

Aquatecture:
Designing a Water Adaptable Cultural Arts and
Relief Center in Ko Kret, Thailand

A Thesis

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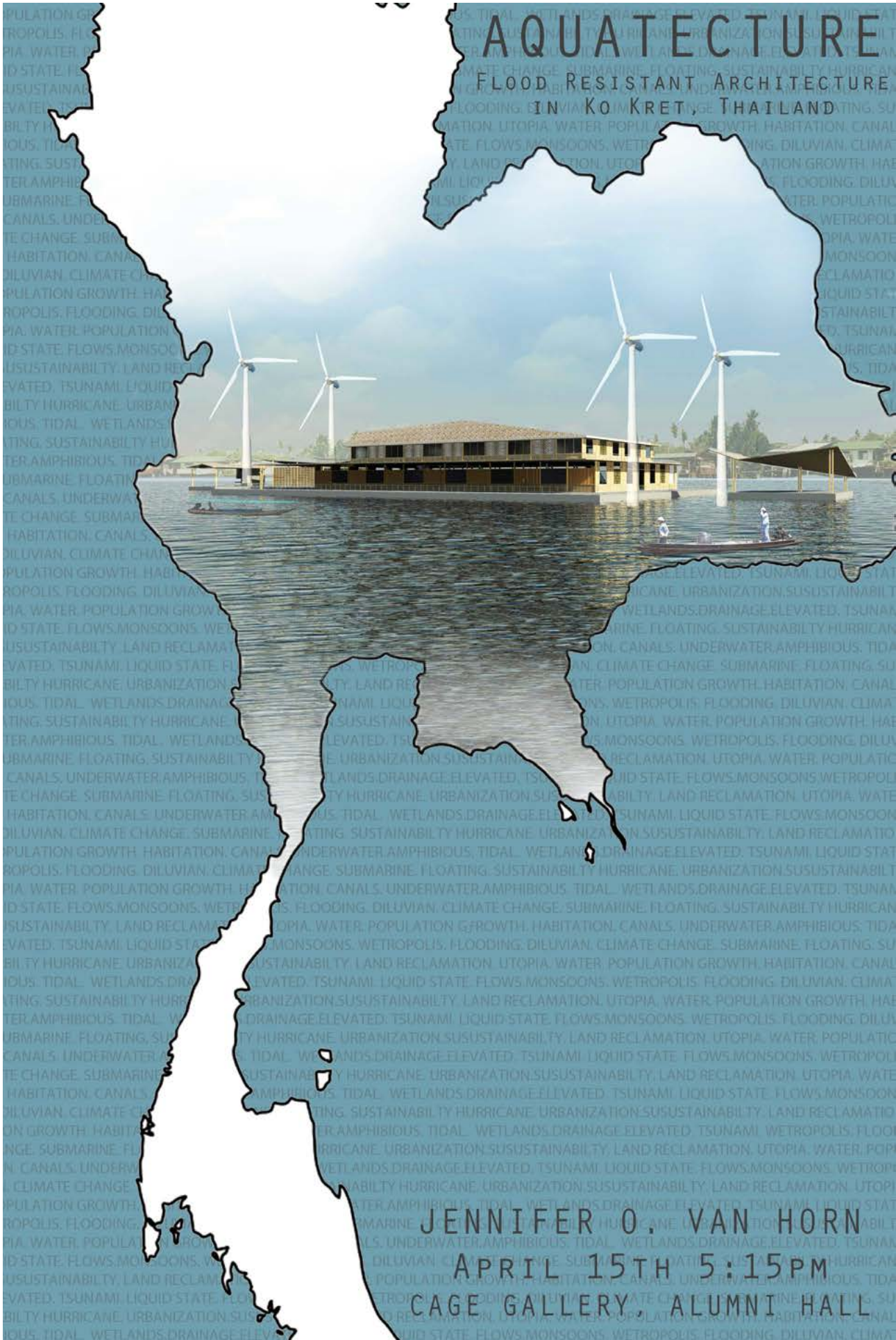
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IN KO KRET, THAILAND



JENNIFER O. VAN HORN
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Thesis:
Abstract and Paper

Aquatecture: Designing Water Adaptable Architecture

Jennifer Van Horn

This paper will address a new approach towards architecture reflecting on the consequences of the city's land based building practice in ecology that is predominately water based. There is a need for opportunities to work with the natural water ecology as a solution for future flooding. Flooding threatens lives, infrastructure, and the economy. In the past fifty years Thailand has moved away from water-based communities and designs, which is what is creating some of the problems and contradicting the water-based design Bangkok should be utilizing.

Bangkok was once designed as a liquid-based system, designed with a multitude of natural and constructed waterways to help with the flow of water in the Chao Phraya delta. The klongs were used to manage the seasonal surpluses and deficits in water, based on the monsoon rains. As industry grew in Bangkok, the klongs grew into asphalt 'highway' transport systems for the city.

The most common solution is to float and rise up with the flood waters. Floating structure is a solution for whole complexes to float, as opposed to the many single unit floating houses. Many of the public amenities and utilities will not float; therefore the city will no longer be fully functioning. New developments need to incorporate building marsh landscapes as a temporary solution for the temporary flooding.

The next step in this new design process is to design for the city or country as a whole. A flooding solution is not to have a single building which can float, but rather a whole city that can remain functional with water. We need to evolve design to welcome water as a part of the system of a city and to work with in. Creating a new water based vernacular.

Aquatecture: Designing Water Adaptable Architecture

Flooding

The problem is water, specifically, rapid and gradual flood water. Climate change will increase the problem as the water levels all over the world rise.

Violent walls of water rushing towards the city, filling each building it encounters like a child's bucket at the beach. The fast moving floods sweeps people, buildings, cars, and debris without judgment, in uncontrolled chaotic movements. Water rises to people's feet, to their legs, to their chest, and above their heads as they try to escape the dark abyss. People grab onto tree limbs, gates, roofs, and anything high enough to offer a chance of rescue.

But, diseases and health problems spread quickly through the remaining population. Buildings mold and rot in the following days, weeks, and months. Throughout the city, infrastructure collapses, buildings are left empty to decay. They collapse. Where did this happen? New Orleans? Venice? Memphis? Prague? Bangkok? Think of any flood. Any city with coastal regions, with rising ocean or river levels, and changes in flood plain are at risk for flooding.

Designing for Cities with Water

This paper addresses the need for architecture to reflect upon the consequences of land-based building practice in ecologies that are predominately water-based. This paper will present the opportunities to work with the natural water ecology as a solution for future flooding. Flooding threatens lives, infrastructure, and the economy. The combination of climate change and irresponsible design has resulted in more lives being lost. Bangkok, Thailand is currently one of the most threatened cities in the world. A multitude of cities will all have to address flooding crisis as water levels rise in future years.

Some of the most at risk cities that are Mumbai, Miami, Shanghai, Bangkok, Guangzhou, Ho Chi Minh City, Yagon, Kolkata, and any city in the Maldives, due to the extreme changes in weather patterns for coastal and river based cities.¹ The rise in sea levels will increase the amount and severity of flooding. The baseline for the water is higher; therefore it will not take much to flood an area. Currently, everyone assumes that a 100-year flood occurs every 100 years, but in fact it is more of a 25 year space between predicted flood occurrences will only decrease.²

Bangkok, Thailand, is my childhood home. I lived in Bangkok from the age of seven through eighteen. This connection is the

reason my whole body wrenches when a natural disaster happens in Bangkok, Thailand. Bangkok was under flood water from July to December 2011, due to the overfilled canals or klongs and the flooding of the Chao Phraya River. Over 250,000 people were affected by the extensive flooding. The Thai government wanted to protect the downtown area and, therefore, created dams to move the water around the downtown circle. The flood levels only increased, forcing the government to make a decision on where to release the water. The decision was to flood the low-income housing areas and the industrial parks. RPS Technologies was one of the companies that flooded. My father has worked for RPS Technologies for over 14 years. RPS Technologies had 15 feet of water in their warehouse and manufacturing facilities at the highest point. RPS Technologies employs over 900 people, most of these people represent whole families; many of the families lost their housing or were displaced due to the flooding. The families were living in the factory at the time the flood gates were opened in the industrial park and had to be rescued. The families lost their jobs, houses, and belongings overnight. The monsoon season in Bangkok is a yearly occurrence, yet this year was the worst flooding they have had since 1983. Bangkok has had flooding water every year, yet they are becoming inept at dealing with the water in an effective manner as the density, industry, and way of life changes in Bangkok.

Bangkok's History with Water

Thailand is located above the equator and has seasonal monsoon cycles. Thailand has six months of wet and six months of dry weather. The geography of Thailand is important as Bangkok is below sea level and leads to the Gulf of Thailand. Bangkok has the Chao Phraya River running through the middle. Thailand historically used the cycles to plant, harvest, and for migration. The city was an "urban/agricultural network centered" canal based society.³ Thaitakoo and McGrath describe the change of Bangkok from a rural to industrial-based society in their article

"Bangkok's Agri- and Aqua-cultural Fringe", Bangkok was once a mix of 'wet-rice farming, fruit orchards, fish ponds, and canal villages', now it is filled with 'golf courses, suburban subdivisions, shopping complexes, and factories.' The city used to operate on canals but, now, it is an automobile-based sprawling society.⁴

Thaitakoo and McGrath also discusses the changing landscape of Bangkok in their article "Changing Landscape, Changing Climate: Bangkok and the Chao Phraya River Delta". The changing climate is going to force a shift in design from "solid-state view of landscape urbanism to more dynamic, liquid state view of waterscape urbanism."⁶ In the past fifty years Thailand has moved away from water-based communities and designs, which is what is creating some of the problems and contradicting the water-based design should be utilizing.

Bangkok was designed as a liquid-based system. A liquid-based design allows for the building to respond to water as a primary design feature. It was designed with a multitude of natural and constructed waterways to help with the flow of water in the Chao Phraya delta. The klongs were used to manage the seasonal surpluses and deficits in water, based on the monsoon rains. As industry grew the klongs grew into asphalt highway transport systems for the city. The rapid development shifted Bangkok from water-based to hardscape, without giving people time to think of the effect of covering the klong with asphalt. Each year, during the monsoon season, Bangkok now is threatened with flooding from May to October. Bangkok is the 'city of three waters': river flow, tidal surges, and torrential rain.³

In the 1890's the Siam Land, Canals, and Irrigation Co. under the direction of Homan van der Heide created a system for the water to drain through the city. The concept was to divert the water into twenty north/south canals. The canals were thirty to forty kilometers wide and spaced every two

kilometers. This system allowed for feeder canals to supply the crops with water throughout the year. The 'Aqua-body; system no longer exists and the current day flooding problems arose from the new design decisions neglecting the basic understanding of the water flow. The canals slowly disappeared, making the few canals left over-populated and polluted.' There is a need for the infrastructure that incorporates, instead of industrialization taking over the canals. There needs to be an investment in the aqua-culture of the city. ⁷

Bangkok, Thailand has had a long history historical and cultural interaction with the water, two examples are the Songkran celebration and the Floating Market. Songkran is the yearly celebration at the end of the raining season to bring in the New Year and the new rains. The rains were a way of life in Bangkok; it was responsible for the rivers, klongs, and rice fields, which all relied on water. The modern day celebration of Songkran is the water festival often celebrated by throwing of water. The festival consists of people with containers of water or water guns and soaking anyone in sight. The festival is the celebration of the New Year and a time to respect elders in the community. The Floating Market is a tourist representation of the old lifestyle of many Southeast Asian communities. Boats were the primary form of transport and, therefore, many of the goods were sold on boats. The floating markets have been slowly disappearing as the klongs disappear. It is important to bring people back to the water and integrate daily life with water. The floating market and Songkran will become catalyst for bring people back to the water. The best solution for Bangkok is creating a site for people to use as refuge when needed, but more importantly to use daily.

Water-based Environments

Two of the most developed geographical regions with water are Venice, Italy, and the Netherlands. Venice's and the Netherlands' layouts and developments have given a new

approach for future water cities. Venice, Italy, is one of the first historical cities designed with aquatecture. Aquatecture is architecture incorporates principles of water based design. There is a relationship with "urban fabric, waterways, and the sea,"⁸ that were all designed in Venice. The city established a transportation system to focus on waterways and walking, as opposed to the vehicular traffic of most industrialized cities. Venice is based on one main canal, the Grand Canal and over 180 smaller connected canals. The interstitial spaces allowed for civic spaces and pedestrian paths. ⁹ Water is present in every part of Venice: the architecture, the culture, the festivals, and the daily lives of the people.

In Venice, the lagoon water has begun to decay the pilings that support the city. The foundations are crumbling under the city and measures have had to be taken to help save the city before it is enveloped by the water. The technology advances and knowledge of water being used for in the Netherlands have helped with new water based development for other sites around the world. ¹⁰

The second study of a water culture is the Netherlands. In the 14th century, the Netherlands made the decision to change their society to a water based environment. The cities were built on canal systems. Dutch urban planning addressed the impending rising water. Dykes were built to accommodate roads and buildings lined the banks. The Dutch have reclaimed the marshlands to develop. The water was formed into canals to allow the water to coexist with development. ¹¹ The Netherlands is one of the most progressive countries with aquatecture. 60% of their population is in threat of being flooded. The Netherlands has currently been designing floating platforms systems for whole developments to float as water rises.

Traditional Thai Architecture

Traditional Thai Architecture is stilt housing along the river. The houses are "elevated from the ground provides protection from floods and wild animals and is also a convenient place to

keep family livestock, store crops, and undertake cottage industries like silk weaving."¹² The houses are raised 8-15 feet depending on the water threat in that area. Flooding started to become a problem, as people no longer lived along the waterways and klongs (canals) were poorly maintained. The initial solution was improvements of the klongs through flood protection barriers and internal drainage network, and through enlargement of the klongs and pumps. "The drainage capacity in the urbanized area and of the klongs increases, but is still inadequate to prevent floods."¹³ The klongs were no longer used as a way of life for the mass population and as a result the klongs currently used for waste disposal or are squatter sites. Klongs are viewed as unneeded or undesirable by the government and the upper class of Thailand.

One area in Thailand that has defensive designs is the slum settlements or lower income communities along the river and canals. They do not have the technology to keep the water out and as a result return to the traditional ways of water protection. They have houses that are lofted and walkways that float on the water and can rise up or down with the water levels. It is an integrated system that adjusts to the climate. "... the landscapes which shows us how people try to strike a balance between their need to adjust to the environment, and survive."¹⁴ The communities are not permanent structures; instead they are an ever evolving way of life. This is one reason this style of design is rejected in the major cities, but the ideas from the communities are instructive. "Flooding is not a new issue, mankind has always lived with the threat and many design responses and strategies to flood risk, whether tidal, fluvial or from urban run-off, exist."¹⁵

Case Studies

Case studies from a multitude of cultures and climates serve as models for possible solution in Bangkok. The project ideas and technologies are starting points for future design.

The Amphibious House, by Baca Architects is a floating house designed to allow the house to respond to the changing environment. The design incorporates a pontoon beneath the ground level floor. In a flooding crisis the house will rise along with the water. The basement of the house is made of concrete and sits inside a "wet dock". The "wet dock" is a sunken outline of the house with retaining walls that will be filled with water during flooding. The house is locked into horizontal movement with vertical.¹⁶

The *FLOAT house* by Morphosis Architects is a conceptual redesign of housing in the Ninth Ward in New Orleans. According to Morphosis, they wanted "A flood-safe house that securely floats with rising water levels."¹⁷ The *FLOAT* house integrated the HVAC, water, plumbing, and electrical systems.¹⁸ The ninth Ward was the focus of this project, however Morphosis Architects understood the widespread use of housing that can float where need arises. The *FLOAT* House is a prefabricated prototype affordable housing option adaptable for the needs of flood zones worldwide. "It's an approach and design that could and should be replicated all over the world now threatened with increased flooding caused by climate change."²⁰

The 'Flop Unit' is a design solution to have a three main space, the 'living container, an ecological water garden, and amphibious open space.' The living container is the living space for the family, specifically the sleeping, relaxation, eating, and bathing. The ecological water garden is used for amphibious plants to help purify the water. The amphibious open space is used for activities and parties.¹⁹ The problem with the Flop Unit is the lack of flexibility once the water can no longer be managed by the garden and open space. This is not a solution for 15 foot water; this is a solution for small fluctuations in water levels.

The Sprout House designed by Studio Archi Farm is a house that raises the yard of the house off the ground. This house was not

designed for a flood solution, but the architecture intent to raise the main level of the building will work for a flood prone area. The house has the primary living spaces raised and below becomes the parking area and storage.²⁰ The lofted yard could become a

platform to step up on during a flood situation and a place to dock the boats. During the dry season the lower areas could be used. This is a new adaptation of a stilt house. This solution allows for water to flood part of the house. The controlled flooding of spaces allows the owner to prepare and respond to the flooding situation, instead of having to abandon their house.

Currently the most common solution for flood waters is to avoid the water. The problem is the single unit floating responses, ultimately limiting people to their house. Floating structures are a solution, but there is a need for whole complexes to float, as opposed to the many single unit floating houses currently being designed. Downtown Bangkok is filled with apartment complexes or slums. Koen Olthuis discussed the need for floating complexes.²¹ The problem with this solution is the technology cost and the lack of flexibility. Most of the solutions are only 12 foot high, the flood waters in Bangkok were 15 foot high. Many of the public amenities and utilities will not float, therefore the city will no longer be fully functioning, unless the whole city could float at once, which is not possible with a constructed downtown. New developments need to incorporate building landscapes as a temporary solution for the temporary flooding.

Aquatecture as a New Architecture Vernacular

"In Architecture the climate determinist view, still rather commonly held, states that primitive man is concerned primarily with shelter, and consequently the imperatives of climate determine form."²² Traditionally flooding and climatic changes have been a design concern with an architectural response across the globe. Technology has allowed for architectural design to no longer focus on

climate as a primary design concern, we have started to think as designers that can control climate. "Climate, as it affects human comfort, is the result of air temperature, humidity, radiation-including light- air movement, and precipitation."²³ An extreme climate would be a climate in which a people are at risk on a daily basis, from cold, water, or extreme heat. The problem with today's contemporary architecture is the lack of consideration towards the vernacular of the area.

Buildings built in Bangkok in the last 30 years did not incorporate climate. The traditional way of life worked with the monsoon season and as a result had less flooding. The new and current architecture and infrastructure have resulted in downtown Bangkok being shut down for months from the flood water from July-December 2011. Vernacular needs to use technology to support the design, instead of inhibit it.

Conclusion

Rappaport understood historical solutions for problems with modern technology were the only way to progressively changing for the better. "Our Modern solutions to climatic problems often do not work, and our houses are made bearable by means of ingenious mechanical devices whose cost sometimes exceeds that of the building shell... man may not be so much controlling the environment as escaping it."²⁴ By simply lofting a building it can escape water, but it is not a practical living solution for all people to be off the ground by 12 feet. "... Vernacular architecture somewhere in the world is probably already designed to cope with the extremes of climate we will face - whether flooding, drought or high winds. We can learn from these precedents."²⁵ The advantage of a global architecture and having access to those designs means we can look to other cultures for design solutions. Currently the places which have the most successful defenses in design from water are low-income areas. Technology solutions have not been the only

means of design, as the low-income areas cannot afford the technology.

To design with climatic and geographical considerations will be a new design process, when designing for the city or country as a whole. The designs will start as small and experimental, but will create a new design vernacular to be used throughout a city or country or globally. A flooding solution is not to have a single building which can float, but rather a whole city that can remain functional with water. We need to evolve design to welcome water as a part of the system of a city and to work in creating a new water-based vernacular. "Perhaps the most significant immediate effect of climate change is the level of uncertainty that we are forced to deal with. If the effectiveness of our historic strategy of simply attempting to subjugate the forces of nature is thrown into doubt, can we replace it with an approach that is more adaptive, flexible, and sensitive to our changing environment?"²⁶

There is a need for an architectural solution to flooding. It would be easy to say, open the klongs and let the water run down into the gulf, but this is unrealistic. Bangkok has developed for 50 years and many of the klongs lead into highways and buildings that cannot be torn down for a klong. Urban planning can help with the future of city development to ensure that practices will change and allow the city to develop in a progressive manner.

Bangkok and many cities will be underwater or have constant flooding in the next decade. Architects and designers should be planning for the future. Planning now will allow for Bangkok to be economically and physically prepared for the impending water. "We rely on our flood defenses to protect not only people and private properties, but also vital amenities and public assets, including hospitals, the emergency service, schools, municipal buildings, and the transport infrastructure."²⁷

The problem with designing for flooding situations is finding the proper solution that works year-round. Flooding is typically a

seasonal issue, therefore majority of the time the building will act as a normal building. However, in a flooding situation it will need to respond to the climate. The building could stand as a refuge; provide amenities to the city, and to be self-sustaining. The main amenities a cities needs are emergency services, broadcasting/news, hospital, food/ water supply and power plants.

The most efficient designs will allow people to move forward in design by allowing us to return to the idea of embracing water. We have to return to architecture, such as Thai Stilt Houses, and explore historic ideas that worked and how we can move to new design with the technology we have available today. Designers need to think the big picture when designing for survival.

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² Nordenson, Guy. Seavitt, Cathrine. Tarnsky, Adam, One the Water.

³ Danai Thaitakoo, Brian McGrath, "Bangkok's Agri and Aquacultural Fringe," *Topos: European landscape magazine* n.56 (2006):34-40

⁴ Danai Thaitakoo, Brian McGrath, "Bangkok's Agri and Aquacultural Fringe," *Topos: European landscape magazine* n.56 (2006):34-40

⁶ Thaiakoo, Danai. Brian McGrath. *Changing Landscape, Changing Climate: Bangkok and the Chao Phraya River Delta*.

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⁸ Wylson, Anthony. *Aquatecture*. New York: The Architectural Press: London, 1986.

⁹ Pasternack , Rebecca. "Aquatecture: Water based architecture in the Netherlands." *USC Thesis* N/A (2011): 42. Print.

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¹¹ Wylson, Anthony. *Aquatecture*. New York: The Architectural Press: London, 1986.

¹² Warren, Williams. *Jim Thompson: The House on the Klong*. Singapore : Archipelago Press, 1999. Page 22.

¹³ Roovers, Harry, Paul Bergsma, Jaap Schokkenbroek, Wim Van Turnhout, and Henri Willemsen. "Alternatives to eviction of Klong

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¹⁴ J.B. Jackson. *Discovering the Vernacular Landscape*. New Haven : Yale University Press, 1984. Page 39.

¹⁵ Visions of a Flooded Future. *Living with Water*. <<http://www.architecture.com/Files/RIBAHoldings/PolicyAndInternationalRelations/Policy/Environment/LivingWithWater.pdf>>. Page 22.

¹⁶ "Modern Floating Houses, Amphibious House that Rises to Survive Flood." Interior Decorating and Home Staging Company, Decorating Ideas and Home staging to Sell your House Quick. <http://www.design-decor-staging.com/blog/modern-floating-houses-amphibious-house-rises-survive-flood/69558> (accessed March 29, 2012).

¹⁷ "FLOAT House | Morphopedia | Morphosis Architects." *Morphopedia - The Online Encyclopedia of Morphosis*. N.p., n.d. Web. 23 Feb. 2012. <<http://morphopedia.com/projects/float-house>>.

¹⁸ 2035. "New Orleans homes could FLOAT above future floods | Energy." *Greenbang - Smart Technology Analysts*. N.p., n.d. Web. 23 Feb. 2012. http://www.greenbang.com/new-orleans-homes-could-float-above-future-floods_12126.html

¹⁹ Hans Venhuizen. *Amfibisch Wonen/ Amphibious Living*

²⁰ [Http://inhabitat.com/a-clever-farm-house-with-elevated-yard/](http://inhabitat.com/a-clever-farm-house-with-elevated-yard/)

²¹ Koen Olthuis, "Building Floating Construction," *Architecture+ Design* v.25 n.12 (December 2008):50-52

²² Rappoport, Amos. *House, Form, and Culture*. Englewood Cliffs, NJ : Prentice-Hall, 1969. Page 19.

²³ Rappoport, Amos. *House, Form, and Culture*. Englewood Cliffs, NJ : Prentice-Hall, 1969. Page 89.

²⁴ Rappoport, Amos. *House, Form, and Culture*. Englewood Cliffs, NJ : Prentice-Hall, 1969. Page 84.

²⁵ Visions of a Flooded Future. *Living with Water*. <<http://www.architecture.com/Files/RIBAHoldings/PolicyAndInternationalRelations/Policy/Environment/LivingWithWater.pdf>> . Page 5.

²⁶ Visions of a Flooded Future. *Living with Water*. <<http://www.architecture.com/Files/RIBAHoldings/PolicyAndInternationalRelations/Policy/Environment/LivingWithWater.pdf>> . Page33.

²⁷ Visions of a Flooded Future. *Living with Water*. <<http://www.architecture.com/Files/RIBAHoldings/PolicyAndInternationalRelations/Policy/Environment/LivingWithWater.pdf>> . Page 5.

PROGRAM FOR CULTURAL CENTER AND RELIEF POINT FOR
KO KRET, THAILAND

Refugee Camp Regulations

UN Regulations

- 1 Latrine: 1 Family (6-10 People)
- 1 Water tap: 1 community (80-100 People)
- 1 Health Center: 1 Camp (20,000 people)
- 1 School: 1 Sector (5,000 People)
- 4 Commodity Distribution Site: 1 Camp (20,000 People)
- 1 Market: 1 Camp (20,000 People)
- 2 Refuse Drums: 1 Community (80-100 People)

Site Planning Figures for Emergencies

- Land: 30-40 meter square (1 person)
- Shelter Space: 3.5 Meter square (1 person)
- Fire Break Space a clear area between shelter: 50 m (for every 300m)
- Roads and walkways: 20-25% of entire site
- Open Space and Public Facilities: 15-20% of entire site
- 1 latrine seat: 20 people or 1 per family
- Meters minimum for latrine- 50 meters from users
- 1x 100 liters refuse bin: 50 people
- 1 wheel barrow: 500 people
- 1 communal refuse pit (2m x 5m x 2m): 500 people
- 15-20 liters of water: per: day
- 40-60 liters of water for hospital: patient: day
- 20-30 Liters of water at feeding center: patient: day
- Tap Stands: 200 people (within 100 meters of the houses)
- Warehouse space for food grains in bags: stacked 6 meters high (allow 1.2 meters square floor space: tons

Refugee Guidelines for the Island

| | | | |
|------------------|---|---|--|
| | 100 people | 200 People | 400 People |
| Land | 3000-4500 meter square | 6000-9000 meter square | 12,000-18,000 meter square |
| Shelter | 350 meter square | 700 meter square | 1400 meter square |
| Latrines | 5 | 10 | 20 |
| Water Tap | 1 | 2 | 4 |
| Open Space | 450-675 meter square 900-1350 meter square | 900-1350 meter square 1200-1800 meter square | 1800-2700 meter square 2400-3600 meter square |
| 100 Liter Refuse | 2 (35-100m) | 4 (70-100m) | 8 (140-100m) |

Ko Kret Island

-3000 people total on the island (1kilometerx 2 kilometers)

1000meter x2000meter = 2,000,000 Meter Square

| | | |
|---------------------|----------------------------|---------------------------|
| 100 people shelters | 30 shelters on the island | 66,666 meter square each |
| 200 people shelters | 15 shelters on the island | 133,333 meter square each |
| 400 people shelters | 7.5 shelters on the island | 250,000 meter square each |

-7 villages (1 village: 1 shelter)+ 1 shelter for Village 3

Living Essentials

| | | | | |
|----------------|-------------------------|-------------|---------------|-----------------|
| | | Person: Day | 400 People | 7 Days |
| Water | | 20 Liters | 8000 Liters | 56,000 Liters |
| Drinking Water | | 7 Liters | 2800 Liters | 19,600 Liters |
| Food | | 505 Grams | 202,000 Grams | 1,414,000 Grams |
| | Cereal (Rice/Wheat) | 400 Grams | 160,000 Grams | 1,120,000 Grams |
| | Public (Beans/ Lentils) | 60 Grams | 24,000 Grams | 168,000 Grams |
| | Oil/ Fat (Veg./ Butter) | 25 Grams | 10,000 Grams | 70,000 Grams |
| | Sugar | 15 Grams | 6,000 Grams | 42,000 Grams |
| | Salt | 5 Grams | 2,000 Grams | 14,000 Grams |

Water Tanks= 8000 Liters (Diameter- 1500mm (1.5m), Length- 4768mm (4.55m))

TOTAL: 7 tanks

Rice Bags= 25 pounds: 160,000 grams= 352 pounds

TOTAL: 14 bags/Day= 98 Bags

Ko Kret Island, Nonthaburi, Thailand

-Vegetation Zone: Tropical/ Sub-Tropical

Evergreen Seasonal Broad Leaved Forest

-Bioclimatic Zone: Tropical, Dry Forest

-Soil Type: Fluvisols, Gleysols, Cambisols; soil developed on river deposits showing alluvial stratification

- Earthquake Zone: Low Impact

-Flooding Zone: Medium-High Occurrence (risk factor 7/10)

-Drought Zone: Medium-Low Occurrence (risk factor 4/10)

- Sunrise time- 06:13

-Sunset time- 17:51

-Daylight Hours: 11:38hours

-Sun Power: 1071 mW/m Squared

-Humidity Zone: Humid (less than 0.65 P/PET_

- Climatic Zone: Tropical Savanna

Program:

| Performance Space (MOVEABLE?) | | Refugee Site One | |
|--------------------------------------|--------------------------------|-------------------------|-------------------|
| | Stage (7.5x6.25 meters) | 46.875 Meters Square | 13 people for cot |
| | Seating Area (7.5x6.25 meters) | 46.875 Meters Square | 13 people for cot |
| | Bathrooms | | |

| Museum for Art Display | | Refugee Site Two | |
|-------------------------------|----------------------------------|-------------------------|-------------------------|
| | Open Gallery (1000 meter square) | 1000 Meters Square | 285 people for cot |
| | Storage | 1000 meter square | FOR FOOD |
| | | | 98 (25 pounds bag) rice |
| | Bathrooms | | |
| | Boat Pull Up | | |

| Artist Work Space | | Refugee Site One | |
|--------------------------|-------------------------------------|--------------------------|--------------------------|
| | Open Work Space (300 meters square) | 300 Meters Square | 85 people for cot |
| | Storage | 400 Meters Square | FOR WATER |
| | | | 4.8mx5m (25meter square) |
| | Selling Space for Vendors | 100 meters square | Cooking and Distribution |
| | | 1x3meter for each vendor | About 30 vendor |
| | Bathrooms | | |
| | Kilns | | |
| | Boat Pull Up | 20 boats | |

Program

Refugee Center

- Place for people to go during the monsoons
- Multiple sites on the island (200-400 people)
- Transportations to and from the site
- Resources (power: solar, hydrology, wind; food; water: rain filtration; sewage: gray/black water filtration)
- Storage and protection for the arts on the island

Museum

- Place to preserve the art
- Display of art
- Sell artwork of the artist
- Storage for the art

Artist Work Space

- Location to view the art
- Kiln Location

Performance Space

- Mon Performance

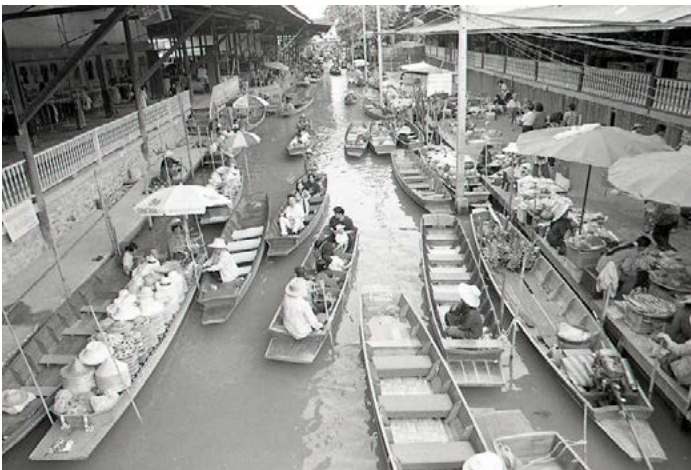
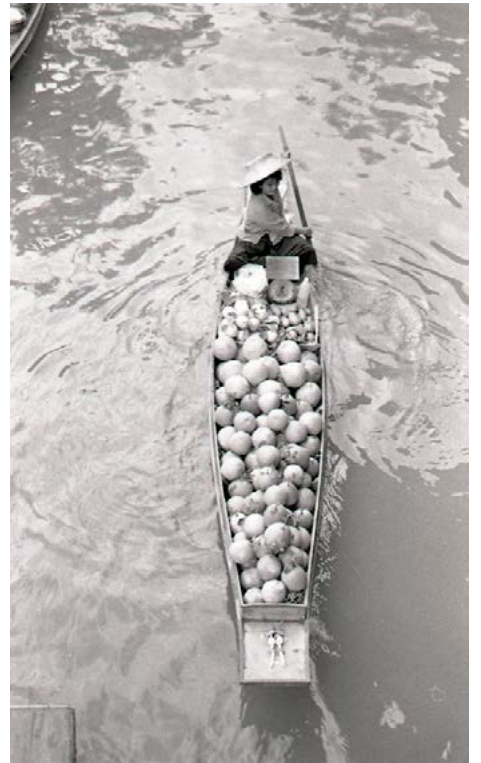
Sustainable Practices

- Vertical Gardens
- Hydroponics
- Natural Ventilation
- Power (solar, wind, hydrology)
- Sewage (gray/ black water)- osmosis

Site Context Photography



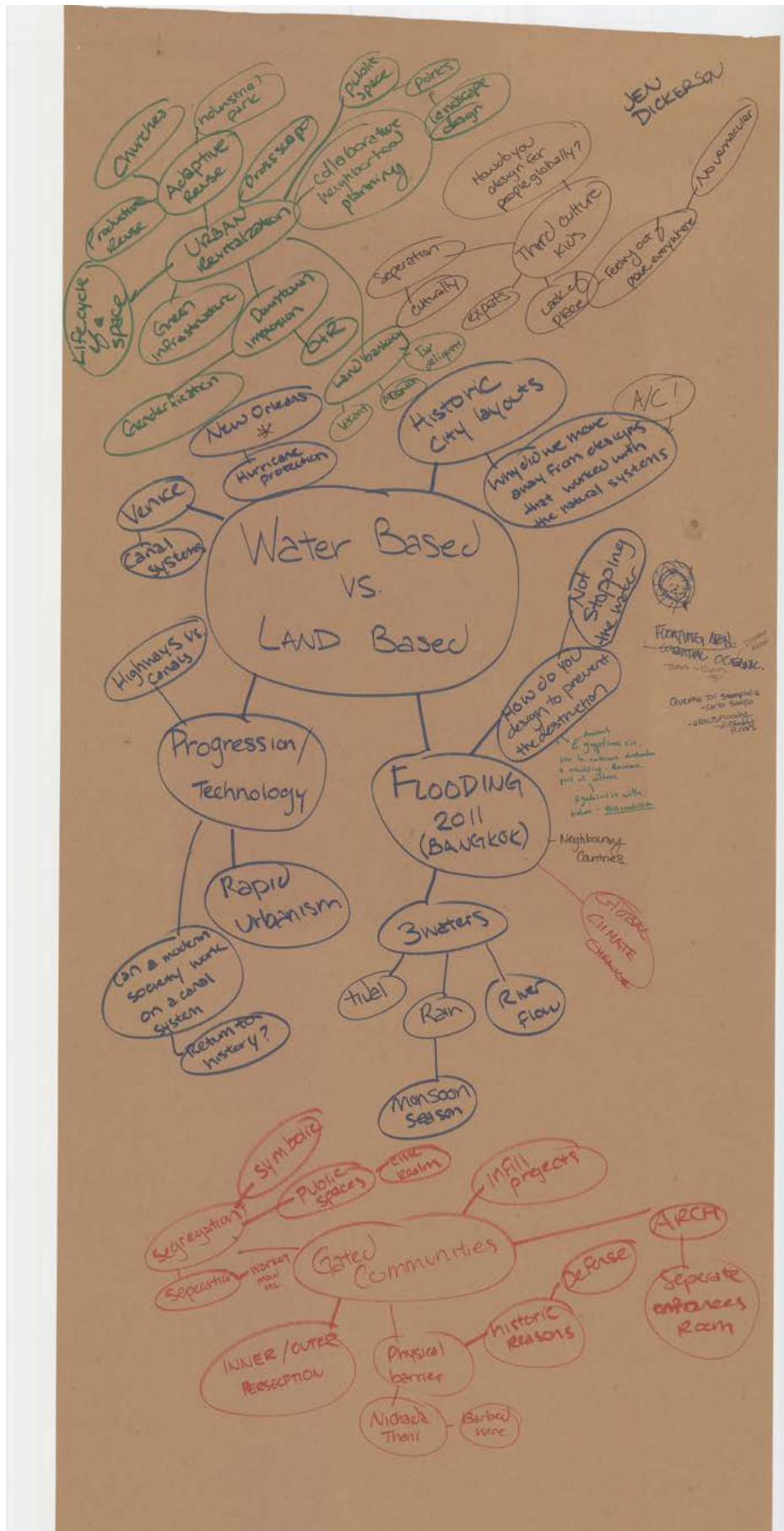






Initial Brainstorming and Process

Concept
Thesis Question
Architecture vs. Architecture
Program
Forms and Main Ideas



LIFE OR DEATH?

SINK, SWIM, OR FLOAT?

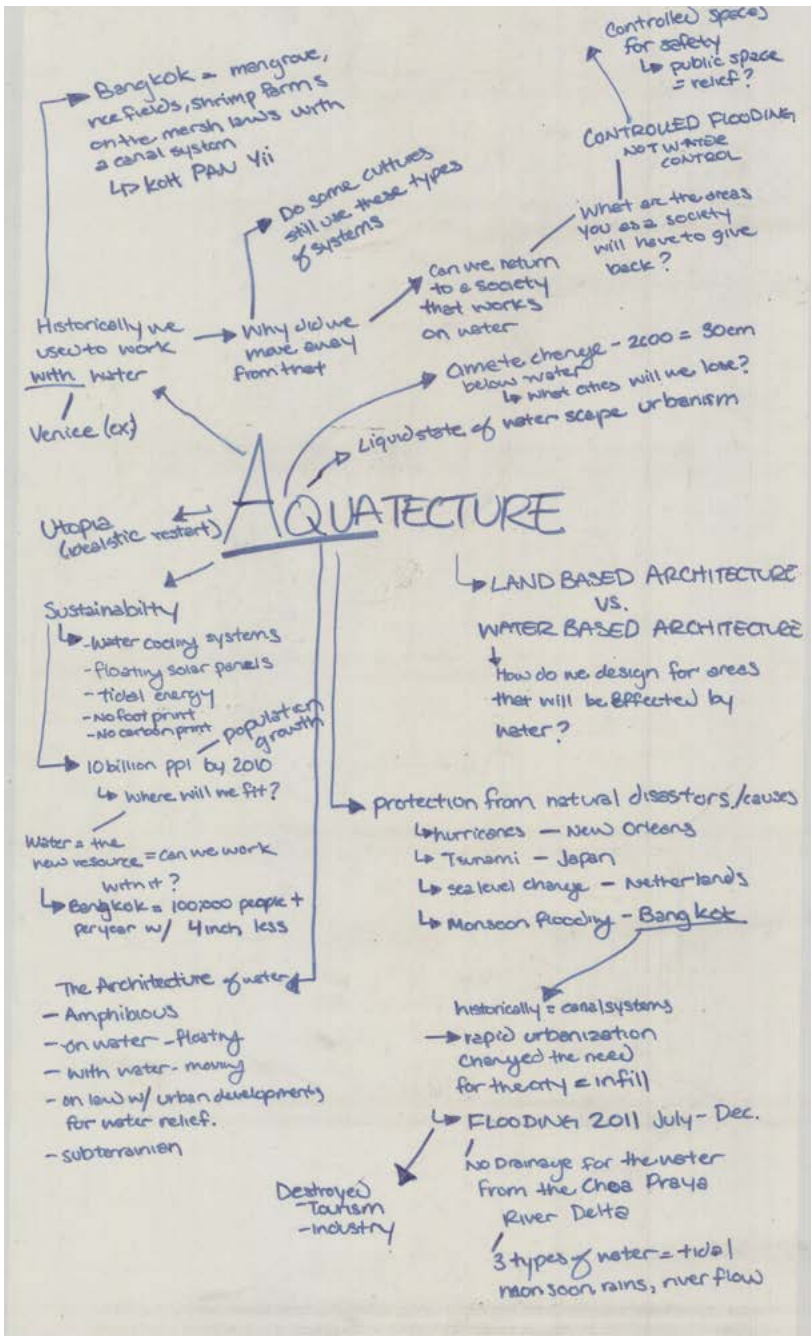
HOW DO WE DESIGN
FOR CITIES THAT ARE
IN THREAT OF BEING
UNDERWATER WHEN RAPID
CHANGES IN WATER LEVELS
OCCUR?

HOW DO WE DESIGN
ARCHITECTURE WITH
WATER?

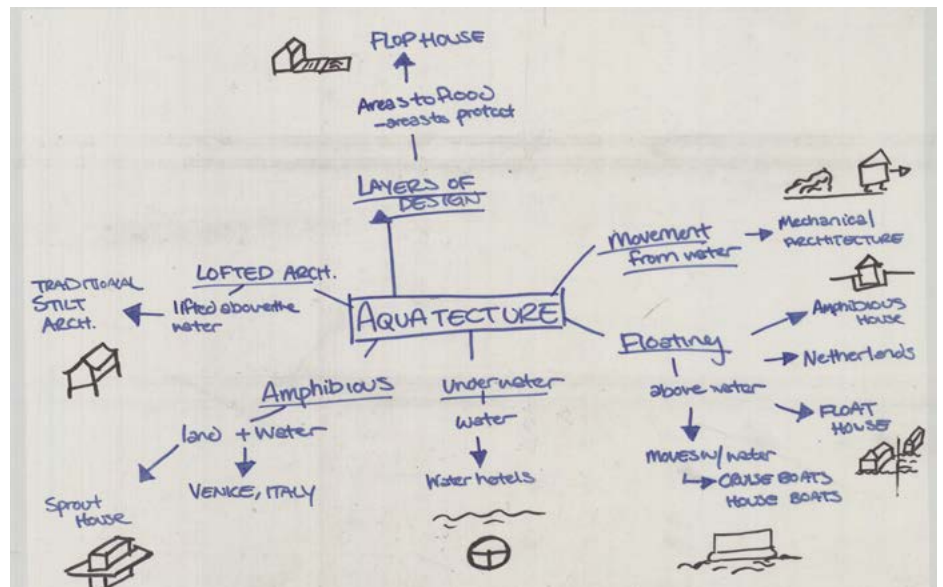
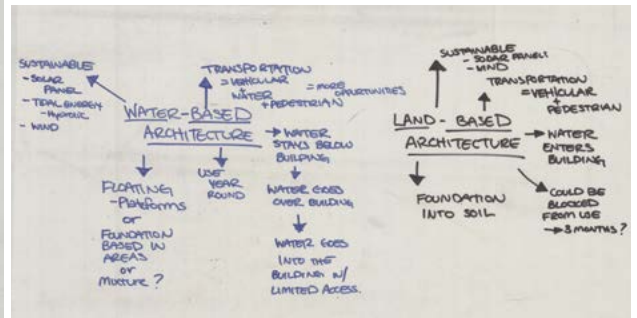
HOW CAN YOU DESIGN FOR
THE FUTURE OF A CITY
THAT WILL BE IN CONSTANT
THREAT OF BEING
UNDERWATER?

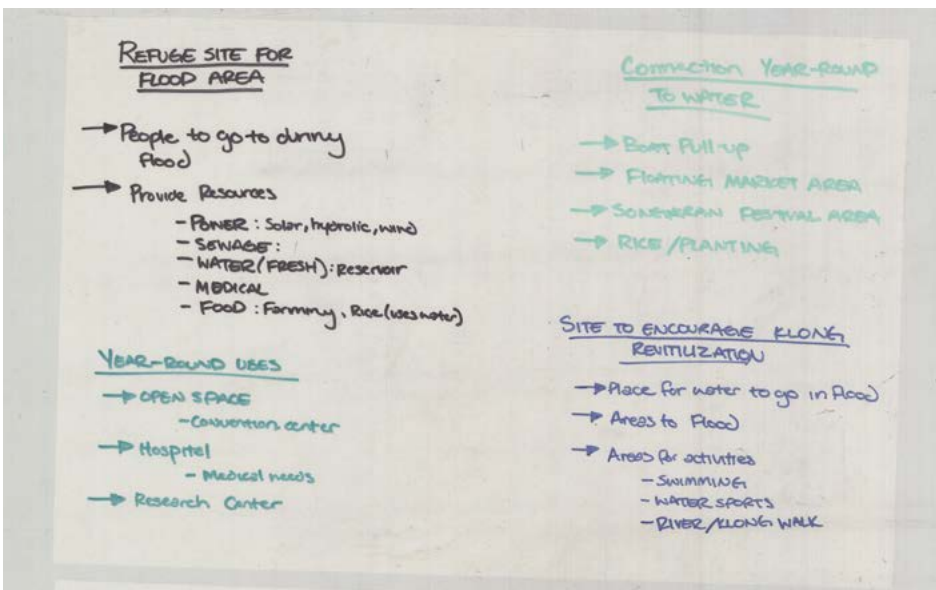
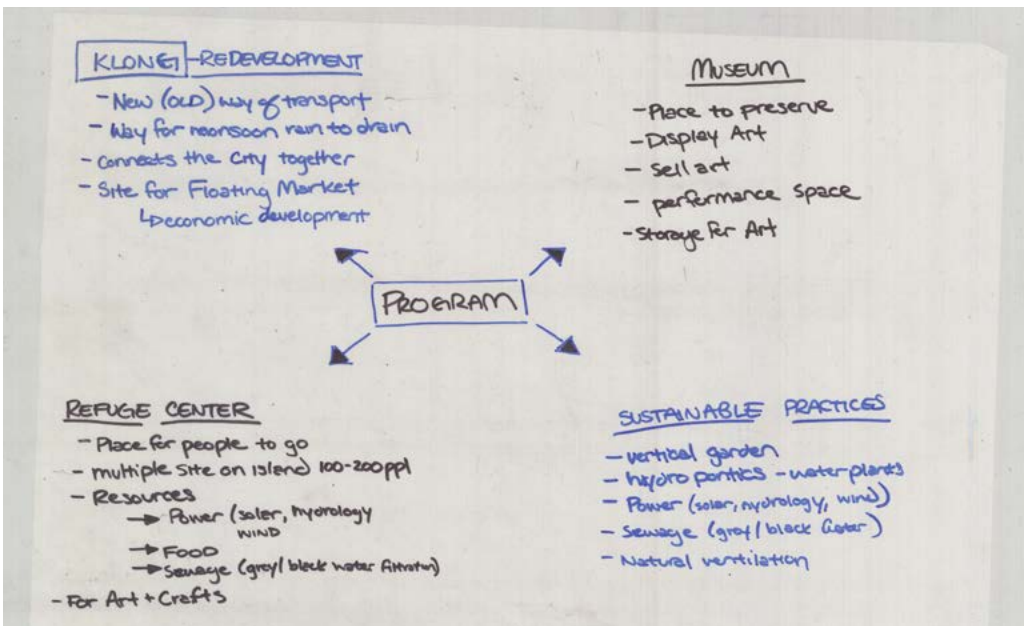
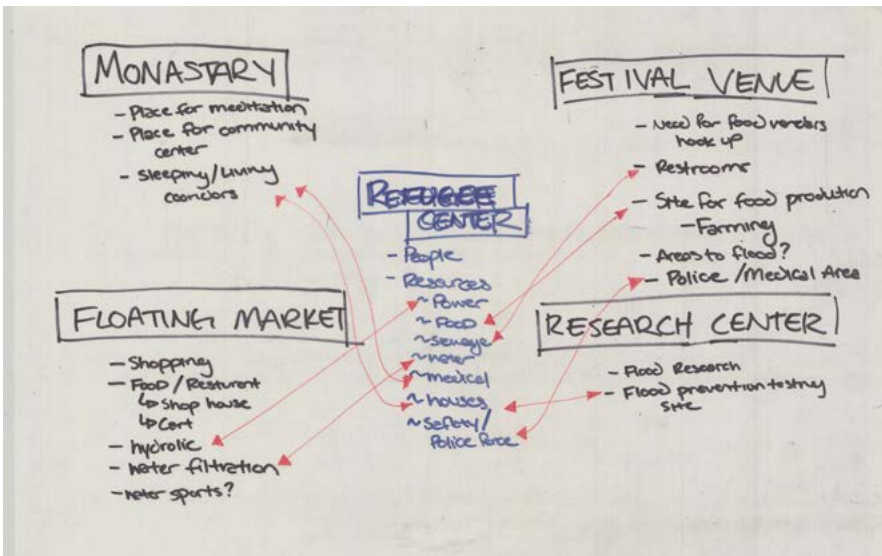
WHERE DO ARCHITECTURE
AND WATER LIVE
TOGETHER?
- CAN WE BUILD THAT

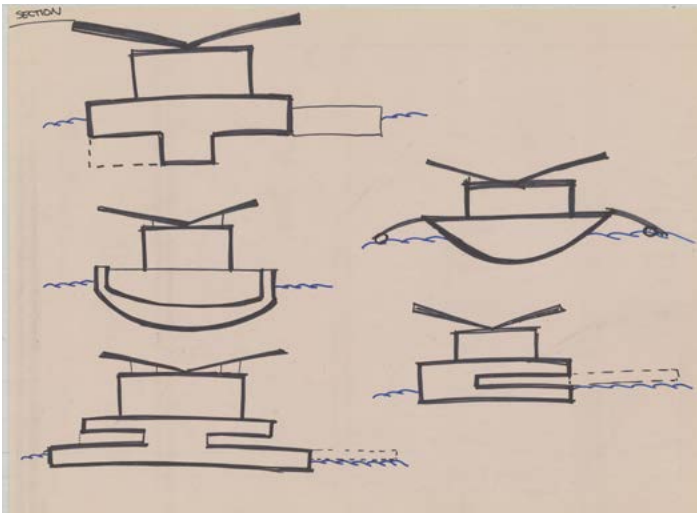
THESIS QUESTION
BRAINSTORMING



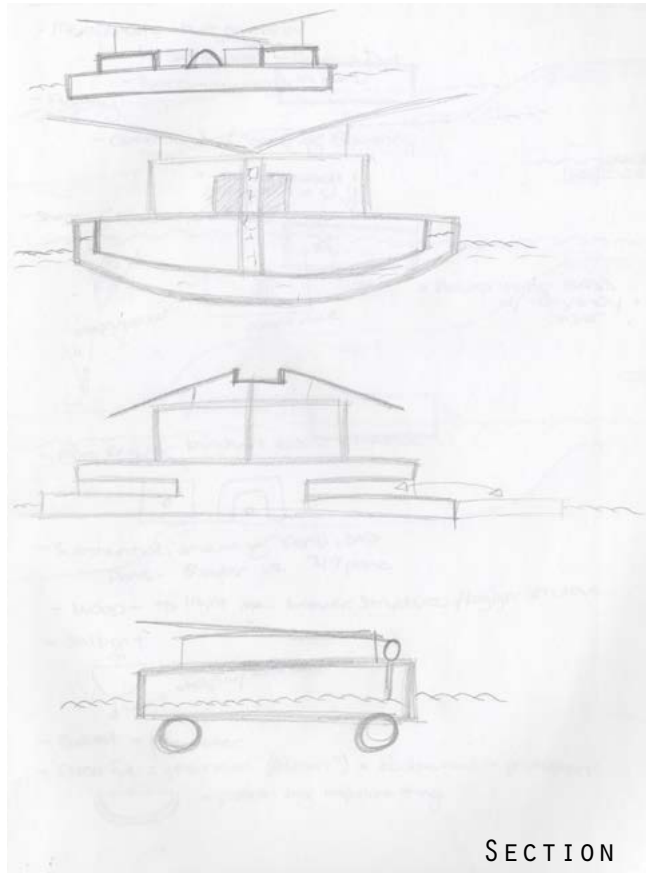
AQUATECTURE BRAINSTORMING



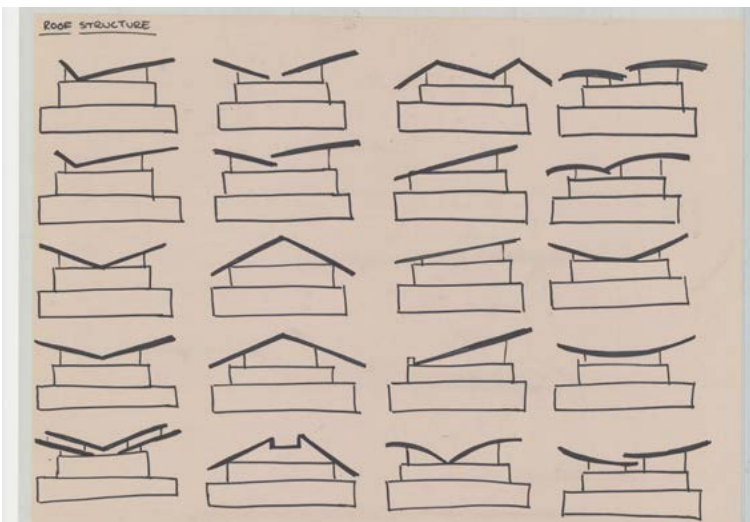




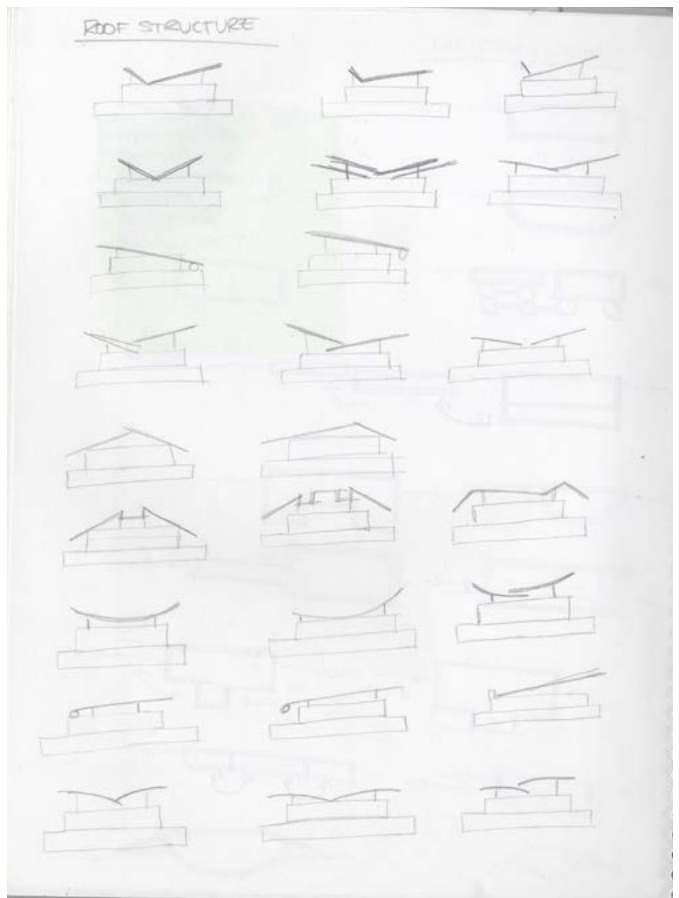
SECTION



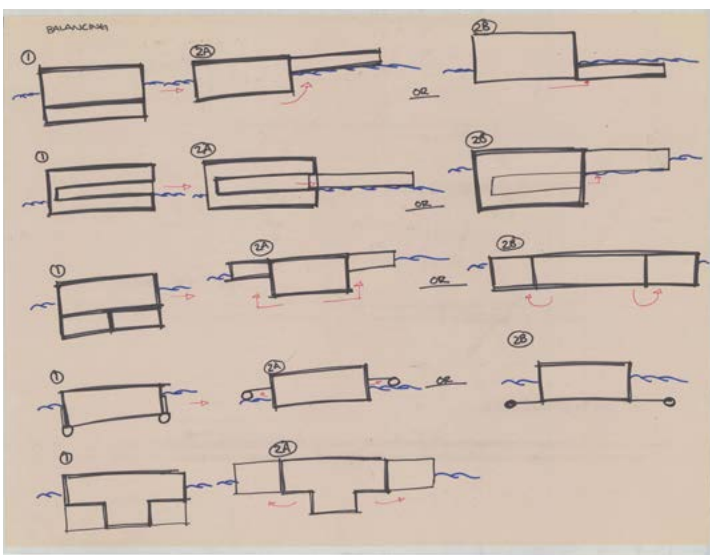
SECTION



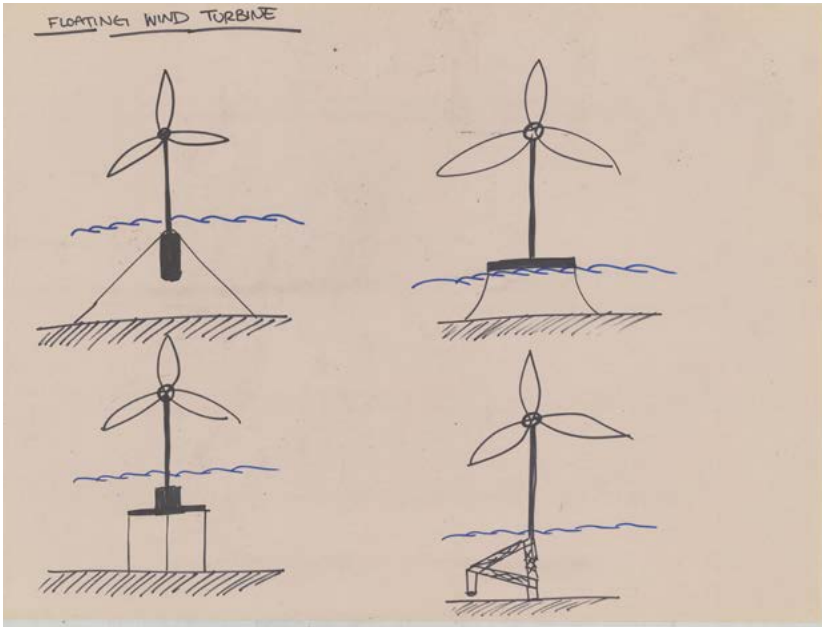
ROOF



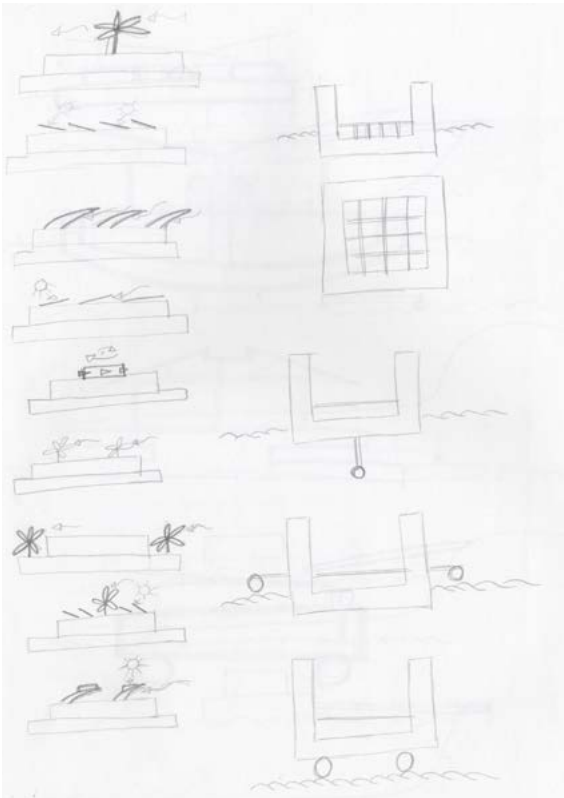
ROOF



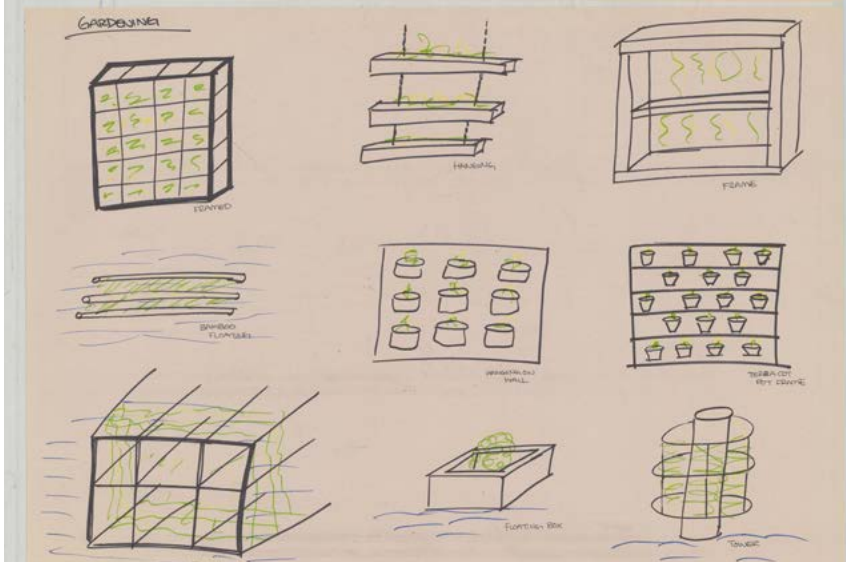
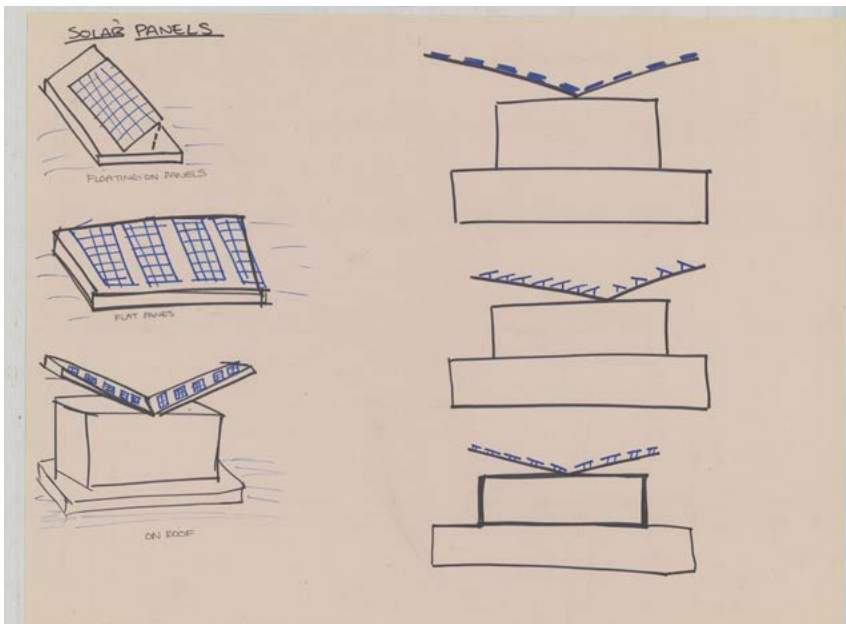
PLATFORM



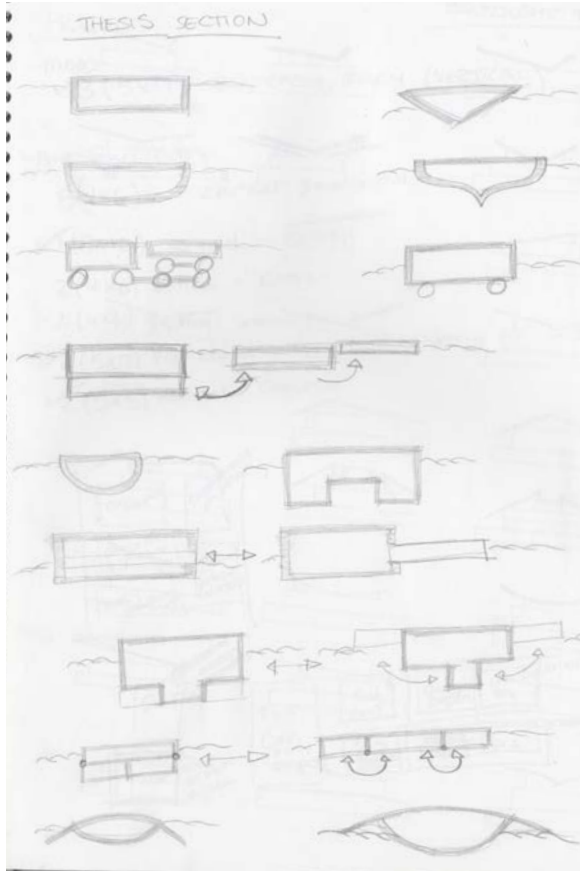
WIND TURBINE



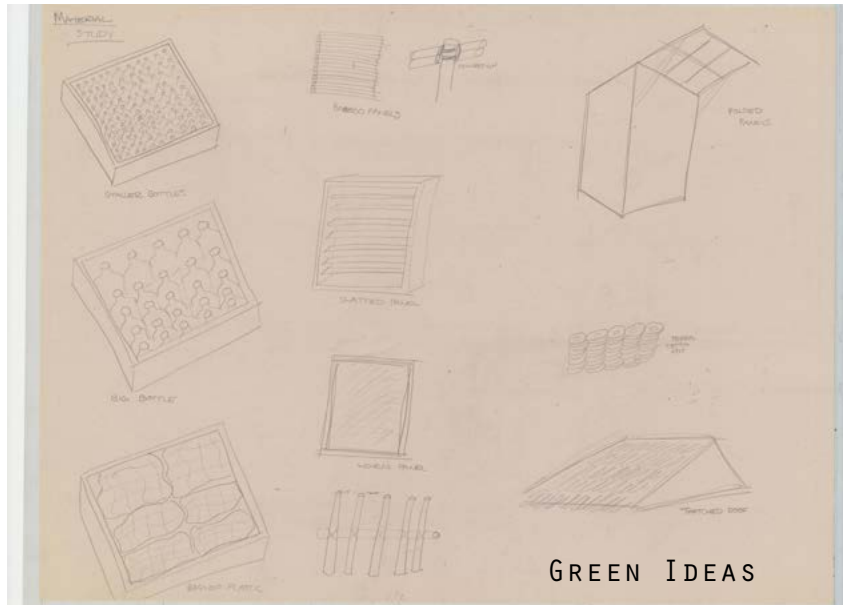
GREEN SOLUTIONS



SOLAR PANELS AND GREEN SOLUTIONS



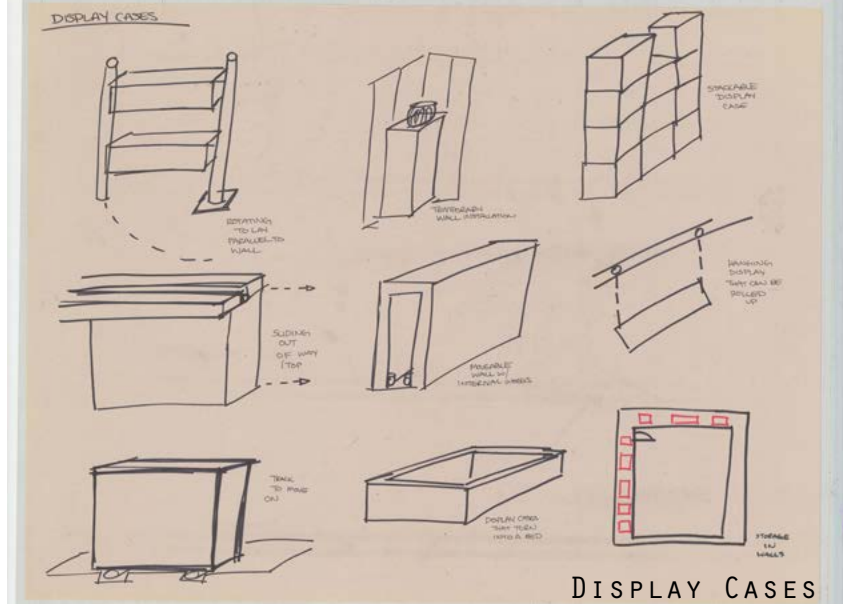
FLOATING IDEAS



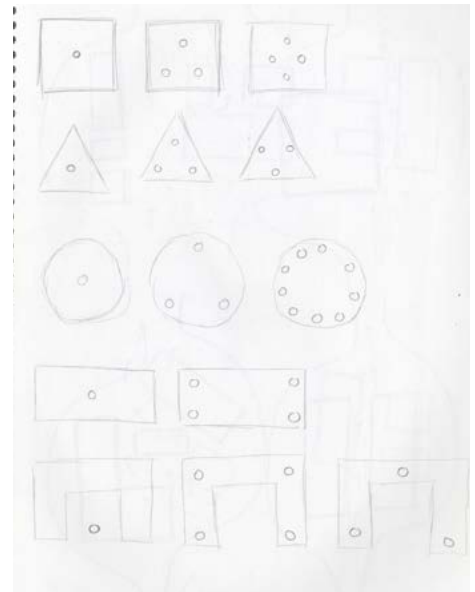
GREEN IDEAS



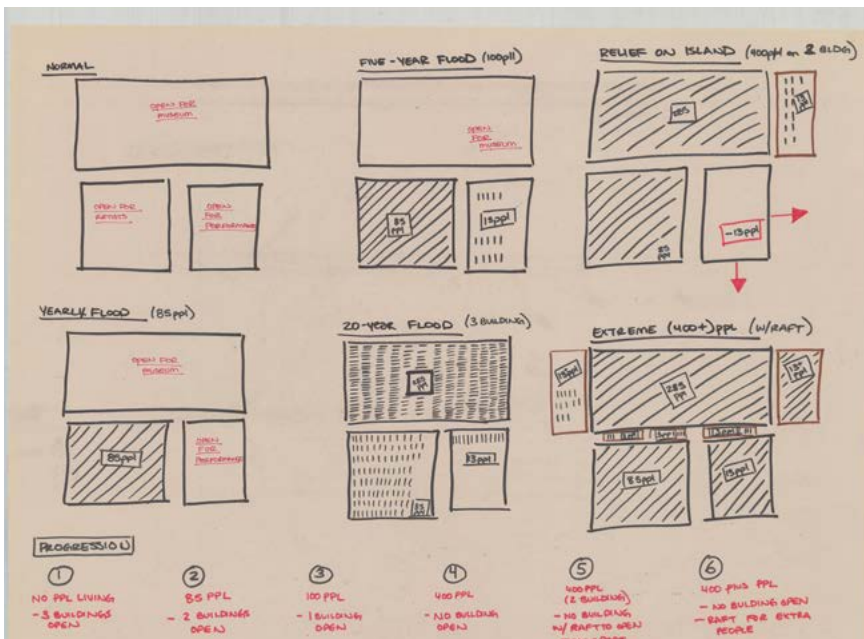
EDGE CONDITION



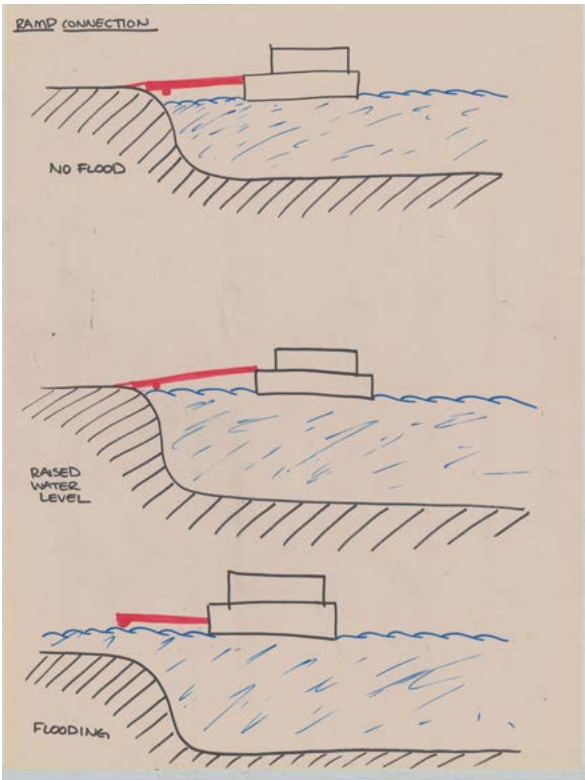
DISPLAY CASES



BALLAST



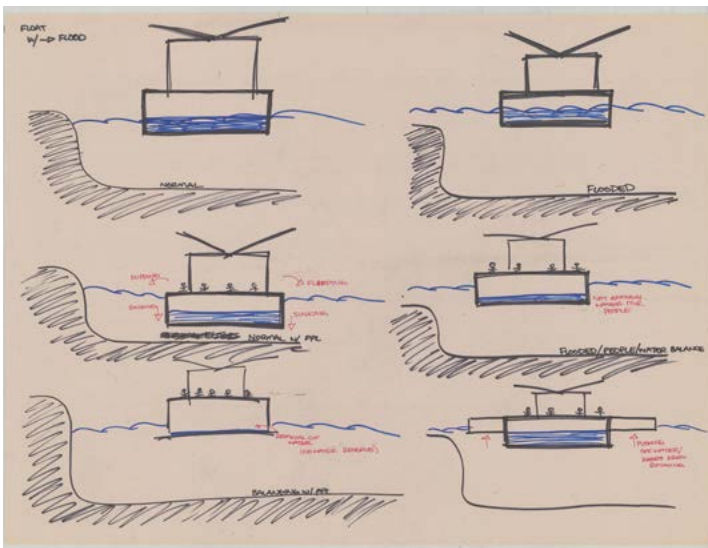
RELIEF IDEAS



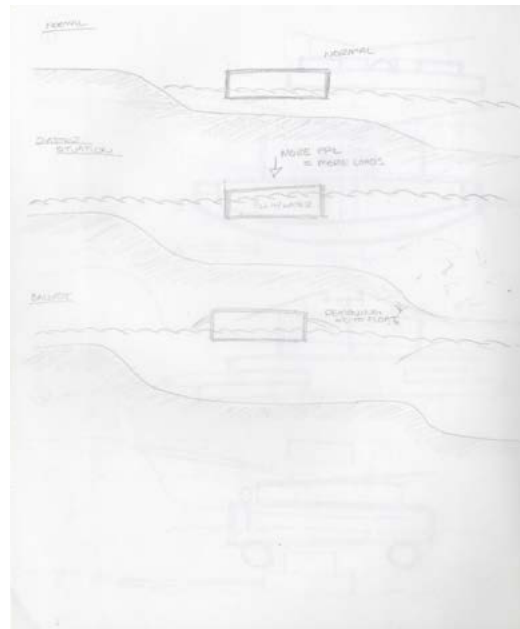
RAMP CONNECTIONS



EDGE CONDITION



FLOODING

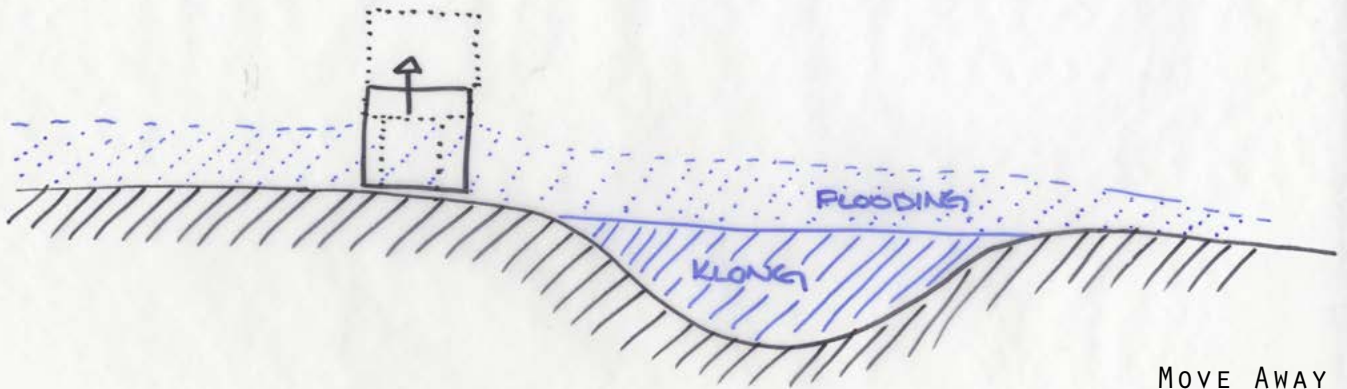
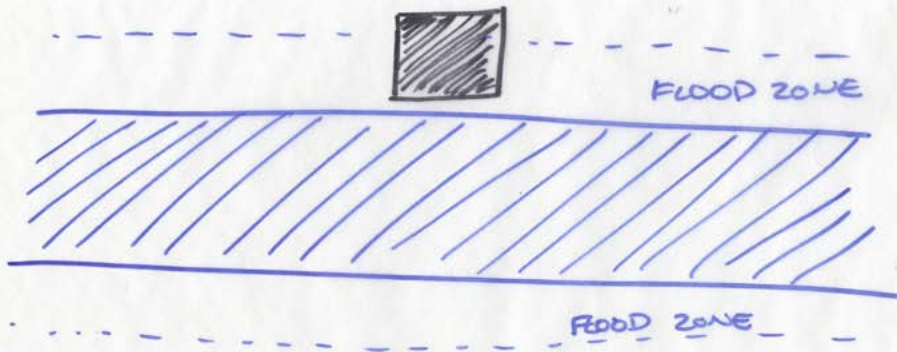


FLOATING

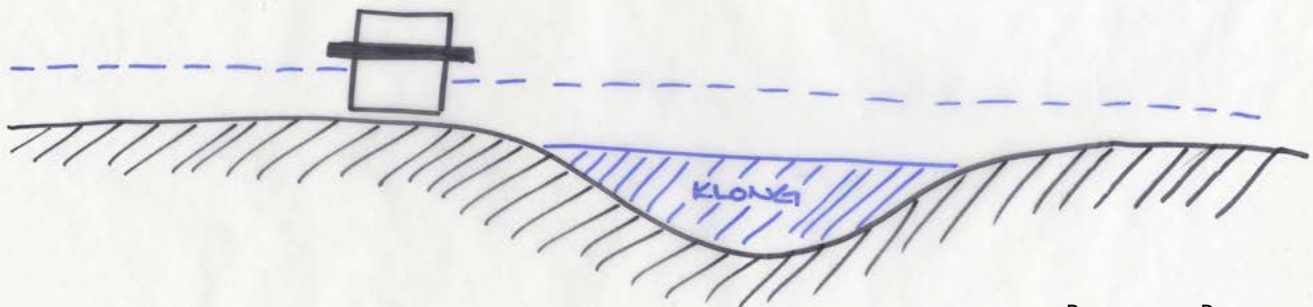
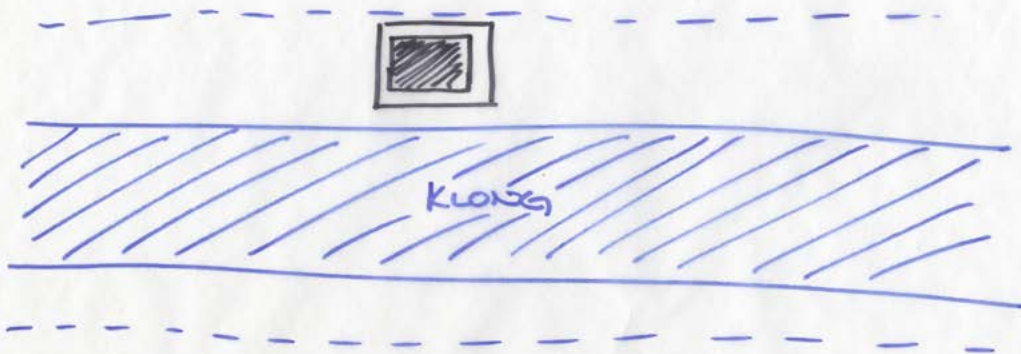
Floating Studies and Water Connections

Flood Solutions

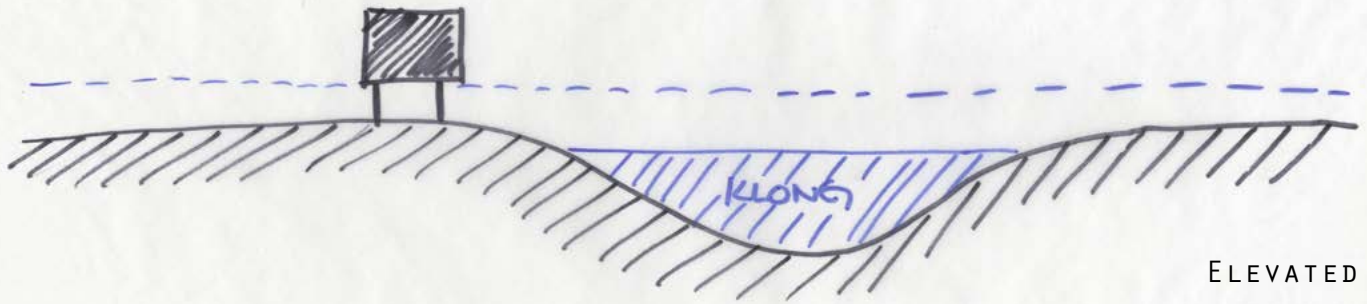
Massing



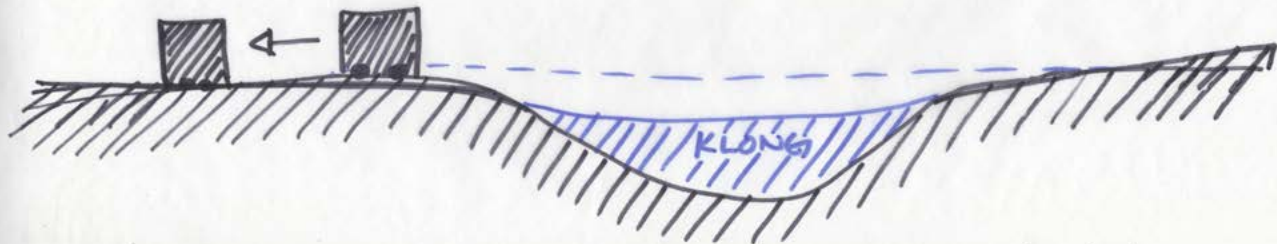
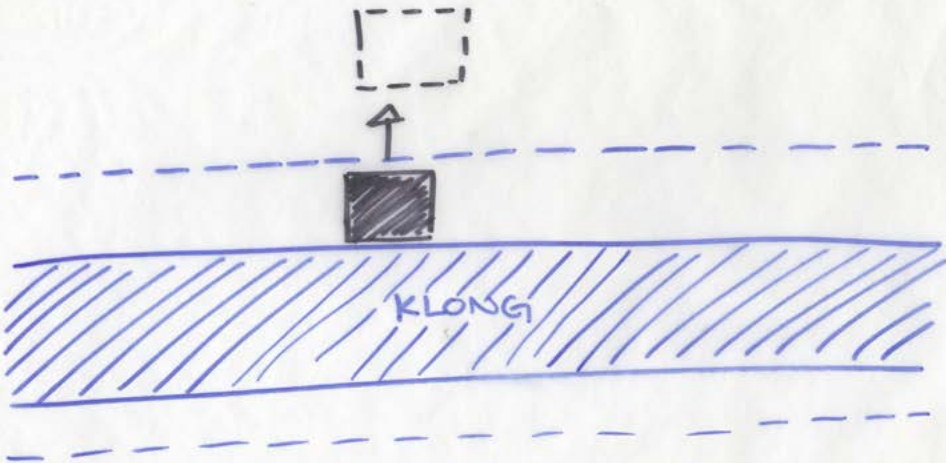
MOVE AWAY



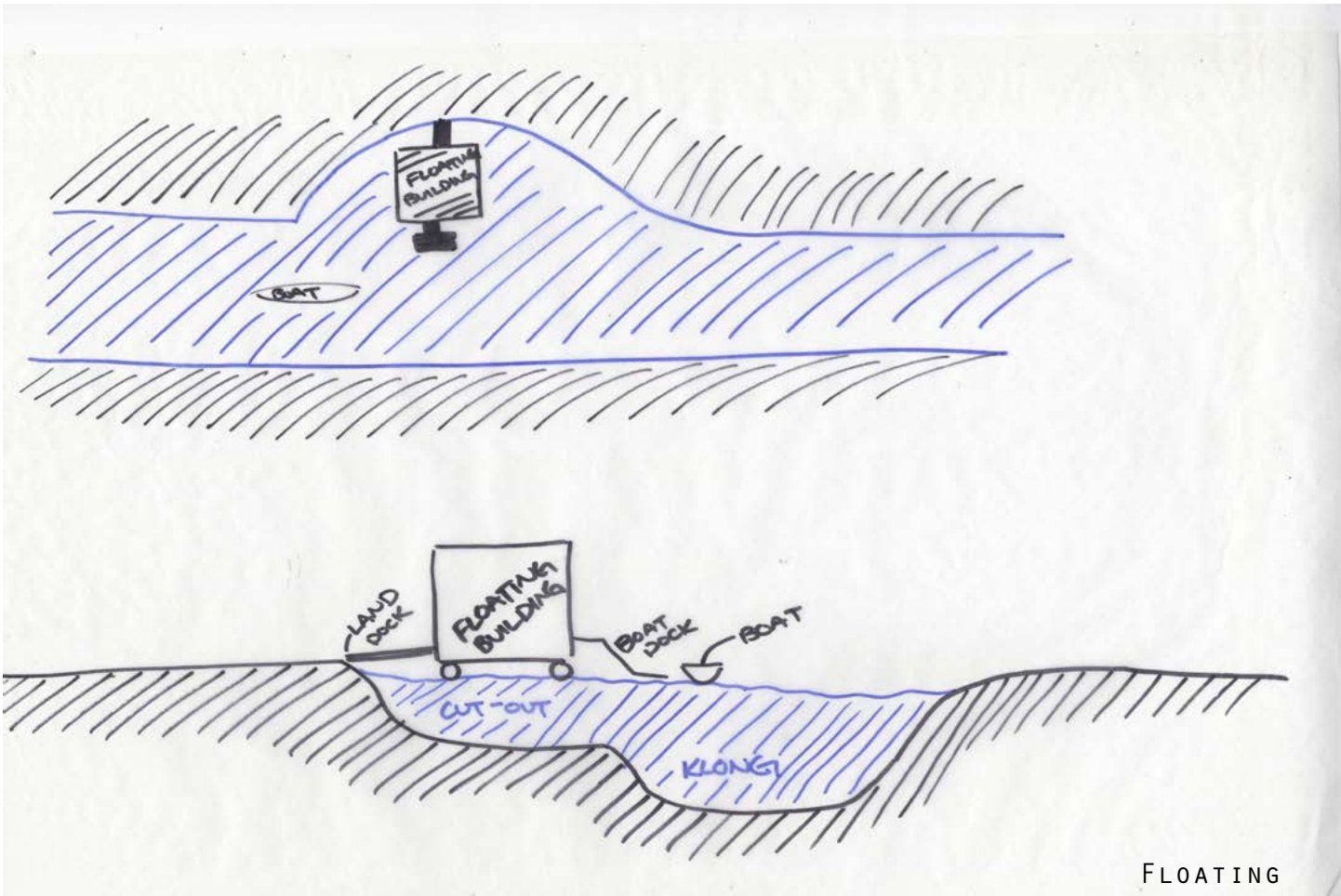
RAISED PLATFORM



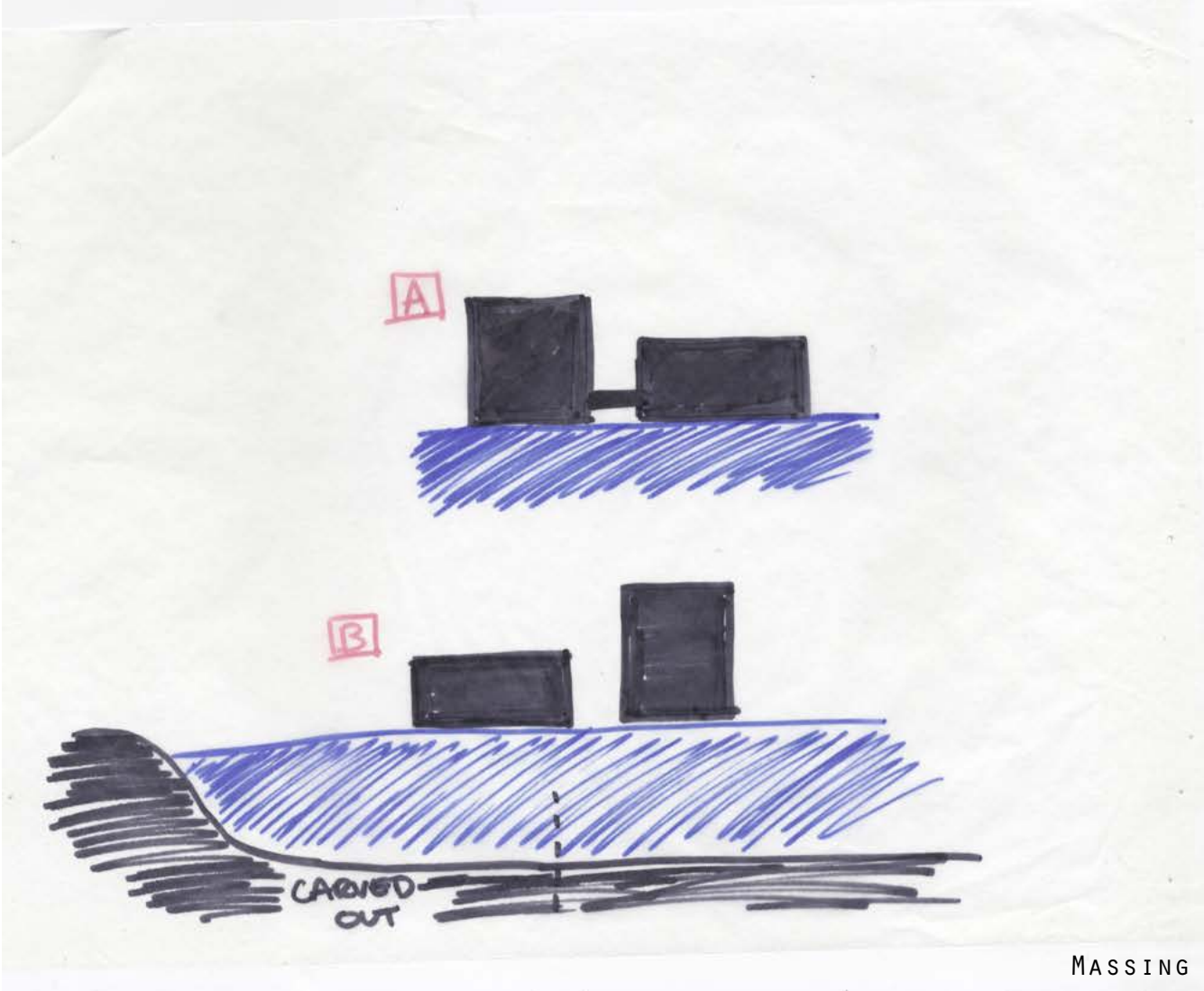
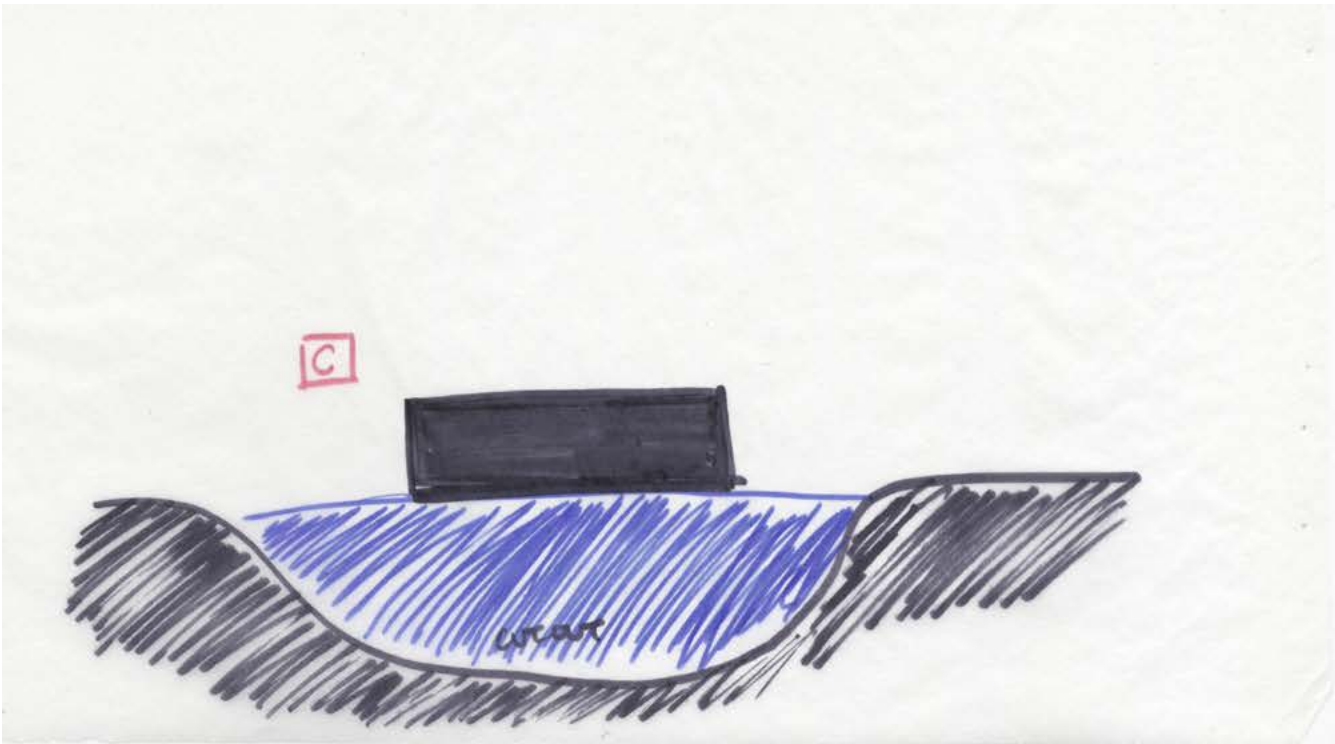
ELEVATED



MOVE AWAY



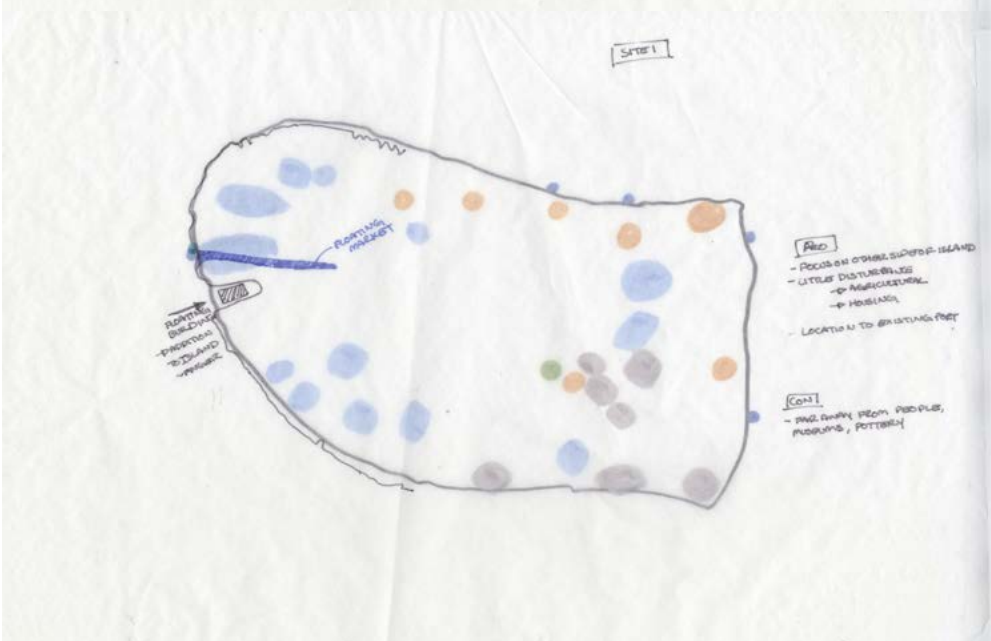
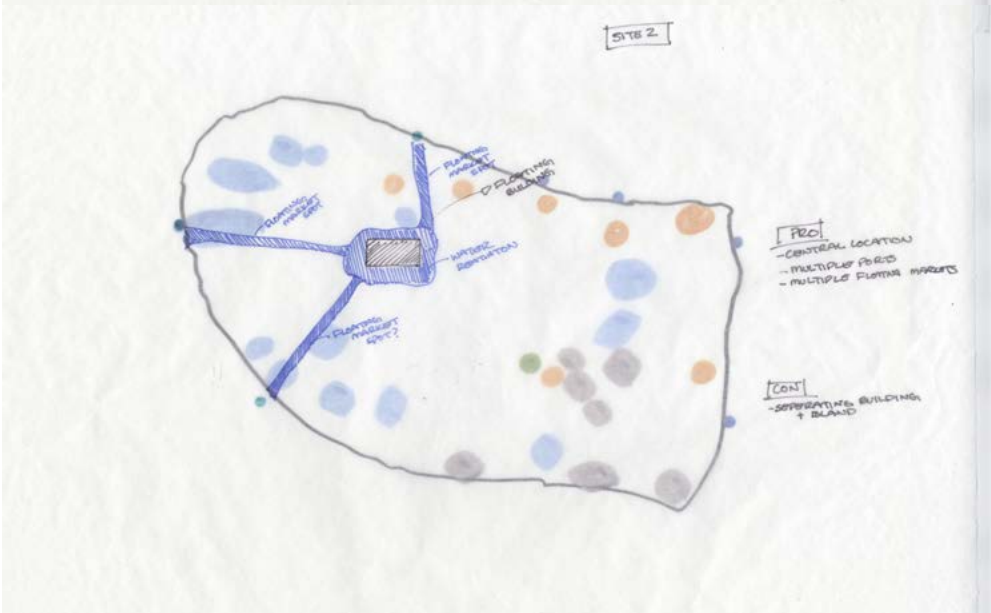
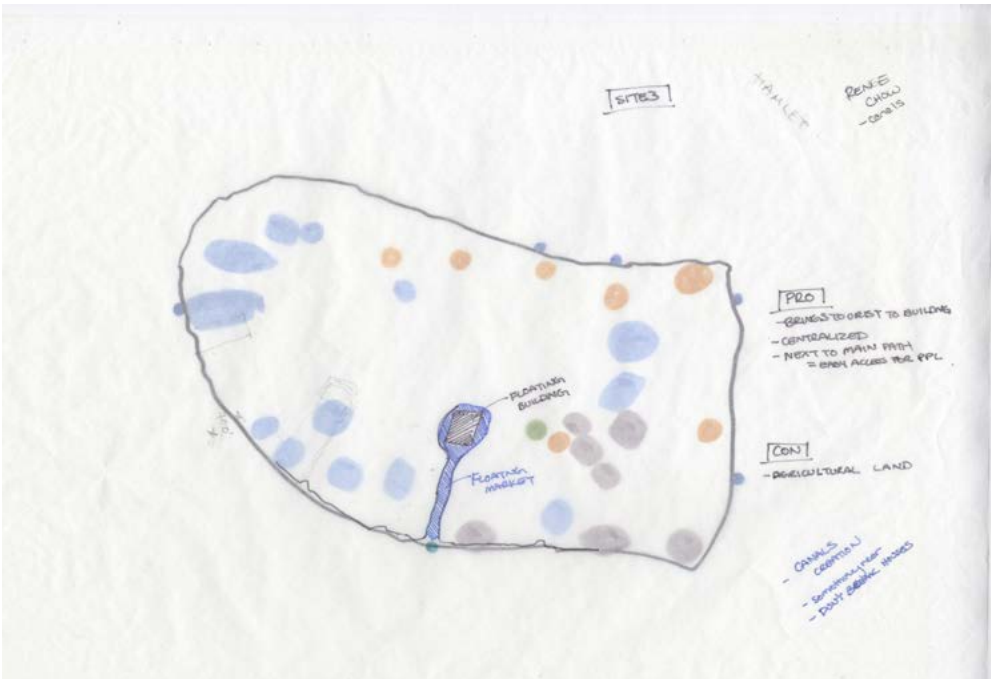
FLOATING

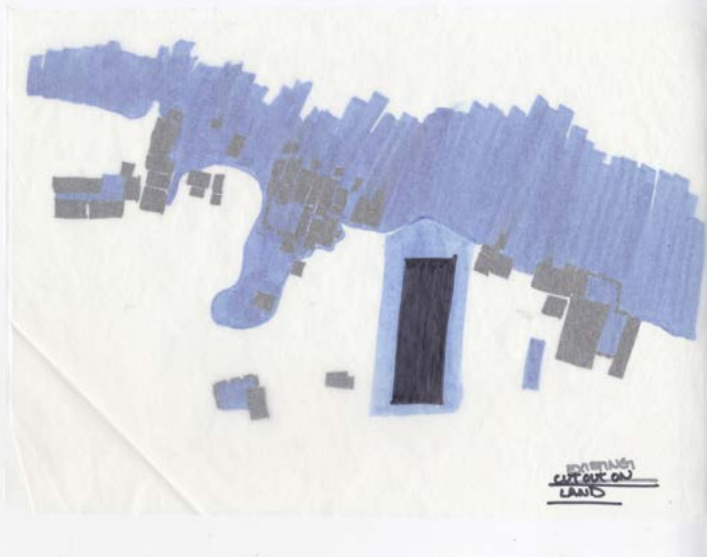
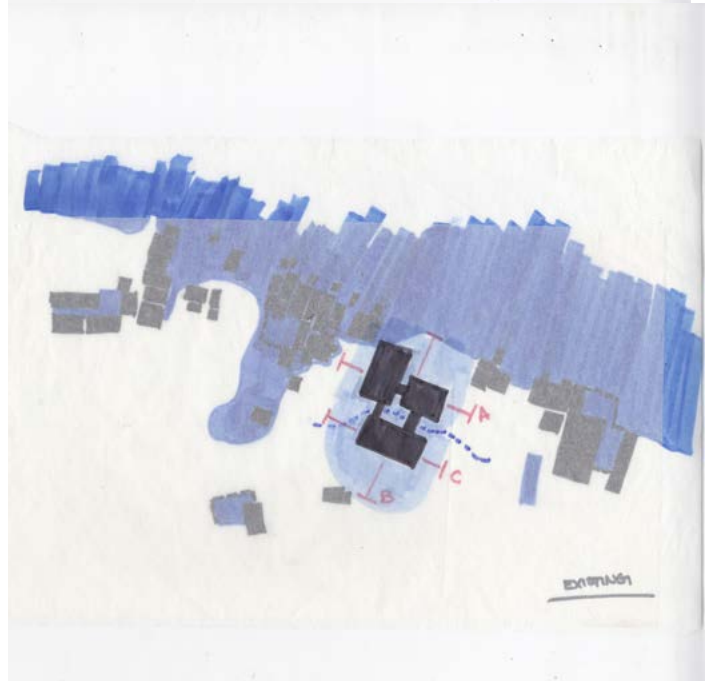
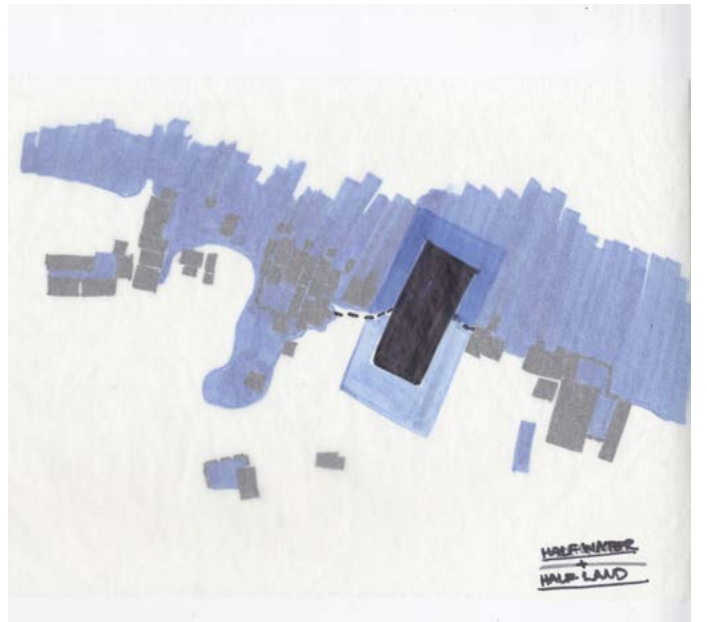
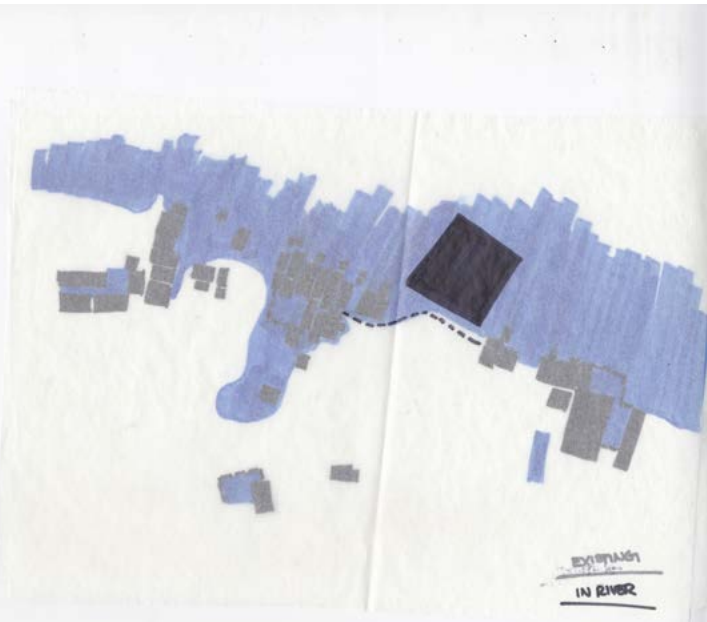


MASSING

Site Studies and Explorations

Island
Site-Edge Condition

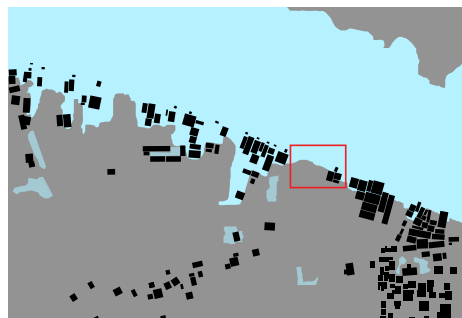
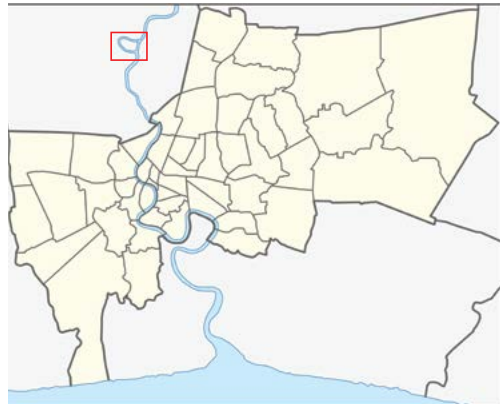




BUILDING SHAPE AND CONDITIONS

Site Analysis- Ko Kret, Thailand

Island
Site One
Site Two- Site Selected

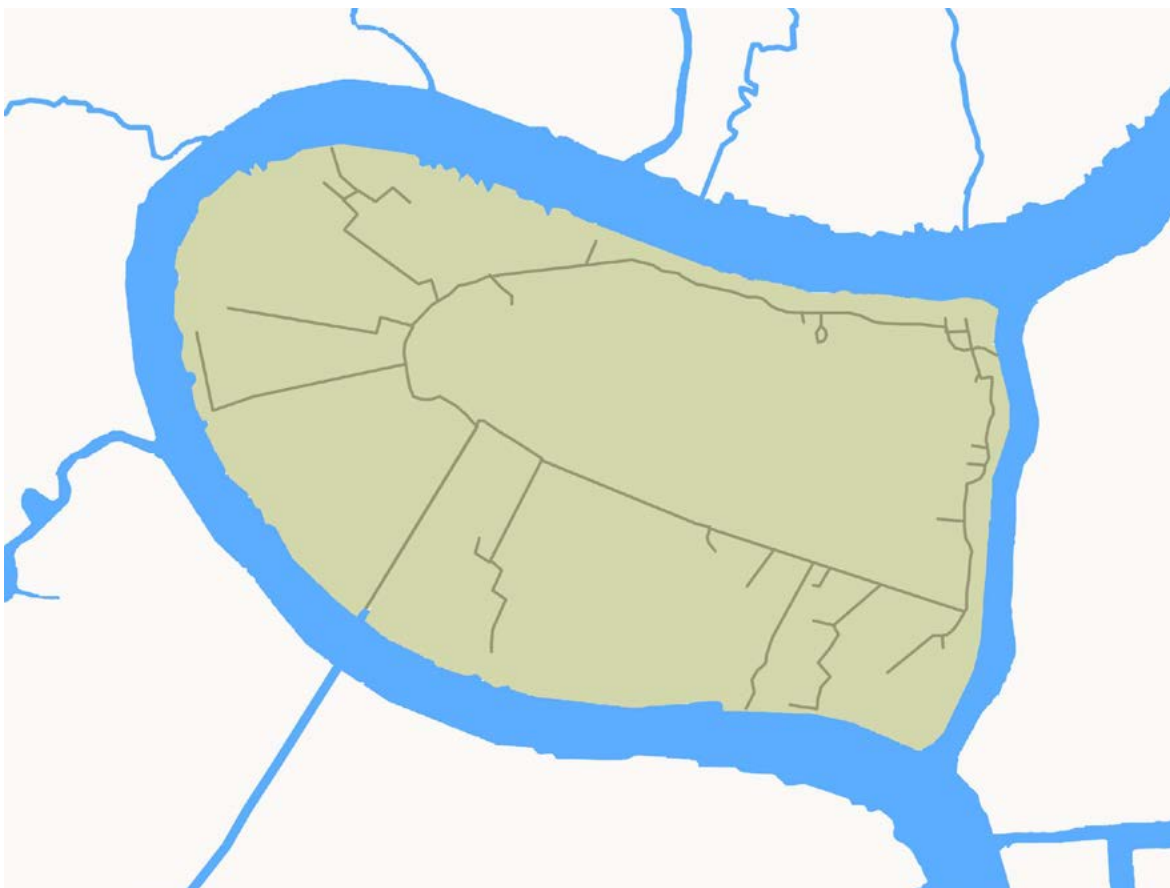


WORLD- THAILAND- BANGKOK-
KO KRET- SITE

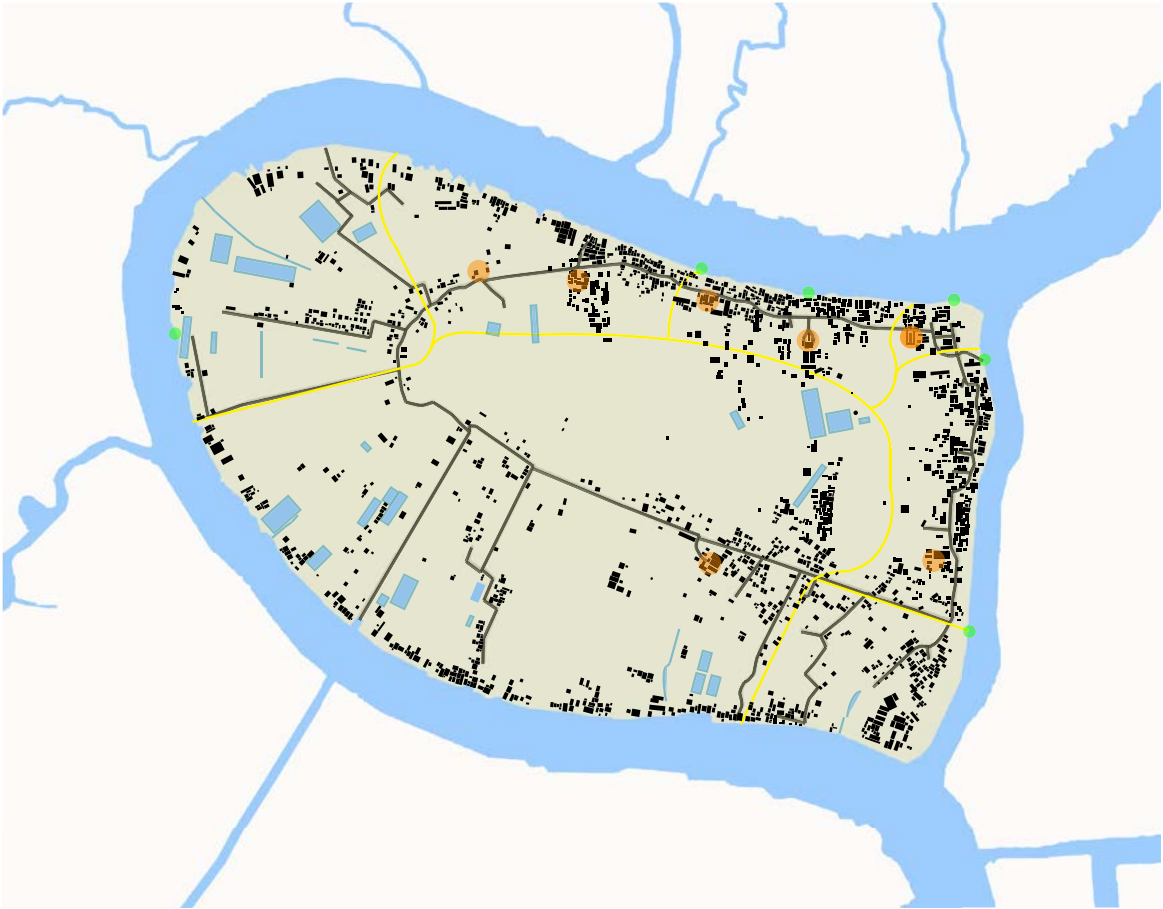




AGRICULTURE VS. DEVELOPMENT



ROADS ON KO KRET



MAJOR POINTS OF INTEREST



HYDROLOGY



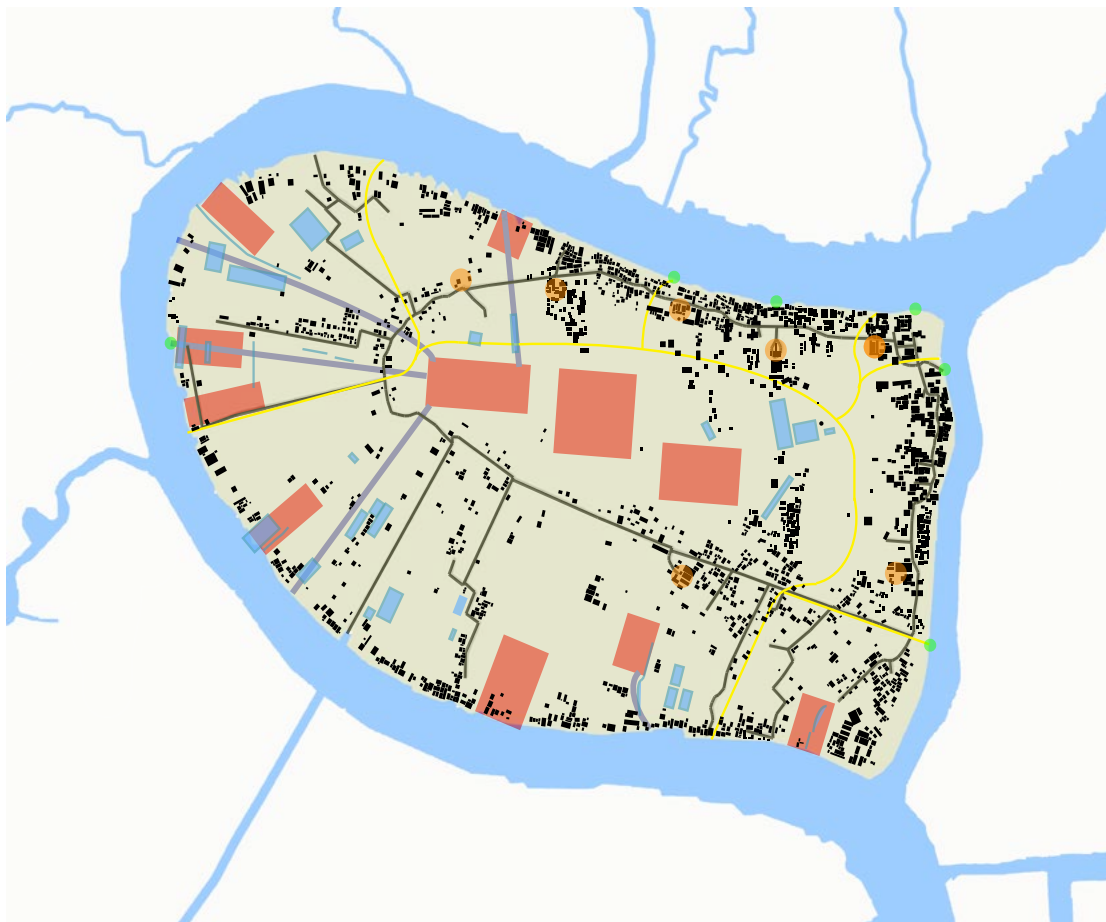
OLD HISTORY KLONG PATHS



SEVEN VILLAGES ON KO KRET

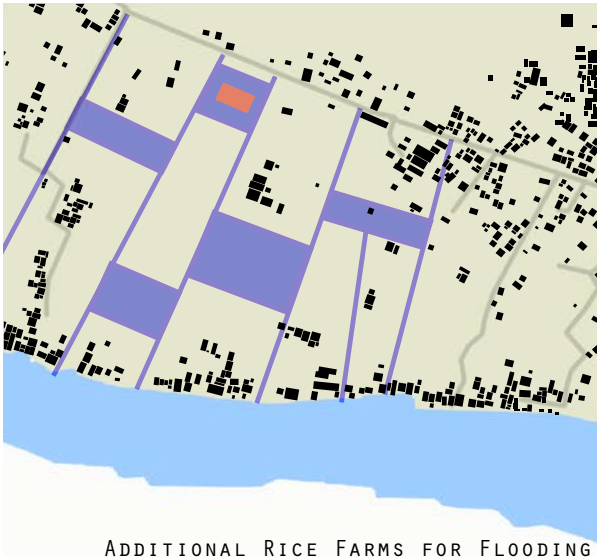


TOPOGRAPHY



POSSIBLE SITE SELECTIONS

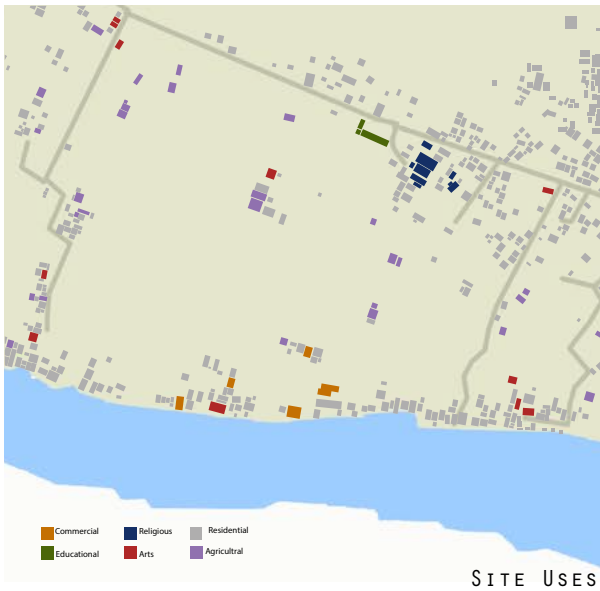
SITE ONE EXPLORATIONS



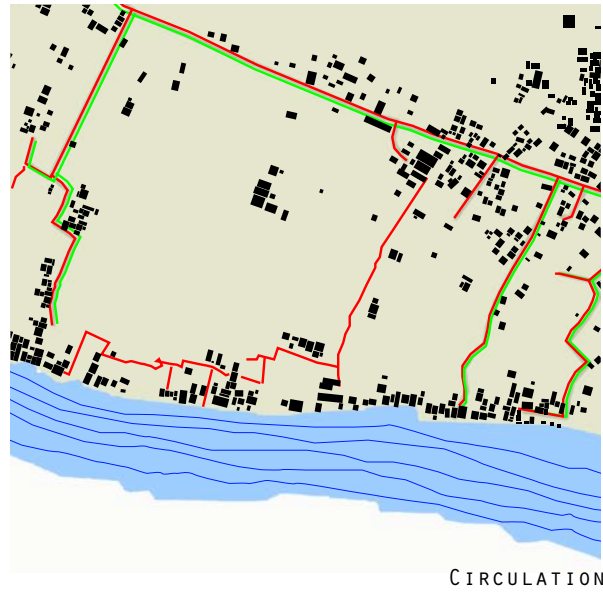
ADDITIONAL RICE FARMS FOR FLOODING



FARMING LAND



SITE USES



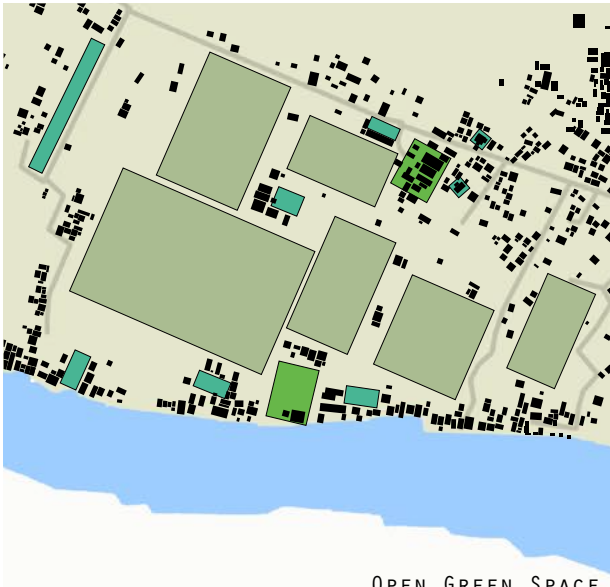
CIRCULATION



AERIAL PHOTOGRAPHY OF SITE



FIGURE GROUND



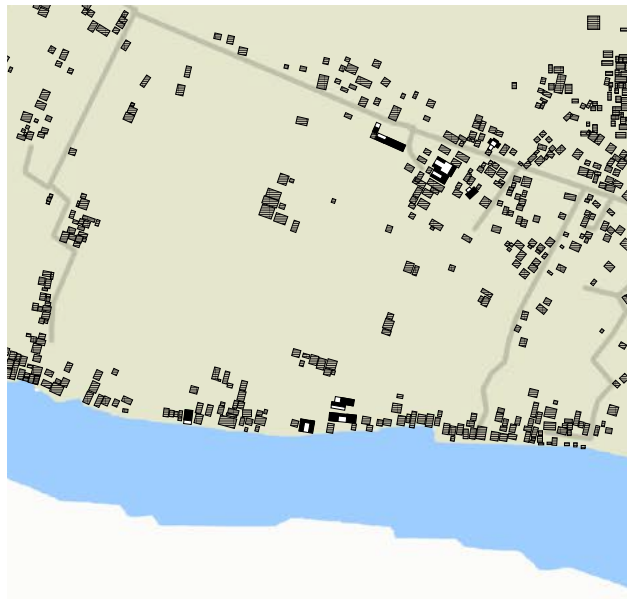
OPEN GREEN SPACE



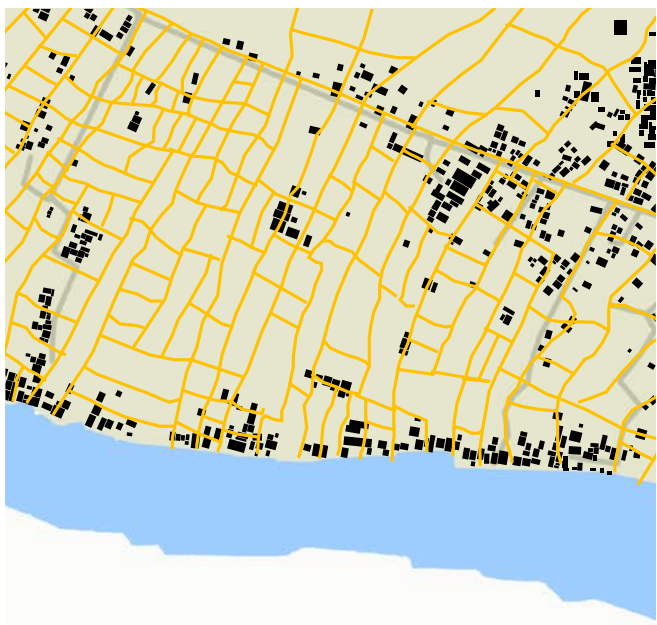
SITTE



HYDROLOGY



NOLLE



PROPERTY LINES



FORMAL TO INFORMAL SPACES

SITE TWO- SELECTED SITE

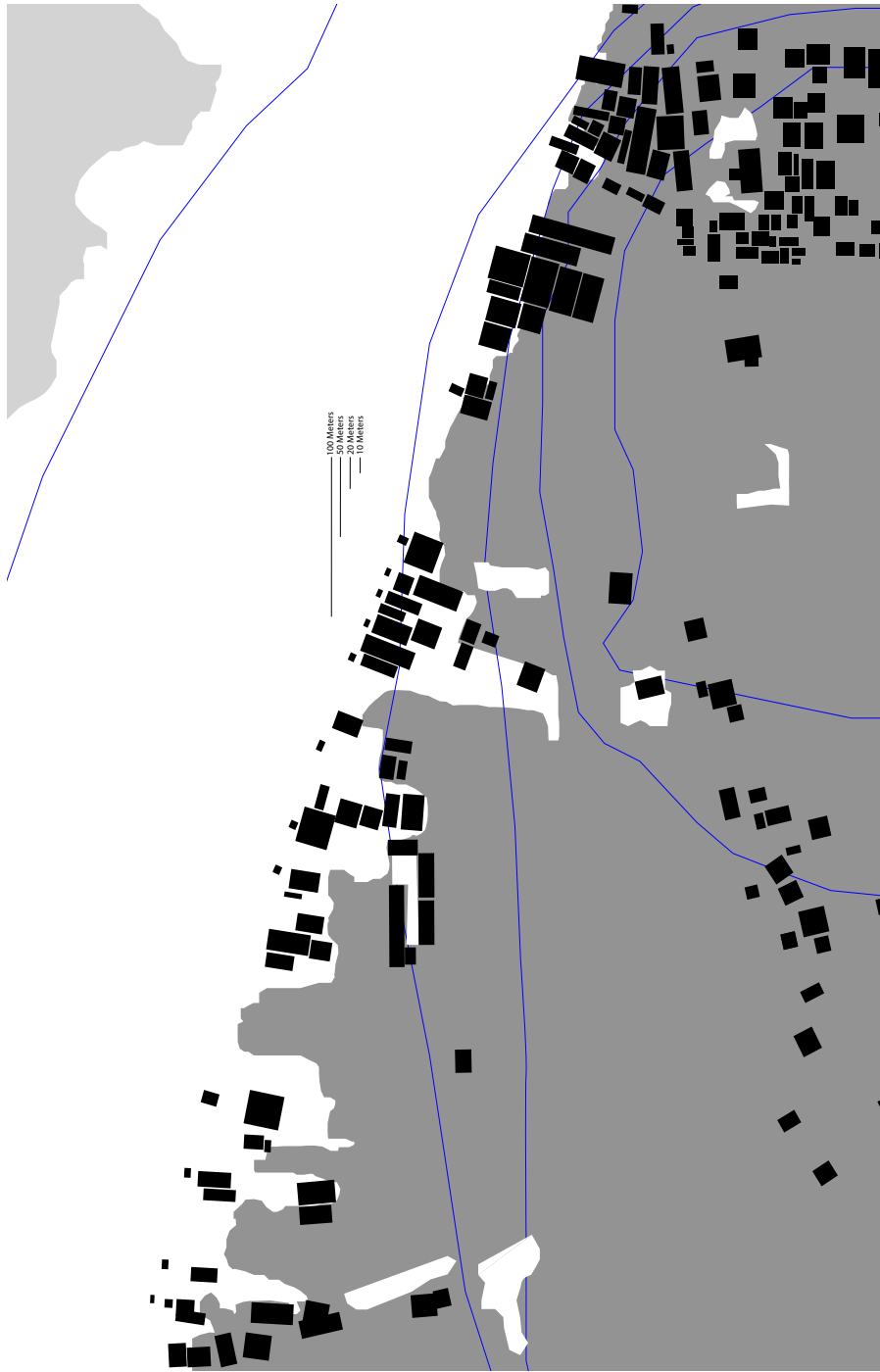
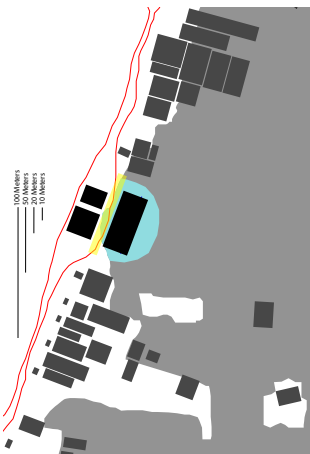
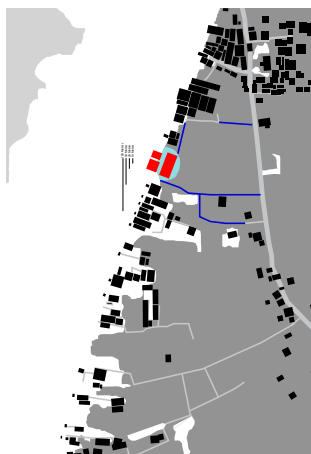


FIGURE GROUND



CIRCULATION PATHS ON WATER



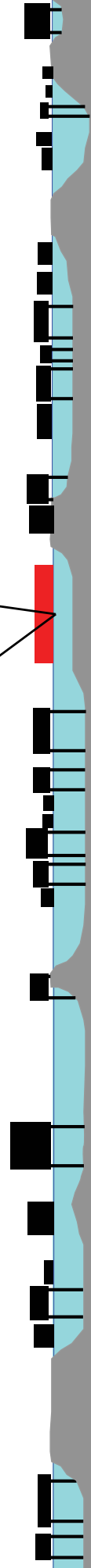
CIRCULATION TO SITE



AERIAL PHOTOGRAPHY

Sun Angle-April 20
97 Degrees (highest)

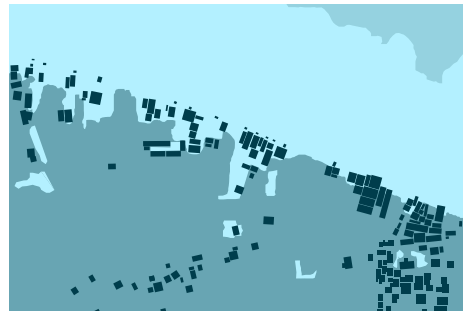
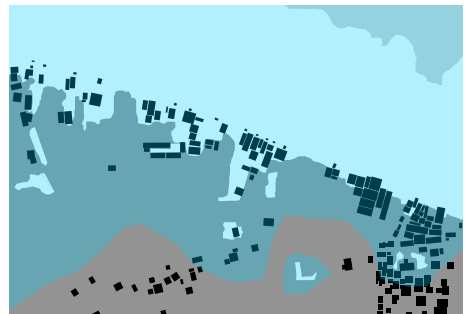
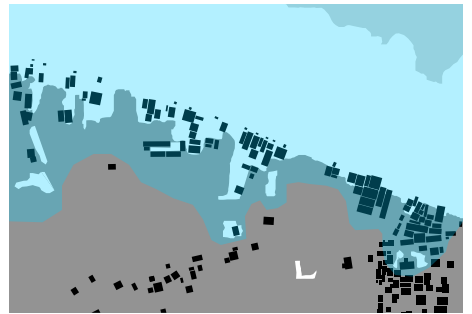
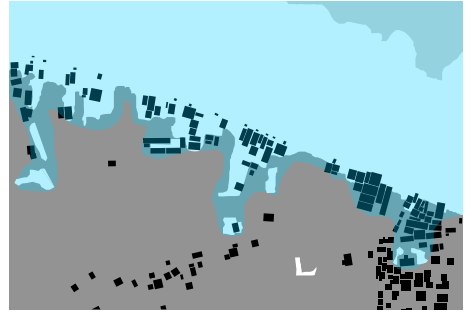
Sun Angle-December 21
53 Degrees (lowest)



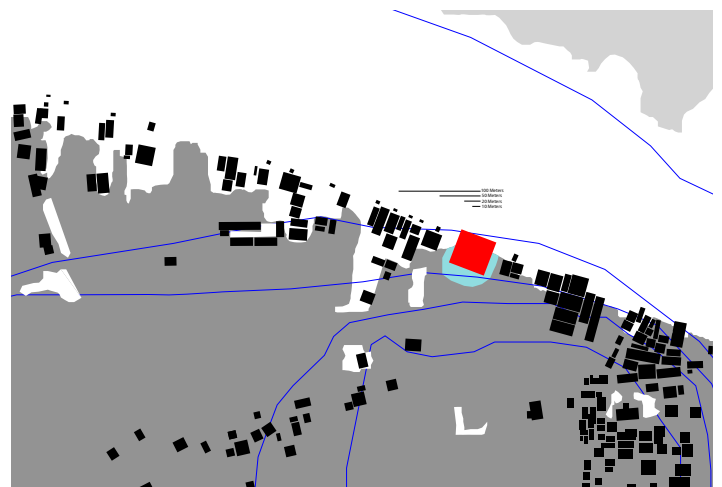
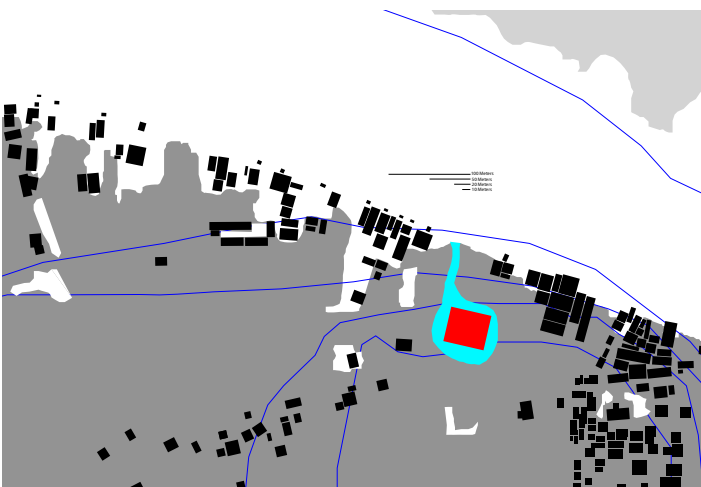
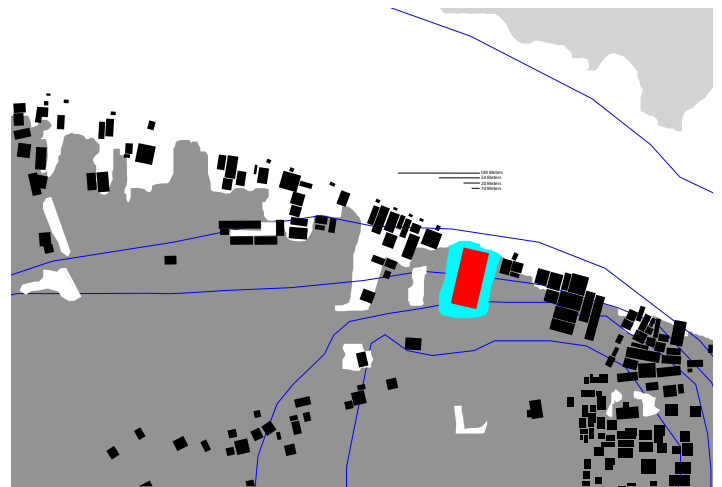
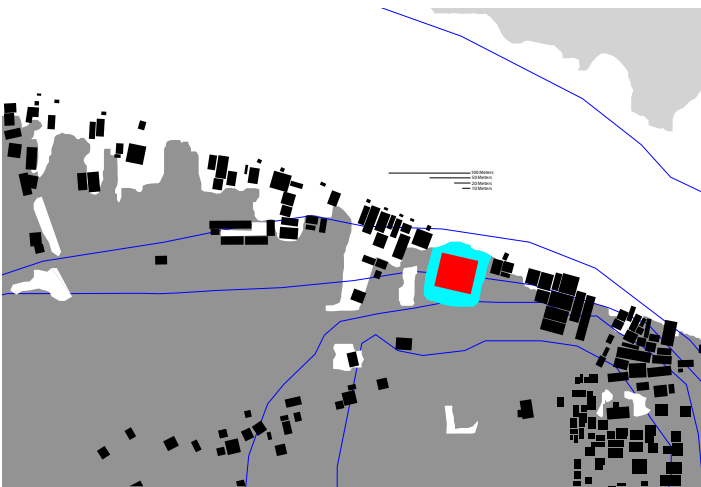
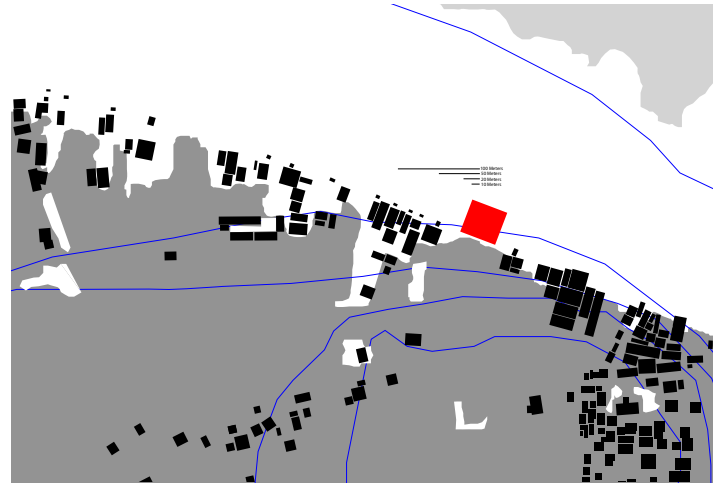
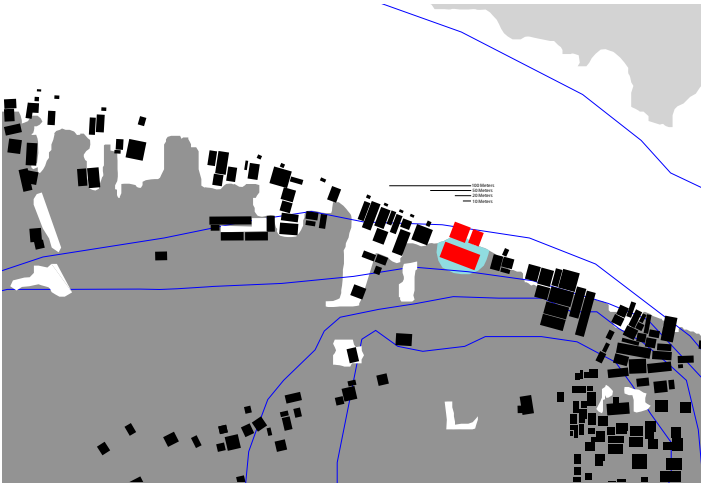
SUN ANGLES

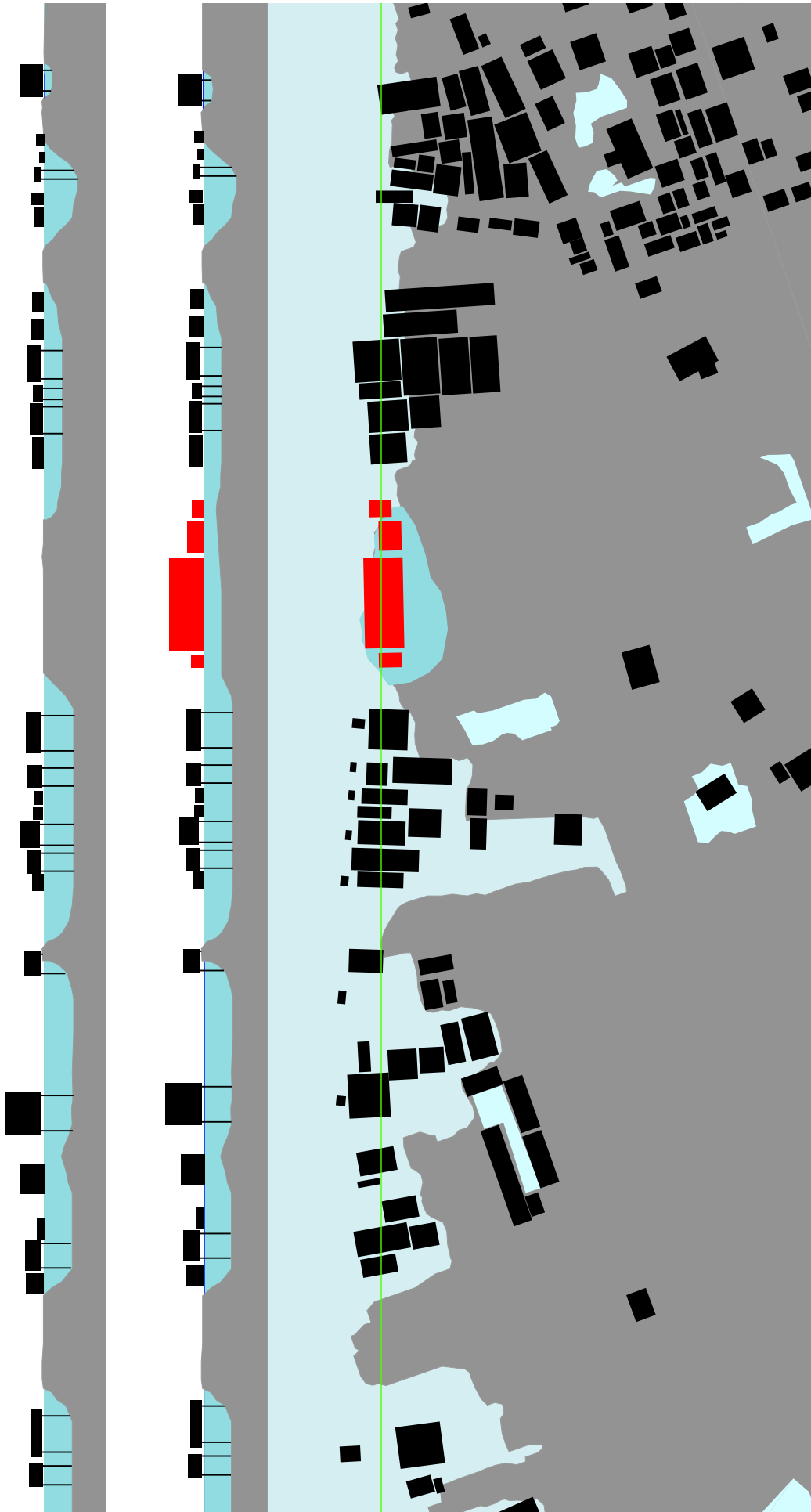


FLOODING LEVELS ON KO KRET ISLAND
0.5 METERS TO 3 METERS

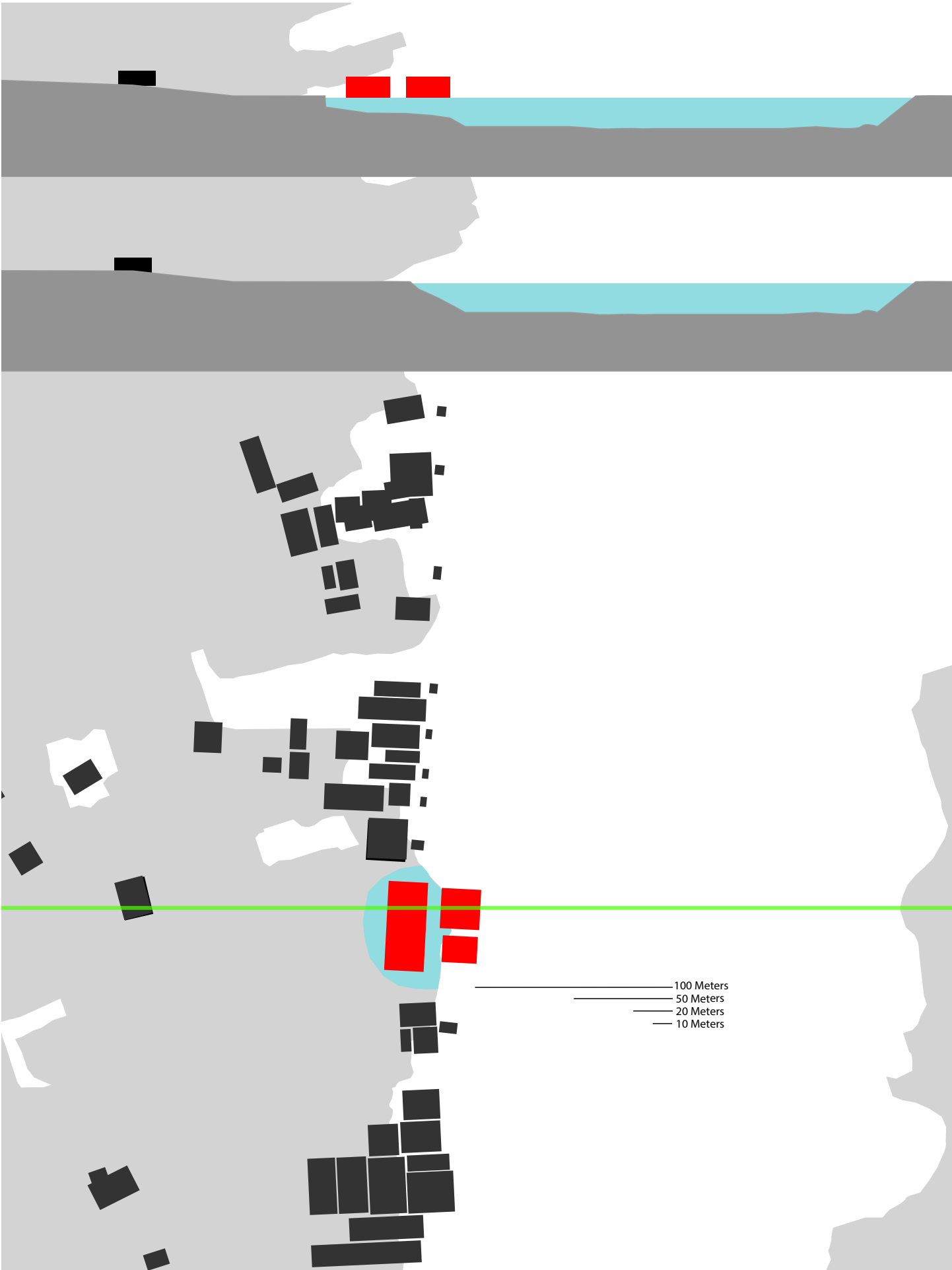


EXPLORATION OF EDGE CONDITIONS WITH THE SITE





SITE SECTION



SITE SECTION B

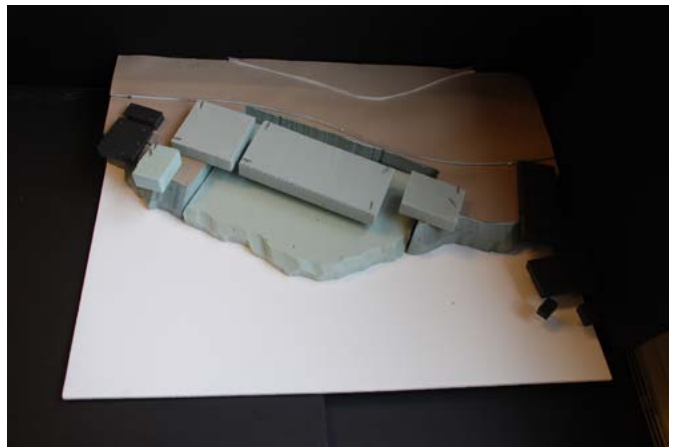
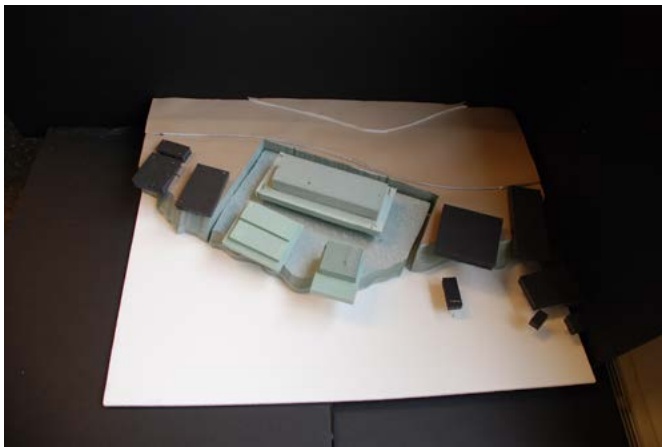
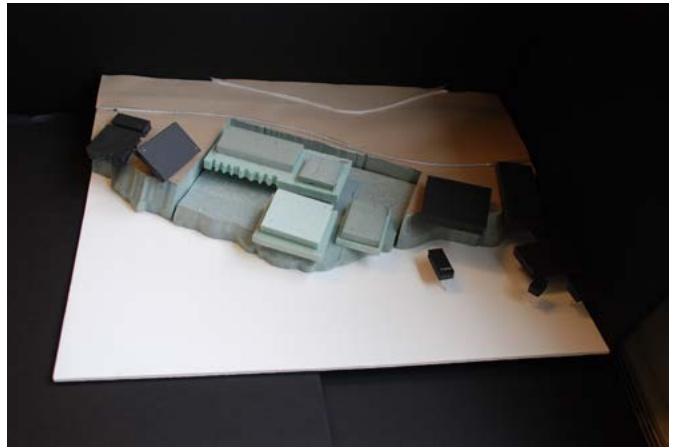
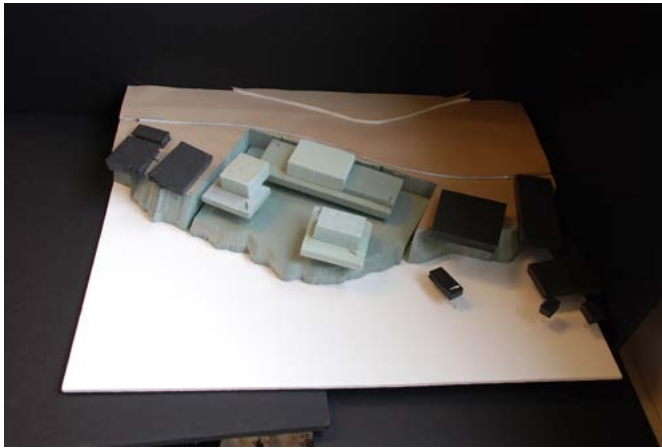
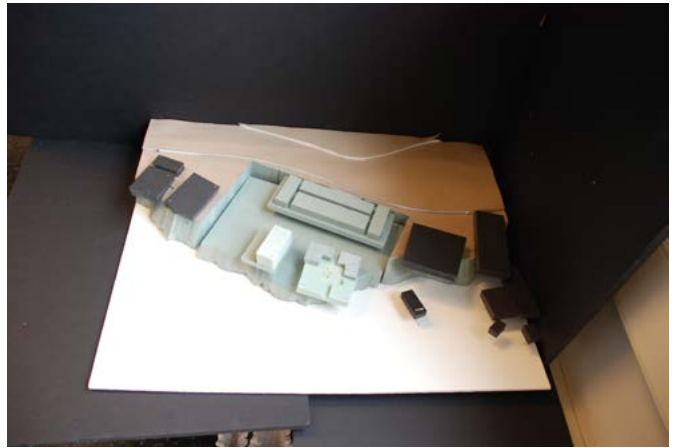
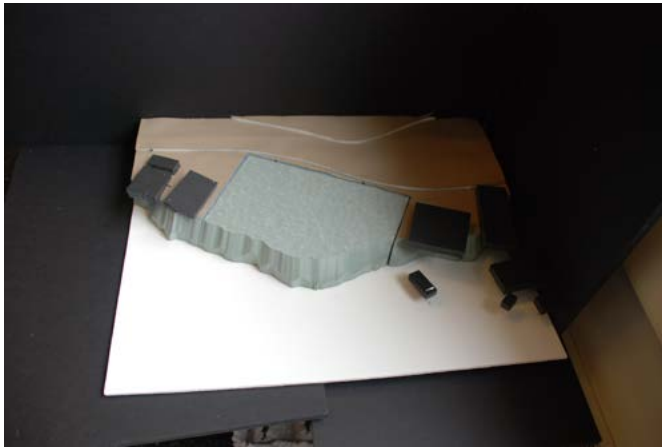


RENDERED SITE

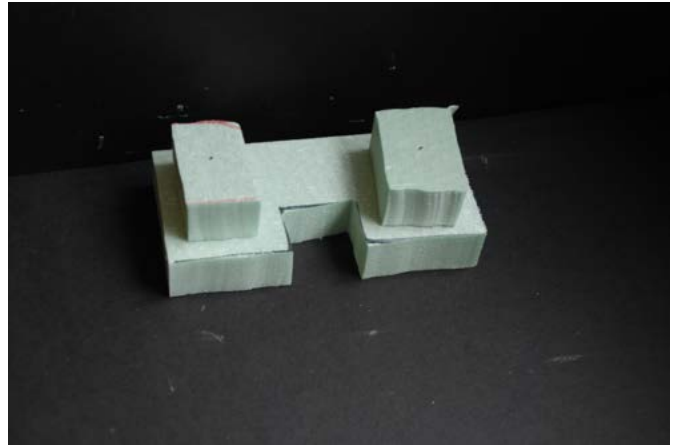
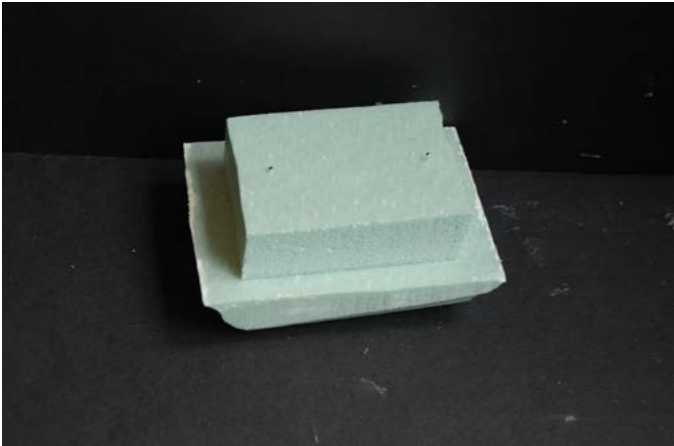
Process

Massing Studies

Forms
Site Studies

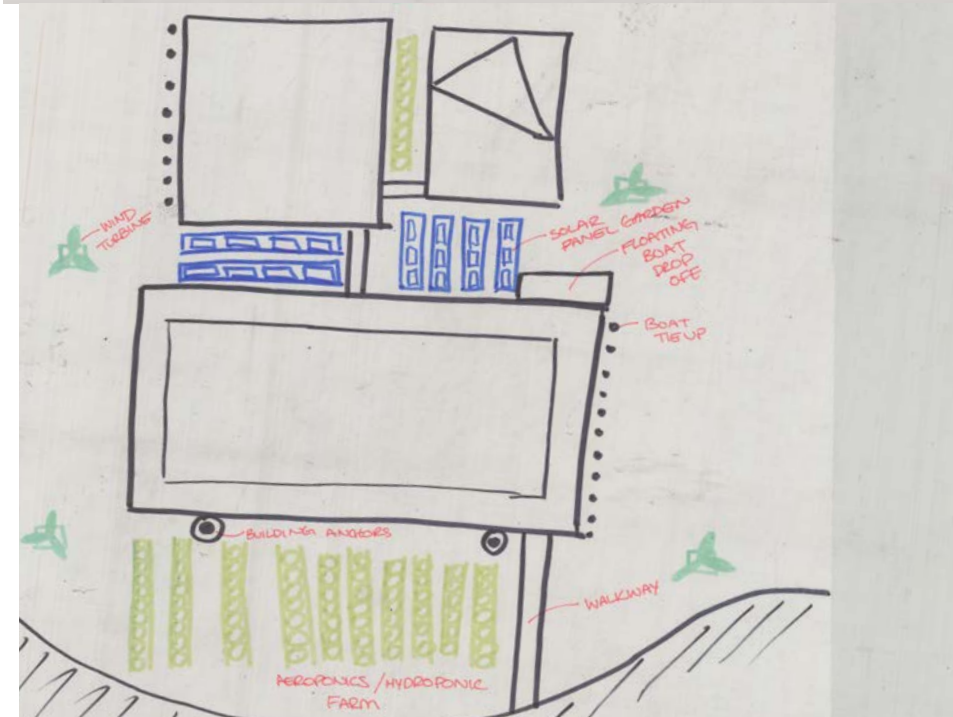
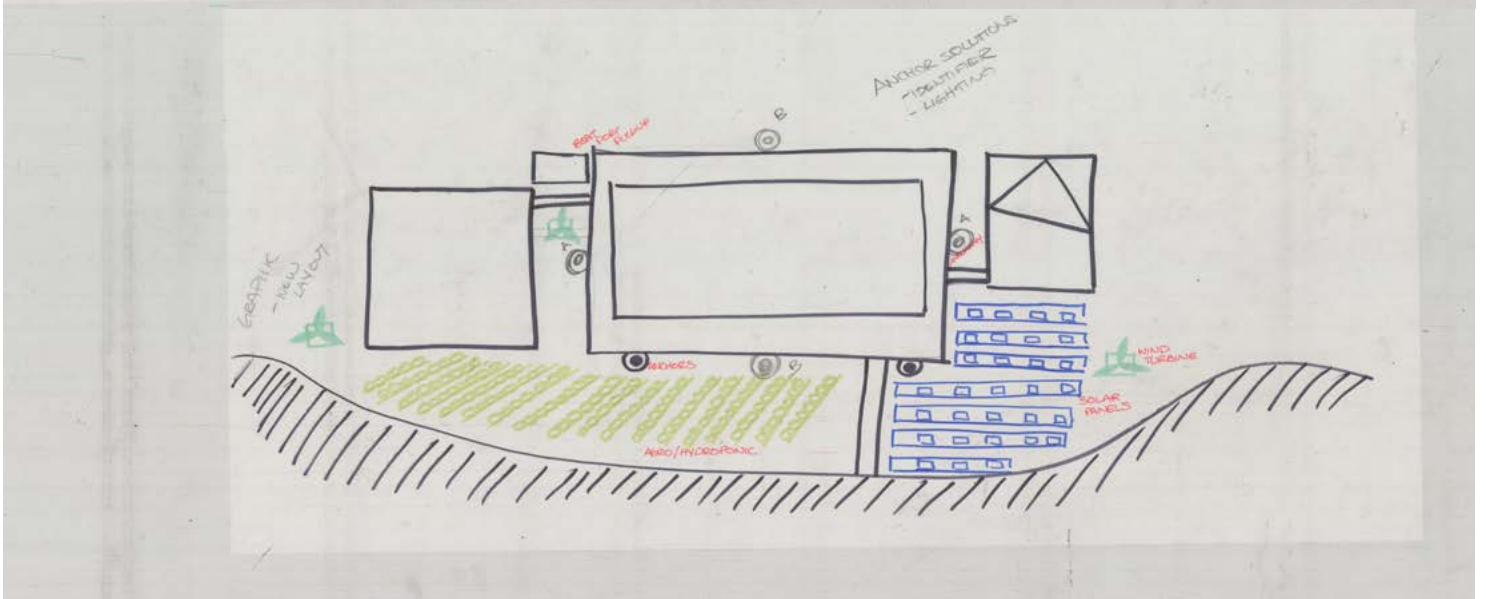
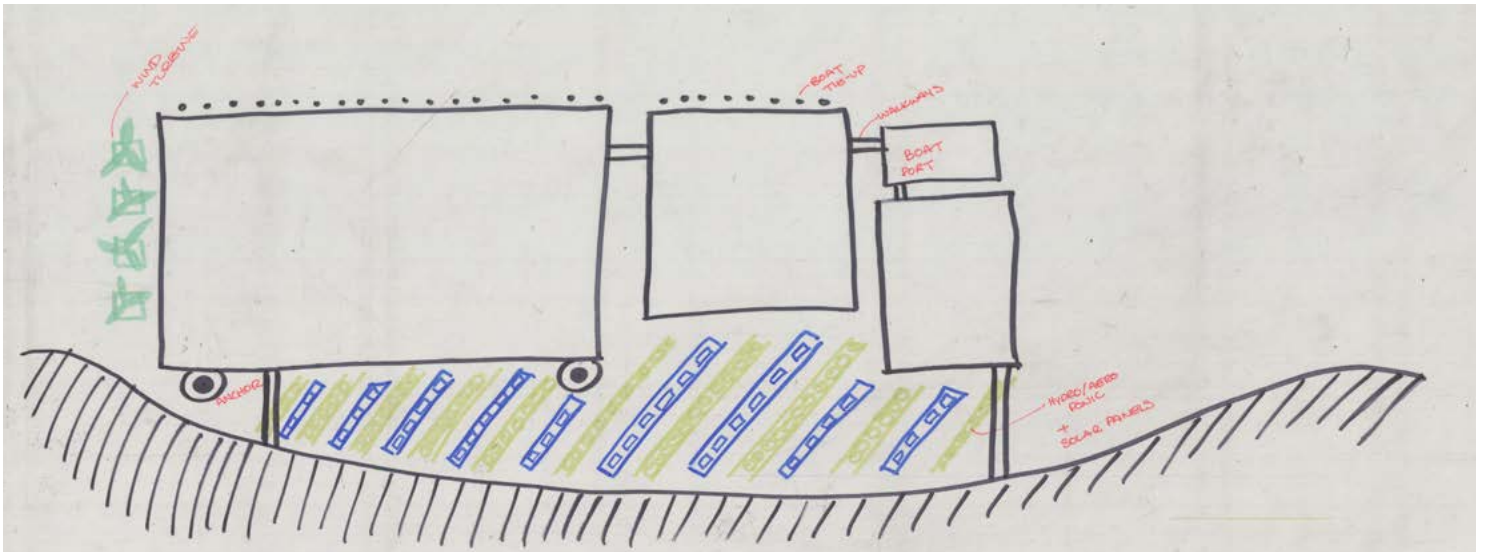


SITE MASSING STUDIES

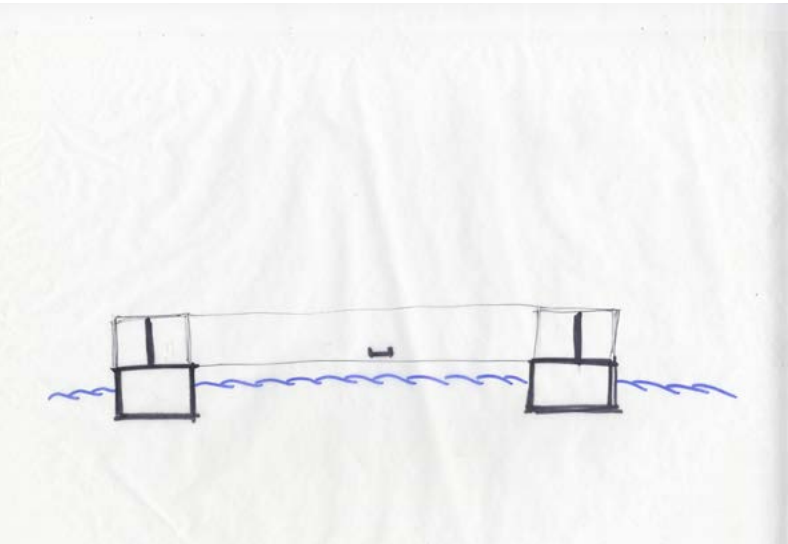


FORM STUDIES

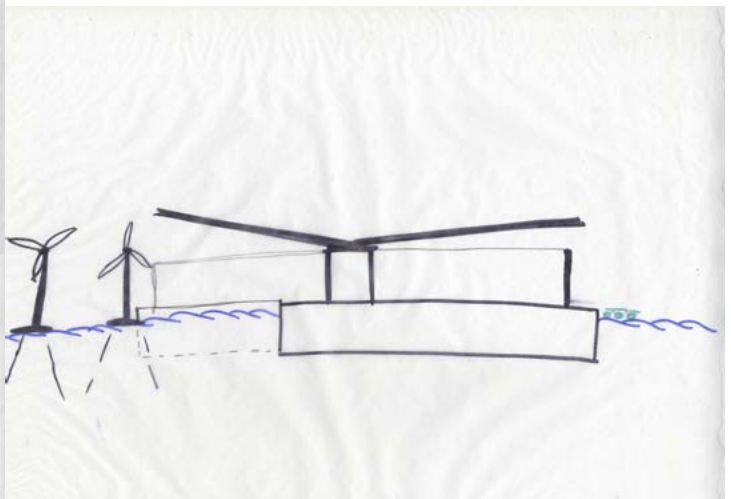
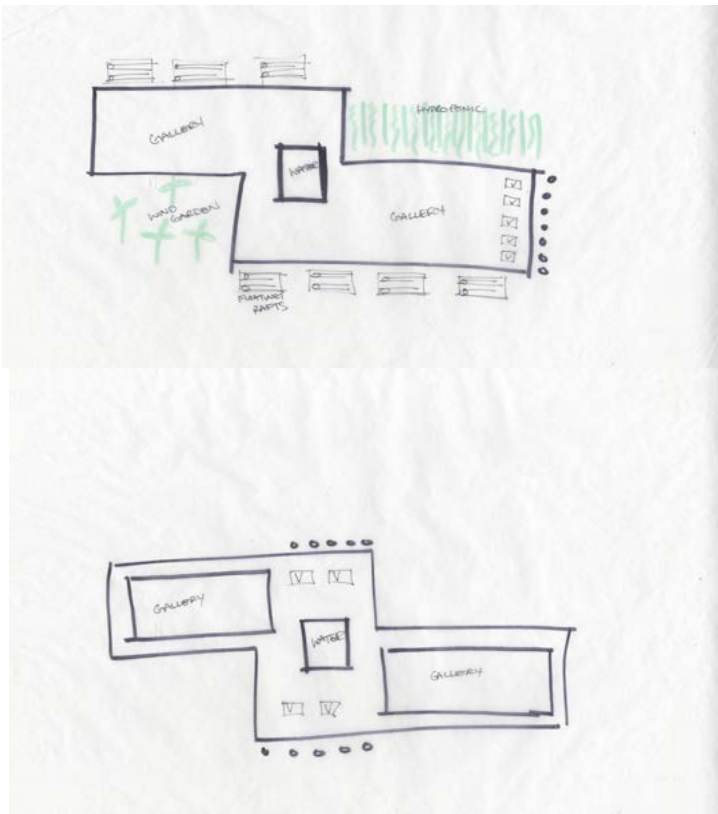
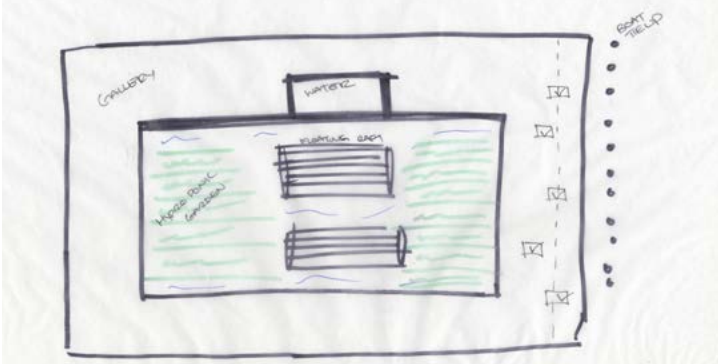
Initial Design Drawings



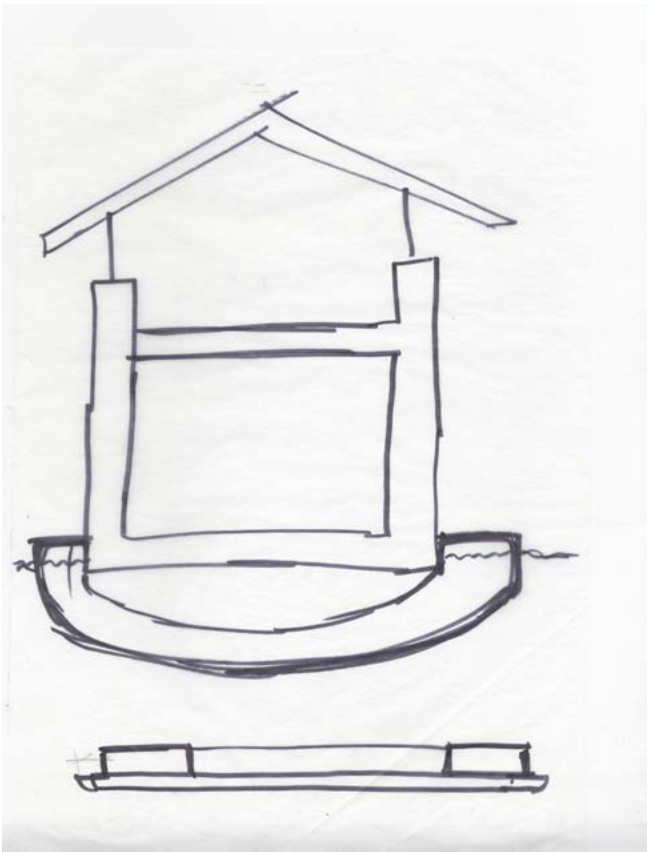
BUILDING ARRANGEMENT AND GREEN IDEAS



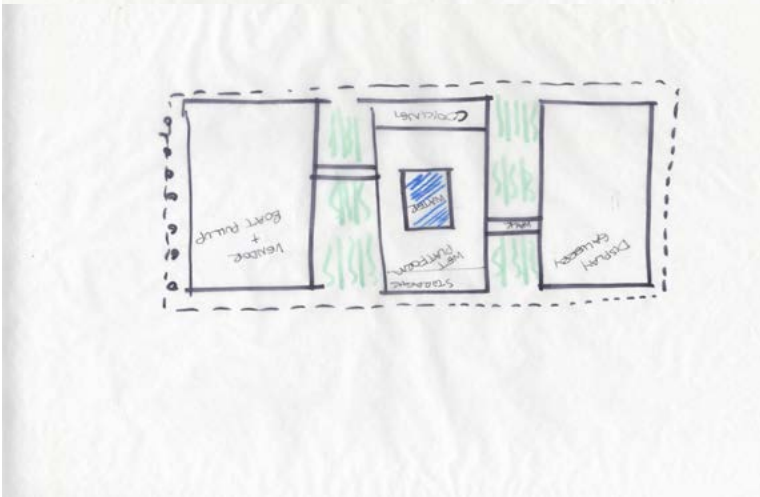
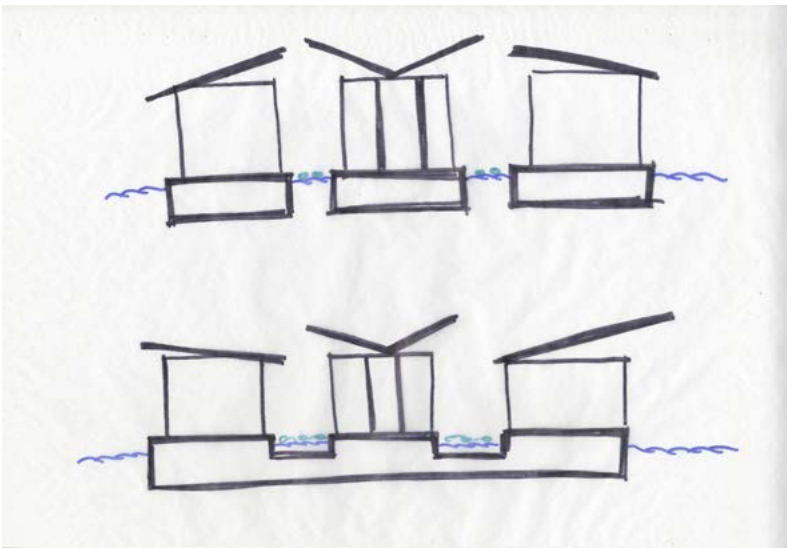
DONUT SOLUTION



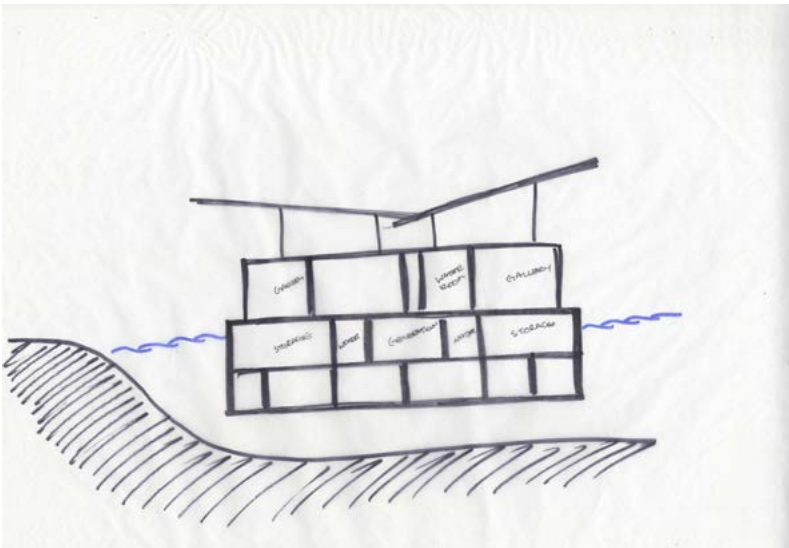
Z SOLUTION



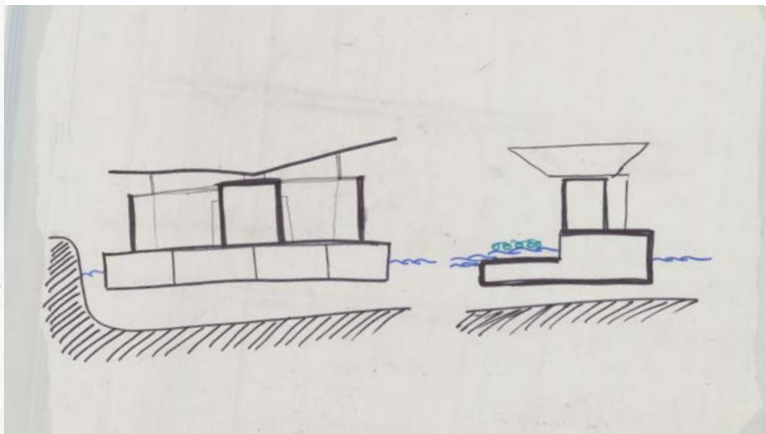
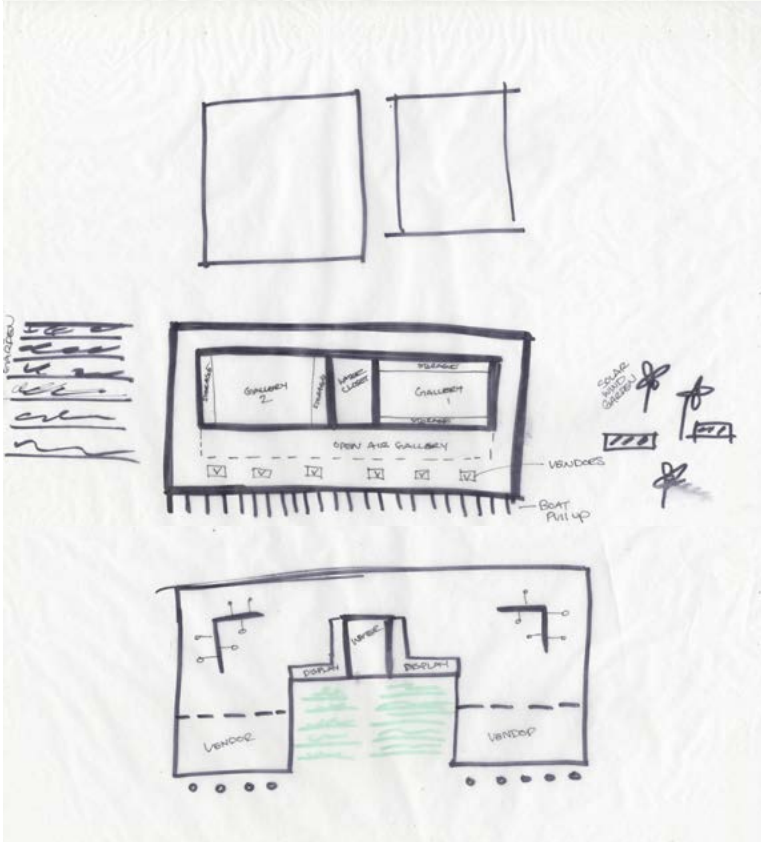
SECTION



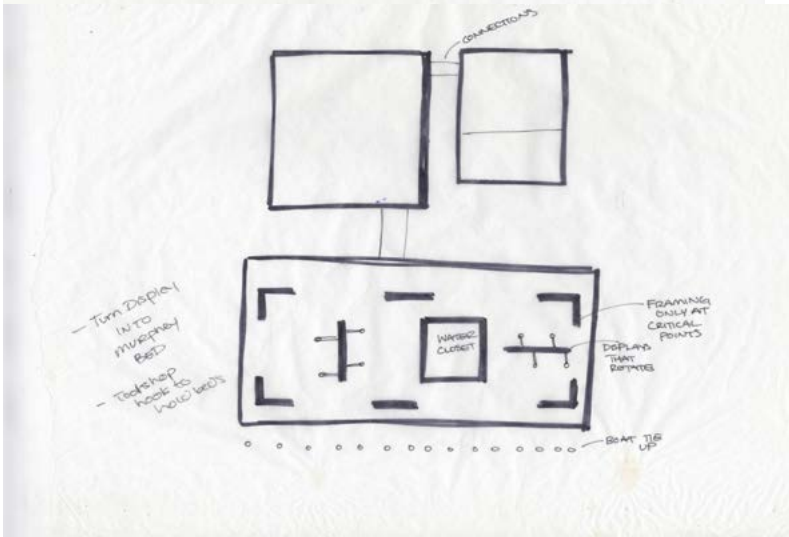
THREE BUILDINGS SOLUTION



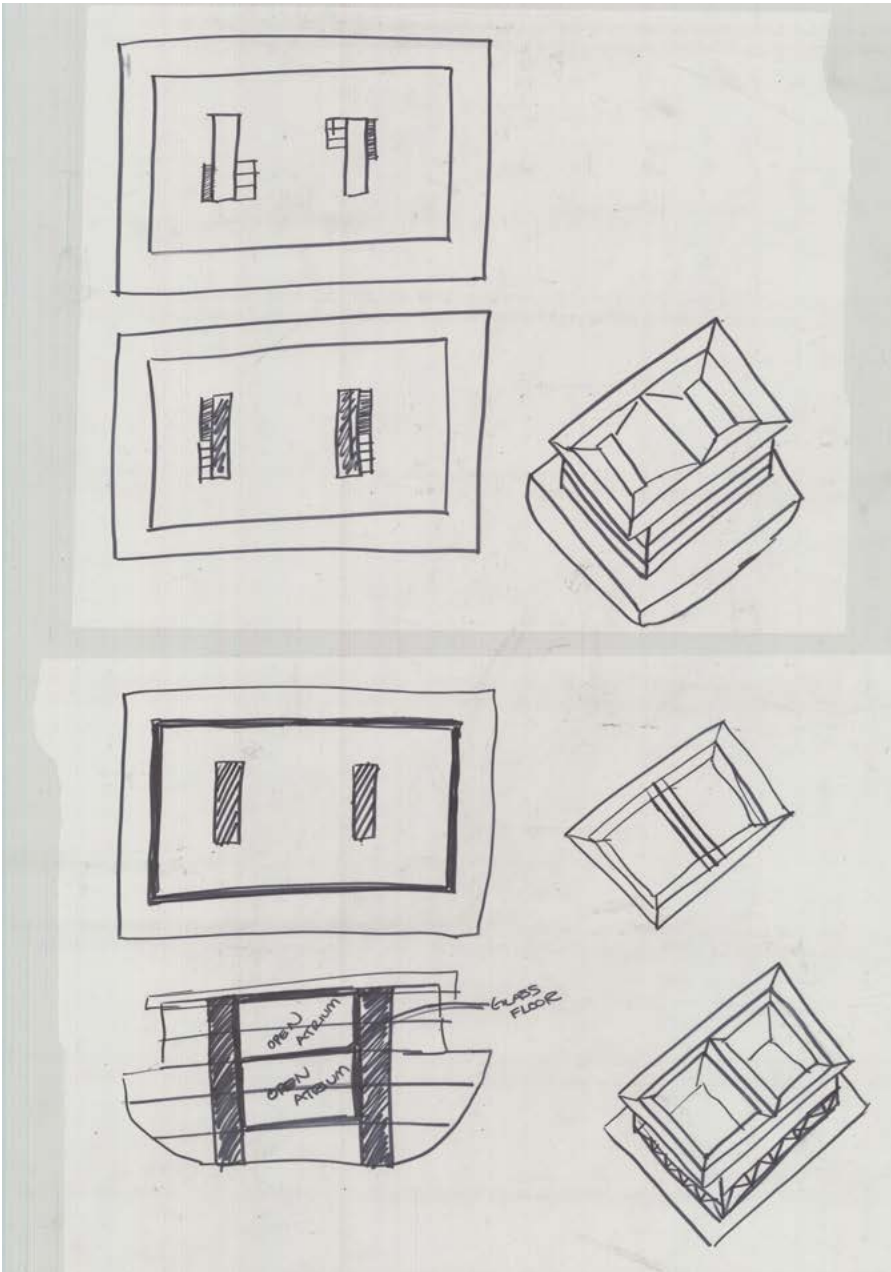
SECTIONS STACKING



C SOLUTION



RECTANGLE SOLUTION



DONUT INITIAL CONCEPT

3D MASSING EXPLORATION



Plaster/ Concrete Model Studies

Forms
Concrete
Floating Tests



RECTANGLE FORMS







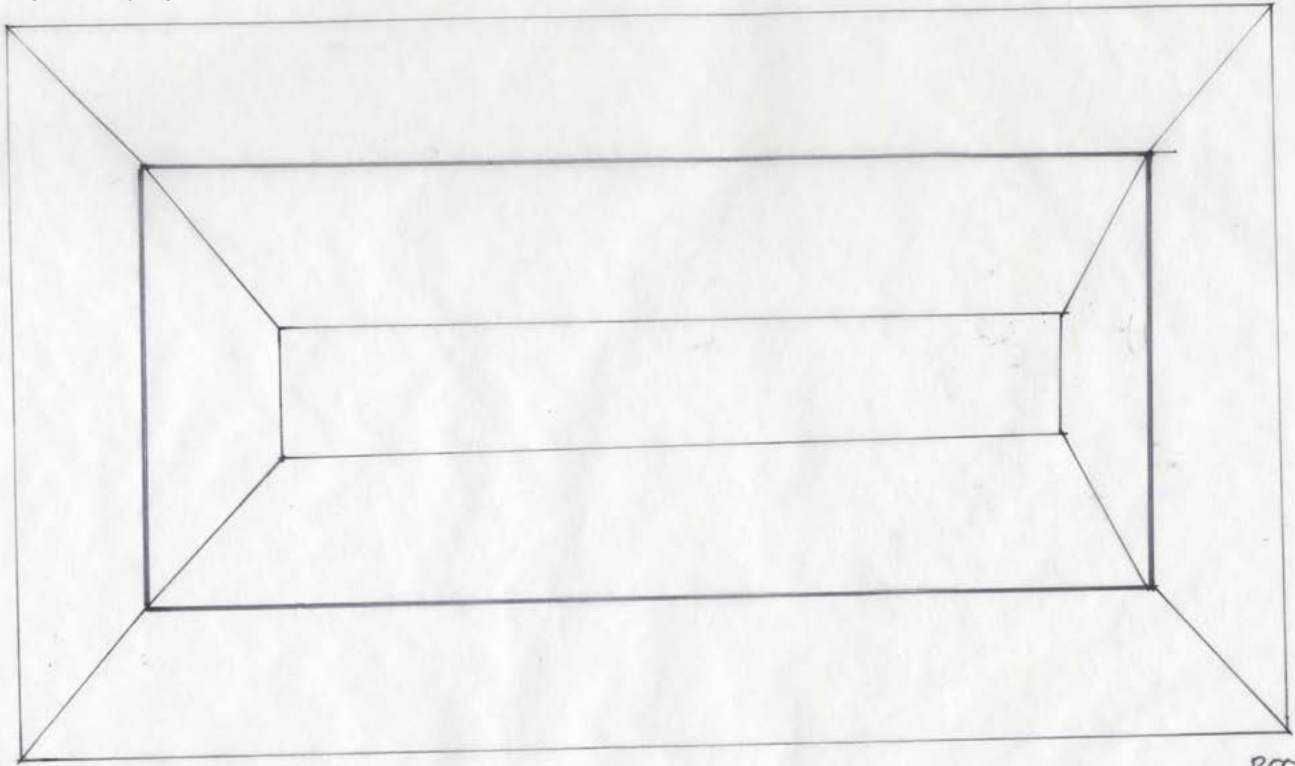


FLOATING TESTS

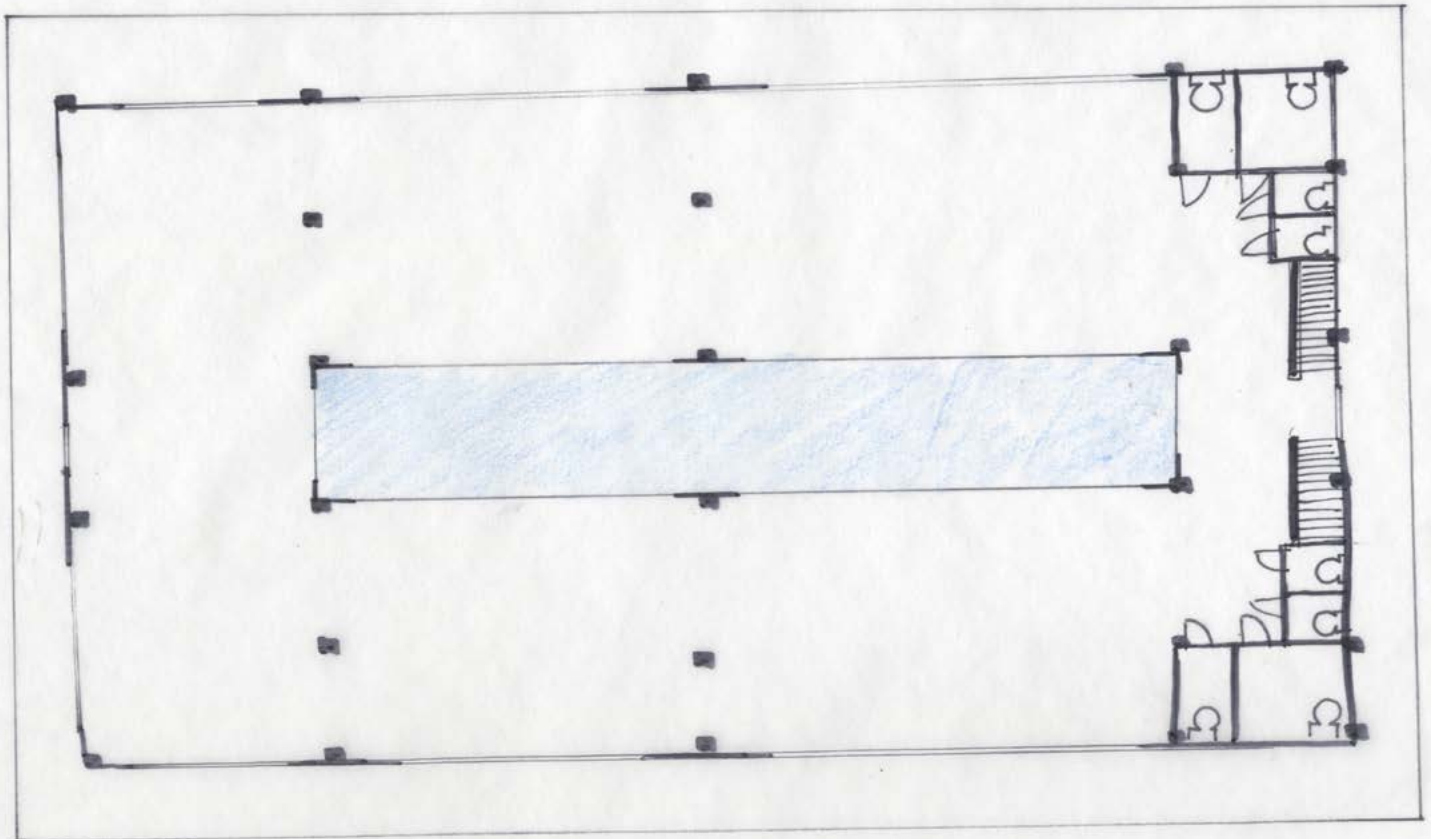
Process- Roof Plan & Floor Plans

Single Donut
Double Donut
Site Plan
Double Donut Final Hand-drawn

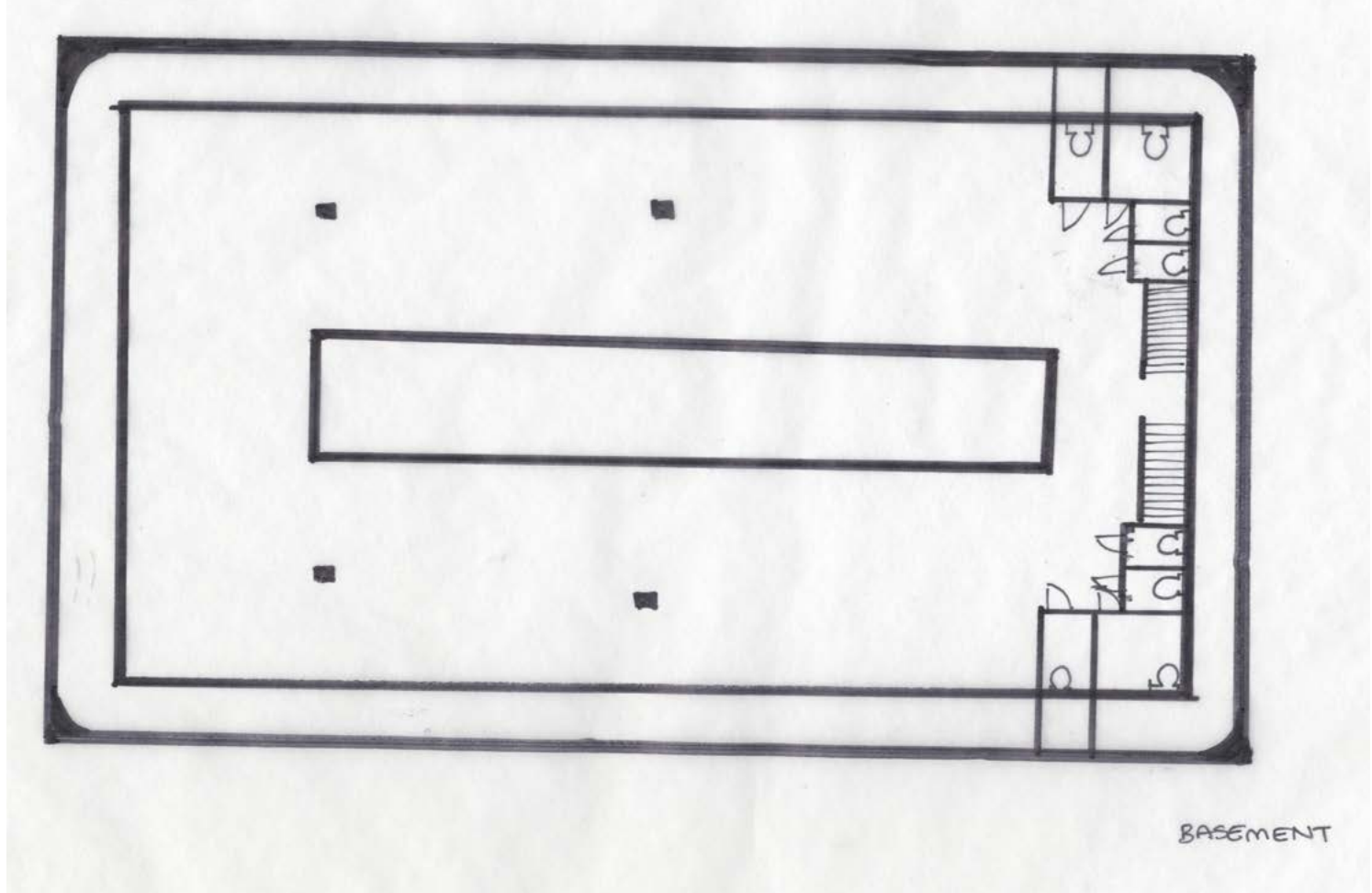
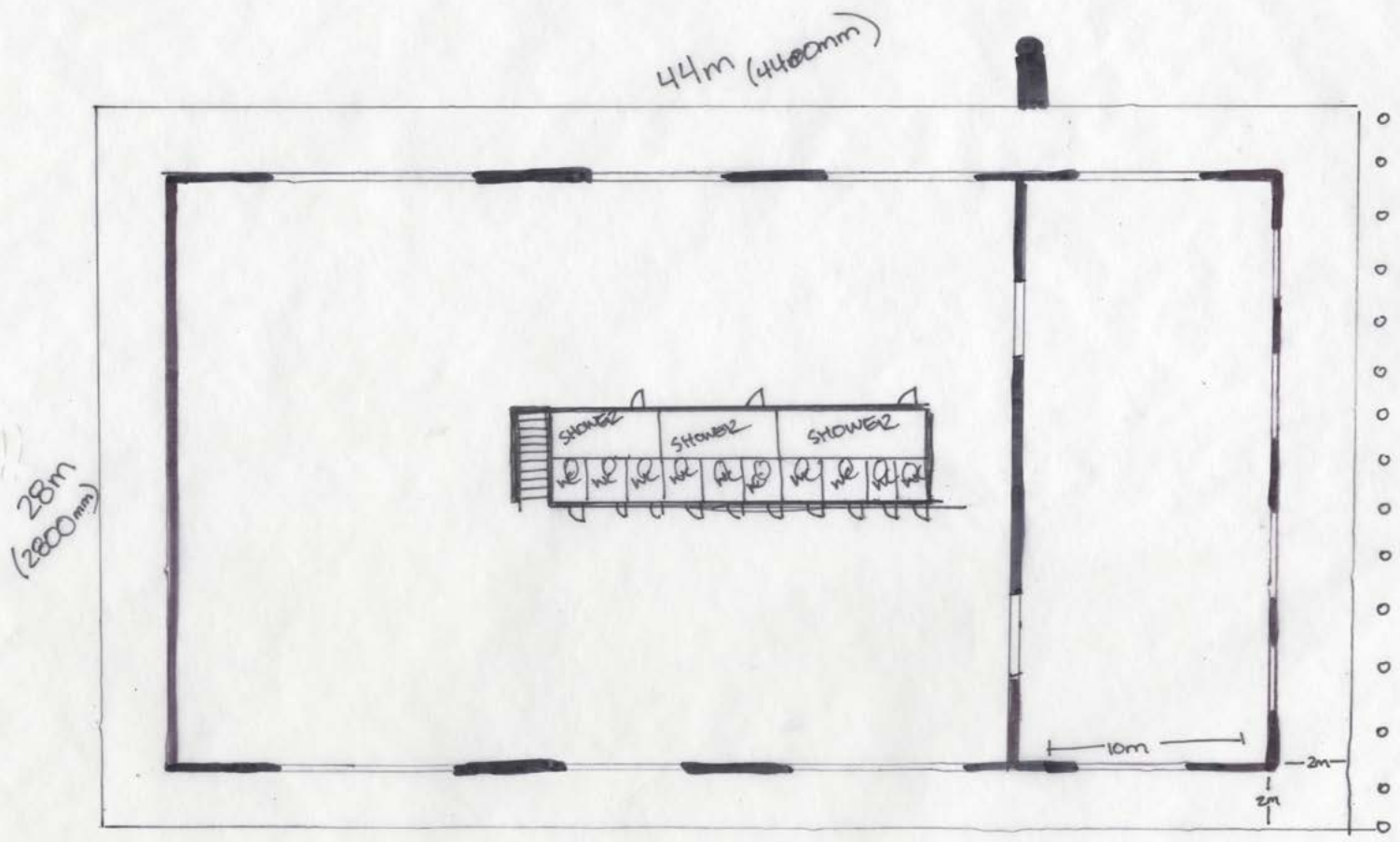
SINGLE DONUT

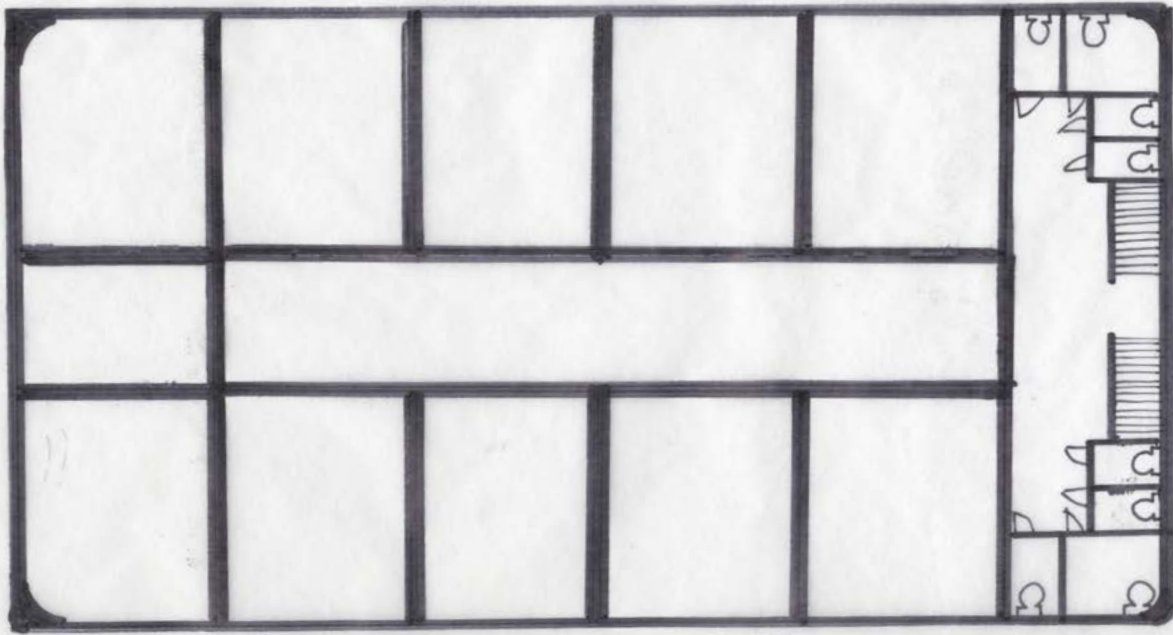


ROOF PLAN



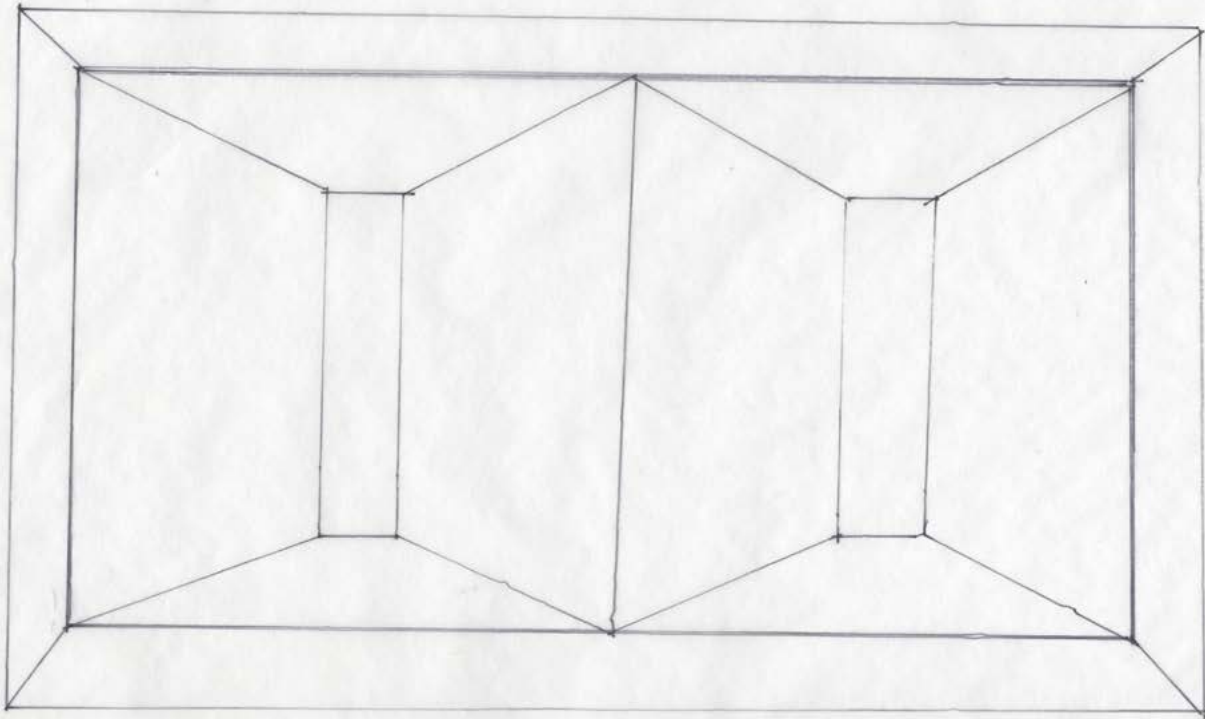
FIRST FLOOR



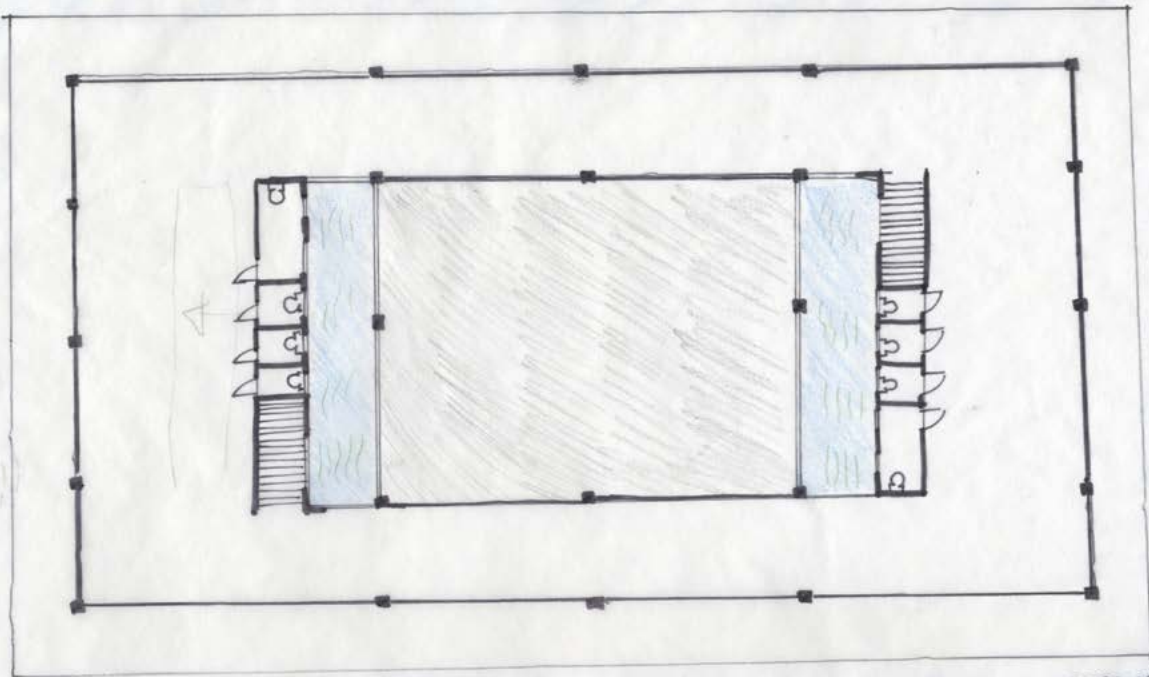


BASEMENT #2

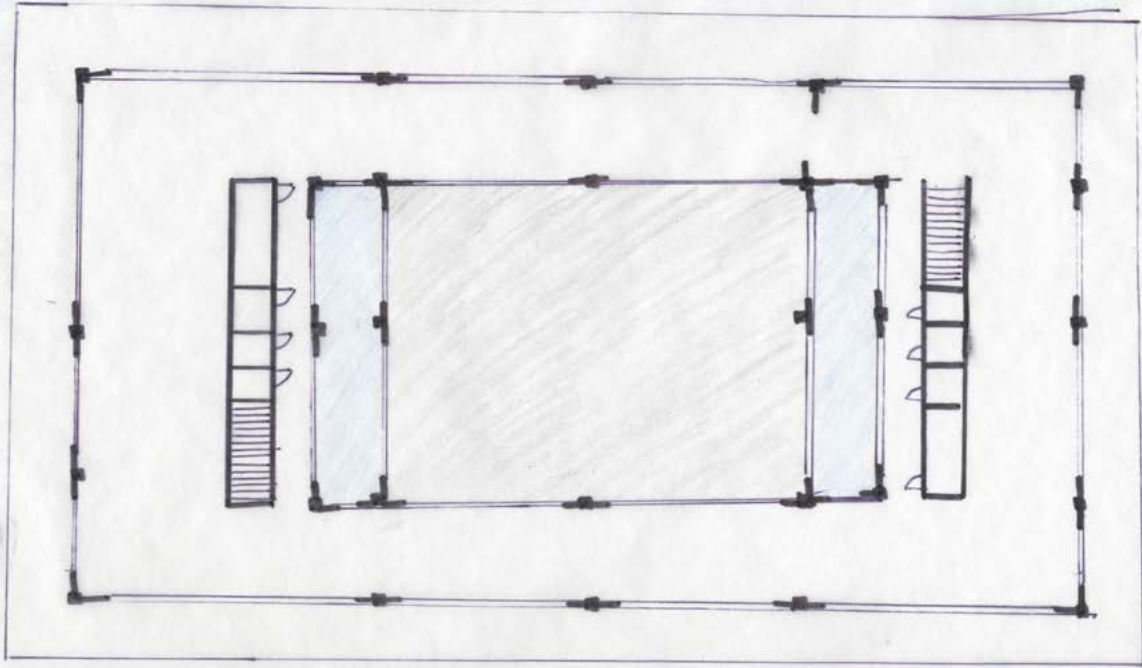
DOUBLE DONUT



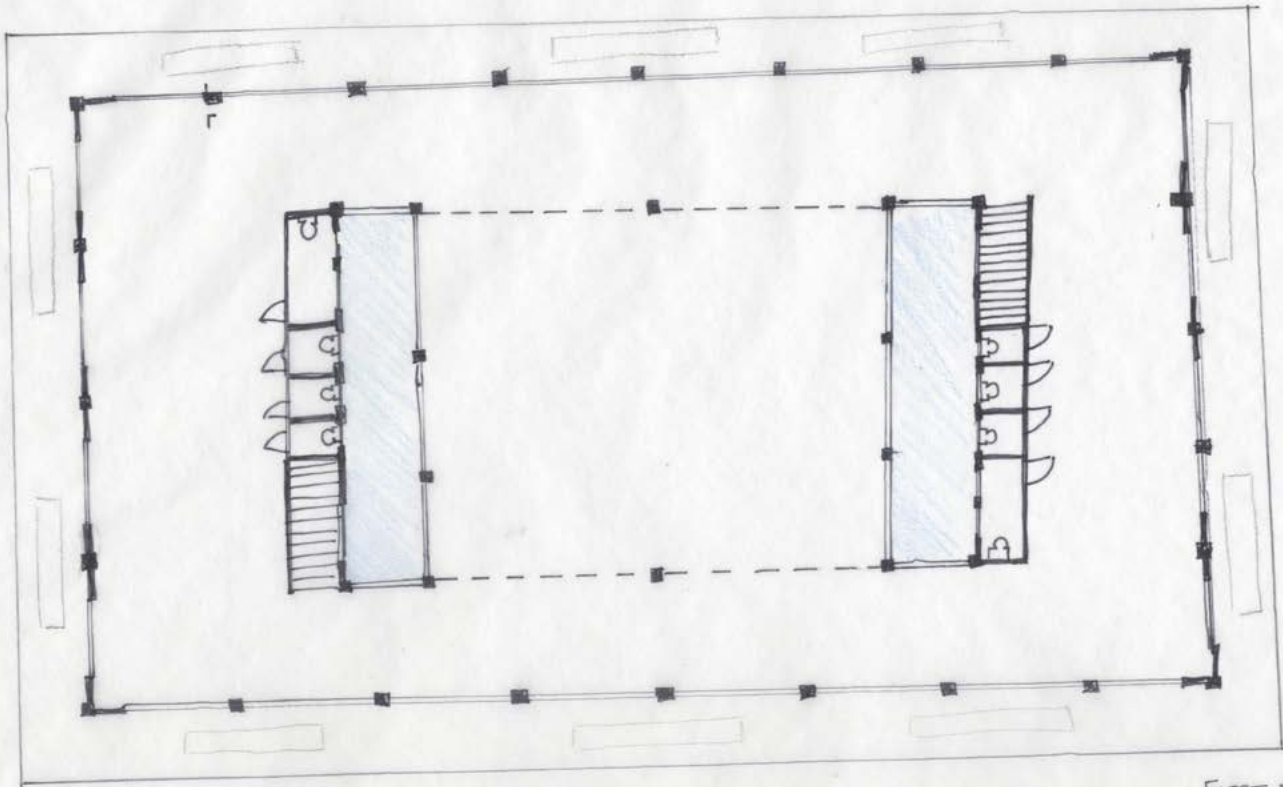
ROOF PLAN



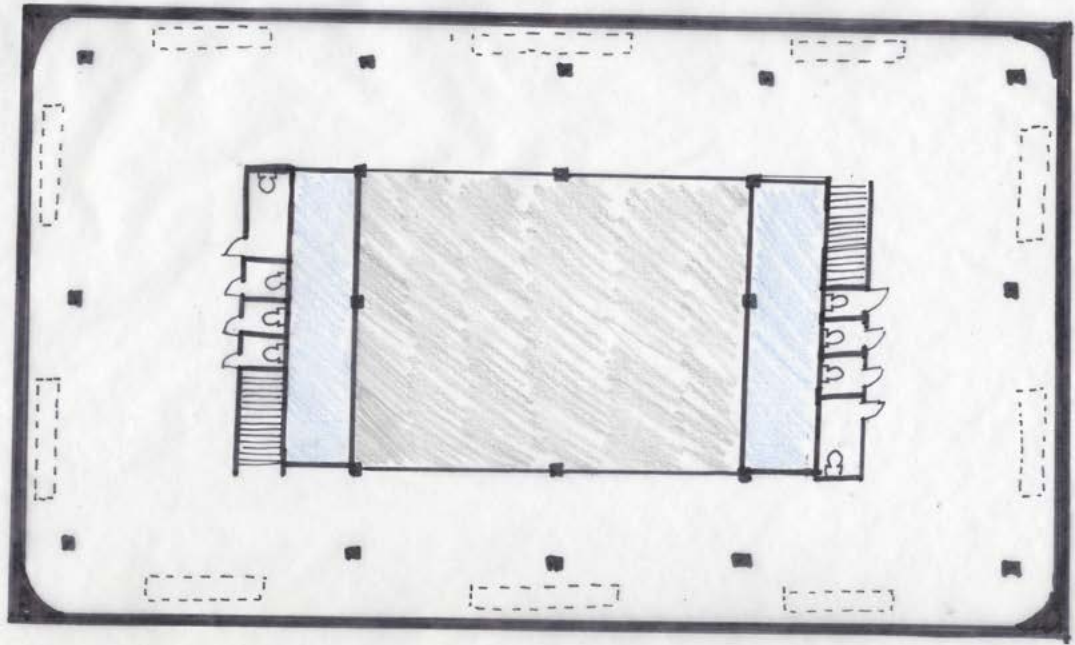
SECOND FLOOR



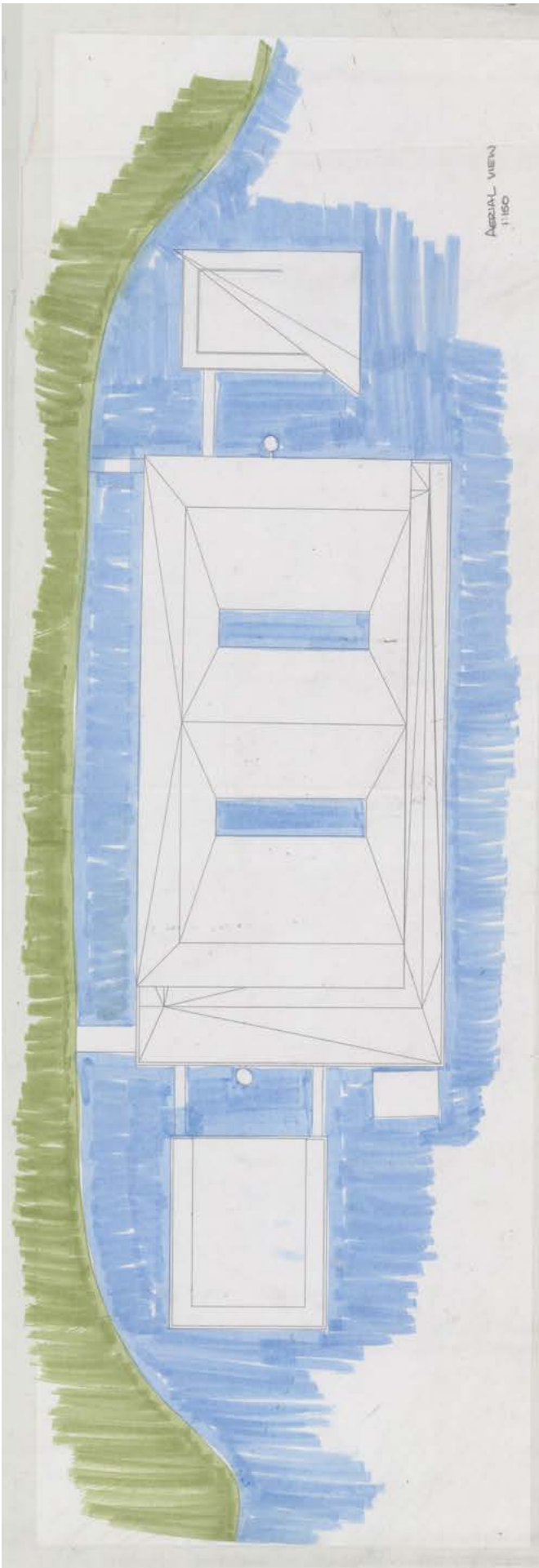
BATHROOM ALTERNATIVE



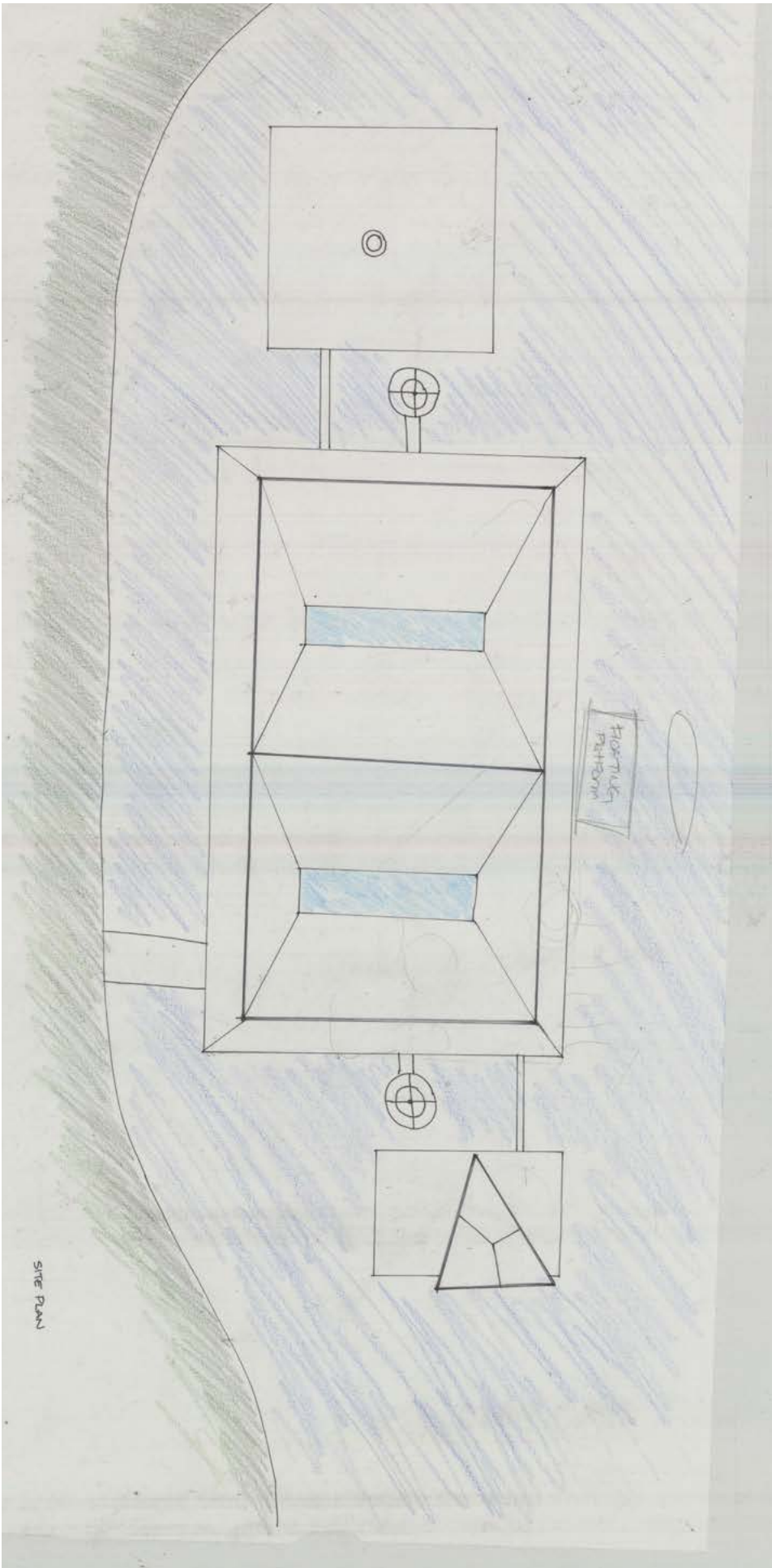
FIRST FLOOR



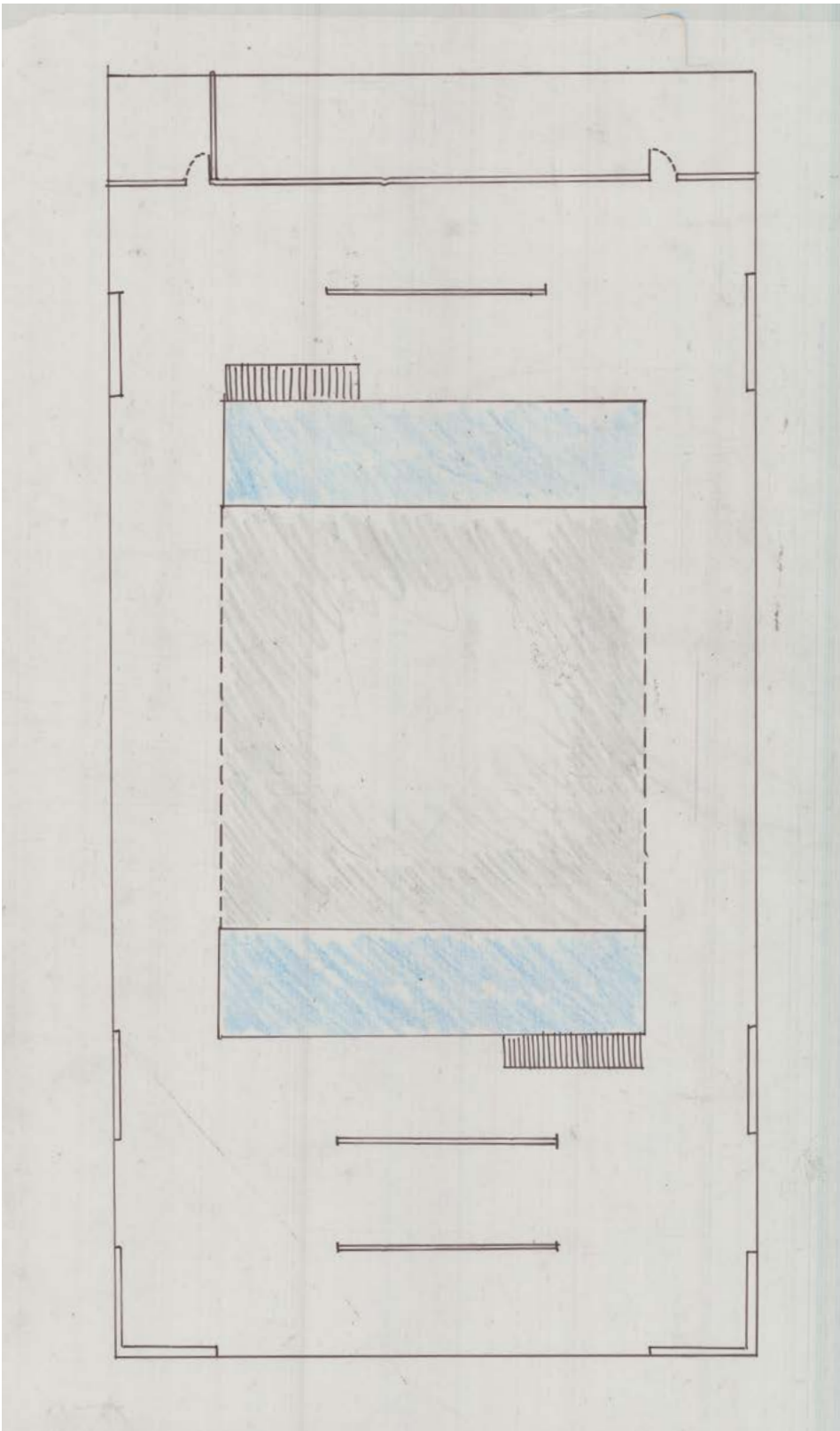
BASEMENT 1



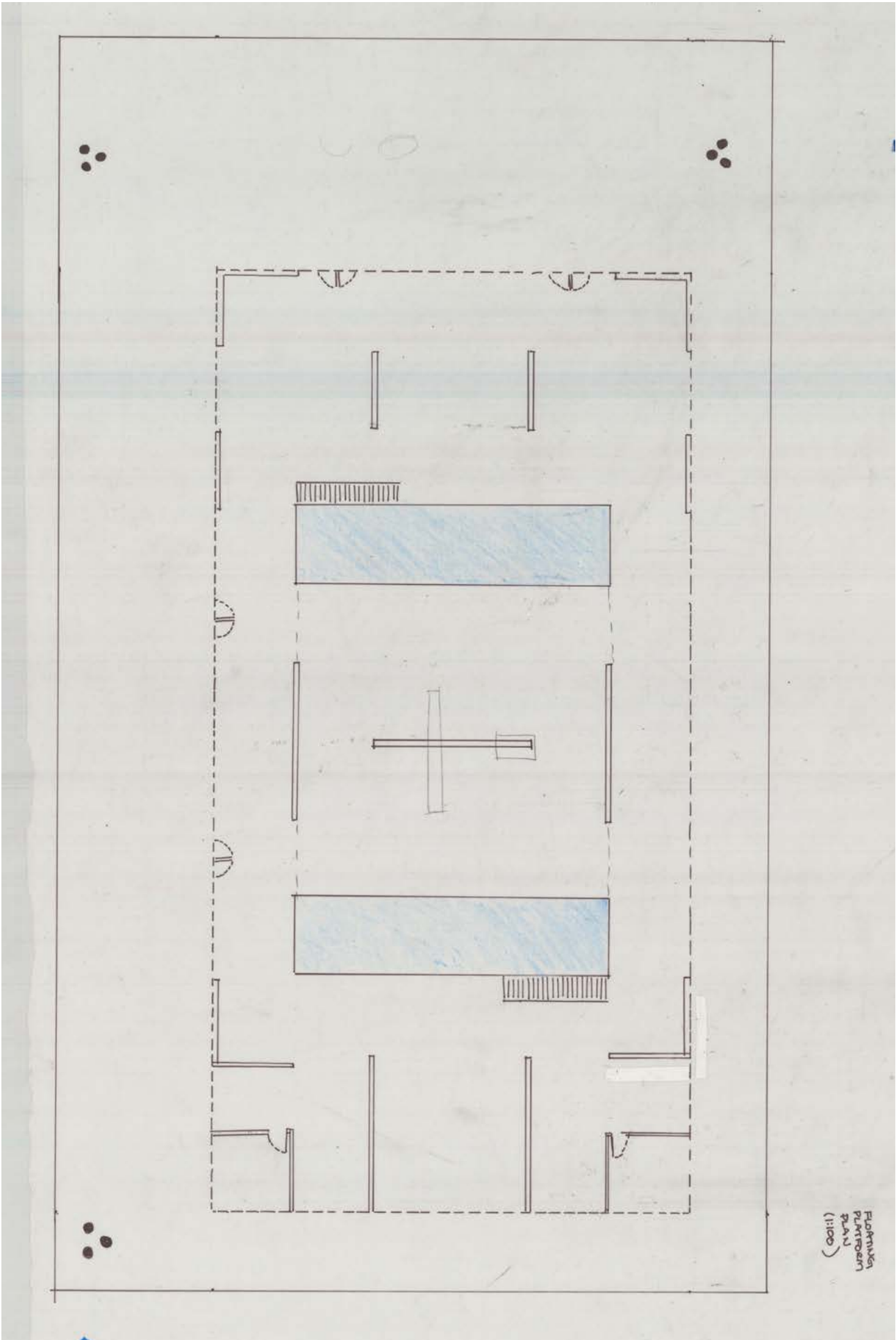
SITE PLAN



SITE PLAN WITH CONNECTIONS



FLOOR PLAN - DOUBLE DONUT
SECOND FLOOR



FLOOR PLAN - DOUBLE DONUT
FIRST FLOOR

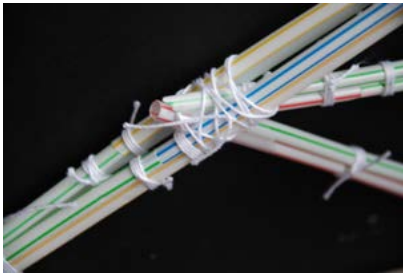
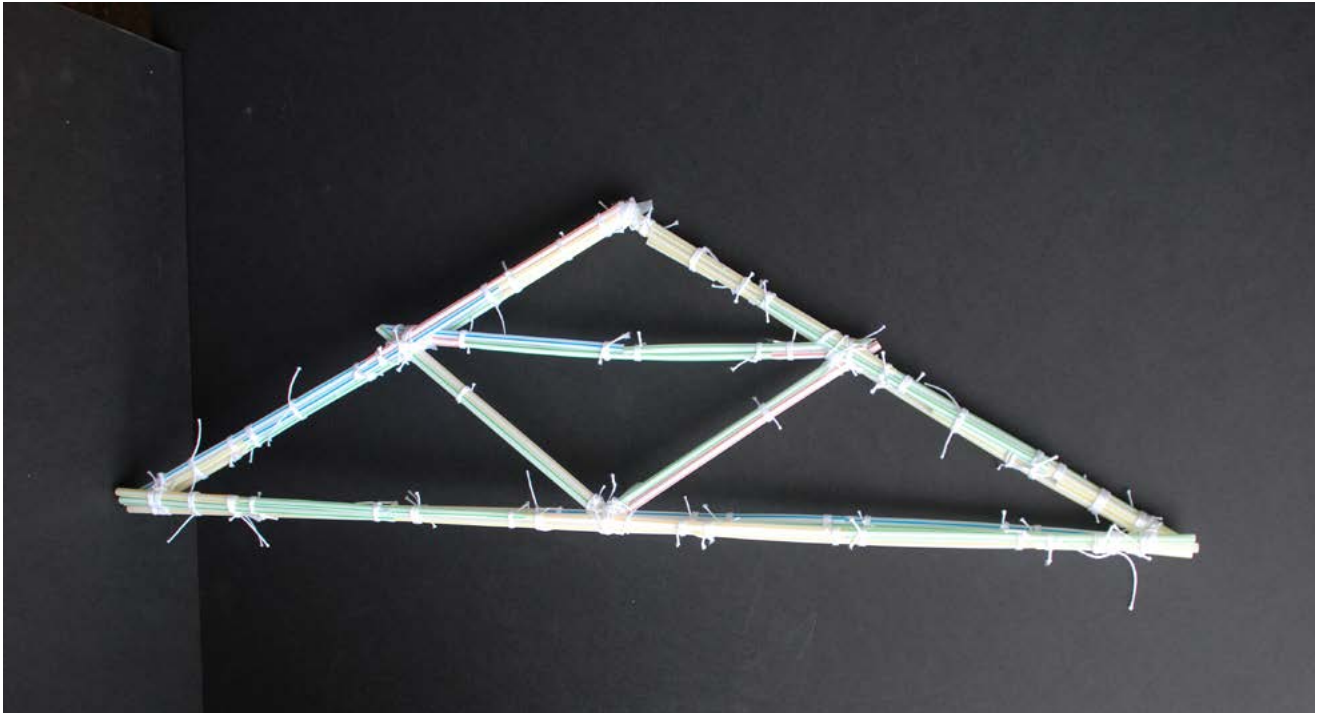
Display Case Study



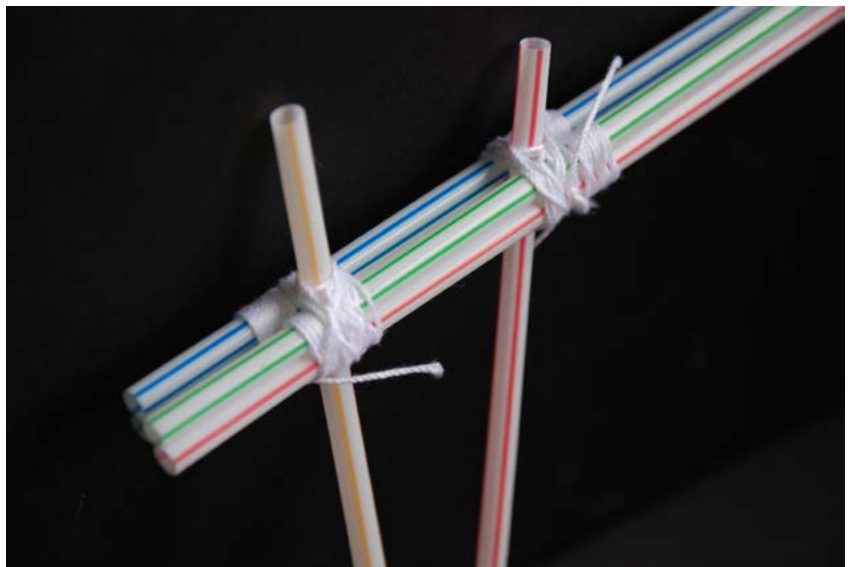
ART TO DISPLAY ART

Bamboo Connections

Initial Studies
Studies with Bamboo and String

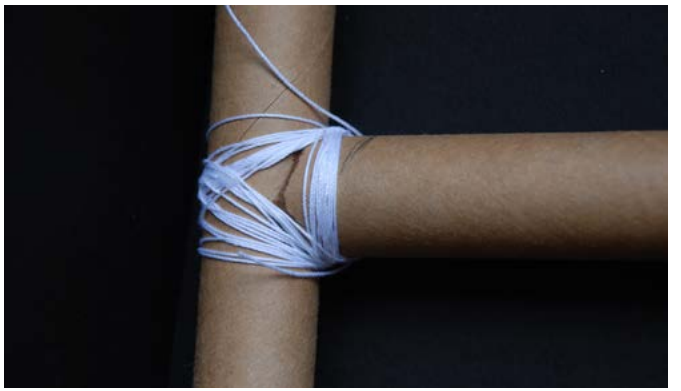
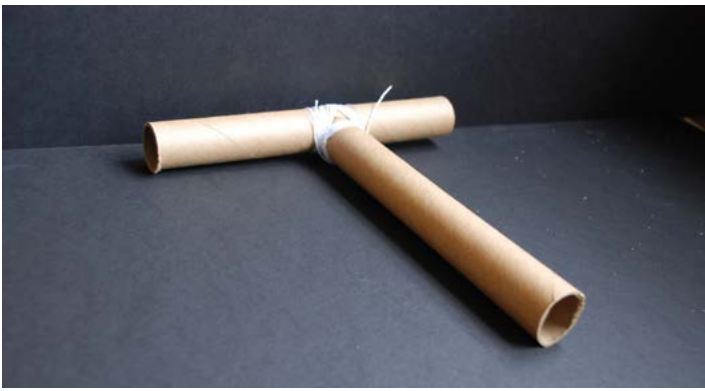


BAMBOO CONNECTION STUDIES
INITIAL EXPLORATION



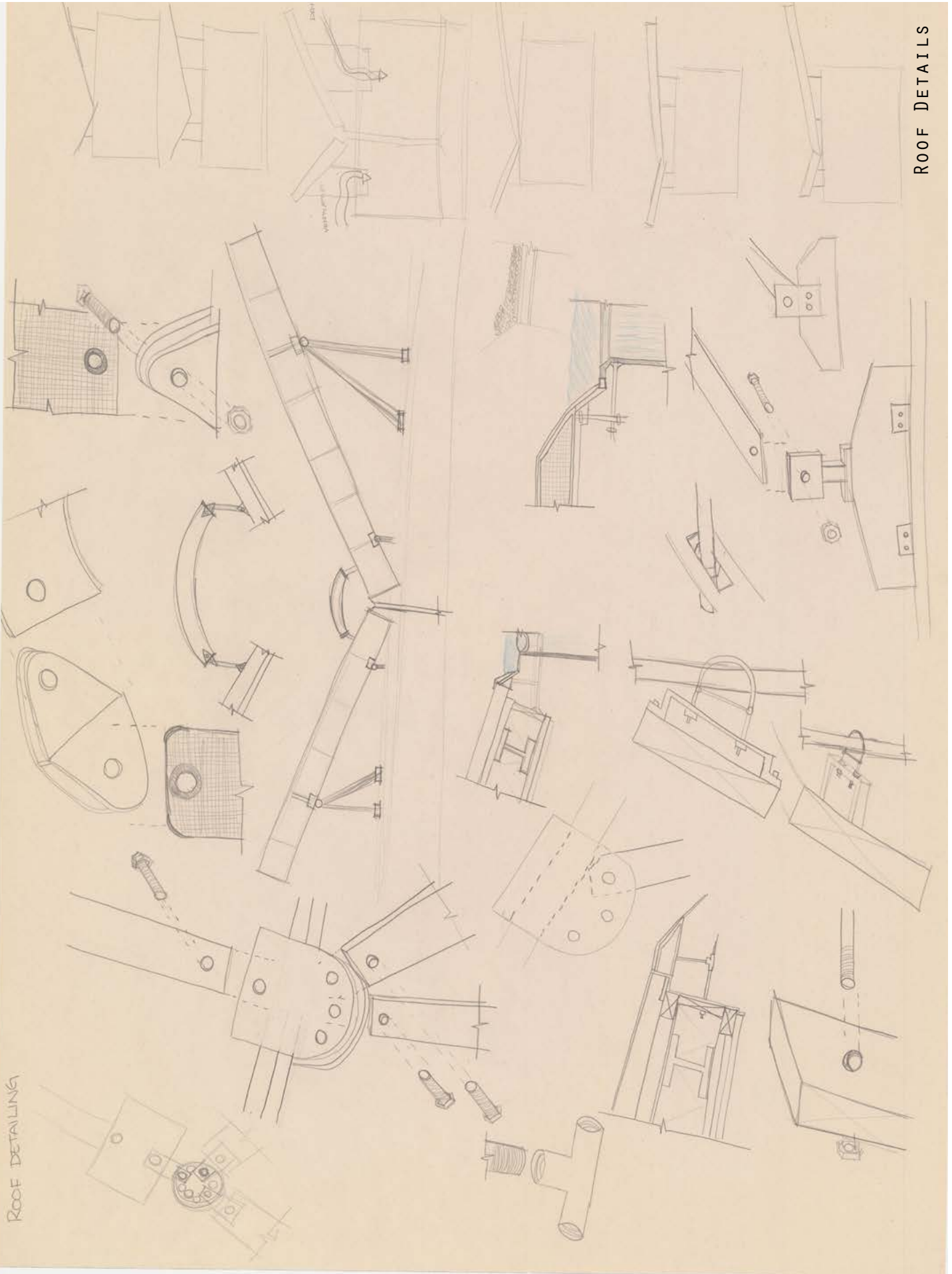


BAMBOO
CONNECTIONS



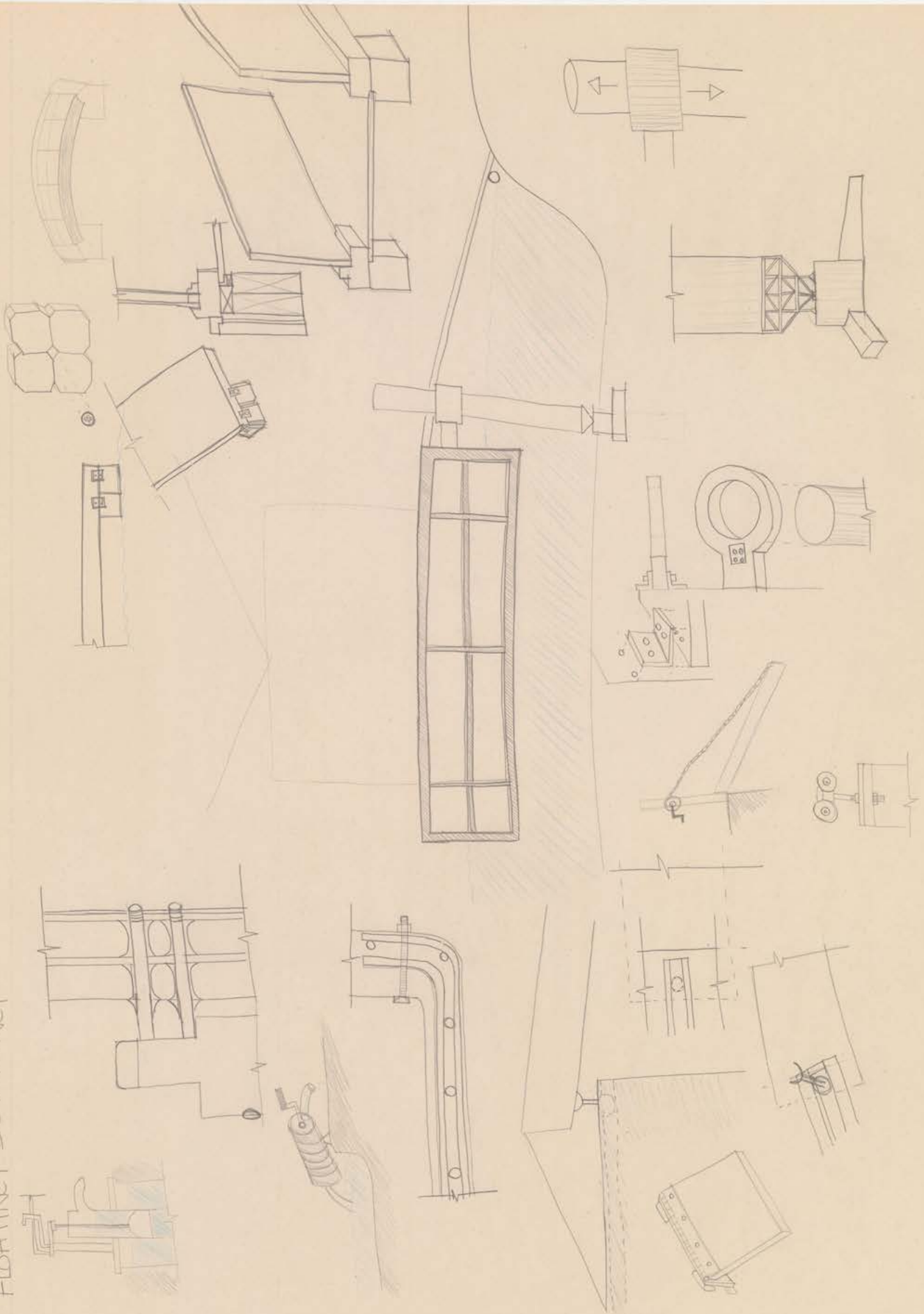
Process-
Details of Building

ROOF DETAILING



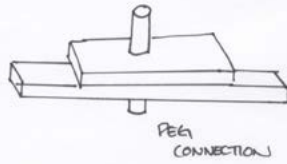
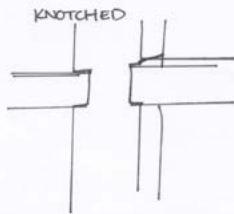
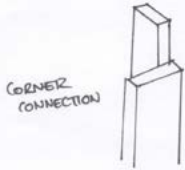
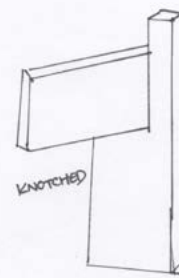
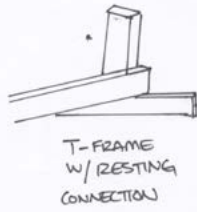
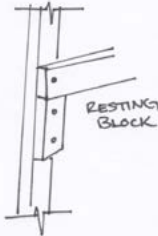
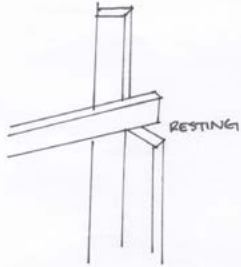
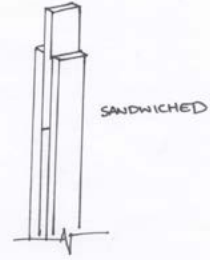
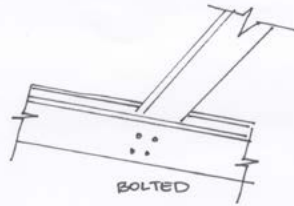
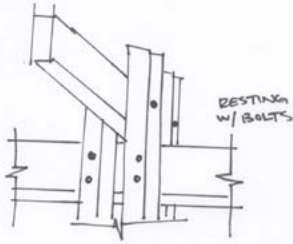
ROOF DETAILS

FLOATING DETAILING



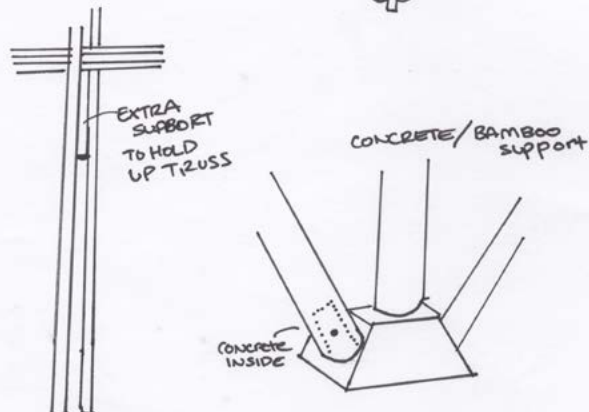
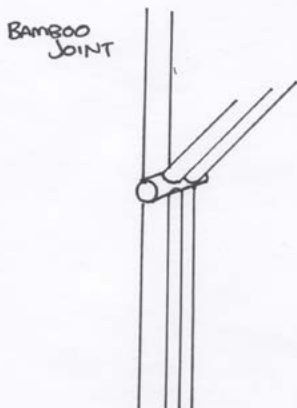
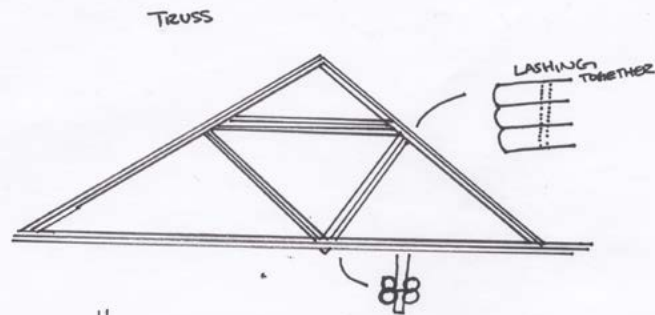
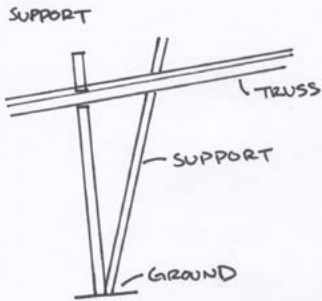
FLOATING DETAILS

WOOD CONNECTIONS



WOOD CONNECTION DETAILS

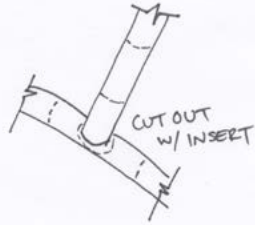
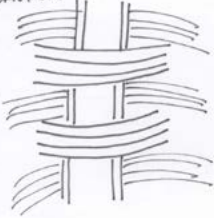
BAMBOO ROOF DETAILS



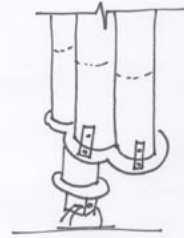
BAMBOO ROOF DETAILS

BAMBOO DETAILS

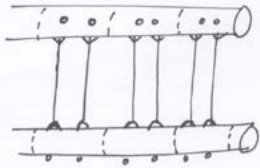
WEAVING



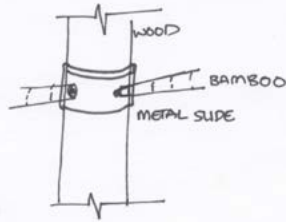
CUT OUT
W/ INSERT



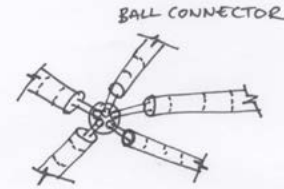
METAL/BAMBOO
CONNECTION



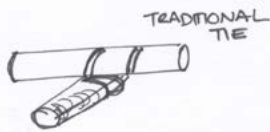
TENSION



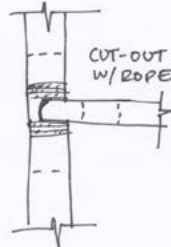
WOOD
BAMBOO
METAL SLIDE



BALL CONNECTOR



TRADITIONAL
TIE



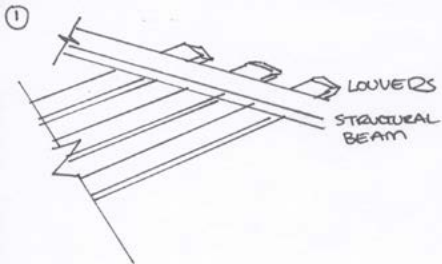
CUT-OUT
W/ ROPE



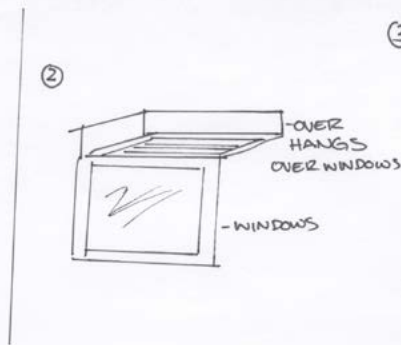
GROUPING
(MORE STRENGTH)

BAMBOO DETAILS

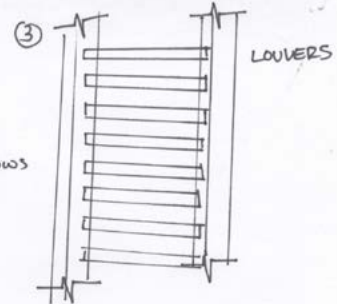
SUNSHADE DETAILS



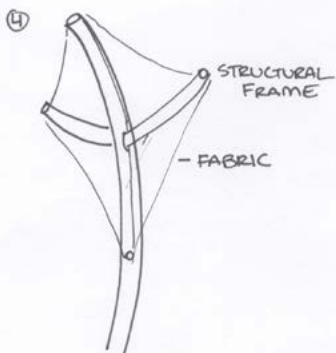
LOUVERS
STRUCTURAL
BEAM



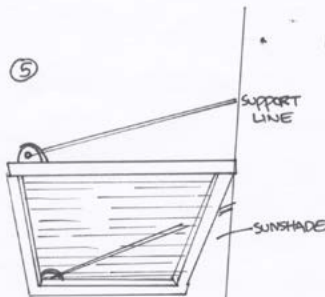
-OVER
HANGS
OVER WINDOWS
-WINDOWS



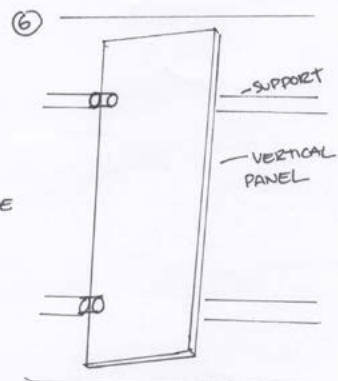
LOUVERS



STRUCTURAL
FRAME
- FABRIC



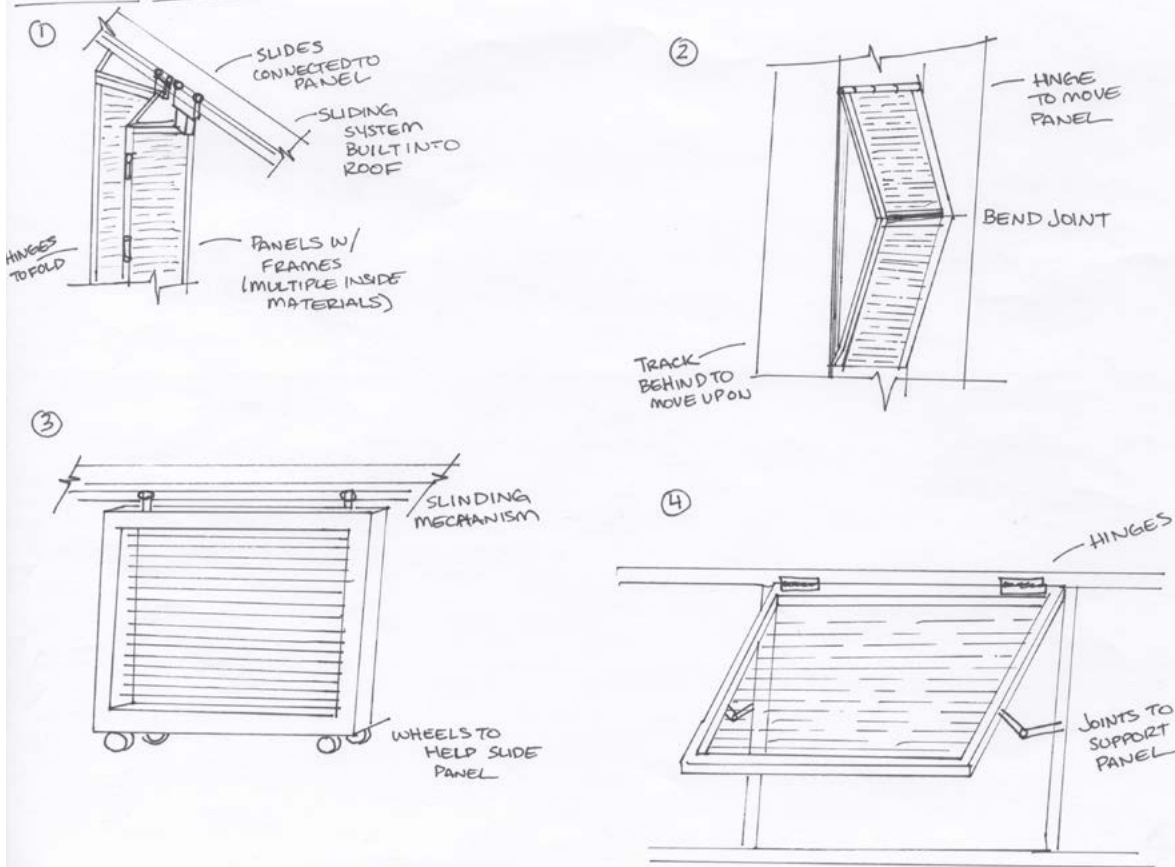
SUPPORT
LINE
SUNSHADE



-SUPPORT
-VERTICAL
PANEL

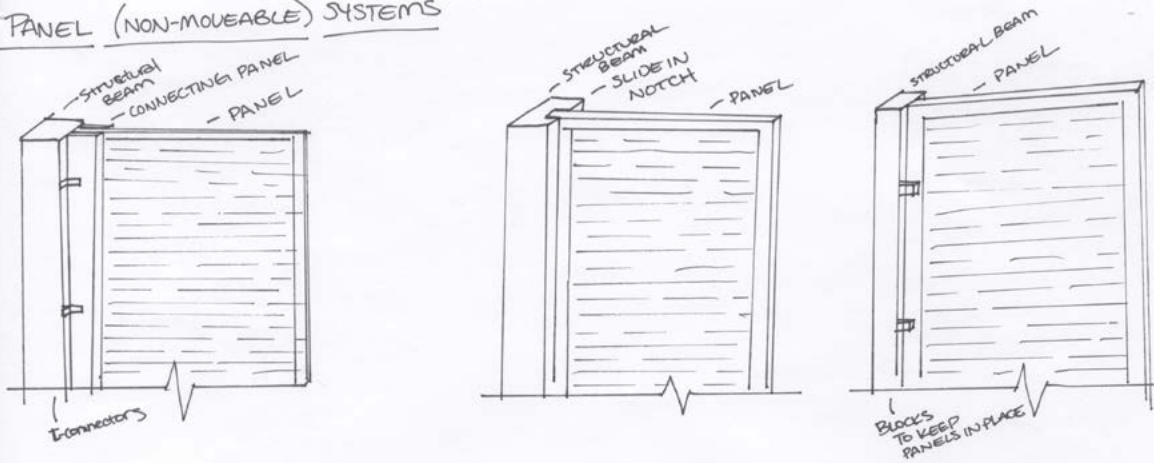
SUNSHADE DETAILS

MOVEABLE PANELS

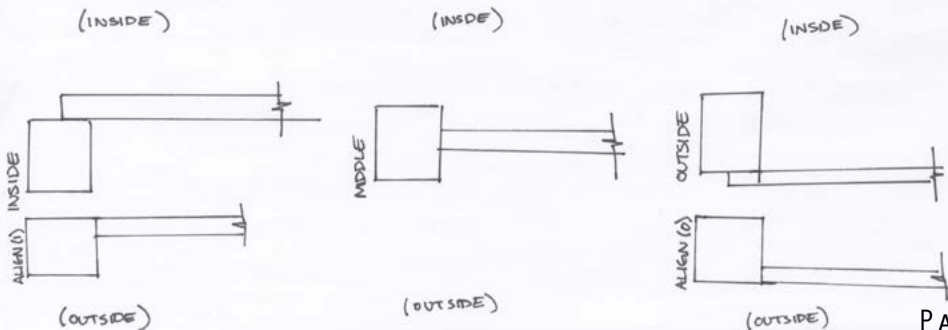


MOVABLE PANEL DETAILS

PANEL (NON-MOVEABLE) SYSTEMS

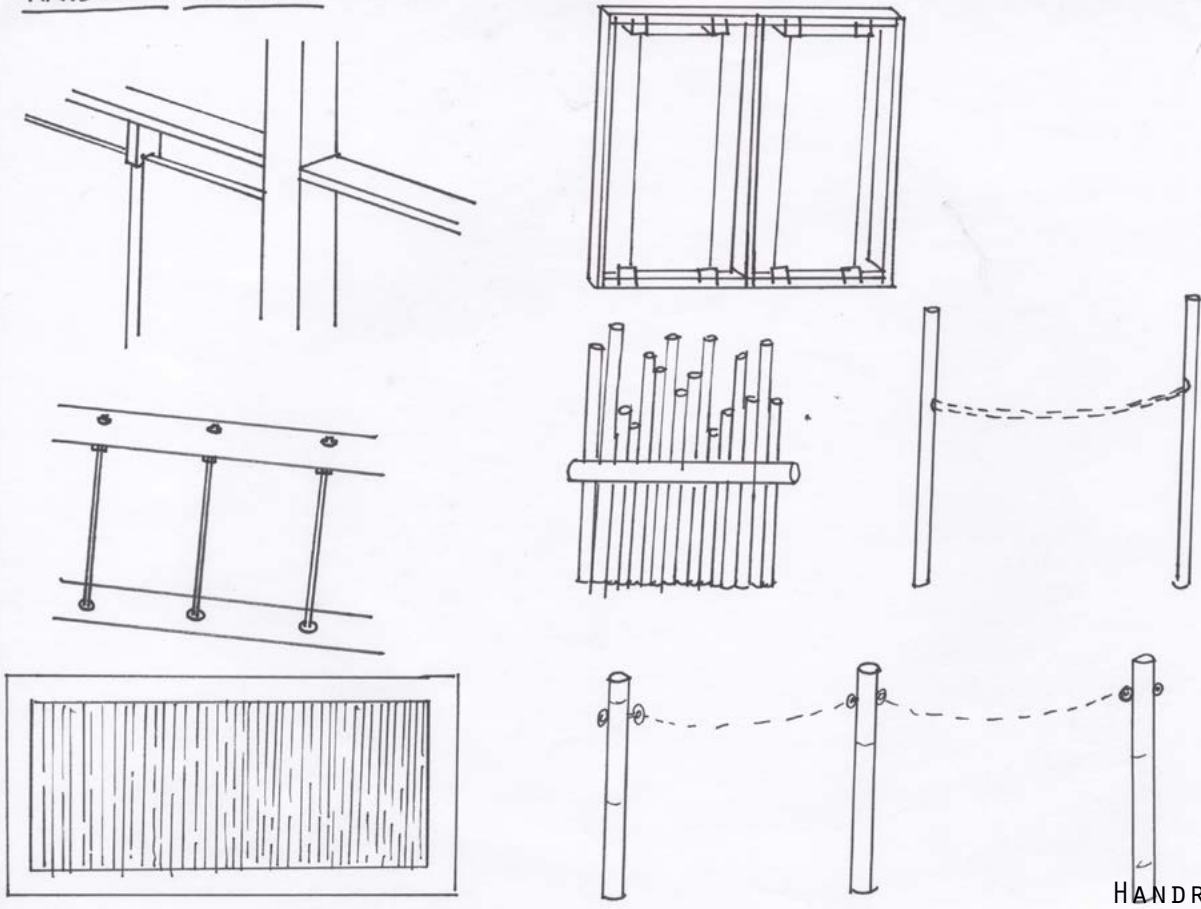


PANEL ORIENTATION



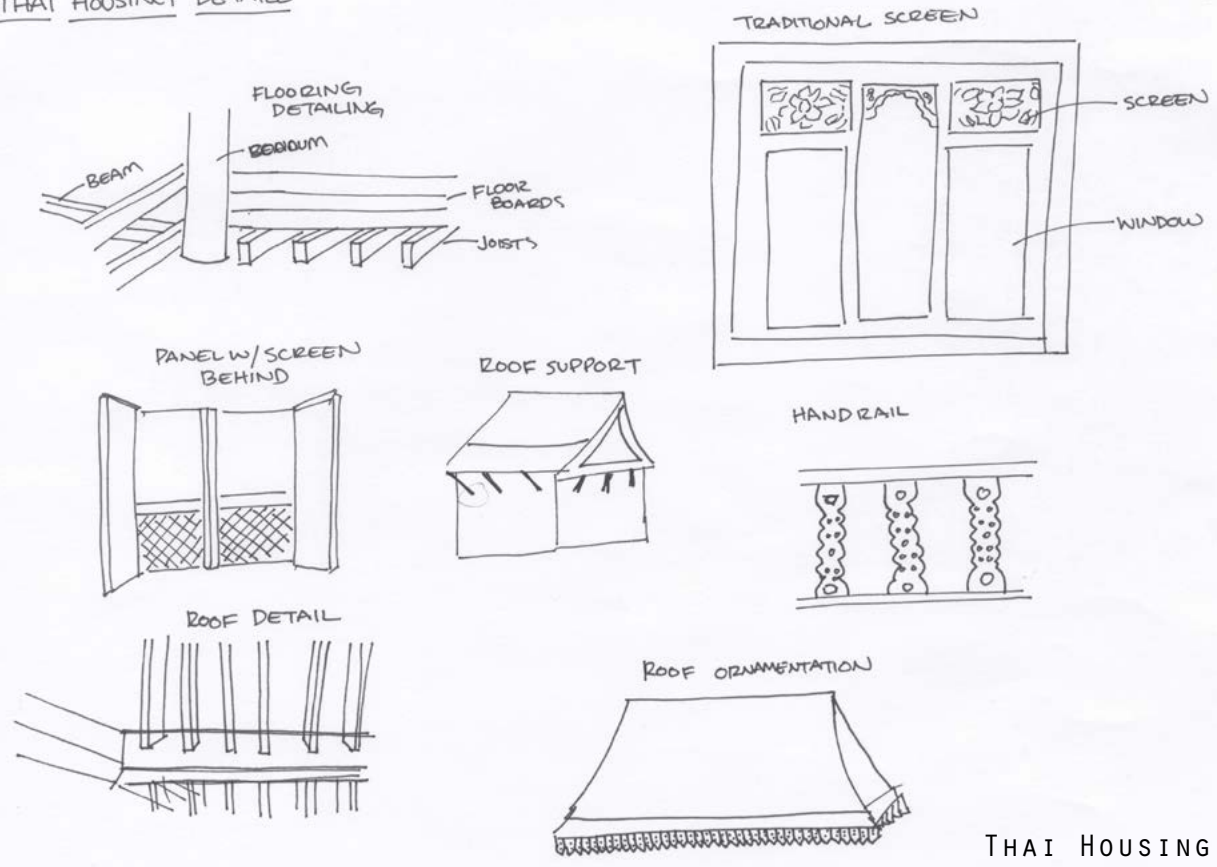
PANEL DETAILS

HANDRAIL DETAILS



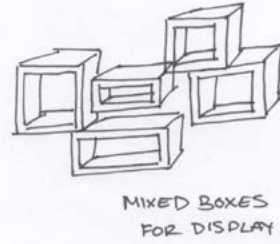
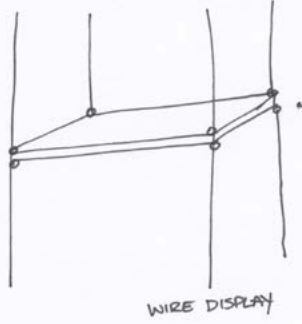
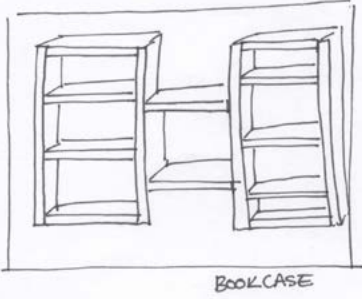
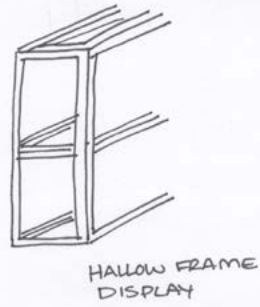
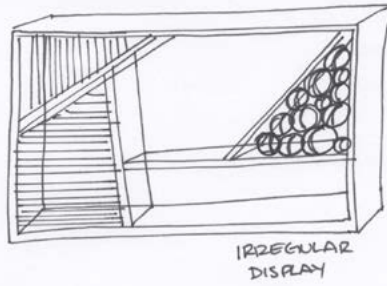
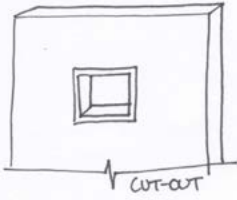
HANDRAIL DETAILS

THAI HOUSING DETAILS

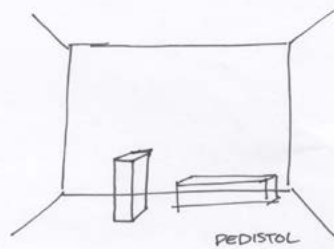
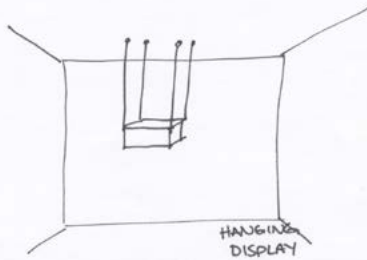
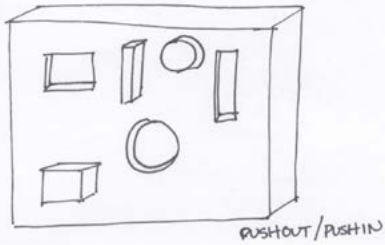


THAI HOUSING DETAILS

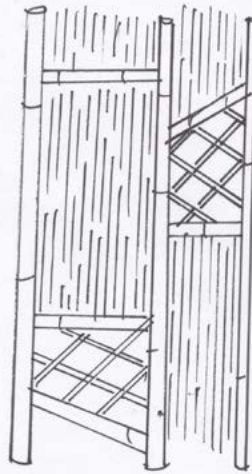
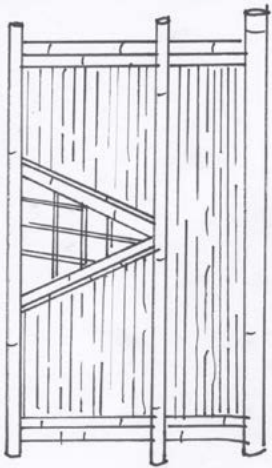
DISPLAY SPACE



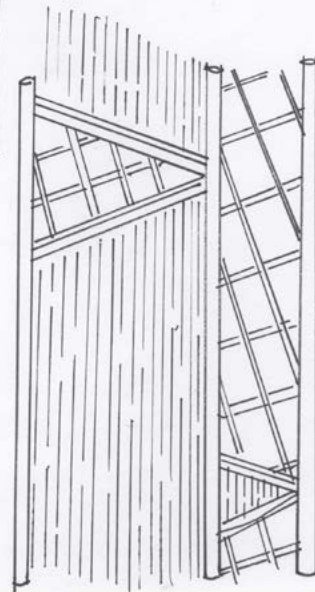
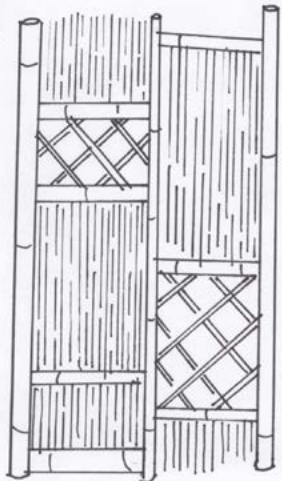
DISPLAY SPACE DETAILS



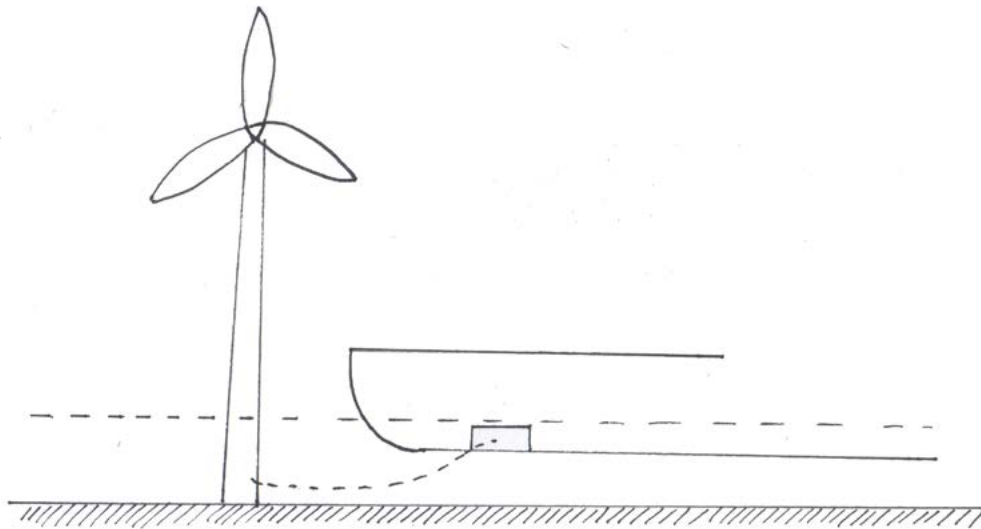
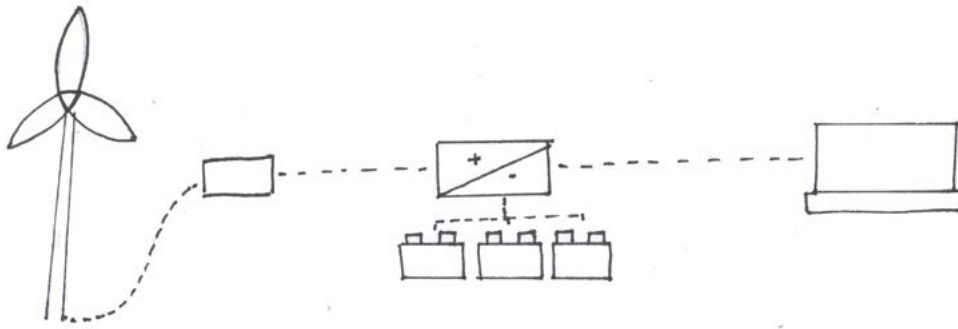
INTERIOR PANELS



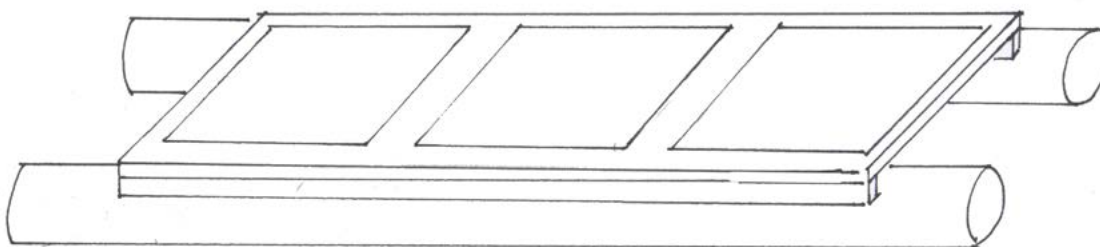
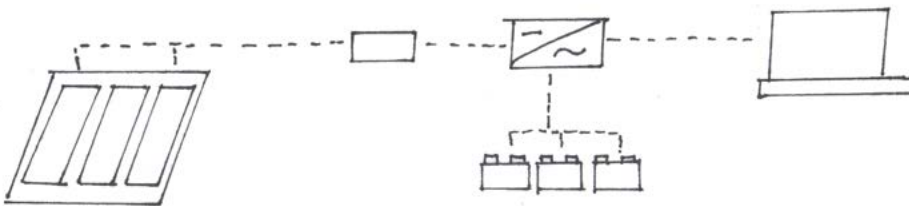
INTERIOR PANEL DETAILS



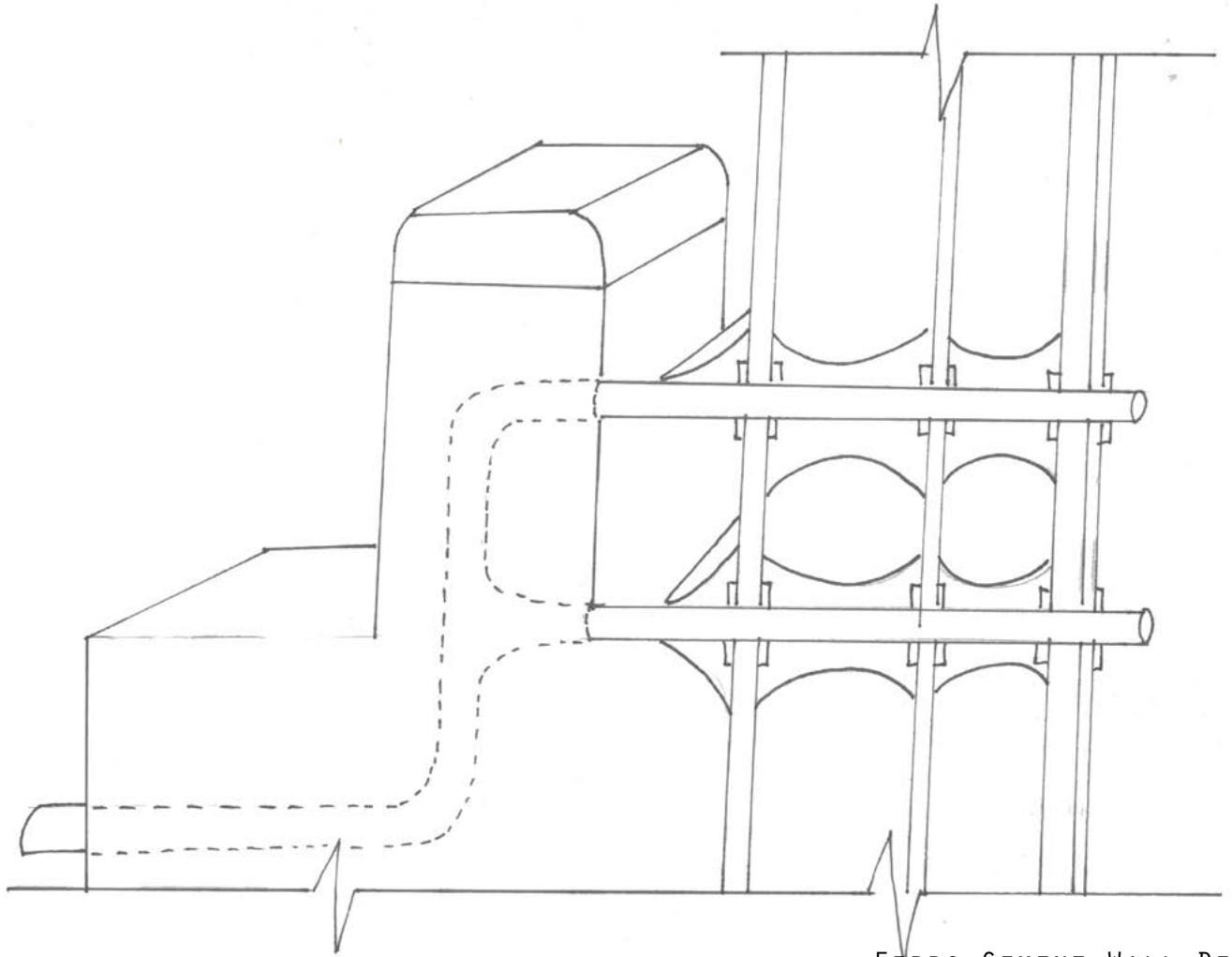
Details of Building



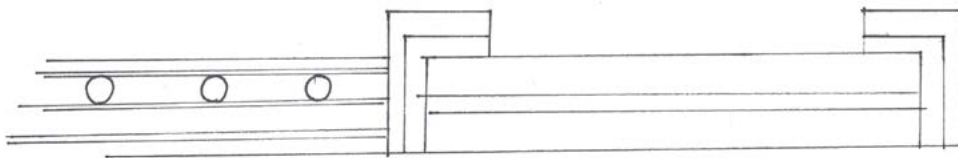
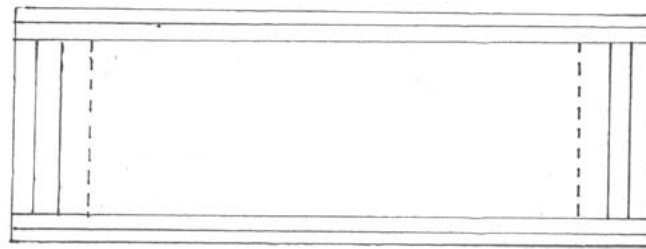
WIND TURBINE



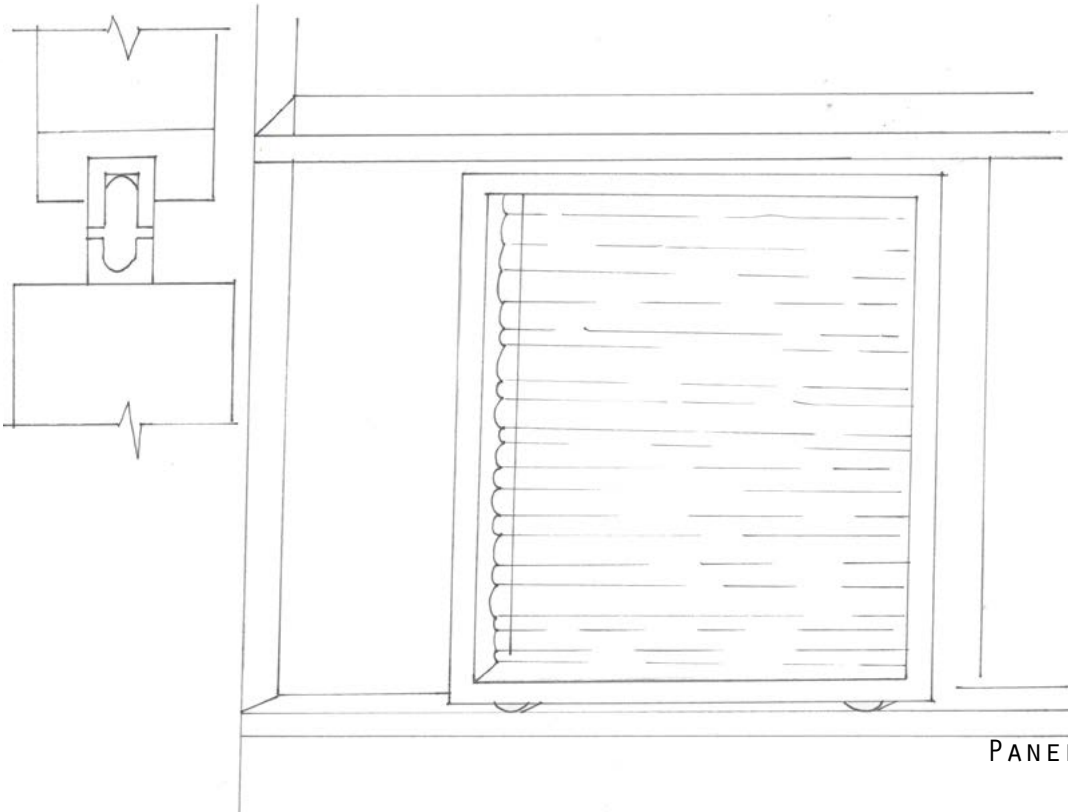
FLOATING SOLAR PANELS



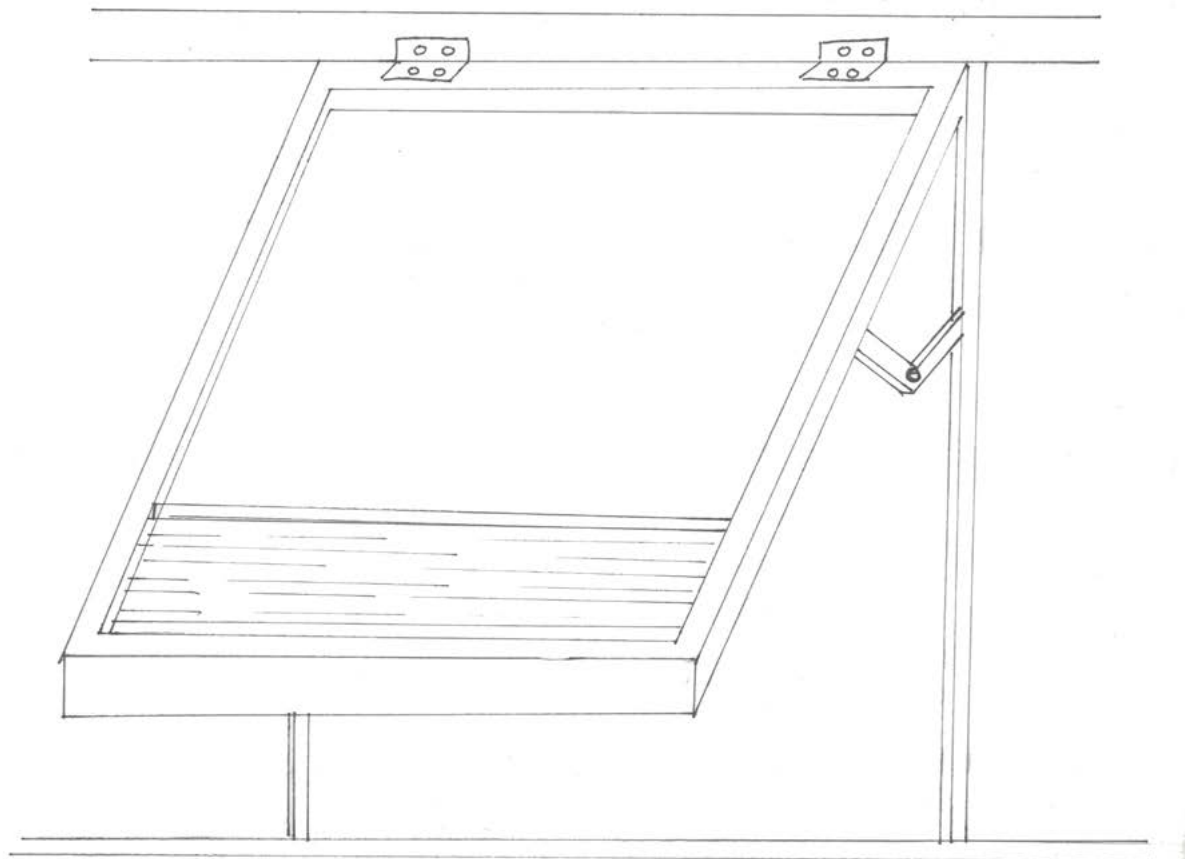
FERRO-CEMENT WALL DETAIL



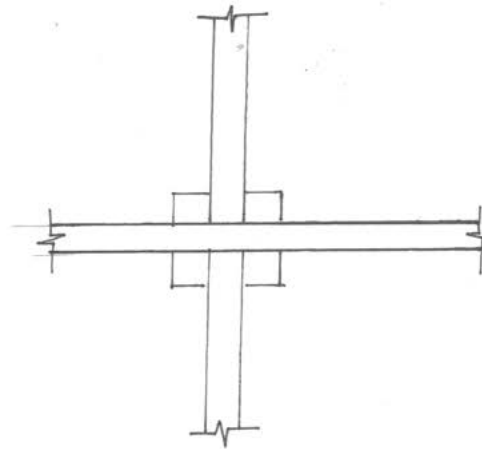
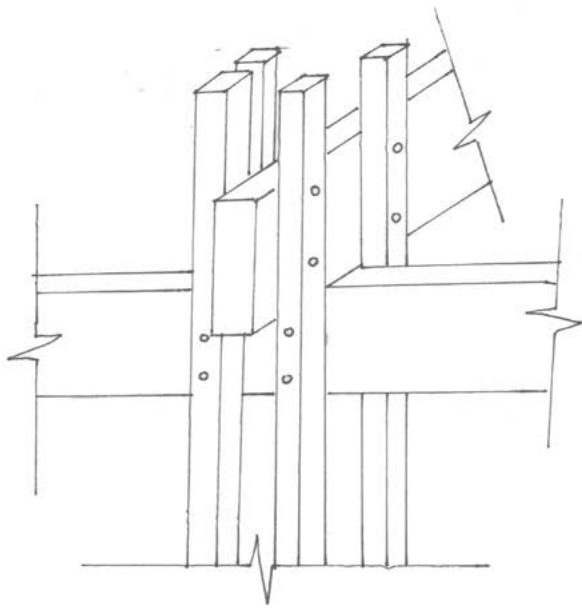
GLASS FLOOR CUT-OUT DETAILS



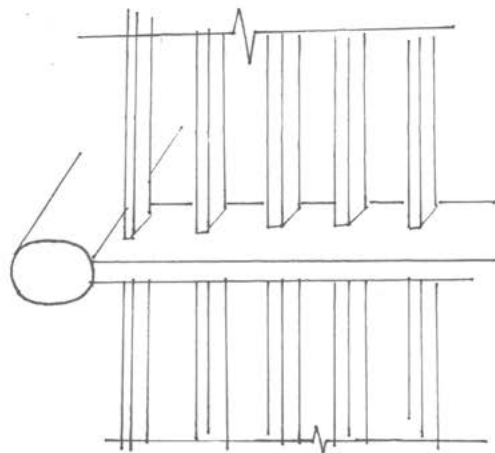
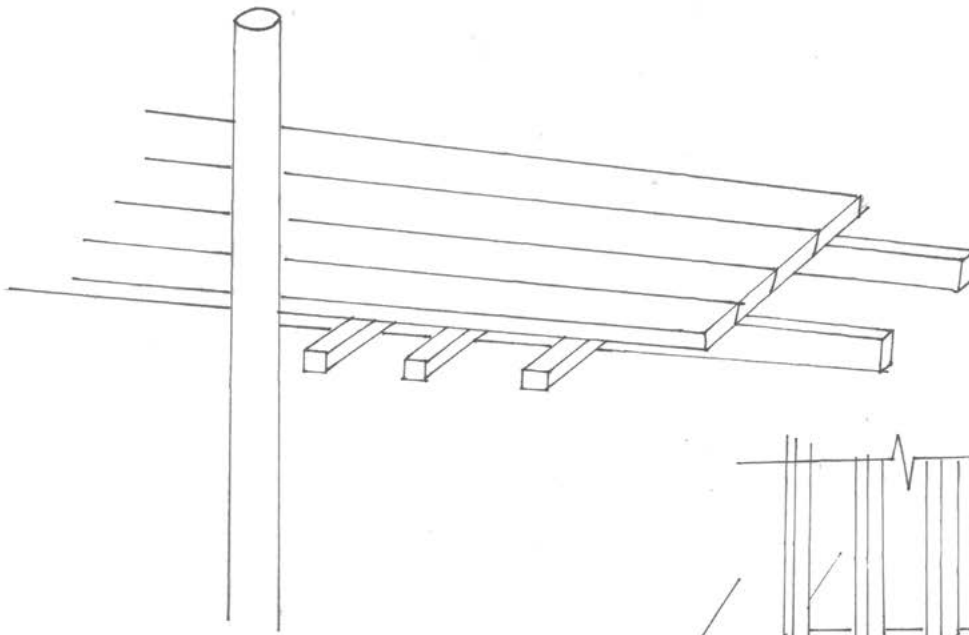
PANEL DETAILS SLIDING



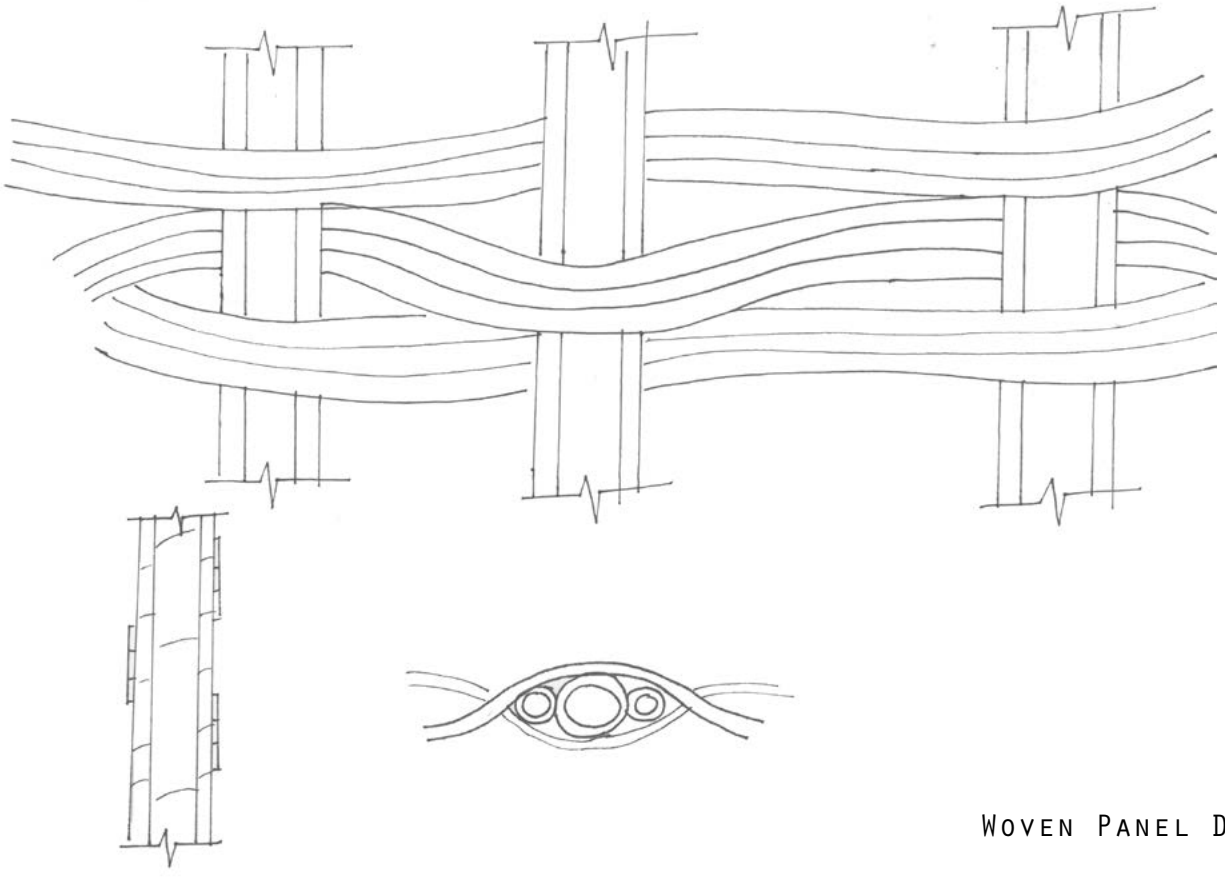
PANEL DETAILS HINGE OPENING



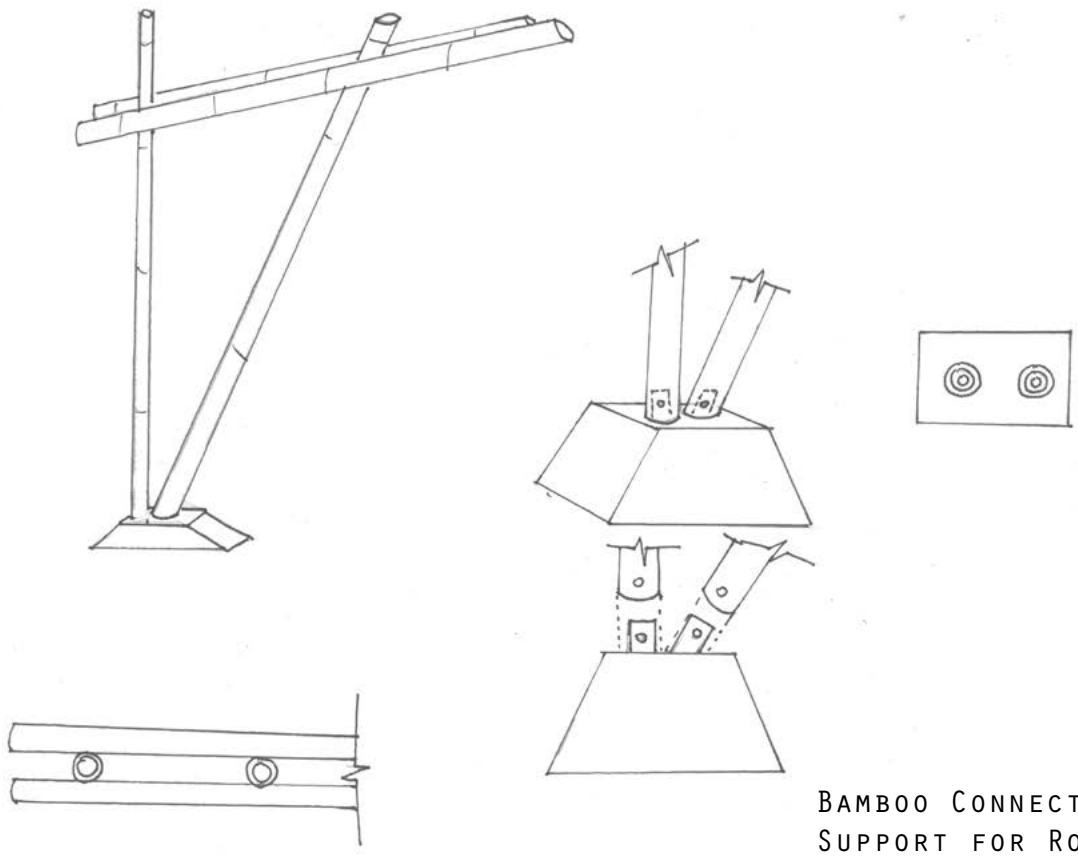
WOOD DETAILS-CONNECTORS



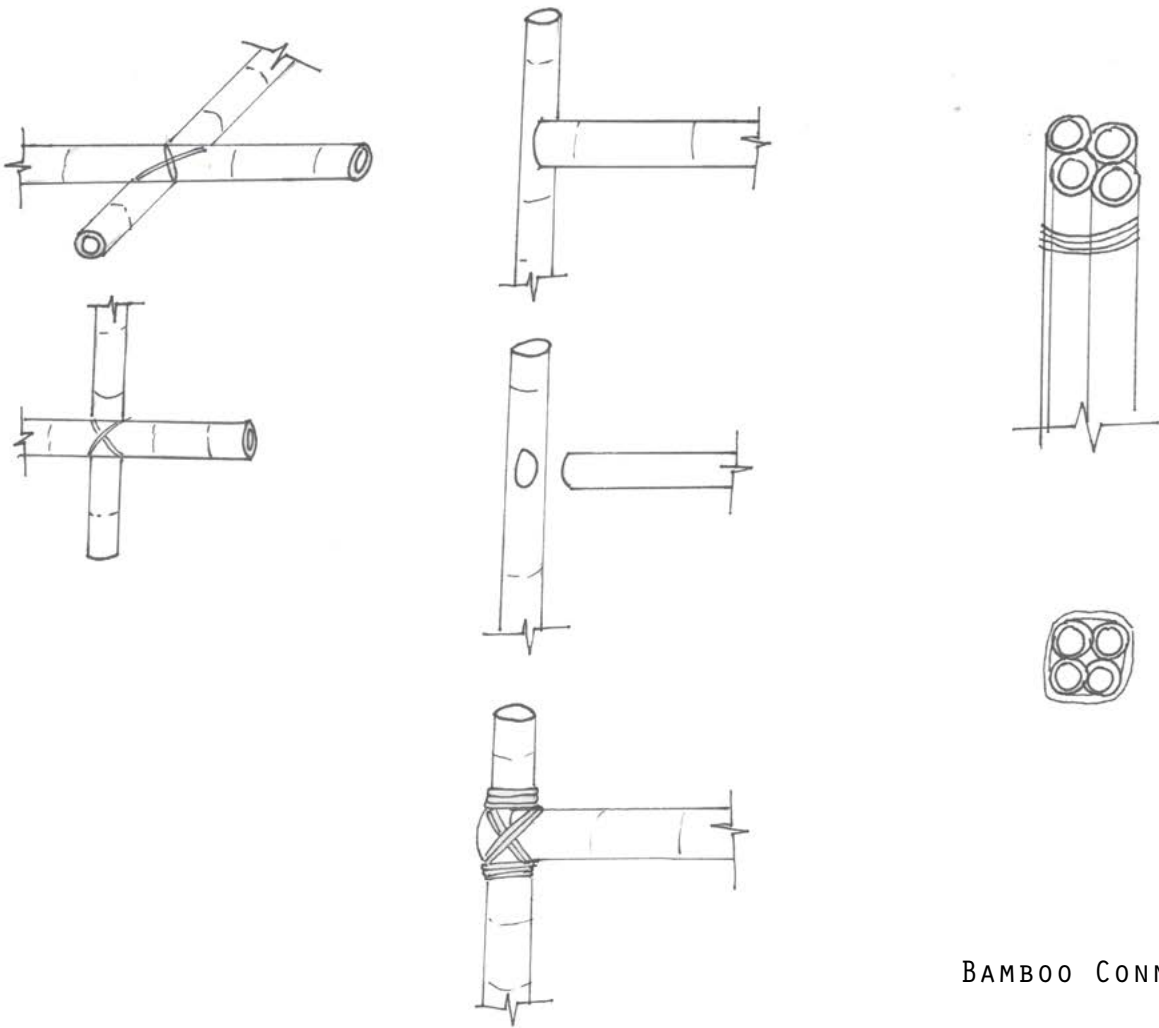
FLOOR/ ROOF DETAIL



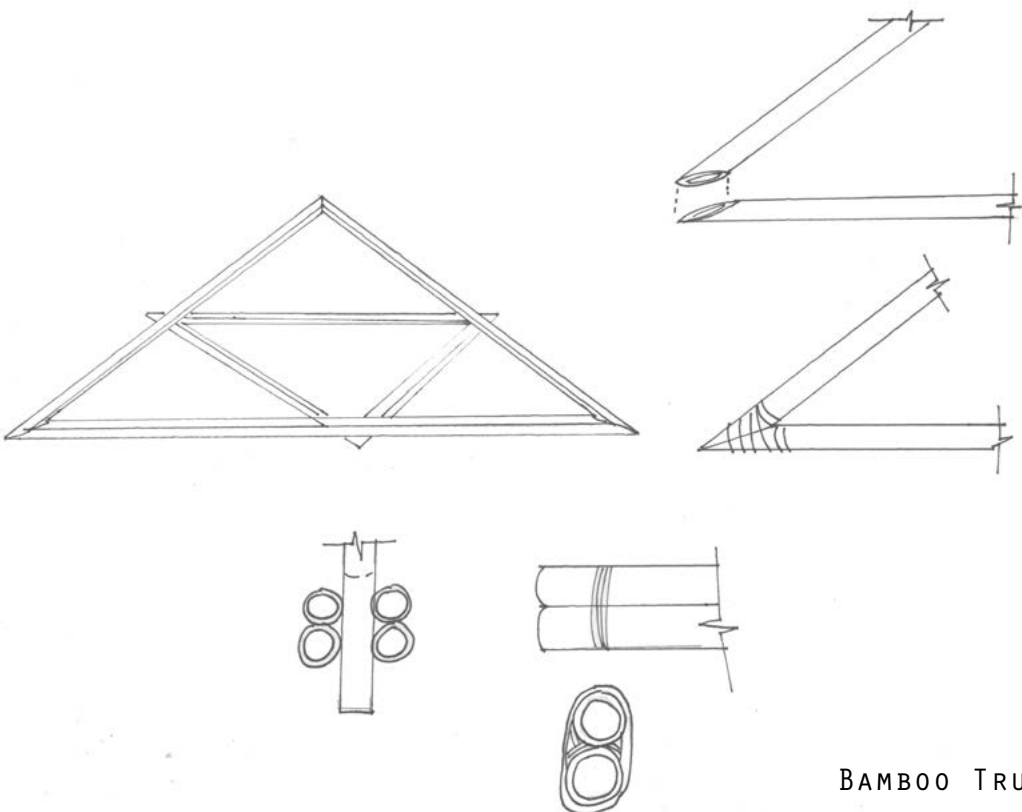
WOVEN PANEL DETAIL



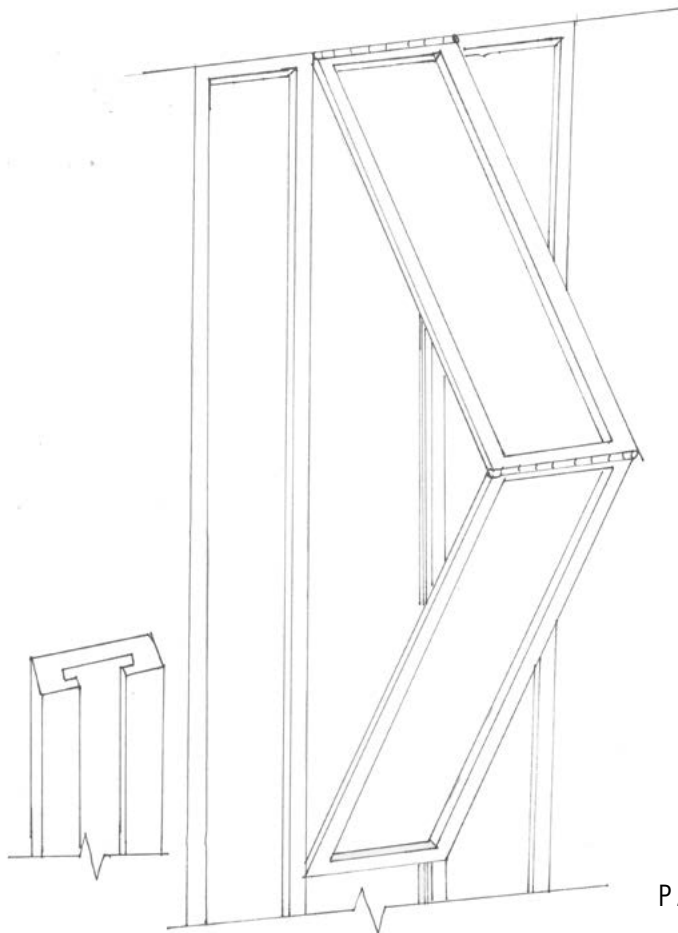
BAMBOO CONNECTIONS AND SUPPORT FOR ROOF DETAIL



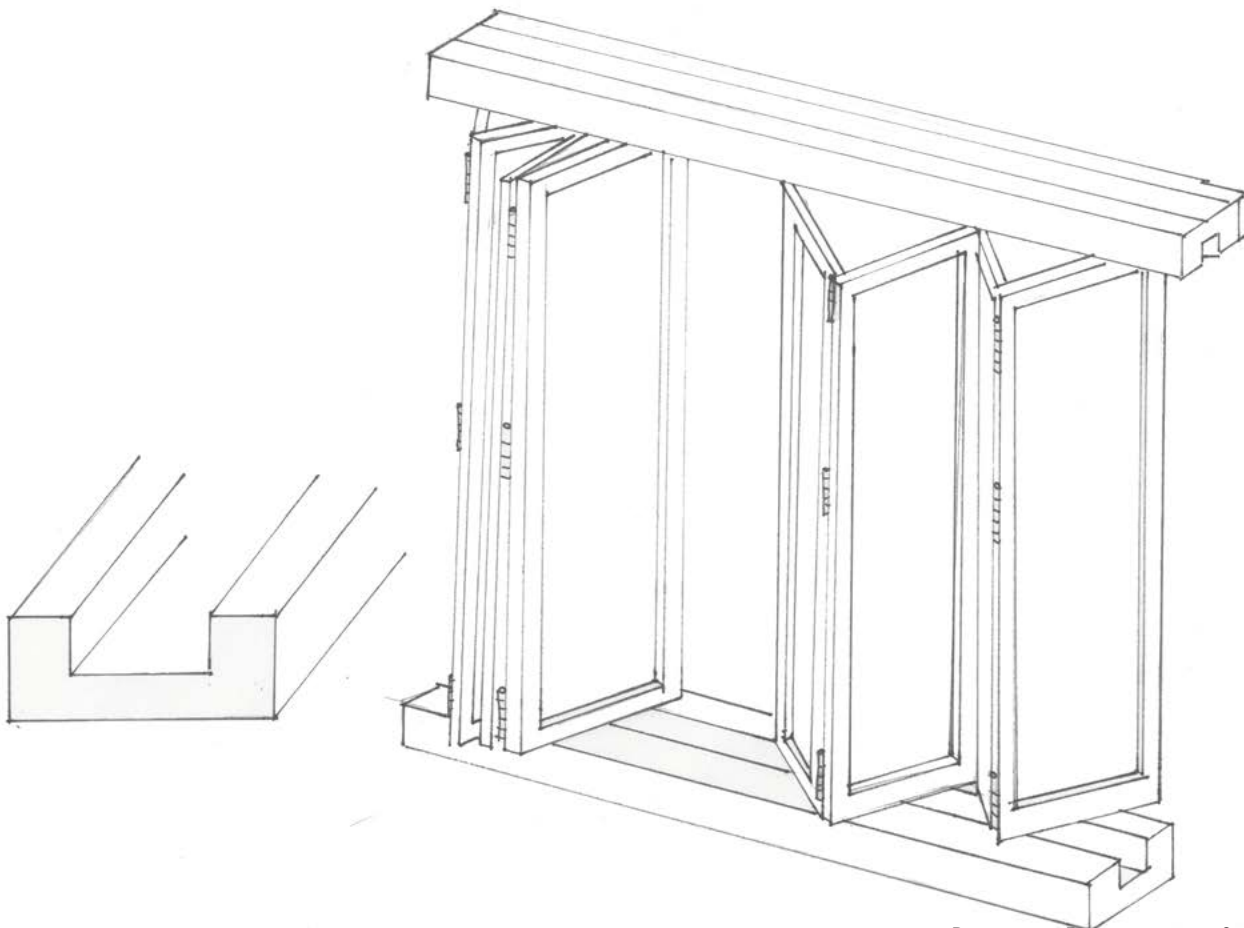
BAMBOO CONNECTIONS



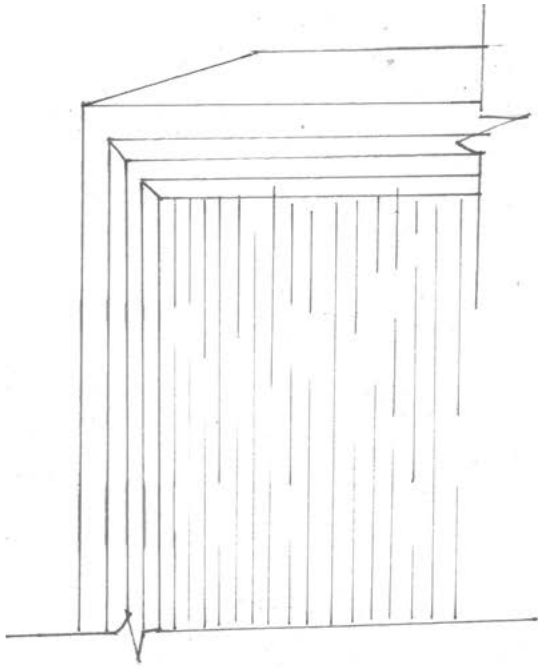
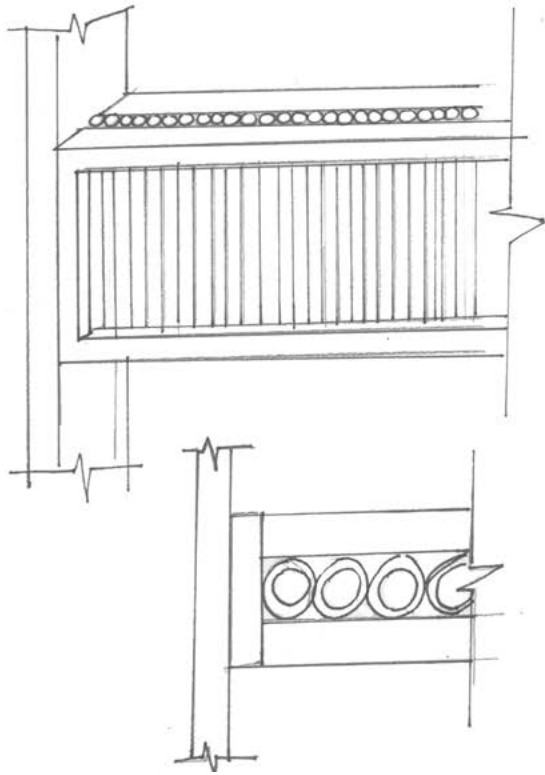
BAMBOO TRUSS DETAILS



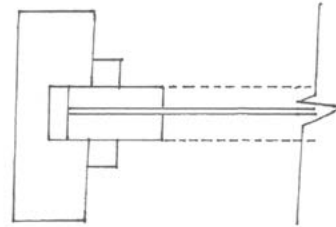
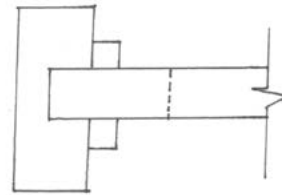
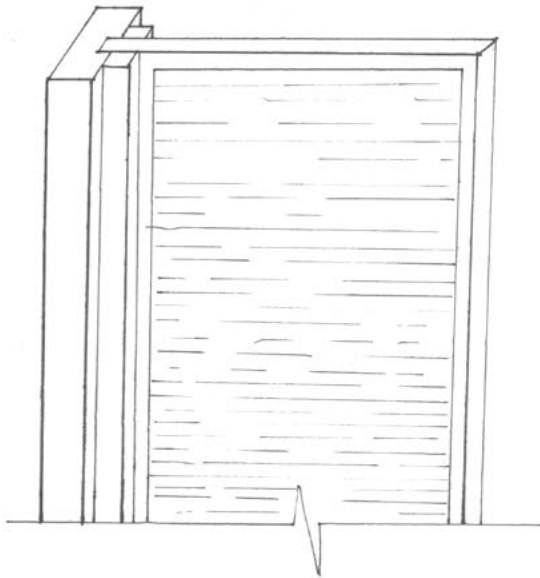
PANEL DETAIL- PUSH OPEN



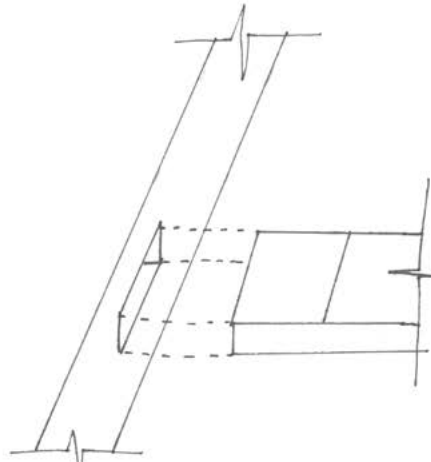
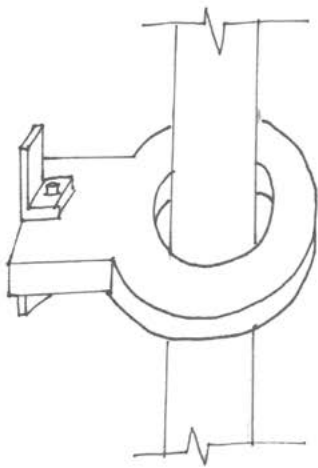
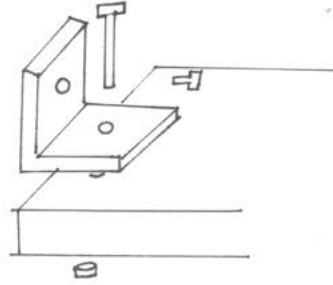
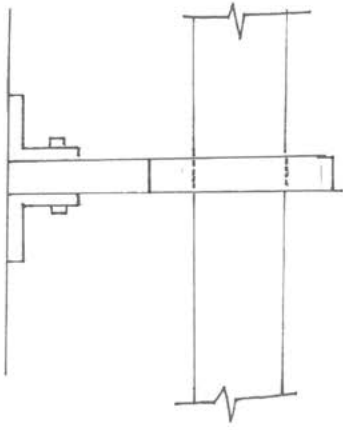
PANEL DETAIL- SLIDE OPEN



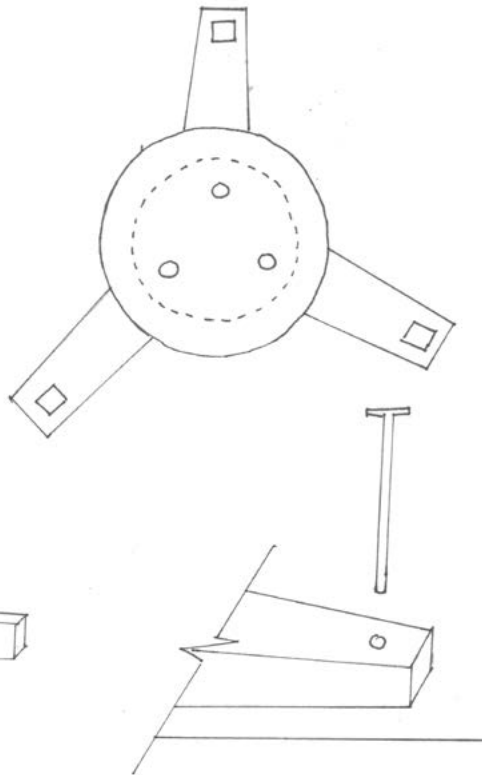
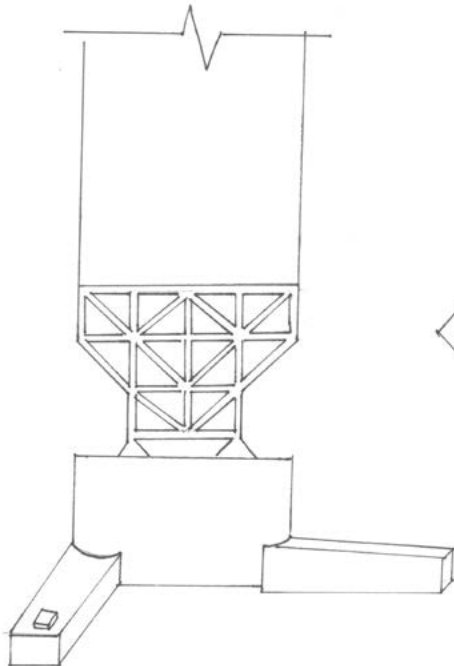
PANEL DETAIL- BAMBOO



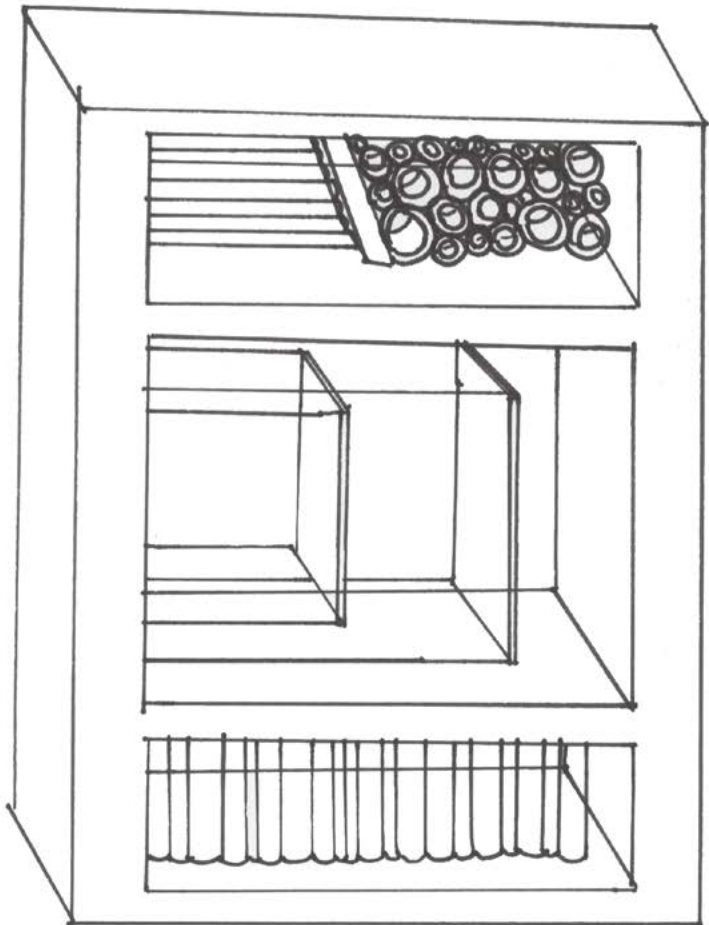
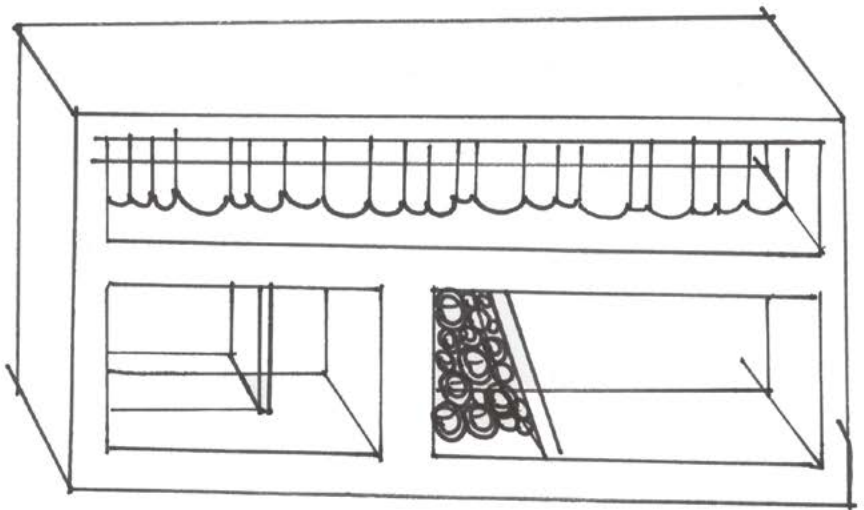
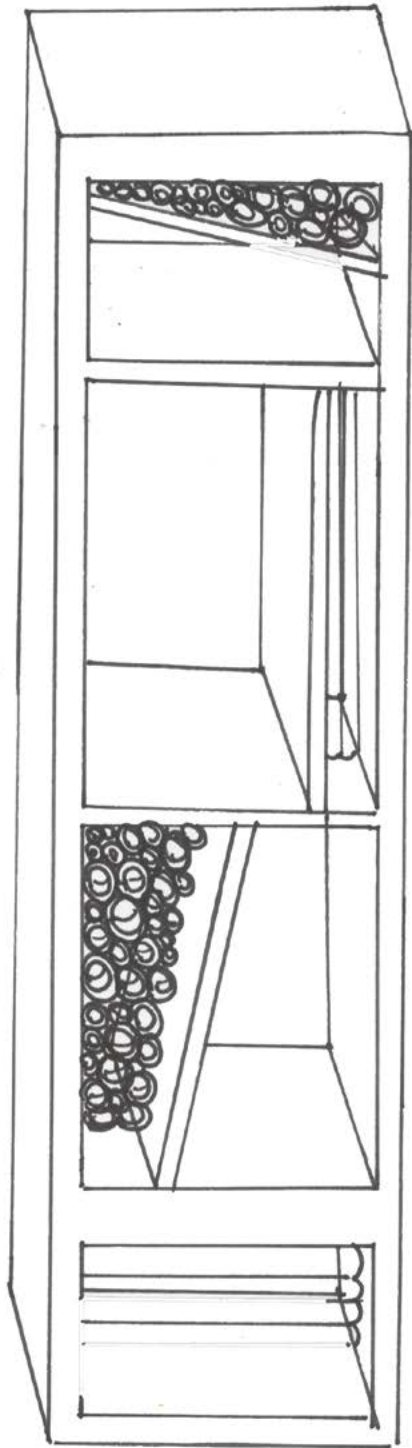
PANEL DETAIL- CONNECTION



BUILDING TO WIND TURBINE CONNECTION



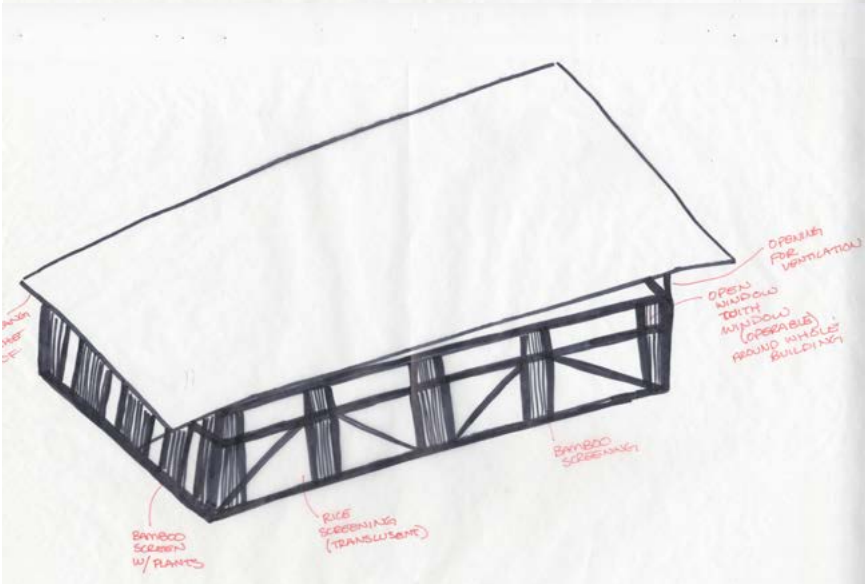
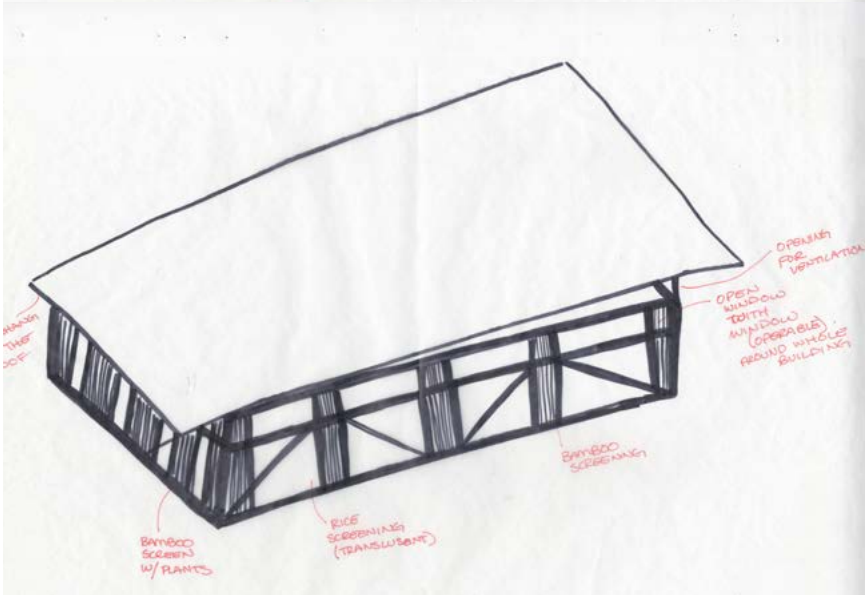
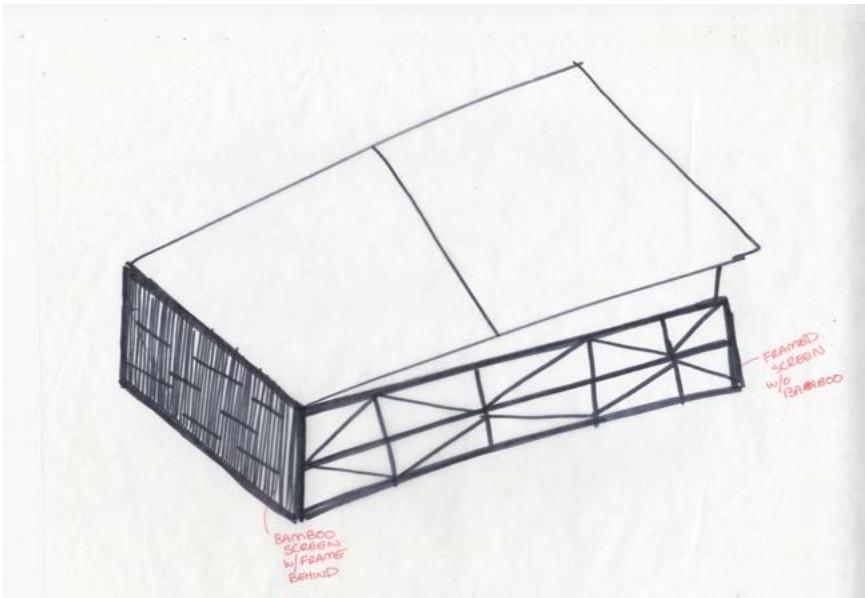
WIND TURBINE TO GROUND UNDERWATER CONNECTION



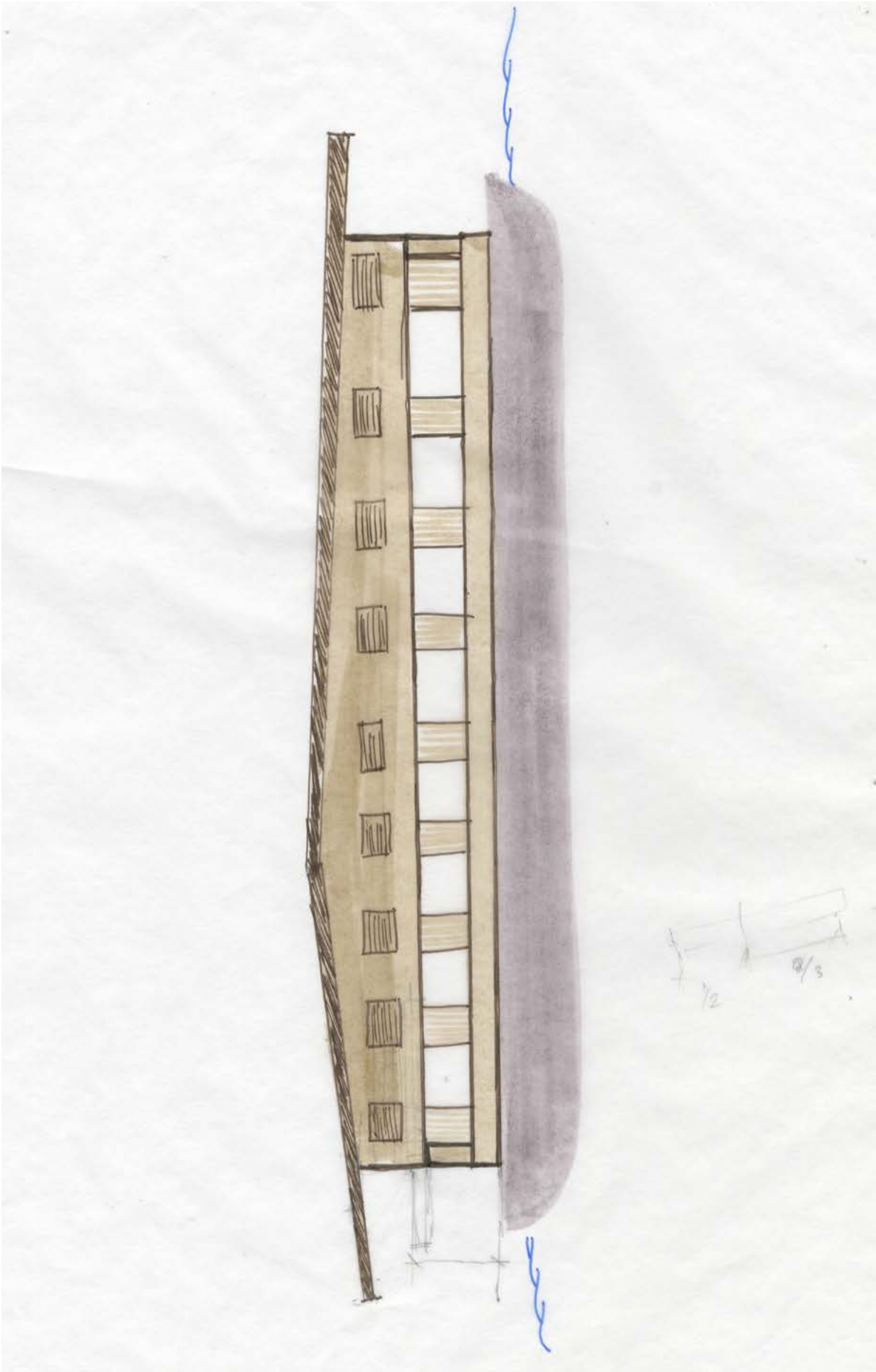
DISPLAY CASES EXPLORATION

Facade Studies

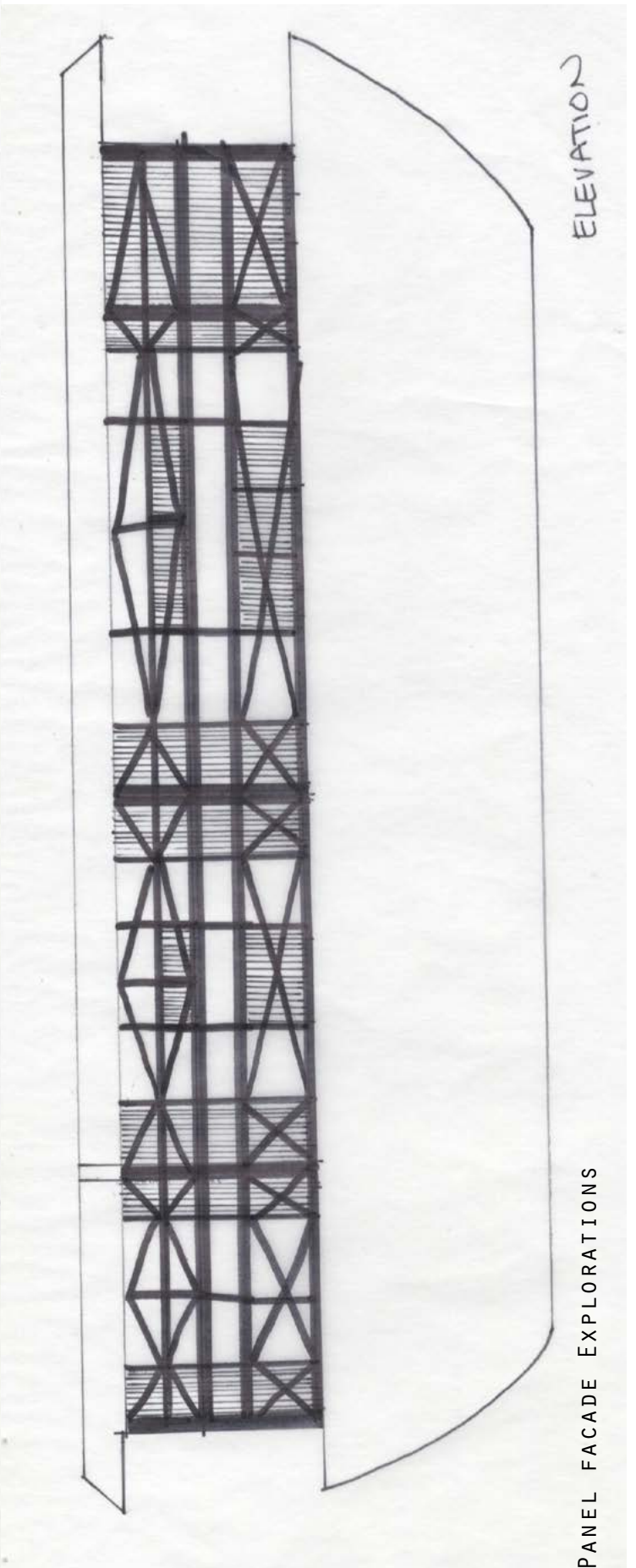
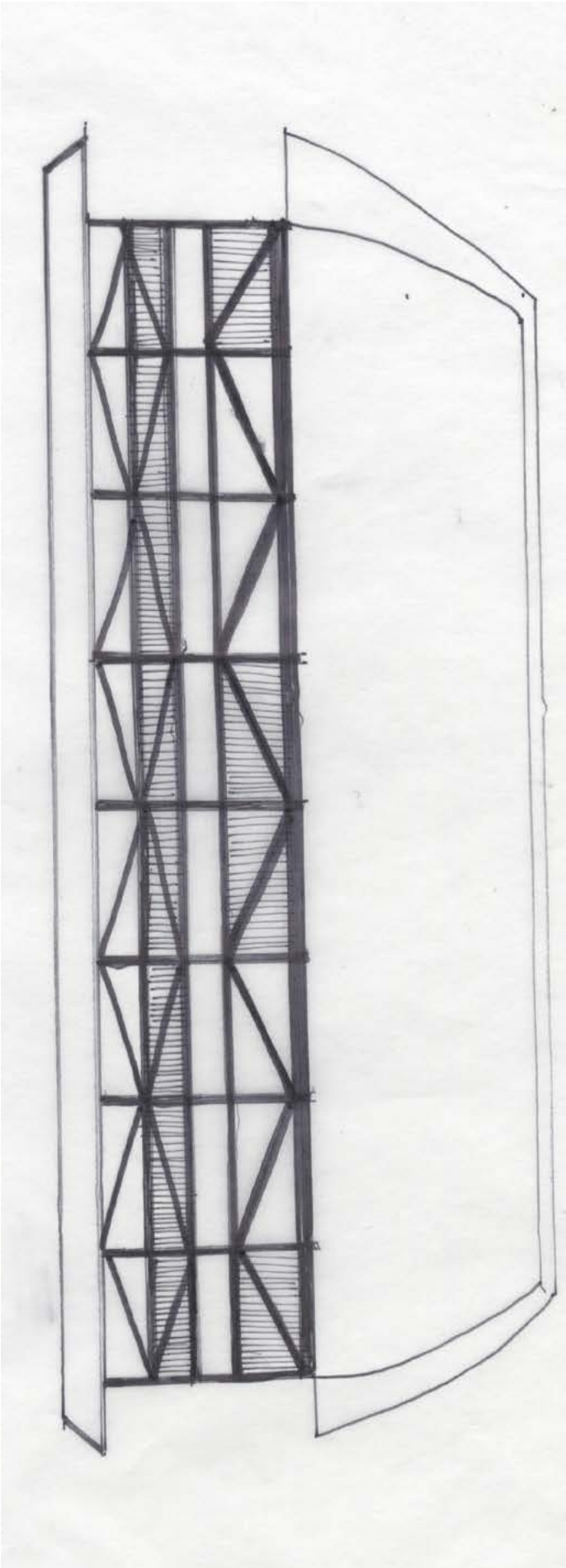
3D Studies
Initial Concept
Panel Studies
Movement of Panels
Color Renderings
Panel Explorations
Montage of Renderings
Elevations Studies
Artist Workspace and



3D FACADE STUDIES

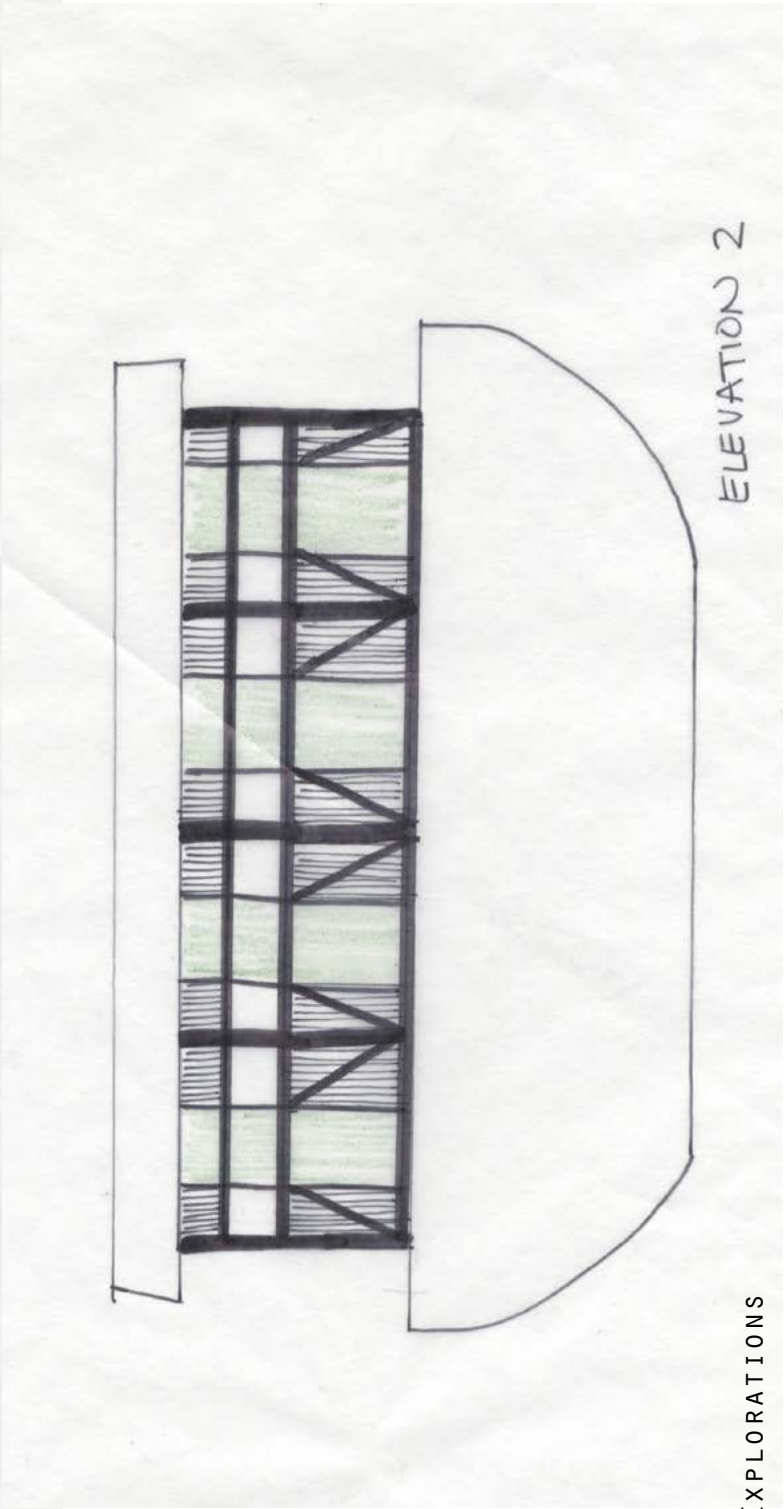
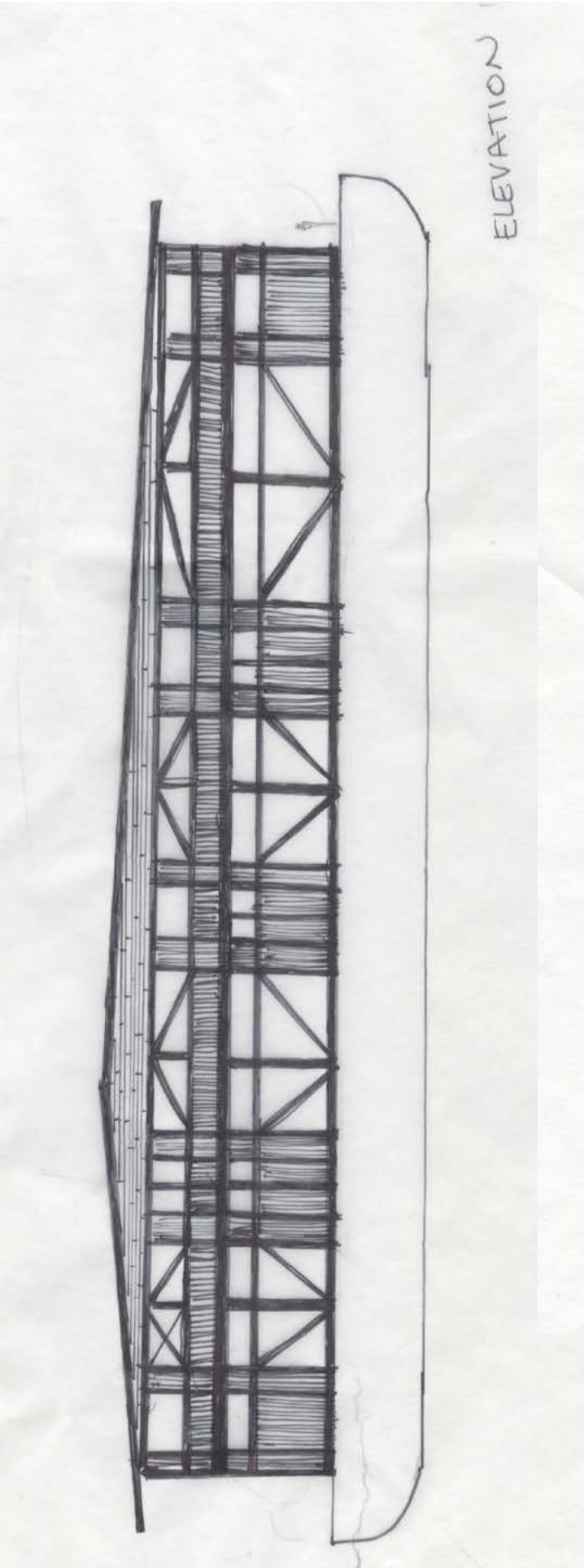


INITIAL COLOR/ MATERIAL STUDY

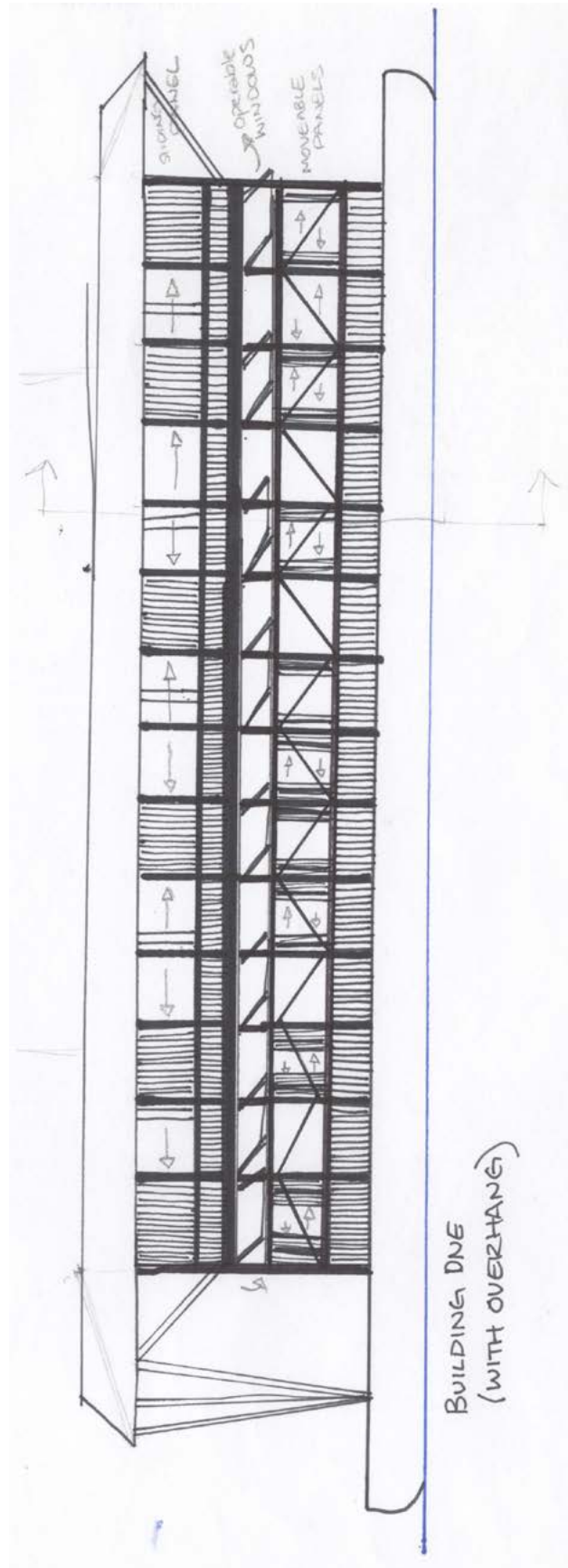


ELEVATION

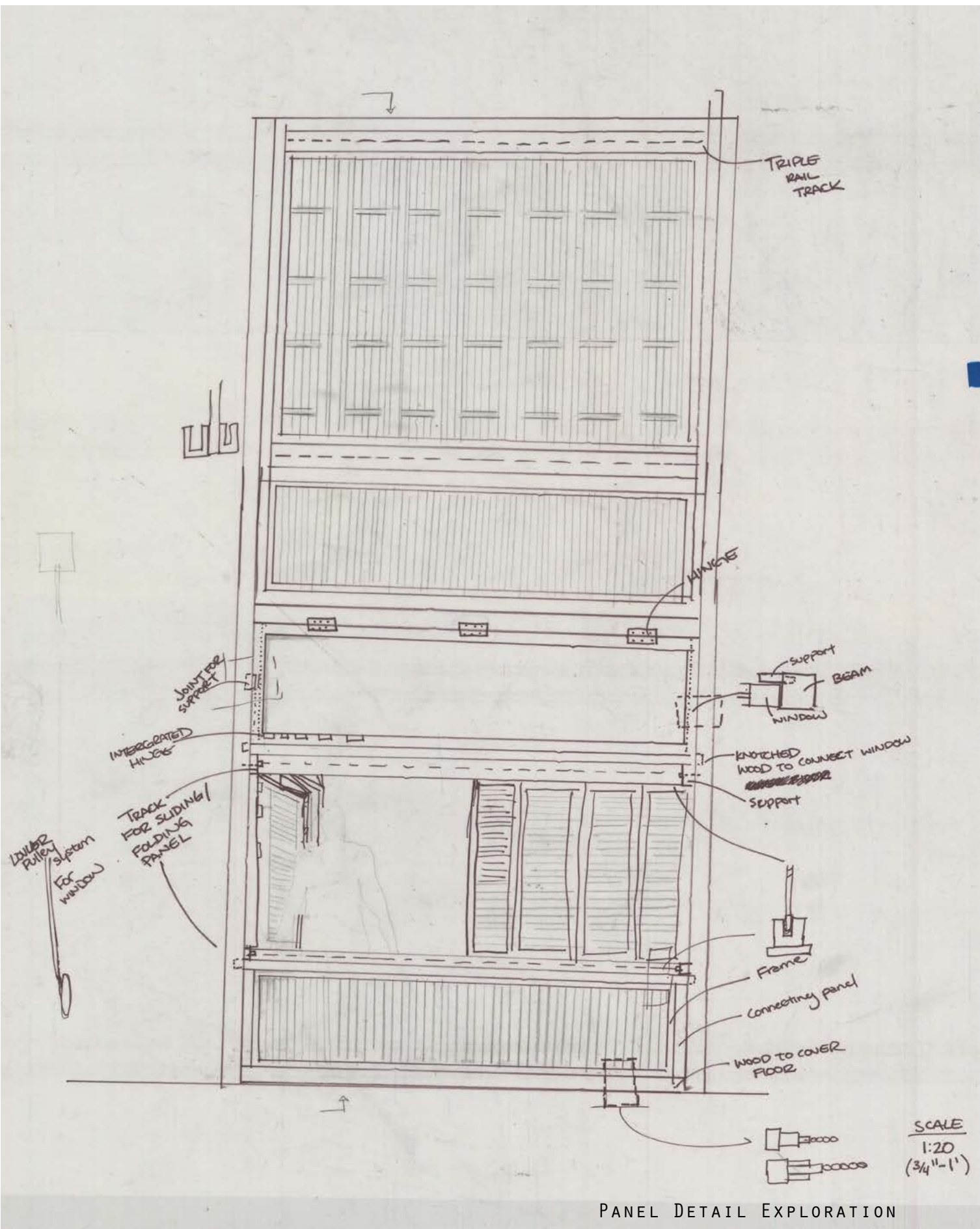
PANEL FACADE EXPLORATIONS



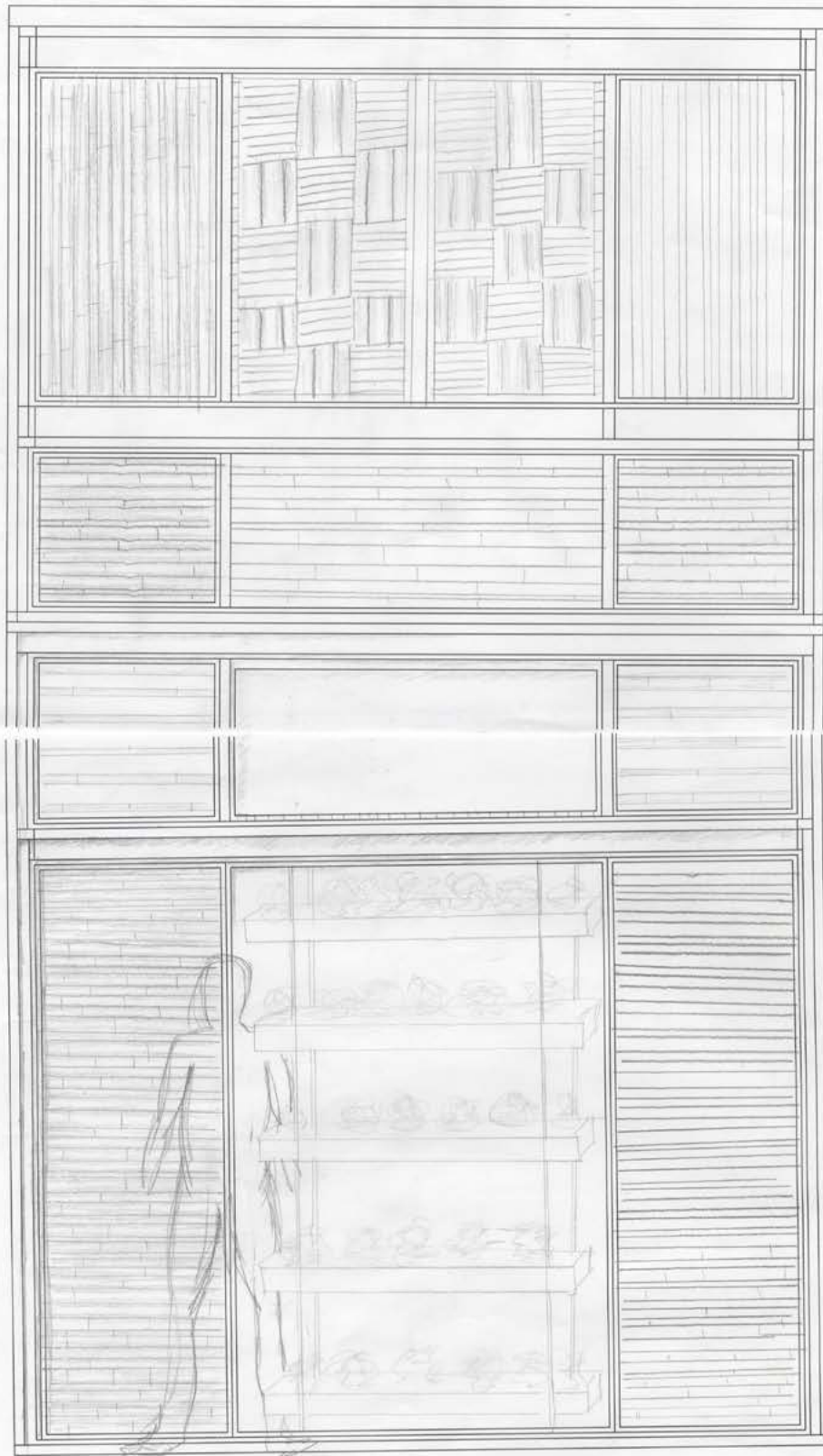
PANEL FACADE EXPLORATIONS



PANEL MOVEMENT EXPLORATIONS

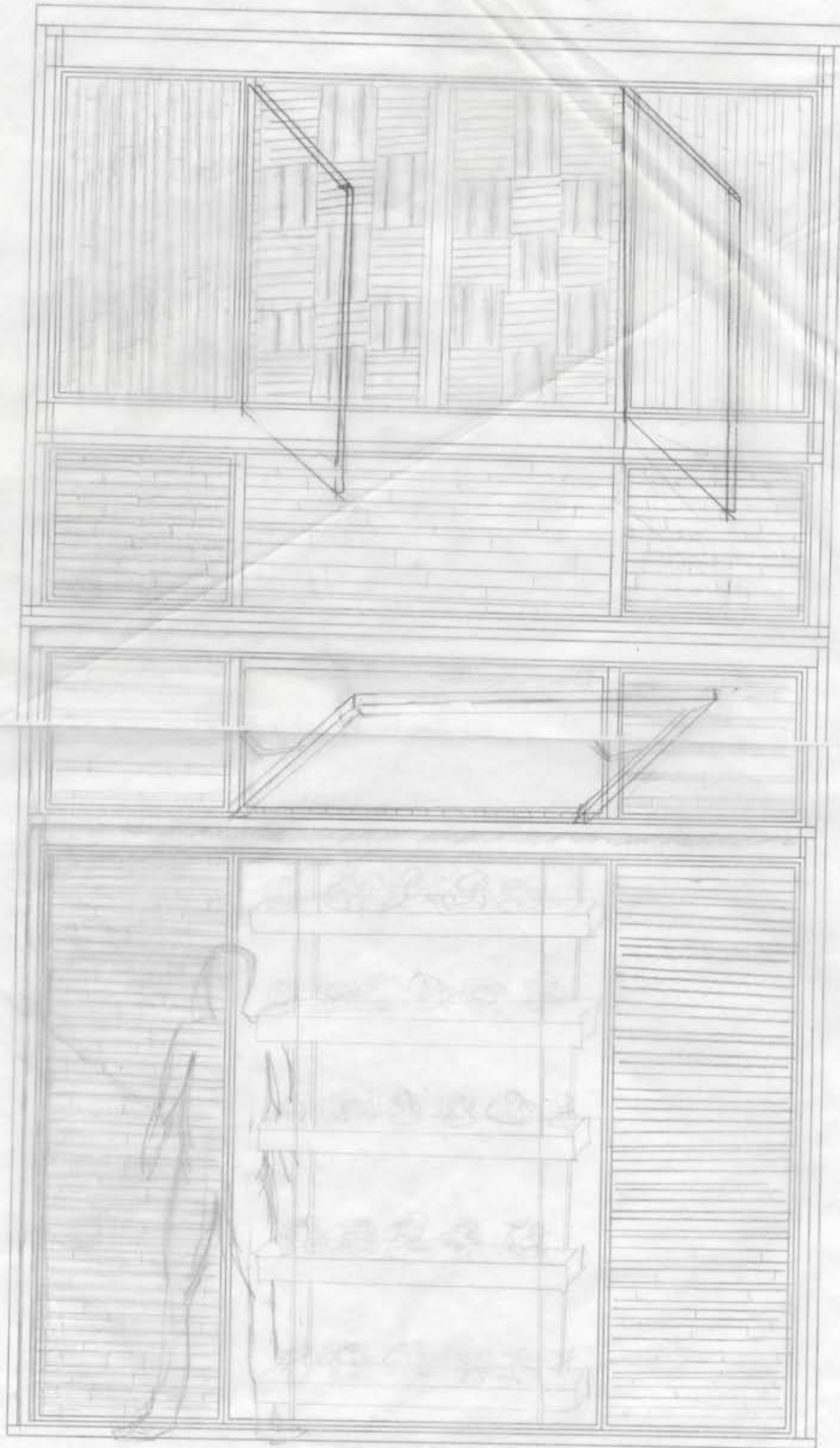


PANEL DETAIL EXPLORATION



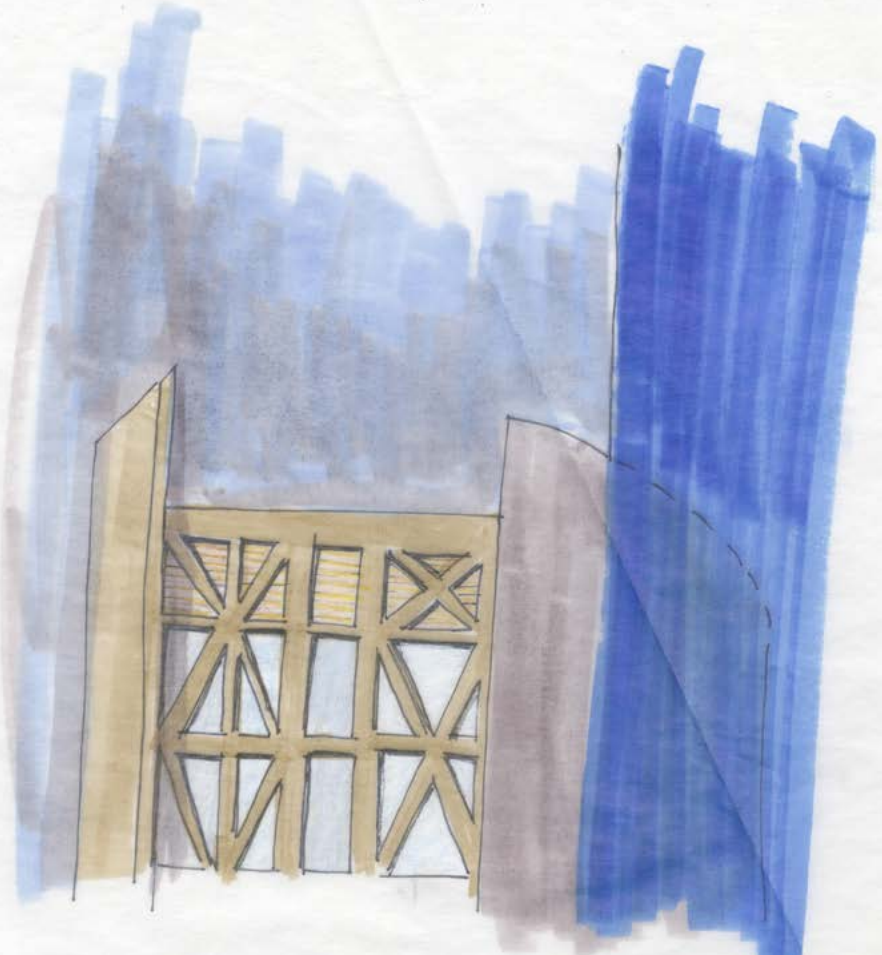
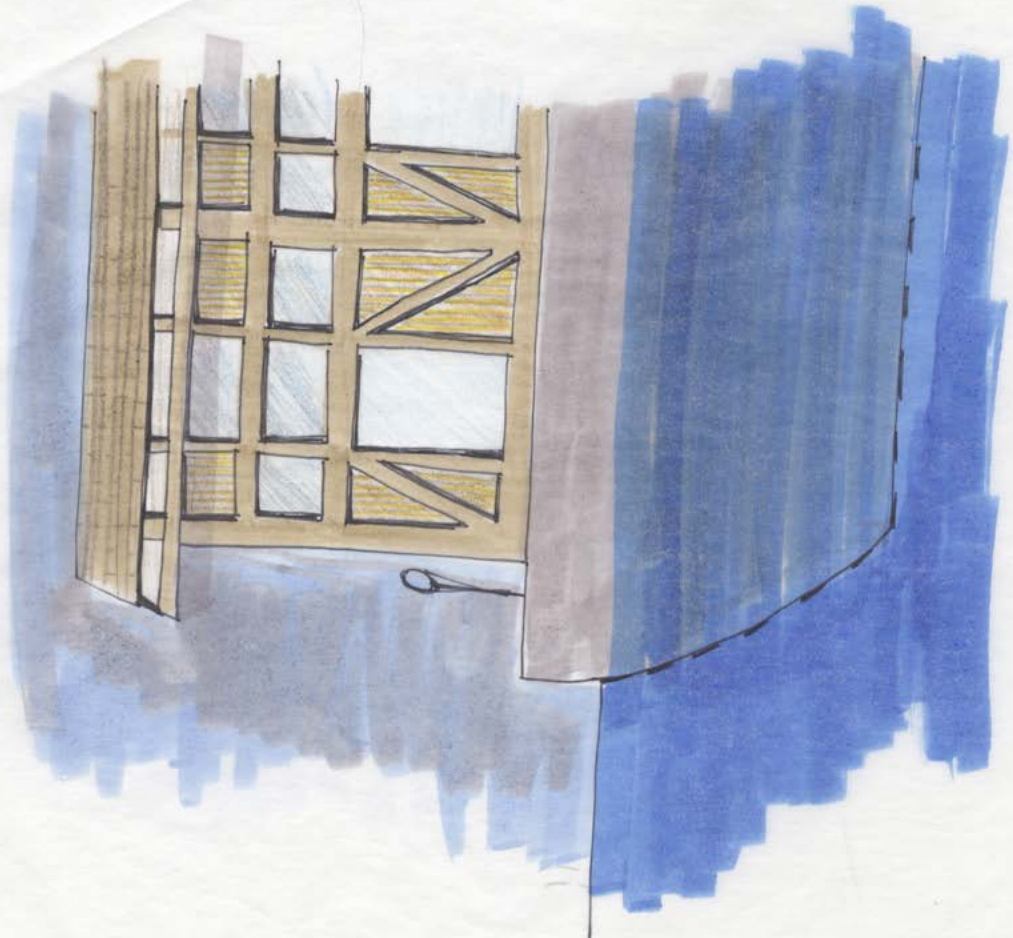
BUILDING 1
(E/W) FACAD.
1:20

PANEL DETAIL EXPLORATION



BUILDING 1
(E/W) FACADE
1:20

PANEL DETAIL WITH OPENINGS EXPLORATION



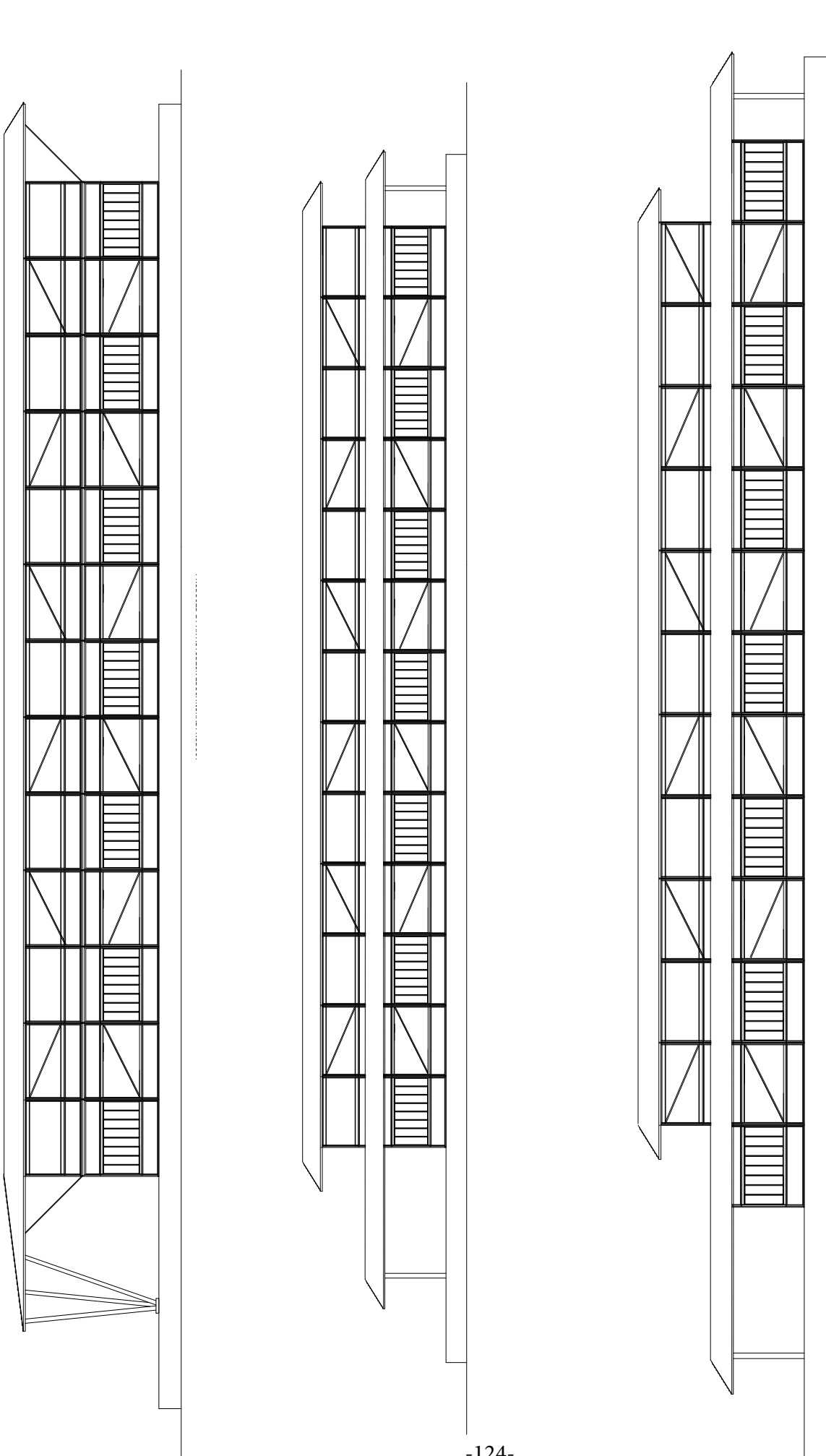


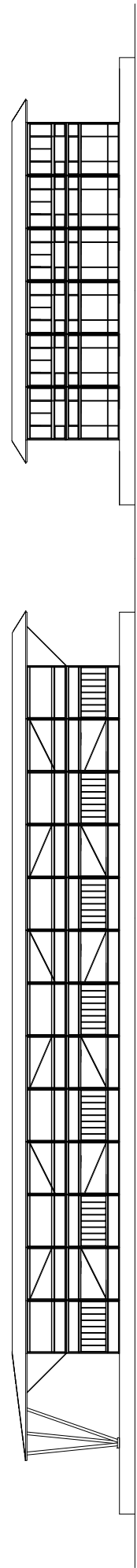
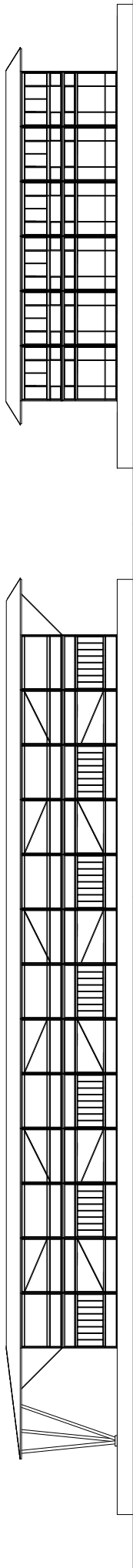


RENDERED ELEVATION EXPLORATIONS

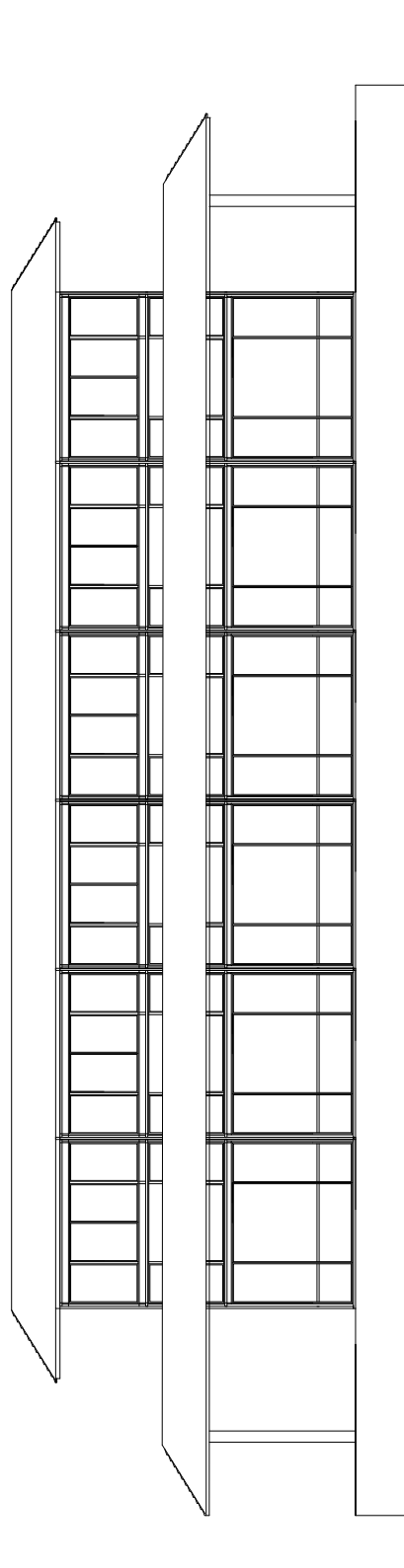
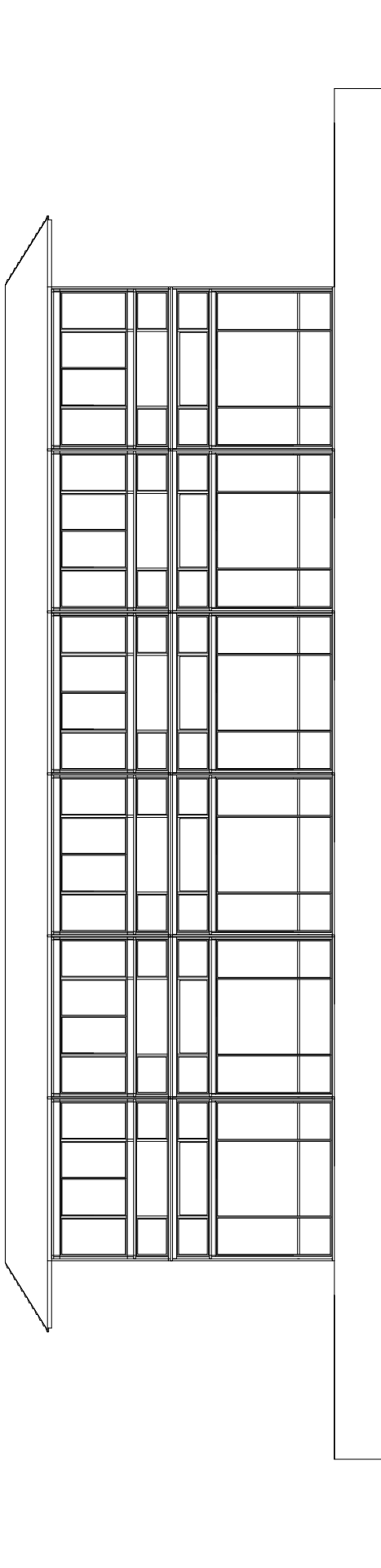


MONTAGE OF RENDERING

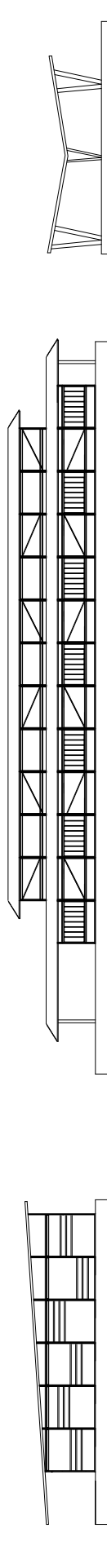


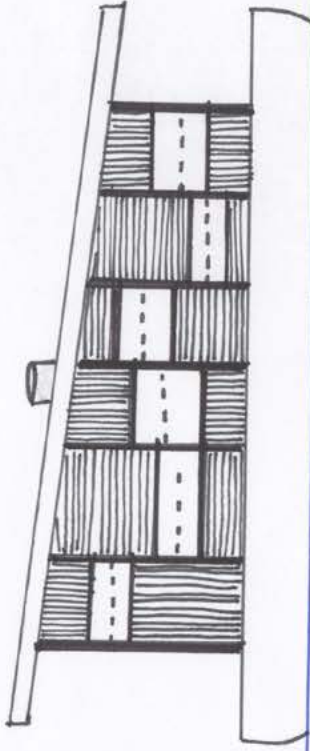


ELEVATION STUDIES

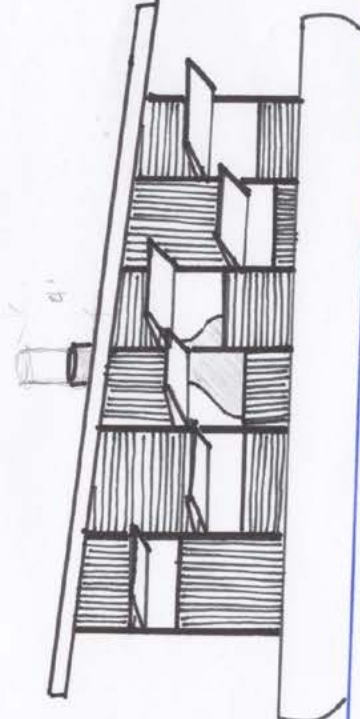


ELEVATION STUDIES

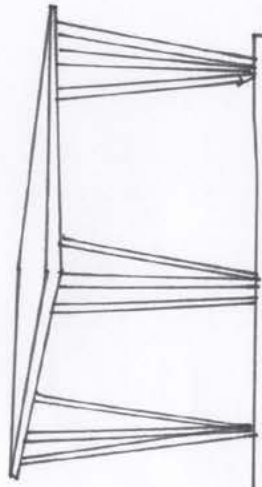




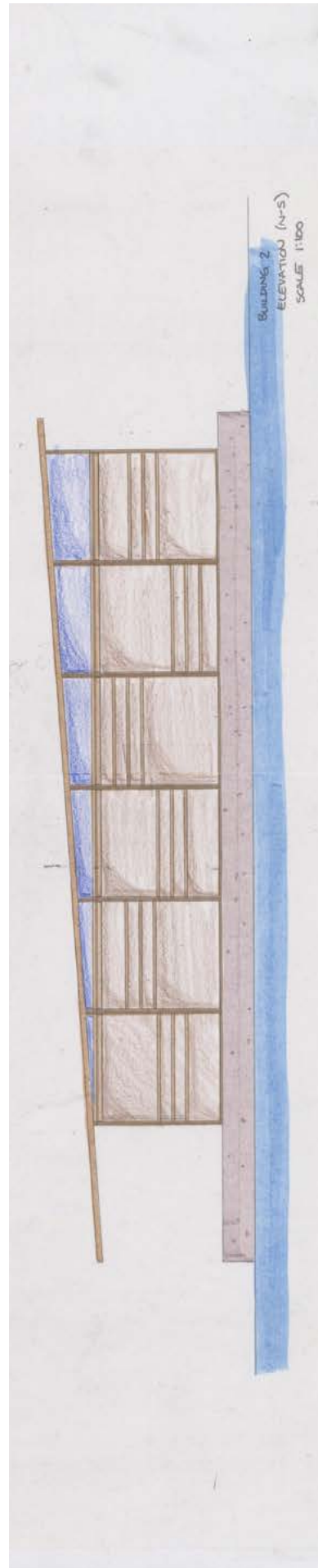
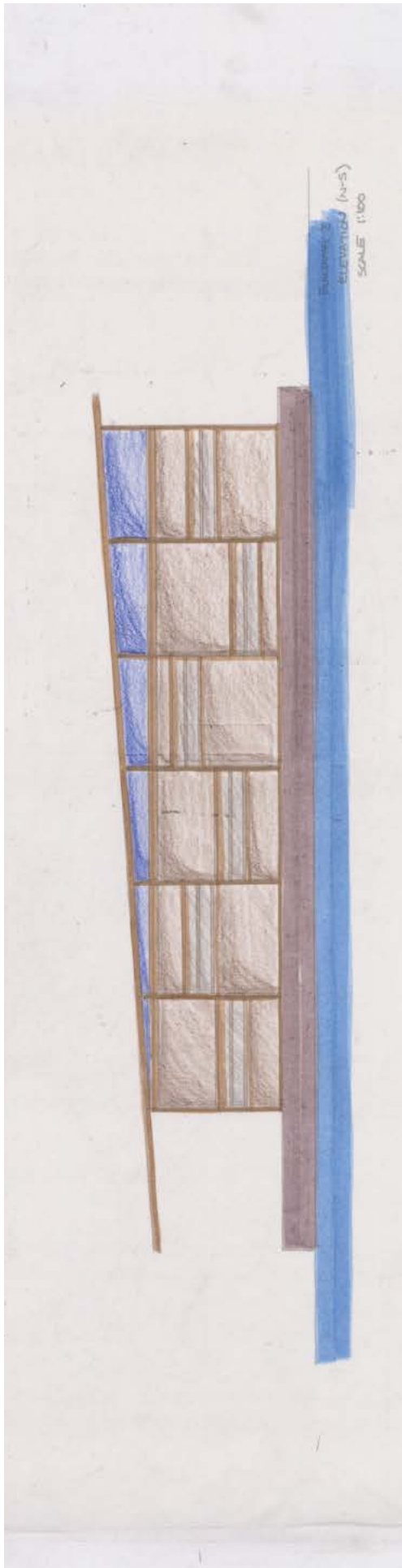
BUILDING THREE



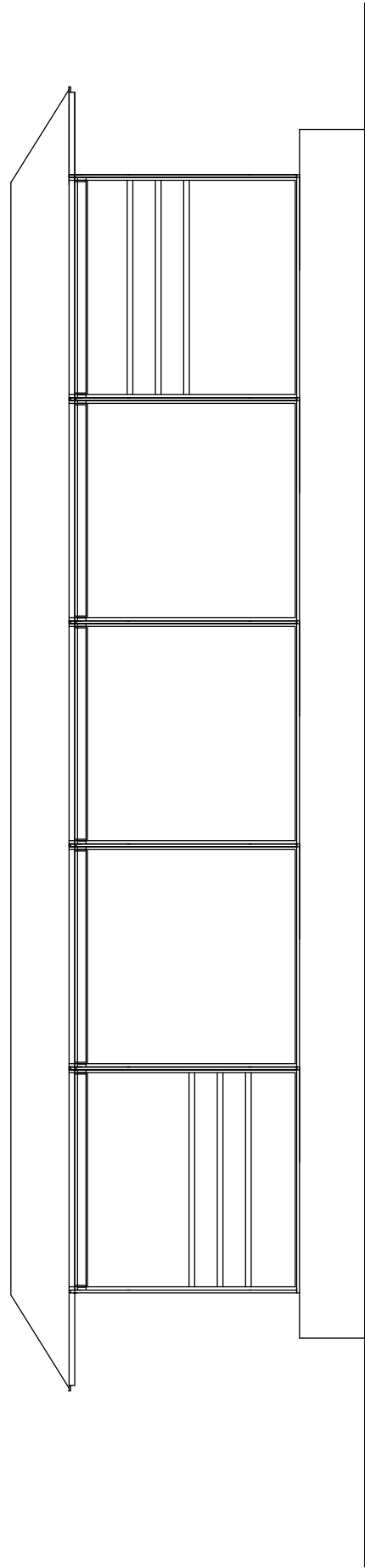
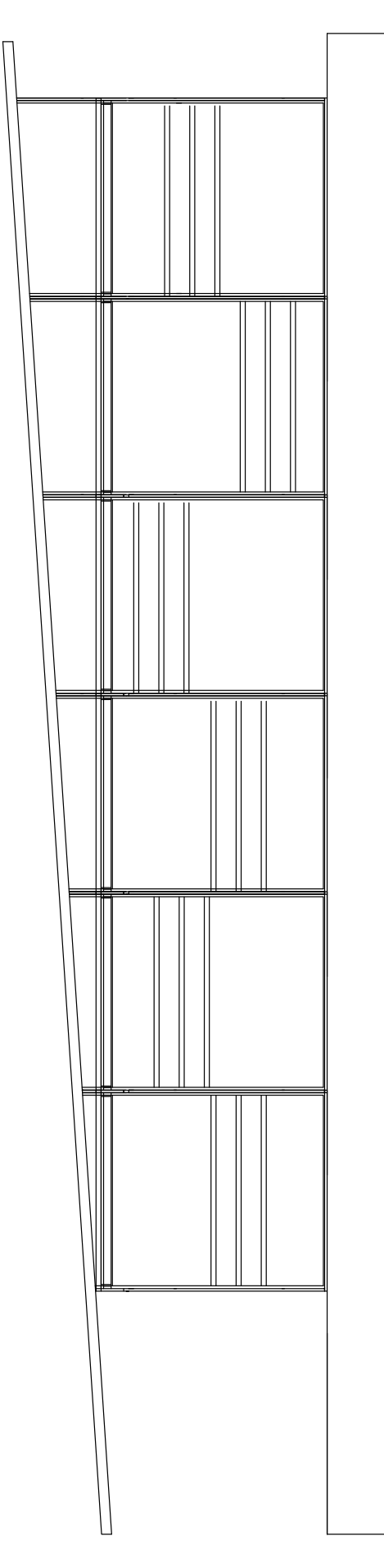
BUILDING #2
WITH SLIDE
PANELS OPEN



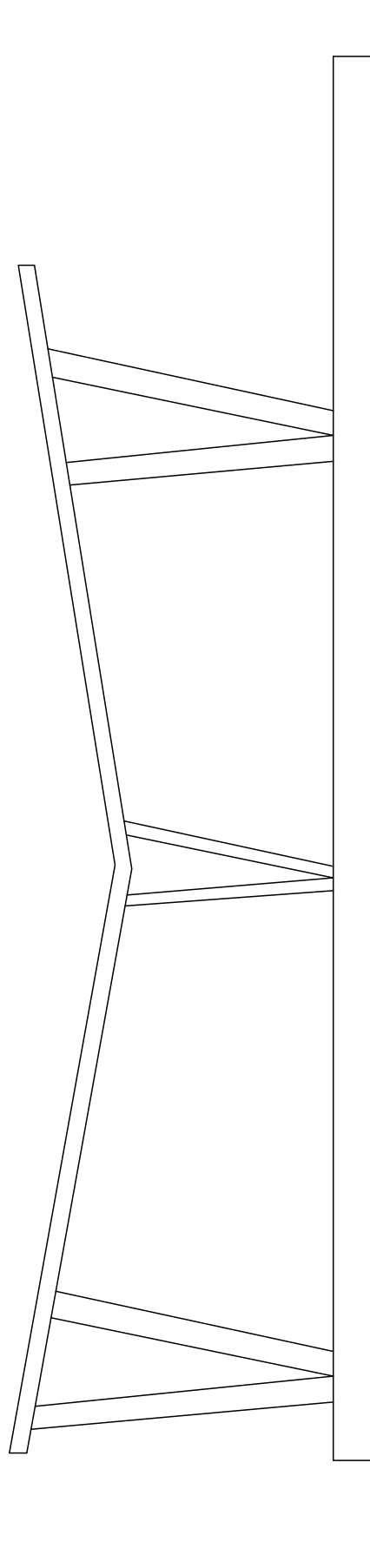
BUILDING #3
WITH FABRIC
SUNSHADE



RENDERED EXPLORATIONS AND PANEL
MOVEMENT ARTIST WORKSPACE



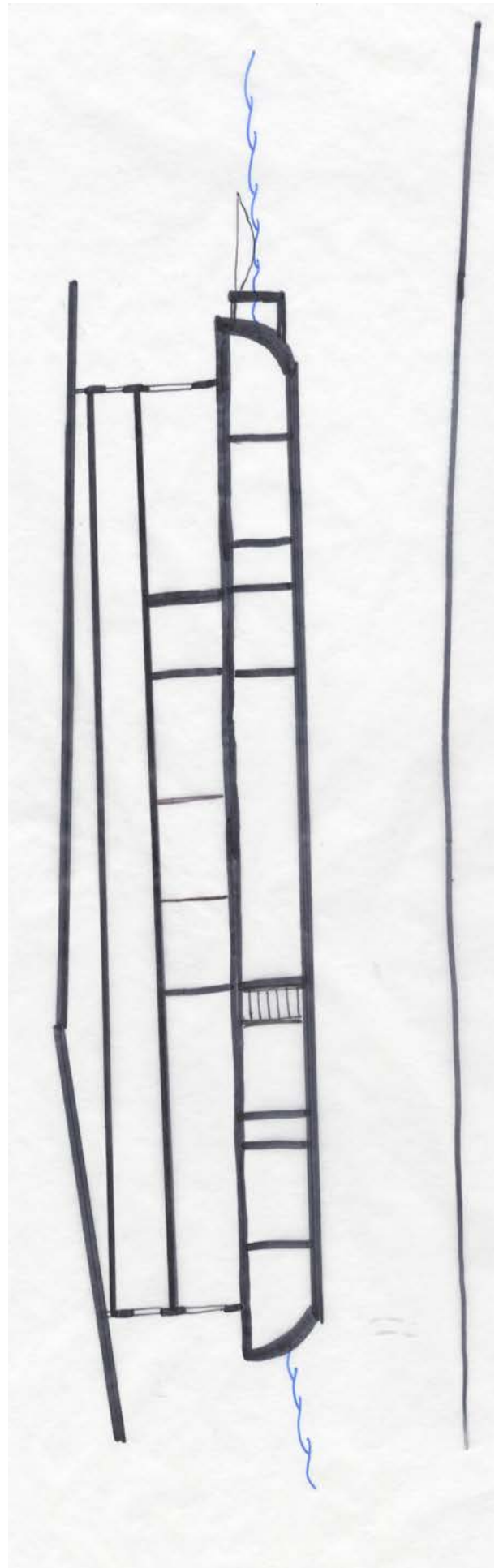
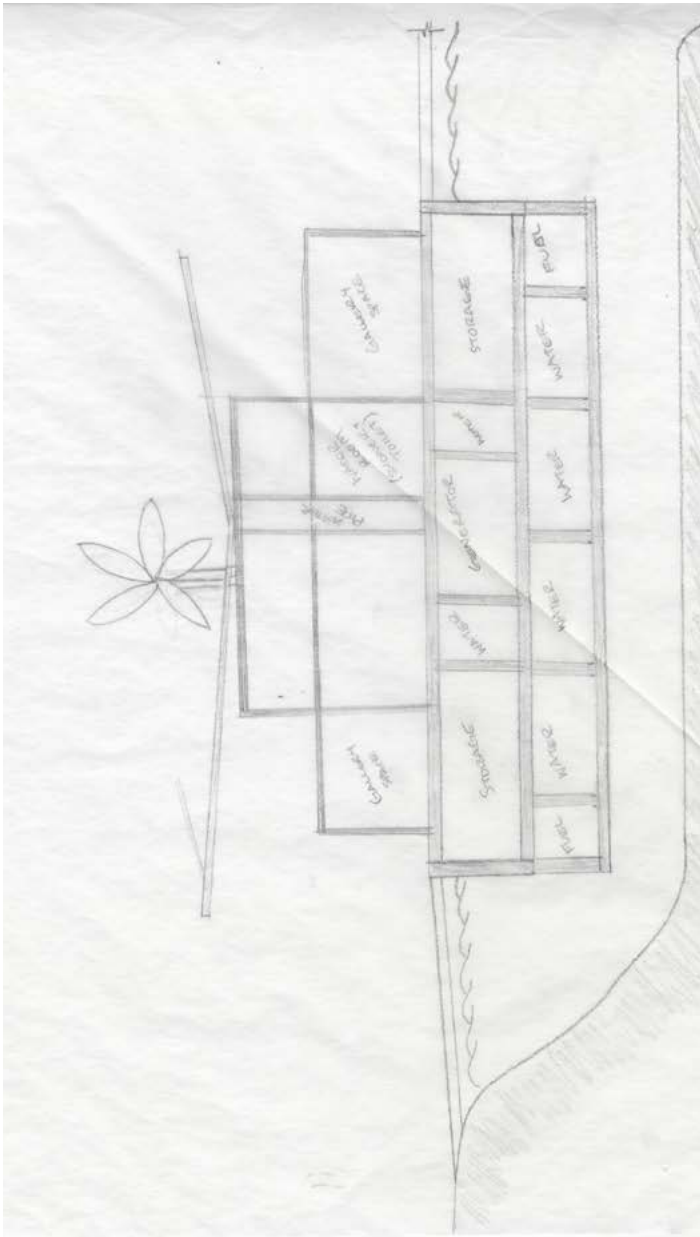
ELEVATION STUDIES ARTIST WORKSPACE

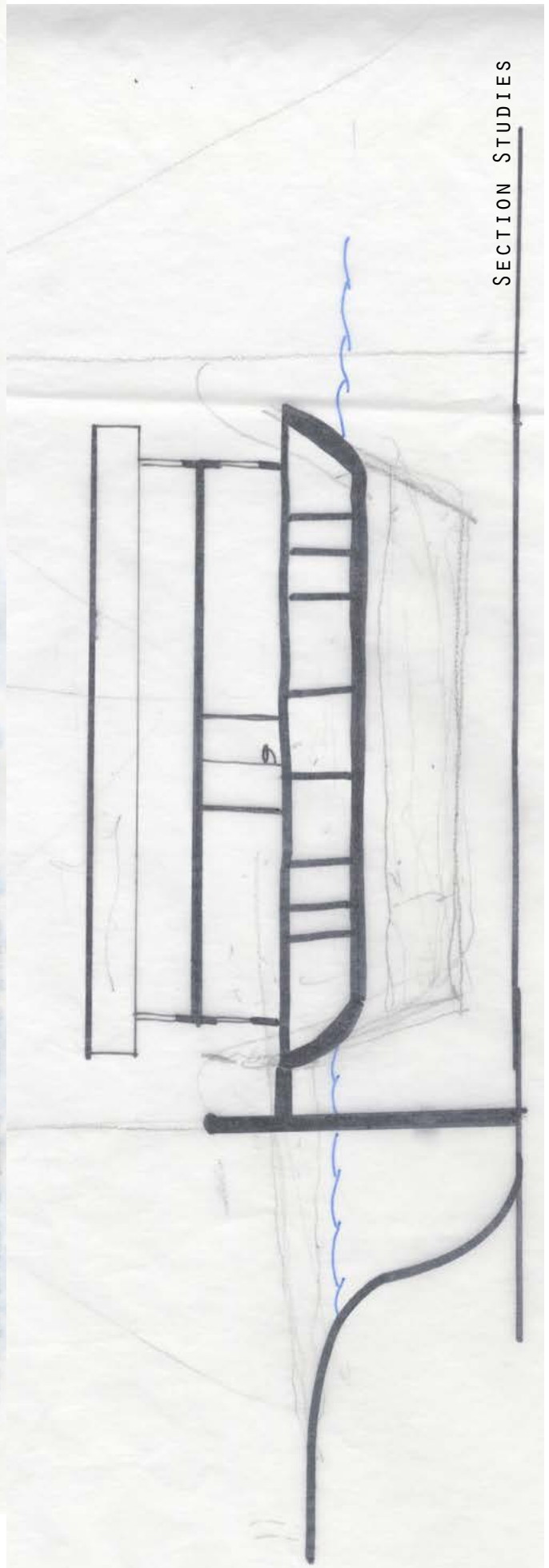
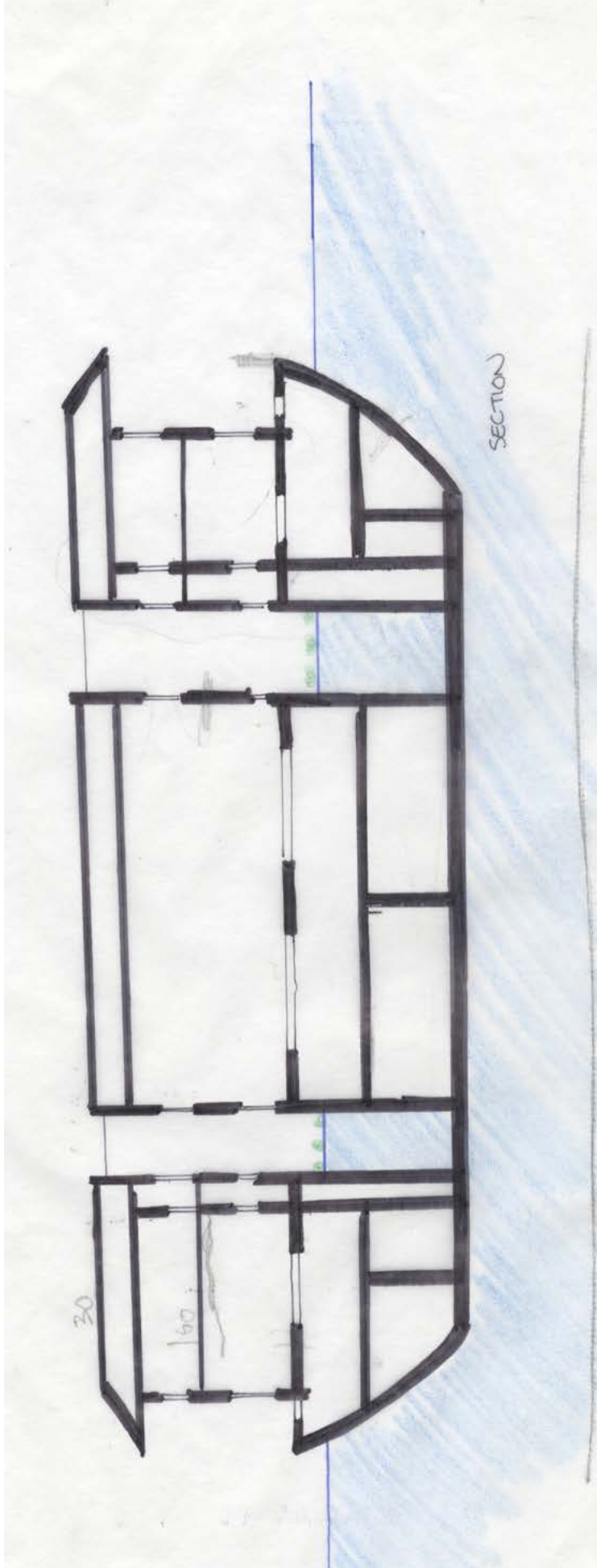


ELEVATION STUDIES PERFORMANCE SPACE

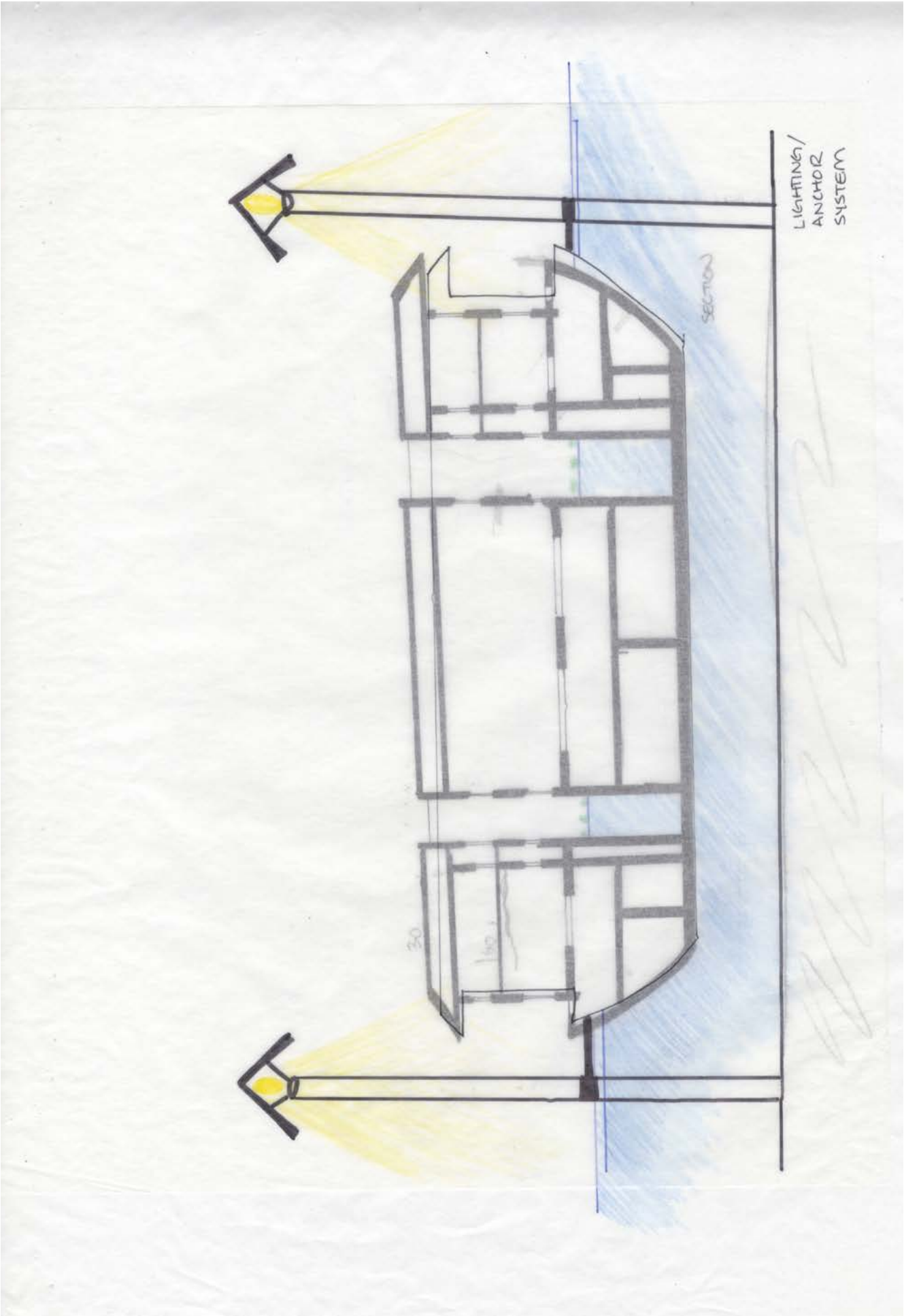
Section- Process

Initial Studies
Connections Points
Wall Section Study
Detailed Section

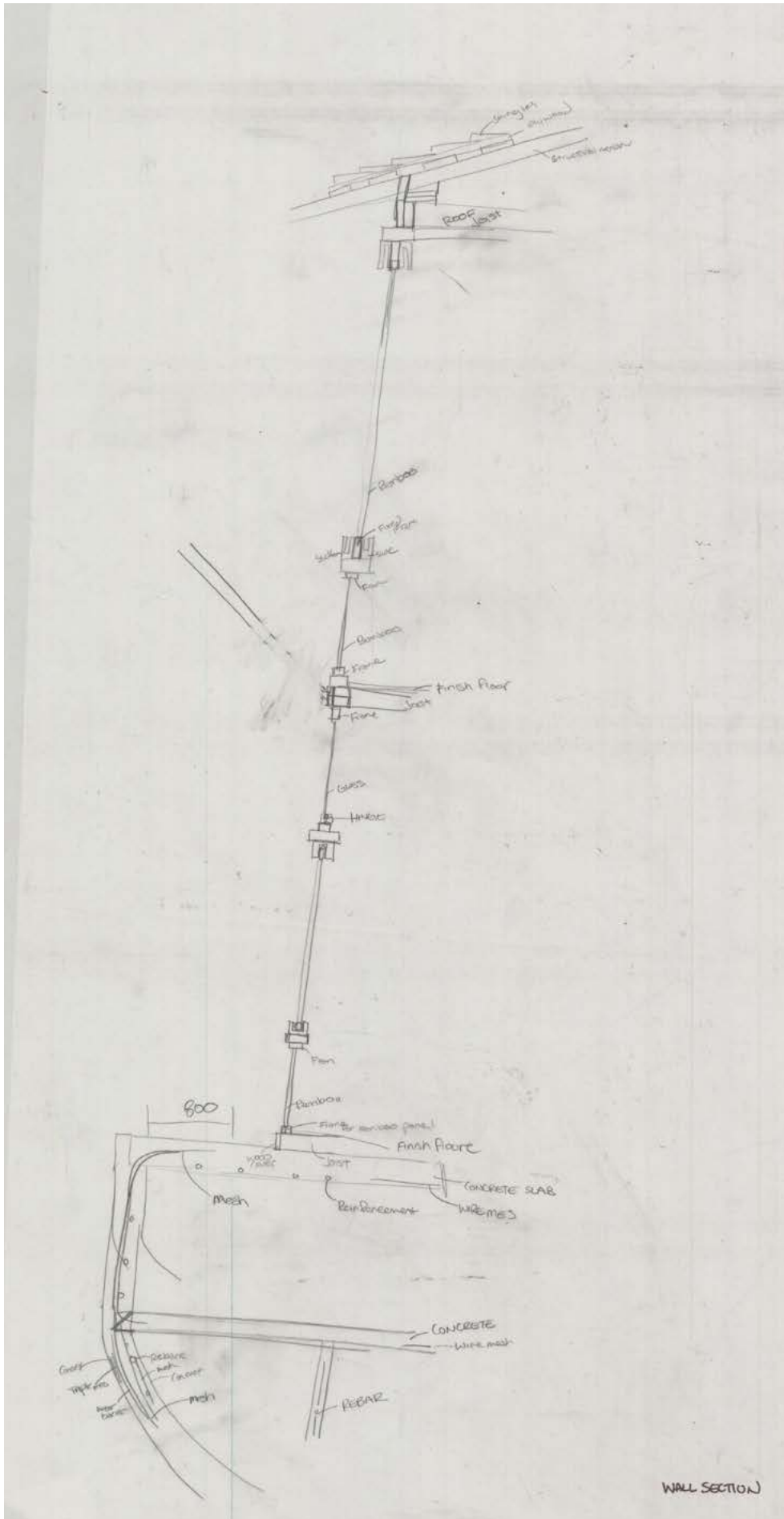




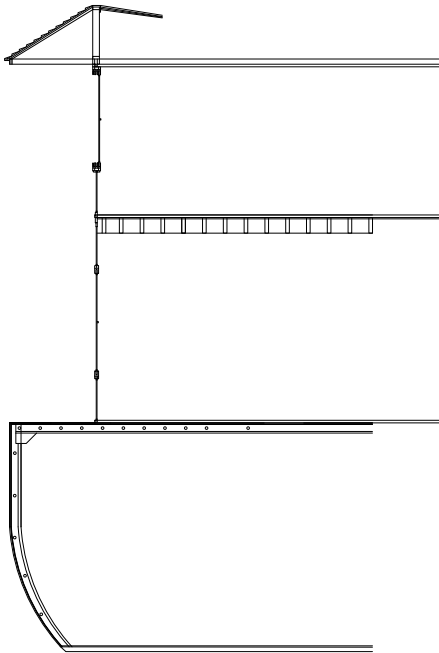
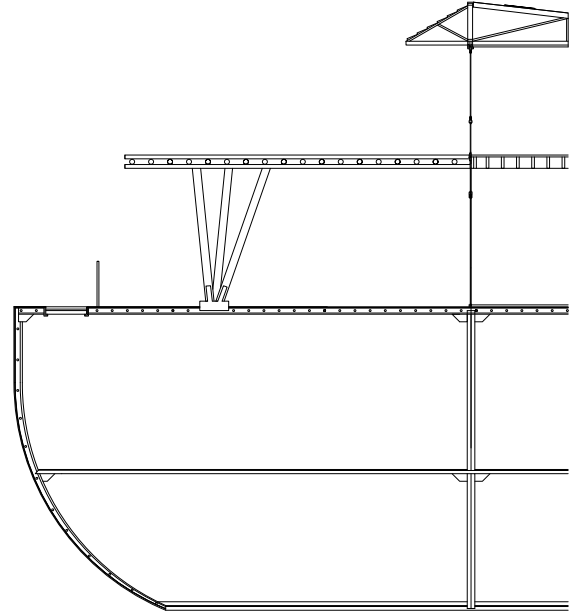
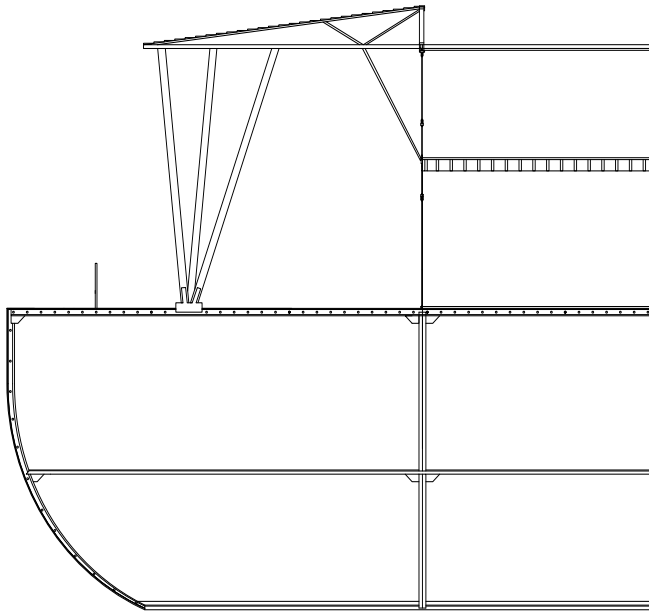
SECTION STUDIES



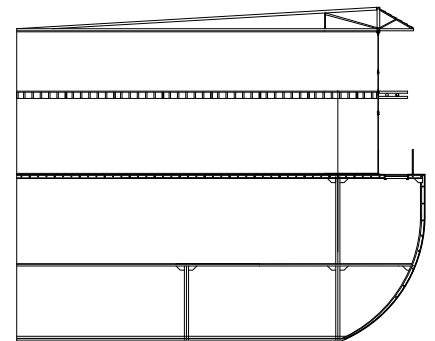
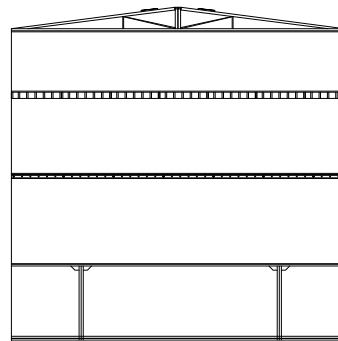
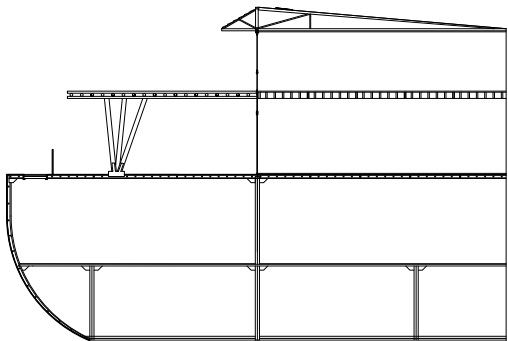
SECTION STUDIES[CONNECTION POINTS



WALL SECTION

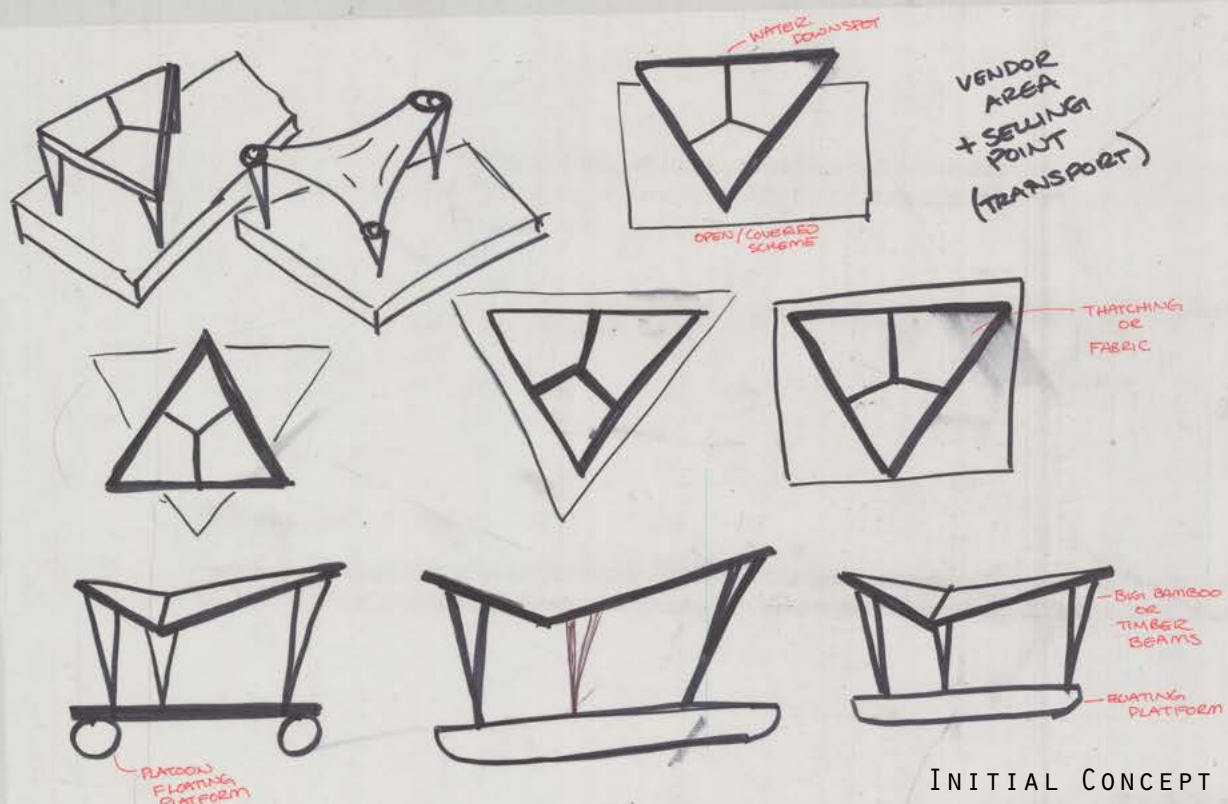
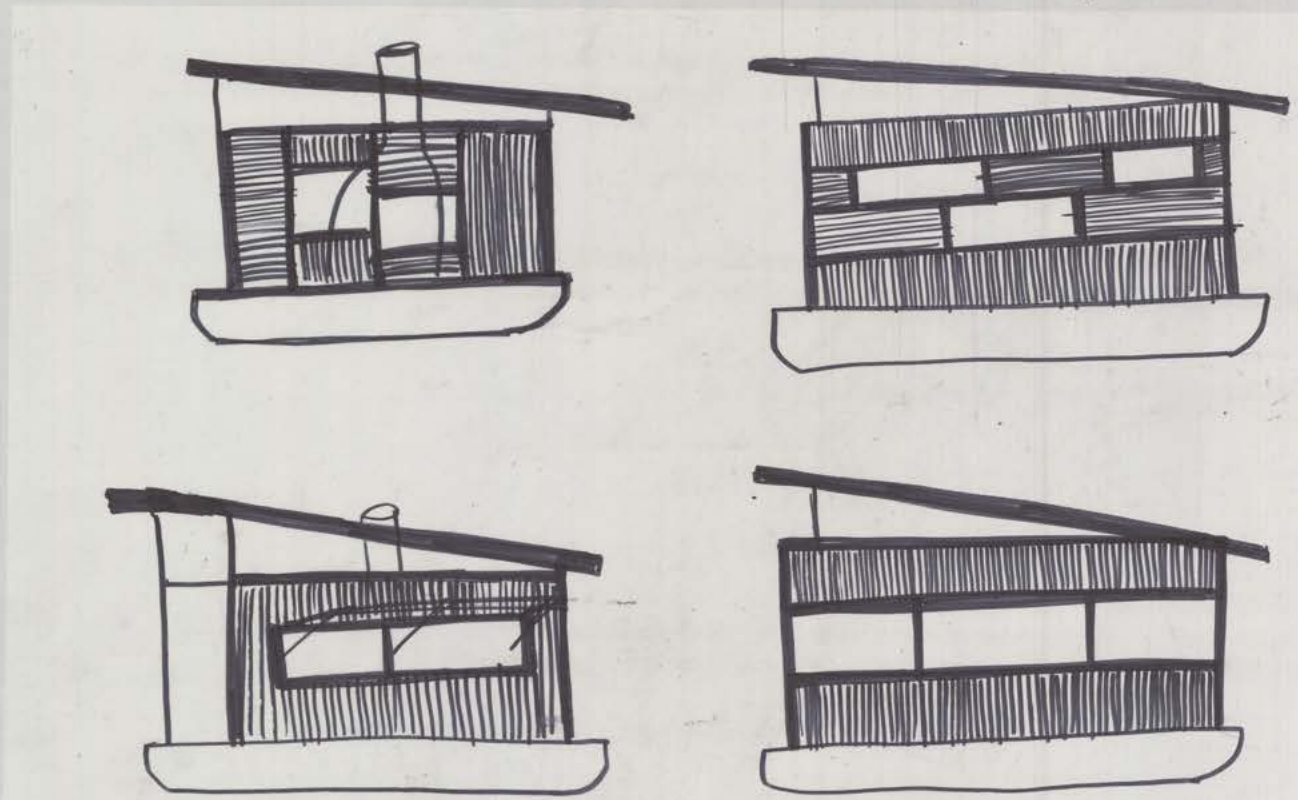


DETAILED SECTION STUDIES

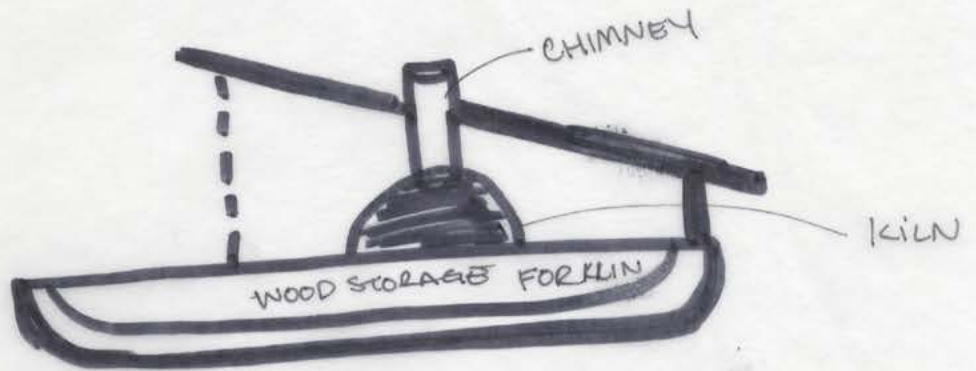


Artist Work Space and Performance Space Process

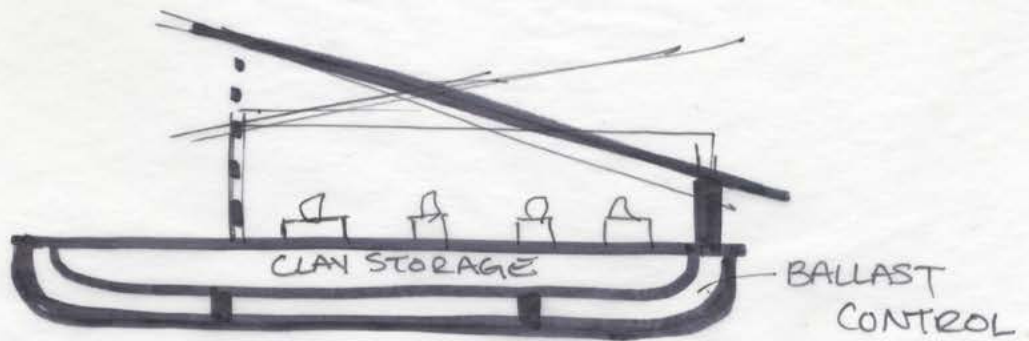
Initial Explorations
Sections and Plans



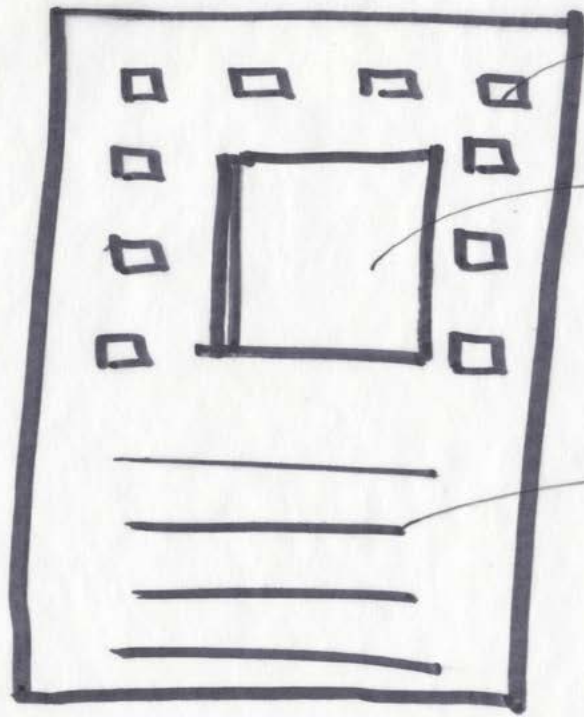
INITIAL CONCEPT



BUILDING
#2



BUILDING #3

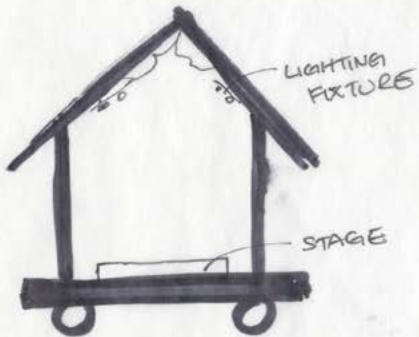


COLUMNS = TRADITIONAL ARCH

STAGE

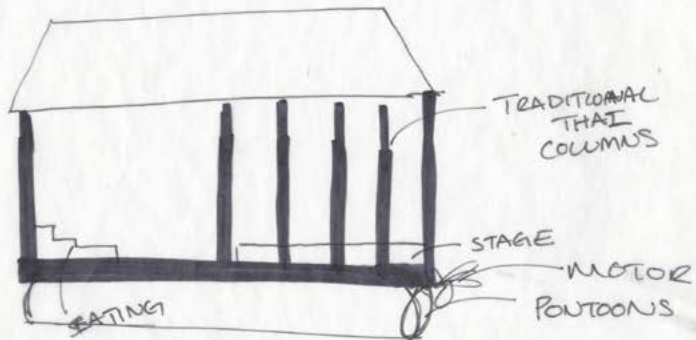
STEPPED SITTING AREA

BUILDING #3



LIGHTING FIXTURE

STAGE



TRADITIONAL THAI COLUMNS

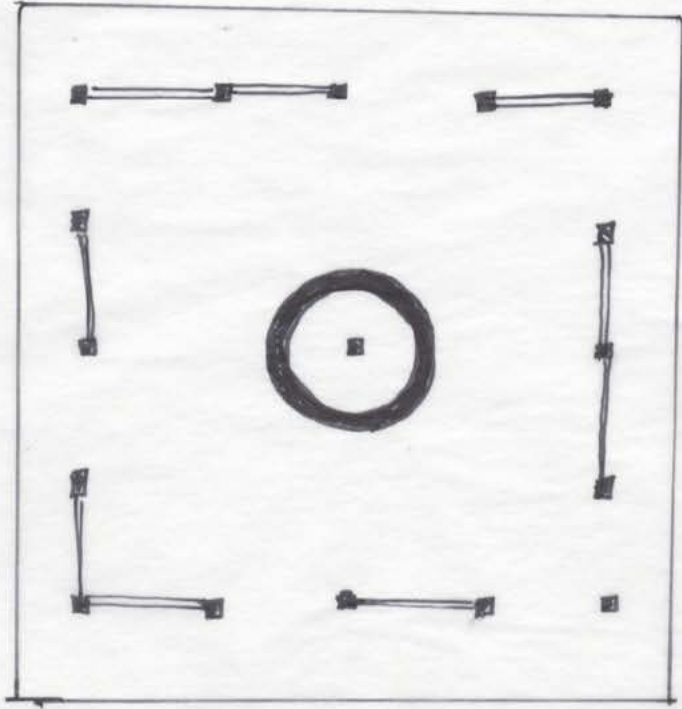
STAGE

MOTOR

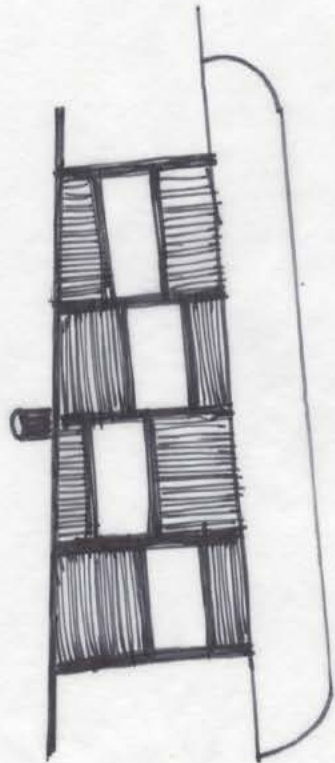
POUTOONS

- MOVABLE STRUCTURE TO GO AROUND THE ISLAND

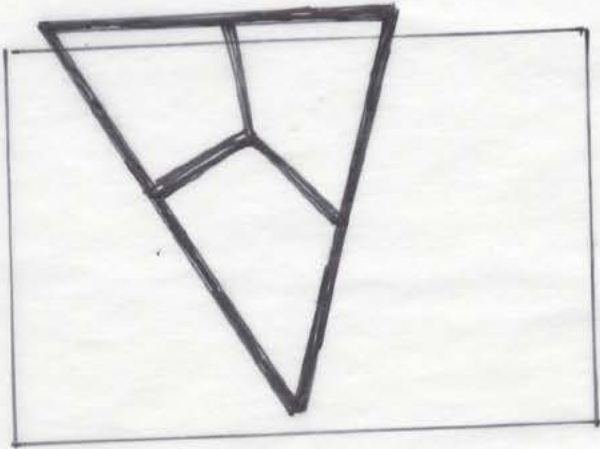
PERFORMANCE



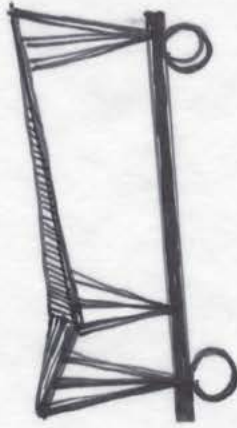
BUILDING #2
PLAN



BUILDING #2
ELEVATION



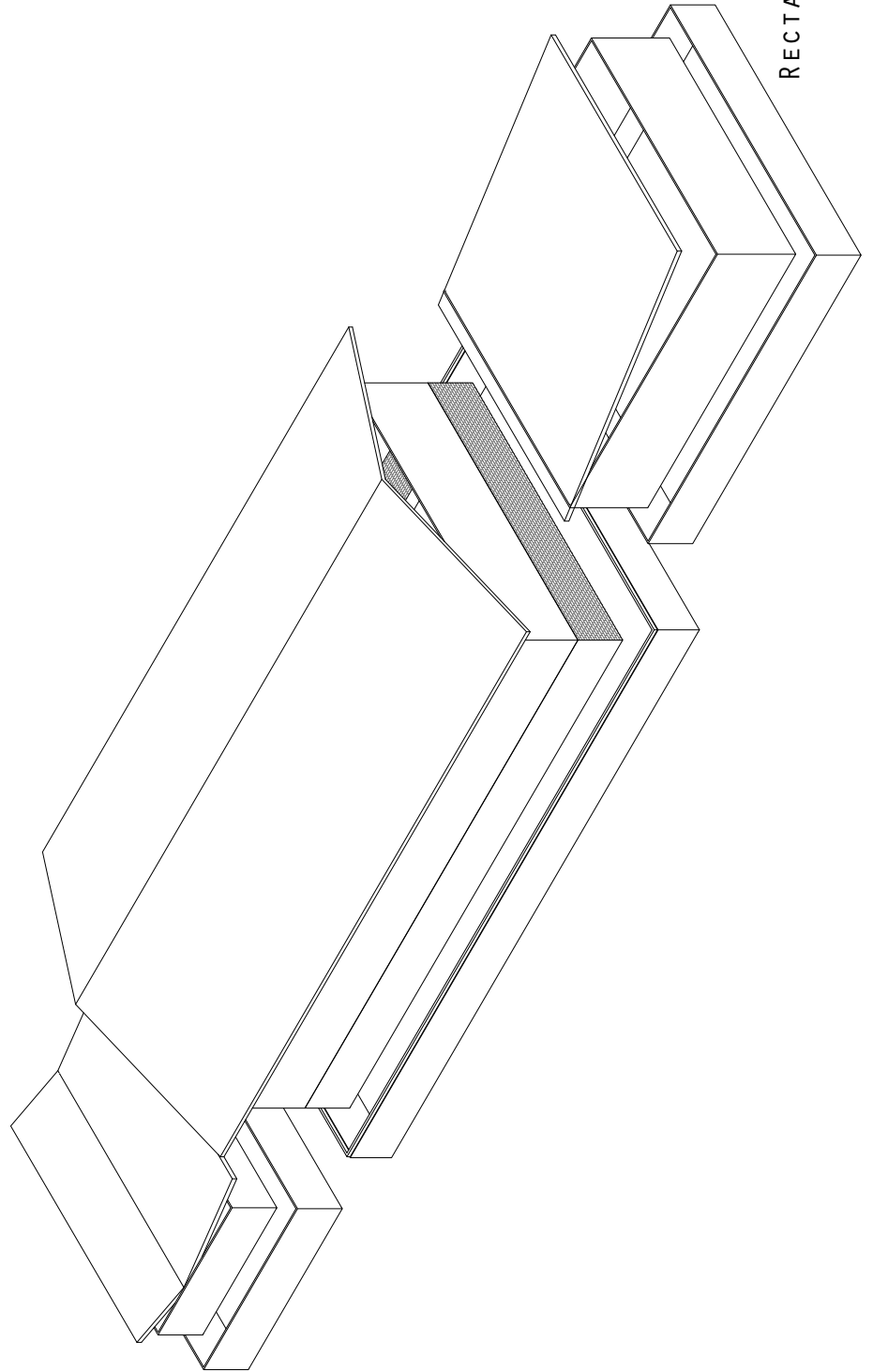
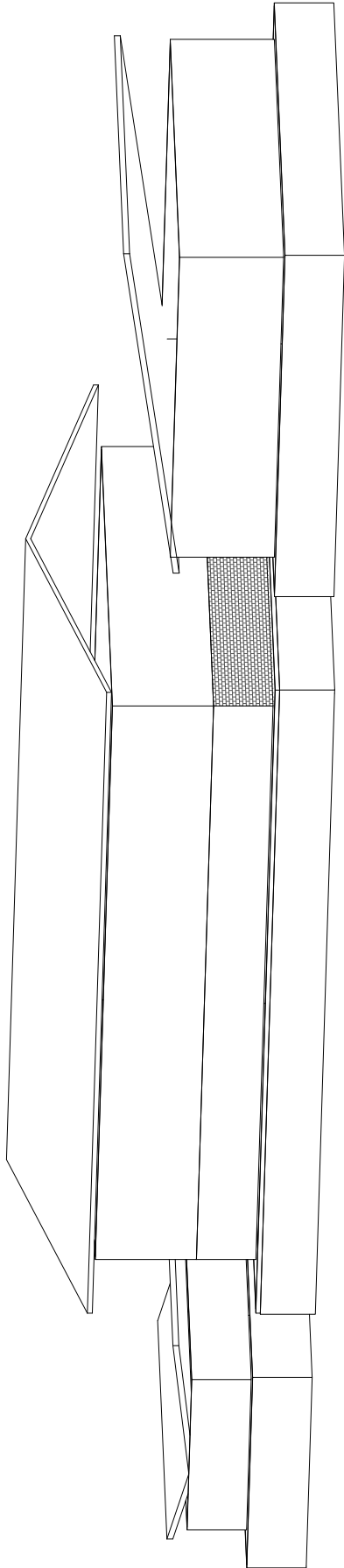
BUILDING #3
PLAN



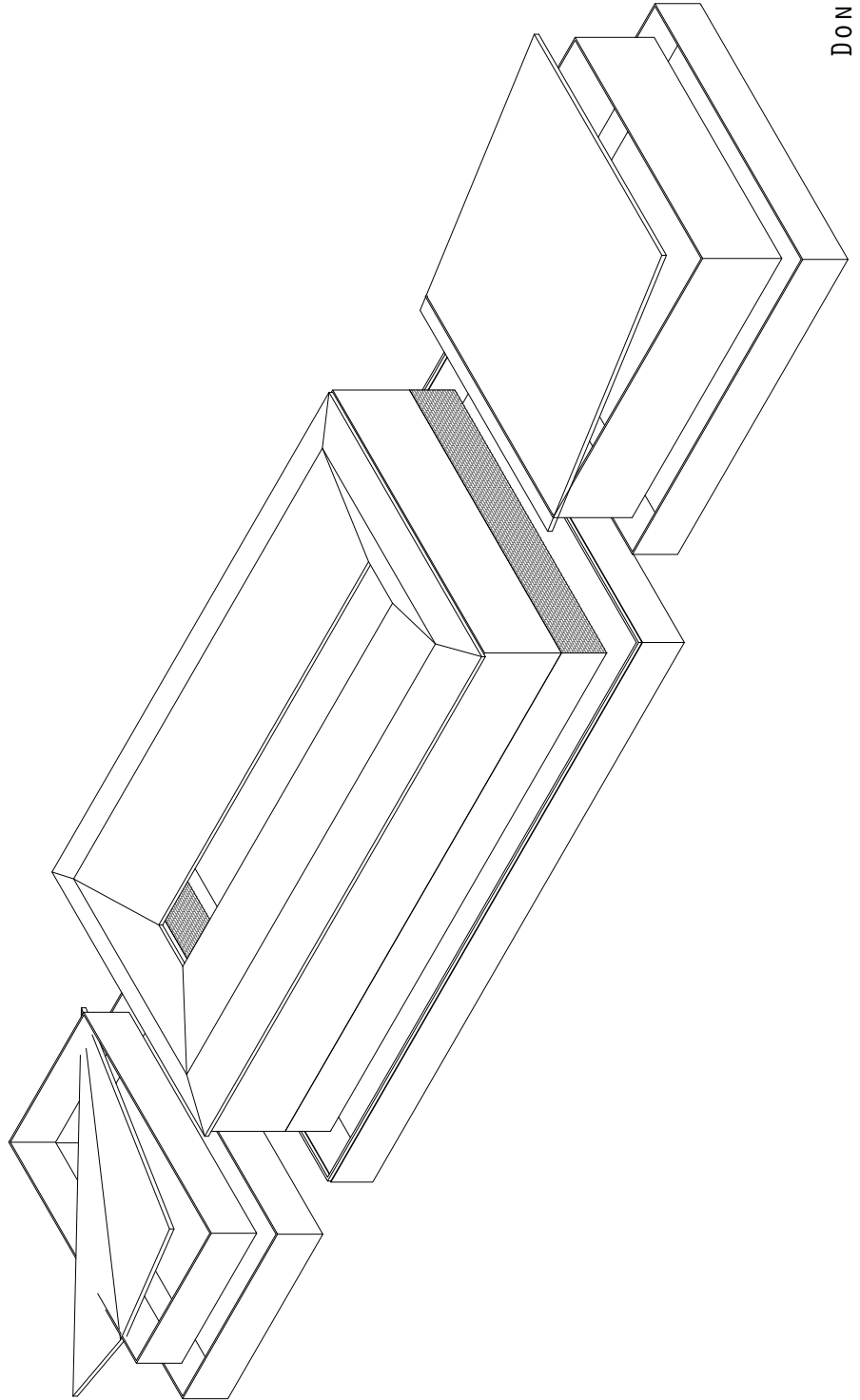
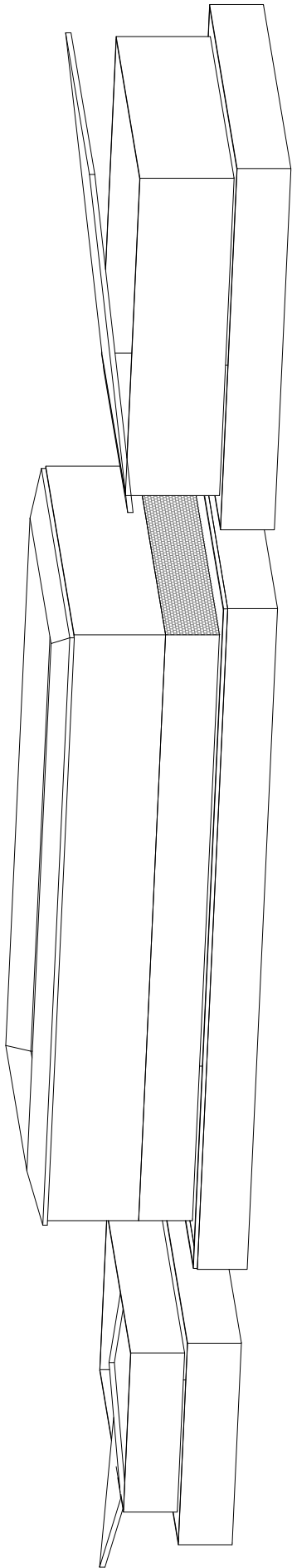
BUILDING #3
ELEVATION

3D Studies- Process

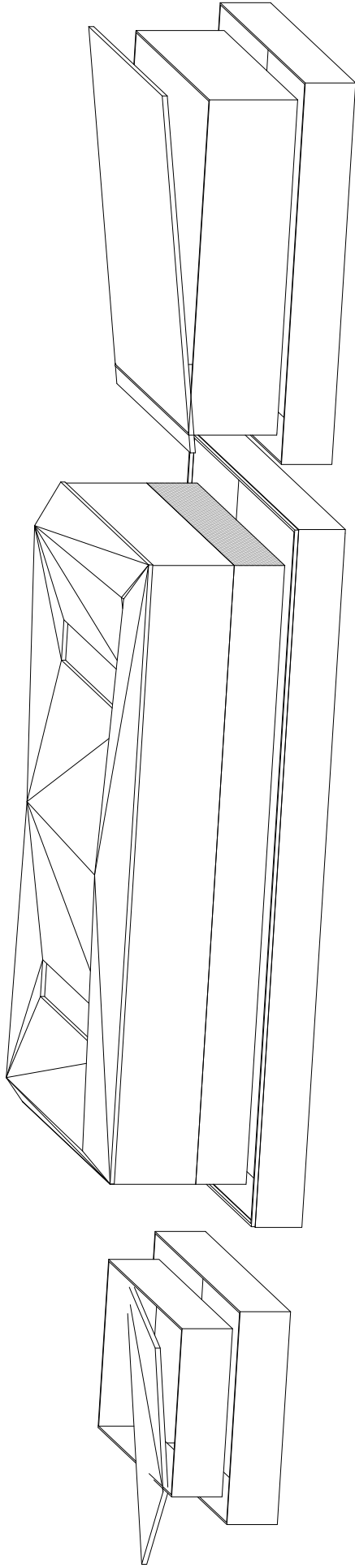
Rectangle Idea
Donut Idea
Double Donut Idea



RECTANGLE FORM

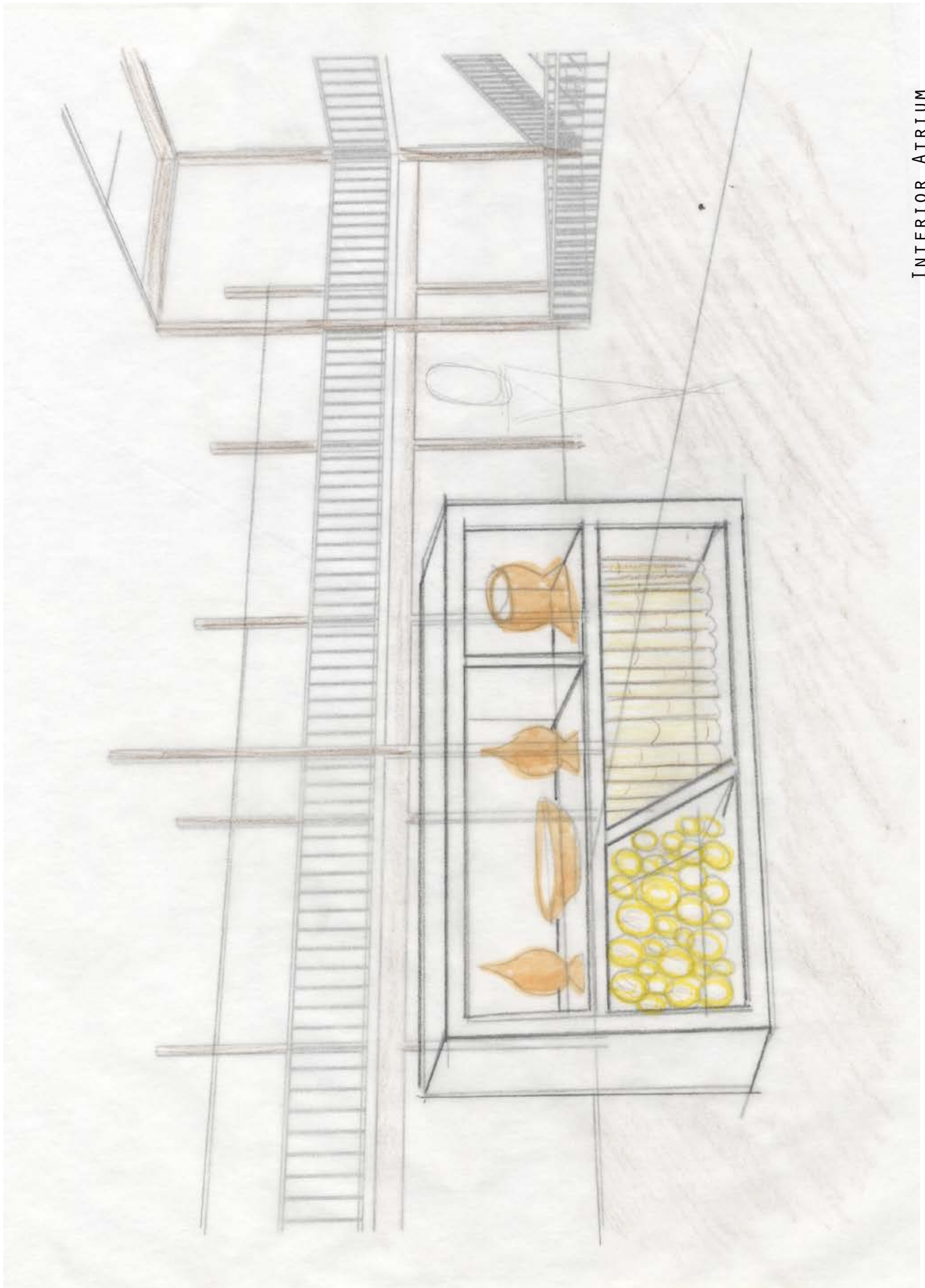


DONUT FORM

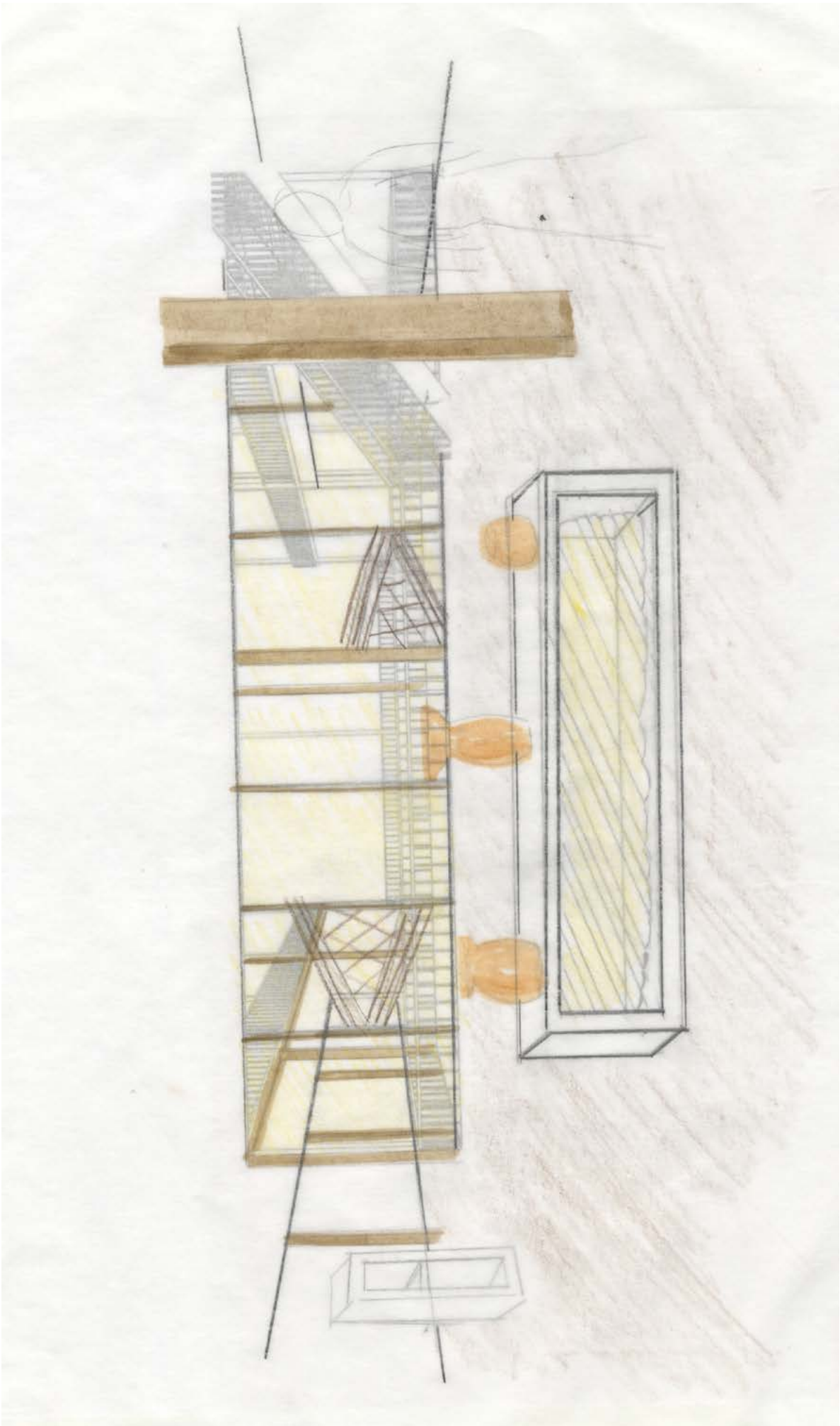


DOUBLE DONUT FORM

Perspectives Process



INTERIOR ATRIUM

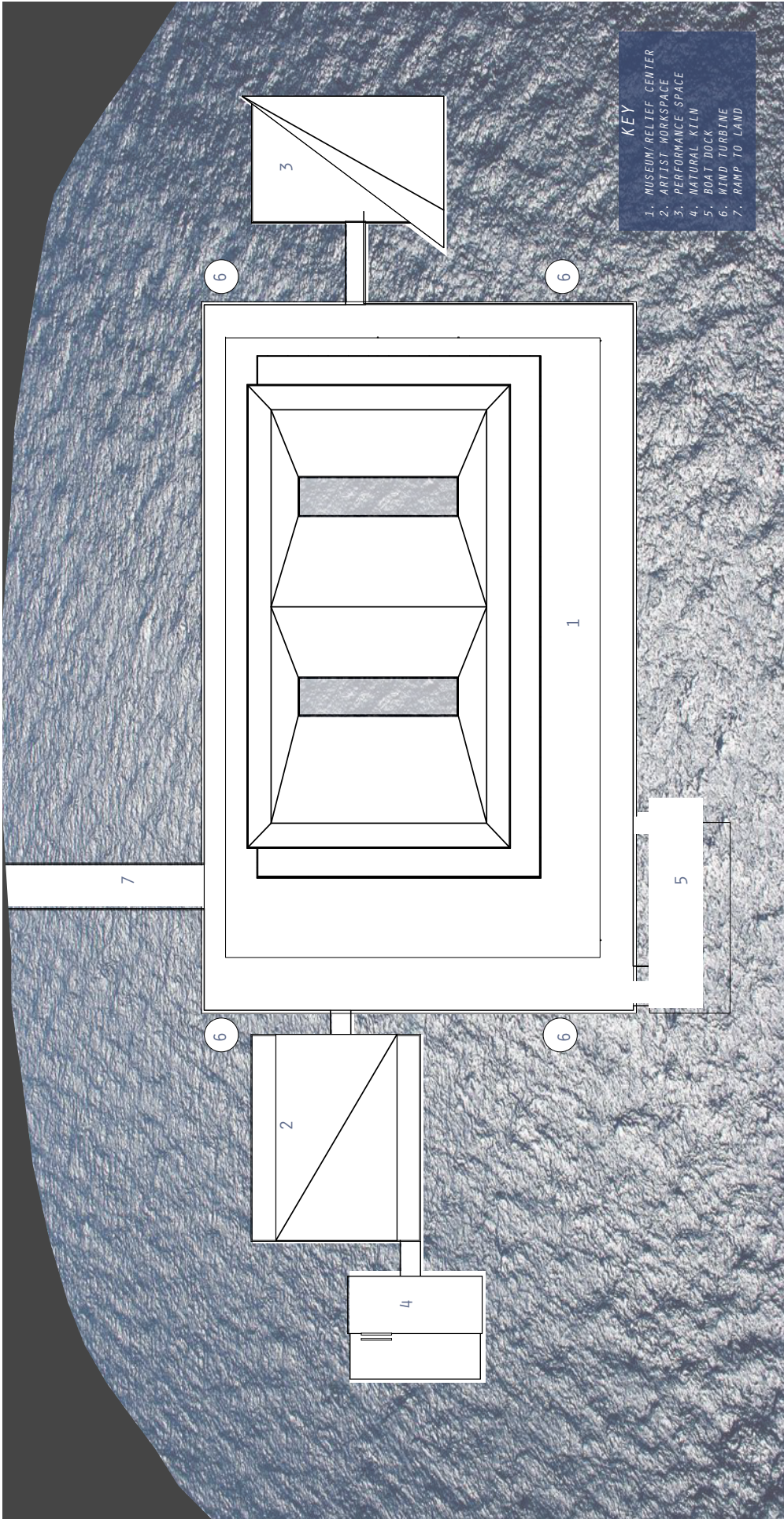


SECOND FLOOR

FINAL PRESENTATION

Floor Plans

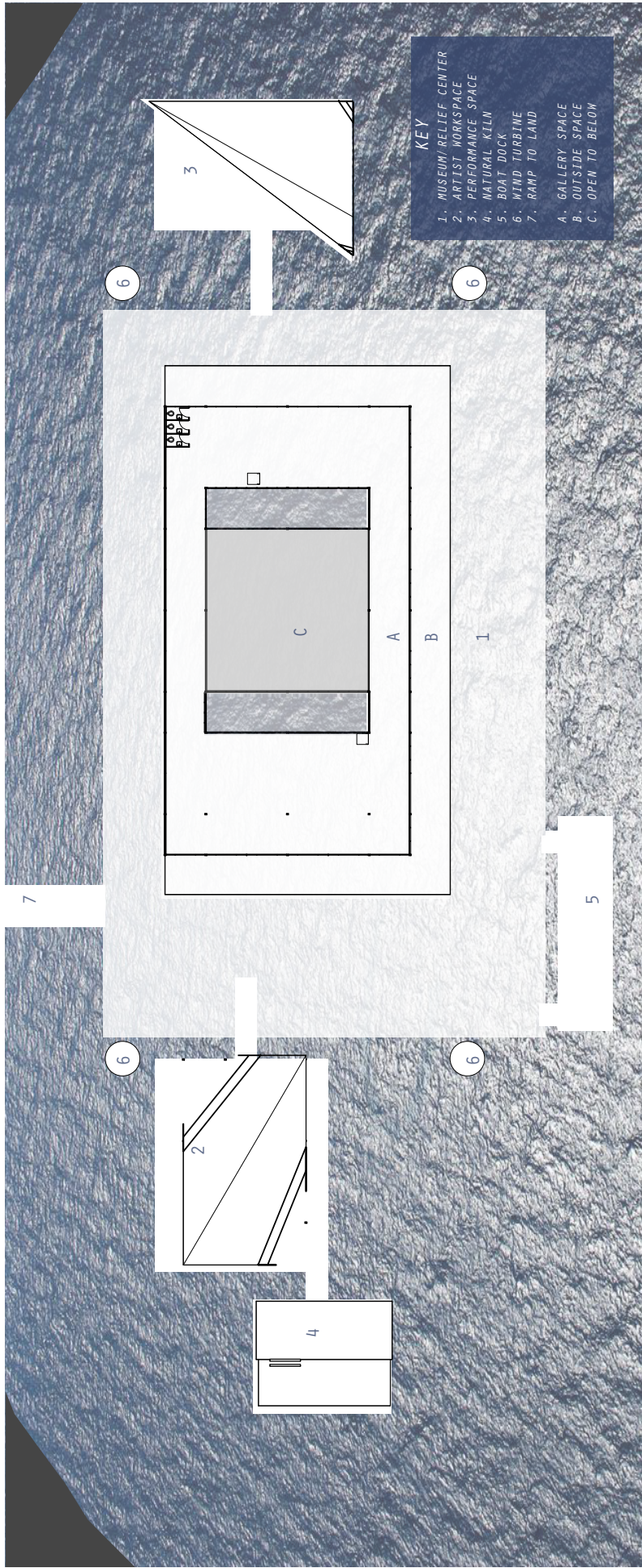
Roof
Second Floor
First Floor
Basement 1
Basement 2



KEY

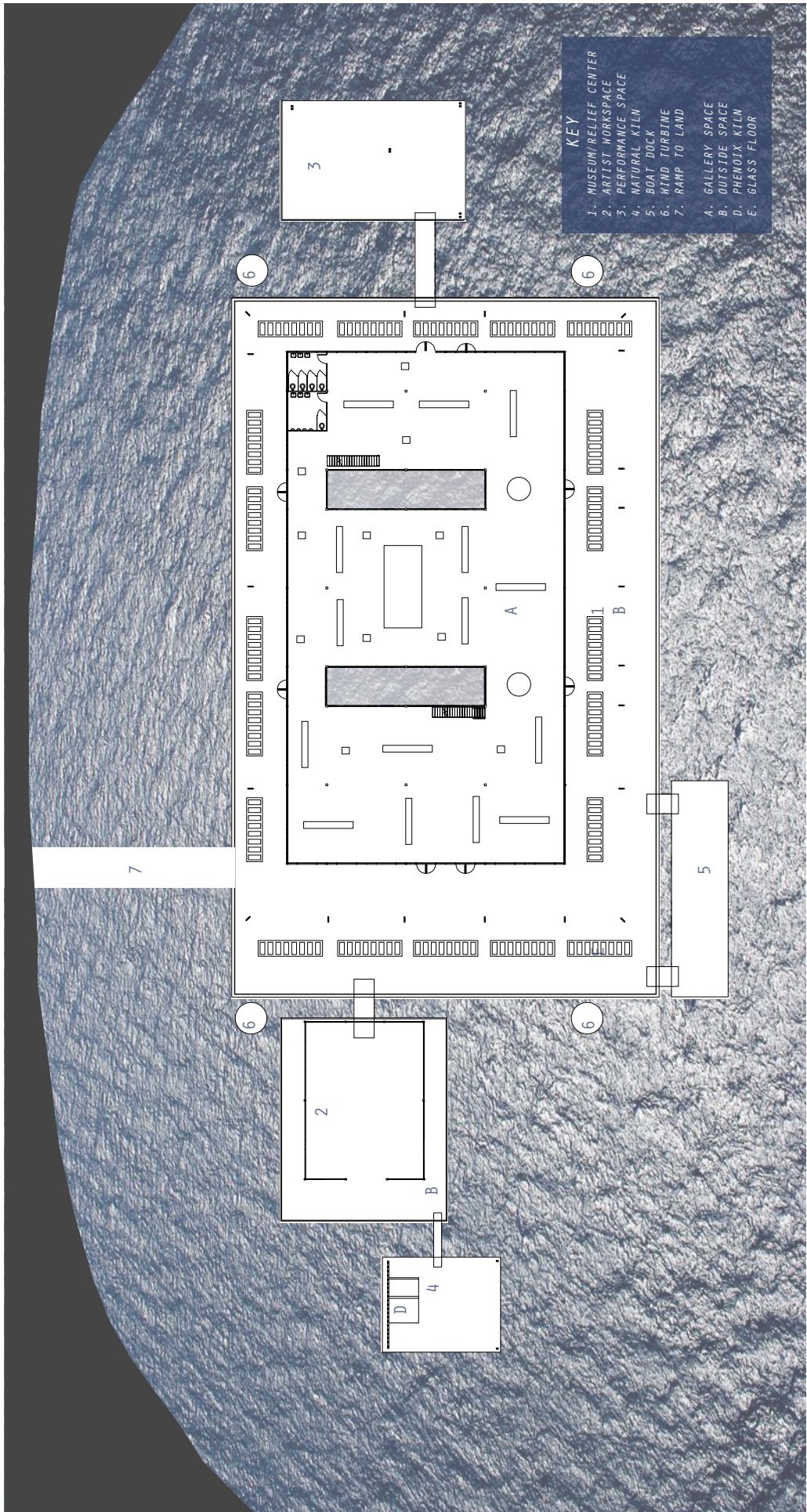
- 1. MUSEUM/RELIEF CENTER
- 2. ARTIST WORKSPACE
- 3. PERFORMANCE SPACE
- 4. NATURAL KILN
- 5. BOAT DOCK
- 6. WIND TURBINE
- 7. RAMP TO LAND

ROOF PLAN

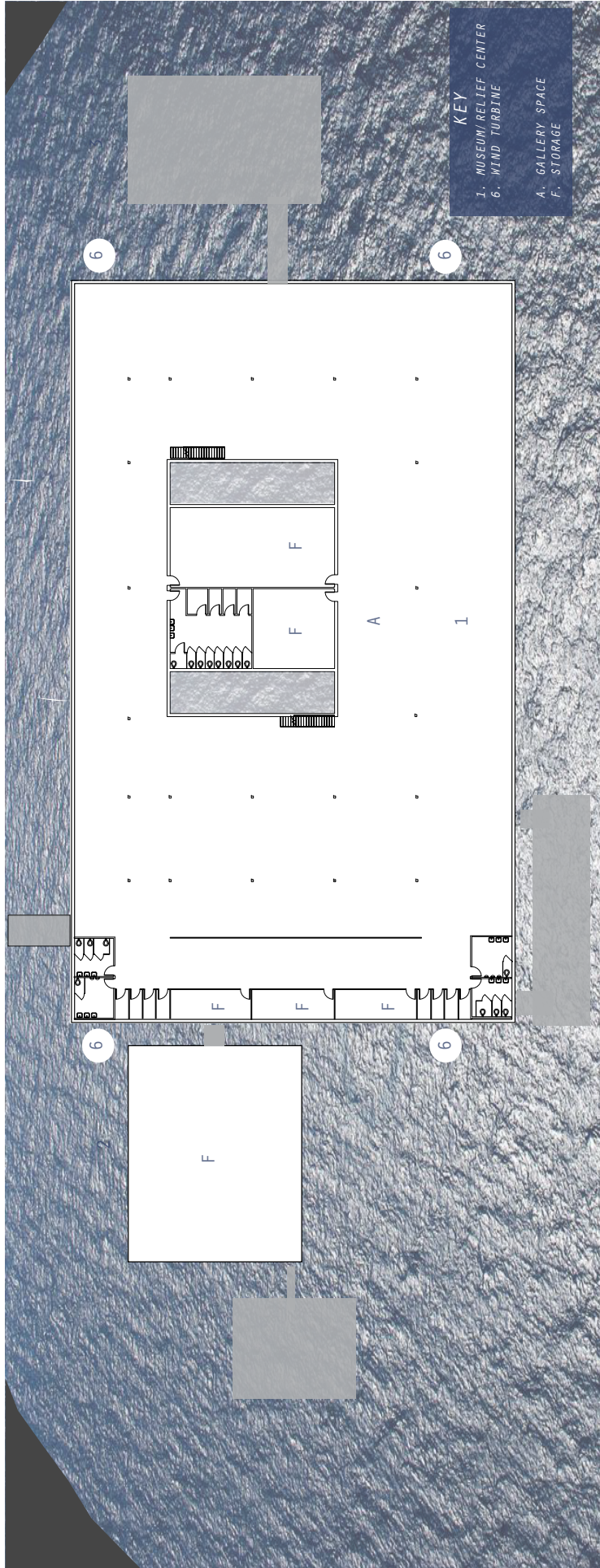


- KEY**
- 1. MUSEUM RELIEF CENTER
 - 2. ARTIST WORKSPACE
 - 3. PERFORMANCE SPACE
 - 4. NATURAL KILN
 - 5. BOAT DOCK
 - 6. WIND TURBINE
 - 7. RAMP TO LAND
- A. GALLERY SPACE
 B. OUTSIDE SPACE
 C. OPEN TO BELOW

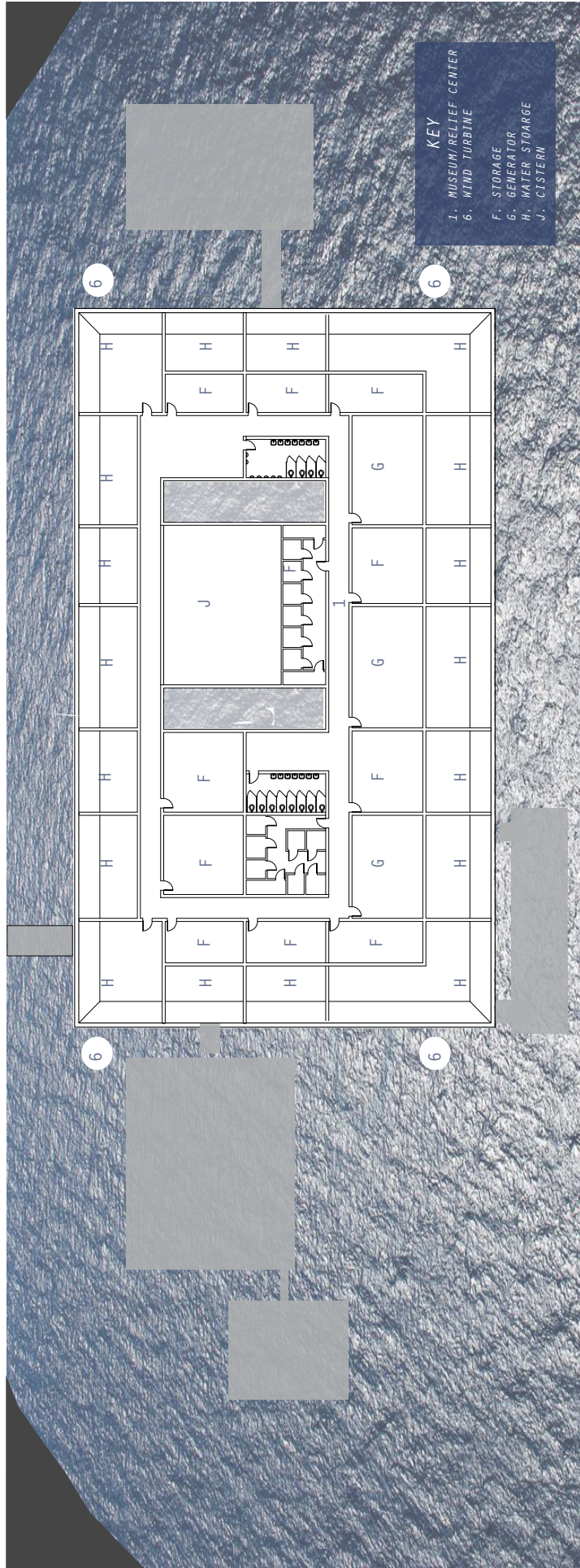
SECOND FLOOR PLAN



FIRST FLOOR PLAN



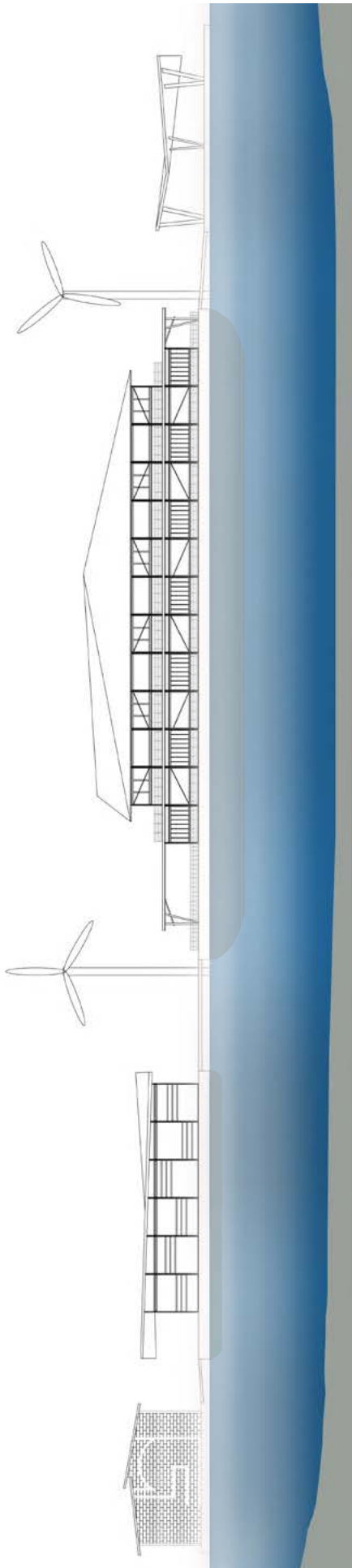
BASEMENT 1 FLOOR PLAN



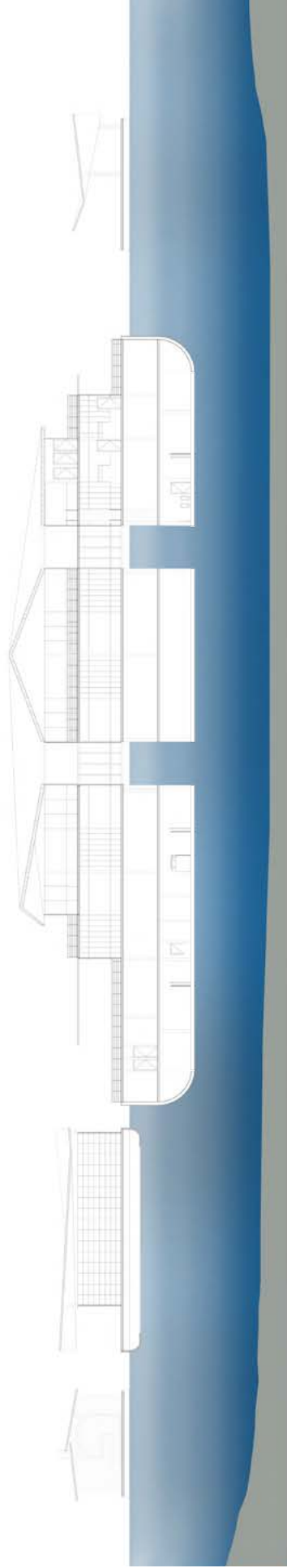
BASEMENT 2 FLOOR PLAN

Sections and Elevation

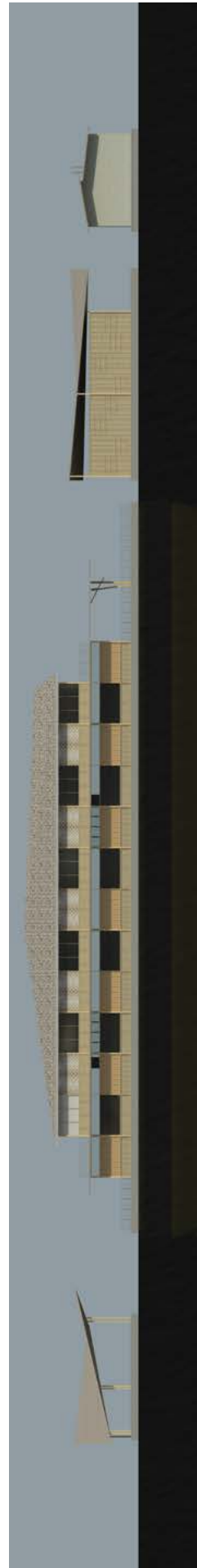
Elevation
Sections
Site Sections
Detailed Section



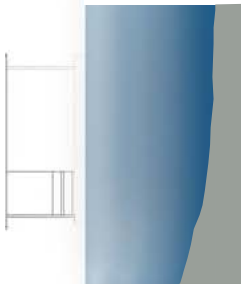
ELEVATION NORTH



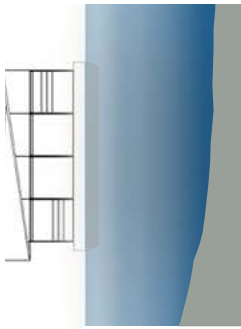
SECTION NORTH/ SOUTH



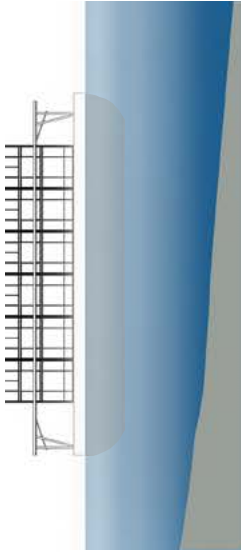
RENDERED ELEVATION NORTH AND SOUTH



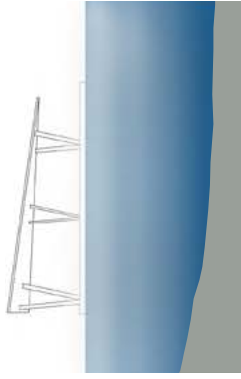
KILN



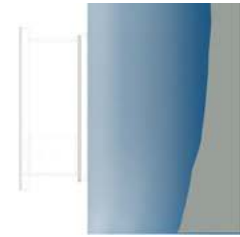
ARTIST WORKSPACE



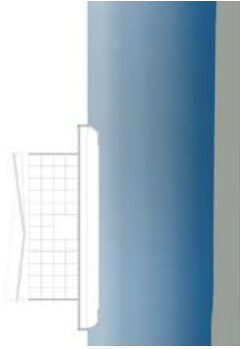
MUSEUM



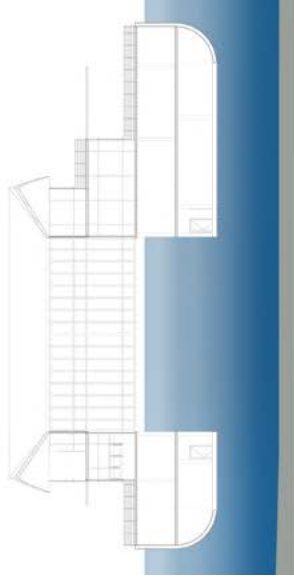
PERFORMANCE SPACE
ELEVATIONS EAST/WEST



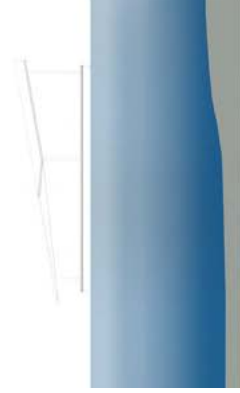
KILN



ARTIST WORKSPACE



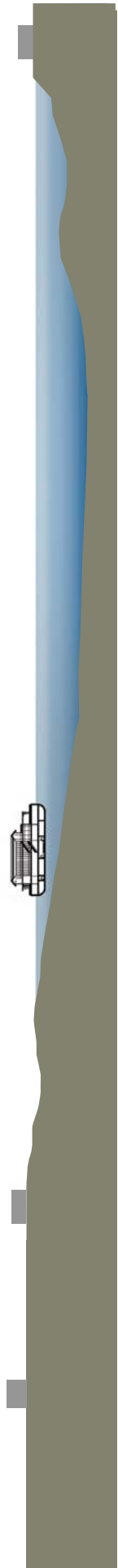
MUSEUM



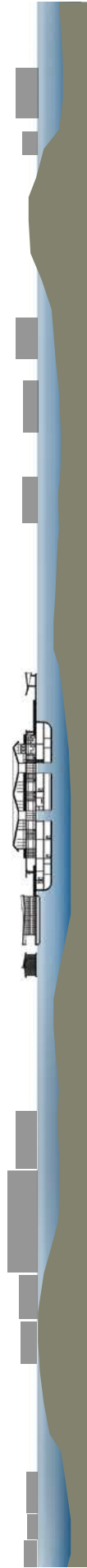
PERFORMANCE SPACE
ELEVATIONS EAST/WEST



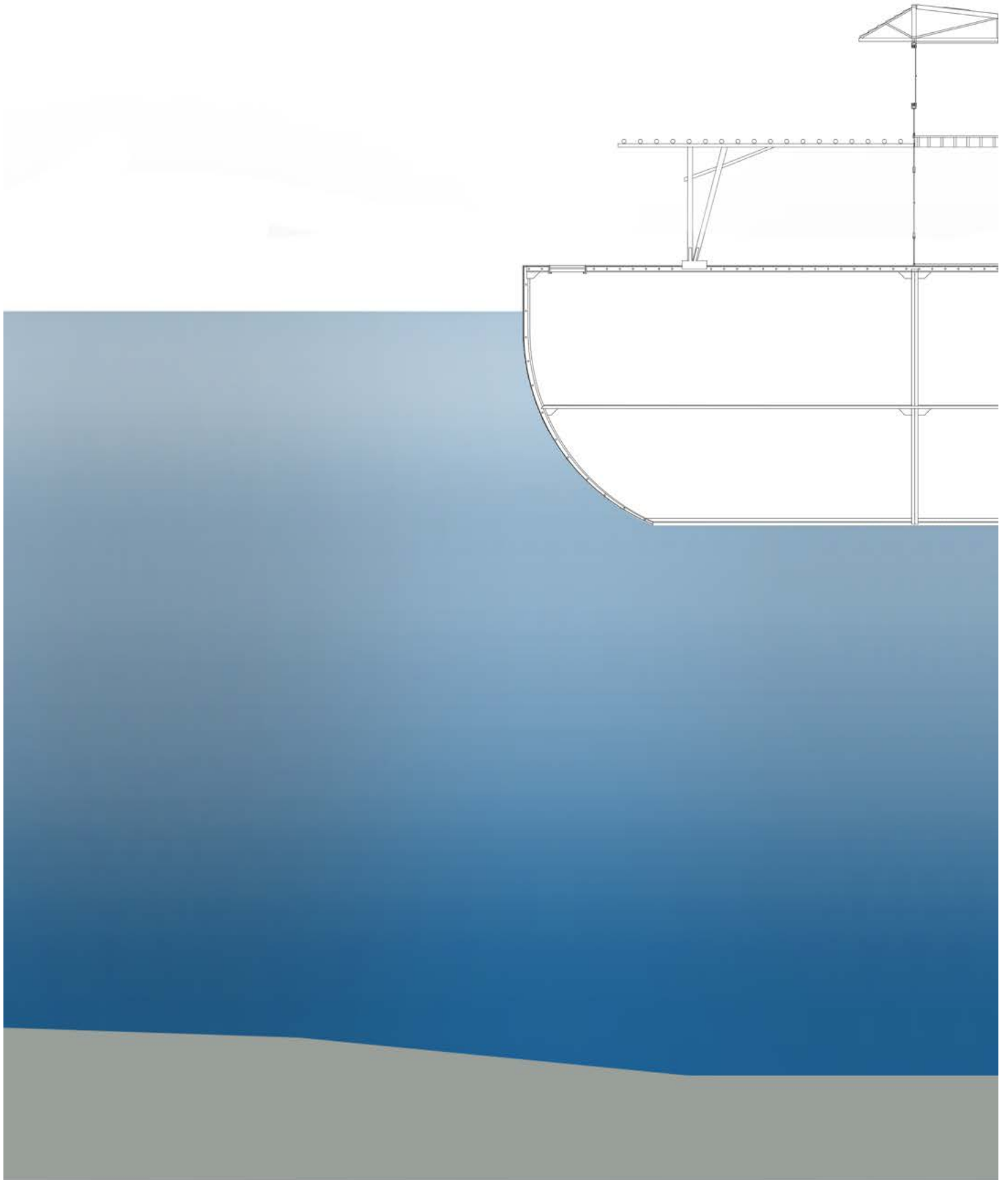
RENDERED ELEVATION EAST



SITE SECTION EAST/WEST

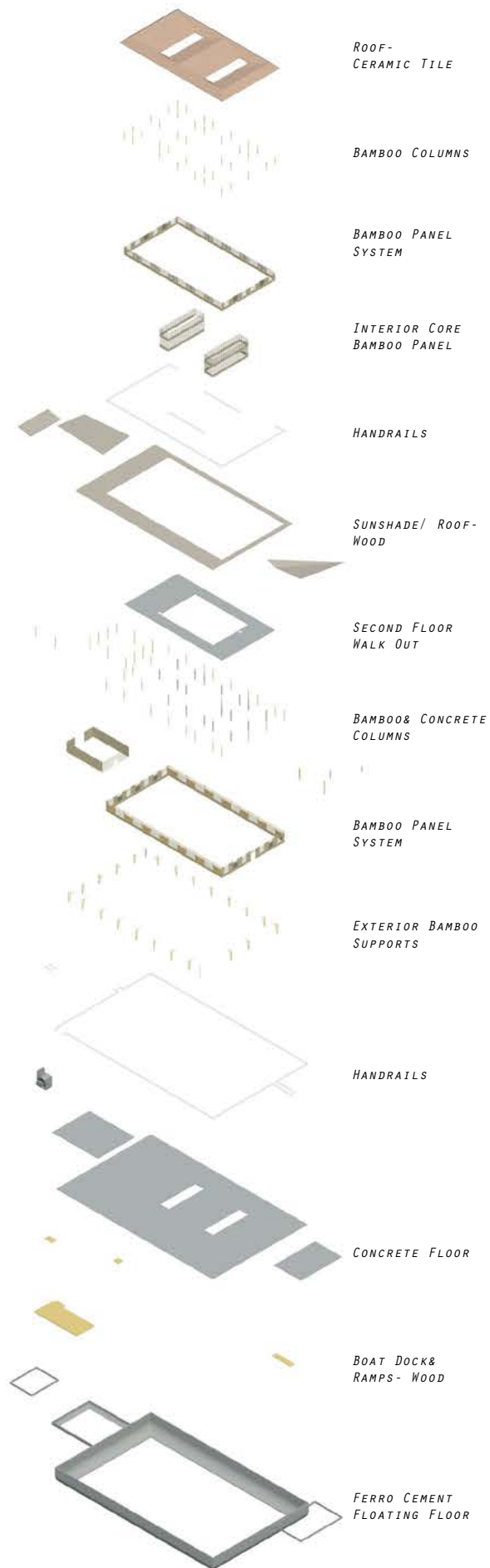


SITE SECTION NORTH/SOUTH

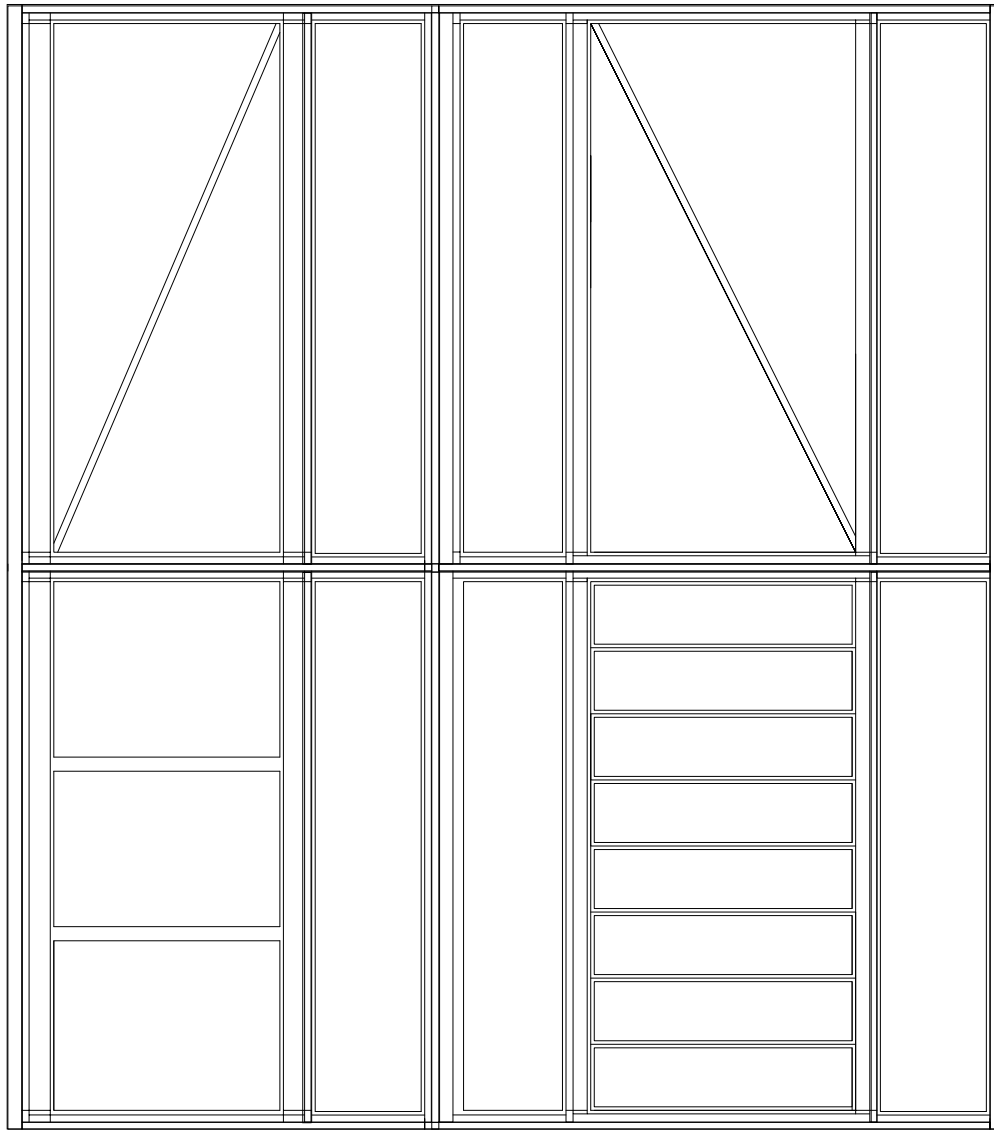


DETAIL SECTION MUSEUM

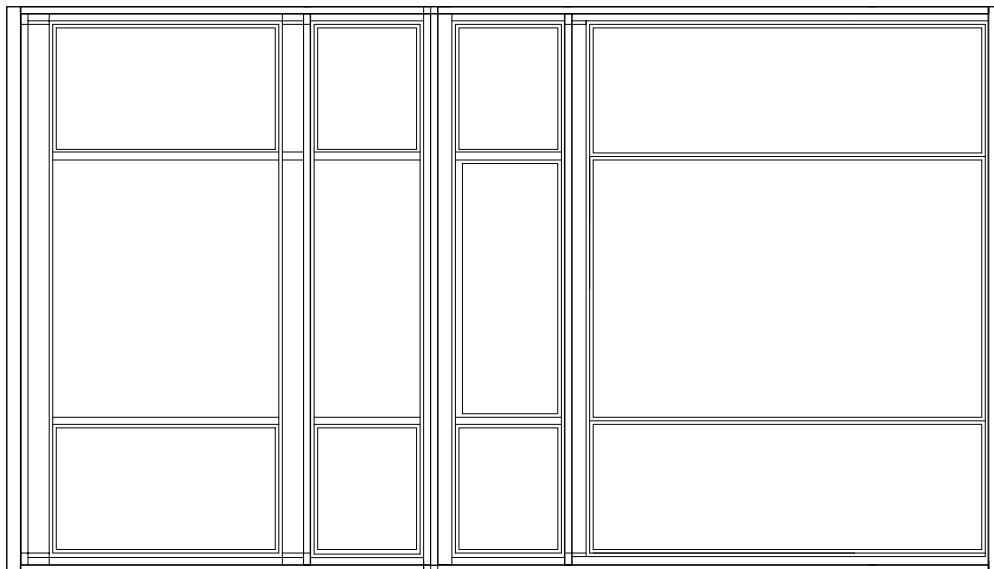
Building Details
Exploded Axon
Panel Details



EXPLODED AXONOMETRIC OF BUILDING LAYERS

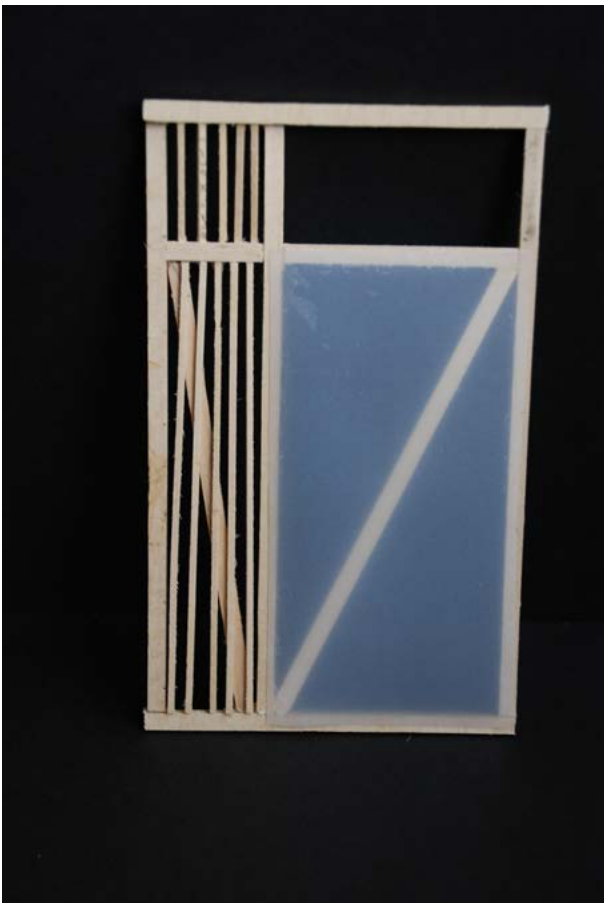


PANELS DETAILS

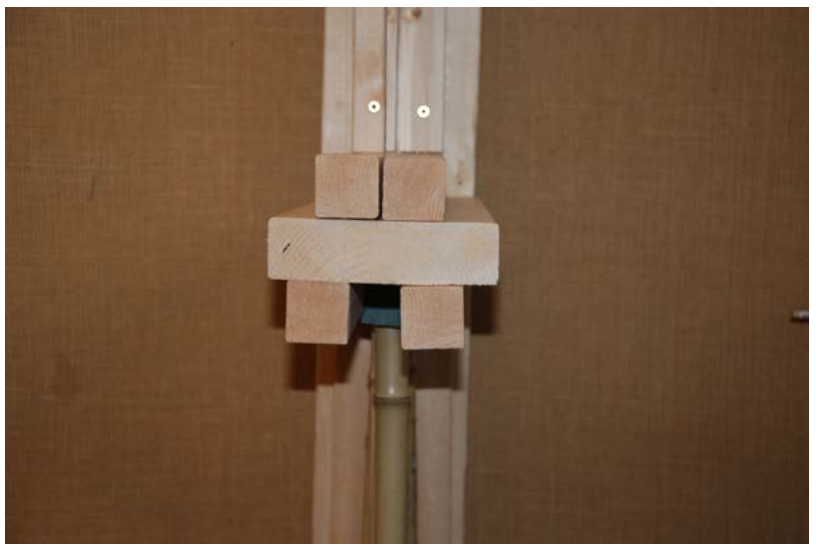


Final Models

Panel
Full Scale Wall Section
Site Model
Museum Model

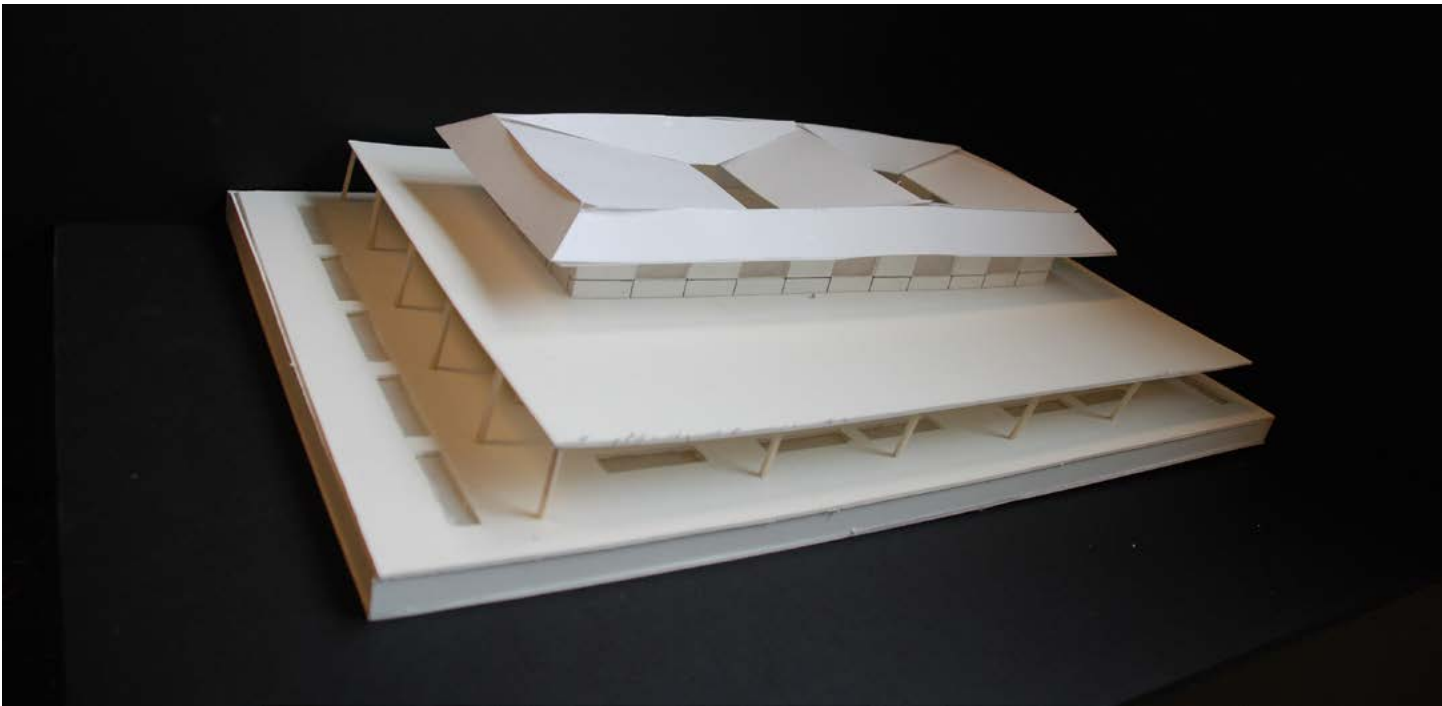


PANEL EXPLORATIONS

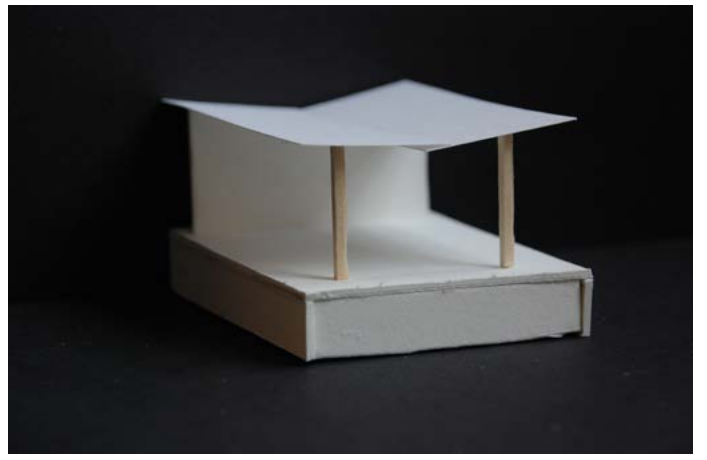
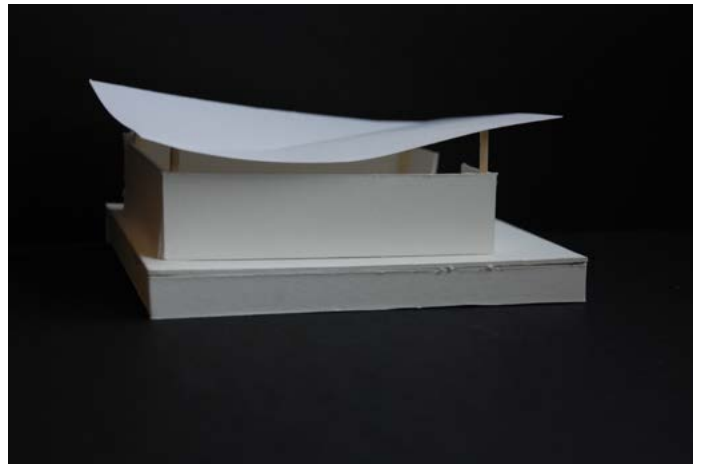


WALL SECTION- FULL SCALE





FINAL MODEL- MUSEUM



PERFORMANCE SPACE
ARTIST WORK SPACE
KILN



FINAL SITE MODEL

Presentation Renderings



RENDERING OF BUILDING



RENDERING OF BUILDING AT NIGHT



RENDERING FROM SHORE



RENDERING OF BUILDING FROM RIGHT AT SUNSET



RENDERING OF BUILDING FROM LEFT



MUSEUM VIEW



VIEW OF KILN AND ARTIST WORKSPACE FROM MUSEUM



MUSEUM FROM BOAT DOCK



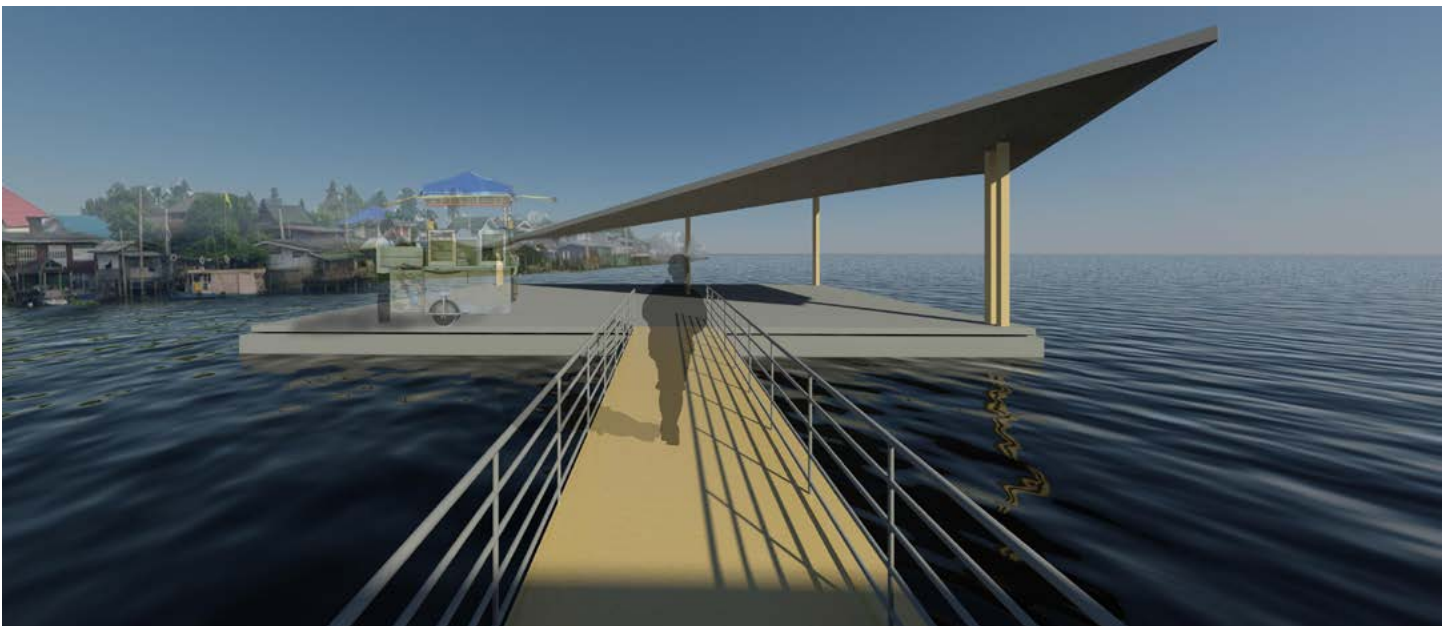
ARTIST WORKSPACE



KILN



ARTIST WORKSPACE AND KILN FROM WATER



FROM MUSEUM TO PERFORMANCE SPACE



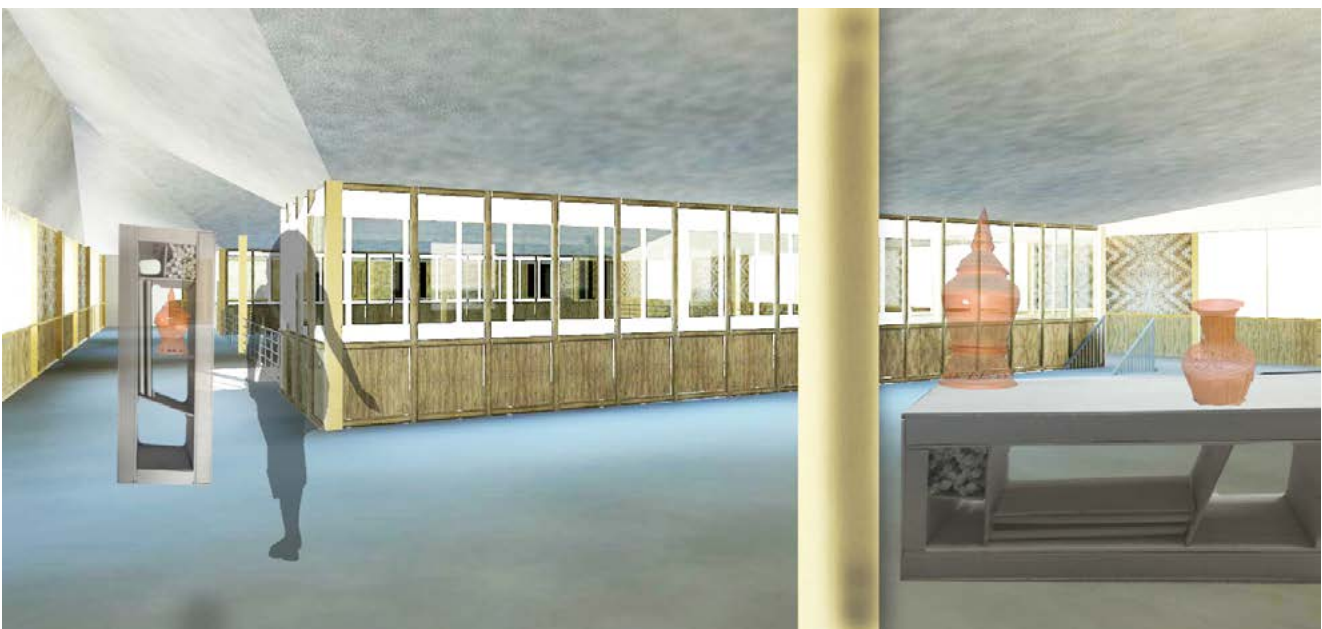
PERFORMANCE SPACE FROM WATER



SECOND LEVEL OF MUSEUM



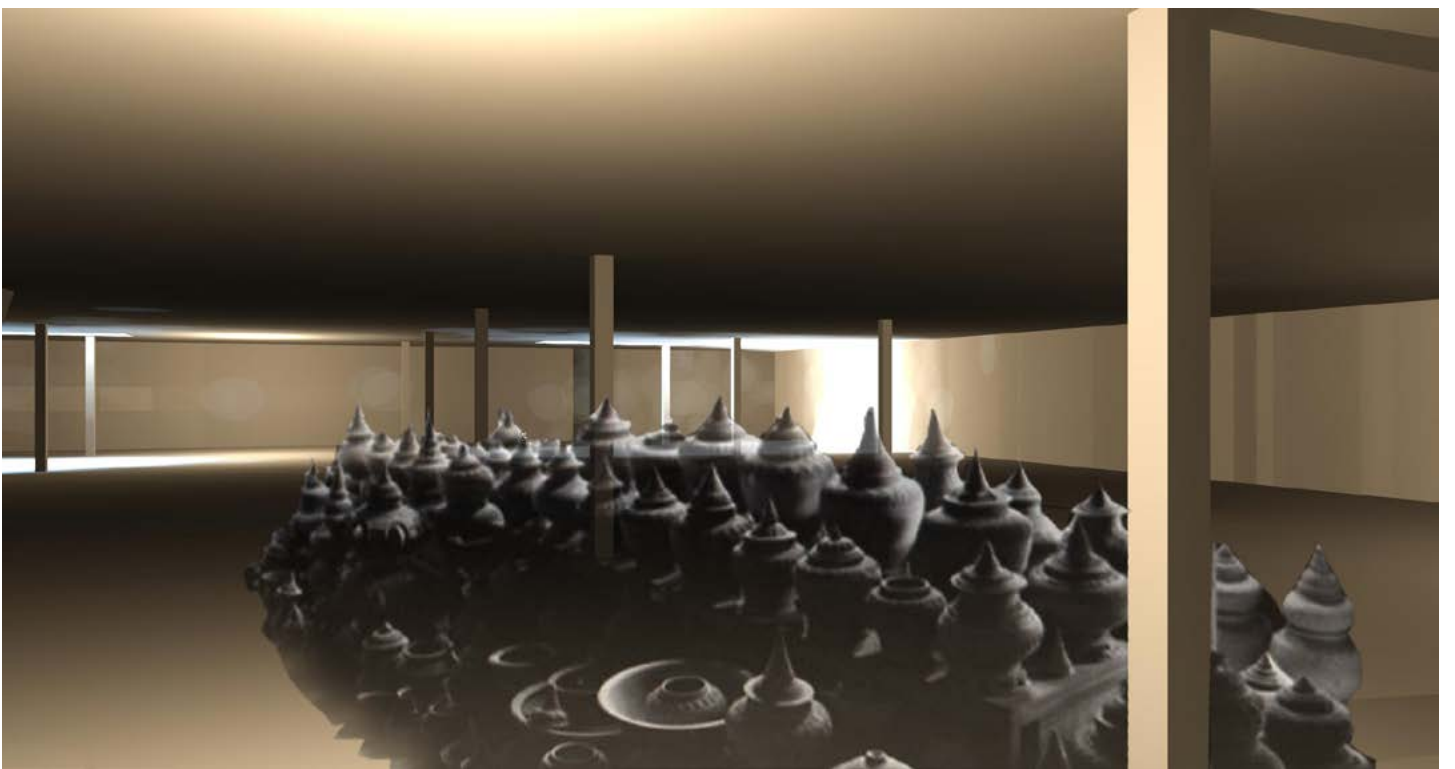
ATRIUM OF MUSEUM



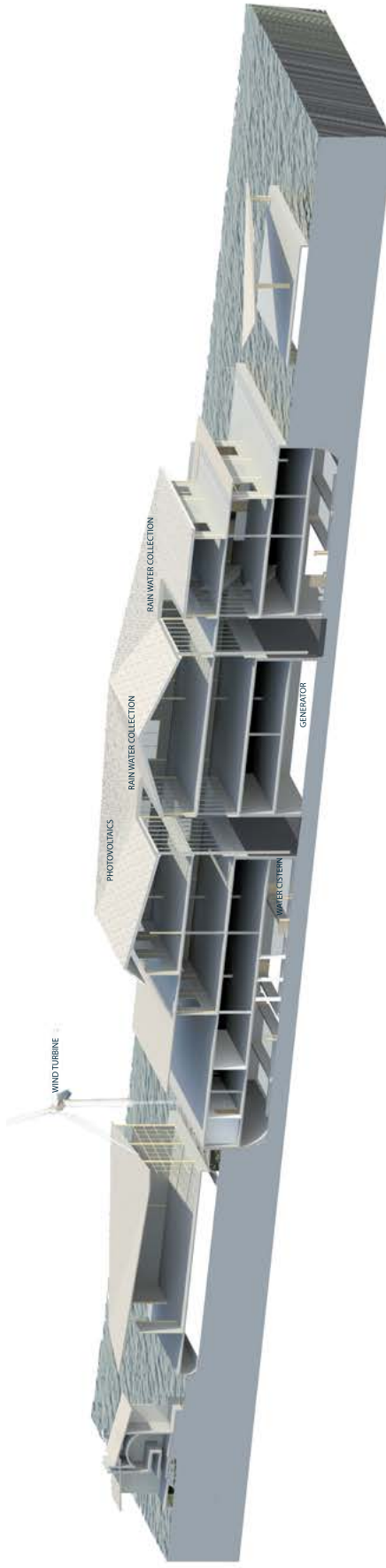
DISPLAY SPACE IN MUSEUM



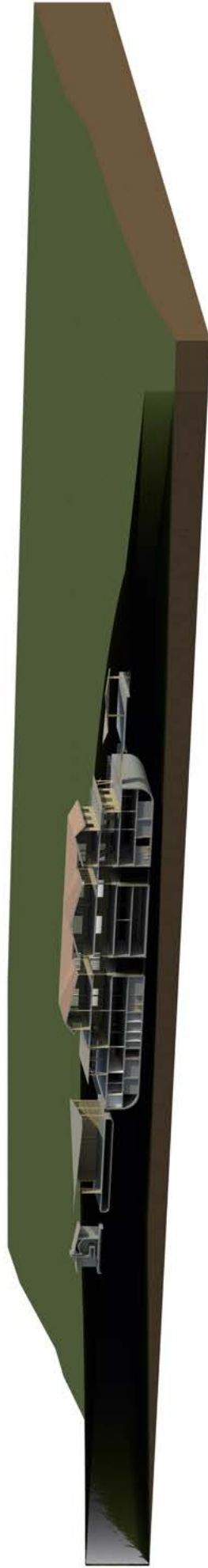
INTERIOR OF MUSEUM



BASEMENT OF MUSEUM



SECTION OF SYSTEMS



LONG SECTION PERSPECTIVES



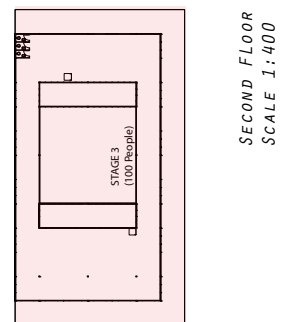
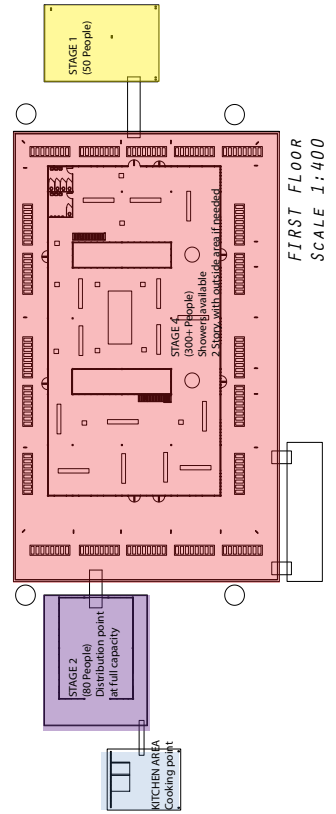
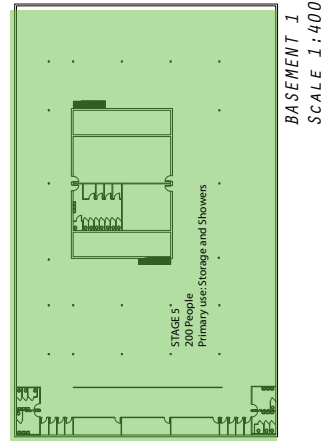
SHORT SECTION PERSPECTIVES

Relief Situation

Rendering
Levels of Relief
Interior Renderings



RENDERING OF RELIEF SITUATION



LEVELS OF RELIEF



SECOND LEVEL RELIEF EXAMPLE



ATRIUM OF MUSEUM IN RELIEF SET UP

Final Reflection

Final Reflection

The thesis process is an interesting in many of the decisions that are decided in the beginning of the two year process form the end result. The process focus for this project was a large relief center for over 400 people; this initial concept drove many of the decisions for the later project. I focus was to create a practical solution, instead of a theoretical proposal. Many of the current flood proposal are not practical for a low-income area or they have never been tested. I wanted a solution that gave the opportunity to be built and designed in Ko Kret, Thailand.

The project was successful in the relief aspect, the flood prevention, and the connection to the detailing of the local vernacular. Most of the current flood solutions are single family homes; I wanted to create a center for people to go to during a flood situation. The Island of Ko Kret's average yearly wage is under 500 dollars. Therefore, single solutions for each family could never be afforded. My focus was to give each person a place to go during a flood.

Flooding is going to only get worse. Flood prevention architecture is going to be a new topic of discussion in the coming years. I wanted to create a flood prevention scheme that would work in Ko Kret, Thailand. The problem with Ko Kret is the lack of topography and that it is outside the Bangkok floodgates, therefore it is not the typical 1 meter (5-6 foot) flood, but instead it is a 3 meter (15-20 foot) flood. Ko Kret Island was completely underwater during the 2011 flooding. Many of the roofs could not even be seen, therefore a simple lifted solution might work for the first year, even the first ten years, but eventually the whole island would be underwater and those solutions would fail just like our typical architecture does. It needed an extreme solution for the extreme situation. There are other solutions: stilts, raises platforms, moveable buildings, flooded plans, however none of these address the extreme water Ko Kret experiences. Floating was the most practical solution for this area.

Fitting into the local vernacular was an important part of the process. I focused on the smaller details of the buildings, such as the panel façade. The decision to keep the building simple for relief situations was one made to help with ballast and maximum use of the space. This did limit the design of the building as a whole; the scale of the building emphasized the simple forms and proportions of the building. The small connections and how the local materials became a focus for my design and a driving point for the craftsman like quality of the architecture in the area. I divided the building into 4 buildings, one main and three small, to help fit with the edge condition of the site. This helped divide up the space/uses as well as giving the opportunity for multiple detailed solutions on one site. Each building had a new approach, based on its needs. The materials and connections are what kept the whole site visually connected.

Overall, the design and presentation of my process in my mind was a success. I achieved the goals that I had set out for myself. I think there are lists of other approaches for a flood solution. This is a single solution for Ko Kret, Thailand. I wanted to bring this architecture to the forefront and have a discussion of solutions for the future, so having people talk about flood resistant design was the point and I hope that architecture will begin to embrace the ideas discussed.



FINAL PRESENTATION



FINAL PRESENTATION