“The complete workflow of B.I.M.”

- Advancements in Digital Design & Fabrication in Architecture

David Fung

LECTURE 2 PART 1

HKPDA PARAMETRIC SEMINAR

April 14th, 7:00PM

SZU, Dept. of Arch.

David Fung

David Fung has over 19 years of architectural experience in Australiaand Hong Kong since graduating from University 1993. After obtaining his HKIA and RAIA, and whilst working in Sydney Australia as an architect, David also completed his Master degree in Project Management. He has been at the frontier of the latest technological applications. He has been using Building Information Modelling technology for 14 years and applied this state-of-the-art technology into the building design, documentation and co-ordination, construction and Facility Management. David was the Vice President of Hong Kong Institute of Building Information Modelling (HKIBIM, formed 2008) promoting BIM in Hong Kong. He was a member of Hong Kong government's CAD Standard for Works Projects (CSWP) Working Committee, HKIA's I.T. Committee, HKIA's Board of Practices, and the past Chairman of the Autodesk's Industry Advisory Board. He teaches BIM technology in different universities in Hong Kong, China and overseas such as HKU, PolyU, HKUSPACE,Chu HaiCollege, Tianjin and TsingHua University.

Information 建築資訊

Graphical
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

Non-Graphical
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

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

Building Projects

Modelling

- Plan
- Section
- Elevation
- Area Diagrams
- Schematic Designs
- General Building Plan
- Structural Plans
- E/M Drawings
- Schematics
- Other Diagrams

BIM

Building Information Modeling

信息化建築模型

Information

- Area Schedule
- Finishing Schedules
- Door/Window/Louvre Sch
- Beam/Column Schedule
- Equipment Schedule
- Diagram
- Cost Estimate
- Quantity Take Off
- Bills of Quantities
- Variations

BIM - INFORMATION FLOW

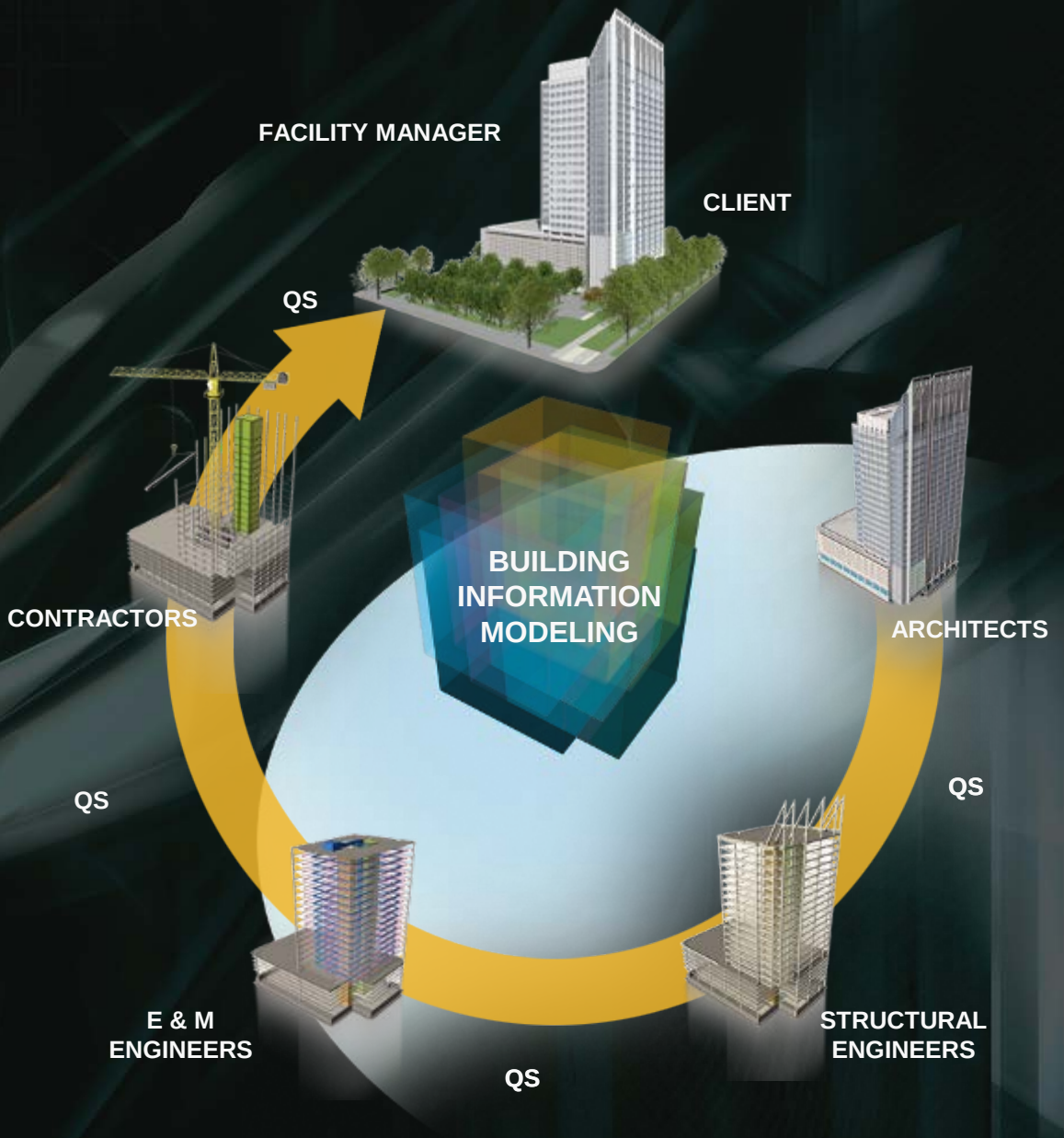
Graphical Data
(model)

+

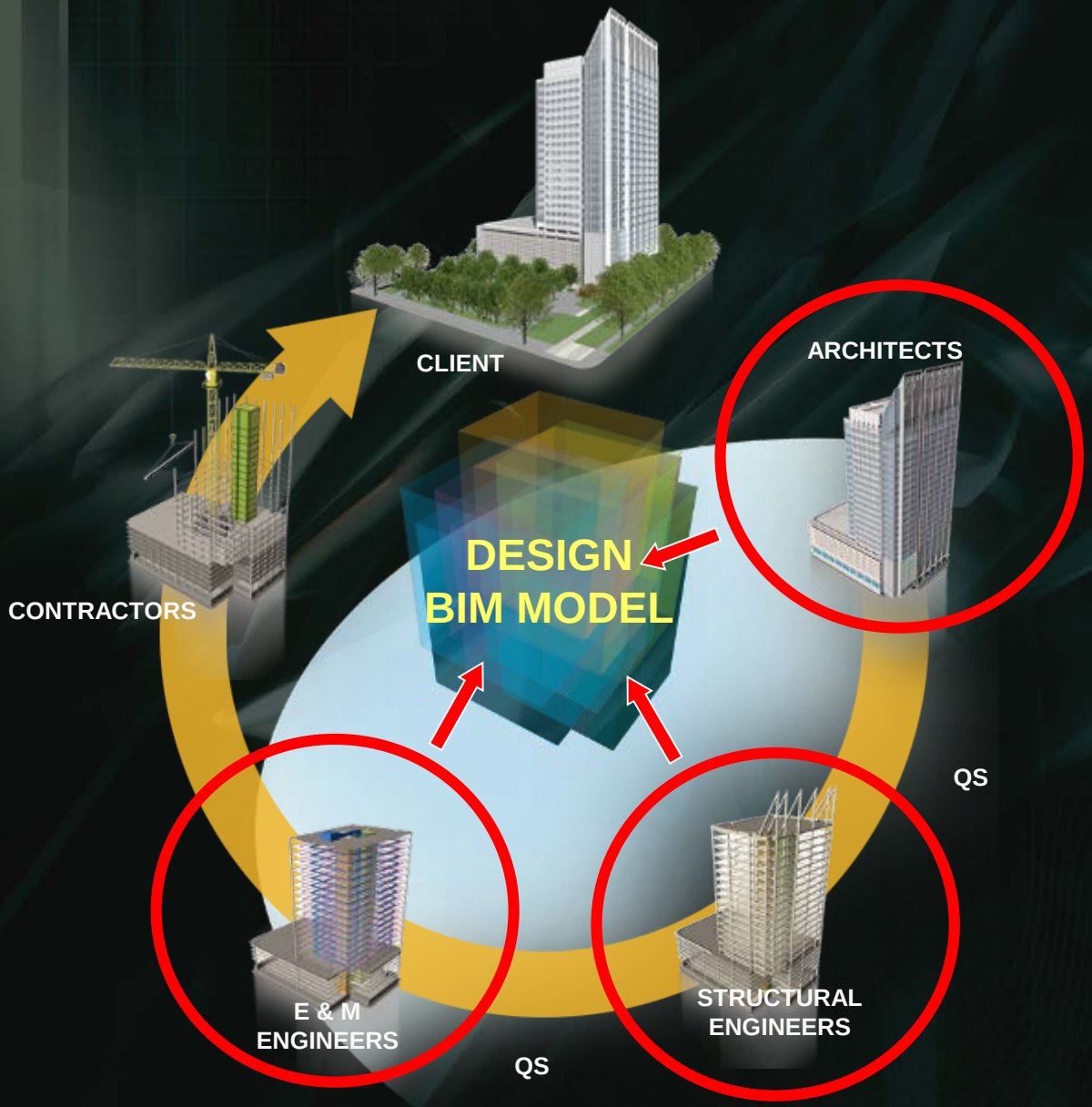
Non-Graphical Data
(Information)

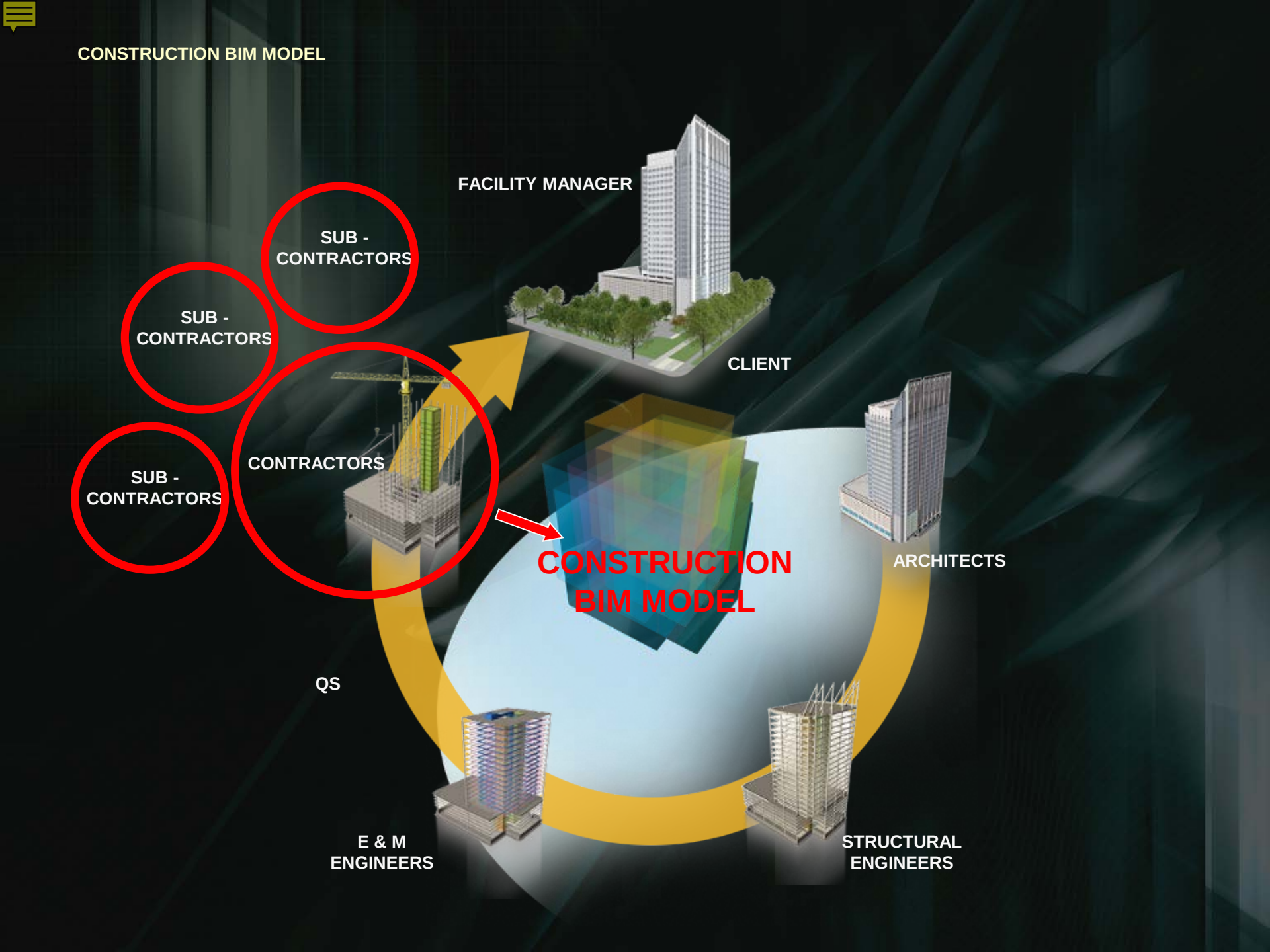
+

New workflow

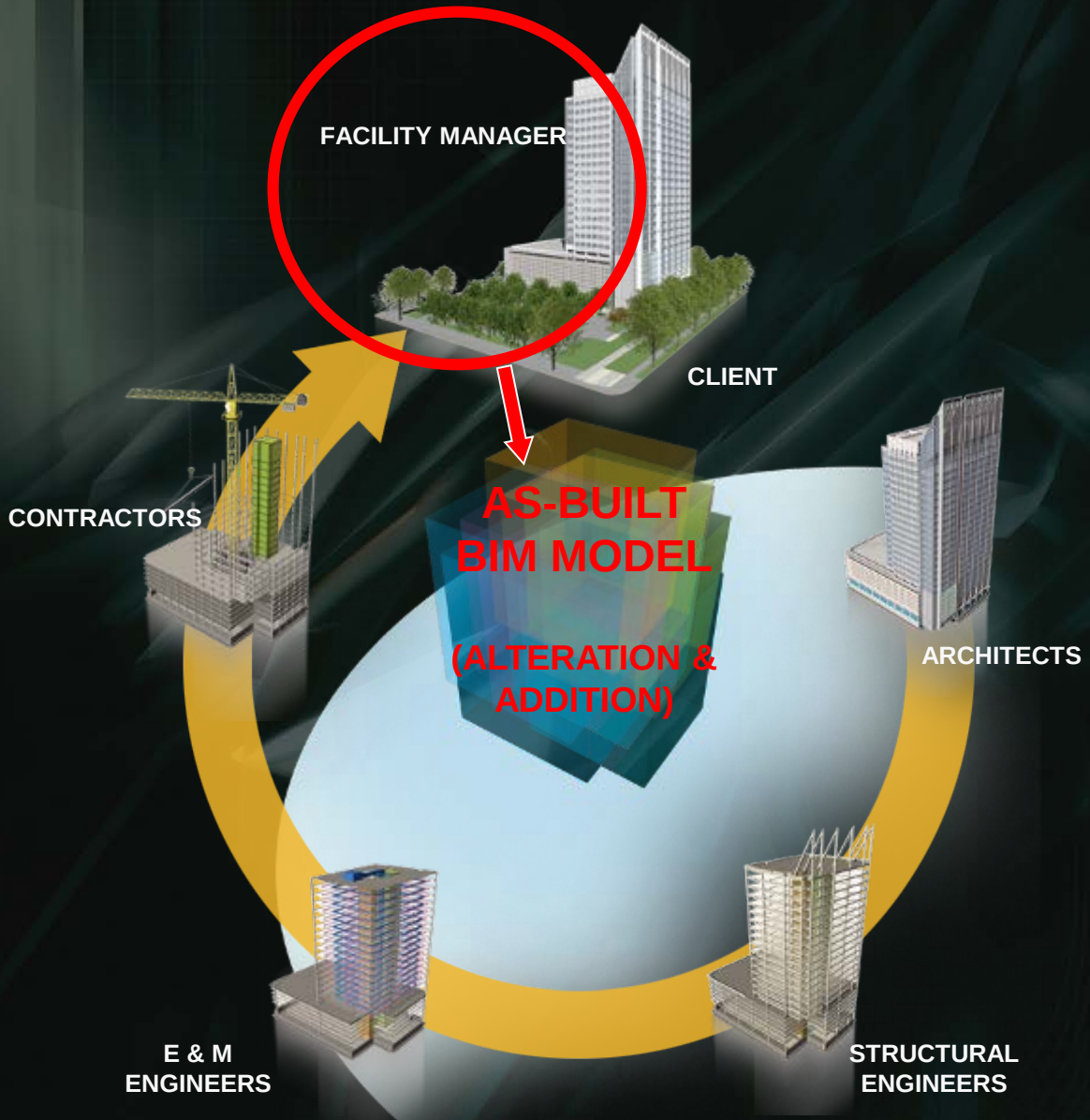


HOW BIM WORKS?




CONSTRUCTION BIM MODEL
FACILITY MANAGER
SUB - CONTRACTORS
SUB - CONTRACTORS
SUB - CONTRACTORS
CONTRACTORS
CLIENT
CONSTRUCTION BIM MODEL
ARCHITECTS
QS
E & M ENGINEERS
STRUCTURAL ENGINEERS

AS BUILT BIM MODEL

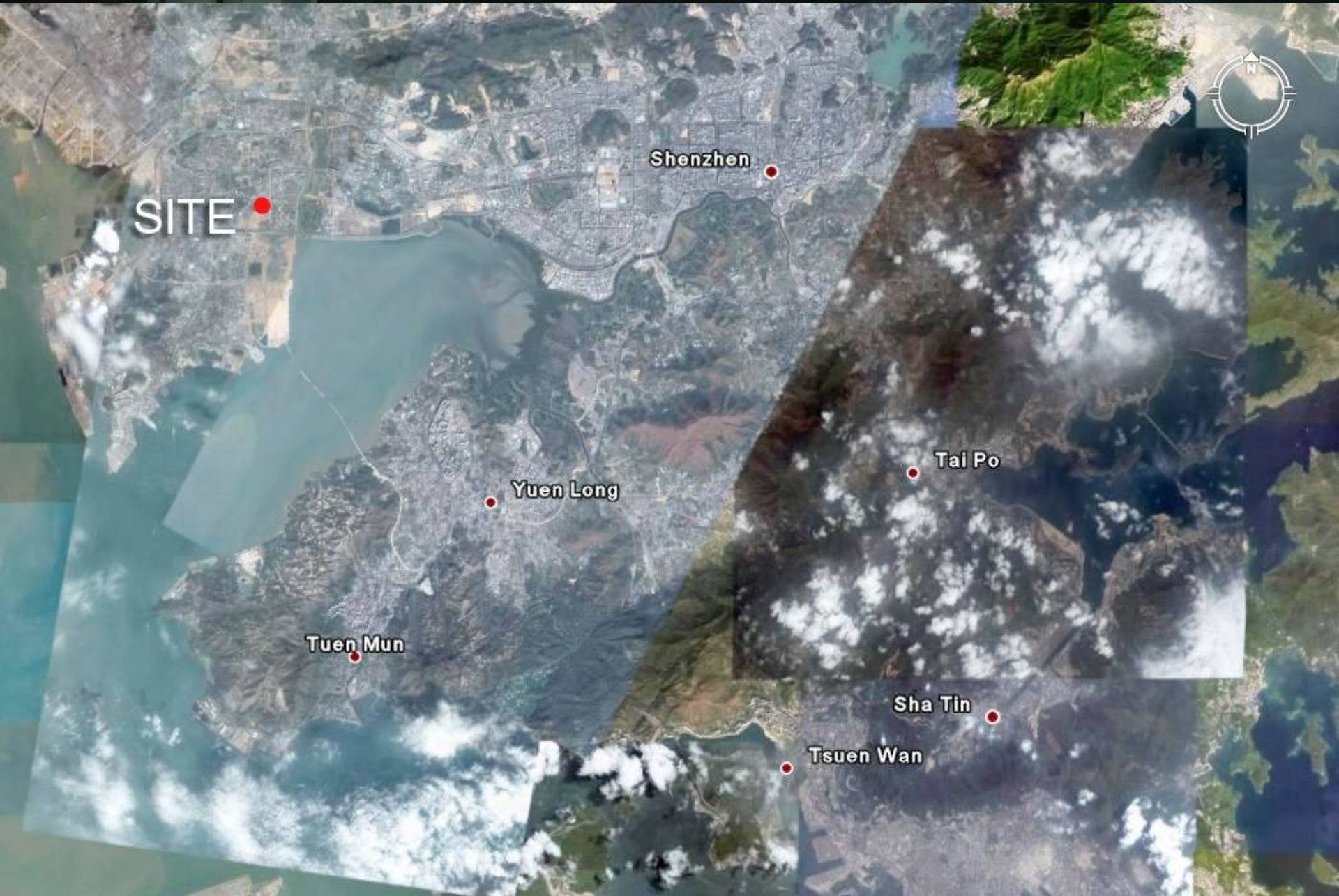


The Hong Kong Polytechnic University

Campus in the Shenzhen Virtual University Science Park

Location	Shenzhen
Building Type	Institutional – Theatre, laboratories, classrooms, library, offices and adminstration
GFA	12,500 sq.m + 4,000 sq.m basement
Completion	End of 2009
Client	Hong Kong Polytechnic University
Architect	Aedas Ltd
Structural Engineer	Scott Wilson (Benaim (China) Ltd.)
E/M Engineer	JRP

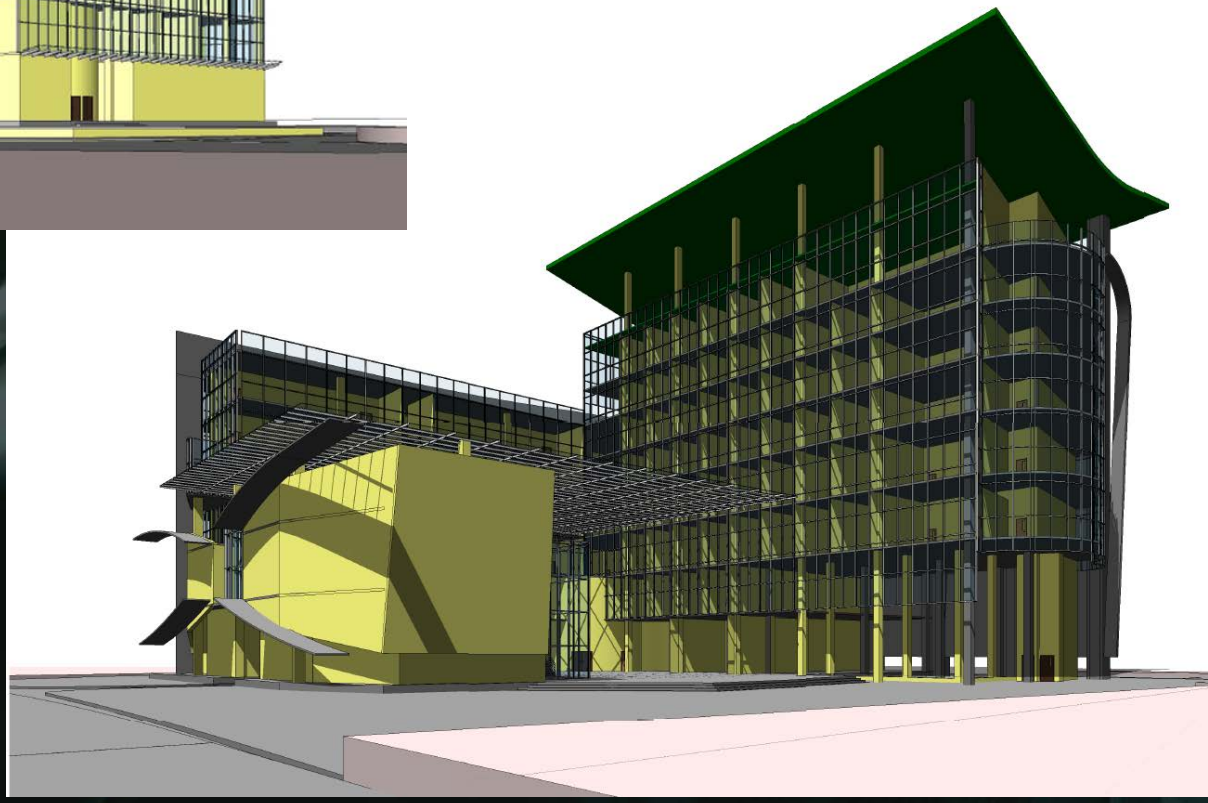
LOCATION



SITE

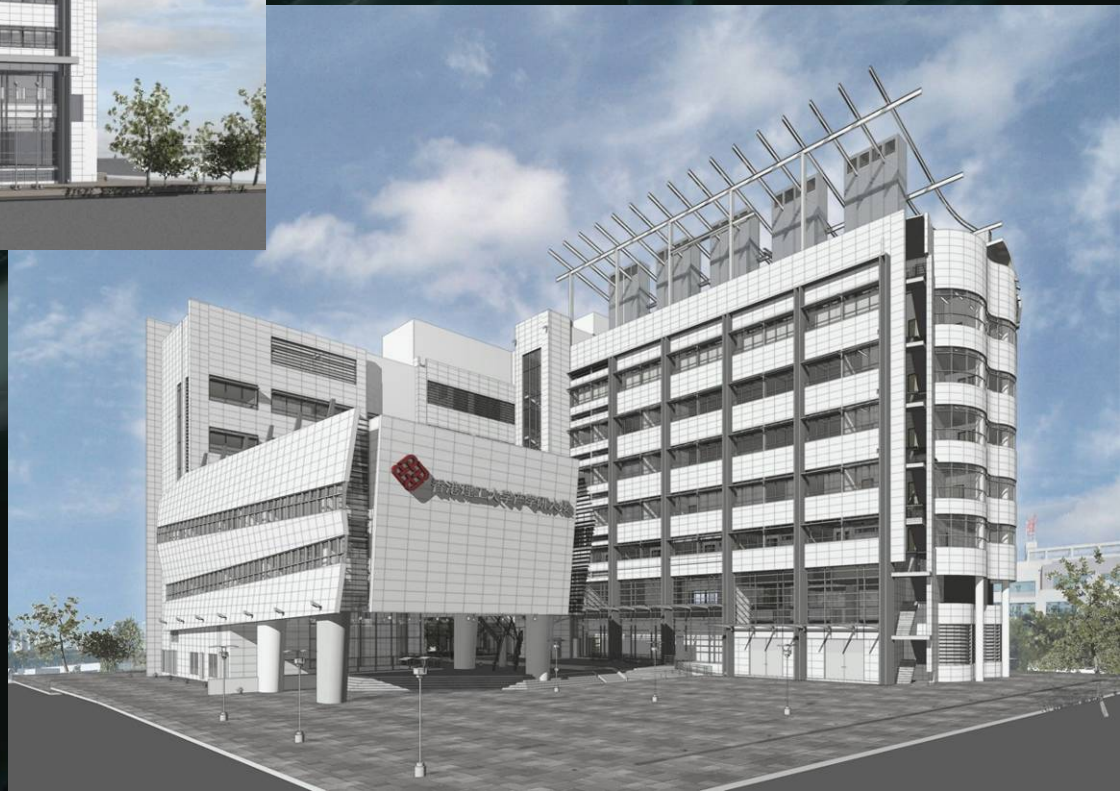
SITE

EARLY DESIGN IDEAS



DEVELOPING DESIGN IDEAS

DEVELOPED DESIGN IDEAS



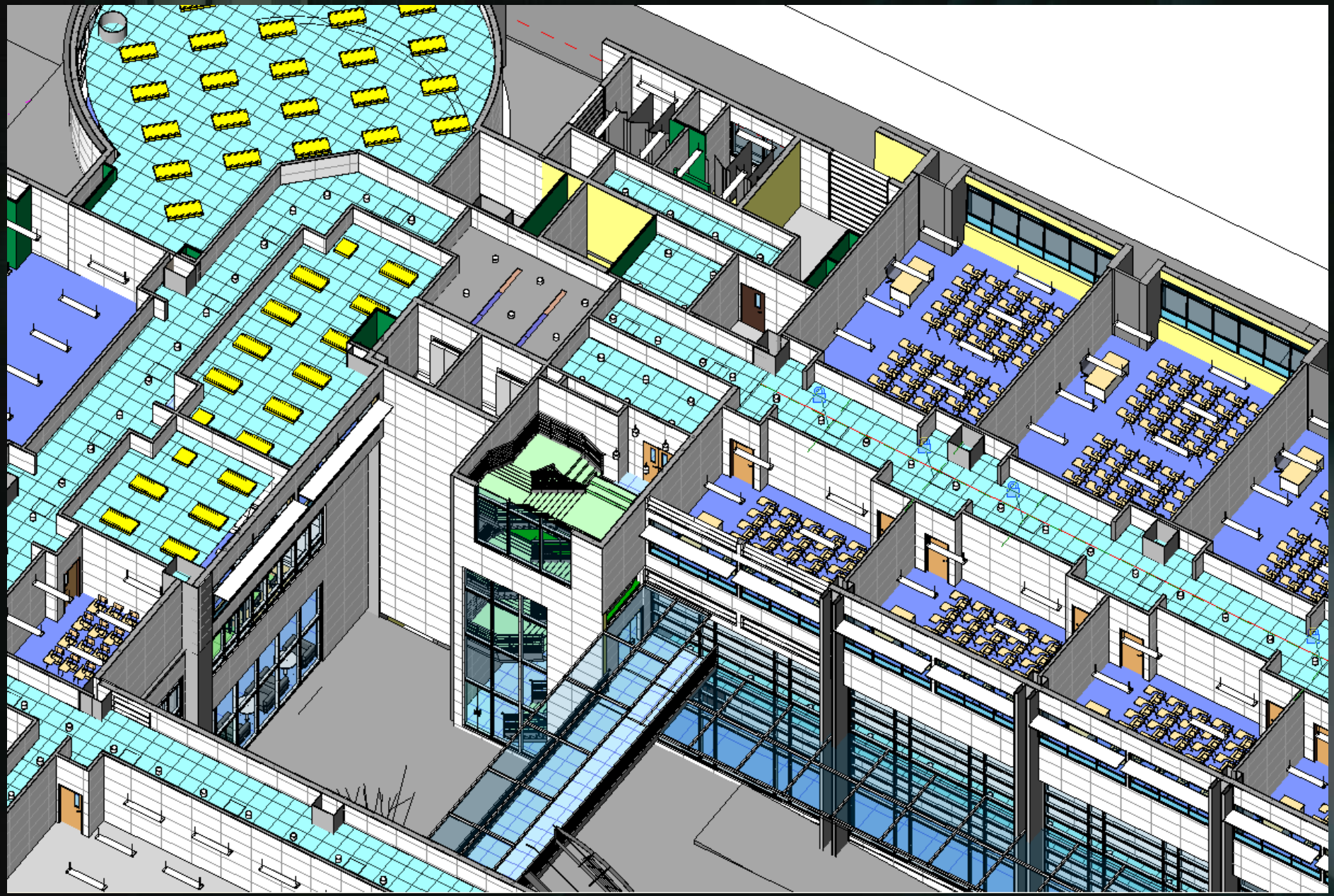
TESTING MASSING IN GOOGLE EARTH

PRESENTING DESIGN IDEAS

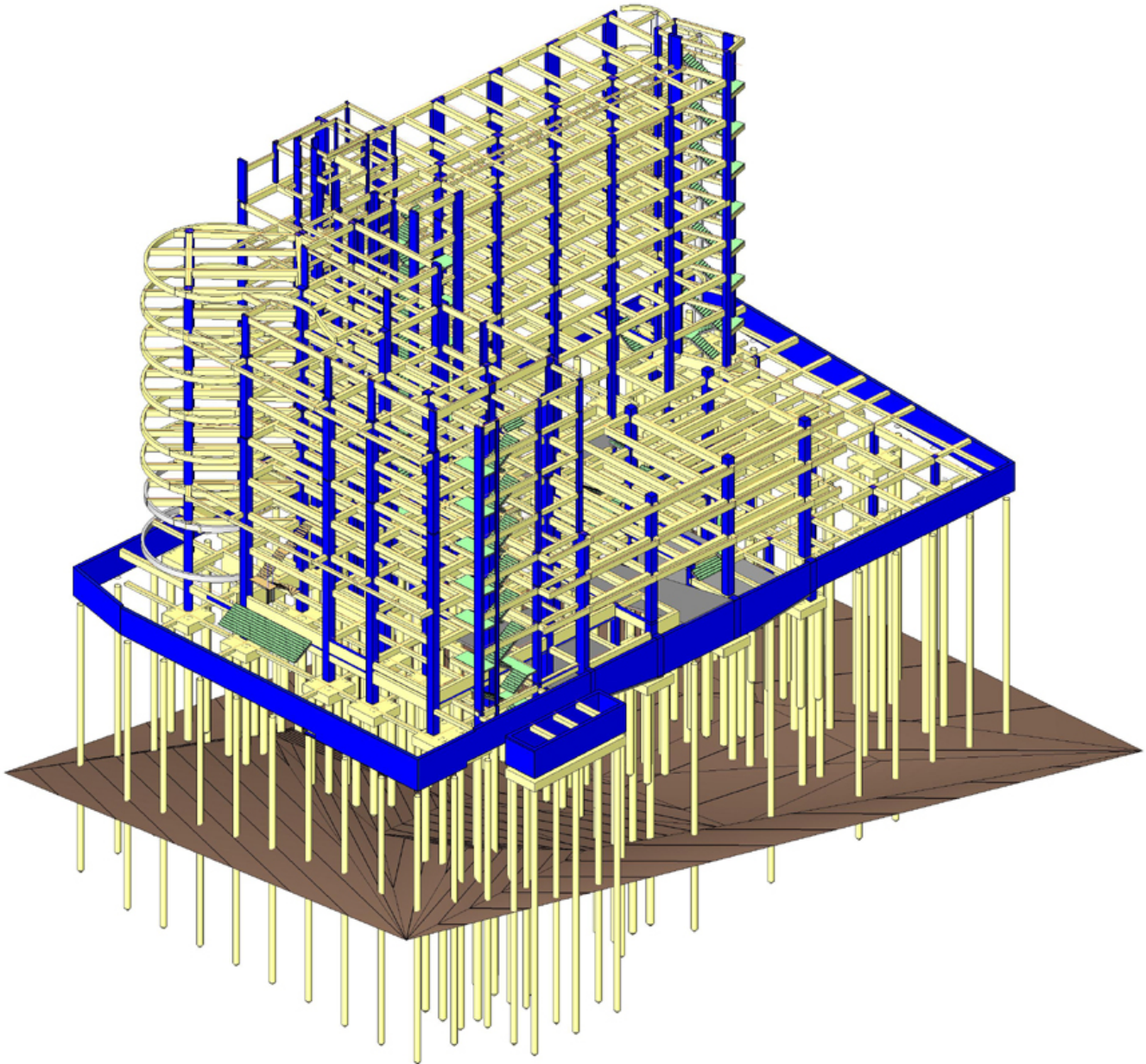
LIFT LOBBY
DESIGN CONCEPT

DETAILED DESIGN

ARCHITECTURAL CO-ORDINATION

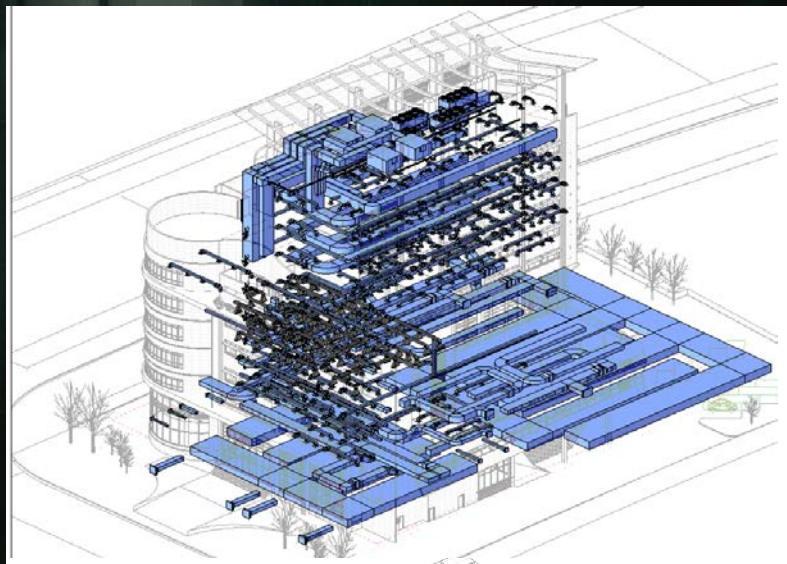


STRUCTURAL DESIGN MODEL

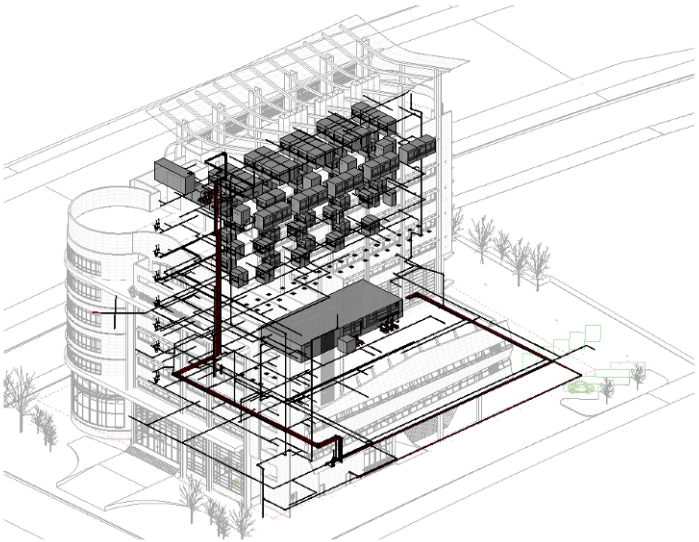


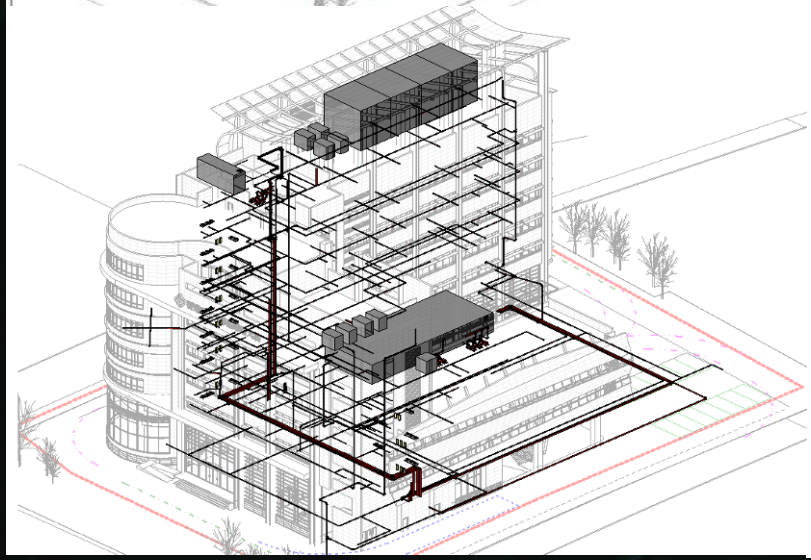
BUILDING SERVICES CO-ORDINATION

HVAC Installation

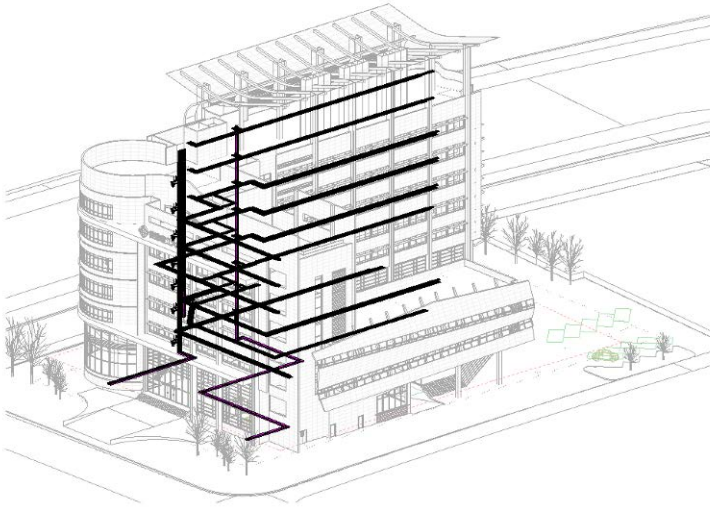


Fire Services Installation



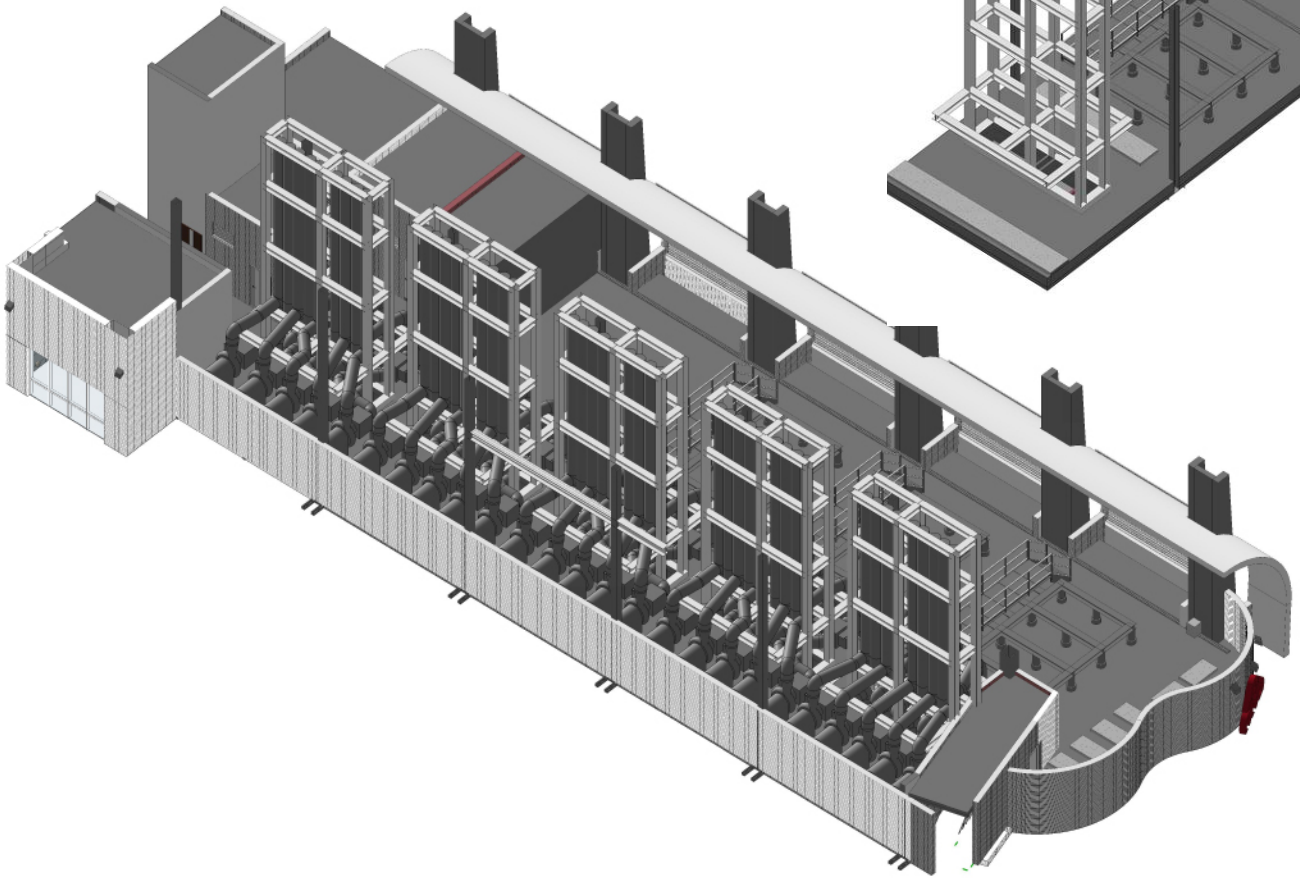


P/D Installation

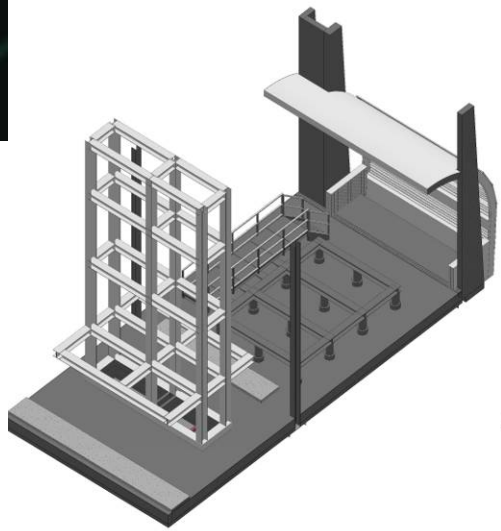


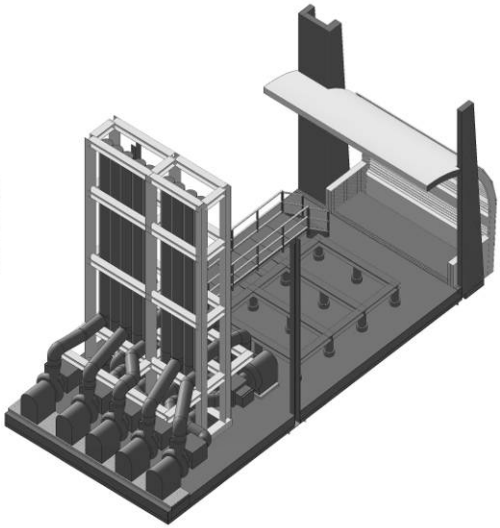
Electricity Installation

SPECIAL CO-ORDINATION - LABORATORIES



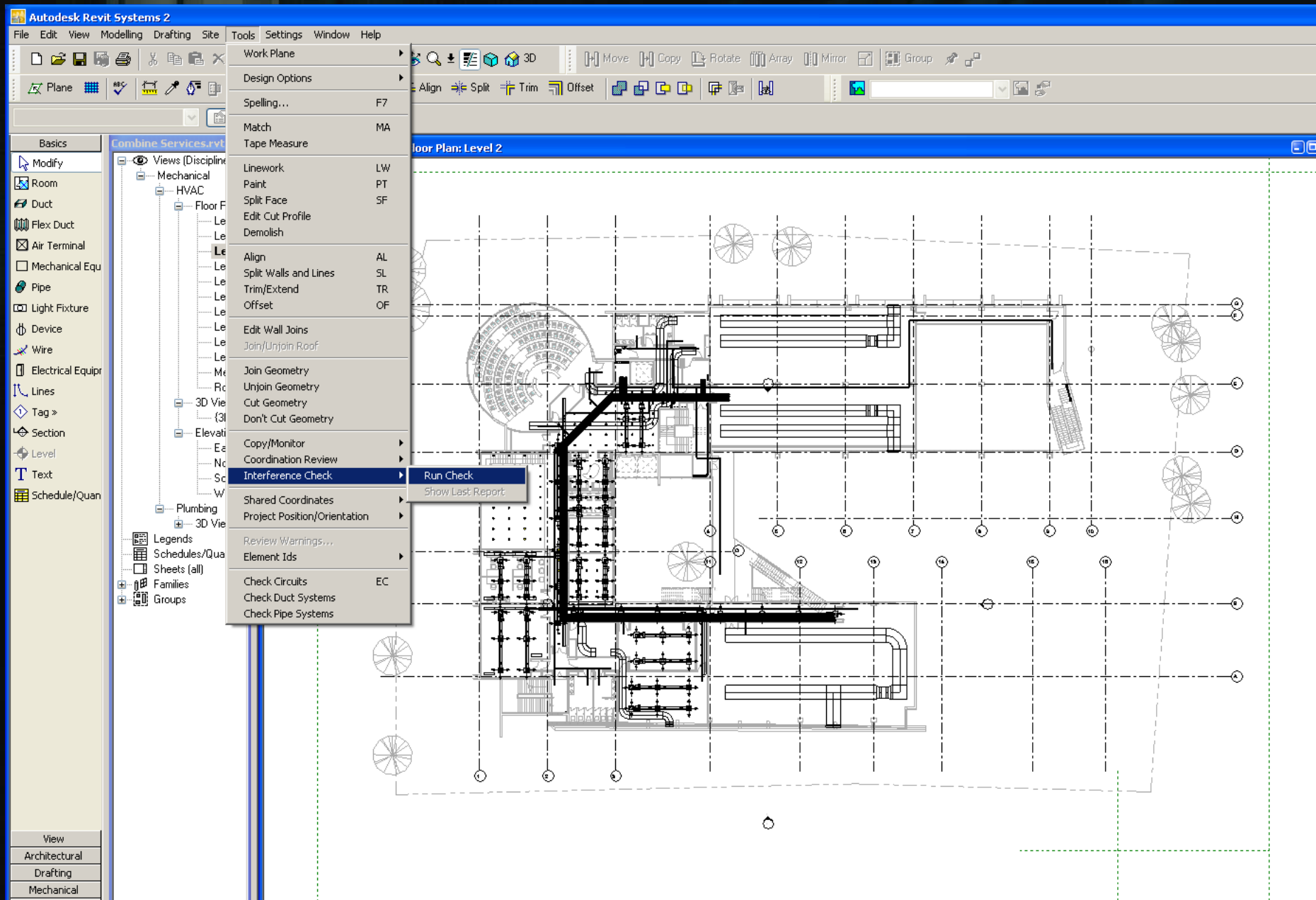
1 层抽气系统支承台立体图一（只供参考）



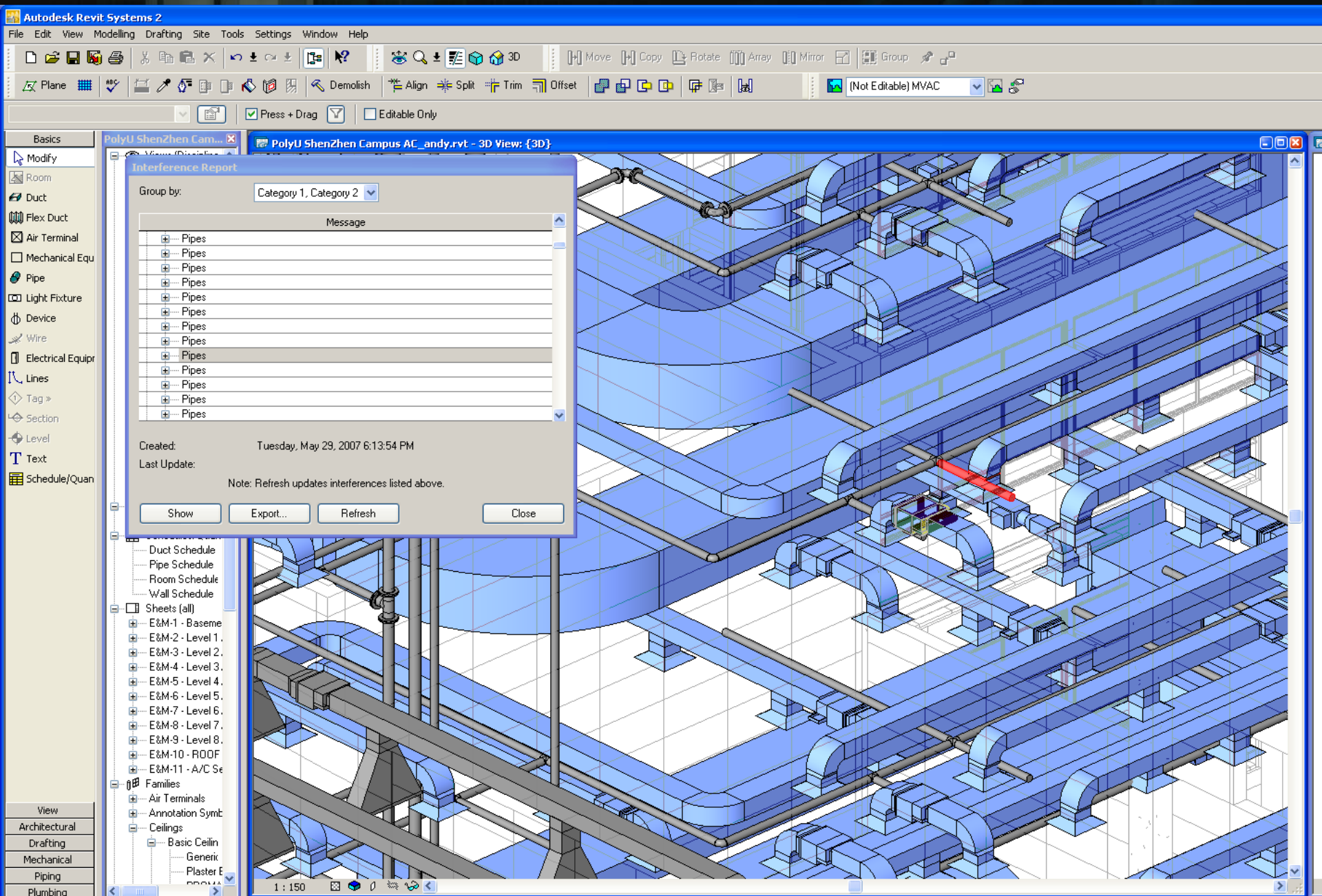


CO-ORDINATED DETAILED DESIGN

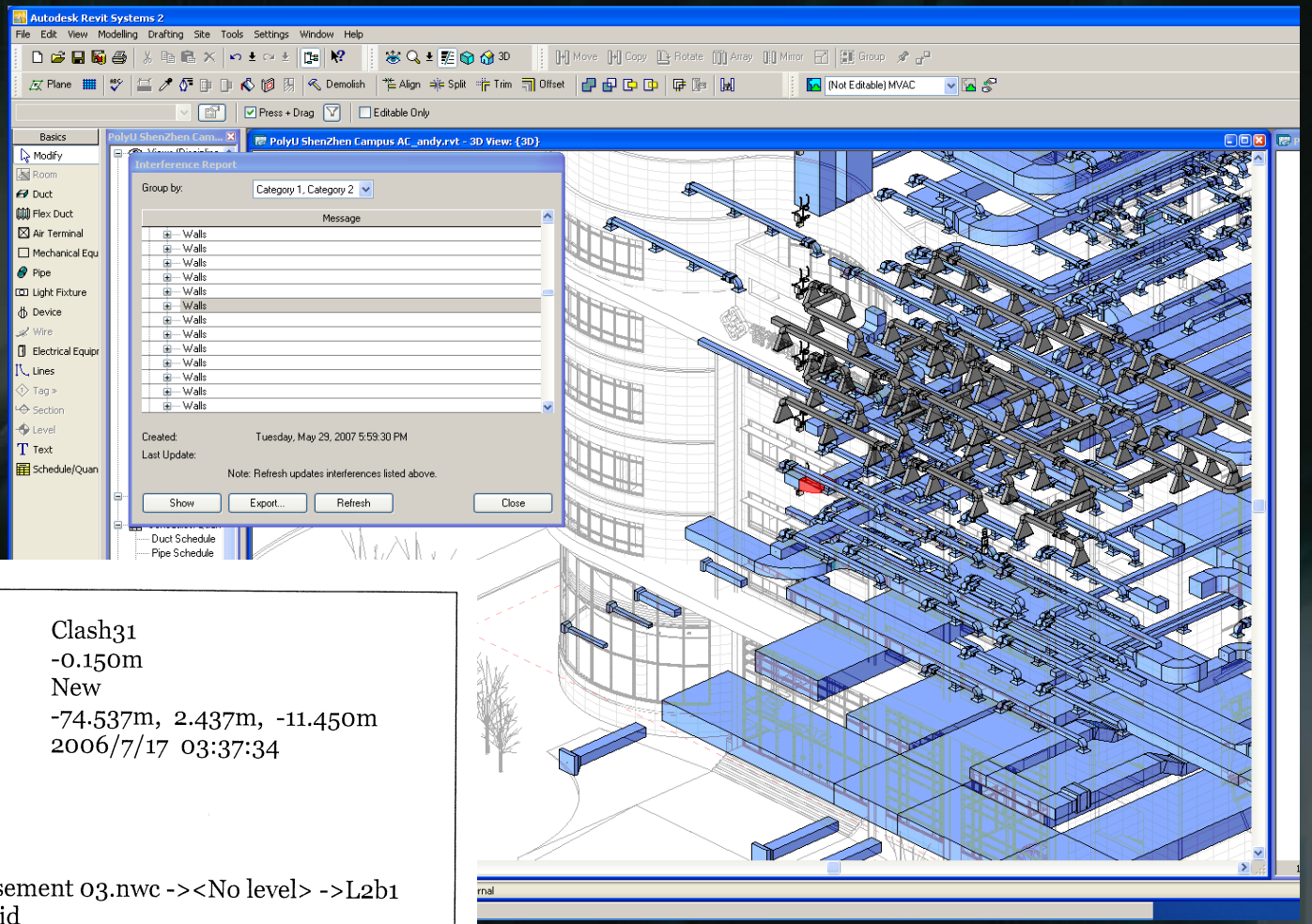
CLASH ANALYSIS

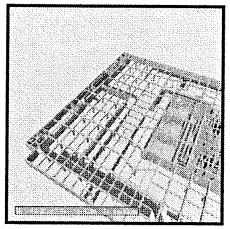


CLASH ANALYSIS



CLASH ANALYSIS 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

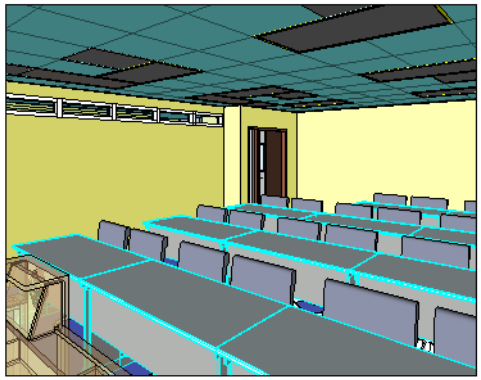
Path File ->File ->Basement 03.nwc -><No level> ->L2b1 500 x 700 ->L2b1 500 x 700 ->Solid

Item 2

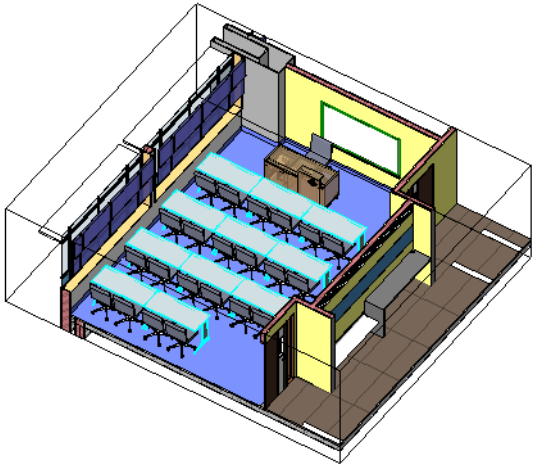
Entity Handle 2AD6

Path File ->File ->B3HVAC_Duct.nwd ->H-Ductwork-G ->Duct

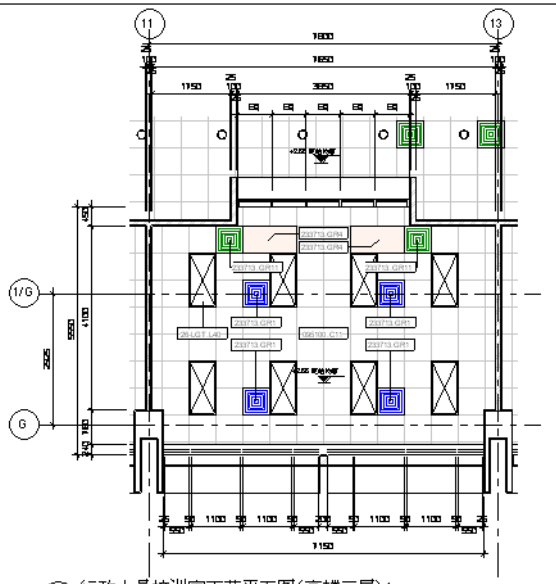
PRODUCTION OF CONSTRUCTION DRAWINGS



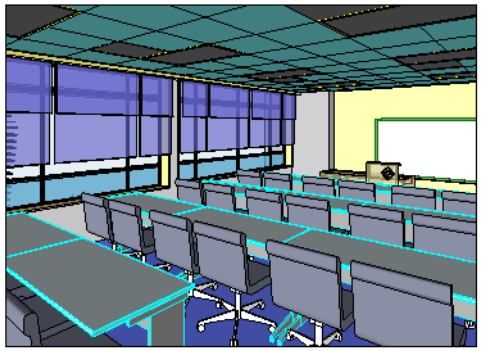
6 行政人员培訓室立体示意图2



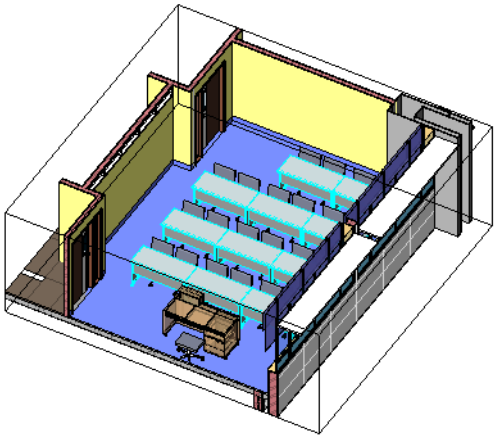
4 行政人员培训室立体剖面示意图2



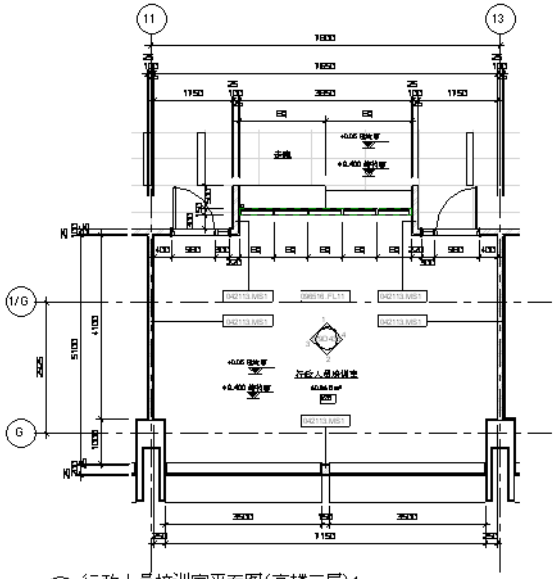
2 行政人员培训室天花平面图(高楼三层)1
1 : 50



5 行政人员培訓室立体示意图1



3 行政人员培训室立体剖面示意图1



1 行政人员培训室平面图(高楼三层)1
1 : 50

AUTHORIZE PERSON
EXCEPT AREA

Structural Engineer
BEAM

benaim

M & E
J.ROGER PRESTON

Q.S
利比 RLB | Rider Levett Bucknall

Aedas
Aedas Ltd.
18th Floor
1063 King's Road
Quarry Bay
Hong Kong
T +852 2961 1728
F +852 2524 4419
E hongkong@aedas.com
aedas.com

Client
THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Project
香港理工大學西九龍「學術港」

Drawing
行政人员培训室平面图(高楼三层)1

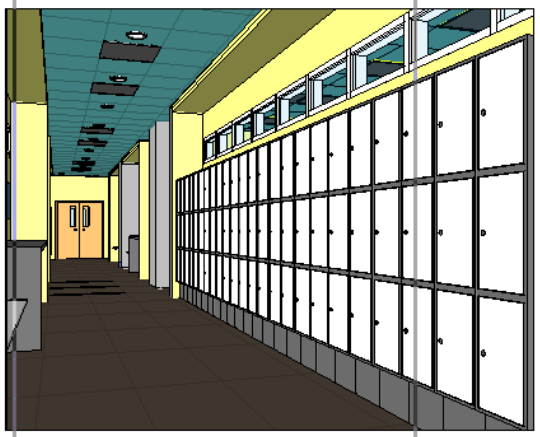
Drawing Number
FTB 0430

Scale
1 : 50

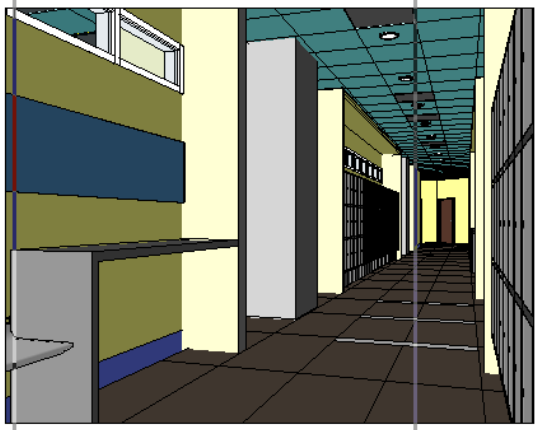
Rev.
REV.

Issue Status
TENDER

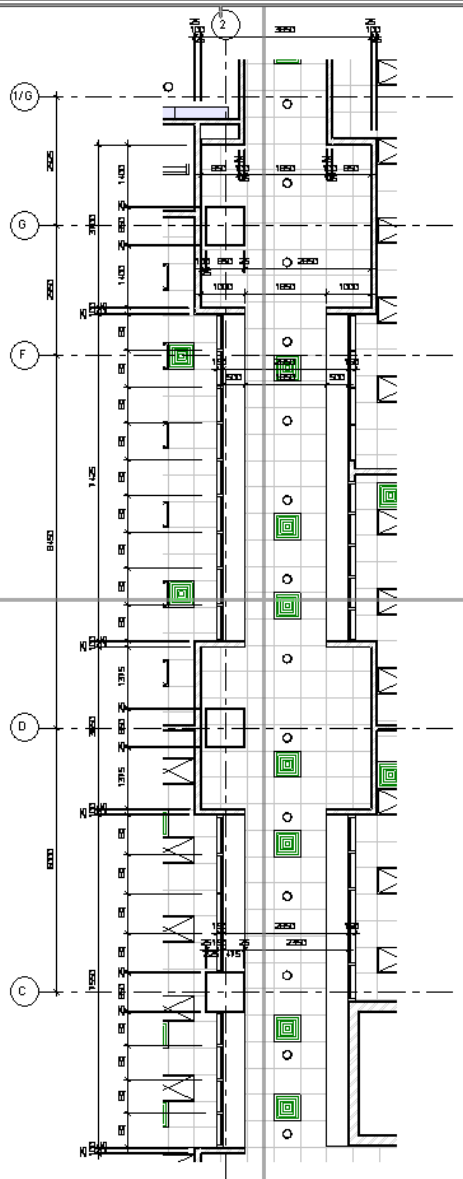
PRODUCTION OF CONSTRUCTION DRAWINGS



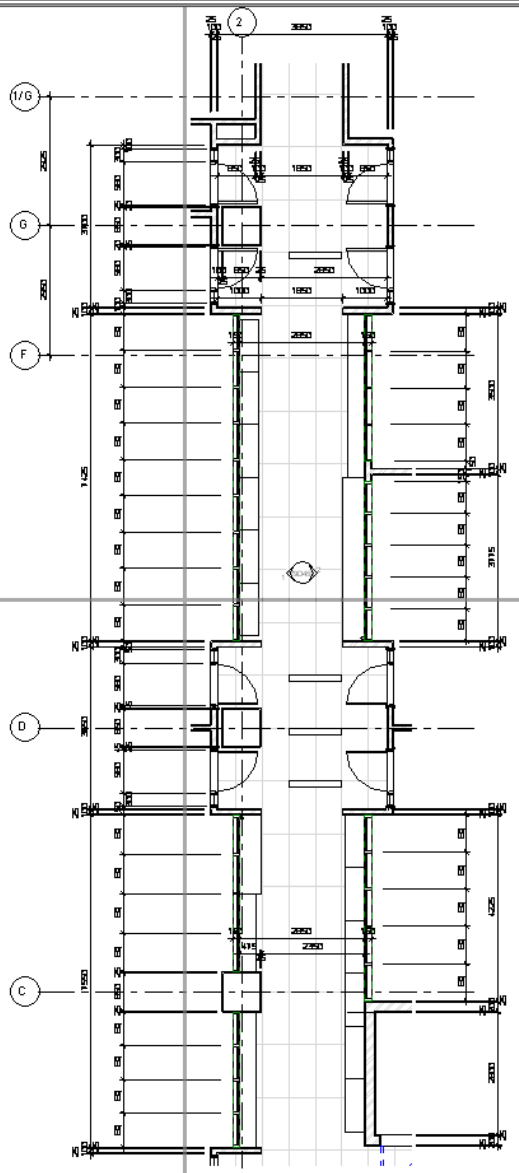
4 走廊立体示意图(低楼三至四层)2



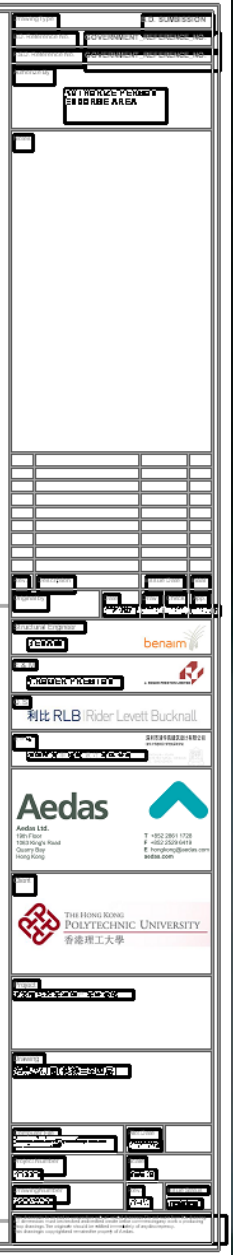
3 走廊立体示意图(低楼三至四层)1



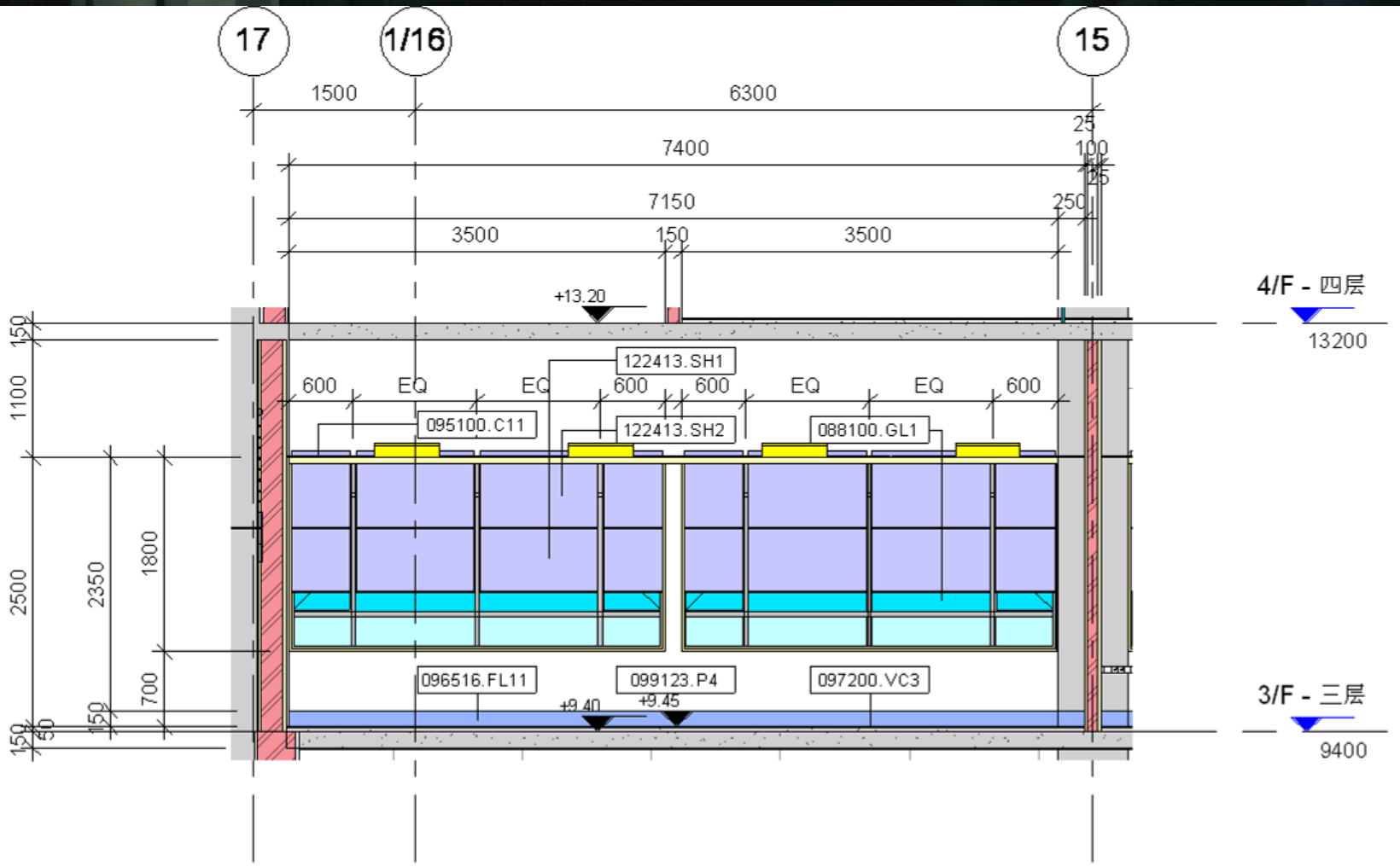
2 走廊天花平面图(低楼三至四层)
1 : 50



1 走廊平面图(低楼三至四层)
1 : 50



PRODUCTION OF DRAWINGS



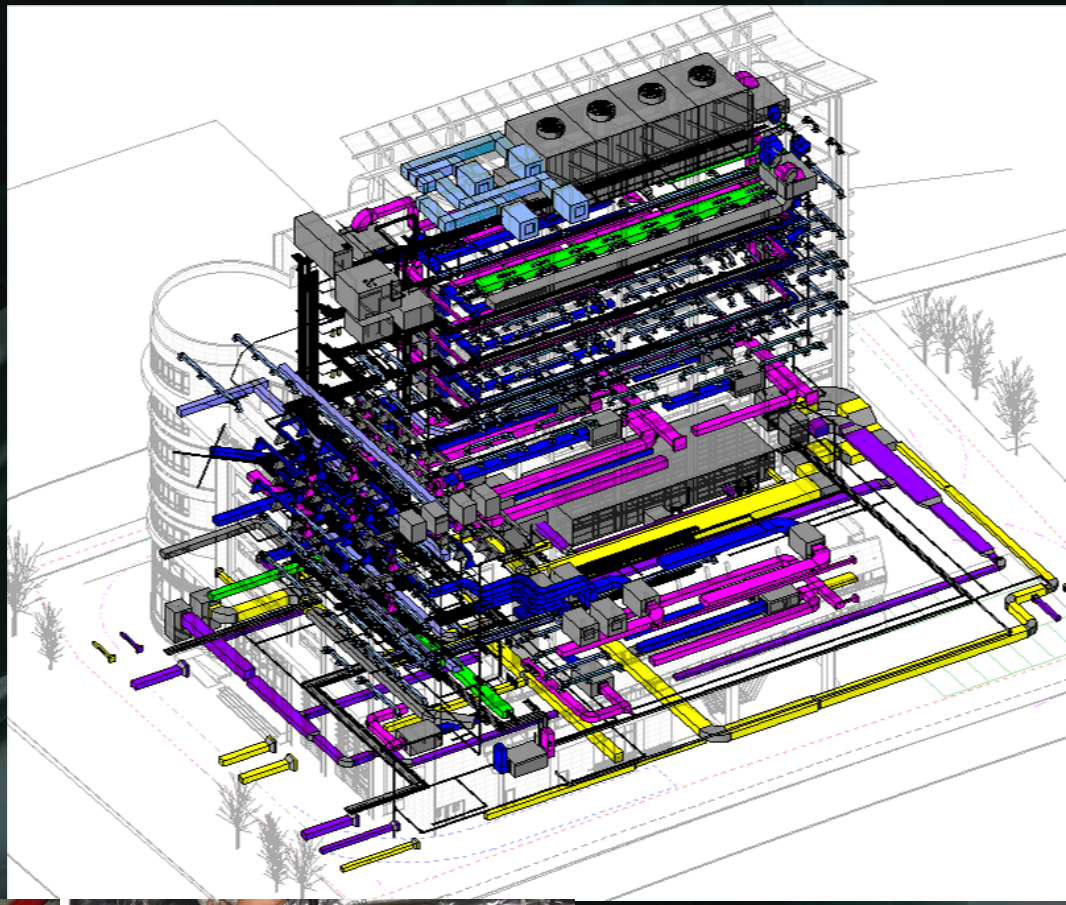
2 行政人员培训室立面图(高楼三层)6

1 : 50

CONSTRUCTION

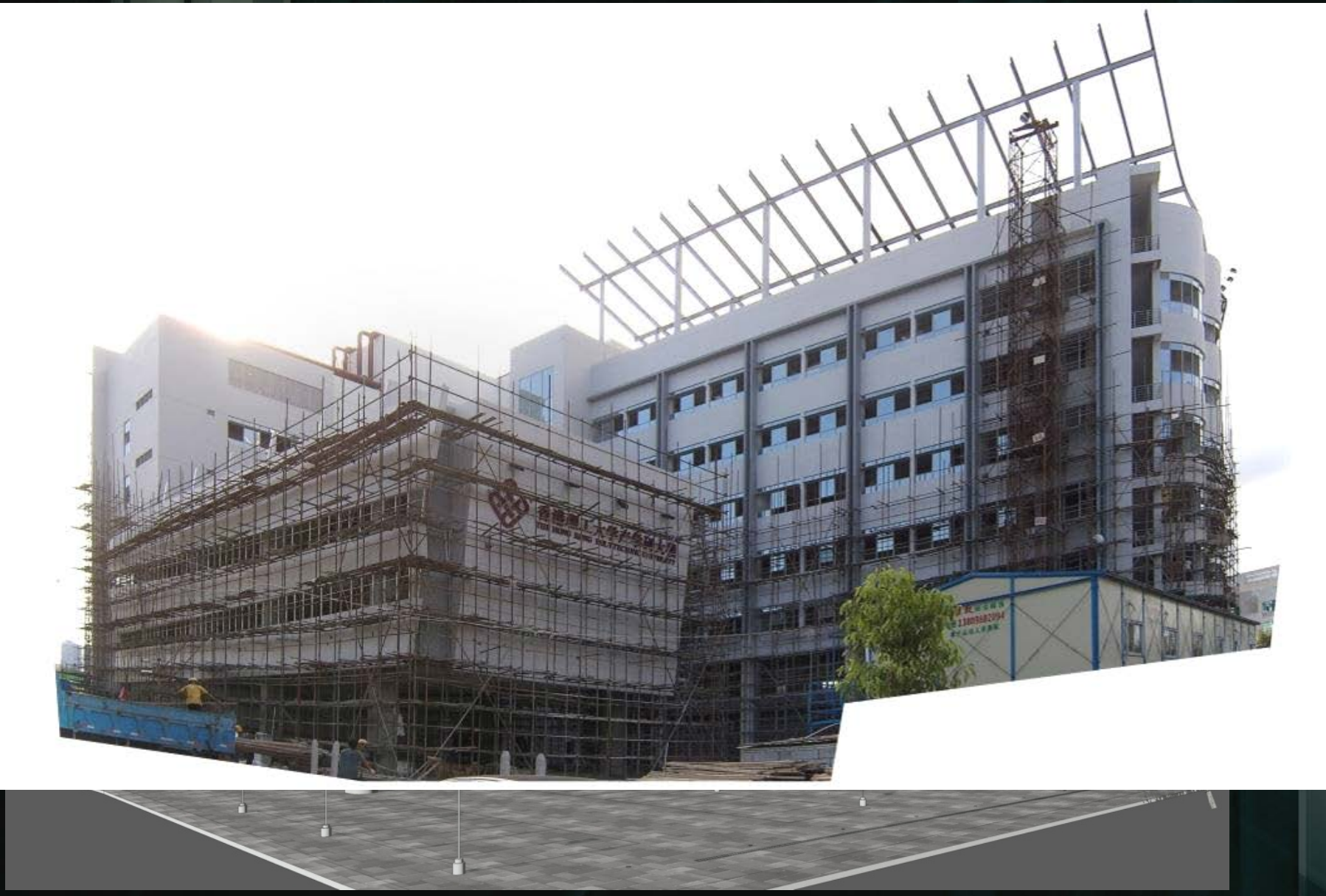
CONSTRUCTION

BUILDING SERVICES CONSTRUCTION



CONSTRUCTION

DEVELOPMENT



BIM 的運用範圍

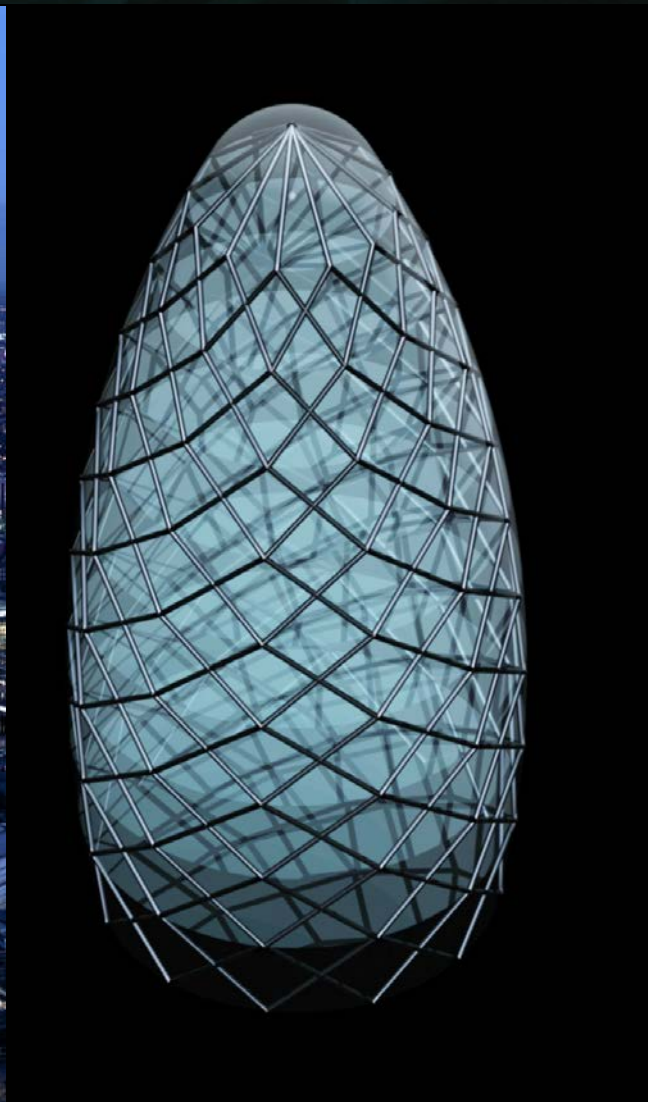
1. Design visualization　型像化設計
2. Drawing Productions　製作圖件
3. Services Co-ordination and Clash detection with other disciplines　各專業協調
4. Quantity taking and preparation of Tender Document　投標文件
5. Automated Statutory Submission　自動化審批
6. Scientific analysis of different environmental aspects　科學性分析
7. Supply Chain Integration with the manufacturing and production　生產制造
8. Complex Geometry　複雜幾何形狀

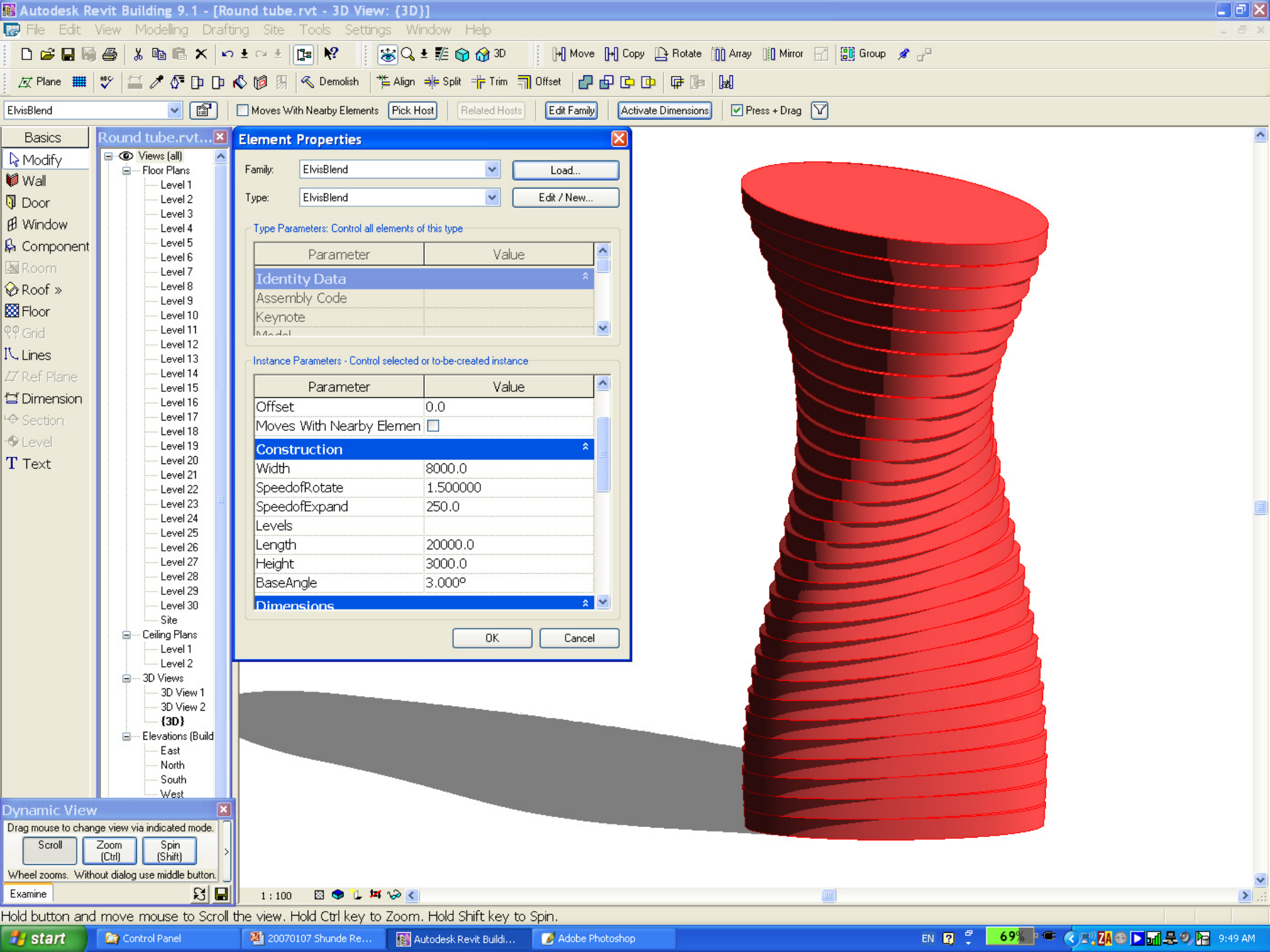
Parametric Modelling

- Use parameters to drive the model
- Relates related to the approach taken in the design process than the software tools an architect uses.
- Creating and modifying these relationships is an important part of the design process. A parametric model is often defined by rules and constraints. Changing a rule or constraint, or modifying a part of the model itself, often has implications in the entire model.
- Why Changes? - Responses to environmental conditions such as sun and shadows, zoning criteria, views, and size (floor areas and program verification, façade surface areas, volume), aesthetics; or other requirements.

Parametric Modelling

"Design a Design Tool" - Thinking creatively and not being constrained by one's own thinking or by a limiting set of tools is the key to innovative designs and design processes.




Autodesk Revit Building 9.1 - [Round tube.rvt - 3D View: {3D}]
File Edit View Modelling Drafting Site Tools Settings Window Help
Move Copy Rotate Array Mirror Group
Plane Demolish Align Split Trim Offset
ElvisBlend
Moves With Nearby Elements
Pick Host
Related Hosts
Edit Family
Activate Dimensions
Press + Drag
Basics
Modify
Wall
Door
Window
Component
Room
Roof
Floor
Grid
Lines
Ref Plane
Dimension
Section
Level
Text
Round tube.rvt...
Views (all)
Floor Plans
Level 1
Level 2
Level 3
Level 4
Level 5
Level 6
Level 7
Level 8
Level 9
Level 10
Level 11
Level 12
Level 13
Level 14
Level 15
Level 16
Level 17
Level 18
Level 19
Level 20
Level 21
Level 22
Level 23
Level 24
Level 25
Level 26
Level 27
Level 28
Level 29
Level 30
Site
Ceiling Plans
Level 1
Level 2
3D Views
3D View 1
3D View 2
{3D}
Elevations (Build
East
North
South
West
Element Properties
Family: ElvisBlend
Load...
Type: ElvisBlend
Edit / New...
Type Parameters: Control all elements of this type
Parameter
Value
Identity Data
Assembly Code
Keynote
Instance Parameters - Control selected or to-be-created instance
Parameter
Value
Offset 0.0
Moves With Nearby Elemen
Construction
Width 8000.0
SpeedofRotate 1.500000
SpeedofExpand 250.0
Levels
Length 20000.0
Height 3000.0
BaseAngle 3.000°
Dimensions
OK
Cancel
Dynamic View
Drag mouse to change view via indicated mode.
Scroll
Zoom (Ctrl)
Spin (Shift)
Wheel zooms. Without dialog use middle button.
Examine
1 : 100
Hold button and move mouse to Scroll the view. Hold Ctrl key to Zoom. Hold Shift key to Spin.
start
Control Panel
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Autodesk Revit Buildi...
Adobe Photoshop
EN
69%
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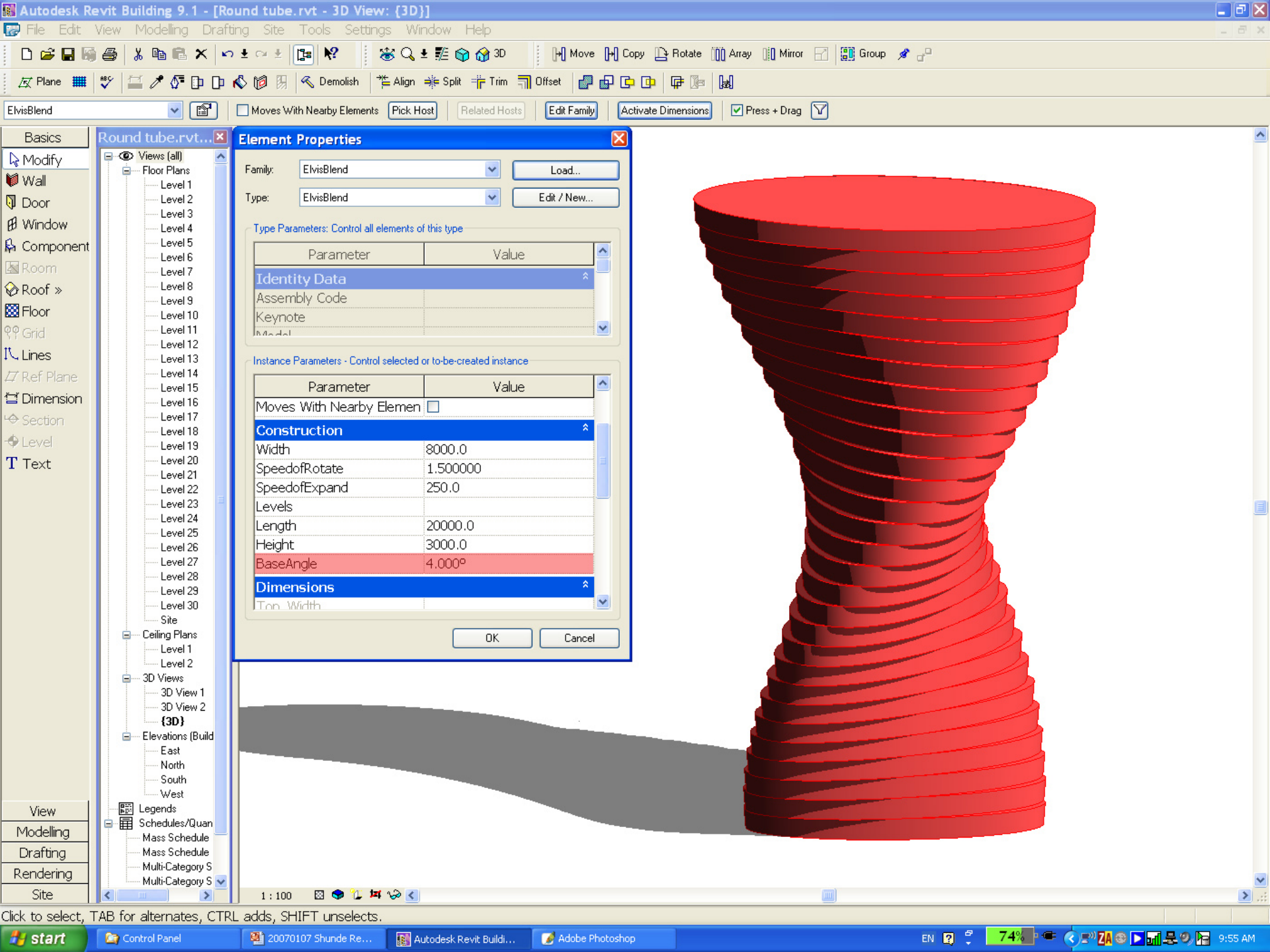
Autodesk Revit Building 9.1 - [Round tube.rvt - 3D View: {3D}]
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Move Copy Rotate Array Mirror Group
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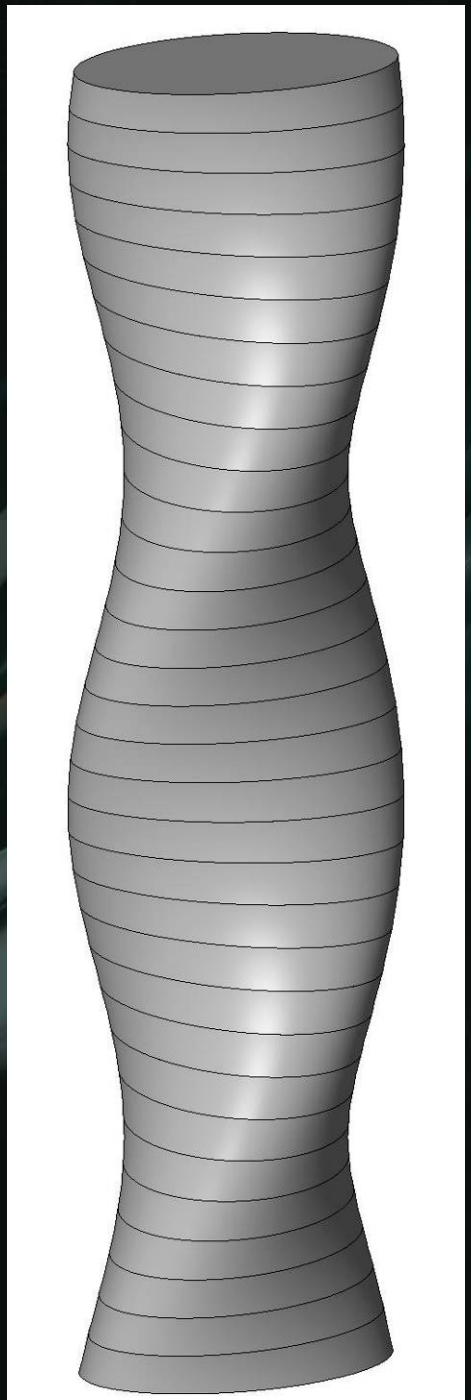
Activate Dimensions
Press + Drag
Basics
Modify
Wall
Door
Window
Component
Room
Roof
Floor
Grid
Lines
Ref Plane
Dimension
Section
Level
Text
Round tube.rvt...
Views (all)
Floor Plans
Level 1
Level 2
Level 3
Level 4
Level 5
Level 6
Level 7
Level 8
Level 9
Level 10
Level 11
Level 12
Level 13
Level 14
Level 15
Level 16
Level 17
Level 18
Level 19
Level 20
Level 21
Level 22
Level 23
Level 24
Level 25
Level 26
Level 27
Level 28
Level 29
Level 30
Site
Ceiling Plans
Level 1
Level 2
3D Views
3D View 1
3D View 2
{3D}
Elevations (Build
East
North
South
West
Legends
Schedules/Quan
Mass Schedule
Mass Schedule
Multi-Category S
Multi-Category S
View
Modelling
Drafting
Rendering
Site
Element Properties
Family: ElvisBlend
Load...
Type: ElvisBlend
Edit / New...
Type Parameters: Control all elements of this type
Parameter
Value
Identity Data
Assembly Code
Keynote
Instance Parameters - Control selected or to-be-created instance
Parameter
Value
Moves With Nearby Elemen
Construction
Width 8000.0
SpeedofRotate 1.500000
SpeedofExpand 250.0
Levels
Length 20000.0
Height 3000.0
BaseAngle 4.000°
Dimensions
OK
Cancel
1 : 100
Click to select, TAB for alternates, CTRL adds, SHIFT unselects.
start
Control Panel
20070107 Shunde Re...
Autodesk Revit Buildi...
Adobe Photoshop
EN
74%
9:55 AM



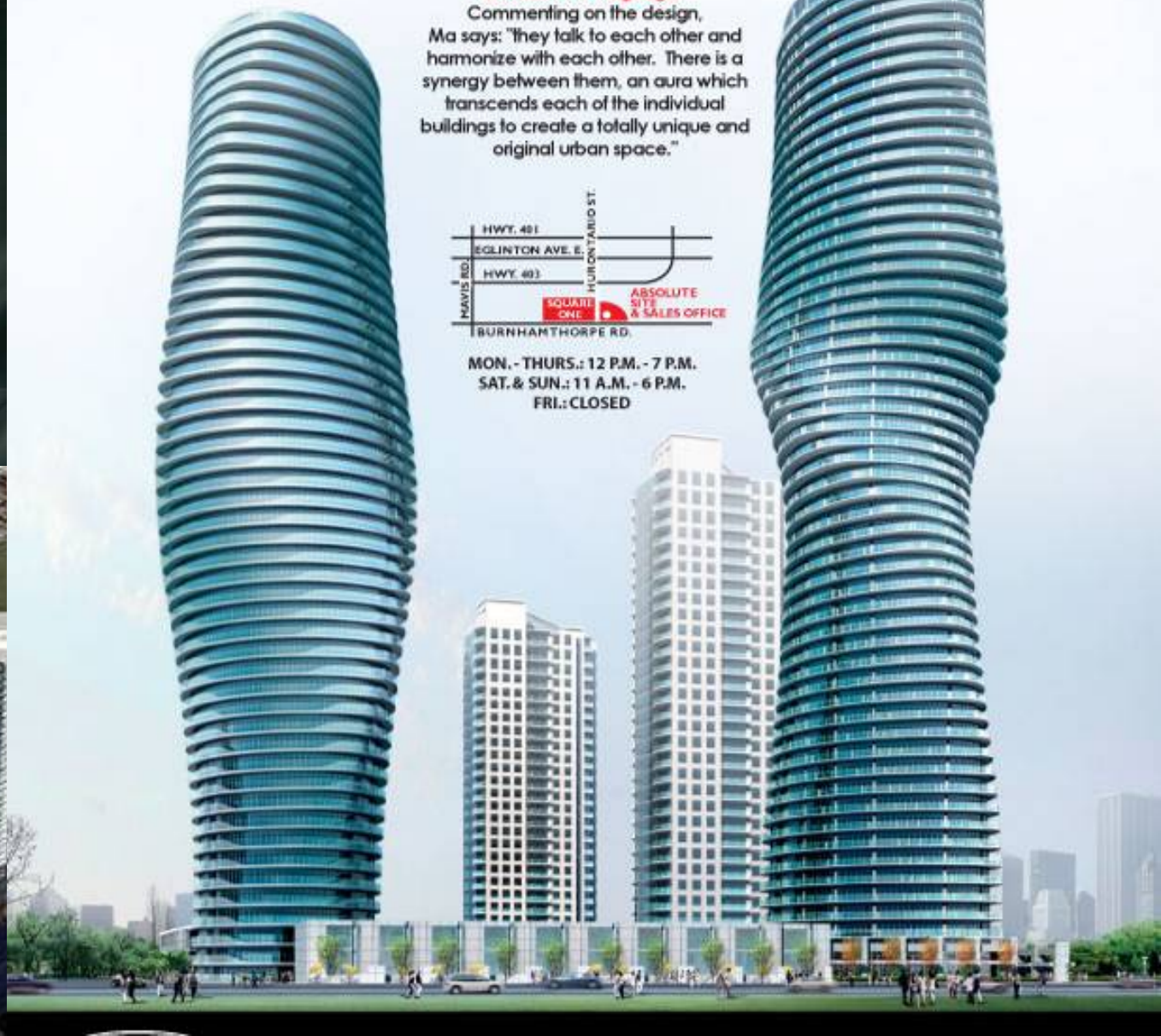
absoluteworld
BUILDING 2

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."

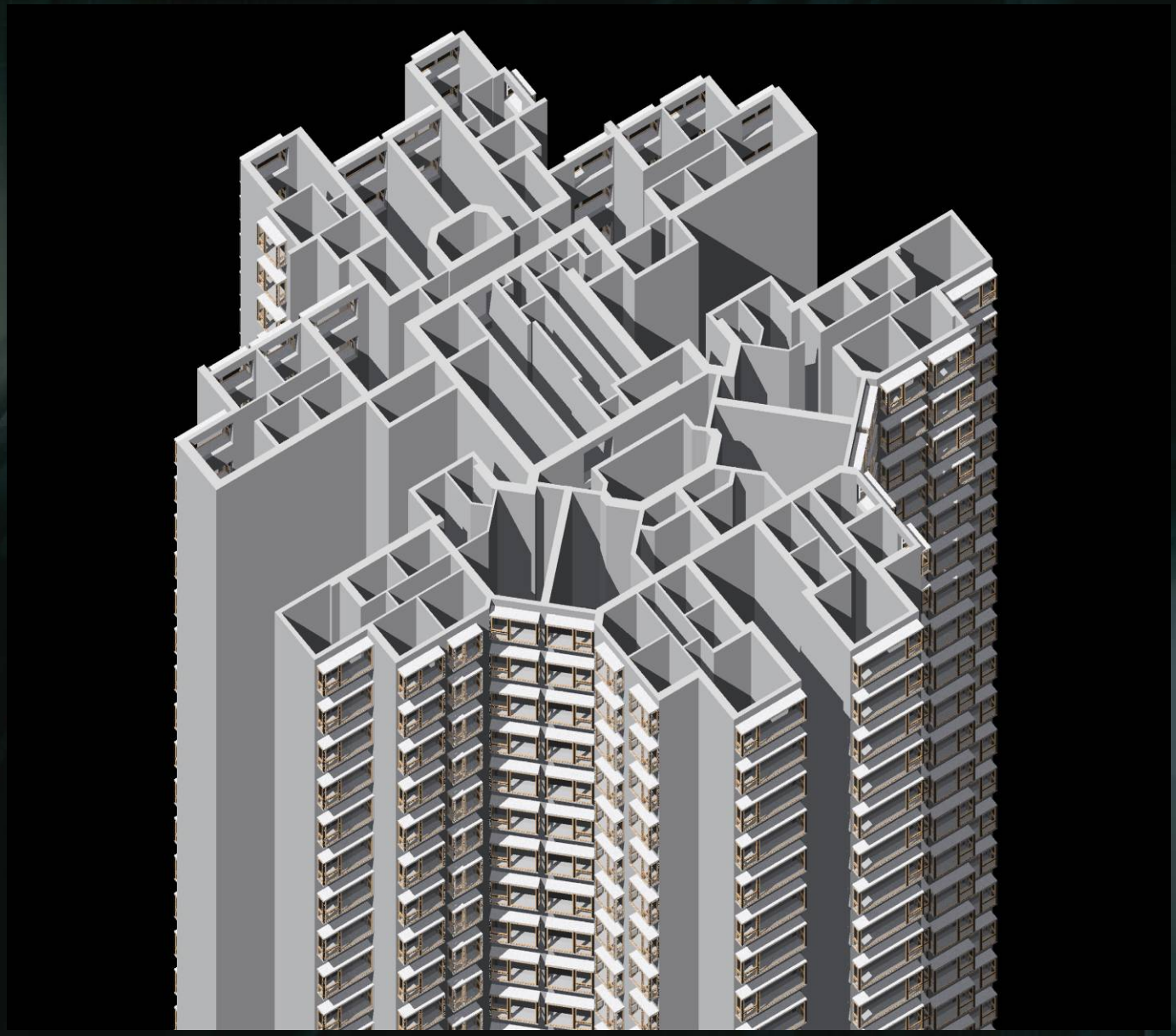
absoluteworld
BUILDING 1

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



REPETITIONS vs VARIATIONS

PARAMETRIC MODELLING



Autodesk Revit Building 9.1 - [AED-Bay Window.rfa - 3D View: View 1]

File Edit View Modelling Drafting Site Tools Settings Window Help

Move Copy Rotate Array Mirror Group

Plane Demolish Align Split Trim Offset

Family

Modify
Family Typ
Dimension
Model Lines
Symbolic Lir
Opening...
Ref Plane
Reference L
Control
Text
Model Text
Section
Component
Symbol
Detail Comp
Solid Form
Void Form
Load into Pr

Family Types

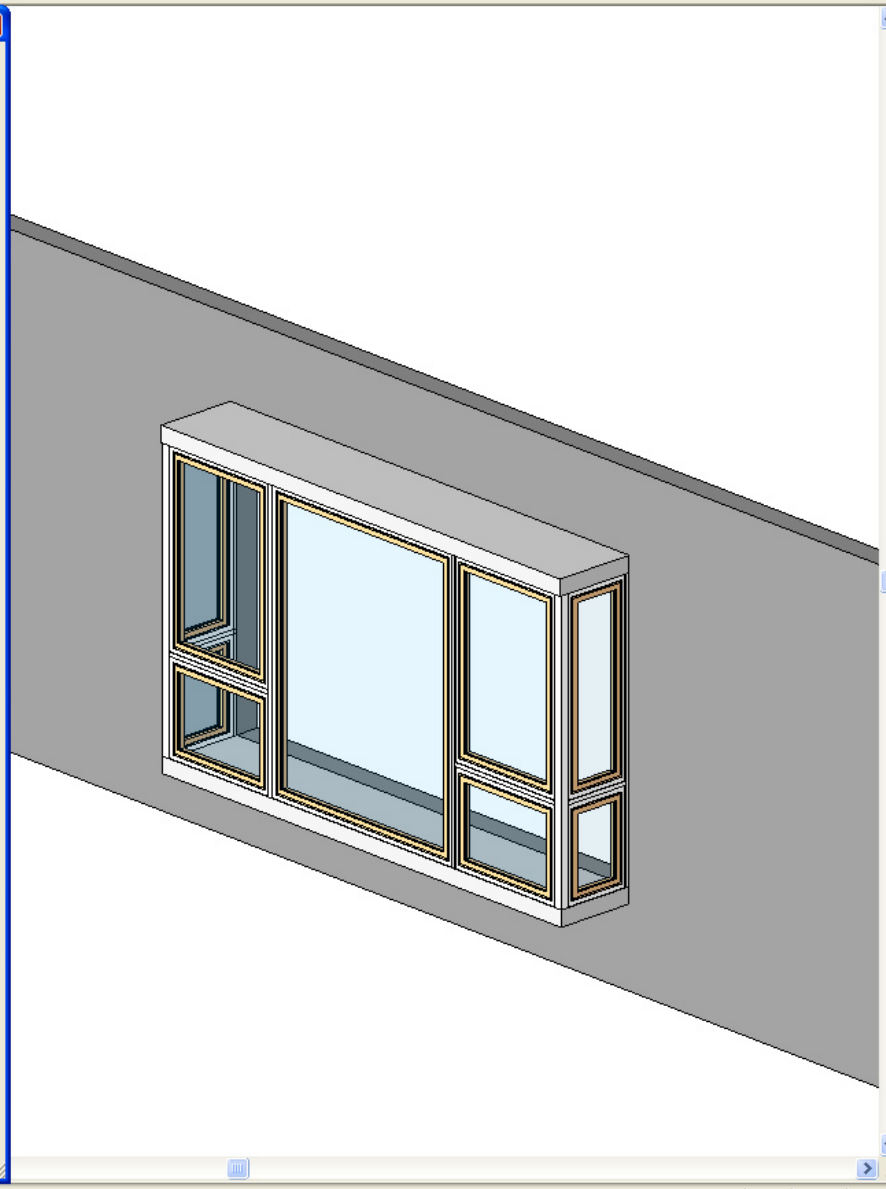
Name: AED-Bay Window

Parameter	Value	Formula
Lslab Overhang_Right	0.0	=
Lslab Overhang_Left	0.0	=
Lslab Overhang_Dept	0.0	=
Left Window Width	800.0	=
Height	1800.0	=Wall Height - (Openning Offset *
Width	3000.0	=
Bay Depth	500.0	=
Rough Width		=
Rough Height		=
Identity Data		
IFC Parameters		
Operation		=
Other		
Vmullion Edge	12.5	=Middle Vmullion Thickness / 2
Uslab_Top	2500.0	=Uslab_Bottom + Slab Thickness
Uslab_Bottom	2400.0	=Wall Height - Openning Offset
Sash Offset	70.0	=
Right Window	☑	=Right Window Width > 0 mm
Openning Offset	600.0	=Window Offset + Slab Thickness
Open Window Middle	593.8	=(Uslab_Bottom - Hmullion_Top) /
Lslab_Top	600.0	=Openning Offset
Lslab_Bottom	500.0	=Lslab_Top - Slab Thickness
Left Window	☑	=Left Window Width > 0 mm
Hmullion_Top	1212.5	=Middle Mullion Height + Openning
Hmullion_Bottom	1187.5	=Middle Mullion Height + Openning
Hmullion Edge	12.5	=Middle Hmullion Thickness / 2
Glass Offset	65.0	=65 mm
Glass Height_Top	2335.0	=Uslab_Bottom - Glass Offset
Glass Height_Mtop	1122.5	=Hmullion_Bottom - Glass Offset
Glass Height_MBotto	1277.5	=Hmullion_Top + Glass Offset
Glass Height_Bottom	665.0	=Lslab_Top + Glass Offset

Family Types: New... Rename... Delete

Parameters: Add... Modify... Remove

OK Cancel Apply Help



Ready

start | Control Panel | 20070107 Shunde Re... | Autodesk Revit Buildi... | Adobe Photoshop | EN | 51% | 9:33 AM

Autodesk Revit Building 9.1 - [AED-Bay Window.rfa - 3D View: View 1]

File Edit View Modelling Drafting Site Tools Settings Window Help

Move Copy Rotate Array Mirror Group

Plane Demolish Align Split Trim Offset

Zoom

Family

Modify
Family Typ
Dimension
Model Lines
Symbolic Lir
Opening...
Ref Plane
Reference L
Control
Text
Model Text
Section
Component
Symbol
Detail Comp
Solid Form
Void Form
Load into Pr

Family Types

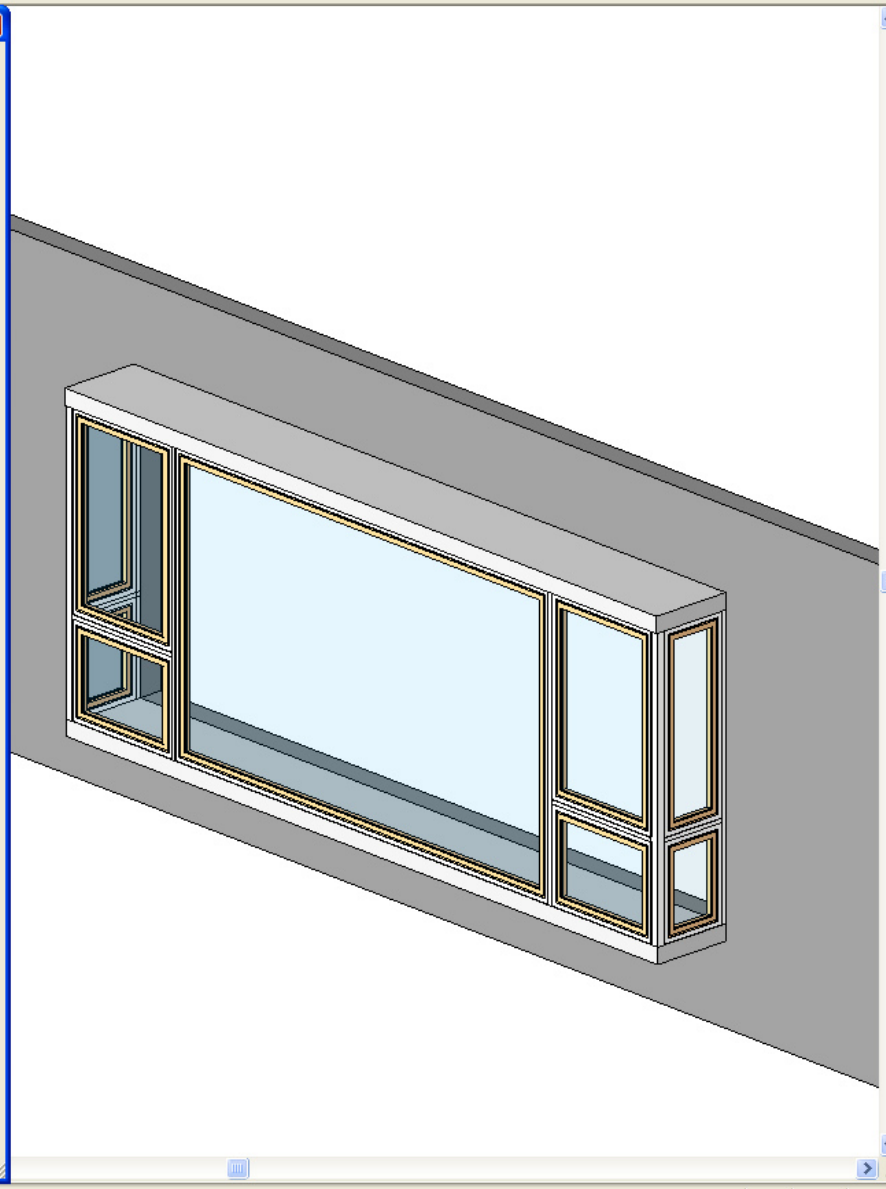
Name: AED-Bay Window

Parameter	Value	Formula
Lslab Overhang_Right	0.0	=
Lslab Overhang_Left	0.0	=
Lslab Overhang_Dept	0.0	=
Left Window Width	800.0	=
Height	1800.0	=Wall Height - (Openning Offset *
Width	4500.0	=
Bay Depth	500.0	=
Rough Width		=
Rough Height		=
Identity Data		
IFC Parameters		
Operation		=
Other		
Vmullion Edge	12.5	=Middle Vmullion Thickness / 2
Uslab_Top	2500.0	=Uslab_Bottom + Slab Thickness
Uslab_Bottom	2400.0	=Wall Height - Openning Offset
Sash Offset	70.0	=
Right Window	☑	=Right Window Width > 0 mm
Openning Offset	600.0	=Window Offset + Slab Thickness
Open Window Middle	593.8	=(Uslab_Bottom - Hmullion_Top) /
Lslab_Top	600.0	=Openning Offset
Lslab_Bottom	500.0	=Lslab_Top - Slab Thickness
Left Window	☑	=Left Window Width > 0 mm
Hmullion_Top	1212.5	=Middle Mullion Height + Openning
Hmullion_Bottom	1187.5	=Middle Mullion Height + Openning
Hmullion Edge	12.5	=Middle Hmullion Thickness / 2
Glass Offset	65.0	=65 mm
Glass Height_Top	2335.0	=Uslab_Bottom - Glass Offset
Glass Height_Mtop	1122.5	=Hmullion_Bottom - Glass Offset
Glass Height_MBotto	1277.5	=Hmullion_Top + Glass Offset
Glass Height_Bottom	665.0	=Lslab_Top + Glass Offset

Family Types: New... Rename... Delete

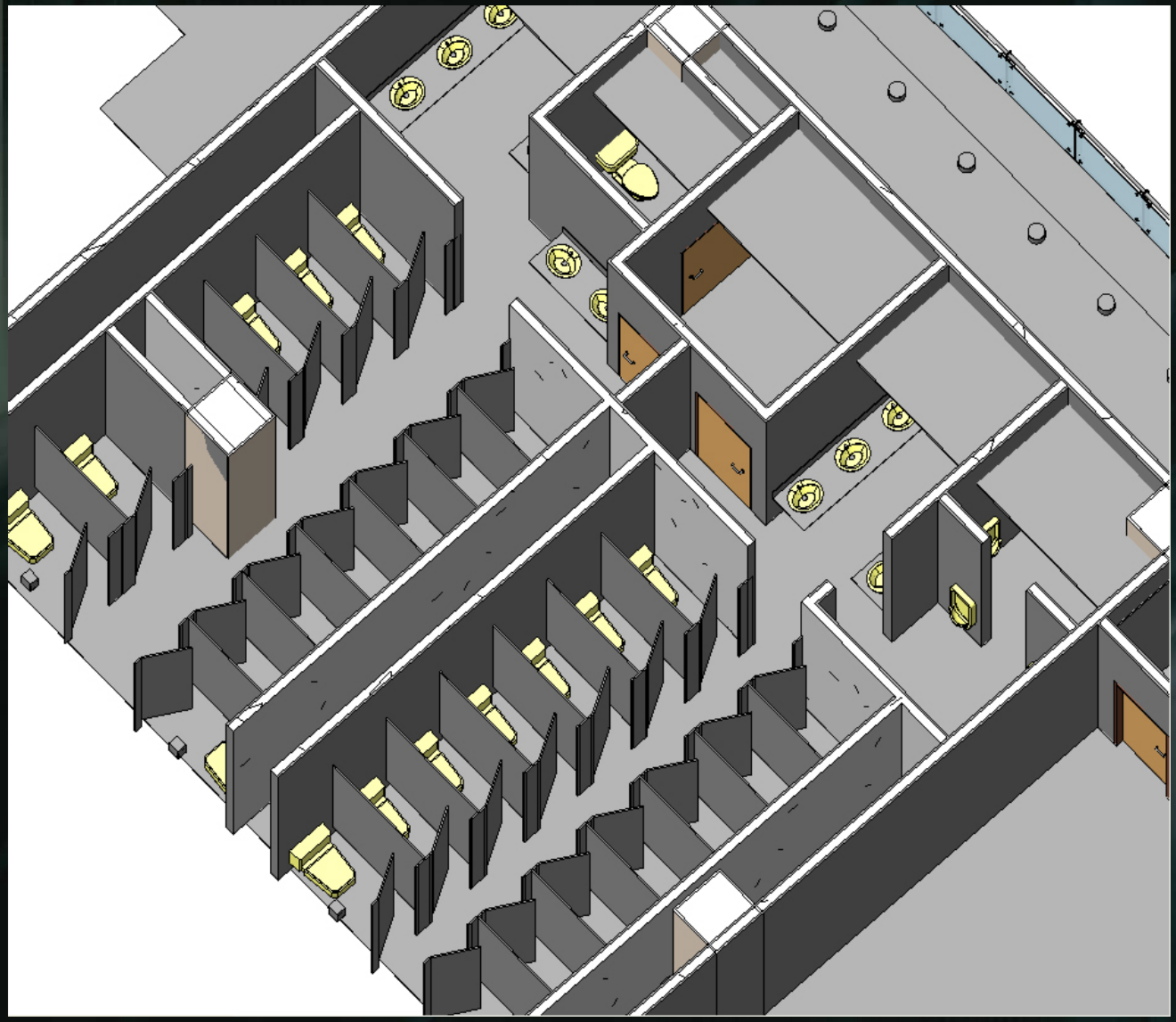
Parameters: Add... Modify... Remove

OK Cancel Apply Help

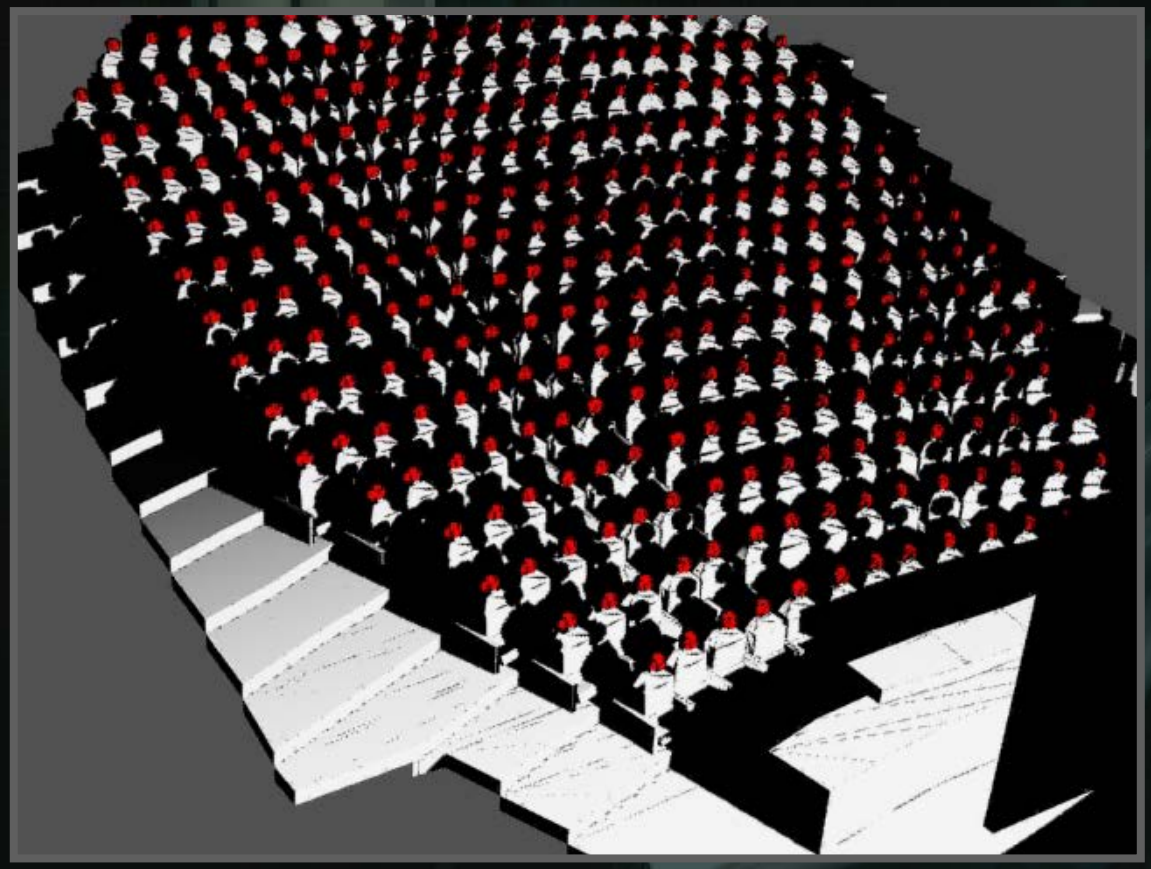


Ready

start | Control Panel | Microsoft PowerPoint ... | 20070107 Shunde Re... | Autodesk Revit Buildi... | Adobe Photoshop | EN | 55% | 9:36 AM

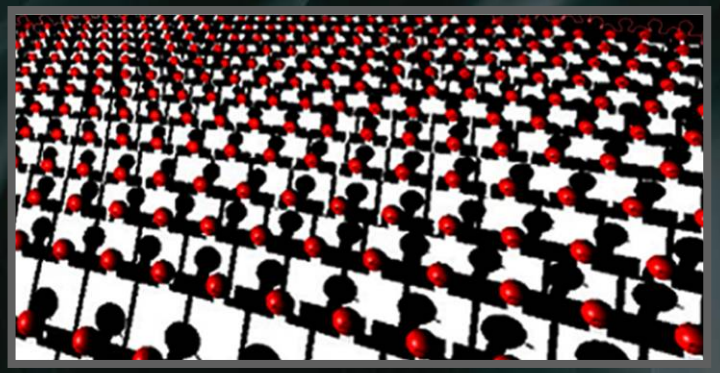


CREATIVE TOOLS



Radiating Light Method

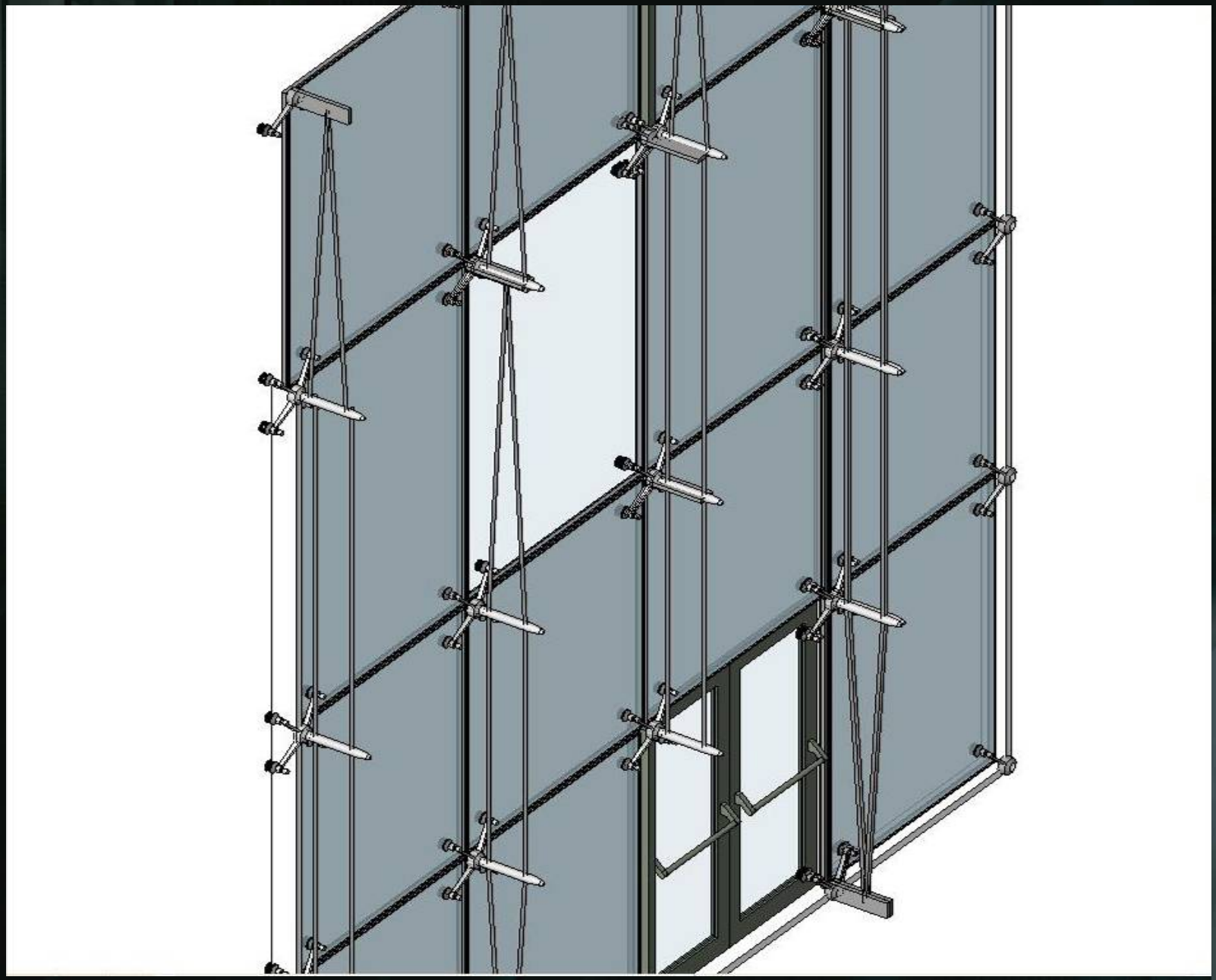
Unsatisfactory sightlines



Satisfactory sightlines

SIGHTLINE STUDIES

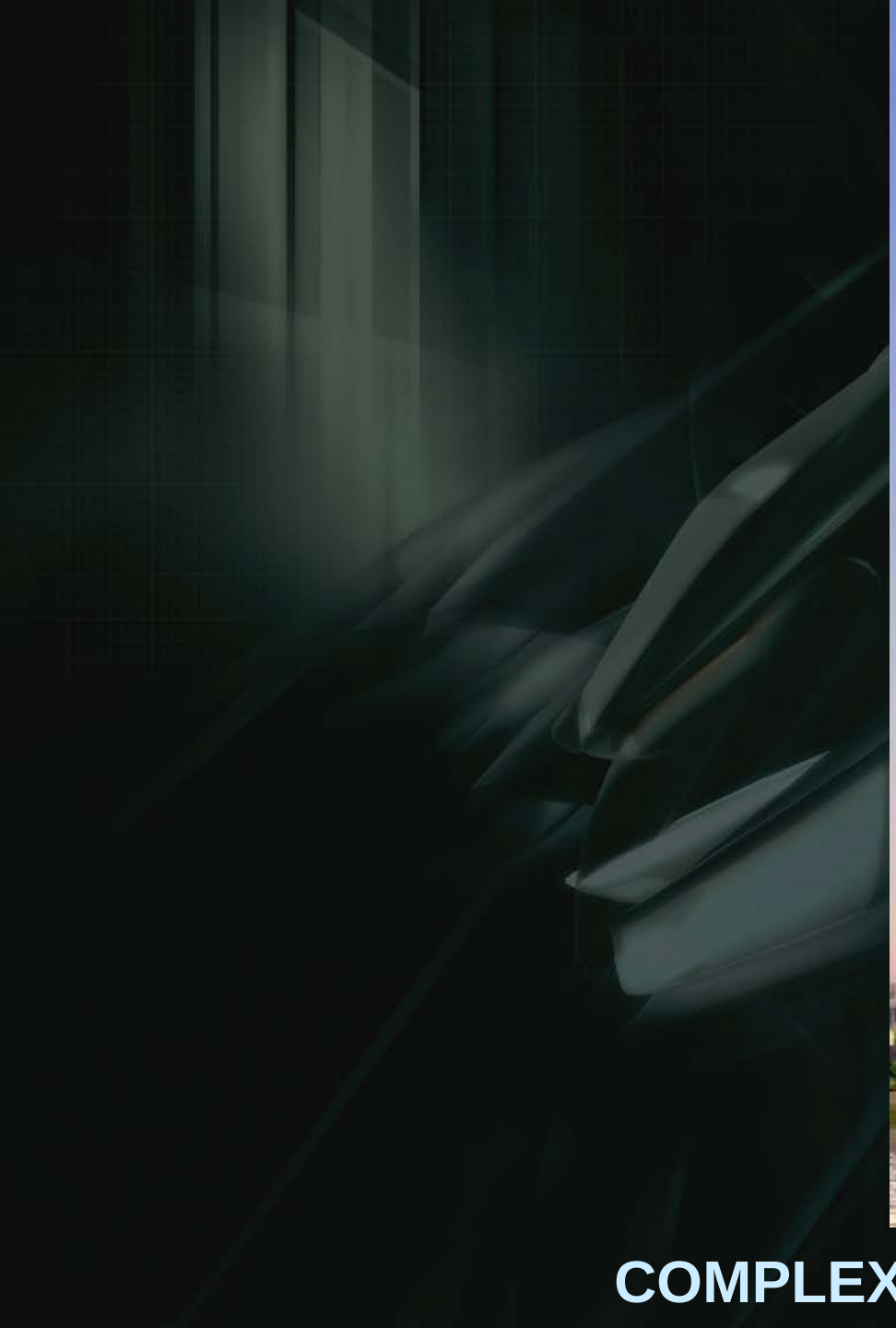

CCCUB
TECHNOLOGY SYMPOSIUM 2010

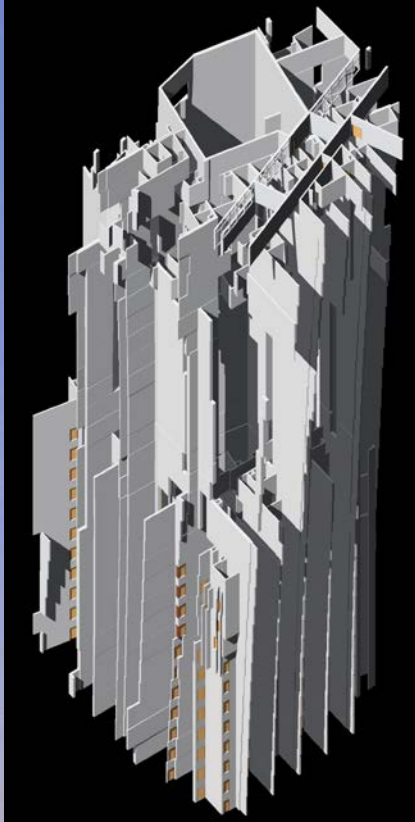


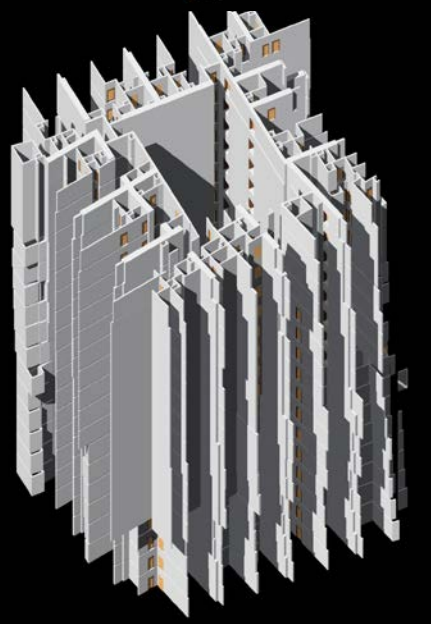
FAÇADE PANEL DESIGN

Program **Residential** Site Area **3,746 sqm**
Floor Area 858,855 sqm Building Height **304 m**

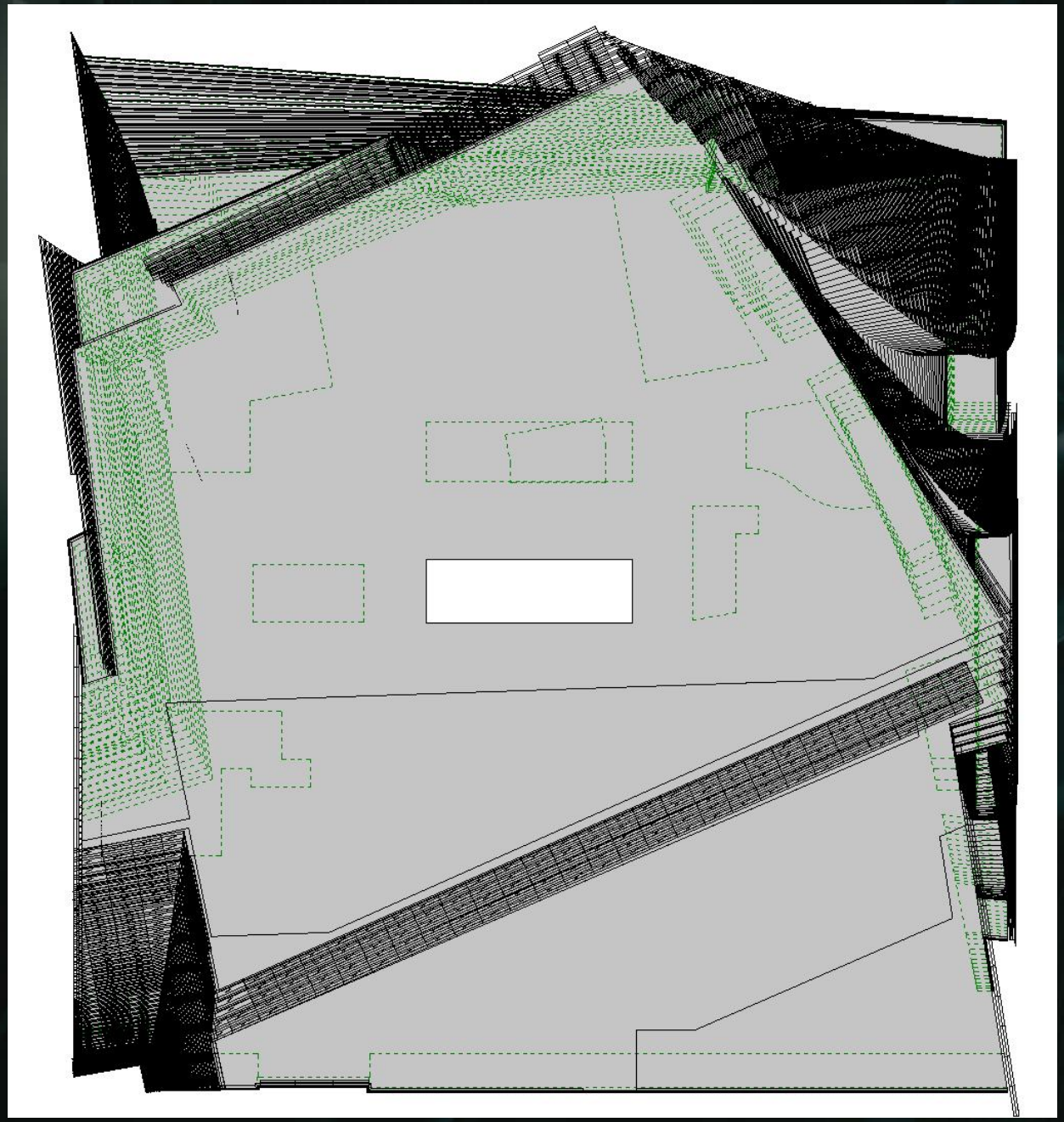
Dubai **Ocean Heights One**

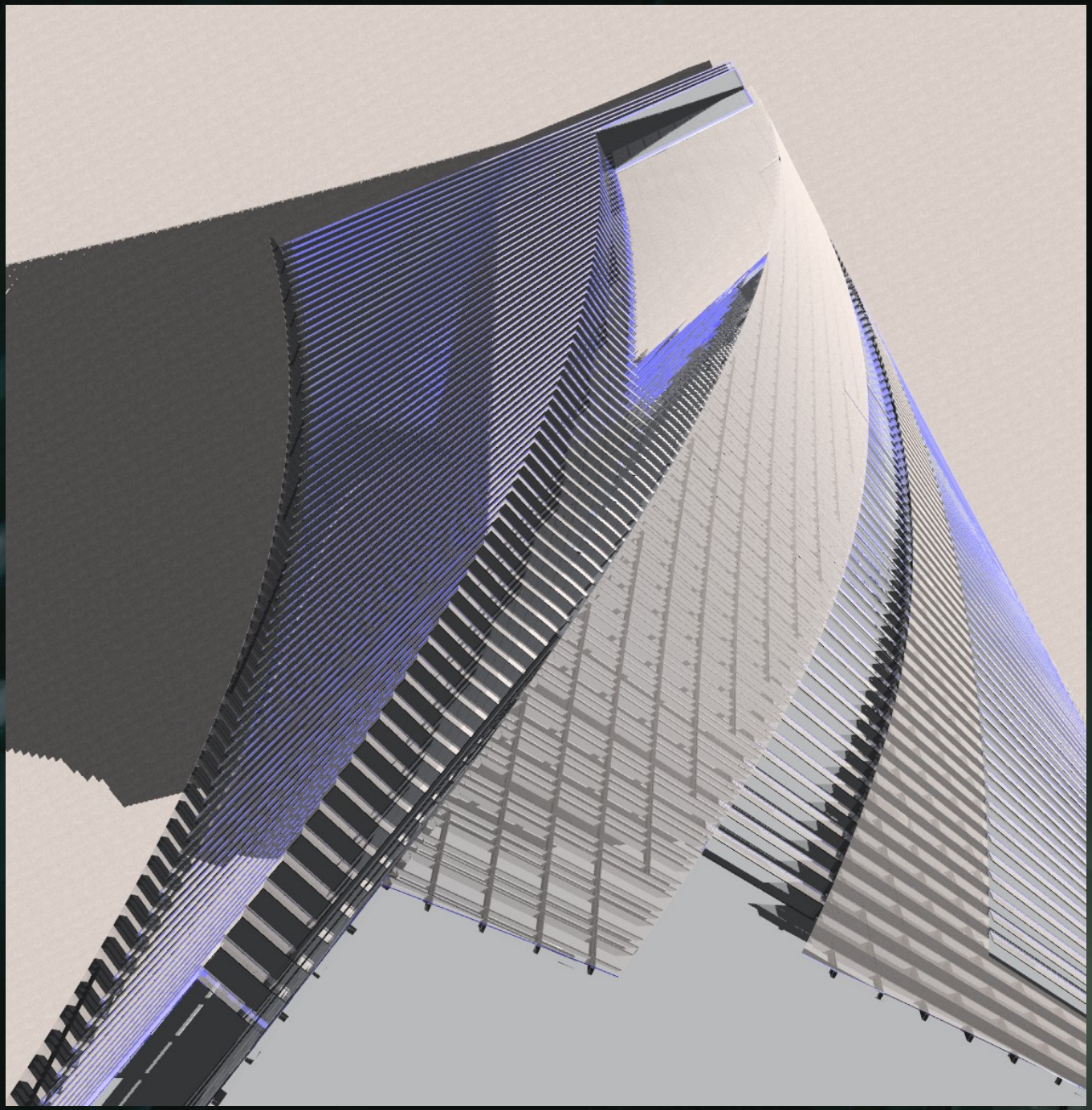


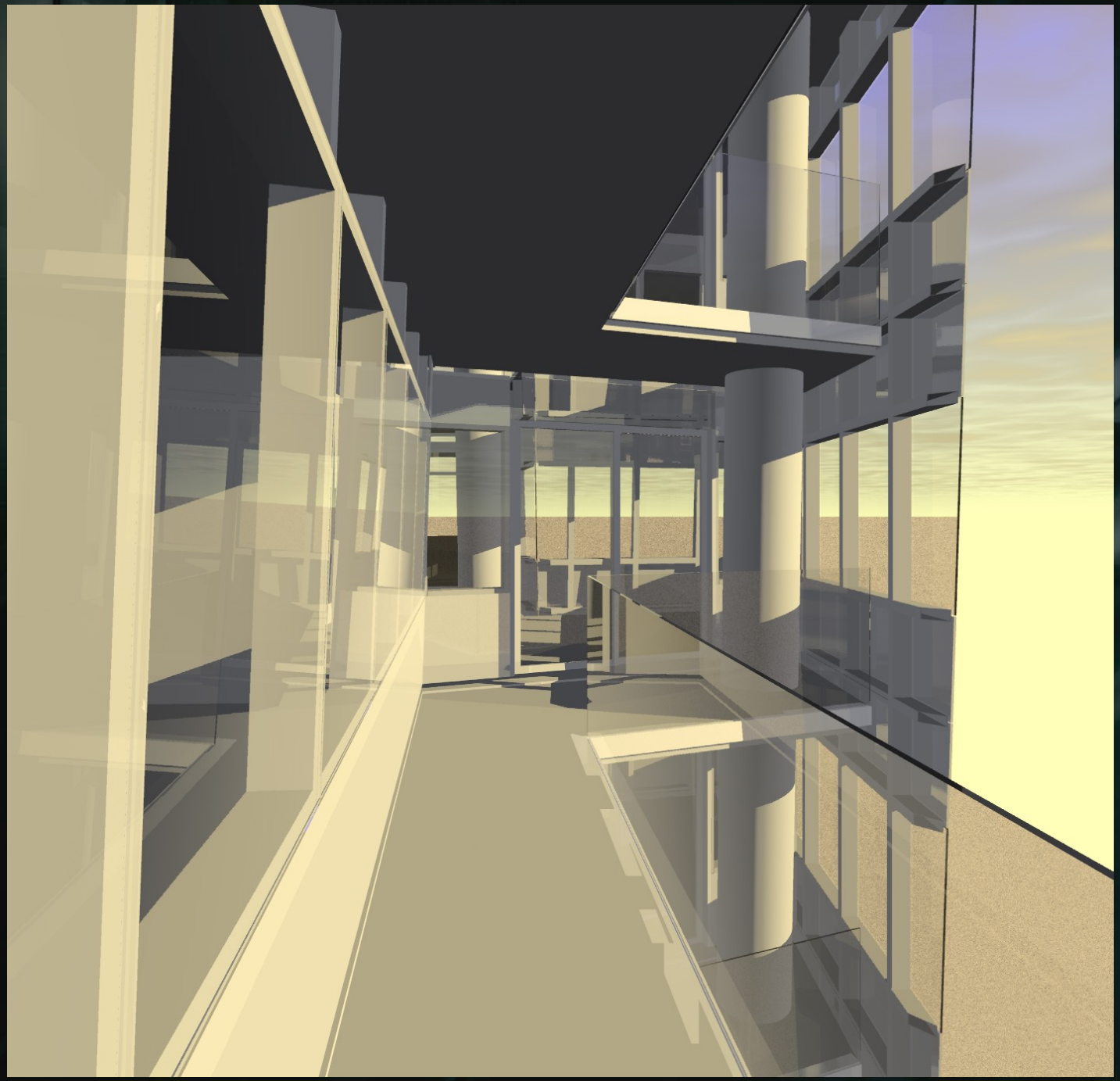


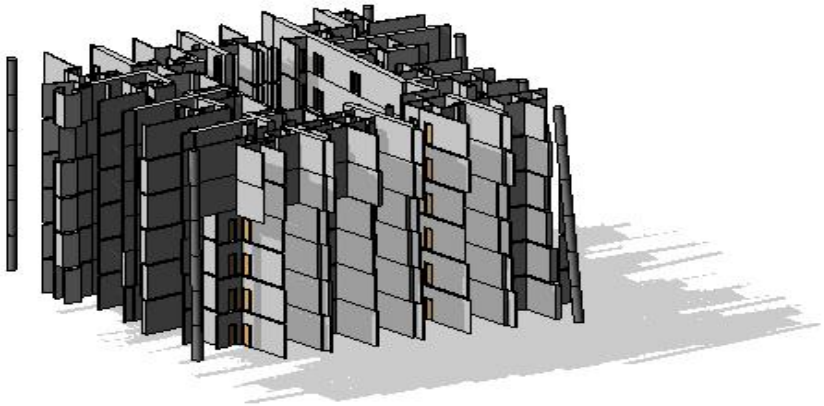


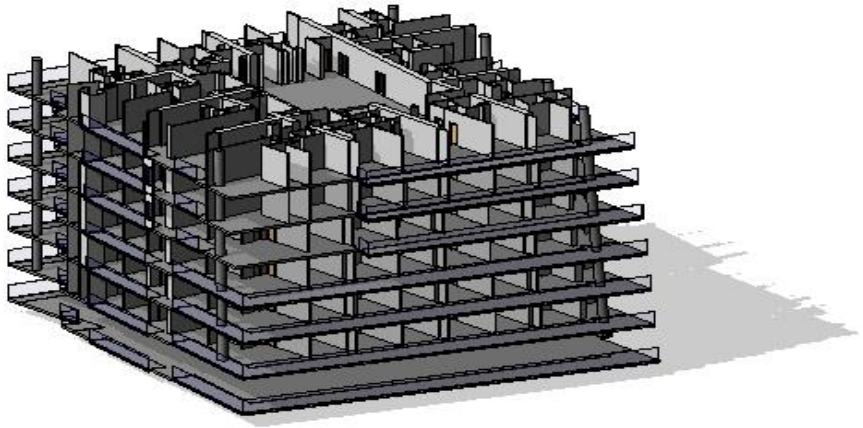
COMPLEX GEOMETRY

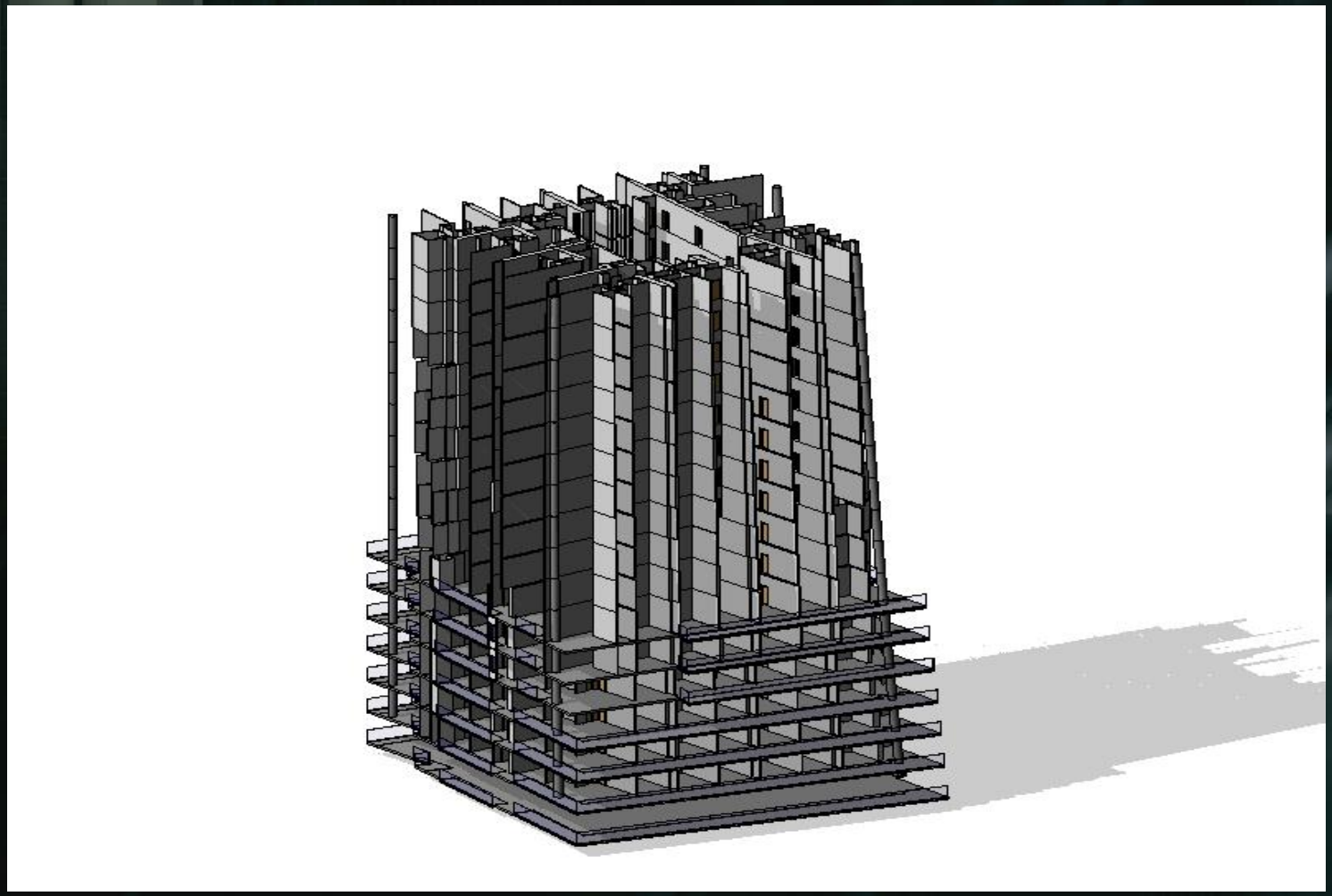


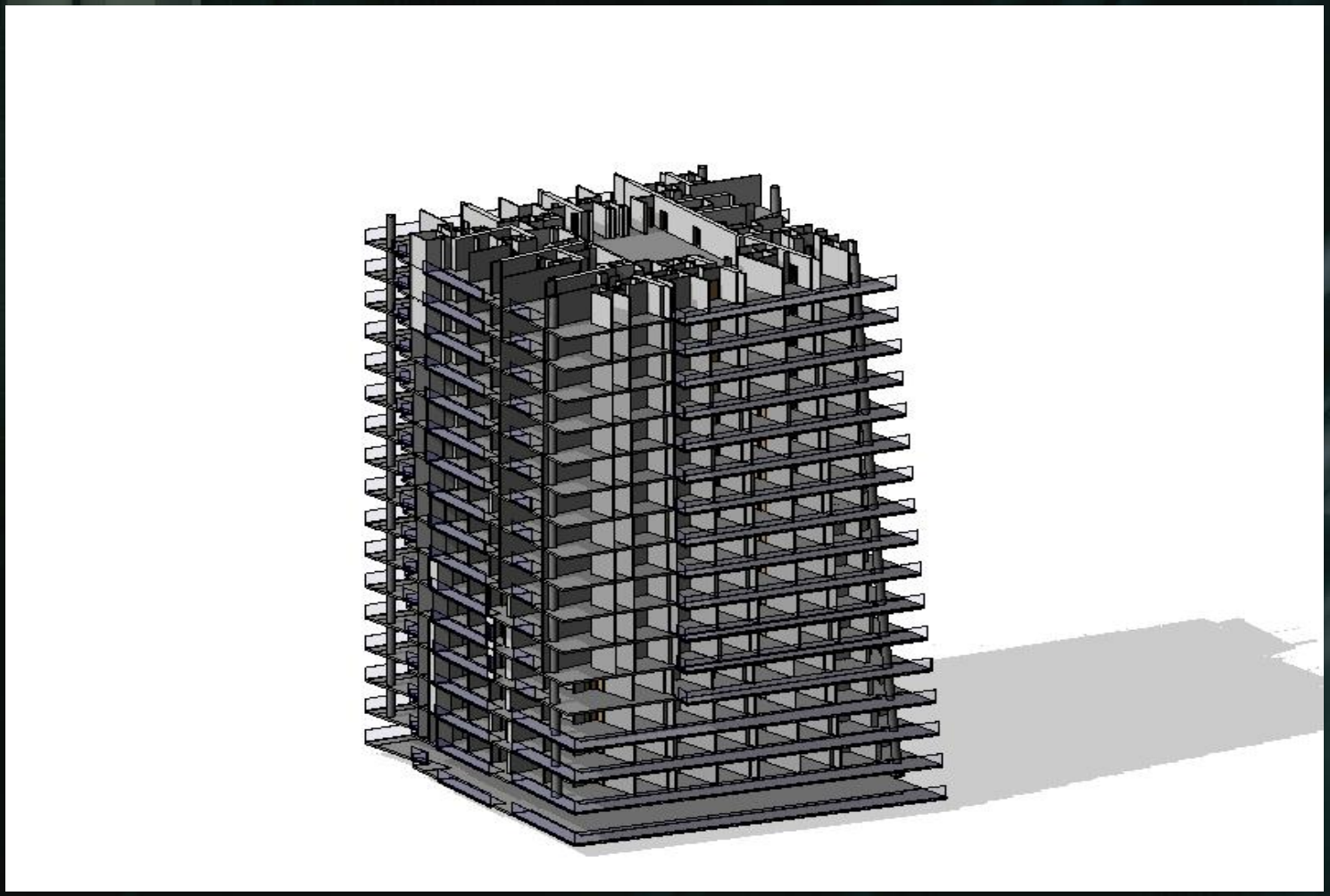


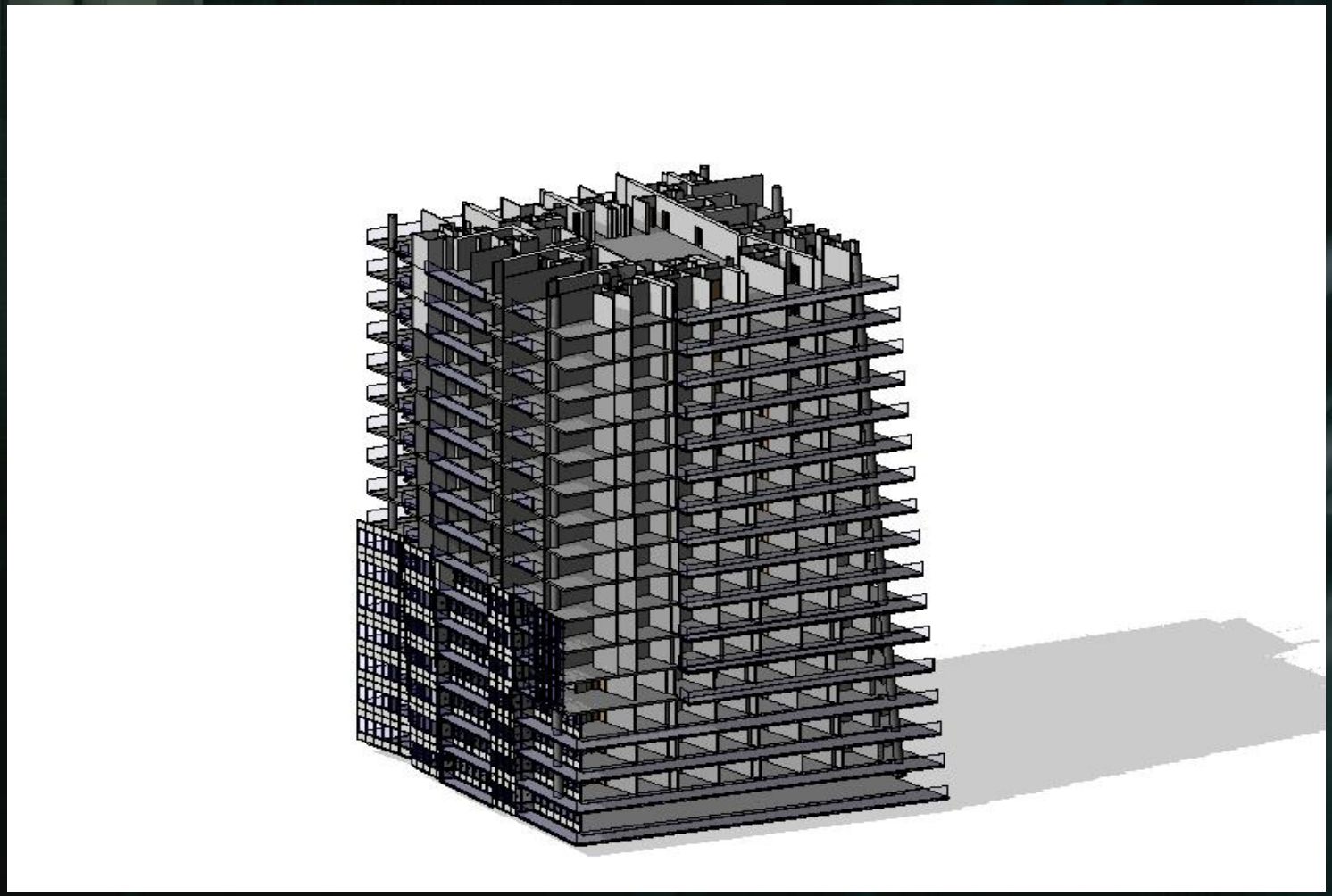


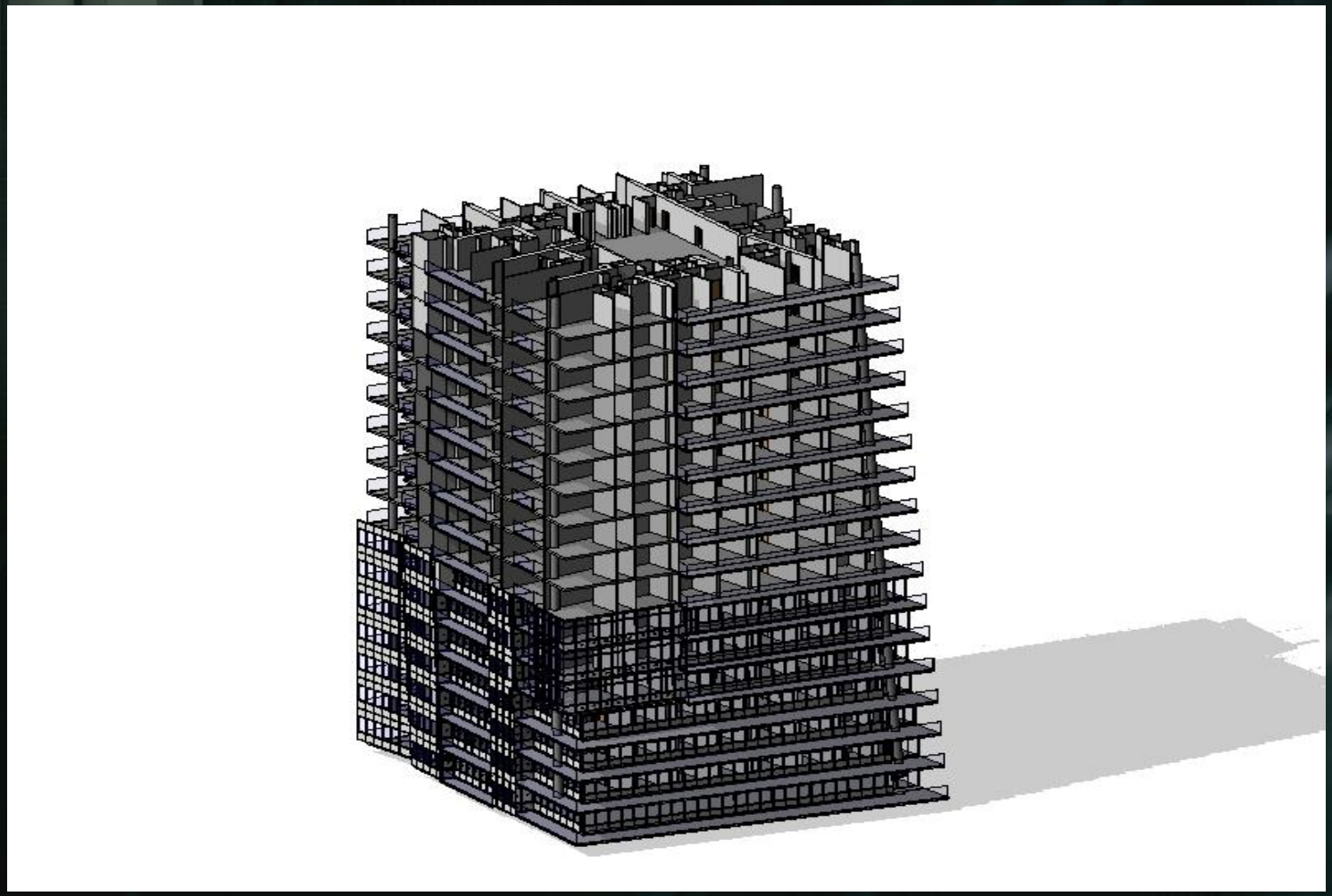


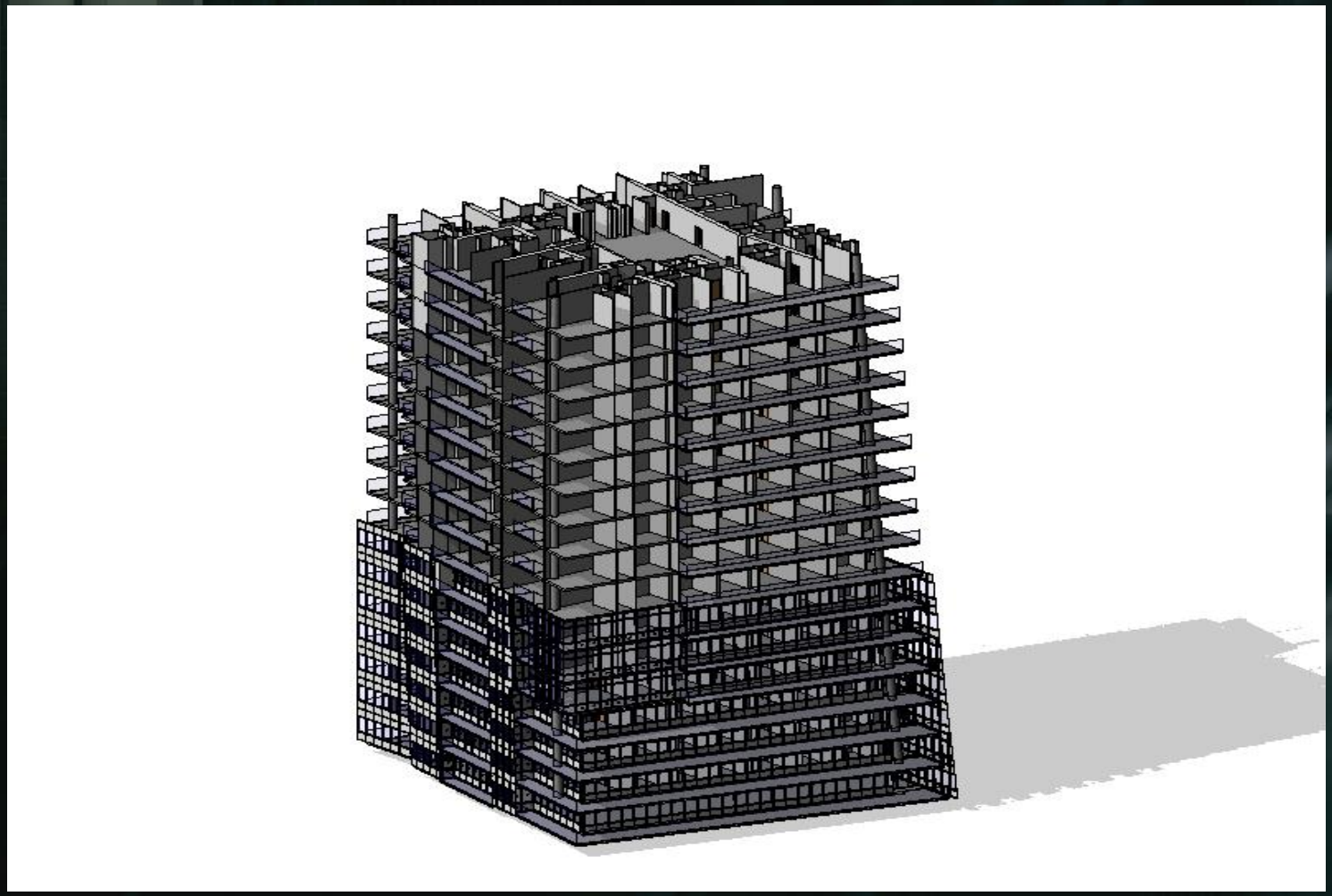


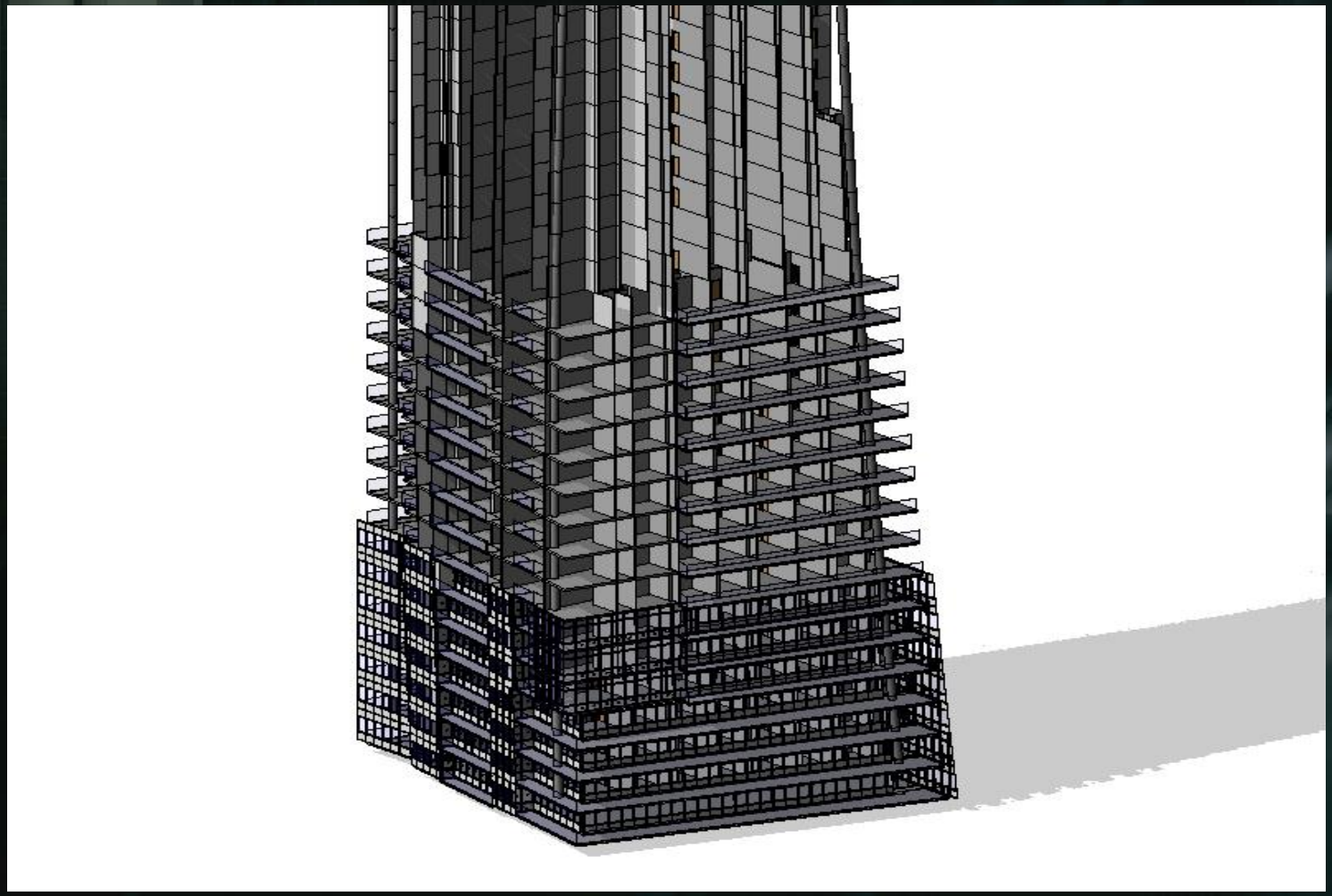


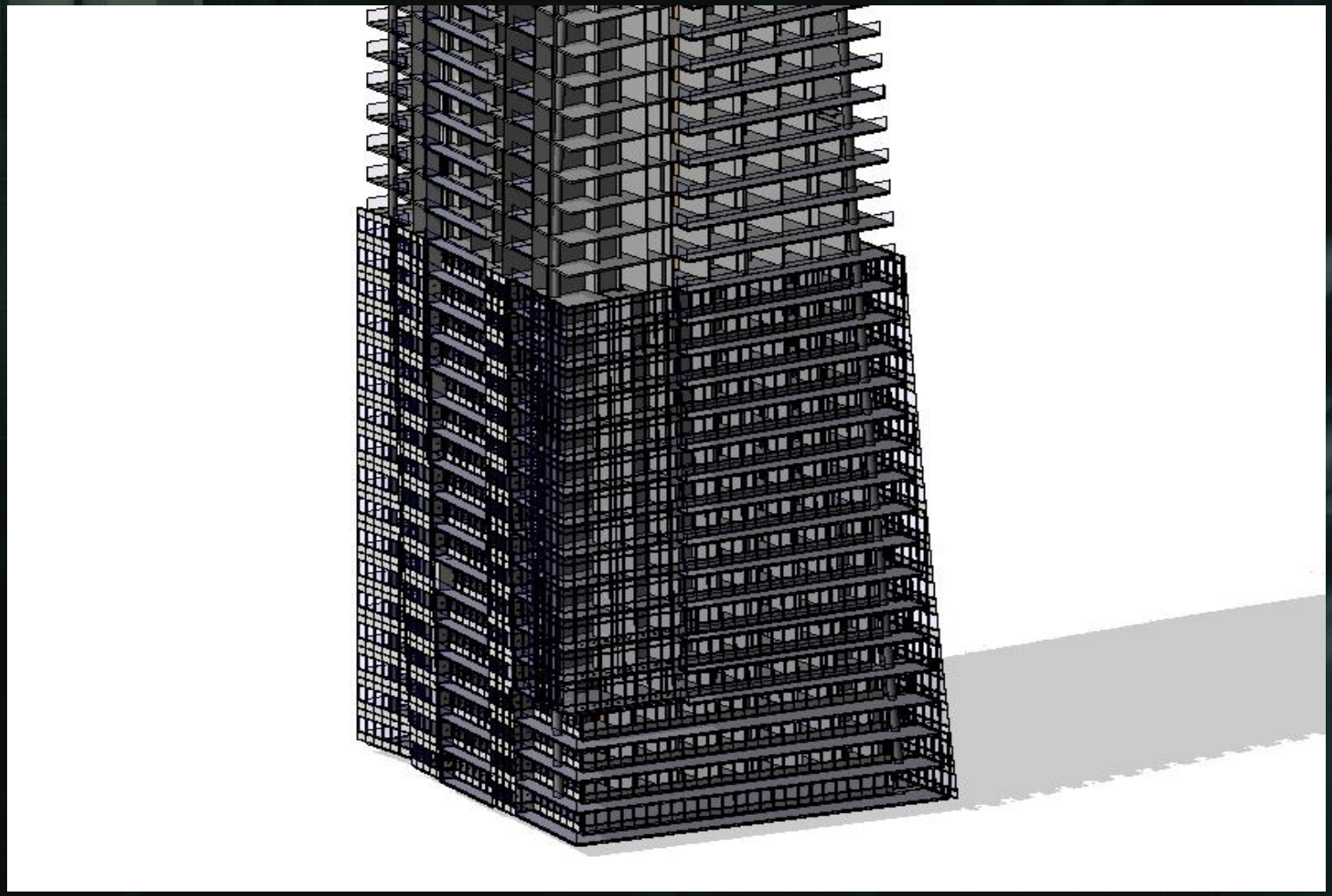


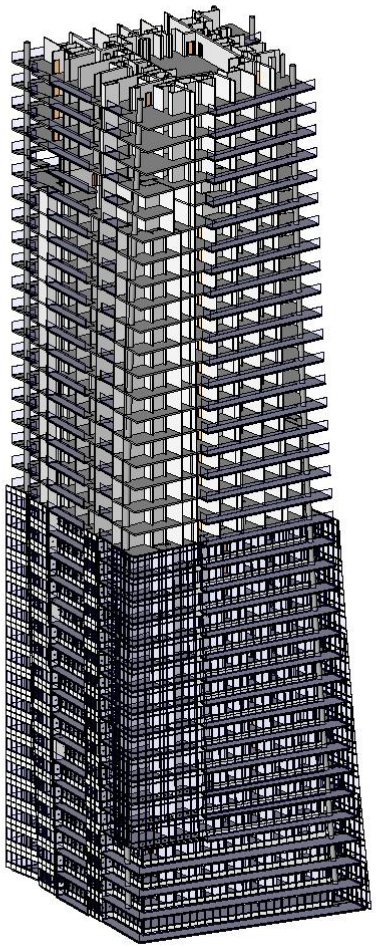


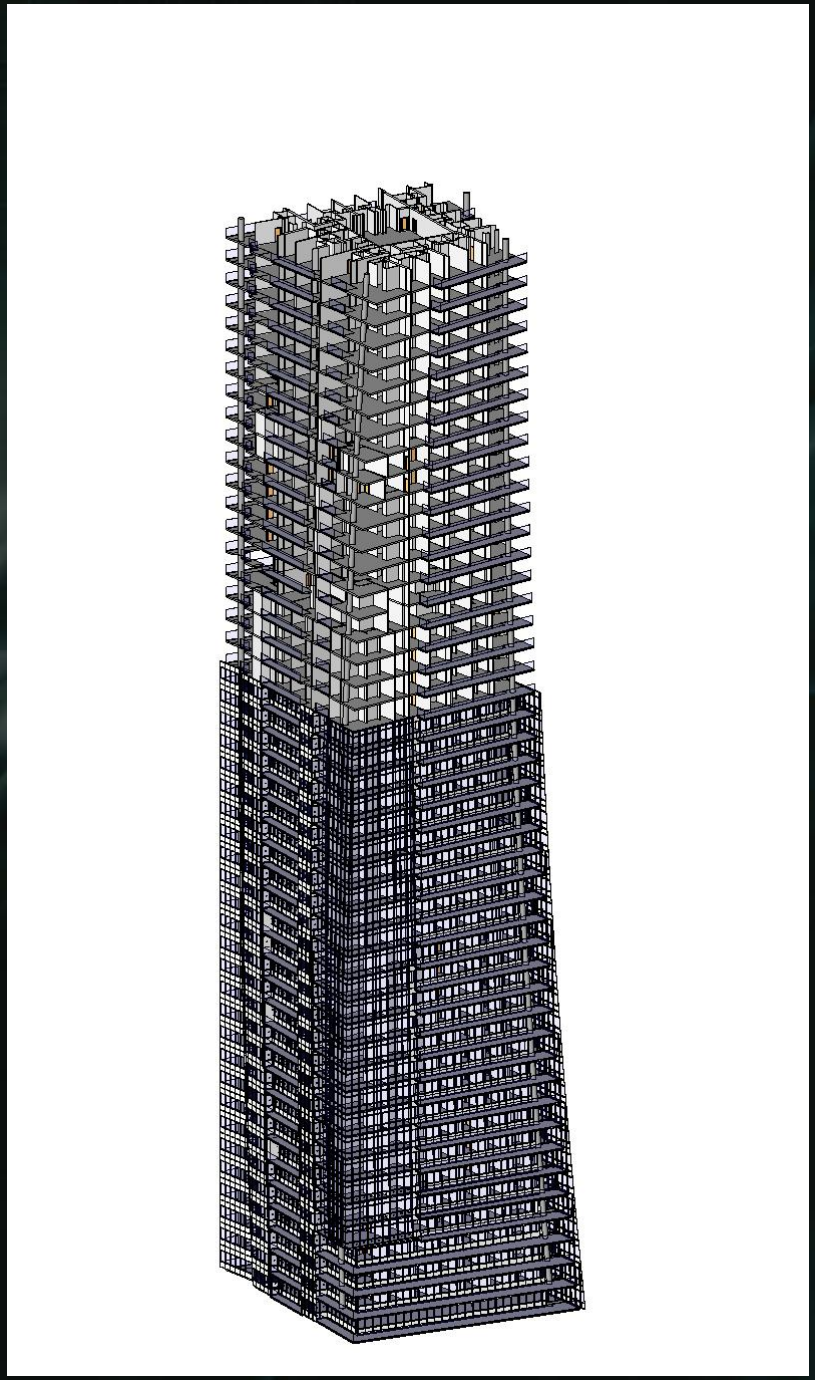


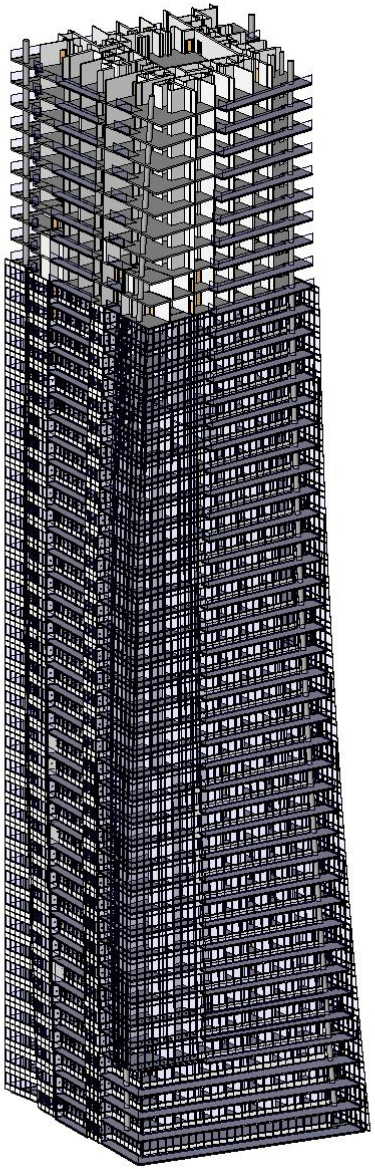


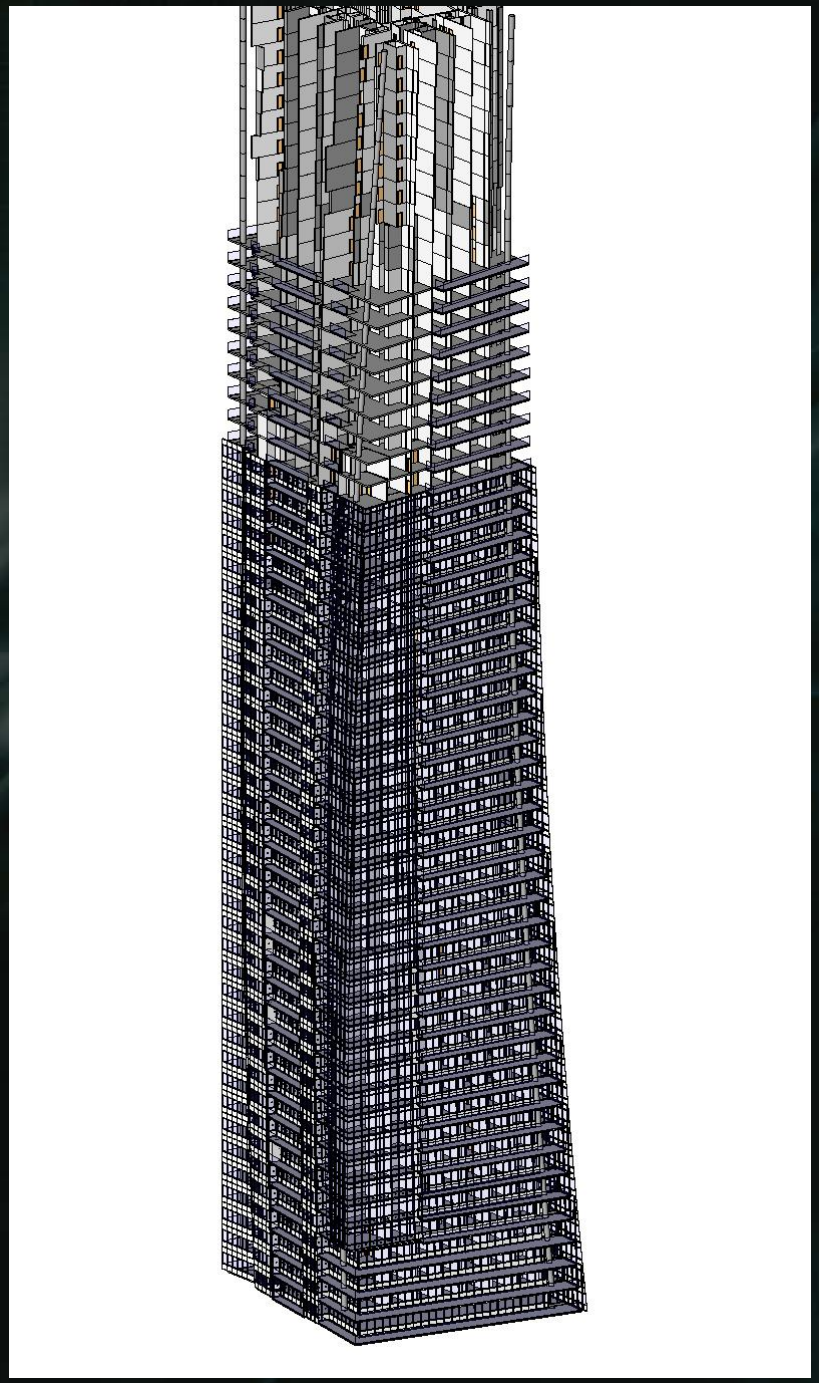


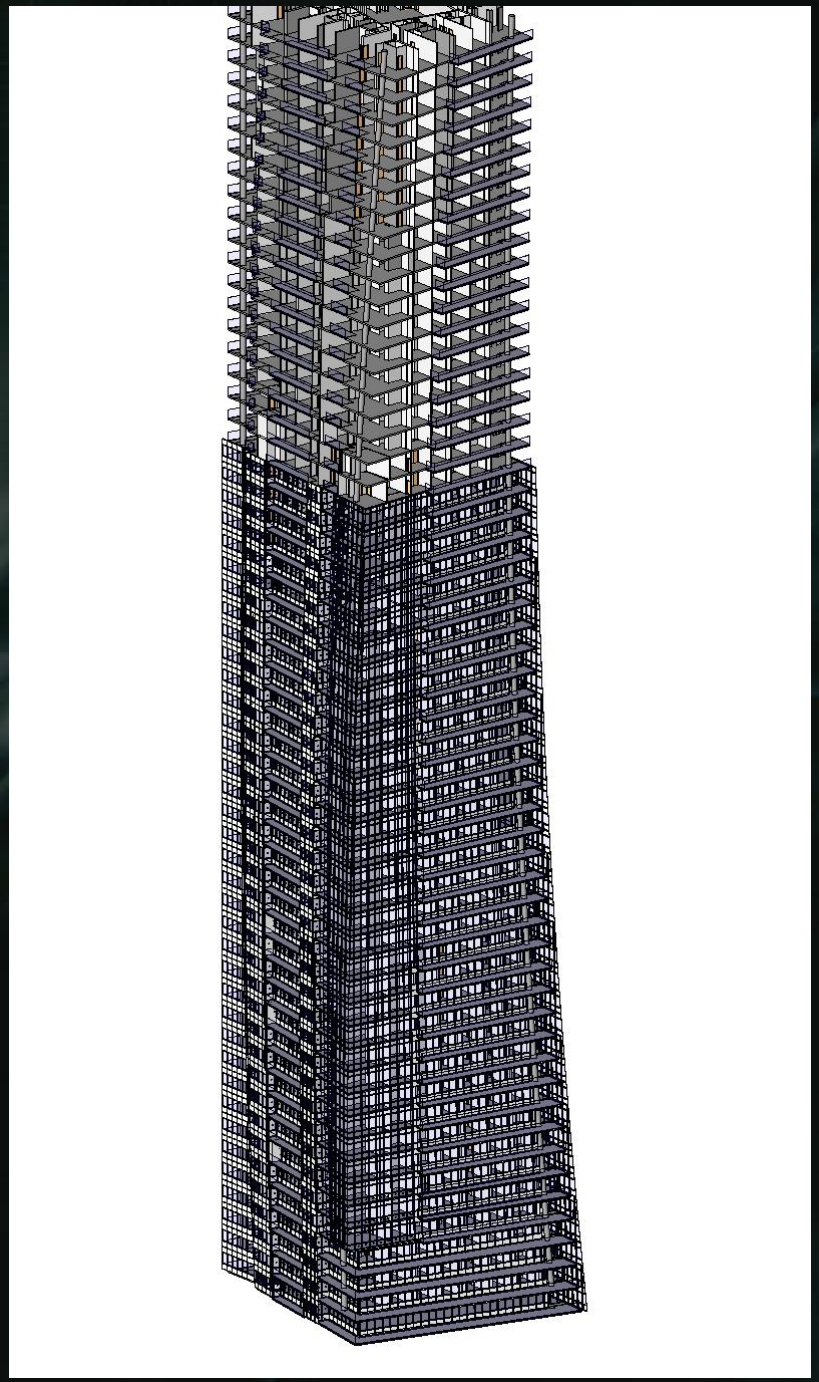


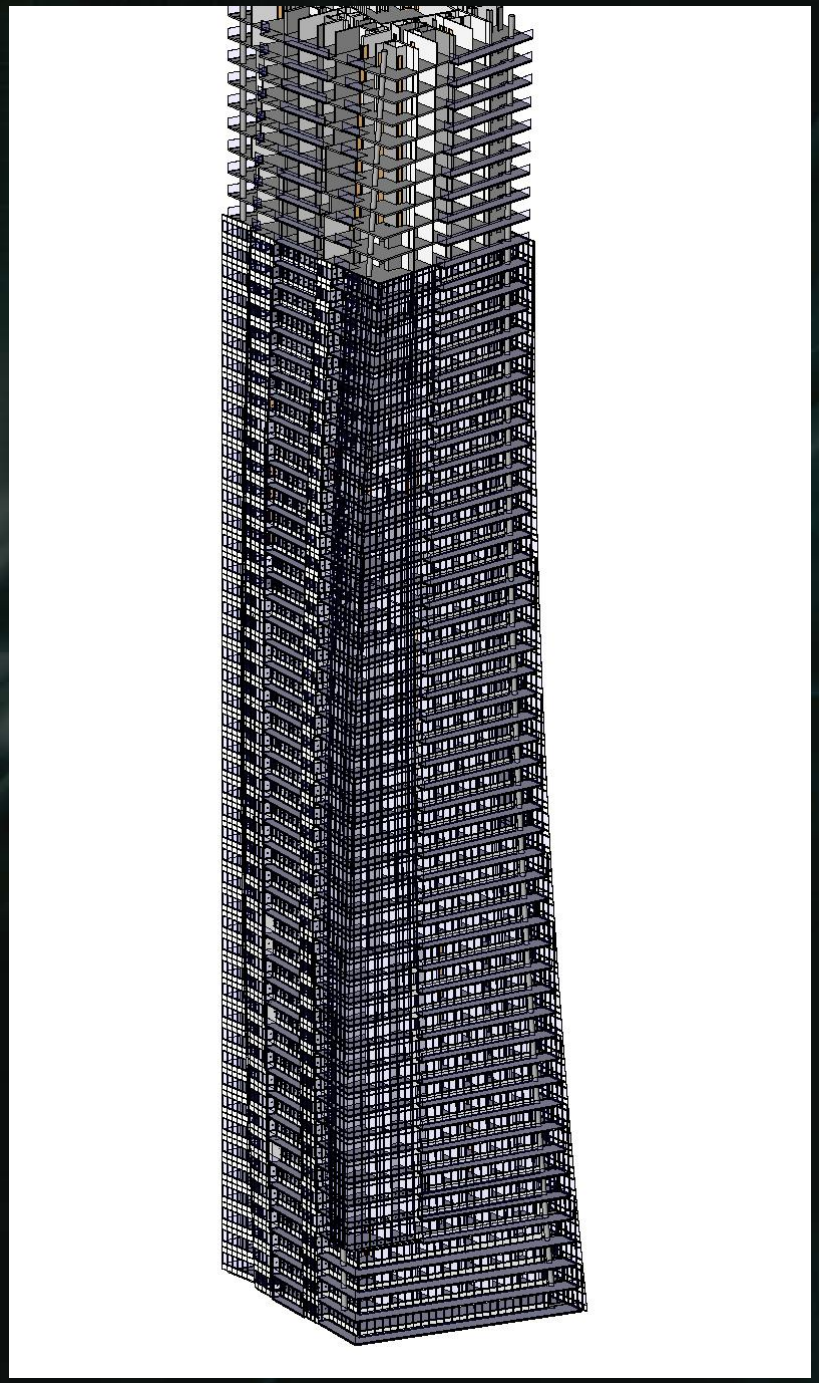


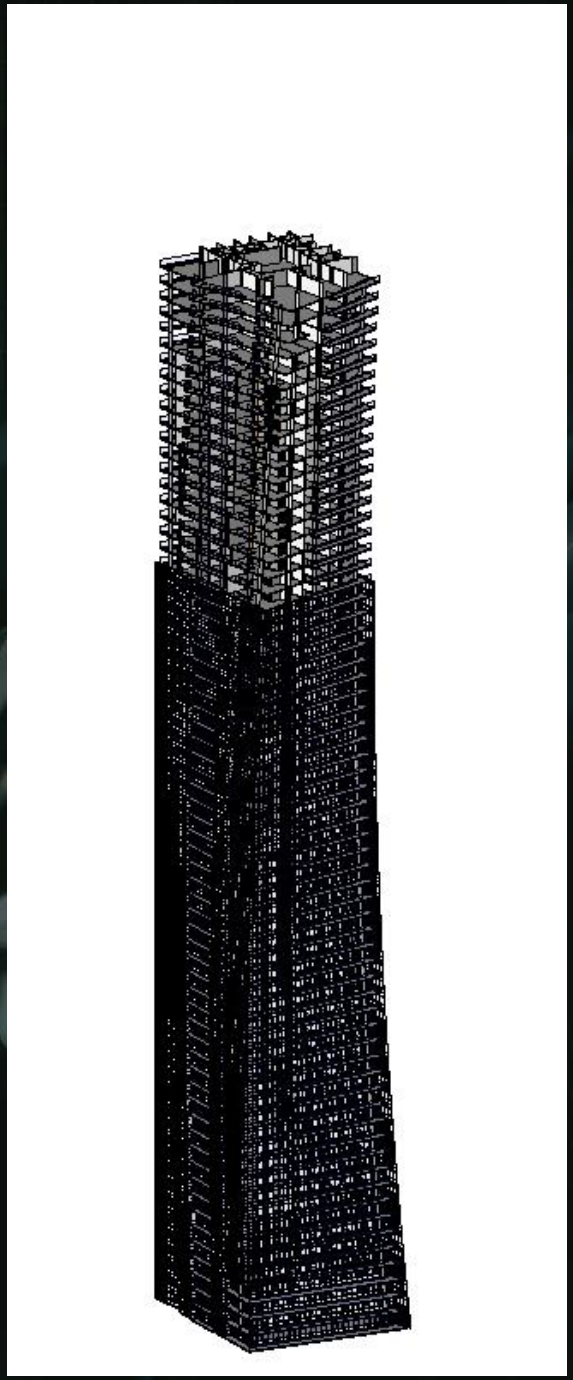


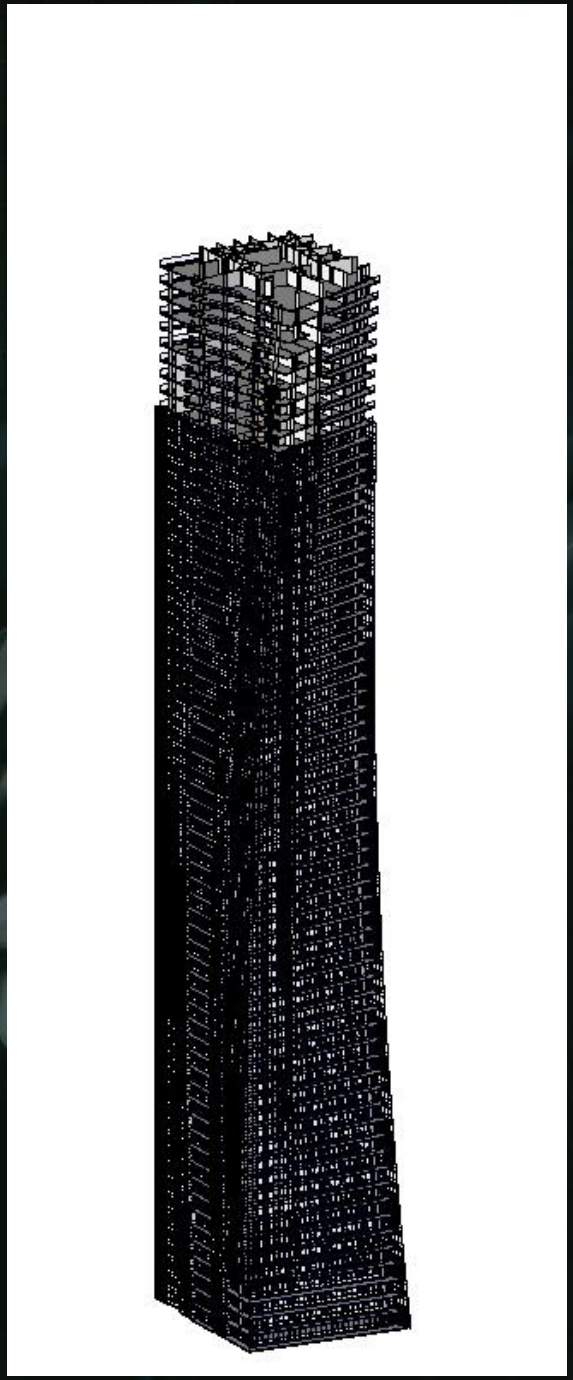


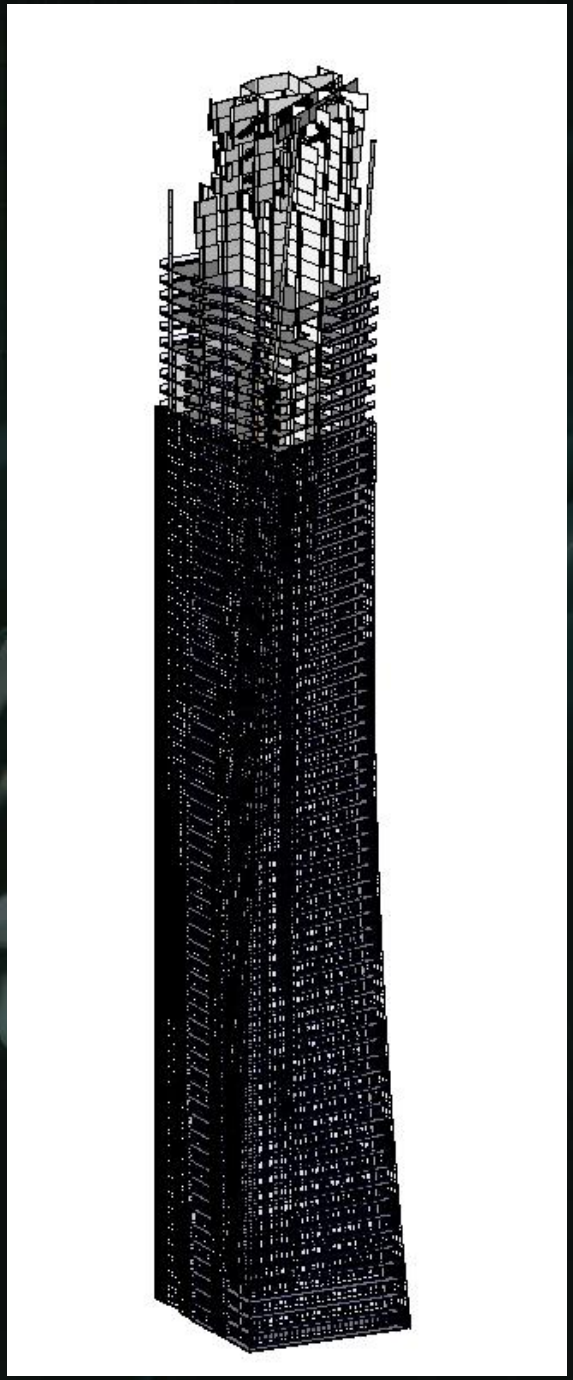


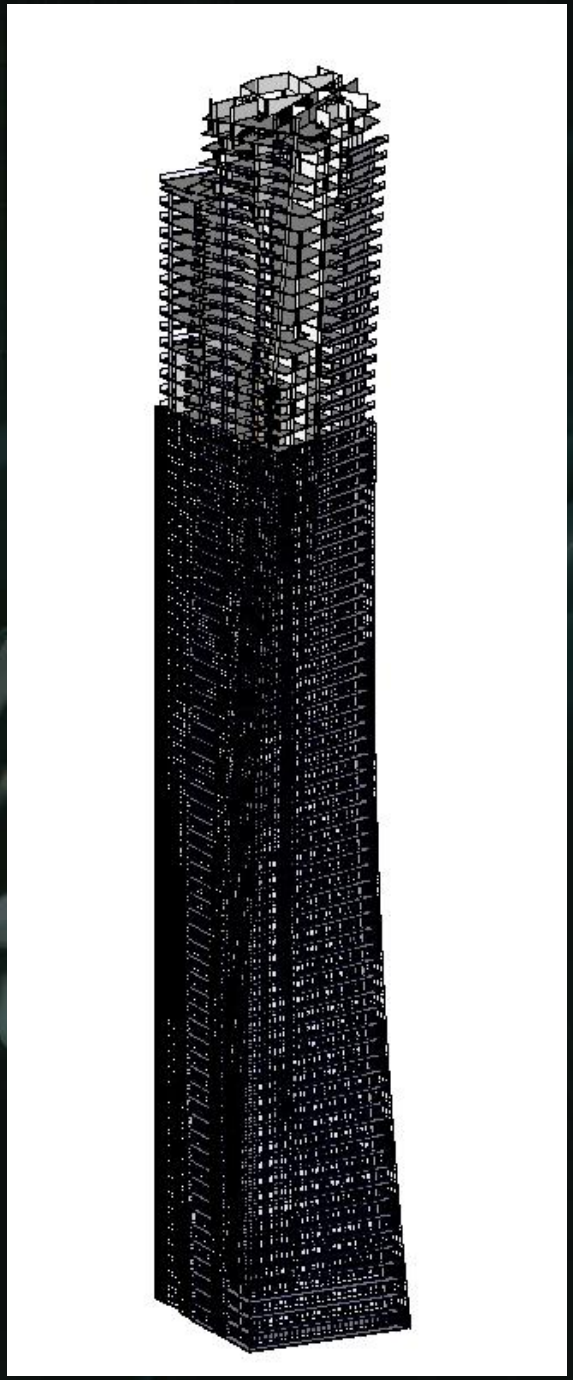


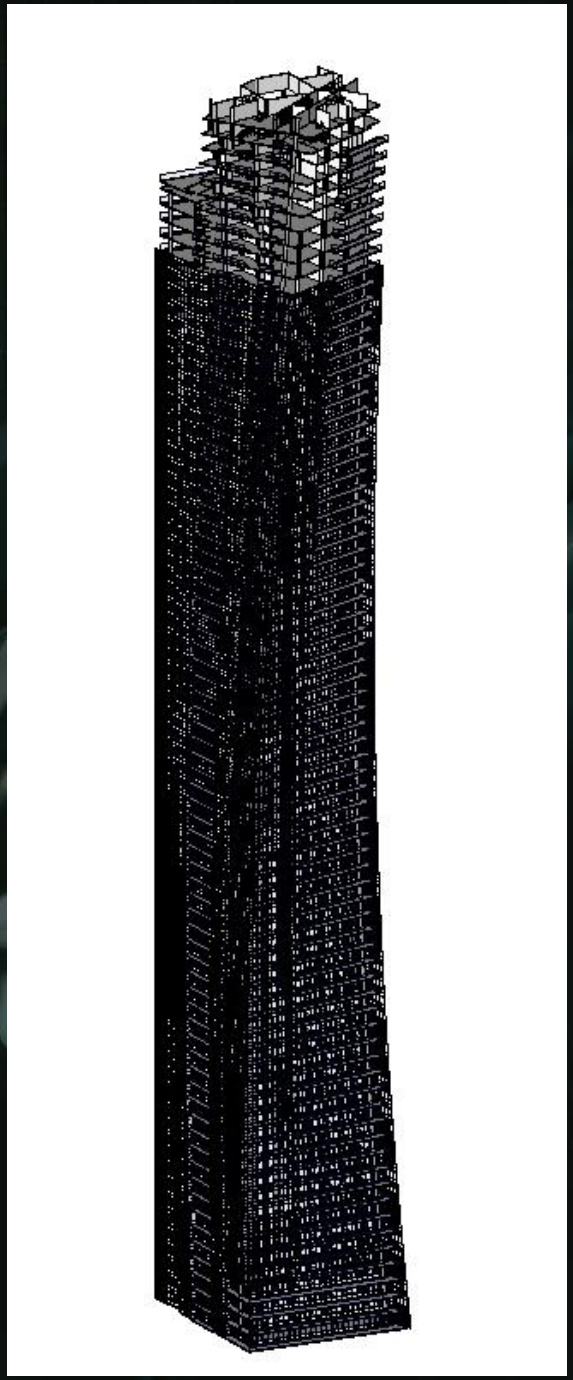


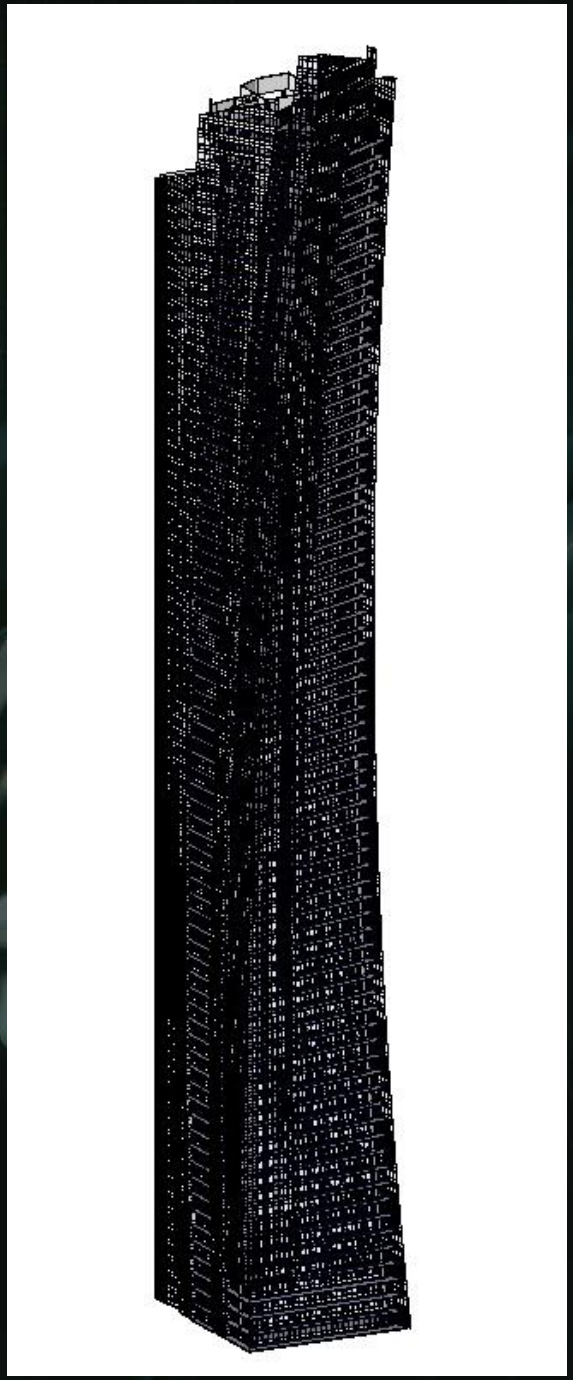


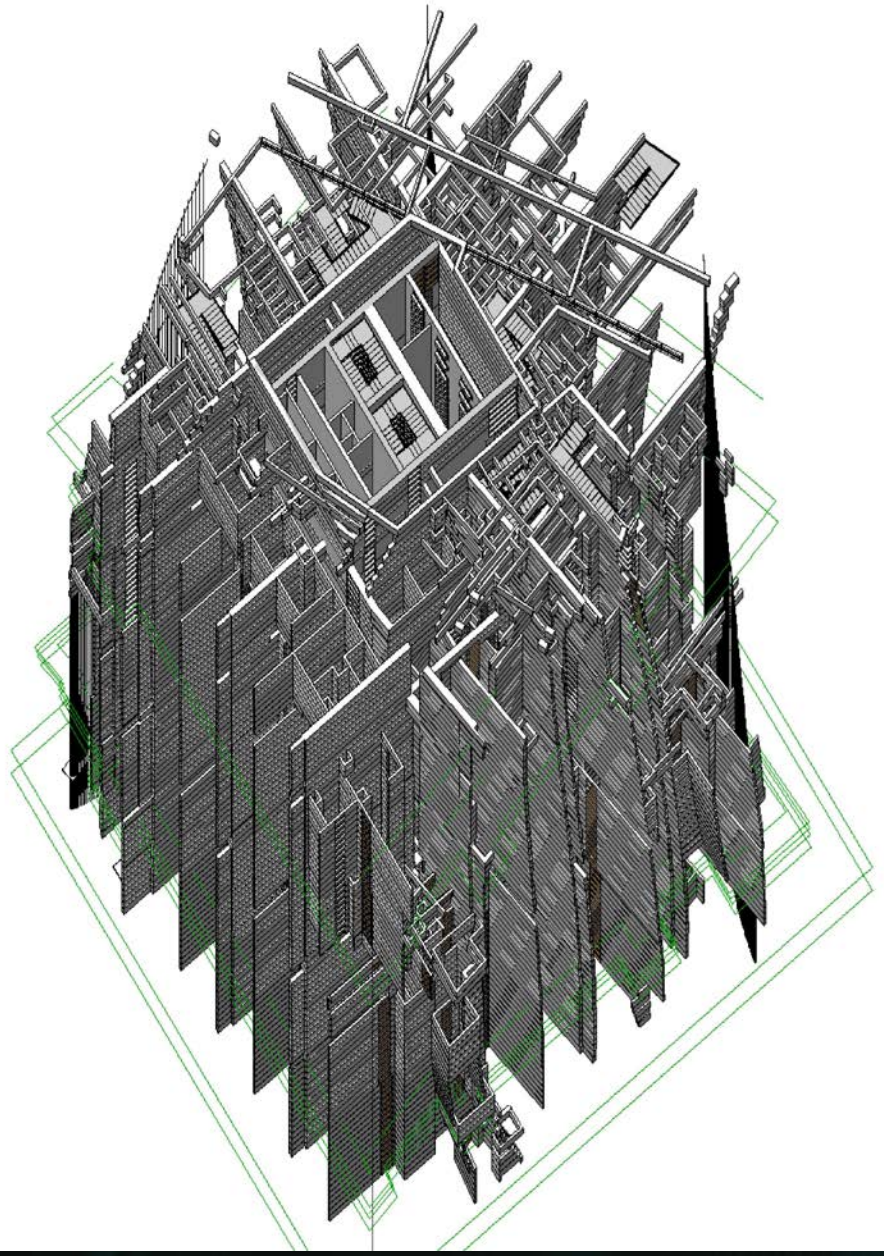




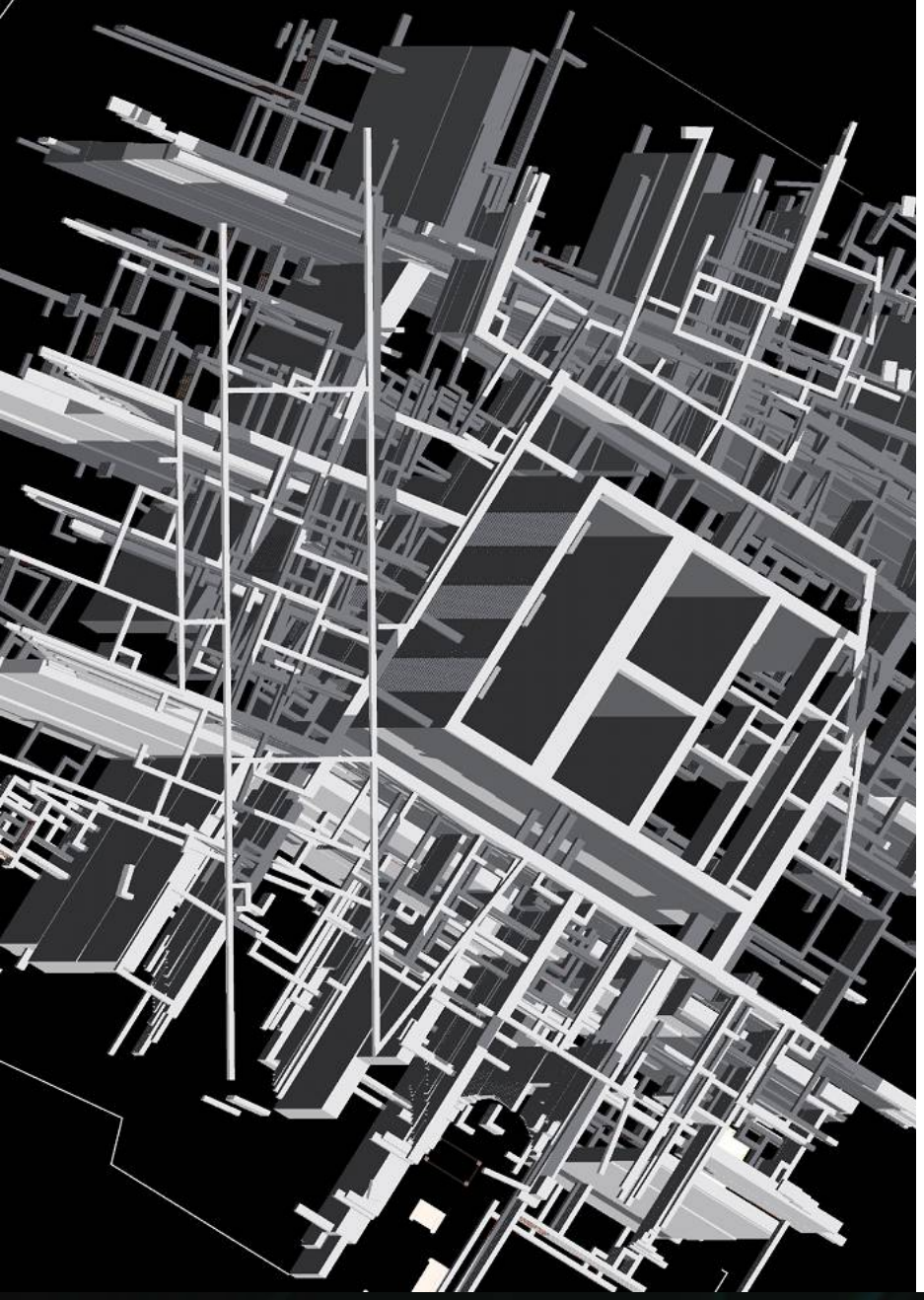


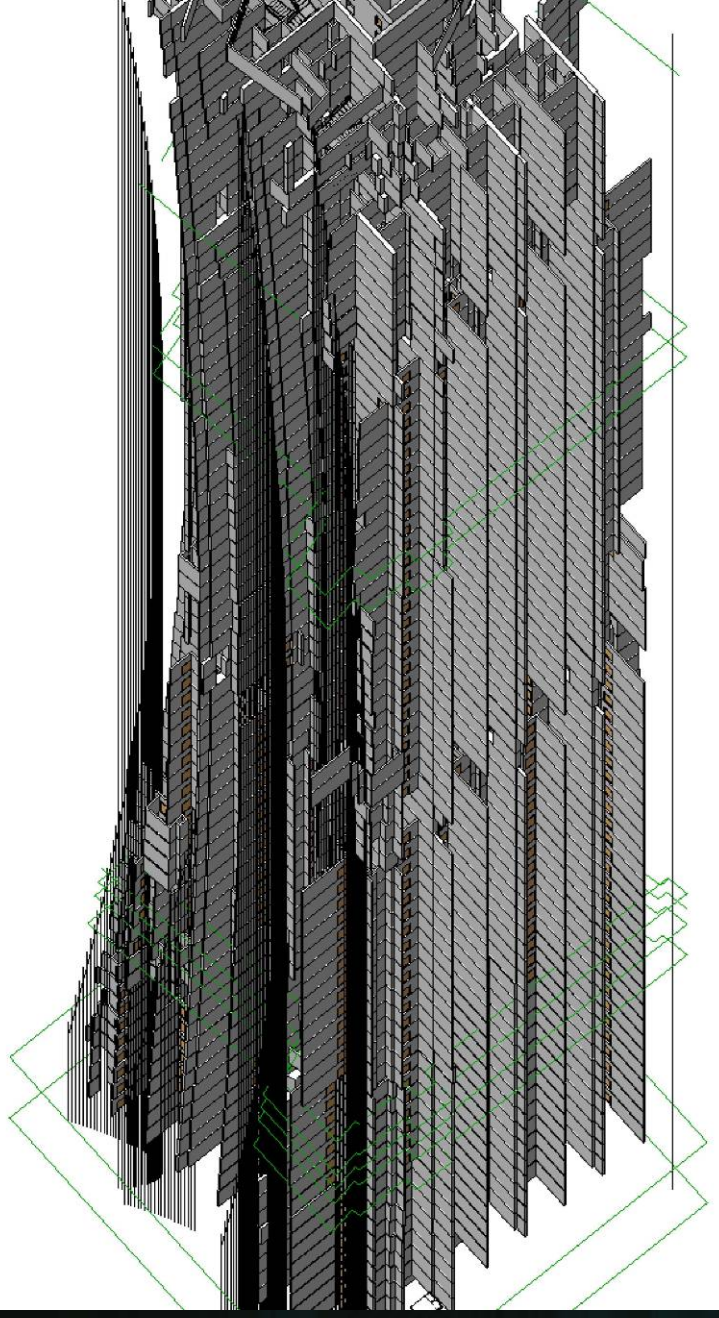




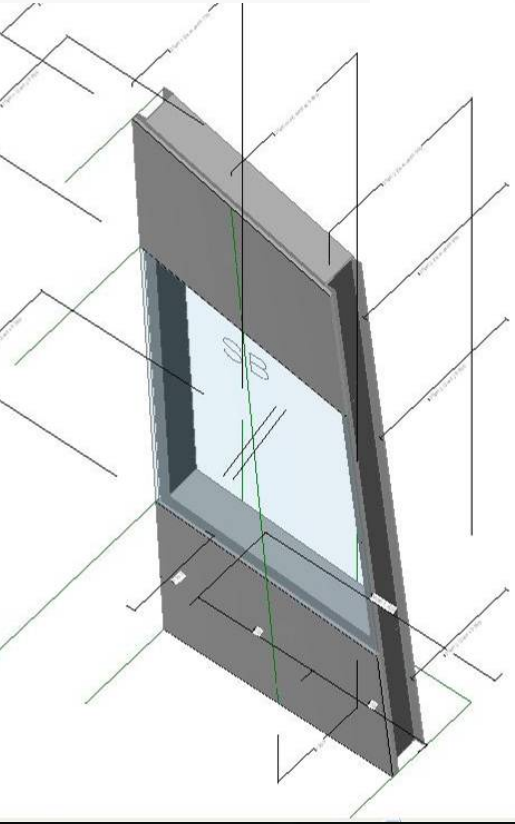


VERTICAL CO-ORDINATION

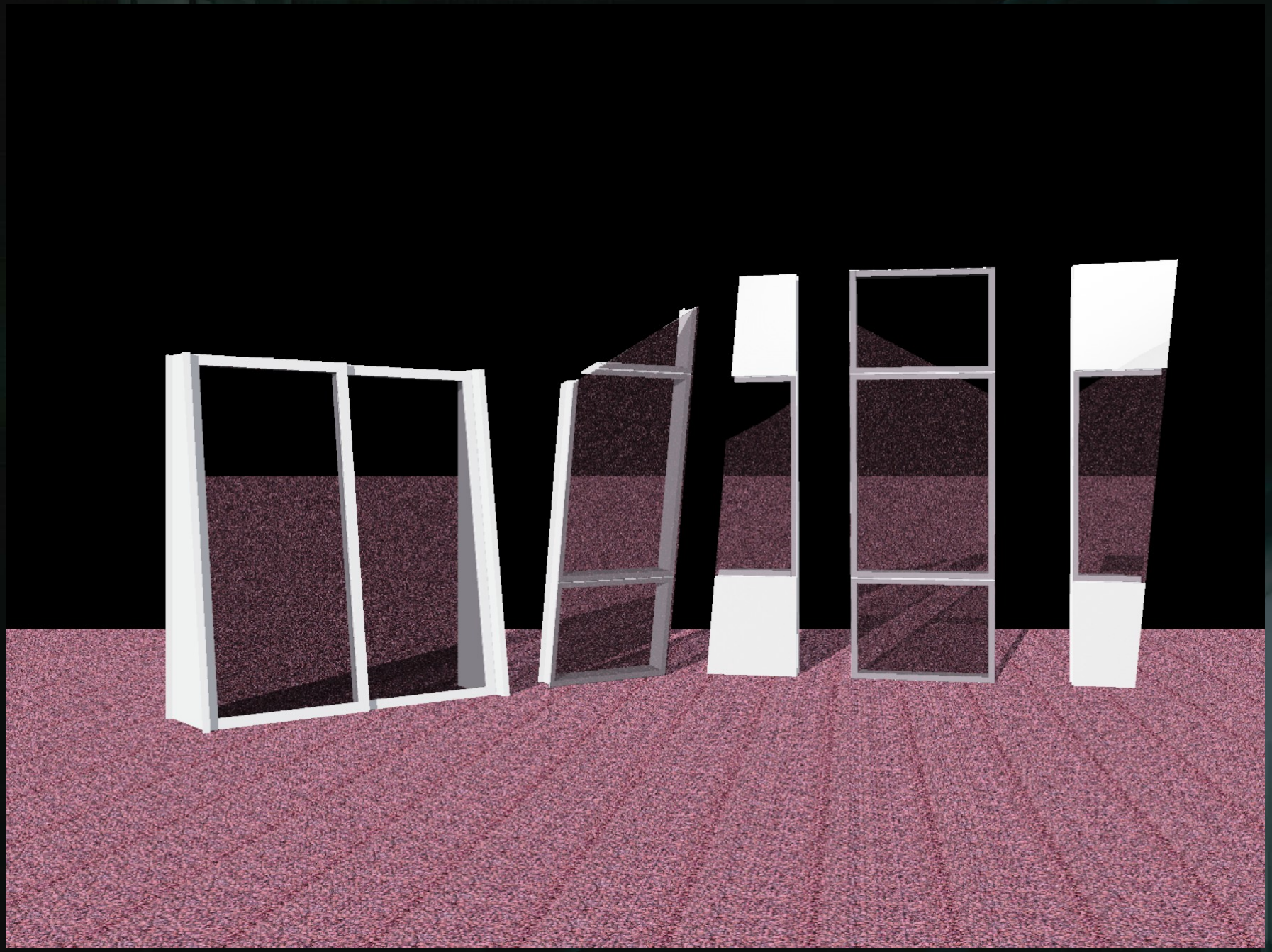




INTERNAL vs EXTERNAL



COMPLICATED CURTAIN WALL



Autodesk Revit Structure 4 - [Ocean Heights 1 R4 Local 2.rvt - Schedule: Multi-Category Schedule]

File Edit View Modelling Drafting Site Tools Settings Window Help

Move Copy Rotate Array Mirror Group 3D

Plane Demolish Align Split Trim Offset (Not Editable) Level 31 to

Headers: Group Ungroup Rows: New Delete Show

Basics

Modify
Structural Colur
Structural Wall
Beam
Component
Slab
Grid
Ref Plane
Dimension
Section
Level
Framing Elevati
Text

Ocean Heights 1 R4 L...

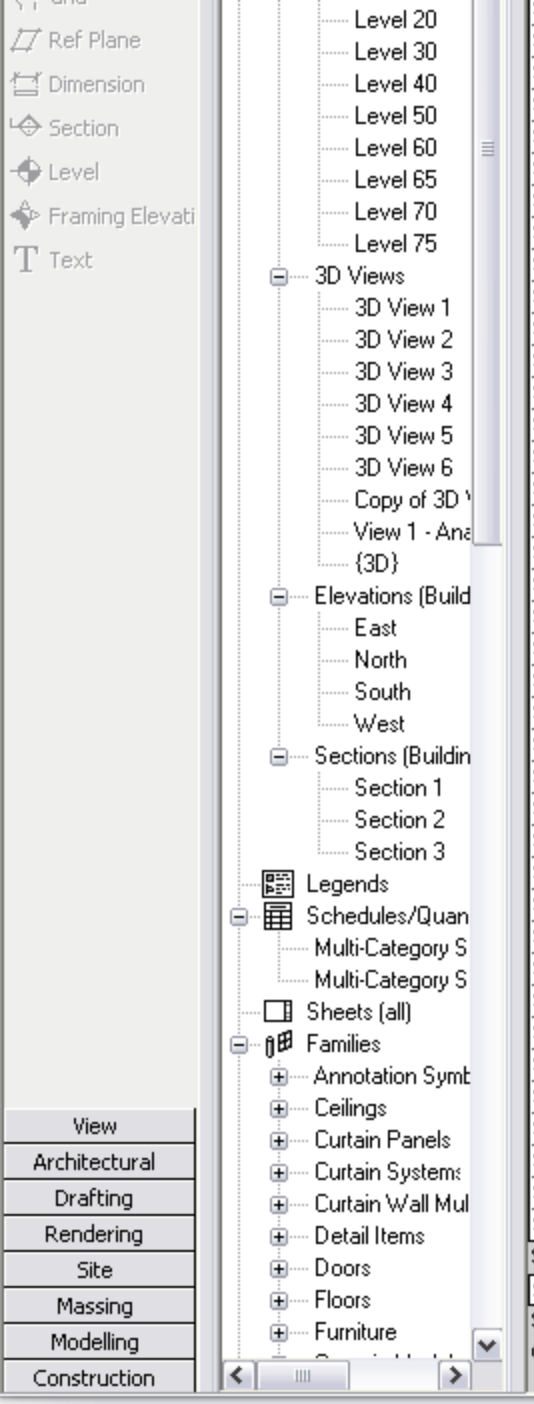
- Views (all)
  - Structural Plans
    - CAD REFEF
    - Level 1
    - Level 1 - An
    - Level 2
    - Level 2 - An
    - Level 4
    - Level 10
    - Level 20
    - Level 30
    - Level 40
    - Level 50
    - Level 60
    - Level 65
    - Level 70
    - Level 75
  - 3D Views
    - 3D View 1
    - 3D View 2
    - 3D View 3
    - 3D View 4
    - 3D View 5
    - 3D View 6
    - Copy of 3D
    - View 1 - Ana
    - {3D}
  - Elevations (Build
    - East
    - North
    - South
    - West
  - Sections (Buildin
    - Section 1
    - Section 2
    - Section 3
- Legends
- Schedules/Quan
  - Multi-Category S
  - Multi-Category S
- Sheets (all)
- Families
  - Annotation Symb
  - Ceilings
  - Curtain Panels
  - Curtain Systems
  - Curtain Wall Mul
  - Detail Items
  - Doors
  - Floors
  - Furniture

View
Architectural
Drafting
Rendering
Site
Massing
Modelling
Construction

Multi-Category Schedule

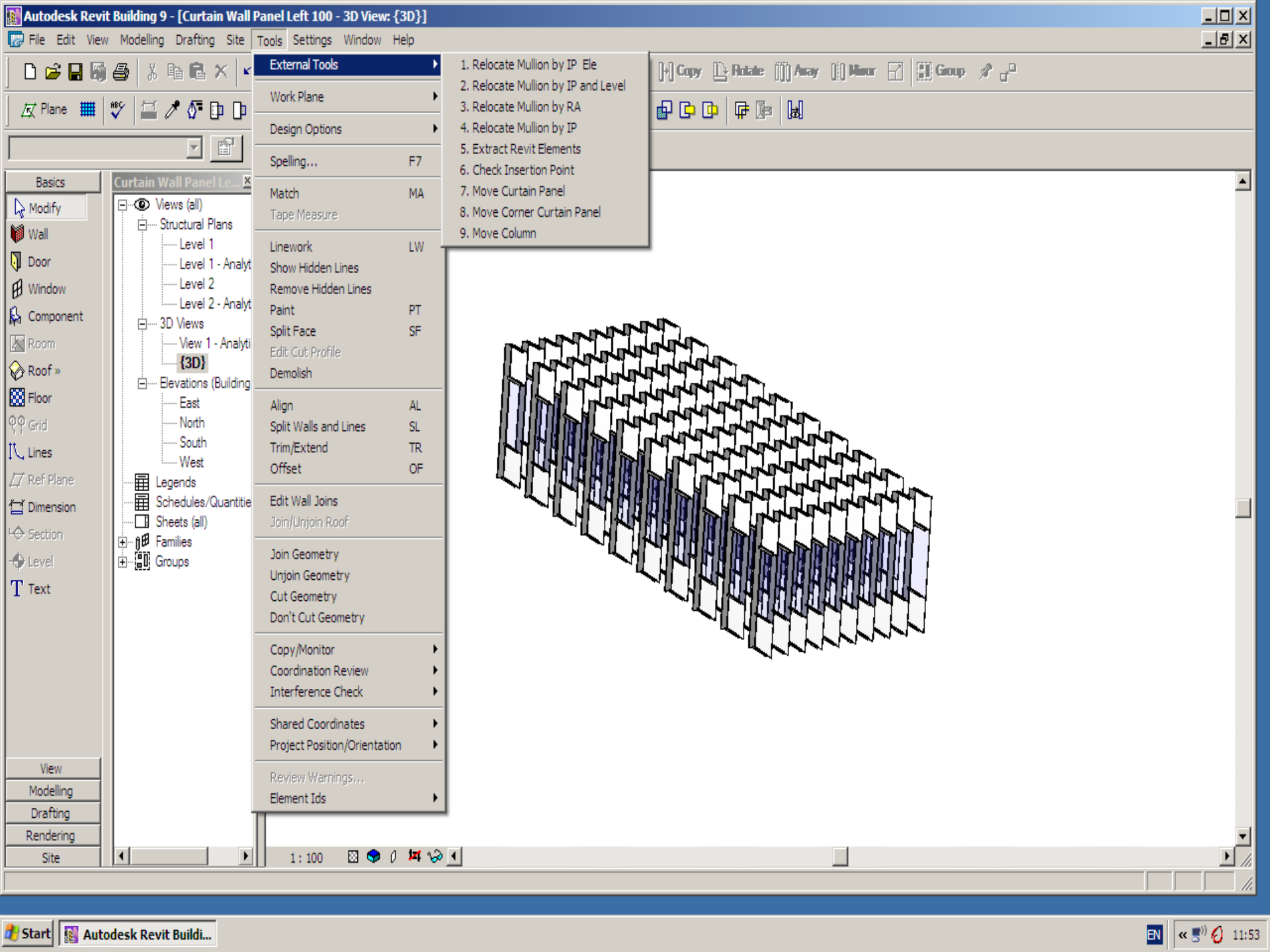
Family	Mark	Level	Width	Width Left	Width Right	Offset 1	Offset 2
Curtain Wall Panel 2	L08F01N01	Level 8	1255.67			-31.08	-41.89
Curtain Wall Panel 2	L08F01N02	Level 8	1255.67			-41.89	-52.71
Curtain Wall Panel 2	L08F01N03	Level 8	1255.67			-52.71	-63.53
Curtain Wall Panel 2	L08F01N04	Level 8	1255.67			-63.53	-74.34
Curtain Wall Panel 2	L08F01N05	Level 8	1255.67			-74.34	-85.16
Curtain Wall Panel 2	L08F01N06	Level 8	1255.67			-85.16	-95.97
Curtain Wall Panel 2	L08F01N07	Level 8	1255.67			-95.97	-106.79
Curtain Wall Panel 2	L08F01N08	Level 8	1255.67			-106.79	-117.60
Curtain Wall Panel 2	L08F01N09	Level 8	1255.67			-117.60	-117.60
Curtain Wall Panel 2	L08F03N09	Level 8	1224.13			5.31	5.66
Curtain Wall Panel 2	L08F03N10	Level 8	1224.13			5.66	6.01
Curtain Wall Panel 2	L08F03N11	Level 8	1224.13			6.01	6.36
Curtain Wall Panel 2	L09F01N01	Level 9	1255.72			-29.00	-39.77
Curtain Wall Panel 2	L09F01N02	Level 9	1255.72			-39.77	-50.54
Curtain Wall Panel 2	L09F01N03	Level 9	1255.72			-50.54	-61.31
Curtain Wall Panel 2	L09F01N04	Level 9	1255.72			-61.31	-72.07
Curtain Wall Panel 2	L09F01N05	Level 9	1255.72			-72.07	-82.84
Curtain Wall Panel 2	L09F01N06	Level 9	1255.72			-82.84	-93.61
Curtain Wall Panel 2	L09F01N07	Level 9	1255.72			-93.61	-104.38
Curtain Wall Panel 2	L09F01N08	Level 9	1255.72			-104.38	-115.15
Curtain Wall Panel 2	L09F03N09	Level 9	1224.13			0.64	0.74
Curtain Wall Panel 2	L09F03N10	Level 9	1224.13			0.74	0.84
Curtain Wall Panel 2	L09F03N11	Level 9	1224.13			0.84	0.94
Curtain Wall Panel 2	L10F01N01	Level 10	1255.77			-26.77	-37.49
Curtain Wall Panel 2	L10F01N02	Level 10	1255.77			-37.49	-48.21
Curtain Wall Panel 2	L10F01N03	Level 10	1255.77			-48.21	-58.93
Curtain Wall Panel 2	L10F01N04	Level 10	1255.77			-58.93	-69.64
Curtain Wall Panel 2	L10F01N05	Level 10	1255.77			-69.64	-80.36
Curtain Wall Panel 2	L10F01N06	Level 10	1255.77			-80.36	-91.08
Curtain Wall Panel 2	L10F01N07	Level 10	1255.77			-91.08	-101.80
Curtain Wall Panel 2	L10F01N08	Level 10	1255.77			-101.80	-112.52
Curtain Wall Panel 2	L10F03N09	Level 10	1224.13			-4.06	-4.21
Curtain Wall Panel 2	L10F03N10	Level 10	1224.13			-4.21	-4.35
Curtain Wall Panel 2	L10F03N11	Level 10	1224.13			-4.35	-4.50
Curtain Wall Panel 2	L81B1RN01	Level 81	1224.10			0.00	0.00
Curtain Wall Panel 2	L82B1RN01	Level 82	1224.10			0.00	0.00
Curtain Wall Panel 2	L83B1RN01	Level 83	1224.10			0.00	0.00
Curtain Wall Panel 2	L84B1RN01	Level 84	1224.10			0.00	0.00
Curtain Wall Panel 2: 38							
Curtain Wall Panel 3	L04F03N01	Level 4	1224.13			-1.53	-0.38
Curtain Wall Panel 3	L04F03N02	Level 4	1224.13			-0.38	0.76
Curtain Wall Panel 3	L04F03N03	Level 4	1224.13			0.76	1.91
Curtain Wall Panel 3	L04F03N05	Level 4	1224.13			12.20	13.34
Curtain Wall Panel 3	L04F03N06	Level 4	1224.13			12.20	13.34
Curtain Wall Panel 3	L04F04N01	Level 4	1200.00			-137.36	-137.36
Curtain Wall Panel 3	L04F04N02	Level 4	1200.00			-137.36	-137.38
Curtain Wall Panel 3	L04F04N03	Level 4	1200.00			-137.38	-137.40
Curtain Wall Panel 3	L04F04N04	Level 4	1200.00			-137.40	-137.42
Curtain Wall Panel 3	L04F04N05	Level 4	1200.00			-137.42	-137.45
Curtain Wall Panel 3	L04F04N06	Level 4	1200.00			-137.45	-137.47
Curtain Wall Panel 3	L04F04N07	Level 4	1200.00			-137.47	-137.49

Ready



Sliding Door	L71B05D12	Level 71	2550.00			0.00	
Sliding Door	L71B05D15	Level 71	2550.00			0.00	
Sliding Door	L72B01D02	Level 72	2400.00			0.00	
Sliding Door	L72B02D02	Level 72	2500.00			0.00	
Sliding Door	L72B04D01	Level 72	1800.00			0.00	
Sliding Door	L72B05D03	Level 72	2550.00			0.00	
Sliding Door	L72B05D05	Level 72	2550.00			0.00	
Sliding Door	L72B05D08	Level 72	2550.00			0.00	
Sliding Door	L72B05D10	Level 72	2550.00			0.00	
Sliding Door	L72B05D12	Level 72	2550.00			0.00	
Sliding Door	L72B05D15	Level 72	2550.00			0.00	
Sliding Door	L73B01D02	Level 73	2400.00			0.00	
Sliding Door	L73B02D02	Level 73	2500.00			0.00	
Sliding Door	L73B04D01	Level 73	1700.00			0.00	
Sliding Door	L73B05D03	Level 73	2550.00			0.00	
Sliding Door	L73B05D05	Level 73	2550.00			0.00	
Sliding Door	L73B05D08	Level 73	2550.00			0.00	
Sliding Door	L73B05D10	Level 73	2550.00			0.00	
Sliding Door	L73B05D12	Level 73	2550.00			0.00	
Sliding Door	L73B05D15	Level 73	2550.00			0.00	
Sliding Door	L74B01D02	Level 74	2400.00			0.00	
Sliding Door	L74B02D02	Level 74	2500.00			0.00	
Sliding Door	L74B04D01	Level 74	1600.00			0.00	
Sliding Door	L74B05D03	Level 74	2550.00			0.00	
Sliding Door	L74B05D05	Level 74	2550.00			0.00	
Sliding Door	L74B05D08	Level 74	2550.00			0.00	
Sliding Door	L74B05D10	Level 74	2550.00			0.00	
Sliding Door	L74B05D12	Level 74	2550.00			0.00	
Sliding Door	L74B05D15	Level 74	2550.00			0.00	
Sliding Door	L75B01D02	Level 75	2400.00			0.00	
Sliding Door	L75B02D02	Level 75	2500.00			0.00	
Sliding Door	L76B01D02	Level 76	2400.00			0.00	
Sliding Door	L76B02D02	Level 76	2500.00			0.00	
Sliding Door	L77B01D02	Level 77	2400.00			0.00	
Sliding Door	L77B02D01	Level 77	2426.17			0.00	
Sliding Door	L78B01D02	Level 78	2400.00			0.00	
Sliding Door	L78B02D01	Level 78	2203.01			0.00	
Sliding Door	L79B01D02	Level 79	2400.00			0.00	
Sliding Door	L79B02D01	Level 79	1974.15			0.00	
Sliding Door: 649							
Sliding Door to Replace CW Pan	L10F01N10	Level 10	1255.77			-123.24	
Sliding Door to Replace CW Panel: 1							
Grand total: 9740							

Ready


Autodesk Revit Building 9 - [Curtain Wall Panel Left 100 - 3D View: {3D}]
File Edit View Modelling Drafting Site Tools Settings Window Help
External Tools
1. Relocate Mullion by IP Ele
2. Relocate Mullion by IP and Level
3. Relocate Mullion by RA
4. Relocate Mullion by IP
5. Extract Revit Elements
6. Check Insertion Point
7. Move Curtain Panel
8. Move Corner Curtain Panel
9. Move Column
Work Plane
Design Options
Spelling... F7
Match MA
Tape Measure
Linework LW
Show Hidden Lines
Remove Hidden Lines
Paint PT
Split Face SF
Edit Cut Profile
Demolish
Align AL
Split Walls and Lines SL
Trim/Extend TR
Offset OF
Edit Wall Joins
Join/Unjoin Roof
Join Geometry
Unjoin Geometry
Cut Geometry
Don't Cut Geometry
Copy/Monitor
Coordination Review
Interference Check
Shared Coordinates
Project Position/Orientation
Review Warnings...
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Wall
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Window
Component
Room
Roof
Floor
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Level 1 - Analyt
Level 2
Level 2 - Analyt
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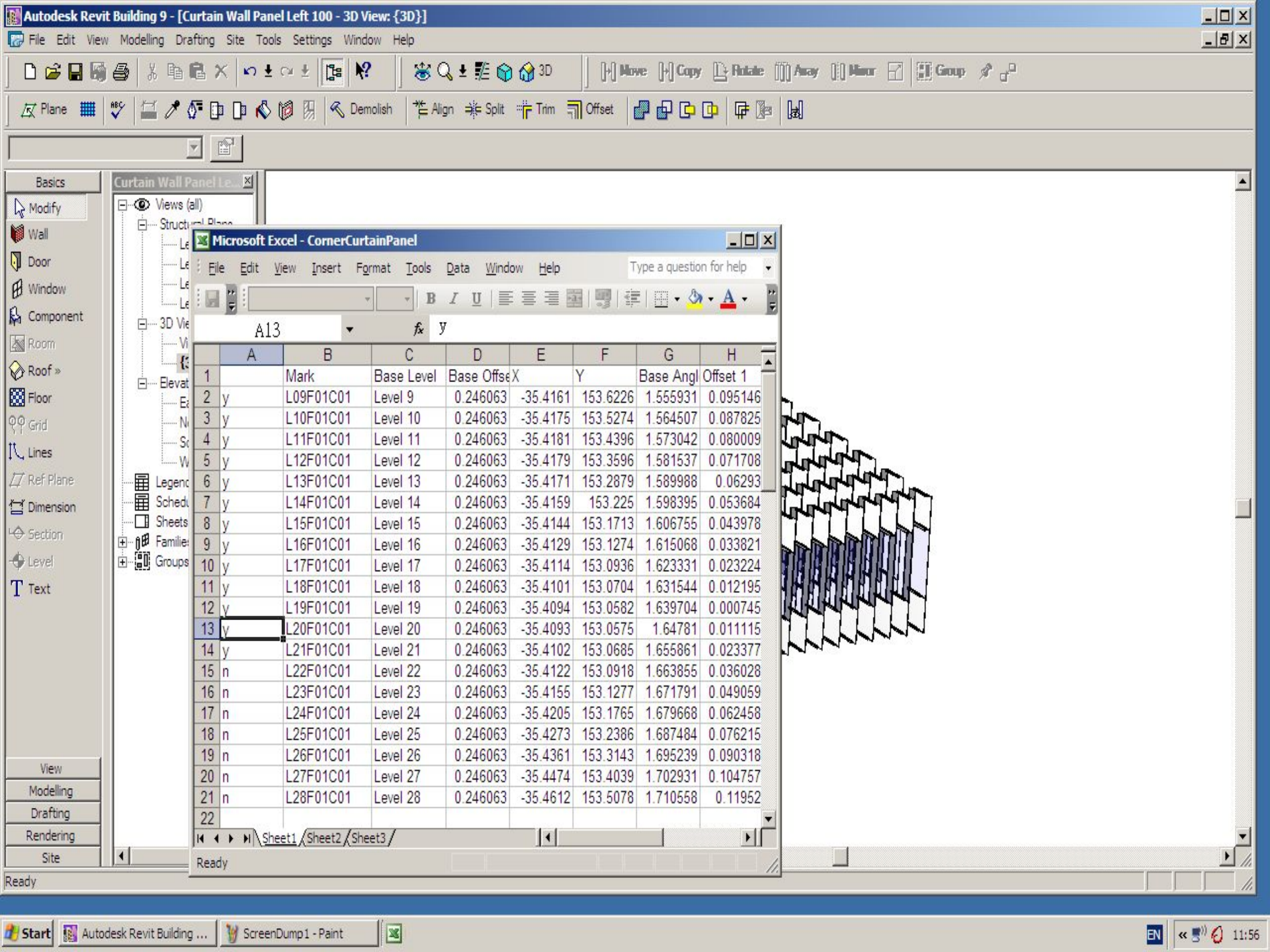
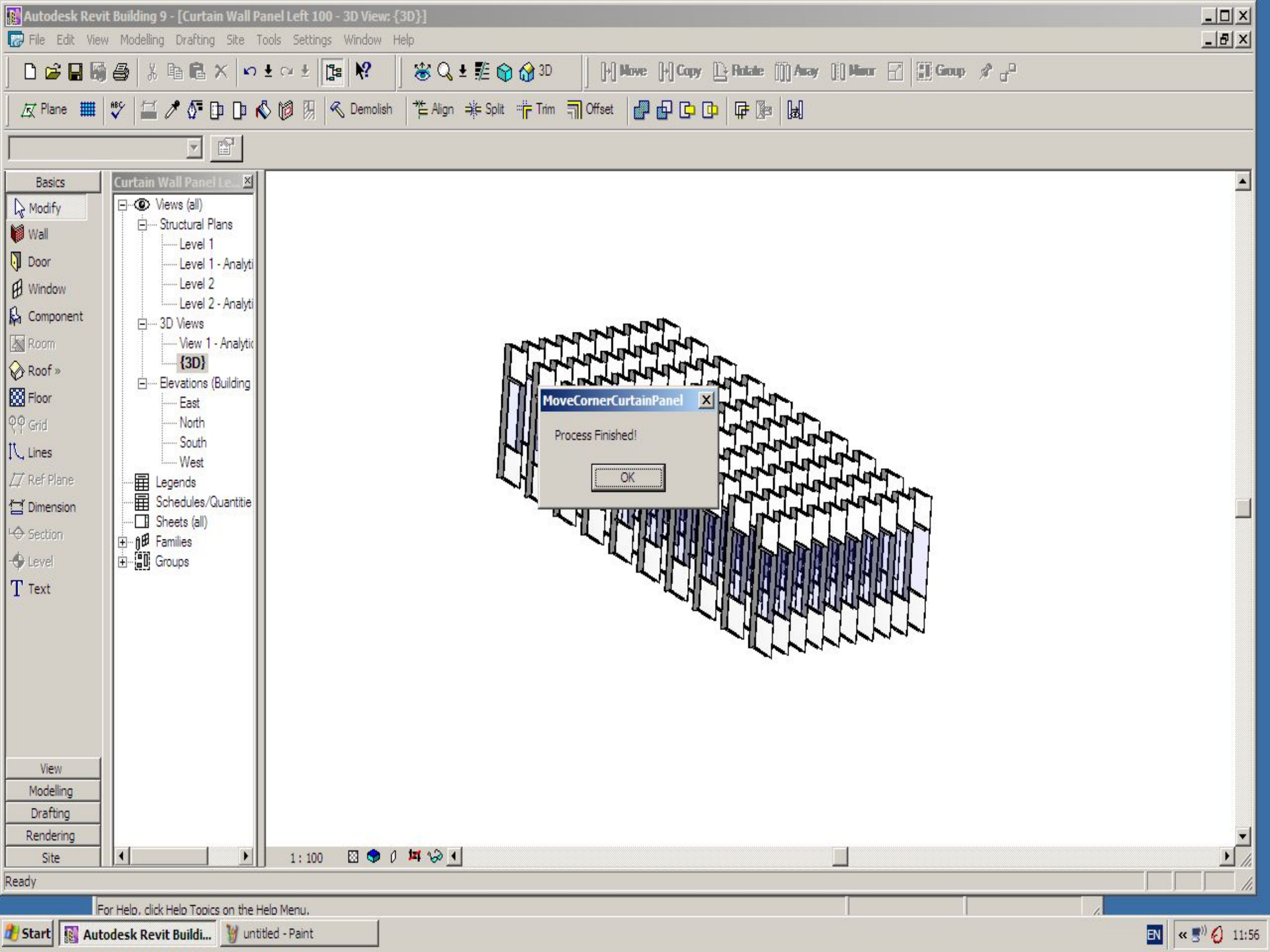


	A	B	C	D	E	F	G	H
1		Mark	Base Level	Base Offse	X	Y	Base Angl	Offset 1
2	y	L09F01C01	Level 9	0.246063	-35.4161	153.6226	1.555931	0.095146
3	y	L10F01C01	Level 10	0.246063	-35.4175	153.5274	1.564507	0.087825
4	y	L11F01C01	Level 11	0.246063	-35.4181	153.4396	1.573042	0.080009
5	y	L12F01C01	Level 12	0.246063	-35.4179	153.3596	1.581537	0.071708
6	y	L13F01C01	Level 13	0.246063	-35.4171	153.2879	1.589988	0.06293
7	y	L14F01C01	Level 14	0.246063	-35.4159	153.225	1.598395	0.053684
8	y	L15F01C01	Level 15	0.246063	-35.4144	153.1713	1.606755	0.043978
9	y	L16F01C01	Level 16	0.246063	-35.4129	153.1274	1.615068	0.033821
10	y	L17F01C01	Level 17	0.246063	-35.4114	153.0936	1.623331	0.023224
11	y	L18F01C01	Level 18	0.246063	-35.4101	153.0704	1.631544	0.012195
12	y	L19F01C01	Level 19	0.246063	-35.4094	153.0582	1.639704	0.000745
13	y	L20F01C01	Level 20	0.246063	-35.4093	153.0575	1.64781	0.011115
14	y	L21F01C01	Level 21	0.246063	-35.4102	153.0685	1.655861	0.023377
15	n	L22F01C01	Level 22	0.246063	-35.4122	153.0918	1.663855	0.036028
16	n	L23F01C01	Level 23	0.246063	-35.4155	153.1277	1.671791	0.049059
17	n	L24F01C01	Level 24	0.246063	-35.4205	153.1765	1.679668	0.062458
18	n	L25F01C01	Level 25	0.246063	-35.4273	153.2386	1.687484	0.076215
19	n	L26F01C01	Level 26	0.246063	-35.4361	153.3143	1.695239	0.090318
20	n	L27F01C01	Level 27	0.246063	-35.4474	153.4039	1.702931	0.104757
21	n	L28F01C01	Level 28	0.246063	-35.4612	153.5078	1.710558	0.11952
22								


Autodesk Revit Building 9 - [Curtain Wall Panel Left 100 - 3D View: {3D}]
File Edit View Modelling Drafting Site Tools Settings Window Help
Move Copy Rotate Array Mirror Group
Plane Demolish Align Split Trim Offset
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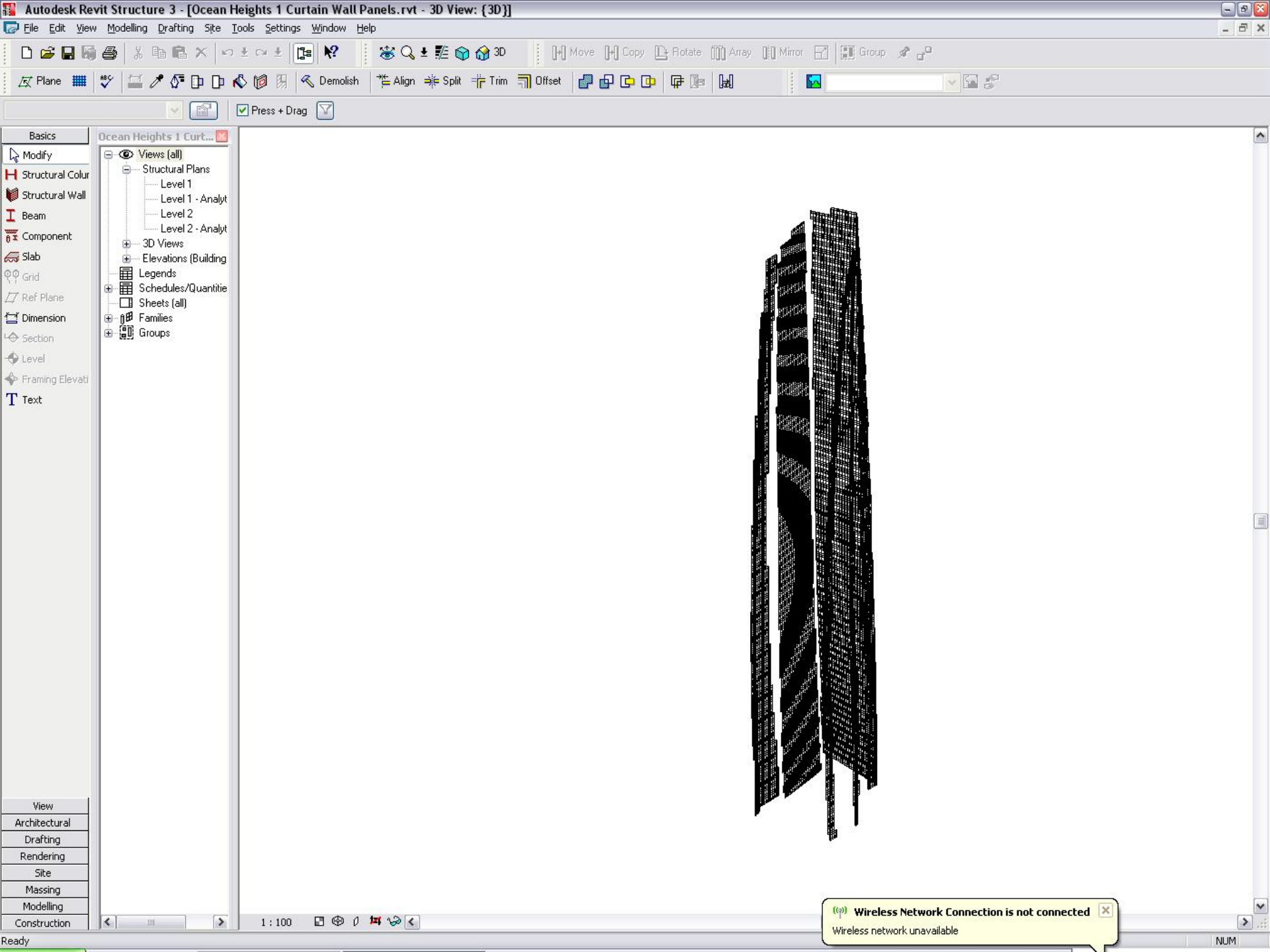
Autodesk Revit Structure 3 - [Ocean Heights 1 Curtain Wall Panels.rvt - 3D View: {3D}]
File Edit View Modelling Drafting Site Tools Settings Window Help
Move Copy Rotate Array Mirror Group
Plane Demolish Align Split Trim Offset
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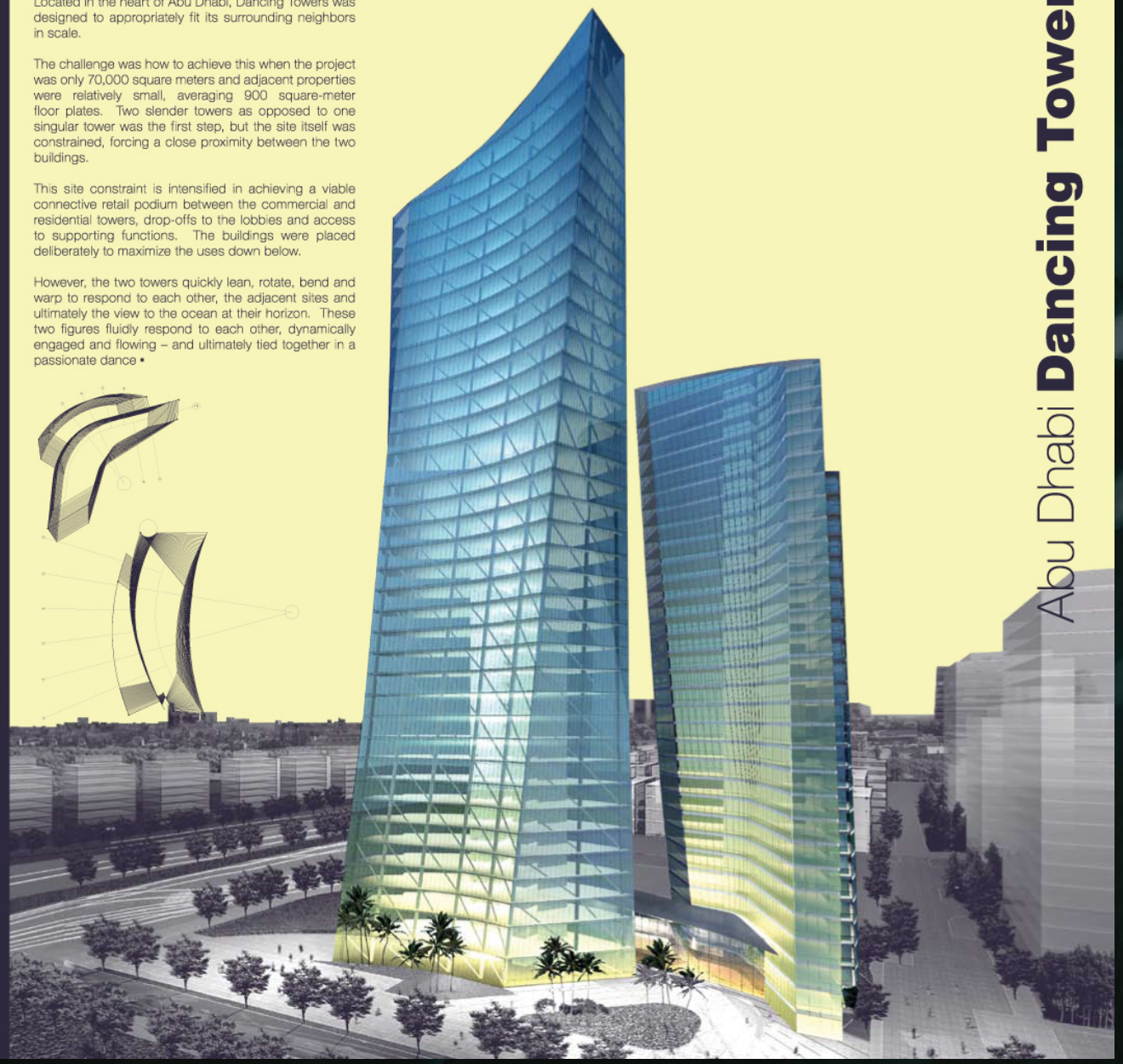
Abu Dhabi **Dancing Towers**

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**

Autodesk Revit Structure 4 - [Dancing Tower Master R4.rvt - 3D View: {3D}]

File Edit View Modelling Drafting Site Tools Settings Window Help

Move Copy Rotate Array Mirror Group

Plane Demolish Align Split Trim Offset

Tower 1 Mass : T1L20 | Floor Area Faces | Related Hosts | Edit Work Plane... | Rehost | Edit Family | Press + Drag

Basics
- Modify
- Structural Colur
- Structural Wall
- Beam
- Component
- Slab
- Grid
- Ref Plane
- Dimension
- Section
- Level
- Framing Elevati
- Text

Dancing Tower Mast...
- Views (all)
  - Structural Plans
    - Ground Onl
    - Level 1
    - Level 1 - An
    - Level 1(1)
    - Level 2 - An
    - ROOF ONL
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    - T1-02
    - T1-03
    - T1-04
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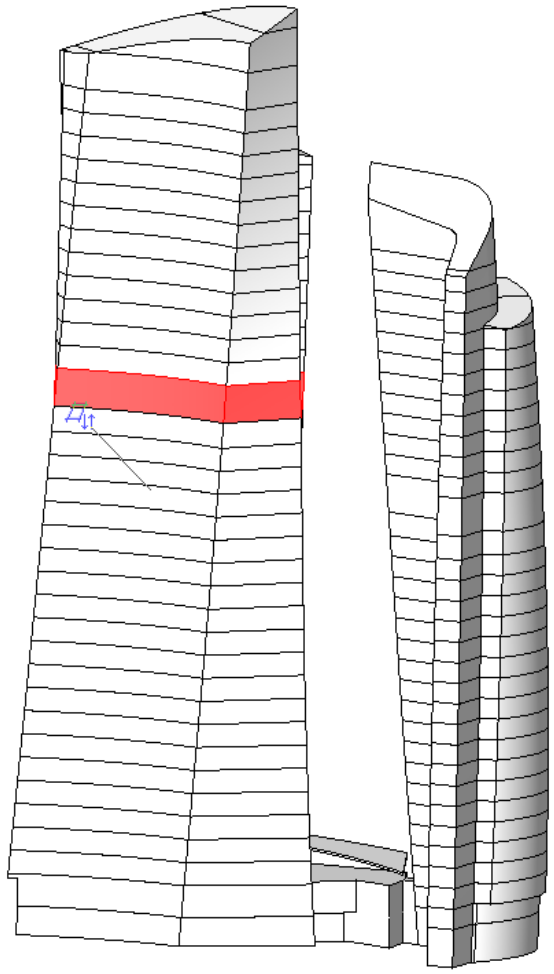

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View
Architectural
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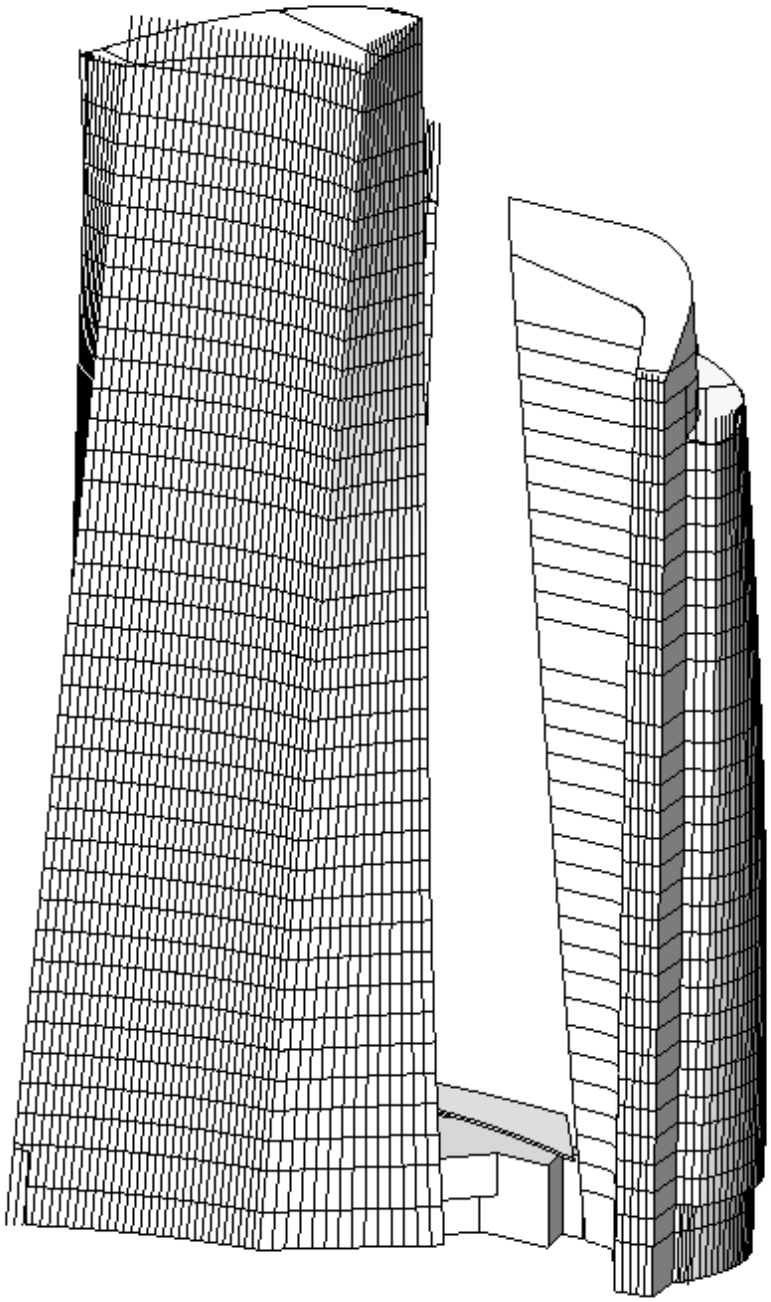
Modelling
Construction

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

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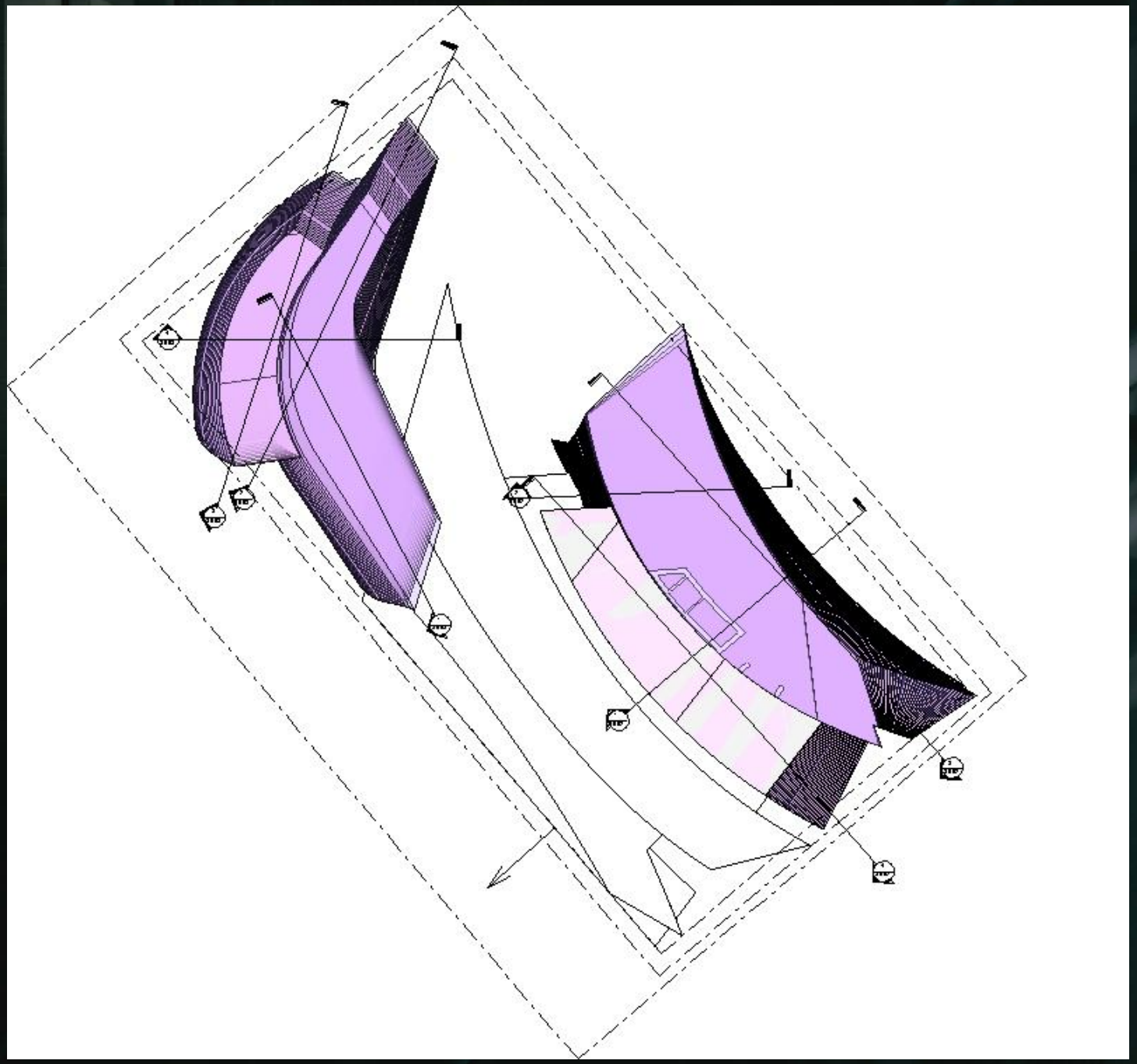


Abu Dhabi **Empire Tower**

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

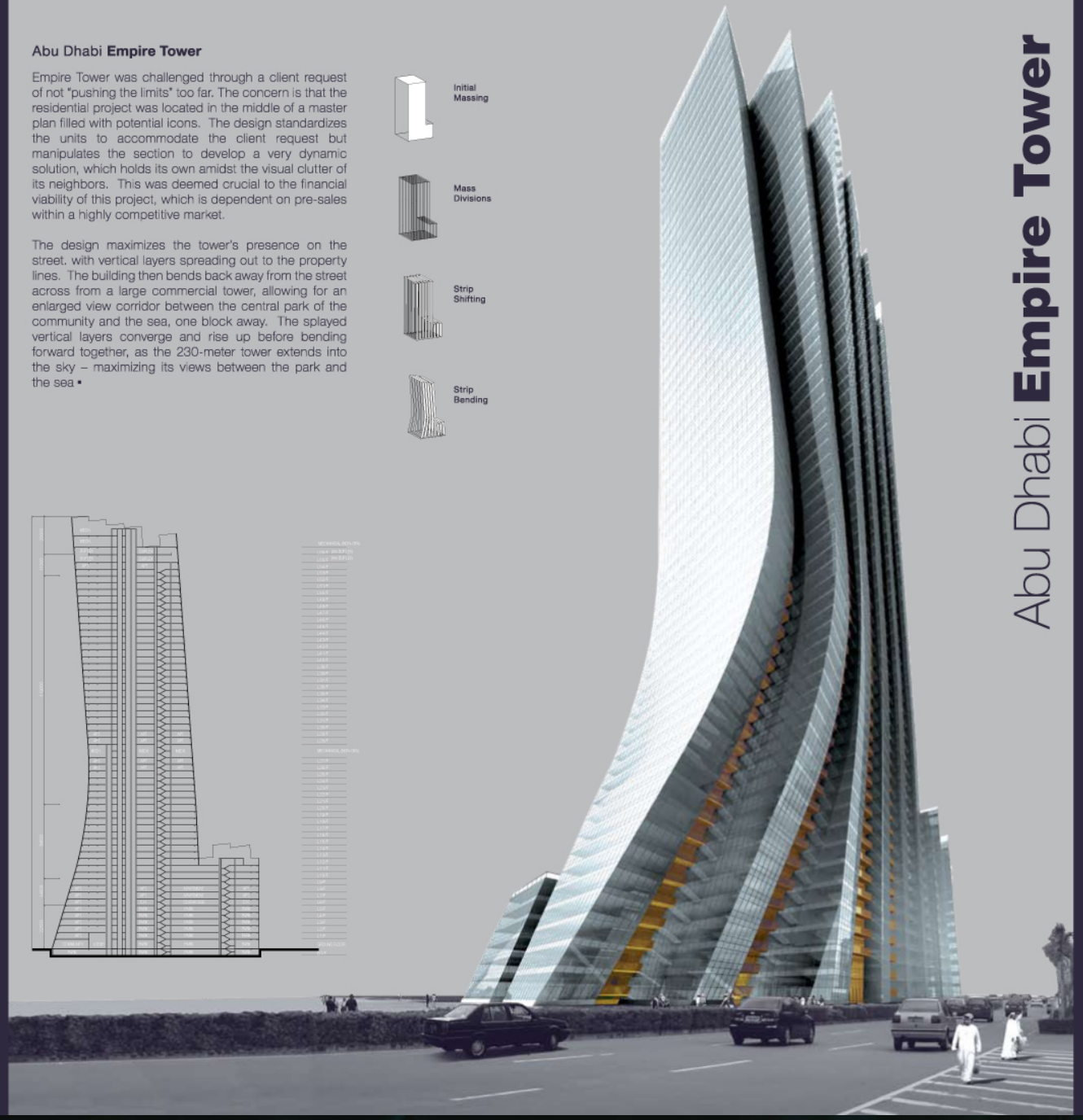
Mass Divisions

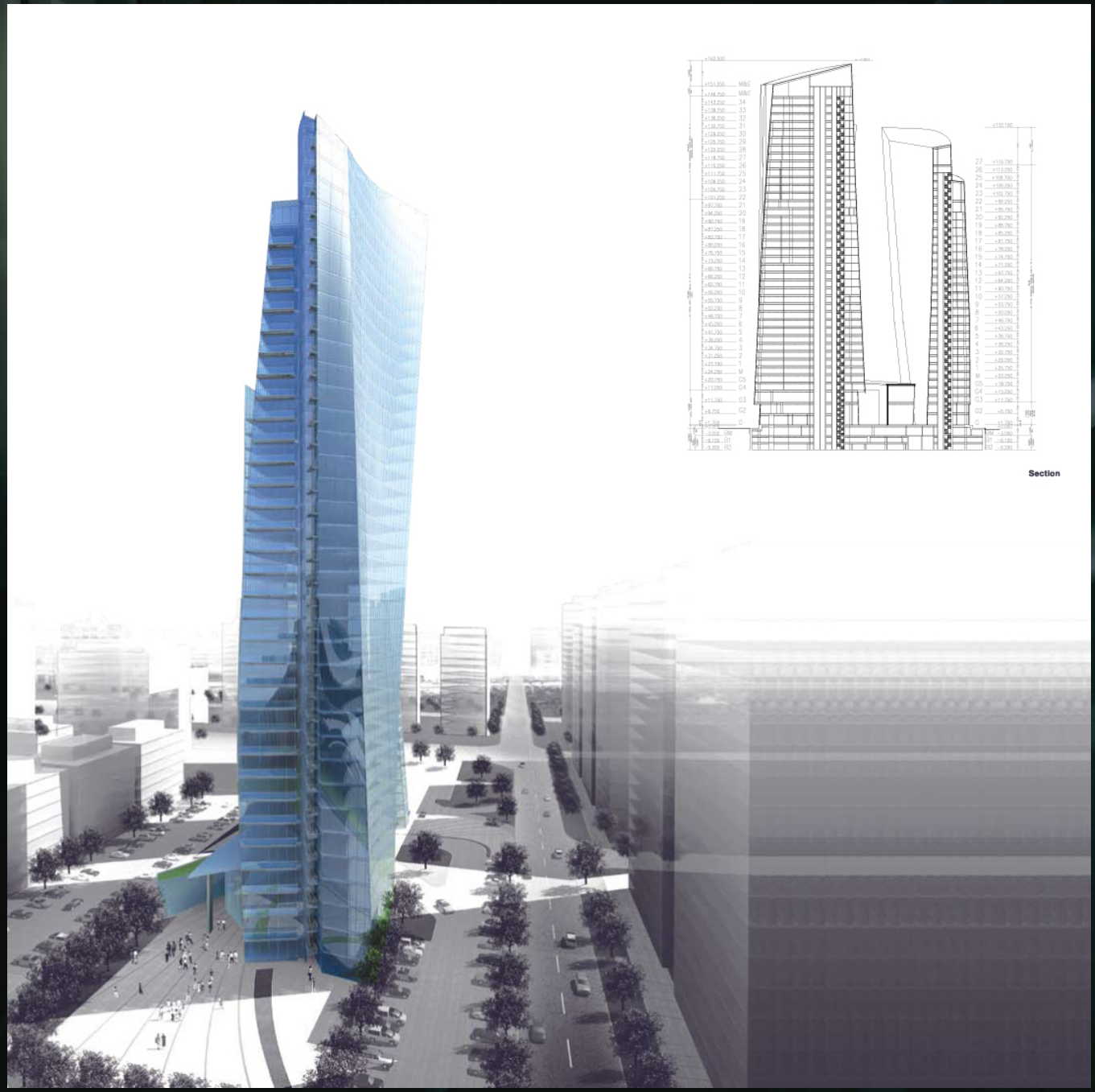
Strip Shifting

Strip Bending

Program **Residential** Site Area **7,007 sqm**
Floor Area **90,206 sqm** Building Height **225 m**

Abu Dhabi **Empire Tower**



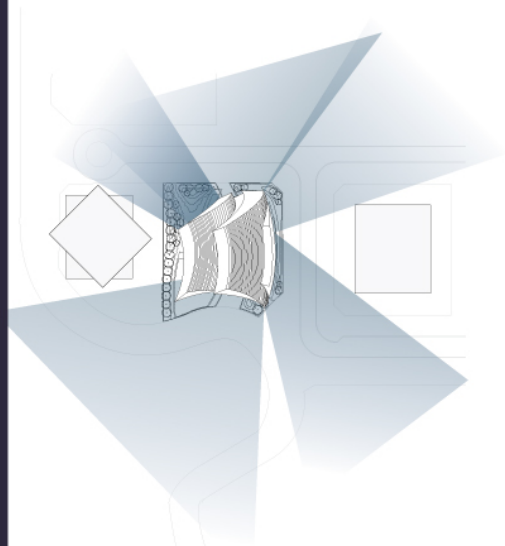


Section

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.

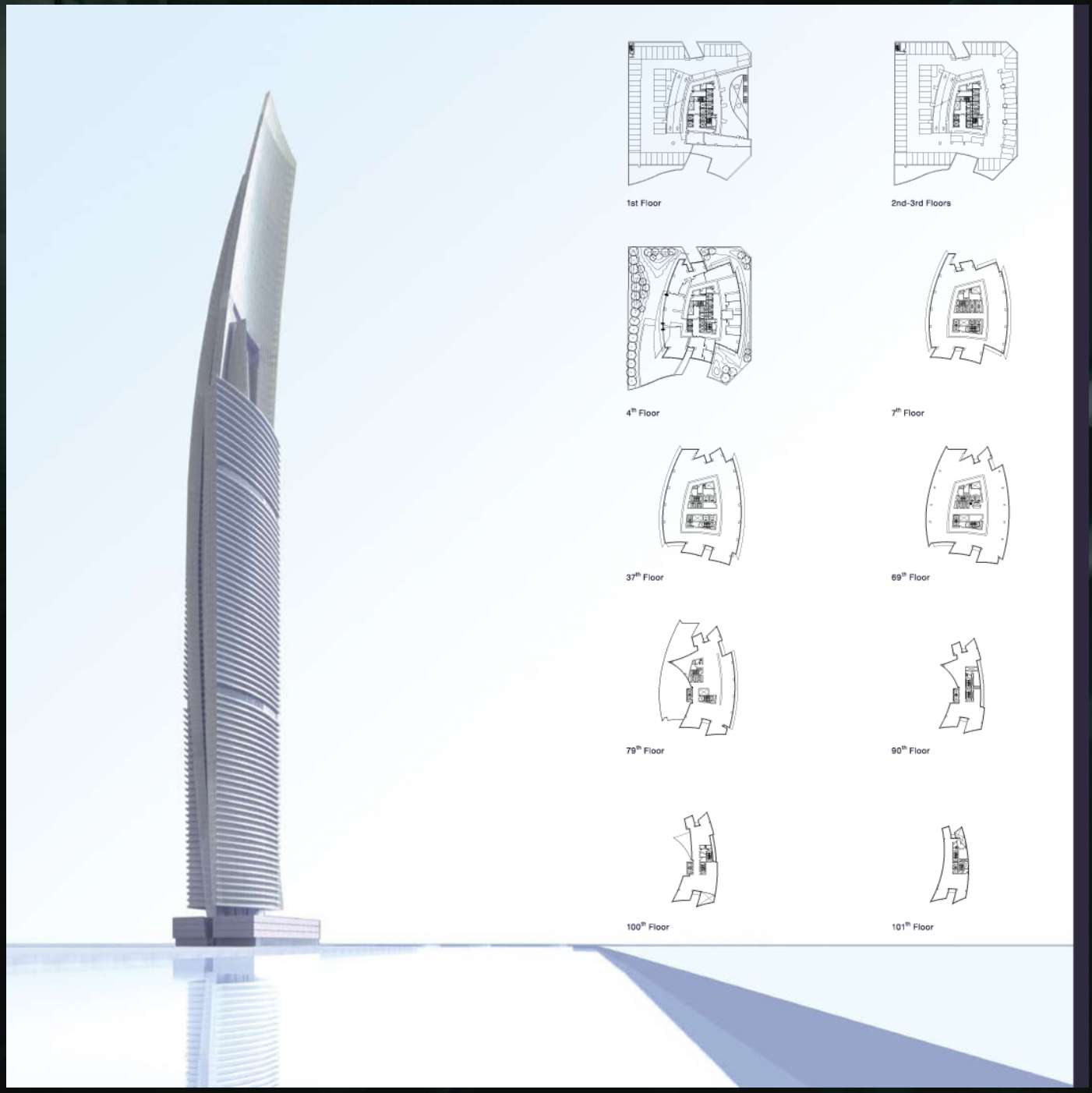
The first 60th floors of the tower are intended to be service apartments, which in order to be marketable, needed to have the majority of units standardized. The curved shape of the tower improves views past its densely located neighbors. The playfulness of this tower was concentrated into the two most visible faces, allowing units to bend up the tower in two blades. These blades were still modulized 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 ▪



View Diagram

Program **Residential** Site Area **9,433sqm**
Floor Area **197,975 sqm** Building Height **460 m**

Dubai **Ocean Heights Two**



1st Floor

2nd-3rd Floors

4th Floor

7th Floor

37th Floor

69th Floor

79th Floor

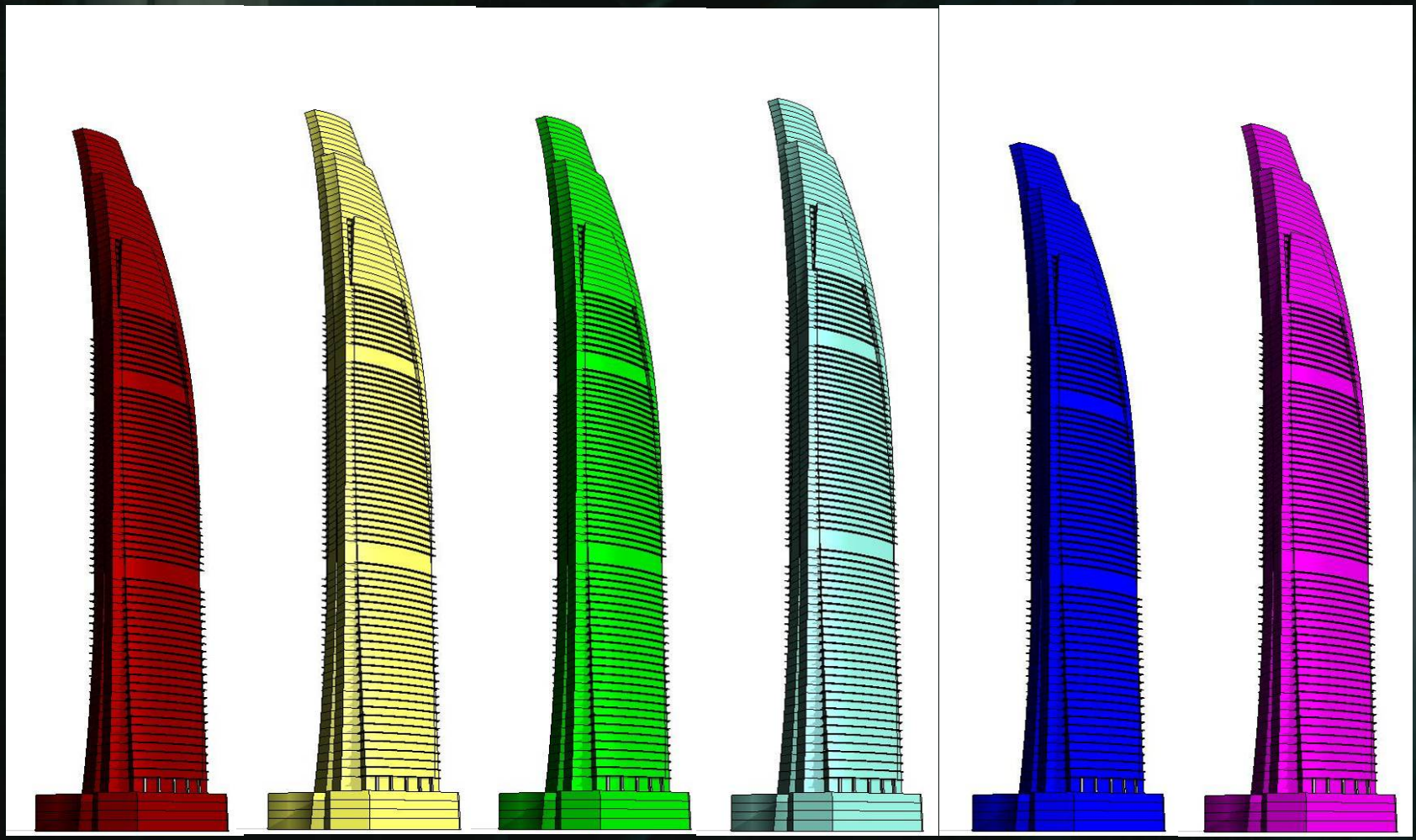
90th Floor

100th Floor

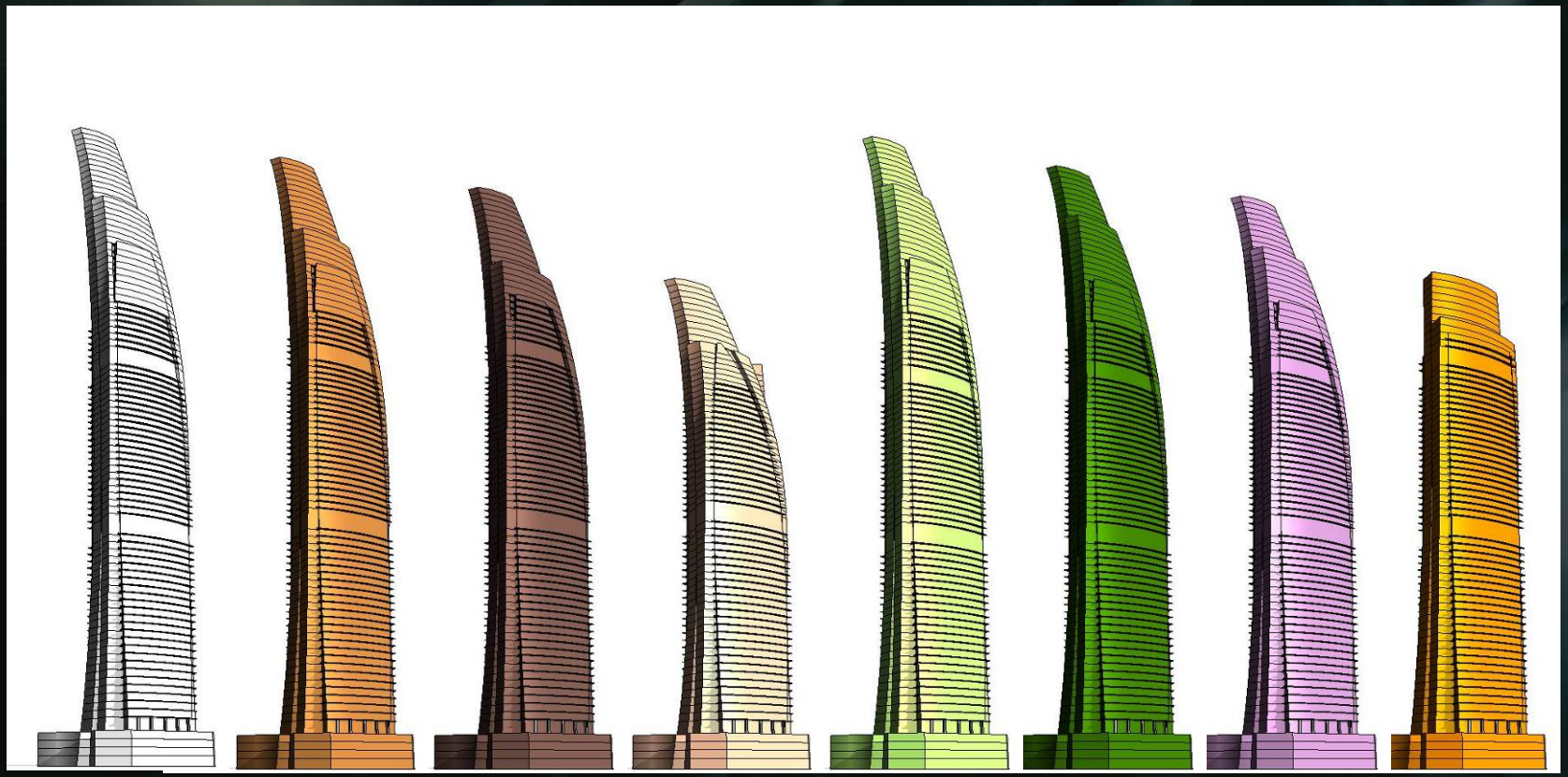
101th Floor

Ocean Heights II

Ocean Heights II – Options



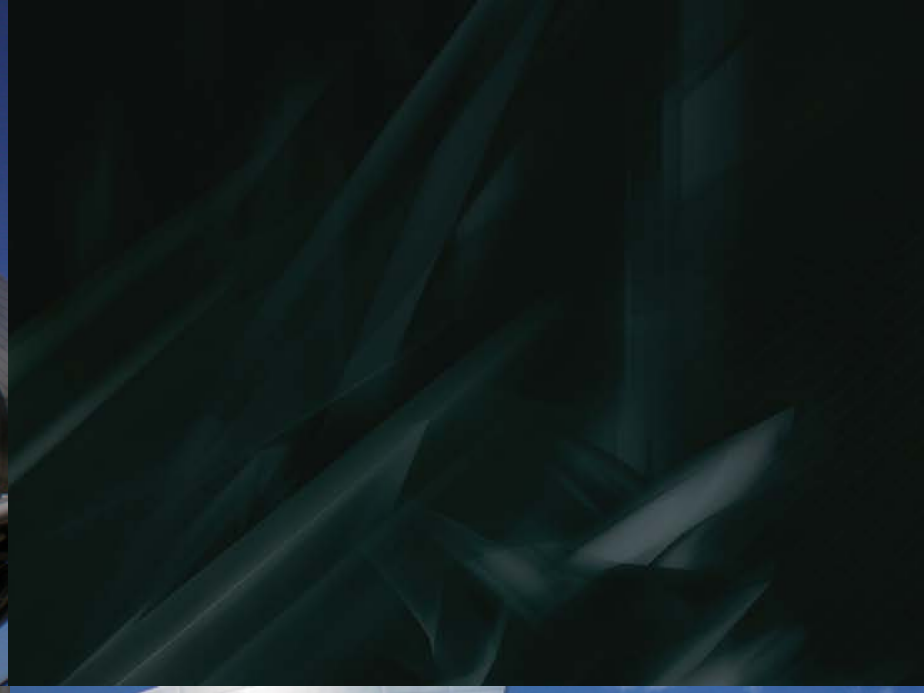
Ocean Heights II – Options



Organic Architecture – 流線型建築

現代建築大師

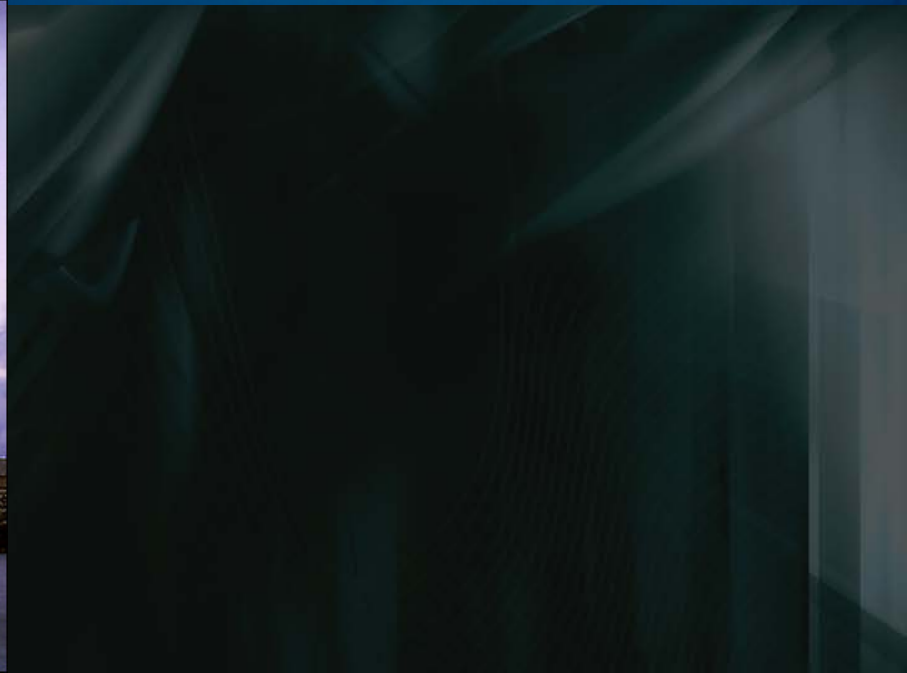
Frank O. Gehry



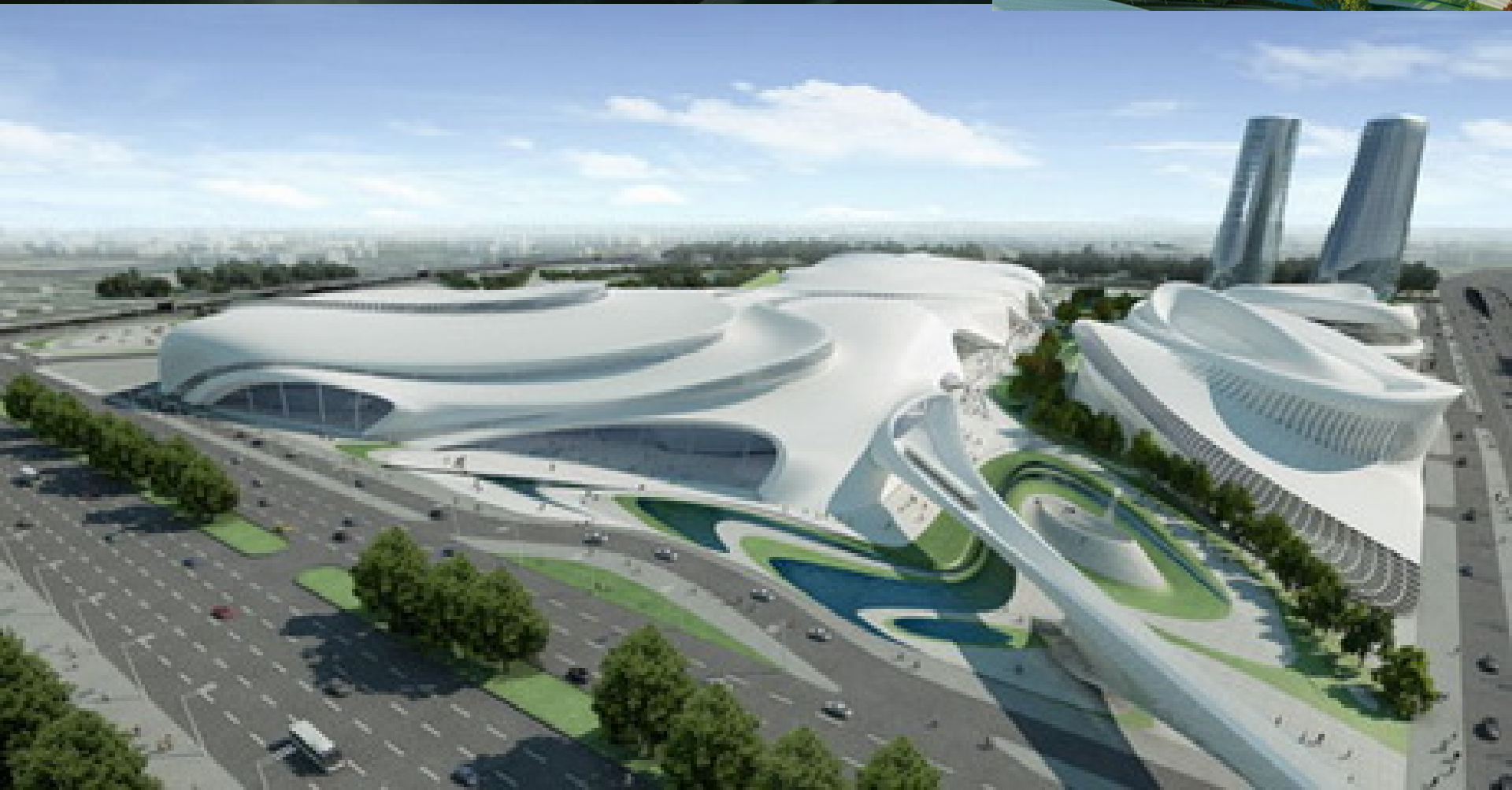
Frank O. Gehry

Frank O. Gehry

Santiego Calatrava

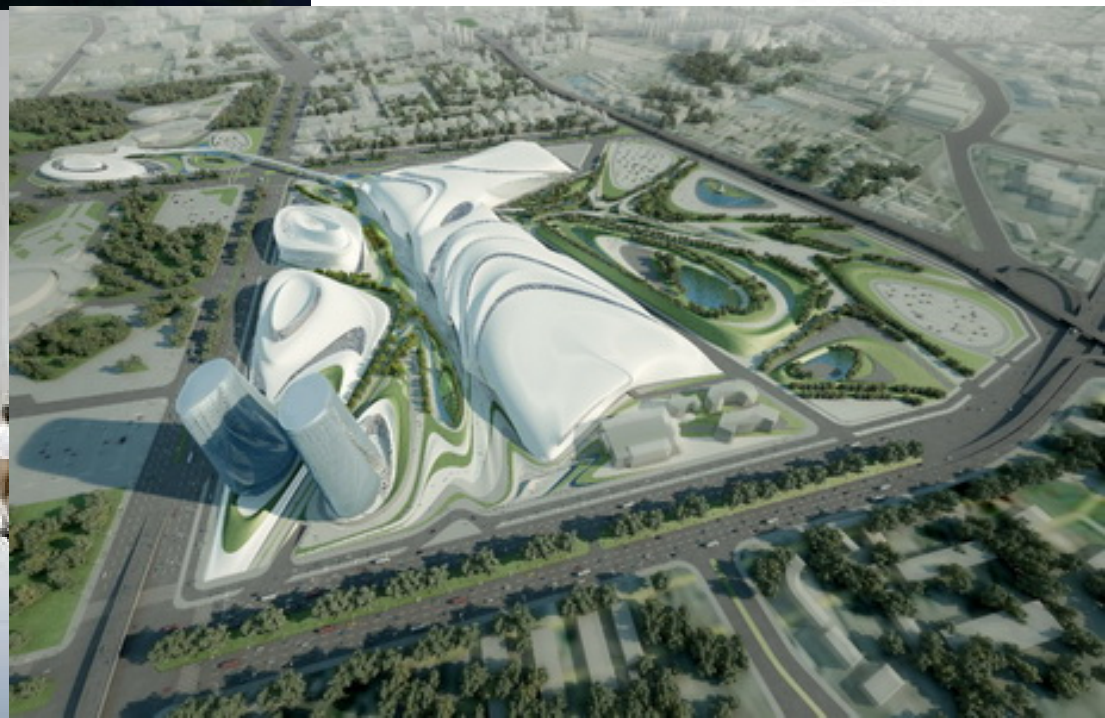


Zaha Hadid



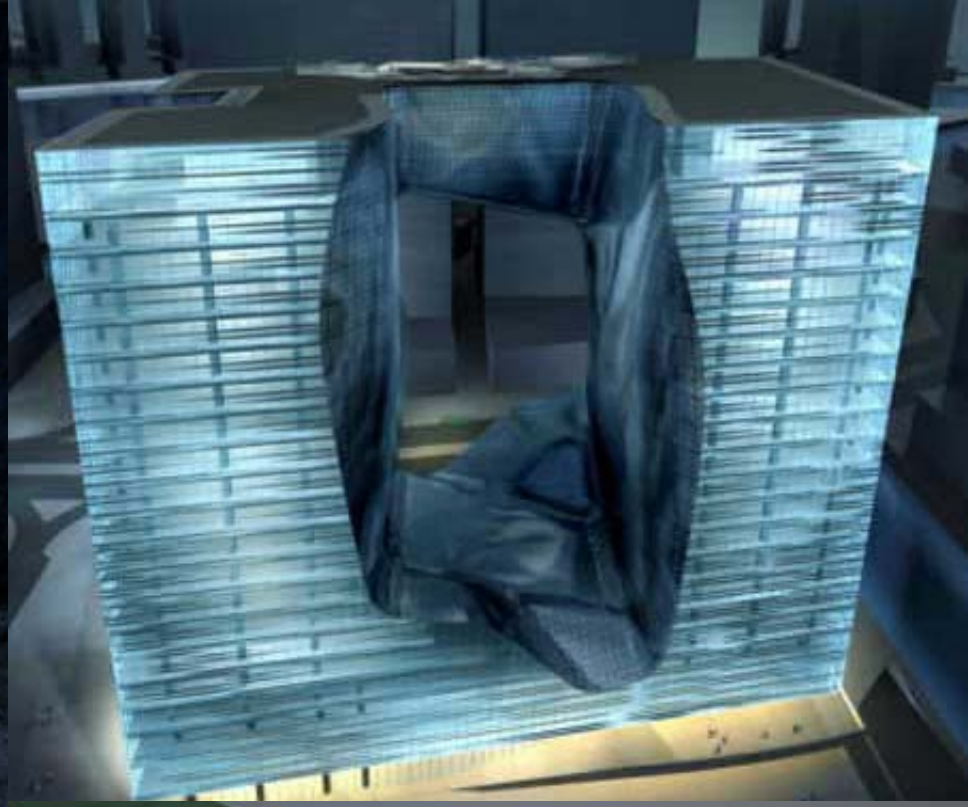
Zaha Hadid

Zaha Hadid



Zaha Hadid

Zaha Hadid



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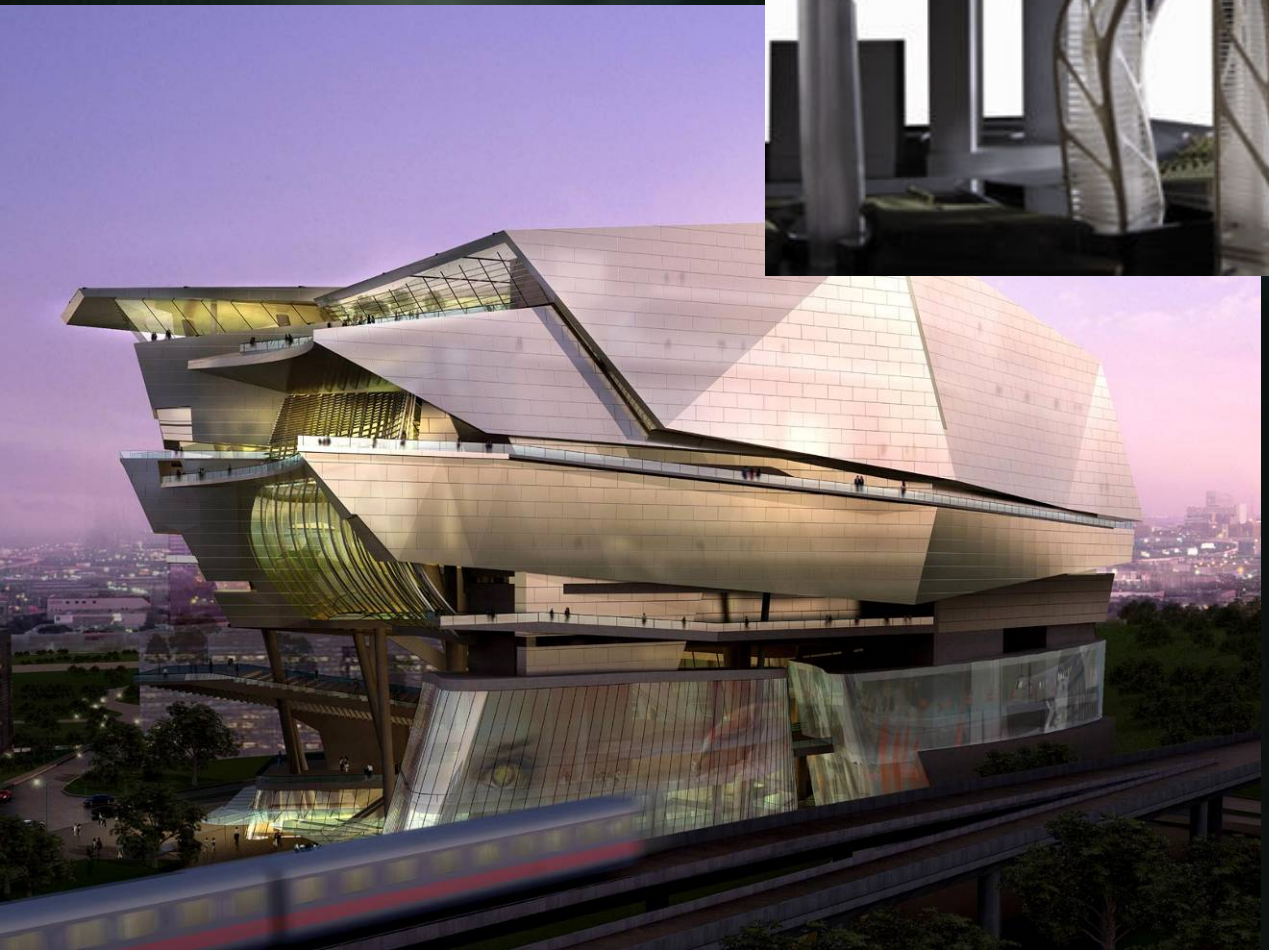

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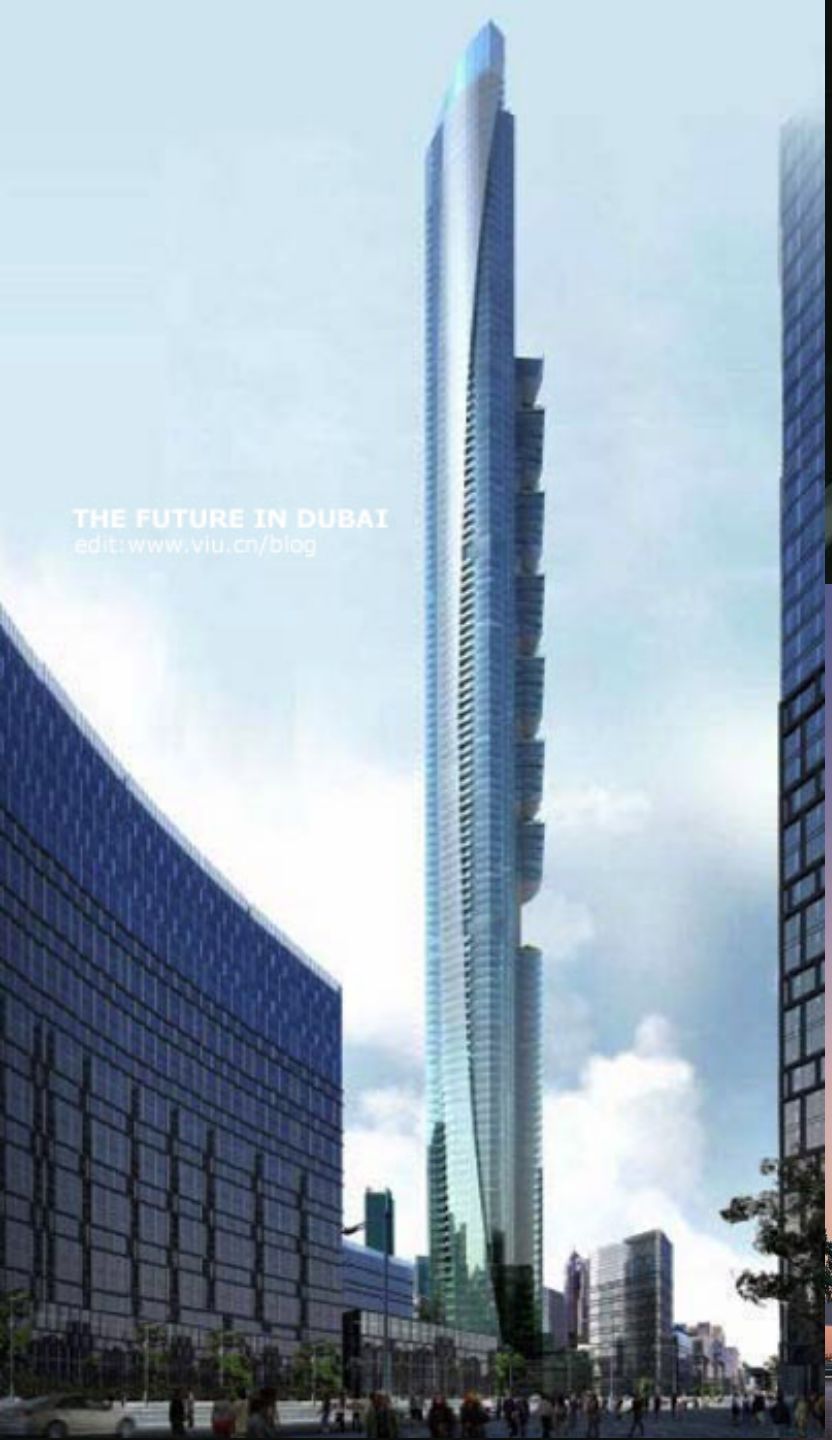
Aedas



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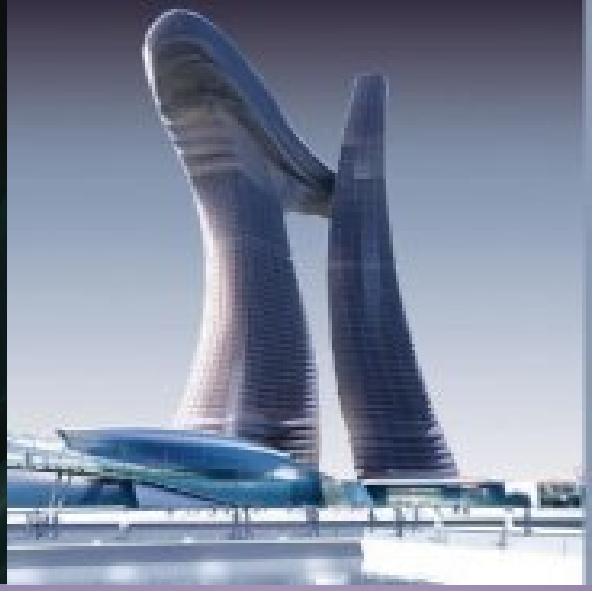
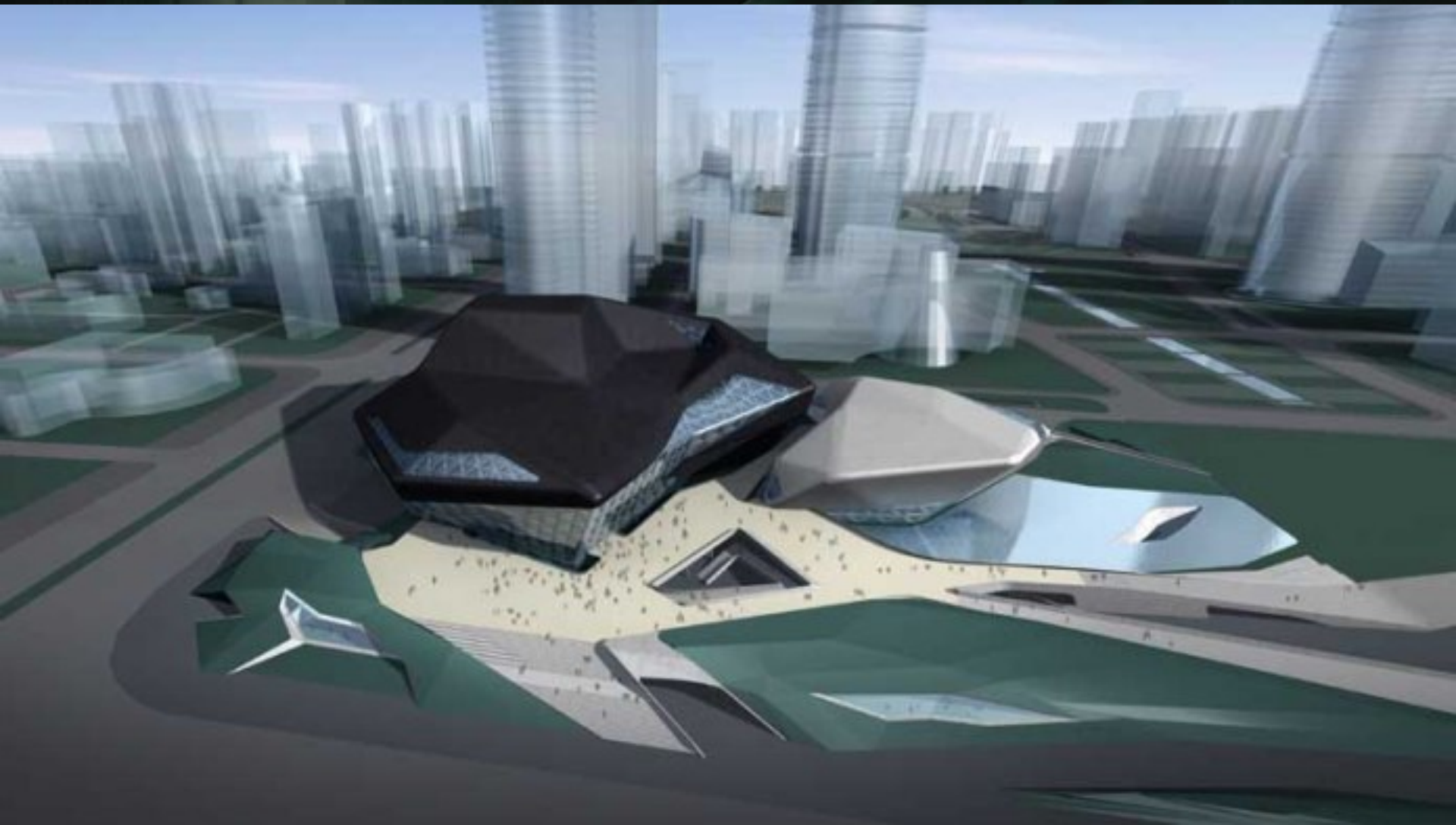
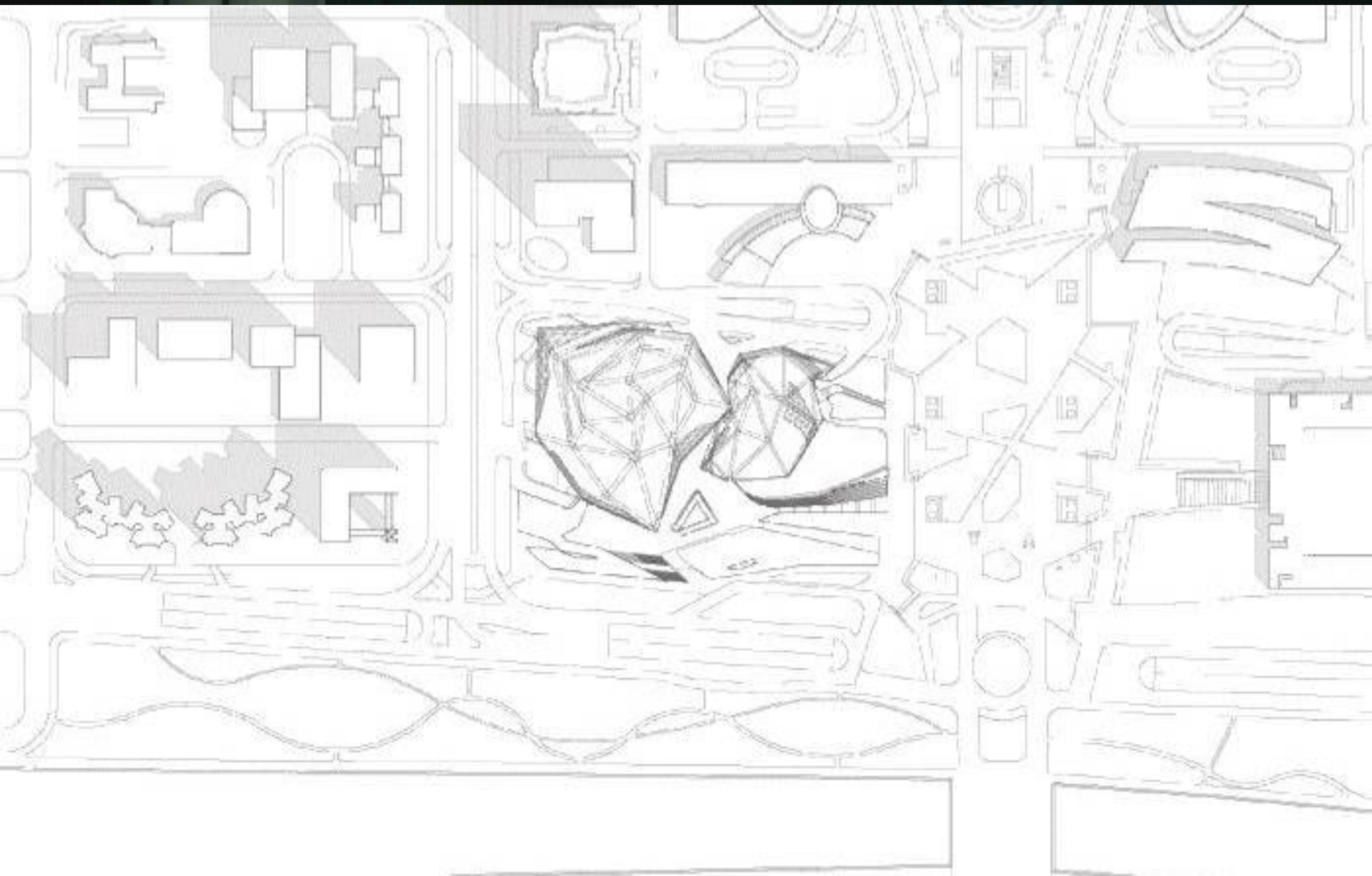


Zaha Hadid Guangzhou Opera House

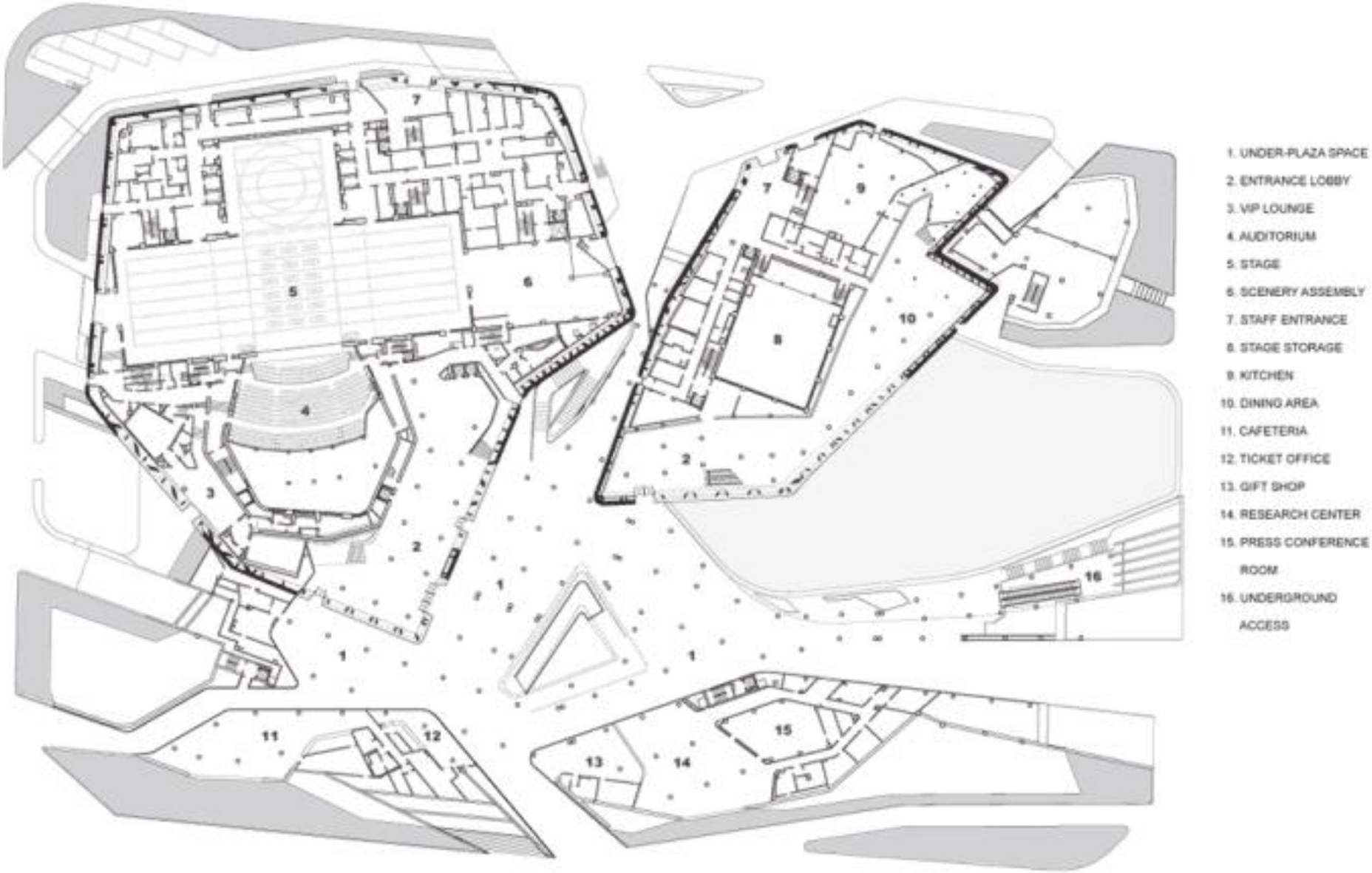
Zaha Hadid Guangzhou Opera House



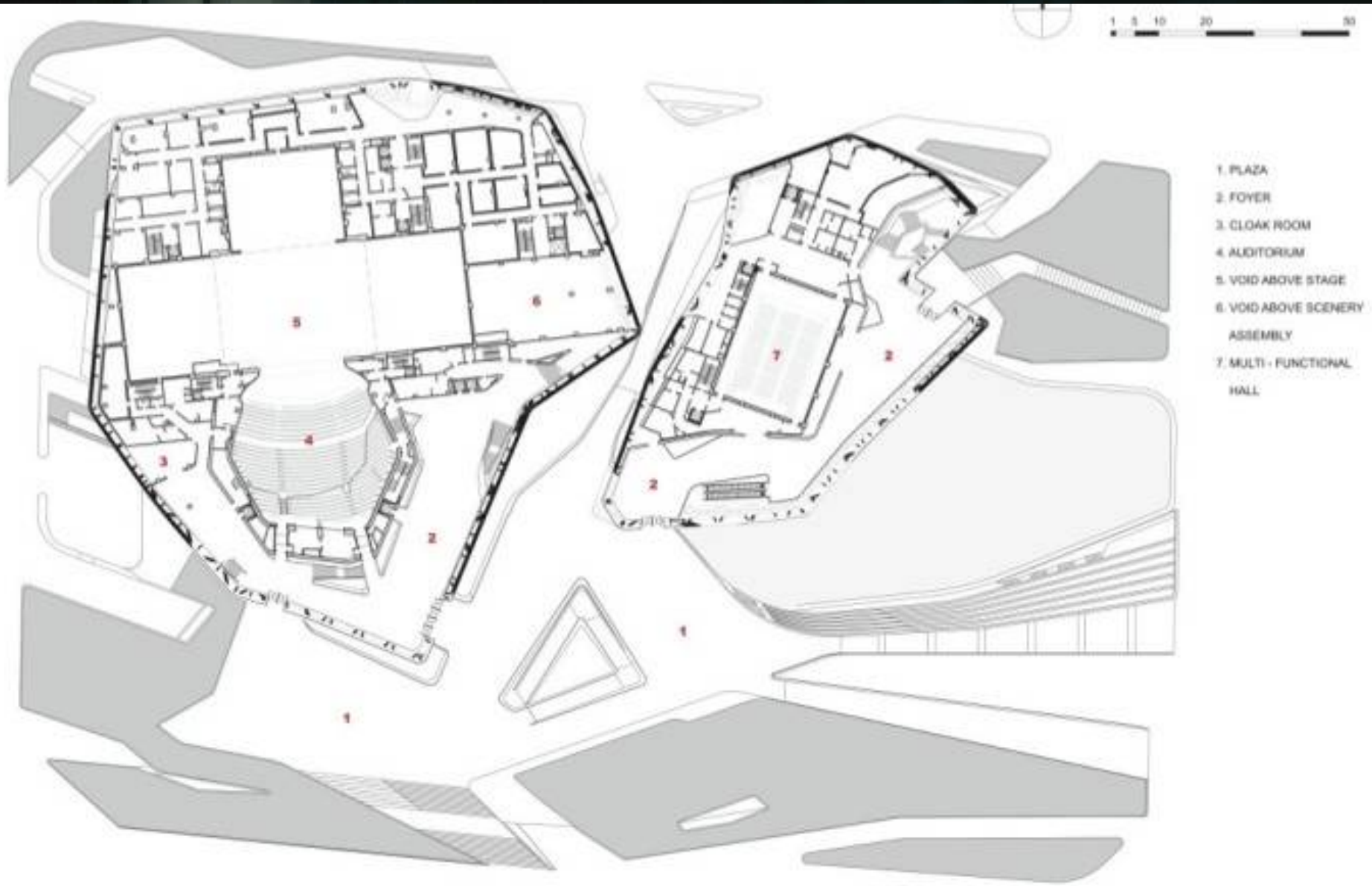
Zaha Hadid Guangzhou Opera House



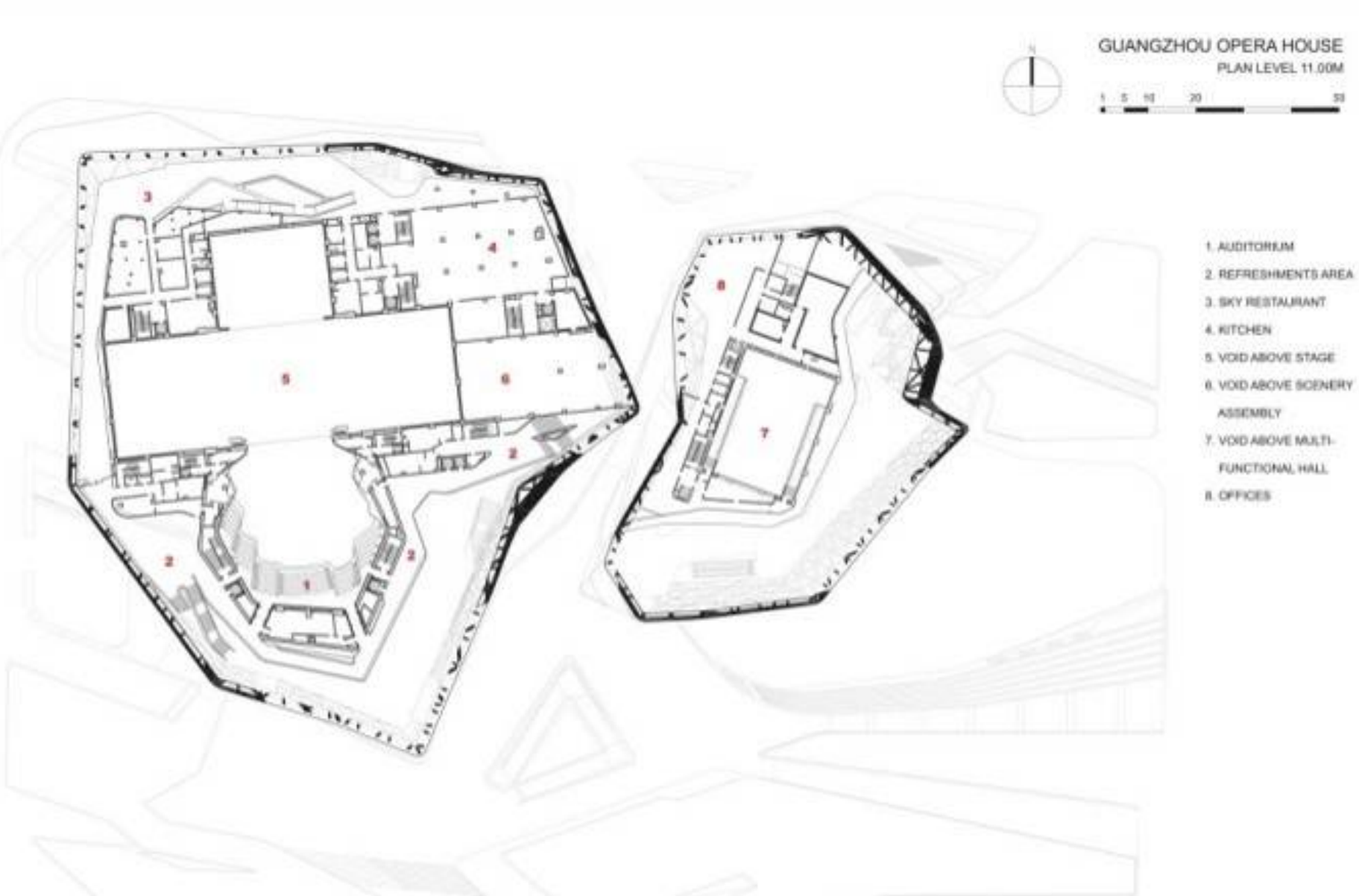
Zaha Hadid Guangzhou Opera House



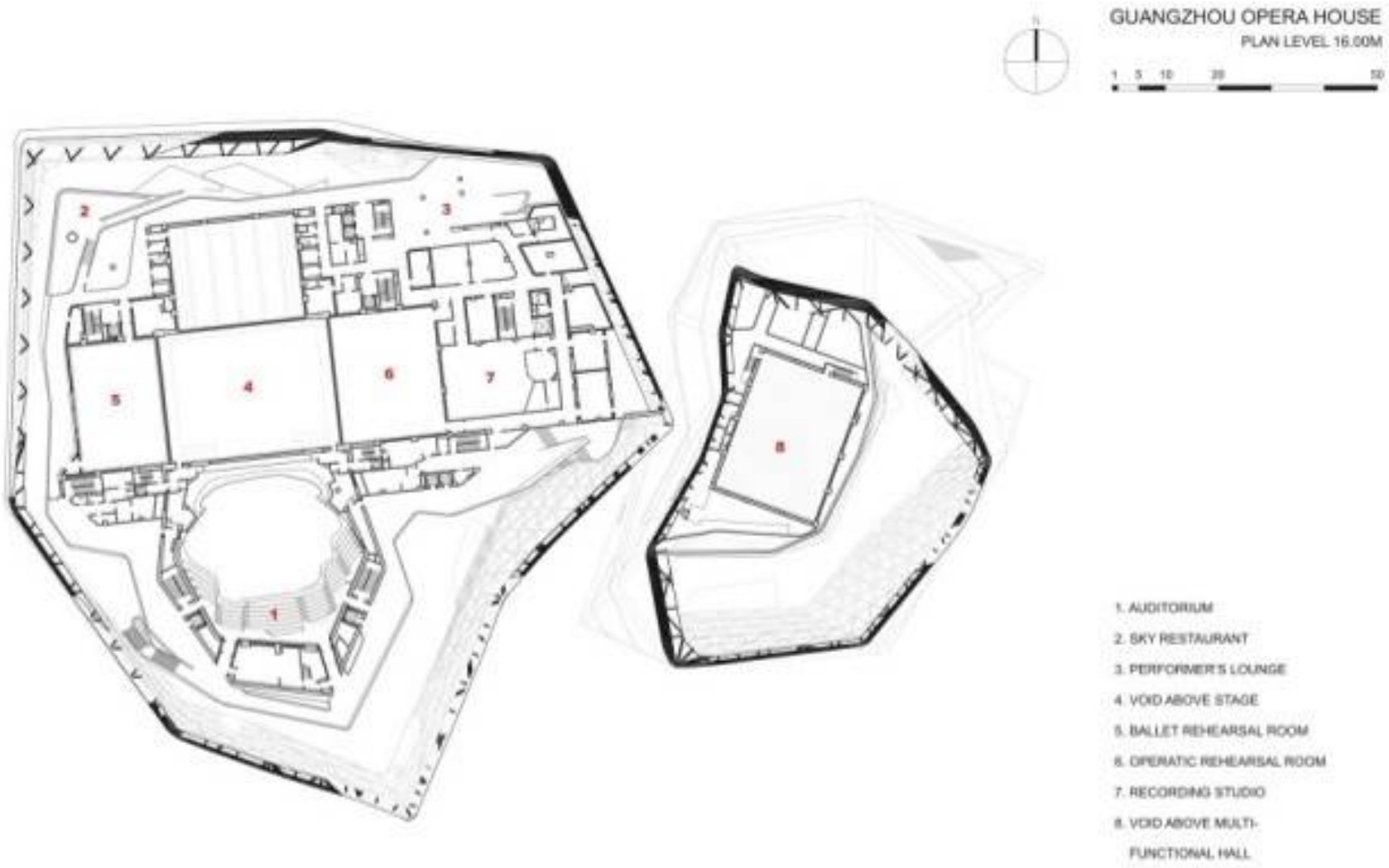
Zaha Hadid Guangzhou Opera House



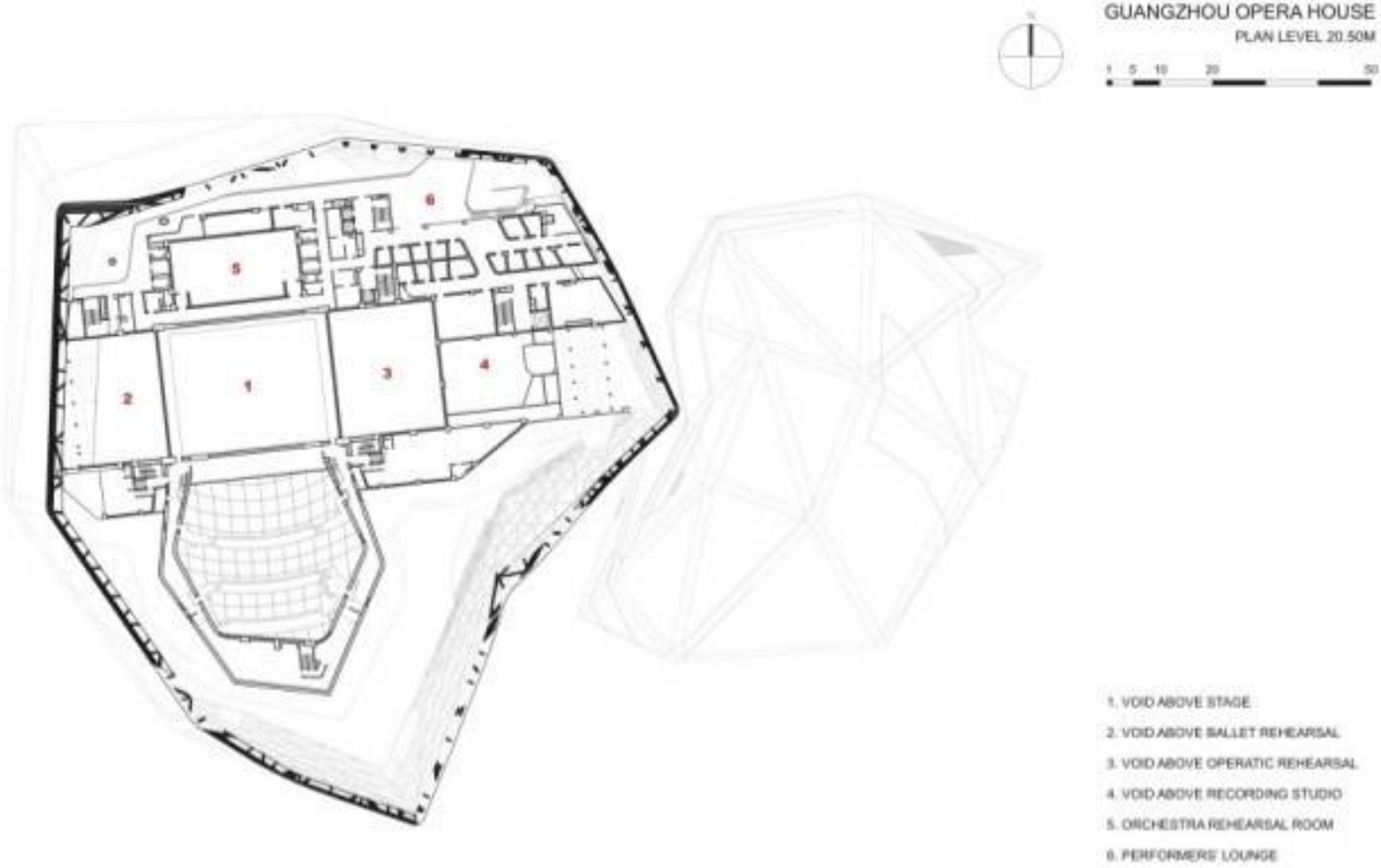
Zaha Hadid Guangzhou Opera House



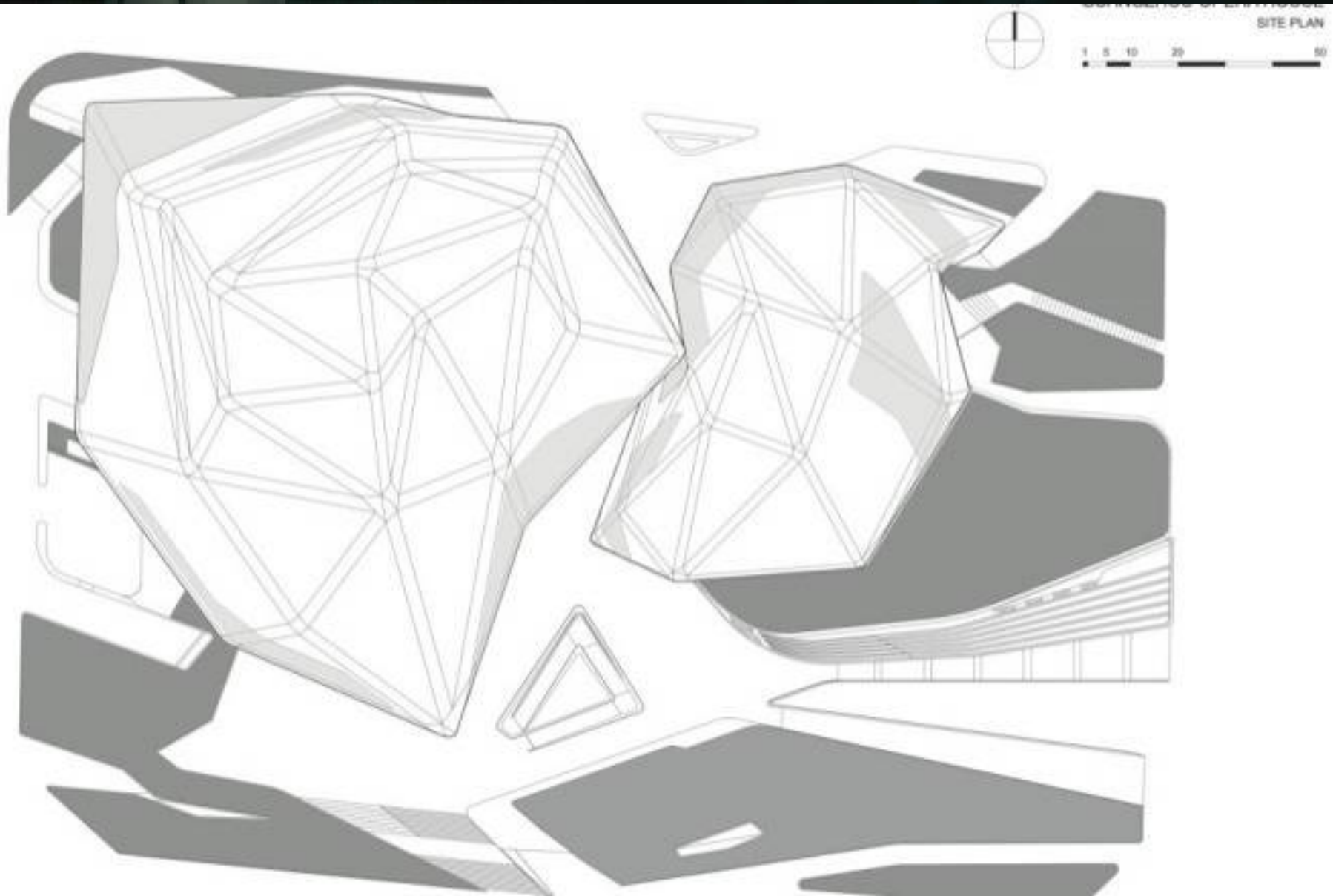
Zaha Hadid Guangzhou Opera House



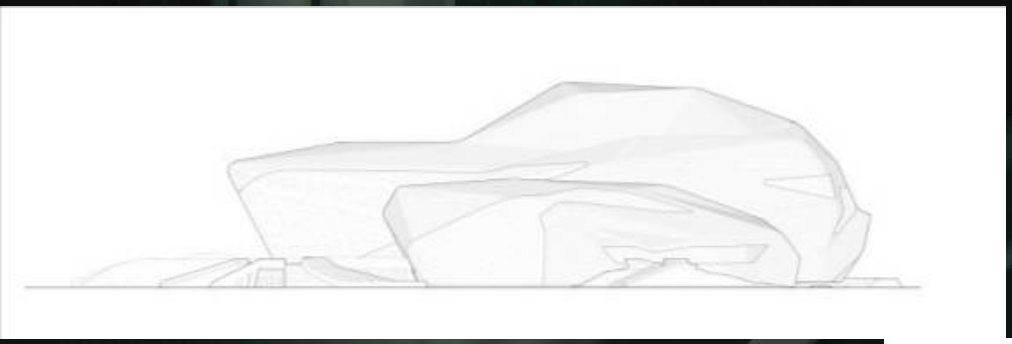
Zaha Hadid Guangzhou Opera House

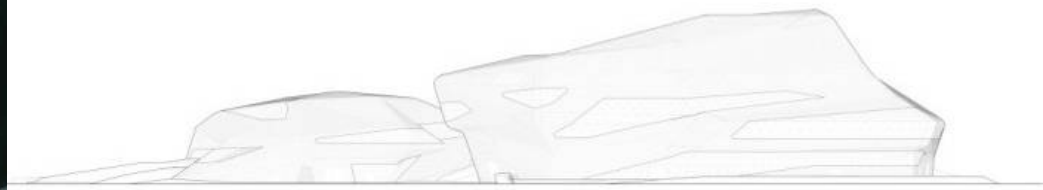


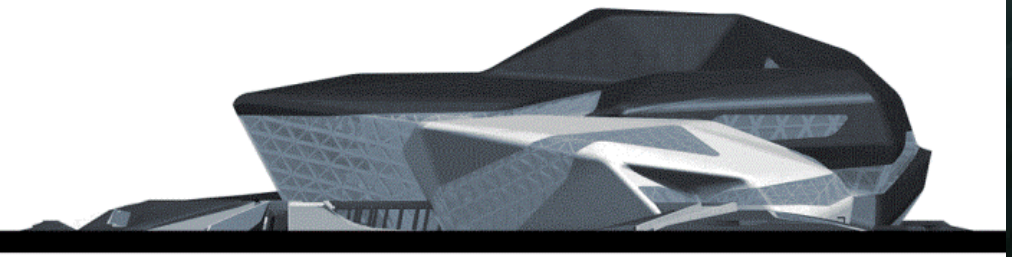
Zaha Hadid Guangzhou Opera House

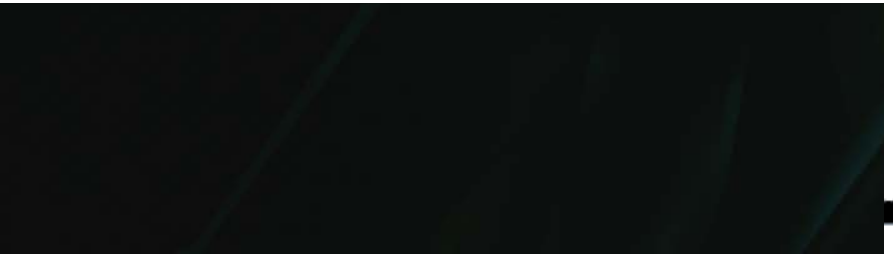


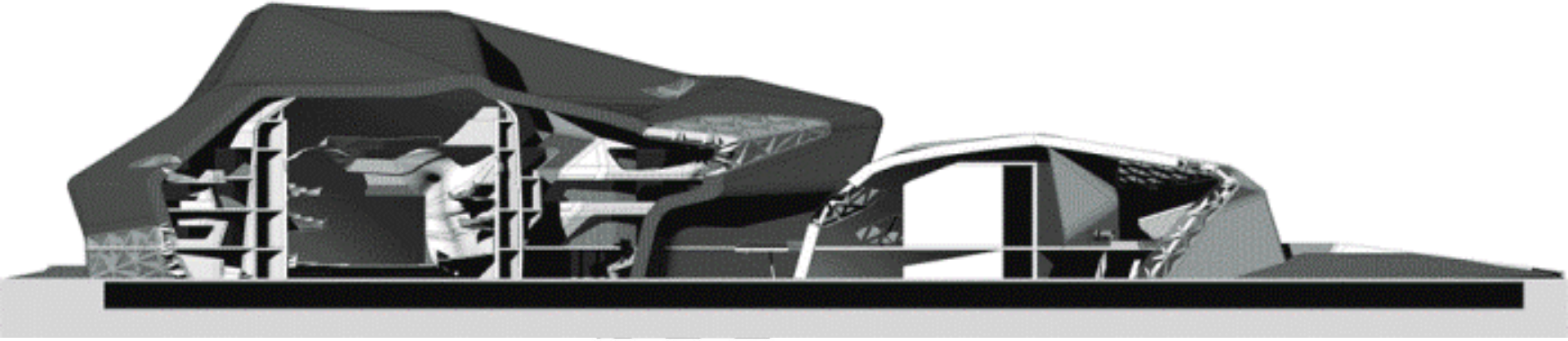
Zaha Hadid Guangzhou Opera House

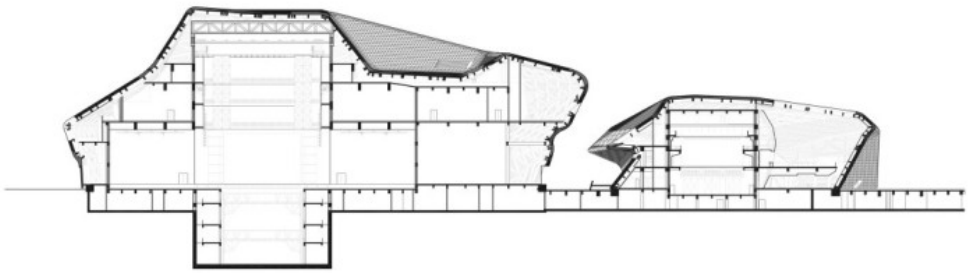


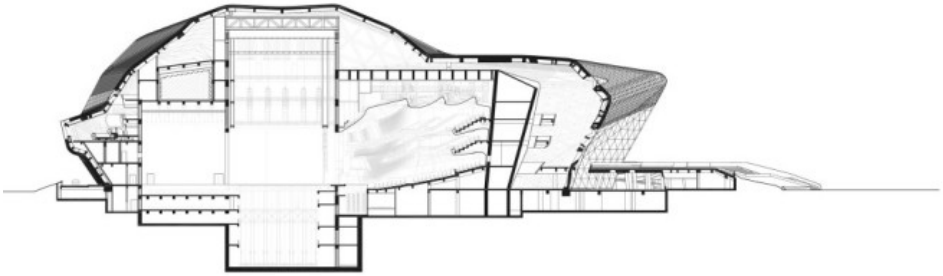


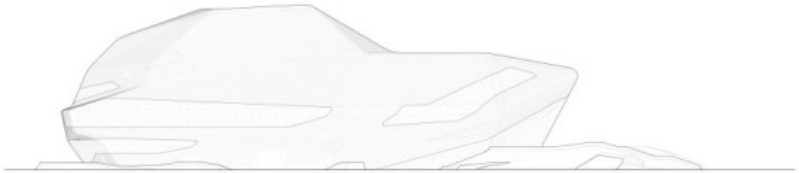




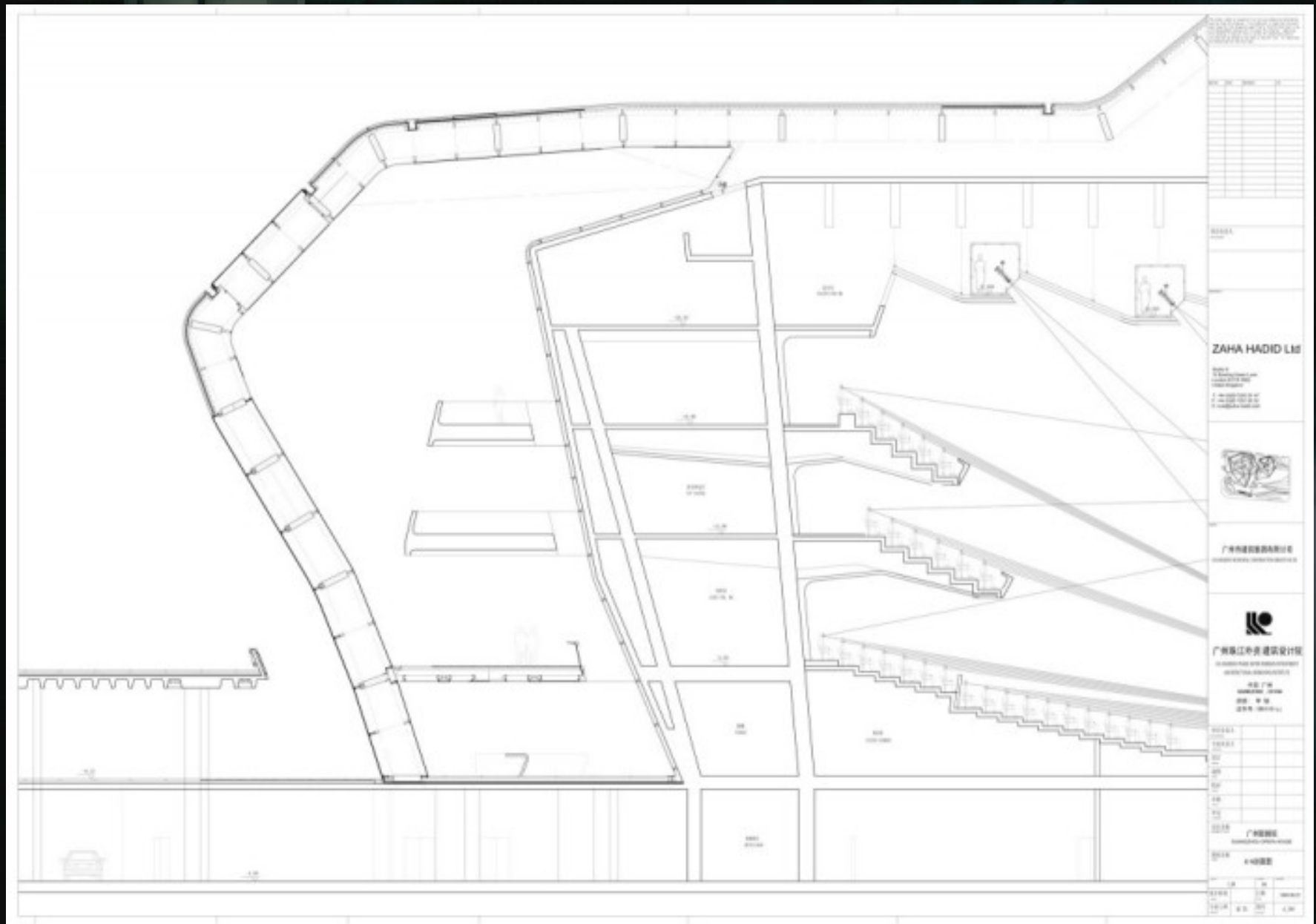








Zaha Hadid Guangzhou Opera House



Zaha Hadid Guangzhou Opera House

Zaha Hadid Guangzhou Opera House

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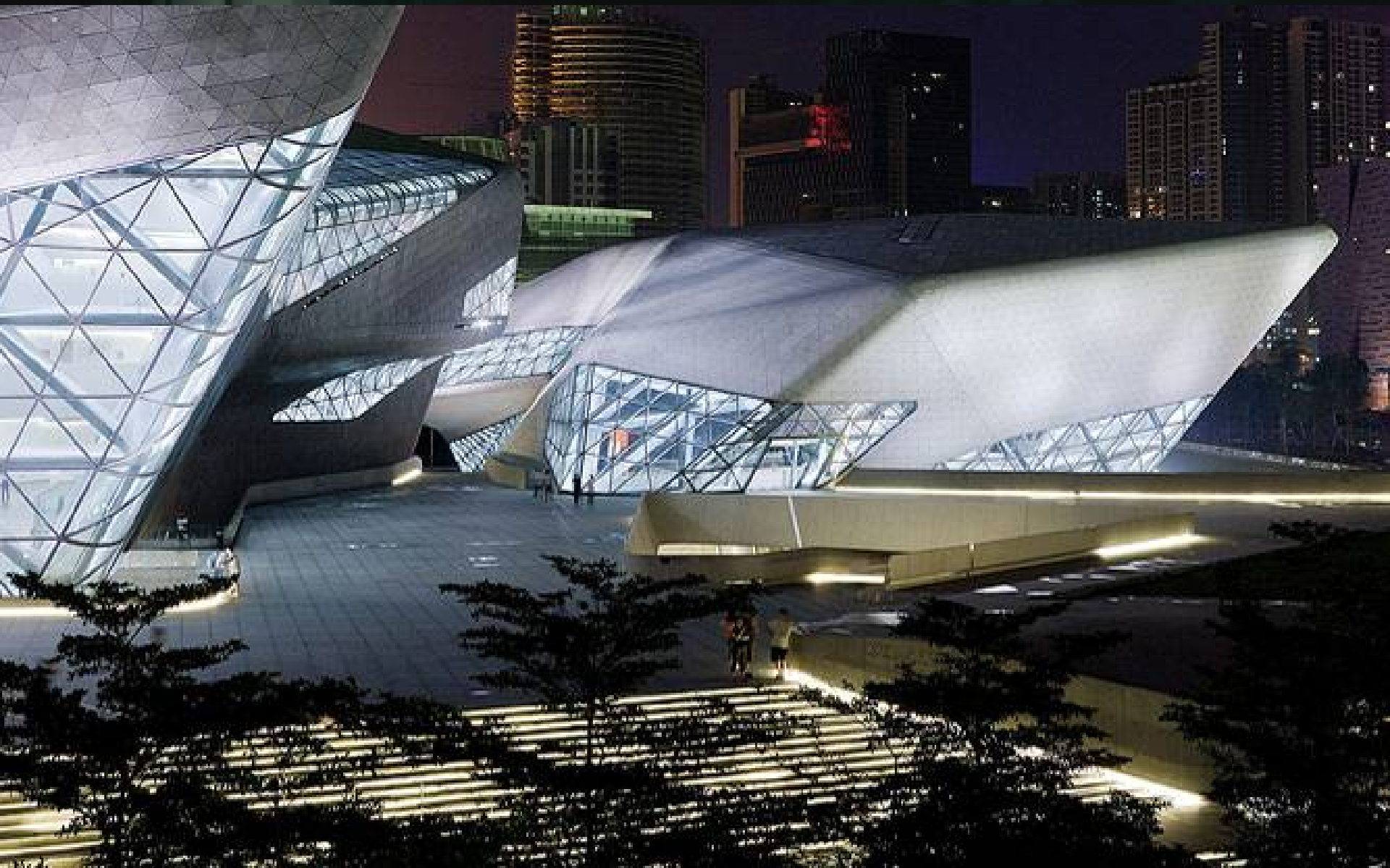
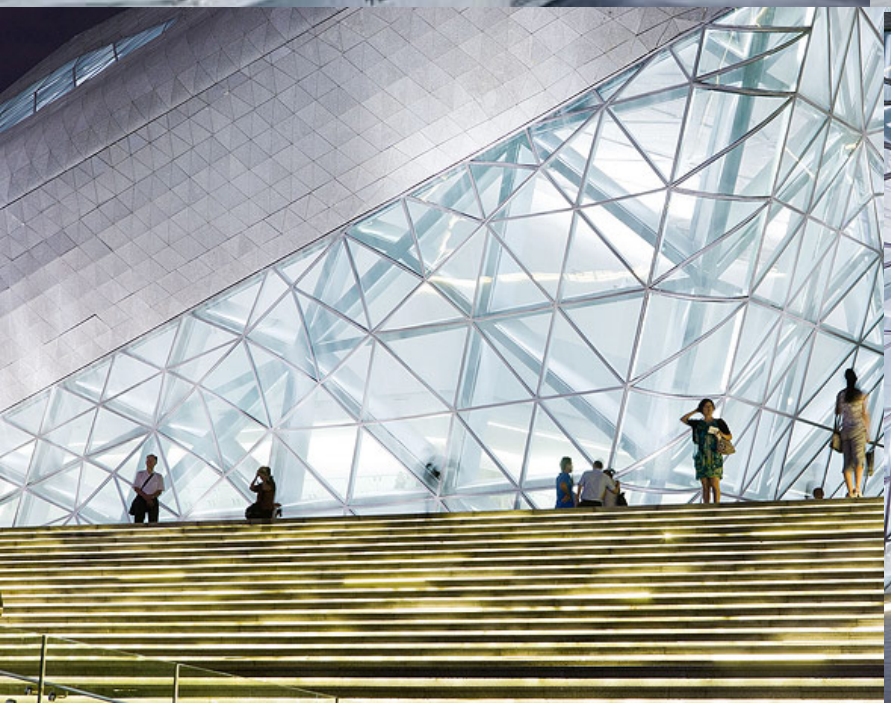
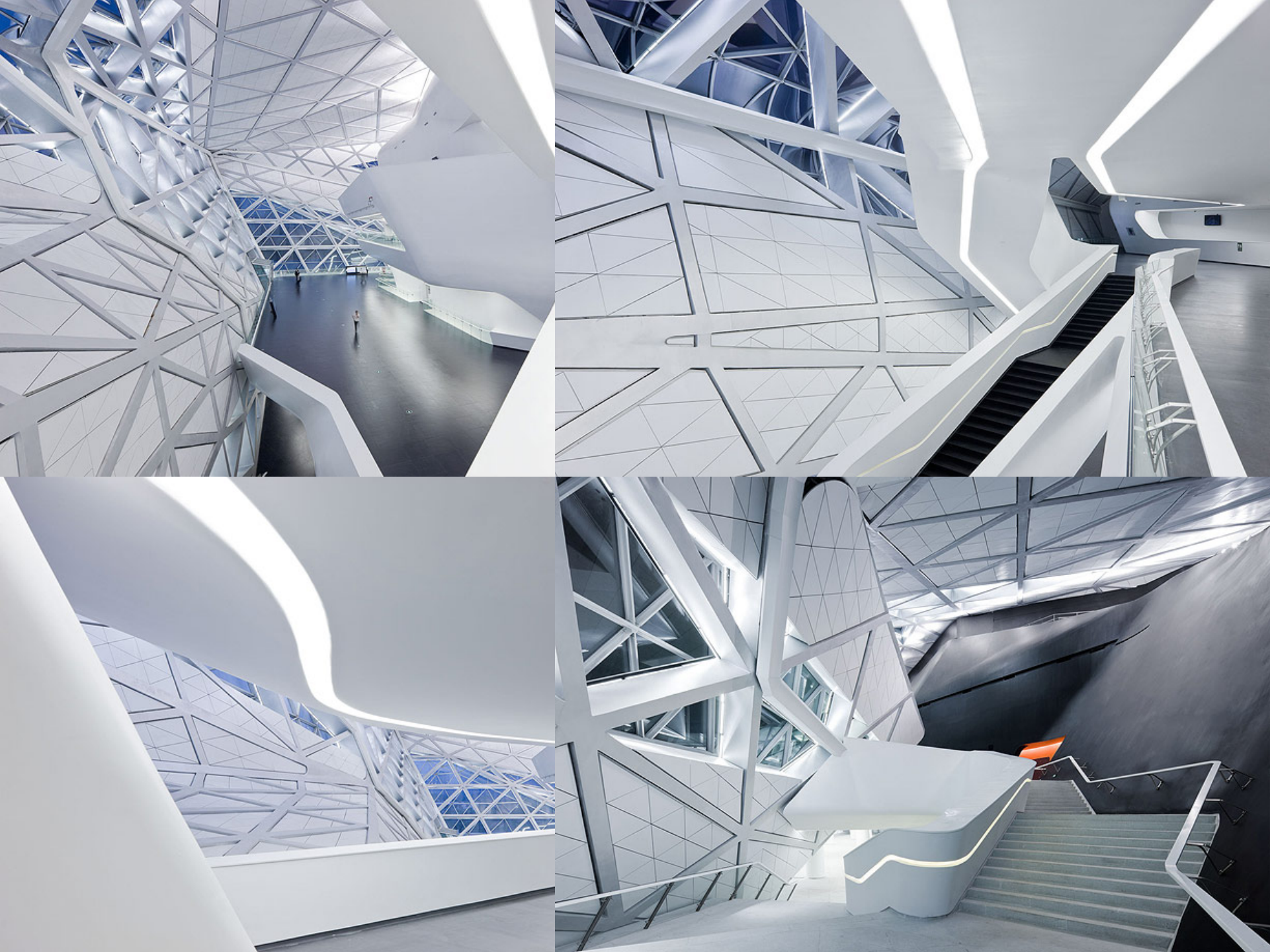
Zaha Hadid Guangzhou Opera House

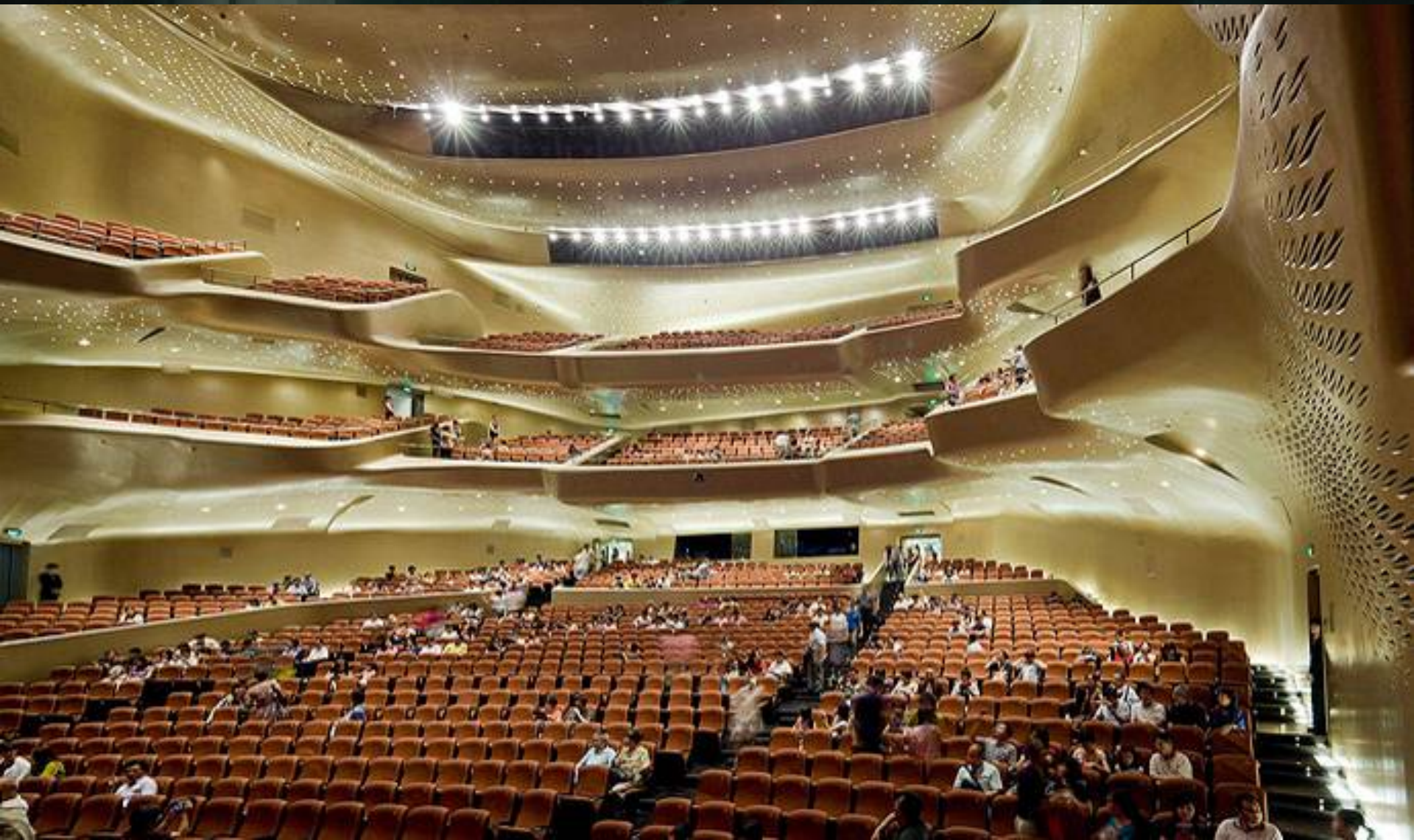


Zaha Hadid Guangzhou Opera House

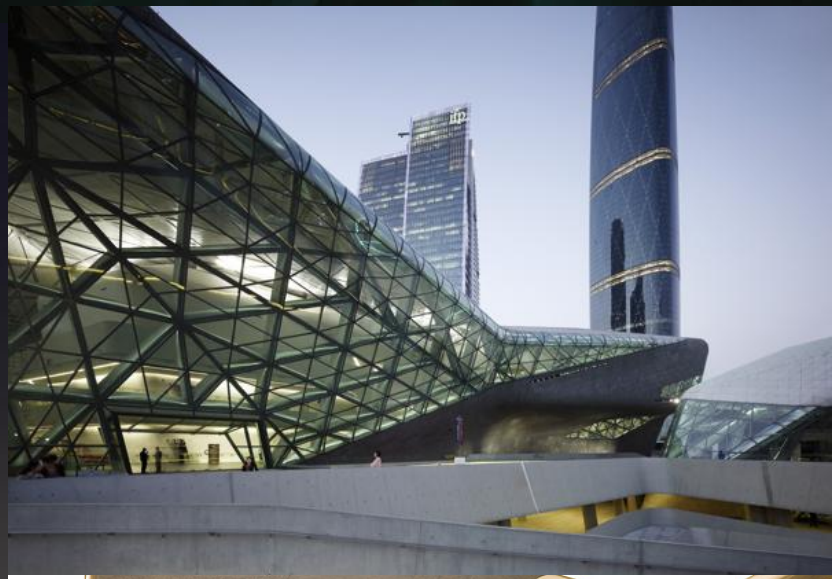
Zaha Hadid Guangzhou Opera House



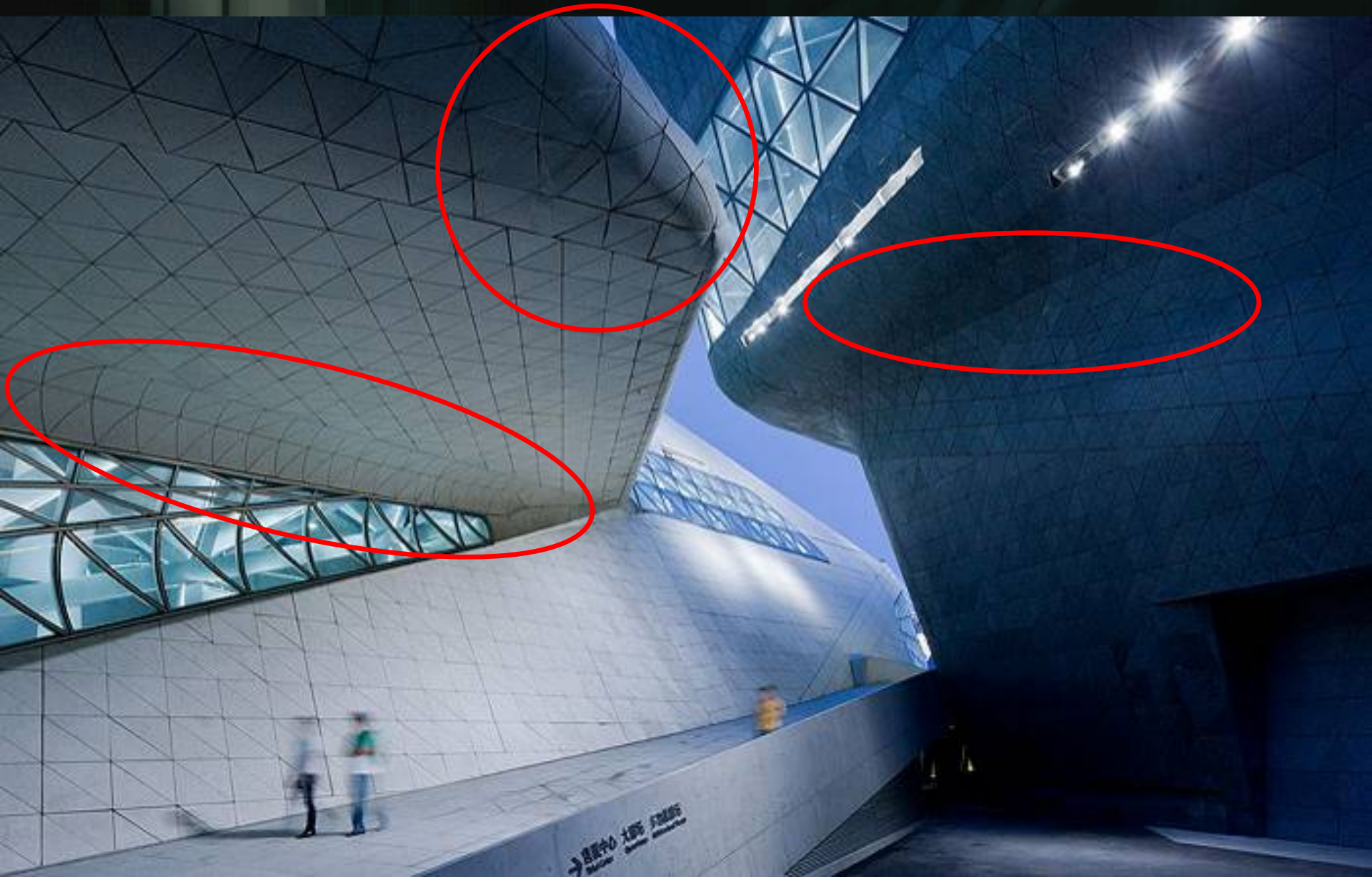




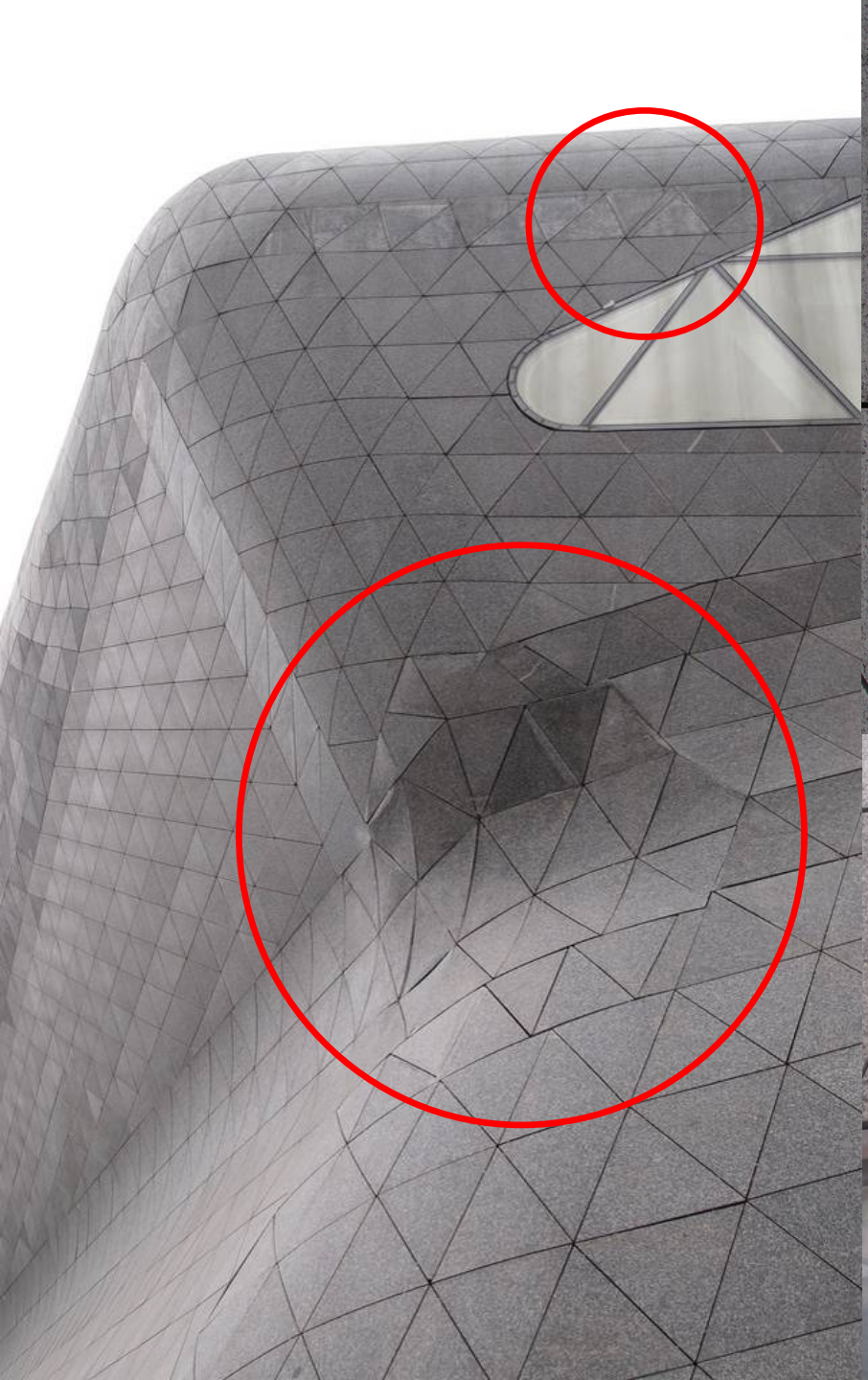
Excited? But wait…….

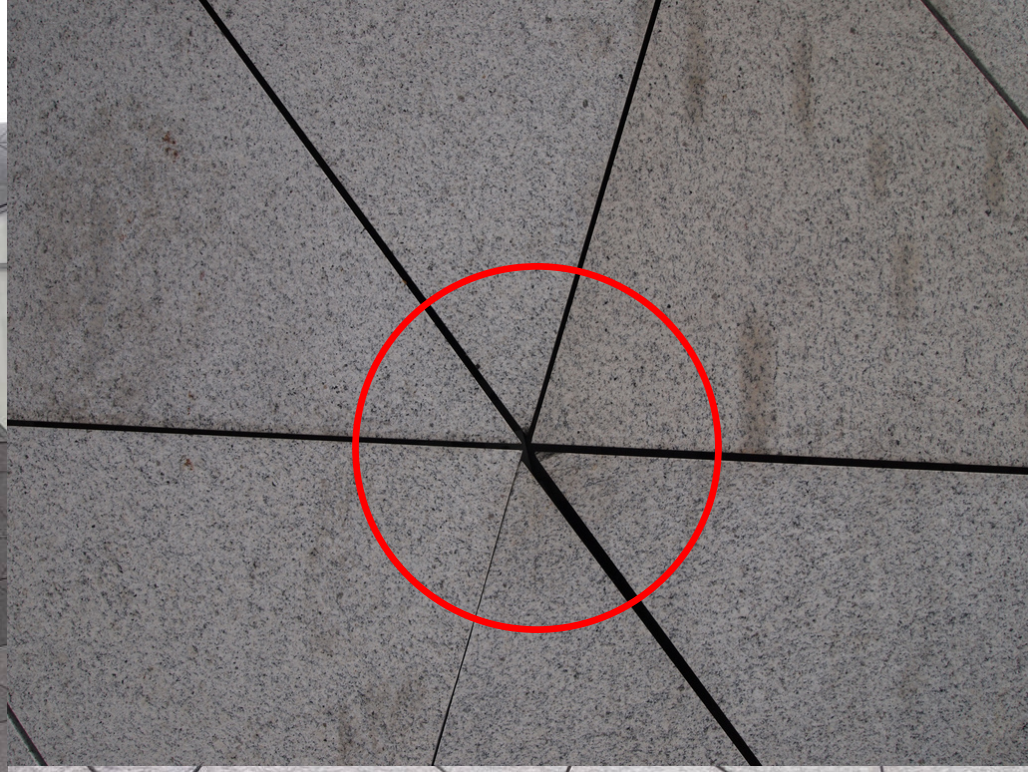


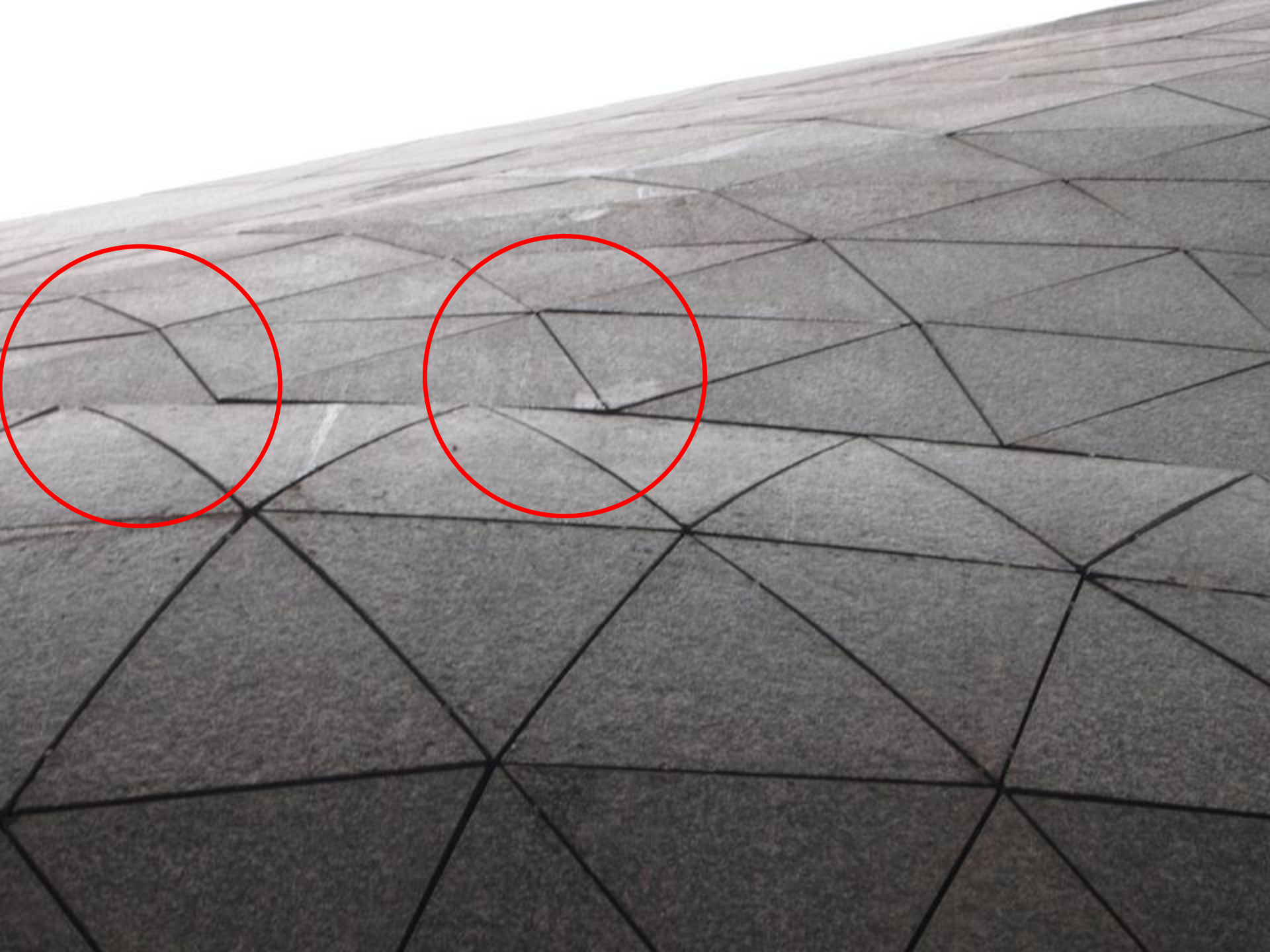
Zaha Hadid Guangzhou Opera House




International Finance Plaza

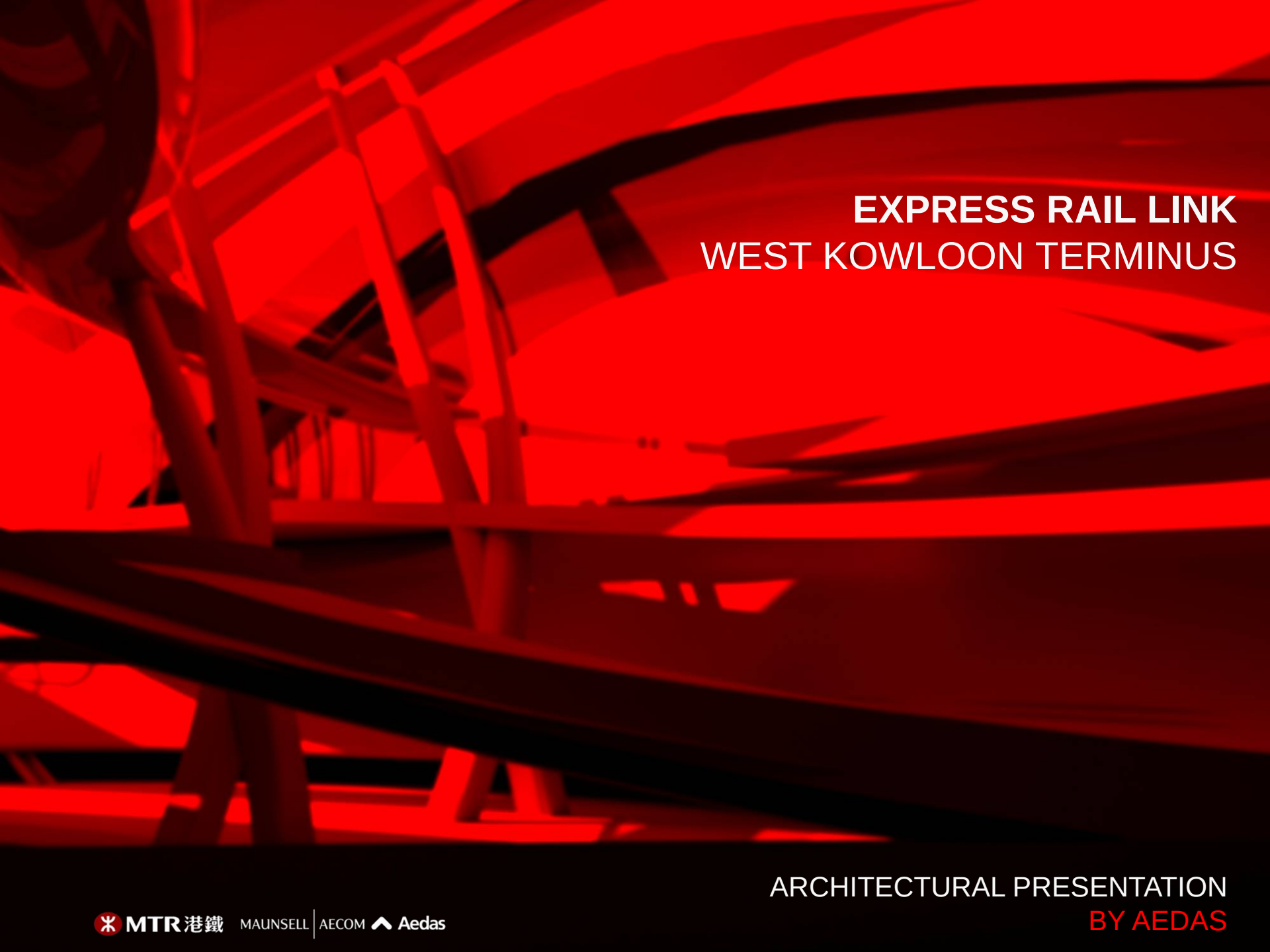






SCULPTURE vs ARCHITECTURE

Purely decorative, NO accommodation	Accommodations - area, uses, clear height, travel distance constraints
Built by Sculptor (Designer)	Built by Workers (Not Designer)
Materials freedom of choice - malleable	Large size, material built up by sticks, sheets
Direct production	Drawings – form of communications
Changes as one thinks fit	Record of Changes => $ and Time



EXPRESS RAIL LINK
WEST KOWLOON TERMINUS

ARCHITECTURAL PRESENTATION
BY AEDAS

MTR港鐵 MAUNSELL | AECOM Aedas

TERMINUS STATION

CONTEXT

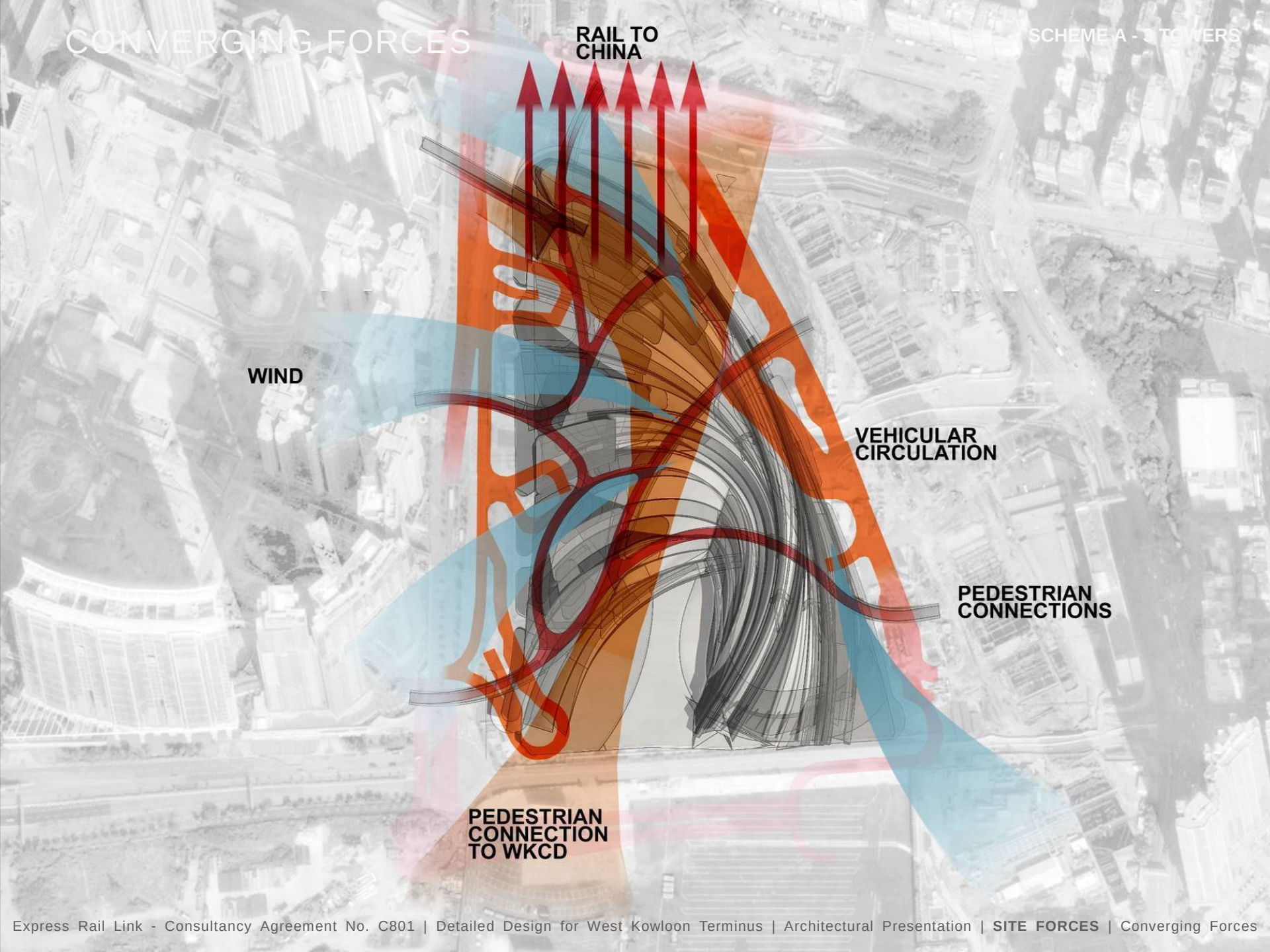

FROM / TO GUANGZHOU
SITE
WEST KOWLOON
TSIM SHA TSUI
VICTORIA HARBOUR
HONG KONG ISLAND SKYLINE
N

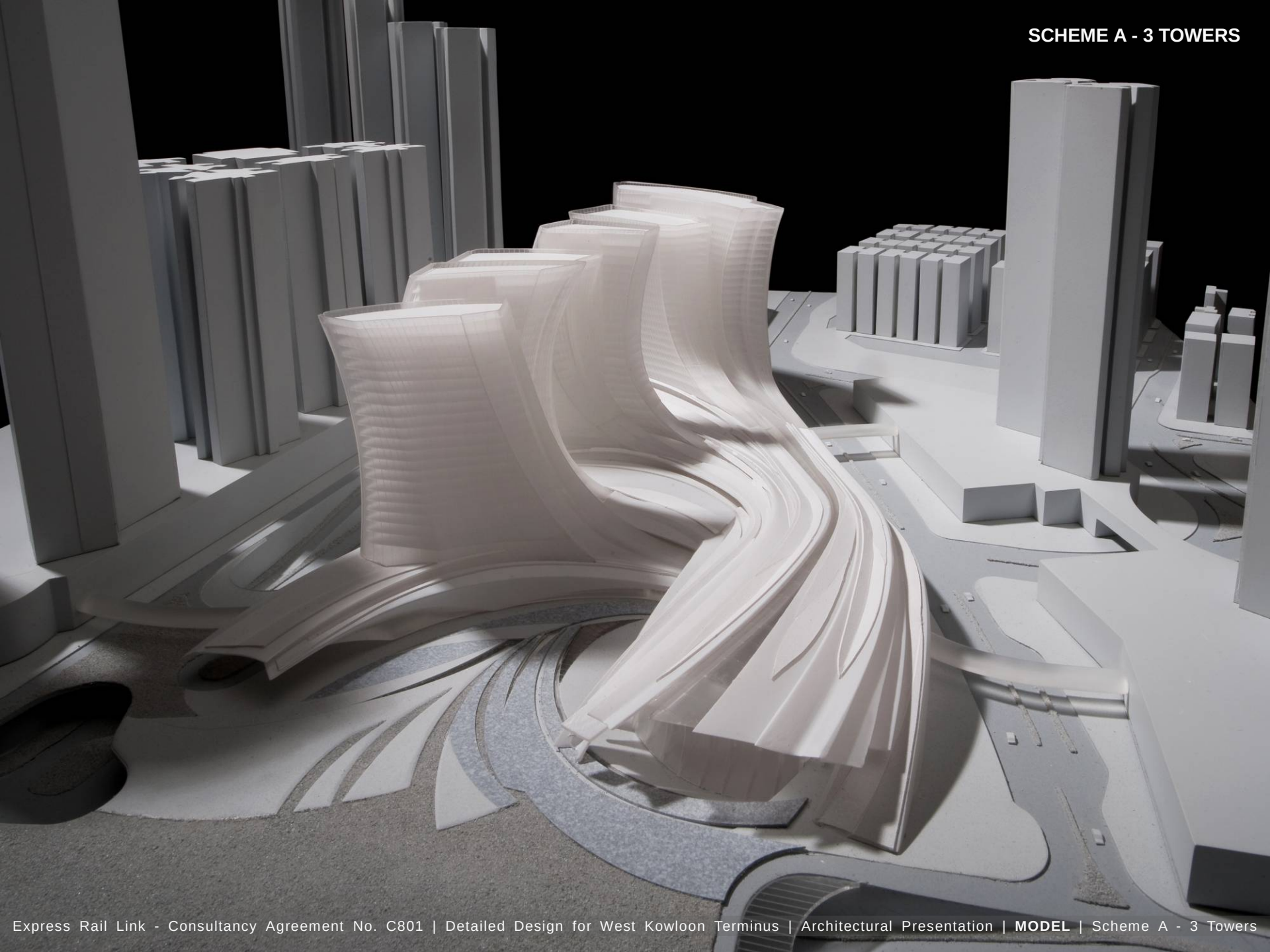
CONTEXT


PTI
KOWLOON STATION
(AIRPORT EXPRESS)
SITE
FUTURE
AUSTIN
STATION
(MTR)
N

TERMINUS STATION

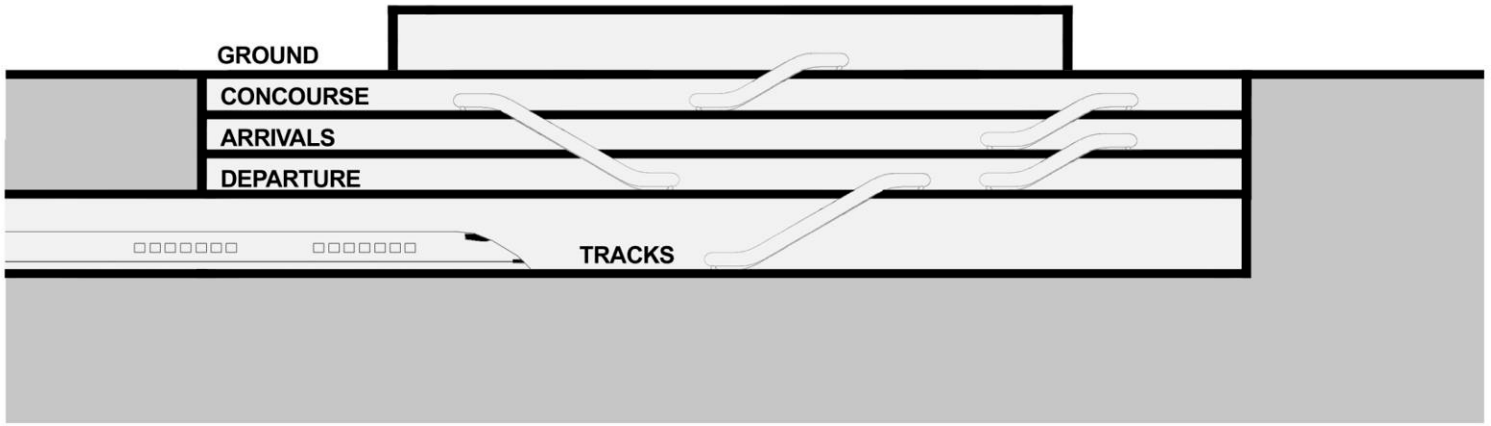
CONVERGING FORCES




SCHEME A - 3 TOWERS

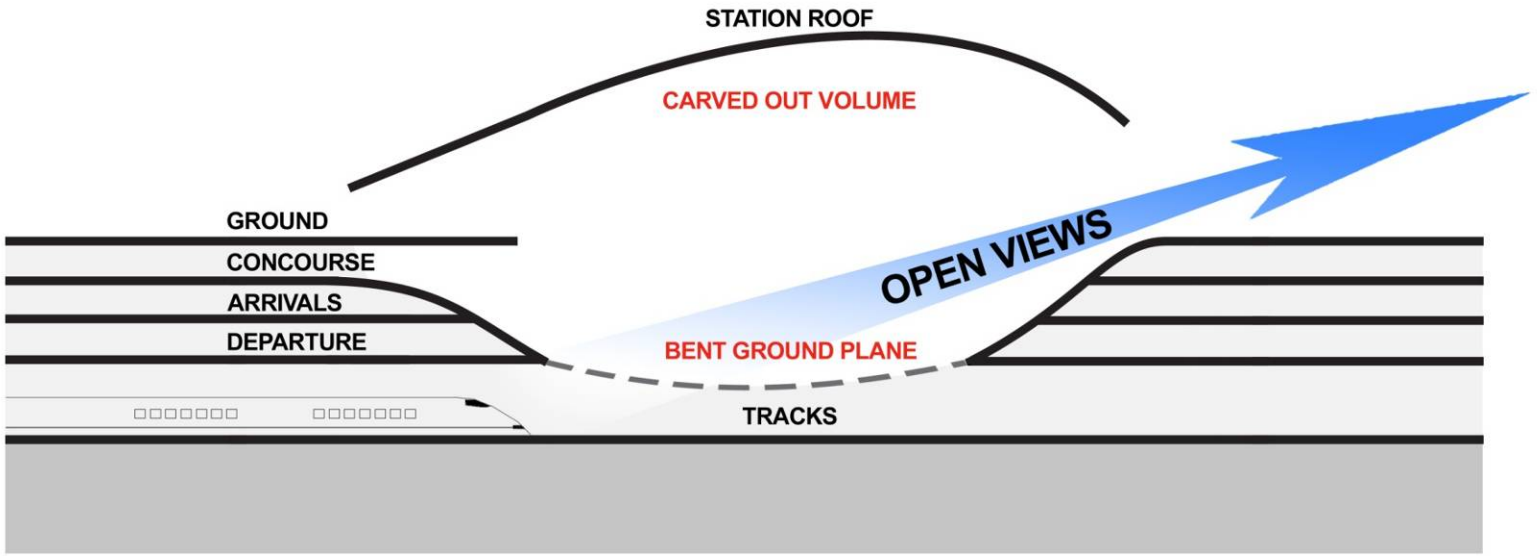
HOLISTIC

SCHEME A



TRADITIONAL UNDERGROUND STATION

Perceptually No Awareness of Surrounding Environment



PROPOSED UNDERGROUND STATION

Awareness of Surrounding Environment

DESIGN A “BELOW GROUND STATION” TO NOT FEEL “BELOW GROUND”

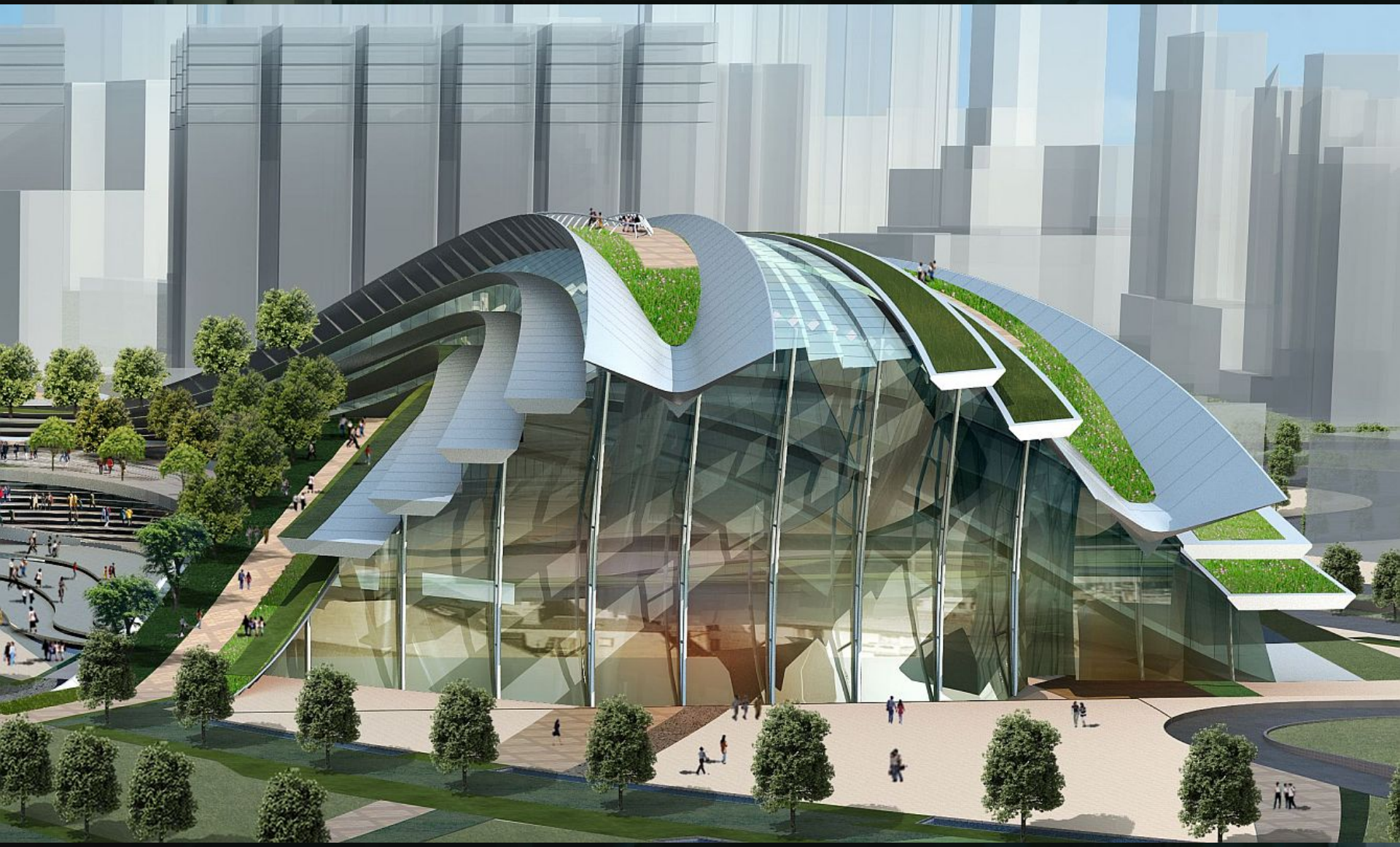
- **IMMEDIATE SENSE OF ARRIVING INTO HONG KONG**

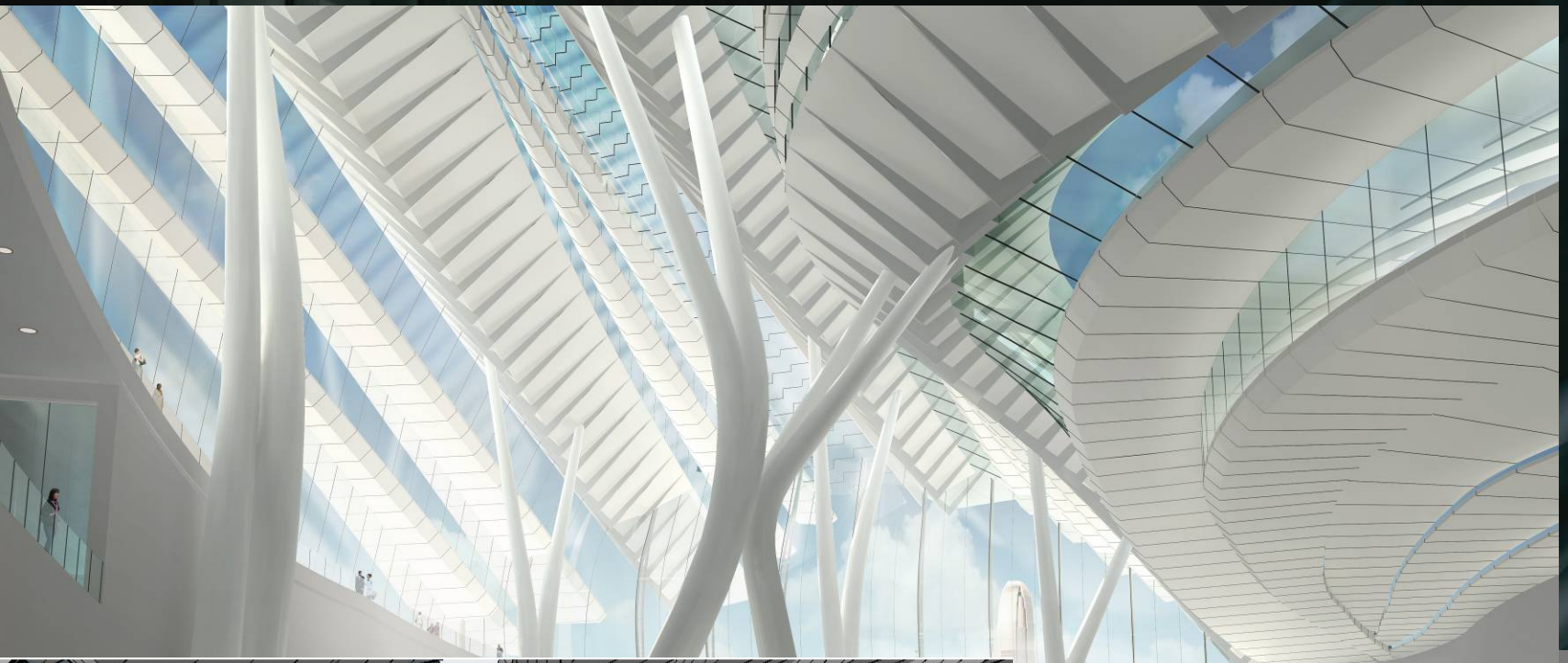
INTEGRATED

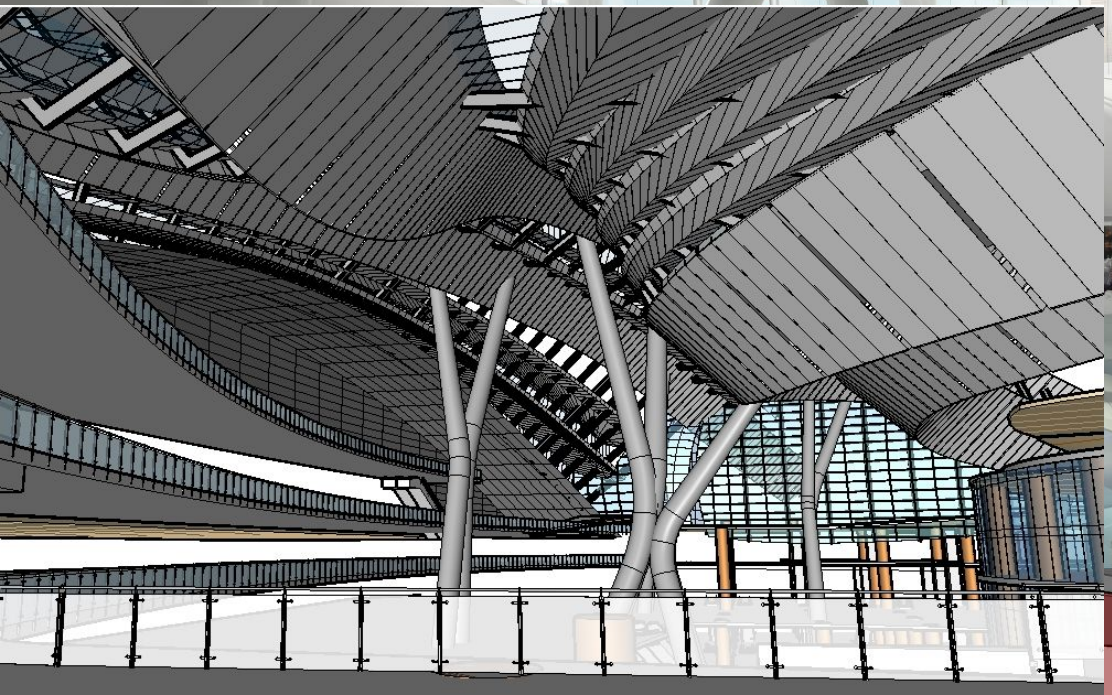
Express Rail Link - Consultancy Agreement No. C801 | Detailed Design for West Kowloon Terminus | Architectural Presentation | **RENDERING** | View of Pedestrian Links

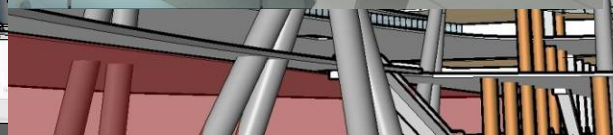
VIEW TOWARDS CITY

- **Sustainable**
- **Public Interaction**

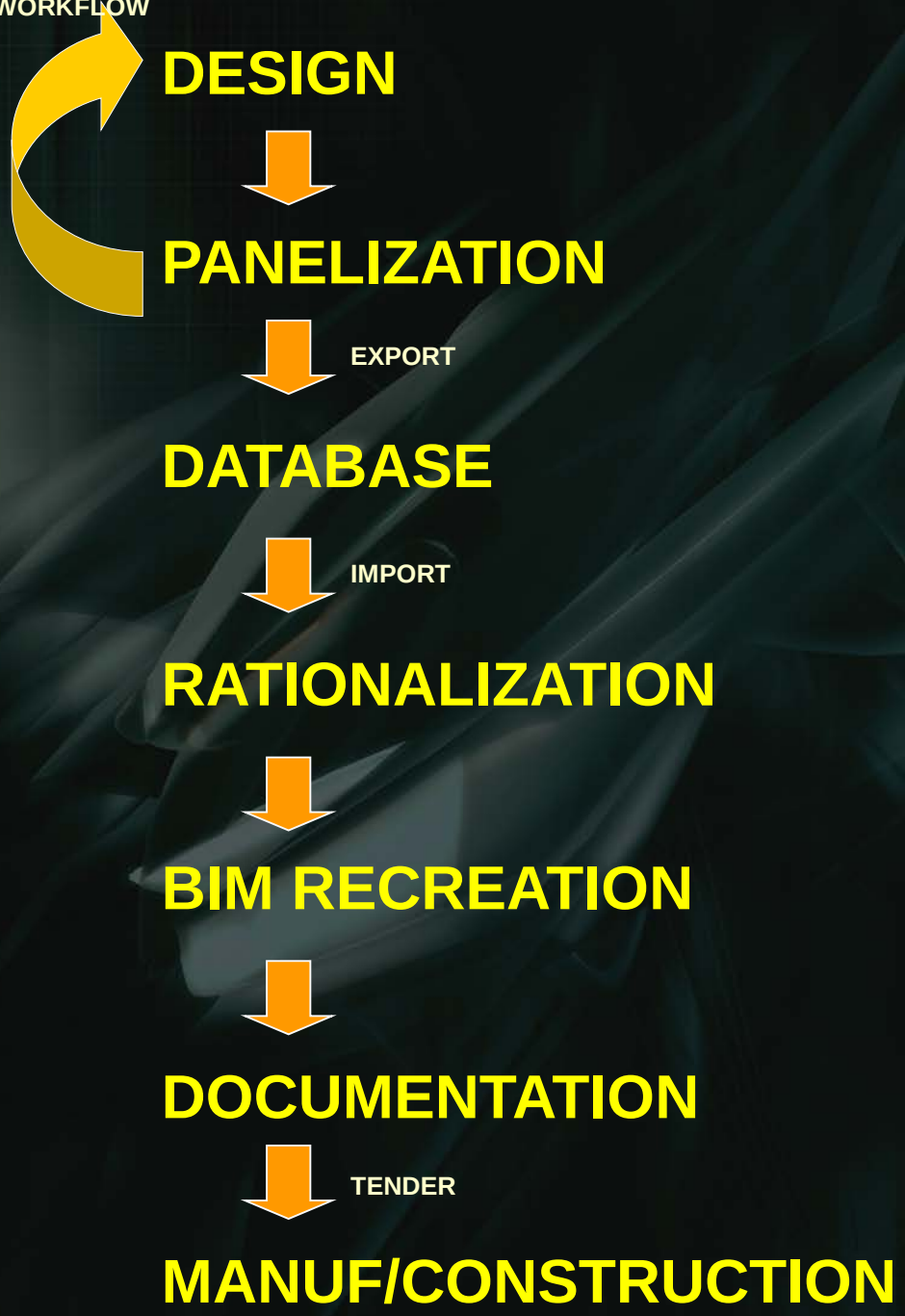


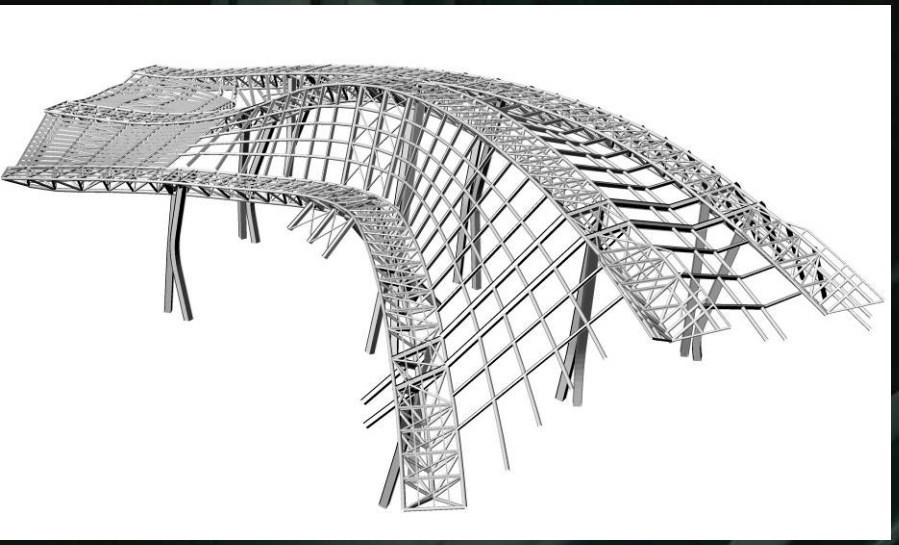


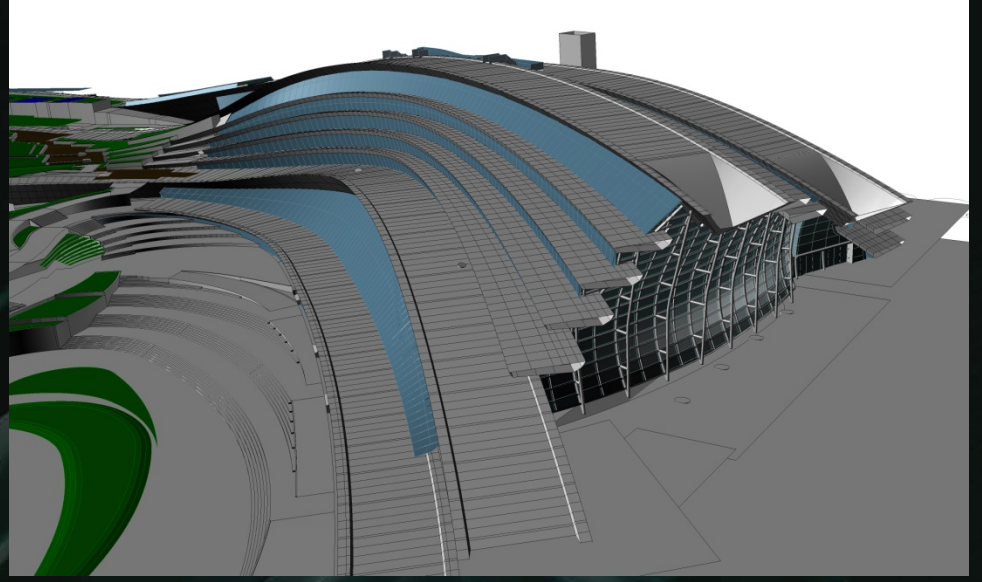


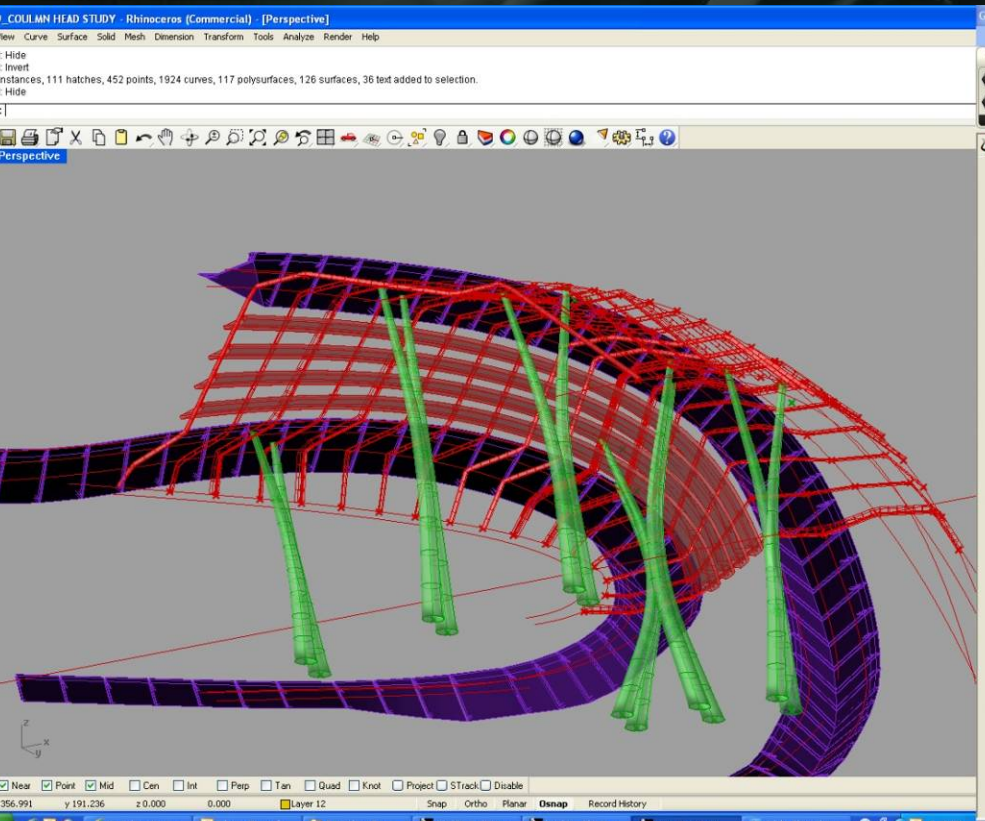


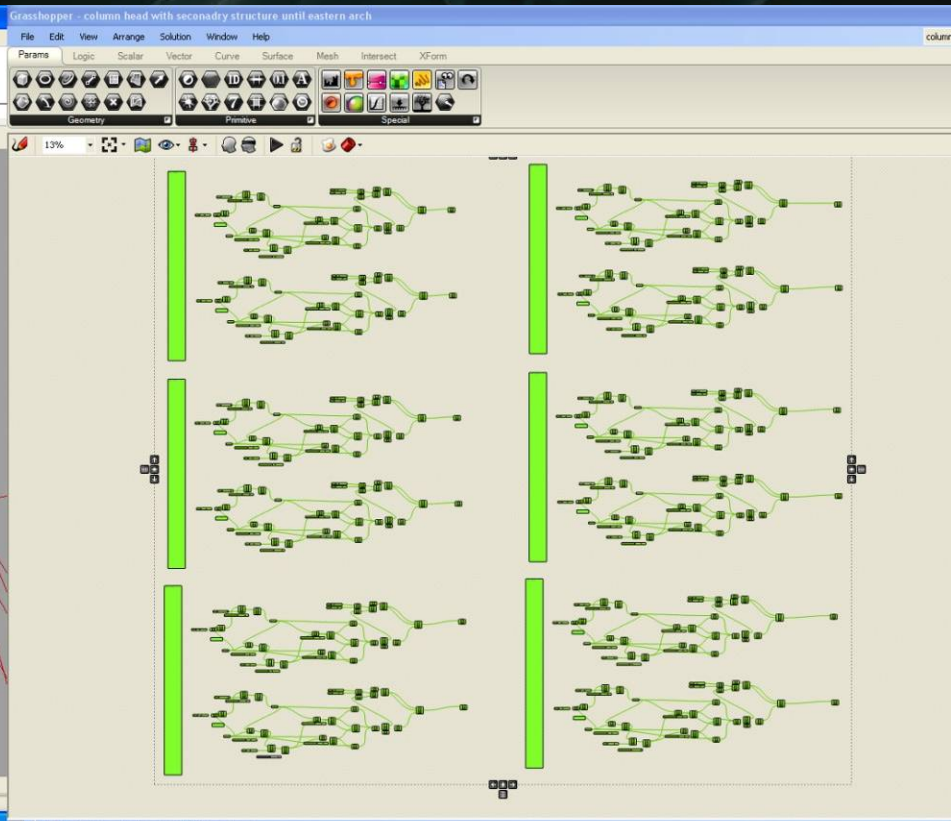
WKT DESIGN/ DOCUMENTATION WORKFLOW

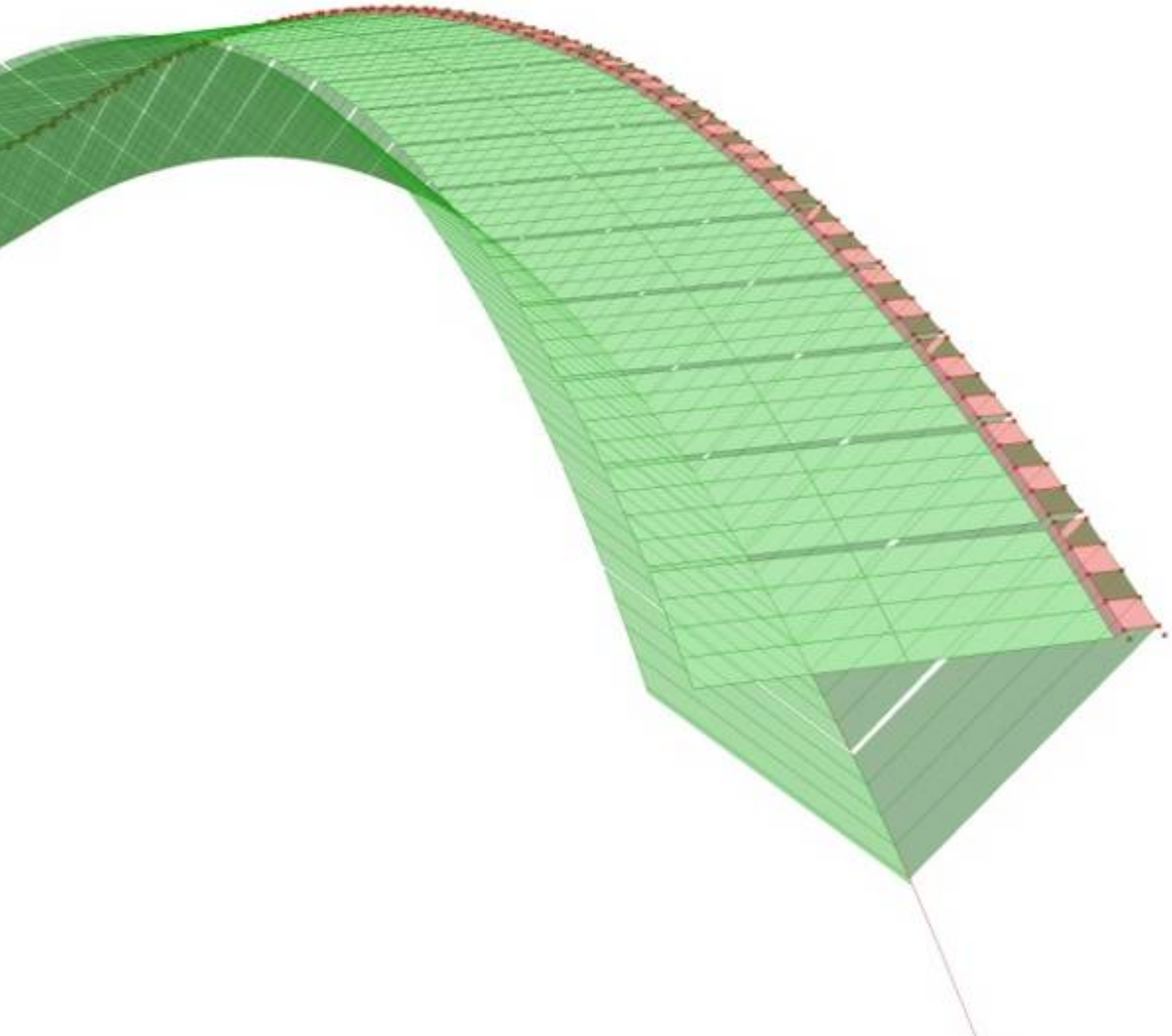


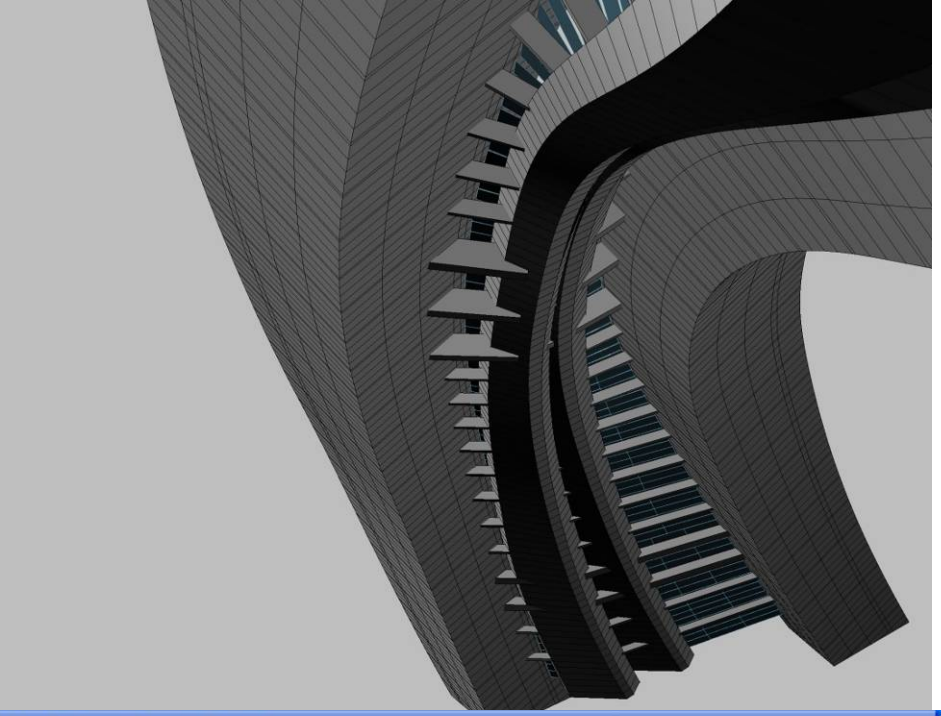


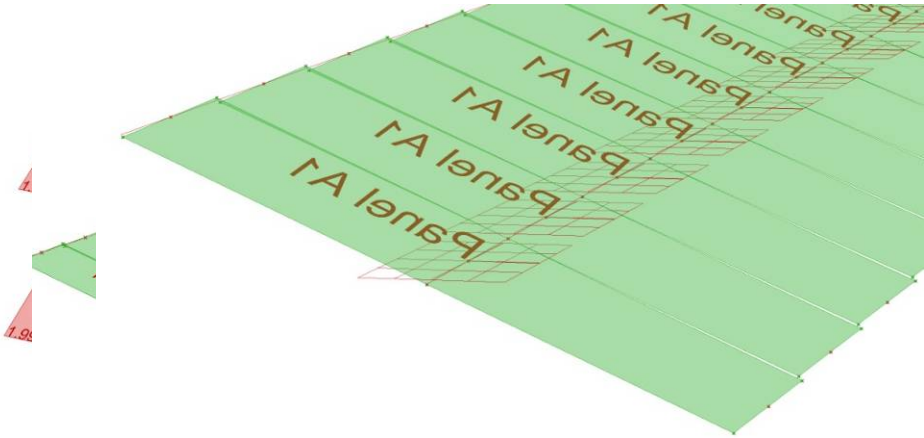



_COULMN HEAD STUDY - Rhinoceros (Commercial) - [Perspective]
Curve Surface Solid Mesh Dimension Transform Tools Analyze Render Help
Hide
Invert
nstances, 111 hatches, 452 points, 1924 curves, 117 polysurfaces, 126 surfaces, 36 text added to selection.
Hide
Perspective
Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable
356.991 y 191.236 z 0.000 0.000 Layer 12 Snap Ortho Planar Osnap Record History


Grasshopper - column head with secondry structure until eastern arch
File Edit View Arrange Solution Window Help
Params Logic Scalar Vector Curve Surface Mesh Intersect XForm
Geometry Primitive Special
13%







216_west fins - Rhinoceros (Commercial) - [Perspective]

5 polysurfaces, 8 surfaces added to selection.
d: Hide
d: _Undo
Hide

Perspective

Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

Grasshopper - panelization of fins

File Edit View Arrange Solution Window Help

panelization of fins

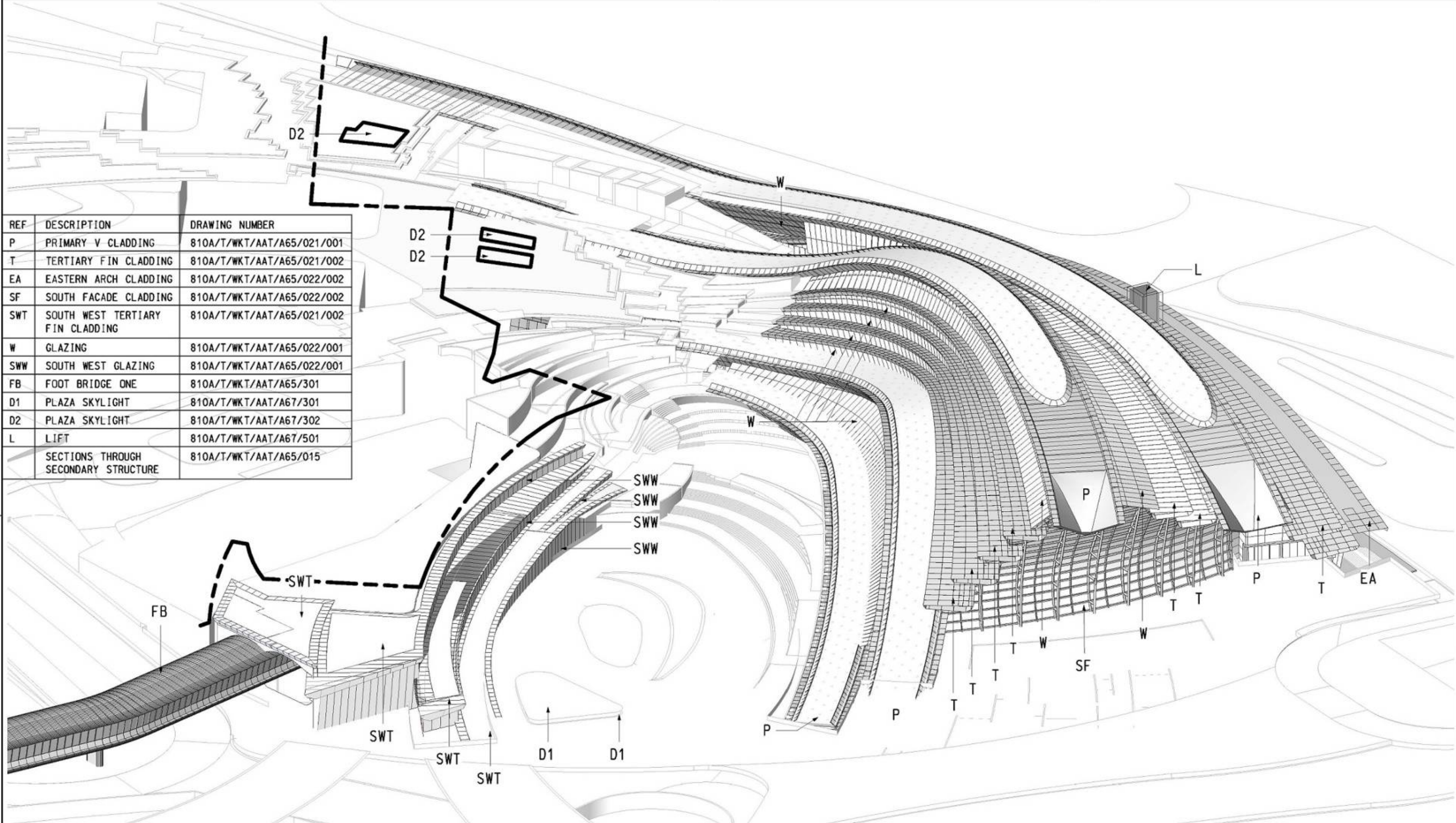
Params Logic Scalar Vector Curve Surface Mesh Intersect XForm

Geometry Primitive Special

64%

12000
12000
12000
12000
12000
235
233

REF	DESCRIPTION	DRAWING NUMBER
P	PRIMARY V CLADDING	810A/T/WKT/AAT/A65/021/001
T	TERTIARY FIN CLADDING	810A/T/WKT/AAT/A65/021/002
EA	EASTERN ARCH CLADDING	810A/T/WKT/AAT/A65/022/002
SF	SOUTH FACADE CLADDING	810A/T/WKT/AAT/A65/022/002
SWT	SOUTH WEST TERTIARY FIN CLADDING	810A/T/WKT/AAT/A65/021/002
W	GLAZING	810A/T/WKT/AAT/A65/022/001
SWW	SOUTH WEST GLAZING	810A/T/WKT/AAT/A65/022/001
FB	FOOT BRIDGE ONE	810A/T/WKT/AAT/A65/301
D1	PLAZA SKYLIGHT	810A/T/WKT/AAT/A67/301
D2	PLAZA SKYLIGHT	810A/T/WKT/AAT/A67/302
L	LIFT	810A/T/WKT/AAT/A67/501
	SECTIONS THROUGH SECONDARY STRUCTURE	810A/T/WKT/AAT/A65/015



01 3D SOUTH

REV	DESCRIPTION	BY	DATE	APPROVED
A4	ISSUE FOR DRAFT ACP	FM	25JUN10	KK
A3	ISSUE FOR DRAFT ACP	FM	04JUN10	KK
A2	ISSUE FOR DRAFT ACP	FM	14MAY10	KK
A1	ISSUE FOR DRAFT ACP	FM	16APR10	KK

DRAWN	ERICA LAM
DESIGNED	MARK POLLARD
CHECKED	F MCGOLDRICK
APPROVED	KELVIN KO
DATE	JUN.2010

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM Aedas

○ AECOM ● AEDAS ○ MEINHARDT ○ MVA ○ BURO HAPPOLD ○ EDAW ○ MOTT

CADD REF. 09018 XRL Station Roof.rvt

TITLE

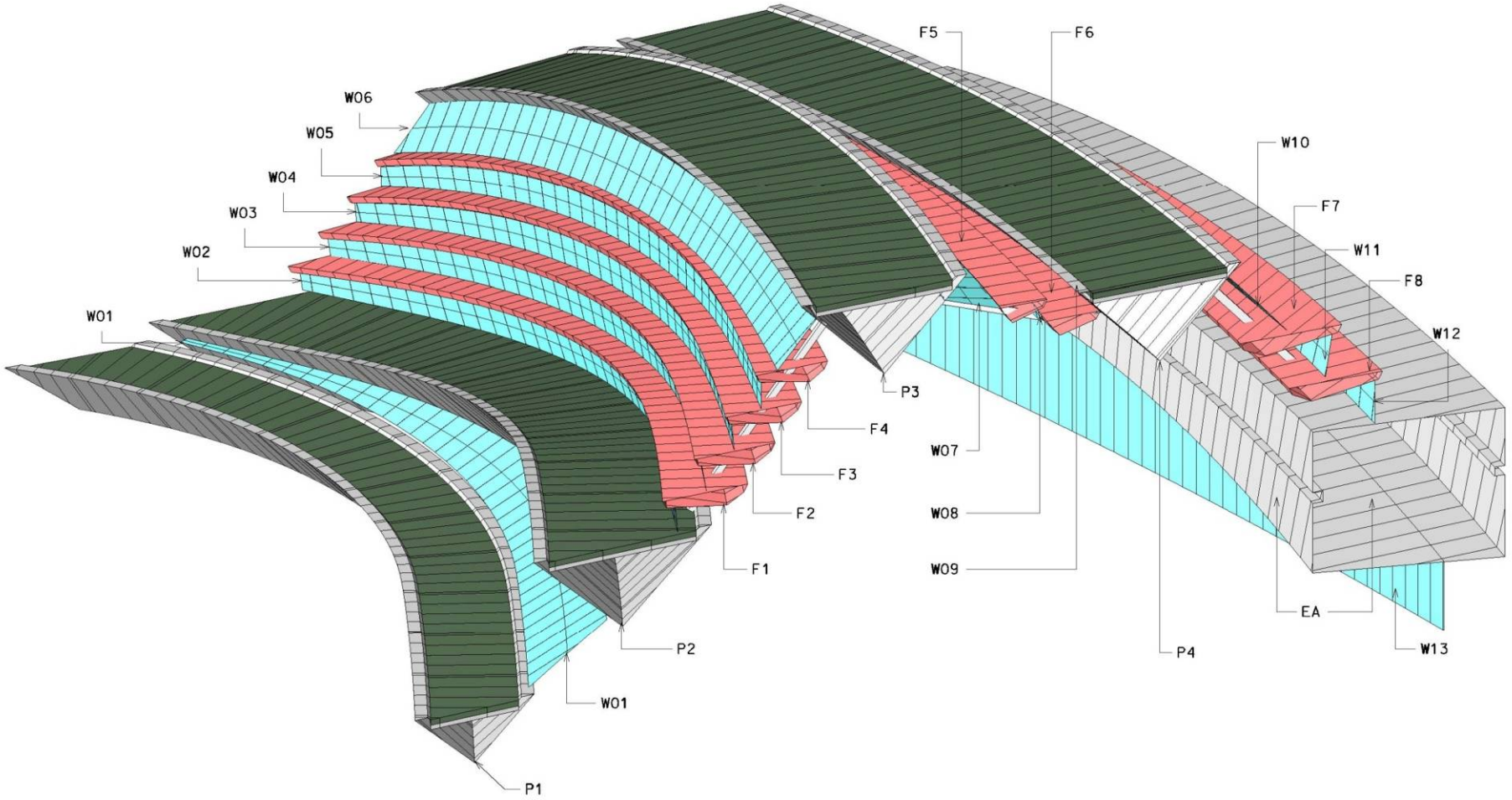
CONTRACT 810A
WEST KOWLOON TERMINUS
ENTRANCE BUILDING, GATEWAY DRAWING SOUTH

SCALE NTS @ A1

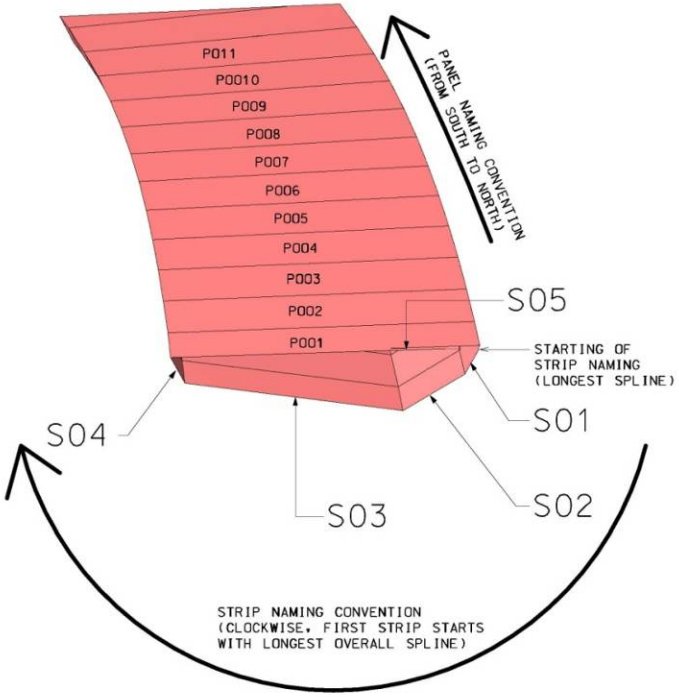
DRAWING NO. 810A/T/WKT/AAT/A65/011

REV. A4

PLOT DRV:
MODELNAME:
FILENAME:
PRINTED BY:
06/22/2010 7:47:03 PM

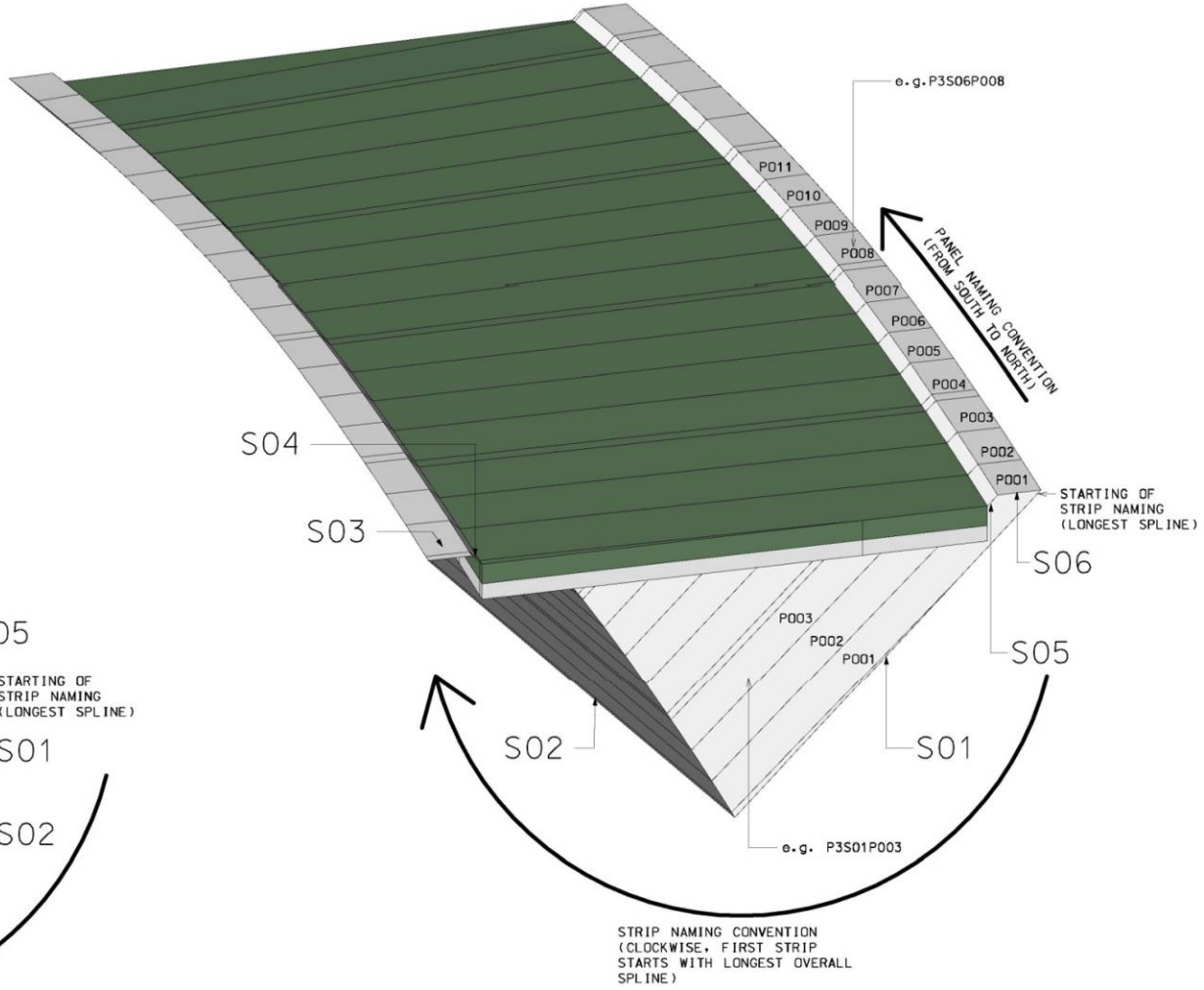

F5
F6
W06
W05
W04
W03
W02
W01
W10
F7
W11
F8
W12
P3
F4
F3
F2
F1
W07
W08
W09
P2
W01
P1
P4
EA
W13

CONTEXT



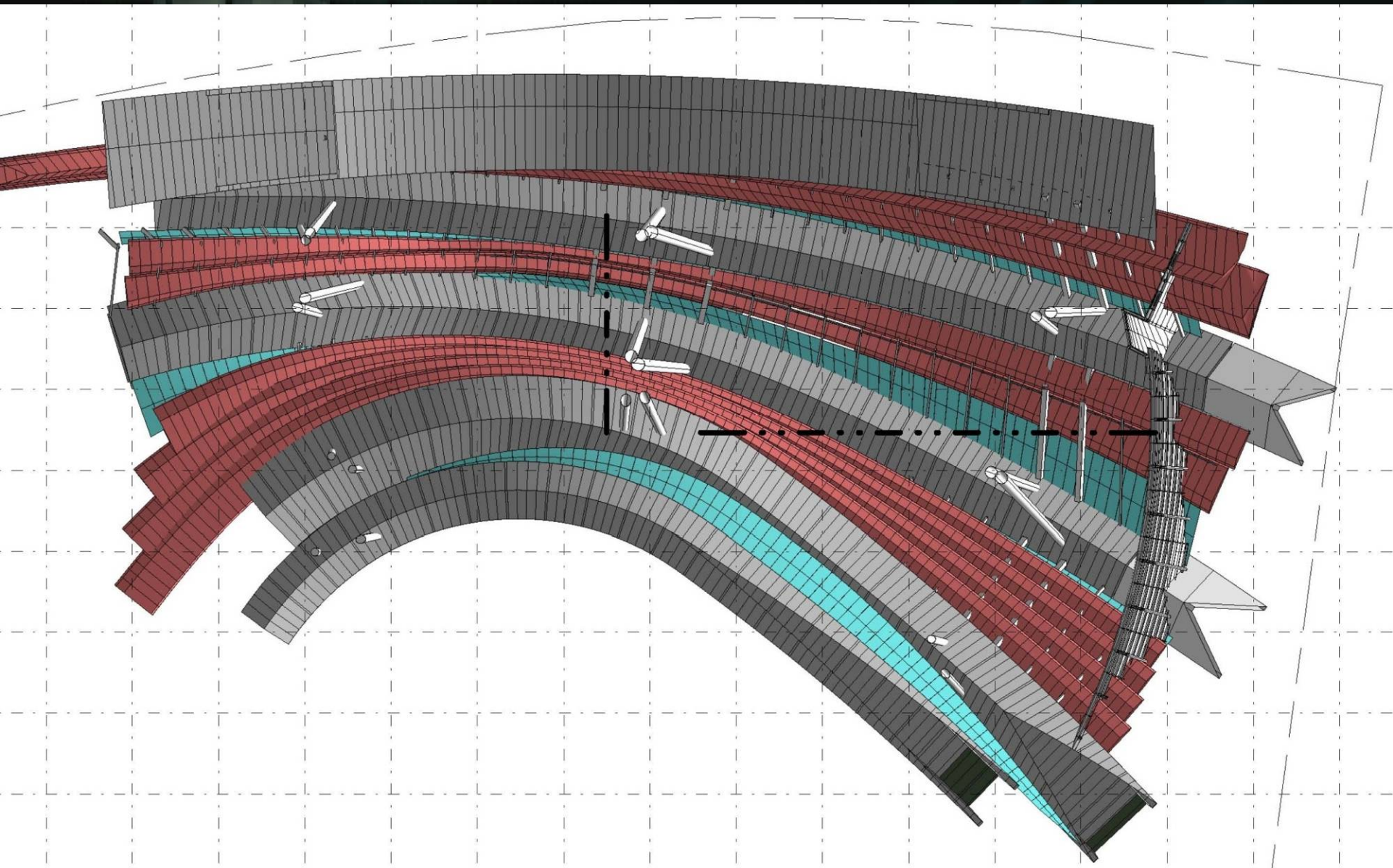
Nomenclature - Fin Cladding
2 e.g. F1

NAMING CONVENTION:
ELEMENT/ STRIP(S) / PANEL(P)
E.G. F1/ SXX / PXXX
F1S03P078



Nomenclature - V Cladding
1 e.g. P3

NAMING CONVENTION:
ELEMENT/ STRIP(S) / PANEL(P)
E.G. P3/ SXX / PXXX
P3S17P123



Microsoft Excel - 20100127_V3_S6.xls

EN English (United States)

File Edit View Insert Format Tools Data Window Help

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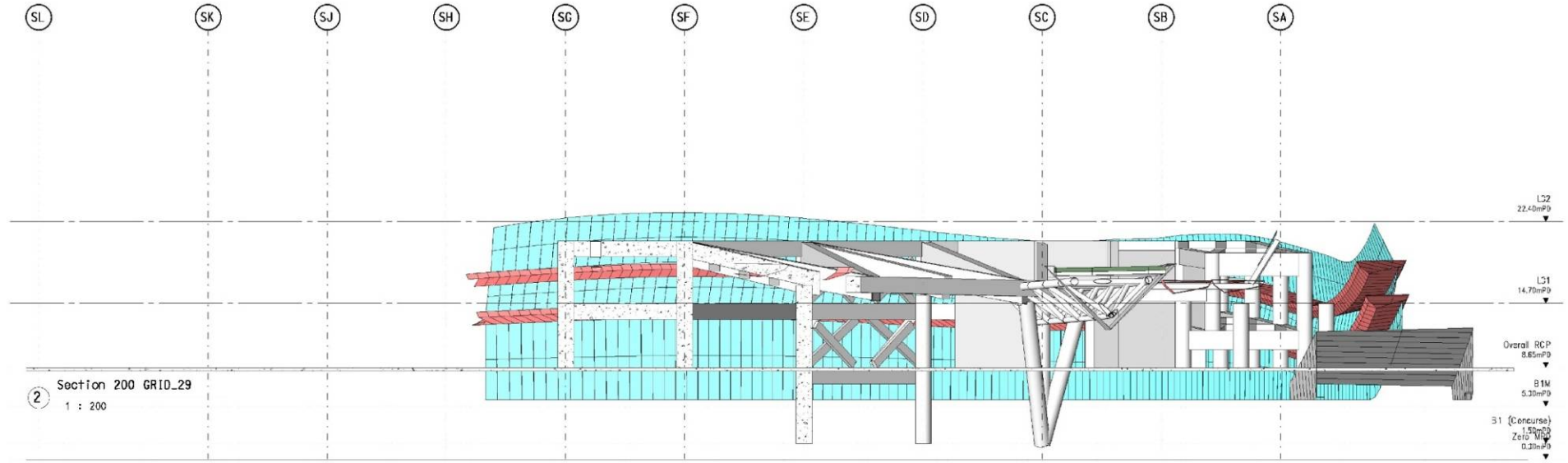
R30

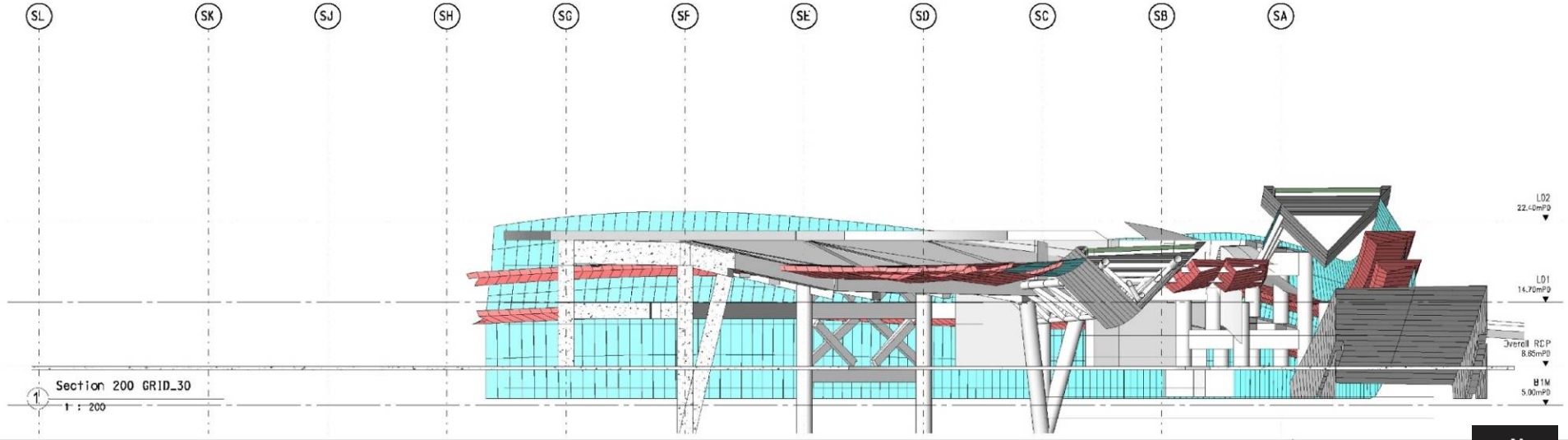
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		P01x## lengt	P01y## lengt	P01z## lengt	P02x## lengt	P02y## lengt	P02z## lengt	P03x## lengt	P03y## lengt	P03z## lengt	P04x## lengt	P04y## lengt	P04z## lengt	Panel Type##ot
2	P3S06P001	149572.632	43124.1138	30997.4089	150034.096	44497.0923	31201.1007	151479.165	44220.6936	29756.4955	151017.994	42846.0425	29553.4116	P3S06P001
3	P3S06P002	150034.096	44497.0923	31201.1007	150490.205	45872.5015	31400.2904	151935	45597.7674	29955.086	151479.165	44220.6936	29756.4955	P3S06P002
4	P3S06P003	150490.205	45872.5015	31400.2904	150940.93	47250.3052	31594.9821	152385.473	46977.2334	30149.1841	151935	45597.7674	29955.086	P3S06P003
5	P3S06P004	150940.93	47250.3052	31594.9821	151386.267	48630.4698	31785.1616	152830.57	48359.0618	30338.7828	152385.473	46977.2334	30149.1841	P3S06P004
6	P3S06P005	151386.267	48630.4698	31785.1616	151474.689	48906.7825	31822.6539	152918.944	48635.7079	30376.1616	152830.57	48359.0618	30338.7828	P3S06P005
7	P3S06P006	151474.689	48906.7825	31822.6539	151913.575	50289.7323	32007.3872	153357.585	50020.3276	30560.3477	152918.944	48635.7079	30376.1616	P3S06P006
8	P3S06P007	151913.575	50289.7323	32007.3872	152347.08	51674.9657	32187.576	153790.836	51407.2369	30740.0246	153357.585	50020.3276	30560.3477	P3S06P007
9	P3S06P008	152347.08	51674.9657	32187.576	152775.147	53062.4739	32363.2813	154218.667	52796.4316	30915.2314	153790.836	51407.2369	30740.0246	P3S06P008
10	P3S06P009	152775.147	53062.4739	32363.2813	153197.744	54452.3272	32534.6167	154641.09	54188.0429	31086.0665	154218.667	52796.4316	30915.2314	P3S06P009
11	P3S06P010	153197.744	54452.3272	32534.6167	153281.603	54730.5766	32568.3694	154724.924	54466.654	31119.7184	154641.09	54188.0429	31086.0665	P3S06P010
12	P3S06P011	153281.603	54730.5766	32568.3694	153697.624	56123.188	32734.5715	155140.841	55861.1282	31285.4274	154724.924	54466.654	31119.7184	P3S06P011
13	P3S06P012	153697.624	56123.188	32734.5715	154108.128	57517.7498	32896.4211	155551.199	57257.4509	31446.8027	155140.841	55861.1282	31285.4274	P3S06P012
14	P3S06P013	154108.128	57517.7498	32896.4211	154513.02	58914.0007	33053.6684	155955.863	58655.1793	31603.5689	155551.199	57257.4509	31446.8027	P3S06P013
15	P3S06P014	154513.02	58914.0007	33053.6684	154912.275	60311.9726	33206.0604	156354.833	60054.3601	31755.4605	155955.863	58655.1793	31603.5689	P3S06P014
16	P3S06P015	154912.275	60311.9726	33206.0604	154991.455	60591.8003	33235.9403	156433.956	60334.4167	31785.2395	156354.833	60054.3601	31755.4605	P3S06P015
17	P3S06P016	154991.455	60591.8003	33235.9403	155384.039	61992.164	33382.3144	156826.258	61735.9125	31931.1206	156433.956	60334.4167	31785.2395	P3S06P016
18	P3S06P017	155384.039	61992.164	33382.3144	155771.104	63394.5402	33523.6095	157213.036	63139.4019	32071.9532	156826.258	61735.9125	31931.1206	P3S06P017
19	P3S06P018	155771.104	63394.5402	33523.6095	156152.641	64799.0536	33659.8994	157594.329	64545.1147	32207.8035	157213.036	63139.4019	32071.9532	P3S06P018
20	P3S06P019	156152.641	64799.0536	33659.8994	156528.665	66205.8406	33791.3989	157970.193	65953.318	32338.8909	157594.329	64545.1147	32207.8035	P3S06P019
21	P3S06P020	156528.665	66205.8406	33791.3989	156603.207	66487.4657	33817.1437	158044.711	66235.2527	32364.5566	157970.193	65953.318	32338.8909	P3S06P020
22	P3S06P021	156603.207	66487.4657	33817.1437	156972.591	67896.8372	33943.1573	158414.002	67646.2548	32490.1972	158044.711	66235.2527	32364.5566	P3S06P021
23	P3S06P022	156972.591	67896.8372	33943.1573	157336.329	69307.9002	34064.607	158777.619	69058.83	32611.2857	158414.002	67646.2548	32490.1972	P3S06P022
24	P3S06P023	157336.329	69307.9002	34064.607	157694.338	70720.5482	34181.3772	159135.5	70472.822	32727.6793	158777.619	69058.83	32611.2857	P3S06P023
25	P3S06P024	157694.338	70720.5482	34181.3772	158046.558	72134.4265	34293.1711	159487.514	71887.6646	32839.0806	159135.5	70472.822	32727.6793	P3S06P024
26	P3S06P025	158046.558	72134.4265	34293.1711	158116.297	72417.2914	34314.8748	159557.191	72170.6364	32860.703	159487.514	71887.6646	32839.0806	P3S06P025
27	P3S06P026	158116.297	72417.2914	34314.8748	158461.474	73832.0687	34419.7934	159901.955	73585.5129	32965.2043	159557.191	72170.6364	32860.703	P3S06P026
28	P3S06P027	158461.474	73832.0687	34419.7934	158800.798	75247.6674	34518.1928	160240.723	75000.5299	33063.172	159901.955	73585.5129	32965.2043	P3S06P027
29	P3S06P028	158800.798	75247.6674	34518.1928	159134.34	76664.522	34609.6099	160573.676	76416.4942	33154.1589	160240.723	75000.5299	33063.172	P3S06P028
30	P3S06P029	159134.34	76664.522	34609.6099	159462.105	78082.6818	34693.7628	160900.837	77833.534	33237.8995	160573.676	76416.4942	33154.1589	P3S06P029
31	P3S06P030	159462.105	78082.6818	34693.7628	159526.964	78366.4655	34709.6976	160965.574	78117.0662	33253.7554	160900.837	77833.534	33237.8995	P3S06P030
32	P3S06P031	159526.964	78366.4655	34709.6976	159847.917	79786.6698	34784.8936	161285.941	79536.0393	33328.5833	160965.574	78117.0662	33253.7554	P3S06P031
33	P3S06P032	159847.917	79786.6698	34784.8936	160163.369	81209.1412	34852.7734	161600.864	80957.3769	33396.1369	161285.941	79536.0393	33328.5833	P3S06P032
34	P3S06P033	160163.369	81209.1412	34852.7734	160473.329	82633.6703	34913.5237	161910.348	82380.8678	33456.5958	161600.864	80957.3769	33396.1369	P3S06P033
35	P3S06P034	160473.329	82633.6703	34913.5237	160777.356	84058.5399	34967.1102	162213.944	83804.7494	33509.9212	161910.348	82380.8678	33456.5958	P3S06P034
36	P3S06P035	160777.356	84058.5399	34967.1102	160837.419	84343.4967	34976.9482	162273.925	84089.5132	33519.7114	162213.944	83804.7494	33509.9212	P3S06P035
37	P3S06P036	160837.419	84343.4967	34976.9482	161133.92	85768.179	35021.638	162570.037	85513.2534	33564.1916	162273.925	84089.5132	33519.7114	P3S06P036
38	P3S06P037	161133.92	85768.179	35021.638	161424.472	87194.961	35058.7408	162860.157	86938.7178	33601.1181	162570.037	85513.2534	33564.1916	P3S06P037
39	P3S06P038	161424.472	87194.961	35058.7408	161710.115	88626.5835	35088.1259	163145.242	88368.1089	33630.3397	162860.157	86938.7178	33601.1181	P3S06P038
40	P3S06P039	161710.115	88626.5835	35088.1259	161991.372	90062.1491	35109.5513	163425.853	89800.6144	33651.6209	163145.242	88368.1089	33630.3397	P3S06P039
41	P3S06P040	161991.372	90062.1491	35109.5513	162046.965	90348.8387	35112.8371	163481.328	90086.742	33654.8892	163425.853	89800.6144	33651.6209	P3S06P040
42	P3S06P041	162046.965	90348.8387	35112.8371	162320.456	91777.2531	35124.1735	163754.377	91513.2313	33666.1912	163481.328	90086.742	33654.8892	P3S06P041
43	P3S06P042	162320.456	91777.2531	35124.1735	162582.475	93187.6147	35126.9896	164016.659	92925.0915	33668.9867	163754.377	91513.2313	33666.1912	P3S06P042

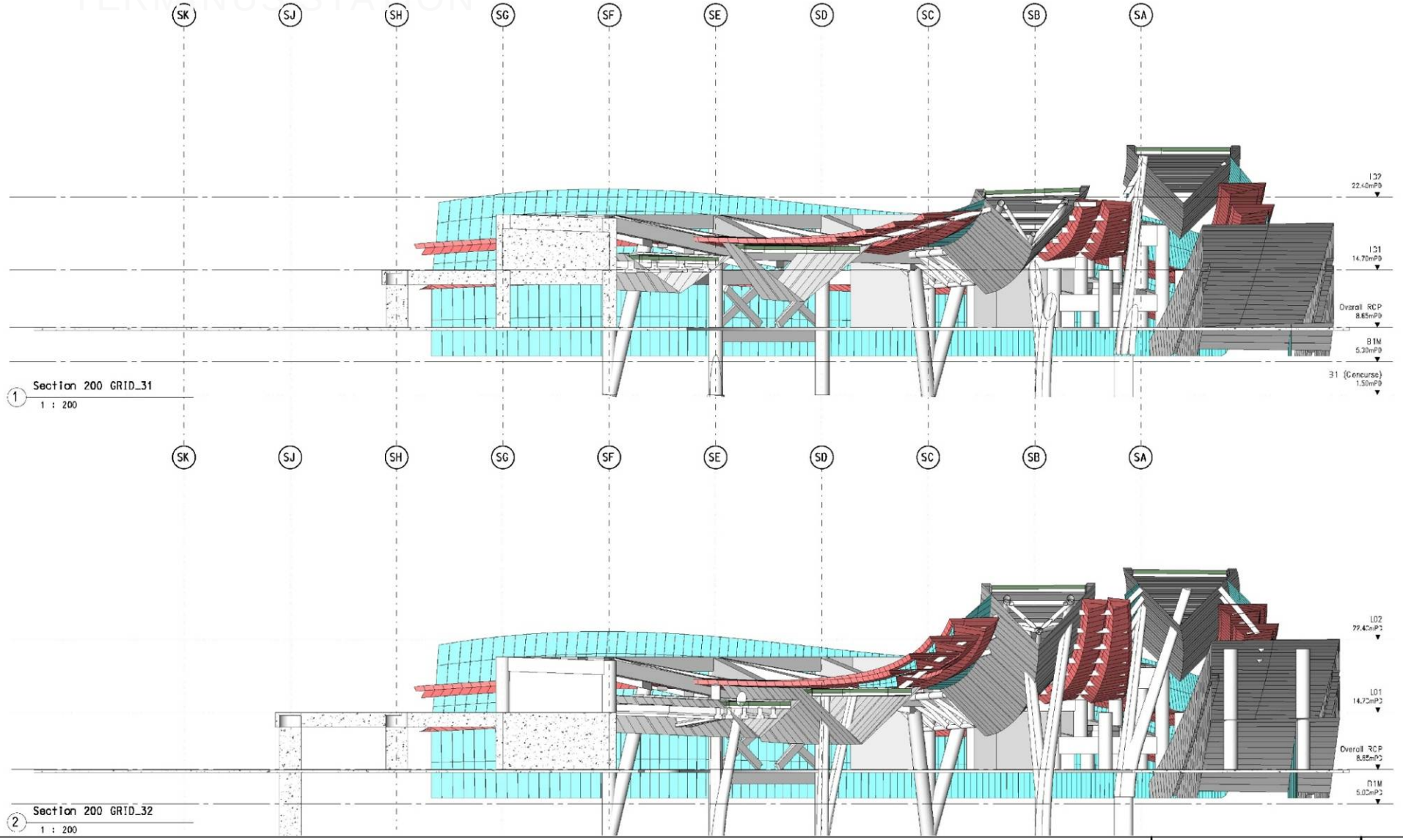
```
                {
                    case 'x':
                        p[index].x = System.Convert.ToDouble(para.AsValueString());
                        break;
                    case 'y':
                        p[index].y = System.Convert.ToDouble(para.AsValueString());
                        break;
                    case 'z':
                        p[index].z = System.Convert.ToDouble(para.AsValueString());
                        break;
                    default:
                        MessageBox.Show("Wrong format of parameter name");
                        break;
                }
            }
        }
    }
    CladdingPanel cl = new CladdingPanel(p, PanelCounter); // new panel created from list of points.
    double Area_m2 = cl.PanelArea / 1000000; // division by 1000000 to get area in m2 from mm2

    //current family type parameter is updated with value of Area_m2 ;
    document.BeginTransaction();
    if( symbol.ParametersMap["Area"].Set(Area_m2) == false )
    {
        MessageBox.Show("Wrong parameter type");
    }
    document.EndTransaction();

    ArrayOfPanels.Add(cl); // new panel inserted into the array of panels

    output += cl.UniqueNumber + "                " + Area_m2 + "  " + cl.T_edge[0] + "  " + cl.T_edge[1] + "  " + cl.T_edge[2] + "  " + cl.T_edge[3

    // creating panel objects in space
    document.BeginTransaction();
    FamilyInstance instance = document.Create.NewFamilyInstance(location, symbol, StructuralType.NonStructural);
    document.EndTransaction();
}
//MessageBox.Show(output);
```

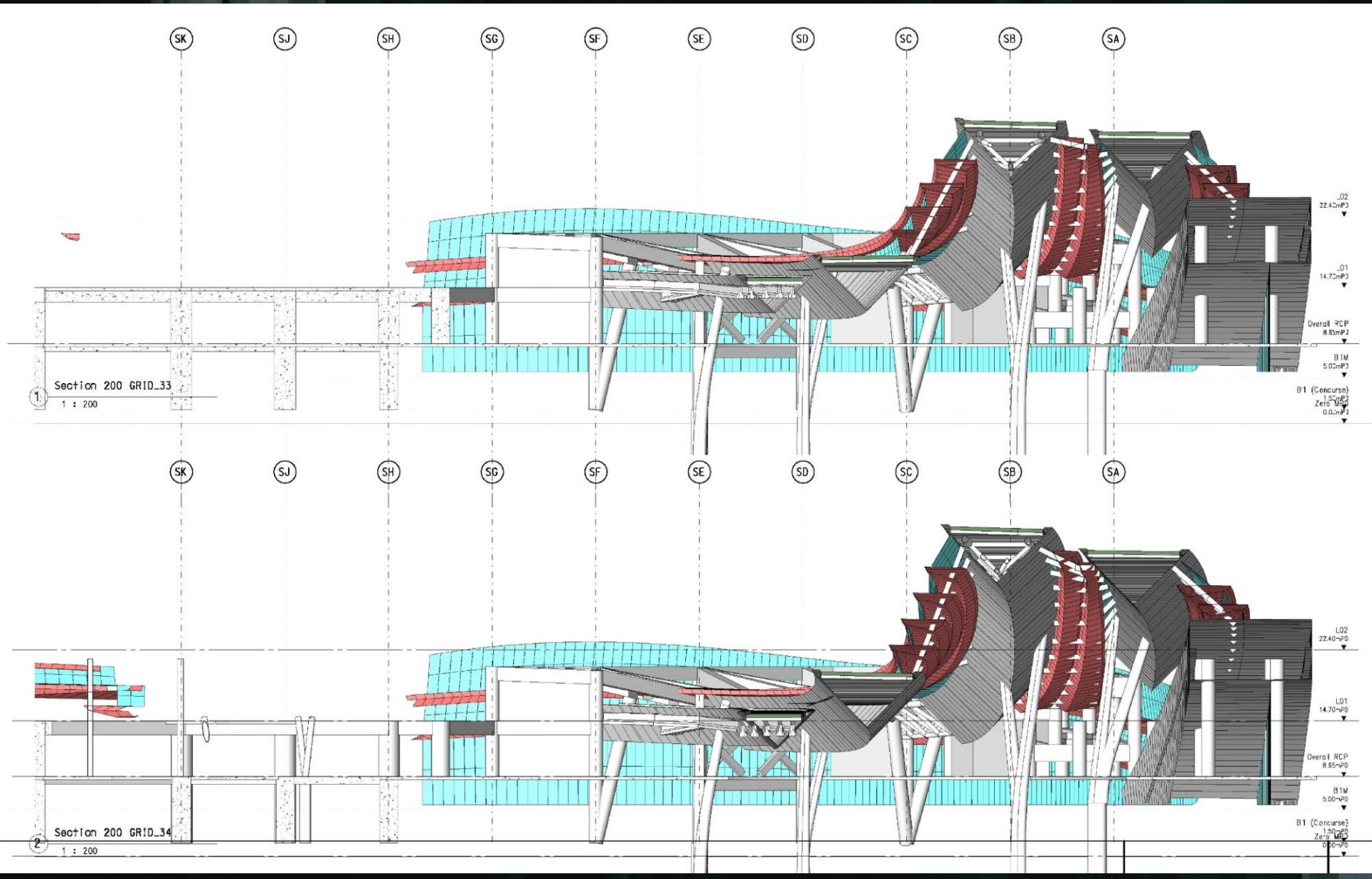
```
    {
        if
        (
            Math.Abs(nextPanel.G_edge[0] - G_edge[0]) <= tolerance
            &&
            Math.Abs(nextPanel.G_edge[1] - G_edge[1]) <= tolerance
            &&
            Math.Abs(nextPanel.G_edge[2] - G_edge[2]) <= tolerance
            &&
            Math.Abs(nextPanel.G_edge[3] - G_edge[3]) <= tolerance
            &&
            Math.Abs(nextPanel.G_diagonal_1 - G_diagonal_1) <= tolerance * Math.Sqrt(2)
        )
        { return true; }
        else
        { return false; }

    }

}
#endregion

public class Group
{
    public int GroupNumber;
    public double[] Edge; //array of lengths of groups's edges.
    public double Diagonal; //length of group's diagonal.
    public double Area; //area of a groupped panel;
}

double toFeet(double value) //convertion of linear sizes for family instances
{
    return value * FACTOR_MMtoFT;
}

double toSqFeet(double value) //convertion of areal sizes for family instances
{
```

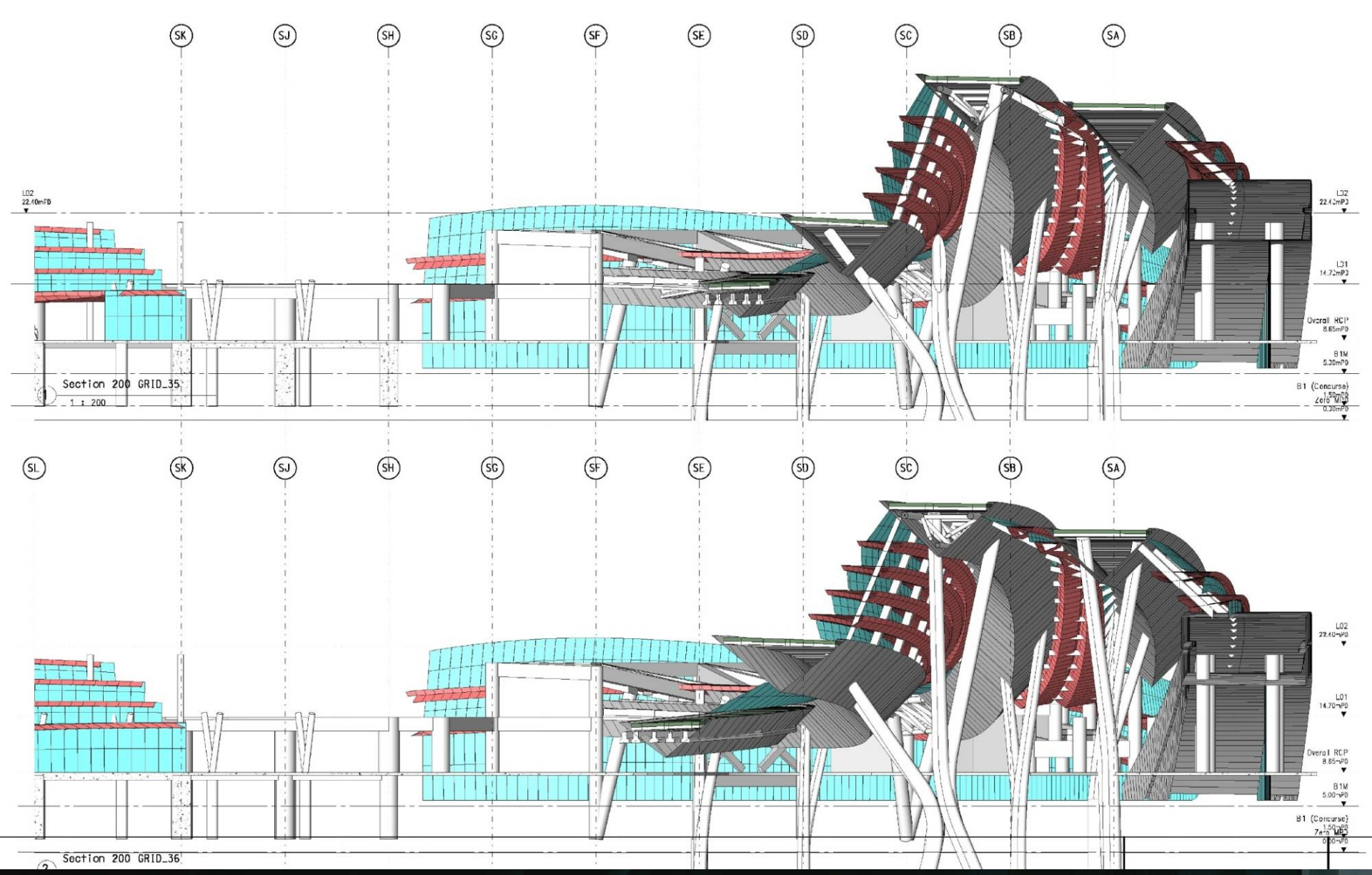
CONTEXT

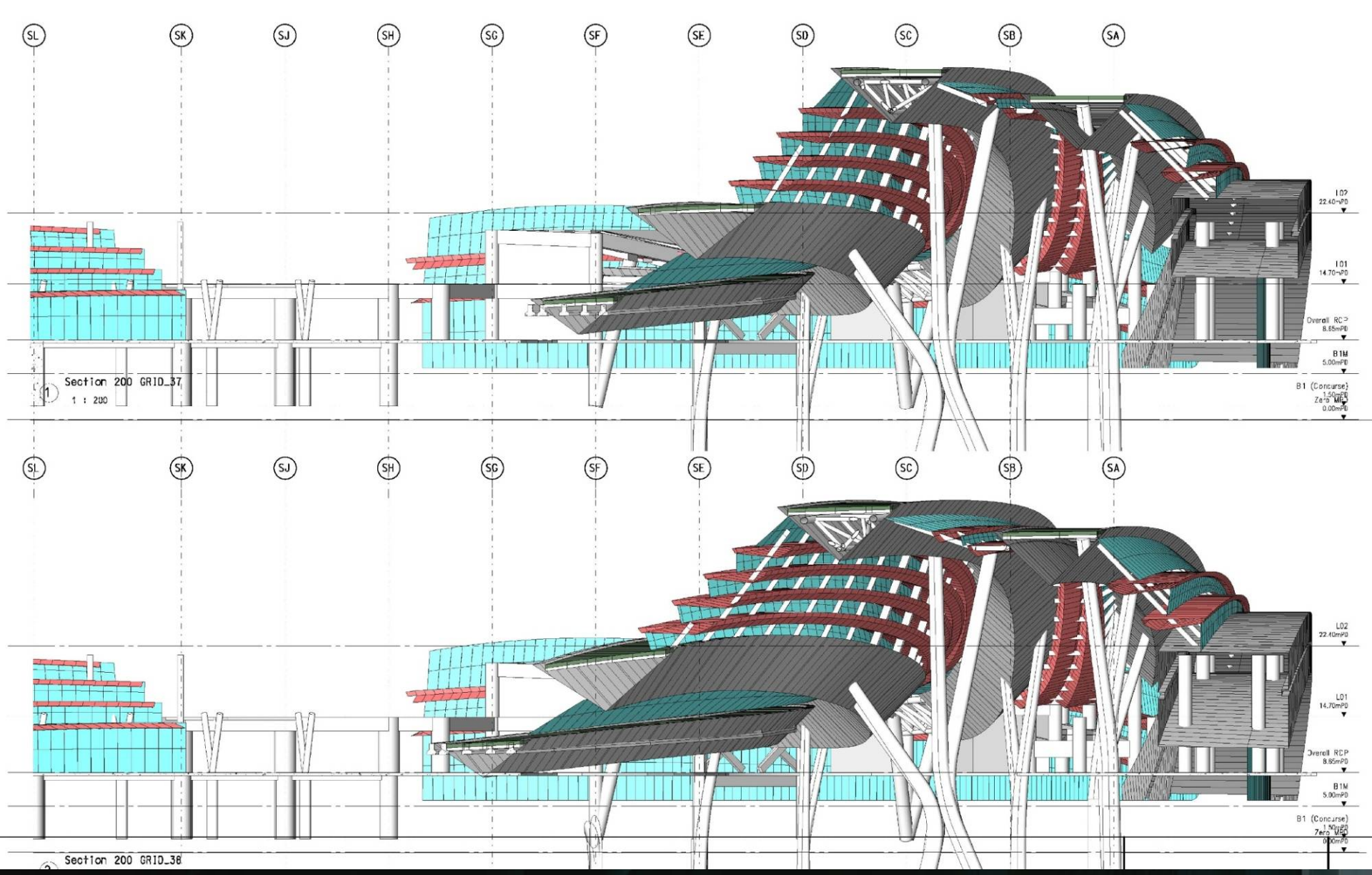

SL
SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
22.40mPD
L01
14.70mPD
Overall RCP
8.65mPD
B1M
5.30mPD
B1 (Concourse)
1.50mPD
Zero Mark
0.31mPD
2
Section 200 GRID_29
1 : 200

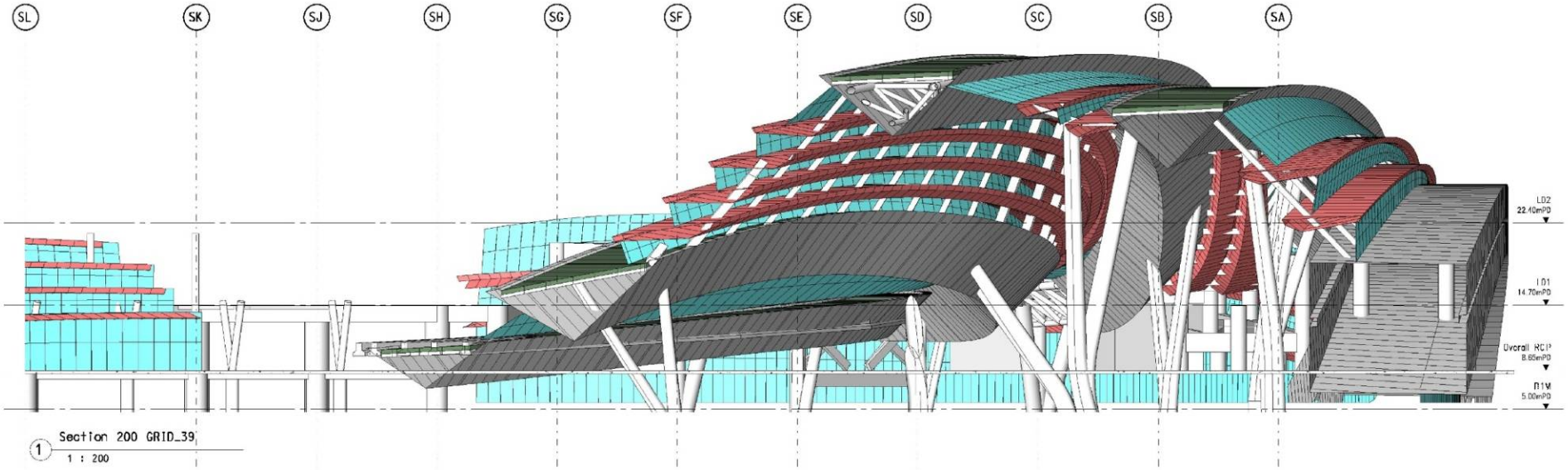

SL
SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
22.40mPD
L01
14.70mPD
Overall RCP
8.65mPD
B1M
5.00mPD
1
Section 200 GRID_30
1 : 200


SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
22.40mPD
L01
14.70mPD
Overall RCP
8.65mPD
B1M
5.30mPD
B1 (Concurse)
1.50mPD
1
Section 200 GRID_31
1 : 200
SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
L01
Overall RCP
B1M
2
Section 200 GRID_32
1 : 200

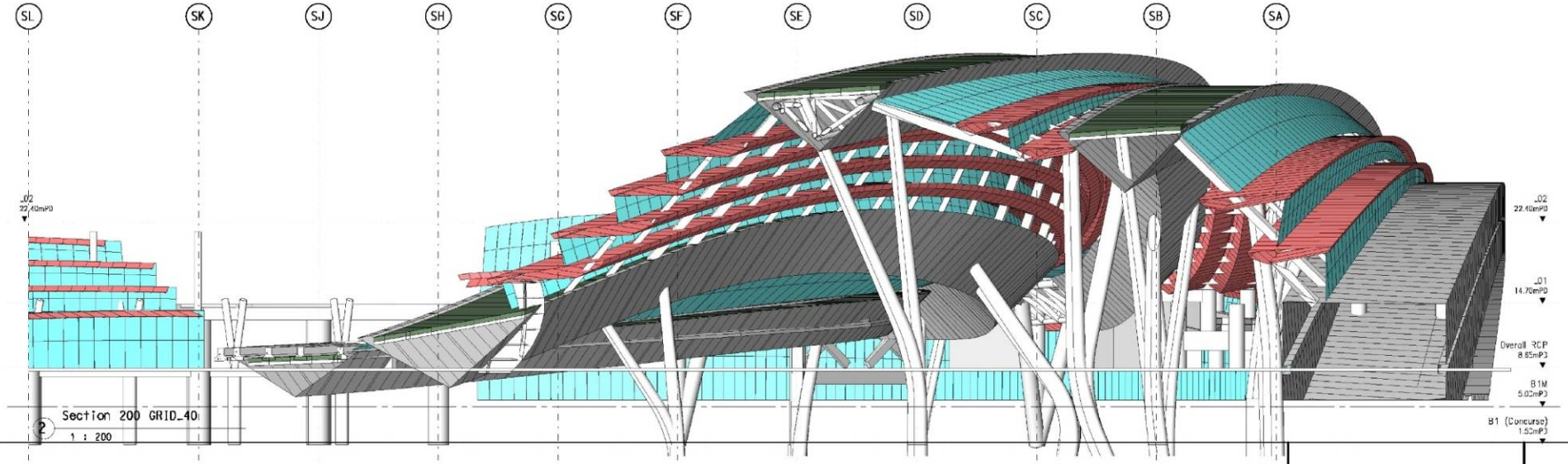

SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
Section 200 GRID_33
1 : 200
Overall RCP
B1M
B1 (Concourse)
SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
L01
Overall RCP
B1M
B1 (Concourse)
Section 200 GRID_34
1 : 200


SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
22.40mPD
L32
22.40mPD
L31
14.70mPD
Overall RCP
8.65mPD
B1M
5.00mPD
B1 (Concourse)
1.50mPD
Zero MSD
0.00mPD
Section 200 GRID_35
1 : 200
SL
SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
22.40mPD
L01
14.70mPD
Overall RCP
8.65mPD
B1M
5.00mPD
B1 (Concourse)
1.50mPD
Zero MSD
0.00mPD
Section 200 GRID_36
2


SL
SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
22.40mPD
L01
14.70mPD
Overall RCP
8.85mPD
B1M
5.00mPD
B1 (Concourse)
1.50mPD
Zero MSD
0.00mPD
Section 200 GRID_37
1 : 200
Section 200 GRID_38

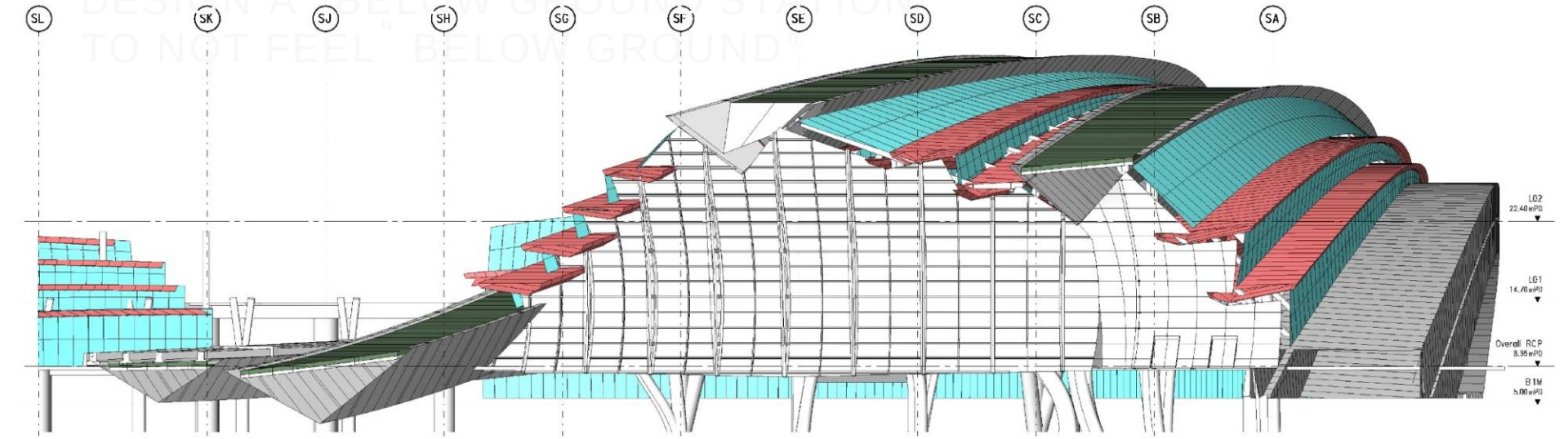


1 Section 200 GRID_39
1 : 200

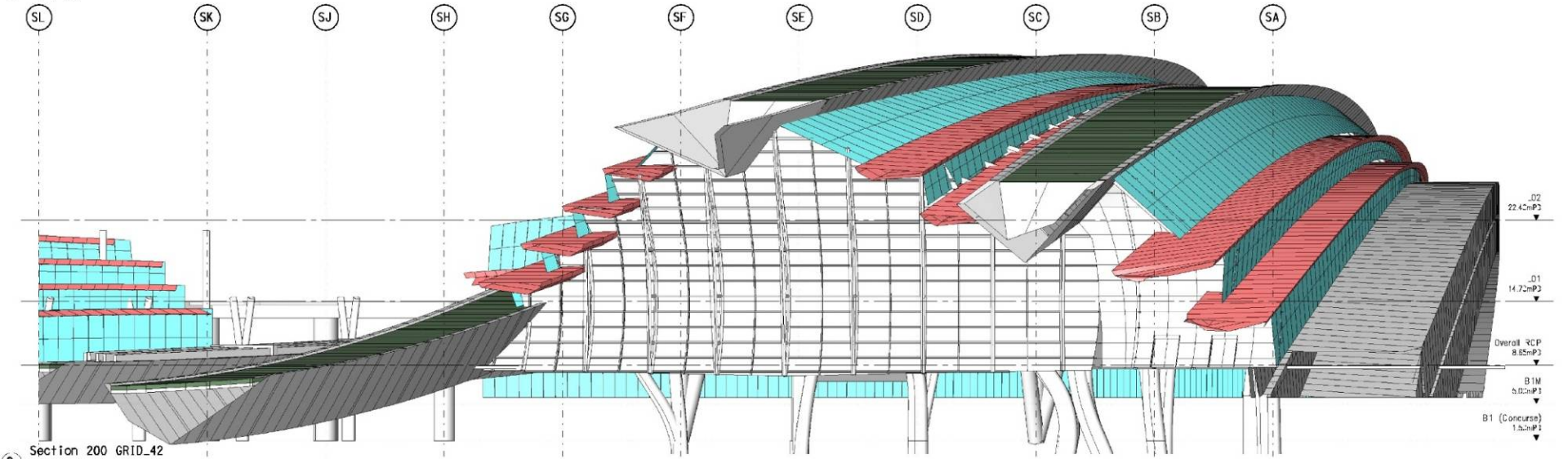


2 Section 200 GRID_40
1 : 200

DESIGN A "BELOW GROUND STATION"
TO NOT FEEL " BELOW GROUND "



1 Section 200 GRID_41
1 : 200



2 Section 200 GRID_42
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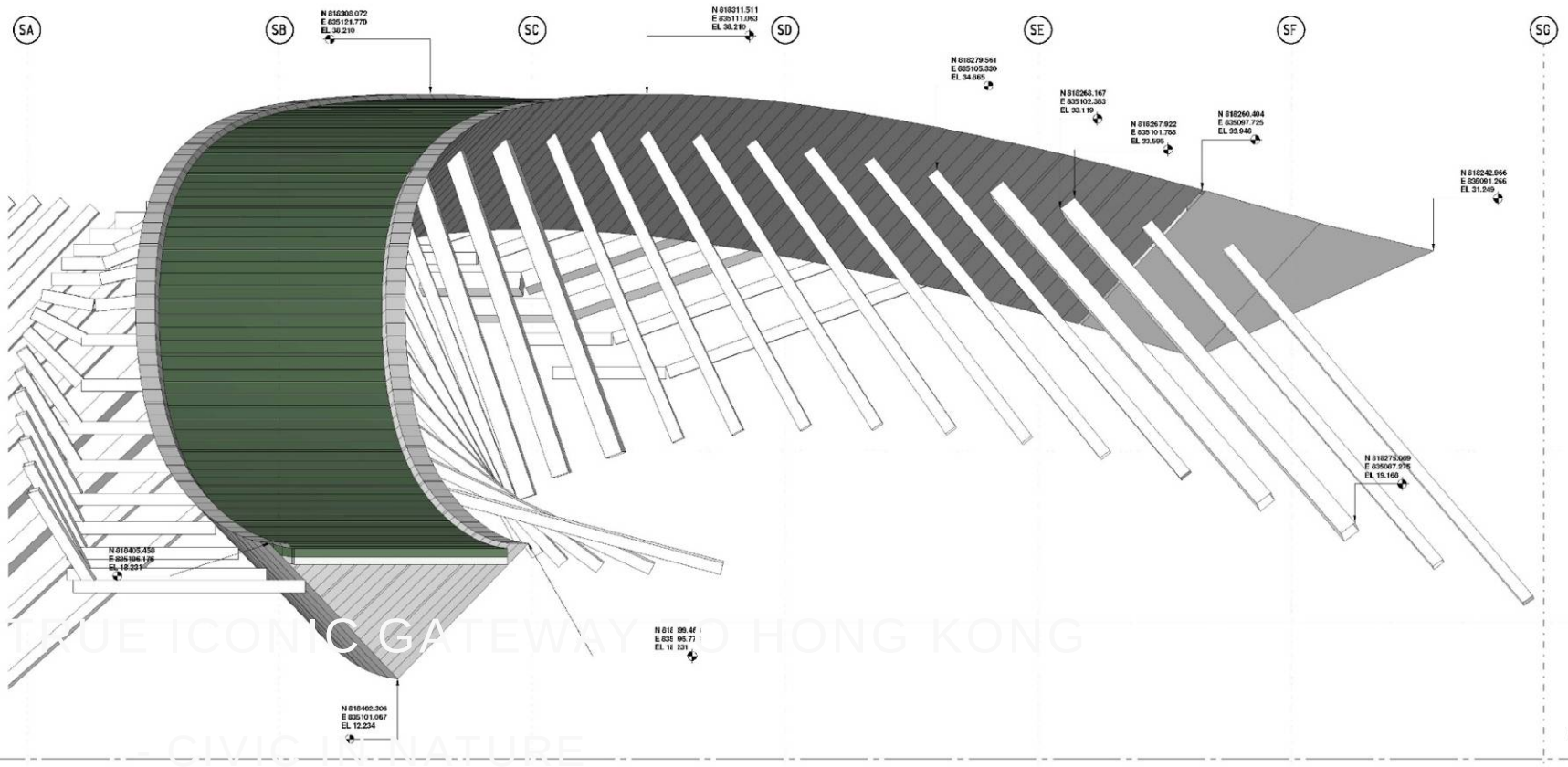
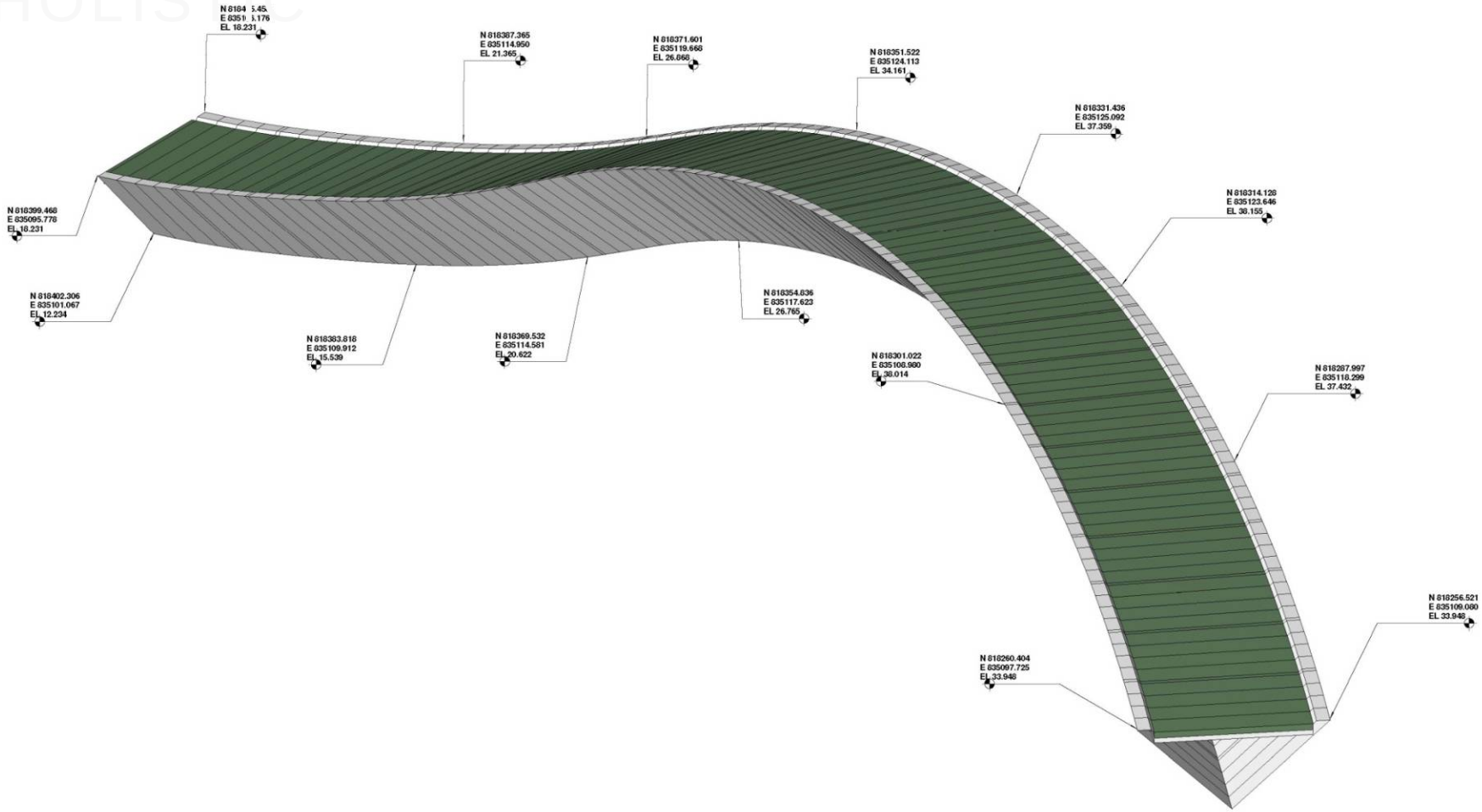


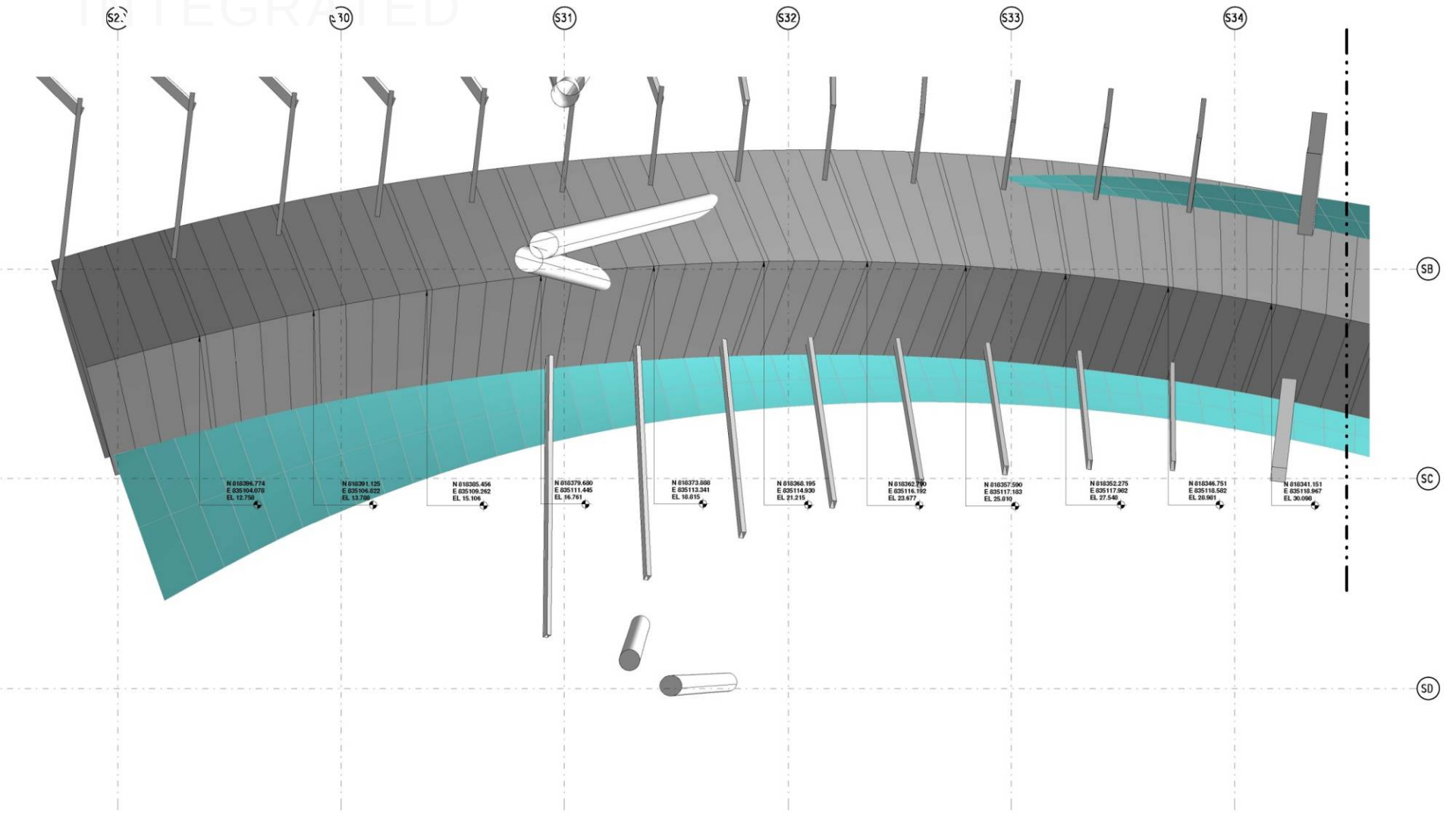
1 Component Elevation P3 North
1 : 100

- TRUE ICONIC GATEWAY TO HONG KONG
- CIVIC IN NATURE
- DEFINED BY FUNCTION
- COST EFFICIENT
- EXCEEDING EXPECTATIONS


N 8184 5.45
E 8351 3.176
EL 16.231
N 818387.365
E 835114.950
EL 21.365
N 818371.601
E 835119.668
EL 26.068
N 818351.522
E 835124.113
EL 34.161
N 818331.436
E 835125.092
EL 37.359
N 818314.128
E 835123.646
EL 36.155
N 818399.468
E 835095.778
EL 16.231
N 818402.306
E 835101.067
EL 12.234
N 818383.816
E 835109.912
EL 15.539
N 818369.532
E 835114.581
EL 20.622
N 818354.636
E 835117.623
EL 26.765
N 818301.022
E 835100.960
EL 38.014
N 818287.997
E 835110.299
EL 37.432
N 818256.521
E 835109.080
EL 33.948
N 818260.404
E 835097.725
EL 33.948

1 ISO - P3

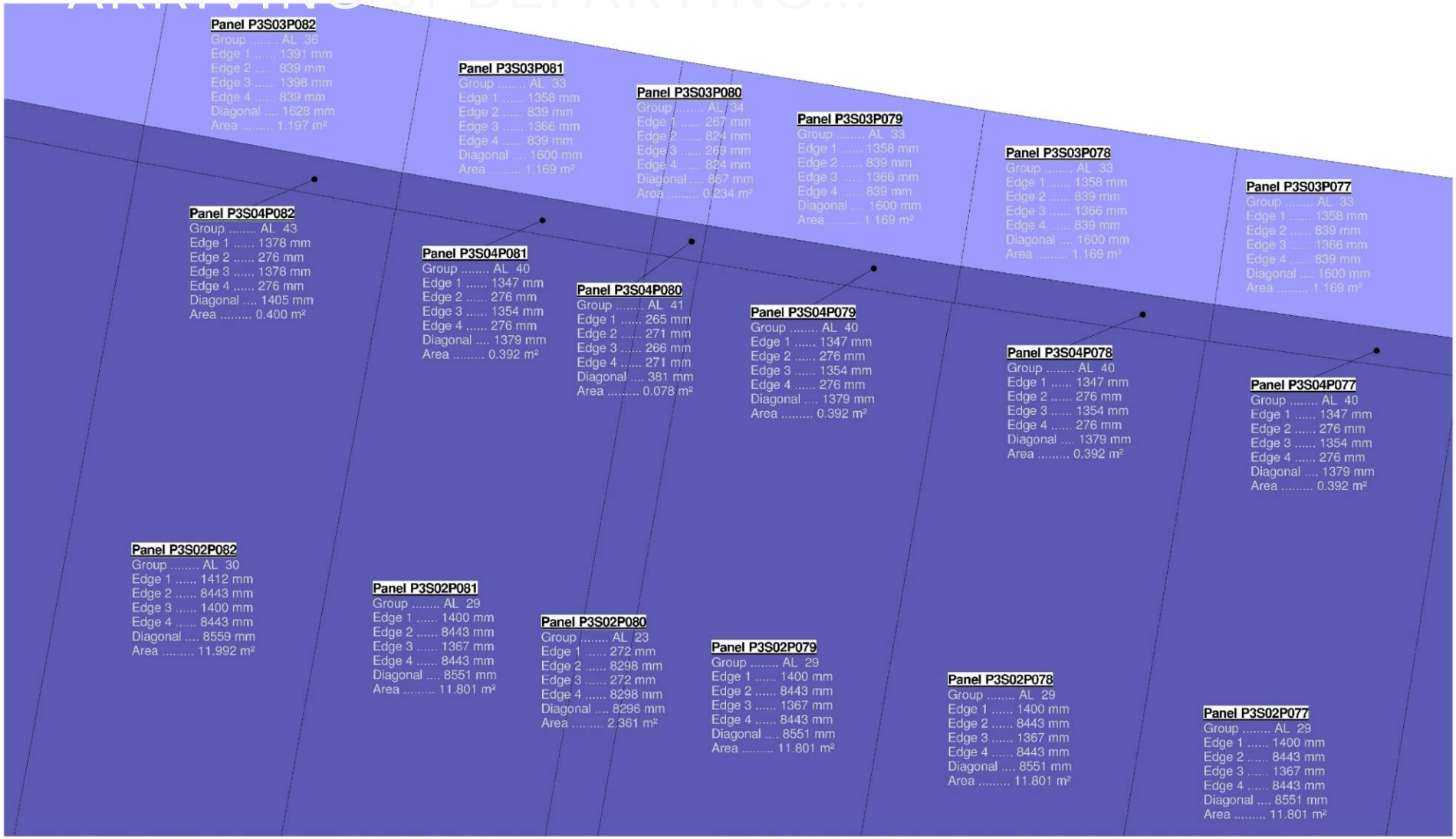
INTEGRATED

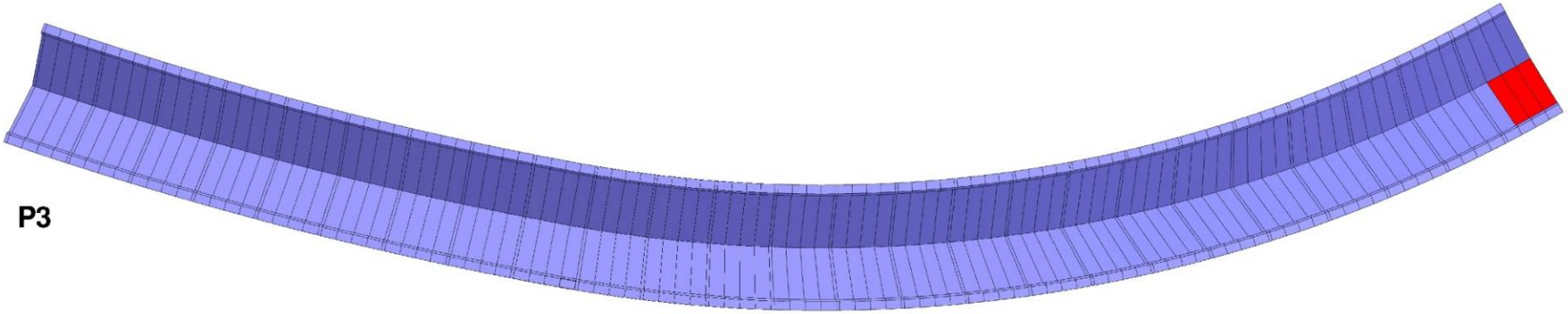


1 LEFT_Component RCP P3

1 : 100

ARRIVING or DEPARTING...

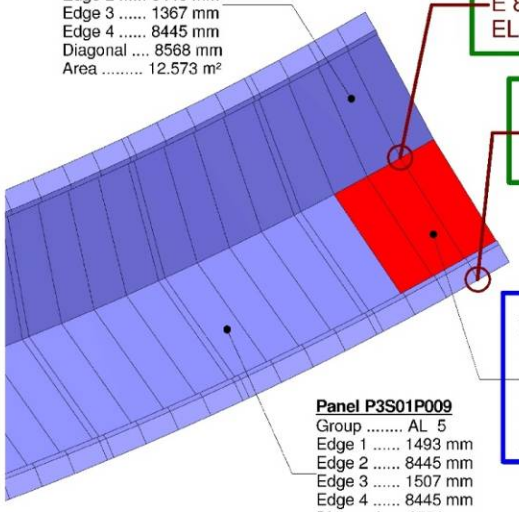




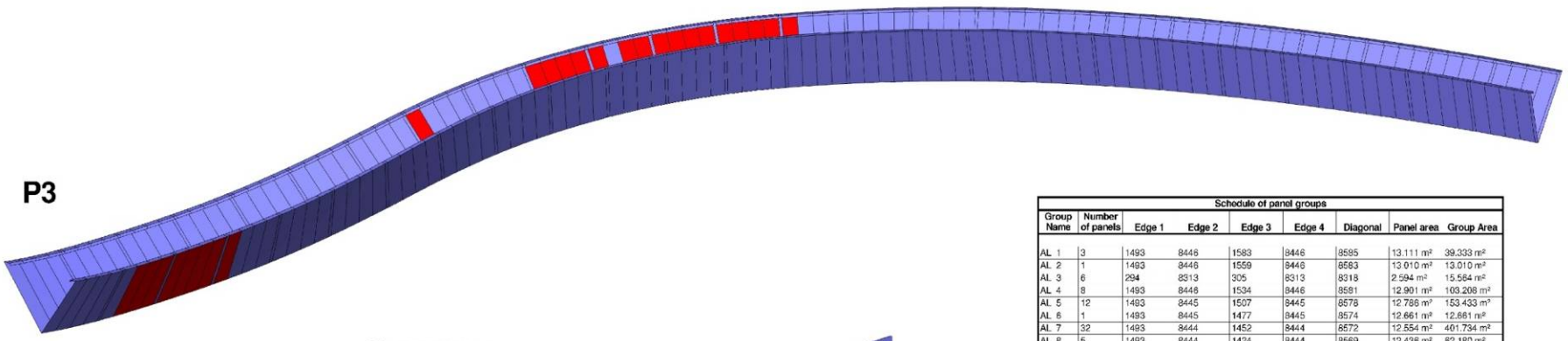
Schedule of panels

Panel	Point 1			Point 2			Point 3			Point 4			Center of weight			Edges				Diagonal	Area	Group
	P01 x	P01 y	P01 z	P02 x	P02 y	P02 z	P03 x	P03 y	P03 z	P04 x	P04 y	P04 z	C x	C y	C z	Edge 1	Edge 2	Edge 3	Edge 4			
P3S01P001	835106129	818405541	18226	835101017	818402394	12231	835106871	818404239	18290	835101802	818401012	12299	835103955	818403297	15262	1493	8446	1583	8446	8585	13.111 m²	AL 1
P3S01P002	835106871	818404239	18290	835101802	818401012	12299	835107598	818402931	18391	835102568	818399625	12410	835104710	818401952	15347	1493	8446	1583	8446	8585	13.111 m²	AL 1
P3S01P003	835107598	818402931	18391	835102568	818399625	12410	835108310	818401617	18528	835103312	818398241	12560	835105447	818400604	15472	1493	8446	1583	8446	8585	13.111 m²	AL 1
AL 1:3																					39.333 m²	
P3S01P004	835108310	818401617	18528	835103312	818398241	12560	835109007	818400300	18698	835104033	818396862	12745	835106166	818399255	15633	1493	8446	1559	8446	8583	13.010 m²	AL 2
AL 2:1																					13.010 m²	
P3S01P005	835109007	818400300	18698	835104033	818396862	12745	835109144	818400036	18736	835104175	818396588	12786	835106590	818398446	15741	294	8313	305	8313	8318	2.594 m²	AL 3
P3S01P010	835111765	818394722	19674	835106783	818391211	13770	835111890	818394454	19728	835106906	818390943	13826	835109336	818392833	16750	294	8313	305	8313	8318	2.594 m²	AL 3
P3S01P015	835114256	818389075	20934	835109228	818385543	15084	835114368	818388805	21001	835109337	818385271	15154	835111797	818387174	18043	294	8313	305	8313	8318	2.594 m²	AL 3
P3S01P020	835116476	818383392	22499	835111414	818379769	16734	835116575	818383121	22582	835111511	818379492	16822	835113954	818381444	19859	294	8313	305	8313	8318	2.594 m²	AL 3
P3S01P025	835118417	818377721	24432	835113315	818373975	18781	835118503	818377451	24534	835113398	818373701	18888	835115908	818375712	21659	294	8313	305	8313	8318	2.594 m²	AL 3
P3S01P030	835120084	818372092	26716	835114909	818368280	21178	835120157	818371825	26832	835114977	818368015	21297	835117532	818370053	24006	294	8313	305	8313	8318	2.594 m²	AL 3
AL 3:6																					15.564 m²	
P3S01P006	835109144	818400036	18736	835104175	818396588	12786	835109822	818398714	18942	835104863	818395227	13005	835107001	818397641	15867	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P018	835115454	818386100	21710	835110405	818382531	15899	835115973	818384746	22094	835110918	818381150	16305	835113167	818383632	19002	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P019	835115973	818384746	22094	835110918	818381150	16305	835116476	818383392	22499	835111414	818379769	16734	835113955	818382264	19408	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P021	835116575	818383121	22582	835111511	818379492	16822	835117059	818381769	23013	835111987	818378111	17278	835114263	818380623	19924	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P022	835117059	818381769	23013	835111987	818378111	17278	835117528	818380417	23465	835112447	818376730	17757	835114755	818379257	20378	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P023	835117528	818380417	23465	835112447	818376730	17757	835117980	818379068	23938	835112890	818375351	18258	835115211	818377891	20855	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P024	835117980	818379068	23938	835112890	818375351	18258	835118417	818377721	24432	835113315	818373975	18781	835115650	818376529	21363	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P026	835118503	818377451	24534	835113398	818373701	18888	835118921	818376108	25052	835113802	818372332	19436	835116156	818374898	21978	1493	8446	1534	8446	8581	12.901 m²	AL 4
AL 4:8																					103.208 m²	
P3S01P007	835109822	818398714	18942	835104863	818395227	13005	835110485	818397388	19170	835105522	818393885	13245	835107673	818396303	16090	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P008	835110485	818397388	19170	835105522	818393885	13245	835111132	818396057	19414	835106161	818392551	13500	835108325	818394970	16332	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P009	835111132	818396057	19414	835106161	818392551	13500	835111765	818394722	19674	835106783	818391211	13770	835108960	818395635	16590	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P011	835111890	818394454	19728	835106906	818390943	13826	835112504	818393115	20006	835107510	818389599	14116	835109702	818392028	16919	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P012	835112504	818393115	20006	835107510	818389599	14116	835113103	818391771	20300	835108097	818388252	14422	835110304	818390684	17211	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P013	835113103	818391771	20300	835108097	818388252	14422	835113688	818390425	20609	835108670	818386900	14745	835110890	818389337	17519	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P014	835113688	818390425	20609	835108670	818386900	14745	835114256	818389075	20934	835109228	818385543	15084	835111460	818387966	17843	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P016	835114368	818388805	21001	835109337	818385271	15154	835114919	818387453	21346	835109878	818383906	15516	835112126	818386359	18254	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P017	835114919	818387453	21346	835109878	818383906	15516	835115454	818386100	21710	835110405	818382531	15899	835112664	818384998	18618	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P027	835118921	818376108	25052	835113802	818372332	19436	835119324	818374766	25590	835114189	818370971	20002	835116559	818373544	22520	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P028	835119324	818374766	25590	835114189	818370971	20002	835119711	818373428	26145	835114559	818369618	20585	835116948	818372196	23081	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P029	835119711	818373428	26145	835114559	818369618	20585	835120084	818372092	26716	835114909	818368280	21178	835117316	818370855	23656	1493	8445	1507	8445	8578	12.786 m²	AL 5
AL 5:12																					153.433 m²	
P3S01P031	835120157	818371925	26832	835114977	818368015	21297	835120513	818370490	27416	835115304	818366697	21896	835117738	818369257	24360	1493	8445	1477	8445	8574	12.661 m²	AL 6
AL 6:1																					12.661 m²	

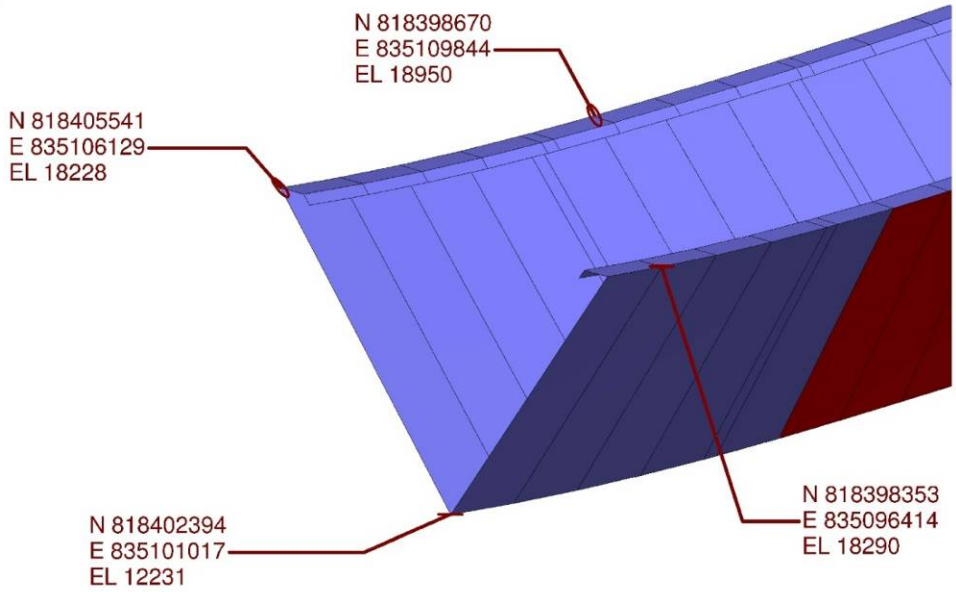
Panel P3S02P002
Group ..... AL 14
Edge 1 ..... 1583 mm
Edge 2 ..... 8445 mm
Edge 3 ..... 1367 mm
Edge 4 ..... 8445 mm
Diagonal .... 8568 mm
Area ..... 12.573 m²



Remark: An above table is a portion extracted for presentation purpose from the full schedule of panels included in the BIM model.



P3

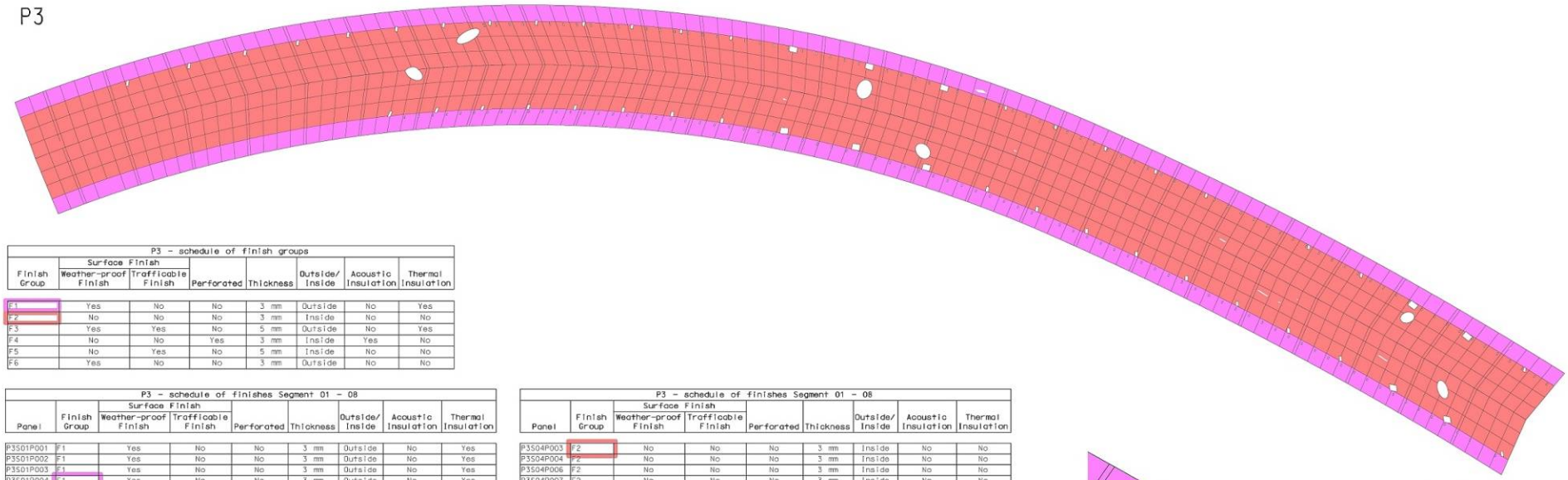


Schedule of panel groups

Group Name	Number of panels	Edge 1	Edge 2	Edge 3	Edge 4	Diagonal	Panel area	Group Area
AL 1	3	1493	8446	1583	8446	8595	13.111 m²	39.333 m²
AL 2	1	1493	8446	1559	8446	8583	13.010 m²	13.010 m²
AL 3	6	294	8313	305	8313	8318	2.594 m²	15.564 m²
AL 4	8	1493	8446	1534	8446	8581	12.901 m²	103.208 m²
AL 5	12	1493	8445	1507	8445	8578	12.786 m²	153.433 m²
AL 6	1	1493	8445	1477	8445	8574	12.661 m²	12.661 m²
AL 7	32	1493	8444	1452	8444	8572	12.554 m²	401.734 m²
AL 8	5	1493	8444	1424	8444	8569	12.436 m²	82.180 m²
AL 9	13	1493	8444	1398	8444	8567	12.325 m²	160.227 m²
AL 10	33	294	8303	272	8302	8307	2.453 m²	80.933 m²
AL 11	25	1493	8443	1369	8443	8564	12.199 m²	304.979 m²
AL 12	3	1493	8443	1354	8443	8562	12.135 m²	36.076 m²
AL 13	3	1493	8443	1338	8443	8560	12.069 m²	36.208 m²
AL 14	3	1583	8445	1367	8445	8568	12.573 m²	37.718 m²
AL 15	1	1559	8445	1368	8445	8560	12.479 m²	12.479 m²
AL 16	8	1533	8445	1369	8445	8556	12.372 m²	98.979 m²
AL 17	3	1513	8445	1374	8445	8547	12.311 m²	36.932 m²
AL 18	1	1497	8446	1385	8445	8536	12.290 m²	12.290 m²
AL 19	1	1477	8445	1387	8445	8534	12.209 m²	12.209 m²
AL 20	1	1452	8445	1387	8445	8531	12.102 m²	12.102 m²
AL 21	1	1424	8445	1387	8445	8529	11.984 m²	11.984 m²
AL 22	1	1398	8444	1386	8444	8527	11.871 m²	11.871 m²
AL 23	11	272	8298	272	8298	8296	2.361 m²	25.974 m²
AL 24	6	1369	8444	1385	8444	8524	11.742 m²	70.452 m²
AL 25	7	1354	8444	1384	8444	8524	11.674 m²	81.718 m²
AL 26	3	1338	8443	1381	8443	8524	11.595 m²	34.788 m²
AL 27	8	1362	8442	1389	8442	8539	11.648 m²	93.185 m²
AL 28	3	1380	8442	1367	8442	8543	11.714 m²	35.143 m²
AL 29	10	1400	8443	1367	8443	8551	11.801 m²	118.005 m²
AL 30	1	1412	8443	1400	8443	8559	11.992 m²	11.992 m²
AL 31	10	1427	8444	1431	8444	8564	12.187 m²	121.867 m²
AL 32	24	1440	8444	1453	8444	8568	12.334 m²	296.014 m²
AL 33	52	1358	839	1366	839	1600	1.169 m²	60.791 m²
AL 34	16	267	824	269	824	867	0.234 m²	3.748 m²
AL 35	13	1372	839	1379	839	1611	1.181 m²	15.348 m²
AL 36	1	1391	839	1398	839	1628	1.197 m²	1.197 m²
AL 37	31	1422	839	1425	839	1653	1.222 m²	37.880 m²
AL 38	3	1444	839	1447	839	1671	1.240 m²	3.720 m²
AL 39	34	284	825	285	825	873	0.248 m²	8.446 m²
AL 40	54	1347	276	1354	276	1379	0.392 m²	21.163 m²
AL 41	24	265	271	266	271	381	0.078 m²	1.883 m²
AL 42	11	1361	276	1366	276	1396	0.396 m²	4.353 m²
AL 43	1	1378	276	1378	276	1405	0.400 m²	0.400 m²
AL 44	32	1406	276	1406	276	1432	0.408 m²	13.052 m²
AL 45	2	1426	276	1425	276	1452	0.414 m²	0.827 m²
AL 46	26	281	271	281	271	390	0.083 m²	2.154 m²
AL 47	100	1456	276	1453	276	1481	0.422 m²	42.209 m²
AL 48	100	1474	839	1483	839	1700	1.269 m²	126.892 m²
Grand total: 750								2923.908 m²

CONTEXT

P3



P3 - schedule of finish groups

Finish Group	Surface Finish: Weather-proof Finish	Surface Finish: Trafficable Finish	Perforated	Thickness	Outside/ Inside	Acoustic Insulation	Thermal Insulation
F1	Yes	No	No	3 mm	Outside	No	Yes
F2	No	No	No	3 mm	Inside	No	No
F3	Yes	Yes	No	5 mm	Outside	No	Yes
F4	No	No	Yes	3 mm	Inside	Yes	No
F5	No	Yes	No	5 mm	Inside	No	No
F6	Yes	No	No	3 mm	Outside	No	No

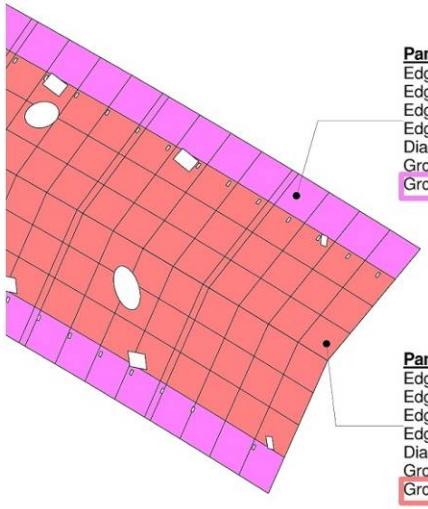
P3 - schedule of finishes Segment 01 - 08

Panel	Finish Group	Surface Finish: Weather-proof Finish	Surface Finish: Trafficable Finish	Perforated	Thickness	Outside/ Inside	Acoustic Insulation	Thermal Insulation
P3S01P001	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P002	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P003	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P004	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P005	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P006	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P007	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P008	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P009	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P001	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P002	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P003	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P004	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P005	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P006	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P007	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P008	F1	Yes	No	No	3 mm	Outside	No	Yes
F 1: 17								
P3S02P001	F2	No	No	No	3 mm	Inside	No	No
P3S02P002	F2	No	No	No	3 mm	Inside	No	No
P3S02P003	F2	No	No	No	3 mm	Inside	No	No
P3S02P004	F2	No	No	No	3 mm	Inside	No	No
P3S02P005	F2	No	No	No	3 mm	Inside	No	No
P3S02P006	F2	No	No	No	3 mm	Inside	No	No
P3S02P007	F2	No	No	No	3 mm	Inside	No	No
P3S02P008	F2	No	No	No	3 mm	Inside	No	No
P3S02P009	F2	No	No	No	3 mm	Inside	No	No
P3S03P001	F2	No	No	No	3 mm	Inside	No	No
P3S03P002	F2	No	No	No	3 mm	Inside	No	No
P3S03P003	F2	No	No	No	3 mm	Inside	No	No
P3S03P004	F2	No	No	No	3 mm	Inside	No	No
P3S03P006	F2	No	No	No	3 mm	Inside	No	No
P3S03P007	F2	No	No	No	3 mm	Inside	No	No
P3S03P008	F2	No	No	No	3 mm	Inside	No	No
P3S03P009	F2	No	No	No	3 mm	Inside	No	No
P3S04P001	F2	No	No	No	3 mm	Inside	No	No
P3S04P002	F2	No	No	No	3 mm	Inside	No	No

P3 - schedule of finishes Segment 01 - 08

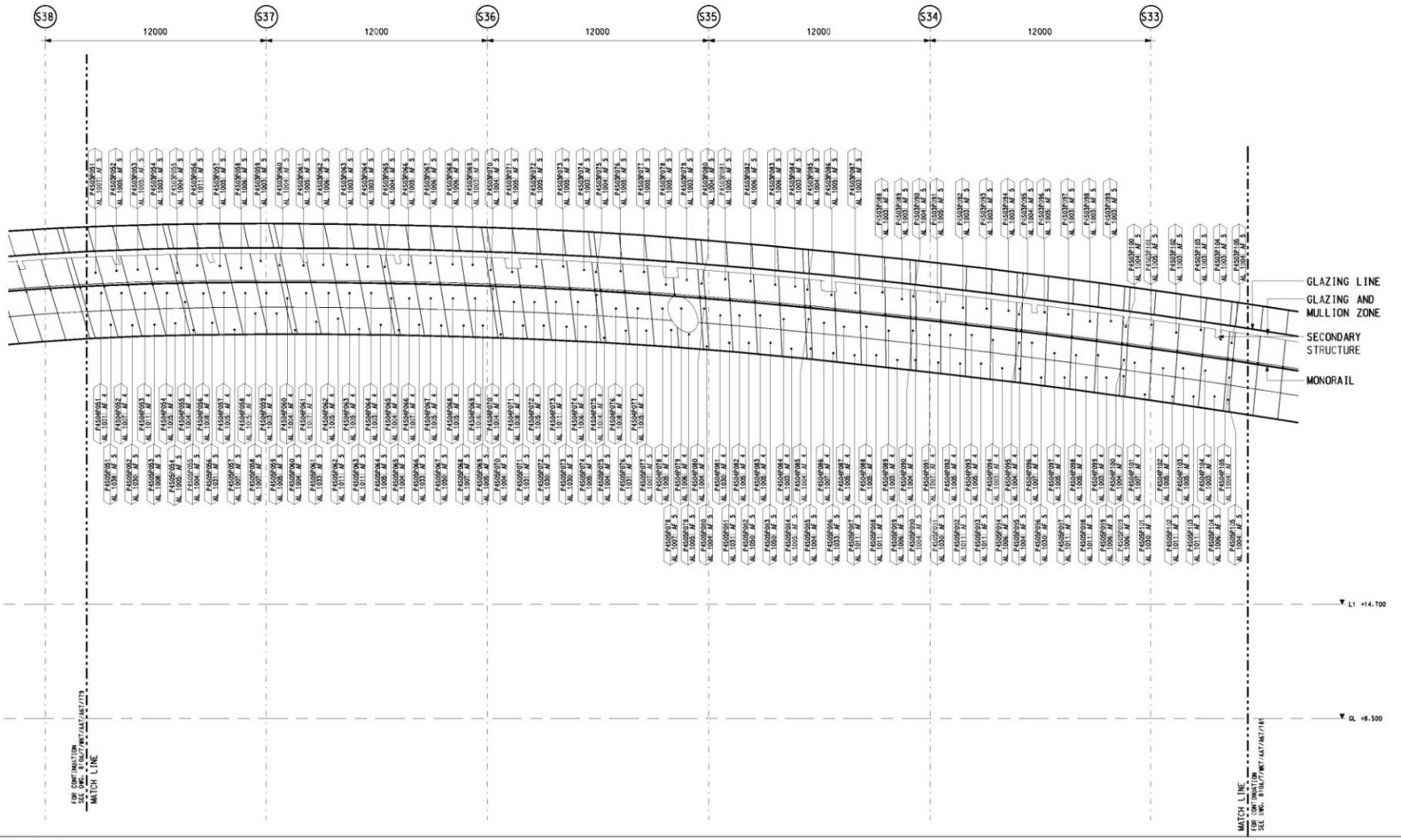
Panel	Finish Group	Surface Finish: Weather-proof Finish	Surface Finish: Trafficable Finish	Perforated	Thickness	Outside/ Inside	Acoustic Insulation	Thermal Insulation
P3S04P003	F2	No	No	No	3 mm	Inside	No	No
P3S04P004	F2	No	No	No	3 mm	Inside	No	No
P3S04P006	F2	No	No	No	3 mm	Inside	No	No
P3S04P007	F2	No	No	No	3 mm	Inside	No	No
P3S04P008	F2	No	No	No	3 mm	Inside	No	No
P3S04P009	F2	No	No	No	3 mm	Inside	No	No
F 2: 25								
P3S03P005	F2	No	No	No	3 mm	Inside	No	No
P3S04P005	F2	No	No	No	3 mm	Inside	No	No
P3S05P001	F2	No	No	No	3 mm	Inside	No	No
P3S05P002	F2	No	No	No	3 mm	Inside	No	No
P3S05P003	F2	No	No	No	3 mm	Inside	No	No
P3S05P004	F2	No	No	No	3 mm	Inside	No	No
P3S05P005	F2	No	No	No	3 mm	Inside	No	No
P3S05P006	F2	No	No	No	3 mm	Inside	No	No
P3S05P007	F2	No	No	No	3 mm	Inside	No	No
P3S05P008	F2	No	No	No	3 mm	Inside	No	No
P3S05P009	F2	No	No	No	3 mm	Inside	No	No
P3S06P001	F2	No	No	No	3 mm	Inside	No	No
P3S06P002	F2	No	No	No	3 mm	Inside	No	No
P3S06P003	F2	No	No	No	3 mm	Inside	No	No
P3S06P004	F2	No	No	No	3 mm	Inside	No	No
P3S06P005	F2	No	No	No	3 mm	Inside	No	No
P3S06P006	F2	No	No	No	3 mm	Inside	No	No
P3S06P007	F2	No	No	No	3 mm	Inside	No	No
P3S06P008	F2	No	No	No	3 mm	Inside	No	No
P3S06P009	F2	No	No	No	3 mm	Inside	No	No
P3S07P001	F2	No	No	No	3 mm	Inside	No	No
P3S07P002	F2	No	No	No	3 mm	Inside	No	No
P3S07P003	F2	No	No	No	3 mm	Inside	No	No
P3S07P004	F2	No	No	No	3 mm	Inside	No	No
P3S07P005	F2	No	No	No	3 mm	Inside	No	No
P3S07P006	F2	No	No	No	3 mm	Inside	No	No
P3S07P007	F2	No	No	No	3 mm	Inside	No	No
P3S07P008	F2	No	No	No	3 mm	Inside	No	No
P3S07P009	F2	No	No	No	3 mm	Inside	No	No
F 6: 29								

Remark: An above is a portion extracted for presentation purpose the full schedule of panels included in the BIM model.



Panel P3S01P004
Edge 1 ..... 1488 mm
Edge 2 ..... 2279 mm
Edge 3 ..... 1476 mm
Edge 4 ..... 2279 mm
Diagonal ..... 2720 mm
Group(Size) .... A 1
Group(Finish)... F 1

Panel P3S04P001
Edge 1 ..... 1460 mm
Edge 2 ..... 2042 mm
Edge 3 ..... 1445 mm
Edge 4 ..... 2042 mm
Diagonal ..... 2508 mm
Group(Size) .... A 13
Group(Finish)... F 2



01 P4 EAST ELEVATION

METRES 0 1 2 3 4 5 1 : 100

REV	DESCRIPTION	BY	DATE	APPROVED
A1	ISSUE FOR DRAFT ACP	FM	04JUN10	KK

DRAWN	ERICA LAM
DESIGNED	MARK POLLARD
CHECKED	F MCGOLDRICK
APPROVED	KELVIN KO
DATE	JUN 2010

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM Aedas

AECOM ● AEDAS MEINHARDT MVA BURO HAPPOLD EDAW MOTT

CADD REF. 09018 XRL Station Roof.rvt

TITLE

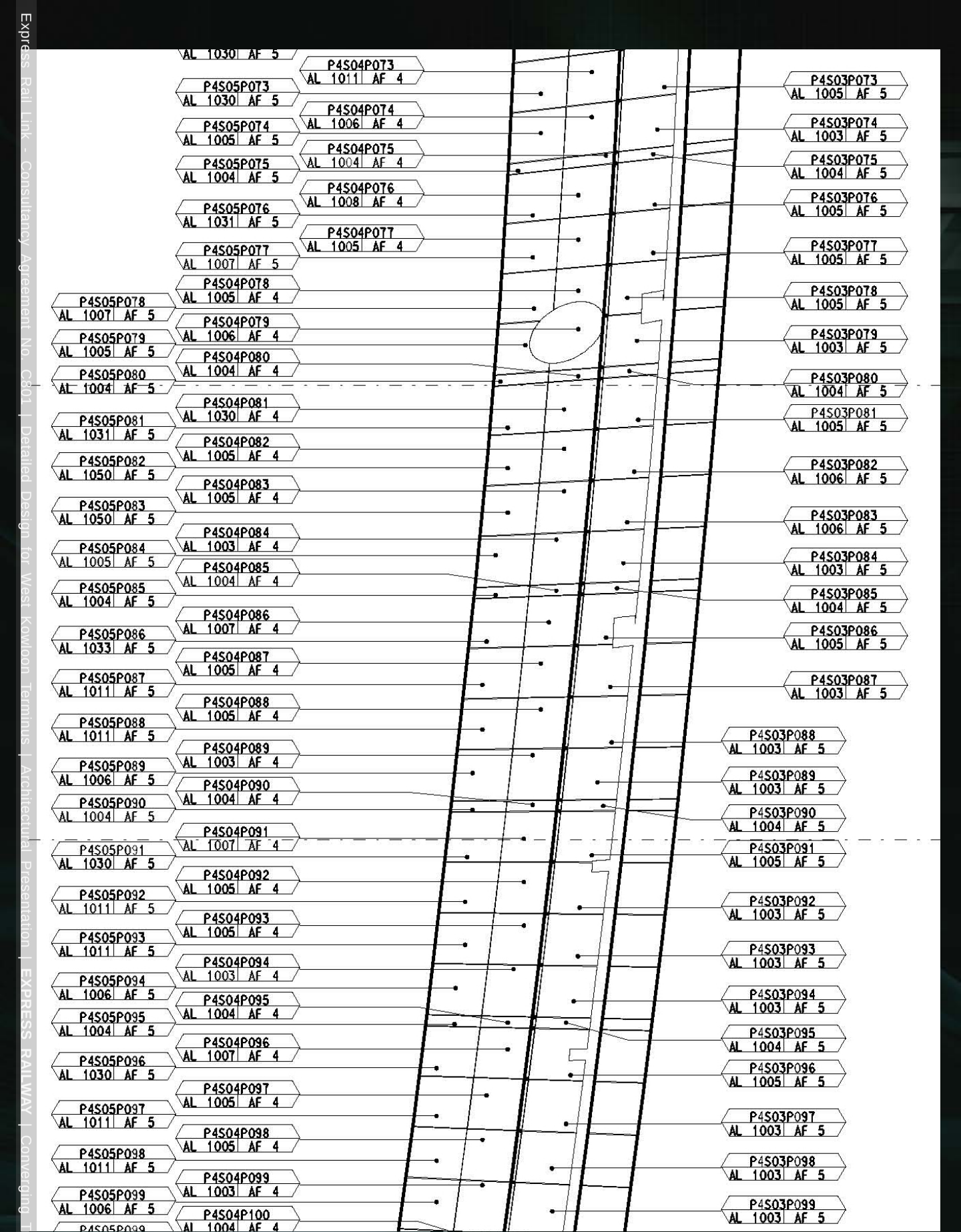
CONTRACT 810A
WEST KOWLOON TERMINUS
ENTRANCE BUILDING. WALL TYPE G. V BEAM P4 EAST ELEV
(SHEET 2)

SCALE 1 : 100 @ A1

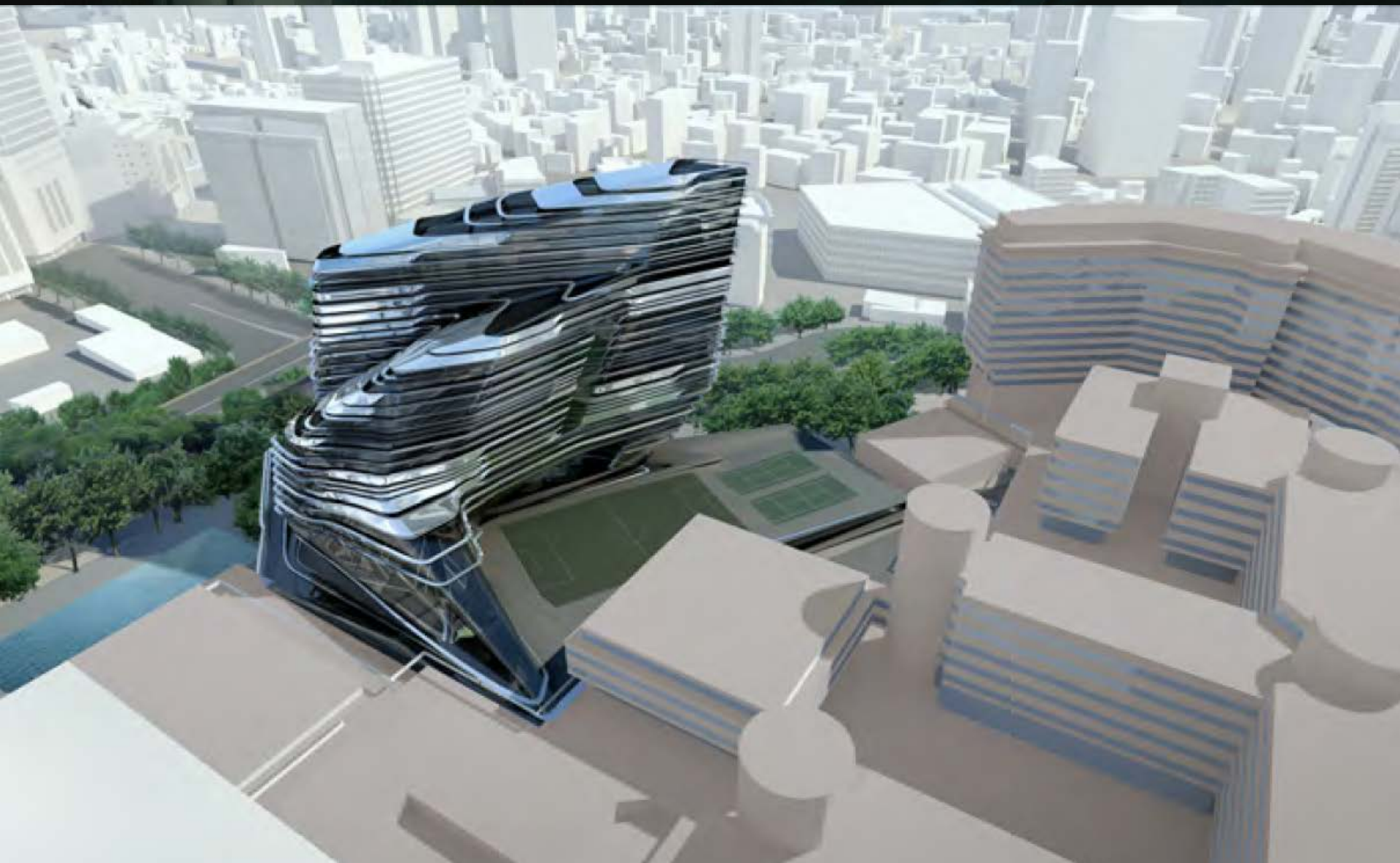
DRAWING NO. 810A/T/WKT/AAT/A67/180

N

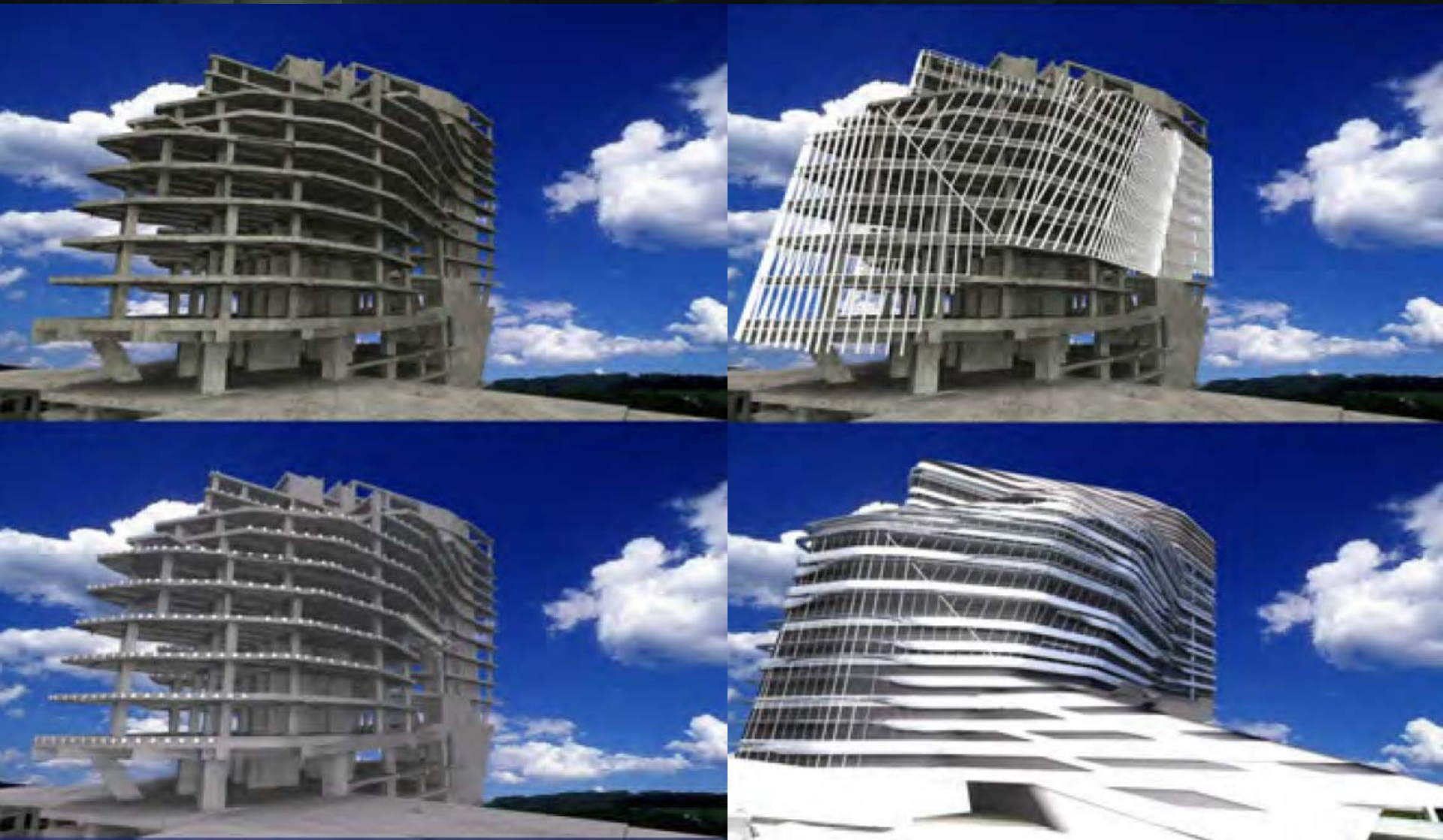
PLOTTED: 6/4/2010 3:30:16 PM
PRINTED BY:
PLOT DRIVE:
FILENAME:



HONG KONG POLYTECHNIC UNIVERSITY



HONG KONG POLYTECHNIC UNIVERSITY



The Real Estate Cash Flow-25 years

- Setting realistic expectations of BIM from the facility maintenance operation team's perspectives.

Virtual Asset

Physical Asset

Physical Asset

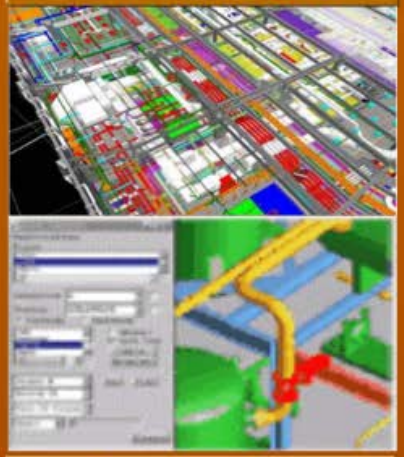
Virtual Asset

As-built BIM Field Checking






As-Built Data

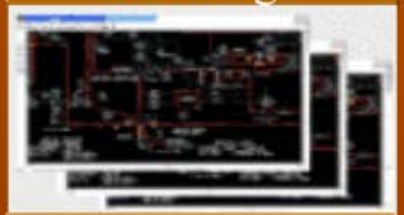


Inspection Data

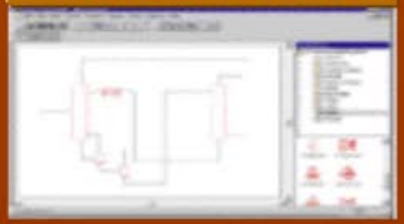
Operation (DCS/PI)

Virtual Asset Portal

Engineering Drawings



Intelligent P&ID



FI HR CRM KM

Maintenance

Operation Safety Procedures

FACILITY MANAGEMENT

ROOM DATA SHEET

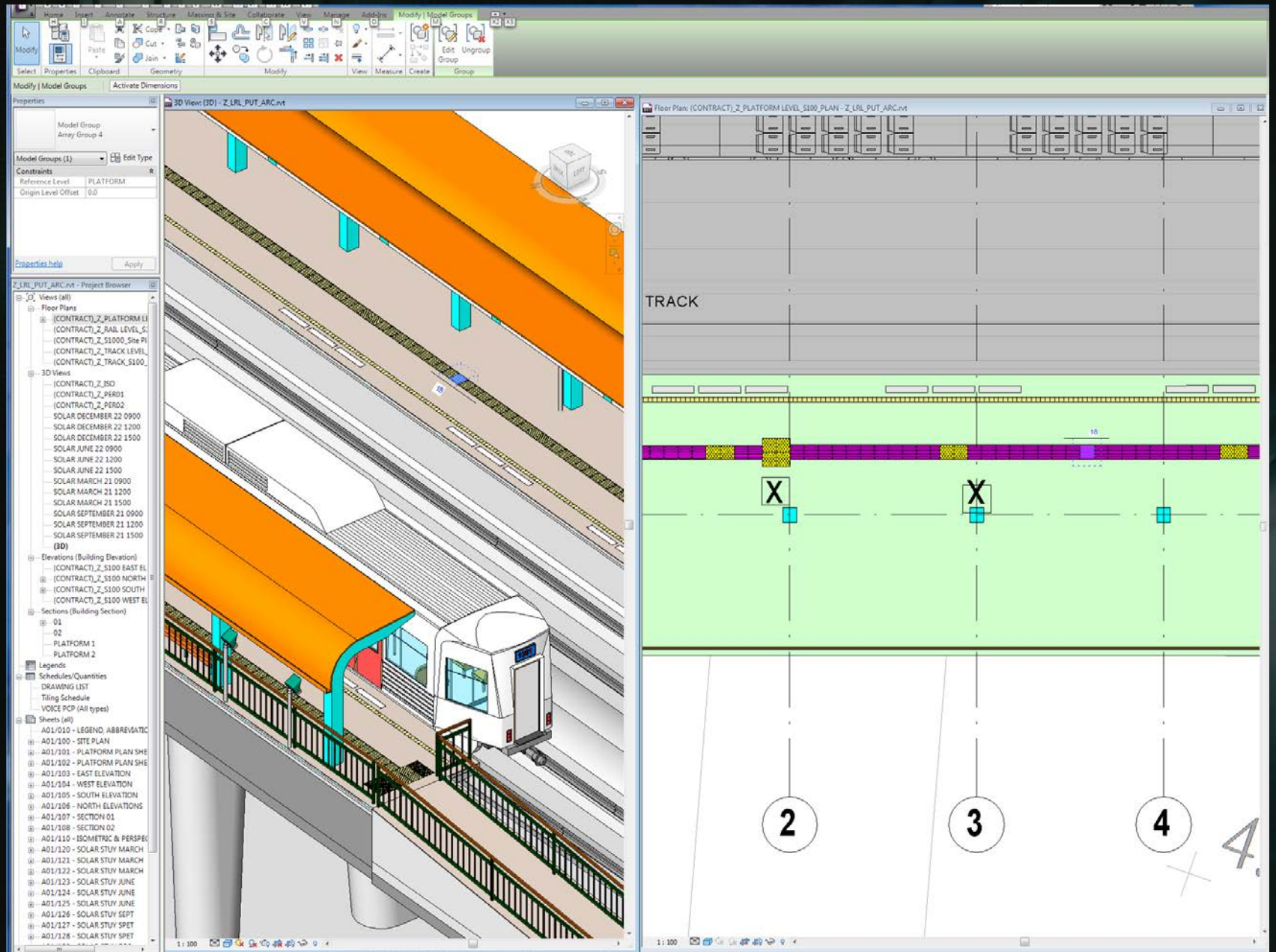
Room No. 3.3 - Cleaners' Room

Function	A room for storage of small volume of cleansing materials, tools and short stay of cleaners							
Size	15 - 20 m^2							
Occupants	3-5 persons							
Location	Non-public area							
Fire Rating	# In accordance with Fire Safety Standard for KTL/TWL/ISL Stations - S/ARC/PD/005							
Security Level	Low							
Finish	**Floor**		**Skirting**		**Wall**		**Ceiling**	
	Vitrified ceramic tiles, 150x150x8, on c/s screed - "Pilkington Dorset, colour Dark Grey" or equal approved; on liquid-applied waterproof membrane - "Lacticrete 9235 with fabric reinforcement" or equal approved		Coved ceramic tiles, 150x150x8, on c/s backing - "Pilkington Dorset, colour Dark Grey", or equal approved; on liquid-applied waterproof membrane - "Lacticrete 9235 with fabric reinforcement" or equal approved		Glazed ceramic tiles, 150x150x6.5, on c/s backing - "Pilkington Architectural Colours, colour Vellum White" or equal approved; Durable paint on c/s render above 2100 high - "Alphadecor, colour 9010 White" or equal approved		Durable paint on fairface concrete - "Alphadecor, colour 9010 White" or equal approved	
Door Set	**Size**	**Fire Rating**	**Acting**	**Frame**	**Inside Finish**	**Outside Finish**	**Air Resistance**	**Others**
	900 x 2100 mm	# (see above)	Swing In 90°	Painted/ S/S *	Painted/ S/S *	Painted/ S/S *	N/A	Durable kickplate to u/s of push plate
Ironmongery	**Lock Set**	**Security Level**	**Access Card**		**Remote Control**	**Inside Handle**	**Outside Handle**	**Accessories**
			Inside	**Outside**				
	Night Latch	Low	No	No	No	Lever handle on back plate	Pull handle on back plate	Door closer, door stop
Signage	Door Plate (supply by Ops)							
Environment	**Temperature**	**Ventilation**	**Humidity**			**Acoustic**	**Thermal**	
	24 °C A/C	N/A	50% ± 10%			NC 50	---	
Lighting	**Normal Illuminance**	**Emergency Illuminance**	**Type**			**Diffusers**	**Source**	
	300 Lux	10 Lux	Fluorescent, surface mounted			---	Direct	
Fire	**Detection**		**Suppression**			**Extinguisher**	**Smoke Extraction**	
	Smoke Detectors		N/A			Relocate existing	---	
Plumbing & Drainage	**Water Supply**					**Drainage**		
	Yes					Yes + Floor drain		
E & M, C & C	**Equipment**		**Socket Type**			**Socket No. / Location**	**Communications**	
	PABX (no outside call feature)		RJ11 provided by in-house C&C			1 / At 1440mm AFFL	Telephone wire to MTRC distribution box	
	General		Twin 13A			2 / Skirting level	---	
Fixtures & Furniture	Slop sink connect to foul drainage, storage cabinets, lockers, vacuum cleaner, table and chair.							
Others	---							

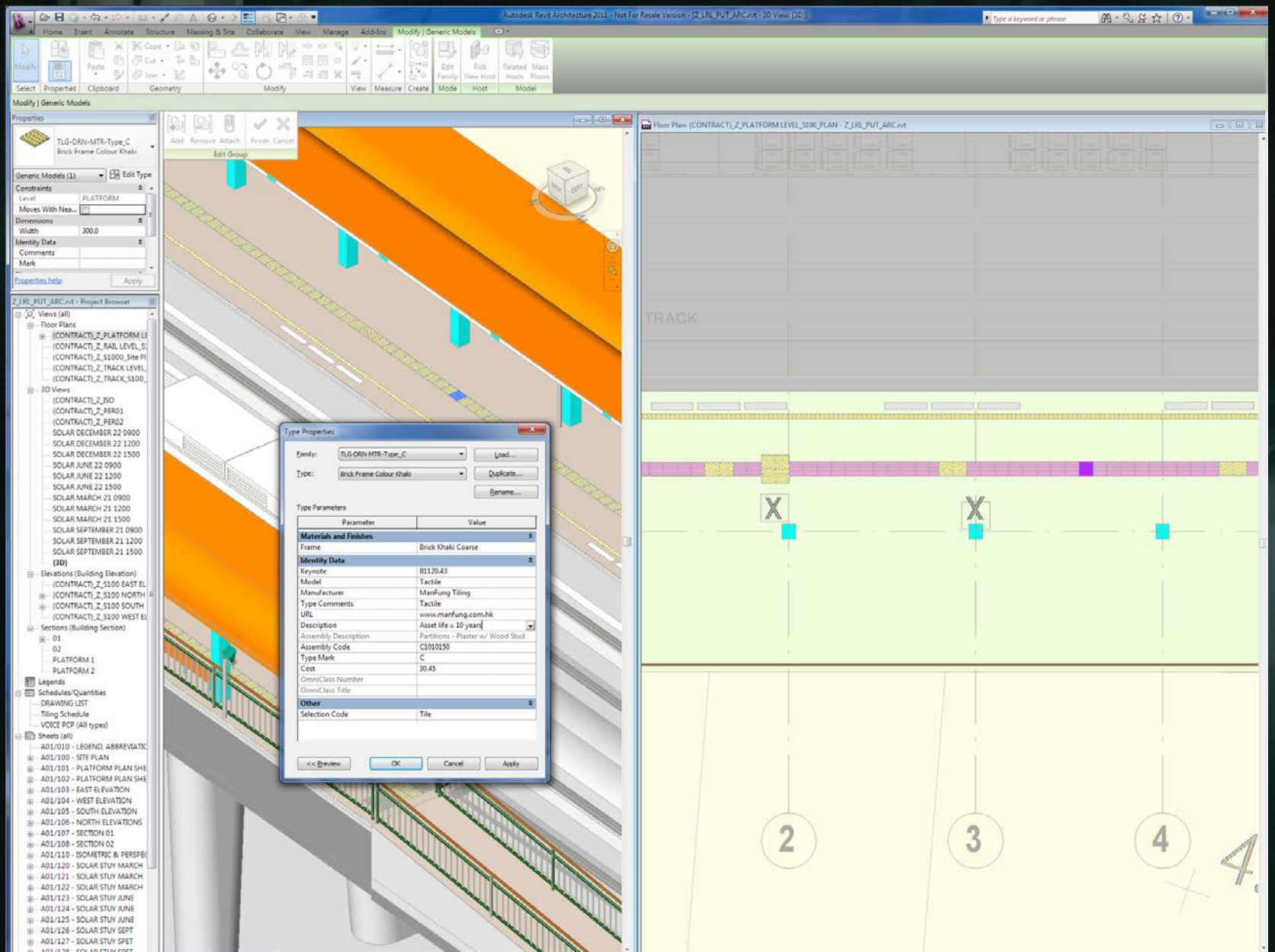
Revision D

* Dependent on location - stainless steel door to be used when facing public areas.
- painted doors to be used when facing BofH areas.

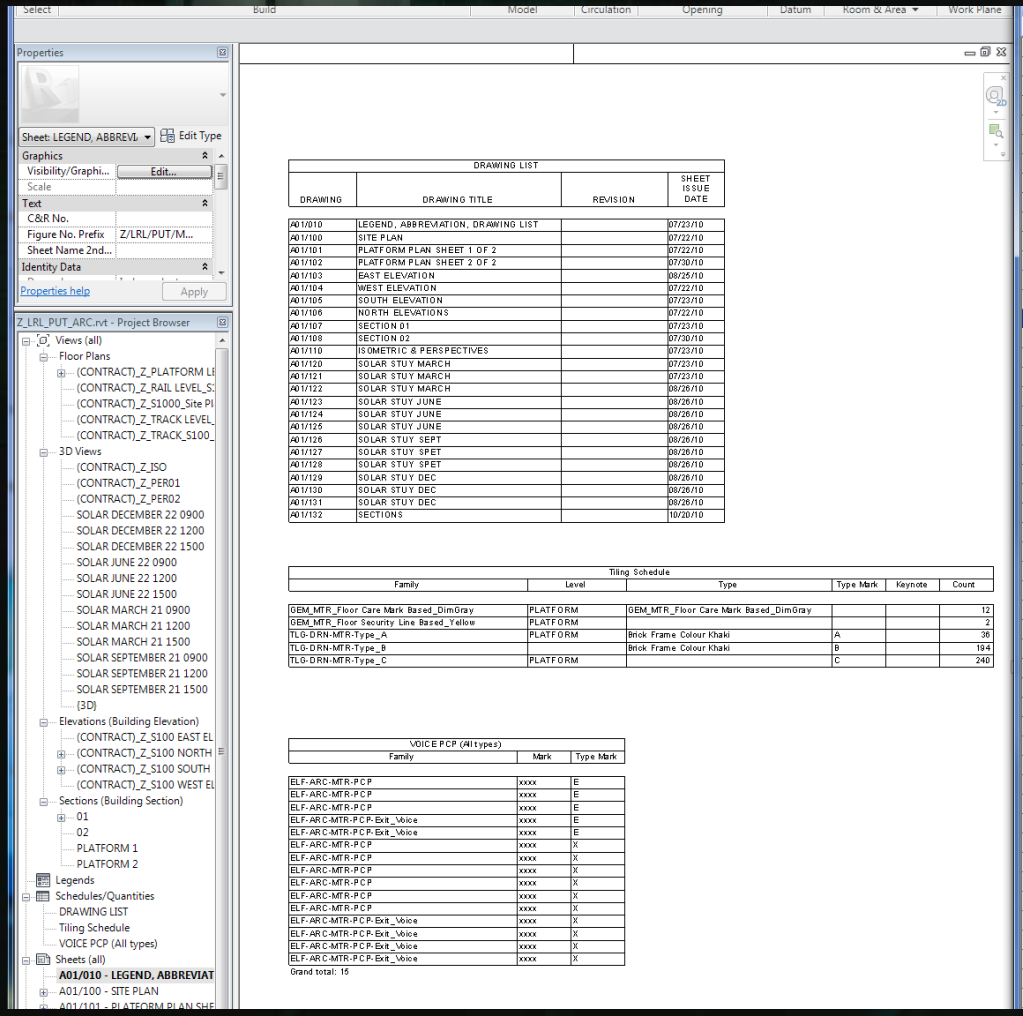
AS BUILT BIM MODEL DEMONSTRATION



AS BUILT BIM MODEL



AS BUILT BIM MODEL



Properties

Sheet: LEGEND, ABBREVI

Edit Type

Graphics

Visibility/Graphi... Edit...

Scale

Text

C&R No.

Figure No. Prefix Z/LRL/PUT/M...

Sheet Name 2nd...

Identity Data

Properties help

Apply

Z_LRL_PUT_ARC.rvt - Project Browser

- Views (all)
  - Floor Plans
    - (CONTRACT)_Z_PLATFORM LE
    - (CONTRACT)_Z_RAIL LEVEL_S
    - (CONTRACT)_Z_S1000_Site Pl
    - (CONTRACT)_Z_TRACK LEVEL_
    - (CONTRACT)_Z_TRACK_S100_
  - 3D Views
    - (CONTRACT)_Z_ISO
    - (CONTRACT)_Z_PER01
    - (CONTRACT)_Z_PER02
    - SOLAR DECEMBER 22 0900
    - SOLAR DECEMBER 22 1200
    - SOLAR DECEMBER 22 1500
    - SOLAR JUNE 22 0900
    - SOLAR JUNE 22 1200
    - SOLAR JUNE 22 1500
    - SOLAR MARCH 21 0900
    - SOLAR MARCH 21 1200
    - SOLAR MARCH 21 1500
    - SOLAR SEPTEMBER 21 0900
    - SOLAR SEPTEMBER 21 1200
    - SOLAR SEPTEMBER 21 1500
    - {3D}
  - Elevations (Building Elevation)
    - (CONTRACT)_Z_S100 EAST EL
    - (CONTRACT)_Z_S100 NORTH
    - (CONTRACT)_Z_S100 SOUTH
    - (CONTRACT)_Z_S100 WEST EL
  - Sections (Building Section)
    - 01
    - 02
    - PLATFORM 1
    - PLATFORM 2
- Legends
- Schedules/Quantities
  - DRAWING LIST
  - Tiling Schedule
  - VOICE PCP (All types)
- Sheets (all)
  - **A01/010 - LEGEND, ABBREVIAT**
  - A01/100 - SITE PLAN
  - A01/101 - PLATFORM PLAN SHE

DRAWING LIST

DRAWING	DRAWING TITLE	REVISION	SHEET ISSUE DATE
A01/010	LEGEND, ABBREVIATION, DRAWING LIST		07/23/10
A01/100	SITE PLAN		07/22/10
A01/101	PLATFORM PLAN SHEET 1 OF 2		07/22/10
A01/102	PLATFORM PLAN SHEET 2 OF 2		07/30/10
A01/103	EAST ELEVATION		08/25/10
A01/104	WEST ELEVATION		07/22/10
A01/105	SOUTH ELEVATION		07/23/10
A01/106	NORTH ELEVATIONS		07/22/10
A01/107	SECTION 01		07/23/10
A01/108	SECTION 02		07/30/10
A01/110	ISOMETRIC & PERSPECTIVES		07/23/10
A01/120	SOLAR STUY MARCH		07/23/10
A01/121	SOLAR STUY MARCH		07/23/10
A01/122	SOLAR STUY MARCH		08/26/10
A01/123	SOLAR STUY JUNE		08/26/10
A01/124	SOLAR STUY JUNE		08/26/10
A01/125	SOLAR STUY JUNE		08/26/10
A01/126	SOLAR STUY SEPT		08/26/10
A01/127	SOLAR STUY SPET		08/26/10
A01/128	SOLAR STUY SPET		08/26/10
A01/129	SOLAR STUY DEC		08/26/10
A01/130	SOLAR STUY DEC		08/26/10
A01/131	SOLAR STUY DEC		08/26/10
A01/132	SECTIONS		10/20/10

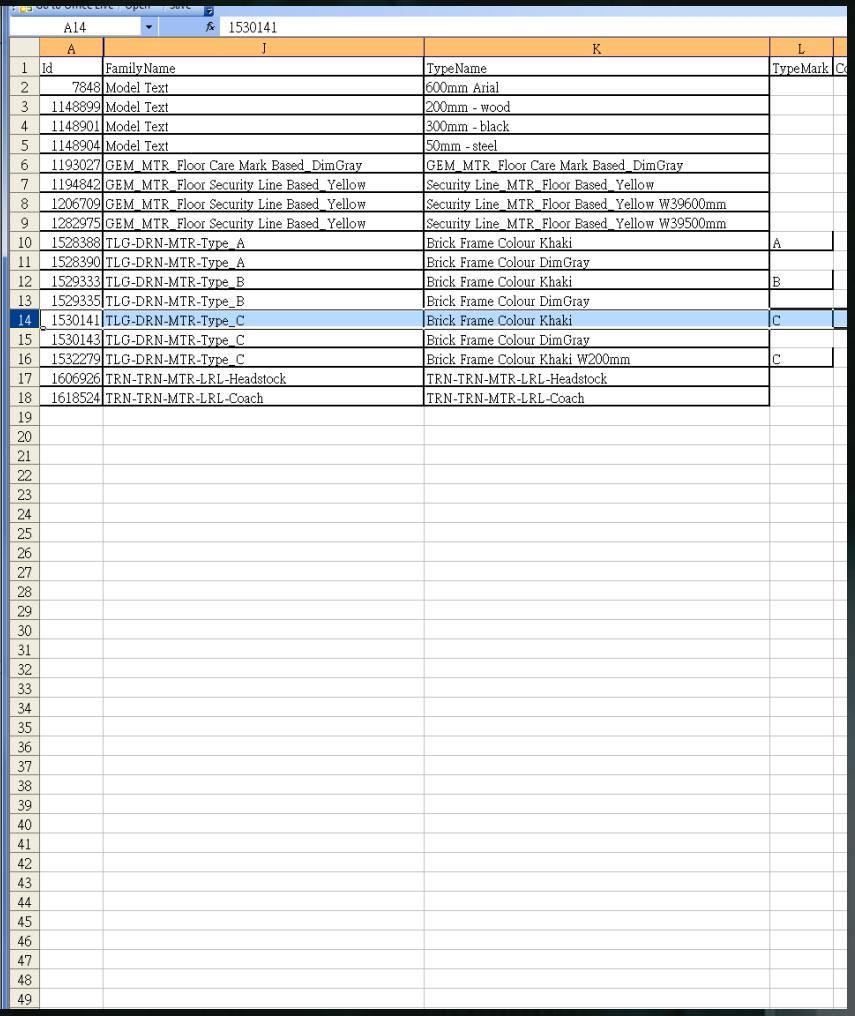
Tiling Schedule

Family	Level	Type	Type Mark	Keynote	Count
GEM_MTR_Floor Care Mark Based_DimGray	PLATFORM	GEM_MTR_Floor Care Mark Based_DimGray			12
GEM_MTR_Floor Security Line Based_Yellow	PLATFORM				2
TLG-DRN-MTR-Type_A	PLATFORM	Brick Frame Colour Khaki	A		36
TLG-DRN-MTR-Type_B		Brick Frame Colour Khaki	B		194
TLG-DRN-MTR-Type_C	PLATFORM		C		240

VOICE PCP (All types)

Family	Mark	Type Mark
ELF-ARC-MTR-PCP	xxxx	E
ELF-ARC-MTR-PCP	xxxx	E
ELF-ARC-MTR-PCP	xxxx	E
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	E
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	E
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X

Grand total: 15



A14 1530141

	A	J	K	L
1	Id	FamilyName	TypeName	TypeMark
2	7848	Model Text	600mm Arial	
3	1148899	Model Text	200mm - wood	
4	1148901	Model Text	300mm - black	
5	1148904	Model Text	50mm - steel	
6	1193027	GEM_MTR_Floor Care Mark Based_DimGray	GEM_MTR_Floor Care Mark Based_DimGray	
7	1194842	GEM_MTR_Floor Security Line Based_Yellow	Security Line_MTR_Floor Based_Yellow	
8	1206709	GEM_MTR_Floor Security Line Based_Yellow	Security Line_MTR_Floor Based_Yellow W39600mm	
9	1282975	GEM_MTR_Floor Security Line Based_Yellow	Security Line_MTR_Floor Based_Yellow W39500mm	
10	1528388	TLG-DRN-MTR-Type_A	Brick Frame Colour Khaki	A
11	1528390	TLG-DRN-MTR-Type_A	Brick Frame Colour DimGray	
12	1529333	TLG-DRN-MTR-Type_B	Brick Frame Colour Khaki	B
13	1529335	TLG-DRN-MTR-Type_B	Brick Frame Colour DimGray	
14	1530141	TLG-DRN-MTR-Type_C	Brick Frame Colour Khaki	C
15	1530143	TLG-DRN-MTR-Type_C	Brick Frame Colour DimGray	
16	1532279	TLG-DRN-MTR-Type_C	Brick Frame Colour Khaki W200mm	C
17	1606926	TRN-TRN-MTR-LRL-Headstock	TRN-TRN-MTR-LRL-Headstock	
18	1618524	TRN-TRN-MTR-LRL-Coach	TRN-TRN-MTR-LRL-Coach	
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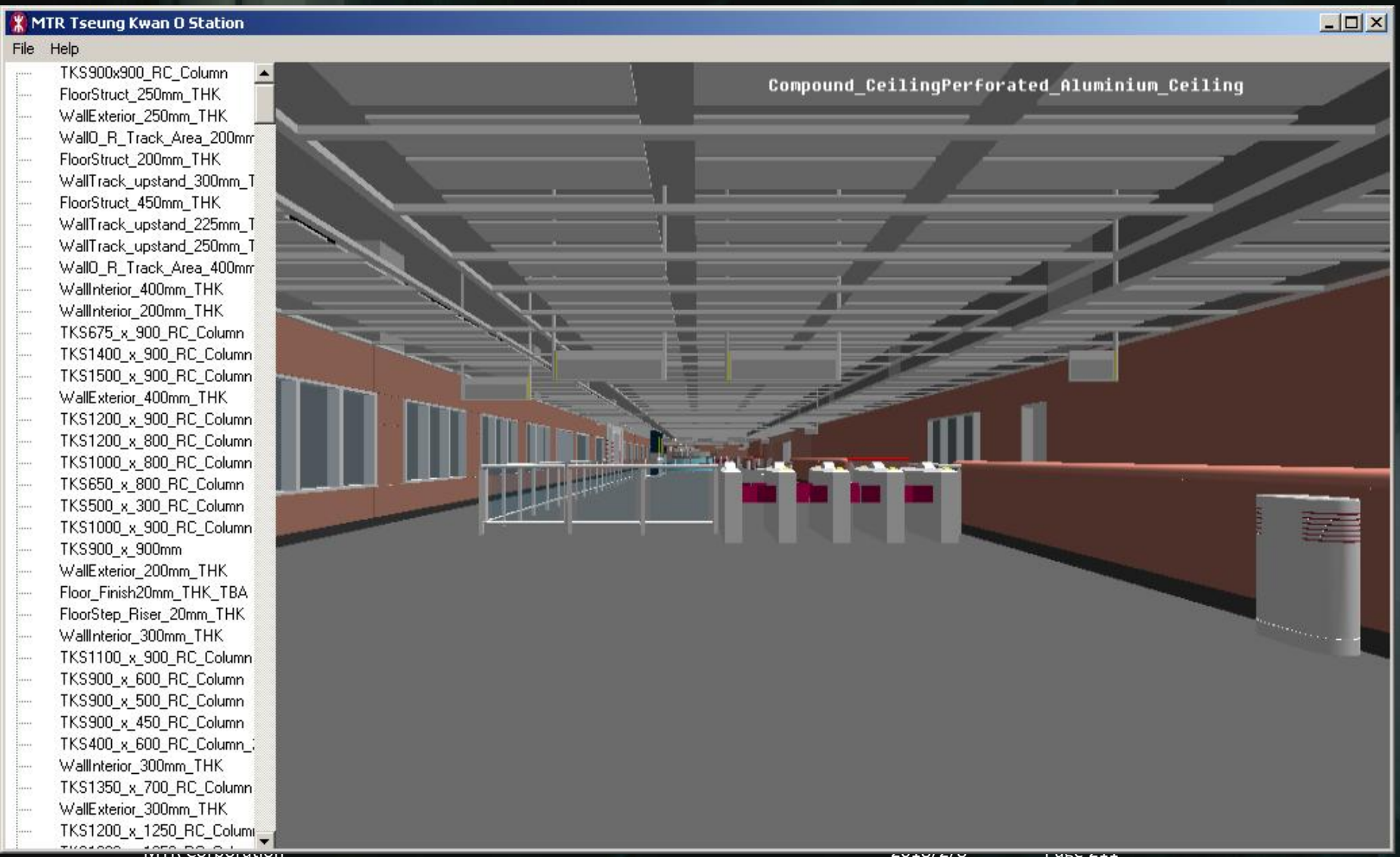
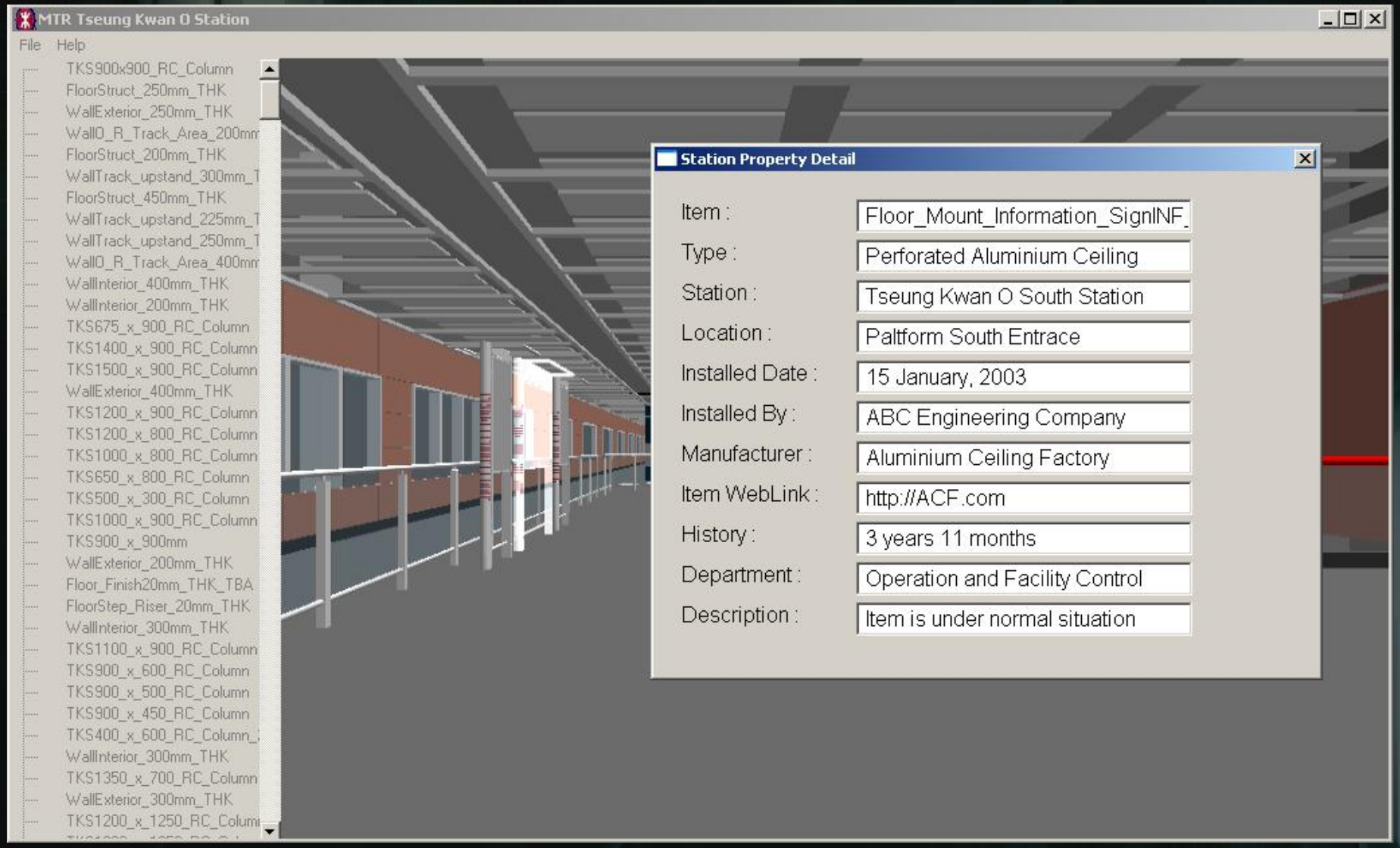
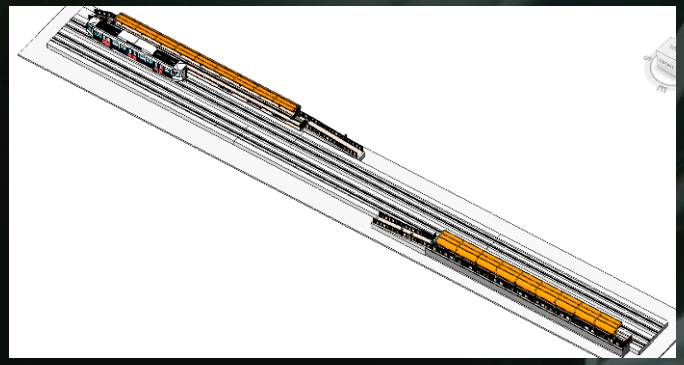
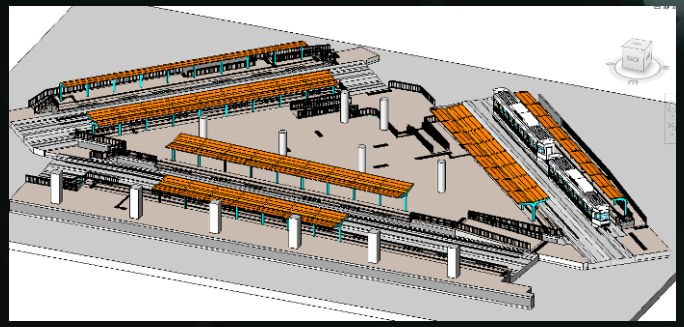

MTR Tseung Kwan O Station
File
Help
TKS900x900_RC_Column
FloorStruct_250mm_THK
WallExterior_250mm_THK
WallO_R_Track_Area_200mm
FloorStruct_200mm_THK
WallTrack_upstand_300mm_T
FloorStruct_450mm_THK
WallTrack_upstand_225mm_T
WallTrack_upstand_250mm_T
WallO_R_Track_Area_400mm
WallInterior_400mm_THK
WallInterior_200mm_THK
TKS675_x_900_RC_Column
TKS1400_x_900_RC_Column
TKS1500_x_900_RC_Column
WallExterior_400mm_THK
TKS1200_x_900_RC_Column
TKS1200_x_800_RC_Column
TKS1000_x_800_RC_Column
TKS650_x_800_RC_Column
TKS500_x_300_RC_Column
TKS1000_x_900_RC_Column
TKS900_x_900mm
WallExterior_200mm_THK
Floor_Finish20mm_THK_TBA
FloorStep_Riser_20mm_THK
WallInterior_300mm_THK
TKS1100_x_900_RC_Column
TKS900_x_600_RC_Column
TKS900_x_500_RC_Column
TKS900_x_450_RC_Column
TKS400_x_600_RC_Column_
WallInterior_300mm_THK
TKS1350_x_700_RC_Column
WallExterior_300mm_THK
TKS1200_x_1250_RC_Colum
Compound_CeilingPerforated_Aluminium_Ceiling

BIM FACILITY MANGEMENT



FACILITY MANAGEMENT ACROSS PROJECTS





MEGA DATABASE

APPLICATION

APPLICATION

APPLICATION

E.G.
REPLACEMENT PROGRAM

“十二五”建筑业信息化发展纲要

（一）总体目标

“十二五”期间，基本实现建筑企业信息系统的普及应用，加快建筑信息模型（BIM）、基于网络的协同工作等新技术在工程中的应用，推动信息化标准建设，促进具有自主知识产权软件的产业化，形成一批信息技术应用达到国际先进水平的建筑企业。

住房和城乡建设部 **10/5/2011**

http://www.c-bm.com/news/2011/5-19/B16543600.shtml

BEYOND BIM

VTT TECHNICAL RESEARCH CENTRE OF FINLAND

Building & Construction

ARScaleModel

ARWebCam

ARPhone

ARonPDA

Google Earth
"on Earth"

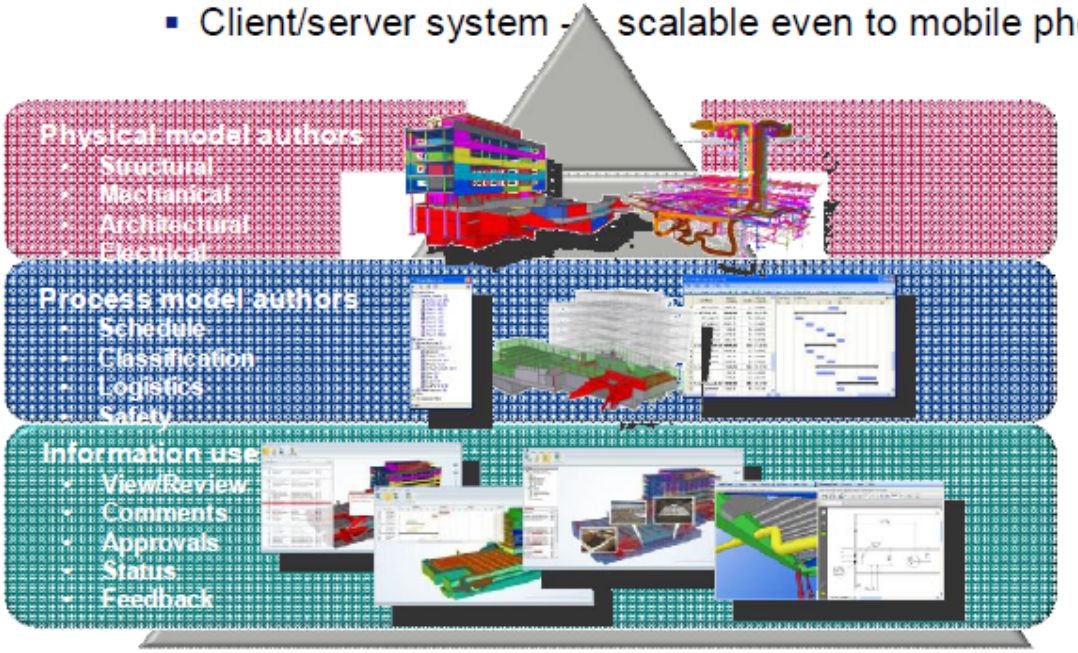
AROnSite

VTT

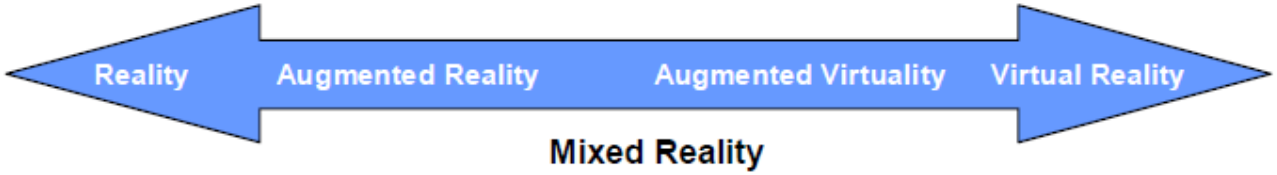
Project "AR4BC"

Augmented Reality for Building and Construction

- Compare project plans (4D BIM) with situation on site
- Provide real time mobile feedback from site to BIM system
- Client/server system - scalable even to mobile phones



Building Information Models (BIM)

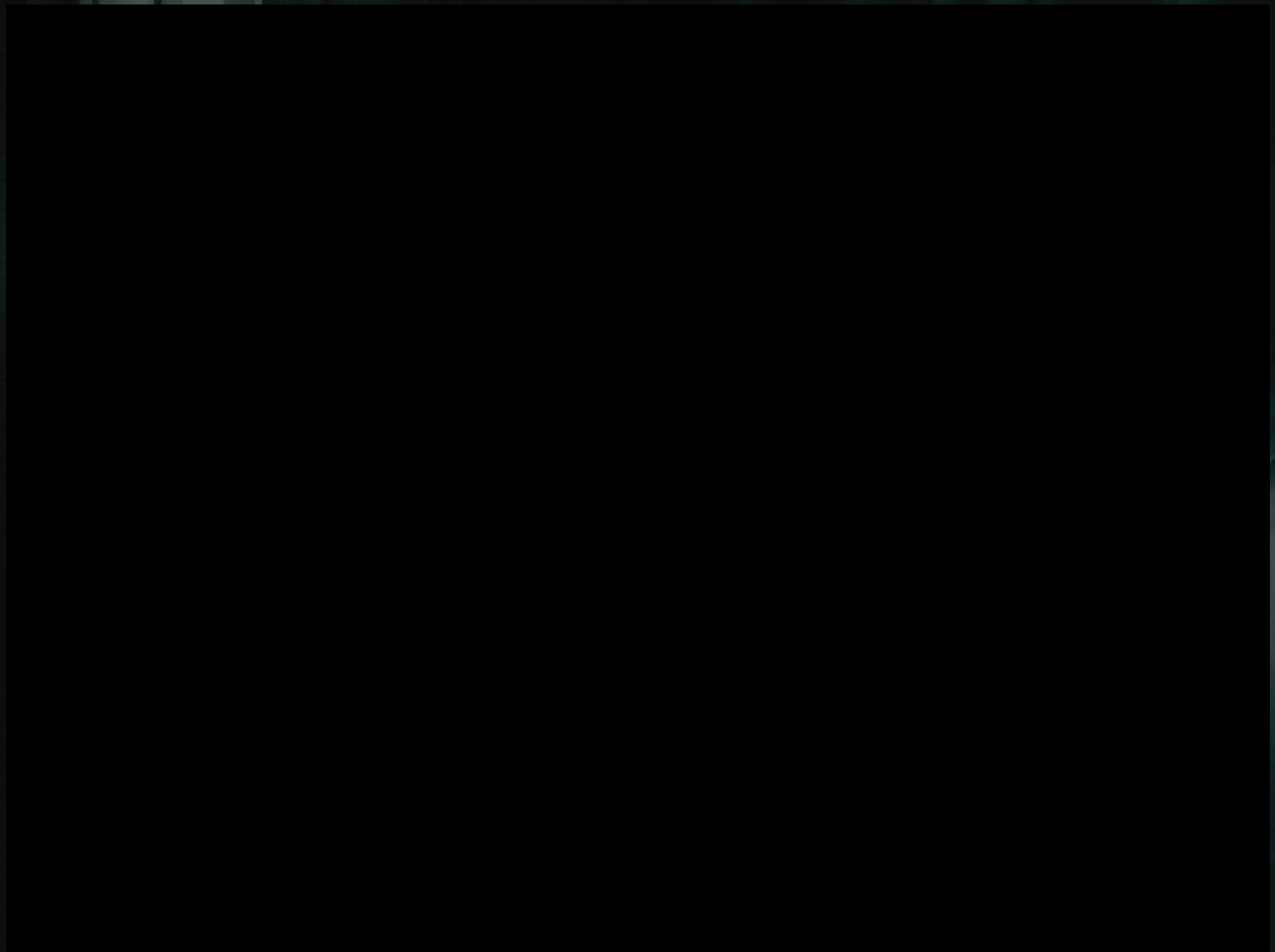



atelier


TOTAL IMMERSION
TOTAL
IMMERSION


TOTAL
IMMERSION

Hardware + BIM + CLOUD + AR



Hardware + BIM + CLOUD + AR


THANK YOU