DESIGN BY SITI SARAH BINTI MOHAMMED SAIDI

HAVEN SANCTUARY MIXED-USE DEVELOPMENT

RETHINKING THE POST-PANDEMIC HIGH RISE OFFICE @ QUEENSBAY PENANG

PROJECT DESCRIPTION

THE RECENT PANDEMIC IMPACTED THE CITY IN ADAPTING TOWARDS THE NEW NORM THAT CHANGED HOW PEOPLE LIVES AND WORK. REIMAGINING WORK SHIFTED THE PARADIGM OF WORK CULTURE AND EXPERIENCES OF OPEN PLAN CONCEPT, COLLABORATIONS AND SOCIAL INTERACTION RATHER THAN INDIVIDUAL WORKING. THE BUZZ CONCEPT LIKE HIGH-DENSITY OPEN-PLAN WORKING AS WELL AS FLEXIBILITY OF SPACES. THE COMING TRANSFORMATION WIILL SEE AN OPTIONS OF OWNED SPACE, STANDARD LEASES, FLEXIBLE LEASES, FLEX SPACES, CO- WORKING SPACES AND REMOTE WORK IN ADAPTING TOWARDS POST-PANDEMIC. BASED ON THIS SCENARIO, THIS PROJECT IS AIMED AT IMPARTING EXPERIENCE TO STUDENTS ON REDUCING BUILDLDING FOOTPRINT BY GOING VERTICAL IN ALEVIATING SOME OF URBAN SPRAWL IN BAYAN LEPAS FREE INDUSTRIAL ZONE, PENANG.

MY PHILOSOPHY

ARCHITECTURAL DESIGN SHOULD ELEVATE THE CONNECTION BETWEEN SPACES & OCCUPANTS WITH NATURE

DESIGN INTENTION

THIS PROJECT IS AN EXPLORATION OF MY INTEREST IN AN IMPACT OF ARCHITECTURE IN HUMAN HEALTH SECURE & MENTAL HEALTH

DESIGN CONCEPT

HAVEN

HAVEN CONCEPT IS THE SOLUTION PRODUCED FROM THE STUDY OF POST PANDEMIC STRATEGIES.

ISSUE + SOLUTION

VIRUSES SPREAD THROUGH AIR BORNE AND SMALL DROPLETS. MOSTLY SICK BUILDING SYNDROME ARE PRON TO THIS ISSUES. HENCE MY DESIGN WILL SOLVE THE PROBLEM BY EMPHASIS ON GOOD INDOOR AIR QUALITY.

THE ARISEN OF PANDEMIC PHOBIA ALONG WITH NEW NORM CULTURE EFFECTS PEOPLE'S MENTAL HEALTH ESPECIALLY WORKERS THAT WORKS AT HOME WITHOUT THE FREEDOM OF GOING OUTSIDE MAKES PEOPLE SPIRIT DECRESING.

DESIGN STATEMENT

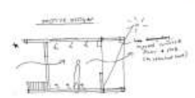
REJUVENATING OF OCCUPANT'S HEALTH, SPIRITUAL & PRODUCTIVITY BY BRINGGING BACK HAVEN CONCEPT INTO BUILDING

CLIENTS

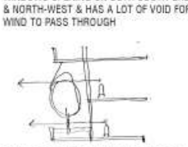
SIME DARBY GROUP

SIME DARBY BERHAD CORPORATION (2007) IS A NOTHEWORTHY MALAYSIA-BASED MULTINATIONAL CONGLOMERAT INVOLVED IN 5 SECTORS : PLANTATIONS, PROPERTY, INDUSTRIAL, MOTORS AND LOGISTIC. THEIR MISSION IS DELIVERING FUTURES.

DESIGN + POST PANDEMIC STRATEGIES



WINDOWS OPENING ON BOTH SOUTH-EAST & NORTH-WEST & HAS A LOT OF VOID FOR WIND TO PASS THROUGH



PROVIDE PRIVATE GREEN BALCONIES FOR TENANTS TO RECHARGE.

A LOT OF GREEN POCKET SPACES THAT ACT AS HIDDEN HAVEN IN THE BUILDING.

THE DESIGN EMPHASIS ON INTRODUCTION OF VACATION MOOD TO WORKERS WHILE WORKING IN THE OFFICE.

WIDE CIRCULATION IN COMMERCIAL PODIUM & CELEBRATED BY GREENERIES, WATER FEATURES AND GREEN POCKETS SPACES.

PROJECT NAME
HAVEN SANCTUARY OFFICE

BUILDING
MIXED-USE DEVELOPMENT :
OFFICE, SOHO, COMMERCIAL COMPLEX

SITE LOCATION
PERSIARAN BAYAN INDAH, PULAU PINANG

SITE AREA
4 ACRES

HEIGHT
100M

TOWER
DUPLEX SOHO -TOWER A
SIME DARBY OFFICES -TOWER B
SOHO -TOWER C

STUDIO COORDINATOR
DR. NOORIATI TAIB
ASSOC. PROF DR. MUNA HANIM
AR ZALENA ADBUL AZIZ
AR ANUAR RIZAL ABDUL RAHIM
AR MICHEAL PNG CHIN KEONG

PROJECT COMMENCE
26 NOVEMBER 2021

PROJECT SUBMITTED
7 FEBRUARY 2022

KEY PLAN
NOT TO SCALE

LOCATION PLAN
NOT TO SCALE

SITE PLAN
SCALE 1:500

SITE SYNTHESIS + SITE RESPOND

CONTINUITY OF PEDESTRIAN WALKWAY INTO THE SITE FROM QUEENSBAY MALL.

LINK TO DESTINATION NODES

BUILDING ORIENTATION WILL TACKLE ON THE 360 DEGREE VIEW AS THE SITE HAS SEA AS ITS FRONTAGE.

THIRD FLOOR PLAN
SCALE 1:300 [FFL 12.0M]

01. Private Garden
02. Jogging Track
03. Exercise Floor
04. Jumping Rope Plateform
05. Parking Podium
06. Ramp up from Ground Floor
07. Ramp down to Ground Floor
08. Lobby Tower A
09. Lobby Tower B
10. Lobby Tower C
11. Ramp up to 4FL
12. Ramp down from 4FL

SECOND FLOOR PLAN
SCALE 1:300 [FFL 8.0M]

01. Retail
02. F&B
03. Mini Local Stall F&B
04. Green Pocket Space
05. Lobby Tower A
06. Lobby Tower B
07. Lobby Tower C

FIRST FLOOR PLAN
SCALE 1:300 [FFL 4.0M]

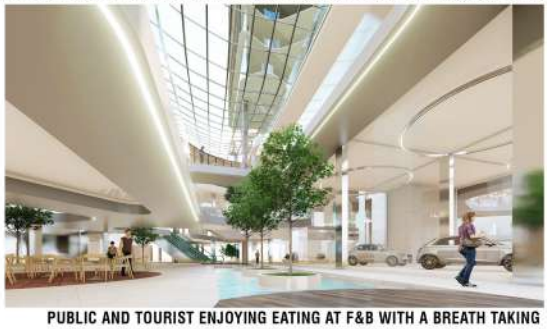
01. Retail
02. F&B
03. Mini Local Stall F&B
04. Green Pocket Space
05. Lobby Tower A
06. Lobby Tower B
07. Lobby Tower C

01. F&B
02. Retail
03. Convenience Store
04. Security Room
05. [illegible] Outlet
06. Refuse Chamber
07. TNB
08. Sime Darby's Security Room
09. Car's Loading Bay
10. Cars workshop
11. Tower Management Office
12. Sime Darby's Car Showroom
13. Water Fountain
14. Concourse
15. Grocery
16. Retail Management Office
17. Control Room
18. Surau
19. Ramp up to 3FL
20. Ramp down from 4FL
21. Ramp down to Basement L1
22. Ramp up from Basement L1
23. Service Lane
24. Loading bay
25. Lobby Tower A
26. Lobby Tower B
27. Lobby Tower C

GROUND FLOOR PLAN
SCALE 1:300 [FFL 0.0M]

PUBLIC AND TOURIST ENJOYING THEIR TIME AT COMMERCIAL PODIUM WHERE SIME DARBY'S CAR SHOWROOM LOCATED AND THEY CAN ENJOY EATING AT F&B WITH A BREATH TAKING VIEW OF SPLASHING WATER POND &THE GLASS ROOF.

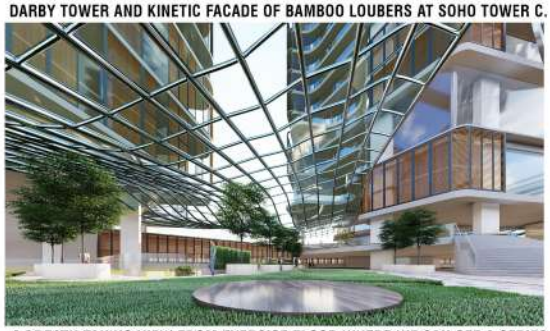
PUBLIC AND TOURIST ENJOYING THEIR TIME AT COMMERCIAL PODIUM WHERE SIME DARBY'S CAR SHOWROOM LOCATED AND THEY CAN ENJOY EATING AT F&B WITH A BREATH TAKING VIEW OF SPLASHING WATER POND & THE GLASS ROOF.



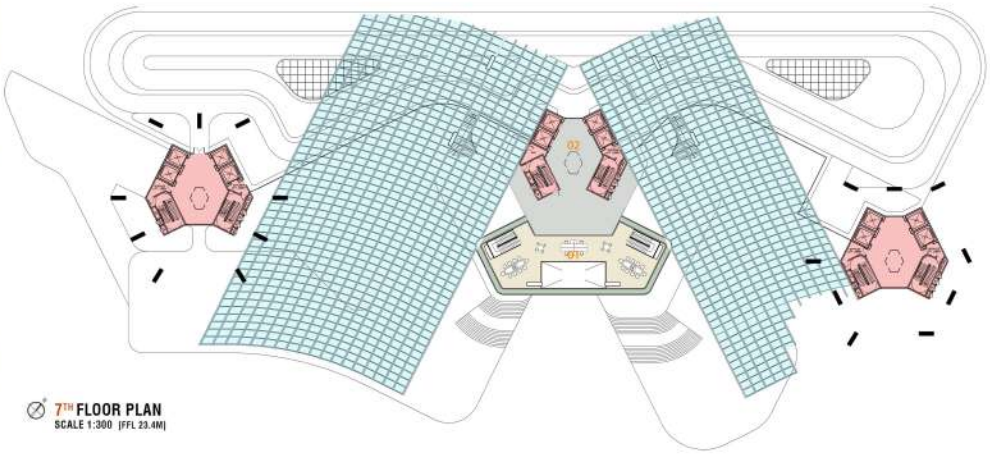
PUBLIC AND TOURIST ENJOYING EATING AT F&B WITH A BREATH TAKING VIEW OF SPLASHING WATER POND & THE ELEVATED TINTED GLASS ROOF.

MESMERISING VIEW FROM EXERCISE FLOOR SHADED WITH TINTED GLASS ROOF TOWARDS AN OPEN CONCEPT ATRIUM WHERE STACK VENTILATION CAN OCCUR AND COOL DOWN THE BUILDING.

A BREATH TAKING VIEW FROM JOGGING TRACK WHERE WE CAN SEE A SERIES OF HORIZONTAL FIXED BAMBOO LOUVERS AT THE PARKING PODIUM, SIME DARBY TOWER AND KINETIC FACADE OF BAMBOO LOUBERS AT SOHO TOWER C.

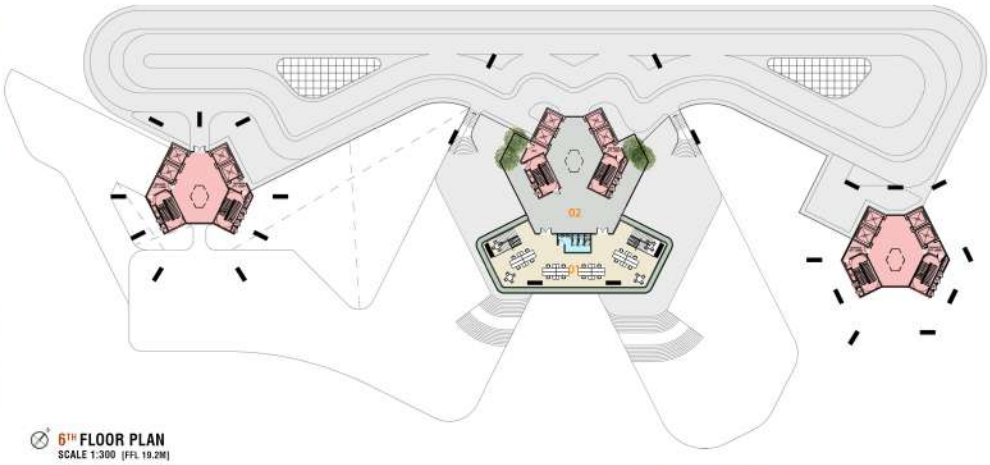


A BREATH TAKING VIEW FROM EXERCISE FLOOR WHERE WE CAN SEE A SERIES OF HORIZONTAL FIXED BAMBOO LOUVERS AT THE PARKING PODIUM, SIME DARBY TOWER AND KINETIC FACADE OF BAMBOO LOUVERS AT SOHO TOWER A.



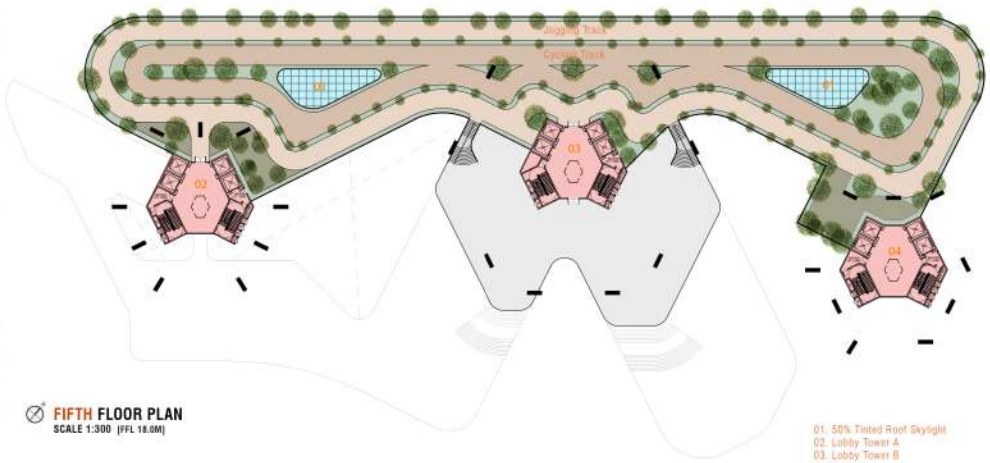
7TH FLOOR PLAN
SCALE 1:300 (FFL 23.4M)

01. Sime Darby Berhad Office (mezzanine floor)
02. Lobby Tower B



6TH FLOOR PLAN
SCALE 1:300 (FFL 19.2M)

01. Sime Darby Berhad Office
02. Lobby Tower B



FIFTH FLOOR PLAN
SCALE 1:300 (FFL 18.0M)

01. 50% Tinted Roof Skylight
02. Lobby Tower A
03. Lobby Tower B
04. Lobby Tower C

FOURTH FLOOR PLAN
SCALE 1:300 (FFL 15.0M)

01. Exercise Floor
02. Lobby Tower A
03. Lobby Tower B
04. Lobby Tower C
05. 50% Tinted Roof Skylight
06. Ramp up from 3FL
07. Ramp Down to 4FL

MESMERISING VIEW FROM EXERCISE FLOOR SHADED WITH TINTED GLASS ROOF AND FACING PARKING PODIUM THAT ENCLOSED WITH A SERIES OF FIXED BAMBOO LOUVERS

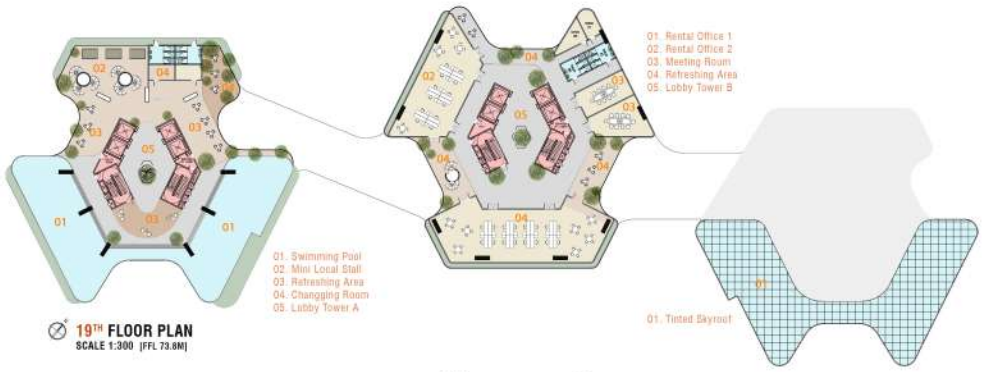
DUPLEX SOHO TENANT ARE ENJOYING THEIR TIME IN LIVING AREA WITH A MESMERISING VIEW FROM THE SEA AND PULAU JEREJAK. LIVING ROOM IS A DOUBLE VOLUME SPACE WITH MEZZANINE FLOOR ON TOP OF IT.

DUPLEX SOHO TENANT ARE ENJOYING THEIR HI TEA AT THE KITCHEN WITH A MESMERISING VIEW FROM THE SEA AND PULAU JEREJAK.

DUPLEX SOHO TENANT ARE ENJOYING THEIR TIME IN LIVING AREA WITH A MESMERISING VIEW FROM THE SEA AND PULAU JEREJAK. LIVING ROOM IS A DOUBLE VOLUME SPACE WITH MEZZANINE FLOOR ON TOP OF IT.

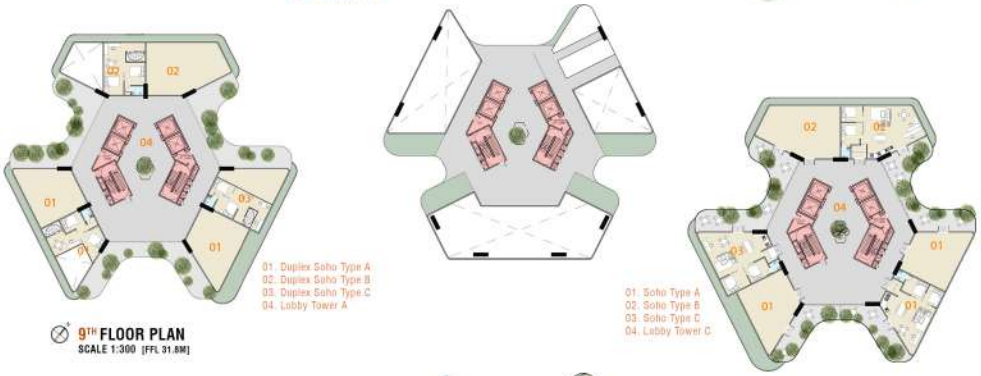
TENANTS ARE ENJOYING THEIR EVENING TIME BUYING FOOD FROM LOCAL STALL LOCATED AT THE FACILITIES FLOOR. THE FLOOR CONNECT BETWEEN TOWER B & C.

HAVING A REFRESHING TIME AT SWIMMING POOL ON THE TOP FLOOR OF TOWER C CAN RECHARGE THEMSELVES AFTER A LONG TIRED DAY WORKING AT HOME THEY CAN SEE A NICE VIEW OF THE SEA & PULAU JEREJAK.



19TH FLOOR PLAN
SCALE 1:300 [FFL 73.6M]

18TH FLOOR PLAN
SCALE 1:300 [FFL 69.6M]



9TH FLOOR PLAN
SCALE 1:300 [FFL 31.8M]

8TH FLOOR PLAN
SCALE 1:300 [FFL 27.6M]

01. F&B/Mini Local Stall
02. Co-Working Area
03. Refreshing Area
04. Lobby

17TH FLOOR PLAN [TOWER B]
SCALE 1:300 [FFL 65.4M]

01. Nap Pod
02. Co-Working Area
03. F&B/Mini Local Stall
04. Refreshing Area
05. Lobby

11TH FLOOR PLAN [TOWER A] [FFL 40.2M]
12TH FLOOR PLAN [TOWER C] [FFL 44.4M]
SCALE 1:300

FRONT ELEVATION
SCALE 1:300

01. F&B/Mini Local Stall
02. Sleeping Pod
03. Lobby Tower B
04. Refreshing Area

21TH FLOOR PLAN [TOWER B]
SCALE 1:300 [FFL 82.2M]

01. Meditate Floor
02. Co-Working Area
03. Lobby Tower B

17TH FLOOR PLAN [TOWER B]
SCALE 1:300 [FFL 65.4M]

REAR ELEVATION
SCALE 1:300

01. Domestic Water Tank & Pump Room
02. F&B/Mini Local Stall
03. Sleeping Pod
04. Sleeping Pod
05. Refreshing Area
06. Lobby Tower B

11TH FLOOR PLAN [TOWER B]
SCALE 1:300 [FFL 40.2M]

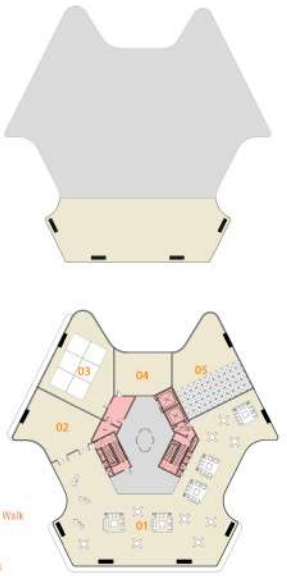
01. Meeting Room 1
02. Lobby Tower B
03. Rental Office 1
04. Rental office 2
05. Refreshing Area

23TH FLOOR PLAN [TOWER B]
SCALE 1:300 [FFL 90.6M]

RIGHT ELEVATION
SCALE 1:300

LEFT ELEVATION
SCALE 1:300

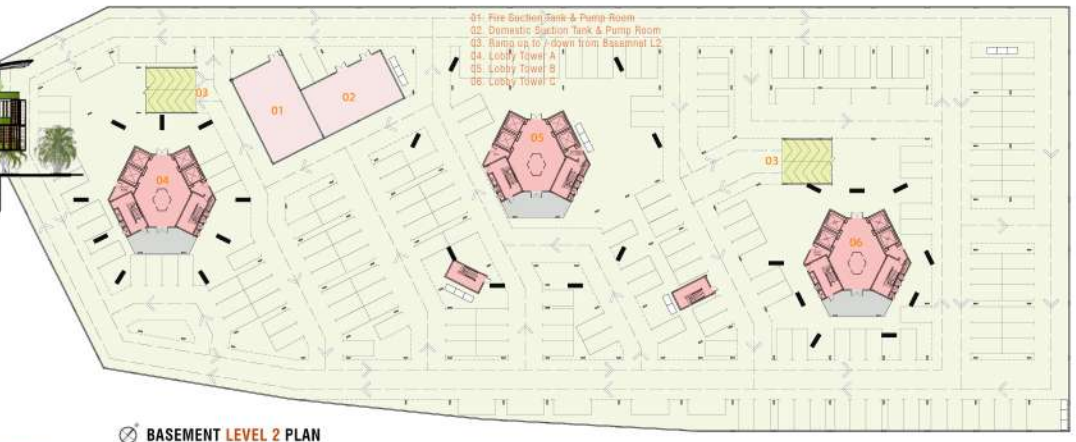
SECTION A-A
SCALE 1:300



24TH FLOOR PLAN [TOWER B]
SCALE 1:300 [FFL 94.8M]

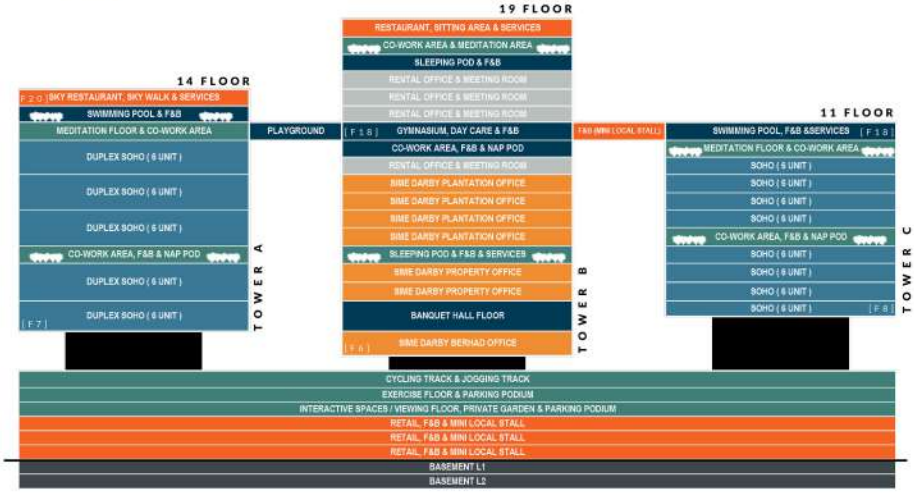
BASEMENT LEVEL 1 PLAN
SCALE 1:300 [FFL -2.8M]

SECTION B-B
SCALE 1:300



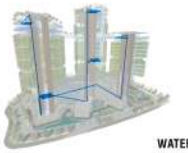
BASEMENT LEVEL 2 PLAN
SCALE 1:300 [FFL -5.6M]

SECTION C-C
SCALE 1:300



PROGRAM DISTRIBUTION DIAGRAM

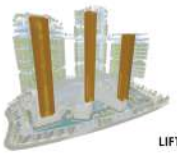
INTEGRATION OF ARCHITECTURAL BUILDING SERVICES & BUILDING CONSTRUCTION TECHNOLOGY



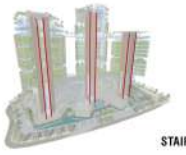
WATER SUPPLY SYSTEM

AIR CONDITIONING SYSTEM

ELECTRICAL SERVICES

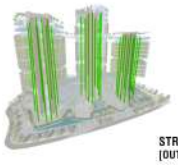


LIFT CORE



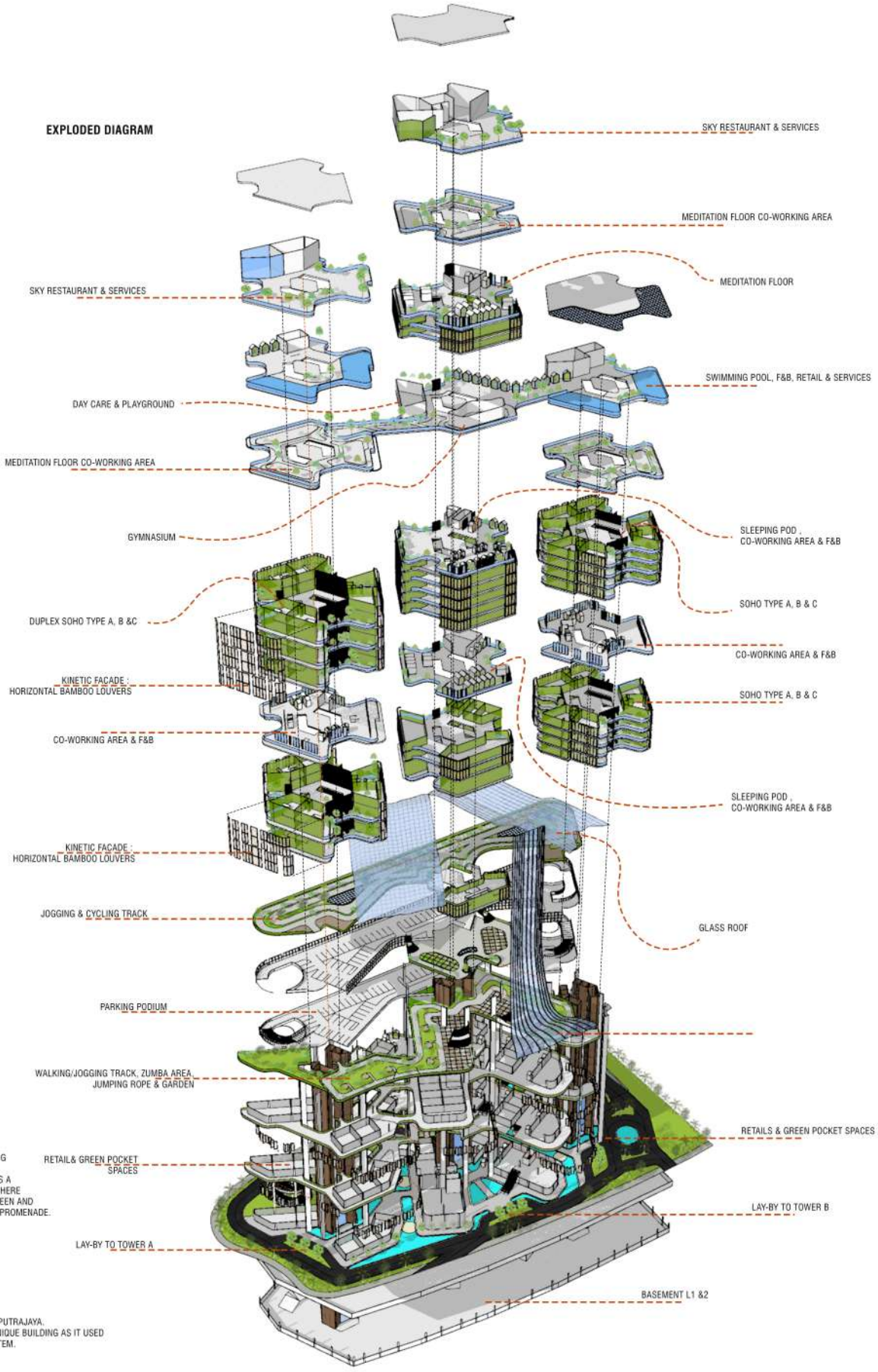
STAIRCASES

ESCALATOR



STRUCTURAL SYSTEM
(OUTRIGGER SYSTEM)

EXPLODED DIAGRAM



PRECEDENT STUDY

DESIGN VILLAGE

DESIGN VILLAGE IS ASHOPPING OUTLET LOCATED AT PENANG, MALAYSIA. THIS OOUTLET HAS A GOOD RETAIL CIRCULATION WHERE THE ARCHITECT CREATE A GREEN AND RELAXING SPACE ALONG THE PROMENADE.

SPRM OFFICE BUILDING

SPRM OFFICE IS LOCATED AT PUTRAJAYA. THIS OFFICE BUILDING IS A UNIQUE BUILDING AS IT USED OUTRIGGER STRUCTURE SYSTEM.

SHOPPING OUTLET

THIS PRECEDENT STUDY IS TO STUDY ON THE WATER FEATURES ALONG THE ARCHITECTURAL PROMENADE

CO-WORKING SPACE

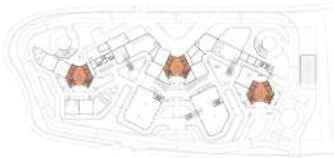
THE CO-WORKING ARE USED OPEN PLAN LAYOUT TO PROMOTE FLEXIBILITY AND VERSATILE CULTURE WHILE WORKING

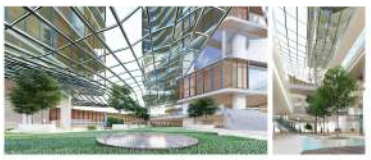
MOCK UP MODEL

DESIGN BY SITI SARAH BINTI MOHAMMED SAIDI P-RM0194/21

ENERGY EFFICIENT BUILDING DESIGN TECHNOLOGY

MIXED USE DEVELOPMENT
OFFICE, QUEENSBAY PENANG





CORE LOCATION

The building's core are located at the centre of the floor plate where tenants and visitors can access easily expecially during fire escape. It also can shorten the AHU ductwork for air conditioning distribution. The centered core can provided tenant a 360° view and allow cross natural ventilation into the building.

KINETIC FACADE

Kinetic facade is installed on the east-west frontage as it receives higher sunlight's intensity at podium floor and also at rental office and soho tower. The facade was madeof horizontal bamboo lovers panel that allow unecxcessive natural lighting and natural ventilation to integrated into the building.

LOW E-GLAZING FACADE

Low e-glass with medium tinted finish is used at the top of podium courtyard and also at office tower as a measure it doesn't accumulated lots of heat during noon hour and to avoid it dissipitates hot air on night.

ELEVATED FLOOR PLATE OF TOWER

SOHO and Sime Darby office towers are 1-2 storay elevated from retail podium as it allows cross ventilation to happen from retail podium to the jogging track on the fifth floor level. The elevated floor of tower are purposely designed to avoid sick building syndrome .

LIGHT TUBE TECHNOLOGY

Light tubes are used to harvest natural lighting of the sun by channeling it via fibre optics into the interior part. The tubes light technology are used at the core because the core were located at the centre floor plate which less natural lighting can enter the core

BUILDING ORIENTATION

Light tubes are used to harvest natural lighting of the sun by channeling it via fibre optics into the interior part. The tubes light technology are used at the core because the core were located at the centre floor plate which less natural lighting can enter the core

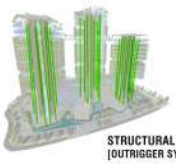
WATER FEATURES AS COOLING SYSTEM

Water features adapted into the retail podium as it can give cooling effect to the building.

WATER FEATURES AS COOLING SYSTEM

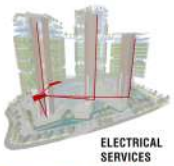
Water features adapted into the retail podium as it can give cooling effect to the building.

STAIRCASES

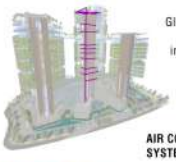


STRUCTURAL SYSTEM [OUTRIGGER SYSTEM]

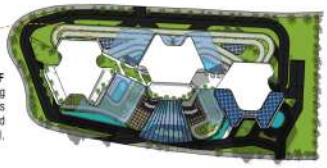
LIFT CORE



ELECTRICAL SERVICES



AIR CONDITIONING SYSTEM



GLASS ROOF

Glass roof can allow natural lighting to come in intothe space. it was installed at the parking podium and facility floor;swimming pool.

PHOTOVOLTAIC SYSTEM

Photovoltaic or commonly known as PV are installed on the most top of the building's tower to harvest all year long sunlight. this also help to reduse the energy usage of the building.

ESCALATOR

WATER SUPPLY SYSTEM

RIGHT ELEVATION

LEFT ELEVATION

REAR ELEVATION

FRONT ELEVATION

OOTV CALCULATION

OTTV COMPONENTS	Wall Location	Wall Area, m²	Window area, m²	Constant	Solar Absorption factor (α)	Window to Wall Ratio (WWR)	(1-WWR)	Wall Constructi on U-Value (Uw)	Glass-U-Value (UI)	Orientation Factor (OF)	Shading Coefficient of Glass (SC1)	Shading Coefficient of External Shading Device (SC2)	Shading Coefficient of the Window (SC) SC1 x SC1	Wall OTTV (ie multiply all shaded cells in the same row)	% of OTTV
Heat Conduction Through Walls	North Wall	591.66	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	1750.57	
	South Wall	548.20	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	1621.99	
	East Wall	596.02	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	1763.46	
	West Wall	706.02	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	2088.92	
	∑	2441.89	Equation for Heat Conduction Through Walls = 15 x α x (1-WWR) Uw										∑	7224.94	7%
Heat Conduction Through Windows	North Window	N/A	591.66	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	6389.93	
	South Window	N/A	548.20	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	5920.56	
	East Window	N/A	596.02	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	6436.96	
	West Window	N/A	706.02	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	7624.96	
		Equation for Heat Conduction Through Windows = 6 x WWR X UI											∑	26372.41	24%
Solar Heat Gain Through Window	North Window	N/A	591.66	194.00	N/A	0.50	N/A	N/A	N/A	0.90	0.51	0.67	0.34	17649.46	
	South Window	N/A	548.20	194.00	N/A	0.50	N/A	N/A	N/A	1.23	0.51	0.60	0.31	20014.16	
	East Window	N/A	596.02	194.00	N/A	0.50	N/A	N/A	N/A	0.92	0.51	0.65	0.33	17631.95	
	West Window	N/A	706.02	194.00	N/A	0.50	N/A	N/A	N/A	0.94	0.51	0.63	0.32	20683.51	
		Equation for Solar Heat Gain Through Windows = 194 x WWR X OI X SC											∑	75979.07	69%
													∑ WALL OTTV	109576.43	
													∑ WALL AREA	2441.89	
													OTTV	44.87	
OOTV CALCULATION TOWER A															
Heat Conduction Through Walls	North Wall	813.80	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	2407.83	
	South Wall	832.26	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	2462.43	
	East Wall	775.27	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	2293.83	
	West Wall	548.43	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	1622.65	
	∑	2969.75	Equation for Heat Conduction Through Walls = 15 x α x (1-WWR) Uw										∑	8786.75	6%
Heat Conduction Through Windows	North Window	N/A	406.90	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	4394.52	
	South Window	N/A	832.26	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	8988.35	
	East Window	N/A	775.27	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	8372.92	
	West Window	N/A	548.43	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	5922.99	
		Equation for Heat Conduction Through Windows = 6 x WWR X UI											∑	27678.78	20%
Solar Heat Gain Through Window	North Window	N/A	406.90	194.00	N/A	0.50	N/A	N/A	N/A	0.90	0.51	0.67	0.34	12117.99	
	South Window	N/A	832.26	194.00	N/A	0.50	N/A	N/A	N/A	1.23	0.51	1.00	0.51	50641.14	
	East Window	N/A	775.27	194.00	N/A	0.50	N/A	N/A	N/A	0.92	0.51	0.65	0.33	22934.86	
	West Window	N/A	548.43	194.00	N/A	0.50	N/A	N/A	N/A	0.94	0.51	0.63	0.32	16066.73	
		Equation for Solar Heat Gain Through Windows = 194 x WWR X OI X SC											∑	101780.72	74%
													∑ WALL OTTV	138246.25	
													∑ WALL AREA	2969.75	
													OTTV	46.55	
OOTV CALCULATION TOWER B															
Heat Conduction Through Walls	North Wall	659.00	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	1949.80	
	South Wall	1220.72	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	3611.79	
	East Wall	715.67	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	2117.47	
	West Wall	1799.48	N/A	15.00	0.15	0.50	0.50	2.63	N/A	N/A	N/A	N/A	N/A	5324.21	
	∑	4394.86	Equation for Heat Conduction Through Walls = 15 x α x (1-WWR) Uw										∑	13003.28	7%
Heat Conduction Through Windows	North Window	N/A	659.00	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	7117.15	
	South Window	N/A	610.36	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	6591.87	
	East Window	N/A	715.67	6.00	N/A	0.80	N/A	N/A	3.60	N/A	N/A	N/A	N/A	12366.69	
	West Window	N/A	1799.48	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	19434.38	
		Equation for Heat Conduction Through Windows = 6 x WWR X UI											∑	45510.09	24%
Solar Heat Gain Through Window	North Window	N/A	659.00	194.00	N/A	0.50	N/A	N/A	N/A	0.90	0.51	0.67	0.34	19658.09	
	South Window	N/A	610.36	194.00	N/A	0.50	N/A	N/A	N/A	1.23	0.51	0.60	0.31	22283.47	
	East Window	N/A	715.67	194.00	N/A	0.80	N/A	N/A	N/A	0.92	0.51	0.65	0.33	33874.50	
	West Window	N/A	1799.48	194.00	N/A	0.50	N/A	N/A	N/A	0.94	0.51	0.63	0.32	52717.81	
		Equation for Solar Heat Gain Through Windows = 194 x WWR X OI X SC											∑	128533.87	69%
													∑ WALL OTTV	187047.24	
													∑ WALL AREA	4394.86	
													OTTV	42.56	
OOTV CALCULATION TOWER C															
Heat Conduction Through Walls	North Wall	473.78	N/A	15.00	0.15	0.25	0.75	2.63	N/A	N/A	N/A	N/A	N/A	2102.69	
	South Wall	201.63	N/A	15.00	0.15	0.25	0.75	2.63	N/A	N/A	N/A	N/A	N/A	894.86	
	East Wall	749.06	N/A	15.00	0.15	0.25	0.75	2.63	N/A	N/A	N/A	N/A	N/A	3324.42	
	West Wall	410.20	N/A	15.00	0.15	0.80	0.20	2.63	N/A	N/A	N/A	N/A	N/A	485.47	
	∑	1834.67	Equation for Heat Conduction Through Walls = 15 x α x (1-WWR) Uw										∑	6807.45	12%
Heat Conduction Through Windows	North Window	N/A	355.34	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	3837.62	
	South Window	N/A	151.22	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	1633.20	
	East Window	N/A	561.80	6.00	N/A	0.50	N/A	N/A	3.60	N/A	N/A	N/A	N/A	6067.39	
	West Window	N/A	82.04	6.00	N/A	0.80	N/A	N/A	3.60	N/A	N/A	N/A	N/A	1417.65	
		Equation for Heat Conduction Through Windows = 6 x WWR X UI											∑	12955.86	22%
Solar Heat Gain Through Window	North Window	N/A	355.34	194.00	N/A	0.50	N/A	N/A	N/A	0.90	0.51	0.67	0.34	10599.79	
	South Window	N/A	151.22	194.00	N/A	0.50	N/A	N/A	N/A	1.23	0.51	0.60	0.31	5520.96	
	East Window	N/A	561.80	194.00	N/A	0.50	N/A	N/A	N/A	0.92	0.51	0.65	0.33	16619.62	
	West Window	N/A	82.04	194.00	N/A	0.80	N/A	N/A	N/A	0.94	0.51	1.00	0.51	6104.01	
		Equation for Solar Heat Gain Through Windows = 194 x WWR X OI X SC											∑	38844.38	66%
													∑ WALL OTTV	58607.68	
													∑ WALL AREA	1834.67	
													OTTV	31.94	
OOTV CALCULATION PODIUM															