

BIM 為建築界帶來的衝擊

馮樹堅

香港註冊建築師
信息化建築模型系統總建築師

Aedas Ltd 凱達環球

www.aedas.com



建築資訊

圖型性資訊

Plan 平面圖

Section 剖面圖

Elevation 立面圖

Area Diagrams 面積圖

Schematic Designs 方案圖

Building Plan 審批圖

Structural Plans 結構圖

E/M Drawings 機電圖

Schematics 機電示意圖

Details 大樣圖

Other Diagrams... 其他圖

非圖型性資訊

Area Schedule 面積表

Finishing Schedules 裝潢表

Door/Window/Louvre 門窗表

Beam/Column Schedule 樑柱

Equipment Schedule... 機器表

Program 進度

Cost Estimate 造價表

Quantity Take Off 材料表

Bills of Quantities 物料清單

Variation Assessments 變更

建築資訊

圖型性資訊

Plan 平面圖

Section 剖面圖

CAD 系統 圖

Area Diagrams 面積圖

Schematic Designs 方案圖

e.g. AutoCAD,

Microstation

E/M Drawings 機電圖

Schematics 機電示意圖

Details 大樣圖

Other Diagrams... 其他圖

非圖型性資訊

Area Schedule 面積表

Finishing Schedules 裝潢表

Door/Window/Louvre 門窗表

Word 文書處理 Beam/Column Schedule 樑柱

Excel 試算表 Equipment Schedule... 機器表

Access (Data Base)

MS Project

BQ Softwares 造價表

Quantity Take Off 材料表

Bills of Materials 物料清單

Variation Assessments 變更

建築資訊

• Area Schedule
Finishing
Schedules

Door/Window/Louvr

• Sch

Beam/Column

Schedule

Equipment

Schedule

Program

BIM

Building Information Modeling

信息化建築模型

• Plan

Section

Elevation

Area Diagrams

Schematic

Designs

General Building

Plan

Structural Plans

E/M Drawings

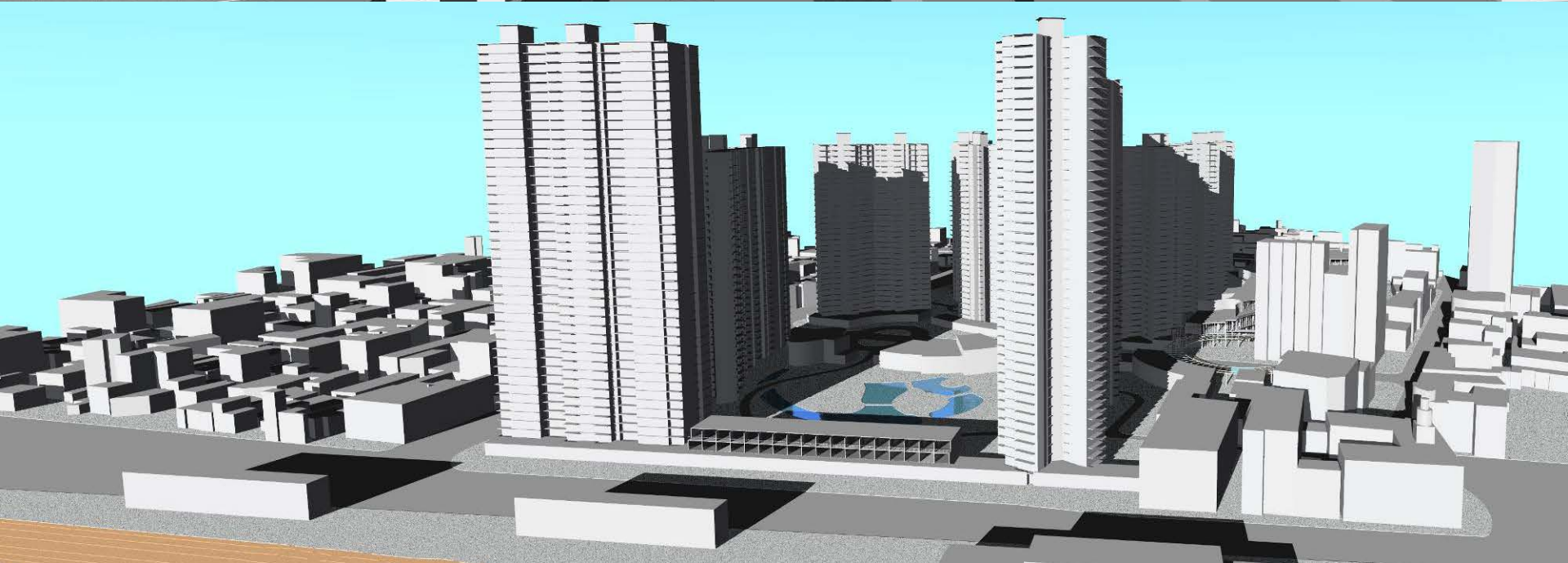


BIM 帶來的衝擊

1. 可視性型像化設計
2. 圖紙製作
3. 各專業協調合作
4. 物件清單及投標文件
5. 自動化送審文件
6. 科學性分析及可持續發展設計
7. 複雜幾何形狀建築
8. 生產制造構件

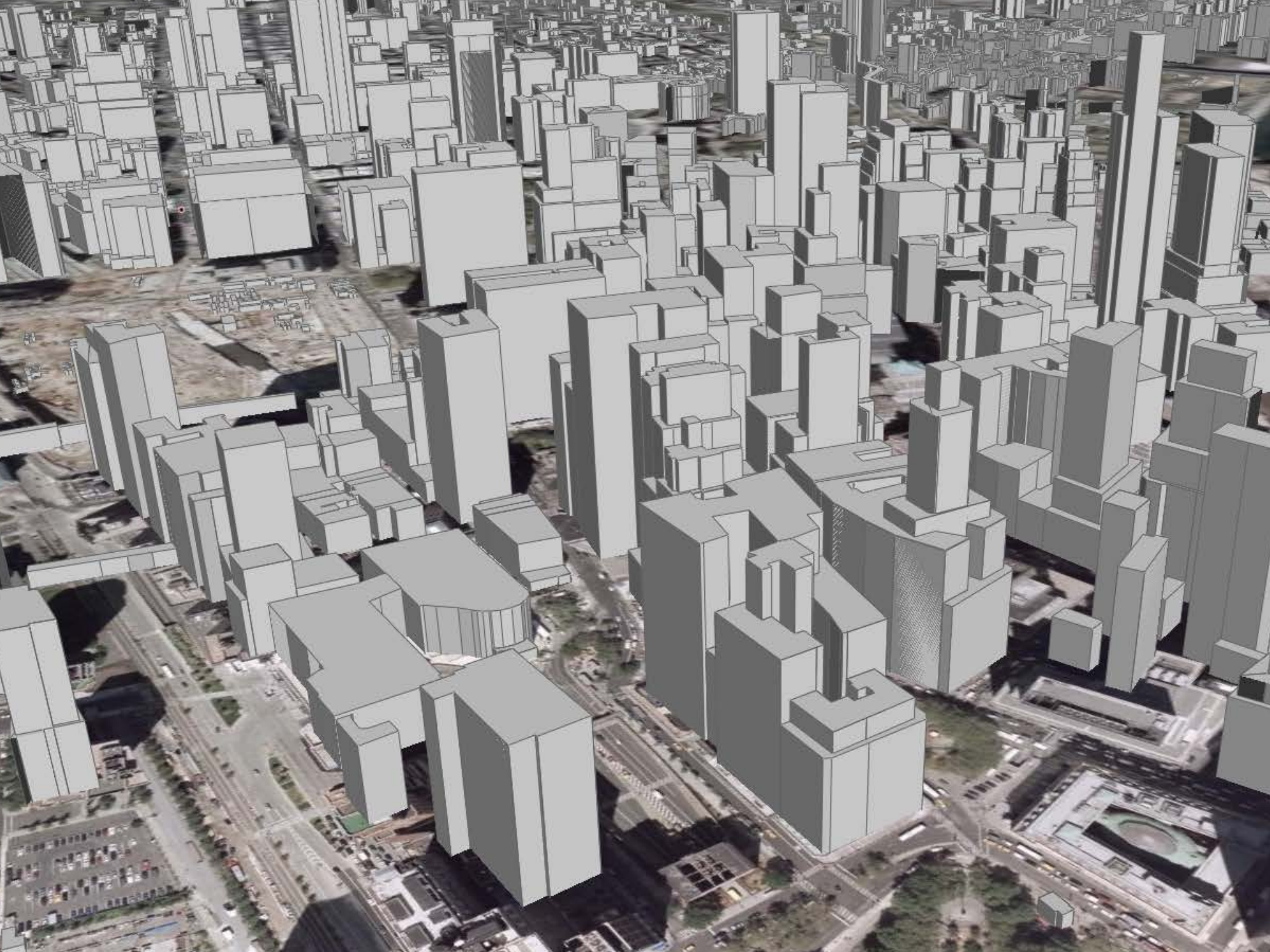
BIM 帶來的衝擊

1. 可視性型像化設計
2. 圖紙製作
3. 各專業協調合作
4. 物件清單及投標文件
5. 自動化送審文件
6. 科學性分析及可持續發展設計
7. 複雜幾何形狀建築
8. 生產制造構件

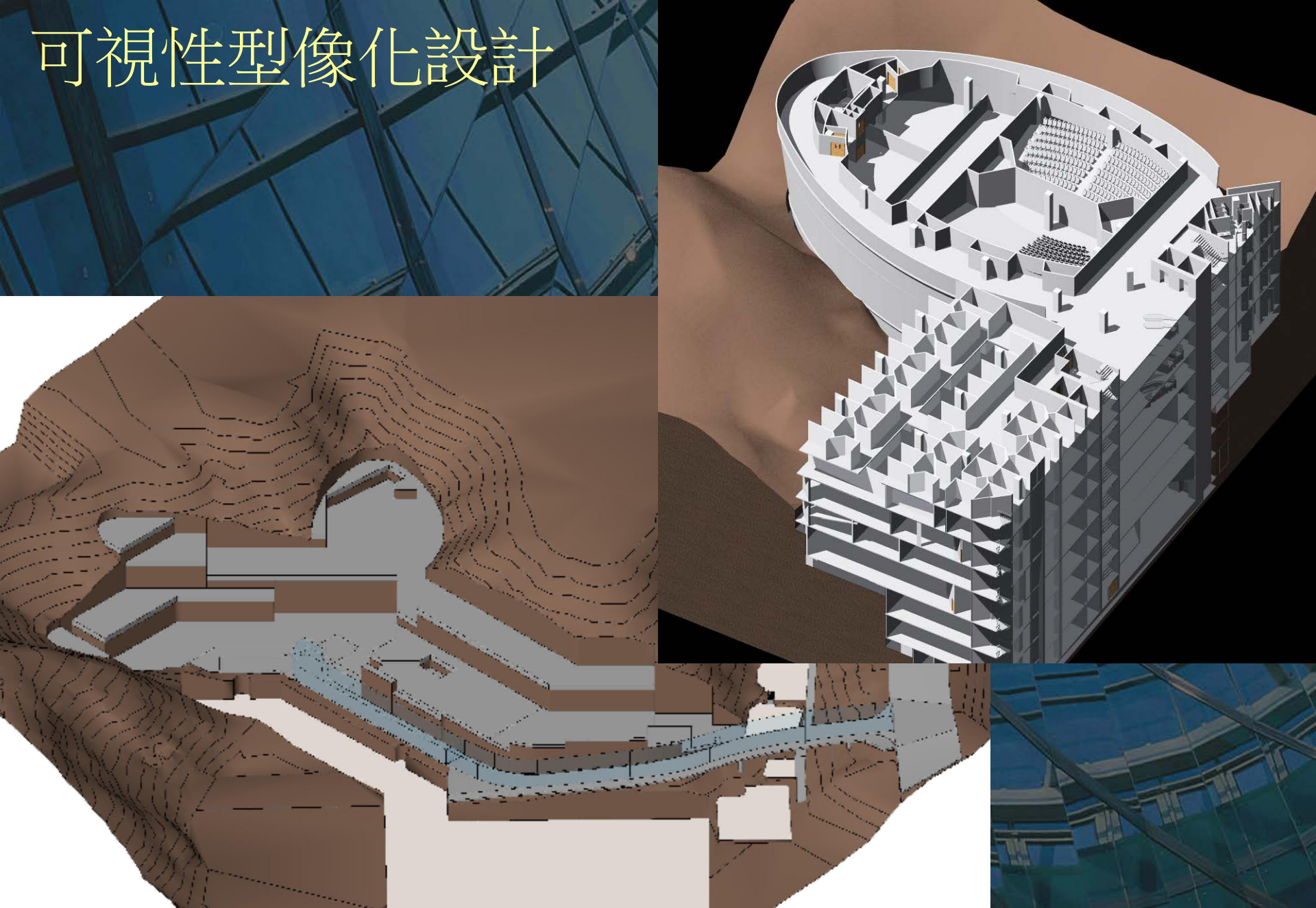


可視性型像化設計





可視性型像化設計



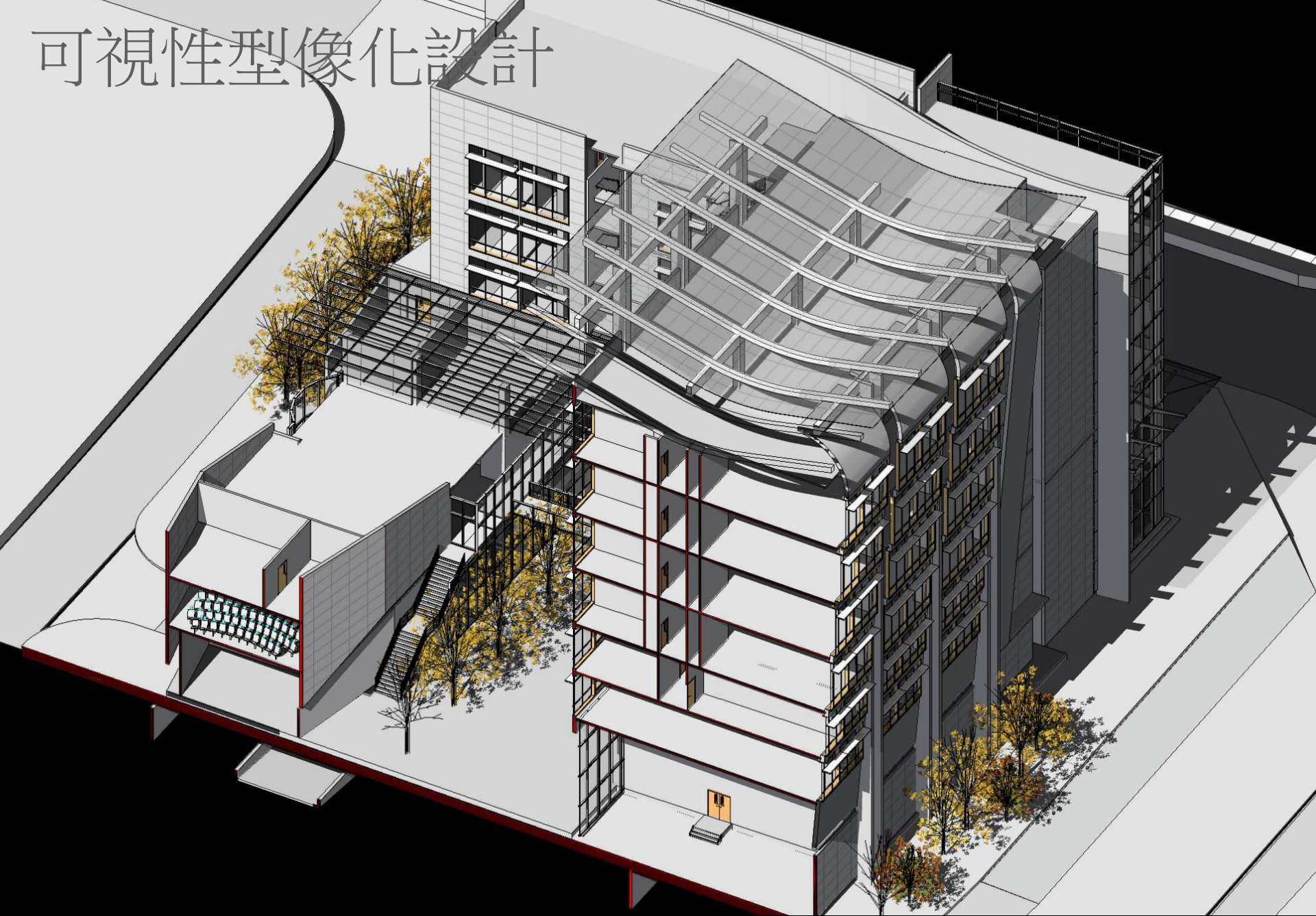
可視性型像化設計



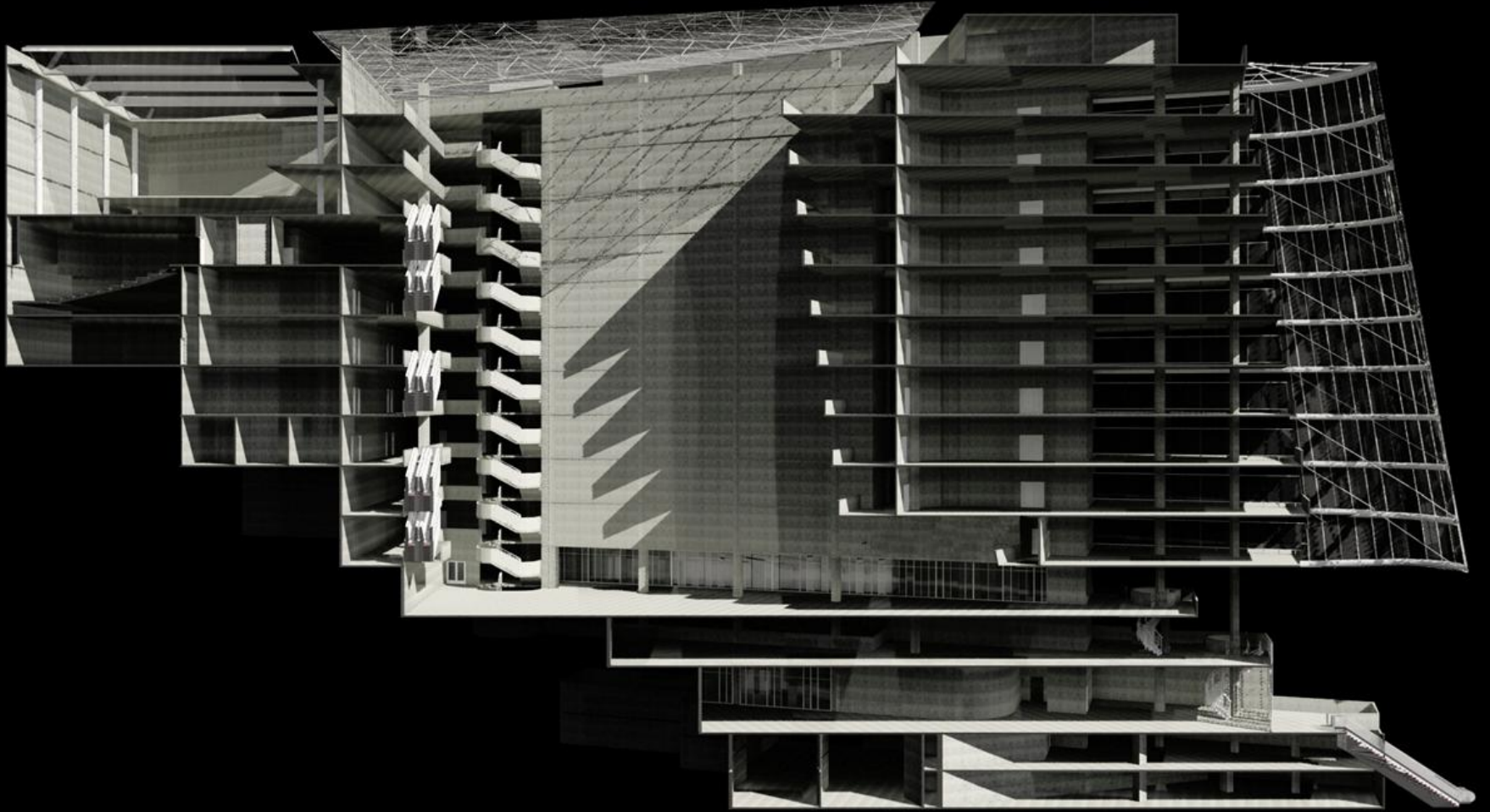
可視性型像化設計



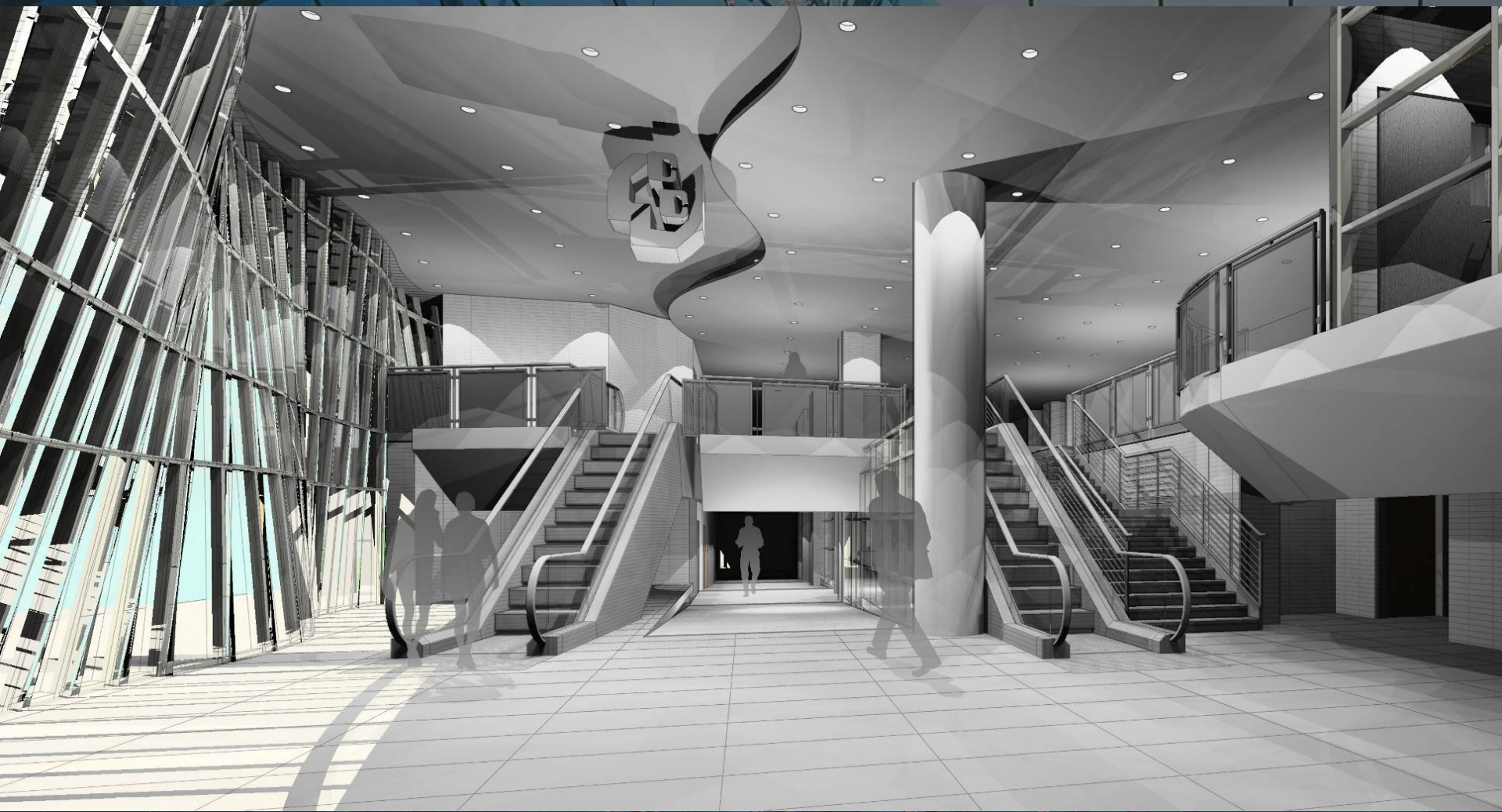
可視性型像化設計



可視性型像化設計

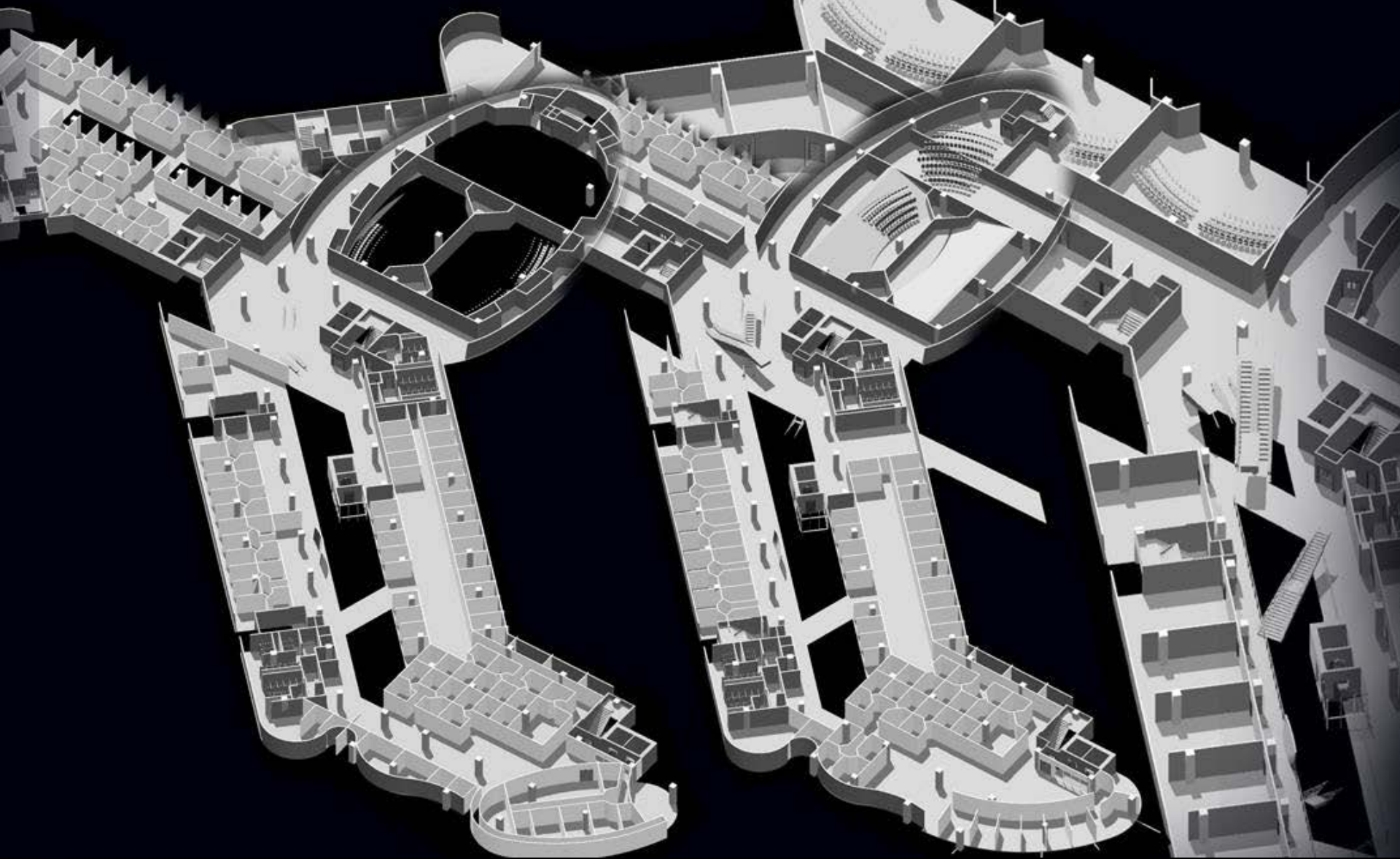


可視性型像化設計

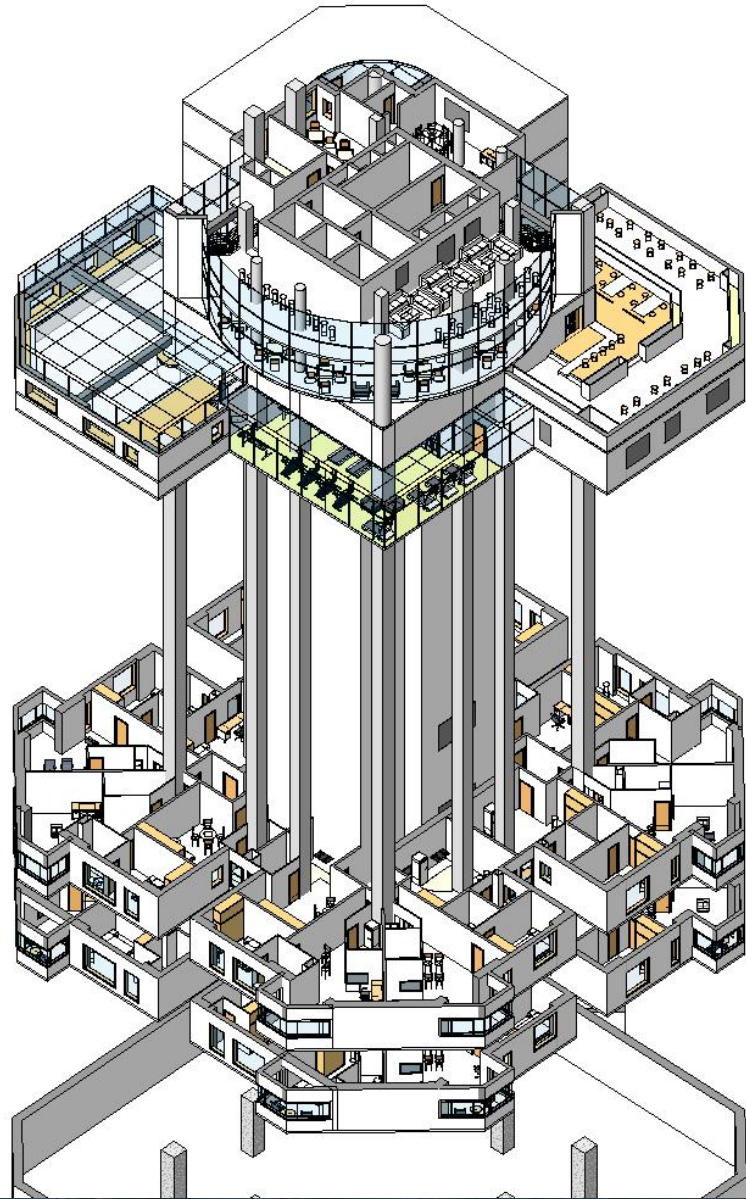




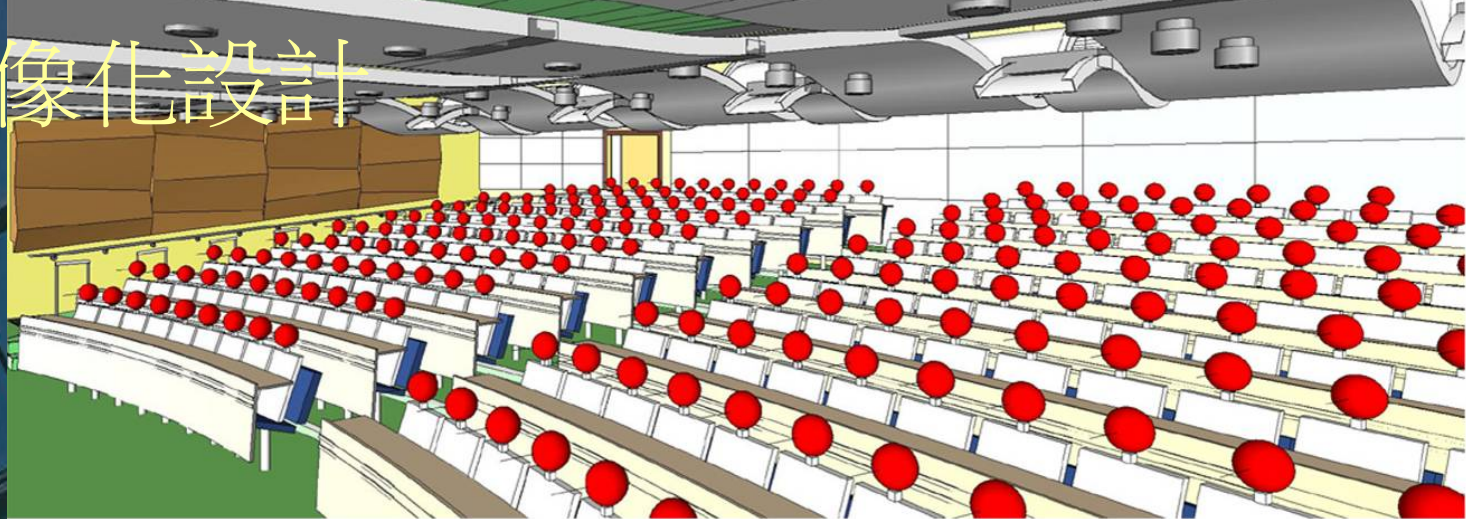
可視性型像化設計



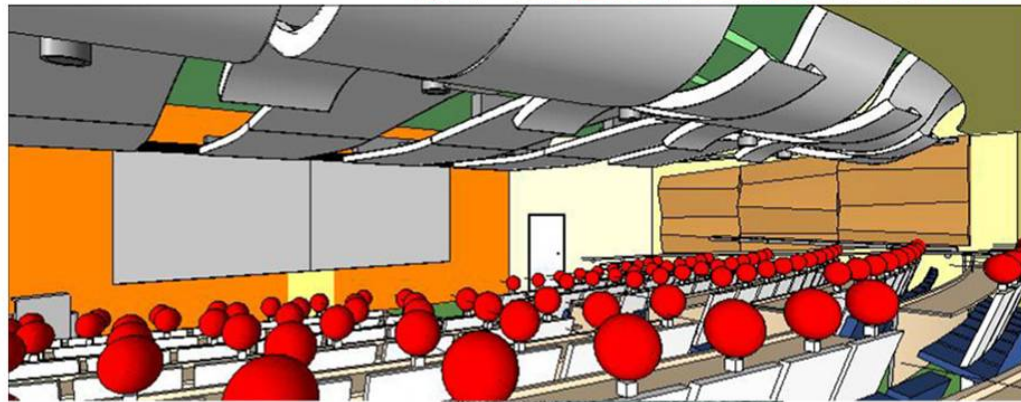
可視性型像化 設計



可視性型像化設計



Acoustical curved metal ceiling

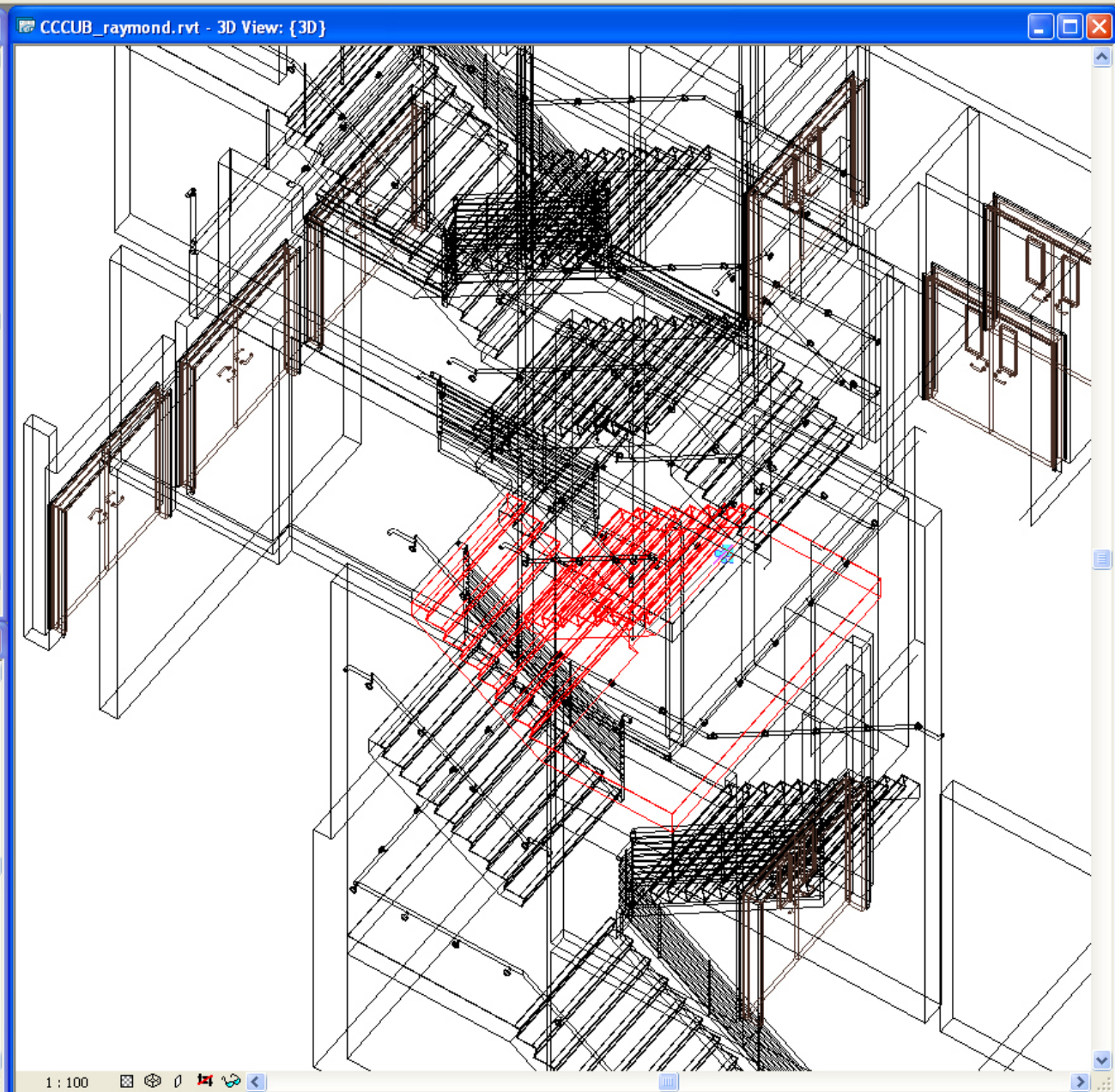
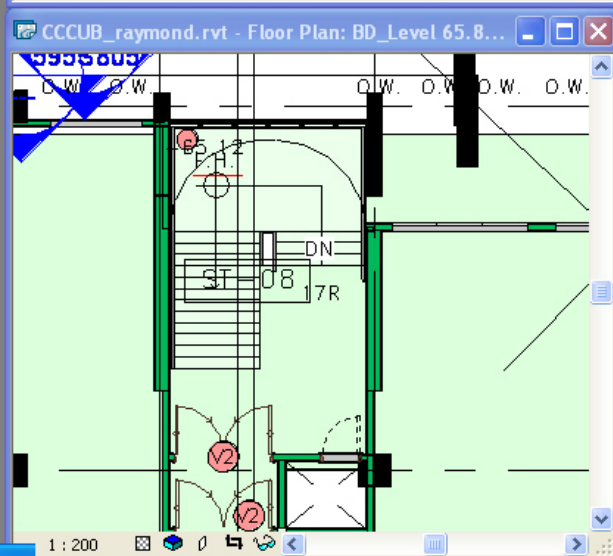
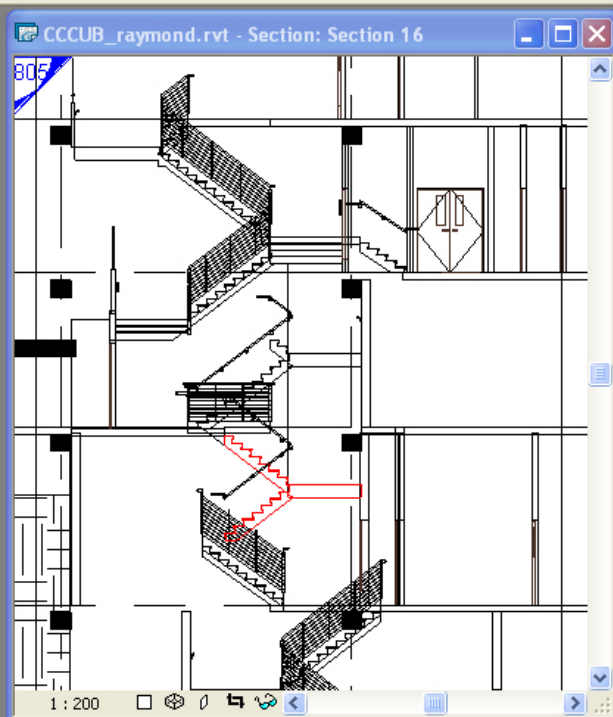


可視性型像化設計

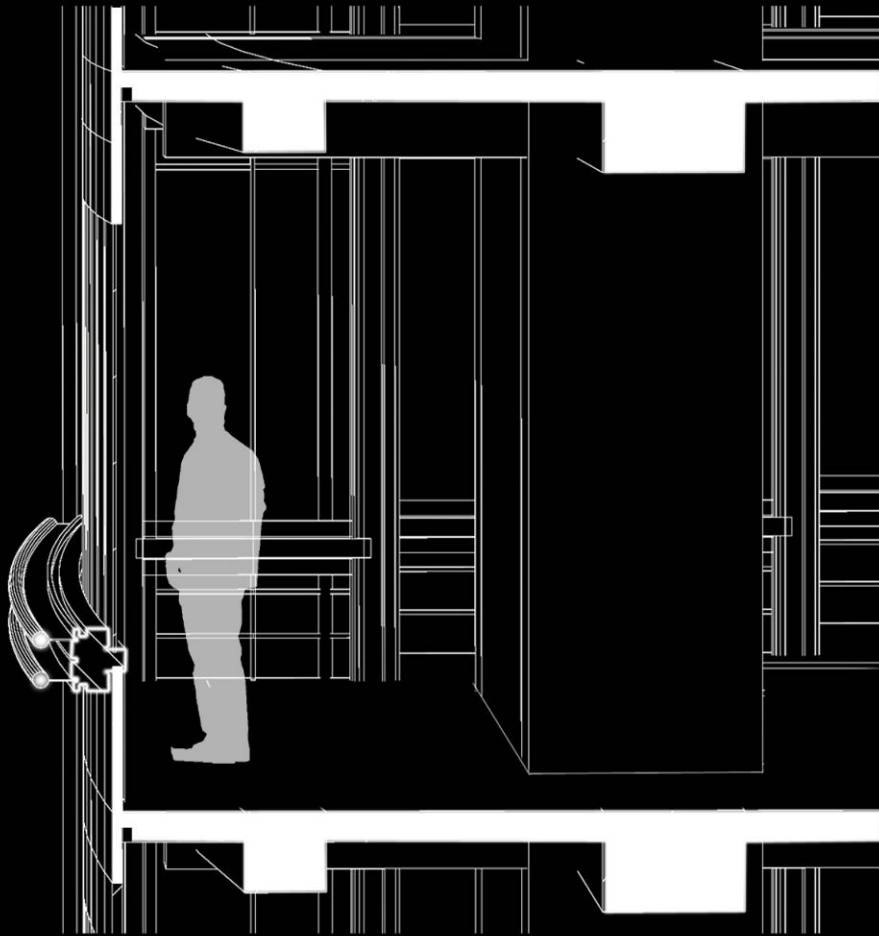


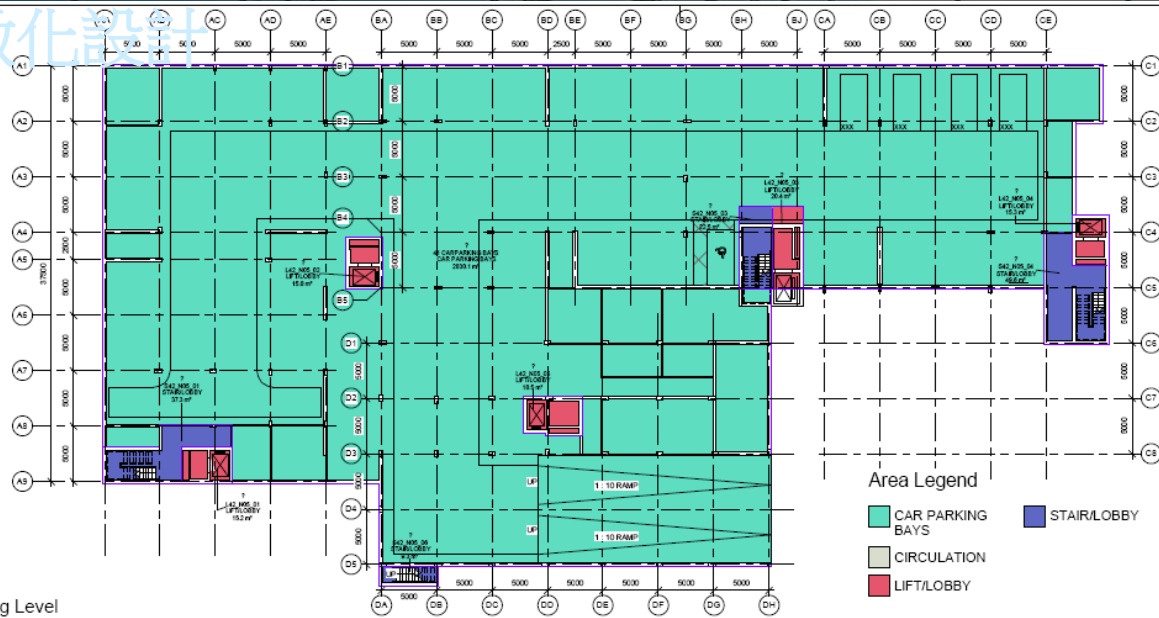
可視性型像化設計







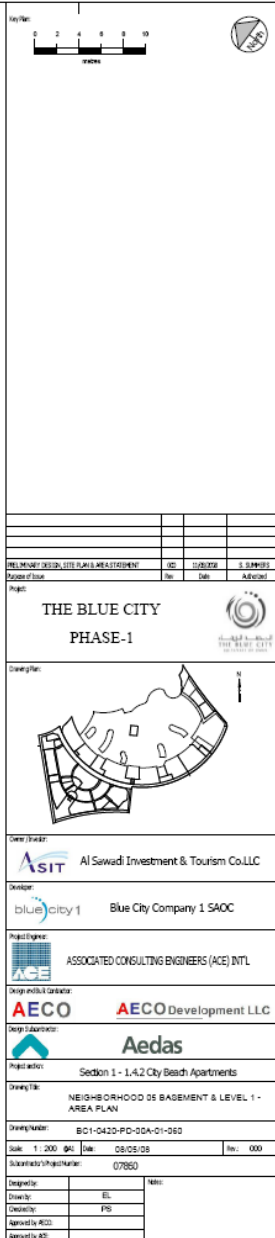


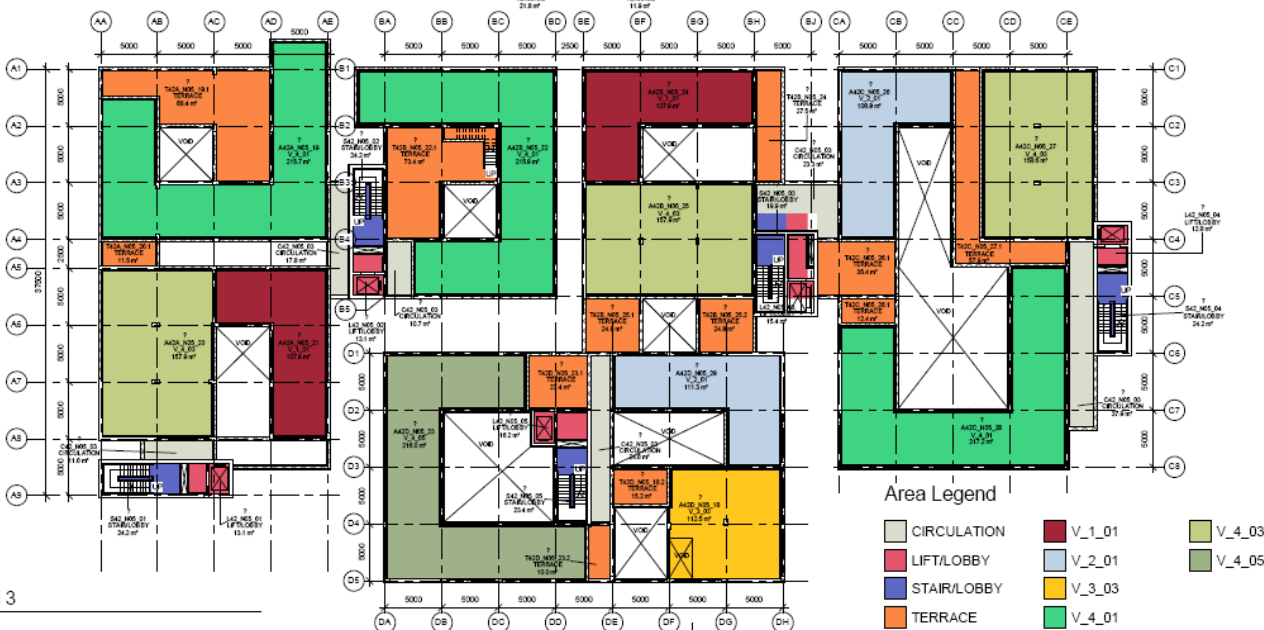
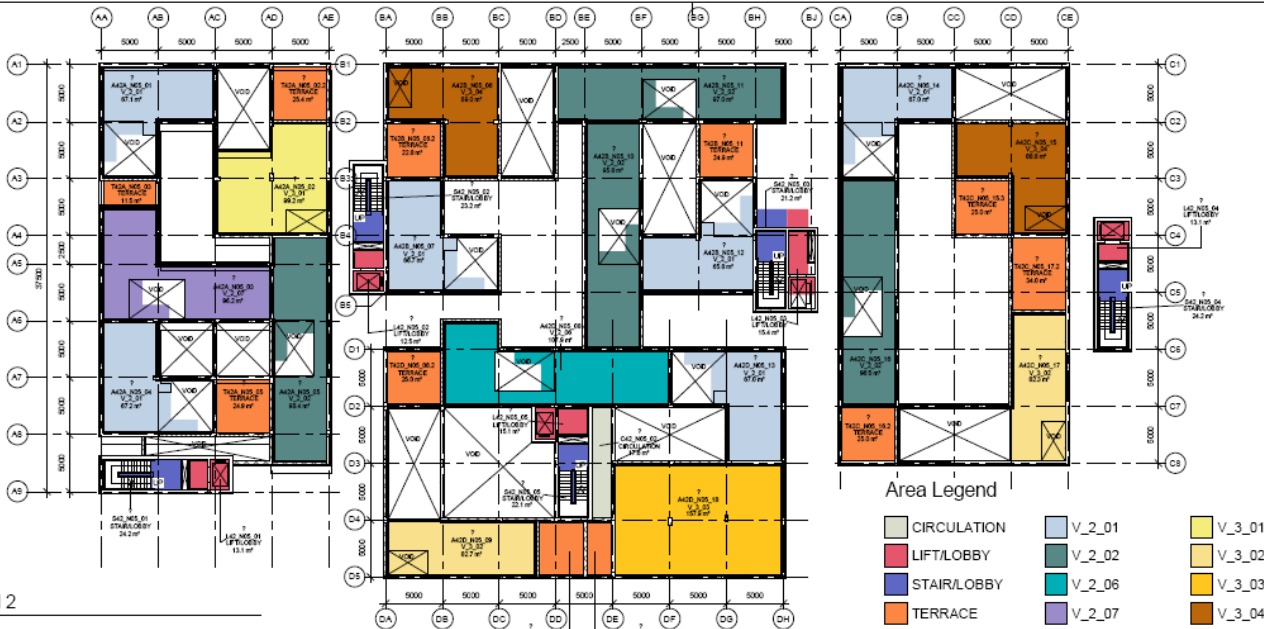


① Parking Level
1 : 200



② Level 1
1 : 200





Scale: 0 2 4 6 8 10 meters

THE BLUE CITY PHASE-1

Owner/Client: ASIT Al Sawadi Investment & Tourism Co.LLC

Developer: bluecity1 Blue City Company 1 SAOC

Project Engineer: ASSOCIATED CONSULTING ENGINEERS (ACE) INTL

Design and Construction: AECO AECO Development LLC

Design Submission: Aedas

Project Name: Section 1 - 1,4,2 City Beach Apartments

Drawing Title: NEIGHBORHOOD 05 LEVEL 2 & LEVEL 3 - AREA PLAN

Drawing Number: BCI-0420-PO-00A-01-061

Scale: 1 : 200 Date: 08/05/08 No.: 000

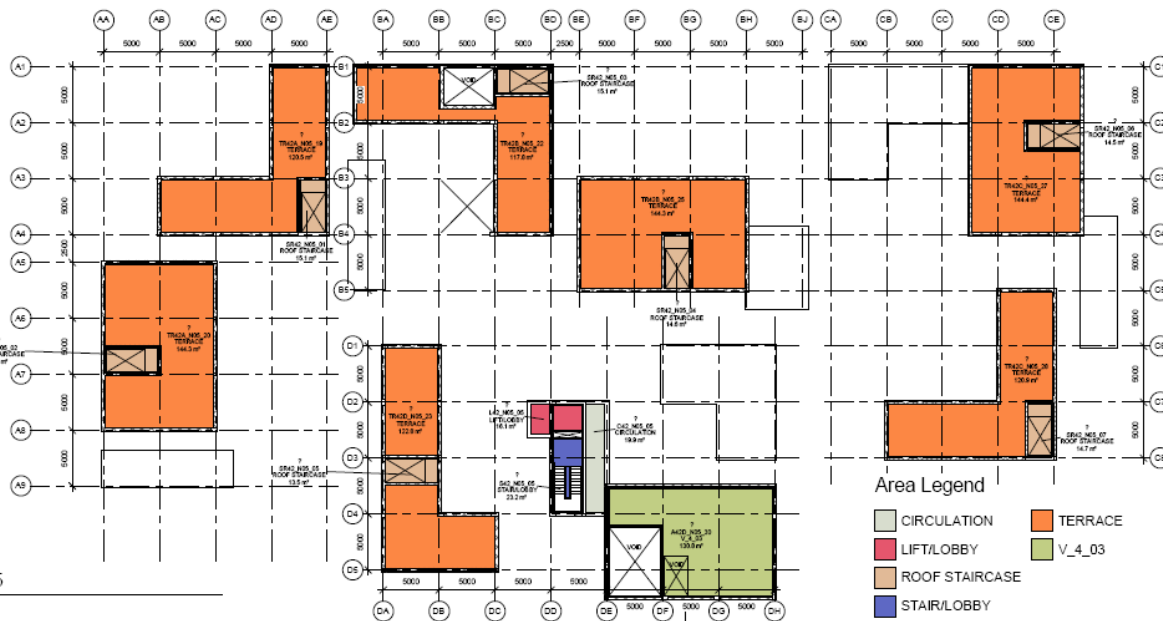
Submitted/Project Number: 07860

Designer: EL

Drawn by: PS

Approved by: R22

Approved by: R22



Key/Rev: 0 2 4 6 8 10

Scale: 1:200

Project: THE BLUE CITY PHASE-1

Client: Al Sawadi Investment & Tourism Co.LLC

Design: bluecity1 Blue City Company 1 SAOC

Architect: ASSOCIATED CONSULTING ENGINEERS (ACE) INTL

Design Architect: AECO Development LLC

Project Name: Section 1 - 1,4,2 City Beach Apartments

Drawing Title: NEIGHBORHOOD 05 LEVEL 4 & LEVEL 5 - AREA PLAN

Drawing Number: B01-0430-PD-00A-01-062

Date: 1/20/2016 By: 08/05/08 Rev: 000

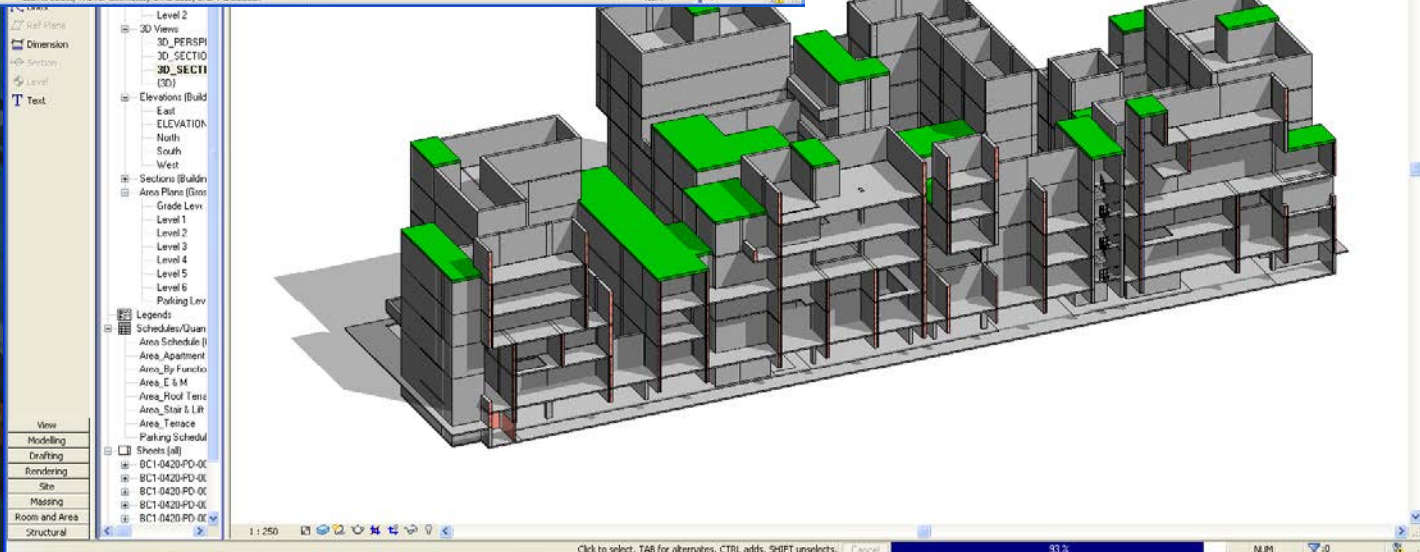
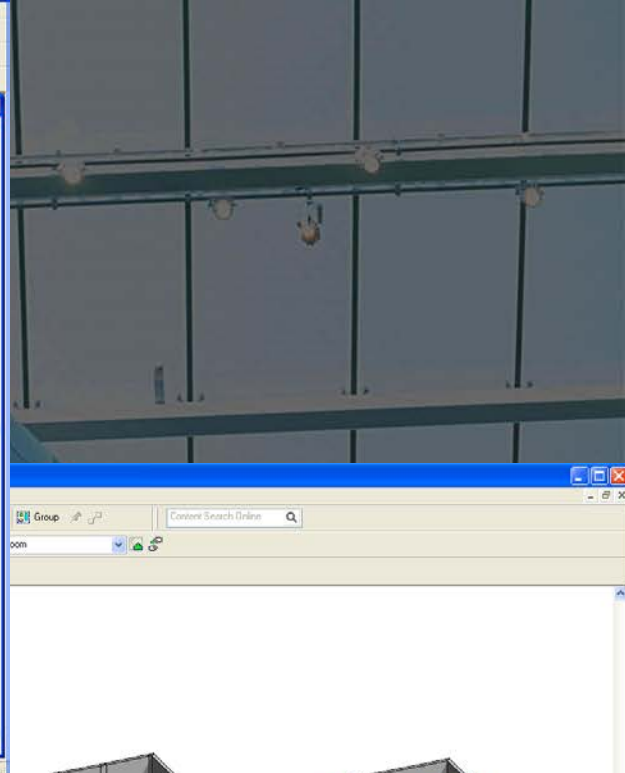
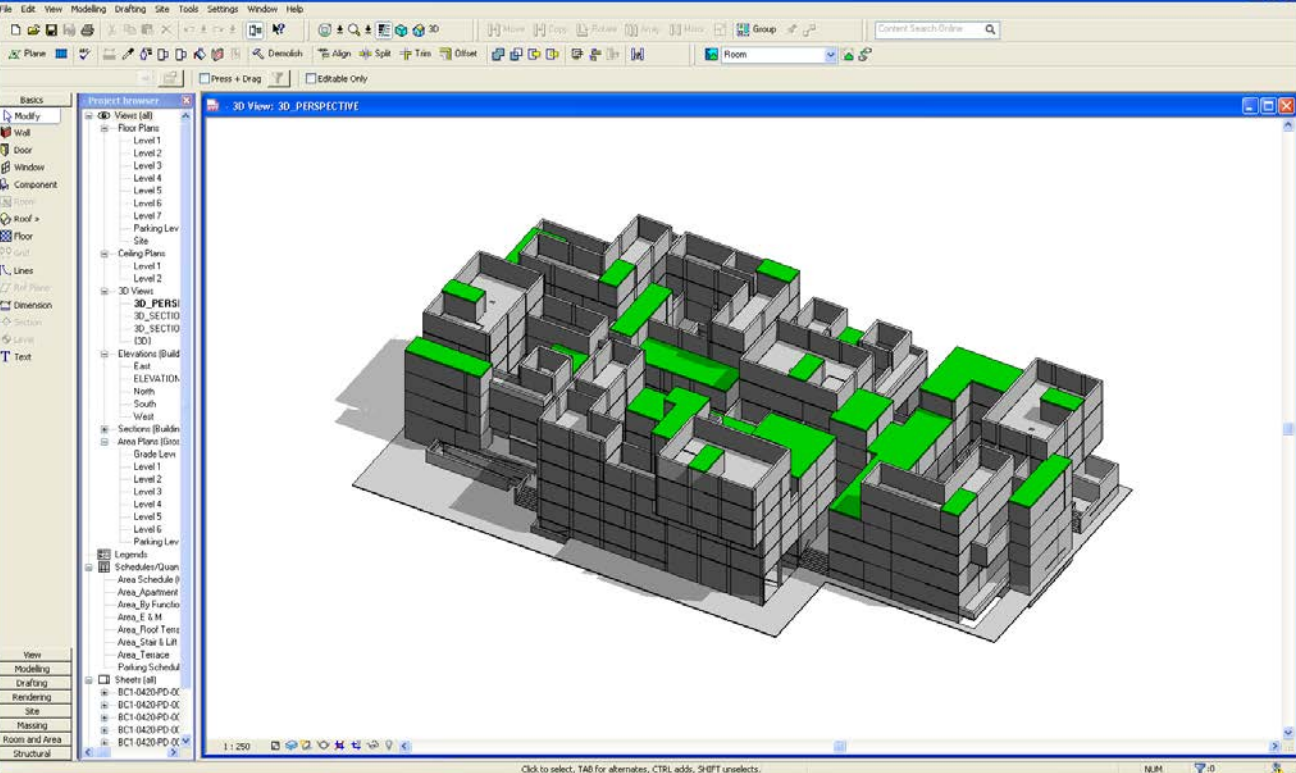
Submitted/Supervisor: 07850

Designer: BL

Checker: PS

Approved by AEC: [Signature]

Approved by AEC: [Signature]



Basics

Modify

Wall

Door

Window

Component

Room

Roof

Floor

Grid

Lines

Ref Plane

Dimension

Section

Level

Text

View

Modelling

Drafting

- Project browser

Views (all)

Floor Plans

Level 1

Level 2

Level 3

Level 4

Level 5

Level 6

Level 7

Parking Lev

Site

Ceiling Plans

Level 1

Level 2

3D Views

3D_PERSPI

3D_SECTION

3D_SECTION (3D)

Elevations (Build

East

ELEVATION

North

South

West

Sections (Buildin

Area Plans (Gros

Grade Lev

Level 1

Level 2

Level 3

Level 4

Level 5

Level 6

Parking Lev

Legends

Schedules/Quan

Area Schedule (I

Area_Apartment

Area_By Func

Area_E & M

Area_Roof Terra

Area_Stair & Lift

Area_Terrace

Parking Schemul

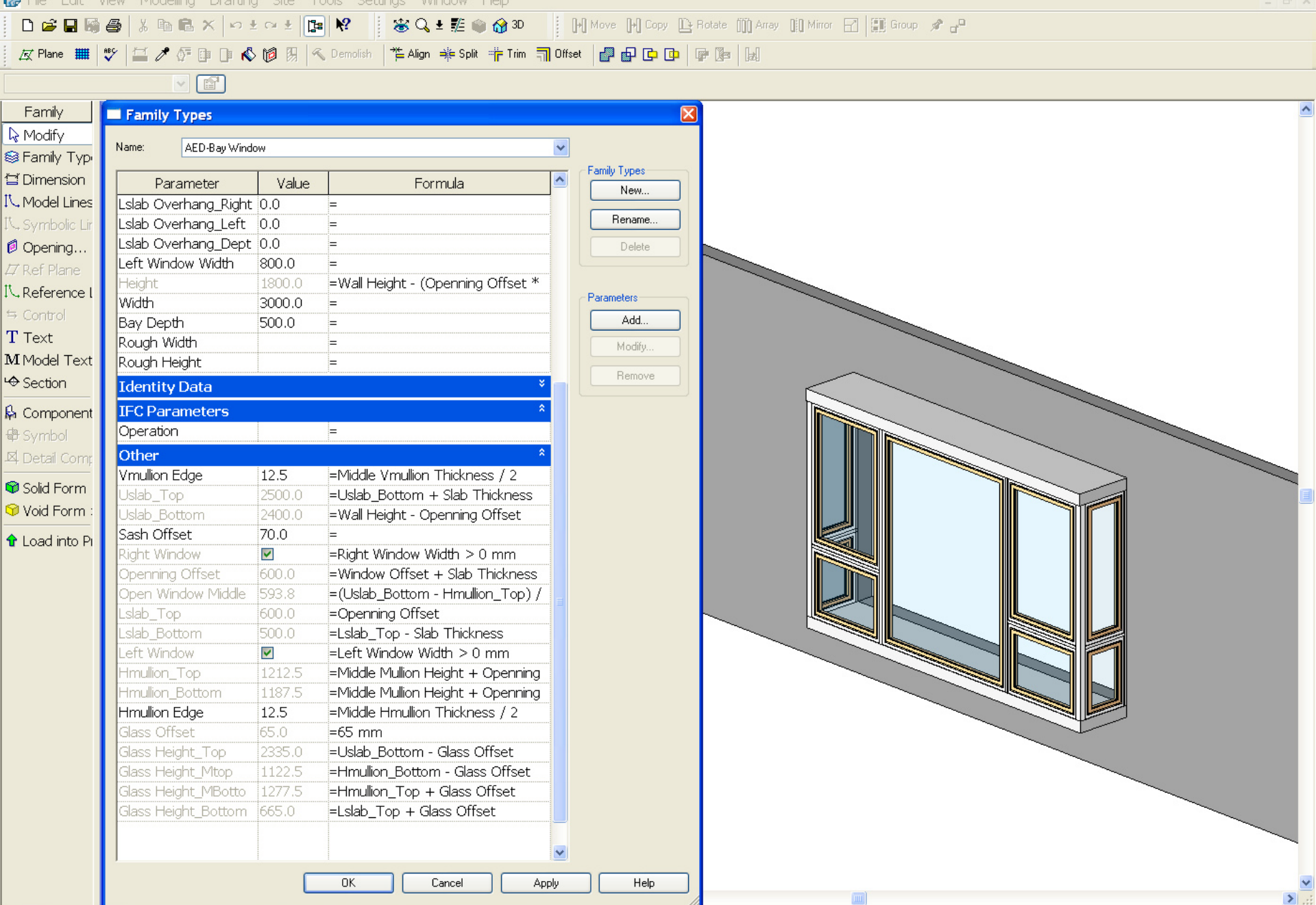
Sheets (all)

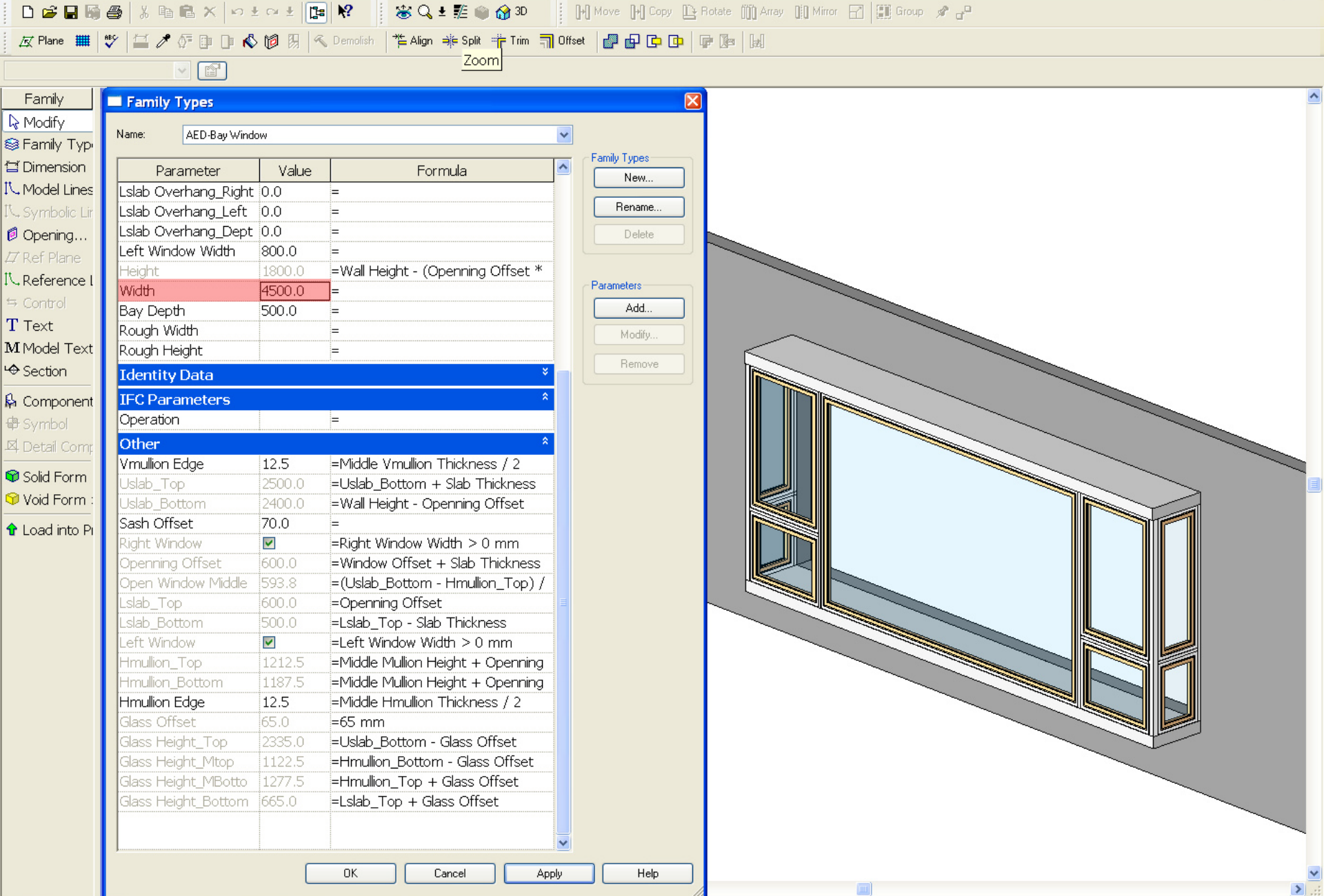
RF1: A42D_N05_00

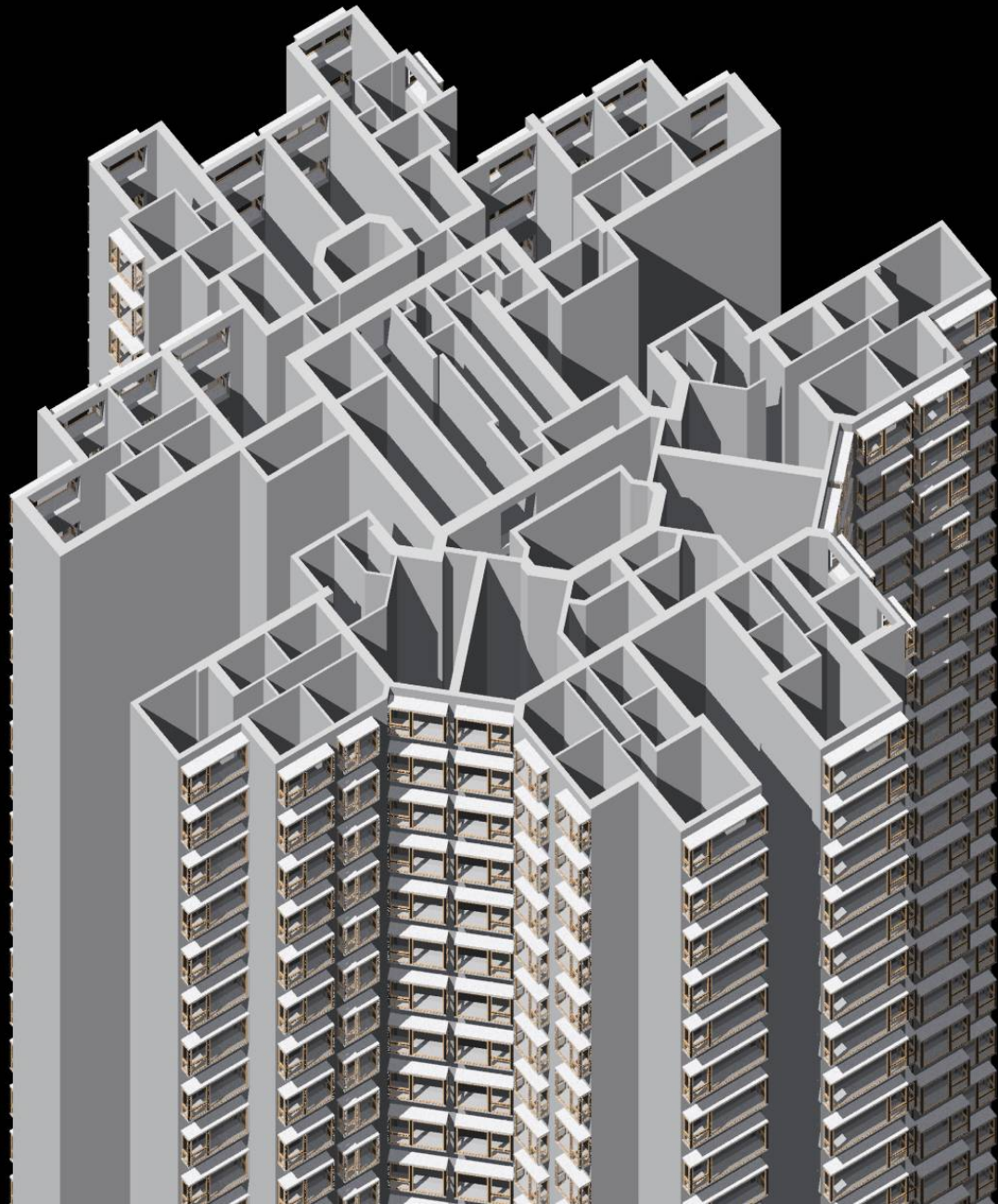
Area_By Functions					
Level	Number	FP Number	AED Number	Name	Area
Level 1	A42A_N05_05		A42A_N05_05	V_2_02	79.2
Level 1	A42B_N05_10		A42B_N05_10	V_2_02	80.7
Level 1	A42B_N05_11		A42B_N05_11	V_2_02	80.7
Level 1	A42C_N05_16		A42C_N05_16	V_2_02	80.3
Level 2	A42A_N05_05		A42A_N05_05	V_2_02	98.4
Level 2	A42B_N05_10		A42B_N05_10	V_2_02	95.8
Level 2	A42B_N05_11		A42B_N05_11	V_2_02	97.0
Level 2	A42C_N05_16		A42C_N05_16	V_2_02	96.5
V_2_02: 8					708.5
Level 1	A42D_N05_08		A42D_N05_08	V_2_06	81.5
Level 2	A42D_N05_08		A42D_N05_08	V_2_06	107.9
V_2_06: 2					189.4
Level 1	A42A_N05_03		A42A_N05_03	V_2_07	80.2
Level 2	A42A_N05_03		A42A_N05_03	V_2_07	96.2
V_2_07: 2					176.4
Level 1	A42A_N05_02		A42A_N05_02	V_3_01	158.0
Level 2	A42A_N05_02		A42A_N05_02	V_3_01	99.2
V_3_01: 2					257.2
Level 1	A42C_N05_17		A42C_N05_17	V_3_02	187.3
Level 1	A42D_N05_09		A42D_N05_09	V_3_02	187.5
Level 2	A42C_N05_17		A42C_N05_17	V_3_02	82.3
Level 2	A42D_N05_09		A42D_N05_09	V_3_02	82.7
V_3_02: 4					539.8
Level 2	A42D_N05_18		A42D_N05_18	V_3_03	157.9
Level 3	A42D_N05_18		A42D_N05_18	V_3_03	112.5
V_3_03: 2					270.4
Level 1	A42B_N05_06		A42B_N05_06	V_3_04	157.8
Level 1	A42C_N05_15		A42C_N05_15	V_3_04	157.0
Level 2	A42B_N05_06		A42B_N05_06	V_3_04	89.0
Level 2	A42C_N05_15		A42C_N05_15	V_3_04	88.8
V_3_04: 4					492.5
Level 3	A42A_N05_19		A42A_N05_19	V_4_01	215.7
Level 3	A42B_N05_22		A42B_N05_22	V_4_01	215.9
Level 3	A42C_N05_28		A42C_N05_28	V_4_01	217.2
Level 4	A42A_N05_19		A42A_N05_19	V_4_01	91.5
Level 4	A42B_N05_22		A42B_N05_22	V_4_01	82.1
Level 4	A42C_N05_28		A42C_N05_28	V_4_01	91.5
V_4_01: 6					913.9
Level 3	A42A_N05_20		A42A_N05_20	V_4_03	157.9
Level 3	A42B_N05_25		A42B_N05_25	V_4_03	157.9
Level 3	A42C_N05_27		A42C_N05_27	V_4_03	158.6
Level 4	A42A_N05_20		A42A_N05_20	V_4_03	130.8
Level 4	A42B_N05_25		A42B_N05_25	V_4_03	130.8
Level 4	A42C_N05_27		A42C_N05_27	V_4_03	130.5
Level 4	A42D_N05_30		A42D_N05_30	V_4_03	158.9

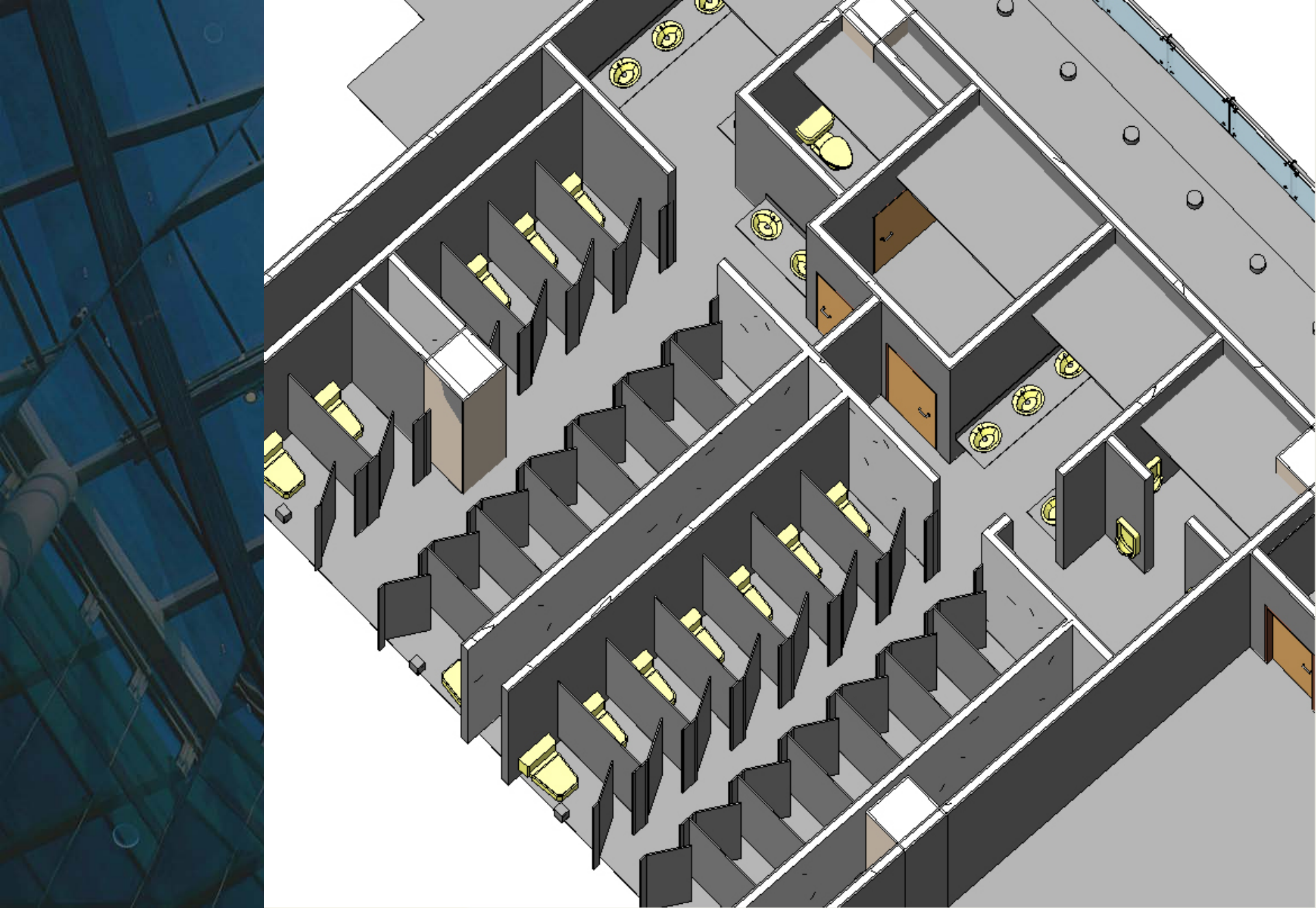


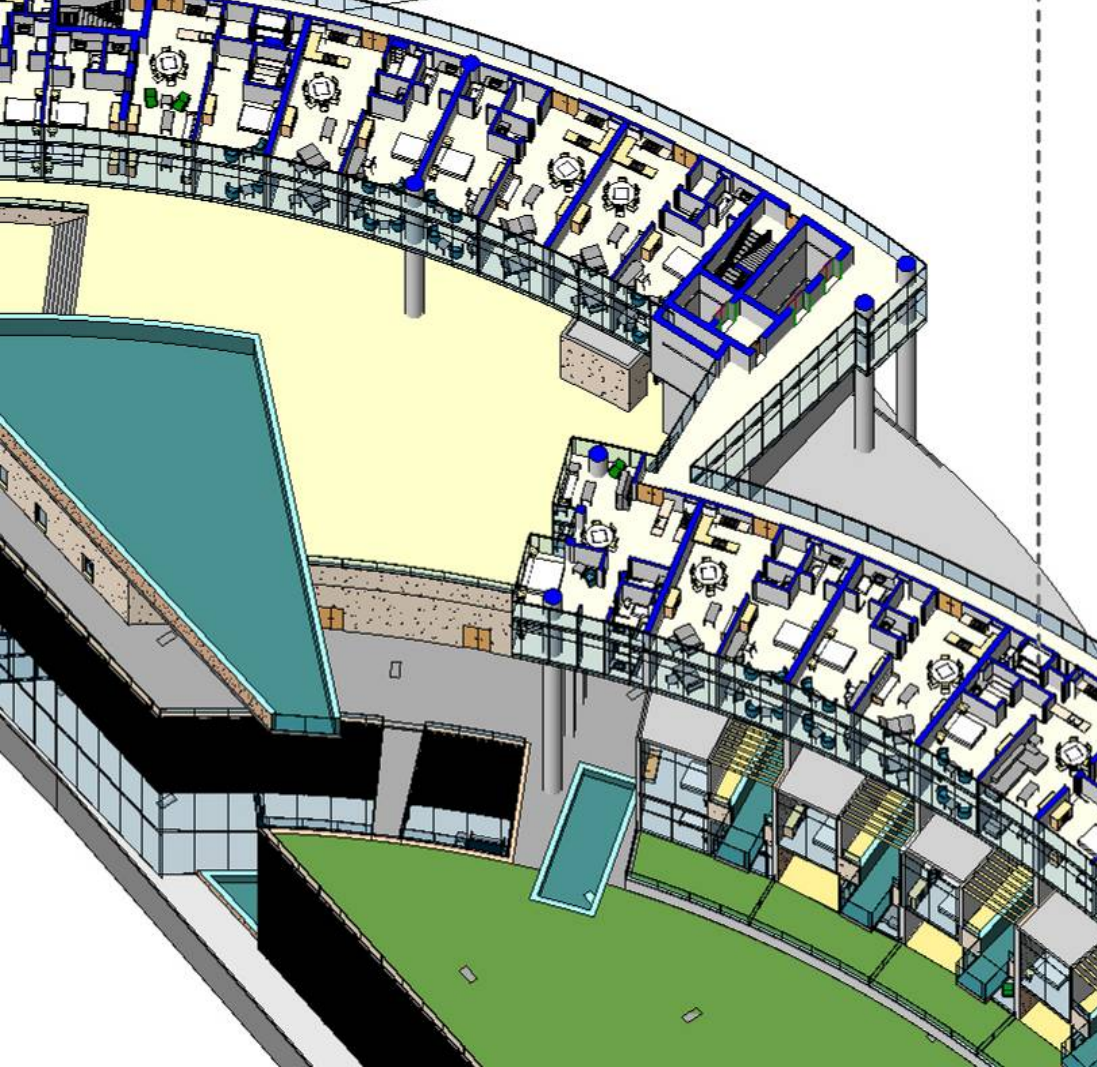
REPETITIONS vs VARIATIONS





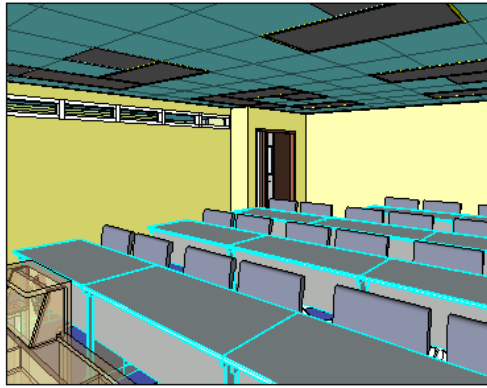




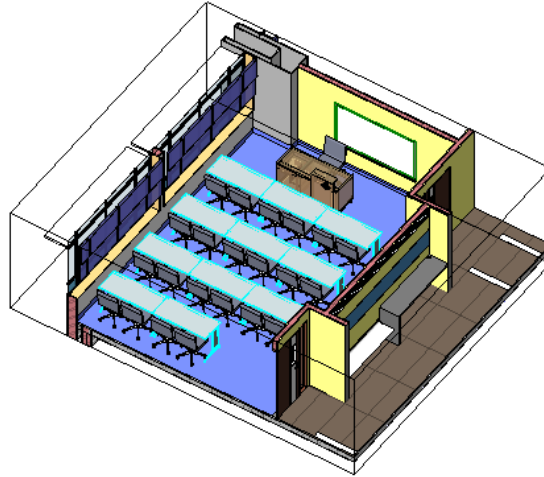


BIM 帶來的衝擊

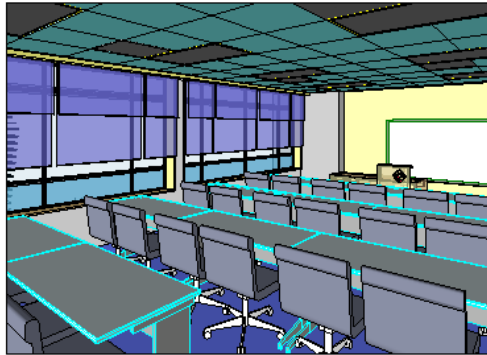
1. 可視性型像化設計
2. 圖紙製作
3. 各專業協調合作
4. 物件清單及投標文件
5. 自動化送審文件
6. 科學性分析及可持續發展設計
7. 複雜幾何形狀建築
8. 生產制造構件



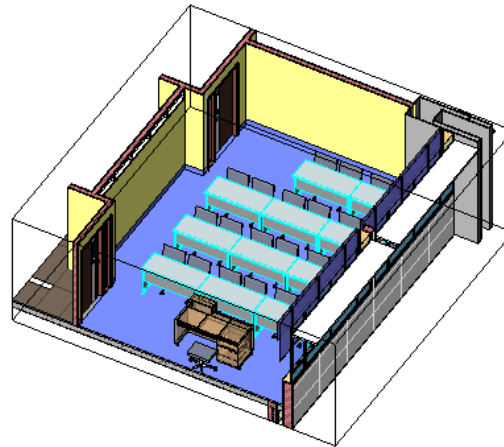
6 行政人员培训室立体示意图2



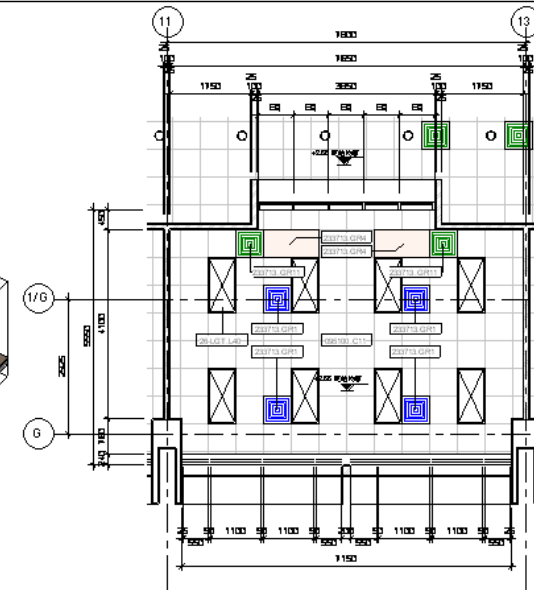
4 行政人员培训室立体剖面示意图2



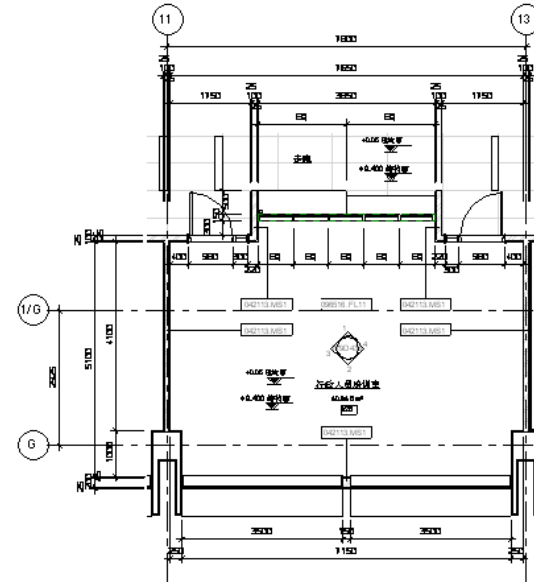
5 行政人员培训室立体示意图1



3 行政人员培训室立体剖面示意图1

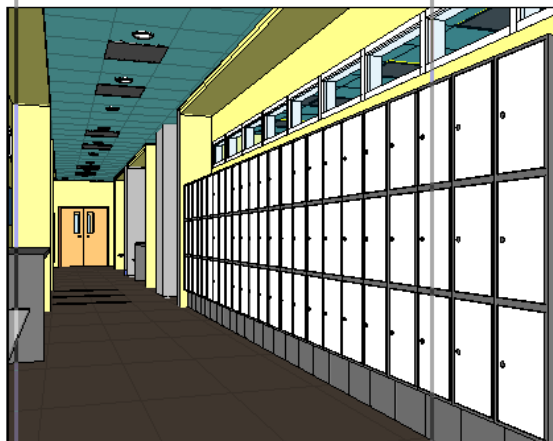


2 行政人员培训室天花平面图(高楼三层)1

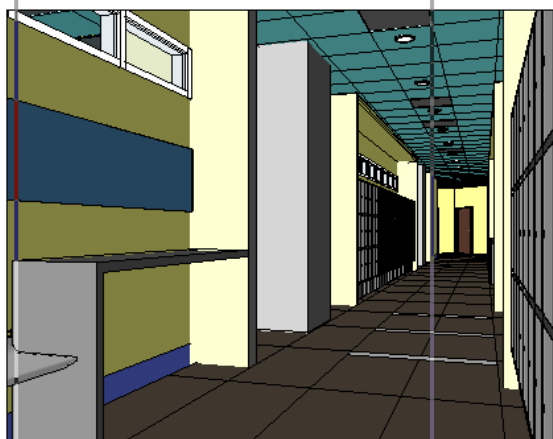


1 行政人员培训室平面图(高楼三层)1

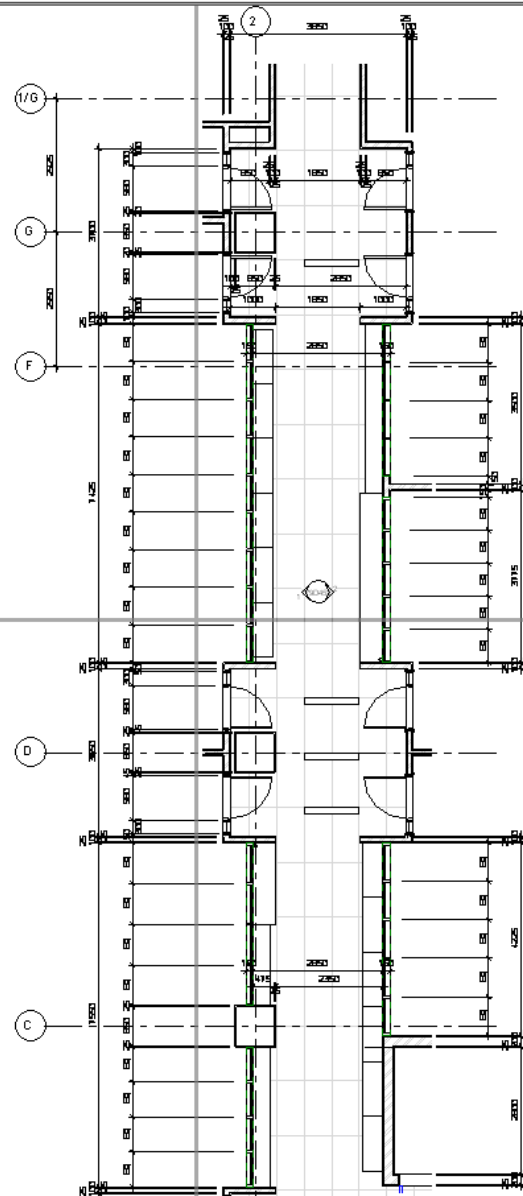
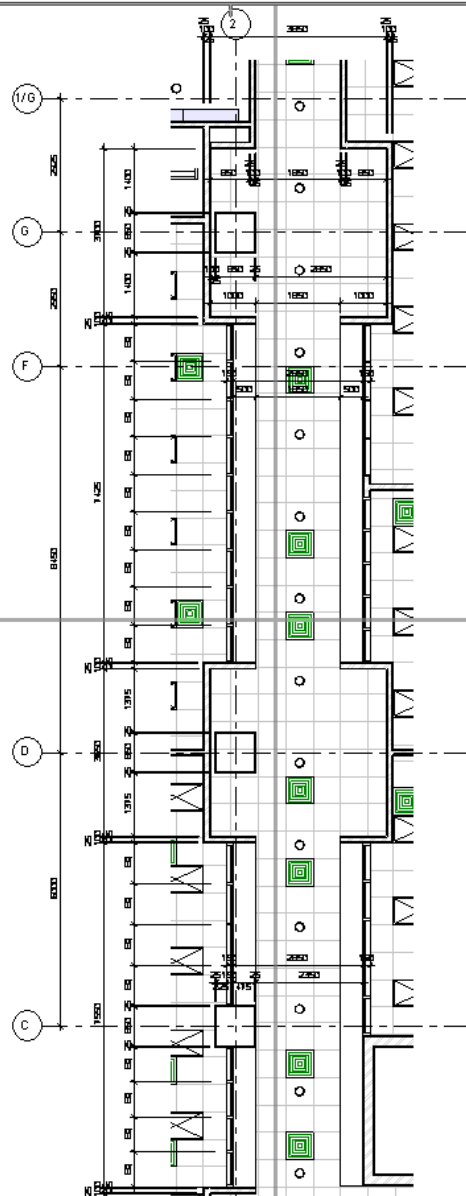
Drawing Type	B.D. SUBMISSION
623 Reference No.	GOVERNMENT REFERENCE NO.
7.623 Reference No.	GOVERNMENT REFERENCE NO.
Author's City	
AUTHORIZE PERFORMER EBS RBC AREA	
Notes	
Rev. Description	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	
51	
52	
53	
54	
55	
56	
57	
58	
59	
60	
61	
62	
63	
64	
65	
66	
67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	
88	
89	
90	
91	
92	
93	
94	
95	
96	
97	
98	
99	
100	

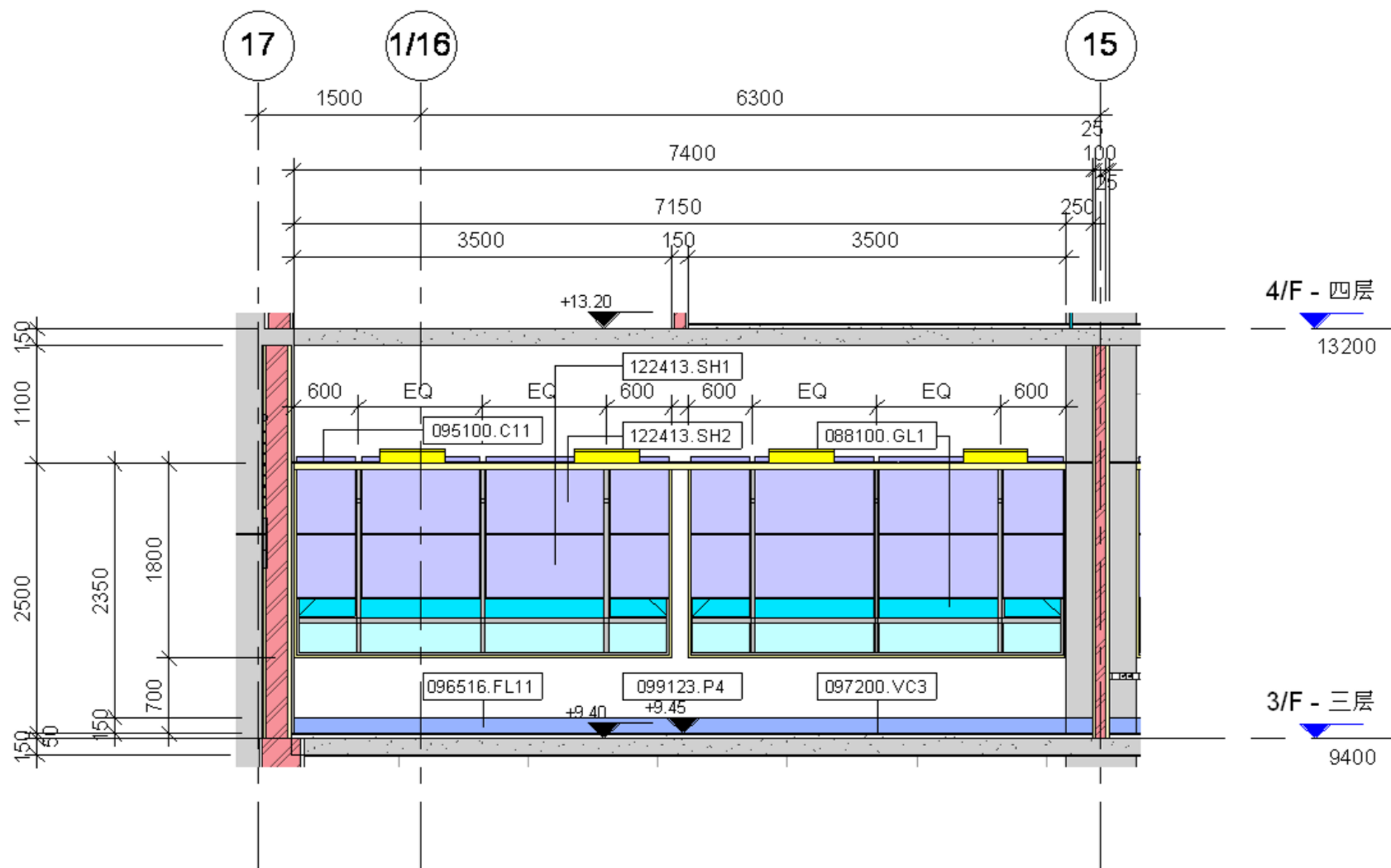


4 走廊立体示意图(低楼三至四层)2

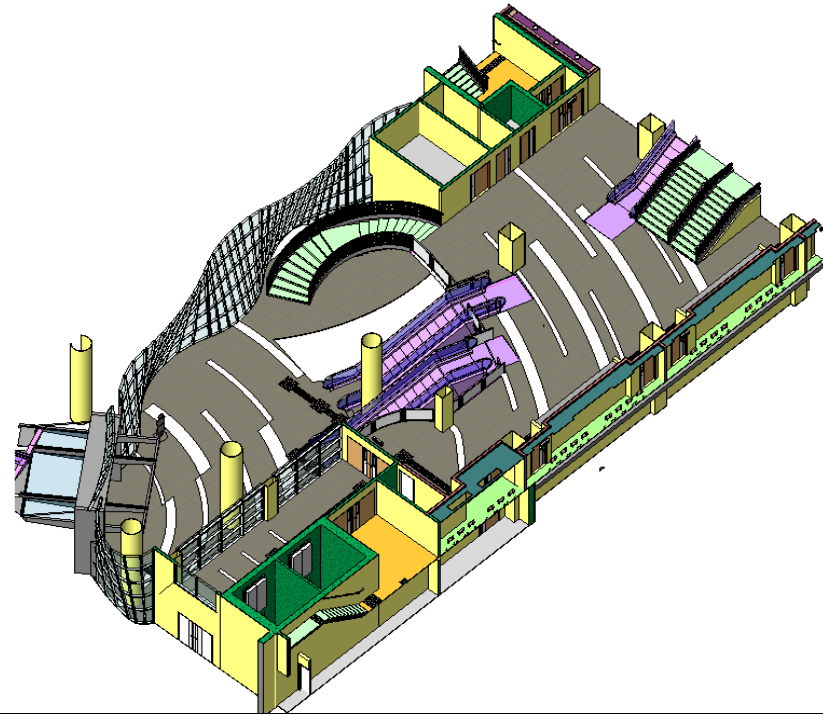
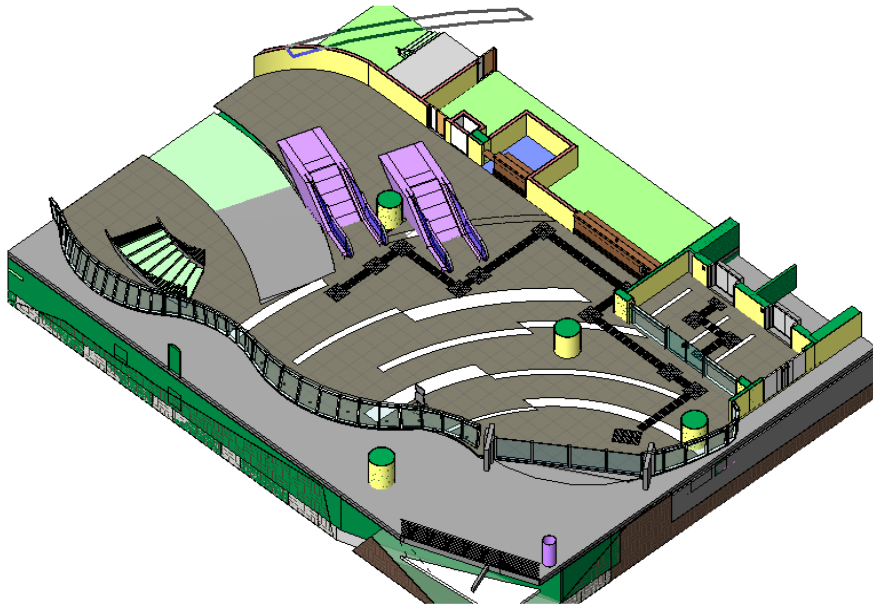
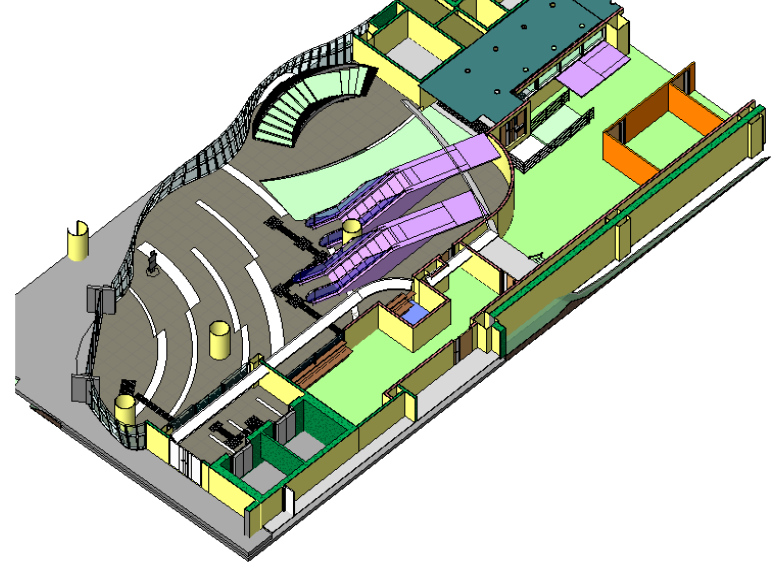
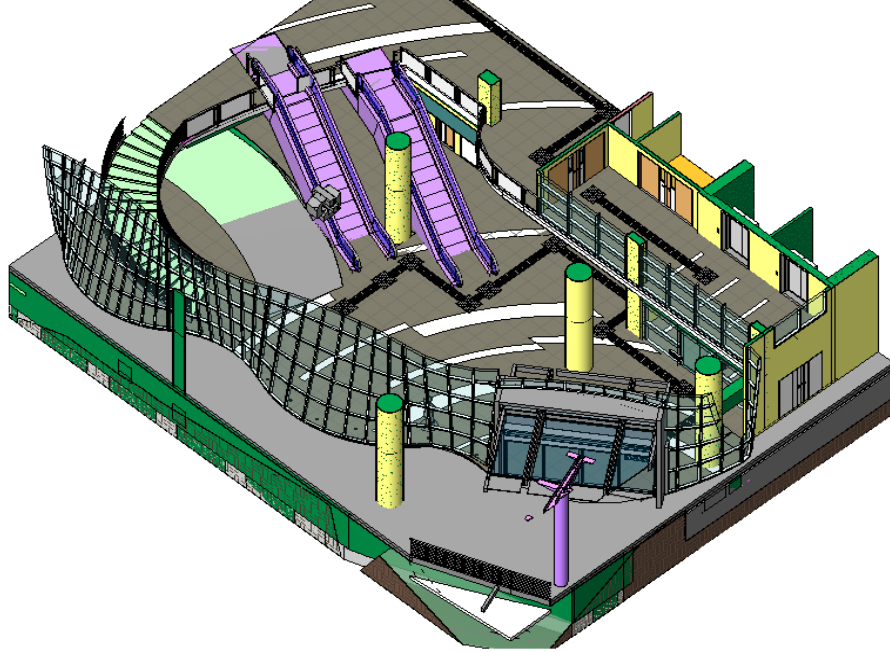


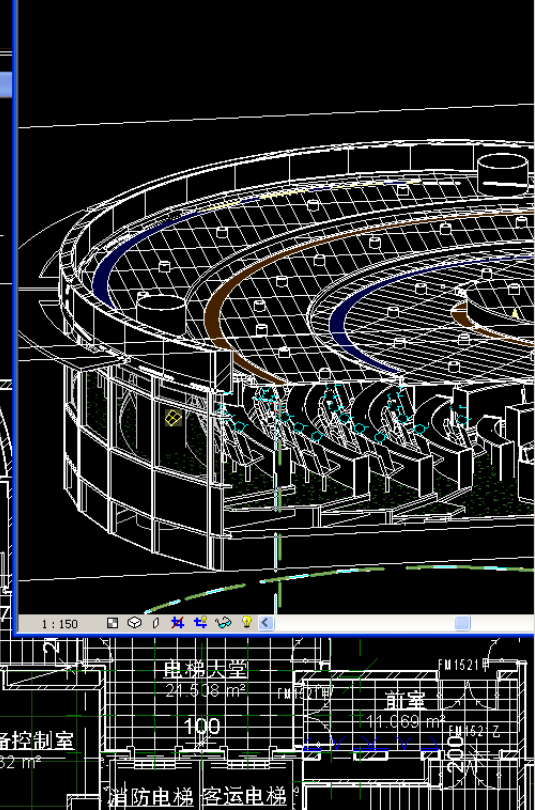
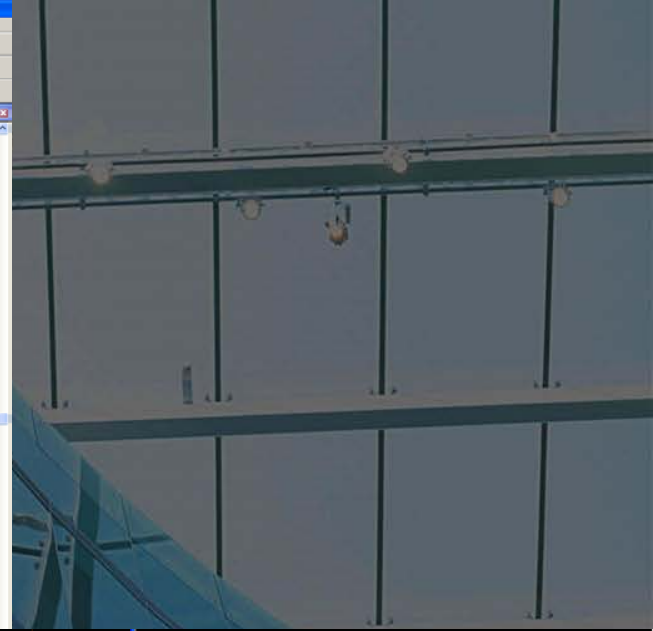
3 走廊立体示意图(低楼三至四层)1





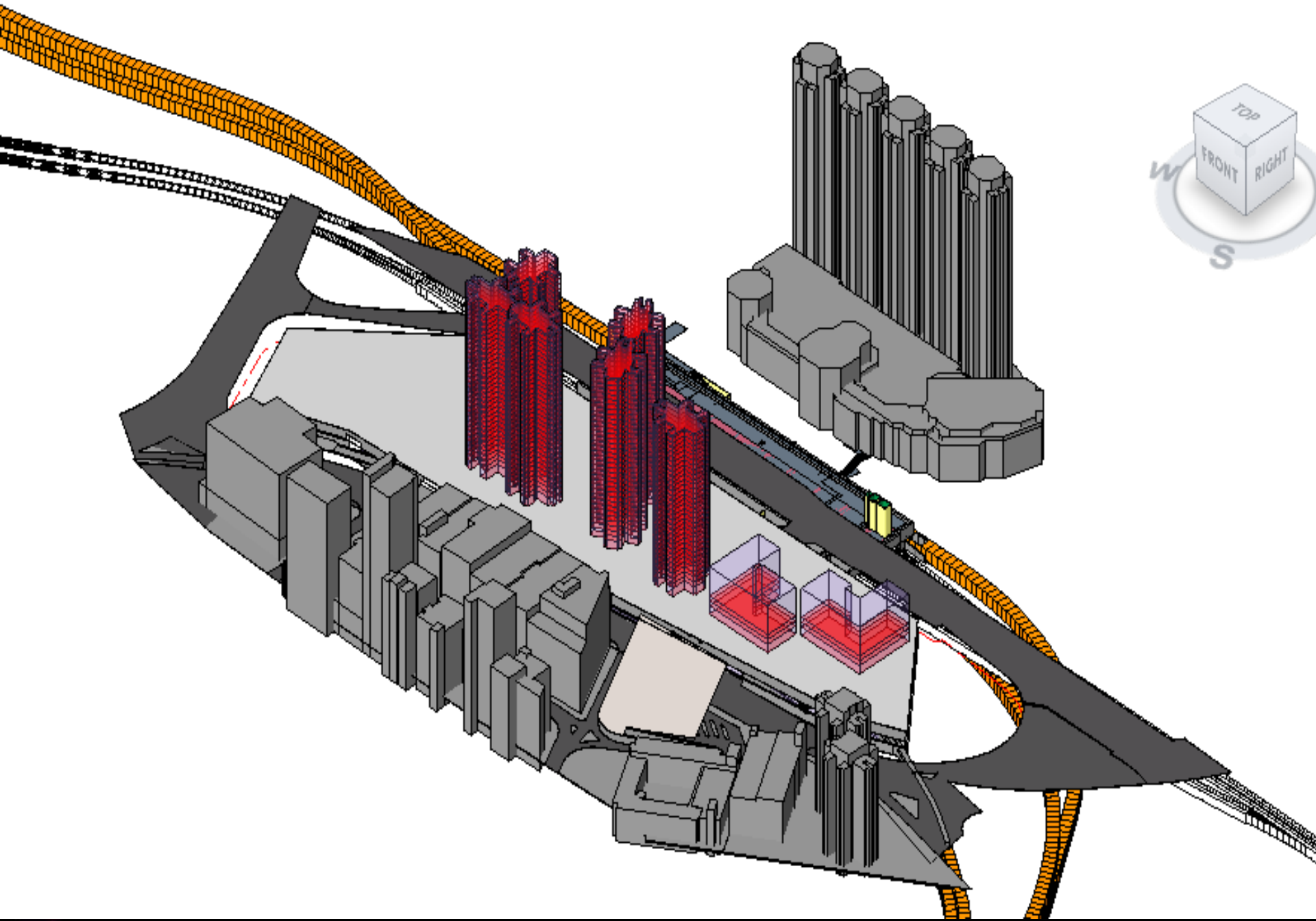
2 行政人员培训室立面图(高楼三层)6
1:50

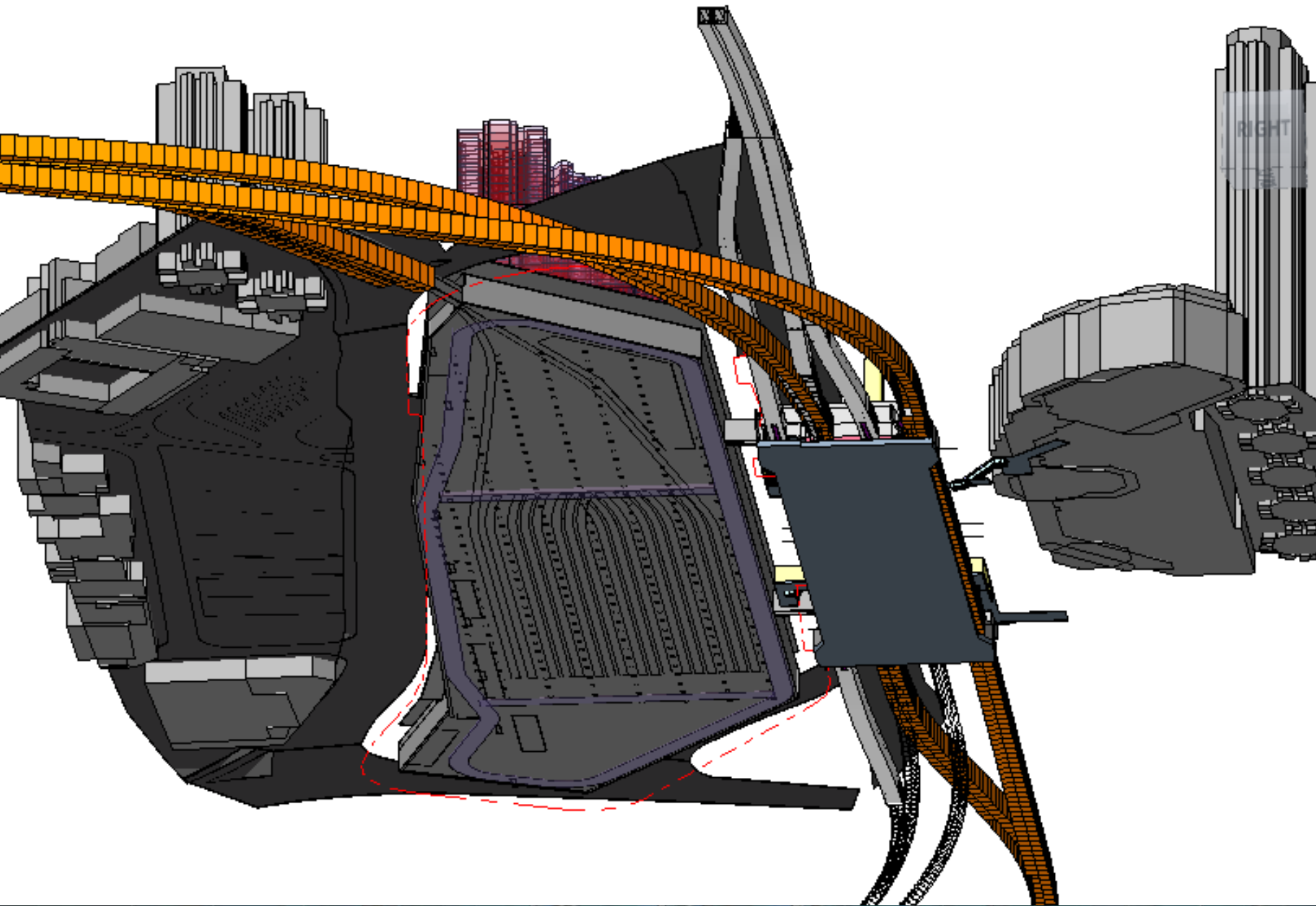


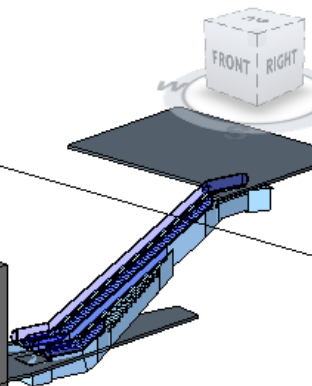
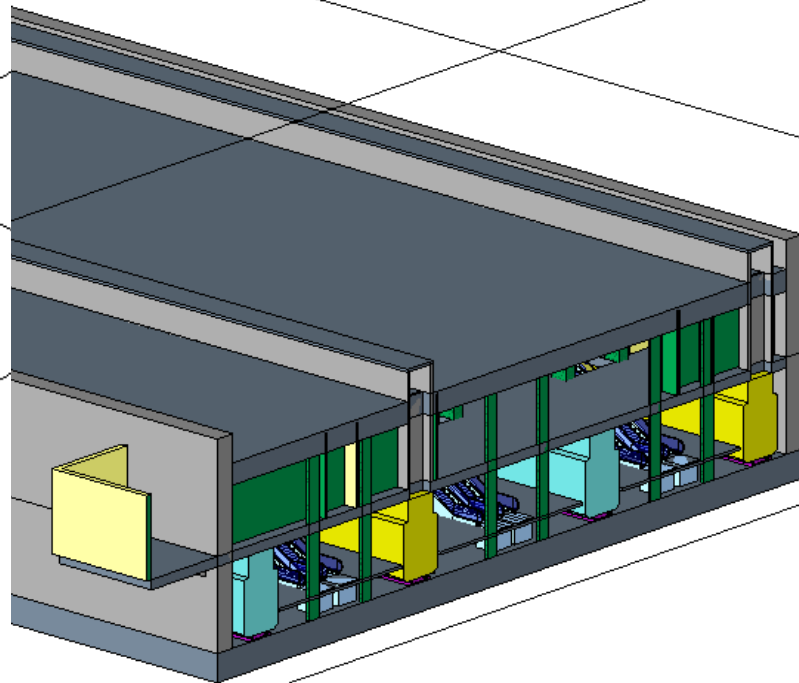
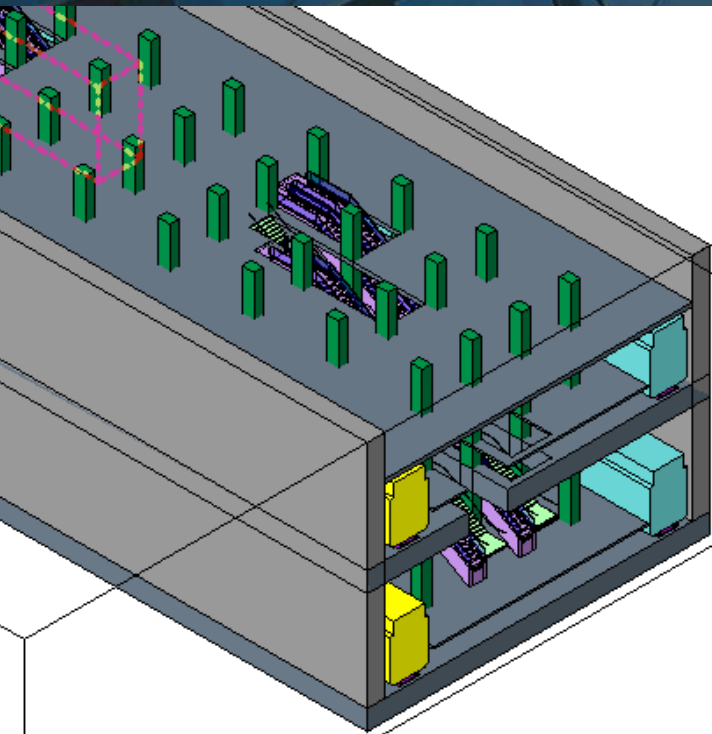


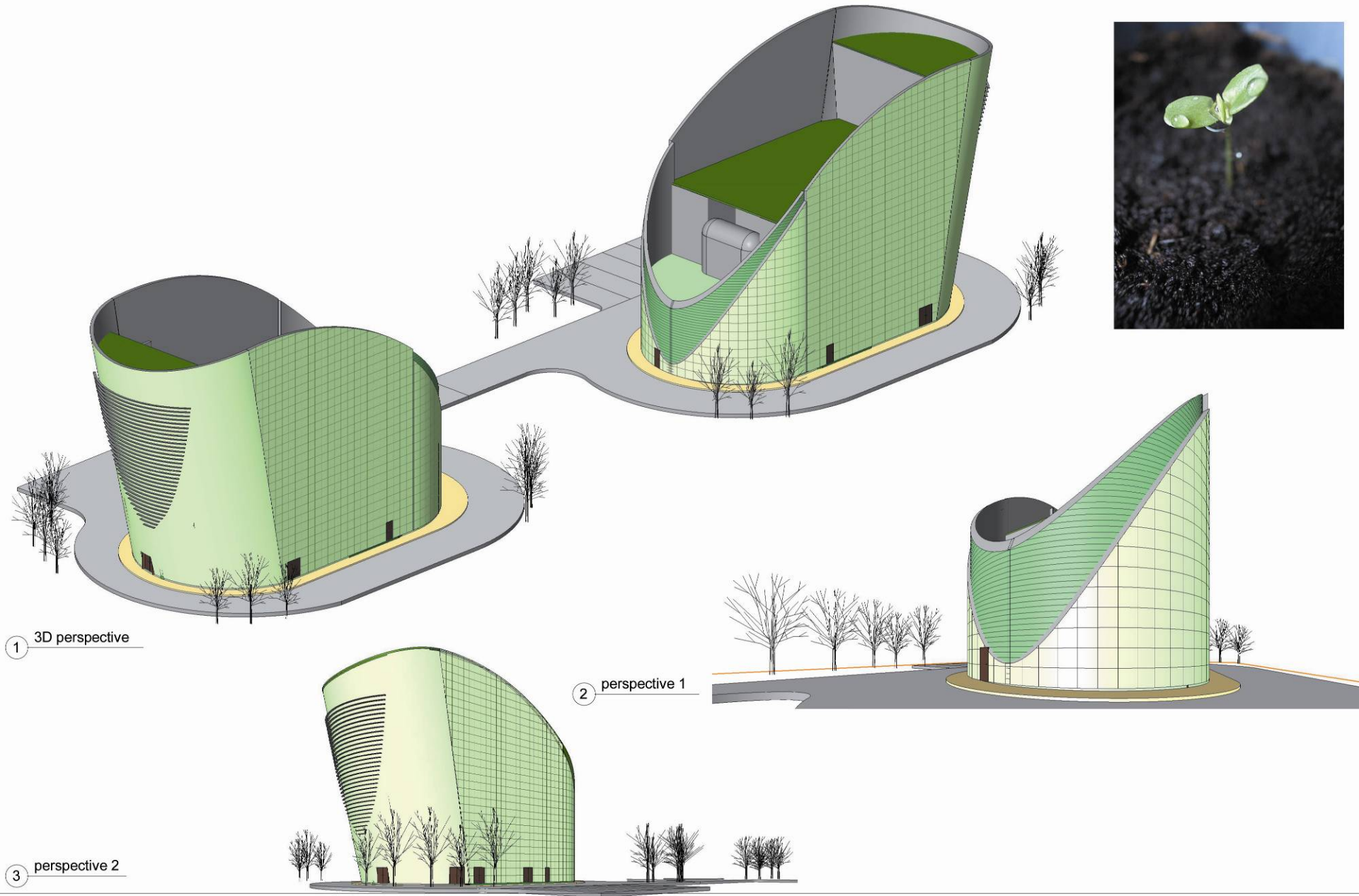
BIM 帶來的衝擊

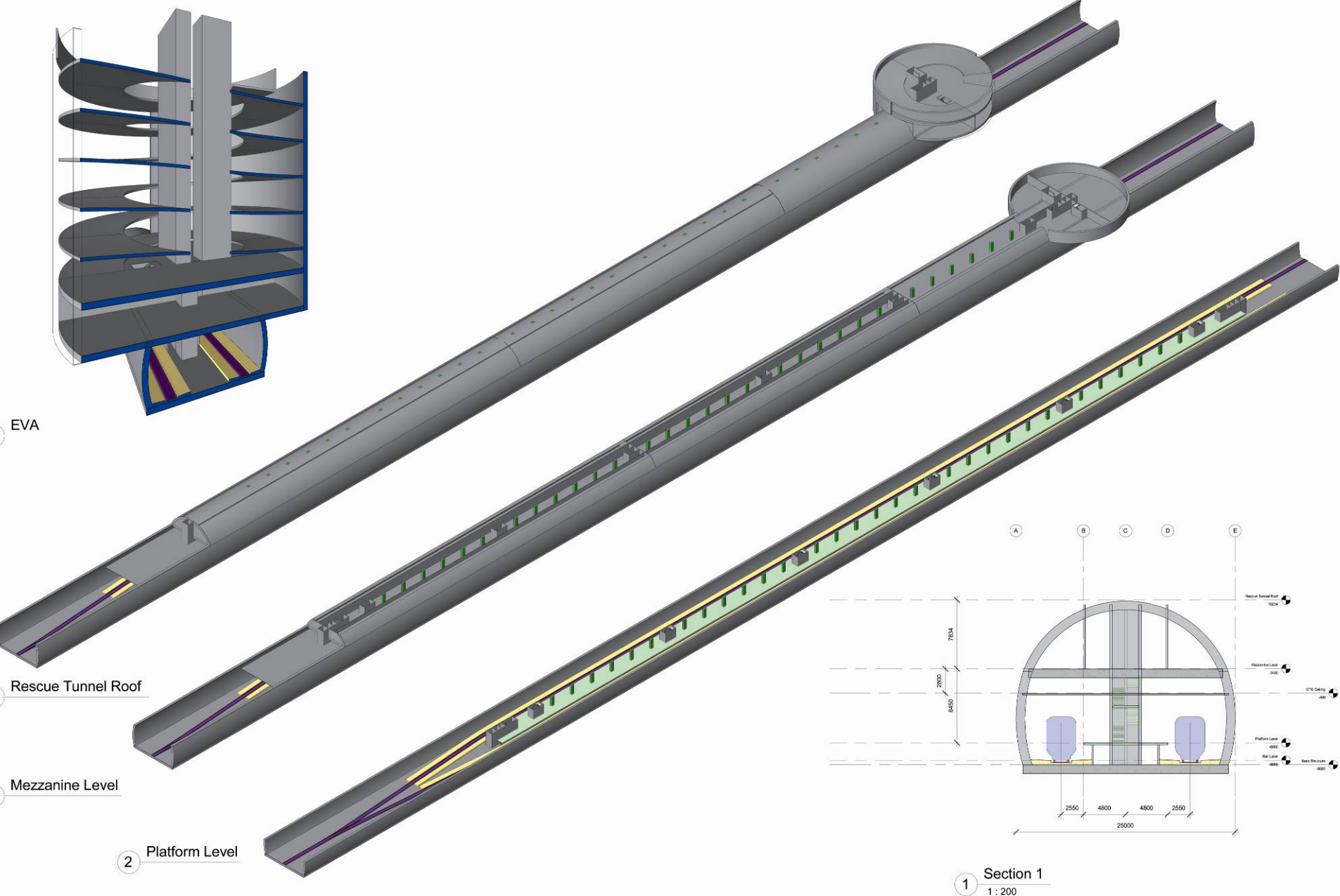
1. 可視性型像化設計
2. 圖紙製作
3. 各專業協調合作
4. 物件清單及投標文件
5. 自動化送審文件
6. 科學性分析及可持續發展設計
7. 複雜幾何形狀建築
8. 生產制造構件

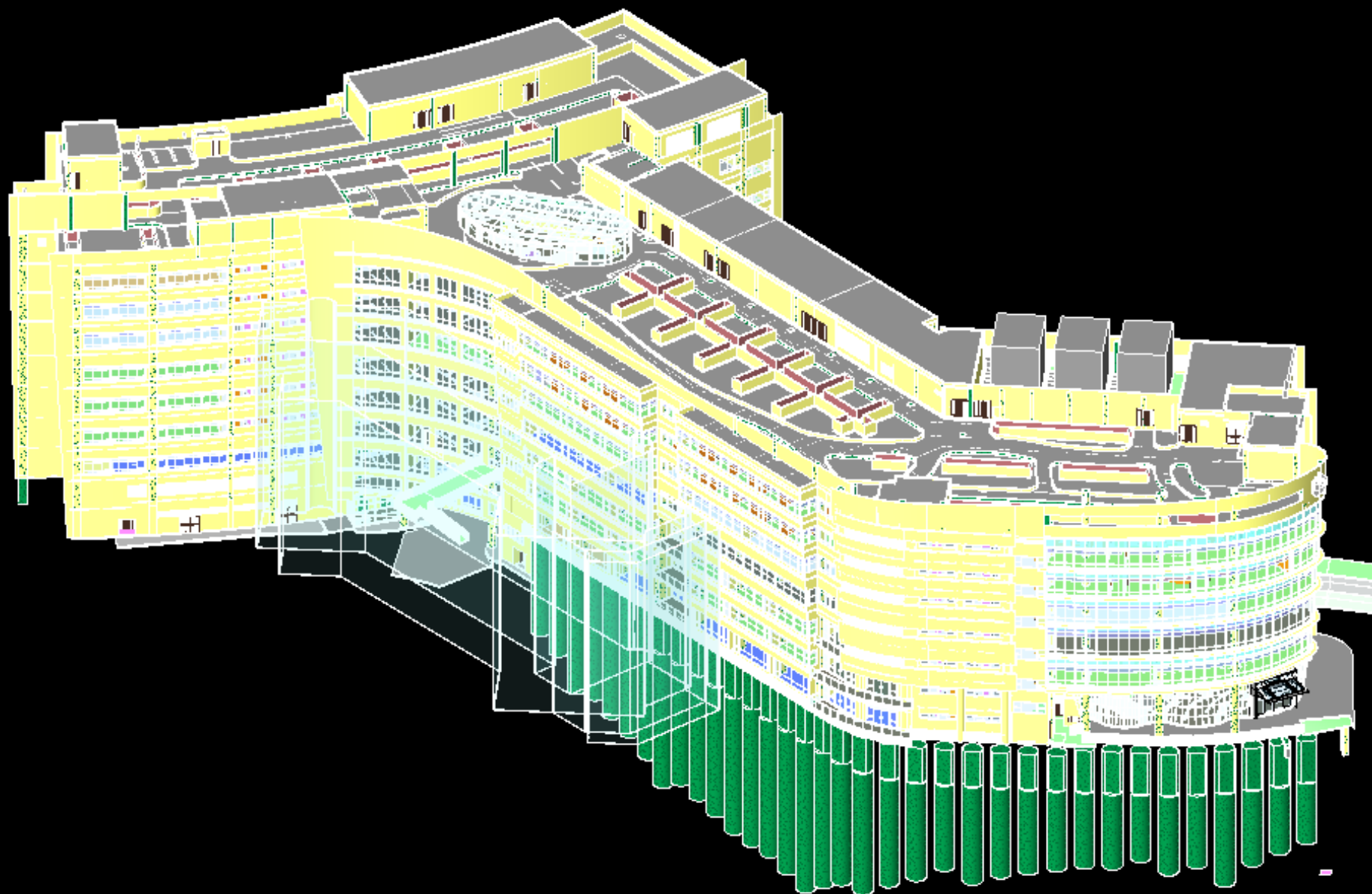


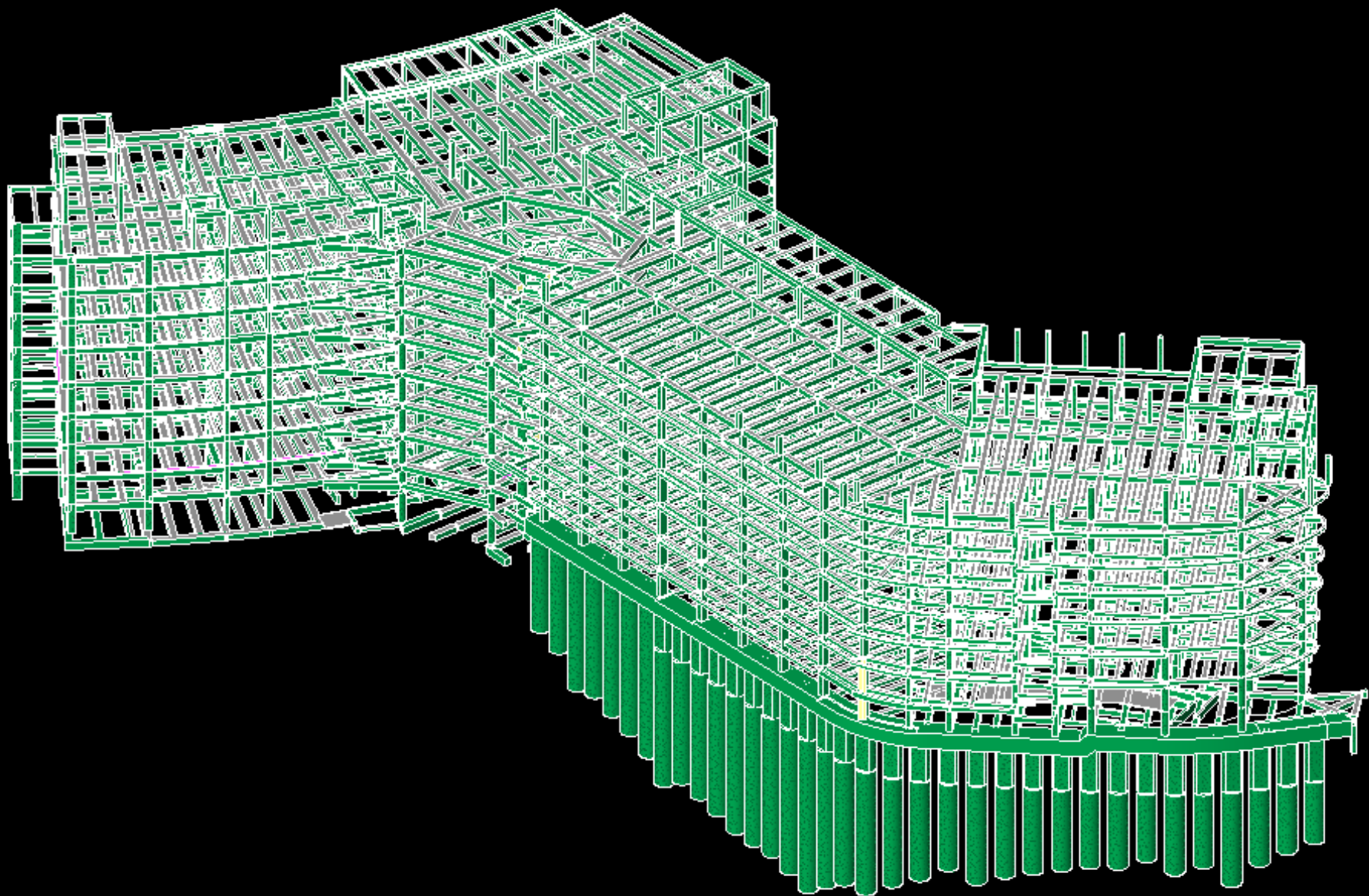


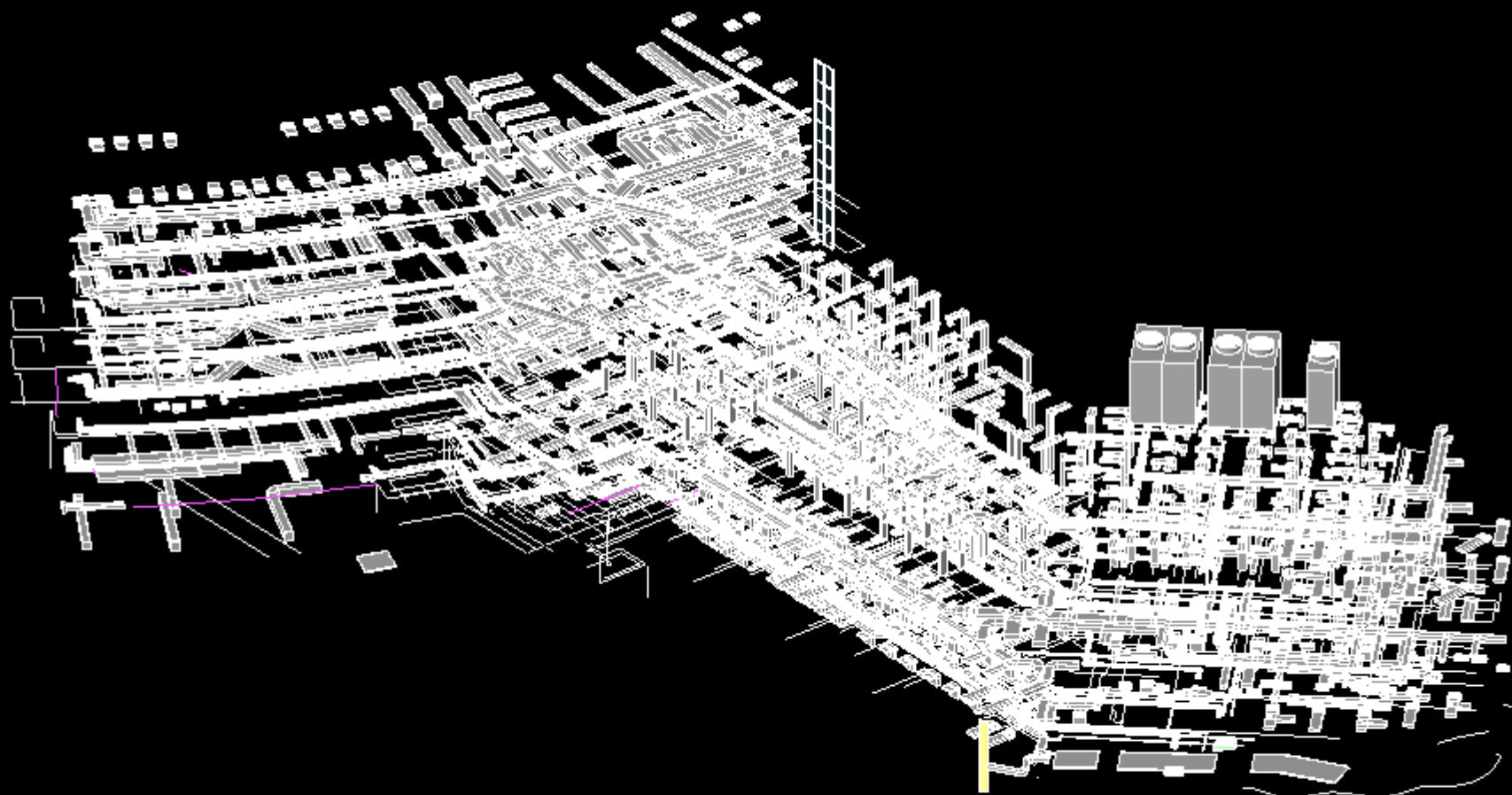


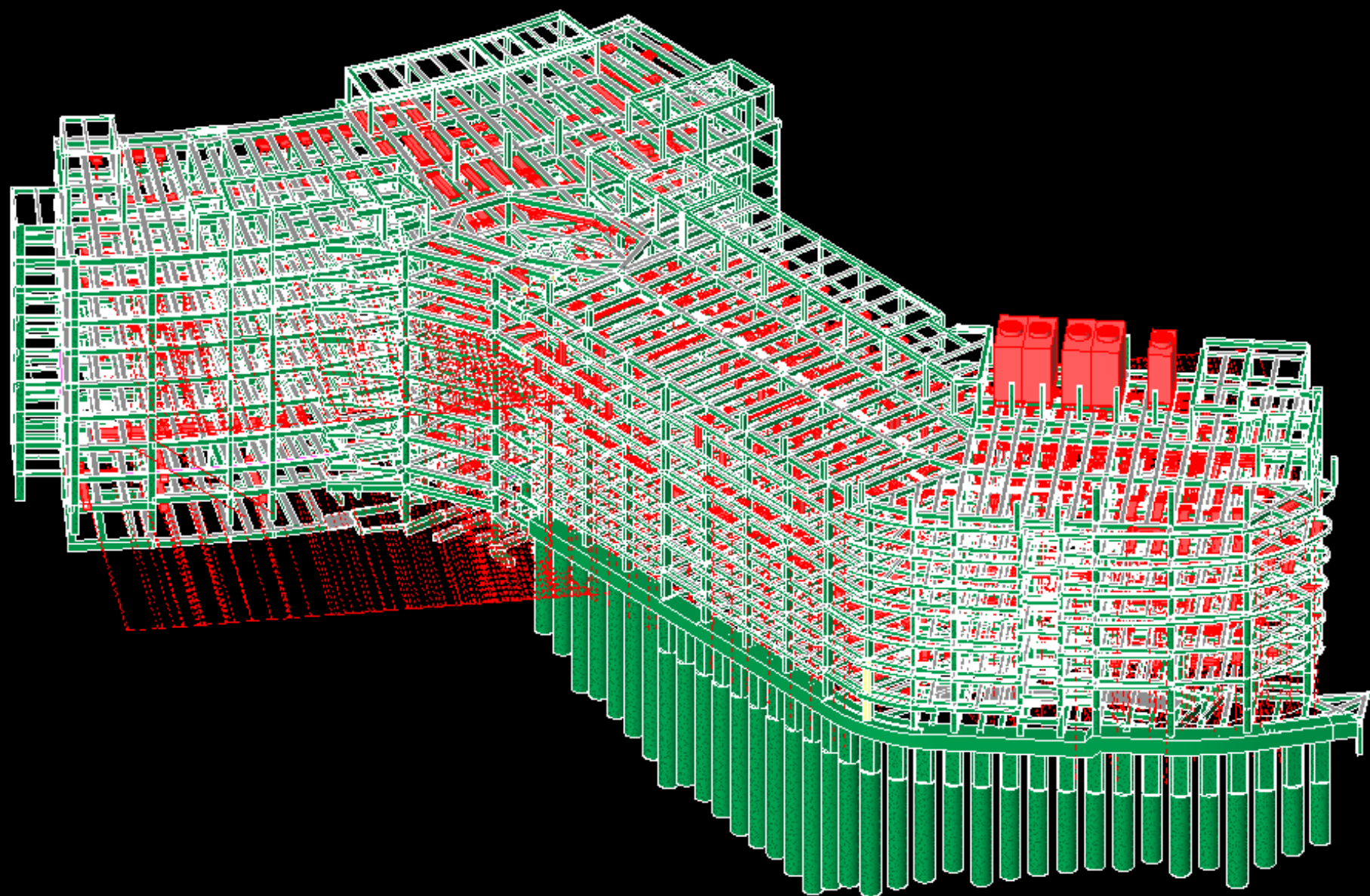


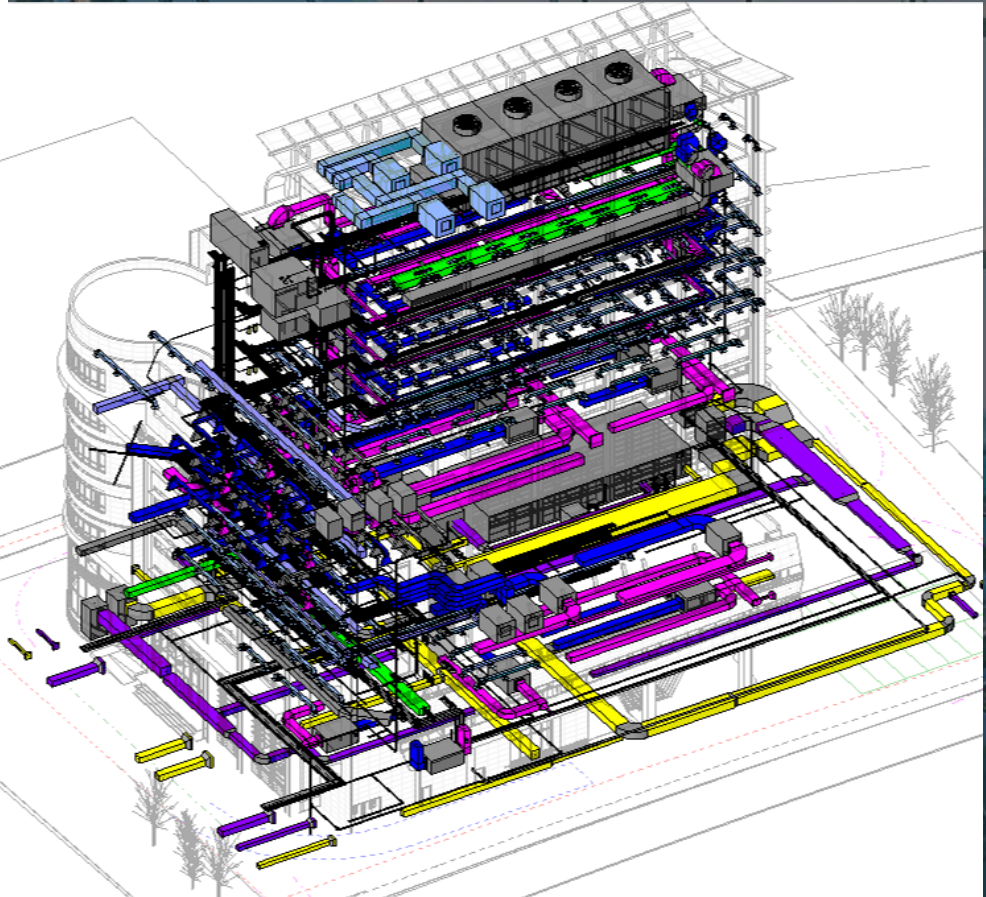
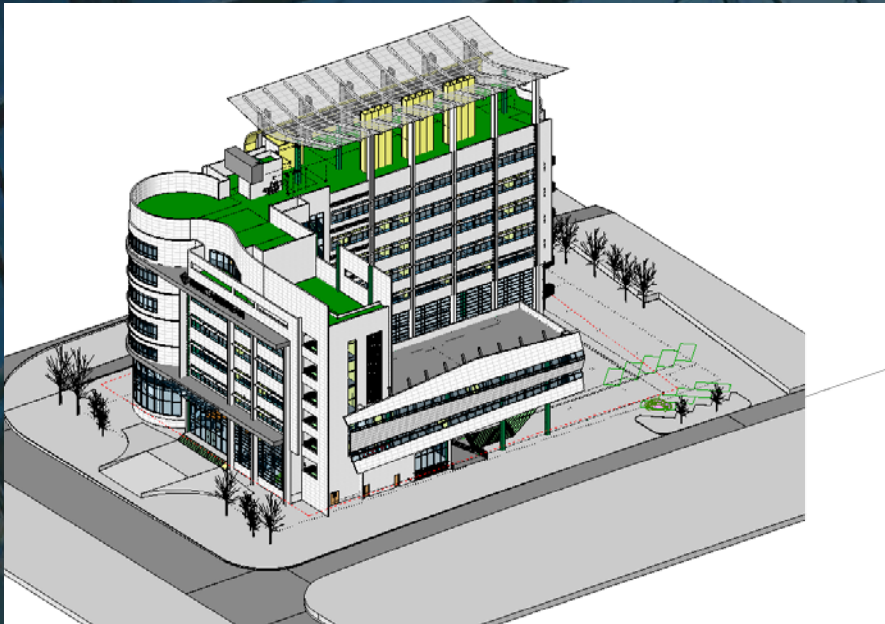






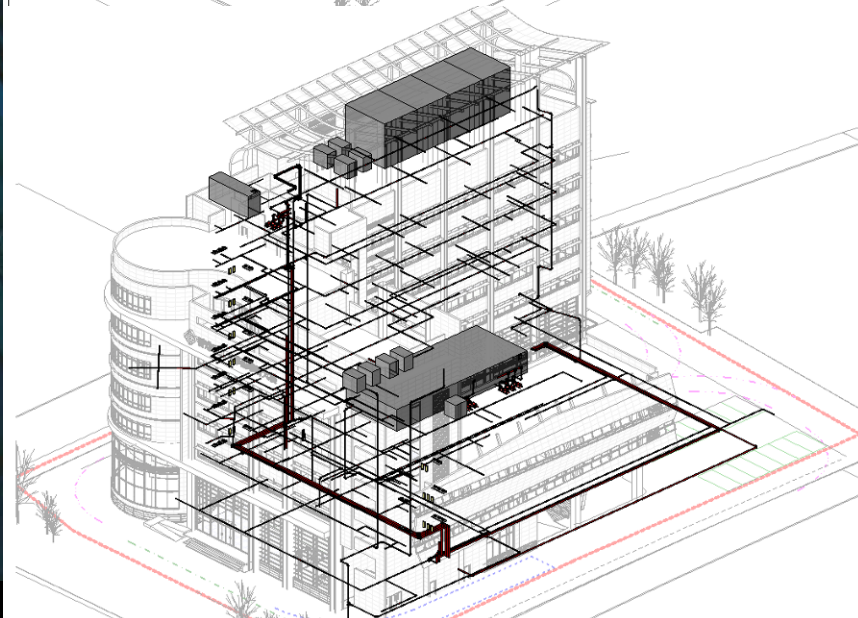
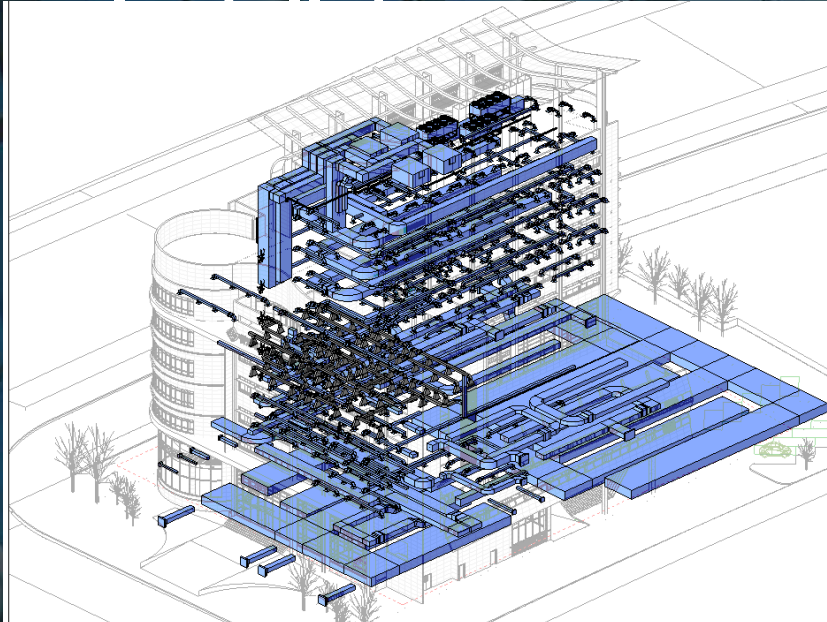
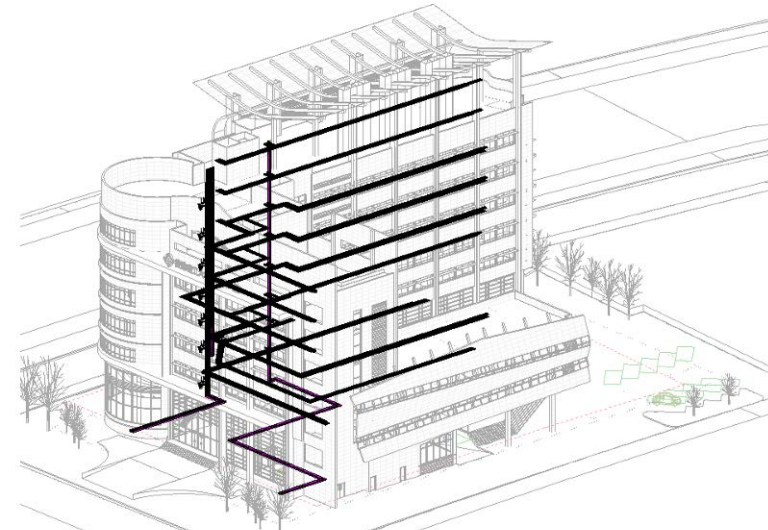
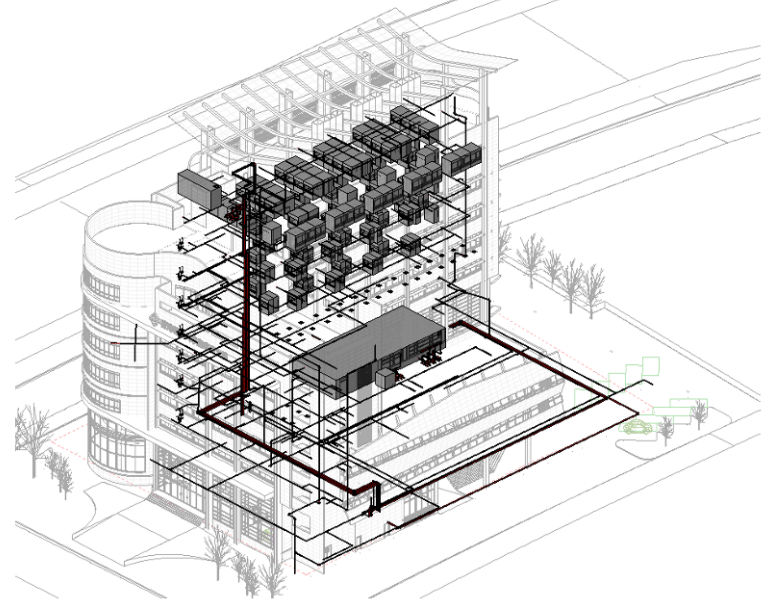






HVAC

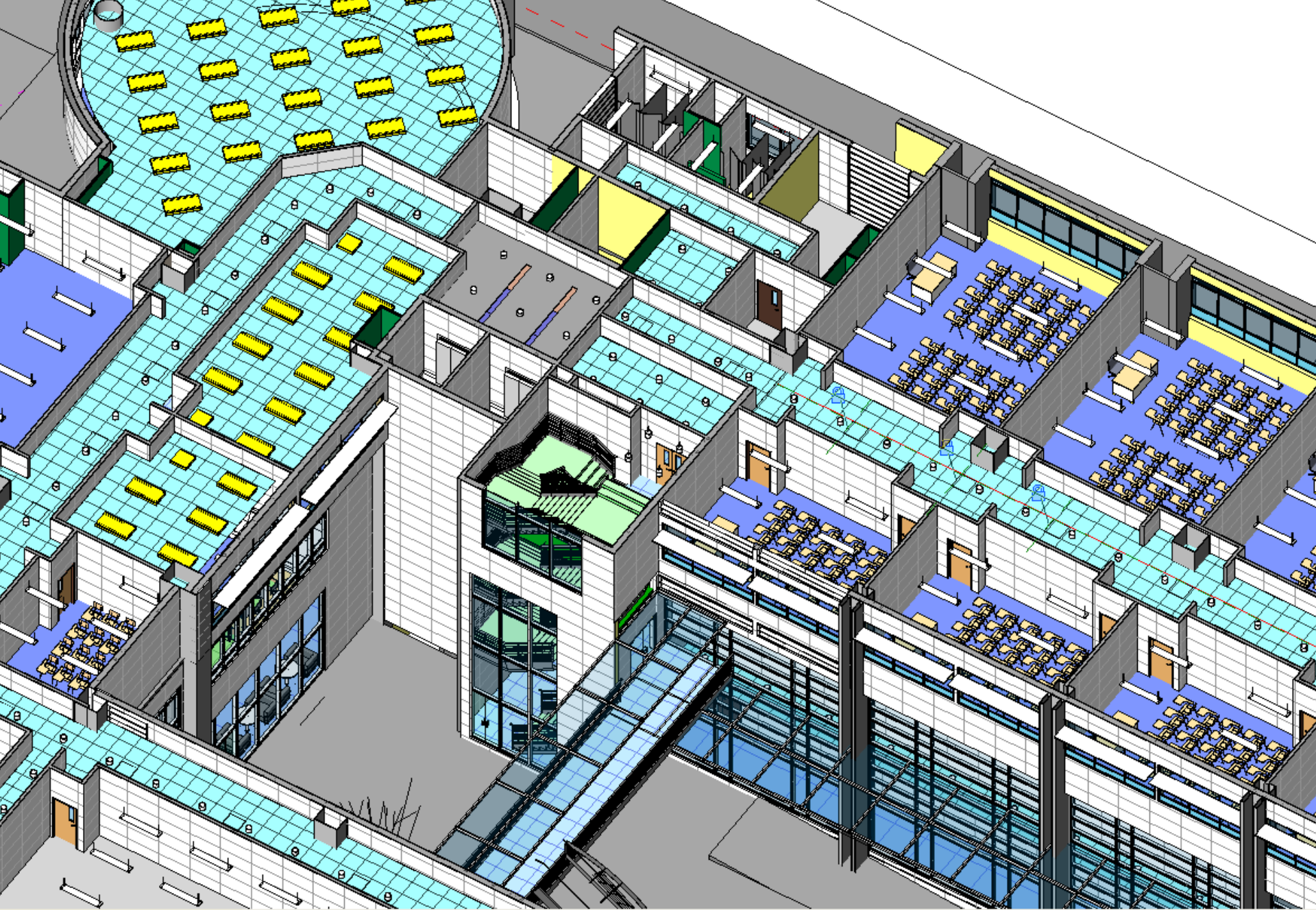
Fire Services



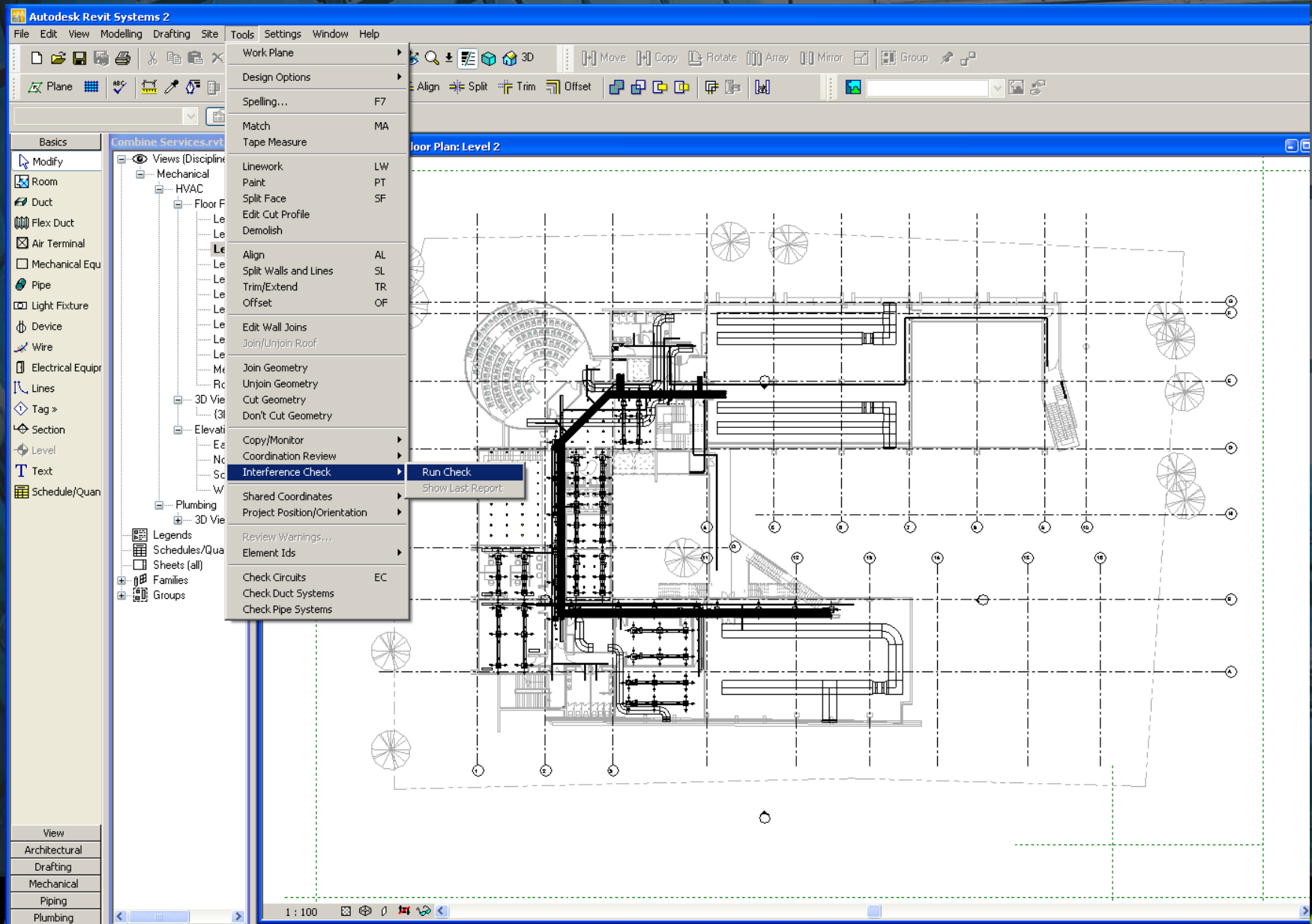
P/D Installation

Electrical Installation

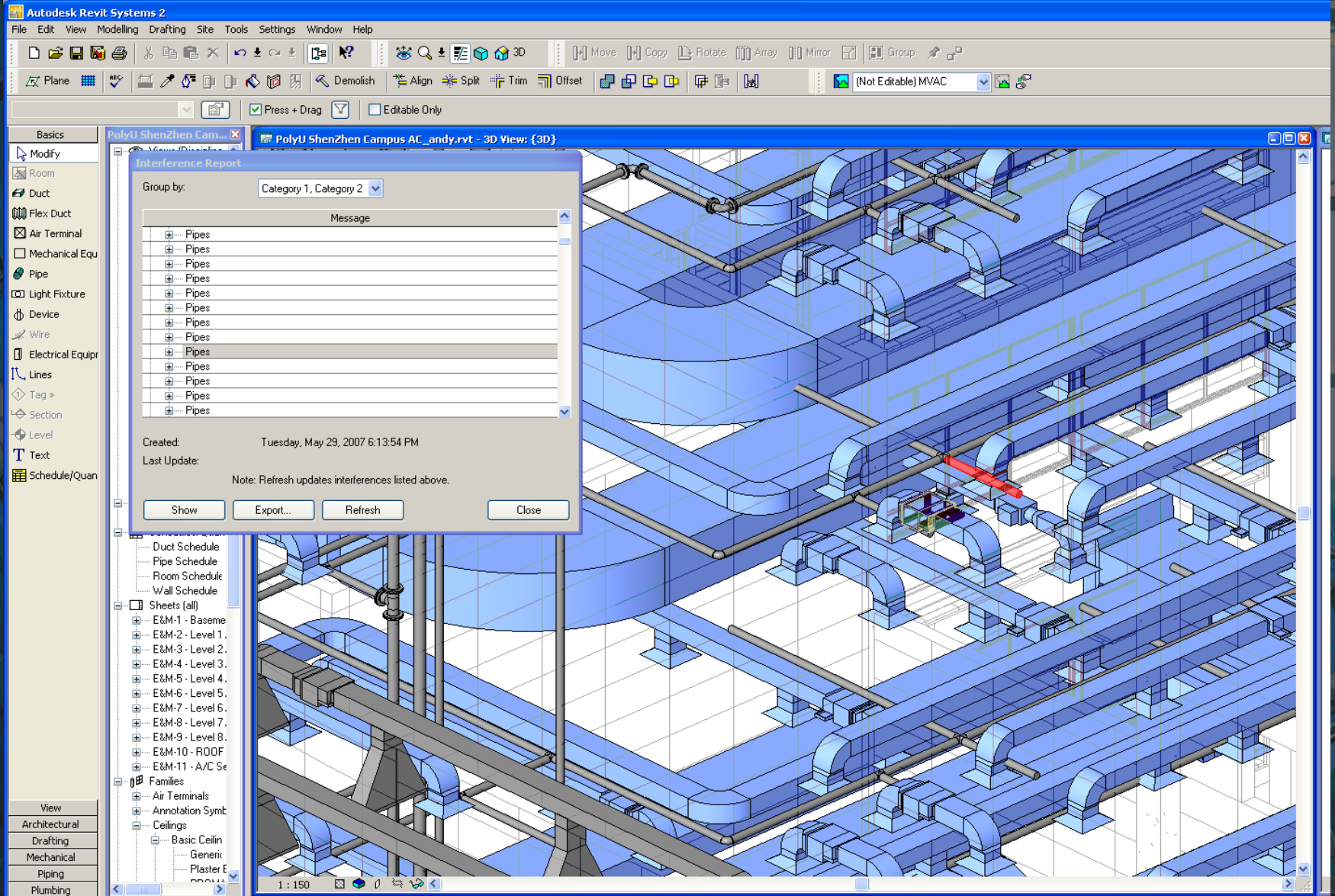




Work Flow – Clashes Report

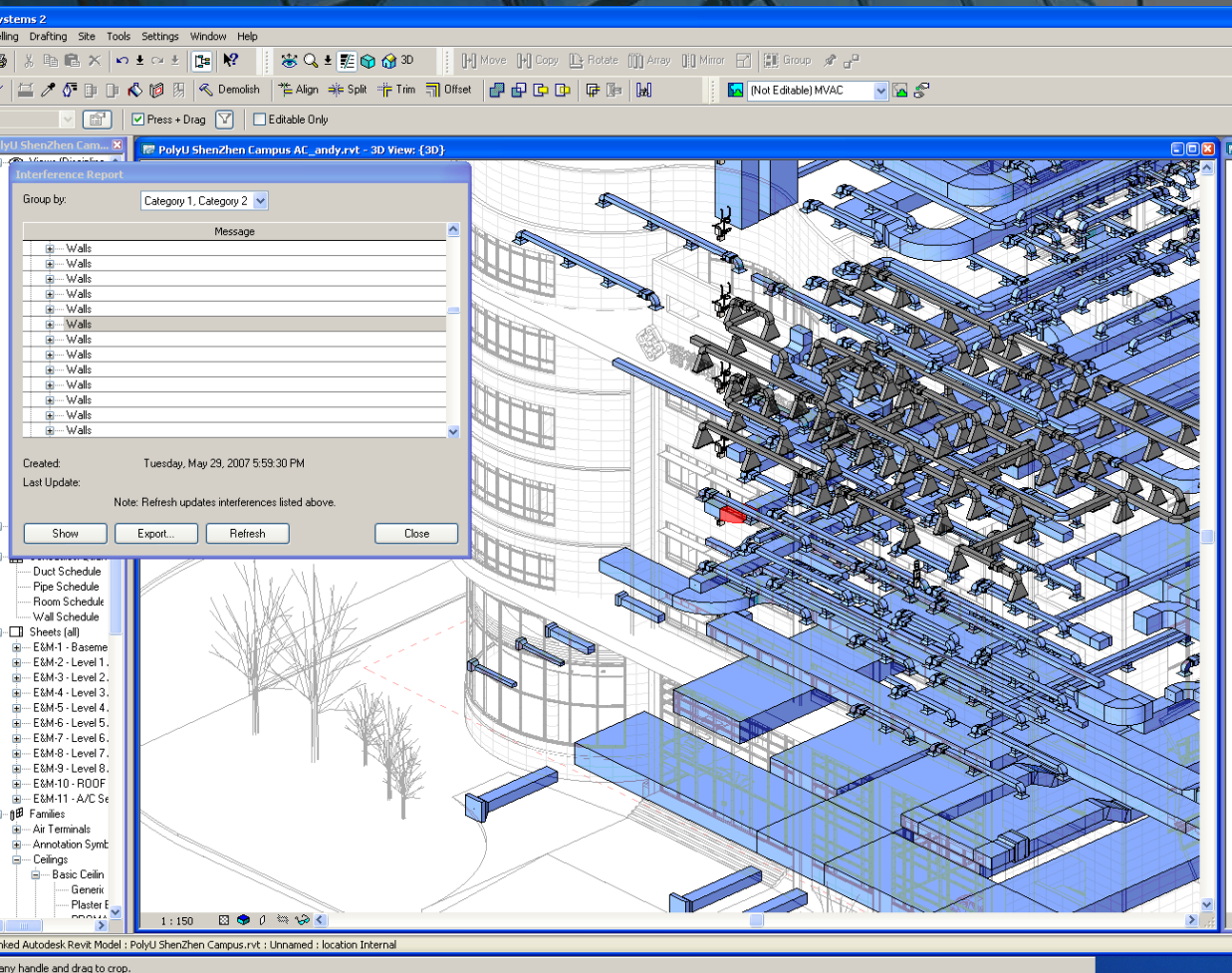


Work Flow – Clashes Report



MVAC : Mechanical Equipment : M_Fan Coil Unit - Horizontal Basic Concealed with Plenum : M_02

Work Flow – Clashes Report



Name	Clash31
Distance	-0.150m
Status	New
Clash Point	-74.537m, 2.437m, -11.450m
Date Created	2006/7/17 03:37:34
Approved By	

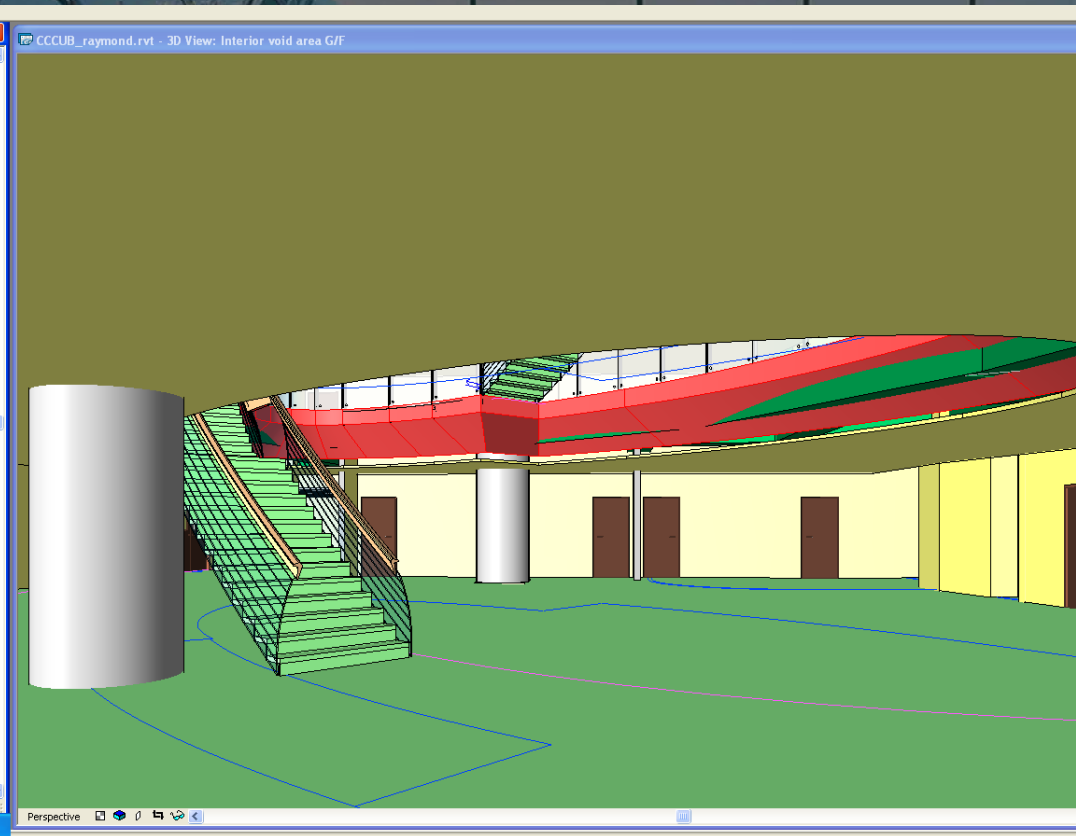
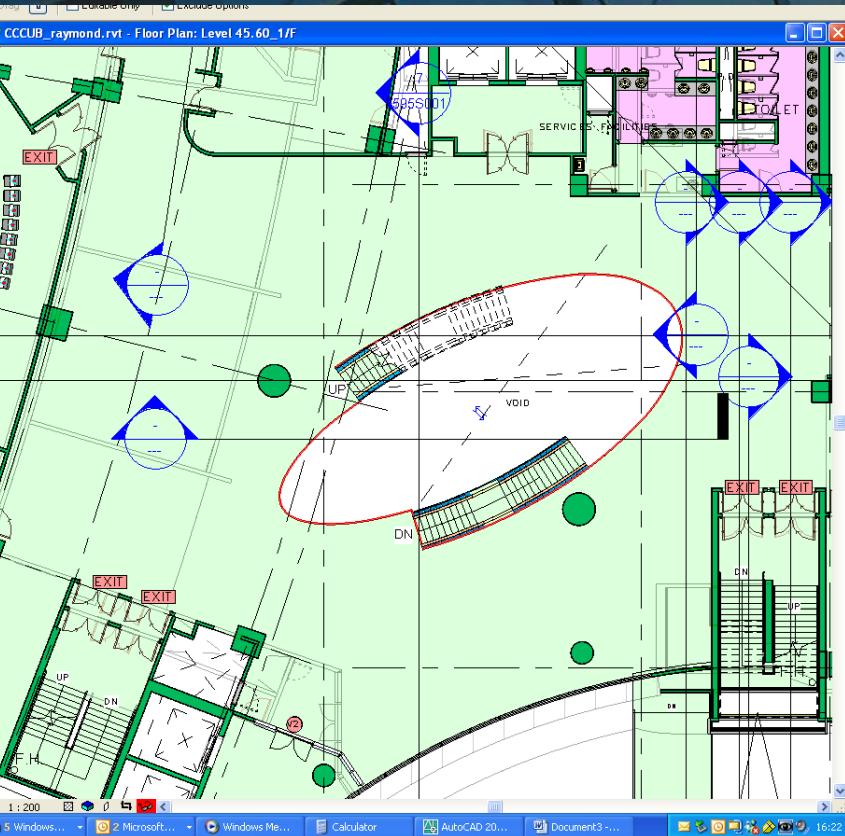
Item 1

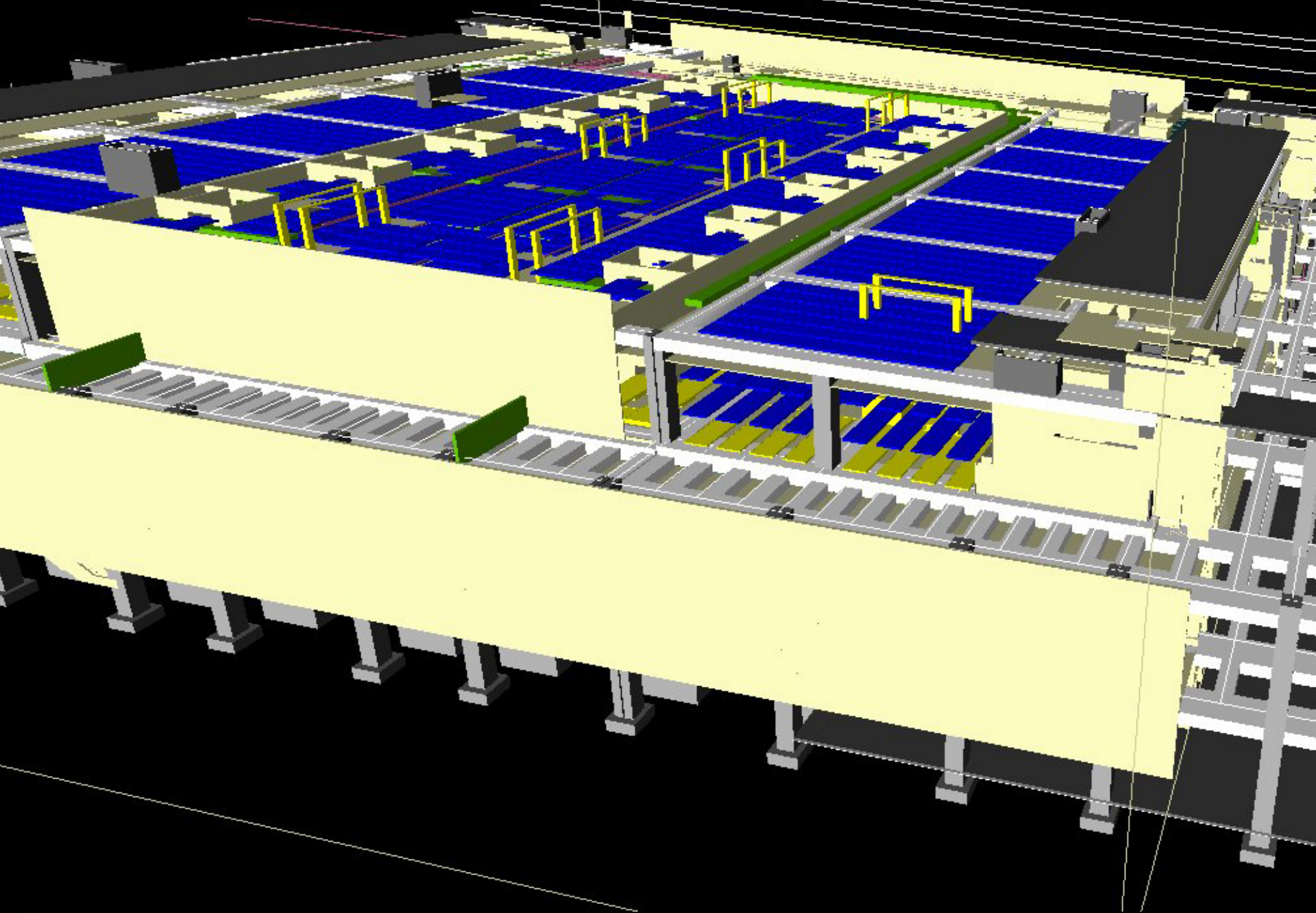
Path	File ->File ->Basement 03.nwc -><No level> ->L2b1 500 x 700 ->L2b1 500 x 700 ->Solid
------	---

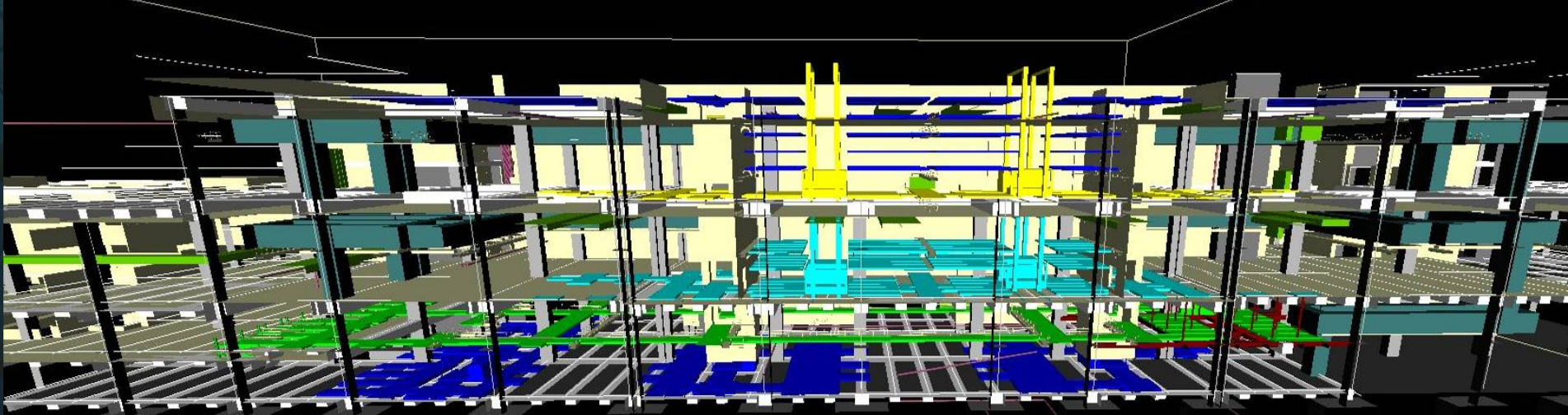
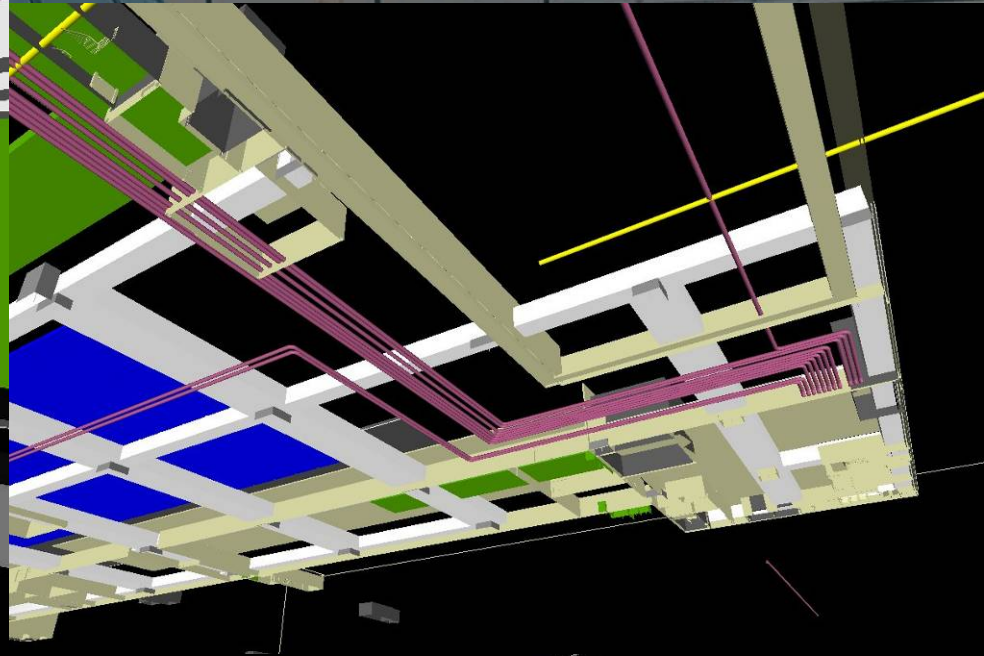
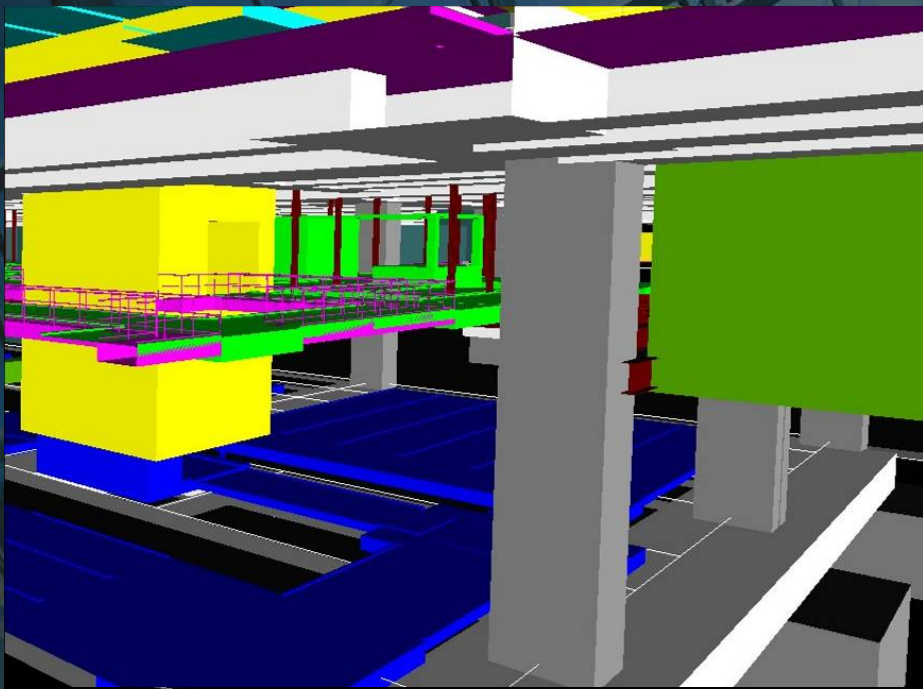
Item 2

Entity Handle	2AD6
Path	File ->File ->B3HVAC_Duct.nwd ->H-Ductwork-G ->Duct









BIM 帶來的衝擊

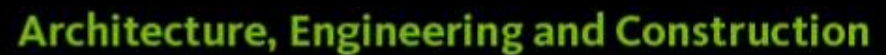
1. 可視性型像化設計
2. 圖紙製作
3. 各專業協調合作
4. 物件清單及投標文件
5. 自動化送審文件
6. 科學性分析及可持續發展設計
7. 複雜幾何形狀建築
8. 生產制造構件

Wall Schedule							
Family	Family and Type	Length	Width	Count	Area	Volume	
Basic Wall: AED-Concrete - 50mm + Render One sides							
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.548 m2	0.027 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.548 m2	0.027 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.548 m2	0.027 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.548 m2	0.027 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.548 m2	0.027 m3	
0.548 m2: 5		1000		5	2.738 m2	0.137 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.578 m2	0.029 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.578 m2	0.029 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.578 m2	0.029 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.578 m2	0.029 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.578 m2	0.029 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.578 m2	0.029 m3	
0.578 m2: 6		1200		6	3.465 m2	0.173 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.608 m2	0.030 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.608 m2	0.030 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.608 m2	0.030 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.608 m2	0.030 m3	
0.608 m2: 4		800		4	2.430 m2	0.122 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.638 m2	0.032 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.638 m2	0.032 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	200	50	1	0.638 m2	0.032 m3	
0.638 m2: 3		600		3	1.913 m2	0.096 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	250	50	1	0.730 m2	0.037 m3	
Basic Wall	Basic Wall: AED-Concrete - 50mm + Render One sides	250	50	1	0.730 m2	0.037 m3	
0.730 m2: 2		500		2	1.460 m2	0.073 m3	

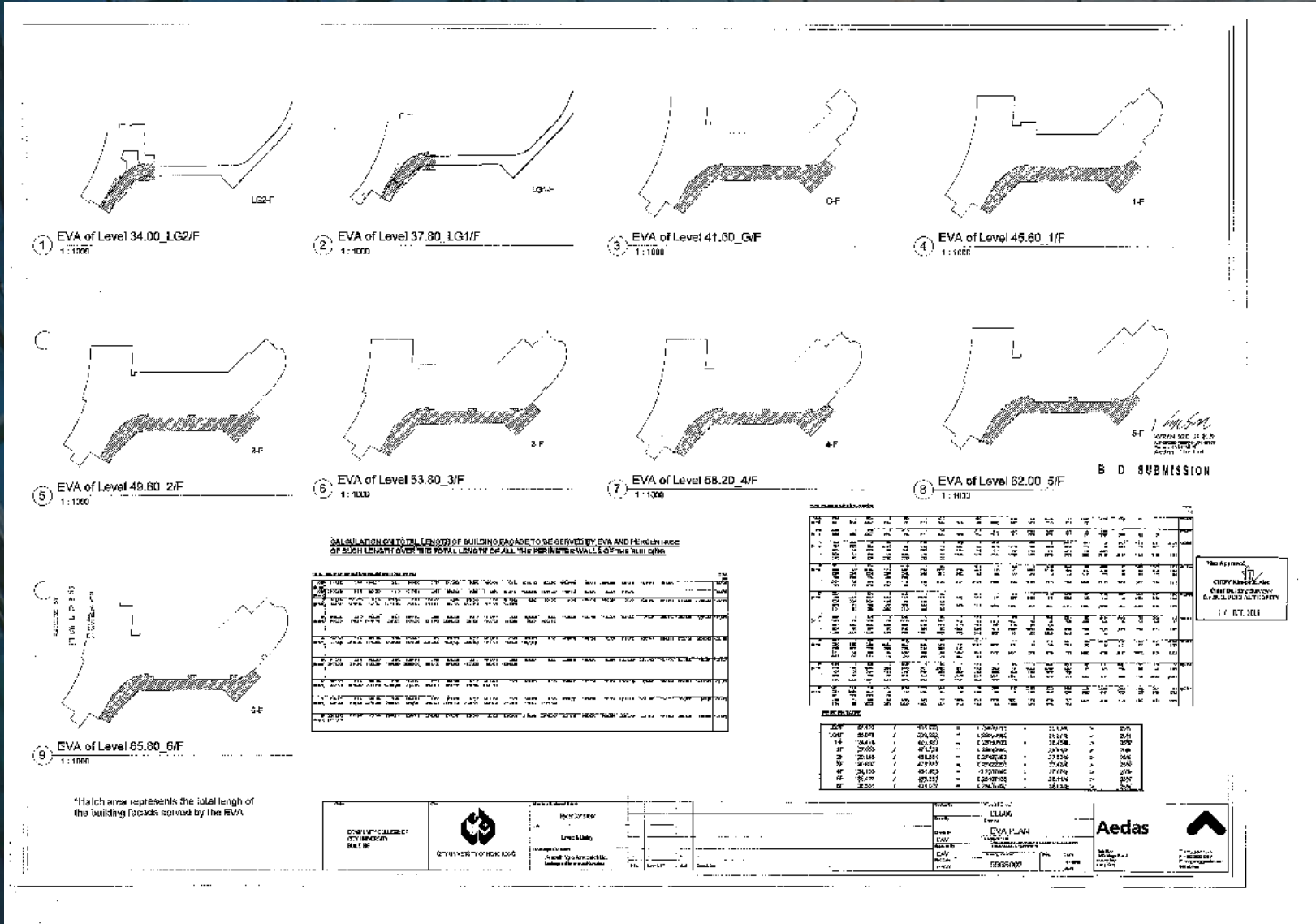
BIM 帶來的衝擊

1. 可視性型像化設計
2. 圖紙製作
3. 各專業協調合作
4. 物件清單及投標文件
5. 自動化送審文件
6. 科學性分析及可持續發展設計
7. 複雜幾何形狀建築
8. 生產制造構件

Autodesk University 2008



自動化送審文件



自動化送審文件

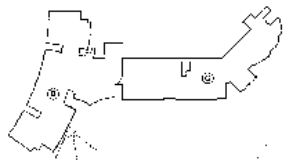
LG/5/F (+37.80) COMPARTMENT CALCULATION



3/F (+53.80) COMPARTMENT CALCULATION



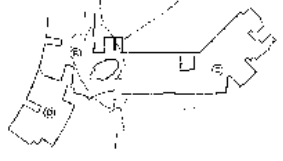
G/F (+41.80) COMPARTMENT CALCULATION



4/F (+53.20) COMPARTMENT CALCULATION



1/F (+45.80) COMPARTMENT CALCULATION



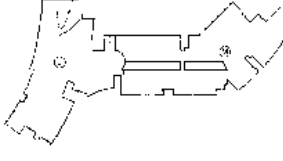
5/F (+52.00) COMPARTMENT CALCULATION



2/F (+49.80) COMPARTMENT CALCULATION



6/F (+55.80) COMPARTMENT CALCULATION



COMPARTMENT OF FLOOR				
FLOOR	AREA	PERIMETER	PERIMETER	PERIMETER
FLOOR	AREA	PERIMETER	PERIMETER	PERIMETER
LG/5/F	100.00	100.00	100.00	100.00
3/F	100.00	100.00	100.00	100.00
G/F	100.00	100.00	100.00	100.00
4/F	100.00	100.00	100.00	100.00
1/F	100.00	100.00	100.00	100.00
5/F	100.00	100.00	100.00	100.00
2/F	100.00	100.00	100.00	100.00
6/F	100.00	100.00	100.00	100.00

Total Capacity of COQUE				
Location	Use	Area	Factor	Total Capacity
LG/5/F	Office	275.442	9	31
G/F	Shop	54.208	3	19
G/F	Office	412.208	9	41
3/F	Restaurant	178.344	1	178
3/F	Kitchen	481.136	4.5	107
5/F	Office	212.144	9	29
6/F	Office	2031.236	9	228
6/F	Restaurant	178.557	1	177
6/F	Kitchen	166.561	4.5	42
6/F	Exhibition hall	704.200	2	353
Total number of students				6000
Total				878

SCHEDULE 1: MINIMUM NUMBER & WIDTH OF EXIT ROUTES FOR EACH FLOOR

LOCATION	FLOOR	AREA	MIN. NO. OF EXIT ROUTES		MIN. WIDTH OF EACH EXIT ROUTE		MIN. TOTAL WIDTH OF EXIT ROUTES	
			REQD.	PHAS.	REQD.	PHAS.	REQD.	PHAS.
LG/5/F	5	100.00	1	1	1.00	1.00	1.00	1.00
3/F	3	100.00	1	1	1.00	1.00	1.00	1.00
G/F	0	100.00	1	1	1.00	1.00	1.00	1.00
4/F	4	100.00	1	1	1.00	1.00	1.00	1.00
1/F	1	100.00	1	1	1.00	1.00	1.00	1.00
5/F	5	100.00	1	1	1.00	1.00	1.00	1.00
2/F	2	100.00	1	1	1.00	1.00	1.00	1.00
6/F	6	100.00	1	1	1.00	1.00	1.00	1.00

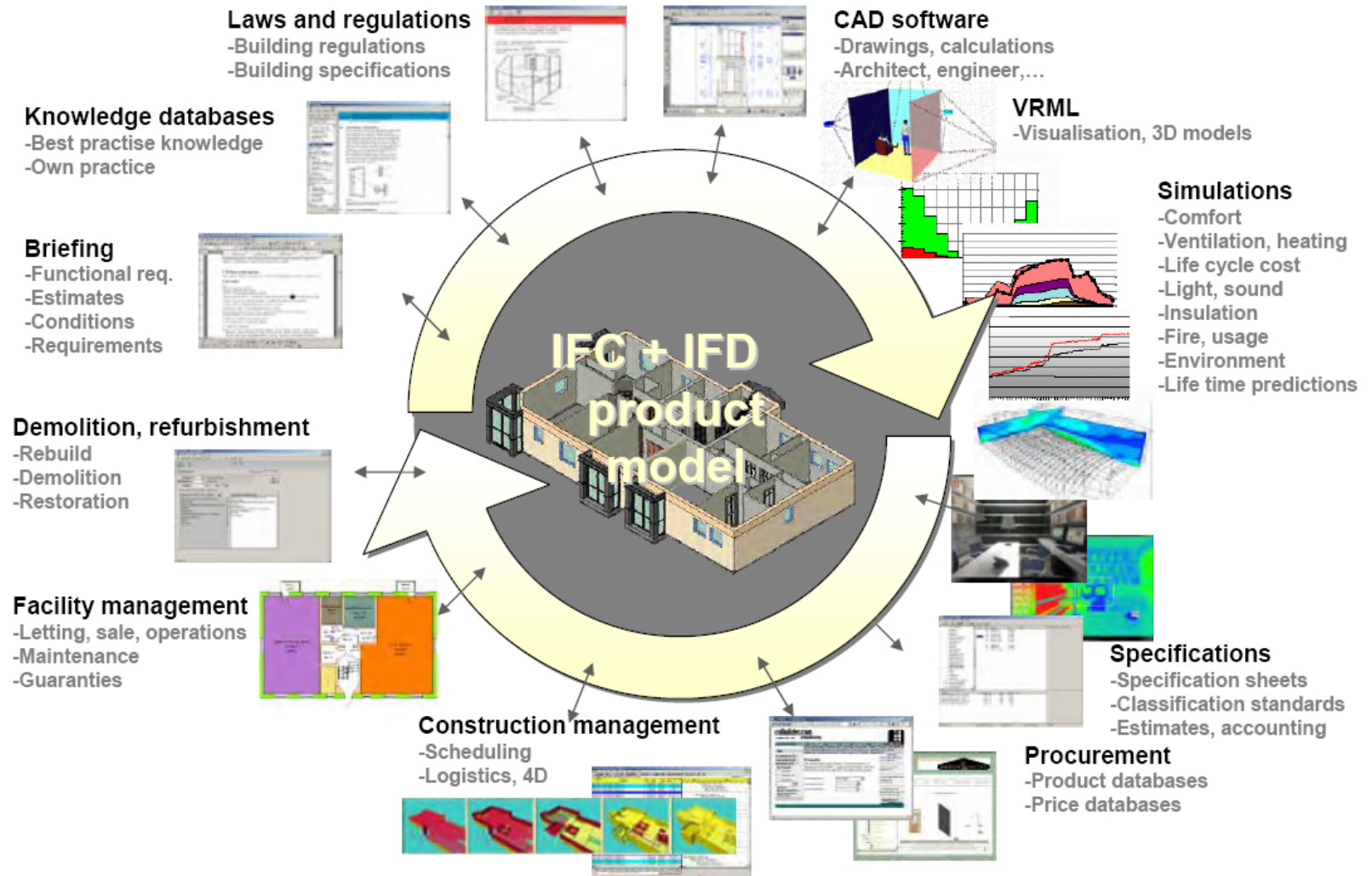
THE RESISTANCE REQUIREMENTS FOR SUB-ELEMENTS OF CONSTRUCTION											
COMPONENT CLASS	CLASS	TOTAL VOLUME	PER. REQD.	R.C. WALL		R.C. COLUMN		R.C. BEAM		R.C. STAIR	
				CONCRETE S.E.E.	THK.	CONCRETE S.E.E.	THK.	CONCRETE S.E.E.	THK.	CONCRETE S.E.E.	THK.
1	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
2	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
3	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
4	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
5	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
6	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
7	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
8	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
9	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
10	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
11	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
12	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
13	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
14	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
15	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
16	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
17	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
18	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
19	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
20	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
21	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
22	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
23	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
24	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
25	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
26	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
27	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
28	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
29	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
30	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
31	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
32	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
33	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
34	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
35	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
36	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
37	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
38	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
39	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
40	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
41	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
42	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
43	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
44	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
45	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
46	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
47	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
48	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
49	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
50	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
51	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
52	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
53	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
54	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
55	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
56	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
57	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
58	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
59	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
60	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
61	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
62	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
63	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
64	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
65	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
66	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
67	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
68	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
69	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
70	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
71	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
72	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
73	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
74	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
75	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
76	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
77	R.C. SLAB	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
78	R.C. STAIR	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
79	CONCRETE	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
80	STEEL	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
81	R.C. BEAM	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
82	R.C. COLUMN	1000.000	1000.000	1000.000	1000.000	1000.000					

BIM 帶來的衝擊

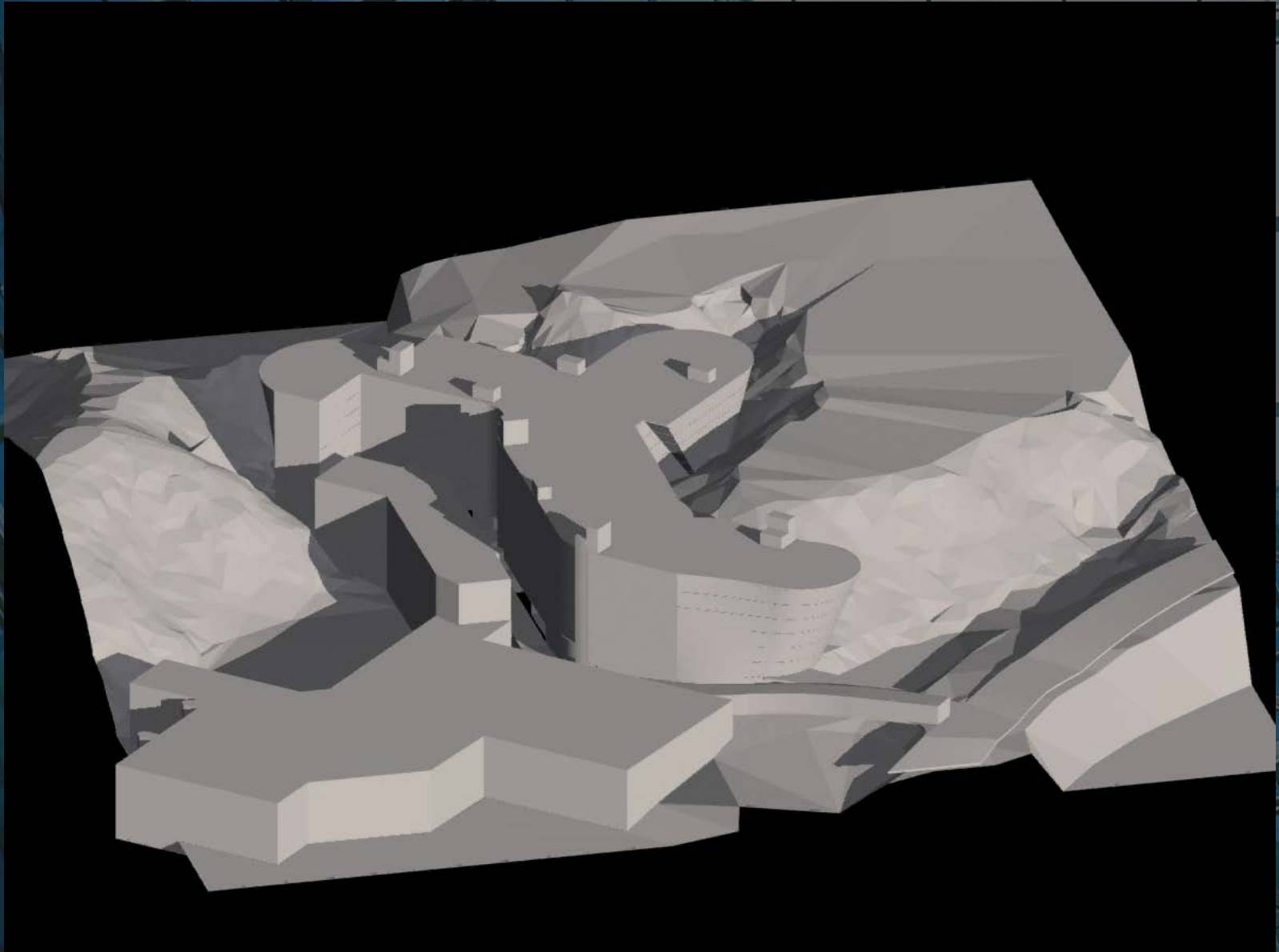
1. 可視性型像化設計
2. 圖紙製作
3. 各專業協調合作
4. 物件清單及投標文件
5. 自動化送審文件
6. 科學性分析及可持續發展設計
7. 複雜幾何形狀建築
8. 生產制造構件



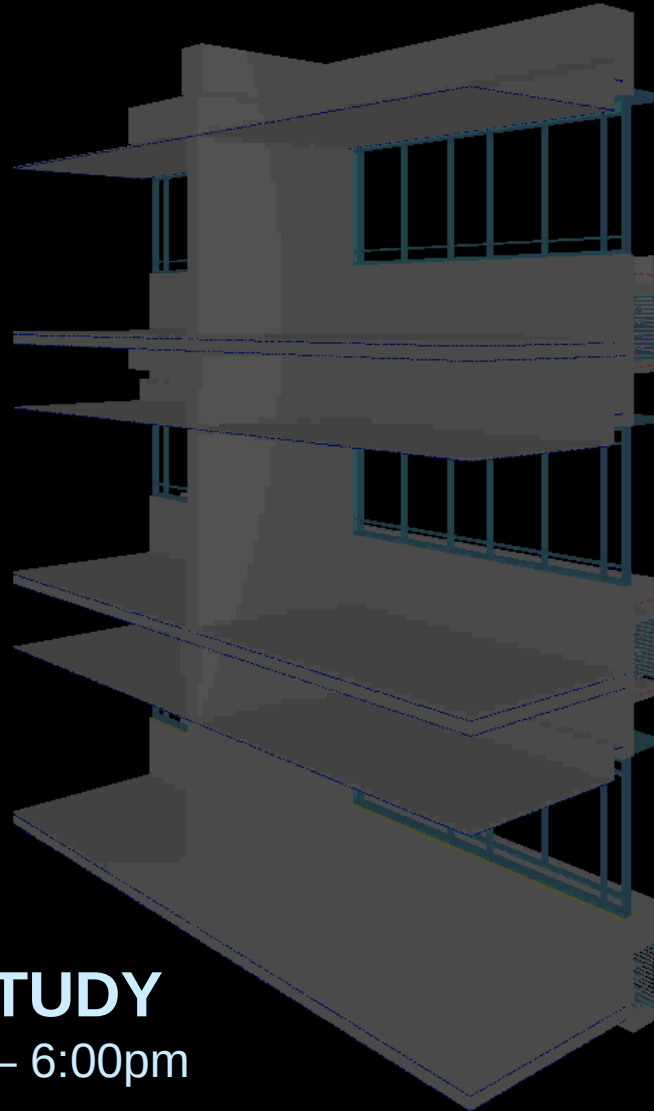
Tier 3 – Derived Lifecycle View



科學性分析及可持續發展設計



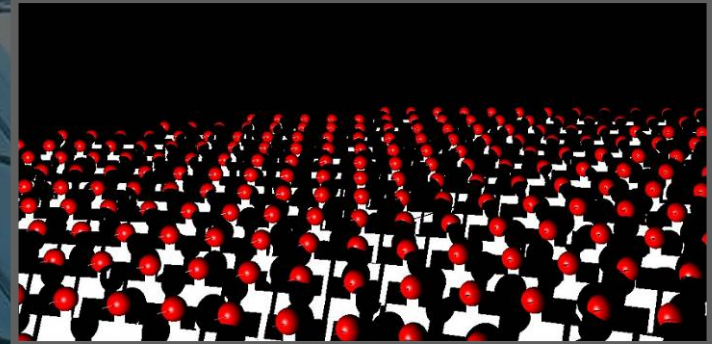
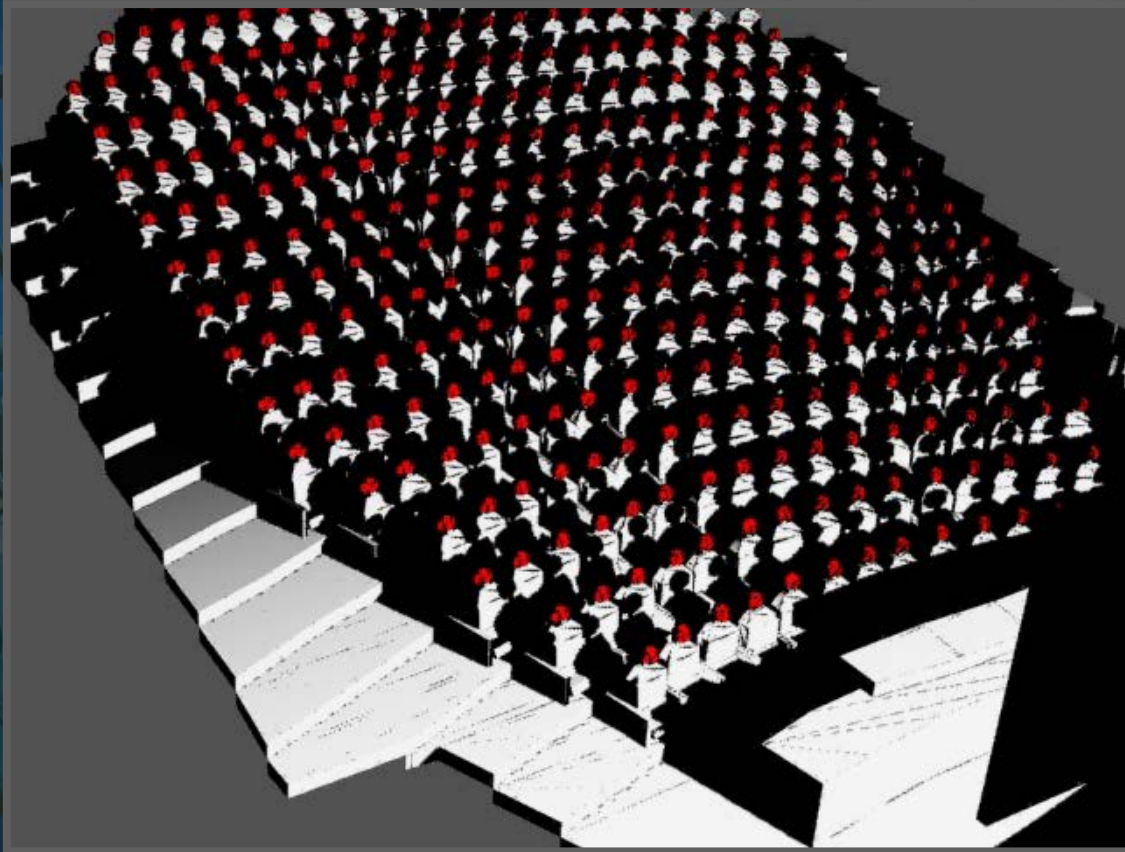
科學性分析及可持續發展設計



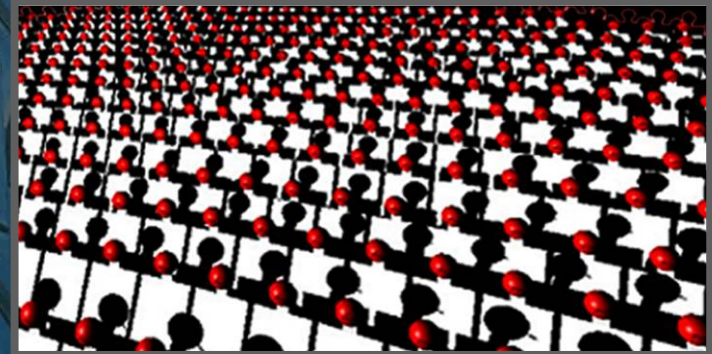
FAÇADE SOLAR STUDY

21/12/2008 7:00am – 6:00pm

科學性分析及可持續發展設計

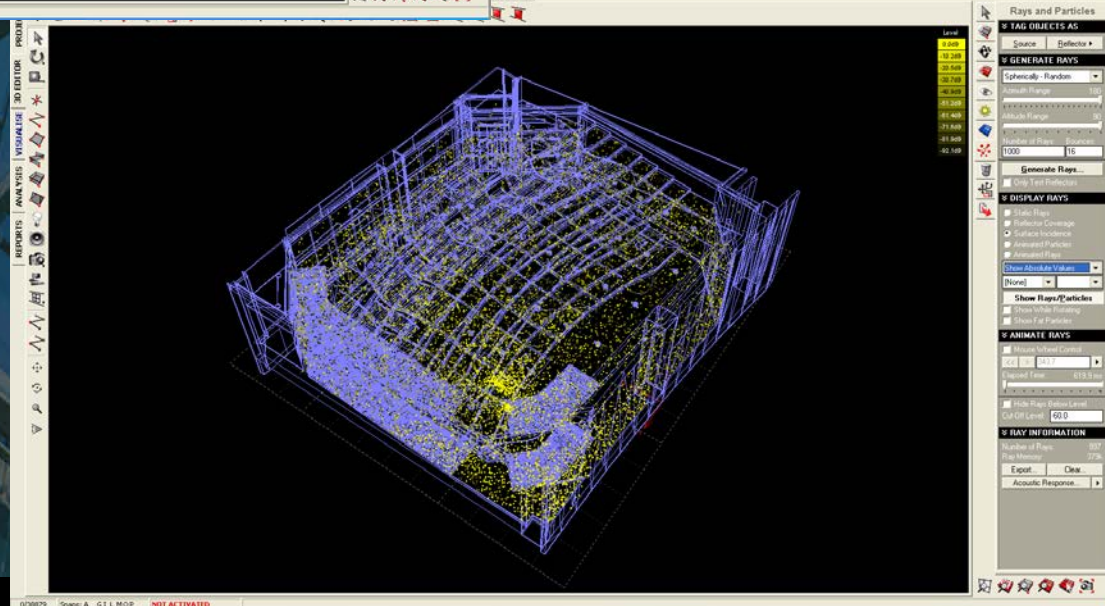
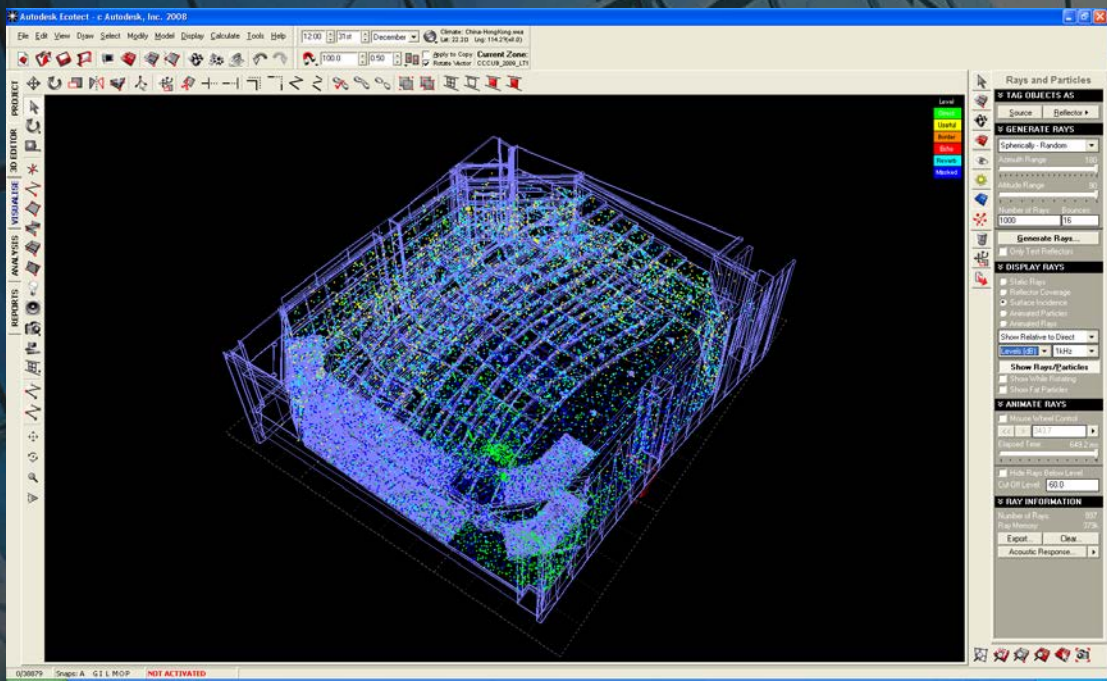


低可視性

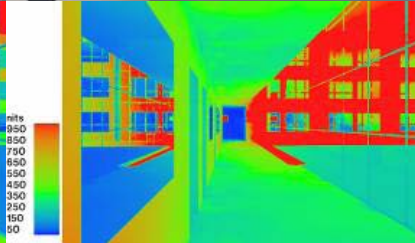
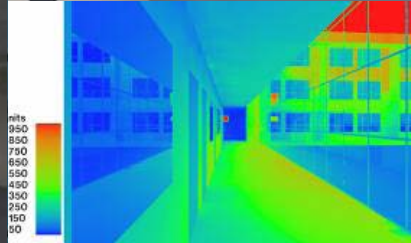
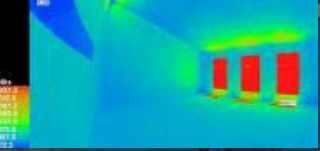
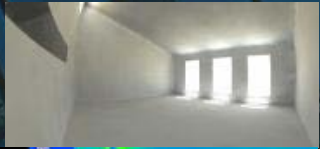


高可視性

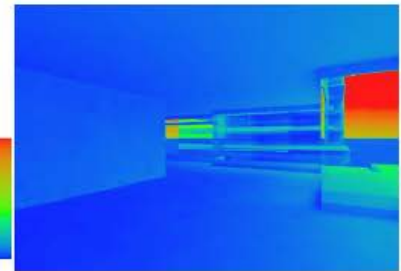
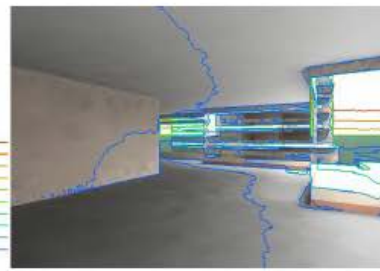
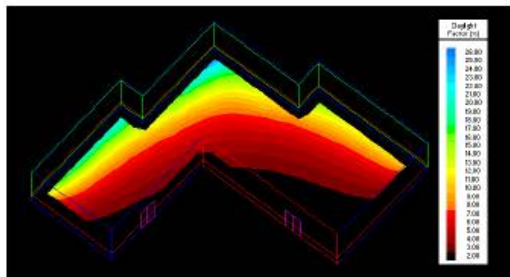
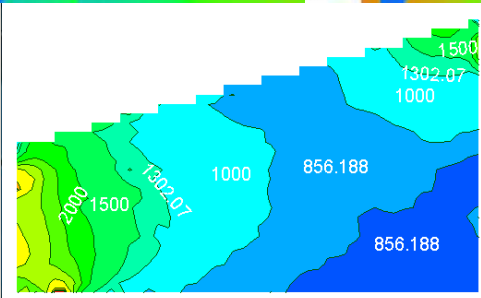
可視性設計



Sustainable Design

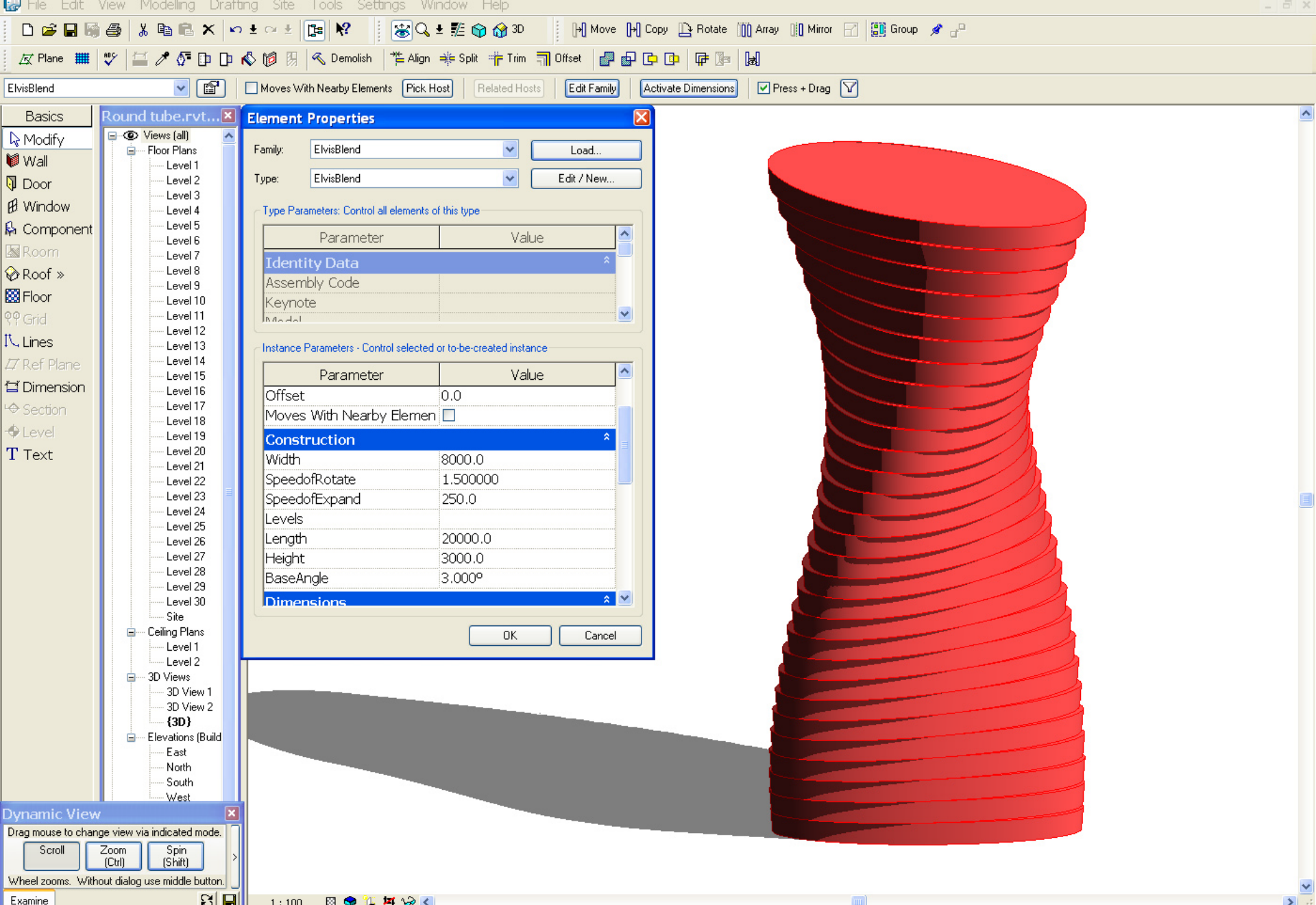


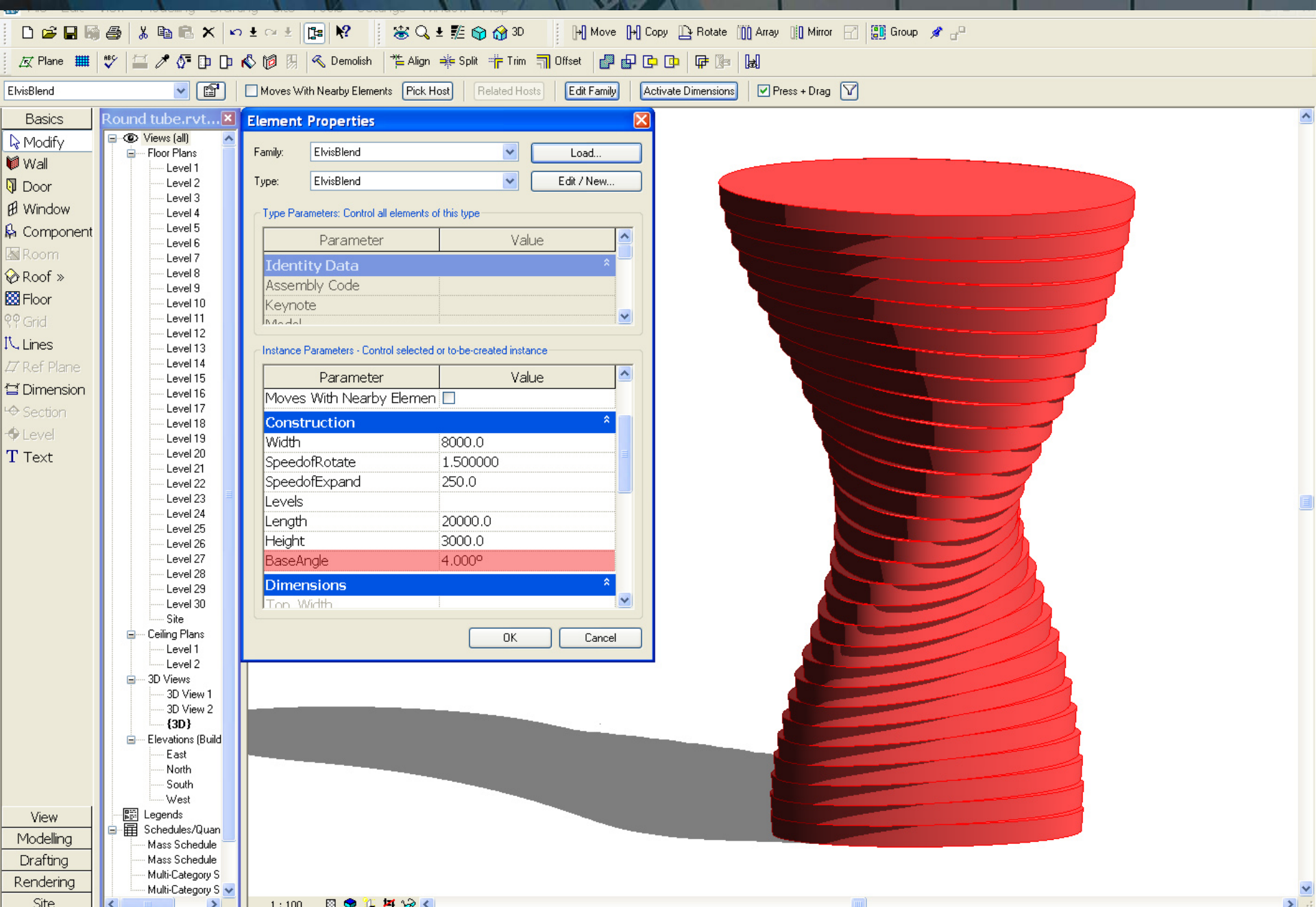
Month	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00	
Jan									100.0	99.7	100.0	100.0	100.0	84.6	38.8	5.2									
Feb								100.0	100.0	100.0	100.0	100.0	100.0	98.7	73.9	32.7	3.0								
Mar							100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	91.5	60.4	25.7								
Apr					0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.0	84.0	51.3	0.0								
May				0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	92.9	0.0	0.0	0.0						
Jun			0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	96.5	0.0	0.0	0.0	0.0					
Jul			0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	96.3	0.0	0.0	0.0	0.0	0.0				
Aug			0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	90.2	64.8	0.0	0.0						
Sep			0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	92.2	64.0	30.8	0.0							
Oct			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0	63.7	26.7									
Nov			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	77.0	31.7	1.8									
Dec			100.0	95.1	93.6	100.0	93.0	67.6	22.2																71.82

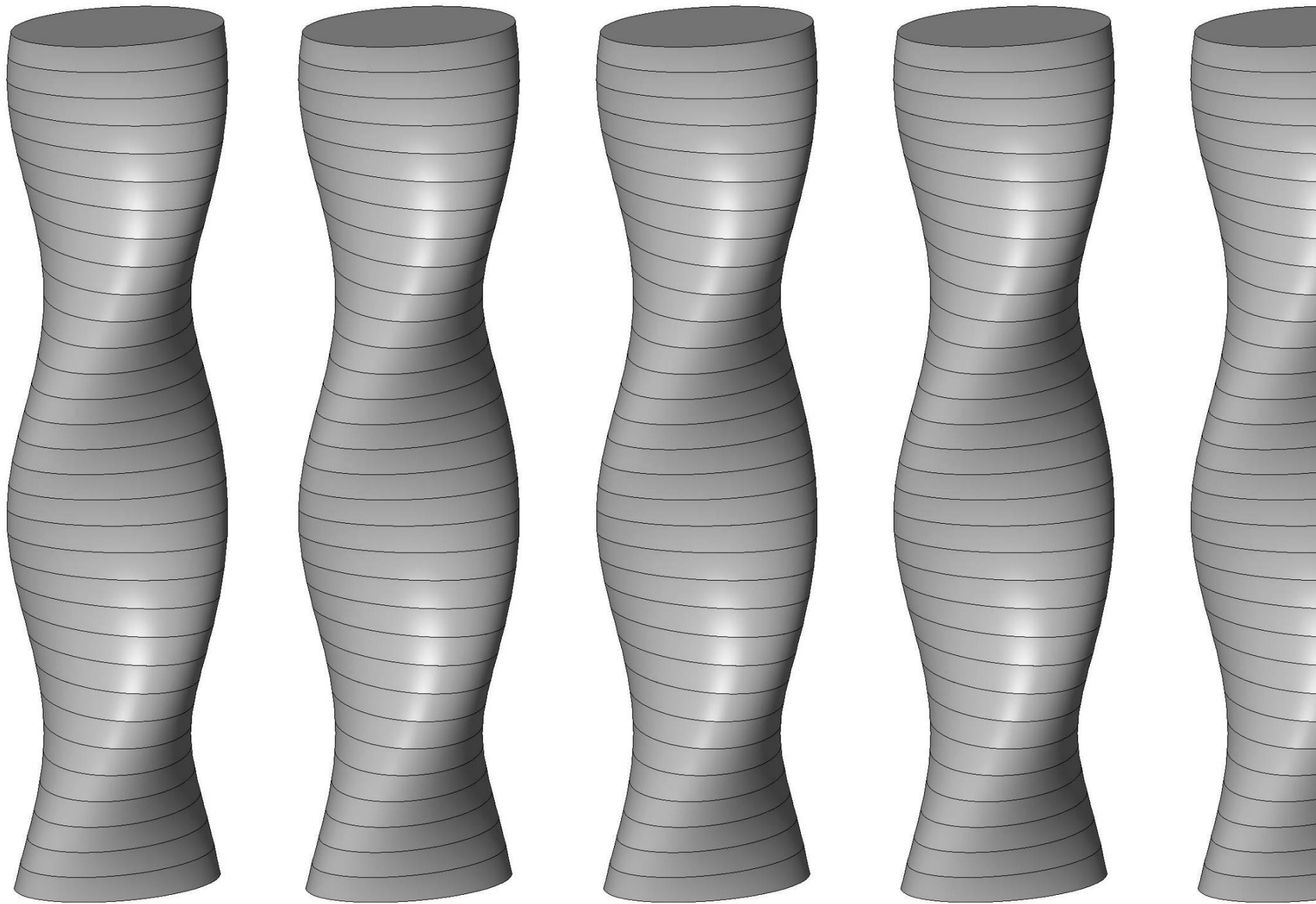


BIM 帶來的衝擊

1. 可視性型像化設計
2. 圖紙製作
3. 各專業協調合作
4. 物件清單及投標文件
5. 自動化送審文件
6. 科學性分析及可持續發展設計
7. 複雜幾何形狀建築
8. 生產制造構件









absoluteworld BUILDING 2

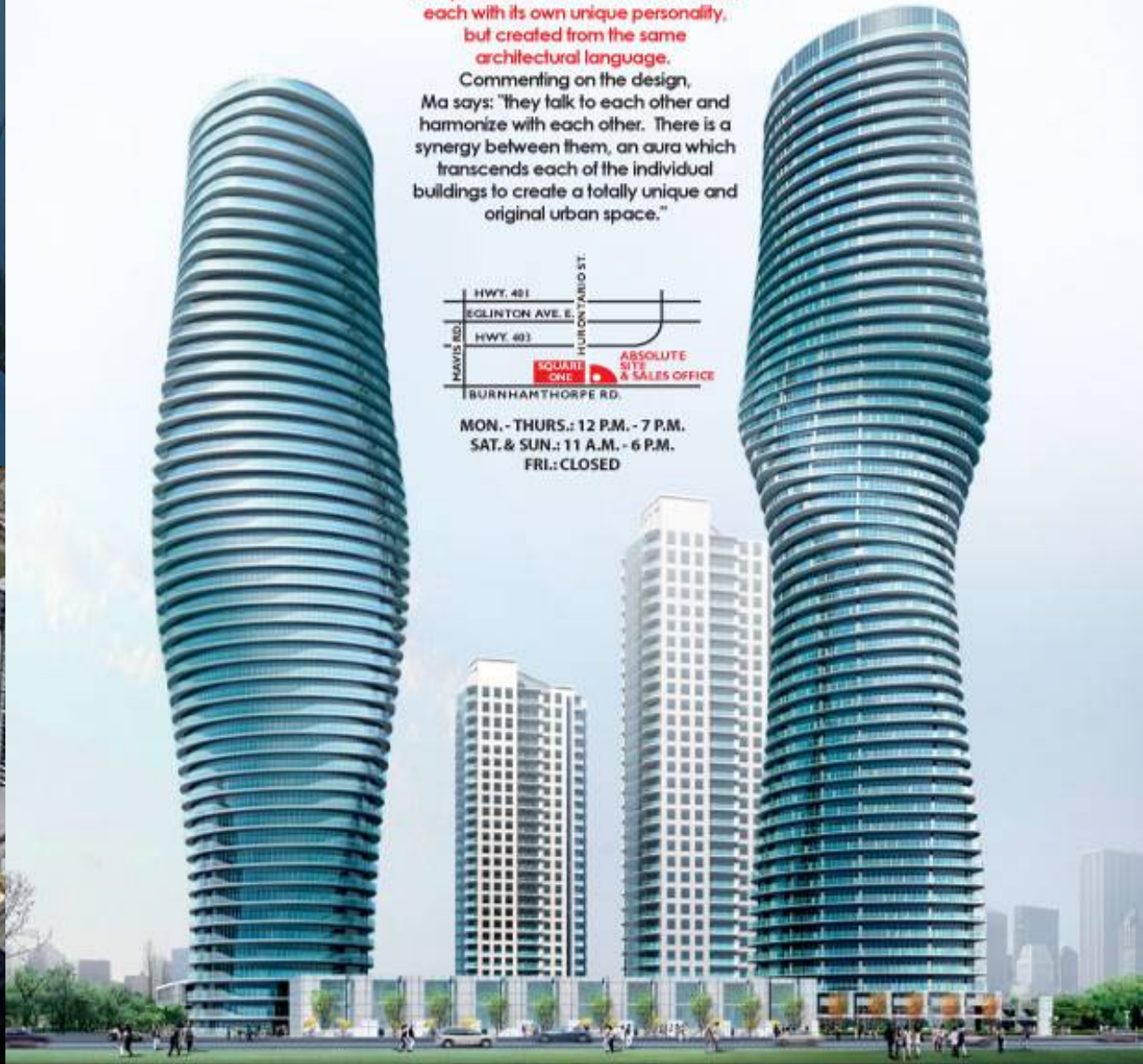
AbsoluteWorld's two buildings, as envisioned by their creator, Yansong Ma. The buildings were designed to complement and enhance each other, each with its own unique personality, but created from the same architectural language.

Commenting on the design, Ma says: "They talk to each other and harmonize with each other. There is a synergy between them, an aura which transcends each of the individual buildings to create a totally unique and original urban space."



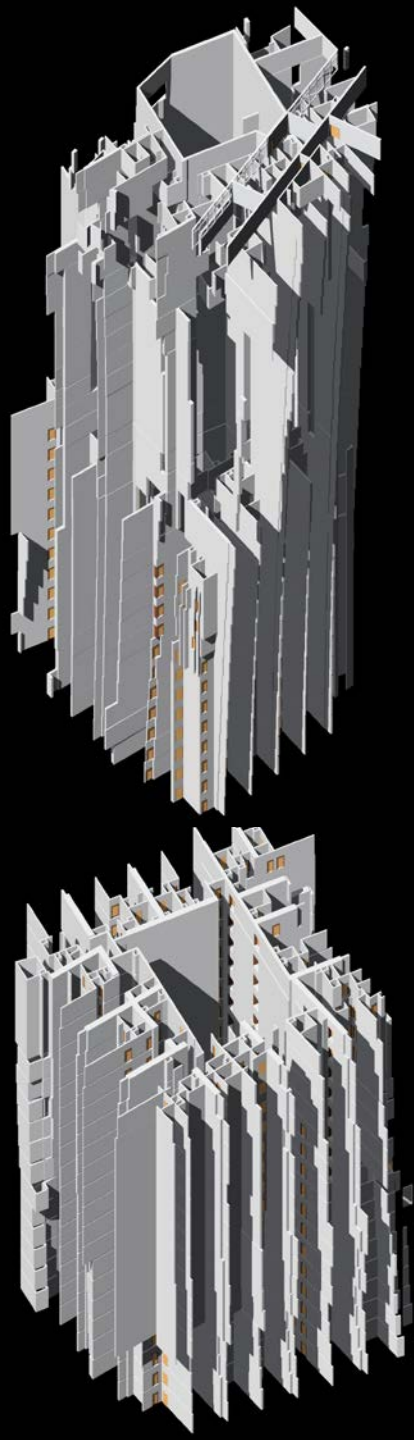
MON. - THURS.: 12 P.M. - 7 P.M.
SAT. & SUN.: 11 A.M. - 6 P.M.
FRI.: CLOSED

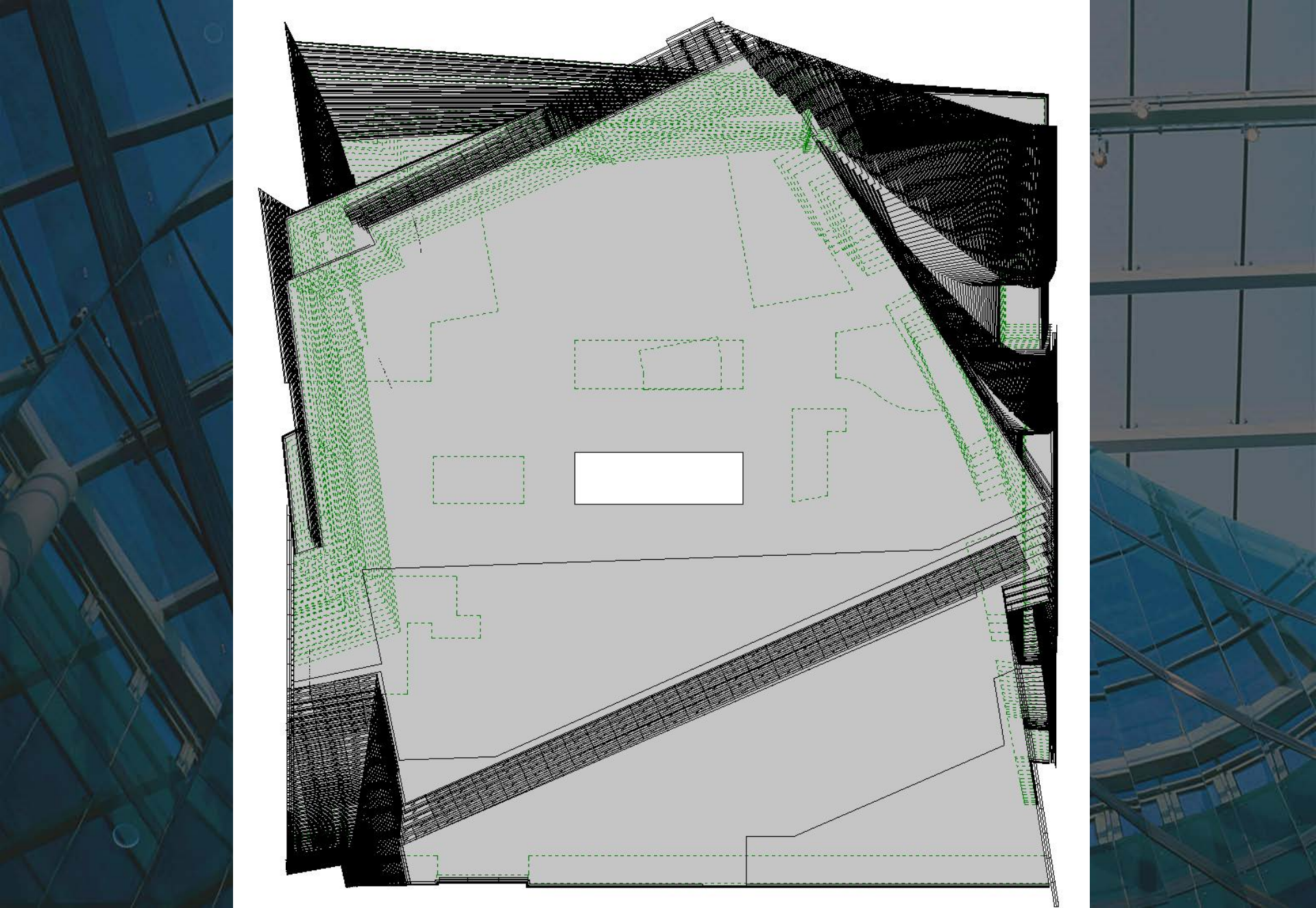
absoluteworld BUILDING 1

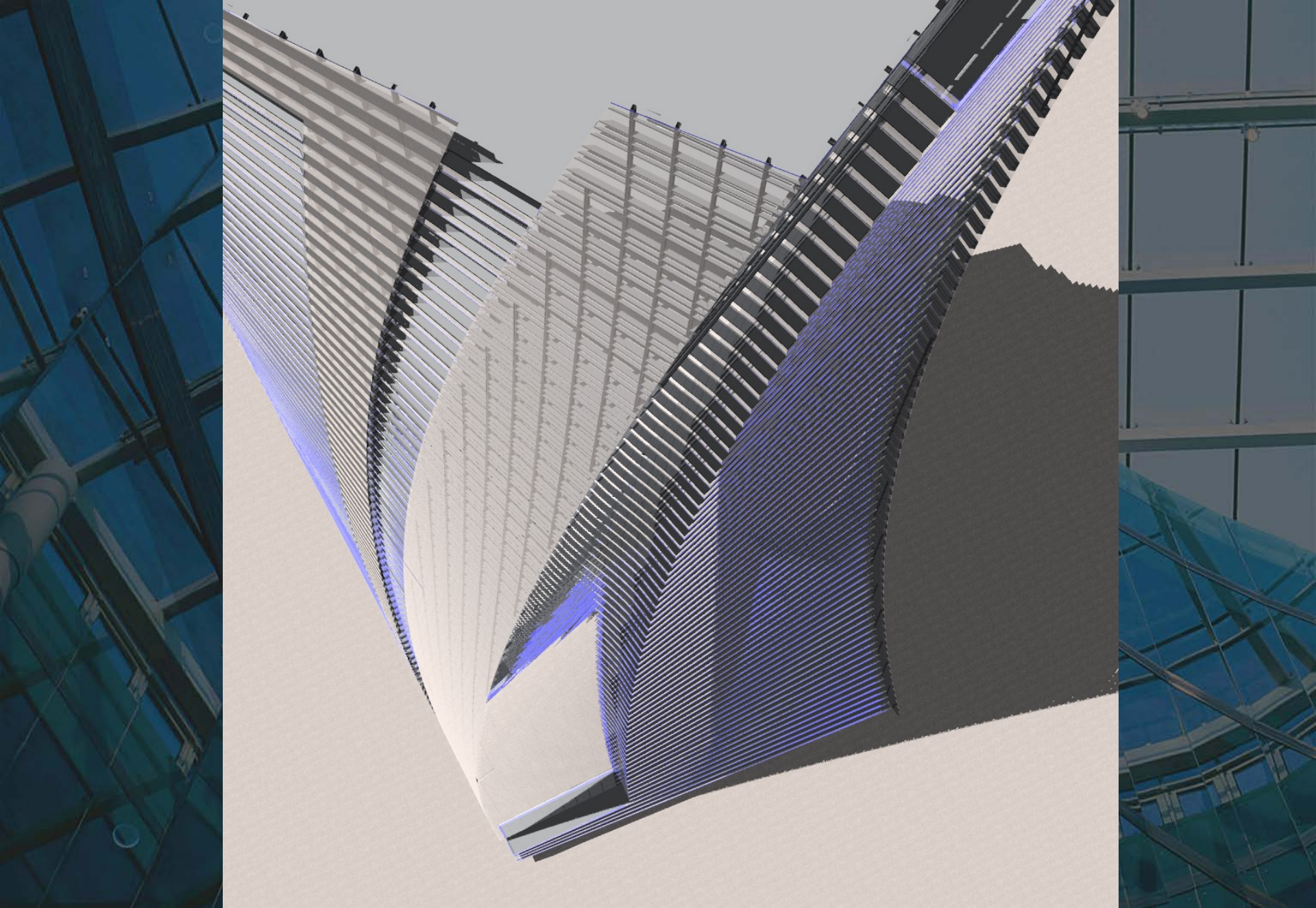


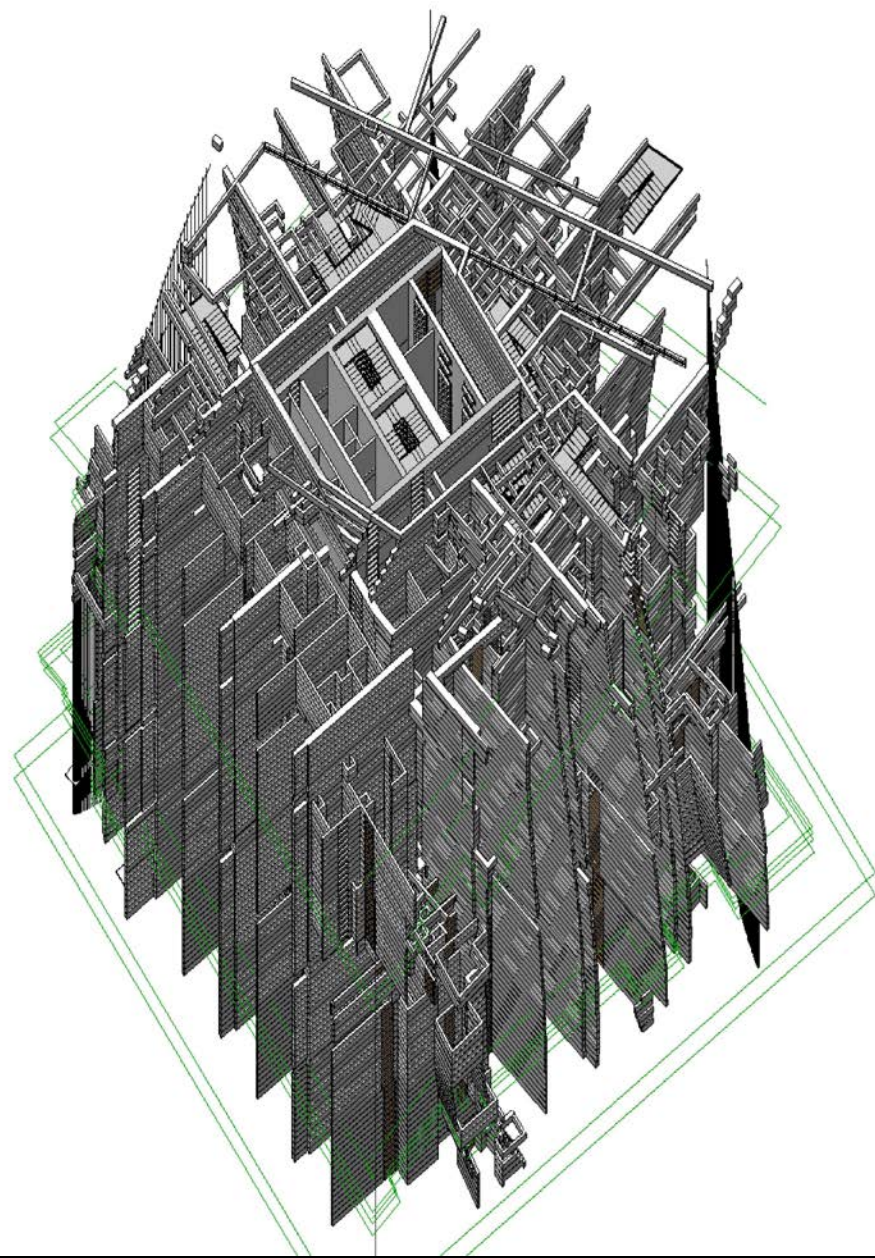
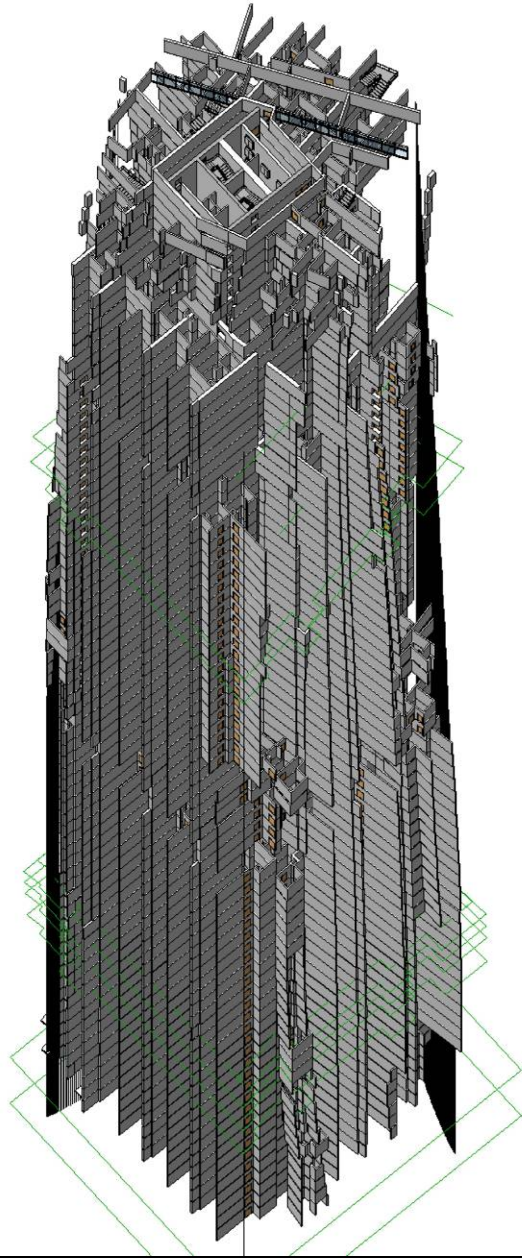
Program Residential Site Area 3,746 sqm
Floor Area 659,652 sqm Building Height 304 m

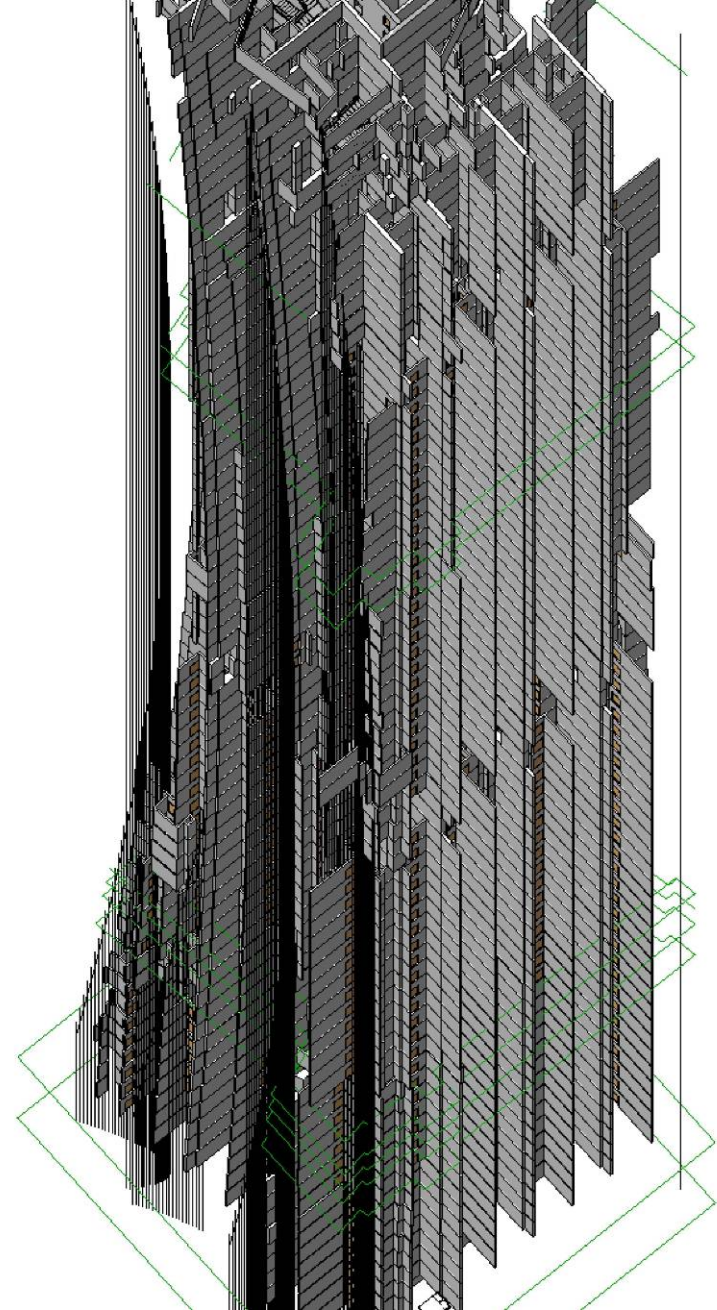
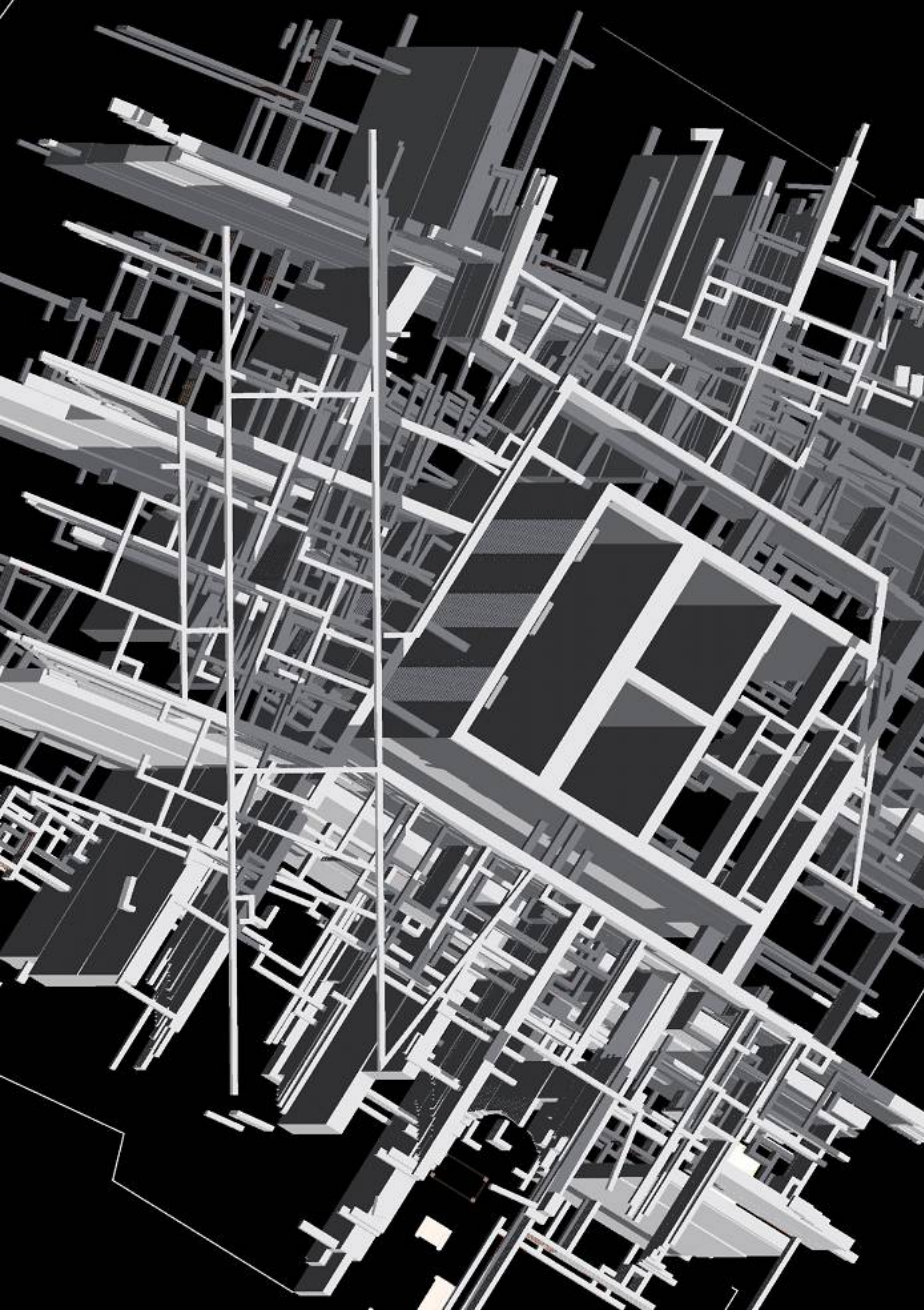
Dubai **Ocean Heights One**

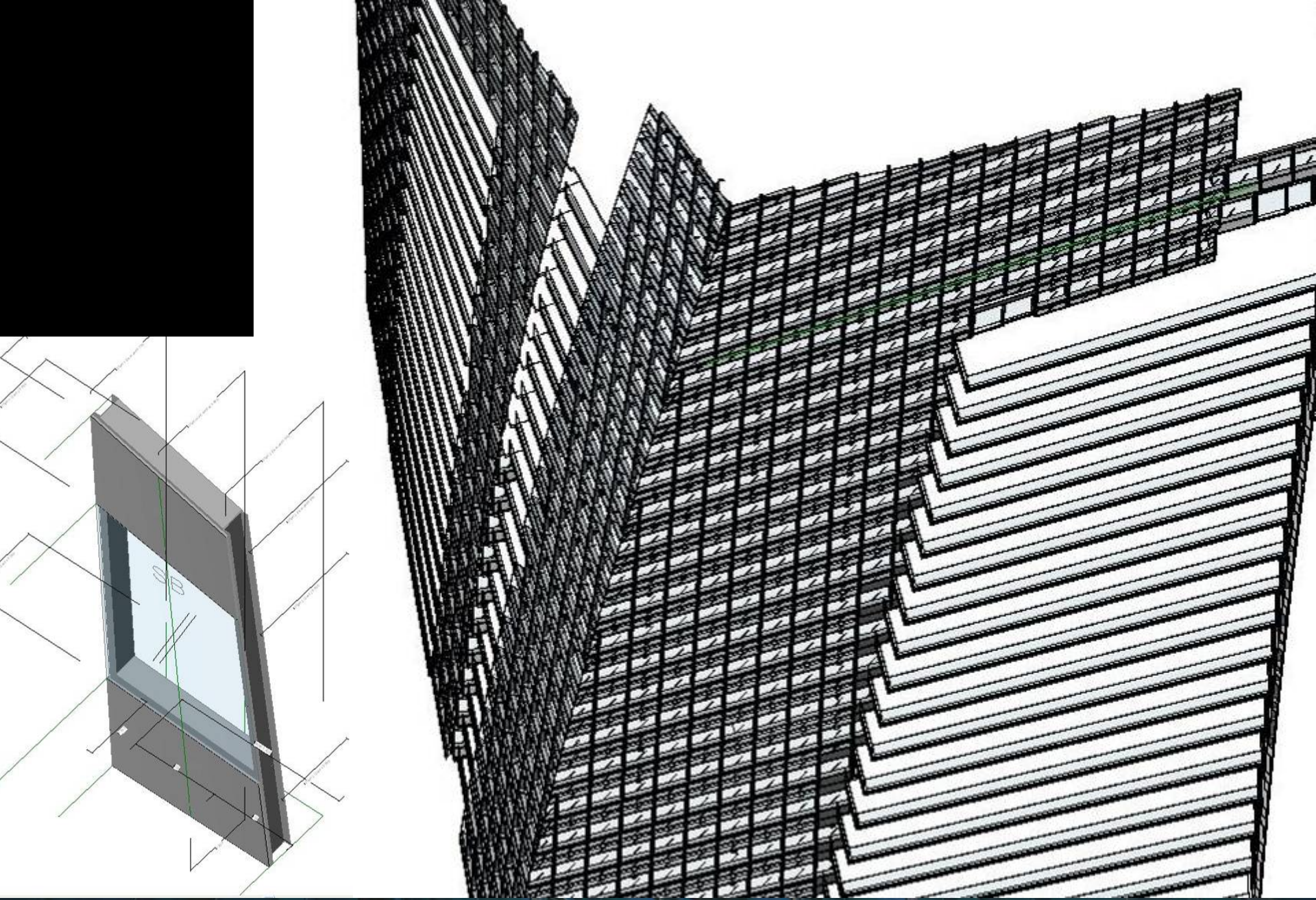


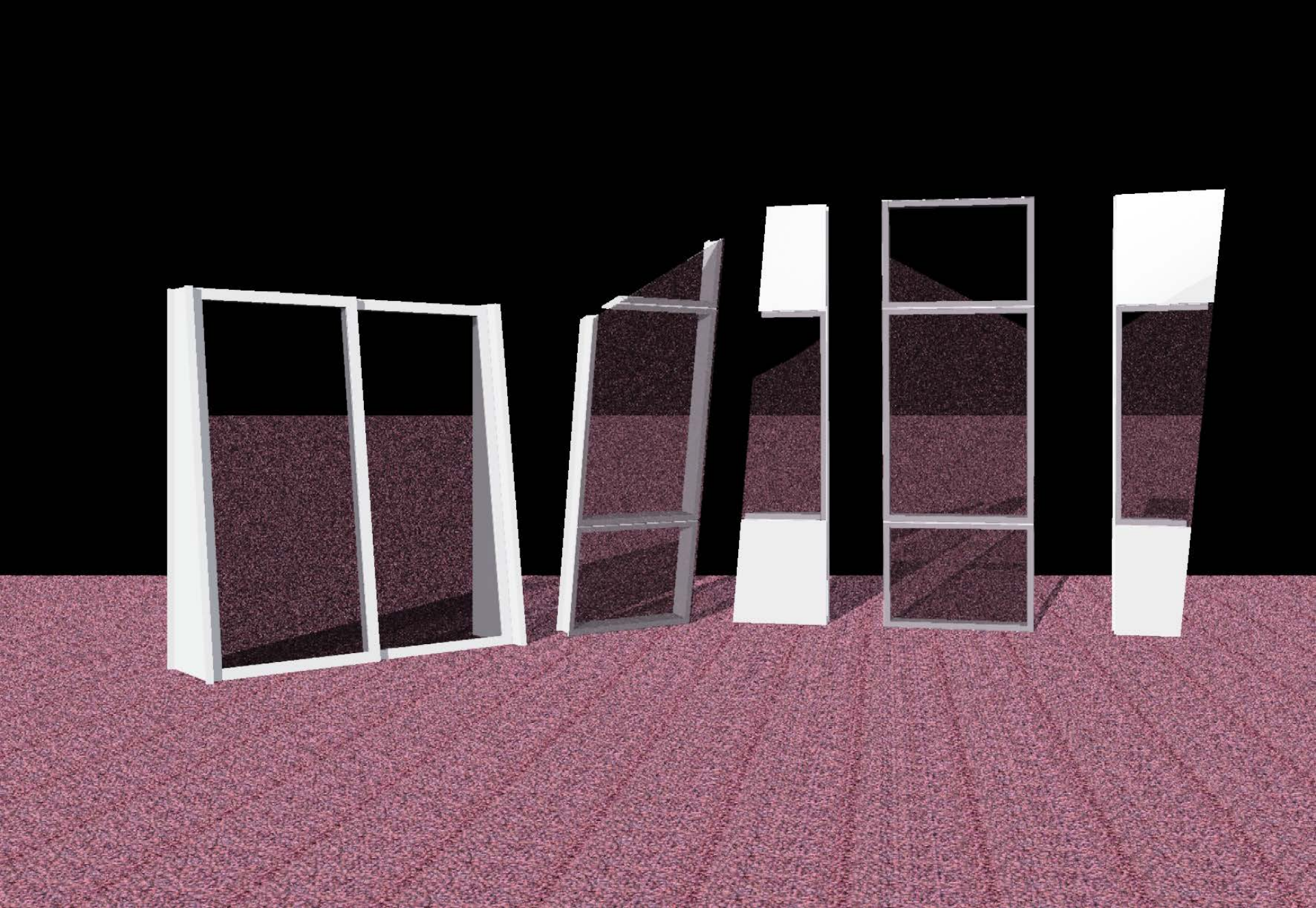












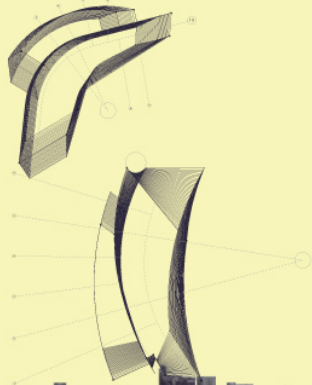
Abu Dhabi Dancing Towers

Located in the heart of Abu Dhabi, Dancing Towers was designed to appropriately fit its surrounding neighbors in scale.

The challenge was how to achieve this when the project was only 70,000 square meters and adjacent properties were relatively small, averaging 900 square-meter floor plates. Two slender towers as opposed to one singular tower was the first step, but the site itself was constrained, forcing a close proximity between the two buildings.

This site constraint is intensified in achieving a viable connective retail podium between the commercial and residential towers, drop-offs to the lobbies and access to supporting functions. The buildings were placed deliberately to maximize the uses down below.

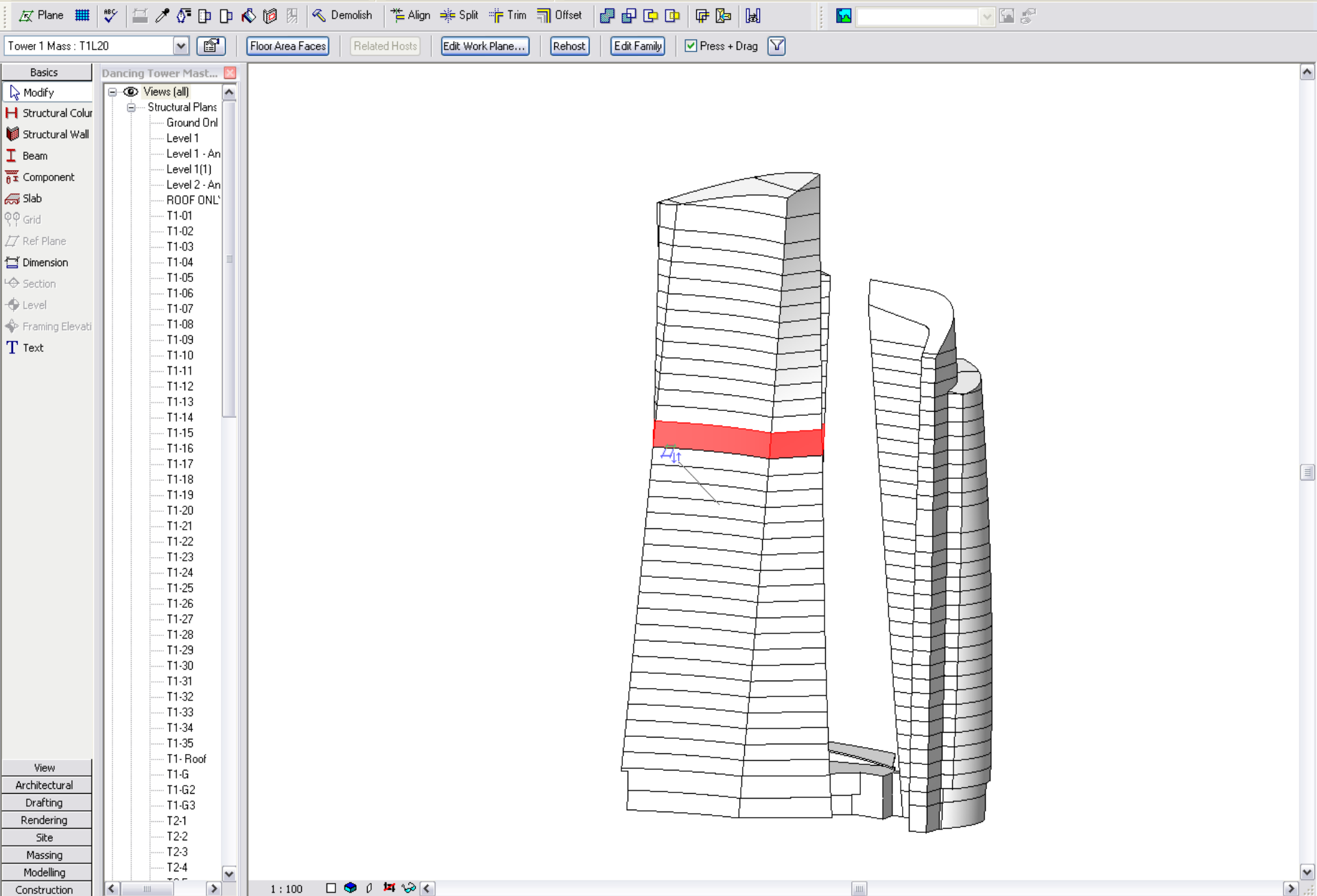
However, the two towers quickly lean, rotate, bend and warp to respond to each other, the adjacent sites and ultimately the view to the ocean at their horizon. These two figures fluidly respond to each other, dynamically engaged and flowing – and ultimately tied together in a passionate dance •

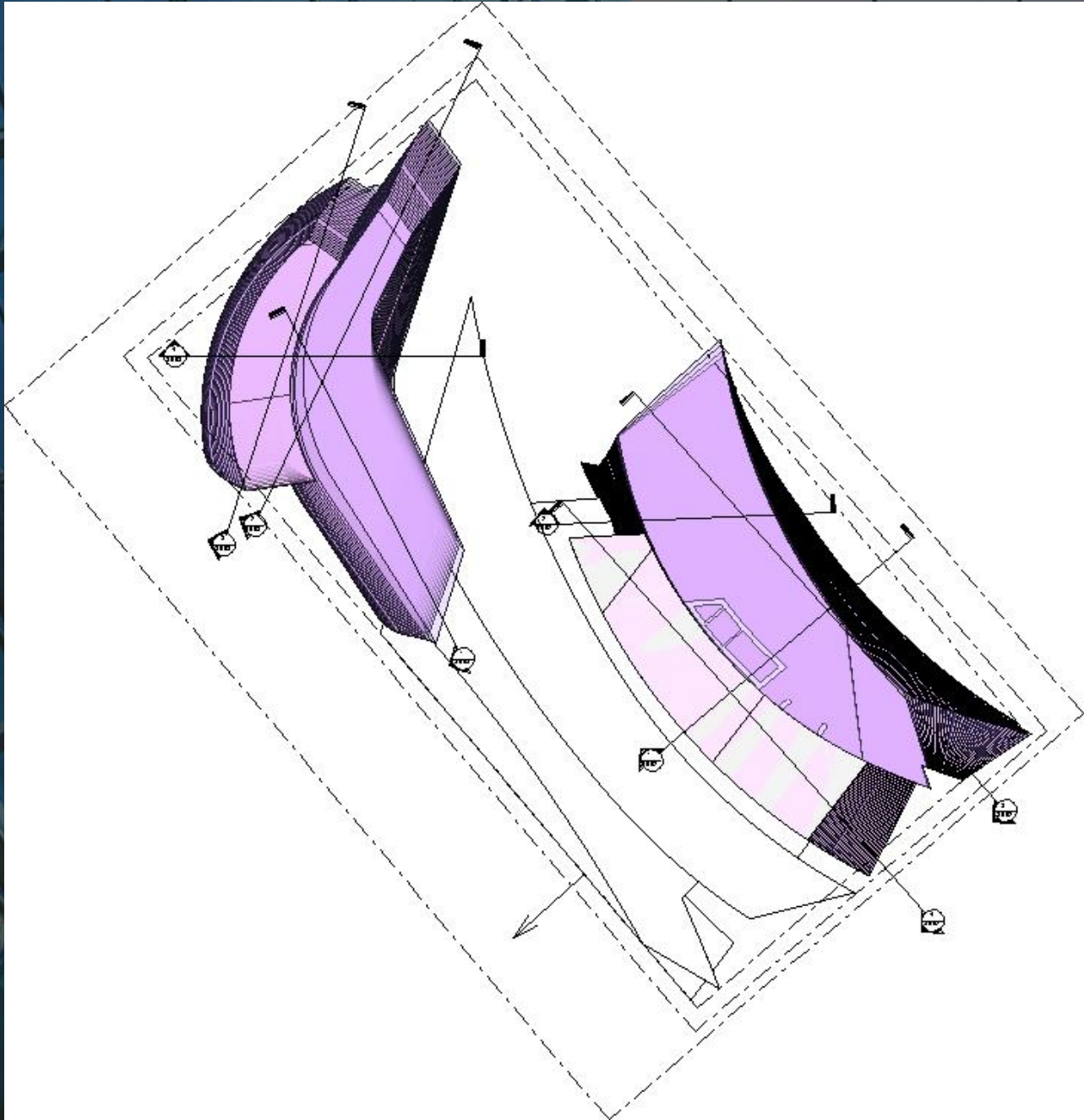


Program Mixed Use, Site Area 4,180 sqm
Floor Area 44,235 sqm, Building Height 160 m



Abu Dhabi Dancing Towers





Abu Dhabi Empire Tower

Empire Tower was challenged through a client request of not "pushing the limits" too far. The concern is that the residential project was located in the middle of a master plan filled with potential icons. The design standardizes the units to accommodate the client request but manipulates the section to develop a very dynamic solution, which holds its own amidst the visual clutter of its neighbors. This was deemed crucial to the financial viability of this project, which is dependent on pre-sales within a highly competitive market.

The design maximizes the tower's presence on the street, with vertical layers spreading out to the property lines. The building then bends back away from the street across from a large commercial tower, allowing for an enlarged view corridor between the central park of the community and the sea, one block away. The splayed vertical layers converge and rise up before bending forward together, as the 230-meter tower extends into the sky – maximizing its views between the park and the sea. ■



Initial Massing



Mass Divisions



Strip Shifting

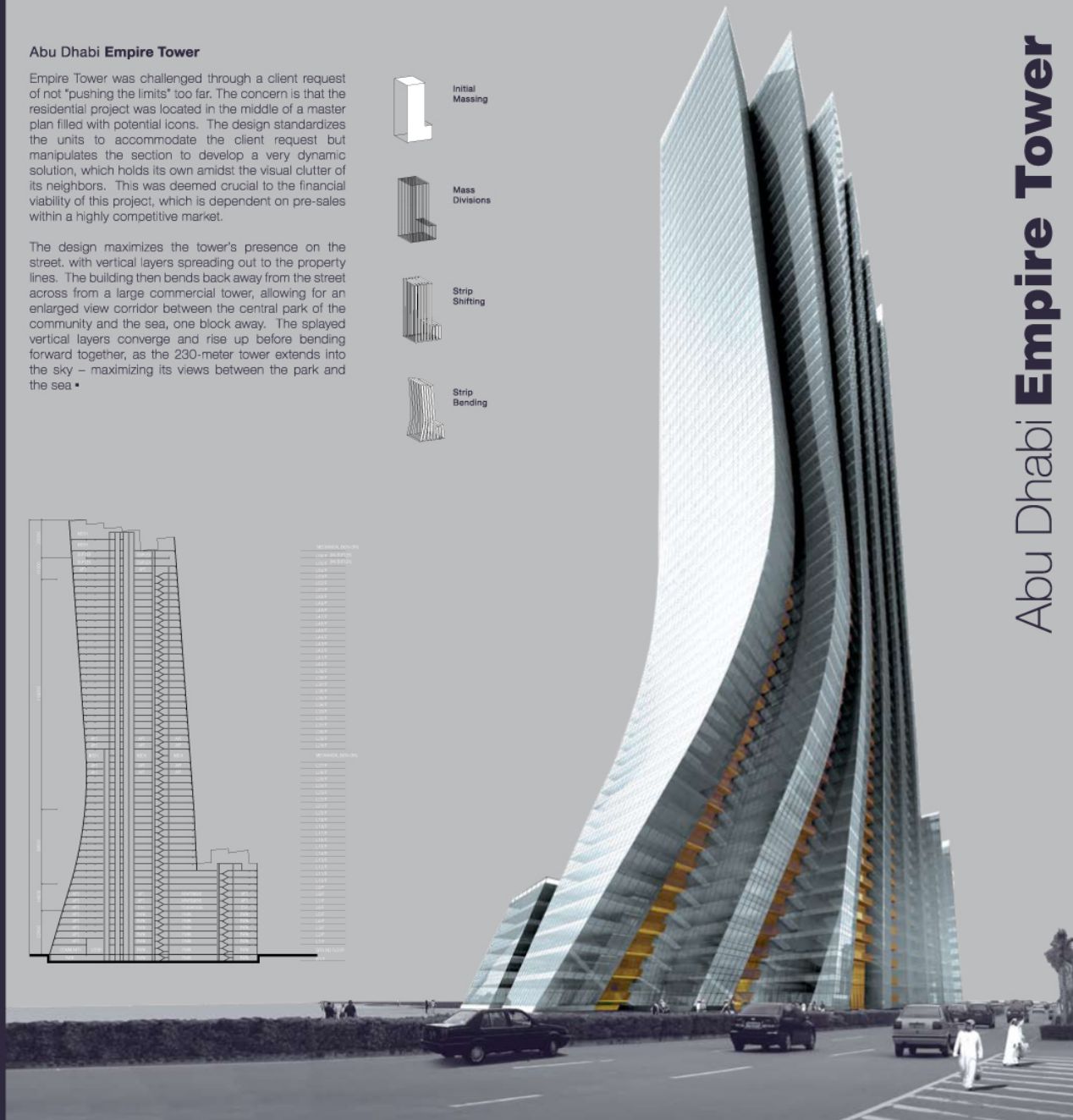


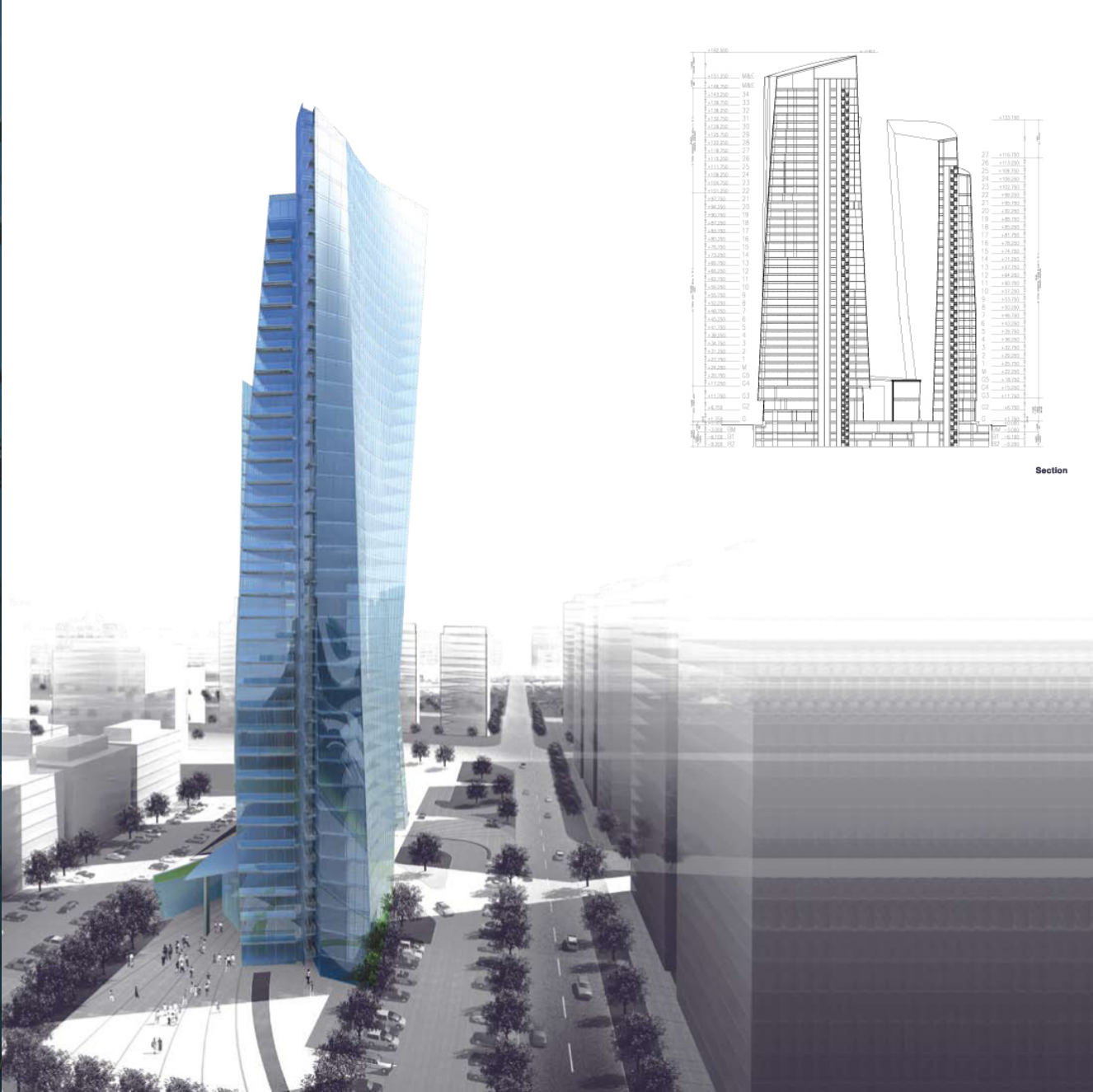
Strip Bending



Program: Residential, Site Area: 7,007 sqm
Floor Area: 90,208 sqm Building Height: 225 m

Abu Dhabi Empire Tower

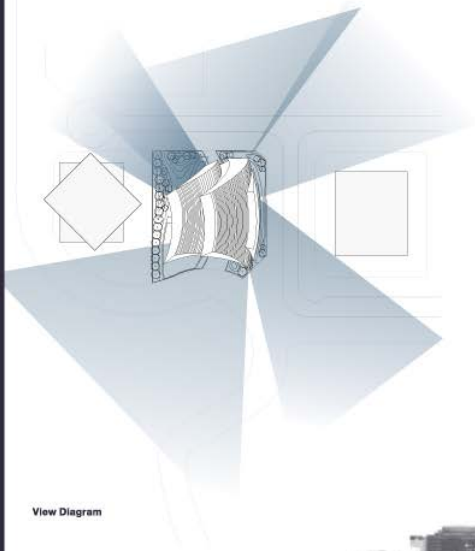




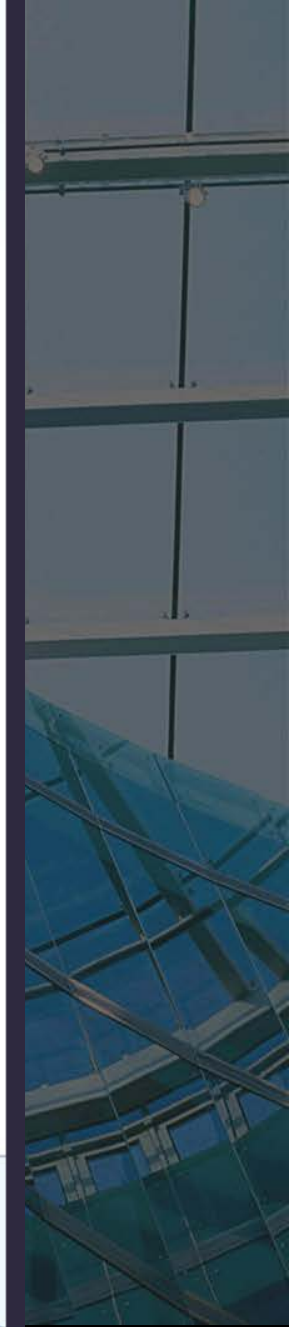
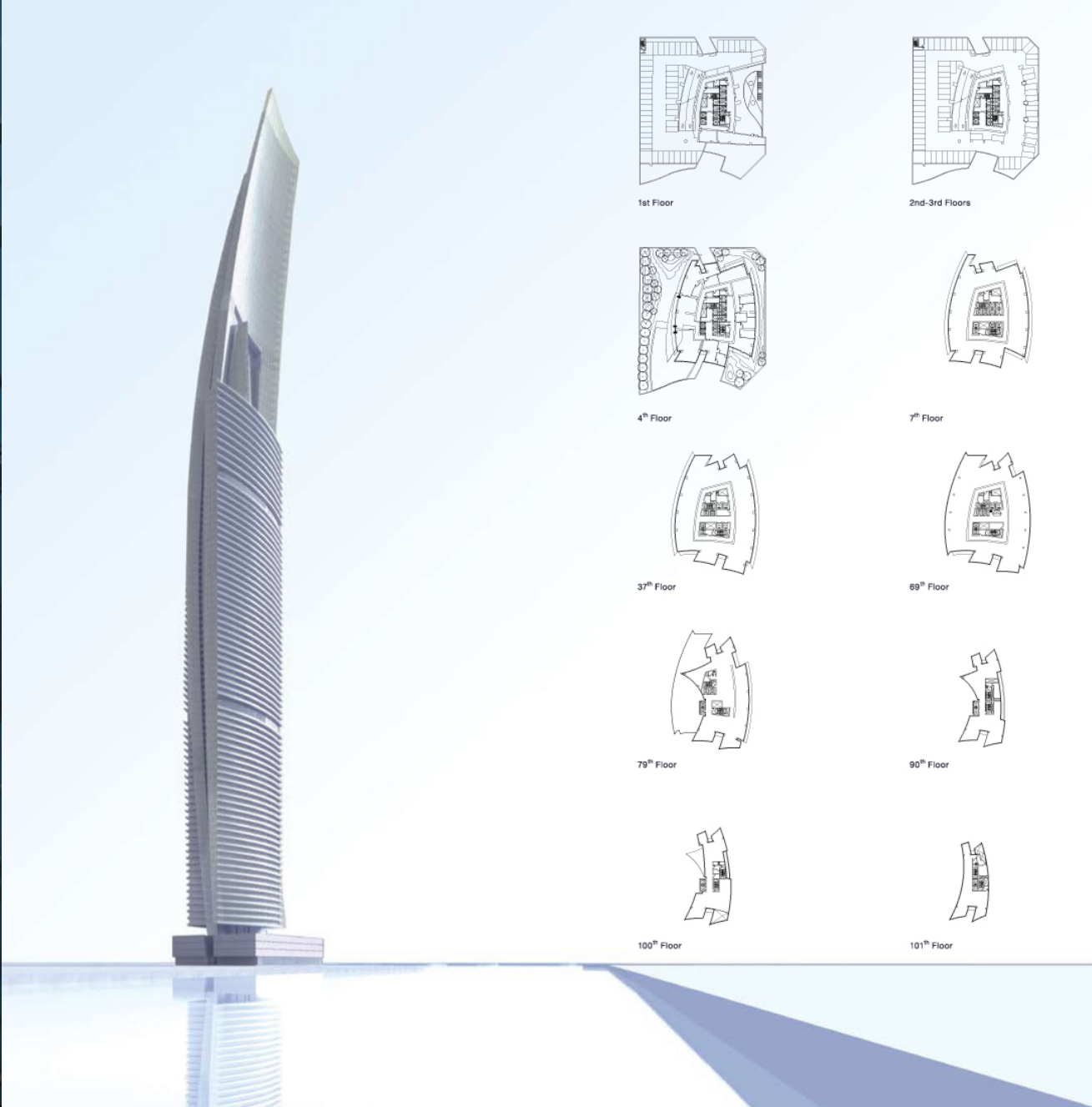
Dubai Ocean Heights Two

Ocean Heights Two is also located in Dubai Marina, UAE, along with its sister project, Ocean Heights One. At 460 meters in height and 105 floors, it will be the tallest tower in its vicinity. However, unlike its predecessor, the requirements for more modulated units up to the 60th floor, forced a different approach while intending to maintain the spirit of its sister.

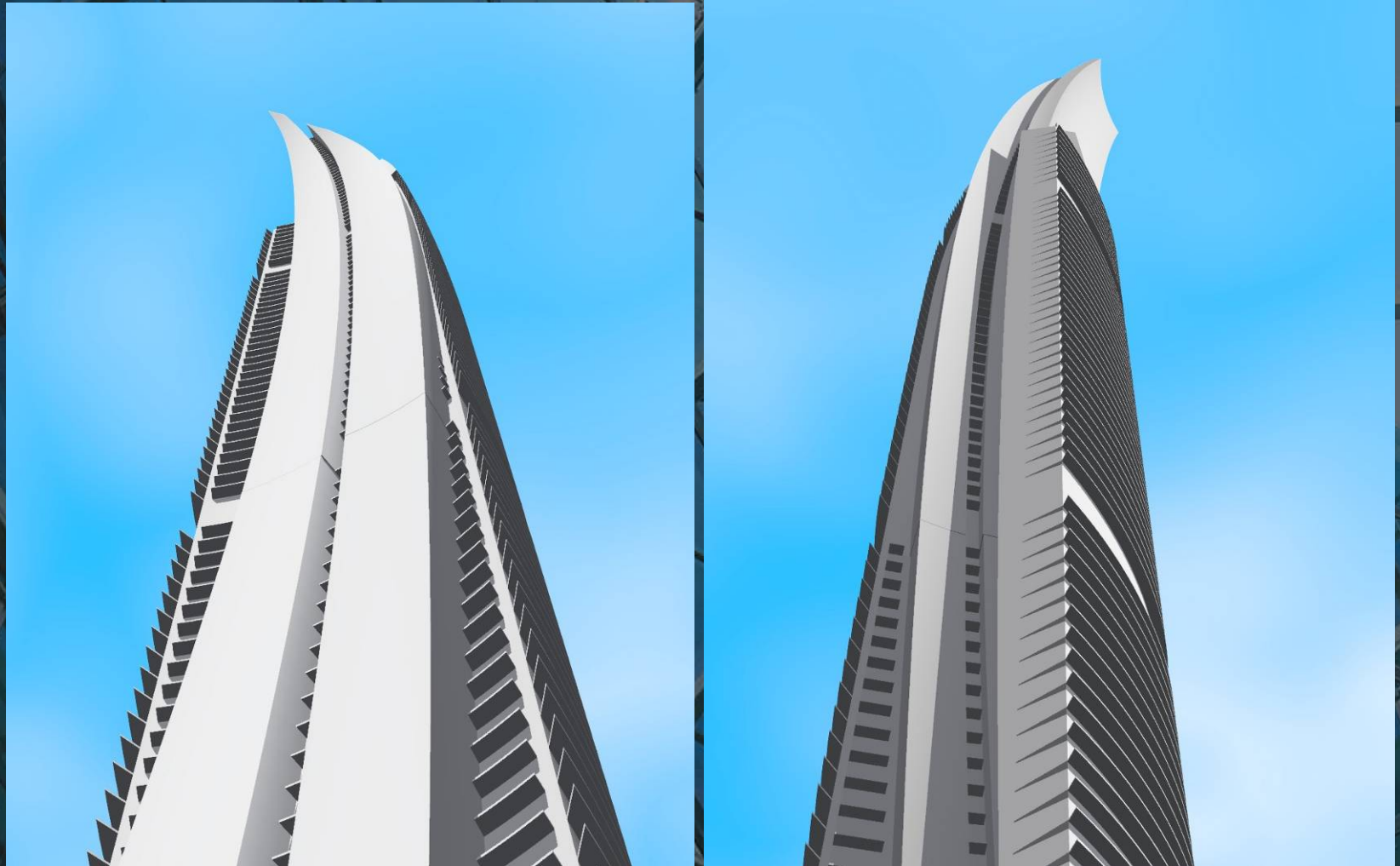
The first 60th floors of the tower are intended to be service apartments, which in order to be marketable, needed to have the majority of units standardized. The curved shape of the tower improves views past its densely located neighbors. The playfulness of this tower was concentrated into the two most visible faces, allowing units to bend up the tower in two blades. These blades were still modulated up to the 60th floor before the tight restrictions of unit area fluctuations become more relaxed. At this point, the modules drop off and the blades continue, tapering and bending into the sky •



Dubai Ocean Heights Two



Ocean Heights II



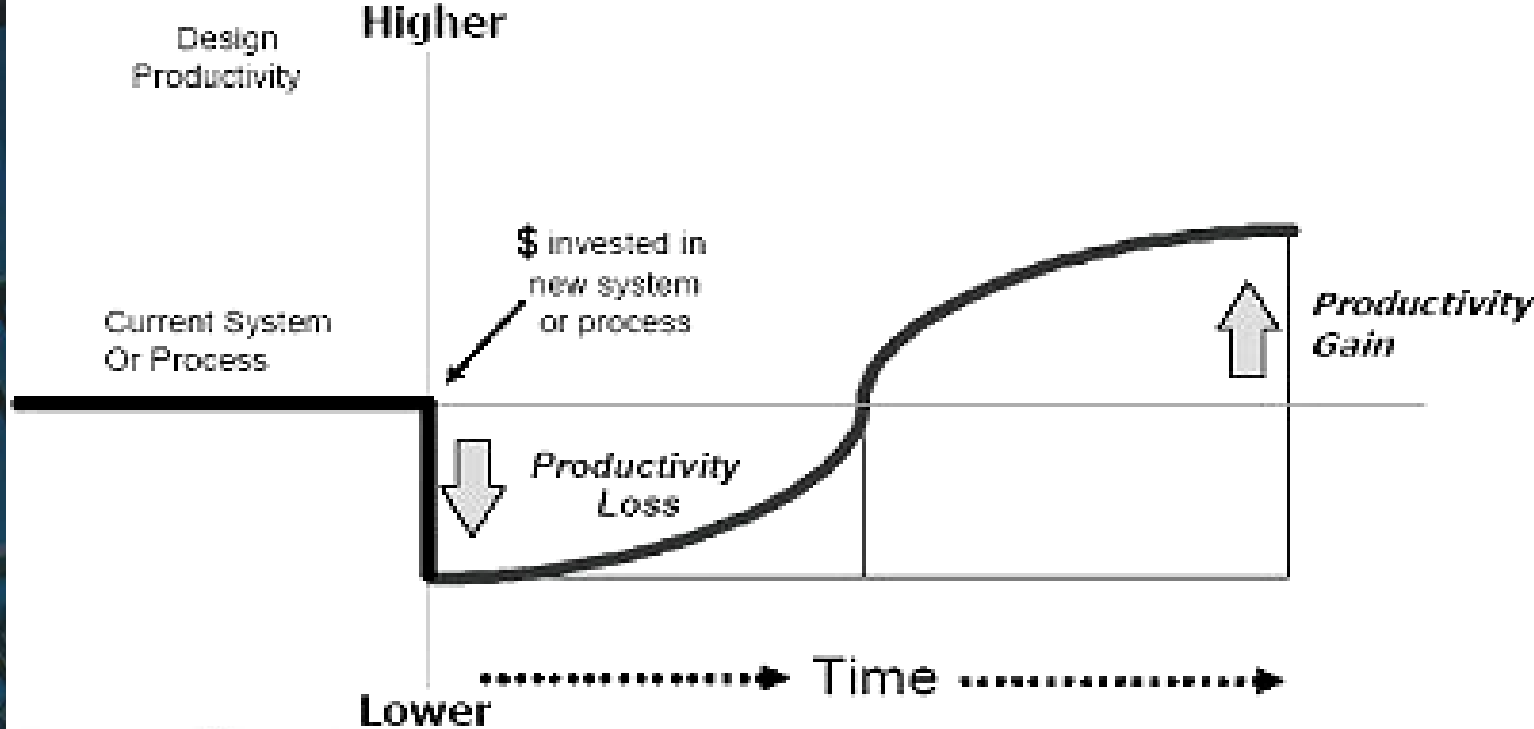
BIM 帶來的衝擊

1. 可視性型像化設計
2. 圖紙製作
3. 各專業協調合作
4. 物件清單及投標文件
5. 自動化送審文件
6. 科學性分析及可持續發展設計
7. 複雜幾何形狀建築
8. 生產制造構件



建築行業在改變嗎？





$$\frac{(B - (\frac{B}{1+E})) \times (12 - C)}{A + (B \times C \times D)} = \text{First Year ROI}$$

A = cost of hardware and software (dollars)	
B = monthly labor cost (dollars)	
C = training time (months)	
D = productivity lost during training (percentage)	
E = productivity gain after training (percentage)	

A = cost of hardware and software	\$6,000
B = monthly labor cost	\$4,200
C = training time	3 months
D = productivity loss during training	50%
E = productivity gain after training	25%

資料來源 26/1/07:
<http://aec.cadalyst.com/aec/article/articleDetail.jsp?id=124222>

生產效率 >60%

Design and Construction

- Overview
- Architecture & Engineering
- CAD Standards
- 3D-4D Building Information Modeling
 - 3D-4D-BIM Overview
 - Spatial Program Validation
 - 4D Phasing
 - 3D Laser Scanning
 - Energy and Sustainability
 - BIM Library
- Commissioning
- Construction Excellence
- Design Excellence and the Arts
- Facility Access for the Disabled
- Sustainable Design
- Urban Development
- Design and Construction Delivery Process

[Home](#) > [Buildings](#) > [Public Buildings](#) > [Design and Construction](#) > 3D-4D Building Information Modeling

3D-4D Building Information Modeling

Since 2003, the General Services Administration (GSA) through its Public Buildings Service (PBS) Office of Chief Architect (OCA) has established the National 3D-4D-BIM Program. OCA has completed 10 pilot projects. It has 11 pilot projects underway in its current capital program, while assessing and supporting 3D, 4D, Building Information Modeling (BIM) applications in over 25 ongoing projects across the nation. The power of visualization, coordination, simulation, and optimization from three-dimensional (3D), four-dimensional (4D), and BIM computer technologies allow GSA to more effectively meet customer, design, construction, and program requirements. GSA is committed to a strategic and incremental adoption of 3D, 4D, BIM technologies.

There is a progression from 2D to 3D, 4D and BIM. While 3D models make valuable contributions to communications, not all 3D models qualify as BIM models since a 3D geometric representation is only part of the BIM concept.

Critical to successful integration of computer models into project coordination, simulation, and optimization is the inclusion of information—the "I" in BIM—to generate feedback. As a shared knowledge resource, BIM can serve as a reliable basis for decision making and reduce the need for re-gathering or re-formatting information. GSA is currently exploring the use of BIM technology throughout a project's lifecycle in the following areas: spatial program validation, 4D phasing, laser scanning, energy and sustainability, and courts design validation.

For all major projects (prospectus-level) receiving design funding in Fiscal Year 2007 and beyond, GSA will require spatial program BIMs be the minimum requirements for submission to OCA for Final Concept approvals by the PBS Commissioner and the Chief Architect. At the same time, all GSA projects are encouraged to deploy mature 3D, 4D, and BIM technologies—spatial program validation and beyond—at strategic project phases in support of specific project challenges.

[BIM Program Flyer](#)

The following are highlights of the GSA National 3D-4D-BIM Program:

- Established policy to phase in 3D, 4D, and BIM adoption for all major projects
- Leading 3D-4D-BIM pilot application on current capital projects
- Providing expert support and assessment for ongoing capital projects to incorporate 3D, 4D, and BIM technologies
- Assessing industry readiness and technology maturity
- Developed GSA-specific incentives for 3D-4D-BIM
- Developed solicitation and contractual language for 3D-4D-BIM services
- Partnered with BIM vendors, professional associations, open standard organizations, and academic/research institutions

CONTACTS

Charles Matta
(202) 219-2355
charles.matta@gsa.gov
• [View Contact Details](#)

Calvin Kam
(202) 208-0447
calvin.kam@gsa.gov
• [View Contact Details](#)

Contact Us

[GSA Staff Directory](#)

GSA Organizations

Choose...
[Abbreviation Look-up](#)

GSA Regions by State

Choose State:

QuickLinks

[A-Z Links to GSA Topics](#)

For all major projects (prospectus-level) receiving design funding in Fiscal Year 2007 and beyond, GSA will require spatial program **BIMs** be the **minimum requirements** for submission to OCA for Final Concept approvals by the PBS Commissioner and the Chief Architect.

