the units stands out, highlighting variations in the rotation and distribution of housing typologies in General Belgrano, as well as the reference to the garden-suburb/neighborhood unit. On the other hand, in Tiradentes – although there is no Complex Floorplan – it is possible to observe, in the aerial photo, the "long blocks" of identical units, without any variation. It can be stated that the concept of identity applies to the first case study, but not to the second.

The Alfredo Palacios Neighborhood, known as Catalinas Sur (Figure 5), differs formally from modern projects in that it uses towers rather than stock housing. However, it adopted the neighborhood-unit urban planning layout. In the 1.6-hectare complex, color was used as a distinctive element, with bright hues typical of tenements in the La Boca neighborhood, where it is located. The project is authored by architects Nicolás Susta and Estanislao Kocourek and engineer Miguel Garrone (Dunowicz, 2000).

2 Add up to 8,216 units in multi-family blocks.

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Figure 5. Alfredo Palacios Neighborhood. Source: Garrone et al. (1963/1964).



Figure 6. Presidente Castelo Branco Housing Complex. Source: Negrelos (2021, p.263).

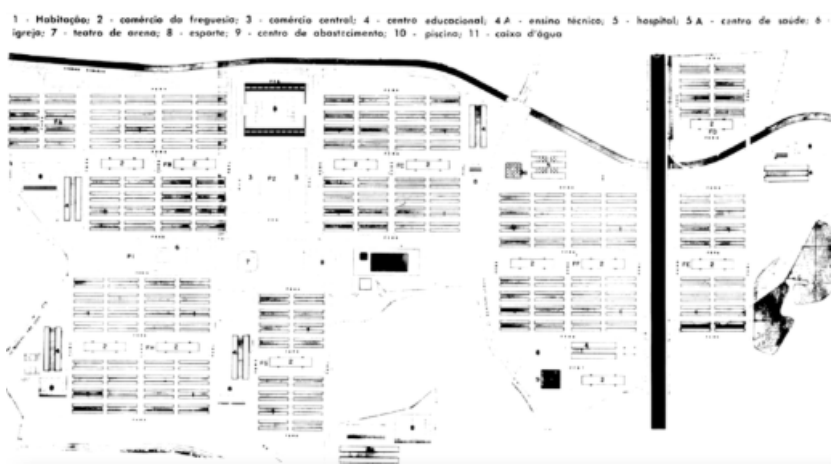


Figure 7. CECAP Park. Source: Housing Complex in Cumbica. (Motta, 1970, p. 32).

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Figure 8. General Savio Urban Complex. Source: Risolía & Aizenberg (2010, p.149).

The second typology identified by Comas (1986, p.127) is revealed precisely in the set of identical laminar blocks, whose "doors have no consistent relationship with the internal or peripheral streets". The Presidente Castelo Branco housing complex (1972-1983; 14,358 units), in Carapicuíba (Figure 6), represents this category, grouping blocks and single-family units in different sectors of the 240-hectare plot.

The CECAP Park in Guarulhos (1972: 480 units; 1980: 4,680 units), designed by Vilanova Artigas, Fábio Penteado, Paulo Mendes da Rocha, Alfredo Paesani, Maria Giselda Visconti, and Ruy Gama, differs from COHAB-SP production in many respects. The laminar multifamily block with three floors on pilotis was designed specifically for this complex, and the urban project (Figure 7) was organized into "parishes" -a concept analogous to the neighborhood unit – each with different equipment and free areas.

In the vertical complexes, the greatest asymmetries between Argentine and Brazilian projects occur. This phenomenon is attributed, above all, to the fact that in Buenos Aires these projects were the subject of competitions in which architects and construction companies collaborated on the execution of the complexes; in São Paulo, conversely, COHAB-SP elaborated standard projects, which construction companies replicated in accordance with local contingencies. Verticalization and intensive occupation are much more common in Buenos Aires than in São Paulo, whose periphery had large unoccupied complexes – unlike the Argentine capital, whose largest complexes, in area, are located in the Metropolitan Region. It is also noteworthy that, in Argentine cases, it is possible to note the affinity of urban projects with the reference of the "superblock/neighborhood unit", while, in São Paulo, according to Negrelos (2021), few projects had an urban planning that aimed to transcend the mere implementation of the largest possible number of housing units. From the end of the 1960s through the 1970s, the

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Figure 9. Soldati Urban Complex. Source: Bielus et al. (1973).

megacomplexes of Buenos Aires were formally presented in line with the "international urban renewal of the time, led by the group of Architects known as Team X" (Ballent, 2018, p. 43).

The General Savio Urban Complex (Lugano I and II) (1967-1983; 9,104 units), the first of Buenos Aires' mega-complexes, was built with the support of the IDB as part of the PEVE (Ballent, 2018). The project occupies 67 hectares and consists of monoblocks of 15 floors on pilotis, arranged in groups "arranged with breaks" (Dunowicz, 2000) that form large common-use spaces, with green areas and collective equipment (Figure 8). The work was carried out by a team of 33 architects and 30 engineers (along with other specialists), among whom Allende, Berllot, Ferrari, Schiaffì, Soucarros, and Viviani (Dunowicz, 2000) stand out.

The Comandante Piedrabuena Urban Complex (1974; 2,100 units; 14.4 hectares) also features monoblocks and pavilions in "connected semicircles" (Dunowicz, 2000). The project was designed by Estudio MSGSSV, a firm with significant activity in the housing sector at the time, by architects Flora Manteola, Javier Sánchez Gómez, Josefina Santos, Justo Solsona, and Rafael Viñoly. Another landmark is the Soldati Urban Complex (1972-1975; 3,200 units), which, with its 19.2 hectares, stood out for its unique architectural and urban composition, the result of the articulation of pavilions, monoblocks, and towers. The result was a diverse volumetry and conformation in the

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Cohab-sp

Em concorrência mais 6.251 unidades

Página 4

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PREFEITO VAI INAUGURAR ITAQUERA, O MAIOR CONJUNTO HABITACIONAL DO PAÍS

Figure 10. Publication of Cohab-SP in June 1980 regarding the Itaquera II/III housing complex. Source: Reports of Cohab Itaquera I (n.d.).

floor plan, with courtyards and free areas between the buildings (Figure 9). The firm Staff (Jorge Goldemberg, Olga Wainstein-Krasuk, and Angela Teresa Bielus) was responsible for this project and, with this compositional model, was successful in several other competitions.

In contrast, the mega-complexes of São Paulo are highlighted by historiography not for their formal attributes, but for encompassing thousands of housing units and, especially, for their extensively occupied areas. Among them, the Padre José de Anchieta, Padre Manoel da Nóbrega, and Padre Manoel de Paiva (1977, 1980, and 1981, respectively) and José Bonifácio (1978-1982) complexes stand out and comprise what Negrelos (2021) calls the "Itaquera complex" (Figure 10). In all, these groups add up to 34,122 housing units in horizontal and vertical multifamily and single-family typologies, both designed by COHAB-SP. The complex, with 415 hectares, constituted a strong growth driver in the East sector. The "East Zone" of São Paulo, where Tiradentes is also located, still carries the stigma of being a "place of housing complexes".

FINAL REMARKS

From the 1960s onward, the intensification of the urbanization process in both Buenos Aires and São Paulo contributed to the growth of precarious settlements. It reinforced the need for public housing policies. In the context of dictatorial regimes, based on developmentalism, civil construction was conceived as a solution not only to the housing issue, but, above all, to unemployment and economic development. Ideologically, housing has emerged as a symbol of the state's concern for the population and, paradoxically, as a tool to confront the "communist threat" identified in working-class struggles. In this process, the construction of "mega-complex" housing was adopted in both metropolises, with significant convergences and disparities.

The predominantly peripheral location of housing projects in both regimes functioned less as an urban solution and more as an instrument

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for consolidating social and economic domination. In this scenario, socio-spatial segregation was not a side effect but an implicit and deliberate result of political decisions. Despite the scale of the housing complexes of the period, the priority of serving middle-income populations accentuated the pre-existing social divides, relegating such strata to poorly integrated urban or suburban areas – whether in megacomplexes or by self-construction -, consolidating socio-spatial segregation as a structural feature of the two metropolises.

Between the 1940s and 1950s, the large scale of Buenos Aires projects was a distinguishing feature compared to São Paulo projects (Ferrari, 2018). However, this dynamic reversed dramatically in the subsequent period, analyzed here, in which the scale of São Paulo's projects became predominant. The megacomplexes of São Paulo occupy hundreds of hectares in peripheral areas that, in several cases, acted as vectors of growth and conurbation, redefining the metropolitan urban landscape. In contrast, the megacomplexes of Buenos Aires, with few exceptions, were erected on considerably smaller strips of arable land. However, they also formed fragmented landscapes, mainly due to their verticalization and the dissonant typology of the surrounding areas.

In the megacomplexes of São Paulo, the concern fell primarily on the number of housing units offered, favoring the construction companies' rationalist logic. The adoption of standard designs facilitated large-scale production but, due to the extent of the occupied areas, often entailed extensive earthworks that disfigured the original topography. The logic of socio-spatial segregation is evidenced not only by peripheral location but also by the scarcity of equipment, mobility, and urban infrastructure (Aravecchia-Botas et al., 2026).

Buenos Aires' megacomplexes stand out for engaging with postmodern precepts such as "fabric", "branches", and "streets in the air", creating expandable systems of circulation and social interaction. Unlike the Brazilian case, the Argentine competition system allowed large architectural firms to associate with construction companies to elaborate and implement projects, enabling professionals to translate latent discussions in the Latin American architectural field into practice (Weinstein, 2015). Despite this, the authoritarian context suppressed the social dimension in favor of an ideological "urban cleansing".

It is considered that the evident differences between housing production in São Paulo and Buenos Aires stem from a fundamental aspect: the degree of the architects' protagonism in the process. In both cases, there is an engagement between political power and the construction industry, particularly represented by large construction companies. However, there was a distancing between the state and architecture in housing production. Only in Argentina is it possible to affirm that architects acted in state production – albeit externally to the bureaucratic apparatus, through competitions. In contrast, in Brazil, they were removed from the space they

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had previously occupied during the alliance between the state and the modern movement.

When analyzing contemporaneity, the logic remains almost unchanged. The alienation of architecture in the production of urban space, driven by big capital and represented and taken up by the construction industry, is perpetuated by current housing policies. Despite the marks left by these groups (segregation, ecological, urban, and social problems), the production of social housing, with some exceptions, still submits to the rationality of construction companies, with typologies that refer to projects built between 1960 and 1980: extensive and horizontal in São Paulo and intensive and vertical in Buenos Aires. The transnational historical perspective helps rescue the role of the state in the production of urban space, as well as the trajectory of the architectural field itself and its relationship with politics, providing, perhaps, a basis for claiming the place once occupied by the modern movement and now overwhelmed by authoritarian regimes.

AUTHOR'S CONTRIBUTION CRediT

Conceptualization, C.F; Data Curation, C.F; Formal analysis, C.F; Obtaining funding; Research, C.F; Methodology, C.F; Project Management, C.F.; Resources; Software; Supervision; Validation; Visualization, C.F.; Writing – original draft, C.F.; Writing – revision and editing, C.F.

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THE SENSE OF PLACE IN STANDARD DESIGN SCHOOLS: THE CASE OF CAIC IN PELOTAS/RS, BRAZIL

O SENTIDO DE LUGAR EM ESCOLAS PADRÃO: O CASO DO CAIC DE PELOTAS/RS, BRASIL

EL SENTIDO DEL LUGAR EN LAS ESCUELAS ESTÁNDAR: EL CASO DE CAIC EN PELOTAS/RS, BRASIL



Figure 0. EMEF Francisco Caruccio gymnasium. Source: Collection of the authors from 2022.

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ABSTRACT

Person-environment relationships are a fundamental pillar in the construction of individual and collective identities. In this context, the insertion of new symbols and meanings from a project of standard school architecture and design can cause a rupture in the identity of the subjects who inhabit these spaces. The standard design consists of repeating an architectural design across different locations. This work aims to identify the way in which students of an educational institution with a standard design perceive the school environment in which they live. The research has a qualitative and phenomenological character and uses the Poem of Wishes as a method applied in a case study at the *Centro de Atenção Integral à Criança* (CAIC) in the city of Pelotas/RS, in southern Brazil. The results show how the transformation of the space took place in the studied school and how the architectural characteristics are related to the formation of the place.

Keywords: architecture, perception, standardization, school buildings, modern architecture

RESUMO

As relações pessoa-ambiente constituem um pilar fundamental na construção das identidades individuais e coletivas. Neste contexto, a inserção de novos símbolos e significados, provenientes de projetos padronizados de arquitetura escolar, pode provocar uma ruptura na identidade dos sujeitos que interagem com esses espaços. O projeto padrão consiste na repetição de um projeto arquitetônico em diferentes localidades. Este trabalho tem por objetivo identificar como os alunos de uma instituição de ensino construída a partir de um projeto padrão percebem e se relacionam com o ambiente escolar em que habitam. A pesquisa possui viés qualitativo e fenomenológico e utiliza como método o *Poema dos desejos*, aplicado em um estudo de caso no Centro de Atenção Integral à Criança (CAIC) na cidade de Pelotas/RS, no sul do Brasil. Os resultados apresentam como ocorreu a transformação do espaço na escola estudada e de que forma as características da arquitetura estão relacionadas à formação do lugar.

Palavras-chave: arquitetura, percepção, padronização, edifícios escolares, arquitetura moderna

RESUMEN

Las relaciones persona-ambiente son un pilar fundamental en la construcción de las identidades individuales y colectivas. Así, la inserción de nuevos símbolos y significados, colocados a partir de proyectos de arquitectura escolar estándar, puede provocar una ruptura en la identidad de los sujetos que lo habitan. El diseño estándar consiste en repetir un proyecto arquitectónico en distintas ubicaciones. El objetivo de este trabajo es identificar cómo los estudiantes de una institución educativa con un diseño estándar perciben el entorno escolar en el que habitan. La investigación tiene un carácter cualitativo y fenomenológico y utiliza como método el Poema de los Deseos aplicado en un estudio de caso en el *Centro de Atenção Integral à Criança* (CAIC) de la ciudad de Pelotas/RS, en el sur de Brasil. Los resultados muestran cómo se produjo la transformación del espacio en la escuela estudiada y cómo las características arquitectónicas se relacionan con la formación del lugar.

Palabras clave: arquitectura, percepción, estandarización, edificios educacionales, arquitectura moderna

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INTRODUCTION

In Brazil, throughout the First Republic (1889-1930), the understanding of education as a tool for social development was consolidated, leading to the emergence of the first buildings for exclusively educational use. Thus, during the 20th century, especially after the first half, the need for new teaching units was met by standardizing projects and rationalizing construction processes (Azevedo, Bastos & Blower, 2007).

The standard design is based on the repetition of an architectural project in different locations (Frampton, 2003). The use of these models, often applied in public institutions such as schools, hospitals, and daycare centers, seeks economy and speed in their implementation. The standardization of institutional buildings also reflects and identifies the political context of a given time (Azevedo, Bastos & Blower, 2007). However, the technical reproducibility of projects is not limited to formal issues; it can also influence how people perceive and interact with the space.

The built environment generates stimuli for users, who, in turn, respond with sensations and behaviors (Cavalcante & Elali, 2011). Therefore, a dynamic interaction between the person and the environment is observed, which transforms the space into a place. While space refers to a neutral, purely geographical location, place is the result of its inhabitants' interpretation. In this context, the concepts of meaning and identity of place refer to users' appropriation of space and their representation (Castello, 2007).

Despite the economic aspect and speed inherent in standard design, its use leads to a loss of characteristics of the local community where the building is installed, either in terms of comfort in the use of the construction (Kowaltowski, 2013) or the identity and cultural dimensions (Gaite, 2003). The research problem of this work concerns the recurrent adoption of standard architectural projects for public schools, often conceived without considering the sociocultural and territorial characteristics of the school communities that use them, which raises questions about how these spaces are appropriated, used, and attributed meaning by their users.

Thus, the objective is to identify how students of a standard design school perceive the educational institution they inhabit and if they configure it as a place. For this, a case study was conducted at the Comprehensive Child Care Center (CAIC) of Pelotas/RS. This article is an excerpt from Cordeiro's master's dissertation (2022), which used a physical-architectural survey, observation, a poem of desires, and interviews. To fit the scope of the text, only the results of observation and expressive activity are discussed here, given their direct relationship to the analysis of the place's dimensions. Although the complete triangulation is detailed in the dissertation, the findings presented remain consistent due to the convergence between observational data and symbolic productions of the participants.

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THEORETICAL FRAMEWORK

Environmental perception and sense of place

The environment acts as a constant matrix of sensory stimuli for the individuals who inhabit it, maintaining a bidirectional, interdependent, and reciprocal relationship with the subjects. The interpretation of these stimuli depends on physiological and psychological factors intrinsic to each person, which influence how they use, understand, and represent space. This relationship is cultural and dialectical, since the environment shapes human behavior, which, in turn, causes changes in the environment itself and in the social relations within it (Cavalcante & Elali, 2011).

Human identification with places occurs through living experiences in these spaces and through their representativeness and significance. The place is where the human being exercises their existence. The projection of meanings in the built environment transforms spaces into places. While "space" refers to the physical environment as a neutral geographical location, "place" refers to the interpretations and meanings attributed to space by the inhabitant. A place is an environment with enough perceptible elements to be identified as a reference structure, endowed with value, meaning, and identity (Castello, 2007). The place refers to the stability of the environment, as a refuge of being, and is associated with safety and comfort, in contrast to the vulnerability and freedom of space (Tuan, 1983).

The individual's bond with the environment is established through the relationship between the four dimensions of the place: (I) physical, (ii) symbolic, (iii) relational, and (iv) functional. The physical dimension refers to the attributes of identification and representation of the space. The symbolic dimension involves the interpretation of the meanings that the environment can refer to the individual. The relational dimension considers the environment as evocative of social relationships, while the functional dimension recognizes the physical environment as an element that performs a role (Cavalcante & Elali, 2011).

The person-environment relationship is established by integrating diverse human sensations into a complex structure that involves the appropriation of space, attachment to place, and place identity. These abstract feelings can be grouped and referred to under the unifying term "sense of place". The sense of place encompasses the connection between individuals and space, built from identification, feeling of belonging, attachment, and engagement with the place (Shamai, 1991).

Characteristics of the school as a place

The school environment comprises a complex interaction among its creators, managers, employees, teachers, students, and the built space, encompassing both material and immaterial aspects. The school building requires specific environments for its purposes. The configuration, sectorization, and dimensioning of these enclosures influence the way individuals use the building and interact with the environment and with each other (Azevedo, 2002).

The spatiality of the school building stems from its location, the arrangement of its rooms, the organization of the lot, and the elements that define the transition between the school's interior and exterior. Thus, the aspects of architecture that form the school built environment can be classified into four groups: (I) contextual-environmental, which refer to the geographical and cultural characteristics of the site, prior to construction; (ii) programmatic-functional, which relate to the performance and role of the built environment; (iii) aesthetic-compositional, related to the image and appearance of the construction; and (iv) technical-constructive, which involve the materialization of the built object (Azevedo, 2002).

These four groups of characteristics are not exclusive to schools; Mahfuz (2004) calls them the "contemporary quaternary of architecture" – place, program, formal structures and construction – whose interaction shapes the built environment. At the school, the program defines its identity as an educational institution, combining pedagogical and training objectives (Kowaltowski, 2013), and is guided by political-pedagogical ideals and local demands. This configuration highlights the duality of the school space as a role and symbol (Cabral, 2020).

The standard design in school architecture

The standardization of architecture aims to unify design methods and buildings. The standard design, widely used in Public Works, seeks economy and construction speed through the use of a previously established program of needs and the repetition of an architectural project in different locations (Frampton, 2003). The strengthening of the governmental image through the reproduction of the built object in highly visible locations in the city is another important aspect of the adoption of standard projects (Azevedo, Bastos & Blower, 2007).

Standard public-school projects operate based on the elements that identify them as benchmarks for behaviors and communications (Cabral, 2020; Cabral & Cordeiro, 2022). The visual elements of the built environment allow their identification, anticipating behaviors and languages associated with this environment, from political and pedagogical discourses (Cabral & Cordeiro, 2024). It is through social representations that public power concretizes the vision of the school and of education in school buildings, and standard-design schools reinforce this representation (Del Rio, Duarte & Rheingantz, 2002).

The school building, laden with meaning, integrates the pedagogical process; however, standard designs conceived as emergency solutions tend to reduce it to a mere shelter, disregarding local needs and compromising its identity (Pascua, 2008). By ignoring cultural specificities, these models weaken the sense of belonging and spatial diversity, since standardization restricts user participation and can generate environments without identity (Gutiérrez, 1989). Promoting the transformation of the space into a place requires understanding the meanings built over time in the relationship between the environment and its inhabitants.

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METHODOLOGY

The personal and subjective nature of the transformation of space into place evokes, for this research, a qualitative and phenomenological approach. Thus, a case study was adopted in a standard design public school in southern Brazil. This decision was made to allow observation and direct contact with the object of study. This enables the analysis of contemporary phenomena in school daily life, allowing for the verification of the problem's real existence and its analysis in an exploratory, descriptive, and qualitative manner (Gil, 2008).

For data collection and analysis, in addition to observation, the following method is proposed: *the Poem of Wishes*. From this method, participants have the opportunity to express their needs, emotions, affections, symbolism, and desires in relation to the environment in question, through texts and/or drawings. This allows for a deeper understanding of how individuals perceive space, as well as their expectations and aspirations for improvement (Rheingantz et al., 2009).

CASE STUDY

The CAIC of Pelotas / RS, Brazil

In 1990, the Federal Government of Brazil initiated a program to create full-time educational institutions to intensify social activities in neighborhoods without municipal government throughout the country. Thus, actions for health, education, and social development related to children and adolescents were combined in a single space comprising preschool, daycare, full-time first-grade schooling, childcare, living environments, and sports facilities (Sobrinho & Parente, 1995).

To meet this demand in the short term, the architect João Filgueiras Lima was invited to develop a standard architectural project for these schools (Kowaltowski, 2013). Thus, a first version of the CAICs was conceived, inspired by the experiences with park-schools and classroom-schools of the Bahian educator Anísio Teixeira, as well as in public schools in the state of Rio de Janeiro (Azevedo, Bastos & Blower, 2007).

After the crisis that plagued the Brazilian government in 1992, culminating in the impeachment of then-President Fernando Collor and the inauguration of Vice President Itamar Franco, the ministries were reorganized, and some government programs were changed. With these changes, the CAICs were definitively rolled out in 1993. The program kept its initial goal - the social development of underprivileged young people -experiencing only minor changes to mark a distance from the previous government (Sobrinho & Parente, 1995).

The CAICs (Figure 1) included a variety of activities, such as school education, early childhood education, special protection for children and families, sports, culture, health, education for work, food, technological education, as well as management and mobilization, which strengthened the program's social and support nature (Sobrinho & Parente, 1995).

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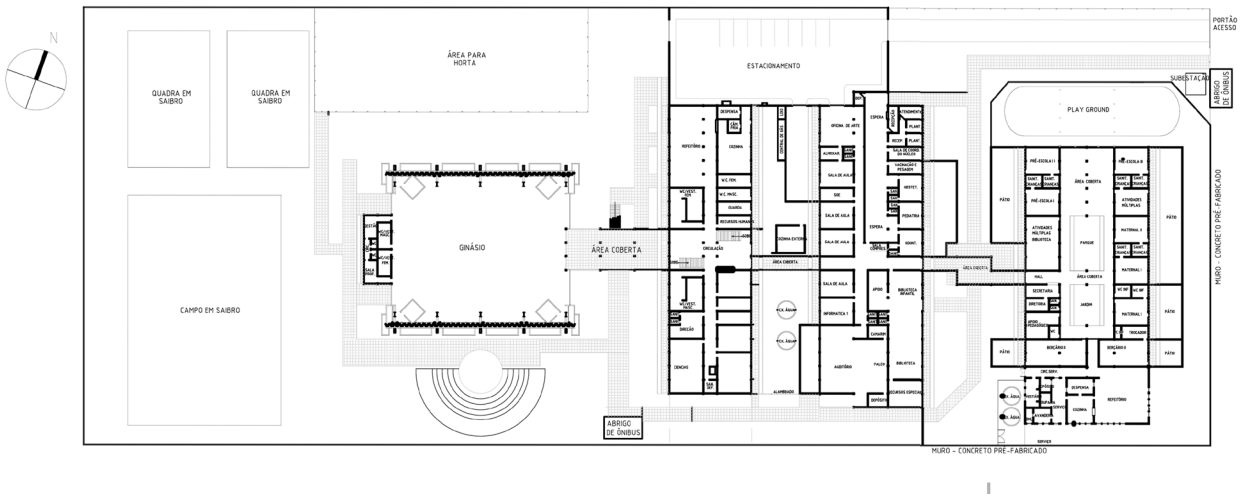


Figure 1. Floor plan-CAIC. Source: Cordeiro, 2022.



Figure 2. Location of Pelotas in Rio Grande do Sul, Brazil. Source: Wikipedia Pelotas (2026).

The case study concerns the CAIC of the city of Pelotas in the extreme south of Brazil, in the state of Rio Grande do Sul (Figure 2). This city is a benchmark in public education in the south of the state, with 94 municipal schools, 53 state schools, a Federal Institute, and a Federal University. Among these institutions, three are examples of standard design, and the CAIC is the only one that originated in a federal program and was implemented at the national level. The CAIC of Pelotas (Figure 3), inaugurated by the Ministry of Education in 1996, quickly abandoned its initial proposal for a full-time school and, instead, adopted the already existing municipal Francisco Caruccio Elementary School (Cordeiro et al., 2021).

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Figure 3. Francisco Caruccio Municipal Elementary School, in Pelotas. Source: Collection of the authors from 2019.

Although Comprehensive Childcare Centers (CAICs) constitute a specific public policy of the Brazilian context of the 1990s, their analysis goes beyond the national setting. In Latin America, institutional projects using standard architecture or replicable typologies, including schools, have been widely adopted as a strategy for rapid infrastructure expansion in contexts of socio-spatial inequality (Gaite, 2003; Gutiérrez, 1989; Cardellino, 2022). In the European context, although there are no directly equivalent contemporary programs, the literature records the historical dissemination of standardized school typologies, associated with the rationalization of public construction and state social formation projects, especially in the late 19th century and in the interwar period (Helfenberger & Schreiber, 2019; Vilkončius, 2023). This background places the study of CAICs in the recurrent international debate on architectural standardization, constructive efficiency, and social adequacy.

Observation

Seven visits were carried out to observe both the school building and its surroundings on the following dates: 09/04/2019; 03/07/2019; 26/11/2019; 31/07/2020; 27/03/2022; 29/03/2022; and 04/08/2022. All visits took place in the mornings. The tours were guided by employees of each school institution operating in the CAIC building. The intent was to act discreetly and non-intrusively, interacting only with the person who accompanied the presentation for each room of the building.

The fieldwork was conducted systematically, based on previously defined categories of analysis based on the specialized literature, which guided the researcher's view and the recording of information. The categories of analysis

were structured in five lines: (I) contextual-environmental characteristics, (ii) programmatic-functional characteristics, (iii) aesthetic-compositional characteristics, (iv) technical-constructive characteristics, and (v) signs of transformation of space into place. For each category, registration units were defined, such as topography, vegetation, built environment, spatial organization, sectorization, access, materials, construction techniques, territoriality marks, reforms, and uses of the school space.

Data were recorded through a systematic photographic survey and annotations on observation sheets, organized according to the adopted analytical categories. This procedure made it possible to identify the physical, functional, and symbolic elements of the school space, as well as signs of appropriation and daily use that contribute to understanding the building as a place.

Poem of Wishes

The method was applied in two classes of the 8th Grade of EMEF Francisco Caruccio, a total of 40 students aged between 13 and 17. The sample was selected because it is in an age group that presents greater capacity for critical reflection and symbolic expression about the lived space, maintaining a daily bond with the school. On 04/08/2022, students were invited to reflect on their experiences at school by answering the following questions: "What do I like about Francisco Caruccio school?" and "How would I like the Francisco Caruccio school to be?" Participants expressed their thoughts through drawings and texts, without the need for technical elaboration.

Each student received sheets of A4 paper, colored pencils, No. 2 pencils, an eraser, and a sharpener for the activity. An environment free of criticism or judgment on the works produced was ensured. Conversations with the students during the application of the method were recorded and transcribed, forming the corpus of the data collected. All students who participated submitted a participation consent form signed by their guardians. To preserve students' identities, they were identified by an acronym consisting of a letter and a number.

The analysis of the poems of wishes followed Bardin's (1977) content analysis methodology, identifying record units that were categorized thematically. The categories included the dimensions of the place (Castello, 2007; Cavalcante & Elali, 2011), the contemporary quaternary, and the characteristics of the architecture (Mahfuz, 2004; Azevedo, 2002). The thematic categories of analysis are presented in Table 1 below. Although the two proposed questions present a similar formulation, the resulting thematic categories partially differ, since they reflect, respectively, aspects of the lived space – belonging to the present time – and projections desired by the students, related to future expectations.

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Question	Thematic categories
What do you like about EMEF Francisco Caruccio?	People
	Environment
	Activities
How would you like EMEF Francisco Caruccio to be?	Environment
	Management
	People
	Activities
	Equipment

Table 1. Thematic categories of the poems of wishes. Source: Adapted from Cordeiro (2022).



Figure 4. Rua Dezesseis, no number, Pestano. Source: Collection of the authors from 2022.

The alignment between thematic categories and place dimensions is not rigid, and the same category can express more than one dimension depending on the context of speech or drawing. It was also observed that the item "what I like" shows dimensions already consolidated in everyday experience, while "how I would like it to be" reveals deficiencies and expectations. In this way, the dimensions operate as an interpretative structure of the emerging categories, allowing us to understand how the school space is transformed into a place.

DEVELOPMENT

The analysis of the case study was organized from the characterization of the place, followed by its four dimensions – physical, functional, relational, and symbolic. The participants' productions (Poem of wishes and transcripts) were examined through thematic analysis, and the identified themes were classified according to their correspondence to these dimensions.

The CAIC de Pelotas building is located in the north of the city, in the Pestano microregion, an area marked by socioeconomic vulnerability. Far from the center, the community faces challenges such as a lack of paving,

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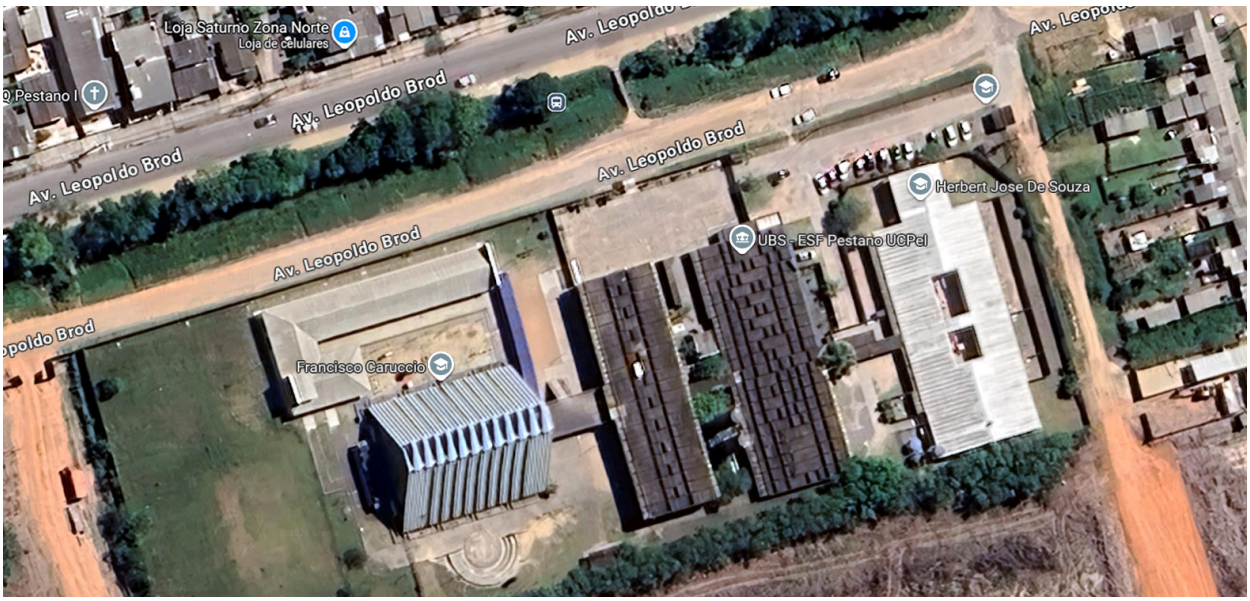


Figure 5. Aerial view of the building that would be the CAIC of Pelotas. Source: GeoPelotas, 2022.



Figure 6. EMEF Francisco Caruccio. Source: Collection of the authors from 2022.

inadequate pavement, and open sewerage (Figure 4). The building, located on a flat, rectangular plot (Figure 5), occupies a prominent position at the very beginning of the lot. Following the national logic of implementing the CAICs (Sobrinho & Parente, 1995), the building was installed in a peripheral neighborhood to serve as public equipment for the region's social and urban development, in a historically underserved place.

The building was built with prefabricated reinforced mortar elements, as determined by the standard design. The project was divided into four sequential blocks, connected by covered walkways. The architectural language of the CAICs has a modern identity (Figure 6), and the Pelotas building was no different. All the blocks, except the gymnasium, had a rectangular modulation, with the spaces arranged around the corridors and

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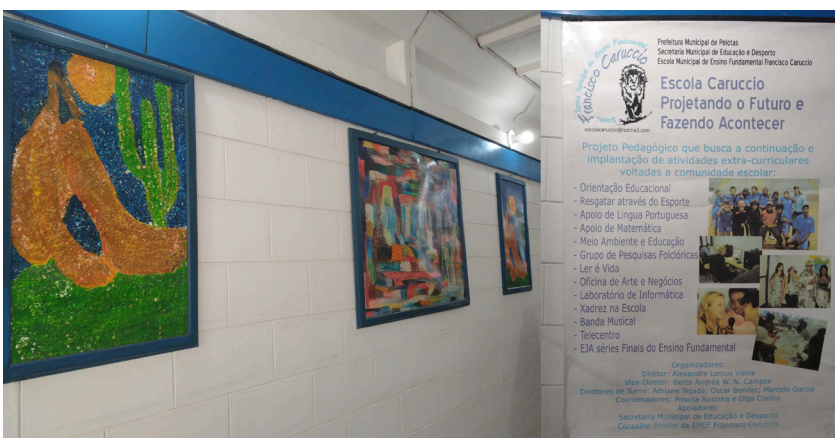


Figure 7. EMEF Francisco Caruccio gymnasium. Source: Collection of the authors from 2022.

Figure 8. Signs of appropriation at EMEF Francisco Caruccio. Source: Collection of the authors from 2022.

walkways. The gym block (Figure 7) has a greater hierarchical appearance than the rest of the building due to its trapezoidal shape and size.

Currently, the building houses two municipal schools, EMEI Herbert de Souza and EMEF Francisco Caruccio, which expands its programmatic diversity. In addition to the classrooms, the complex comprises a gymnasium, auditorium, laboratories, library, cafeteria, and sports areas, configuring an educational and sociocultural building of great functional complexity for the neighborhood. The appropriation of space and attachment to the school are evident in the speech of the research participants, as well as in the corridors and classrooms of the institutions. According to one of the students (A8B6):

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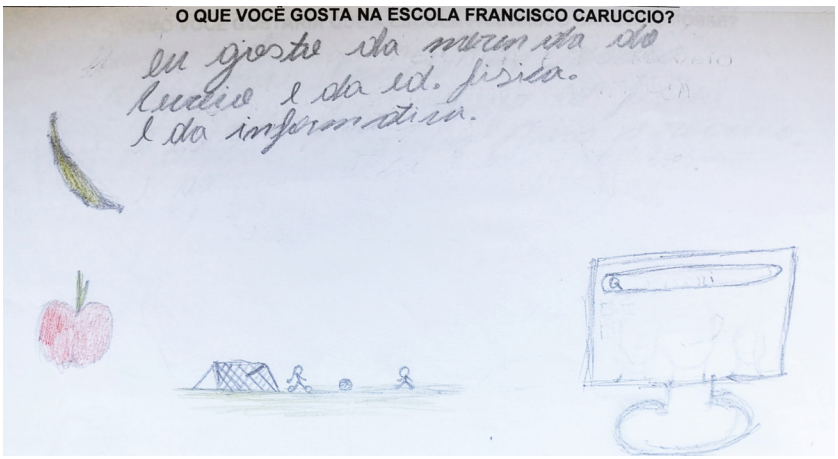


Figure 9. Poem of wishes – A8A 8. Source: Collection of the authors from 2022.

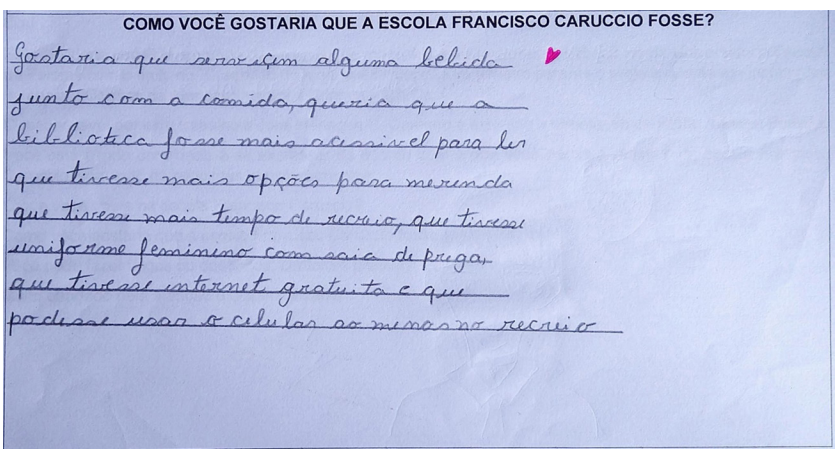


Figure 10. Poem of wishes – A8B 4. Source: Collection of the authors from 2022.

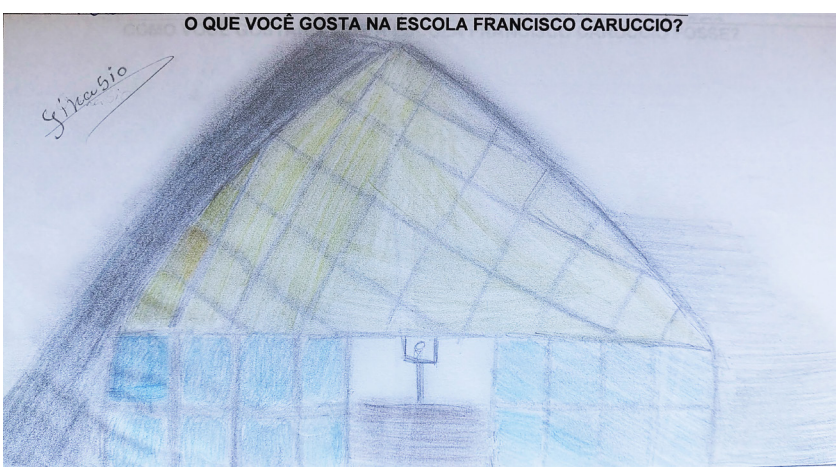


Figure 11. Poem of wishes – A8B 10. Source: Collection of the authors from 2022.

"[...] I like the entire school [EMEF Francisco Caruccio]." In the entrance halls and corridors of the schools, panels depict their history, featuring photographs and students' work, reinforcing the identity of the spaces (Figure 8). These can be considered traces of the transformation of space into place.

The functional dimension is related to the role that the building performs for its inhabitants and can be observed from the emphasis given to the

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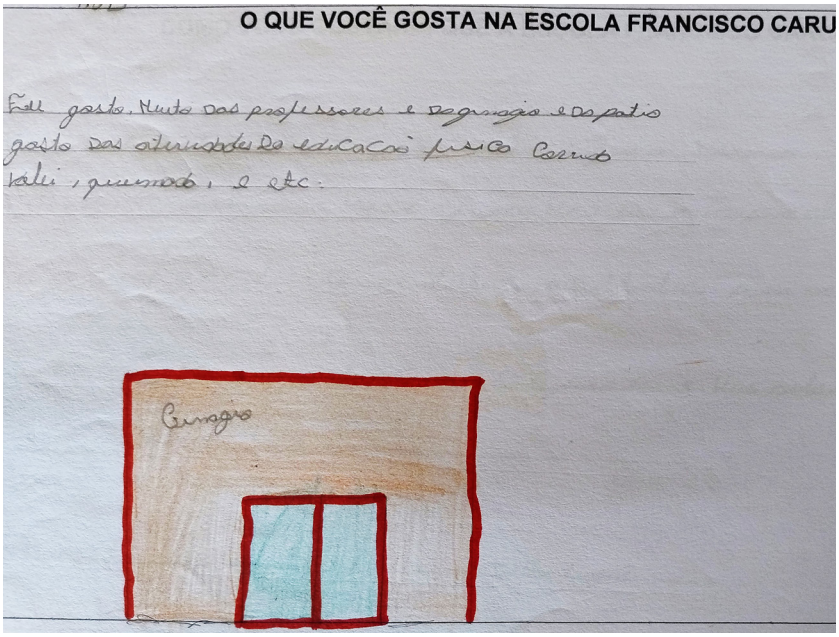


Figure 12. Poem of wishes – A8B 3. Source: Collection of the authors from 2022.

program of EMEF Francisco Caruccio, presented during the activity of *poems of wishes*, especially concerning the gym, the football field, the computer room, the library, and cafeteria (Figure 9). In responses to the question "What do I like at school?", the functional dimension recurred, especially regarding meals, access to Information Technology, the gym, and cultural activities. These elements were mentioned as experiences already part of daily school life, which indicates that the social impact of the institution is not limited to future expectations, but is realized in the present. The provision of adequate food, internet access, and participation in extracurricular activities were described as positive aspects of the school. Although in the question "How would I like it to be", some students have requested improvements in these same aspects – such as increased access to technology or a greater frequency of cultural activities (Figure 10) –, the answers show that such functions already play a relevant role in students' lives.

The students have also mentioned the gymnasium as one of the spaces in the school that they appreciate. However, not all students who mentioned the gym did so for the same reason. Some drew it very similarly to the real building, with the same shapes and colors (Figure 11), while others represented it as a square with colors different from those in the building (Figure 12). To this fact, it is attributed that the former described it by its image and the others by the activities that took place inside it, which evidences the particularity of the formation of the place for each individual and the way in which its dimensions are intertwined.

The students perceive the school's monumentality as an imagistic reference for the place. It is noted, in the poem presented above, that the student not only represented the different format of the gymnasium, with its colors and textures, but also that the drawing occupied almost all the space available on the sheet, evidencing its monumentality. In another poem,

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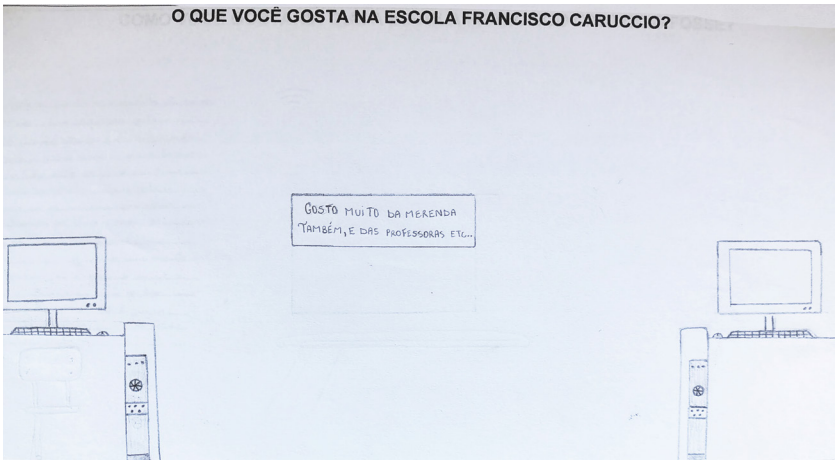


Figure 13. Poem of wishes – A8B 7. Source: Collection of the authors from 2022.

a student mentioned that she "quite likes the size of the school" (A8A 5). Another aspect present in the students ' imagination is that it represents a technological environment, due to computers and the possibility of Internet access (Figure 13). Although these technologies are related to computer class activities, for example, and can make up part of the functional dimension of the place, the technological environment also represents part of the physical and imagistic dimension of the place.

It is thought that the esteem for the project's monumentality and architectural language is related to the welcoming feeling created by the implementation of the standard project in the locality. The architectural language of prefabricated elements refers to industrialization, development, and progress, while the project's monumental scale refers to shelter, safety, and visibility. The physical dimension of the place is formed in the identification of the environment as an imagistic reference. It is linked to the individual's mental projection of the space. In the research participants' imagistic reference, there is a representation that combines grandiosity with welcoming, technology with teaching, and culture with community development.

Among the research participants, the functional dimension stood out as the most expressive in the case study, reflecting the supporting nature of the schools, essential to the Pestano community. This dimension manifests itself in two stages: immediately, by meeting needs such as education and meals, and in the long term, with subsequent benefits from cultural, sports, and professional training activities. It is perceived that, despite the importance of the physical dimension in the formation of the place, the participants considered it subordinate to functionality, valuing more the practical usefulness of the space than its image.

The relational dimension of the place is shaped by the interactions and activities that occur in the space. In the study, all participants recognized the school as a meeting point. Rooms such as the computer room, the amphitheater (Figure 14), and the gym are valued not only for their specific

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Figure 14. Poem of wishes – A8B 8. Source: Collection of the authors from 2022.

roles but for enabling coexistence, conversations, and moments of relaxation. According to one of the students (A8B 8), "here [... this is where we talk...] actually, the whole school is beautiful, but I like it more there because I am with my friends." It is from the place's relational dimension that the cultural plurality of the environment takes place, so that part of the appreciation for space is provoked by the encounters that take place in it.

The symbolic dimension of the place deals with people's memories and the meanings linked to the environment where they live. Therefore, it is a more subjective, individualized dimension of place. In the case study, it was observed that the affective connection to memory among the participants encompassed not only the schools analyzed, but also the neighborhoods in which they are located. The history of EMEF Francisco Caruccio and EMEI Herbert de Souza is related to the development of Pestano; thus, participating in educational institutions is also part of the neighborhood's construction. As memories and recollections are formulated differently for each individual, this is the most personal dimension of the formation of place.

From what has been presented, it can be seen that the place's dimensions lack well-defined boundaries between where one ends and where another begins. The transformation of a space into a place depends on the interaction of the four dimensions of place, which coexist continuously throughout this process, though with varying intensities and relevance. The roles each individual plays in a community are distinct, resulting in different assessments of place. The experience of space, which occurs through the perception of the four groups of aspects presented, will serve as a reference for the individual regarding the built environment. It is the interpretation of these factors that transforms space into place.

CONCLUSIONS

The standard design of the schools, with their monumental scale, broad program of needs, and strategic location, reflects a national program of public education and generates in the vulnerable community of Pestano a feeling of valorization and protection. Despite the standardized character, the

space was appropriated by the local population, being seen as an instrument of reception and development. The CAIC in Pelotas demonstrates how the dimensions of place – physical, symbolic, functional, and relational – influence and are materialized in the characteristics of the design, reinforcing its relevance in the geographical and cultural context.

Schools in Pestano also have characteristics that dialog with social progress and community integration. The rooms' organization promotes interpersonal interaction and symbolizes cultural and social values, while construction techniques, such as the use of prefabricated elements, enhance the space's functionality and economic efficiency. Thus, the architectural project combines functionality, aesthetics, and symbolism, consolidating itself as a milestone of progress and strengthening the ties between the community and the built environment.

This study contributes to the debate on standardization in school architecture by demonstrating that adopting repeatable projects does not necessarily entail the homogenization of spatial experience or the weakening of the sense of place. In the case analyzed, standardization ensured scale, programmatic diversity, and institutional visibility in a vulnerable area, creating material conditions for the construction of social and symbolic ties. The sense of place did not emerge from the building's formal uniqueness but from the everyday appropriation, the functions performed, and the relationships established in the space. Thus, the case of the CAIC of Pelotas suggests that the impact of standardization depends less on typological repetition and more on the equipment's ability to respond to local needs and be incorporated into the territory's social dynamics.

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NEOLIBERALISM, SPATIAL PRODUCTS AND UNIVERSITY INFRASTRUCTURES IN FLORIANÓPOLIS AND LAUSANNE, BRAZIL

NEOLIBERALISMO, PRODUCTOS ESPACIALES E INFRAESTRUCTURAS UNIVERSITARIAS EN FLORIANÓPOLIS Y LAUSANNE, BRASIL

NEOLIBERALISMO, PRODUTOS ESPACIAIS E INFRAESTRUTURAS UNIVERSITÁRIAS EM FLORIANÓPOLIS E LAUSANNE, BRASIL



Figure 0. RLC. Planters prevent access where floor unevenness poses a danger. Source: Author's file from 2023.

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ABSTRACT

Neoliberal logics have transformed universities and impacted their architectural artifacts. Concomitantly, a qualitative change in infrastructural studies addresses the material and discursive dimensions of infrastructures in a cohesive manner and opens up new methodological possibilities. In this article, we draw on the concept of the spatial product to describe buildings in which the logics of neoliberalism appear materially and spatially embedded. Our research begins with two artifacts that have very different characteristics and contexts. The first is the Rolex Learning Center (RLC) at the École Polytechnique Fédérale de Lausanne in Switzerland, and the second is the Center for Culture and Events (CCEven) at the Federal University of Santa Catarina in Florianópolis, Brazil. This unusual pair reveals microcosms of their institutions and campuses, reflecting the contradictions and interscalar pressures that affect universities. We analyze how, in these educational infrastructures, the immediate and the global are mutually constructed and projected, also as spatial products. Our primary sources include design materials, institutional documents, and statements from relevant actors involved in the processes of constituting university space, allowing us to situate these two artifacts within an expanded network of relationships. The discussion we propose expands the possibilities for critical architectural and infrastructure analysis, both in terms of physical support and as a methodological-interpretative tool. Our results show that RCL and CCEven are inseparable and active in multiscalar transformative processes within their respective institutions, and that they contribute to the construction of a theoretical framework in which architectural criticism confronts the weight of neoliberalism on architectural forms, programs, and lexicons.

Keywords: architectural criticism, campuses, infrastructural turn, globalization, university

RESUMEN

Las racionalidades neoliberales han transformado las universidades e incidido en sus artefactos arquitectónicos. De forma concomitante, un cambio cualitativo en los estudios de infraestructura aborda las dimensiones materiales y discursivas de las infraestructuras de manera cohesiva y despliega nuevas posibilidades metodológicas. En este artículo, recurrimos al concepto de producto espacial para describir edificios en los que las lógicas del neoliberalismo aparecen incrustadas, tanto material como espacialmente. Nuestra investigación parte de dos artefactos con características y contextos muy diferentes. El primero es el Rolex Learning Centre (RLC) en la École Polytechnique Fédérale de Lausanne, en Suiza, y el segundo es el Centro de Cultura e Eventos (CCEven) en la Universidad Federal de Santa Catarina, en Florianópolis, Brasil. Este par inusual revela microcosmos de sus instituciones y campus, reflejando las contradicciones y presiones interescalares que afectan a las universidades. Analizamos cómo, en estas infraestructuras educativas, lo inmediato y lo global se construyen y proyectan mutuamente, también como productos espaciales. Nuestras fuentes primarias incluyen materiales de diseño, documentos institucionales y declaraciones de actores relevantes en los procesos de constitución del espacio universitario, lo que nos permite situar estos dos artefactos en una red ampliada de relaciones. La discusión que proponemos amplía la posibilidad de un análisis arquitectónico e infraestructura crítico en términos de soporte físico y como herramienta metodológica-interpretativa. Nuestros resultados nos permiten ver cómo el RCL y el CCEven son inseparables e incluso actúan activamente en procesos transformadores a múltiples escalas dentro de sus respectivas instituciones. Además, contribuyen a la construcción de un marco teórico en el que la crítica arquitectónica enfrenta el peso del neoliberalismo sobre las formas, los programas y los léxicos arquitectónicos.

Palabras clave: campus, ciudades universitarias, crítica de arquitectura, virada infraestructural, globalización

RESUMO

Racionalidades neoliberais têm transformado as universidades e impactado seus artefatos arquitetônicos. Concomitantemente, uma mudança qualitativa nos estudos infraestruturais aborda as dimensões materiais e discursivas das infraestruturas de modo coeso e, ao fazê-lo, abre novas possibilidades metodológicas. Neste artigo, amparamo-nos no conceito de "produto espacial" para descrever edifícios nos quais as lógicas do neoliberalismo aparecem material e espacialmente incorporadas. Nossa investigação parte de dois objetos com características e contextos muito distintos. O primeiro é o Rolex Learning Center (RLC), na École Polytechnique Fédérale de Lausanne, na Suíça, e o segundo, o Centro de Cultura e Eventos (CCEven), na Universidade Federal de Santa Catarina, em Florianópolis, Brasil. Esse par inusitado revela microcosmos de suas instituições e respectivos campi, refletindo contradições e pressões interescalares que afetam as universidades contemporâneas. Analisamos como, nessas infraestruturas educacionais, o imediato e o global se constroem e se projetam mutuamente, também enquanto produtos espaciais. Nossas fontes primárias incluem materiais projetuais, documentos institucionais e declarações de atores relevantes nos processos constitutivos do espaço universitário, o que nos permite posicionar esses dois artefatos em uma rede ampliada de relações. A discussão que propomos expande a possibilidade de análise crítica arquitetônica e infraestrutural, tanto na qualidade de suporte físico quanto de ferramenta metodológica-interpretativa. Os resultados evidenciam que o RLC e o CCEven são indissociáveis e atuantes em processos transformadores multiescalares em suas respectivas instituições, além de contribuírem para a construção de um arcabouço teórico no qual a crítica de arquitetura enfrente o peso do neoliberalismo sobre as formas, os programas e os léxicos arquitetônicos.

Palavras-chave: campus; cidades universitárias; crítica de arquitetura; globalização; virada infraestrutural

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INTRODUCTION

In Lausanne, Switzerland, two concrete topographic surfaces enclose a glazed plane. The voids that traverse the building's rectangular plan create, among other environments, areas of rest and student coexistence, a library, and an auditorium. Much farther south, in the capital of Santa Catarina, Florianópolis, Brazil, in a socioeconomic context that bears little resemblance to the aforementioned one, two large porticoes dominate the predominantly opaque facades of one of the state's largest event centers. The Swiss building is the Rolex Learning Center (RLC) at the École Polytechnique Fédérale de Lausanne (EPFL). The Brazilian example is at the headquarters of the Federal University of Santa Catarina (UFSC) and houses the Culture and Events Center (CCEven). We take these two university buildings as institutional microcosms of both their respective campuses and, more significantly, of the recent state of university infrastructures under neoliberalism. The two artifacts, although emerging from different scenarios, embody the interscalar pressures that have marked universities. They also open a source of discussion on the analytical potential indicated by infrastructure studies.

The debate over an "infrastructural shift" has gained momentum in urbanism-related areas in recent years. This approach understands infrastructures as material arrangements, such as the buildings of a university campus, and as discursive and organizational devices that operate jointly. If this alteration broadened the urbanistic field, it still appears contingently in the examination of architectural artifacts. From this, two central repositionings that we have developed in this paper can be deduced. The first analyzes neoliberalization processes as part of the sociotechnical network that the University comprises. This conceptual extension of infrastructure displaces campuses and universities in the scenario of asymmetric globalization. The space generated there, called infrastructural in this paper, evidences historical changes and socio-technical systems that articulate, uninterruptedly, local and global scales. The second repositioning examines the relational characteristics of university infrastructures. From this, it is inferred that their existence and functioning arise from broader dynamics that shape both their form and their effects.

Neoliberal processes have reduced universities to the role of service providers. Something less apparent is how neoliberalization organizes the built environment in universities and, in doing so, transforms it into an economic asset. In this context, we can treat some educational infrastructures as "spatial products". In essence, this term designates the physical and regulatory arrangements that serve as a vehicle for global capital, encapsulating and reproducing its rationalities as an infrastructure with an embedded political agenda (Easterling, 2005). The juxtaposition of RLC and CCE, even beyond their shared methodological orientation, allows one to observe how parallel realities, formed in different socio-technical and socioeconomic contexts, become mutually readable. By bringing together these two fields of observation, a contribution is made to an architectural critique that recognizes the need to complexify scales, ranging from technical detail to territory, from everyday practices to institutional logics, and to situate architecture in broad infrastructural networks. The comparison shows operational variations of

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these processes and their direct material and expressive effects, which require tools capable of articulating materiality, politics, and form. This is also where the gaps we work with are found. Although the infrastructural turn offers tools for integrating the discussion of architectural artifacts, this approach remains incipient in the architectural discipline. Architecture criticism has rarely faced the weight of neoliberalism on forms and lexicons, focusing almost always on urban or segregation dynamics and leaving its morphological, programmatic, or aesthetic implications in the background. Finally, if in the Global North this theme is little visited, in South America this approach remains, to the best of our knowledge, virtually unexplored.

THEORETICAL FRAMEWORK

FROM ALMA MATER TO SPATIAL PRODUCT

The term *Alma Mater*, "nurturing mother", designates the institution where one graduated and evokes an intimate personal bond with the place of academic formation. Western universities have established themselves as a phenomenon capable of undergoing processes of secularization, bureaucratization within nation-states, and, later, expansion beyond Europe (Shils & Roberts, 2004). It is not appropriate to detail this path here, but it is in the most recent phases of university history that transformations associated with globalization are evident. This process manifests differently in each territory, giving rise to reservations about the use of overly broad concepts. Still, university infrastructures allow connecting local and universal scales, accompanying the very expansion of capitalism (Souza, 2011). In this perspective, Barboza & Dauß (2022) argue that understanding campuses requires thinking of them simultaneously in the singular and plural, since their forms express both territorial and global logical roots.

Even where public financing remains the main source of income, such as in Brazilian federal institutions of Higher Education (IFES) or German universities, a privatist rationality is diffusing and reconfiguring governance, financing, and spatial organization. In this setting, internationalization drives instruments such as academic rankings, standardized performance metrics, and evaluation systems. In Brazil, this rationality gained strength with the Support Program for the Restructuring and Expansion of Federal Universities (REUNI), launched in 2007. Even though it has expanded access, the program has consolidated a management model by linking the implementation of proposals to the government's budget capacity, emphasizing indicators such as the relationship between the number of students and the number of professors, resource optimization and curriculum flexibility, often conditioning the release of funds to these parameters (Andrade, Lucena, & Barleta, 2018; Léda & Mancebo, 2009).

In Europe, the Bologna Declaration established a common higher education space from 1999 and encouraged universities to anchor themselves in the formation of globally competitive research centers focused on performance, innovation, and the construction of international networks (Hertig, 2016; Lorenz, 2011; Lund, 2020). In this context, rankings also play

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a central role in imposing standardized, high-impact evaluation systems on institutional priorities and financing strategies, often to the detriment of local specificities (Burrell & Fourcade, 2021). At the same time, the demand for "useful" and immediately applicable research is growing, which intensifies utilitarian and profit-oriented criteria (Fleming, 2021; Wedlin, 2020). The growing dependence on corporations, private donors and foundations – such as the role of the latter in the Brazilian IFES – further reinforces this movement.

Neoliberalism is a proteiform project, with a high capacity for mutation, which aims to build a state based on a set of technologies and infrastructures that yearn not for the withdrawal of the state, but for its mobilization, by virtue of a market order. Between adaptable local practices and a fierce competitive emphasis, neoliberalism also produces its own aesthetic framework and cultural sensitivity (Clarke, 2008; Laval & Sorondo, 2022; McGuigan, 2016; Biebricher & Ptak, 2020). This project was consolidated in Europe between 1970 and 1980, in response to the crisis and stagnation of the welfare state, through austerity and market reforms. In Latin America, it intensified after 1980, mainly due to the imposition of structural adjustment policies agreed upon by regional governments and international organizations. In Brazil, the expansion occurred from redemocratization, when economic reforms made the market more flexible, privatized companies, and reduced the state's role, impacting social and educational policies and the functioning of the IFES (Costa & Silva, 2019).

The conceptualization of a so-called "knowledge society" qualitatively changes universities. In the USA of the 1960s, this paradigm redefined knowledge, moving it from a relatively stable public good to a continuous flow regulated by intellectual property, in which the student body is also a consuming public (Slobodian, 2020). The diffusion of this model intensified mainly through the American concept of soft power, via technical cooperation with Latin America and Europe. In Brazil, the work of the United States Agency for International Development (USAID) and partnerships with the Ministry of Education intensified since the 1950s and culminated in the educational reforms of the late 1960s (Cunha, 2007). The neoliberal bias in higher education expanded in the governments of the early 1990s, with Presidents Collor and Franco; it was then consolidated in the period of Fernando Henrique Cardoso (1995 to 2002), with private expansion, and returned, reconfigured, in the Lula and Dilma governments, aligned with the guidelines of the World Bank to expand universities and spaces in them (Chaves & Amaral, 2016).

Ignoring that these modifications affect the university's built environment makes it difficult to study the territory of universities, not least because, as it is sought to demonstrate, infrastructures are both relational and shaped by movements far less immediate than a quick analysis might suppose. Disregarding that these dimensions interact on campuses limits the analysis to the formal and functional, preventing the recognition of how they participate in broader flows and how the ubiquitous presence of neoliberalism modifies

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their functioning and materiality. Precisely here, the idea of spatial products, proposed by Easterling (2005), is useful, as it demonstrates how certain urban and architectural developments circulate globally as standardized models that express the logics of transnational corporate capitalism. This movement accompanies the transition from centralized, universalist infrastructures to segmented, unequal networks; it shifts from the state to the private sphere (Graham & Marvin, 2022).

In the humanities, recent conceptualizations of infrastructure recognize its historical, political, and cultural dimensions and support a qualitative shift in studies of the area. As a term, "infrastructure " appears in French and is linked to the physical base on which the railway tracks were laid; only at the beginning of the 20th century did it begin to include elements such as bridges and embankments. Since then, researchers have been continuously expanding the concept, which explains its widespread use (Richter, 2018; van Laak, 2018). For Edwards (2002), infrastructures shape and are shaped by the conditions of modernity, connecting scales of time, space, and social organization. Richter (2018) proposes something similar when defending a hermeneutics of infrastructures capable of revealing historical changes, power relations, inequalities, and technological systems. For both, the infrastructure exceeds the hardware; it is always material and discursive.

Universities, in this sense, constitute complex infrastructures, comprising buildings, technologies, administrative routines, financing systems, and institutional values. Their buildings operate as organizational devices that stabilize practices and contribute to the continuous fabrication of the institution itself (Martin, 2010; Martin, 2021). It is possible to bring the concept of spatial product closer to the idea that, in the campus's daily operations, different infrastructures intersect to produce space. In this key, the organizational and architectural models that circulate transnationally arrive at campuses as standardized protocols, but are only effective when they meet local institutional conditions, which modulate and sometimes transform them. This process inserts campuses into management and regulatory matrices that combine global and local scales and act as spatial production devices.

The architectural artifacts emerging from these dynamics represent the organizations that house and actively participate in producing their modes of operation, capturing contingencies and reconfiguring practices. Distancing from strictly economic approaches, Spencer (2021) redefines contemporary architecture as a technology of power dedicated to the production of neoliberal subjectivity. Design and its discourse thus act as mechanisms of conformity that sculpt ideal profiles for maintaining the neoliberal order, such as the student-entrepreneur, the citizen-consumer, and the flexible worker. Thus, a network of reciprocities forms among artifacts, actors, technologies, and economies, in which materiality is crucial. This paper's theoretical framework supports the understanding that built artifacts, management systems, and political processes act as infrastructures that co-produce the campus by combining global and local scales. University buildings condense norms, technologies, and managerial flows, functioning as operational devices

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of the institution. Neoliberalization reconfigures this group by reorganizing supply networks, segmenting access, and shifting power to corporate actors, changing the campus's infrastructural configuration.

METHODOLOGY

The method followed here is anchored in the critical approach to architecture and guided by the qualitative change that has shaped the study of infrastructures, which requires integrating architectural production, the dynamics of neoliberalization, and transformations of university infrastructures. The choice of two contrasting cases, the CCEven of UFSC and the RLC of EPFL, stems from this need. Both condense tensions between public and private financing, serve as markers of institutional visibility, and crystallize changes in management, governance, and systems of provision, although in widely different national and institutional contexts. Complementary movements advance the research. First, the transformations at UFSC and EPFL, situating inflections in management and financing in the broader context of neoliberalization, are examined. Next, the buildings' design is analyzed using technical documentation, institutional archives, and available public materials. At RLC, the analysis focused on public materials related to the building, especially versions published in specialized journals – such as Gregory (2010) and BauNetz (N.D.) – and on official institutional dissemination materials via EPFL (2010). At CCEven, the analysis focuses on the original 1995 project, obtained from the archives of the Department of Architecture and Engineering at UFSC, as well as on the as-built project, accessed via the same file. In both cases, visits to the buildings were instrumental in the elaboration of the analyses. An investigation was also conducted into how each university presented these projects, examining expectations, discourses, and symbolic uses. Finally, the actors involved in the promotion and financing of the works are considered, highlighting different connections between architecture, the market, and governance. This paper condenses these layers, combining description, interpretation, and criticism; it seeks to link heterogeneous materials ranging from institutional documents and project archives to public discourses and the media. It is judged that this approach makes visible connections that would otherwise remain scattered, without weakening the text's conceptual and methodological rigor.

THE CLOCK AND THE ELEPHANT

Lausanne

In the late 1960s, Rolex launched the *"You'd Wear a Rolex"* campaign with minimalist advertisements in which a wrist adorned with the famous clock amplified scenes that conveyed a great professional performance. The slogan, in Helvetica, announced: *"If you were... tomorrow, you'd wear a Rolex,"* and it supported the message. (Figure 1). Among the images, we saw the Palais des Nations-the headquarters of the United Nations in Geneva – and the headquarters building of the same organization in New York, comprising a prestigious repertoire. However, what does this announcement

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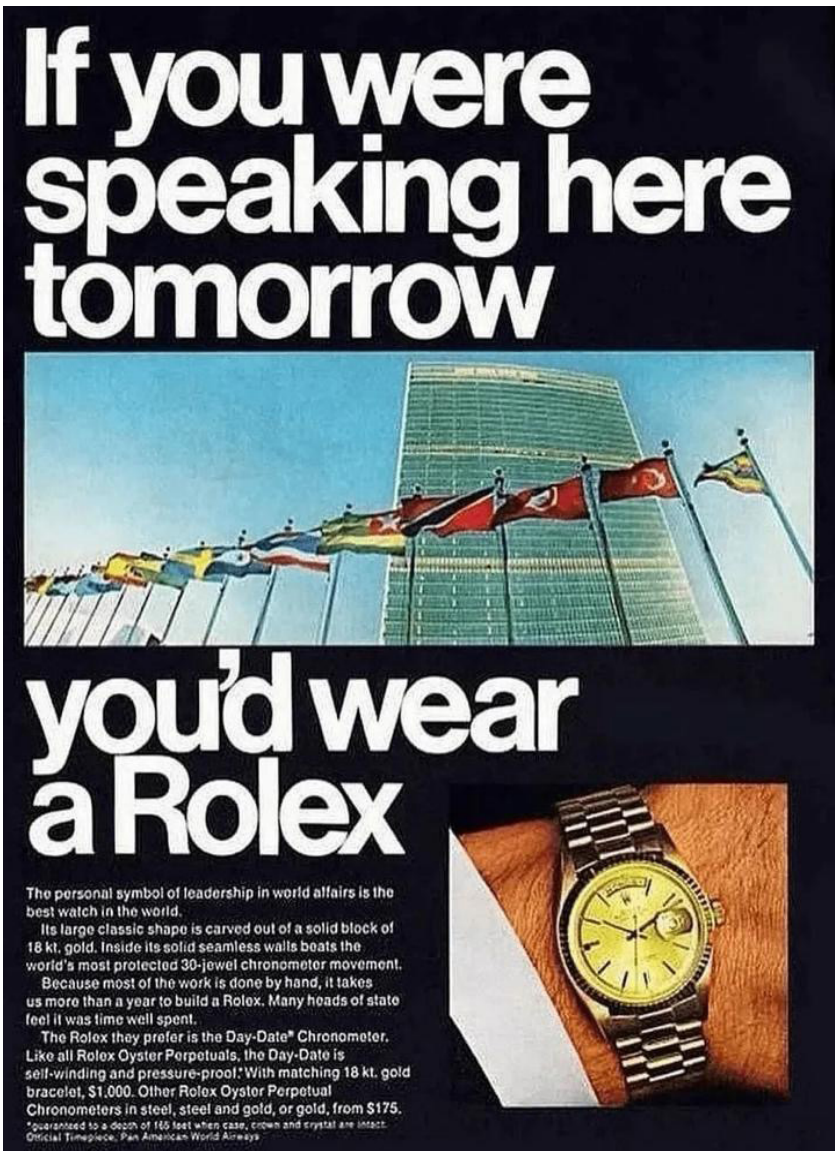


Figure 1. Rolex advertising campaign, circa 1960. The piece associates the advertised product with the symbolism of leadership and authority linked to the United Nations headquarters building. Source: Avdić Pašagić (2024).

help one understand about the current state of research and educational infrastructures, and about a building built decades later? The RLC is proposed as a paradigm of the intersection of university infrastructures with architectural spatial products. This building was the result of a project by the Japanese office SANAA and was built at EPFL between 2005 and 2010. It occupies a central part of the campus designed by Zweifel + Strickler in the 1960s. There, the University and the business sector work together to strengthen the combination of academic excellence and corporate partnership.

EPFL, founded in 1853, underwent significant transformation throughout the 20th century, culminating in its integration into the Swiss federal system in 1969, after which it was strengthened as a research university and expanded its international presence. The RLC offers an accurate entry point for discussing how the transition from a national university system to international and global structures fits within the campus's spatial organization.

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As an architectural artifact, it materializes this passage and allows exploring three decisive fronts. First, it translates curricular and institutional guidelines into a built form, revealing how academic policies are converted into space. Second, it incorporates central principles of infrastructure theory, such as visibility, transparency, and friction reduction, as evidenced by its emphasis on fluidity. Third, it makes explicit the articulation between these dimensions and the corporate interests that financed the building – especially those of Rolex, whose brand underpins the narrative of the "historical overcomer" (Marchl, 2019). It is a global status symbol that the RLC converts into symbolic University capital.

Between 1880 and 1930, Switzerland prioritized vocational training in higher education. The expansion of academic education gained momentum only in the 1990s and 2000s, and even today it occurs unevenly, since the German-speaking region is home to the most prestigious universities (Orosz, 2018). Since 1960, the Confederation has taken a more active role and promoted shared governance (Goastellec, 2017). As in other contexts, internationalization reorganized power relations and brought the Swiss system closer to European and North American standards. The Bologna Process expanded governmental instruments and strengthened institutional autonomy. At the same time, it paved the way for internal reforms that accelerated internationalization, modified investment models, and increased private presence in a previously mostly public sector (Bieber, 2016). In this scenario, the dispute over investments and international competition has also transformed the institutions' physical space.

At EPFL, the spatial transformation of the campus, which the RLC epitomizes, has become a strategic asset for recruiting faculty from prestigious institutions. The University went on to publicize its ability to offer competitive funding, modern infrastructure, and attractive salaries (Escher, 2018; Jiang, 2022). When Patrick Aebischer assumed the presidency of the institution, EPFL adopted new public management practices, reduced direct government supervision, and assumed greater autonomy supported by performance financing. This strategy attracted professors from Berkeley, Google, and Harvard, but also increased dependence on external resources amid federal retrenchment (Escher, 2018). Aebischer advocated "a university where traditional boundaries [...] are replaced by a spirit of collaboration or true scientific inspiration" (EPFL, 2010). This vision has shaped the RLC as an architectural artifact from the beginning. In 2005, when launching the building competition, it was defined that the project should act as a landmark in the landscape and symbol of this institutional expansion based on flexibility and independence (Bisbrouck, 2006).

SANAA conceived the RLC as a rectangular volume oriented along the east-west axis, aligned with the Route Cantonale and visible upon arrival at the campus. The Japanese architectural firm founded by Kazuyo Sejima and Ryue Nishizawa, two of the most influential names in contemporary architecture, became known for projects that combine formal lightness, transparency, apparent simplicity, and innovative spatial solutions. The building houses

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Figure 2. View of the main auditorium of the RLC. The ubiquity of the name of the building's main sponsoring company appears both in the object – the clock – and in the other visual communication elements of the program. Source: Author's file from 2023.

the multimedia library, study areas, a multipurpose hall, and workspaces. Companies such as Rolex, the main donor, Logitech, Credit Suisse, and Nestlé financed part of the project's 110 million Swiss francs (EPFL, 2010). The precision associated with Rolex appears in the building on an enlarged scale and reinforces its role as EPFL's advertising piece, articulating design, image, and corporate architecture (Figure 2). As Horn (2022) points out, these elements integrate an organization's visual identity and involve multiple sensory levels. The corporate image shapes public perception, while the corporate architecture translates values and beliefs into physical structures that convey symbolism and create experiences. At the RLC, EPFL, Rolex, and other sponsors simultaneously activate these plans, transforming the building into a spatial product that combines academic function and brand operation (Figure 3).

All building elements, including the roof, are designed to flex and respond to structural and environmental variations. To allow these movements, the internal ceilings were joined, and the curved glass facades were fitted with

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Figure 3. RLC seen from one of the inner courtyards. The concrete topographic surfaces surrounding the glazed plane, which forms most of the work's fences, are noted. Source: Author's file from 2023.

bespoke panels that move independently (Bollinger, Grohmann & Weilandt, 2010). The university and the architects faced the challenge of organizing the uses in a form that approximates an artificial relief rather than a conventional building. Spatial continuity, which brings together all activities in a single program, expresses a bold conceptual gesture and underpins constructive experimentation and technological innovation. In this scenario, technology also redefines cultural norms and modes of use. Although the building appears in the literature and official publications as "free of physical barriers" (BauNetz, n.d.; EPFL, 2010), its materiality reveals adjustments that relativize this narrative. Gregory (2010) points out that SANAA prioritized the fluidity of the plan and made the structure secondary, but downplays the building's practical challenges. One of them is the internal inclination that reaches 30°, which forced the adoption of specific, sometimes improvised, solutions to ensure safety in everyday use (Figure 4).

Fluidity emerges as a central concept, perhaps more influential than technological radicalism itself. In dialogue with infrastructure theories, ideas

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Figure 4. RLC. Planters prevent access where floor unevenness poses a danger. Source: Author's file from 2023.

of flow, transparency, and continuity have come to shape the relational, kinetic, and formal qualities of architecture and urban spaces. Transparency, understood in the infrastructural study as a tendency for such systems to become invisible when they work and visible when they fail, is a key category for understanding infrastructures, but recent literature has complicated this notion, showing that transparency and fluidity are more ambiguous and less stable phenomena than classical formulations suggest (Larkin, 2021; Star, 1999). In this sense, the university presents the RLC as a "fluid space", where areas of study, coexistence, and external environments are continuously connected (EPFL, 2010). Last (2014) argues that SANAA breaks with traditional models based on rigid oppositions – such as those of form and function or of interior and exterior – and privileges adaptation. The form avoids single narratives and refuses fixed directions or closed programs. However, this indeterminacy, often celebrated as emancipatory, also reveals the naturalization of neoliberal rationalities: it exalts flexibility, indeterminacy, and self-organization, while the building asserts itself as an institutional icon and instrument of privileged power that architecture helps stabilize (Pavan, 2026; Spencer, 2021).

Florianópolis

Anyone who enters UFSC's Trindade campus from the North can hardly ignore the building. Imposing in size, it is organized around a monumental portico that concentrates the composition. Behind it, two volumes stand out: to the West, housing support rooms; to the East, the large auditorium.

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Figure 5. North facade of the CCEven. Source: Author's file from 2023.

The north facade displays the university's name. During extensive work, CCEven earned the nickname "White Elephant", in a mixture of humor and criticism (Figure 5). Today, the space hosts more than 150 graduations a year, as well as numerous academic and cultural events. Differences from RLC are not restricted to context. The building is older, with another form and a distinct program. Conceived in 1995 and built over almost a decade, it predates REUNI and reflects the dynamics of the post-return-to-democracy period, marked by privatization and the advancement of the neoliberal agenda in the FHC government. As a case study, it reveals how these ideals have impacted university infrastructure and redefined internal relations, keeping public universities aligned with neoliberal rationality.

UFSC emerged in 1960 from the meeting of isolated faculties, a common process in the formation of federal universities. Of the first urban plans – " by Duarte and Mange in 1957 and by Souza, Peña and Guntzel in 1964" – little was built, and the campus ended up being implemented without a general plan (Ripper-Kos, Pavan & Poeta-Mangrich, 2020). As in the rest of the country, the campus was strategic in training human resources for regional development and for the public machine. In the late 1970s, the economic crisis interrupted infrastructure expansion, and many works were paralyzed until the end of the 1990s. The landscape plan of

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Burle Marx (1969-70) was partially implemented and opened only in 1992. The process of preparing a Master Plan (1998-2005) generated more reports than concrete interventions (Pimenta et al., 1998; Ripper-Kos et al., 2020). The FHC period combined cuts and restrictions on IFES with typical stimuli of neoliberal rationality, by authorizing private-sector profits and reinforcing the transfer of resources to these institutions at the expense of public ones. However, as discussed, neoliberal reason also involves postural and philosophical changes that extend to university management. Although it is difficult to define a starting point of this transition, we can highlight some markers. Already in the university reforms of 1968, in the authoritarian and technocratic context of the military regime, an important principle is found. In interactions with USAID technicians, actions aimed at reducing dependence on the centralizing model and guiding universities towards efficiency standards, eliminating redundancies, and rationalizing physical and administrative structures were observed (Ripper-Kos et al., 2020).

As contradictory as it may seem, even in the military period, a university system less dependent on the state was already being designed. The Manual on the integral planning of the university campus (Atcon, 1970), written by Atcon and central to the reforms, proposed a campus model to reduce construction and operating costs. The work also criticized what it understood as management inefficiency and a supposed moral bankruptcy associated with a lack of discipline. This approach advocated flexibility and austerity, while relegating social factors to the background. The document outlined precise protocols and guided universities to pursue greater spatial self-sufficiency, particularly through internal technical offices responsible for the development and ongoing adaptation of the campus. For institutions in transition, these guidelines sought to decrease dependence on state resources in spatial governance.

Going back to the "elephant", in the original project, the external structure was already close to the current one, with a rectangular floor plan, a dominant portico, ground-floor access, and first-floor balconies facing Citizenship Square and the Rectory. Two discrete setbacks on the large walls, which act as pillars, reinforce the visual weight of the ensemble and create a tension that seems to challenge its stability. The main difference is the absence of the podium that today raises the building, from which the monumental ramp leading to the first floor departs. Although the shell has remained, the interior has changed significantly. The main access would lead to an exhibition space that, next to an internal garden, would serve as the entrance to two programs: a smaller auditorium beneath the current central auditorium and a cinema. The ground floor also housed art workshops, meeting rooms, and support areas. On the first floor, the large auditorium structured the program, accompanied by a foyer, a raised square, visually connected to the internal courtyard, an external stage facing the rectory, and a row of workshops (Figure 6). The project, from 1995, is by Luiz Roberto Mayr, then the university's architect. Throughout the

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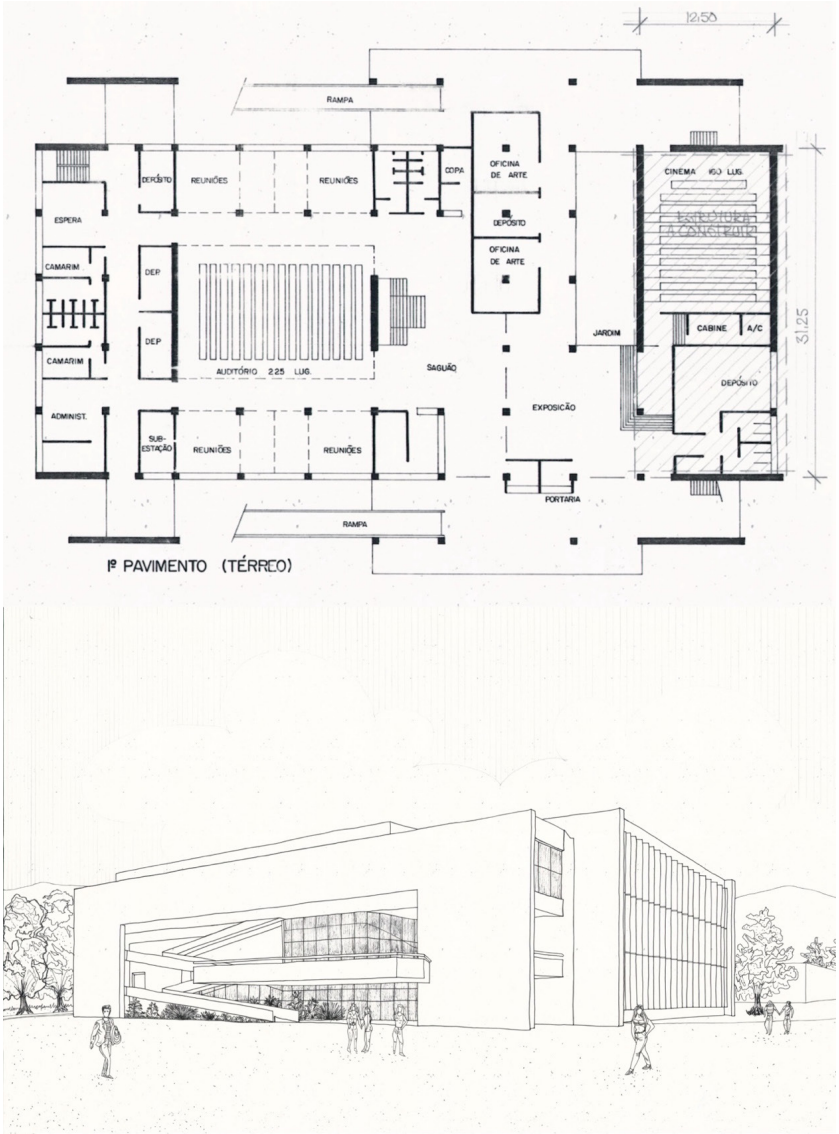


Figure 6. CCEven. Project by Luiz R. Mayr. 1995. The plan for the original project, shown above, focuses on social-use programs that were later removed when other actors, notably foundations such as FEESC, joined the body of financiers for the work. Source: Department of Architecture and Engineering of UFSC. Prepared by the Authors.

construction, much of this conception was modified to enable profitable spaces of interest to the financiers – the new actors that enabled the completion of the work.

In 1996, more than a year after the start of the works, UFSC resorted to the Rouanet Law to resume the project, which had been paralyzed after the contractors' abandonment, leading to lawsuits to release part of the R$ 1.68 million contracted (Figure 7). With scarce resources and amid the increasing outsourcing of services considered peripheral, the university hired new companies solely to ensure the basics: a roof and an auditorium (University Journal [JU], 1996; Scarduelli, 1999). The most lasting effect of this crisis came from the profound redefinition of the program. The ground floor was reconfigured, and almost all public spaces disappeared. To complete the work, UFSC received funding from the Stemmer Foundation (FEESC) in 2003 and, in return, gave the foundation the use of a large part

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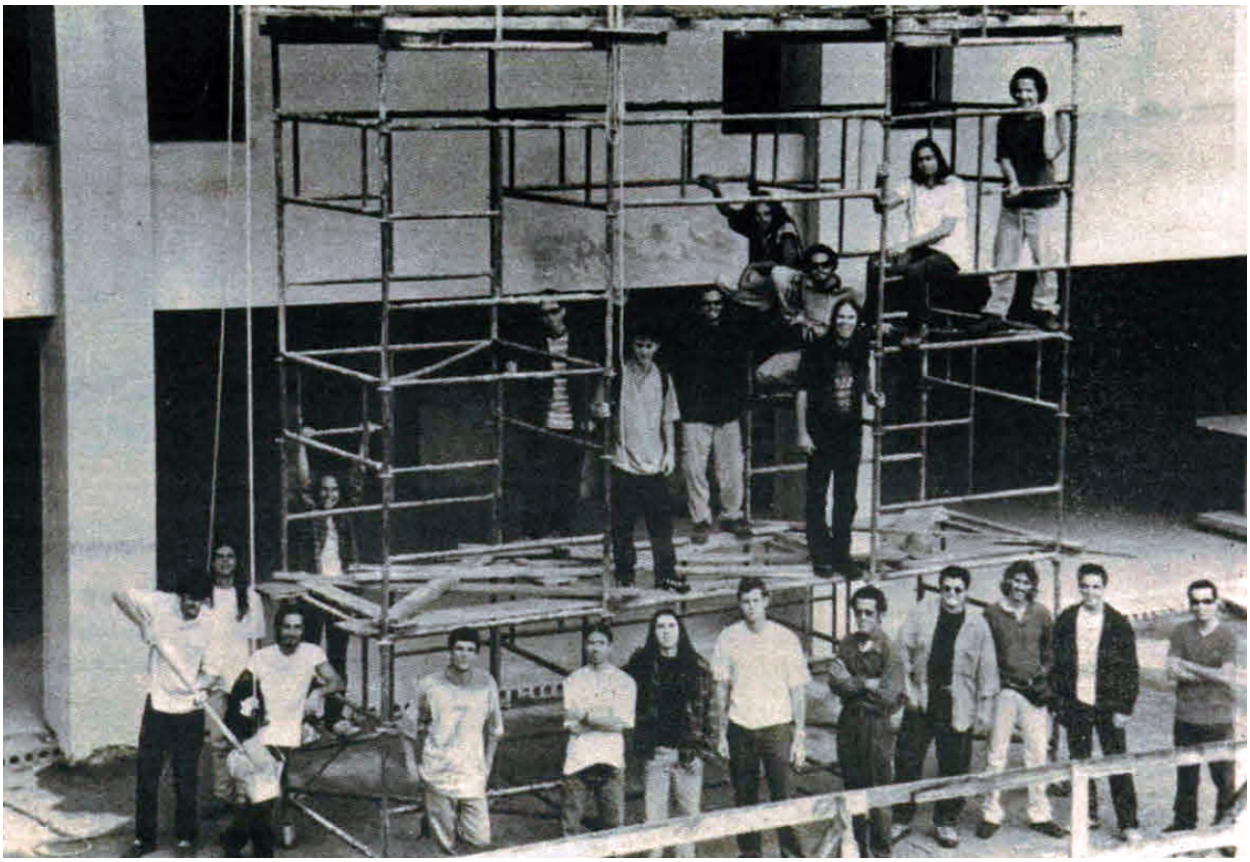


Figure 7. In 1999, Students held an exhibition in the CCEven building, still under construction; the action was part of a protest against the work stoppage. Source: Campos (1999).

of the ground floor for twenty years (UFSC, 2023b). The move affected precisely one of the most symbolic buildings on campus. As a result, the community was deprived of an important space for the university to engage with society, and the building's open character was diminished (Ripper-Kos et al., 2020). During almost the entire FEESC occupation, a Spanish bank and a bookstore shared the space — the bank branch was on the main facade.

CONCLUSIONS

Infrastructures reconfigure social dynamics and, at the same time, open up new possibilities of expression, functioning as a diffuse cultural condition that reveals the technical means as mediating and transforming agents. Its effect is neither linear nor driven by a single goal, but stems from the wide reach of technical networks. This impact produces discrete but relevant transformations, both in the organization of space and social relations and in the forms of imagination and visual creation (Schabacher, 2022). The so-called aesthetics of fluidity forms an aesthetic– ideological regime that translates neoliberal principles -such as mobility, flexibility, unrestricted circulation, and self–organization– into continuous forms and smoothed curves. This appearance of spontaneity and freedom masks, under the rhetoric of complexity and emergence, the material relations of production and power that sustain the built space. Formal fluidity thus functions as a technology of legitimation, naturalizing processes guided by specific political

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and economic interests. Jameson (1998) points out that new architectural styles arise when certain investment regimes, supported by specific technologies and infrastructures, are consolidated. From this perspective, infrastructure is understood as an expanded concept that allows for the analysis of buildings themselves as spatial and symbolic artifacts that record how universities have responded to external pressures and continue to shape the campus.

The two artifacts thematized here demonstrate the viability of the concept of "spatial product" by helping to describe architectural ensembles in which neoliberal rationality appears embedded and inscribed. The RLC, for example, inaugurated a cycle of ventures that sensitively transformed the campus. It creates practices and displaces them, serving as a precursor case study that guides how other projects may emerge on campus. Above all, it offers a "closed package", in the sense that Easterling (2005) gives to spatial products: the combination of emblematic work, cutting-edge architecture, established names, specific aesthetic principles and public-private partnerships. This set continues to inform EPFL's institutional advertising and professional attraction strategies. We see this in the EPFL Pavilions project, a low, almost 200-meter-long building by Kuma and Kobler. The same occurs in the Double Deck project by the Architect Dominique Perrault, whose work is expected to be completed by 2028 (EPFL, 2012; EPFL, 2024). Both resume the logic of flexibility and innovation that the RLC helped institute. At UFSC, CCEven recently opened another chapter in this relationship with foundations such as FEESC. The building's physical space is still debated, almost twenty years later. The concession to the companies ended, and CCEven entered a new inflection point: the bank branch vacated its space, and the bookstore that occupies part of the ground floor re-discusses a possible rental agreement with the university, which depends on the revenue generated to supplement its budget (UFSC, 2023a).

This paper seeks to highlight how the material and immaterial dimensions are intertwined in the contemporary production of campuses, posing an inherent challenge to the vision of infrastructure as a concept that spans heterogeneous scales and objects. The idea of the university is not fixed; it continually remakes itself from multiple worlds of knowledge. As Martin (2021) notes, each scale – from the relations between society and the university to the internal interactions between faculties and disciplines – rests on material and historical foundations. The strength of these institutions comes precisely from this constant movement of transition. In this scenario, neoliberalism imposes a new physical, administrative, symbolic, and epistemological frontier by redefining the conditions of knowledge production, reconfiguring infrastructures, and imposing market-aligned metrics. There are paths this study has not taken. A deeper investigation of the contexts of EPFL and UFSC would bring new layers of complexity, sufficient to support their own articles. For example, it is pertinent to note that the two buildings, in terms of form, expression, and materiality, are linked to a modern lexicon of 20th-century architectural production. Still,

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it has been chosen to treat them together, through spatial products, to make visible parallel realities that, although distant, dialogue with one another by showing how similar pressures produce different infrastructural responses. This gesture strengthens a critical reading of university architecture, shifts the debate beyond the building, and accompanies important advances in infrastructure studies in other disciplines.

CONTRIBUTION OF THE AUTHORS CRediT

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RECOVERY OF THE TRADITIONAL "ALISAR" CONSTRUCTION TECHNIQUE IN MORELOS, MEXICO

RECUPERACIÓN DE LA TÉCNICA CONSTRUCTIVA TRADICIONAL "ALISAR" EN MORELOS, MÉXICO

RECUPERAÇÃO DA TÉCNICA CONSTRUTIVA TRADICIONAL "ALISAR" EM MORELOS, MÉXICO



Figure 0. Tlecuil on the singular parapet of Metepec, Morelos. Source: Preparation by the Authors in 2024.

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ABSTRACT

The traditional construction technique known as alisar is the result of the wisdom of the inhabitants of Metepec, Morelos, Mexico, and the surrounding region. It is used to build and repair the cuezcomate (barn) and the tlecuil (fire pit) using local materials such as ash, nejayote, and earth. Despite its singular nature, this technique is at risk of disappearing because it is not being passed on to future generations and lacks documentation. Its recovery could provide long-term, sustainable continuity for adobe housing and improve the living conditions of families. The objective of this research is to recover the traditional construction technique of alisar to ensure the continuity of spaces and places within an adobe house in Metepec, Morelos. In the methodological process, analytical tools from architecture, vernacular architecture, and ethnography are employed. These contribute to the theoretical and descriptive basis of traditional construction techniques, the characterization of local traditional knowledge, the practical application of the traditional alisar technique, and the process to pass this technique on. The results show how the described technique represents a sociocultural, traditional, and sustainable response for the continuity of traditional architecture in its material and intangible dimensions, as well as for the generation of new construction alternatives in the region.

Keywords: vernacular architecture, adobe house, traditional knowledge, culture, sustainability

RESUMEN

La técnica constructiva tradicional de alisar es producto de la sabiduría de los habitantes de Metepec, Morelos, México y la región, se utiliza para construir y cuidar el cuezcomate y el tlecuil a partir del uso de materiales locales como ceniza, nejayote y tierra. A pesar de su singularidad, esta técnica corre el riesgo de desaparecer por la pérdida de transmisión y ausencia de registro. Su recuperación podría otorgarle a la casa de adobe una continuidad duradera y sustentable y mejorar las condiciones de habitabilidad de las familias. El objetivo de esta investigación pretende recuperar de manera integral la técnica constructiva tradicional de alisar para la continuidad de los espacios y lugares de la casa de adobe de Metepec, Morelos. En el proceso metodológico se emplean herramientas de análisis de la arquitectura, arquitectura vernácula y etnografía, las que contribuyen al sustento teórico y descriptivo de las técnicas constructivas tradicionales, la caracterización del conocimiento tradicional local, la puesta en práctica de la técnica tradicional de alisar y sus procesos de transmisión. Los resultados muestran cómo la técnica descrita representa una respuesta sociocultural, tradicional y sustentable para la continuidad de la arquitectura tradicional en su dimensión material e inmaterial y la generación de nuevas alternativas constructivas en la región.

Palabras clave: arquitectura vernácula, casa de adobe, conocimiento tradicional, cultura, sustentabilidad

RESUMO

A técnica construtiva tradicional conhecida como alisar é fruto da sabedoria dos habitantes de Metepec, Morelos, no México, e da região; ela é utilizada para construir e conservar o cuezcomate (granário tradicional de origem náuatle) e o tlecuil (fogão tradicional de lenha), a partir de materiais locais, como cinza, nejayote (água residual da nixtamalização do milho) e terra. Apesar de sua singularidade, essa técnica corre o risco de desaparecer devido à perda de transmissão e à ausência de registros. Sua recuperação poderia assegurar a continuidade duradoura e sustentável das casas de adobe e melhorar as condições de habitabilidade das famílias. O objetivo desta pesquisa é recuperar de maneira integral a técnica construtiva tradicional de alisar, visando a continuidade dos espaços e locais das casas de adobe de Metepec, em Morelos. No processo metodológico, são empregadas ferramentas de análise da arquitetura, da arquitetura vernacular e da etnografia, que contribuem para a fundamentação teórica e descritiva das técnicas construtivas tradicionais, a caracterização do conhecimento tradicional local, a aplicação prática da técnica tradicional de alisar e seus processos de transmissão. Os resultados mostram como a técnica descrita representa uma resposta sociocultural, tradicional e sustentável para a continuidade da arquitetura tradicional em suas dimensões material e imaterial, bem como para a geração de novas alternativas construtivas na região.

Palavras-chave: arquitetura vernacular, casa de adobe, conhecimento tradicional, cultura, sustentabilidade

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INTRODUCTION

In Mexico, vernacular architecture, its typologies, and traditional construction techniques are manifestations of diversity and cultural richness; they represent the most genuine human wisdom in creating their habitat. Traditional construction knowledge supports vernacular expressions and allows the materialization of constructive techniques such as the adobe system, tapial, bajareque, and terrado (Prieto, 1978; Guerrero Baca, 2014; Vizcarra de los Reyes, 2020), as well as unregistered local techniques. This knowledge is millenary, transmitted and inherited from generation to generation, and represents "the cornerstone from which the vernacular heritage is sustained" (Sánchez Suárez, 2020, p. 84).

Traditional constructive knowledge, together with constructive techniques, is in danger of disappearing due to a lack of understanding of their multidimensional characteristics of habitability, the imposition of modern construction cultures, the loss of transmission, and the absence of records. Metepec is a community in the northeastern region of the state of Morelos, in Mexico. It has a total population of 2,942 inhabitants, is rural, and its residents use the constructive technique of smoothing, or alisar, to build and maintain the cuezocomate (barn) and the adobe house's tlecuil (fire pit), using local materials and everyday products. However, the continuity of this technique is at risk due to the aforementioned factors. The cuezcomate is located in the center of the courtyard of the adobe house. It is used to store corn and symbolizes a sacred place. On the other hand, the tlecuil, or fire pit, is located inside the kitchen of the same name. It is used to prepare corn tortillas and daily meals for families.

The theoretical approach of the traditional construction technique of smoothing (*alisar*) is framed within traditional knowledge and vernacular architecture. Those who enrich the concept of traditional knowledge are the works of the World Conference on Science (United Nations Educational, Scientific and Cultural Organization [UNESCO], 1999), Convention for the Safeguarding of the Intangible Cultural Heritage (UNESCO, 2003), Pérez Ruiz & Argueta Villamar (2011), Acuña Castrellón (2013), Valladares & Olivé (2015), Amescua Chávez, Topete Lara & Rebollo Cruz (2024), Sánchez Suárez (2020), Vizcarra de los Reyes & Hernández Spinola (2020), and the Letter on Philosophical Thought in Cultural Heritage (2024). The World Intellectual Property Organization (2020) recognizes traditional knowledge as the living body of knowledge, created, maintained, and transmitted from one generation to another within a community. The works that explain vernacular architecture and its diversity of expressions are Prieto (1978), Sánchez Suárez (2006), Sánchez Suárez (2020), Guerrero Baca (2014), Herrera Rivas & Medina Márquez (2018), Vizcarra de los Reyes (2020), Herrera Rivas, Hernández Sánchez & De La Torre Sánchez (2024) and Herrera Rivas, Hernández Sánchez & De La Torre Sánchez (2025).

Accordingly, the traditional construction technique of *alisar* is a product of the inhabitants' wisdom; it is used to build and maintain the cuezcomate and the tlecuil, using local materials such as ash, nejayote, and earth. The

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ash is solid waste produced by the combustion of wood in the tlecuil; the nejayote is a yellow substance obtained from the nixtamalization process **1**; and the yellow earth is from the local clay soil. The full recovery of the technique could ensure lasting, sustainable continuity for adobe housing in Metepec, Morelos. This research aims to comprehensively recover the traditional *alisar* construction technique to ensure the continuity of the spaces and places of adobe housing in Metepec, Morelos. The relevance of this study lies in the need to improve the deteriorating conditions of living spaces, enhance the knowledge of the inhabitants to enable them to generate their own sustainable construction strategies, and enrich the theory and methodology of vernacular architecture in local contexts.

The document is structured in three sections. In the first, traditional construction techniques are presented in a theoretical and conceptual way. In the second, the cuezcomate and the tlecuil of Metepec, Morelos, are characterized through the architectural survey, registration, and identification of architectural, structural, and constructive components. In the third, the smoothing (alisar) constructive technique for cuezcomate and the tlecuil is presented, along with the processes of its teaching. The most important results show that the recovery of the smoothing technique represents a socio-cultural, traditional, and sustainable response to the continuity of the adobe house and the generation of new constructive alternatives in the region.

Linking built heritage

Traditional construction knowledge is a component of Intangible Cultural Heritage (ICH); the Convention for the Safeguarding of the Intangible Cultural Heritage of the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2003) refers to it in the field of traditional craft techniques. Valladares & Olivé (2015) state that traditional knowledge has been generated, preserved, and applied by communities to understand and solve social and environmental problems. Despite these particularities, due to their non-scientific origin, science, academia, and governments have disqualified them.

The World Conference on Science, organized by UNESCO (1999), considers traditional knowledge to be an understanding of the world that has contributed to science and technology and should be preserved, protected, and promoted. It should be noted that women are the backbone in the construction of the tradition and transmission of this knowledge, and the Charter on Philosophical Thought (UNESCO, 2024) has ratified this statement.

More precisely, Vizcarra de los Reyes (2020) recognizes the constructive traditions of the world, products of place-specific physical conditions and culture. In this line, Sánchez Suárez (2020) indicates that constructive knowledge is the cornerstone on which vernacular heritage is sustained.

1 Ancestral traditional process of cooking corn with hydrated lime and water to make tortilla dough in Mexican gastronomy.

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On the other hand, vernacular architecture encompasses diverse construction systems and traditional techniques. Vizcarra de los Reyes (2019) interprets it as the living cultural memory that evolves within its cultural contexts. Throughout Mexico, different vernacular expressions are identified such as the adobe house, Mayan house, flooring, cuezcomates, zincolotes, tlecuils, bread ovens and steam rooms (Prieto, 1978; Sánchez Suárez, 2006; Sánchez Suárez, 2020; Guerrero Baca, 2014; Herrera Rivas & Medina Márquez, 2018; Vizcarra de los Reyes, 2020; Herrera Rivas, Hernández Sánchez & De La Torre Sánchez, (2024) and Herrera Rivas, Hernández Sánchez & De La Torre Sánchez (2025). The traditional technique is the construction technology and the subsistence pillar of vernacular architecture (Sánchez, 2006). The unique construction techniques of vernacular architecture include the adobe system, the tapial, the bajareque, the roof, stone masonry set in earth, and mixed systems derived from these.

The adobe technique involves molding sun-dried clay blocks to build load-bearing structures such as walls, arches, vaults, and domes (Guerrero Baca, 2014). The adobe pieces for structural walls are bonded with rope and embers. The adobe blocks are rectangular and wedge-shaped. The latter are used for circular spaces such as the cuezcomate, the temazcal, and the bread oven. The sizes of the adobe blocks are 0.62 x 0.28 x 0.09 m, 0.60 x 0.40 x 0.09 m, and 0.45 x 0.35 x 0.09 m. The tapia technique is a rammed-earth method for building load-bearing walls, in which layers of earth are poured into formwork (Vizcarra de los Reyes, 2020). The bajareque technique is a structural system comprising dividing walls built from a network of plant material covered with earth (Guerrero Baca & Ramírez Rodríguez, 2024). According to Sánchez Suárez (2006), it is a dividing palisade built of sticks on which a mixture of earth and water or mud is placed. From the techniques described, a mix of techniques emerged to meet collective and family needs. Many of them have not been documented to date, posing a risk of disappearance. This is the case of the cuezcomate in Metepec, Morelos, which uses the technique of weaving red grass into a rope, then coating it with layers of a mixture of earth, water, and ash.

METHODOLOGY

The research is based on grounded theory and participatory action research. The first involves collecting and analyzing data related to the study problem to explain the phenomenon through interpretative processes (Strauss & Corbin, 2002; Martínez Isidro et al., 2022). The second puts the possible solution into practice through knowledge exchange among actors, according to Usher & Bryant (1992) and Fals Borda (2007). Data collection techniques use tools from architecture, vernacular architecture, and ethnography.

This research's methodology comprised three stages. In the first stage, a conceptual and descriptive review of three traditional construction techniques is presented: adobe, bajareque, and tapial. The second stage describes the traditional construction knowledge of Metepec, Morelos, to characterize the

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Figure 1. Cuezcomate located in the center of the courtyard of the adobe house. Source: Prepared by the Authors in 2023, Metepec, Morelos.

cuezcomate and the tlecuil, through the architectural survey, registration, and identification of architectural, structural, and constructive components of four tlecuils and thirty-one cuezcomates. 8 in-depth interviews were also conducted with four owners of tlecuils and four of cuezcomates. In the third section, the traditional *alisar* construction, or smoothing, for the conservation of four cuezcomates and four tlecuiles in disrepair is presented, identifying the processes involved in recovering this technique.

Traditional constructive knowledge in Metepec, Morelos

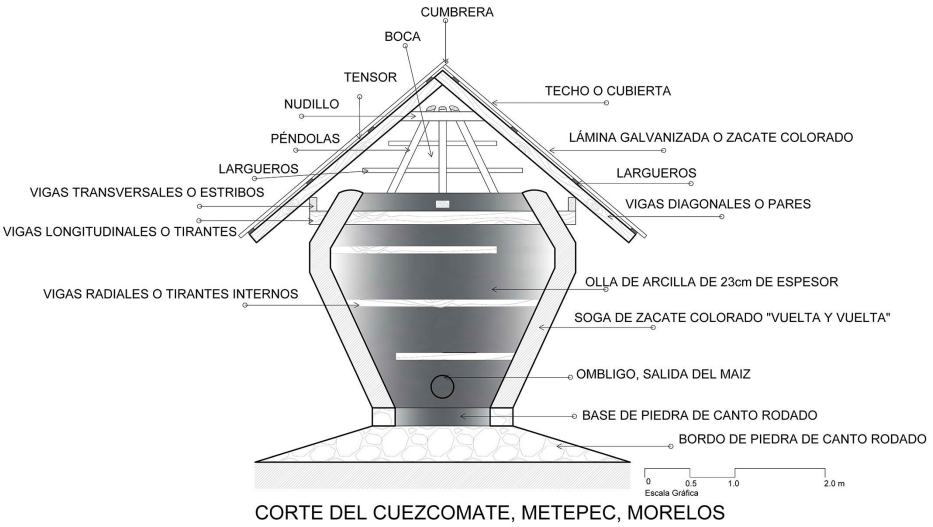
Metepec is a community in the state of Morelos. It is distinguished by its adobe houses, with cuezcomates in the heart of the courtyards and tlecuils in the kitchens. Both are built with traditional construction techniques. The cuezcomate is the central and articulating component of the adobe house's spatial layout. It is considered a place because of its symbolic value. Currently, there are 31 cuezcomates in good condition, and according to the inhabitants of Metepec, it is where they keep their corn (Figure 1).

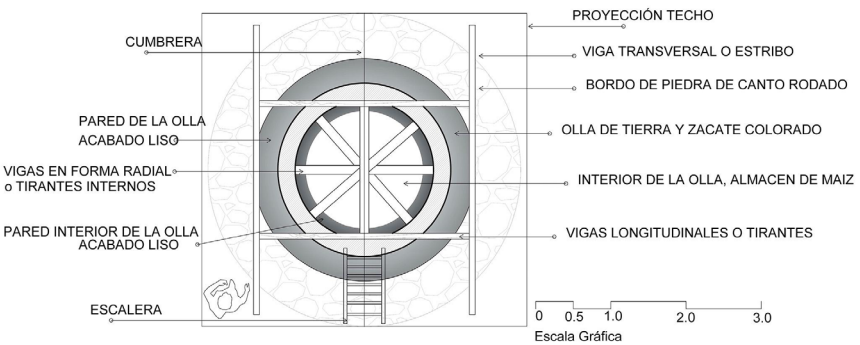
Alpuche (Alpuche Garcés, 2008; Alpuche Garcés, 2015) recognizes the cuezcomate as a storage place and element of Mesoamerican origin. Structures of this type have been located in Chihuahua, with "la Cueva de la Olla" being recognized as the oldest in Mexico (National Institute of Anthropology and History [INAH], 2025), and in the valleys of Mexico,

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Figure 2. Cross section of the components of the cuezcomate, Metepec, Morelos. Source: Prepared by the Authors in 2023.

Figure 3. Plan view of the Cuezcomate, Metepec, Morelos. Source: Prepared by the authors in 2023.





Toluca, Puebla, Tlaxcala, and Morelos. The Metepec cuezcomate is located in the center of the courtyard of the adobe house; the courtyard covers 132 m^2, of which 9 m^2 is the cuezcomate. The use is intended to store up to sixty-five loads of corn**2** obtained from sowing maize on six hectares of land. Filling the cuezcomate with corn brings a sense of pride because it will provide food for the family, which consumes 3,000 tolls of corn annually.

The cuezcomate is circular, like a clay pot. Symbolically, it is considered the protective mother of corn according to Alpuche Garcés (2015). Its round shape and smooth finish follow the constructive and structural system. This also prevents the entry of insects and rodents, thereby protecting the corn kernels.

The structural characteristics and construction improvements have allowed it to remain stable for more than a hundred years, despite the area's seismic activity. The components that structure the shape of the kitchen are the side, the base, the pot, and the roof (Figure 2 and Figure 3).

2 65 loads of corn are equivalent to 6,500 tolls, 9,750 kilograms, or 9.75 tons. Producing 65 loads of corn requires an area of 60,000m2. Information obtained from the inhabitants of the community of Metepec, Morelos.

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The wall is a buttress at the base of the Cuezcomate; it provides stability, resistance to thrusts, and protection from environmental factors such as rain and humidity. Its shape is circular, with a slope of approximately 20%, and it is built with boulder stone set with mud.

The circular base is made of boulder stone masonry set in mud, has an approximate diameter of 1.60 m, reaches a height of 70 cm, and stands on firm ground.

The pot is where the corn is stored. Its structure is woven from red grass into a rope that follows the base's circular shape. The thickness of the pot's wall is approximately 23 cm, and its total height is 3 m. The diameter of the pot's base is 1.60 m. The first two-thirds have a diameter of 3 m, and the last third has a diameter of 2.30 m. The pot's internal structure consists of beams or internal wooden braces placed radially, recessed into the pot's wall. The separation between each beam is 50 cm. Its main role is to reinforce and unite the structure.

The ceiling is the roof of the cuezcomate. It has a wooden structure with two sides. The base consists of two longitudinal cedar beams that run through the pot's walls, joined by two transverse beams or buttresses that form a quadrangular or rectangular base. The diagonal or paired beams are placed on the buttresses, connected by a joint, which gives shape to the frame. This triangular piece is placed at 60 cm intervals and is joined to crossbeams at 60 cm intervals. In each section of the roof slope, a diagonal tensioner is installed, allowing the crossbeams to be joined to the pairs. On the side behind the mouth of the cuezcomate, three queen posts are placed at the joint, allowing it to be connected to the base of the frame. To cover the roof, red grass is used and has currently been replaced by zinc-coated sheets. The total height of the cuezcomate ranges from 4.50 m to 6 m.

The term *tlecuil,* from Nahuatl, means "home"; its origin dates back to the boom of pre-Hispanic cultures, as noted by Quiroz Carranza & Cantú Gutiérrez (2012). Currently, it is located inside the kitchen of the Tlecuil. The surface of this space is 14 m^2. The tlecuil rests on the base, called the parapet, which serves as a table, and together they comprise an area of 1.8 m^2. This space is used to make corn tortillas, prepare food, and for family meal-related activities (Figure 4). It symbolizes the family union and the warmth of home and life; it is the woman's place, and she decides where to build it, as well as its shape, size, materials, and finish. The tlecuil consists of the following components: parapet, neck, chair, and hotplate.

The tlecuil is where the fire and the family's hearth are found. It has a C-shaped setup with adobe pieces and a height between 20 cm and 28 cm; the thickness is 15 cm, the diameter ranges from 50 cm to 70 cm, and the mouth from 30 cm to 35 cm. The hotplate is placed on top of the tlecuil, and the neck is centered.

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Figure 4. Tlecuil on the singular parapet of Metepec, Morelos. Source: Preparation by the Authors in 2024.

The parapet is the tlecuil's base and is used as a table for eating and for storing kitchen utensils, such as the grinding stone, tortillera, bread basket, pots, jars, and earthenware pot. Its height is 45-55 cm, length is 1.50 m, and width is 80 cm. It is built with adobe placed on rope or headers; the central space is filled with earth and pieces of fired red clay. The final finish with a uniform appearance is called smoothing or *alisar*; women manually carry out this technique by mixing ash, nejayote, and water.

The neck is the center of the tlecuil; it is recognized as the navel. It is an earthen jar buried below the parapet; its diameter is 10 cm, and its depth is 15 cm. The role of this neck is to maintain the place's warmth, store embers, and facilitate lighting the fire.

The small wooden chair is used to sit next to the tlecuil and parapet. Every woman who occupies this place does so as they prefer, considering their anthropometric characteristics.

The hotplate is made of fired red clay; it is large, with a diameter of 55 cm; there are also small (35 cm), medium (45 cm), and jumbo (60 cm)

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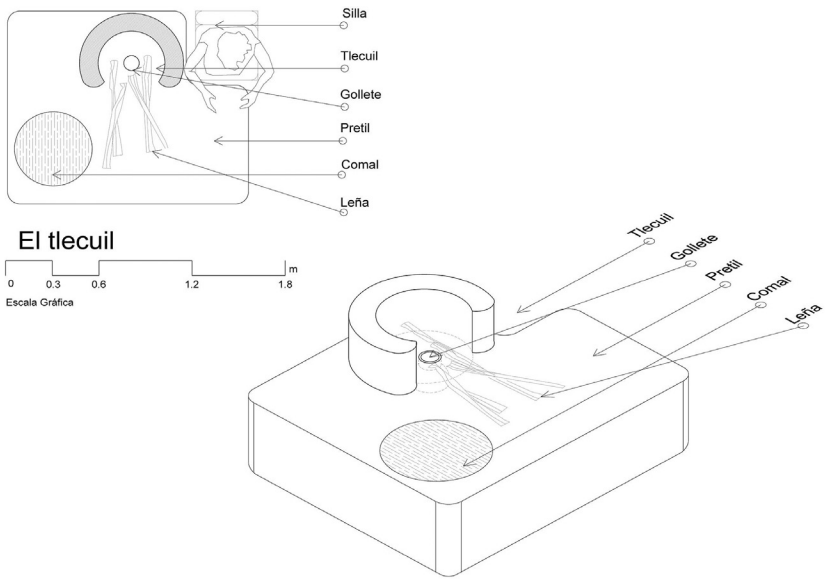


Figure 5. Views of the Tlecuil, Metepec, Morelos. Source: Prepared by the Authors in 2023.

sizes. Before use, it is cured to prevent leaks and the tortilla from sticking to it. For this, it is heated, and lime dissolved in thick water is spread over the entire surface (Figure 5).

The *Alisar* Technique

The *alisar* traditional construction technique is used to provide a final finish to newly built cuezcomates and tlecuiles, and to repair those in disrepair in Metepec, Morelos. This technique improves their physical and aesthetic conditions and is intended to support the family's food preparation. Using ash, nejayote, earth, and water, the main tools for this intervention are the hand and vegetable fiber.

Smoothing the cuezcomate contributes to its upkeep, helping prevent severe deterioration caused by environmental, biological, and mechanical factors. This technique, performed by all the family, is applied to the cuezcomate's base and pot, giving the surfaces a uniform, smooth appearance. It is typically performed every 10 years or when fractures, fissures, or significant detachments occur. Today, cuezcomates are no longer built, so the technique is used exclusively for their conservation.

The materials required to smooth the cuezcomate are yellow earth, ash, nejayote, and water. The earth is yellow, free of organic residues, and is taken from the region's earth banks. The ash is obtained from burning firewood in the tlecuil. The nejayote is the yellow liquid from nixtamal, a product of cooking corn with lime and water, while the water needs to be free of impurities. The exact amounts of the mixture's components vary with the cuezcomate's size. To smooth a cuezcomate that stores sixty-five loads of corn, the average size seen in the community, five earthen jars, one of ash, 19 liters of nejayote, and 35 liters of water are required. The

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Figure 6. Assessing the cuezcomate's conservation. Source: Prepared by the Authors in 2025.



Figure 7. Cracks and detachment of earth fragments in the cuezcomate's pot. Source: Prepared by the Authors in 2025.



Figure 8. Dancing on a mixture of earth, ash, and nejayote. Source: Prepared by the Authors in 2025.

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Figure 9. Final finish of the cuezcomate's pot. Source: Prepared by the Authors in 2025.

storage volume of one jar is 19 liters; the ratio of earth, ash, and nejayote is 5:1:1. Additionally, 60 liters of nejayote are used to moisten, seal, and give the cuezcomate its final finish.

The smoothing process for the cuezcomate begins by cleaning the cover, pot, and base. Organic residues and external pathogenic agents are removed to assess the state of conservation and identify environmental, biological, and mechanical deterioration that triggers fissures, cracks, fractures, erosion, and the breaking off of earthen fragments (Figure 6 and Figure 7).

After the materials are collected, the mixture is prepared. The materials require the yellow earth and the ash to be sieved through a 1mm mesh, and the nejayote to be strained through a 2mm mesh to ensure purity. Once these criteria have been met, the earth–ash–nejayote mixture is prepared at a 5:1:1 ratio. To prepare the mixture, the people in charge of this intervention dance on the earth barefoot to ensure the homogeneous integration of all components (Figure 8).

The surface of the cuezcomate to be intervened in is then wet with nejayote. The cracks, fractures, fissures, and detached earthen fragments are filled with the earth-ash-nejayote mixture. This is then allowed to dry for about an hour. Once this stage is completed, the uniform, final finish is applied to the pot's entire surface. The mixture is diluted with nejayote and spread by hand (Figure 9). To finish, a coat of nejayote, a liquid, is applied for final sealing. The intervention starts at the top and continues to the bottom to prevent runoff.

Smoothing the tlecuil is done by the women who live in the adobe houses. They are the ones who make decisions regarding its construction, design, and care. This process is carried out in the days leading up to

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Figure 10. Tlecuil and deteriorated parapet. Source: Prepared by the Authors in 2023.



Figure 11. Fine ash-nejayote mixture, 1:1 ratio. Source: Prepared by the Authors in 2023.



Figure 12. Tlecuil with its smoothed parapet in the adobe house. Source: Prepared by the Authors in 2023.

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traditional festivals and celebrations, and when deterioration warrants it (Figure 10). After the intervention, the tlecuil is left with a uniform, smooth, clean, and aesthetically pleasing parapet.

The materials required to smooth the tlecuil are ash, nejayote, and water. The processes and characteristics are the same as those described above for smoothing the cuezcomate. Smoothing a tlecuil with an average surface area of 12 m^2 requires 2 containers of ash, 40 liters of nejayote, and water; the amount of the latter may vary. The storage volume of the container is 19 liters; the ash-nejayote ratio is 1:1. The tools used to perform this action are a hand, a shovel, a 1-mm mesh, and 19-liter containers.

To start smoothing the tlecuil, two mixtures of ash-nejayote are prepared, one coarse and one fine. The first is used to fill the erosion, deformations, cracks, and fractures. Its preparation requires ash sieved through a 2 mm mesh and mixed with nejayote in a 1:1 proportion. The second is used to fill fissures and give the parapet and tlecuil their final finish. The ash is sieved through a 1-mm mesh and mixed with the nejayote at a 1:1 ratio (Figure 11).

The tlecuil and its parapet are then cleaned to remove contaminating residues. This allows assessing the state of conservation and identifying environmental and mechanical deterioration, including erosion, deformation, fissures, cracks, fractures, detachments, and settlement. The affected areas are then wetted to fill and level the cavities and slumping. Erosion, detachments, deformations, cracks, fractures, and fissures are treated with a coarse-and-fine mixture. This is then allowed to dry for about an hour.

When the surface is properly leveled, compacted, and dry, the first coat of the final finish is applied to the entire surface with the coarse mixture. The second coat is applied with the fine mixture. The entire surface of the tlecuil and the parapet is covered. Finally, to seal the smoothing, the fine mixture is diluted in nejayote and applied to the parapet and the tlecuil (Figure 12). To conclude, the hotplate is cured with slaked lime water, applied with a vegetable fiber. This is used to clean and seal the fired red clay hotplate.

Both actions took place at the family and academic levels. At the family level, the teachers of traditional knowledge passed on the technique to their sons, daughters, and grandchildren through voluntary involvement and collaboration. The children got involved by observing and playfully repeating what adults did. At the academic level, bachelor's degree students in architecture from the "Archiquitzin" and "Weaving Heritage" groups collaborated and learned the technique through their participation and the teaching of traditional knowledge teachers.

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CONCLUSIONS

In general, vernacular architecture topics have historically been excluded from architectural theory and academia. On the other hand, methodological approaches to research related to the topic tend to analyze it from a disciplinary perspective by dissociating the physical components that characterize it as materials, constructive techniques, and structure from the sociocultural ones, which include cultural practices, knowledge, and symbols. This way of researching has led to subjective assertions that it is an exhausted field; however, an interdisciplinary vision shows that it is a dynamic field of constant interpretation, as it is closely linked to the social and cultural dimensions.

The consulted documents on vernacular architecture showed that there are still gaps in the literature explaining the traditional architecture of each region of Mexico, and that there are unidentified and undocumented expressions that undermine the knowledge, understanding, and valuation of this architecture.

Traditional construction knowledge has addressed the ways of inhabiting premises of different cultural groups through the materialization of traditional constructive techniques such as smoothing and the use of adobe, tapial, bajareque, and roofing systems. This knowledge, due to its non-scientific origin, continues to be dismissed by scientific, academic, and governmental spheres, despite its validity, as it is applied to solve economic, cultural, social, and environmental problems in communities.

The results of this research allowed us to identify that the smoothing technique in Metepec, Morelos has a millenary origin taken from traditional construction knowledge, is passed on from generation to generation, and is structured by knowledge of the environment, local construction materials, and conservation processes. This technique is evident at the regional level in Morelos; however, the cultural richness of Metepec allowed the research to focus on the cuezcomate and tlecuil of adobe houses.

The smoothing technique is used to build, maintain, and improve the surfaces of the adobe house before traditional religious and significant family holidays. The management, use, and acquisition of materials for this technique, the products of food preparation, and the natural environment support the reaffirmation of its sustainability across the economic, social, environmental, and cultural dimensions. The implementation of the smoothing technique contributed to improving living spaces in disrepair, reactivating their use, appropriating and transmitting traditional knowledge, and developing strategies for conserving their cultural heritage.

Finally, it is essential to continue research and recover traditional constructive expressions in a comprehensive, horizontal manner, so that the residents can rehabilitate their spaces, recover their traditional knowledge, improve their living conditions, and generate new sustainable construction alternatives at different scales to reverse the current environmental crisis.

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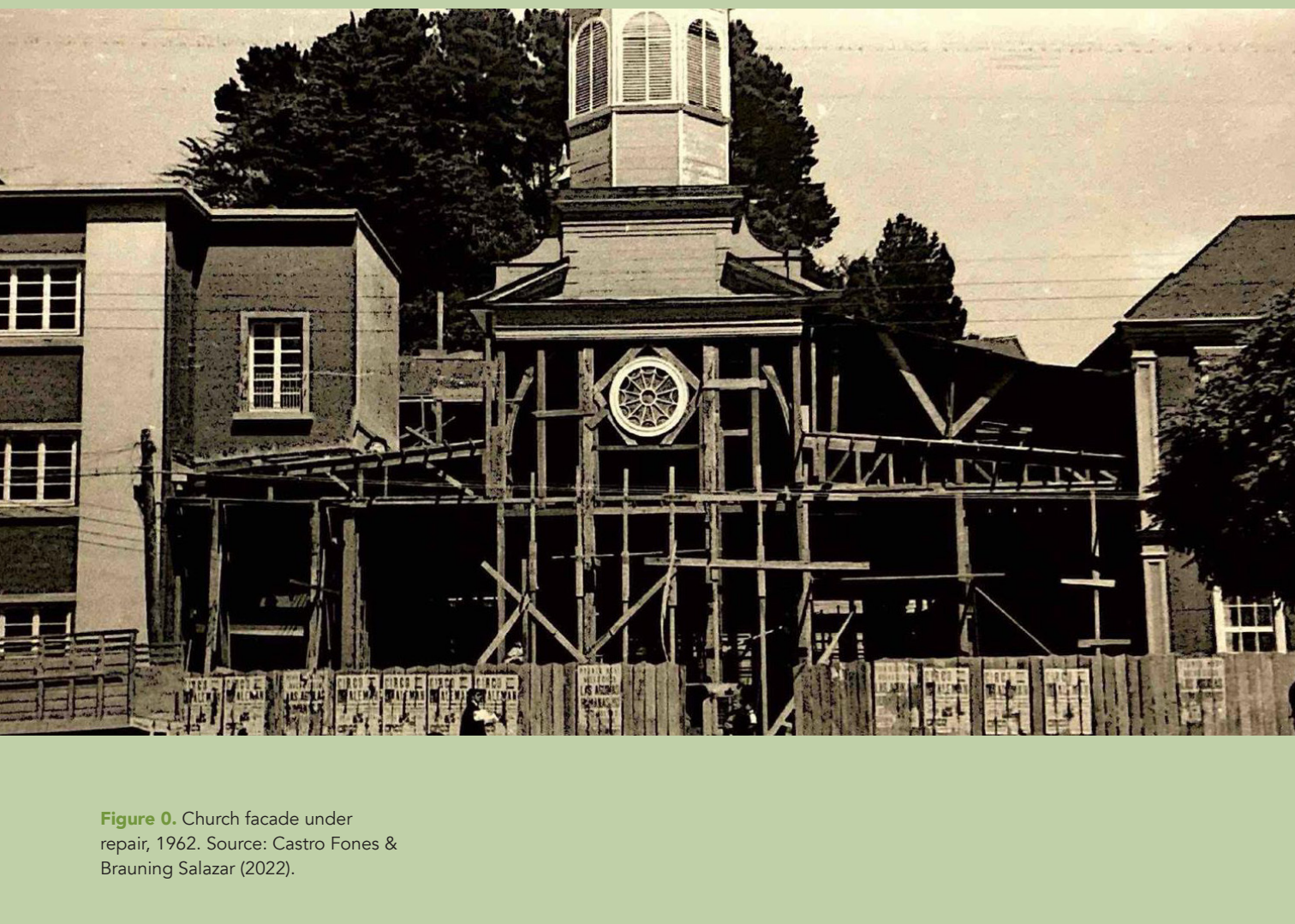


Figure 0. Church facade under repair, 1962. Source: Castro Fones & Brauning Salazar (2022).

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ABSTRACT

This research examines the concept of religious-educational heritage, a typology that has been little studied and scarcely acknowledged in the country. The case study is San Francisco Javier College in Puerto Montt, which serves as a living testament to foundational architecture in the city and is one of the few legacies of the presence of the Society of Jesus and the German immigrants' carpentry school. However, despite the material and intangible importance of the case, it lacks broader recognition that fully acknowledges its value as urban, educational, religious, and constructive heritage.

Keywords: Jesuit School, religious-educational heritage, jesuit architecture, Chiloé's School of Carpentry, Fachwerk

RESUMEN

Esta investigación examina el concepto de patrimonio religioso-educacional, una clasificación poco revisada y reconocida en Chile. Se tomó como caso de estudio el Colegio San Francisco Javier de Puerto Montt, el que constituye un testimonio de la arquitectura fundacional puertomontina al ser, además, un legado señero de la presencia de la Compañía de Jesús y de la escuela de carpinteros alemanes inmigrantes. Sin embargo, pese a la importancia material e inmaterial del caso, carece de un reconocimiento mayor que reconozca su valor como patrimonio urbano, educacional, religioso y constructivo de manera integral.

Palabras clave: Colegio Jesuita, patrimonio religioso-educacional, arquitectura jesuítica, Escuela de Carpintería Chilota, Fachwerk

RESUMO

Esta pesquisa examina o conceito de patrimônio religioso-educacional, uma classificação pouco revisada e reconhecida no Chile. Tomou-se como estudo de caso o Colegio San Francisco Javier de Puerto Montt, que constitui um testemunho da arquitetura fundacional de Puerto Montt, sendo também um legado singular da presença da Companhia de Jesus e da escola de carpinteiros alemães imigrantes. Contudo, apesar da importância material e imaterial do caso, este carece de um reconhecimento mais amplo que contemple, de forma integral, seu valor como patrimônio urbano, educacional, religioso e construtivo.

Palavras-chave: Colégio jesuíta, patrimônio religioso-educacional, arquitetura jesuítica, Escola de Carpintaria de Chiloé, Fachwerk

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INTRODUCTION

Educational institutions have become more complex over time and in their built spaces. Therefore, it is not a novelty to reflect on educational architecture. Analyzing its scope in a private or state context, considering its built expression, construction regulations, identity codes and social imaginaries, among others aspects, represents an opportunity to prepare an incipient specialized historiographic production (Ramírez Potes, 2011; Torres Gilles, Valdivia Ávila & Atria Lemaitre, 2015; Albanelli, 2021; Mondragón & Marini, 2021; Marini & Mondragón, 2023; and Garrido, 2014).

Consequently, there is not a very in-depth and sustained academic debate on architecture and education in Chile (Exss, 2016) as a topic for investigation, as publications addressing the unique relationship between education and school architecture are lacking. They also favor approaches that strongly emphasize State action to the detriment of other relevant actors.

Hence, the revision of the significant educational architecture related to religious orders has been abandoned. They were pioneers in Latin America in establishing the educational role, maintaining it to the present day. Their educational buildings and facilities constitute a unique historical, religious, and educational heritage.

As a result, the Jesuit San Francisco Javier educational complex, in the city of Puerto Montt (Los Lagos Region), is proposed as the object of study. This complex, a recognized historical expression of Chilean school architecture, is a symbol of the Society of Jesus's presence and community service, which has left an indelible imprint on this southern city. Its buildings and facilities, given the aforementioned social representativeness, suggest the possibility of considering them a heritage asset, asking which values, stemming from the action of private (religious) education, the San Francisco Javier School represents, and whether they consolidate an outstanding urban heritage and architectural case in Puerto Montt and other cities where schools of different religious orders were established.

This assessment is pending, as it is significant given the absence of an architectural analysis of the characteristics of the religious-educational complex, which results in limited heritage valorization of this example of educational architecture, Jesuit heritage, and the German carpenters' school in Puerto Montt.

THEORETICAL FRAMEWORK

In the field of school architecture, Exss (2016), in his research on architecture and education, suggests a quantitative deficiency. Similarly, in studies that link school space to historical lines, experts such as Garrido (2014) and Marini & Mondragón (2023) have recently emerged, focusing on state architecture and government policies. Meanwhile, Egaña Baraona

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(2000), Garrido (2014), and Torres Gilles et al. (2015) have researched public education of a heritage nature. However, there is no research in Chile related to the school architecture of religious orders.

In the field of Spanish-American Jesuit architecture, authors such as Enrich, Schwerter & Tilly (2002), Cherini (2009), and Page (2019) have worked on Jesuit educational campuses. However, according to Page (2019), while there is valuable information, there is also meager research on buildings and few specialists in the field. The application of Jesuit architecture, since its foundation in 1558, has been characterized by St. Ignatius's development of the idea of a "Modus Noster" (what is ours), which organizes and directs an institution in functional, economic, and constructive aspects, but not in an artistic style (Page, 2019).

Consequently, the Jesuit outline of the ideal school is characterized by the arrangement of spaces around courtyards, with the ground floor containing all kinds of services, in addition to the classrooms, and the second floor housing the bedrooms. What is seen is that the school studied was designed under the concept of the "Modus Noster", taking the prototype of the establishment that constitutes the organization in organizational and administrative areas, in its construction. Thus, the school is a set of elements that comprise a religious educational complex (Cherini, 2009).

On the other hand, the urban morphology of Puerto Montt features port architecture characterized by a set of overlapping picturesque constructions that cover the mountainsides that dominate the maritime space. Thus, forms that reinterpret previous styles predominate, such as neoclassical, neo-Greek, neo-renaissance, etc., as expressed in the architectural composition and decoration of the 19th century and the pre-modernist and industrial eras (Benavides, Pizzi & Valenzuela, 1994), achieving particularly common ties, in the sobriety of the architectural language of public and private buildings,

Similarly, the San Francisco Javier School in Puerto Montt, given its history and architecture, is relevant to be examined through several concepts and stages. Academic studies related to this Jesuit Puertomontino school are mainly ethnographic and historical, divided into school, port, Jesuit architecture, and German migration, with which this educational complex was designed and built (Hanisch Espindola, 1974). The works of Tampe Maldonado (1999), Enrich et al. (2002), Schmidt & Tampe (2011), Ortega, Fábregas & Abud (2022), Castro Fones & Brauning Salazar (2022), and Fábrega (2022) on these aspects stand out.

Subsequently, this case study is linked to the school's construction system, which, in the first instance, is related to the *"Fachwerk"* system as a traditional construction method associated with the school of German carpenters in German migratory buildings (Cherubini, 2015). Indeed, D'Alencon Castrillón & Prado García (2014) explain that among the Germanic villages, differences were identified in their building methods, resulting in "types of *Fachwerk*"

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depending on environmental conditions, the organization of houses, the availability of materials, etc. Therefore, when arriving at a new territory, this Germanic construction system would adapt. Finally, Araya Toro & Almonacid Burgos (2022) highlight the *Fachwerk* system's use of Roman numerals, its assembly and splicing techniques, and a certain correlation between the German method and the Chilote carpenters, due to migratory flows that coexisted during the German migration.

METHODOLOGY

In this research, an exploratory methodology was employed, including a bibliographic analysis of the school's history, the city's port character, the Jesuit order, and the cultural contribution of German migration to the development of the built complex. Archives of images documenting the building's historical evolution were also consulted.

The fieldwork collected information through interviews and the Delphi method with key actors (workers, architects, and local historians) associated with the educational complex.

Subsequently, a historical, cultural, and patrimonial analysis of the San Francisco Javier school was conducted, with primary information obtained through fieldwork and a Delphi survey, which analyzed the material and immaterial heritage value of the educational complex studied, ultimately yielding the corresponding conclusions.

CASE STUDY

The Jesuit complex studied is located in the city of Puerto Montt (Los Lagos Region, Chile). Its surface area covers a block of 21,600 m^2, which contains the small hill of the Jesuit Priests. Its perimeter is delimited to the north by the Santa María, Vial, and Ochagavía roads, to the south by Benavente Street, to the east by Guillermo Gallardo, Talca, and Cauquenes Streets, and to the west by Balmaceda Street. It houses a built area of 12,987.2 m^2, comprising the school with about 714 m^2 (5.5%); the church at 405 m^2 (3.1%); its bell tower with an area of 37.2 m^2 (0.3%); finally, the aforementioned built elements are connected by a 11,831 m^2 park (91.1%) (Figure 1).

DEVELOPMENT

San Francisco Javier School (Formerly the San José School)

The first Jesuit priests arrived in Puerto Montt in 1858. After a long journey and a shipwreck, they occupied a house and a donated piece of land, called "Cerro de los Jesuitas" or the Jesuits Hill, located between Guillermo Gallardo and Vial Streets. This high ground was more extensive than it is today because it was accessible only from Curicó Street. After its inhabitation, on the orders of the Bishop of Ancud, some houses had to be built, with funds from the Melipulli "Evangelical Society" (Enrich et al., 2002).

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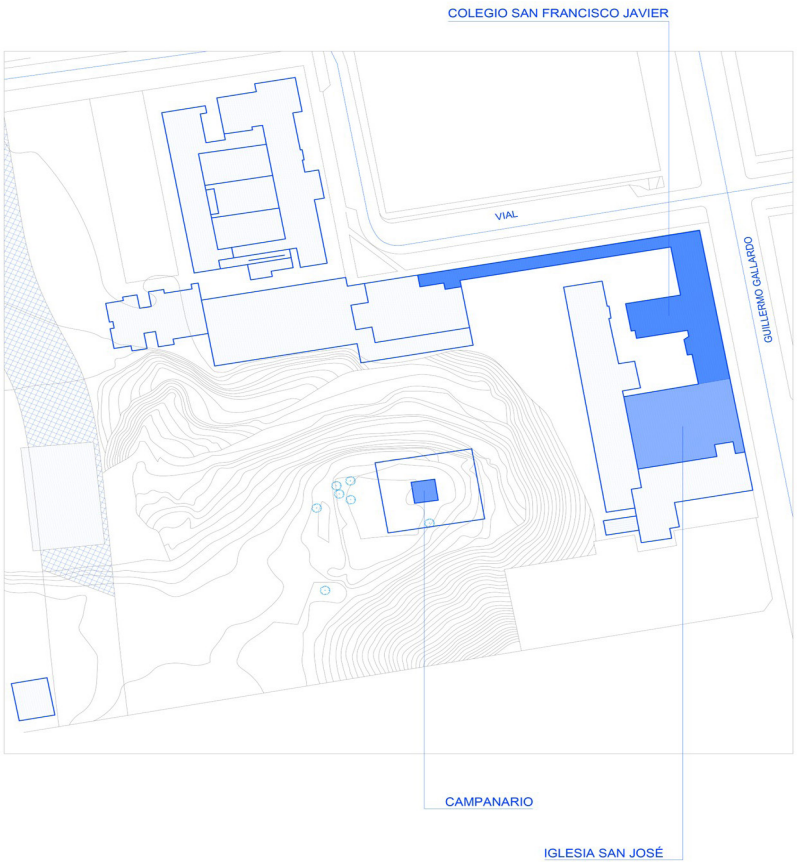


Figure 1. Layout of the San Francisco Javier Educational Complex. Source: Obando Aedo (2024).



Figure 2. Image of the Church of the Jesuits and the San Francisco Javier School, when it had not yet reached Vial Street. Source: Fabregas Zelada (2022).

In 1859, with the founding of the San José school, which would later become the San Francisco Javier School, the German settlers gradually sent their children to be educated at this Jesuit establishment, enabling the school to become a residence and providing it with a solid academic and religious foundation. In 1880, the San José School was complemented with a boarding

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Figure 3. Image of the facade of the San Francisco Javier School. Source: Obando Aedo (2024).

school called "San Francisco Javier", building a new large construction (Enrich et al., 2002) (Figure 2).

In 1881, the Chilean state faced an economic deficit resulting from the War of the Pacific, leading to the closure of public schools nationwide. Complementing this, Lutheran influence was absent from Llanquihue Lake, so the San Francisco Javier Jesuit School was established as a boarding school (Fábregas Zelada, 2022).

In 1882, the head priest and the Jesuit priests resided at the San Francisco Javier boarding school. The San Javier house opened on April 27th with a small number of students; by the end of the year, there would be a total of 48 students, 24 of whom would be boarders (Fábregas Zelada, 2022).

The most characteristic building of the school and residence, still standing today, was built in 1894 (called the "blue building"), and the following year the priests and students were brought together there. The most important extension took place in 1926, on the corner of Guillermo Gallardo and Vial streets. It was 19 m. long by 9 m. wide and 14 m. high. A third floor was added that overlaps with the old house and extends about 7 m. farther towards the south.

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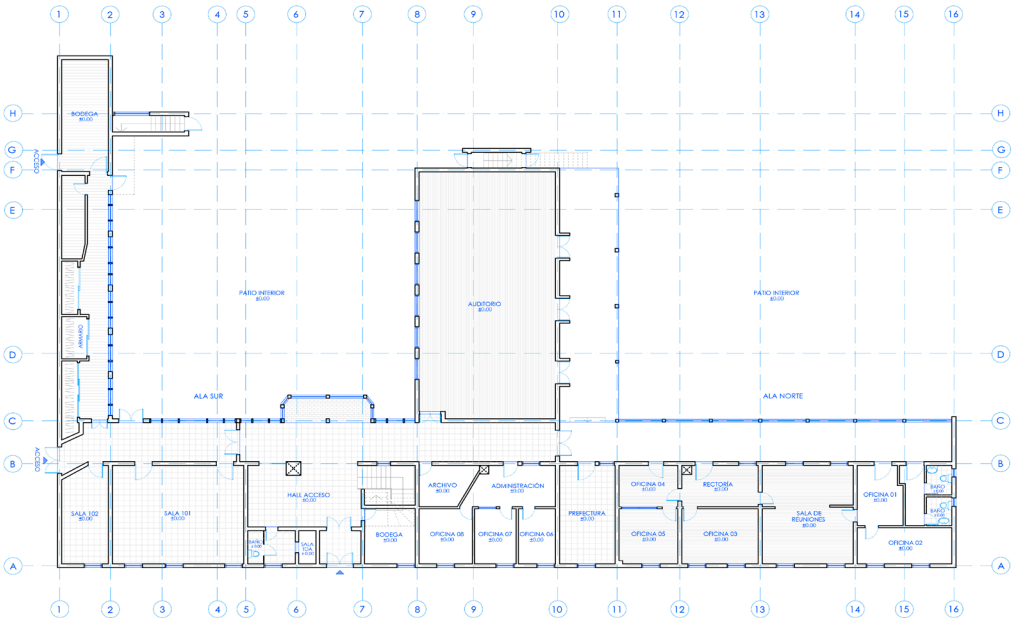


Figure 4. Planimetry of the floor plan of the San Francisco Javier School, based on the survey by the Restauro Team (2021). Source: Obando Aedo (2024).

This building has three floors, laid out as follows. On the first floor, there is a study hall for day students, with a capacity for 100 people; there are also the rooms of Father Prefect and Father Procurator; while on the second floor there is the priests' library, alongside the study hall, and some rooms for them; and the third floor was exclusively for bedrooms (Figure 3).

The construction took place amid the port boom and the city's rapid expansion. Its architectural features include a simple box-like volume, with corridors featuring glazed galleries and interior courtyards (Benavides et al., 1994). It has regularly placed rectangular windows made of larch wood, in a guillotine style. Together, these characteristics provide a simple but imposing composition (Castro Fones & Brauning Salazar, 2022).

The arrangement of the continuous façade's volumes, with regular sections, and the integration of interior courtyards, reflects the intentionality in the design of the building under the company's "Modus Noster", complying with a "useful, functional, inexpensive architecture", which notes a character of rationality and functionality (Cherini, 2009).

For the building's construction, which considered the older two-story section and the more recent three-story one, with constructions dating from 1894 and 1926 respectively, native woods were used, transforming it into one of the few buildings with these characteristics remaining in the city of Puerto Montt, with a built area of 714 m^2 and a maximum height of 14 meters (Figure 4).

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Figure 5. Image of the San Francisco Javier School with the damage from the 1960 earthquake. Source: Fabregas Zelada (2022).

In 1931, the construction of the Assembly Hall was completed. Since its opening, this room has been used for different activities; in addition, the lower part of the Hall has served as a covered courtyard on rainy days. Between 1952 and 1954, the indoor gymnasium was built, with a capacity of 1,500 people (Tampe Maldonado, 1999). The 1960 earthquake hit the building hard, the most obvious damage being that one of its exterior walls was left leaning (Figure 5).

Over time, the building has seen considerable damage to its foundations. As a result, the two-story structure from 1894 was studied in a critical survey for facade restoration by several teams of heritage architects in 2022 (Castro Fones & Brauning Salazar, 2022).

It should be noted that the Jesuit community used this educational building for almost a century. However, in 2011, the school moved from its historic and central premises to the Pelluco Alto sector, where the new infrastructure is located, exceeding the dimensions of the old campus and abandoning the site.

Today, this building has been declared in the communal regulatory plan as a historical conservation building, which recognizes its heritage value, mainly its materiality, its wooden structure, as well as its corrugated metal sheet cladding (Castro Fones & Brauning Salazar, 2022).

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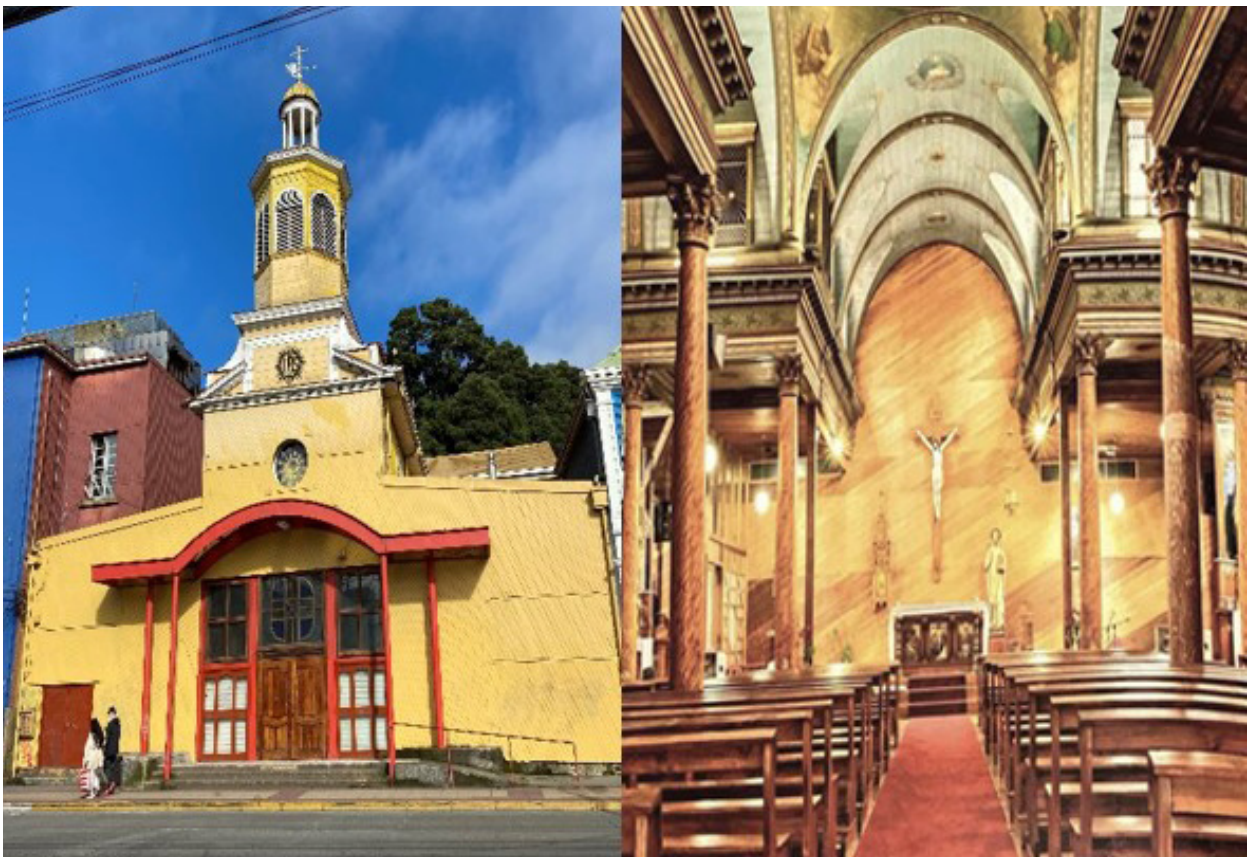


Figure 6. Images of the facade and central nave of the Jesuit Church. Source: Obando Aedo (2024).

San José de los Padres Jesuit Church

The San José de los Padres Jesuit Church was built in 1872, making it one of the oldest buildings of Puerto Montt. From the very beginning, the Jesuits tried to provide themselves with as many priests as possible, since they did not have the minimum number of missionaries needed for such an extensive territory, corresponding to the Diocese of Ancud. Therefore, the Bishopric decided to bring German Jesuits for this evangelizing work.

With the arrival of Father Francisco Enrich in 1860, the San José Temple was built in Puerto Montt, and another was built in Puerto Varas. Father Ramón Tubau was commissioned as the architect of the San José Church.

The San José Church has the main temple of the Society of Jesus in Rome, called "Gesù", as its design reference. Its structure is 30 meters long, 12.5 meters wide in the central part, and 20 meters wide by the transept, to accommodate up to 1,000 people. Its interior had a Corinthian style, with three naves and five altars, and a bell tower on the facade. The Jesuits Juan Struck and José Patten worked on the finishes and the furniture, together with the carpenter Matías Doggenweiller (Castro Fones & Brauning Salazar, 2022) (Figure 6).

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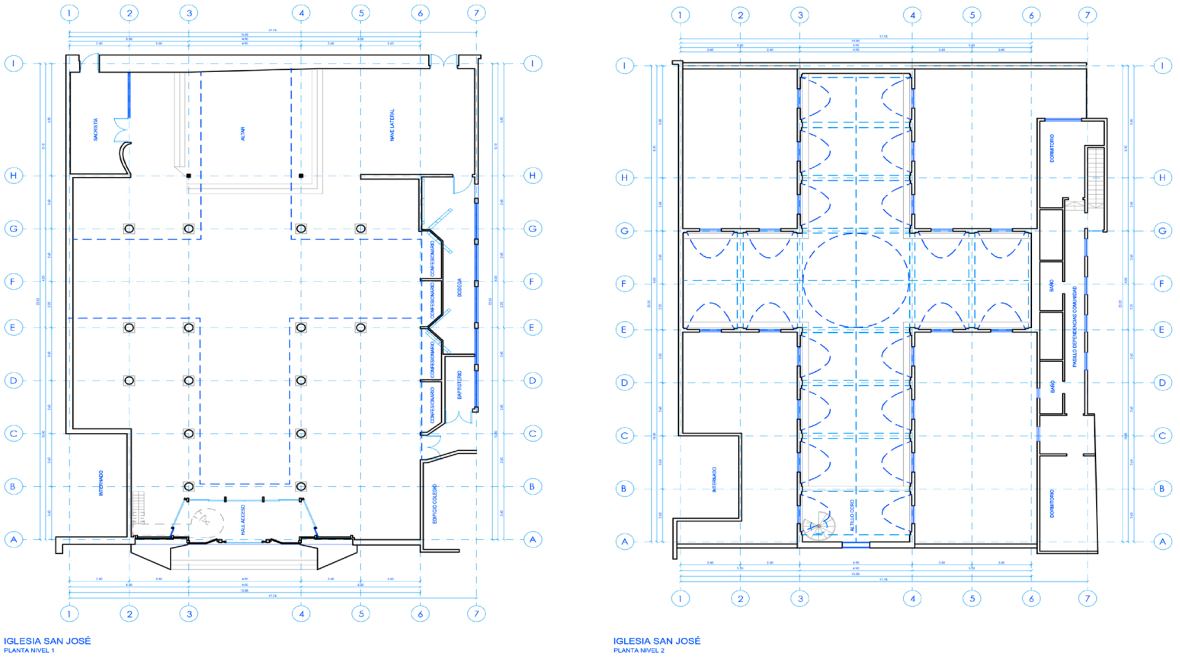


Figure 7. Planimetry of the floor plan of the Church of the Jesuit Fathers, based on the architectural survey by José Cabedo Ibarra (1982). Source: Obando Aedo (2024).

It was inaugurated at Christmas 1872, although several details remained unfinished, including interior works, the finishing of the façade's cladding (which used Cancagua stone to reduce the risk of fire and provide greater stability to the exposed structure), and the delay in installing its final doors. The only thing finished was the presbytery vaults (Tampe, 2016).

In 1873, the rough work, fittings, details, and ornamentation of the new chapel, the dome, and the vault were completed. In June of that year, the scaffolding inside the Church was removed, allowing the Eucharist to finally be celebrated in its current Temple (Schmidt & Tampe, 2011).

This temple has a built-up area of 405 m^2 and a maximum height of 16 meters (Figure 7). The altars of the Sacred Heart and the Virgin Mary stand out inside. These have remained intact since its foundation. Similarly, the paintings of the ceiling, the vault, and the columns maintain their original, very different character from that of the churches of Chiloé and the Puerto Montt Cathedral (Castro Fones & Brauning Salazar, 2022) (Figure 8).

Among the interventions it has experienced, the first and most significant occurred at the end of the 1950s, when a new boarding school was built. It was built on the south side of the Church to provide street access, thereby reducing the temple by 60 m^2. From the outside, it resembles a side door of the temple; however, it is an entrance to the boarding school (Castro Fones & Brauning Salazar, 2022). Other interventions relate to what happened during the 1960 earthquake. The serious damage and deterioration observed in the old wooden structure highlighted the consequences of its rapid initial construction, in which the materials were not properly prepared (Castro Fones & Brauning Salazar, 2022).

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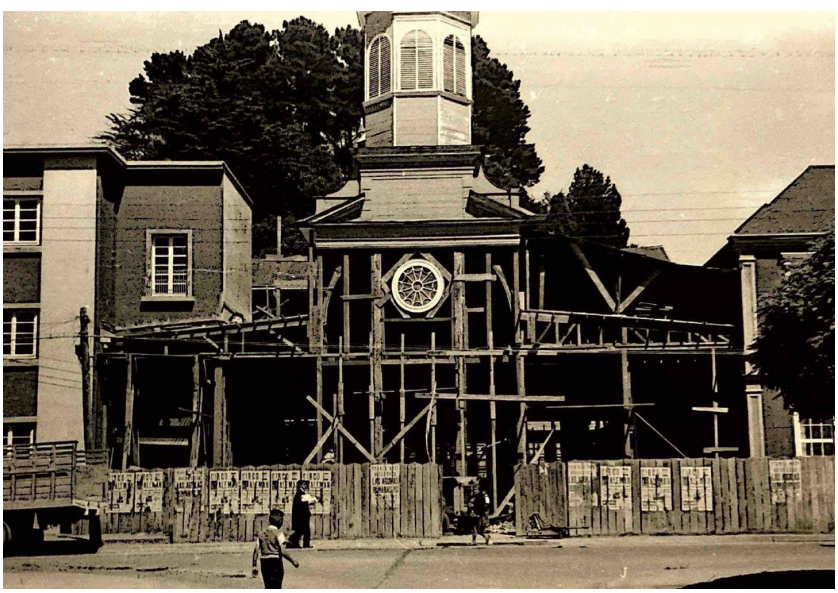


Figure 8. Images of inside the Jesuit Church. Source: Obando Aedo. (2024).

Figure 9. Church facade under repair, 1962. Source: Castro Fones & Brauning Salazar (2022).

The restoration carried out by the Pontifical Catholic University of Valparaiso (PUCV) School of Architecture between 1962 and 1964 introduced changes to the Church, such as the removal of the pulpit and the main altar, with the Eucharist celebrated facing away from the public.

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Figure 10. Panoramic view of the San Francisco Javier Jesuit educational complex. Source: Fabregas Zelada (2022).

Structural walls were also demolished to create a free floor plan in line with the modern concepts of the time, and the resulting openings were replaced with tensioners. Due to differences of opinion between the Jesuit fathers and the architects, this restoration project was left unfinished. However, the structural consequences of this work are currently visible (Castro Fones & Brauning Salazar, 2022) (Figure 9).

Due to the deterioration of the church, the Society of Jesus, through a 2022 collaboration agreement with San Sebastian University, conducted a "critical architectural survey" of the Temple. This study seeks to develop knowledge of the property's state of conservation to implement optimal maintenance, conservation, and preservation measures over time for new generations.

Finally, the San José de los Padres Jesuit Church is the oldest historical conservation building in Puerto Montt. The Municipality of Puerto Montt also declared it a Historical Conservation Property in the community regulatory plan.

Bell Tower

In 1893, under the administration of the Jesuit Head Priest Lorenzo Wolter, a bell tower was erected at the top of the hill next to the college to announce and brighten religious holidays and extraordinary events. However, there is no agreement among historical sources on the year of its construction, which dates between 1891 and 1893 (Tampe Maldonado, 1999; Castro Fones & Brauning Salazar, 2022). Father Wolter entrusted its construction to the German carpenter Theodor Langenbach (Enrich et al., 2002) (Figure 10).

Its design has a single volume, built on gravel from the same hill; approximately one meter of soft ground was excavated, and stones

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Figure 11. View of the facade of the Bell Tower of the San Francisco Javier School. Source: Obando Aedo (2024).

brought from Ancud were used to cement the bases of its structural columns. In its construction, a system of regulating sections was applied based on a square module of 6 meters of edges for the floor plan and the body of the base, the cane and the roof, and a square submodule of one and a half meters of edge, for the roof slopes that interlock the bodies of the tower, obtaining a height of the tower of three and a half squares (Cherubini, 2015) (Figure 11).

Its materiality is mainly native larch, pine, and oak. For the structural joints, box and herringbone assemblies were used, with wooden dowels to secure the beams and diagonals. The second-floor structure supporting the bells is the only one reinforced with bolts to bear their weight. Finally, the roof has an orthogonal floor plan in neo-Gothic style, completing the structure with a cross that, together with the entire construction, reaches a height of 21 meters, covers a built area of 37.2 m^2, and has a volume of 781.2 m3. (Cherubini, 2015) (Figure 12).

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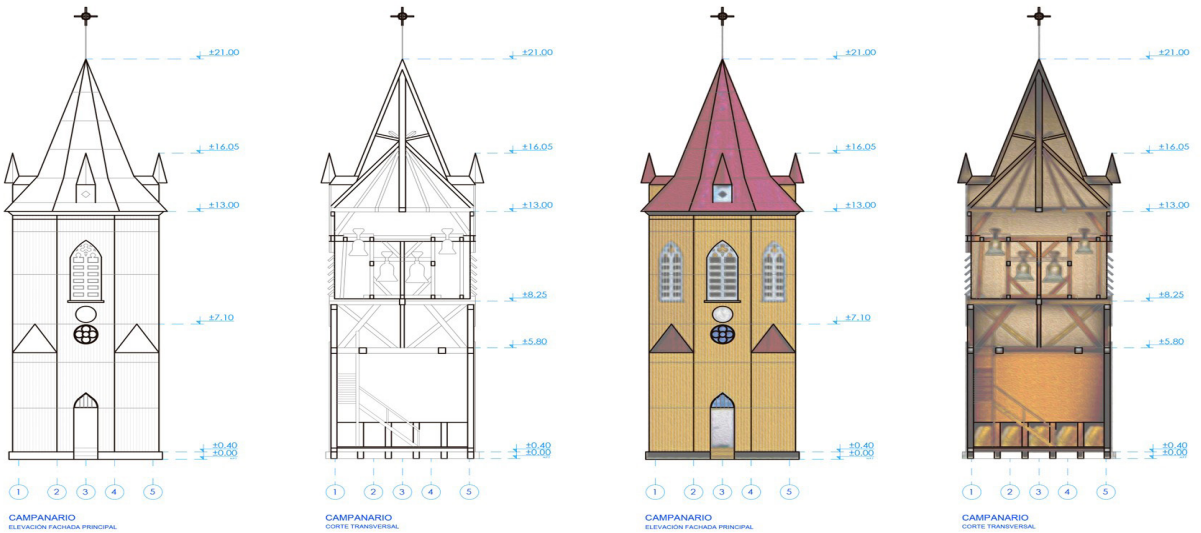




Figure 12. Planimetry of the side elevation of the Bell Tower, based on the architectural survey of Oficina Plan Arquitectos (2010). Source: Obando Aedo (2024).

Figure 13. Details of the clock and the bells of the Bell Tower. Source: Castro Fones & Brauning Salazar (2022).

This bell tower is lined with corrugated zinc plates, with semi-oval windows, rose windows, and a Gothic-style roof, topped by small minarets crowned with crosses at their tips, whose slenderness and location make it a historical urban landmark in Puerto Montt. Unfortunately, this bell tower is affected by xylophagous agents (Castro Fones & Brauning Salazar, 2022). Finally, in 1997, the National Monuments Council declared the bell tower a National Monument under declaration N° 975 (Figure 13).

Fachwerk Construction System adapted to the San Francisco Javier Educational Complex

The German migratory influence in southern Chile during the mid-19th century is relevant to its cultural, social, and economic development. Their contribution was also materialized in the birth of new cities. This urban development is evident in the large number of buildings, mostly wooden, that can be classified as "German architecture", such as churches, housing,

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Figure 14. Bell tower structure with sighting of joint recess and use of dowels. Source: Oficina Plan Arquitectos.

Figure 15. Detail of the mark of German carpenters in the union of beams in the school. Source: Castro Fones & Brauning Salazar (2022).

schools, stables, and industrial buildings (Cherubini, 2015). Of these architectural examples, some are highly documented and have National Monument status, while others are totally ignored (D'Alencon Castrillón & Prado García, 2014).

Since its arrival in Puerto Montt, the Society of Jesus allegedly employed German builders to construct the school under study, which allows us to highlight the traditional construction system they employed. In addition, it is known that German migrants would have brought their construction techniques to Chile, including the use of the Fachwerk System (Cherubini, 2015).

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Figure 16. Bell tower structure with carpenter's mark visible. Source: Castro Fones & Brauning Salazar (2022).

This vernacular system is characterized by large wooden frames with complex joint assemblies, separated from the ground by wooden panels set on masonry foundations of stone or brick. On the conveniently diagonalized partitions, the mezzanine layout is created, with the second-floor partitions supported, or the roof structure is formed, consisting of a central partition that supports the truss structure that shapes the roof's slope. The aesthetic nature of the framework is to remain visible, subject to climatic variations (Cherubini, 2015). According to the definition by D'Alencon Castrillón & Prado García (2014), this place would be filled with seals without raw-earth supports or bricks, on a fabric of branches fixed to the frames. The structure would be combined with horizontal platforms that eliminate the need for wood on one or more floors (Figure 14).

At its foundation, the San Francisco Javier School was built using the traditional Fachwerk system, as were many buildings in Puerto Montt at the time, by German migrants.

In a second stage, according to the interview with the architect G. Paredes (19/03/2025), it was possible to establish that the construction system that the educational complex had was not a replica of the Fachwerk system used by German migrants, but that it was adapted to the area, closer to the definition provided by D'Alencon Castrillón & Prado García (2014) (Figure 15 and Figure 16).

Finally, Araya Toro & Almonacid Burgos (2022) agree that the school's building would have an assembly-and-splicing constructive system with characteristics of the *Fachwerk* system. However, this work would not have a stone filling in its structure, unlike the wooden framework, which would be more closely aligned with the Chilota carpentry school and unrelated to the traditional *Fachwerk* system.

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CONCLUSIONS

Firstly, this research, through historical and ethnographic sources, has managed to determine that in the San Francisco Javier Jesuit School, there are different historical periods for the origin of its construction, its constructive interventions, and the current state of the building, which allows understanding and complementing the evolution of an architectural analysis that goes beyond general descriptions of its style and materiality.

As for the historical-urban dimension that represents the complex studied for the development of Puerto Montt, by identifying and linking the different historical episodes such as the immigration of German families, the arrival of the Society of Jesus, and other events that affected this city, the existence of this educational and heritage complex is identified as a remnant of the Jesuit presence in Puerto Montt, as well as the academic cradle from which outstanding citizens graduated who had a relevant role in the activities of Puerto Montt. These include regional and national figures, such as the former Minister Enrique Paris, the former Mayor Ramón Yuraszeck, the former Senator Fidel Espinoza, and the anthropologist Pablo Ortuzar, among other outstanding alumni. However, the current Puerto Montt community is in a state of ignorance or "heritage amnesia" about the old enclosure.

In this sense, the abandonment and neglect of the old site demonstrate a lack of recognition of its architectural value, given that it is one of the few preserved complexes in the city of Puerto Montt that still retain German-migrant architecture.

In the same way, the Jesuit work of the "Modus Noster" in this educational complex is not recognized, which is demonstrated in different spaces, such as the inner courtyards, arranging the layout distribution around them, in addition to having complementary buildings that would help a correct schooling, as is the case of the church.

Finally, the relevance of researching educational architecture from religious orders, as a case study: the San Francisco Javier school, has shown that it is part of the genesis and identity of Puerto Montt. Likewise, this case study is one of the first schools built by the Jesuits upon their return to Chile. This demonstrates that conducting this type of study, from its characterization to its dissemination, would enable, in the near future, a possible and appropriate architectural enhancement by different local actors. Hence, it is necessary to continue research related to Jesuit heritage and the educational campuses of religious orders in Chile.

CONTRIBUTION OF AUTHORS CRediT

Conceptualization, J.M.B.S., P.D.G.; Data Curation, J.M.B.S., P.D.G.; Formal analysis, P.D.G.; Acquisition of financing; Research, J.M.B.S., P.D.G., D.O.A.; Methodology, J.M.B.S., P.D.G., D.O.A.; Project management; Resources; Software; Supervision, J.M.B.S., P.D.G., D.O.A.; Validation, P.D.G.; Visualization, D.O.A.; Writing - original draft, J.M.B.S., P.D.G., D.O.A.; Writing - revision and editing, J.M.B.S., P.D.G., D.O.A.

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METHODOLOGICAL ARCHITECTURE IN ARTIFICIAL INTELLIGENCE-MEDIATED DESIGN, SÃO PAULO, BRAZIL

ARQUITECTURA DEL MÉTODO EN DISEÑO MEDIADO POR INTELIGENCIA ARTIFICIAL, SÃO PAULO, BRASIL

ARQUITETURA DO MÉTODO EM PROJETOS MEDIADOS POR INTELIGÊNCIA ARTIFICIAL, SÃO PAULO, BRASIL



Figure 0. The first results of the exercise. Source: Prepared by the authors.

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ABSTRACT

The incorporation of artificial intelligence (AI) into architectural design processes in Latin America has been predominantly instrumental and fragmented, lacking explicit methodological frameworks that articulate design decisions, disciplinary responsibility, and technological mediation. This paper proposes and qualitatively demonstrates a constructive methodological framework to integrate AI as a structural component of design reasoning, organized into three interdependent levels: theoretical, operational, and critical/evaluative. The core of the method is a matrix and an application protocol that relates project phases, cognitive tasks, and functional categories of AI, requiring the declaration of inputs, criteria, operations, and trace records at each intersection. A pilot study in an academic context revealed consistent improvements in process traceability and procedural clarity, strengthening the capacity to justify, audit, and communicate decisions without implying automatic formal optimization. Results indicate that the primary transformation introduced by AI lies not in task automation, but in the reconfiguration of the cognitive power that structures the space of design possibilities. As an original contribution, the study formulates a transferable methodological architecture that, through algorithmic design thinking, governs algorithmic mediation through explicit criteria, verifiable records, and design responsibility, shifting innovation from technical novelty toward the epistemological organization of the process. It concludes that the critical integration of AI in architecture depends on traceable methodological structures capable of making limits, risks, and zones of opacity visible, constituting an internal condition of disciplinary, ethical, and scientific validity in contemporary design practice.

Keywords: BIM, algorithmic governance, design process, decision-making, traceability

RESUMEN

La incorporación de inteligencia artificial (IA) en el proyecto arquitectónico ha sido predominantemente instrumental y fragmentaria en América Latina, al carecer de marcos metodológicos explícitos que articulen decisiones proyectuales, responsabilidad disciplinar y mediación tecnológica. Este artículo propone y demuestra cualitativamente un marco metodológico constructivo para integrar la IA como componente estructural del razonamiento proyectual, organizado en tres niveles interdependientes: teórico, operacional y crítico/evaluativo. El núcleo del método es una matriz y un protocolo de aplicación que relaciona fases del proyecto, tareas cognitivas y categorías funcionales de IA, que exigen la declaración de insumos, criterios, operaciones y registros de traza en cada intersección. La demostración mediante un estudio piloto en contexto académico evidenció mejoras consistentes en la trazabilidad del proceso y en la claridad procedimental, al fortalecer la capacidad de justificar, auditar y comunicar decisiones sin implicar optimización formal automática. Los resultados indican que la principal transformación introducida por la IA no reside en la automatización de tareas, sino en la reconfiguración del poder cognitivo que organiza el espacio de posibilidades del diseño. Como aportación original, el estudio formula una arquitectura del método transferible que, por medio del pensamiento algorítmico de proyecto, gobierna la mediación algorítmica mediante criterios explícitos, registros verificables y responsabilidad proyectual, que desplaza la innovación desde la novedad técnica hacia la organización epistemológica del proceso. Se concluye que la integración crítica de IA en arquitectura depende de estructuras metodológicas trazables capaces de hacer visibles los límites, riesgos y zonas de opacidad, al constituir una condición interna de validez disciplinar, ética y científica del proyecto contemporáneo.

Palabras clave: BIM, gobernanza algorítmica, proceso de proyecto, toma de decisiones, trazabilidad.

RESUMO

A incorporação da inteligência artificial (IA) ao projeto arquitetônico tem sido predominantemente instrumental e fragmentária na América Latina devido à ausência de referenciais metodológicos explícitos que articulem decisões projetuais, responsabilidade disciplinar e mediação tecnológica. Este artigo propõe e demonstra, qualitativamente, um referencial metodológico construtivo para integrar a IA como componente estrutural do raciocínio projetual, organizado em três níveis interdependentes: teórico, operacional e crítico-avaliativo. O núcleo do método consiste em uma matriz e um protocolo de aplicação que relacionam as fases do projeto, as tarefas cognitivas e as categorias funcionais da IA, e exigem a declaração de insumos, critérios, operações e registros de rastreio em cada interseção. A demonstração, por meio de um estudo piloto em contexto acadêmico, evidenciou melhorias consistentes na rastreabilidade do processo e na clareza procedimental, ao fortalecer a capacidade de justificar, auditar e comunicar decisões, sem implicar otimização formal automática. Os resultados indicam que a principal transformação introduzida pela IA não reside na automação de tarefas, mas na reconfiguração do poder cognitivo que organiza o espaço de possibilidades do projeto. Como contribuição original, o estudo formula uma arquitetura do método transferível que, por meio do pensamento algorítmico de projeto, rege a mediação algorítmica com base em critérios explícitos, registros verificáveis e responsabilidade projetual, deslocando a inovação da novidade técnica para a organização epistemológica do processo. Conclui-se que a integração crítica da IA na arquitetura depende de estruturas metodológicas rastreáveis, capazes de tornar visíveis os limites, os riscos e as zonas de opacidade, uma vez que constituem uma condição interna de validade disciplinar, ética e científica do projeto contemporâneo.

Palavras-chave: BIM, governança algorítmica, processo de projeto, tomada de decisão, rastreabilidade

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INTRODUCTION

The incorporation of artificial intelligence (AI)- based tools can reconfigure how architectural projects are conceived, organized, and evaluated in professional and academic contexts (Bernstein, 2025; Coeckelbergh, 2024; Leach, 2025).

From a theoretical, conceptual, and practical digital perspective—without exhaustive pretension, but oriented to the scope of this article's interest—it is proposed to understand the architectural project as a representational process of spatial intentions within parametric and complex informational structures. Unlike studies that treat AI as a set of tools or as a strictly technical problem, this study assumes it as a methodological mediation that reconfigures the feedback loop between data, decisions, and form, and stimulates the development of algorithmic project thinking.

Recent literature has addressed AI in architecture through historical, informational, taxonomic, and technical-operational approaches, focusing on data, digital manufacturing, automation, BIM, or the classification of project processes, especially along the US-Europe axis (Bernstein, 2025; Chaillou, 2022; Leach, 2025).

However, in Latin America, this process has developed — inferentially and in the absence of systematic statistical evidence — in a difficult, fragmented and predominantly experimental way. Dispersed evidence indicates that the technological approach has been promoted largely by academic environments and research networks rather than by consolidated professional practice. In practical terms, this Latin American dynamic has generated some local project behaviors, but with a limited methodological systematization and scarce structured and expanded transfer towards the daily work of the architectural project (Britto, Pereira, & Checcucci, 2025; Donoso, Pardo, & Cabrera Arias, 2025; Felipe & Nome, 2025; Nunes & Tramontano, 2025; Quedas Campoy, 2025; Santos Fischer & Leoni Schmid, 2024).

In these cases, AI is used as a generator of basic formal alternatives, a visualization assistant, or an organizer of preliminary information, without clear articulation of its role within the cognitive, decisional, and ethical phases of the design process. The explicit formulation of methodological frameworks that integrate AI as a constituent part of project reasoning — in a certain sense, as an epistemological approach — is left in the background, or left open to expansion.

Research in the field of applied methodology has pointed out that, without operational and epistemological frameworks, digital tools tend to reinforce practices dependent on external technical logics and implicit criteria not controlled by the designer, which limits their professional value (Bonilla-Vallejo & Tramontano, 2024; Jones, Gold, & Claxton, 2023; Kasanen, Lukka, & Siitonen, 1993; Nunes & Tramontano, 2025; Sarzosa Soto, 2025). In this context, AI risks remaining an operational black box or

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opaque workflows, rather than a reflective means of producing design knowledge.

The central problem addressed by this research lies in the absence of explicit methodological structures, together with technological frameworks (namely parameters, decisions, and representations), within the Latin American context, that allow understanding and operating AI as an integrated project instrument and as an epistemological platform (cognitive and ethical).

The objective is to propose and demonstrate a Latin American methodological framework qualitatively, in the form of a matrix and an application protocol, to integrate AI into the project process, aimed at the academic and professional communities, epistemologically articulated in three dimensions: theoretical, operational, and critical/evaluative — which will be outlined later in this article.

THEORETICAL FRAMEWORK

In pioneering approaches to informational modeling, the project process was understood as the construction of symbolic models that integrate form, function, and behavior under a single logic, shifting the emphasis from the final object to the process as a system of interdependent decisions (Mitchell, 2009).

The increase in the computerization of design implies a transformation of the digital formalization of project reasoning into explicit informational structures. Digital environments, databases, and parametric systems extend simultaneous operation over multiple layers. They operate as a network of metadata, rules, and relationships that organize the transit between program, form, materiality, and performance, particularly in Building Information Modeling (BIM) and parametric modeling, where each formal decision is associated with informational attributes and internal dependencies (Bonilla-Vallejo & Tramontano, 2024; Eastman et al., 2008; Nunes & Tramontano, 2025).

Thus, the architectural project is not limited to graphic representation as a final product, but also includes conceptual decision-making processes, technical parameters, logical relationships, and systematic reviews (Bernstein, 2025; Coeckelbergh, 2024; Leach, 2025). To project, in this framework, is to structure information: to declare, organize, and transform data into coherent spatial configurations.

AI is incorporated as a new mediation, especially interesting for the non-computer science specialist architect: it not only generates alternatives easily - (from friendly interfaces)- but also processes, correlates, and reorganizes large volumes of data, which intensifies the informational character of the project, without replacing architectural reasoning (Bernstein, 2025; Bonilla-Vallejo & Tramontano, 2024;

Coeckelbergh, 2024; Leach, 2025).

Based on complex thinking (Castro, 2025; Morin, 2005), the project is configured as a network of technical, cognitive, and social interdependencies, irreducible to predictable variables, crossed by uncertainty and multiple causalities. In this sense, AI constitutes a multidimensional active space for the conditions of design possibility.

Algorithmic systems, based on statistical models and data structures that are not always transparent (Bernstein, 2025; Coeckelbergh, 2024; Leach, 2025), introduce technical mediation, correlation, and prediction processes. AI (algorithmic and parametric) operates as an active partner of the complex design system - not as an autonomous subject - by participating in feedback loops between data, decisions, and formal results; it accelerates generation, expands exploration, but can reduce critical capacity if it is not integrated into an explicit methodological framework (Bonilla-Vallejo & Tramontano, 2024).

In this framework, Latin America constitutes a theoretical and methodological opportunity: academic tradition, regional networks, and experience in contexts of limited resources that favor critical approaches to technology, by incorporating AI as an object of methodological and pedagogical project reflection (Britto et al., 2025; Donoso et al., 2025; Felipe & Nome, 2025; Santos Fischer & Leoni Schmid, 2024).

The structured incorporation of AI - as it has been presented from the theoretical and operational dimensions - can reconfigure the distribution of cognitive power in design, so the methodological discussion should include algorithmic governance (Coeckelbergh, 2024).

Therefore, in line with the article's objective, the methodological structure of the critical/evaluative dimension is organized into verification criteria, trace records, ethical rules of use, and critical review and audit. Regulatory and qualitative coherence, tectonic consistency, and contextual adequacy are also sought.

In short, integrating AI into architecture requires moving from a paradigm of instrumental adoption - obeying opaque technical infrastructures, statistical correlations, and external regulatory patterns as implicit authority-, or from a simple delimitation of tasks, to one of procedural responsibility: innovation depends less on automating than on building methodological architectures that make the relationship between data, criteria, and decisions traceable.

Therefore, the central methodological issue is how AI is integrated into the process's complex decision network. The scientific relevance lies in the method's architecture and in the importance of developing algorithmic project thinking.

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METHODOLOGY

The research is applied and methodological in nature, based on the tradition of constructive research - where the artifact (methods, models, or structures) constitutes a scientific result subject to development, demonstration, and systematic evaluation for its internal coherence (Jones et al., 2023; Kasanen et al., 1993)— and articulated by analytical generalization (Yin, 2015). Its applicability lies in its ability to generate transferable knowledge.

To ensure evaluability, the study is initially presented in three questions: (i) to what extent the phases–tasks–AI matrix increases the traceability of decisions against conventional flows; (ii) whether the framework improves procedural clarity by making actions, criteria and justifications explicit; and (iii) what limits and risks emerge when integrating AI as methodological mediation.

The methodological artifact (matrix and protocol) is organized in three interdependent dimensions. The theoretical dimension frames the project as an informational structure and a complex process that incorporates notions of feedback and technical mediation. The operational dimension translates these principles into procedures that relate project phases, cognitive tasks, and functional categories of AI. These two dimensions constitute the core of the matrix. The critical/evaluative dimension, which acts as a cortex over the others, defines qualitative criteria that enable evaluation and auditing of the process — an algorithmic governance relationship.

From this organization, the matrix ceases to operate solely as an implementation instrument and assumes an epistemological and strategic role within the project process. The artifact is not limited to systematizing operations, but establishes a structuring support for design reasoning mediated by data and algorithms.

The framework was demonstrated through an extended pilot study in an academic context, developed as a Graduation Final Project (TFG) course at Universidade São Judas Tadeu in São Paulo, Brazil, over four consecutive semesters between 2024 and 2025. Forty-six students, organized into six teams, participated and worked with three residential typologies at small and medium scales, including a compact single-family house, low-rise collective housing, and a social housing complex. In all cases, the projects were developed only within the scope of the Preliminary Study, covering context and regulations, definition of the needs program, volumetric exploration and preliminary organization (surroundings, circulations and accesses), initial definition of the structural system, enclosures and basic carpentry, and initial environmental assessments, without advancing to the executive project, technical documentation or complete interdisciplinary compatibilization.

The study was conceived as a qualitative methodological demonstration aimed at observing the framework's operability across different educational moments, the capacity for systematic recording of decisions, the coherence among project intention, procedure, and result, and the explicit identification of limits and risks. These processes will be analyzed by analog transfer to the professional field. Small and medium-sized architectural firms tend to work more with these

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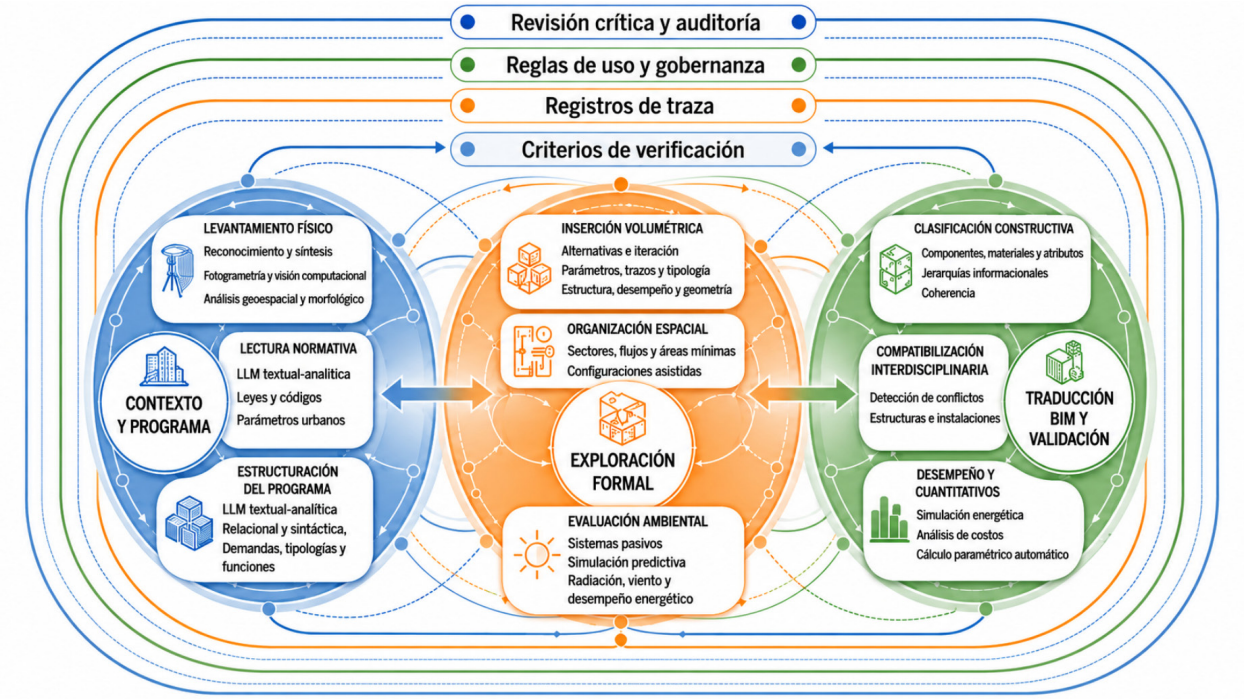


Figure 1. Matrix. Source: Prepared by the authors.

residential typologies than with larger scales. In addition, they face conditions comparable to those in academic contexts, including fragmented tools, time constraints, and the need for continuity between phases. The matrix can serve as a mechanism to reduce operational dispersion and as strategic support for documenting decisions in front of teams, clients, and regulatory frameworks.

The protocol was organized in five steps: presentation of the matrix and its criteria; application by project phase; registration of inputs, prompts, parameters, versions, and decisions; qualitative comparison with equivalent exercises without the structured use of the matrix; and teaching review using rubrics derived from the framework. The latter procedure is fundamental to the validations and incorporates the practical experience of the teachers involved, but was especially addressed by the methodological, theoretical, and conceptual references on the architectural design process developed through composition/modularity (Bernstein, 2025; Chaillou, 2022). The analysis was carried out by directed coding and considered four qualitative criteria: procedural clarity of the decisions, project consistency, identification of risks/opacities, and pedagogical feasibility. The evidence was triangulated between logs, matrices, decision diagrams, final deliverables, and critical reflections. Validation, therefore, is understood as an analytical demonstration of internal consistency and situated applicability, not as a statistical extrapolation.

DEVELOPMENT

In this section, the matrix configuration and the application protocol are defined. Up to this point, the configurations of the three dimensions

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of the proposed methodological artifact have been presented. The critical/evaluative and peripheral (cortex) comprise four layers. Although it is extremely relevant, their graphic organization is facilitated in the matrix. On the other hand, the theoretical and operational dimensions, which form the core of the matrix, have many internal elements, which tend to make graphic organization difficult. Therefore, they should be related to the cognitive and design tasks of the Preliminary Study and oriented by the typology under study. Thus, the theoretical and operational core is subdivided into three main phases, each with specific cognitive tasks, connected in a complex network: Context and Program (Physical Survey; Regulatory Reading; Program Structuring); Formal Exploration (Volumetric Insertion; Spatial Organization; Environmental Evaluation); and BIM Translation and Validation (Constructive Classification; Interdisciplinary Compatibilization; Performance and Quantitative). Their respective internal elements are reorganized following this design approach. The matrix is presented below (Figure 1):

The application protocol is started. In the Context and Program phase, specifically in the cognitive task of Physical Surveying, artificial intelligence serves as a mediator of recognition and synthesis. Photogrammetry, computer vision, and geospatial analysis systems reconstruct the material condition of the place from topographic, environmental, and imagery data. The operation consists of producing verifiable spatial models and comparable morphological readings. In Regulatory Reading, linguistic AI models - of the Large Language Model (LLM) type extract, classify, and synthesize rules from urban laws, codes, and parameters. The operation is textual-analytical. In the structuring of the Program, the AI, also a textual-analytical LLM, organizes demands, typological references, and functional relationships. The operation is relational and synthetic - oriented by criteria stipulated by the clients, users, or the title of the academic exercise, in this case.

The Formal Exploration phase is associated with the controlled expansion of the project's space of possibilities. AI operates as a system of regulated generation, systematic comparison, and analytical simulation, without determining the final form. Based on this approach, its specific operational functionalities are of less interest, and its role as a mediator in architectural decision-making is more important. In the cognitive task of Volumetric Insertion, without presupposing a single linear sequence, parametric models and generative systems produce alternatives based on legal, programmatic parameters, terrain limits and typological criteria - which would depend on the completion of the previous stage, but which do not end there, since they can also be developed based on structural, environmental or performance parameters, as well as geometric logics, through iterative operations of variation and adjustment. In Spatial Organization, generative tools distribute sectors, flows, and minimal areas through assisted configurations. In Environmental Assessment, analytical systems simulate solar radiation, wind, and energy performance through predictive operations.

The BIM Translation and Validation phase integrates moments of information formalization and auditable project control, in which the architect adopts a

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linear sequence that follows the previously described phases. However, if the design process starts on the BIM platform itself and in validation environments, no translation is configured; rather, it begins with algorithmic-parametric thinking based on geometric attributes linked to the construction industry and computational simulation systems. It is entirely plausible, especially with the support of artificial intelligence and parameterization, to start a project from a formal study or even from a system performance evaluation within the BIM platform. In any of these scenarios, AI and the associated systems operate as an algorithmic-parametric semantic structure, an inconsistency detection mechanism, and a verifiable automated calculation support.

It is important to note that the artificial intelligence tools relevant to the Formal Exploration phase have interchangeable applications and extensions with the BIM platform. Thus, the instrumental transition between the last two mentioned fields is unnecessary.

In the cognitive task of constructive classification, AI-assisted BIM environments operationally organize components, materials, and attributes into coherent informational hierarchies. In interdisciplinary compatibilization, conflict detection algorithms compare architectural, structural, and facility models using systematic validation procedures. In performance and quantitative verification, the energy simulation and cost analysis systems are applied to the BIM model through automated parametric calculations.

Next, the protocol relevant to the critical/evaluative dimension is organized. The verification criteria constitute the first inner layer of the AI's critical control cortex in the Architectural Preliminary Study. They articulate geometric precision, coherence with the surveyed reality, and data consistency with respect to regulatory, legal, and programmatic compliance. AI helps verify spatial, functional, circulatory, and proportional relationships and also supports the evaluation of contextual relevance, comfort, efficiency, and technical and economic feasibility. It is an instance of qualified filtering of the alternatives, oriented by normative documentation, occupancy parameters, and project adequacy criteria.

The trace records are the documentary layer that makes the process traceable, comparable, and auditable. Point clouds, analytical maps, documented formal versions, change history, programmatic matrices, metric reports, geometry collision reports, comparative diagrams, and a series of alternatives are included. These records allow the reconstruction of the decision path, explicit iterative review cycles, and the preservation of the memory of parameters, queries, simulations, and choices made. The AI stops operating as an opaque instance of generation and starts integrating a critical documentation system of the project transformations.

The ethical rules of use define the epistemological limits of algorithmic mediation in the Preliminary Study. They demand transparency of sources, reliability checks, information standardization, methodological clarity in simulations, and the explicit articulation of the parameters mobilized. They delimit the scope of automatic generation, reaffirming that algorithmic interpretation must be used critically and subordinated to human design judgment. The architect's authorship,

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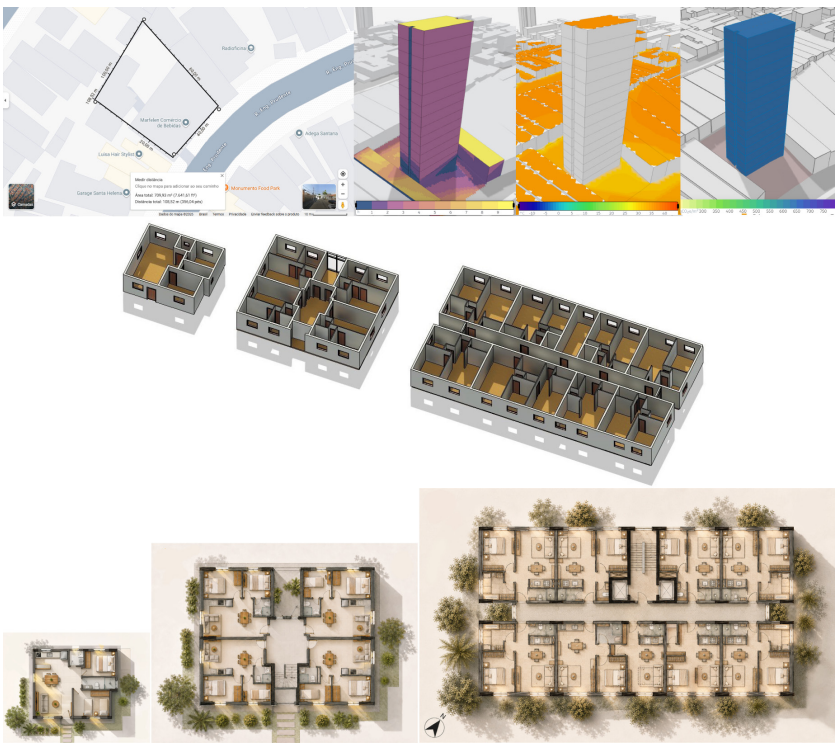


Figure 2. The first results of the exercise. Source: Prepared by the authors.

Figure 3. Results of the exercise with the matrix and the protocol. Source: Prepared by the authors.

decision-making responsibility, and technical responsibility are preserved, especially in the face of socio-environmental, legal, and contextual implications.

The critical review and audit constitute the layer of reflective validation for AI-mediated results. Its role is to verify the survey's consistency, the model's semantic integrity, the legal validity of the solutions, the calculation conditions, and the correspondence between initial parameters and achieved results. This review must be argued by the architect, open to contrast with clients, users, or academic instances, and complemented by multidisciplinary evaluation. In this way, the audit is not reduced to the automatic verification of performance, but operates as a qualitative exercise in judgment, cross-validation, and design accountability.

Pilot study as a qualitative demonstration

The first round of exercises was performed without the matrix and the protocol. The students were asked to develop typologies for a piece of land in São Paulo's Cambuci neighborhood, as well as for its legal and regulatory framework. The results are presented below (Figure 2):

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Subsequently, the matrix and the protocol were introduced. The results presented below (Figure 3) were developed under the same conditions, but with a more robust architectural approach and an algorithmic project mindset.

DISCUSSION

The graphical results are important, but in the evaluation, it was not sought to measure productivity, technical performance, formal superiority, or constructive impact; rather, the aim was to verify whether the matrix and the protocol allowed making the relationships among inputs, operations, criteria, and decisions explicit with greater precision.

In Figure 2, it is evident that the spatial arrangements are inadequate to ensure activities and circulation can take place. Certain legal and regulatory issues were not addressed. The dimensioning of structural systems is not included. In the buildings (low-rise collective housing and a social housing complex), some access to the housing units is mistakenly occurring through the bathrooms; in some cases, access is impossible. The bioclimatic study across all options is deficient, meaning that in the three typologies, a facade is entirely south-facing, i.e., without solar incidence throughout the year, in rooms where people spend a lot of time.

Figure 3 shows, in the upper part and from left to right, the location map and three studies: solar, microclimate, and incorporated carbon; in the center of the image, the modeling in the BIM interface, where the data of the studies were verified; and below, the floor plans of the three typologies. The results indicate that the problems above were solved. The studies enabled optimization of the structure from an economy-of-means perspective, with direct implications for the carbon footprint and the cost-benefit ratio. In addition, in the low-rise collective housing, a storage area was included on the ground floor, and in the social complex, there were shafts for the passage of uprights, which reveal attention to the installations. Therefore, there was not only problem-solving, but also the advancement of project thinking.

The pilot allowed the identification of four recurring patterns, important for the internal verification of the investigation protocols:

- P1. Early formalization of restrictions: Regulatory, environmental, and programmatic restrictions are declared from different starting points and reappear as tectonic selection and discard criteria in other instances of the process.
- P2. Stabilization of parameters and iterations: Induces a registered iteration logic (purpose of the change, adjusted parameter, and verification criterion), avoiding *ad hoc* modifications.
- P3. Explicit design judgment: The selection of alternatives is based on declared criteria (functional, environmental, compositional, and contextual), which make the decision reviewable.
- P4. Visibility of opacity and dependencies: The method requires declaring what is delegated to the AI, what is manually corrected, and what is rejected due to bias or contextual mismatch.

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Observed dimension	Flow without the matrix (instrumental use of AI)	Flow with matrix (methodological use of AI)	Evidence recorded in the pilot
Declaration of inputs	Dispersed inputs; regulatory and environmental restrictions appear late or partially	Inputs declared at the beginning by phase; explicit and prioritized restrictions	Logs and matrices completed with a list of inputs, restrictions and sources
Generation/ analysis parameters	Prompts and unstable configurations; unjustified changes	Declared parameters; changes recorded as iterations with explicit purpose	Iteration log (version, parameter, purpose of change)
Selection criteria	Selection based on implicit preferences or better appearance	Selection based on declared criteria (functional, environmental, compositional, regulatory)	Comparative tables and discard/acceptance annotations by criterion
Continuity between phases	Jumps between contextual reading, preliminary project and technical consolidation	Continuity reinforced by traces: Initial decisions reappear as constraints and attributes	Decision diagrams and links between phases in matrices
Verification/ control	Ad hoc verification; little critical review of biases or local adequacy	Explicit verification: Contextual and regulatory consistency checks; identification of biases	Critical reflections and risk lists/opacity zones by phase
Algorithmic opacity	Non-thematic opacity; results treated as neutral suggestions	Registered opacity: What is delegated, what is manually corrected, what is rejected	Black box sections and dependencies in logs; justifications
Documentation for communication	Reconstructed later narrative; difficult to explain why an alternative was chosen	Narrative derived from traces; communicable decisions to teacher, team and client	Presentations and deliveries with decision sequence supported by trace

Table 1. Evidence from the pilot study: Qualitative comparison with and without matrix. Source: Prepared by the authors.

Table 1 extends the explanation of the differences observed between workflows without structured use of the matrix and those with methodological use of the framework, based on evidence from the pilot study. The previously described patterns are summarized using these differences.

CONCLUSIONS

The results support a central thesis: Artificial intelligence does not transform the architectural project by automating tasks, but by reconfiguring the cognitive power that organizes the space of design possibilities. The study's scientific contribution lies in the method's architecture and the project's algorithmic thinking, not in instrumental novelty.

From the constructive research, a structure was proposed and demonstrated that makes the algorithmic mediation observable, debatable, and governable - between intention, technical mediation, and form -as an active dimension within the project process with the capacity to produce transferable knowledge, since the proposal and validation lie in the epistemological field, not in a specific environment. This condition was evidenced by the four identified patterns, even though they do not

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constitute a statistical sample and cannot be weighed directly in the professional field.

The qualitative evidence from the pilot study indicates consistent improvements in procedural clarity and in the explanation of selection criteria, strengthening the argumentative capacity against algorithmic-parametric systems without implying automatic formal superiority. At this point, the value of the framework is measured by the traceability and auditability of the project reasoning.

In the Latin American context, given the aforementioned common characteristics, the matrix and the protocol operate as a methodological denaturalization device by requiring the explicit declaration of context, norm, tectonic criterion, and decisional justification in each phase, by shifting the discussion from technical efficiency to the epistemological, even ethical, responsibility of the project. In this sense, algorithmic mediation shapes the definition of what is possible in design by determining which procedural alternatives emerge as viable and which remain invisible, thereby allowing the architect to assume explicit responsibility for the criteria that guide the delegation of decisions to automated systems.

In concrete terms, the matrix requires, for example, that a volumetric alternative generated by AI indicate which urban planning restrictions were used, which environmental parameters guided the selection, which option was discarded, and why. Similarly, in a residential program, it forces recording whether the AI barely reorganized demands, whether it suggested functional relationships, or whether it produced solutions incompatible with regulations, context, or design intent. Thus, it shifts from operating solely on abstract concepts to operating through procedures for verification, documentation, comparison, and discarding.

From a pedagogical perspective, the proposed structure reinforces understanding the project as a cognitive decision-making process. The explanation of traces allows us to reflect critically on biases, limits, and areas of opacity of AI. In this way, technology ceases to operate as an apparently neutral resource and becomes a generative and analytical object within the training process itself.

The limitations of the study arise from its qualitative, academic, and demonstrative nature. The pilot study depended on internal teacher validations. External replicability requires testing in other courses, professional offices, building scales, and later stages of the project and construction. It also demands comparable metrics, such as decision time, number of justified iterations, regulatory consistency, parameter stability, and documentation quality. In the studies carried out here, the decisions were developed within one academic semester, which lasts between four and five months. The average number of justified iterations to meet the aforementioned regulatory, parametric, and documentation requirements was approximately equal to the number of weeks in the period: about

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eighteen. Comparing these variables constitutes the framework's future agenda.

In continuity with this, future developments focus on its integration with heritage modeling environments, digital urbanism, and advanced educational platforms, expanding the scale of application from the building to more complex territorial and cultural systems. In the pedagogical field, the method can serve as a basis for curricular structures that integrate critical thinking, technological mediation, and project practice from the early stages of training, promoting situated and responsible algorithmic literacy.

From a disciplinary point of view, the study's contribution tends to reconfigure the relationship between shape, norm, context, and decision in the contemporary architectural project, shifting the focus from formal production to the methodological dimension of the process, mediated by algorithmic project thinking. In summary, the proposed innovation depends on the development of transferable methodological architectures that govern technological mediation with transparency and a sense of project responsibility.

CONTRIBUTION OF AUTHORS CRediT

Conceptualization, C.Q.C., C.I.; Data curation, C.Q.C., C.I.; Formal analysis, C.Q.C.; Acquisition of financing; Research, C.Q.C.; Methodology, C.Q.C.; Project management, C.Q.C.; Resources, C.I.; Software, C.I.; Supervision, C.Q.C.; Validation, C.Q.C.; Visualization, C.I.; Writing - original draft, C.I.; Writing - revision and editing, C.I.

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THE MENDOZA COMPREHENSIVE SCHOOLS PLAN (ARGENTINA, 1962-1972: STANDARD PROJECTS AND TERRITORY

EL PLAN DE ESCUELAS INTEGRALES DE MENDOZA (ARGENTINA, 1962-1972): PROYECTOS TIPO Y TERRITORIO

O PLANO DE ESCOLAS INTEGRAIS DE MENDOZA (ARGENTINA, 1962-1972): PROJETOS-PADRÃO E TERRITÓRIO



Figure 0. Standard rural project developed by Corti and Alfaro. Sources: Images from Summa (López de Genovart, 1976); plans of the archive of the Directorate of Architecture of Mendoza.

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ABSTRACT

Throughout the 20th century, school construction became a core component of state consolidation processes in Argentina, closely linked to the expansion of schooling, territorial organization, and socioeconomic development. In a context marked by overlapping responsibilities between the national state and provincial governments, and by the progressive advance of educational decentralization since the mid-1950s, school architecture acquired a strategic role in the formulation of public policies. During the 1960s, developmentalist orientations and the country's growing international engagement fostered the professionalization of educational architecture, in dialogue with organizations such as UNESCO. Within this framework, this article analyzes the school construction plan implemented by the province of Mendoza between 1962 and 1972. Based on the revision and analysis of documentary and technical sources, the architectural and territorial characteristics of standardized designs, the connections among different levels of the state, and continuity and reformulation processes were examined, in comparison with previous experiences. The study demonstrates that Mendoza's school building policy constituted a sustained strategy of educational planning and territorial development, consolidating the provincial government's leading role and assigning standardized projects a central role as instruments of state modernization in the Argentine context of the 1960s.

Keywords: educational architecture, primary schools, public works, planning, territory

RESUMEN

A lo largo del siglo XX, la construcción de escuelas constituyó un componente central de los procesos de consolidación estatal en Argentina, estrechamente vinculada a la expansión de la escolaridad, la organización del territorio y el desarrollo socioeconómico. En un contexto marcado por la superposición de competencias entre el Estado nacional y los gobiernos provinciales, y por el avance progresivo de la descentralización educativa desde mediados de la década de 1950, la arquitectura escolar adquirió un papel estratégico en la definición de políticas públicas. Durante la década de 1960, las orientaciones desarrollistas y la creciente inserción internacional del país impulsaron la profesionalización del campo de la arquitectura educativa, en diálogo con organismos como la UNESCO. En este marco, el artículo analiza el plan de construcción de escuelas impulsado por la provincia de Mendoza entre 1962 y 1972. A partir del relevamiento y análisis de fuentes documentales y técnicas, se examinan las características arquitectónicas y territoriales de los prototipos, la articulación entre los distintos niveles del Estado y los procesos de continuidad y reformulación respecto de experiencias previas. El estudio demuestra que la política mendocina de edificación escolar constituyó una estrategia sostenida de planificación educativa y desarrollo territorial, que consolidó el protagonismo del gobierno provincial y otorgó a los proyectos tipo un rol central como instrumentos de modernización estatal en el contexto argentino de la década de 1960.

Palabras Clave: arquitectura educacional, escuela primaria, obras públicas, planificación, territorio

RESUMO

Ao longo do século XX, a construção de escolas constituiu um componente central dos processos de consolidação do Estado na Argentina, estreitamente vinculada à expansão da escolarização, à organização do território e ao desenvolvimento socioeconômico. Em um contexto marcado pela sobreposição de competências entre o Estado nacional e os governos provinciais, bem como pelo avanço progressivo da descentralização educacional a partir de meados da década de 1950, a arquitetura escolar assumiu um papel estratégico na definição de políticas públicas. Durante a década de 1960, as orientações desenvolvimentistas e a crescente inserção internacional do país impulsionaram a profissionalização do campo da arquitetura educacional, em diálogo com organismos como a UNESCO. Nesse cenário, o artigo analisa o plano de construção de escolas promovido pela província de Mendoza entre 1962 e 1972. Com base no levantamento e na análise de fontes documentais e técnicas, examinam-se as características arquitetônicas e territoriais dos protótipos, a articulação entre os diferentes níveis do Estado e os processos de continuidade e reformulação em relação às experiências anteriores. O estudo demonstra que a política de edificação escolar de Mendoza constituiu uma estratégia contínua de planejamento educacional e desenvolvimento territorial, que consolidou o protagonismo do governo provincial e conferiu aos projetos-padrão um papel central como instrumentos de modernização do Estado no contexto argentino da década de 1960.

Palavras-Chave: arquitetura escolar, escola primária, obras públicas, planejamento, território

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INTRODUCTION

Throughout the 20th century, school construction became one of the main instruments in the processes shaping modern states. In Argentina, the country's size and migratory flows shaped heterogeneous scenarios, in which elementary schools occupied a central place amid high illiteracy rates. The expansion of school infrastructure accompanied the growth of educational systems and promoted architectural transformations in response to new pedagogical demands, technological advances, and local conditions (Cattaneo & Durá Gúrpide, 2024). The school building was thus combined with state institutionalization, regional organization, and economic and social development processes.

Between 1905 and 1978, educational management in Argentina was characterized by the alignment of competencies between the national state and the provinces. Although the National Constitution (General Constituent Congress of the Argentine Confederation, 1853) and Law 1420 on Common Education (1884) assigned to the latter the responsibility for primary education, the ratification of the Láinez Law (Law 4874, 1905) enabled the National Council of Education to create and manage schools in provincial areas, a situation that remained in place until these were fully transferred in 1978. This overlap of competencies led to a dynamic of multilevel articulation that alternated between cooperation and conflict and that, since 1955, has been inscribed in a progressive educational decentralization (Southwell & De Luca, 2008; Petitti, 2024; Durá Gúrpide, 2025a).

In the 1960s, development policies and the country's growing international integration transformed the production of state infrastructure. The implementation of major public works, such as dams, roads, hospitals and schools, was combined with the objectives of industrial modernization and urban expansion (Müller & Schmidt, 2020). In the field of school architecture, Argentina joined an international process of professionalization, fostered in particular by UNESCO and the Regional Center for School Buildings for Latin America (CONESCAL) (Durá Gúrpide, 2026). Within this framework, the National School Construction Plan was implemented in 1965, which led to standardized prototypes (Estrella, 1984; Barrán, 2022; Cattaneo & Durá Gúrpide, 2025). These projects were applied to the construction of approximately 200 schools; however, their implementation was inconsistent over the provinces, and in some cases, such as Mendoza, none were implemented.

In contrast to the limited national intervention, the government of the Province of Mendoza implemented an intensive school construction policy from 1962 to 1972. Francisco Gabrielli's involvement over the three periods (1961-1962, 1963-1966, and 1970-1972), together with the management of José Blanco (1966-1970), helped consolidate a provincial strategy oriented toward expanding educational infrastructure. Following UNESCO's recommendations, this project elevated the school to a role as an instrument for regional and social development.

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The Mendoza initiative was based on a previous route taken in the field of school construction. Since the late 1920s, the province had supported sustained school construction plans, which allowed it to develop technical and institutional capacities and consolidate a relevant position compared to the State (Cattaneo, 2015; Durá Gúrpide, 2018; Durá Gúrpide, 2025a; Durá Gúrpide, 2025b; Raffa, 2020). In this framework, the use of standardized projects was consolidated as an effective strategy to respond to the regional expansion of the educational system, in tune with international experiences disseminated since the postwar period, such as the British CLASP system and, in Latin America, the prototypes of the State programs of Mexico, Chile, and Venezuela (Estrella, 1984; Shmidt, 2014; Barrán, 2022).

This article analyzes the Integrated School Plan implemented in the province of Mendoza between 1962 and 1972 to understand how the provincial policy combined educational planning, architectural production, and regional development in a context of educational decentralization. Based on a study of the standard projects and their regional concretization, the paper examines the relationships between provincial policies, international guidelines, and technical professionalization.

THEORETICAL FRAMEWORK

Recent historiography on school architecture has progressively shifted interest from the isolated building to the analysis of public policies, planning processes, and institutional networks that made its production possible. From this perspective, standard projects are understood as instruments through which the State has materialized pedagogical, economic, and regional objectives. At the same time, they constitute a privileged object to study the professionalization of school architecture during the 1960s and 1970s. This problem has been addressed in Argentina (Fiorito, 2013; Shmidt, 2014; Blanc, Cattaneo & Durá, 2025) and in other Latin American countries (Pereira, 2019; Peláez Iglesias, 2021; Exss, 2022; Torres et al., 2024).

To a lesser extent, the relationship between standard projects, regional planning, and implementation in rural areas has been explored. In this sense, the contributions on the experimental nature of the rural school in educational architecture, linked to their specific conditions, are summarized (Cattaneo & Durá Gúrpide, 2024). Under this approach, the work interprets the standard projects as the result of a local appropriation of international guidelines and as instruments for regional planning and the strengthening of state presence.

METHODOLOGY

The study is based on the analysis of primary sources such as official publications, institutional reports, educational regulations, press releases, and technical documentation of architectural projects, preserved in the Archive of the Architecture Directorate of Mendoza, the Historical Archive of Mendoza, the San Martín General Public Library, and the Library of the Faculty of Philosophy and Literature of the National University of

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Cuyo. The analysis was developed in three complementary dimensions: first, the provincial school construction policy and the educational planning processes associated with the Integrated School Plan were reconstructed based on official speeches, government reports, and institutional documentation. Then, the standard projects were analyzed from an architectural perspective, considering their spatial organization, construction solutions, implementation criteria, and reformulation processes. Finally, the buildings that were actually built were identified and geo-referenced to assess their completion and regional scope. The Mendoza case was also examined in the context of previous provincial and national experiences to identify continuities, reformulations, and specific contributions.

DEVELOPMENT

THE INTEGRATED SCHOOL AND THE CONCENTRATED MODEL

The policies promoted by the government of Francisco Gabrielli placed education at their heart, with particular attention to rural schools, in line with recommendations from regional specialists. The National Population Census of 1960 highlighted persisting problems with literacy and school attendance, especially in rural areas, underscoring the need for intervention in this sector. Within this framework, the rural school was conceived by the provincial government not only as a space for basic preparation but also as a strategic instrument of economic and social development, aimed at promoting productive specialization, strengthening local roots, and mitigating migration to urban centers.

The initial diagnoses of the provincial educational situation identified insufficient classroom capacity and the sustained growth of the school population as the main problems, resulting from both the organic growth and migratory flows. Faced with the saturation of existing establishments, it was proposed to expand the teaching staff and build new school buildings, taking into account the cultural characteristics of each area and contemporary trends in educational architecture. In this sense, a balanced regional organization of the school system was proposed, prioritizing small-scale schools close to neighborhoods and rural populations, at the expense of large centralized establishments (Government of Mendoza, 1961, p. 16).

According to the governor himself, the educational initiatives were guided by rational, modern, and practical criteria (Government of Mendoza, 1961, p. 16). The "Integrated school" was formulated in this context, as a "school of life, which radiates all the knowledge that children, adolescents and men need to be useful in their lives and in society" (El Tiempo de Cuyo, 1962, p. 8). This definition expressed a pragmatic conception of education, focused on technical preparation at the earliest levels. In rural areas, practical courses (on engines, pumps, fruit and vegetable curing, among other topics) were proposed, aimed at both

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students and adults in the community, along with the incorporation of small intensive crop farms for pedagogical purposes (Government of Mendoza, 1961, p. 16).

As part of this policy, the provincial state focused on developing school buildings, which were conceived as tangible indicators of educational progress. School infrastructure occupied a priority position within provincial public works, both in the number implemented and in the proportion of the allocated budget. In 1962, the Integrated Schools Plan was launched, proposing a new type of establishment linked to provincial development, demographic growth, and the expansion of industrial capacity. The plan was based on UNESCO's recommendations in the fields of educational planning and infrastructure and set an objective: the construction of 100 school buildings (El Tiempo de Cuyo, 1962).

The program envisaged for these establishments reflected the breadth of their goals, which exceeded formal education. The official documentation provided classrooms according to the area of influence, with a possibility for expansion; a principal's office; a library; an assembly hall; housing for the principal and a teacher; and basic gas, electricity, and running water services. In addition, agricultural and forestry education workshops, units for agricultural activities, a first-aid room, a small post office, and spaces for community use were added (El Tiempo de Cuyo, 1962, p. 8).

To implement the plan, a standard project was developed by the architect Juan Manuel Benegas, who had been trained at the National University of Córdoba and was brought into the provincial Architecture Directorate in 1957. Among his first works are the Mariano Necochea School in Las Heras in 1958 and, later, the Philosophy and Literature Faculty building at the National University of Cuyo. His career reveals a specialization in educational architecture (Raffa et al., 2017, pp. 71-74).

The standard project conceived by Benegas proposed a broad program, albeit more limited than the one initially stated (Figure 1). The complex was organized around a central covered courtyard intended for multiple uses, around which the classrooms, the toilet block, and an area next to the entrance, which was home to the principal's office, the teachers' lounge, and a storage room, were arranged. The layout also included two houses, one for the principal and one for the doorman. This concentrated organization reinforced the conception of the school as a community meeting space.

From a constructive point of view, traditional and easily accessible materials were chosen: an anti-seismic reinforced-concrete structure, a flat-slab roof, and exposed-brick enclosures. The central space was higher, allowing for large windows to bring in daylight and natural ventilation. The classrooms had large glazed surfaces comprising several panes, allowing them to be opened outward.

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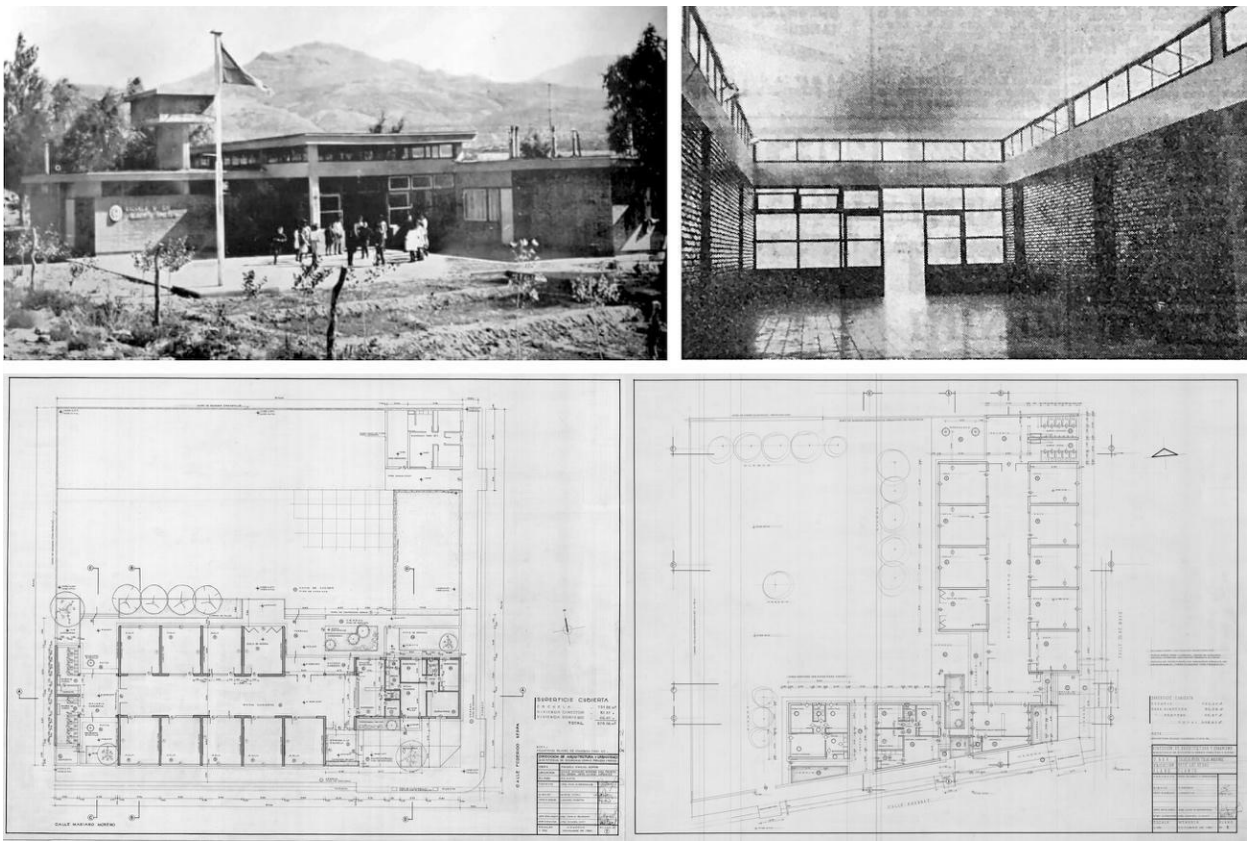


Figure 1. School prototype developed by Benegas. Sources: Images from the Government of Mendoza (1964b). Mendoza moving forward, 1963-1964. Official Printing Press; plans of the archive of the Directorate of Architecture of Mendoza.

The project contemplated variants of five- and nine-classroom configurations, the latter with a music room, and incorporated location-specific adaptations, especially in the entrance area and teachers' lounges, as well as in the design of the outdoor spaces, which included galleries, terraces, gardens, and drinking fountains. It is worth highlighting the design of the reinforced-concrete drinking fountain with five spouts on a central container, comparable to that of Arne Jacobsen's Munkegårds School (Denmark, 1951-1958).

The concentrated model was novel compared to the standard projects previously used in the province, characterized mainly by linear classroom layouts linked by corridors, open to the landscape in rural areas and to courtyards in the city. While urban establishments usually incorporated multipurpose rooms, rural programs were generally minimal, except for the Peronist period, which featured a broad program and linear layout. Schools with a concentrated organization began to spread internationally from the 1960s, driven by approaches in pedagogy and sociology, and the Mendocino case aligned with this model (Durá Gúrpide, 2024).

Planning, continuity, and optimization of standard projects

Upon assuming his second term in 1963, Francisco Gabrielli reaffirmed the priority given to education by constructing school buildings (Government of Mendoza, 1963, p. 10). The guidelines of his actions in

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building matters were summarized in the motto "Neither monuments, nor ruins", which expressed the rejection of both sumptuous and oversized buildings and precarious and insufficient constructions (Government of Mendoza, 1964b; Government of Mendoza, 1965a). On repeated occasions, the Governor highlighted the volume of resources allocated to education and culture, equivalent to 33% of the Central Administration's budget, which exceeded the constitutional minimum of 20%, as a way to legitimize the State's effort in this area (Government of Mendoza, 1964a; Government of Mendoza, 1964b; Government of Mendoza, 1965a).

In addition, the provincial Government actively promoted community participation through Cooperative Commissions, Mothers' Clubs, and Graduate Centers. The contributions of these organizations, which included land donations, building improvements, the provision of teaching materials, social assistance, cultural outreach, and actions related to child health, were significant and helped strengthen the regional integration of the educational system (Government of Mendoza, 1964a).

During this period, provincial educational planning was consolidated, in line with the boom in state planning between 1960 and 1975. A Provincial School Census was carried out in 1964, aimed at comparing progress with the 1960 National Census and to produce detailed information for planning. At the same time, the educational programs were revised, and the School Guide was updated to systematize the location and distribution of institutions by zones and regions (Government of Mendoza, 1964b). In November of the same year, the Commission for the Integral Planning of Education was created (Law 3109, 1964), one of the first offices of this type in the country, preceded only by the one in Córdoba (1962) and created simultaneously with the one in Buenos Aires (1964) (Aguerrondo, Mejer & Araujo, 2009). Comprising officials and specialized personnel, the commission prepared an exhaustive 1966 study of the main problems of the provincial educational system and the solutions required. In 1965, these initiatives were complemented by the creation of the Center for Educational Documentation and Information, which produced, among other works, a report presented at the International Conference on Public Instruction held in Geneva in 1966.

The consolidation of technical planning and continuity policies was reflected in a second school construction plan initiated in 1964, conceived as an extension of the previous one and aimed at achieving the initial objective of building one hundred new establishments (Government of Mendoza, 1964b; Government of Mendoza, 1965a; Government of Mendoza, 1965b; Government of Mendoza, 1966a). In this framework, a new standard project was developed, defined as "more economical and fundamentally more in line with the characteristics of our climate and the needs of our school population" (Government of Mendoza, 1965b). Firstly, a model was designed for rural areas, and in 1965 another specific one for urban areas, in light of the lower availability of land and the higher population density. The rural project was signed by the architects Hipólito

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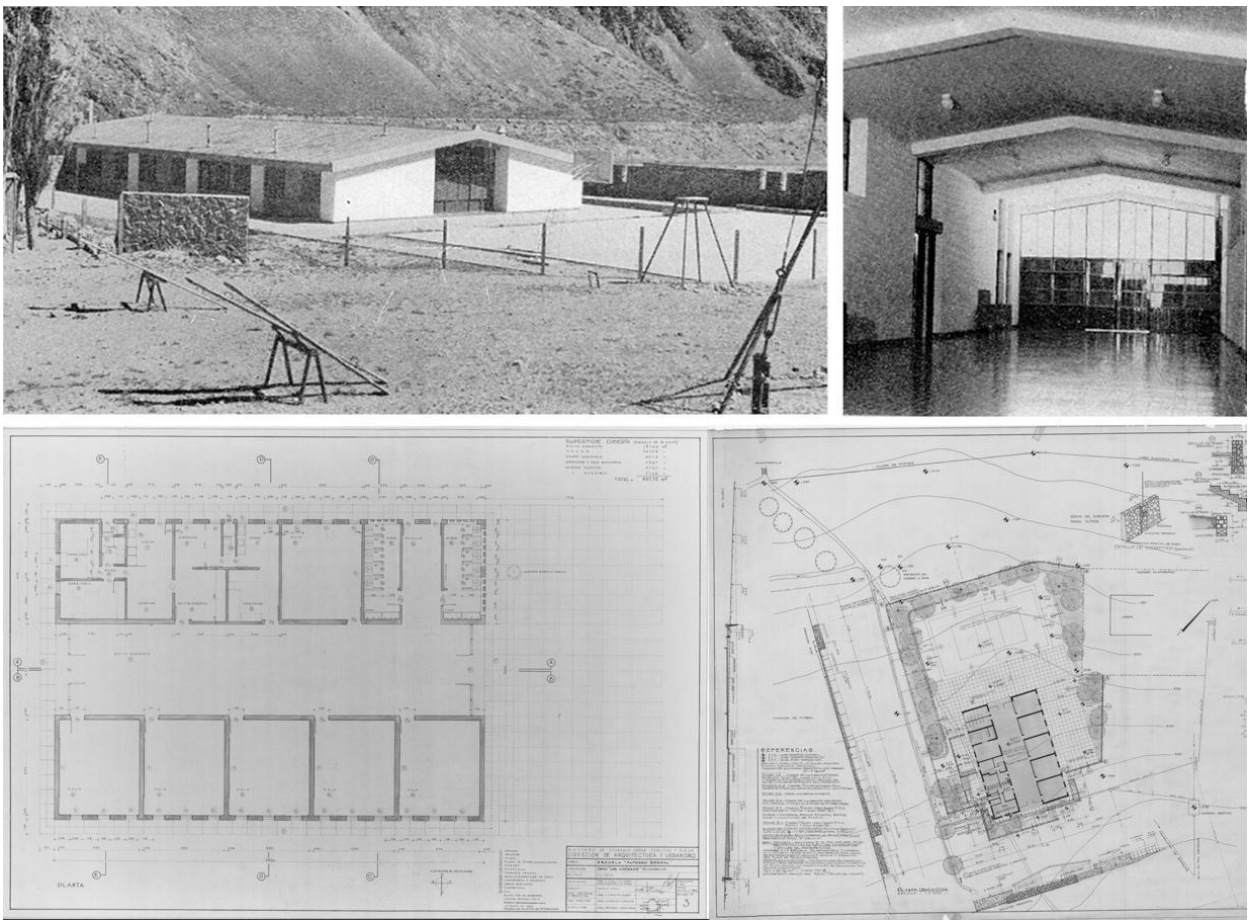


Figure 2. Standard rural project developed by Corti and Alfaro. Sources: Images from *Summa* (López de Genovart, 1976); plans of the archive of the Directorate of Architecture of Mendoza.

Corti and Edgardo Alfaro, while the urban one was led exclusively by Alfaro.

The rural model was an optimized version of the project developed by Benegas in 1961 (Figure 2). The main modification consisted of grouping all the spaces into a single volume with a gabled roof, a solution that simplified construction and maintenance. The building was organized around a central multipurpose space, open to the outside through large glazed panes at both ends. The classrooms were arranged on one side, preferably facing north; on the other, the teaching facilities were concentrated: the principal's office, teachers' lounge and dormitory, office, toilet, and principal's house, along with the toilet block and, depending on the variant, some classrooms. The most widespread version had six classrooms, although there were also variants of five and ten classrooms, the latter with a library and side entrance. In all cases, the standard drinking fountain designed by Benegas was maintained.

The urban prototype, on the other hand, was resolved as a compact two-story building with eleven classrooms -one for music- linked by an open gallery (Figure 3). The ground floor included administrative units, four classrooms, the toilet block, and a staircase, while the upper level housed seven classrooms. The classrooms had wide openings to the north,

1 Edgardo Alfaro trained as an architect at the National University of Córdoba. He worked at the Department of Architecture of the Province of Mendoza together with Hipólito Corti, with whom he also carried out private construction projects. He also served as director of the Provincial Housing Institute and as a professor at the Faculty of Architecture and Urbanism of the University of Mendoza and the Higher School of Arts of the National University of Cuyo. He died in 1967 in a car accident (Raffa, 2017, p. 37-38).(Raffa, 2017, p. 37-38).

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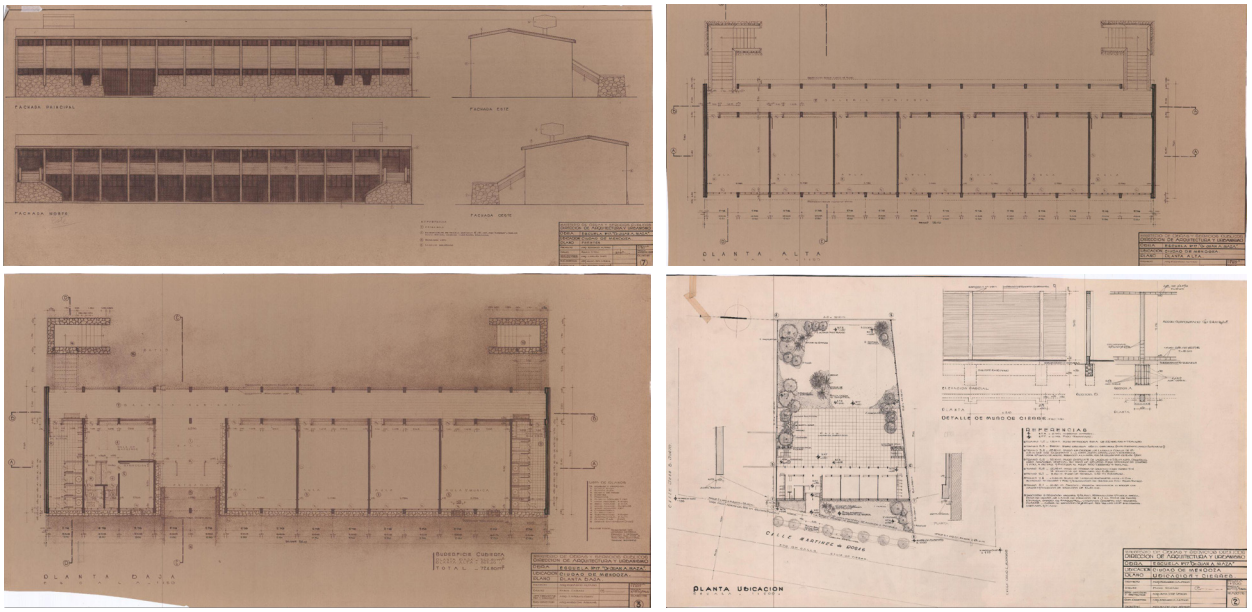


Figure 3. Standard urban project developed by Alfaro. Sources: Image of *Los Andes*, July 6th, 1970; plans from the archive of the Directorate of Architecture of Mendoza.

protected by galleries, while to the south they had high, narrow windows. These establishments lacked a multipurpose room, and the project was replicated without any variations. The linear organization on two levels allowed optimizing land use and freed up exterior surfaces for recreation. It is worth noting the differentiation of the two levels through the use of different cladding materials: stone on the ground floor and ceramics on the upper level. This strategy allowed adapting its scale.

In both models, the orderly, modular distribution of spaces facilitated the optimization of the construction processes. The buildings shared a reinforced concrete structure, brick partitions, and industrialized roofs of galvanized corrugated sheet on steel reticulated beams. They incorporated thermal insulation solutions and finishes that combined traditional and industrialized materials. These decisions sought to reduce costs, take advantage of local resources, and facilitate assembly using unskilled labor.

During the governorship of José Blanco (1966-1970) and the third term of Gabrielli (1970-1972), both educational planning and the school construction policy continued (Government of Mendoza, 1966b; Government of Mendoza, 1970; Government of Mendoza, 1971; Federal Intervention of the Province of Mendoza, 1973). Coordination at a national level was strengthened through the National Meetings of Ministers of Education and Educational Planning Offices, in which Mendoza actively participated, hosting these in 1970.

During this period, the use of prototypes developed under Gabrielli's second plan continued, along with unique projects in specific contexts, such as the Helen Keller school for blind and amblyopic children, designed by Jaime Perelló in 1967. In high-mountain areas, extreme climatic conditions motivated the development of specific solutions: initially, singular projects

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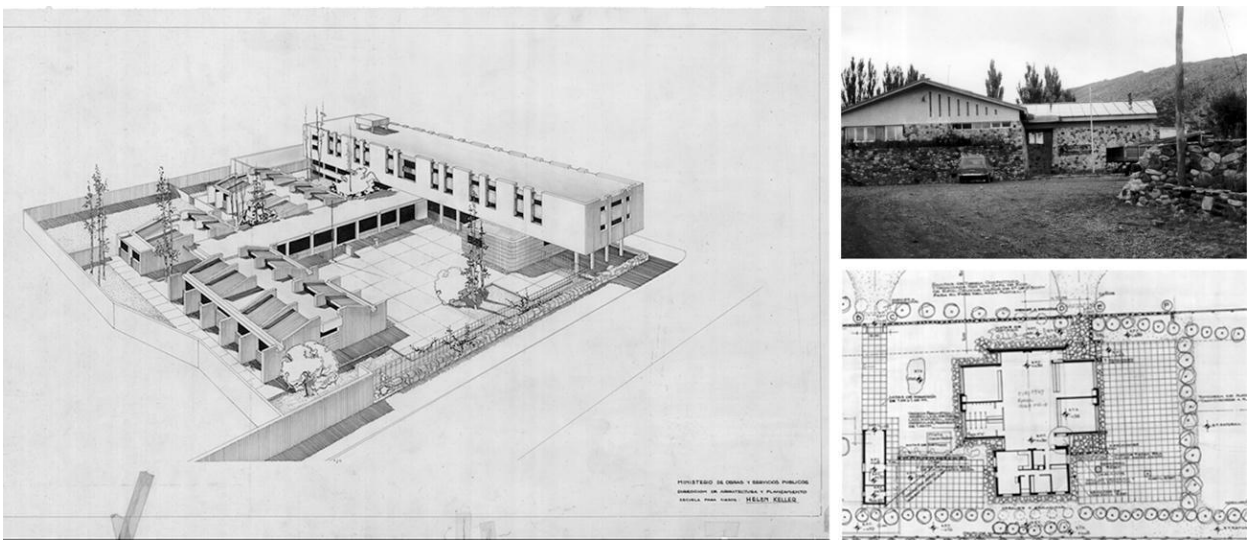


Figure 4. The Helen Keller School and standard high-mountain project. Sources: Drawings from the archive of the Directorate of Architecture of Mendoza (1979); image by INCIHUSA Digital, Fondo Civit-Manchón, Atlas of the western Argentine Border Project, 1979.

such as the Puente del Inca school, designed by Alfaro in 1965, and then a cross-shaped project with a central multipurpose space and greater thermal insulation (Figure 4).

Completion and impact

The contrast between the planned works, the documentary sources, and the actual buildings allows making an approximation of the degree of completion achieved by the school building programs. **2** Regarding the first stage of the plan (1962-1963), 27 implemented works were identified, 24 of which follow the standard project developed by Benegas, while the remaining three had been planned and/or started previously. During this period, the provincial government also assumed responsibility for constructing three State-financed national schools, revealing inter-jurisdictional articulation.

In the second stage (1964-1972), the standard projects designed by Corti and Alfaro were systematically applied in the construction of 25 provincial urban and 67 rural schools. The rural prototype was also used in the construction of three national schools. To these achievements are added four establishments that follow the high-mountain prototype and five unique projects designed to address specific pedagogical or environmental conditions.

Overall, a significant expansion of buildings can be observed between 1962 and 1972, with at least 134 establishments built by the provincial government, six of which were destined for national schools. The regional distribution of these works was broad, spanning 17 of the province's 18 departments, except for La Paz. Although most of the schools were located around the province's main oases, where most of its population is concentrated due to the local semi-arid climate, they also reached rural areas with dispersed populations and, in particular, isolated areas, such as high-mountain areas (Figure 5).

2 Some of the schools listed in the plan could not be located. Consequently, the identified works constitute a proven minimum, very close to the total actually built.

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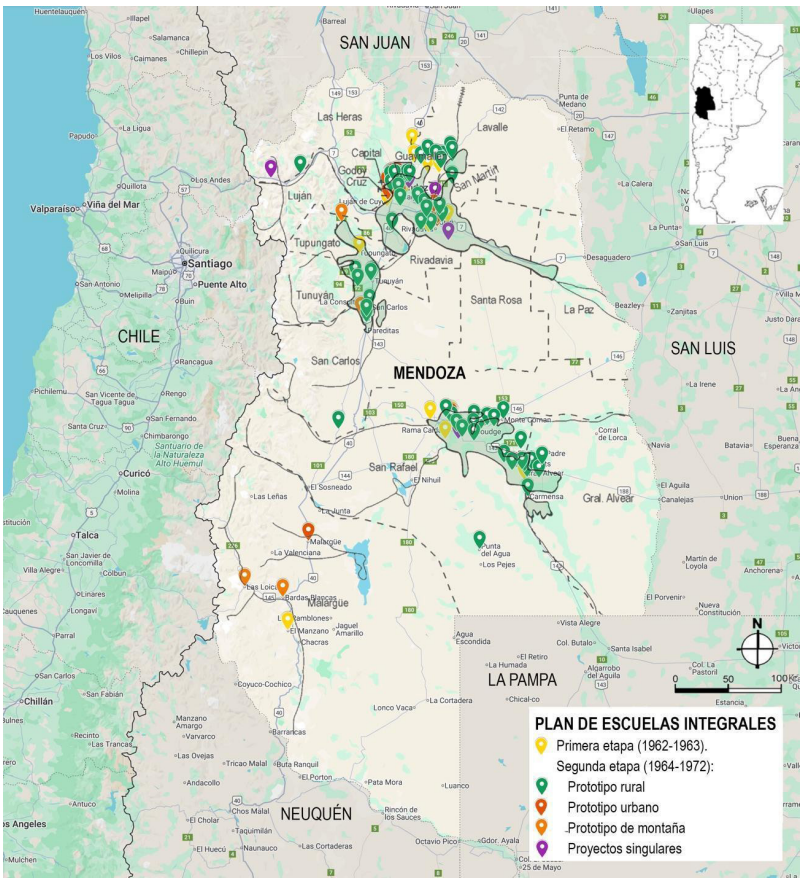


Figure 5. Distribution of the schools built in Mendoza, mostly located in the oases (marked with delimited green plots), where most of the provincial population and production is concentrated. Source: Prepared by the Author using a Google Earth map.

These figures can be compared with the experience of the first Peronism period (1945-1955), a stand-out precedent in school construction. In Mendoza, 112 schools were built during that period, 60 of which were implemented by the provincial government and 52 by the National Government (Durá Gúrpide, 2018). Although the global scales are relatively close, the difference lies in the distribution of responsibilities: while in the Peronist stage both state levels participated in a complementary manner, in the analyzed developmentalist period (1962-1972) the construction of the new buildings fell almost entirely on the provincial Government, which reinforces the interpretation of the process as a concrete expression of educational decentralization.

The standard rural project designed by Corti and Alfaro was the most used during the study period, on about 70 occasions, and continued to be used subsequently. Adopted for at least a decade by the School Architecture Division, directed by Marta López de Genovart between 1967 and 1982, it incorporated constructive adaptations that allowed its implementation in mountainous areas. In 1976, Summa magazine, a national benchmark, highlighted the Mendocino model's flexibility and ability to adapt to various climatic conditions (López de Genovart, 1976). This experience also gained international prominence through López de Genovart's participation in the CONESCAL meetings held in Mexico during the 1970s, representing the Government of Mendoza. **3**

3 Interview with Alberto Treves, conducted on March 5th, 2025. A specialist in educational infrastructure, he participated in the CONESCAL meetings during the 1970s and formally joined the institution in 1976, where he became deputy director.

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CONCLUSIONS

The analysis of the school construction plan promoted by the province of Mendoza between 1962 and 1972 reveals a unique process within the Argentine panorama of the second half of the 20th century, characterized by the provincial government's central role in planning and implementing school infrastructure. In a national context marked by overlapping competencies between the Nation and the provinces and by the progressive decentralization of education, Mendoza developed its own strategy, sustained over time and rooted in a tradition of state intervention in school building.

School construction, linked to both educational expansion and economic and territorial development, became a priority from the first government of Francisco Gabrielli. The Comprehensive School Plan of 1962 reflected this conception: the rural school was conceived not only as a space for literacy, but also as an instrument for population rooting, social cohesion, and technical training, capable of contributing to productive modernization. In this context, the standard project developed by Benegas represented a significant departure from previous models by proposing an organization centered on a multipurpose space, reinforcing the institution's community character and expanding its functional potential.

Although the Benegas' project was distinguished by the ambition of its plan and the spatial richness of its concentrated layout, which favored flexibility of use and the integration of school and extracurricular activities, it also presented limitations related to construction and upkeep, particularly in the solution for its roof. These tensions of typological innovation, technical feasibility, and long-term sustainability were addressed in the next stage through a systematic model optimization process.

The second phase of the school construction plan, initiated in 1964, reflected the maturation of provincial policy and the systematic incorporation of technical planning tools. The realization of the Provincial School Census, the updating of the School Guide, and the creation of the Commission for the Comprehensive Planning of Education and the Educational Documentation and Information Center consolidated a rational approach to educational planning, aligned both with the recommendations of international organizations and with the rise of planning in the Argentine public administration during the sixties. In this sense, Mendoza was positioned early as a pioneer province in the professionalization of educational planning.

The projects developed by Corti and Alfaro constituted the architectural correlate of this stage. The rural model, conceived as an optimized version of the previous concentrated layout, and the urban prototype demonstrate specialized knowledge of contemporary school architecture and, in turn, of the province's particular environmental conditions. The adoption of streamlined construction systems, the combination of traditional and industrialized materials, and the modulation

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of the spaces reduced costs, facilitated implementation and maintenance by local labor, and ensured the replicability of the buildings, without renouncing comfort and functionality criteria.

The continuity of these policies during the federal intervention of José Blanco and the third term of Gabrielli confirmed the structural character of the provincial strategy. The persistence in using prototypes, together with the development of unique projects for specific contexts, demonstrates the provincial State's capacity to balance standardization and adaptation, responding to diverse regional, climatic, and pedagogical situations.

In quantitative and regional terms, the scale of the process is striking: between 1962 and 1972, at least 134 school establishments were built, across 17 of the province's 18 departments, including widespread rural and high-mountain areas. This building expansion consolidated a province-wide school network and positioned the Mendoza government as a central actor in building educational infrastructure, even for national schools built through inter-jurisdictional agreements.

The study also highlights a sustained multi-level connection among the provincial State, the national State, and international organizations, complemented by the participation of community and private actors. The cooperation commissions, neighborhood associations, and contributions from companies and philanthropists reinforced schools' regional integration and showed that the school-building policy was also a socially shared process.

In short, the construction of schools in Mendoza during the developmentalist period went beyond a sectoral building program to become an integrated public policy in which educational decentralization, technical planning, regional development, and the professional consolidation of state architecture converged. The resulting schools not only expanded the capacity of the educational system, but also served as material manifestations of the provincial modernization project, connecting technical knowledge, pedagogical aspirations, and intervention strategies in the region.

CONTRIBUTION OF AUTHORS CRediT

Conceptualization, I.D.G.; Data Curation, I.D.G.; Formal analysis, I.D.G.; Acquisition of financing; Research, I.D.G.; Methodology, I.D.G.; Project management; Resources; Software; Supervision; Validation; Visualization; Writing - original draft, I.D.G.; Writing - revision and editing, I.D.G.

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LAS CASAS DE SÃO PAULO DE JOAQUIM GUEDES. DISEÑO Y DETALLE

AS CASAS PAULISTANAS DE JOAQUIM GUEDES. DESENHOS E DETALHES

THE SÃO PAULO HOUSES OF JOAQUIM GUEDES. DRAWINGS AND DETAILS

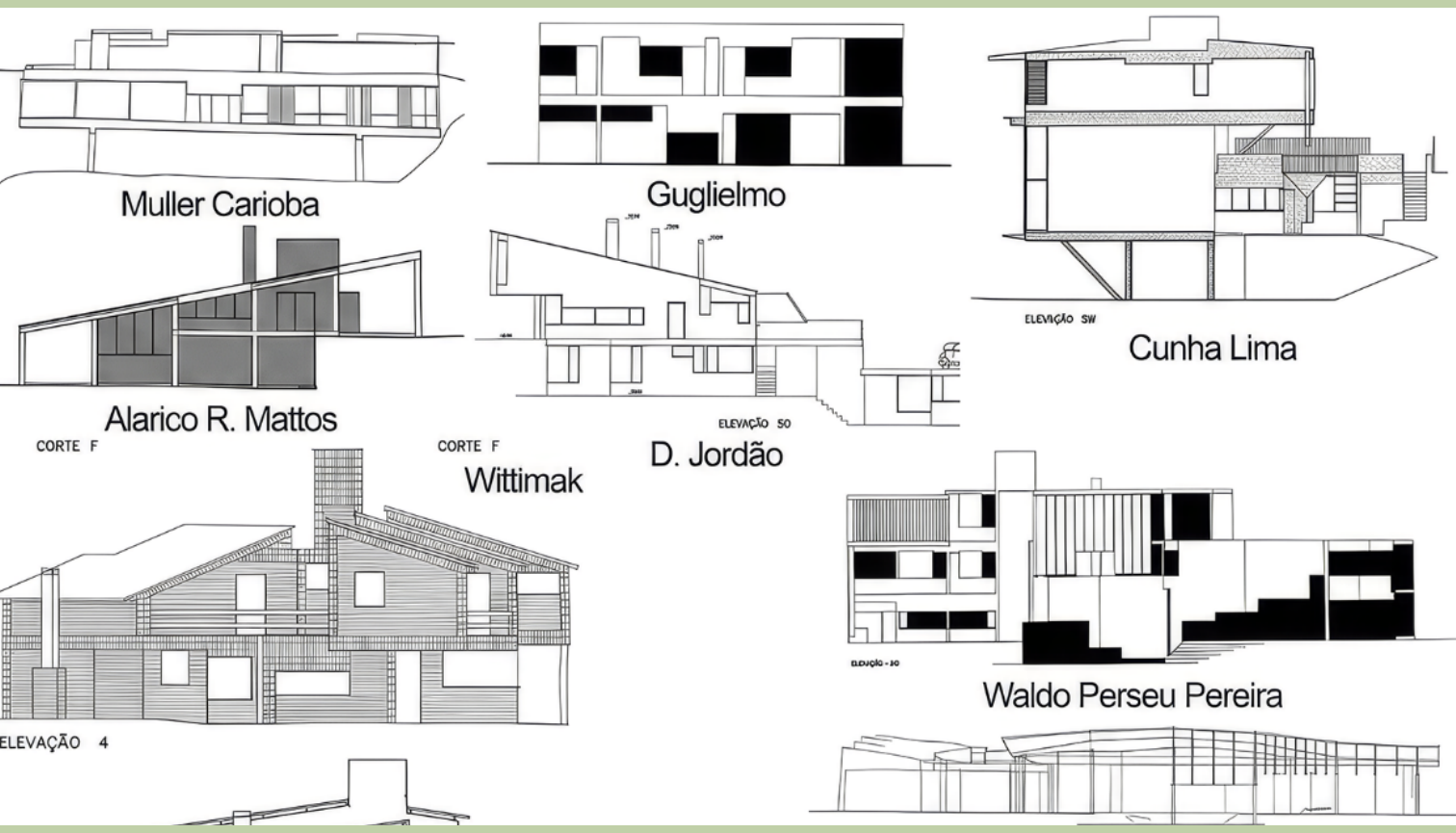


Figura 0. Elevaciones. Fuente: Colección de Joaquim Guedes-FAUUSP/Autores.

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ABSTRACT

The architectural office Joaquim Guedes & Associates and, in particular, Guedes himself developed projects on various scales, ranging from furniture and residences to institutional buildings and even cities. The city of São Paulo is home to many of his well-known works, especially residences, as well as lesser-known projects and works. The collection donated by the architect Joaquim Guedes to FAUUSP in São Paulo contains projects that have not yet been analyzed. These include the residential projects developed by Guedes and Associates, which were consulted and provided essential data and insights, allowing design strategies and distinctive characteristics to be identified. The study examines the construction details in the architectural drawings of houses in São Paulo, emphasizing notable features, particularly building elements such as windows, stairs, fireplaces, and roofs. This paper discusses how the modulation of spaces was achieved based on the dimensions of readily available materials, such as brick, fiber cement tiles, and ceramic tiles, which the architect explored as a rational construction process. The original contribution reveals how the locus of the architect's expertise was in his construction details.

Keywords: brazilian architecture, collection, composition, geometry, modern architecture

RESUMEN

El estudio de arquitectura Joaquim Guedes & Associados, y en particular Guedes mismo, desarrolló proyectos de diversas escalas, desde mobiliario y residencias hasta edificios institucionales e incluso ciudades. La ciudad de São Paulo concentra muchas de sus obras más conocidas, especialmente residencias, así como proyectos y obras menos conocidos. La colección donada por el arquitecto Joaquim Guedes a la FAUUSP en São Paulo contiene proyectos que aún no han sido analizados, entre los cuales se incluyen proyectos residenciales desarrollados por su estudio, que consultamos y que nos proporcionaron datos y perspectivas esenciales, lo que permitió identificar estrategias de diseño y características distintivas. Este artículo examina los detalles constructivos presentados en los planos arquitectónicos de viviendas en São Paulo, destacando características notables, en particular, elementos constructivos como ventanas, escaleras, chimeneas y techos. Se analizó cómo la modulación de los espacios se produjo a partir de las dimensiones de materiales comunes, como el ladrillo, las placas de fibrocemento y la cerámica, que el arquitecto exploró como un proceso constructivo racional. La contribución original revela cómo el enfoque de la experiencia del arquitecto residió en sus detalles constructivos.

Palabras clave: arquitectura brasileña, colección, composición, geometría, arquitectura moderna

RESUMO

O escritório Joaquim Guedes e Associados e, em particular, o próprio Guedes desenvolveram projetos em diversas escalas, que vão do mobiliário e das residências aos edifícios institucionais e até às cidades. A cidade de São Paulo abriga muitas de suas obras mais conhecidas, sobretudo residências, bem como projetos e obras menos difundidos. O acervo doado pelo arquiteto Joaquim Guedes à FAUUSP, em São Paulo, contém projetos ainda não analisados. Entre eles, estão os projetos residenciais desenvolvidos por Guedes e Associados, cuja consulta forneceu dados e perspectivas essenciais, permitindo identificar estratégias projetuais e características distintivas. O estudo examina os detalhes construtivos dos desenhos arquitetônicos de casas paulistanas, com ênfase em soluções notáveis, em particular em elementos como janelas, escadas, lareiras e coberturas. O artigo discute como a modulação dos espaços foi obtida a partir das dimensões de materiais de fácil obtenção, como o tijolo, as placas de fibrocimento e as telhas cerâmicas, explorados pelo arquiteto como um processo construtivo racional. A contribuição original revela que o lócus do domínio técnico do arquiteto residia em seu conhecimento dos materiais e de seus detalhes construtivos.

Palavras-chave: arquitetura brasileira, acervo, aomposição, geometria, arquitetura moderna

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INTRODUCCIÓN

Joaquim Manoel Guedes Sobrinho (1932-2008), egresado en 1954 de la Escuela de Arquitectura y Urbanismo de la Universidad de São Paulo, fue arquitecto y urbanista. Su oficina permaneció activa desde su graduación en 1954 hasta su muerte en 2008 y fue influenciada por Vilanova Artigas, Le Corbusier y, en particular, Alvar Aalto, entre otros.

El libro "Joaquim Guedes" de Mônica J. Camargo (2000) ofrece una perspectiva importante sobre algunos de los edificios de Guedes. De hecho, en Brasil, se publicaron números especiales sobre su arquitectura en revistas como Acrópole (Guedes, 1968; Guedes, 1969) y AU (Belleza, 2008). Los proyectos habitacionales de Guedes también han aparecido en revistas internacionales, entre ellas Summa, en Argentina, y en las revistas japonesas Process Architecture (Yamaki, 1980) y G. A. Houses (Futagawa, 2008), lo que demuestra su originalidad.

Una colección de documentos de la oficina de Joaquim Guedes & Asociados fue donada a la biblioteca de la FAUUSP en 1997, donde fue profesor durante más de 40 años. Esta consta de dibujos, fotografías, planos y mapas. En ella se presentan las diferentes etapas del proceso de diseño: estudio preliminar y bocetos; diseño preliminar; diseño detallado; y diseños complementarios: estructura e instalaciones. A través de estos, es posible reconocer su comprensión y respeto por la naturaleza de cada material al observar los dibujos técnicos y sus detalles.

Su corpus de trabajo incluye numerosos proyectos residenciales que han recibido premios y reconocimientos en la escena arquitectónica de São Paulo. Sin embargo, la casa fue un tema recurrente en la obra del arquitecto. Esto lo muestra en el texto "Geometría habitada", que escribió como prefacio para la traducción del libro de Paul Valéry, "Eupalinos ou l'Architecte" (Valéry, 1996, pág. 8):

> "La casa es la primera construcción, y la construcción, el tema, construye al hombre. La casa es su cuerpo, que es la medida del mundo, da las verdaderas referencias de placer y guía al espíritu" (traducción libre).

Guedes también estaba profundamente enfocado en el trabajo docente, particularmente en el diseño arquitectónico: "Las escuelas de arquitectura no son muy diferentes de las antiguas Escuelas de Bellas Artes; parecen no saber actualizar la enseñanza de la construcción" (Valéry, 1996, pág. 12, traducción libre).

En el diálogo de Sócrates con Fedro, Valéry destaca la importancia de la tríada de Vitruvio: utilitas, firmitas y venustas. Se puede decir que el concepto de firmitas está estrechamente relacionado con la tectónica de la arquitectura de Guedes. En el siguiente extracto, queda clara la inseparabilidad de esta tríada:

> "El cuerpo, por tanto, nos obliga a desear lo útil, o simplemente conveniente; el alma exige belleza; pero el resto del universo, con sus leyes y sus accidentes, nos obliga a considerar la cuestión de la solidez en cada obra" (Valéry, 1996, pág. 139, traducción libre).

Para Guedes, una residencia debe trascender la mera utilidad; debe ir más allá de ella; debe ser una construcción sólida que satisfaga las necesidades del

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alma. Es el arte de construir, o de construir con arte, sin descuidar las necesidades humanas. Su arquitectura resalta el valor de su conocimiento de las propiedades de los materiales como parte importante del proceso de diseño; de manera similar, Kenneth Frampton analizó la arquitectura de Carlo Scarpa, destacando la veneración por la unión e integración de elementos heterogéneos (Frampton, 1996, pág. 299).

Esto se puede observar en los detalles y en el encuentro de materiales y elementos que aportan valor a la calidad del conjunto en sus dimensiones expresivas y habitadas, haciéndolo adecuado al clima y a la ubicación.

El estudio examina los detalles constructivos en los dibujos arquitectónicos de las casas de São Paulo, enfatizando características notables, en particular elementos como ventanas, escaleras, chimeneas y techos. Aquí se discute cómo se logró la modulación de los espacios, considerando las dimensiones de los materiales comunes disponibles, como el ladrillo, las baldosas de fibrocemento y las baldosas cerámicas, que el arquitecto empleó como un proceso constructivo racional. La contribución original revela cómo el locus de la experiencia del arquitecto residía en sus detalles constructivos.

FORMACIÓN DE CONCEPTOS GUÍA

Joaquim Guedes fue influenciado por importantes arquitectos brasileños modernos de su época, como Rino Levi, Carlos Millán y Vilanova Artigas, así como por arquitectos internacionales, en particular Alvar Aalto y Le Corbusier. Su malestar con lo que se estaba produciendo en la arquitectura paulista ya estaba presente en la siguiente declaración de 1957: "era urgente enfrentar con valentía la construcción del espacio, dejando de lado soluciones puramente formales, libres del detestable juego de fachadas..." (Guedes, 1958, pág. 19). Sobre los arquitectos Carlos Millán y Rino Levi, Guedes afirmó: "Encontré en ellos apoyo a esta obsesión mía con el rigor científico-constructivo" (Fracalossi, 2015, traducción libre).

Joaquim Guedes buscó producir gradualmente una arquitectura más centrada en la vida social cotidiana y en las necesidades humanas, como deja claro en esta declaración: "Me da un inmenso placer ver las cosas nacer de las necesidades de la vida social" (Guedes, 1993). Su cuidadosa observación de la vida cotidiana en la construcción y de las necesidades humanas llevó al arquitecto a priorizar medidas pragmáticas en el arte de la construcción. "...tenemos un papel: el arquitecto puede construir", afirmó Guedes en una entrevista con Jean-Paul Dollé (Guedes, 1993, traducción libre). En este sentido, fueron las técnicas tradicionales y los materiales disponibles los que guiaron sus acciones de diseño.

Guedes admiraba la arquitectura de Lina Bo Bardi: "Culta y, por lo tanto, desprovista de arrogancia, parecía no tener dudas, pero hacía preguntas; su método de conocer e inventar se movía a través de la refutación y la contradicción para llegar al núcleo de la poesía. Con frecuencia completaba una explicación científica diciendo que solo quería hacer algo 'poético'" (Guedes, 1992). La razón de esto puede ser la audacia de la arquitecta al cuestionar las tendencias arquitectónicas imperantes de su época, hibridando técnicas tradicionales con técnicas modernas, mientras valora la artesanía del trabajador.

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A diferencia de los arquitectos de São Paulo, Guedes no utilizó las dos estrategias más frecuentes de su época, especialmente entre las décadas de 1950 y 1970: la caja suspendida sin volumen y el gran refugio. Con la excepción de la residencia Cunha Lima (1958), Guedes mantuvo sus residencias cerca del suelo, emergiendo del terreno y sin imponerse a la topografía, como hizo Frank Lloyd Wright en sus casas (Wright, 1954). La estructura de un solo volumen es una excepción en la obra de Guedes, como en la residencia Guglielmo (Guedes, 1968). La volumetría de sus residencias está fragmentada, con ángulos agudos en el vidrio multifacético, paredes diagonales y formas de "abanico de mano".

Su acercamiento a la arquitectura surgió de una afinidad por reconciliar el humanismo y el organicismo. Guedes exploró un nuevo léxico de posibilidades espaciales formales, distanciándose de la arquitectura moderna de sus contemporáneos en São Paulo. Si el libro de Bruno Zevi "Storia dell'Architettura Moderna" (Zevi, 1975) tuvo un impacto en su desarrollo, fue porque despertó reflexiones renovadas sobre los dogmas de la arquitectura moderna. Así, la arquitectura más inspirada de Guedes, y en consecuencia más integrada al paisaje y a la vida cotidiana, lo llevó a ser reconocido como una especie de disidente de la arquitectura moderna más ortodoxa de São Paulo.

EL PROCESO DE DISEÑO Y EL CONOCIMIENTO DE LOS MATERIALES

> Ser moderno simplemente significa que todos los materiales se utilicen honestamente por sus cualidades y que estos modifiquen el diseño del edificio (Wright, 1955, pág. 99).

Cada proceso de diseño, a pesar de su rigor técnico, se construye lentamente de forma artesanal. Este hecho es confirmado por el arquitecto, quien afirmó: "Debo aclarar que considero que todo trabajo de pensamiento es profundamente artesanal"(Fracalossi, 2015, traducción libre). Por otro lado, debemos decir que fue un hombre de su tiempo, la sociedad moderna. Entonces, podemos observar que la arquitectura de Guedes está conectada tanto con el diseño industrial como con una forma de pensar artesanal.

El proceso de diseño se caracteriza por un descubrimiento gradual de la naturaleza del problema. Sin embargo, es a través de los dibujos que el arquitecto descubre gradualmente el hilo conductor de su pensamiento: "Cuando empiezo a diseñar, siento que, a partir de cierto momento, ya no soy yo quien comanda el dibujo, sino que los análisis exigen que yo haga el dibujo de esa manera... El razonamiento se guía por el diseño, y es el diseño el que encuentra las complejidades a través de las cuales descubre el espacio, las formas de construcción… Entiendo que ser arquitecto es como ser médico; implica una obsesión por resolver problemas" (Guedes Sobrinho, 2000).

Según el propio arquitecto, las etapas de ejecución del proyecto son: "Primera etapa. Análisis sistemático y completo del programa y de los problemas relacionados con el tema. Estudio del sitio y de los aspectos urbanos; redacción de una teoría por parte del alumno para su proyecto. Dibujos exploratorios, posibilidades, ideas iniciales. Segunda etapa. A partir de las ideas, teorías y referencias dimensionales,

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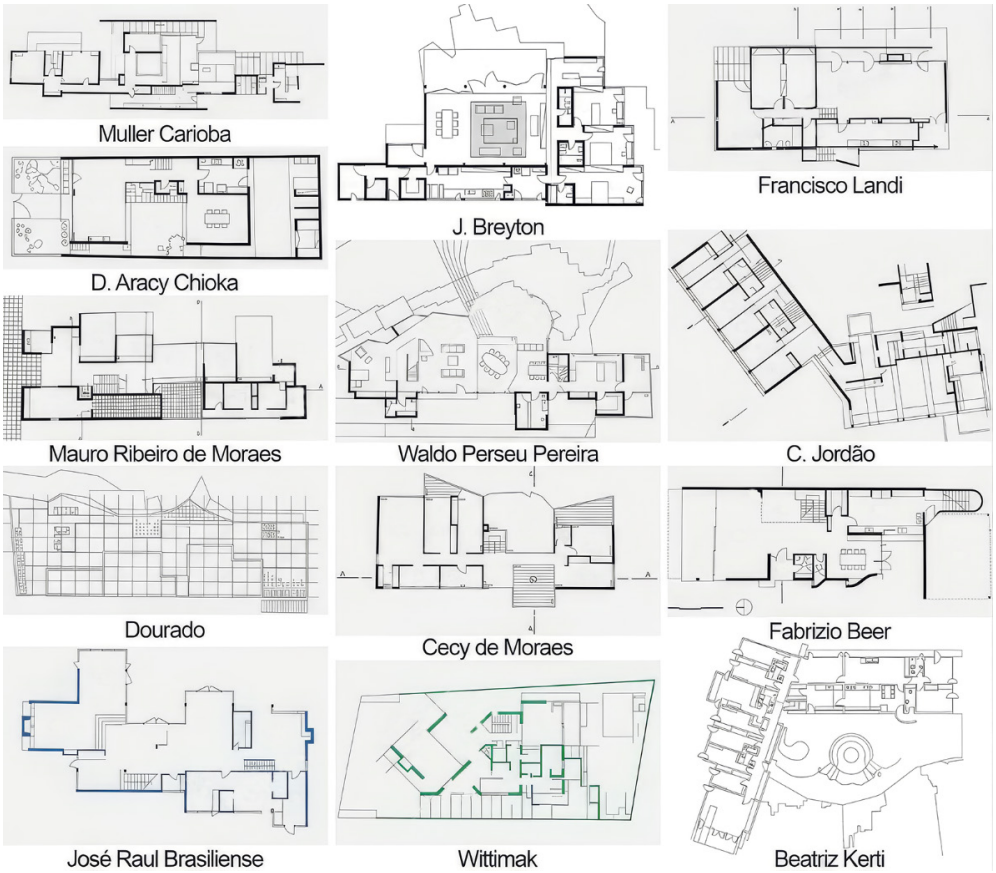


Figura 1. Planos de planta. Fuente: Colección de Joaquim Guedes-FAUUSP/Autores.

funcionales y constructivas de la primera etapa, se investiga los subsistemas espaciales que organizan el programa como arquitectura. Tercera etapa. Concepción del anteproyecto, incluyendo la estructura, la elección de materiales, las imágenes y el sistema de detalles que la califican. Cuarta etapa. Verificación, confirmación, profundización y finalización del anteproyecto, con todos sus elementos gráficos, la maqueta y las justificaciones (Guedes, 1993). El arquitecto describe lo que, clásicamente, se sabe sobre el proceso de diseño: análisis, síntesis y evaluación.

"Es necesario entender el acto de planificar como un proceso creativo. Es necesario afirmar que los problemas humanos son problemas humanos, que no pueden ser contenidos dentro de las matemáticas" (Guedes Sobrinho, 1972, pág. 175).

A partir del análisis realizado, los autores pueden verificar que los detalles constructivos son un aspecto relevante del proceso de diseño, articulando la tercera y la cuarta etapa de su método, especialmente como componente esencial de su pensamiento.

EL CONOCIMIENTO CONSTRUCTIVO RADICA EN LOS DETALLES

ANÁLISIS DE RESIDENCIAS

Los proyectos residenciales de São Paulo encontrados en el archivo permitieron identificar estrategias de diseño y características distintivas.

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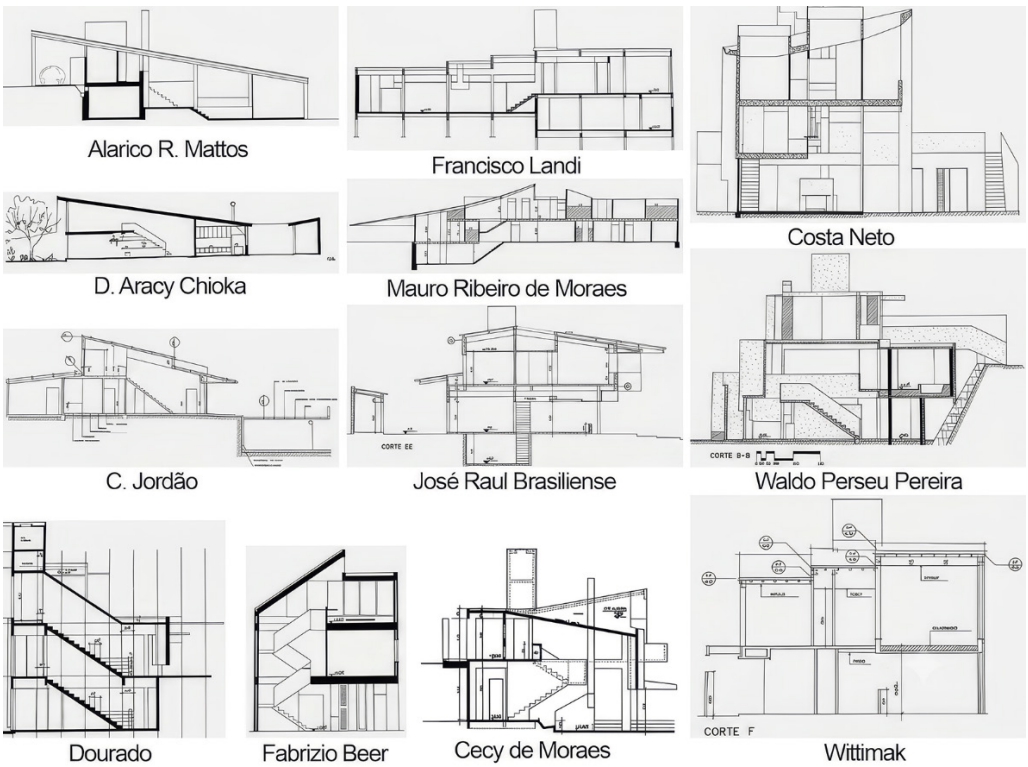


Figura 2. Secciones transversales de las casas de Guedes. Fuente: Colección de Joaquim Guedes-FAUUSP/ Autores.

La tabla visual de planos de planta de 13 proyectos de casas diferentes (Figura 1) revela características sorprendentes del proceso de diseño del arquitecto que se alinean con las etapas de ejecución del proyecto mencionadas anteriormente. Primero, la geometría; segundo, las aberturas (puertas y ventanas); tercero, la colocación en el lote urbano; cuarto, la modulación oculta de los espacios mediante los materiales adoptados.

A primera vista, el plano de planta no revela las sutilezas estructurales que llevaron al arquitecto a adoptar formas geométricas esculpidas. Sin embargo, tras un análisis más detallado, se observa que los espacios rectangulares, predominantemente en ángulo recto, están dispuestos uno al lado del otro, como si se debieran a dimensiones específicas del programa arquitectónico, y de manera secuencial a lo largo de los ejes de circulación.

La disposición escalonada de los dormitorios de la residencia Jacques Breyton (1965) y las formas escalonadas de la residencia Waldo Perseu Pereira (1967) pueden interpretarse como consecuencia del método de diseño empleado por Guedes.

Las terrazas ajardinadas en zigzag, dispuestas orgánicamente, de Maison Carré (1956-1959), así como las escaleras externas de la casa consistorial de Säynätsalo (1948-1952), probablemente inspiraron el diseño escalonado de los peldaños externos en las residencias de Guedes.

La residencia Dourado (1974) es modular y mide 1,20 por 1,20 metros. La residencia Fabrizio Beer (1975) es modular y utiliza ladrillos y bloques

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de cerámica del encofrado de hormigón. Estos hallazgos se deben a los detalles constructivos de los proyectos analizados.

Es importante resaltar que estudios previos presentan planos, secciones y elevaciones sin detallar el diseño final, lo que deja mejor ver lo que está prácticamente oculto en el estudio preliminar o incluso en el diseño inicial.

Debido al uso extensivo de ladrillo, vidrio, madera, cerámica y tejas de fibrocemento, las juntas y combinaciones de estos materiales se definieron en los detalles de construcción para cumplir con el nivel de rigor constructivo deseado por el arquitecto.

La tabla visual de secciones verticales de 12 proyectos de casas diferentes (Figura 2) destaca las alturas, los desniveles y los techos. El predominio de las cubiertas inclinadas es evidente. Con la excepción de la residencia Waldo Perseu Pereira (1967), con losa plana impermeabilizada, y la residencia Costa Neto (1961), con techo curvo, las demás tienen losas de concreto inclinadas con tejas livianas en la parte superior, como el techo de la Aalto Maison Carré (1956-1959), con su pendiente única, que posiblemente inspiró a Guedes.

Los techos de las residencias diseñadas por Guedes incorporan conocimientos sobre la protección contra la radiación solar. "El techo es la superficie externa más expuesta a la radiación solar directa… como solución común, el techo generalmente se construye en dos capas, siendo la capa exterior una losa liviana que actúa como sombrilla. Con ventilación entre las dos capas, la temperatura de la cara exterior de la capa inferior estará cercana a la del aire. En este caso, la capa inferior, generalmente una losa, funciona de manera similar a una pared. En un clima árido, es importante emplear losas y muros con alta inercia térmica. Así, un techo eficiente consistiría en una losa gruesa (de ladrillos, por ejemplo), sombreada por una teja liviana de fibrocemento, ambas separadas por un espacio ventilado" (Guedes Sobrinho, 1981, pág. 144; traducción libre). Se puede observar que el diseño de las cubiertas va más allá de una simple forma estética, presentando un riguroso análisis científico y técnico, coherente y compatible con el confort ambiental térmico y con la iluminación natural.

A diferencia de sus arquitectos contemporáneos de São Paulo, la losa plana de concreto estaba altamente expuesta a los elementos, que, cuando no se implementaban adecuadamente, causaban serios problemas estructurales, como la infiltración de agua de lluvia y la transferencia excesiva de calor hacia los edificios.

Los dibujos muestran el compromiso del arquitecto con los detalles del techo, especialmente en la interfaz entre los materiales: tejas corrugadas, vigas de madera, losas de concreto y ladrillos.

Destacan los amplios aleros y las marquesinas de hormigón, que extienden los espacios interiores y brindan protección solar al exterior. Los tragaluces diagonales, como los cobertizos, servían para captar la luz y favorecer la ventilación cruzada, como en las residencias Cunha Lima (1958) y Beatriz Kerti (1971).

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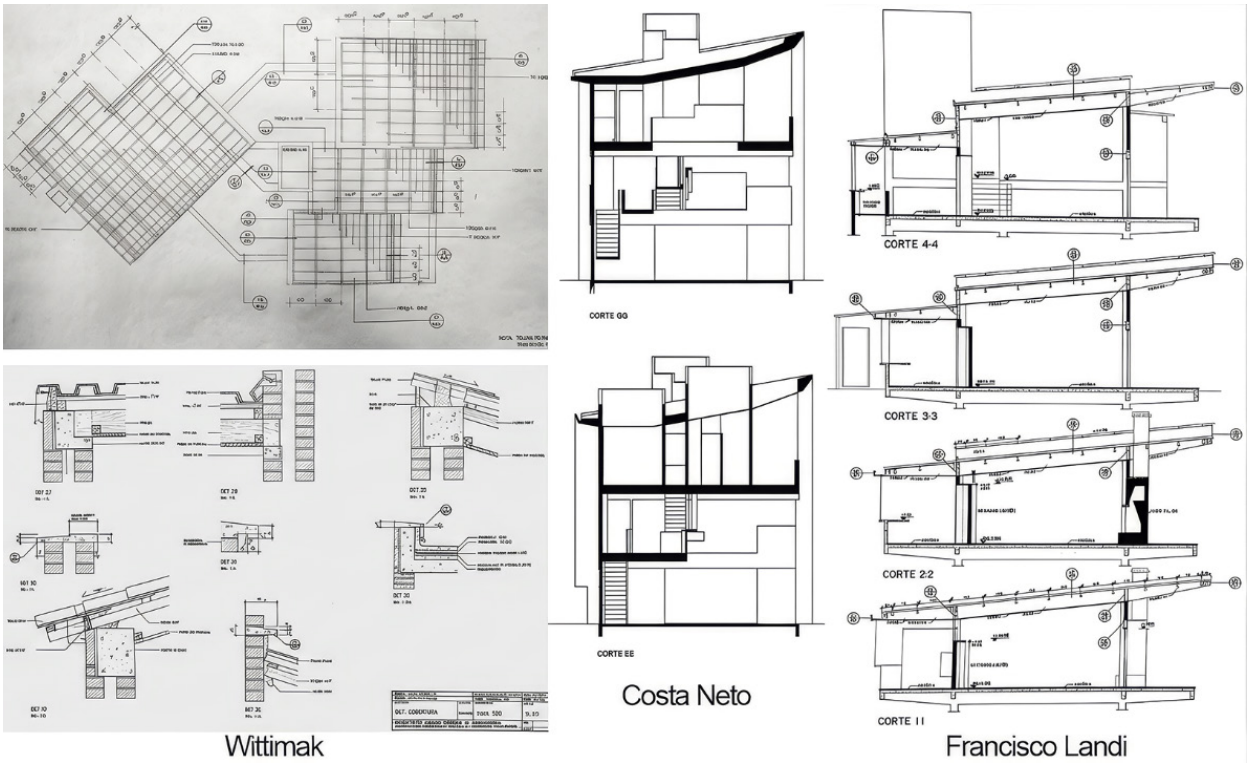


Figura 3. Techos. Fuente: Colección de Joaquim Guedes-FAUUSP/Autores.



Figura 4. Escaleras. Fuente: Colección de Joaquim Guedes-FAUUSP/Autores.

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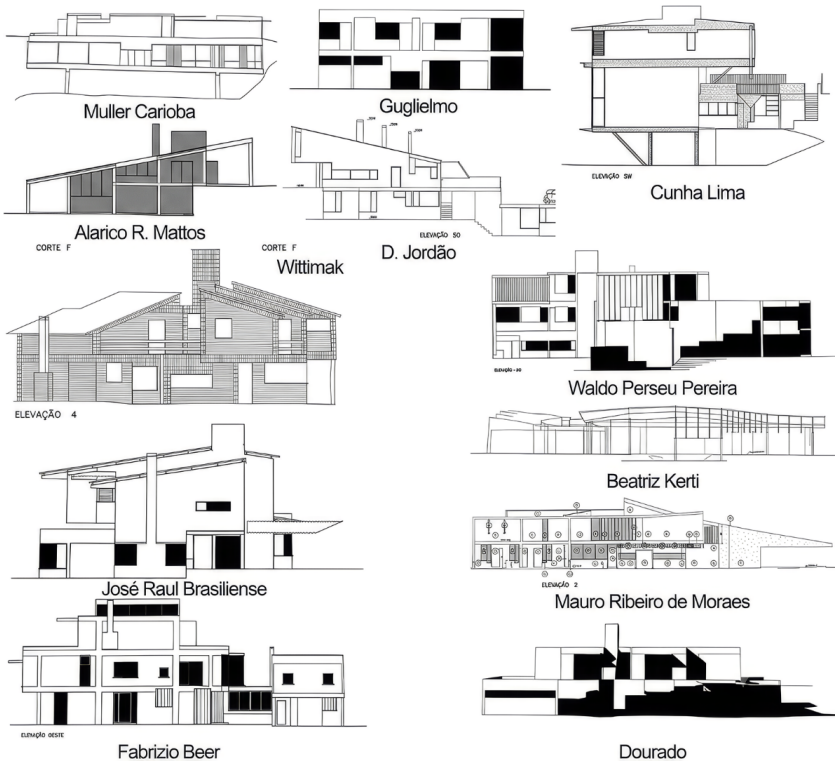


Figura 5. Elevaciones. Fuente: Colección de Joaquim Guedes-FAUUSP/Autores.

Los techos de una sola pendiente se detallaron ampliamente en los proyectos analizados (Figura 3). Una canaleta de concreto con un borde de goteo generalmente se colocaba sobre aleros anchos, como en la residencia Francisco Landi, y, en algunos casos, se acompañaba de una gárgola, como en Cunha Lima (1958).

Los detalles técnicos de los techos de tejas demuestran que la modulación del encofrado se derivó de las dimensiones de las tejas de fibrocemento, lo que evidencia que las dimensiones de los materiales utilizados dictaron el diseño y la organización espacial. La tabla visual de 3 proyectos de casas diferentes presenta algunos detalles técnicos del techo (Figura 3) de Francisco Landi (1965), Costa Neto (1961) y de la residencia Wittimak (1988), que contribuyeron a la modulación de los espacios.

El diseño del techo escalonado se determinó por el desnivel de los interiores de las residencias, así como por la necesidad de brindar espacios interiores de mayor calidad, tanto en términos de diseño espacial como para lograr un mayor confort térmico (aumento del volumen de aire). Por lo tanto, el diseño del techo surgió de consideraciones técnicas y de construcción, así como de consideraciones espaciales internas.

La tabla visual de 6 proyectos de casas diferentes (Figura 4) resalta las escaleras en los dibujos y en las fotos. Este elemento tiene una importancia singular en la arquitectura de Guedes, ya que esta circulación vertical permite conectar y cruzar los espacios en diagonal. También eran frecuentes los desniveles internos, con pocos peldaños, para acomodar los pisos en el terreno. La topografía de São Paulo influyó

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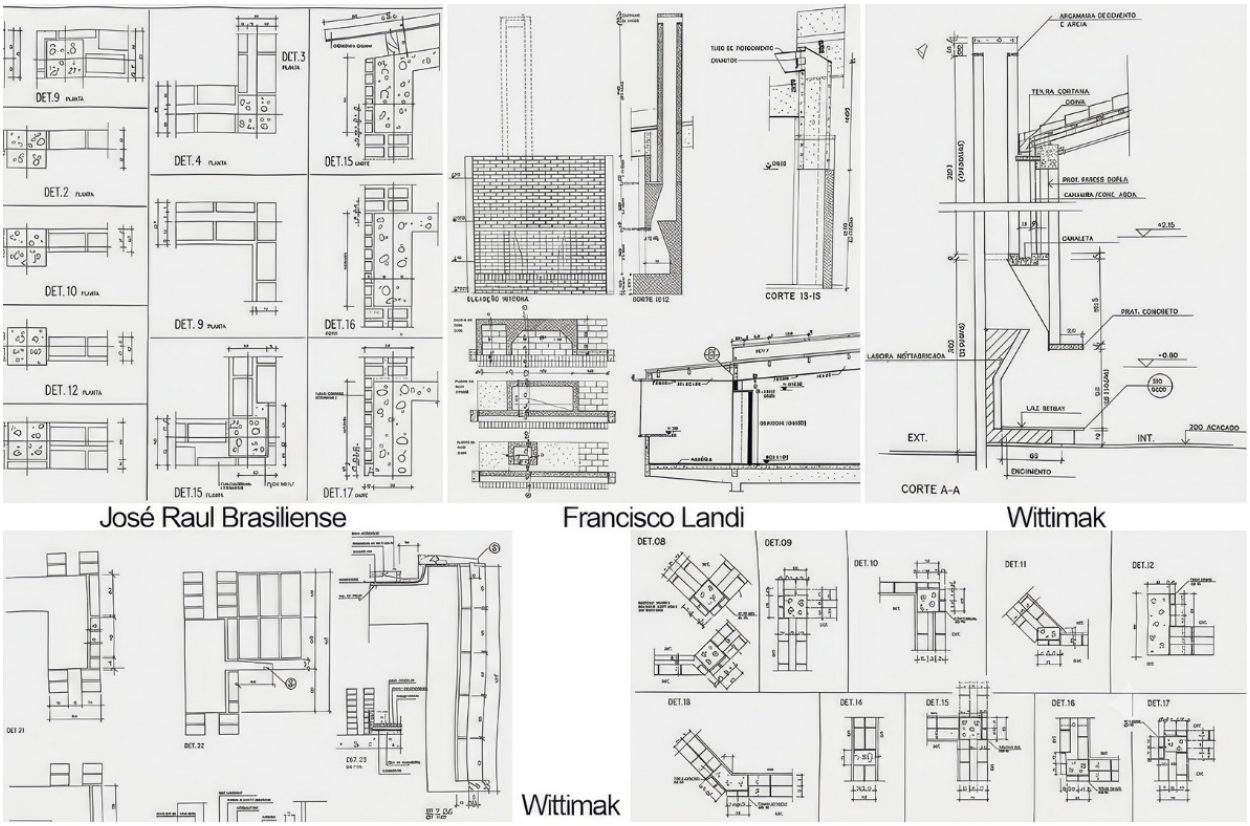


Figura 6. Ladrillos. Fuente: Colección de Joaquim Guedes-FAUUSP/Autores.

en la decisión del arquitecto de explorar los desniveles del terreno inclinado y cuesta arriba.

Si bien los peldaños interiores son rectos, los exteriores se adaptan orgánicamente a los desniveles del terreno, como se ve, por ejemplo, en las residencias Waldo Perseu Pereira (1967) y Beatriz Kerti, de manera libre y espontánea, probablemente inspiradas en los diseños de Alvar Aalto.

Las escaleras, rectas o en U, atraviesan los huecos internos, permitiendo disfrutar de amplios campos de visión. Se observó que, predominantemente, las escaleras también tienen barandas de concreto a una altura entre 82 y 90 cm.

En las residencias Waldo Perseu Pereira (1967) y Dourado (1974), los frontones de concreto "colgantes" (es decir, suspendidos del piso) (Figura 5) frente a las salas de estar crean sombra y una sensación de profundidad plana. Estas "aletas" verticales escalonadas se retraen del suelo al variar sus alturas, lo que permite diferentes encuadres del paisaje para quienes se ubican en estos entornos.

En la residencia Fabrizio Beer (1975), la mampostería de ladrillo de las paredes y las baldosas cerámicas de las losas definieron toda la modulación espacial. En la residencia Wittimak (1988), los ladrillos fueron diseñados para modular las dimensiones de los pilares de hormigón, como se puede ver en los detalles constructivos. En la residencia José Raúl Brasiliense (1975), los pilares y las vigas están envueltos por la precisa modulación de las dimensiones del ladrillo.

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En las residencias de Francisco Landi (1965), Fabrizio Beer (1975), Anna Mariani (1977) y Wittimak (1988), son evidentes las referencias a la Casa Experimental Aalto (1952-53) en cuanto al uso del ladrillo visto.

Los detalles de las chimeneas muestran que el número de hiladas de ladrillos modula el muro exterior de estas residencias. Por tanto, como acertadamente afirmó el arquitecto, "los materiales, su interpretación, su diseño y el resultado global, en definitiva, están vinculados a la posibilidad de realizar determinados sistemas de detalles constructivos" (Guedes, 1969, pág. 20).

Las dobles paredes externas de ladrillo, alternadas con huecos internos, de la residencia Wittimak (1988) evidencian las preocupaciones térmicas expresadas por el arquitecto. Es importante tener en cuenta que la continuidad a través de las paredes, los pisos y las losas se logró mediante ladrillo.

En los pisos interiores, se presta especial atención a la modularidad de las baldosas cerámicas. En los pisos exteriores, la modularidad se logra a través de las dimensiones del ladrillo (Figura 6).

Las alturas alternas de los alféizares de las ventanas, sus dimensiones y sus posiciones en las fachadas son características de sus diseños residenciales. La tabla visual de 6 proyectos de casas diferentes (Figura 7) destaca las distintas formas y posiciones de las aberturas en las fachadas. En consecuencia, los efectos "plásticos" y "compositivos" no fueron aleatorios, simplemente el resultado del deseo, sino que se derivaron de argumentos racionales y de una conciencia de construir con un sentido "estético" de las necesidades humanas.

El diseño de las ventanas surgió de preocupaciones interconectadas, ya sea para satisfacer las necesidades de iluminación y ventilación o para establecer relaciones satisfactorias entre los espacios internos y externos de las residencias. La afirmación de Guedes en su tesis es esclarecedora: "La diferencia de nivel entre las ventanas proporciona el efecto chimenea, haciendo que el aire caliente suba y salga por la abertura más alta…" (Guedes Sobrinho, 1981, pág. 145).

Una característica de los marcos de las ventanas es la alternancia entre vidrios fijos y ventanas venecianas. Mientras que el área acristalada proporciona iluminación, las ventanas venecianas permiten un flujo de aire continuo entre los ambientes externos e internos. La fachada oeste de la residencia Fabrizio Beer (1975) presenta vidrios fijos y ventanas venecianas.

Los dibujos de las aberturas en las fachadas de la residencia Guglielmo (Guedes, 1968) muestran en azul las áreas destinadas a vidrio fijo y en blanco las destinadas a persianas.

En el detalle de uno de los marcos de las ventanas de la residencia Wittimak (1988), se observa que el ancho del área con persianas es menor que el de la zona acristalada. Además, es evidente la alineación entre la doble pared de ladrillo, la profundidad del marco de la ventana y el dintel exterior de hormigón con ladrillo.

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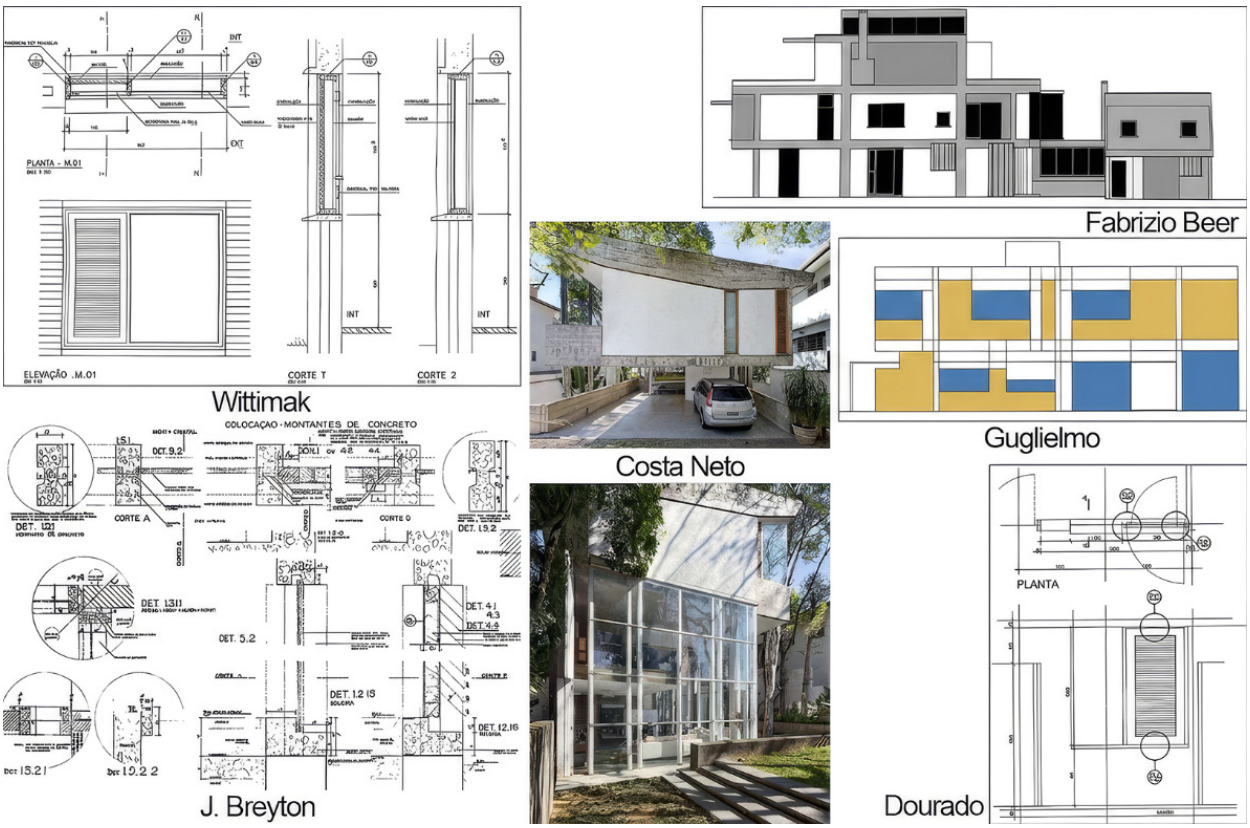


Figura 7. Acristalamiento con ventanas venecianas y soportes de hormigón. Fuente: Colección de Joaquim Guedes-FAUUSP/ Autores.

El movimiento de contrapeso de las contraventanas en la residencia Cunha Lima (1958) crea sombreado en la fachada a la vez que permite grandes aberturas al exterior.

Las columnas de hormigón, con huecos para alojar vidrio templado, en las residencias Costa Neto y Jacques Breyton (1965) son innovadoras y desafiantes. En estos detalles constructivos se evidencia la pericia del arquitecto al definir el encuentro entre los materiales.

El encuadre del paisaje circundante y los campos visuales externos dependían de las dimensiones de las aberturas, lo que favorecía una mayor transparencia en el edificio. Sin embargo, el diseño de las ventanas (ancho, alto y alféizar) y su ubicación dependían de factores ambientales, en particular, del confort térmico. El arquitecto afirmó: "Los marcos de las ventanas son las partes del edificio más vulnerables al paso de la radiación térmica… Las ventanas están hechas con materiales livianos de baja resistencia térmica" (Guedes Sobrinho, 1981, pág. 145). En consecuencia, el arquitecto pensó en las ventanas de una manera muy particular y con gran preocupación.

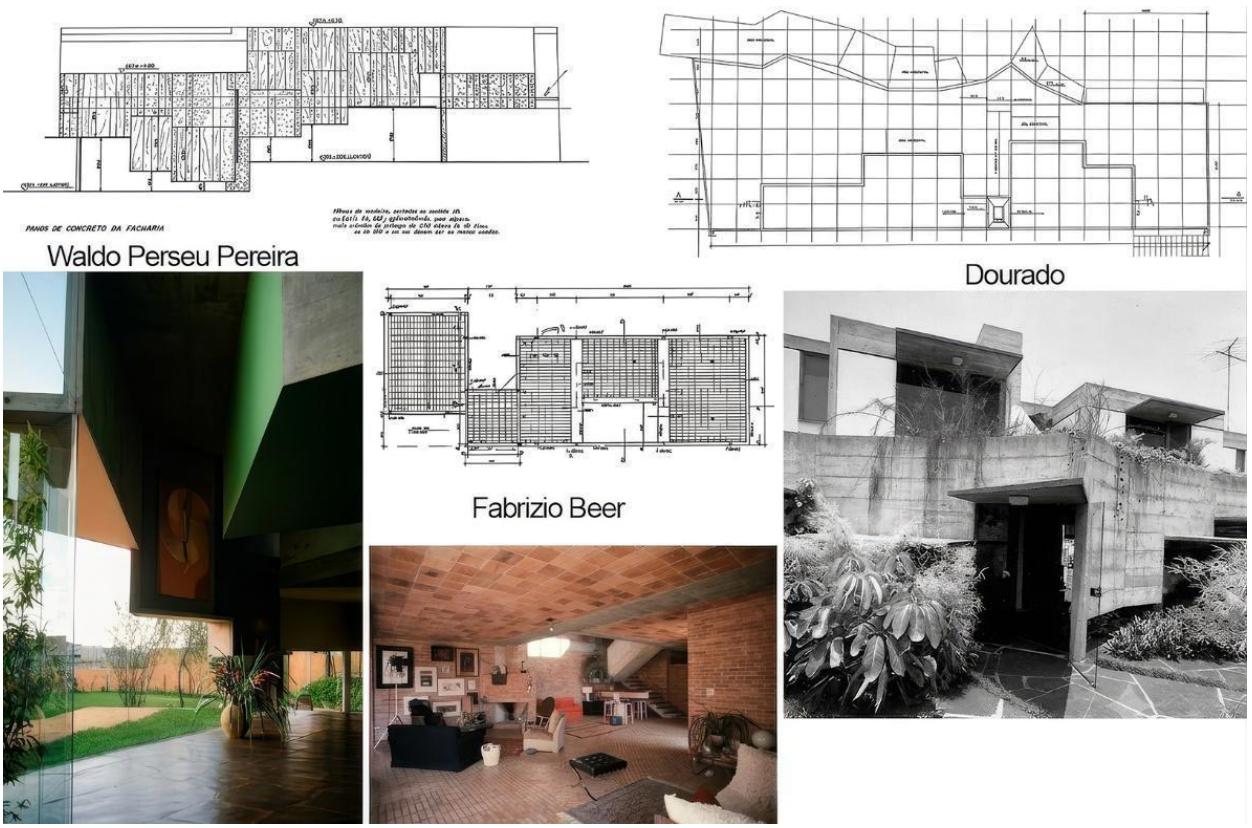
No obstante, también puede considerarse que las alturas variables de los alféizares de las ventanas permitieron que la mirada del usuario cambiara del interior al exterior de la residencia, ofreciendo distintos marcos del paisaje circundante. Como acertadamente afirmó el arquitecto, se trataba de un "(...) diálogo entre vidrio y hormigón, entre espacio interior y espacio exterior..." (Guedes, 1969, pág. 20).

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Figura 8. Marcos de ventanas y puertas: entre líneas rectas y curvas. Fuente: Colección de Joaquim Guedes-FAUUSP/ Autores.

Figura 9. Hormigón, ladrillo cerámico y sistemas modulares. Fuente: Colección de Joaquim Guedes-FAUUSP/Autores.



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En la descripción detallada del vidrio multifacético (o "en forma de abanico de mano") (Figura 8), se puede ver claramente la rigurosa construcción que el arquitecto emprendió para lograr el efecto deseado en la obra construida. Los diseños de las residencias J. Breyton (1965), Beatriz Kerti (1971), Cecy de Moraes (1973) y Dourado (1974) presentan vidrio templado fijado al piso y losa de concreto en las salas de estar, lo que ofrece transparencia y amplias vistas al exterior. En palabras del arquitecto, "...el vidrio existe como materia; no es meramente transparencia; construye volúmenes prismáticos transparentes-reflectantes; se conecta directamente al concreto, sin marcos, a través de juntas internas" (Guedes, 1969, pág. 20). Los cristales de las ventanas de las esquinas de las residencias Costa Neto (1961), Waldo Perseu Pereira (1967) y Fabrizio Beer (1975) amplían la iluminación interna y dirigen un amplio campo visual externo.

El diseño de los paneles de hormigón de la fachada de la residencia Waldo Perseu Pereira (1967) revela la preocupación del arquitecto por la disposición de los tablones de madera, "madeirit", en las formas de hormigón (Figura 9). Los tablones de madera se cortaron a los anchos de 27,5, 55 y 82,5 cm y se apartaron del suelo a las distancias de 39, 91, 106, 156 y 226 cm. Más que al uso eficiente de los tablones de madera, estas dimensiones, curiosamente, se parecen mucho a las de las series Modulor, rojo y azul, de Le Corbusier, lo que indica el proceso constructivo racional de Guedes.

En el plano del techo y en la fotografía de la residencia Dourado (1974), se observa el contraste entre el perímetro del techo de la planta baja y la regularidad del techo de la planta superior. También destacan los amplios voladizos horizontales que proyectan sombra sobre las aberturas, protegiendo los espacios interiores de la intensa luz solar.

Los modelos físicos, las perspectivas y las fotografías de la colección del arquitecto demuestran experiencia en el diseño y excelencia en la ejecución. Para el arquitecto, "lo que importa es la construcción del espacio y la luz" (Guedes, 1969, pág. 20). Se puede decir que la luz y el espacio no eran meras abstracciones teóricas, sino realidades físicas que podían materializarse mediante la disposición organizada de un ladrillo, el diseño perfecto de una ventana, etc. Los detalles precisos del proyecto, o un diseño particular de la unión de un elemento, son donde la arquitectura de Guedes alcanza su máxima expresión.

DISCUSIÓN Y COMENTARIOS FINALES

El texto "L'esercizio del dettaglio" (Gregotti, 1983), escrito por Vittorio Gregotti, destaca la importancia del detalle para expresar la integridad del proyecto en su conjunto, resistiendo la arbitrariedad y mediando entre la idea y la construcción. Si, como acertadamente afirmó Marco Frascari (1997), "los detalles son el lugar de un orden de conocimiento en el que la mente descubre su propia inteligibilidad, es decir, el logos", entonces el detalle debe entenderse como el locus de conocimiento que el arquitecto debe tener sobre la realidad y la naturaleza de la construcción.

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Figura 10. Residencia Cunha Lima. Fuente: Fotografías tomadas por los autores (2021).

Como herramienta de registro conciso, el dibujo conserva las ideas. El detalle en la arquitectura de Guedes puede entenderse como evidencia de su conocimiento de la naturaleza de los materiales. "Los materiales de construcción preceden al diseño y tienen la mayor responsabilidad en la definición de los espacios", afirmó Guedes (1968, pág. 21). Por ende, a través del dibujo técnico, como sugiere Franco Purini (1976, pág. 24), Guedes utiliza un plano de planta para guiar su pensamiento y garantizar la viabilidad de la implementación. Así, la premisa de Guedes se confirma mediante el análisis de los dibujos técnicos de los proyectos de la casa. Es a través de diferentes tipos de dibujos, en distintas etapas del proyecto, que el arquitecto registra y guía su pensamiento para garantizar la viabilidad de la ejecución durante la construcción.

Los proyectos residenciales de Joaquim Guedes oscilan entre la racionalidad de la modulación y la naturaleza orgánica de las formas. En la visión de Guedes, el arquitecto, como constructor, debe adherirse al oficio de construir bien, explorando materiales tradicionales como el ladrillo, el hormigón, el vidrio templado, las baldosas de fibrocemento y la madera. Como una especie de "sociólogo", lo que interesaba al arquitecto era lo cotidiano, lo que podía observarse. Sin audacia innecesaria y atento al rigor constructivo, Guedes desafió los cánones y generó controversia, pero ejerció la profesión de arquitecto con el cuidado de quien se preocupa por el ser humano, atendiendo las necesidades del cuerpo y del alma. El placer de satisfacer las "necesidades de la vida social" guiaba sus acciones.

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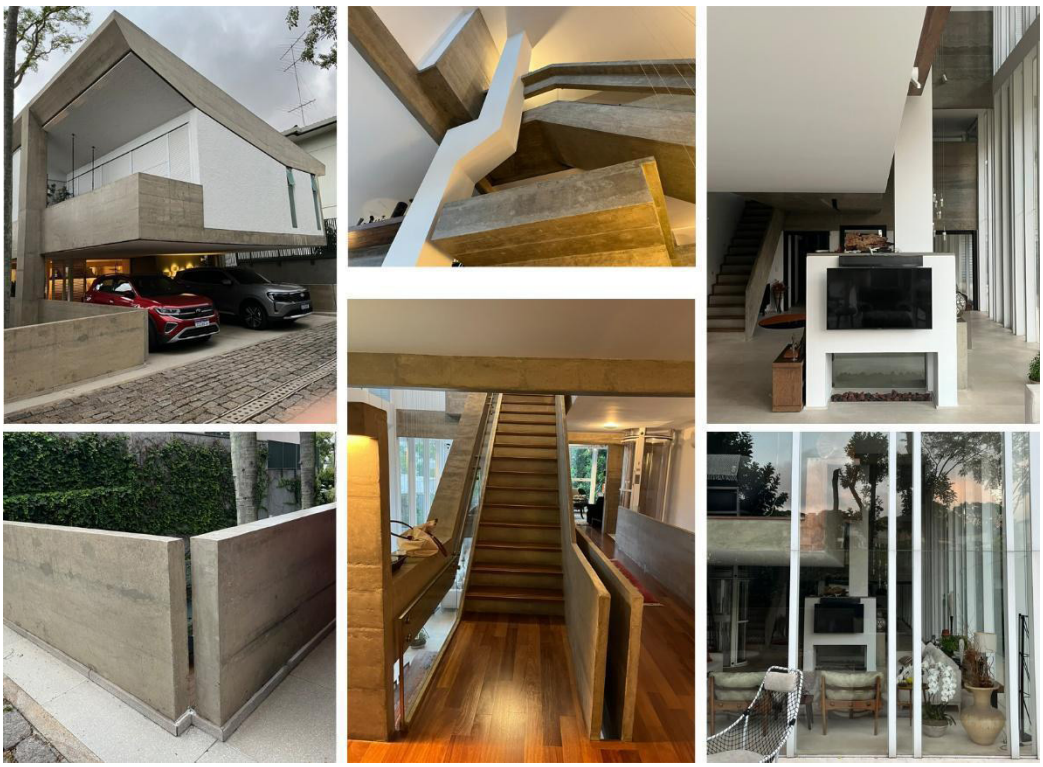


Figura 11. Residencia Costa Neto. Fuente: Fotografías tomadas por los autores (2026).

Mientras Guedes buscaba satisfacer las necesidades del cuerpo, ya fueran de funcionalidad o de comodidad técnica, también buscaba satisfacer "el alma", que "pide belleza", como Valéry la definió acertadamente.

A partir de la investigación realizada y de la cuidadosa interpretación de los diseños y dibujos de varias fases del proyecto, quedó claro que, más específicamente, se hizo hincapié en los elementos estructurales de las residencias y en los materiales utilizados. Se descubrió que, de hecho, su "razonamiento" estaba "impulsado por el diseño" y por la naturaleza de los materiales.

Se negó a levantar la casa del suelo y, siempre que fuera posible, estableció una casa más conectada al terreno y a la topografía natural. Se rehusó a trabajar con diseños de un solo volumen. Finalmente, se negó a limitar su arquitectura a la imitación superficial de las tendencias estéticas de su tiempo.

La afirmación del arquitecto de que "los materiales de construcción preceden al diseño" podría confirmarse a partir de los dibujos técnicos de la colección. El núcleo de su conocimiento sobre la construcción radicaba en los numerosos tableros de dibujo que producía en su oficina para guiar el proceso de construcción.

Los dibujos técnicos de las residencias de la colección revelan estrategias de diseño. Entre ellos, destacan las siguientes: formas escalonadas; ricos detalles constructivos entre materiales como hormigón, ladrillo, vidrio, teja y madera; techos de una sola inclinación; marcos de ventanas a diferentes alturas; aleros y marquesinas horizontales y verticales; alturas de techo alternas; y modulaciones basadas en las dimensiones del material.

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Como se ha señalado en este artículo, la modulación de los espacios se basó en las dimensiones de materiales fácilmente disponibles, como ladrillos, baldosas de fibrocemento y losas cerámicas, que el arquitecto exploró como parte de un proceso constructivo racional. Por otro lado, se permitió la libertad poética para crear marcos orgánicos de ventanas y puertas en entornos más amplios. Los detalles constructivos revelan el diálogo entre la delicadeza del vidrio y la rusticidad del hormigón, o entre el vidrio industrial templado y el ladrillo artesanal (Figura 10 y Figura 11).

Tres factores indican que el diseño y la posición de las ventanas dependían de la interacción entre los problemas técnicos y de construcción: la altura del dintel de la viga de concreto y del alféizar; los problemas de ventilación e iluminación, como la ventilación cruzada; y el encuadre del paisaje, es decir, la relación entre el interior y el exterior.

Los marcos de vidrio (puertas y ventanas), en gran parte sin marcos, acentúan su transparencia y fueron diseñados con precisión; además, los "volúmenes prismáticos" del vidrio multifacético contrastan con los ángulos rectos. Con accesorios y uniones precisos entre vidrio, concreto y ladrillo, ya sea en marcos, dinteles y alféizares o en techos, losas, paredes y pisos, Guedes se destacó por su dedicación a los detalles constructivos y por su conocimiento de la naturaleza de los materiales.

Para Guedes, la cuestión no era si la forma se derivaba meramente de la función y viceversa. Existía una gran preocupación por emplear el conocimiento humano para beneficiar el arte de la construcción, aprovechando al máximo la naturaleza de los materiales y las técnicas disponibles. Con respecto a la relación forma-función en su método de enseñanza del diseño en FAUUSP, Guedes (1993) afirmó en una entrevista con una revista francesa: "La forma no necesariamente sigue a la función. Sin embargo, la arquitectura se basa en dos principios: (a) debe resolver un conjunto de necesidades prácticas de un cliente, público o privado; (b) debe crear un orden inteligible que vaya más allá de la simple solución de sus necesidades". Se puede inferir que prevalece la realidad: la solución de problemas en la práctica, pero una que excede las necesidades básicas y genera placer estético.

A partir de un análisis de su arquitectura, se puede afirmar que su método de diseño se desarrolló a partir de la idea de componer la parte para el todo, a diferencia del conocido lenguaje de la "Escuela de São Paulo", donde el diseño de un solo volumen indica lo contrario. El valor del detalle en la arquitectura de Guedes está directamente relacionado con su comprensión de la arquitectura como síntesis de técnica, construcción, materiales, estructura, uso y lugar, como arquitectura moderna.

Se trata, por tanto, de una arquitectura generada de adentro hacia afuera, basada en la idea de que cada elemento debe tener su propio diseño adecuado. La forma final del edificio fue el resultado de una articulación de fuerzas internas, de las necesidades humanas de refugio con comodidad y placer y, notablemente, de una comprensión de la naturaleza de los materiales.

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En consecuencia, el número de residencias, caracterizadas por formas diagonales escalonadas, resultó de la yuxtaposición de factores funcionales y técnico-constructivos, antes que el "estético".

Al resaltar la importancia del diseño detallado de la construcción, Guedes da visibilidad a un proceso de producción que a menudo se confunde con un acto mecánico de fabricación.

Estos hechos permiten posicionar la arquitectura de Joaquim Guedes como única en el panorama de la arquitectura moderna de São Paulo. Con una arquitectura más libre de ortodoxias, pero con el rigor científico-constructivo que vio en la arquitectura de Rino Levi y Carlos Millán, el arquitecto se estableció como un pensador particular y original de la arquitectura moderna en Brasil y en São Paulo.

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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.

Tesis Doctoral "El paisaje de la vivienda colectiva en la arquitectura moderna de Valparaíso-Chile (1906-1976)". Universidad Politécnica de Madrid (UPM).
Proyecto de Investigación FONDART Nacional Línea Arquitectura. N° 80338/2015 "Cartografía de la vivienda colectiva en Valparaíso: De la Caja de la Habitación Popular a la Corporación de la Vivienda (1936-1976)".

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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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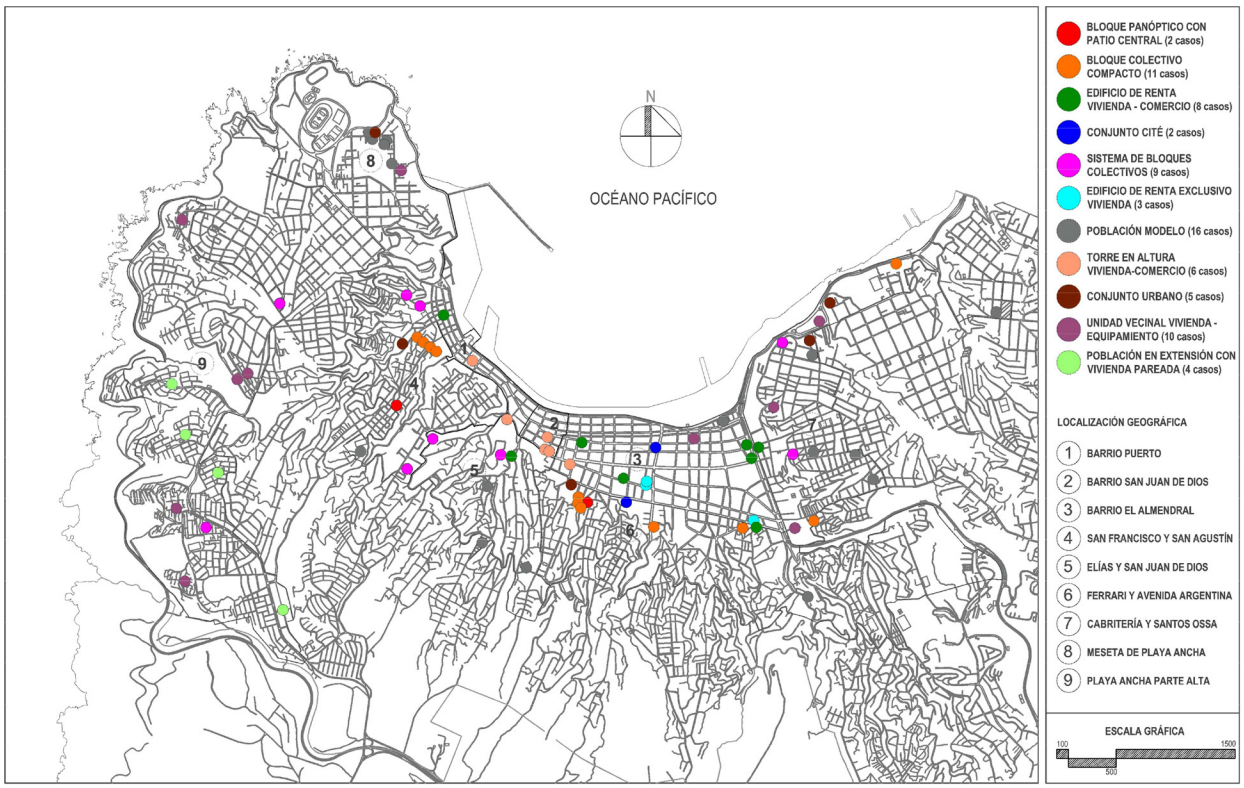


Figure 3. Cartography of the geographical distribution of the various types of collective housing in Valparaíso (1906-1976). Source: Prepared by the Authors.

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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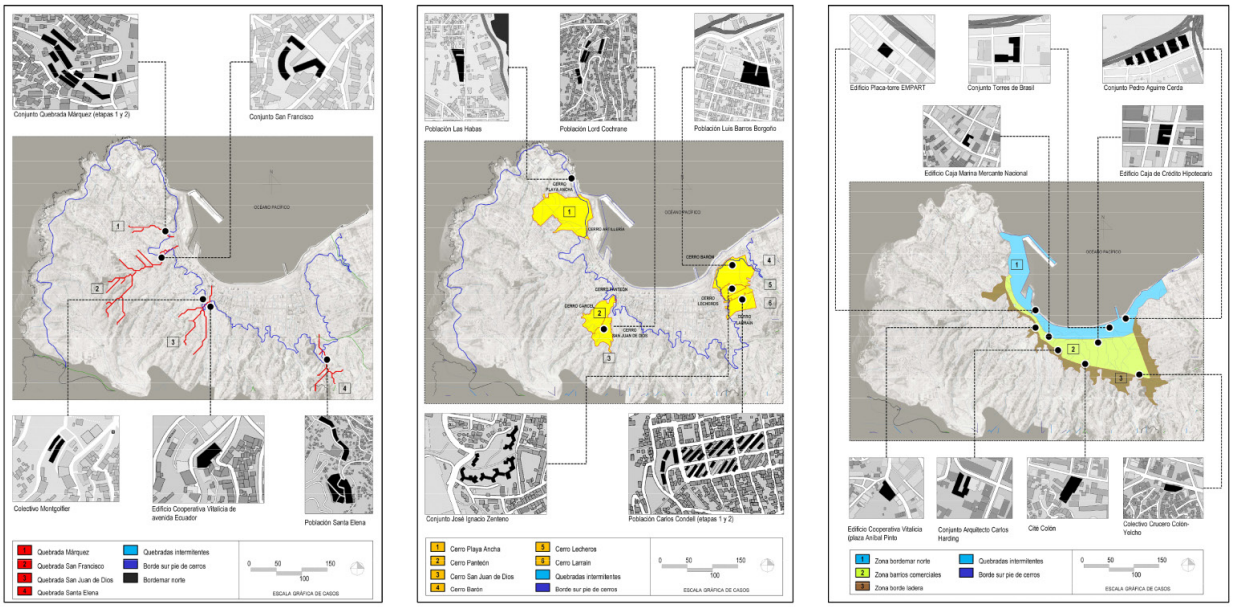


Figure 4. Geographical conditions where the modern collective housing in Valparaíso is developed (ravines, hills, and urban plan). Source: Prepared by the Authors.

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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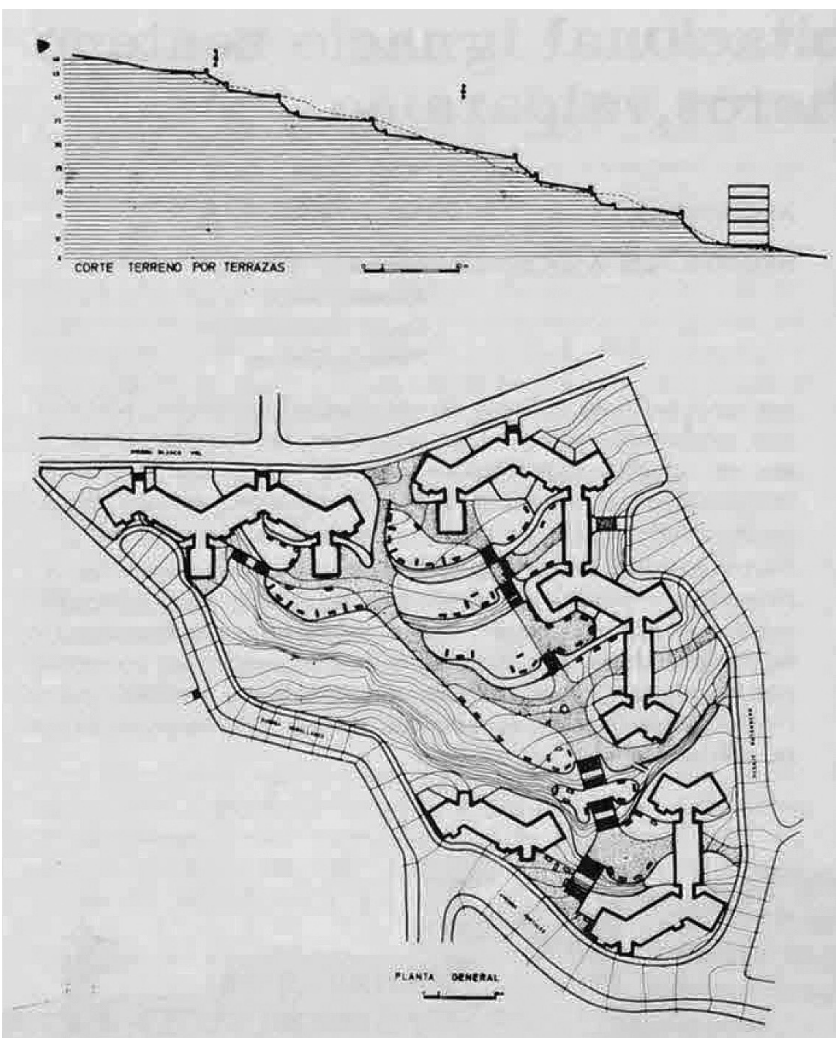


Figure 8. José Ignacio Zenteno Housing Complex (1961-1962). Source: Prepared by the Authors.

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

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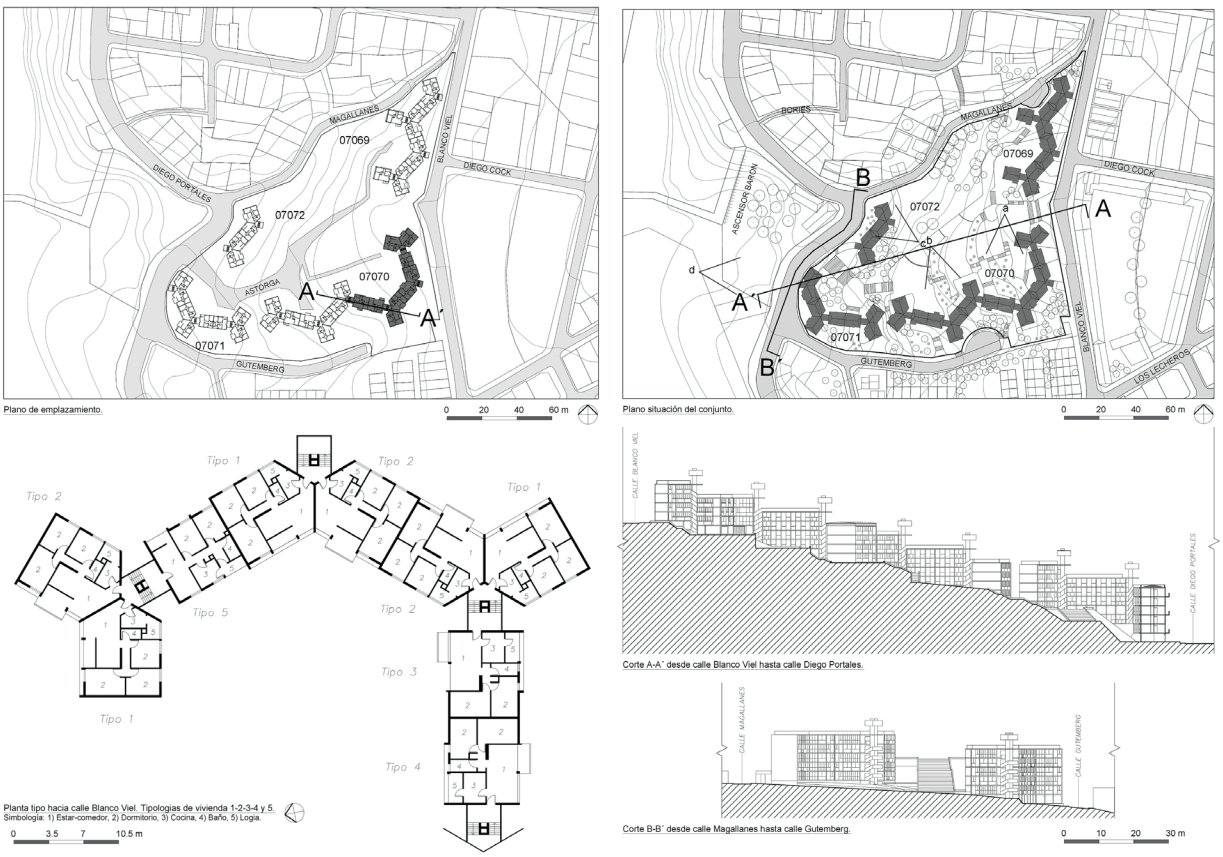


Figure 10. Planimetry of the José Ignacio Zenteno Housing Complex. Source: Prepared by the Authors.

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.

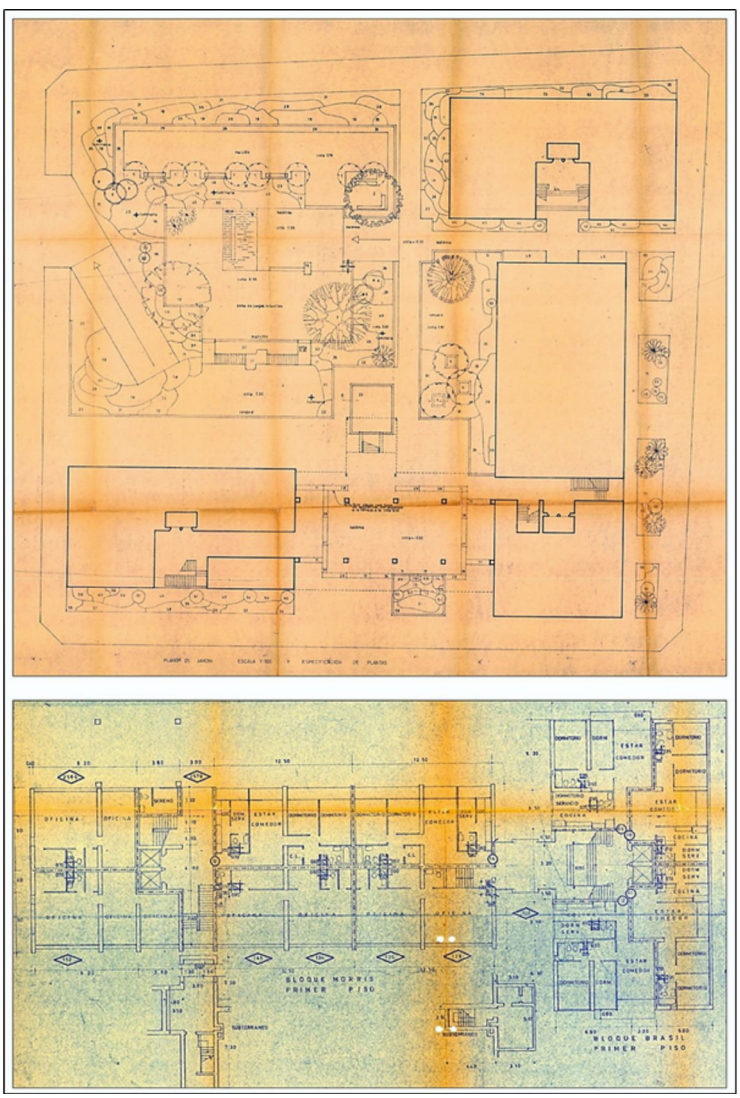


Figure 12. Plan of the original project for the Torres de Brasil Complex, built by the Housing Corporation between 1966 and 1967. Source: Ministry of Housing and Urbanism Archive (MINVU, 2025).

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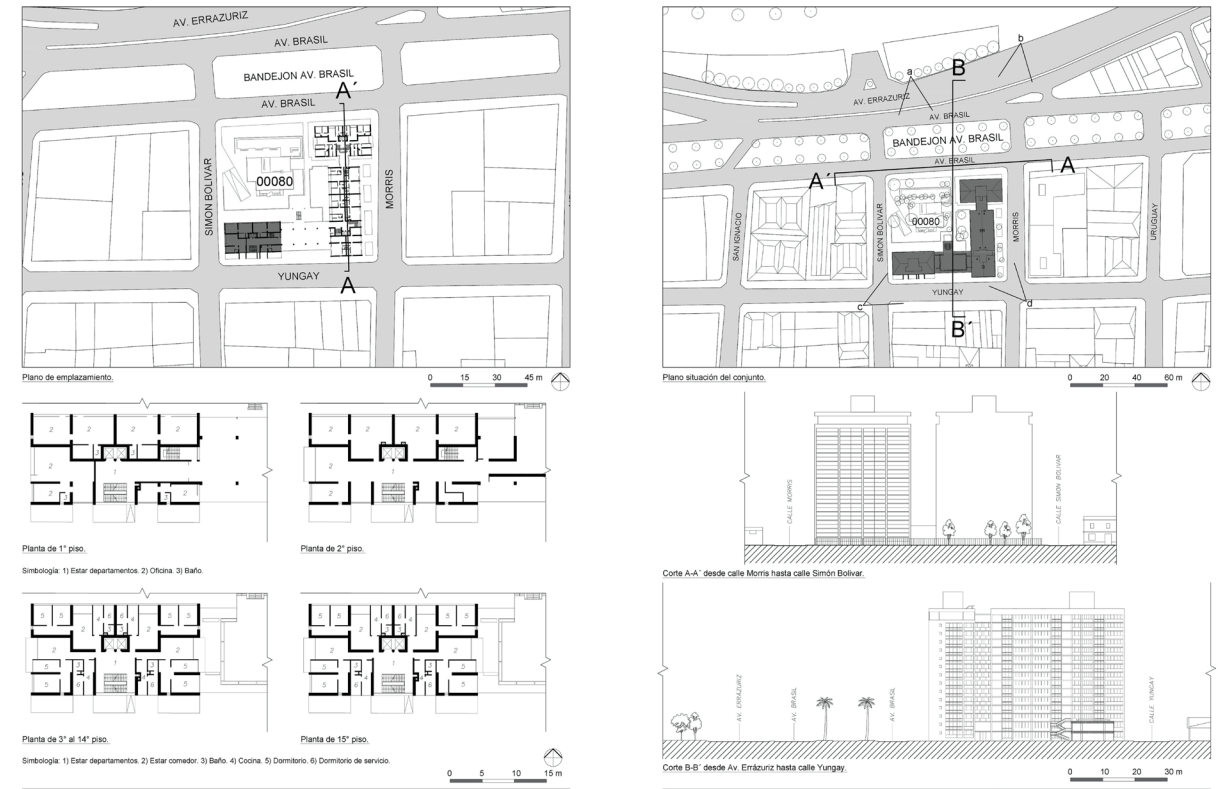


Figure 13. Planimetry of the Torres de Brasil Housing Complex. Source: Prepared by the Authors.

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)

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 (Figure 14), 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 (Figure 15), 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 (Figure 16), 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

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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

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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.

the unitary 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

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the necessary 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.

CONTRIBUTION OF AUTHORS CRediT

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NOTRE-DAME AND PAÇO DE SÃO CRISTÓVÃO: MEMORY AND RESIGNIFICATION POST-FIRE

NOTRE-DAME Y PAÇO DE SÃO CRISTÓVÃO: MEMORIA Y RESIGNIFICACIÓN POSTINCENDIO

NOTRE-DAME E PAÇO DE SÃO CRISTÓVÃO: MEMÓRIA E RESSIGNIFICAÇÃO PÓS-INCÊNDIO



Figure 0. Marks and scars of the fire in Paço de São Cristóvão. Source: Author's collection, 2021.

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ABSTRACT

This article comparatively examines the heritage reconstruction processes undertaken at Notre-Dame Cathedral in Paris and Paço de São Cristóvão, the historic seat of the National Museum of the Federal University of Rio de Janeiro, following the fires of 2019 and 2018, respectively. It seeks to understand how different institutional paths and architectural decisions reorganize heritage values, sources of authenticity, uses, and systems of public visibility. The study adopts a qualitative approach, combining historical and documentary analysis, theoretical review, and a comparative examination using a matrix applied to architectural projects, legislation, technical and institutional documents, photographic records, and communication materials. The findings show that, at Notre-Dame, centralized decision-making and the concentrated intervention timeframe produced a composite formal unity, combining documented medieval references for the nave and choir with the "Viollet-le-Duc state" adopted for the spire and the main roof structure. At Paço de São Cristóvão, interinstitutional governance and implementation through successive phases constitute an incremental process in which the conservation of the surviving fabric, the reconstruction of lost elements, the integration of notoriously contemporary structures, and new connections support the complex's reactivation as a museum, a scientific institution, and a public facility. The circulation of images also performs distinct roles: at Notre-Dame, it tends to stabilize a narrative of continuity and reopening; at Paço, it communicates successive stages and legitimizes an ongoing reconstruction. The study contributes to the debate on architectural restoration by demonstrating that post-catastrophe reconstruction operates simultaneously on material fabric, values, uses, and forms of public visibility, revealing the constitutive role of symbolic dimensions and communication processes in the contemporary reinscription of heritage.

Keywords: museum architecture, religious architecture, fires, heritage reconstruction, architectural restoration

RESUMO

Este artigo analisa comparativamente os processos de reconstrução patrimonial da Catedral de Notre-Dame de Paris e do Paço de São Cristóvão, sede histórica do Museu Nacional/UFRJ, após os incêndios de 2019 e 2018. O objetivo é compreender como trajetórias institucionais e decisões arquitetônicas distintas reorganizam valores patrimoniais, fontes de autenticidade, usos e regimes de visibilidade pública. A pesquisa adota uma abordagem qualitativa e combina análise histórico-documental, revisão teórica e exame comparativo, operacionalizados por meio de uma matriz aplicada a projetos arquitetônicos, à legislação, a documentos técnicos e institucionais, a registros fotográficos e a materiais de comunicação. Os resultados mostram que, em Notre-Dame, a centralização decisória e a temporalidade concentrada da intervenção produziram uma unidade formal composta, articulando referências medievais documentadas para a nave e o coro e o "estado Viollet-le-Duc" para a flecha e a grande cobertura. No Paço, a governança interinstitucional e a execução por frentes sucessivas configuram um processo incremental, no qual a conservação de remanescentes, a recomposição de partes perdidas, a inserção de estruturas contemporâneas distinguíveis e novas conexões sustentam a reativação museológica, científica e pública do conjunto. A circulação das imagens também assume funções distintas: em Notre-Dame, tende a estabilizar uma narrativa de continuidade e de reabertura; no Paço, comunica etapas e legitima uma reconstrução ainda em curso. O estudo contribui para o debate sobre restauração arquitetônica ao demonstrar que reconstruções pós-catástrofe operam simultaneamente sobre matéria, valores, usos e formas de visibilidade pública, evidenciando o papel constitutivo das dimensões simbólicas e comunicacionais na reinscrição do patrimônio.

Palavras-chave: arquitetura de museus, arquitetura religiosa, incêndios, reconstrução patrimonial, restauração arquitetônica

RESUMEN

Este artículo analiza comparativamente los procesos de reconstrucción patrimonial de la catedral de Notre-Dame de París y del Paço de São Cristóvão, sede histórica del Museo Nacional de la Universidad Federal de Río de Janeiro, tras los incendios de 2019 y 2018, respectivamente. Su objetivo es comprender cómo distintas trayectorias institucionales y decisiones arquitectónicas reorganizan los valores patrimoniales, las fuentes de autenticidad, los usos y los regímenes de visibilidad pública. La investigación adopta un enfoque cualitativo y combina análisis histórico-documental, revisión teórica y una matriz comparativa, aplicados a proyectos arquitectónicos, legislación, documentos técnicos e institucionales, registros fotográficos y materiales de comunicación. Los resultados muestran que, en Notre-Dame, la centralización de las decisiones y la temporalidad concentrada de la intervención produjeron una unidad formal compuesta, articulando referencias medievales documentadas para la nave y el coro con el "estado Viollet-le-Duc" adoptado para la aguja y la gran cubierta. En el Paço, la gobernanza interinstitucional y la ejecución en etapas sucesivas configuran un proceso incremental en el que la conservación de los elementos remanentes, la reconstrucción de partes perdidas, las estructuras contemporáneas y las nuevas conexiones sustentan la reactivación del conjunto como museo, institución científica y equipamiento público. La circulación de imágenes también cumple funciones distintas: en Notre-Dame tiende a estabilizar una narrativa de continuidad y de reapertura; en el Paço comunica las distintas etapas y legitima una reconstrucción aún en curso. El estudio contribuye al debate sobre la restauración arquitectónica al demostrar que las reconstrucciones posteriores a catástrofes operan simultáneamente sobre la materialidad, los valores, los usos y las formas de visibilidad pública, y al revelar el papel constitutivo de las dimensiones simbólicas y de los procesos de comunicación en la reinscripción contemporánea del patrimonio.

Palabras clave: arquitectura de museos, arquitectura religiosa, incendios, reconstrucción patrimonial, restauración arquitectónica

INTRODUCTION

In recent decades, catastrophes that have struck historical monuments have made the tensions inherent in contemporary architectural conservation and restoration practices visible. The resulting damage compromises the materiality of buildings of high historical value and triggers processes of symbolic reconstruction and public reconfiguration of cultural heritage. In these circumstances, restoration transcends physical recovery and encompasses interpretive tensions, narrative choices, and institutional strategies to reactivate the monuments' public presence.

Recent literature on cultural heritage documents the expansion of the field of heritage interventions. Studies on conservation and restoration theory indicate that decisions about reconstruction, the upkeep of material marks of the catastrophe, and a formal recomposition combine historical, aesthetic, and social values attributed to monuments (Muñoz Viñas, 2005). Meanwhile, formulations on collective memory and places of memory help explain why the symbolic dimensions of heritage have become central in contexts marked by the widespread circulation of images and the intensification of disputes over cultural memory (Halbwachs, 1990; Nora, 1993). In this scenario, historical monuments act as devices to produce meaning and have their public visibility continuously reconfigured by institutional, media, and cultural processes.

The fires that occurred at the Cathedral of Notre-Dame de Paris in 2019 and at the Paço de São Cristóvão, the historical headquarters of the National Museum of the Federal University of Rio de Janeiro, in 2018, constitute paradigmatic episodes. Both monuments have great architectural and symbolic value, and after the fires, they became the object of extensive mobilization processes aimed at reconstruction. In the French case, this mobilization included the National subscription instituted by a specific law, large donations, and public and parliamentary debate on the spire's reconstruction (France, 2019). In the Brazilian case, it combined campaigns for heritage donations, the "Museu Nacional Vive" program, and cooperation of the University, the Institute of National Historical and Artistic Heritage [IPHAN], UNESCO, and public and private funders. Although they have different uses, the two cases share decisive aspects for comparative analysis: strong public impact, intense image circulation, and renewal of symbolic presence.

The originality of the article lies in the link between architectural analysis, conservation theory, and the symbolic dimensions of heritage visibility. Through historical-documentary analysis, theoretical review, and comparative examination operationalized by a matrix, the study identifies similarities and differences in the material, symbolic, and public reconfiguration of Notre-Dame and the Paço de São Cristóvão after the fires.

THEORETICAL FRAMEWORK

The analysis understands architectural heritage as a cultural construct supported by historical selection processes, interpretation, and attribution of value. Monuments are preserved for their materiality, but also because groups and institutions recognize in them historical, aesthetic, symbolic, and use values that justify their permanence. Post-catastrophe reconstruction is therefore not

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an exclusively technical operation: it involves cultural, political, and social decisions about what to conserve, transform, rebuild, and make publicly readable (Riegl, 2016).

Alois Riegl (2016) offers the key axiological basis for this interpretation. Its memory values link the monument to the past, while the current values respond to the demands and perceptions of the present. Among the former, the historical value recognizes the asset as a unique and intelligible document, and the seniority value reflects its duration in the matter at hand. Among the latter, use value maintains its functional continuity, while art and novelty values respond to aesthetic expectations and to the visual integrity perceived in the present. This formulation shows that every intervention reorders hierarchies. However, by preserving certain attributes, it can reduce others and modify how the monument is recognized.

This interpretation is connected to the principles of the Venice Charter (ICOMOS, 1964), the Nara Document on Authenticity (ICOMOS, 1994), and the Burra Charter (Australia ICOMOS, 2013). The Venice Charter relates restoration to respect for the original material, authentic documentation, contributions from different periods, and the limits of conjecture. Nara broadens the sources of authenticity to include form, matter, use, function, tradition, context, and meaning. Burra, in turn, links conservation to cultural significance and legal change management. Together, these documents allow us to evaluate not only the final appearance of interventions, but also the evidence, values, uses, and decision-making processes that support them.

In addition, Muñoz Viñas (2005) allows us to understand conservation as a selective, negotiated, and communicative practice. Intervening implies choosing evidence, hierarchizing meanings, and establishing degrees of legibility. In post-catastrophe situations, such choices respond simultaneously to material and regulatory requirements, collective expectations, institutional positions, and narratives of loss, reparation, and permanence. Their contribution is used here to explain that values are not just identified: they are selected, communicated, and legitimized by agents with different forms of authority.

The public dimension of these decisions requires considering the image's contemporary centrality. Monuments affected by catastrophes begin to circulate intensively through photographic records, transmissions, recurrent frames, and institutional narratives. Benjamin (2015) helps us understand how technical reproducibility broadens exposure and shifts the reception of the monument beyond its immediate material presence. Debord (1997) helps us recognize that this circulation is not neutral, as images also mediate social and institutional relations. Marx (2013) critically situates this process by showing how socially produced relations and values can present themselves as evident properties of things.

The widespread visual circulation does not directly determine restoration decisions, but frames alternatives, intensifies expectations, and favors the stabilization of certain narratives. Images of fire, ruin, technical work,

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reconstruction, and reopening organize public sequences of interpretation, in which certain values become more recognizable than others. The reconstruction acts, thus, on the matter and on the ways of seeing, narrating, and legitimizing the heritage.

It is within this outlook that the article's comparative matrix is inserted, organized into four lines: institutional and decision-making; values, matter, and authenticity; use and heritage practices; and visibility and mediation. The circulation of images is considered a constitutive, but not isolated, dimension of contemporary legitimation: architectural devices, institutional decisions, and forms of public communication jointly contribute to re-inscribe the monument in the present. The comparison between Notre-Dame and the Paço de São Cristóvão therefore allows for an examination of how different contexts reorganize the relationships among matter, memory, use, authenticity, and visibility after the catastrophe.

METHODOLOGY

The research adopts a qualitative and comparative approach to examine two contemporary heritage reconstruction processes after fires. The choice of Notre-Dame and Paço de São Cristóvão stems from their historical and symbolic relevance, as well as from the possibility of examining, in different institutional contexts, different strategies for conservation, reconstruction, use, and resignification.

The procedure combines historical-documentary analysis, theoretical review, and comparative examination of a corpus comprising architectural projects, intervention reports, heritage legislation, technical and institutional documents, photographic records, images in public circulation, and communication materials produced during the reconstruction processes. In the French case, the corpus brings together legislation, reports, and institutional documentation on Notre-Dame (Cour des Comptes, 2020; Diocèse de Paris, 2024; France, 2019). In the Brazilian case, it includes projects, reports, and technical documents related to the reactivation of the Paço de São Cristóvão and the National Museum (Hereñú + Ferroni Arquitetos Ltda. & Atelier of Architecture and Urban Design, 2022; Hereñú + Ferroni Arquitetos Ltda., Soares & Freire, 2023, Hereñú + Ferroni Arquitetos Ltda., Soares, Portugal, 2024; IPHAN, 2023; IPHAN, 2024a).

The analysis uses a comparative matrix organized along four lines. The first examines the institutional and decision-making paths of each process, considering forms of governance, the agents involved, temporalities, and intervention methods. The second observes values, matter, and authenticity, paying attention to historical, antiquity, use, art, and novelty values (Riegl, 2016), as well as to sources of authenticity and cultural significance mobilized in the decisions. The third analyzes use and heritage practices, considering continuity or functional transformation, circulation, accessibility, infrastructure, and modes of monument reactivation. The fourth examines visibility and mediation, through the circulation of images, recurrent frames, institutional narratives, and

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architectural and interpretative devices associated with monuments after the fires.

The study does not directly measure public opinion or survey local communities. The term "public visibility" designates, in this article, how institutions, media, projects, and spatial devices propose, repeat, and stabilize certain readings of heritage. The analysis therefore considers both the materiality of the interventions and frameworks through which their decisions are communicated and legitimized.

The collation examines how the two cases responded to fires through distinct institutional and architectural paths, reorganizing matter, memory, use, authenticity, and visibility, as summarized in the comparative matrix.

CASE STUDY

Notre-Dame and Paço de São Cristóvão have different roles, funding scales, and governance structures. However, they share a critical event with far-reaching repercussions, extensive material losses, and the need to publicly legitimize choices regarding conservation, reconstruction, and transformation.

The fire at Notre-Dame on April 15th, 2019, occurred during roof work and destroyed the spire, much of the wooden structure, and sections of the roofs of the nave, the choir, and the transept. The preliminary investigation ruled out evidence of a criminal origin. It maintained as a working hypothesis a short circuit in temporary electrical installations connected to the roof or a badly extinguished cigarette left by workers, neither of which was definitively confirmed (Europe 1, 2019). The French state quickly centralized the response through specific legislation, international financial mobilization, and the creation of a public body to carry out the work. In the following months, contemporary proposals for the spire and roof circulated widely, broadening the debate's visibility, but institutional decisions progressively narrowed the field of alternatives. The option, summarized in the public and institutional debate by the expression *à l'identique*, was oriented towards the recreation of the historically consolidated image of the cathedral. This operation can be read, in a Brandian line, as a search for its potential unity, but which remains stressed by the plurality of documented historical statuses (Brandi, 2004). The spire and large roof recovered the "Viollet-le-Duc state," while the nave and choir referred to the documented medieval state.

In Paço de São Cristóvão, the fire on September 2nd, 2018 caused the collapse of the roofs and a large part of the floors and interiors, resulting in a significant loss of the collections. However, the facades, masonry, and several remnants remained intact (Figure 1). The official investigation identified a short circuit in the air-conditioning system installed in the building's auditorium as a probable cause (Federal Police, 2019). The first actions involved expert review, rescue, shoring, stabilization, and protection of the surviving elements. Unlike in the French case, the process began to respond simultaneously to the

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Figure 1. Fire at Paço de São Cristóvão, historical headquarters of the National Museum of the Federal University of Rio de Janeiro. Source: Author's collection, 2018.

palace's recovery and the reconstitution of the National Museum as a scientific and museological institution. Conducted by the National Museum / UFRJ in conjunction with IPHAN, UNESCO, funding institutions, and design teams, it was structured in successive and connected fronts: emergency consolidation, recovery of facades and roofs, preservation of the assets, implementation of infrastructures, intervention in interiors and gardens, reconfiguration of the Alípio de Miranda Ribeiro Annex, and museography work.

The paths produced different responses. At Notre-Dame, decision-making centralization, liturgical continuity, and the strength of a consolidated historical image guided the reconstruction towards a documented formal recovery. At Paço, the extent of the losses and the need to update the museum's operations led to a convergence of the conservation of remnants, the recomposition of lost parts, the insertion of distinctive contemporary structures, museological reorganization, and new infrastructure. These differences underlie the comparison outlined in the following sections.

DEVELOPMENT

Reconstruction outlines and redistribution of values

At Notre-Dame, the adoption of medieval references for the nave and choir, and the "Viollet-le-Duc state" for the spire and the large roof, resulted in

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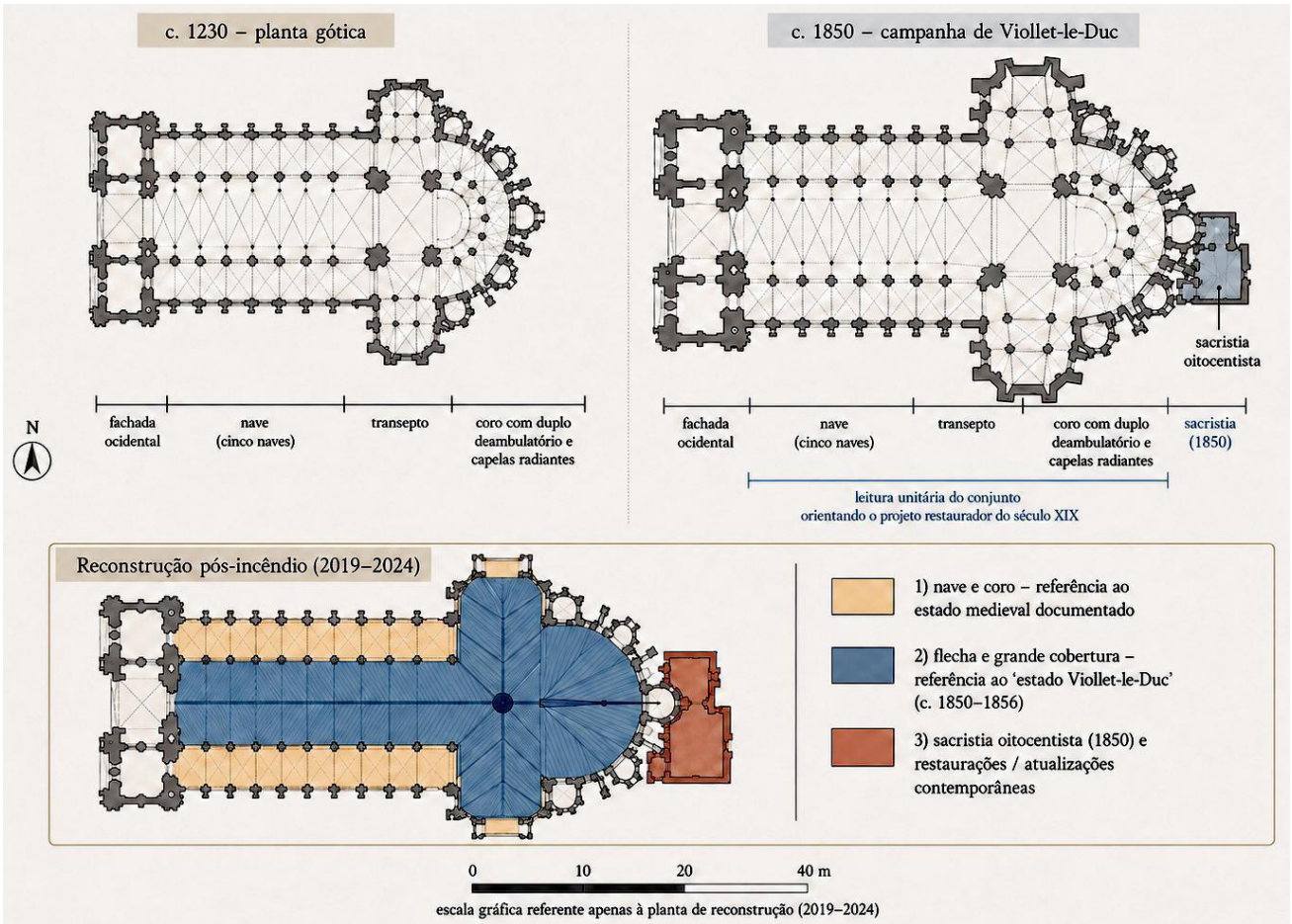


Figure 2. Notre-Dame de Paris: Historical references and summary of the reconstruction (outline). The representation distinguishes the documented medieval references for the nave and choir, the "Viollet-le-Duc State" for the spire and the large roof, and the restored and updated 18th-century sacristy. Source: Prepared by the Author, 2026, based on Guilhermy and Viollet-le-Duc (1856) and the Établissement public chargé de la conservation et de la restauration de la cathédrale Notre-Dame de Paris (2024).

a visual unity that does not conform to the homogeneous reconstruction of a single historical moment. It is a documentarily sustained, selective composition, in which different temporalities are brought together under a continuous and immediately recognizable heritage image. The intervention thus subordinates the visibility of novelty to the recomposition of the cathedral's consolidated figure, reinforcing its historical and artistic values and preserving the continuity of liturgical use (Figure 2).

This formal continuity, however, coexists with a significant perceptual transformation of the interior. The cleaning of surfaces and, above all, the reconfiguration of artificial lighting reduced areas of penumbra and contrast, increasing the luminous homogeneity and spatial legibility of the nave. The comparison between the records of 2007 and 2025 shows that the permanence of the architectural configuration did not prevent the creation of a new, cleaner, and visually controlled environment (Figures 3 and 4).

In Paço de São Cristóvão, the extent of the losses and the simultaneous reconstitution of the building and the institution displace novelty to another sphere. Instead of remaining mostly contained in discrete systems, it becomes legible in the new structures of circulation, reception, infrastructure, and museological support. The reconstruction not only seeks to recompose a previous architectural figure but also to make an ensemble

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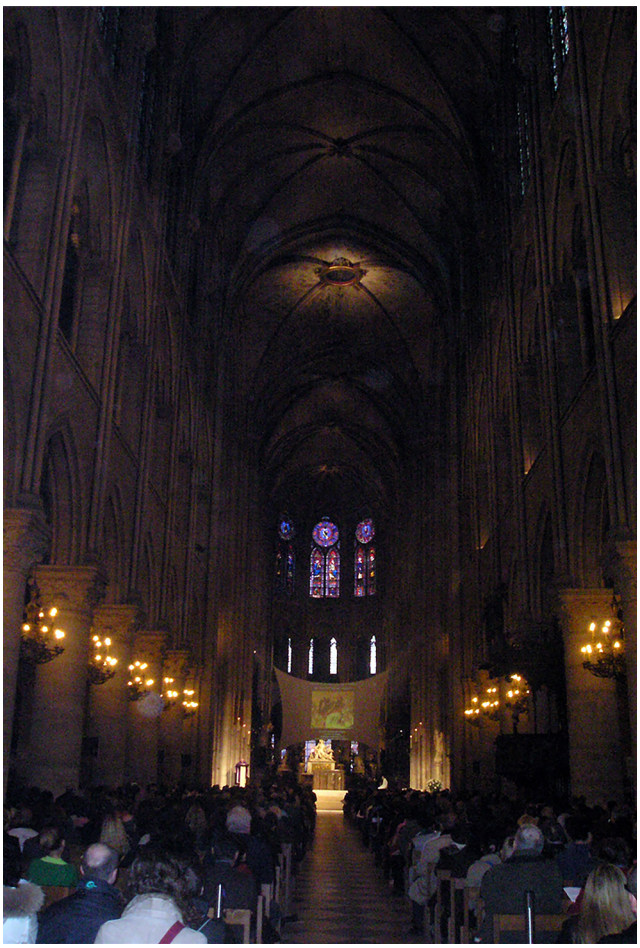




Figure 3. Central Nave of Notre-Dame before the fire and the recent cleaning process, with greater penumbra and contrast. Source: Author's collection, 2007.

Figure 4. Central Nave of Notre-Dame after restoration, with lighter surfaces and greater luminous uniformity. Source: Author's collection, 2025.

whose scientific, museum, and public functions have been profoundly interrupted operable again.

This combines the conservation of remnants, the recomposition of lost parts, and the insertion of distinctive contemporary structures. Certain traces of the fire remain as evidence of the material rupture, while other spaces receive treatments necessary for security, conservation, and new museological functioning (Figure 5). The scar, therefore, is neither a homogeneous guideline nor a value in itself: its permanence results from interpretative choices that can broaden the building's historical legibility, but also involve the risk of aestheticizing the catastrophe.

The comparison shows distinct redistributions between historical, antique, use, art, and novelty values. At Notre-Dame, novelty remains largely integrated as a technical and perceptual update at the service of historical, liturgical, and formal continuity. At Paço, it manifests itself more explicitly in the contemporary system of support for museum use, formed by connections, access, routes, infrastructures, and the reconfiguration of the northern sector. These devices make the assembly operable again and allow parts of the fire-induced rupture to remain readable. In both cases, reconstruction rearranges hierarchies of value; what varies is how this redistribution is materially expressed, publicly mediated, or visually contained.

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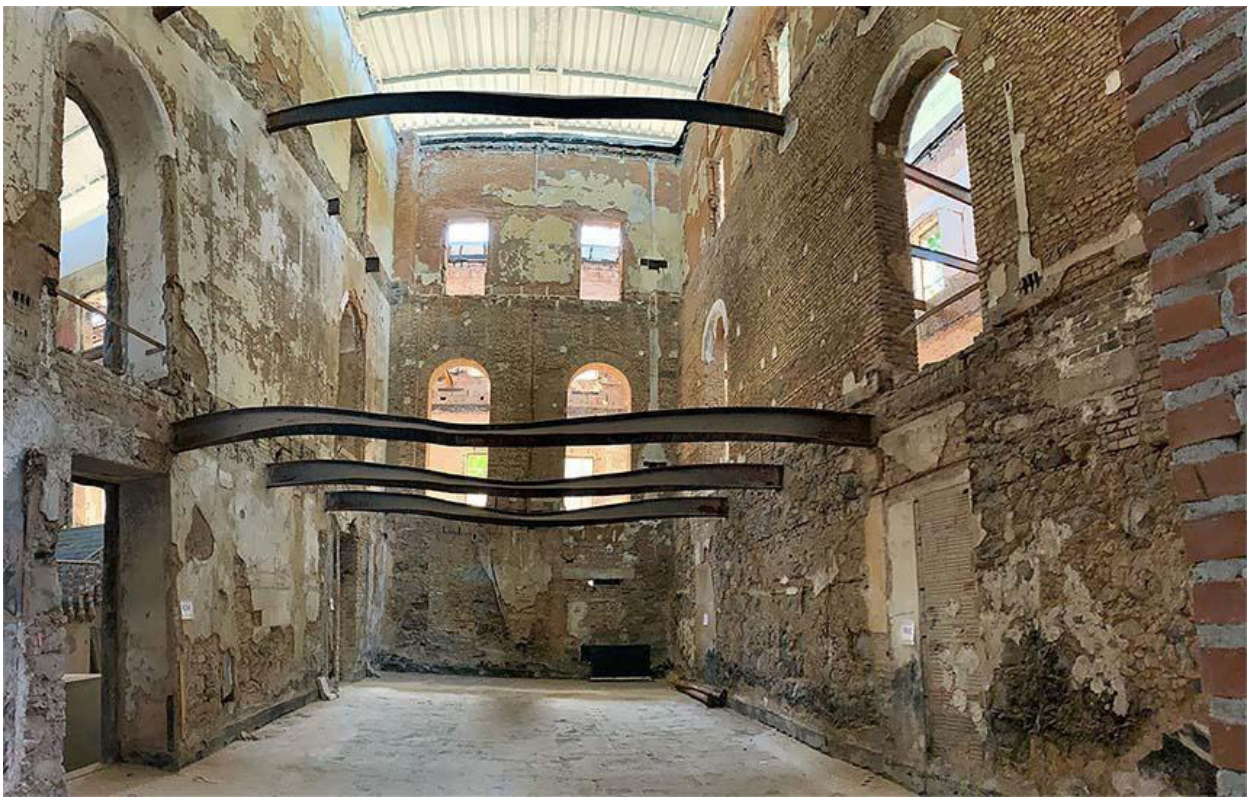


Figure 5. Marks and scars of the fire in Paço de São Cristóvão. Source: Author's collection, 2021.

Use, connections and transformation of heritage practices

In both cases, the use value contributes to the definition of architectural choices, but operates in different ways. In Notre-Dame, the intervention reestablishes the continuity of worship, visitation, and the cathedral's civic presence, without altering its primary role. The technical and environmental upgrades, subordinated to the monument's formal and symbolic permanence, support the resumption of these practices. The reopening thus represents less a reprogramming of the building than the institutional and liturgical reactivation of historically consolidated uses.

In Paço de São Cristóvão, the reconstruction of heritage practices is more comprehensive. The complex must once again function as a museum, scientific center, and public facility, subject to new requirements for security, accessibility, collection conservation, circulation, air conditioning, and reception. The use value ceases to mean only functional continuity. It begins to organize the intervention itself, requiring a system capable of articulating preservation of architectural reading, risk reduction, separation of flows, and incorporation of technical support (Lobo & Werneck, 2024).

The Bendegó room integrates this system as a space for welcoming, guiding, and redistributing visitors to the exhibition circuits (Figure 6). The permanence of the meteorite, survivor of the fire and symbol of the museum, combines material continuity, memory of the catastrophe, and anticipation of the reopening. In the north sector, the old stair tunnel was incorporated into the

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Figure 6. Sala do Bendegó as a space for welcoming, orientation, and connection with the exhibition circuits. Source: Author's collection, 2025.

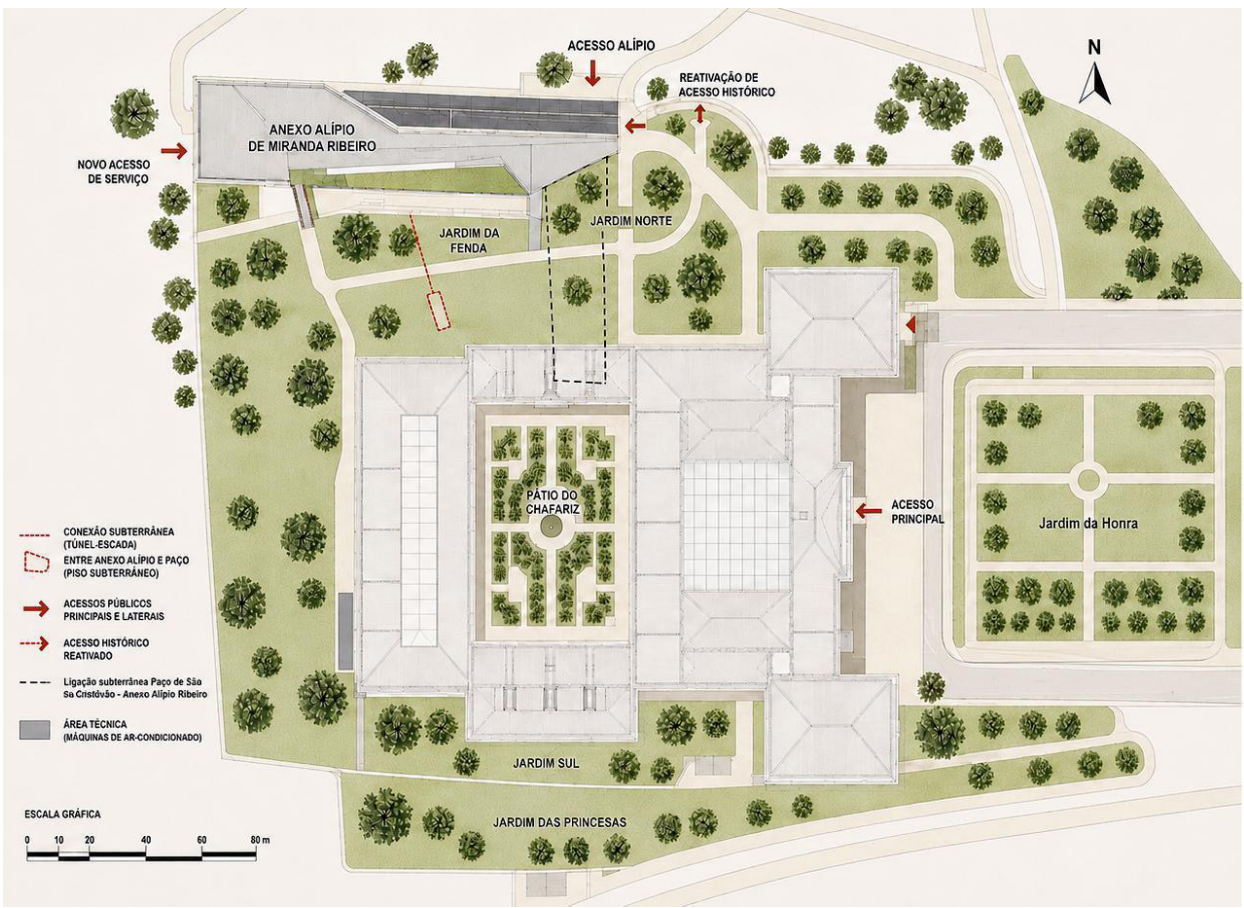


Figure 7. Paço de São Cristóvão and Annex Alípio de Miranda Ribeiro: Layout of the complex's entrances, gardens, and connections. Source: Prepared by the Author, 2026, based on the work of Hereñú + Ferroni Arquitetos Ltda. et al. (2022), Hereñú + Ferroni Arquitetos Ltda. et al. (2023) and Hereñú + Ferroni Arquitetos Ltda. et al. (2024).

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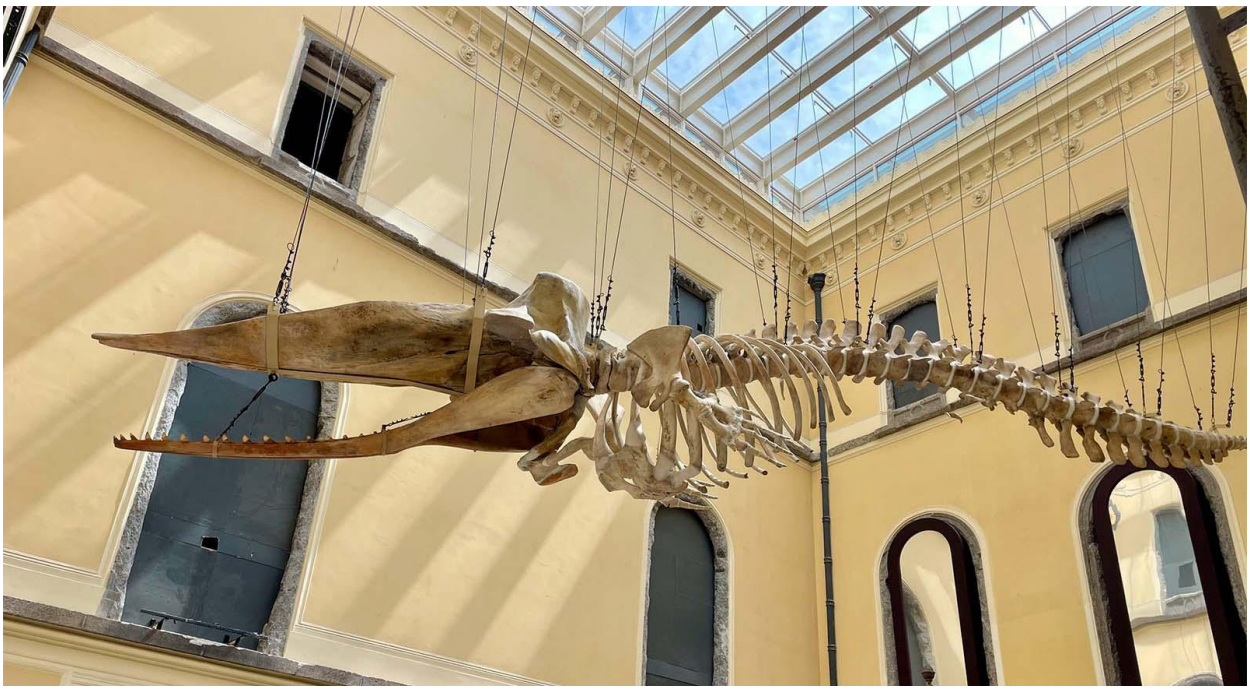


Figure 8. Paço de São Cristóvão (National Museum / UFRJ). Staircase hall with contemporary zenithal closure and redistribution of the internal route. Source: Author's collection, 2025.

new functional organization as a service access, connecting the Annex, by the Jardim da Fenda, to the new Jardim Norte, on the ground floor of the Palace, without making the direct connection between the Alípio de Miranda Ribeiro Annex and the historic building.

The Alípio Annex and the reconfiguration of the northern sector constitute the same architectural and territorial operation. The annex has auditoriums, technical areas, staircases, services, and the substantive part of the contemporary supports, allowing the main body to be allocated predominantly to museological functions while preserving its spatial intelligibility. The new underground link connects the Annex to the vertical corridor of the Palace's North Block. The old stair tunnel integrates this system as a service access between Jardim da Fenda and Jardim Norte (North Garden). The external ramp, new entrances, reactivation of the historical entrance, and routes through the gardens reorganize the relationships between Paço, Anexo Alípio, and Quinta da Boa Vista (Figure 7) (IPHAN, 2024b).

The annex's upper slab creates the Jardim Norte and converts an old service area into a space for walking, sitting, and observing the Palace. Its central opening introduces daylight and ventilation, exposes the historic slope, and leads to Jardim da Fenda on the lower level. The slope thus ceases to act only as a limit and begins to integrate the ensemble's architectural experience and historical interpretation. The operation expands the presence of the Palace in the landscape and concentrates in distinguishable contemporary layers part of the support, maintenance, transport, and reception systems (Hereñú + Ferroni Arquitetos Ltda. et al., 2022; Hereñú + Ferroni Arquitetos Ltda. et al., 2023; Hereñú + Ferroni Arquitetos Ltda. et al., 2024; IPHAN, 2023).

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The zenithal closure of Pátio da Escadaria integrates this restructuring as an infrastructure of protection, environmental qualification, and museographic support (Figure 8). The roof modifies the ambiance of one of the Palace's main intersections. It links the entrance, the Bendegó Room, the Salão da Escadaria (Staircase Hall), the ticket office, the Memory Room, the café, and the exhibition circuits. Its insertion remains legible as a contemporary intervention, highlighting the tension between preserving the historical space and the new operational requirements.

The comparison, therefore, shows different forms of the action of use value. At Notre-Dame, religious, civic, and visitation practices are reactivated under a principle of functional continuity. At Paço, the recovery of the use depends on the construction of a new network of circulation, infrastructure, museography, and relationship with the landscape. The intervention not only restores interrupted roles, but also redefines the spatial and technical conditions under which the National Museum will once again operate as a scientific and public institution.

Circulation of images and stabilization of narratives

The public circulation of images assumed different roles in the two processes. In both cases, the fire records converted the catastrophe into a visual event with far-reaching repercussions, without being able to attribute the architectural decisions to the images in isolation. It occurred amid losses, amid the amplification of expectations, and amid the public legitimization of institutional interpretations built during interventions.

At Notre-Dame, the image of the flaming spire brought together the rupture and reinforced the element's centrality in the cathedral's silhouette and public recognition. The circulation of contemporary proposals for the spire and roof initially made a field of alternatives visible, but institutional decisions later restricted this field. During the works, the panels installed around the site connected historical documentation, diagnosis, research, construction techniques, and valuation of the *métiers du chantier*. The work thus also became a mediation device, in which artisanal knowledge and contemporary instruments of control were presented as foundations of heritage continuity. With the reconstruction of the spire, the re-roofing, and the resumption of worship, the public narrative progressively shifted from loss to the recovery of the cathedral's iconic presence. In this process, as Poulot (2019) observes, the real challenge was to transform collective communion in the face of the drama into a heritage project, turning Notre-Dame into a civic heritage space capable of sustaining, beyond the initial shock, new forms of recognition and public legitimation.

At Paço de São Cristóvão, institutional communication operates within a longer, still-open temporality. The image of the burning building established a representation of national loss. At the same time, the records of the rescue, the remnants, the recovered facades, and the successive fronts of work began to document the continuity of the process. Bendegó acquired particular

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Comparative matrix of post-fire reconstruction layouts			
Dimension	Notre-Dame	Paço de São Cristóvão	Comparative results
Institutional and decision-making path	state centralization; specific legislation; progressive restriction of alternatives	interinstitutional governance; implementation by fronts and cycles; integration between building and museum	concentrated decision and political temporality × articulated and incremental process
Values, matter and authenticity	documentary composition of historical states; visually restrained novelty	distinguishable remnants, recompositions and insertions; selective permanence of scars	Composite formal unit × stratified readability
Heritage use and practices	liturgical, civic and visitation reactivation	museological, scientific, technical and public rescheduling	functional continuity × reconstruction of conditions of use
Visibility and mediation	restitution of the icon; narrative of crafts, reconstruction and reopening	institutional survival; work in progress; "National Museum Lives On"	stabilization of a recovered figure × legitimization of a reconstruction still in progress

Table 1. Synthetic comparative matrix of post-fire reconstruction systems. Source: Prepared by the authors, 2026.

symbolic strength by bringing together material survival, memory of the fire, and expectation of reopening. The "National Museum Lives On" denomination, disseminated through spatial devices and institutional and digital media, shifts the focus from the building's reconstruction to the permanence of the scientific, educational, and museological institution. This communication is linked to a form of governance that declares transparency and participation as conditions of legitimacy. However, these principles depend on mediation, public accountability, and the continuous review of the narratives presented.

The comparison, therefore, reveals different temporal and communicative regimes. At Notre-Dame, the images after the reopening tend to close the public sequence of the catastrophe by the recovery of the icon and its uses. At Paço, they continue to present stages, remnants, and anticipations, legitimizing a reconstruction still in progress. Public visibility thus participates in the contemporary re-inscription of monuments by selecting what will be shown, which conflicts will remain noticeable, and which interpretations will acquire greater stability. The main contrasts between the institutional paths, value redistributions, uses, and visibility regimes of the two cases are summarized in Table 1.

CONCLUSIONS

The comparative analysis between Notre-Dame de Paris and the Paço de São Cristóvão shows that post-catastrophe heritage reconstruction simultaneously constitutes an operation on the subject involved, reorganizing values, and practicing public legitimation. The two cases share a critical event with far-reaching repercussions and a need to reinscribe the monument in the present. However, they respond to this requirement along different institutional and architectural paths, whose contrasts the comparative matrix specifies.

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At Notre-Dame, the centralization of decision-making by the French state, specific legislation, and the progressive restriction of alternatives produced concentrated temporality, guided by the recovery of the cathedral's consolidated historical image. The adoption of documented medieval references for the nave and choir and the "Viollet-le-Duc State" for the spire and the large roof resulted in a composite formal unity, documentarily sustained but not following the homogeneous recovery of a single historical moment. The novelty remained subordinated to the stability of the inherited figure. Technical and perceptual updates, including the transformation of the interior lighting system, were incorporated in a controlled way, while preserving the liturgical continuity and the monument's civic presence.

At Paço de São Cristóvão, interinstitutional governance, implementation across successive fronts, and the connection between the building's recovery and the reconstitution of the scientific institution constitute an incremental, ongoing process that remains open. The reconstruction combines the conservation of remnants, the recomposition of lost parts, and the insertion of different contemporary structures. This operation favors a stratified reading, where different historical layers and certain marks of the fire can remain as interpretable evidence, without the scar constituting a homogeneous guideline or a value in itself. The use value ceases to mean only functional continuity. It begins to organize the intervention, requiring infrastructures, connections, and museological supports that enable the contemporary operation of the museum, the scientific center, and the public equipment.

The public circulation of images also operates differently. At Notre-Dame, it tends to close the sequence of the catastrophe by the recovery of the icon, the resumption of uses, and the stabilization of a narrative of continuity and reopening. At Paço, it operates in a still procedural temporality, communicating stages, remnants, and anticipations and reaffirming, through formulas such as the "National Museum Lives On", the continuity of the institution beyond the loss of the building and the collections. In both cases, public visibility does not constitute a mere aftereffect of the intervention: it integrates its legitimation by selecting what will be shown, framing the values mobilized, and favoring certain interpretations, without eliminating the conflicts or alternatives that the processes went through.

The study contributes to the debate on architectural restoration by showing that symbolic and communicative dimensions are not external to material decisions, but participate in the re-inscription of heritage in the present. Reconstructing implies defining relationships between matter, memory, use, authenticity, and visibility and establishing which continuities, ruptures, and temporalities will remain publicly readable. As a limitation, the research examines institutional, architectural, and visual frameworks but does not directly measure their reception among communities or user groups. This dimension may, in later studies, expand the understanding of the forms of recognition, negotiation, and contestation of heritage interventions.

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