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THE LEGACY OF OSCAR NIEMEYER IN THE NEW TECHNIQUE: AN ANALYSIS ACCORDING TO FRANCIS CHING'S CRITERIA

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Abstract: Through bibliographical studies and comparative analyses, based on the concepts established by the architect Francis Ching, we seek a deeper study of the pavilion project for the Serpentine Gallery, the work of the Brazilian architect Oscar Niemeyer. The Pavilion, inserted in the last phase of his professional career, expressed the main characteristics of his architecture, as a project synthesis. Another intention of the study is to understand and expose the legacy of the Brazilian architect, his contributions to architecture in Brazil and on the international scene. Qualitative research is used, using photos, plans, elevations, among other representations of content related to Niemeyer's architecture. Such compilation of analyzes demonstrate the grandeur of the artist's contributions to the construction scenario, its lightness, originality, simplicity and organicity.
Keywords: Architecture, history, design, pavilion, modern movement.

INTRODUCTION

The Brazilian Oscar Niemeyer is among the most important architects of the 20th century. His buildings can be found in different countries and his great works are part of history. With an organic and sensual layout, it made Brazilian architecture significant to the world, thus attracting both reverence and indignation (GONÇALVES, 2010).

In a social and artistic context, the architect rescued, along with other modernist figures, Brazilian architecture from the historical, artistic and technological dependence in which it found itself. Being the father of the distinctively Brazilian layout, he produced a lot and much about him has already been studied, but there are still aspects to be unveiled in his architecture (GONÇALVES, 2010).

This study presents a research about Niemeyer's legacy, especially in his last period of production, when he already had national and international recognition, had an architectural baggage and innovative successful works. The architect was then faced with an invitation to design a work that he would express all of his architecture through a pavilion.

METHODS

For the composition of this work, bibliographical references of master's dissertations, scientific research, course completion work, doctoral theses, articles, official internet sites and books that explained the theme as an architect, context, work and surroundings were used. The book "Form, space and order" by the architect Francis Ching (2002) also supported the analysis of the work, guiding the understanding of aspects such as shape, proportion and symmetry, among other factors that make up the complexity of an architectural volume, in its various relationships.

RESULTS

Oscar Niemeyer, a great representative of architecture in Brazil, first considers, in his design method, the practical issues, the environment where the architecture will be inserted, economic aspects and the direction, only then to start drawing sketches of the idea and finally checks if it is compatible with the program, the structural system and the dimensions. All being well, the architect begins to write an explanatory text, exposing his arguments (GONÇALVES, 2010).

The architect acts in all stages of the project and even when the project is already resolved, he still modifies it several times, this happens throughout the development, including execution, a bold architecture. The works of Oscar Niemeyer, according to Gonçalves, are divided into six phases, "Pre-Pampulha"

(1935-1939), "Pampulha" (940-1944), "From Pampulha to Brasília" (1945-1955), "Brasília" (1956-1960), "Performance Abroad" (1961-1982) and the last phase called by Gonçalves, at the time, "Current Phase" (1983-2006) (GONÇALVES, 2010, p. 28).

During the Pre-Pampulha phase, he was still a student working with Lucio Costa and Carlos Leão, he graduated in 1934 at the National School of Fine Arts in Rio de Janeiro, in 1936 he had contact with the master Le Corbusier, which allowed him to observe his design method, Niemeyer's proposals are significant, revealing his search for lightness and purity in his works (GONÇALVES, 2010).

During his Pampulha phase, at the invitation of Juscelino Kubitscheck, then mayor of Belo Horizonte and introduced by Gustavo Capanema, the project's creator, Niemeyer, aged 34, designs the Pampulha neighborhood, totally focused on the entertainment of the Minas Gerais middle class, as project led Brazilian architecture to succeed abroad (GONÇALVES, 2010).

According to Fraga, the development of Brazilian architecture owes to this period the possibility of carrying out some works of great importance that were only viable due to state investments, particularly benefiting Niemeyer's architecture, through a partnership with Jucelino Jubitscheck (FRAGA, 2006).

After the success of Pampulha, Oscar Niemeyer began to receive several private and state orders, mainly in Rio de Janeiro, São Paulo and Belo Horizonte, a period of diversified productions, factories, schools, banks, theaters, restaurants, hotels, buildings such as the Copan (1950), his own residences in Gávea (1942) and Estrada de Canoas (1952), at this time also stand out major projects such as the United Nations Headquarters (1947) (Figure 01), and Ibirapuera Park (1951) (GONÇALVES, 2010).

In 1955 Juscelino Kubitscheck, the then president of Brazil, decided to build the new capital, Brasilia, capable of uniting the country from the inside, and he invited Oscar Niemeyer to design the symbol city of the new Brazil, however Oscar preferred to be in charge only of the architecture and suggests that an international competition be held to choose the urban plan, which was won by Lucio Costa (GONÇALVES, 2010).

From 1964 onwards, the architect did not find a favorable environment for his work during the military government, so he opted for self-exile, continuing to design in France, Algeria, Portugal, Israel and Italy, using his formal diversity and techniques with reinforced concrete, some of the main works include the Headquarters of the French Communist Party, in Paris (1967); the headquarters of the Mondadori publishing house, in Milan (1968) (Figure 02); the Cultural Center, in Le Havre (1972), among others (GONÇALVES, 2010).

Even so, the architect in this period, despite conflicts with the government and ideological divergences, maintained professional activities in Brazil, both for private clients and for the state, with projects including for the central government and even military instances (FRAGA, 2006).

There is a change in the Brazilian political context, in 1985 the candidate Tancredo Neves wins the presidential elections, a civilian, after twenty years of military government, but he dies before taking office, then vice president José Sarney assumes the presidency. In this context, Niemeyer returns to the country, to his office in Copacabana (GONÇALVES, 2010).

In the 1980s, the architect designed important architectural works responding to this new situation in Brazil, such as the Rio Sambadrome (1983), the Integrated Public Education Center - CIEPS (1984), the Latin America Memorial (1986-1988), all government works (GONÇALVES, 2010).

Figure 01 – UN Headquarters in New York

Source: ArchDaily (2012).

Figure 02 – Mondadori headquarters

Source: ArchDaily (2017)

In a context of world architecture, at this moment they marked a range of new proposals, "whose objective is to establish a critique of modern architecture", provoking the austerity of modernism (GONÇALVES, 2010, p.81).

The movement is configured as a plurality of trends, reassessing historical references, with some architects adopting ornament patterns and academic, historicist, eclectic or repertoire composition forms, other professionals prefer to rehabilitate the human scale, while others are concerned with the insertion of the project, the relationship with existing constructions and the landscape (GONÇALVES, 2010).

Oscar Niemeyer's attitude towards this International Style is classified as a precursor, with anti-rational buildings and promoting a return to historicism, however, after the peak of his career, Niemeyer, in the 1970s and 1980s, is classified as an "outdated architect". However, his influence on the work of contemporary architects such as Richard Méier, Zaha Hadid and Shigeru Ban is currently recognized (GONÇALVES, 2010, p.82).

In recent decades, the architect seems to have adopted an autonomous posture that disregards criticism and external references, with the avid demand for the consumption of images and superficial Brazilian cultural policies, this context offered Niemeyer an almost limitless creative freedom, in greater part of the time creating a surprising resulting form, whose program is placed in the background (GONÇALVES, 2010).

In this last period of works by the architect, he designed for the first time museums with more complex needs programs, two of them were the Museum of Contemporary Art - MAC, in Niterói (1991-1996) and the Oscar Niemeyer Museum - MON, in Curitiba (2000 - 2002) (Figure 03). Both projects "demonstrate the continuity of Niemeyer's research with high volumes of the solo on a single recessive support", a form initiated with the Centro Musical do Rio de Janeiro (1969) (GONÇALVES, 2010, p.83).

The MAC work (Figure 04) has lightness, complexity and an abstract form. It was created in 1991, a four-story structure, a central support from which a circular shape grows like a flower, a large ramp at the front. All with spatial intonation through lighting (SILVEIRA *et al.,* 2016).

Standing sixteen meters high, the MAC rises on a cylindrical base measuring 9 meters in diameter, supported by a large footing two meters high, positioned in a circular water mirror measuring 817m² and sixty centimeters deep, giving lightness to the building (SILVEIRA *et al.,* 2016).

The roof follows a circular shape, fifty meters in diameter and an area of almost two thousand square meters, having received a waterproofing treatment. Ahead, the red concrete external ramp leads the viewer along ninety-eight meters of curves to the main entrance on the upper floor(SILVEIRA *et al.,* 2016).

With glass manufactured exclusively for it, the MAC has seventy triplex blades, eighteen millimeters thick, in bronze color, each one 4.80 m high and 1.85 m wide, supporting the equivalent weight of 20 people. Positioned at a 40° inclination to the horizontal plane (SILVEIRA *et al.,* 2016).

The building has asymmetry and visual unity, the lines, organic and sinuous, are in harmony, in a high degree of formal organization. Despite being complex, the work confers elevation, lightness, softness, simplicity, clarity and visual cleanliness, presenting a perfect balance; (SILVEIRA *et al.,* 2016).

Also bringing a suspension of the main volume, on a single support point, the Oscar Niemeyer Museum - MON (Figure 05), also

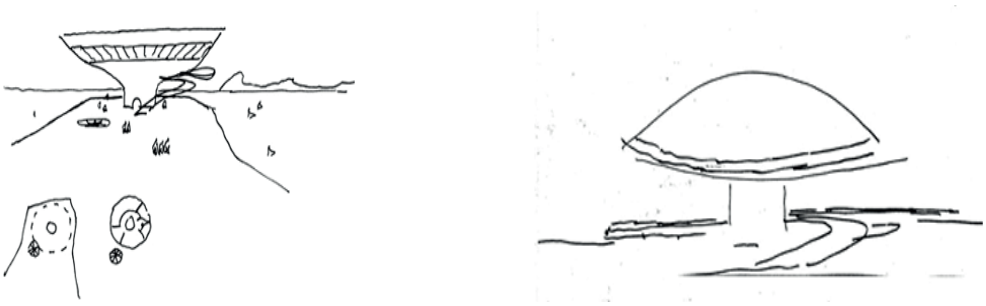


Figure 03 – Sketch Museum of Contemporary Art and Oscar Niemeyer Museum

Source: ArchDaily (2012)

Figure 04 – Museum of Contemporary Art of Niteroi

Source: House Vogue (2020)

Figure 05 – Oscar Niemeyer museum

Source: Oscar Niemeyer Museum (no date).

known as "Torre do Olho", incorporating a new volume to an existing building, designed in 1976 for the Instituto of Education of Paraná - IEP (GIROTO, 2019).

A horizontal, opaque block measuring seventy meters, made up of a family of suspended volumes. Two surfaces, in white concrete, curved and opposed, rest on a tower covered with yellow tiles, a pedestal that breaks a little with the organic elegance. For the support of this work, on the walls of the tower that suspends the eye, two large longitudinal beams of seventy meters are supported, which support cantilevers of five to thirty meters in each direction (GIROTO, 2019).

Because there is no horizontal base on the ground that goes against the vertical axis, the work appears as if it sprouted from the ground, organically like a tree. The large water mirror projected around the base of the central axis also gives the feeling that the building emerged from the water (GIROTO, 2019).

The building has an elaborate format, in order to maintain a relationship with the existing block of complementarity through established tensions, such as containment and exuberance, straight lines and curved lines, stability and instability, closure and opening (GIROTO, 2019).

As a milestone of Oscar Niemeyer's return to the international scene, the pavilion for the Serpentine Gallery (Serpentine Gallery) (Figure 06) at Hide Park in London, England, designed and built in 2003, in a context of revaluation of modern architecture (GIROTO; SEGAWA, 2018).

The Serpentine Gallery Pavilion is an annual event where temporary architectural constructions are made, giving preference to internationally renowned architects who have never built in the UK. With a usable area of approximately 300m², open to the public during the day and at night it becomes a space for lectures and films with architecture as the central theme (ROEDEL, 2009).

The pavilion presents some of the main characteristics of Niemeyer's works, with a permanent aspect, the shape resembles the architect's drawings, with a concept of mountains or female bodies. Which led him to a design (Figure 07) with a basement, a central floor raised from the ground (as in MAC and MON), which conveys a strong idea of lightness (Figure 08) (PEREIRA, 2013).

> My concern when designing the pavilion for the Serpentine Gallery, in London's Hide Park, the only metallic work I designed, was to manage, in the elaboration of this work so simple and of such reduced proportions, to express what I think characterizes my architecture.
>
> Thus, by suspending the pavilion's floor 1.50 m above the ground, I sought to ensure the lightness that distinguishes it. And the same was my intention in giving such a busy line to the profile of the pavilion, as it is with this game of curves and straight lines that I create my architecture.
>
> The rest was about looking for simplicity, the good application of colors and coatings with which interiors must maintain the unity of any architectural work. (NIEMEYER, 2009)

The work was positioned laterally to the street, with the front facing Exhibition Street, through which access is given to the site, as shown in figure 09, this main façade receives natural morning lighting and is against the direction of the prevailing winds. The pavilion was also located orthogonally to the Serpentine Gallery building, circled in red in figure 10, located in Kensington Gardens (FRAGA, 2006).

The surroundings of the exhibition site are marked by several memorials to important figures for the United Kingdom, as well as the pavilion itself made by Oscar Niemeyer already in its last production period, "One can

Figure 06 – Pavilion for the Serpentine Gallery

Source: ArchDaily (2018).

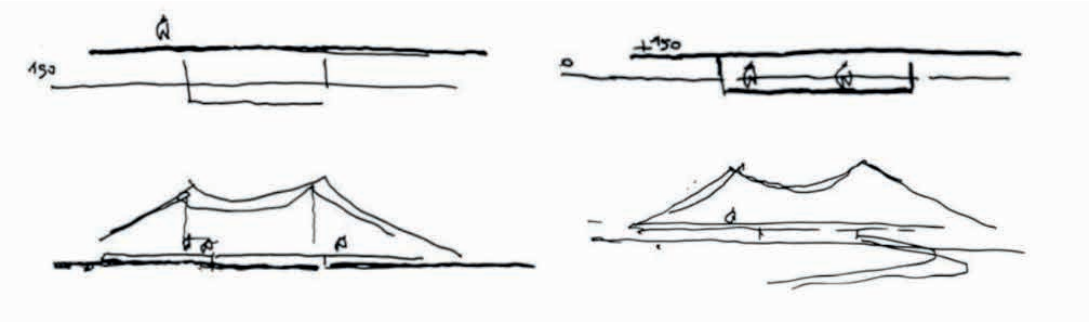


Figure 07 – Sketch of Oscar Niemeyer's Pavilion

Source: Roedel (2009).

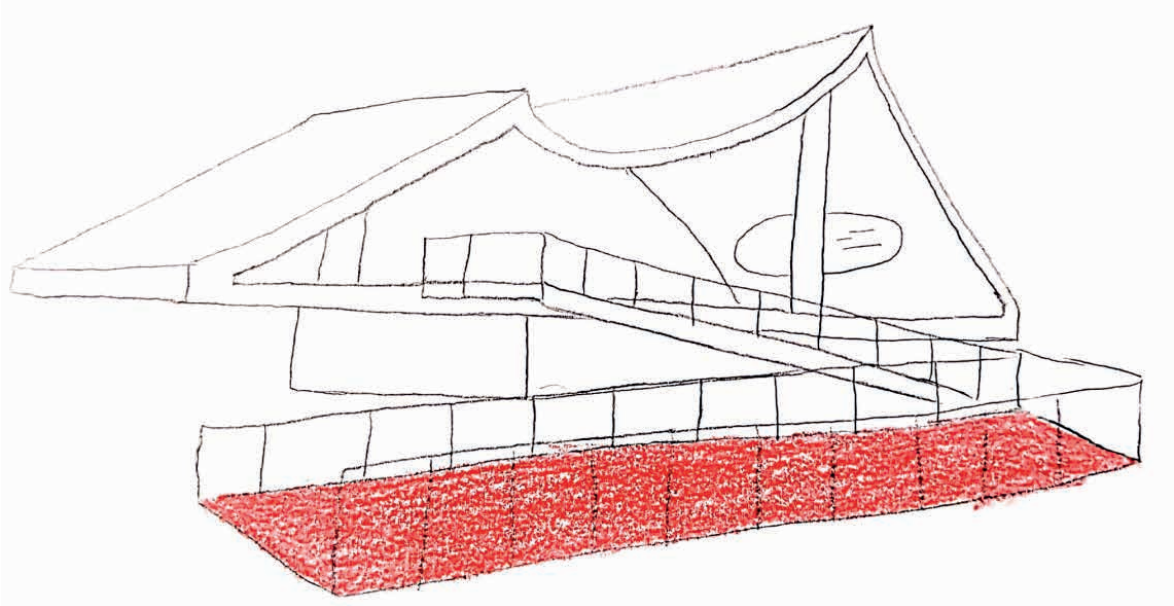


Figure 08 – Perspective Sketch of the Pavilion

Source: author (2022).

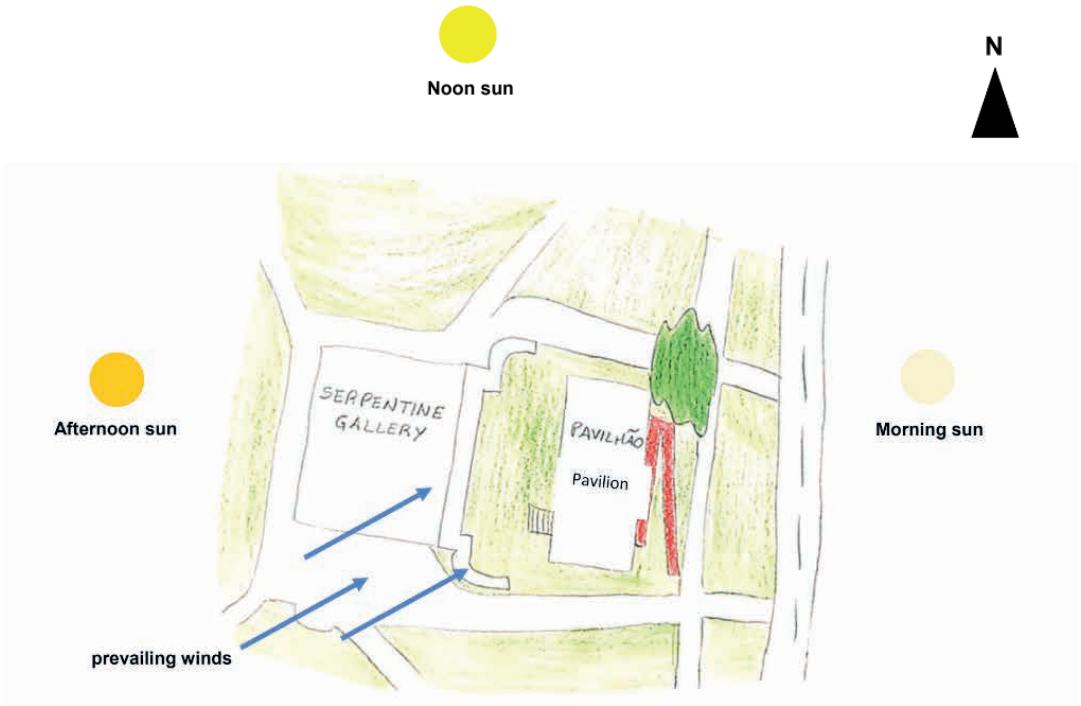
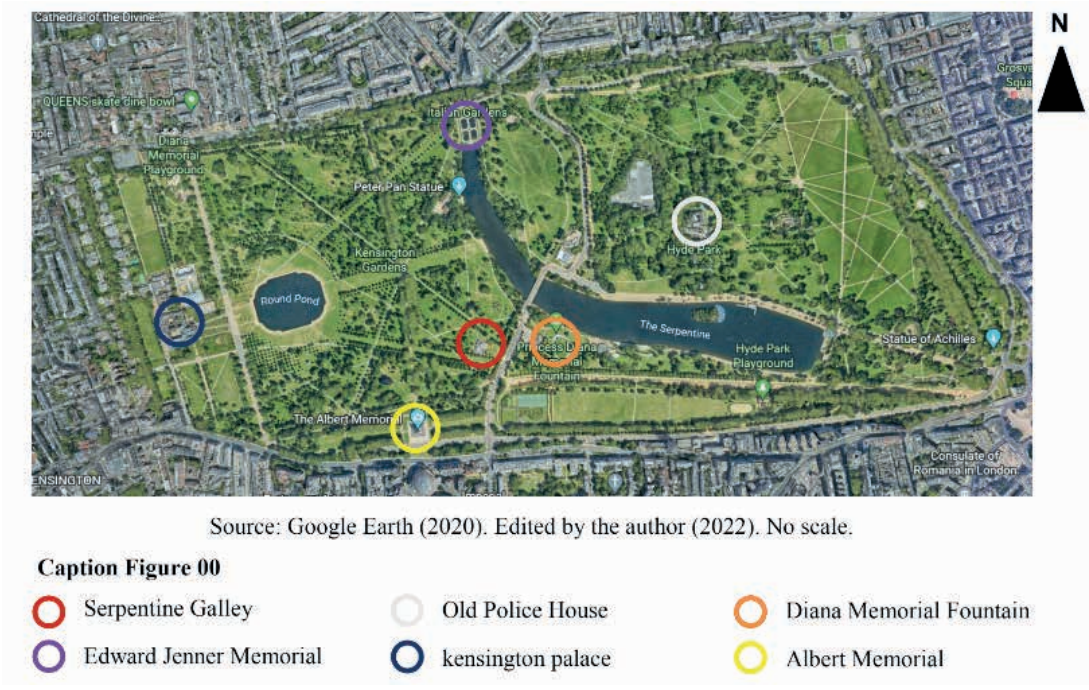


Figure 09 – Sketch of the pavilion's implantation

Source: author (2022).



Source: Google Earth (2020). Edited by the author (2022). No scale.

Caption Figure 00

- Serpentine Galley
- Old Police House
- Diana Memorial Fountain
- Edward Jenner Memorial
- kensington palace
- Albert Memorial

Figure 10 – Around the Serpentine Gallery

Source: Google Earth (2020). Edited by the author (2022). No scale.

think, in a way, in this pavilion as a memorial that celebrates the architect and his work" (FRAGA, 2006, p.339).

Regarding the relationship between interior and exterior spaces, an attempt was made to spread out the internal limits of the pavilion, a characteristic of the dematerialization of space, typical of the modern movement. A search that conditions the lightness of the building, with a reduction in dimensions and the number of supports, the cantilevered built mass, whose structural design was carried out by José Carlos Sussekind (FRAGA, 2006).

The base of the pavilion, with the floor one meter below ground level, has glass closures on the larger sides, this material is also found within the project at the closure of the upper floor, there are one and a half meters above ground level, between the pillars of the main façade facing the street, these translucent closures, provide different views of the park, at an unusual height, considering its slightly uneven topography, also allow good visual permeability and a wide relationship between the interior of the pavilion and the park outside (FRAGA, 2006).

Based on studies by Francis D. K. Ching, the main plan (figure 12) can be understood as having a regular shape, stable and symmetrical in nature. As for the facade (figures 14, 15 and 16), it has an irregular, asymmetrical, dynamic shape, whose parts are incoherently related, in this case regular shapes subtracted, forming an irregular composition of regular shapes. In a volumetry context, the lower floor is an addition to the upper floor, in a balanced proportion (CHING, 2002).

Four pillars of the pavilion started from the vertices of the bases and went up to the roof, and the two on the back, on the upper floor, were moved to the limit of the cantilever. These pillars supported the entire building and promoted their different heights that provided the asymmetry of the facade. Together with the tie-beams that start from the top of the pillars and proceed towards the end of the longitudinal beams, forming the triangular figures (FRAGA, 2006).

The first floor, located partly underground (figure 17), had concrete supports in the grounded part of the base, which went up, some to the height of the ground and others to the slab of the upper floor, the rest of the structure was made of steel and aluminum, with beams in type I section, due to the short time available for execution, different from usual in Niemeyer's works (FRAGA, 2006).

Ching divided the planes, as the horizontal elements, into Base Plane, Elevated Base Plane, Lowered Base Plane and Superior Plane, of which two of them can be found in Niemeyer's pavilion, the second and third, being naturally three-dimensional., articulate the volume of the surrounding space, generating a field of influence (CHING, 2002). First the +1.50m level of figure 17, the Elevated Base Plan, "A horizontal plane elevated above the ground plane establishes, along its edges, vertical surfaces that reinforce the visual separation between its field and that of the surrounding ground " (CHING, 2002, p.99). Such a level, as a form, creates a domain over the surrounding spatial context, in this case the visual continuity is maintained, on the other hand that the spatial continuity is interrupted, expressing an extraverted nature (CHING, 2002).

In another plane, the -1.00m level of figure 17, the Recessed Base Plan, "A horizontal plane that describes a depression in the ground plane uses the vertical surfaces of the recessed area to define a volume of space" (CHING, 2002, p.99). This, as a form, isolates a field of space from its wider external context, weakening the visual relationship with the surrounding space, alluding to an introverted nature of volume. However, with such positions, Niemeyer proposes different

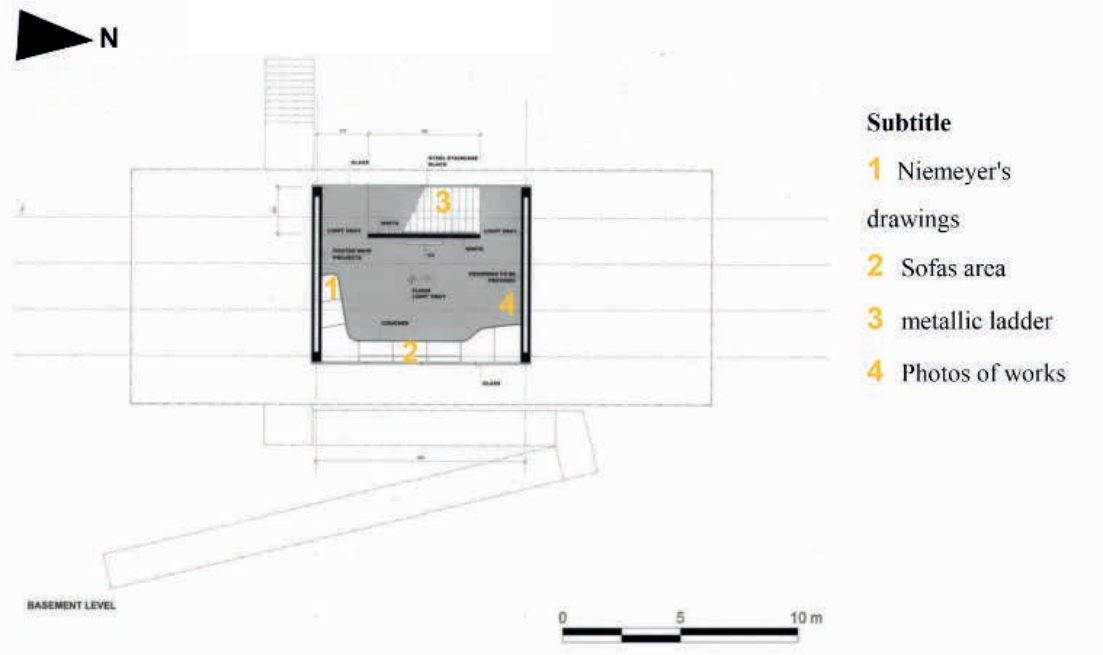


Figure 11 – First floor plan

Source: Fraga (2006). indicated scale.

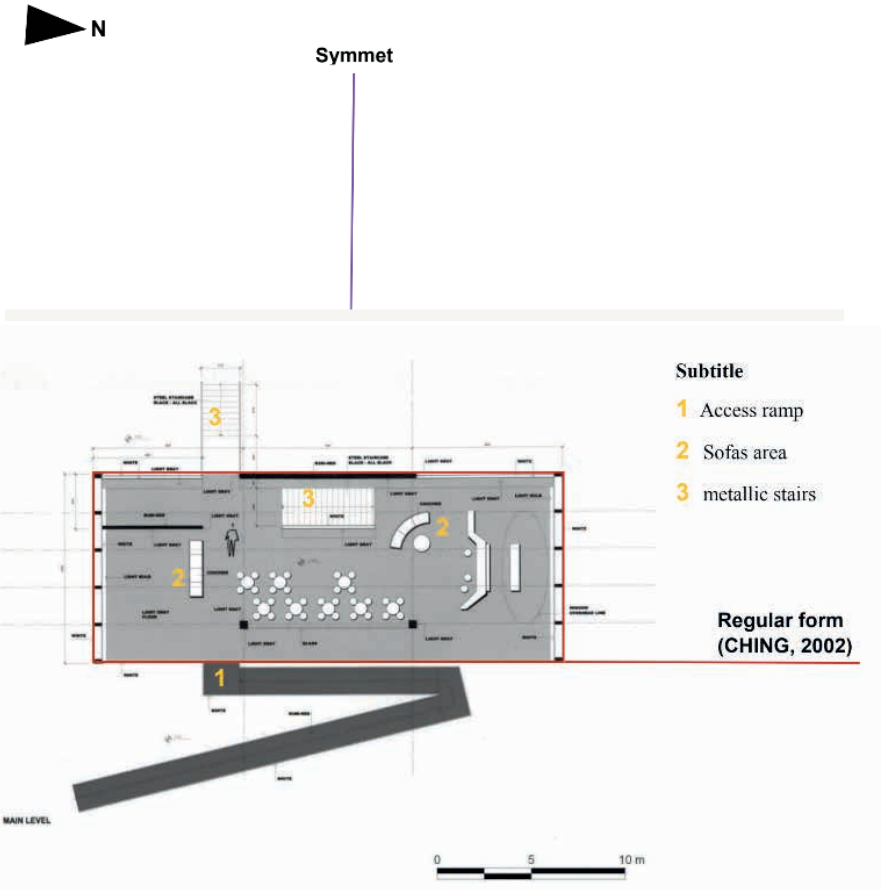


Figure 12 – Second floor plan

Source: Fraga (2006). Indicated scale.

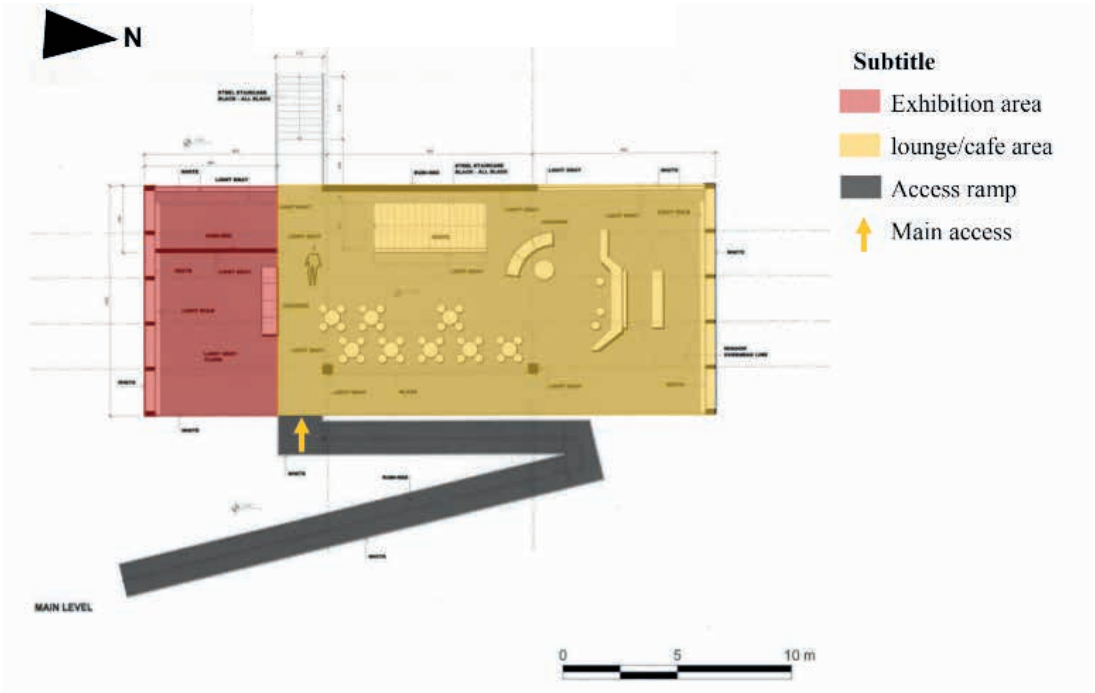


Figure 13 – Sectorization of the pavilion

Source: Fraga (2006). Indicated scale.

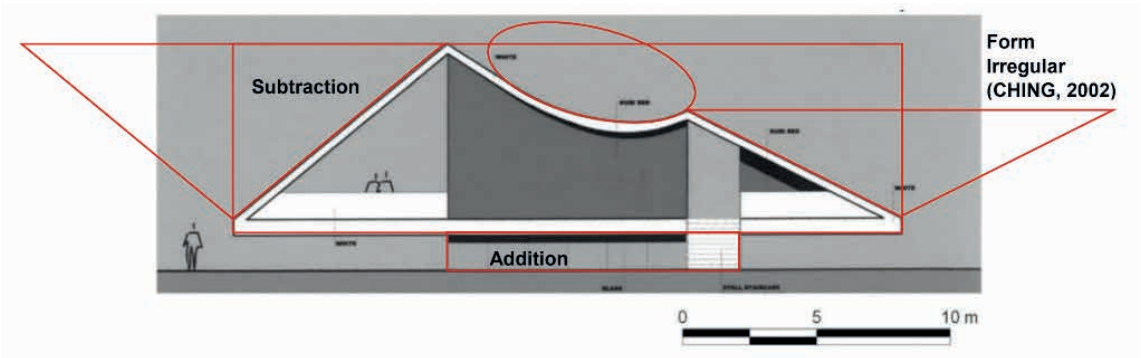


Figure 14 – West Elevation

Source: Fraga (2006). Edited by the author (2022). Indicated scale.

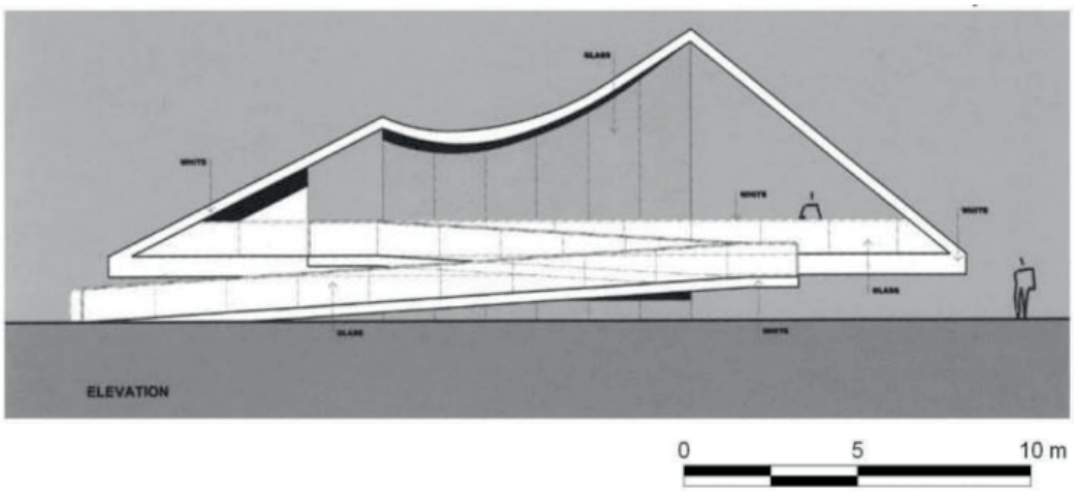


Figure 15 – East Elevation

Source: Fraga (2006). Indicated scale.

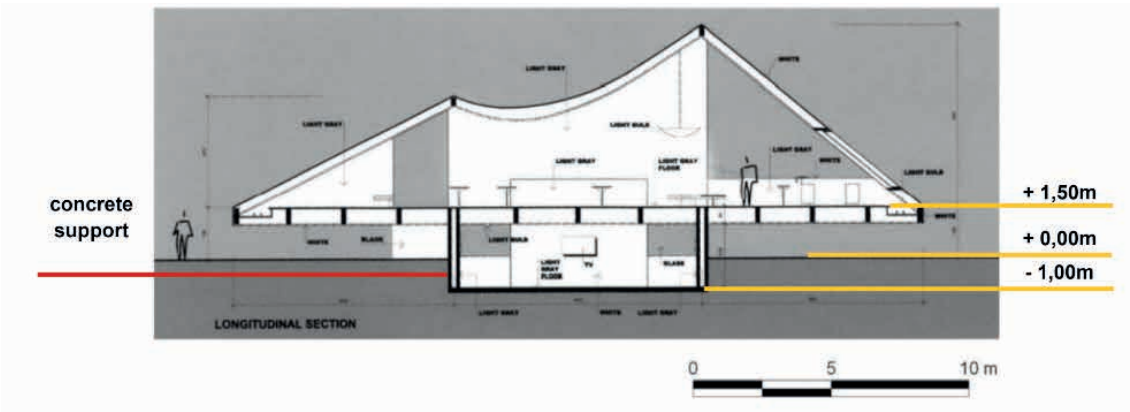


Figure 17 – Level cutting and indication

Source: Fraga (2006). Edited by the author (2022). Indicated scale.

Figure 18 – West Facade

Source: Oscar Niemeyer Foundation (no date).

levels for the viewer's field of vision, leaving the traditional line of sight (CHING, 2002).

On the upper floor, the floor was made of exposed concrete, with the slab supported by *"framming"* of steel from two main beams that start from the pillars, then running along the entire length of the building. The pavilion had a striking white and red color, the latter being present on the panel on the west façade and on the ramp on the east façade (FRAGA, 2006).

On each facade, the pillars are connected by a curved beam, against the wind with the floor beam on the west side, facing the gallery seat, hiding this bracing by closing the red panel (figure 18). This connection allows the counterbalancing of the structure (FRAGA, 2006).

FINAL CONSIDERATIONS

The great representative of the Carioca school, of Brazilian and international architecture, Oscar Niemeyer marked the artistic architectural scene while designing, developing studies and expanding the horizons of design and construction. He developed modern architecture in terms of visual cleanliness, free facade, structural skeleton, free plan, garden terrace, large glass windows, and developed all these innovations of the new technique to an even greater level, with the agreement between work and site, analyzing the aspects where the architecture would be inserted, and creating its own unique design.

According to Costa, in this new system, responsibility was transferred to an independent framework, which could be made of reinforced concrete or metal, this way the large walls could be transformed into a simple sheet of glass, when correctly oriented, south in our case. These methods were adopted by Niemeyer and developed prominently throughout his works (COSTA, 1930).

The understanding of the pavilion for the Serpentine Gallery, being one of the works of the artist's last design period and an event that seeks to express his architecture, has a lot of representation of what he sought for good architecture, his design principles, his dynamics and his evolution as an artist. It also represents what he left as a legacy, all his contribution to the development of art and art as a construction.

Many studies have already been developed about Oscar Niemeyer and his works, but architecture lives in constant transformation, many of his works are still alive, either by themselves or living as a legacy in others, and all of them still have a lot to happen and to reveal, so it is important for research to be part of this evolution, after all, it is through it that others are to come.

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