HEALING URBAN WORKPLACE

The role of Biophilia in a Knowledge Work Environment

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DECLARATION

I hereby declare that this design thesis is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis. This thesis has also not been submitted for any degree in any university previously.

Alistair Aaron Ngui Chiu Sheng

15 November 2022

APPROVAL BY THESIS COORDINATOR & SUPERVISORS

This is to certify that the design thesis work submitted by Alistair Aaron Ngui Chiu Sheng has been approved by the School of Architecture & Built Environment in the prescribed format of the Faculty of Engineering, Technology and Built Environment.

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ABSTRACT

Malaysia's developing economy has seen to many rise in new developments and work ethics adopted by employers and capitalized by capitalism. Due to these rising developments, the demand of knowledge base workers has been on a rise for small to large scale organization in the country. This rise has seen to newly built office developments ignoring the wellbeing aspect of the white collar wok environment. Although with new breakthrough in technology, white collar offices today still express a production and consumption factory working concept of times of old.

This project explores the possibilities of high rise offices adopting a more human centric approach to designing it. The project adopts the idea of Biophilia, a human's innate attraction to nature and its natural processes, as a driving concept in designing knowledge based work environment. Thus, Healing 360 curates a space for a live-work community and a central business hub for knowledge worker from different disciplines to thrive not only in their respective careers but thrive along one another and to cultivate a sense of healing while working at the commercial centre of Kuala Lumpur at Plaza Rakyat.

The proposal will explore the question of how does biophilia affect the architecture of knowledge based work environments? and the objective of the thesis will be to demonstrate a new office typology for Plaza Rakyat through the expression of Biophilia.

Keywords: *Knowledge workers, Biophilia, Office*

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CHAPTER 1: INTRODUCTION

The office environment has always been known as a place of business and is an essential part of any country's economy. Being one of the main economic engines of Malaysia's economy, the office mainly serves as a tool for knowledge based workers in the service sector of the economy. But like any engines, wear and tear are inevitable especially to the 'cogs'(employees) that operate them. In Malaysia, efficiency and profit is one of the main leading factors that contribute to a building's typology. Sacrificing more quality for quantity where the wellbeing aspects of the employees are most of the time, compromised as a result of 'good business'. In the context of the office, although bricks and mortar has been replaced with steel and glass, the offices still express the 19^{th} century idea of production and consumption even in this era.

Although many efforts have been made to address these problems via interior design space planning and technological advancements. Perhaps it is time to bring it back a notch and address this issue from a more 'natural' perspective. To improve employees wellbeing and productivity through basic principles that has helped us survived for centuries.

This thesis is an attempt to create a proper environment for knowledge workers and its role in their wellbeing and productivity. By rebooting the cliché ideology of what an office should be.

BACKGROUD ISSUES

Malaysia is among the urbanly dense country in East Asia. According to the report titled *East Asia's Changing Urban Landscape: Measuring a Decade of Spatial Growth*, Malaysia is among the more urbanized countries of East Asia, and its urban population continues to increase rapidly.

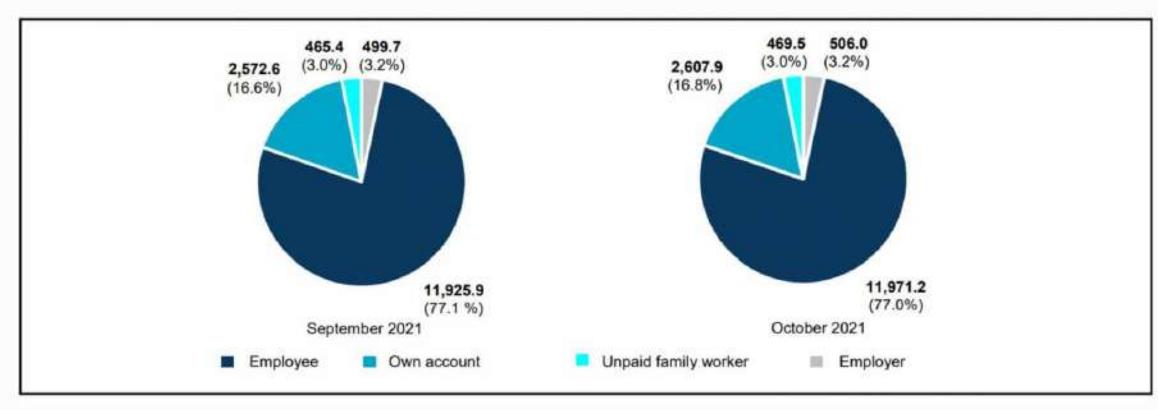


Figure 1Knowledge Employment Status 2021

With this growth in urbanisation also comes with more employment rate, where there is an upward trend of employed person across Kuala Lumpur as mentioned in the above diagram. Where a majority of these employees are working in the servicing sectors that requires them present in the office environment most of the time. (Arinah Sofiah, 2021).

With no signs of urban development slowing down, the essence of the problems that employees face lies within their work environment which have been notorious for contributing to several health issues (healthiest workplace.aia, 2019) .

Figure 2 Health Issues and Work Environment

Understanding how these health issues come about will guide us in minimizing or managing the impact of the said issue.

The typical ideology of an office environment is a place of business where employees are placed in cubicles or behind a desk and employers expecting them to work efficiently without any harmful consequences.

Currently, we have come a long way from the factory and bureaucratic work environment. And with technological advancements, and building materials switching to a more seemingly aesthetic visual. We are still holding onto the same principles of production and consumption and ignoring the new era of employees, psychological study and even social issues that has been raised time and time again.

The current building typology are affecting employees mentally and physically. Therefore, this thesis is an exploration of bringing life into the work environment.

Currently, the raised issues come from two sources within the context of the employee work culture which is from the external and internal sources as shown in the diagram below.

Figure 3Internal vs External Conflicts

INTENTION

The overall aim of this research is to explore the potential of designing a new typology of work environment whereby the employees physical and mental wellbeing can be sustained in a rigid environment like an office. By evaluating the common physical and mental barriers in a work environment. The data will greatly affect the outcome of the new architectural typology. Through the implementation of healing architecture and active architecture into the project, it is possible for these two aspects to be the foundation in sustaining the wellbeing of future employees and the future of a healthy work environment.

The healing process will involve the building typology as a whole, through spatial planning and qualities of spaces as well as the quality in terms of the urban intervention as well on the proposed site. The urban planning's will greatly focus on the continuation and improvement of existing facilities on the site while the proposed building will be the healing and active based aspects that offices are now lacking.

TERMINOLOGY

The proposal focuses on the wellbeing aspect of a specific office building typology where the gaps in these aspects are a result of the absence of proper social and healing programs and facilities and filling these gaps by addressing the physical and mental issues in a work environment is one way of doing so. By breaking down and re-constructing the mental framework of what the office should be.

The improvement towards the office typology is an opportunity to rejuvenate society's mind-set towards an office in general. Integrating oneself into a working community with a healthy working culture and activity is much more sustainable than integrating into a toxic working community with no social bonds.

The idea is not to completely ignore the working aspect of the office environment. The work and the stress that comes with it will always be there, it is how employees manage them through spatial design strategies and interventions that will help them keep the said side effects at bay.

SCOPE

The scope of the study area is conducted on white-collar employees (knowledge workers) in general considering their physical and mental well-being within a particular office typology. The area of study will mainly consist on an urbanly dense commercial area in Kuala Lumpur where the concrete jungle has played a part in affecting the knowledge workers state of mind.

Besides the target users, the issue that would be tackled is the psychological and physical strain that knowledge workers face at the office. Where the goal is to design an engaging environment that would promote wellbeing and social interaction through healing design strategies.

CHAPTER 2: LITERATURE REVIEW

THE RISE OF THE MODERN OFFICE

While an office can refer to a place within which business is conducted, or denote the entity of people, the specific culture and kind of work subsumed within such a finite architectural entity, it at the same time stands in a wider context. The types of business conducted in an office, the means and structure by which this work is carried out, as well as the occupational profit le and social composition of its workers are all embedded in wider social, economic and technological changes. Understanding this context is critical for imagining and assessing the future of the office in the decades to come.

At the turn to the 20th century, the rise of the service sector and transition from industrial labour to clerical tasks has triggered a mass migration of workplaces from factories into bureaux, which previously were largely reserved for government administration or specific sectorial work, e.g. lawyers and journalists. This would eventually lead to A changing understanding of individual success and personal aspirations, as well as the separation of work and leisure, are all reflected in what we conceive as an office today and its role in everyday life (Wilson, Guerriero R. 1988).

In the second half of the 20th century, technological changes have swept across the entire economic sectors. Under the moniker ‘Post-Industrial Society’, the sociologist Daniel Bell diagnosed the transformation of an industrial society into a service society, where the service sector generates more economic wealth than the previously dominant manufacturing sector. This terminology is congruent with the notions of primary sector (raw materials), secondary sector (manufacturing) and tertiary sector (services).

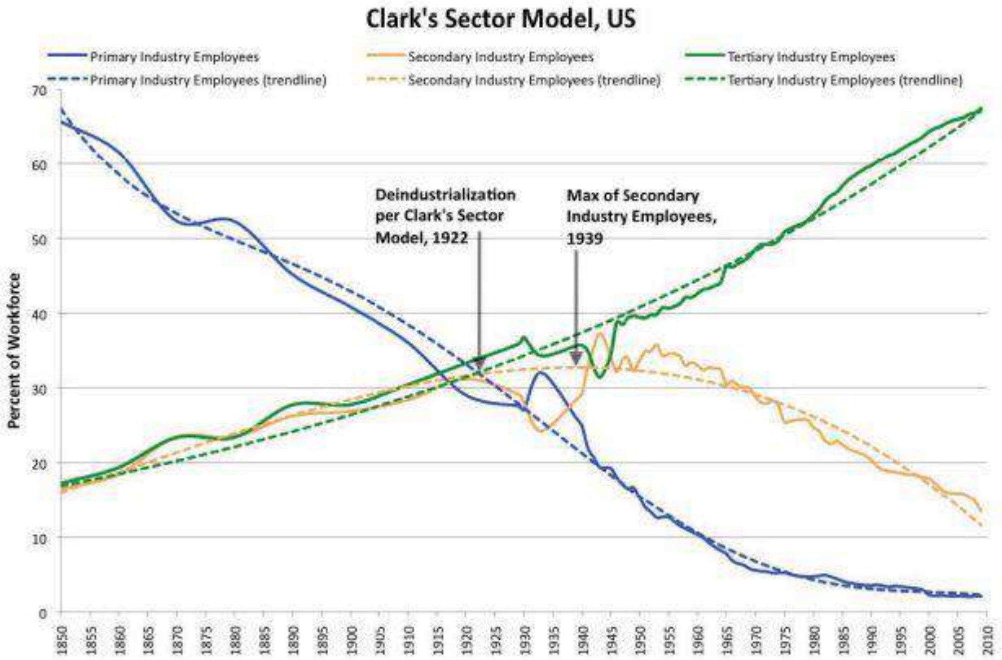


Figure 4Economic Report of Knowledge Workers

As knowledge becomes a crucial form of human capital, the steady supply of ideas fuels economic growth, it became clear that future growth required an organisational environment which could foster and develop those skills as a competitive advantage. Whereas the nature of work had changed, management styles and office environments still echoed assembly line jobs and a Fordist work structure.

The new organisation relied on autonomy in the workplace and employee initiative. This change was reflected in changing office design, which now needed to facilitate collaboration, flat hierarchies and flexibility, e.g. ‘hot desks’ (Boltanski & Chiapello 2005).

As the office evolved over time, and in relation to external social, economic and technological factors, which have modified its appearance and functionality. **Crucially, the office has become the engine room for the service and knowledge economy. As this engine room, by definition it has become an environment of innovation, critical for fostering productivity and competitiveness.**

WORKSITE HEALTH AND WELLNESS IN EUROPE

Based on the data of the World Health Organization (Perk.J et. Al...) the World Economic Forum recently declared that "chronic disease" is the leading cause of death and disability worldwide. Increasingly, it affects people in low to middle-income countries while continuing to be a major health concern in high-income countries. Chronic diseases impair productivity and lead to increased costs (Suhrcke M, et. AL...) To combat these trends, multinational companies are using the workplace to promote long-term behavioural changes, which will benefit employers, employees and communities". (The World Economic Forum. Working towards wellness. Accelerating the prevention of chronic disease.)

Societal changes and commercial influences have led to the present unhealthy environment in the EU, which has led to an increase in CVD (Cardiovascular Disease) risk.

Workplace health promotion (WHP) provides the opportunity not only to improve the health and wellbeing of people at work but also to deliver CV primary prevention programs by improving healthy lifestyles. Essential components of WHW programs are also well established. Health care professionals who are skilled in health education and/or motivational strategies/behavioural modification are of benefit to WHW programs, particularly when there is a focus on CV risk reduction.

EU-OSHA: osha.europa.eu/en

The EU-OSHA is an organization committed "to making Europe a safer, healthier and more productive place to work". It promotes the culture of risk prevention to improve working conditions in Europe. Wellbeing at work is a concept that summarizes the quality of the work environment, including occupational safety and health (OSH) aspects. OSH are major determinants of productivity and are thus of major importance for employees and employers in the EU.

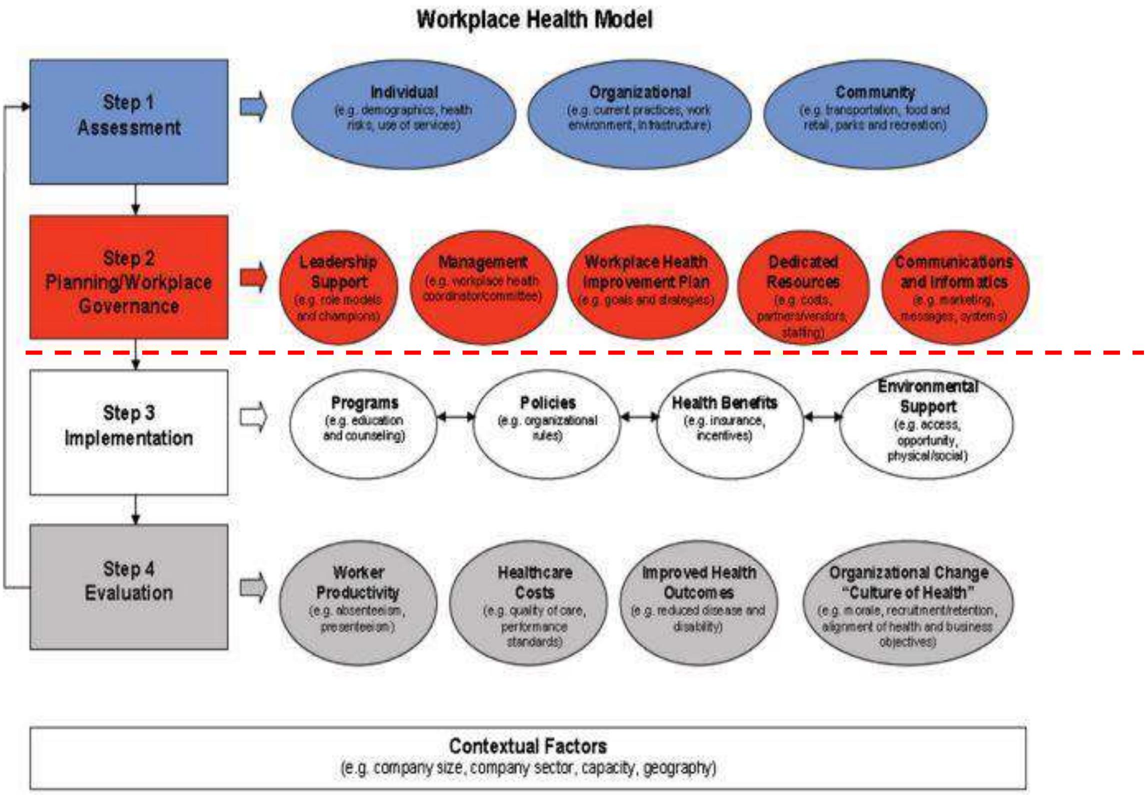


Figure 5The CDC Workplace Health Model

There is a common problem in sustaining the implementation of the Workplace Health Models in built environments. Where users tend to forget and ignore the benefits of such system for the inconvenience of life.

The CDC Workplace Health Model is a systematic and stepwise process of building a workplace health promotion program that emphasizes four main steps:

- An assessment to define employee health and safety risks and concerns and describe current health promotion activities, capacity, needs, and barriers.
- A planning process to develop the components of a workplace health programs including goal determination; selecting priority interventions; and building an organizational infrastructure.
- Program implementation involving all the steps needed to put health promotion strategies and interventions into place and making them available to employees
- An evaluation of efforts to systematically investigate the merit (e.g., quality), worth (e.g., effectiveness), and significance (e.g., importance) of an organized health promotion action/activity.

The areas of activity for WHP include life-styles, aging, mental health and stress, wellness, nutrition and physical exercise. Special attention is paid to physical exercise, since many employees spend their working time sitting, which leads to a lack of movement or exercise.

The ENWHP recommends that the promotion of physical activity in the workplace should include:

- an approach that encourages exercise and sports' activities, as well as participation in social events during working and non-working hours and on weekends,
- an infrastructure that provides a variety of easily accessible programs for physical exercise, either on company property or through cooperation with external sports 'centres and facilities,
- extensive information on the importance of PA to create awareness among employees.

THE ARCHITECTURE OF WELL BEING

HOK is responding to the coronavirus pandemic by accelerating their commitment to sustainable design to deliver a new "Architecture of Well-Being."

The tactical responses to the COVID crisis, like installing plexiglass barriers or eating lunch alone will either fade or become part of our daily routines. We want to be more strategic in our response and guide cities like New York toward a healthy, low-carbon and regenerative future.

Six Principles

Six fundamental principles drive their integrated design approach for the Architecture of Well-Being: Accessing Nature, Movement, Nutrition, Air Quality, Decentralization and Trust.

The principles begin by addressing the health of individuals and then scale up to focus on the health of the city.

Figure 6 Six Fundamental Approach to Well Being

Source: HOKdesign.com. 2022

When activated by architecture, interior design and urban design, these six principles act as a membrane catalysing positive feedback loops between individuals and the city. As the rising tide of health lifts all boats, it can reinvent New York City as a model of health and sustainability for the world.

With a design guided by the six fundamental principles of the Architecture of Well-Being, a next-generation life science community could embrace the richness of dense city environments to enhance people's work-life balance:

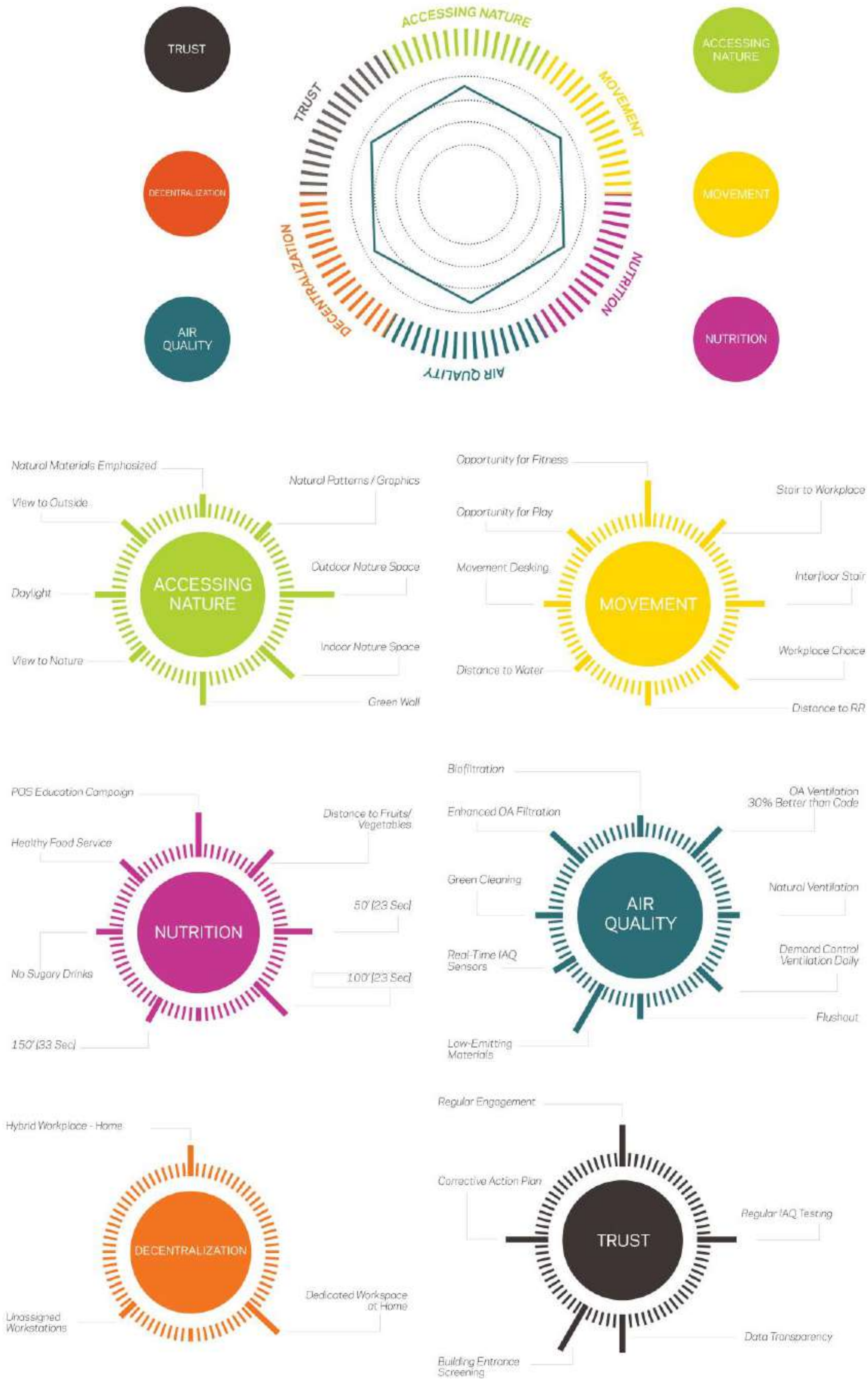


Figure 7Six Architectural Approach to Well Being

HOW CENTRAL PARK IS HEALTHY FOR URBAN NEW YORK

Source: https://www.centralparknyc.org/articles/park-city-healthy

Figure 8 Comparison of New York with and without Central Park

TREES KEEP CITIES COOLER

The Park’s trees not only decrease carbon dioxide levels, but also help keep New York City cool during increasingly common heatwaves that are exacerbated by the climate crisis. Metropolitan areas like New York City often constitute “urban heat islands,” which are hotter than surrounding rural areas due to heat-absorbing materials like concrete and glass. Trees work as natural air conditioners, not only providing shade for the people sitting under them, but cooling the city as a whole. These trees also absorb water that evaporates in the heat, cooling the air temperatures around them.

HEALTHY PARKS MAKE HEALTHY PEOPLE

Access to open spaces for physical activity results in a 25 percent increase in exercise, three or more days a week. This is great news for the millions of New Yorkers who live near Central Park. More than half a million people live within a 10-minute walk from the Park, and roughly 1.2 million more are within a half-hour bus or subway ride. With ballfields, tennis courts, handball courts, playgrounds, ice skating rinks, boat rentals, swimming pools, running trails, and more, Central Park offers New Yorkers a variety of ways to stay active. For those looking for some relaxation, newly renovated areas like the North Woods and the Hallett Nature Sanctuary offer an opportunity for quiet and solitude amid the bustle of New York City

COMPARING THE IMPORTANCE OF CENTRAL PARK AND WITHOUT CENTRAL PARK IN NEW YORK

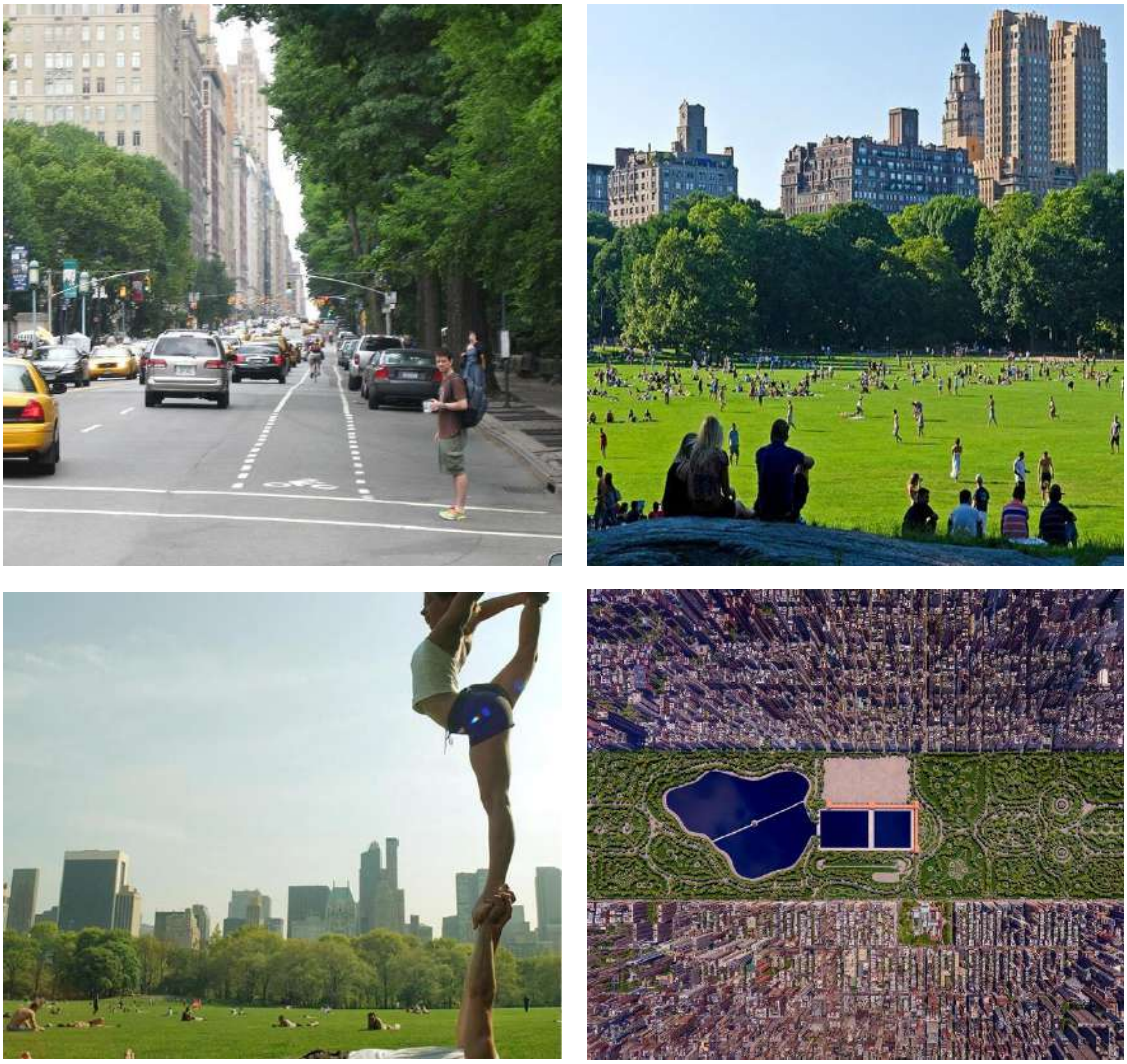


Figure 9 Central Park with greens

Figure 10 Central Park without greens

CHAPTER 2.5: PRECEDENT STUDY

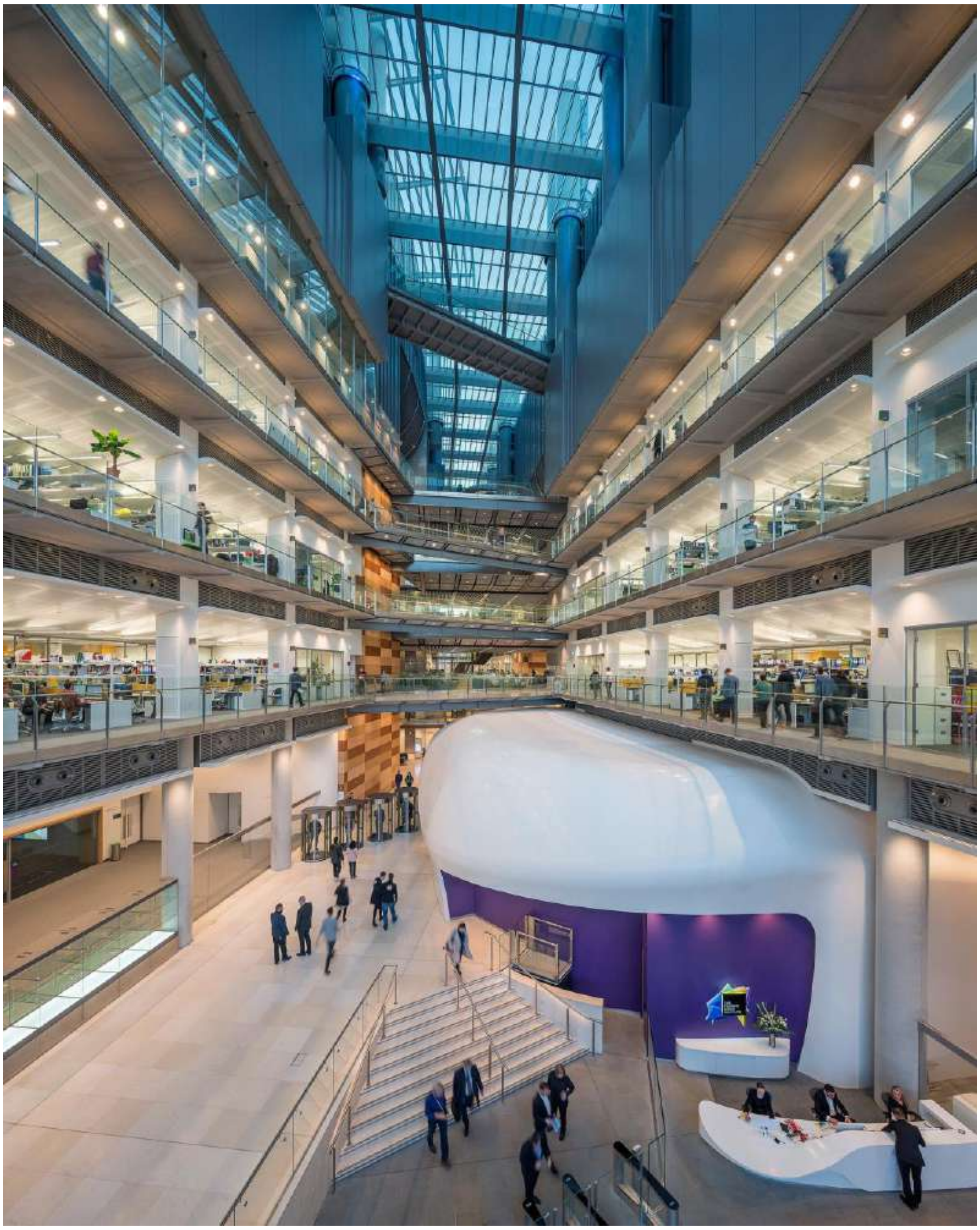
CASE STUDY 1

FRANCIS CRICK INSTITUTE, LONDDON, UNITED KINGDOM

By HOK Architects

Imagine a research centre without hierarchy or departmental divisions. A place with open doors for impromptu conversations and idea sharing. An environment where collaboration trumps competition and where the work of one researcher is intimately connected to that of her peers.

That's the idea behind Francis Crick Institute, a first-of-its-kind biomedical and translational research centre in the heart of London.



Daylighting and Open Space

Visitors are immediately struck by the abundance of natural light streaming in from the four-story atrium that runs the entire east-west length of the building. This atrium, along with a smaller north-south atrium, lends the Crick an open, transparent feel that also provides views and connections to all four lab neighbourhoods within this nearly 1 million-sq.-ft. structure.

Science on Display

The Crick's neighbourhood layout further promotes transparency with glass-walled labs and open write-up areas around the perimeter of the main atrium. Researchers and scientists from the centre's 120 labs can easily observe each other and share ideas.

Myriad Collaboration Areas

Located in the centre of London's scientific community, the Crick has become a hub for both formal and spontaneous gatherings. Colourful breakout spaces on each floor facilitate chance meetings. An open stair in the central atrium leads to informal meeting areas where researchers gather for planned or serendipitous meetings. Mobile, double-sided white boards encourage impromptu brainstorming and sharing.

Accelerating Translation for Health and Wealth

The Crick's leaders want to translate their basic biomedical research findings into prevention and treatment as quickly as possible. Our challenge was to eliminate any physical or psychological obstacles that would hinder the knowledge sharing that is so essential to linking lab discoveries to partners who can take these products and technologies to patients. Only then could we fully activate the "hive mind" of the Crick's people.

The team designed every part of the building to serve as an incubator that supports the combined efforts of researchers, educators, students, clinicians, technology transfer staff and strategic business partners.

First, there are no departments or physical barriers dividing the 120 labs. The openness of the entire building, open space plan and relationships among write-up offices, primary labs and secondary labs make it easier for scientists to work together in meaningful ways.

CASE STUDY 2

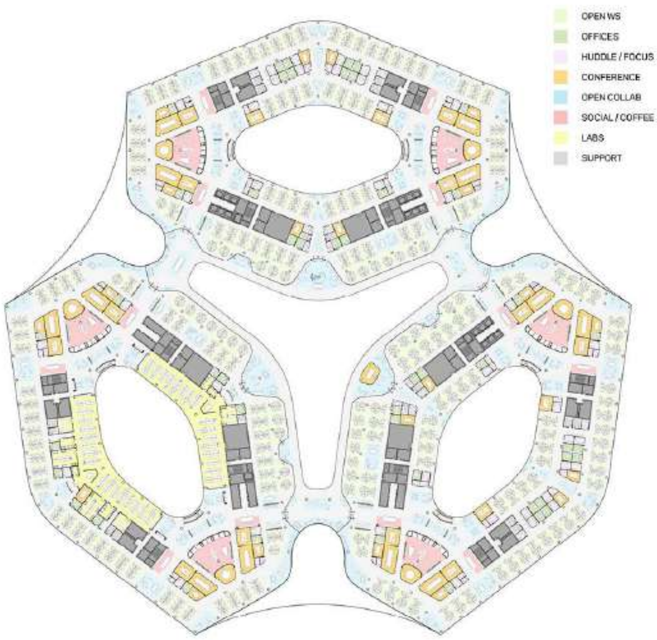
RESEARCH COMPLEX DESIGN COMEPETITION, Asia

HOK Architects

The design nestles this R&D complex into a crescent-shaped valley in a clearing at the base of a mountain range. It’s a jewel in the forest.

Blending the new R&D complex into the natural world supports the company’s goal of driving discovery and innovation.

The architecture, interiors, building systems and landscape work together as a timeless composition to put employees at ease. Surrounded by nature, they can relax and think more creatively. The stunning outdoor landscape inspires them as they conceive ideas for changing the world.



The main R&D center’s three diamond-shaped pavilions feature 250,000-sq.-ft. concentric floor plates that merge to form one contiguous floor plate. This blurs boundaries between the pavilions and promotes serendipitous encounters and discoveries. Occupants experience a sense of perpetual motion that pushes them forward and stimulates innovative thinking.

The design orients building footprints to provide maximum exposure to the natural surroundings. The three diamond-shaped pavilions of the main R&D centre each have views to the outdoors including vistas on all sides.

At One with the Environment

The form and undulating roofscape are in harmony with the surrounding hills. Structured openings in the building form incorporate light, air and the landscape as essential design elements, offering occupants direct access to nature.

As a companion to the main complex, the sub R&D building embraces the hillside from which it has emerged. Its stepped terraces are landscaped with vegetation, gardens, paths and outdoor seating areas that act as extensions of the natural green hillside.


Connecting 10,000 Innovators

The design of the main R&D complex ensures that the company’s people are connected. They all benefit from ample daylight, openness, and physical and visual access to their colleagues and outdoors.

The efficient plan ensures that every desk is within 46 feet of the building’s perimeter, giving everyone access to views outside and the amenities placed around the building perimeter.

People can walk around the outer perimeter of the building—from corner to corner in every direction—in less than a minute.

Inclusive Workplace

The strategy of providing neighbourhood-based environments creates micro communities within the larger floor plates and connects everyone with central amenities.

The design creates a neurodiversity-friendly workplace that enables people from diverse backgrounds to thrive. Employees can choose their appropriate work environments for each task. Spaces are optimized for acoustic quality, thermal comfort and daylighting. They can easily adapt to the needs of both hypersensitive and hyposensitive occupants.

Amenities that support employee health and well-being include healthy dining options, fitness centres, gardening areas, walking trails, a health clinic, nap nook, prayer room and yoga room.

Science on Display

The design challenges preconceived notions of a typical scientific research facility, putting science “on display” by maximizing transparency and integration between labs, offices and public spaces.

Public-facing technology labs, high-tech product displays, and science-inspired artwork blend the research activities into the building design.

Pedestrians First

The plan prioritizes pedestrian safety, comfort and efficiency.

All employee parking is underground, allowing for a car-free landscape. The carefully designed campus plan eliminates the need for even small personal electric vehicles.

Open staircases are strategically located at nodes within each of the building pavilions, as well as along the atriums.

Resilient for the Future

The design treats the company's land as a precious asset. Consolidating the new main R&D center and sub R&D facility preserves a large portion of the campus site for future development. With a carefully phased construction approach, the site will accommodate needs the company cannot predict for years to come.

The highly flexible interior space will allow the company to adapt to whatever the future brings.

Science + Technology
Next >

slideshow

CASE STUDY 3

LG SCIENCE PARK, SEOUL KOREA

HOK Architects

The chairman of LG Group had a vision: Merge LG's eight affiliate companies into a single research site in Seoul and infuse this next-generation campus with the company's "innovation for a better life" esprit de corps.

That vision became reality in LG Science Park, a 26-building campus designed to inspire 24,000 LG researchers, engineers, scientists and visitors at work on tomorrow's new products and discoveries. Located in Seoul's R&D-focused Magok District, the campus is the world research headquarters for LG Group's consumer electronics business and a new scientific hub for South Korea.

HOK's design propels scientific breakthrough by stimulating the synergies among people, places and activities. Though it's one of the world's largest corporate research campuses, LG's people have opportunities for interaction at four scales:

- Within individual labs.
- In lab neighborhoods.
- Via transparent atria that link lab neighborhoods and enable staff to make visual connections across large expanses of space.
- Through the entire collection of buildings joined by linear, landscaped parkways.

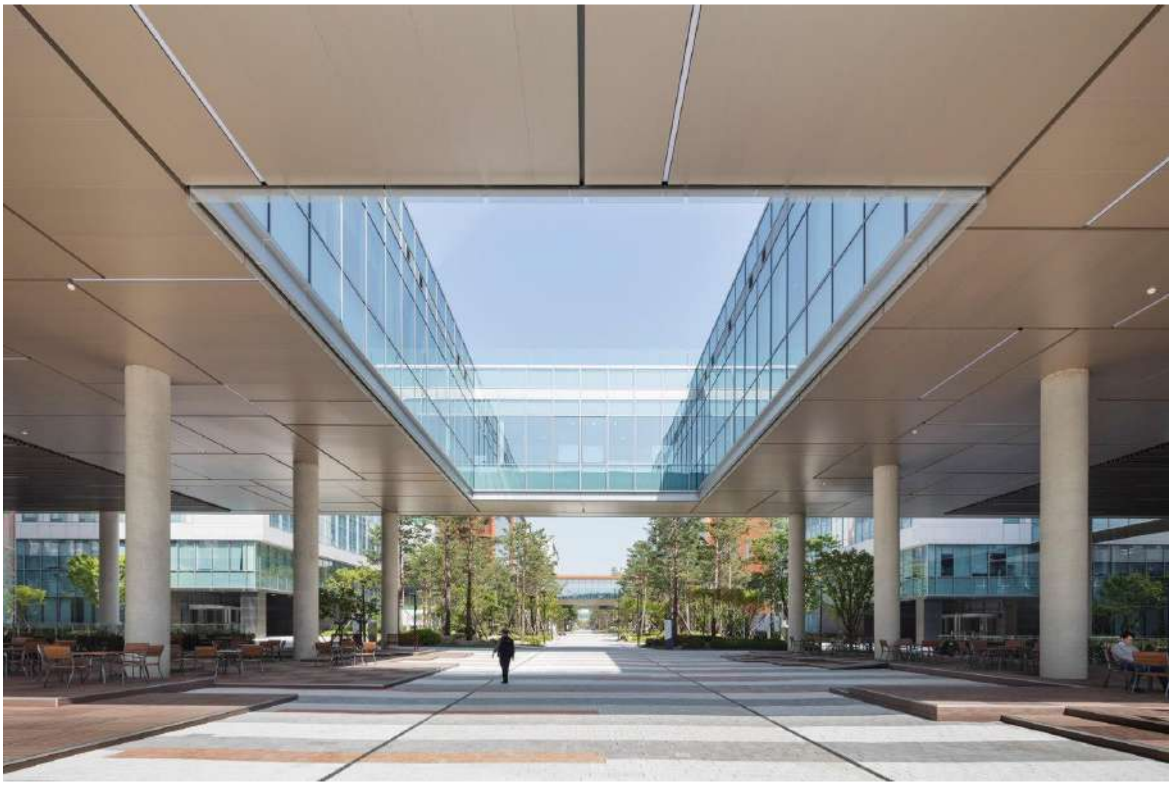
"All design decisions were made from the perspective of researchers, with research productivity and the synergy of fusion in mind. Here, LG will chart the right future for mankind."

— Ju-Hwan Shin , Managing director, LG Science Park Business Unit/Construction Drive Division

Advanced Technology, Beautifully Designed

Scientists and architects recognize that innovation emerges knowledge and imagination, which is why LG Science Park offers a mix of spaces for teamwork, individual reflection and discovery.

From a distance the campus appears pixelated, with each building having its own identity and entrance. Closer inspection reveals the buildings also function as a cohesive whole, connecting to each other through ground-levelamenity spaces that appear to grow out of the landscape and third-floor bridges. The campus is also united by a landscaped promenade that serves as both a public park and gathering space for employees.



Timeless Design

Emphasizing LG's minimalist approach to form, the post-and-beam, frame-based construction establishes a timeless feeling. Transparent ground-level spaces seamlessly connect the buildings to a new east-west linear park with plazas and gardens open to LG's employees and the community.

Though the campus is unified, every component is distinct. Each LG business group has its own main entrance and lobby.

HOK designed LG Science Park's labs to be highly flexible, allowing research teams to reconfigure the spaces quickly in response to new demands and research directions.

A dining hall beneath the promenade can serve 4,300 people per sitting, enabling employees from LG's various research groups to interact and share ideas in an informal setting that offers access to daylight and views onto sunken gardens.

Sustainable, Durable Materials

Building materials, which are as classic and durable as LG's consumer products, include glazing, natural stone cladding and aluminium mullions. The pale granite natural stone facades of the research buildings contrast with the dark-clad Integrated Support Centre located at the heart of the campus.

CASE STUDY 4

Khoo Teck Puat Hospital, Singapore

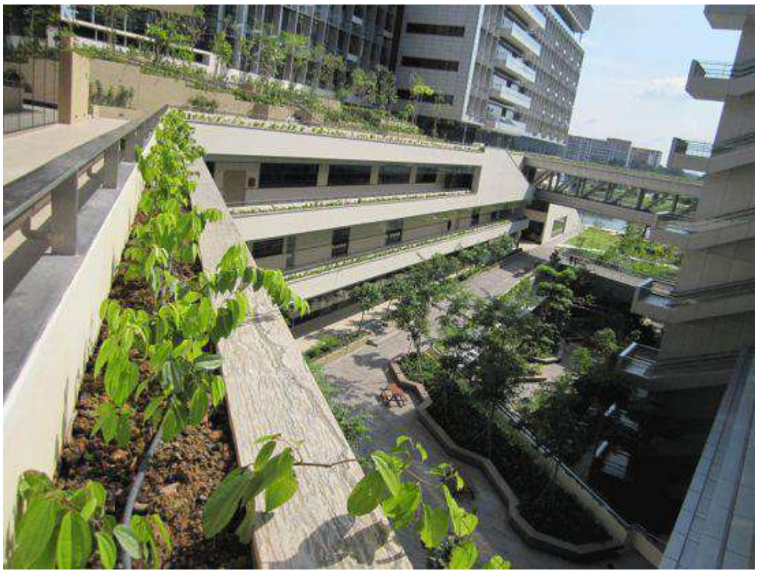
Architect Stephen Kieran

The 1.1-million-square-foot, 590-bed public facility deeply integrates plants in its architecture. This Singapore hospital offers a healing environment by appealing to the senses, from sight—views of abundant greenery and water features—to the smell of those plants and the sound of falling water.

Greenery takes up nearly four times the size of the plot of land, known as the green plot ratio, giving the hospital a rainforest-like quality that's heightened by the dragonflies, birds, and butterflies attracted to this oasis in the city.

The hospital is built in a V-shaped configuration to allow breezes to first skim over the stormwater pond next to the site. In the center is a forest-like court with greenery cascading to the highest levels of the building, bringing nature to patients' bedsides.

To the architect Stephen Kieran, the hospital proves the essential role this approach can play in improving health. "With Khoo Teck Puat, we see that biophilic design elements and attributes should not only be considered as part of the design process, but also as part of the healing process."



Green Plot Ratio

This metric shows the relationship between the surface area, either horizontal or vertical, filled with greenery, to the plot of land. It's an indicator of how much greenery there is in a given development.

V-Shaped Massing

Shaping a building into an angled series of blocks can maximize natural ventilation and reduce energy usage.

Stormwater Pond

An artificial lake surrounded by vegetation helps prevent flooding and erosion after rainfall.

Biophilic Design

This practice believes humans will thrive in built environments that integrate elements of the natural world.

CHAPTER 3: SITE ANALYSIS

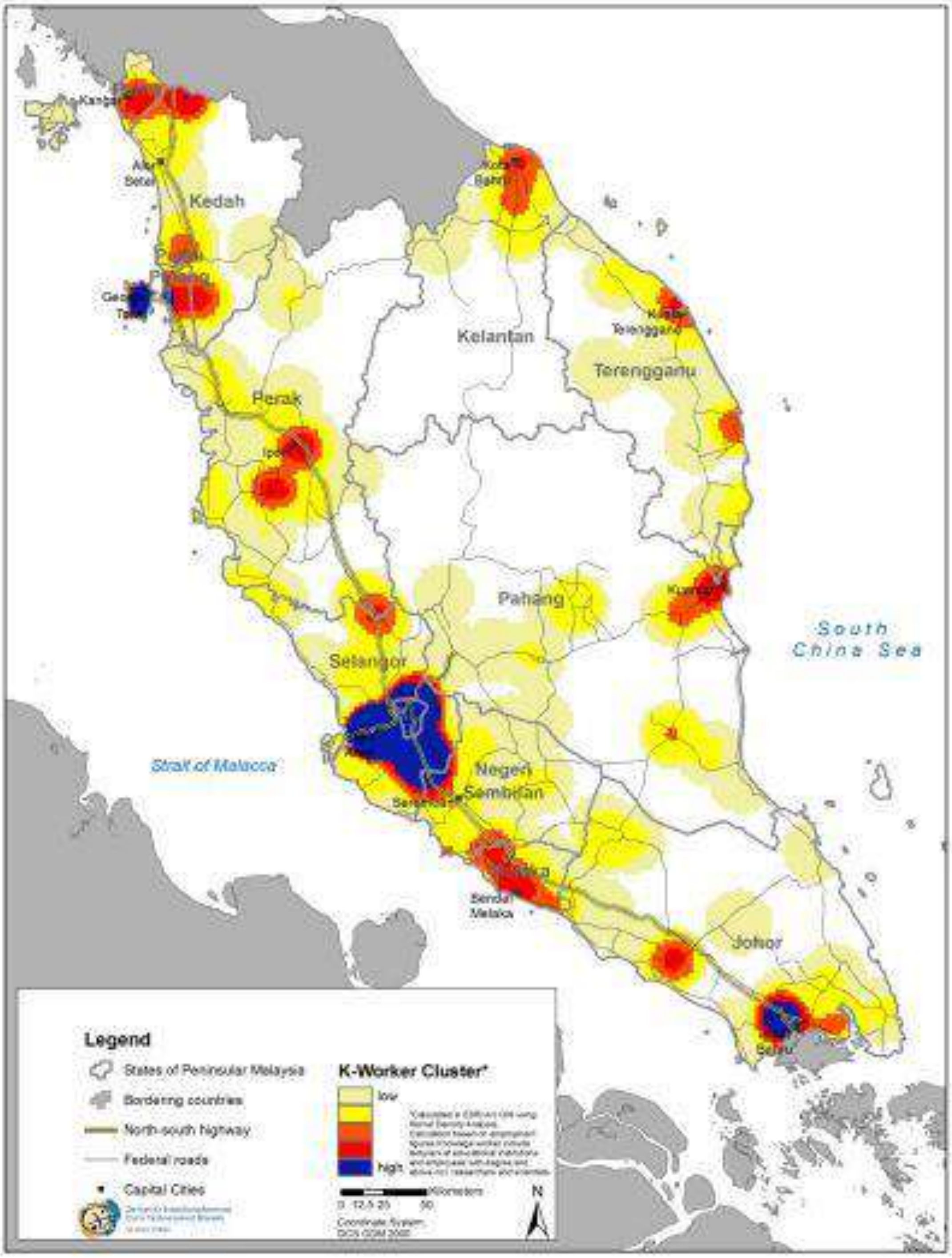
3.1: INTORDUCTION

The site selection was based on high rates of knowledge clustering indicators of a particular area in West Peninsular of Malaysia. Due to this clustering formation, the indicated area was set out to be the driving force for Malaysia to be a knowledge based economy and innovation following Malaysia and Singapore's clustering policy (Hornidge 2007; Menkhoff and Evers 2011).

3.2: SITE SELECTION CRITERIAS

(Hans-Dieter Evers, 2011) In his paper: Knowledge Cluster Formation as a Science Policy: Lessons Learned, states that the expansion of knowledge based institutions has created different groups of ownership i.e. individual proprietors, private companies, consortium of companies, public listed companies, government corporations, foundations, philanthropic organisations and community financing (Lee, 2004: 1).

The author discussed knowledge clusters in Peninsular Malaysia are still concentrated on the west coast with three main locations having the highest concentration of knowledge producing institutions and knowledge workers, namely Kelang Valley, Johor Bahru and Penang



Sources:
Ministry of Higher Education, 2008a, 2008b, 2009, 2010(unpublished data); Ani Asmah(eds), 2009 and field data, 2009[7]. Map design: H.D. Evers, cartography: Pamela Nienkemper.

[6] The map is based on number of employee as of 31 December 2008.
[7] Data on employees for some of the R&D Institutions were collected by Ramli Nordin through a telephone survey between April-December, 2009.

Figure 11 Knowledge Clusters in Peninsular Malaysia

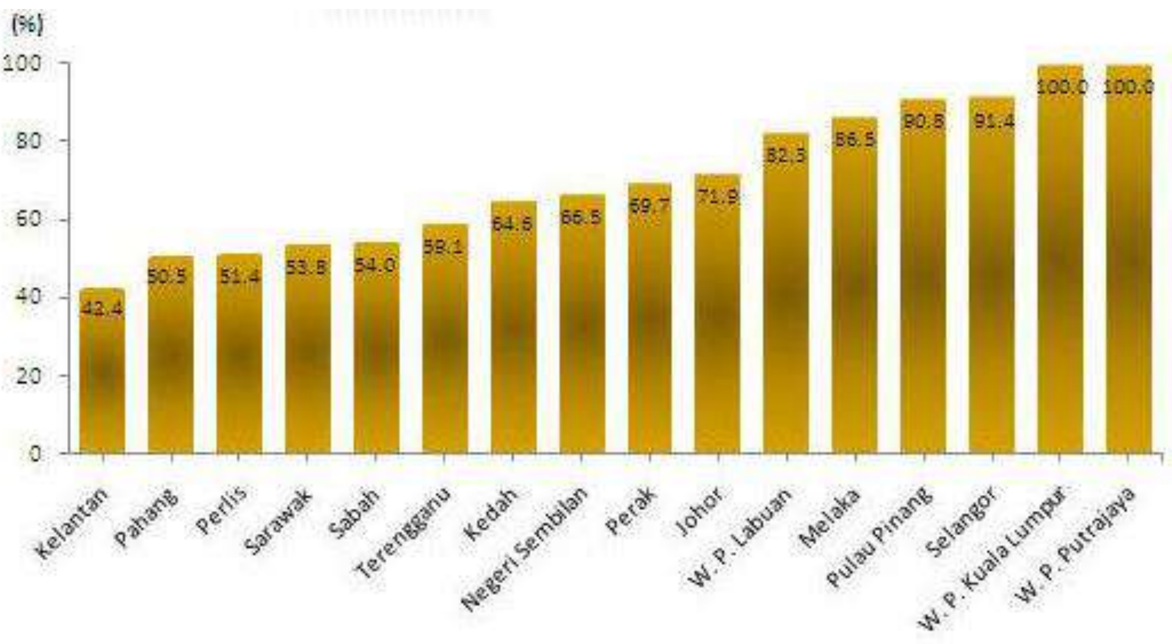


Figure 12: Level of Urbanisation by State in Malaysia,2010

3.3: SELECTED SITE

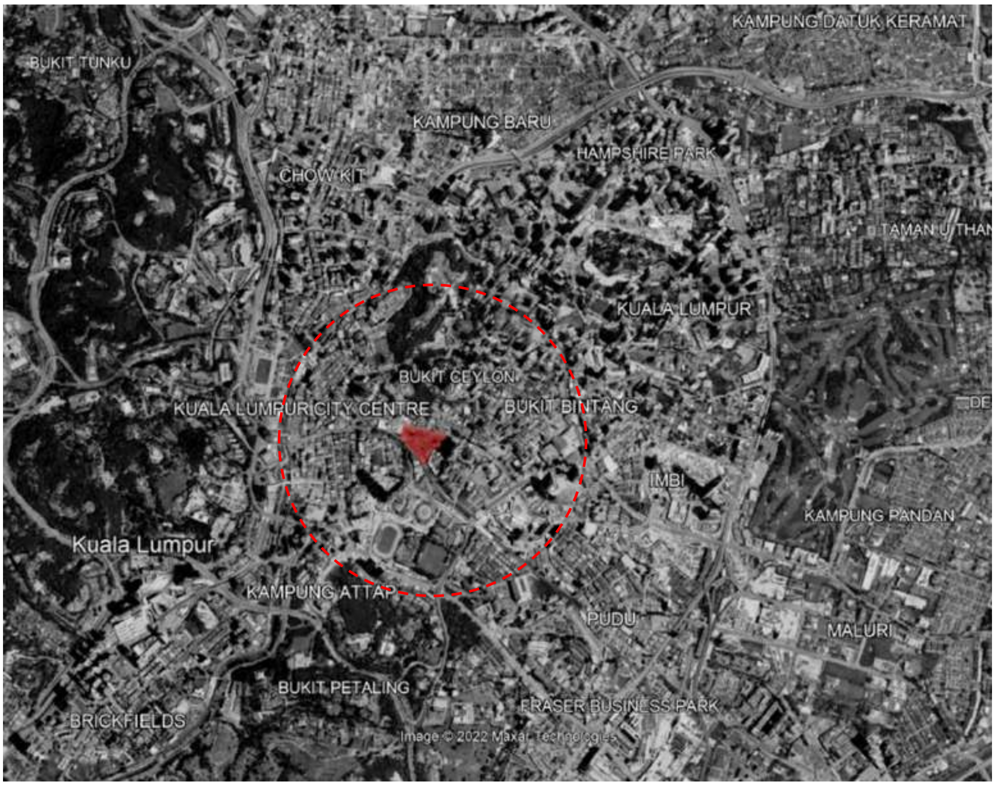


Figure 13 Satellite view of site

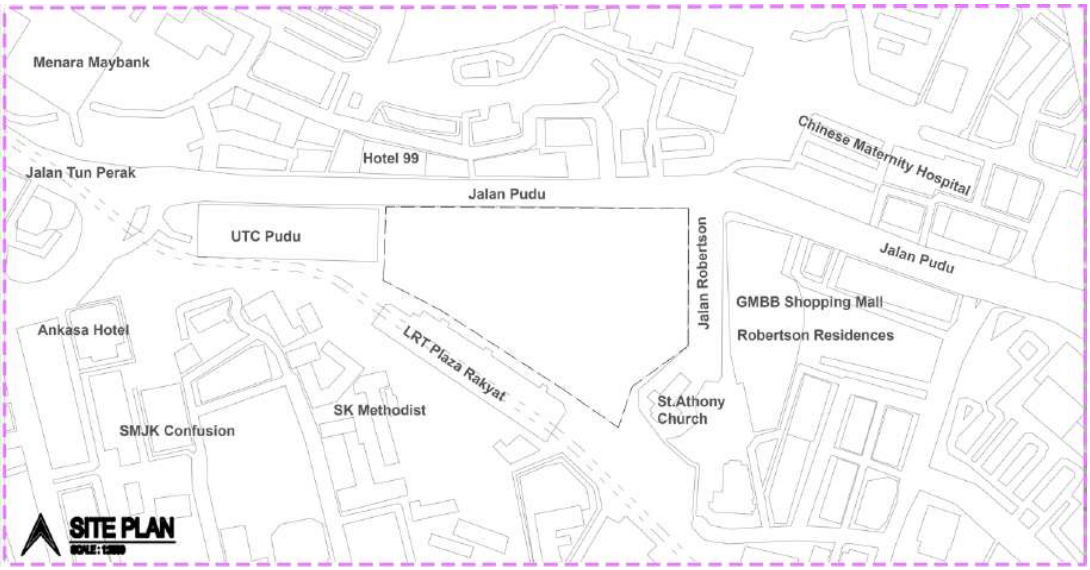


Figure 14 Site Plan

3.4: SITE BACKGROUND

3.41 History of the Plaza Rakyat

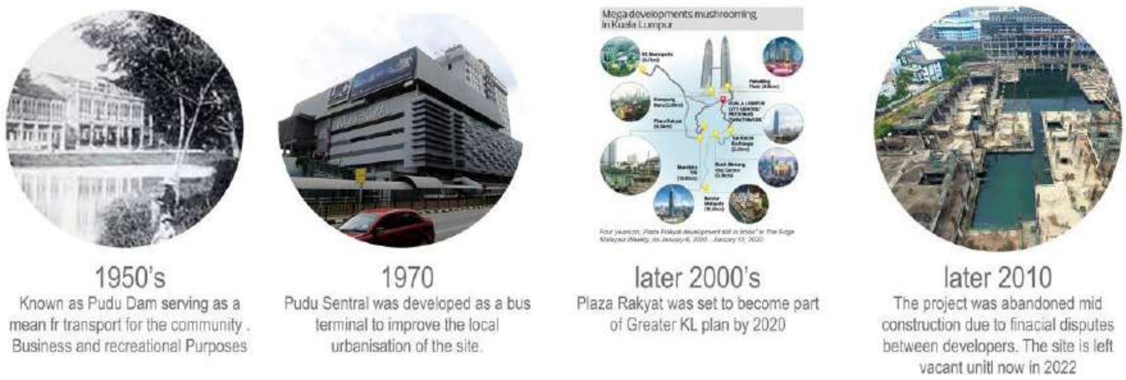


Figure 15 History of Plaza Rakyat

3.42 Urban Morphology within 1km of the Site

Plaza Rakyat has been undergoing rapid urbanization within the past 20 years. As can be seen in the figure below, the amount of greens is greatly diminishing with more high rises popping up within the proximity in just less than 20 years.

Figure 16 Site urban morphology

3.5: SITE SYNTHESIS

3.51. URBAN CONTEXT

a. Building Use

The site comprises of mostly institutional and commercial businesses making up of almost 50% of the site zoning.

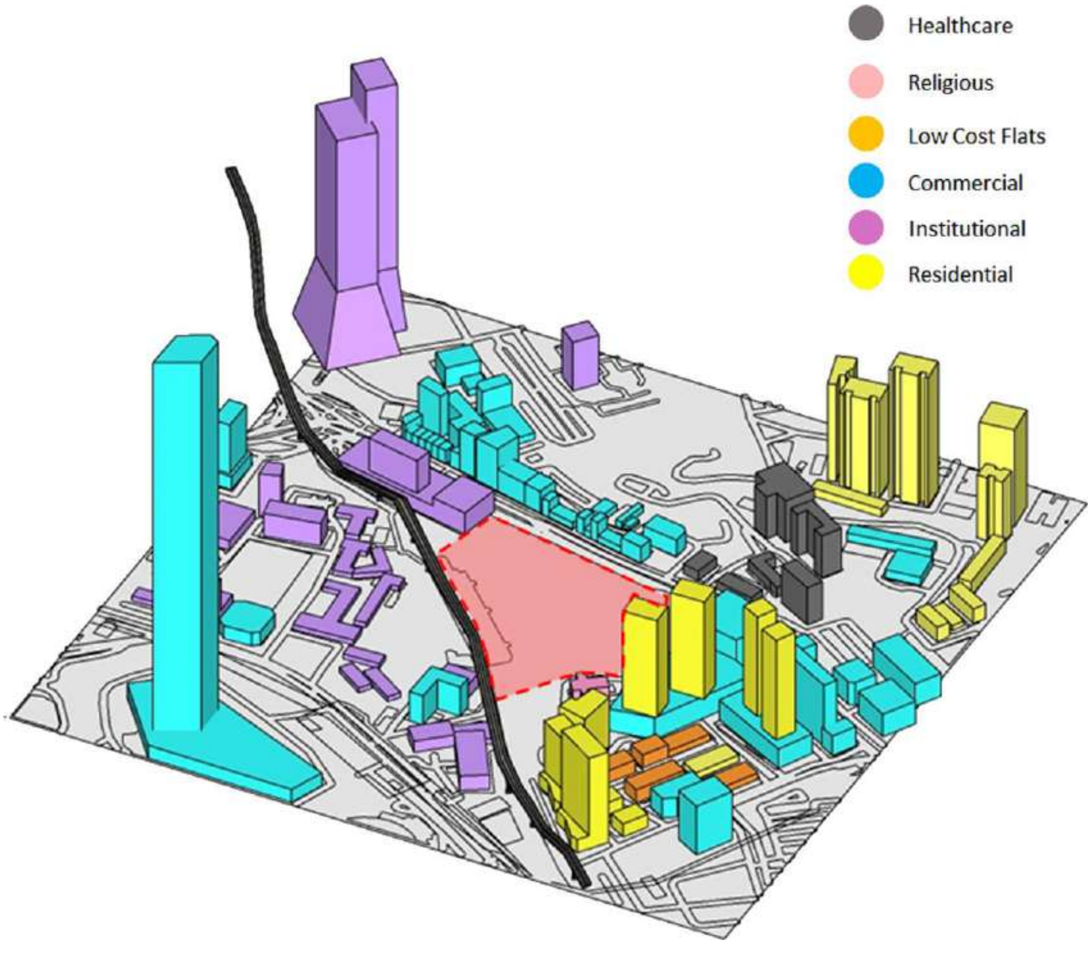


Figure 17 Contextual Building Use

a. Vehicular Circulation

The main vehicular access dominated by mobile vehicles are the main obstruct for community movement in Pudu. Although the surrounding nodes and buildings are within close proximity with each other, they are physically inaccessible due to the vehicular road circulation.

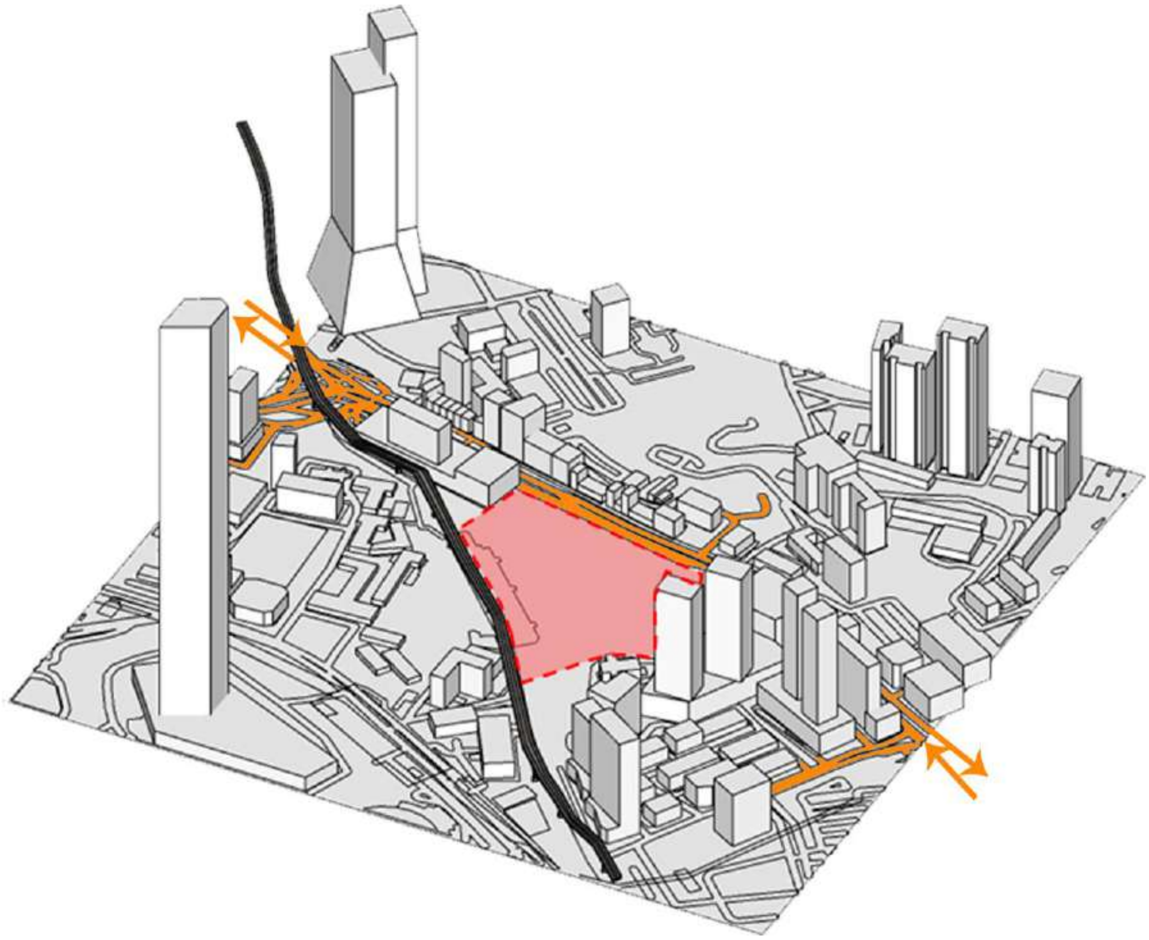


Figure 18 Vehicular Circulation

b. Pedestrian Circulation

Due to the dominant vehicular circulation, the pedestrian circulation is limited to only the boundaries of each existing building plot of lands. Therefore, pedestrian mobility is obstructed due to safety concern due to the traffic.

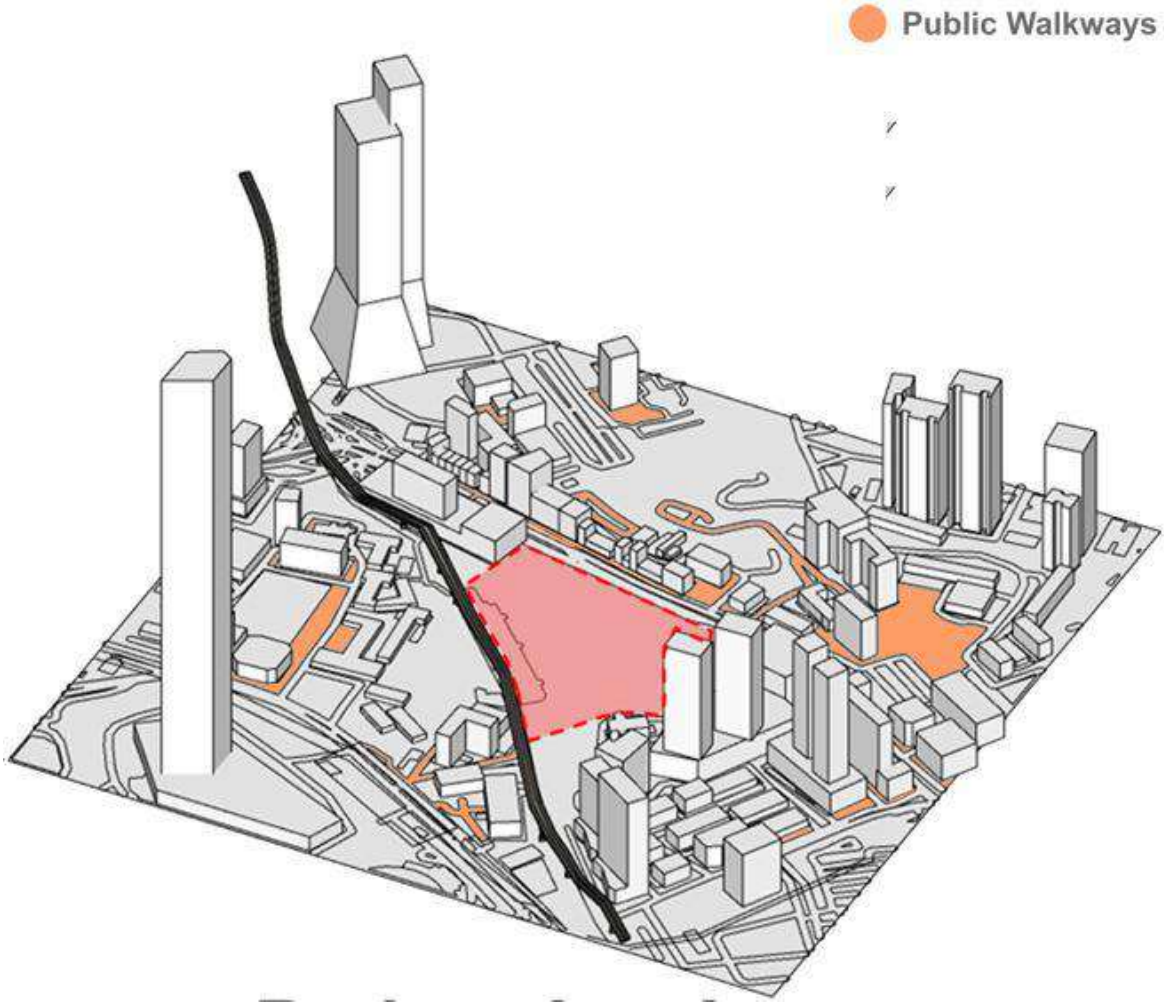


Figure 19 Pedestrian Circulation

c. Existing Nodes

Two main nodes which are the commercial and transit are disconnected as can be seen in the diagram below. Although located within the proximity of 1km of the site, the commercial nodes are segregated from each other with no means of linkages for the community.

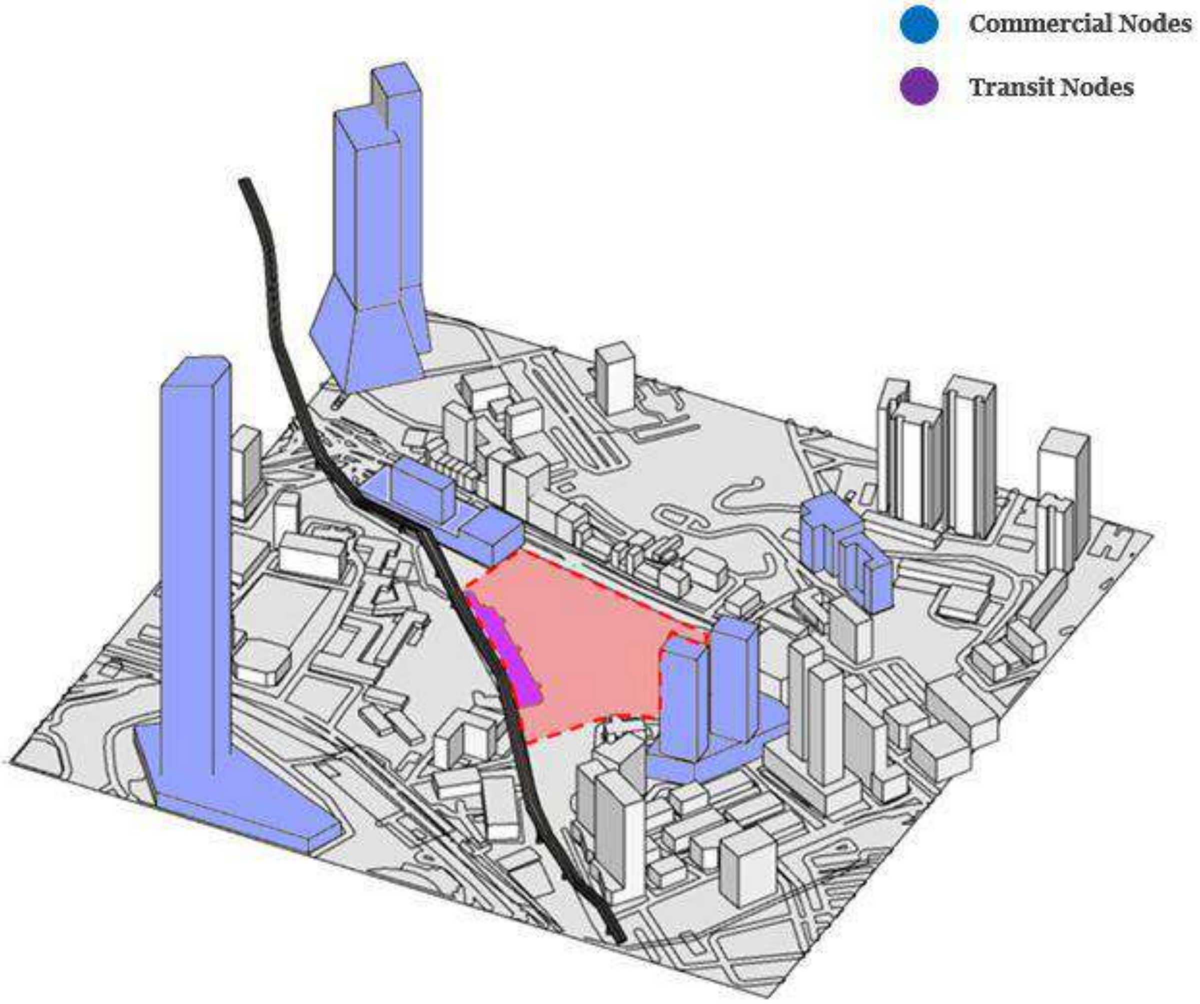


Figure 20 Existing nodes

d. Zone usage

The open spaces around the Site are mostly privatised for institutional and commercial used and is closed off to the public with security measures in place. Although open spaces like car parking are found on the site, they are unsafe to be utilised by the community other than parking their vehicles.

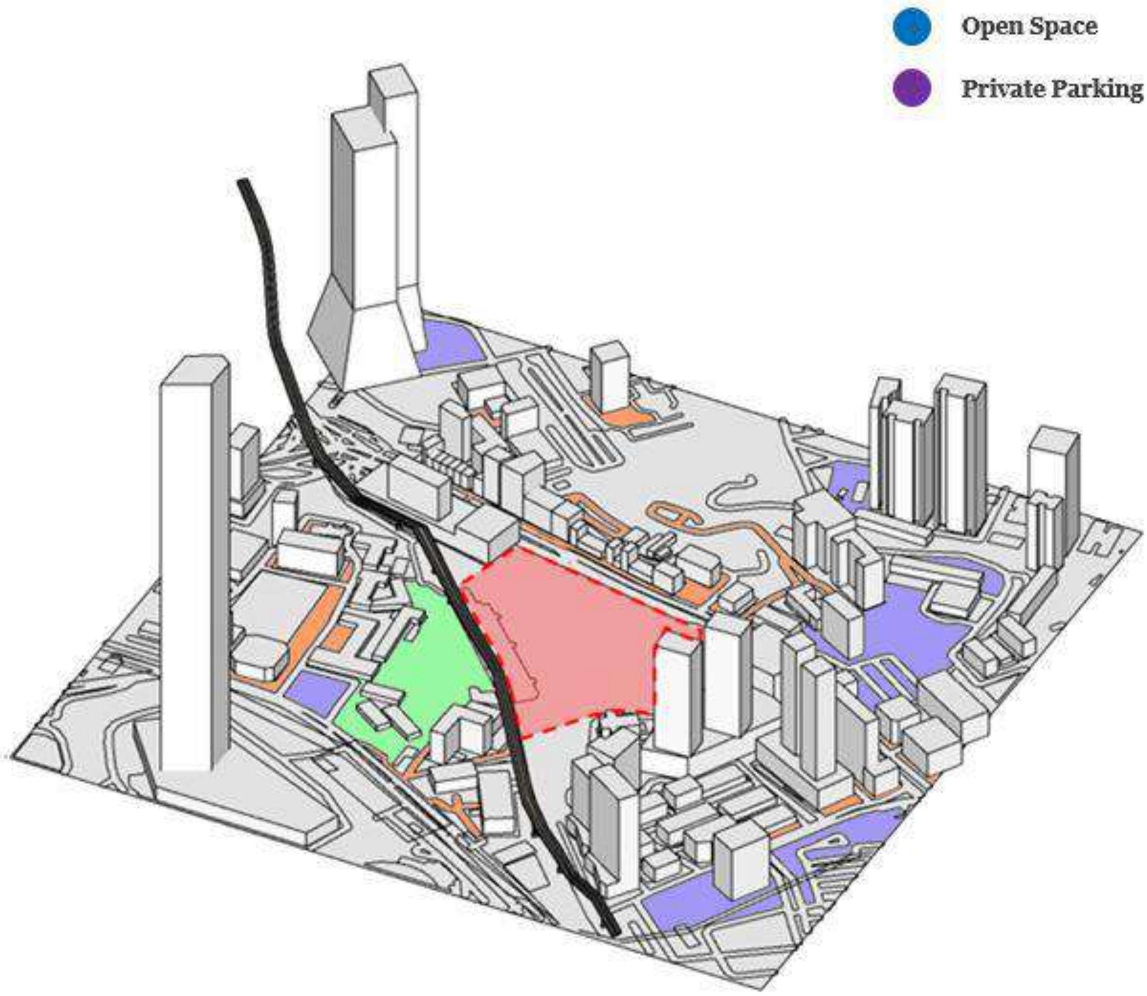


Figure 21Zone usage

e. Existing Office Typology

Since Pudu is dominated by commercial and institutional businesses and operations. There are 2 types of commercial office typology dominantly found around Pudu which are the wisma's and office shoplots.

Wisma Offices

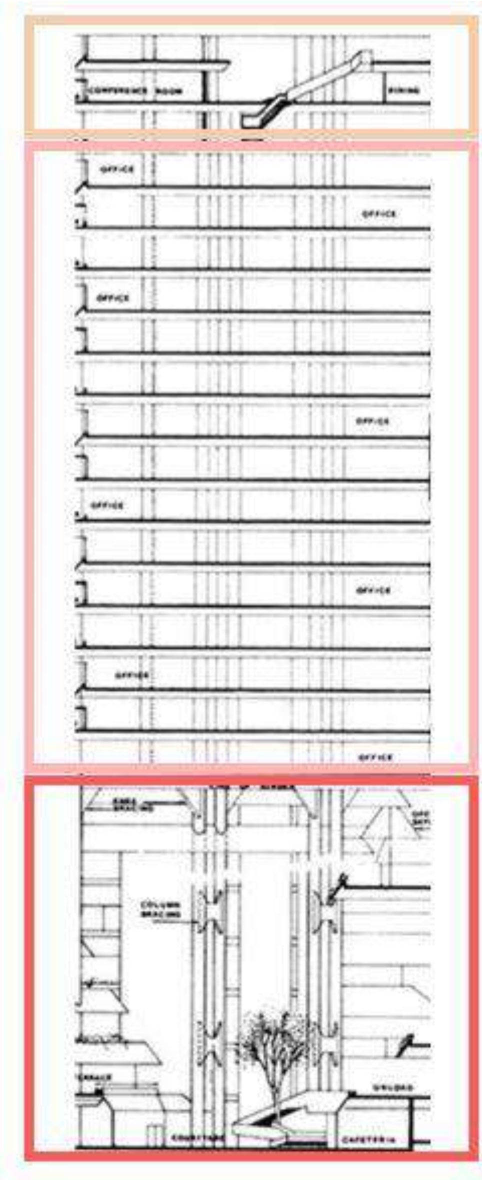


Figure 22 Wisma Typology in Pudu

The wisma's are mainly operated by big businesses where the commercial spaces are mainly operated on the first few floors of the building. Where there is a sense of hierarchy of space where the value of privacy increases as we move up the building floors. The visual and physical interaction between the employees and the commercial aspect of the building is lacking resulting in the commercial ground floor being quite vacant even during office hours. This office building is usually empty at night after office hours even though some commercial stores are still opened during the night. Making the wisma inactive during night time although there still some employee still working overtime after office hours.

Figure 23 Wisma Commercial Layout Typology in Pudu

The spatial layout of the building is mostly cluttered to maximise quantity of store lots within the building. This hinders the visual interaction between the end users and also isolates the different store owners within the wisma itself.

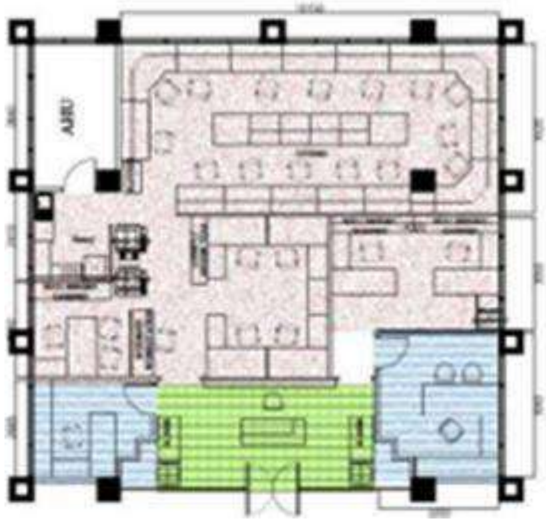


Figure 24 Wisma Commercial Office Layout Typology in Pudu

The repetitive office floor layout shows a distinct pattern in so called efficiency. The layout above shows the efficient layout arranged by the employee within the building over time but results has shown that there is a lack of productivity linked with this kind of freedom. The lack in spatial definition raises privacy concerns between the employees in the office and also a sense of hierarchy. Causing a sense of diplomacy within the office itself.

Office Shop lots

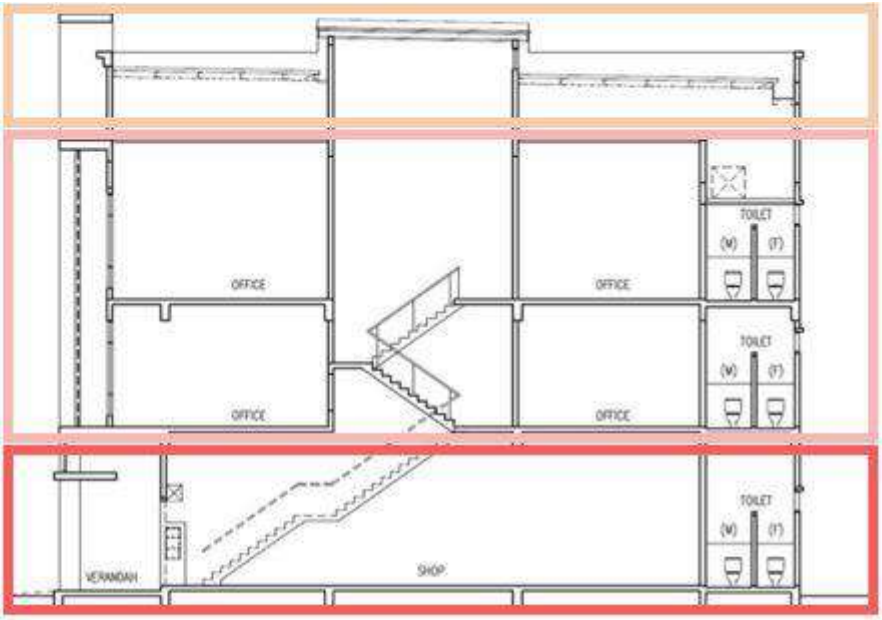


Figure 25 Office Shop Lot Typology in Pudu

The shop lot office shares the same space typology as the wisma in terms of commercial placement on the ground floor. But on a smaller scale. And like the wisma typology, the visual and physical interaction between the employee and commercial value is hindered by this separation.

Figure 26 Shop lot Office Layout Typology in Pudu

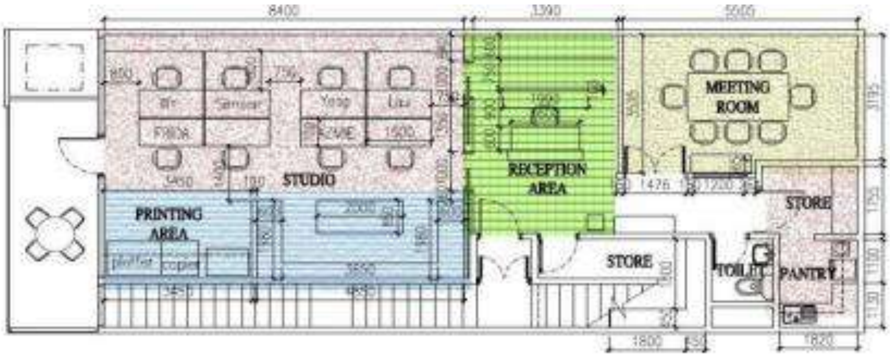


Figure 27 : Shop lot Office Layout Typology in Pudu 2

These are two the most common office shop lot layout arrangement that is found in Pudu. Just like the repetitive floor layout of the wisma offices, the shop lot sacrifices the sense of wellbeing aspect among the employee for the sake of efficiency. Resulting in a machine-like working culture in the organization.

Nurul Afida Isnaini Janipha et al. / Procedia - Social and Behavioral Sciences 68 (2012) 183 – 191

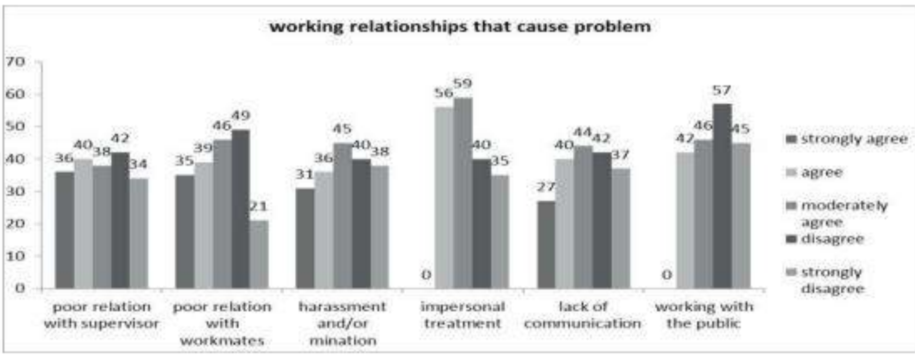


Figure 28 the working relationship that cause problems

	inadequate staffing to your team/department	poor communication among team member	poor planning	insufficient training	lack of feedback	interpersonal conflicts	poor relations with superiors	bullying
strongly agree	28	35	45	35	42	34	32	32
agree	45	43	45	37	52	39	38	33
moderately agree	47	46	55	47	45	46	39	50
disagree	42	40	35	45	44	40	45	43
strongly disagree	28	26	10	26	7	31	36	32

Figure 29 Organizational factors that cause workplace stress

3.6: LOCAL PLAN GUIDEINE AND PLANNING REQUIREMENT

Figure 30 : Land zoning of Plaza Rakyat

The proposed site is a commercial plot of land. And since it is located in the centre of Kuala Lumpur. The maximum plot ratio for the site is 1:10.

CHAPTER 4: DESIGN DEVELOPMENT

4.0: DESIGN JUSTIFICATION

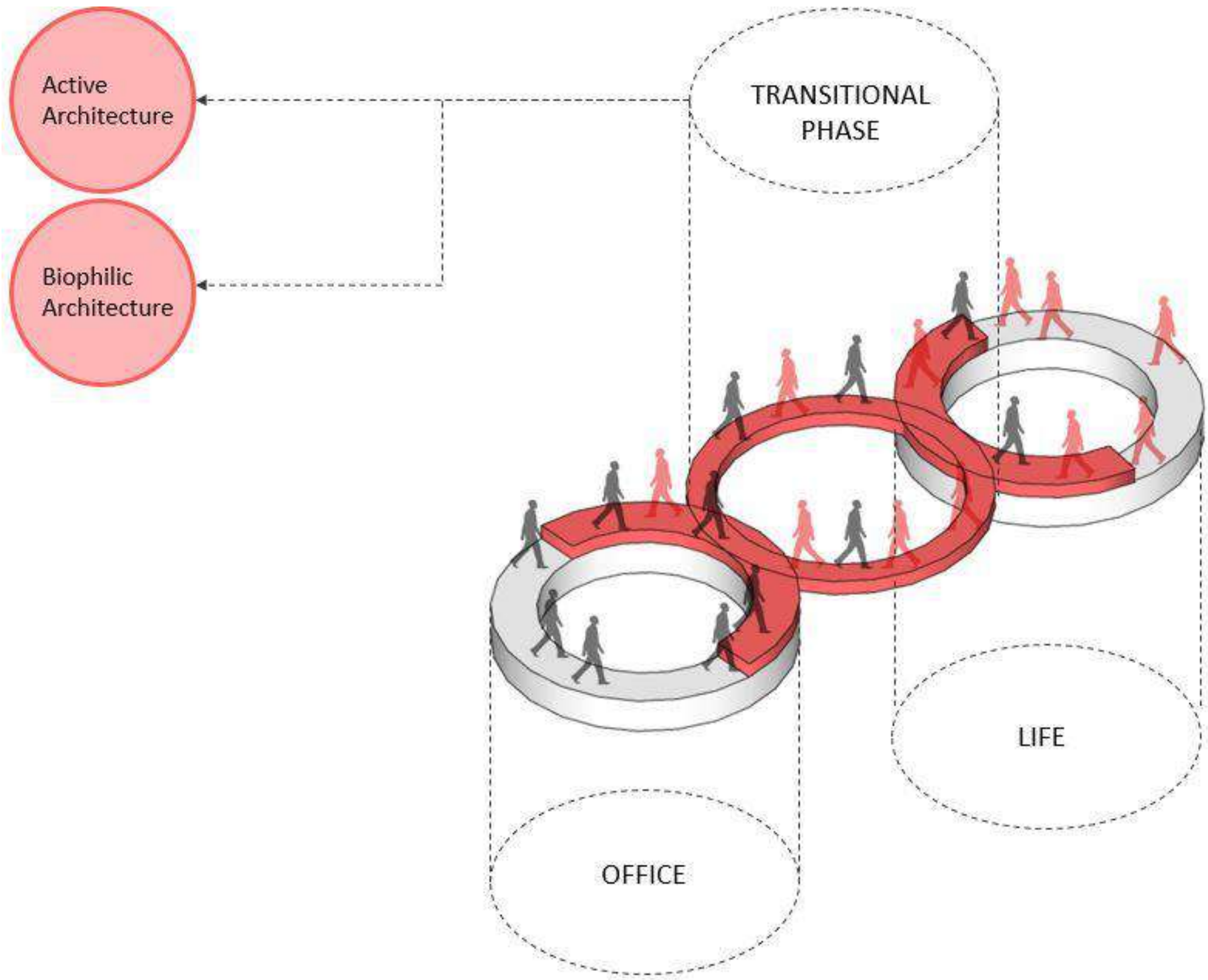


Figure 31 : Design Strategy for Master planning and Building Typology

Bridging the gap between the office culture and Wellbeing with a transitional phase through Active and Biophilic Architecture.

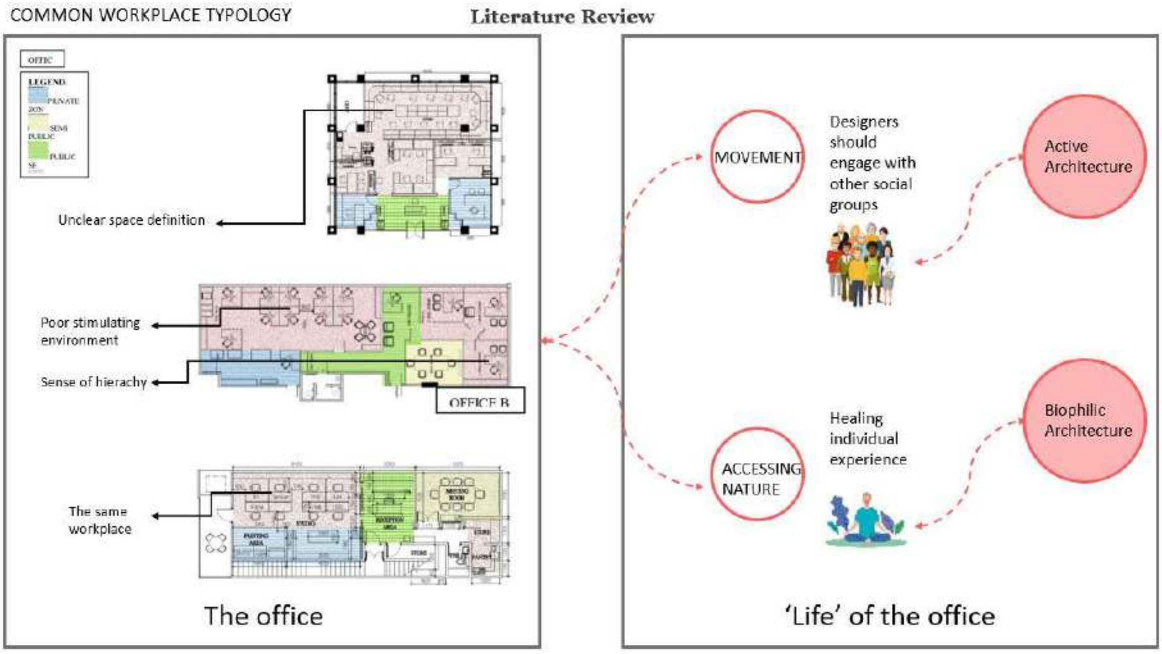


Figure 32 Design Approach for Building Typology

a. Biophilia

Figure 33 Biophilia Abstract

- literally meaning **'love of nature',** refers to the idea that humans have an innate desire to be close to nature and other living organisms.

- **humans have evolved in the context of a natural environment**, long before they started to build cities and that do not resemble the hunter-gatherer environments in which they built their homes. The move away from a simple hut in the savannah into a more technologised and urban world, **has detached humans from nature**.

b. Biohpilic Strategies

- Accessing Nature

Direct contact with vegetation. The presence of plants can reduce stress, improve comfort, enhance mood, and prompt healing. Through including these outdoor gardens, we offer patients, families, and staff green spaces with native plants, walking paths, and a variety of seating, which—when woven together—create nature-filled spaces for moments of connection, reflection, and respite.

- Natural Shapes and Form

Natural environments show complexity at varying scales, from the vast openness of the sky to the dense complexity of the pattern of a single leaf. This range of variance feeds our need for the diverse forms found in nature—it is something to which we humans are attuned.

- Natural Patterns and Processes

According to Dr. Stephen Kellert, human evolution and survival have always required managing highly sensuous and variable natural environments, particularly responding to sight, sound, smell, touch, and other sensory systems. It is essential to find opportunities to connect to the richness of our sensory system, in and around the built environment.

- Light and Space

This element of biophilic design focuses on the many diverse qualities of light and spatial relationships. The integration of abundant natural light in this cultural public space creates stimulating, dynamic, and sculptural forms. The design response spurs imagination, movement, and exploration.

- Evolved Human-Nature Relationship

Areas of refuge, a primary associated attribute, help to provide a safe place for retreat. Refuge spaces are considered important for restoration and relaxation (Browning et al., 2014). As demonstrated in this student housing space, a resident in their place of refuge can still feel some connection to the larger space. Together, prospect and refuge in this space offer areas that improve concentration, attention, and perceived safety (refuge) (Browning et al., 2014).

4.1: DESIGN CONCEPT

Formulation of Ideas

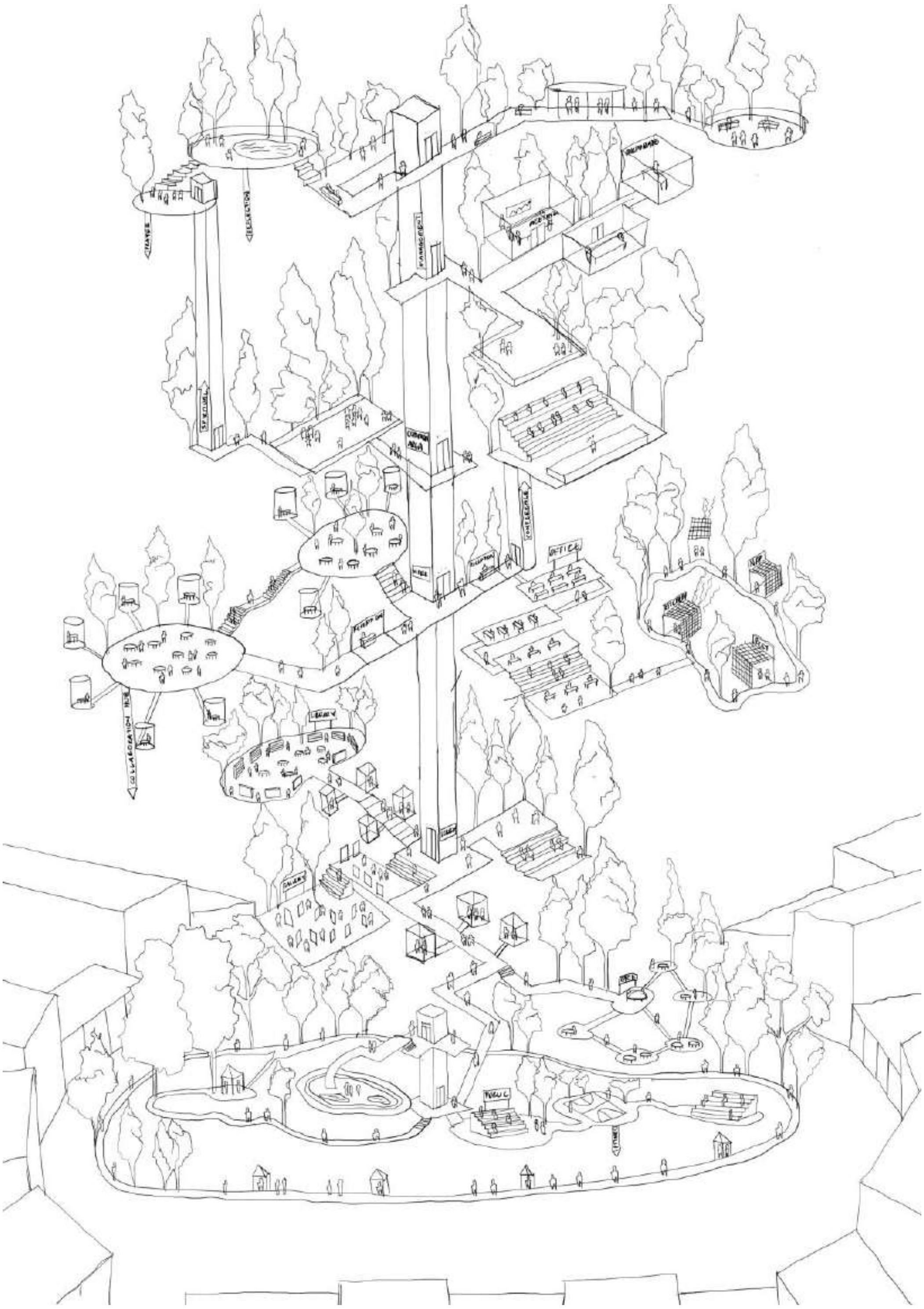


Figure 34 Experiential Artwork

The art piece is a re imagination of the endless potential to revitalize a 'dead' office. It emphasizes on the wellbeing aspect of the corporate workplace for knowledge workers. Hierarchy of spaces and its effect on human interaction through spatial programming is portrayed in the art piece.

Stitching the Community Together

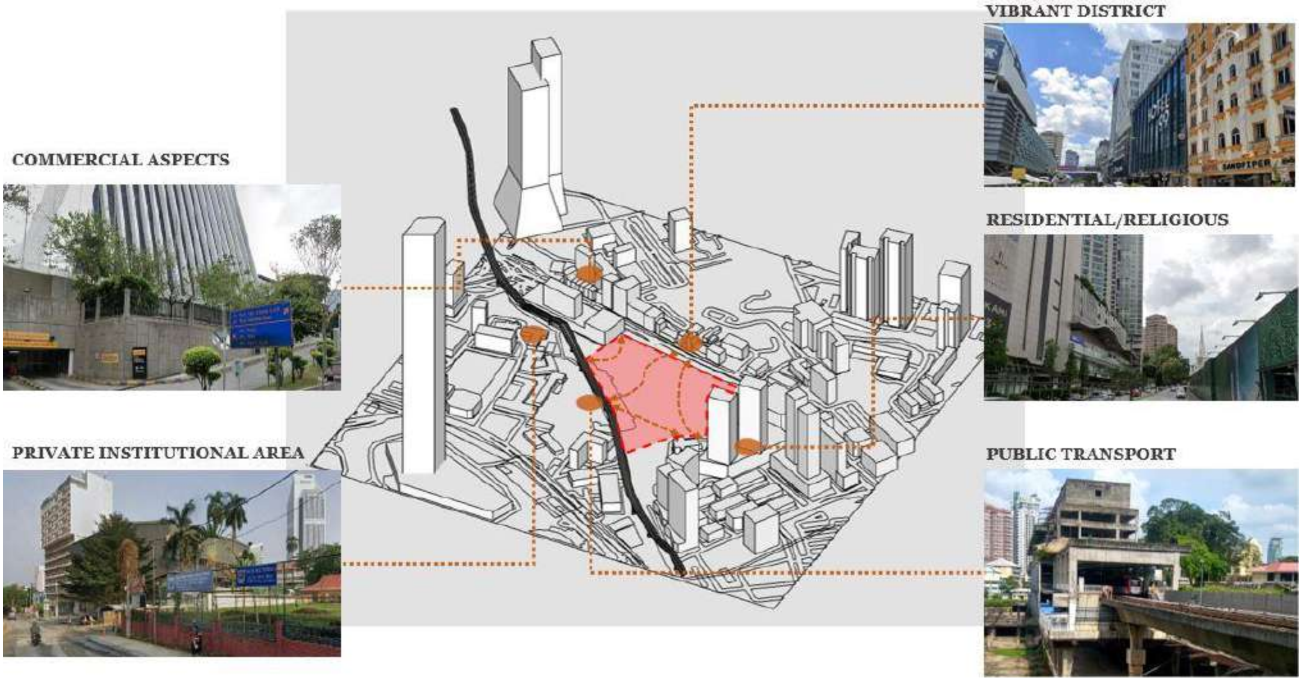


Figure 35 Driving planning concept

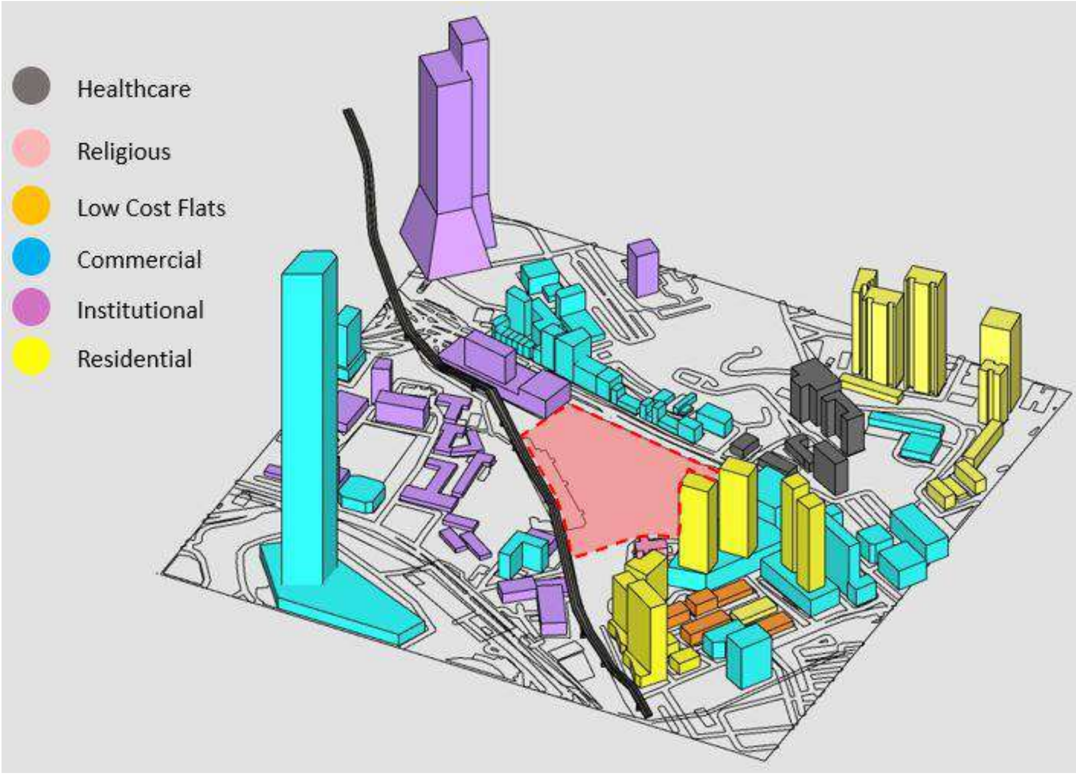
4.2: SITE PLANNING STRATEGIES

a. Sensory Mapping

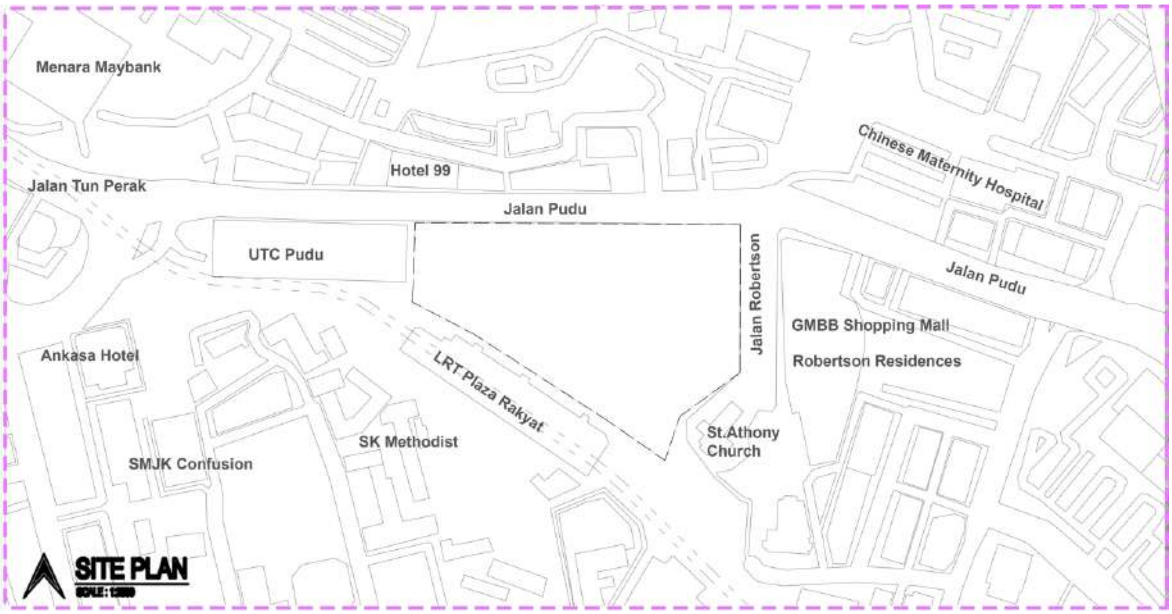
The proposed site is located in Jalan Pudu, in the middle of a commercial Bukit Bintang rea and cultural district of Petaling Street and Chow Kit. There are significant commercial nodes such as the Menara 118 located opposite of the site and the Pudu Sentral next to the site as well. Making Plaza Rakyat area filled with a commercial/cultural community hotspot.

The site has a rich context considering the:

- Transportation Nodes (Pudu Sentral LRT)
- Commercial Nodes (Menara 118, shoplot hotels, Menara Maybank)
- Institutional Nodes (Hospitals adjacent to the site, Residential Highrises spread around the site context)
- Religious Nodes (Churches and Temples are religious buildings found nearby Plaza Rakyat)



Healthcare
Religious
Low Cost Flats
Commercial
Institutional
Residential



Menara Maybank
Hotel 99
Chinese Maternity Hospital
Jalan Tun Perak
Jalan Pudu
UTC Pudu
Jalan Robertson
Jalan Pudu
GMBB Shopping Mall
Robertson Residences
Ankasa Hotel
LRT Plaza Rakyat
St.Athony Church
SK Methodist
SMJK Confusion
SITE PLAN

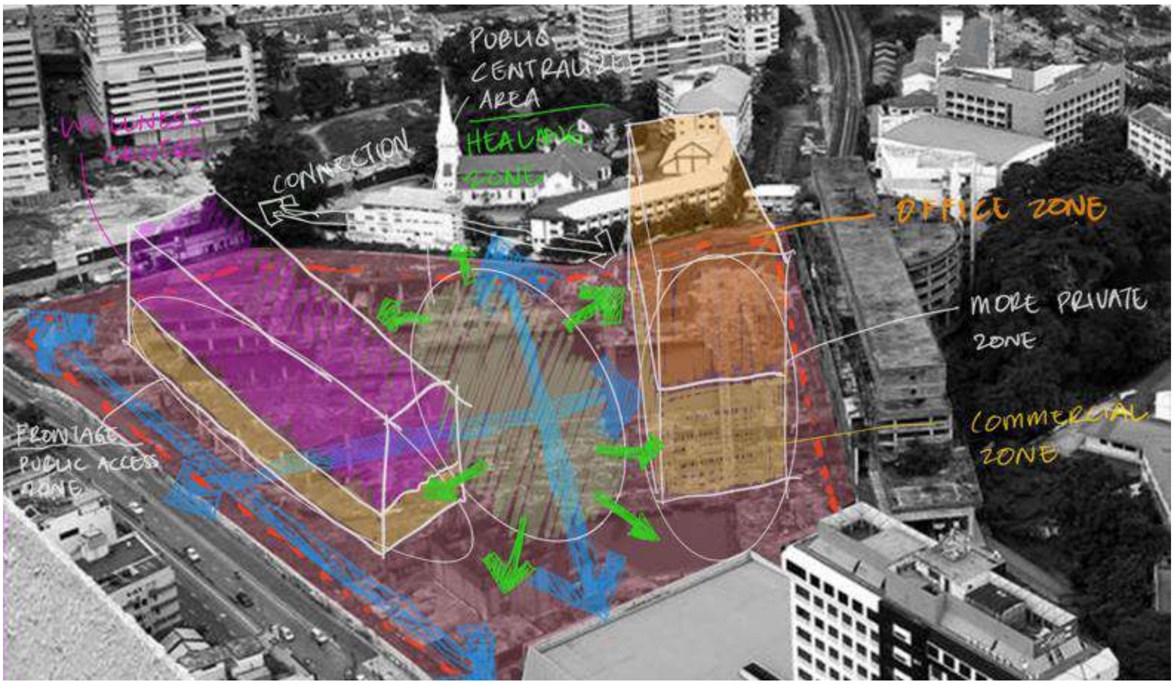


Figure 36 Site Planning Approach

4.3: MASSING SIMULATION

The main objective of the research was to demonstrate a proper massing reduce the annual solar heat gain. Since human and nature centric design is a priority in the biophilia theory, it is important from the building to achieve a certain level of thermal comfort while also providing adequate daylighting into the office as well. Self-shading strategies were explored for the overall faced of the building.

Annual Solar Gain Analysis

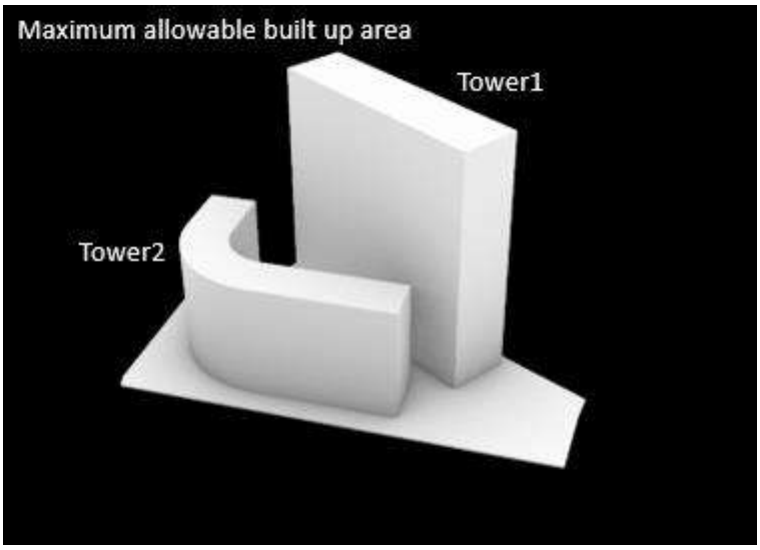


Figure 37Baseline Model based on the maximum allowable built up area

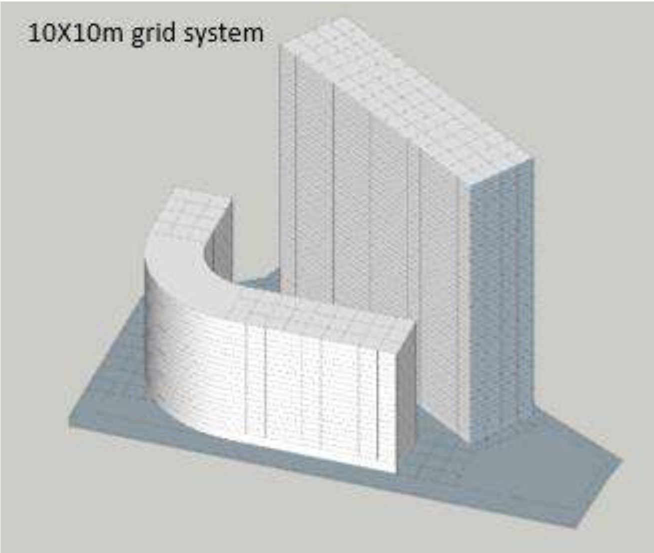


Figure 38 The parameters were worked within a 10x10m grid system

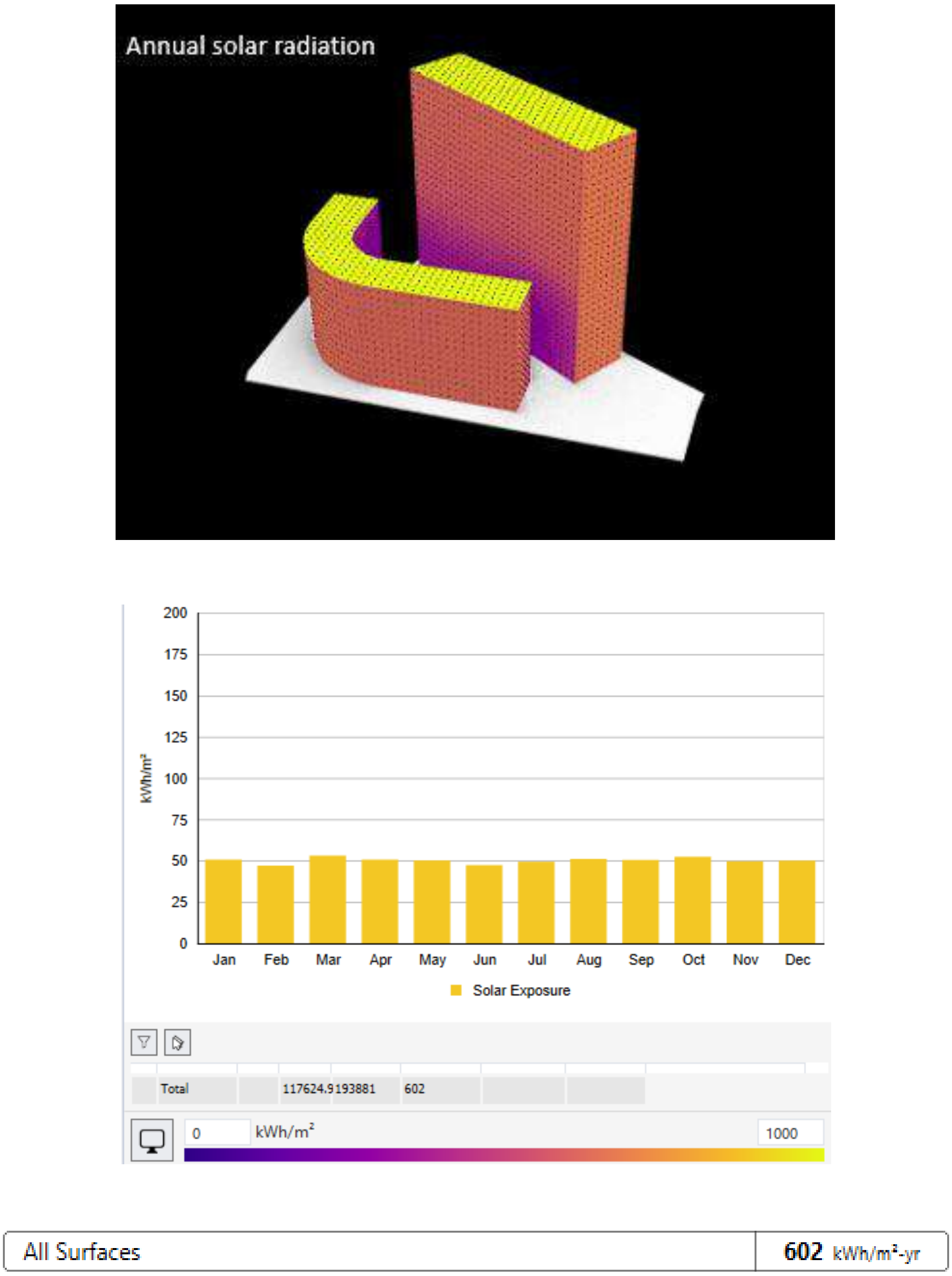


Figure 39 The initial readings of annual solar gain.

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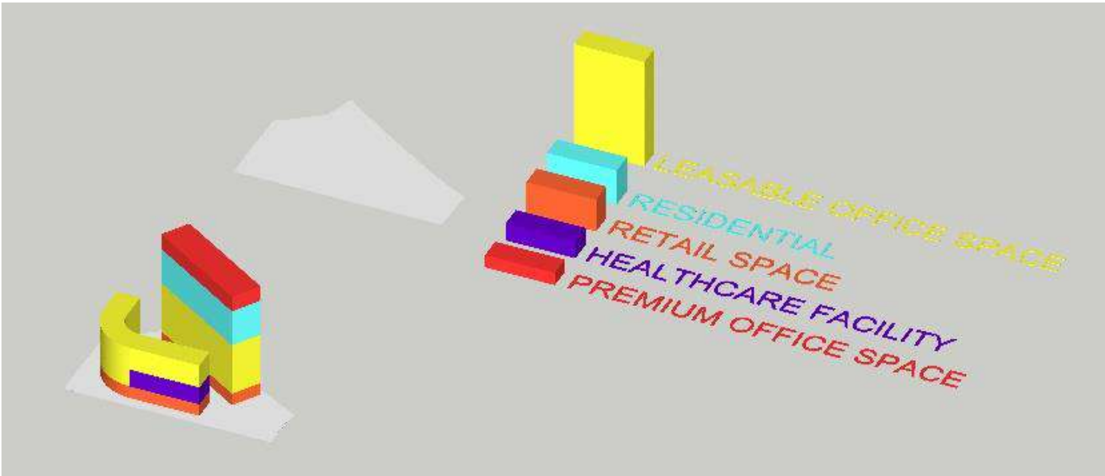
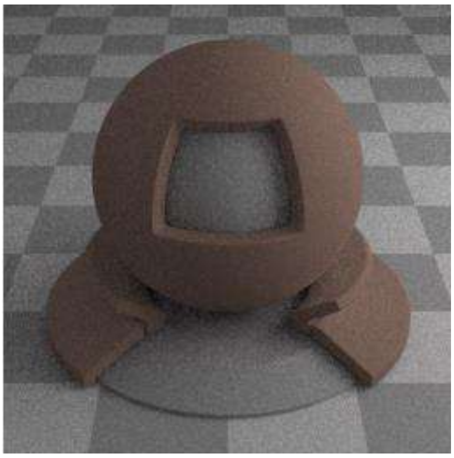


Figure 40 Building Programs



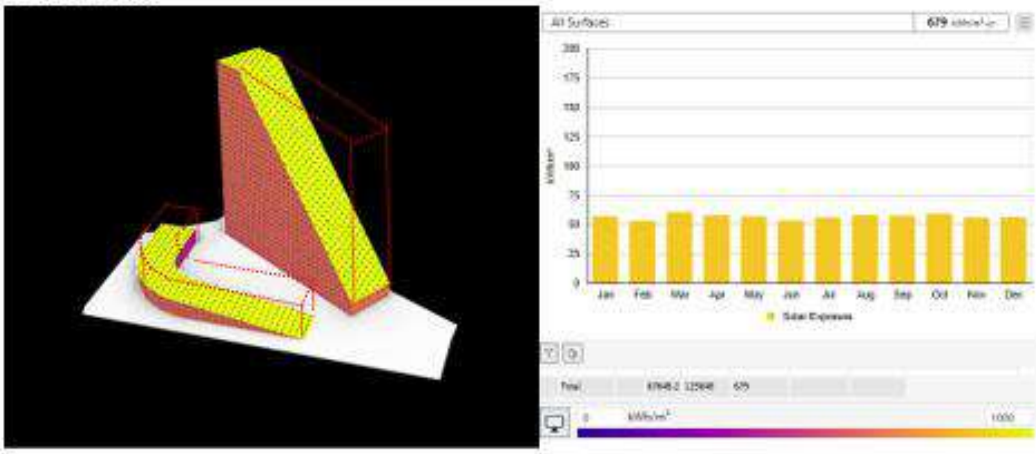
100 Memorial Dr brick

Type	Glossy
Reflectance	11.18%
Specular	0.02%
Diffuse	11.16%
R	0.158
G	0.097
B	0.078
Roughness	0.200
Measurement Type	Spectrophotometer
Credit	Nathaniel Jones (MIT Sustainable Design Lab)

Figure 41 Building Façade Materiality

Solar Reduction Options

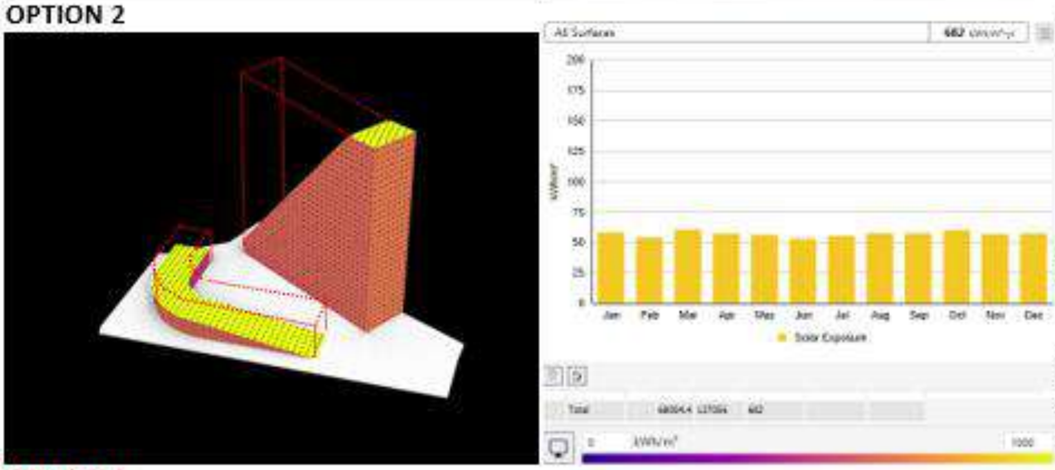
OPTION 1



The massings were diagonally split in half to reduce the amount of faces that is exposed to solar radiation

Result
The solar radiation exposed to the massing faces increased by **12.8%** from the base model readings.

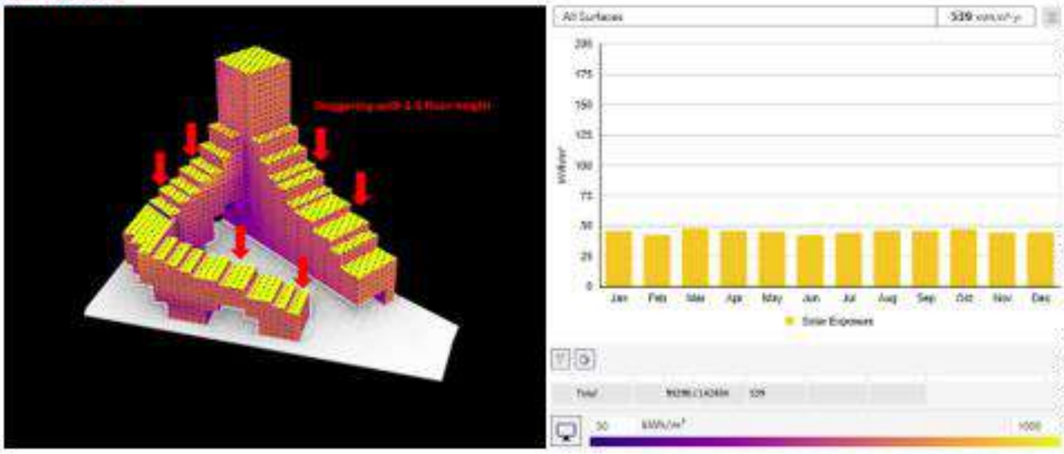
OPTION 2



The split massing was rotated

Result
The solar radiation exposed to the massing faces increased by **9.9%** from the base model readings.

OPTION 3

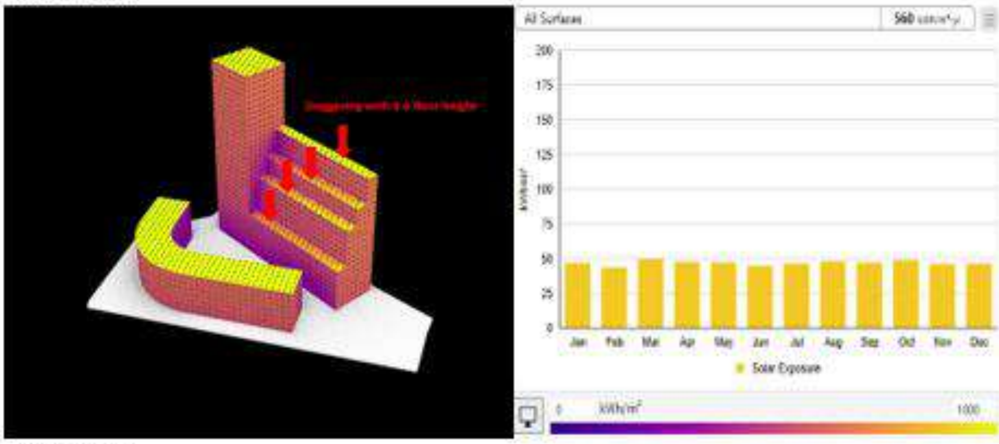


The plot ratio was maximised again but staggers with 10x10m3 volume blocks.

Result
The solar radiation exposed to the massing faces was reduced by **14%** from the base model readings.

Figure 42 Annual Solar Simulation

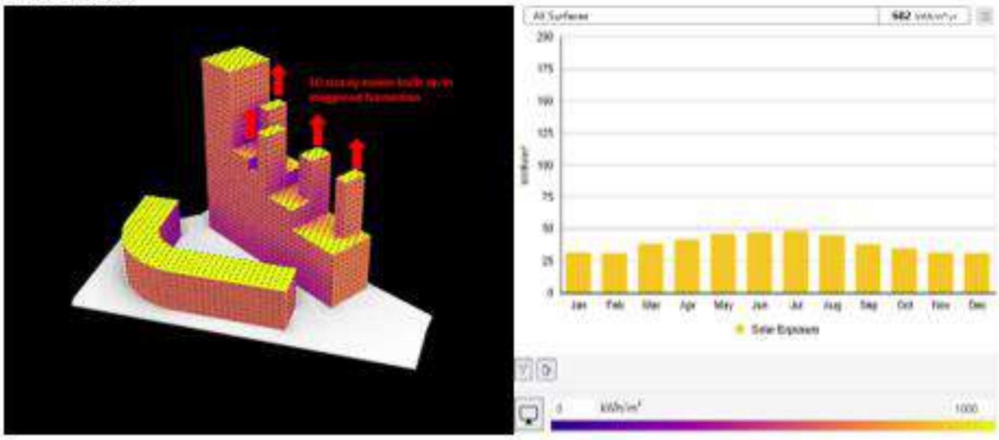
OPTION 4



Volume of tower 1 was reduced by half in staggering forms

Result
The solar radiation exposed to the massing faces reduced by **7%** from the base model readings.

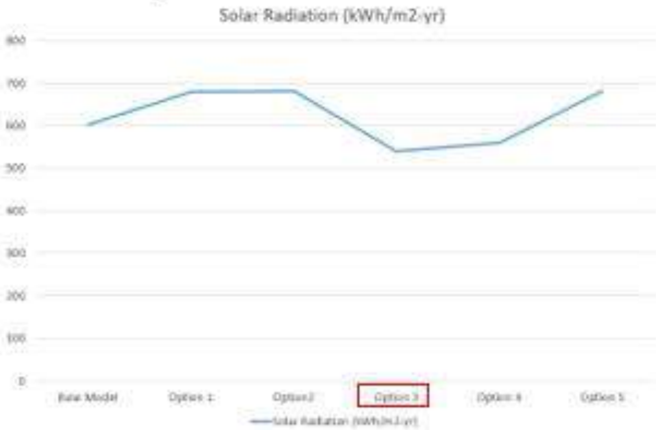
OPTION 5



Volume of tower 1 was reduced by half in staggering forms with vertical towers on top.

Result
The solar radiation exposed to the massing faces increased by **9.9%** from the base model readings.

Result Comparison



Conclusion
Option 3 massing configuration has the lowest reading of solar radiation on all faces compared to the other 4 options.

Figure 43Annual Solar Simulation

Daylighting Simulation

The objective of this part for the research was to optimize the façade of the building. It is important for the building façade to have a self-shading element without sacrificing the views and also daylighting into the office. Following the daylighting standard of the Malaysian Energy Use for Offices.

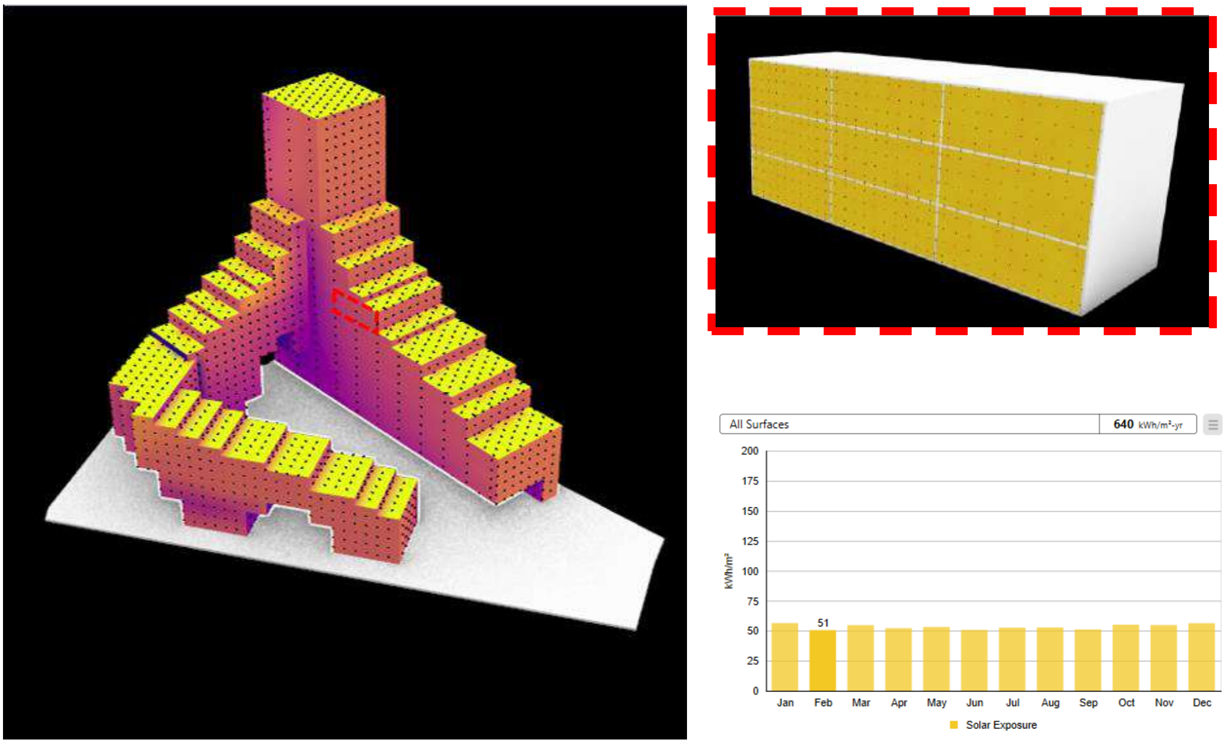


Figure 44 Selected Model Thermal Analysis

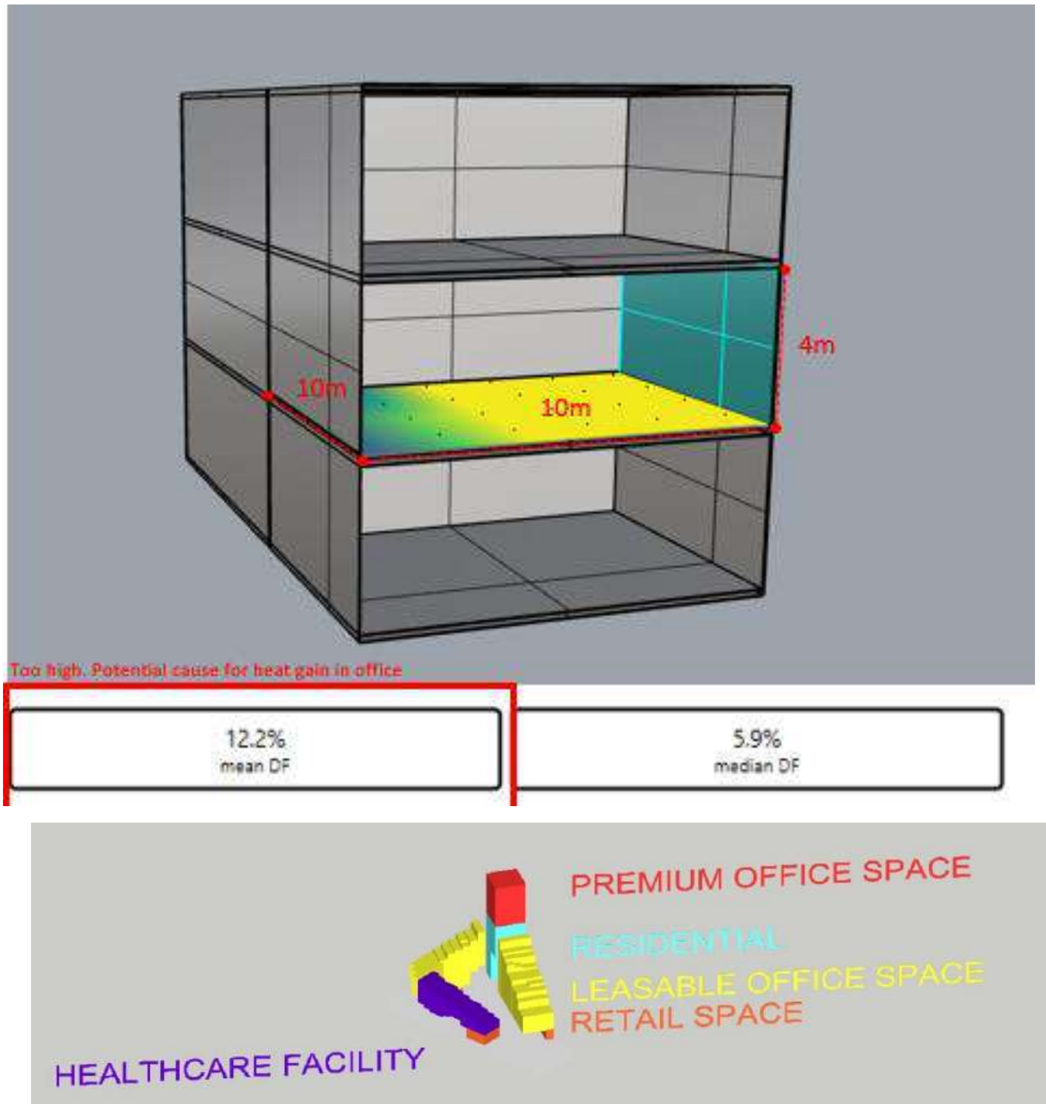


Figure 45 Selected Model Daylight Availability

Daylighting Option Analysis

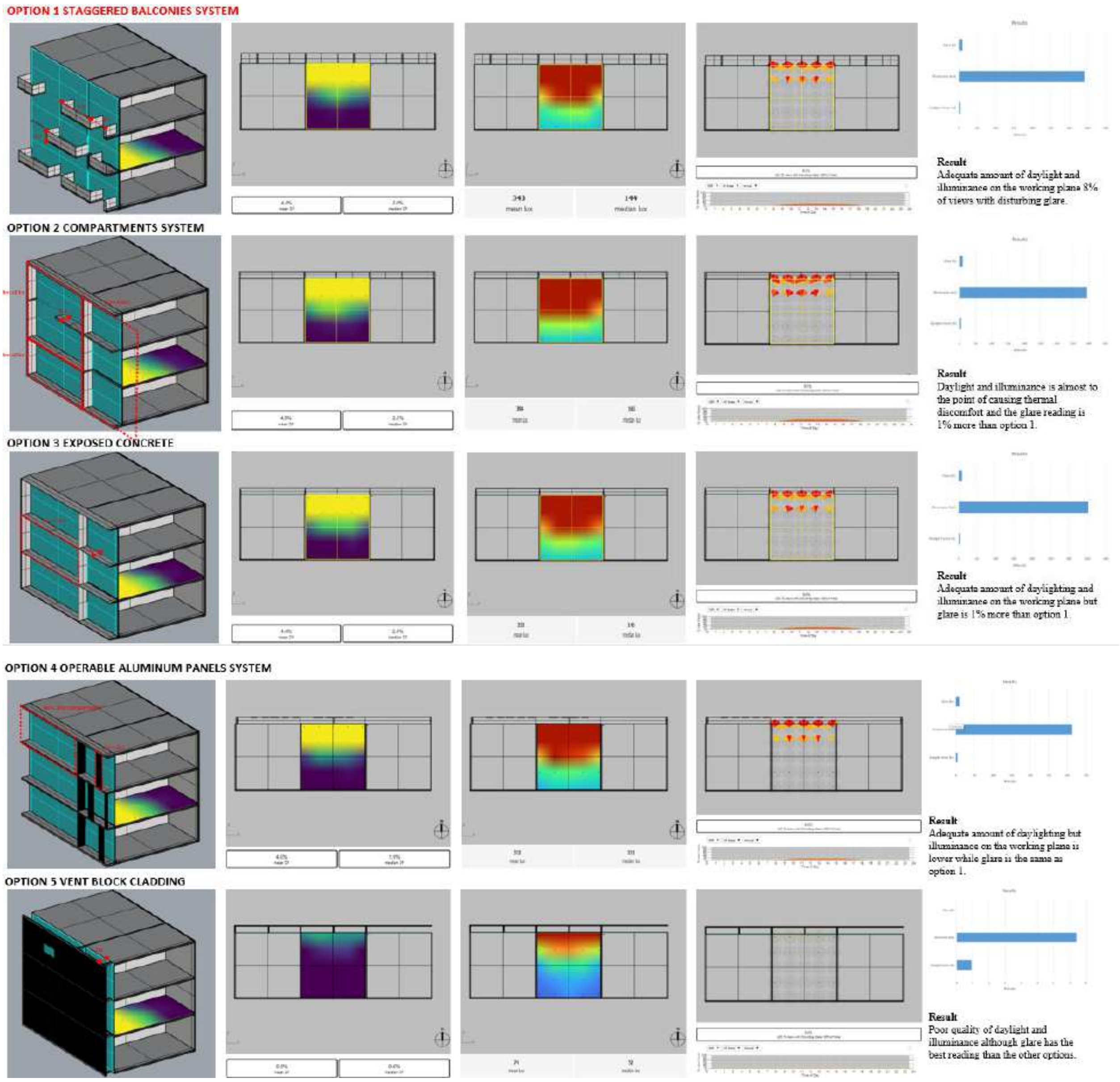


Figure 46 Daylighting Simulation of sectional office space

Building Type	Recommended Daylight Factor %
Dwellings	
Kitchen	2
Living room	1
Bedroom	0.5
Schools	2
Hospitals	1
Offices	
General	1 to 2
	2
Drawing offices	2
(on drawing boards)	6
Typing and computing	4
Laboratories	3 to 6
Factories	5
Art galleries	6
Churches	1 to 2
Public buildings	1

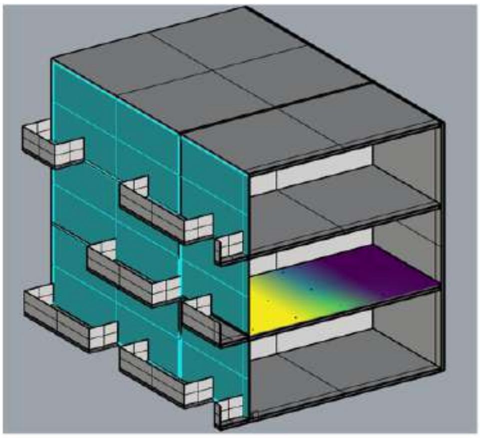
DF	APPEARANCE	ENERGY IMPLICATIONS
< 2%	room looks gloomy	Electric lighting needed most of the day
2% to 5%	**Predominantly daylit appearance**	**Good balance between lighting and thermal aspects**
> 5%	Room appears stongly daylit	potential for thermal problems due to overheating in summer and heat

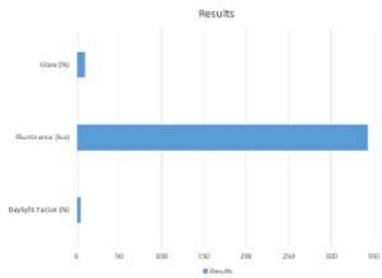
Table 13. Recommended average illuminance levels

Task	Illuminance (Lux)	Example of Applications
Lighting for infrequently used area	20	Minimum service illuminance
	100	Interior walkway and car park
	100	Hotel bedroom
	100	Lift interior
	100	Corridor, passageways, stairs
	150	Escalator, travellator
	100	Entrance and exit
	100	Staff changing room, locker and cleaner room, cloak room, lavatories, stores.
	100	Entrance hall, lobbies, waiting room
	300	Inquiry desk
	200	Gate house
Lighting for working interiors	200	Infrequent reading and writing
	300 – 400	General offices, shops and stores, reading and writing
	300 – 400	Drawing office
	150	Restroom
	200	Restaurant, Canteen, Cafeteria
	150 – 300	Kitchen
	150	Lounge
	150	Bathroom
	100	Toilet
	100	Bedroom
	300 – 500	Class room, Library
	200 – 750	Shop / Supermarket/Department store
	300	Museum and gallery
Localised lighting for exacting task	500	Proof reading
	1000	Exacting drawing
	2000	Detailed and precise work

21

Figure 47 Malaysian Standard of Energy Use for Offices





OPTION 1 is able to reduce the daylight factor to 4.4% compared to the base model. It also provides better result in terms of daylighting for working offices and glare compared to other façade options.

Figure 48 Selected Facade Option for Best Daylighting Access

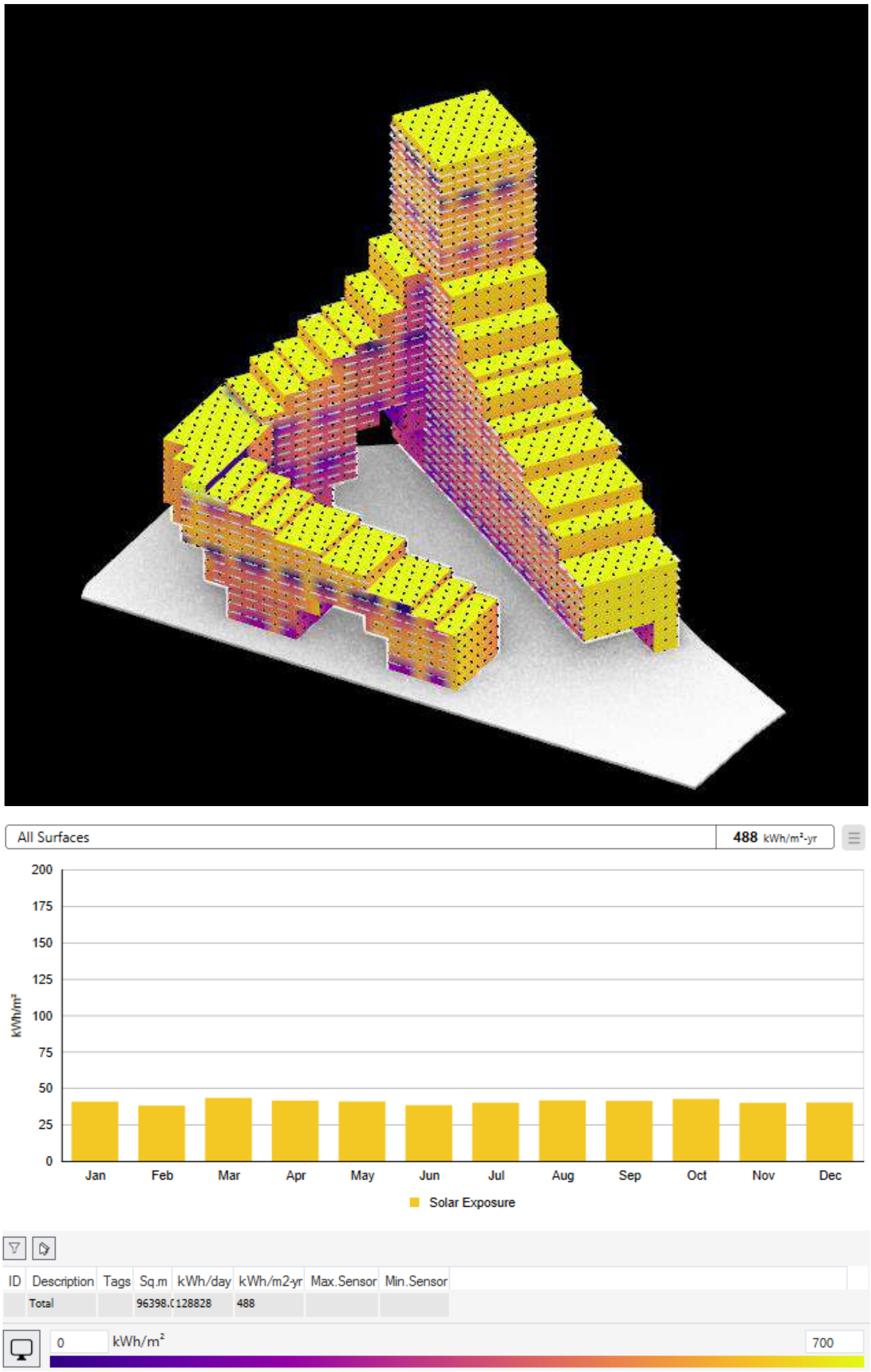


Figure 49 Applied facade treatment with solar reduction simulation

This façade application is able to further reduce the massing's solar radiation from 14% to 23% from the original base model simulated result. Overall improved shading and maintaining required daylight factor in office space.

Overall Thermal Transfer Value Analysis

The OTTV reading will focus on only the commercial office. Since the thesis is focusing on wellbeing of knowledge based workers. Overall thermal building comfort should be studied and applied into the office programs of the thesis scheme.

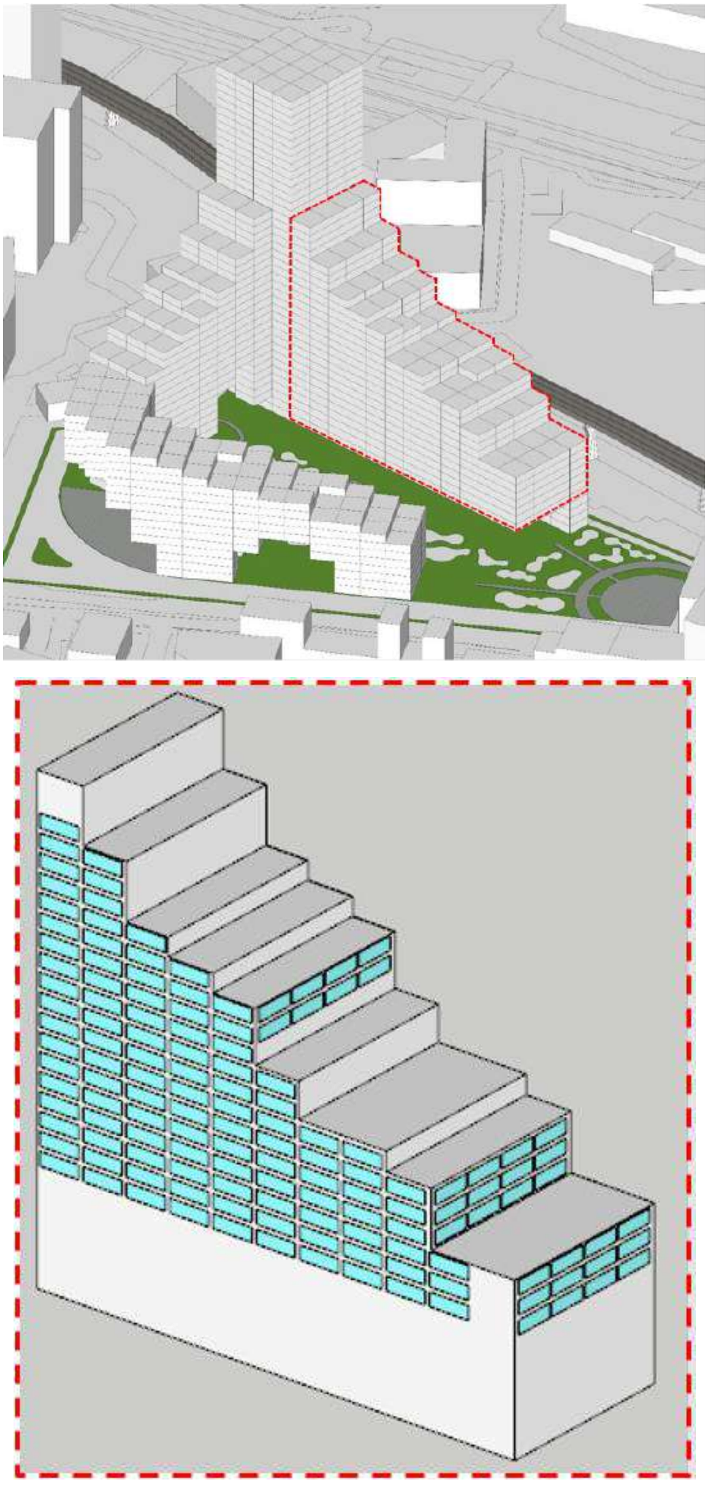


Figure 50 OTTV part for thermal study

i. Baseline Model

Heat Conduction Through Walls

Orientation	WWR (%)	AREA (m2)	WWR AREA (m2)	Fixed Window Openings Dimension (m2)	Constant	Solar Absorption Factor (α)	(1-WWR)	U-value (W/M2K)	Orientation Factor (OF)	Shading Coefficient (SC1)	External Shading Device (SC2)	Overall Thermal Transfer Value	Area x OTTV
North (150mm plastered Brickwall, bright red)	0.4	7151	28.612	27	15	0.25	0.6	2.87	n/a	n/a		6.4575	46,180.50
East (150mm plastered Brickwall, bright red)	0	4168	0	27	15	0.25	1	2.87	n/a	n/a		10.7625	[illegible]
West (150mm plastered Brickwall, bright red)	0.2	4167	8.336	27	15	0.25	0.8	2.87	n/a	n/a		8.61	[illegible]
South (150mm plastered Brickwall, bright red)	0.3	7151	21.459	27	15	0.25	0.7	2.87	n/a	n/a		7.53375	53,888.31
15 x α x (1-WWR) Uw													[illegible]

Heat Conduction Through Window

Orientation	WWR (%)	AREA (m2)	WWR AREA (m2)	Fixed Window Openings Dimension (m2)	Constant	Solar Absorption Factor (α)	(1-WWR)	U-value (W/M2K)	Orientation Factor (OF)	Shading Coefficient (SC1)	External Shading Device (SC2)	Overall Thermal Transfer Value	
North (10mm, Pilkington Clear Glass)	0.4	7151	28.612	27	6	n/a	n/a	5.5	n/a	n/a		13.4	95,850.20
East (10mm, Pilkington Clear Glass)	0	4168	0	27	6	n/a	n/a	5.6	n/a	n/a		0	-
West (10mm, Pilkington Clear Glass)	0.2	4167	8.336	27	6	n/a	n/a	5.6	n/a	n/a		6.72	28,015.68
South (10mm, Pilkington Clear Glass)	0.3	7151	21.459	27	6	n/a	n/a	5.5	n/a	n/a		10	71,530.30
6 x WWR x Uf		0											195,395.18

Solar Heat Gain Through Window

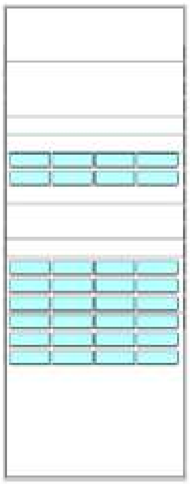
Orientation	WWR (%)	AREA (m2)	WWR AREA (m2)	Fixed Window Openings Dimension (m2)	Constant	Solar Absorption Factor (α)	(1-WWR)	U-value (W/M2K)	Orientation Factor (OF)	Shading Coefficient (SC1)	External Shading Device (SC2)	Overall Thermal Transfer Value		SC
North (10mm, Pilkington Clear Glass)	0.4	7151	28.612	27	194	n/a	n/a	n/a	0.9	0.91	1	53.5	454,225.50	0.91
East (10mm, Pilkington Clear Glass)	0	4169	0	27	194	n/a	n/a	n/a	1.23	0.91	1	0	-	0.91
West (10mm, Pilkington Clear Glass)	0.2	4169	8.336	27	194	n/a	n/a	n/a	0.94	0.91	1	13.2	[illegible]	0.91
South (10mm, Pilkington Clear Glass)	0.3	7151	21.459	27	194	n/a	n/a	n/a	0.92	0.91	1	48.7	[illegible]	0.91
194 x OF x WWR X x SC														
Total		[illegible]											[illegible]	
												Overall OTTV	41.56	

Figure 51OTTV calculation

OTTV Value is **41.56 W/sqm**. It complies with UBBL 38A (1)(a) : OTTV value should not exceed **50 W/m2**

Figure 52Baseline window opening

The main parameter is a fixed window opening of 27sqm on all sides of the office.

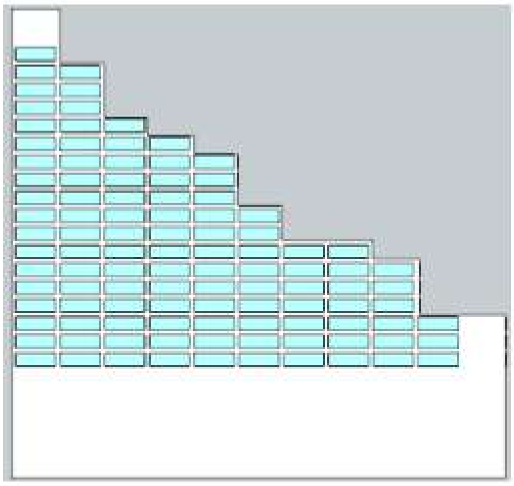


West 20%

Window
= (3m x 9m) x32 unit of window panels
= 27m x 32
= 864sqm

Wall
= 4169sqm

WWR= 0.20

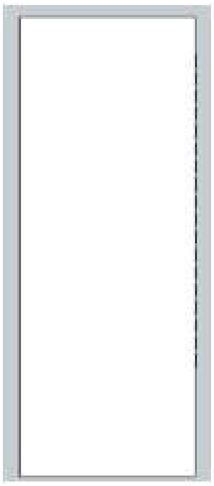


North 40%

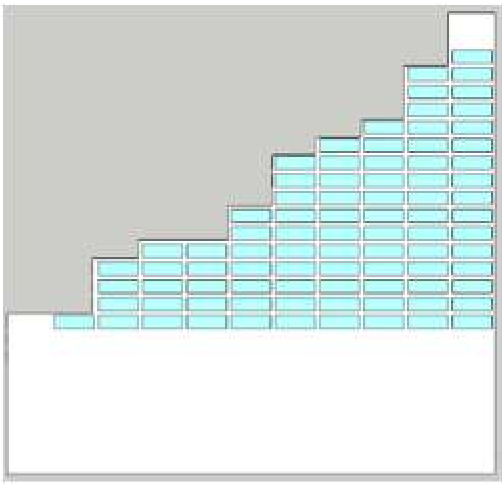
Window
= (3m x 9m) x106 unit of window panels
= 27m x 106
= 2862 sqm

Wall
= 7153 sqm

WWR= 0.40



East 0%



South 30%

Window
= (3m x 9m) x86 unit of window panels
= 27m x 86
= 2322 sqm

Wall
= 7153 sqm

WWR= 0.30

i. Option 1 Slanted Overhang

Heat Conduction Through Walls

Orientation	WWR (%)	AREA (m2)	WWR AREA (m2)	Fixed Window Openings Dimension (m2)	Constant	Solar Absorption Factor (α)	(1-WWR)	U-value (W/M2K)	Orientation Factor (OF)	Shading Coefficient (SC1)	External Shading Device (SC2)	Overall Thermal Transfer Value	Area x OTTV
North (150mm plastered brickwall, bright red)	0.4	7153	28.612	27	15	0.25	0.6	2.87	n/a	n/a		6.4575	46,190.50
East (150mm plastered brickwall, bright red)	0	4160	0	27	15	0.25	1	2.87	n/a	n/a		10.7625	44,866.86
West (150mm plastered brickwall, bright red)	0.2	4160	8.328	27	15	0.26	0.8	3.87	n/a	n/a		8.61	35,846.09
South (150mm plastered brickwall, bright red)	0.3	7153	21.459	27	15	0.26	0.7	3.87	n/a	n/a		7.54875	53,882.91
15 x α x (1-WWR)Uw													180,842.26

Heat Conduction Through Window

Orientation	WWR (%)	AREA (m2)	WWR AREA (m2)	Fixed Window Openings Dimension (m2)	Constant	Solar Absorption Factor (α)	(1-WWR)	U-value (W/M2K)	Orientation Factor (OF)	Shading Coefficient (SC1)	External Shading Device (SC2)	Overall Thermal Transfer Value	
North (10mm, Pilkington Clear Glass)	0.4	7153	28.612	27	6	n/a	n/a	5.6	n/a	n/a		13.44	96,136.32
East (10mm, Pilkington Clear Glass)	0	4160	0	27	6	n/a	n/a	5.6	n/a	n/a		0	-
West (10mm, Pilkington Clear Glass)	0.2	4160	8.320	27	6	n/a	n/a	5.6	n/a	n/a		6.72	28,015.68
South (10mm, Pilkington Clear Glass)	0.3	7153	21.459	27	6	n/a	n/a	5.6	n/a	n/a		10	71,530.80
6 x WWR x Uf		0											195,295.88

Solar Heat Gain Through Window

Orientation	WWR (%)	AREA (m2)	WWR AREA (m2)	Fixed Window Openings Dimension (m2)	Constant	Solar Absorption Factor (α)	(1-WWR)	U-value (W/M2K)	Orientation Factor (OF)	Shading Coefficient (SC1)	External Shading Device (SC2)	Overall Thermal Transfer Value		SC
North (10mm, Pilkington Clear Glass)	0.4	7153	28.612	27	194	n/a	n/a	n/a	0.8	0.91	0.77	48.938880	350,046.56	0.7007
East (10mm, Pilkington Clear Glass)	0	4160	0	27	194	n/a	n/a	n/a	1.23	0.91	0.71	0	-	0.6461
West (10mm, Pilkington Clear Glass)	0.2	4160	8.320	27	194	n/a	n/a	n/a	0.94	0.91	0.79	26.2197208	109,310.02	0.7189
South (10mm, Pilkington Clear Glass)	0.3	7153	21.459	27	194	n/a	n/a	n/a	0.92	0.91	0.77	37.5182008	268,368.20	0.7007
194 x OF x WWR x SC														
Total		22946											727,713.94	
												Overall OTTV	32.18	

Figure 53Option 1 OTTV calculation

Option 2 was able to reduce the OTTV Value from **41.56 W/sqm to 32.14 W/sqm**. Reducing the energy consumption of the office by 22% from the base model.

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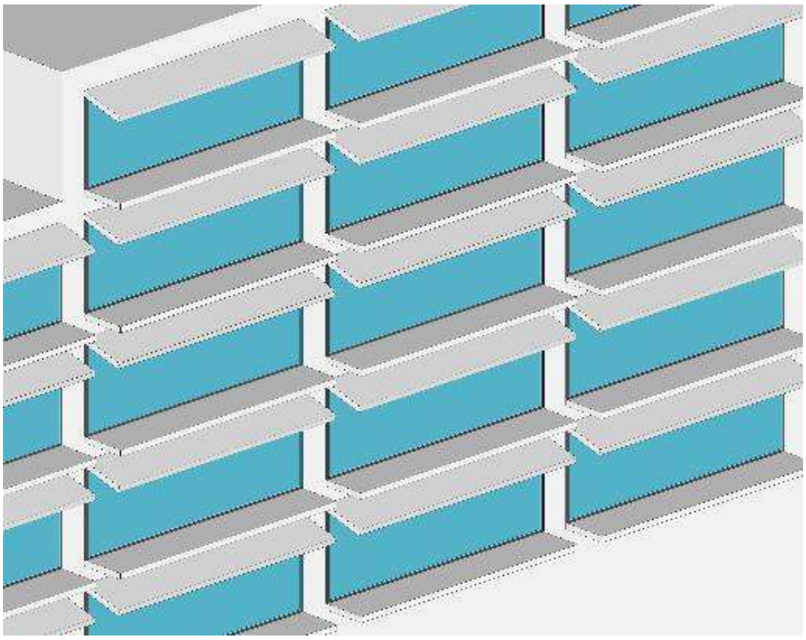


Figure 54 Option 1 view

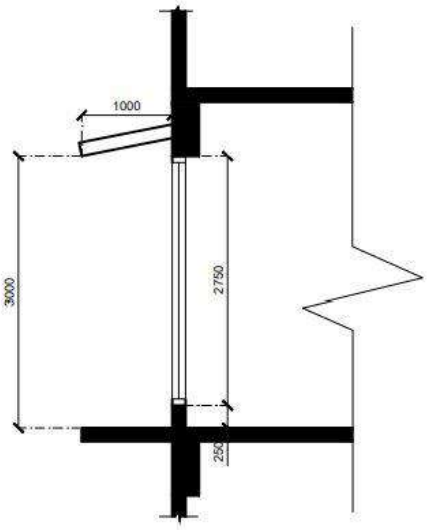
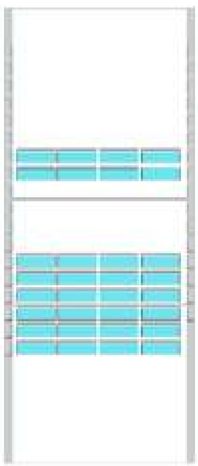


Figure 55 Option 1 Detail



West 20%

Window
= (3m x 9m) x32 unit of window panels
= 27m x 32
= 864sqm

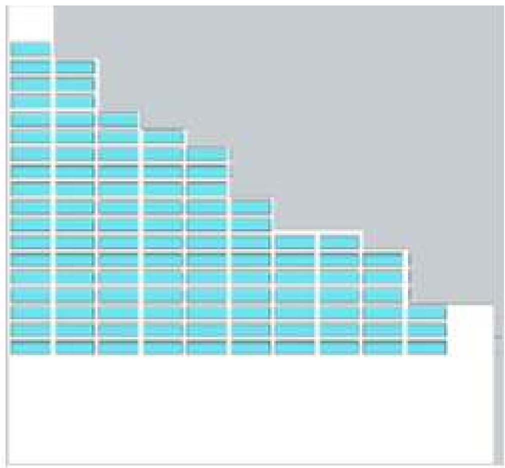
Wall
= 4169sqm

WWR= 0.20

Shading Coefficient of External Shading Device

X/Y = 1000/3000
= 0.33

SC2= 0.3-0.4 (W)
=0.79



North 40%

Window
= (3m x 9m) x106 unit of window panels
= 27m x 106
= 2862 sqm

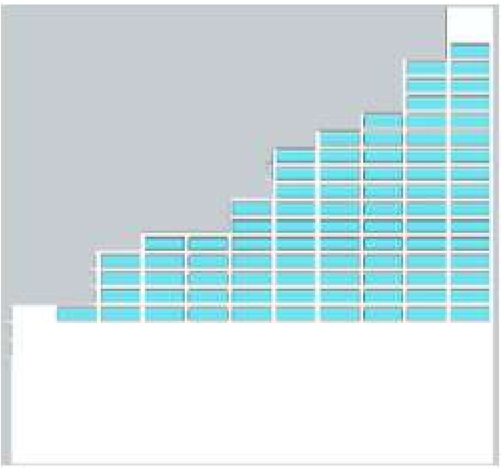
Wall
= 7153 sqm

WWR= 0.40

Shading Coefficient of External Shading Device

X/Y = 1000/3000
= 0.33

SC2= 0.3-0.4 (N/S)
=0.77



South 30%

Window = (3m x 9m) x86 unit of window panels = 27m x 86 = 2322 sqm	Shading Coefficient of External Shading Device
Wall = 7153 sqm	X/Y = 1000/3000 = 0.33
WWR= 0.30	SC2= 0.3-0.4 (N/S) **=0.77**

ii. Option 2 Overhang

Heat Conduction Through Walls

Orientation	WWR (%)	AREA (m2)	WWR AREA (m2)	Fixed Window Openings Dimension (m2)	Constant	Solar Absorption Factor (α)	(1-WWR)	U-value (W/M2K)	Orientation Factor (OF)	Shading Coefficient (SC1)	External Shading Device (SC2)	Overall Thermal Transfer Value	Area x OTTV
North (150mm plastered Brickwall, bright red)	0.4	7155	28.612	27	15	0.25	0.6	2.87	n/a	n/a		6.4575	46,130.50
East (150mm plastered Brickwall, bright red)	0	4105	0	27	15	0.25	1	2.87	n/a	n/a		10.7625	44,808.86
West (150mm plastered Brickwall, bright red)	0.2	4105	8.338	27	15	0.25	0.8	2.87	n/a	n/a		8.61	35,835.09
South (150mm plastered Brickwall, bright red)	0.3	7155	21.465	27	15	0.25	0.7	2.87	n/a	n/a		7.53375	53,888.91
15 x α x (1-WWR)Uw													180,843.36

Heat Conduction Through Window

Orientation	WWR (%)	AREA (m2)	WWR AREA (m2)	Fixed Window Openings Dimension (m2)	Constant	Solar Absorption Factor (α)	(1-WWR)	U-value (W/M2K)	Orientation Factor (OF)	Shading Coefficient (SC1)	External Shading Device (SC2)	Overall Thermal Transfer Value	
North (10mm, Pilkington Clear Glass)	0.4	7158	28.612	27	8	n/a	n/a	5.8	n/a	n/a		[illegible]	99,990.03
East (10mm, Pilkington Clear Glass)	0	4105	0	27	8	n/a	n/a	5.8	n/a	n/a		0	-
West (10mm, Pilkington Clear Glass)	0.2	4109	8.338	27	8	n/a	n/a	5.8	n/a	n/a		[illegible]	29,019.48
South (10mm, Pilkington Clear Glass)	0.3	7155	21.465	27	8	n/a	n/a	5.8	n/a	n/a		[illegible]	71,550.00
8 x WWR x Uf		0											[illegible]

Solar Heat Gain Through Window

Orientation	WWR (%)	AREA (m2)	WWR AREA (m2)	Fixed Window Openings Dimension (m2)	Constant	Solar Absorption Factor (α)	(1-WWR)	U-value (W/M2K)	Orientation Factor (OF)	Shading Coefficient (SC1)	External Shading Device (SC2)	Overall Thermal Transfer Value		SC
North (10mm, Pilkington Clear Glass)	0.4	7154	28.612	27	198	n/a	n/a	n/a	0.9	0.86	0.75	48.123628	320,769.38	0.6462
East (10mm, Pilkington Clear Glass)	0	4102	0	27	194	n/a	n/a	n/a	1.23	0.86	0.75	0	-	0.6462
West (10mm, Pilkington Clear Glass)	0.2	3169	8.338	27	198	n/a	n/a	n/a	0.95	0.86	0.75	23.5685582	88,250.65	0.6462
South (10mm, Pilkington Clear Glass)	0.3	7153	21.465	27	194	n/a	n/a	n/a	0.82	0.86	0.77	37.5148868	268,368.26	0.7007
194 x CF x WWR X x SC														
Total		22644											680,279.19	
												Overall OTTV	30.44	

Figure 56 Option 2 OTTV Calculation

Option 3 was able to further reduce the OTTV Value from **32.14 W/sqm to 30.44 W/sqm**. Further Reducing the energy consumption of the office by 6% from the option 2 readings.

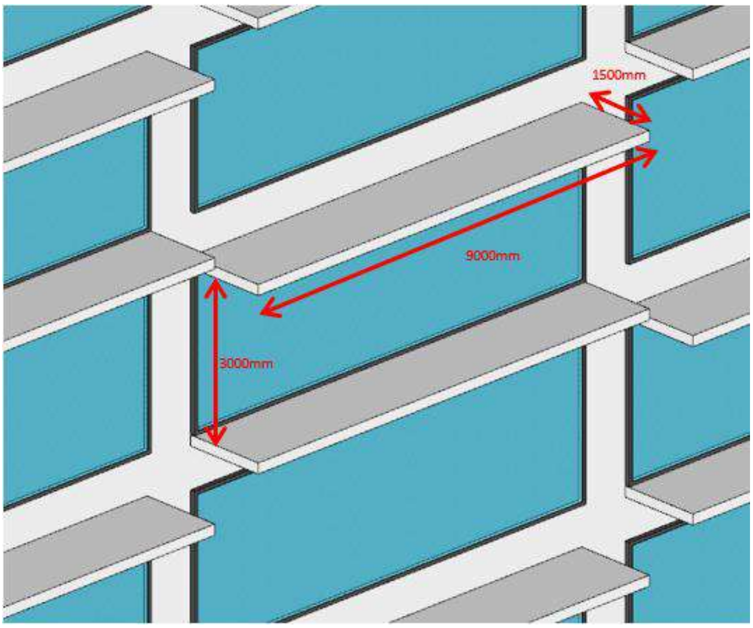


Figure 57 Option 2 view

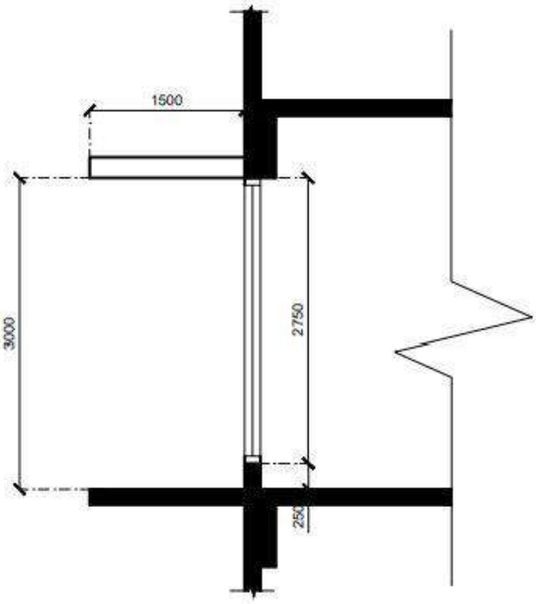
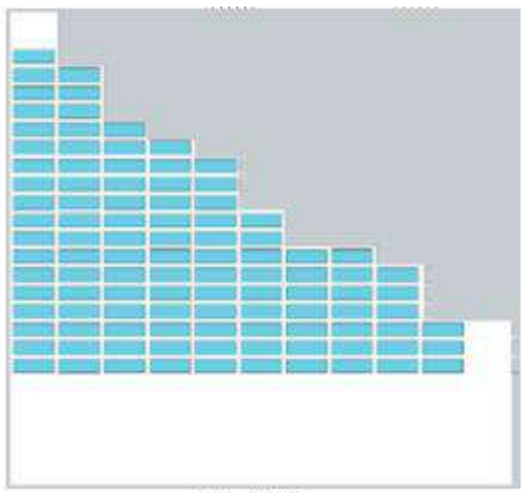


Figure 58 Option 2 Detail

West 20%



North 40%

West

Window
= (3m x 9m) x32 unit of window panels
= 27m x 32
= 864sqm

Wall
= 4169sqm

WWR= 0.20

Shading Coefficient of External Shading Device

X/Y = 1500/3000
= 0.50

SC2= 0.0-0.7 (W)
=0.71

North

Window
= (3m x 9m) x106 unit of window panels
= 27m x 106
= 2862 sqm

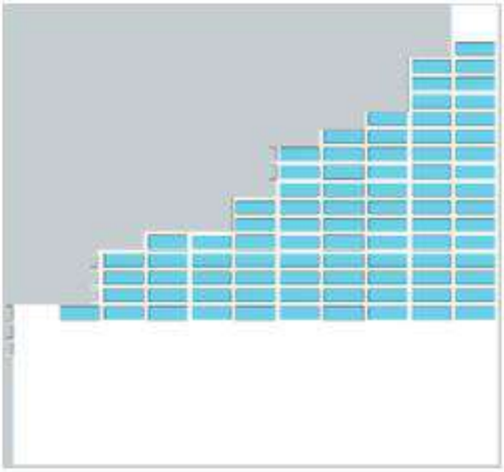
Wall
= 7153 sqm

WWR= 0.40

Shading Coefficient of External Shading Device

X/Y = 1500/3000
= 0.50

SC2= 0.0-0.7 (N/S)
=0.71



South 30%

Window = (3m x 9m) x86 unit of window panels = 27m x 86 = 2322 sqm	Shading Coefficient of External Shading Device
Wall = 7153 sqm	X/Y = 1500/3000 = 0.50
WWR= 0.30	SC2= 0.0-0.7 (N/S) **=0.71**

Conclusion

Option 3 overhang option is able to reduce the OTTV Value by 28% the original base model results. Therefore, Option3 is more suited to reduce the energy consumption of the office building

CHAPTER 5: DESIGN DEVELOPMENT

5.0: DESIGN STATEMENT

Kuala Lumpur booming economy has seen to many high and low rise office developments catering to knowledge based workers. As knowledge workforce is the main spine in moving the country forward towards technological and economic advancement, it is stress and burden put unto white collar workers are quite heavy. Over the decades, we have seen a complete evolution in the knowledge workforce industry as their work culture and attitude have evolved from the times of factory work environment. With this evolution, the architecture of today's offices has not been able to catch up therefore deterring the workers of their productivity as well as their wellbeing. Prioritising quantity more than quality as the knowledge industry has been monopolised by capitalism.

Therefore, the project proposes as human centric spaces towards designing the work environment for today's knowledge based workers. The proposal focuses on 1 key strategy that is biophilia. Not only to improve the building user experience but also the contextual surrounding as well. Promoting a more holistic approach towards designing office spaces in the heart and centre of Kuala Lumpur. The structure will be a new business hub where knowledge workers of all disciplines are welcome to work and interact among one another, creating a more socio-economic community and well and a new business collaboration. All tied together with the key strategies of biophilia to create a healing live-work office space in a very urban district in West Malaysia.

5.1: SITE PLAN / MASTERPLAN

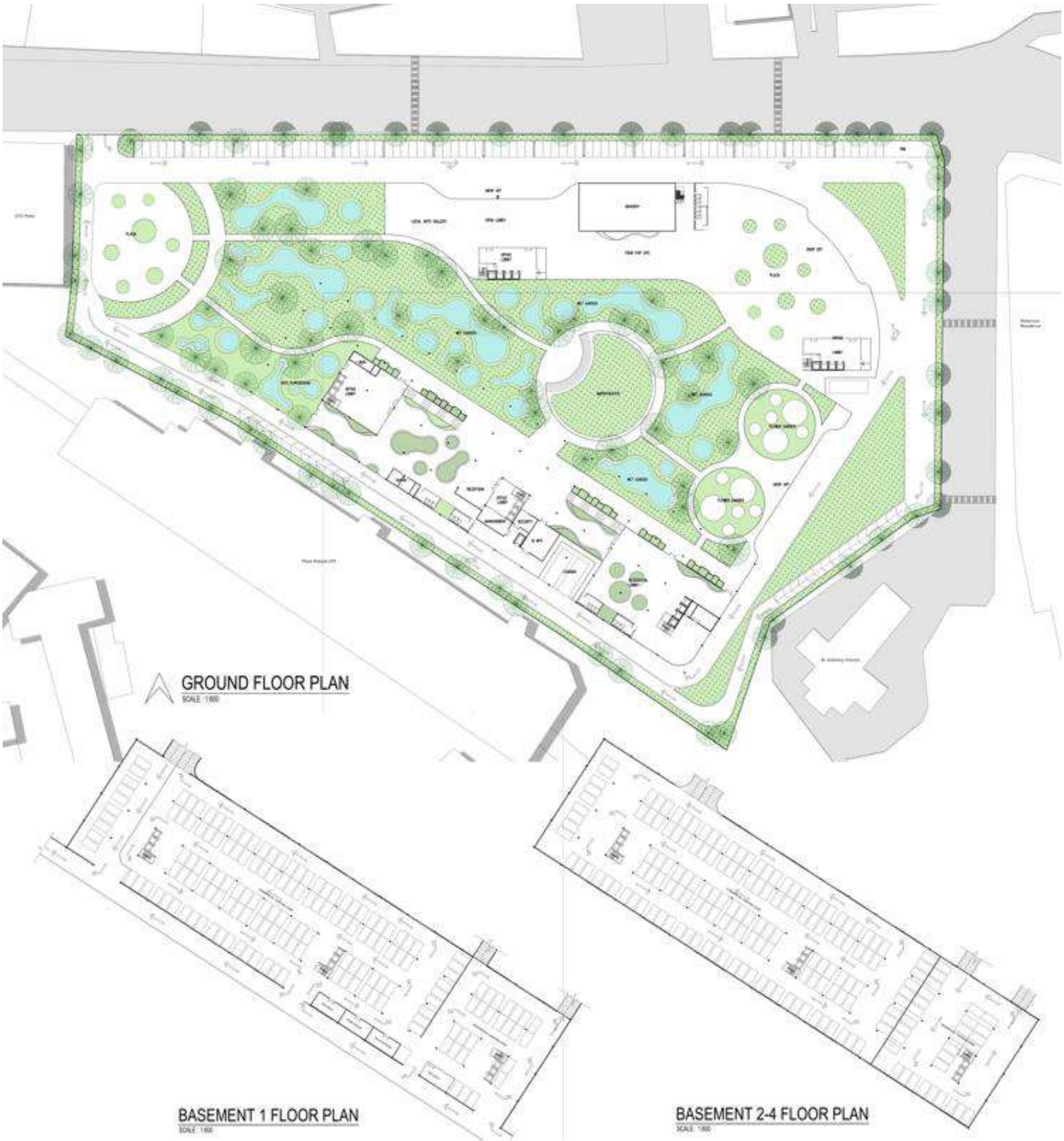
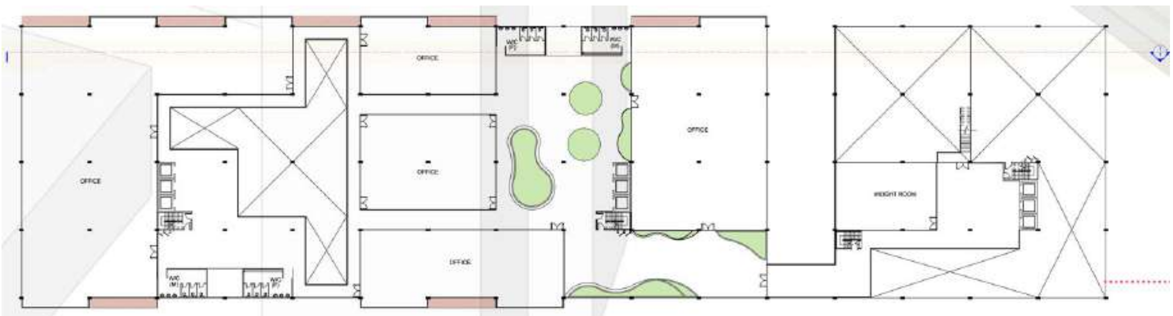


Figure 59 Urban planning layout

5.2: BUILDING FLOOR PLANS

4th floor plan 1:600

5th floor plan 1:600

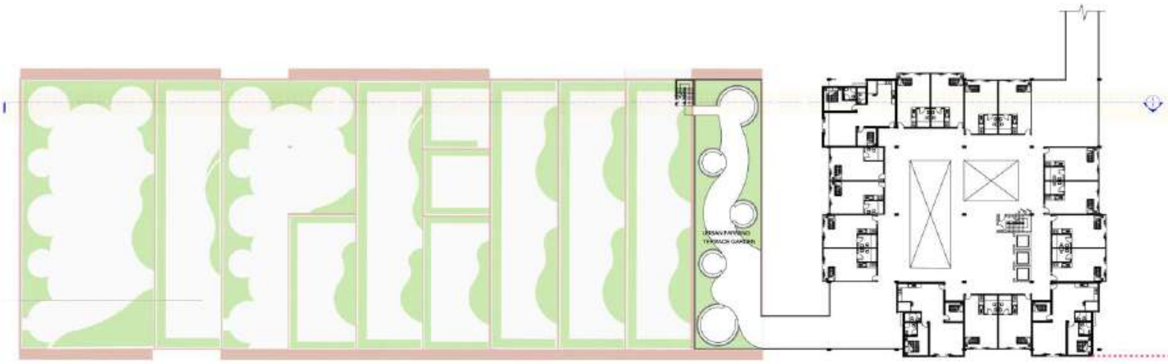


6th floor plan 1:600

Figure 60 Intermediate floor plans

14th floor plan 1:600

19th residential floor plan 1:600



27th floor plan 1:600

Figure 61 Intermediate floor plans

5.3: SECTIONS

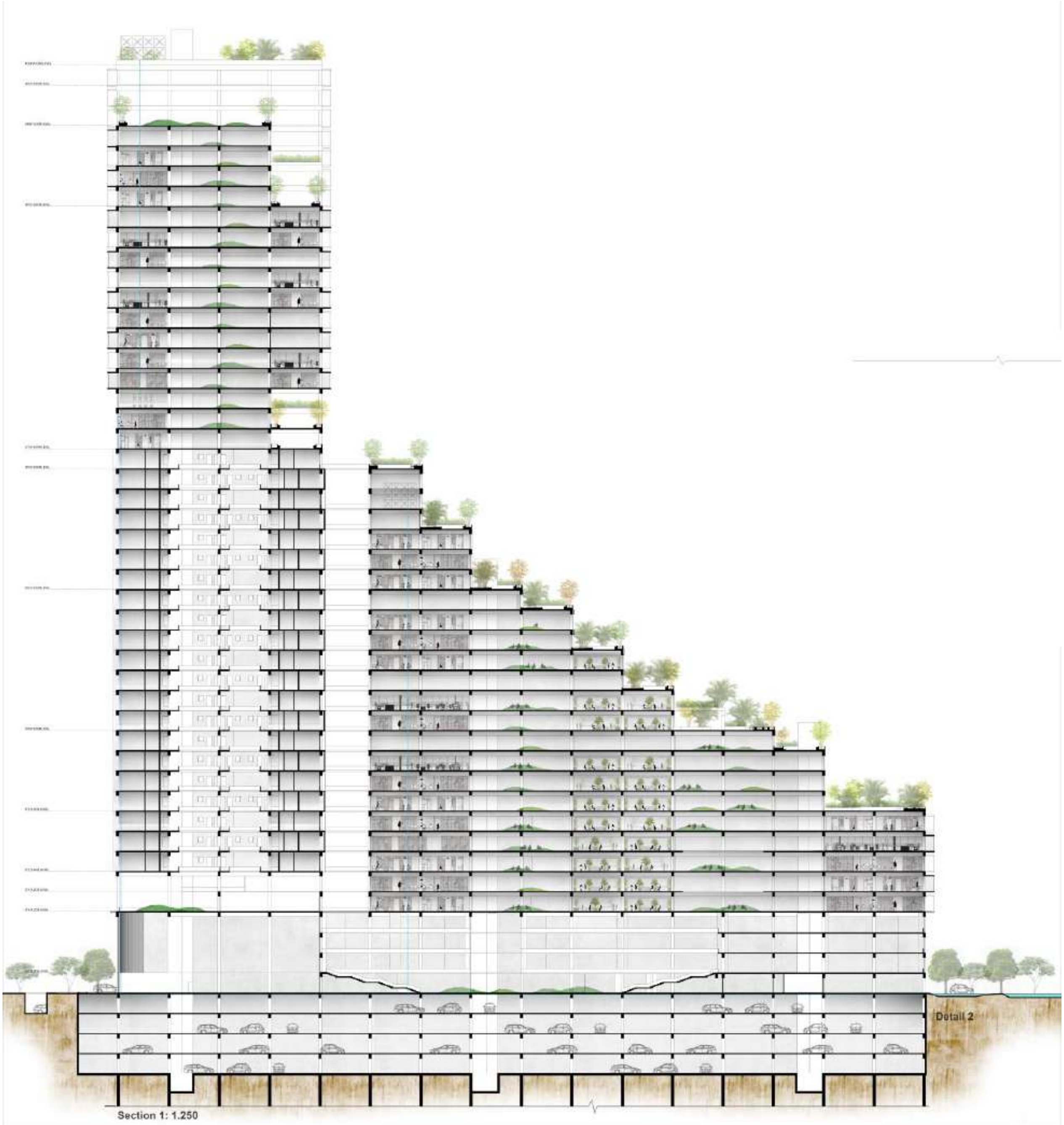
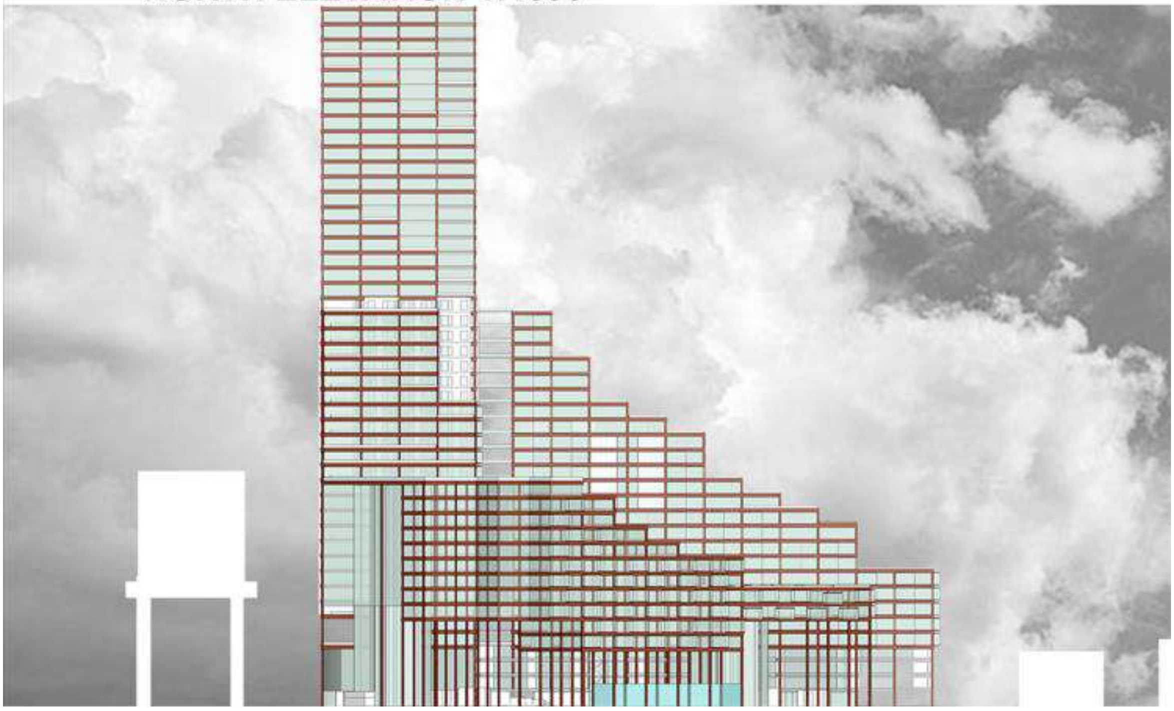


Figure 62 Sectional Render

5.4: ELEVATIONS

NORTH ELEVATION 1:1500



WEST ELEVATION 1:1500

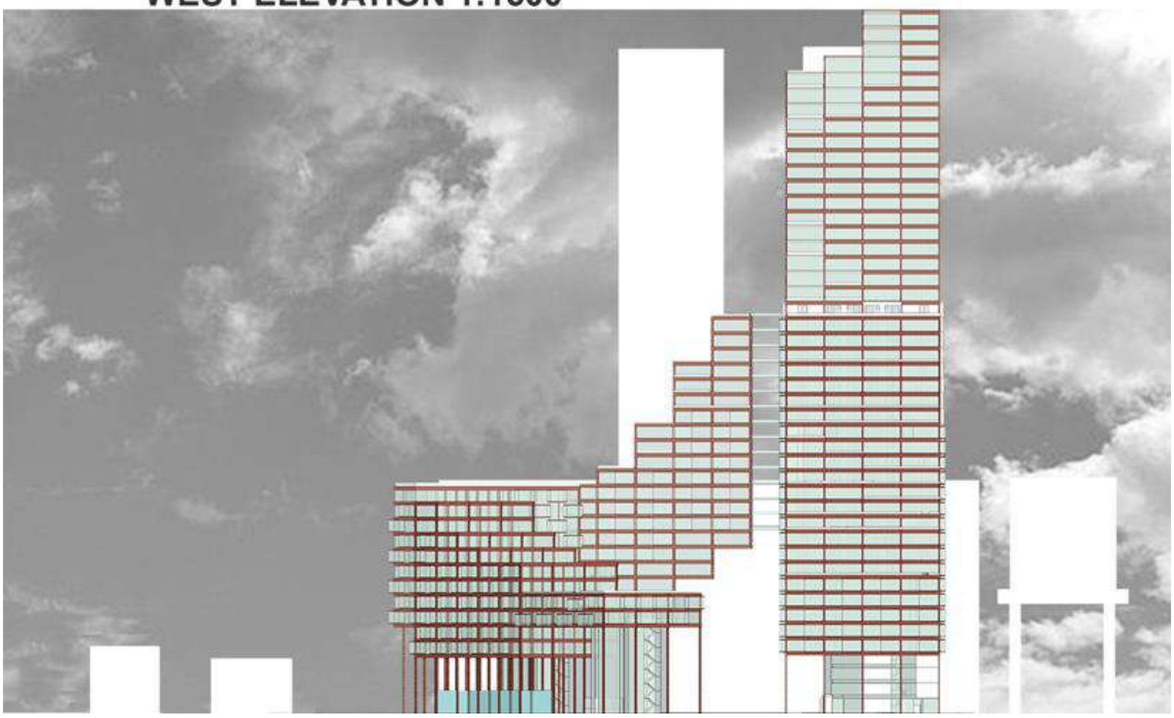


Figure 63 Elevation Render

5.5: ISOMETRIC VIEW & PERSPECTIVES

Figure 64 Aerial View

Figure 65 Master View

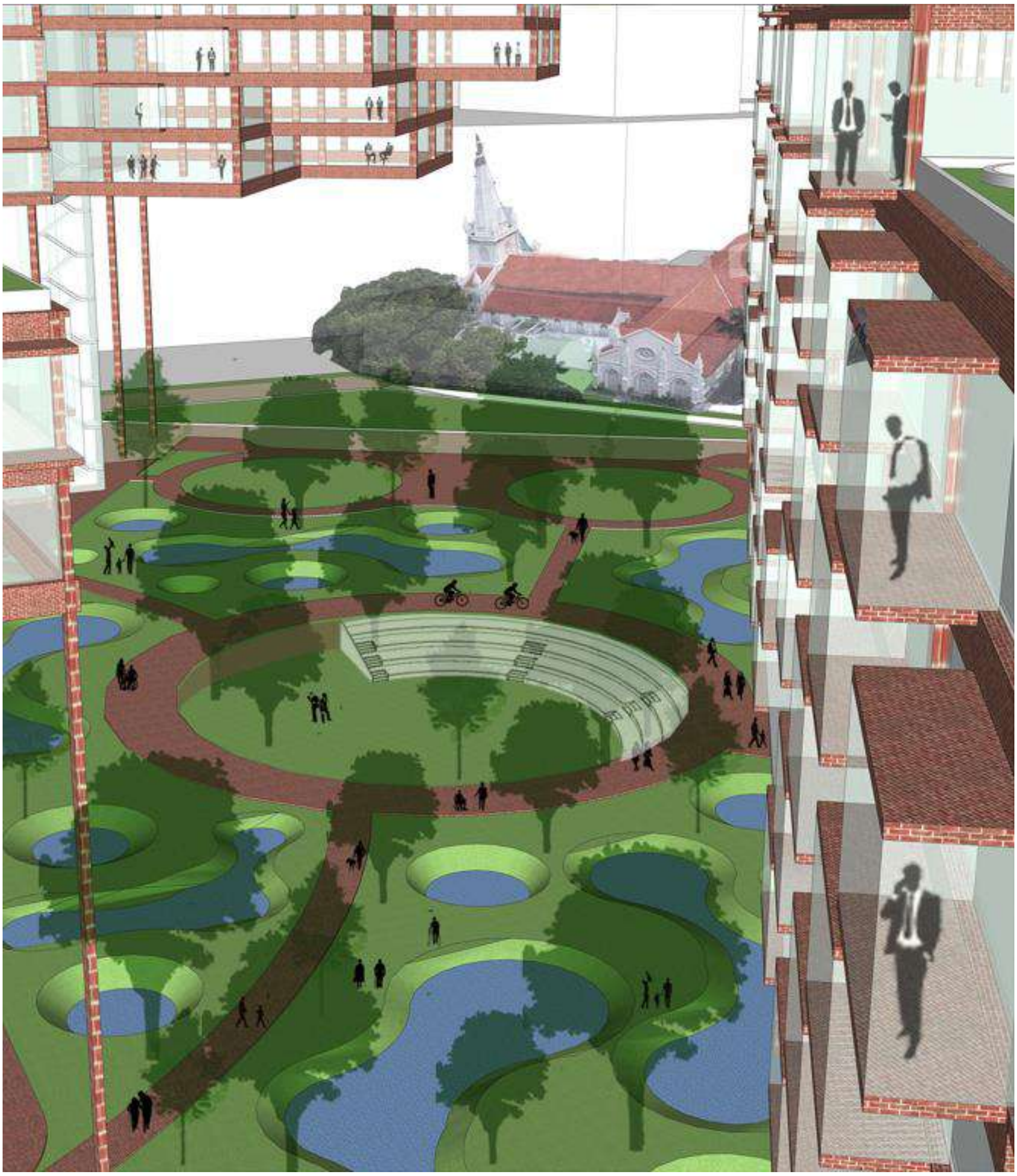


Figure 66 Wet Garden

Figure 67 Wet Garden

Figure 68 Retail podium

Figure 69 Healing office lobby

Figure 70 Outdoor balcony garden

Figure 71Exploded view

5.6: BUILDING DETAILS / TECHNICAL DRAWINGS

a. Technical Floor Plan

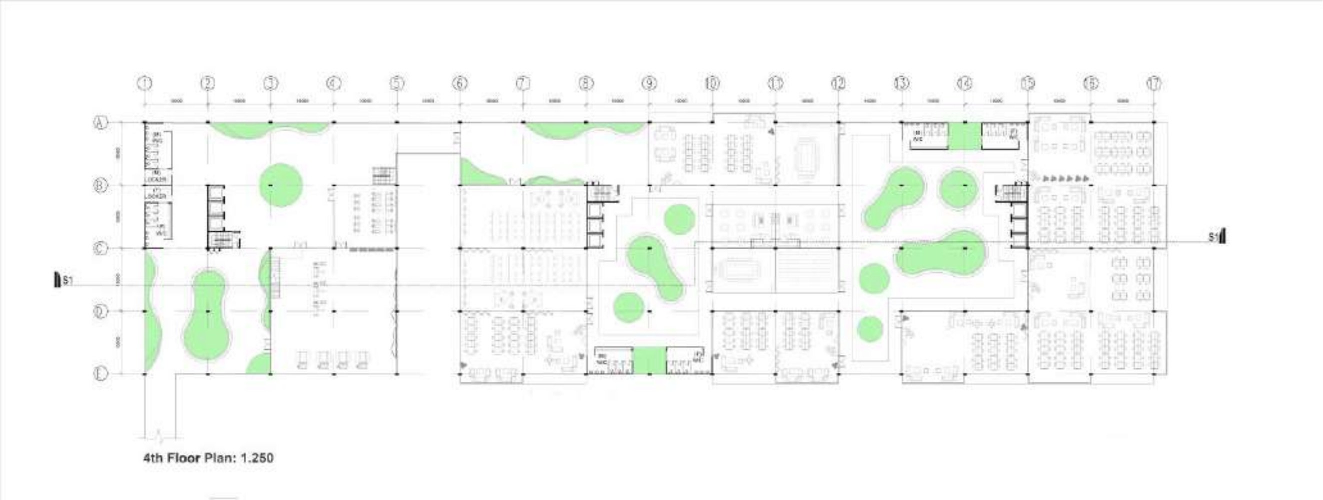


Figure 72 Technical floor plan

b. Plant Species

i. Ground Level Species

Azadirachta Indica (Pokok Mambu)

15-20m tall
White fragrant flowers in drooping panicles to 10" long bloom in spring. Trees are polygamous (both bisexual flowers and male flowers exist on the same plant)

Filicium decipiens (Fern tree)

Up to 20m in height
Leaves are glossy, alternately arranged, with 5-10 pairs of leaflets. Leaflets are lanceolate to linear or narrowly oblong – elliptic (5 – 16 cm long and 0.5 – 4 cm wide) with entire yet curled wavy margin.

Kahaya senegalensis (Roadside Tree)

Up to 30m in height
A very large and tall tree, semi-deciduous. The crown is large, rounded, bushy and dark green. The trunk is robust, straight and cylindrical, with buttresses. The bark is dark grey

Figure 73 Green species

ii. Mid-Level Species

Figure 74 Green species

iii. Urban Farm Species

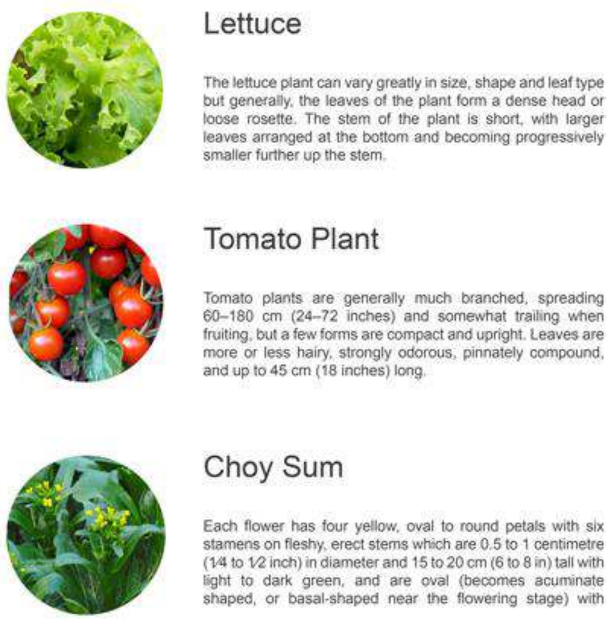


Figure 75Green species

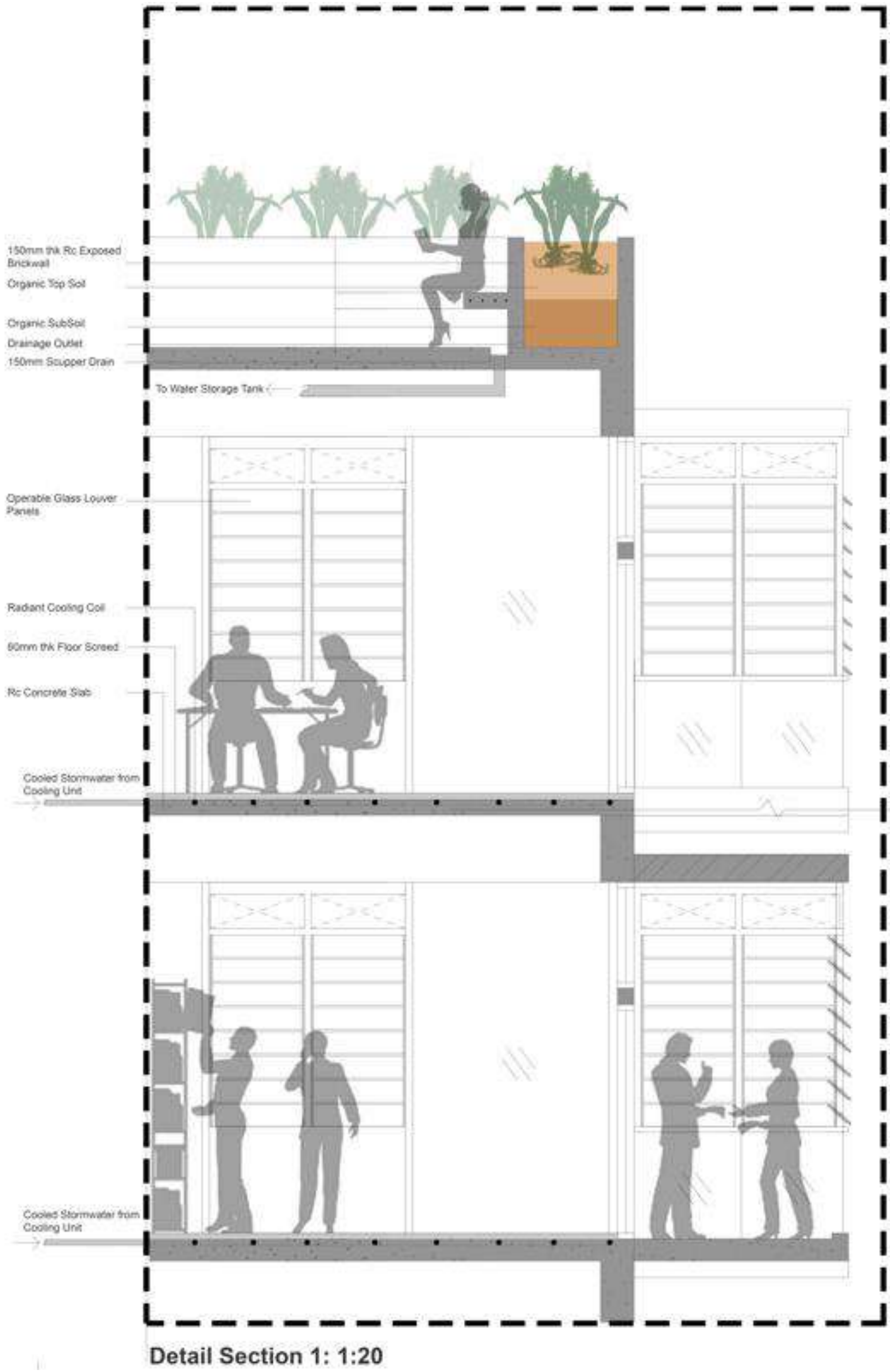


Figure 76 Façade Detail section

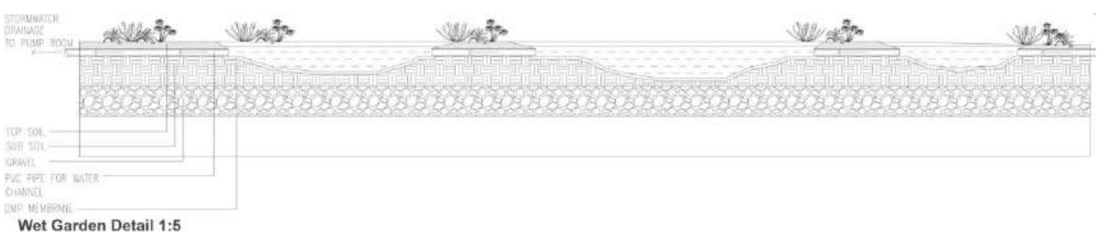


Figure 77 Wet garden detail

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