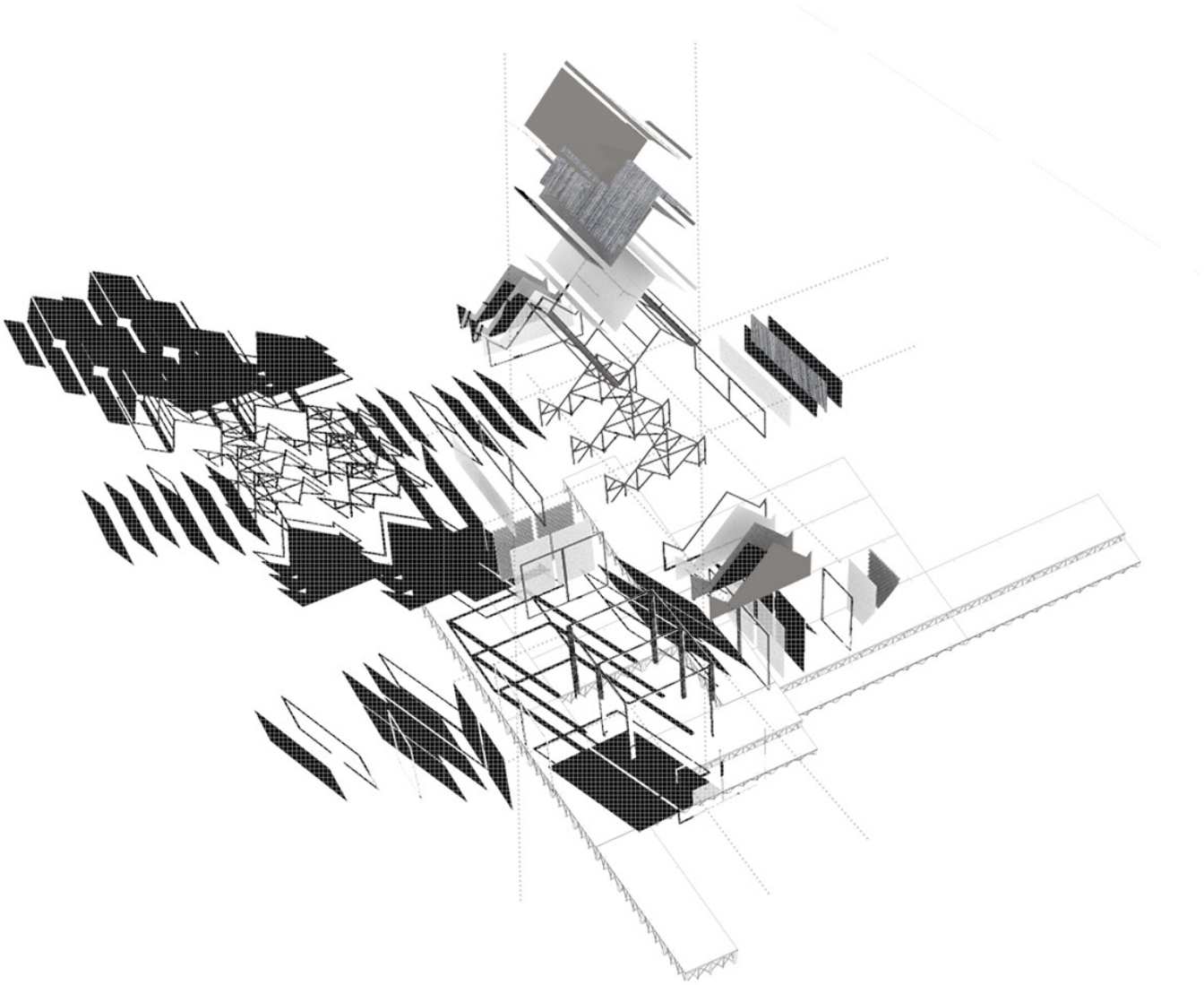


RICARDO LIONAR

ARCHITECTURE DESIGN & SCIENCE
SELECTED PROJECT

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Professional Works

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02 SPRINGLEAF HOUSE

03 BRICK BOARDHOUSE

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OTHER CREATIVE PURSUITS

01

CHESTNUT CRESCENT HOUSE

Good Class Bungalow in Singapore

Singapore, 2021
Project Type: Housing
Principal: Lim Koon Park & Christina Thean
Team: Phachara, Zi Xin
Status: Under construction

Located in the GCB (Good Class Bungalow) area, this building houses a large family with four children. The site has a couple of challenges including the narrow driveway, triangular main shape, and level difference from the Chestnut Crescent to the Cashew Road.

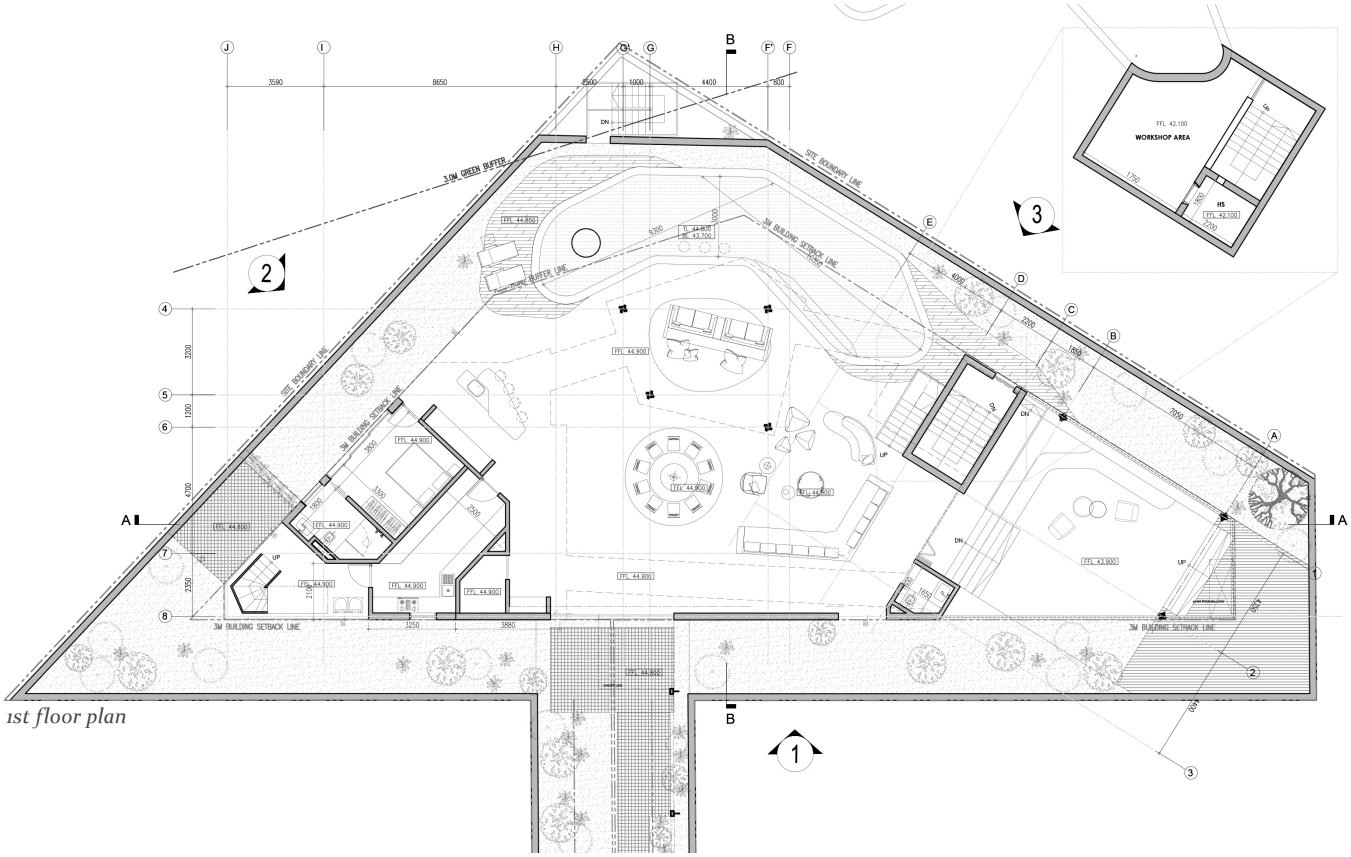
The main project brief is that the client wants the first floor area to be totally open to each directions. Therefore, we came up with the concept of open living space to craft the hearth of the home as well as providing connectivity through the secondary edges on the upper storeys.

The design concept follows a concept of industrial design and technology where it fits the client's background whose caompany is associated with the contemporary robotics technology.





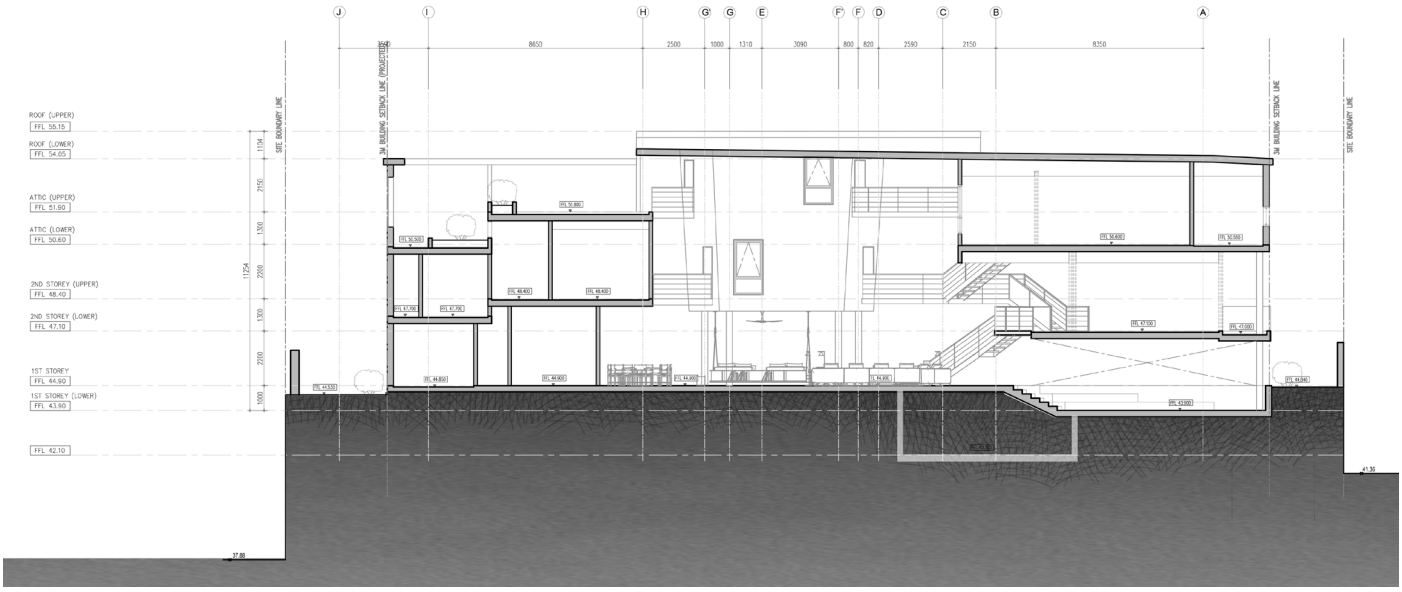
Rear Elevation



1st floor plan



Rear view



Section 02

02

SPRINGLEAF HOUSE

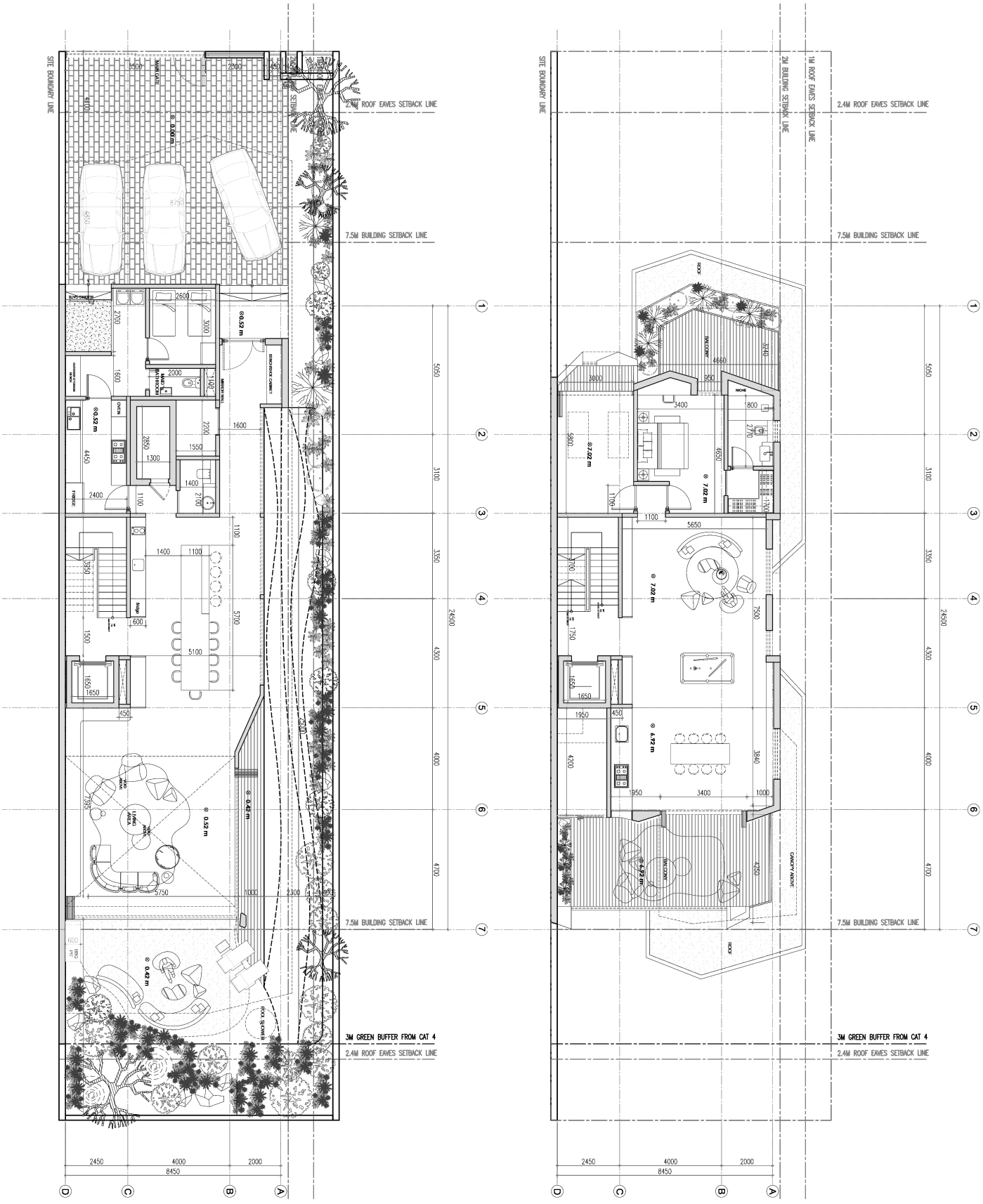
Semi-detached House

Singapore, 2021
Project Type: Housing
Principal: Lim Koon Park & Christina Thean
Team: Phachara, Danilo
Status: In development

The house embraces the challenge of creating a harmony between architecture and nature where it serves as a gateway to connect the monotonous street of Springleaf Height to the lush greenery on the south of Springleaf Rd.

Inspired by the narrow canyon leading to the woodland, this house recreates the “secret” pathway which provides intriguing passage and integration with the outdoor spaces.

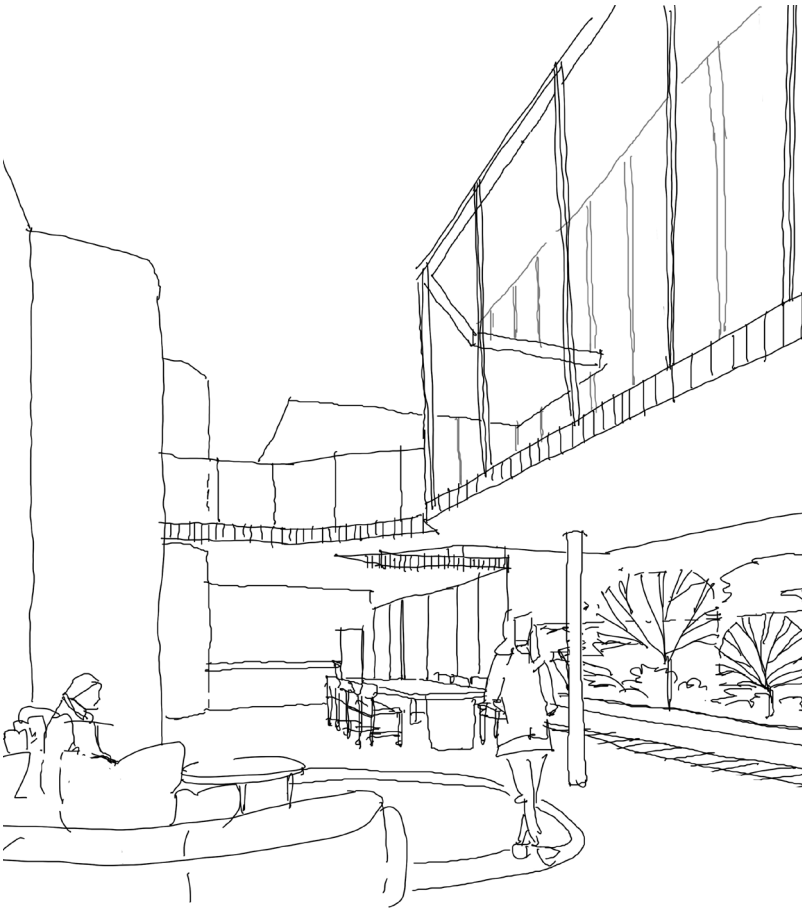



SITE BOUNDARY LINE
2M BUILDING SETBACK LINE
1M ROOF EAVES SETBACK LINE
2.4M ROOF EAVES SETBACK LINE
7.5M BUILDING SETBACK LINE
3M GREEN BUFFER FROM CAT 4
2.4M ROOF EAVES SETBACK LINE
8450
2450
4000
2000
24500
5650
3100
3350
4300
4000
4700
A
B
C
D
1
2
3
4
5
6
7

Floor plan



Living area



The Back of House is located on the front area of the plan in order for the living area to be fully open towards the rear garden.

The double volume living space with the stone cladding materiality curates the experience and views into distinct rear courtyards

03

BRICK BOARD HOUSE

Low- cost boardhouse in Sintang

Sintang, Borneo, 2020
Project Type: Housing
Team: Joseph Fredrick, ST, IAI
Status: In development

As the second largest district in Borneo with great potential for natural resources, Sintang is currently prioritising their state budget in developing the infrastructure including roads and bridges as the way to improve their economy. As the result, more workers arrive in Sintang to support those development.

The board house project is located in the downtown area flanked by shophouses and residentials. It is designed to accommodate low-income workers in the city by providing them with efficient living space and facilities such as motorcycle parking and communal kitchen.

In order to create an affordable living condition, cheaper and sustainable materials which are locally available in Sintang are used, such as Ulin Wood and Red Bricks for the facade, while homogenous tile and bare concrete are predominantly used in the interior area.





Second Floor Plan

The main goal of this project aside from providing adequate facilities for the lower income people to live, is implementing the sustainability concept such as providing skylight to ensure the interior space is well-lit during the day, ventilations in each room, and void to allow stack effect air flow.

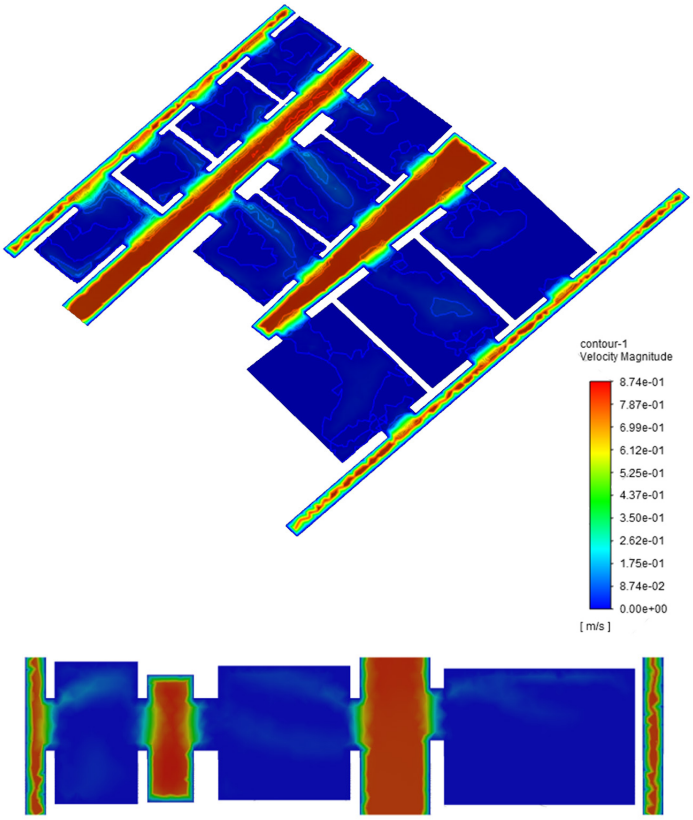


Below The Void



Bathroom area

Windows and small openings (roster) are placed in each room to ensure that every living space have the adequate airflow without Air Conditioning.
Ventilation could also lower humidity inside the building



Airflow Simulation

The simulation result indicates that each room received quite a small portion of the wind speed (but still considered to be acceptable). Therefore, wall exhaust fan might help to increase the indoor airflow.



Exterior Rendering

The facade consist of mainly two materials, brick cladding and simple exterior paint combined with shadow lines to add more variety to the building enclosure.

04

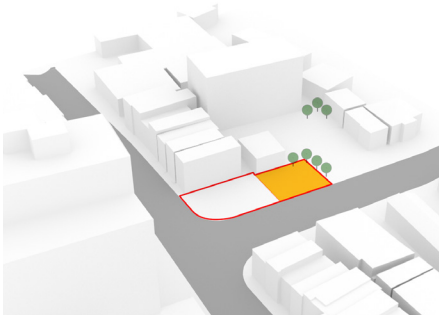
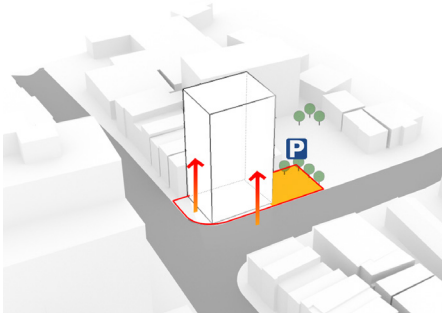
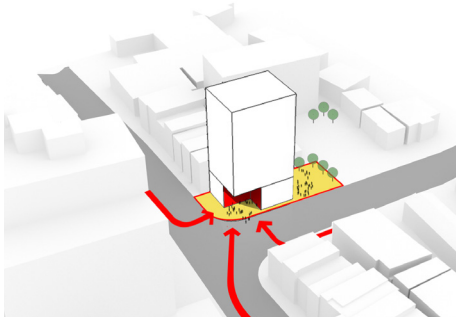
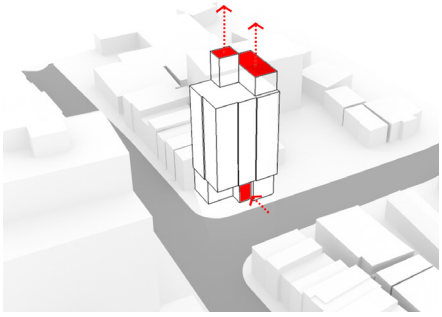
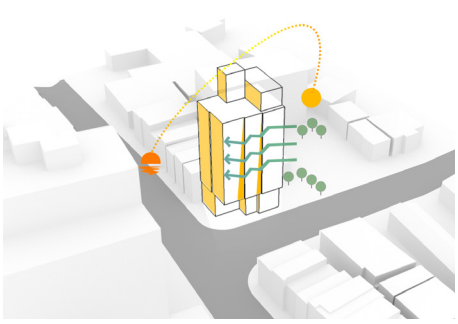
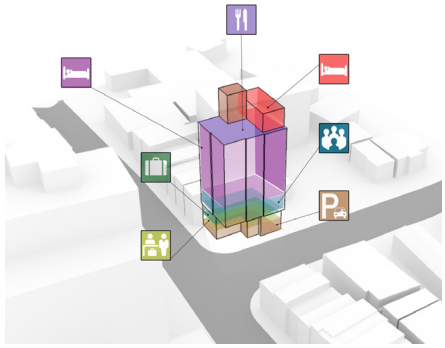
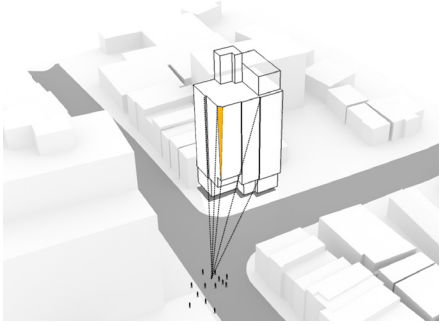
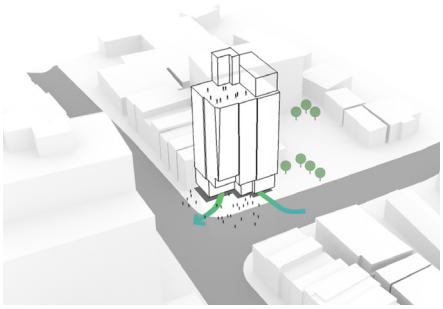
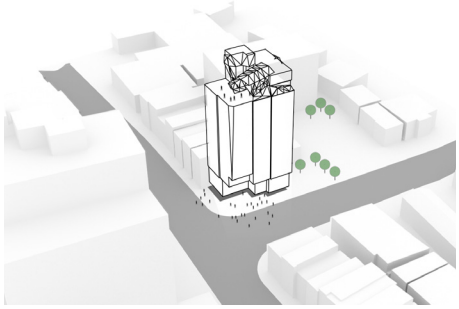
NEO HOTEL

A commercial space in Pontianak

With: PHL Architects, August 2013
Project Type: Hotel, commercial
Principal: Ir. Hendyanto Lim, IAI
Patrick Lim, ST., MA., MSc
Team: Jennifer Hansbert, S.Ars
Nathanael Hadinata, S.Ars
Publications: Segar Exhibition by Indonesian Institute of Architect (2015)
Jakarta Architecture Trienalle 2015 Exhibition

Pontianak, one of the largest city in Borneo, Indonesia, is facing a watershed moment in their growth and development. The city is experiencing population growth of around 10.000 people per year as well as the increasing number of tourists. Thus, supported by the city planning council, property development including residential and commercial is flourishing in the city to a ccommodate the growing demand.
The project aims to support the development of the main street of Pontianak - Gajah Mada - as well as enabling the community to occupy the site by supporting the pedestrian walk on the ground floor. It also acts as the iconic landmark through its strategic location. The building is situated at the intersection of a major urban axis between Gajah Mada street and main street leading to Pontianak Airport. The ground floor comprises the main entrance lobby and stairs that lead to the reception area. The elevated reception area is intended to give a shaded area for the pedestrian. The lobby area constitutes the reception area and cafe lounge which faced the Gajah Mada street. The main feature of the building is the rooftop area which often used by people in Pontianak to enjoy the view as well as seeing the annual Chinese Festival situated in the Gajah Mada street. The main facade is covered with EPS Polystyrene Foam Panel to reduce building's load significantly while also provide a more efficient installation process.


NEO

The design process analysed a series of categories, such as maximum building height, total area, pedestrian view, programs, and the view from the building itself. The rooftop floor used as the dining area provides residents with a rather enjoyable view of Pontianak's landmark both day and night.

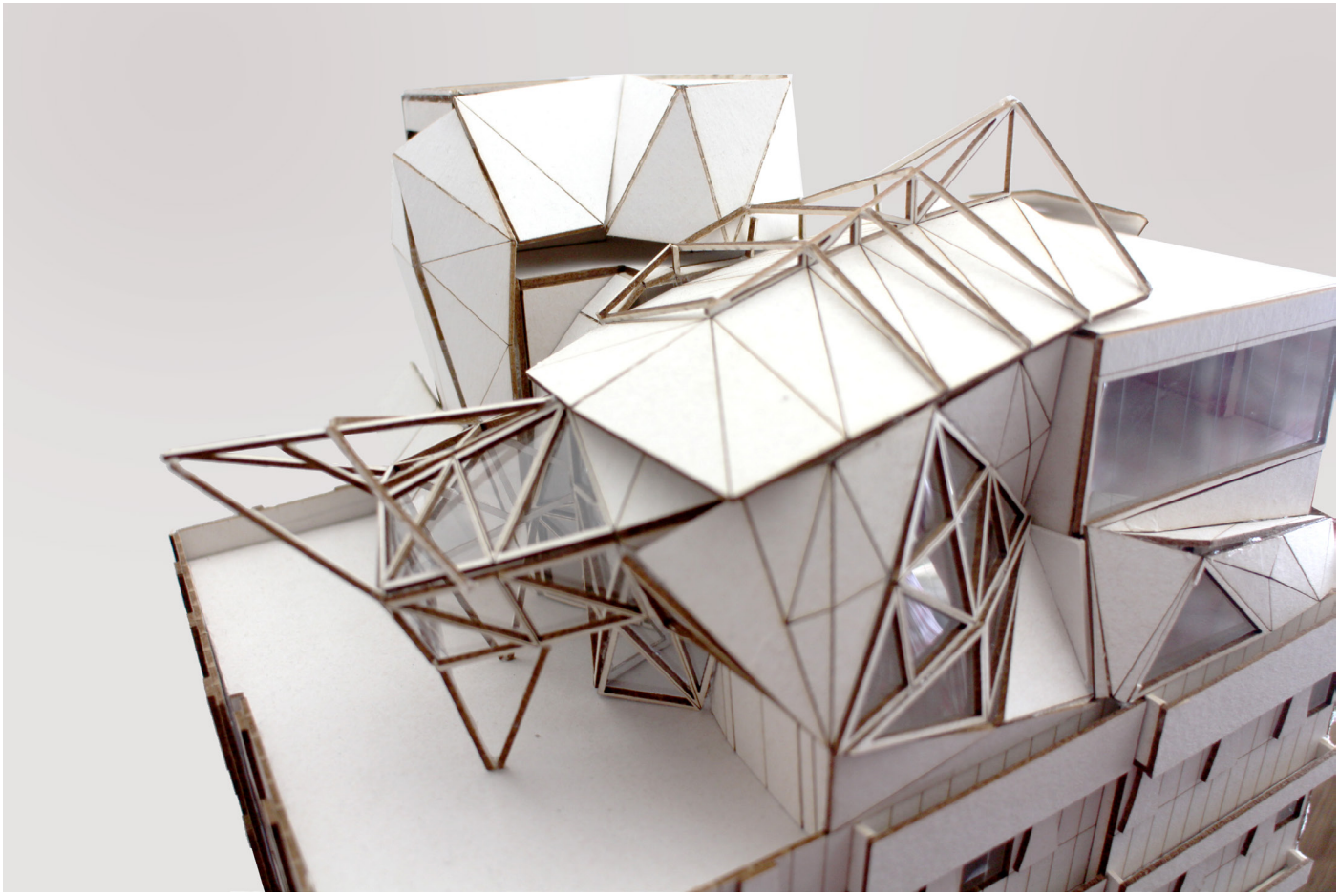




Fully constructed breakfast area

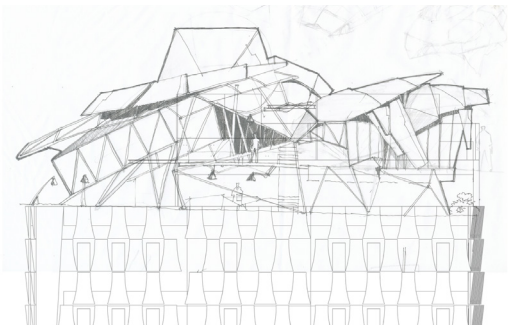


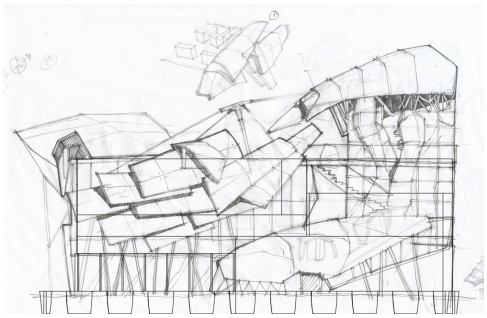
Interior with wood finishes

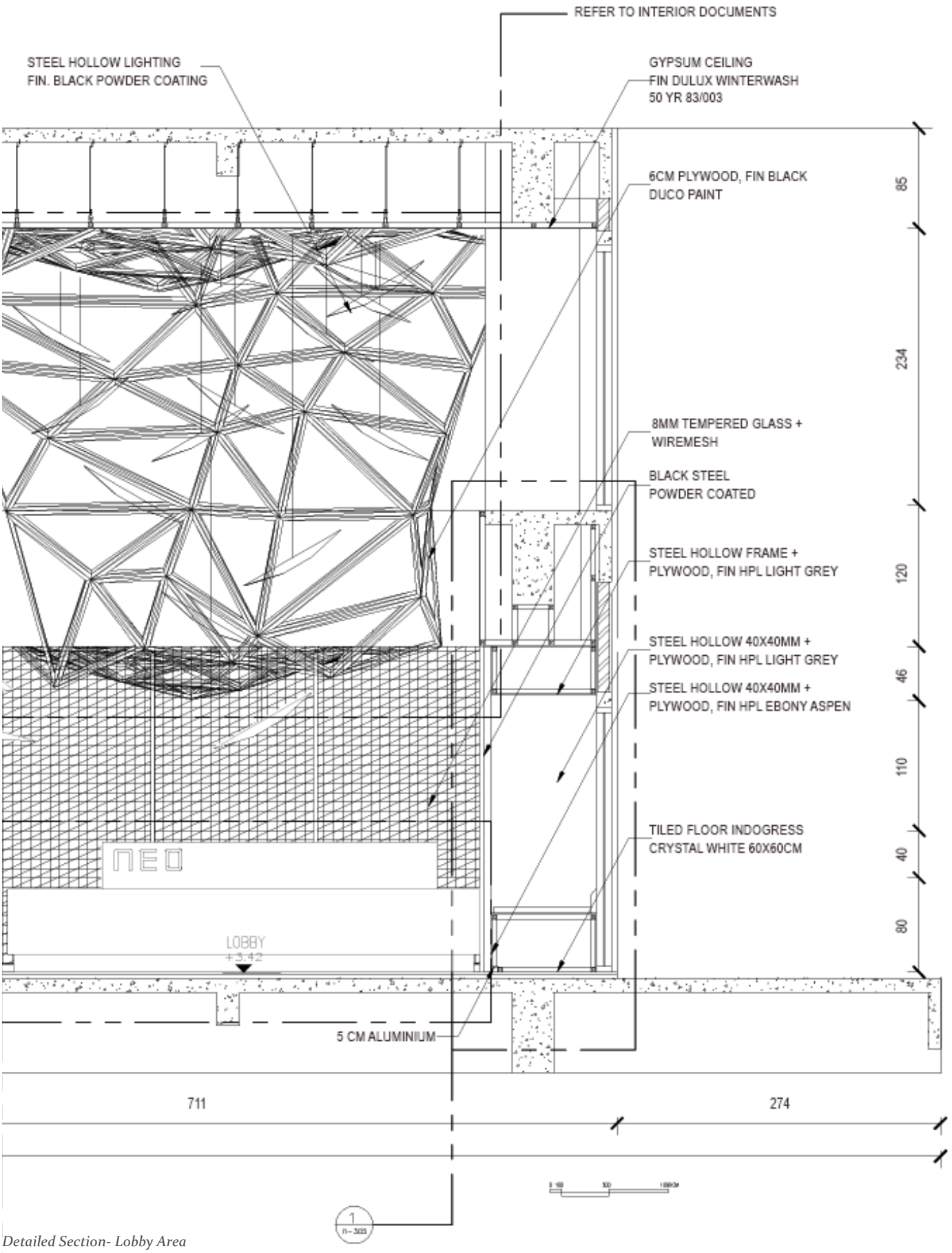




The rooftop area serves as the gathering space for people in Pontianak to enjoy the 360° city landmark. Its outdoor and indoor space allows flexibility in Pontianak's harsh climate.







Detailed Section- Lobby Area

05

MALL OF BORNEO

A One Stop Entertainment in Pontianak

With: PHL Architects, 2015
Project Type: Mixed-use Shopping Mall & Hotel, Commercial
Principal: Ir. Hendyanto Lim, IAI
Patrick Lim, ST., MA., MSc
Team: Agnes Setiawan, Joseph Fredrik, Juanita Christine

Pontianak, one of the largest city in Borneo, Indonesia, is facing a watershed moment in their growth and development. The city is experiencing population growth of around 10.000 people per year as well as the increasing number of tourists. Thus, supported by the city planning council, property development including residential and commercial is flourishing in the city to a ccommodate the growing demand.

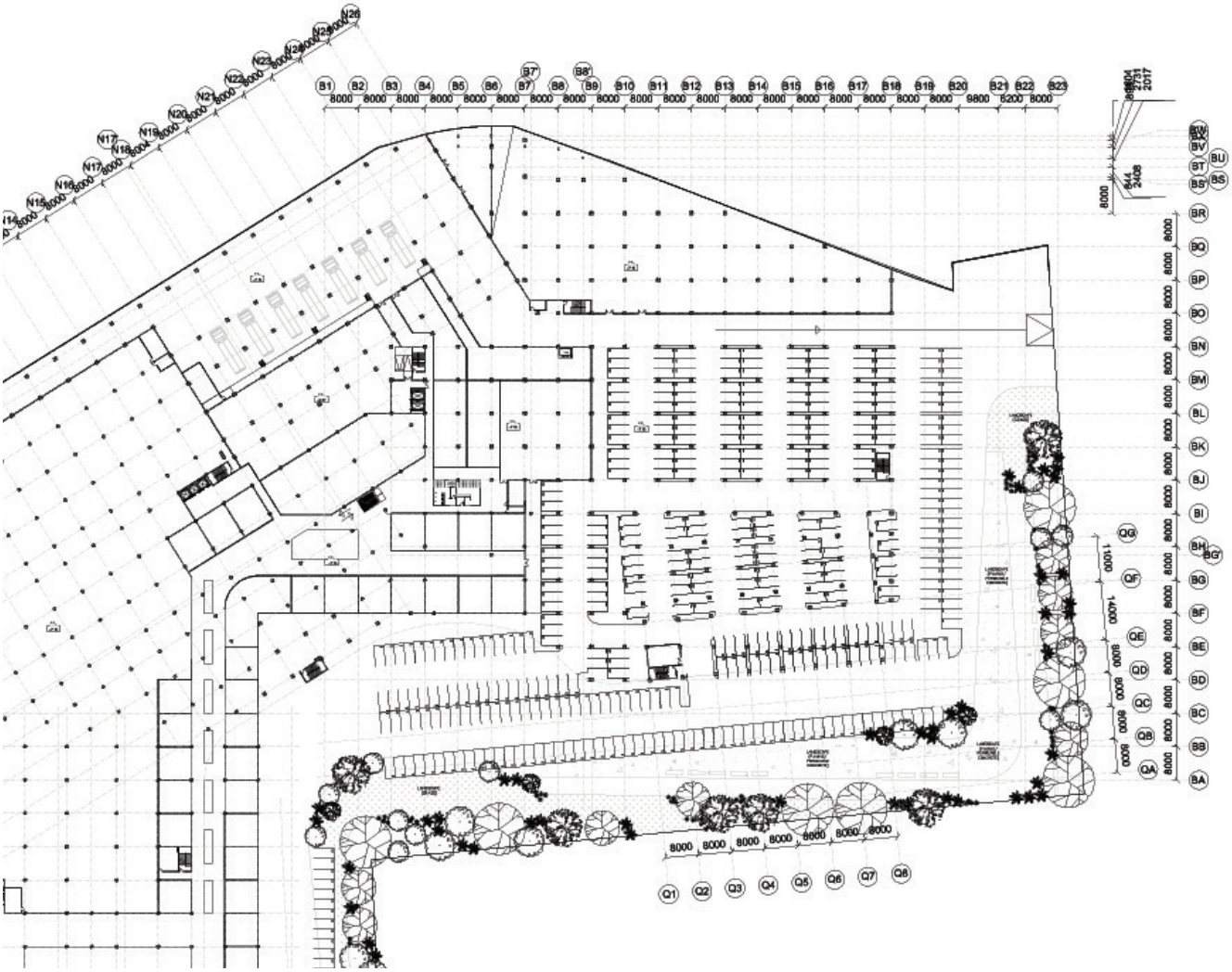
Having experienced rapid development in infrastructure and tourism, Pontianak requires a one-stop entertainment centre with adequate facilities to accommodate both local and international tourists. The Mall of Borneo project situated on the main road leading to both Pontianak's international airport and city centre. Hence, its strategic location provides many benefits to the project including its potential as the icon of Pontianak's commercial sector.



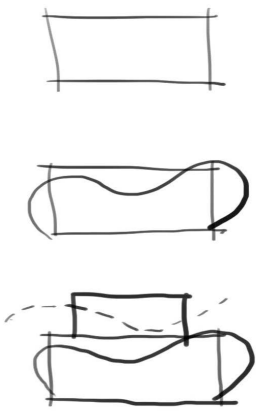
Main Bird Eye View



Main Exterior View



Ground floor plan



The project consists of the business park, shopping mall, 4-star hotel and two apartment towers located on the rooftop area accessed via transfer lobby. The building takes shape from the Kapuas river to create an organic geometry, with skylights added on lobby area to ensure adequate daylight in the building.



Business park area



Atrium area



Business park area

06

CASA GRANDE PHASE 2

Mixed-use in Kota Kasablanka

With: Airmas Asri, 2013
Project Type: Mixed-use Shopping Mall & Hotel, Office
Principal: Ir. Ardi Jahya, IAI
Team: Ir. Dede Ryan, Prastika Lestari, ST

Case Grande Phase 2 is part of the significant development in South Jakarta after Kota Kasablanka Shopping Mall has been established. The development consists of two apartment towers and one office tower located on the north side of the existing mall, connected by open spaces and parking basement.

Located in the heart of Tebet, the regional area has been targetted for a mixed-use development with Transit-Oriented Development plan. Further, this area also being planned by the local authority to become a development area for residential towers with integrated green space area.
Continuing its previous development in phase 1, the phase 2 project emphasizes its architectural planning in terms of the pedestrian area, parking provision, and connectivity to the previous development including to Kota Kasablanka Shopping Mall.



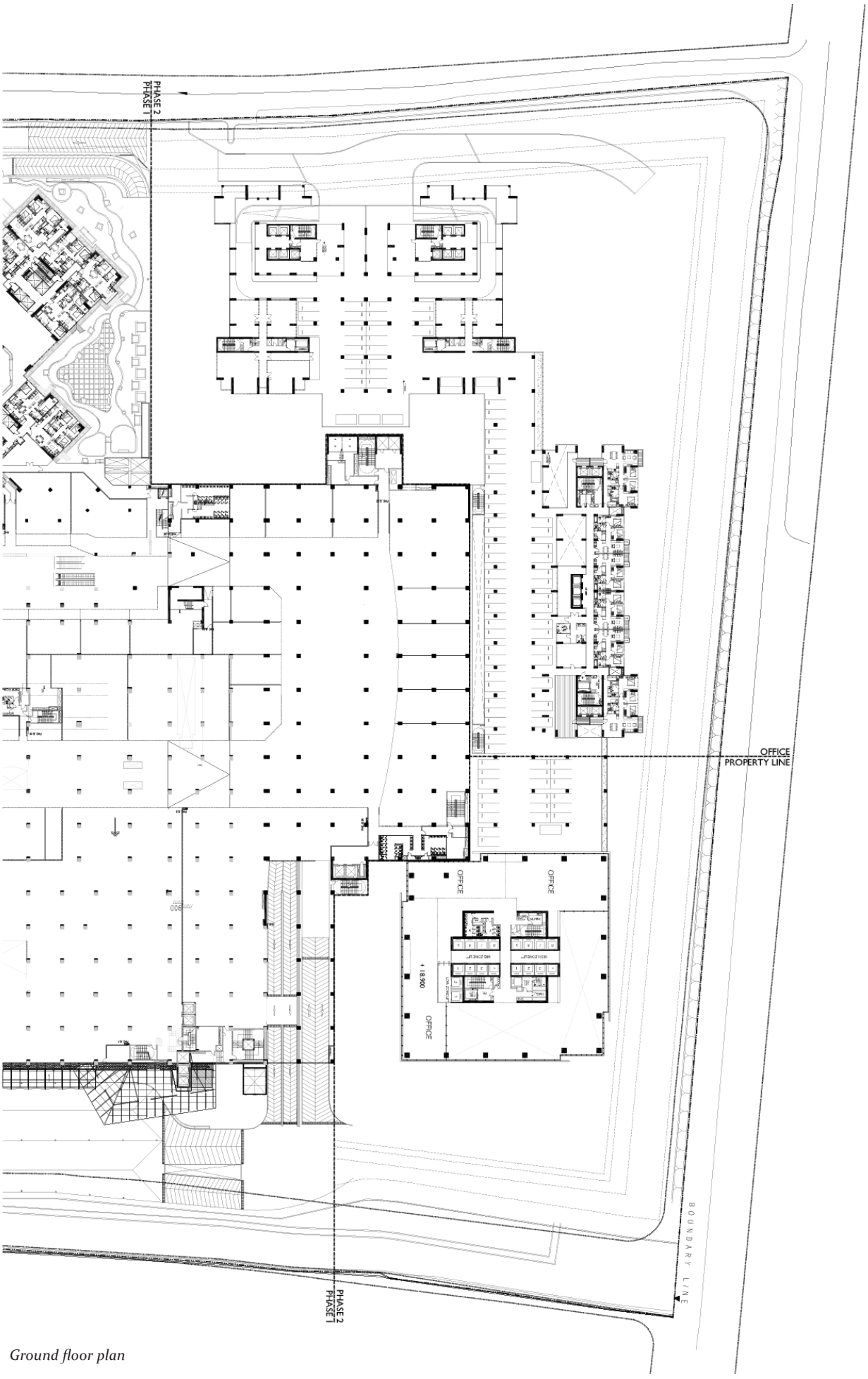
Main Bird Eye View



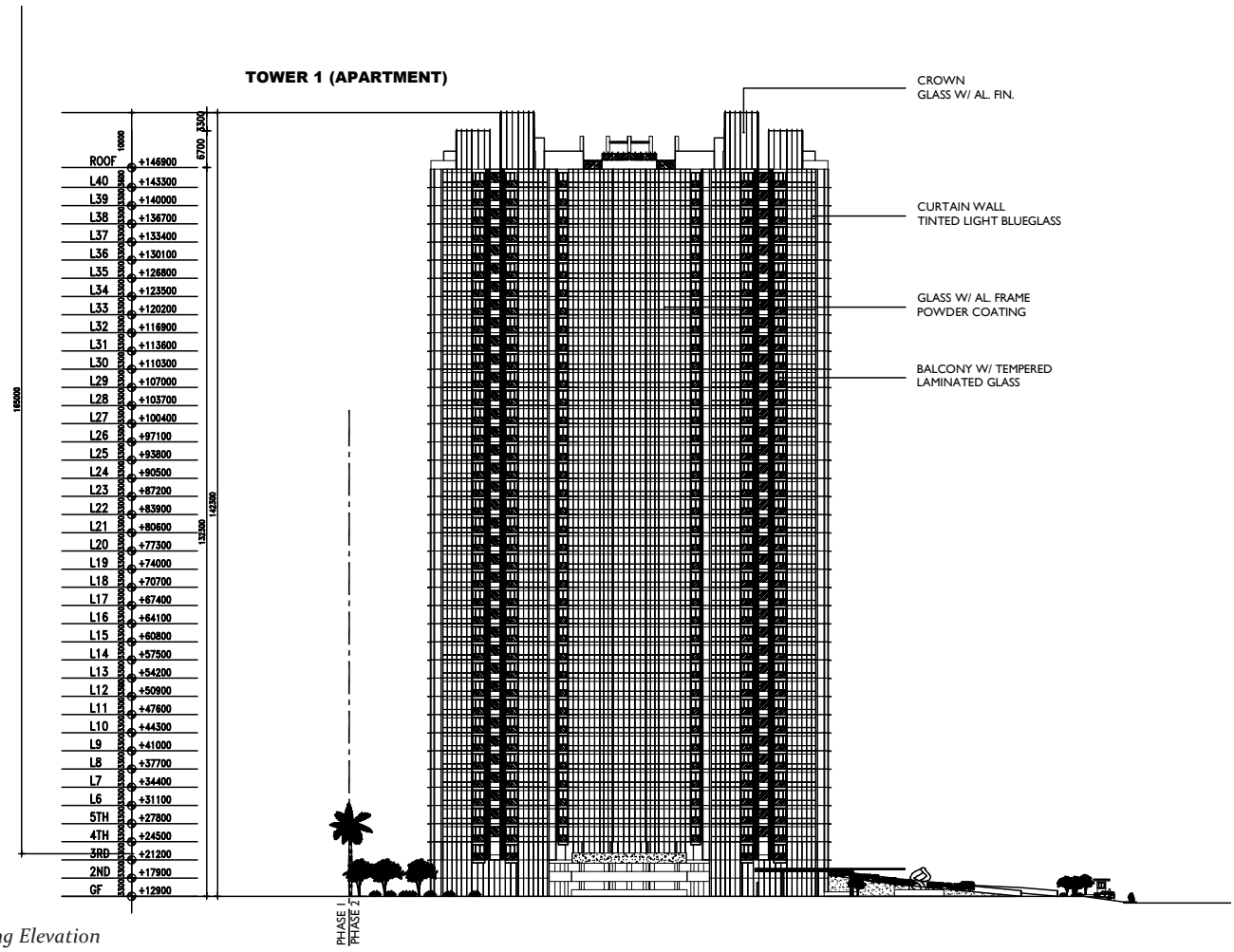
View from swimming pool area

The 3-tower apartments consists of two and three bedroom units with ranging size from 76 sqm to 153 sqm with executive unit type equipped with private lifts. Furthermore, public facilities inside the property includes swimming pool, jogging track, function room, gym, sauna, playground area, and tennis courts.

Other design considerations for the Casa Grande project includes natural daylight through each of the interior space through the use of insulated curtain walls, pressurised shaft for fire safety, and minimum distance between towers.



Ground floor plan



Building Elevation



Artist Impression for Casa Grande Phase 2

07

SELF-SHADING STEEL FAÇADE PROFILES

Performance-driven façade design for improved thermal performance

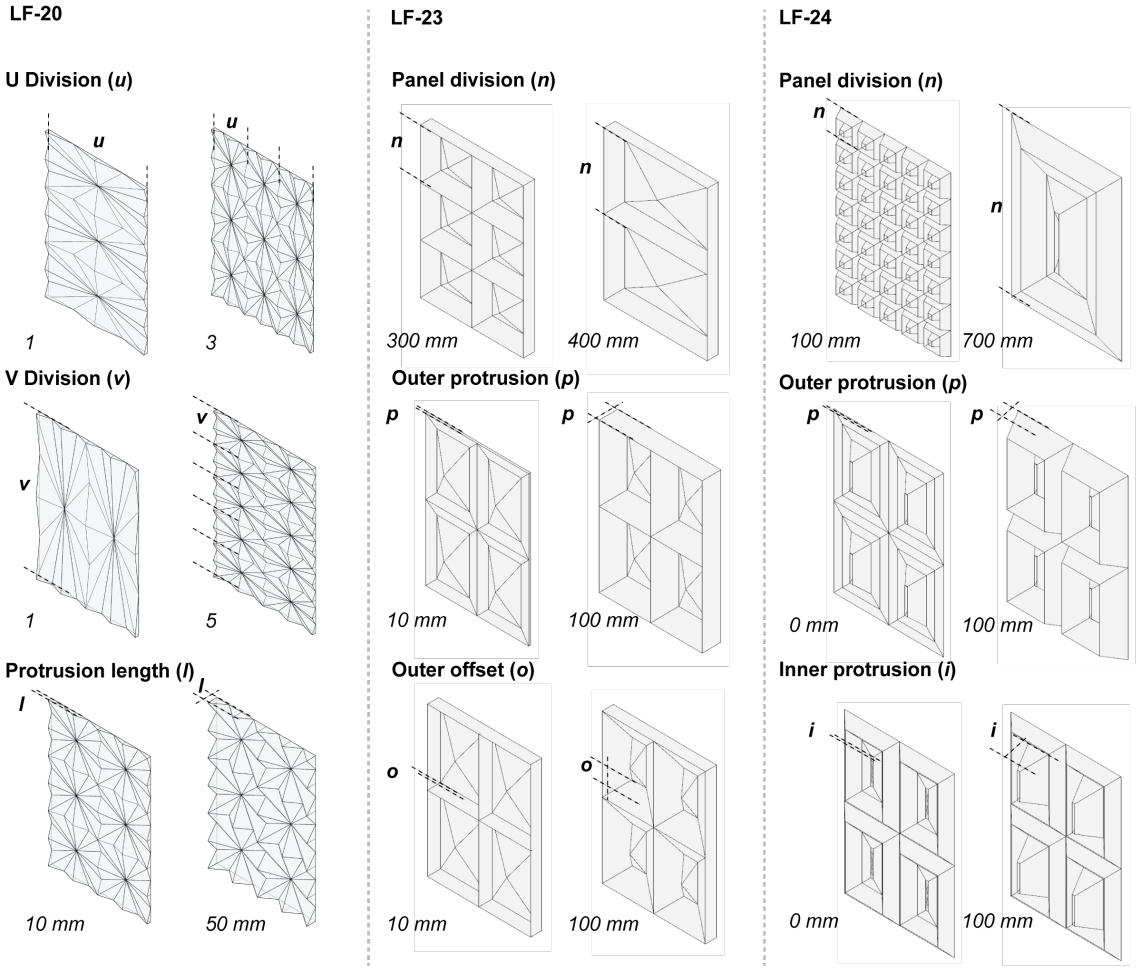
Adelaide, Australia, 2022–2026
Project Type: Architectural Research / Building Performance
Role: PhD Researcher
Industry Partner: BlueScope / Lysaght
Status: Thesis submitted for examination

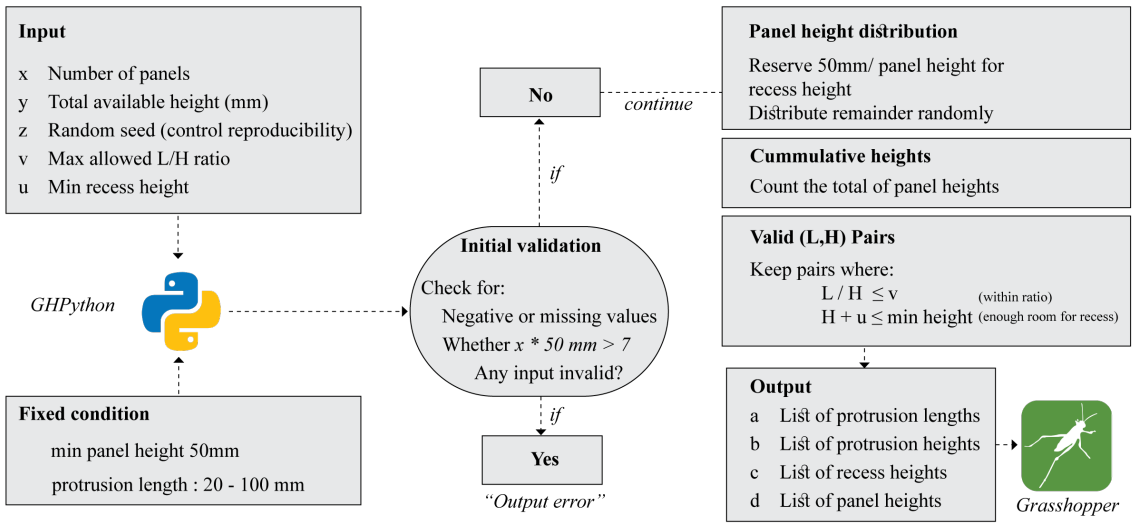
This research investigates the potential of self-shading steel cladding profiles to reduce solar heat gain through building façades in warm Australian climates. The project explores how façade geometry can be developed to improve thermal performance through passive design, reducing reliance on mechanical cooling.

The research combines parametric modelling, outdoor experimental testing, building energy simulation, and computational fluid dynamics (CFD) to evaluate the relationship between façade geometry, solar exposure, and heat transfer. Through iterative design development and performance evaluation, the project examines how variations in cladding profiles can influence façade performance under real-world environmental conditions.

The aim is to demonstrate how building envelope design can contribute to improved energy performance while maintaining the practical application of steel cladding systems in contemporary architecture.

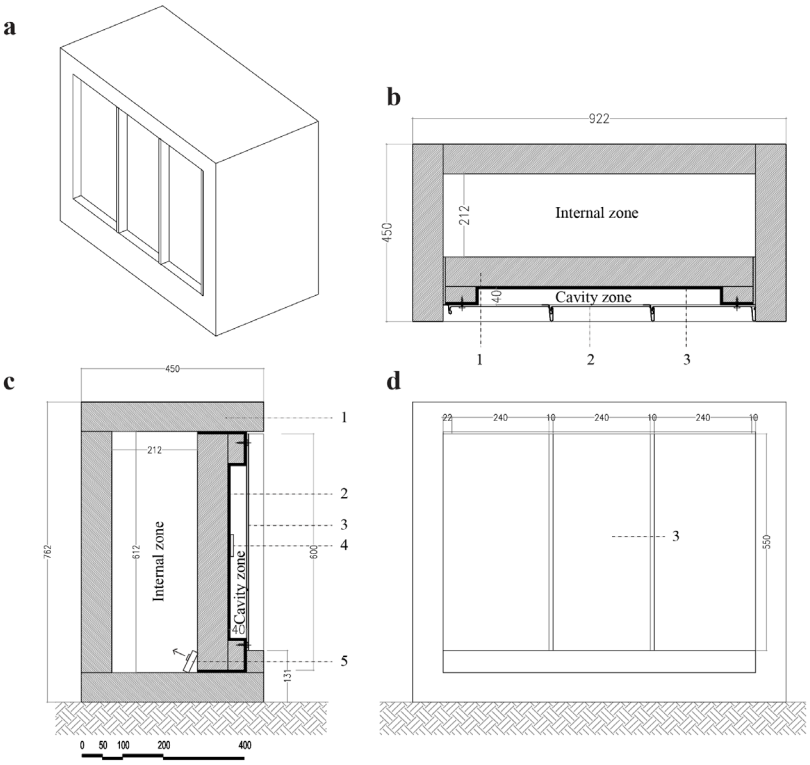






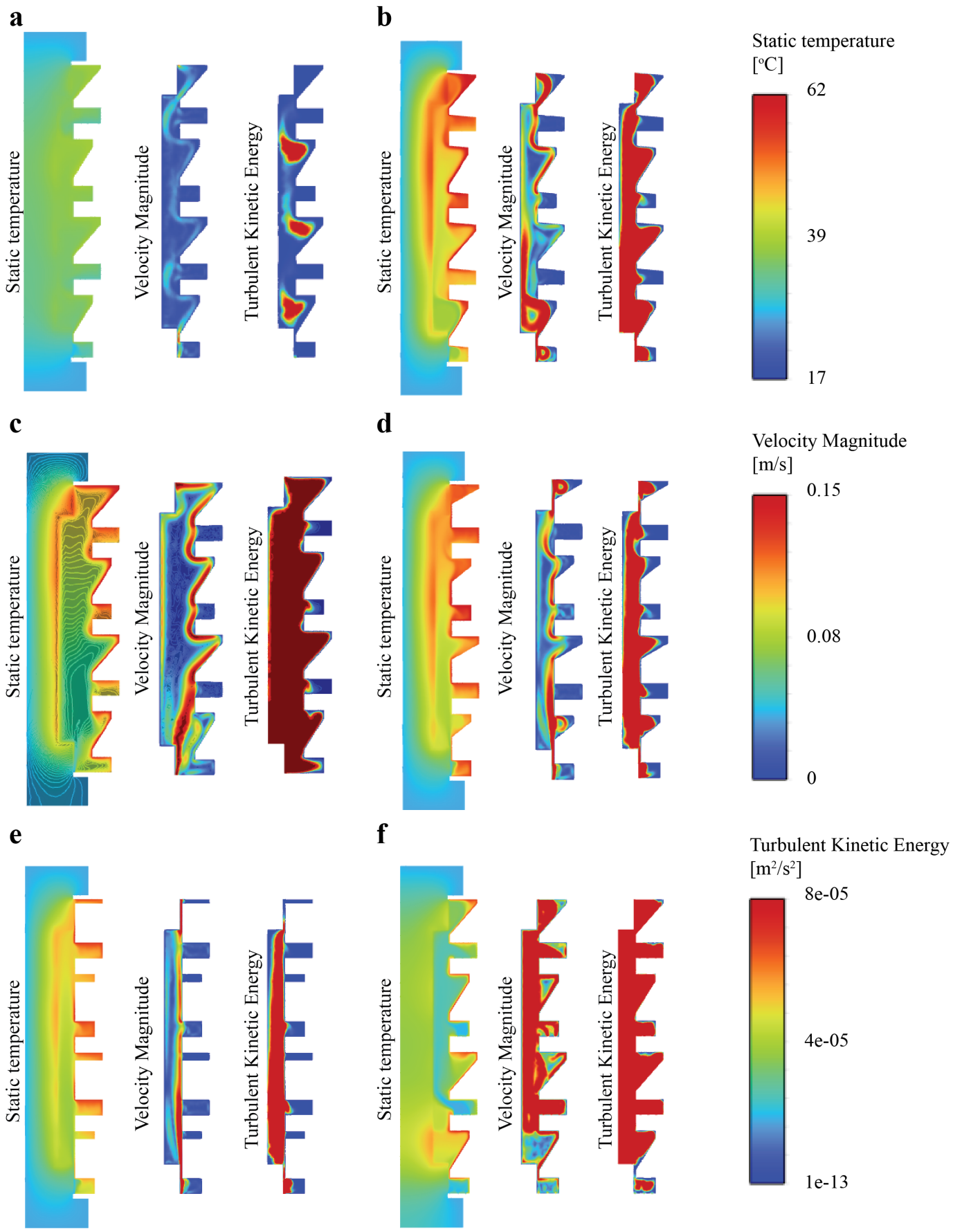
Using parametric modelling, different steel cladding geometries were developed to investigate how folding configurations influence façade thermal performance. Variations in folding depth, angle, and shape were explored to understand their effects on self-shading and solar heat gain. This approach integrates environmental performance into the design process, enabling façade geometry to be evaluated as a means of improving passive thermal performance.





1. 75 mm Expanded Polystyrene
2. 6mm Marine Plywood
3. Profiled steel cladding
4. Cavity temperature sensor (HOBO MX2303 probe)
5. Internal temperature sensor (HOBO MX2301A)

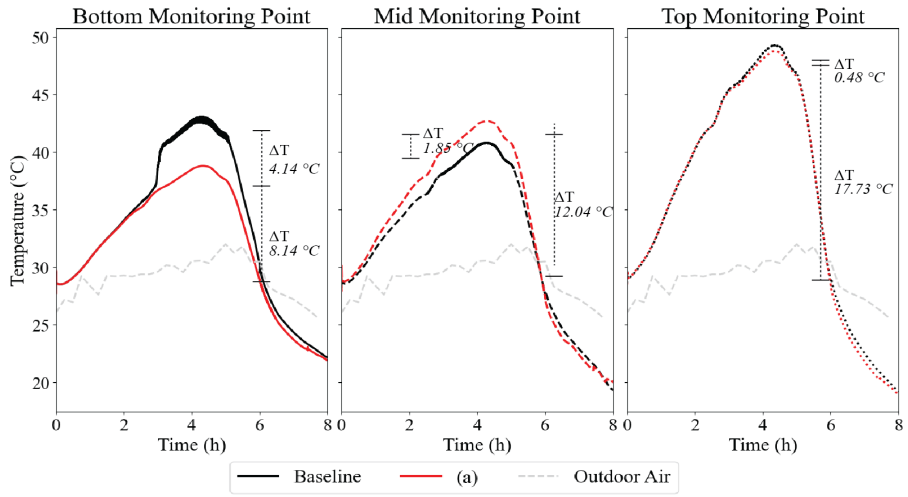
An outdoor experimental setup was developed to evaluate the thermal behaviour of steel cladding profiles under real environmental conditions. Temperature measurements collected under natural solar exposure were used to calibrate and assess the accuracy of the building energy simulation model. This process established a link between physical testing and numerical analysis, supporting more reliable evaluations of alternative façade configurations.



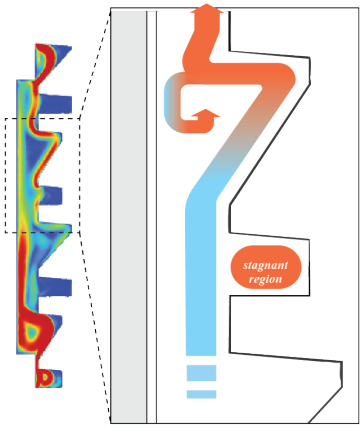
Computational fluid dynamics (CFD) was used to investigate the thermal and airflow behaviour of different self-shading steel cladding profiles. Using ANSYS Fluent, the simulations examined cavity temperature distribution, airflow patterns, turbulence, and turbulent kinetic energy to understand how variations in profile geometry influence heat transfer within the façade.

Comparison between Baseline and iteration (a) - adding 5° slope for rainwater runoff

Temperature differences

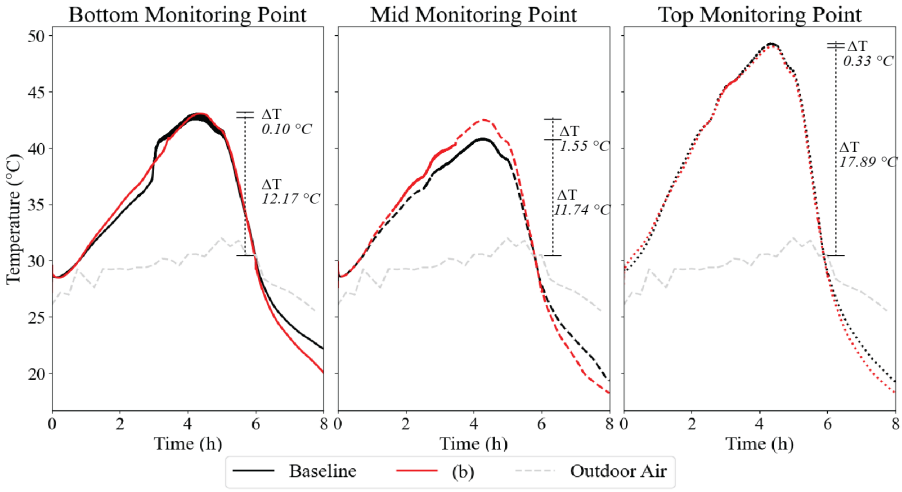


Airflow diagram

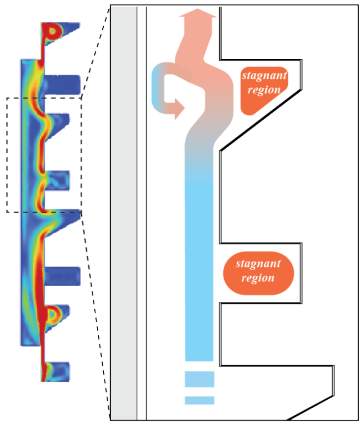


Comparison between Baseline and iteration (b) - altering the angle of the triangular shape

Temperature differences

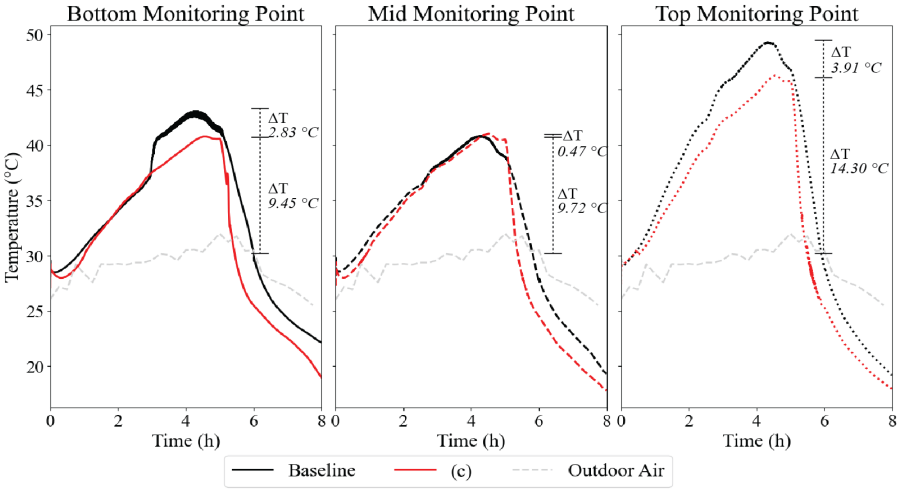


Airflow diagram

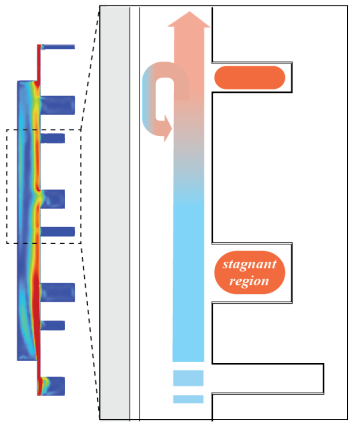


Comparison between Baseline and iteration (c) - changing the triangular shape to a rectangular shape

Temperature differences



Airflow diagram



The comparison of different profile configurations provides insight into the relationship between cavity geometry, air movement, and thermal performance. By analysing these flow and temperature characteristics, the study evaluates how folding profiles can influence heat transfer and contribute to the development of self-shading façade systems for improved thermal performance.

08

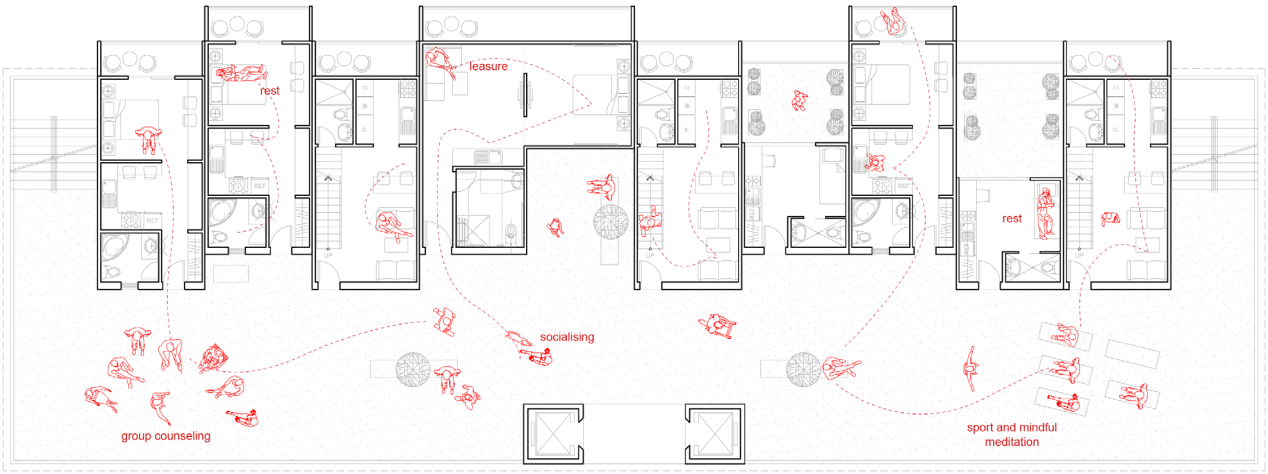
ALTERNATIVE HOUSING

Rebuilding The Life of Sydney's Homeless People

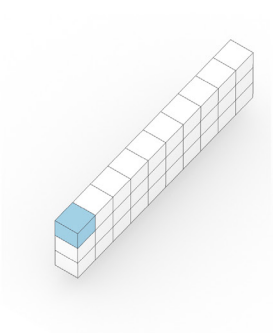
May 2019
Project Type: Affordable Housing Competition
Team: Alvaro Bellon, Arash Sohrabi

Homelessness is caused by the interaction of individual-level and broader structural inadequacies and causes. This proposal assumes that the most efficient way to overcome the situations that lead to homelessness is by first granting permanent private places to live, within a receptive community environment; to then further support the reinsertion processes through different strategies, according to the diverse social characteristics of each homeless individual. In that sense, we devised the concept of creating buildings within a building; where homeless people would receive habitable units and constant support, each of the "inner" buildings accommodating one of the "socially-diversified" types of homelessness, with their own spaces for social interaction, while also sharing some common inter-social activities within the major building envelope. These buildings will be modular, with studios, one and two bedrooms apartments, plus the common areas. They are designed to maximise the use of natural resources to manage the internal IEQ and to produce energy in all available ways, through micro-generation.



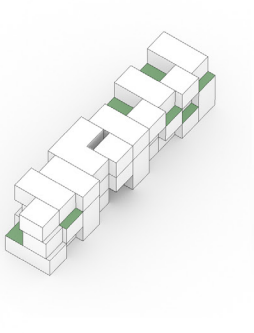


The housing project comprises of three-storey modular units designed to be replicated and stacked based on the conditions of each site. Therefore, the project is flexible to be adjusted in accordance with Sydney's Local Environmental Plan and Development Control Plan.



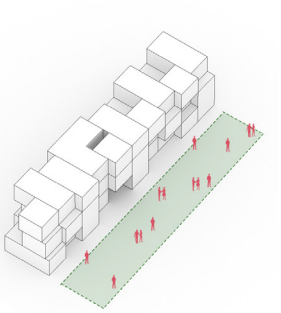
Stacked units

Units are stacked vertically to provide maximum efficiency in Sydney's medium and high density area.



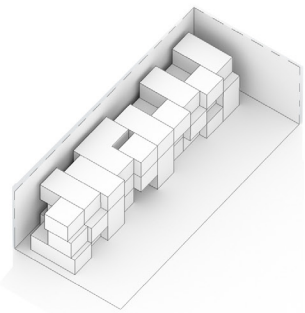
Green spaces

Green area to ensure each occupants could have their own private open space.



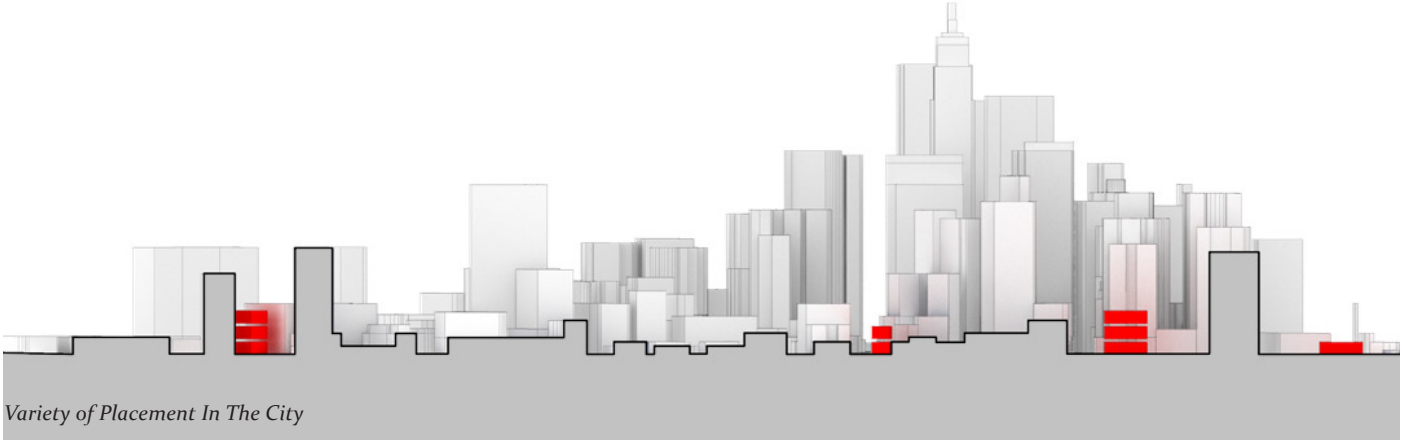
Communal Spaces

Spaces where community-based activities to empower homeless people are done.

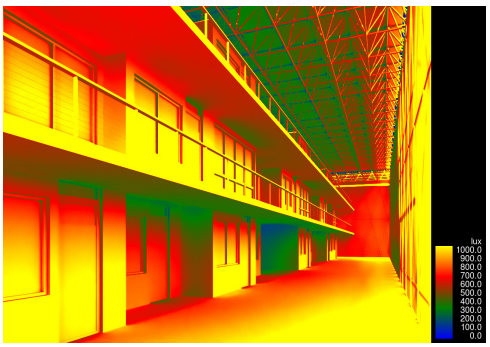


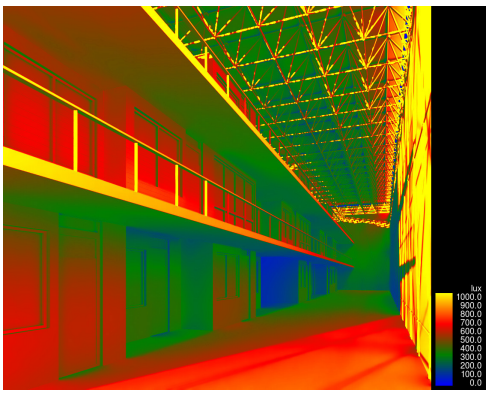
Enclosed Spaces

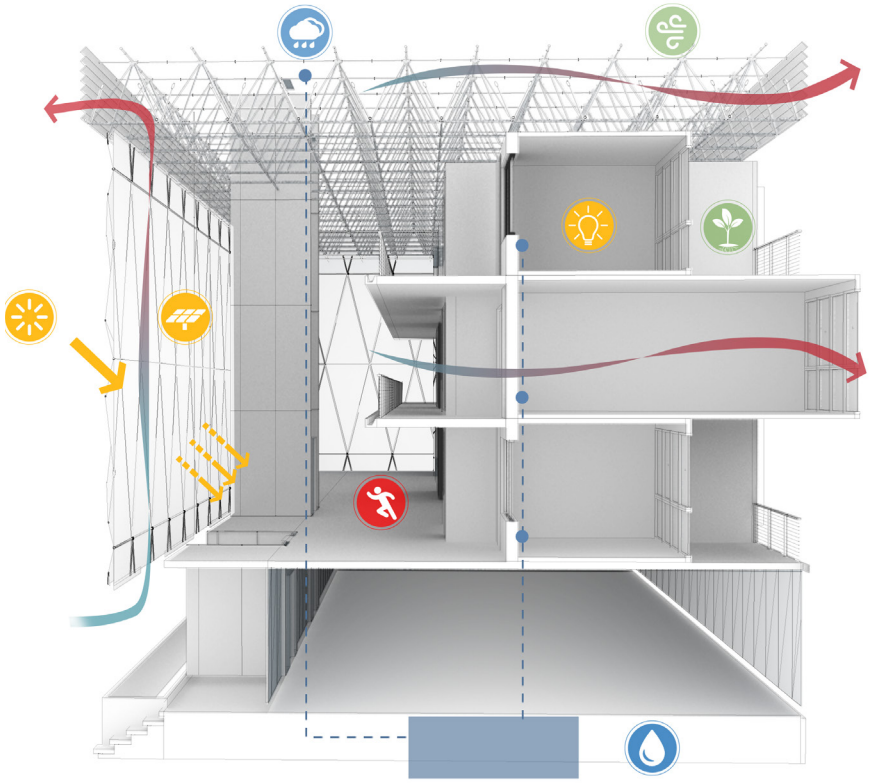
Building within building as the mean to protect the communal spaces.



Variety of Placement In The City





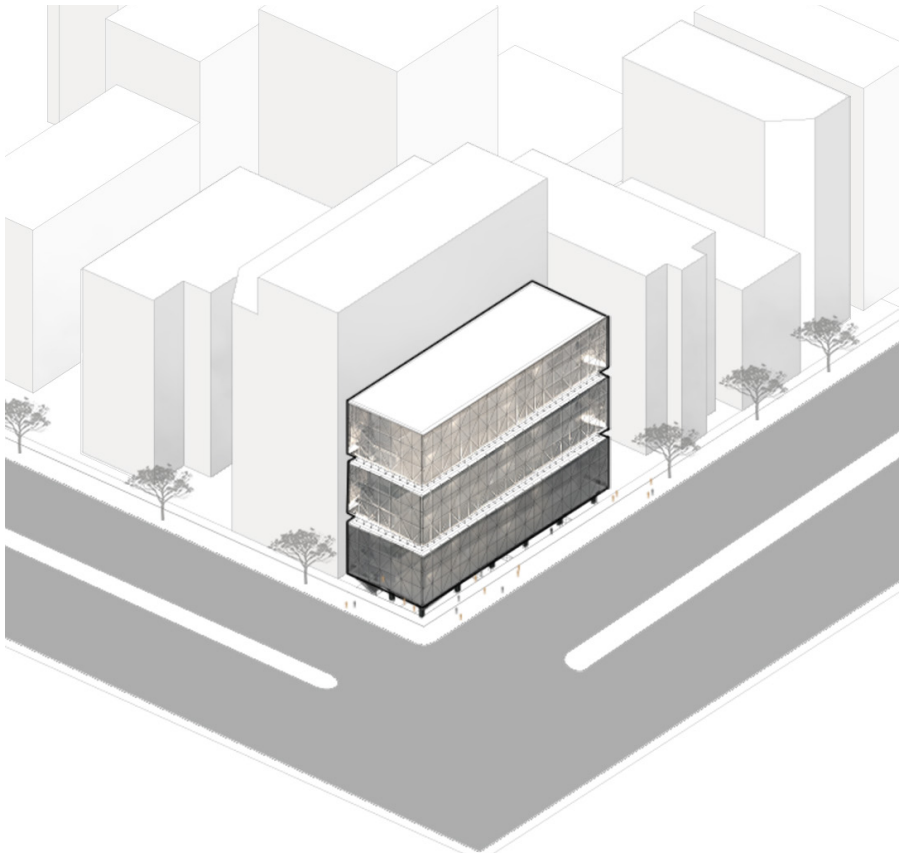


The solar illuminance simulation result shows the comparison of the indoor illuminance between two different façade system (Standard glazing and using the standard ETFE layer). The standard glazing system results in the interior covered by high illuminance (>1000 lux), while the ETFE layer minimise the indoor illuminance to a more acceptable range (<500 lux).

Recyclable ETFE is proposed as it requires minimal energy for transportation and installation. The printed foil allows the light transmission to be regulated through a shading coefficient

The widespread usage of glazing can be less effective as the high-performance glasses have limited size and require much higher installation maintenance costs.

On the other hand, the ETFE layer can accommodate to much wider areas and accumulates less dust due to its smooth and anti-adhesive properties, therefore reducing maintenance tasks. Aside from that, ETFE could minimise the impact of reflections on the surrounding building.



09

OCEAN AGGLOMERATION PROJECT

Jacques Rougerie Competition 2019

November 2019
Project Type: Innovation and Architecture for the Sea
Award: Finalist 2019

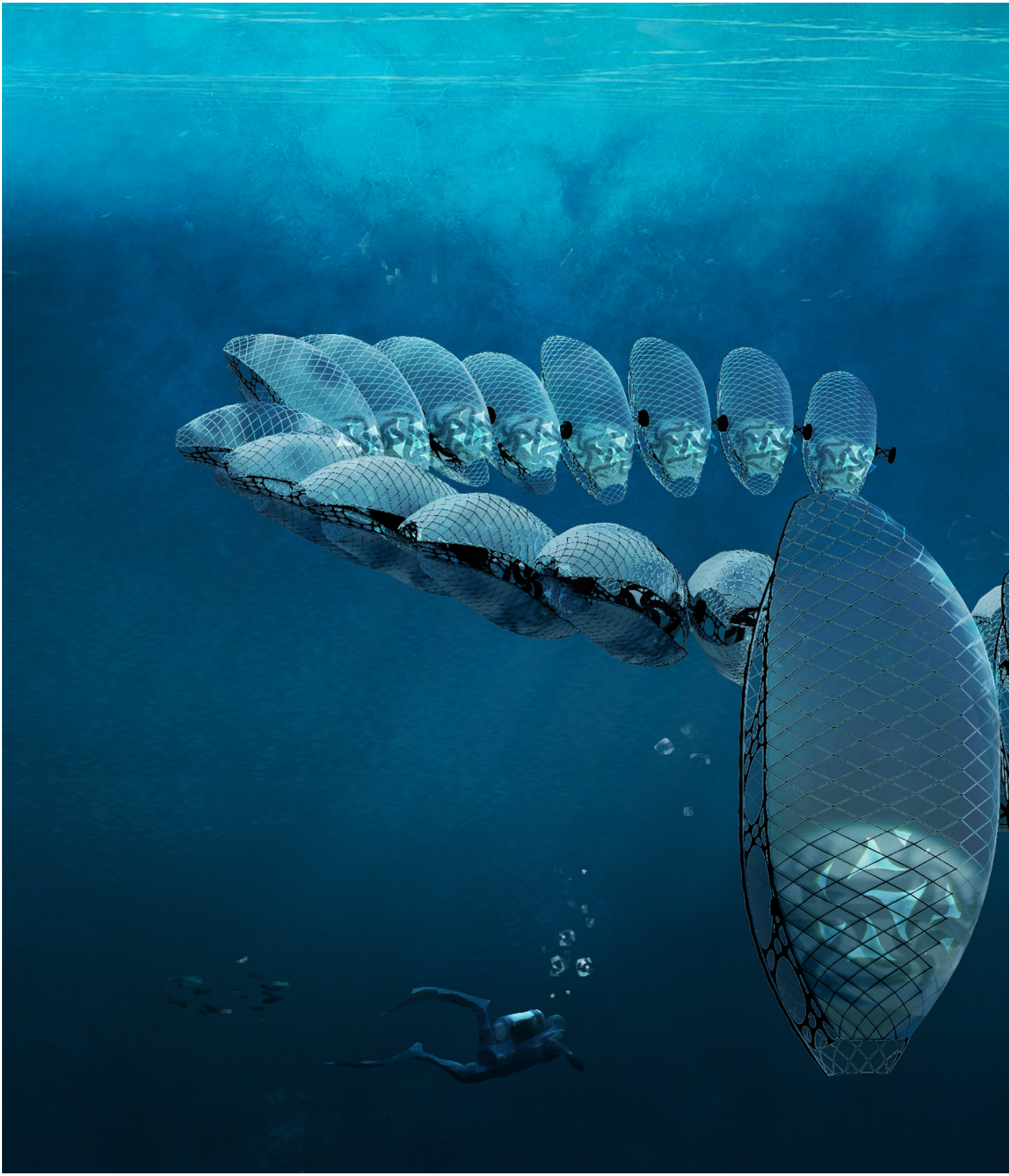
According to the United Nation, the global population is expected to increase to about 9.7 billion in 2050. With the population rising to more than 3,5 billion at the end of the century, the inevitable rising demand for housing and food will become critical issues in preparing for the future.

The future demand for housing forces people including the government to find an alternative solution to the housing scarcity. Moreover, the need for a sustainable design which encourages re-use, reduce and recycle will be crucial in reducing the problem in resource scarcity and long-lasting community.

Further, while the sea covers 71% of the earth's surface, utilising the ocean's potential to be a future habitat for people through technology becomes more plausible and desirable. Thus, The Ocean Agglomeration Project is designed to counter the current issues associated with global population increase, garbage patch, and the supply-demand gap of ocean fisheries

Today, the increasing housing demand causes issues in terms of space and sustainability. However, ecologically oriented lifestyles should be followed by social cohesion. Hence, an alternative approches to design, solution, as well as lifestyle is needed. The project consists of a mobile underwater village layered with a structural net to accommodate farming for ocean products. Each units of the residential pods could be attached and detached while roaming collectively in the ocean. The hope is that the social innovation could promotes real empowerment to people and make their sense of community stronger.

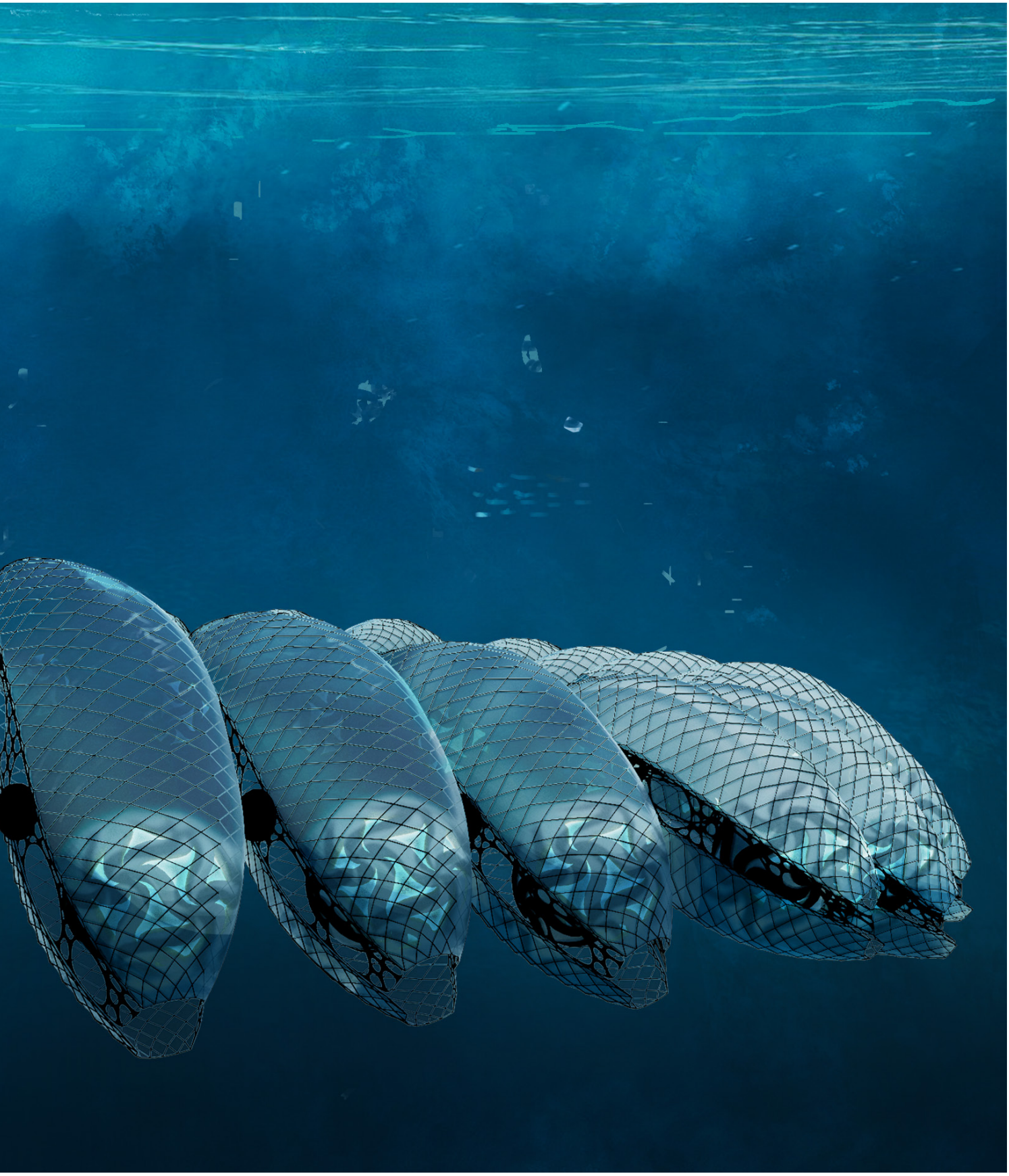


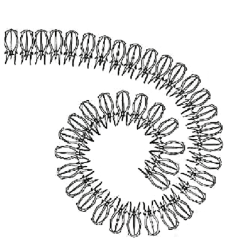


Biomimicry

The concept takes the form of salps as an important element in oceanic life. Salps swim collectively to form a colony and drifting through the ocean in the form of a long chain. The biomimicry concept imitates that very concept in order to provide sustainable solutions in the challenges and introduce new ways of living to adapt to the earth's condition in the long run.

There are three key components of the biomimicry that could be adapted from the chain of salps. Including its transparency nature, collective swimming, and its carbon reduction potential. By creating architecture with less obtrusive to the marine life through translucent materials, along with its replicability and sustainability aspects, the project can become a beacon for future living in the ocean.





Transparency

Chain

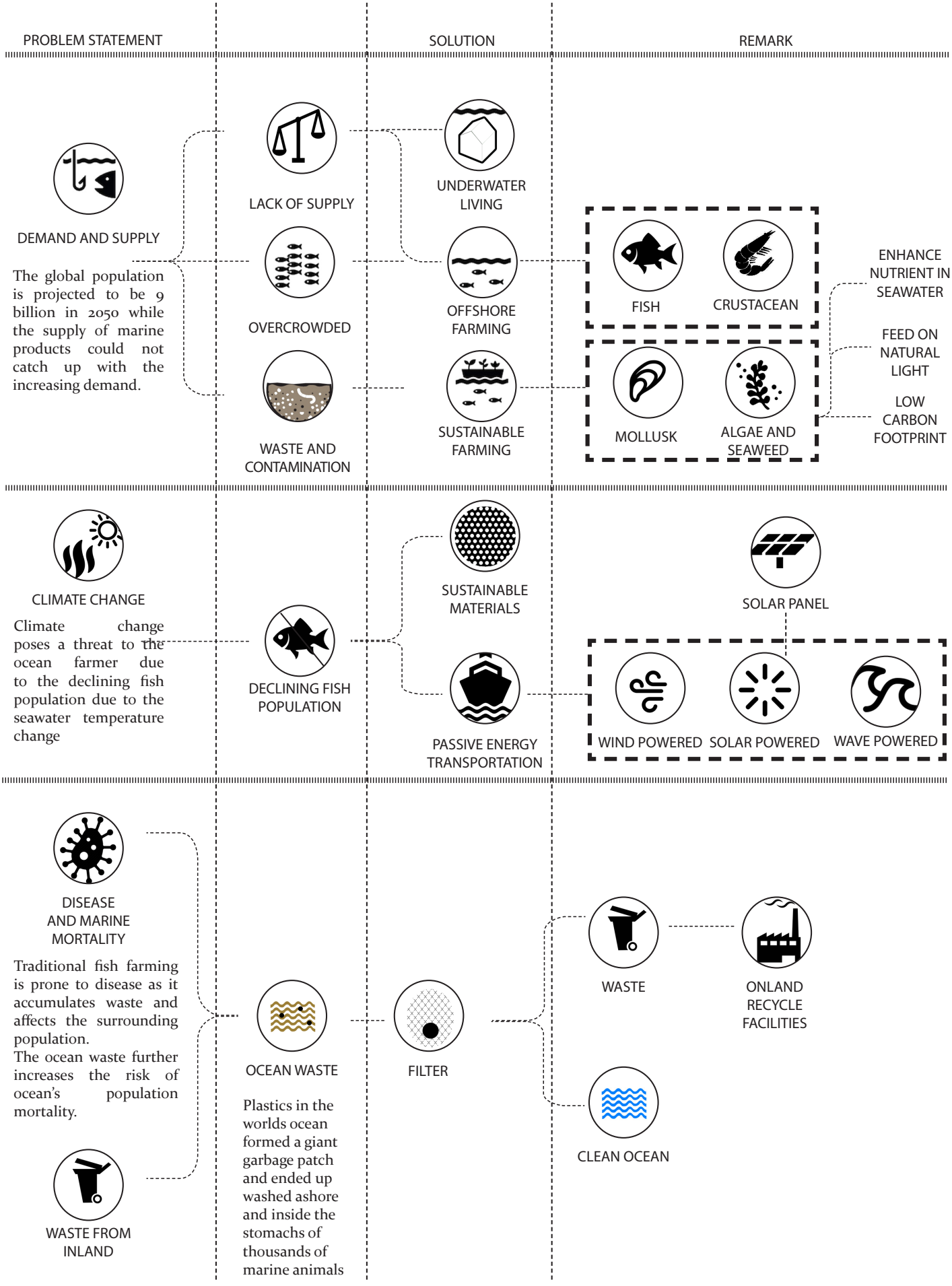
Carbonreduction

Unobstructed Light

Replicability

Sustainability

DESIGN THINKING

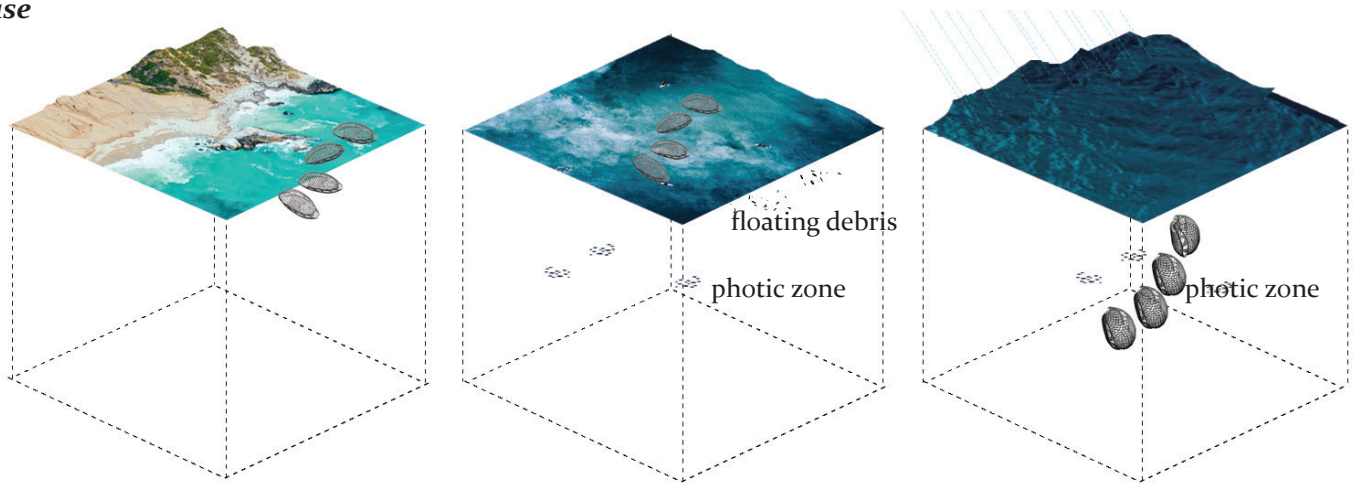




Site

The pods with its replicability make it easier to be built and transported via an ocean gyre. The ocean gyre itself created by wind patterns, waves, and differences in water temperature and salinity, which could directly be utilized by the pods moving system. Furthermore, by placing the pods in the ocean gyre circular path, the system could catch the debris trapped inside the ocean current.

Phase



Docking

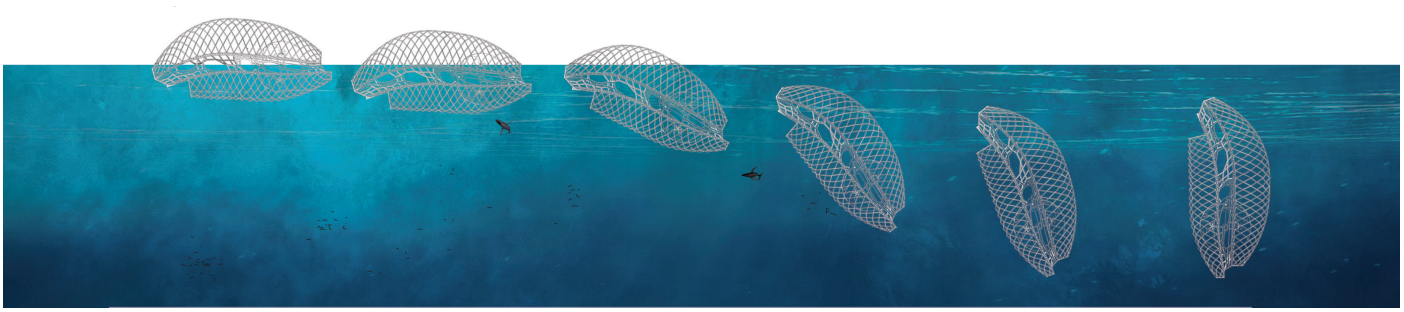
During the docking, the pod could be reached via boat or jetty to transport either the occupants or sell the ocean products to the market.

Sailing

During surfacing, the pod act as the ocean cleaner, sweeping the floating waste along the surface. The movement of the pod follows the ocean waves and winds, providing a passive approach to transporting people and products.

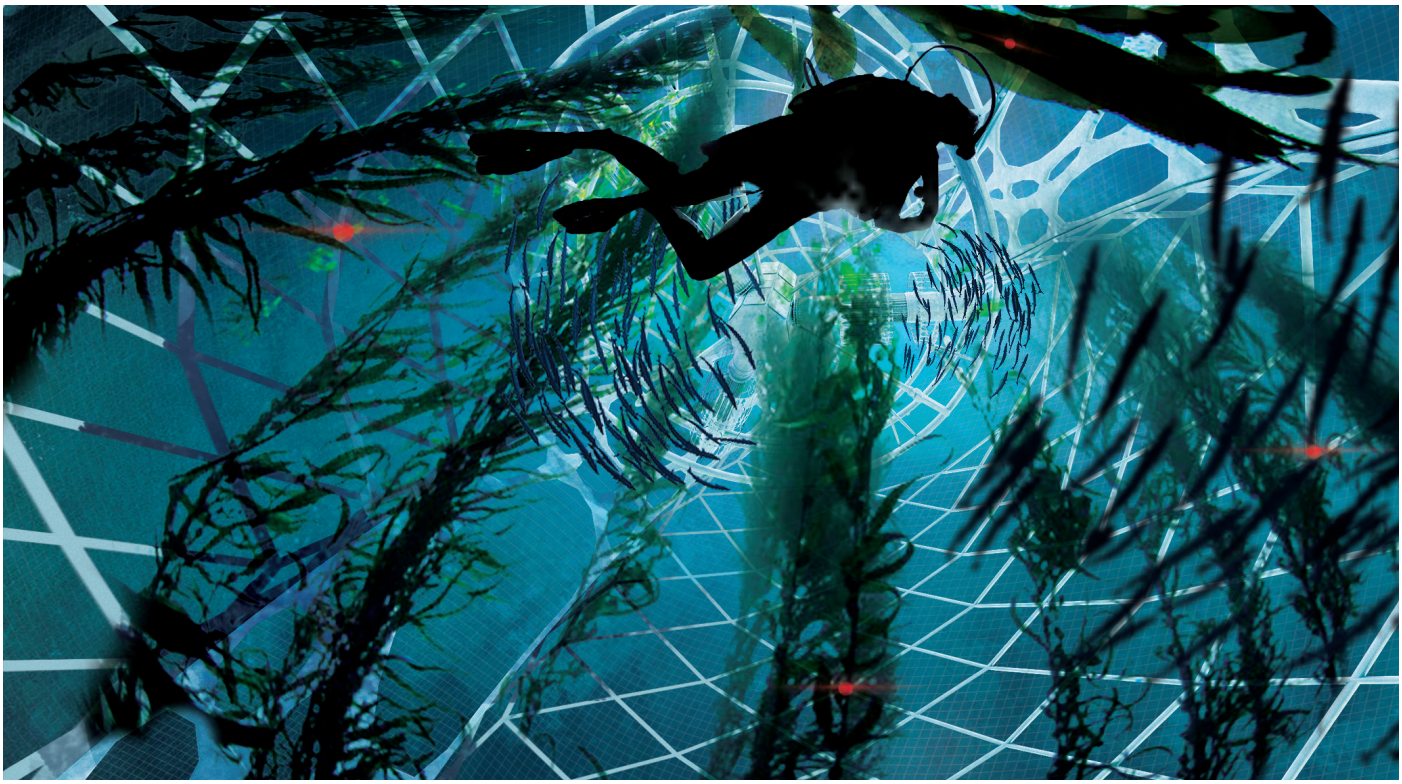
Submerging

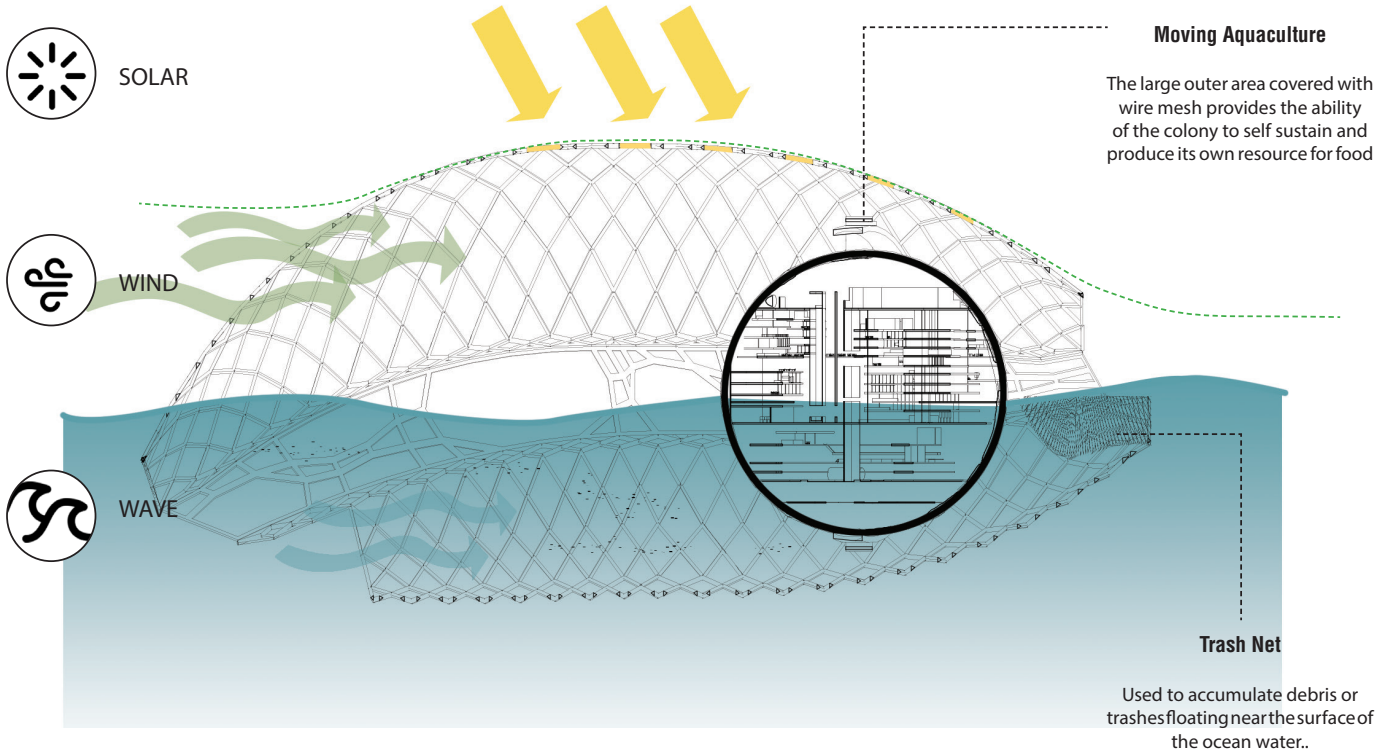
During severe rainstorm or when the waves are too high, the pod uses its ballast tank to submerge. Thus, the fish farming would be protected and the pod could be stabilized.



Self Sustaining

In the rapid expansion of the global fish demand, aquaculture is deemed to effectively fill the supply-demand gap. It is targetted that the total fish supply and capture fisheries will be equally split by 2030. In order to achieve the global fish supply target 2030, this pod serves as the media to grow not only fishes in the open ocean but also the low impact farming such as mollusc and kelps.
Within the pod, the seaweed/ kelps are tied to the inner structure of the net and it acts as the additional source of nutrients to the captured fishes. On the other hand, the drifting molluscs, such as mussel spawn can easily attach itself to the structure net and grow.

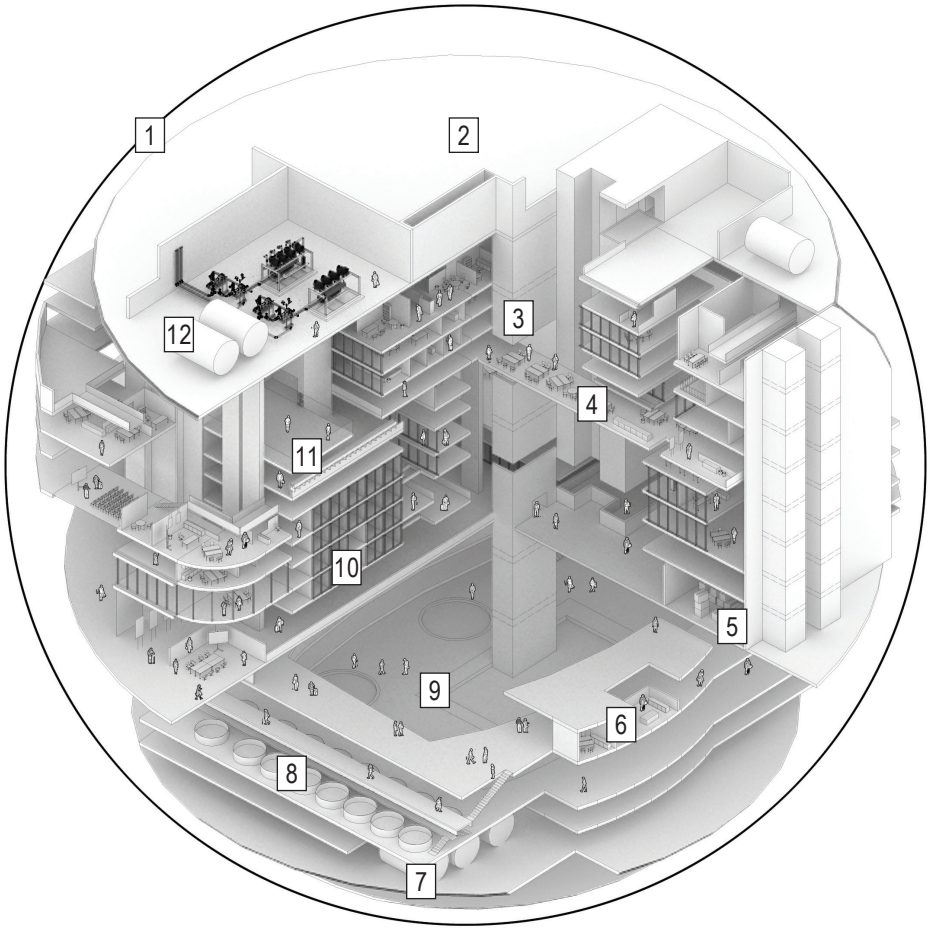


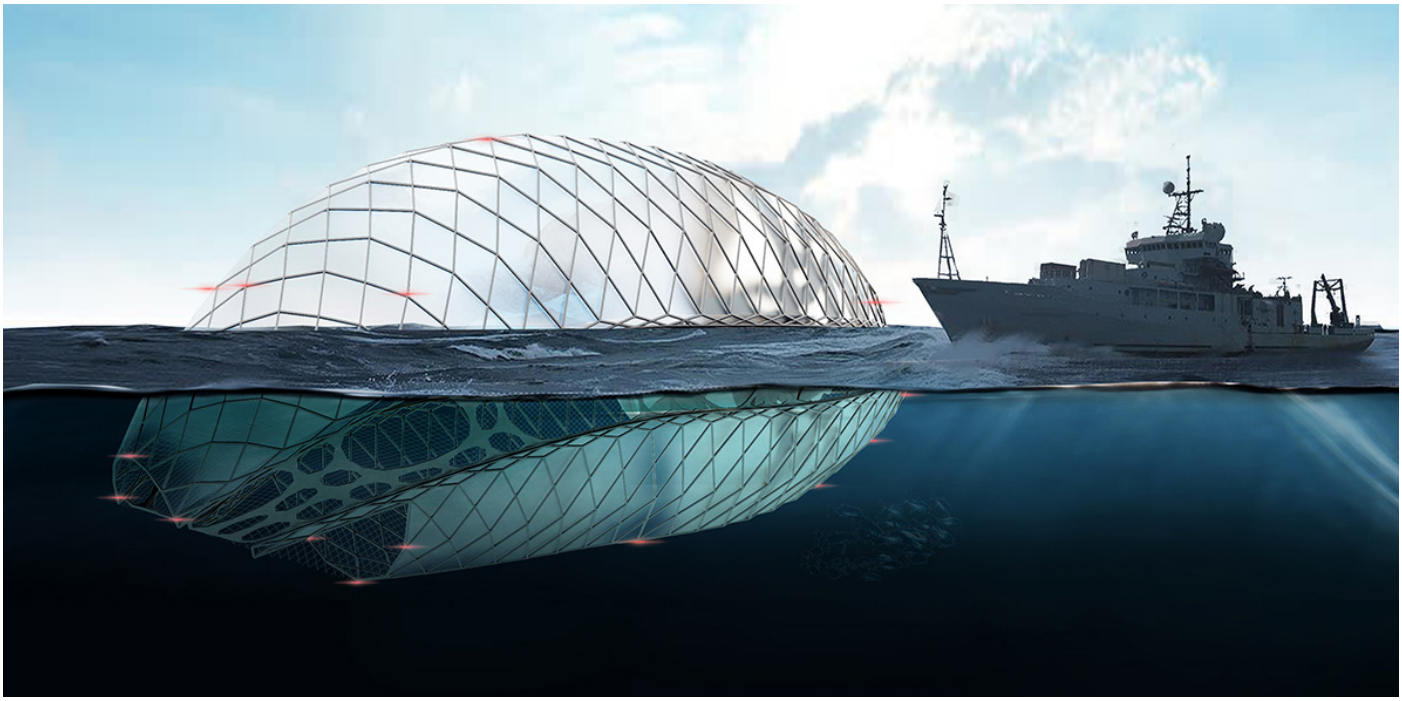


Buoyancy

The sphere is equipped with ballast tank to regulate submerging and surfacing of the whole system. The outer layer of the body with the light weight material is there to accommodate aqua culture. Thus, during submerging, the pressure between the ocean and the water inside the outer structure is equal. On the other hand, the sphere must maintain the water pressure while being submerged. Thus the hull is made of foam, flanked between two layers of recycled carbon fibre composite/ flax fibre biodegradable material. The foam contributes buoyancy, which balances the combined weight of the rest of the submarine and its systems.

1. Hull
2. Pressurised Tank Comp
3. Vertical Access
4. Communal Space
5. Supply Storage
6. Management System
7. Waste Treatment Plant
8. Distillation Apparatus
9. Marine Research Centre
10. Residential Area
11. Function Area
12. MEP Area





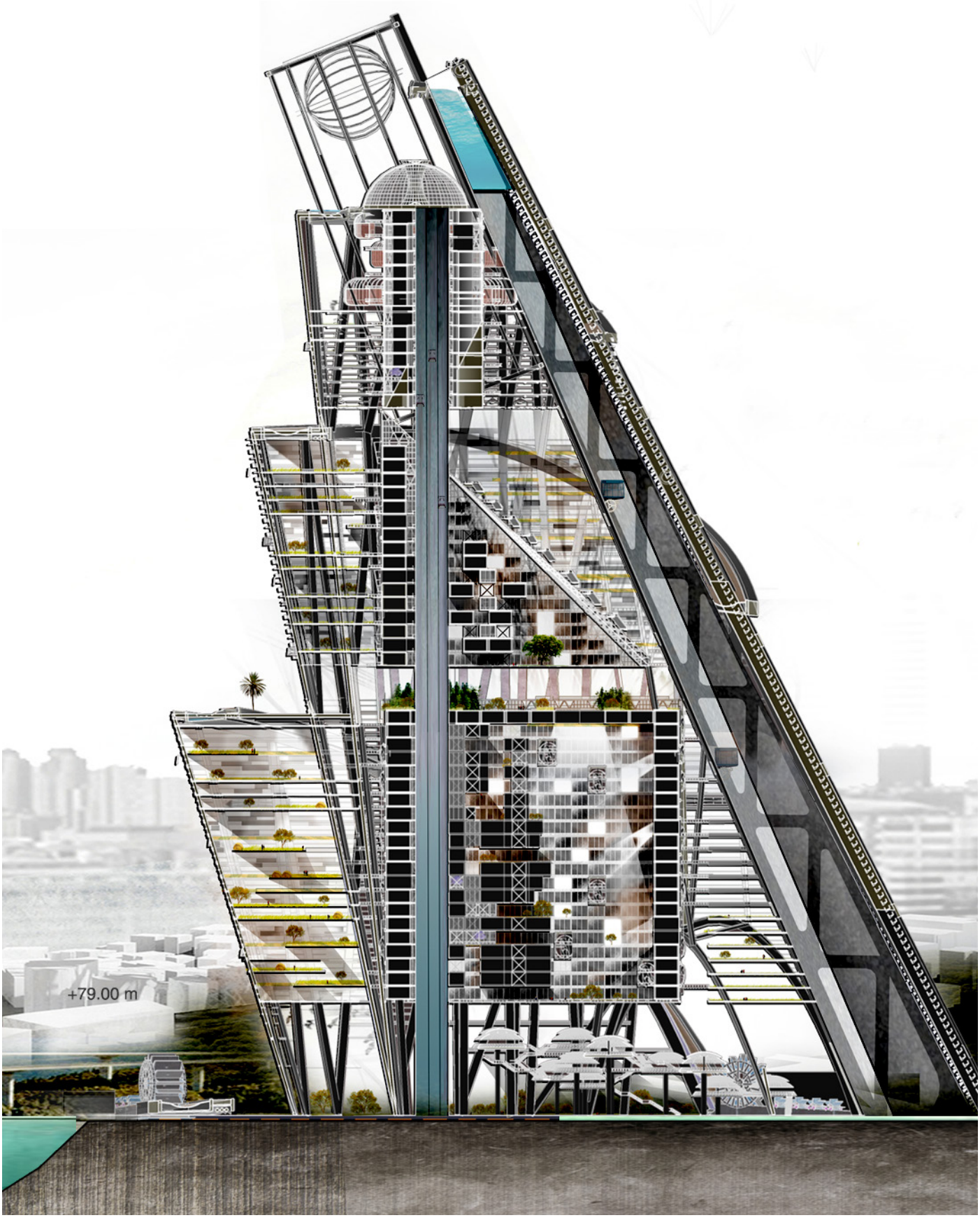
10

ENVISIONING TATLIN'S TOWER

Creating a Sustainable City

With: PHL Architects, 2015
Project Type: Mixed-use
Principal: Ir. Hendyanto Lim, IAI
Patrick Lim, ST., MA., MSc
Team: Juannita Christine, Melanie Sugiarti, Jennifer Hansbert
Publication:
Evolo.us (http://www.evolo.us/envisioning-a-new-tatlins-tower-at-ciliwung-river-in-jakarta/

The deterioration of the natural environment due to the increasing population makes it essential to rethink the way we look at sustaining natural resources.
Monument of The Third International Tatlin's Tower was initially designed in 1919 by Russian architect, Vladimir Tatlin as the "Propaganda hub" to challenge the architectural wonders both real and imagined, such as the Tower of Babel and the Statue of Liberty. However, the tower remains a utopian symbol which inspires later artists for its futurism and pathos.
The project of envisioning Tatlin's Tower sets on the riverbank of Ciliwung River, the longest river in Jakarta, Indonesia. The high-density area with approximately 472 people per hectare negatively affects the river condition through informal settlement along the riverbank. Therefore, the project aim is to bring back the ecosystem in the area. The 400 metres helices structure comprises of the public, residential, and production area to support the life of the residence and generate sustainable energy through the use of the photovoltaic panel, wind-generated propellers, and water turbine on each of the centre geometries inside the structure.

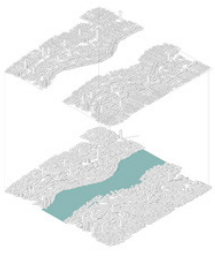

+79.00 m



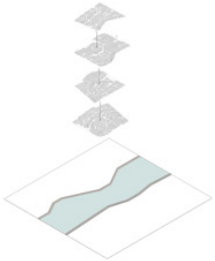
Returning Ecosystem

The concept of the project is about bringing back the natural environment in the area. It is possible to return the ecosystem along the river by relocating the settlements surrounding the river into the stacks residential area. Supported by the green structure, the community can sustain their living without putting risk to the river conditions.

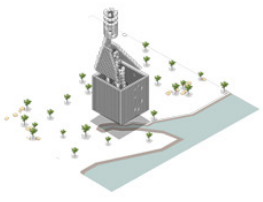




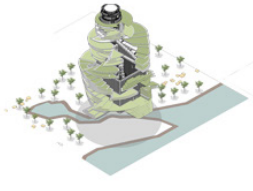
Urbanization



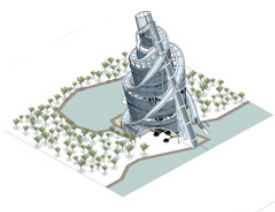
Residential stacks



Returning ecosystem

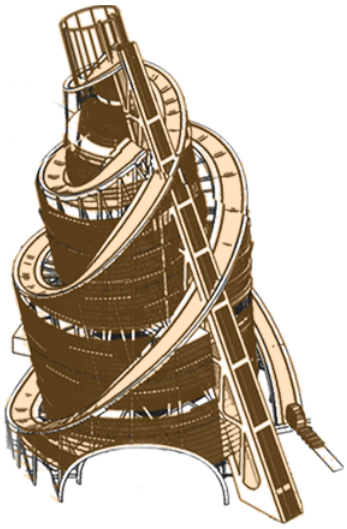


Food production

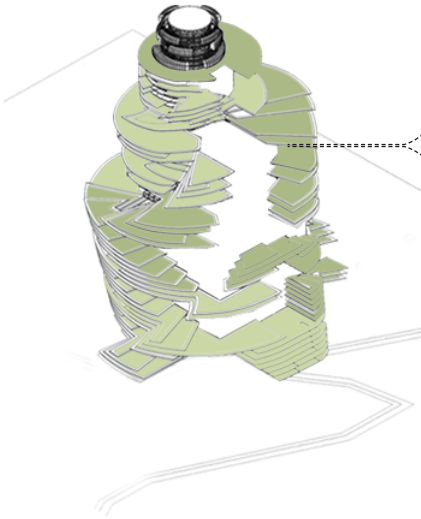


Self-sustaining

Structural envelope



Production



14.276 sqm
38% 5.350 TON

19.217 sqm
52% 870 TON
3.113.360 GALLON

2.882 sqm
7% 41 TON

1.163 sqm
3% 288 TON

323.970 sqm
32% 288 TON

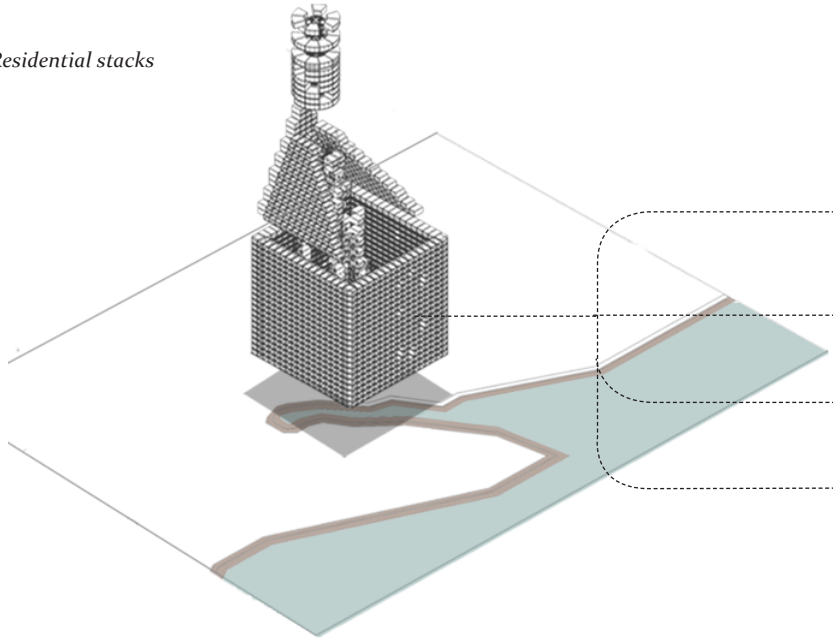
1% 355.000 TON

15% 92 TON

2% 1.173 TON

7% 74 TON

Residential stacks

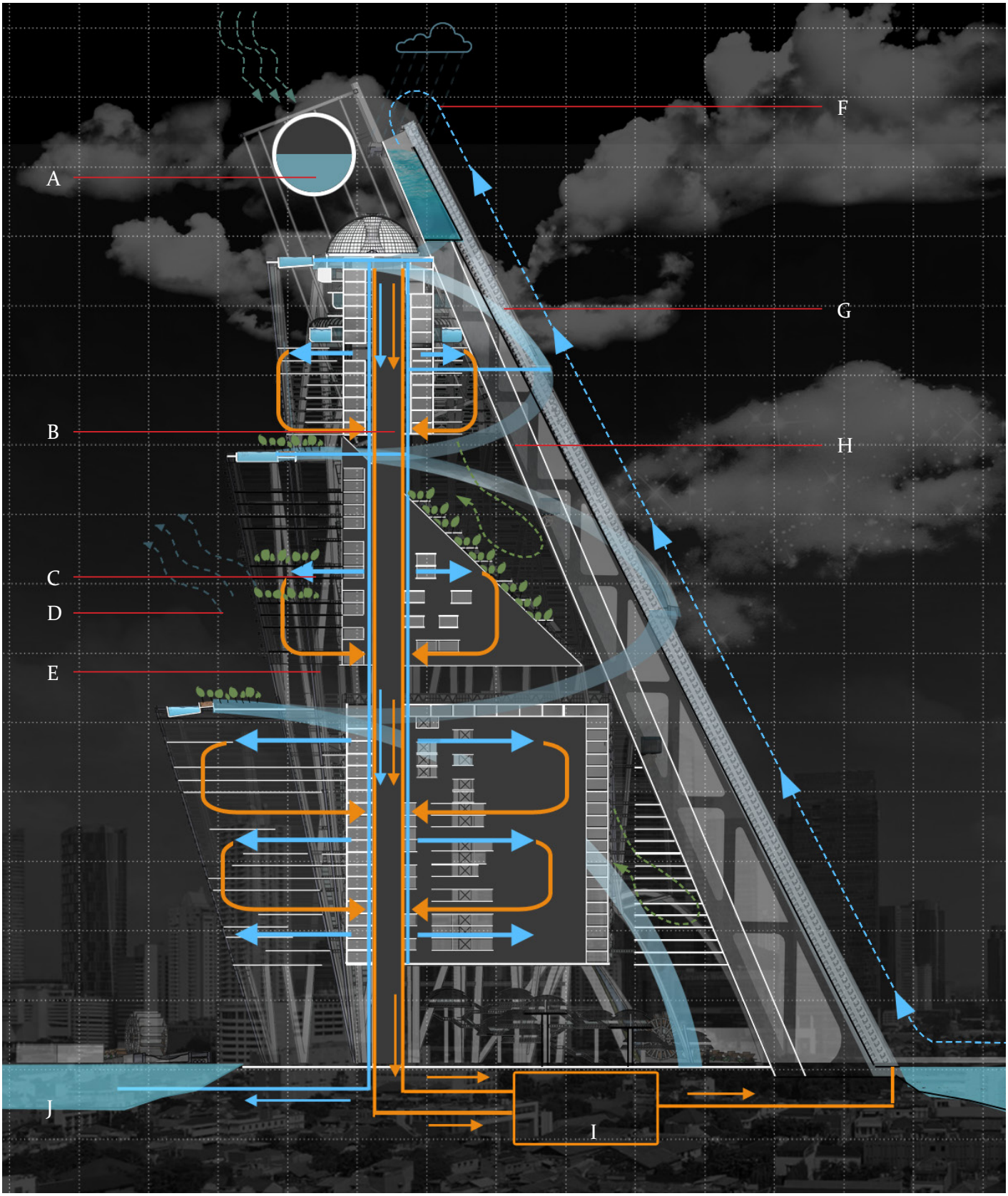


HOUSING 9.256 person
52% 2.314 unit

PUBLIC SPACE
25%

LIFESTOCK
10%

VEGETABLE
13%



A. Air filtered through the uppermost structure
B. Water distributed through the main shaft
C. Irrigation & production
D. Evaporative cooling through vegetation
E. Waste water run through main shaft
F. Rain water accumulated
G. Water distribution from reservoir to roof tank
H. Water distribution through helix structure
I. Water Treatment Plant
J. Clean water to the river

11

ORANGE SHELTER PROJECT

A Small Intervention in Urban Network

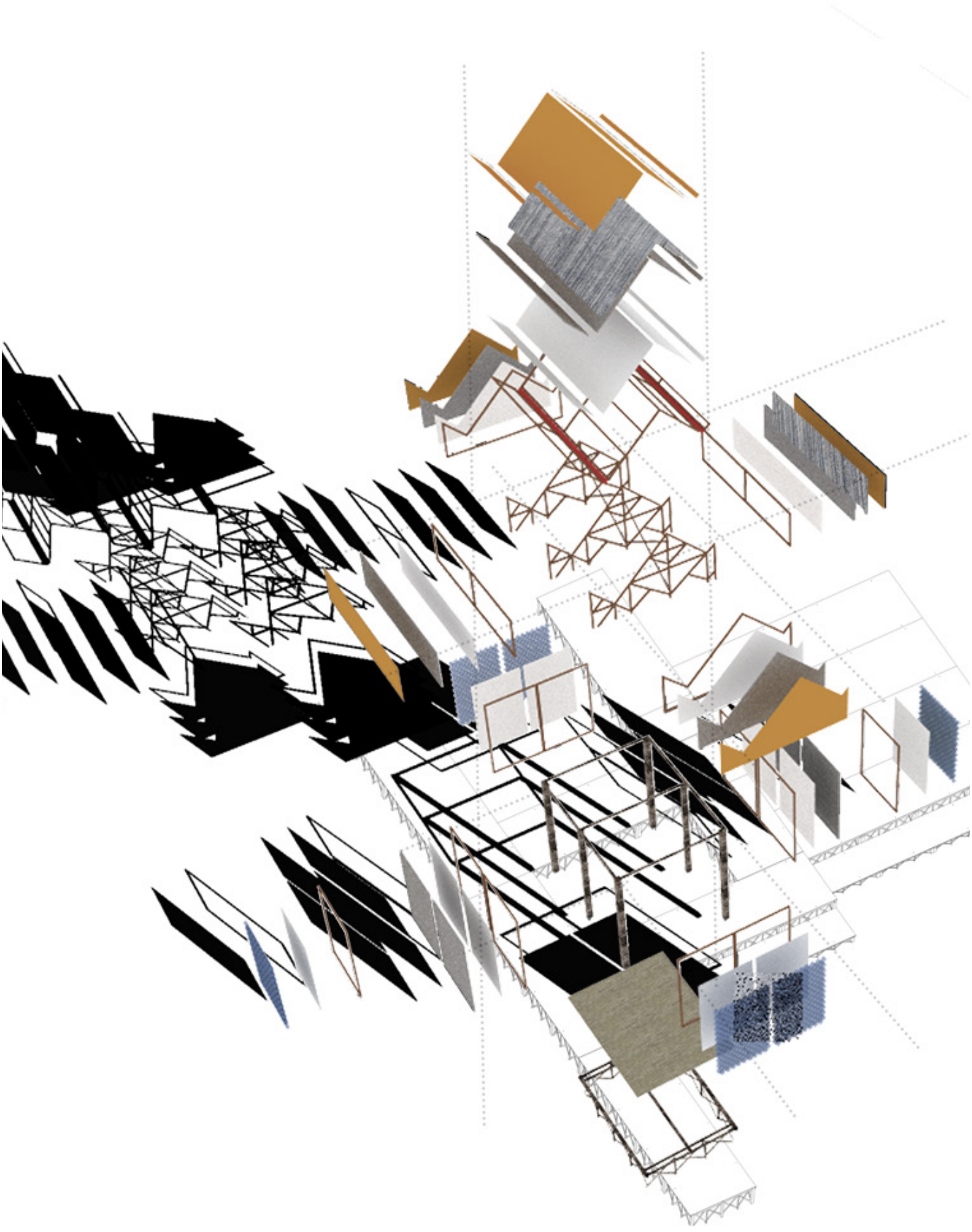
With: PHL Architects, December 2013
Project Type: Shelter
Principal: Ir. Hendyanto Lim, IAI
Patrick Lim, ST., MA., MSc
Team: Joseph Fredrick, Sylvia, Lidwitianingrum
Award:
Shortlisted at World Architecture Festival 2014 Singapore

In the 1970's, Kapuas River in Borneo was used for floating markets activity which drove the city's economic development. Aside from commercial activity, traditional boats have also been used for transporting people to and from several places within the city via waterways.

Nowadays, the canals, although still exist in some parts of the city, has been covered by the steel structure to accommodate the flourishing land transportation such as motorcycles which contributes to the city's traffic jam.

Despite the city's development, communities of the Kapuas river still maintain their existence within the riverbank living in the non-permanent house or inside the bigger fisherman ship called "Rumah Bandung". Their poor economic conditions force them to cope with their current living condition, including having minimum access to clean water and makes them regularly bath and wash in the murky water of Kapuas River.

This project aims to create an urban intervention to improve not only the local community's welfare but also Pontianak as the more sustainable city. Orange Shelter acts as the "Agents of Change" by accommodating the transfer of goods and knowledge. The shelter also encourages the use of water transportation to cross the Kapuas River which separates part of the Pontianak.



Exploded axonometry

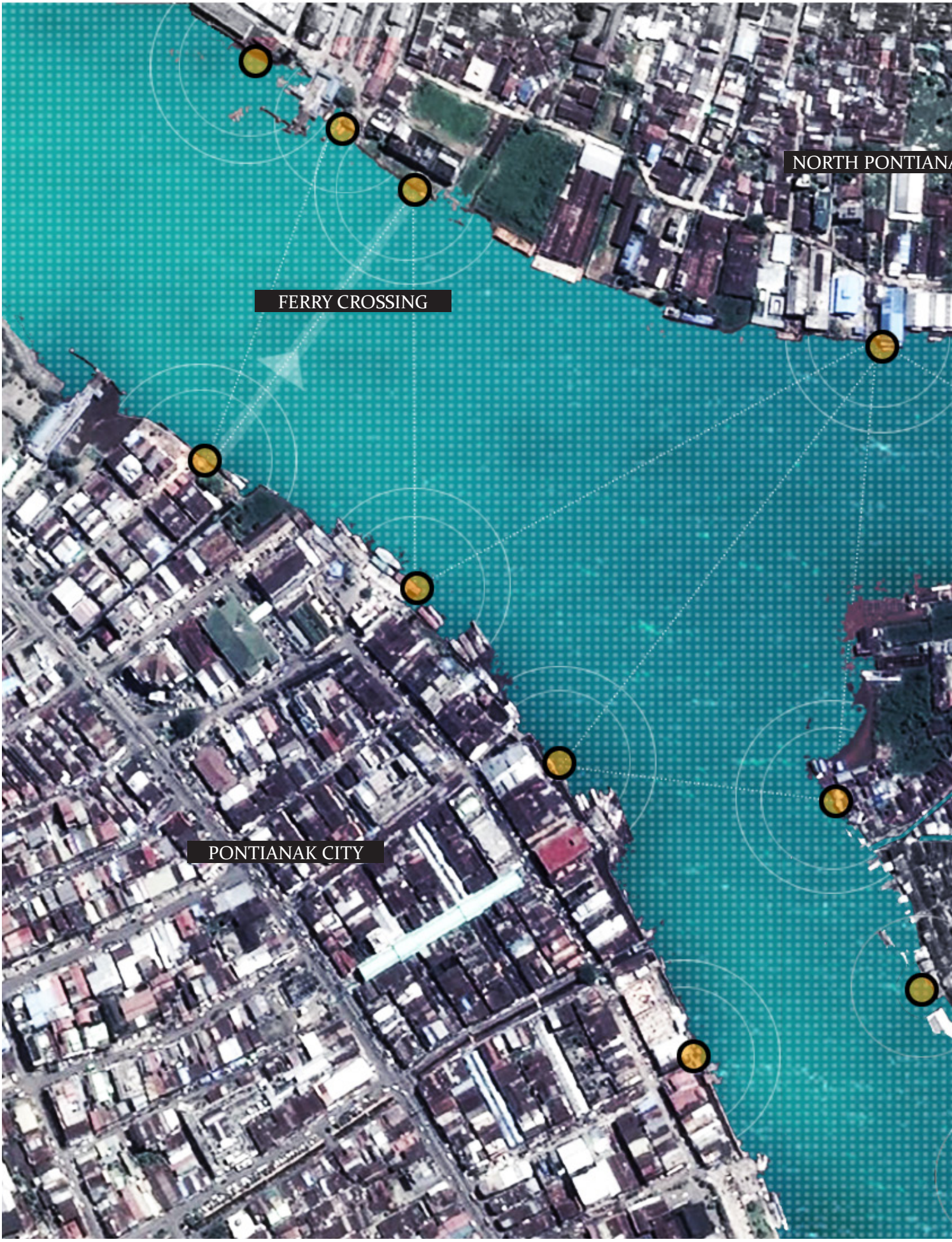


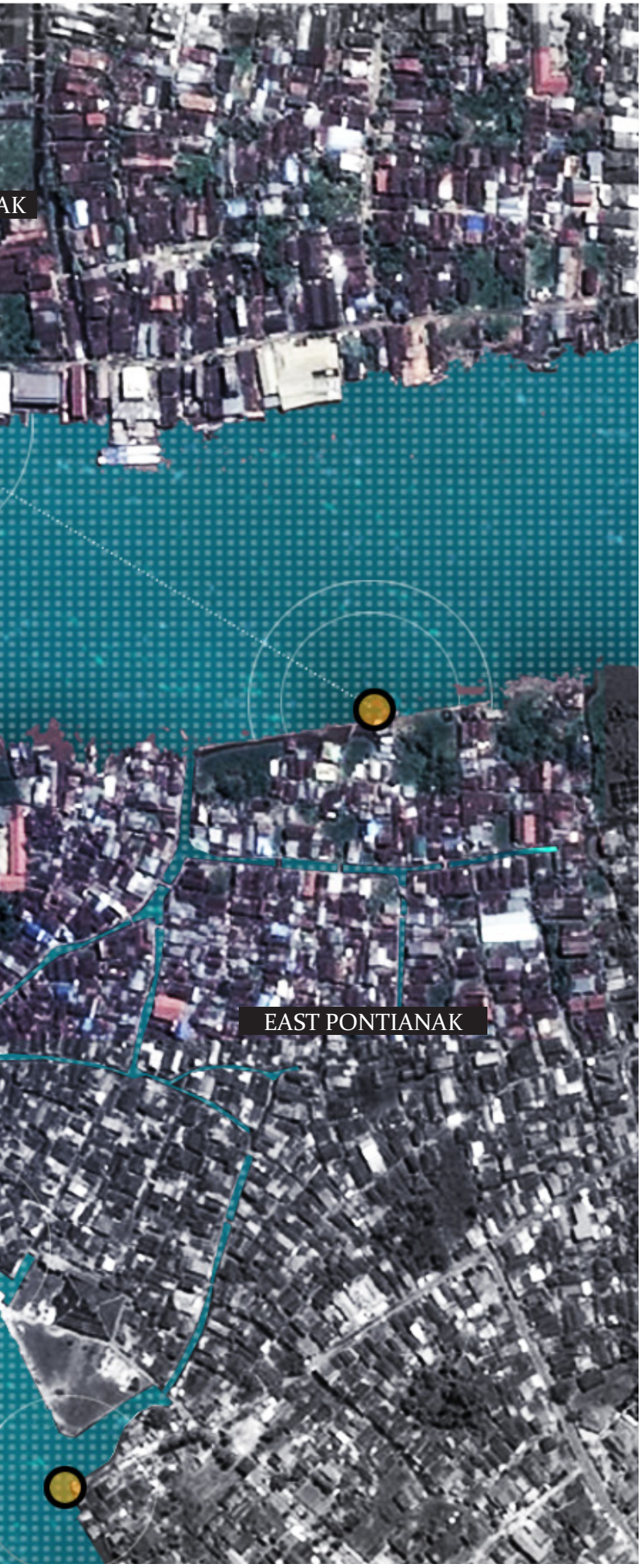
The existing boat area does not have an adequate visual cue as well as facilities for tourists or the community. The existing boat operators are scrambled along the river, which makes it rather hard to find the boat service from the access road. Therefore, the project provides the necessary visual cue in the form of shelter shapes and colour and provides the community with facilities to support their economic and social development through trash bank, boat jetty, and small local market in different dedicated zones.





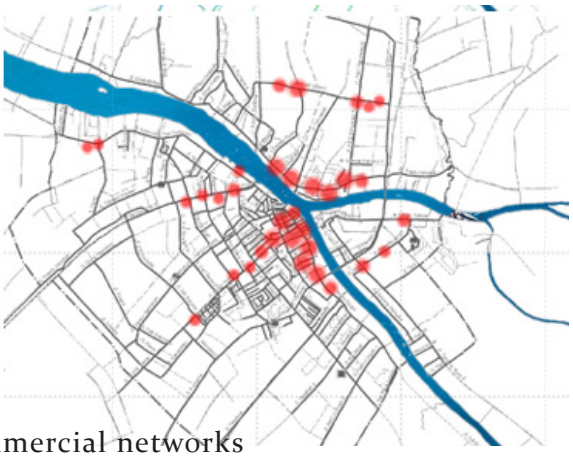



NORTH PONTIANA
FERRY CROSSING
PONTIANAK CITY





Ease of Accessibility



Commercial networks



Tourism spots



Existing educational facilities





Site condition





Top elevation





Section



3x5 Module



6x6 Module



3.4x4 Module



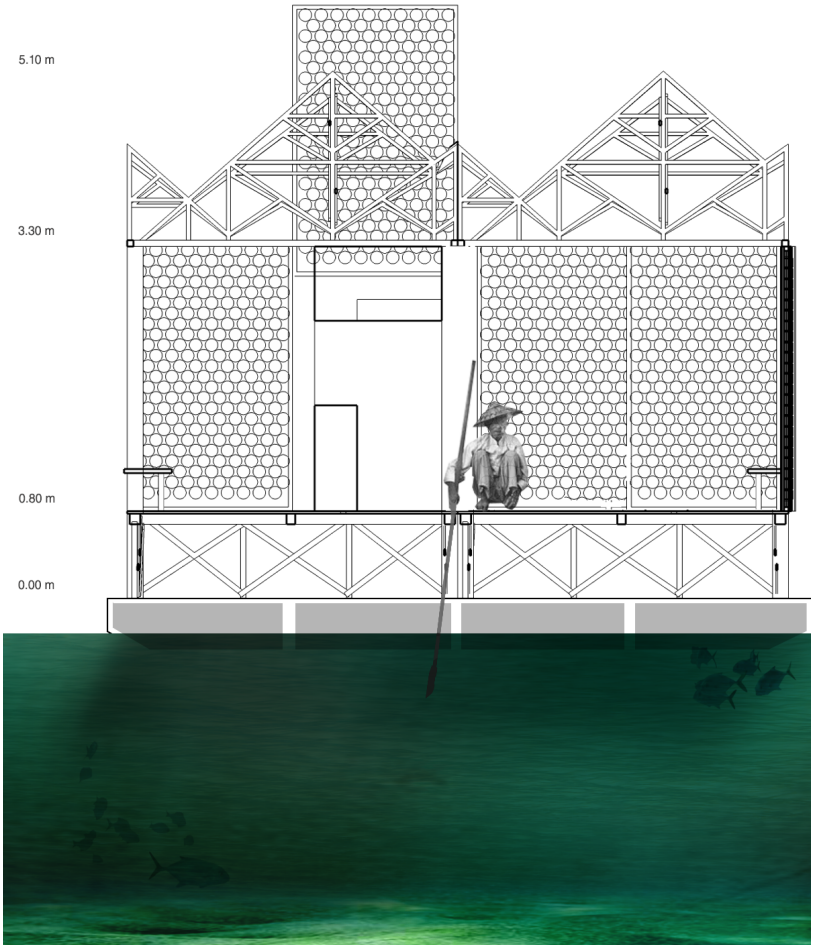
6x5 Module



5.6x10 Module

Module

The size of the shelter in between needs to be considered based on the potential site's length and width



Building Typology

The shape of the shelter derived from visuals of the surrounding slum houses with their gable roof. The shelter calls for an honest expression of materials and structure from local material, consisting bamboo as the primary structure and 'simpai' wall- a Pontianak traditional construction method comprises of steel/ wire mesh reinforced plaster wall.



12

EQUATOR MONUMENT

Revitalizing The Historical Sites

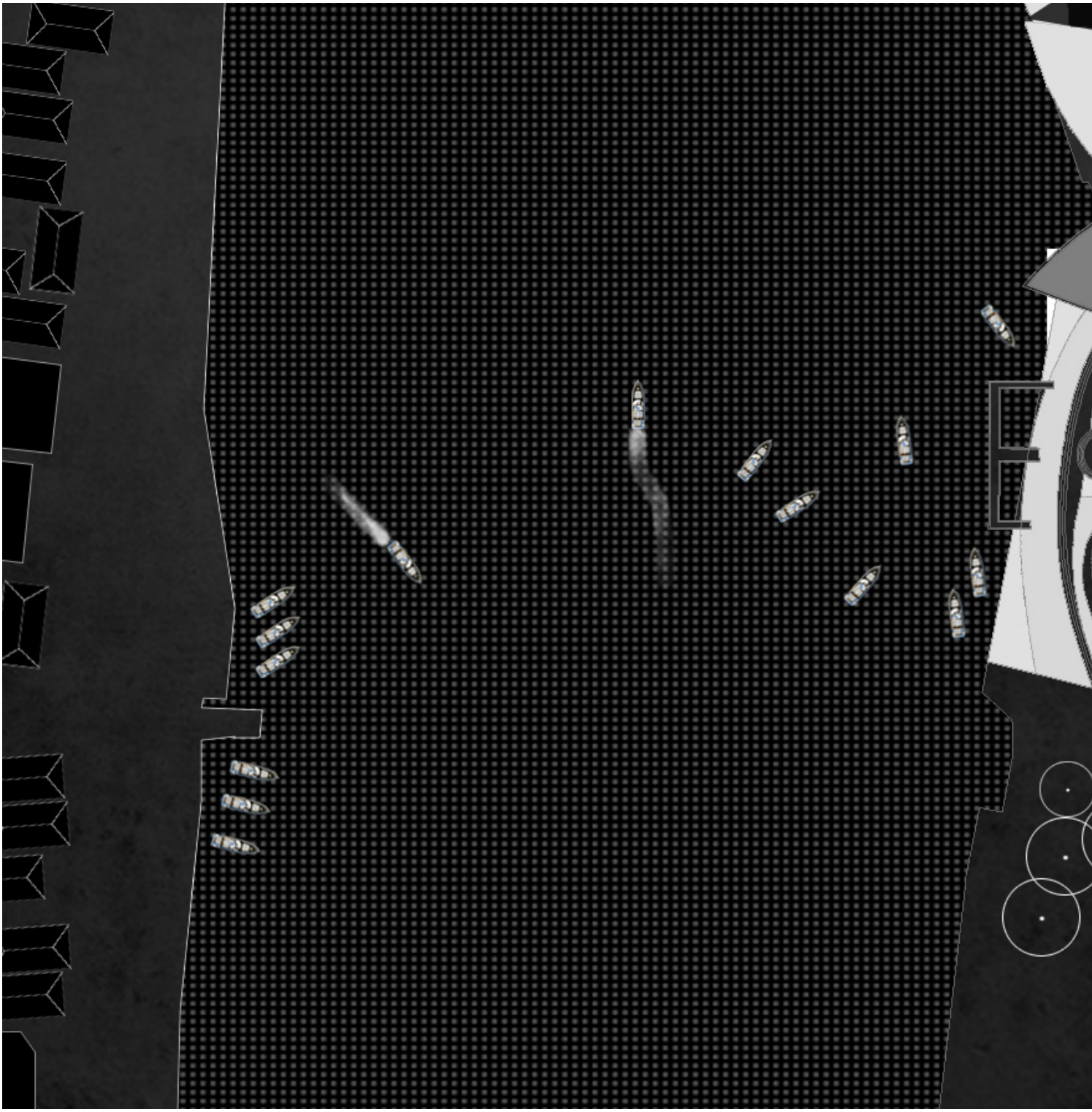
With: PHL Architects, 2013
Project Type: Mixed-use
Principal: Ir. Hendyanto Lim, IAI
Patrick Lim, ST., MA., MSc
Team: Joseph Fredrick, Sylvia, Lidwitianingrum
Award:
Runner up National Competition Award
Architecture@15 Magazine, 2014

A Dutch geographer initially built the monument which sits on the invisible line separating northern and southern hemisphere in 1928 after his exploration in the city of the equator, Pontianak. It then underwent renovations and reconstructions by the city council to further increase its location accuracy using contemporary technology and covered from harsh weather by an additional building structure and giant replica on top of it. Despite its historical and tourism value, the building does not adequately foster the sense of community and have a supporting landscape condition near the Kapuas River.

The design process views the monument as the centre of attention in the area and strives to provide spaces for the community and see the area as the opportunity to create a more integrated tourism spot.

The configuration of the massing uses the array of circular shape to resembles the equatorial line and uses it as the structure to hold the giant replica of the monument. The local brick material is used on the ground floor to connect the historical value with contemporary architecture.

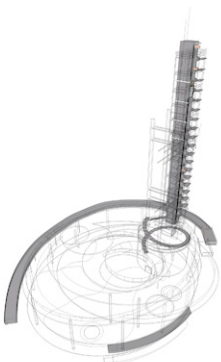




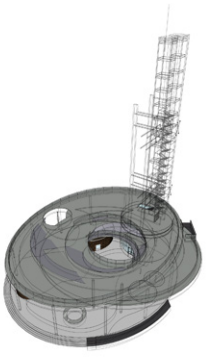
The Equator

The monument which sits on the imaginary equatorial line can be viewed from the Kapuas river and the city centre, which makes it essential to design the integrated park area instead of focuses only on the museum building.

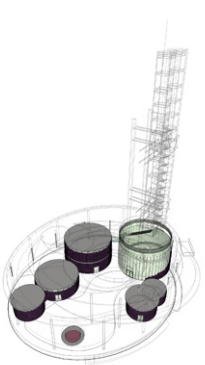
1. Equator monument
2. Amphitheater
3. Harbour
4. Outdoor exhibition area
5. Food and beverages
6. Local markets
7. Parking lot
8. Kapuas river
9. Pontianak city



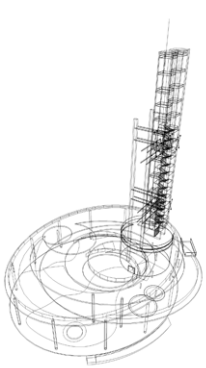
Circulation



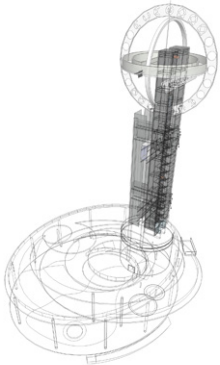
Communal space



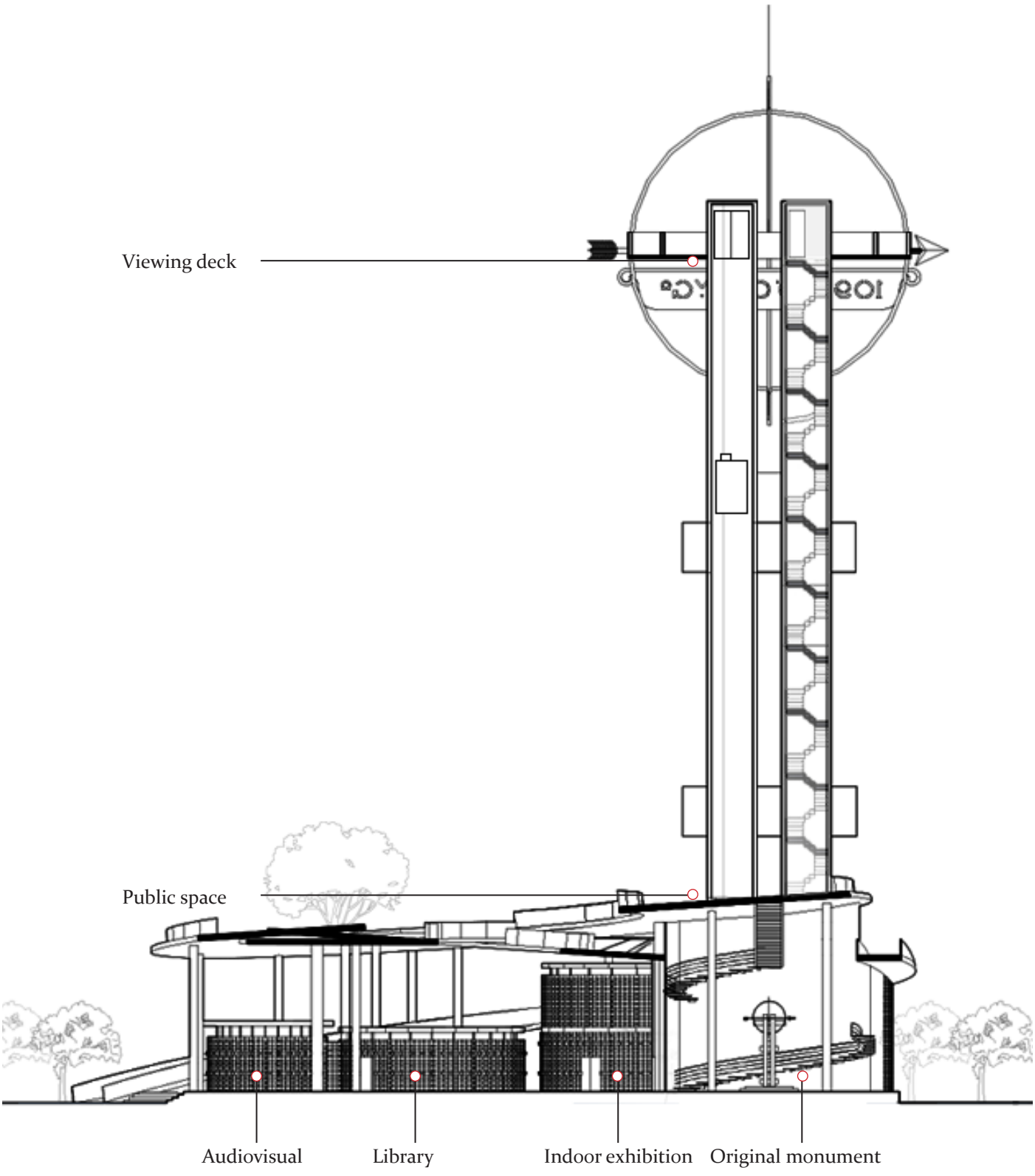
Indoor facilities

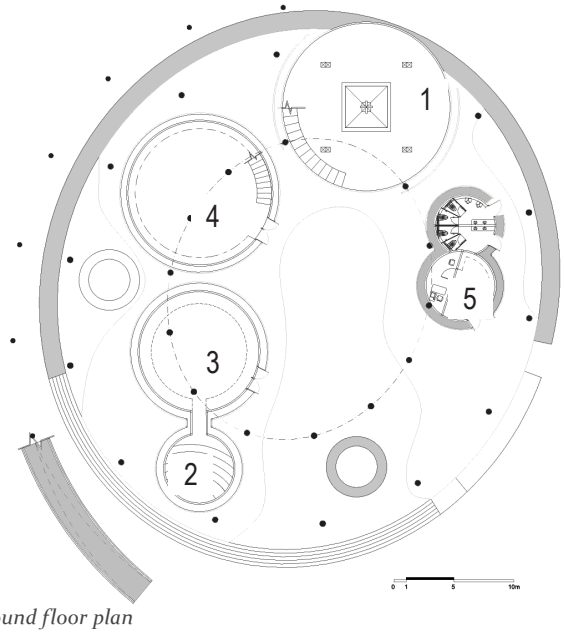


Main structure

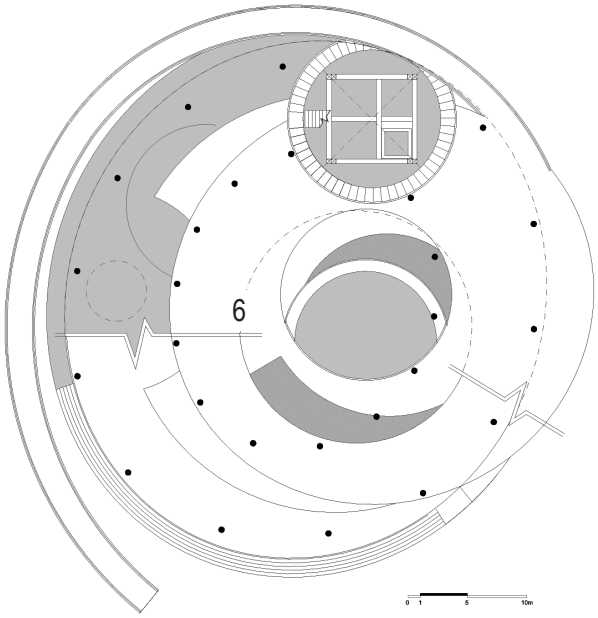


Replica

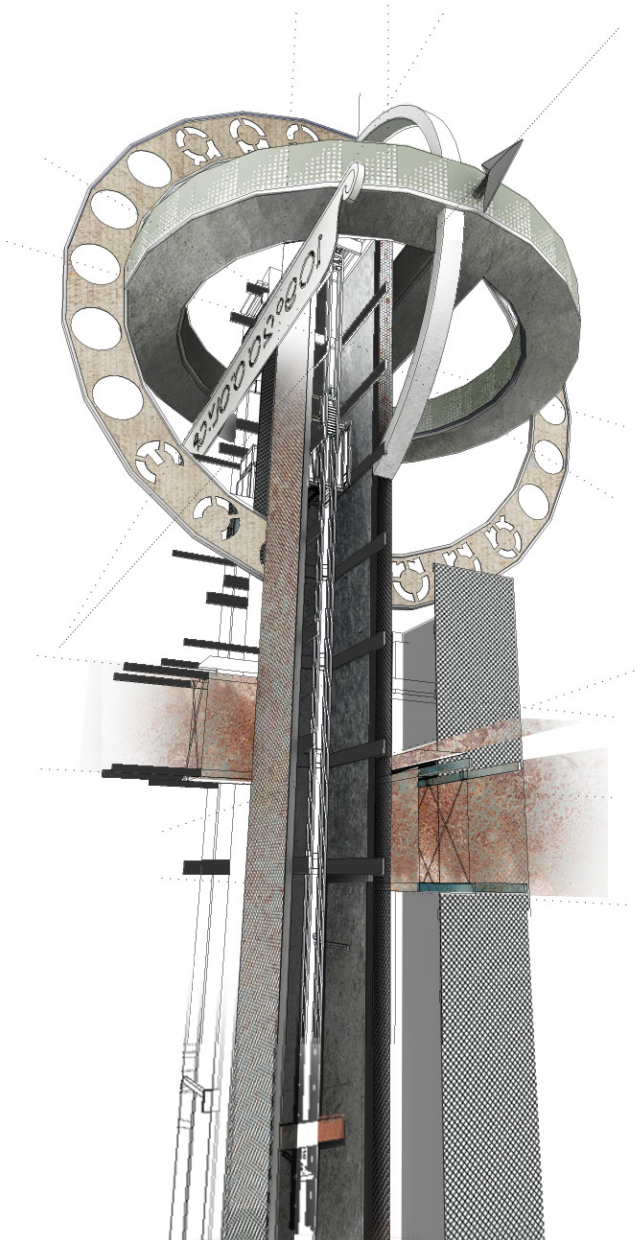

Viewing deck
Public space
Audiovisual
Library
Indoor exhibition
Original monument



Grround floor plan



Roof floor plan



1. Original monument
2. Audiovisual
3. Library
4. Indoor exhibition
5. Souvenir shop
6. Public space

Shape and material

The cylindrical shape derived from the equatorial ring that circulates the earth. The added circular ramp also provide inclusiveness for people with disability and leads to the roof concrete construction for public space and access to viewing deck via elevator. As for the ground floor, The abundance of red brick in the local area makes the construction of the inner facilities more affordable.

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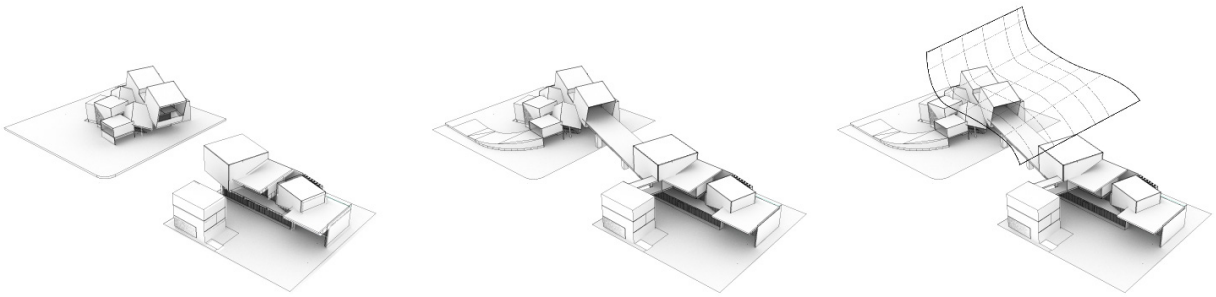
SENEN FLEA MARKET

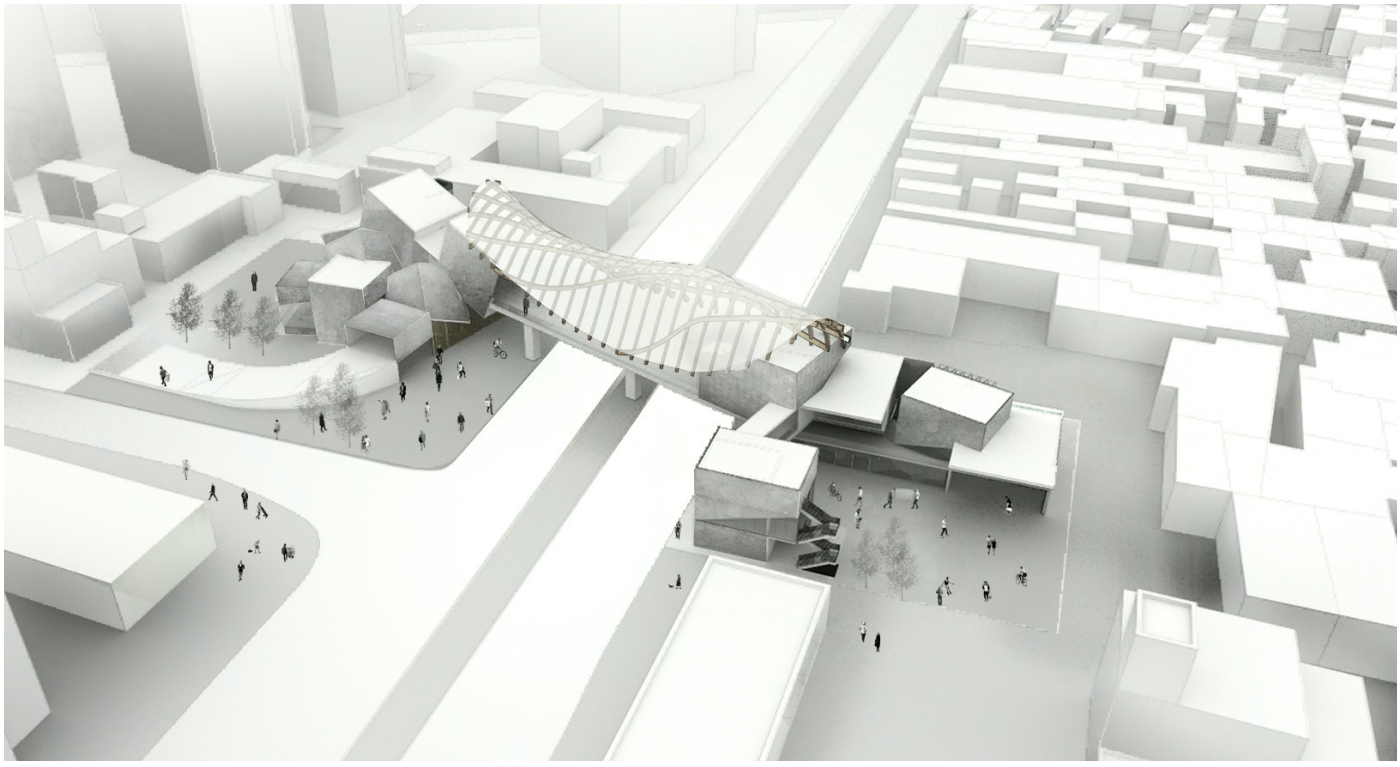
An Urban Catalyst

Studio VII: 4th-Year Undergraduate, September 2011
Project Type: Mixed-use. commercial
Instructor: Ir. Agustinus Sutanto, M.Arch., M.Sc., PhD
Award: University Public Expose

The flow of globalisation has shifted the life of the community in Jakarta's Senen district. As the city oldest market, the ethnically -mixed region have a significant mixture of residents- lower middle and low upper income- which in turn brings more diversity to the district's economic condition. The most prominent feature of the economic activity is the proliferation of flea markets, which spans along the streets in Senen. While modernisation took places, such as the development of high rise building and commercial area, the traditional market still exists, and frequently deemed as the cause of the district's high rate of crime and high-density street. The current states tend to make the society less tolerant of class differences.

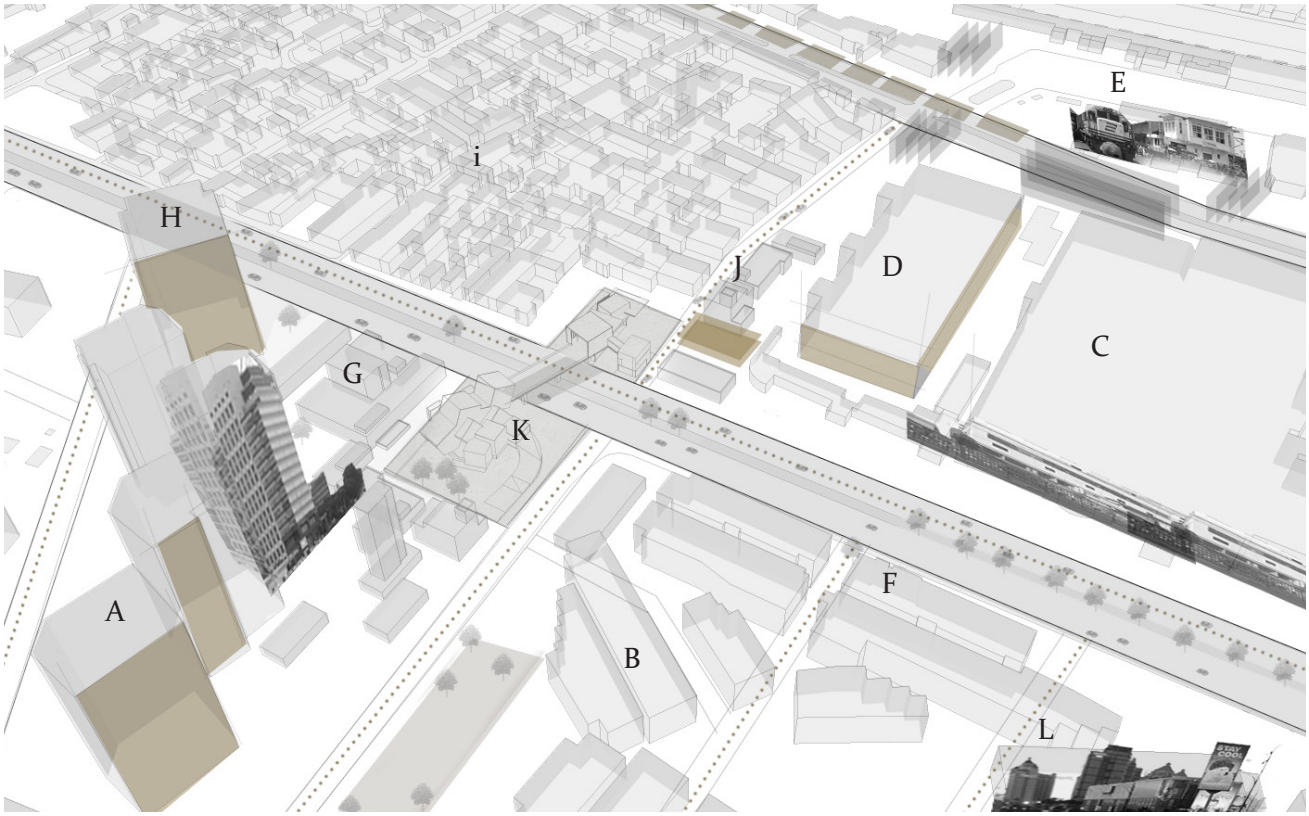
The project aims to look at the potential of the informality in Senen district and create a permeable and sustainable condition, where both residents and community members can reside mutually within the district to support their economic life.





Main Perspective

The project combines the two “old and new” areas of the district separated by the main road via a sky bridge. The sky bridge, equipped with a tensile roof, also functions as the market area served by the street vendors.





Density



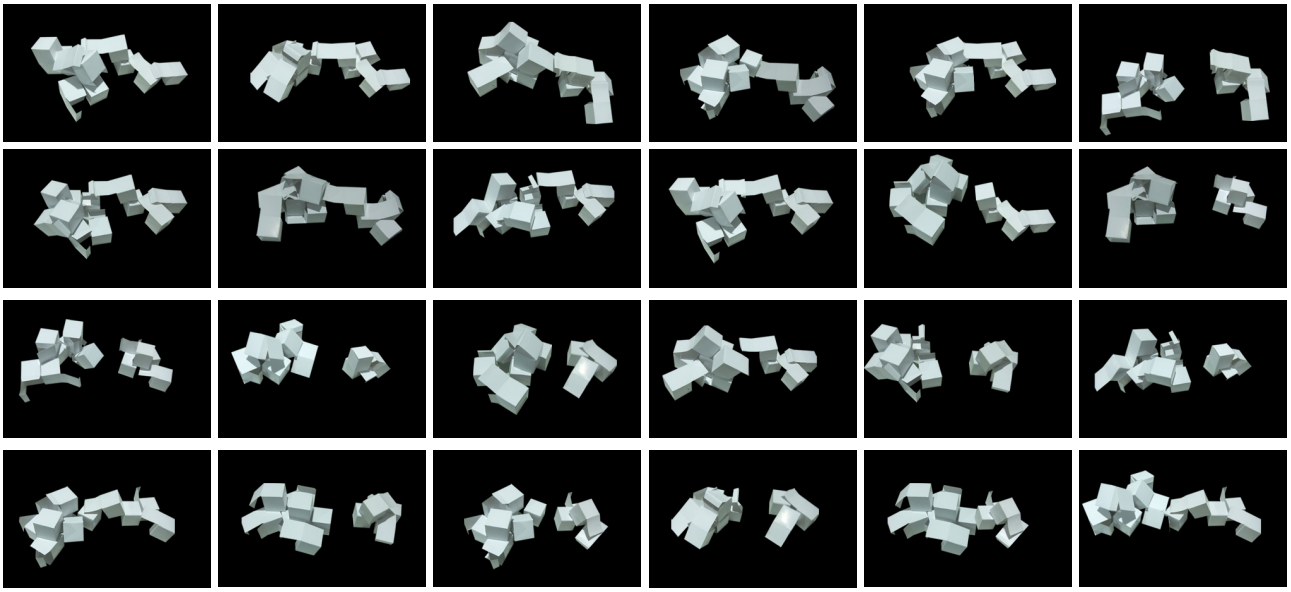
Open space



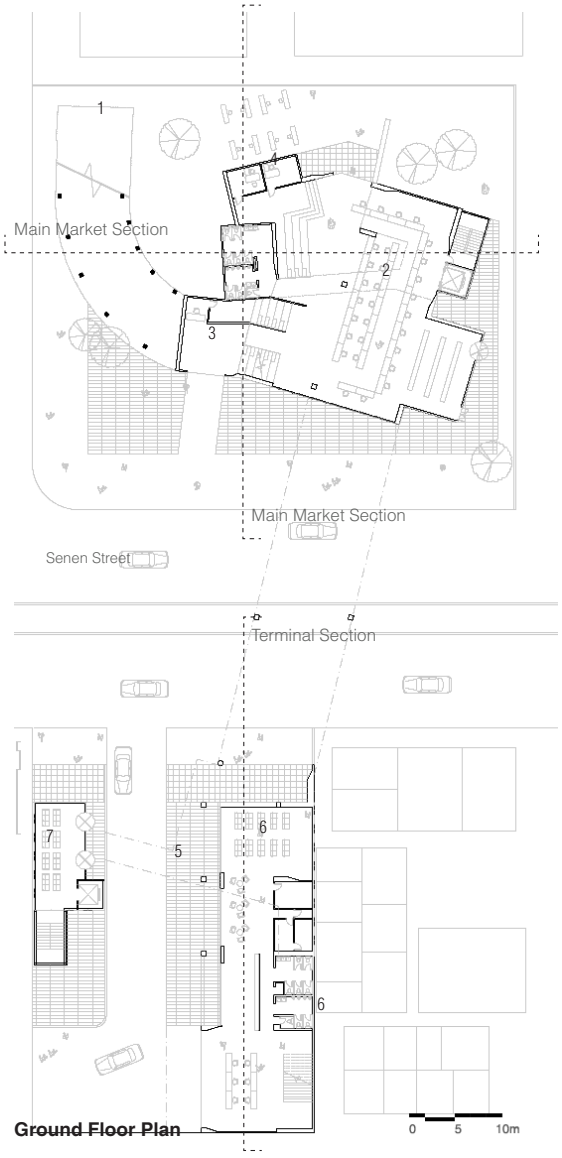
City road



High rise building



The building's geometrical shape comes from the idea of Senen's shambling market, where multiple probabilities of the form are tested using rectangular containers. The forms also defined by the need for expansive open spaces on the back of the site.



Ground Floor Plan

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VERGE GALLERY

Daylighting Improvement

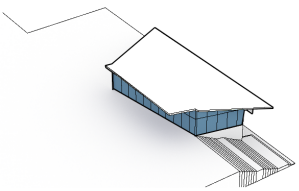
M.Arch.Sci Daylight in Building, Autumn 2017
Project Type: Museum
Unit Coordinator: Dr Thomas Parkinson
Tutor: Haico Schepher (ARUP)
Patrick Hespe (ARUP)

Within the daylighting assessment, several daylighting metrics that are often used include Daylight Factor (DF), an Illuminance level, Daylight Glare Probability (DGP), Daylight Autonomy (DA), and Useful Daylight Illuminance (UDI). The verge gallery project uses those metrics to assess the daylighting performance and improve the overall existing design.
The analysis shows that the default model of the gallery is having DF below the recommended level, which is 2%. In terms of interior sense of space, the gallery itself does not adequately consider daylighting from entrance facade, aside from having a wide canopy, so that some area is excessively bright. The second step is to try adding a skylight in the perimeter area where it is considered to be underlit, which is the inner-most part of the building. The simulation results indicate that adding skylight can increase the UDI between 100-2000 lx to more than 50% of building occupancy. The DA with the threshold of 300 lx shown only 38% in the existing design. The changing of the existing 4m canopy into aluminium louvres shading placed 70 cm from the upper limit of the window shows the better result with DA value exceeds 65%.

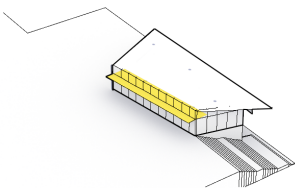


Testing The Model

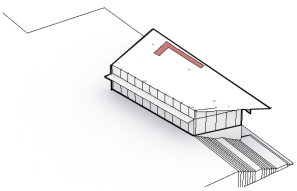
While many possible interventions can be implemented in the design, physical intervention model is made and tested using analog modelling and HDR procedure. In this case, Four significant intervention were physically made with the scale of 1:10 and placed on the standard physical model.



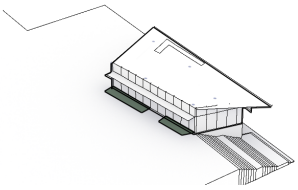
Window transmission



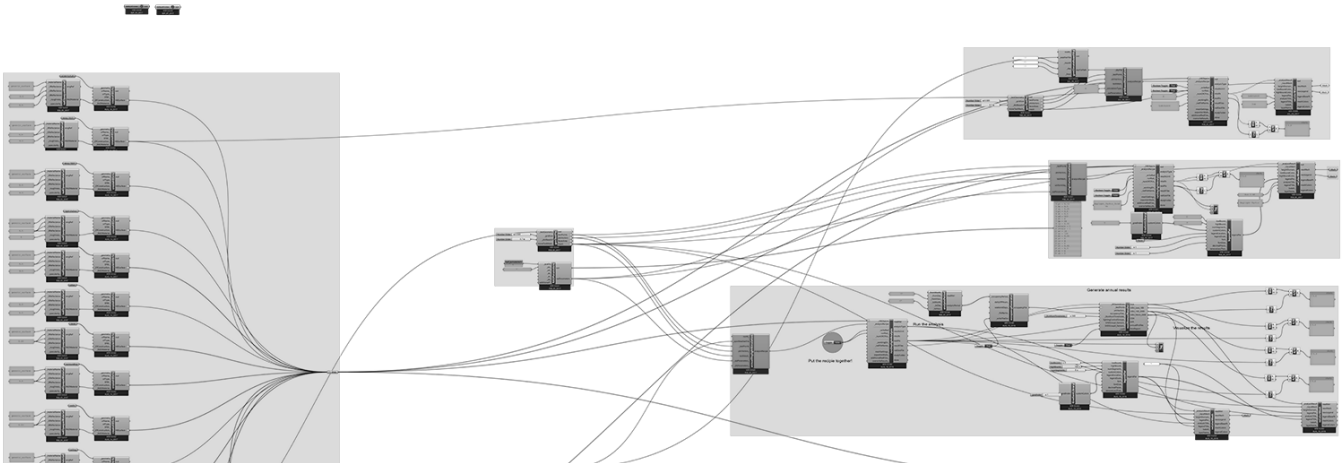
Light shelves



Skylight



Albedo



Grasshoper simulation



Lux Meter used in the observation

Radiance Parameter

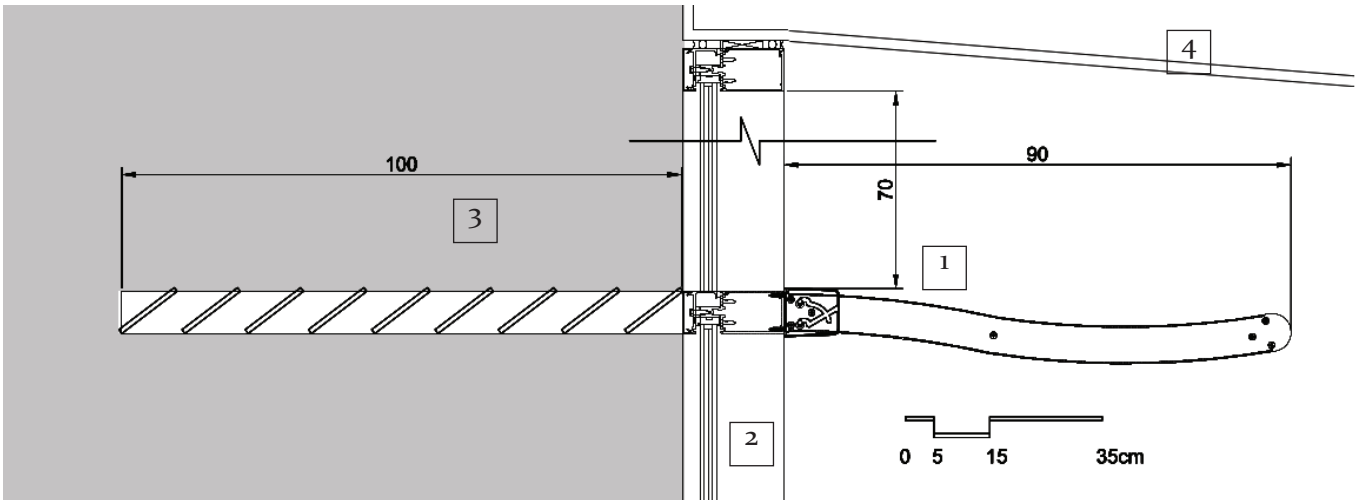
To correctly calibrate the model, several ambient bounds was tried, ranging from 1 to 4. Ambient Bound larger than four is not used because it shows excessive Daylight Factor falls on the entrance area,

Daylight Factor (DF) and Mean Biased Error (MBE)

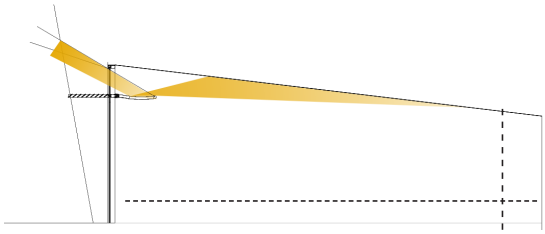
In order to correctly calibrate the model, several ambient bounds was tried, ranging from 1 to 4. Ambient Bound larger than four is not used because it shows excessive Daylight Factor falls on the entrance area. The MBE calculation to compare the actual and simulated DF shows an acceptable percentage below 20%.

$$MBE = \frac{1}{n}\sum_{i=1}^{n}(e_i - m_i)$$

e_i : simulated DF
m_i : measured DF



1. Bright aluminium reflective panel
2. Vertical mullion
3. Aluminium sunshade
4. Concrete ceiling surface



21 Jun 8.15
VSA: 18.6
HSA: 50.6

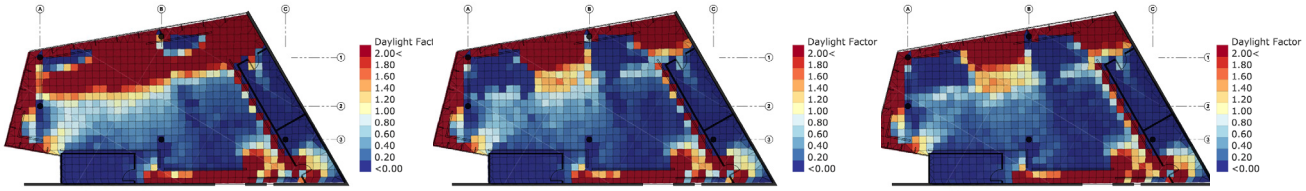


21 Dec 11.15
VSA: 79.8
HSA: 40.8

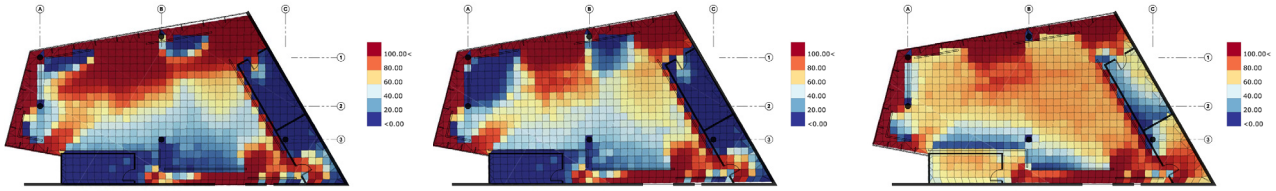
Light Shelves

One of several strategies used in this study is using light shelves to draw light further into the inner part of the gallery. It also mitigates the high illuminance contrast that could cause glare. Both summer and winter Vertical Sun Angle (VSA) and Horizontal Sun Angle (HSA) is analysed to ensure an effective length of the light shelves.

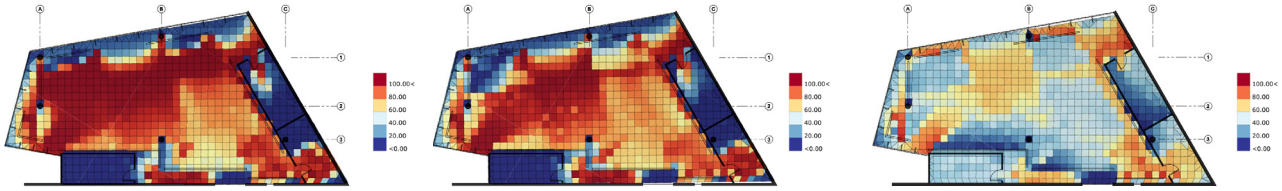
DF **Trial 4** **Trial 5** **Trial 6**

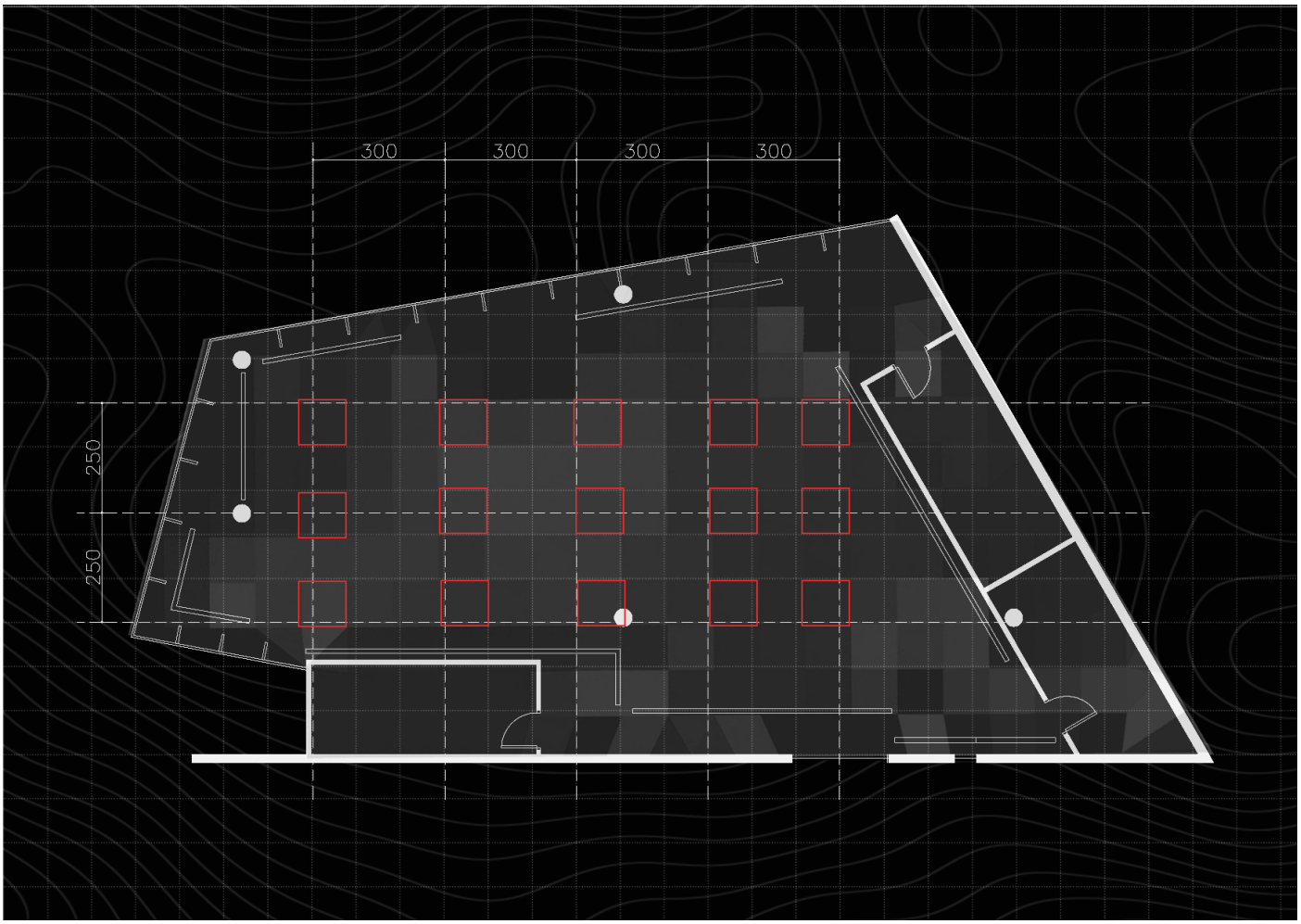


DA

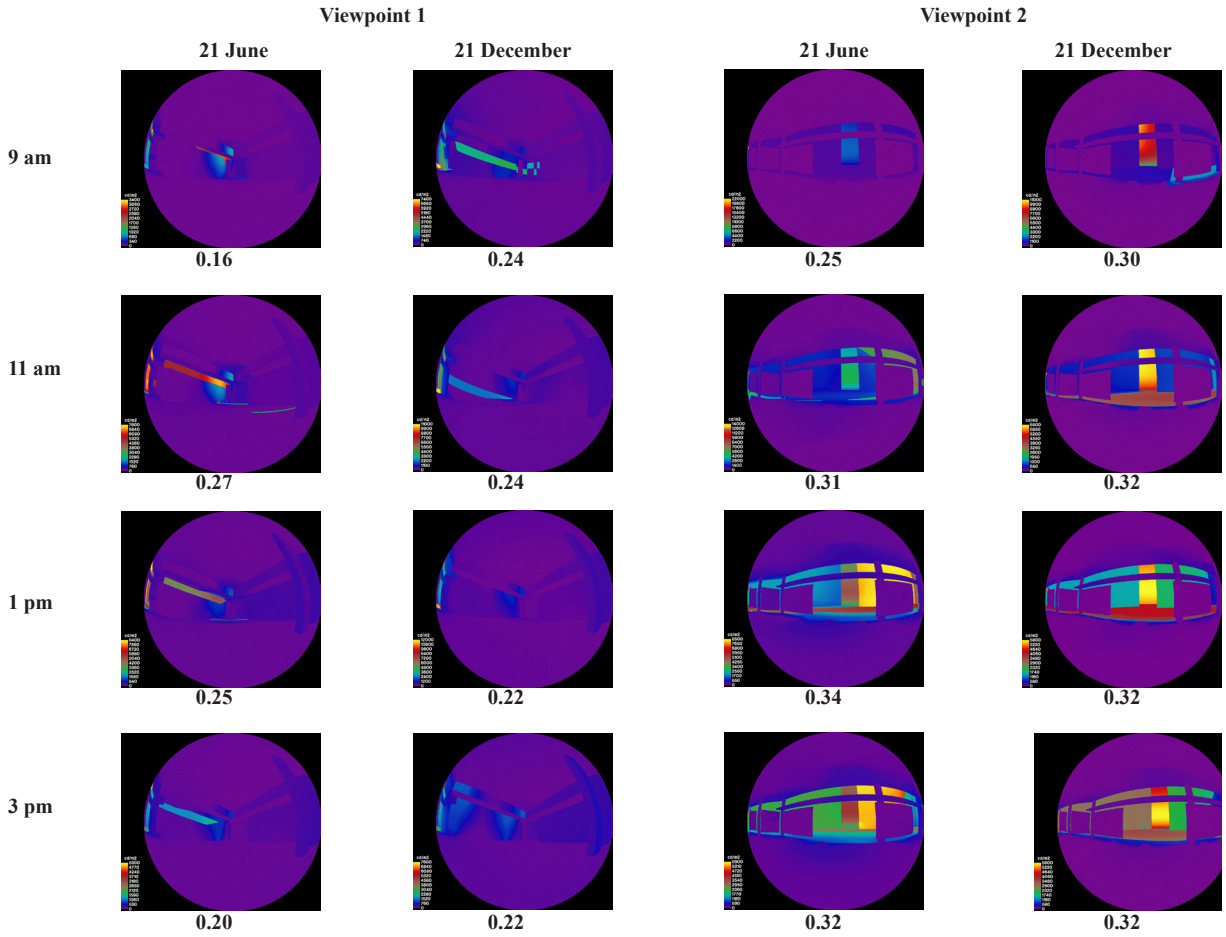


UDI 100-2000 lx



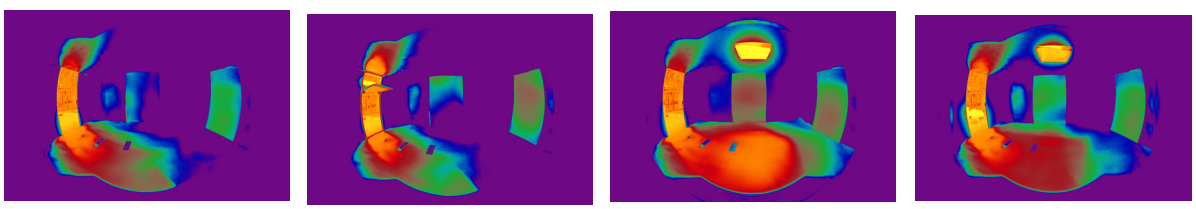


Calibration spots for Daylight Factor measurement



Glare Mitigation

While many possible interventions can be implemented in the design, physical intervention model is made and tested using analog modelling and HDR procedure. In this case, Four significant intervention were physically made with the scale of 1:10 and placed on the standard physical model.



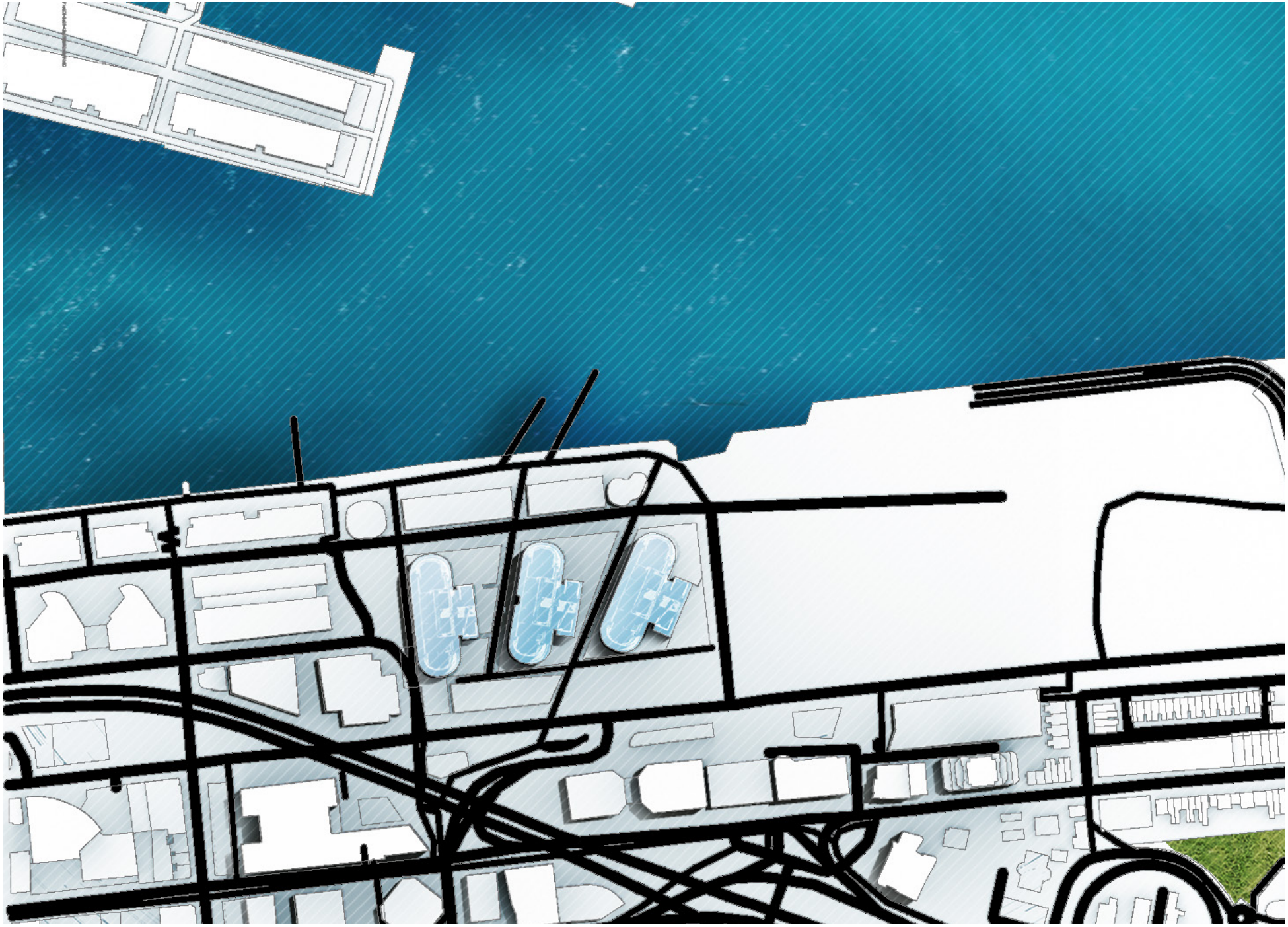
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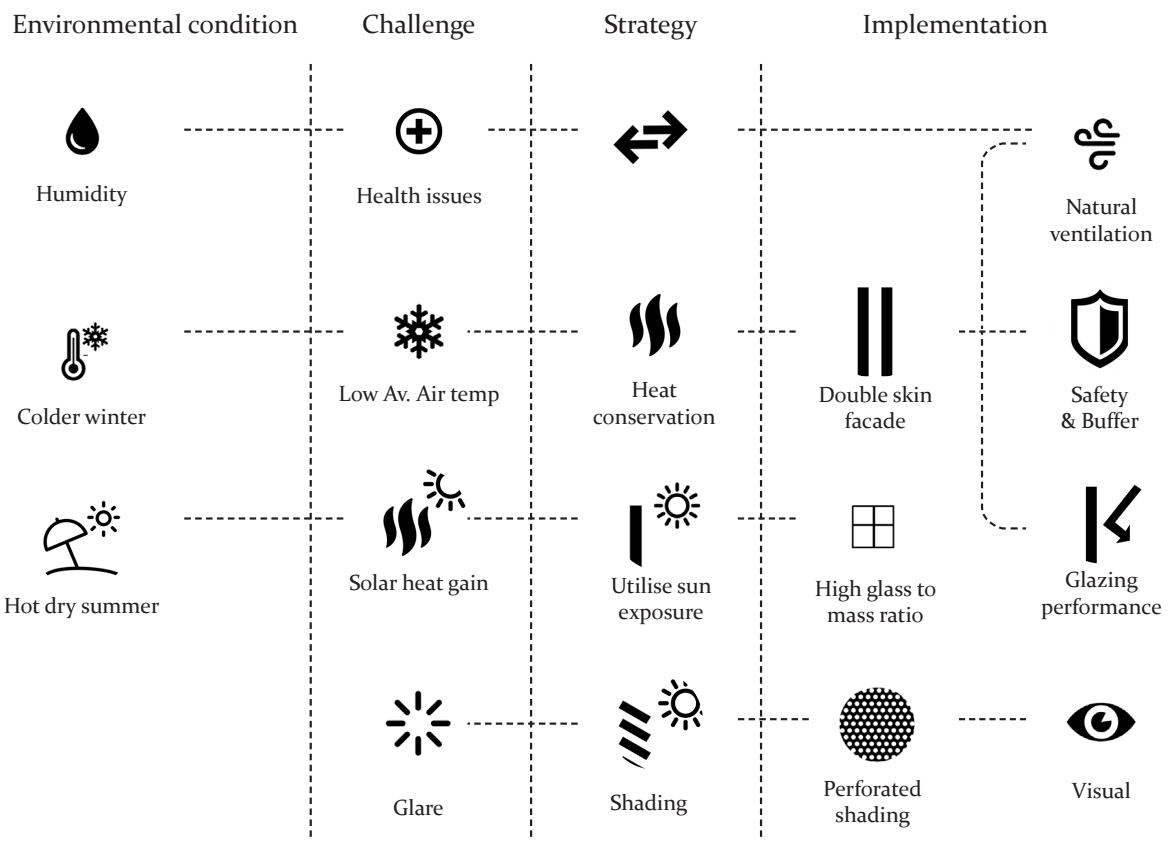
BARANGAROO FACADE REDESIGN

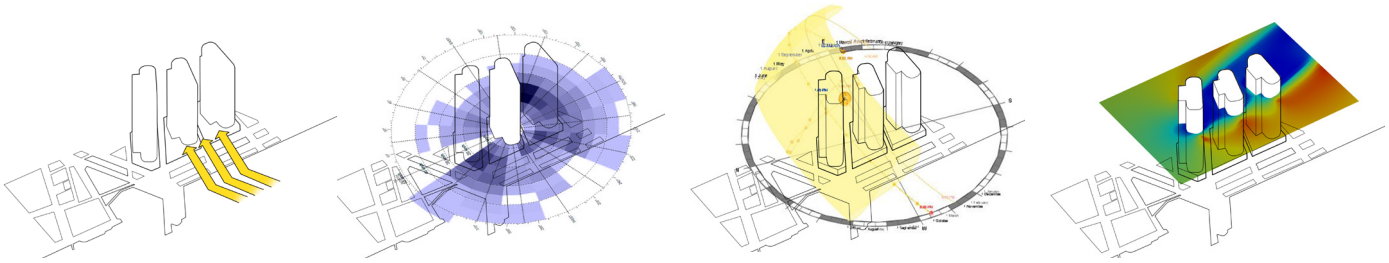
Bioclimatic Design

M.Arch.Sci High Performance Facades, Fall 2018
Project Type: Office
Unit Coordinator: Dr. Jungsoo Kim
Tutor: Haico Schepher (ARUP)

The Barangaroo International Tower in Sydney comprises of three towers with more than 39-storey high office spaces. This project focused on redesigning the facade of the building in a cold climate, specifically in Hobart, Tasmania to perform better using passive design approach.
While the local climate indicates cold winter and hot-dry summer, the design strategies addresses the heat conservation, heat gain in west and east facade, and utilising sun exposure in the north facade. The implementation of a double skin facade had greater benefit compared to the single pane curtain wall and used in this study.
The west and east part of the building contains the motorised louvres to block excessive heat gain and light shelves to bring daylight further into the plan, while the north and south facade uses double skin facade with a cavity to provide insulation in during colder months





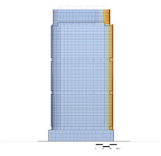
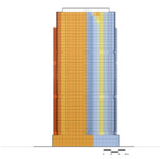
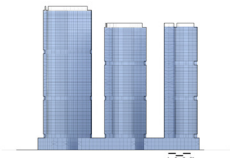
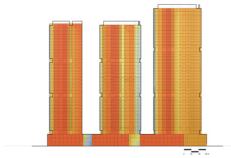
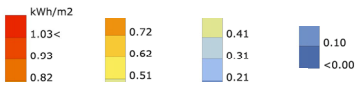
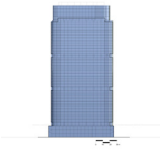
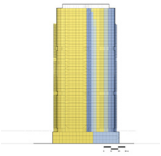
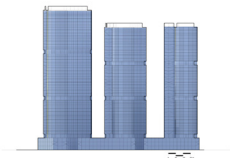
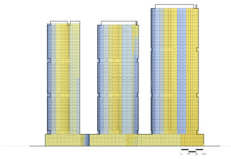
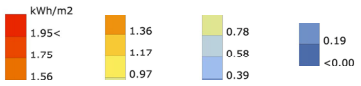
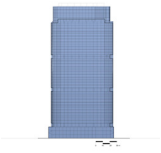
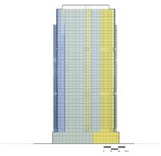
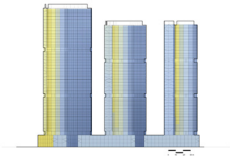
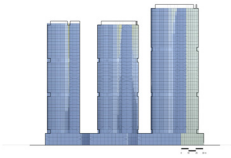
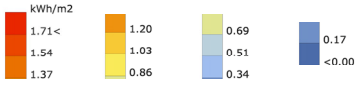
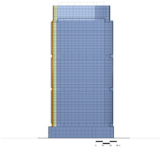
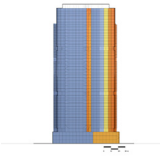
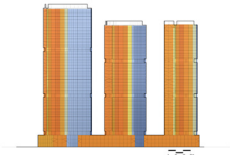
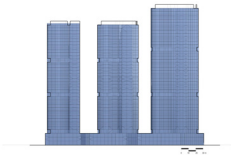
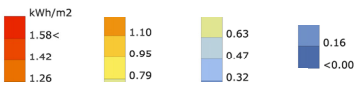


Site context *Prevailing wind* *Sun path* *Wind flow*

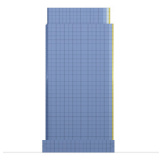
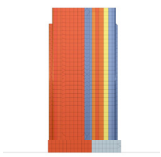
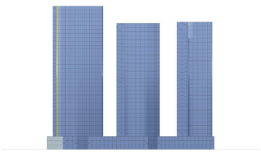
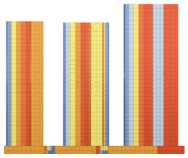
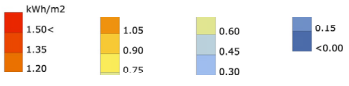
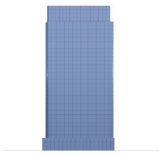
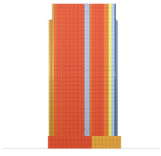
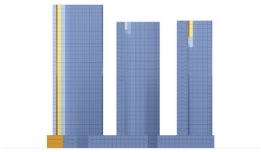
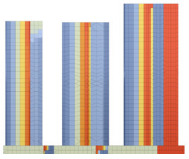
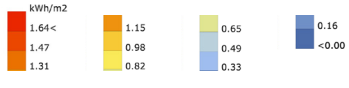
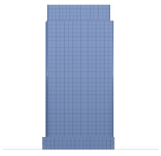
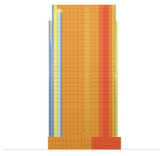
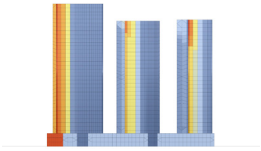
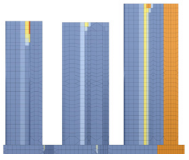
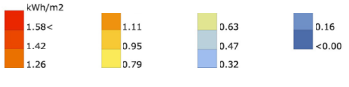
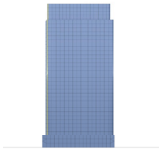
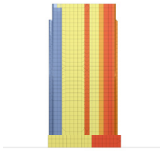
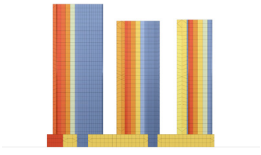
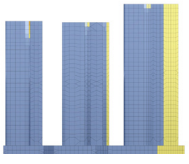
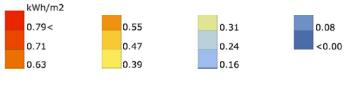
Design Strategy

Like any other cold climate, Hobart experiences cold winter and hot-dry summer. The air humidity can also cause a problem if the HVAC system is not working properly. The proposal suggests several strategies in implementing passive design strategy in the tower facade redesign.

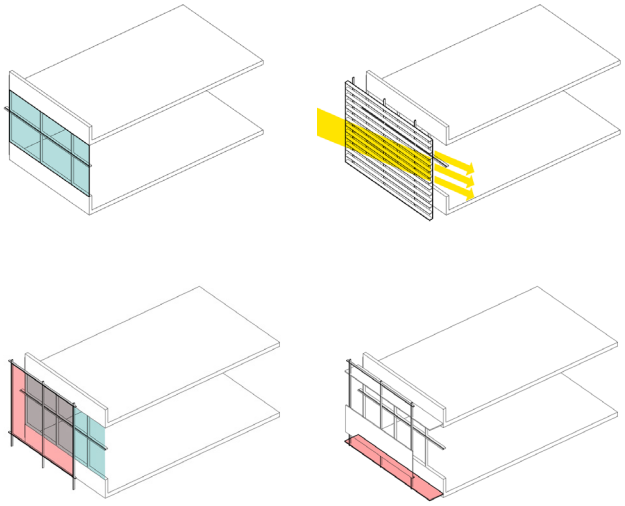
Winter

	South	North	West	East	
9 AM					
11 AM					
1 PM					
3 PM					

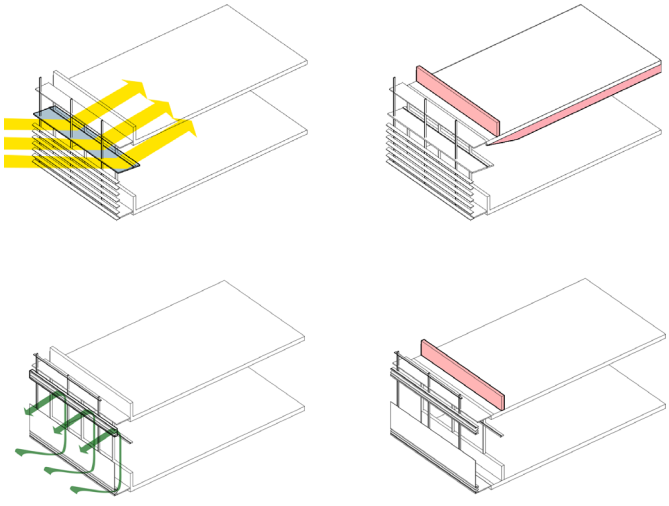
Summer

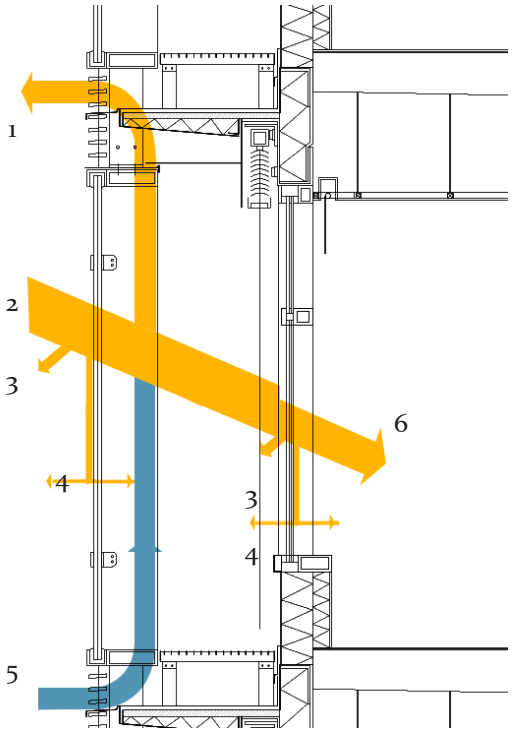
9 AM					
11 AM					
1 PM					
3 PM					

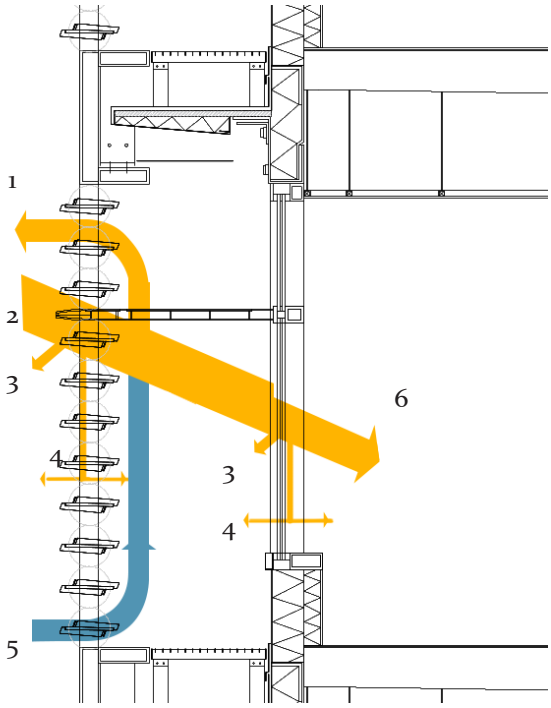
Facade type -1



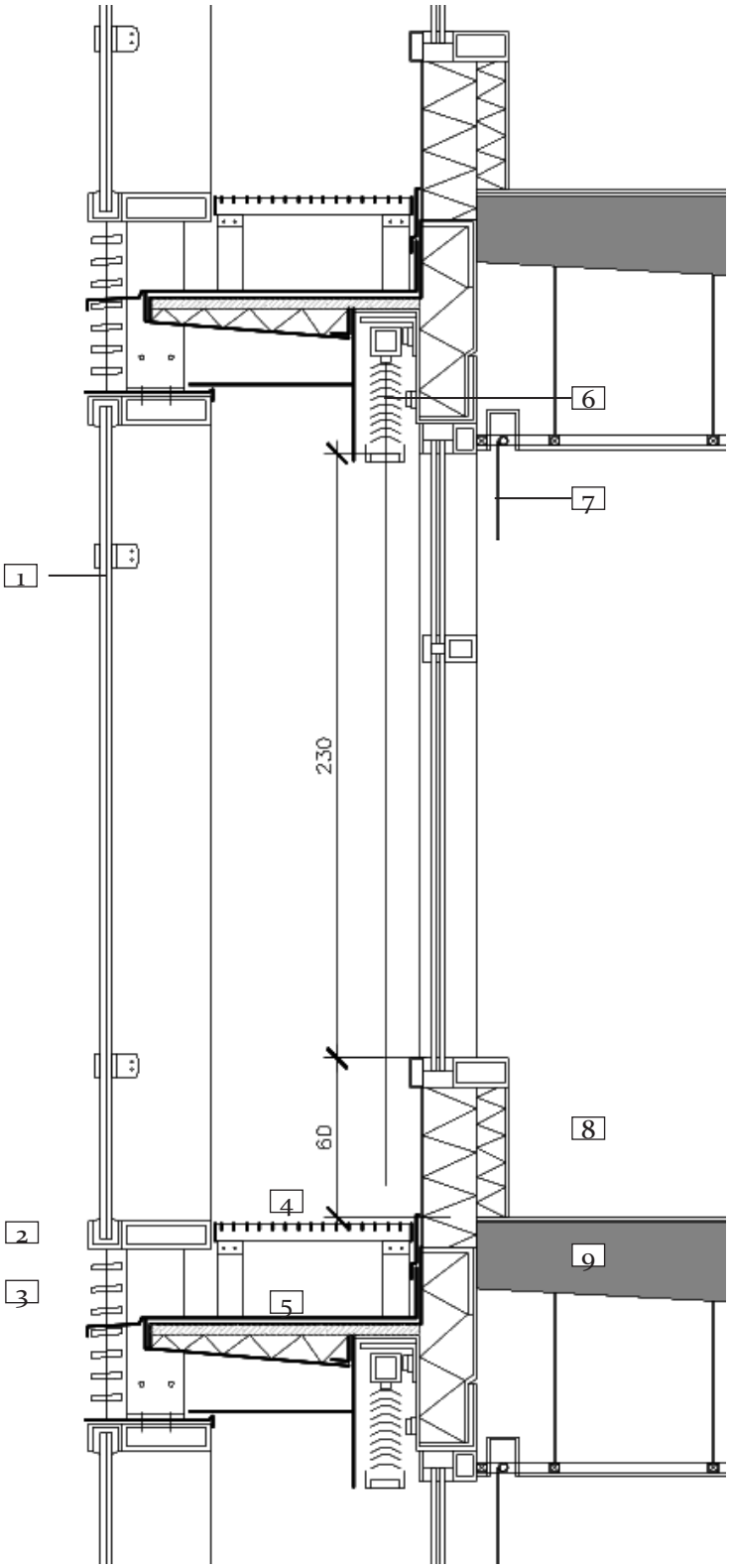
Facade type -2



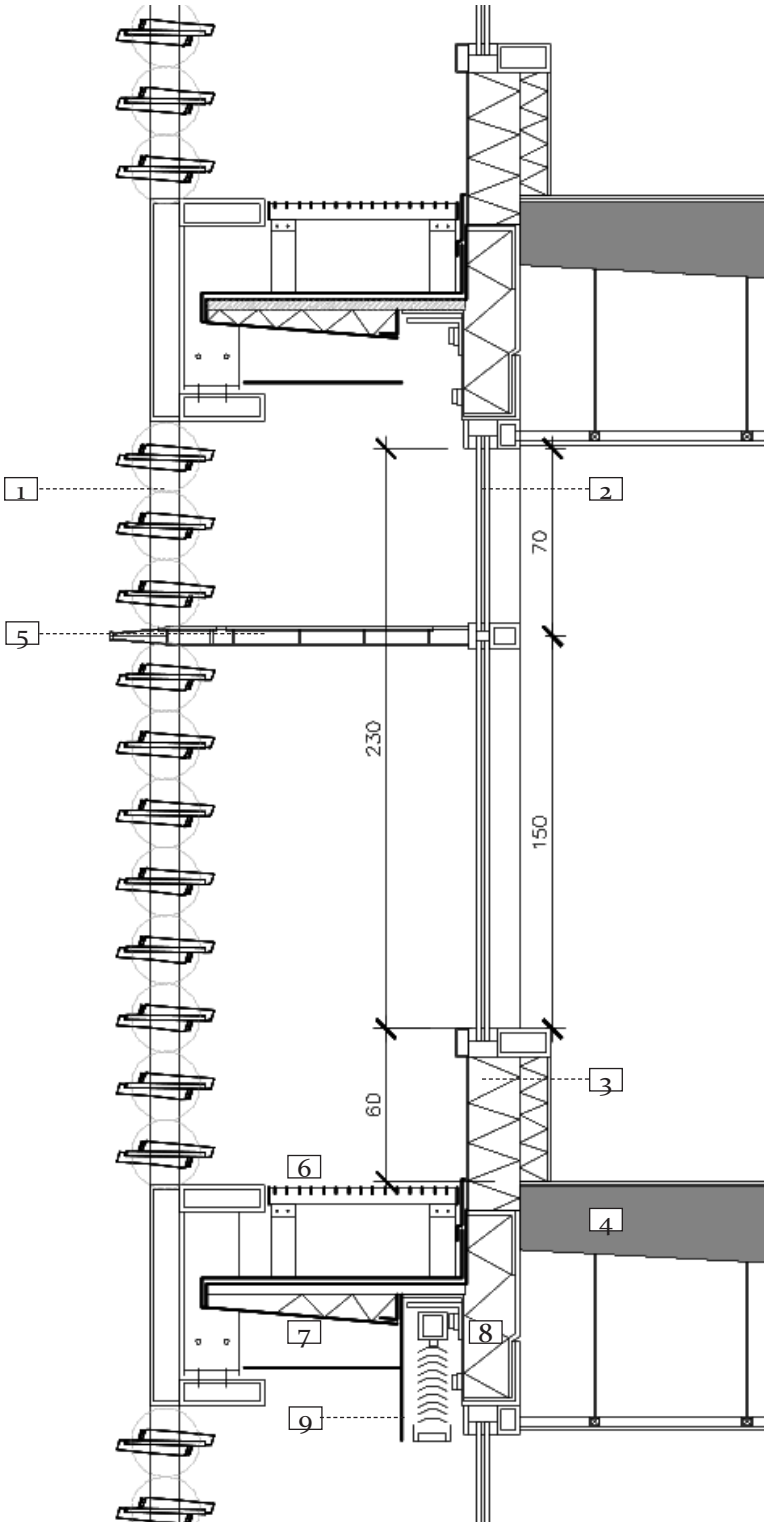




1. Heat removed
2. Solar incident
3. Reflected shortwave radiation
4. Conduction and reradiation in & out
5. Airflow from outside
6. Transmitted heat



1. Laminated safety glass 12mm
2. 50/35 mm steel channel
3. 50/10 mm aluminium louvres
4. Maintenance catwalk, 360/30 mm grating
5. Cement impregnated chipboard (fire rated 60 minutes)
6. Retractable solar control aluminium louvres, micro-perforated for daylight and glare control
7. Roll blind
8. Spandrel panel
9. Concrete floor plate



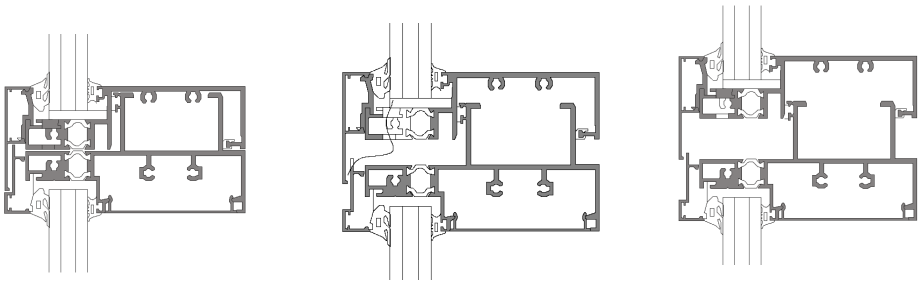
1. Laminated safety glass 12mm
2. Insulated double glazing with argon gas
3. Spandrel panel
4. Concrete floor plate
5. Light shelves
6. Maintenance catwalk, 360/30 mm grating
7. Cement impregnated chipboard (fire rated 60 minutes)
8. Insulation
9. 4 mm aluminium sheet

National Construction Code compliance

In order to conduct performance compliance, the method of measuring the project's feasibility in term of energy efficiency is tested using NCC Building Code of Australia J Section

Façade direction	Façade Area (m^2)	Glazing Area (m^2)	Energy Constant			SHGC	P	H	P/H	Heating shading multiplier	Cooling shading multiplier	System U-Value
			Ca	Cb	Cc							
North	79.42	47.08	-0.41	1.32	0	0.18	1.2	2.3	0.521739	0.61	0.49	1.15
South	242.5	143.75	-0.74	0.25	0.16	0.52	1.2	2.3	0.521739	0.8	0.73	1.4
East	74.42	44.11	-0.7	1.09	0.06	0.18	1.2	2.3	0.521739	0.64	0.6	1.15
West	25.61	15.18	-0.92	0.81	0.11	0.52	1.2	2.3	0.521739	0.64	0.61	1.4
Northwest	73.14	43.36	-0.71	1.09	0.05	0.18	1.2	2.3	0.521739	0.62	0.54	1.15
Northeast	73.14	43.36	-0.43	1.39	0.01	0.18	1.2	2.3	0.521739	0.66	0.56	1.15
Southwest	73.14	43.36	-0.85	0.47	0.15	0.52	1.2	2.3	0.521739	0.71	0.64	1.4
Southeast	73.14	43.36	-0.76	0.59	0.13	0.52	1.2	2.3	0.521739	0.7	0.64	1.4

Façade direction	Energy Index	Allowance	Aggregate air conditioning value	Compliance
North	0.083	6.59186	3.36179448	COMPLY
South	0.083	20.1275	1.589875	COMPLY
East	0.083	6.17686	4.6791888	COMPLY
West	0.083	2.12563	1.59019608	COMPLY
Northwest	0.083	6.07062	3.65143232	COMPLY
Northeast	0.083	6.07062	4.35889408	COMPLY
Southwest	0.083	6.07062	2.28056256	COMPLY
Southeast	0.083	6.07062	4.41023232	COMPLY



Structural Movement

Considering lateral movement, thermal expansion or shrinkage, and heat build-up in the system, it is important to consider expansion of the facade elements. Seveal considerations including:

1. Mullion cut tollerance
2. Frame fabrication tolerance
3. Installation tolerance
4. Mullion thermal expansion
5. Structural slab deflection
6. Concrete self-weight
7. Weight of the facade
8. Weight of internal finishing
9. Love loading
10. Building long-term creep of slab edge beam
11. Structural long-term column shortening

16

WILKINSON BUILDING REDESIGN

Economic Feasibility Study

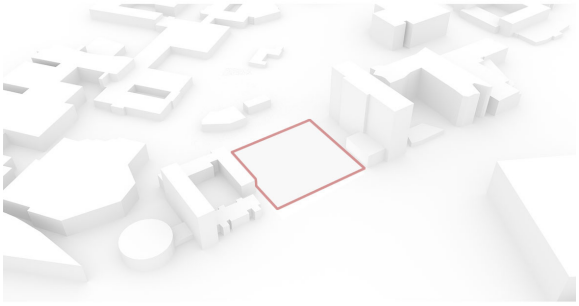
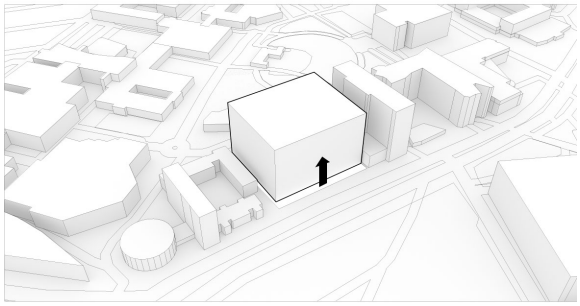
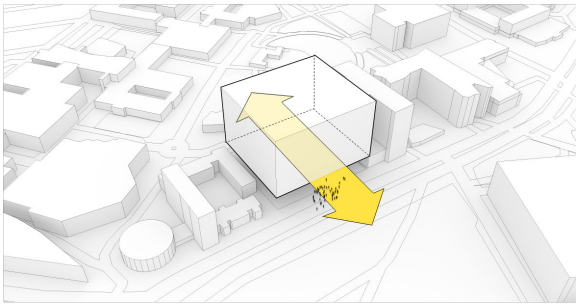
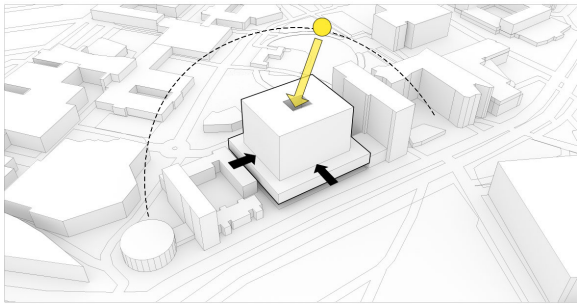
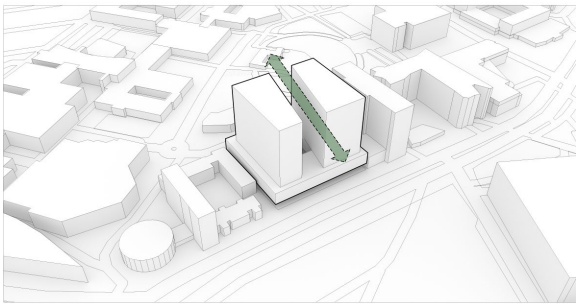
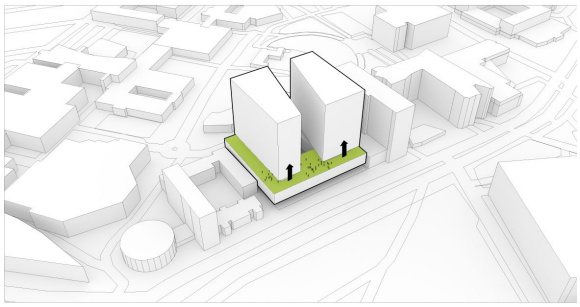
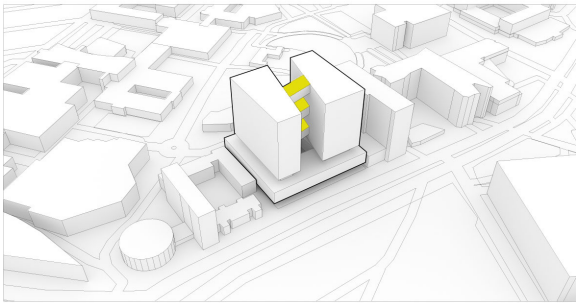
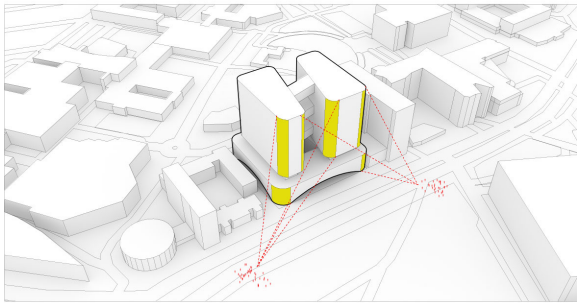
M.Arch.Sci Building Economics, Spring 2018
Project Type: Academic Institution
Unit Coordinator: Dr. Sunil Dubey
Tutor: Flavio Rossi (Ernst & Young)
Team: Nelson Leung, Elizabeth Cuan, Melati Nurguritno, Xinger Li, Angelica Chacon

Wilkinson building was first built in 1959 as a T-shape modernist building and refurbished between 2002 and 2005 with the aim to develop each wing by giving them their respective atrium and courtyard to cater better connectivity and more social areas.

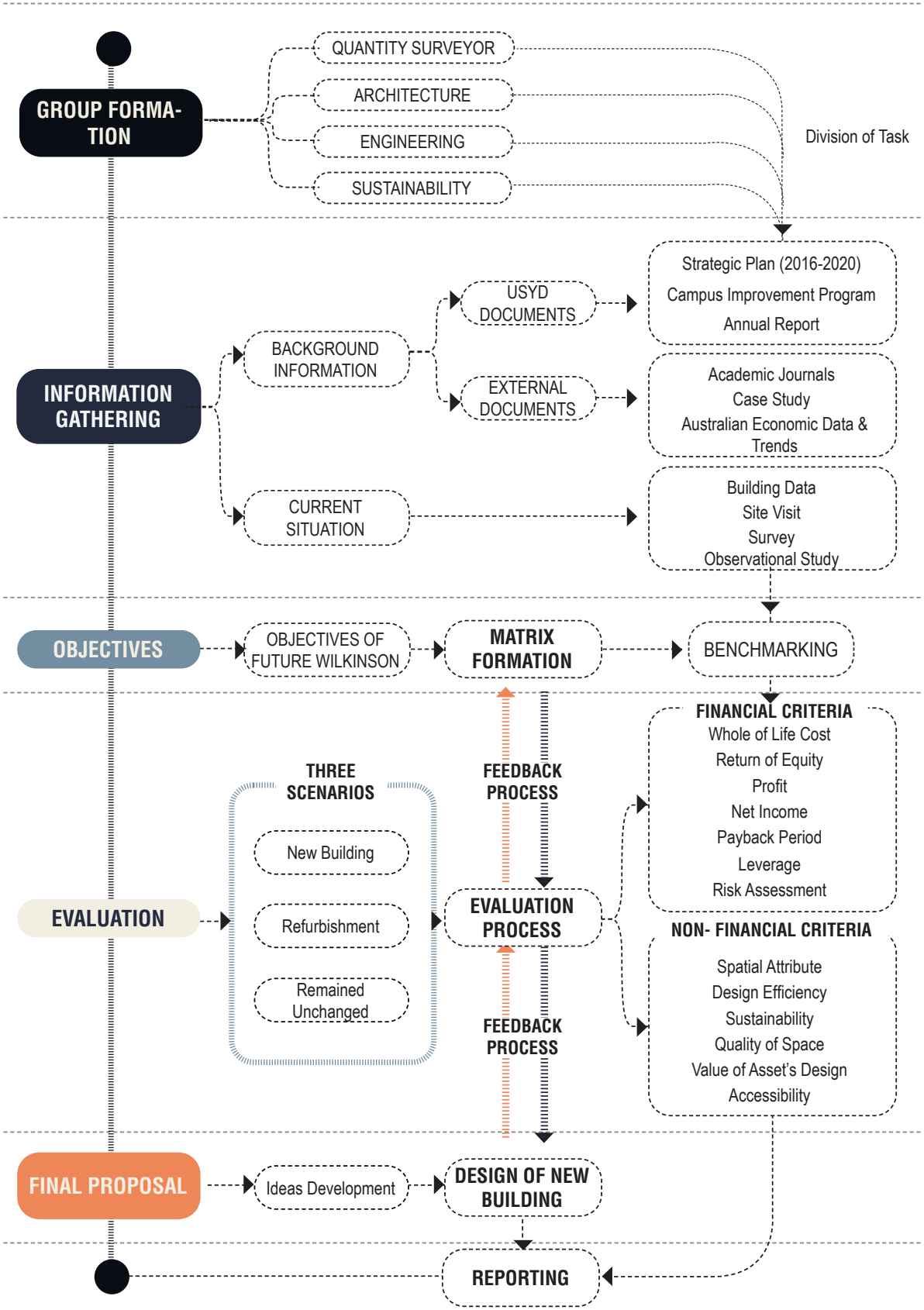
The new Wilkinson building proposal aims to provide higher economic value, which means it should not only be a financially feasible project, but also take the responsibility to maximize its value on different communities and the environment.

In this proposal, Wilkinson Building aims to become a place where students can work, learn and progress.It is essential to provide students with the necessary facilities to sustain and support the future study of architecture.

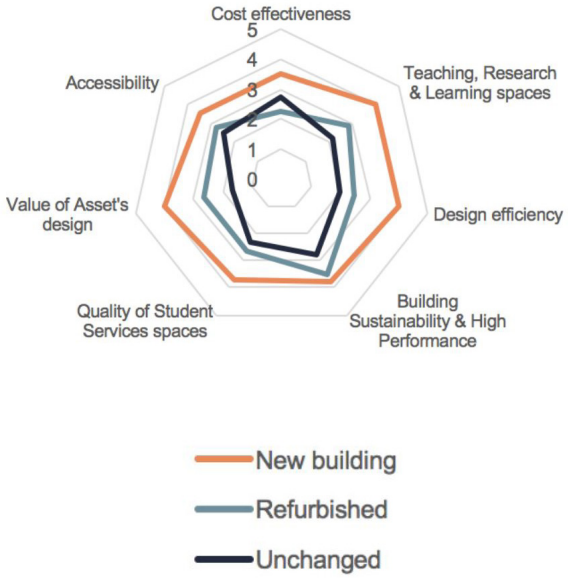


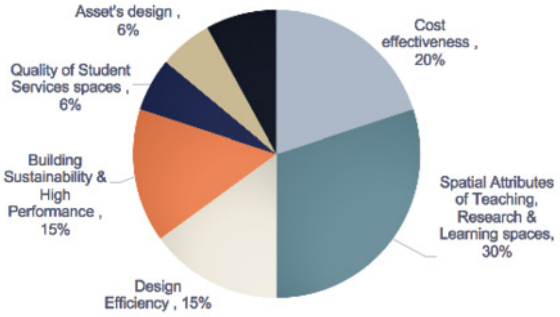









Figures above show the process of the design which involves several key aspects in creating a good economic proposition. Firstly, the building was formed according to its GFA to cater the increasing number of students in the future. Secondly, ground floor as the public space is used to establish accessibility and visibility between the City Road and Cadigal Green. Thirdly, the building itself has to accommodate the need of the occupants, such as solar access, circulations, outdoor spaces, and also its aesthetic value.


GROUP FORMATION
QUANTITY SURVEYOR
ARCHITECTURE
ENGINEERING
SUSTAINABILITY
Division of Task
INFORMATION GATHERING
BACKGROUND INFORMATION
USYD DOCUMENTS
EXTERNAL DOCUMENTS
CURRENT SITUATION
Strategic Plan (2016-2020)
Campus Improvement Program
Annual Report
Academic Journals
Case Study
Australian Economic Data & Trends
Building Data
Site Visit
Survey
Observational Study
OBJECTIVES
OBJECTIVES OF FUTURE WILKINSON
MATRIX FORMATION
BENCHMARKING
EVALUATION
THREE SCENARIOS
New Building
Refurbishment
Remained Unchanged
FEEDBACK PROCESS
EVALUATION PROCESS
FEEDBACK PROCESS
FINANCIAL CRITERIA
Whole of Life Cost
Return of Equity
Profit
Net Income
Payback Period
Leverage
Risk Assessment
NON- FINANCIAL CRITERIA
Spatial Attribute
Design Efficiency
Sustainability
Quality of Space
Value of Asset's Design
Accessibility
FINAL PROPOSAL
Ideas Development
DESIGN OF NEW BUILDING
REPORTING

	Category	%
1	**Cost effectiveness (20%)**	
1a	Capital Cost	8
1b	Replacement Cost (cost/m2 per annum)	5
1c	Maintenance costs (cost/m2 per annum)	4
1d	Operational costs (cost/m2 per annum)	3
2	**Spatial Attributes of Teaching, Research & Learning spaces (30%)**	
2a	Allows experiential and living environment learning	5
2b	Allows collaborative and inter-faculty learning	5
2c	Comfort in teaching spaces	5
2d	Comfort in research spaces / facilities	5
2e	Comfort in library	5
2f	Comfort in offices	5
3	**Design Efficiency (15%)**	
3a	Operational flexibility	5
3b	Area efficiency	4
3c	Layout flexibility	3
3d	Fit for growth	3
4	**Building Sustainability & High Performance (15%)**	
4a	Indoor Environmental Quality (IEQ)	5
4b	Use of energy efficient design and equipment	4
4c	Sustainable use of building materials	3
4d	Integration of biophilic designs	3
5	**Quality of Student Services spaces (6%)**	
5a	Quality of amenities	2
5b	Quality of Social Hubs	2
5c	Quality of Retail spaces & food providing spaces	2
6	**Value of the Asset's design (6%)**	
6a	Building outlook	2
6b	Represents the School of Architecture, Design and Planning	2
6c	Quality of interior design	2
7	**Accessibility (8%)**	
7a	"Permeability" of the building to university facilities	2
7b	Accessibility for people with disabilities	2
7c	Access to and from public transportation	2
7d	Access to public / private space	2





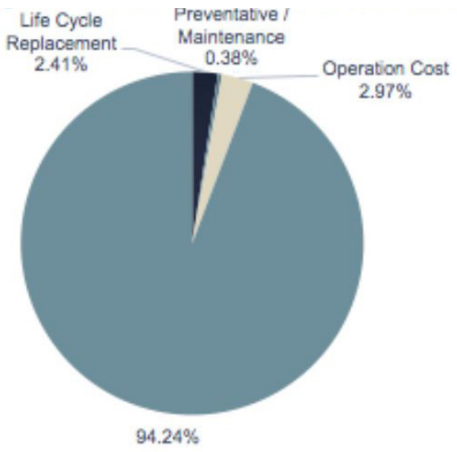
Whole of Life Assessment

The spider diagram above shows the results of Whole of Life (WoL) Assessment by taking into account both the financial and non-financial criteria for the 3 options. The "New Building" option got the highest mark (74) comparing to "Refurbished" option (56) and "Unchanged" option (50.4). Therefore, it is concluded that "New Building" option can best suit our predetermined objectives for this exercise

As seen in table on the left ; the heaviest weight was given to the spatial attributes of teaching, research & learning spaces (30%); the second highest weighted one was cost effectiveness with 20%, and the remaining 50% was divided between design efficiency, building sustainability & high performance, quality of student services spaces, value of assets design and accessibility.

	New Building (Option 1)	Refurbished (Option 2)	Unchanged (Option 3)
Total Investment	$165.72 M	$45.26 M	n/a
Total Net Income (50 yrs)	$1,084 M	$283.32 M	$204.82
Average Annual Net Income	$21.68 M	$5.67 M	$4.08 M
Return on Equity	13.08%	12.52%	n/a
Profit on Cost (Profit Margin)	27.90%	8.65%	7.12%
Payback Period	7.64 years	7.99 years	n/a

New Bldg (Option 1)	Debt Cost %		
Debt %	**4%**	**7%**	**10%**
25%	16.11%	15.11%	14.11%
50%	22.17%	19.17%	16.17%
75%	40.33%	31.33%	22.33%



New Building's WoL Assessment cost distribution

Financial Analysis

As shown in the table above, although "New Building" option has highest total investment cost (~$165 million), it can generate the highest total net income for 50 years with the amount of ~$1,084 million, which is around 3.8 times higher than that of "Refurbished" option. In terms of return on equity and profit margin, "New Building" option seems to have the best performance. For the payback period, "New Building" option is ~7.6 years which is slightly shorter than the "Refurbished" option(~8 years).

The Debt Cost table above shows the impacts to RoE under the "New Building" scenario. If the University would borrow 25% of the total investment from other sources, given the debt cost is 4%, the RoE will increase from 13.08% to 16.11%. All the values in the tables are higher than the university 5-year annualized long-term and mid-term investment returns which are 10.9% and 6% respectively, which represent they are good investment.

17

MISCELLANEOUS

Other Works

ISLAND PASSIVE HOUSE IMPROVEMENT

Improving Comfort Hours Through Building Enclosure

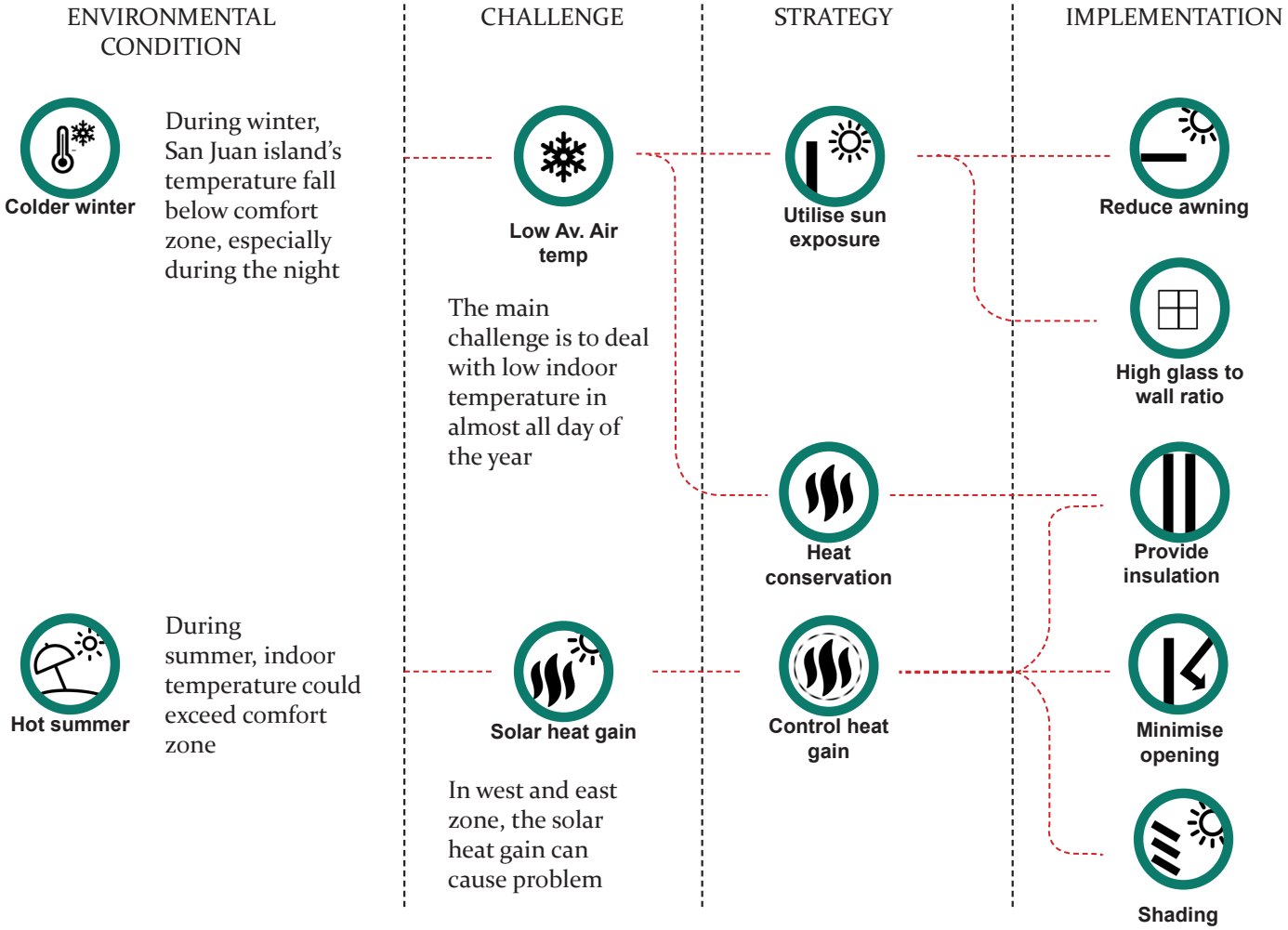
M.Arch.Sci Building Energy Analysis, Autumn 2018
Project Type: Passive House
Unit Coordinator: Prof. PC Thomas
Tutor: Dr. Jungsoo Kim



A Sustainable House by Artisans Group

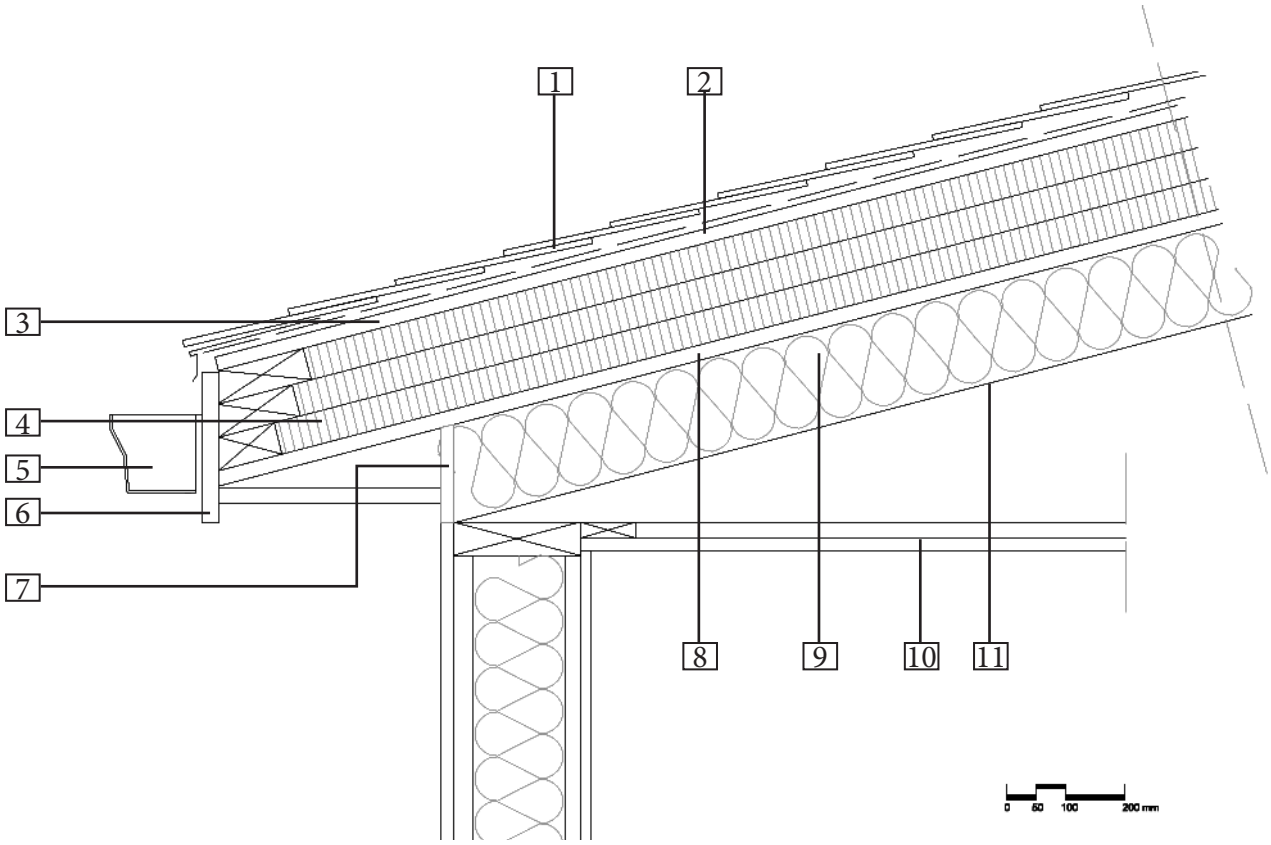
The passive house is located in the centre of San Juan Islands, Washington. It was built to accommodate retired teachers who want a sustainable house with high efficiency. The site was initially an undeveloped land where infrastructure was inadequate. Based on Koppen Geigger Map, the building is located in the Cfb climate area classification, which is considered to be an oceanic climate. Typical features of oceanic climate are: low clouds, fog, and drizzle, light or moderate rain, precipitation can increase in mountainous area, low annual temperature range, some snowfall, rain and cloudy dominates the weather condition.

This proposal aims to review the performance of the Island Passive House in terms of its comfortable hours and improve its performance using various methods. The analysis process uses Design Builder software to generate the .iso, .csv, and .html file and examine the comfort hours in five zones of the house.



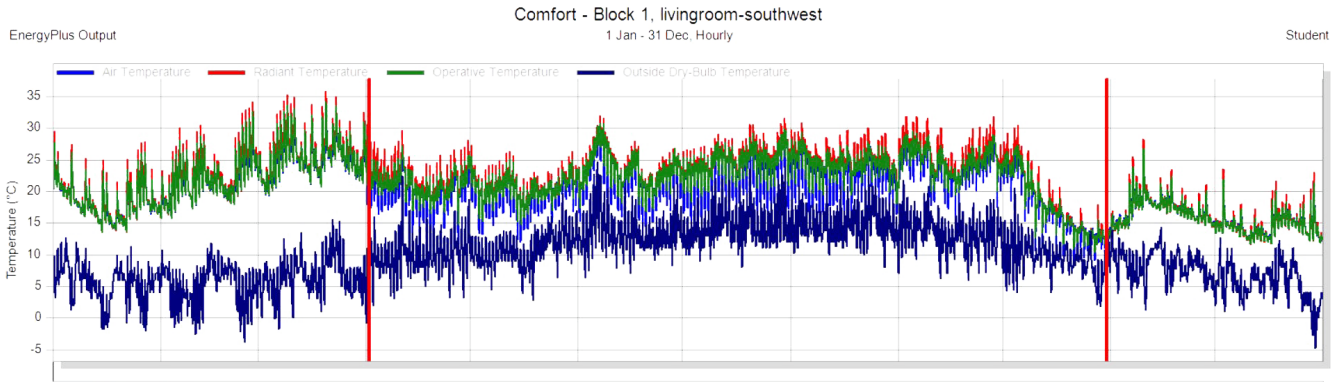
Proposed Insulation Value

Wall		
R-Value/U- Value (no bridging)	**2.857 m²K/W**	**0.35 W/m²K**
R- Value/U- Value (with bridging)	**2.857 m²K/W**	**0.35 W/m²K**
Floor		
R-Value/U- Value (no bridging)	**4.762 m²K/W**	**0.21 W/m²K**
R- Value/U- Value (with bridging)	**7.635 m²K/W**	**0.131 W/m²K**
Roof		
R-Value/U- Value (no bridging)	**9.432 m²K/W**	**0.106 W/m²K**
R- Value/U- Value (with bridging)	**9.432 m²K/W**	**0.106 W/m²K**
Glazing		
High SHCG glass is needed to ensure that the solar radiation can be transmitted into the space and heat up the thermal mass during the day before releasing it back at night.	**0.83 W/m²K** **VLT 76%** **SHGC 0.62**	



Section Detail

1. Asphalt shingles
2. Roof underlayment
3. 1/2" plywood
4. 3-layer expanded polystyrene insulation
5. Gutter
6. Roof fascia
7. Rigid insulation seathing
8. 1/2" plywood
9. Cavity insulation\ Glass fibre
10. Gypsum board ceiling
11. Common rafter



Sample Comfort Analysis for Living Room Zone

Overall, the building insulation and thermal mass gives better performance and makes the indoor temperature warmer than the outside dry bulb. During summer when the outdoor temperature increases, the insulation can make the indoor temperature becomes slightly hotter. However, opening window in this zone could result in a significant increase of hours below comfort zone. Therefore, the opening of the window is also scheduled between 11am-15pm which is the hottest hours during the day. The window should be open only when necessary to avoid the space becoming colder.

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Interval Start	less than	12.00<=	13.00<=	14.00<=	15.00<=	16.00<=	17.00<=	18.00<=	19.00<=	20.00<=	21.00<=	22.00<=	23.00<=	24.00<=	25.00<=	26.00<=	27.00<=	28.00<=	29.00<=	30.00<=	31.00<=	to or mor	Row
Interval End	12	13.00>	14.00>	15.00>	16.00>	17.00>	18.00>	19.00>	20.00>	21.00>	22.00>	23.00>	24.00>	25.00>	26.00>	27.00>	28.00>	29.00>	30.00>	31.00>	32.00>	32	Total
January	0	0	0	0.5	27	83	77	126.5	131.5	69	73	65	38.5	17	20	11	2.5	2.5	0	0	0	0	744
February	0	0	0	0	0	0	15.5	23	45.5	69.5	92	95.5	72	70	54.5	39.5	33	23	13.5	8.5	11	6	672
March	0	0	0	0	0	0	0	0	0	0	13	25	68.5	71.5	110.5	97.5	98	73	50.5	43	39	54.5	744
April	0.5	1	7	19	22	23.5	32.5	86	128	123.5	118	84	36	19	15	2.5	1.5	0.5	0.5	0	0	0	720
May	1.5	3.5	11.5	19.5	21	34.5	81.5	85	141.5	147	109	51	30	7.5	0	0	0	0	0	0	0	0	744
June	0	0	0	3	16	14.5	21.5	35	49.5	75	99.5	96.5	87.5	80.5	50	33	28.5	17.5	8.5	4	0	0	720
July	0	0	0	0	3.5	12	27	29.5	35	34.5	37	78.5	104.5	136.5	112	82	33	14	5	0	0	0	744
August	0	0	0	0	0	15	19	31.5	38.5	45.5	41	53	141.5	163.5	127	47	18.5	2.5	0.5	0	0	0	744
September	0	0	0	0	0.5	2	11.5	14	10.5	24.5	54	104	99.5	141.5	104	82	49	23	0	0	0	0	720
October	64.5	44.5	106	82.5	57	66	74	28	21.5	24.5	38	26.5	43	40	18	10	0	0	0	0	0	0	744
November	0	0	12	29.5	58.5	137	87	171	108.5	68	23.5	10	6.5	3	2.5	3	0	0	0	0	0	0	720
December	0	4	111.5	174.5	185.5	146.5	74	28	8.5	7.5	4	0	0	0	0	0	0	0	0	0	0	0	744
12:01 to 1:00 am	0	1	11.5	9	19.5	16	19	19.5	28.5	26.5	31.5	35	40	41	28.5	21	9	5.5	3	0	0	0	365
1:01 to 2:00 am	0	1	13.5	9	19.5	16.5	20	21	32.5	25.5	29	40	34.5	45.5	22.5	21.5	8	4.5	1	0	0	0	365
2:01 to 3:00 am	0	2	13	10.5	22.5	15	19.5	25	28.5	29.5	26.5	40.5	37	44.5	23	16	9	2	1	0	0	0	365
3:01 to 4:00 am	0	2	16	10.5	22	16.5	18	24.5	28.5	36	25	39	43.5	36	25	14	5.5	3	0	0	0	0	365
4:01 to 5:00 am	0	2.5	16.5	13	20	18	19	24	27	35.5	30.5	38.5	45	31	28.5	9	5.5	1.5	0	0	0	0	365
5:01 to 6:00 am	0	4.5	16	16	18.5	17	16.5	26	29.5	32.5	33	37.5	47	30.5	25.5	9	5	1	0	0	0	0	365
6:01 to 7:00 am	1	4	16	18	16.5	18.5	15	24	29.5	28.5	35	37.5	42.5	34	28.5	11.5	3.5	1.5	0	0	0	0	365
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9:01 to 10:00 am	10.5	3.5	15.5	15.5	24	20.5	21	40.5	29	34	40	30	24	17	13	10	7	6	2	1.5	0.5	0	365
10:01 to 11:00 am	13.5	0.5	12.5	15.5	23	29	36.5	49	44	28.5	26	17.5	17.5	14.5	10.5	5.5	7	2.5	7	2	2	1	365
11:01 to 12:00 pm	12	3	10.5	16	19.5	37.5	38.5	43	46.5	30	18.5	19.5	14	13.5	11	9	3.5	2.5	4.5	6	2.5	4	365
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1:01 to 2:00 pm	11	3	10	11	27.5	28.5	40.5	49	35.5	26	28	20.5	14	6.5	12.5	6	8	6.5	2	3	6.5	9.5	365
2:01 to 3:00 pm	5	6.5	7	16	16.5	30.5	25.5	39	38	32	29.5	19.5	21.5	13	16.5	11.5	8	8	2.5	3.5	3.5	12	365
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6:01 to 7:00 pm	0	0	6	13	5	21.5	19.5	13.5	26.5	29.5	29.5	22	23.5	41.5	36.5	27	18	12	8	6	4	2.5	365
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9:01 to 10:00 pm	0	0	3	13.5	8	23	15.5	18	23.5	25	32	23	32	41.5	37.5	25.5	20	12.5	7	2.5	2	0	365
10:01 to 11:00 pm	0	0	4	14	7	23.5	16	19	23	28.5	33	27.5	35	39.5	41.5	18.5	18	9.5	4.5	2	1	0	365
11:01 to 12:00 am	0	0	8	12	13	20.5	18	17	31	24.5	31	33	35.5	45.5	30.5	21.5	13.5	6.5	2.5	1.5	0	0	365

Total Comfort Hours for Living Room Marked in Grey

Steps	Strategy	Discomfort hours	Comfort Hours	Total Hours	% Decrease
1	Initial Lightweight	4899.5	575.5	5475	0
2	Revising U-value based on passive house standard	3478	1997	5475	29.0131646
3	Change overall U-Value	3338	2137	5475	31.870599
4	Reduction of awning and enlarging window	3567.5	1907.5	5475	27.1864476
5	Use high SHGC glass	3596.5	1878.5	5475	26.5945505
6	Use window schedule	2819.5	2655.5	5475	42.4533116
7	Use thermal mass	2217.5	3257.5	5475	54.7402796

% Decrease of Comfort Hours for Living Room

Reduction of Discomfort Hours

Overall, the discomfort hours in the living room has been reduced by 54.74% to 2217.5 hours (Table above). In step 6, it could be seen that opening windows to minimise the high temperature in summer contribute significantly to the increase of comfort hours.

All in all, the Passive House in San Juan Island, Washington, experience a cold climate all year long, which makes building insulation and air tightness becomes the dominant factor in achieving thermal comfort. Building in such climate also needs to utilise thermal mass in order to store the heat dan release it during the night, where the cold temperature is imminent. In that case, the insulation layer cannot be placed on the surface of the construction where solar radiation hits, because it might prevent the heat to access the thermal mass layer such as concrete. While window opening can mitigate high temperature above comfort zone, the schedule must be thoroughly tested as it can also increase the discomfort hours below 18°C.

OTHER PROJECTS

Boutique Hotel at Padang

Schematic - 2019



Residential House at Alam Sutera

Schematic - 2019



Private Jet Interior

3D Modeling and Rendering - 2019





Cabin House

3D Modeling and Rendering - 2019







Residential House at Padang

Schematic - 2019



Trampoline Cabin

3D Modeling and Rendering - 2020



Interior Projects

Interior Design - 2020





















Lake Cabin

3D Modeling and Rendering - 2020









Coastal Pavilion

3D Modeling and Rendering - 2020



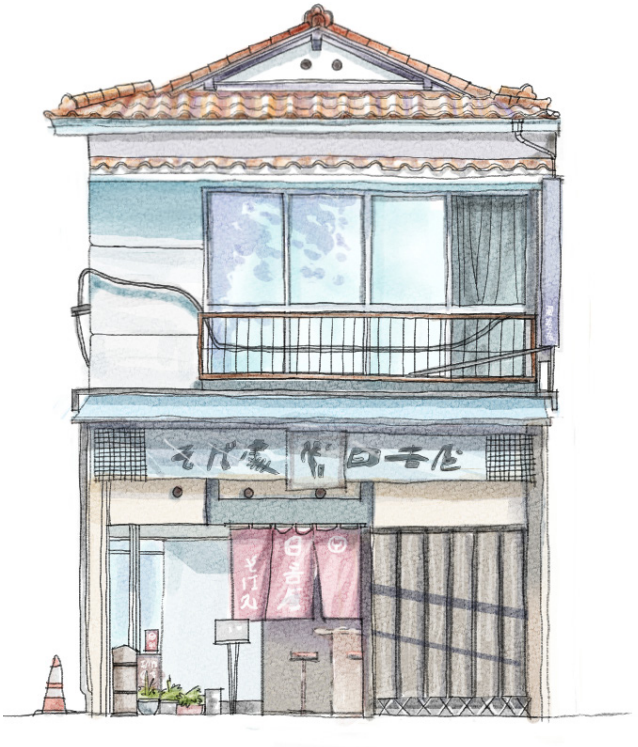


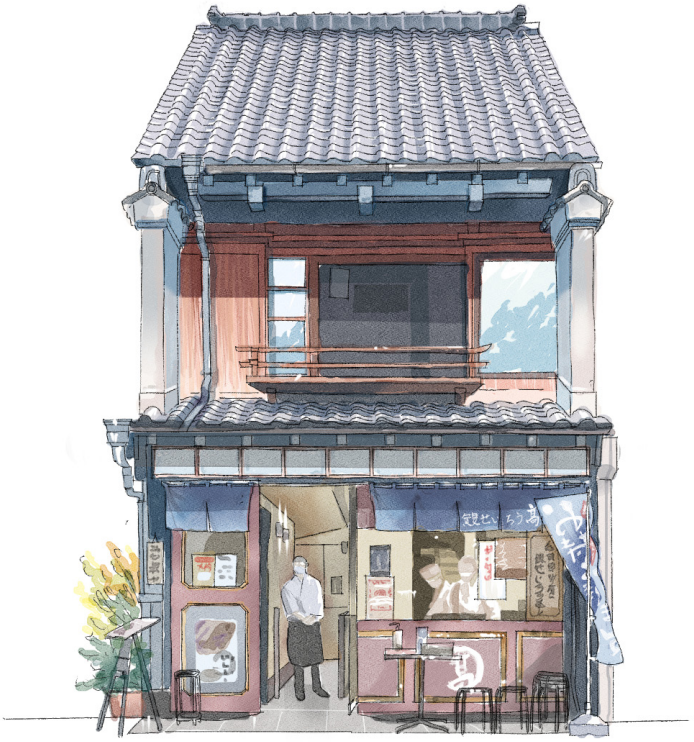
OTHER CREATIVE PURSUITS

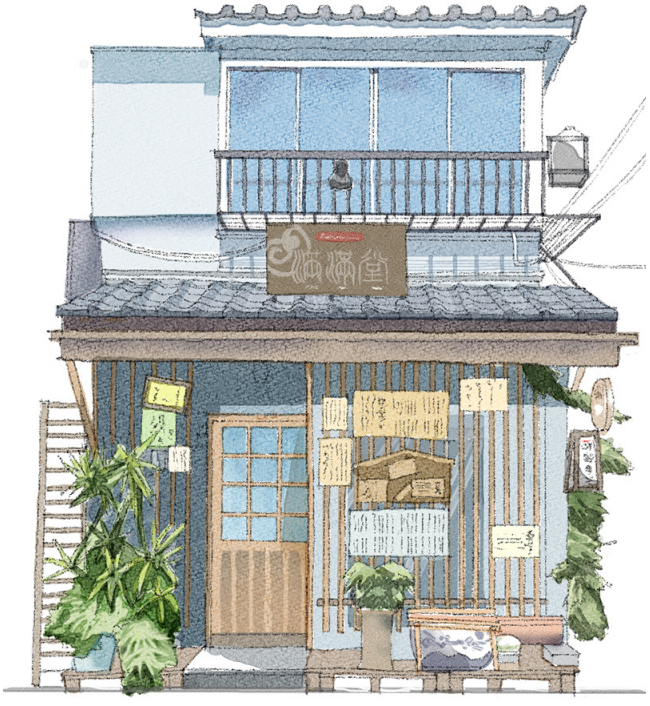
Digital Drawing and 3D Modeling

Japan Shophouses Painting

Software used: Clip Studio





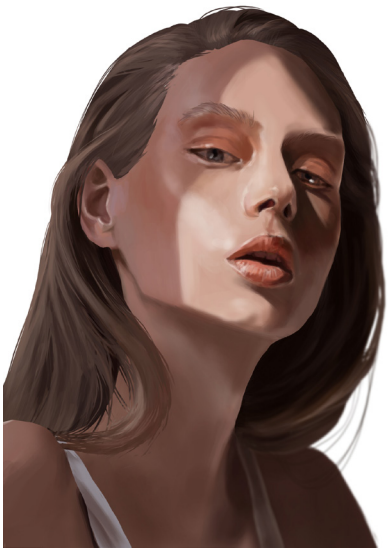




Portrait Painting

Software used: Photoshop







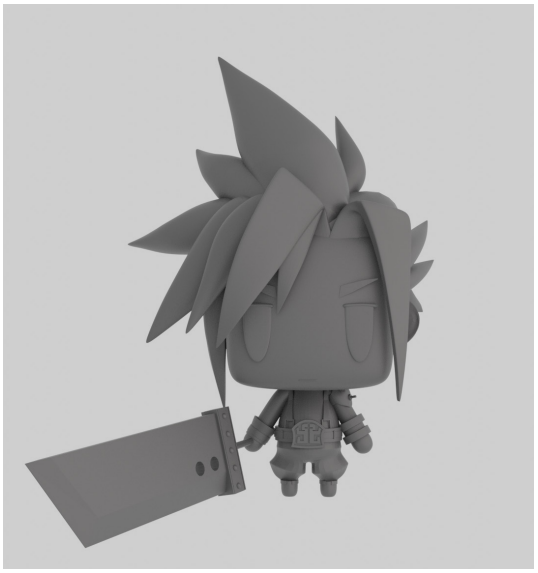




3D Modeling/ 3D Sculpting

Software used: Blender 3D/ 3DS Max/ ZBrush









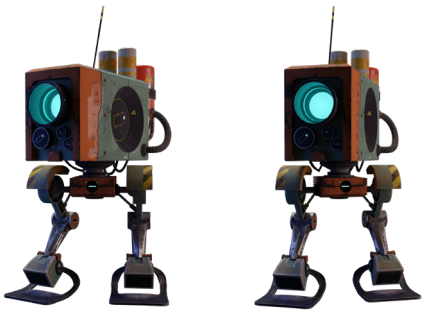




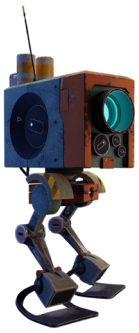














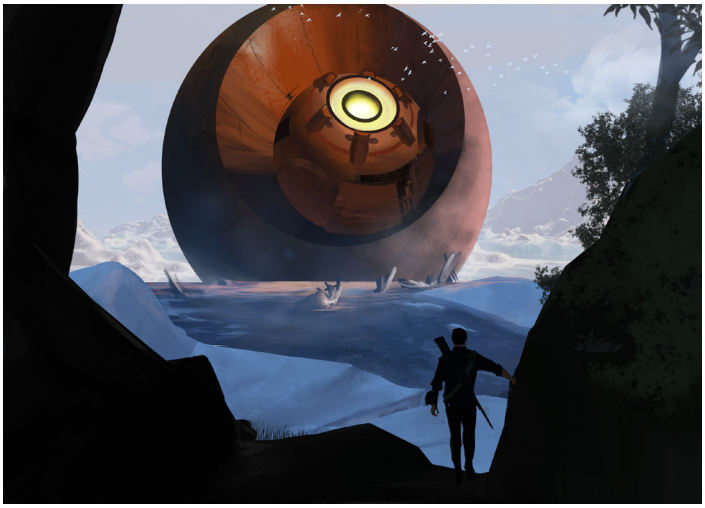




Environment Painting

Software used: Photoshop











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