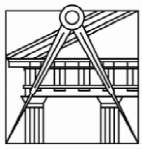
Universidade Técnica de Lisboa
Faculdade de Arquitectura



Boundaries in Architecture
The Japanese Transitions

(Dissertação/Projeto para a obtenção do Grau de Mestre em Arquitetura)

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Lisbon, March 2013

À minha família,

Mãe, Pai e Vera.

I would like to thank to my family for all their support during my student years.

Thanks to my housemate, Mário Sousa, for the five years sharing ideas and knowledge as well as all the funny and good moments.

Thanks to Ana Luísa, Andreia Lopes, André Rosa, Liliana Lino, Ana Júlia, Bruno Gonçalves, Nídia Brás, Rita Almeida, Jani Dunne and all my friends that supported me during this final project.

Thanks to Lander Patrick, Luís Freitas, Maira Carpenedo and Luís Valente for their long time friendship and support during my student years.

Thanks to my supervisor Nuno Miguel Arenga Reis for all the support, attention and all the knowledge shared with me.

Thanks to professor Shigetomo Kikuchi for all the support during my student time in Fukuoka.

To all these people, thank you so much.

Abstract

The boundaries in Architecture is a theme that always have been relevant in the interpretation of the architectural and urban spaces, however starting to be even more emphasized in the last century. With the constructional facilities provided by the utilization of new materials, the relations between areas, functions, characters as well as between private and public started to be questioned. The domain of the limits became a challenge in all scales and realities.

This dissertation focuses on the theme of Boundaries in Architecture based in an experience *in situ* of the traditional Japanese architecture and its rich set of transitions. However, once projecting in a Japanese city, the density is turned into a concern added to the global work. Thus, the research relies in two different themes and scales, by placing the question: how is it possible to apply the rich characters and boundaries of the traditional Japanese architecture in such a dense city, keeping its density and compression?

Taking advantage of a living experience in Japan, the answers are constantly searched not only with theoretical bases but mainly through several experiments of the Japanese architectural and urban spaces. These personal experiences constitute the main support of the entire research.

With this research resulted an experimental project which tries to answer to the Japanese urban density but with the application of several transitional spaces of the traditional architecture. These project and research were fundamental for an understanding of a city and architecture different from the ours, but also, and consequently, for a better understanding of our cities, architecture and spatial appropriation, through the constant comparisons between both.

Key-words: Limit, transition, density, articulation, Japanese tradition

Resumo

O tema dos limites e fronteiras na Arquitetura sempre foi relevante para uma interpretação dos espaços urbanos e arquitetónicos, começando no entanto a ganhar relevância no ultimo século. Com as novas facilidades de construção adquiridas através do uso de novos materiais, as relações entre os diferentes espaços, funções, caracteres assim como entre publico e privado, começaram a ser questionadas. O domínio dos limites na escala arquitetural assim como na escala urbana começou a ser um desafio para Arquitetos e Urbanistas modernos e contemporâneos.

Esta dissertação centra-se no tema dos limites em Arquitetura (Boundaries in Architecture) apoiando-se numa experiência *in situ* da Arquitetura tradicional japonesa bem como no conjunto dos limites e transições a ela associados. No entanto, uma vez projetando numa cidade Japonesa, a questão da densidade torna-se numa preocupação acrescida ao processo projectual. Assim, o projeto apoia-se sobre dois diferentes temas de escalas distintas, colocando a questão: como é possível aplicar os carateres e transições da Arquitetura tradicional Japonesa numa cidade extremamente densa, mantendo a sua densidade e compressão?

Tirando partido de uma experiência de vida no Japão, as respostas ao projeto são constantemente procuradas não só em bases teóricas mas também, e principalmente, em referências da Arquitetura e cidade Japonesas que foram experimentadas. O conjunto destas experiências pessoais tornam-se no principal apoio de todo o processo de pesquisa e projectual.

Com esta pesquisa resultou um projeto experimental que tenta responder à densidade urbana Japonesa mas mantendo a aplicação de diversas transições e limites. Todo o processo de pesquisa para a realização do projeto e dissertação foi fundamental para o entendimento de uma Arquitetura e cidade a nós alheias, mas também, e consequentemente através de uma constante comparação, um melhor entendimento das nossas cidades, Arquitetura, e diferentes apropriações espaciais no mundo ocidental.

Palavras-chave: limite, transição, densidade, articulação, tradição Japonesa

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Introduction



Image 1 - Hosokawa samurai House, Kumamoto

Source: picture of the author

The present dissertation focuses on the theme of *Boundaries in Architecture* and its relevance regarding contemporary architecture. This concept has always been present in the interpretation of space, that is, urban spaces in a city and the relation between areas, functions and characters, including housing and its spatial organization. It is both a concern and a challenge in all scales and realities that architects are dealing with.

Taking advantage of a period of time spent living in Japan, I applied the acquired knowledge about the Japanese culture and architecture and its techniques for controlling the boundaries between several spaces, and mainly between the interior and the exterior.

For a better understanding of the theme of boundaries and articulation of spaces, as well as the project of housing in the Daimyo neighbourhood, this dissertation is divided into three different chapters which approach and explain the themes of the project in the different components, times and scales, according to the different struggles of the project faced during its conception.

The first chapter explains the theme of boundaries from different points of view of the subject, from both western and oriental architects and authors. This allows for a general view of the theme in different times and its importance and approach by different architects all over the world. For a real approach of the Japanese traditional architecture, I will also explain the boundaries within it, regarding my direct appropriation and experiencing of Japanese spaces. Based on this personal experience I will present the spaces and sequential articulation of three examples of these buildings of the traditional Japanese architecture, a temple, a samurai house and a *machiya* house.

Approaching a different scale, the second chapter is related with the Japanese city and its urban density. After an explanation of the Japanese city and its elements I will explain two different architectural approaches as an answer for density, the Mat Building of the Team X members, and the Metabolism from the Japanese architects.

The third and last chapter is an explanation of the entire project of an housing building in Daimyo neighborhood. This chapter tries to create a general connection between the two previous ones, thus resulting in the final project. Besides, during its explanation, the project is compared with the main themes and with architectural and theoretical examples enounced in the previous chapters.

This dissertation is a personal study of the theme regarding an experience *in situ* of the spaces, and it is strongly supported by two different but complementary components, the theoretical concepts and my own living experience in the Japanese space and culture.

Chapter 1

Boundaries and Limits in the Japanese Architecture

1.1 Concepts of Limit and Transition

Although architecture has always been present through the ages, concepts of limit and transition have become more relevant in the present as a response to the limitations of Modernism. Modernism has brought about several problems related to spatial and functional integration regardless of the positive effects of architectural development. New materials and technical assembling created not only new ways of thinking about space, but also several innovative concepts regarding the transitions between spaces, and so, tried to solve problems created by modern ideas. Therefore, some actions were established by several architects to overcome the problems of Modernism. The "*in-between*" concept was initially thought of as important seeing that it took into consideration the Architecture of the Future. This concept was greatly studied not only by architects from the Western world such as Aldo Van Eyck and Herman Hertzberger but also by those from the Far East, Kisho Kurokawa and Arata Isosaki. By taking into account important models of transition in traditional architecture, they rethought the "*in-between*" concept for the present and global architecture.

So, the Boundaries in Architecture became relevant for the new spatial communication, since it was allowed to create the spatial communication unhindered by constructive problems.

These concepts of limit and transition are also deeply present in my project of housing in Daimyo area, Fukuoka, which will be referred to in this chapter, regarding its successive spatial division by layers, but always keeping open connections between them. Besides projecting in a dense Japanese urban area, I struggle to keep the boundaries between the several spaces with the relevance that they need, and which the contemporary city also deserves, emphasizing the different confrontations and managing them in diverse ways.

1.2 The In-Between in the Western World

The concepts of in-between are related not only with architecture but also with the humans confrontation with space, things, etc. Therefore, it is important to have profound knowledge in several areas in order to have a better understanding of the "*in-between*" concept and its importance for human relations before relating it to architecture. Keeping this in mind, I will enounce several concepts by different authors, architects as well philosophers.

1.2.1 Martin Buber and the concept of *Intersubjectivity*

The "*in-between*" concept was studied in the field of philosophy by Martin Buber, a 20th century Austrian philosopher and writer, who, in his publications, gave emphasis to the idea that there is no existence without communication and dialogue, and that objects do not exist without interaction. Buber explained in *Ich und Du. In Über das Dialogische Prinzip I* the relation between *I* and *things* (*ich* and *es*) and the *I* and *you* (*ich* and *du*). He believed that Man was born with the ability to relate with his/her

neighbour, i.e., *intersubjectivity*. This is the relationship between subject and subject or subject and object. The relationship that happens between *Me* and *You* (relationship) or between *Me* and *That* (experience), describes the two dimensions of the philosophy of dialogue.

Martin Buber says that these relations of *I* in the *I-you* relation are different from the *I* in *I-it*. "*I encountered you, because you turn towards me and approach. But the direct relation between you and me is created by my action.*"[1]. Therefore, such relationship between you and me is simultaneously active and passive, that is, being chosen and choosing.

However, in the relationship between *I* and *it*, the realm of *it* (*es*) exists in a complex of time and space. "*When the relational phenomena have passed, the individual you must become one it, but individual its, by moving into relation with phenomena, can become a single you*."[2]

Moreover, he states that interrelationships involve dialogue, meeting and responsibility between two subjects or the relationship between subject and object. Martin Buber says "*The fundamental condition of being human is, man with his fellow man. It is rooted in the fact that a being considers another as an other, so as to be able to communicate with him/her in a sphere which is common to both and which transcends the individual spheres of both. I call it the sphere of the in-between. It is a primary category of human reality. It will be the starting point for the real third.*"[3]

Only the confrontation between two different things, I mean, object and object, object and subject or subject and subject, creates the real essence of existence, an existence of relationships. Without confrontations and relations there's no existence.

This Buber's logic of the *I* and *you* transcended the Western logic and approached the Oriental World, more specifically the Buddhist philosophy.

1.2.2 Herman Hertzberger and the In-Between

Regarding the architectural field, several architects have discussed the theme of "*in-between*" related to habitable spaces, subsequently the philosophic precedents as an answer to the problems of the new age. Herman Hertzberger shows his concern towards the interpretation of architecture by modern and contemporary architects, thus criticizing their way of thinking that architecture is as a sculpture instead of the creation of space between physical elements. Additionally, he considers new Architecture to be the suffering of and show-offing of an object. Architects think more about volume and objects without dealing specifically with space, occupation and dwelling. According to Hertzberger, *in-between* space is all the space which remains between objects. Therefore, this space is what architects should be worried about. "*Everything that gets built is – necessarily – the object-like or thing-like, physical, 'bodily' aspect of architecture. We have to look for space where it remains, or has been left, in-between,*

[1] Kurokawa, Kisho - "*The Philosophy of Symbiosis*", Academy Editions, Great Britain, 1994, p.141
[2] *Idem, Ibidem*
[3] P. Klee - (1925) *Paagosiches Skizzenbuch* Munich (reprint, Mainz 1966) *in* Farhady, Maryam and Nam, Jeehyun, *Comparison of In-between Concepts by Aldo Van Eyck and Kisho Kurokawa – ThroughTheories of 'Twin Phenomena' and 'Symbiosis'*, Journal of Asian Architecture and Building Engineering, May 2009

shaped to this end, constructed with spans or cantilevers, recesses, indentations, coverings, galleries, loggias and so forth."[4]

Besides, Hertzberger provides some concepts about the transition of space, which he names *threshold.* He says, "*The threshold provides the key to the transition and connection between areas with divergent territorial claims and, as a place in its own right, it constitutes, essentially, the special condition for the meeting and dialogue between areas of different orders*"[5].



Image 2 - Herman Hertzberger, Central Beeher, Apeldoom, 1973

Source:http://www.earchitect.co.uk/architects/herman_hertzberger.htm

1.2.3 Aldo Van Eyck and the Relativity

Aldo Van Eyck, member of the Team X, subsequent to the philosophy of Martin Buber, is another European architect that reveals special cocern with contemporary architecture and the path it is taking. Van Eyck thinks tradition is being forgotten and, with it, all the knowledge acquired throughout the generations is being lost. In addition, Van Eyck tries to understand the architectural heritage and its retained values, by reformulating and reconstructing it. He (re)introduces several concepts and notions in architectural thinking such as identity, reciprocity, twin phenomena, in-between realm, configuration, counterform, place and occasion. By considering these notions, he believes in the power of intervals, which can transform vertical forms that create closed spaces into horizontal, open and linear expansion of space, in a continuous connection. Taking in the concepts of relativity, in-between and twin phenomena, and having the avant-garde artistic and scientific movement as a foundation, Van Eyck states that the coherence of things is not inherent in central and dominant principles, but instead, in their reciprocal relations. This relativity concept shows that even autonomous things can be in perfect relation, and this relation is as important as the real things themselves. In relation to the twin phenomena, Van Eyck declares that opposites always remain opposites, however this does not mean that they should neither be taken to an extreme nor can they be in perfect relation between themselves. Van Eyck says that the polarities can occur in two different levels: structure and form. At the structural level, the most evident way to connect two opposite things is with an in-between. This occurs whenever one tries to make two opposites extend until they

[4] Hertzberger, Herman - "*Space and the Architect - Lessons in Architecture 2*", Rotterdam, 010 Publishers, 2000

[5] Hertzberger, Herman – "*Lessons for Students in Architecture*", 010 Publishers, p.32 *in* Farhady, Maryam and Nam, Jeehyun, *Comparison of In-between Concepts by Aldo Van Eyck and Kisho Kurokawa – ThroughTheories of 'Twin Phenomena' and 'Symbiosis'*, Journal of Asian Architecture and Building Engineering, May 2009

get to a point that these two opposites are simultaneously present, thus creating an interpenetration of two different worlds. This is a place filled with "*multiple meaning in equipoise"*[6].



Image 3 - Aldo Van Eyck, Amsterdam Orphanage, 1960

Source: http://www.archdaily.com/151566/ad-classics-amsterdam-orphanage-aldo-van-eyck/13-180/

1.2.4 The Smithsons and the Charged Void

Other members of the Team X, Alison and Peter Smithson were important modern architects that developed new ideas about the city and the house and the correlation between both. They focused mainly, as well as all the Team X, in the relations between cell and cluster. For them, the cell, a single building or space that lodges private human activities, is part of the cluster and is organized in an urban principle of "from cell to cluster". This principle is related with an organization of components of different sizes - from cell to cluster and from cluster to city - which creates a variation between private and public spaces in an urban mattress.

The Smithsons believed that the cluster, as a component of the city and a group of cells, is mainly an accommodation of a specific community in the entire city. This concept is associated with an organized group of cell, stem and mat, which are all correlated components.



Image 4 - Village: Fold Houses. Allison Smithson, 1995

Source: Forés, Jaime J. Ferrer - "*Mat Urbanism: Growth and Change*", Universitat Politécnica de Catalunya

[6] Van Eyck, Aldo – "*Aldo Van Eck-Hubertushuis*". Stichting Wonen, p.82, Amsterdam *apud* Farhady, Maryam and Nam, Jeehyun, *Comparison of In-between Concepts by Aldo Van Eyck and Kisho Kurokawa – ThroughTheories of 'Twin Phenomena' and 'Symbiosis'*, Journal of Asian Architecture and Building Engineering, May 2009

With these concepts and adding the attempt of creating autonomous stems, the mat arises - a network of stems and cells. Influenced by several historical dense cities, mainly the Arabic ones, the mat-building is an organized network of circulation routes and support systems which allow a multidirectional growth and flexibility for unifying several clusters. The Smithsons and Peter Sigmond explored the concepts of mobility and connectivity in a mat's structure in their project for Hauptstadt Berlin. This project emphasizes different relations between part and whole and, suggesting new forms of mobility, propose different patterns of connectivity which are associated with open networks instead of divisions.

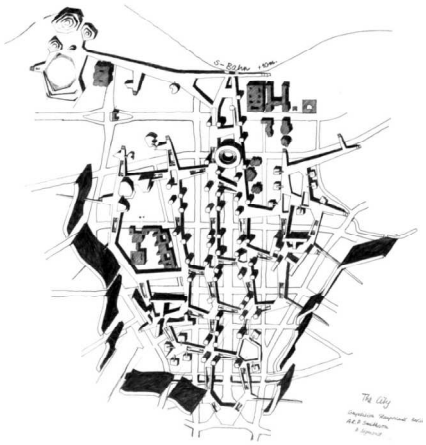


Image 5 - Hauptstadt Berlin, Smithsons and Peter Sigmond, 1958
Source: Forés, Jaime J. Ferrer - "Mat Urbanism: Growth and Change", Universitat Politécnica de Catalunya

1.3 The In-Between in Japan

While in Europe several architects started to be concerned with the contemporary architecture and its values trying to find solutions for the problems they encountered, in Japan a rethinking of the space and spatial relations arose, especially with the appearance of metabolism ideals. Some of these ideals or concepts cannot be appointed as in-between or transitional concepts, but, as Japanese spatial concepts, they are always related and tried with the limits and transitions in the spatial organization. However, its strong and direct relation with the Buddhist Philosophies, the metabolism concepts can easily approach the boundary concepts in the spatial forms and interrelations between different realms. These Japanese concepts are as well entirely related with the Japanese spatial appropriation of space, a different one from the Westerns. As Kisho Kurokawa says "*One could say that the difference between Western and Japanese space is that Western space is discrete and space in Japan is continuous. Western architecture is created to conquer nature and the significance of the wall, dividing exterior from interior, is very great for this reason. Japanese space, by contrast, seeks to harmonize architecture and nature, to make them one, by enveloping nature in architecture and making architecture and nature equal partners.*"[7]

[7] Kurokawa, Kisho - "*The Philosophy of Symbiosis*", Academy Editions, Great Britain, 1994, p.155

1.3.1 Kisho Kurokawa and the Symbiosis

Kisho Kurokawa, one of the founders of the Metabolism movement in Japan, expresses his special concern towards the philosophic ideas of the western world which is a philosophy of dualism between different worlds, such as religion and technology or science and art. As such, Kurokawa takes the philosophy of Buddhism as a basis; that is, taking the Buddhist concepts such as *ma*, *ku* and *symbiosis,* in the architectural field, thus creating the concept of Metabolism. This new movement, unlike western philosophy, defends the coexistence between opposites through the life principle of symbiosis. The term Metabolism comes from the field of biology and is related to the process and change of a creature during its life. This movement is based on two principles of the biologic concept: first, it defends that an architectural building should not be static and untouchable once it is completed, but instead, it should be in constant transformation so as to respond to different times, thus taking into consideration that everything in the world is totally static and should involve a process that consists of past, present and future. The second concept is related to the synchronicity of space which is associated with the concept that every culture has its own character and can be linked to every other culture in the world. It is the basis for the change from internationalism to interculturalism.

Kurokawa considers the concept of symbiosis and enounces different types: symbiosis of part and whole, symbiosis of interior and exterior, symbiosis of past and present and symbiosis of man and technology. According to Kurokawa, in architecture and city planning, the concept of the intermediary is an essential key for the philosophy of symbiosis. Moreover, the *in-between* creates a continuous and dynamic relationship between two opposites without changing their opposing characteristics. This relationship can be made by a spatial distance or a temporal space between opposites.

For Kurokawa, the symbiosis is different from harmony, compromise, amalgamation or eclecticism. The symbiosis is possible when recognizing the real importance of the *sacred zone* between opposing factors and different elements, or *"between the extremes of dualistic opposition."*[8].

As Kurokawa says *"The second condition necessary to achieve symbiosis is the presence of intermediary space. Intermediary space is important because it allows the two opposing elements of a dualism to abide by common rules, to reach a common understanding. I call this a tentative understanding. Intermediary space does not exist as a definite thing. It is extremely tentative and dynamic. The presence of intermediate space makes possible a vibrant symbiosis that incorporates opposition."*[9]

For Kisho Kurokawa, the intermediary space is even more than a simple *in-between* space. It can act as a stimulus for metamorphosis. That is, the bounds of the intermediate space are always in motion, which, due to the existence of this intermediate space, reveals the life principle itself in all its ambivalence, multivalence and vagueness. [10]

[8] *Ibidem*, p.29
[9] *Idem*, *Ibidem*
[10] *Ibidem*, p.30

1.3.2 Fumihiko Maki and the Japanese *inner-space*

When talking about *inner-space* in the Japanese tradition we can relate it to several dimensions of confrontation. Fumihiko Maki talks about the spatial and psychological organization of the Japanese land as an association of *inner-spaces* which was related, in the ancient times, with the difference between the mountains and cities. This difference has established an organization and confrontation of different poles. For a better understanding, when looking at the Japanese spatial organization it's possible to understand a strong confrontation between cities and mountains. The Japanese cities are mainly settled in the plain and waterfront lands, leaving the mountains as depth, occult and secret areas. These occult lands are considered as *inner-spaces* where were established the main temples and Shinto and Buddhist monasteries were established. Besides that, Maki make a distinction between the *inner-space* of Japan and *center* of European cities. While the European cities are organized according to centers, setting the main and most impressive buildings, as churches, concentrated in the central districts, in Japan, the impressive temples are mainly located in a kind of gap outside to the central urbanization. As Maki states *"In the West, the idea of a center (that is, a mountaintop) was expressed in the form of cities, churches, and spires, whereas in Japan mountains were expressed, in tumuli and gardens, in such a way as to suggest inner space, not a cosmic pivot."*[11]



Image 6 - Scene of Yabukoji road beneath Mt. Atago, from Hiroshige Ando's Hundred Views of Edo series

Source: Maki, Fumihiko - "*Nurturing Dreams. Collected Essays on Architecture and the City*", Massachusetts Institute of Technology, Cambridge, 2008

However it's possible to take this Maki's concept of *inner space* to a smaller scale, relating it with the traditional Japanese house. According to a Maki's experience of a visit to a *machiya* in Akashi-cho in the Tsukiji district of low-city Tokyo, he states *"Stepping into the house through a latticed door slightly over a meter in width, I found not in front of me but to one side a raised doorsill leading to a small, 4.5-mat (about seven-square-meter) room behind shoji panels. In the center of the room was a kotatsu, a quilt-covered table built over a sunken pit. Light entered from the street, which ran parallel to the vestibule through which I had entered. This section of the house was used for receiving guests. Behind this room was a second 4.5-mat room combining the functions of kitchen and bedroom"*[12]. According to Maki, that room

[11] Maki, Fumihiko - "*Nurturing Dreams. Collected Essays on Architecture and the City*", Massachusetts Institute of Technology, Cambridge, 2008, p.160

[12] Maki, Fumihiko - " *Nurturing Dreams. Collected Essays on Architecture and the City* ", Massachusetts Institute of Technology, Cambridge, 2008, p.155

expressed a "*complexity of orientation and density of space manifest*" in such a small area. The different characters of the room, as the household Shinto shrine, the family Buddhist altar and a *tokonoma* alcove, creates a sacred-zone of the house and reinforces the idea of inwardness and depth, just like an *inner space*.

1.3.3 Arata Isozaki and the concept of *Gap*

When taking the Japanese traditions in the architectural and philosophic fields as the basis, some other architects as Arata Isozaki and Yoichiro Hosaka show their special concern regarding in-between space and its importance for architecture, also known as 'gap'. Isozaki uses the word 'gap' to describe the empty space between two things, this is, old concept of *ma* of Buddhist philosophy, which states, "*It seems to me that ma ought to be best thought of as gap, or (as with the original Sanskrit meaning) an original difference immanent in things"*[13]*.* However, Yoichiro Hosaka says this distance between two things, that is, *"In many cases we could see two worlds that are distant enough not to influence each other directly, but still related… gap is a vital part to make it possible for each area to keep its identity. In a physical level, gap has an amorphous structure"*[14]*.*

1.3.4 The Concepts of *Ma* and *Ku* of Buddhist Philosophy



Image 7 - Chinese caracter for Ma

間, the Chinese character, is used to write the word *ma*. This character is the union of two different characters, which means door and sun. In the kanji dictionary, this word has several meanings in a spatial and temporal context:

1. (space in-between) INTERVAL, space, opening, distance
2. (time between) INTERVAL, duration of time, period
3. BETWEEN, among
4. Timing, situation, occasion
5. Room, chamber

According to the dictionary, *ma* is primarily coated as space. However, for the Japanese culture, it is also related to a temporal aspect. It is, in this way, temporal and spatial interval. The concept of space in Japanese culture has a different connotation to the English one. In the English dictionary, the word *space* is related to the volumetric area. But for the Japanese culture, the word *ma* describes the real essence and

[13] Isozaki, Arata – "Japan-*ness in Architecture*", Massachusetts Institute of Technology, p.95 *in* Farhady, Maryam and Nam, Jeehyun, *Comparison of In-between Concepts by Aldo Van Eyck and Kisho Kurokawa – ThroughTheories of 'Twin Phenomena' and 'Symbiosis'*, Journal of Asian Architecture and Building Engineering, May 2009

[14] Hosaka, Yoichiro – "*Kyokai no Katachi* " [Shape of Boundary], Kodansha, p.6-7, 95 *in* Farhady, Maryam and Nam, Jeehyun, *Comparison of In-between Concepts by Aldo Van Eyck and Kisho Kurokawa – ThroughTheories of 'Twin Phenomena' and 'Symbiosis'*, Journal of Asian Architecture and Building Engineering, May 2009

conscience of place, in a perfect control of continuity of the relationships between objects and intervals.

As we have mentioned before, several Japanese architects have talked about the *ma* concept regarding the importance of its philosophy for contemporary architecture and its connection with Japanese culture. Kisho Kurokawa claims that *"spacial [sic] character of Japanese culture can perhaps best be described by its multiplicity of 'greys'. Grey represents the Japanese multidimensional cultural essence, a synthesis of contradictions"*[15]. To him, *ma* describes this as a grey-zone or buffer-zone.

According to Japanese tradition, everything in the world functions as a network of events separated by non-eventual intervals. These non-eventual intervals are known as *ma,* an intertwining of space and time. This kind of 'space' that *ma* projects is totally different from the three-dimensional space concept. An example of this kind of 'space', the *ma* concept is the well-known *engawa* of the Japanese traditional architecture. This space is an extension of the interior space of a Japanese house which goes around the perimeter of the house and protected by the extension of the roof. This space neither belongs to the interior nor to the exterior. It is an in-between space between the two, a third space that mediates in-between. The *engawa* is a perfect example of the grey-zone or buffer-zone, a synthesis of contradictions communicated by Kurokawa.



Image 8 - Toji-in Temple, Kyoto
Source: picture of the author

Related to the concept of *ma,* there is also the Buddhist concept of *ku*, i.e., *ma* can contain *ku*. The Japanese word, *ku*, means void, and is related to the Buddhist concept of *sunyata*, the absolute emptiness. Ku is an idea of possibility that "*embraces all contradictions and paradoxes*"[16], and, according to Japanese philosophy, the void (*ku*) has no limits for expression.

Before the 19th century there were no words to describe the architectural and urban space in Japan. Only after the Meiji era (1868 - 1912) with the contact with the occidental world, the concept of space was introduced by the japanese term of *kukan*, which means empty space. However the Japanese already had the concept of space in

[15] Kisho Kurokawa, "*Rediscovering Japanese Space*", p. 56 *apud* Kwok, Ricky – "*Architecture of the Interval",* January 2010

[16] Kisho Kurokawa, "*Rediscovering Japanese Space*", p. 55 *apud* Kwok, Ricky – "*Architecture of the Interval",* January 2010

art, represented for example in the zen paintings using mountains and clouds in a long distance.



Image 9 - Painting from Ike no Taiga

Source: Maki, Fumihiko - " *Nurturing Dreams. Collected Essays on Architecture and the City* ", Massachusetts Institute of Technology, Cambridge, 2008

1.3.5 The concept of *Oku*

奥, is the Chinese character for the word *oku*. This is another concept of the Buddhist philosophy and is related with the organization of Japanese lands. Called by Fumihiko Maki as innermost area, *Oku* is directly described as *gap* in the Japanese urbanity, however, this gap is different from the void of the *ku* concept. In *oku*, it means the sacred zone, and it reveals itself as the sacred zone separated from the main urban area which is the main place in the mountains and woods. Therefore, these areas are considered sacred areas and are the places where temples and monasteries were established. Maki quotes - *"Oku also has a number of abstract connotations, including profundity and unfathomability, so that the word is used to describe not only physical but psychological depth. It is interesting to note how often the Japanese use the word in adjectival form. Such usages include oku-dokoro (inner place), oku-guchi (inner entrance), oku-sha (inner shrine), oku-yama (mountain recesses), and oku-zashiki (inner room), all relevant to the notion of physical space; oku-gi (secret or hidden principles) and oku-den (secret mysteries of an art), referring to things invisible but present in hidden form; and o-oku (wife of a shogun) and oku-no-in or oku-gata (wife of an aristocrat or nobleman), terms suggesting social position. Evident in the use of all these words is a tendency to recognize and esteem what is hidden, invisible, or secret."*[17]

[17] Maki, Fumihiko - " *Nurturing Dreams. Collected Essays on Architecture and the City* ", Cambridge, MIT Press, 2008, p. 154

1.4 Boundaries in Japanese Architecture

Regardless of all the architectural changes in the western world throughout history, Japan took a different path concerning its architectural development, perhaps due to its unfavourable location in the world. Although Japan went on an individual course in developing its own architecture and methods up till the Meiji era, it was always done according to the needs of both protection and relations. This is what makes Japanese architecture so pure and robust, regarding its own individual methods so as to respond to individual needs.

In the beginning of the Japanese Nation, Japanese architecture was mainly characterized by temple architecture without any distinction between types of buildings. This type of architecture prevailed across the Japanese territory until the influence of the continent and the introduction of Buddhism in 551 AC. The implementation of Buddhism caused several alterations to the esthetical, organizational and structural components of architecture. It started with the introduction of Chinese aspects of Buddhist architecture, from temples to palaces. Nevertheless, throughout this long period, Japan transformed and restructured its architecture in an individual process. Consequently, it always took into consideration the relationship between construction and nature seeing that Japanese people worried about the relationship between these two elements: Nature and humanity. Therefore, Japanese architecture developed the concept of boundaries in an extreme way; that is, according to its need to relate itself to its surroundings. Moreover, Buddhist and Shinto religions were important development drivers of boundaries, due to their relationship with nature and continuity.

Seeing that Japan is composed of a group of volcanic islands, it is a poor geological source for construction, thus the prospect of construction required wood so as to solve this problem. Subsequently, Japanese architecture quickly developed structural knowledge which enabled the construction of complex wood structures while maintaining open spaces in the interior and connections with the exterior. This implemented a complex structural architecture in Japan which has created an interior space in total harmony with the surrounding nature. However, this kind of architecture quickly spread across the country however, in many different ways.

In the Meiji Era (1868-1912), there were several reforms and changes implemented in Japan in order to develop a country still very attached to its past. In regard to the developed western world, Japan developed its industrial, economic, political and social components, by trading products and ideas with modernized countries. This also changed Japanese architecture, which started to show a western influence, in other words, an international architecture. However, Japanese spatial perception and its relationship did not disappear from its architecture, thus always maintaining the presence of Japanese spatial design. The cultural aspects of a Japanese house, that is the perception of continuity of space and fluid boundaries, were relevant aspects which have remained in Japanese architecture until now.

1.4.1 From Physical to Non Physical Boundaries

For the creation of the fluid boundaries, the Japanese architecture took numerous elements, physical and non physical, that were pertinent to create the open connections well known in Japanese architecture. From the spaces as the *engawa* to the simple curtains in the entrances, a big number of elements were applied and created in the Japanese architecture, creating a division by layers in the buildings itself, and well connected between them.

These layers can be called layers of intimacy, which are distributed in an organized way from the most intimate place to the exterior, however always keeping in mind the concept of connection and separation at the same time.

It's possible to distinguish the elements that create the boundaries in different groups, which are enounced as follows.

1.4.2 Boundaries as Appropriated Spaces

These boundaries consist of the creation of a space in the building which makes the transition between several spaces, for example, the interior and exterior. These boundaries are related to the spatial articulation that Japanese architecture is made of, in other words, an open transitional way which maintains a fluid connection across the building. It applies transitional spaces as important connectors between the inside and the outside and the private and public areas.

Some examples of these boundaries are the spaces of *engawa* which make the transition between the inside and the outside, that is, the rooms and the Japanese garden; the *tori-niwa* limits a space as the entrance and connects it to several interior spaces in the traditional urban Japanese house, *machiya;* the g*enkan* characterizes an entrance area with a difference, that is, an elevated interior space which makes a transition between the street level and the interior one, thus supporting the act of removing shoes so as to prepare others before entering a private area.



Image 10 - Genkan space, Ryoanji Temple, Kyoto
Source: picture of the author



Image 11 - Engawa space, Ryoanji Temple, Kyoto
Source: picture of the author

1.4.3 Physical Boundaries

In Japanese buildings, are usually applied physical elements which make a more direct division of spaces. These elements can be characterized as soft or hard elements, depending on the kind of material used and on which assembly method. With hard elements they offer protection, and with soft ones they provide a separation restricting some possibilities like visual connections.

The walls (*hei*) or Japanese fences (*kabine*) are some examples of these hard elements that divide in a direct way several spaces, splitting them in two, sometimes without connections. However, sometimes elements like the curtain (*noren*), blinds (*sudare*) or even the sliding paper doors (*shoji*) are used to divide spaces but allowing connectors between them, like the light, visual connections or others that affect our senses.

Some other physical elements like the Shinto gate, in a way, symbolic elements, are used as symbols that mark the entrance of a special space, as the *torii* marks the entrance of a sacred place. These elements work with human senses and perceptions to warn about the presence of a boundary that exists in a fluid and indirect way.



Image 13 - The Japanese gate - tori
Source: picture of the author



Image 12 - The shoji doors
Source: picture of the author

1.4.4 Non-Physical Boundaries

Although the numerous boundaries are physical elements that create direct limits between spaces, there are other kinds of elements, untouchable ones, which define the spaces and emphasize the diverse layers of a space. The most well-known of these elements is the light. This element creates a relationship between light and shadow which are associated with the different spaces of the building. The big and heavy roof of the Japanese house creates shadow inside the building, offering protection in the living space. These relations between light and shadow and different intensities of light are also associated with the relation between the inside and the outside and between several spaces inside the house, as the rooms and *engawa*. Sometimes the light is also controlled by physical elements like the shoji doors or blinds. This is the beauty of darkness and light of the Japanese architecture and a distinction from the European lighting beauty. As Tanizaki says in "*In Praise of Shadows*", *"(…) I understand that in the Gothic cathedral of the West, the roof is thrust*

up and up so as to place its pinnacle as high in the heavens as possible – and that herein is thought to lie its special beauty. In the temples of Japan, on the other hand, a roof of heavy tiles is first laid out, and in the deep, spacious shadows created by the eaves the rest of the structure is built. Nor is this true only of temples; in the palaces of the nobility and the houses of the common people, what first strikes the eye is the massive roof of tile or thatch and the heavy darkness that hangs beneath the eaves."[18]



Image 14 - Ninna-ji Temple, Kyoto
Source: picture of the author



Image 15 - Toji-in Temple, Kyoto
Source: picture of the author

1.4.5 Layers of Intimacy and Transitional Spaces

The elements of boundaries enounced previously and the Japanese spatial articulations create a division of the space by layers, which we can refer to as layers of intimacy. These layers are relevant to the architectural perception, which we can assume to be an intellectual perception, but however, fit into a sensorial field and into human impressions. These kind of layers are with any doubts architectural domains, being articulated in a sensory way and creating several spaces of different meanings that are not only set in dimensional proportions but also creating experiences captured by the human impressions. The good articulation and the application of several elements are important for these experiences, and it is possible to say that the Japanese architecture, from the most traditional to the contemporary, is a good example in this theme in this theme.

In the Japanese House, these layers are usually organized from the inside to the outside, corresponding the private space to the public space. The articulation of spaces, the physical and the non-physical elements are essential for the division of the space by layers, creating different characters of each space. These elements create living spaces with different characters of intimacy, in-between spaces as transitions, semi-public spaces and public spaces. The in-between spaces are important due to their strong relation with different spaces, taking the transitional function as the primary domain and emphasizing the idea of layers of intimacy.

Fumihiko Maki states in his book "*Nurturing Dreams"* as follows*: "Having traveled to many cities abroad, I am inclined to believe that multilayered spaces are among the few phenomena observable only in Japan. The Japanese have always*

[18] Tanizaki, Junichiro – "*In Praise of Shadows*", Leete's Island Books, 1977

postulated the existence of what is called oku (innermost area) at the core of this high-density space organized into multiple layers like an onion, and the concept of oku has enabled them to elaborate and give depth to even a delimited area."[19]

1.5 Analysis of Three Case-Studies of Traditional Architecture

For a better understanding of the boundaries in Japanese Architecture I focused on the traditional one regarding its rich spatial articulation which is, without any doubt, an example for the contemporaneity. To reach this goal, I analyzed three different types of traditional buildings with different functions; a samurai house, a temple and an urban house, with the aim of understand the differences and similarities of the boundaries in private and public buildings. These buildings were chosen regarding their importance for my spatial perception of the Japanese architecture and their values in physical and poetic meanings. The analysis is focused on the boundaries between inside and outside, comparing in a way with the occidental ones discussed in the first topic.

1.5.1 Hosokawa Samurai House, Kumamoto

The Hosokawa House is an old samurai house in Kumamoto city, near the Kumamoto castle, and has belonged to the samurai *Hosokawa Gyobu*. Regarding its rich articulation between interior spaces and the relation of the latter with the exterior in so many different ways, this house becomes special in the spatial appropriation, being a great case study for this research.

Its analysis follows a route through the house, beginning and ending in the entrance and traveling around the different spaces of the house.

1.5.1.1 The entrance and its Layers

Before getting inside the house, it is necessary to cross a first building - which could perhaps be a barn - and then cross an outside area, a rock garden, and then going inside the hall entrance protected by the dark roof. The first building faces the outside garden and makes a transition between public space and semi-public space. The in-between space, the semi-public one, creates anticipation before going inside. It is a rock garden crossed by a stone path that connects the two entrances of the two buildings in a diagonal line. Once under the big roof of the entrance, we reach a preparation area before entering the private space, with stairs and shoe removal area. These different processes until getting inside the house are identified as layers of intimacy, which connect the public and the private with several transitional spaces.

[19] Maki, Fumihiko - "Nurturing Dreams", Cambridge, MIT Press, 2008, p. 153



Image 17 - Entrance of the Hosokawa Samurai House, Kumamoto

Source: picture of the author

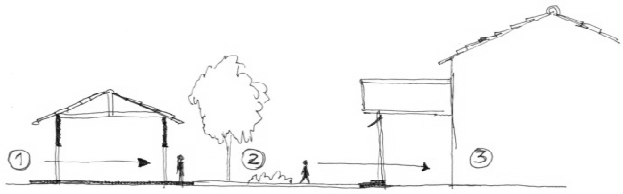


Image 16 - Sketch of the Entrance

Source: sketch of the author

1.5.1.2 The engawa

This space is a board-floored area projecting from the perimeter of the house that serves as a corridor and as a transitional space between the *tatami*'s rooms and the Japanese garden. Its periphery materials and elements change according to the spaces it goes through. Sometimes it is just floor, roof and an open connection with the garden, other times it is between opaque sliding doors and wood elements that control the light and view. This space is an in-between space and a transitional space that create a smooth layering organization from the interior to the exterior.



Image 18 - The engawa of Hosokawa Samurai House, Kumamoto

Source: picture of the author

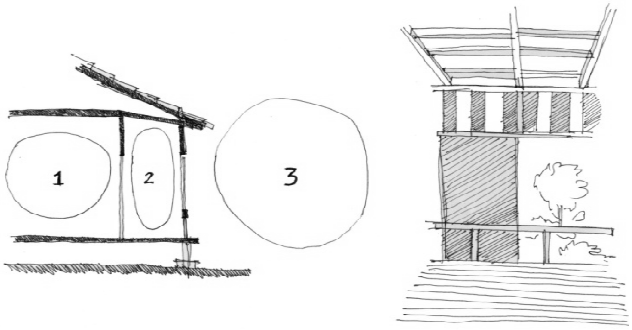


Image 19 - Sketches of the engawa

Source: sketch of the author

1.5.1.3 The sliding doors (*shoji*)

Several sliding doors exist between the interior spaces and the *engawa* thus allowing opening and closing of interior space while offering the possibility of changing the connections and transforming the space. These doors are composed by a wood structure that supports a thin rice paper on the top and a glass on the bottom. The rice paper prevents the visual connections between the inside and the outside, offering privacy to the internal space; however, the glass on the bottom allows the visual connection for the people that are seated inside the room. As in Japanese houses people sit on the *tatami's* floor and not in chairs as in the occidental world, maintaining a low visual line, this difference between opaque and transparent material in the sliding

doors is important for a relation between public and private, and what is possible to see and what is not. So, with these elements, the people seated inside the room can contemplate the Japanese garden but the people that are passing on the *engawa* can't see the interior space.



Image 21 - Shoji Door - Hosokawa Samurai House, Kyoto

Source: picture of the author

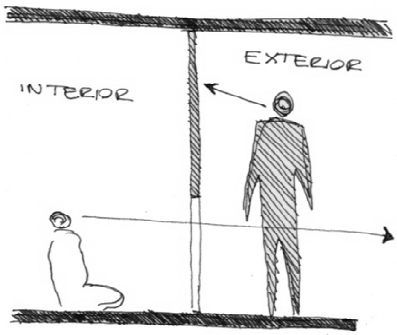


Image 20 - Sketch of the relations between the shoji doors

Source: sketch of the author

1.5.1.4 Light and Shadow

The relation between light and shadow and different intensities of light is very important and powerful in this house. The big roof controls the light under it, creating a shadow or penumbra that characterizes the private and protected space. The light throughout the house acquires different intensities that divide the space in a sensorial way. So, the light in the interior rooms with *tatami*'s floor is much less intense than the light in the *engawa*, and this last one is even less intense that the one in the exterior. Subsequently, the interior space is divided by light intensities creating a layering division process to the outside. However, the use of several physical elements as the *shoji* doors and wood transoms are important for this transitional lightning and its intensities.

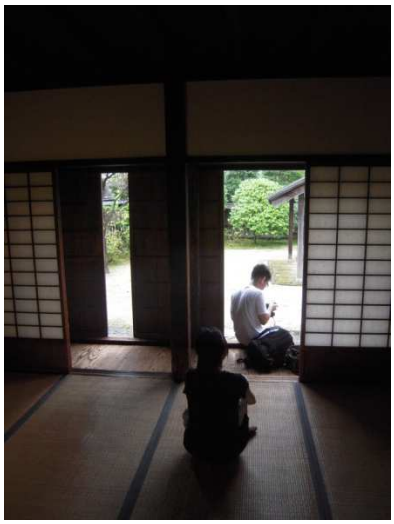


Image 22 - Light Graduation, Hosokawa Samurai House, Kyoto

Source: picture of the author

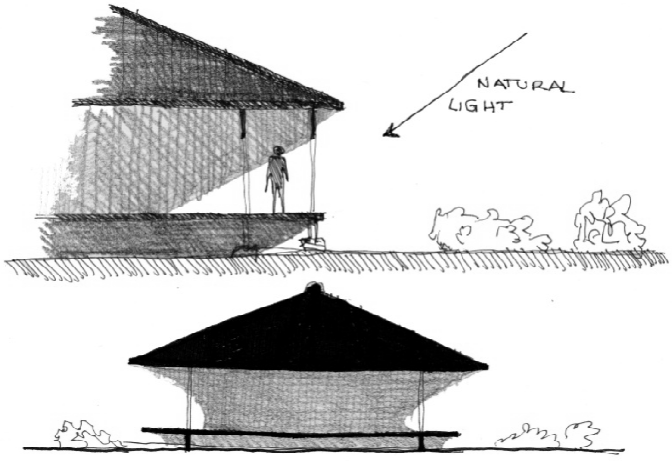


Image 23 - Limits created by light, Sketches

Source: sketch of the author

1.5.1.5 Pocket Patio

A pocket patio can be found in the middle of the house where trees and bushes are grown in direct contact with the exterior. This patio allows the purification and circulation of air and the lightning inside the house as well as a connection with nature. It is surrounded by a covered corridor that, like the *engawa*, makes a connection between the outside and the inside as a space in-between. The light and the cold air provided by the patio are controlled with wood sliding doors on the corridor which can close and protect the interior space from unpleasant sensory experiences. The walking path around the house is always in a direct connection with the outside and the Nature, even inside, due to its relation with this green patio. It is a perfect example of the proximity to Nature which is popular in Japanese architecture.



Image 24 - Indoor Pocket Patio, Hosokawa Samurai House, Kyoto

Source: picture of the author

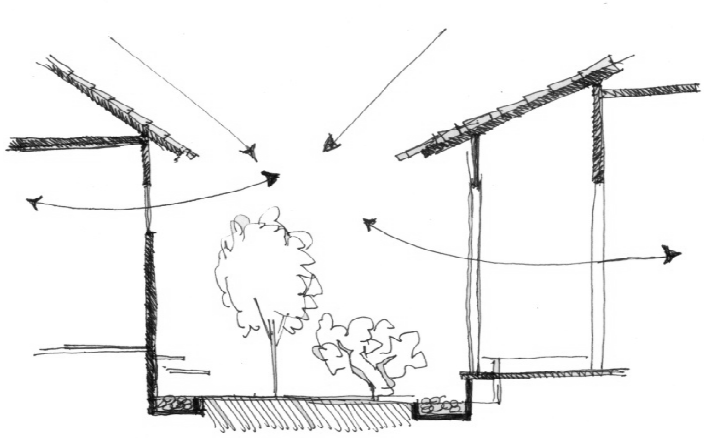


Image 25 - Relations with the Pocket Patio

Source: sketch of the author

1.5.2 Komyozenji Temple, Dazaifu

Komyozenji is a Zen temple of the Rinzai sect of Japanese Buddhism that is located near Dazaifu's famous Tenmangu Shrine. The temple was founded in the middle of the Kamakura Period (1192-1333) by a disciple of the founder of Kyoto's Tofukuji Temple and belongs to the Tofukuji school of Rinzai Zen Buddhism.

The temple includes two Japanese rock gardens of different dimensions and characteristics, one in the entrance and the other in the back. This temple is an important building for this study of boundaries due to its relation with the Japanese garden, a perfect example of the Japanese relationship between human and nature.

1.5.2.1 The entrance and its Layers

The Komyozenji temple is separated from the street through one wall which defines the perimeter of the temple. On the two extreme sides of the wall there are two gates protected by a dark roof that marks the entrance on the perimeter. After crossing the doors, we arrive at a Japanese rock garden which is crossed by one paved stone walking path, protected by bamboo fences. Once we cross the rock garden we arrive at the entrance, marked by a dark roof, where we can find the *genkan* where we can remove our shoes and enter. The first door and the entrance to the building are elevated in relation to the previous space, which intensifies the boundaries between spaces. This organization of spaces and in-between spaces is another example of the organization of the space in layers, from the public one to the private one.



Image 26 - Entrance of the Komyozenji Temple, Dazaifu

Source: picture of the author

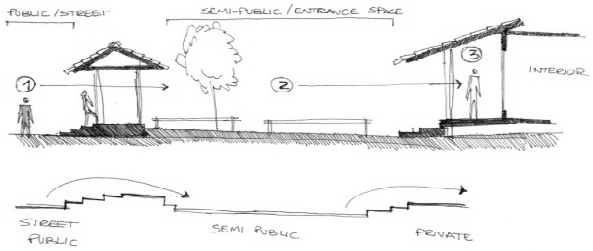


Image 27 - Different stages of the Entrance, Sketches

Source: sketch of the author

1.5.2.2 From façade to façade

From the entrance to the back garden, the building is divided in different spaces without using physical elements that close them directly. The main interior space (and the only one whose access is open to the visitors), the ceremonial room, is divided in two parts, the peripheral corridor with wood board pavement and the ceremonial area paved with traditional *tatamis*. The division is made with the changes of material in the floor but also with the assembly of physical elements like the half wall on the top that create a kind of portic with the structure. Besides the open space and visual continuity in the interior, the walls and different highs of the roof creates a division of the space, distributing characters to each one, according to the privacy that it offers.



Image 29 - . Layers of the interior space, Komyozenji Temple, Dazaifu

Source: picture of the author

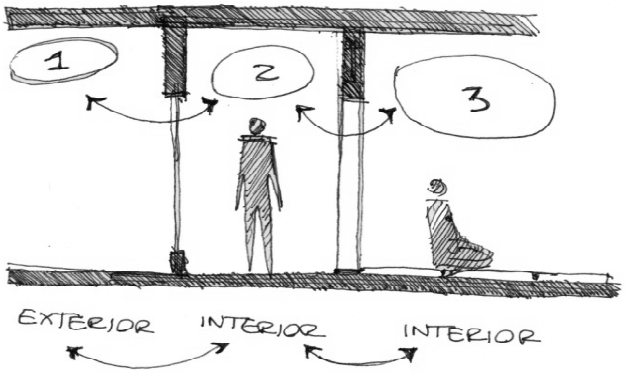


Image 28 - Sketch of the interior's layers

Source: sketch of the author

1.5.2.3 The engawa

Like in the samurai house, this temple has an *engawa* around the house that makes the transition between the interior and the exterior. However, the *engawa* of this temple has another characteristic. It is not mainly a space to walk through and get to other spaces, but it is also a place to stay and observe. This *engawa* works as a stand for the Japanese garden, where people can enjoy their connection with nature. It is a wood floored platform protected by the roof, which is supported by the complex wood structure of the house and is separated from the garden by a wood short handrail. Since that the garden is a place to be seen and not to walk through, this element provides protection to the garden, preventing the crossing from the house into it.



Image 31 - The engawa, Komyozenji Temple, Dazaifu

Source: picture of the author

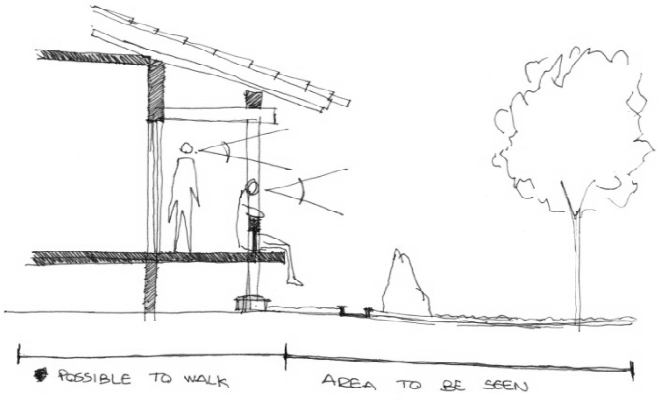


Image 30 - Relations between inside and outside in the engawa,

Source: sketch of the author

1.5.2.4 The raised spaces

All the traditional buildings in Japan are raised from the ground due to several comfort and aesthetic reasons. It allows air circulation under the house, prevents the house from contacting with the groundwater level, separates the house space from the outside and makes a transition between the interior and the exterior. Although it creates a feeling of continuity due to the visual connection from the interior to the exterior. That connection is upon the ground and the Japanese garden, which brings the entire exterior landscape to the interior.



Image 33 - Raised engawa, Komyozenji Temple, Dazaifu

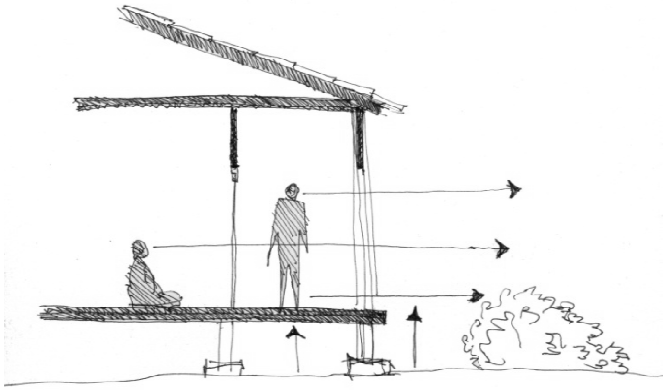


Image 32 - Visual connections,
Source: sketch of the author

1.5.2.5 Boundaries with materials

In this building it is possible to find quite a few boundaries created with the simple application of materials. Regarding the articulation of several spaces in the building, some of which are just spaces to be seen like the rock gardens, it was necessary to create boundaries that could apply rules to the space but without changing the visual connections and feeling of continuity to the garden. One example of this is the black rocks used between the wood platform and the rock garden that work as a kind of warning of a space where it is not allowed to go. These rocks do not only create a barrier, but also are part of the design of the rock garden. It is a boundary that is totally implemented in the garden as well as in the building space. Thanks to this, the wood structure floats above the rocks, never getting to the garden.



Image 35 - Diference of materials, Komyozenji Temple, Dazaifu

Source: picture of the author

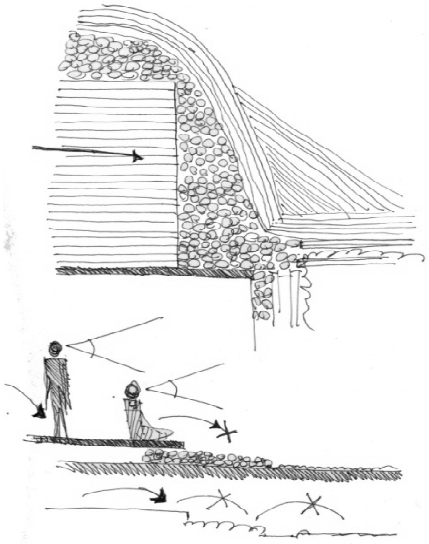


Image 34 - The Importance of the materials for the definition of the spaces

Source: sketch of the author

1.5.3 The Udagawa Family House, Urayasu

Built in 1869, the Udagawa family house is one of the oldest private houses still standing in Urayasu, a city in the periphery of Tokyo. It was built by the Udagawa clan, the leaders of the village of Urayasu during the Edo period, to accommodate family members. The residence had attached a store named Fujimuraya which sold items like rice, oil, clothes and daily goods. So, the house is divided in two parts, the store section that is facing the street and the residential section on the top floor and backyard.

The house has different occupations during time, such as the Urayasu Post Office in 1914, medical center from 1946 untill 1973, and again residence until 1982. On October 20 of 1982 the house was designated as a tangible cultural asset due to its historical and cultural value. It has been open to the public since 1984, and incorporated in the designated tangible cultural asset of Urayasu city.

1.5.3.1 The entrance and the Facade

When walking on the street and passing through the Udagawa family house, the first thing that catches our attention is the store area. Protected from the outside by a wooden structure composed by several battens spaced between each other, it allows a reduced lightning in the interior and provides privacy to the inside area. The house contains three different sized roofs which reinforce the different characters and layers of intimacy in the same facade. In front of the store area, the facade is protected by a black traditional roof, the lower one, which creates a more intimate area for the commercial interaction between clients and inhabitants/sellers. On the upper floor's facade, the windows are also protected by the battens' structure and hidden between the two roofs, the smaller one which protects the store and the entrance and the bigger and heavy one on top.



Image 36 - Front Façade of the House
Source: picture of the author

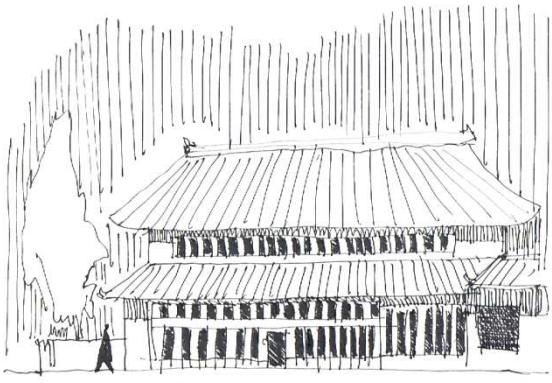


Image 37 - The batens on the windows draw the front façade
Source: sketch of the author

1.5.3.2 The *Genkan* Space

To get inside of the house it is necessary to cross through a small door, around 1.5 meters height. This door reinforces the separation between the interior of the house and the street, warding off the strangers and offering privacy. Besides that, the small door creates a moment of boundary between the street and the interior just with the simple movement of lowering the head to get inside the house. That movement shows as well some respectful interaction between outsiders and inhabitants and between the people and the private interior.

Once crossing the door we enter in a large open space but which is divided in two different areas. The first area is the one immediately one after the door, the entryway or entrance foyer, called *genkan*. It is in the same level of the street and the floor is composed by a compact earth soil. This is an area of preparation, where the people take off their shoes before getting to the next level, the store and circulation area.. This area is elevated from the ground at around 50 centimeters and it is coated by the *tatami* panels.



Image 38 - Genkan and Store area
Source: picture of the author

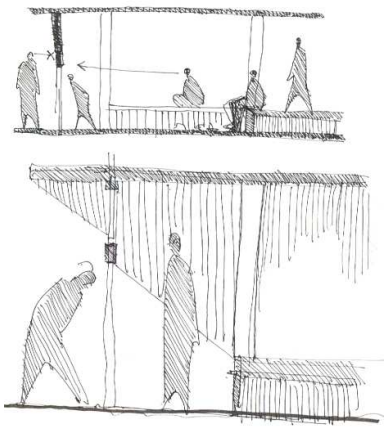


Image 39 - The genkan space and the low entrance door
Source: sketch of the author

1.5.3.3 The Patio

Separated from the store with shoji doors, the backside of the house is constituted by two different rooms which are aggregated with two different exterior spaces on each side of the house. In one side there's a room used to meet guests. This room is in contact with a private Japanese garden but using an *engawa* as in-between space between the interior and the exterior.



Image 41 - Rooms separated from the patio using *shoji* doors and an *engawa*

Source: picture of the author

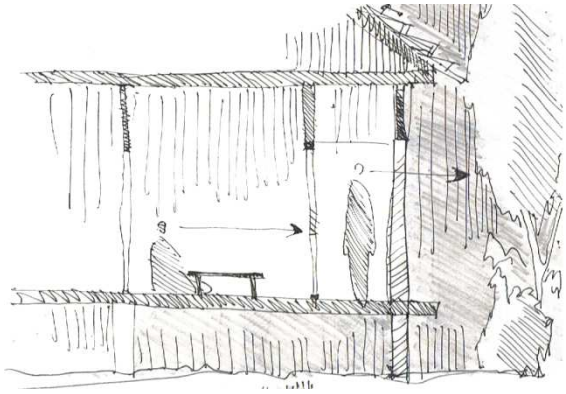


Image 40 - The room, the engawa and the private patio

Source: sketch of the author

1.5.3.4 The Kitchen

In the other side of the patio there's another room, smaller and more private, which is connected to the kitchen. This kitchen, similar to the *genkan*, is on the ground level, separating the work area from the comfortable interior. The kitchen is in contact with the exterior through a shoji door, allowing the easy cleaning and cooking services. The ceiling of the kitchen is open and habitable, taking advantage of an attic which housed the servants of the family. Between the *tatami'*s interior room and the kitchen area there's a wood platform making a transition and where it 's also possible to store dry food. The room is still divided from the kitchen with the *shoji* doors, defining the kitchen as external area.



Image 42 - The kitchen area

Source: picture of the author

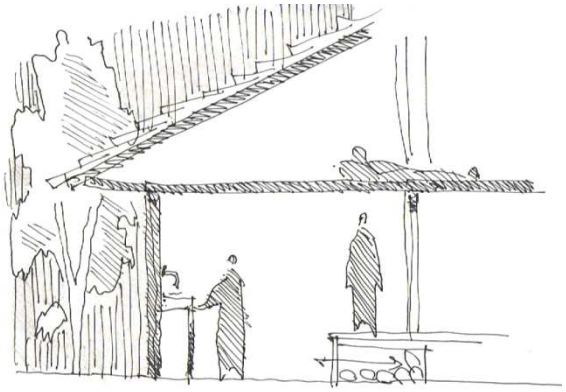


Image 43 - Kitchen area, the room and the attic

Source: sketch of the author

1.5.3.5 The Top Floor

In the entrance area, just next to the *genkan*, there is a hidden and almost vertical stairs which connects the ground floor and the top one. Arriving on the top floor, we enter in a room with wooden floor, where is located the closet. Separated from this room with *fusuma* doors (sliding solid doors) is the private *tatami*'s room where the *futons* are placed for sleeping. Besides the required living accommodations, this top floor area is equipped with several clever instruments for protection of the samurai family. There's a hole on the floor where is possible to control the *genkan* area, the small closets are connected with the ground floor allowing the fast escaping if invasions occurred, and the ceiling, in contrast with the ground floor, is lowest hindering the *katana* sword's fight in the interior.

Because these rooms are on the side of the street, the windows are smaller and opaque, using sliding paper windows and the wooden battens for more privacy.



Image 45 - The rooms on the top floor

Source: picture of the author

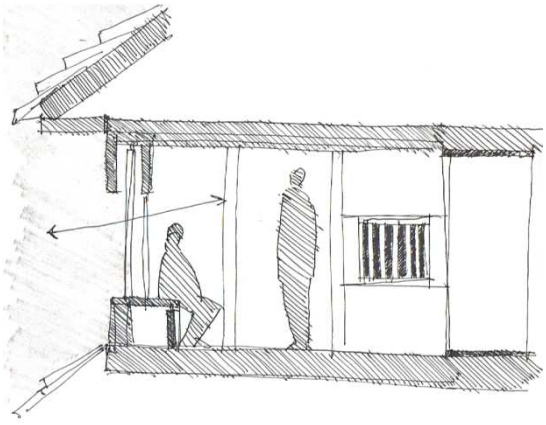


Image 44 - The private room, and the several physical elements of the limit walls and windows

Source: sketch of the author

Chapter 2

The Japanese Dense City

2.1 The Japanese City

"To foreign visitors and even to many residents, Tokyo appears to be a paradigm of urban chaos, spatially confusing and structurally illegible. Nevertheless, every city with a long history possesses an internal logic in its physical form, however unclear or inconsistent this logic may appear at first, and Tokyo is no exception. In the chaos of its urban plan, we can read a rich collage of patterns and figures, which relate a colorful, contradictory history of several centuries of urban growth."[20]

The linearity of the structure of western cities and urban spaces is the essential key for proper, controlled organization of the urban and western shapes. Several architects and urban planners like Le Corbusier, Lynch or Cullen focused their attention on lines as an essential main structural element of the contemporary city, so as to control the design and organization of functions according to the city centre and surroundings.

However, on the other side of the globe, the art of city construction is made from different and perhaps contradictory concepts. For a better understanding of the Japanese city, it is necessary to understand these concepts which are unfamiliar to westerners. For any western visitor, it is hard to understand the composition and organization of a Japanese city, especially in a large metropolis like Tokyo or Osaka. The Japanese city is inevitably governed by traditional spatial concepts which are inherent in the Japanese understanding of space. For the Japanese, unlike the westerners, the straight line is not merely a crucial organizer of all the urban space. The curve is a derivation of the straight line and it is as important as any other line.

Some Japanese cities like Kyoto, Nara and Sapporo, were built with orthogonality and linear mesh imposed by Chinese cultures during the VIII century. However, this orthogonality is not justified by rational organization originating in the Greek-roman city. It follows a rational organization based on religious considerations. Urban spaces and the buildings are distributed according to the Buddhist and Shinto philosophy. However, this orthogonal pattern was not taken into account as an example for posterior city constructions. The greater part of Japanese cities, even today, follows a non-linear organization based on philosophic concepts like *ku*, *oku* and *ma* which have been mentioned before. Cities are developed by a constant overlapping of layers, roads and lines which create a super complex urban space. Maki says that Tokyo "was developing into a fairly complex array of overlapping figures and patterns." This different understanding of space explains the organic and natural organization of Japanese urban spaces with an open and active structure.

Besides the organization of the whole, in the Japanese cities, the plan and the interaction between the interior and the exterior are dominant qualities. The different languages and meanings are very evident in the writing systems of the occidental and the oriental, where one is based in the line and the other one in the multidirectional surface. This means, as Barrie says, that the occidental phrases need a linear grouping, while the Japanese characters, the kenji, have different meanings together

[20] Maki, Fumihiko - "*Nurturing Dreams - Collected Essays on Architecture and the city*", Cambridge, MIT Press, 2008, p. 150

as well as alone. This organization of groups of several independent elements is a base of the Japanese urban organization.[21]

2.1.1 Comparison of Urban Meshes



Daimyo, Fukuoka Bairro Alto, Lisbon Campo de Ourique, Lisbon

Image 46 - Comparison of three different Urban meshes - two in Lisbon and one in Fukuoka

Comparing these three different urban meshes of two different countries, Daimyo in Fukuoka and Lisbon in Portugal, we can understand the difference of density, organization and alignments. While the Bairro Alto and Campo de Ourique meshes follow an organization of several alignments, mainly perpendicular, and keeping the interior of the quarters open for private use of the houses, the Daimyo neighbourhood occupies the land with singular buildings without closing the streets. This way, we can understand several streets of different dimensions, large or narrow ones, but also all the gaps between buildings. Observing this, in some parts it is almost impossible to make the differentiation between vacant areas and streets.

2.1.2 The Centripetal inwardness

The Japanese cities were always organized according to several centers with different characters and uses. This multicentre city is nowadays even more visible due to the large extension of the urban areas. However, today the centers are mainly connected with train and metro stations which are the busiest areas. The shopping malls and public squares are established next to metro and train stations, creating commercial and financial centers, as well as other kinds of centers such like the technologic one in Akihabara, or the governmental center like the Shinjuko in Tokyo.

Fukuoka city was always been divided in two different main centers, which are Hakata and Tenjin, which in the past were the trade and fisherman center and the

[21] Neiva, Simone LG; Righi, Roberto - "*A Cultura e o Espaço Urbano no Japão*" in Arquitextos, retrieved 15 December 2012, < http://www.vitruvius.com.br/revistas/read/arquitextos/09.099/119>

samurai and daimyo living area. Today Hakata stands as the transport center, where the main train station was established, while Tenjin is the main commercial area of the city. However, today the city is composed and organized by many other centers such as the sport, the fishering and the educational centers. As Fumihiko Maki states, *"A centripetal okusei, or inwardness, has always been basic to space formation in Japan".*[22]

2.1.3 Movement and the Path

In the feudal period, the Chinese organization of space was no longer used in Japan. Due to an aversion towards the orthogonal organization, the Japanese architectural organization became much more complex, and started to follow a natural and organic organization with the implementation of an essential characteristic, movement. Cities follow a natural movement that responds to the fluidity of landscape and soil, hence creating urban spaces that are in constant growth, consequently following straight and curved lines through land. In addition to this growth of Japanese cities, several layers are constantly overlapped therefore creating urban spaces in constant mutation. Nonetheless, this tendency for movement in Japanese cities is applied in cities as well as in the organization of buildings. The buildings in urban and rural areas do not always answer to an orthogonal tracing and organization in land, instead they follow a movement which organizes the buildings between them, according to lines and directions that are not perfect traits, but together form a perfect language and relationship between the entire set. This relationship is perceptible in a visual field, thus creating mystery and doubt between the constructed and empty spaces. The several layers of architectural organization involve, hide, protect, and offer a sense of depth and mystery around the void. These spatial perceptions are directly connected to the spatial concept of *Oku*.

The complex of temples of Kiyomizu-Dera (1633) in Kyoto is a perfect example of this spatial organization according to movement. This complex is located in the slopes of the mountains that surround the city centre. According to the fact that the complex is located in an area that is not level, all the buildings and their links are constantly misaligned; even one of them is suspended and supported by a big wooden structure on a hill. These constant misalignments across the path bring a sense of movement to the space and a climax of mystery consequently involve the entire complex. The visitor will always wish to walk through the buildings, enter them and seize the whole spatial perceptions, while always sensing mystery in the space. Hence, as in many other Japanese spaces, the path is important for spatial apprehension and comprehension is important. Starting by climbing the stairs that mark the main entrance of the complex, passing through the red gate, the *pagoda*, temples, the second gates and finally arriving at the suspended veranda, the crucial moment of the journey, the path becomes even more sacred than each individual space. On the path, the visitor gets a spatial apprehension of each individual space through different viewpoints, and once the path is finished, one ends it exactly at the same point where one had started.

[22] Maki, Fumihiko - "*Nurturing Dreams. Collected Essays on Architecture and the city*", Cambridge, MIT Press, 2008, p. 153

These characteristics of movement and direction are seized by the visitor during his/her journey around the complex, thus connecting him/her with the space itself. In this kind of spaces, the elements are connected as links of a chain. Here, it is not important to arrive to the iconic building of the end of the path, as it happens in the European cities, but instead, the succession of the different spaces during the entire journey is more important.

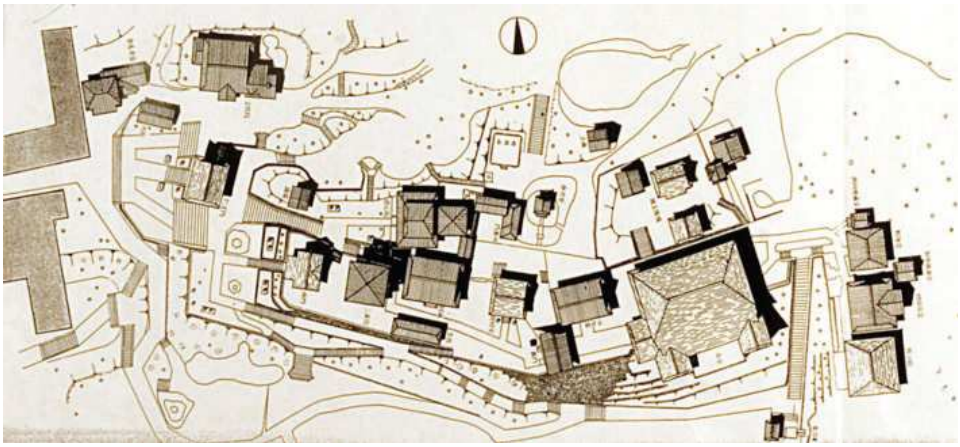


Image 47 - Plan of Kiyomizu-Dera complex, Kyoto

Source:
http://www.revistasusp.sibi.usp.br/scielo.php?script=sci_arttext&pid=S151895542008000200003

2.1.4 Fragmentation and Articulation

Japanese cities, in addition to not following a symmetric and orthogonal organization, are fragmented and organized according to different patterns unusual to westerners. This fragmentation is entirely related with the Japanese rural areas. The fragmentation of the cities is directly related with the ancient division of the agricultural lands in several small lots using solid structures as fences, walls or dikes. These dividing elements were established as the walking paths through the fields.[23]

For a western visitor, the Japanese city seems to be completely disorganized, somehow chaotic, where buildings are distributed without following any rules for the composition of the city as a whole. Unlike the occidental city, the Japanese city is not organized in straight lines and the buildings do not follow the streets, facing them with facades, creating an organization of quarters with hallways and patios between buildings. Instead, Japanese streets are irregular, following both straight and curved lines, and the buildings are distributed along the streets dividing the quarters in plots and occupying them independently from the adjacent buildings. Each building is built in urban areas in an independent way, without restrictions to its surroundings, thus composing diversity in the urban city. Buildings occupy almost the whole area between the streets of the city, adapting to the space. Nowadays, given that the Japanese urban land is extremely expensive (according to the fact that Japanese cities, usually constrained between mountains and water, do not have any more space to expand to), this entire occupation of urban areas for construction is essential. But, besides this

[23] Neiva, Simone LG; Righi, Roberto - "*A Cultura e o Espaço Urbano no Japão*" in Arquitextos, retrieved 15 December 2012, < http://www.vitruvius.com.br/revistas/read/arquitextos/09.099/119>

reason for fragmenting urban cities, this is a characteristic which remains from tradition. When visiting several complex of temples in Japan, as the Kiyomizu-Dera mentioned before, one understands that the buildings are distributed in the area in a fragmented way, sometimes without following axis lines that would control all the buildings. Such buildings are all related and connected with stone or gravel walk paths or even with other elements like *toris* or stone statues that mark the path and temple entrances. However, despite the collective relationships and connections of the entire complex, the different buildings are independent from each other and therefore each building has its own characteristics, use and position. The same way that the *kanji* characters (Japanese characters) have a meaning on their own or in a group, so do the organization and distribution of the buildings in the temple complex. *Toris*, gates, temples, verandas, pagodas and Japanese gardens are distributed in the space thus creating a complex set of buildings all related to each other, however maintaining the singularity of each building and each area.

2.1.5 The Japanese Public Space

The Japanese public space is another important difference from the Occidental cities. When talking about the public spaces in the European cities we immediately think about the several squares and avenues. However, in the Japanese cities there are no squares. For the Japanese, the street is much more characterized as public space than an open space like a plaza. In the traditional cities, the streets were not merely transportations. They took an important role as a communication space. For them, the crossroads (*tsuji*) or streets were exhilarating places where encounters occurred. Kisho Kurokawa describes a street life in a traditional Japanese city as follows *"On both sides of the narrow streets, less than three meters in width, houses exploited the open construction of wooden frame design and through the device of the lattice, created a shared space with the street. On hot summer nights the streets would fill with people seeking the evening cool; through the lattice doors, people could be seen chatting and laughing. Sometines the room facing the street was used as a shop. If the avenues were places of ceremonies, festivals, and displays of authority, the streets were an extension of residences; a place for the activities of ordinary citizens."*[24]

2.1.6 The Traditional House Typologies of the Japanese City

Going back to the Edo period (1603 to 1867), it is possible to identify three different kinds of urban dwellings that influenced the cities' organization and which reflect the division of social classes of that period. These different types of cities are displayed according to the characteristics of the buildings, to the urban mesh and to the relationship between cities and streets.

The first type of Japanese house was *buke-yashiki* residence. This kind of city had several buildings surrounded by private gardens and separated from the street with high walls and gates which were the primary organization of space. These *yashiki* quarters were occupied by Samurai and warrior classes.

[24] Kurokawa, Kisho - "*The Philosophy of Symbiosis*", Academy Editions, Great Britain, 1994, p.160

The second type was the *machiya* or townhouse. This kind of house functioned as a residence with a shop on the bottom facing the street. These houses were usually straight and long with a small façade facing the street. Once during the Edo Era, the price of land was quoted according the size of the façade. Whenever houses needed to settle in urban areas, *machiya* houses detained peculiar characteristics of spatial organization such as backyard gardens, pocket patios and a narrow corridor that connected all the spaces of the house. This kind of house usually belonged to merchants and artisans.

The third type of urban dwellings in Japan was the tiny row house or *nagaya*. This was the commoner's house and it might have been the most numerous of all the urban buildings, however it did not occupy large areas because it was a confined form. This kind of house was not a model to be followed because it was a repetition in a compressed form of the spatial characteristics of the *buke-yashiki* and *machiya* types in a compressed form.

The characteristics of these typologies are still well visible in today's Japanese meshes, such as the long and straight houses with small facades facing the streets like the *machiya* and the compressed forms of the *nagaya*.

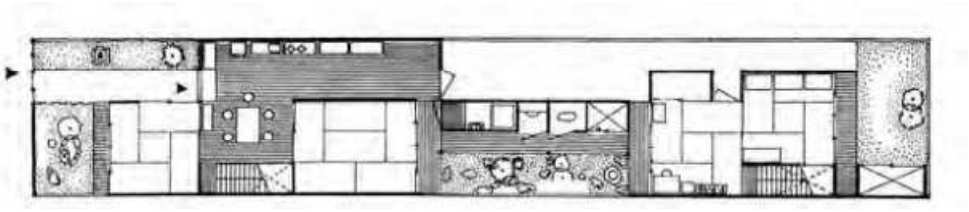


Image 48 - Plan of a Kyoto machiya (townhouse)

Source: Maki, Fumihiko - " Nurturing Dreams. Collected Essays on Architecture and the City ", Massachusetts Institute of Technology, Cambridge, 2008



Image 49 - Machiya in Daimyo area, Fukuoka

Source: picture of the author



Image 50 - buke-yashiki residence, Sakura, Japan

Source: picture of the author

2.2 Fukuoka Development

Since the first settlements of population in all the Japanese islands, Fukuoka was always an important and strategic area of the Kyushu Island. Regarding its proximity with the Korean peninsula, the Hakata bay (Fukuoka is extended through the plains around the Hakata bay) was an important place of connection between the Japanese islands and Korea and China. It is even said that Fukuoka is the oldest city of Japan due to this proximity to the continent.

During the Japanese middle ages, Fukuoka was divided into two different former cities, Fukuoka and Hakata. While the first one was the place of the castle and the samurai residences, the other was the port and merchant district. The union of the two former cities only occurred in 1889 and were then named Fukuoka. However, the different areas of the city are still distinct due to the different characters of each one.

Since the Meiji Period (1880), the city suffered several changes in its structural organization and urban typologies. The old castle in the previous former city of Fukuoka was located in an artificial island in the middle of a lake, which was destroyed because it was no longer being used. The lake suffered several transformations during a century and became what is now the biggest park in Fukuoka, the Ohori park.

The coastal area was always intended for houses and fish industries. However it has suffered several changes in the last centuries. Because Fukuoka was completely surrounded by mountains and sea, and with the population growth and densification of the city, there was a constant conquest of land over the sea with more and more artificial islands. These "new artificial" lands were aimed at the construction of industry, ports and the fish market, which, however, closes the connection between the city center and the sea.

During the 2nd world war, Hakata was partially destroyed by the American bombers. These enabled the renewal of the city center with modern buildings and creating several big avenues.Some other major infrastructures were established in the city during the time, as the tram that connected Hakata and Fukuoka, which no longer exists, the Hakata station which inward bound the *Shinkansen* (Japanese bullet train), the city highway in 1990s and the Fukuoka tower and Dome in a new area of the city.

The city and its several changes in such a few centuries is a perfect example of the mutation of the Japanese urban areas during short periods of time. Nevertheless it is still possible to see the city in mutation today, mainly its advances to the see with the construction of fake islands such as the one in the kashi area for new typologies of houses and some public facilities like the island city central park gringrin, from Toyo Ito. These mutations are mainly consequences of a constant densification of the city.



Image 51 - Fukuoka in 1881
Source: document provided by Kyushu University

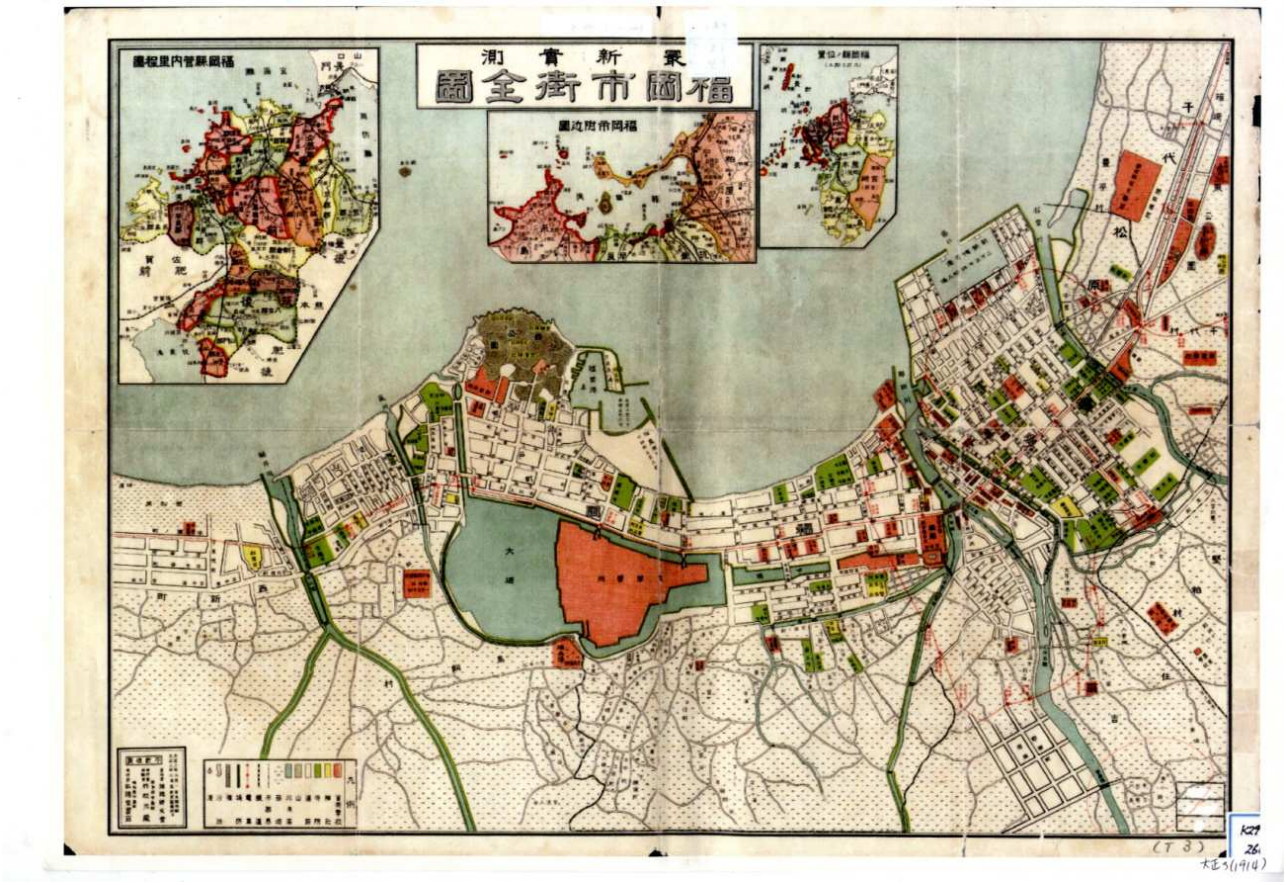


Image 52 - Fukuoka in 1914
Source: document provided by Kyushu University



Image 54 - Fukuoka in 1935

Source: document provided by Kyushu University

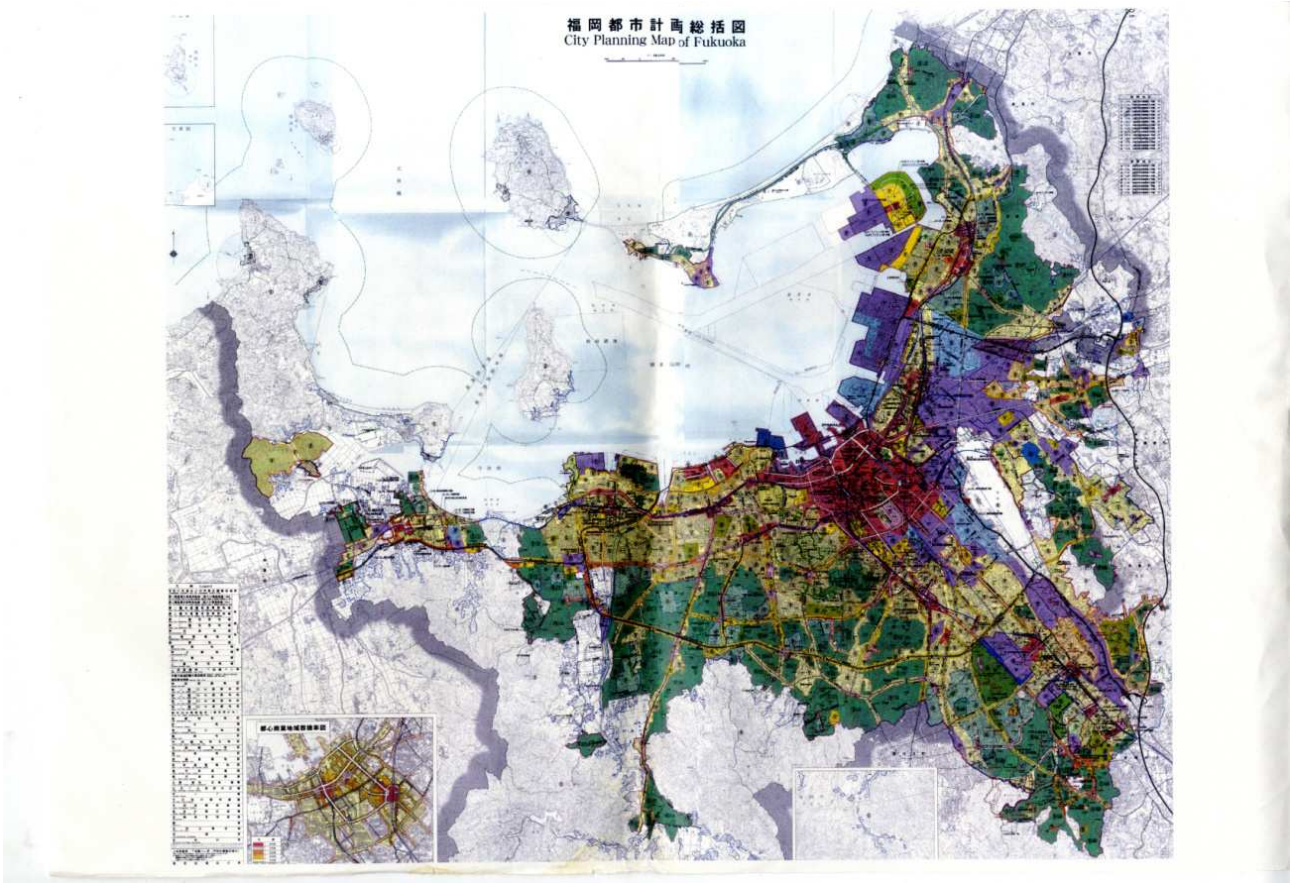


Image 53 - Fukuoka in 2010

Source: document provided by Kyushu University

2.3 The Compact City

Subsequent to the previous characterization of the Japanese cities, having Fukuoka as an example, I found necessity to adjoin several concepts related with their densification. The density is a contemporary problem and concern that is affecting ever more cities all over the world, however discussed during the last century by many architects, urban planners, philosophers, among others. Here is important to explain several concepts of reaction to the dense cities, such as the compact city and iterative growth systems. These concepts are important for a better understanding of the cities' density and will be fundamental for the design process as well as the entire research.

"*The contemporary debate on urban form was sparked off in the late 1980s as it became clear that planning, and hence urban form, would be central to the promotion of sustainable development. Suddenly, urban compaction became the order of the day.*"[25]

After the two mathematicians George Dantzig and Thomas L. Saaty created the term compact city with the wish to get a more efficient use of resources, several other authors studied it and its sustainable form and the quality of life, as opposed to the disperse cities, mainly of the modern times. It raised a contemporary debate of two distinct realities: urban compaction versus decentralism.

Jane Jacobs, an advocate of the centrist urbanity and compaction, criticized some of the classic decentrists, such as Mumford and Howard, but also some other centrists such as Le Corbusier which wanted a "clean sweep in the cities"[26]. Jacobs wanted to keep the vitality and diversity in the cities, declaring that the density creates diversity and the richness of urban life, which values which she enjoyed in her neighborhood in New York.

Besides that, other authors like Michael Breheny defended the compact city as an answer for a sustainable urban area and quality of life. For Breheny, the urban containment has several benefits such as reducing the need for travel by making shorter journeys easy and encouraging the use of public transportation, improving an environmental sustainable urbanity. Besides that, it reduces the loss of open land and valuable habits.

Louise Thomas and Will Cousins, for a description of the compact city, compare it with a medieval city inside a wall, which is the product of form, scale and mix of activities in a restricted area. For them, the compact cities already have good reputation as a response to the issues that the urban development forms need to address. Some of the benefits of urban compaction are less car dependency, reduced energy consumption, better public transportation services, increased overall accessibility, re-use of infrastructure and previously developed land, the rejuvenation of existing urban areas and urban vitality, a good quality of life and the preservation of green space.[27]

[25] Breheny, Michael - "*The Compact City - A Sustainable Urban Form?*", E & F Spon, London, 1996, pp. 20
[26] *Ibidem*, pp. 19
[27] Thomas, Louise; Cousins, Will - "*The Compact City - A Sustainable Urban Form?*", E & F Spon, London, 1996, pp. 56

Michael Breheny defends a compact city in harmony with the green, using however existing land

within the city more intensively.

2.4 Iterative Growth

Over the last decades, as an answer to the high density and the constant population growth in the cities of the world, several architects have presented many different proposals for collective housing in a process of infinite growth. This kind of proposals is centered on the concept of basic unities which are repeated in different manners, creating mechanisms of relation and iteration between autonomous elements and the whole.

According to Stan Allen, these iterative growth proposals are characterized by systems in which elements are joined by matrices of space and form. These systems create several entities which allow for a constant interaction between units but without losing their individual identity. These systems or compositions are organized in basic units associated with mechanisms of relation and growth. The interval, repetition, seriation and system are some terms that describe these mechanisms and are the essential links between the individual elements.[28] These links make clear that these systems are not only overall shapes but a shape of individuals in relation to one another.

According to Magda Serrano, the symmetry, repetition and sequence of forms of the classical architecture are important axioms for the organization of the component elements of these systems. They can also have several mechanisms that relate to one another, but without being constrained by a specific limit.[29] The order of these systems does not prioritize some parts over others, maintaining an organization in iteration without hierarchies. Alberti says *"beauty is a certain harmony between the parts that compromise something, such that one cannot add, take away or change anything without making the thing less worthy of praise"*.[30]

These systems of iterating architectural elements didn't emerge in the last decades. The Modernists of the end of the World War II developed several patterns of iterative growth between units but limited by local factors like materials, the climate, the economy or culture. These factors imposed limits in a system of great growth. Some of these modernist projects are the horizontal city by Hilberseimer and the one-story dwellings designed by Sert for the city of Chimbote in Peru. Some of these architects of the Modernism like Sert were enthused by the rural villages and centers of the Arabian and North African cities. The high density of these cities, the organization of houses and cities and all the intelligent spatial organization dwellings became case studies for several architects as Jorn Utzon, Libera, Sert and the members of the Team X.

[28] Mária i Serrano, Magda - "*The Genealogy of Iterative Growth*", Polytecnic University of Catalonia and of the Thematic Network Architecture, City and Environment, 2011, pp.7

[29] Ibidem, pp. 8

[30] Alberti, L. B. - "De re aedificatoria, lib. VI, cap. II, pp. 245-247 apud Mária i Serrano, Magda - "*The Genealogy of Iterative Growth*", 2011, pp.8

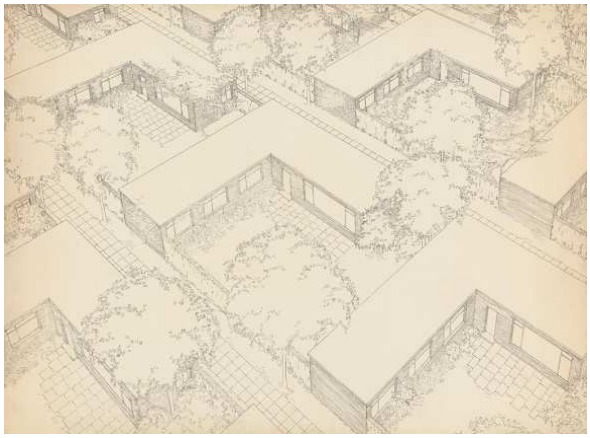


Image 55 - Horizontal city, 192,9 L. Hilberseimer

Source: Mária i Serrano, Magda - "*The Genealogy of Iterative Growth*", Polytecnic University of Catalonia and of the Thematic Network Architecture, City and Environment, 2011

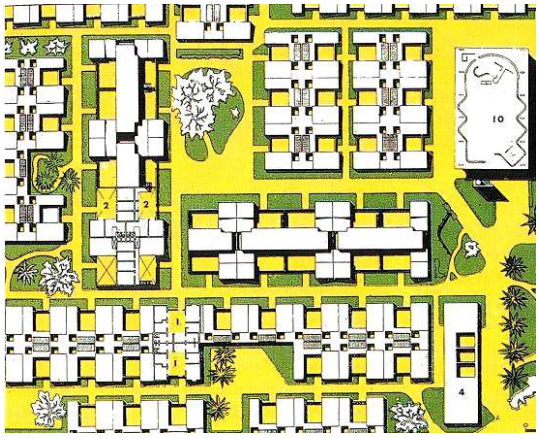


Image 56 - Plan drawing of Chimbote, Peru, J. L. Sert

Source: Mária i Serrano, Magda - "*The Genealogy of Iterative Growth*", Polytecnic University of Catalonia and of the Thematic Network Architecture, City and Environment, 2011

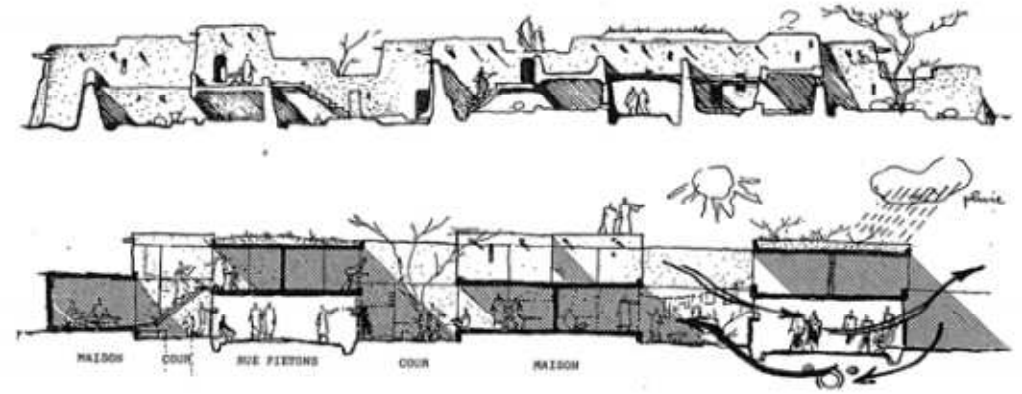


Image 57 - popular architecture in Fort Lamy, Chad, 1962, Candilis, Josic, Woods

Source: Mária i Serrano, Magda - "*The Genealogy of Iterative Growth*", Polytecnic University of Catalonia and of the Thematic Network Architecture, City and Environment, 2011

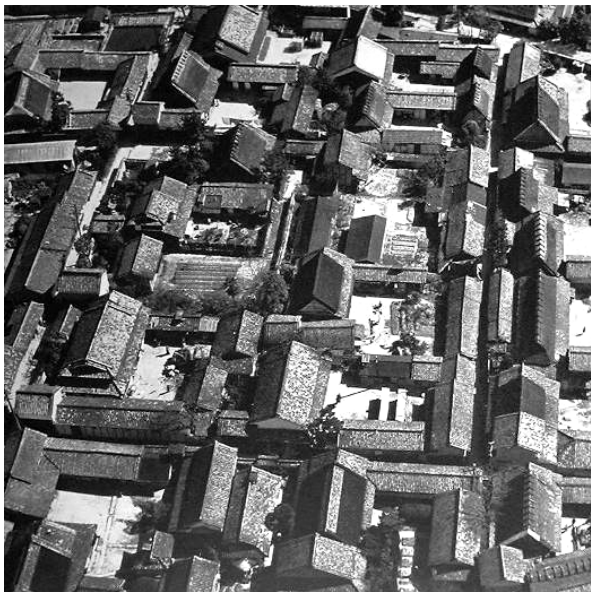


Image 58 - Jori-Sei village, Yamamoto plain, Japan

Source: Mária i Serrano, Magda - "*The Genealogy of Iterative Growth*", Polytecnic University of Catalonia and of the Thematic Network Architecture, City and Environment, 2011

These systems were, during that time, taken to Universally Utopian proposals winning the capacity of incorporated different solutions, saving the systems from losing their individual identities. This idea of detaching any personalization of the solutions allowed to validate an universal comprehension and enable several approaches of infinite reproduction.

The idea of repetition of elements or units in a infinite system is not new. Inspired in the organic processes of growth in all nature, mathematicians, artists and scientists during the last four centuries created several mechanical instruments, illustrations and shapes which are regulated by infinite processes of growth. Some of those shapes and instruments were without any doubt fundamental for the architectural researches of unlimited growth and urban comprehensions. The polygons of Kepler and the sponge of Menger are some examples of infinity growth systems turned into shapes and illustrations. They are fundamental for the spatial comprehension and the critical relations between individuals and collective form.

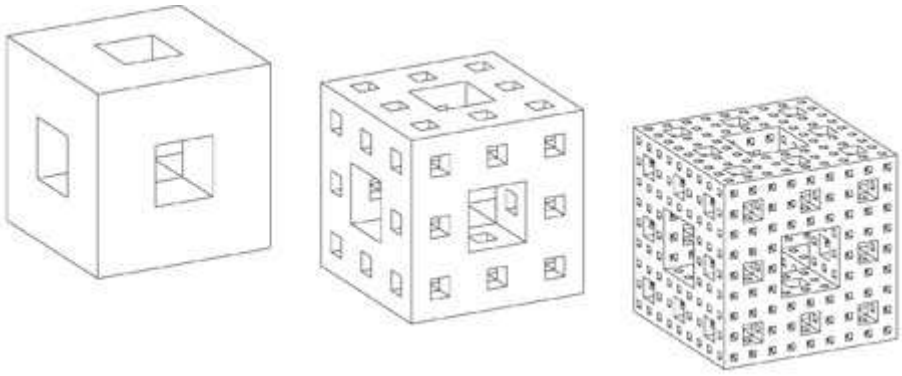


Image 59 - three phases of Menger sponje

Source: http://www.cabinetmagazine.org/issues/24/wertheim.php

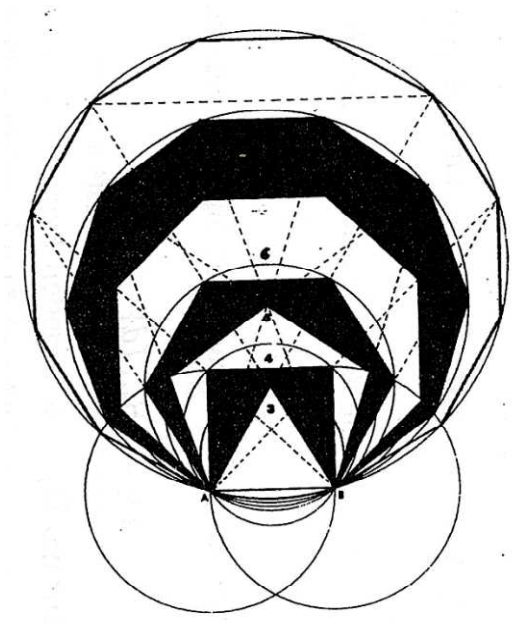


Image 60 - polygon of J. Kepler, 1619

Source: Mária i Serrano, Magda - "*The Genealogy of Iterative Growth*", Polytecnic University of Catalonia and of the Thematic Network Architecture, City and Environment, 2011

According to the mathematician Andreas Speiser in his research about the geometrical laws that governs the repetition of forms, the repetitions can be made according to three basic operations - translation, rotation and reflection - which together can produce 17 possible symmetries.[31] Some of these different operations of repetition of forms can be even be seen in the Iberian and Arabic tiles used for coating walls and floors.

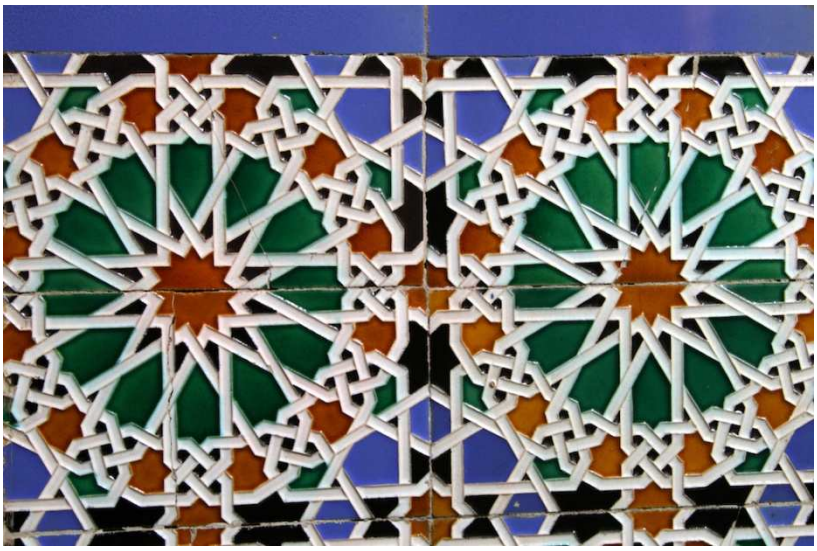


Image 61 - Tiles in Casa do Alentejo - Lisbon
Source: http://azulejosnaminhaterra.blogspot.pt/2012/03/409-azulejo-em-lisboa-i.html

There are different kinds of systems of iterative growth which can expand for different axis according to the shapes of the units. Those systems can be unidirectional or bidirectional systems, depending on the kind of growth they can reach. Several architects took advantage of these systems and created many proposals which rethought the urban organization of the contemporary cities. The members of Team X, Candillis, Josic and Woods, Louis Khan, Moshe Safdie, Kenzo Tange, Kikutake and Kisho Kurokawa were some of the architects which included the repeatable elements in their buildings. They created dissimilar systems, some of which could be adapted to any space, while others only worked in a specific area. The *mat-building* and the *Metabolism* are two examples of infinite expansion of architectural objects from two different worlds.

2.4.1 Mat - Building

The mat-building concept was created in the 1950s by the team X members, as a consequence of the CIAM debates. It was a result of quite a few ideals which worked as alternatives to the functional city of Le Corbusier's Athens Charter of 1933. These new ideologies tried to segregate the four functions of daily life - living, working, circulating and recreating - in a continuous architectural object, thus rethinking the

[31] The crystallographer Fedorov also demonstrates 17 different symmetries in a plane corresponded to the structure of crystals.

dwellings and urbanity. Alison Smithson described the mat-building concept as follows: "*mat-building can be said to epitomize the anonymous collective; where the functions come to enrich the fabric, and the individual gains new freedoms of action through a new shuffled order, based on interconnection, close knit patterns of association and possibilities for growth, diminution and change.*"[32]

Nevertheless, one of the first proposals considered as mat was Le Corbusier's proposal for the Venice hospital in 1965.

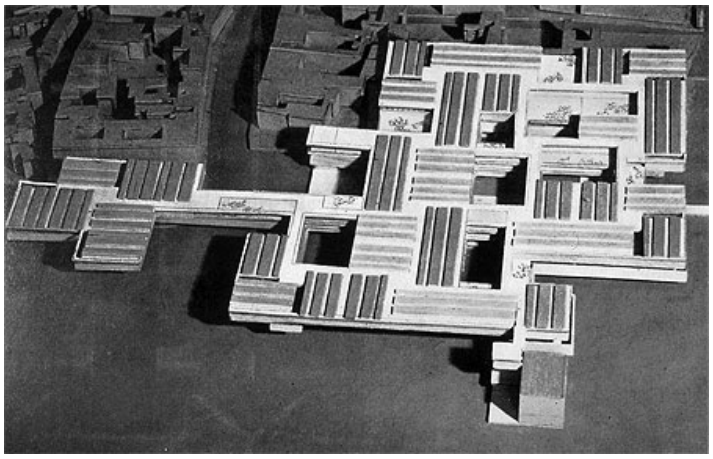


Image 62 - proposal for the Venice Hospital, Le Corbusier
Source: http://www.revistaau.com.br/arquitetura-urbanismo/182/artigo134779-1.asp

The mat-building is a low-rise compositional structure based in several layers of grids which distributes solids and voids in its mesh. It creates a conjugation between public and private and full and empty spaces in a set, like a mat of levels and patterns which is extended horizontally through the land. In these systems, the dwellings are combined with courtyards, throughways and green spaces as a complex range of frameworks. The mat was intended to provide flexibility in a continuous changeable city, thus guaranteeing its own longevity. These proposals, according to Alyson Smithson, will have more than the usual three dimensions, including a forth one, time.[33]

The Smithsons presented theoretical interpretations of the city which were fundamental for the comprehension of the organization of the mat-building's compositions. Their re-organization of the cities regarding the relation between cells, clusters, steams and city, enounced in the first chapter, was a key for the mat-buildings' compositions. As I said before, for the Smithsons, the city is organized according to continuous sets of individual spaces or forms which are called the cells. Moreover, the association of several cells creates a cluster. This assembly of the dwelling cells generates spatial variation between the public and private. Furthermore, the clusters all together create a stem and multiply parallel stem forms a network of passages which connects several dwelling types and activities in a continuous grid. These set of cells, clusters and stems forms the new urban type of mat.

Inspired on the streets of London and the working class neighborhoods instead of avenues and plazas, the Smithsons created the term of "new monumentality" for

[32] Smithson, Alison; 1974 apud Forés, Jaime J. Ferrer - "Mat Urbanism: Growth and Change", Universitat Politécnica de Catalunya pp. 74
[33] *Ibidem*

these kind of proposal. That is a contradiction of the Le Corbusier's four functions of cities which were replaced by the younger members of the CIAM by four others which could better account for diversity - the social, cultural, climatic and ethic. According to the Smithsons, *“this might be termed the ecological concept of Urbanism, a concept of obvious value when we are dealing with the problem of ‘habitat’”.*

The mat, a two-dimensional network of stems and cells and the several connectors, offers the flexibility of unifying diverse clusters and activities in different directions.

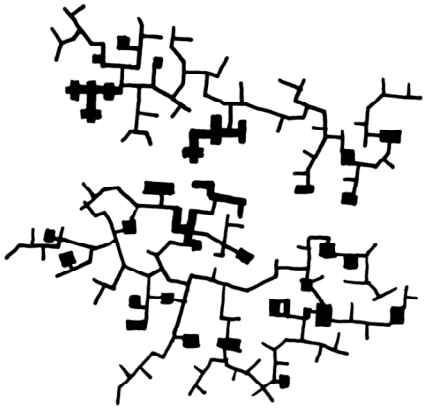


Image 64 - Diagrammatic plan of a small city from the Golden lane project, The Smithsons

Source: Forés, Jaime J. Ferrer - "Mat Urbanism: Growth and Change", Universitat Politécnica de Catalunya

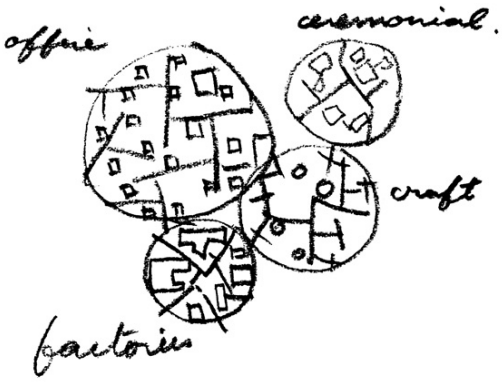


Image 63 - Cluster of overlapping functions, The Smithsons

Source: Forés, Jaime J. Ferrer - "Mat Urbanism: Growth and Change", Universitat Politécnica de Catalunya

However, these structures were also inspired on the dense historical meshes of the cities, mainly the Arabic ones. Candilis and Woods, seduced by the spontaneity and diversity of the Souks of Marrakech, they created their mat proposals as vehicles for generating the spatial and functional density of the traditional cities. For them the Souks are like Skeletons for the surrounding city and they are fundamental for the continuous urban density. Candilis, Josic and Woods took these characteristics for their proposal for the Free University of Berlin in 1963.

The Smithsons describe the textures of the Arabic casbah as *"full of starts and stops and shadow… with a high degree of connectedness to allow for change of mind and the in-roads of time".* They presented several mat proposals as the proposal for the Hauptstadt Berlin in collaboration with Sigmond, or even their project in an Arabic context - their urban study for Kuwait. Besides these, some other architects presented other mat proposals such as the Orphanage of Amsterdam from Aldo van Eyck.

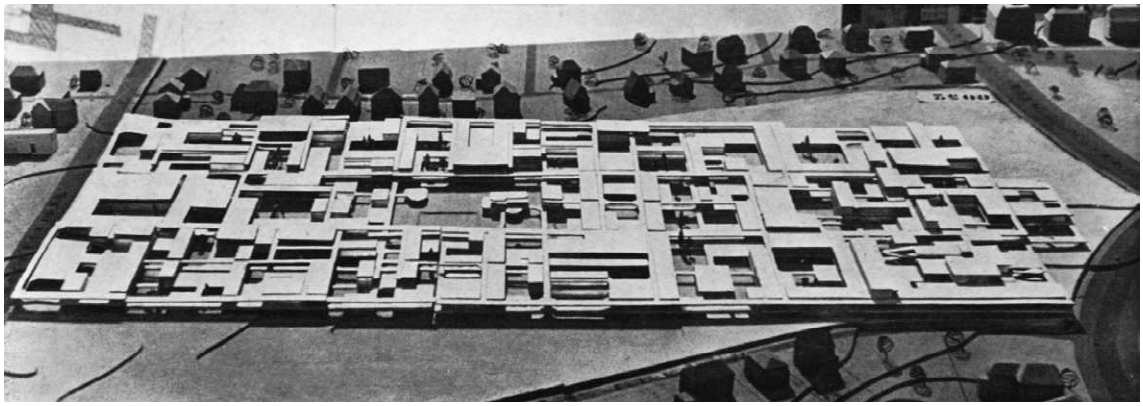
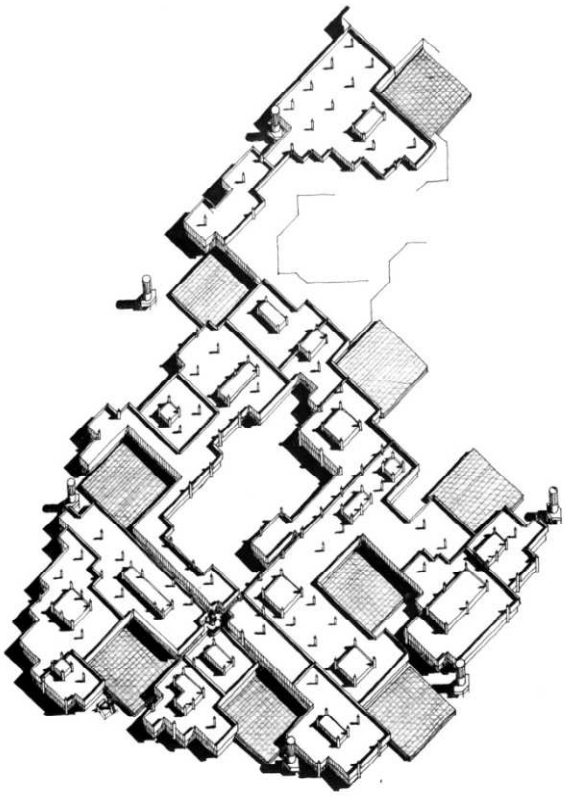


Image 65 - Candilis, Josic and Woods - competition design for the Free University of Berlin, 1963
Source: Forés, Jaime J. Ferrer - "Mat Urbanism: Growth and Change", Universitat Politécnica de Catalunya



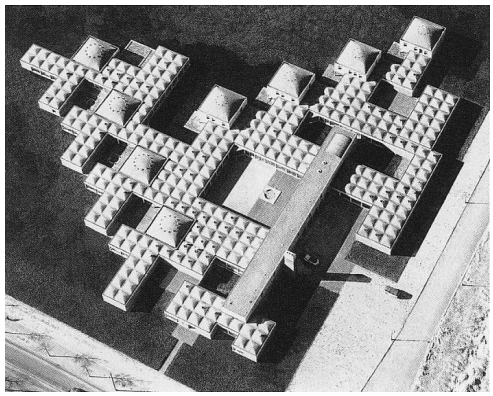


Image 66 (on the top) - Orphanage of Amsterdam, Aldo Van Eyck
Source: http://upload.wikimedia.org/wikipedia/commons/8/87/Orphanage-1a.Aldo_van_Eyck.jpg

Image 67 (on the left) - mat-building of the Crown Prince, The Smithsons
Source: Forés, Jaime J. Ferrer - "Mat Urbanism: Growth and Change", Universitat Politécnica de Catalunya

2.4.2 Metabolism

While in Europe the members of the Team X developed low-rise and high density systems like the mat-building, responding to the general problems of the contemporary cities, the Japanese architects created a new movement - the Metabolism. Considered the last architectural movement, the Metabolism appeared after the World War II as a solution for the necessity of a fast reconstruction of the Japanese cities. During the World War II, many Japanese cities were partially or entirely destroyed by the American bombers - among others, Tokyo suffered a destruction of 51%, Fukuoka of 24.1%, Toyama of 99% and Hiroshima and Nagasaki were entirely destroyed by the atom bombs. These aggressive destructions generated a *tabula rasa* in those cities where everything needed to be built from a starting point. While the modernist repertoires of urban planning couldn't be applied, new ideas were required and many radical plans have been proposed for a new land where everything was possible. Yoshikazu Uchida pointed out - *"The Japanese trauma associated with land - saturated on its own mountains archipelago, then liberated in foreign territories, now scorched at home - forms a critical backdrop for the growth of a new generation of architects that will become the Metabolists...".*[34]

After the Japanese redemption, many architects, the future Metabolists, visited the ruins of Hiroshima and many other destroyed cities. Kenzo Tange, an architect with an already vast experience - during the Japanese occupations, together with other Japanese architects presented several proposals for the Manchuria and other occupied land in the Asian continent - visited Hiroshima's ground zero and destroyed districts of Tokyo and started producing new masterplans for the cities' reconstructions. However, Tange discovered that the erased urban fabric doesn't mean a tabula rasa where everything is possible but any proposal needs to answer to a "*bizarre mixture of flattened city and an intact land ownership system that makes radical planning still difficult."*[35]

With this necessity of new proposals for the masterplans of the Japanese cities, the Metabolism was born and Tange was without any doubt fundamental for it. With his lab based in Tokyo University, he worked in three fronts at the same time: the reinforcement of the social status of the profession, the credibility of the design and the reinvention of the architect.

After 10 years of the first atomic bomb, Tange inaugurated the first 'metabolism' building, the Hiroshima Peace Memorial Museum. This, together with the Yoyogi National Gymnasia and the Big Roof at Expo '70 in Osaka were symbols and catalysts of the Japan's economic and spiritual postwar resurgence.

Besides Tange, many other architects such as Kisho Kurokawa, Kiyonori Kikutake and Takeshi Asada developed a new movement and manifesto, however, Noboru Kawazoe was the first using the word 'Metabolism' to describe it. Inspired by the Japanese word *shinchitaisha*, which means 'regeneration' or 'replacement of the old with the new', the term is associated with a system which can develop freely with the multiplication, substitution and repetition of cells in space, creating an iterative growth system. Kawazoe quoted - *"'Metabolism' is the name of the group, in which*

[34] Koolhaas, Rem; Obrist, Hans Ulrich - "*Project Japan. Metabolism Talks...*", Taschen, Spain, 2011, pp. 78
[35] *Ibidem*

each member proposes future designs of our coming world through his concrete designs and illustrations. We regard human society as a vital process - a continuous development from atom to nebula. The reason why we use such a biological word, metabolism, is that we believe design and technology should be a denotation of human vitality...".[36] As the cells of the human body reproduce and regenerate during the life, the 'metabolism' in architecture follows the same ideals in the urban space. These concepts allow for a fast construction and regeneration of the city, putting together dwellings, public spaces and circulations in iteration in a global system.

However, the Metabolism doesn't follow completely new ideologies, it was also inspired by other traditional Japanese buildings. The Ise shrine in Nara, the Shintoism's most sacred shrine in Japan, has been rebuilt every 20 years since 690 CE. It represents a cyclical renewal through time, a regeneration according a continuous line. The courtyards of the Imperial Palace in Kyoto and the expansion of the interior rooms, as well as the Katsura Detached Palace raised in pilotis have desirable features for a modern architecture. These two palaces together with the Ise shrine constitute the Japanese antipodes exemplary for the Metabolism, as well as the modern architecture of Le Corbusier and Mies van der Rohe.

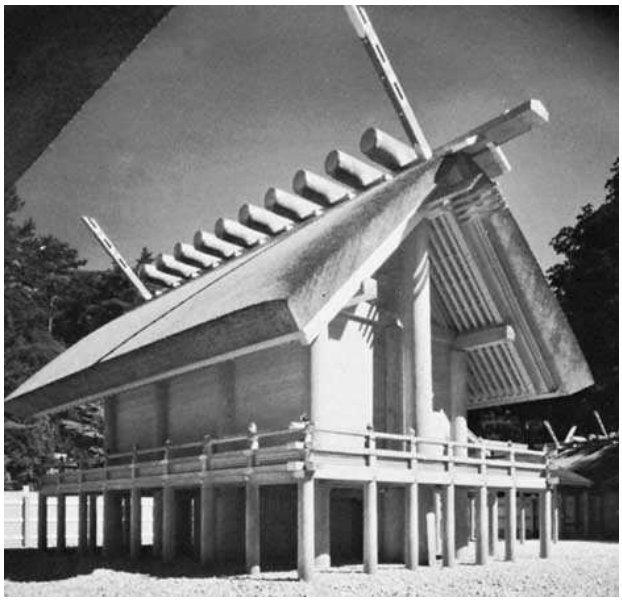


Image 68 - Ise Shrine, Nara, Japan

Source: http://www.britannica.com/EBchecked/media/6160/Main-building-of-the-Inner-Shrine-at-Ise

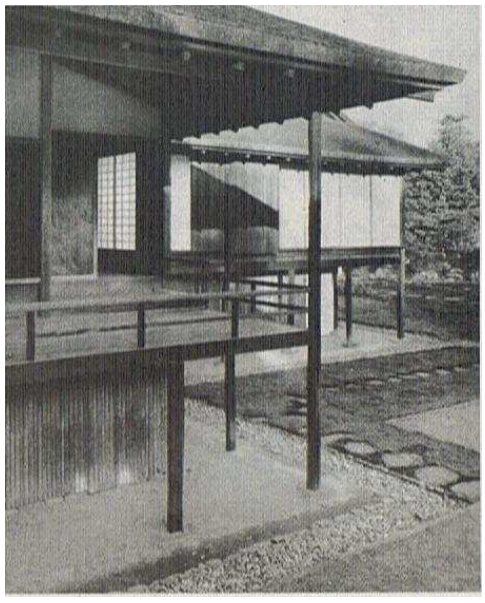


Image 69 - Katsura Detached Palace, Kyoto

Source: Koolhaas, Rem; Obrist, Hans Ulrich - "*Project Japan. Metabolism Talks...*", Taschen, Spain, 2011,

Despite its purpose of projecting new cities according to new concepts, the Metabolism keeps its association with the spatial concepts of the Japanese traditions. Kisho Kurokawa, one of the most prestigious metabolists and author of one of the main emblematic metabolism buildings in Japan - the Nakagin Capsule Tower in Tokyo, relates this new movement to the Budhist concepts of *ma*, *ku* and *oku* enounced in the

[36]Kawazoe, Noboru apud Koolhaas, Rem; Obrist, Hans Ulrich - "*Project Japan. Metabolism Talks...*", Taschen, Spain, 2011, pp. 78

previous chapter. Besides that, and completing an ideological reasoning, he established the philosophy of symbiosis as an essential key for the Metabolism. In biology, symbiosis is a term used to describe long-term interactions between two or more different species. For Kurokawa, the symbiosis between activities as well as between private and public properties are fundamental for the equilibrium of the city. For this equilibrium it is necessary to work with the intermediary spaces for a continuous iteration of the elements in the whole. This is where the relations between parts enter again, i.e., the in-between and the concepts of *ma*, *ku* and *oku*. These are essential keys for a complete understanding of the concept of Metabolism. The continuous aggregation of the activities in an ordered system as well as the complete projection of an entire urban fabric in only one transformable composition demand a control of the intermediary spaces. Kurokawa quoted "*The concepts of intermediary space and ambiguity are important keys to understanding the philosophy of symbiosis. In the West, dualisms are transcended through the dialectical method of resolving opposites on a higher level. The two opposites are either unified into a single entity, or one of the two is negated and rejected. Symbiosis instead creates a dynamic relationship between the two elements while allowing them to remain in opposition. A relationship between two opposing elements can be achieved by placing spatial distance (a neutral zone) or temporal distance (a cooling-off period) between them."*

The Hiroshima Peace Memorial Museum, the Yamanashi Press Center and and the Shizuoka Press and Broadcasting Center in Tokyo from Tange; the Nakagin Capsule Tower in Tokyo and the Sony building in Osaka from Kurokawa; the Sky House and the Izumo Shrine Administrative Building from Kikutake, are some of the most representative buildings of the Metabolism concepts. However, these architects along with others presented many other proposals for different scales, however more utopist. Some examples are the several plans for the artificial ground in Tokyo Bay. With the fast growth of population in Tokyo - after the World War II it exploded from 3.5 million to 9.5 million - and with the unremitting conquest of land to the sea, several architects designed their proposals for a new city in the water. Hisaakira Kano, Masato Otaka, Kisho Kurokawa, Kenzo Tange, Taro Okamoto and Kiyonori Kikutake employed many creative strategies in competition to answer to the urgent necessity of colonizing the outlands of Tokyo. Another big scale Metabolism proposals are the Kikutake's marine city, Isozaki's Clusters in the air or the Agricultural city from Kurokawa. Although these proposals of enormous scales were indeed utopians, they were fundamental for the comprehension of the city as well as the Metabolism systems and their implementation in the contemporary cities. Besides that, they were part of the manifesto which marked a change in the Japanese architectural paradigms and defining a transition from the past to the modern times.



Image 72 - Hiroshima Peace Memorial, Kenzo Tange

Source: picture of the author



Image 71 - Nakagin Capsule Tower, Kisho Kurokawa

Source: picture of the author



Image 70 - Shizuoka Press and Broadcasting Center, Kenzo Tange

Source: picture of the author



Image 75 - Plan for Tokyo Bay, 1960, Kenzo Tange

Source: http://archinect.com/features/article/56468/atelier-bow-wow-tokyo-anatomy

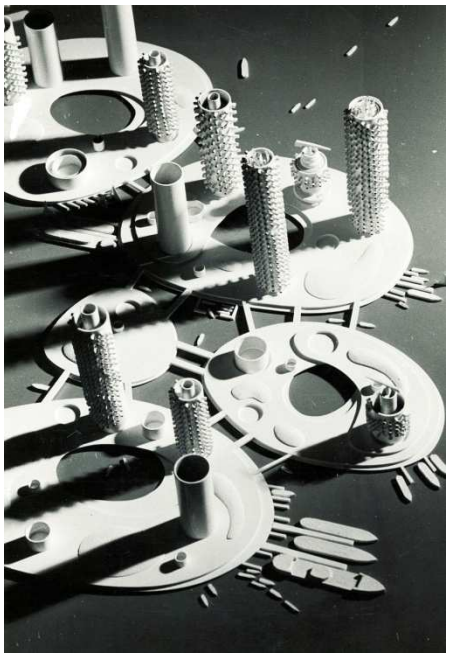


Image 74 - Marine City, Kiyonori Kikutake

Source: http://www.domusweb.it/en/news/metabolism-the-city-of-the-future/

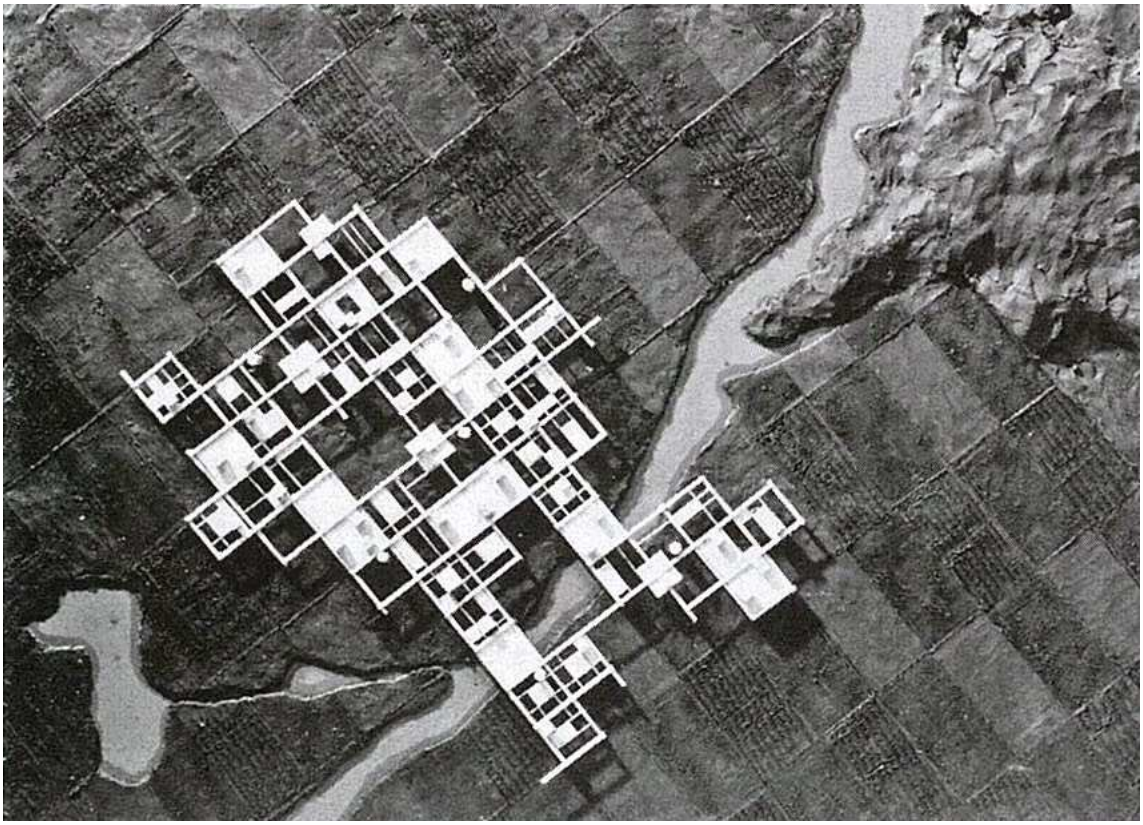


Image 73 - Agricultural City, Kisho Kurokawa

Source: http://architecturalmoleskine.blogspot.pt/2011/10/metabolist-movement.html

Chapter 3

The limits and transitions in the conception of a collective housing in a compact urbanity

3.1 The Daimyo Neighborhood



Image 76 - Localization of Daimyo neighborhood in Fukuoka, Kyushu island, Japan
Source: picture of the author

Before operating in the Japanese city it is necessary to understand it, interpret its ambivalence of density and the several connections. The different scales, gaps, and articulations in the urban web should be unconditionally taken as important characteristics for the development of the urban project.

Daimyo, compounded from *dai* ("large") and *myō* (for *myōden,* or “name-land,” meaning “private land”), is a generic term referring to the powerful territorial lords. In Fukuoka it was part of the old former city of Fukuoka, and it is directly related with the *daimyo* (lords) and the samurais which lived around the old castle of Fukuoka, i.e., the Daimyo neighbourhood and the areas around Ohori Park. The *daimyo* era was extinguished after the Meiji restoration when Japan adopted the prefecture system. However, some areas still testify the ancient presence of the daimyo and samurais through the architecture as well as the urban network. Daimyo neighbourhood, besides having traditional *damiyo* and *samurai's* houses and keeping the old mesh, it still uses the name of the Japanese social class.

Nowadays Daimyo is a neighbourhood in the centre of Fukuoka with very unique characteristics which distinguish it from the rest of the city. It is located between the Ohori park - the biggest park of the city - and Tenjin, the most important commercial area and where one of the main metro, train and bus stations of the city is. The Tenjin and the other surrounding areas are characterized by extremely dense areas where the buildings derived from heights but higher than the average of the city. However, the Daimyo neighbourhood has a uniquely urban mesh with different urban typologies, acting as an island in the city centre. The narrow streets follow mainly straight lines, perpendicular to each other, and the buildings have a smaller height than average of those in the surrounding avenues. Besides that, the Daimyo neighbourhood followed the mesh of the old urban house typologies of *machiya* and *nagaya* enounced in the last chapter. As opposed to the main Japanese urban dense areas, the traditional houses like the *machiya* were kept in Daimyo neighbourhood, keeping the characteristics of the shop areas from the house for new commercial infrastructures. The traditional typologies, the low-rise of the buildings, the narrow streets and the predominance of the people over cars makes Daimyo an important commercial and cultural area but with a singularity that distinguishes it from the rest of the city. Due to the quality of the area, second hand shops, craft stores and other kind of occupations were established which are hard to find in any other part of Fukuoka.

Because of this private sector activities' occupation, the government doesn't interfere with the neighborhood, resulting in an attractive urban area where many singular activities coexist in community. However, the Daimyo neighborhood is in a constant renovation of uses and activities. This is caused by a rotation of the activities through the entire city. That is, several private activities and commercial areas are constantly changing location due to the increasing of urban land prices. In this case, the private activities settled in Daimyo came from another urban area called Kitatenjin, however, due to the increasing of land price, these activities are changing again to Imaizumi, at south of Daimyo. The land price and the decreasing of construction results in an increase of vacant areas and the buildings are changing their uses to living, commerce and offices. Thus, the Daimyo neighborhood as well as the surroundings are in a constant mutation, changing their activities, buildings and mainly their character along the time.

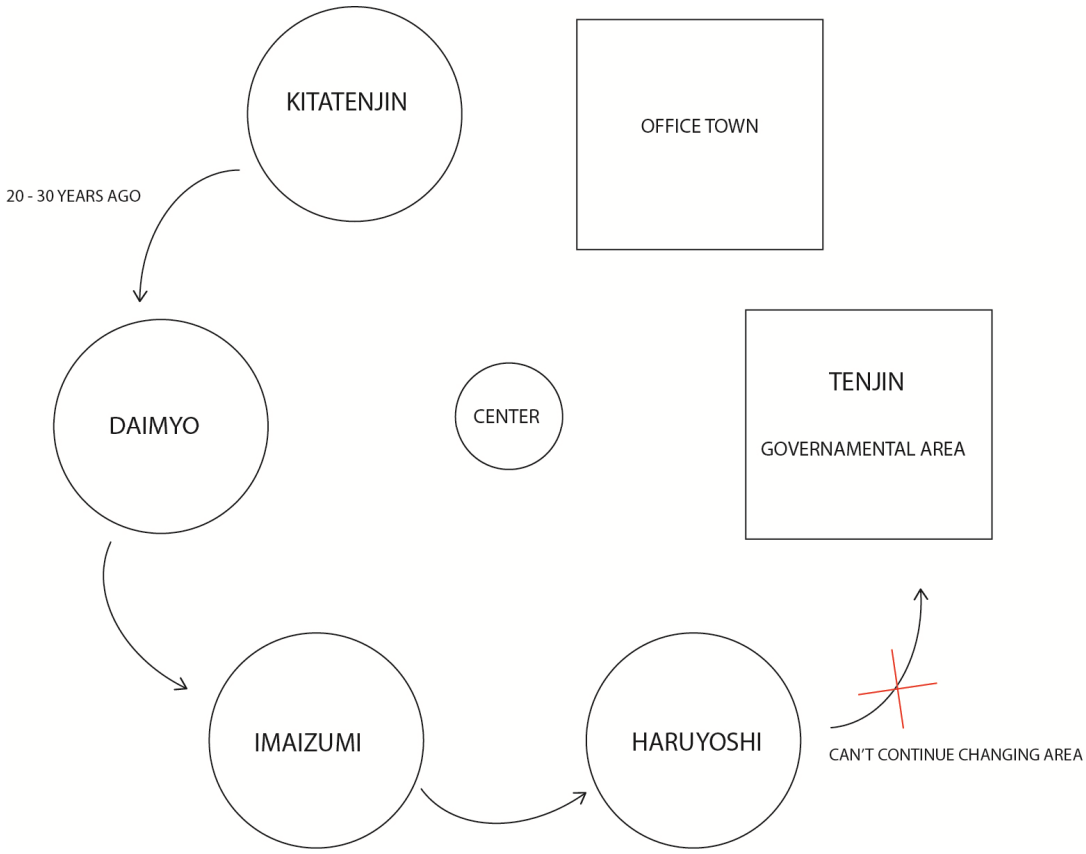


Image 77 - Diagram - change of private sector activities around the commercial center of Tenjin, Fukuoka
Source: diagram of the author



Image 77 - Map of the project site and surroundings and associated images



Image 80 - Area of the project occupied by parking lots, Daimyo, Fukuoka

Source: picture of the author



Image 79 - Area of the project seen by the south avenue, Daimyo, Fukuoka

Source: picture of the author

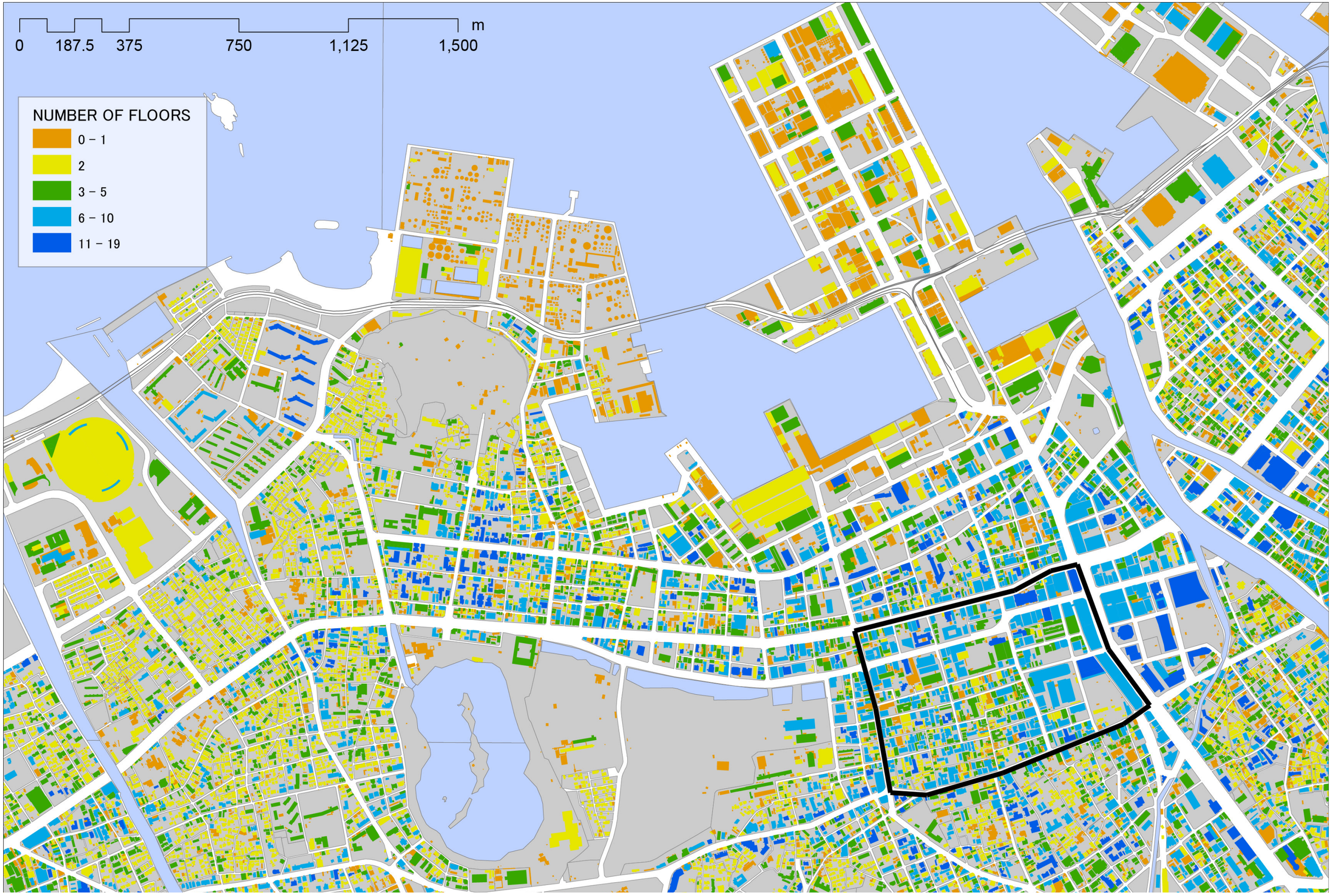


Image 80 - Number of Floors of the Fukuoka city center and Daimyo Neighborhood

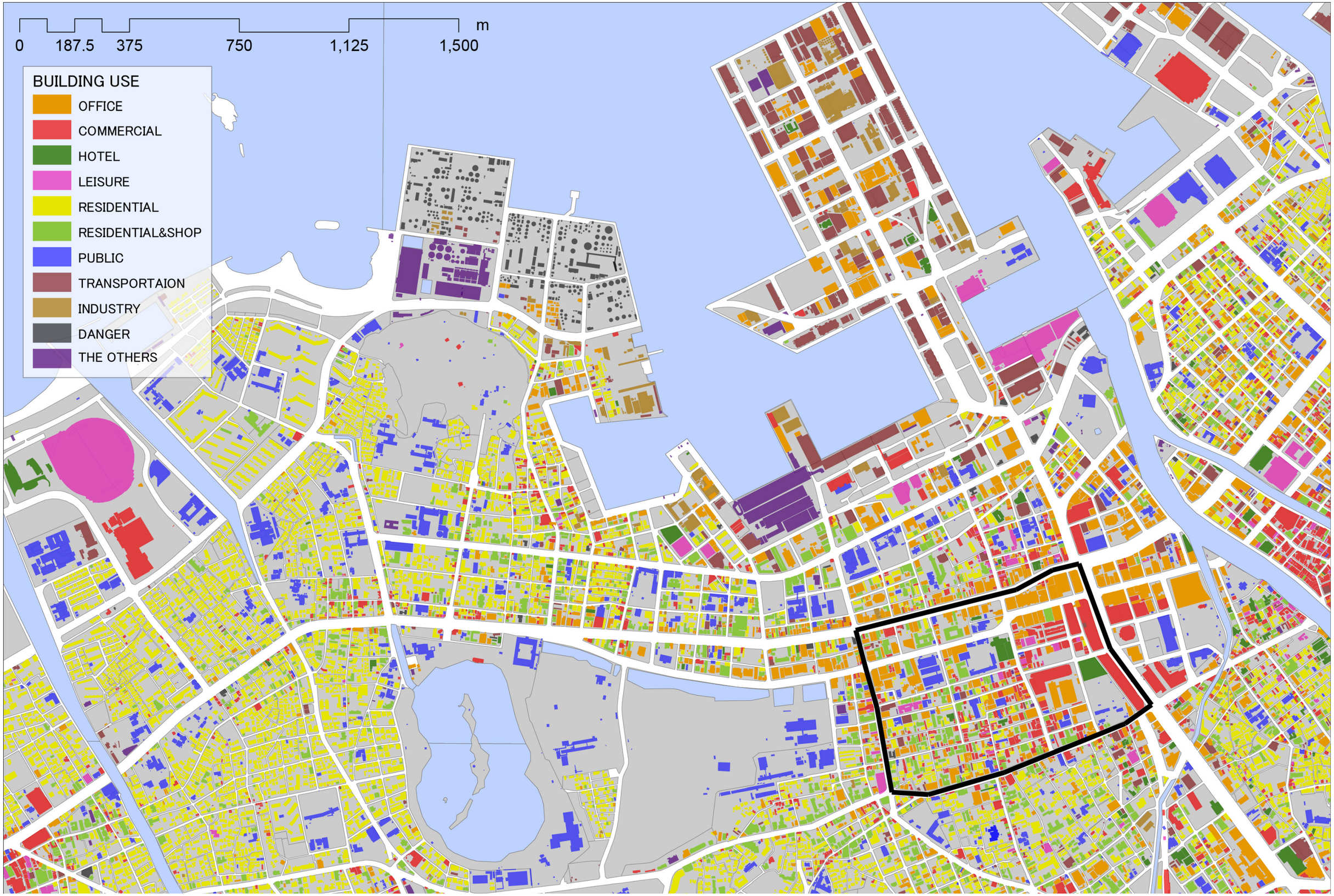


Image 81 - Building uses in the Fukuoka city center and Daimyo Neighborhood

3.2 Concerns and Project Goals

After studying, in the last chapters, different themes of architecture from different scales - the boundaries in the building scale and the compact city and iterative growth in the urban scale - the project of a collective housing implemented in Daimyo neighborhood tries to reach a parallel in harmony between both. Answering to the problems of an extremely dense city, it was necessary to understand it as well as several strategies in response to its density. The main concern was to implement identical characters of a Japanese traditional house in a dwelling located in a dense urban mesh, or, to be more precise, apply the potentialities of the limits and transitions of several traditional houses in the dense city. Besides, the study of iterative growth proposals allowed me to provide the capacity of expansion of a model of organization and create aggregation rules of several models of dwellings together with public facilities. These aggregation and iterative growth proposals allowed me not only to create a visionary urban proposal for the neighborhood but also to understand the organization of an urban and living model which can itself create urbanity by following different approaches - the iteration between dwelling and city, between public and private and between interior and exterior. These several approaches provided me the conditions to study different boundaries in an entire urban object and its variations depending on the different layers of intimacy in a city.

Once the path and the several limits and transitions inherent to it are fundamental for a Japanese spatial appropriation and comprehension, all the project was thought according to a path and its successive boundaries. Similar to the routes from the outside to the most private areas studied in the case studies, with this journey through the proposal, it was possible to understand the several limits and transitions and compare them, recognizing important elements always associated to the architecture - the temporal and sequential boundaries.

3.3 Implementation and Urban Strategies

As I referred before, the Daimyo area is characterized by a high occupation of land where the buildings follow no rules of alignments, height or image, however keeping the character of a traditional ancient city. Besides, the implementation of the buildings in an area where one of a few rules is the 400% of volume ratio allowed, influenced the construction of several new buildings in height, keeping vacant areas in the peripheries. However, these vacant areas are not occupied as public spaces but as parking areas, only keeping the streets has public domains, where cars and people share the same space. From this, results not only extreme lively streets but also an undefined area for people and wastage areas which could belong to the city.

The interventional area is situated in a vacant place of the Daimyo neighborhood occupied by parking lots. This lot is situated in the furthermost southern point of the Daimyo neighborhood, between a crowded avenue and the narrow streets of the quarters. Occupied before by a seven floor-high building facing the avenue, which backside was turned to the interior of the neighborhood, this lot has become a vacant place after its demolition. It turned into another gap in the city mesh, but which

makes a connection between the avenue and the interior of the neighborhood. However, as several vacant areas, its gap is not regular, zigzagging around the high neighboring building that faces the avenue and the three floors high dwellings facing the perpendicular street. For the creation of a regular compositional structure, these dwellings were demolished, creating a more regular gap and creating the possibility of projecting a building which can face three streets of different dimensions and characters - the main avenue, the perpendicular street that creates an important entrance for the neighborhood, and the North street. Besides, at North of the lot is located a singular quarter defined by low-rise buildings and narrow pedestrian streets, where were established second-hand and retail shops, transforming the character of the streets.

This proposal tries to answer to several problems, or rather conceptualizations of the Japanese cities, putting together many different characters of the urban space in a compact object which could answer to the urban density. The goal is not to change the character of the streets, gaps or dwellings, but instead set them in parallel and in harmony as a whole. In this way, I followed several urban concepts of iterative growth which can answer to the high density keeping the several characteristics of the city. The mat-building from Europe and the Metabolism from Japan announced in the last chapter are the main concepts that I used as examples to follow.

Despite the possibility of this project being placed in any other area of the Daimyo neighborhood or even of the entire Japan, I found the need to create several strategies which could conduct my project in harmony with the surroundings of the site. The first strategy is the creation of a low rise and high density object, answering to the need of densify the area but keeping the building low in a perfect relation with the pre-existent buildings of the neighborhood. This necessity of a low rise building answers to the right of getting direct sunlight in all the houses, i.e., in an urban context of narrow streets, the new building needs to be a low construction in order to avoid being a barrier between the sunlight and the surrounding buildings.

The second strategy was the requirement of creating several gaps in the entire compositional structure which could offer air circulation and light to the interior of the dwellings as well as under them. The gaps were strategically distributed in all the housing models, keeping a defined metric in the entire building.

The need to offer a design to the streets which can qualify them, keeping their public character as well as the continuity of some alignments of the neighborhood, such as the narrowest street which defines the quarter at north, are certainly important conditions to follow. Besides, the Fukuoka's city hall established several rules for a better requalification of the city center. The restructuration and the increasing of public areas in the city, the creation of green areas along the center and the need for a good image, clean streets and reduction of commercial advertisements are some of the strategies established by the city hall.[37] These strategies are vital for the conduction of the project so that it can perfectly belong to the city and be synchronized with the surroundings.

[37] The Fukuoka city hall established several strategies for a better future image of the city center. These strategies were created with various purposes: clean areas without garbage, smoke, and illegal advertisement; decreasing the congestion of traffic; better paths for people and bicycles; facilitate the movement between shops and retails; and create information for a better hospitality.

3.4 The Compositional Structure and its Boundaries

The proposal is composed by an aggregation of several equal models of housing which are repeated in different directions. This compositional structure allows an infinite growth, however, with the possibility of including exceptions in its mesh, such as different directions of the dwellings or the implementation of other urban structures like public gaps - a possible square - or parking structures. Besides, the high density of the dwellings' floors allows the creation of free ground level for public facilities, offering them to the neighborhood.

Each model of house is a parallelepiped of 12 meters length and 9,6 meters width with two floors high plus one floor for the entrance. The parallelepiped is composed by interior spaces between two gaps of different characters - one completely private that works as a patio, and a bigger one which is continuous and links the sky with the ground level. These houses are located in the third and fourth floors and correspond to the most private areas of the compositional structure. Under them, in the first floor, are situated the smallest houses (the T1 dwellings) as well as the access rooms of the biggest houses of the top floors. Furthermore, the accesses for the houses are made through interior streets which are in connection with the surroundings on the edges as well as with the vertical gaps of the structure in several places. The ground floor is all a public area that can belong to the neighborhood. The public facilities and stores can be freely shaped between the columns keeping the interstitial spaces as public areas or as several paths under the compositional structure. This organization from public to private is related to the layers of intimacy refered in the first chapter.

While in a traditional Japanese house we can find several layers of intimacy during our journey from the street until the interior, the same happens in this proposal, however in a vertical approach. Besides that, these layers can be still identified according to the emptiness that decreases while the building is higher. Thus, from the open spaces of the ground level to the interior space of the top floor, the layers of intimacy differ following a linear order. For the conception of aggregation rules and an iterative growth system I used several modern and contemporary projects as examples. The OMA's Nexus World housing complex in Fukuoka and its recurrence of private patios, the light wells from the project of residential building in Borneo Sporenburg from Xaveer de Geyter, the Thierry Lacoste and Antoniette Robain's proposal for Dunkirk and the aggregation of housing models in different layers of the Madrid Residential complex from the Morphosis are some of the references for the conceptualization and creation of this project.

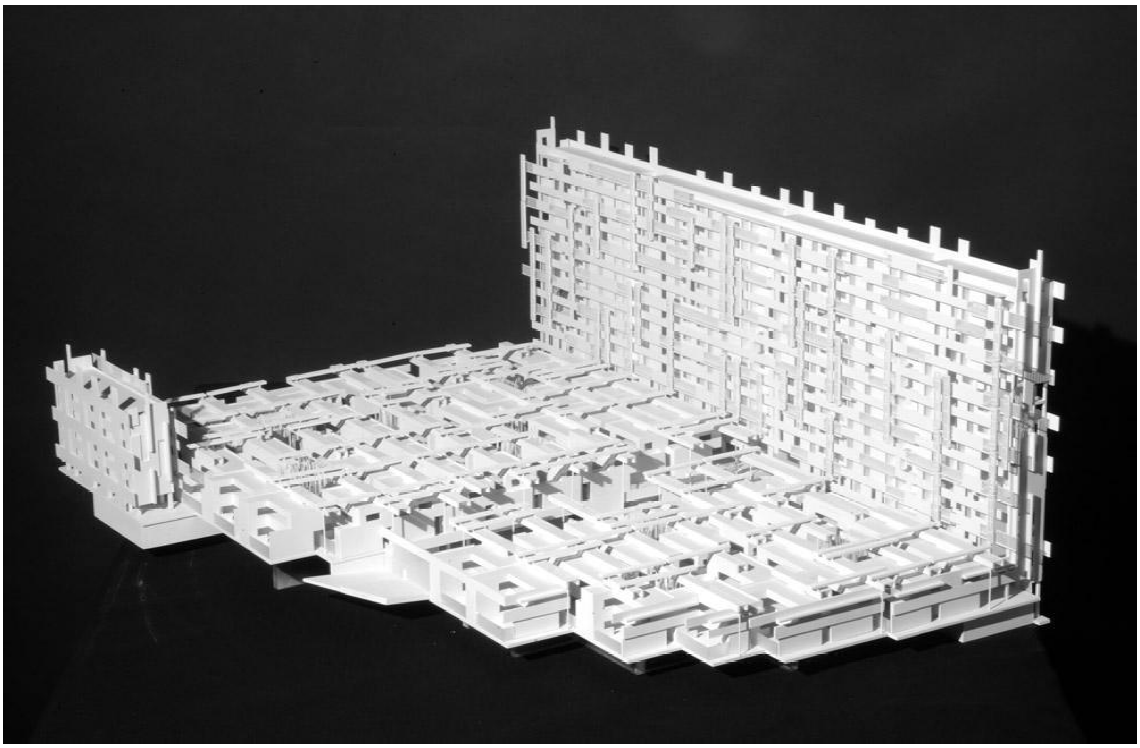


Image 83 - Model of the project of Housing in Madrid, Morphosis
Source: http://morphopedia.com/projects/madrid-housing

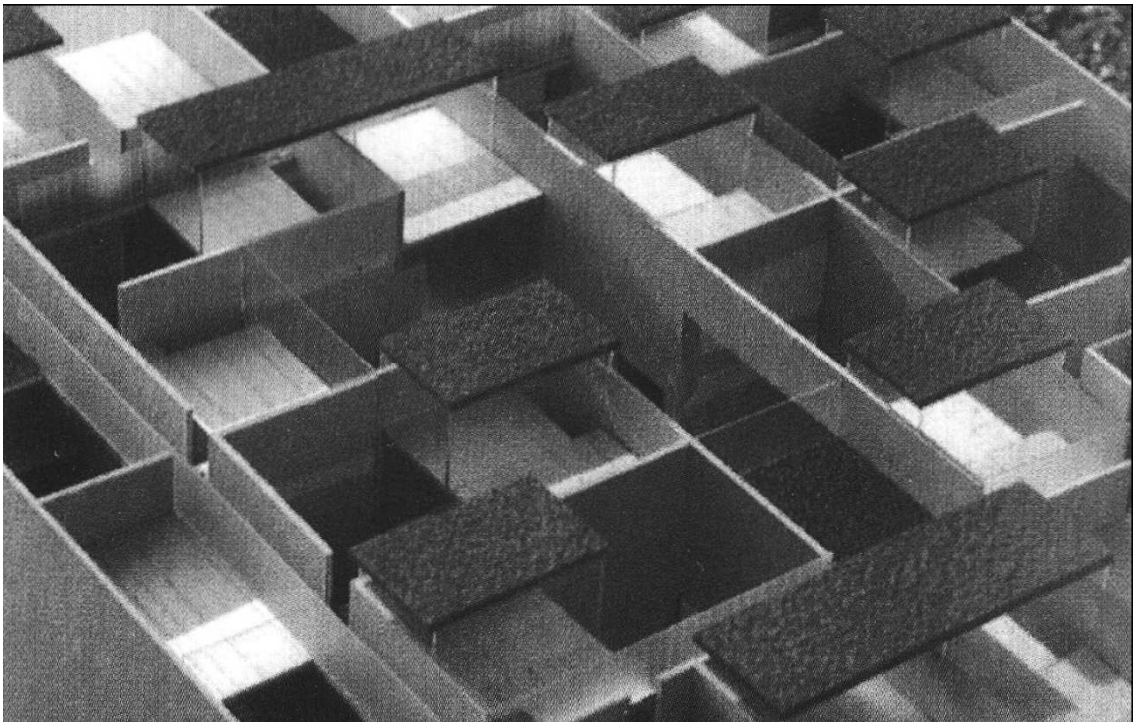


Image 84 - coverage of the housing proposal for Borneo Sporenburg, Xaveer de Geyter



Image 86 - Coverage and private patios of the OMA's Nexus World, Fukuoka
Source: http://nsss.tumblr.com/post/42111236/oma-rem-koolhaas-housing-nexus-world-fukuoka

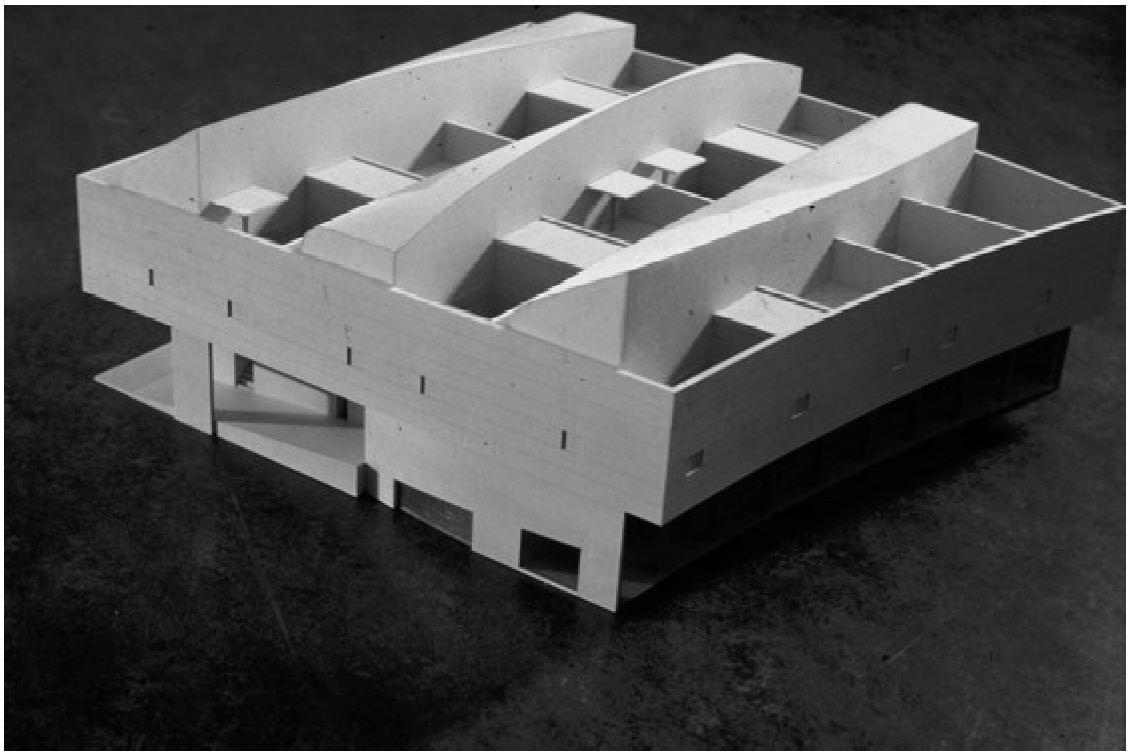


Image 85 - OMA's proposal for the Nexus World in Fukuoka
Source: http://oma.eu/projects/1991/nexus-world-housing

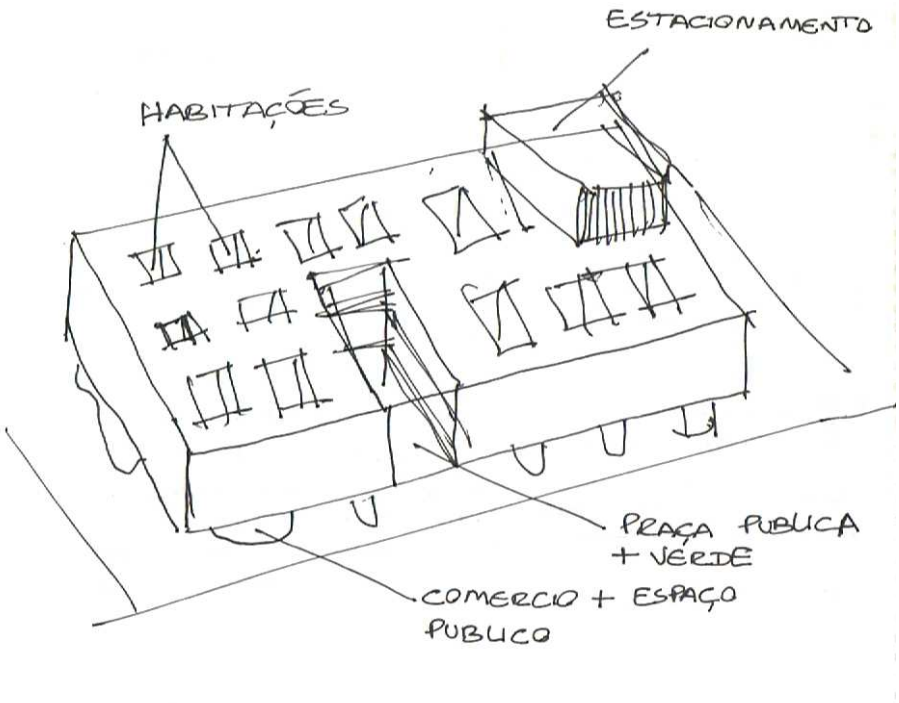


Image 87 - Sketch of the compositional structure of the project
Source: sketch of the author

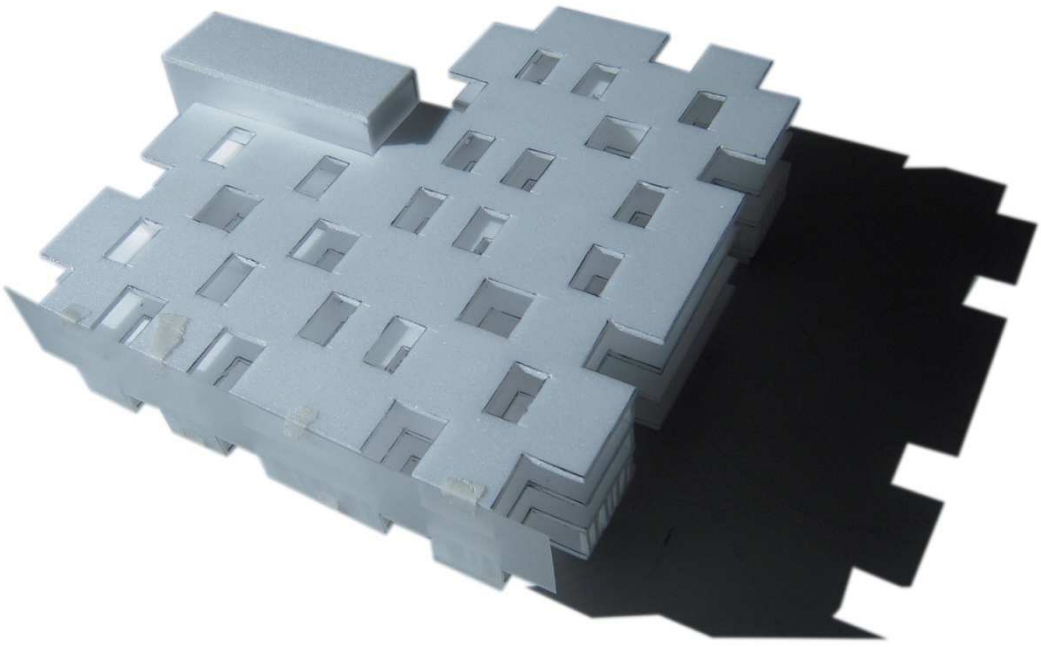
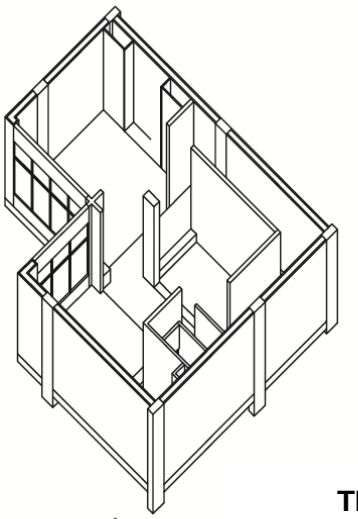
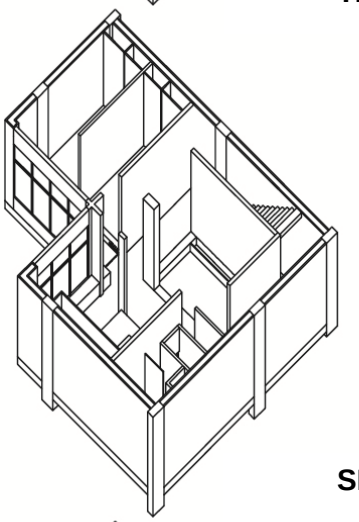


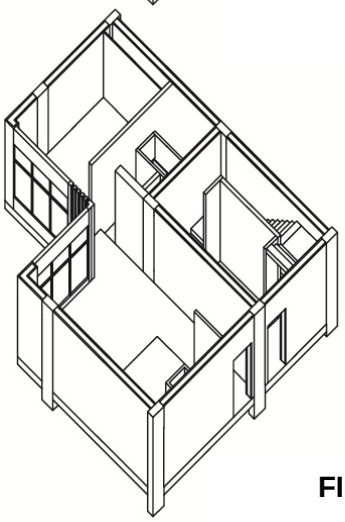
Image 88 - model of the project during the research
Source: picture of the author



THIRD FLOOR - dining room, living room, toilet



SECOND FLOOR - bedrooms, toilet and shower



FIRST FLOOR - T1 dwelling and private access to T3

Image 89 - Axonometric of the dwellings of the project in Daimyo

The collective structure is composed by several housing modules. Each module consists in one T1 house and one T3 on the top. The both accesses are placed next to each other along the internal streets.

3.4.1 The Parking Silo

In Japan, the parking areas usually occupy vacant areas inside the quarters instead of the periphery of the streets or underground areas. Due to the constant occurrence of earthquakes, the construction of basements is avoided, therefore, the parking areas need to occupy part of the urban area. To minimize this area in a dense city, several parking systems were placed in many vacant areas. These systems are usually mechanized, moving the vehicles to different directions and placing them in vertical or horizontal structures according to the area. Once the mechanized systems do all the work, there is no need for space for driving movements nor for humans, hence saving more space for the parking lots. The usual systems used in Daimyo as well as in the entire city are structures with several levels where is possible to place 2 or 3 times more cars than in normal parking lots. However, there are many other mechanized systems created by several companies. A vertical system composed by different parking levels with moving platforms and two elevators that move the vehicles around the system was used in this project. Placed inside a silo, it releases the intervention's ground level from parking lots, returning it to the city and the people. Besides, this silo creates an exception in an low-rise system of repetitive models.

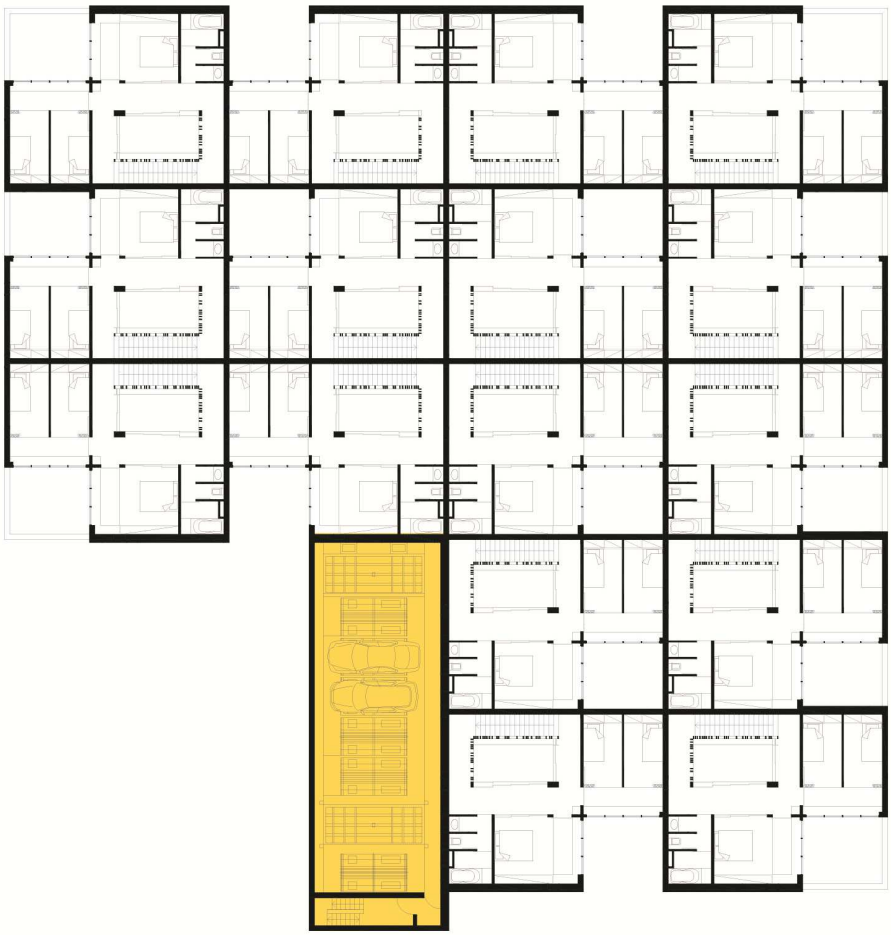


Image 90 - The parking Silo in the Daimyo project

The parking is placed in a silo which marks a difference in the entire structure. It takes advantage of a narrow space between the dwellings and the neighboring building, avoiding the occupation of the ground level for parking lots.



Image 92 - Mechanic Parking System in Tokyo

In Daimyo, the parking lots are mainly occupied with this kind of mechanical systems. They make possible to parking three times more cars than an usual parking in the ground floor.

Source: http://japan.mattanderson.net/?paged=5



Image 91 - Auto Parking System

Source: http://www.tradevv.com/chinasuppliers/jessicayang_p_59bb5/china-auto-parking-system.html

3.4.2 The Ground Level and the Vertical Accesses

The Ground level is the most public area of the building which is directly connected with the surrounding streets. It is a large open space filled with several columns of the building and four vertical accesses, placed in strategic points, which connect the ground level with the first floor. Beyond these elements, several light wells/gaps arise from the ceiling, enlightening the entire ground area and ensuring a proper air circulation beneath the complex.

This level is divided into two main uses for the inhabitants and for the entire neighborhood - commercial area and public space. The commercial areas are distributed through the ground level according to several alignments from the surroundings, keeping important connections between the building and the streets, like the continuation of the narrow street of the north quarter. The stores are entirely independent of the structure and their shapes break with the orthogonality of the entire complex. Thus, the commerce is divided into several stores, each one with their own shapes and areas, whose curved lines create a distinction between ground and top floors. This, besides resulting in a differentiation between levels, also makes a distinction between public and private. Furthermore, the differentiation of the shapes on the entire level and the individual commercial cores allow for an overlapping of characters and functions in this continuous space. In other words, the places to walk, places to stay, the stores or even the accesses to the first floor share the same public space, a space of boundary between the living areas and the city. This space is a reinterpretation of the Japanese commercial galleries where stores and street share the same space under a continuous roof. Besides, the raised floors of the dwellings supported by columns in the ground level make a relation not only with the pilotis of the modern architecture but mainly with the raised spaces of the traditional Japanese houses, palaces and temples, like the Toyokuni shrine in Miyajima island.

This underneath space still makes for an important boundary between the top floors and the street. When we enter a temple complex in Japan, Shinto or Buddhist, we always have to cross a remarkable gate. This gate can be a high building or just a simple *tori* depending on the temple, however they are essential elements in all the temple complexes. Usually they don't close the internal area and merely reinforce a space of boundary. In several temple complexes, these gates are the biggest buildings of the entire set, even bigger than the palace or temple, which emphasizes their importance. The project in Daimyo creates an identical transitional space like these gates. Before getting the door of the house we need to cross an area beneath the entire set and get the vertical accesses to the top. This moment of the path to the dwellings emphasizes a transition between the public streets and the private, in a space that is not closed to the city but is part of it. It creates a temporal boundary throughout the journey.



Image 93 - between the pilotis under the Toyokuni Shrine, Miyajima

Source: picture of the author



Image 94 - The longest commercial gallery in Japan, Osaka

Source: picture of the author



Image 95 - Sanmon gate of the Nanzen-Ji temple, Kyoto

Source: picture of the author

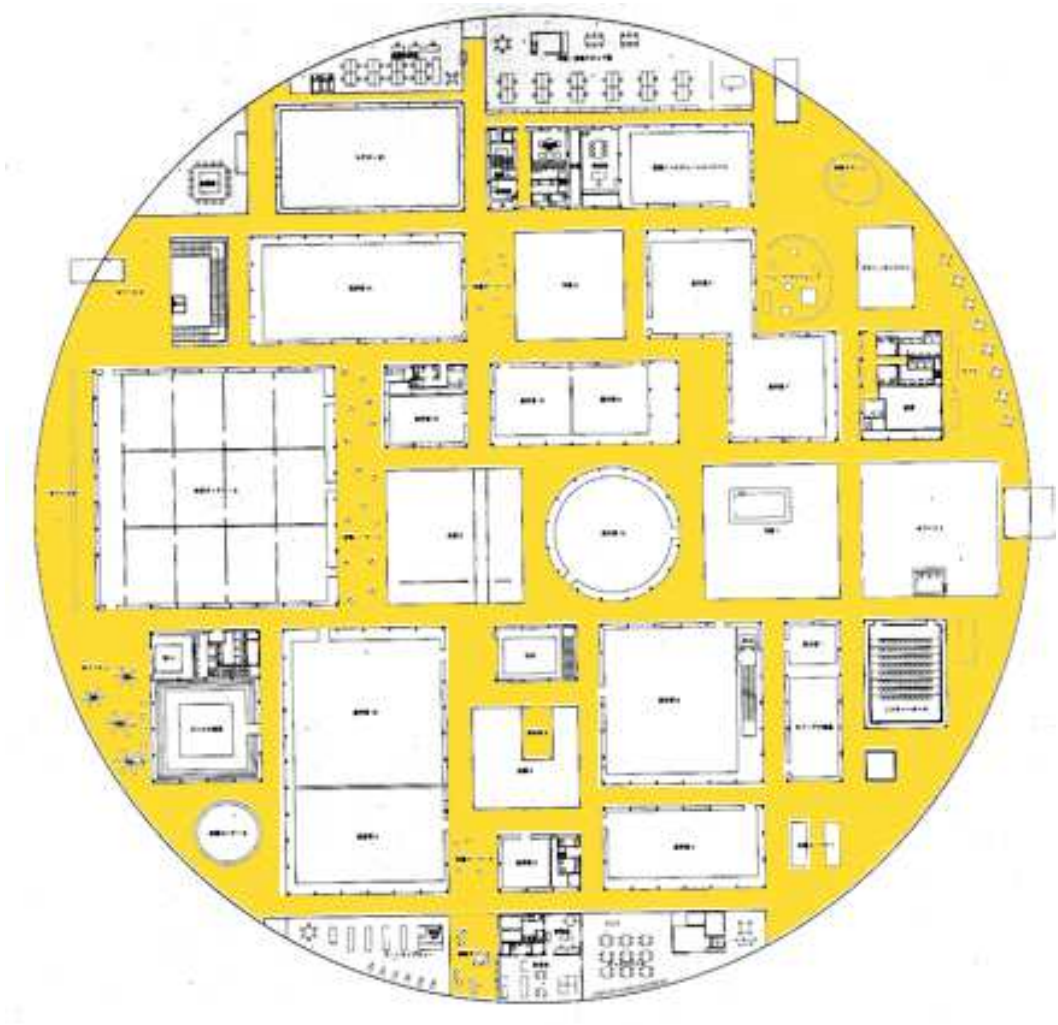


Image 97 - Plan of the Kanazawa Museum, SANAA

The different spaces and rooms are freely distributed in the space has several blocks, resulting in numerous in-between spaces in the entire museum. These spaces can be appropriated by the rooms or just work as corridors. When crossing the entire museum, the people can see the many different spaces distributed inside the main circle. It creates a constant contact between the several rooms, exhibitions, events with the people. Besides, it's location in the middle of a central park creates the possibility of choosing between crossing around the museum or inside it.



Image 96 - Kanazawa Museum's entrance, SANAA

Source: http://www.hot-ishikawa.jp/kanko/english/20047.html

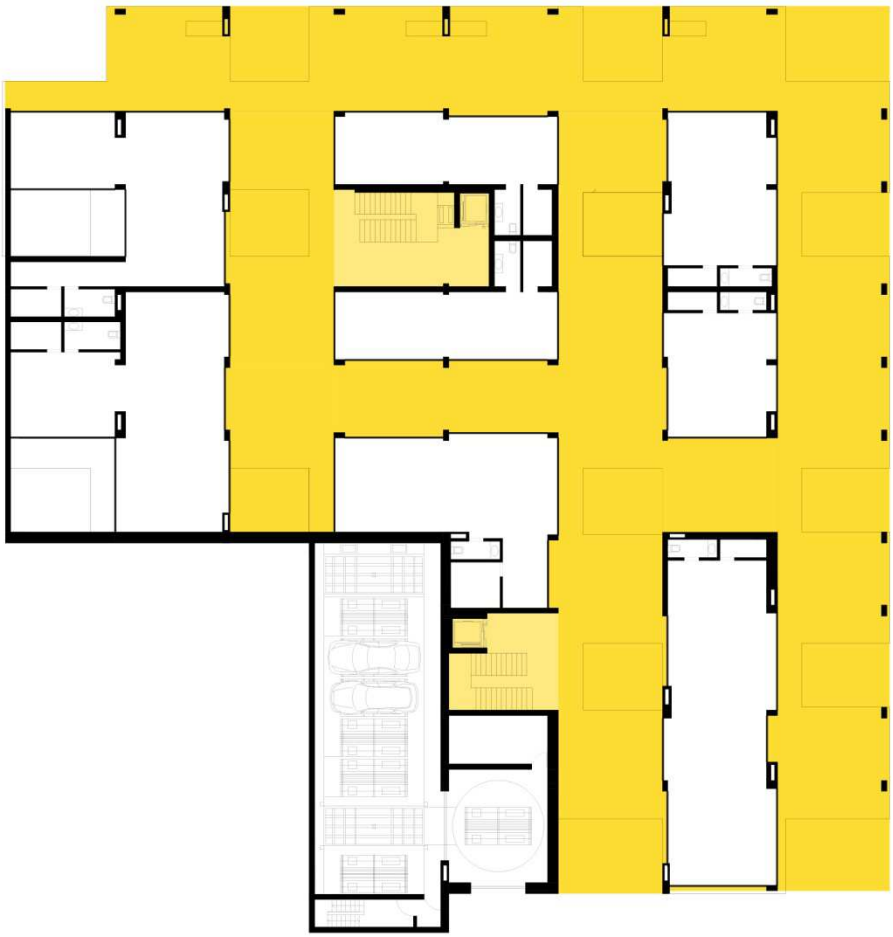


Image 99 - Circulation areas - Plan ground level
Source: drawing of the author

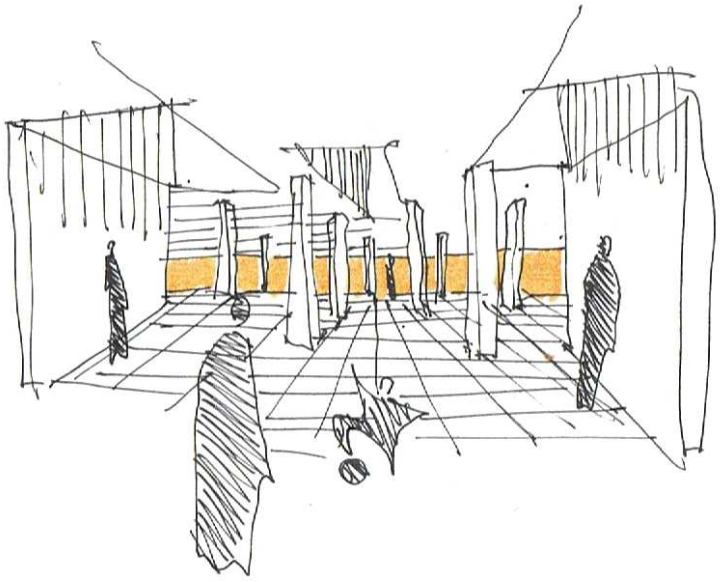


Image 98 - Study of the ground level
Source: sketch of the author

3.4.3 The Internal Streets

After climbing the stairs to the first floor, we arrive in a large open space that links with the interior corridors. These access spaces function as entrance halls of the entire floor and reinforce the transition between the stairs and the remainder level. Besides, these are important communal spaces for the inhabitants that function as preparation areas before getting to the street. Mail boxes or storages can be settled here, as well as some equipments or furniture that enables the collective encounters between inhabitants. On the opposite side of the points of access there is an intersection with long corridors that connect the extreme points of the building. They function as interior streets where the entrances for all the houses are placed. Beyond the openings to the Northern and Southern façades, these streets still intersect with the vertical light wells, keeping a proper illumination and air circulation. Besides, when crossing the houses' doors and walking through these spaces, the inhabitant can already have a visual and sonorous connection with the city and the surrounding streets. It characterizes a space that is inside the building but is not considered interior, but however is a protected part of the city which belongs to the inhabitants.

Along the street, several benches are placed turning it in a space to stay as well as to be traversed. The openings on the ceiling as well as on the floor allow for several visual connections with the sky and the ground floor. They are essential for a connection between parts of the entire system of different uses.

The doors of the T1 houses open to the interior streets, next to the biggest typologies' doors, hence sharing the same space of connection. Here, children and adults can use this space unconditionally, protected from cars or undesirable weather. Small windows of the T1 dwellings open to these internal streets, enabling possible visual connections between the house and the exterior, where mothers can watch over their children playing.

This idea of interior streets is related with the "street-in-the-air" proposal from several modern architects as the Smithsons or Hertzberger. These proposals tried to acquire a potential to be recognized as extensions of the house, an originator of identities and a space for meeting and socialization.

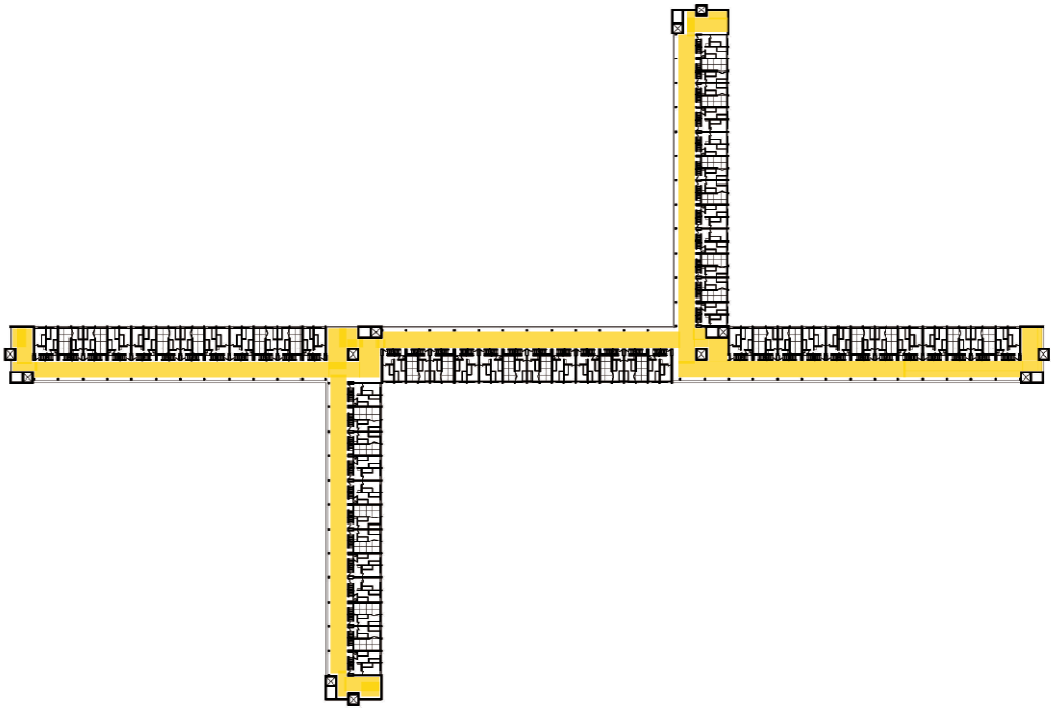


Image 100 - Internal streets in Golden Lane proposal, The Smithsons
Source: http://archiflux.wordpress.com/2010/09/14/golden-lane-floor-plans-1-00/

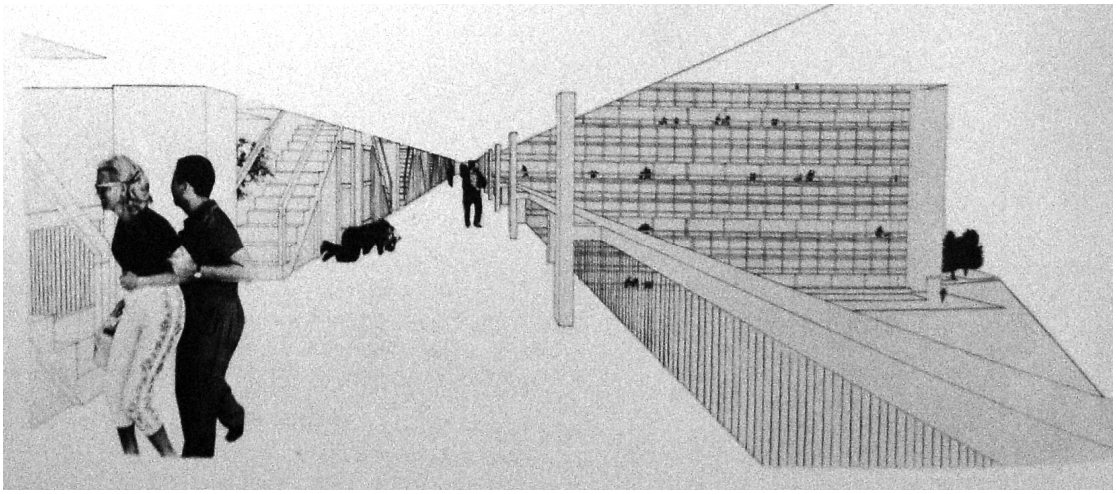


Image 101 - street in the air, Golden Lane, The Smithsons
Source: http://www.mixite.es/es/alison-smithson-un-acercamiento-particular-a-la-realidad-urbana/



Image 104 - Exterior corridor of access to the dwellings, students residence in Weesperstraat, Herman Hertzberger

Source: Hertzberger, Herman - "*Space and the Architect - Lessons in Architecture 2*", Rotterdam, 010 Publishers, 2000





Image 102 (on the right) - Balcony/ street in the air of access to the dwellings, Nemausaus Housing, Jean Nouvel

Source: http://farm1.staticflickr.com/32/36596532_5a2476405b_z.jpg?zz=1

Image 103 (on the left) - Interior gallery of the Unité d'Habitation of Marseille, Le Corbusier

Source: http://www.architravel.com/architravel/building/unite-d-habitation-cite-radieuse



Image 106 - Interior accesses to the dwellings, Nexus World Fukuoka, OMA

The private accesses to the dwellings work as interior streets shared between the inhabitants. Besides accesses, it is used as parking or storage for bicycles and it is a protected space where kids can play safely.

Source: http://nexusworldhousing.blogspot.pt/



Image 105 - Interior accesses, Nexus World Fukuoka, OMA

Source: https://ksamedia.osu.edu/media/21203

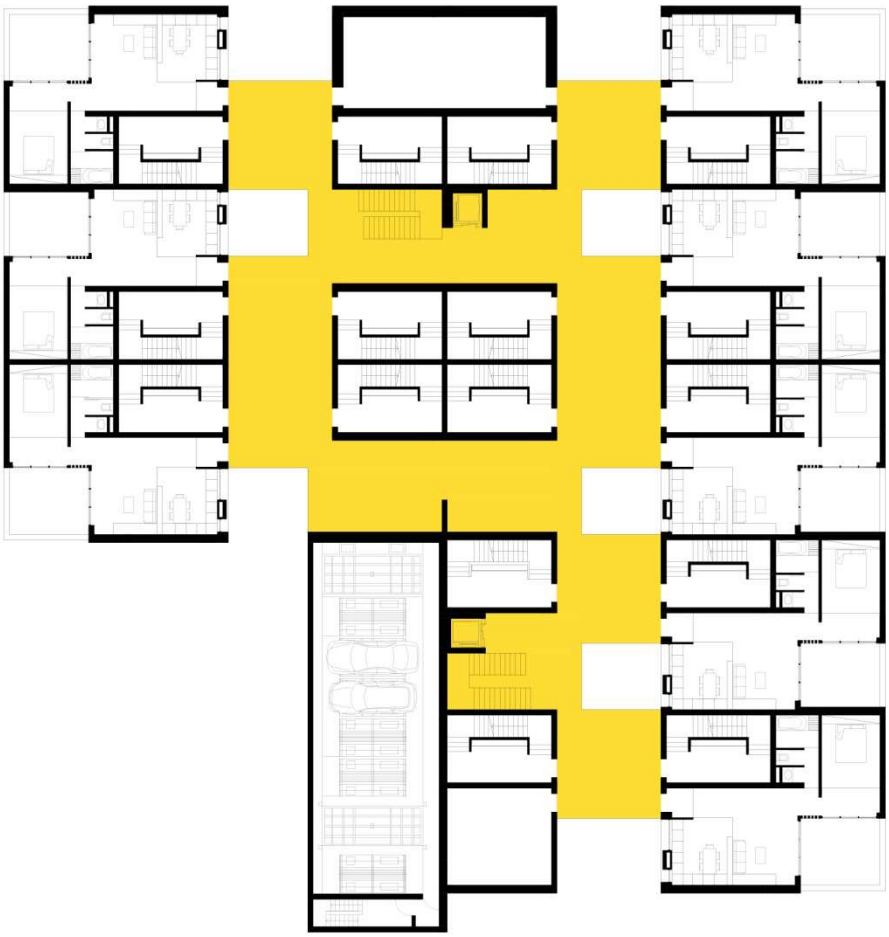


Image 107 - The internal street in Daimyo project - plan
Source: drawing of the author

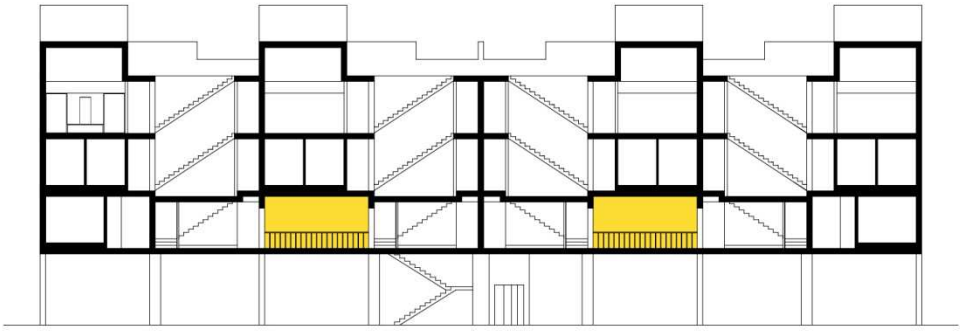


Image 108 - The internal streets - section
Source: drawing of the author

3.4.4 The *Genkan* and Private Accesses

When getting inside any house we arrive into a transitional space between the most private areas of the interior and the streets. These spaces differ according to the typologies of the houses - while in the smaller typologies in the first floor they are directly connected to the living spaces, in the bigger typologies they occupy an entire access room at the same level of the interior streets.

In the T1 dwellings they are right next to the door separated from the house by a wood raised floor where is possible to sit. The differentiation of the material from this area to the exterior as well as to the living areas emphasize the character of intermediary space.

These spaces are a reinterpretation of the Japanese traditional space referred in the first chapter, the *genkan*. This is a space of preparation, where the inhabitants take off their shoes and leave their coats before getting inside the living areas. Besides, in the T3 dwellings, these spaces function like a private storage where the inhabitants can store their bicycles and other objects that are usually used outside. An opening on the ceiling allows natural lighting to the area but keeping a gradient between light and shadow, allowing a sensorial division of the space.[38]

Once crossing this area, a few steps mark a transition to the beginning of the stairs that are revealed behind the longitudinal wall. This is where the journey between the several areas of the house begins, equated to the *engawa* around a traditional Japanese house.



Image 109 - Genkan space, Udagawa Family House, Urayasu
Source: picture of the author

[38] These division of the space according the gradient of light is related with the "*In Praise of Shadows*" from Junichiro Tanizaki. Here, the light can divide the area to walk from a possible storage area. Tadao Ando uses this kind of spot lights along walls to create different gradients in his interiors.

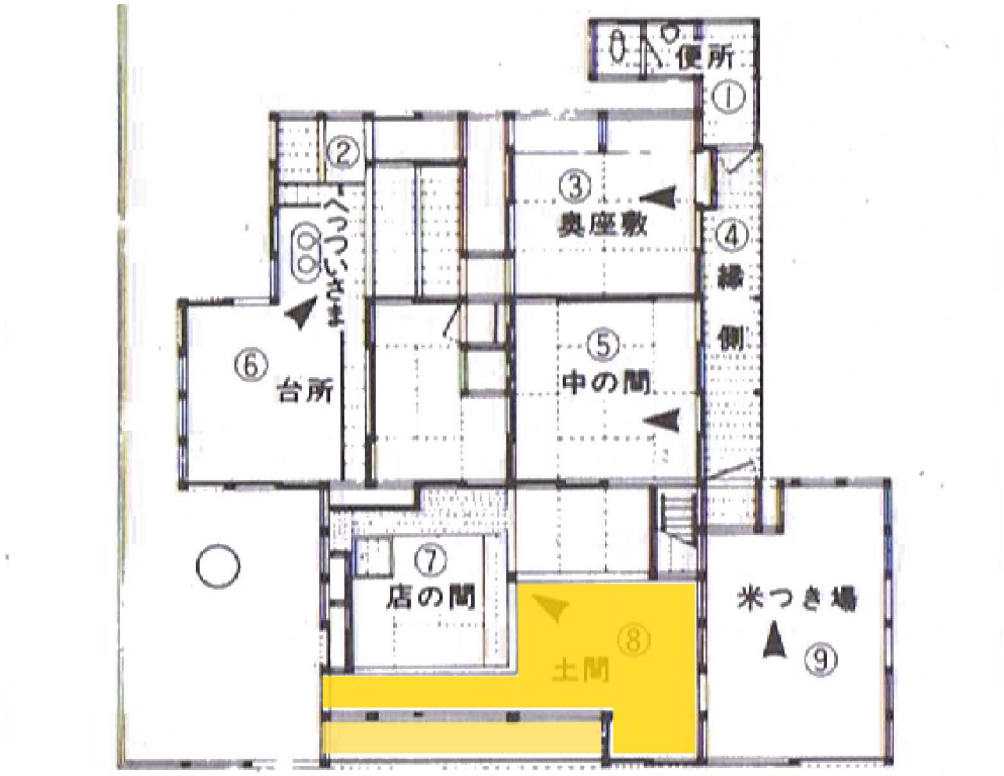


Image 110 - Genkan space, plan, Udagawa Family House, Urayasu

Source: Urayasu City-Facility Use and Promotion Agency

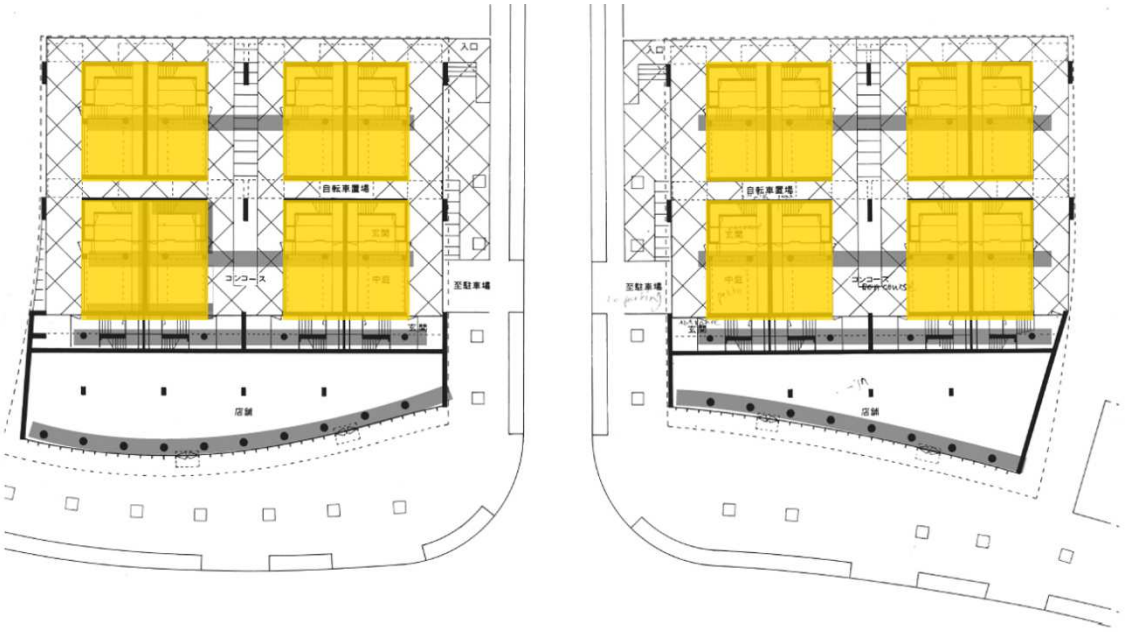


Image 111 - Private accesses of the dwellings, Nexus World Fukuoka, OMA

The access nucleus divide the entire access floor in several corridors. These nucleus are closed boxes which mark the private and patio and, next to it, the entrance door and corridor. The natural light of the patio emphasizes the entrance of the dwelling.

Source: http://nexusworldhousing.blogspot.pt/

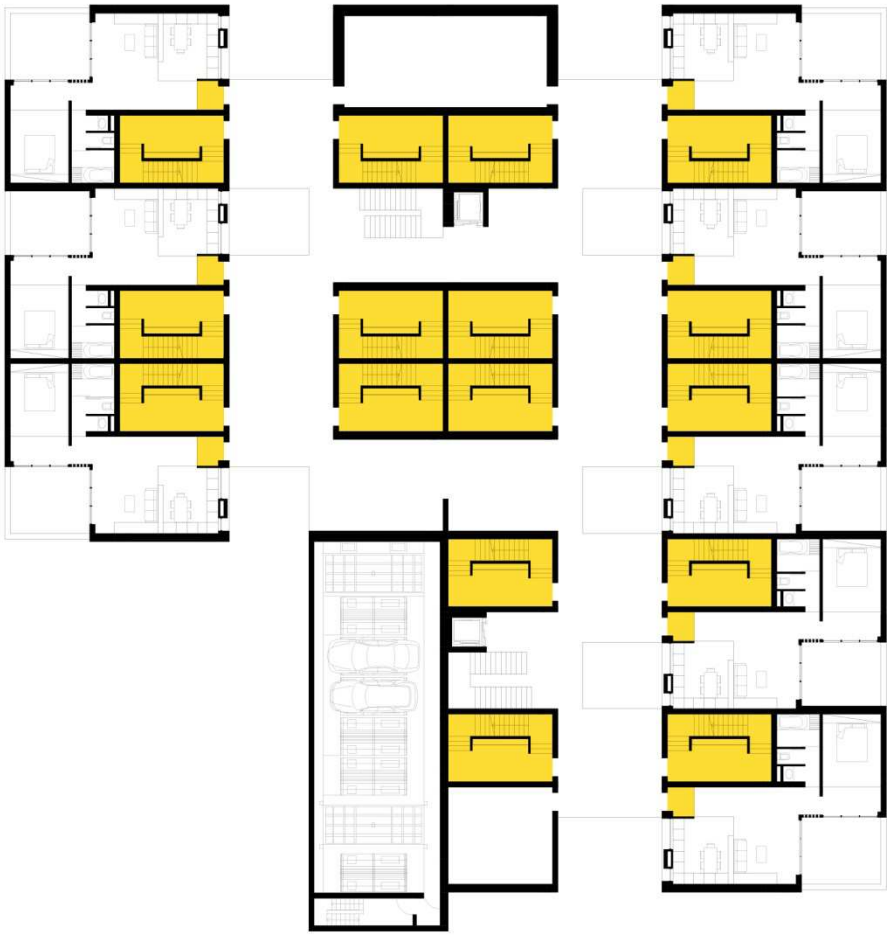


Image 113 - The *genkan*/ private accesses - plan

The private accesses of the T3 dwellings are placed next to the entrances of the smaller dwellings

Source: drawing of the author

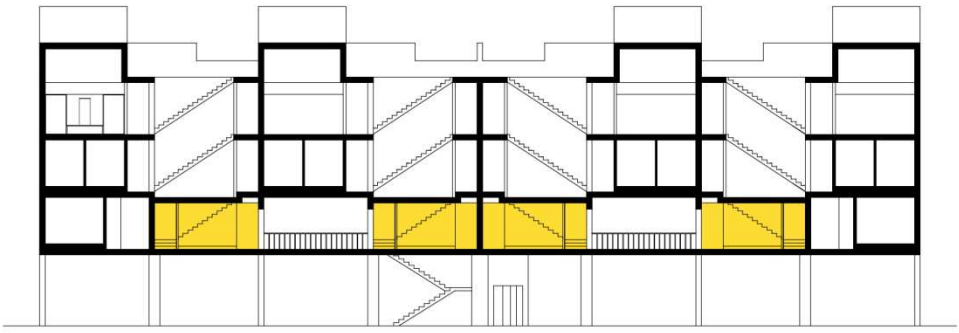


Image 112 - The private accesses - section

Source: drawing of the author

3.4.5 The Patio and *Engawa*

Once reaching the second floor, the first thing that catches attention is a private patio next to the stairs. This patio receives the inhabitants and visitors and creates a private relation between the house and the exterior. Around this private patio the accesses link the several parts of the house with corridors and stairs, thus, defining the access' core of the house. The rooms and the most private areas of the house are located in this floor having a direct connection with the patio. They are separated from the patio by a corridor which works as a transitional space between private domains and the exterior and which works as an extension of the private rooms. The corridor is characterized as an *engawa* around the patio, similar to the one around the pocket patio of the Hosokawa samurai House in Kumamoto. Like in this house, the patio is unleveled from the *engawa*, reinforcing a transition but also offering the possibility to sit and inhabit the boundary. Sliding doors separate the patio from the *engawa* as well as the last with the rooms, transforming the space according to the necessities during the day. Different levels as well as static elements of the doors' structure on the ceiling emphasizes several divisions of the space and create different layers in an horizontal analysis of the space.

The visual connections are controlled by several physical elements positioned in strategic points such as the sliding doors, battens, concrete walls or even with the wooden boxes that collect the sliding doors.

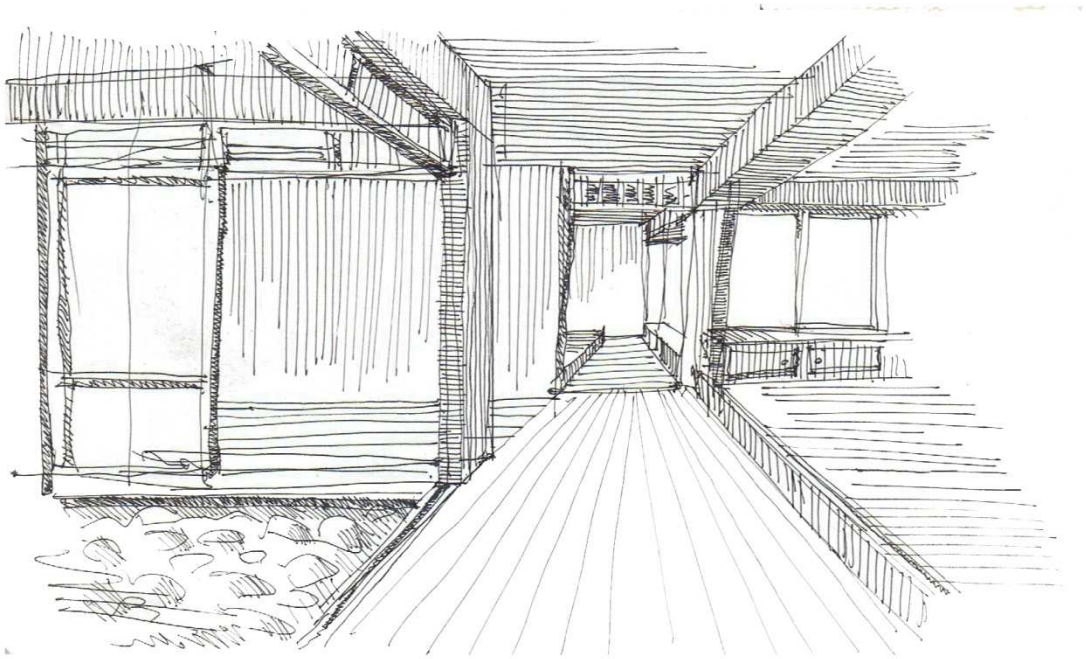


Image 114 - Project sketch of the *engawa* and private patio
Source: sketch of the author

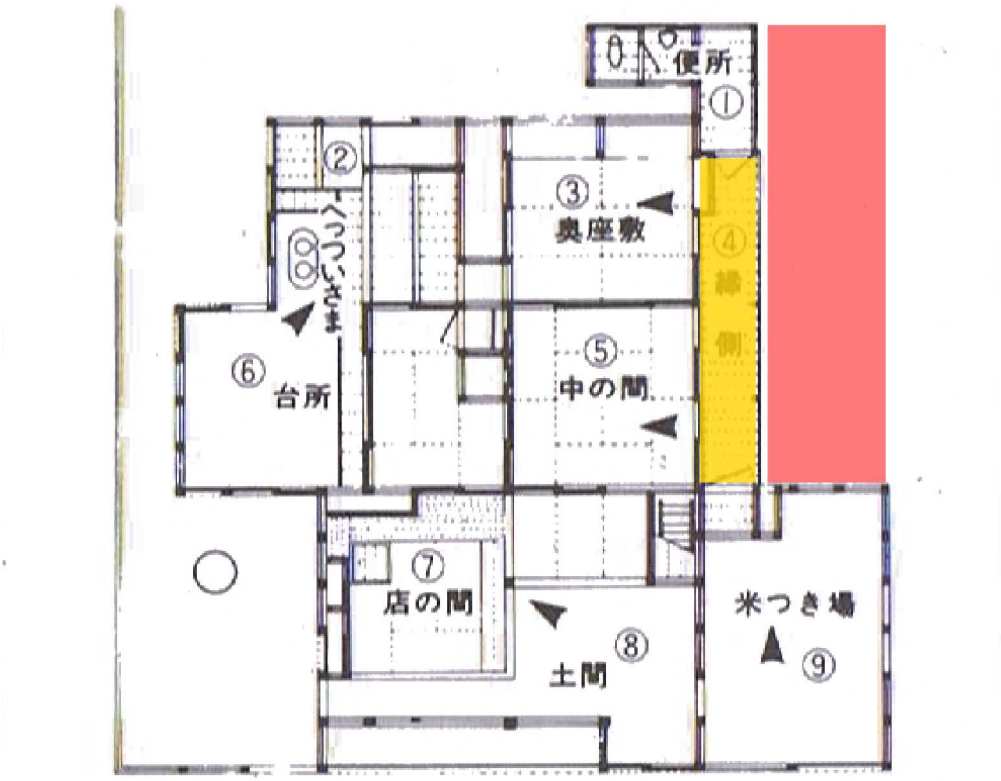


Image 116 - Private patio and *engawa*, plan, Udagawa Family House, Urayasu
Source: Urayasu City-Facility Use and Promotion Agency



Image 115 - *engawa* and patio, Udagawa Family House, Urayasu
Source: picture of the author

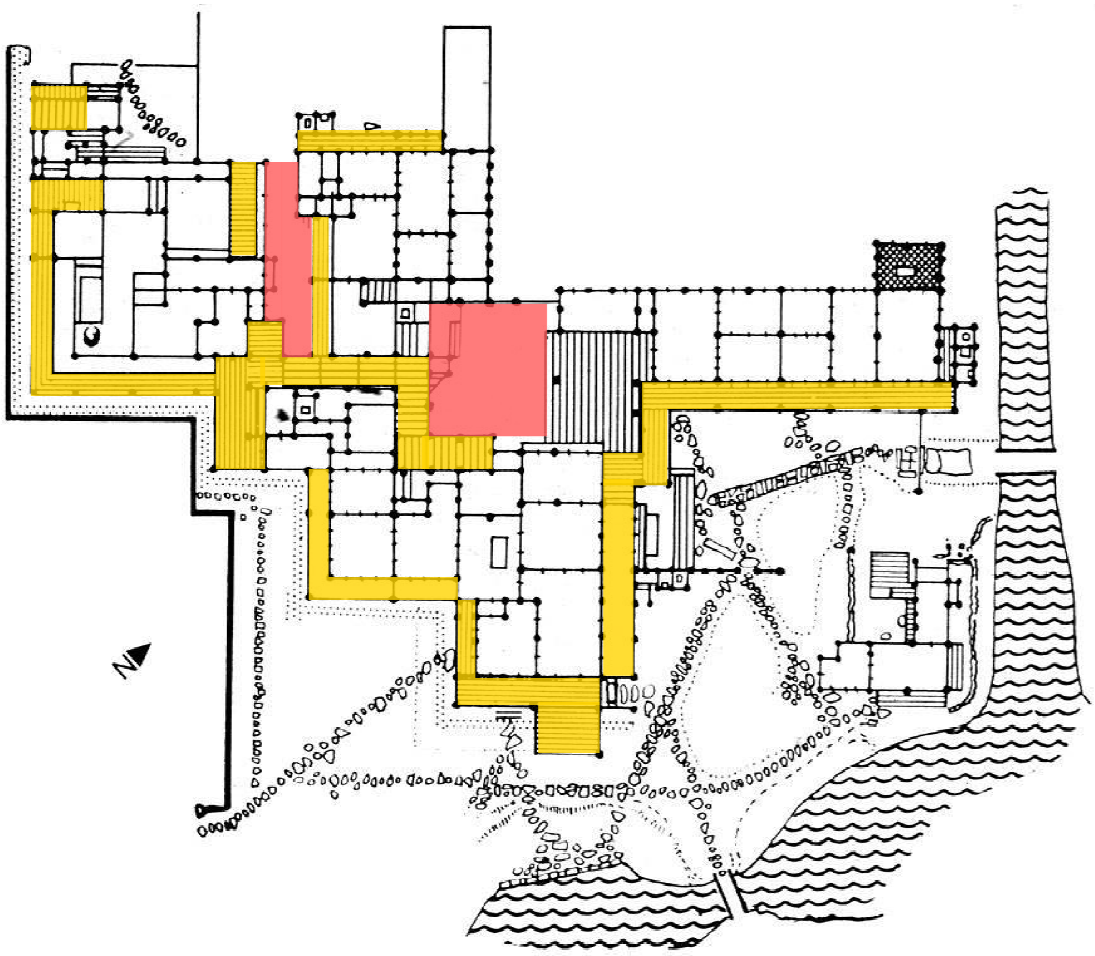


Image 118 - *engawa* and patios, plan, Katsura Detached Palace, Kyoto
Source: http://www.studyblue.com/notes/note/n/architecture-218-lecture-17/deck/2409742



Image 117 - Engawa and interior room - Toji-in Temple, Kyoto
Source: picture of the author

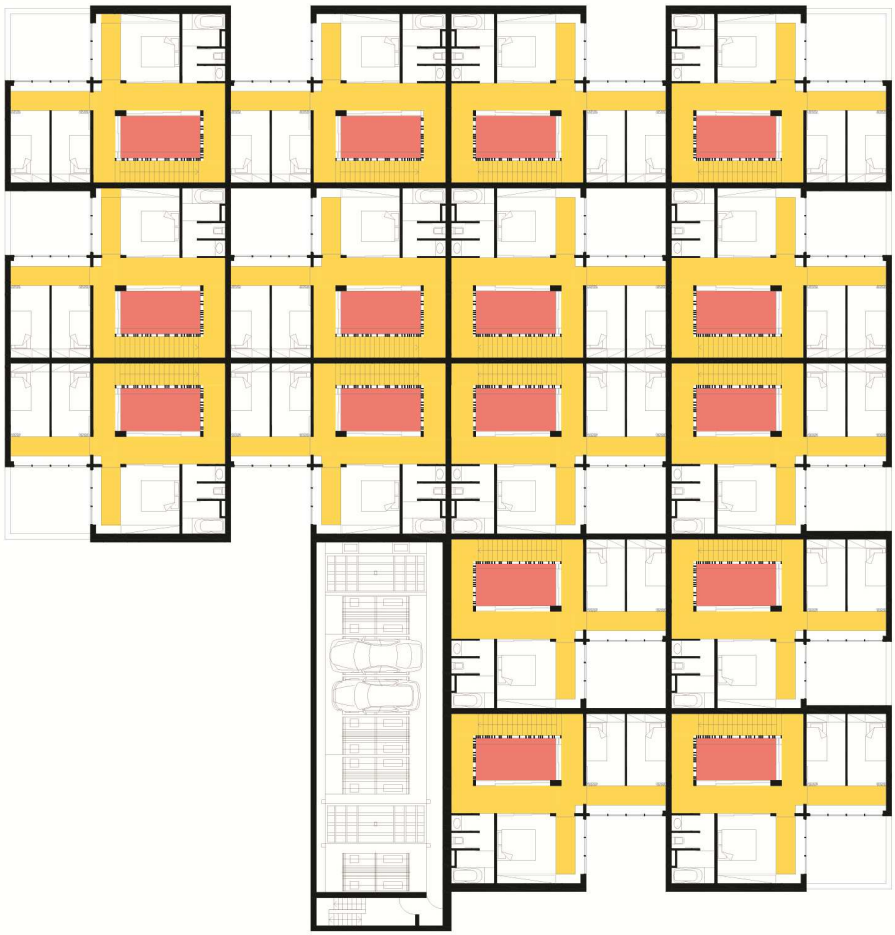


Image 120 - The private patios and the *engawas* - plan
Source: drawing of the author

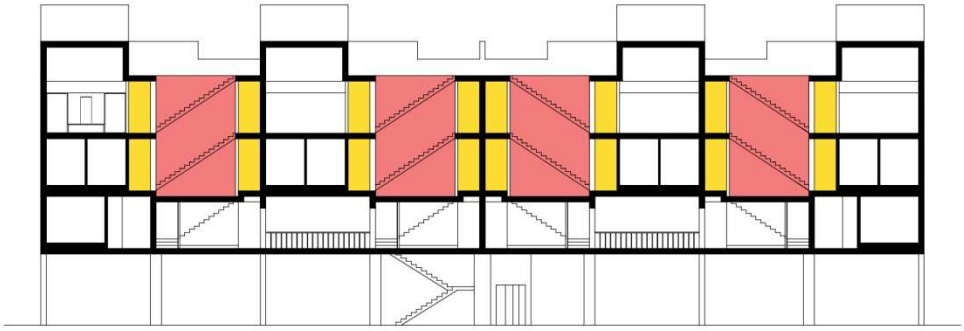


Image 119 - The private patios and the *engawas* in the different levels - section
Source: drawing of the author

3.4.6 The Vertical Gaps and Light Intensities

In the opposite side of the private patios are situated the light wells. They illuminate the house's interior as well as the interior streets on the first floor and the ground level. Besides, together with the patios, they enable transversal ventilation in the interior.

Each light well is associated with a single model house situated in its corner. Besides its placement between two dwellings, only one opens to it, using the front concrete wall for reflecting the sunlight and offering privacy to the interior. Once several dwellings don't have any direct contact with the streets, these light wells are fundamental. Besides, the houses were organized according to the different intensities of light. That is, the most public areas like the living room and kitchen were placed on the top floor receiving direct light, while the lower level with the rooms receive mainly reflected light through the vertical gaps. Like the organization of the space in the Hosokawa Samurai House, the different light intensities were fundamental for the interior organization of this project.

The limits that divide the interior from the vertical gaps are not merely divided elements. Taking advantage of physical elements such as cupboards or simple overhangs which have the perfect dimensions to sit on, these limits are transformed in living boundaries. Besides, the rooms are in direct connection with these limits, having the possibility to use them as part of the interior space.

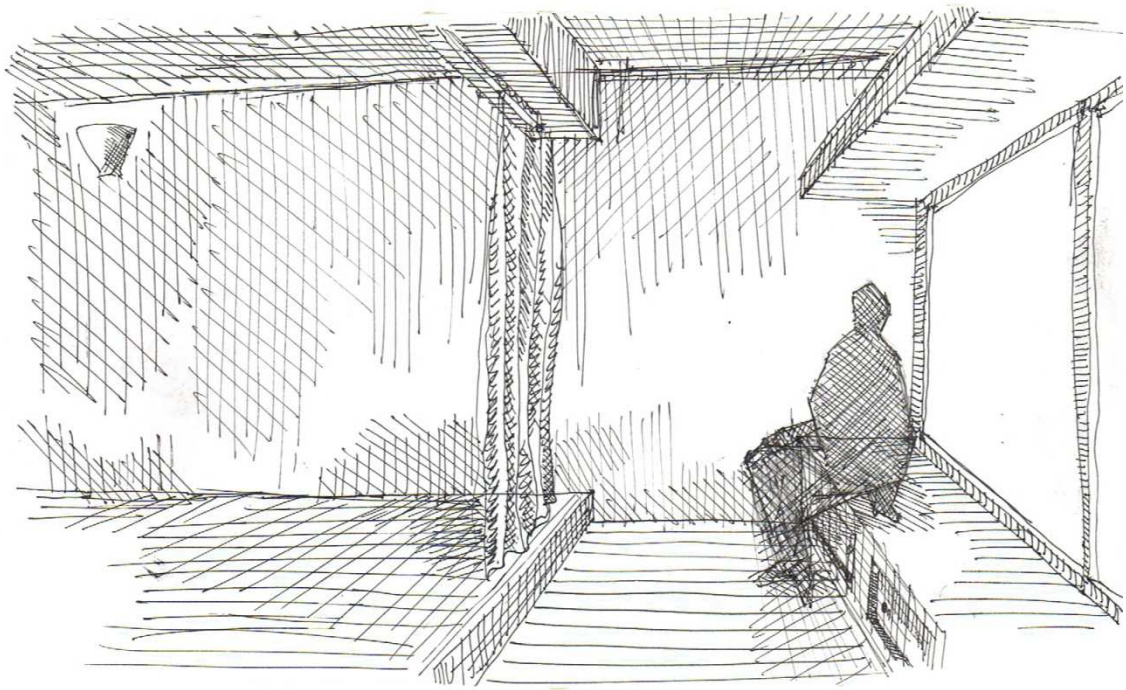


Image 121 - Space between the room and the light well

Source: sketch of the author

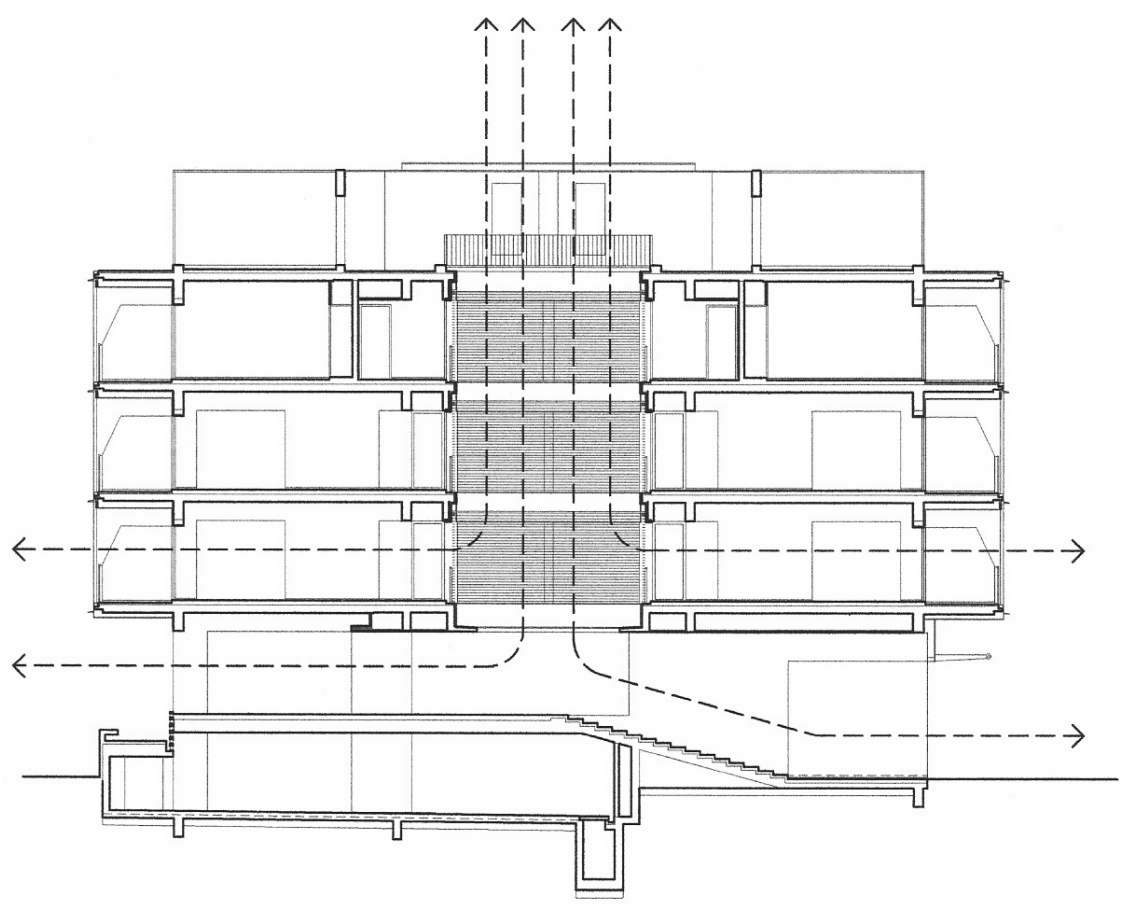


Image 122 - scheme of vertical and horizontal ventilation - Section of the light well, Housing Unit, Lagos Marina, Gonçalo Byrne

Source: picture of Nuno Arenga



Image 123 - Interior images of the different light wells - Housing Unit, Lagos Marina, Gonçalo Byrne

Source: pictures of Nuno Arenga



Image 124 - Vertical Gaps (patios and light and ventilation wells) of the OMA's project of Nexus World, Fukuoka

Source: http://nexusworldhousing.blogspot.pt/



Image 125 - Vertical Gaps of the housing proposal for Borneo Sporenburg, Xaveer de Geyter

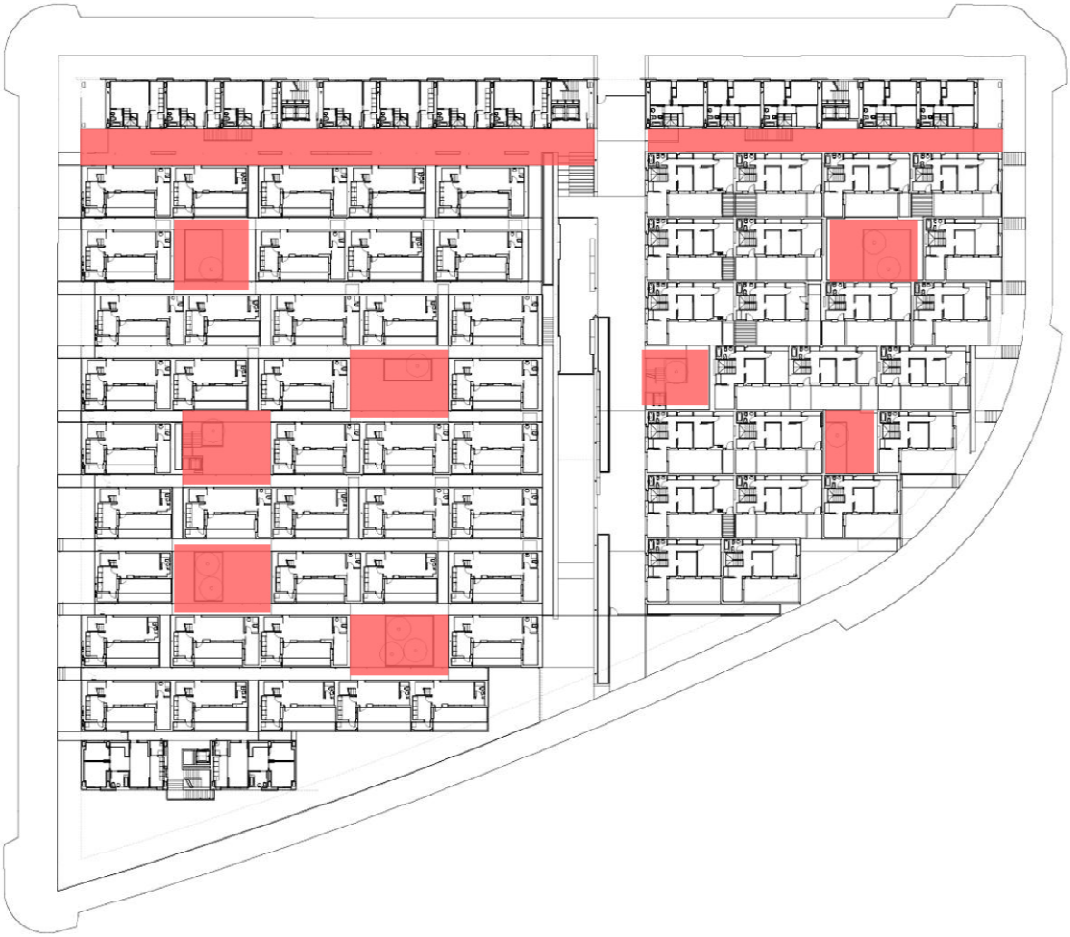


Image 127 - Vertical gaps in the Housing structure in Madrid, plan, Morphosis
Source: http://morphopedia.com/projects/madrid-housing

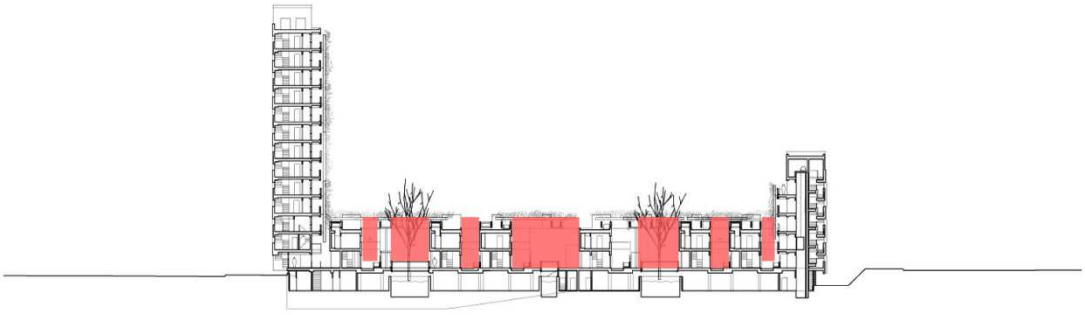


Image 126 - Vertical gaps in the Housing structure in Madrid, section, Morphosis
Source: http://morphopedia.com/projects/madrid-housing

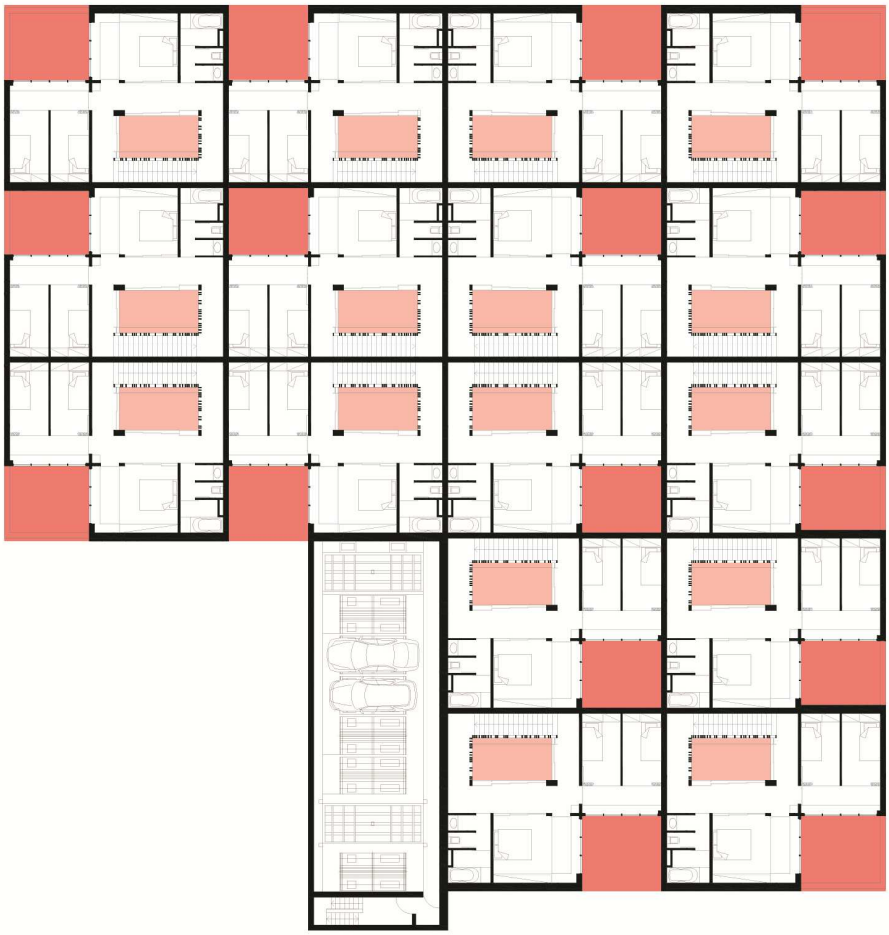


Image 129 - The vertical gaps and private patios of the entire building - plan
Source: drawing of the author

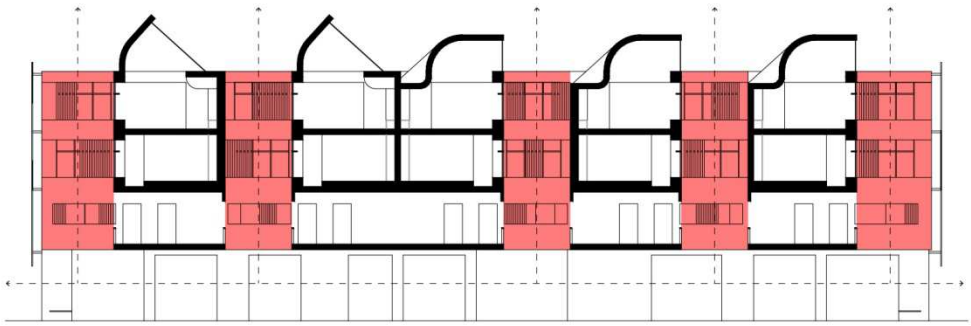


Image 128 - The light wells and vertical ventilation in the project - section
Source: drawing of the author

3.4.7 The Top Floor and the Coverage

The top floor is an entire open space where the kitchen, patio and living room share an area with visual continuity. It is the most enlightened space of the house, taking advantage of the outside gap and the roof for catching sunlight. In one side, the dining room is directly connected with the kitchen and the two gaps - the pocket patio and the light well. In the other corner, the living room takes advantage of the longest side of the light well and its limit and, like in the bedrooms, is designed with a long cupboard with dimensions that turn possible the inhabitants to sit. Besides, the ceiling of this room is higher than in any other area of the house, taking advantage of a high ridge vent. This allows a better illumination to the rooms' interior and enlarges the visual connections with the exterior (in this case, with the sky). In the opposite side of the light well, in the living room, is placed a *tokonoma*, i.e., the sacred area of the house. The *tokonoma* is an area in the traditional Japanese house where are placed jars with flowers on a cupboard and strips with Japanese characters on the walls. Because usually this place is situated in a dark area of the house - the darkest places are the sacred ones - the ceiling in this area is lower than in the rest of the room. This difference of high in the ceiling as well as its round shapes creates different layers of light in the interior and reflects the direct light to the most public area of the room.

Next to the private patio, in the continuation of the *engawa* and the path around it, there is a last set of stairs which connects the upon floor with the roof. This set of stairs, already in the exterior, is equal to the others inside of the dwelling. It finishes the path through the house, a path which begins and ends in the exterior - the void - crossing through several public and private spaces, different layers of intimacy, different characters, always connected with several exterior places. Thus, the habitable roof terrace connects with the open exterior, a private one which is more connected with the sky and the surrounding urban landscape and mountains. It is the last place of the journey through the building which emphasizes the relation with the possible journeys across the Japanese houses, temples or palaces, which usually start in the public exterior areas and finish in another exterior area, a private void.

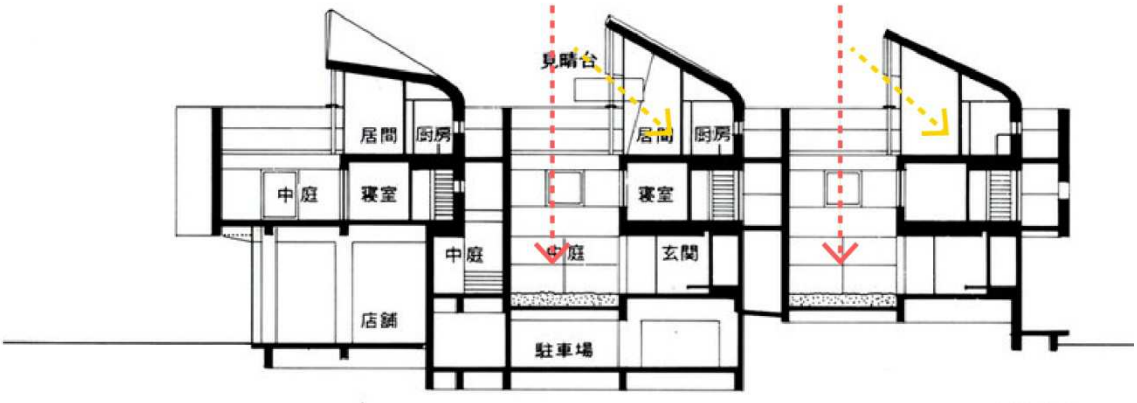


Image 130 - The roof and the patios in the Nexus World, OMA - section
Source: http://nexusworldhousing.blogspot.pt/



Image 133 - Living room - Nexus World - OMA
Source: http://oma.eu/projects/1991/nexus-world-housing

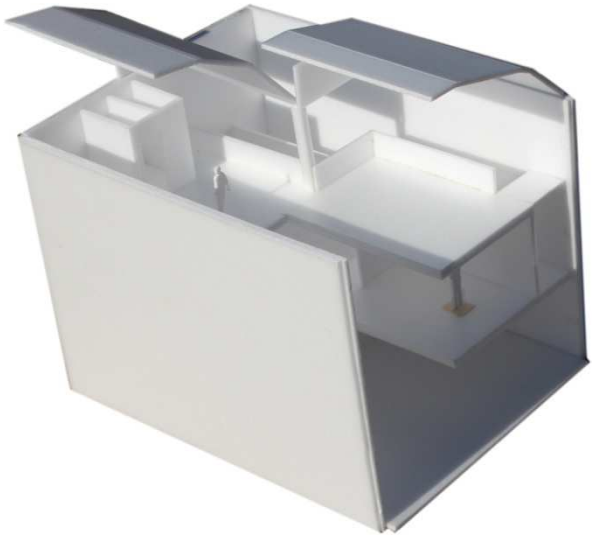


Image 132 - study of a housing module and its roof - model
Source: picture of the author

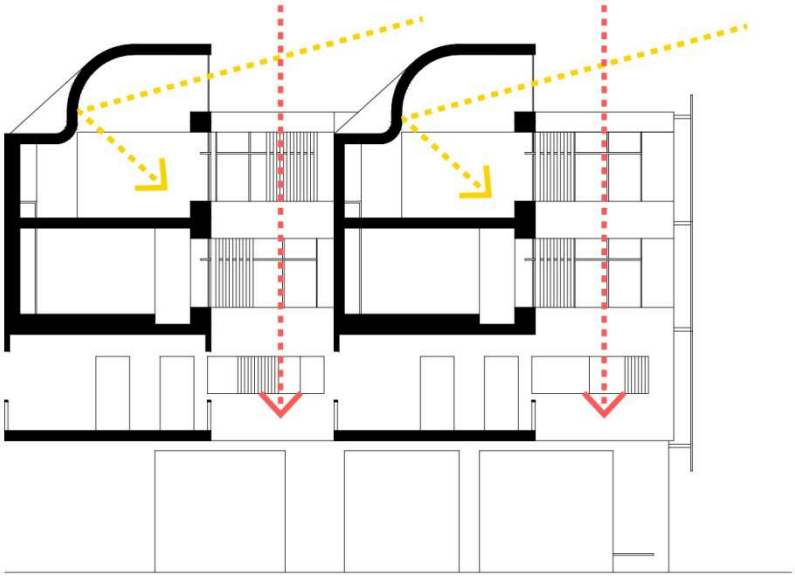


Image 131 - direct light and reflected light on the vertical gaps and top floor - section of the project
Source: drawing of the author

Conclusions and Final Considerations

The experience of living in a country with a different culture was fundamental for a clarification of the project and dissertation's theme. This dissertation as well as the design process were always supported not only by a theoretical process but mainly by an experience *in situ* of the Japanese spaces, their boundaries, characters and living appropriations. The experience of living in a Japanese house shared with a Japanese family in Oizumi-Gakuen, living in Fukuoka city, studying in Kyushu University and all my travels around Kyushu and South Honshu guided me and provided guidelines for this work.

During my travels, when visiting the Japanese traditional houses, temples and palaces, the richness of their spatial sets somehow captivated me. Coming from a country where the walls are the main limits used in its architecture, the several Japanese transitions between spaces and all the sequential temporal boundaries was something that I wanted to study, to understand and to apply in my own work.

The chosen area for the project is located in Fukuoka , Kyushu Island, a city where I lived for six months, thus knowing it better. However, projecting in the center of a Japanese dense city, with a different urbanity compared with those in my home country, brought the need to study its characteristics in order to understand its differences from the European cities. Besides, during my research, many urban problems were found which I couldn't ignore. Thus, before applying the boundaries experienced in many buildings during my travels as well as those studied in the case studies, it was necessary to find strategies that could provide an answer to the urban problems, to their density and in order to avoid waste of space. This is where the main problem was found: how is it possible to apply the rich characters and boundaries of the traditional Japanese architecture in such a dense city, keeping its density and compression? The answers to this question were acquired by looking over several characters and themes from different times of the Japanese architecture and urbanism.

The proximity with many Japanese spatial concepts as well as with different architectural interpretations of the modern cities, like the Metabolism movement, guided me to several answers to the urban density problem. Looking over this movement, together with another iterative-growth concepts from Europe, the problems were solved with the creation of an object that can grow and occupy either a vast or contained area of the Japanese city, or that can be relocated to any other area of the neighborhood, but always with the capacity of to answer each local problem. Besides, the urban object followed several guidelines that allowed an emphasizing of the spatial boundaries studied in the first chapter. Thus, the urban organizational system and the desired boundaries were studied in parallel, resulting into an addition of a vast number of spaces contained in harmony in a unique compositional system. Moreover, the journey from the street to the interior studied in the case studies, and the several spaces and boundaries inherent to it, were also applied in this proposal, however transformed from a horizontal to a vertical interpretation.

This project and this dissertation are the result of a reinterpretation of numerous Japanese characters of different scales - the urban density and the architectural boundaries. Always working with several scales in a constant struggle to acquire an unique product, the result is a building that represents a different urban expression and

a new urbanity which answers to local and specific living requirements. It is an expression of the tradition together with the modernity. However, this is not the only result. The entire research process offered me a large knowledge about Architecture, urban issues and new spatial expressions. The constant comparisons between the Japanese architecture and urbanism with the Occidental ones, enabled the understanding of different visions, opinions and interpretations of equal subjects. Besides, studying an Architecture and Urbanism from a different country made me question their differences from those in my own country, resulting in a better understanding of both. It was a grateful experience that enhanced my knowledge in several areas such as Architecture, Urbanism and Culture, among others.

Total number of words: 19475 words

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Annexes

Final Drawings

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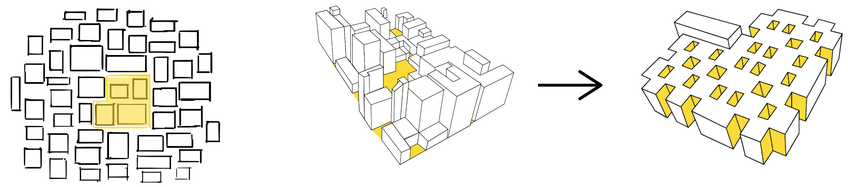

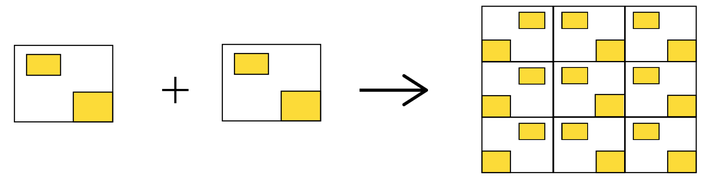





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BOUNDARIES IN ARCHITECTURE THE JAPANESE TRANSITIONS

PLANTA IMPLANTAÇÃO

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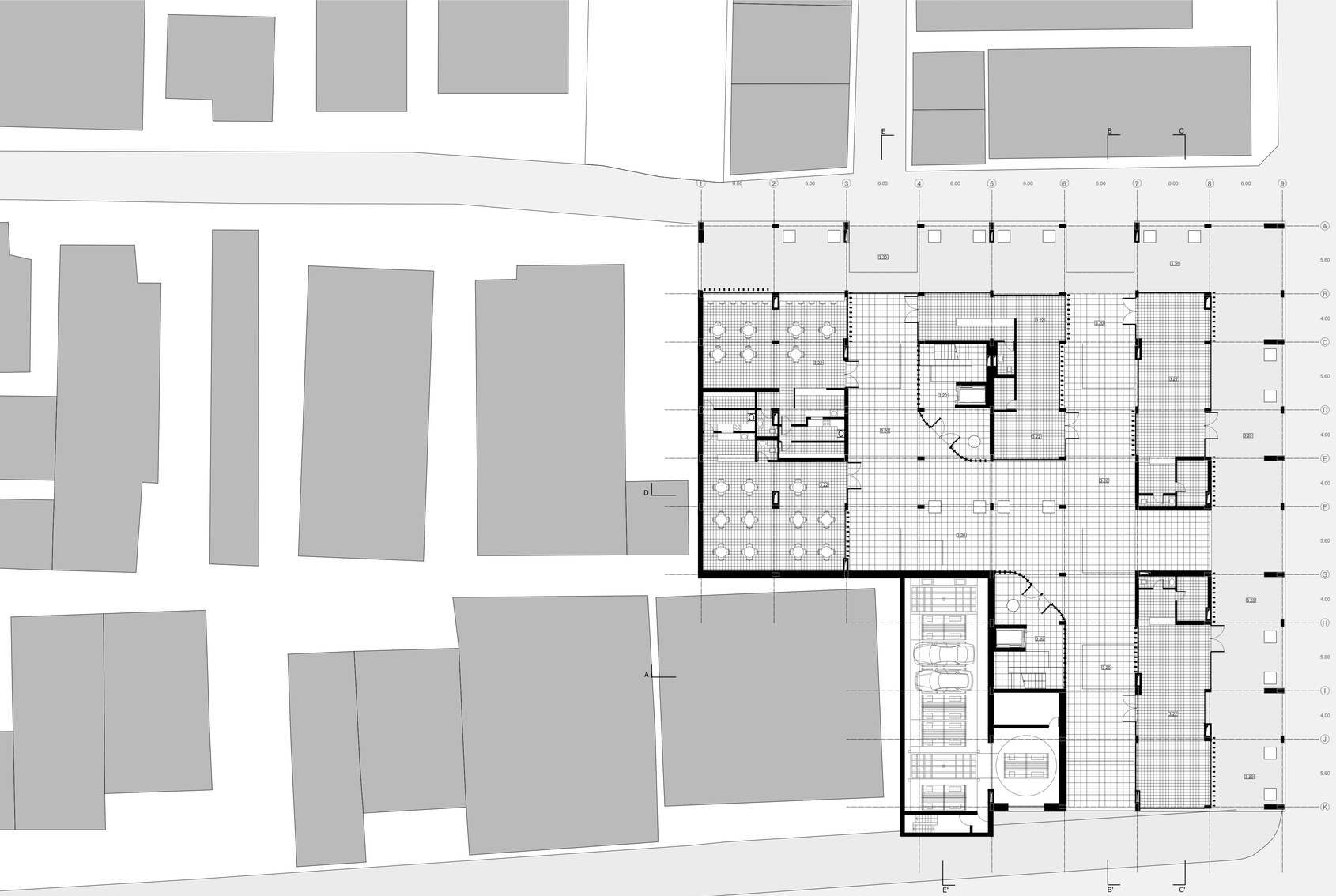

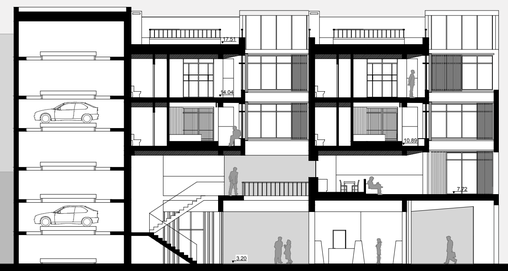

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BOUNDARIES IN ARCHITECTURE THE JAPANESE TRANSITIONS

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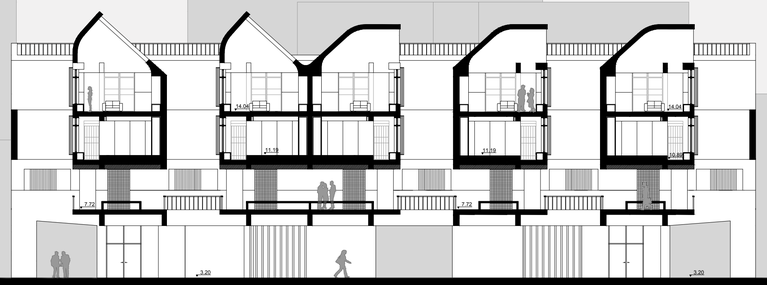

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BOUNDARIES IN ARCHITECTURE THE JAPANESE TRANSITIONS

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04





CORTE C C'

FACULDADE DE ARQUITECTURA DA UNIVERSIDADE TÉCNICA DE LISBOA
PROJECTO FINAL DE MESTRADO
MESTRADO INTEGRADO EM ARQUTECTURA
CANDIDATO: VÍTOR HUGO GÍLDE DE SÁ
ORIENTADOR CIENTÍFICO: PROFESSOR DOUTOR NUNO MIGUEL ARENGA REIS

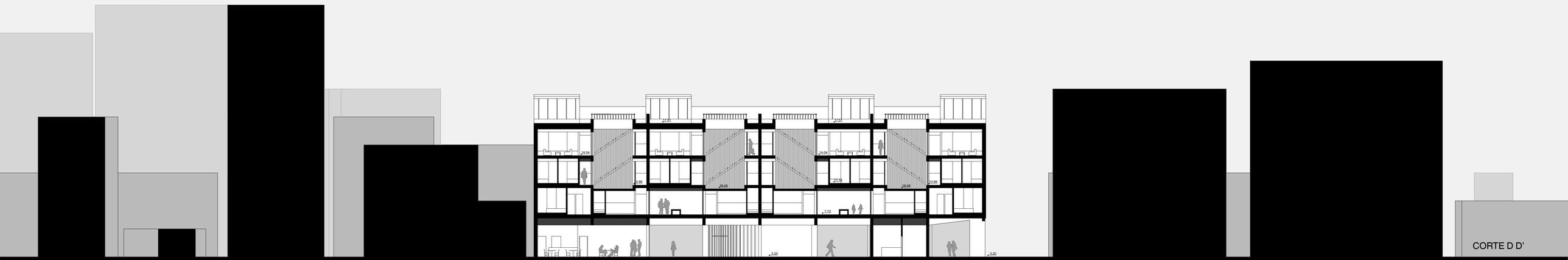
BOUNDARIES IN ARCHITECTURE THE JAPANESE TRANSITIONS

PLANTA PISO 2

ESCALA 1:200 0 1 2 5

05





CORTE D D'

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ORIENTADOR CIENTÍFICO: PROFESSOR DOUTOR NUNO MIGUEL ARENGA REIS

BOUNDARIES IN ARCHITECTURE THE JAPANESE TRANSITIONS

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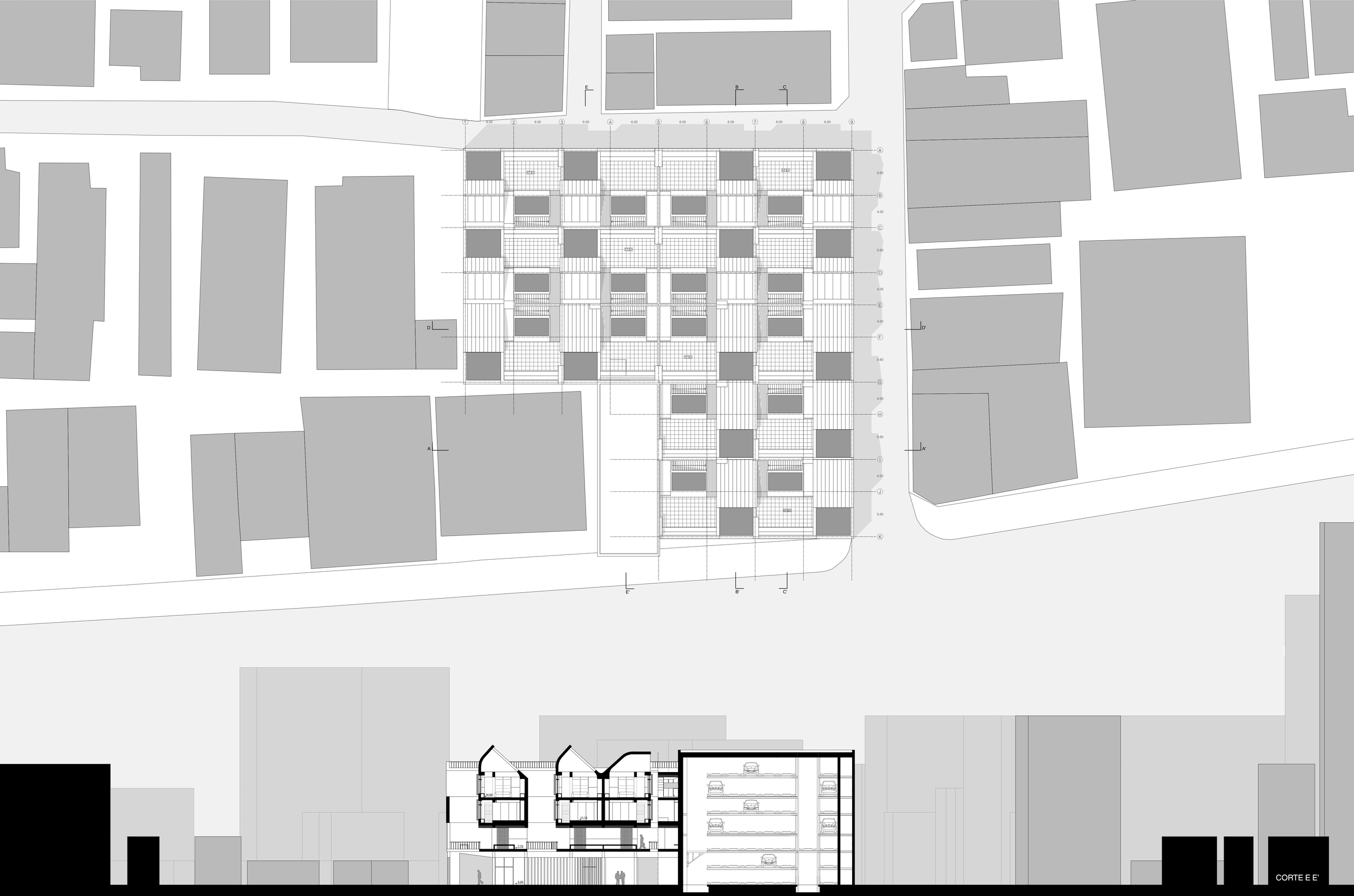

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PROJECTO FINAL DE MESTRADO
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ORIENTADOR CIENTÍFICO: PROFESSOR DOUTOR NUNO MIGUEL ARENGA REIS

BOUNDARIES IN ARCHITECTURE THE JAPANESE TRANSITIONS

PLANTA COBERTURA

ESCALA 1:200 0 1 2 5



ALÇADO NORTE



ALÇADO NASCENTE



ALÇADO SUL

FACULDADE DE ARQUITECTURA DA UNIVERSIDADE TÉCNICA DE LISBOA
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BOUNDARIES IN ARCHITECTURE THE JAPANESE TRANSITIONS

ALÇADOS

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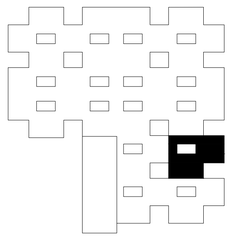

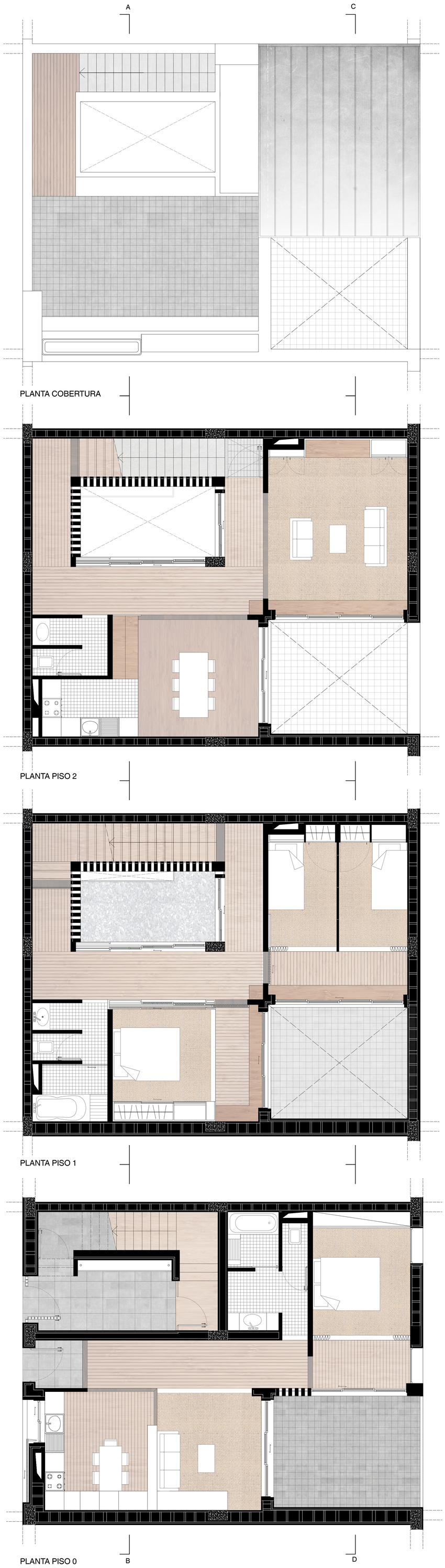

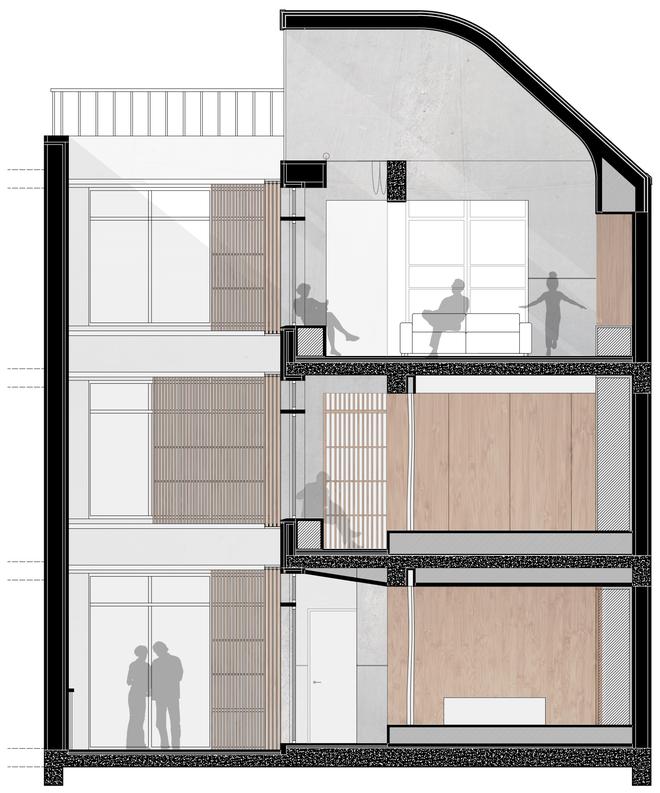

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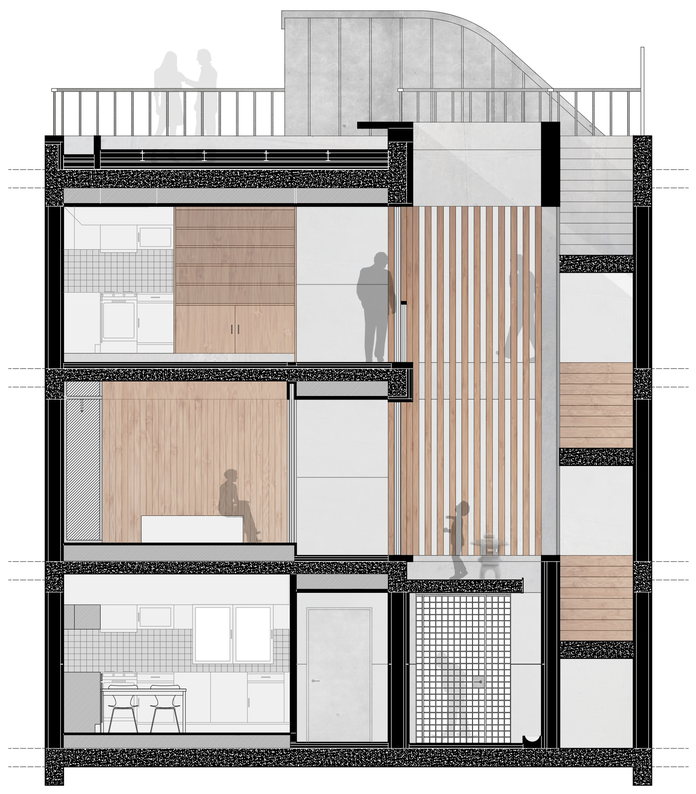

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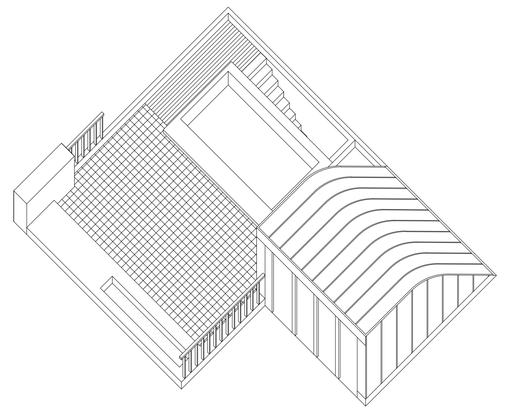

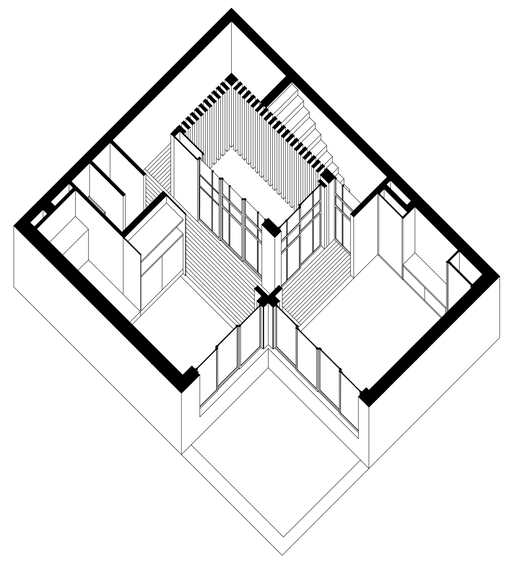

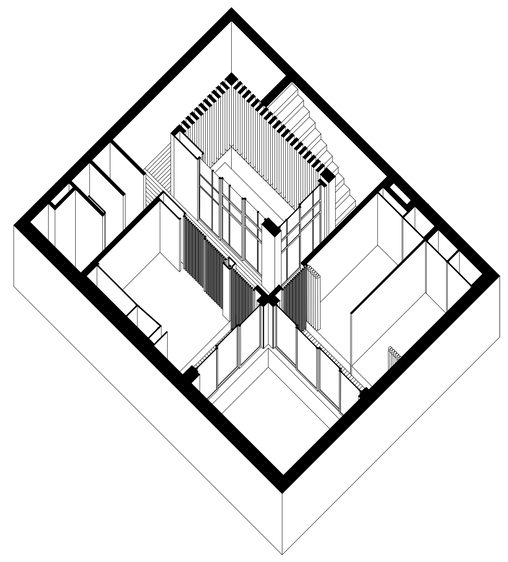

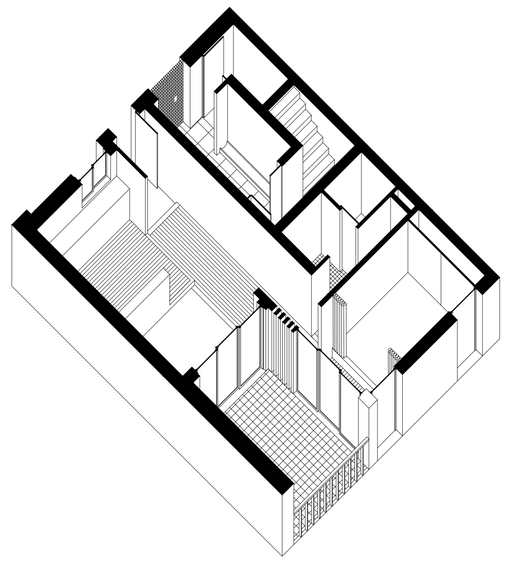

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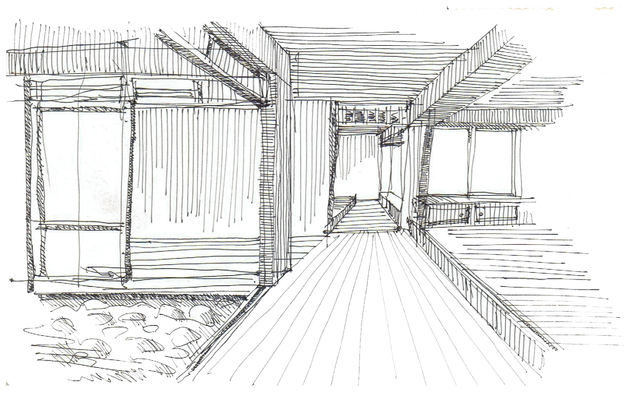

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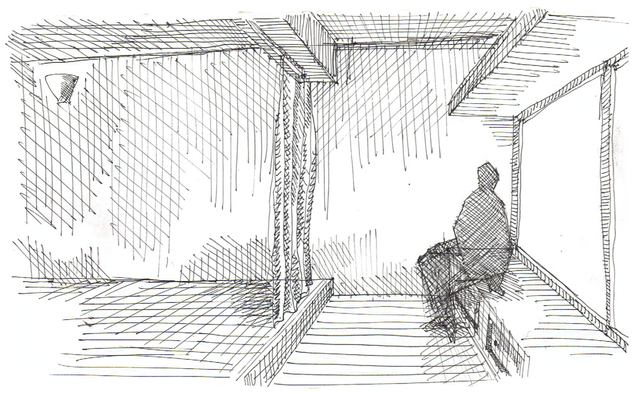

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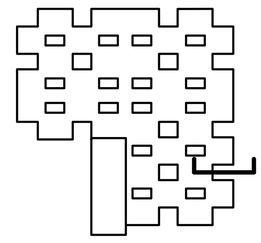

LEGENDA:

1 - Chapa Metálica de Capeamento
2 - Lajetas em Betão Pré-Fabricado 0.5 x 0.5 x 0.05 m
3 - Isolamento Térmico 0.05 mm
4 - Tela de Impermeabilização
5 - Betonilha de Regularização
6 - Camada de Forma
7 - Isolamento Térmico 0.035 m
8 - Laje em Betão Armado
9 - Suporte Metálico
10 - Barrote de Suporte em Madeira
11 - Pavimento de Rpias em Madeira 0.1 m
12 - Elemento Metálico Suporte Cortina
13 - Perfil em Madeira
14 - Painéis Amovíveis em Ripado de Madeira
15 - Pedra de Soleira
16 - Banco/Armário em Madeira
17 - Lajeta Betão Pré-fabricado
18 - Betão Armado
19 - Perfil em Madeira Termicamente Modificada
20 - Caixilho com Perfil Alumínio
21 - Vidro Duplo 0.005 m
22 - Pavimento em Sisal Sintético
23 - Camada de Colagem
24 - Sistema Estrutural Shear Wall Composto por Estrutura Metálica e Revestimento em Lajetas de Betão Pré-Fabricado
25 - Guarda Metálica de Zinco
26 - Lajetas de Betão Pré-Fabricadas 0.5 m
27 - Tecto Suspenso em Gesso Cartonado
28 - Iluminária
29 - Estrutura Metálica de Suporte
30 - Rebite Metálico
31 - Pedra de Remate
32 - Pavimento em Pedra 0.25 x 0.25 x 0.03 m
33 - Betão de Limpeza
34 - Enrocamento
35 - Massame Armado
36 - Terra Compactada
37 - Grelha Metálica
38 - Tubo de Drenagem
39 - Estrutura de Suporte em Madeira

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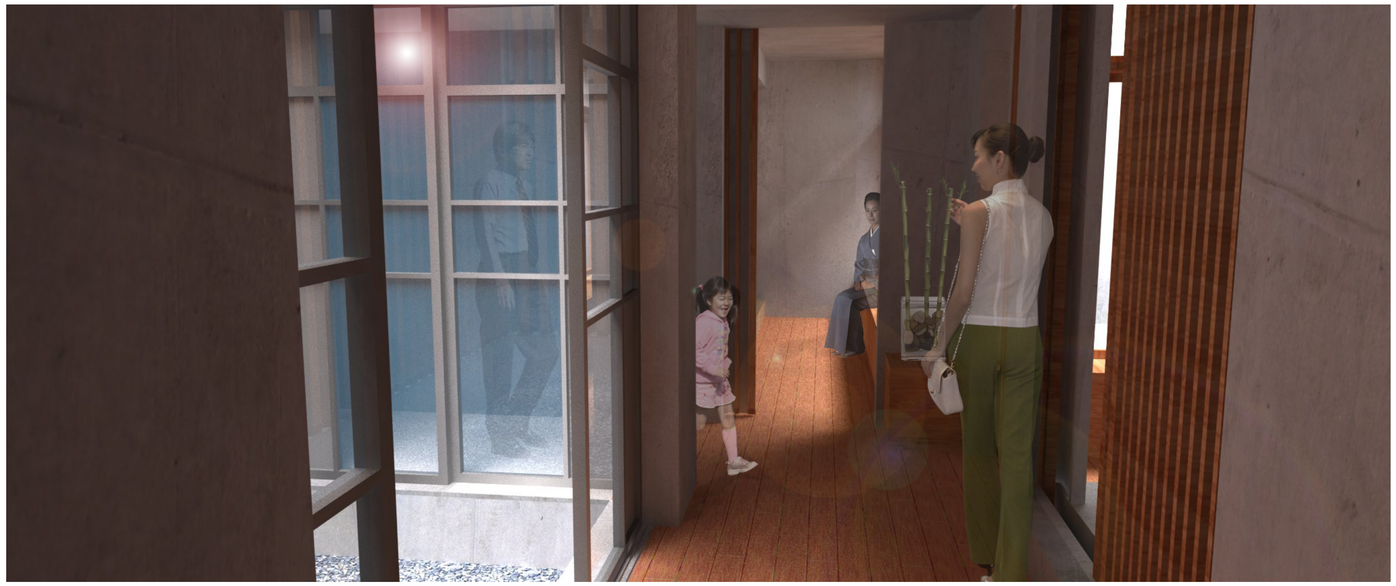
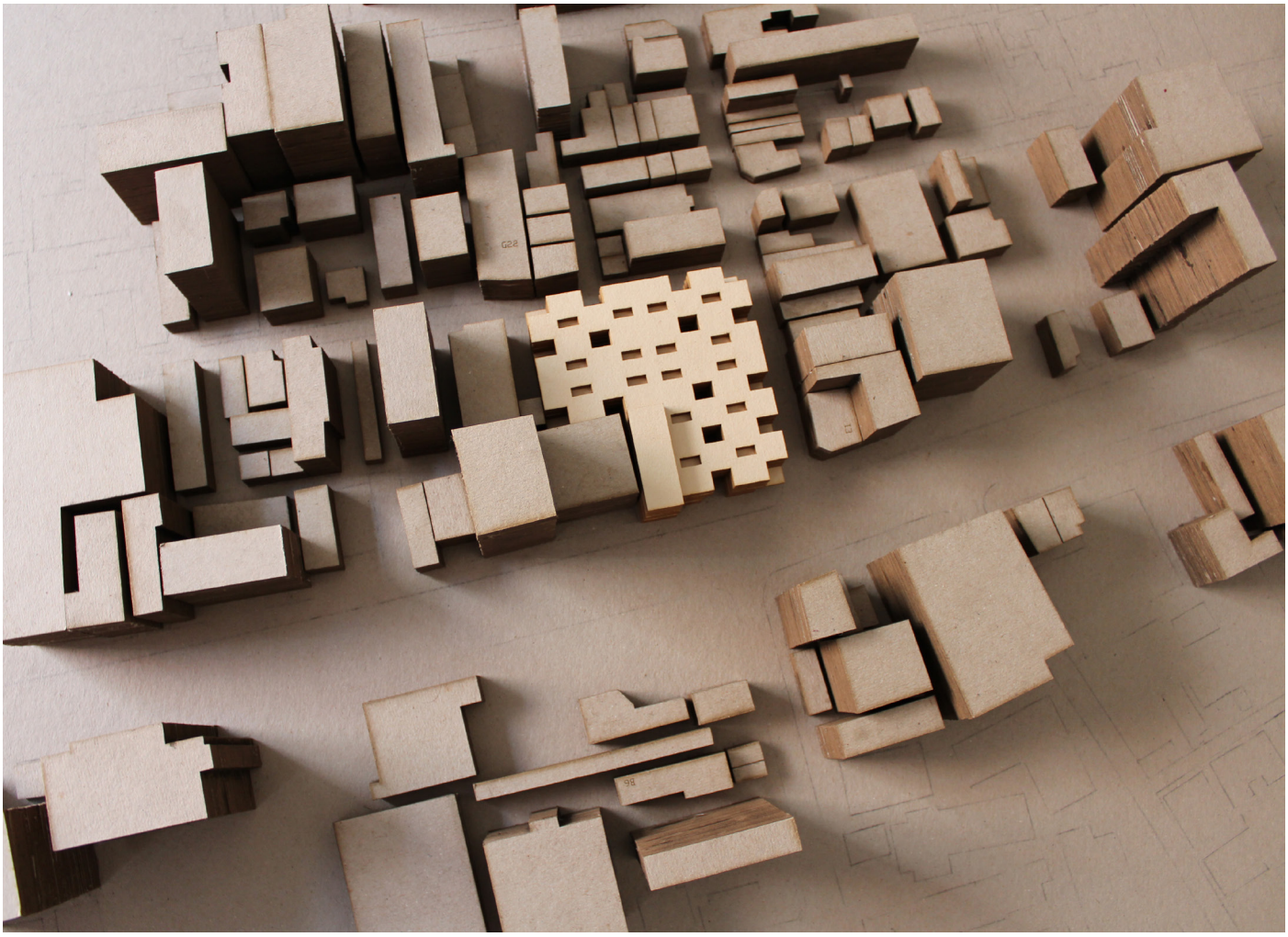
CORTE CONSTRUTIVO DE FACHADA ESCALA 1:20 0 0.5 1






air SHOP

Final Models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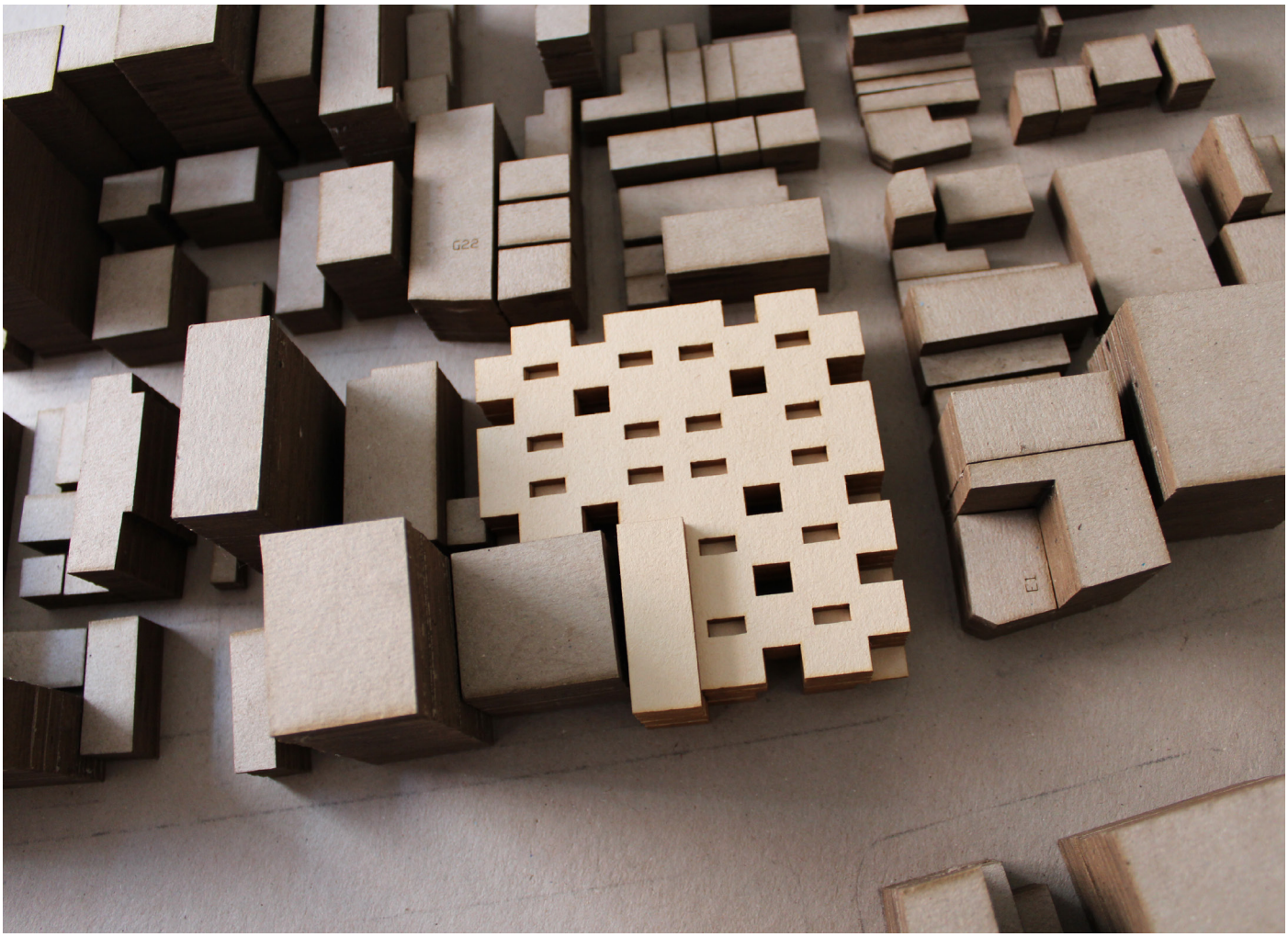
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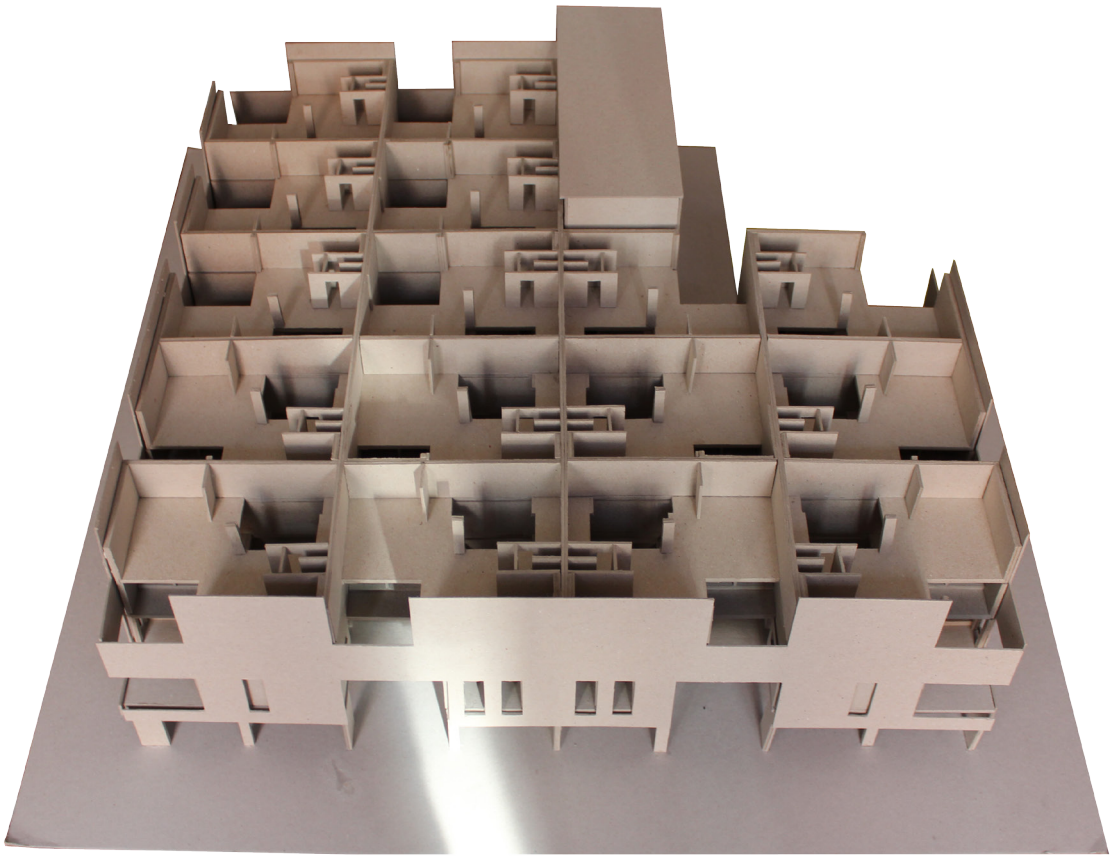
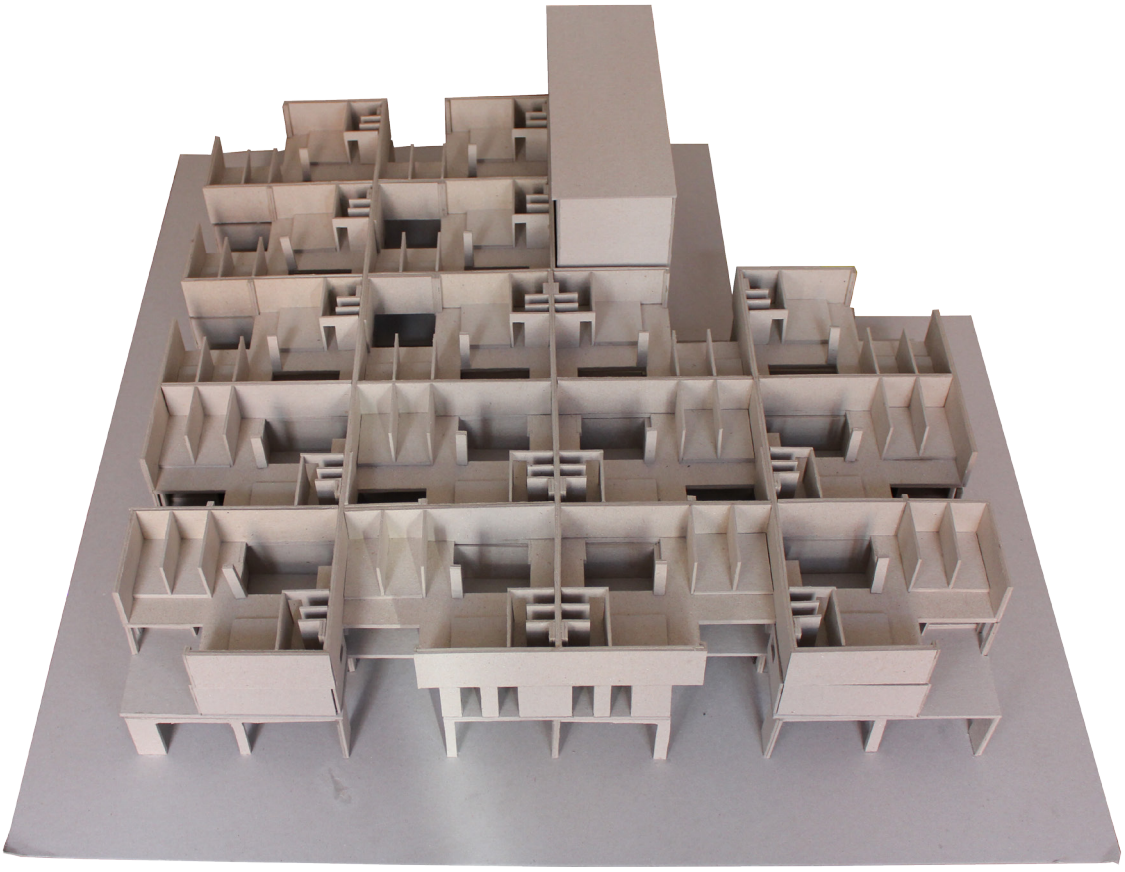
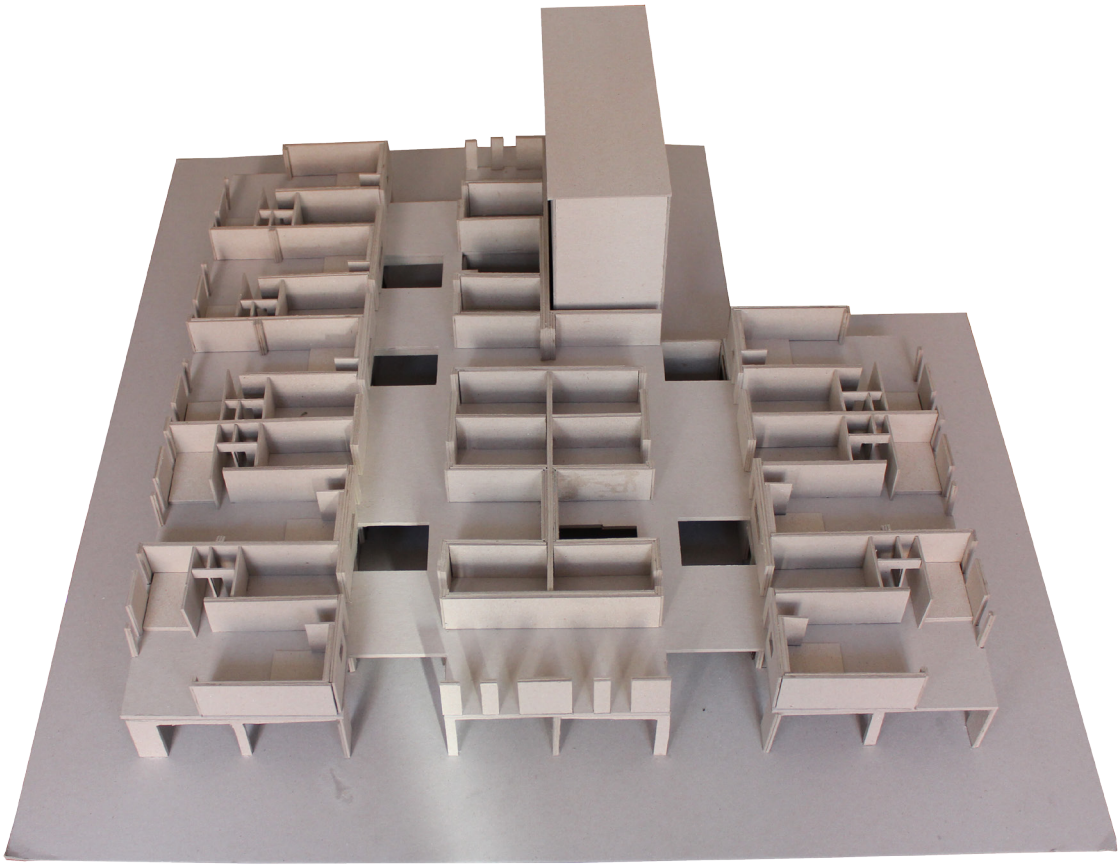
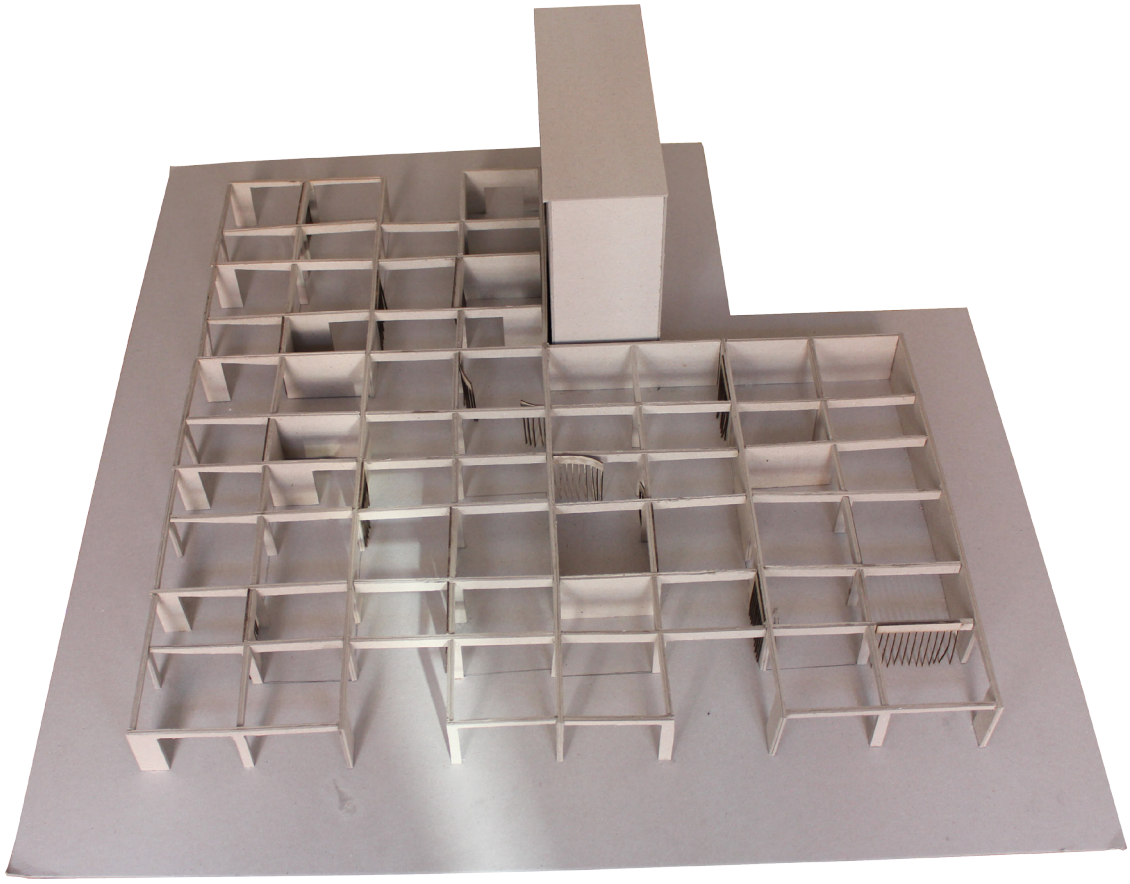
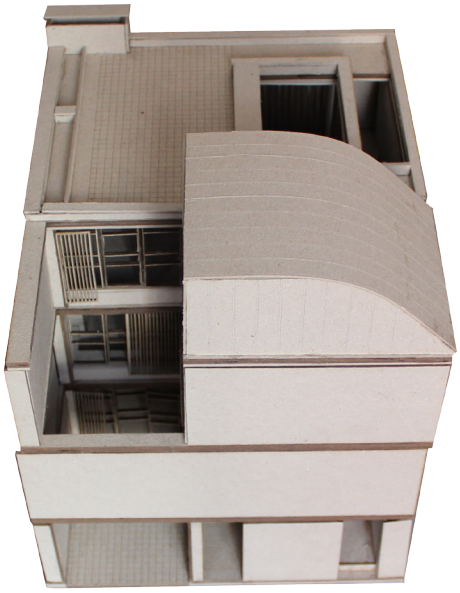
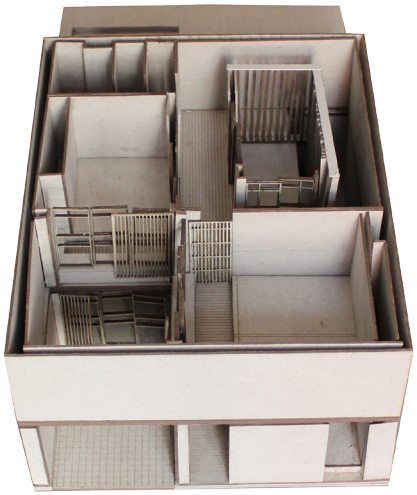




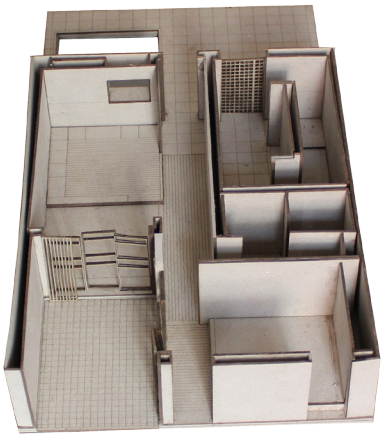




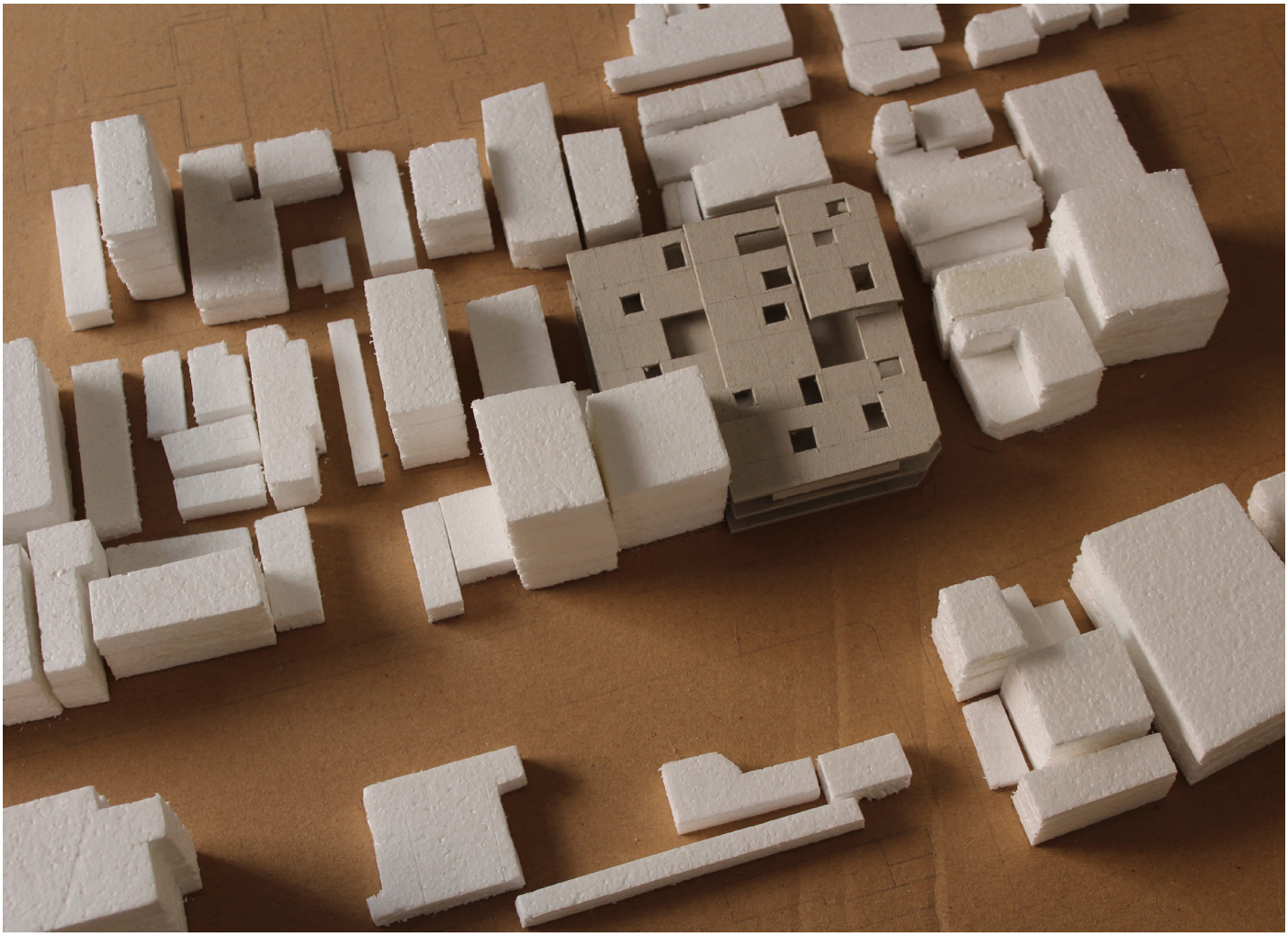


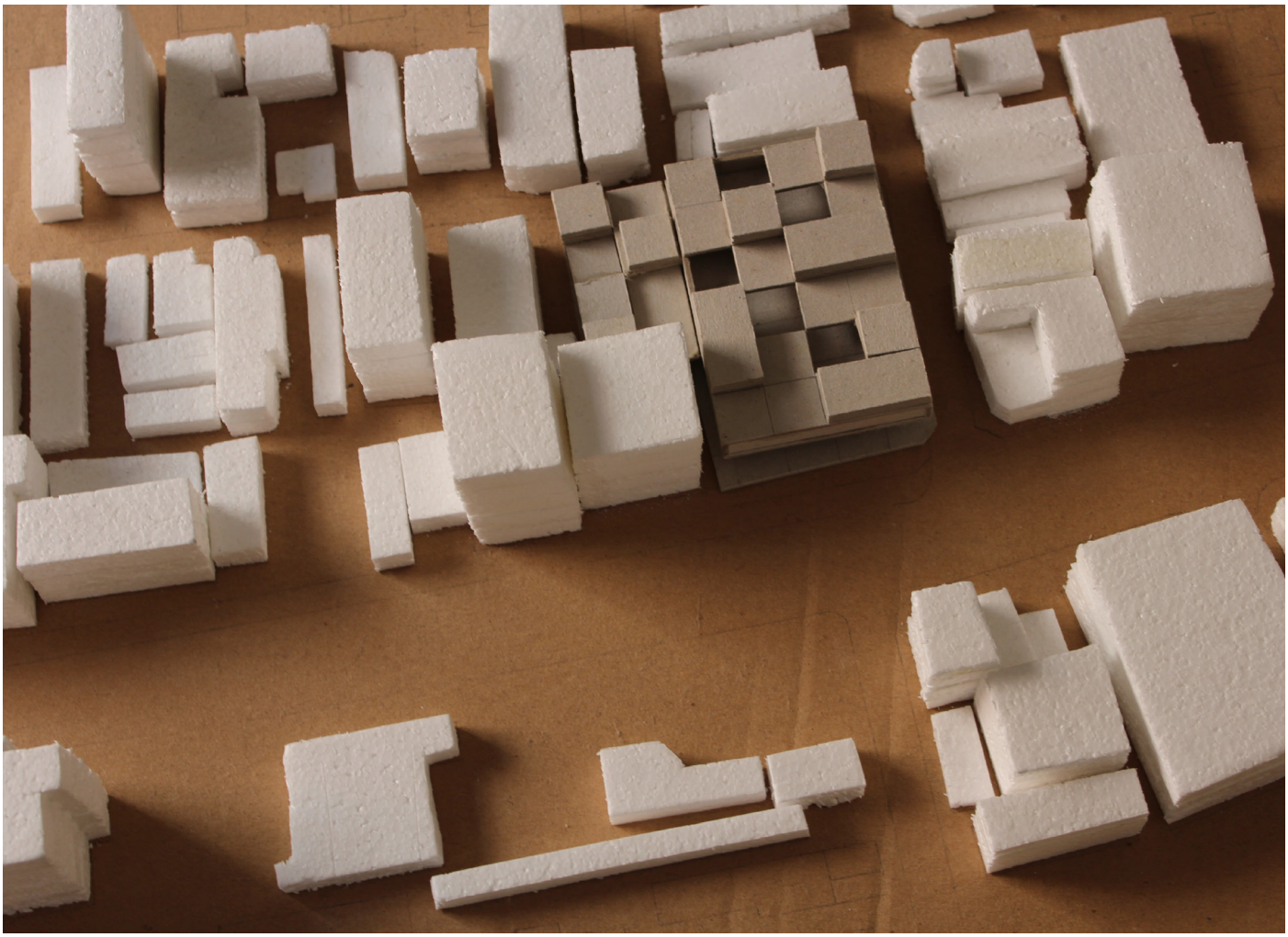


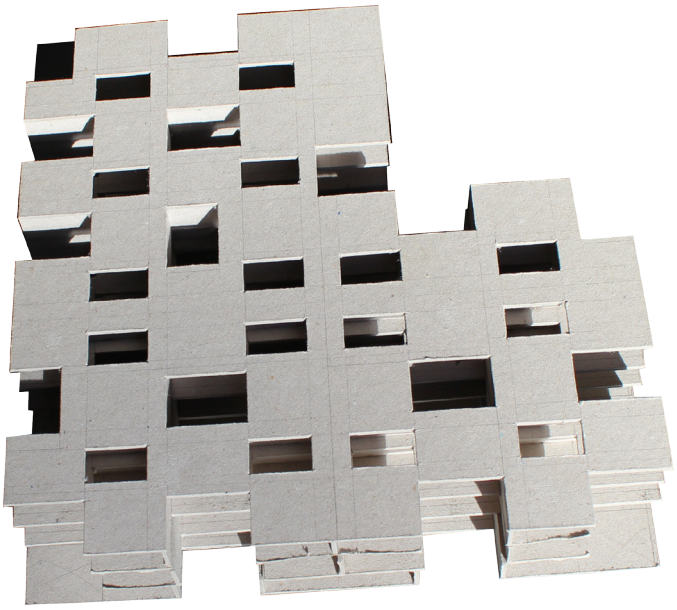


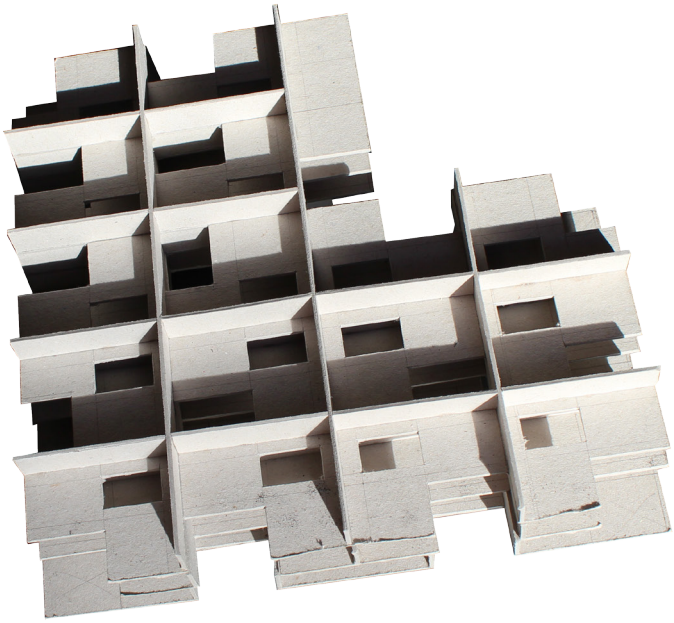


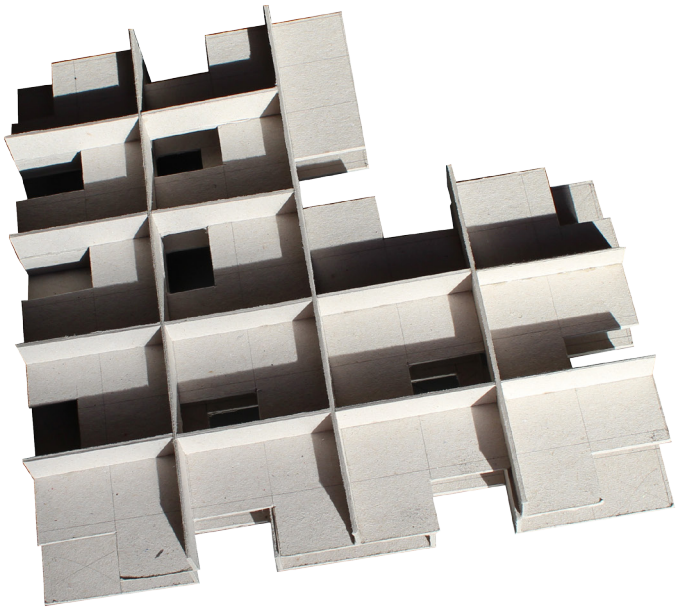
Study Models

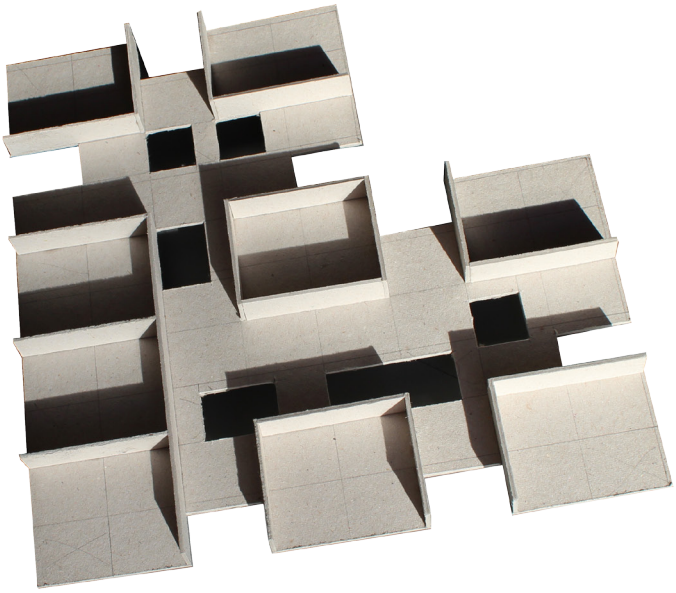


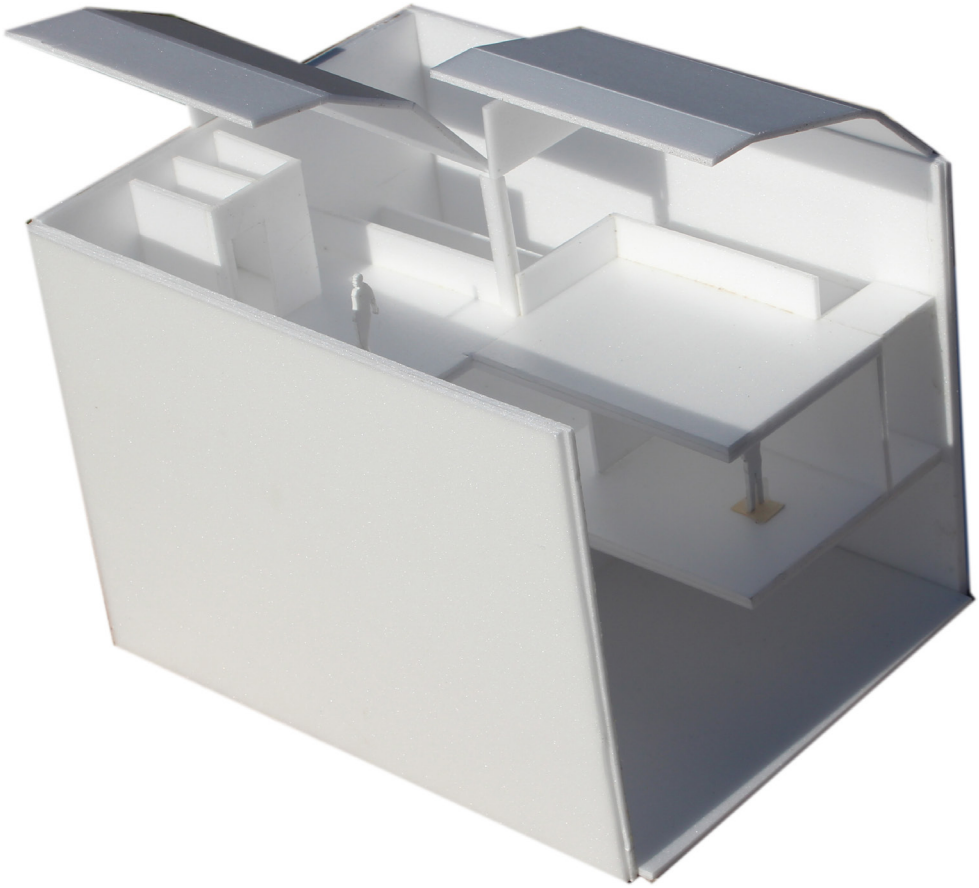


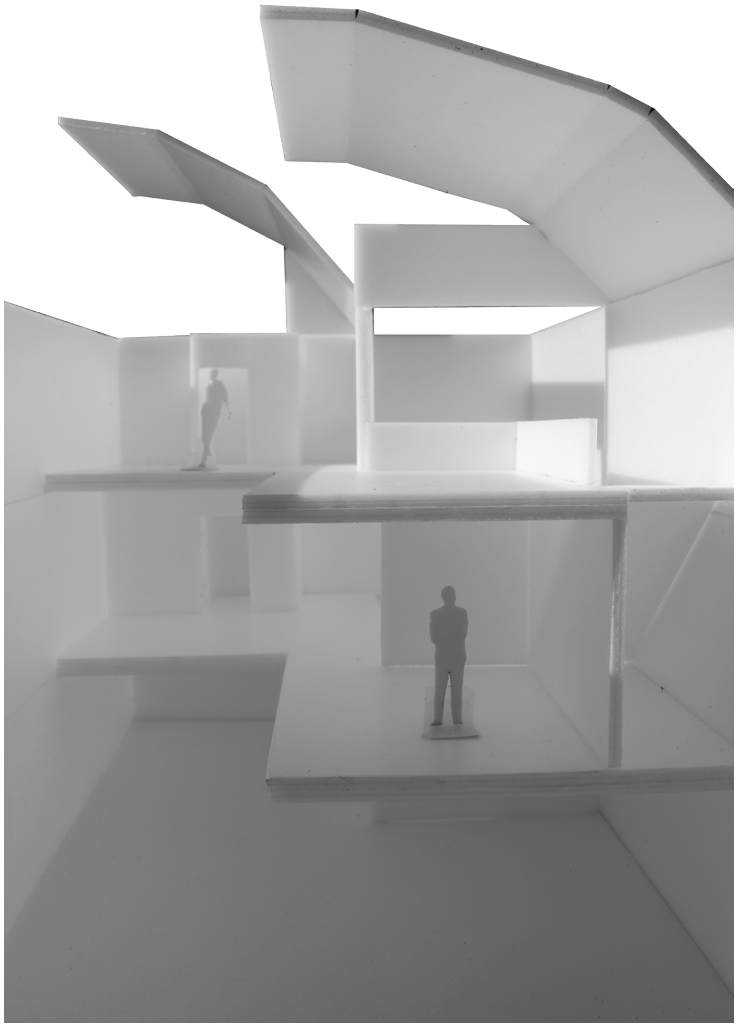


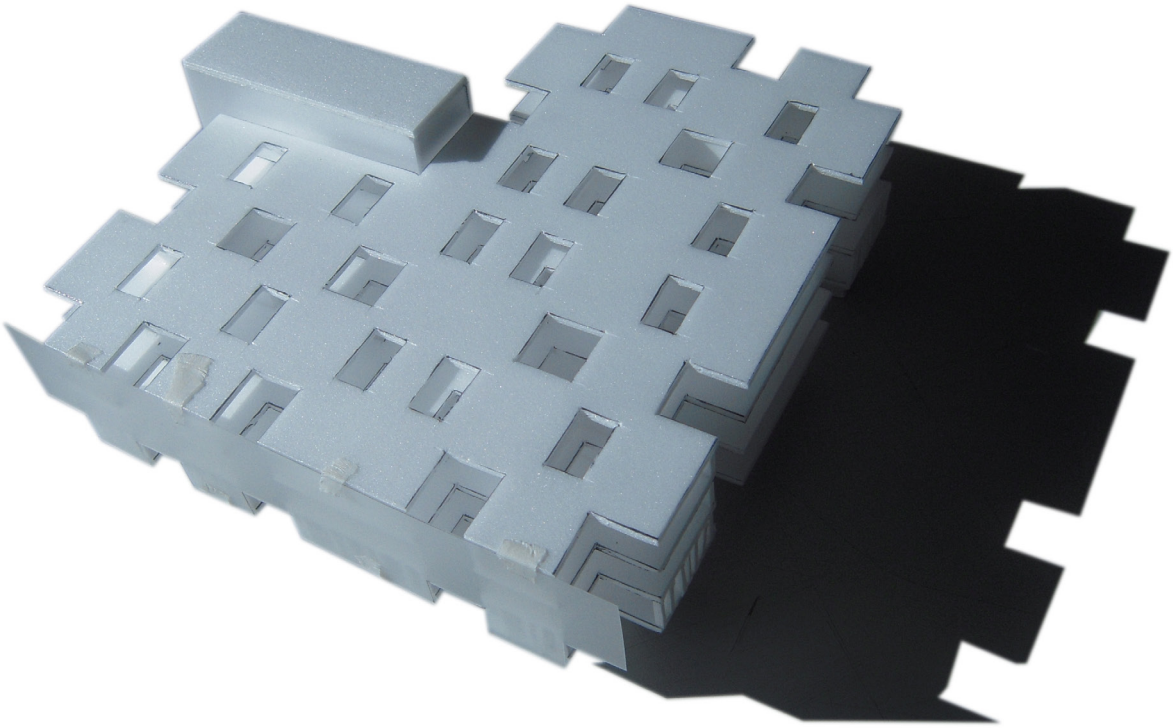


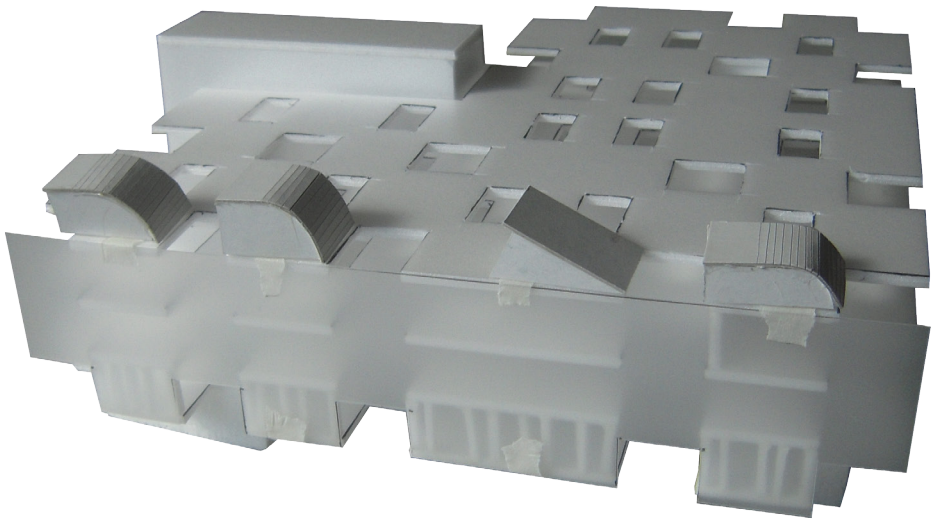


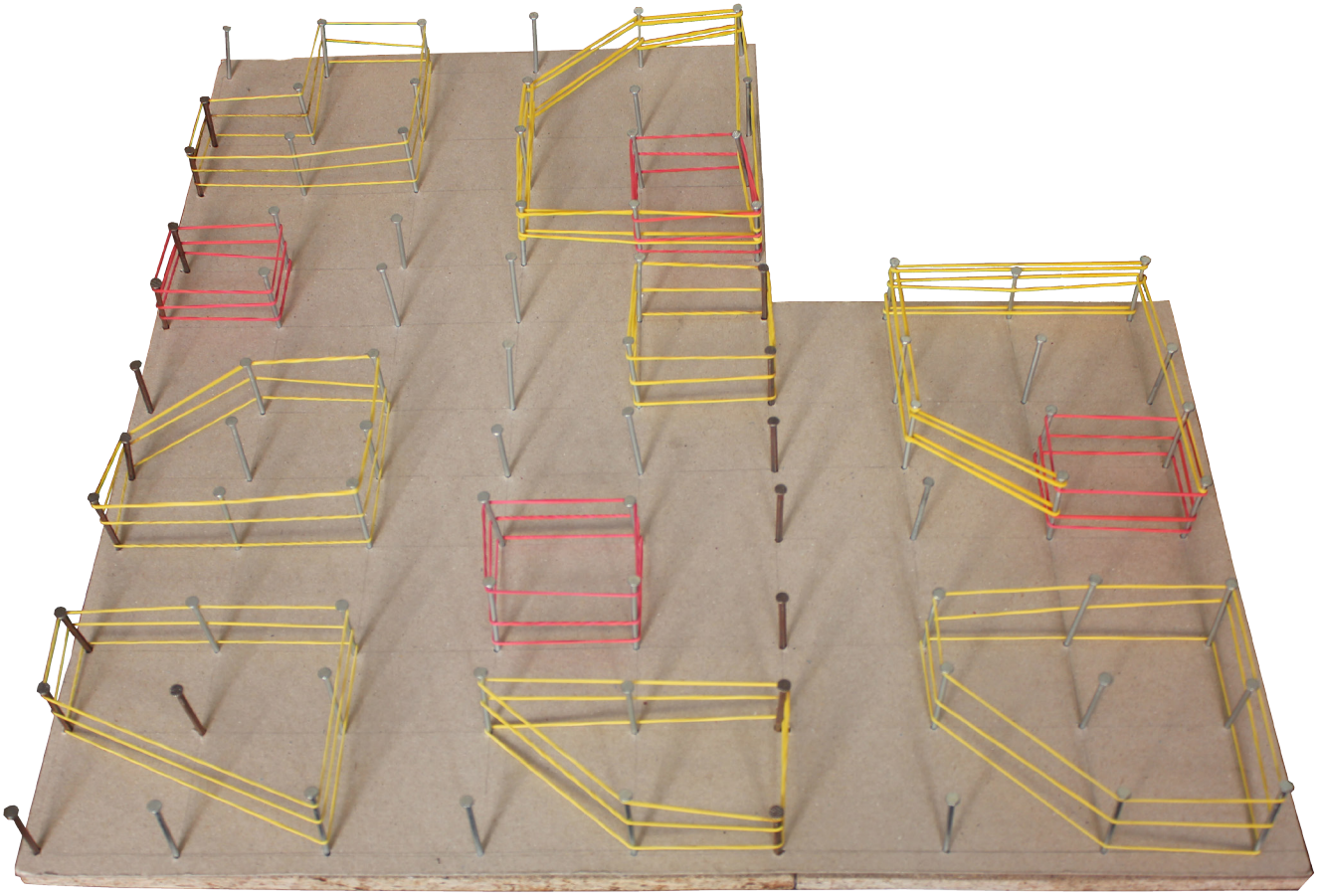


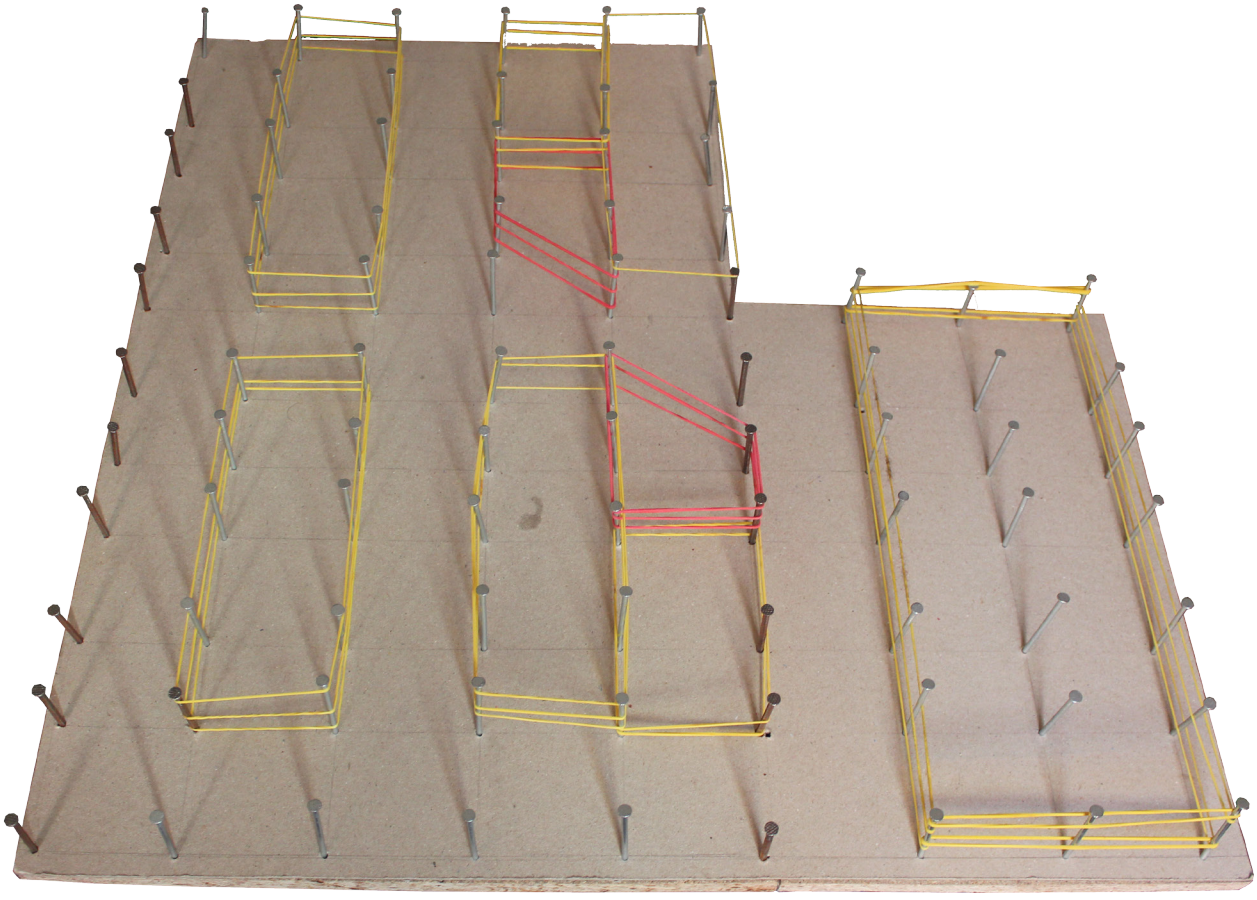


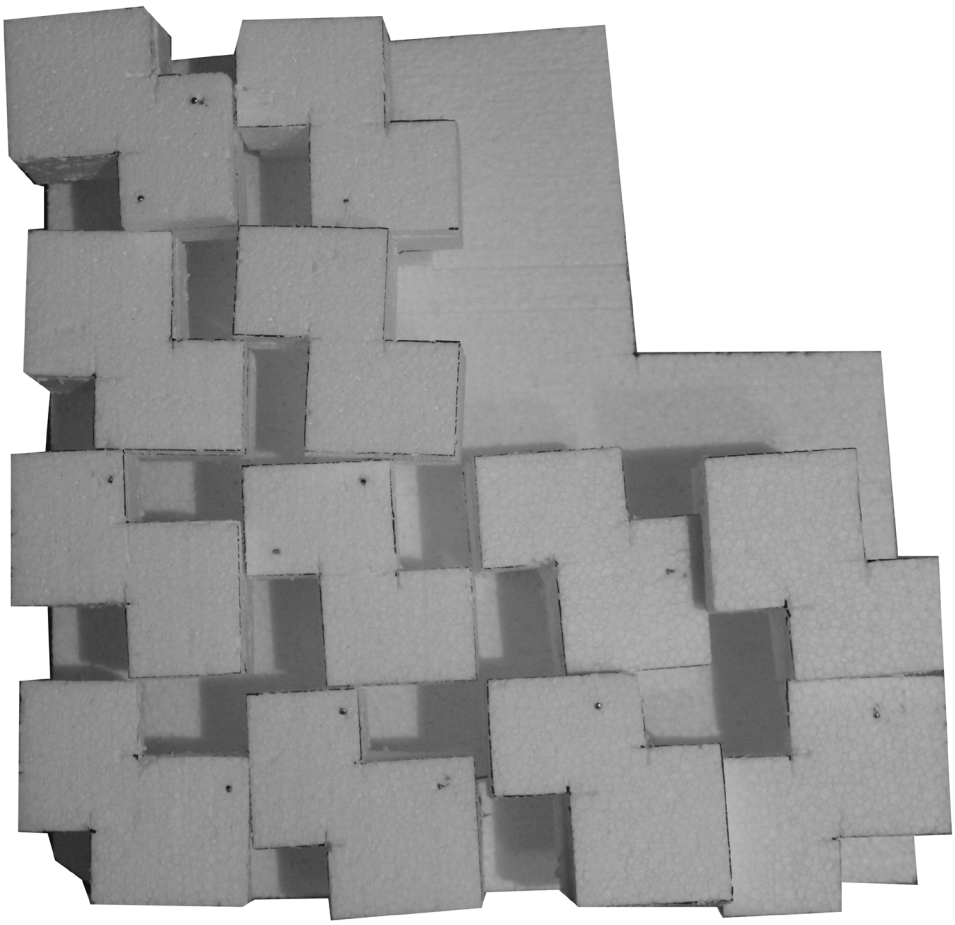


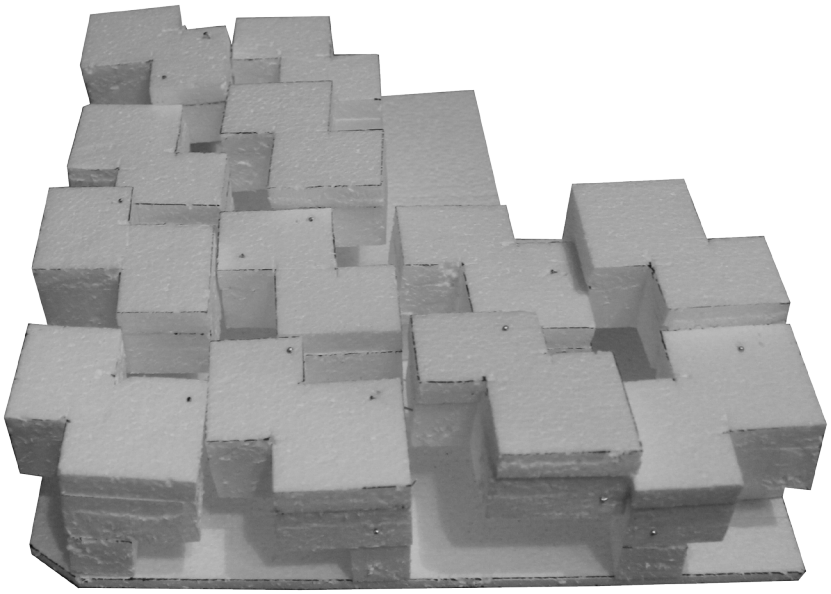


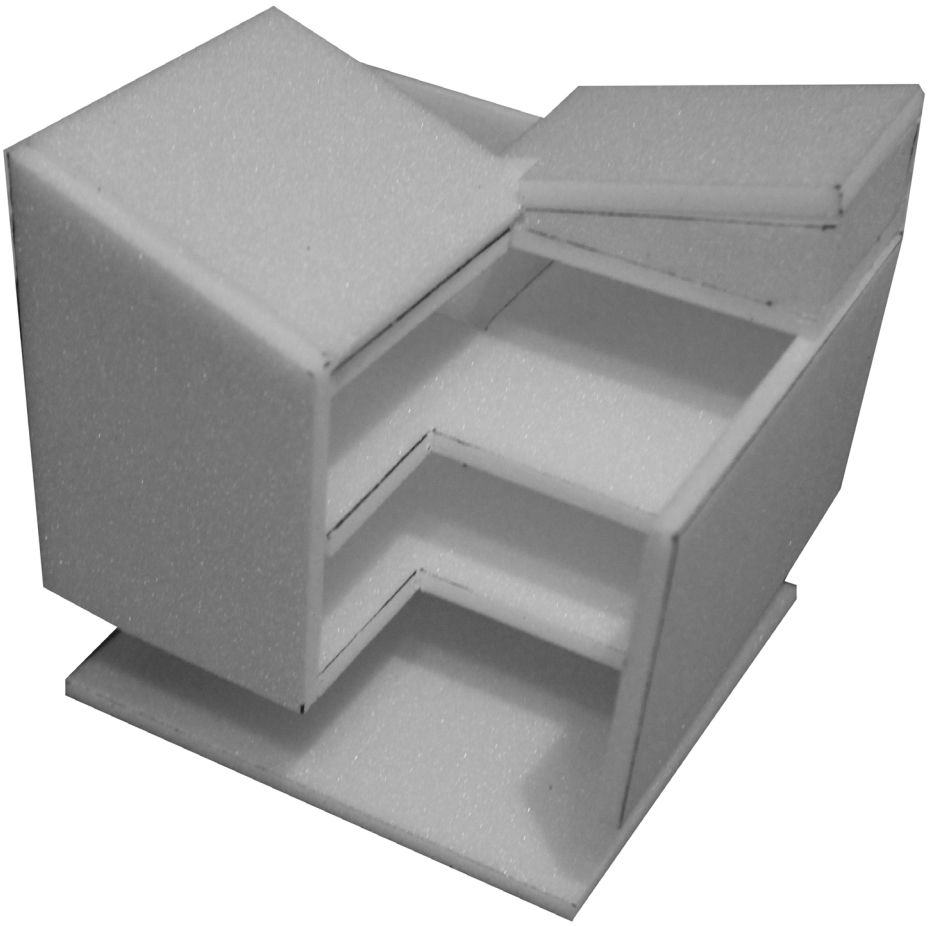


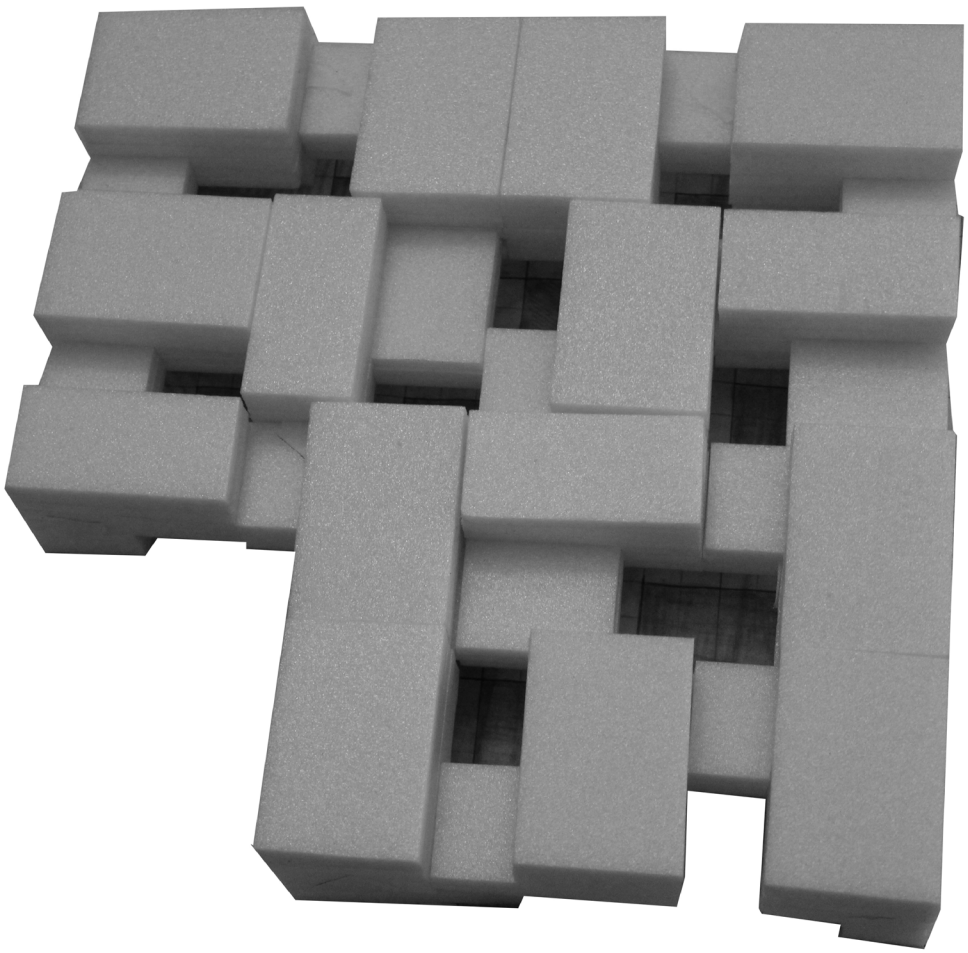












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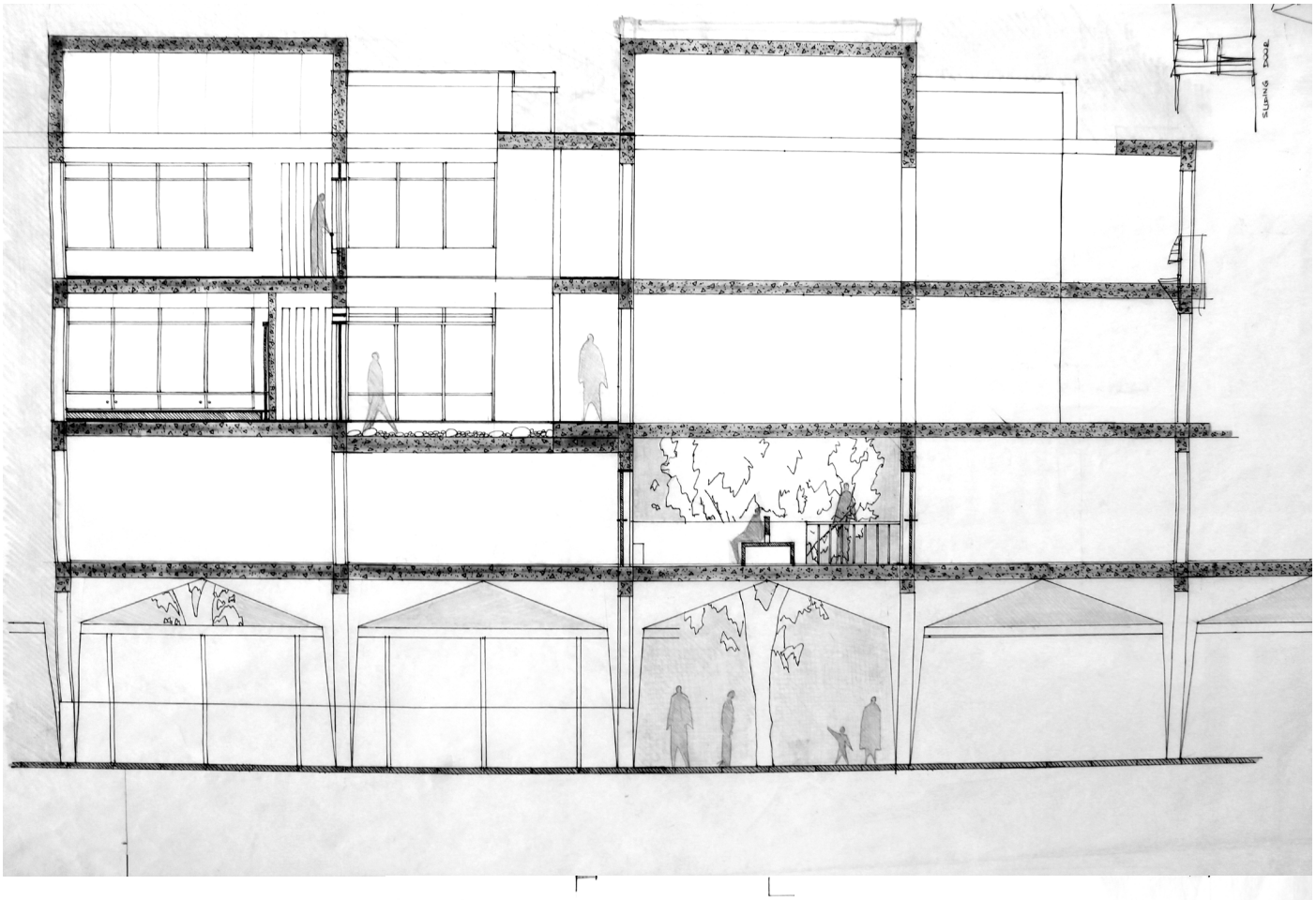

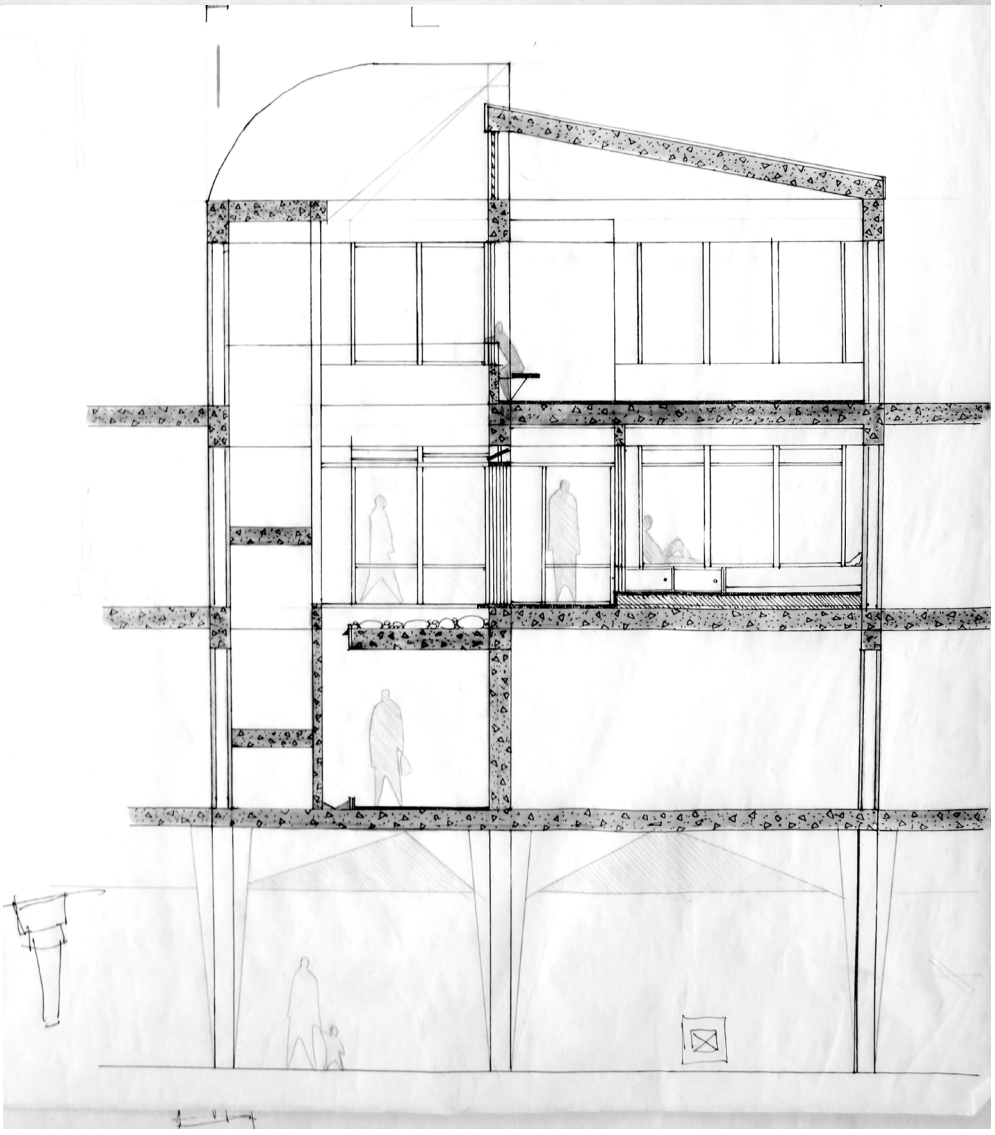

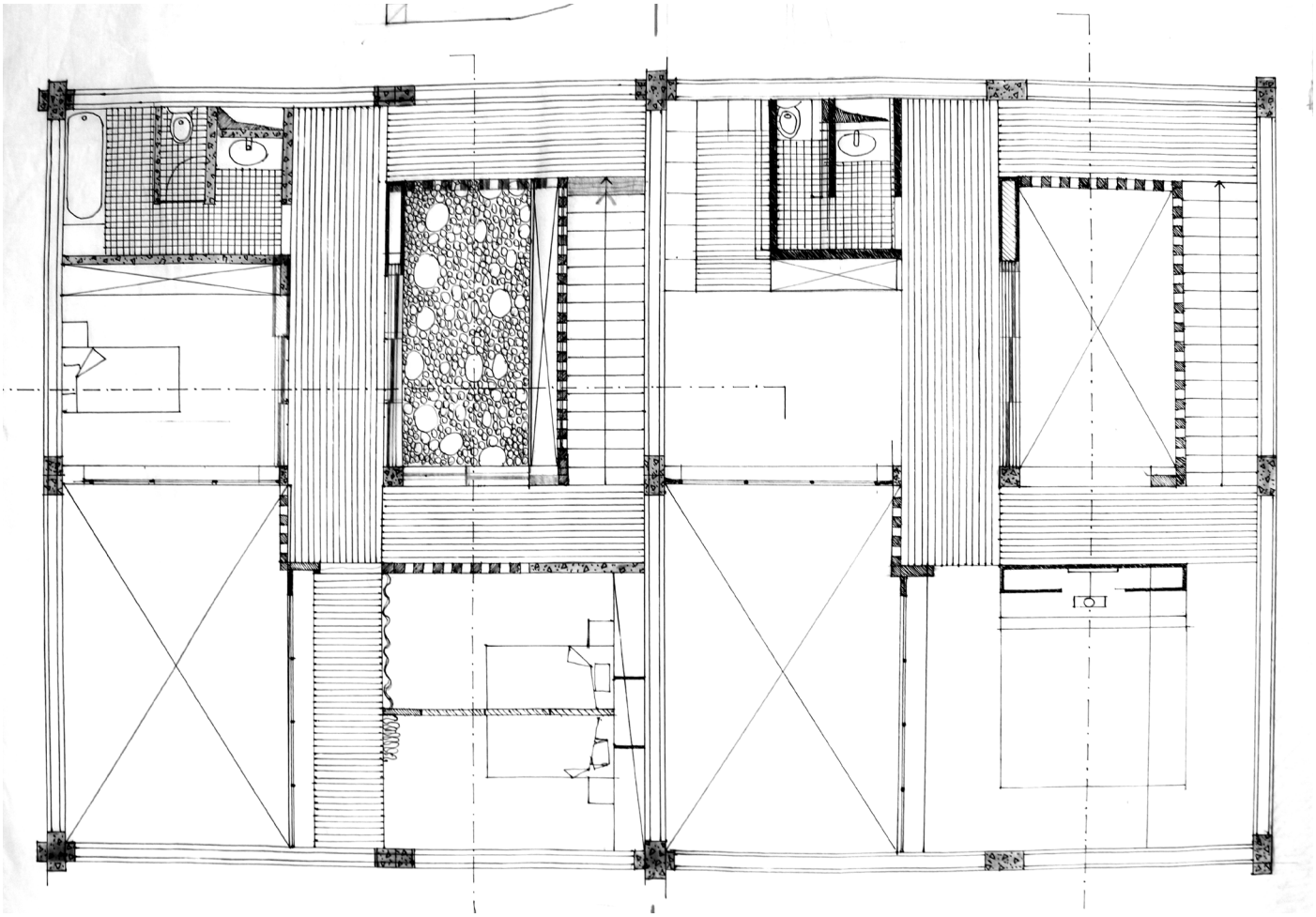

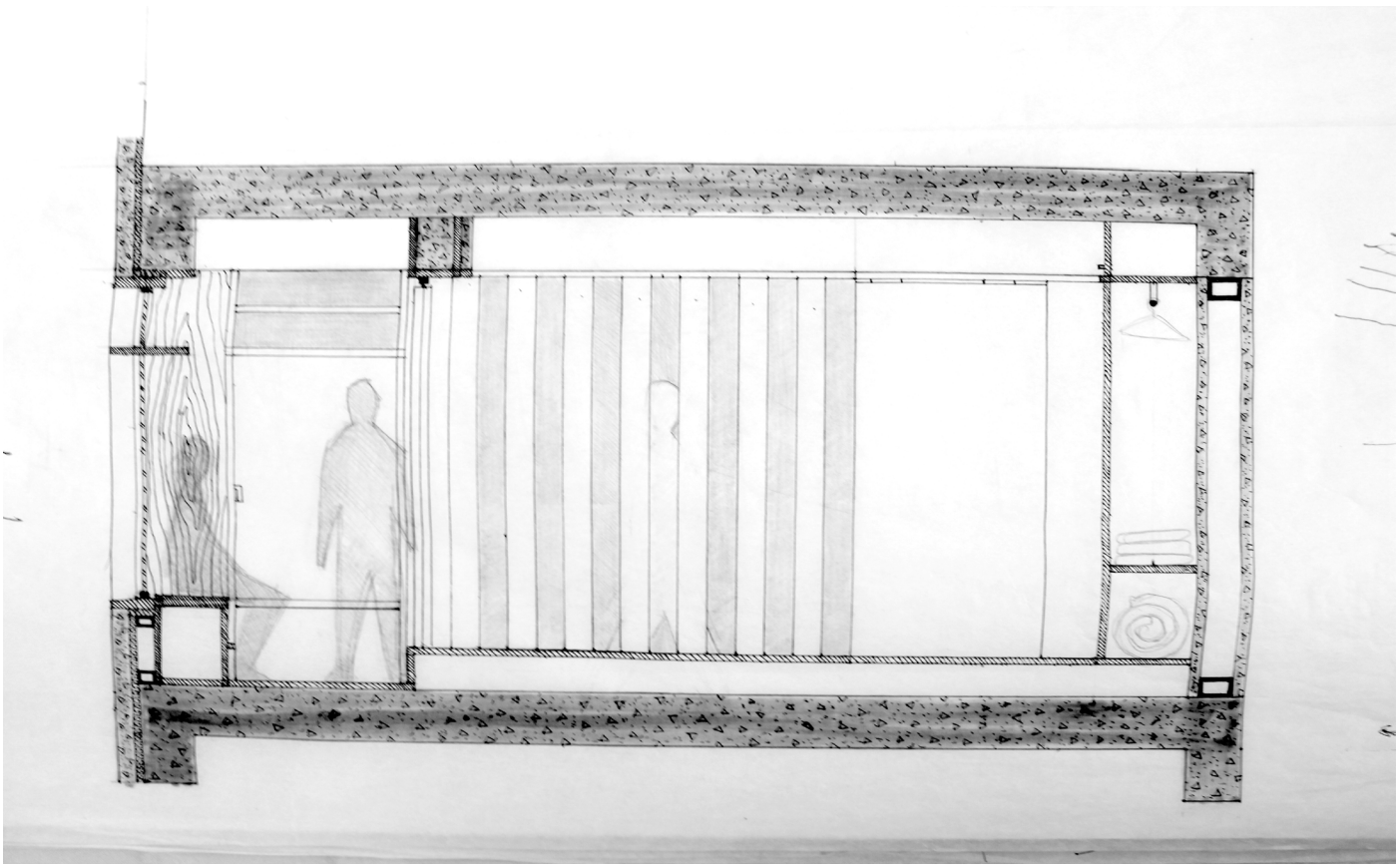

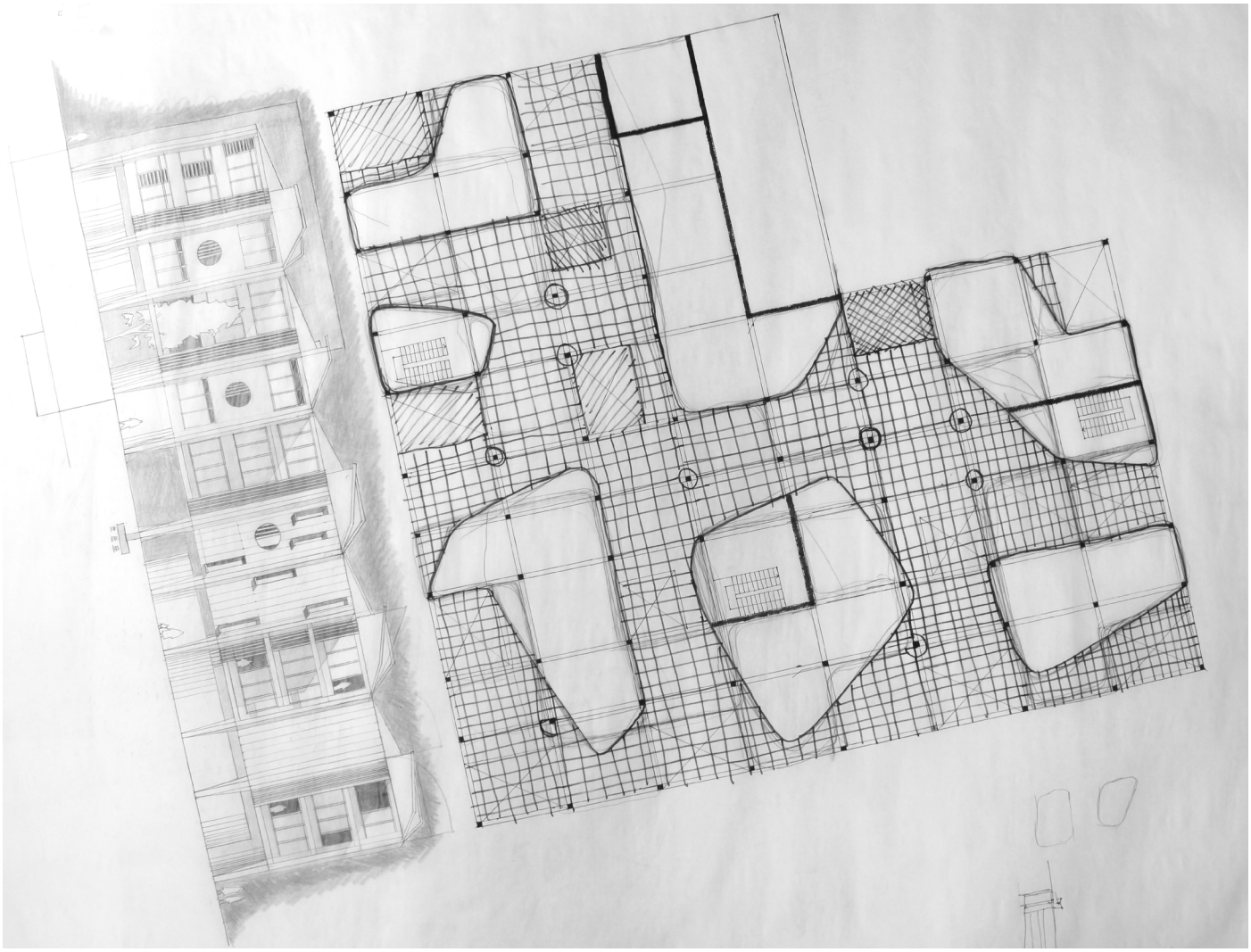

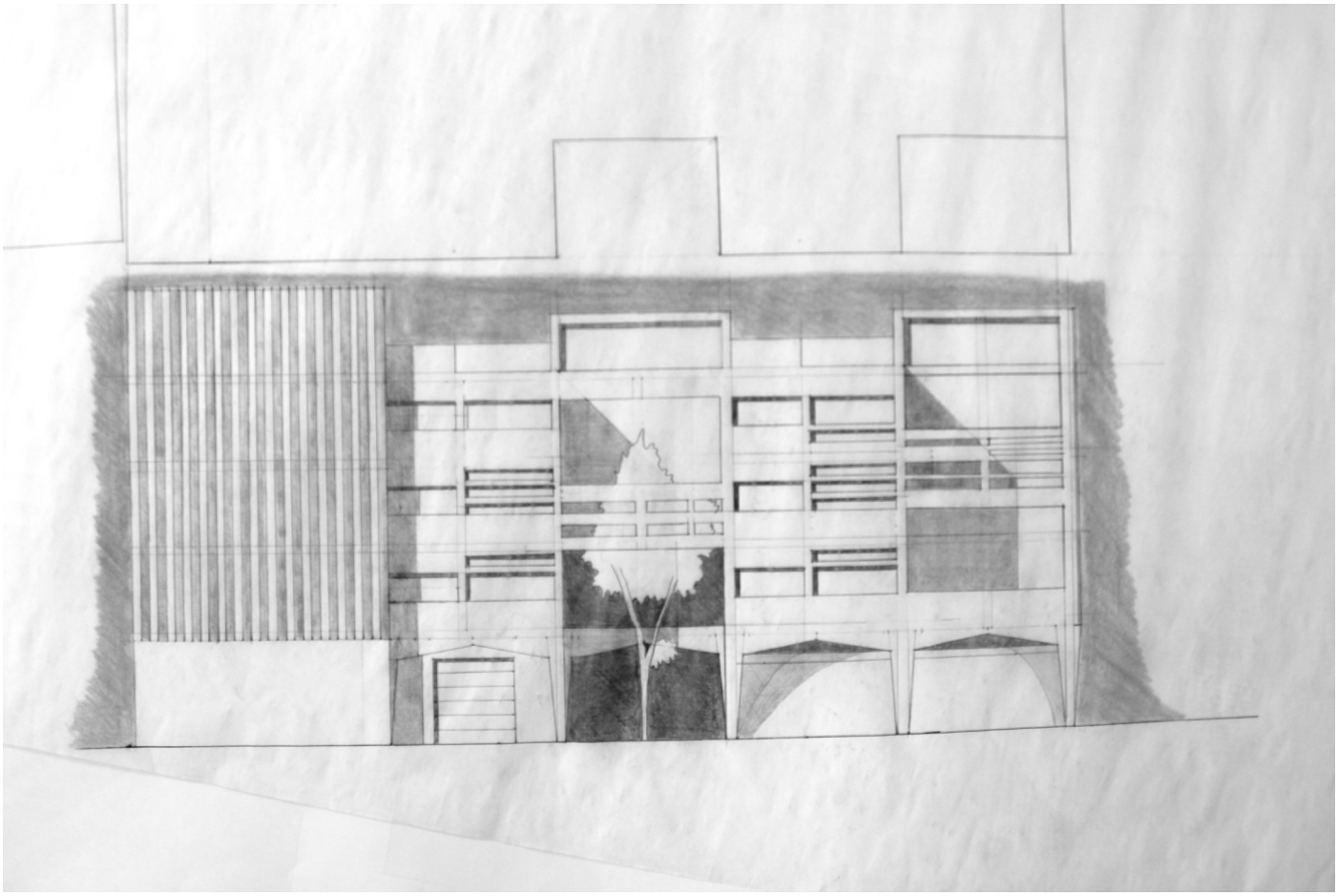

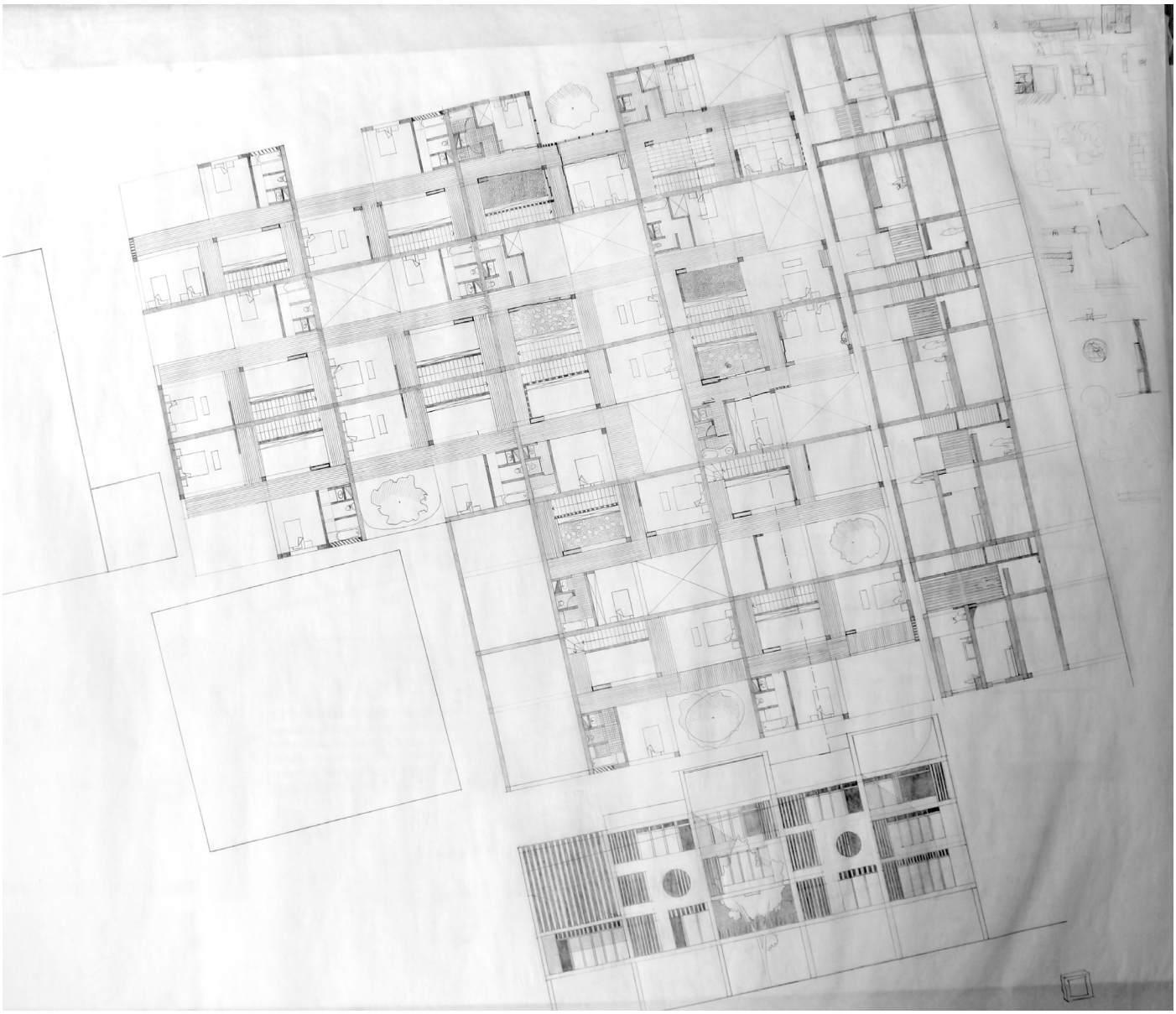

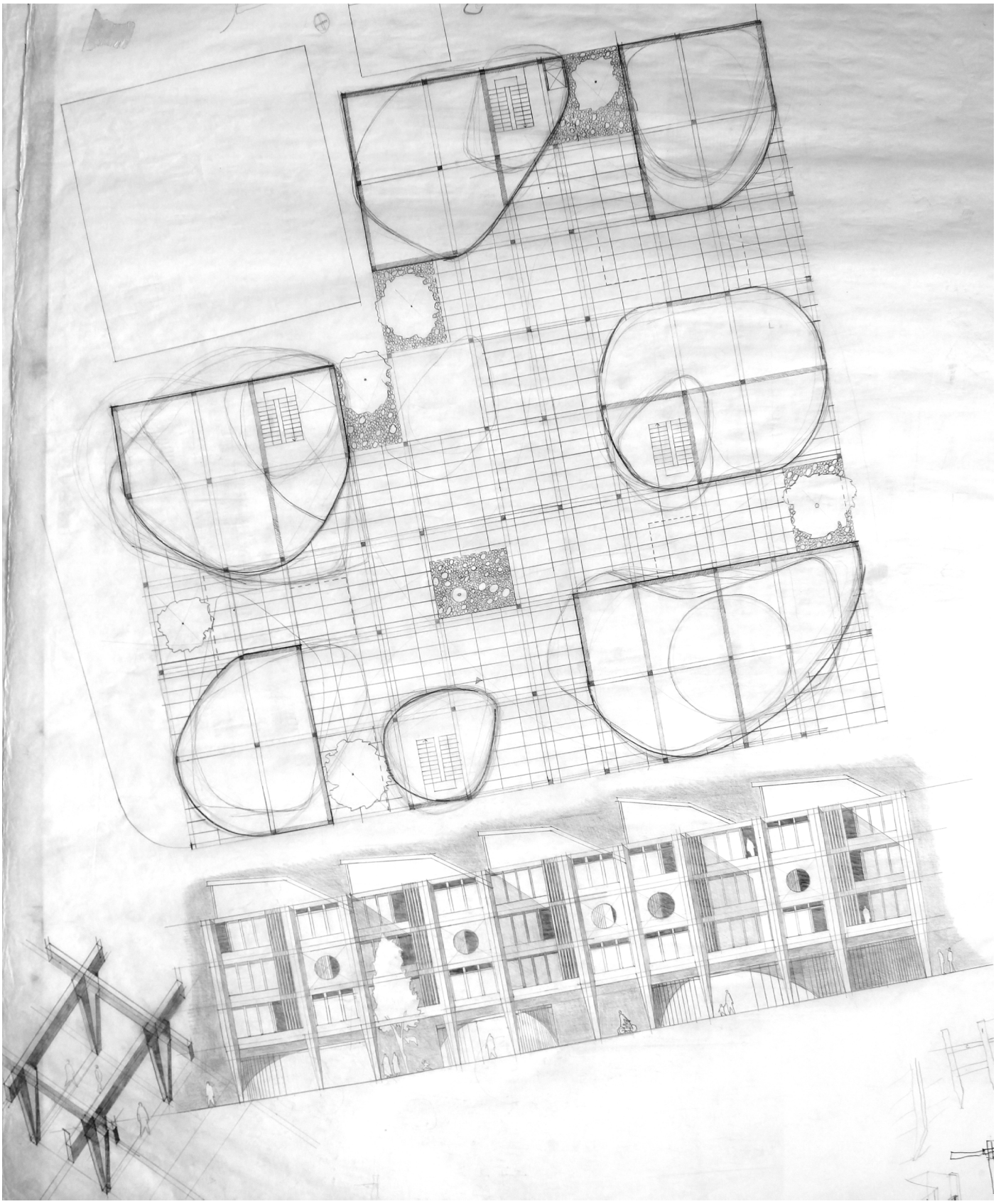

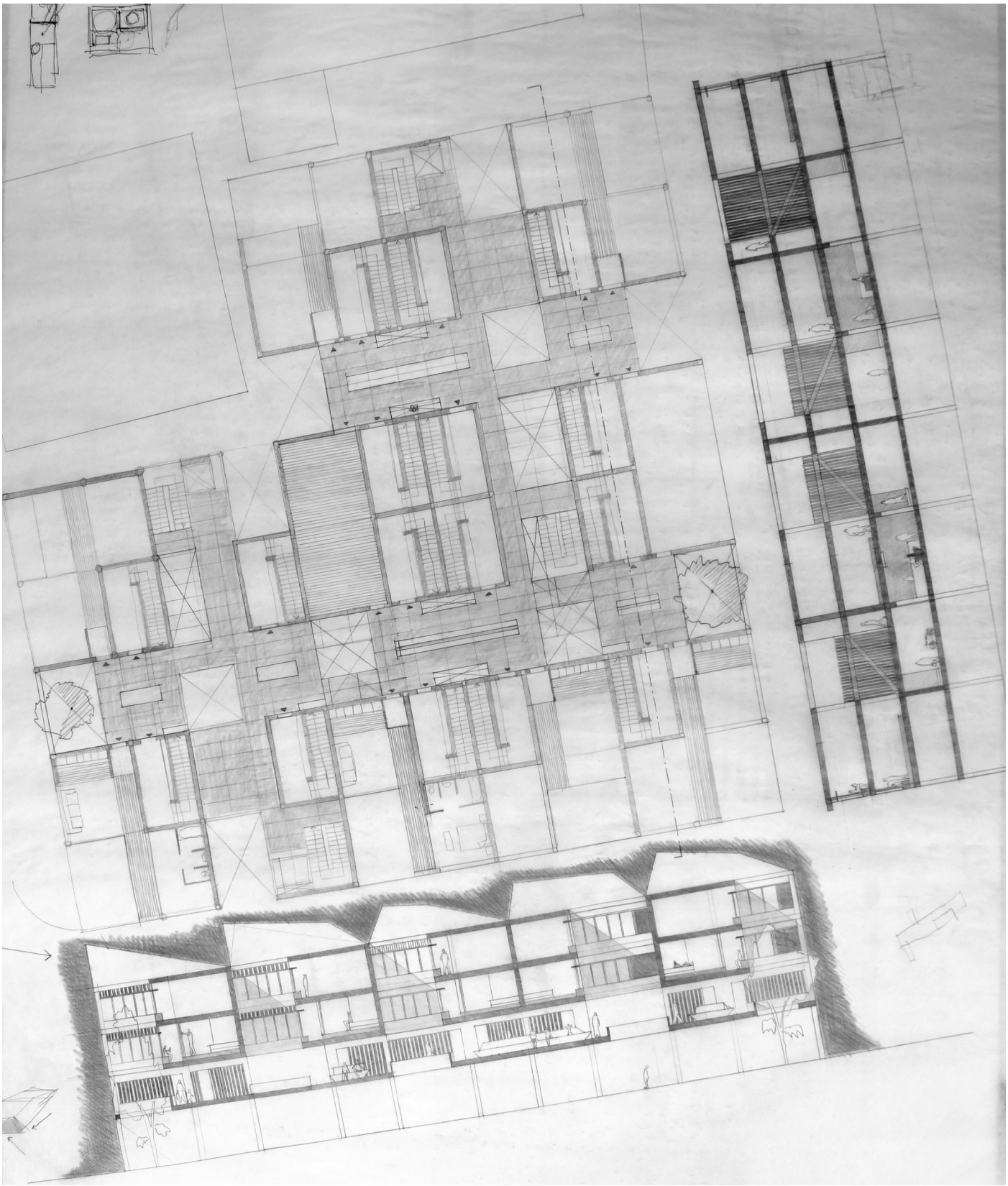

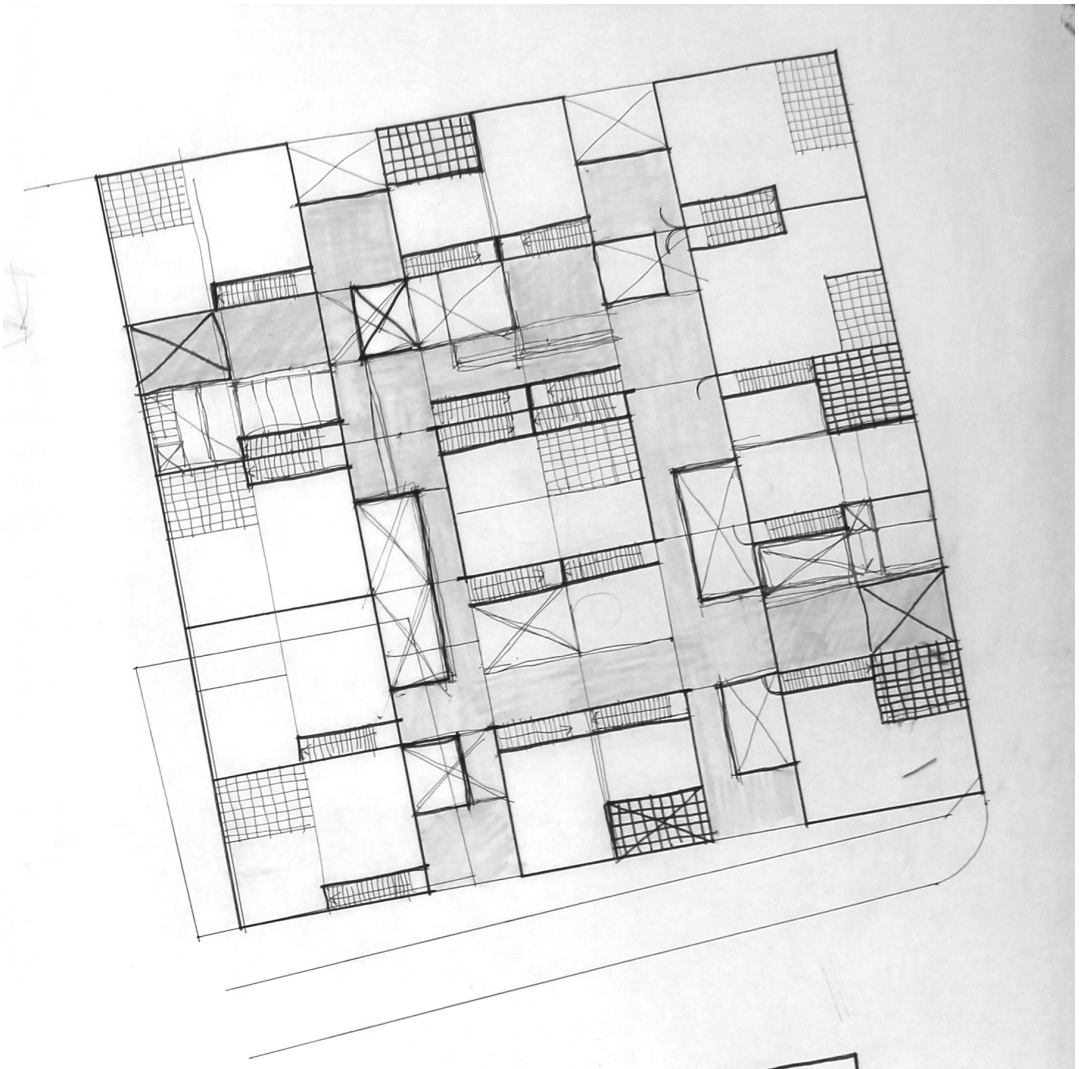

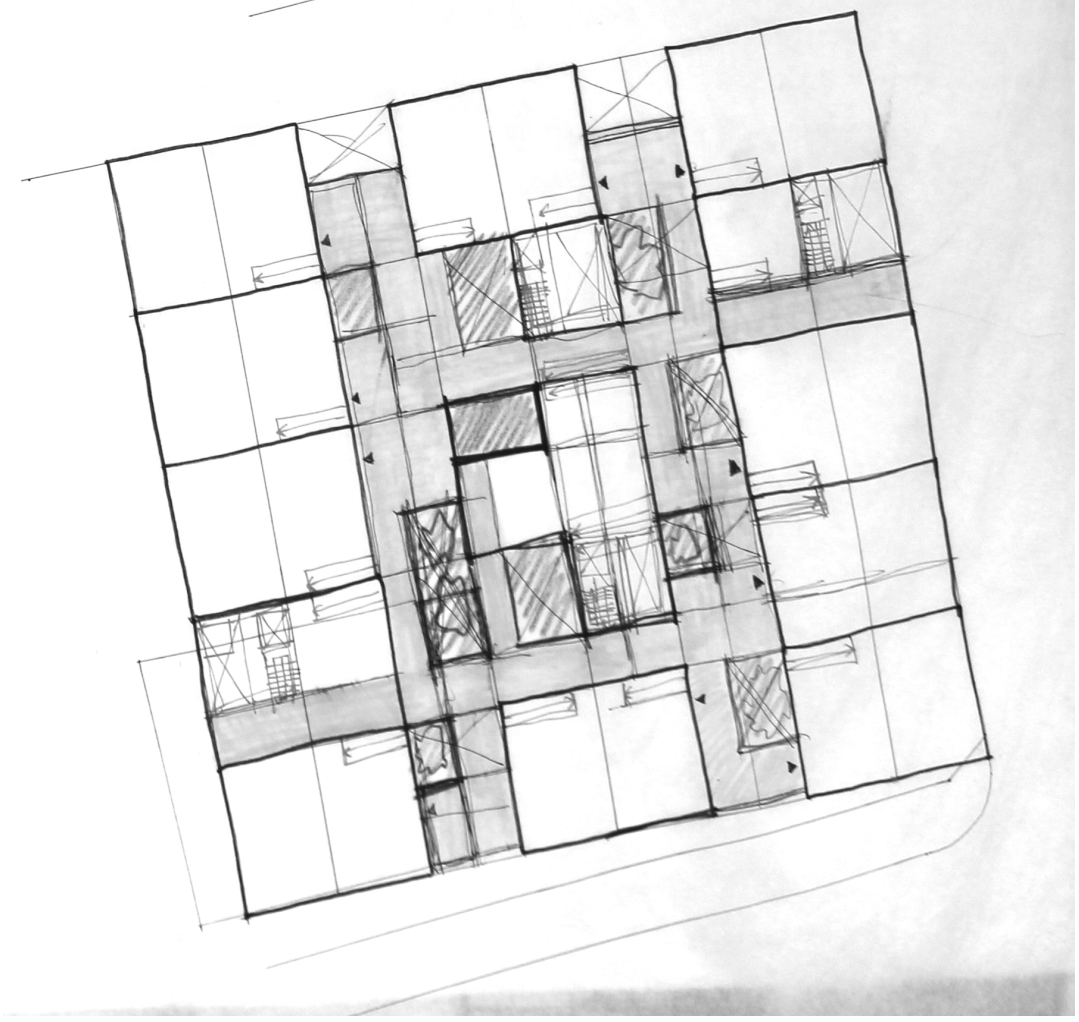

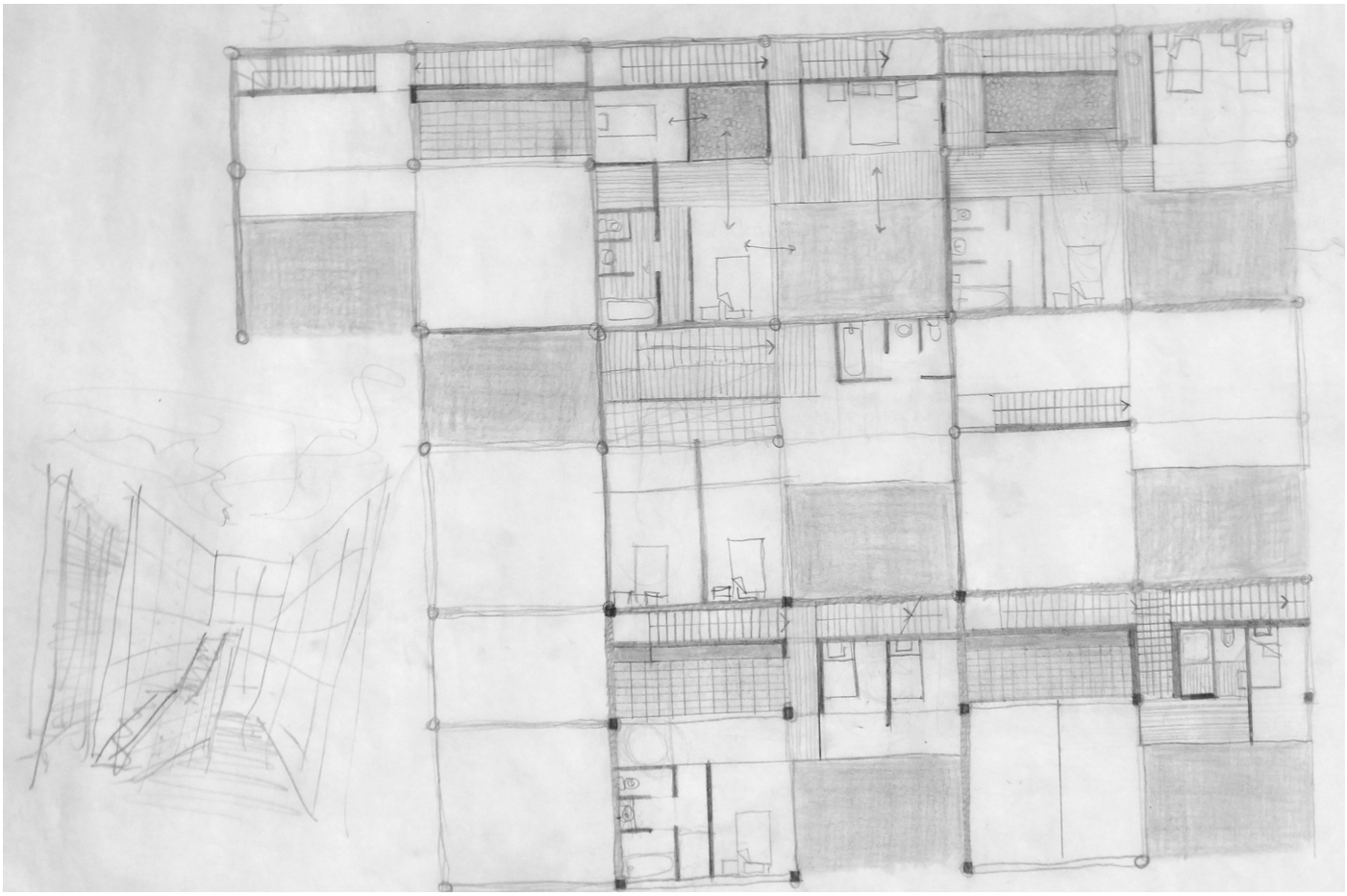

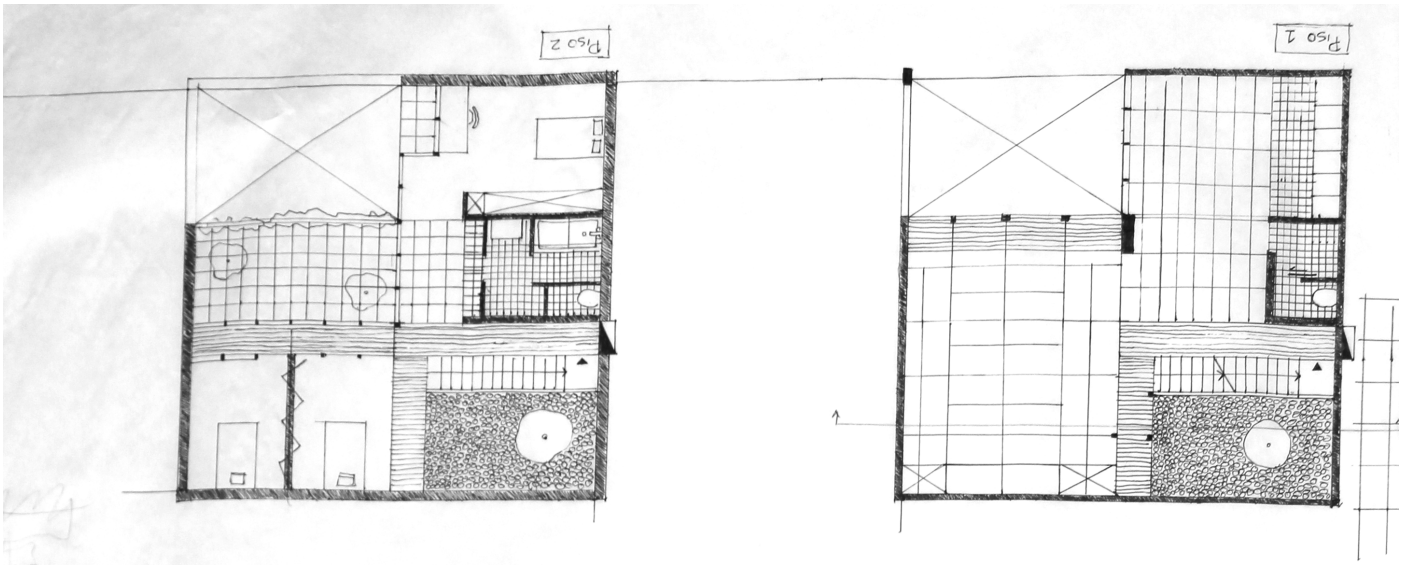
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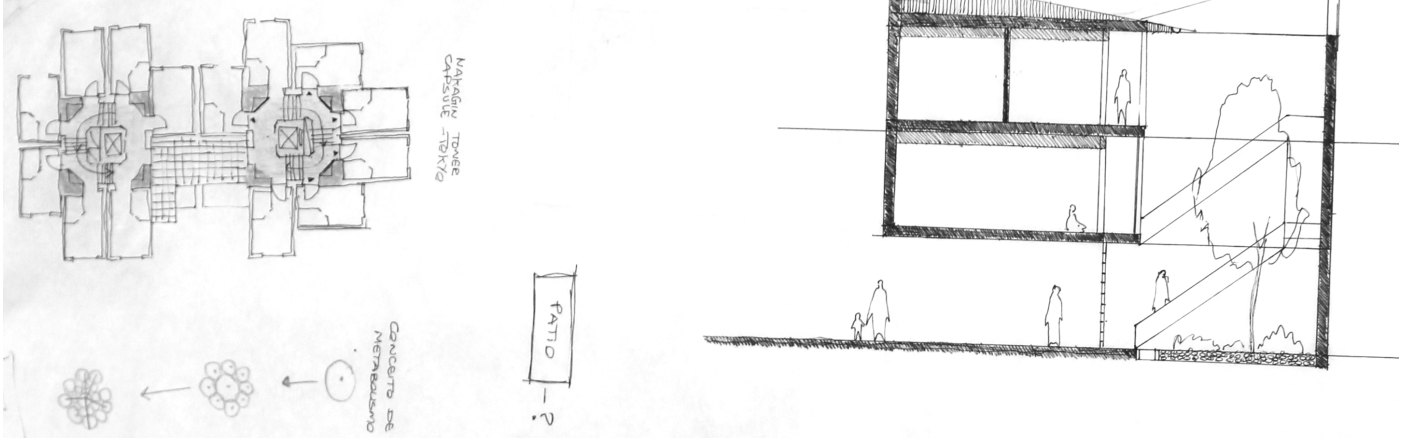
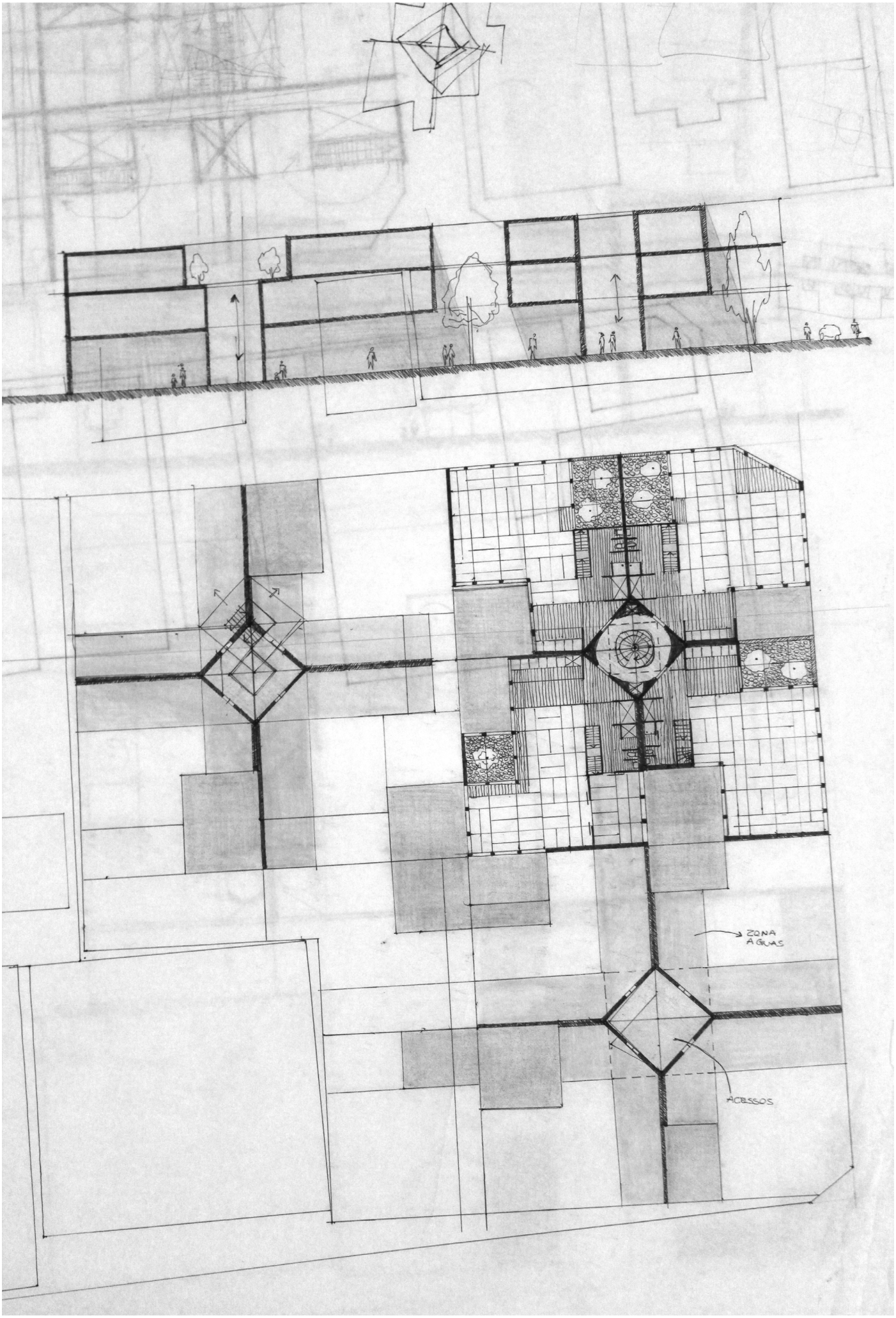

NAKAGIN CAPSULE TOWER TOKYO
CONCEPTO DE METABOLISMO
PATIO


ZONA
AGUAS
ACESSOS