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Max Borges del Junco: pioneer of mass-produced timber houses in Cuba

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Abstract: The mass-produced timber houses and the self-construction business, as solution to alleviate the acute housing problem in Havana of the first post-war years is practically no mentioned in the literature that studies the housing of the period. The present work aims to characterize a type of timber house very popular in those years, became known as the portable house, prefabricated in large construction yards of continuous production and transported to the assembly sites in the form of numbered pieces. The analytical-synthetic, as well as the historical- logical method was used to process the information and formulate the conclusions. The investigation revealed that the prefabricated frames were destined not only for economic housing models, but also for high-specification ones. At the same time, confirmed the leading role played by the architect-engineer Max Borges del Junco in the development of the industrialization of timber construction in Cuba.

Key words: Havana; portable house; timber house; mass-produced house; industrialization; Max Borges del Junco

1 Introduction

Between 1898 and 1914, wooden construction in Cuba underwent major structural transformations. The methods of working with the material, inherited from the 19th century, began to merge with other technologies arriving from North America—balloon and platform frame—resulting in a wide range of load-bearing systems, all valid, that shaped the landscape of wooden construction during that period.

This was a spontaneous, empirical process of trial and error that, in practice, improved and simplified wooden frameworks and the way they were designed. Traditional methods began to change with the emergence of a professional who started calculating how structures could be made more efficient. The field of civil engineering was established in Cuba in 1900, and its influence began to be felt in various sectors starting in the second decade of the century.

While traditional methods of woodworking persisted at first, as foreign techniques became better understood, frames came to form the load-bearing core of new constructions, while architraved porticos continued to be used in the construction of entrances, terraces, and other areas where large spans needed to be spanned. The function each part of the building was to perform was matched with the technology best suited to meet those requirements. (Figure 1)

Thus emerged a unique building style, one with a local, creole character, which continued to evolve until it lost its original American influence as Cuban workers' methods for laying foundations, waterproofing roofs, and erecting walls gradually took hold.

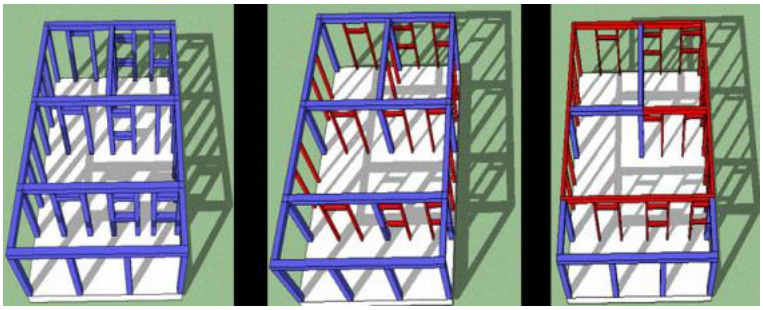

Figure 1. Evolution of wooden structures. Assembled solutions, shown in blue (left), predominated in early load-bearing systems. Frame technologies (in red) were gradually adopted, first as enclosures, until they came to form the load-bearing core of the buildings (right). Source: author

After the outbreak of World War I, American manufacturers of wooden structures were forced to produce for the military. Unable to purchase frames from abroad, Cuba replaced its potential imports of the "globe" system with local productions of the same structural design, particularly for projects intended for the sugar industry, whose investments were bolstered during those years by the sustained rise in sugar prices.

Amid this situation, the wooden houses of the bateyes began to be manufactured on the premises of the sugar mills themselves, which remained inactive after the completion of the industrial construction. This is how the carpentry, blacksmith, and roofing workshops, originally established exclusively to support the construction of sugar mills and sugar production, these workshops had to diversify their output to carry out the most diverse woodworking projects required by the sugar-producing communities.

Finding a new use for these carpentry shops—equipped with band saws, table saws, planers, and large-format jointer—and the ability to rehire their regular workers, in addition to serving as a secure source of employment, helped to multiply the secondary products—or byproducts—derived from the sugar industry and spurred the mass production of frame houses in Cuba.

Wooden housing from this period has been studied by some Cuban authors; however, the technological aspects related to the mass production of a significant portion of this architecture—and, on a broader scale, the industrialization of wood-based construction in the country—have not received sufficient attention [1].

In order to shed light on the origins and evolution of prefabricated housing production, a study was conducted that revealed the leading role played by architect Max Borges del Junco in promoting and developing the mass prefabrication of wooden structures in Cuba. Hence the interest in documenting and publicizing his pioneering work, which constitutes a small chapter in the history of Cuban construction.

Although the advertisements and articles consulted in magazines and newspapers of the time corroborate the national reach of Max Borges' workshops [1], the research has focused on the city of Havana and its neighboring towns, specifically the former municipality of Marianao, as it was an area where wood was not prohibited and was used extensively, both in urban areas and in the rural surroundings of the municipality.

Furthermore, given the age and fragility of this heritage—which, unfortunately, is disappearing almost daily—it is urgent to raise awareness among the general public and decision-making bodies regarding the value of this architecture in order to halt its loss and take concrete actions for its conservation.

2 Materials and methods

The research was based on the analysis and synthesis of archival sources, supported by fieldwork that allowed for the

verification of data obtained from these primary sources against what actually existed in reality. Files for new construction projects from the period 1900–1925, belonging to the Urban Planning Collection of the Marianao City Hall, National Archive of Cuba, were reviewed.

The focus of this study was on wooden structures, regardless of their intended use—whether residential, public, or military—provided that wood was used throughout the entire structure, with the exception of the foundation. Furthermore, from a technological standpoint, they had to be constructed from elements prefabricated in carpentry workshops—that is, squared pieces with the necessary recesses, cuts, notches, and grooves to allow for joints between them.

The resulting universe was narrowed down to distinguish those buildings constructed using the balloon or platform frame systems. Since the descriptive reports contain no references to the load-bearing systems, it was necessary to establish other parameters to infer the type of frame used, including designers, the use of repetitive plans and descriptive reports, the selection of models from catalogs (which were published at that time by the Cuban companies producing prefabricated houses themselves), as well as the dates of preparation and approval of the documentation.

The sample consisted of 120 files, from which the works designed by Architect Max Borges del Junco were extracted—a total of fifteen dwellings, listed in the following table (Table 1):

Table 1. Records of serialized wooden houses, signed by Max Borges del Junco

YearBox	File	Owner	Address
1916 55	146	Mendoza & Co.	Block 99, lots 3 and 4, Almendares
1916 55	147	Virgilio Villalta	Block 99, lots 2 and 3, Almendares
1916 57	211	América Regueira de Franca	Block 89, lot 3, Almendares
1920 66	34	Enrique Nogueira	Robau between Santa Petronila and Martínez, block 4, lot 4, La Serafina
1920 66	187	Marta Latorre de Galletti	Panorama Street between San Jacinto and Boquete, Ampliación de Buen Retiro
1920 67	237	Enrique Nogueira	House A, Robau Street, between Santa Petronila and Martínez, part of lot 12, block 4, La Serafina
1920 67	238	Enrique Nogueira	House B, Robau Street, between Santa Petronila and Martínez, part of lot 12, block 4, La Serafina
1920 66	239	Enrique Nogueira	House C, Robau Street, between Santa Petronila and Martínez, part of lot 12, block 4, La Serafina
1920 67	219	José Guanche	Line between Robau and Medrano, block 6, lot 3, La Serafina
1921 94	249	Suarez and Mendoza	Infanta between Robau and Medrano, block 11, lot 14, Buen Retiro
1922100	illegible	José Viera	Santa Brígida between Primera and the Havana-San Cristóbal Highway, Torrecilla, La Lisa
1922112	93	Luisa Ruiz	Block bounded by streets A, B, 16, and 18, Almendares
1922117	159	Julio Mayano	Block bounded by streets 2, 3, Passage A, and Passage B.
1922118	246	Luisa Chartrand	Block bounded by streets San Julio, Santa Catalina, Anguere, and Santa Isabel
1923107	35	José Ángel Muley	18 between 3rd and 5th Streets, lot 9, Block 16bis, Almendares

Source: author, based on data from the National Archives of Cuba. Urban Planning Collection of the former Marianao Municipal Government.

As a result of the fieldwork, the completion of the selected projects was confirmed, as well as the structural modifications that have taken place in them throughout their use. In the final stage, the data obtained were processed using quantitative, qualitative, and comparative analyses. The historical-logical analysis allowed for the extraction and formulation of the research conclusions.

3 Results and discussion

Max Borges del Junco graduated with a degree in civil engineering on February 1, 1916, and nearly a year later, on January 9, 1917, he received his degree in architecture [1]. During that time, specifically in June 1916, he submitted his first designs for low-cost housing to the Marianao City Council for approval. These were small houses, built with brick walls, steeply pitched wooden roofs, and fiber-cement shingles of the Ternolit- Planiol type, which gave these buildings a very Anglo-Saxon appearance [2]. This early foray into affordable housing was decisive for his professional development and served as the foundation for his designs for portable wooden houses, which featured very similar interior layouts and dimensions. (Figure 2)

Figure 2. Houses designed by the young engineer Max Borges del Junco, 1916. Owners: V. S. Villalta (left) and Del Valle Duquezne (right). Source: author. Compiled from records of the Urban Planning Fund, ANC

Borges del Junco was one of the few professionals who, in addition to designing and building, also devoted himself to the development of materials, construction systems, and technical solutions in order to support and reduce the cost of his projects.

For his masonry homes, Max Borges designed several prefabricated concrete elements, such as arches, lintels, door and window frames, and structural elements with a mixed wood-concrete section—unprecedented in the country—as well as decorative elements in general, which also allowed him to reduce construction timelines. That same prefabricated solution was used in more modest homes, built in the California Mission style, popularly known as "black cat houses" due to the use of ornamental felines as part of the building's design [2].

By 1925, Max Borges del Junco was already a renowned professional, with more than 400 buildings constructed in Havana, ranging from eclectic mansions in El Vedado to estates in the Marianao neighborhoods of Buen Retiro, Navarrete, Almendares, Barandilla, and San Rafael. He was also responsible for other public works, such as the large metal structure of the sports stadium at what was then the National University, and the Melena del Sur and Güines aqueducts, where he built reinforced concrete reservoirs in the southern part of the former province of Havana [1, p. 821]. In addition, Borges del Junco served as Secretary of Public Works under President Federico Laredo Bru from 1936 to 1940.

3.1 The first Cuban factory for portable houses

The success of his first stone houses provided Max Borges with sufficient capital to set up a factory for portable

wooden houses in 1919, for which he gained great recognition, "...since in that style he has become a specialist in housing, a true master. In Naranjito, near the city of Havana, he owns a factory producing portable bungalows, which is the envy of locals and visitors alike" [3, p.56].

The outskirts of Naranjito, still semi-rural, were linked to the rest of the country via several railway lines. The Havana Central and Western Railways ensured both the transport of raw materials to industrial warehouses and the distribution of finished orders.

According to his contemporaries, the young engineer-architect's activities in the field of construction:

"have been carried out in such a way that, through his intelligence, he has managed to blend architectural art with an intense industrial approach to manufacturing, thereby achieving the greatest possible economy, which makes it accessible to all income levels.

His standard wooden structures—his bungalows—have in many cases solved the housing problem for workers and farmers, while his small houses in the neighborhoods have provided homes for modest employees, merchants, professionals, and rentiers.

The energy generated over so many years of struggle has been channeled into a large number of houses, factories, villas, and bungalows, which, designed, financed, and built by Max, have emerged as a model worth emulating." [4, p.311]. (Figure 3)

Figure 3. Promotional clipping of the wooden bungalows by Architect Max Borges in El Junco. Source:

Ministry of Public Works Collection, processed and collated by Lic. Juan de las Cuevas Toraya

Max Borges's prefabricated house business adopted the model that had been highly successful in the United States. His company was based on three fundamental principles: the use of catalogs to quickly and conveniently promote the models produced in the workshop; the involvement of future homeowners in designing their homes, facilitated by the postal service; and the delivery of finished products by rail.

It is noteworthy that, although the new industry proposed and promoted its own designs through magazines and commercial catalogs, these could be modified according to the tastes and needs of the users. It was permitted to alter the floor plans and facades included in the brochures, remove or add rooms, and replace ornamental elements, door and window details, types of hardware, and their quantities.

An unprecedented relationship between manufacturer, designer, and client was established. Although several

homeowners chose the same catalog design for their respective homes, each homeowner's interaction with Naranjito's technicians and designers could lead to different results, depending on the individual needs of each family.

The technical office, created by Max Borges, was also responsible for preparing the plans for the houses featured in their sales brochures in advance. The plans included a properly dimensioned floor plan of the home, a front elevation of the building, and a cross-section detailing the layout of the plumbing and sanitation systems.

Upon selecting a specific model and paying the corresponding fees, customers immediately received a copy of the designs, technical specifications for the structures, and the essential assembly diagram. The firm prepared standard plans and then, depending on the client, filled in the details regarding the user's name and the location of the home. The difference in the quality of the handwriting between the repetitive elements and the specific information for each commission highlights that the preparation of project documentation was also standardized. (Figure 4)

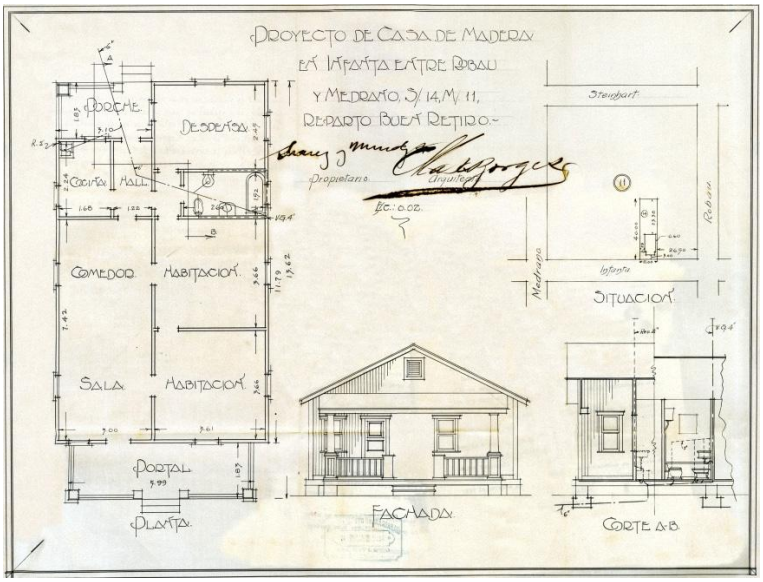

Figure 4. Example of a repetitive project, prepared by the technical office of the Naranjito factory.

Owners: Suarez and Mendoza, 1921. Source: Urban Planning Fund,, ANC

The descriptive reports included a printed document with the technical specifications of all materials included in the home purchase: doors, windows, locks, hardware, plumbing and electrical materials, as well as the structural components and fasteners.

These recommendations, which were identical for all of the factory's projects, also outlined the different types of foundations that could be constructed, depending on the soil's bearing capacity. Although the foundations were built on-site, without any prefabrication in the workshop, their selection determined the type of ventilation to be used in the homes:

… "the bungalow referred to in this report will be one of those designated as number 2 (in the catalog) and will be mounted on brick or concrete pillars" [5, n.p.].

"The bungalows are designed to rest on brick, concrete, or stone pillars, or wooden piles, and may also be placed on continuous masonry or brick footings, but always strictly following the accompanying plan and conforming to the indicated dimensions: these dimensions are expressed in meters as this is the easiest way to take measurements on-site.

The bungalow can be built at any height above ground level; all you need to do is adjust the height of the pillars. However, based on our experience, we recommend a height of 0.60 m, which places the floor, 0.80 m above ground level —a height sufficient to provide the ventilation necessary to prevent moisture buildup. A greater height unnecessarily

increases the cost of the pillars and the entrance staircase" [6, n.p.].

The prefabricated components were transported to their final installation site, clearly labeled with the same numbers that appeared on the assembly drawings. All elements arrived fully prefabricated, with their cuts and recesses already in place, ready for assembly. This was the key to the success of mass production, to the point that many homeowners took the risk of assembling their own houses with minimal technical supervision. When buyers handled the assembly themselves, the cost of the house decreased by three to ten percentage points of the total budget, an amount in the range of 400–500 pesos. According to Max Borges himself, his houses could be erected in as little as "…24 hours with the same ease as assembling a piece of furniture…," without the need for skilled workers. Nevertheless, the final result was dignified, understated—one might even say attractive and well-proportioned [6, n.p.].

Thus, in just six years, the Naranjito workshop managed to distribute nearly 2,000 wooden houses to be assembled on site throughout the country. The Max Borges factory in Junco reached a production capacity of 200 houses per month, an average of seven houses per day [1].

The innovative nature of the work and the ease with which a home could be built in a very short time encouraged other professionals in the field to design wooden frame houses. Eduardo F. Tella, Ricardo de la Torre, Cesar Guerra, Eugenio Cosculluela, Rubén Díaz Irizar, Joaquín Codina, Emilio de Soto, José Ramón Toñarely, Luís Juan Bonich, Antonio Rojas Rodríguez, and Jorge Luís Echarte Mazorra, among others, played an important role in the expansion and widespread acceptance across the island of the prefabricated wooden houses made in Cuba.

3.2 Exclusive commissions and repetitive projects

In Naranjito, production catered to two major consumer groups, ranging from exclusive commissions to affordable housing intended for the middle and lower-middle classes. The simultaneous construction of houses using repetitive elements resulted in more modest prices compared to handcrafted homes and, consequently, allowed for sales tailored to the purchasing power of the clientele.

Max Borges was able to satisfy the extravagances, fads, and eccentricities of the most demanding clients, often fueled by the images published in Cuban catalogs (including those by Borges del Junco himself) and those arriving from abroad.

According to architect Roberto Segre, the formal expression of the houses featured in American catalogs published between 1914 and 1919—a source of inspiration for Max Borges—took four well-defined styles: "…for cold climates (Gothic), for warm climates (Mediterranean Italian villa), for rural settings (rustic and picturesque), and for unconventional tastes (Oriental or Moorish styles)"[3] [7, p.48].

However, this was not the case with the little houses of Naranjito. The appearance of the wooden buildings constructed in the southern and western areas of Havana responded solely to the clients' demands. It was the result of competition among owners, fashion trends, and, of course, depended on the budgets allocated for each construction project.

The elegant Havana of the 1920s could boast of its Cantabrian granaries, its Victorian mansions, and its opulent Moorish villas, built using wooden frameworks and constructed with Cuban labor and materials, although the importation of certain species from the United States continued, such as California red pine, white pine, and cypress, which were particularly sought after for high-end residences.

The press of the time reported on the exclusively designed mansions built for "…Mr. Roberto Heydrich (…), the one built for Mr. Enrique Fontanills, the one built for Mr. Federico Morales, the one for the former governor of Havana, Commander Alberto Barreras, and the one for Dr. Juan Montalvo. All these houses, built of wood, constitute the famous cluster of bungalows (…), a name given to these structures by their introducer" [1]. (Figure 5)

Figure 5. Exclusively designed bungalow, owned by Enrique Fontanills, editor of the Diario de La Marina. Source: Ministry of Public Works Collection, processed and collated by Lic. Juan de las Cuevas Toraya

The high-budget buildings stood out for their double-lined walls (made of pine or cypress), imported flooring boards, sash windows, charming staircases with custom-made banisters, and, above all, interior wooden colonnades or triumphal arches that served as dividers between rooms and parlors, almost identical to those in American catalogs. The use of an elegant color palette for highlighting the ornamentation—almost always light-colored in the main structure and decorative details, and dark in the siding—also helped enhance the visual appeal of these highly comfortable wooden homes.

In contrast, the cheaper bungalows were built exclusively from domestic pine, using the appropriate sections to obtain 2.5 cm thick exterior siding, 7.5 x 22.5 cm joists, two-piece 7.5 x 7.5 cm studs, and 5 x 12.5 cm floor joists [5].

For its prefabrication, the rectangular floor plan was usually broken down into panels formed by frames measuring 1.20 meters in width by the height of the house. The frames, which were joined together with nails, were lined "with one-inch boards on the interior lining, and three-quarter-inch boards or beaver board [4] on the interior partitions, planed, jointed, and tongue-and-grooved" [6, n.p.]. An additional top plate or chain was placed on top of these, which served to support the roof.

Floors were typically made of plank or tile, while roofing materials ranged from waterproof paper covered with red or green slate and clay tiles to fiber-cement sheets or corrugated zinc sheets.

The most affordable bungalows were priced: (...) from $1,250 (with an entrance hall, living room, dining room, kitchen, one bedroom, and a bathroom) up to $2,000, $2,525, or more, with a greater number of bedrooms and higher-end amenities commensurate with the price. The prices included immediate delivery, transportation of materials to any location in Havana and its neighborhoods, assembly on concrete pillars [5], and exterior painting with oil-based paint [8, n.p.]. (Figure 6)

Figure 6. Economy-type portable house, built in the Torrecilla neighborhood (present-day La Lisa municipality), 1922. Owner: José Viera. Source: author

The damp areas of the Naranjito homes were addressed using imported metal mesh[6]. The metal was nailed to the structures and served as a bonding bridge between the wood and the cement mortar, which was applied directly over the mesh using a mixture of cement and sand in a 1:3 ratio to prevent cracking [9, p. 97].

This "second skin" made it possible to install the same vitrified ceramic tiles and plumbing fixtures in the bathrooms and kitchens of the wooden bungalows that were commonly used in stone houses. Consequently, bathrooms and kitchens were permanently moved inside the homes, and there was greater freedom and flexibility regarding their placement on the new floor plans.

3.3 Impacts of the prohibition of carpentry factories and workshops in Havana

Max Borges's business remained active after the end of World War I. Despite the collapse of the sugar markets and the ensuing financial depression that affected the country, real estate construction in the city's outlying areas continued to be a profitable and secure business.

The prefabricated house, which had until then remained a commendable alternative for addressing the workers' housing problem due to its low cost and ease of assembly, had to navigate, starting in 1923, the severe controls imposed by municipal authorities.

During those years, wooden buildings in the city were regulated by the Building Ordinances (Articles 114, 249, and 254), the Sanitary Ordinances (Resolution of the Health Board of May 2, 1916), and the specific laws of each municipality (in the case of Havana, Article 169 of the Municipal Ordinances) [10, pp. 482–484].

In order to organize and enforce the regulations established at the beginning of the century regarding the location of timber industries in Havana, in 1923 the city council agreed to modify the designated area for timber warehouses in the city— whether or not they included workshops—as well as for temporary storage facilities and timber dealers. The area approved in 1900 was retained, near the port's shipyards, which included the section defined by "the side of the gas factories, from the waterfront to Diaria, from there to Figuras, from there to Puerta Cerrada to Arroyo de Matadero, and from the waterfront to the continuation of Alambique." At the same time, a new site was approved that took into account current health and aesthetic standards, as well as the city's growth patterns, bounded by "Avenida Presidente Menocal, west side, from the boundary of the "El Retiro" district to Arroyo del Pontón, along this to the parallels of the Marianao railroad,

along this to Callejón de San Martín, along this to Calzada de Ayestarán, and following this road back to the starting point" [10, pp.482-484]. A deadline of up to six months was set for relocating establishments situated outside the agreed-upon area to a new authorized location, under penalty of closure of the businesses and carpentry workshops.

Legislation was also enacted regarding the type of fencing required to protect workshops, the slopes of open areas for rainwater drainage, as well as circulation within carpentry shops and the procedure for disposing of carpentry waste. It was mandated that waste products from saws and other cutting equipment should be stored in a separate room, constructed of non-combustible material and secured with a metal door (Figures 7 and 8).

Figure 7. The lumber yard of Martí y Cía. was forced to change its location because it was in an area not authorized by the Havana City Council for establishing wood factories. Source: Ministry of Public Works Collection, processed and collated by Lic. Juan de las Cuevas Toraya

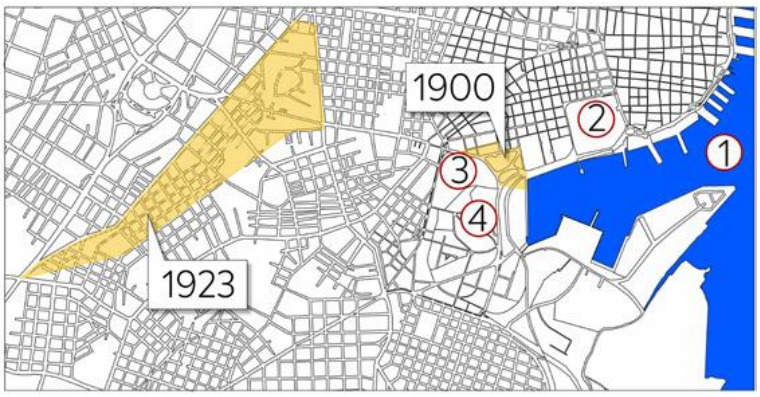

Figure 8. Permitted locations for wood workshops and warehouses in Havana, according to the legislation of 1900 and 1923. Legend: 1) Havana Bay, 2) Railway Terminal, 3) Cristina Station, 4) Atarés Castle. Source and preparation: author

Outside the municipality of Havana, in areas distant from the center but well-connected to the city—such as San Francisco de Paula, the Luyanó, Concha, and Diez de Octubre avenues, as well as on Fábrica, Cristina, and Lugareño streets (within the so-called Ensanche de La Habana)—carpentry workshops were built that claimed to handle general carpentry work, that is, in addition to load-bearing structures and enclosures, they could produce doors, shelves, and the rest of the furniture necessary to deliver a house ready for occupancy [7] [11].

The Marianense factories owned by Avelino Estévez, Walfrido Ramírez, Teófilo Urrueta, Manuel Portilla, and Antonio Martínez—which were not subject to the same pressure and control that existed in Havana during the 1920s—appeared in periodicals of the time, boasting that they could build a house, a villa, or a wooden bungalow for very little money [12, 13].

In 1923, President Alfredo Zayas signed the so-called "Regulations for the Management of Protected Forests and Forest Reserves," which delegated to the then-National Directorate of Forests and Mines the authority to grant permits for all types of trees or shrubs, whether wild or planted, as well as the harvesting of timber and firewood for charcoal, both on state-owned land and on privately owned property.

The law, which involved the Ministry of Agriculture in reforestation efforts and the production of timber and other forest products, hindered not only the export of Cuban hardwoods but also their routine use in the country's woodworking projects, workshop carpentry, and construction [14].

3.4 The widespread production of portable wooden houses

Although the laws regulating timber harvesting and the location of carpentry workshops in specific areas of the city hindered the construction of wooden houses, it was the installment sales imposed by postwar economic conditions—and, above all, the serious problems of accumulated non-payment faced by the business—that led Max Borges to give up his factory in the second half of the 1920s.

Emilio Roig de Leuchsenring, in El libro de Cuba: historia, letras, artes, ciencias, agricultura, comercio, bellezas naturales: Obra de propaganda nacional, published in 1925, mentions the economic difficulties that the workshop faced in those years, which has made it possible to narrow down the date of the closure of Max Borges's production facilities to the period 1925–1926:

"Eager to ensure that every humble family could obtain a home without great sacrifice, Mr. Borges spent several years building countless bungalows to sell on installment plans, investing time and money that he could not recoup for various reasons—reasons that undoubtedly caused him to abandon his noble endeavor. Max Borges did not speculate with those installment-plan constructions, he had the purpose, the desire, to contribute without prejudice to his own interests, to ensuring that everyone had a home" [1, p.821].

In its place, a new manufacturing workshop was established, where large concrete pipes intended for sanitary sewers began to be produced; this was not linked to the family business "Construcciones Max Borges" [8] .

After the Naranjito workshop closed, the construction of skeletal structures south of Havana and in the municipality of Marianao continued quietly. By the mid-1920s, wooden constructions had already taken deep root in popular preference and in the understanding of Cuban workers, who reproduced the same portable houses, but logically at a much lower cost. (Figure 9)

Figure 9. Wooden frame, inspired by Max Borges' prefabricated structures, used in the construction of houses for victims of the fire in Playa Cajío, south of Havana, 1950–1951. Source: Ministry of Public Works Collection, processed and collated by Lic. Juan de las Cuevas Toraya.

While Max Borges had previously drawn inspiration from handcrafted models to launch mass production, his now-simplified designs, conversely, spurred the popular construction of chalets and bungalows. The building of these structures returned to manual methods of working with materials and was carried out by small neighborhood workshops or so-called "carpenters without workshops," who used their own homes as production sites.

What was novel was that these neighborhood carpenters added decorative elements to the homes that industrial production could not incorporate due to cost considerations. Turned columns and balusters, latticework, carved cartouches, and other handmade ornaments returned to working-class homes, in keeping with the eclectic spirit of the time.

When, in April 1931, the municipal governments of Havana and Marianao signed Agreement No. 455, which prohibited all wooden construction in both territories, many of the small and medium-sized workshops were forced to close indefinitely [10].

From his position as Secretary of Public Works, in response to a request from a group of wooden structure manufacturers, Max Borges processed and succeeded in repealing the 1931 regulation. Structural wood was once again permitted, but restricted to the municipality of Marianao and the neighborhoods of Arroyo Apolo, Arroyo Naranjo, and El Calvario, south of Havana (Figure 10).

Figure 10. Toast in honor of the Secretary of Public Works, Engineer and Architect Max Borges del Junco (center), offered by the Cuban Society of Engineers on April 7, 1937. Source: Photo Library of the José Martí National Library of Cuba

4 Conclusion

Max Borges del Junco introduced mass production of wooden residential architecture to Cuba. The engineer-architect created the manufacturing and workshop infrastructure that fostered the emergence and spread of the portable house, a significant alternative during the postwar real estate boom, both quantitatively and qualitatively, considering that even the most modest homes offered decent living conditions and hygiene.

The self-construction business, based on the "do-it-yourself" philosophy, which emerged in Cuba in the first third of the 20th century, made it possible not only to shorten housing construction timelines but also to build homes without the need for specialized labor.

The construction method introduced by Max Borges has not lost its validity and constitutes a valuable lesson both for the rehabilitation of these century-old buildings and for new projects designed for diverse functions that incorporate the structural use of wood.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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Note

[1] Among the researchers, the following stand out: Ramón Cotarelo Crego, Laudino Méndez Torres, Mónica Cabrera Ferriols, Diana María Cruz, and Antonio Toppe Montero.

[2] The information about the "black cat houses" (casas del gato negro) and other data of interest for the writing of this work was provided by Manuel Notario Mayor, who worked as an apprentice on the construction sites of Max Borges del Junco and over time became the foreman of the most well-known works of the architect Max Borges Recio.

[3] Unlike Max Borges's catalogs, North American magazines of modern houses also included dwellings made from stone materials. The subdivision proposed by Architect Roberto Segre is, therefore, broader and valid for constructions of different materials.

[4] Beaver Board is a board made from wood fiber or wood shavings. Beaver in Castilian (Spanish) means castor (beaver). The association between the beaver and wood fiber gave the material its name. These boards, which were used abundantly in the 1920s, continue to be manufactured today.

[5] Author's note: Not including the foundations.

[6] Among the best-known suppliers of structural mesh were The General Fireproofing Company and Truscon Steel Co., located in Youngstown, Ohio; as well as The Berger Mfg. Co., which sold Berloy brand metal products from New York through technical manuals. For its part, the Cuban company of Víctor G. Mendoza led the group of suppliers dedicated to the sale in Cuba of North American metal mesh.

[7] The delivery of houses "ready to live in" or "turnkey" was a modality developed from 1915 in the United States, where it assumed the denomination of "kit houses."

[8] Interview with Lic. Juan de las Cuevas Toraya, conducted on April 3, 2013.