



BIM Applications in Practice

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デービッド・ファン シニア・アソシエート、BIM部長

Aedas Ltd

www.aedas.com



Leaders in use of BIM Technology

Aedas

[promotion]

Voices of Revolution

In *hinge* Vol 144, you read about Building Information Modeling (BIM), a revolutionary new approach for the architectural, engineering and construction industries. Autodesk, a leading software company, has developed several software packages that support this approach – the most recent iteration being the Revit 2008 series. In July, the firm held an awards ceremony honouring four Hong Kong industrial players for their excellence in BIM usage. They are Aedas, Henderson Development Co Ltd, the Hong Kong Polytechnic University and New World Development Co Ltd. Here we talk to the four honourees about their experiences with BIM.



A E D A S



Agnes Ng, Aedas' Managing Director and David Fung, Senior Associate and Head of BIM Division reveal how they have been pushing BIM in their company and the industry at large, and how BIM will change the quality of architecture.

hinge: So Aedas has a BIM division. When was it established? What was your role in its establishment?
David Fung: It was established about four years ago and I was the one who initiated it. We had known about this technology for quite a while before it was implemented by the industry. I saw a lot of potential in this technology in terms of efficiency and creativity. To begin with we concentrated BIM usage on our own architectural practice. Later we extended its use to our sub-consultants including the structural engineers and quantity surveyors. We required them to follow our architectural model when producing theirs. In essence this

worked out the work flow as a whole industry. Because of these meetings, we were able to generate many new ideas. And there has been a ripple effect. Now academics, building owners and even contractors are using BIM.

h: What percentage of Aedas' projects use BIM?

AN: The percentage is not very high at the moment. But the interesting thing is that there is no turning back for anyone who has used Revit. For them it's the best way forward.

DF: My team is currently working on the City University project in

h: This certainly sets a precedent for more geometrically-complex buildings.
DF: Definitely.

AN: The introduction of this kind of methodology influences the architectural design. There is a paradigm shift; we no longer think in plans, sections and elevations but in three dimensional models.

h: Has this technology given you an edge in competitions?

DF: Certainly. We can work more efficiently and resolve more problems than our competitors. BIM also gives us an edge when it



HENDERSON LAND DEVELOPMENT CO LTD

Thanks to Assistant General Manager of the Project Management Department of Henderson Land Development Co Ltd, and to the Project Manager of this department, we as Henderson Land Development Co Ltd are proud to be one of the winners of the Financial Times Building of the Year 2008 award. A testament of Aedas' design and the benefits they have experienced with this approach.

1. The building is a landmark in the Hong Kong skyline. It is a testament of Aedas' design and the benefits they have experienced with this approach.

2. The building is a landmark in the Hong Kong skyline. It is a testament of Aedas' design and the benefits they have experienced with this approach.

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hinge

DESIGN IN STORE...

NEW LOOKS IN RETAIL

Glazing... Steve Wall Lightening... Smeaton... Redman Zuck with... Smashing... Cecil Edmund Brown Woods

Leaders in use of BIM Technology

Aedas

BIM

Building Information Modeling

A New Chapter of Building Industry



香港
Hong Kong

Autodesk



AUTODESK INDUSTRY ADVISORY BOARD (AIAB) — THE 1ST BIM USER GROUP

On April 2005, a group of Revit users found that there was a need to form a user group to promote the development, usage and awareness of BIM design technology in HK. Therefore, The Autodesk Industry Advisory Board (AIAB) was founded. Through seminars and technology exchange conferences organized by AIAB, the use of the BIM technology in Hong Kong is getting more and more popular.

BIM is one of the keys to the future success of the Hong Kong AEC industry. The benefits are huge and some of the key players in the industry are already successfully applying BIM in different projects.

The adoption of the technology is progressing rapidly. In this section, several of the well known industry leaders are displaying how BIM helped to resolve different problems in their projects.



<http://www.aiab.org>

Being Leaders in the use of BIM technology in Hong Kong, our Project Team is led by Members of the Autodesk Industry Advisory Board (AIAB)





Being Leaders in the use of
BIM technology

International
Revit Experience Award
2007 Las Vegas





Information 情報

Graphical

図面上

Plan

Section

Elevation

Area Diagrams

Schematic Designs

General Building Plan

Structural Plans

E/M Drawings

Schematics

Details

Other Diagrams...

Non-Graphical

非図面上

Area Schedule

Finishing Schedules

Door/Window/Louvre

Schedules

Beam/ Column Schedule

Equipment Schedule...

Program

Cost Estimate

Quantity Take Off

Bills of Quantities

Variation Assessments



As a result.....

Inefficiencies（低生産性）, mistakes(エラー) and delays（工期延長） account for \$200 billion of the \$650 billion spent on construction in America every year.

New wiring, The Economist, January 13th, 2000

In the UK alone, the annual cost of rectifying construction defects(デフエクト) caused by poorly detailed drawings and operatives being given incorrect instructions has been put at £1bn (≈\$1.66bn).

IT Construction Best Practice service, <http://www.itcbp.org.uk>

The process of construction is itself repeated in its essentials from project to project. Indeed, research suggests that up to 80% of inputs into buildings are repeated.

M4i, <http://www.m4i.org.uk>



Information

Graphical

CAD SYSTEMS

e.g. AutoCAD,
Microstation

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

Non-Graphical

- Area Schedule
- Word Schedules
- Door/Window/Louvre Sch
- Excel (spreadsheet)
- Beam/Column Schedule
- Access (Data Base)
- Program
- MS Project
- BQ Softwares
- Quantity Take Off
- Bills of Quantities
- Variations



Information

Graphical

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

BIM

Non-Graphical

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

Building Information Modeling

信息化建筑模型

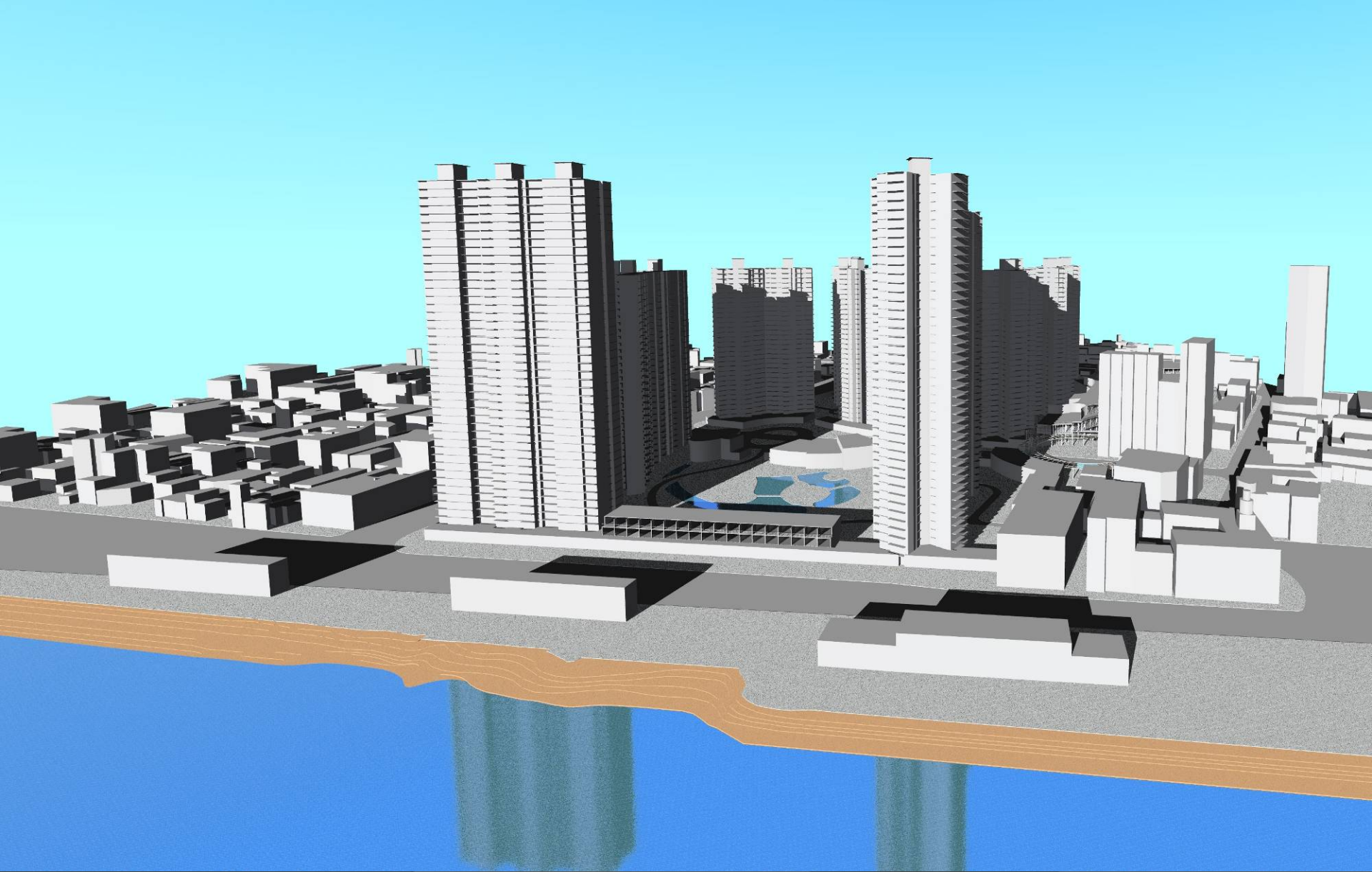
Use of Building Information Modeling (BIM)

BIMの活用

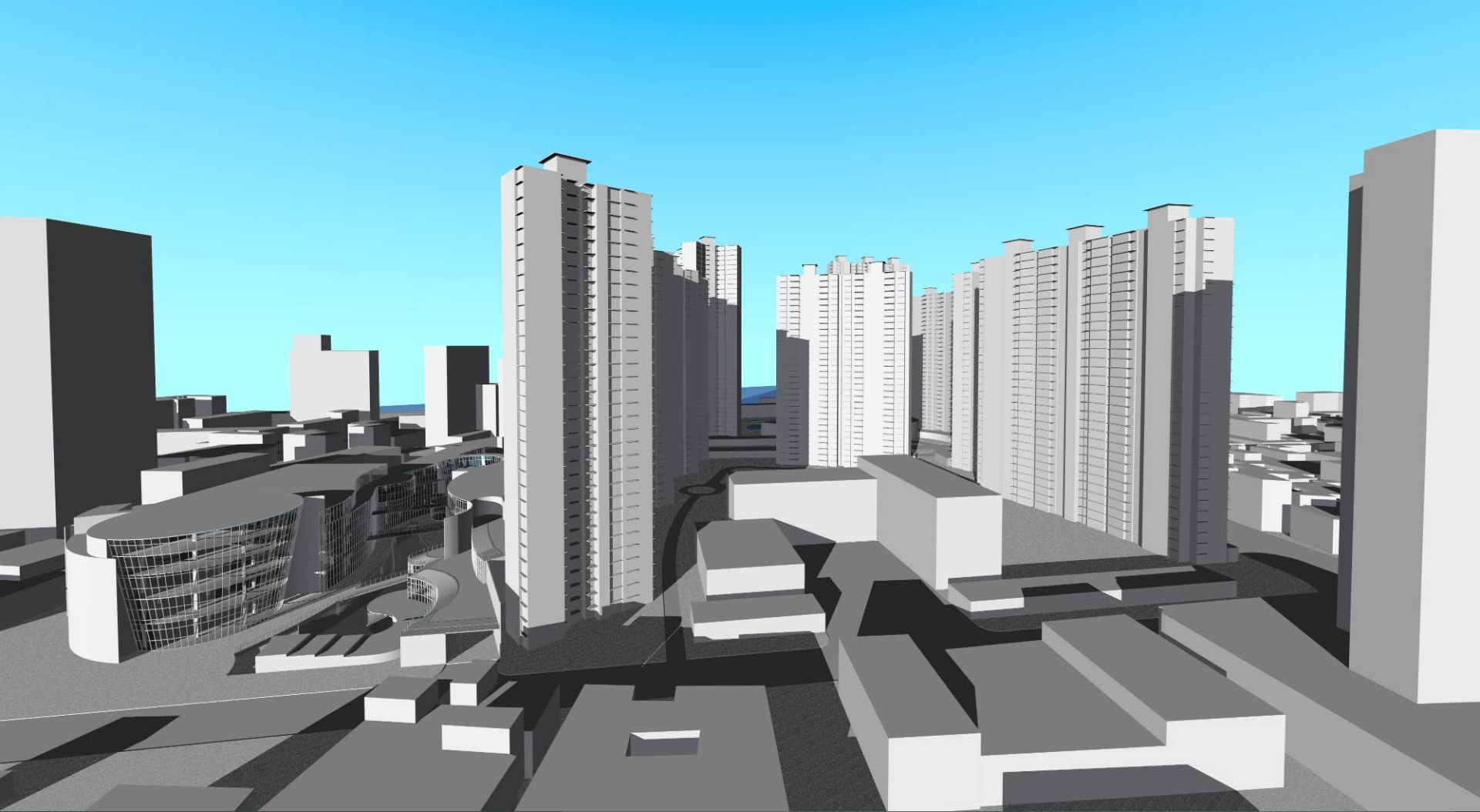
Aedas

1. **Design visualization** 設計の可視化
2. **Drawing Productions** 図面製作
3. **Services Co-ordination and Clash detection with other disciplines** 多部門との連携と干渉チェック
4. **Quantity taking and preparation of Tender Document** 数量拾い及び入札書類の作成
5. **Automated Statutory Submission** 確認申請図書作成の自動化
6. **Scientific analysis of different environmental aspects** 様々な環境解析
7. **Supply Chain Integration with the manufacturing and production** サプライヤとの連携
8. **Complex Geometry** 複雑な形状を実現可能

- 1. Design visualization** 設計の可視化
2. Drawing Productions
3. Services Co-ordination and Clash detection with other disciplines
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8. Complex Geometry



BUILDING IN CONTEXT



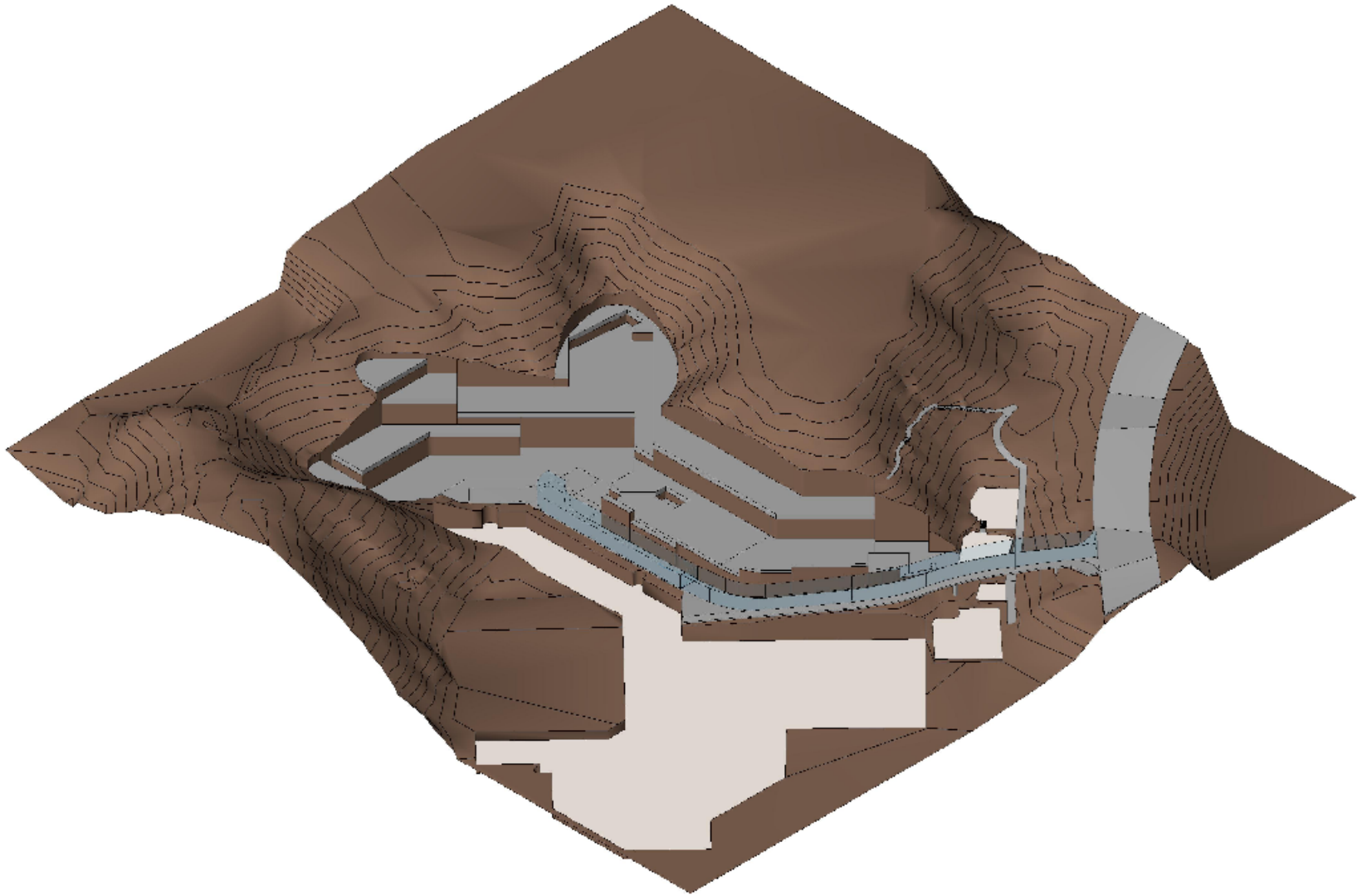
BUILDING IN CONTEXT



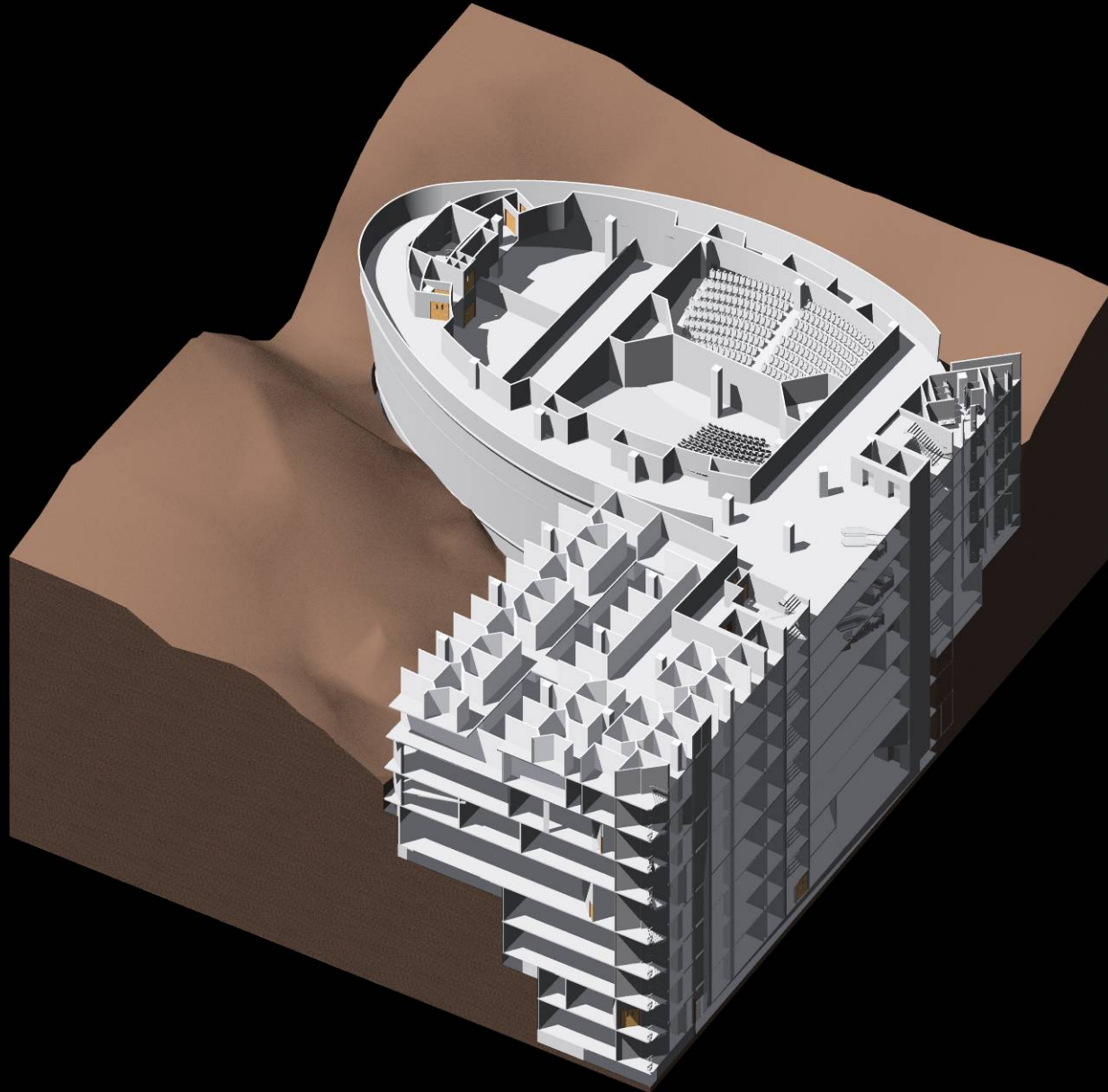
BUILDING IN GOOGLE EARTH

Aedas





TOPOGRAPHY HANDLING



BUILDING IN SITE CONTEXT





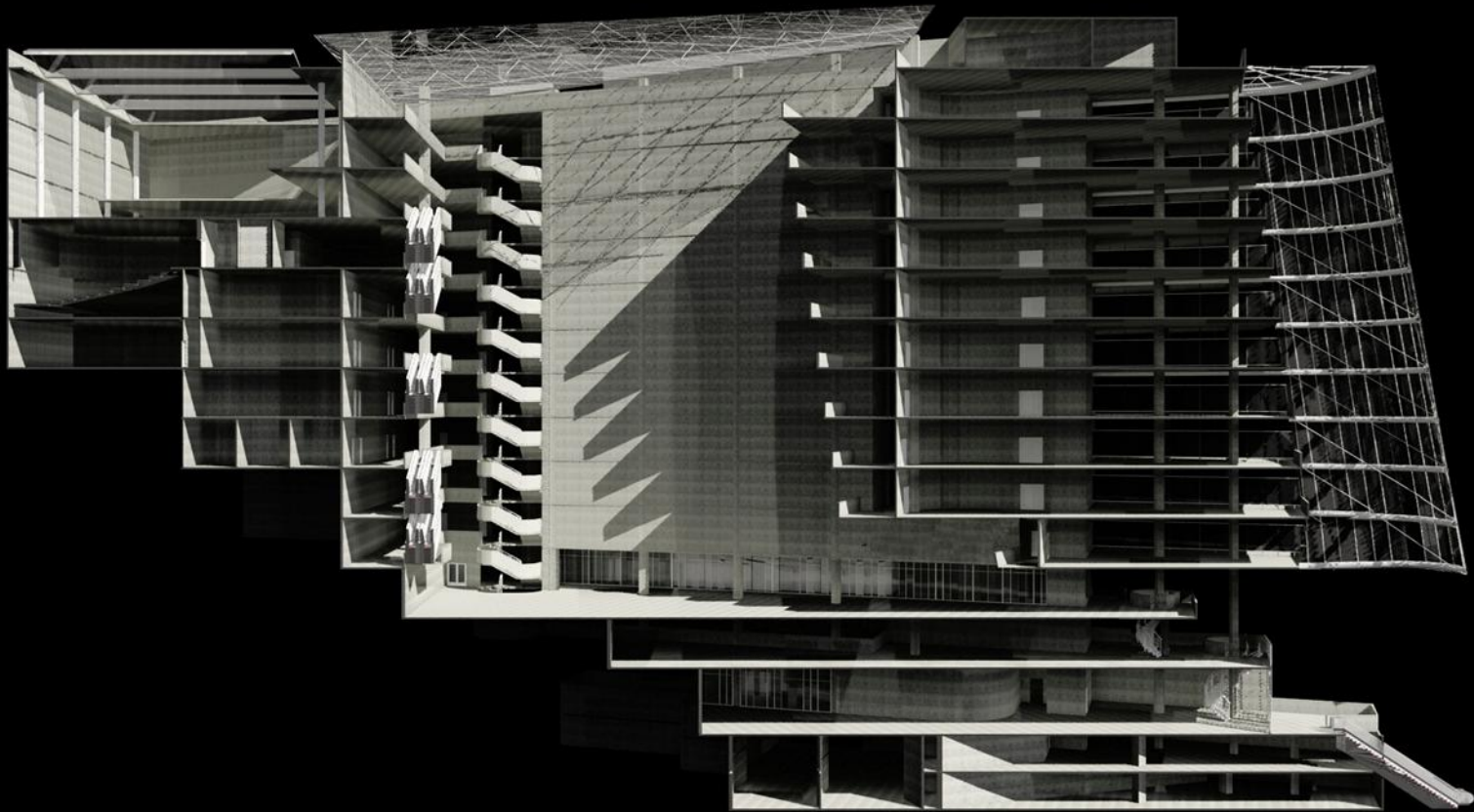




PERSPECTIVE



PERSPECTIVE



CUT AWAY PESPECTIVE







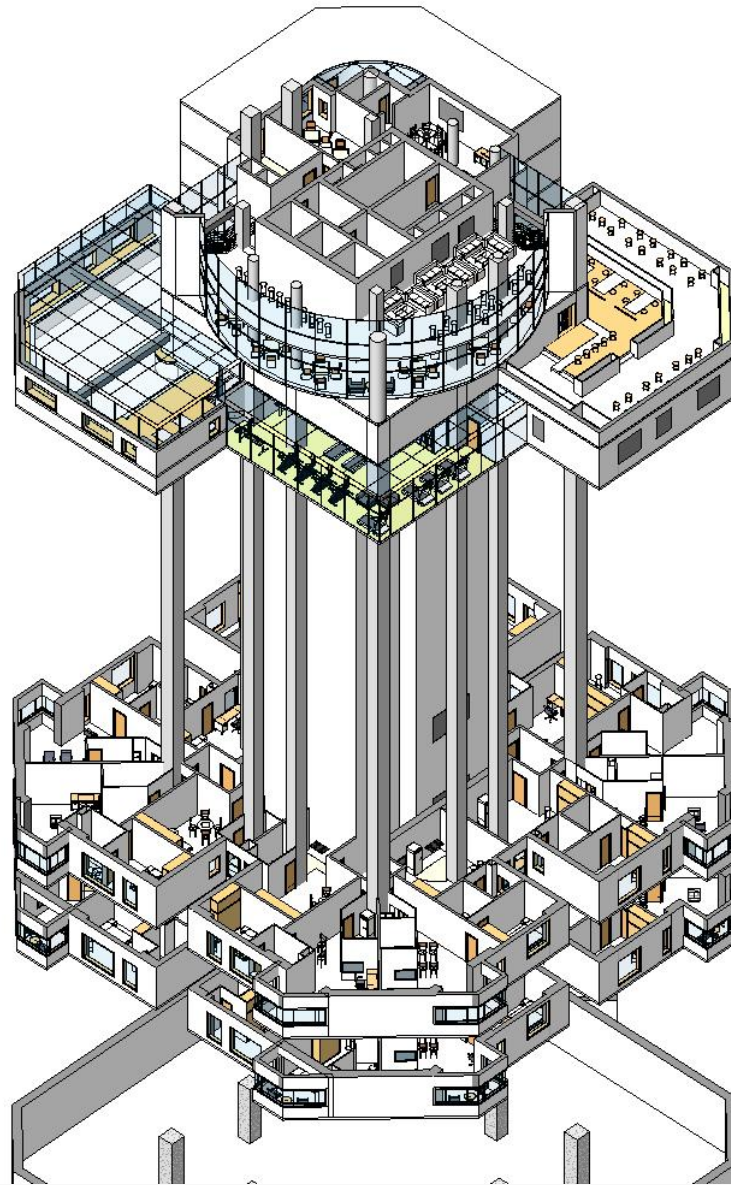




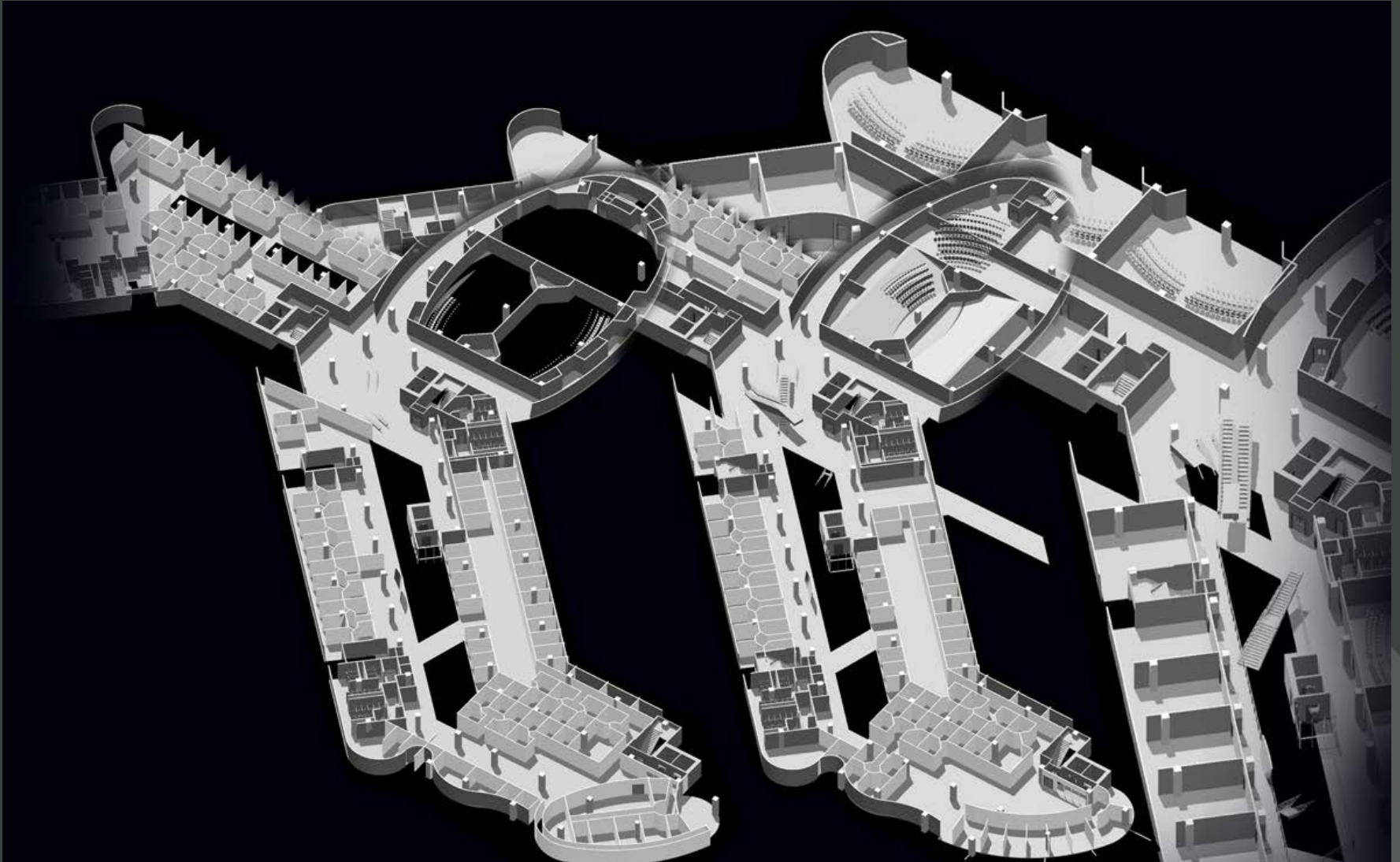
VISUALIZATION



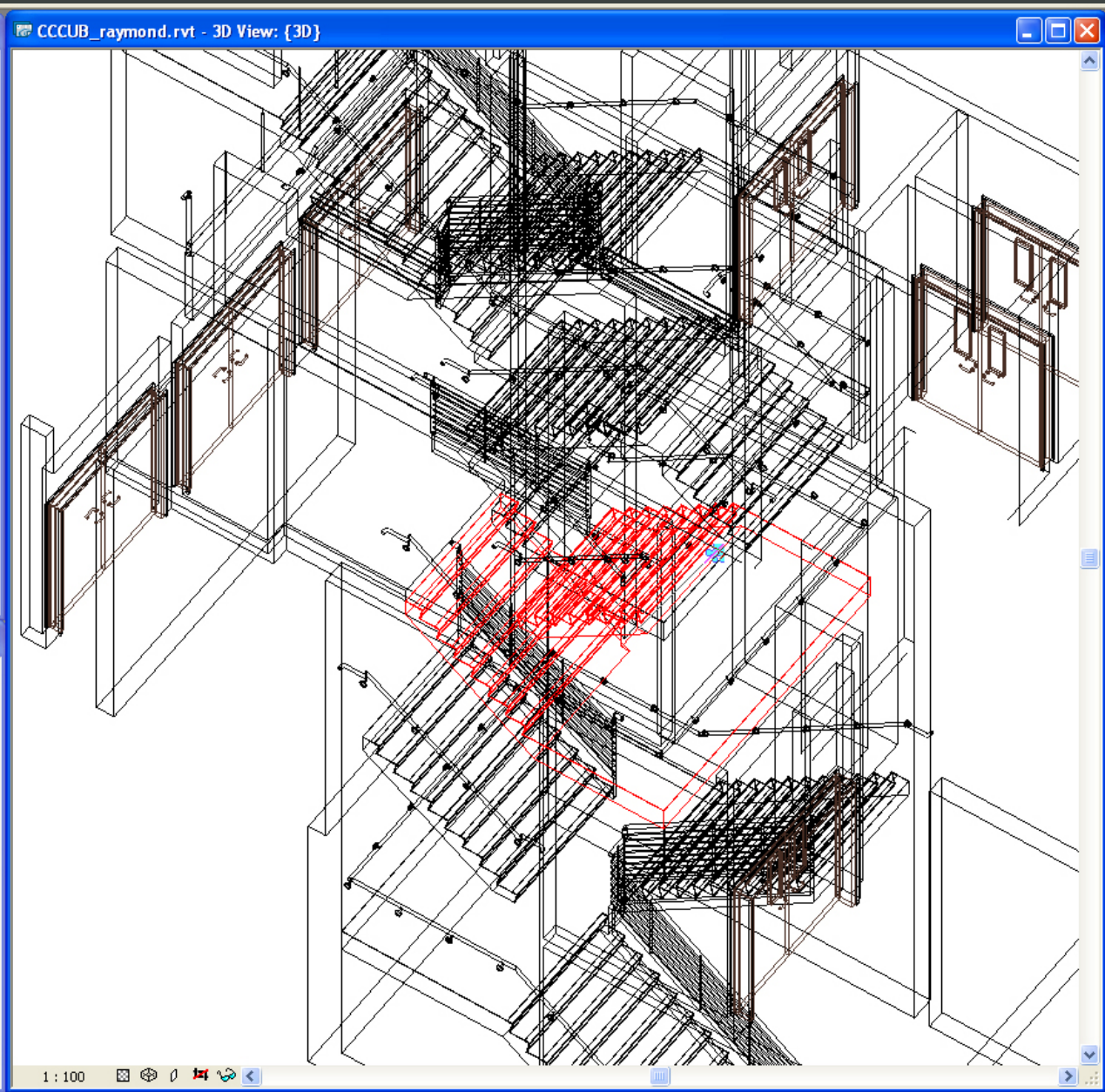
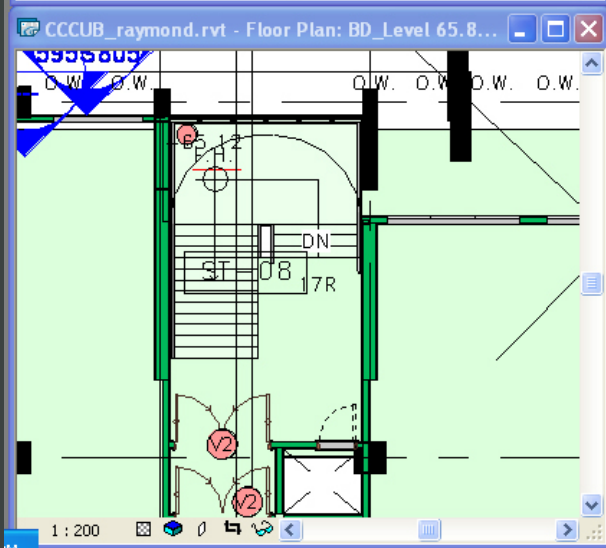
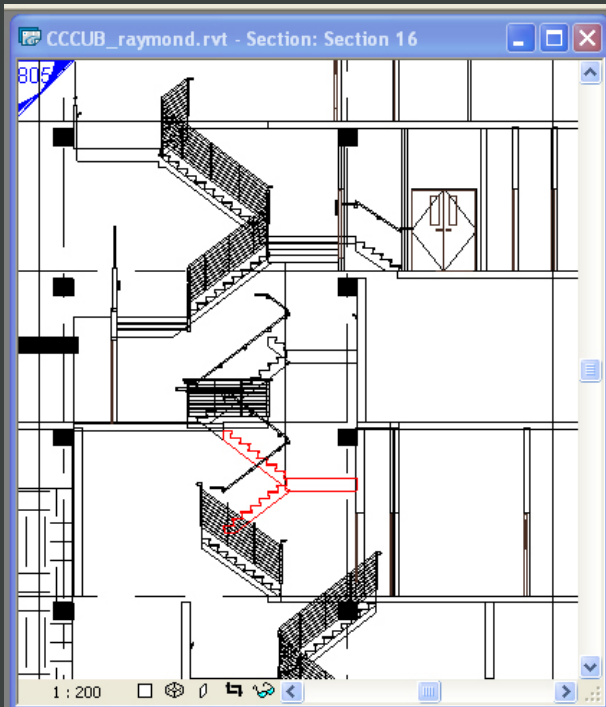
FAÇADE PANEL DESIGN



VERTICAL CO-ORDINATION



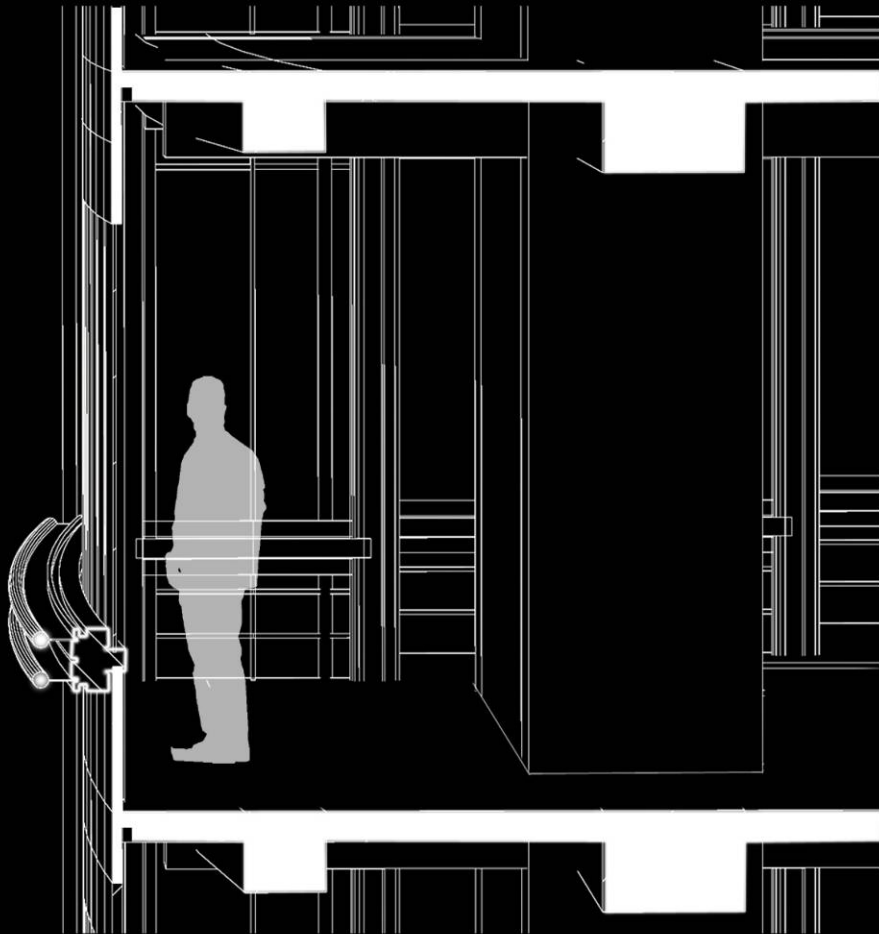
DIFFERENT DESIGN APPROACH



VERTICAL CO-ORDINATION



FAÇADE DESIGN and CO-ORDINATION



FAÇADE DESIGN and CO-ORDINATION



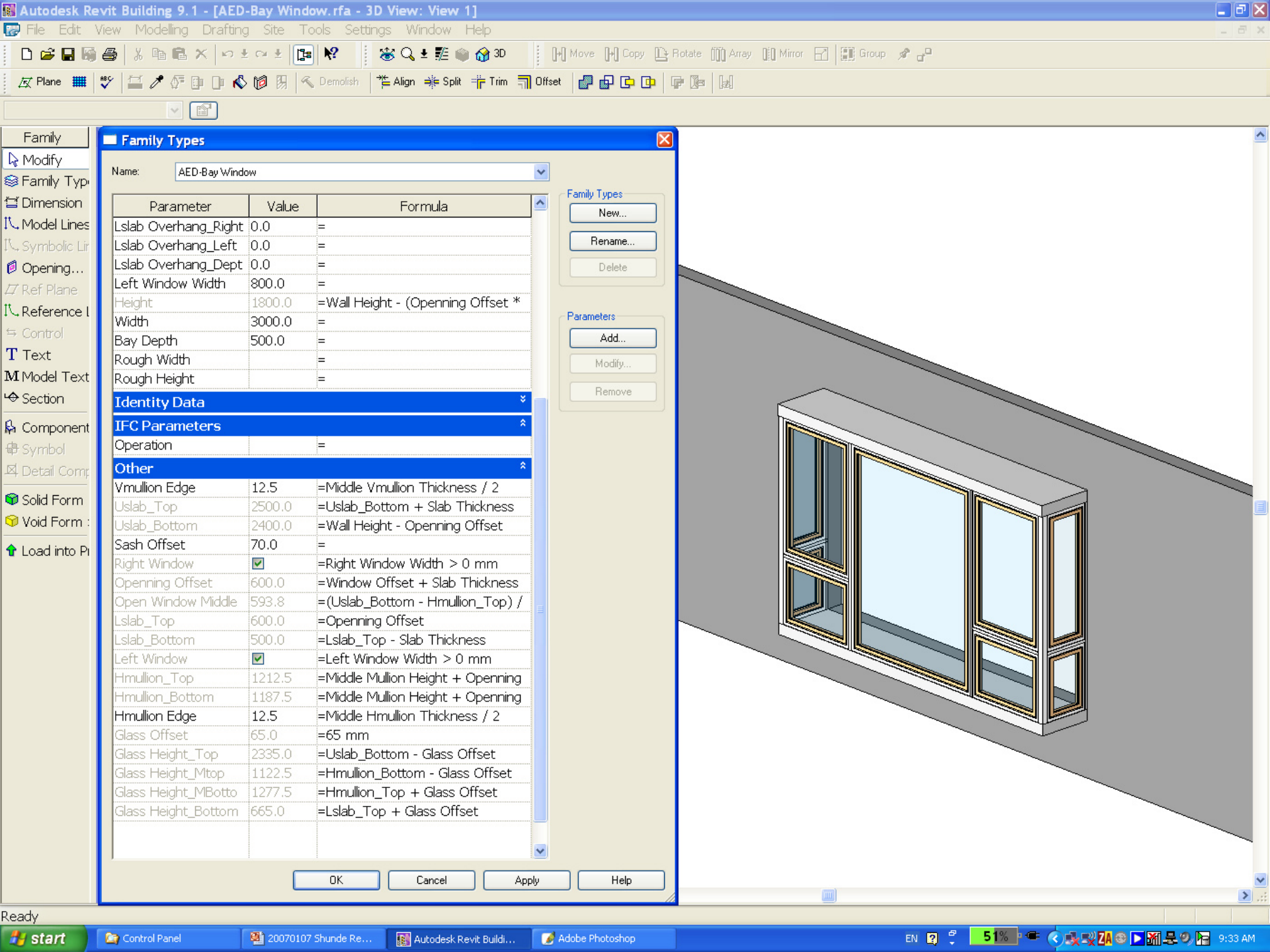
REPETITIONS vs VARIATIONS



PARAMETRIC MODELLING

Aedas



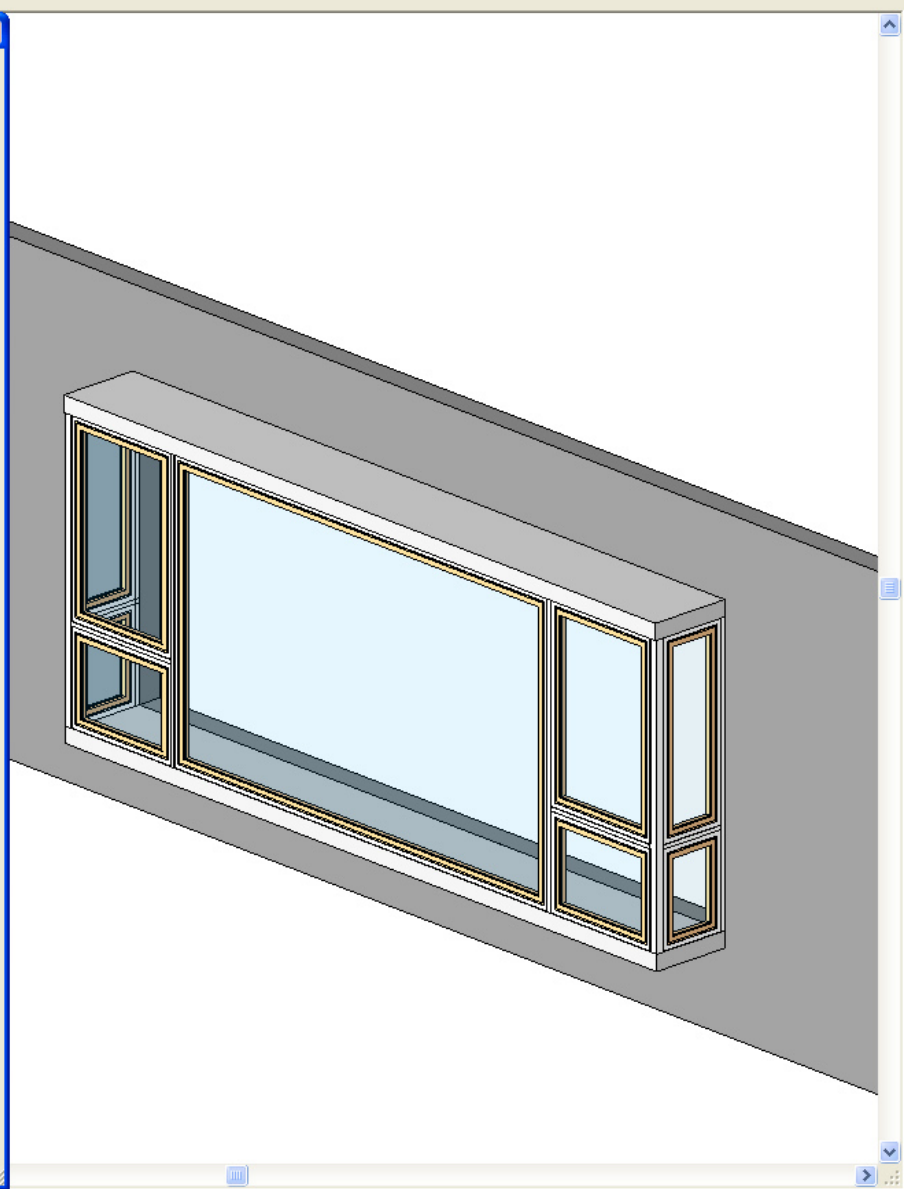


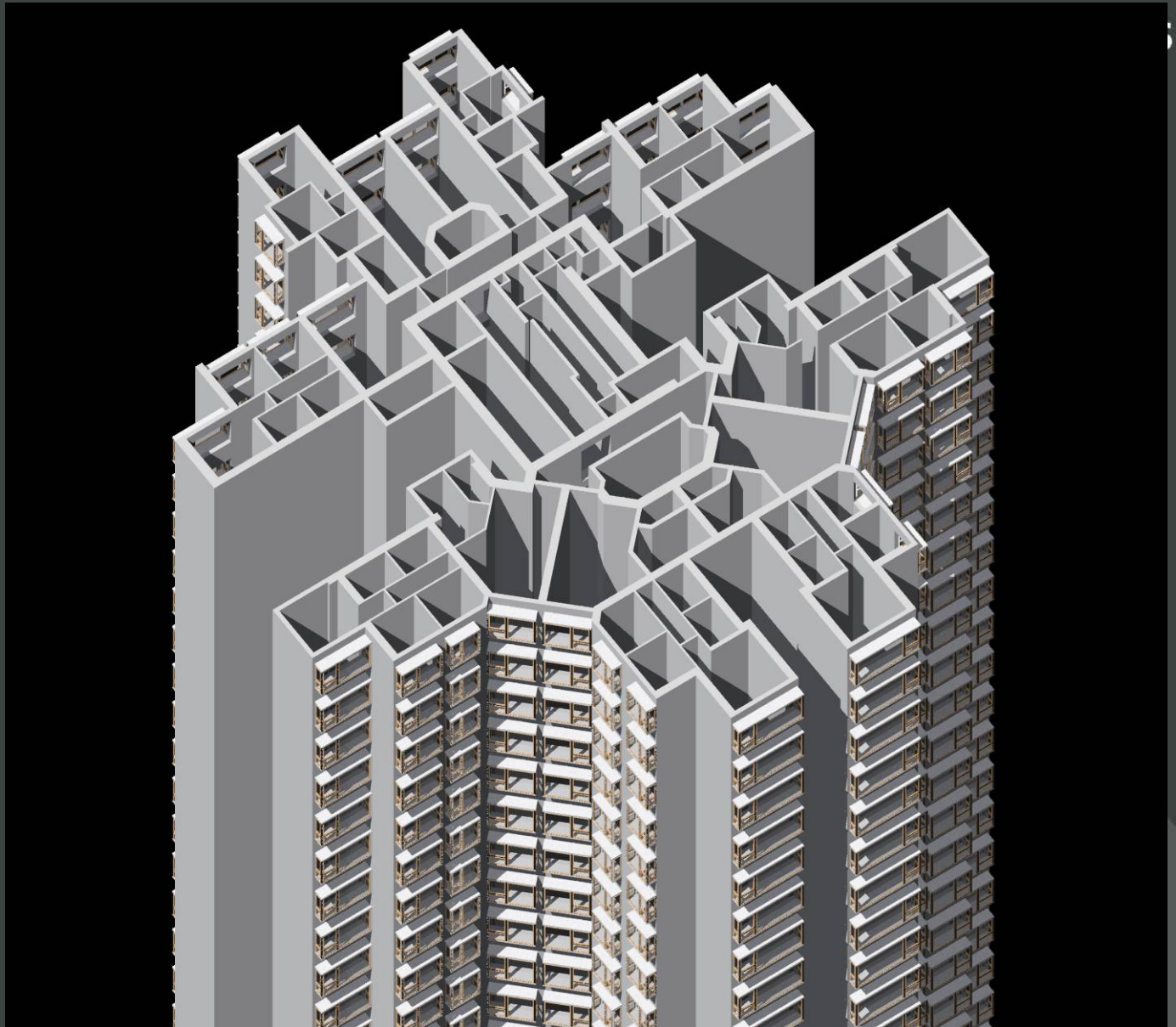
Family Types

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 - (Opening 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 - Opening Offset
Sash Offset	70.0	=
Right Window	☒	=Right Window Width > 0 mm
Opening Offset	600.0	=Window Offset + Slab Thickness
Open Window Middle	593.8	=(Uslab_Bottom - Hmullion_Top) /
Lslab_Top	600.0	=Opening Offset
Lslab_Bottom	500.0	=Lslab_Top - Slab Thickness
Left Window	☒	=Left Window Width > 0 mm
Hmullion_Top	1212.5	=Middle Mullion Height + Opening
Hmullion_Bottom	1187.5	=Middle Mullion Height + Opening
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

OK Cancel Apply Help





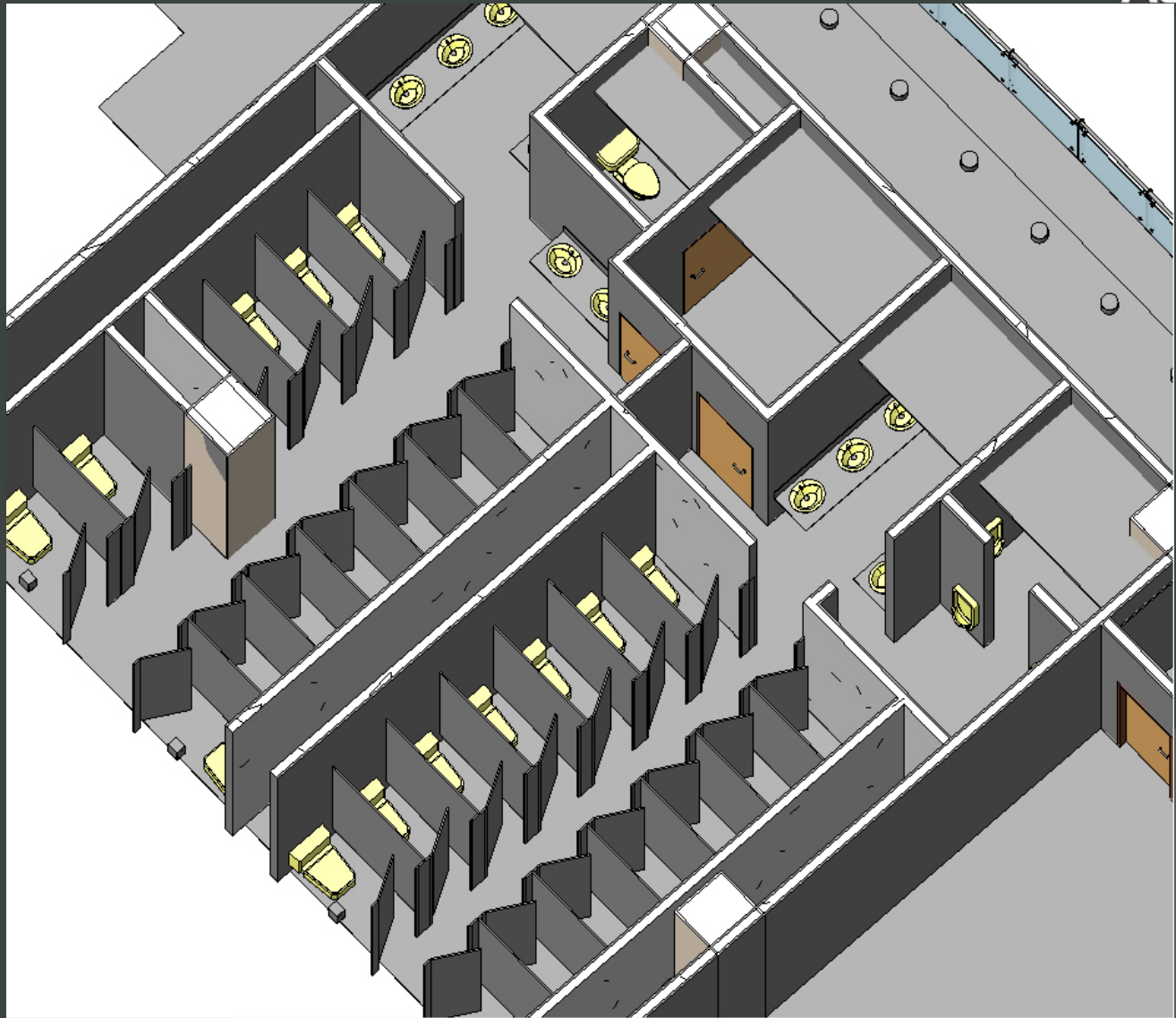
REPETITIONS vs VARIATIONS



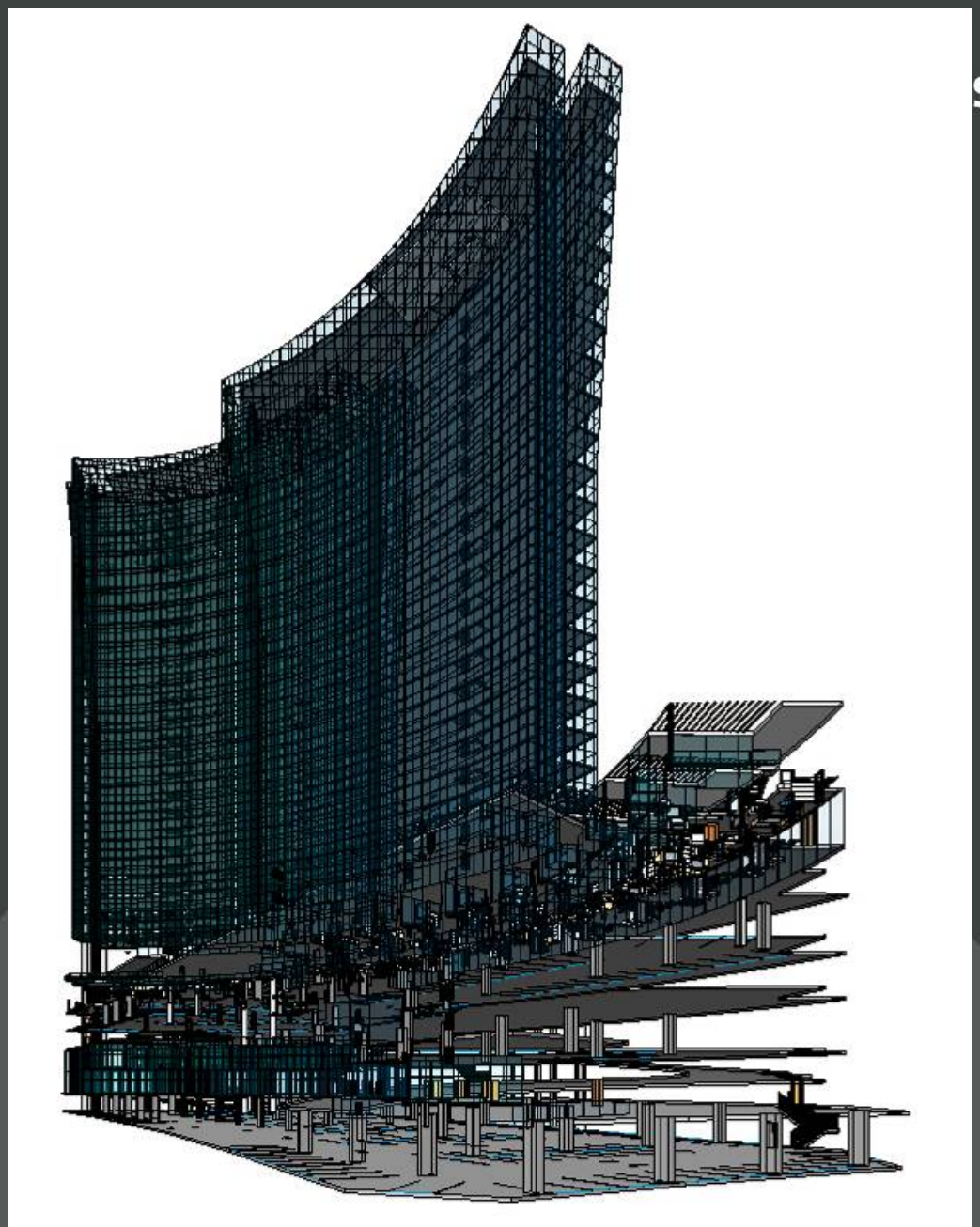
PARAMETRIC MODELLING

Aedas

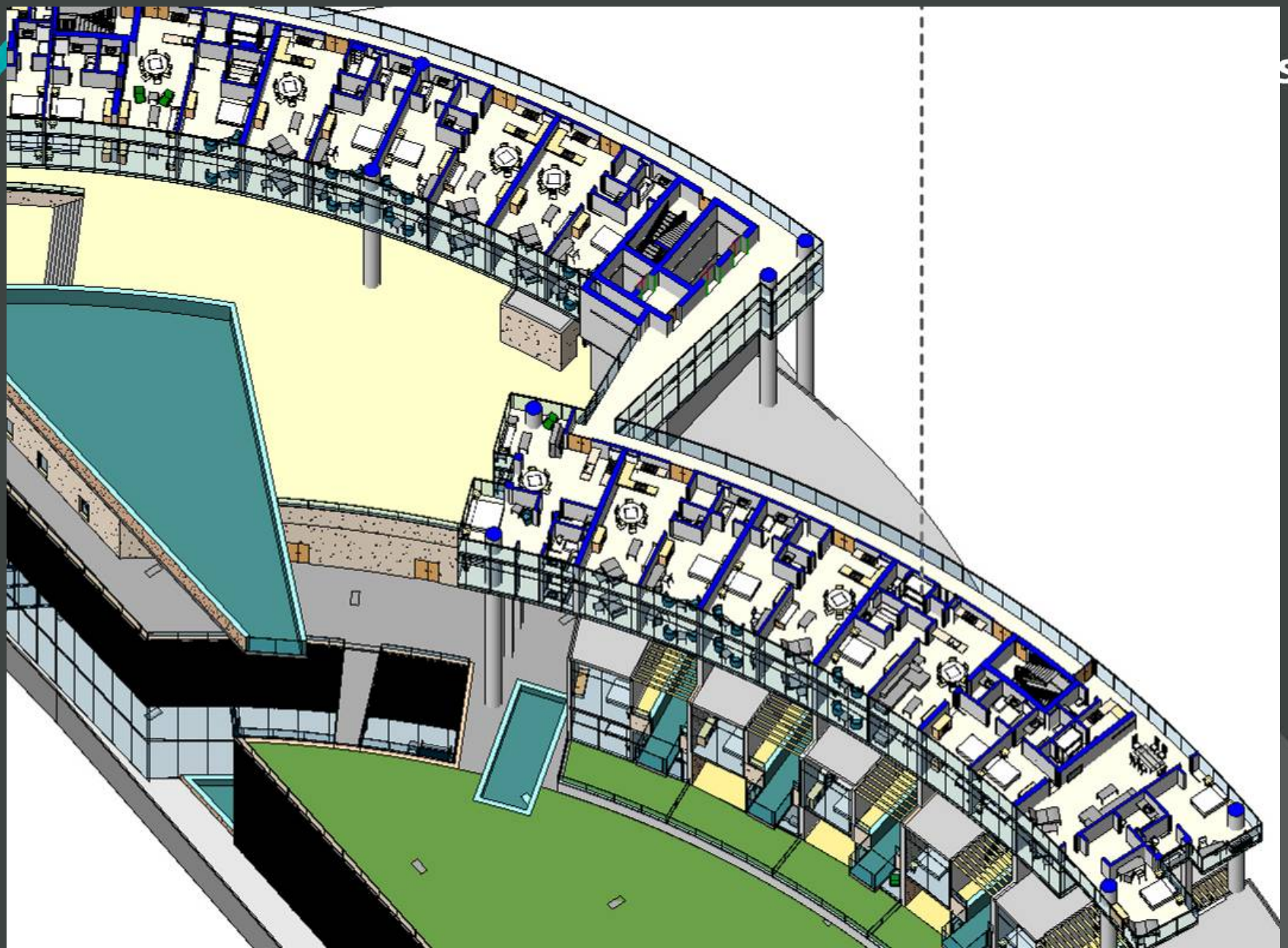




CREATIVE TOOLS

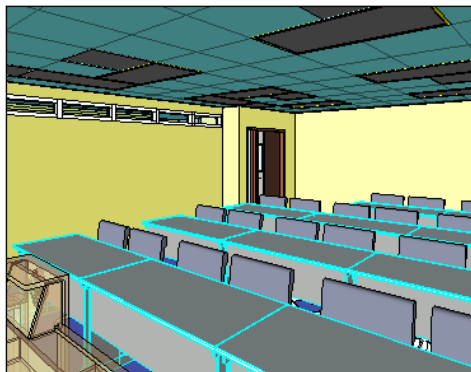


HORIZONTAL REPETITION / MODULARIZATION

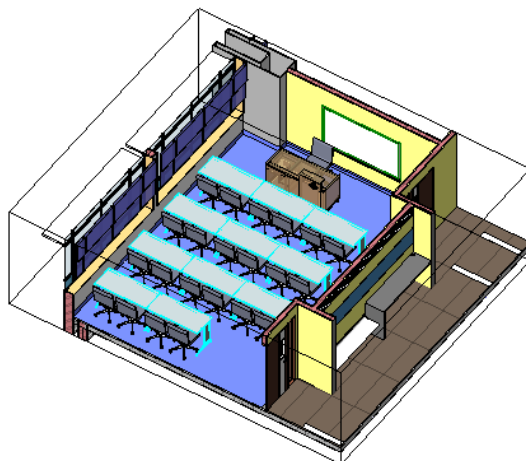


MODULAR DESIGN

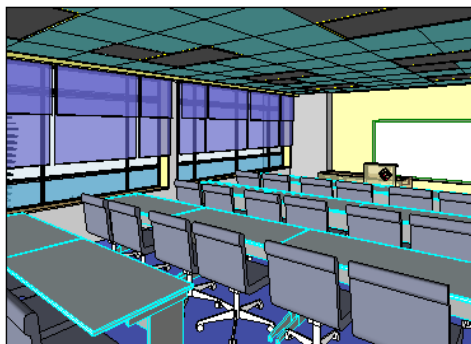
1. Design visualization
- 2. Drawing Productions 図面製作**
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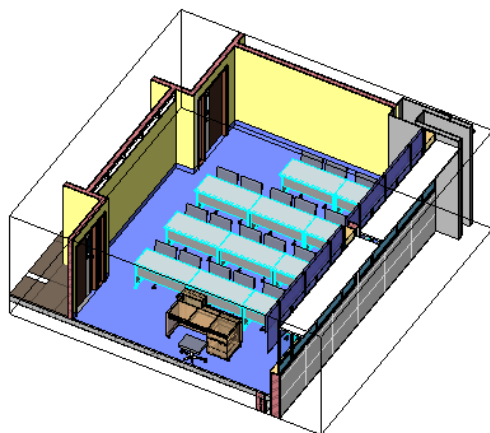
6 行政人员培训室立体示意图2



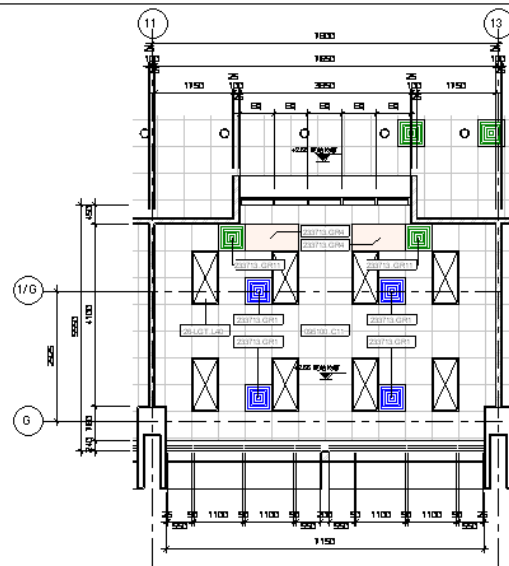
4 行政人员培训室立体剖面示意图2



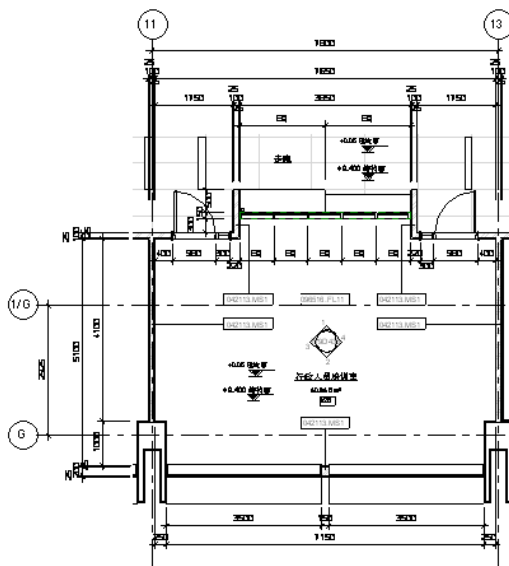
5 行政人员培训室立体示意图1



3 行政人员培训室立体剖面示意图1

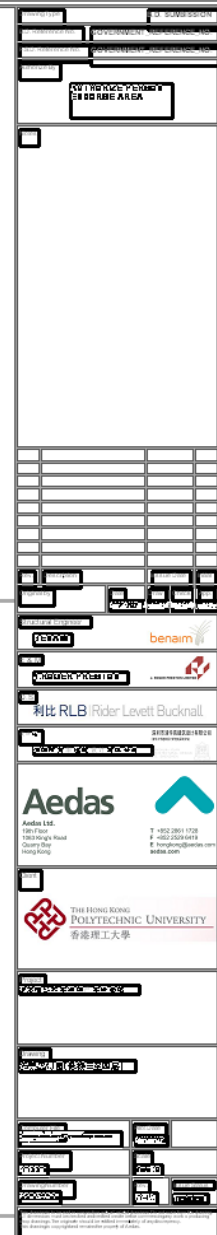
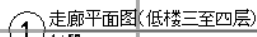
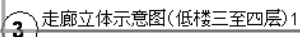


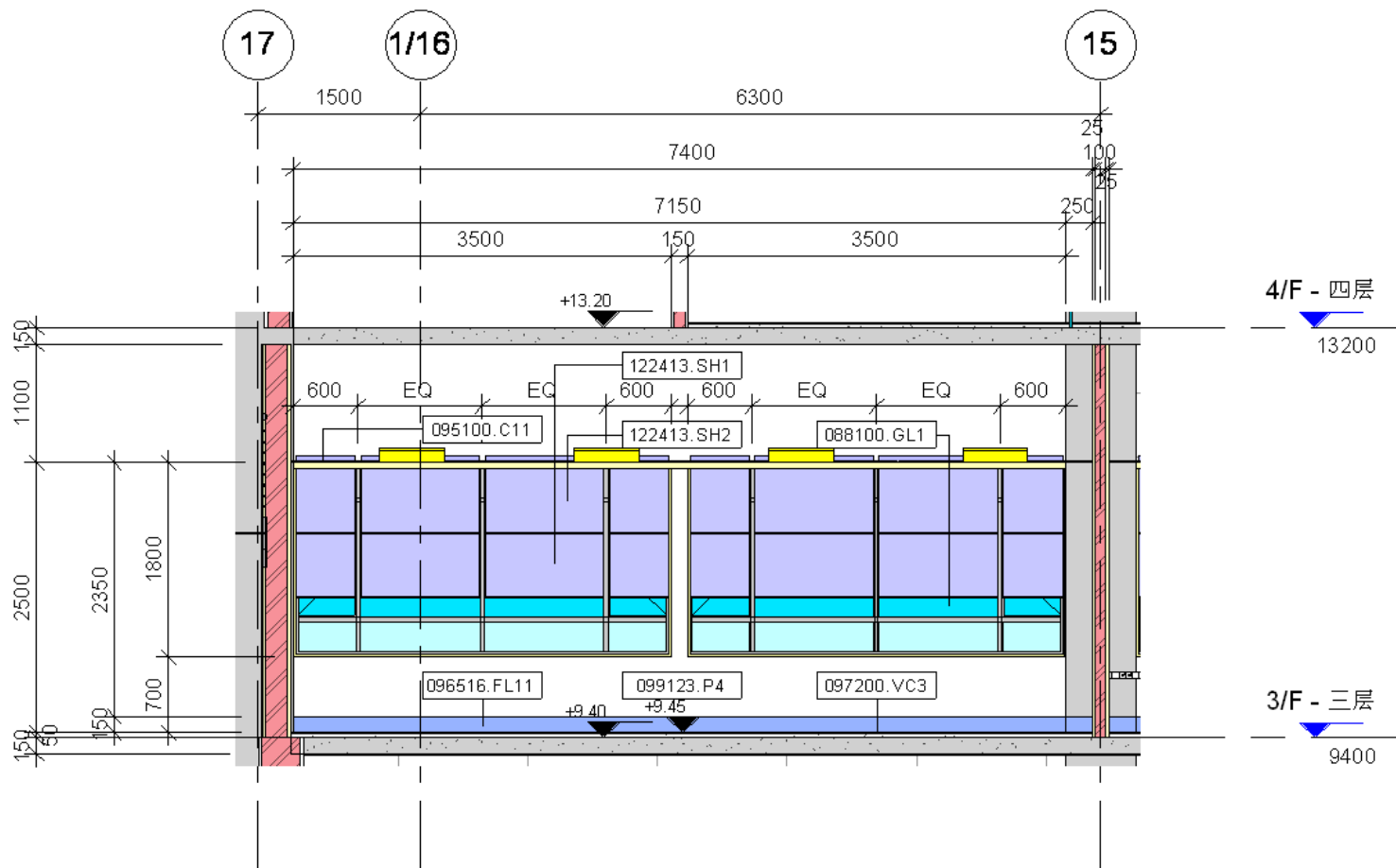
2 行政人员培训室天花平面图(高楼三层)1
1 : 50



1 行政人员培训室平面图(高楼三层)1
1 : 50

Drawing Type		S.D. SUBMISSION	
S.D. Submission No.		GOVERNMENT REFERENCE NO.	
1-2-2 Submission No.		GOVERNMENT REFERENCE NO.	
Author's Name		AUTHORIZE PERSON OR SUBMIT AREA	
Notes			





2

行政人员培训室立面图(高楼三层)6

1:50

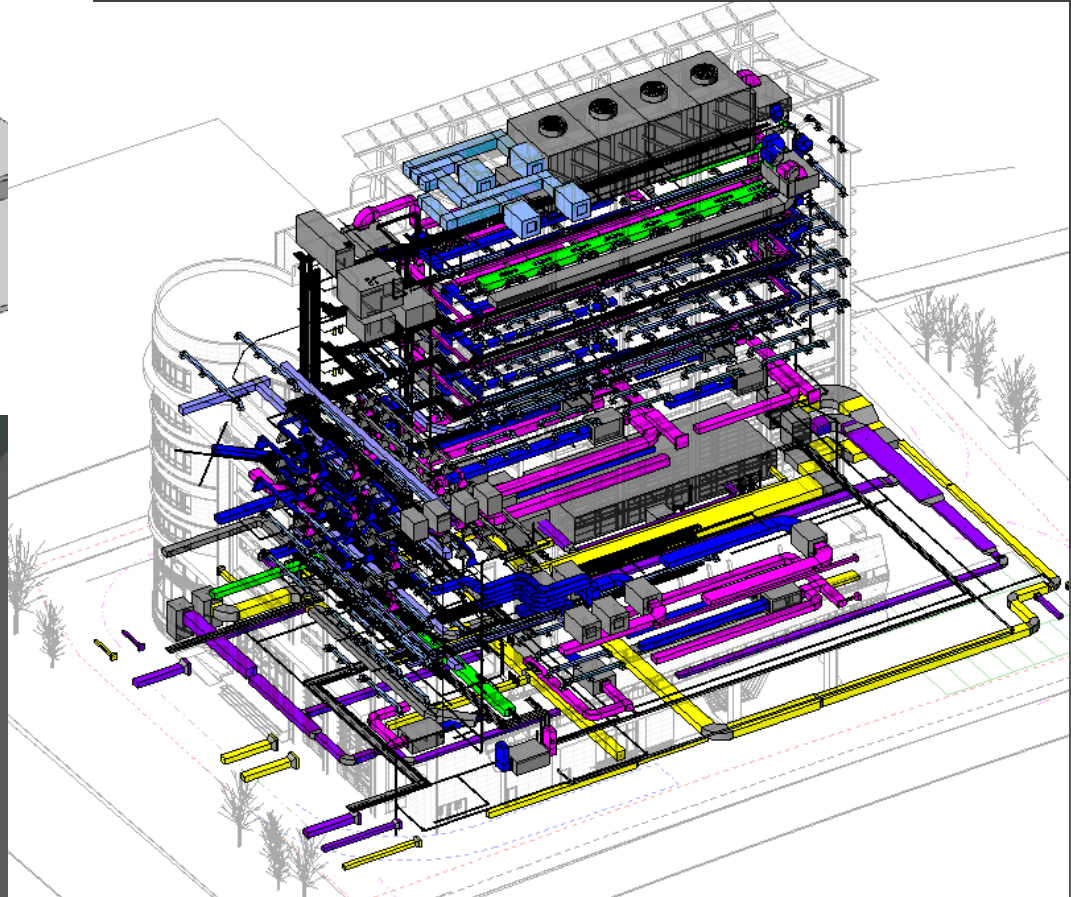
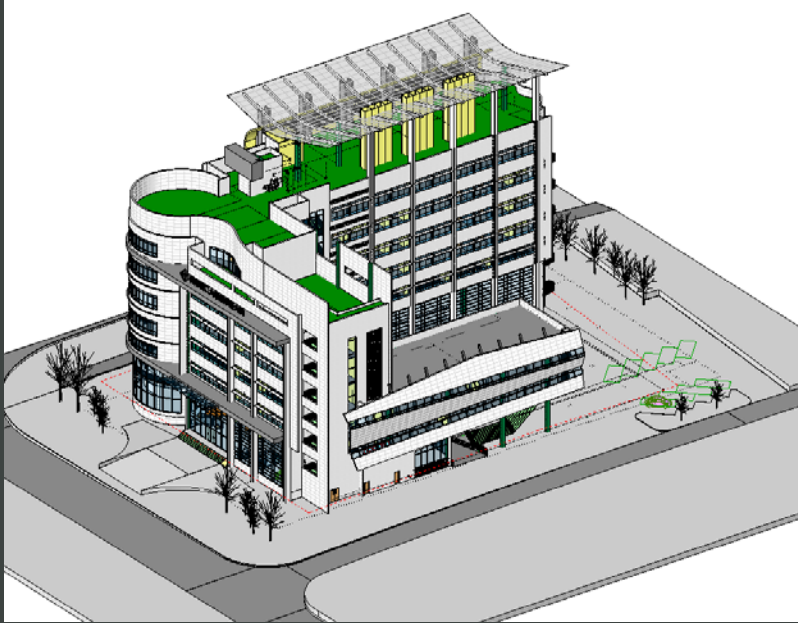
1. Design visualization
2. Drawing Productions
- 3. Services Co-ordination and Clash detection with other disciplines**
多部門との連携と干渉チェック
4. Quantity taking and preparation of Tender Document
5. Automated Statutory Submission
6. Scientific analysis of different environmental aspects
7. Supply Chain Integration with the manufacturing and production
8. Complex Geometry



CO-ORDINATION / COLLABORATION

Work Flow – Establish BIM Models

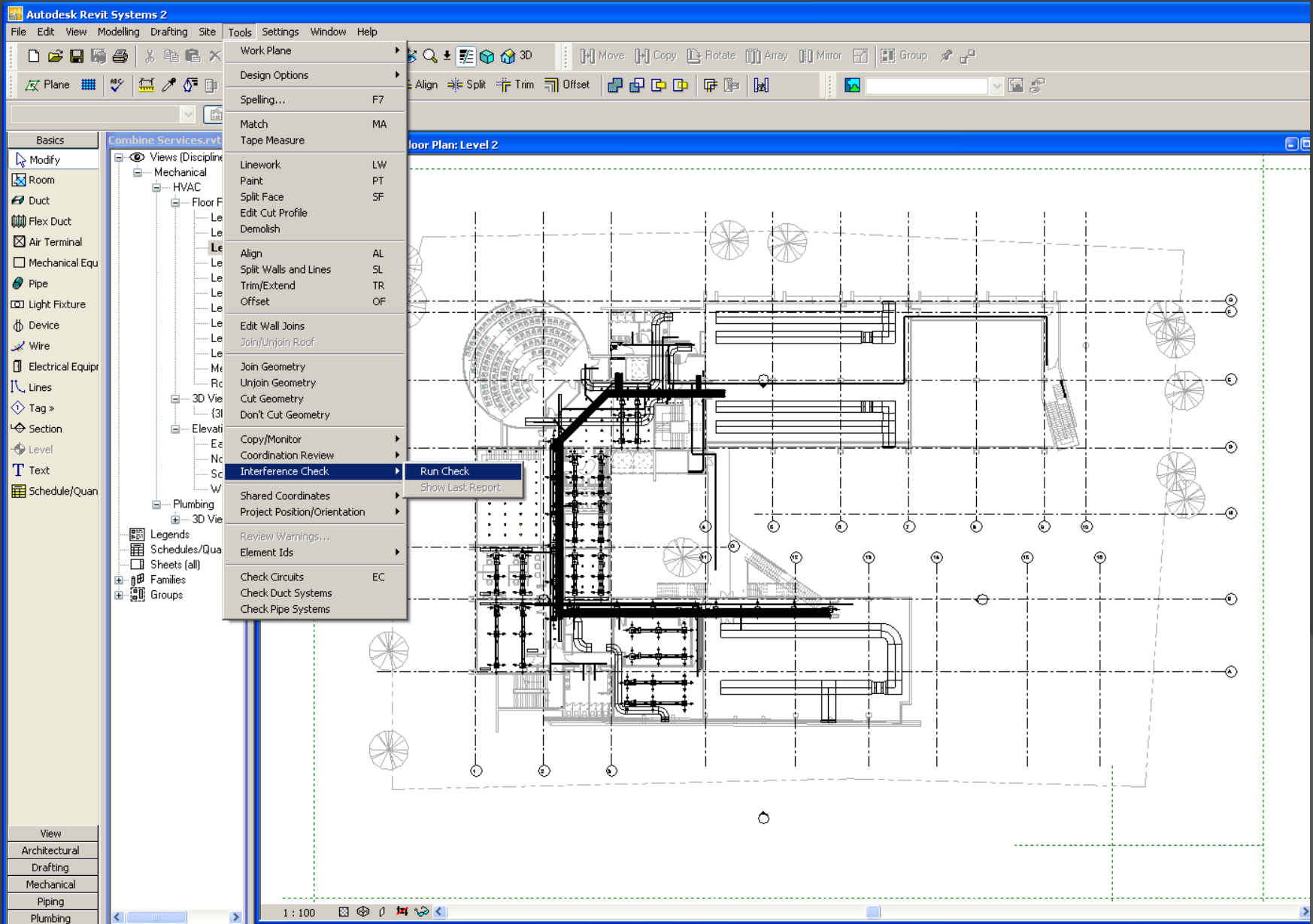
Aedas





Work Flow – Clashes Report

Aedas



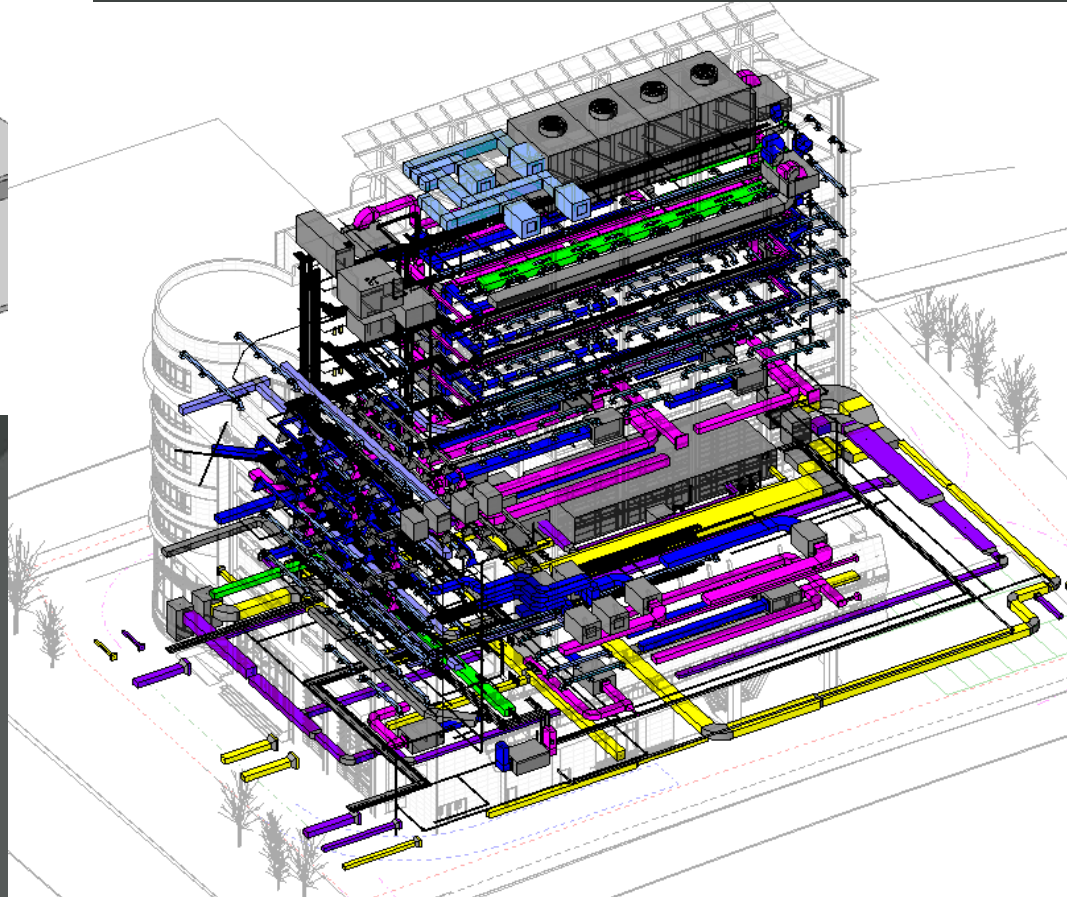
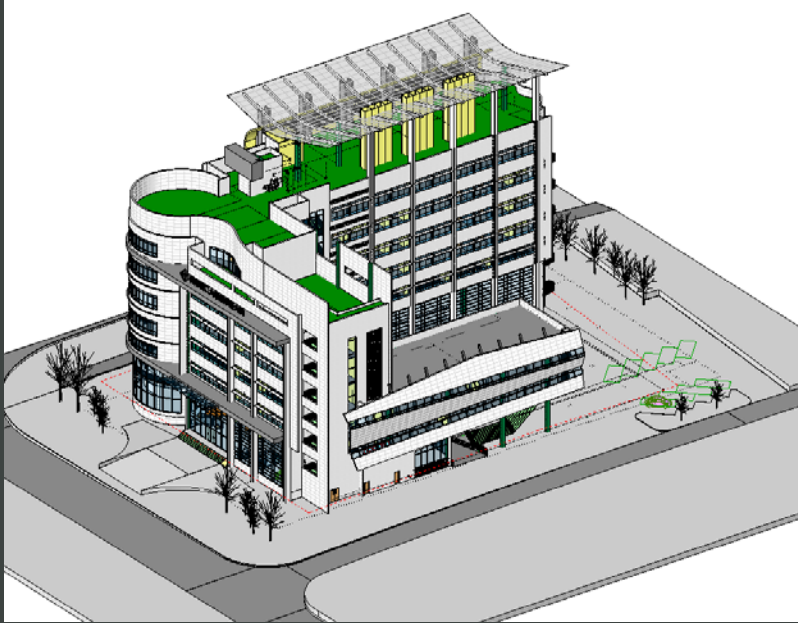
Run Interference Check on the current project, a selection, or a linked project.

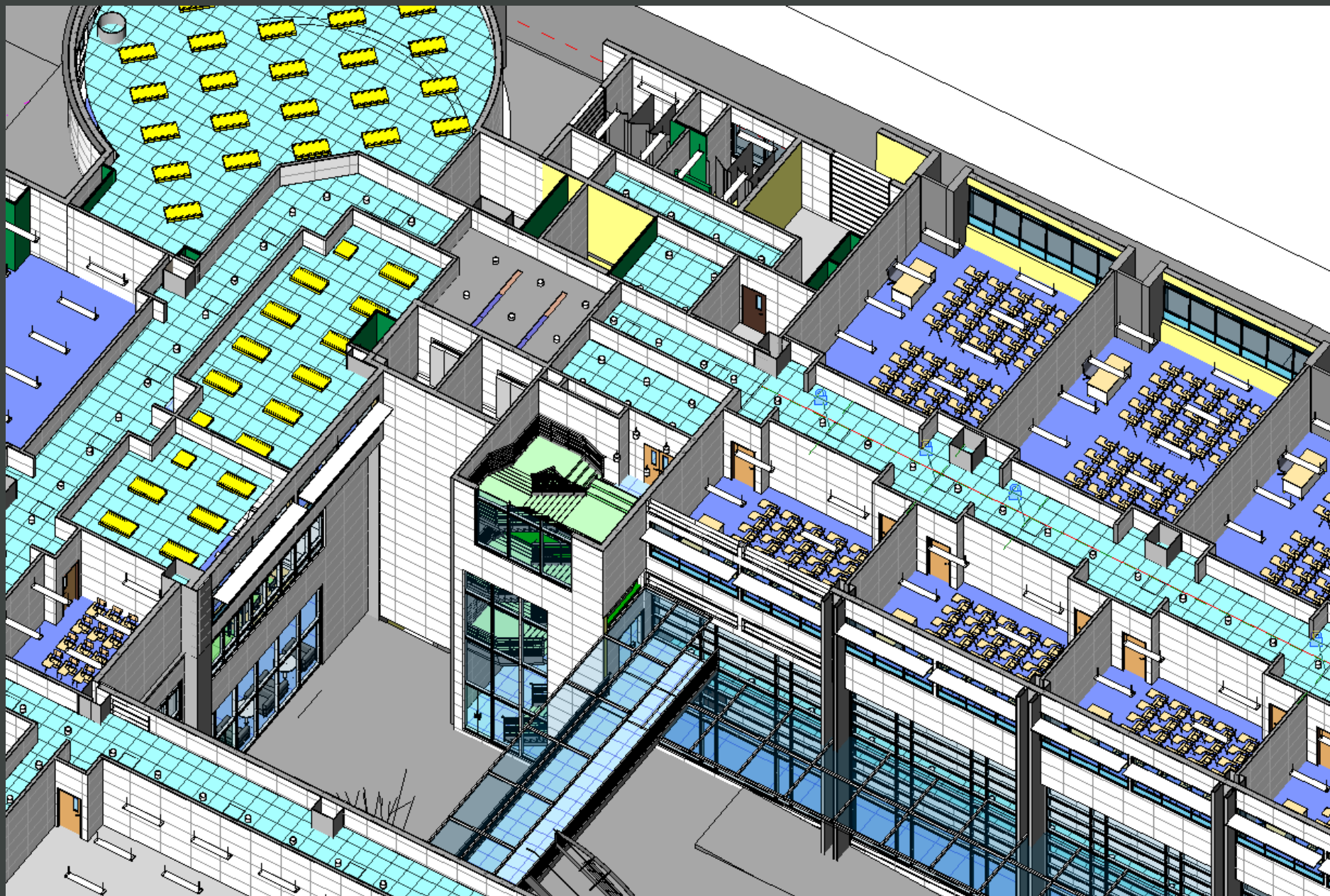


CO-ORDINATION / COLLABORATION

Work Flow – Establish BIM Models

Aedas



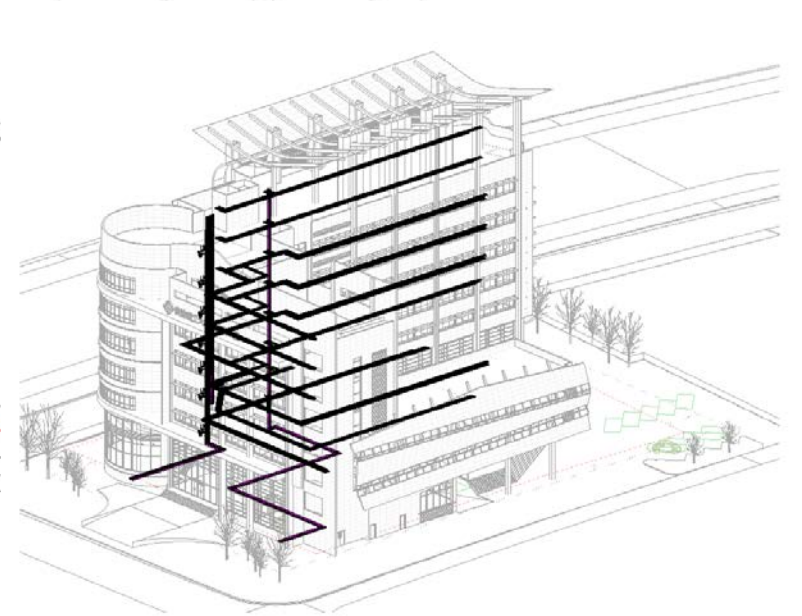
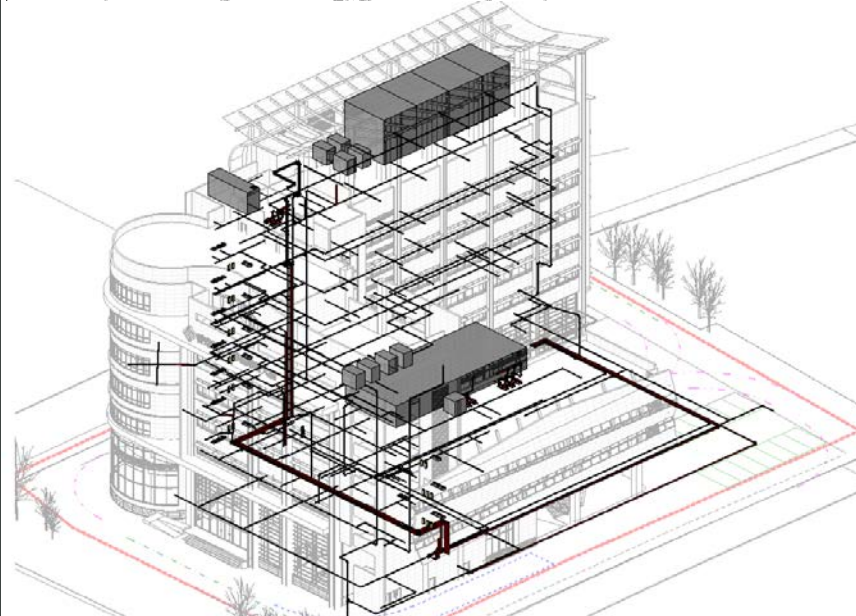
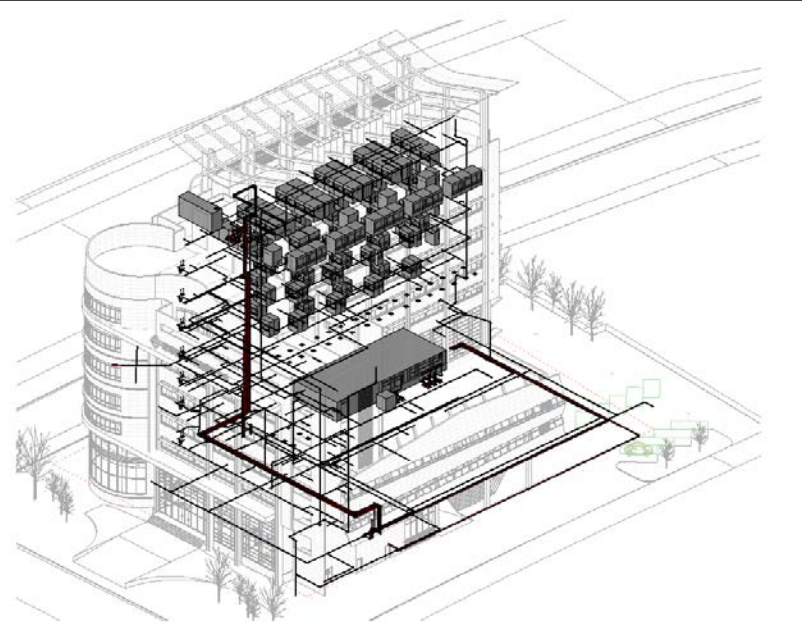
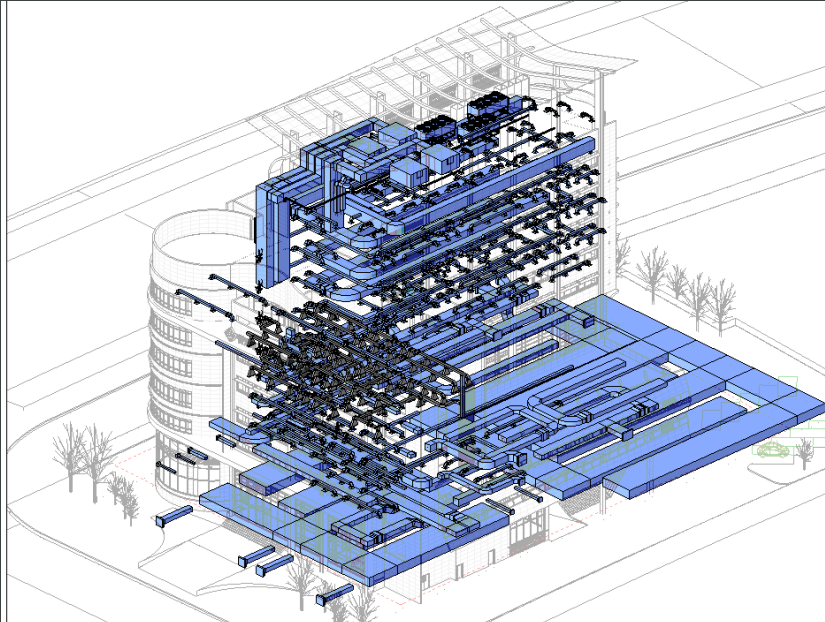




HVAC Installation

Fire Services Installation

Aedas



P/D Installation

Electricity Installation

Work Flow – Clashes Report

Aedas

The screenshot displays the Autodesk Revit Systems 2 interface. The main window shows a 3D view of a building's mechanical system, specifically a fan coil unit (M_Fan Coil Unit) with a horizontal basic concealed plenum (M_02). The model is rendered in blue and white, showing various pipes, ducts, and structural elements. A red line highlights a specific pipe in the model.

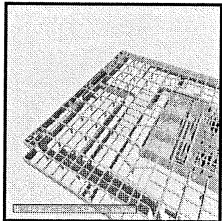
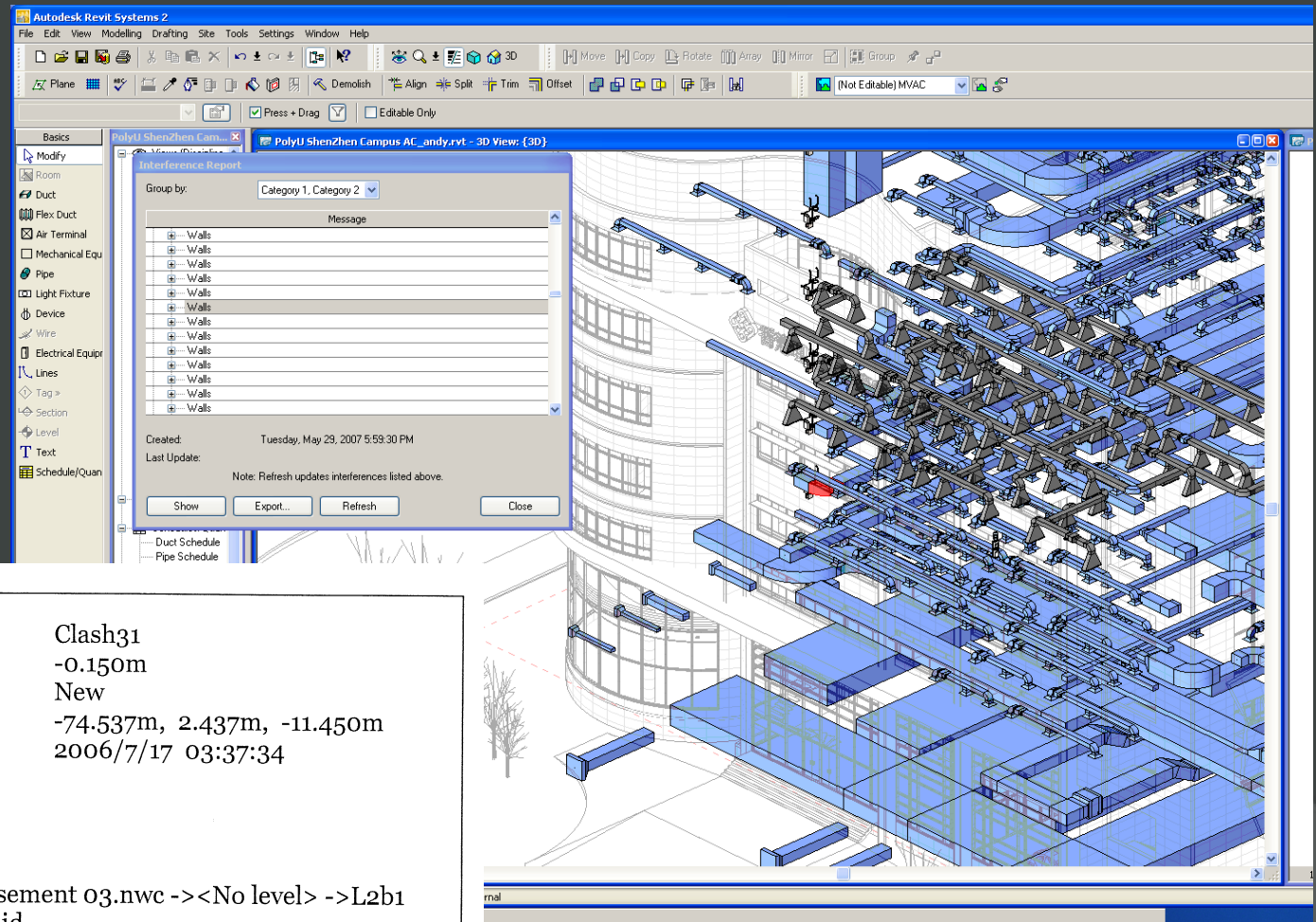
An "Interference Report" dialog box is open in the foreground. It has a "Group by:" dropdown set to "Category 1, Category 2". The "Message" list contains 12 entries, all labeled "Pipes". The "Created:" field shows "Tuesday, May 29, 2007 6:13:54 PM". The "Last Update:" field is empty. A note below the fields states: "Note: Refresh updates interferences listed above." The dialog box has four buttons: "Show", "Export...", "Refresh", and "Close".

The left sidebar shows the "Basics" tab selected. The "Modify" panel is active, showing options for Room, Duct, Flex Duct, Air Terminal, Mechanical Equ, Pipe, Light Fixture, Device, Wire, Electrical Equip, Lines, Tag, Section, Level, Text, and Schedule/Quantities. The "View" panel shows options for Architectural, Drafting, Mechanical, Piping, and Plumbing. The "Schedule/Quantities" panel shows options for Duct Schedule, Pipe Schedule, Room Schedule, and Wall Schedule. The "Families" panel shows options for Air Terminals, Annotation Symbols, Ceilings, Basic Ceiling, Generic, and Plaster.

The status bar at the bottom indicates the current view is "3D View: {3D}" and the scale is "1:150". The page number is "Page 4", and the section is "Sec 1". The current location is "4/4" at "Ln 2", "Col 2". The status bar also shows "REC TRK EXT OVR" and "English (U.S)".

Work Flow – Clashes Report

Aedas



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

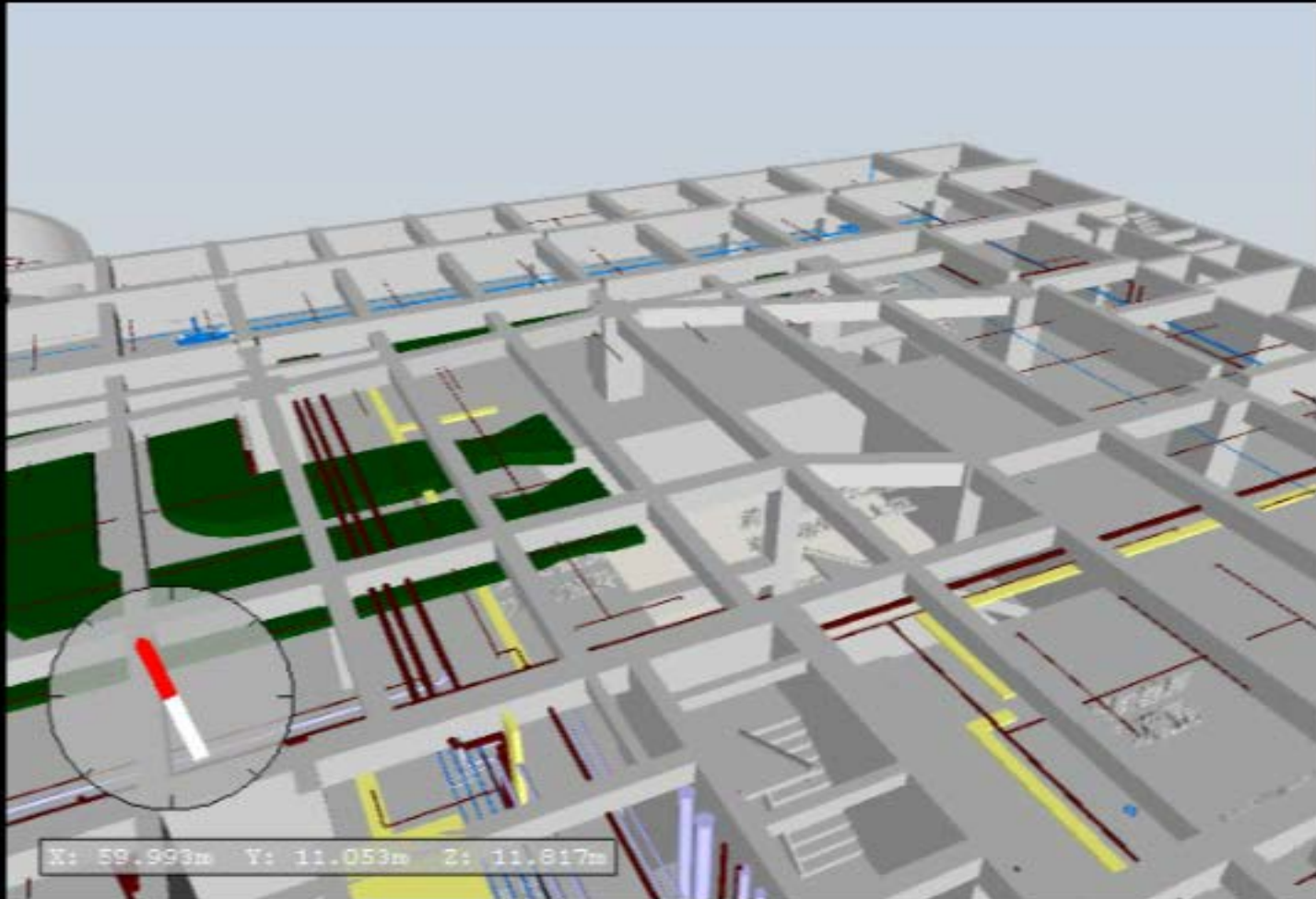
Path File ->File ->Basement 03.nwc -><No level> ->L2b1
500 x 700 ->L2b1 500 x 700 ->Solid

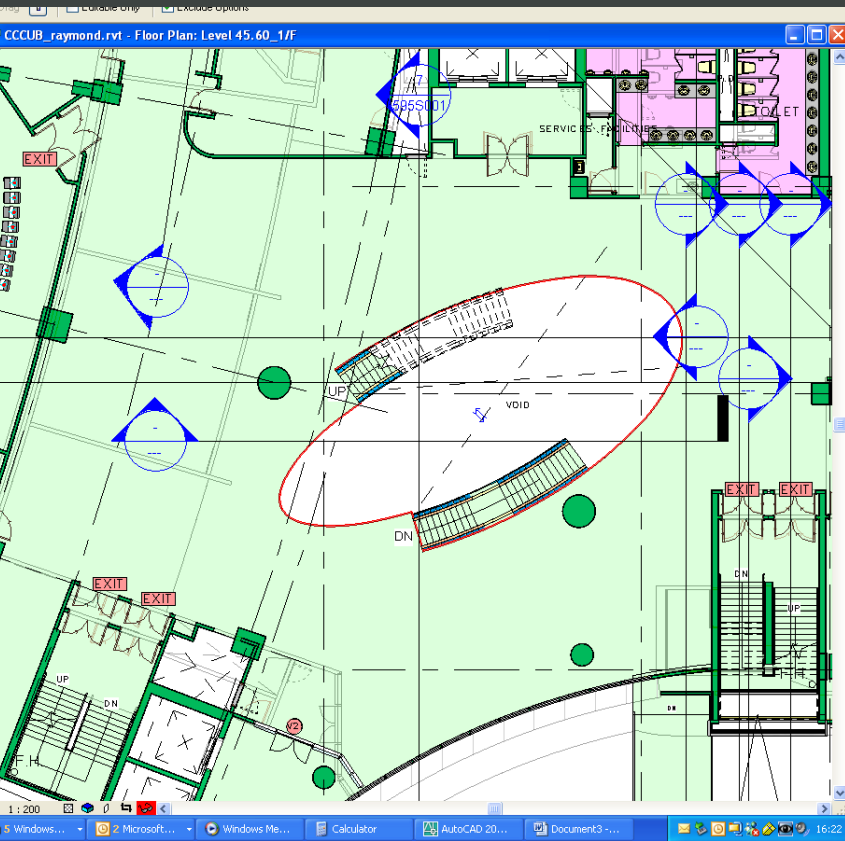
Item 2

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



Work Flow - Clashes Identification Processes



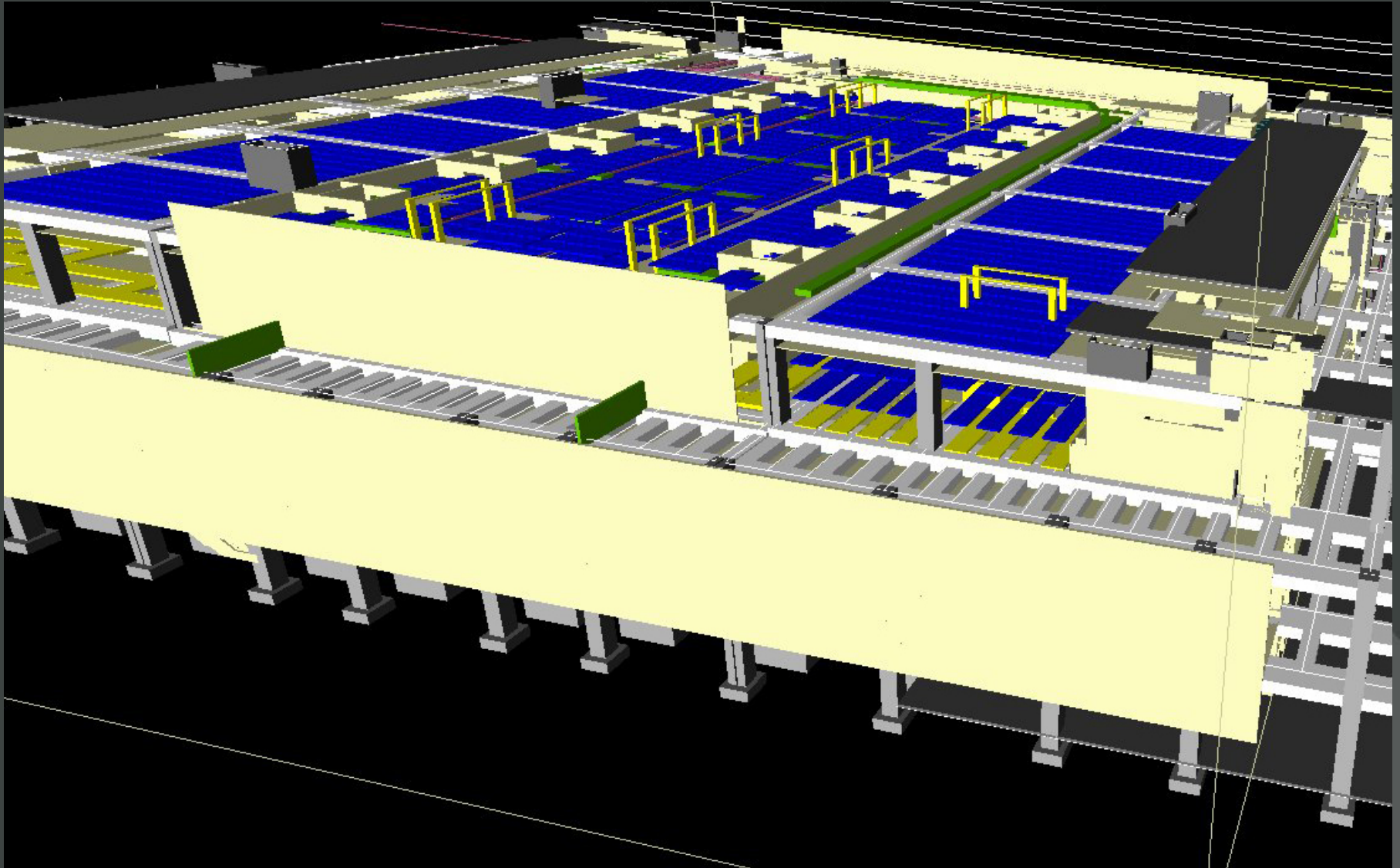




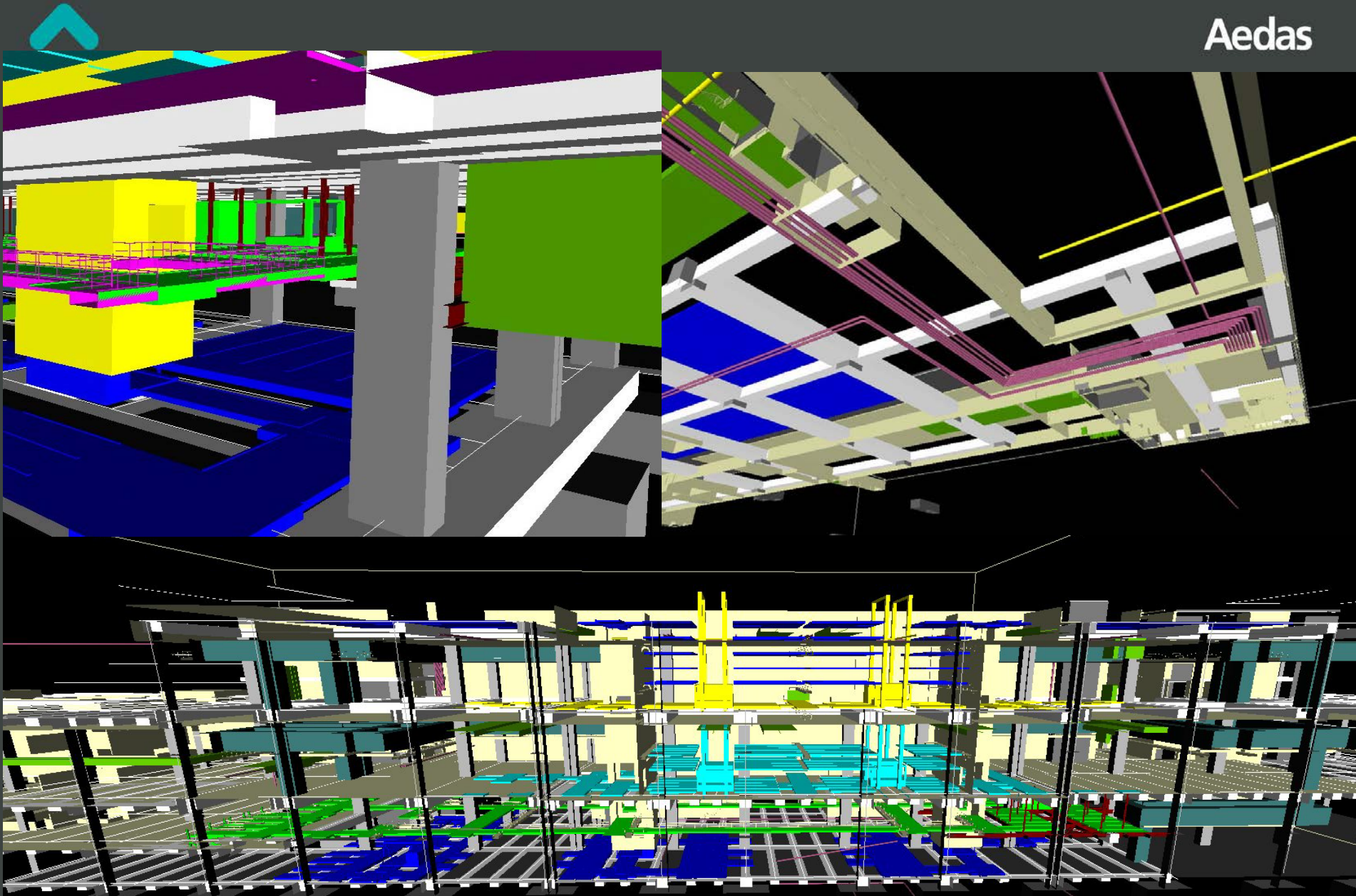
Results – No of Clashes

結果 – 碰撞數目

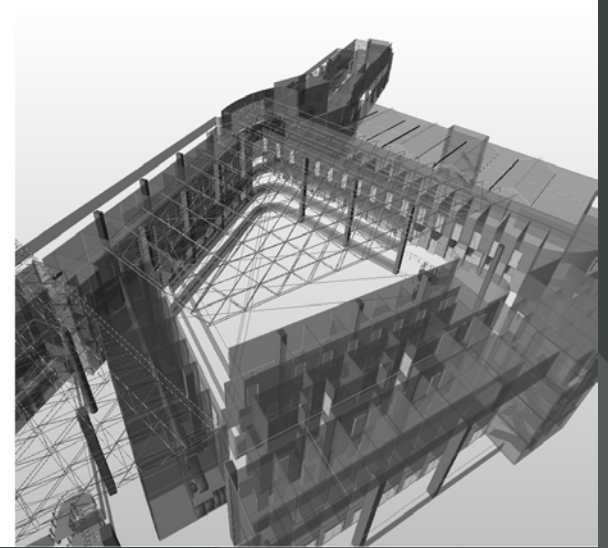
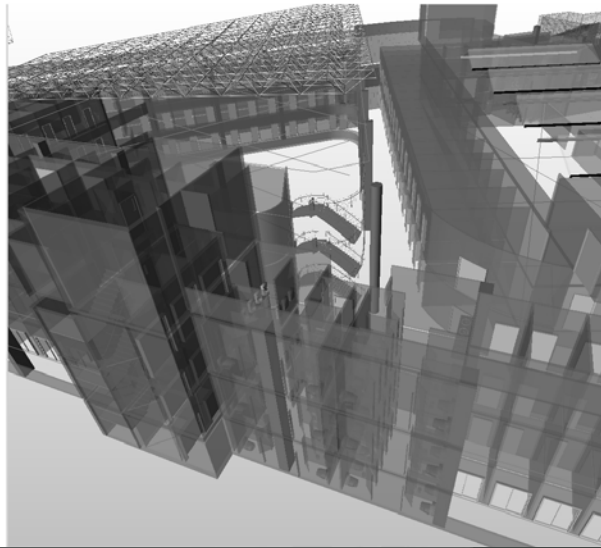
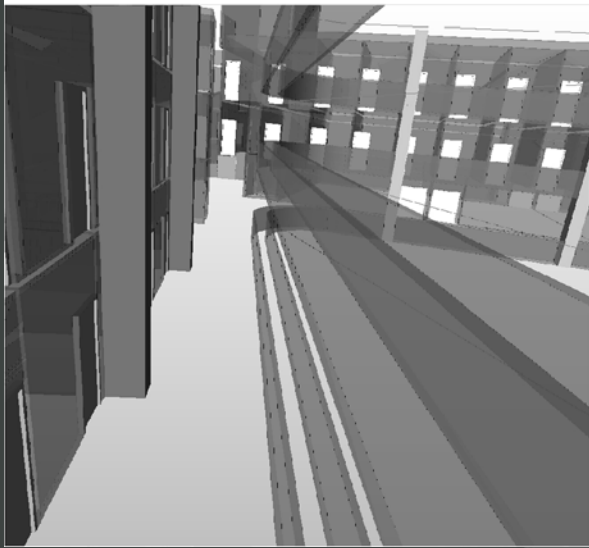
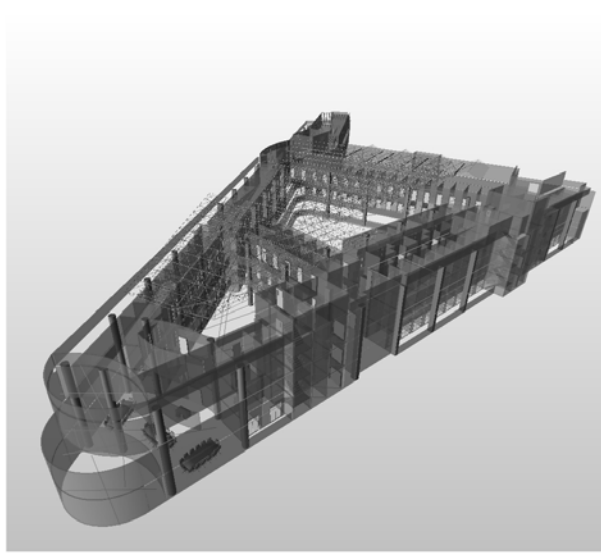
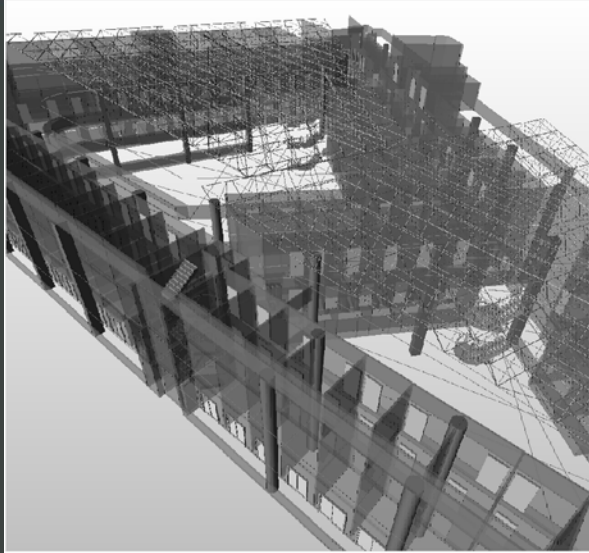
	HVAC Ductwork	Chiller Water Pipe	Fire Services	P&D	Electrical	Total
B1	0	0	0	0	0	0
B1M	0	0	0	0	0	0
B2	0	0	0	0	0	0
B3	0	0	0	0	0	0
Total	0	0	0	0	0	0



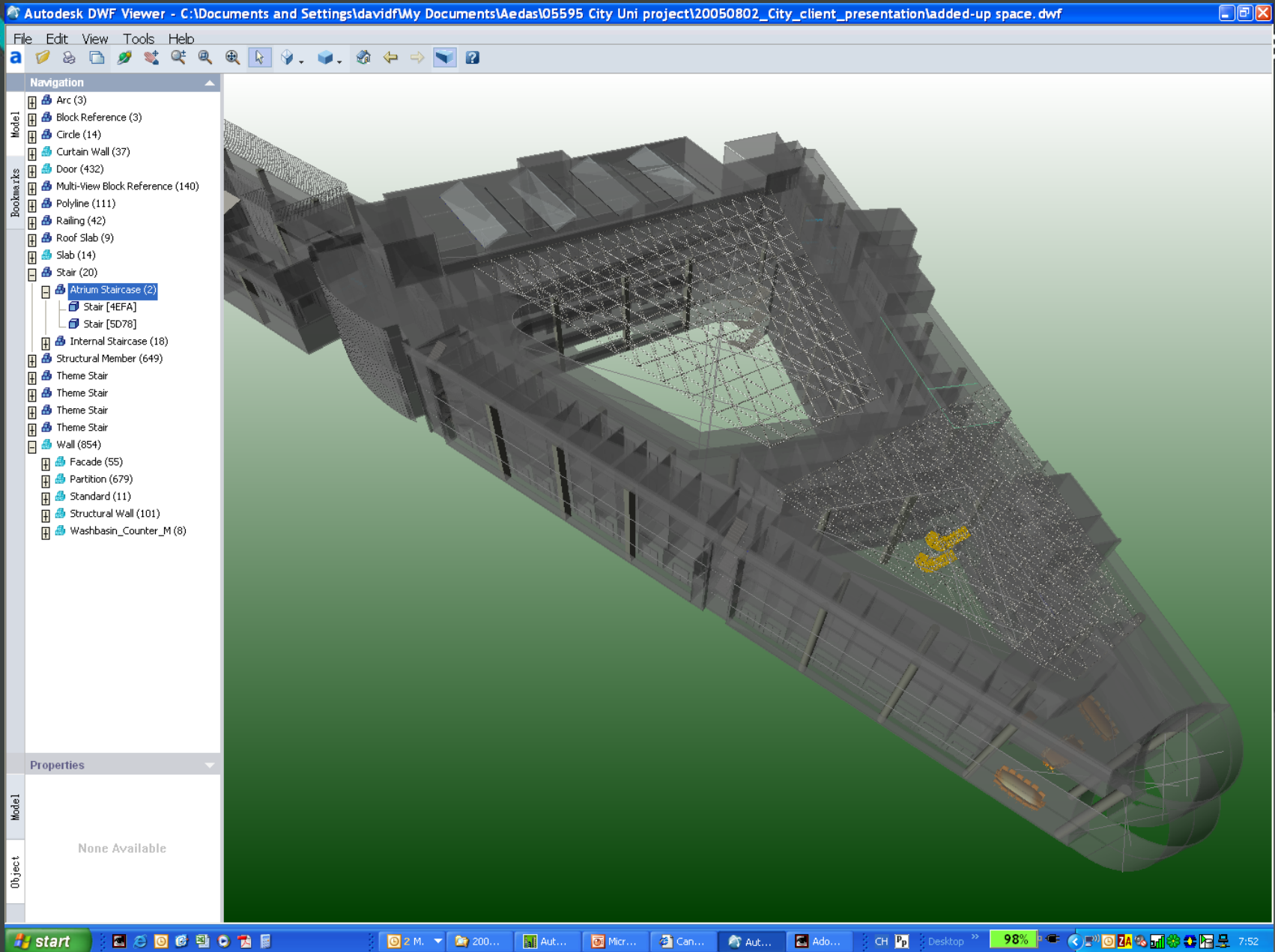
DISCIPLINES COLLABORATION



DISCIPLINES COLLABORATION



INTERACTIVE COMMUNICATION – DWF



INTERACTIVE COMMUNICATION – DWF

1. Design visualization
2. Drawing Productions
3. Services Co-ordination and Clash detection with other disciplines
- 4. Quantity taking and preparation of Tender Document** 数量拾い及び
入札書類の作成
5. Automated Statutory Submission
6. Scientific analysis of different environmental aspects
7. Supply Chain Integration with the manufacturing and production
8. Complex Geometry



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

DISCIPLINES COLLABORATION

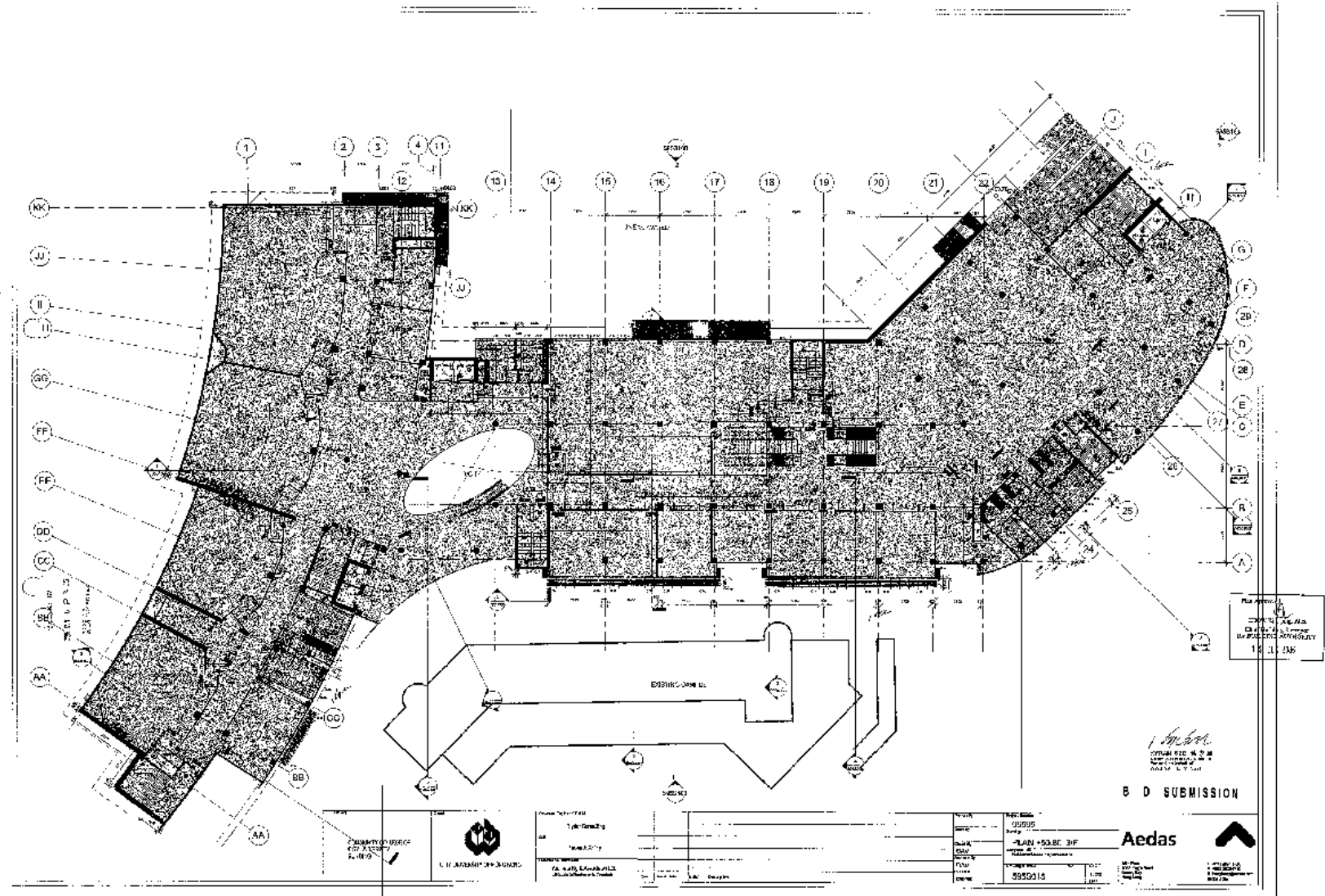
Use of Building Information Modeling (BIM)

Aedas

1. Design visualization
2. Drawing Productions
3. Services Co-ordination and Clash detection with other disciplines
4. Quantity taking and preparation of Tender Document
- 5. Automated Statutory Submission** 確認申請図書作成の自動化
6. Scientific analysis of different environmental aspects
7. Supply Chain Integration with the manufacturing and production
8. Complex Geometry

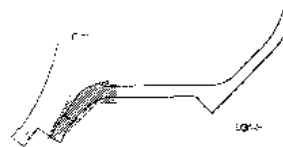


Aedas

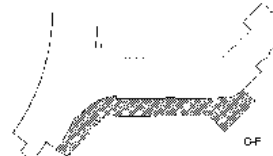




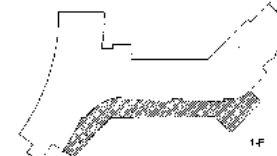
① EVA of Level 34.00_LG2/F
1:1000



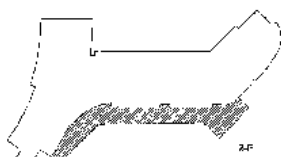
② EVA of Level 37.80, LG1/F
1:1000



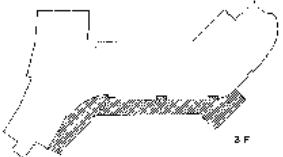
③ EVA of Level 41.60_G/F
1:1000



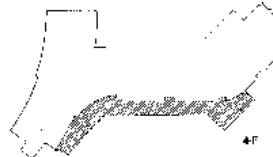
④ EVA of Level 45.60... 1/F
1:1000



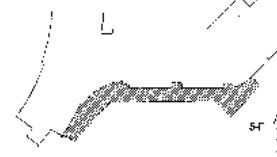
⑤ EVA of Level 40.60 2/F
1:1360



⑥ EVA of Level 53.80_3/F
1:1000

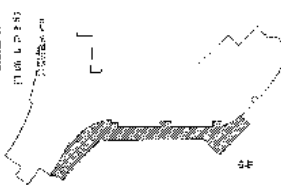


7 EVA of Level 5B.2D_4/F
1:1300



⑧ EVA of Level 62.00 5/F

B D SUBMISSION



9) EVA of Level 65.80_6/F
1:1000

*Hatch area represents the total length of the building facade served by the EVA

CALCULATION OF TOTAL LENGTH OF BUILDING FACADE TO BE SERVED BY EVA AND HENGCHEN FIRE OF SUCH LENGTH OVER THE TOTAL LENGTH OF ALL THE PERIMETER WALLS OF THE BUILDING

www.marine-weather.com																	
Date	Time	Lat		Long		Alt		Speed		Heading		Course		Status		Remarks	
2010-01-01	00:00	37.50	122.50	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
2010-01-01	00:01	37.51	122.51	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01
2010-01-01	00:02	37.52	122.52	10.02	10.02	10.02	10.02	10.02	10.02	10.02	10.02	10.02	10.02	10.02	10.02	10.02	10.02
2010-01-01	00:03	37.53	122.53	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03
2010-01-01	00:04	37.54	122.54	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04
2010-01-01	00:05	37.55	122.55	10.05	10.05	10.05	10.05	10.05	10.05	10.05	10.05	10.05	10.05	10.05	10.05	10.05	10.05
2010-01-01	00:06	37.56	122.56	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06	10.06
2010-01-01	00:07	37.57	122.57	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07
2010-01-01	00:08	37.58	122.58	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08
2010-01-01	00:09	37.59	122.59	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09
2010-01-01	00:10	37.60	122.60	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10
2010-01-01	00:11	37.61	122.61	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11
2010-01-01	00:12	37.62	122.62	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12
2010-01-01	00:13	37.63	122.63	10.13	10.13	10.13	10.13	10.13	10.13	10.13	10.13	10.13	10.13	10.13	10.13	10.13	10.13
2010-01-01	00:14	37.64	122.64	10.14	10.14	10.14	10.14	10.14	10.14	10.14	10.14	10.14	10.14	10.14	10.14	10.14	10.14
2010-01-01	00:15	37.65	122.65	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15
2010-01-01	00:16	37.66	122.66	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16
2010-01-01	00:17	37.67	122.67	10.17	10.17	10.17	10.17	10.17	10.17	10.17	10.17	10.17	10.17	10.17	10.17	10.17	10.17
2010-01-01	00:18	37.68	122.68	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18
2010-01-01	00:19	37.69	122.69	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19

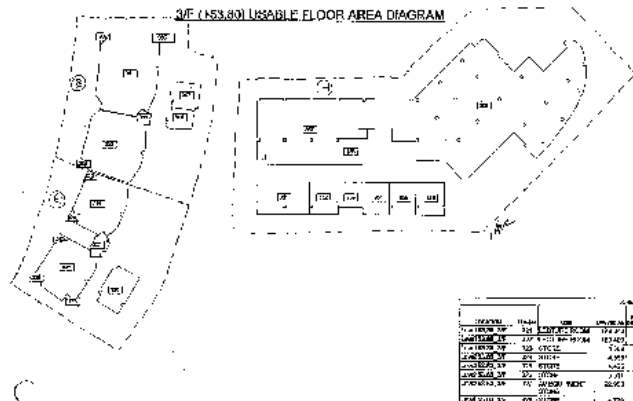
姓名	性别	出生年月	民族	籍贯	文化程度	政治面貌	工作单位	职务	备注
王德胜	男	1945.12	汉族	山东烟台	高中	中共党员	烟台大学	教授	
李国强	男	1952.08	汉族	河南郑州	大学	中共党员	河南省委	处长	
张为民	男	1958.03	汉族	江苏苏州	大学	中共党员	苏州大学	教授	
赵子龙	男	1965.11	汉族	四川成都	大学	中共党员	成都军区	少将	
周树人	男	1970.05	汉族	浙江杭州	大学	中共党员	浙江大学	教授	
吴永年	男	1975.09	汉族	广东广州	大学	中共党员	广东省政府	处长	
陈永年	男	1980.01	汉族	福建福州	大学	中共党员	福建省政府	处长	
林永年	男	1985.06	汉族	广西桂林	大学	中共党员	广西壮族自治区政府	处长	
黄永年	男	1990.12	汉族	湖南长沙	大学	中共党员	湖南省政府	处长	
刘永年	男	1995.07	汉族	湖北武汉	大学	中共党员	湖北省政府	处长	
孙永年	男	2000.03	汉族	江西九江	大学	中共党员	江西省政府	处长	
周永年	男	2005.10	汉族	安徽合肥	大学	中共党员	安徽省政府	处长	
吴永年	男	2010.04	汉族	山西太原	大学	中共党员	山西省政府	处长	
陈永年	男	2015.08	汉族	陕西西安	大学	中共党员	陕西省政府	处长	
林永年	男	2020.02	汉族	甘肃兰州	大学	中共党员	甘肃省政府	处长	
黄永年	男	2025.06	汉族	宁夏银川	大学	中共党员	宁夏回族自治区政府	处长	
刘永年	男	2030.11	汉族	青海西宁	大学	中共党员	青海省人民政府	处长	
孙永年	男	2035.05	汉族	新疆乌鲁木齐	大学	中共党员	新疆维吾尔自治区政府	处长	
周永年	男	2040.09	汉族	内蒙古呼和浩特	大学	中共党员	内蒙古自治区政府	处长	
吴永年	男	2045.03	汉族	辽宁沈阳	大学	中共党员	辽宁省政府	处长	
陈永年	男	2050.07	汉族	吉林长春	大学	中共党员	吉林省政府	处长	
林永年	男	2055.12	汉族	黑龙江哈尔滨	大学	中共党员	黑龙江省人民政府	处长	
黄永年	男	2060.06	汉族	河北石家庄	大学	中共党员	河北省人民政府	处长	
刘永年	男	2065.10	汉族	河南郑州	大学	中共党员	河南省人民政府	处长	
孙永年	男	2070.04	汉族	山东烟台	大学	中共党员	山东省人民政府	处长	
周永年	男	2075.08	汉族	江苏苏州	大学	中共党员	江苏省人民政府	处长	
吴永年	男	2080.02	汉族	浙江杭州	大学	中共党员	浙江省人民政府	处长	
陈永年	男	2085.06	汉族	安徽合肥	大学	中共党员	安徽省人民政府	处长	
林永年	男	2090.10	汉族	江西九江	大学	中共党员	江西省人民政府	处长	
黄永年	男	2095.04	汉族	广西桂林	大学	中共党员	广西壮族自治区人民政府	处长	
刘永年	男	2100.08	汉族	湖南长沙	大学	中共党员	湖南省人民政府	处长	
孙永年	男	2105.12	汉族	湖北武汉	大学	中共党员	湖北省人民政府	处长	
周永年	男	2110.06	汉族	福建福州	大学	中共党员	福建省人民政府	处长	
吴永年	男	2115.10	汉族	广东广州	大学	中共党员	广东省人民政府	处长	
陈永年	男	2120.04	汉族	四川成都	大学	中共党员	四川省人民政府	处长	
林永年	男	2125.08	汉族	重庆重庆	大学	中共党员	重庆市政府	处长	
黄永年	男	2130.12	汉族	贵州贵阳	大学	中共党员	贵州省人民政府	处长	
刘永年	男	2135.06	汉族	云南昆明	大学	中共党员	云南省人民政府	处长	
孙永年	男	2140.10	汉族	陕西西安	大学	中共党员	陕西省人民政府	处长	
周永年	男	2145.04	汉族	甘肃兰州	大学	中共党员	甘肃省人民政府	处长	
吴永年	男	2150.08	汉族	宁夏银川	大学	中共党员	宁夏回族自治区人民政府	处长	
陈永年	男	2155.12	汉族	青海西宁	大学	中共党员	青海省人民政府	处长	
林永年	男	2160.06	汉族	新疆乌鲁木齐	大学	中共党员	新疆维吾尔自治区人民政府	处长	
黄永年	男	2165.10	汉族	内蒙古呼和浩特	大学	中共党员	内蒙古自治区人民政府	处长	
刘永年	男	2170.04	汉族	辽宁沈阳	大学	中共党员	辽宁省人民政府	处长	
孙永年	男	2175.08	汉族	吉林长春	大学	中共党员	吉林省人民政府	处长	
周永年	男	2180.12	汉族	黑龙江哈尔滨	大学	中共党员	黑龙江省人民政府	处长	
吴永年	男	2185.06	汉族	河北石家庄	大学	中共党员	河北省人民政府	处长	
陈永年	男	2190.10	汉族	河南郑州	大学	中共党员	河南省人民政府	处长	
林永年	男	2195.04	汉族	山东烟台	大学	中共党员	山东省人民政府	处长	
黄永年	男	2200.08	汉族	江苏苏州	大学	中共党员	江苏省人民政府	处长	
刘永年	男	2205.12	汉族	浙江杭州	大学	中共党员	浙江省人民政府	处长	
孙永年	男	2210.06	汉族	安徽合肥	大学	中共党员	安徽省人民政府	处长	
周永年	男	2215.10	汉族	江西九江	大学	中共党员	江西省人民政府	处长	
吴永年	男	2220.04	汉族	广西桂林	大学	中共党员	广西壮族自治区人民政府	处长	
陈永年	男	2225.08	汉族	湖南长沙	大学	中共党员	湖南省人民政府	处长	
林永年	男	2230.12	汉族	湖北武汉	大学	中共党员	湖北省人民政府	处长	
黄永年	男	2235.06	汉族	福建福州	大学	中共党员	福建省人民政府	处长	
刘永年	男	2240.10	汉族	广东广州	大学	中共党员	广东省人民政府	处长	
孙永年	男	2245.04	汉族	四川成都	大学	中共党员	四川省人民政府	处长	
周永年	男	2250.08	汉族	重庆重庆	大学	中共党员	重庆市政府	处长	
吴永年	男	2255.12	汉族	贵州贵阳	大学	中共党员	贵州省人民政府	处长	
陈永年	男	2260.06	汉族	云南昆明	大学	中共党员	云南省人民政府	处长	
林永年	男	2265.10	汉族	陕西西安	大学	中共党员	陕西省人民政府	处长	
黄永年	男	2270.04	汉族	甘肃兰州	大学	中共党员	甘肃省人民政府	处长	
刘永年	男	2275.08	汉族	宁夏银川	大学	中共党员	宁夏回族自治区人民政府	处长	
孙永年	男	2280.12	汉族	青海西宁	大学	中共党员	青海省人民政府	处长	
周永年	男	2285.06	汉族	新疆乌鲁木齐	大学	中共党员	新疆维吾尔自治区人民政府	处长	
吴永年	男	2290.10	汉族	内蒙古呼和浩特	大学	中共党员	内蒙古自治区人民政府	处长	
陈永年	男	2295.04	汉族	辽宁沈阳	大学	中共党员	辽宁省人民政府	处长	
林永年	男	2300.08	汉族	吉林长春	大学	中共党员	吉林省人民政府	处长	
黄永年	男	2305.12	汉族	黑龙江哈尔滨	大学	中共党员	黑龙江省人民政府	处长	
刘永年	男	2310.06	汉族	河北石家庄	大学	中共党员	河北省人民政府	处长	
孙永年	男	2315.10	汉族	河南郑州	大学	中共党员	河南省人民政府	处长	
周永年	男	2320.04	汉族	山东烟台	大学	中共党员	山东省人民政府	处长	
吴永年	男	2325.08	汉族	江苏苏州	大学	中共党员	江苏省人民政府	处长	
陈永年	男	2330.12	汉族	浙江杭州	大学	中共党员	浙江省人民政府	处长	
林永年	男	2335.06	汉族	安徽合肥	大学	中共党员	安徽省人民政府	处长	
黄永年	男	2340.10	汉族	江西九江	大学	中共党员	江西省人民政府	处长	
刘永年	男	2345.04	汉族	广西桂林	大学	中共党员	广西壮族自治区人民政府	处长	
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周永年	男	2355.12	汉族	湖北武汉	大学	中共党员	湖北省人民政府	处长	
吴永年	男	2360.06	汉族	福建福州	大学	中共党员	福建省人民政府	处长	
陈永年	男	2365.10	汉族	广东广州	大学	中共党员	广东省人民政府	处长	
林永年	男	2370.04	汉族	四川成都	大学	中共党员	四川省人民政府	处长	
黄永年	男	2375.08	汉族	重庆重庆	大学	中共党员	重庆市政府	处长	
刘永年	男	2380.12	汉族	贵州贵阳	大学	中共党员	贵州省人民政府	处长	
孙永年	男	2385.06	汉族	云南昆明	大学	中共党员	云南省人民政府	处长	
周永年	男	2390.10	汉族	陕西西安	大学	中共党员	陕西省人民政府	处长	
吴永年	男	2395.04	汉族	甘肃兰州	大学	中共党员	甘肃省人民政府	处长	
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林永年	男	2405.12	汉族	青海西宁	大学	中共党员	青海省人民政府	处长	
黄永年	男	2410.06	汉族	新疆乌鲁木齐	大学	中共党员	新疆维吾尔自治区人民政府	处长	
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林永年	男	2440.10	汉族	河南郑州	大学	中共党员	河南省人民政府	处长	
黄永年	男	2445.04	汉族	山东烟台	大学	中共党员	山东省人民政府	处长	
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孙永年	男	2455.12	汉族	浙江杭州	大学	中共党员	浙江省人民政府	处长	
周永年	男	2460.06	汉族	安徽合肥	大学	中共党员	安徽省人民政府	处长	
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林永年	男	2475.08	汉族	湖南长沙	大学	中共党员	湖南省人民政府	处长	
黄永年	男	2480.12	汉族	湖北武汉	大学	中共党员	湖北省人民政府	处长	
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周永年	男	2495.04	汉族	四川成都	大学	中共党员	四川省人民政府	处长	
吴永年	男	2500.08	汉族	重庆重庆	大学	中共党员	重庆市政府	处长	
陈永年	男	2505.12	汉族	贵州贵阳	大学	中共党员	贵州省人民政府	处长	
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黄永年	男	2515.10	汉族	陕西西安	大学	中共党员	陕西省人民政府	处长	
刘永年	男	2520.04	汉族	甘肃兰州	大学	中共党员	甘肃省人民政府	处长	
孙永年	男	2525.08	汉族	宁夏银川	大学	中共党员	宁夏回族自治区人民政府	处长	
周永年	男	2530.12	汉族	青海西宁	大学	中共党员	青海省人民政府	处长	
吴永年	男	2535.06	汉族	新疆乌鲁木齐	大学	中共党员	新疆维吾尔自治区人民政府	处长	
陈永年	男	2540.10	汉族	内蒙古呼和浩特	大学	中共党员	内蒙古自治区人民政府	处长	
林永年	男	2545.04	汉族	辽宁沈阳	大学	中共党员	辽宁省人民政府	处长	
黄永年	男	2550.08	汉族	吉林长春	大学	中共党员	吉林省人民政府	处长	
刘永年	男	2555.12	汉族	黑龙江哈尔滨	大学	中共党员	黑龙江省人民政府	处长	
孙永年	男	2560.06	汉族	河北石家庄	大学	中共党员	河北省人民政府	处长	
周永年	男	2565.10	汉族	河南郑州	大学	中共党员	河南省人民政府	处长	
吴永年	男	2570.04	汉族	山东烟台	大学	中共党员	山东省人民政府	处长	
陈永年	男	2575.08	汉族	江苏苏州	大学	中共党员	江苏省人民政府	处长	
林永年	男	2580.12	汉族	浙江杭州	大学	中共党员	浙江省人民政府	处长	
黄永年	男	2585.06	汉族	安徽合肥	大学	中共党员	安徽省人民政府	处长	
刘永年	男	2590.10	汉族	江西九江	大学	中共党员	江西省人民政府	处长	
孙永年	男	2595.04	汉族	广西桂林	大学	中共党员	广西壮族自治区人民政府	处长	
周永年	男	2600.08	汉族	湖南长沙	大学	中共党员	湖南省人民政府	处长	
吴永年	男	2605.12	汉族	湖北武汉	大学	中共党员	湖北省人民政府	处长	
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黄永年	男	2655.12	汉族	青海西宁	大学	中共党员	青海省人民政府	处长	
刘永年	男	2660.06	汉族	新疆乌鲁木齐	大学	中共党员	新疆维吾尔自治区人民政府	处长	
孙永年	男	2665.10	汉族	内蒙古呼和浩特	大学	中共党员	内蒙古自治区人民政府	处长	
周永年	男	2670.04	汉族	辽宁沈阳	大学	中共党员	辽宁省人民政府	处长	
吴永年	男	2675.08	汉族	吉林长春	大学	中共党员	吉林省人民政府	处长	
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林永年	男	2685.06	汉族	河北石家庄	大学	中共党员	河北省人民政府	处长	
黄永年	男	2690.10	汉族	河南郑州	大学	中共党员	河南省人民政府	处长	
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林永年	男	2720.04	汉族	广西桂林	大学	中共党员	广西壮族自治区人民政府	处长	
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吴永年	男	2780.12	汉族	青海西宁	大学	中共党员	青海省人民政府	处长	
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黄永年	男	2795.04	汉族	辽宁沈阳	大学	中共党员	辽宁省人民政府	处长	
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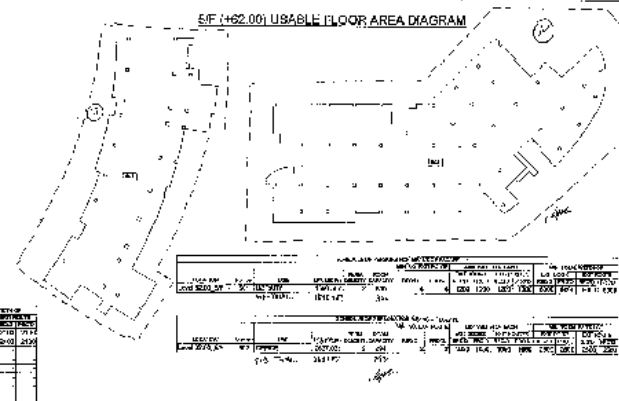
Vice President
 Chief Marketing Officer
 Chief Design Director
 Director of Operations

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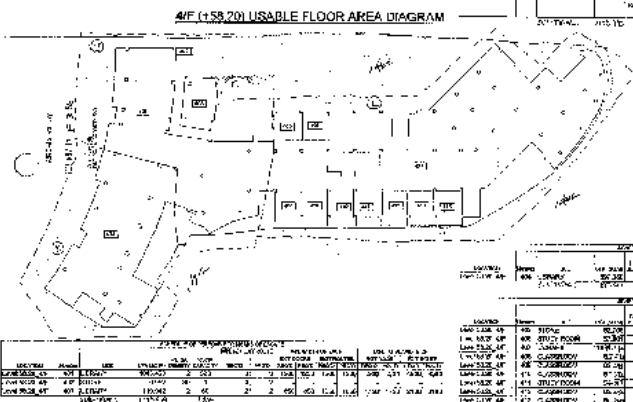
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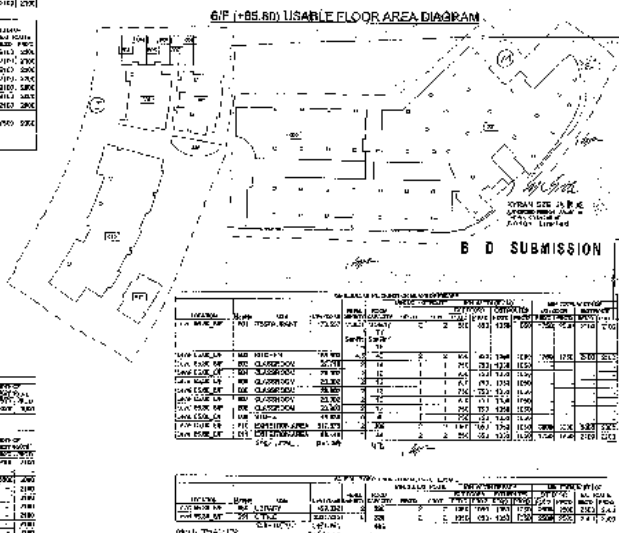


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4/F (+58.20) USABLE FLOOR AREA DIAGRAM

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6/F (+85.80) USABLE FLOOR AREA DIAGRAM

[illegible]

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J. M. Applegate
 CHIEF OF ALB.
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SEMPER PARATUS

Hypoxia Conditioning

Lactate Infusion

J Appl Physiol • VOL 97 • SEPTEMBER 2004
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ADDRESS	CAL L
CITY	NEW YORK
STATE	NEW YORK
ZIP	10008

Aedas

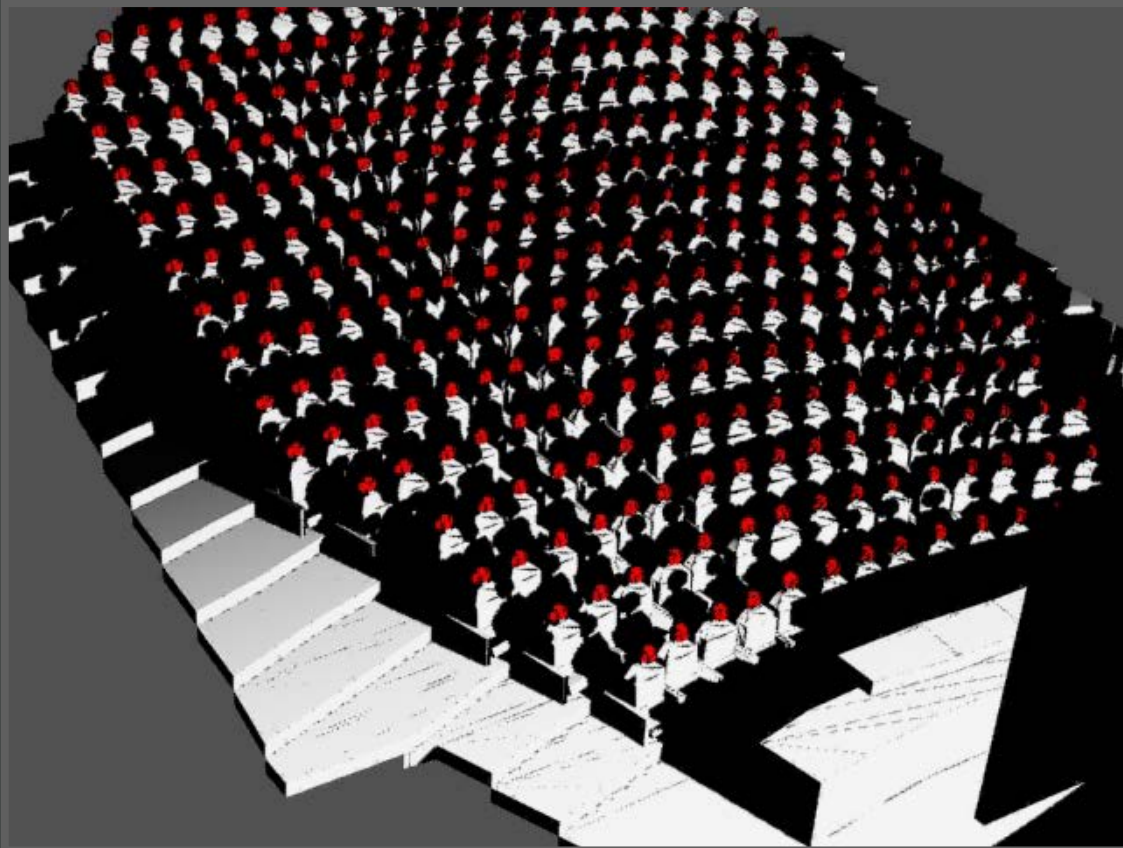


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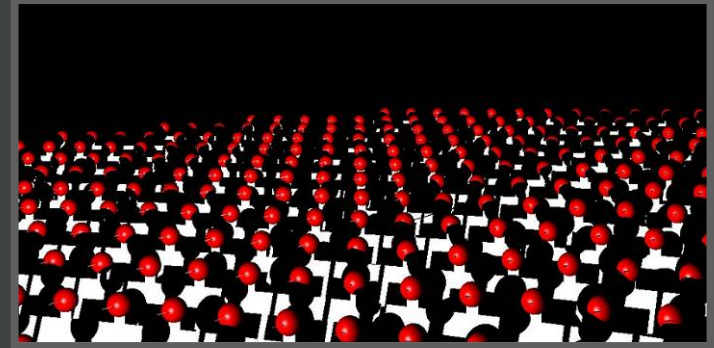
Use of Building Information Modeling (BIM)

Aedas

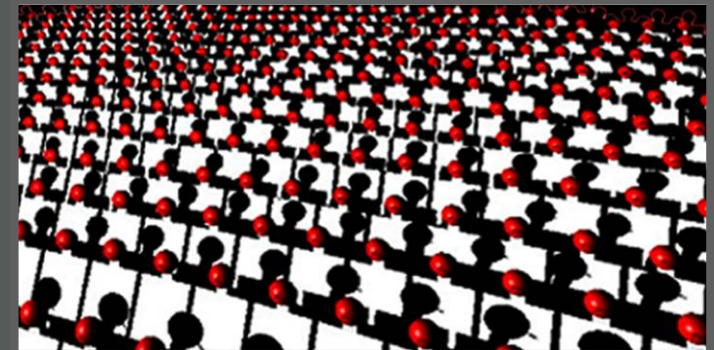
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2. Drawing Productions
3. Services Co-ordination and Clash detection with other disciplines
4. Quantity taking and preparation of Tender Document
5. Automated Statutory Submission
- 6. Scientific analysis of different environmental aspects** 様々な環境解析
7. Supply Chain Integration with the manufacturing and production
8. Complex Geometry



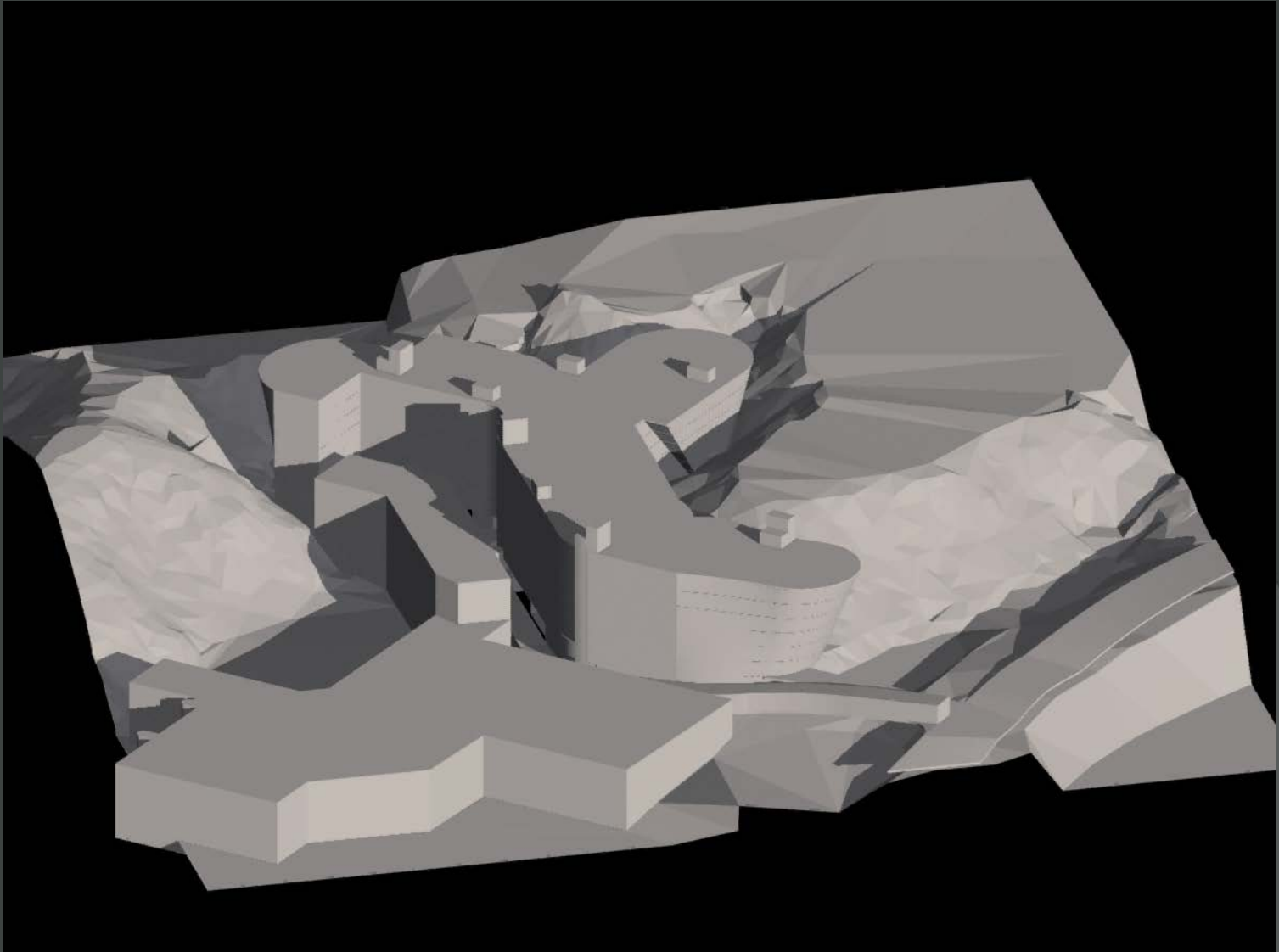
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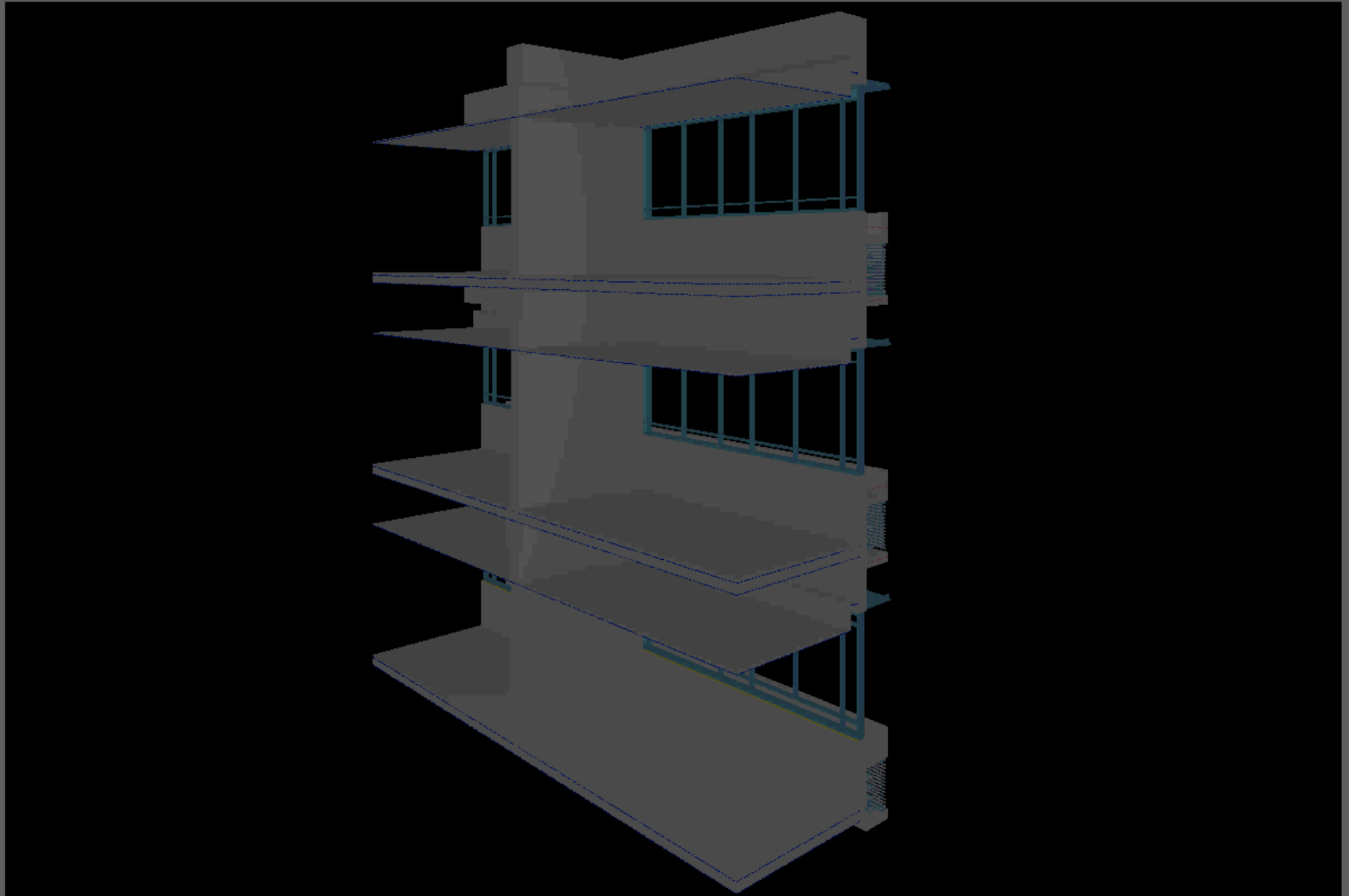
Unsatisfactory sightlines



Satisfactory sightlines

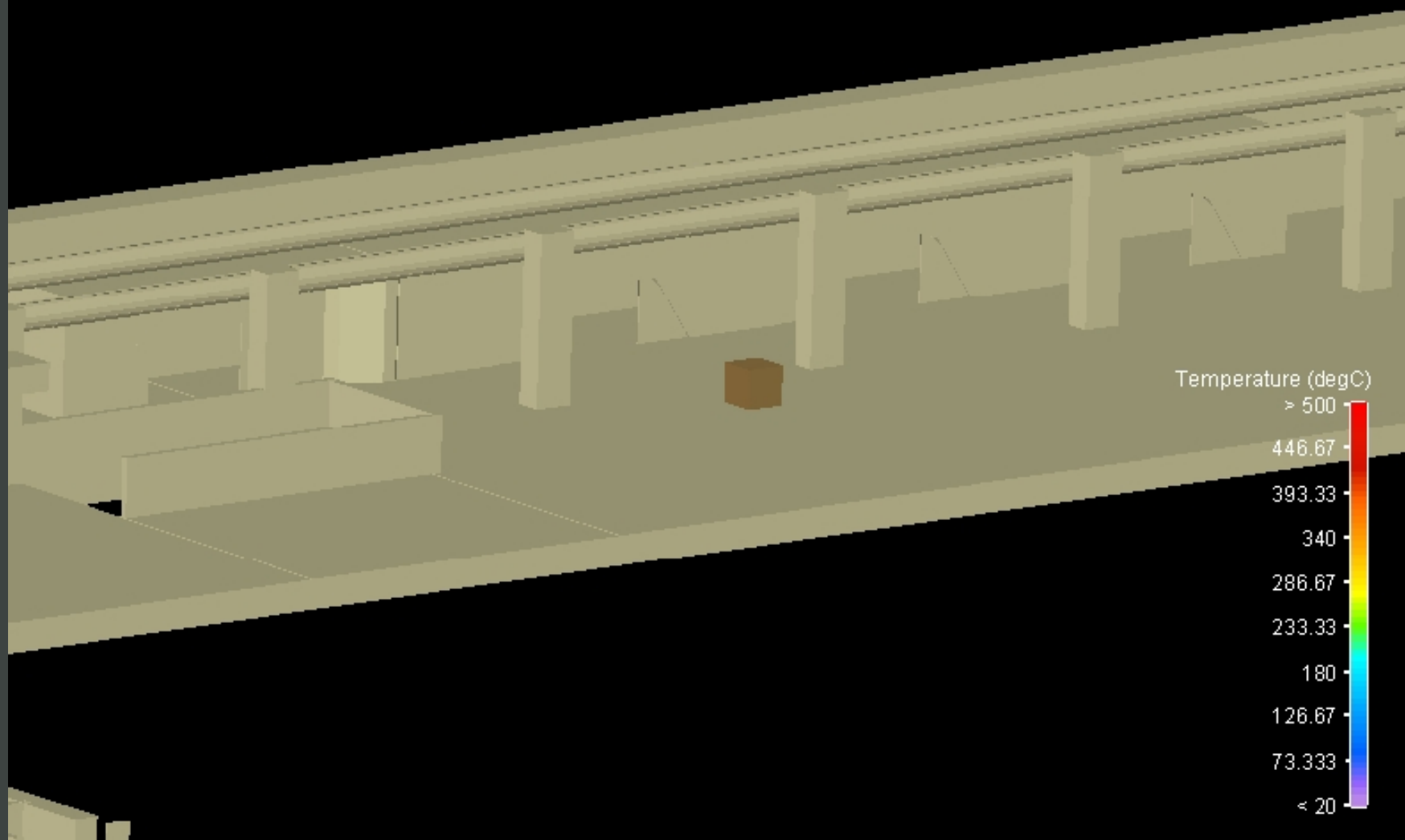


SUN STUDY

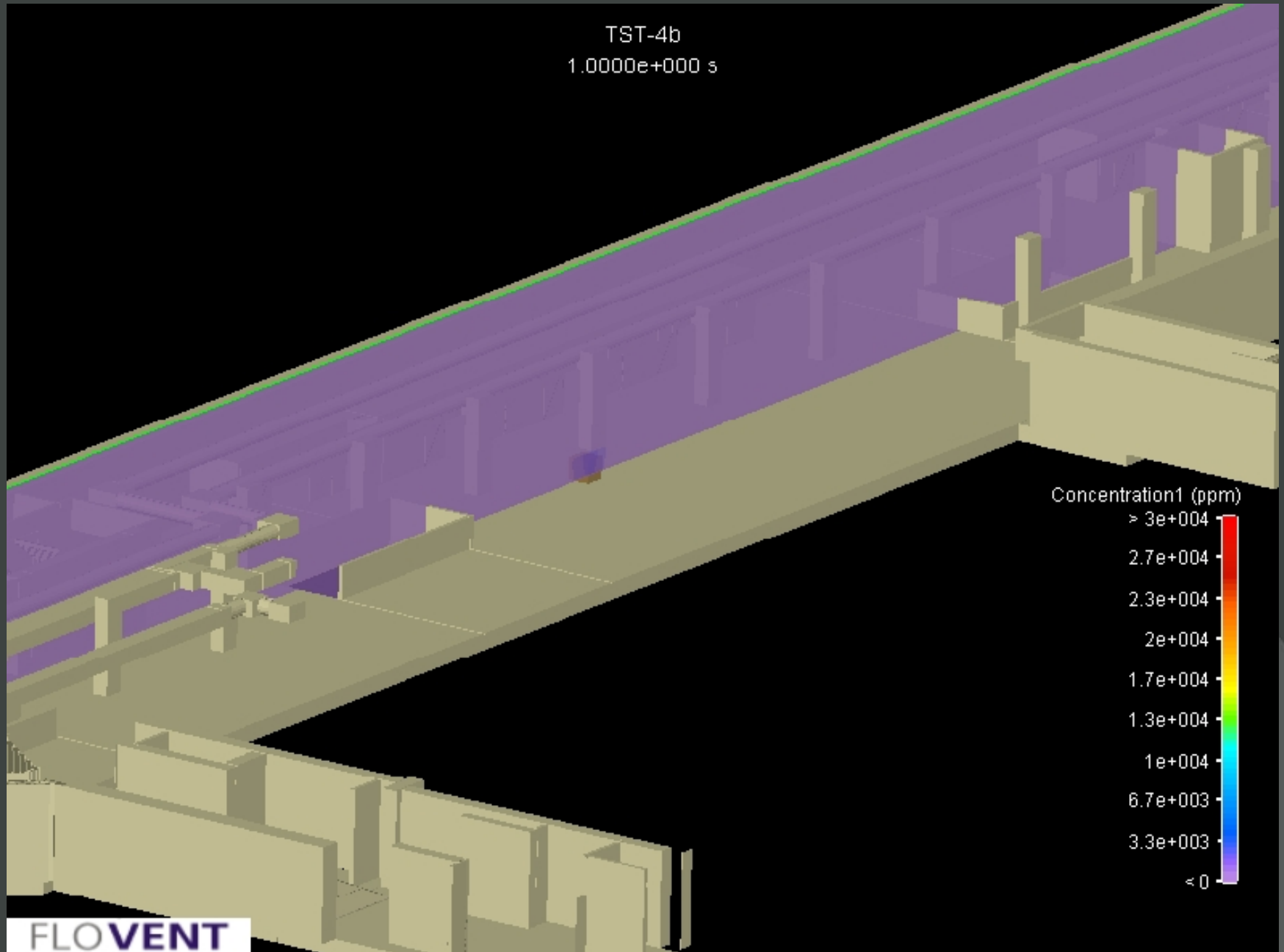


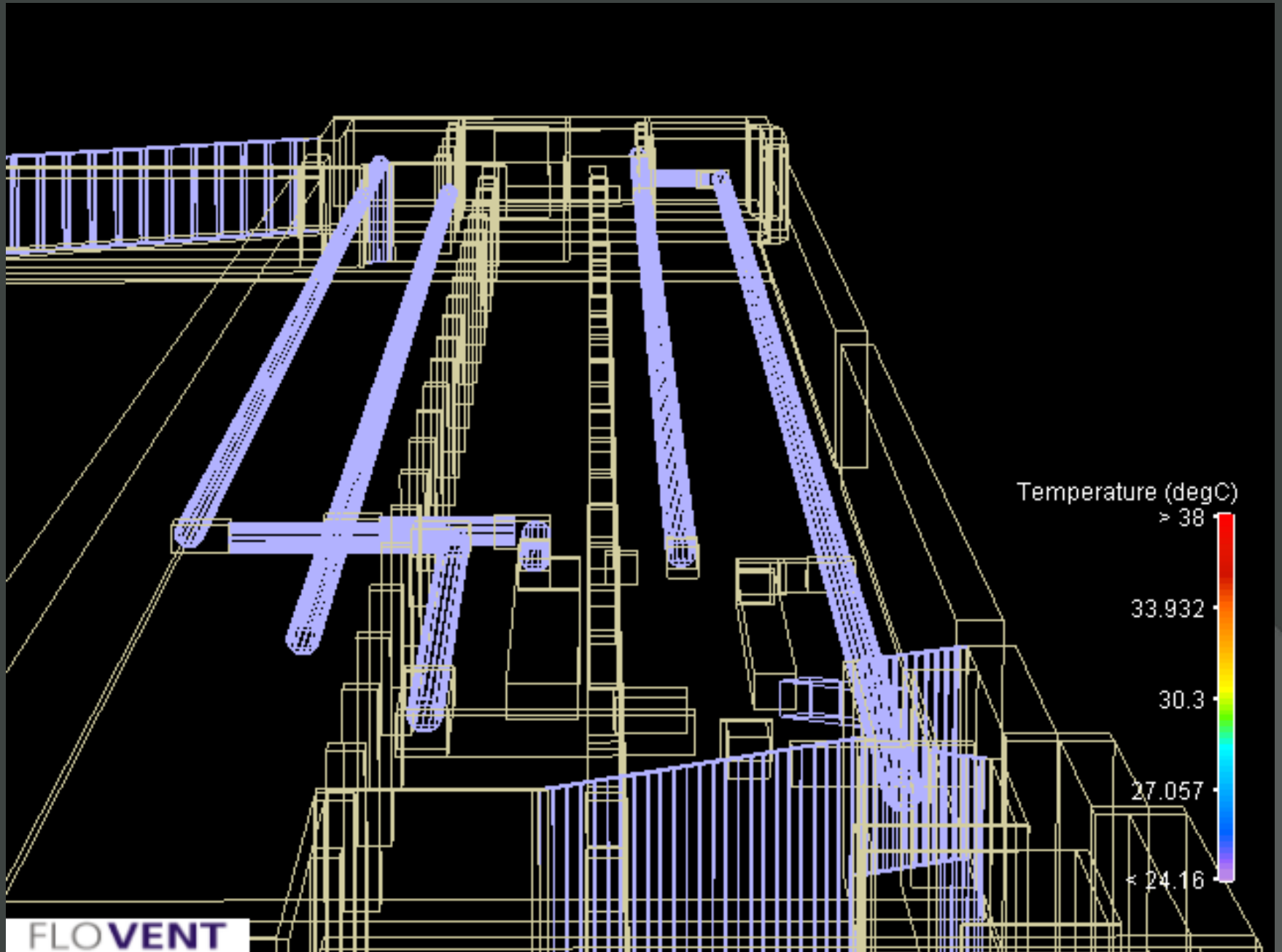
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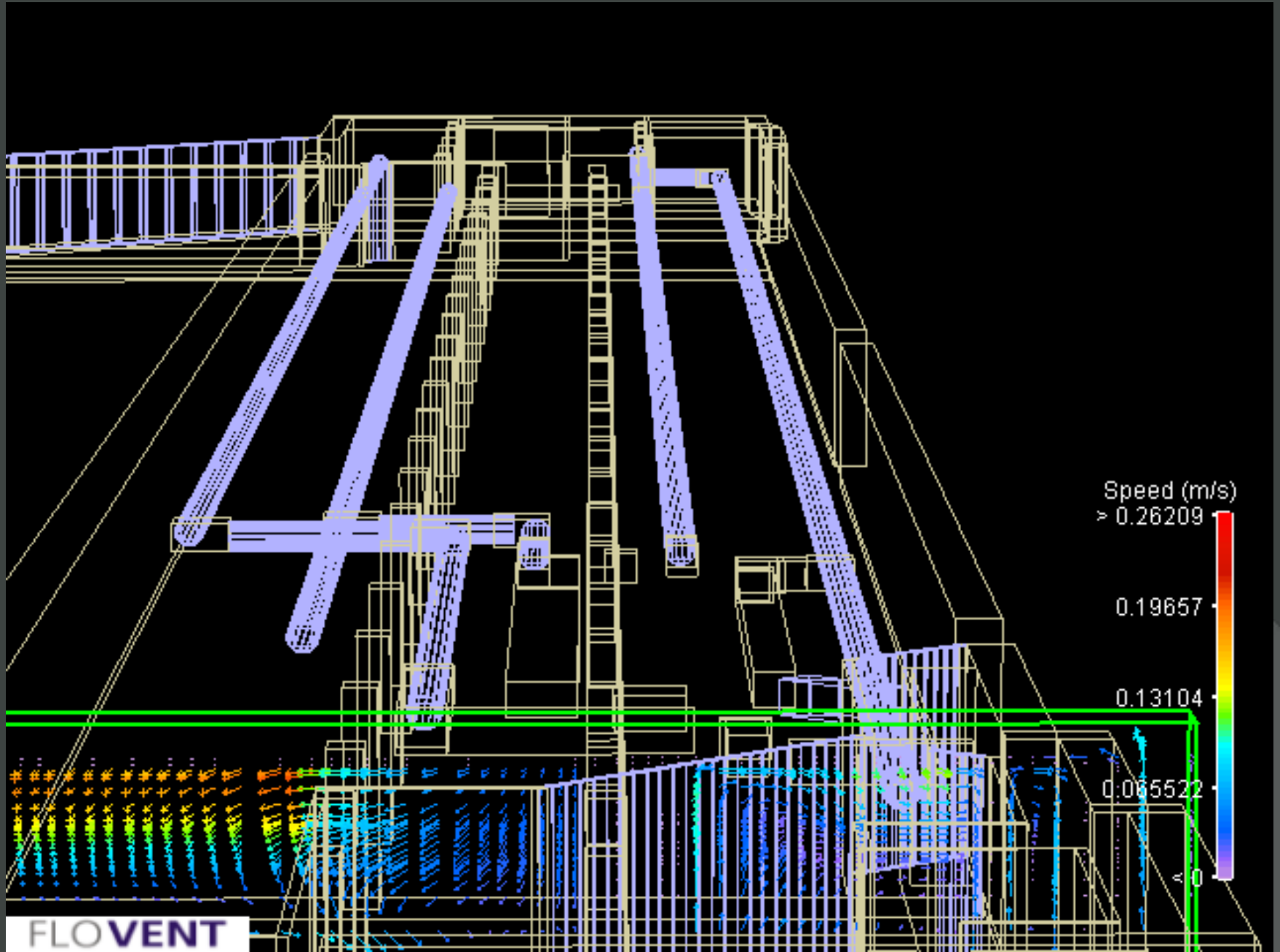
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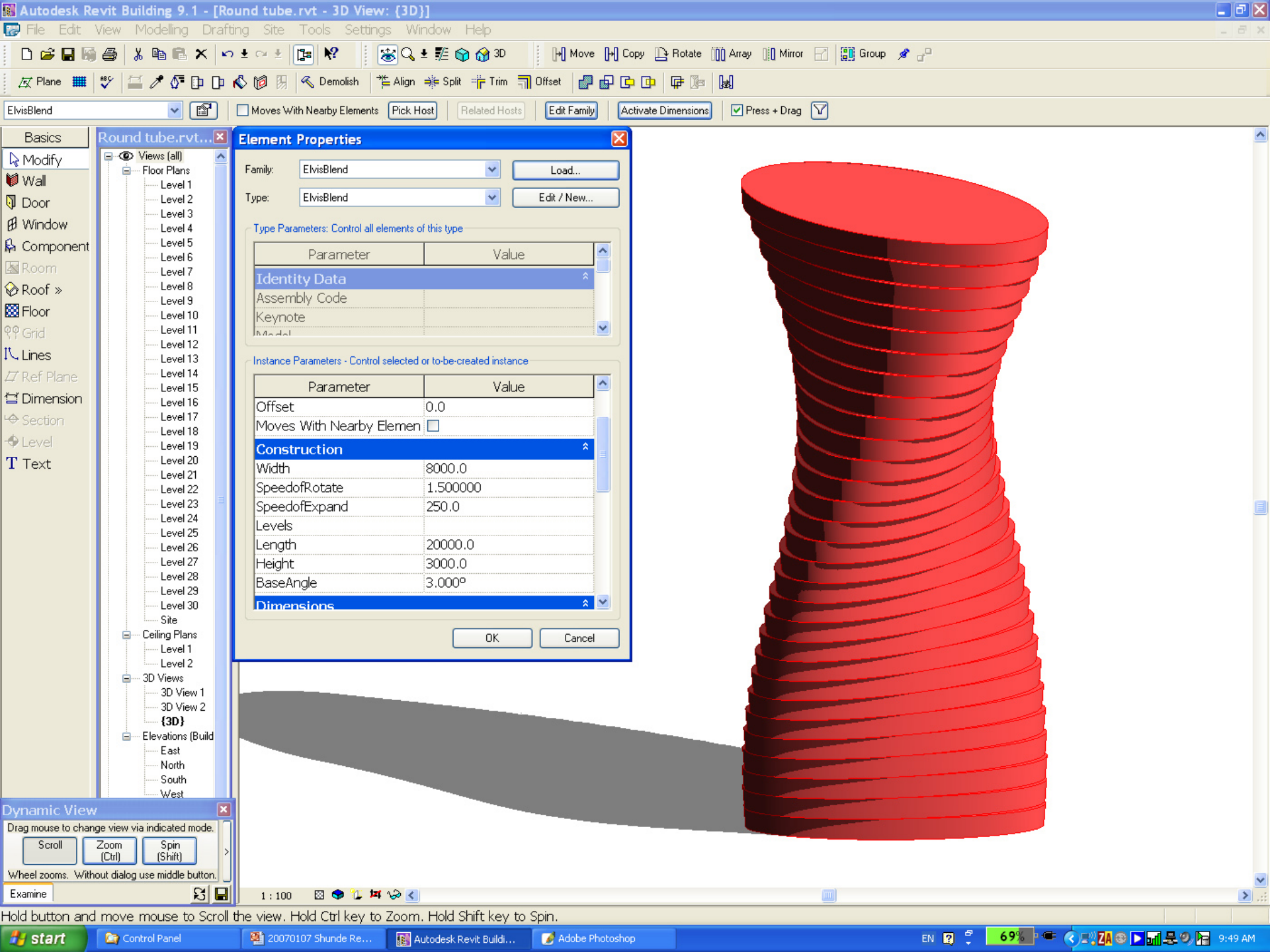


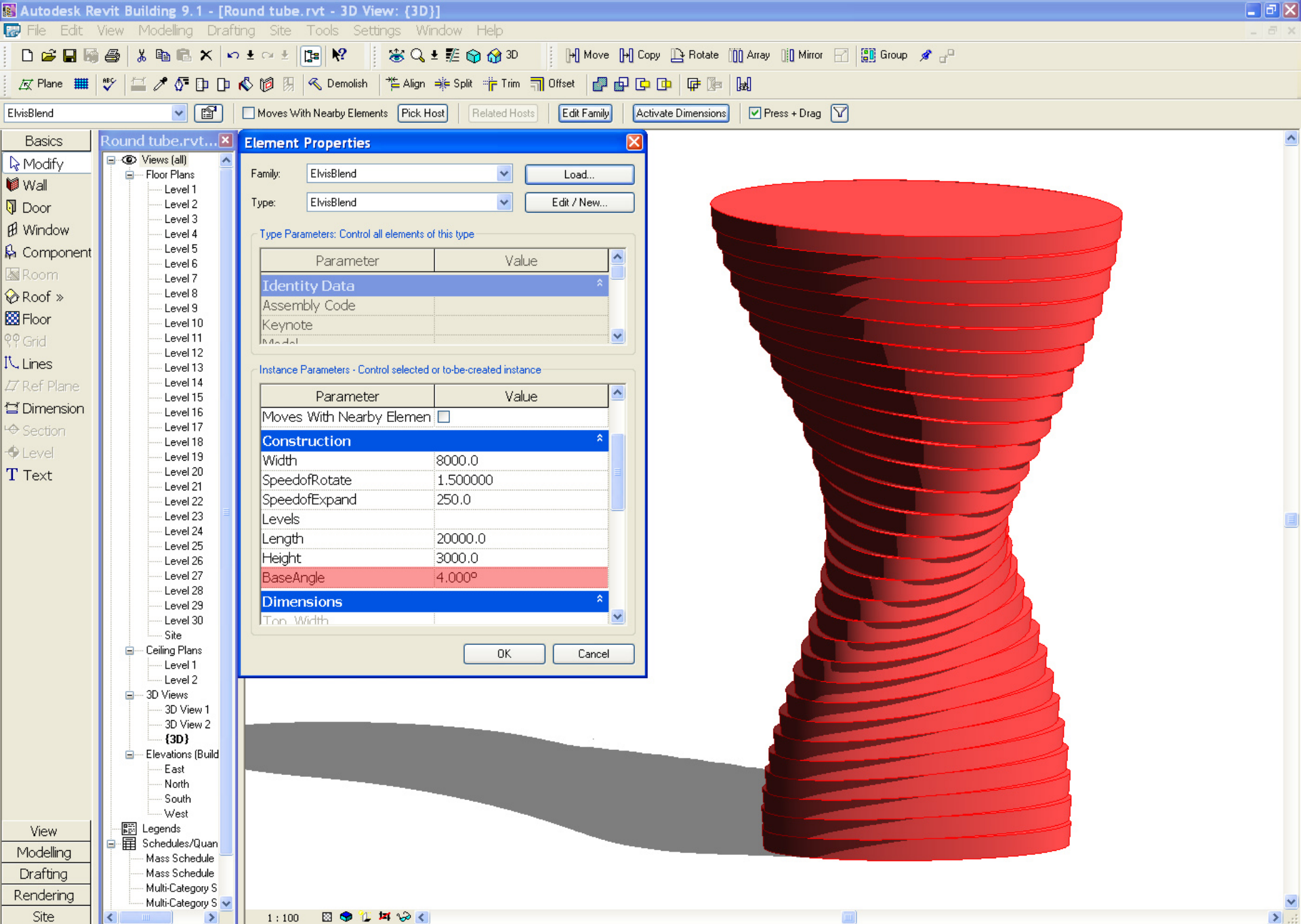
1. Design visualization
2. Drawing Productions
3. Services Co-ordination and Clash detection with other disciplines
4. Quantity taking and preparation of Tender Document
5. Automated Statutory Submission
6. Scientific analysis of different environmental aspects
- 7. Supply Chain Integration with the manufacturing and production**
サプライヤとの連携
8. Complex Geometry

Use of Building Information Modeling (BIM)

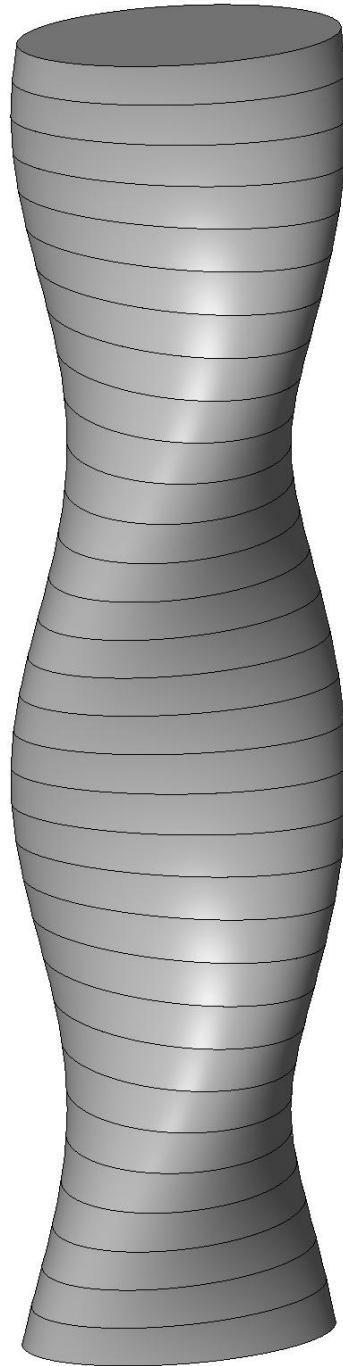
Aedas

1. Design visualization
2. Drawing Productions
3. Services Co-ordination and Clash detection with other disciplines
4. Quantity taking and preparation of Tender Document
5. Automated Statutory Submission
6. Scientific analysis of different environmental aspects
7. Supply Chain Integration with the manufacturing and production
8. **Complex Geometry** 複雑な形状を実現可能





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





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

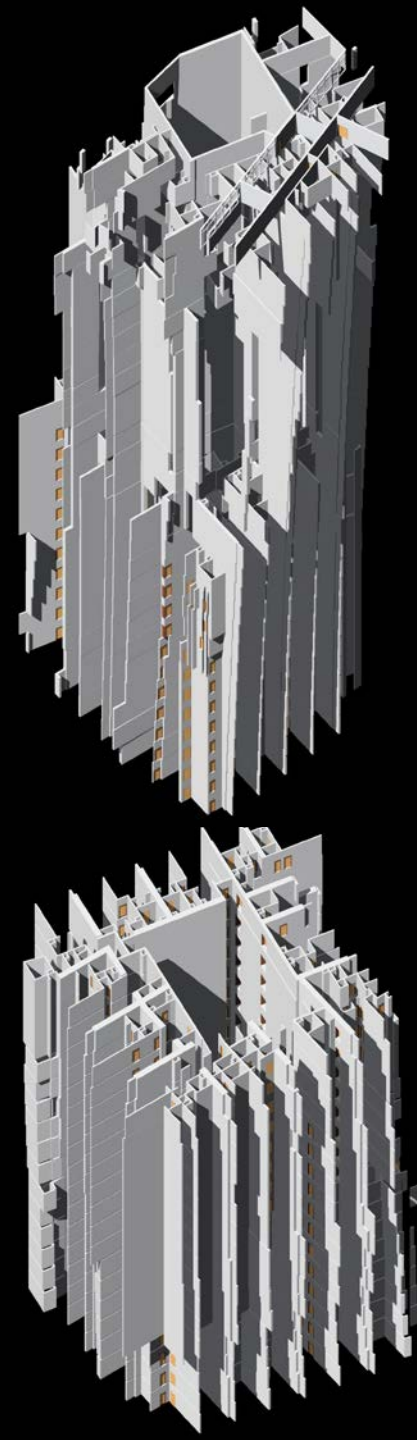




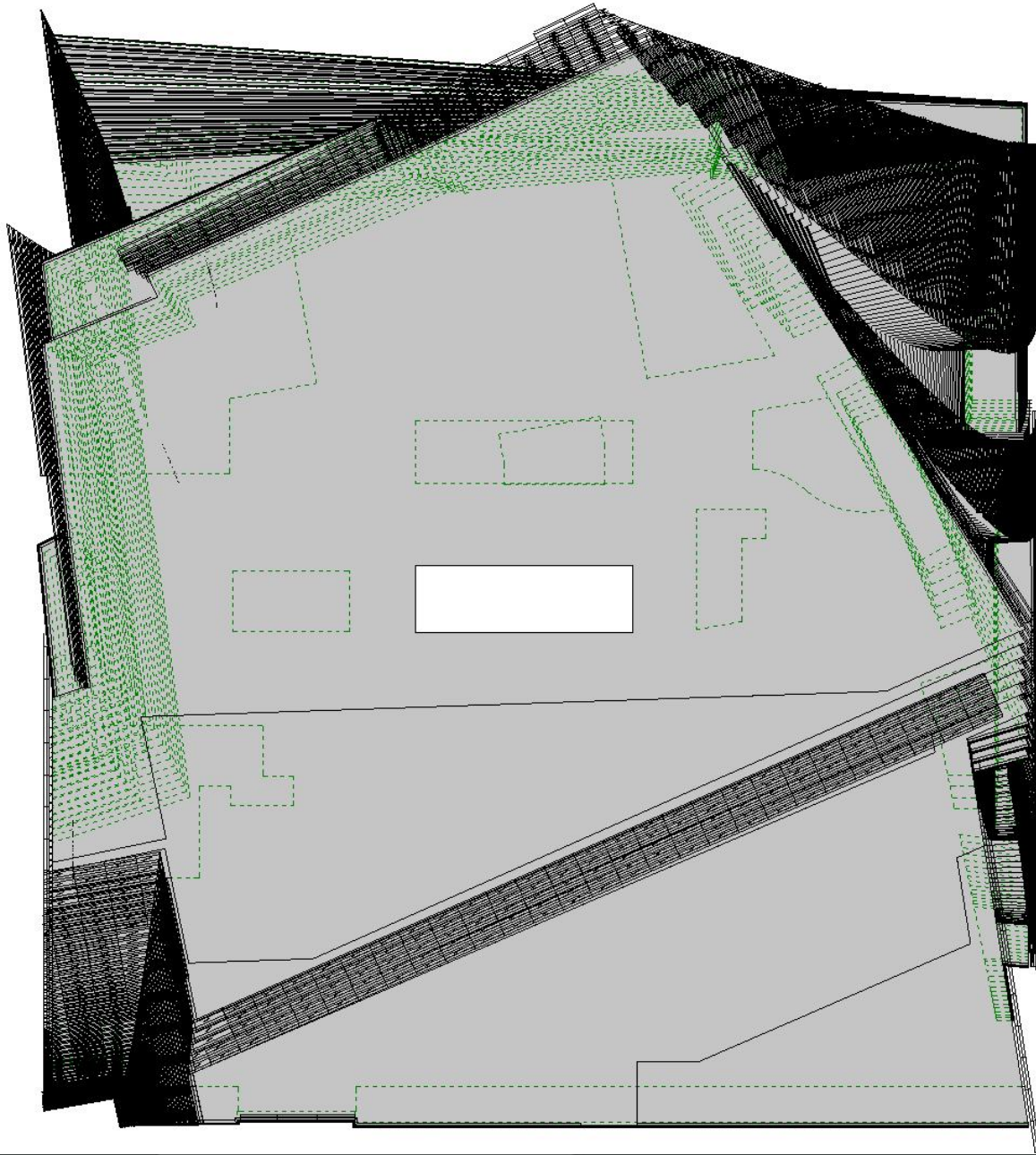
Program: Residential Site Area: 3,746 sqm
Floor Area: 659,659 sqm Building Height: 345 m

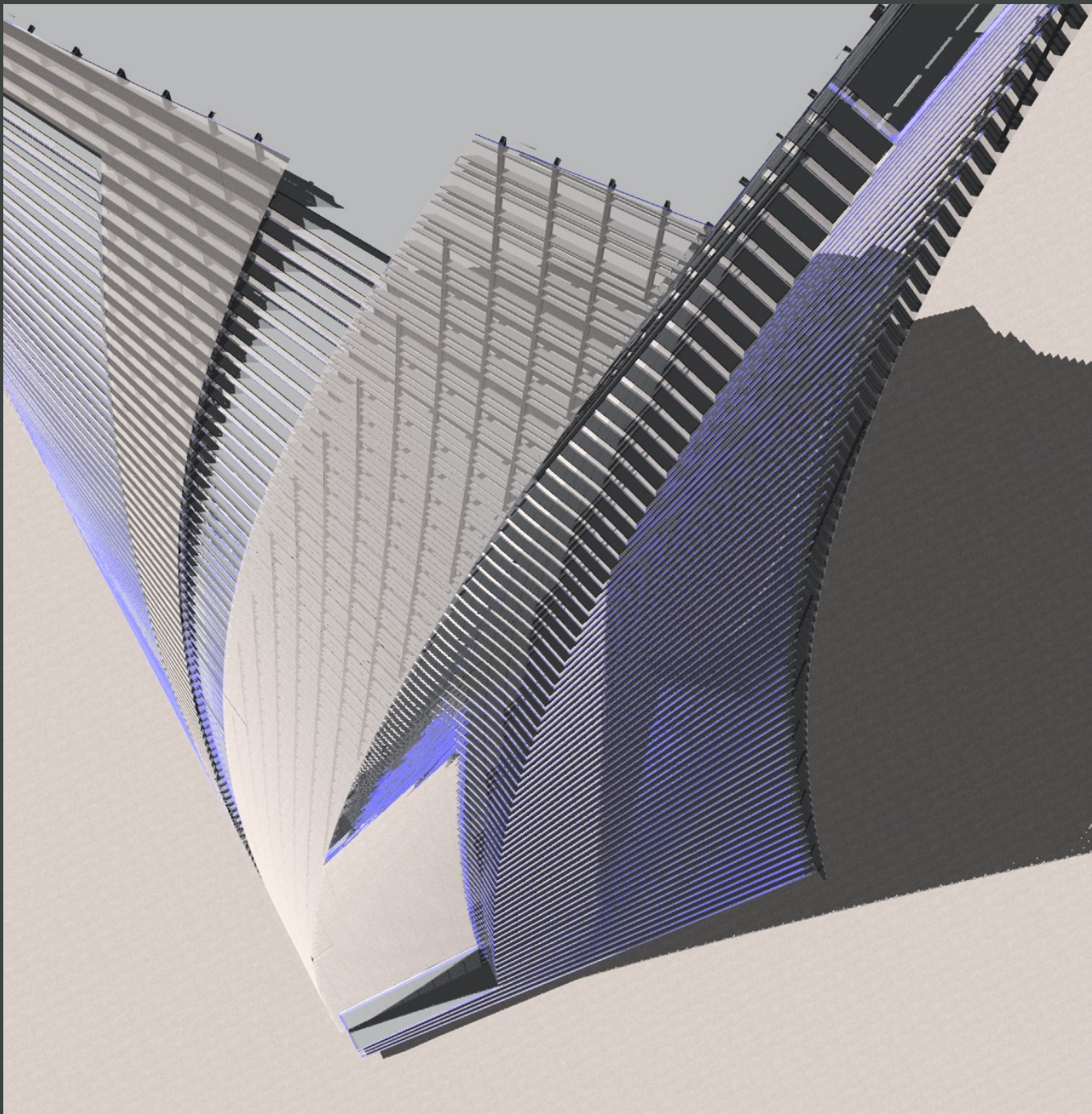


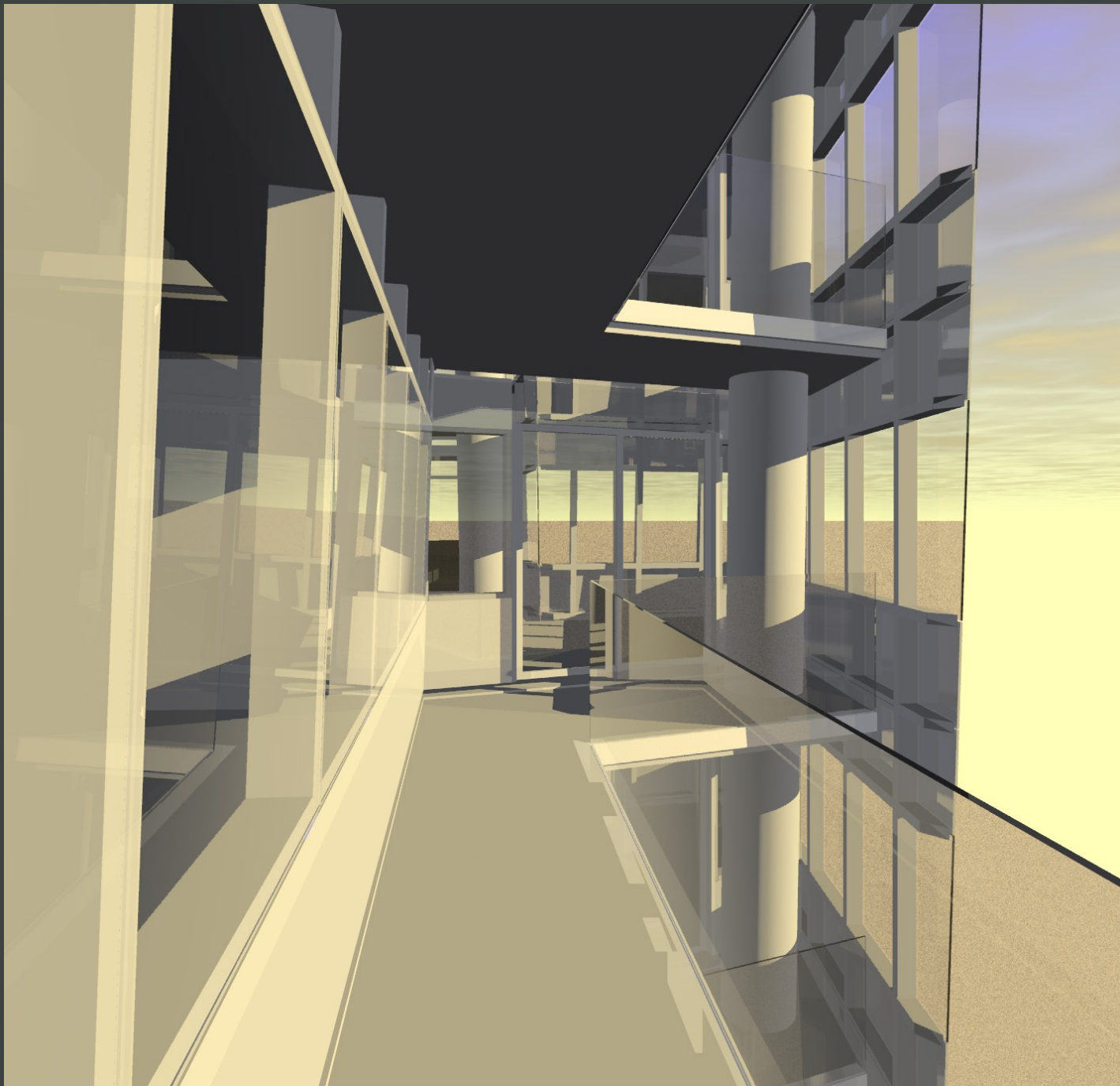
Dubai **Ocean Heights One**

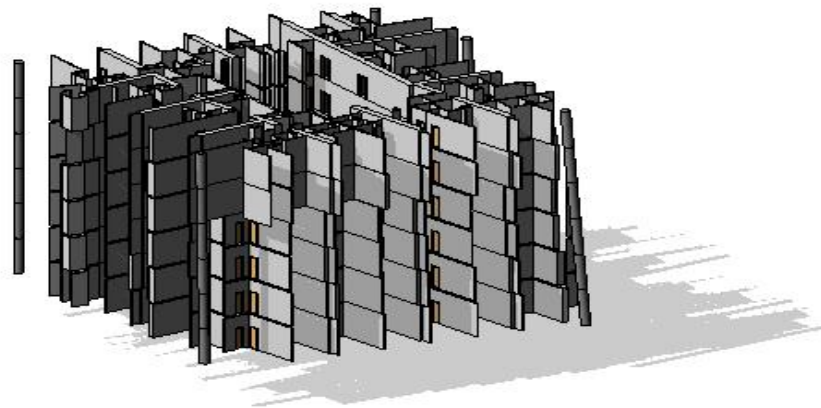


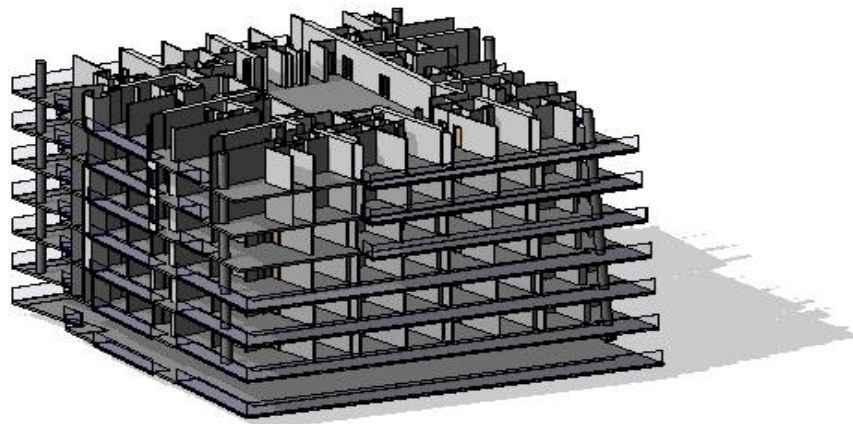
COMPLEX GEOMETRY









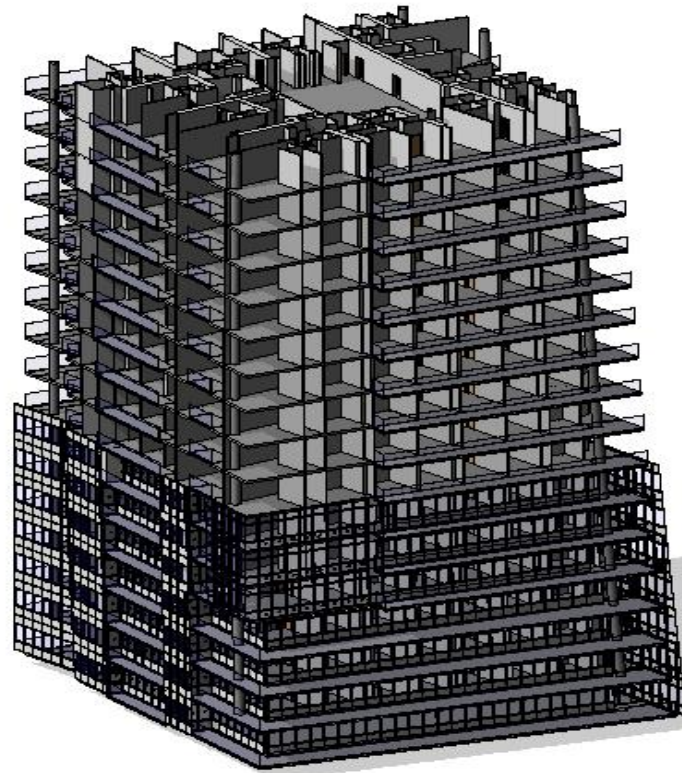


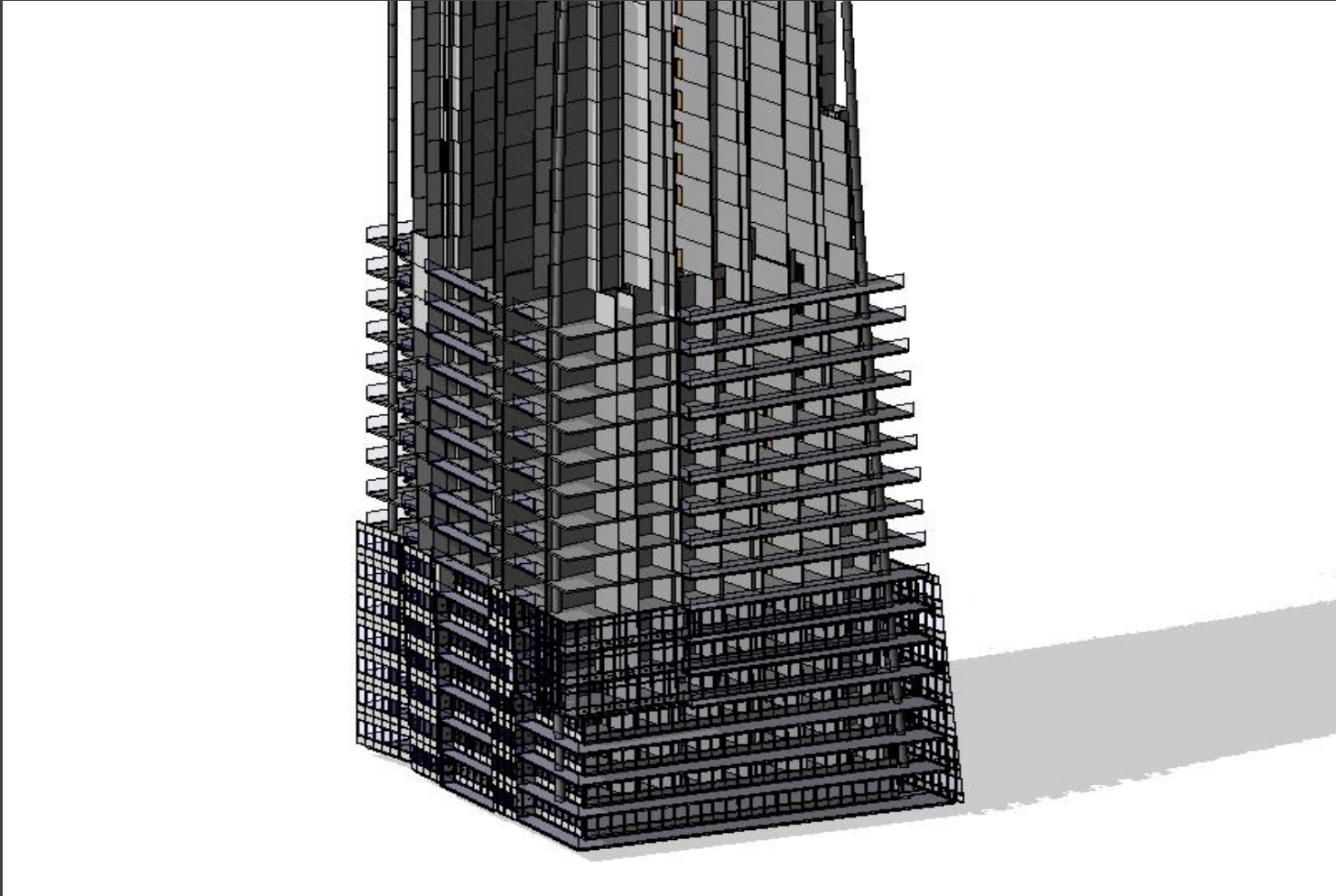








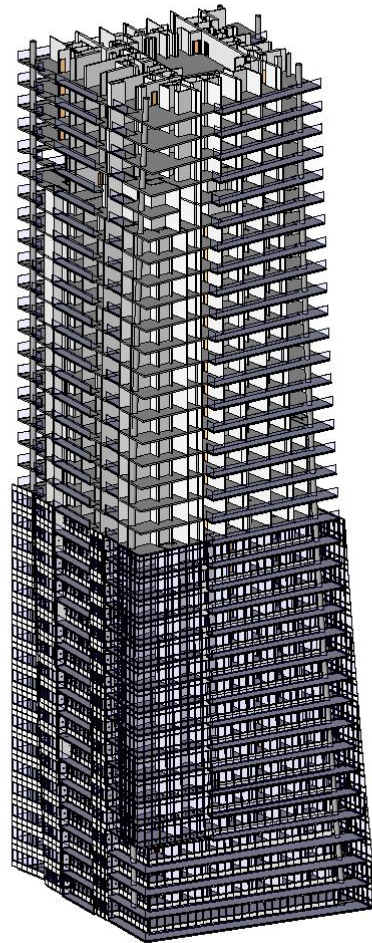


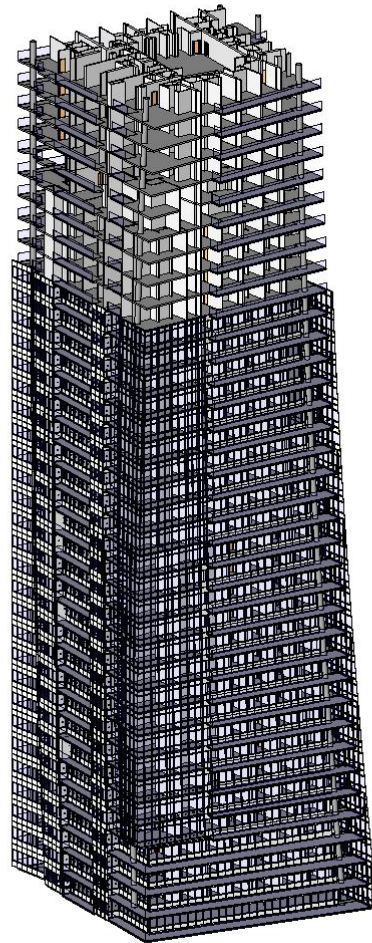


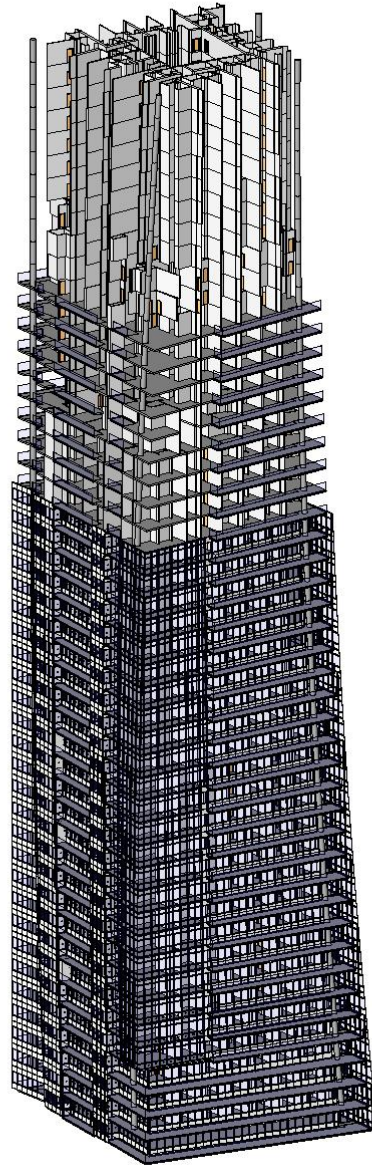


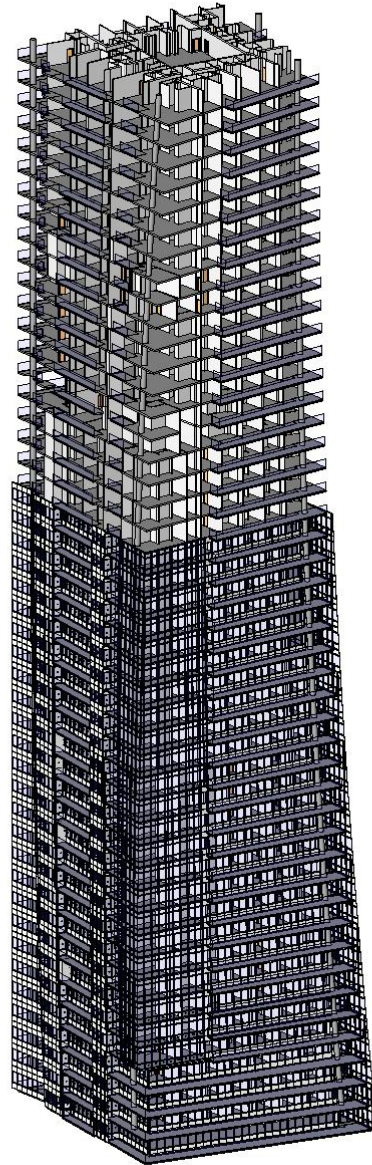


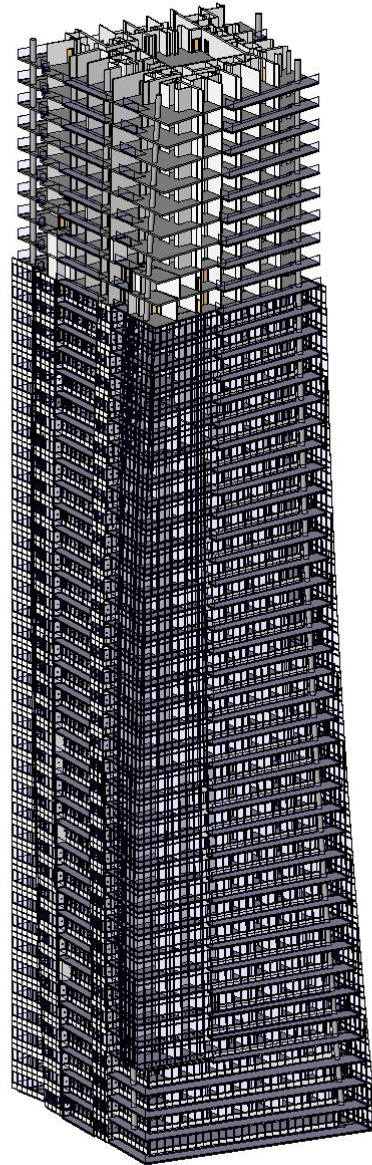


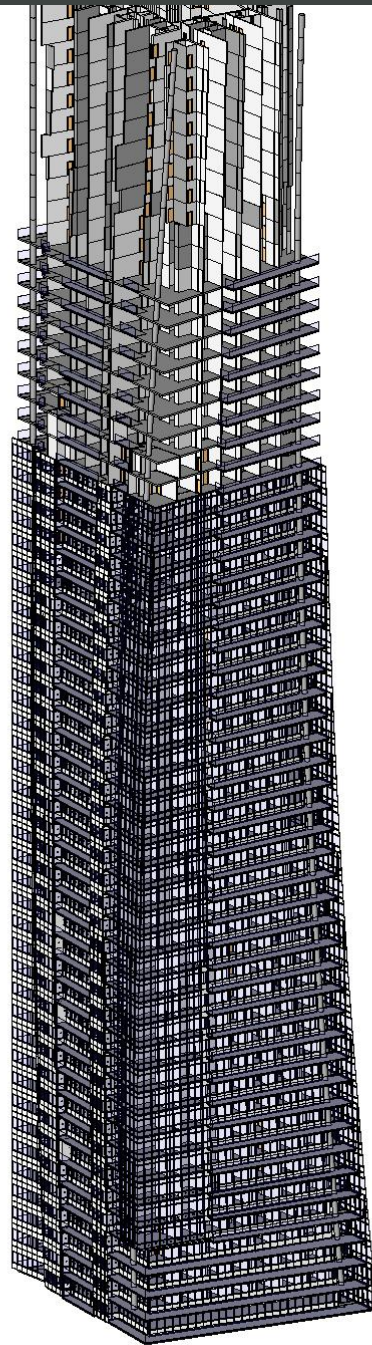


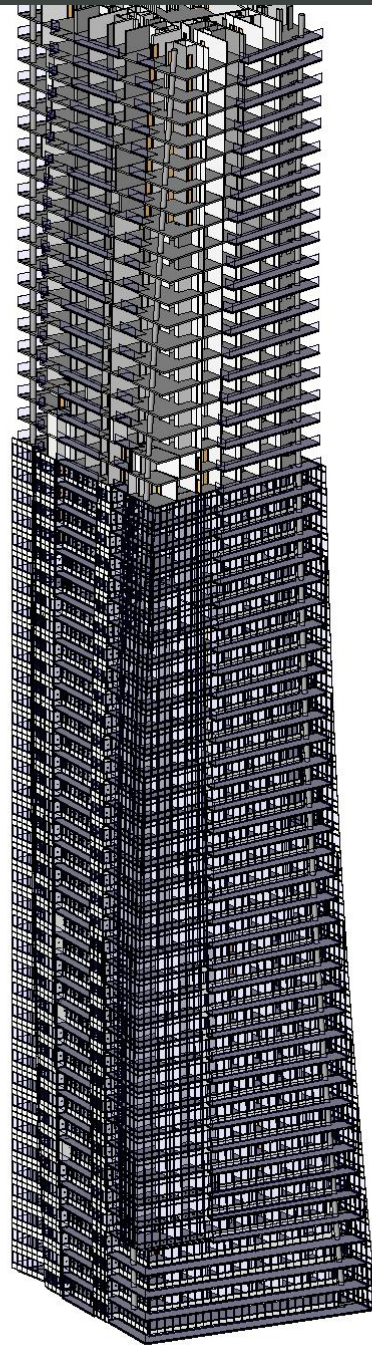


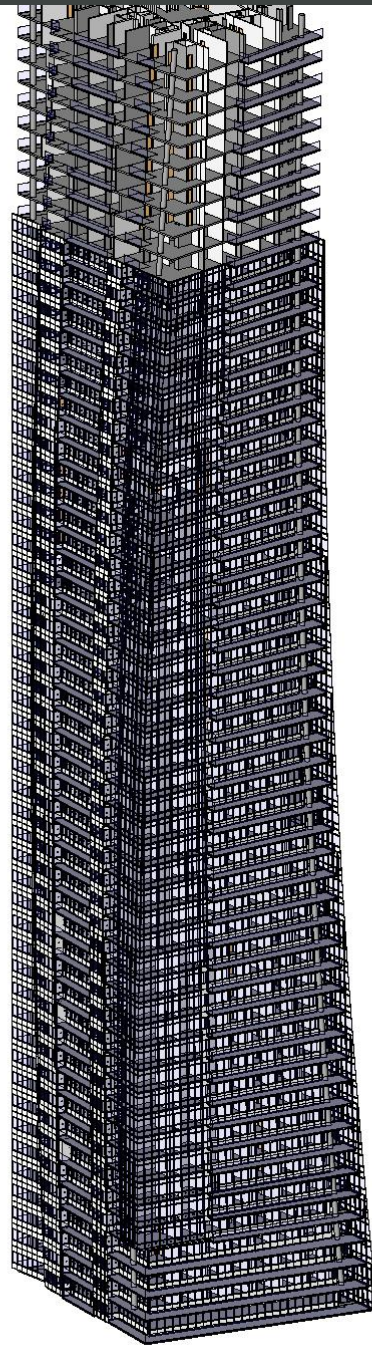
















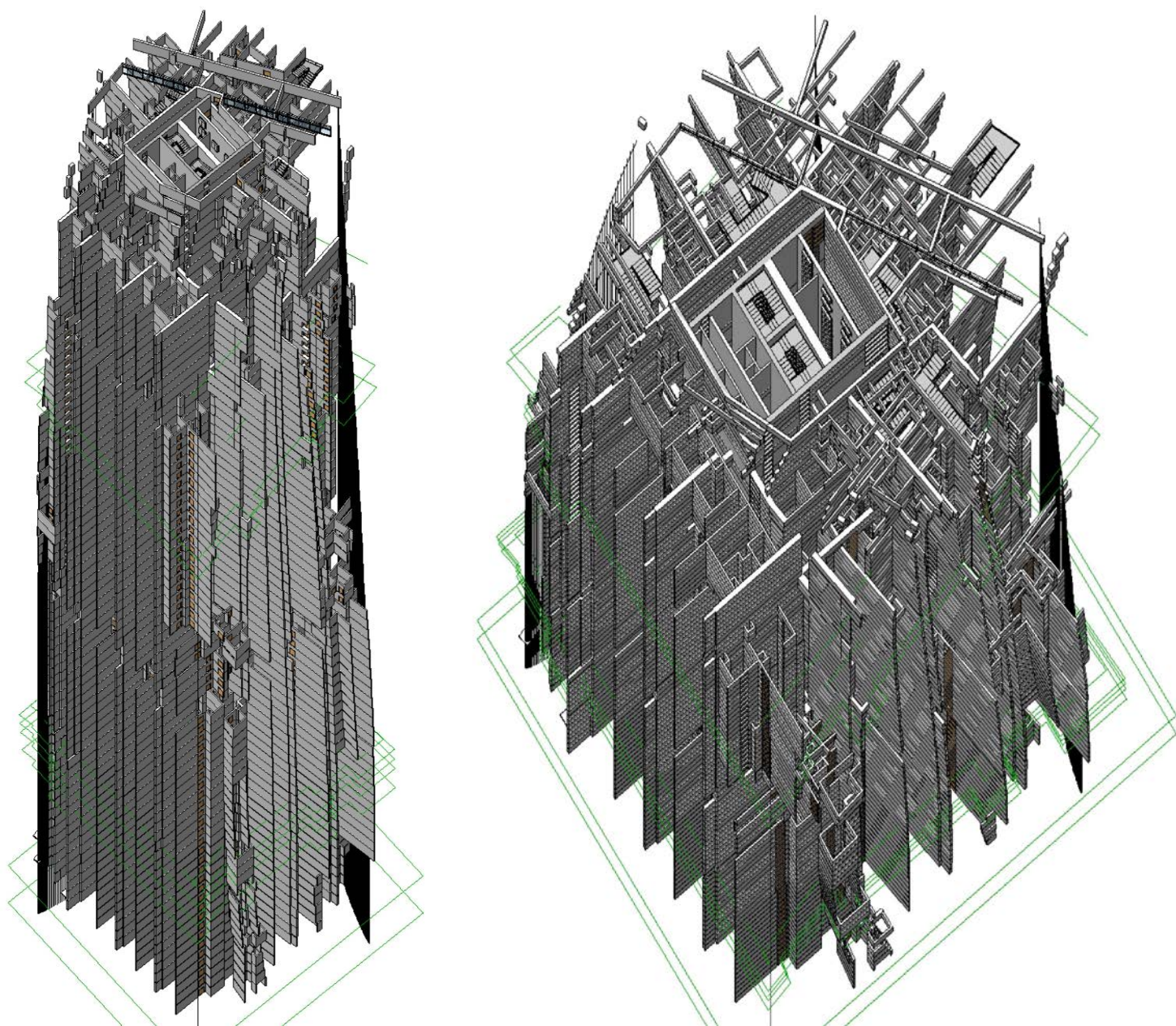




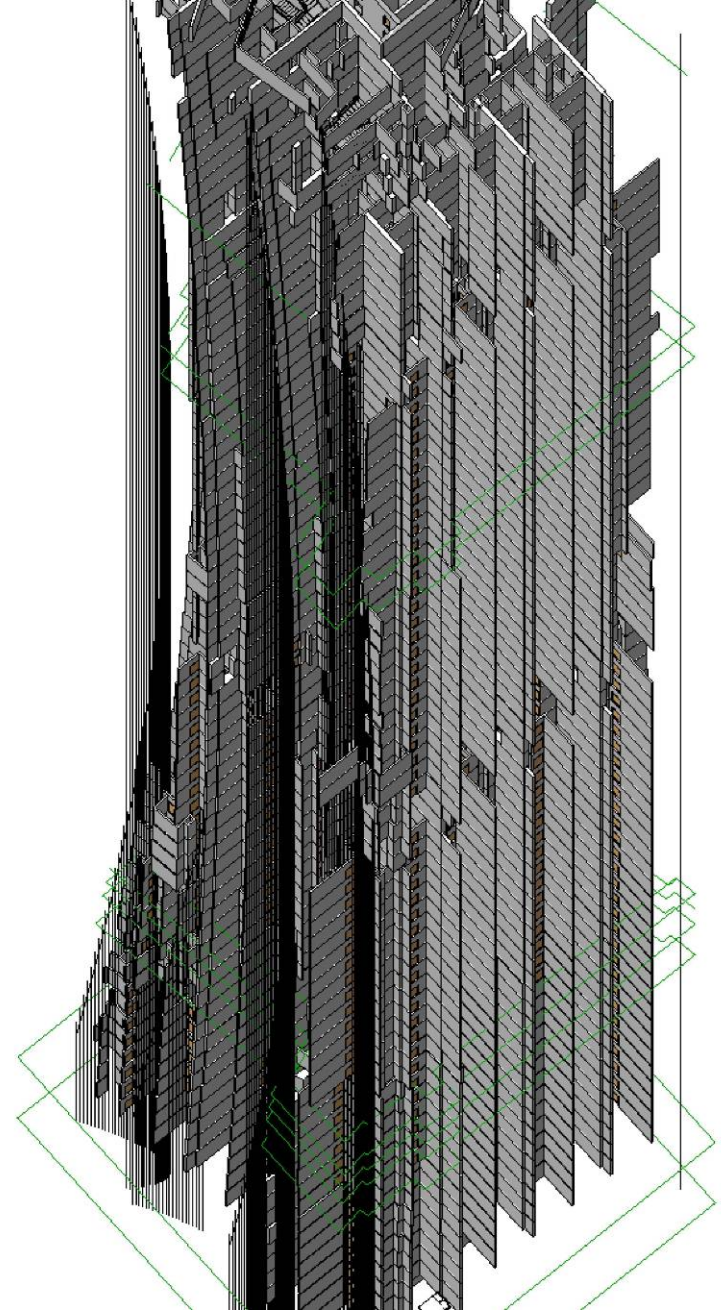
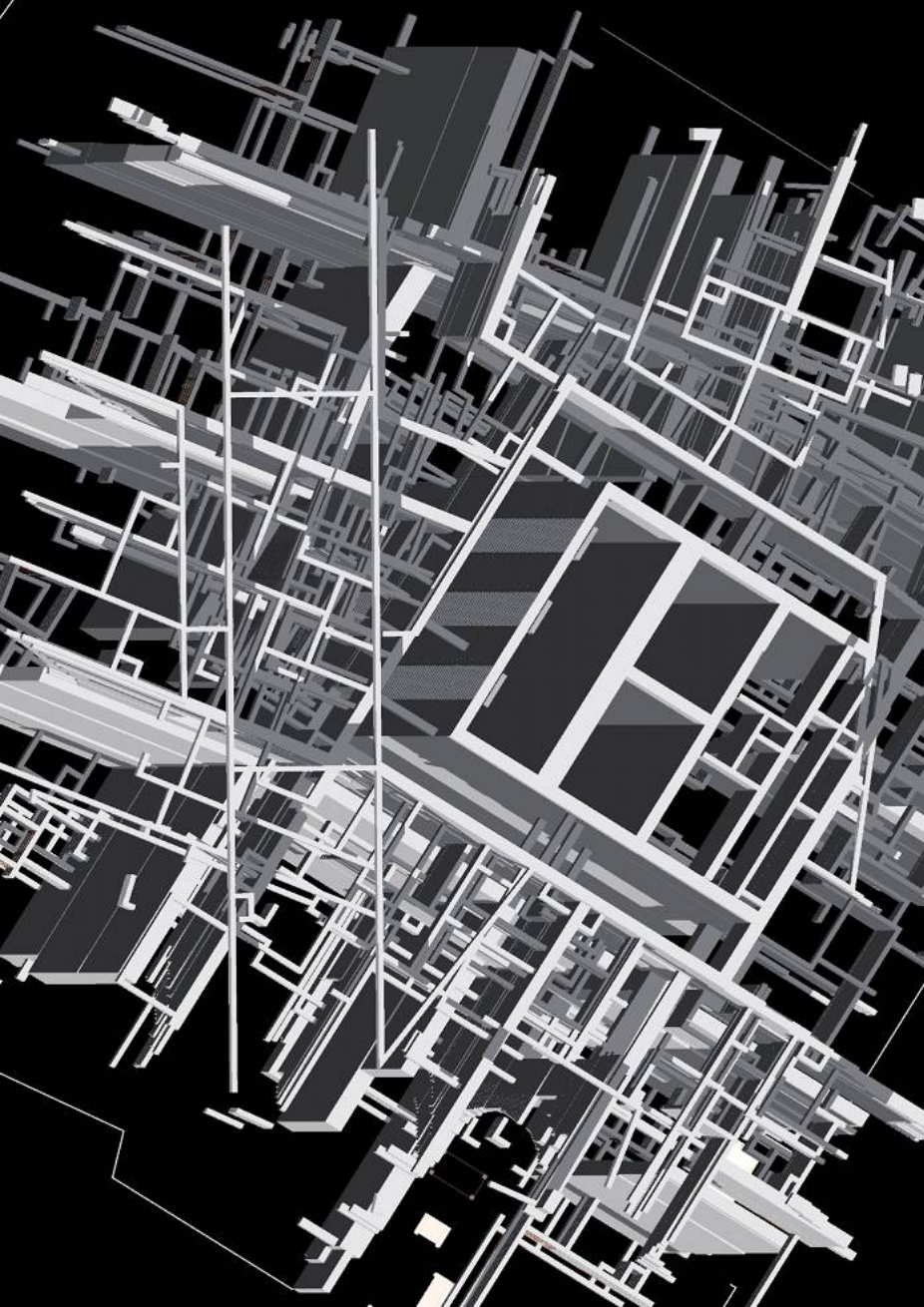




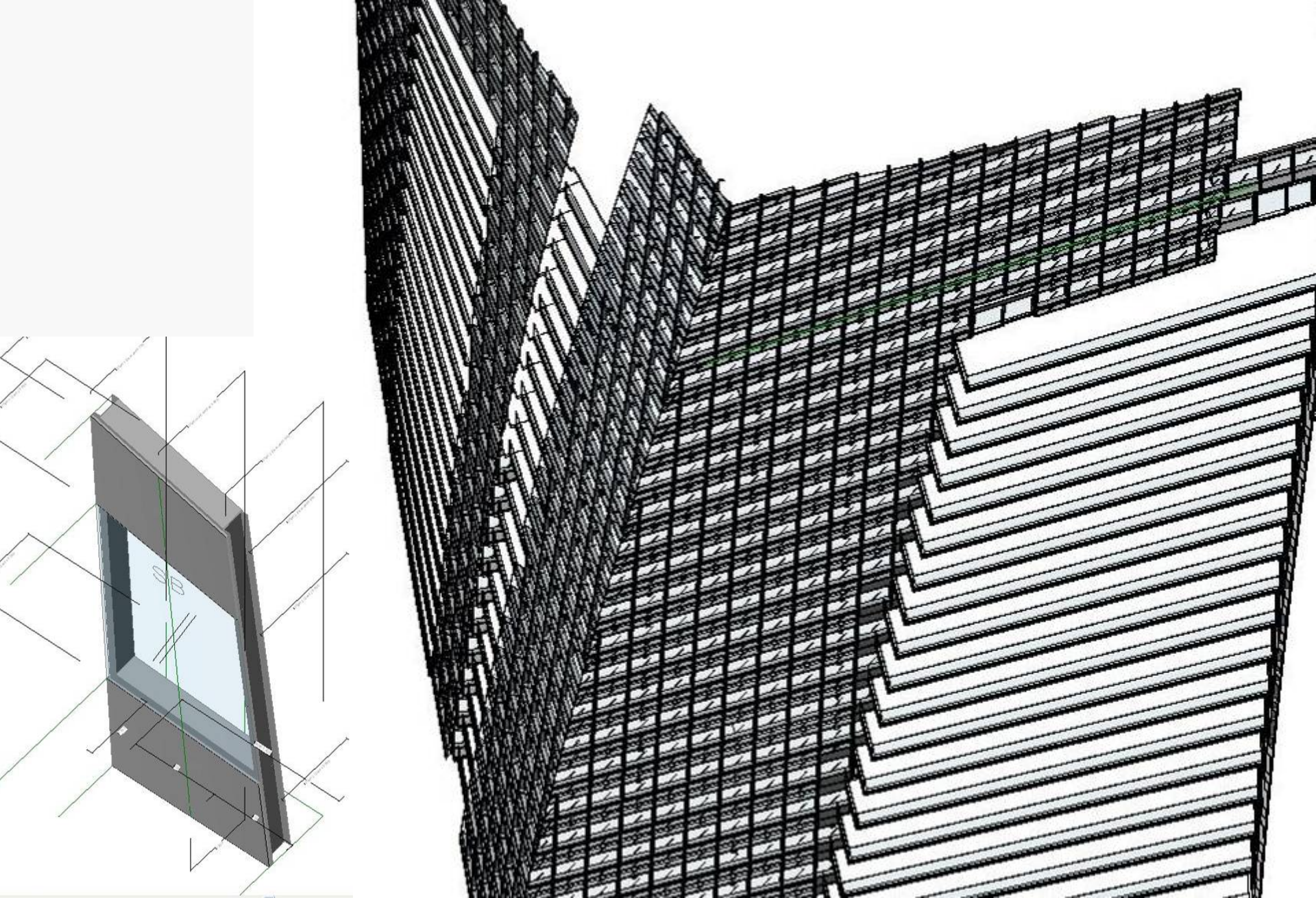




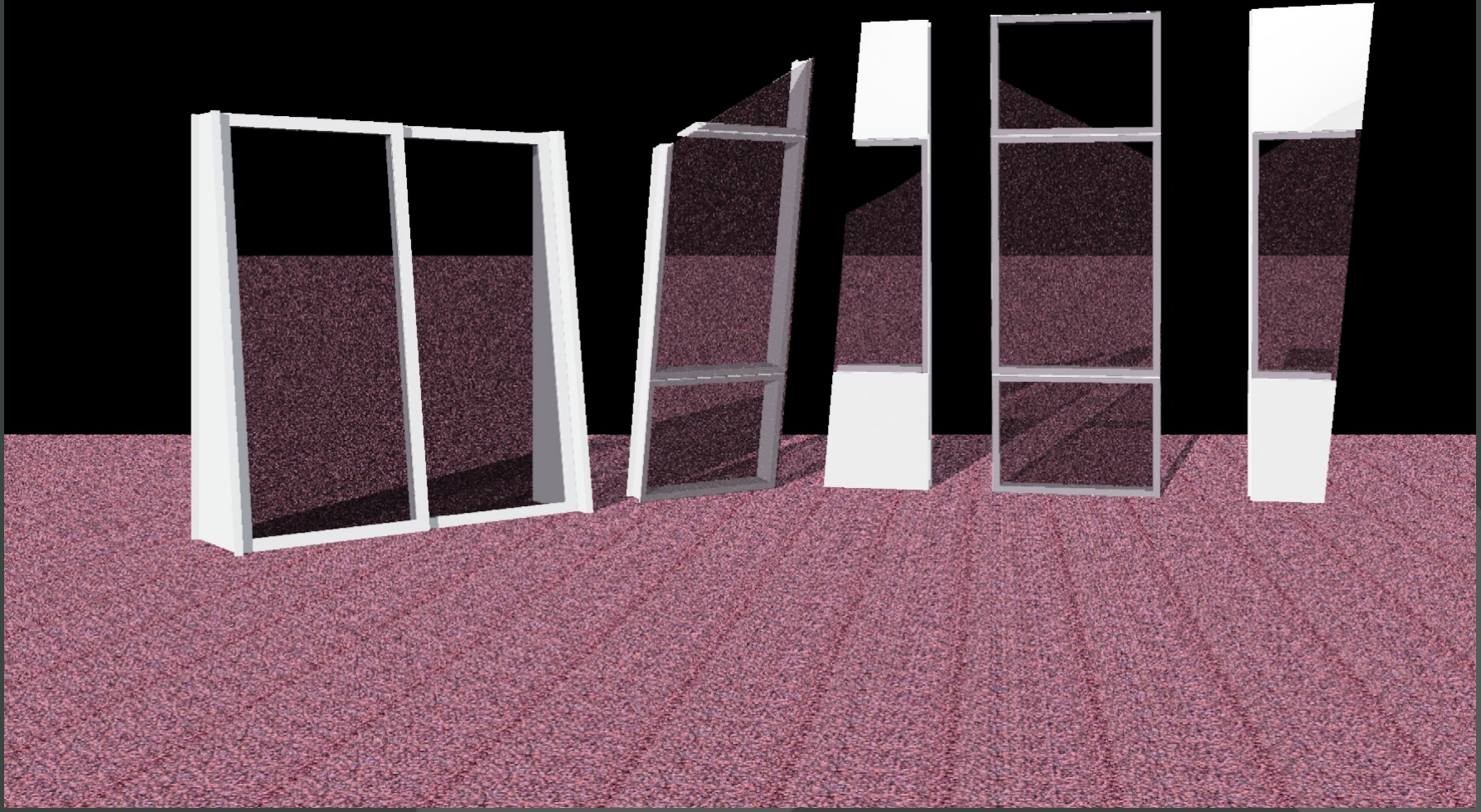
VERTICAL CO-ORDINATION

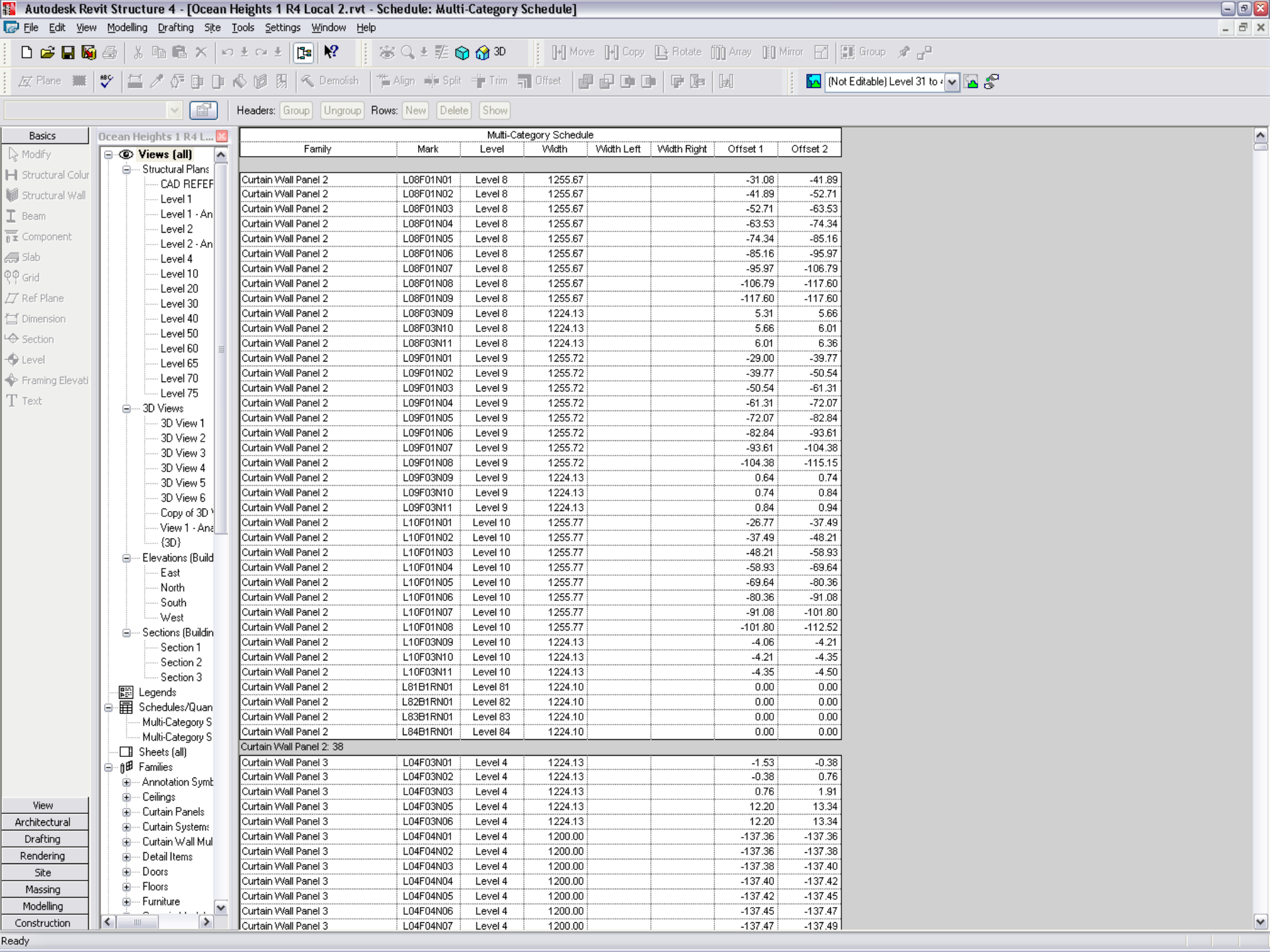


INTERNAL vs EXTERNAL



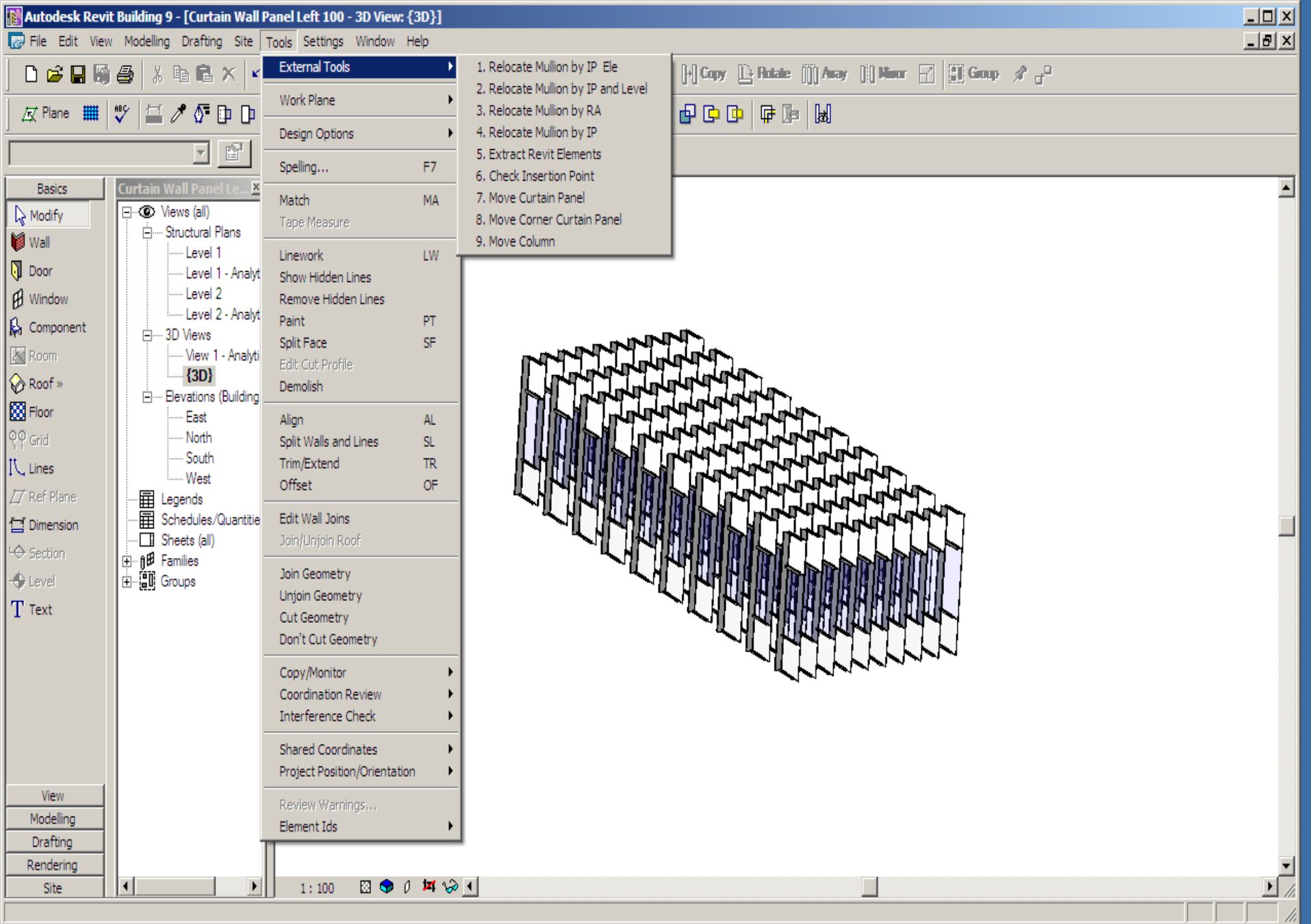
COMPLICATED CURTAIN WALL

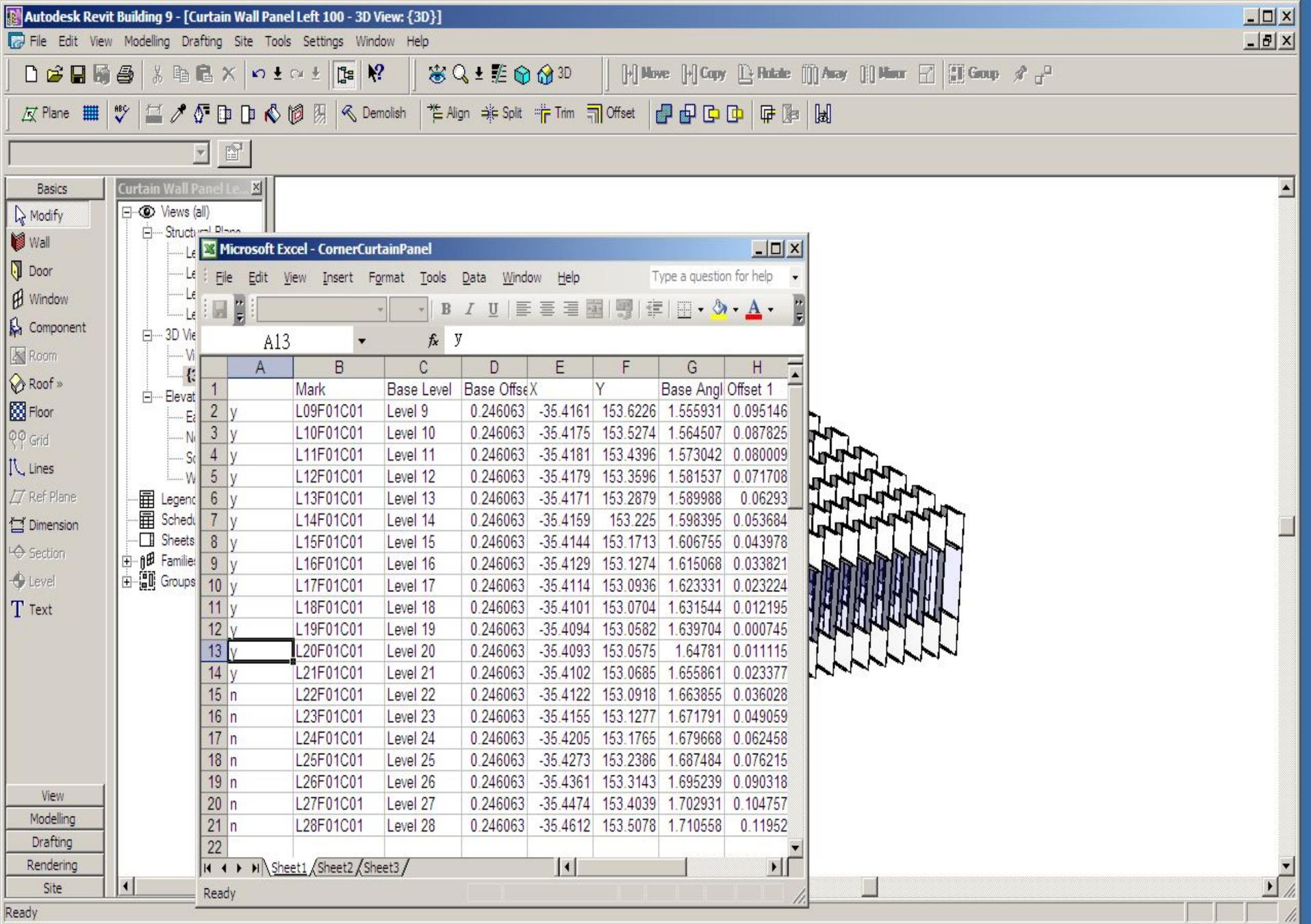


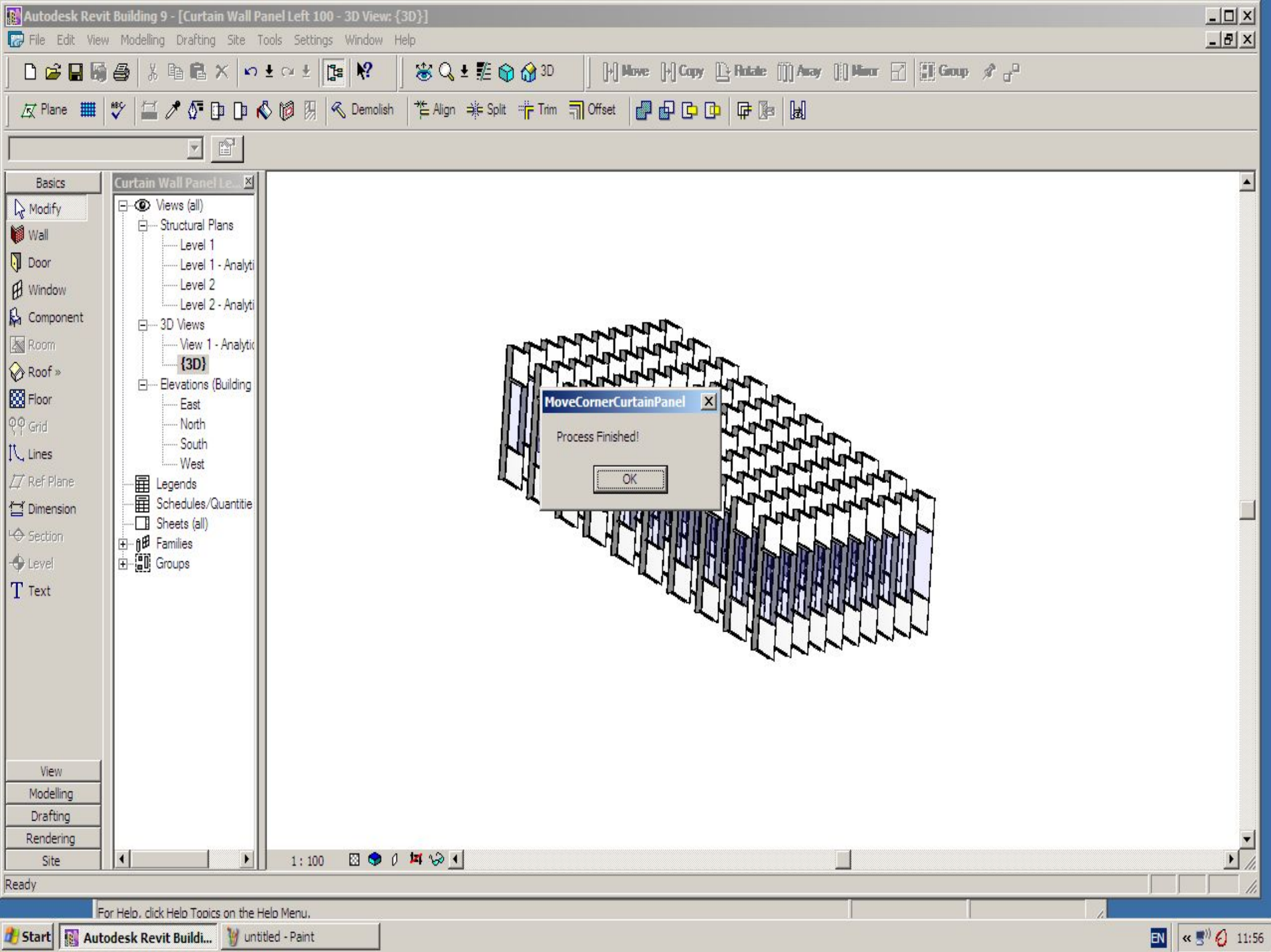


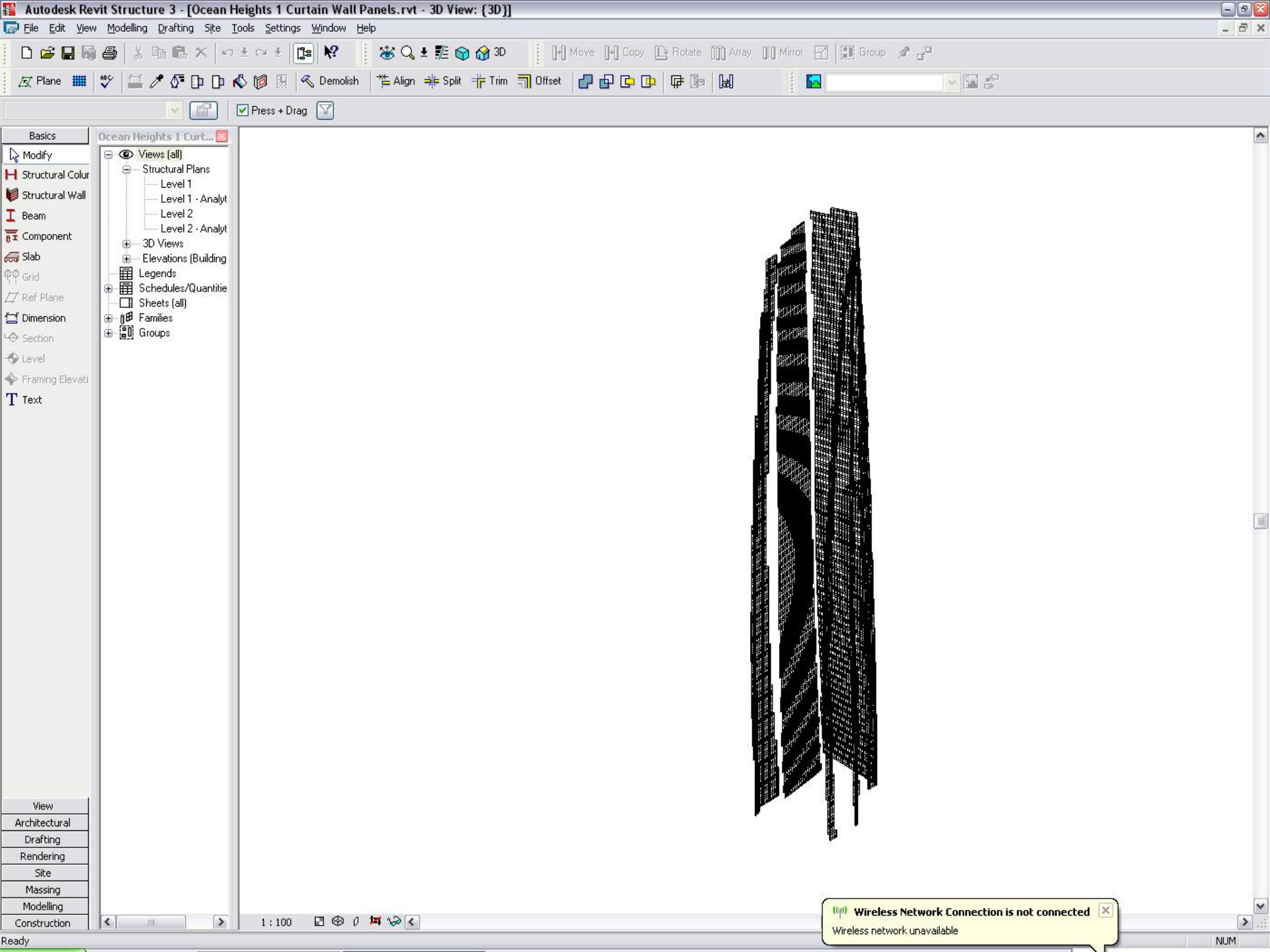
Multi-Category Schedule							
Family	Mark	Level	Width	Width Left	Width Right	Offset 1	Offset 2
Curtain Wall Panel 2	L08F01N01	Level 8	1255.67			-31.08	-41.89
Curtain Wall Panel 2	L08F01N02	Level 8	1255.67			-41.89	-52.71
Curtain Wall Panel 2	L08F01N03	Level 8	1255.67			-52.71	-63.53
Curtain Wall Panel 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

Ref Plane	Level 20	Sliding Door	L71B05D12	Level 71	2550.00		0.00
Dimension	Level 30	Sliding Door	L71B05D15	Level 71	2550.00		0.00
Section	Level 40	Sliding Door	L72B01D02	Level 72	2400.00		0.00
Level	Level 50	Sliding Door	L72B02D02	Level 72	2500.00		0.00
Framing Elevati	Level 60	Sliding Door	L72B04D01	Level 72	1800.00		0.00
Text	Level 65	Sliding Door	L72B05D03	Level 72	2550.00		0.00
	Level 70	Sliding Door	L72B05D05	Level 72	2550.00		0.00
	Level 75	Sliding Door	L72B05D08	Level 72	2550.00		0.00
	3D Views	Sliding Door	L72B05D10	Level 72	2550.00		0.00
	3D View 1	Sliding Door	L72B05D12	Level 72	2550.00		0.00
	3D View 2	Sliding Door	L72B05D15	Level 72	2550.00		0.00
	3D View 3	Sliding Door	L73B01D02	Level 73	2400.00		0.00
	3D View 4	Sliding Door	L73B02D02	Level 73	2500.00		0.00
	3D View 5	Sliding Door	L73B04D01	Level 73	1700.00		0.00
	3D View 6	Sliding Door	L73B05D03	Level 73	2550.00		0.00
	Copy of 3D V	Sliding Door	L73B05D05	Level 73	2550.00		0.00
	View 1 - Ana	Sliding Door	L73B05D08	Level 73	2550.00		0.00
	{3D}	Sliding Door	L73B05D10	Level 73	2550.00		0.00
	Elevations (Build	Sliding Door	L73B05D12	Level 73	2550.00		0.00
	East	Sliding Door	L73B05D15	Level 73	2550.00		0.00
	North	Sliding Door	L74B01D02	Level 74	2400.00		0.00
	South	Sliding Door	L74B02D02	Level 74	2500.00		0.00
	West	Sliding Door	L74B04D01	Level 74	1600.00		0.00
	Sections (Building	Sliding Door	L74B05D03	Level 74	2550.00		0.00
	Section 1	Sliding Door	L74B05D05	Level 74	2550.00		0.00
	Section 2	Sliding Door	L74B05D08	Level 74	2550.00		0.00
	Section 3	Sliding Door	L74B05D10	Level 74	2550.00		0.00
	Legends	Sliding Door	L74B05D12	Level 74	2550.00		0.00
	Schedules/Quan	Sliding Door	L74B05D15	Level 74	2550.00		0.00
	Multi-Category S	Sliding Door	L75B01D02	Level 75	2400.00		0.00
	Multi-Category S	Sliding Door	L75B02D02	Level 75	2500.00		0.00
	Sheets (all)	Sliding Door	L76B01D02	Level 76	2400.00		0.00
	Families	Sliding Door	L76B02D02	Level 76	2500.00		0.00
	Annotation Symb	Sliding Door	L77B01D02	Level 77	2400.00		0.00
	Ceilings	Sliding Door	L77B02D01	Level 77	2426.17		0.00
	Curtain Panels	Sliding Door	L78B01D02	Level 78	2400.00		0.00
	Curtain Systems	Sliding Door	L78B02D01	Level 78	2203.01		0.00
	Curtain Wall Mul	Sliding Door	L79B01D02	Level 79	2400.00		0.00
	Detail Items	Sliding Door	L79B02D01	Level 79	1974.15		0.00
	Doors	Sliding Door: 649					
	Floors	Sliding Door to Replace CW Pan	L10F01N10	Level 10	1255.77		-123.24
	Furniture	Sliding Door to Replace CW Panel: 1					
		Grand total: 9740					











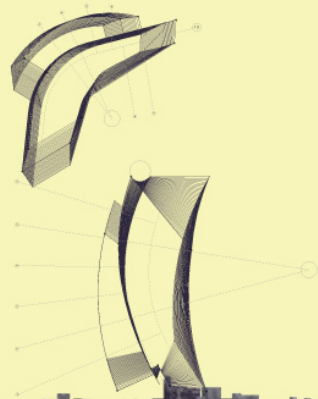
Abu Dhabi Dancing Towers

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.

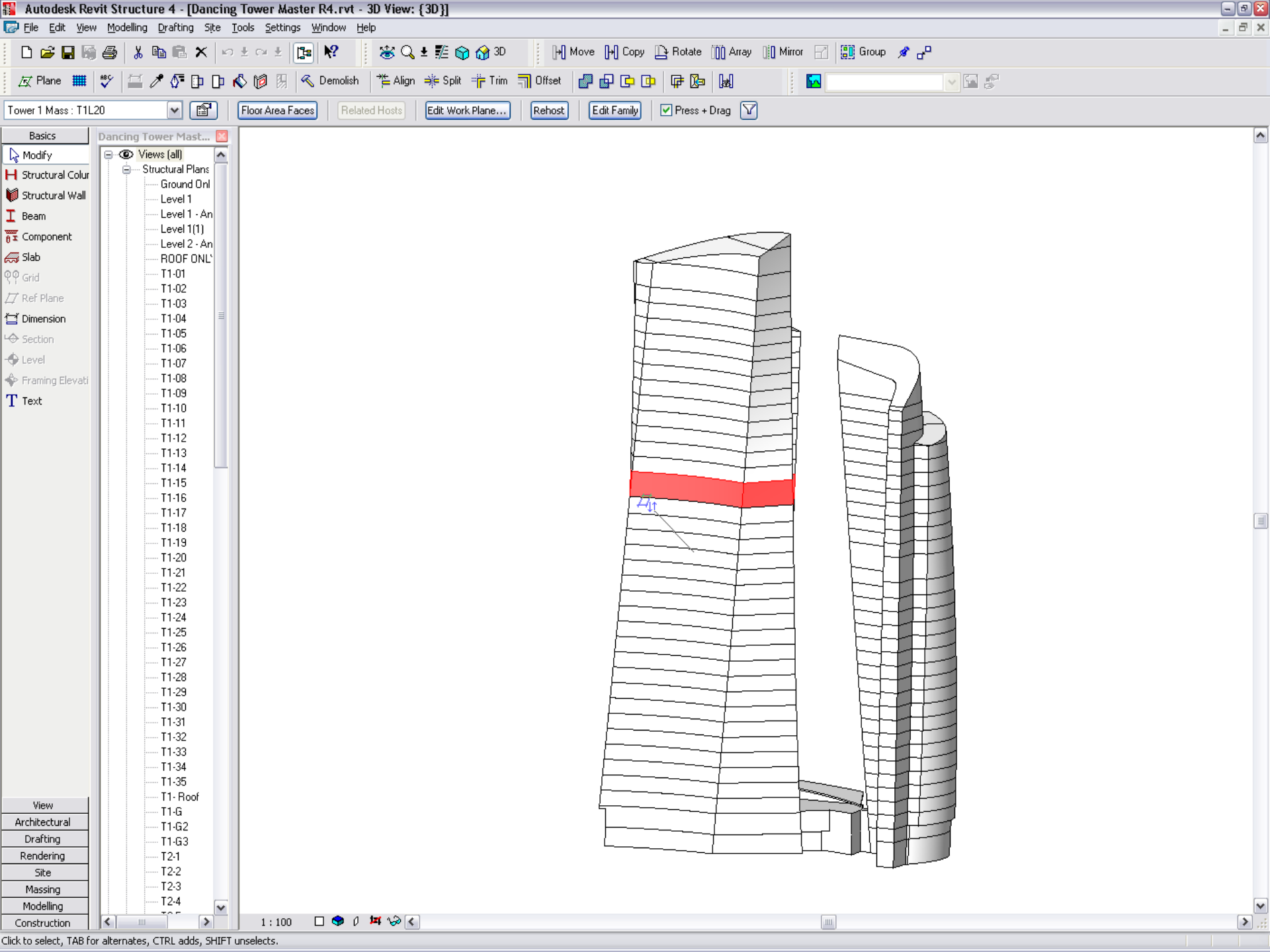
However, the two towers quickly lean, rotate, bend and warp to respond to each other, the adjacent sites and ultimately the view to the ocean at their horizon. These two figures fluidly respond to each other, dynamically engaged and flowing – and ultimately tied together in a passionate dance •

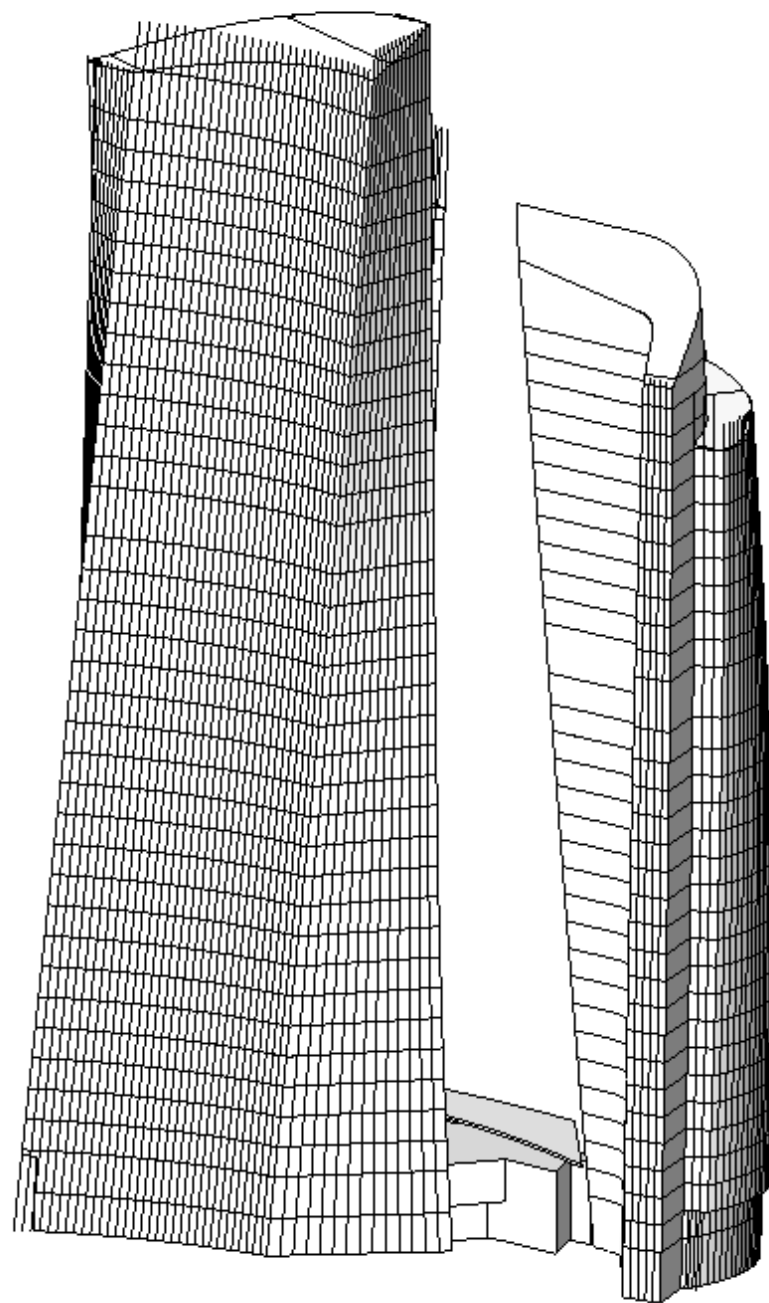


Program Mixed Use Site Area 4,160 sqm
Floor Area 44,235 sqm Building Height 160 m

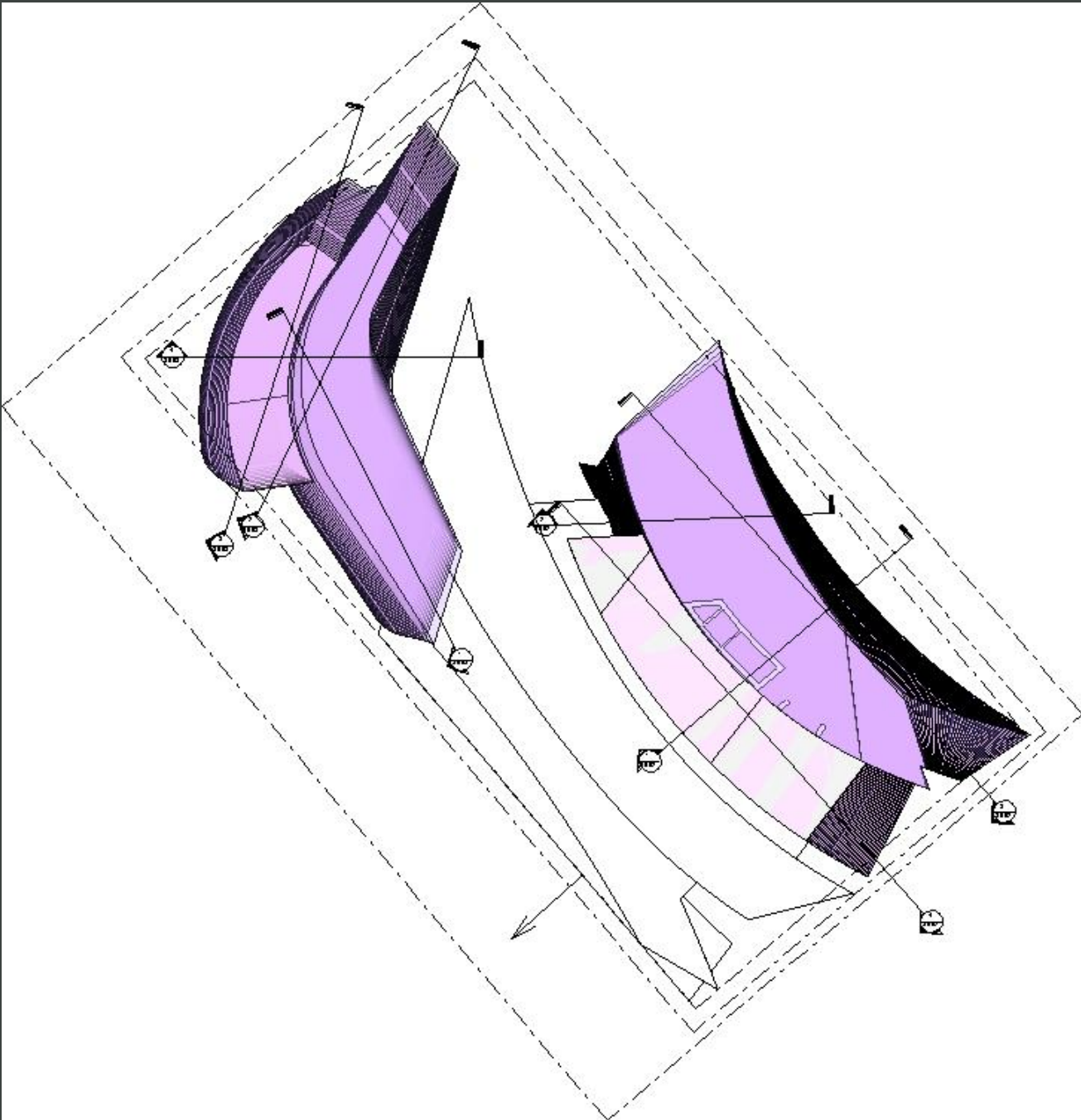


Abu Dhabi Dancing Towers









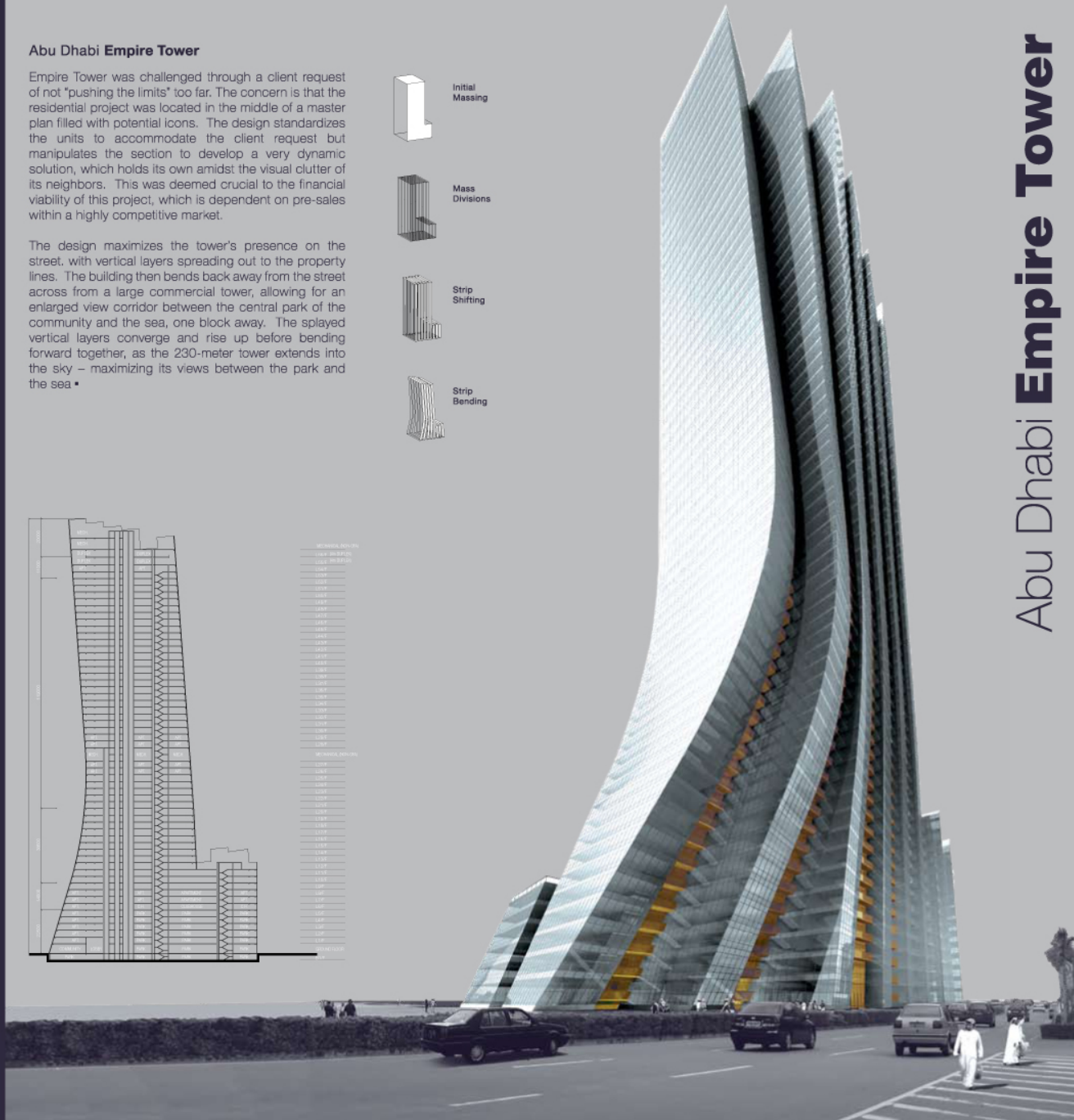
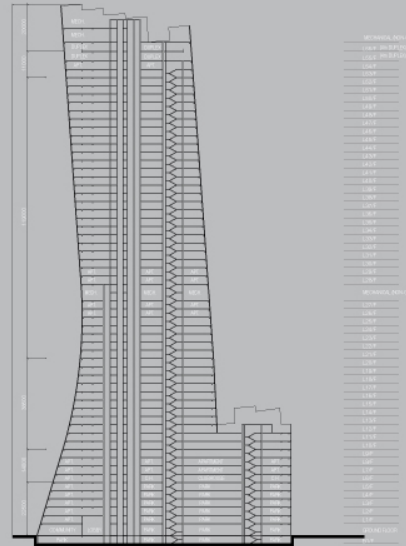


Program: Residential, Site Area 7,007 sqm
Floor Area 90,206 sqm, Building Height 225 m

Abu Dhabi Empire Tower

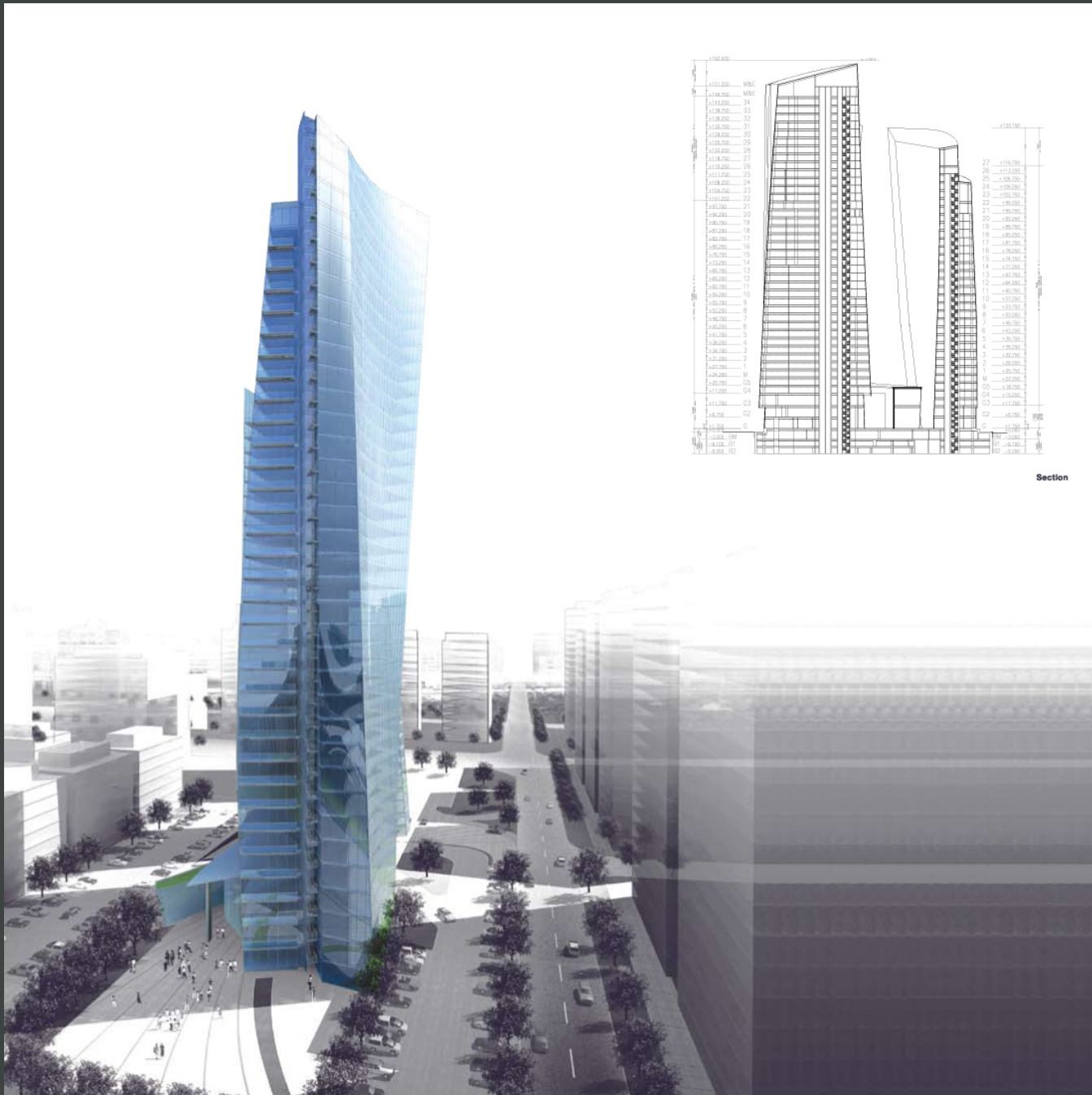
Empire Tower was challenged through a client request of not "pushing the limits" too far. The concern is that the residential project was located in the middle of a master plan filled with potential icons. The design standardizes the units to accommodate the client request but manipulates the section 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 •



Abu Dhabi Empire Tower

Aedas

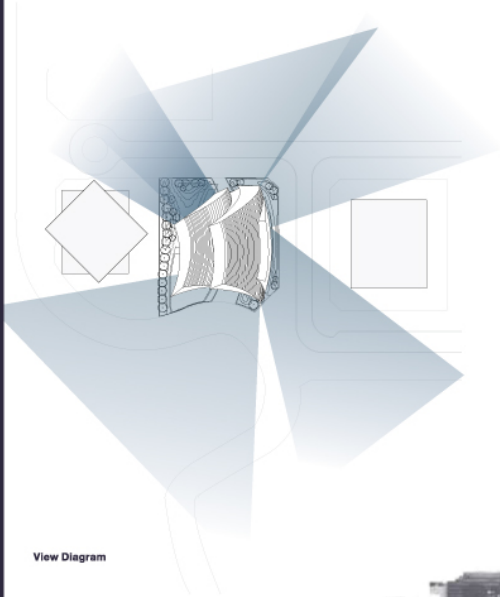




Dubai Ocean Heights Two

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

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

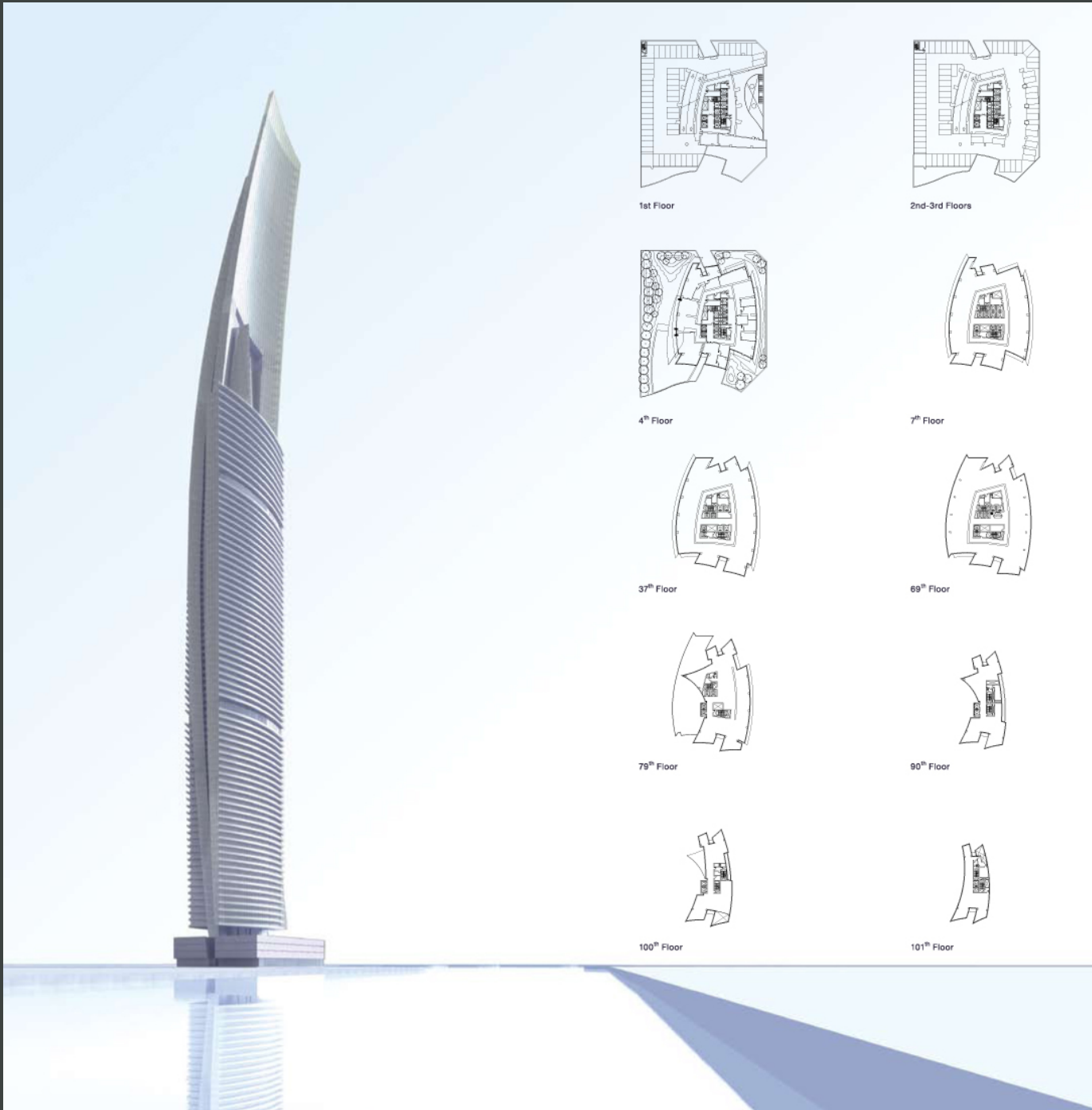


View Diagram

Program Residential Site Area 3,463sqm
Floor Area 197,979 sqm Building Height 460 m

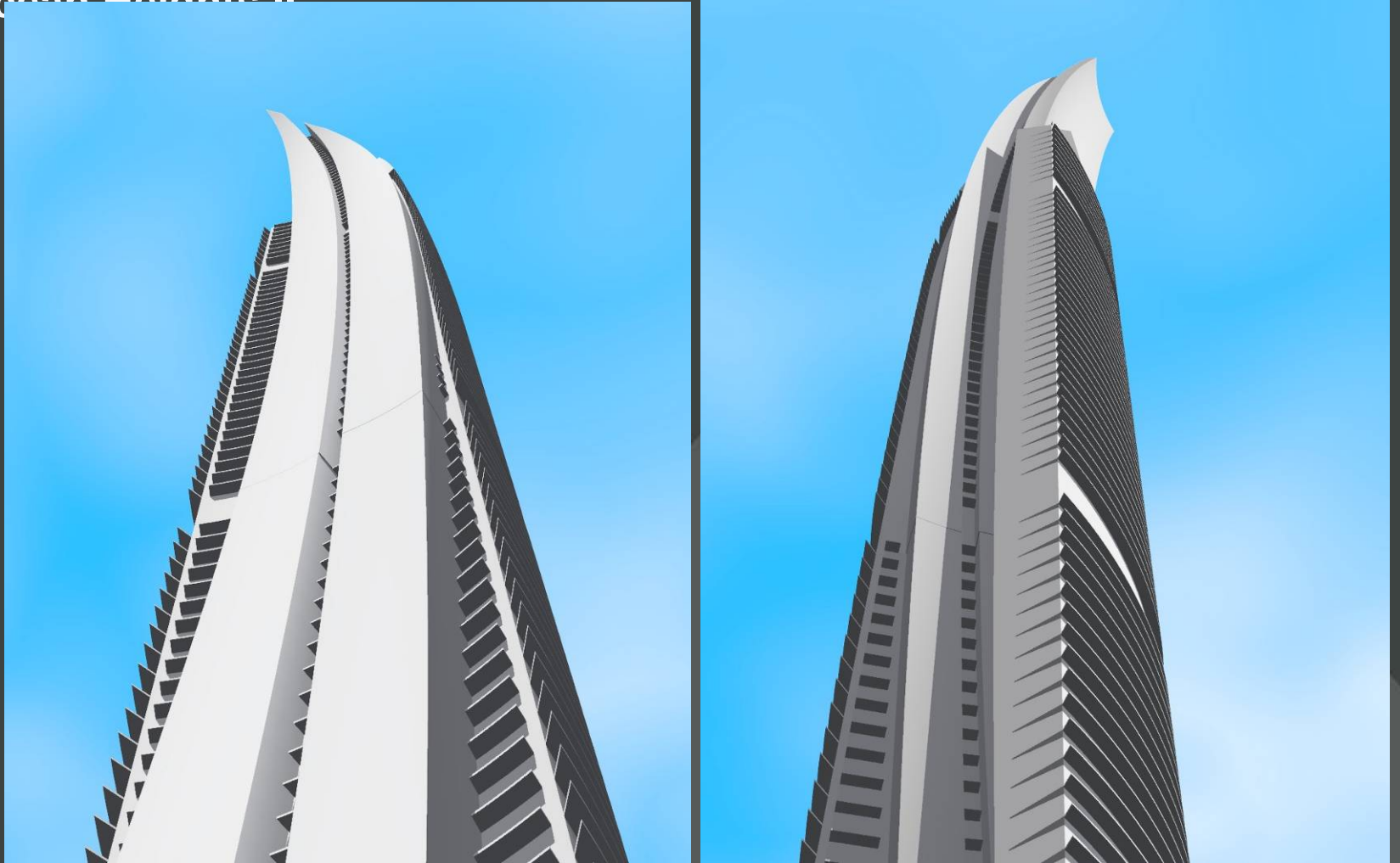
Dubai Ocean Heights Two





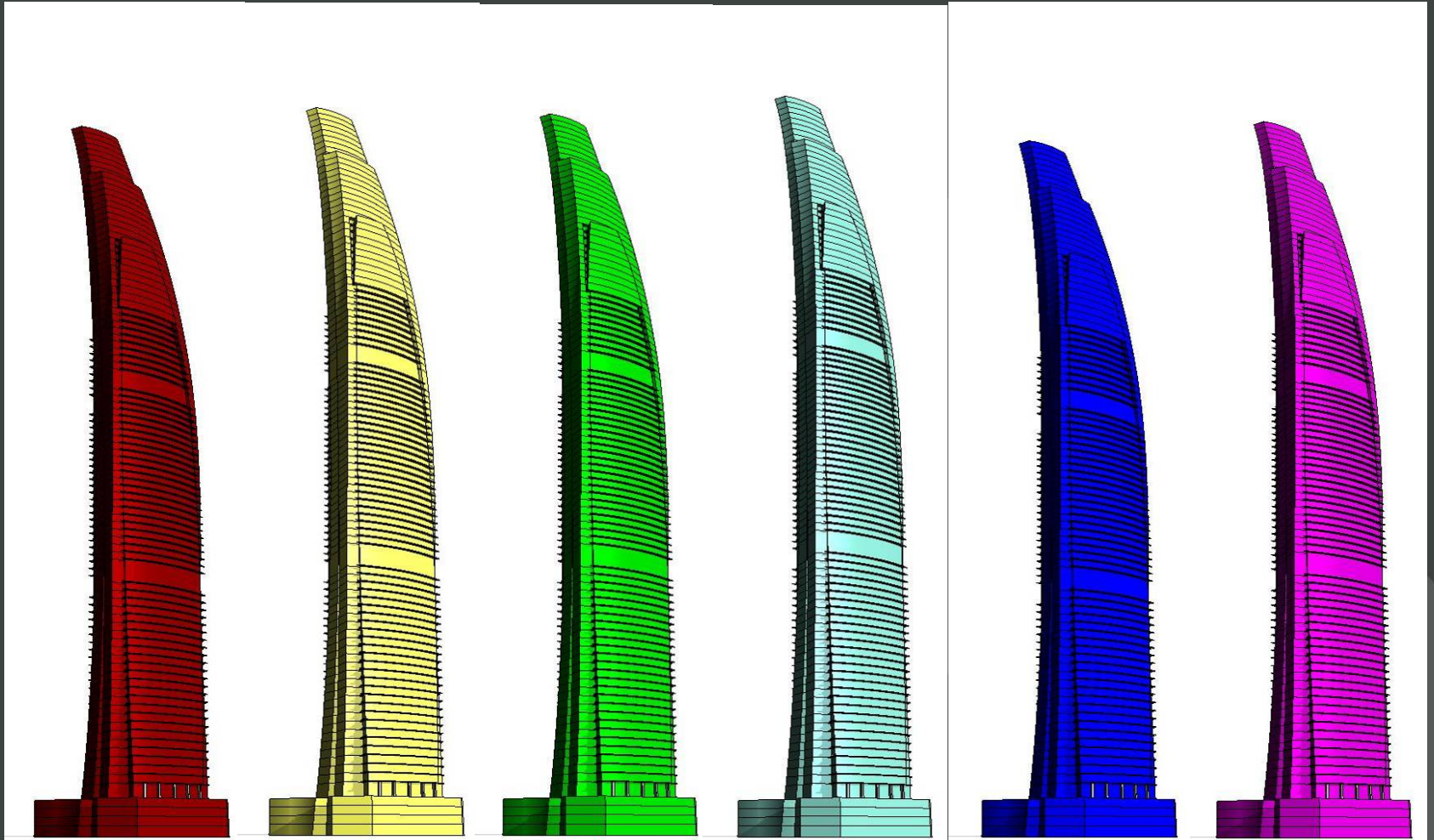


Ocean Heights II



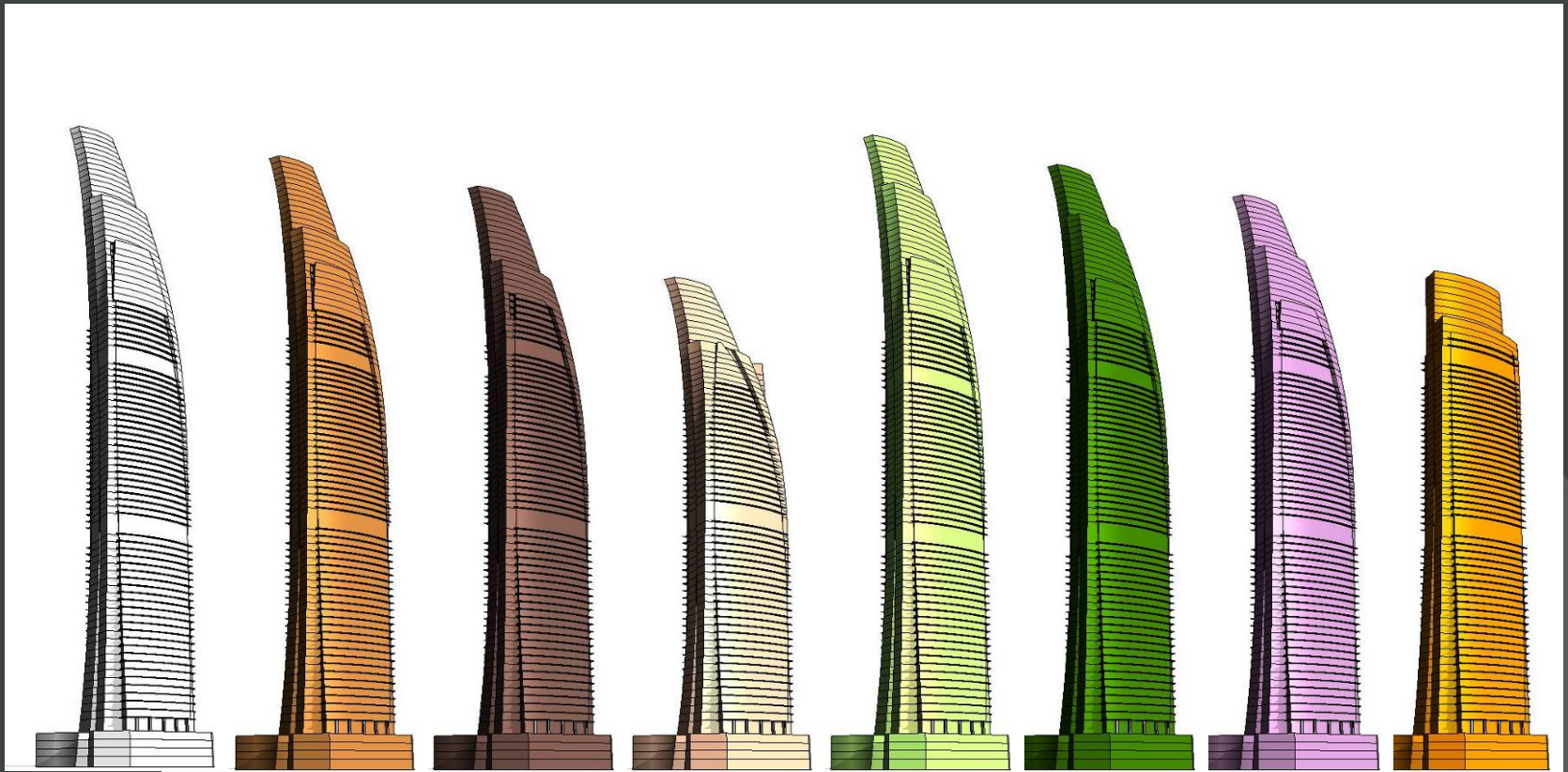


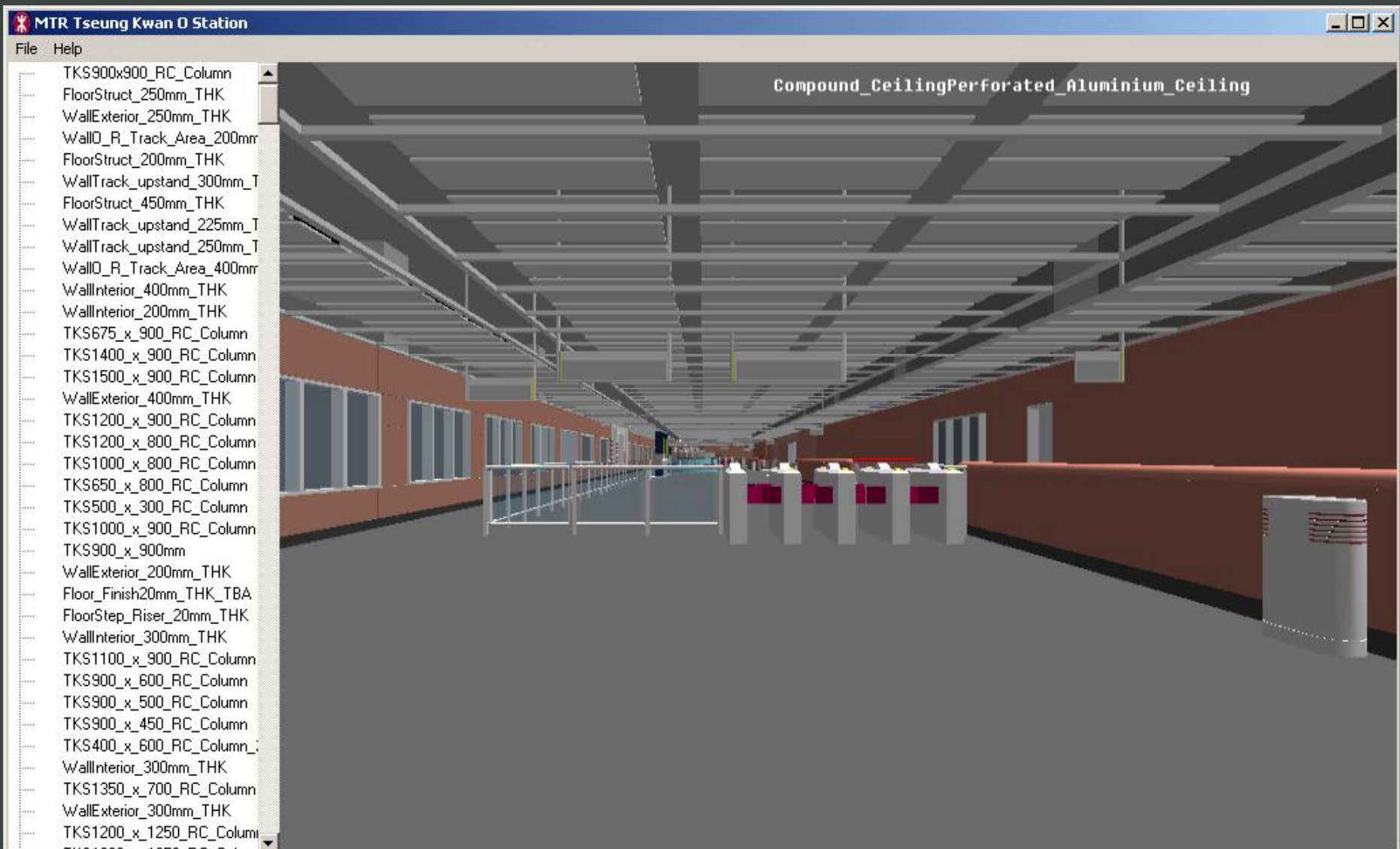
Ocean Heights II – Options

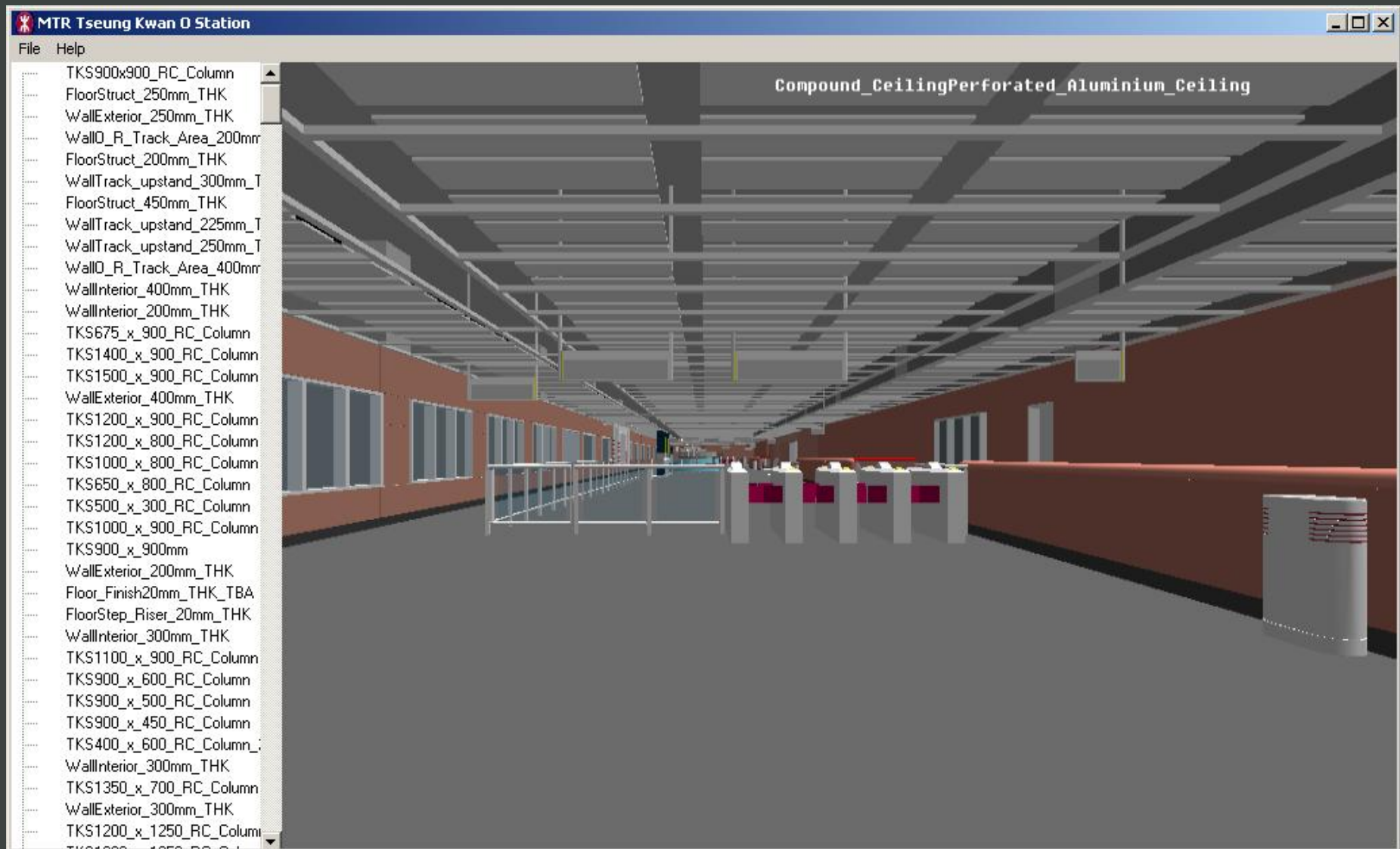




Ocean Heights II – Options









The screenshot shows the 'MTR Tseung Kwan O Station' software interface. On the left, a tree view lists various structural components. The central 3D view shows a perspective rendering of the station platform with a train. A 'Station Property Detail' dialog box is open, providing specific information for the selected item, 'Floor_Mount_Information_SignINF_1'.

Station Property Detail	
Item :	Floor_Mount_Information_SignINF_1
Type :	Perforated Aluminium Ceiling
Station :	Tseung Kwan O South Station
Location :	Platform South Entrance
Installed Date :	15 January, 2003
Installed By :	ABC Engineering Company
Manufacturer :	Aluminium Ceiling Factory
Item WebLink :	http://ACF.com
History :	3 years 11 months
Department :	Operation and Facility Control
Description :	Item is under normal situation

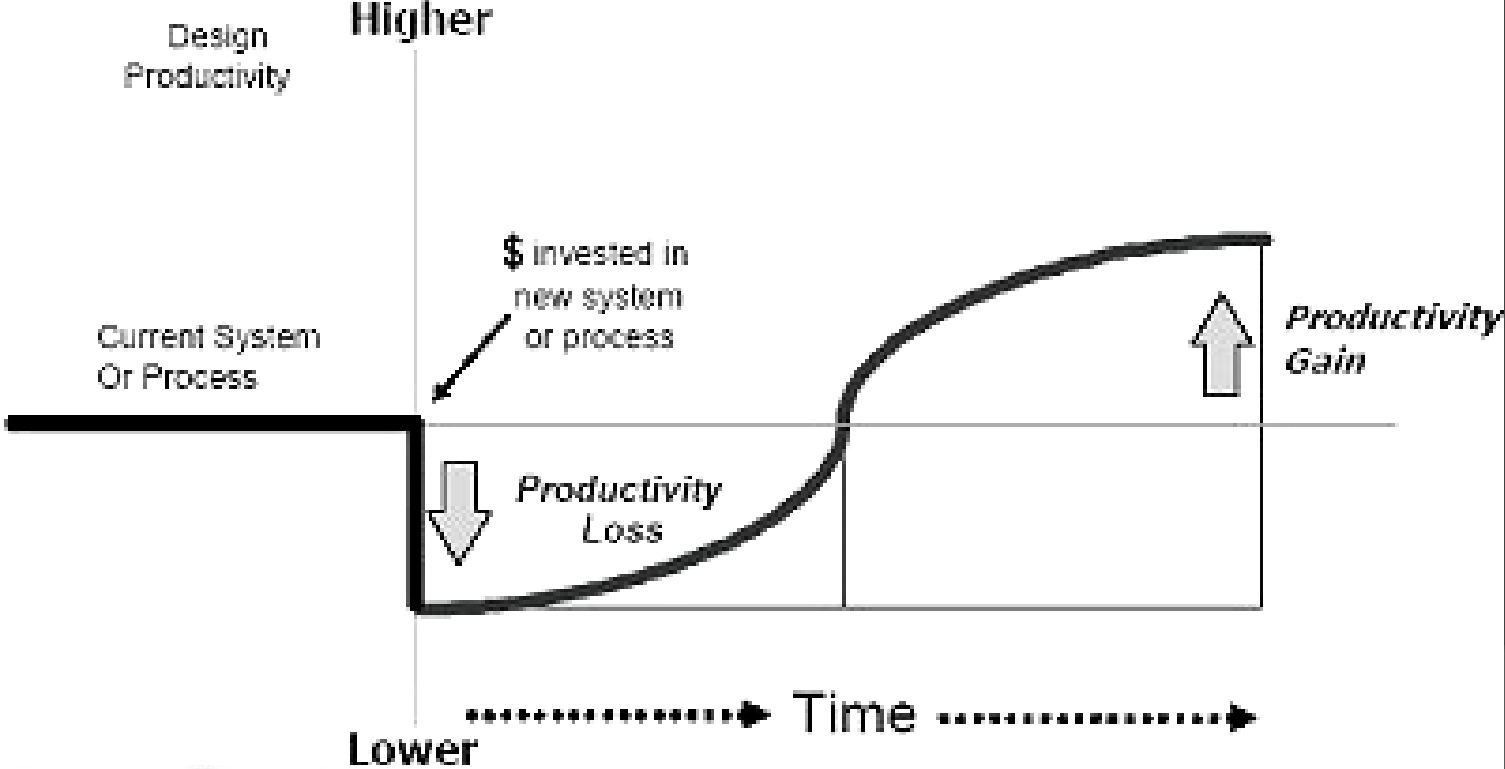
1. Design visualization
2. Drawing Productions
3. Services Co-ordination and Clash detection with other disciplines
4. Quantity taking and preparation of Tender Document
5. Automated Statutory Submission
6. Scientific analysis of different environmental aspects
7. Supply Chain Integration with the manufacturing and production
8. Complex Geometry 複雑な形状を実現可能

Sustainable Design



Is the AEC Industry Changing?





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

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

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

**PRODUCTIVITY
 >60%**

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



Design and Construction

• Overview

• Architecture & Engineering

• CAD Standards

▶ 3D-4D Building Information Modeling

3D-4D-BIM Overview

Spatial Program Validation

4D Phasing

3D Laser Scanning

Energy and Sustainability

BIM Library

• Commissioning

• Construction Excellence

• Design Excellence and the Arts

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3D-4D Building Information Modeling

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

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

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

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

[BIM Program Flyer](#)

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

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

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Q & A



Thank You...