

Scientific
Journal of
**Applied
Social and
Clinical
Science**

**THE SOCIAL
AESTHETICS AND
SUSTAINABILITY OF THE
APPARENT STRUCTURE
IN THE CONTEMPORARY
ARCHITECTURE OF
MARCOS ACAYABA**

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Abstract: The idea of the apparent structure is linked to the expression of the materials used in their natural state, in a way that can contribute in a positive way to architectural thinking during the elaboration of a project. Beams, pillars, trusses, buttresses and several other structural elements are often seen as a purely technical component of buildings, or even a necessary evil. of materials due to the non-use of coatings, of which, as an alternative, fitting materials can be used, fixed as a seal or simply not using any material for coating. In this scientific research, based on Marcos Acayaba's projects, it is intended to show, within this stage of contemporary architecture, how the structure can and must be perfectly integrated and involved in the creative process, playing significant roles involving the senses, feelings and minds of the users of the buildings. influence towards an increasingly sustainable and economical architecture, making it also more accessible.

Keywords: Social aesthetics; Apparent structure; Marcos Acayaba.

INTRODUCTION

The relevance of this work is due to the study of the apparent structure and its aesthetic, sustainable and financial contribution to an architectural project, based on the projects of Marcos Acayaba, in which he has a diversified production with regard to structural materials.

This concept was very well exemplified by the 95m² residence project built in 2015 for a day laborer living in the East Zone of São Paulo. Despite the limited resources (around 150 thousand reais available), it showed that in addition to making the project cheaper, when properly used, the apparent structure can become a potential architectural element, especially when it comes to maintenance, sustainability and accessibility to an architectural project. Thus, hiring an architect is not exclusive to the elite, but to

those who seek future savings in renovations, readjustments and any other extra expense in a poorly thought out project.

The research problem arises from the very common concept in our daily lives that the structure is irrelevant. In contemporary times, buildings will have to incorporate sustainable characteristics into the design process, in which designers will have to strive to achieve the construction goal with minimal or no waste. To achieve this goal, architects and engineers will have to work in an increasingly synchronized context where ethics, technique and aesthetics in architectural design are interconnected throughout its creation and execution process. Bearing in mind that the fabrication of any material for covering requires cost and energy, many architects appropriate the sculptural plastic of the structure, which, through the transparency of the building, makes the architecture express its personality and sensorial characteristic. So are the closures, the fences, the act of hiding the structure really necessary? Is it possible to create a quality architecture while keeping the structure apparent or even emphasizing it?

The objective of the research is to contribute to a better understanding of the value that the apparent structure can offer to the architectural project, expanding the repertoire of lay people, beginners in architecture and those interested in the plastic and advantages of the apparent structure. Thus, based on four projects by Marcos Acayaba, I intend to show how the technical domain does not limit, but rather contributes to the ability of architects to develop creative formal, spatial and structural solutions. of structural materials: concrete, steel, wood and masonry.

THEORETICAL REFERENCE

The theoretical basis of this work approaches the contemporary period, and is based on four pillars: 1) The esthetics and

ethics in social architecture: a new trend; 2) Sustainability: non-coating as an architectural option; 3) The form and its relationship with the plasticity of the apparent structure;

1) *The aesthetics and ethics in social architecture: a new trend*

“The creation of the beautiful, which was once considered the architect’s primary function, has quietly evaporated from serious professional debates and retreated into a confused imperative of intimate order. (BOTTON, 2006, p.28). The reading of the site, the discovery of the meaning and purpose of the project, the design and formulation of a work is a multiple interrelated process by itself. For Peter Zumthor, atmosphere is a category of aesthetics that communicates through our sensibility towards space and the work performed on a work. “According to Peter, it is possible to create different atmospheres with different spatial approaches, materials, sounds, temperatures, objects in the air, lights and shadows on the forms, the conduction of the bridge and the dimension between inside and outside.

The beauty. Beauty has a good definition, which I heard a long time ago and I try to explain things like this. That beauty is a consequence, but it is that one there where anything leftovers and anything lack.

Every work is the result of a combination of factors in which it becomes a product of culture, varying according to places and times, and adapting to the realities of each culture and individual. In an interview with Renzo Cassigoli, Renzo Piano states that “The moment you agree that an architecture is the mirror of a society, it is also necessary to recognize that it is the mirror of the moment of a culture” (PIANO, 2011p. 24).

Sérgio Ferro, who graduated from FAUUSP in the early 1960s, believed that Vilanova Artigas was the disseminator of the Brutalist trend in Brazil. Artigas’s professional

practice linked popular housing and the social issue of architecture. For Artigas and his followers, including Sérgio Ferro, the practice of projects was directly linked to political and social ideals. Thus, social issues were reflected in the “truth of materials” and “structural honesty”. In other words, the valorization of ethics in architecture is seen as a concept that comes to characterize aesthetics through the expression of materials in their raw state, that is, the formal plastic conceived by the apparent structure was a consequence of a social ethics. “I do not start [...] from ‘concepts’ [...] my starting point is the simplest social form that the product of work in contemporary society assumes: the commodity” (FERRO, 2006apud. KarlMarx,1968p.105).

Many architects and engineers have a similar discourse regarding the role of civil construction in today’s society, such as Walter Gropius, Eladio Dieste and Alejandro Aravena. Aravena says that architects capable of accomplishing something in realities contrary to architecture, fleeing the current status quo must be prioritized. According to the Pritzker jury, Alejandro Aravena epitomizes the rebirth of a more socially engaged architect. The architect’s role is now being challenged to serve greater social and humanitarian needs, and Alejandro Aravena has responded to this challenge in a clear, generous and full manner. According to the jury, the award is given to an architect who, convinced of the power of good architecture, highlights the importance of our work. Which is somehow helping to change this established (and almost suicidal) idea that the architect is the act that makes the project more expensive with operations that have nothing to do with reality.

2) *Sustainability: non-cladding as an architectural option*

The concept of sustainability is related to the act of integrating people into the planet’s environment, raising awareness

of the importance of the economy and the better management of resources offered by nature, which are finite and scarce. Ignoring the “so-called basic structures of planetary survival, such as climate, water, biodiversity, non-renewable resources and the capacity to support nature.” (COSTA et al., 2009p.91), current societies have expanded the industrial, agricultural and technological sectors, whose damages will hardly go back throughout history. This development has brought great benefits to the quality of life, but it also ends up producing waste and technological scraps that are not assimilated by nature in the short term, even with sophisticated recycling technologies.

The success indicator of a manation is its economic growth (Gross Domestic Product). With this, we create a culture of production and consumption that tends to grow. In this consumerist context, the creation of techniques of a temporary nature is more encouraged than the creation of more durable techniques.

In times of crisis, companies produce less, people buy less, and thus the consumption of resources such as water, energy and fuels decreases. The GDP of a country it always needs to increase and, for that, it is necessary to generate employment, income and the economy to turn around again. Thus, saving in one point makes it possible to spend in another, such as security, health, education, research, which, in the long term, will increase GDP, especially with the development of research and new technologies that facilitate our daily lives. Thus, a profound change in customs is necessary, as new sustainable habits are culturally consolidated. As the philosopher Mário Sérgio Cortella would say: “Are you doing the best you can? It’s not the best in the world. Ethics begins to play an important role in the face of the environmental crisis. The damage we cause to nature (such as the global

warming, the greenhouse effect, scarcity of water resources, loss of biodiversity, etc.) alert us to more dramatic future effects.

According to Bill Addis (2009), over the last few decades, legislation has gradually contributed significantly to reducing the human impact on the environment, both at the construction stage and in the subsequent life of the building, and this has greatly influenced the work of those working in the civil construction area, who previously did not need to deal with such issues. With intense industrialization, population growth, increasing rural exodus and diversification of consumer goods and services, the accumulation of large amounts of volume and mass of waste has become a serious urban problem that requires expensive and complex management.

According to the article by Sérgio Cirelli Ângulo, Sérgio Eduardo Zordane Vanderley Moacyr John, one of the ways of solving the problems generated by the excess of waste would be recycling. However, the entire process needs materials and energy to transform the product or handle it in a way that makes it suitable for returning to the production chain. This process can also generate new residues, which are not always as simple as those that were recycled, and it is also possible that they become even more aggressive to the environment and to man, especially for the workers in the recycling industry. In Brazil, the waste recycling process in Brazilian civil construction still has flaws in the research and development process, requiring a different attitude towards the generated waste.

The manufacture of any material for coating in construction or in any other field requires cost and energy, from the extraction of raw material or transport to the construction site until the moment when it can or cannot be reused, whether tile, paint or even wallpaper. All involve energy and cost expenditure

at various times, making the project less sustainable and more expensive. Therefore, it is necessary to incorporate sustainable characteristics into the design process, having as a construction goal minimal or no waste, always remembering the complete life cycle of the project.

For this purpose, architects and engineers will have to work in an increasingly interconnected context, in which ethics, technique and aesthetics are synchronized in the project, from the creation process to the execution and use of the building.

3) *The shape and its relationship with the plasticity of the apparent structure*

According to Panofsky, in the Renaissance, the goals of art were to provide artists with firmly and scientifically based rules, an objective that would only be achieved if the demands of exactitude and beauty were formulated, respecting the laws of perception, anatomy, physiognomy and those of psychological and psychological theory. movement physiology. The importance of this was shown mainly by the theory of proportions, knowing how to determine this harmony and the pleasure that results from it, and what constitutes the foundation of this pleasure, respecting the absolute law of nature, as well as size, disposition, motif, color, senses and other similar properties.

Contemporaneity can be characterized by the discontinuities and by the pluralism of concepts and methodologies that reach architecture. Currently, the architectural form is seen as a communicative element, that is, the image with which the building shows itself, in which the form is the representation of the content. This limited definition also reflects observations from both the reality of different design approaches and the built architecture. In this context, care must be taken not to produce an architecture that is sophisticated in design, however, void of

human considerations (such as practical and social functions).

An analysis of visual aspects of architecture depends on sensory experiences, defined according to what each one understands of what they see, revealing the foundation of human perception, based on the mental structure, which influences the psychological effect generated by the presence of the architectural work. This way of perceiving space is linked to the knowledge of the psychology of perception, that is, Gestalt, which focuses on mental laws (the principles that determine the way in which we perceive what is around us), preaching that our perception is not based on “isolated points”, but imposes a vision of “the whole”, therefore, it is based on the idea that the whole is more than the simple sum of its parts. Each space is created by a set of objects that relate to each other, establishing in the mind of each one its own spatial structure, which derives from the simplest physical and psychological structure known.

LaVine (...) observes how a ridge beam can symbolize the center of a house, and how a superstructure orders space by virtue of its regularity and hierarchy. In other examples, pillars or columns signify human activities of special importance or ‘depict a mechanical idealism’. He reads walls as ways of separating occupants from the world external, and frames structural as computer systems of space inside. When you read the structure, each structural element is loaded with meanings and makes an important contribution to architecture. (CHARLESON, 2009, p.13)

When the structural elements contrast with architectural elements through color, material, relief or natural finish, they also contrast with a normally light-colored background, meaning that at times, the structural elements in sight are not even perceived as a structure, but as an element of architectural composition.

of the entire construction surroundings, highlighting the building. In the Hélio Olga Residence, built by the same architect, there is a contrast between the brown tone of the wooden structure and the clear sky and landscaping.

The effectiveness of any degree of structural exposure must be evaluated taking into account how the exposure or its lack contribute architecturally, must enhance the design concept and result in a better resolved and coherent architecture. more striking and vibrant colors. A well-known example would be the CentroGeorges Pompidou project, France (project by Renzo Piano together with Richard Rogers, 1974), in which technological elements are used as aesthetic objects, components that can be observed in the large apparent pipes (air conditioning and other services), in the external escalators in the steel structure system, a project that has become, for some theorists, one of the landmarks of the beginning of postmodernity in the arts.

The architect's creation process is fed by a cultural repertoire, not just a professional one. The construction of relationships between theoretical proposals and project achievements, the accumulation of information obtained, philosophical convictions and various aspects of the architect's education are all elements that form a personality that leads to a characteristic way of doing things. The greater the scope of the architect's knowledge, resulting from interests in the profession and social issues that affect individuals and the places they inhabit, the greater the offer of quality architectural production, contributing to the enrichment of architecture.

Form and space in themselves are not the goal of architecture, but they are means of solving a problem in response to conditions of contextualization and functionality. At this point, it is of great importance to establish ideas that transcend historical limits, so that

the considerations made can be valid for buildings designed at any time. Architectural design is a response-to a set of conditions, which may be of a purely functional nature or a reflection of the social, political and economic atmosphere.

...structures are the columns, plans, or a combination of such elements that a designer can intentionally use to reinforce or realize ideas. In this context, columns, walls and beams can be thought of in terms of concepts of frequency, pattern, simplicity, regularity, randomness and complexity. This way, the structure can be used to define space, create units, articulate circulations, suggest movement or develop compositions and modulations. Thus, it becomes intrinsically related to the same elements that create architecture, its quality and power of movement. (CLARK, PAUSE, 1985 apud CHARLESON, 2009p.11)

Many architects respond satisfactorily to specific demands regarding the contribution that the structure can make to architectural plastics. Eladio Dieste (1917-2000, Montevideo), Arthur Erickson (1924-2009, Canada), João Filgueiras Lima (1932-2014, Brazil), Renzo Piano and many other architects and engineers contributed and still do with projects that result from structures that are integrated with the function and aesthetics of the building, such as modulating it through patterns and/or textures, which present variety, rhythm and hierarchy, and, consequently, create contrasts between illuminated and shaded areas, visually animating a facade.

After choosing a structural material, the detailing of structures can also transform utilitarian elements into objects of expressive plasticity, as well as communicate design ideas and concepts, including the design of cross sections, elevations and connections of structural elements, aiming to meet engineering requirements, such as stability, strength and rigidity.

The design concept must inform the detailing. Before turning to the specific issues of structural detailing, the designer must review his design concept and ask himself how he can guide the detailing decisions. Only then will it be possible to arrive at an architecture in which all structural elements are integrated with all other architectural elements and work together to achieve the design concept. (CHARLESON, 2009, p.129)

When the details are hidden from view, all considerations that go beyond structural performance, economy, and constructability are lost, leaving only a pragmatic approach to detailing. According to Charleson (2009), in addition to expressing the concept of the architectural project.

From a structural point of view, it is consistent with the assumptions of structural engineering. Thus, the successful resolution of structures and their details in large buildings requires the close collaboration between architects and expert engineers, therefore, the detailing must satisfy both the architectural design concept as well as the structural needs, thus providing the feeling of harmony, coherence and necessity. "The success of any structure in architecture must be measured by the degree to which it realizes an architectural concept, or, in other words, how it enriched a project." (CHARLESON, 2009, p.199).

During the design stage, it is the architect who defines the guidelines, shapes and materials of the building, fully interfering with the indices of waste, environmental impacts, economy, functionality and comfort. This more proactive stance towards structure allows it to play more substantial functional and aesthetic roles in architecture, transforming surfaces, spaces and the experiences that observers have of built architecture. Thus, designers can count on great freedom of choice, showing opportunities for innovative and creative

1 Original quote: "It may be true that one has to choose between ethics and aesthetics, but whichever one chooses, one will always find the other at the end of the road."

structural projects, always remembering that each design decision must be taken in a strategic way, aware of the structure's load-bearing function.

Making architects and architecture students aware of the aesthetic value that the structure can offer leads them to demand less conventional responses from structural engineers and teachers that can be better integrated into design concepts. Thus, structural engineers will become aware that the systems and elements they design have considerable architectural value, representing something beyond mere loading systems.

The framework that enriches the architecture will likely require greater analysis and design skills; it challenges the designer's dependence on the use of ready-made formulas in the design of structures in which the most cost-effective and easiest-to-build solutions are adopted. Finally, a better appreciation of how the apparent structure plays important roles in architecture will increase the sense of pride among structural engineers and reinforce collaboration between the two professions. (CHARLESON, 2009, p.200)

Despite the apparent structure's ideology being based on an ethical discourse, no project was able to detach itself from an aesthetic reference. "It may be true that we have to choose between ethics and aesthetics, but anyone who having chosen, we will always find the other at the end of the road." (HAGAN, 2001 apud. JeanLuc Godard, 2001 p.3, free translation¹).

METHODOLOGY

The data collected for the realization of the theoretical reference were based on bibliographic references, as in the contents of the speeches of each cited author. An in-depth research on each theme was necessary for a better understanding and familiarity with

the content that will cover the entire study, enabling the establishment of a critical look at the subjective and deep layers of each project under analysis (YIN, 2003).

The research method consists of research-intervention through a visit to the work, an interview with the architect-self-reappropriation of the project through sketches, photos of the researcher and images from the personal archive of the architect under study (MONTANER, 2007), following the construction processes of the works through images, developing appropriate procedures and modes for the narrative language in relation to all the content found. connected with the theme. At this point, the research on the aesthetics of the structure will not be related to purely ornamental elements. If they are not important loads, even imitating their materiality and dimensions, they will be disregarded.

With regard to materials, each one has its positive and negative points, allowing the builder to objectively manipulate a structural design process in accordance with their design needs. From this point, descriptions were made of four works carried out throughout the architect's career, chosen according to the materials used as structure, in the approach to the concept, influences, innovations, and techniques used, treating each project with reference to all the studies that have already been carried out related to each chosen project. Each work chosen has a different structural material, namely: concrete, steel, wood and masonry.

RESULTS AND DISCUSSION

A LITTLE ABOUT THE ARCHITECT: MARCOS DE AZEVEDO ACAYABA

“When I was a young professor and Marcos, a young student. What impressed me was his personal independence of judgment,

his freedom to think, at a time when the tendency was to think and participate in groups abdicating a critical stance of their own. “(ACAYABA apud. Julio Roberto Katinsky,2007P.7)

“I started to pay attention to Marcos Acayaba in 1964 or 1965, at FAU-USP, when I was a young professor and Marcos, a young student. What impressed me was his personal independence of judgment, his freedom to think, at a time when the tendency was to think and participate in groups abdicating a critical stance of their own. “(ACAYABA apud. JulioRoberto Katinsky, 2007p.7)

In Acayaba's projects there is an aesthetics of logic, in which the solutions result from a structural perception, which plastically organizes and orders the space and the resulting volumes through a certain technique, program and intention. respect to the nature of the place, the correct use of materials and the specific geography of the work site. Thus, his projects result from rigorous analysis processes in relation to specific conditions, achieving “the greatest efficiency, comfort and, as a consequence, beauty. Where nothing is left, where nothing is lacking.”(ACAYABA, 2007 p.9).

In international magazines, it is still common to find architecture in which, as Acayaba (2007) says, “[...] the architect does not have the slightest concern with construction or technique, he works almost as a scenography; he is between scenography and plastic arts”. Acayaba, in an interview, assumes that “Sometimes, it is a conversation with the engineer, with the builder, which defines even this question of the technique to be used” (ACAYABA, 2007).

“I try to highlight the structures, and they become the thing that plastically characterizes the project. The projects are characterized plastically by the structures, more than by being full of voids and by volume, by volumetry, it is more the design of structure.” (Marcos

Acayaba. Interview granted to Mariana Rabello de Almeida on 03/28/2017)

The issues related to the construction of the architect's responsibility are notable in the work of Marcos Acayaba, in which the dialogue between the technical areas is part of the entire design process, from the architectural design adopted to the work built. With most of his projects as single-family homes, the explanation lies in the fact that "Acayaba believes that the architecture of residence appears as an open field to experimentation" (PRANCHETA 1986, p.58), an idea clearly reflected in his works. Its architecture is characterized by a transition between the most varied types of materials and construction techniques, always experimenting with the potential of each material in the formulation of the architectural space and in the contributions to the formal purpose of each project. according to the particularities of each project, such as the climate, the relief and the program. The field study to deepen the most used structural materials was carried out based on three projects: 1) *Milan Residence (1972)*; 2) *Marcos Residence acaba (1996)*; 3) *Agency Banespa Santo Amaro (1984)*; 4) *Vila Butantã (2004)*.

1) Residence Milan (1972)

During the period of its formation, the use of reinforced concrete was predominant, which was the symbol of contemporary architecture and allowed for a strong expressiveness, since it was a constructive technique that supported the ideology of industrialization, the focus of politics at the time. Brutalism, a style that prevailed at the time, was characterized by the low variety of materials with the abundant use of concrete and the apparent structure without coatings or decorative appliques. gifts. The wide variety of plastic possibilities that the material provided made it a very present solution among architects, especially after the construction of Brasília, which established a

new language in national architecture.

At the beginning of his career, graduated 3 years ago, in 1972, Acayaba had the opportunity to carry out a project with greater freedom (Milan Residence). Under the influence of Oscar Niemeyer, the most admired architect since his childhood, he carried out a project based on a curved shell in reinforced concrete, his main reference being Clube Diamantina (1954), which had a shell supported on four points of support superimposed by an elongated slab. in the longitudinal direction. In his project, it is possible to notice a search on the part of Acayaba to develop differentiated technical solutions, exploring the potential of the materials and techniques used, making them adequate to the needs established by the program and the medium in which the work is inserted.

The program consists of a plot of 2150 m² with a house measuring 791.49 m², which allows for internal spaces integrated with the surrounding vegetation and enhancement of the landscape (with a wide variety of species), bringing more privacy to residents and following the concepts of integration of internal environments, as approached by modern architects of the same period.

The building system consists of an almost catenary shell of reinforced concrete (with polyurethane insulation) cast in situ which covers most of the house. The gap between the shoes (33m) has a starting angle of 30°, it is supported on the ends and is secured and prestressed, with this, many complex wooden forms were wasted, increasing the expenses and the complexity of the work, mainly by making use of a technique until then new in Brazil: pumping and casting the concrete at great heights, which is not recommended for a residence by the architect himself. Due to some errors of calculation, shell, which must be a catenary curve, did not work only with compression. With unexpected acting

forces, the errors were noticed soon after the scaffolding was removed with the appearance of cracks in the four shell supports. Thus, a prismatic structural reinforcement in concrete was necessary through mullions in the four foundations, forming a quadrilateral of prestressed braces between the footings.

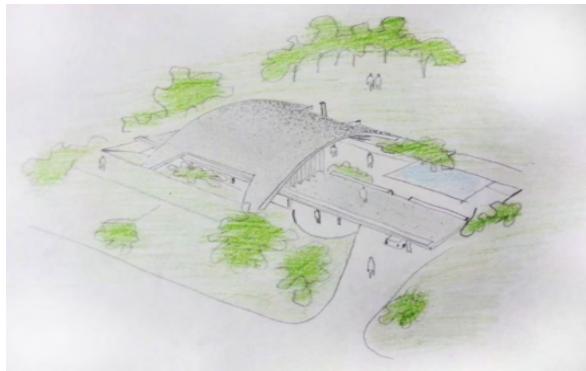


Figure1-Source:sketchesgivesresearcher

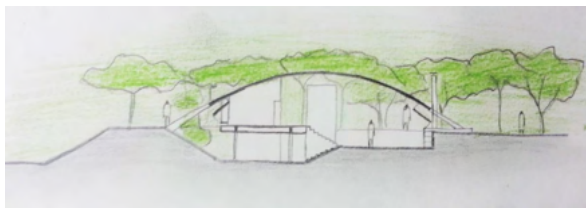


Figure two–source:sketchesgivesresearcher

The house is articulated in three half levels, not isolating the internal spaces of the house and adapting the program to the topography of the land. The project offers comfort and spatial richness with a perfect integration between interior and exterior through the glass. “In the central area, on the level, two concrete volumes house the four bathrooms and the two water tanks.” (NAKANISHI,2007, p.42).

The use of apparent reinforced concrete has several formalist advantages that can provide high spatial and visual quality, in addition to having an abundant workforce in Brazil. But care must be taken not to create a project of sophisticated execution, generating wood residues (through the forms) or even

the concrete itself in case of dismantling.

The Auditorio de Tenerife in Spain (1997), by Santiago Calatrava, is another example that shows the plastic potential of exposed concrete, however, it is a project of slow and laborious execution, unlike works in precast concrete.

Technique:

Place	Av. of the Magnolias, 70–Cidade Jardim, São Paulo
Year from the project	1972
Period in construction	1972-1975
Area of the ground	2,150.00m ²
Area built	791.49m ²
Team of the project	Frames Acayaba, Marlene Milana cayaba

2) Agency Banespa Santo Amaro (1984)

At the end of the 19th century and the beginning of the 20th century, steel began to be used in construction, but only in bridges or large buildings. In Brazil, the use of steel had only an industrial purpose, however, over the years, with the possibility of carrying out increasingly faster works with the use of steel, this material has gained space in the civil construction sector. The good performance of buildings has become a mandatory requirement, also integrating the concern with the sustainability of materials and the work as a whole, an increasingly prominent requirement for customers and society. These demands found an adequate response in industrialized construction systems, among which steel systems stand out.

The idea behind the Banespa de Santo Amaro Agency project was to serve exclusively public servants who, in large numbers in the neighborhood, generated huge queues on payday. Thus, the Bank's Wealth Department opted for an extremely fast and economical construction. Researching metal structures,

Marcos Acayaba and his team opted for a mixed construction system:

Metal roofing through folded sheet metal porticos (3mm) with 13m of free span, spaced 7.5m apart, concrete block masonry cladding and common iron frames, tilting, with common glass. Only a fluted shutter was superimposed externally to filter some of the direct sunlight. (ACAYABA,2007 p.122).



Figure3-Source:sketchesgivesresearcher

The construction turned out to be simple, with the exception of the adjustment between the masonry and the metal structure, which solves the sealing against water from wind rains and contributes to the articulation between the walls and the metal frames, avoiding the inevitable cracks of the masonry as a result of the different coefficients of expansion of each of the two materials.

The design of the project is due to the golden proportion, in which the composition of the entire structure's closure respects a succession of golden rectangles and squares, a way of composing full and empty spaces adopted since antiquity.

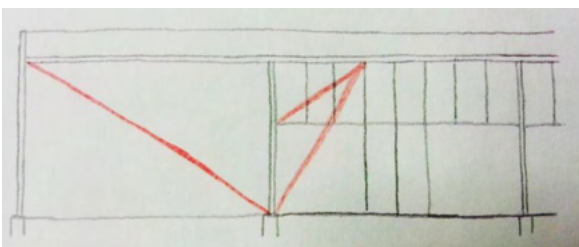


Figure 4-Proportiongoldenatfacade.

Source:sketchgivesresearcher

“The work was carried out in three months at a cost equivalent to one third of the usual constructions from the bank. (ACAYABA,2007 p. 123)

In this context of changes and opportunities, the Brazilian Steel Construction Center (CBCA) was created in 2002 with the intention of disseminating metallic construction and supporting the development of this market, allowing a “correct analysis of the potential of steel structures, as well as of mixed and hybrid systems, without the influence of paradigms and prejudices” (EVOLUÇÃO DA CONSTRUÇÃO EM AÇO NO BRASIL, 2015).

Steel is an easy-to-find and quick-to-apply material, however, it requires specialized labor and rigorous protection against fire and environmental attack, which increases its costs.

Brazil, with few specialists in this material. However, it is a material that allows rapid execution, which does not occur with concrete, since its curing time slows down the work.

Technique:

Place	Santo Amaro, SP
Year from the project	1984
Year in construction	1984
Area of the ground	911.00m ²
Area built	486.00m ²
Team of the project	Marcos Acayaba, Domingo Spascale

3) Residence Frames Acayaba (1996)

In the 1980s, due to major environmental concerns, architecture was marked by the use of traditional local materials, such as wood and masonry, for example. Consequently, in the late 1980s and early 1990s, in addition to concrete, Acayaba also started working with wood.

According to researcher and professor

Paulo Fujioka, 2003, in his doctoral thesis, it is possible to notice the close relationship between the positions of Wright, Artigas and Acayaba, in a process in which the constructive solution is entirely linked to the rigorous structuring of the program, resulting in a differentiated plastic language. Unlike many architects of his time, the plastic solution of his projects became a consequence of the program and the constructive solution adopted, and not the opposite, using and abusing all kinds of technology, material and language, just like Wright. The interrelationships between Wright's work and references to oriental architecture are noted in the structure's triangulation system at the Baeta Residence. The new structural conception adopted by the architect gave the residence a differentiated language, both plastically and structurally, which defined the construction as it was inserted into the terrain, resulting in a configuration of spaces integrated with nature and overlooking the sea, as intended by the clients.

Based on all the experience acquired in the triangulation system at Residência Baeta, Acayaba decided to build a house for his family in a similar style in Tijucopava, also in Guarujá, the Residência Acayaba (1996). Using the same 1.25 m triangular modulated wooden grid (in the case of both projects, Jatobá wood), which by the way had given excellent results, he realized, "due to the performance of the structure, that it could support the same built area with less support. ACAYABA, 2007, p.208). Thus, it was adopted for the Residence.

Acayaba is a much simpler, symmetrical structure that allows only three ground support points instead of six, as in Baeta Residence.

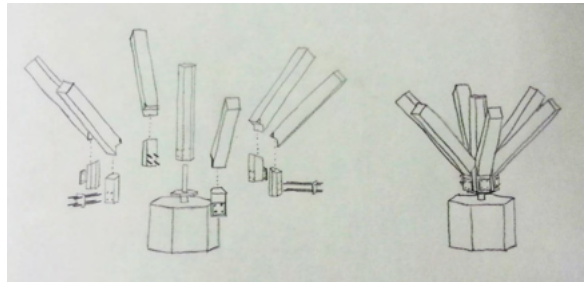


Figure5-Residence Marcos Acayaba (1996).

Source: fileguysFramesacayaba

Figure 6- Support structural.

Source: sketchesgivesresearcher

The spaces are distributed in four floors. Access is via the third, via a walkway (later covered) at the living room and kitchen level, where there are also three terraces with a swing. The lower floor, below the suites, houses a bedroom, laundry and maid's toilet. The spiral staircase, which connects the four floors, is supported by a central wooden pillar and steel cables, which at the same time serve as a guardrail. (NAKANISHI, 2007, p.116).

According to Nakanishi, for the slabs of the covered area of the terrace, where thermal insulation is required.

and low specific weight, resulting in better comfort conditions and avoiding overloading the structure and foundations.

With the experience gained from the Hélio Olga Residence, Acayaba was able to explore even more the potential of wood in these projects. Taking into account the complexity and assembly difficulties demanded by the bracing elements of Hélio's house, and realizing that it would be possible to make wooden fittings with angles that were not necessarily straight, the architect developed this triangularly modulated system (verbal information). (NAKANISHI, 2007, p.132).

This modulation is not new. Frank Lloyd Wright had already used this module design, however, in the Acayaba works, it is a constructive solution that solves all the spatial needs related to the program and the

determinants of the terrain, resulting in a very expressive plastic language, very well integrated with the landscape. “Architecture happens here as a unique symbiosis: art, space, construction and shelter.” (NAKANISHI,2007,p.133)

The use of wood as a structure and closure has plastic qualities (with regard to color, for example), sustainable and thermal, but there is still little skilled labor in this material, raising its prices. With the modular system, it is possible to “reduce waste, increase labor performance and reduce construction time” (JARA; MENDOZA,1984, p.4-13, emphasis added).

Token technique:

Place	Tijucopava-Guarujá-SP
Year from the project	1996
Period in construction	1996-1997
Area of the ground	1963.0m ²
Area built	251.0m ²
Team of the project	Frames Acayaba, Suely Mizobe, Fabio Valentine, Mauro Hallubi

4) Vila Butantã (1998)

Currently, as a result of the need to reduce costs, the construction sector has undergone a great development of many techniques and technologies, which, many times, disregard the natural human needs, in which the market value overlaps the technical and spatial value (use) (MASCARÓ, L., 1990).

In 2002, after many projects worked together with the engineer Hélio Olga, which resulted in several publications and awards for spatial improvement and constructive innovations, both joined forces to carry out an enterprise real estate located in Vila Butantã in São Paulo: Vila Butantã. A set of houses that deviate from the current real estate standard, presenting differentiated solutions, of an exploratory nature, with

the best constructive and spatial solutions according to the conditions of elevation, soil and insolation. All the houses were implanted in a way that favored collective leisure and adapted to the high slope relief and the little existing vegetation cover.



Figure 7 - Mixed structure of concrete slab cast *in loco* on the wooden beams, supported at the wall of masonry-Source:personal archives

In the project, there is a coordination between the various systems that make up the construction, in which the measure of the blocks interferes in the modulation of the frames and in the structure, and the structure interferes with the electrical and hydraulic installations, which later interfere in the conformation of the space and so on.

Unlike other projects in the sector, false ceilings are not used to hide the installations or coatings to hide the structure, making the project cheaper. In this project, the architect’s constant attention to the needs of other specific areas was fundamental. Thus, interdisciplinarity is manifested in the plastic of the building, bringing beauty in the harmonious articulation of each building function.



Figure8-Source:fileguysFramesacayaba

By having its own characteristics with a tonality that highlights the eyes, if well used, the brick does not need plastering or painting, bringing rusticity to the project. It is a cheap material, easy to execute and with a vast workforce in Brazil. Wall thickness increases if used structurally, but in a small, well-designed project this is not a problem. For large projects, reinforced ceramics comes in as a great ally, allowing the realization of projects possible until then only with concrete or steel, and can be used as beams, slabs, bearing walls or even as curved walls and roofs. It is possible to create different forms of zenith lighting, allowing natural light to enter. Reinforced ceramics provide a free and even daring way of designing, despite being a little more expensive.

Technique:

Place	Village Pirajussara- São Paulo, SP
Year from the project	1998
Period in construction	1998-2004
Area of ground	4439.0m ²
Occupied zone	1140.0 m ² (25.7%)
House area type	173.69m ²
Team of the project	Frames Acayaba, Suelymizobe

FINAL CONSIDERATIONS

The conflict between technique and art still prevails today. She will disappear into the extent that art is recognized as the language of the designs of themen. Human consciousness, with its sensitive side and its rational side, has not been conveniently interpreted as an integer, but as the sum in two halves. (ARTICLE,2004,p.117).

As a disciple of the master Vilanova Artigas, Marcos Acayaba seeks to break this paradigm through technical mastery and constant plastic and spatial investigation, treating each project in a different and particular way. In his activity as an architect, Acayaba presents a design posture that characterizes much more of a method than a ready-made model.

Marcos Acayaba's works are characterized by the proper use of the constructive technique applied to the program and the physical environment in which it is inserted, the constant investigation regarding the needs of each material, the labor present in the project region, the assembly and maintenance and the various details required for each project.

Each material has its particularity, with formal and technical advantages that vary according to the project. Whether concrete, steel, wood or masonry, they all allow plastic qualities that do not limit the creative capacity of the architecture even as used in its apparent form.

In this architecture, the solutions follow an aesthetics of logic, in which the choice of materials, the most convenient techniques, demonstrate the rationality and programmatic adjustment expressed in the formal intention of the project, being much more a function of the existing workforce or the environment in which a ready-made formal model is inserted.

Therefore, the importance not only of technical knowledge, but also of architecture as art and space, in which constructive solutions are developed together with formal

intentions, is highlighted.

“It makes me happy to imagine that this building will perhaps be remembered by someone 25, 30 years from now. Maybe because there he kissed his first love. The why doesn't matter. It's just to explain that I like this idea better than imagining that this building 35 years from now will still appear in some architectural dictionary. It's a completely different plan. (...). I must admit that it would be a great pleasure to be able to create things that others love.” (ZUMTHOR, 2006, p.67).

Architecture is an art to be used, in which the most beautiful thing is when art and functionality combine, forming a whole. “The explanation of the form must arise from its use, and when this is eligible, I consider it the greatest of compliments. (...) The place, the use and the form. The form refers to the place, the place is this and the use is this. “(ZUMTHOR,2006, p.69).

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