
José Lei, Rainha Dona Leonor Housing Block, Macau, China, 1961.

# Tropical Modernity: a Hybrid-Construct in South China

BY RUI LEÃO AND CHARLES LAI

Parallel to the discourse of Tropical Architecture and the work of UK architects in the British colonial territories in the Middle East, Africa, and India after the WWII, climate adaptation designs or devices such as *brise-soleil*, perforated cement bricks, sun shading screens, courtyards, etc., started to emerge in modernist buildings in Asia. This article is a preliminary survey of these cases in Hong Kong and Macau since the 1950s. It discusses how tropicality was used in response to the post-war revisionism of Modern Movement that placed emphasis on local identity and culture.

The adoption of Modernism in European Colonial Territories had a multiple layered agenda. From the perspective of the state, it was understood as a method for optimizing the exploitation of these places for more profit. The introduction of the lift, the high-rise, the *brise-soleil,* the fan, the air-conditioner and other climate control devices throughout the 20th century, were all seen as urgent innovations to boost the economy and the speeding up the means of production. To understand the role of architects in spinning the ambivalence of cultural production through architecture, the technological innovations of passive energy are of particular interest to us, such as the *brise-soleil*, the perforated cement bricks and shading screens, and the use made of these technologies to explore the "vernacular" and "regionalism" to signify both the environmental functionality of a building and express cultural meaning.

In places like Indonesia, Malaysia, Singapore, and Thailand, the advent of Modernism and the access to new construction technology led many architects to look back at their traditional techniques and environmental control, to develop new approaches to cultural discourses, aiding the buildup of identity politics on the post-colonial globalized world. With their projects, these architects were re-accessing their local design culture, and testing how Tropical Architecture could be used to assert regional differences. In the case of Hong Kong and Macau, the introduction of Modernist architecture didn't give rise to a re-visitation of the vernacular and proto-tropical traditions, due to the strictly urban and colonial conditions in both places.

In 1958, Hong Kong-born, London-trained, Shanghai-practiced, migrant architect Luke Him Sau (1904-1991) designed the Saint Ignatius Chapel for the Kowloon Wah Yan College with in-fill screens made of perforated cement bricks as a *brise-soleil* facade. It synthesizes both Christian symbolism and modern "Chineseness" with the rectilinear geometry of architectural modernism. Rather than defining it as an isolated architectural event, Luke's use of *brise-soleil* bears certain resemblance to British architects Maxwell Fry and Jane Drew's designs in Ghana since the late 1940s. Their use of perforated cement screens or balustrade as *brise-soleil* devices was quintessential to Tropical Architecture, an architectural discourse reinforced by the 1953 Tropical Architecture Conference, and the establishment of the Department of Development and Tropical Studies in the AA led by Otto Königsberger. Devices of Tropical Architecture such as *brise-soleil* and perforated cement blocks became a design culture that had made its mark across the entire British Commonwealth from Ghana to Singapore to Hong Kong.

Across the Pearl River Delta, in the same year in Macau, the design for the Rainha Dona Leonor Housing Block (RDL) was underway, led by architect José Lei (1930-), a Hong Kong-trained architect from Macau. The block adopts a modernist vision for dwelling, with a stacking of the duplex typology, the use of *brise-soleil*, ventilated concrete blocks and naturally ventilated circulation. The RDL block represents the first intentional effort to signify local modernism relating to the sub-tropical climate of the region and producing a localized cultural artifact to respond to a large scale modern commission. Lei applies to this tower project several of the innovations on solar protection systems from Le Corbusier's research for the Marseille Unité d'Habitation of 1952, adapting it to a more compact urban situation.

## Background, Knowledge Gap, and Initial Findings

When examined against the framework of the Tropical Architecture discourse, the work of Luke and Lei can be seen not only as devices of the function-driven "environmental design", but a branch of modern architecture that

aimed to materialize the sub-tropical climate of the region into an architectural representation that could simultaneously respond and embody local contexts and identities, through the uses of *brise-soleil* and perforated cement bricks.

The frequent use of perforated cement bricks in Hong Kong's modern architecture had turned it into an urban milieu and anchor of local identity. The recent resurgence of the material also mystifies the link between such material culture and the international discourse of Tropical Architecture, leaving behind potentials to compare and dialogue with emerging studies on the same topic in Singapore, Thailand, Indonesia, India, etc. Hence this research aims at discovering, documenting and historicizing the cases and potential links between Hong Kong and Macau's architectural design and the international discourse of Tropical Architecture. In other words, this research defines the perforated cement bricks and *brise-soleil* in the Pearl River Delta's modern architecture not only as a local, isolated vernacular adaptation, but also as a design culture conditioned by a larger international modern architectural discourse. The overlap of Tropical Architecture and the post-colonial processes in Southeast Asia produced a category of architecture not only responding to the emerging science of climatic adaptations in modern architecture, but an architectural genre that was inextricably tied with (post) colonial politics as well. This research put Hong Kong and Macau's Tropical Architecture under the same trajectory: it signifies the production of a localized version of an international architectural culture, as architects saw it not only as a scientific apparatus to cope with the challenges of heat and rain, but as a potential to localize the modern movement in architecture under the asymmetrical power-relation in colonial context.

For instance, the theme of emerging design methods and material to cope with tropical and sub-tropical climate had been the main focus of the *Colonial Building Notes* (1950-1958) and *Overseas Building Notes* (1958 onwards) published by the Building Research Station of the UK Government. The circulation of images and solutions created a transnational design culture. This highlights the role of such networks and is of particular interest in the work of Cantonese-speaking architects of the Pearl River Delta region and their role in the larger discourse of Tropical Architecture.

The paper will assess how such design culture influenced the emergence of the "South China Architectural Faction" (or "*Lingnan* Architectural School"). One of its founding members, Chinese architect Xia Chang-shi (1903-1996) published an article "Lowering Temperature in Sub-Tropical Architecture", in Vol. 10, 1958. Xia's affiliation with the Sun Yat-sen University (or Zhongshan University) and the influence of the teaching staff members like Lin Ka-ming and Lau Sun-fo, as well as other Cantonese-speaking architects who had received education overseas such as Robert Fan (1893-1979), Szeto Wai (1913-1991), Luke, among others.

*Lingnan* Architecture is the umbrella term for the local architecture of Guangdong, Guangxi, Hunan, and Jiangxi provinces in South China. *Lingnan* Architecture, within the regional architecture of the Changsha area, the Pearl River area and Hakka culture can be distinguished by distinct architecture and unique features. Architect Xia thoroughly studied the local houses and their climate-responsive systems and elements which presented a vernacular response of architecture to the hot and humid subtropical climate in many ways, such as with large porches and archways, natural cross ventilation systems with special perforated bricks and roof structures to let air move through the building, and mobile shading systems of bamboo wickerwork.

## A Hybrid-Construct in South China

We have identified several cases that continued the exploration of this approach of tropical adaptation of architectural typologies in Hong Kong, like the public housing estates such as Model Housing Estate, Choi Hung Estate, Wah Fu Estate, St Joseph's Primary School, CUHK Chung Chi College Chapel, HKU Robert Black college, Tang Lung Chau Market, Ward Memorial Methodist Church, Star Ferry Car Park, etc. In Macau, some public buildings from the 1950s, designed by the architect Aureliano Guterres Jorge, João Canavarro Nolasco, Lam Fai Teng and by other local engineers and draftsmen had made incursions into this new science of climate response, namely in the São Lourenço Market, the Mitra Market, the Long Va Tea House, the Liceu Nacional Infante D. Henrique (demolished) and the main block of the São Januário Hospital (demolished), the two latter designed by the GUC, the Planning Office of the *Ministério do Ultramar*.[1]

An analysis of the above will deepen our understanding and contextualize a design culture that we have assumed to be local, fulfilling a rather neglected and urgent chapter of Hong Kong and Macau's post-war modern architecture that heavily interacted with the international scene in both direct exchanges of knowledge and indirect, unintended diffusions across national boundaries in the shifting political landscapes of post-war decolonization in the region.

In 1962, a group of young architects arrived in Macau, to set up an Urban Planning department to substitute the urbanization role of the GUC. In Macau they built projects exploring the climatic, cultural and contextual site-specific concerns, using a modernist lexicon with distinct architectural renderings. Their Portuguese background and the opportunity to observe the daily life of Macau allowed for a whole new level of experimentation applied to their design.

These young professionals were Manuel Vicente (1934-2013), José Celestino Maneiras (1935-), Natália Gomes, and Jorge Silva. They brought with them the experience of Portuguese Modernism and the lessons learned with the Survey on Popular Architecture,[2] a nationwide survey tasked by groups of architects, who, in a direct counter-action against the nationalist revival of the Estado-Novo Regime, organized a systematic mapping of the autochthonous architecture built without architects all over Portugal. This survey had a big impact on the younger generation of modernist architects, leading them to question the context,

the pre-existence and the dimension of the autochthonous in their projects.

José Maneiras, the only Macau-born architect of this group, designed in the 1960s and 1970s several housing projects for private clients. In all of his interviews José Maneiras states that he was solely concerned with the insertion of the building on the site to minimize soil works, on natural ventilation and on solar penetration, but it is obvious that there was a deep humanist contribution to the plastic and cultural expression of Macau Architecture in his built work. His 1966 Fon Wong housing block close to the St. Paul's Ruins,[3] explores very plastic expressions for integrating shading devices into the facade design, based on very functionalist principles. His buildings enhance the use of natural ventilation and are all looking for an expression for modernist principles in the tropics. The Government Staff housing block opposite the Military Club,[4] looks at the same type of solutions as the Fong Wong housing to address climate control to the building, but at a larger scale, designing a piazza in-between the blocks and articulating the scale of the traditional city with a high-rise typology. His project for the *Belle Court* building on Guia Hill pursues the use of projecting roofs and a Brutalist language to deal with climate control, achieving other aesthetic solutions to the same premise of tropical response to architecture.

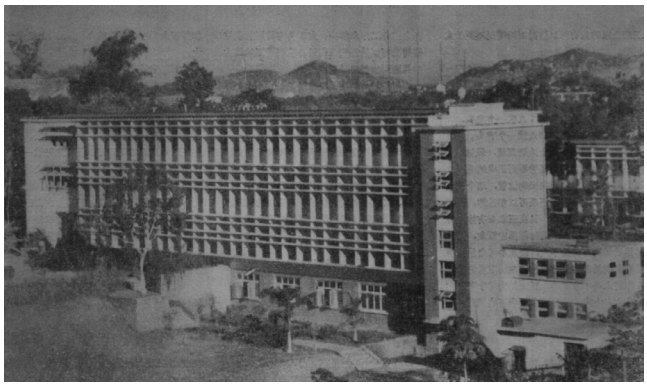
On a crest of Penha Hill, the elegant Adjoin-Secretary residence stands heroicly over Praia Grande Bay. Designed by Jorge Silva in 1962, this careful composition, transpiring Wrightian assimilations, reflects his concentrated exercise to deal with the heat and humidity of the sub-tropical climate and defines a strong urban statement for the dwelling. It makes use of shading screens, projected slabs, high horizontal windows and narrow vertical openings to address the climatic conditions and defines the argument for a sophisticated composition along the street perimeter.

Architect Natália Gomes, had worked as a designer in the public works department and as a partner in Manuel Vicente's practice, to whom she was then married. In 1970, she designed the public showers for Hac Sa Beach. This small piece of infrastructure is fully adapted to its tropical climate. Around the centrally ventilated shower core, a full outer ring of shaded space is placed to act as a receiver of users, and serves the ancillary function for people arriving at and leaving the beach.

Manuel Vicente was the most influential of the new-comers. Since 1963, he practiced in both Macau and Lisbon. Manuel Vicente kept an engagement with the local social context, translating how a Portuguese type of public engagement could be received in the Southeast Asian context. In Macau, he learned the freedom of inserting different realities into the realm of the project, which resulted in a freedom of form in his projects. His work reveals his ability to adapt to the local building practice and his interest in understanding the phenomenological difference of Chinese culture applied to the art of architecture, through the qualities of light, color, scale and spatial proportions.

Three of his projects from the 1960s contributed to the cultural discussion of Tropicality as a cultural

**01** Xia Chang-shi, Sun Yat-sen University (or Zhongshan University, Medical School, Guangdong Province, China, published in his article "Lowering Temperature in Sub-Tropical Architecture", Vol. 10, 1958.



benchmarking for architecture. The CTT Housing Block from 1963 (built in 1965) at Avenida do Almirante Lacerda, designed around a low-rise stacking of duplex apartments, makes use of louvers, *brise-soleils* and sun screens to filter the sunlight to the apartments and the common areas, which evolve around an interior patio and the staircase that together generate a ventilated micro-climate for the block.

The Pa Ka Pio is a typical office building, built in 1964 on Avenida do Infante D. Henrique, to house the local Pa Ka Pio lottery staff premises. The ground floor is an open space, occupied by the Number Drawing machine placed ritualistically at its center. The design of the facade makes an interesting investigation of the proportion of the typified windows, intended to optimize climate control to the office spaces. Manuel Vicente details the facade with elements to reminisce bamboo structures and their structure articulations, a vague reference to bamboo structures which are used for scaffolding on civil works, and are still a common sight on Macau construction sites.

Along Rua da Praia do Bom Parto, in the Helen Liang Orphanage building, from 1966 (designed from 1963) we can find a myriad of climate control devices applied to the facade: the *brise-soleil*, the louver, the perforated cement bricks, raised ventilation windows and pergolas. These are used to produce a very complex object, out of a simple volumetric design, where each functional part is differentiated by use of different fenestration and shading devices. The mature plastic use of these elements, over a mixed use of concrete and brick, also meant to express the functional divide of the plan, results in a very novel architectural rendering that is both Brutalist and heterogeneous. Local South Chinese Architecture, or Lignan style tradition had developed valid responses to the subtropical climate of South China, reflected in the temples, mansions and other public buildings built in the local tradition by Chinese Interests. The experience of this architecture is well filtered into the projects of Manuel Vicente, with a clear intent on avoiding cultural appropriation.

Manuel Vicente returned to Macau in the late 1970s, after spending several years at the *Housing Development Fund*[5] in Lisbon, where he headed the planning sector during the heated years of the SAAL[6] process. That experience was very

**02** Luke Him Sau, Saint Ignatius Chapel, Seattle, USA, 1958.


**03** José Celestino Maneiras, FON WONG housing block close to the St. Paul's Ruins, Macau, China, 1966.

**04** Natália Gomes, public showers for *Hac Sa* Beach, Macau, China, 1970.

**05** The Helen Liang Orphanage, from 1966, Manuel Vicente's first project for Macau, designed from 1963 for the Praia Grande waterfront location.

**06** Manuel Vicente's, *Fai Chi Kei* Social Housing Scheme, 1979-1980, his most celebrated building in Macau, demolished in 2010.

**07** Raul Chorão Ramalho, Portuguese School of Macau, Macau, China, 1963-1966, architect Raul Chorão Ramalho's masterpiece.

formative for the role he took up in Macau, where he used social resettlement programs to produce consolidated and qualified stretches of city where nothing else was in place yet. Like the Kong Mou Un Resettlement Block in Toi San, the STDM Resettlement Housing block, both built in 1965 and the Fai Chi Kei Social Housing Scheme of 1979-1980 (demolished in 2010).

The Fai Chi Kei scheme revisits many of the themes that were initiated in his projects from the 1960s, but re-organized through an over-riding urban scheme that defined a hierarchy of monumental gates ordering a central public space. All the housing units were clustered around naturally ventilated patios, which were organized in a comprehensive system, where the central piazza was a useful cross ventilation device. The proportion of the central piazza's section made optimal use of the shadows produced over it by the two blocks during the day.

In the last part of the 1960s, there was another important agent in the Modernist narrative of Macau. In one of the last manifestations of the GUC, which was now known as GUU,[7] the Portuguese architect Raul Chorão Ramalho (1914-2002), whose practice had been intensely involved with the SAAL process in Portugal, was directly commissioned for several public buildings for Macau, of which the Guia Kindergarden[8] of 1964, the Leal Senado municipal staff housing tower of 1966 at Avenida Sidónio Pais, the semi-detached houses for higher ranking government servants at Avenida Coronel Mesquita of 1962 (built in 1965), and the Escola Portuguesa de Macau [Portuguese School of Macau] (former Escola Comercial Pedro Nolasco) of 1966, were important contributions to Macau's Modernist Tropicalism.

The semi-detached houses project, from 1963 (completed in 1966) proposed an integration of the *brise-soleils* into the geometry of the unit, using it to draw the shape of the patios around the dwelling. The houses make use of perforated cement bricks and shading screens to regulate the design of the exterior and semi-exterior spaces.

The Escola Portuguesa de Macau (1963-1966) is a sophisticated building, and architect Raul Chorão Ramalho's most important legacy to Modernism in Macau. It is organized as a system of pavilions connected through a network of pergolas and hallways. This scheme allows for a series of in-between gardens, passages and patios that draw a well-balanced articulation of interior and exterior spaces for the school's use. The building adopts *brise-soleils*, shading screens and louvers to articulate the complex spatial arrangement, and develops spatial solutions that relate to both the Chinese tradition and the Mediterranean.

The Escola Portuguesa de Macau building is probably the most sophisticated Modernist artifact built in Macau. It proposes a rich set of climate control devices and builds an architectural discourse around the use it makes of them. From the mid-1970s onwards, with the general adoption of the fan and later the air-conditioner, the focus on climatic adaptation concerns in the projects diminished, resulting in a reduction of the depth of the building's skin, a loss in the use of shadow and the abandonment of detailing on the filtering light into buildings.

### Notes

1 The GUC, or *Gabinete de Urbanização Colonial*, was a department of the *Ministério do Ultramar* that had oversight of the Colonial territories, namely for management of resources and planning strategy.
2 *Inquérito à Arquitectura Popular.*
3 The St. Paul's Ruins on Monte Hill are the remains of the Mater Dei Church, a Jesuit temple that burned down in the early 19th century and is today the city's main touristic attraction.
4 An important secular Institution of Macau.
5 *Fundo de Fomento de Habitação.*
6 The SAAL operation (Local Ambulatory Support Service) promoted by the First Provisional Government in the aftermath of the 1974 revolution involved Architects and Residents' Associations in a unique process of joint production of collective housing with controlled costs.
7 The *Gabinete de Urbanização do Ultramar* [Overseas Urbanization Office].
8 Known as *Infantário da Guia.* Originally named *Infantário Avé Maria.*

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