ARCHITECTURE WITHOUT ARCHITECTS

A Thesis

Presented to

The Faculty of the Department of Architecture

Cornell University

In fulfillment

of the Requirements for the Degree of

Master of Science in Advance Architectural Design

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by

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May, 2020

Abstract

This portfolio is a manifestation of an ongoing investigation of understanding the agency of architecture in our current built environment. Through illustrations and writings, I elaborated my research and understanding of architecture in the area of my TI (Territory of Investigation) - Architecture and Discourse. It mainly consists of two different studio explorations (ARCH 7712 - Rational Form Making) (ARCH 7113 - Universum Carrousel Journey), and elective courseworks related to my Territory of Investigations (ARCH 6308 - Shinohara Kazuo and Contemporary Arch in Japan) (ARCH 6408 - Robots, Cyborgs, and Architecture) (ARCH 6408 PhotoArch/Collective Fictions) (ARCH 6309 - Principles, Theories, and Elements in Japanese Architecture and Gardens). In the research, I attempt to challenge the idealistic role of architects in defining the future of our built environment. With the advancement of technology, methods of building, and materials in this postmodernism era, certain changes, inventions, and evolution of styles are inevitable. The title "Architecture Without Architects" summarizes the modern trend where the essence of architecture is often neglected and overcome by aesthetic, ego, and power. A phenomenon that leads us to the question of "to what degree is the role of vernacular architecture transpiring in this 21st century, when glass and steel towers proliferate and the homogeneity of urban fabric increases?" Therefore, in this research I would like to explore how architects can adopt the essence of vernacular architecture while still maintaining the integrity and aspects of post-modern architecture. The research is concluded with comprehensive illustrations and supplemental materials of my work to support the respective investigation.

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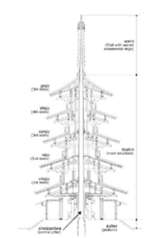
Architecture Without Architects

What I have learnt about architecture these passing years has raised my curiosity and interest in the idealistic role of architects in defining the future of our society. In the 21st century, I realize the challenge we are facing is the eroding quality of our general built environment. In Hong Kong, for example, high-rises were built with minimal set-back in the city fabric, creating extreme density and causing urban congestion. For architecture to regain its foothold as a substantive medium, the general quality of the built environment needs to be raised to a much higher level. In this technology - saturated age, when prefabrication becomes the new norm of construction, skyscrapers and high-rise buildings have become a prominent measure of modern cities. To say the least, we are confronted with the syndrome of "city anonymity". What makes a building complex in New York different from one in Shanghai, or Chicago, Hong Kong, and Tokyo? All these cities have accumulated a tremendous sprout of "concrete jungle" portraying power and capitalism, bold and conflicting to the environment. This sequence: the accumulation of modernist ideals, the imagery of our discipline's failure, and our inability to recover from such a fall, has culminated in the marginalization of our professional and cultural authority. As a consequence, we indulged ourselves in solving this self-created problem.

For architecture to regain its relevance, it must perform outside of its prescribed role by curating techniques and modalities of thought that establish extrinsic relevance in service of repositioning ourselves as authoritative guardians of the environment and culture. While many obsess over the rapid growth that leads to a monochromatic scheme of a city, an architecture which presents a new perspective on such a built environment becomes essential in a time that views the loss of identity as imminent. In response, I believe revitalizing vernacular architecture is crucial to fight the paradigm shift from local to global in the realm of architecture.

With the advancement of technology, methods of building, and materials in this postmodernism era, certain changes, inventions, and evolution of styles are inevitable. A movement that leads us to the question of "to what degree is the role of vernacular architecture transpiring in this 21st century, when glass and steel towers proliferate and the homogeneity of urban fabric increases?" Therefore, in this research I would like to explore how architects can adopt the essence of vernacular architecture while still maintaining the integrity and aspects of post-modern architecture.

In the global era, when homogenous architectural styles have infiltrated the urban fabric of cities around the world, architects ought to seek solutions to prevent this accumulation of urban concrete and the eroding culture of our society. Sendai Mediatheque, being one of the most notable architecture pieces in the 21st century, stands as an exemplary work that displays the unification of vernacular and post-modern architecture. Despite its modern look and advance physics, Sendai Mediatheque has taken inspiration from native Japanese tree, Zelkova, an ornamental tree with seemingly weaving trunks, and traditional "tree-like" structure that can be traced back to the 592-710 Asuka period in the history of Japanese architecture from Horyu-ji Temple. The columns on Sendai Mediatheque work identically with that of Horyu-ji Pagoda, with a technique called 'tuned mass damping', where the architects let the columns (Shinbashira) move deliberately to withstand shear forces from wind and earthquake.



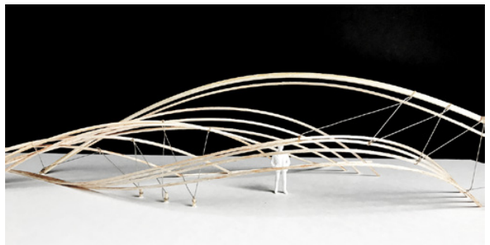
web-japan.org

Image taken from: ai-archinect.com

"Sendai Mediatheque survived a devastating magnitude 9.0 earthquake in 2011. The image indicates how Toyo Ito combined both rigid and dynamic structure to achieve optimal balance and structural efficiency, one that could withstand such natural forces. Two points to be noted here are as follow: (1) the columns start from the underground, giving a higher tolerance for the columns to shear. (2) Dynamic (higher tolerance) rectangular structure is located below the rigid (less tolerance) triangular structure, increasing the tolerance for the building to earthquake."

ARCH 7712 - Rational Form Making - Case study analysis of Sendai Mediatheque
ARCH 6309 - Principles, Theories, and Elements in Japanese Architecture and Gardens - Horyu-ji Pagoda atructure analysis

The research continued with an exploration in combining different, possibly contradictory, existing architecture concepts, including Sendai Mediatheque, Mannheim Multihalle, Orleans Bridge, and Millennium Dome, in order to come up with an innovative piece of architecture. It is an attempt to showcase architecture as a growing and evolving process, as we have 'stood on the shoulders of giants' to reach this point today. Hereby, the final outcome of the exploration was formed through one iteration after another, a methodology used to preserve fragments of architecture and move forward.



To understand further about the application of vernacular architecture in the postmodernism setting, a research on five different exemplary houses throughout three different cultures, America, Japan, and Europe was conducted. The case studies focused on the architecture history, typology, and tradition of each respective house and how they can relate to one another. These houses were made by architects Yoshida Isoya, Kazuo Shinohara, Jos Van Driessche, and the architect of the Shaker House, pioneers of their respective era. The study began with Inomata-tei, by Yoshida Isoya, a Japanese architect and pioneer of modern 'sukiya style' of building, in which an affinity for natural materials and traditional construction techniques finds expression in contemporary structures. According to Yoshida Isoya, a 'sukiya style', although ordinarily based on handcrafting in wood, could use modern materials as long as they were used in the 'spirit of the style'. This expression could be seen in Inomata-tei, 1967, where he altered the traditional style of japanese architecture into a modern setting.

ARCH 7712 - Rational Form Making - Case study analysis of Sendai Mediatheque
ARCH 7113 - Universum Carrousel Journey - Movement 1 case studies

A study of House in Uehara, by Kazuo Shinohara, is crucial to understand how vernacular architecture (in Japan) evolved during the transitional era of globalization. As Japan's most celebrated postwar architect, Kazuo Shinohara had initiated an empirical research into Japan's contemporary vernacular architecture and the typology of private houses where he separated his findings into four different styles each with its time period. For example, House in Uehara, 1976, would fall into the 'third style' of his architectural language.

Van driessche house, 1980, is a derivation of several architecture pieces one of which is Frank Lloyd Wright's FallingWater. The impact of Scandinavian architecture was clearly visible in his architectural designs in a kind of 'romantic modernism', in which he established an organic connection between architecture and relief design. As a Belgian pioneer in architecture, Jos Van Driessche has established his place among the notable architects in his era.

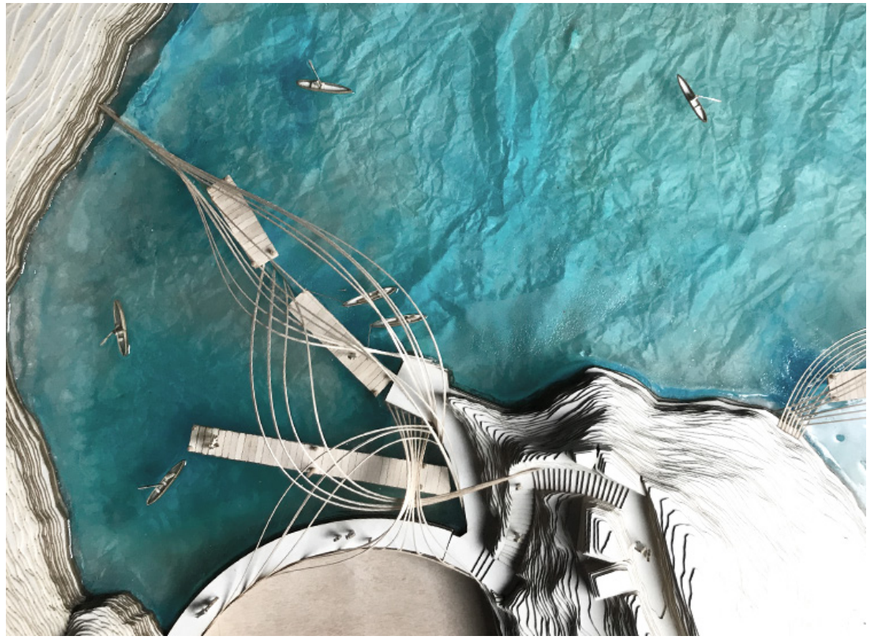
These studies aimed to understand the relation between the making (construction), material and detail, the meaning (context), culture, and tradition. Using this methodology is a way to preserve our history and to move forward in creating new architecture. The study continued with creating several iterations as an attempt to merge several congruent elements of those different houses together. I concluded the research and studies by showcasing transcription pieces of architecture throughout history in the form of a house, an effort to show the possibility of adopting the essence of vernacular architecture in a post-modern architecture setting.

ARCH 6308 - Shinohara Kazuo and Contemporary Arch in Japan - Study of Kazuo Shinohara's houses and influences
ARCH 7113 - Universum Carrousel Journey - Movement 1 case studies and Movement 2 transcription

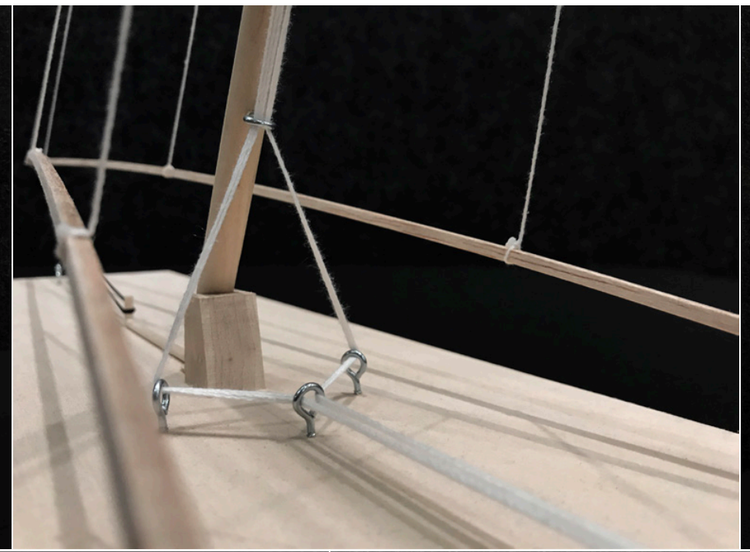
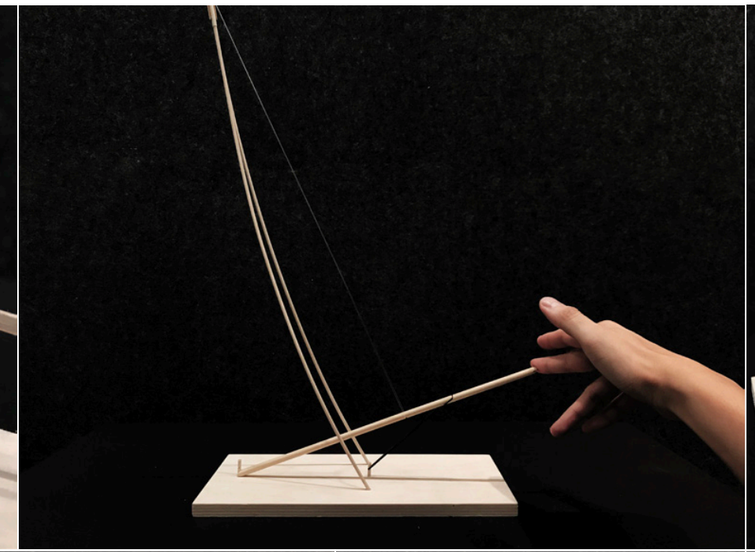
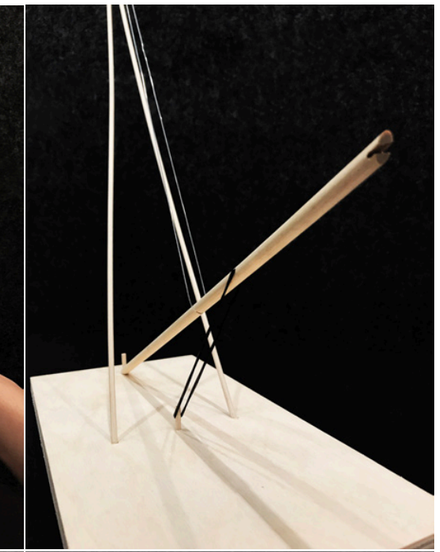
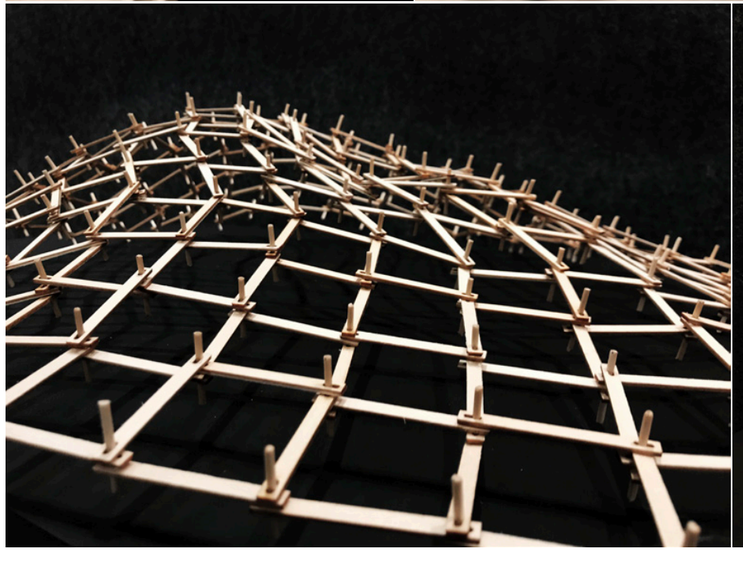
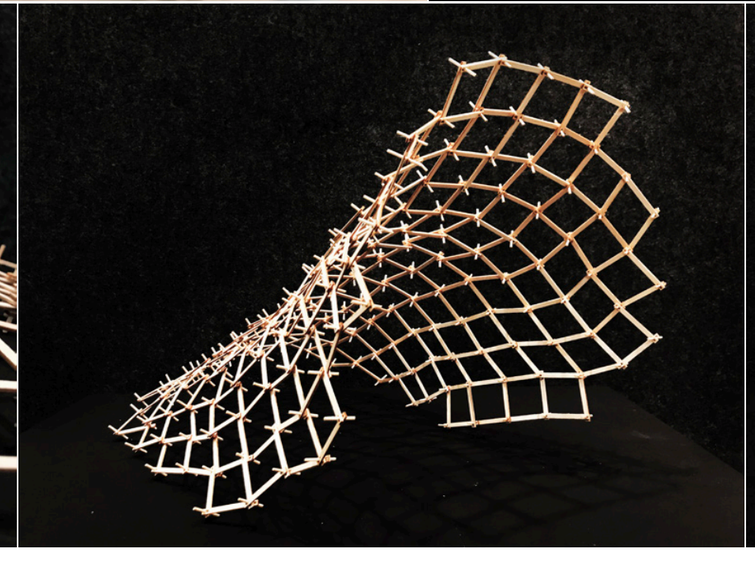
It is very unfortunate that vernacular architecture tends to be overlooked in the era of globalization, where most architecture are bound by money and power as sole inspiration. Nowadays, we often see stylistic elements of design intentionally incorporated for aesthetic purposes which go beyond a building's functional requirements. On one hand, it allows architects to create astonishing, extravagant, sculpture-like pieces of architecture. On the other hand however, the atmosphere, the sense of place, and the essence of architecture are often neglected, leading to the diminishing quality of our built environment. To end this phenomenon, I found it necessary to analyze the context, studying the cultural, social, and artistic influences of architecture pieces before going into the drawing board. We ought to let ourselves be inspired by architectural works in the past and carry on the concept of those pieces to the current. Vernacular architecture should be the key element to our progression in this post-modern era. Hence, it is up to the new generation of architects to question the status quo.

ARCH 7712 - Rational Form Making
Instructor : Angela Pang
Work Type : Individual
Fall 2019

Exterior Render
Digital media: V-ray raw render, Photoshop



Physical Model (20” x 24” x 8”)
Media: 1/16” matboard, 1/16” balsa, 1/32” wood dowel, resin

Media: wood plank, 1/8” & 1/16” Balsa, 1/16” Wood dowel, threads, hook nails

Case studies of different architectural projects
Sendai Mediatheque -
Mannheim Multihalle -
Millennium Dome -
Orleans Bridge -

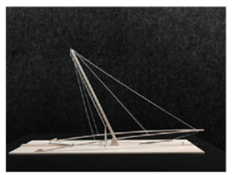
RATIONAL FORM MAKING
#STRUCTURAL RATIONALISM

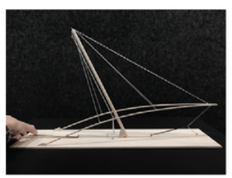
Typology: Pavilion
Location: Lake Treman / Ithaca / NY
Instructor: Angela Pang
Work Type: Independent Study
Team: Individual

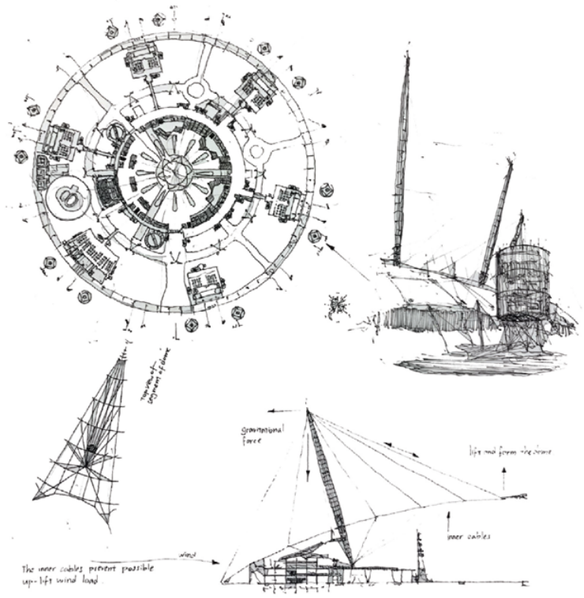
Fall 2019

In pursuit of freedom in aesthetics, the disciplines of architecture and structural design have always worked hand in hand in expanding new possibilities of form finding and space making. Rationality is at the heart of modernism's approach and can be traced back to trajectories in structural design. The first is the gradual reduction of mass, as exemplified in the Domino House and the Miesian language. The other is the transition from clear Euclidian geometries in spatial strucutres (such as the Pantheon) to a return of naturalism and free forms.

Optimization precedes superfluous forms. This project highlights the collaboration between architects and structural designers in exploring new possibilities of form finding. The dominant value in this collaborative relationship has been that of structural rationalism, as expounded upon by the work of Brunelleschi and Viollet-le-Duc. The goals are to (I) explore the possibilities of close integration between strucutral concept and architectural design, contrary to the conventional practice of a linear progress from archtiect's imagery to structural engineer's implementation and to (II) discover the differences between geometry-based form making versus strucutrally-based rational form finding. Structure is not only a problem solving process but a key to new possibility in design.



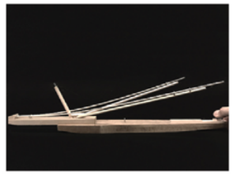


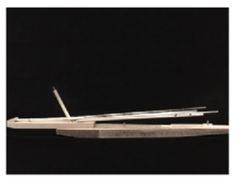


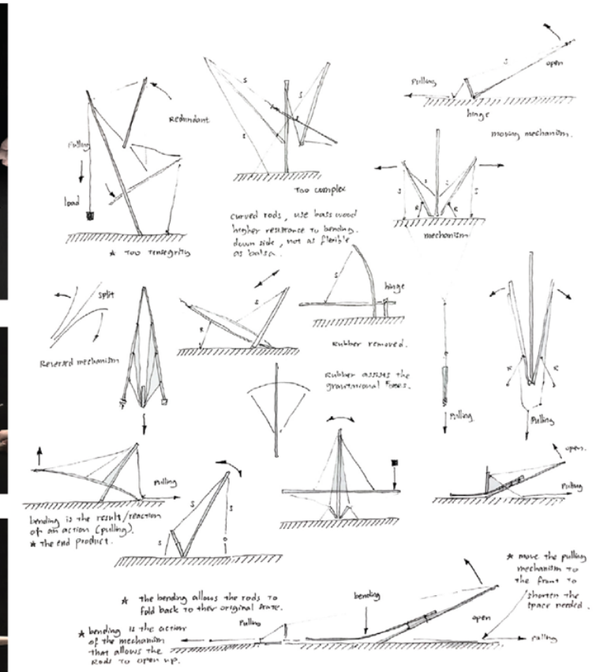
MILLENNIUM DOME

Part I - Research of major paradigms of form / structure with both historical and more recent precedents. Four case studies were selected as the basis of the project, Sendai Mediatheque, Mannheim Multihalle, Millennium Dome, and Orleans Bridge. The case studies were later focused into two, (1) ***Millennium Dome*** and (2) Orleans Bridge, due to their unique correlation, identical, but distinct quality in term of concept and structural logic.

Millennium Dome (1999), designed by architect Sir Richard Rogers, consists of 12 (300 ft) inclined steel masts tied to the center ring with steel cables attached to 12 pulling mechanisms. The teflon-coated membrane of the dome creates an interior floor area of more than 861,000 square feet, a considerably light weight structure to the volume it made. Key notes: (1) Each pair of pillars create a counter gravitational force to lift and form the dome. (2) The membrane is attached with steel cables from above and below to prevent possible up-lift wind load.



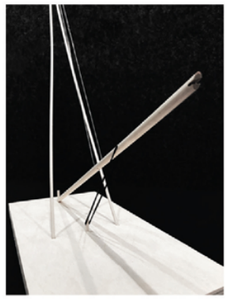


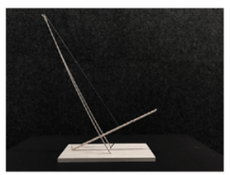


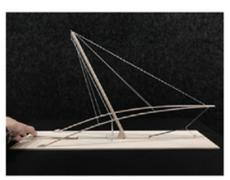
DECONSTRUCT / MILLENNIUM DOME

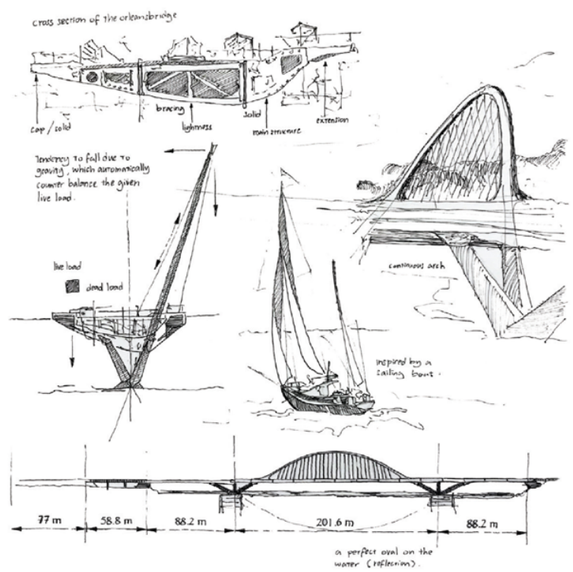
Part II - An experimental workshop, where a series of experiments through scale models to test the structural concepts were conducted. In the case of ***Millennium Dome****, I experimented on the impact of mechanism and movement in relation to form finding (kinetic). In contrast, the conducted experiment on Orleans Bridge is about tension-compression relation to maintain a respective form (static).*

Inspired by the kinetic movement of Millennium Dome's study model, I figured a new approach of an action-reaction mechanism. In the previous study model, the bending is caused by six strings pulling the two wooden rods in varied tension levels on 3 different segments (bending = reaction). In this experimental model, the bending is causing a chain reaction which allows two rigid rods to span and return (bending = action). Through this study, a reversed mechanism was discovered.





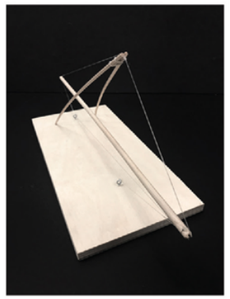


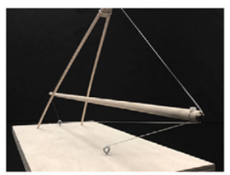


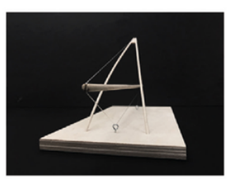
ORLEANS BRIDGE

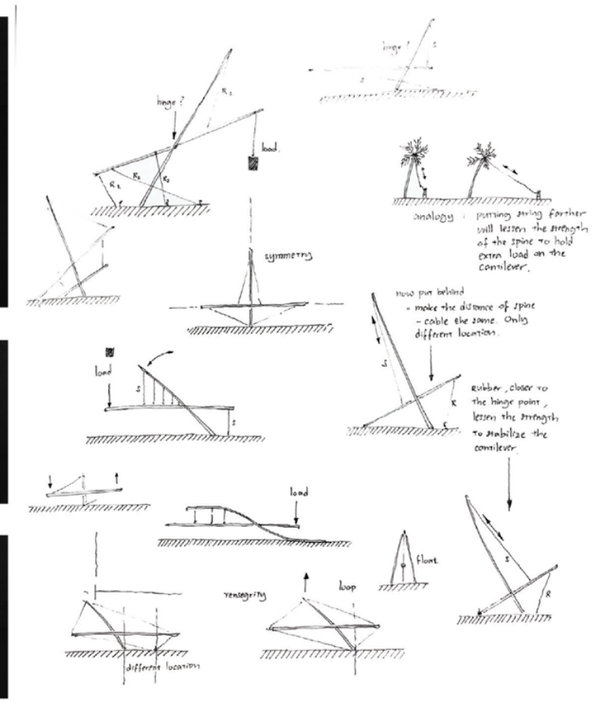
Part I - Research of major paradigms of form / structure with both historical and more recent precedents. Four case studies were selected as the basis of the project, Sendai Mediatheque, Mannheim Multihalle, Millennium Dome, and Orleans Bridge. The case studies were later focused into two, (1) Millennium Dome and (2) ***Orleans Bridge****, due to their unique correlation, identical, but distinct quality in term of concept and structural logic.*

Orleans Bridge (2000), designed by architect Santiago Calatrava, is an inclined (680) arch bridge over the river Loire. Two concrete tripods of three inclined branches support the central arch span. The optimal use of support helps one observe a perfect oval on the water. The deck is assymmetrical and curved from the bottom, representing a ship's hull, while the arch representing the mast of the boat. Two series of 28 cables in a reversed V-form suspend the bridge. The hangers stabilize arch and distribute the force created by the inclination, on the deck.



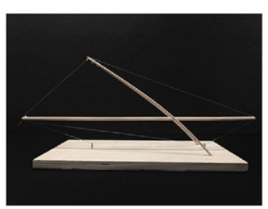




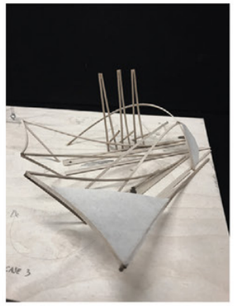


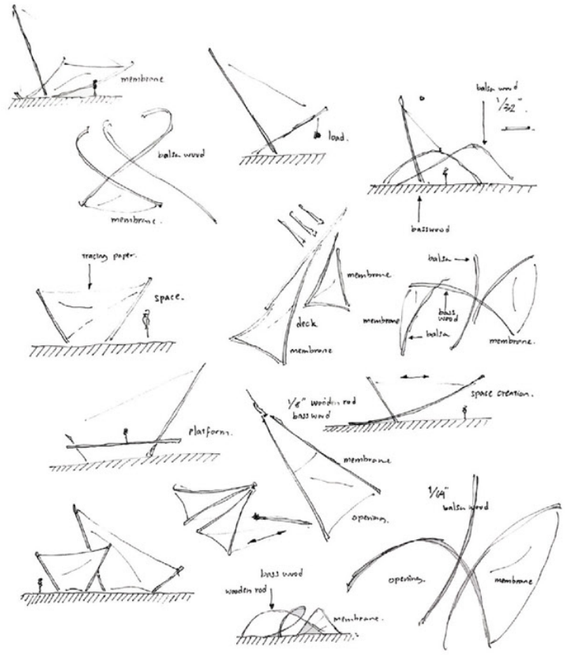
DECONSTRUCT / ORLEANS BRIDGE

Part II - An experimental workshop, where a series of experiments through scale models to test the structural concepts were conducted. In the case of Millennium Dome, I experimented on the impact of mechanism and movement in relation to form finding (kinetic). In contrast, the conducted experiment on **Orleans Bridge** *is about tension-compression relation to maintain a respective form (static).*



Derived from the Orleans Bridge's study model, this experimental model aims to use minimal contact to the ground while utilizing tension and compression to hold certain object, in this case a 6/32" wooden rod. The bending creates a vertical force, allowing the string to lock the 6/32" wooden rod in place. The result is a simplistic structure of floating compression / tensegrity.



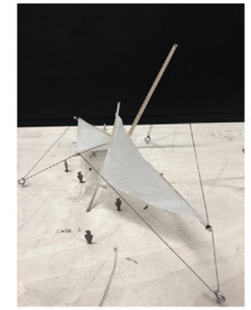


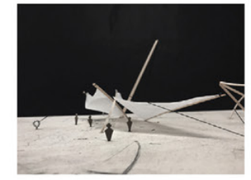
BENDING + SCALE

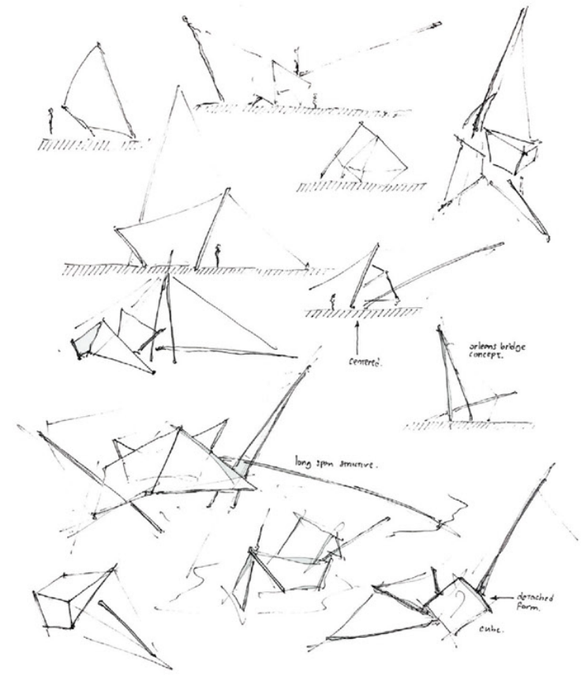
Part III - caps the studio with a design charrette that bases on the work between research information and empirical knowledge. Some more key factors were added into consideration such as scale, proportion, and spaces into the schematic design based on the experimental studies conducted.

Iteration I

Based on previous study models, two new factors were added into consideration (curve and scale). Through this iteration I discovered three things, (1) knowing the bending limit of different wooden rods, (2) experimenting on breaking the symmetry of tension-compression structure, and (3) attempting a space creation through an amalgamation of curved rods.





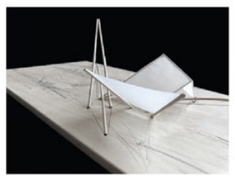


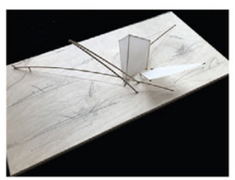
MEMBRANE + UNITY

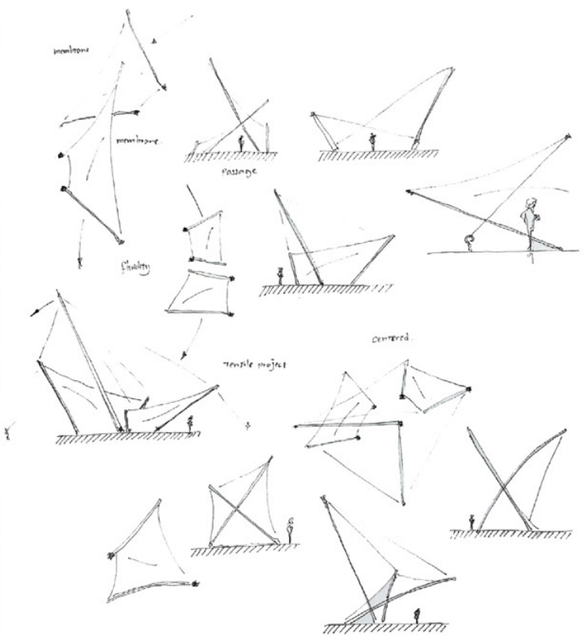
Part III - caps the studio with a design charrette that bases on the work between research information and empirical knowledge. Some more key factors were added into consideration such as scale, proportion, and spaces into the schematic design based on the experimental studies conducted.

Iteration II

In the second iteration, I was experimenting on unifying two separated structure and further breaking the symmetry of a generic tension-compression structure. Another new element was added in this iteration (membrane). The membrane helped defining spaces better and giving volume to the structure.





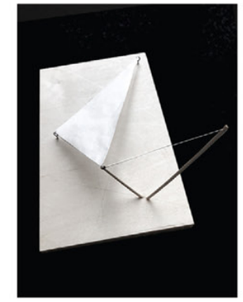


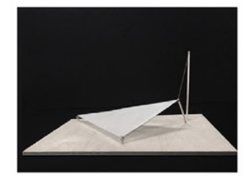
SCENARIO + DETACHMENT

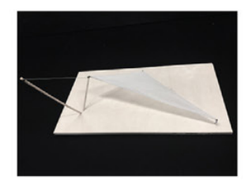
Part III - caps the studio with a design charrette that bases on the work between research information and empirical knowledge. Some more key factors were added into consideration such as scale, proportion, and spaces into the schematic design based on the experimental studies conducted.

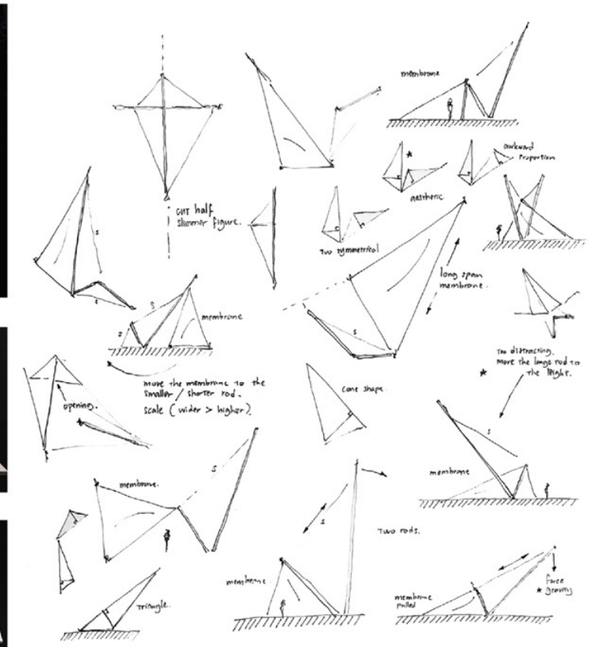
Iteration III

In the third iteration, I was experimenting on giving the structure a scenario (site specific). The goal is to use minimal supports from the ground to create a space, as it would be located near a lake. The spaces in this iteration are concentrated at the center. An experiment on creating a detached form was also conducted.







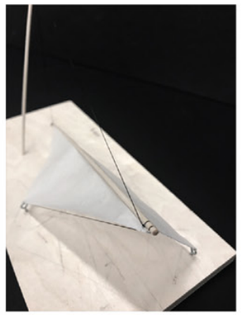


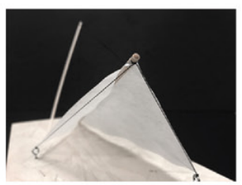
LONG SPAN + EXTENSION

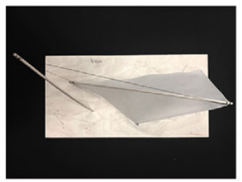
Part III - caps the studio with a design charrette that bases on the work between research information and empirical knowledge. Some more key factors were added into consideration such as scale, proportion, and spaces into the schematic design based on the experimental studies conducted.

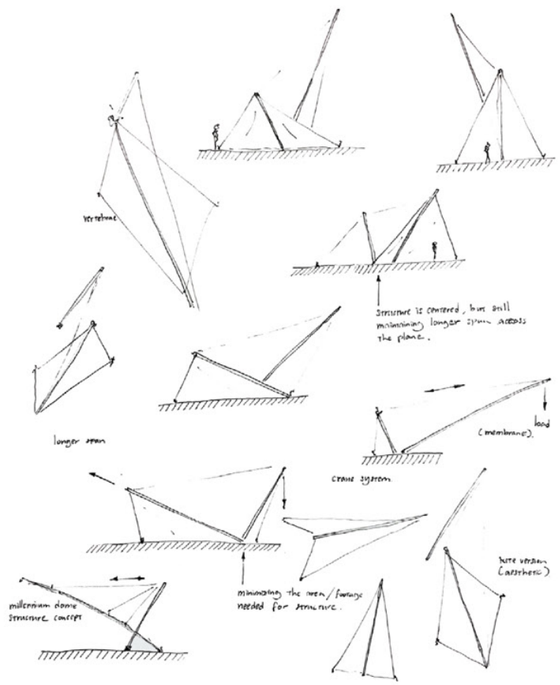
Iteration IV

This iteration is a revision of a part of iteration III. I decided to remove the detached form and went along with a clearer structural logic. Still following the same concept, the structure is only supported at corners (long span structure) and only using minimal components, giving a lightweight appearance.



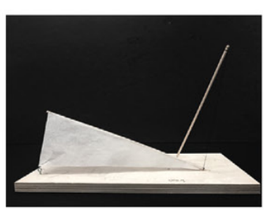






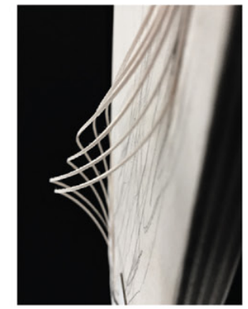
LONG SPAN + SPINE

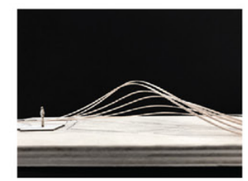
Part III - caps the studio with a design charrette that bases on the work between research information and empirical knowledge. Some more key factors were added into consideration such as scale, proportion, and spaces into the schematic design based on the experimental studies conducted.

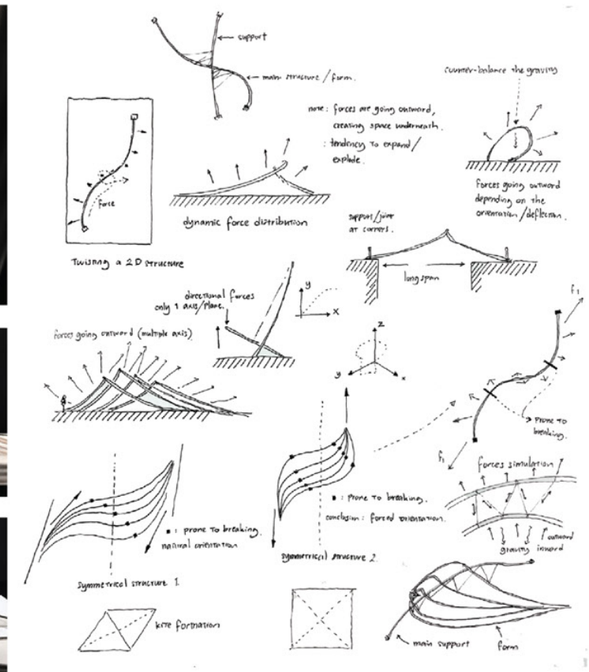


Iteration V

This iteration is a development of iteration IV. The use of two wooden rods gives a more optimal (long span) and wider support compared to its previous iteration. Similar structural concept with the Millennium Dome, the vertical rod acts as a counter balance toward the leaning rod (resembling a vertebrae of the tent).

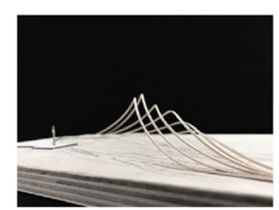






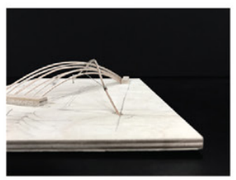
TWISTING + FREE STANDING

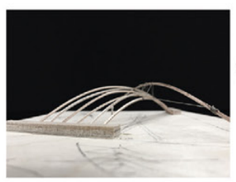
Part III - caps the studio with a design charrette that bases on the work between research information and empirical knowledge. Some more key factors were added into consideration such as scale, proportion, and spaces into the schematic design based on the experimental studies conducted.

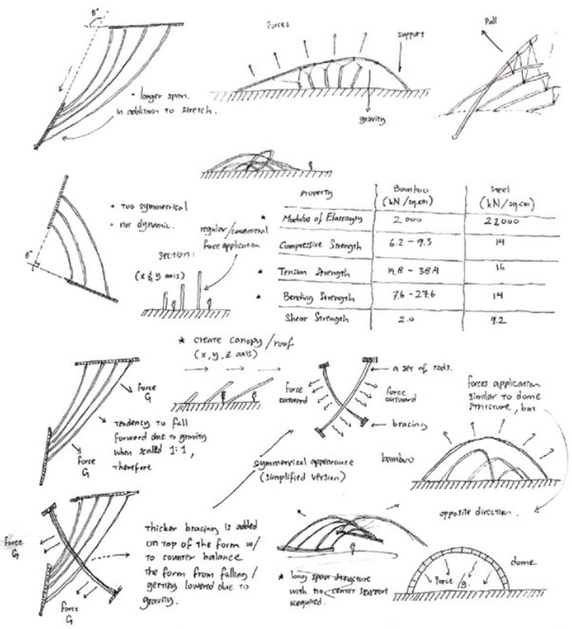


Iteration VI

Exploration on tension-compression from 2D to 3D. A new factor was added into consideration (deflection). Through this iteration I discovered that a gesture as simple as twisting a wooden rod would create a free-standing (tension-compression) structure. This iteration would result in a more dynamic design posibilities. Although free-standing, supports are still necessary near the point of max. deflection to avoid breaking.

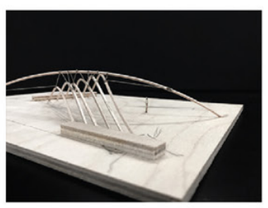






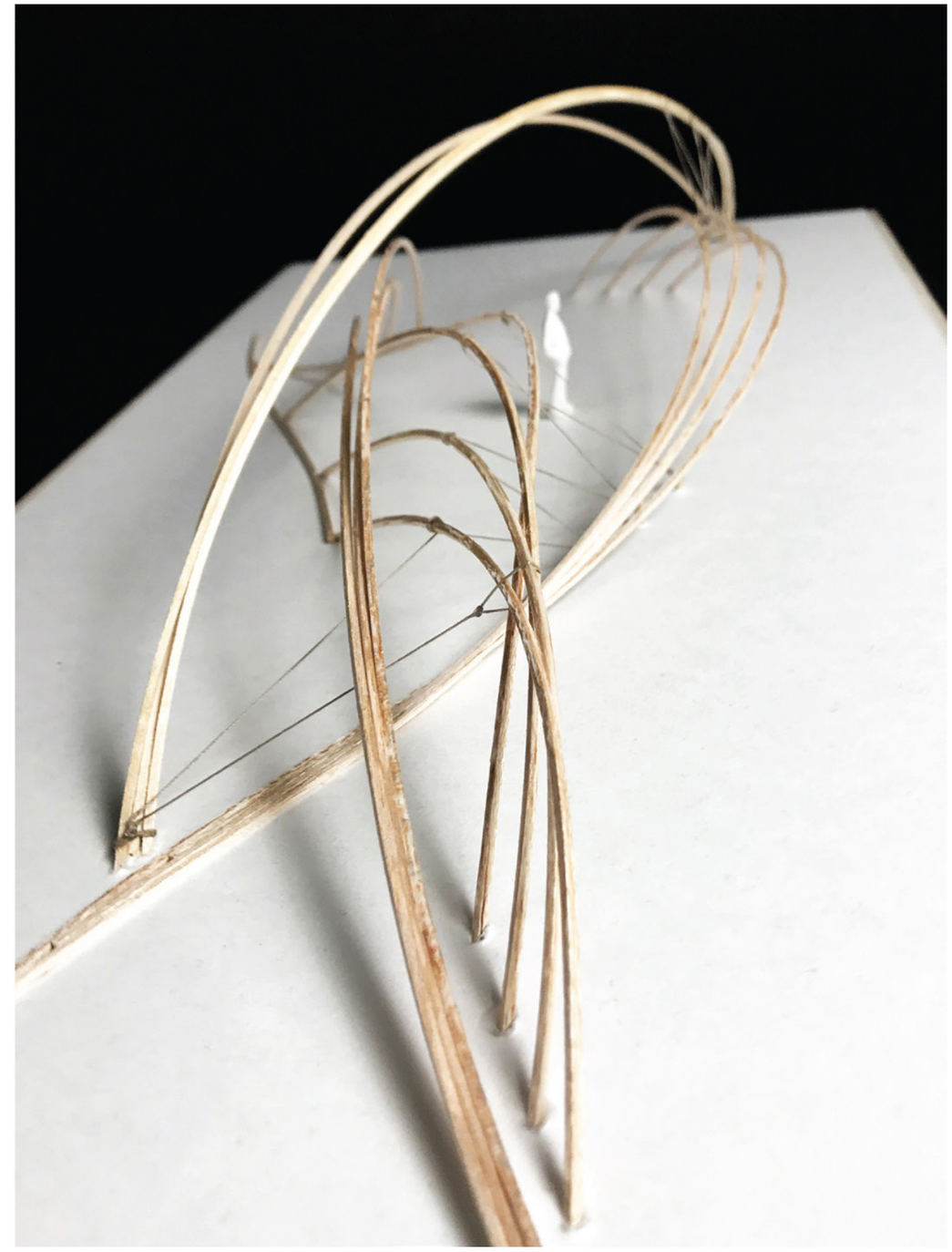
PAVILION / CONCEPT

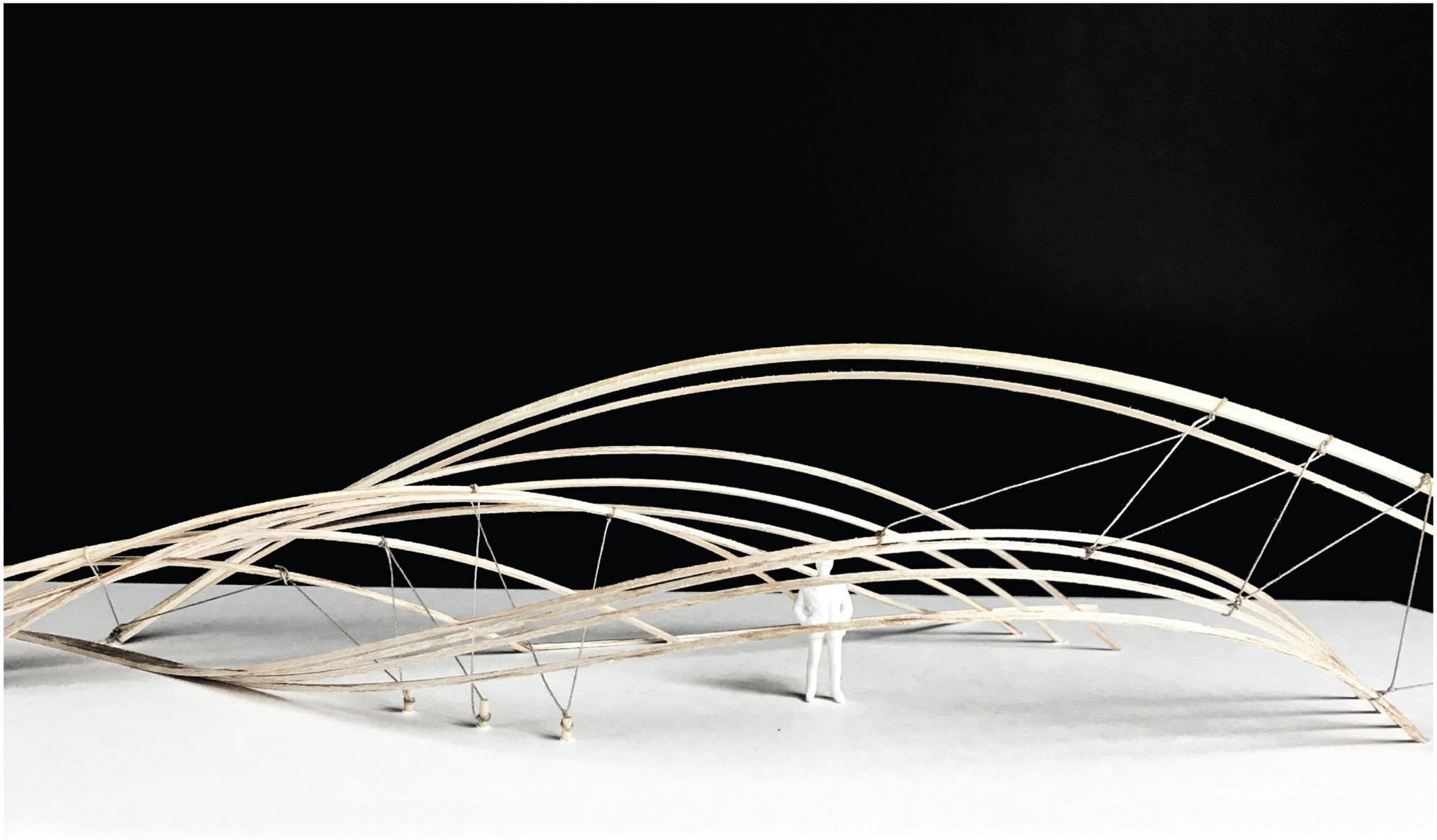
Emphasizing the importance of experimental explorations on new form finding, the final outcome of the studio is the creation of a pavilion, based on the thorough studies and experiments, in Lake Treman, Ithaca, NY.



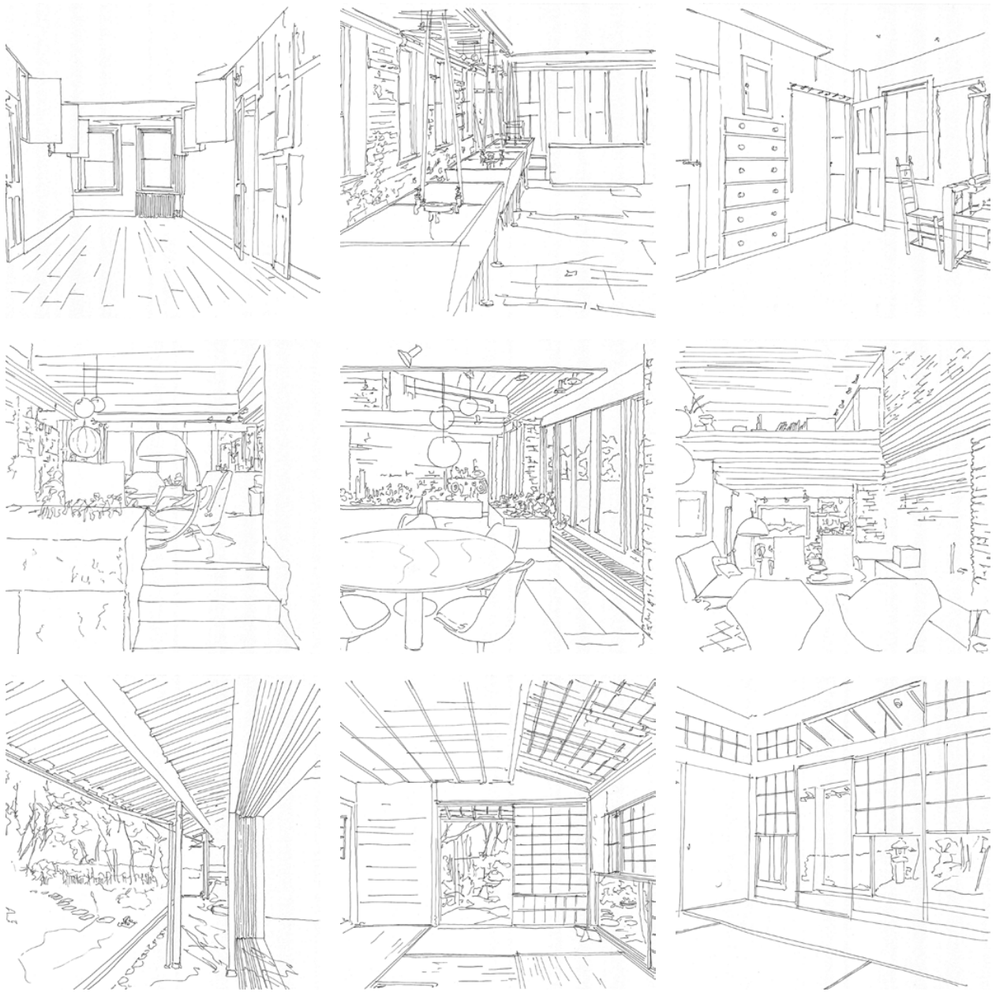
Concept & Details

A mock up model of the pavilion. To create a space, a set of wooden rods were twisted and bent to acquire the desired volume and span. To secure and brace the form, a larger wooden rod was added (perpendicular or adjacent, but never parallel) on top of the set and fixed with strings. A great material option for the pavilion is Guadua Bamboo, due to its high tension/bending strength and its relatively low modulus of elasticity.



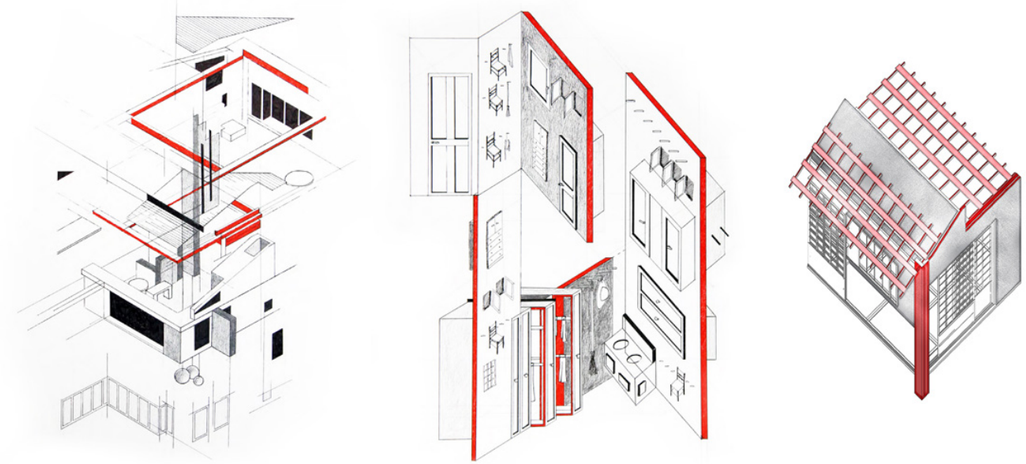


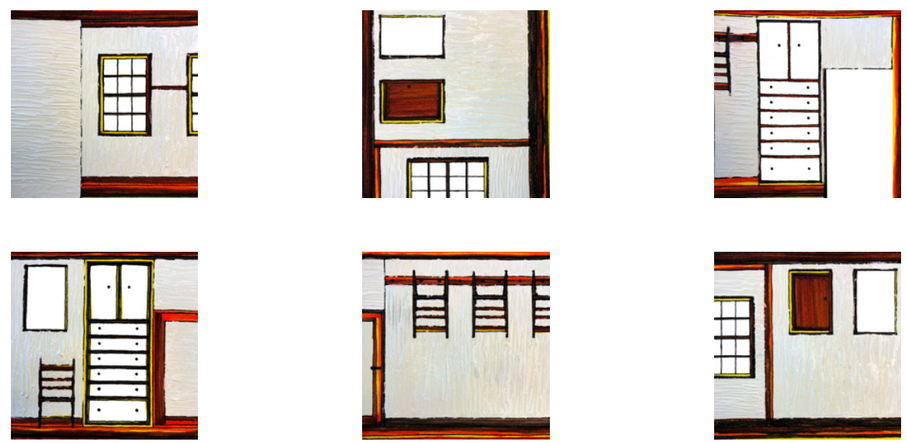
ARCH 7113 - Universum Carrousel Journey
Instructor : Kana Arioka, Jan de Vylder
Work Type : First half, Group of two (In collaboration with Mitchie Qiao) (research)
: Second half, Individual (Project)
Spring 2020



Case studies of different architectural projects
- The Shaker House
- Van Driessche House
- Inomata-tei

Media:
Micron pen
Strathmore paper





Case studies of different architectural projects
- The Shaker House
- Van Driessche House
- Inomata-tei

Media:
Micron pen
Acrylic paint
Strathmore paper

Case studies of different architectural projects
- The Shaker House
- Van Driessche House
- Inomata-tei

Media:
1/16” matboard
1/16” & 1/8” balsa
plaster

Case studies of different architectural projects
- The Shaker House
- Van Driessche House
- Inomata-tei

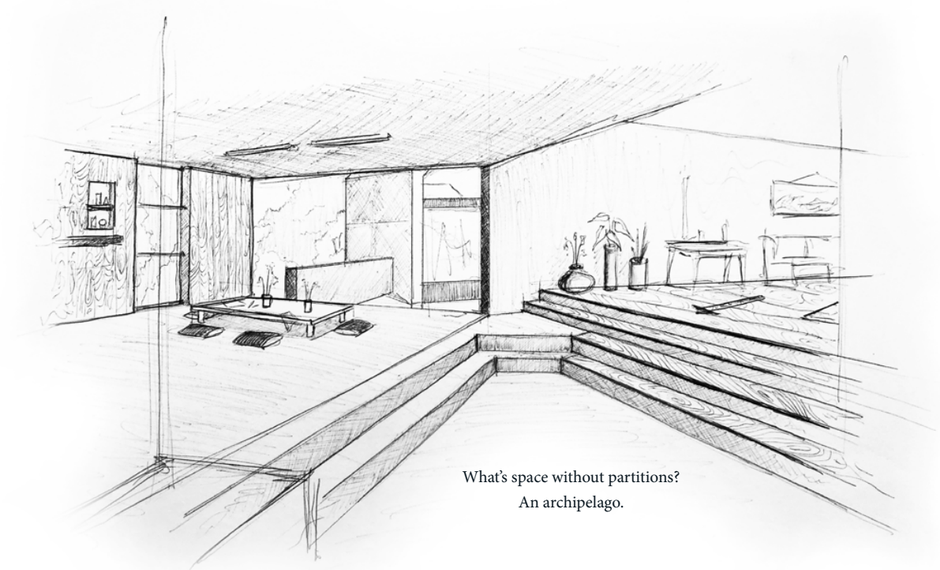
Media:
1/16” matboard
1/16” & 1/8” balsa
plaster

As I ascend up the stair, toward the small aperture at the corner, I can already hear distant voices of excitement; the sound of wind and rustling leaves, birds chirping, passerby walking, the steady burble of water fountains. The landscape stares at me in the face and diminishes into the horizon.

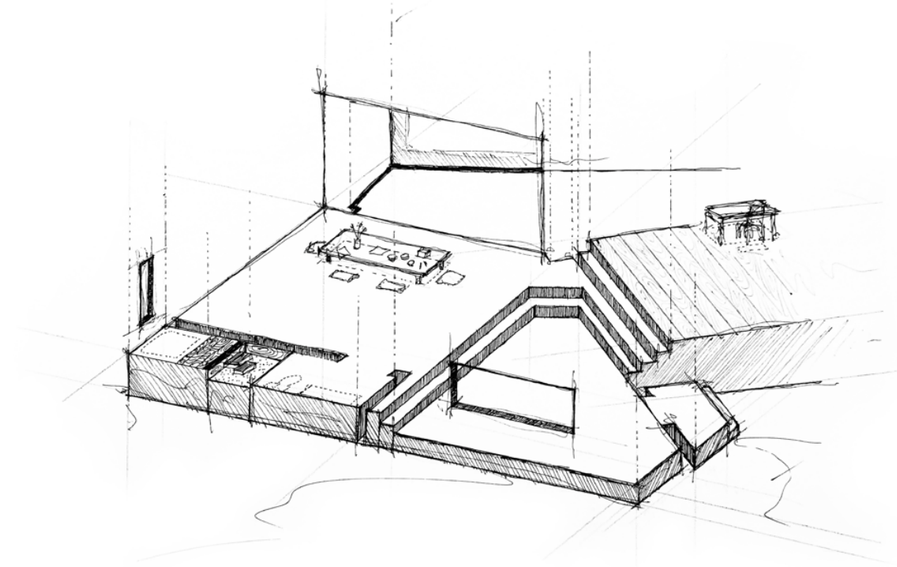
"I always dreamed of having a window with a view. The window asks for a view don't you think? A view of zen, a serene landscape, complete with oasis of plants, flowers, and trees. Who wouldn't dream of such panorama in the midst of this chaotic world."

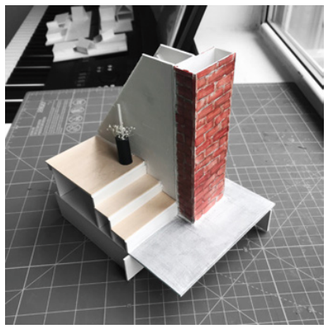
Here is a place I called home.

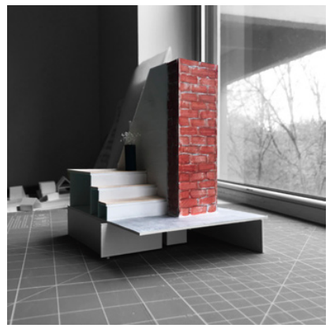
成城
Setagaya City, Tokyo 157-0066
Japan



What's space without partitions?
An archipelago.





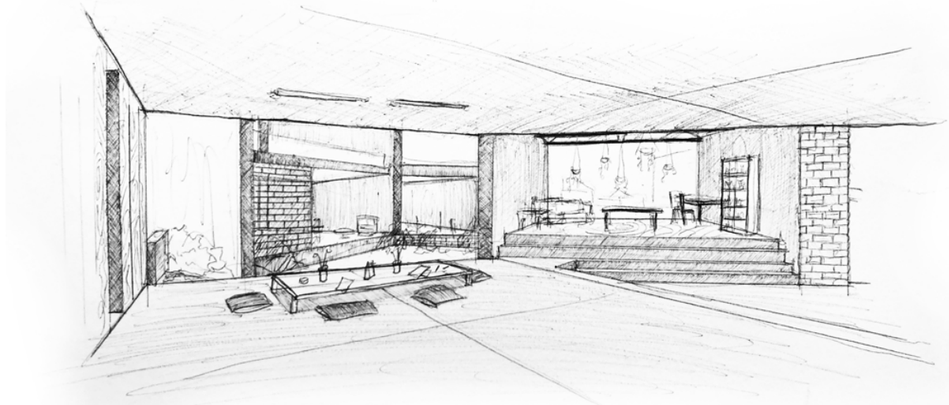


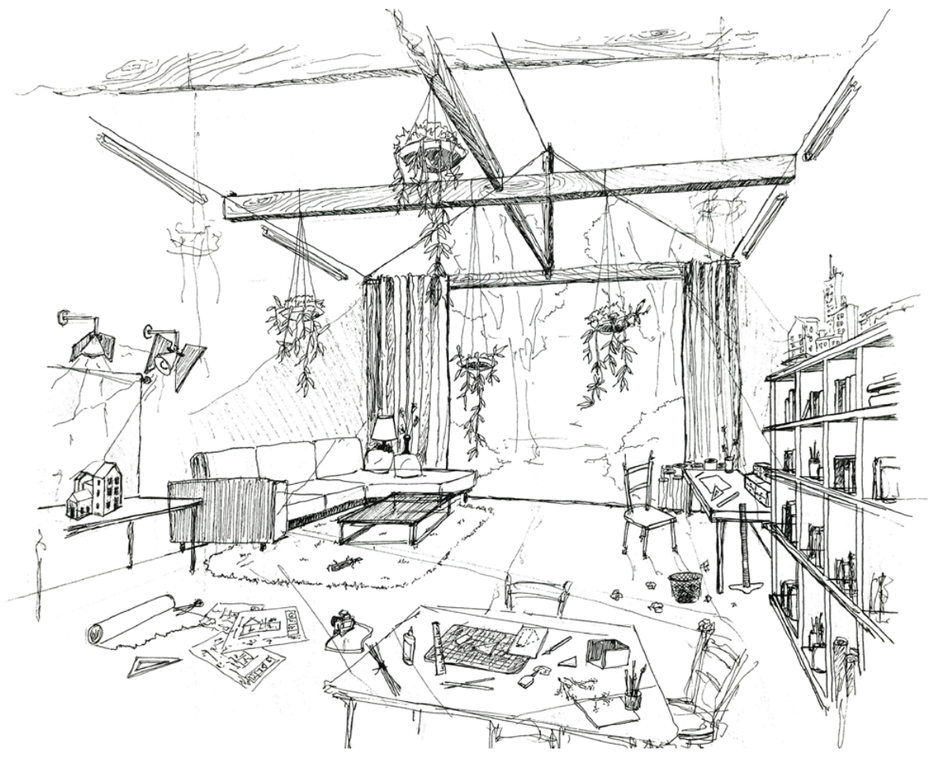
There is magic in its fragrance
There is solace in its taste
And the laden moments vanish
Somehow into space

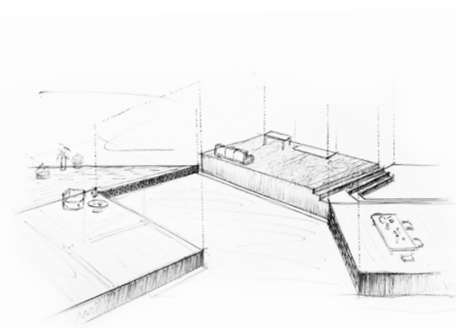
The world becomes a lovely thing
There's beauty as you'll see
All thanks to a sip of tea.

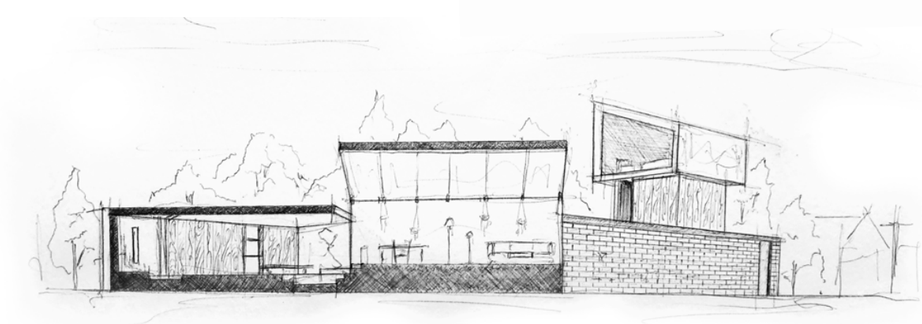
A place I find comfortable and adore
But I have no clue if I still have a floor
To the left of me are stacks of books
To the right, maquettes galore
A mountain of scraps lies in the corner
Under the hanging vines and bonsai

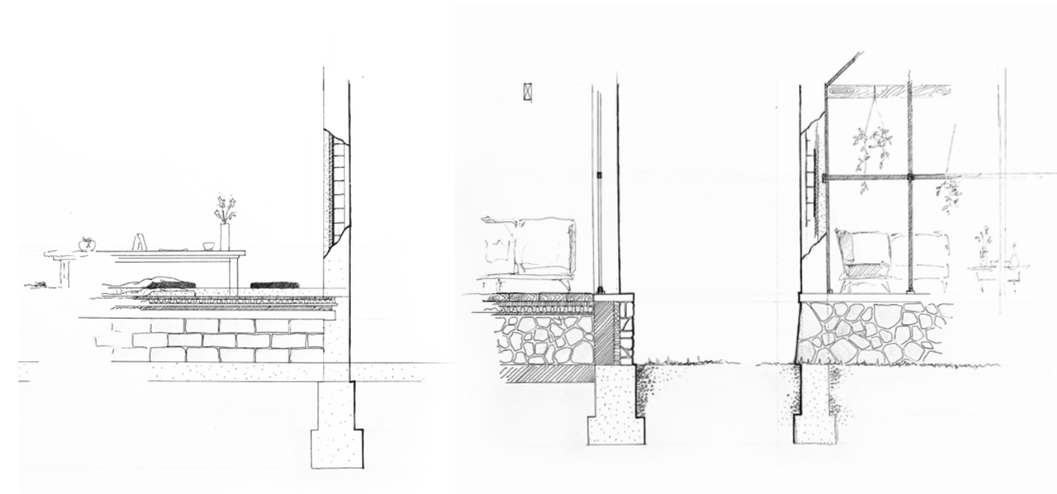
Perhaps with enough time, a week or two
I might someday find
Beneath that pile of paper rolls and debris
That trusty key of mine.

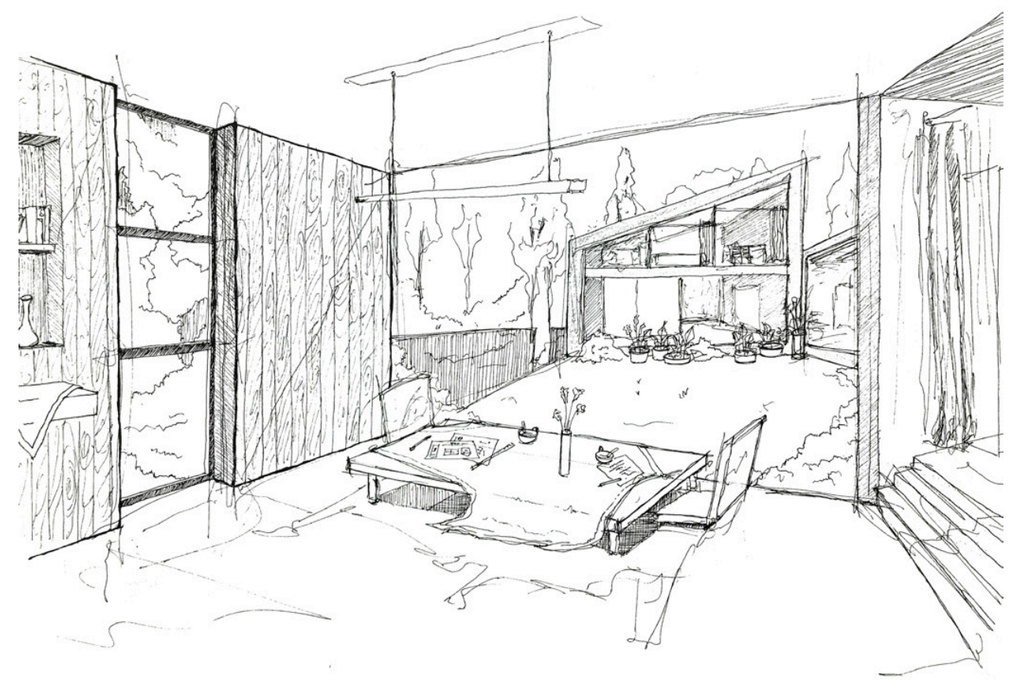


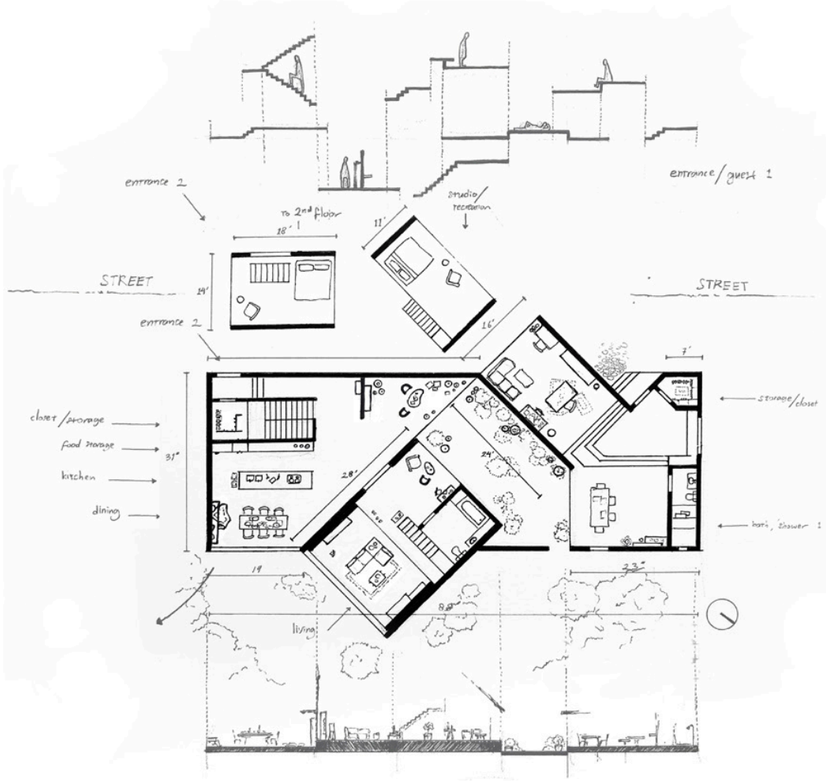


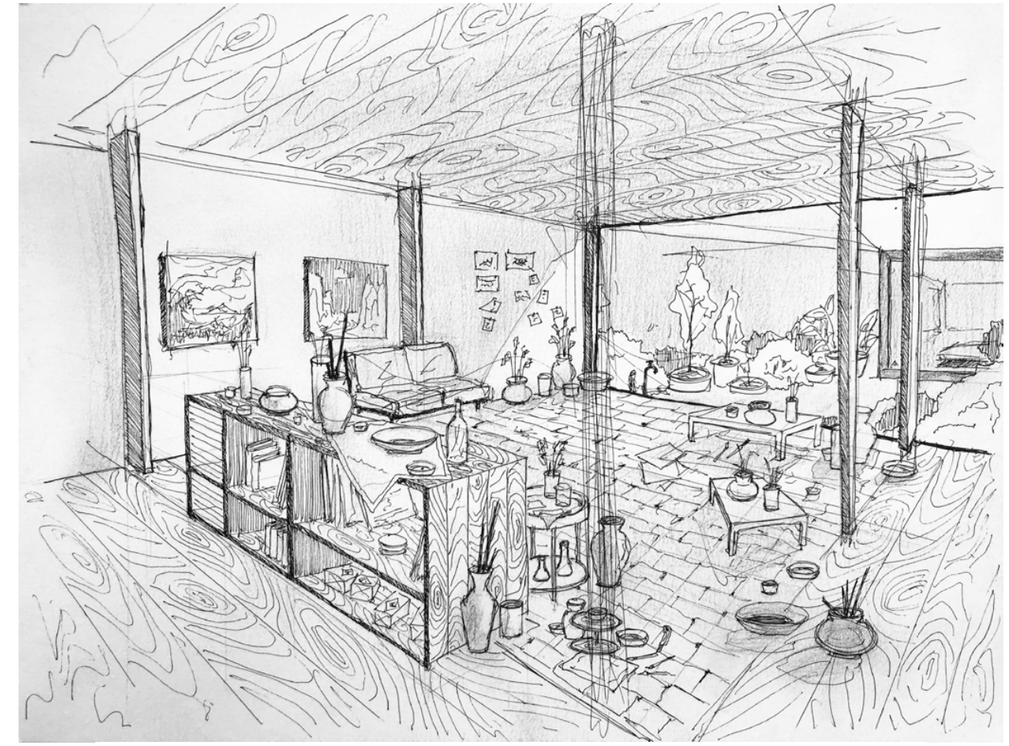


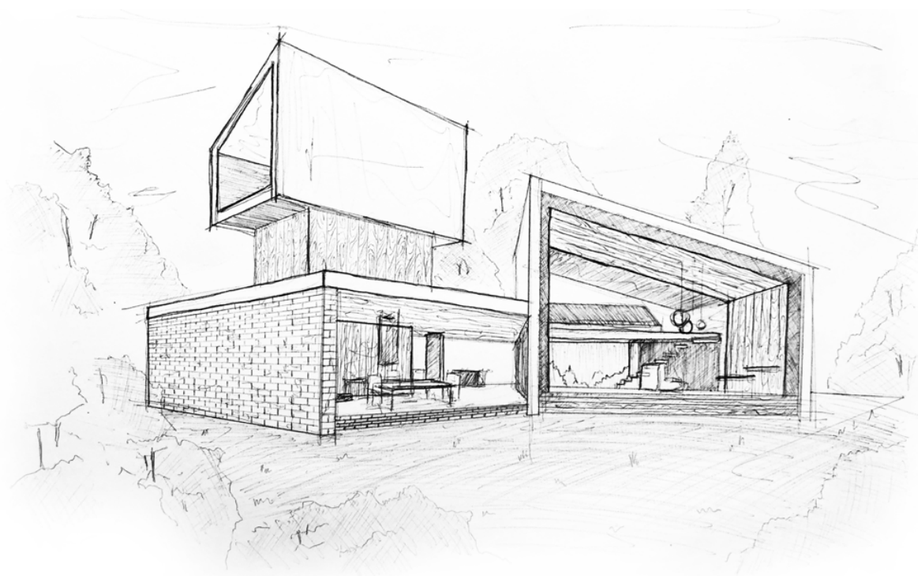


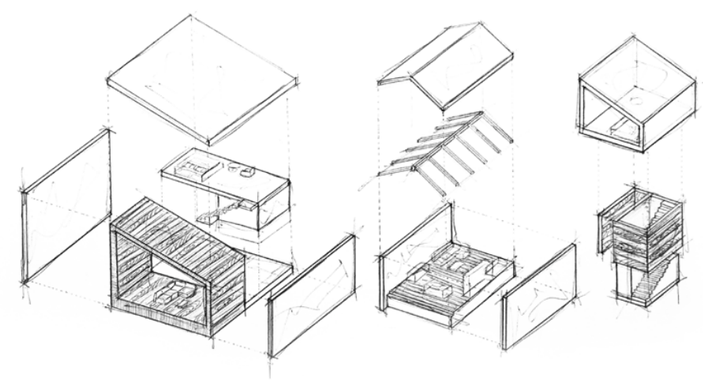


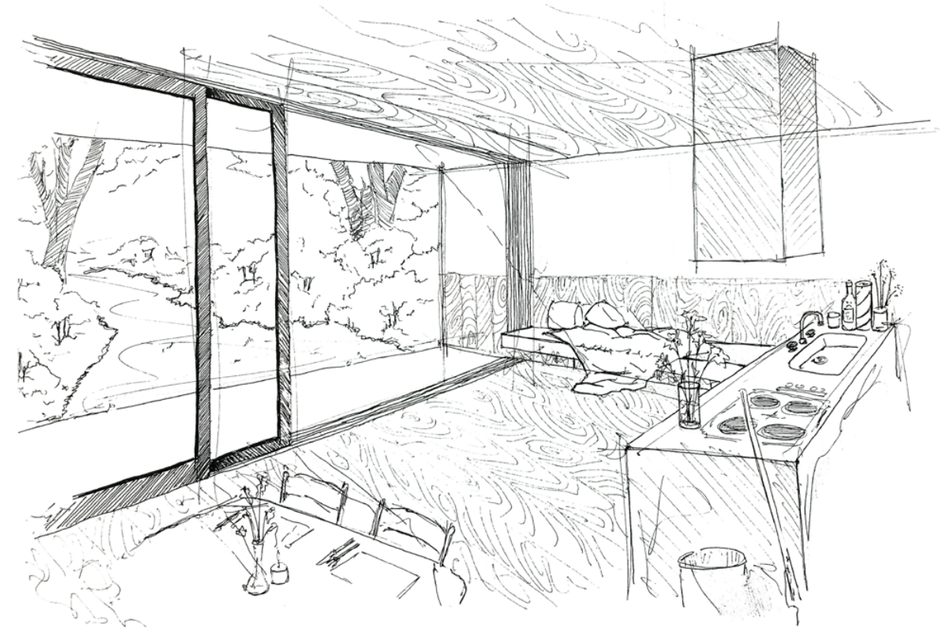


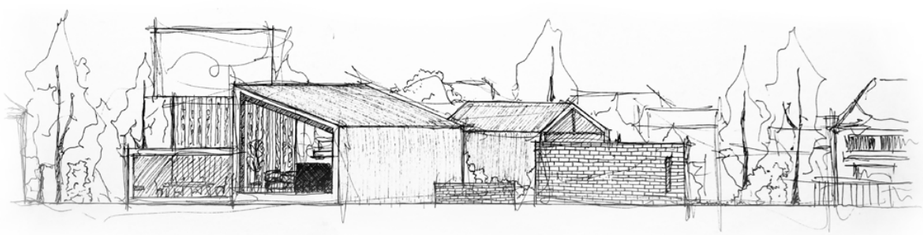

entrance 2
to 2nd floor
studio/
recreation
entrance/guest 1
STREET
STREET
entrance 2
18'
11'
14'
16'
7'
closet/storage
food storage
kitchen
dining
31'
28'
24'
storage/closet
bath, shower 1
19
33'
8'
living

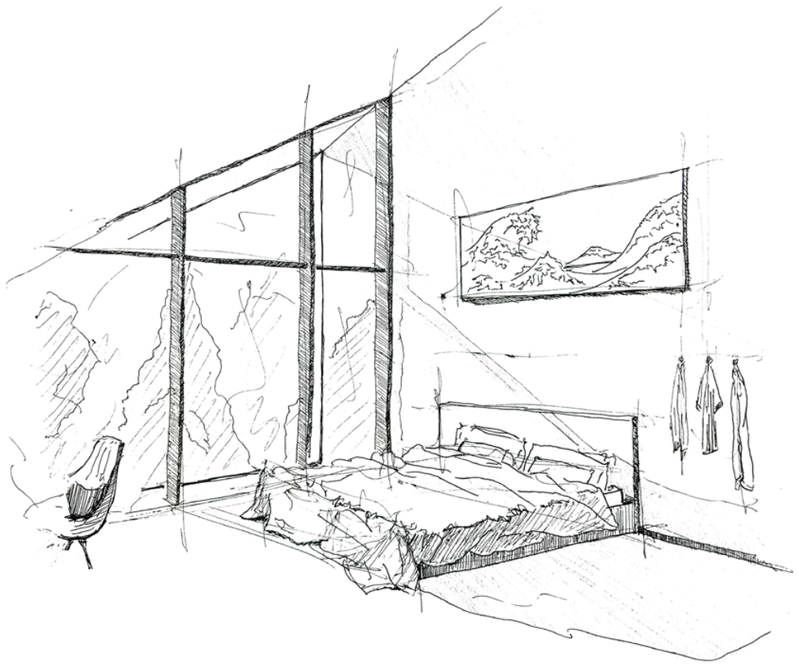


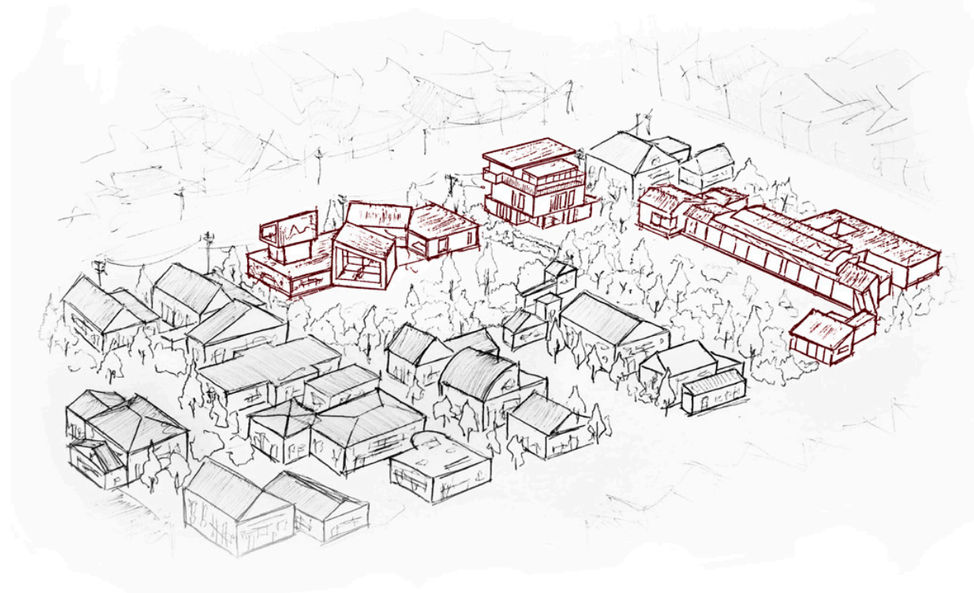


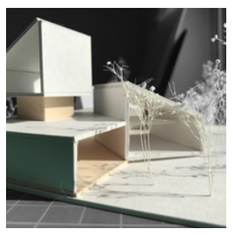


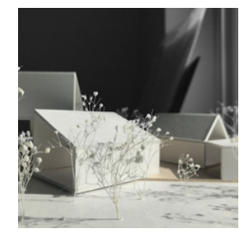




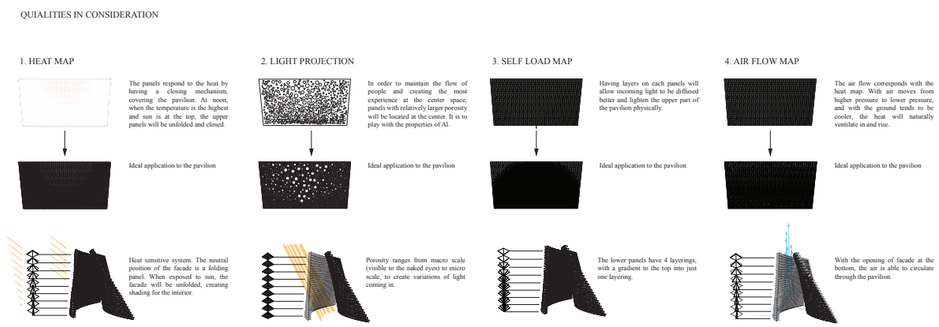


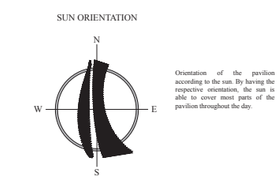


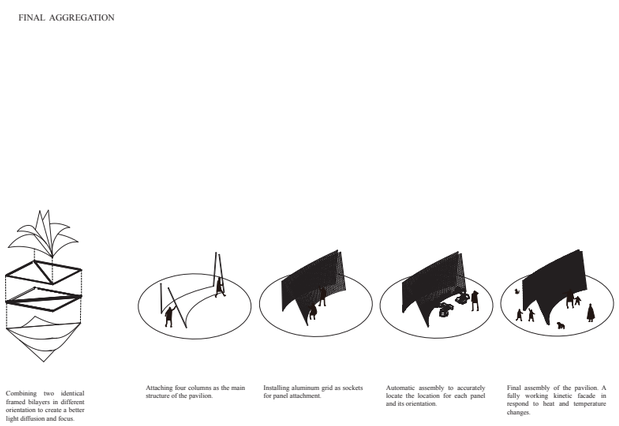




ARCH 7111 - Summer Studio, Territory of Investigations
Instructor : Laia Mogas-Soldevila, Jorge Duro-Royo
Work Type : Group of four (In collaboration with Zheng Yang, Xiao Qian, and Jingyan Ma)
Summer 2019







Material (aluminum) investigation and innovation

Fabrication Methods of Aluminum:

A. Material Preparation:
Storage
aluminum needs to be kept in a dry area to avoid water staining.

Cutting (circular saw / band saw / laser cutting)

Holing
Hole spacing and edge distances must not be made too small, so as to avoid premature tearing in joints loaded in shear. CNC router.

Forming
Using heat to bend and form aluminum.

Machining
Computer-controlled milling machine. Often to create structural component.

B. Mechanical Joints:
Bolting and screwing
close-fitting, in reamed holes, clear-ance.

Friction-grip bolting
connection for maximum rigiditynder shear loading. This method is using special high tensile steel bolts (HSFG) in clearance holes, being torqued up to a high tension so the service loading is carried entirely by friction.

Riveting (out of date)
Should not be used in situations where they have to carry tensile loading.

C. Arc Welding: (has achieved complete acceptance as a method for joining aluminum)
works by utilizing the flow of inert gas from the welding torch which shields the arc and weld-pool from the air and so prevents oxidation. need to pay attention in the Heat Affected Zone. (HAZ)

MIG (Meta Inert Gas)
widely employed, especially for heavier construction. It is a Direct Current (DC) process with electrode positive.

TIG (Tungsten Inert Gas)
mainly used for small welds in light gauge material, and to repair MIG welds. It is an Alternating Current (AC) process.

D. Friction Stir Welding:
The plates to be joined are butted together on top of a firm support bar, and are clamped so as not to move apart during welding.

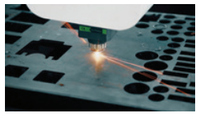
E. Adhesive Bonding:
As a connection technique for aluminium, adhesive bonding has features that often make it a valid alternative to bolting, riveting or welding. Adhesives used with aluminium are usually epoxy materials.

F. Protection and Finishing:
The reason for specifying a surface finish on aluminium is either protection against corrosion, or else appearance.

Anodizing
Anodizing is a process in which the thin oxide layer, always present on an aluminium surface, is artificially increased. The effect is to improve the corrosion resistance and also the appearance, as compared with mill finish.

Painting
Mass-produced components can be painted in the factory using powder coatings. For non-factory application, aluminium can be coated in the normal way using solvent-based paints.

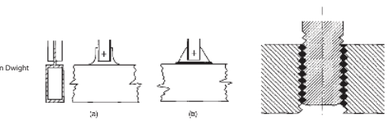
Aluminum Design and Construction, John Dwight



https://chinalaser.en.alibaba.com/product/60595346603-804411739/IPG_laser_source_500w_aluminum_fiber_laser_cutting_machine.html

https://www.youtube.com/watch?v=-DJDWlafCN8

Aluminum Design and Construction, John Dwight



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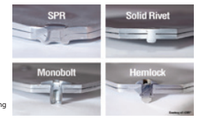

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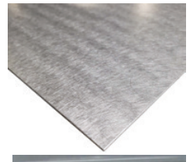

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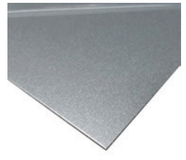

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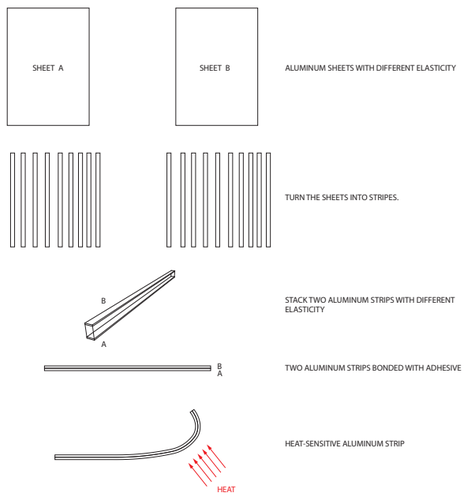
FABRICATION METHODS



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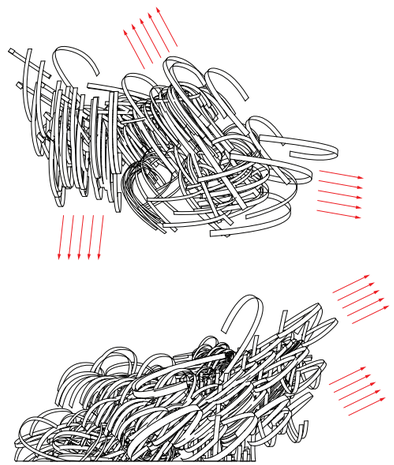

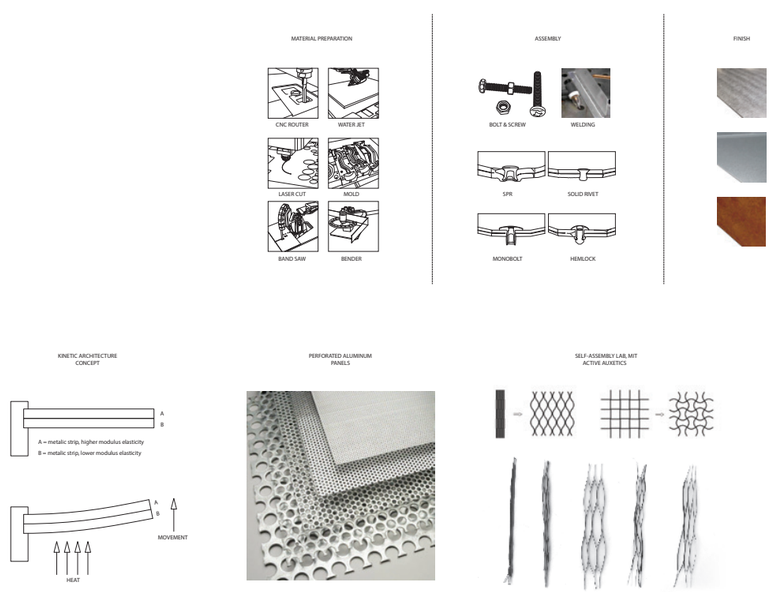

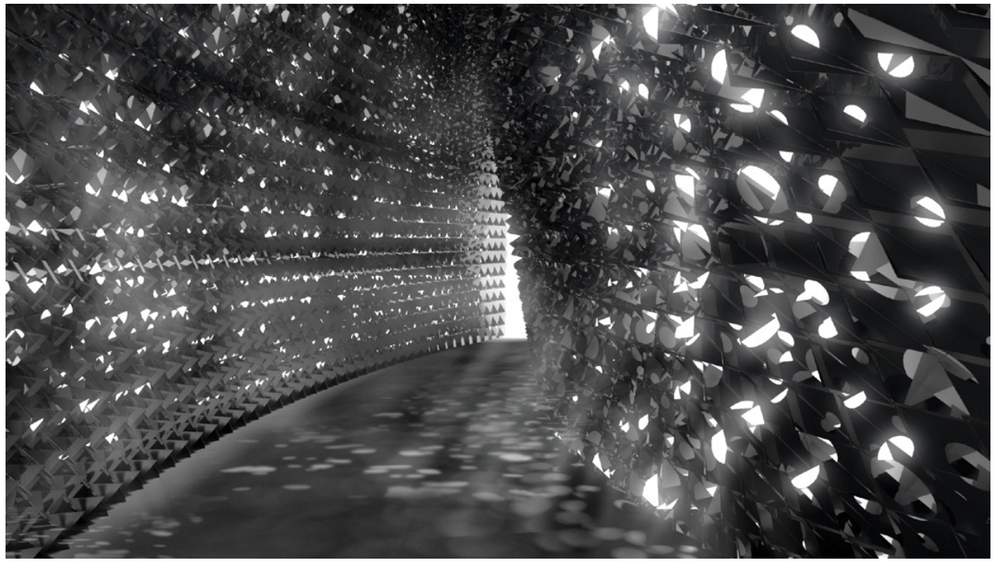

ARCH 6308 - Shinohara Kazuo and Contemporary Arch in Japan

Instructor : Angela Pang

Work Type : Individual (research paper)

Fall 2019

In this essay, we will be analyzing the work of two Japanese Architects, Kazunari Sakamoto and Yoshiharu Tsukamoto. Each of these figures began their career with empirical research into Japan's contemporary vernacular architecture and the typology of private house, followed by an instrumentalization of their findings in their own architectural designs. Looking at the history, I found unique correlation between these two architects (teacher and student). Yoshiharu Tsukamoto studied in the atelier of Kazunari Sakamoto, who himself was a student of Kazuo Shinohara. Shinohara (Japan's most celebrated postwar architect) in turn studied architecture with Kiyoshi Seike, who knew modern architecture directly from his own experience, traveling through Europe. Even though they have shared architecture knowledge and language under the tree-branch teaching of Kiyoshi Seike, both architects have developed their own interpretation of the kind of architecture and how it would fit in within the urban fabric of Cities in Japan. Kazunari Sakamoto was one of Shinohara's students who graduated from Tokyo Institute of Technology in 1966. After graduated, he later worked as shinohara's assistant and eventually joined the faculty of Tokyo Institute of Technology. Yoshiharu Tsukamoto is Kazunari Sakamoto's most famous student, who graduated in 1987 and became an associate professor at Tokyo Institute of Technology in 1994. Before becoming an associate professors, Yoshiharu Tsukamoto established Atelier Bow - Wow with Momoyo Kaijima (http://www.dnp.co.jp/artscape/eng/focus/0811_02.html).

https://www.urbpedia.org/beja/Kiyoshi_Seike
https://www.rencontres-arles.com/en/artistes/view/832/kazuo-shinohara
http://en.cafa.com.cn/intelligentsia-poetry-sakamotos-architecture-exhibiting-at-power-station-of-art-shanghai.html
https://www.itech.ac.jp/english/research/stories/faces25_tsukamoto.html

01

Throughout this essay, the first project we would be discussing is The Tower House (2006) by Atelier Bow-Wow (Yoshiharu Tsukamoto and Momoyo Kaijima), followed by a housing project by Kazunari Sakamoto, Kumoro - Nagareyama House (1973). Atelier Bow - Wow is renowned for their domestic and cultural architecture and theories, especially their work surrounding the concept of vernacular architecture and behaviorology. Thinking of architecture from the viewpoint of human behavior has always been Tsukamoto's vision and mission to create architecture. His interest derived from the teaching of Kazunari Sakamoto when he was studying at the Tokyo Institute of Technology. Yoshiharu Tsukamoto studied at Kazunari Sakamoto Laboratory where they researched about "architecture and ecology". Under the supervision of Kazunari Sakamoto, Yoshiharu Tsukamoto evaluated architecture in relation to its surrounding environment and activities that happened around it instead of objectifying the kind of architecture itself. Looking at architecture through these lens is a great way to increase our awareness toward global environmental issues. Throughout the research, extensive studies, and lectures from environmental engineerings, Yoshiharu Tsukamoto was able to acknowledge the difference between environmental engineers and architects in terms of approaches and points of view on Ecology, Which later got him interested in developing and establishing his own theory on "architecture as ecology" (https://madoken.jp/en/interviews/4959/).

The House Tower (2006) by Atelier Bow-Wow (Yoshiharu Tsukamoto and Momoyo Kaijima) is one fascinating project. The project was a response and an outcome of a concern about urban spaces in Tokyo that have been disregarded and considered irrelevant. Tsukamoto defines it as "pet architecture". To understand more about Yoshiharu Tsukamoto's work, we should first look into one of his notable books "Made in Tokyo". Through the book, Yoshiharu Tsukamoto expressed his thoughts and discoveries of Tokyo's efficiency as a city. He would call it efficient because the way Tokyo works as a city fabric is determined by its inhabitants' own behaviors. This means that the city undergoes constant changes

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throughout history. With the city struck by the devastating 1923 earthquake and severely damaged by 1945 World War, constant reconstruction and growth were so much limited by the inhabitants' living conditions at the respective time. These struggles within limitations and constraints over time has achieved a certain quality of avant - garde construction and creation in architecture. In relation to Yoshiharu Tsukamoto's practice through Atelier Bow - Wow, a design project should address efficiency and the optimization of a given condition.

Furthermore, through his book "Pet Architecture" and fascination for micro-buildings, Yoshiharu Tsukamoto describes a unique typology of building which takes form in leftover urban spaces. When we look up his works in which categorized as "Pet Architecture", the projects are not at the forefront of aesthetic design or advanced technology, but produces a unique characteristic of self-appropriation in cities which forces users to make the most of smaller spaces. Yoshiharu Tsukamoto elaborates on the meaning of "Pet Architecture" by saying, "Our society does not consist only of human beings. Various animals come into our lives as 'Pets', and they are given spaces to live. If decent buildings standing in decent spaces are considered 'human beings', small buildings standing with all their might in odd spaces would seem to be like pets in urban spaces."

Both of these viewpoints "Made in Tokyo and Pet Architecture", are reflected well in the House Tower (2006). The house is situated in a narrow 3 meters wide space and 6 meters in depth. Despite its relatively small dimension, the House Tower hosts 9 rooms, with workshops on the lower level and dwelling above. One of the main features of the House Tower is a delicate stairwell that cuts through the entire tower, dividing the front and rear portions of the house, creating an interesting juxtaposition of spaces. Looking from the exterior of the building, we could see the adjacent building to the right separated by a narrow alley is about 3 stories high with a roof, while the adjacent building to the left is a

03

regular house with a hut roof only stand at one story high. Before looking at the inside of the building, I would not have thought the building would contain 9 different floors. The building uses reinforced concrete as structure, stands tall with minimal ornamentation, aside from the upside down arched windows, a cut out on the roof, and an arched entrance door. In terms of coloration, they decided to keep the natural look of the concrete, thus giving the house a monochromatic color tone. I believe this is a conscious decision about creating unusual aesthetic through elements like structure exposition, also through building features such as ventilation, entrances, stairs, and windows. The building does not occupy the whole square footage of the lot provided but instead, leaving a small gap on one side of the building to allow access to the backyard. From the image, we can also see how the setback of the building gives extra outdoor spaces for bicycles and plants, also to avoid further congestion to the neighborhood.

https://www.flickr.com/photos/wakiin/8747974360
http://i-ne-kore.blogspot.com/2009/03/atelier-bow-wow-house-tower.html

I figured to give a sense of spaciousness, the architect sheared the rear floors up, creating mezzanines. The play of space division is crucial on a site with minimum square footage. The image below shows the width of the house in comparison with a person. Despite the relatively small spaces, the house seems to be rather spacious through the mezzanine strategy and the delicate stairwell which creates

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Research paper on Historical Architecture Typology and Japanese Architects

"transparency" between the divided spaces. The stairwell, in this house, emphasizes continuity due to its light and delicate features. The stairwell, combined with small mezzanine floors make it possible for the users to see each other in a distance or different spaces, it's all connected. The stairwell substitutes the use of strong partition between rooms, to give a subtle articulation in the continuous space. Therefore, as the users walked around, they will encounter different types of occupancy. Private spaces are made private through the use of curtains instead of solid wall. Practice of space, according to Yoshiharu Tsukamoto, becomes very important in designing, since occupancy is one very powerful issue to think about in such challenging site. Thus, building without any partitions would most likely be the ideal to overcome the issue of spaces. This allows the creation of one continuous space, but subdivided.

https://agile-city.com/agile-city-research/pet-architecture-building-in-leftover-urban-spaces/

The entrance of the House Tower leads us to the living / dining space with kitchen located at the rear end of the house. The living / dining space is the largest space occupation out of all, with double - height ceiling, completed with a whimsy balloon chandelier, which neutralizes the monochromatic concrete walls. There are a couple interesting plays of lighting in the living / dining space, one that I found most prominent is the large arched window in the front facade. The window is divided by the floor above, leaving the square portion of the window to the living / dining space. The square window gives a more optimum day lighting inside the space. Furthermore, since the window is cut just before the floor, we are able to see the reflected light on the ceiling of the living / dining space, giving it a sense of spaciousness. Another opening is located on the right facade, where a large arched window is located a bit lower than the one in the front facade, with the bottom aligned with the first mezzanine. Intentional or not,

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the bedroom with an additional small upside down arched window located on the side. There is no privacy curtain in the bedroom besides the one curtain to cover sunlight. Up on the third floor, the House Tower contains a utility room on the rear end and a bathroom on the front space. The bathroom has privacy curtain attached diagonally on the ceiling. This allows a landing for the stairwell and gives extra space (for safety) before accessing the upper or lower floor. The bathroom has an interesting touch of an upside down arched window near the bathtub. Rooftop terrace and storage space are located at the top of the house.

http://i-ne-kore.blogspot.com/2009/03/atelier-bow-wow-house-tower.html

I recalled the Higashi Tamagawa Complex built in 1982 (fourth style) when looking through many detailed images of the Tower House. The similarity includes materiality and the purpose/intention of the building. The house is very compact and functional overall. In a way, it stripped down any redundancy of a building's space and utilities to the very core, leaving only its core elements. When examining the house, I figured that, Yoshiharu Tsukamoto implemented vernacular elements in his architecture. A prominent example of this would be how he selected and created view through windows. In such a small sites, it is very important to revise the understanding of what a view is, especially when it is located in a dense city like Tokyo. In vernacular architecture, the view from inside a house is very important. However, if we keep the traditional understanding of view, it would be impossible to make a window on the site, since the neighborhood is surrounded by concrete walls and gap spaces between buildings. Therefore, Yoshiharu Tsukamoto found alternatives by opening a big window to the

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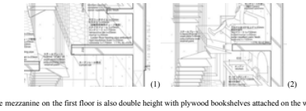
both of the large openings are not only lit up the interior space, but also light up the balloon chandelier due to the light reflection.

http://i-ne-kore.blogspot.com/2009/03/atelier-bow-wow-house-tower.html

The living space continues to the first mezzanine, where a couch is located. There is an interesting detail in the mezzanine, as it is the only floor chamfered, giving an extra stair step. By looking at the section cut, perhaps, Yoshiharu Tsukamoto wanted to keep the stair count the same on each floor, as they will all be hanging from the roof one step at a time. However, since there is a shift in the ground level, where the rear end sheared up one step count, an extra step is necessary on the mezzanine. The first image below shows the read end ground floor, shifted up one step. The second image below shows the cropped mezzanine and the extra stair step.



(1) (2)

The mezzanine on the first floor is also double height with plywood bookshelves attached on the wall. On the second floor, the bedroom is located. The cropped arched window creates an opening from the floor of

06

neighborhood. He picked up on small things such as plants and small trees along the street and utilized those as part of the picturesque on his windows. Doing so would cultivate another way to sense the environment. We can see from the plan, that Yoshiharu Tsukamoto put a tree in the front yard that can be observed from the living / dining space and bedroom.

https://www.archiweb.cz/en/b/dum-vez

08

Kumono - Nagareyama House (1973) by Kazunari Sakamoto, is part of the series from his book titled "Lecture, Tao Baerlocher and Samuele Squassabia (Eds)", where he reflected his own projects in the context of dwelling, city, and life in terms of proclamation of modern thought in architecture. Throughout his work, Sakamoto's spatial concept shifts from complementary and abstract terms to an investigation on anonymous dwelling typologies and later developed into a synthetic view on urban spaces and their use. These changes were deeply influenced by the concepts of space and architecture from his former teacher, Kazuo Shinohara, at the Tokyo Institute of Technology. Being built in 1973, Kumono - Nagareyama House is one of the evidence of these changes. We started to see the sharp distinction between plain and void which is given up in favor of a strong spatial moulding. Here, composition also appears as a guiding principle on the house's elevations; furthermore, inner and outer space are characterized by increasing continuities.


(1)

(2)

https://www.flickr.com/photos/wakiiii/7651724568/in/photostream/
https://cread.jd.com/read/startRead.action?bookId=30425241&readType=1

The Kumono - Nagareyama House portrays such a depth in its gradation of domain. The house comprised of boxes of progressive size encasing one another, playing the notion of box - in - a - box nested form. Compared to his previous works before 1973, a big difference lays in the form of the exterior "box". Dispatching from the symmetrical and rectangular form, one corner of the rectangular shape is cut off diagonally, adjusting the house with the intersection on the site. Instead of exposing the concrete, Kazunari Sakamoto puts finishing treatment of painting over the exposed concrete. What fascinates me the most of this project is the idea of encasing. It seems to me that Kazunari Sakamoto aimed to explore

the richness of this in between space. The nested structure forms a place inside the house that is fairly near the street, a place that is a bit far from the street, and a place far off the street, in secure privacy. The house has a setback where Kazunari Sakamoto utilizes those spaces by putting small plants along the house.


(1)

(2)

https://cread.jd.com/read/startRead.action?bookId=30425241&readType=1

Going along with the idea of vernacular architecture, Kazunari Sakamoto would emphasize on openings in the Kumono - Nagareyama House. On the first image, the bottom half of the facade has smaller series of windows facing the street. In contrast, the opposite side of the house where there would be a small courtyard along the house, Kazunari Sakamoto installed a large window covered with white curtain. A series of irregularly spaced larger openings can be seen on the top half of the facade. I would assume these openings are purely intended to lighting purposes, since it is not accessible. The living space seems to be the highlight of the house as it occupies almost half of the total square footage of the entire house and is double height.

https://cread.jd.com/read/startRead.action?bookId=30425241&readType=1

in response to the site. Both houses' forms are materialized through the conflict between its external environment and the autonomy that the architecture itself maintains.

In terms of architectural expression, Yoshiharu Tsukamoto seems to be an architect that celebrates structure through the clarity of his drawings and structure exposure in most of his works. In Tsukamoto's book "Graphic Anatomy", all of the illustrations are detailed drawings, which are made through design process with added perspective. These detailed drawings embrace and express the story of the design process. In the House Tower, he made a deliberate decision to keep the reinforced concrete texture and coloration exposed and true, giving a more industrial look to the house. In his projects, there seems to be no prejudice towards aesthetics. On the other hand, Kazunari Sakamoto often puts finishes to his architecture. The Kumono - Nagareyama House has glossy panels installed to the facade and most of the interior in his work is either painted white or have wood texture. Perhaps this has something to do with Kazunari Sakamoto striving to achieve lightness throughout his works. This is one of the notable differences I discovered between these two Japanese architects. YoshiharuTsukamoto would analyze a situation of site and program, respond with an architecture in which he puts aside aesthetic, solve problems, and bring back the question of aesthetic to the table. In this case, coming from an engineering background, the driving force of the projects is more about what is efficient and effective in order to solve a given problem. One small similarity I found in terms of the use of structure is the use of stairwell for both Yoshiharu Tsukamoto and Kazunari Sakamoto. Stairwell in most of their works is portraying lightness by using thin steel plates and delicate structure.

Both architects see compositional form and proportion as a potential of contemporary architecture to balance conflicts and create hierarchy. The House Tower and Kumono - Nagareyama House seem to have a similar sense of progression / hierarchy on their own. This progression differs from one another in

how Yoshiharu Tsukamoto presented the respective concept in a form of vertical continuous passage, while Kazunari Sakamoto applied this idea through the voids within an encasing structure. However, composition as a design principle owed to Kazunari Sakamoto is clearly recognizable in how Yoshiharu Tsukamoto juxtaposed different portion of spaces as a way to create hierarchy. Due to the limited space he has on the site, the volumes need to be stacked mostly vertically, if not allocated front or rear. While Kazunari Sakamoto seems to have more freedom in positioning volumes and spaces. However, both emphasize the notion of composition throughout their houses; volumes, space, and structure are rendered into one beautifully composed architecture piece. This notion brings Yoshiharu Tsukamoto's concept again into the proximity of his master Kazunari Sakamoto. Going along with the concept developed by Yoshiharu Tsukamoto, behaviorology defines the architectural expression through the understanding of the complex relationship between people, the built environment , and urban space. In a way, the building shaped itself based on the behavior of both the building (challenge) and natural elements. The volumes, in the work of Yoshiharu Tsukamoto, inherent properties of elements such as heat, wind, light, water, and the users' behaviors that eventually lead to the creation of a stronger localized (vernacular) architecture. In the case of Kumono - Nagareyama House, I found the architect puts more emphasis on the spatial production through the building itself, and less external influences compared to Tsukamoto's. In Kazunari Sakamoto's I feel, a house is more like a place to meditate, it echoes solitude, privacy, and peace. Perhaps, Kazunari Sakamoto wants to offer users a (sacret) experience within the house itself. A prominent example of this would be the finishes and the touch up of materials he did in order to achieve the kind of atmosphere / aura he wanted to project. Even Though a few external factors, such as natural lighting is still considered. I found Kazunari Sakamoto's way of thinking in conceptualizing architectural space closer to Kazuo Shinohara's. However, I found Yoshiharu Tsukamoto's view on architecture and nature is closer to Kazuo Shinohara's. Kazuo Shinohara stated that minka was not an architecture by itself, but a part of nature. According to him, the minka is the expression of the natural milieu and it is

There are a couple small details in this house, one of which is the small platform on top of the living space, leveled with the second floor, where he attached a single light fixture and created a cut out for the chimney pipe to go through. The compositional method takes a large box as the house's external shape, with the boxes within are assigned as functions and utilities (kitchen, bath, and multipurpose space). The remainder, following the organization of those spaces, becomes the main space (the living and dining space). This act of reversal raises questions about the relationship in general between room hierarchies and the design process. Thestairwell and utility spaces become a space divider between the living space and bedroom, a separation between public and private. Kazunari Sakamoto "combined" the living space with the dining space together by extending the kitchen area with a dining table through an opening. This opening granted the house with seemingly more spaces as solid walls were deducted. The second floor above the kitchen space also works in a similar way. The ribbon opening creates huge cut out of the solid walls, allowing users to observe the entire living / dining space. Kazunari Sakamoto added a warm touch of the interior space by using wood to frame windows. To further increase the spaciousness on the house, Sakamoto installed a thin steel plate stairwell, just like his other houses, Machiya in Minase and Machiya in Daita. To increase the sense of lightness in Kumono - Nagareyama House, Kazunari Sakamoto painted concrete walls into white.

https://cread.jd.com/read/startRead.action?bookId=30425241&readType=1

Derived from Kazuo Shinohara's teaching, both Kazunari Sakamoto and Yoshiharu Tsukamoto (being that Sakamoto is his teacher) have thrived to recreate and apply the concept of vernacular architecture in the modern city fabric of Japan. However, despite both being successful in applying the ideal (modern) vernacular architecture in their own interpretation, they use different approaches in investigating such cases. The different approaches are clearly reflected in the two housing project we've been discussing in this essay. Yoshiharu Tsukamoto believes urban spaces surrounded a house is part of a landscape that needs to be taken into high consideration when creating openings. He feels the connection between inside and outside, especially visually, is necessary. He stays true to this by having large openings as a way to frame "pictures" of the outside neighboring conditions. In contrast to Yoshiharu Tsukamoto, Kazunari Sakamoto seems to put more focus on the event inside the house. It could be part of the reasoning to why he located smaller openings at the bottom half of the facade adjacent to the street and non accessible larger openings on the other half. Moreover, the largest openings are made facing the private courtyard behind the house. This, I would say, makes the Kumono - Nagareyama House seems to be more intimate when compared to the House Tower, where things are more exposed. This disparity brings me back to the concept of architectural behaviorology by Yoshiharu Tsukamoto. In his architecture way of thinking, there is always an external scenario that plays along cohesively with the house. One of the external scenarios of the House Tower is the trees in front of the house that helps framing the view of the surrounding neighborhood. In the case of Kumono - Nagareyama House, The setback where small plants are planted, are not meant to achieve the same purposes as those in House Tower. The small plants along the periphery of the house seem to create a separation between the street and the house, instead of being part of the picturesque view. Therefore, in this case, the events are defined by a stark spatial interaction with the house itself. Despite these differences, we also need to take into account that both architects faced different challenges when designing the houses. The Kumono - Nagareyama House has a chamfered portion faces the intersection, corresponding to the site, while the House Tower is built slender

also the result of collaboration between man and nature. Yoshiharu Tsukamoto applies this expression in his works through the concept of architectural behaviorology.

I found great fascination analyzing both Kumono - Nagareyama House and the House Tower. Throughout this essay, I observed much influences and differences of both architects' conception of space and in their way of thinking through the analysis and comparisons of drawings and writings. Even though both architects derived from one teaching of Kiyoshi Seike through Kazuo Shinohara, and both architects concentrated on the space of residential architecture as a catalyst to bring back the idea of vernacular architecture, they both have their unique traits that made them known as who they are nowadays. To really grasp the architects' intention and their unique traits, it is very important to understand and identify the conditions which construct a narrative of a project since it would have a strong impact on where the project goes. These kind of foundations is necessary to create a platform where many behaviours of people and nature emerge. Through these kind of foundations, Kazunari Sakamoto and Yoshiharu Tsukamoto excel in overcoming any mimetic or typological reference towards the city fabrics in Japan especially in a type of architecture on a human scale that interacts with Japanese society.

References

Tsukamoto, Yoshiharu, Junzo Kuroda, and Momoyo Kaijima. *Made in Tokyo*. Kajima Institute Publishing Co. 5 September, 2001.

Tsukamoto, Yoshiharu, and Momoyo Kaijima. *Graphic Anatomy Atelier Bow - Wow*. Toto, 42603rd edition. 2 February, 2007.

Pet Architecture Atelier Bow-Wow: https://agile-city.com/agile-city-research/pet-architecture-building-in-leftover-urban-spaces/

Sakamoto, Kazunari Lecture: http://www.dnp.co.jp/artscape/eng/focus/0811_02.html

Tsukamoto, Yoshiharu interview: https://madoken.jp/en/interviews/4959/

Image References

Portrait of Seike, Koyoshi: https://www.urbipedia.org/hoja/Kiyoshi_Seike

Portrait of Shinohara, Kazuo: https://www.rencontres-arles.com/en/artistes/view/632/kazuo-shinohara

Portrait of Tsukamoto, Yoshiharu: https://www.titech.ac.jp/english/research/stories/faces25_tsukamoto.html

Portrait of Sakamoto, Kazunari: http://en.cafa.com.cn/articlimax-poetry-sakamotos-architecture-Exhibiting-at-power-station- of-art-shanghai.html

Graphic Anatomy Atelier Bow-Wow: https://www.archiweb.cz/en/b/dum-vez

House Tower, exterior: https://www.flickr.com/photos/wakiiii/8747974360

House Tower, interior: http://ii-ne-kore.blogspot.com/2009/03/atelier-bow-wow-house-tower.html

Kumono Nagareyama House: https://www.flickr.com/photos/wakiiii/7651724568/in/photostream/

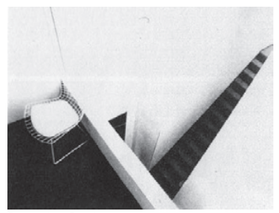
Kumono Nagareyama House: https://cread.jd.com/read/startRead.action?bookId=30425241&readType=1

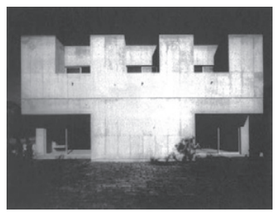

House with a Big Roof
1960-61

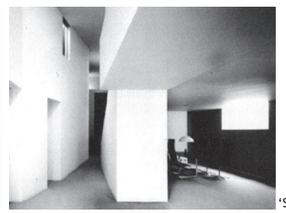

House with an Earthen Floor
1963


House in White
1964-66

'First Style'

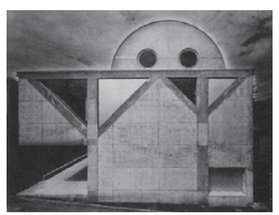

Repeating Crevice
1969-71

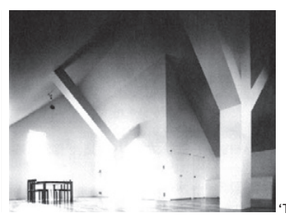

House in Kugahara
1971-72


House in Higashi Tamagawa
1971-73

'Second Style'


Tanikawa House
1972-74

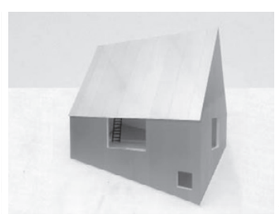

House in Uehara
1975-76


House in Hanayama n.3
1976-77

'Third Style'


House in Yokohama
1982-84


Hyakunen Kinenkan
1984-87


House in Tateshina Project
2000-06

'Fourth Style'

60

Comprehensive study on Kazuo Shinohara's four architecture styles

ARCH 6309 - Principles, Theories, and Elements in Japanese Architecture and Gardens
Instructor : Leonard Jay Mirin
Work Type : Presentation Slides
Spring 2020

Comparative study of structural composition between the past and the present