CIC BIM Competition 2021 – **Coffeeholics**

Location Plan 1:2000

21 JUNE

21 DECEMBER

Site Address: 8 Sheung Yuet Road, Kowloon Bay, Hong Kong

About the Advancing Net Zero Hub

Design Concept:
We aim to design a public welcoming Hub to provide a space for supporting new initiatives for architecture, engineering, construction, owner and operations (AECOO) industry and to showcase an eco-building and to create active and passive recreational place serving the needs of local district.

Building Form:
Our main concept of the building is to create internal visual connection from every room to the central courtyard and to catch the summer prevailing wind through the Southeast opening in order to maximum the Passive Cooling effect.

Spatial Arrangement:
The programme for the public such as The Indoor exhibition area and Café are arranged to locate on the G/F surrounding the largest outdoor exhibition space courtyard. Semi –Public facilities such as workshops and classrooms are located on the 1/F with an outdoor covered exhibition space. The Private programs such as the offices and board rooms are located at the 2/F.

Connectivity:
We placed 2 carparks at the 2 sides of the Main Entrance for 10 private car parking and a loading and unloading bay each. Pedestrian way is also connected from the 4 sides of the site to the main circulation path of the building. Two Cargo lifts and two passenger lifts are connecting the whole building. 2 set of staircases on each floor are provided to ensure smooth evacuation for Occupants.

BIM Uses in Design, Collaboration, Engineering, Analysis and Optimisation:
BIM can speed up our workflow and data transferring across the entire project lifecycle. The multi-discipline of real life data would highly enhance the accuracy of design decisions. In addition, the design collaboration with engineering to construction aspects could also minimize the time of solving foreseeing problems and thus better outcomes can be achieved.

BIM Collaboration approach:
Our team member discussed how to fulfill the competition brief requirement through Regular Zoom meeting. We use the Revit 2020 version and BIM 360 to collaborate our design model with the help of immediately update feedback and markup.

Quality of Design:
Use of Revit Room Schedule to aid in space design decisions making and to monitor the room area to be within 10% tolerance. Use of Enscape Asset Library to speed up interior and landscape design in 3D visualization

Sustainability:
Used Autodesk Insight to simulate the solar analysis during design optimization stage, testing the orientation of the building in order to obtain the most PV Energy Productive and the shortest years payback for the Roof Solar Panel. Use of Flow Design to find the best orientation to capture the strong wind from South-East in Summer and minimize wind from North-East in Winter.

MiC/ DfMA:
Most rooms of the building consisted with curtain wall and concrete wall. While the toilet, elevator slot, board room and workshop are in rectangular shape with concrete wall on 4 sides. Hence, we decide to adopt MiC unit for these rooms to facilitate the construction duration.

Constructability:
Navisworks Manage was used in this project to identify obstacles and clashes between different discipline. 4D simulation also carried out for reviewing the project in order to prevent errors, delays, and cost overruns.

Summary:
BIM software facilitates the design process. Decisions can be made swiftly by reviewing multiple simulations from different BIM software. The CDE platform improves the communication among the personnel involved.
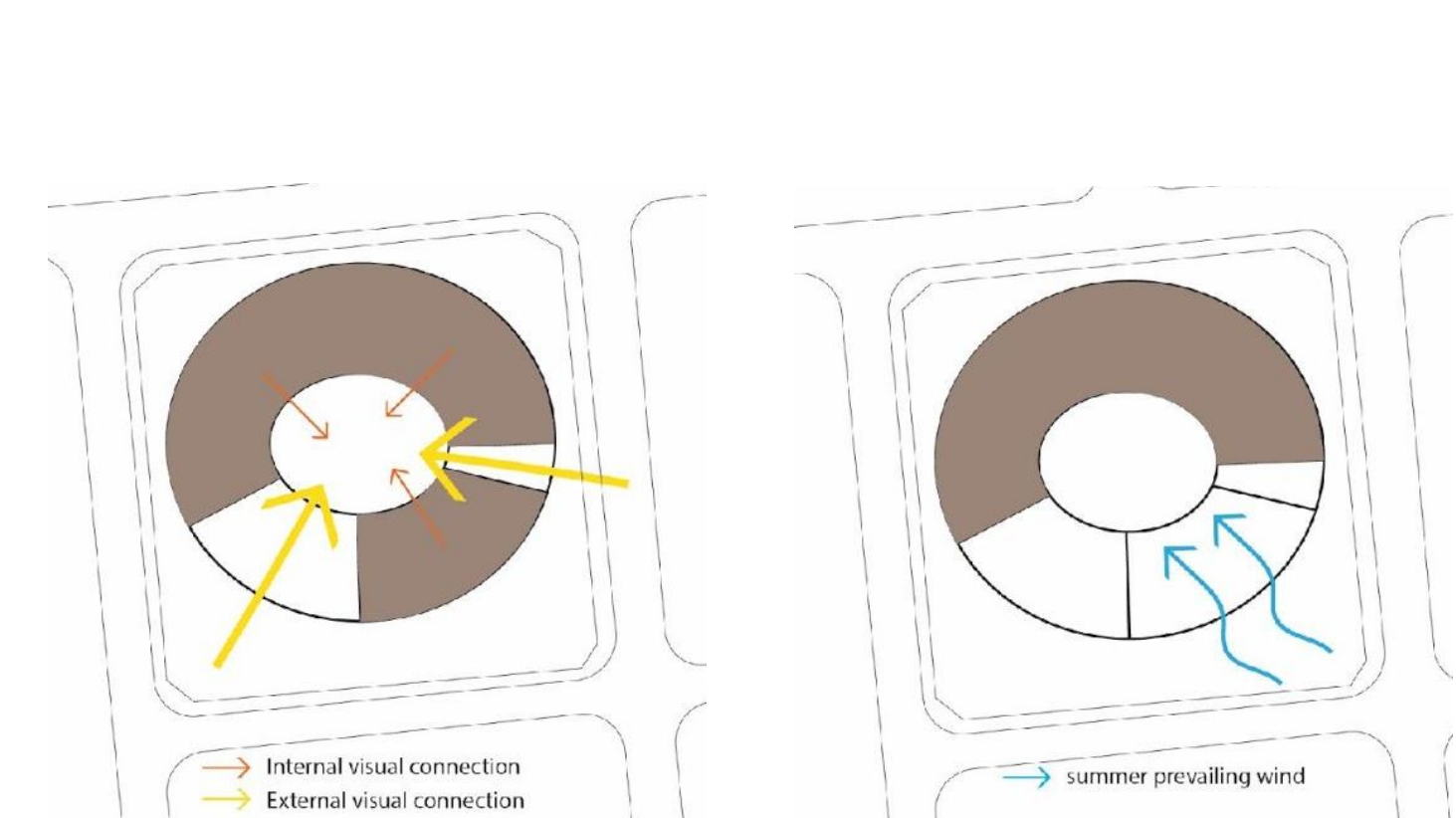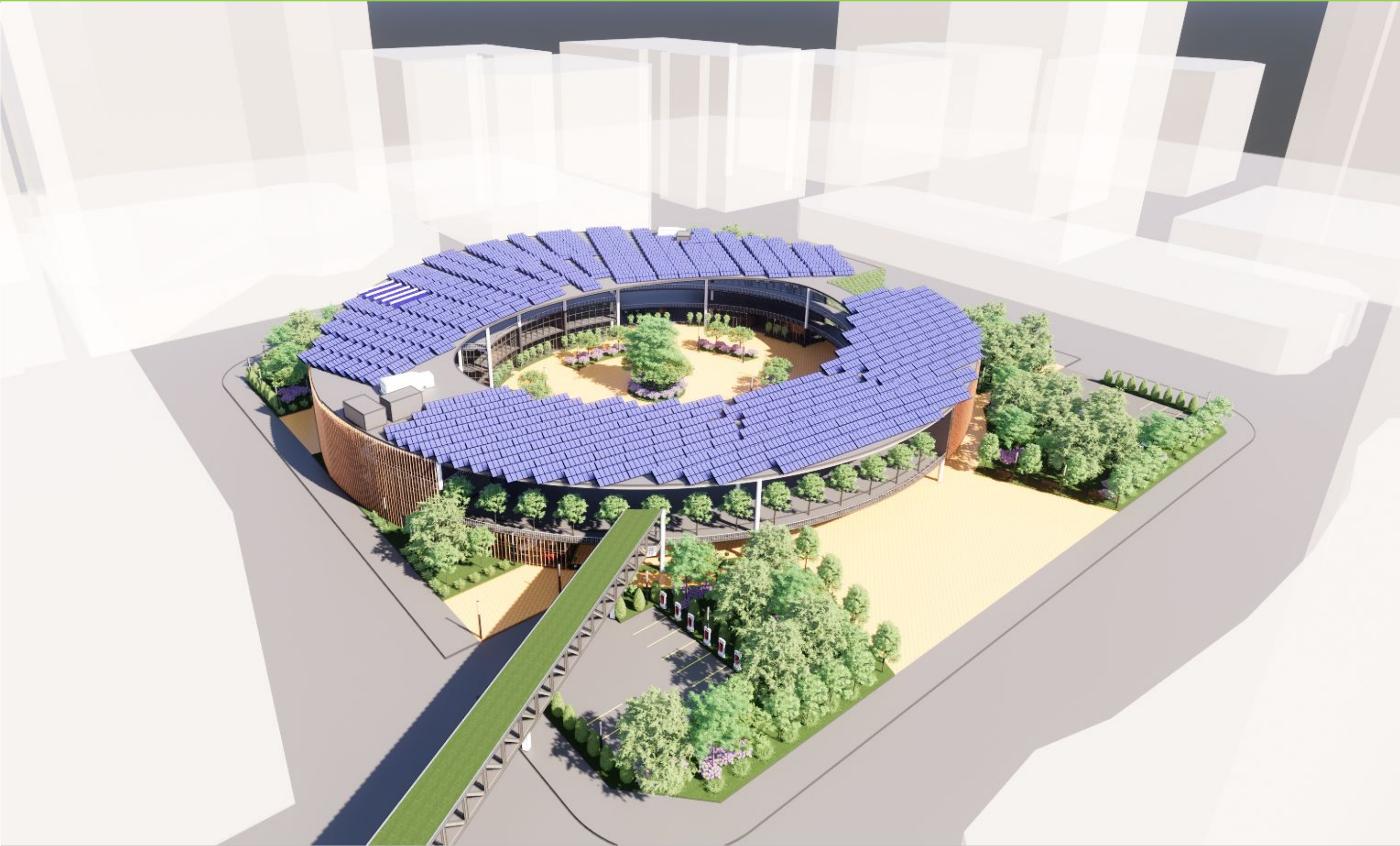
Overall Bird Eye view: Our ring-shape building with a central exhibition courtyard, can be seen as an expression of an abstract sustainable cycle to promote the green concept to the public. Its surrounding by mid-rise building, yet our building with green landscape would minimize the heat-island effect on the ground level. Besides, vertical louver is also added to prevent over-heating.

Private – 2/F
Office (support)
Board room

Semi-public – 1/F
Workshops / Labs
Classrooms
Information resources library
Multi-purpose hall
Outdoor exhibition space

Public – G/F
Indoor exhibition areas
Canteen / Cafe
Canteen / Cafe
Classrooms
Indoor exhibition areas
Outdoor exhibition space

Building Form and Space: The ring shape building form create a large courtyard at the center. In order to encourage and welcome the public to visit the Hub.

Room Schedule

	Number	Level	Department	Name	Area	Required Area	Variance	Tolerance %
1	G/F - 6150mPD	Indoor Exhibition Areas	Indoor Exhibition Areas 3	191.411 m²	200.000 m²	-8.589 m²	-4.294585
2	G/F - 6150mPD	Amenities-Canteen / Cafe	Indoor Exhibition Areas 1	396.527 m²	400.000 m²	-3.473 m²	-0.868536
3	G/F - 6150mPD	Amenities-Canteen / Cafe	Indoor-Canteen/Cafe 2	682.257 m²	700.000 m²	-17.743 m²	-2.534658
4	G/F - 6150mPD	Indoor Exhibition Areas	Indoor Exhibition Areas 2	198.953 m²	200.000 m²	-1.047 m²	-0.523543
5	G/F - 6150mPD	Indoor Exhibition Areas	Indoor Exhibition Areas 4	109.216 m²	100.000 m²	9.216 m²	9.216789
6	G/F - 6150mPD	Indoor Exhibition Areas	Indoor Exhibition Areas 5	91.551 m²	100.000 m²	-8.449 m²	-8.449092
7	G/F - 6150mPD	Reception & lounge seating	Reception & lounge seating	104.031 m²	100.000 m²	4.031 m²	4.030616
8	G/F - 6150mPD	Meeting rooms	Meeting rooms 1	54.966 m²	50.000 m²	4.966 m²	9.932685
9	G/F - 6150mPD	Meeting rooms	Meeting rooms 2	53.720 m²	50.000 m²	3.720 m²	7.439119
10	G/F - 6150mPD	Meeting rooms	Meeting rooms 3	53.805 m²	50.000 m²	3.805 m²	7.609288
11	G/F - 6150mPD	Amenities-Canteen / Cafe	Amenities-Canteen/Cafe 1	208.572 m²	200.000 m²	8.572 m²	4.286172
12	G/F - 6150mPD	Meeting rooms	Meeting rooms 4	46.161 m²	50.000 m²	-3.839 m²	-7.677997
13	G/F - 6150mPD	Meeting rooms	Meeting rooms 5	48.801 m²	50.000 m²	-1.199 m²	-2.396684
14	G/F - 6150mPD	Classrooms	Classrooms 1	108.326 m²	100.000 m²	8.326 m²	8.32669
15	G/F - 6150mPD	Classrooms	Classrooms 2	107.801 m²	100.000 m²	7.801 m²	7.800733
16	G/F - 6150mPD	Indoor Exhibition Areas	Indoor Exhibition Areas 6	106.854 m²	100.000 m²	6.854 m²	6.854427
17	G/F - 6150mPD		Pump room	17.429 m²			
18	G/F - 6150mPD		Transformer room	50.845 m²			
19	G/F - 6150mPD		Switch room	36.528 m²			
20	G/F - 6150mPD	Outdoor Exhibition Space	Outdoor Exhibition Space 6	977.035 m²	1000.000 m²	-22.965 m²	-2.296468
50	G/F - 6150mPD		Chiller plant room	77.767 m²			
51	G/F - 6150mPD		MCB room	4.116 m²			
54	G/F - 6150mPD		Pipe duct room	2.974 m²			
55	G/F - 6150mPD		Pipe duct room	2.013 m²			
21	1/F - 10000mPD	Computer server room	Computer server room	105.979 m²	100.000 m²	5.979 m²	5.978846
22	1/F - 10000mPD		Pump room	17.429 m²			
23	1/F - 10000mPD	Information resources library	Information resources library	537.182 m²	500.000 m²	37.182 m²	7.436499
24	1/F - 10000mPD	Meeting rooms	Meeting rooms 6	54.966 m²	50.000 m²	4.966 m²	9.932685
25	1/F - 10000mPD	Meeting rooms	Meeting rooms 7	53.720 m²	50.000 m²	3.720 m²	7.439119
26							
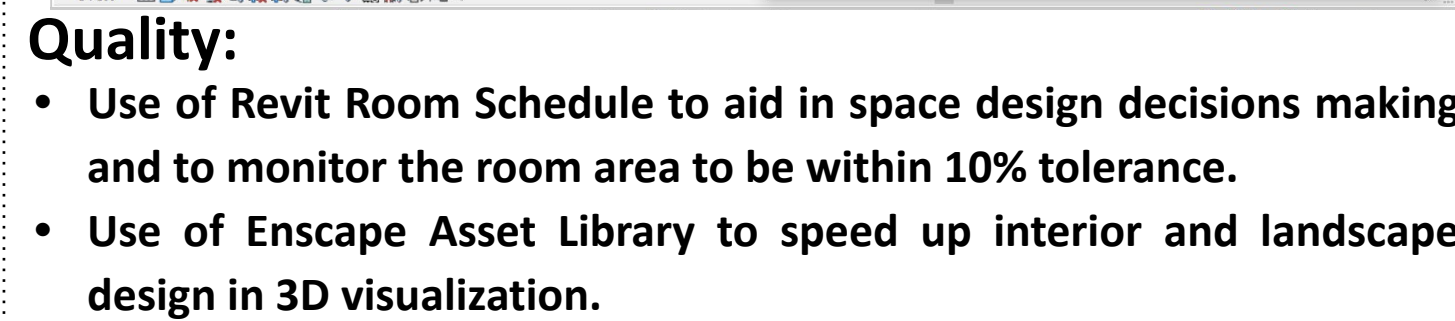
Quality:
- Use of Revit Room Schedule to aid in space design decisions making and to monitor the room area to be within 10% tolerance.
- Use of Enscape Asset Library to speed up interior and landscape design in 3D visualization.

OPTION 1

Solar Analysis
Study Type: Solar Energy - Annual PV
Surface: <new selection>
Results
PV Energy Production
919,528 kWh/Year
HK$137,929 energy savings
Building Energy Offset
5,024 m² PV panel area
16.9 years payback

OPTION 2
30° Clockwised

Solar Analysis
Study Type: Solar Energy - Annual PV
Surface: <new selection>
Results
PV Energy Production
1,024,173 kWh/Year
HK$153,626 energy savings
Building Energy Offset
5,489 m² PV panel area
15.7 years payback

OPTION 3
50° Clockwised

Solar Analysis
Study Type: Solar Energy - Annual PV
Surface: <new selection>
Results
PV Energy Production
1,035,373 kWh/Year
HK$155,306 energy savings
Building Energy Offset
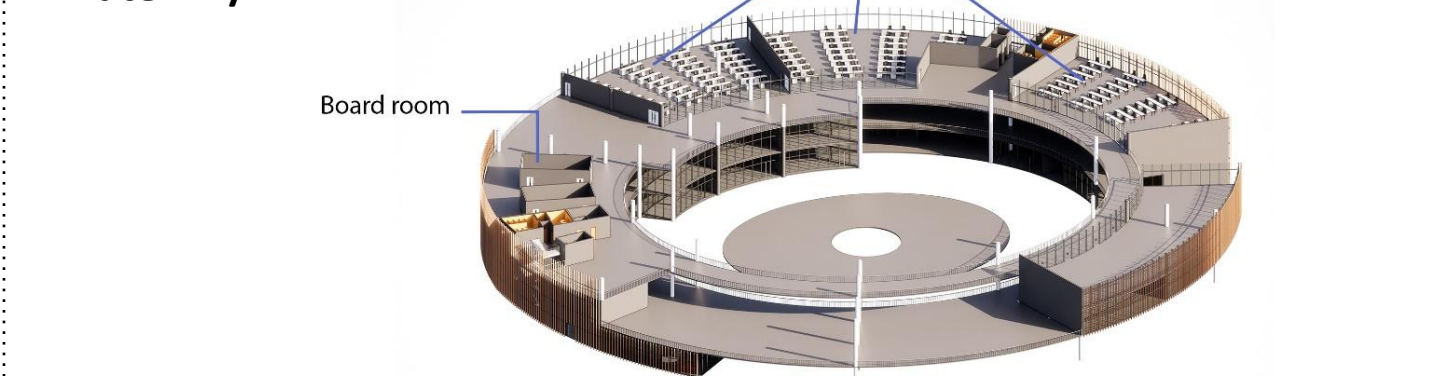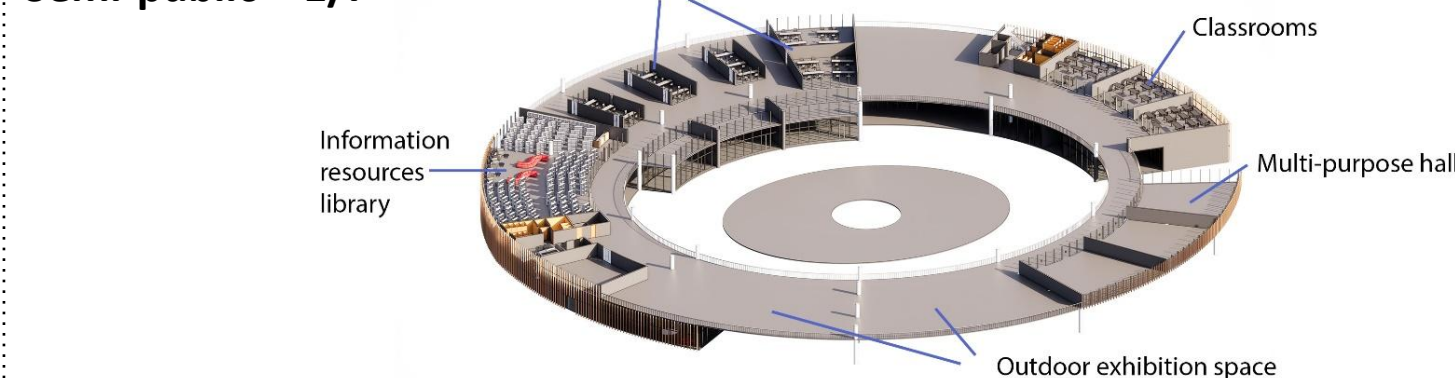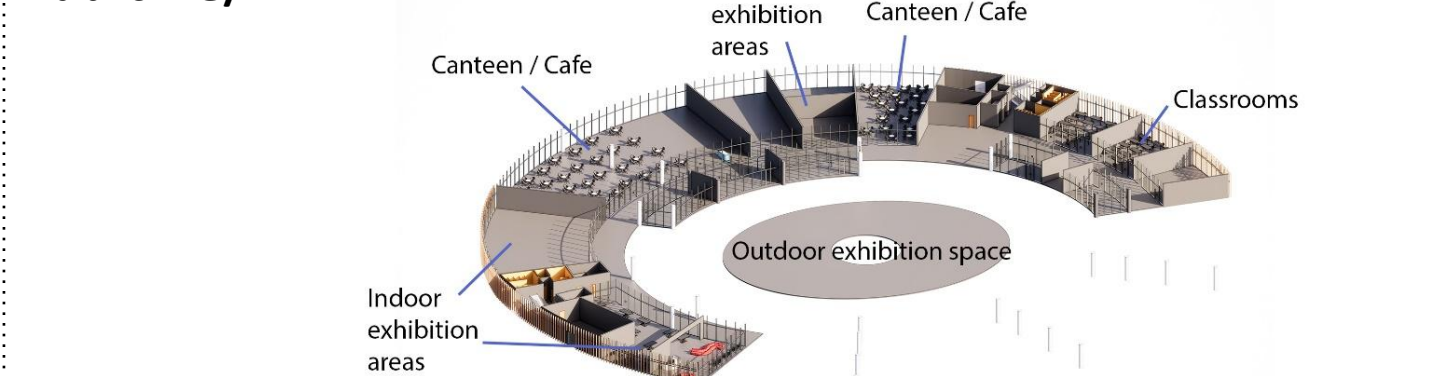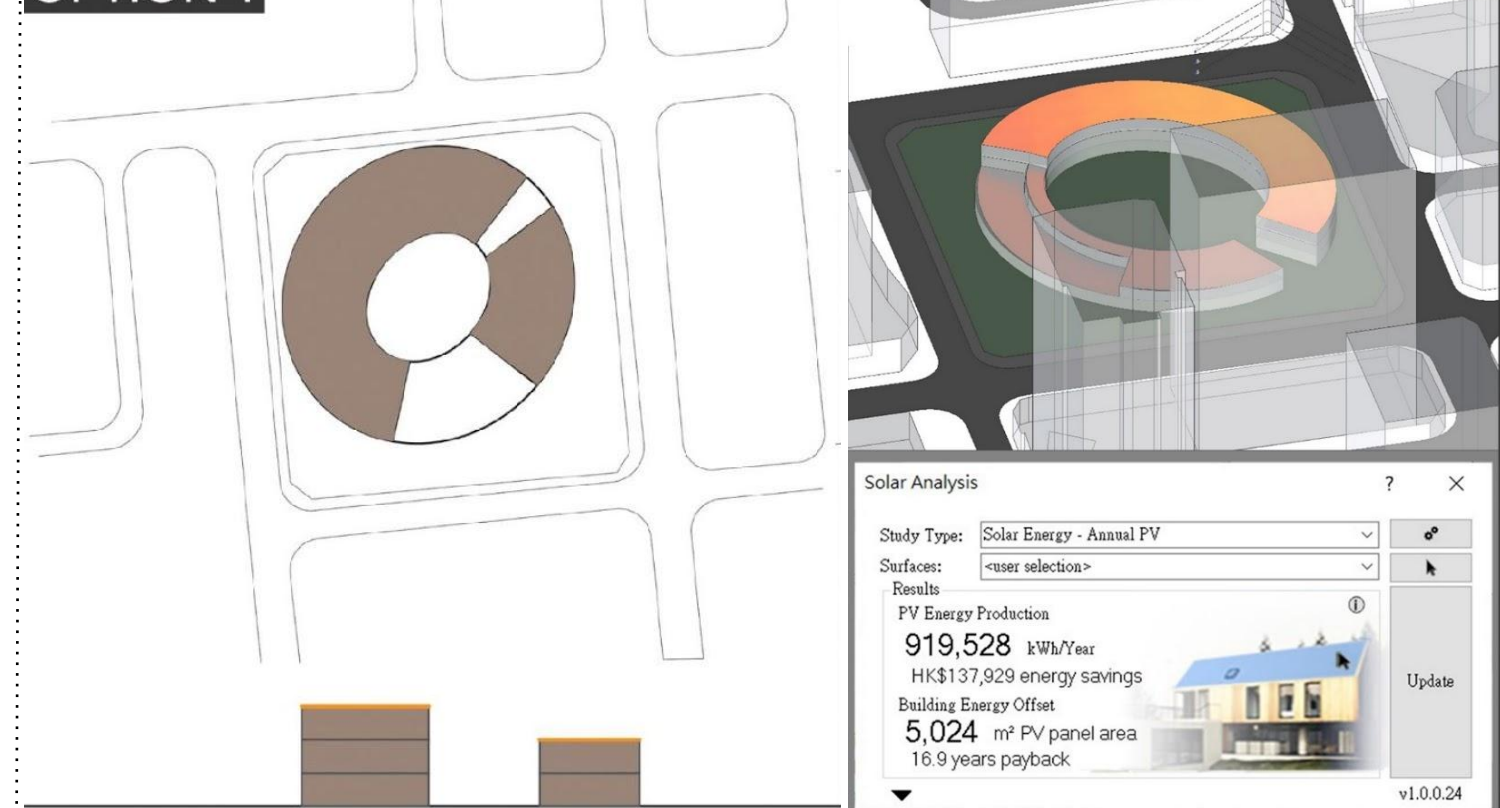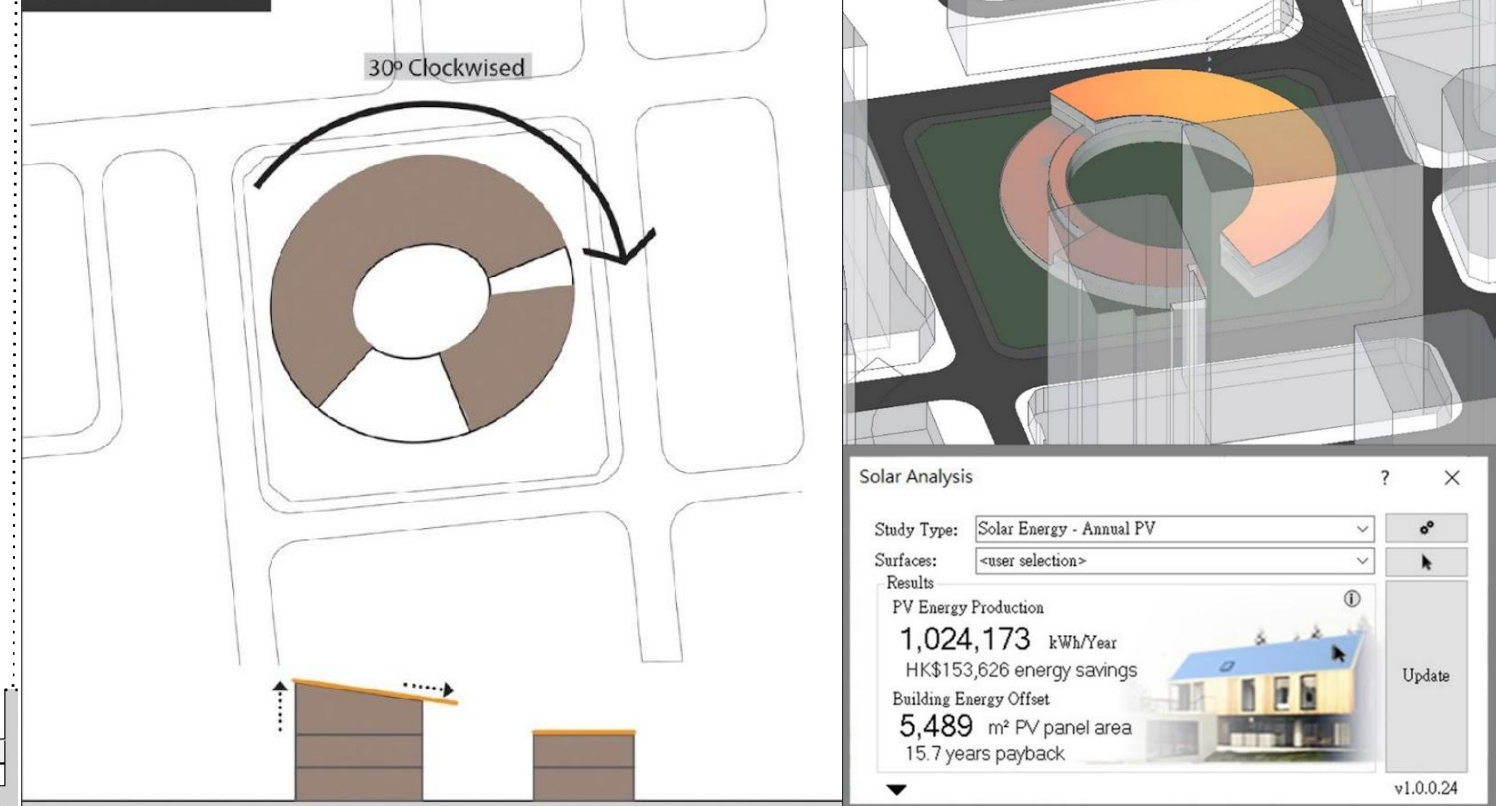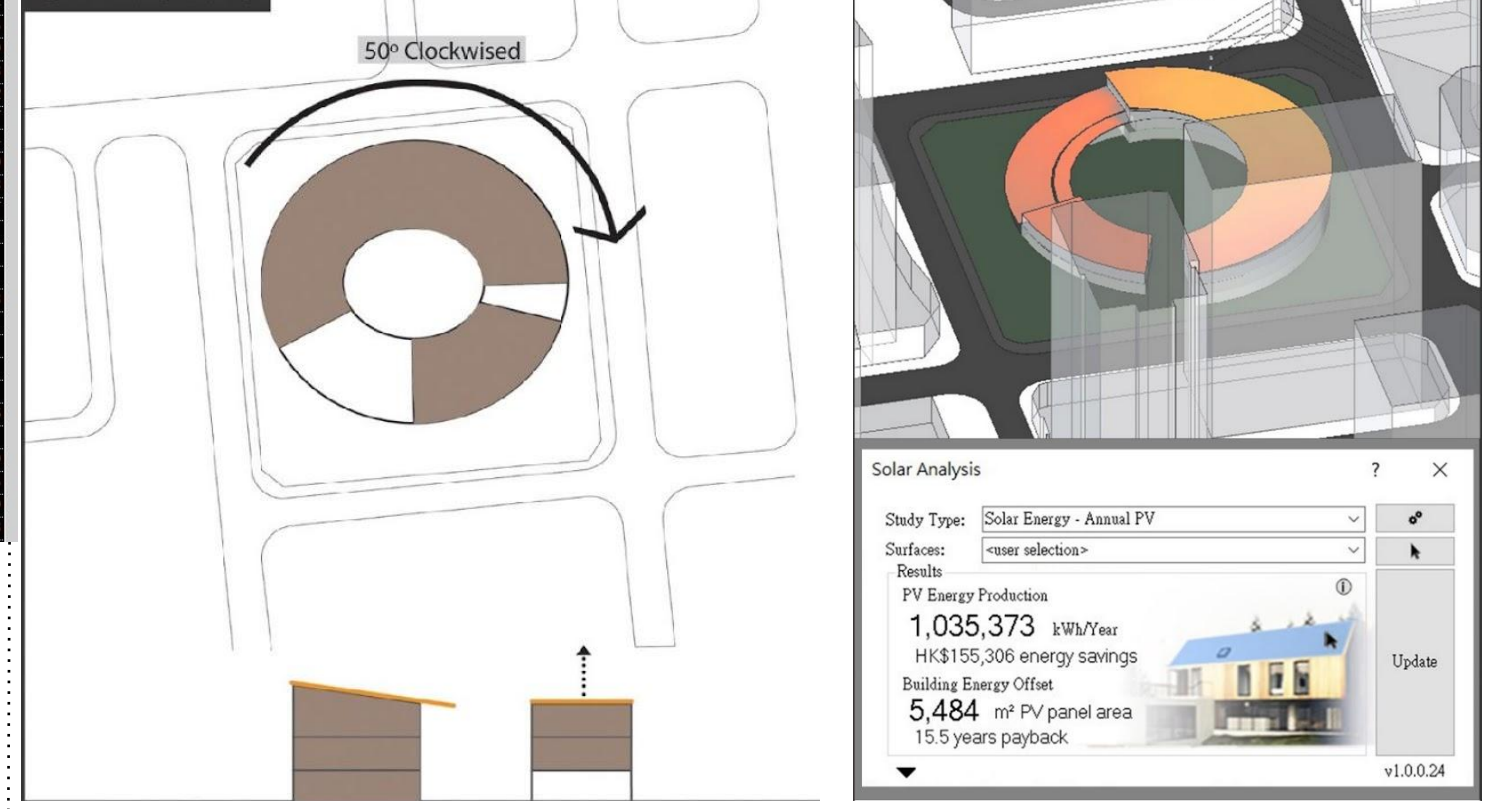**5,484** m² PV panel area
15.5 years payback

Conceptual Diagram: Our main concept of the building is to create internal visual connection from every room to the central courtyard and to catch the summer prevailing wind through the Southeast opening in order to maximum the Passive Cooling effect.

→ Internal visual connection
→ External visual connection
→ summer prevailing wind

Sustainability: Using Autodesk Insight to simulate the solar analysis during design optimization stage, testing the orientation of the building in order to obtain the most PV Energy Productive and the shortest years payback for the Roof Solar Panel.
Therefore we have chosen option 3 which is 50° Clockwise tilted compared to the original design proposal.

CIC BIM Competition 2021
BIM for Design Collaboration

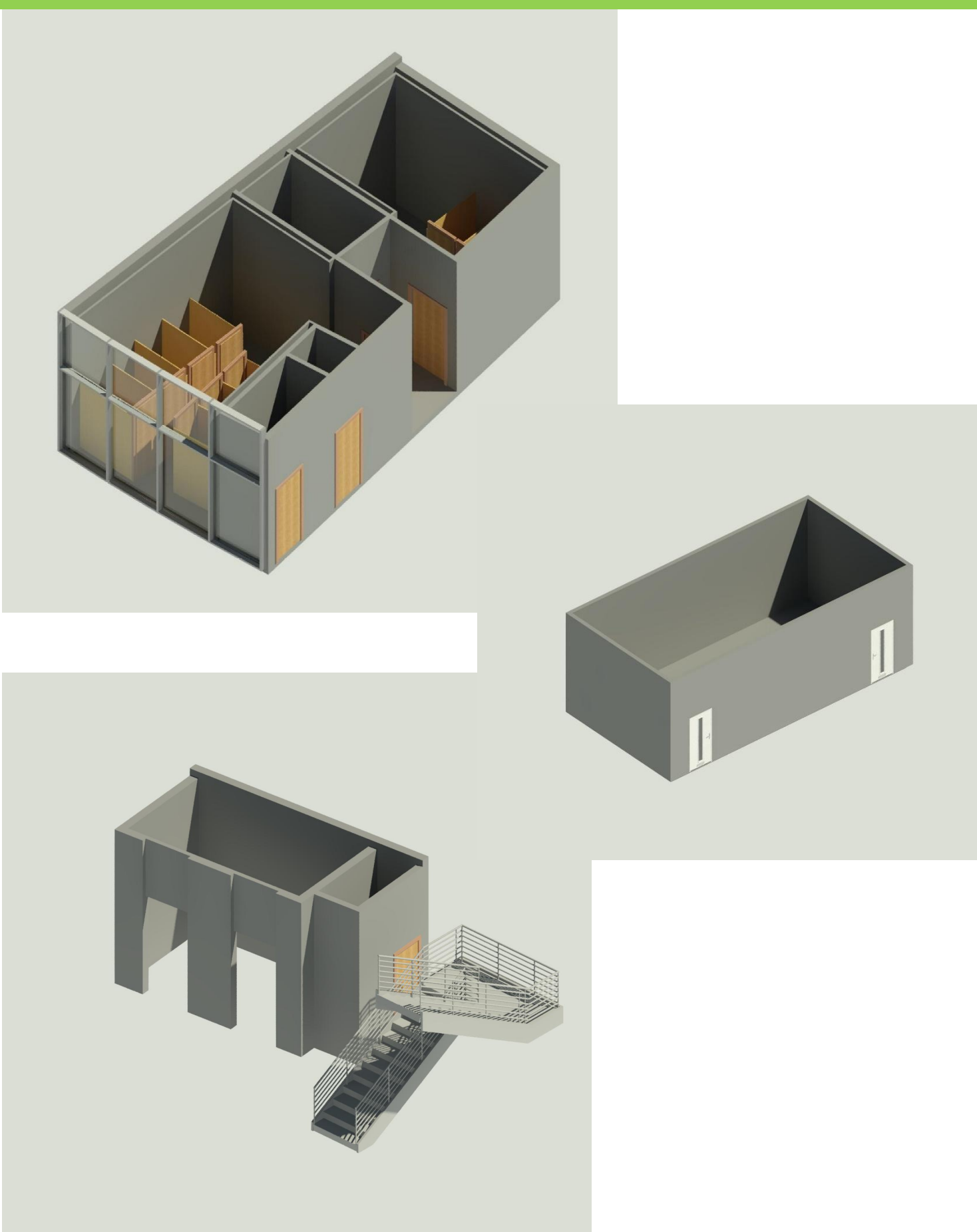**Site Layout Plan 1:1000**

9 am

4 pm

Perspective View: The View of the Main Entrance facing the Megabox mall. This would attract the people flow from the mall to our Hub with the public-welcoming central courtyard.

OPTION 1

SUMMER

WINTER

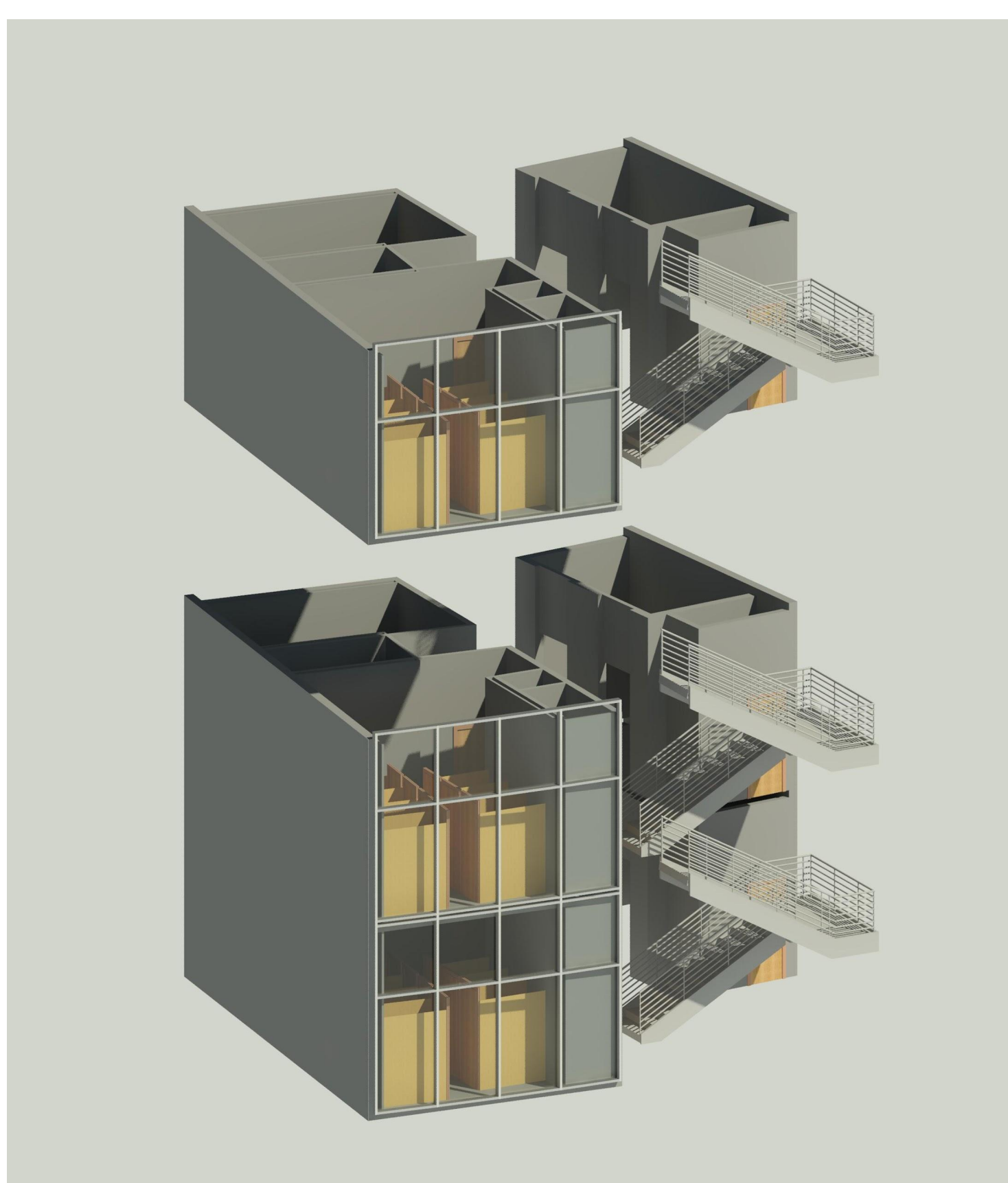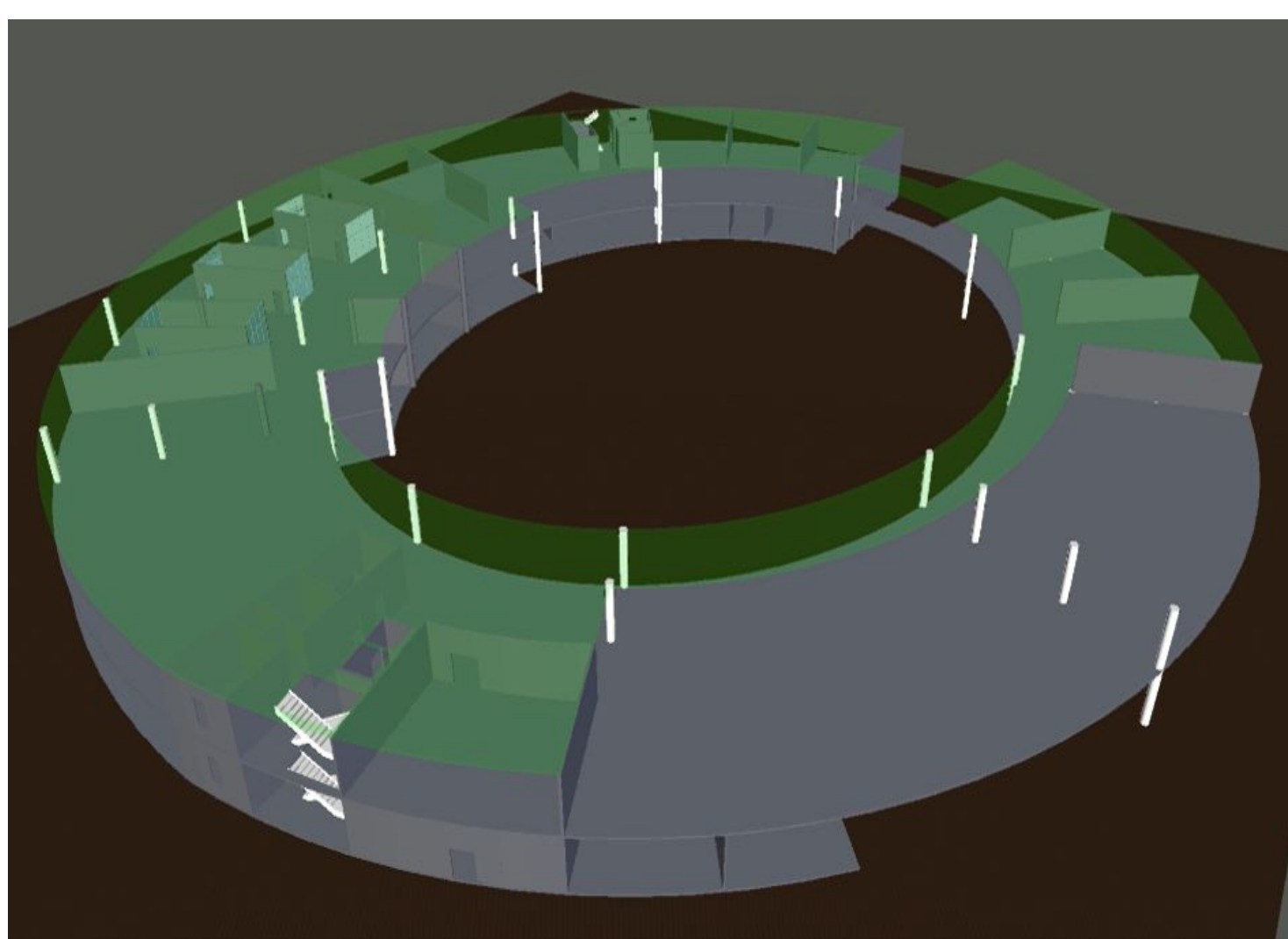OPTION 2

SUMMER

WINTER

OPTION 3
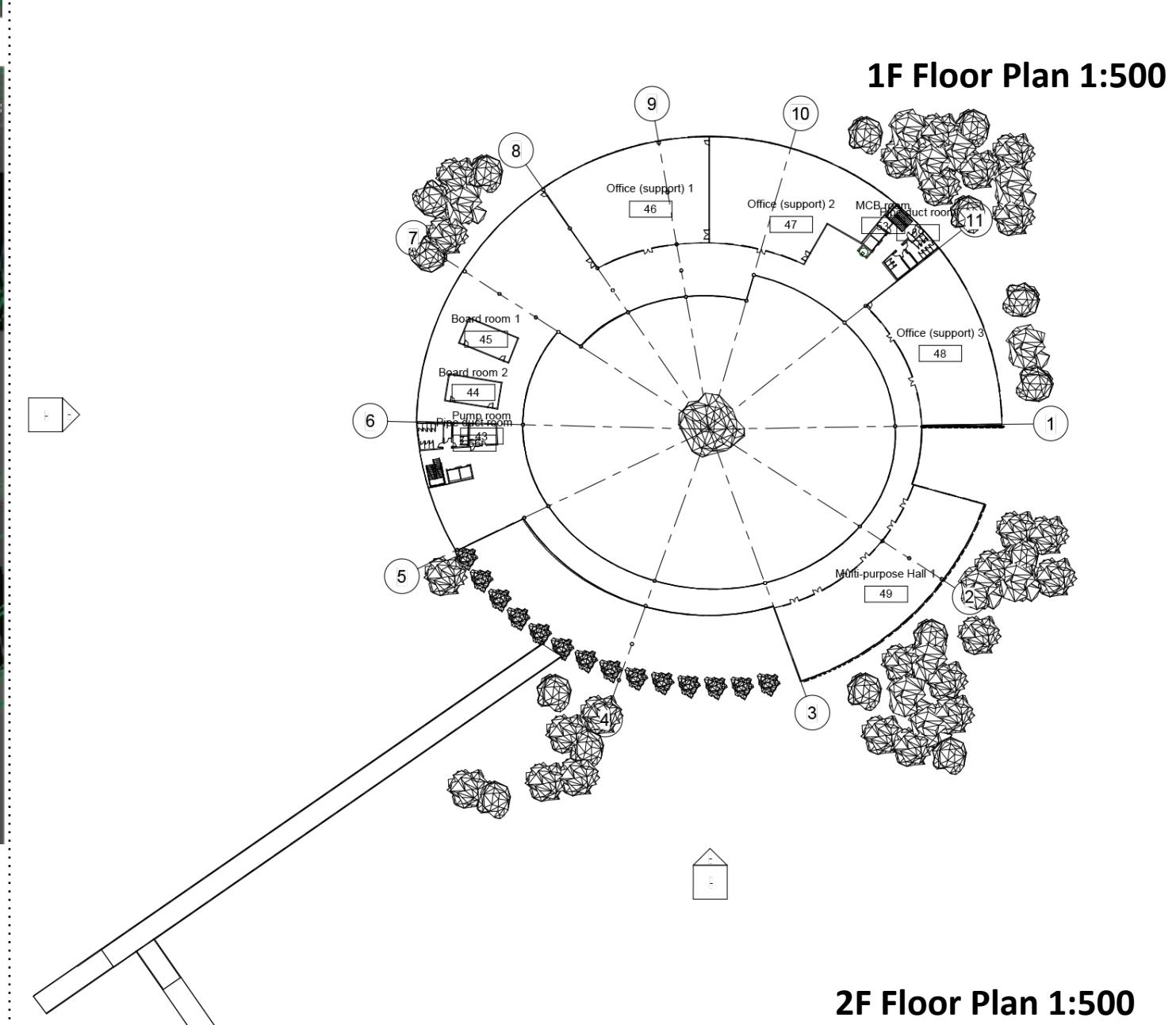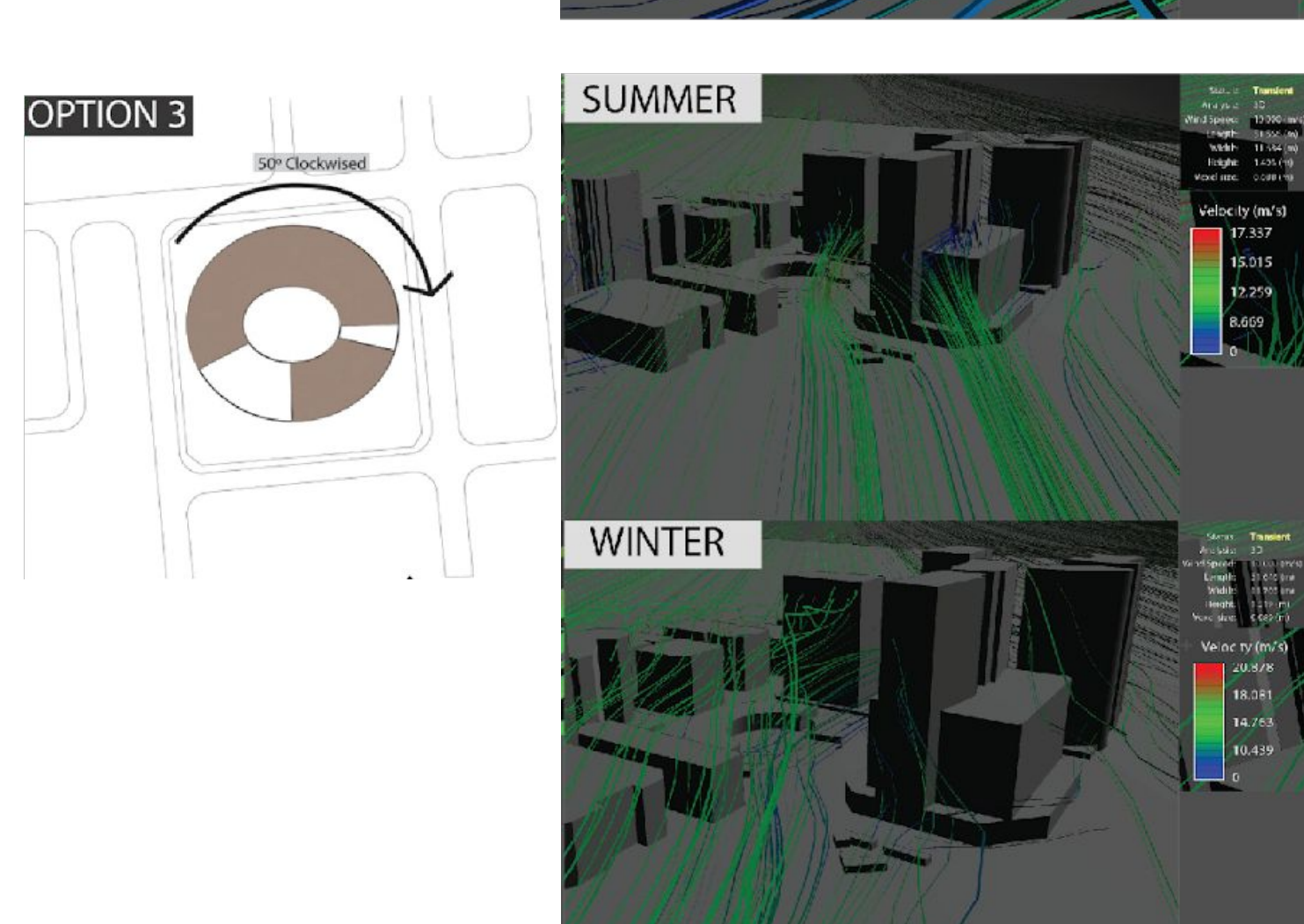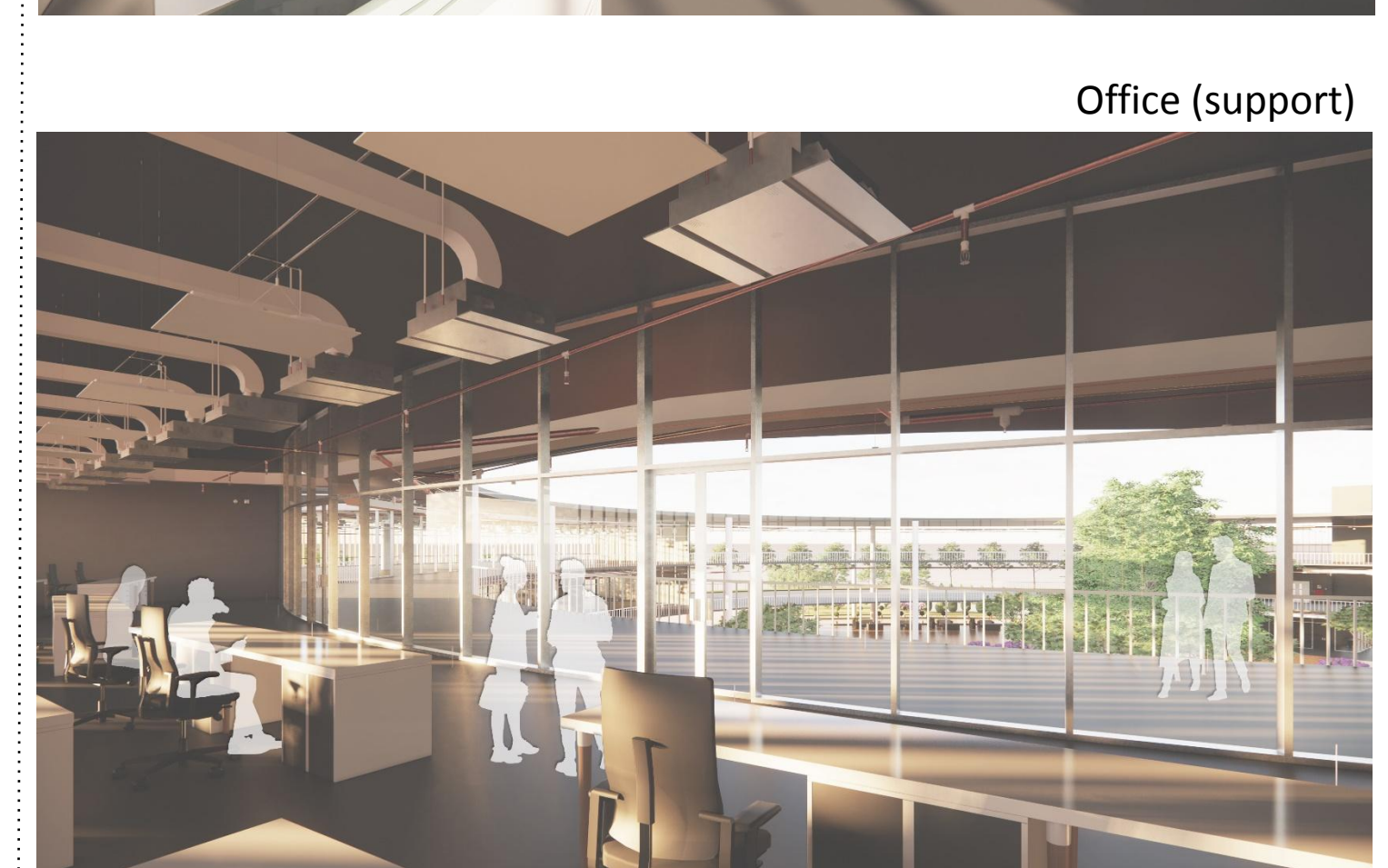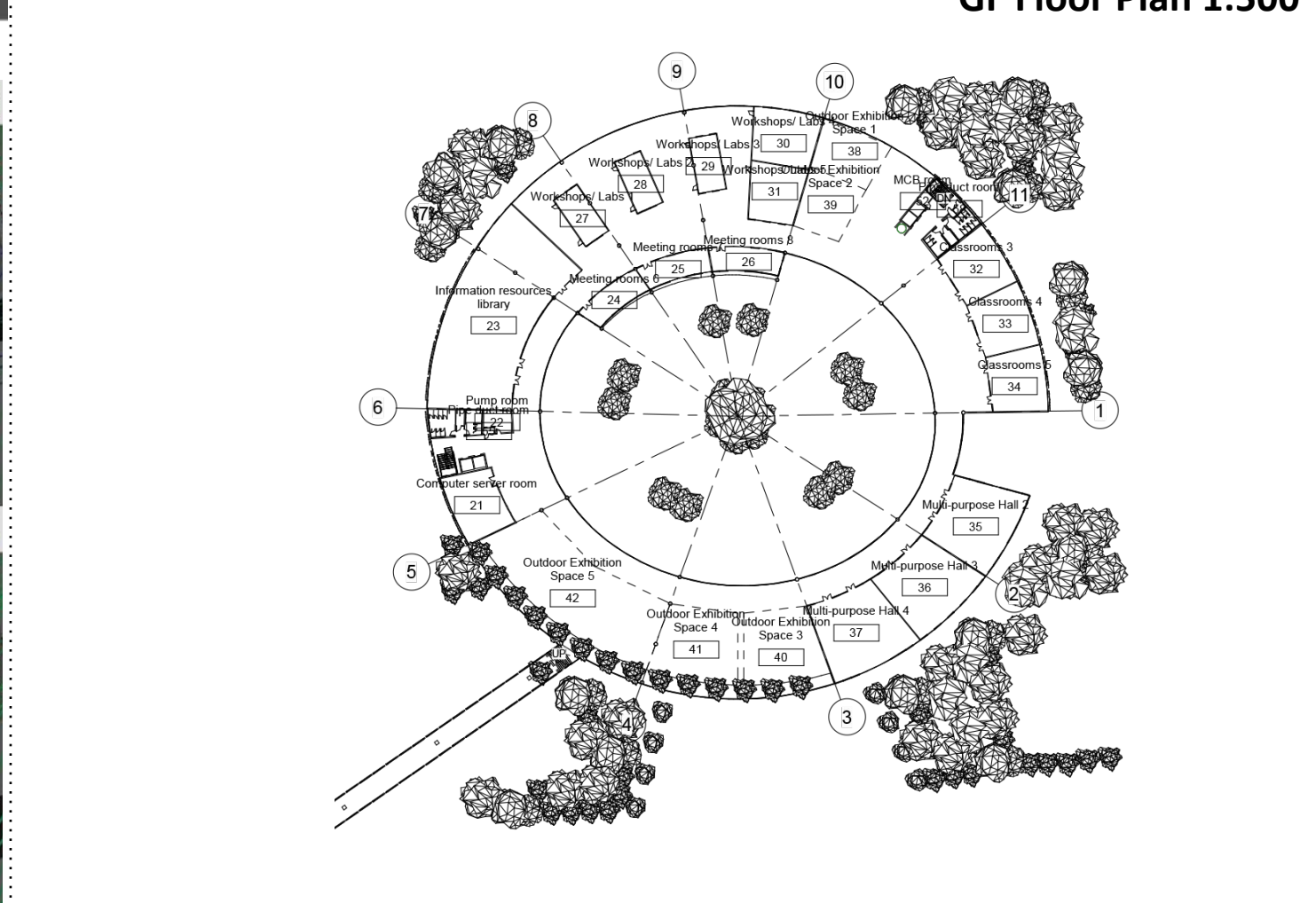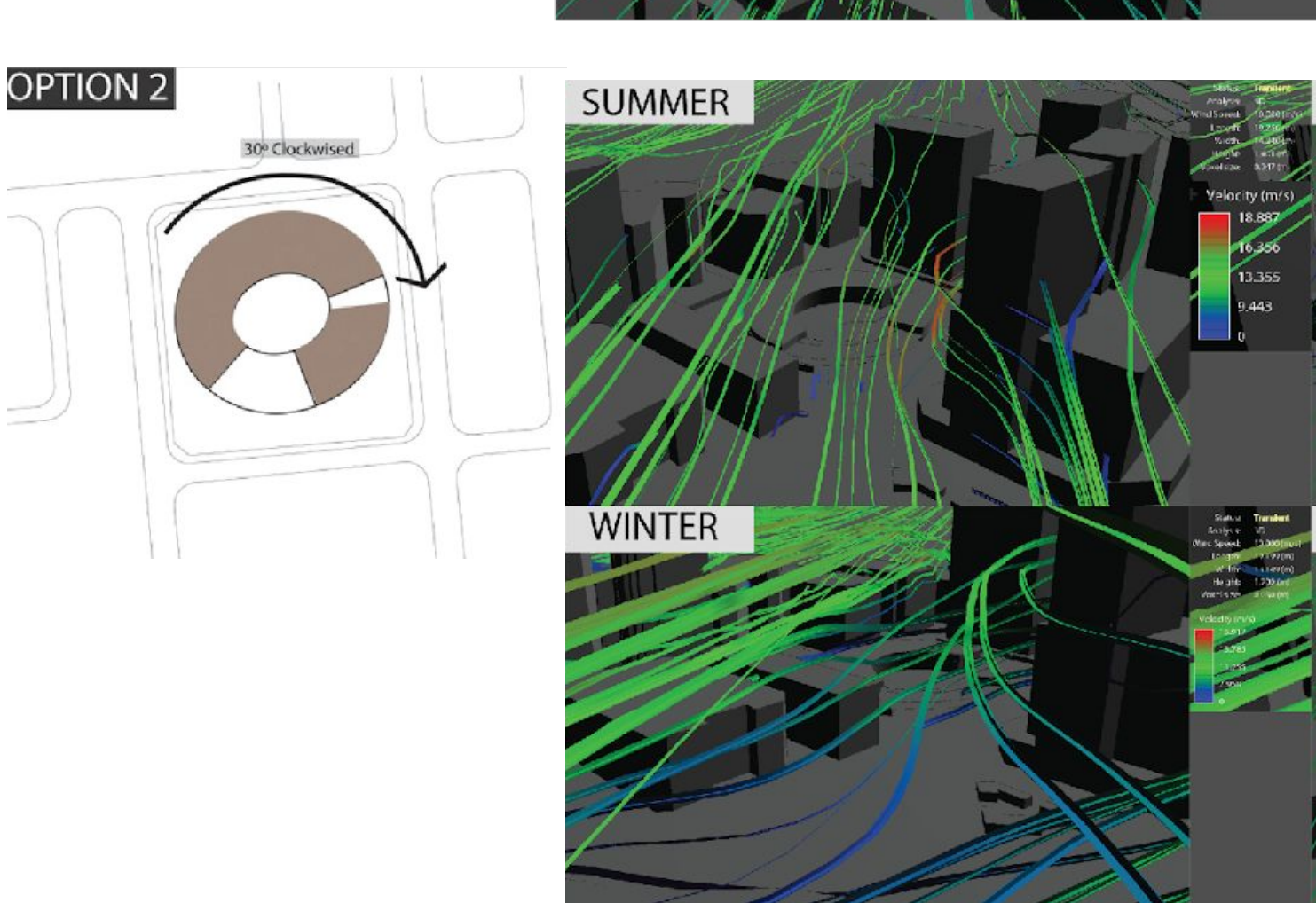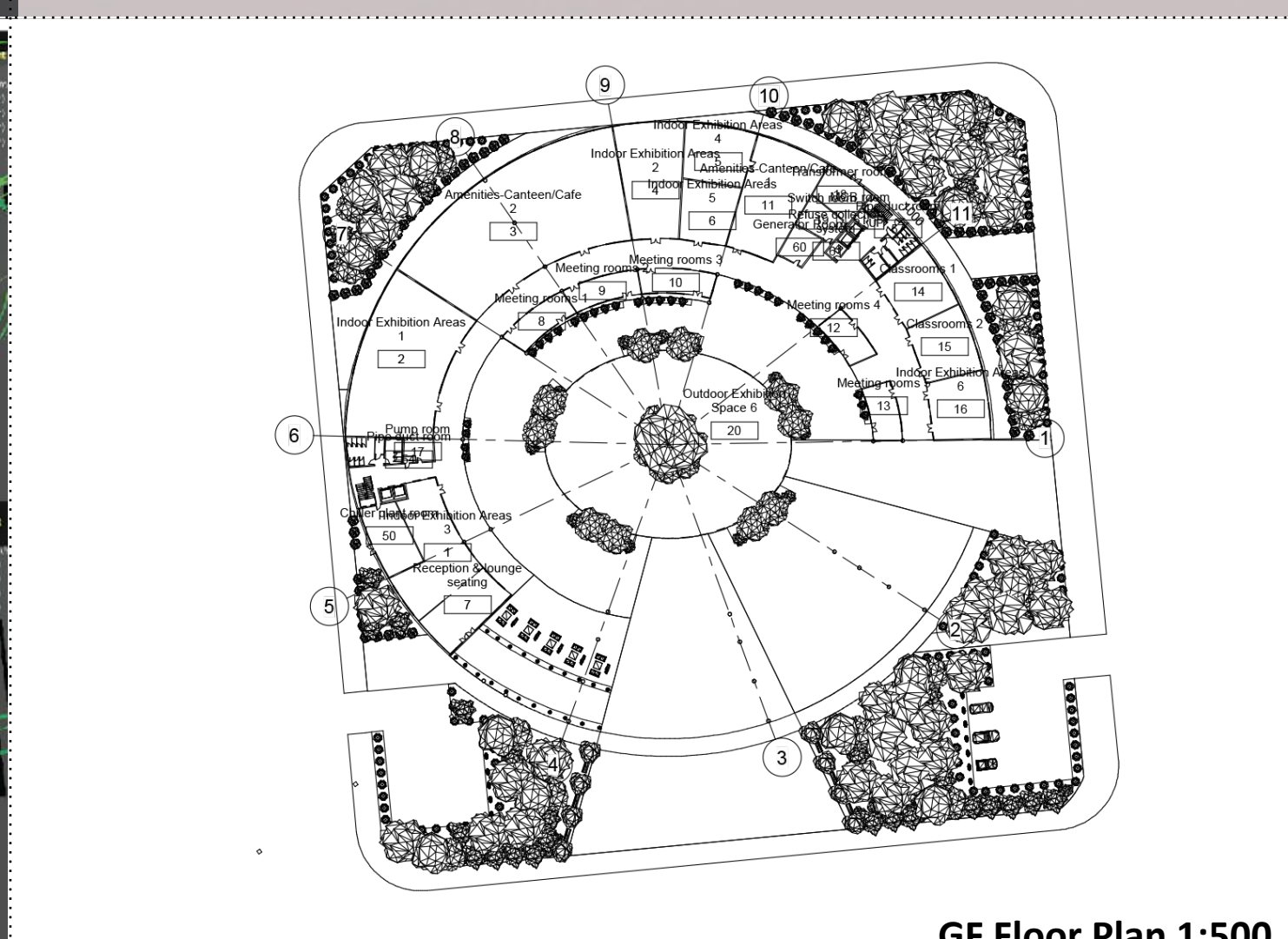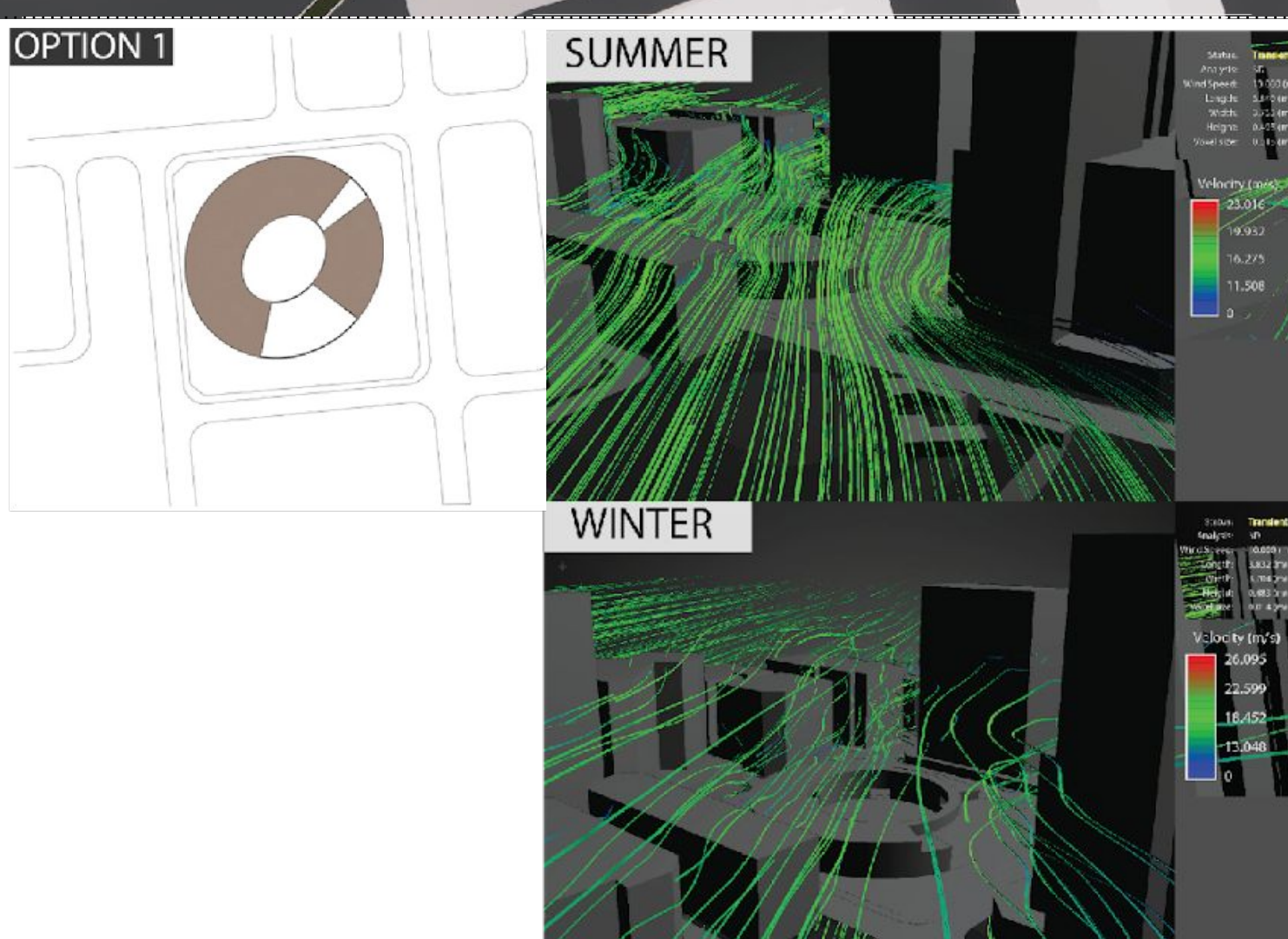
SUMMER

WINTER

Computational Design: Based on the 3 options of Flow Design wind analysis testing as above, Option 3 is the best orientation to capture the strong wind from South-East in Summer and minimize wind from North-East in Winter.

GF Floor Plan 1:500

1F Floor Plan 1:500

2F Floor Plan 1:500

Reception & lounge seating

Office (support)

Internal Perspective 1:500

Overall Bird Eye view (Night View)
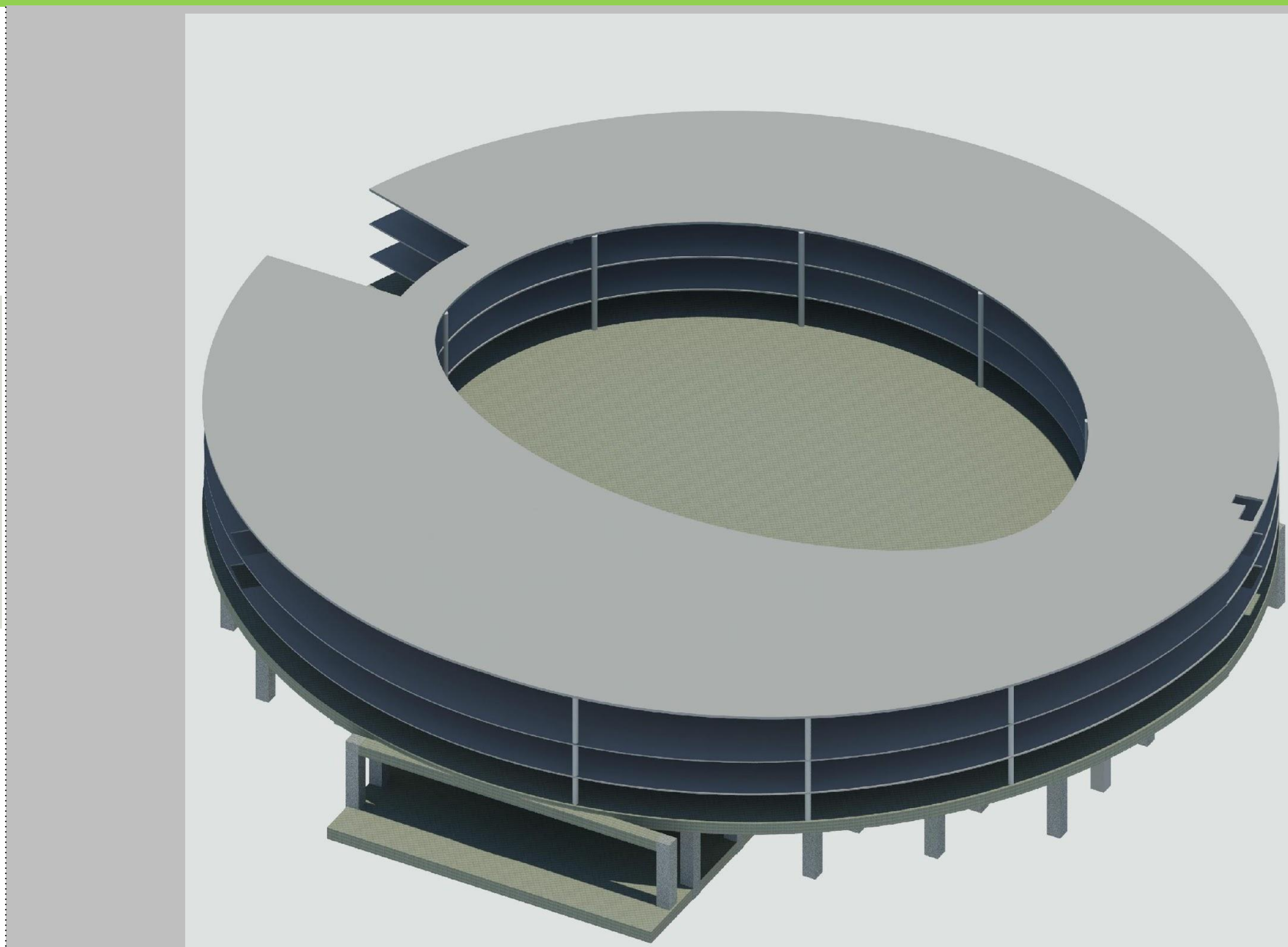
CIC BIM Competition 2021 – Coffeeholics

MiC/DfMA: This building consisted of 2 core blocks for toilets, staircases and elevators slots. MiC can be adopted in the core blocks since they are repeated and identical on each floors. The workshop and board room are also a MiC unit as well.
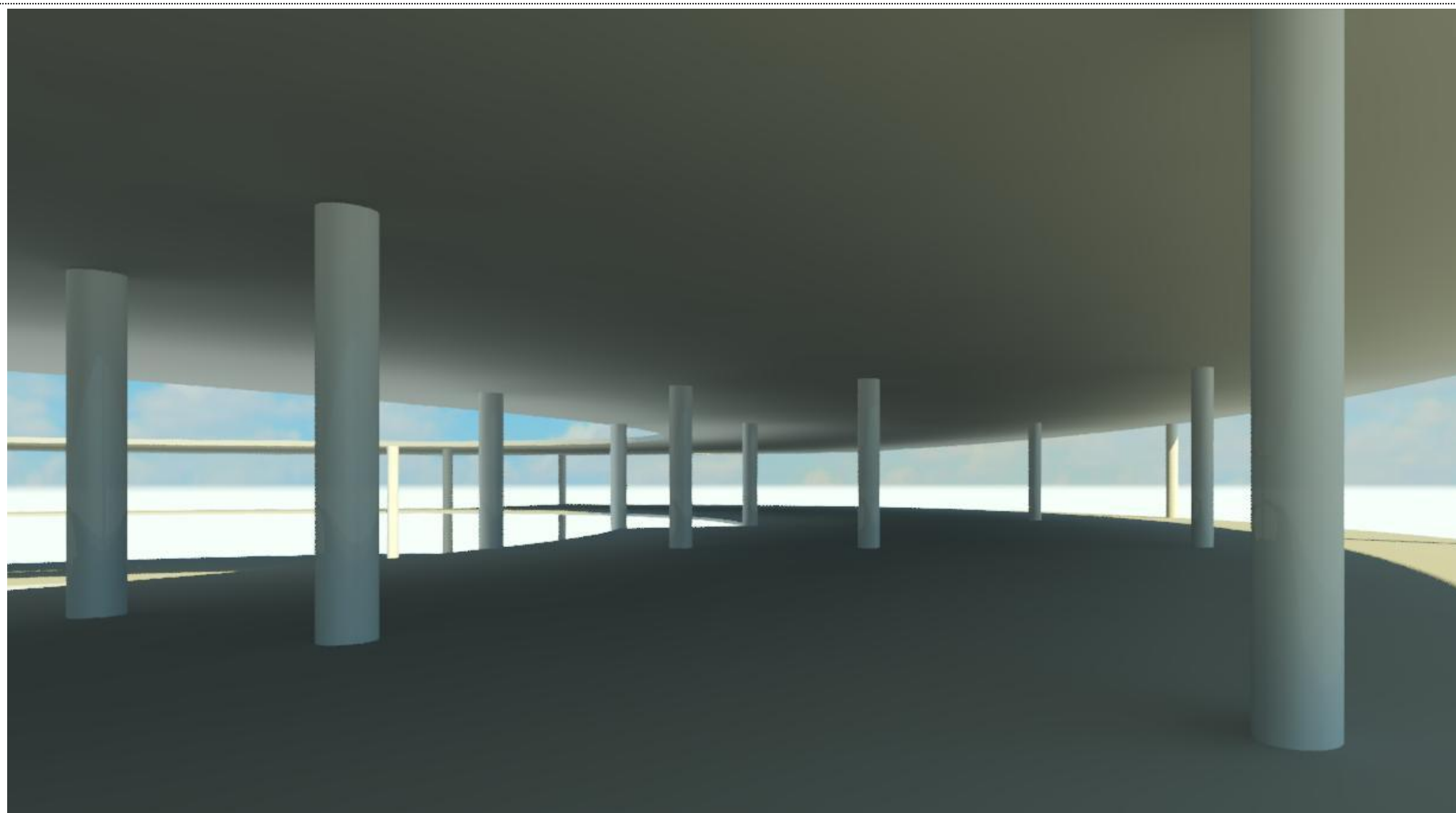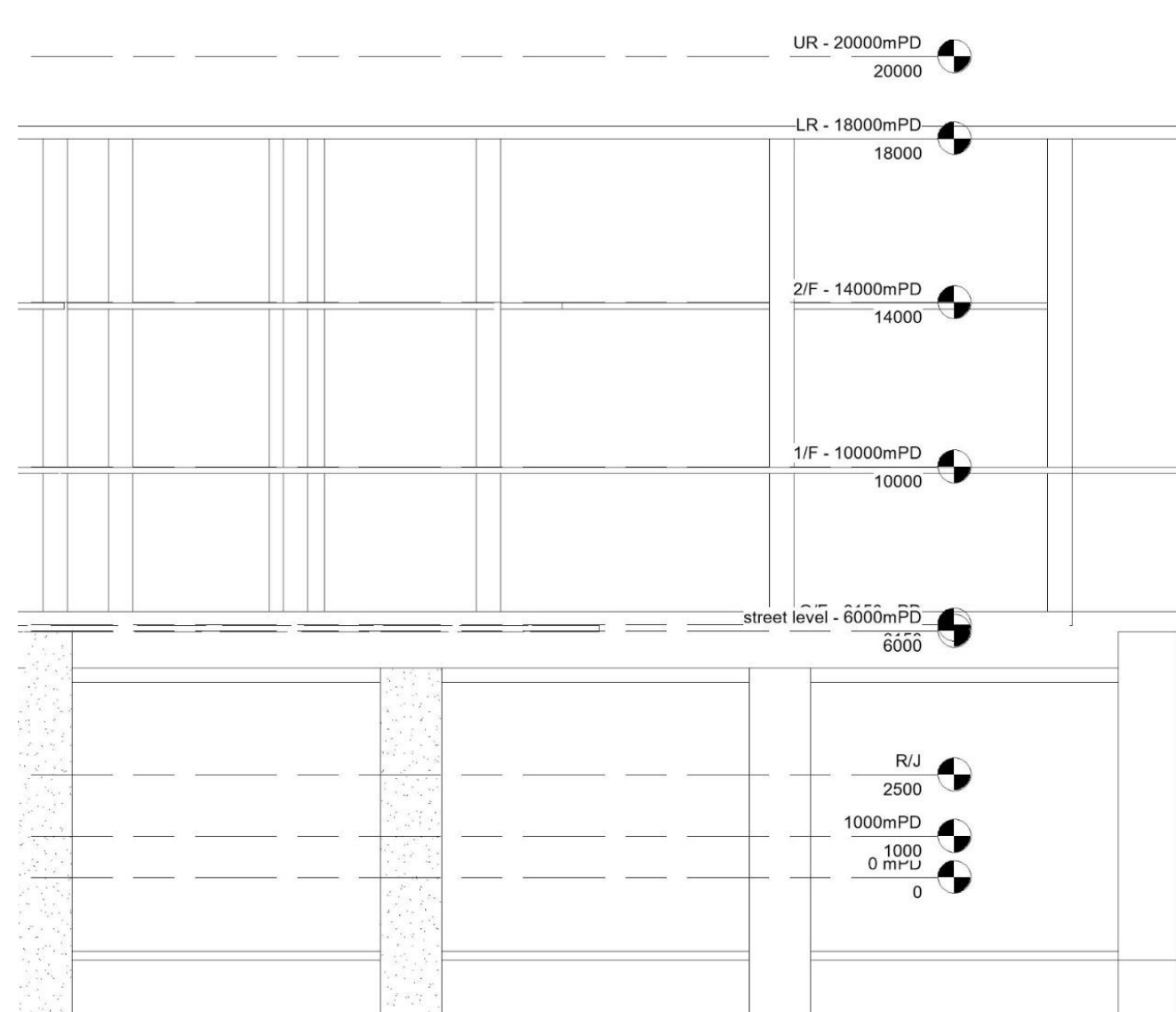

Perspective View: Structure of the building with columns and slabs. A portal was developed to bridge over the underground box culvert for transferring the building load to the surface of box culvert.
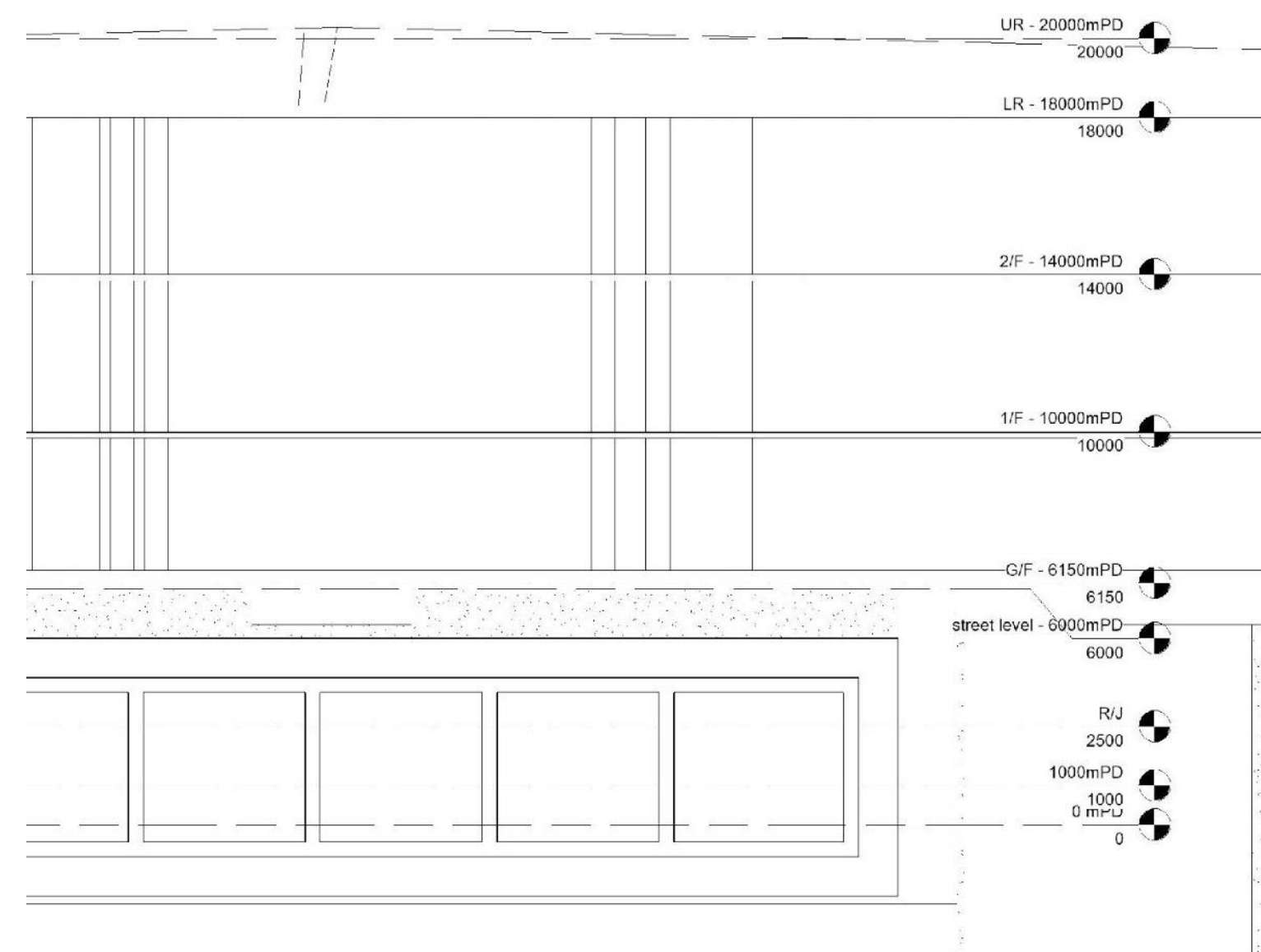

Perspective View : Combining of MiC Units

Internal Perspective View : Columns and slabs on 2/F.

Internal Perspective 1:500

Computational Design : 4D Simulation for the building structure to review the construction time by using MiC compared with the traditional method.

Sectional Perspective View : Building Structure Side View

Sectional Perspective View : Building Structure Front View

Sectional Perspective 1:500

Design Coordination : Structural, Electrical and Mechanical (SEM) carried out coordination with Architecture discipline. Clash Detection can be carried out by Autodesk Navisworks Manage to review clashed objects in the BIM model.

Perspective View : Whole Building Design including HVAC system, Fire Service system, Lighting system, Fresh water and Flushing water system.

Project Team Collaboration: BIM360 was used as a CDE platform to share all information and models. Aligning to ISO 19650, 4 folders (Archived, Published, Shared, and WIP) are created. The markup function was used for team communication.

Internal View of Chiller Plant Room

Internal View of ceiling MEP equipment in Canteen

The building Service system in all areas of the building was developed by inserting the Architectural plan and design the specific areas by their purposes.

Internal Perspective 1:500

Parameter	Value
Building Type	School or University
Location	Hong Kong, China
Ground Plane	street level - 6000mPD
Project Phase	New Construction
Sliver Space Tolerance	304.8
Building Envelope	Use Function Parameter
Building Service	Active Chilled Beams
Schematic Types	<Building>
Building Infiltration Class	Tight
Report Type	Standard
Use Load Credits	☐

Zone Summary - Default

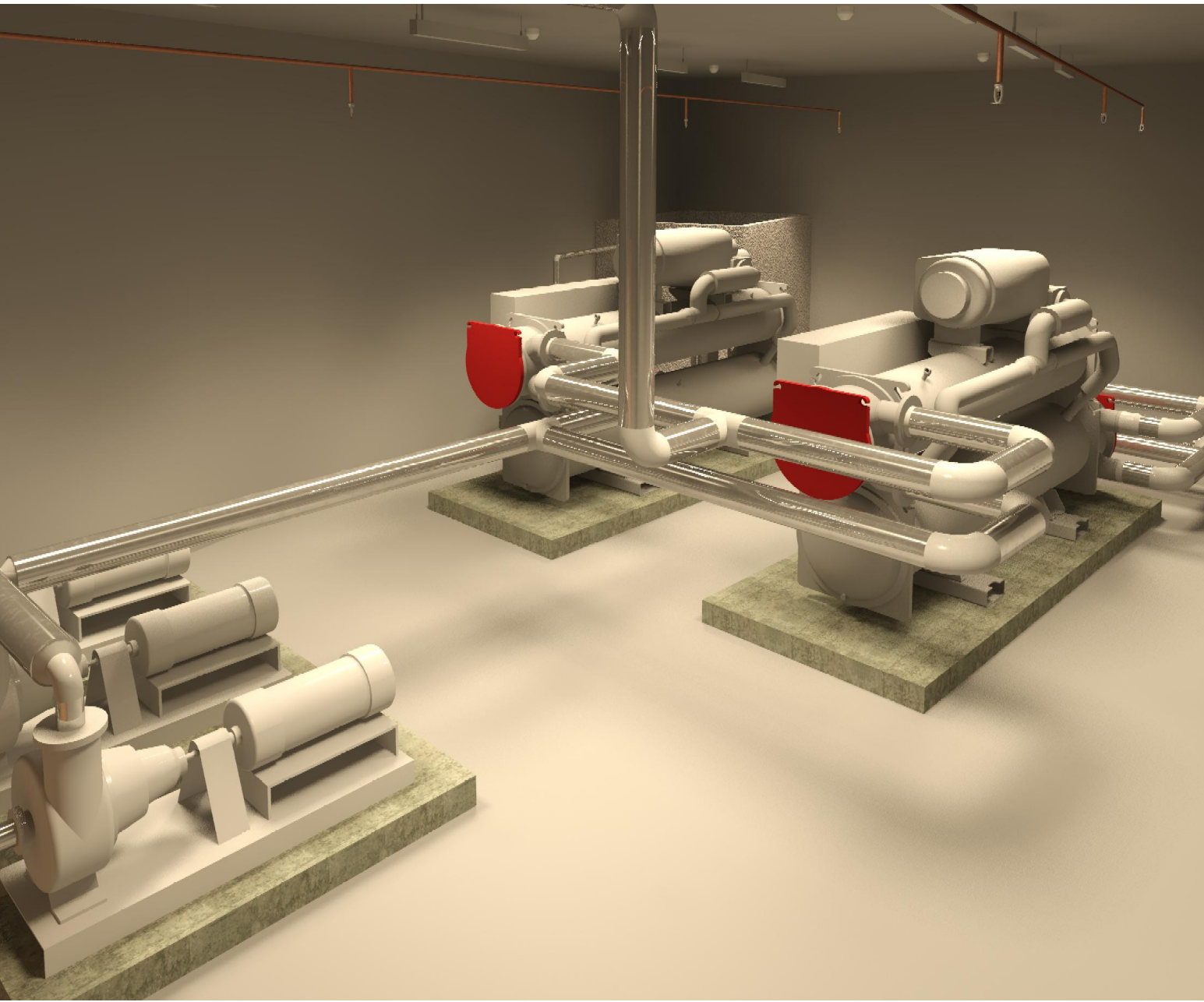| Inputs	
Area (m²)	6,873.140
Volume (m³)	26,443.31
Cooling Setpoint	25 °C
Heating Setpoint	0 °C
Supply Air Temperature	15 °C
Number of People	1578
Infiltration (L/s)	589.1
Air Volume Calculation Type	Active Chilled Beams
Relative Humidity	60.00% (User Specified)
Psychrometrics	
Psychrometric Message	None
Cooling Coil Entering Dry-Bulb Temperature	26 °C
Cooling Coil Entering Wet-Bulb Temperature	21 °C
Cooling Coil Leaving Dry-Bulb Temperature	15 °C
Cooling Coil Leaving Wet-Bulb Temperature	16 °C
Mixed Air Dry-Bulb Temperature	26 °C
Calculated Results	
Peak Cooling Load (W)	1,550,274
Peak Cooling Month and Hour	June 4:00 PM
Peak Cooling Sensible Load (W)	1,211,321
Peak Cooling Latent Load (W)	338,953
Peak Cooling Airflow (L/s)	98,210.2
Peak Heating Load (W)	-289,195
Peak Heating Airflow (L/s)	11,634.1
Peak Ventilation Airflow (L/s)	11,634.1

Computational Design : Heating and Cooling load analysis was used to determine the desired cooling load and Revit generate layout function was used to generate the preliminary layout of ducts
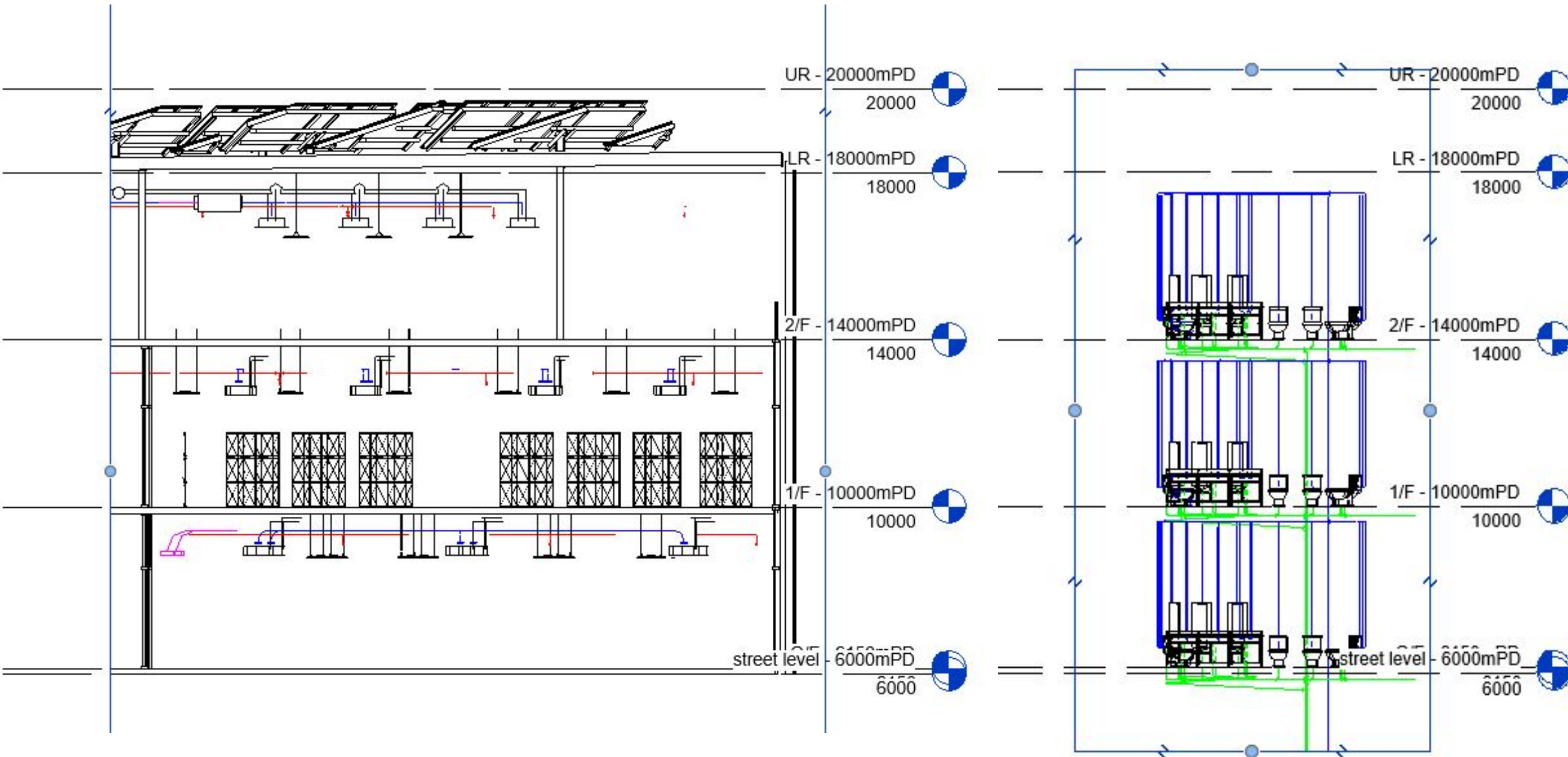
HVAC, Lighting and Fire Services Section View

Plumping Services Section View

The Building Service elements are developed by first analyzing the rooms, then design the suitable system and ducting inside the rooms

Sectional Perspective 1:500