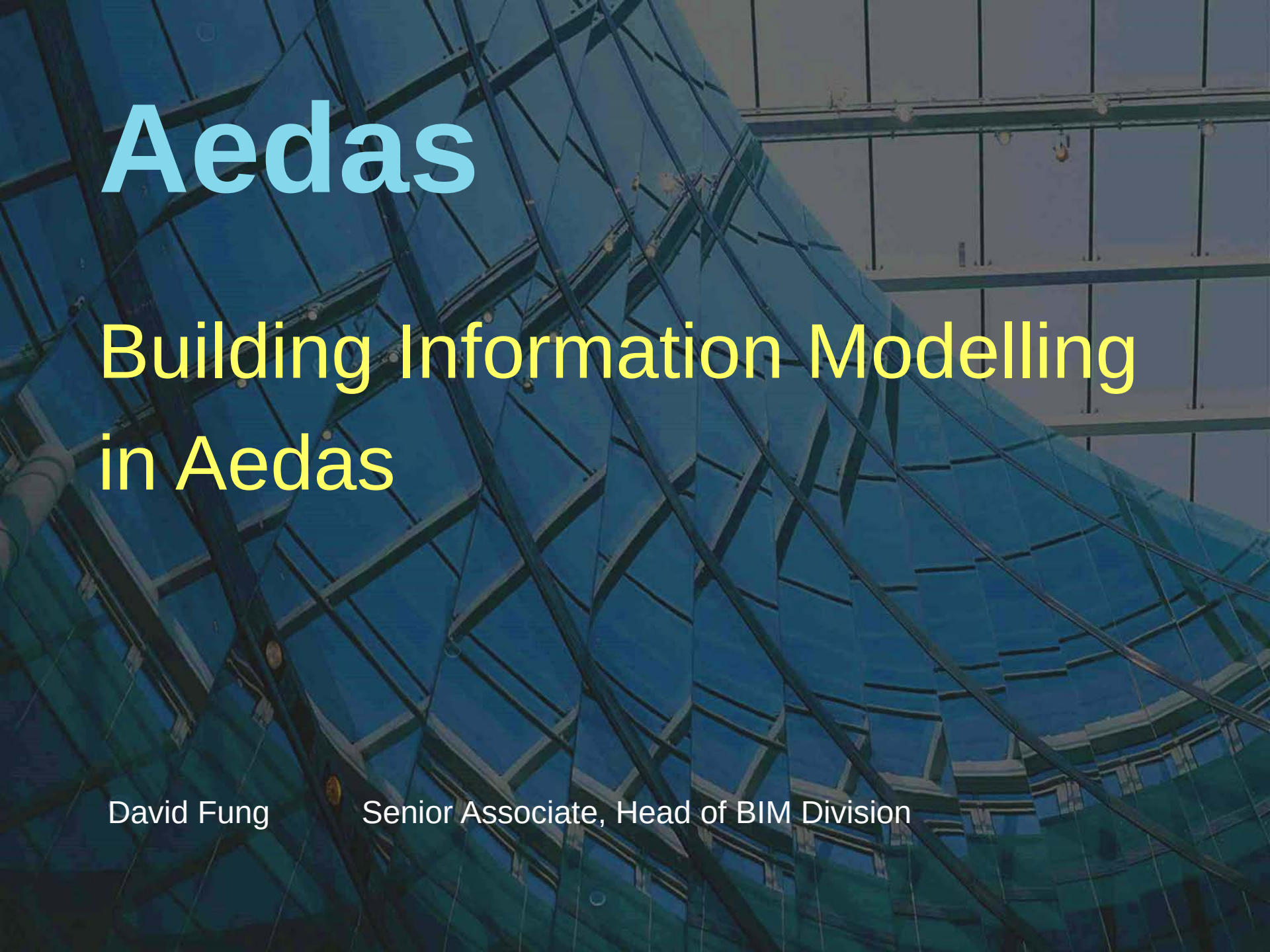




Aedas

Building Information Modelling in Aedas

David Fung

Senior Associate, Head of BIM Division

Building Information

Graphical

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

Non-Graphical

Area Schedule
Finishing Schedules
Door/Window/Louvre Sch
Beam/Column Schedule
Equipment Schedule
Program
Specifications

Cost Estimate
Quantity Take Off
Bills of Quantities
Variation Assessments

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)
- MS Project
- BQ Softwares
- Quantity Take Off
- Bills of Quantities
- Variations



As a result.....

Inefficiencies, mistakes and delays account for \$200 billion of the \$650 billion spent on construction in America every year.

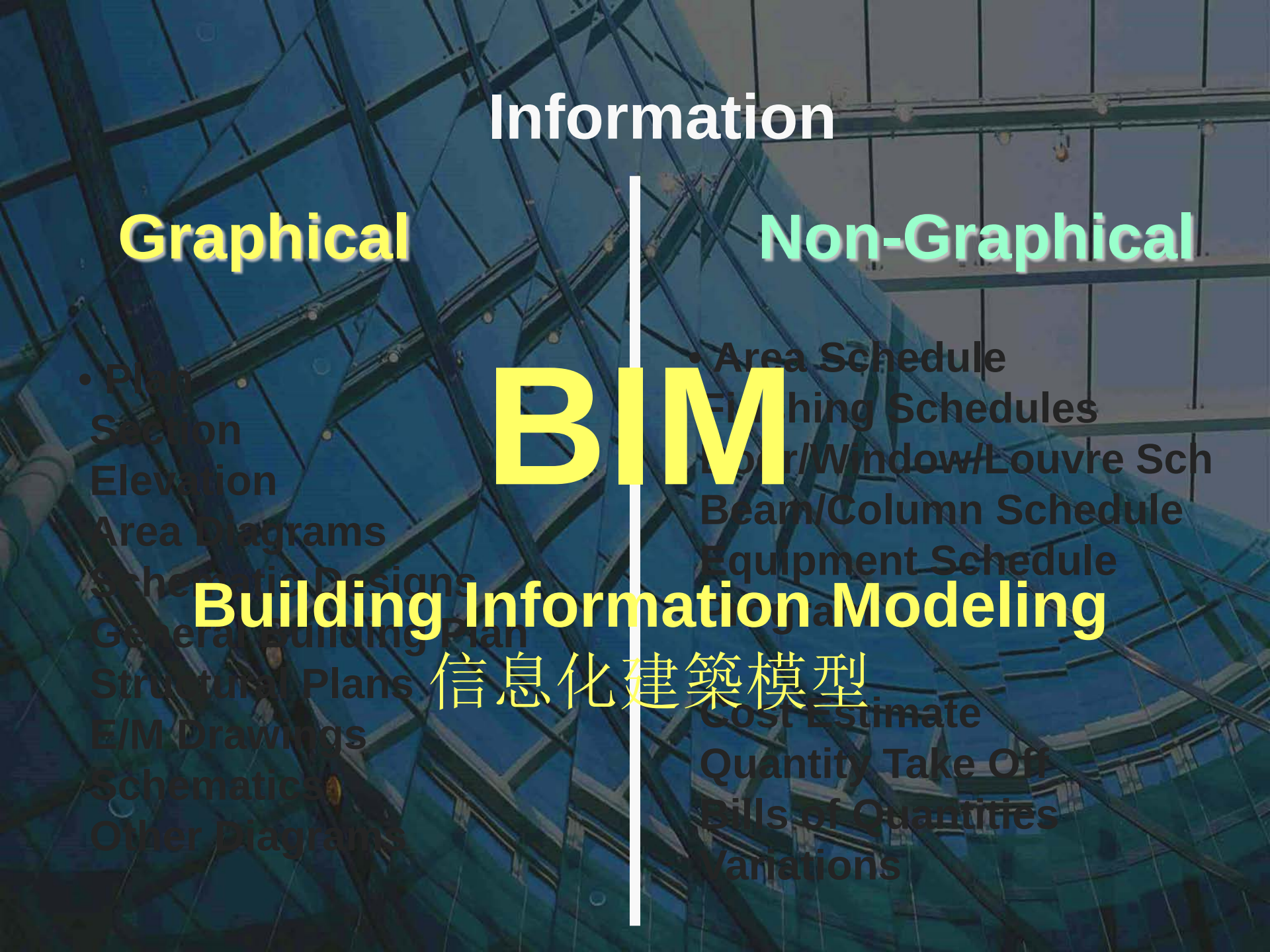
New wiring, The Economist, January 13th, 2000

In the UK alone, the annual cost of rectifying construction defects 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

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

Non-Graphical

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

BIM

Building Information Modeling

信息化建筑模型

Building Information Modeling (BIM)

信息化建築模型

Definition:

BIM is an **innovative** approach to **architectural design** and **documentation** supporting all phases of design and all the architectural **drawings** and **schedules** required for the design, construction and management of a building project.

Building Information Modeling (BIM)

Misconceptions:

1 BIM



3D CAD

Architectural Desktop (Autodesk)

Revit (Autodesk)

ArchiCAD (Graphsoft)

Triforma (Bentley)

Digital Project (Gehry Technology)

AutoCAD (Autodesk)

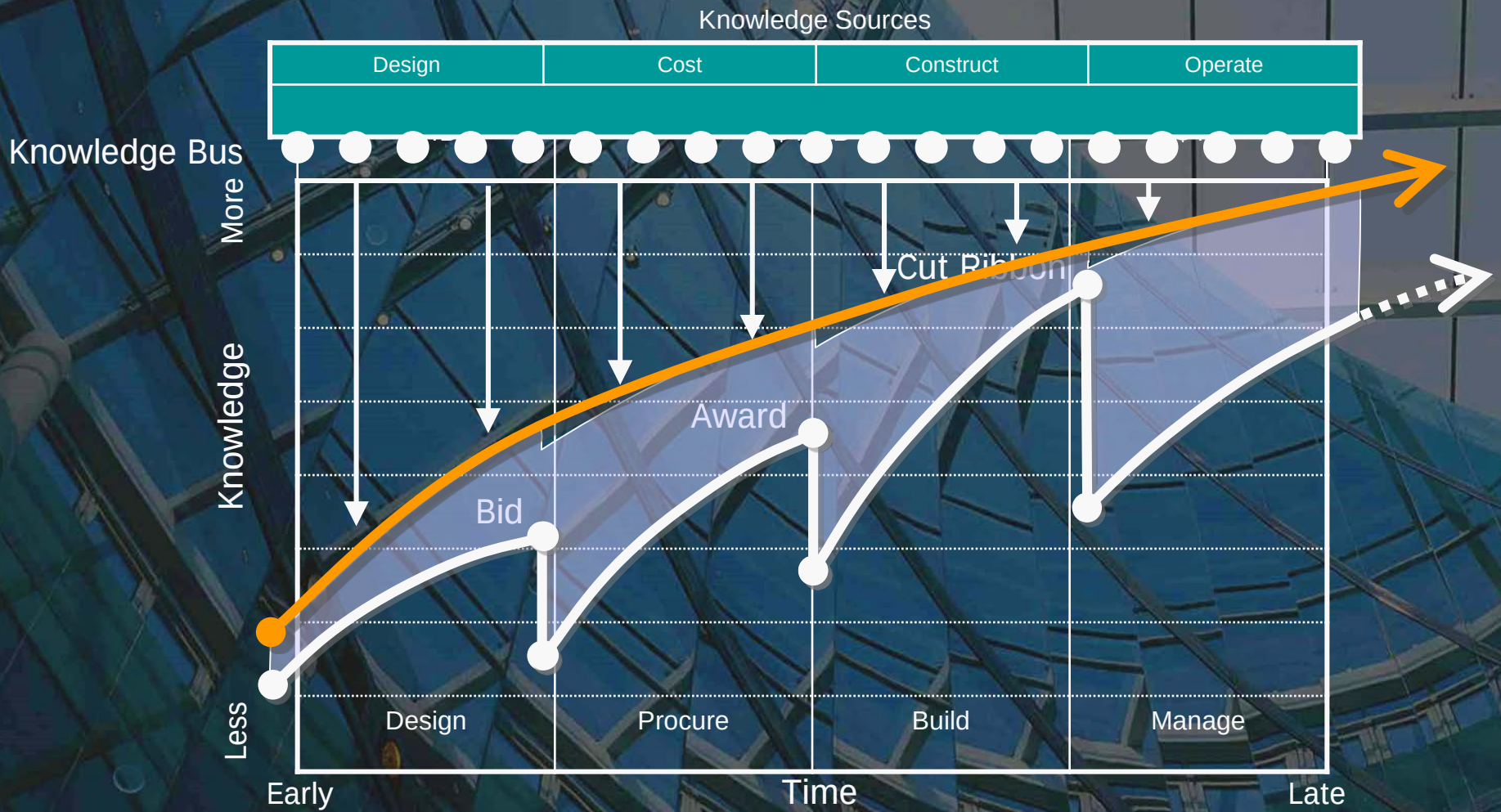
Microstation (Bentley)

2 BIM



Clash Analysis only

Information “Backflow”



What is BIM (Building Information Model)

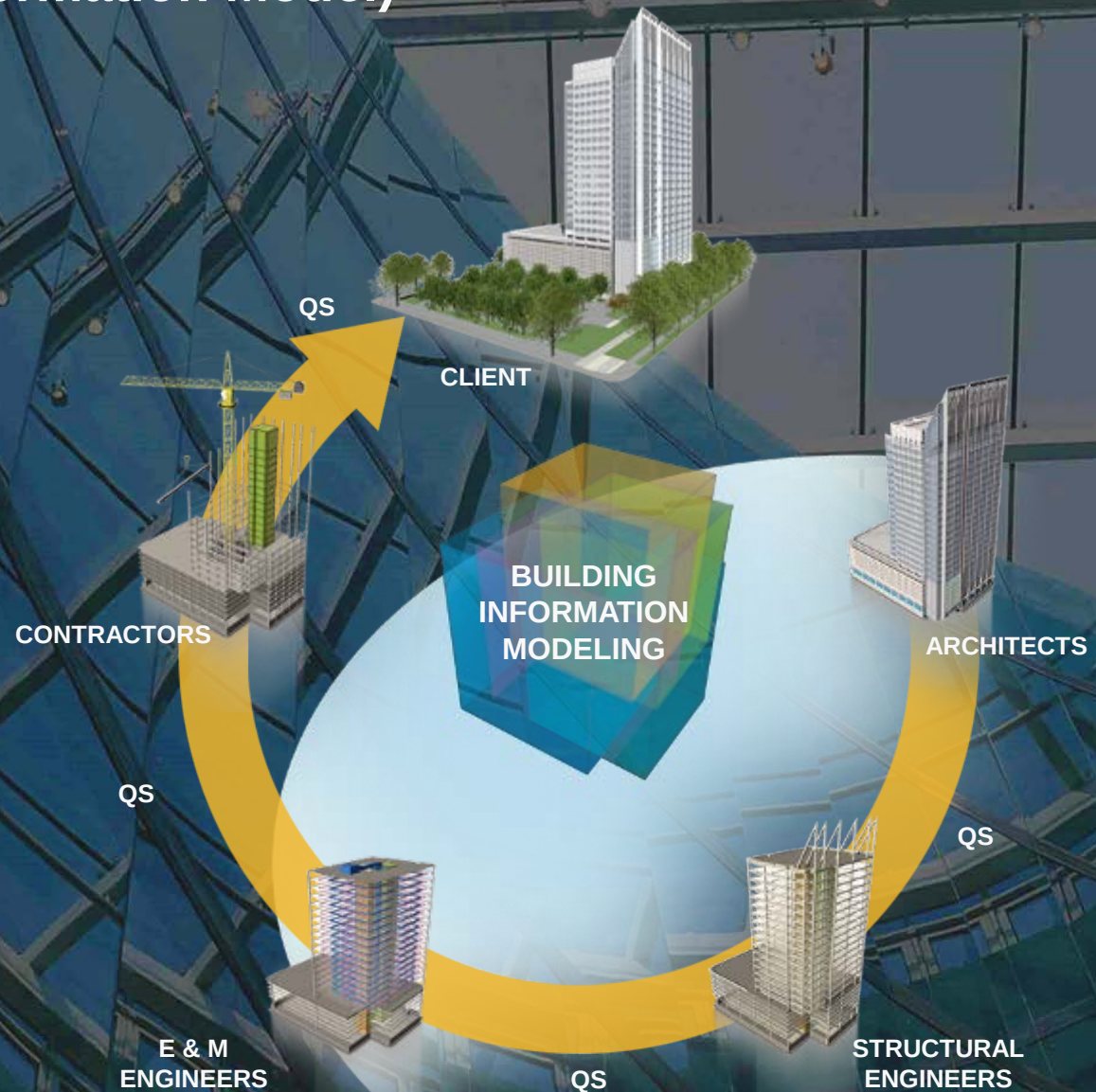
Graphical Data

+

Non-Graphical
Data

+

New workflow





Use of Building Information Modeling (BIM)

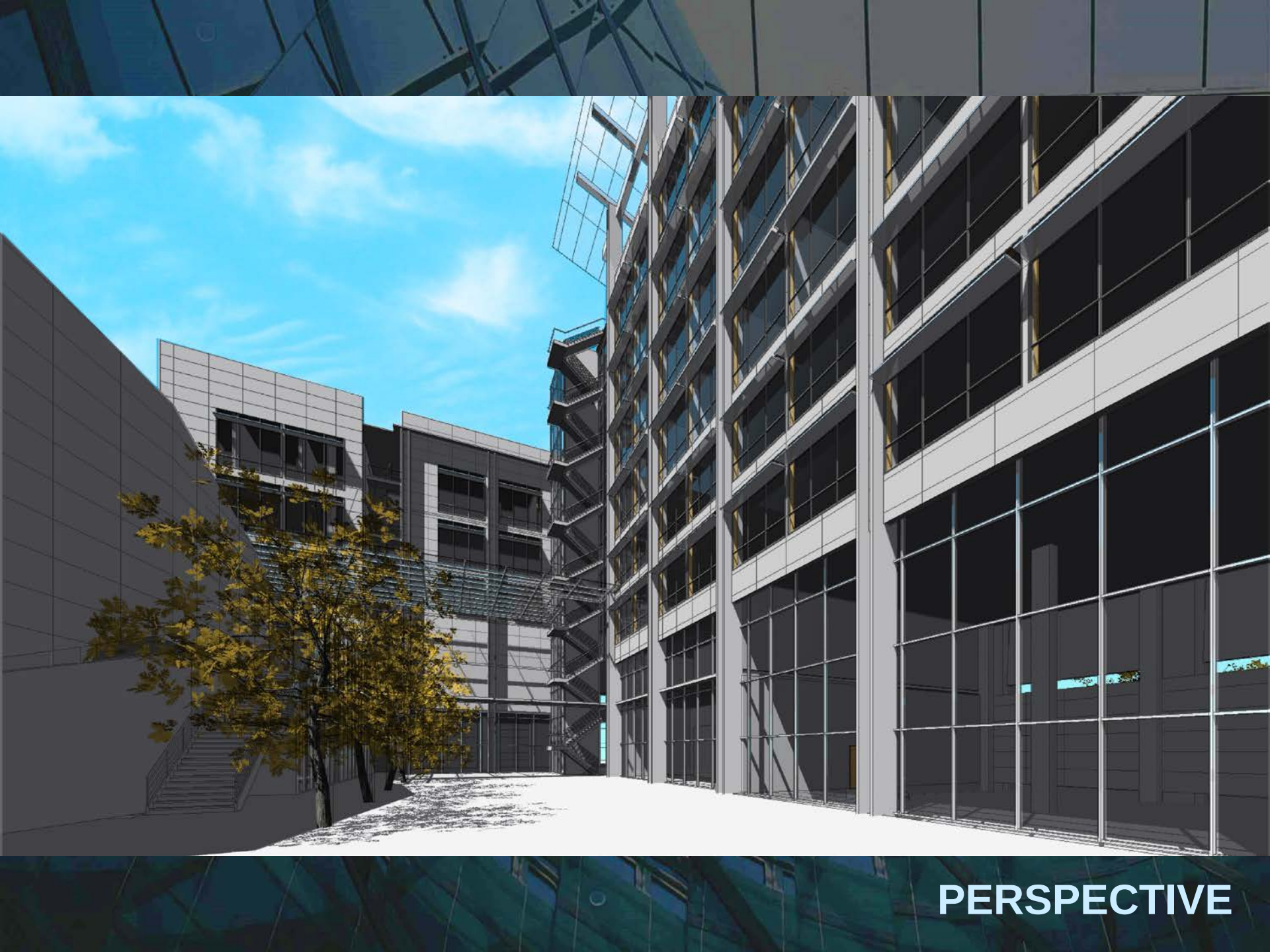
- 1 Visualization
- 2 Production
- 3 Co-ordination/ Collaboration
- 4 Quantity Taking & BQ
- 5 Statutory submission
- 6 Analysis
- 7 Supply Chain Integration
-

VISUALIZATION & PRODUCTION



VISUALIZATION & PRODUCTION





PERSPECTIVE

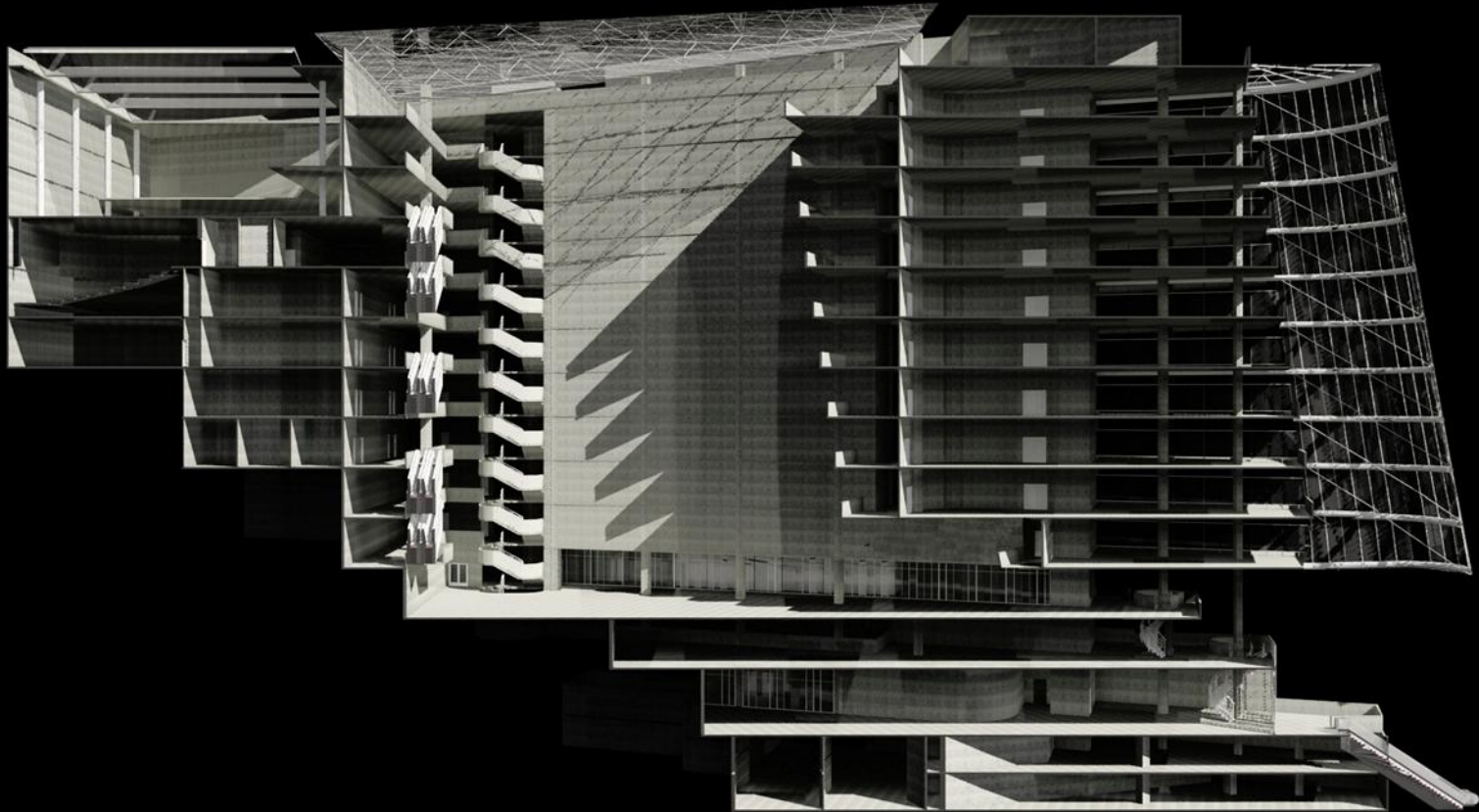


CUT AWAY SECTIONS

VISUALIZATION & PRODUCTION



VISUALIZATION & PRODUCTION



CUT AWAY PERSPECTIVE

VISUALIZATION & PRODUCTION



[illegible]

VISUALIZATION & PRODUCTION



VISUALIZATION & PRODUCTION

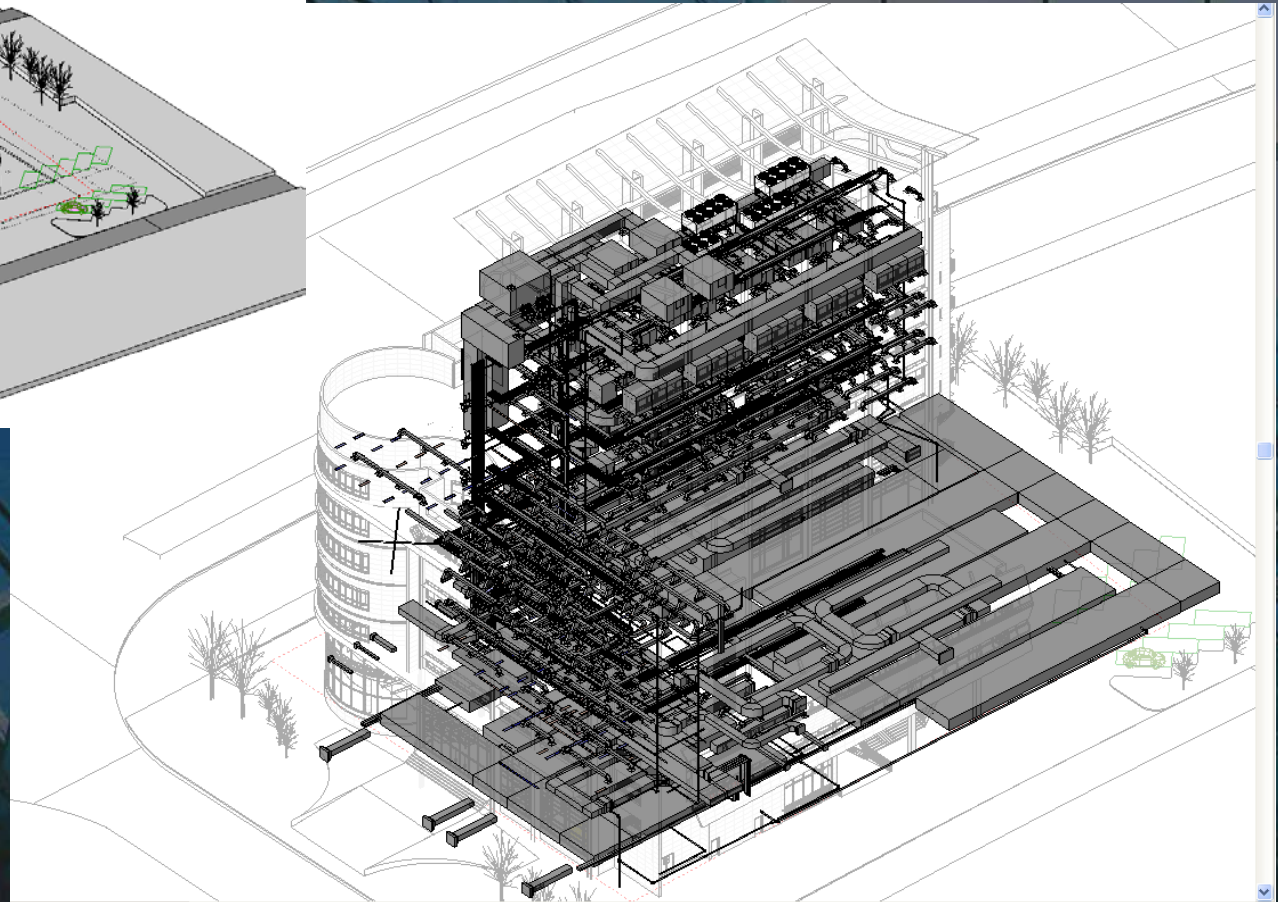
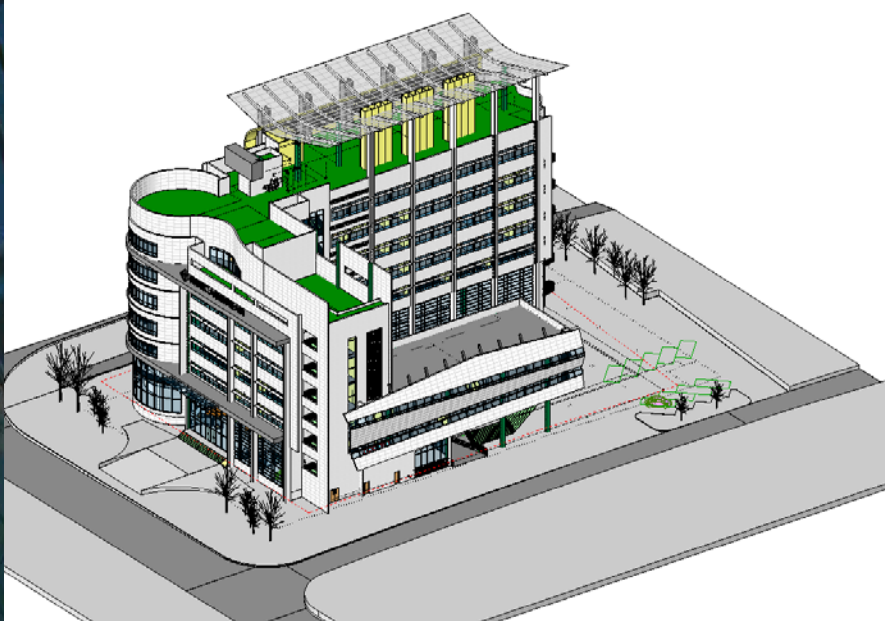


VISUALIZATION & PRODUCTION

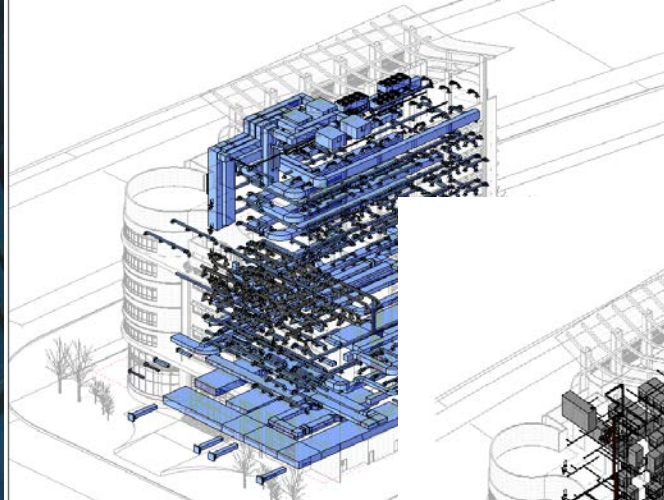


CO-ORDINATION / COLLABORATION

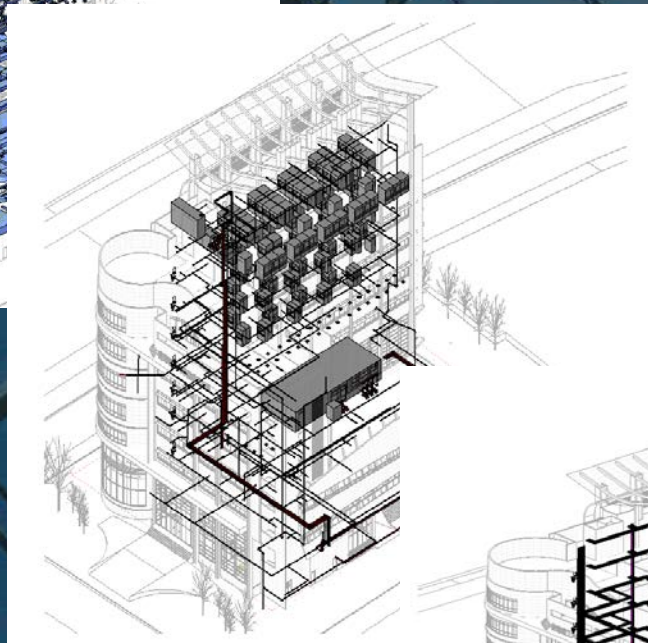
Work Flow – Establish BIM Models



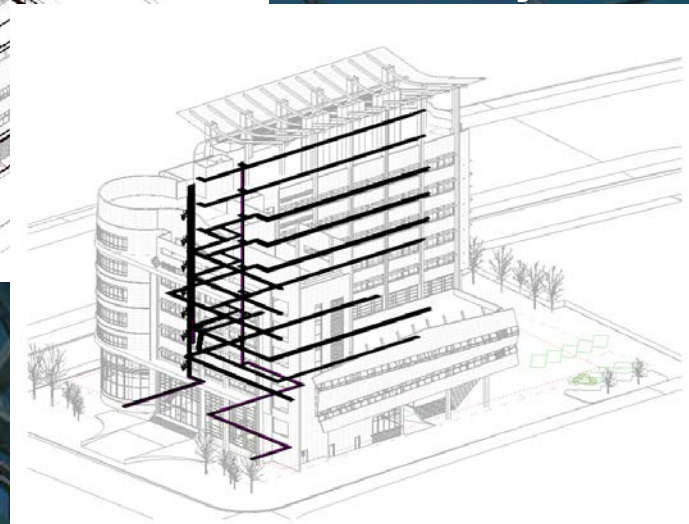
HVAC Installation

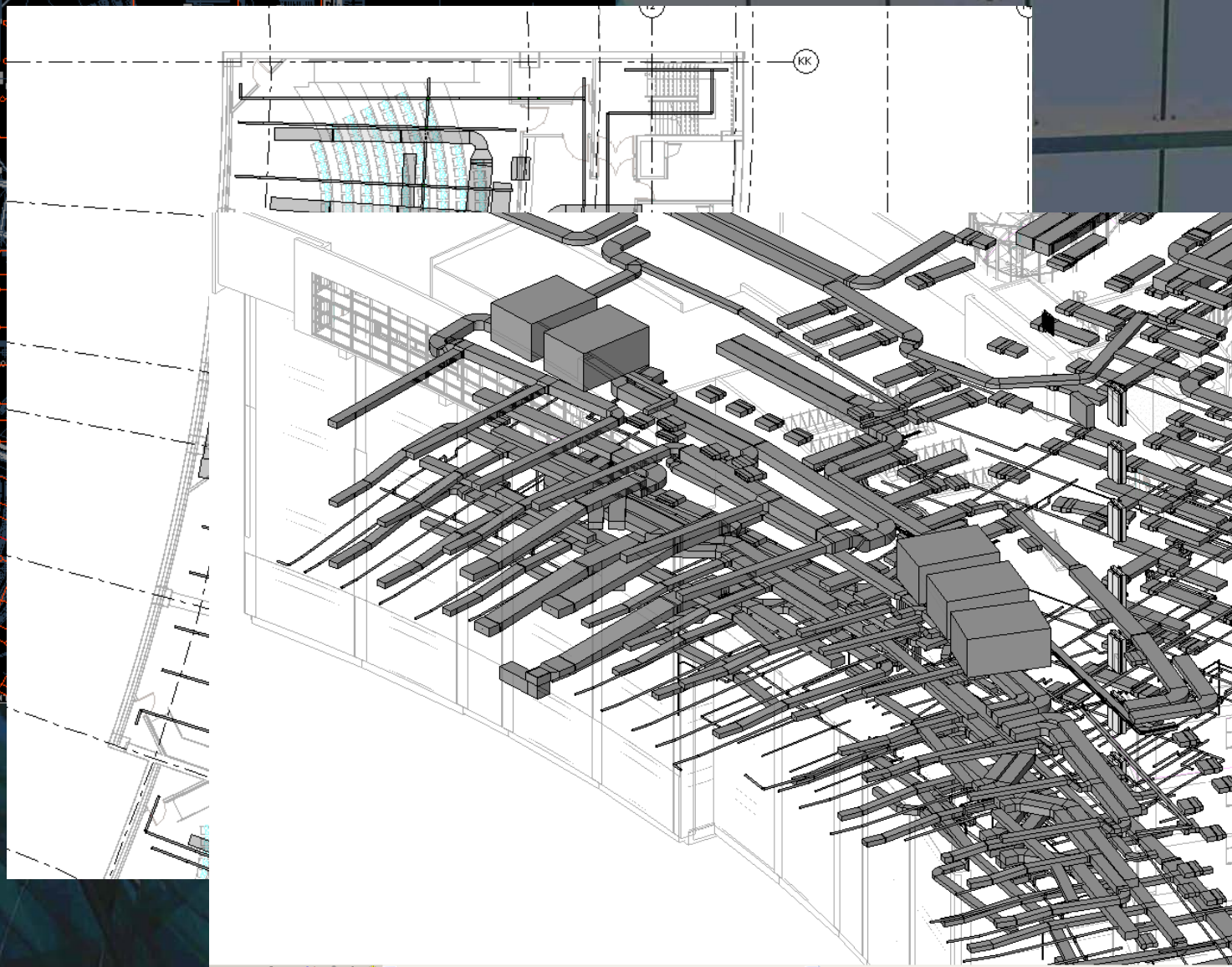
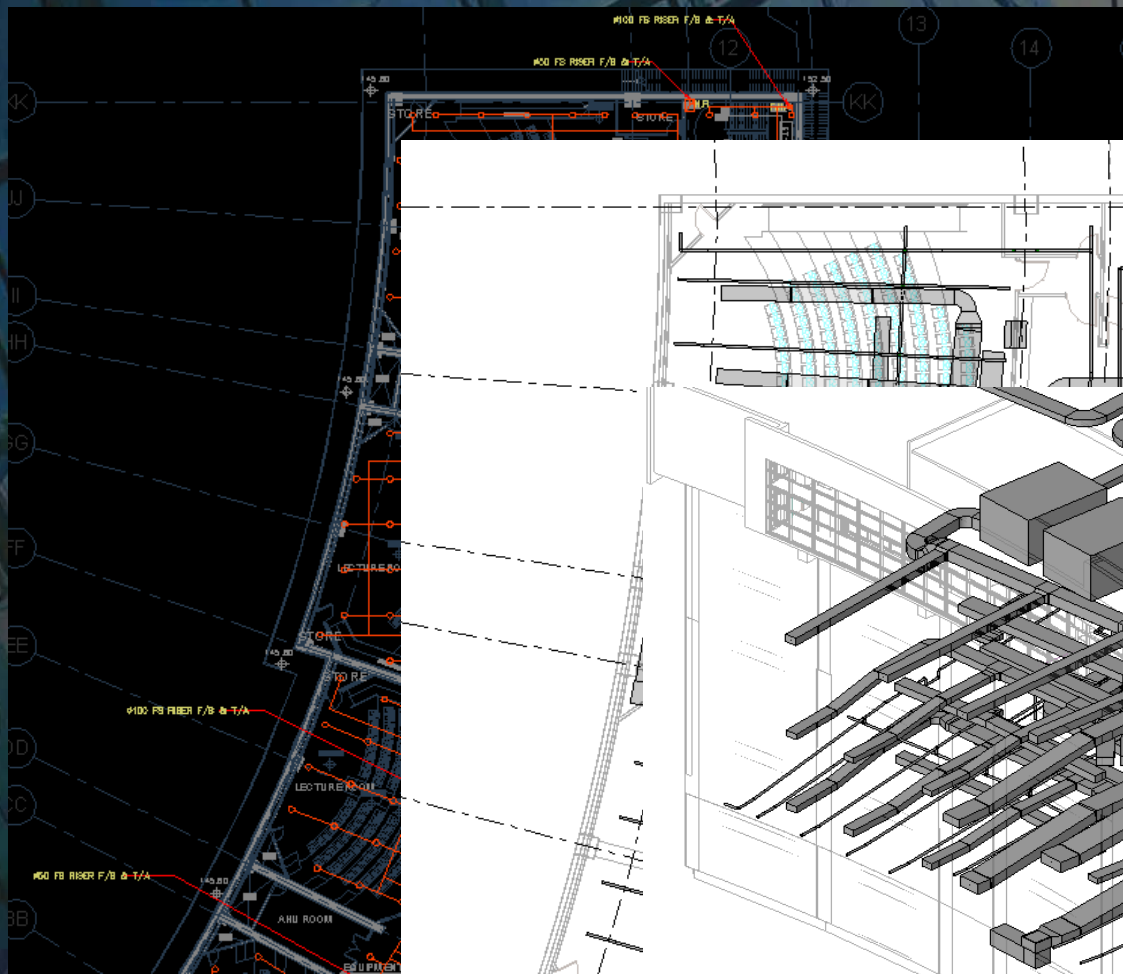


Fire Services Installation

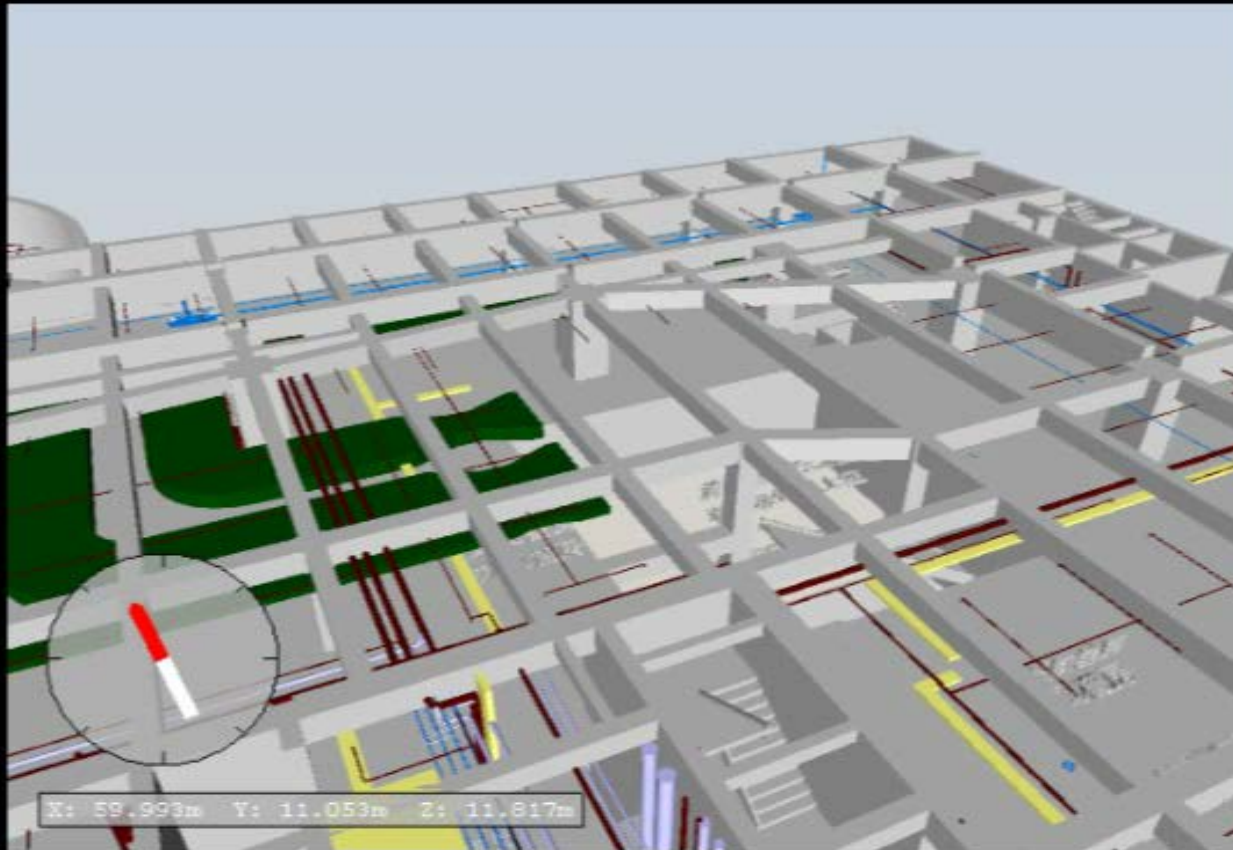


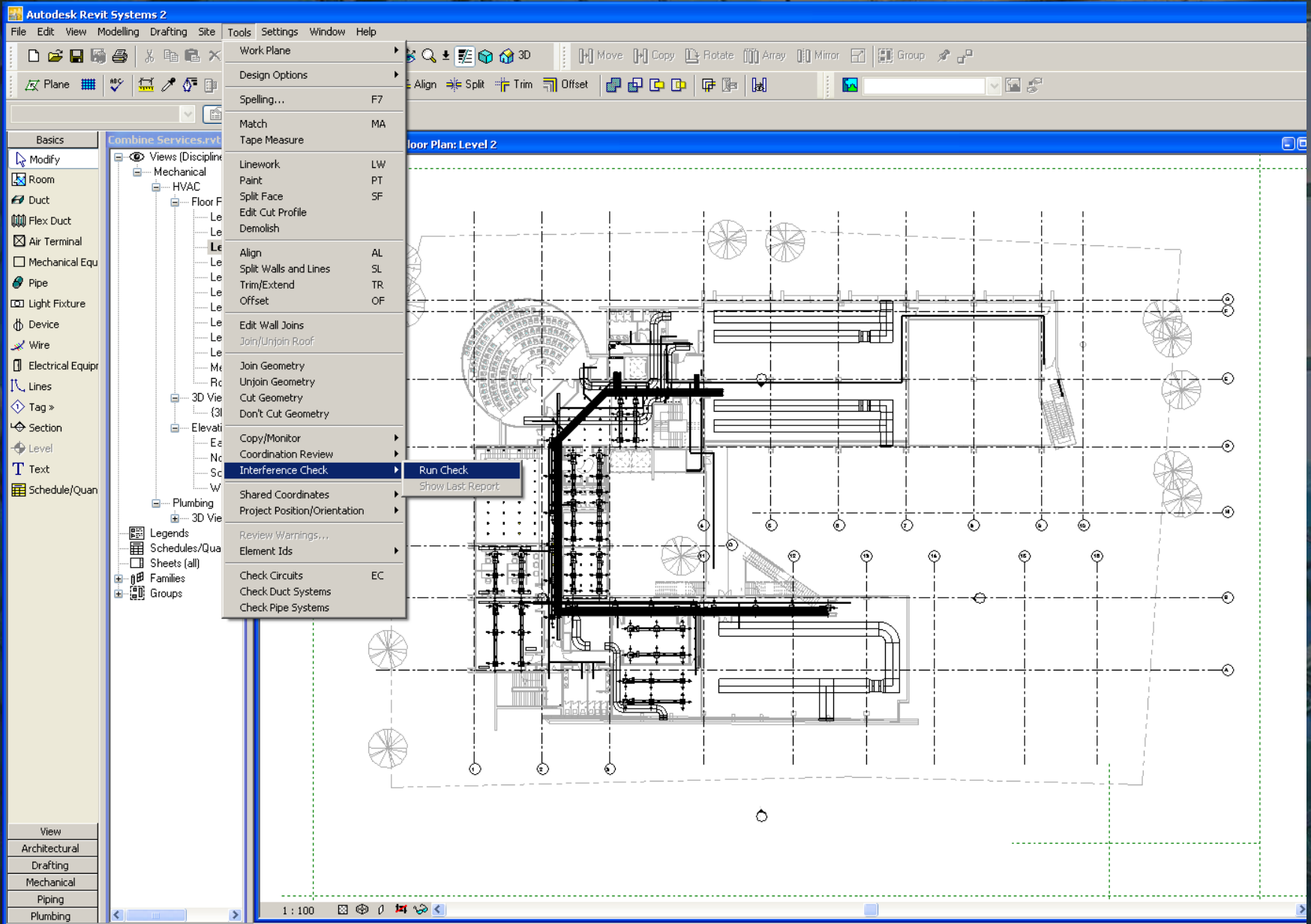
Electricity Installation





Work Flow - Clashes Identification Processes





Work Flow – Clashes Report

Autodesk Revit Systems 2

File Edit View Modeling Drafting Site Tools Settings Window Help

Plane ☒ Press + Drag ☐ Editable Only

PolyU Shenzhen Campus AC_andy.rvt - 3D View: {3D}

Interference Report

Group by: Category 1, Category 2

Message
Pipes
Pipes
Pipes
Pipes
Pipes
Pipes
Pipes
Pipes
Pipes
Pipes
Pipes
Pipes
Pipes
Pipes

Created: Tuesday, May 29, 2007 6:13:54 PM
Last Update:

Note: Refresh updates interferences listed above.

Show Export... Refresh Close

Duct Schedule
Pipe Schedule
Room Schedule
Wall Schedule

Sheets (all)
E&M-1 - Baseme
E&M-2 - Level 1.
E&M-3 - Level 2.
E&M-4 - Level 3.
E&M-5 - Level 4.
E&M-6 - Level 5.
E&M-7 - Level 6.
E&M-8 - Level 7.
E&M-9 - Level 8.
E&M-10 - ROOF
E&M-11 - A/C Se

Families
Air Terminals
Annotation Symb
Ceilings
Basic Ceilin
Generic
Plaster E

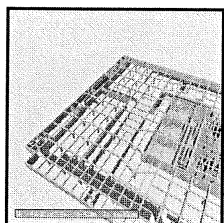
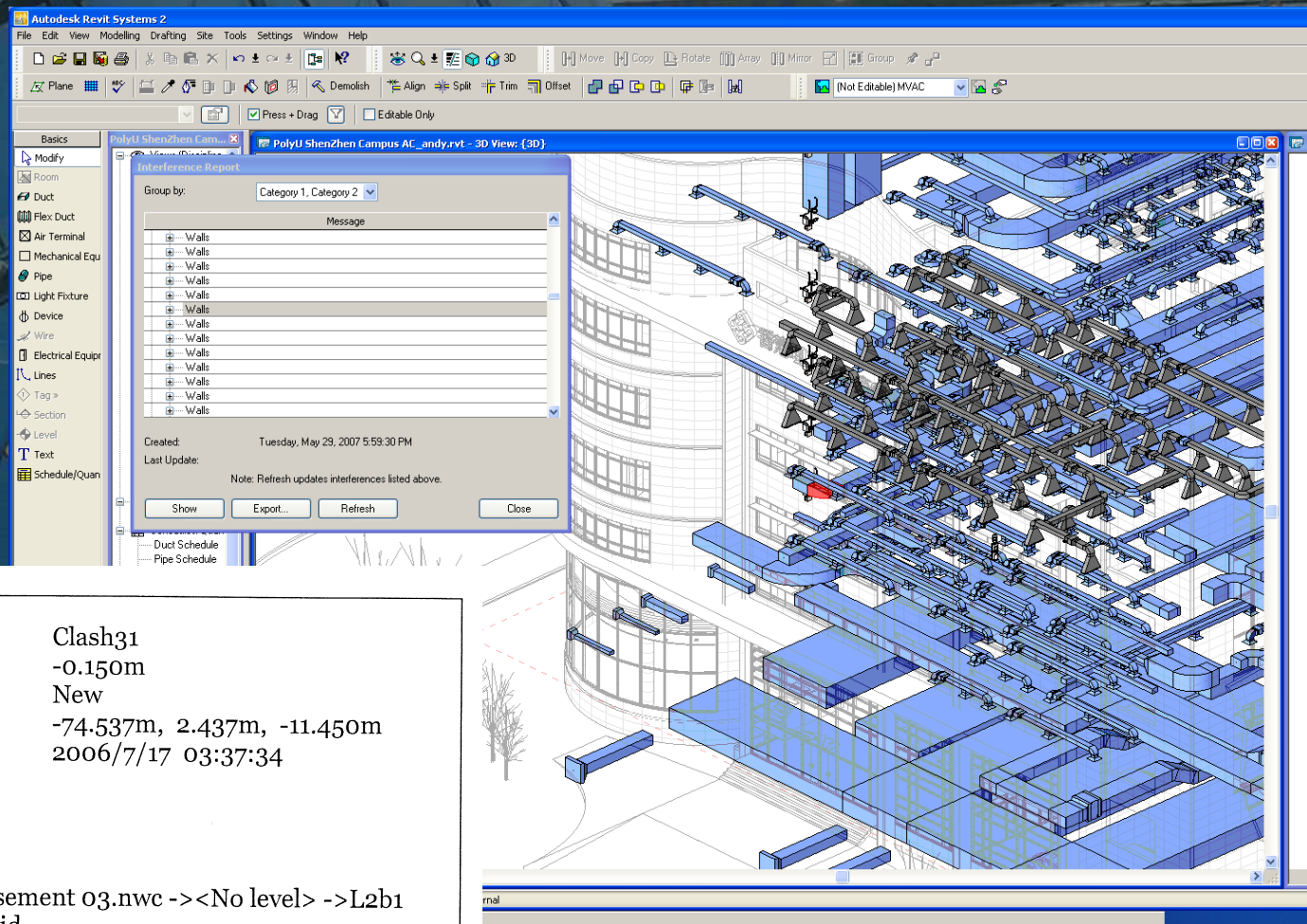
View
Architectural
Drafting
Mechanical
Piping
Plumbing

1:150

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

Page 4 Sec 1 4/4 At 3.1cm Ln 2 Col 2 REC TRK EXT OVR English (U.S)

Work Flow – Clashes Report



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

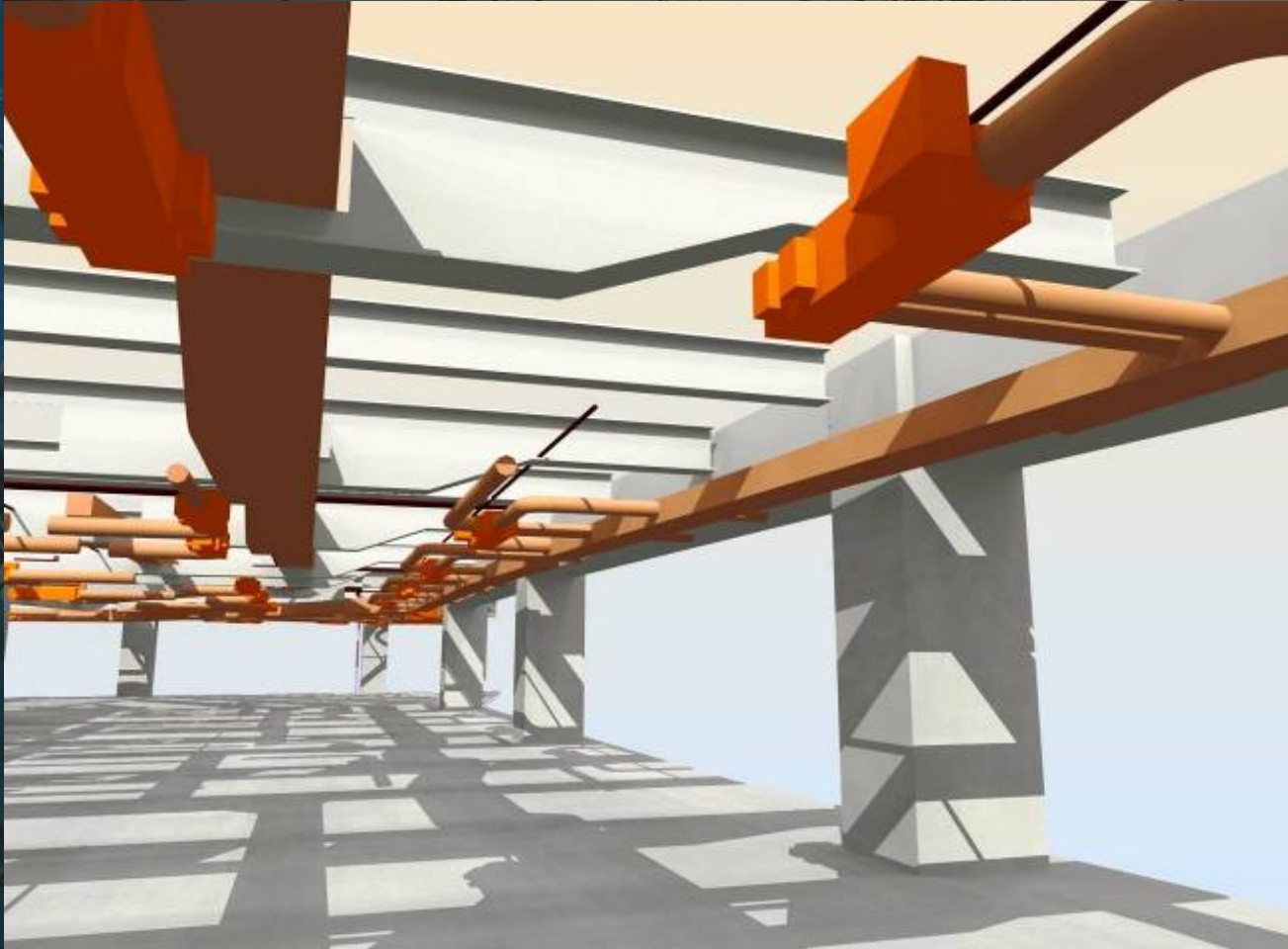
Item 1

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

Item 2

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

Work Flow – BIM Model Revision

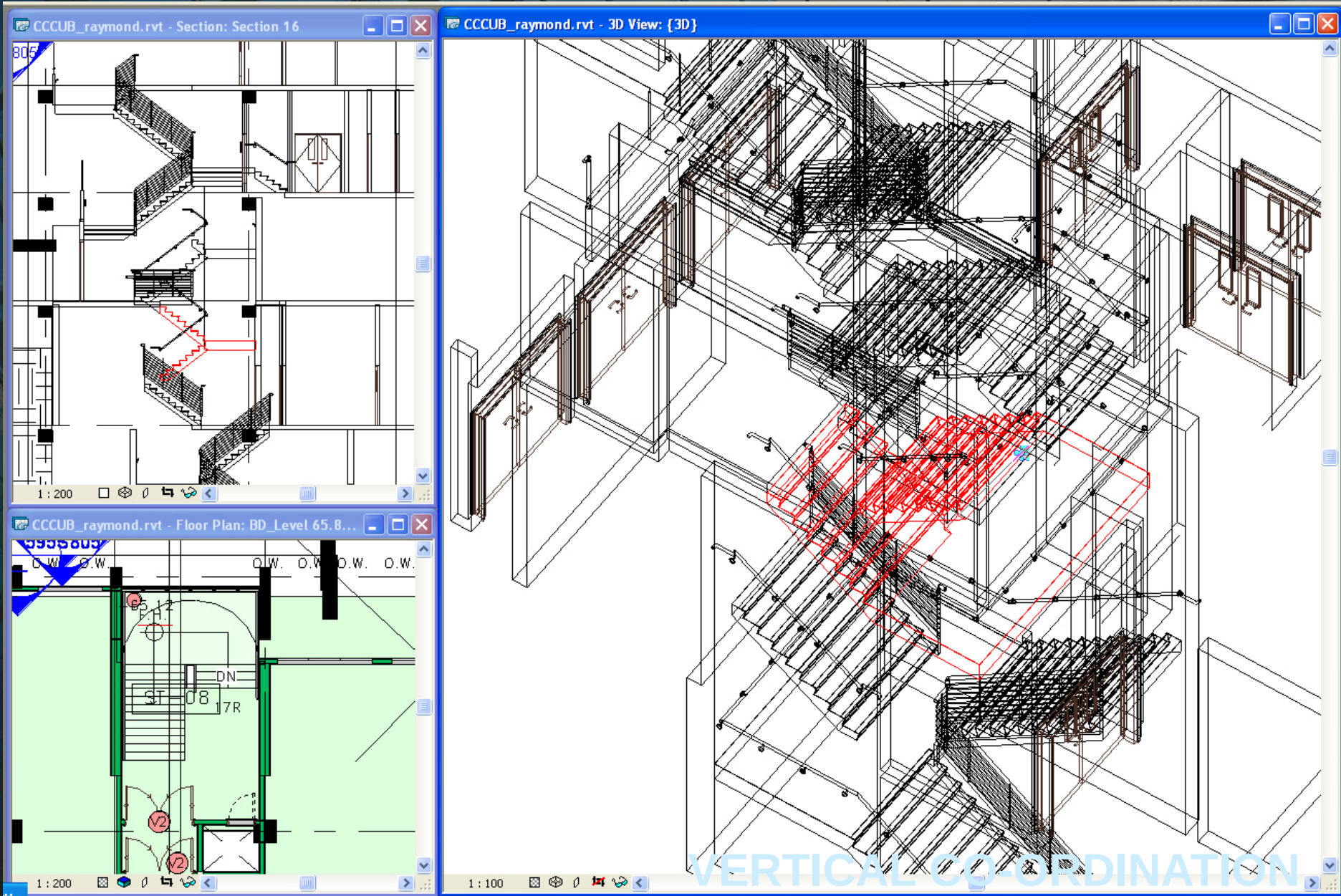


Results – No of Clashes

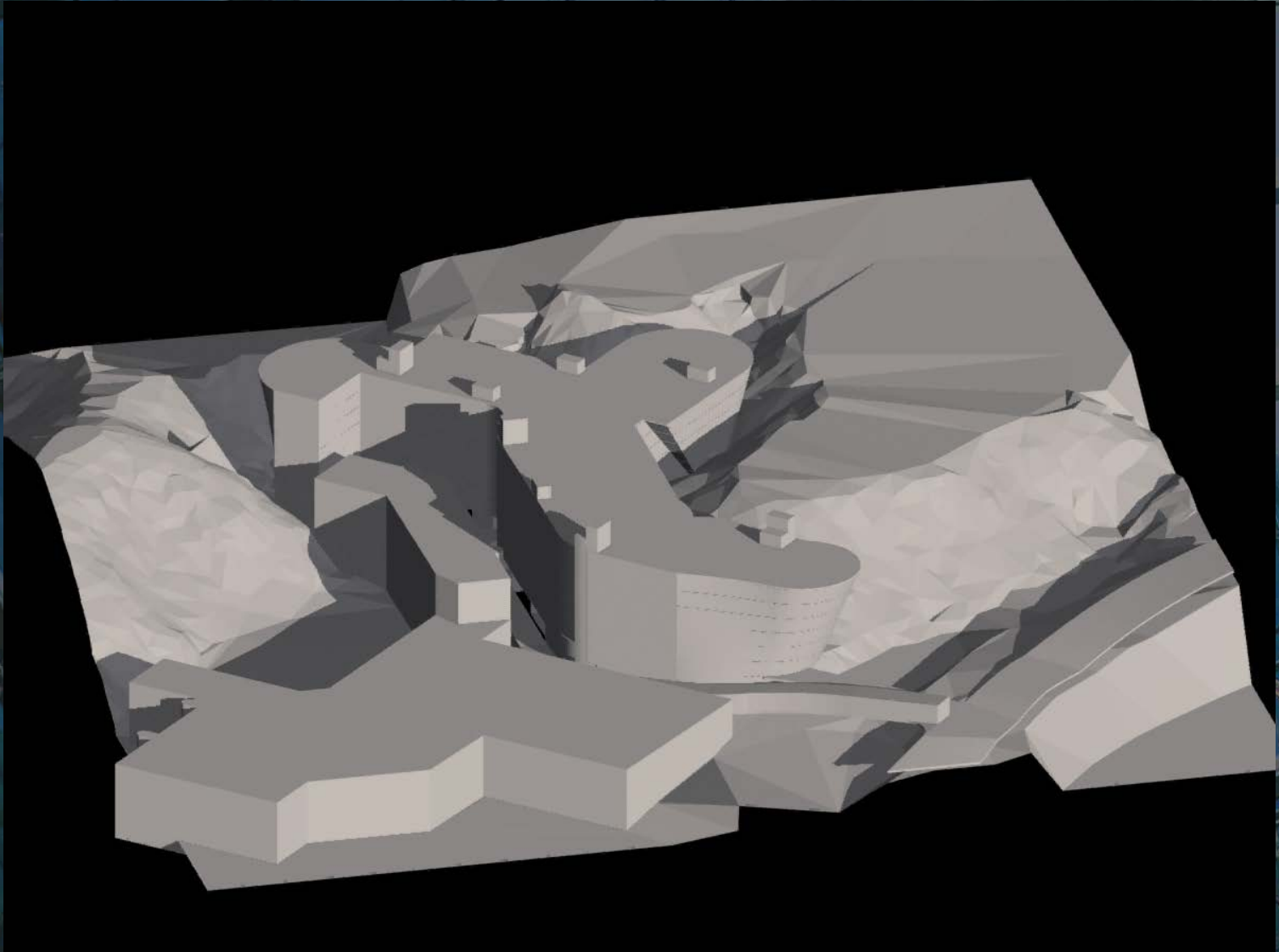
結果 – 碰撞數目

	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

ANALYSIS

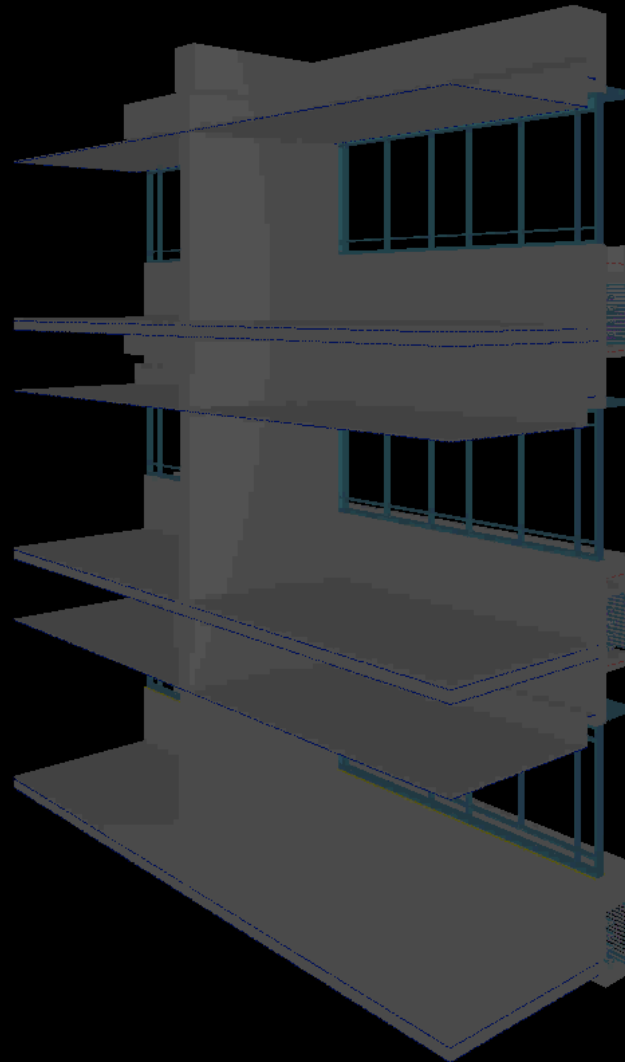


ANALYSIS



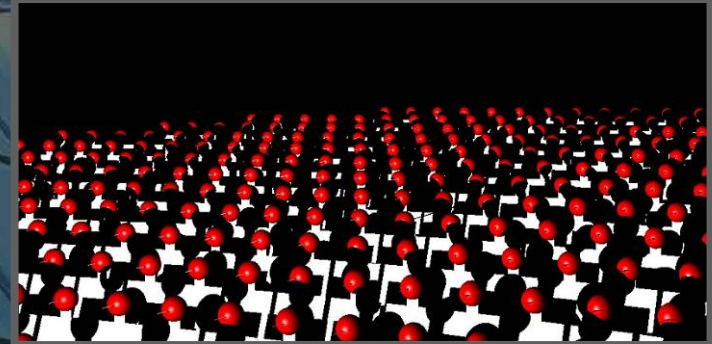
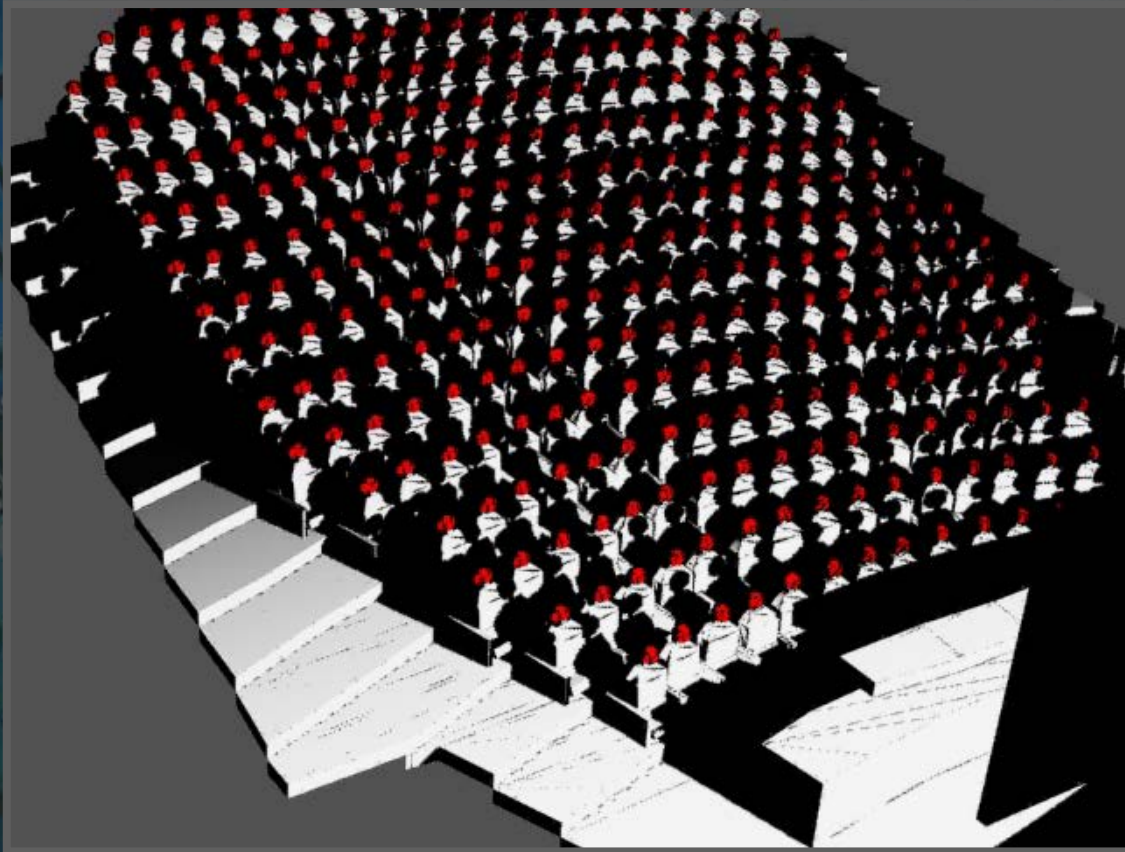
SUN STUDY

ANALYSIS

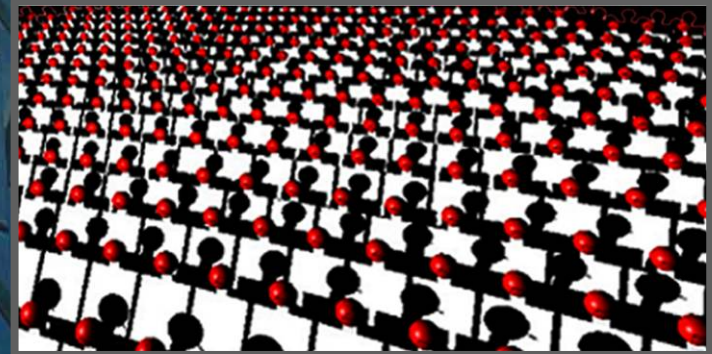


FAÇADE SOLAR STUDY
21/12/2006 7:00am – 6:00pm

ANALYSIS



Unsatisfactory sightlines



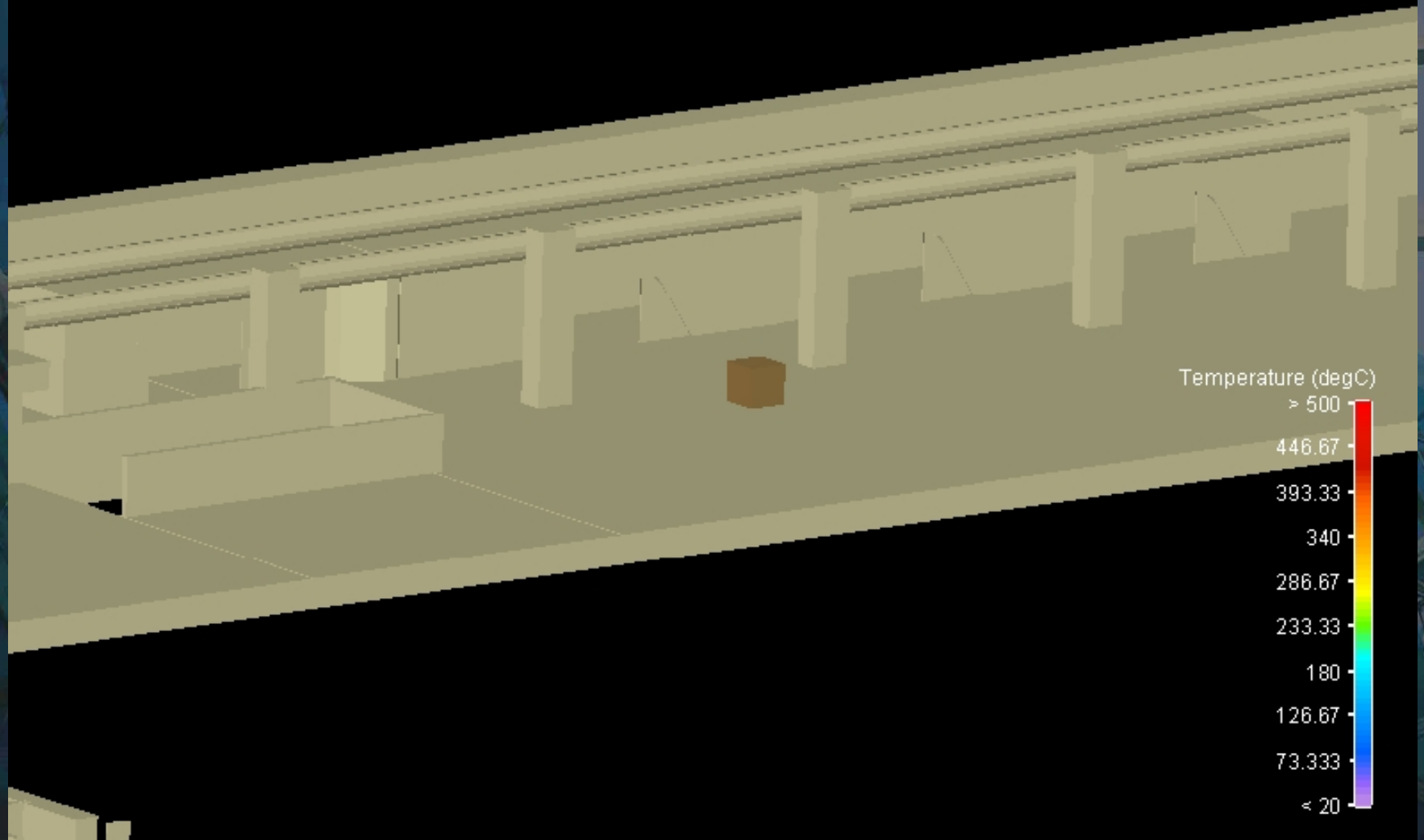
Satisfactory sightlines

Radiating Light Method

SIGHTLINE STUDIES

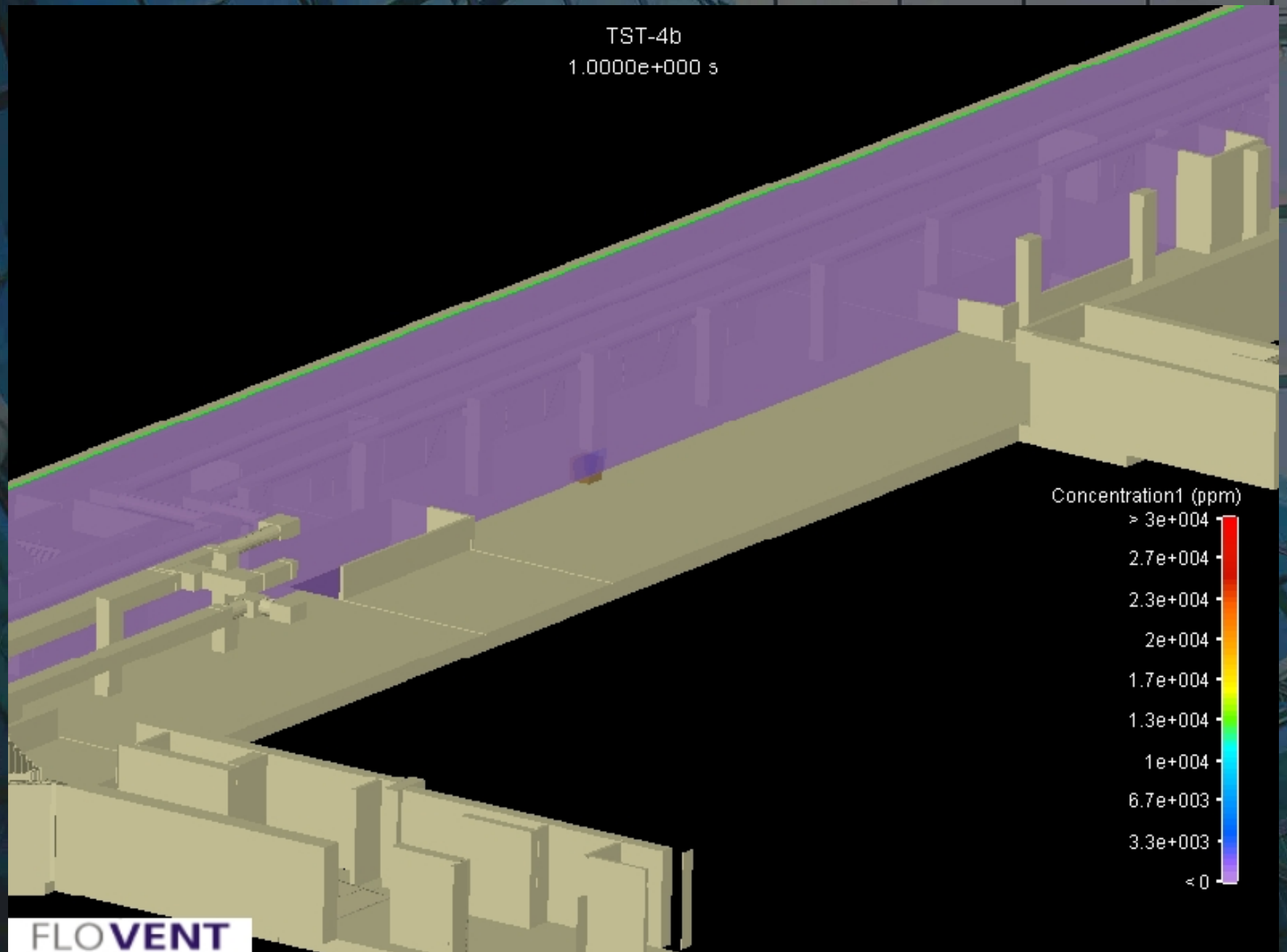
ANALYSIS

TST-4c
1.0000e+000 s

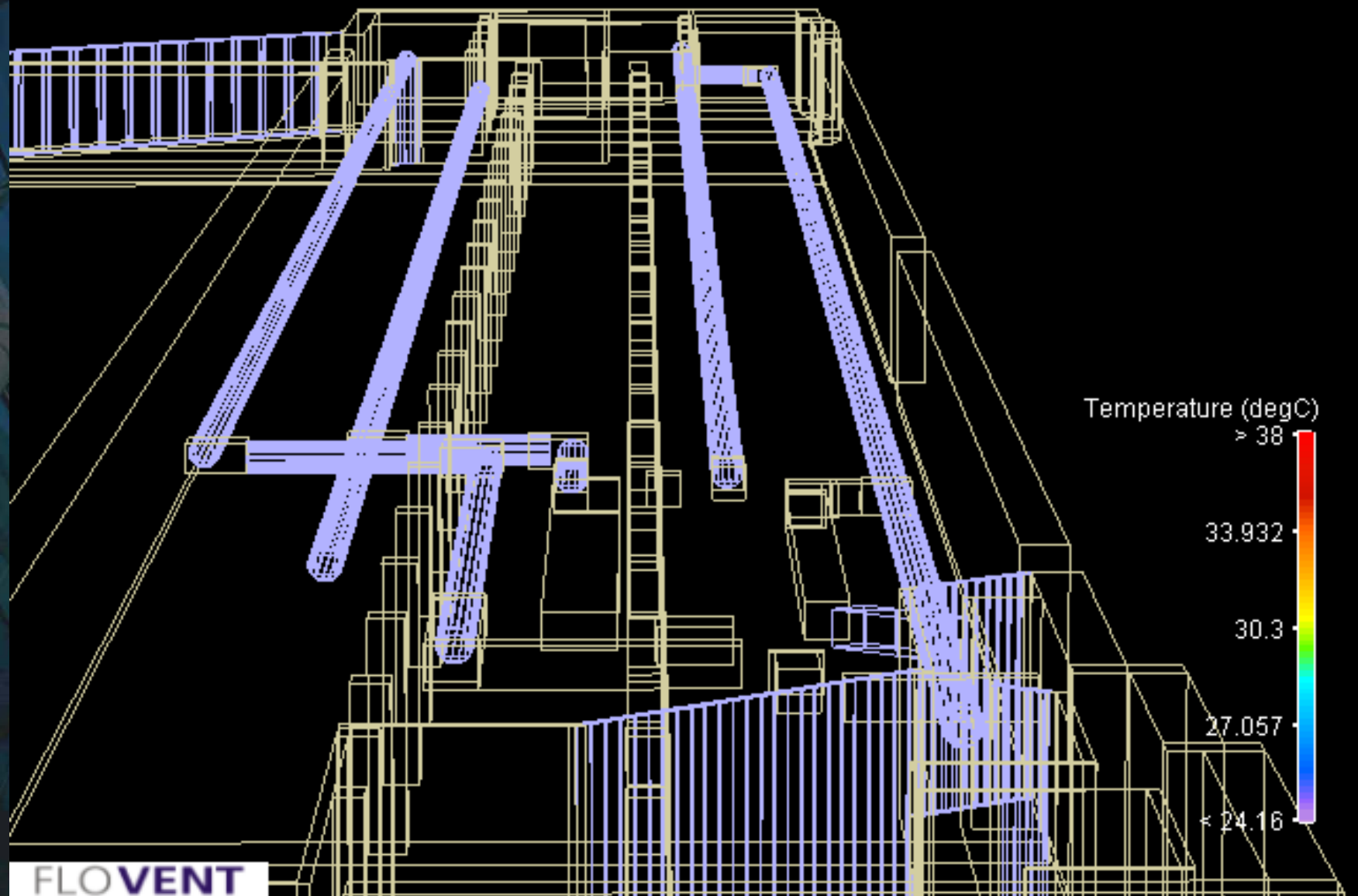


ANALYSIS

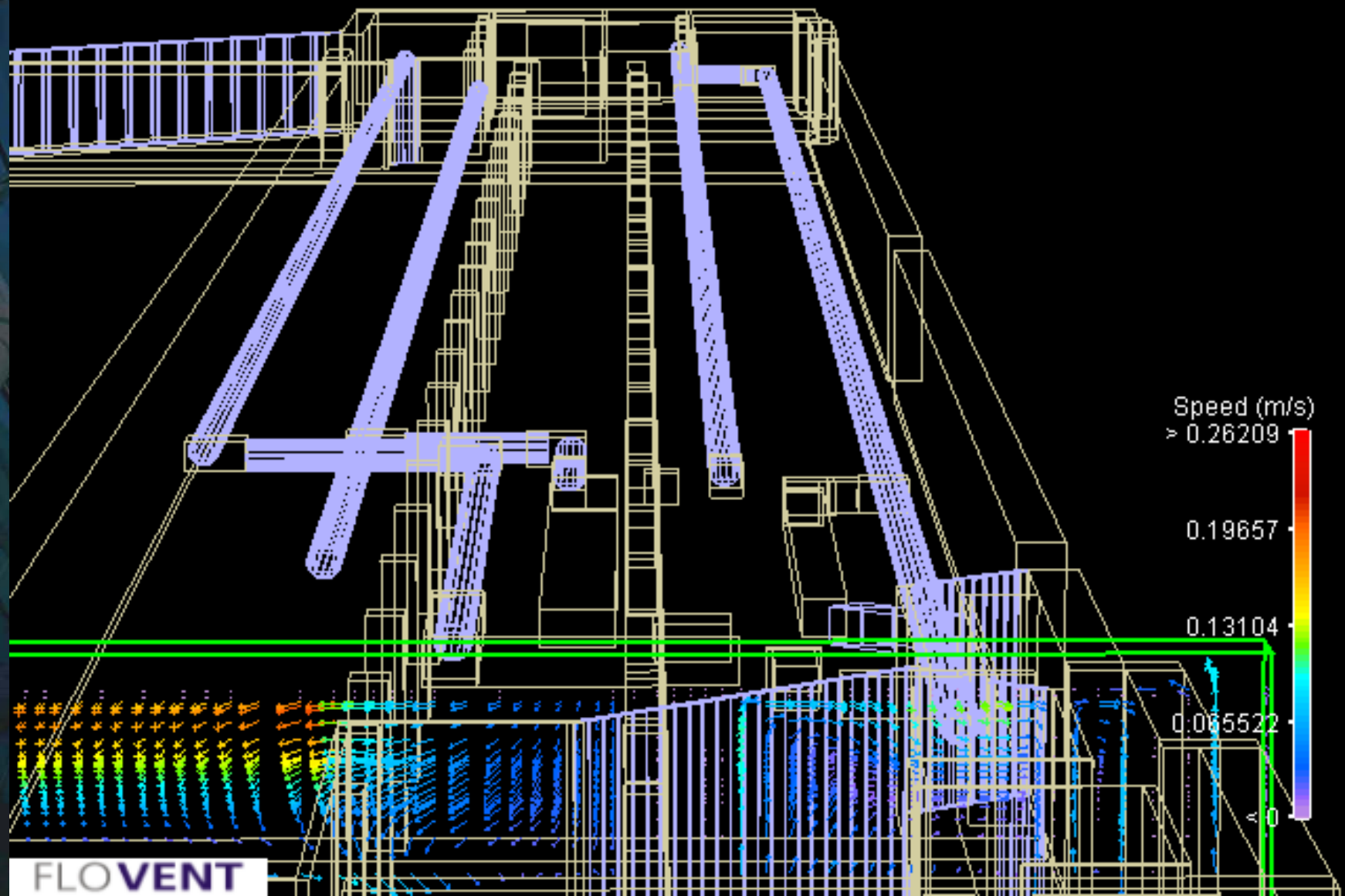
TST-4b
1.0000e+000 s



ANALYSIS



ANALYSIS

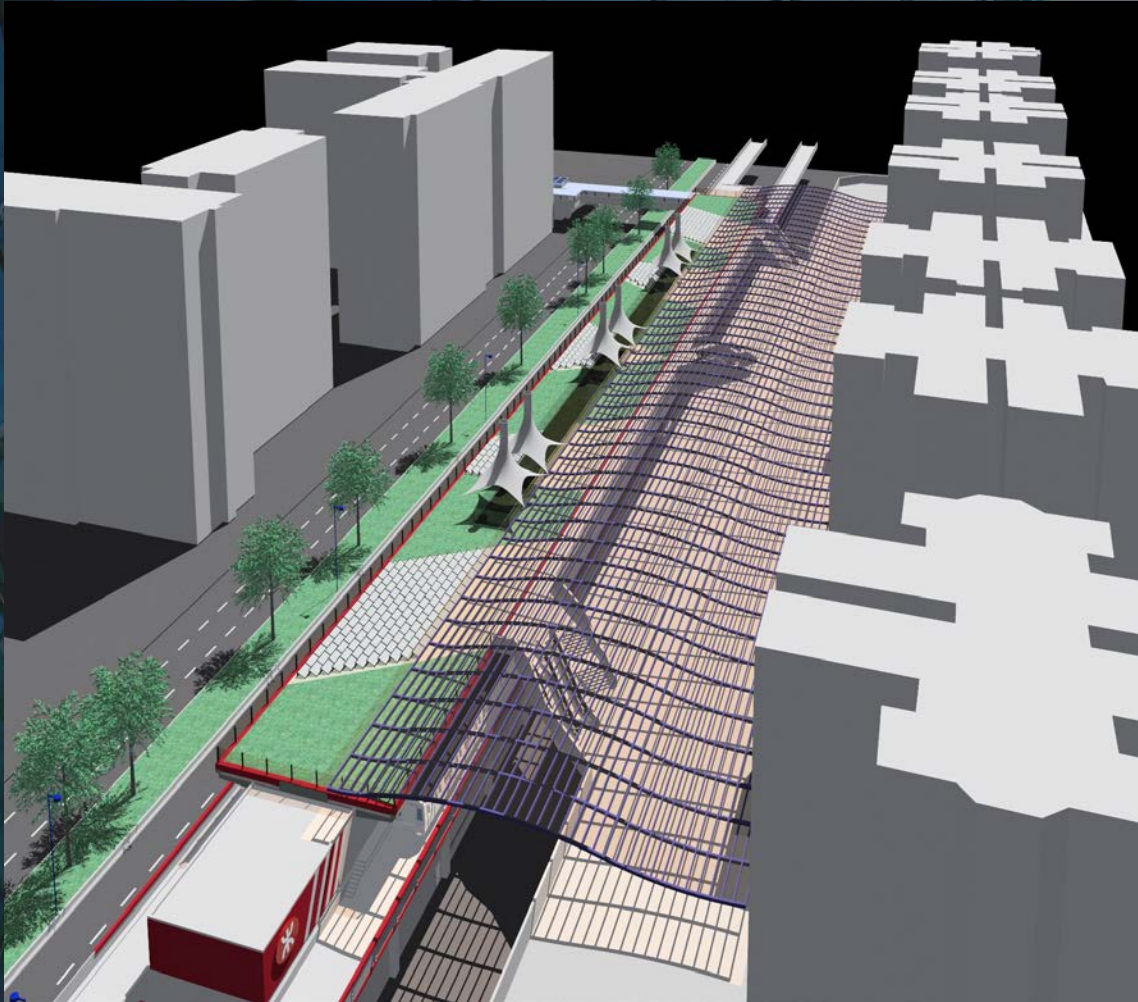


Is the Building Industry changing?



A year ago...

MTRC ...



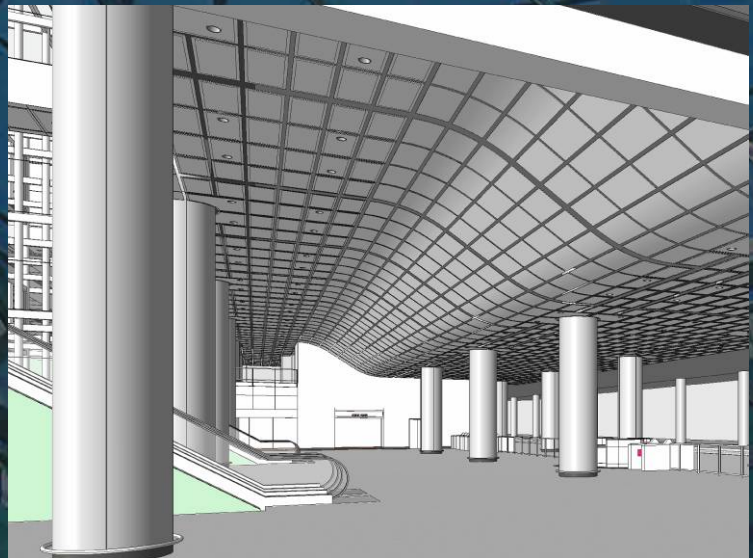
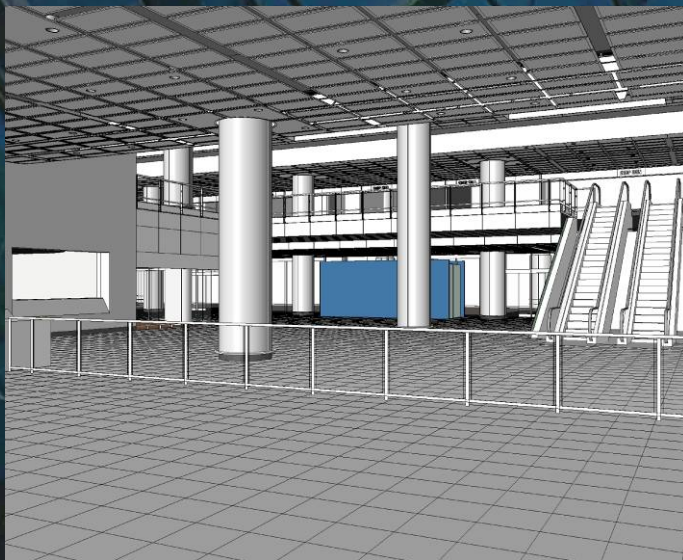
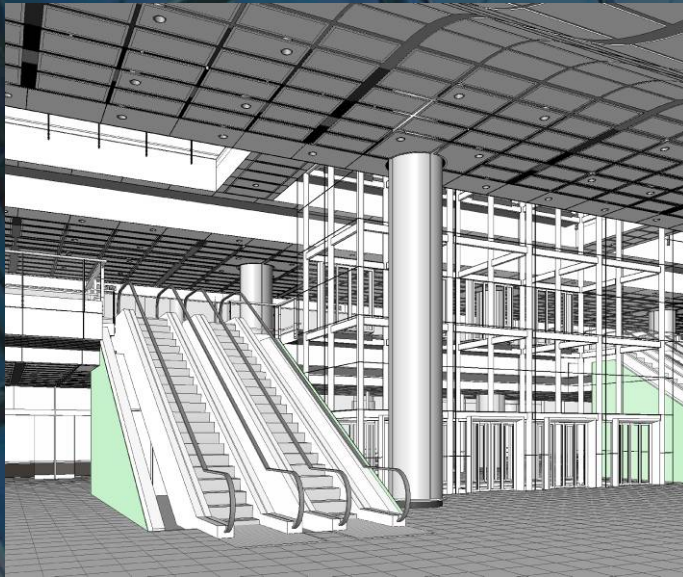
A year ago...



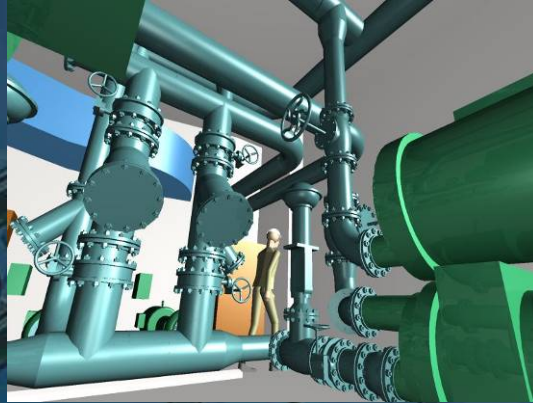
Early Projects...



Early Projects...Hong Kong Station

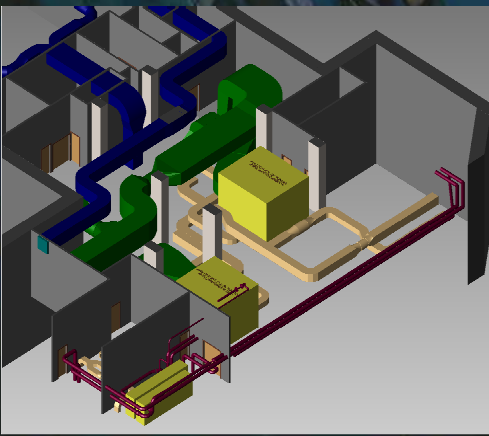
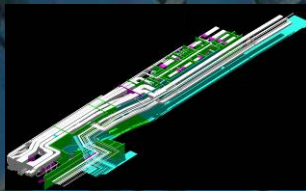
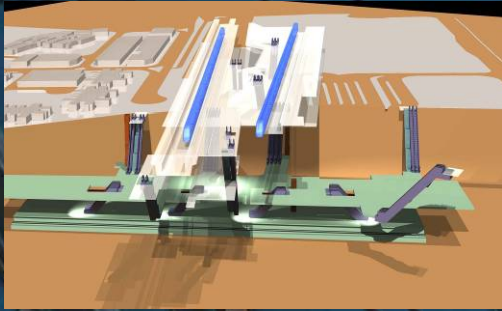


6 Months Ago



三維空間信息

- 更容易展示物體之間的關係
- 導線碰撞檢查



New Projects... Tai Wo Hau External Passenger Lift

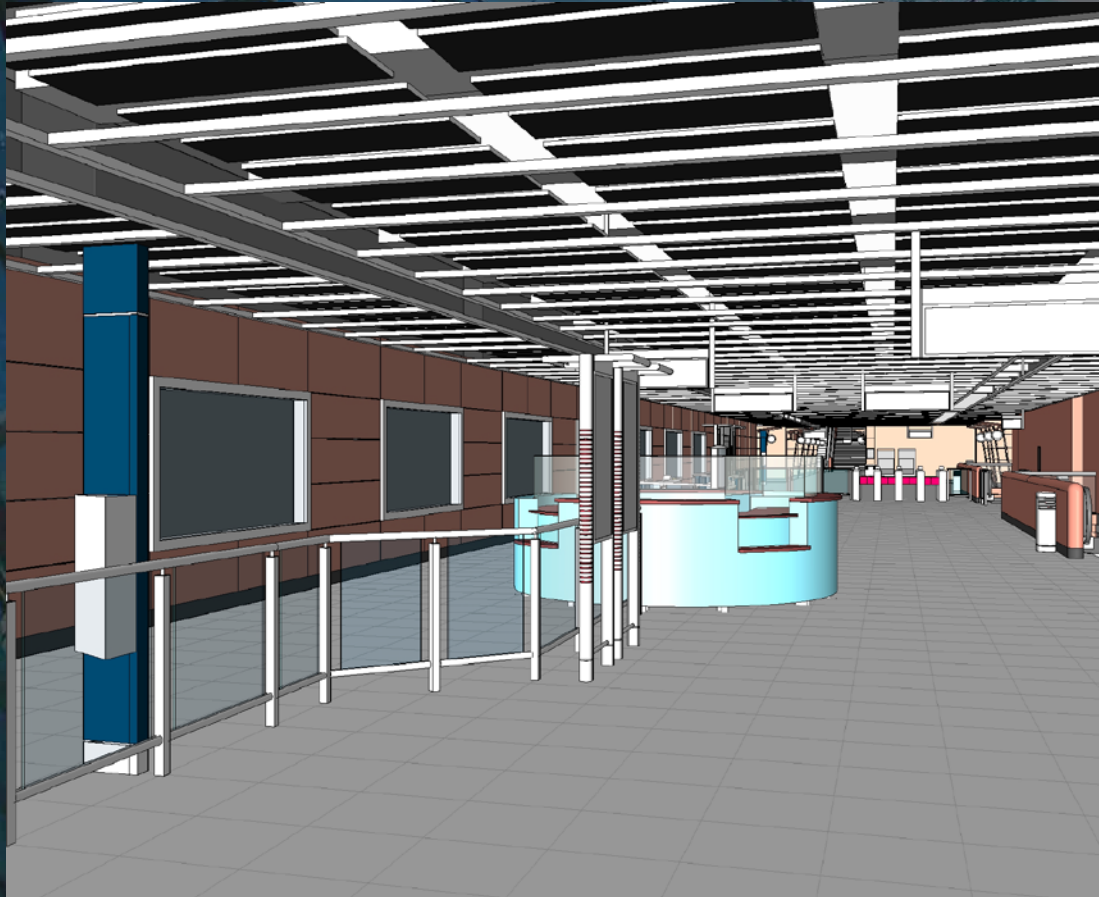


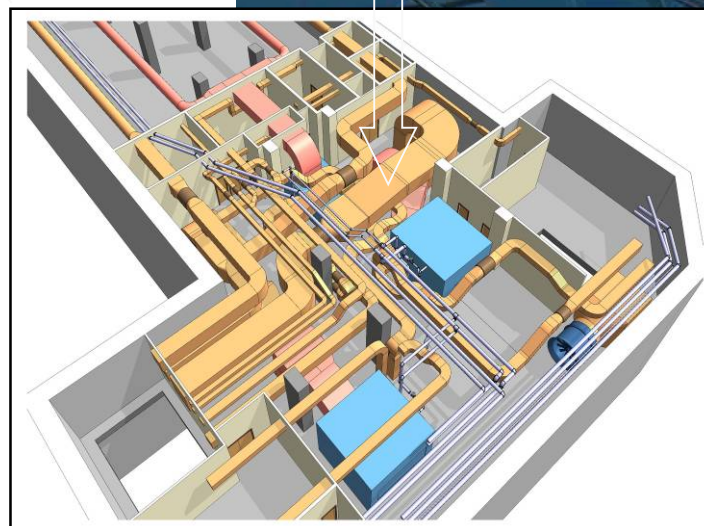
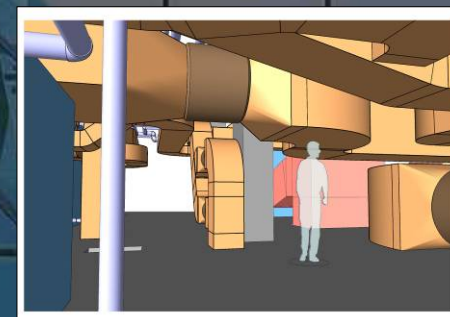
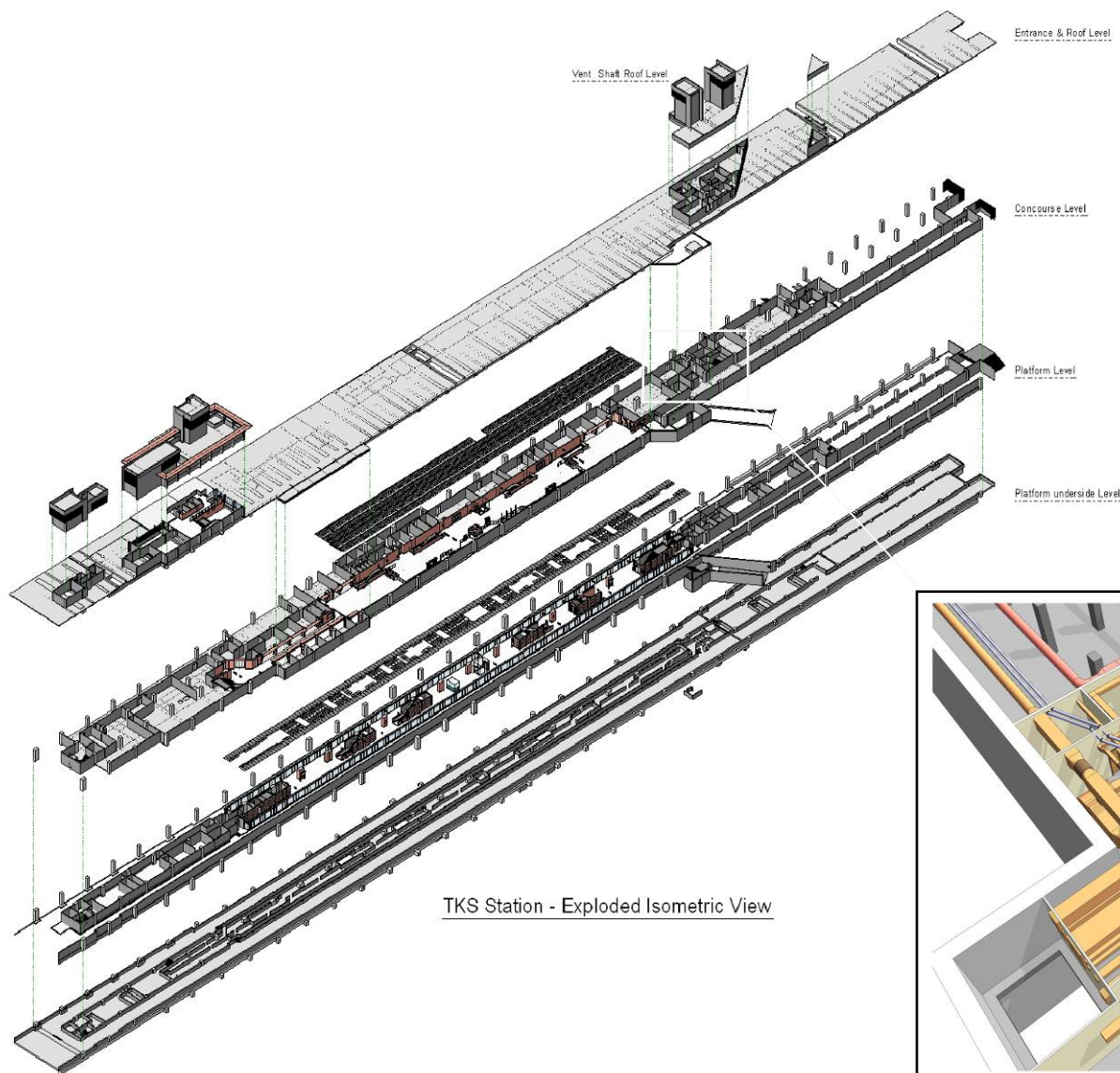
From Design to Project Documentation



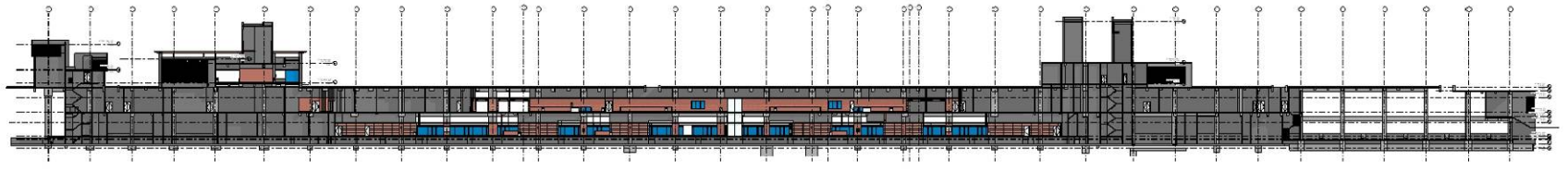
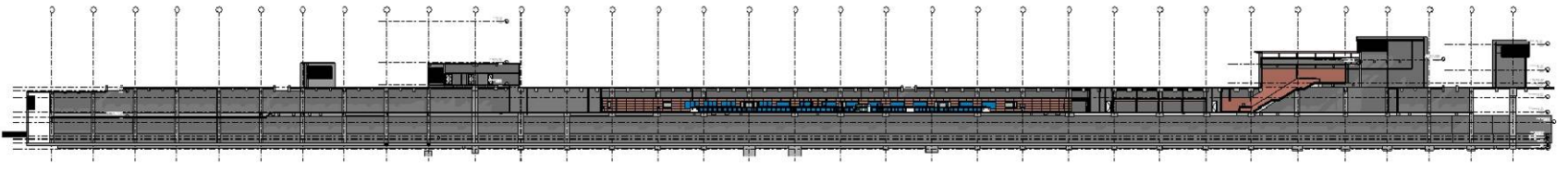
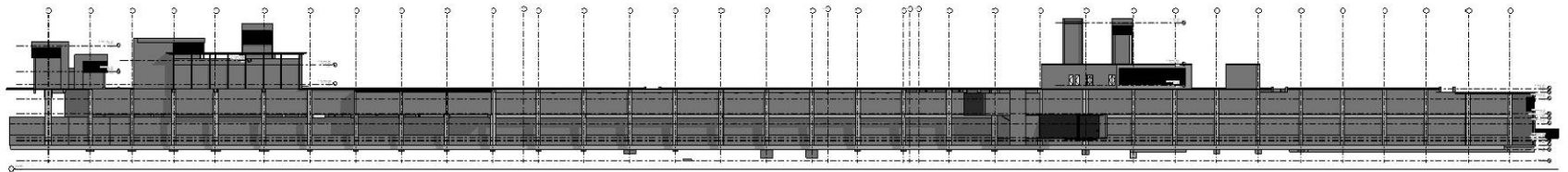
New Project...Tseung Kwan O South Station

Spatial Study
Design Checking



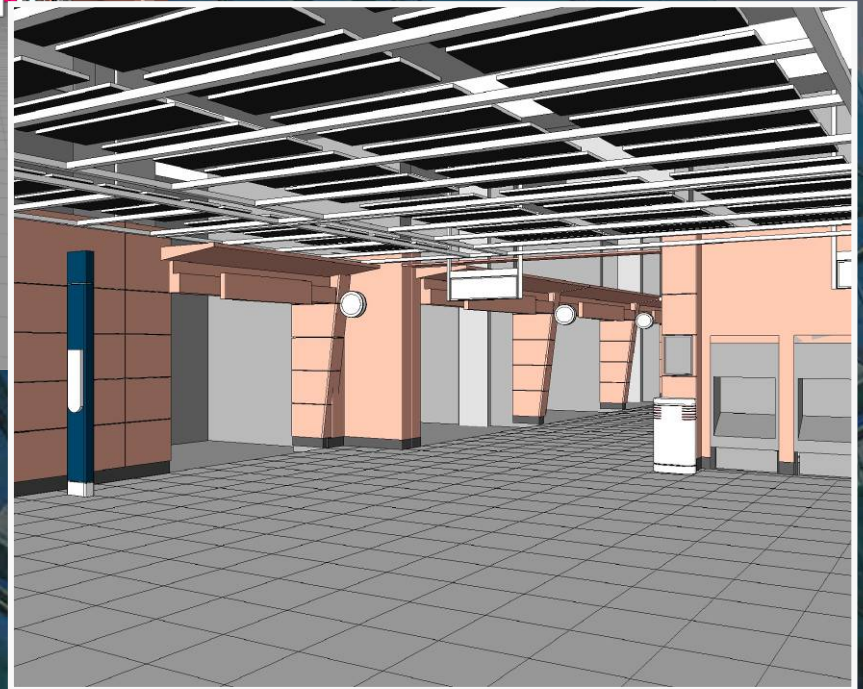
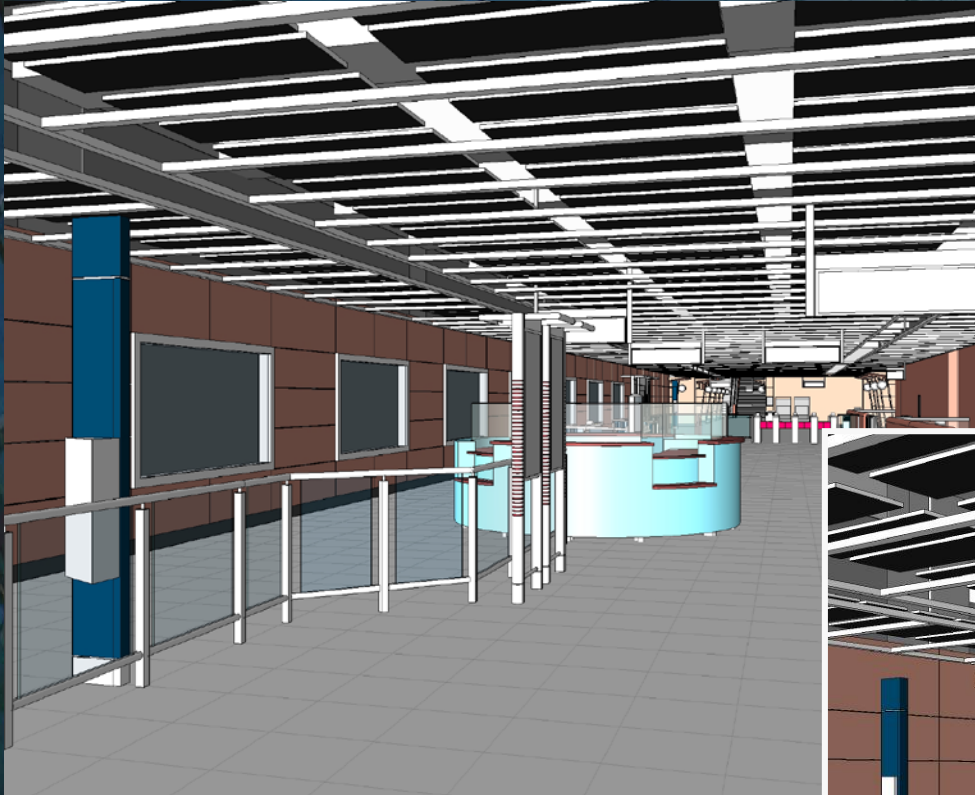


New Project...Tseung Kwan O South Station



New Project...Tseung Kwan O South Station

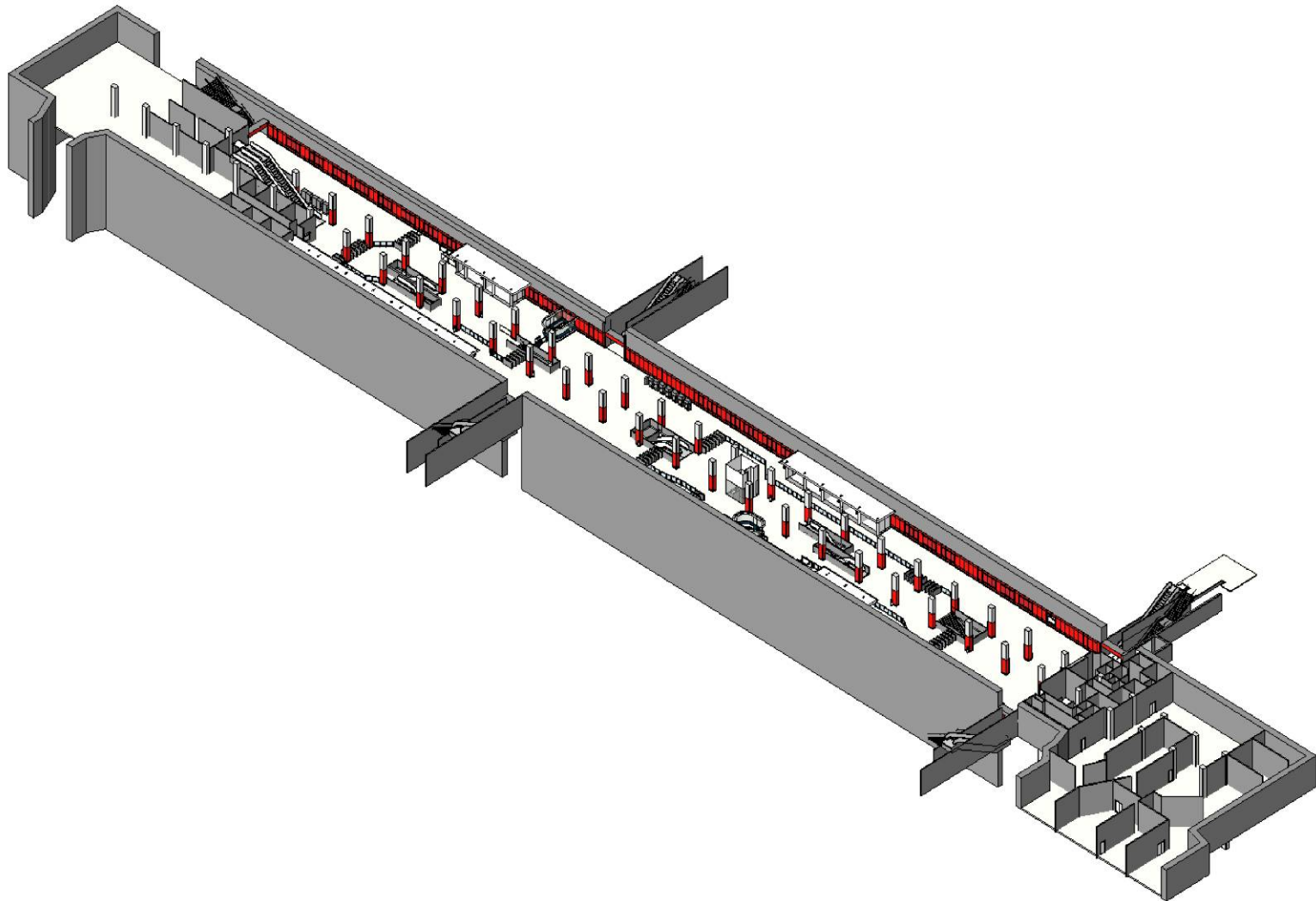
➡ See walkthrough



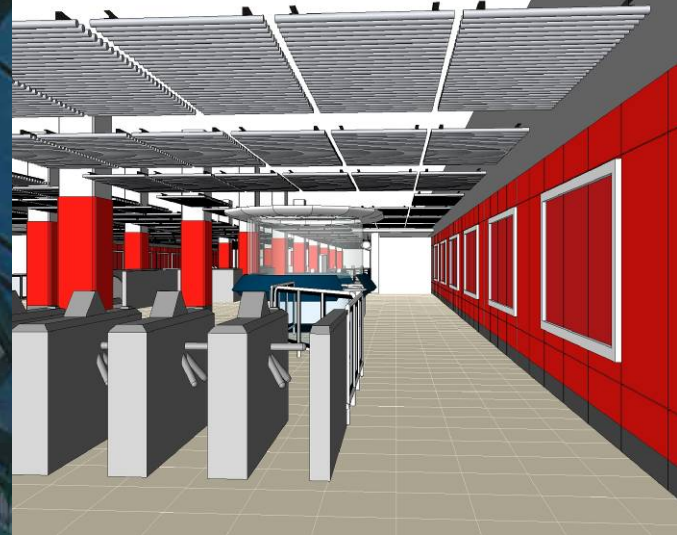
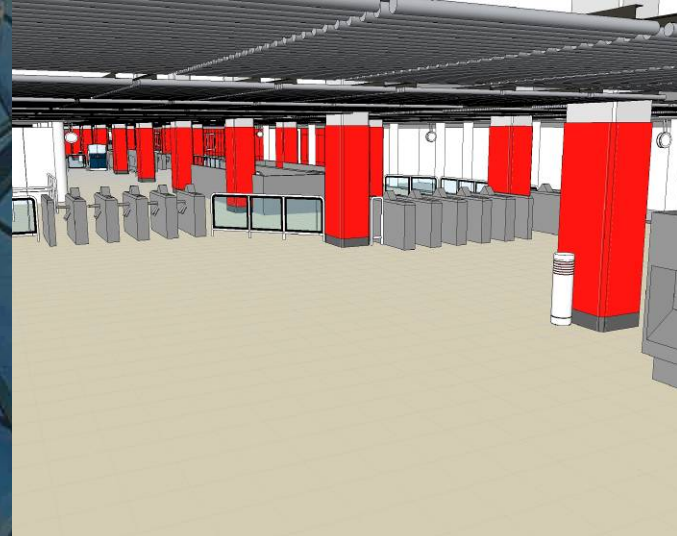
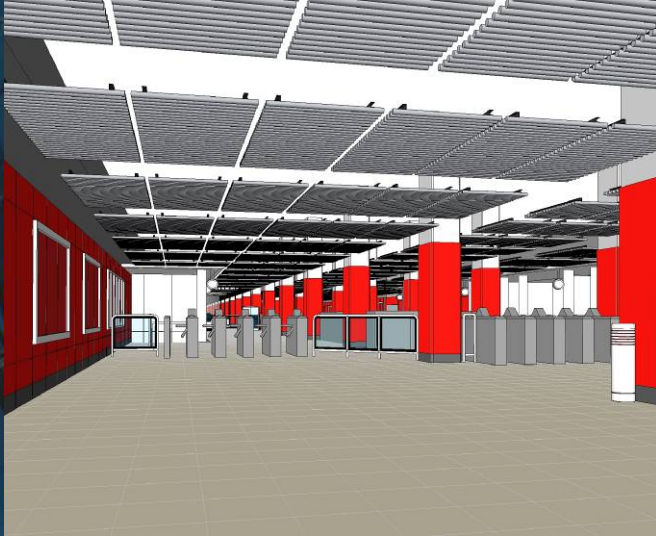
Spatial Analysis... Mong Kok Station Year 2020



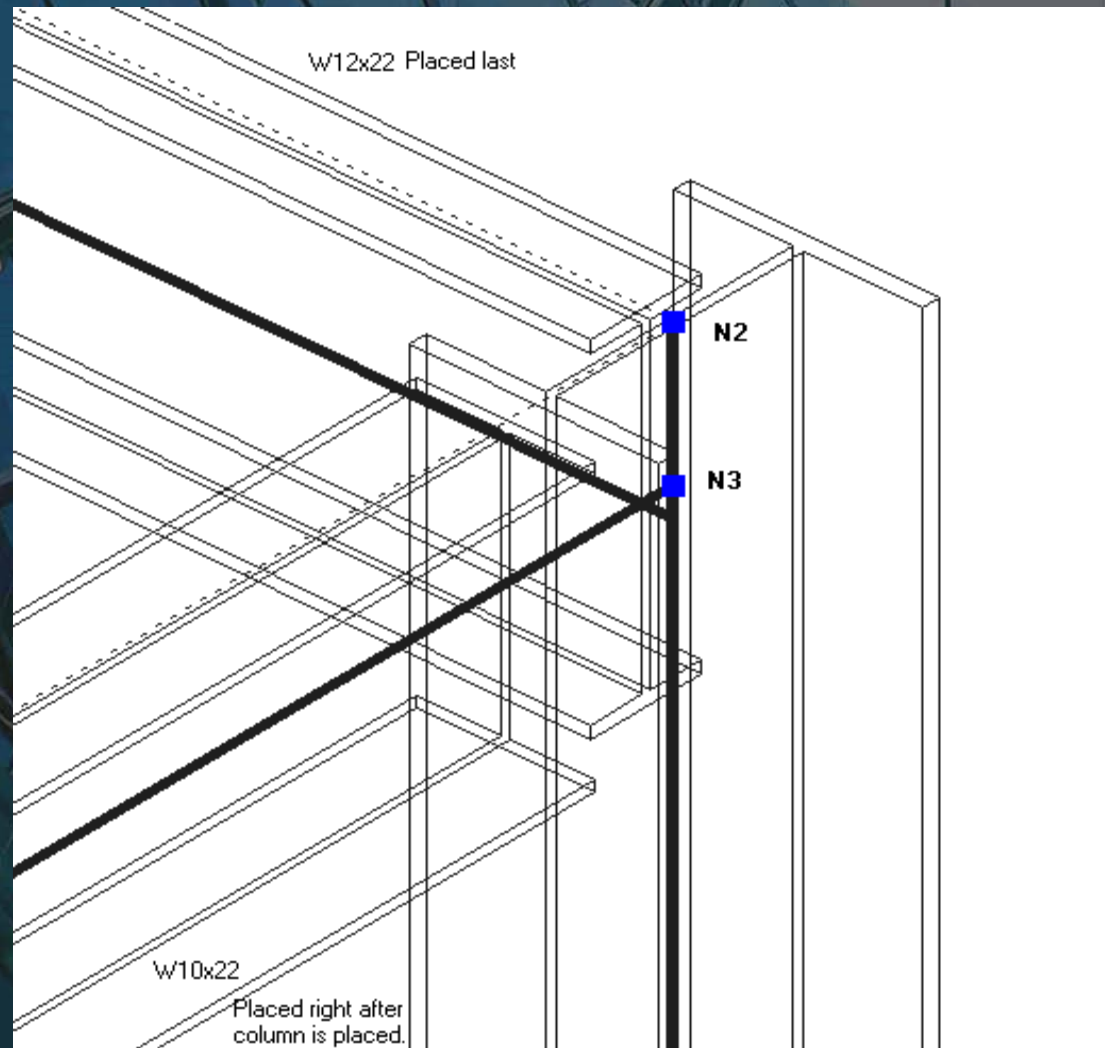
Spatial Analysis... Mong Kok Station



Spatial Analysis... Mong Kok Station



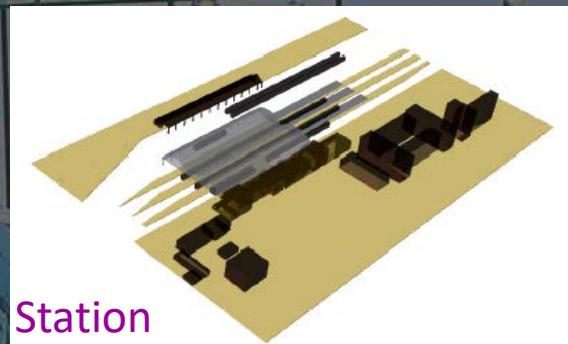
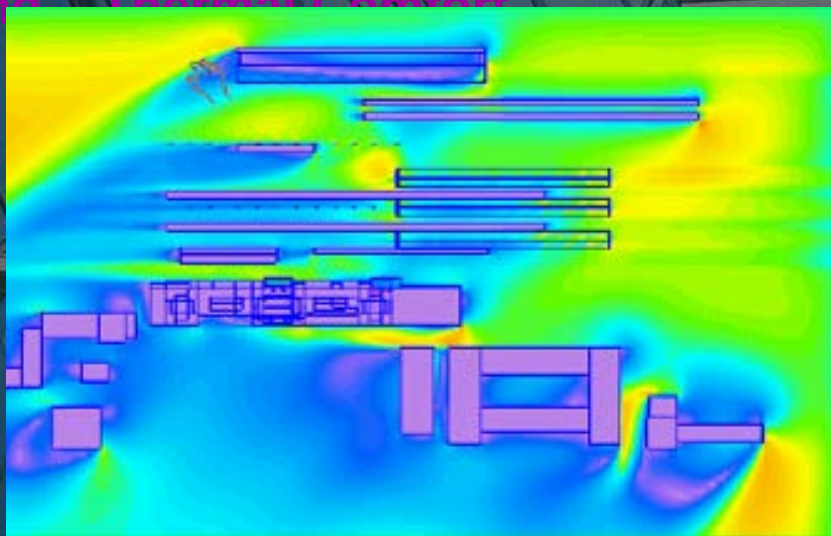
Synchronization between CAD Model and Analytical Models



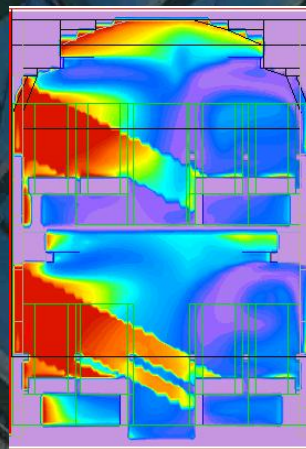
Energy Saving Thermal Comfort



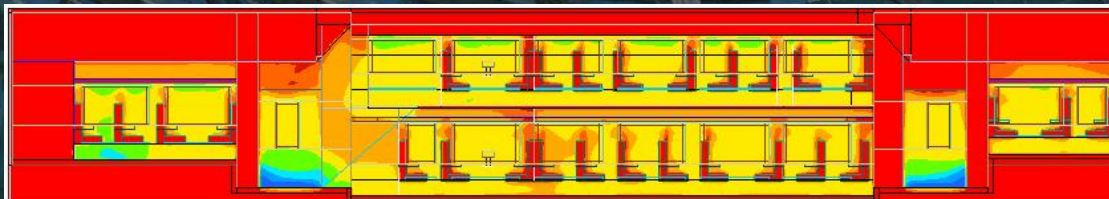
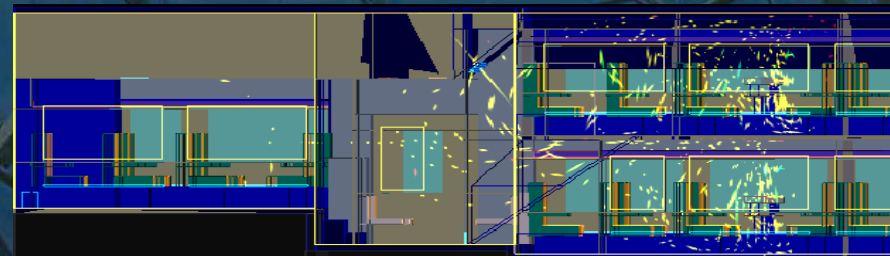
Train Driver



Station



Train



Simulations Software



Asset Management

Asset Technical Information System - Microsoft Internet Explorer provided by MTR Corporation Limited

File Edit View Favorites Tools Help

http://hqsdms0002/PWDocPubTemp/296500AD566CC45A649557B2507B07DB/11829/503_T_00_OAP_C07_012_B.PDF

http://hqsdms0002/mtrcl/rais/atis.htm

Asset Technical Information System

Initial ion Project Definition Document Statutory Record Fire Safety Information Maintenance Information Asset Replacement Planning Project-In-Progress Asset Key Parameter Drawing Management System Knowledge Library

Statutory Record

ords found : 1126

Ungrouped

Statutory Type	Submission Title	Document Ref No
BD	Agreement between the Mass Transit Corporation and the Public Works Department	-
BD	Lantau Airport Railway - Kowloon Station	1993-09-28 BD 3/7163/93 F BD_AURP
BD	Lantau Airport Railway - Kowloon Station	1993-10-26 BD 3/7163/93 F BD_ARUP
BD	Lantau Airport Railway - Kowloon Station	1993-10-26 BD 3/7163/93 F BD_ARUP
BD	Lantau Airport Railway - Kowloon Station	1993-10-26 BD 3/7163/93 F BD_ARUP
BD	Lantau Airport Railway - Kowloon Station	1993-10-26 BD 3/7163/93 F BD_ARUP
BD	Lantau Airport Railway - Kowloon Station	1994-01-07 (20) in BD 3/7163/93 F BD_ARUP
BD	Lantau Airport Railway - Kowloon Station	1994-01-20 BD 3/7163/93 F BD_ARUP.PDF
BD	Lantau Airport Railway - Kowloon Station	1994-03-24 BD 3/7163/93 F BD_ARUP.PDF
BD	Lantau Airport Railway - Kowloon Station	1994-05-19 BD 3/7163/93 F BD_ARUP
BD	Lantau Airport Railway - Kowloon Station	1994-09-06 BD 3/7163/93 F BD_ARUP
BD	Lantau Airport Railway - Kowloon Station	1995-02-09 BD 3/7163/93 F BD_ARUP
BD	Lantau Airport Railway - Kowloon Station	1995-02-24 BD 3/7163/93 F BD_ARUP

Drawing / Document List

Drawing Title	Drawing Number	Revision
	Letter	
CONTRACT 503A KOWLOON STATION FOUNDATIONS SITE PLAN GEOTECHNICAL MONITORING PLAN	503/T/00/OAP/C07/012/B	B
CONTRACT 503A KOWLOON STATION FOUNDATIONS SITE PLAN GEOTECHNICAL MONITORING PLAN	503/T/00/OAP/C07/012/B	B
CONTRACT 503A KOWLOON STATION FOUNDATIONS GENERAL INFORMATION FORMATION PLAN	503/T/00/OAP/C/10/015/A	A
CONTRACT 503A KOWLOON STATION FOUNDATIONS GENERAL INFORMATION FORMATION PLAN	503/T/00/OAP/C/10/015/A	A
CONTRACT 503A KOWLOON STATION FOUNDATIONS SITE FORMATION SECTIONS	503/T/00/OAP/C/10/016/A	A
CONTRACT 503A KOWLOON STATION FOUNDATIONS SITE FORMATION SECTIONS	503/T/00/OAP/C/10/016/A	A
CONTRACT 503A KOWLOON STATION FOUNDATIONS DIAPHRAGM WALL ZONE 11 LAYOUT AND WALL SCHEDULE	503/T/03/OAP/C/10/150/B	B
CONTRACT 503A KOWLOON STATION FOUNDATIONS DIAPHRAGM WALL ZONE 11 LAYOUT	503/T/03/OAP/C/10/150/B	B

Buildings Department
屋宇署

Our Ref: 水務署: BD 3/7163/93 F
Your Ref: 水務署: 848 1139
Fax: 526 7430

28 September 1993

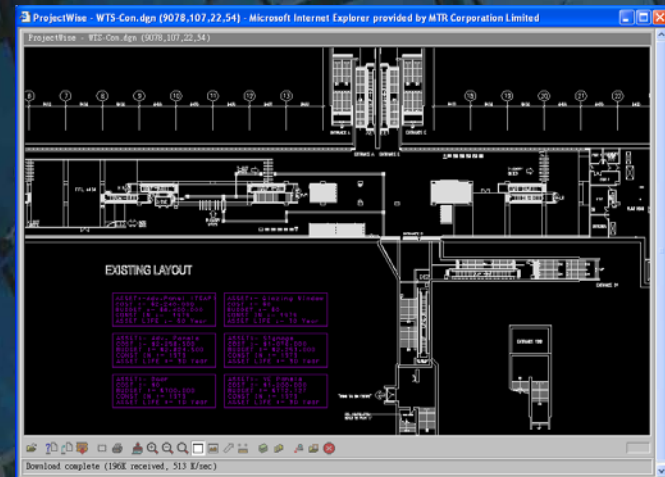
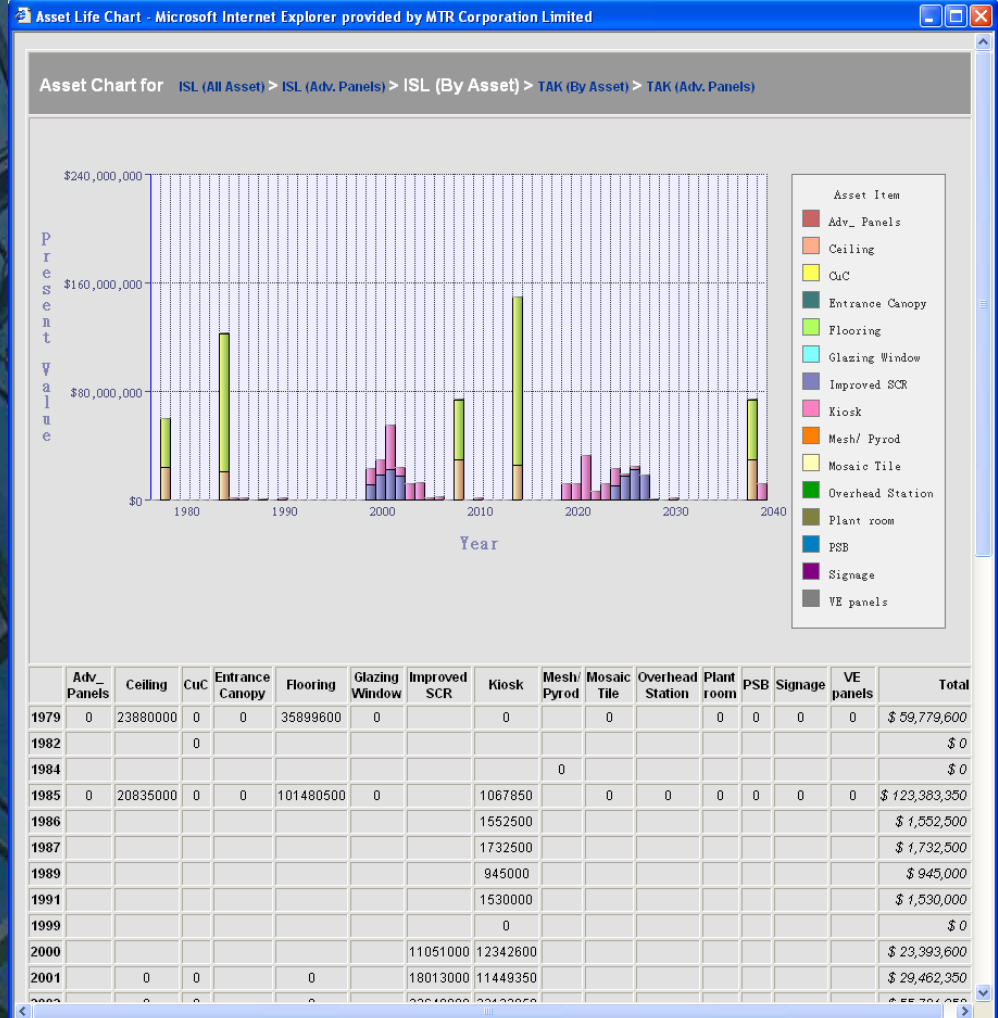
Mr. I A Curreen
D63, Provident Centre,
Wharf Road, North Point,
Hong Kong.

Dear Sir,

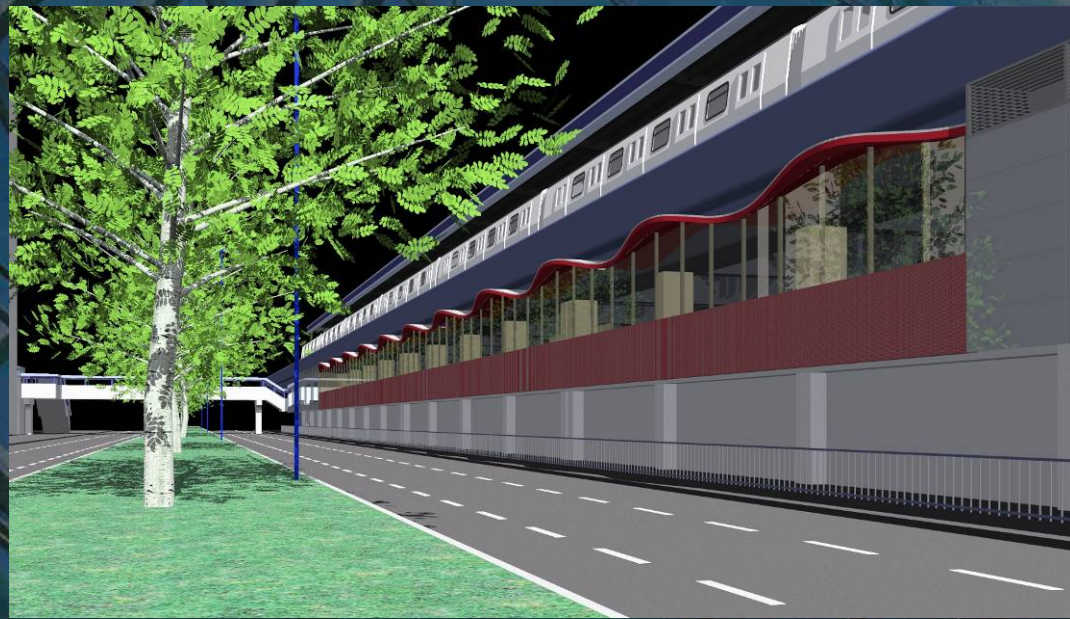
Lantau Airport Railway - Kowloon Station

I refer to your application dated ** for approval of proposals in respect of **

Your submission has been checked in accordance with the contents of Practice

[illegible]

Asset Management



MTR Tseung Kwan O Station

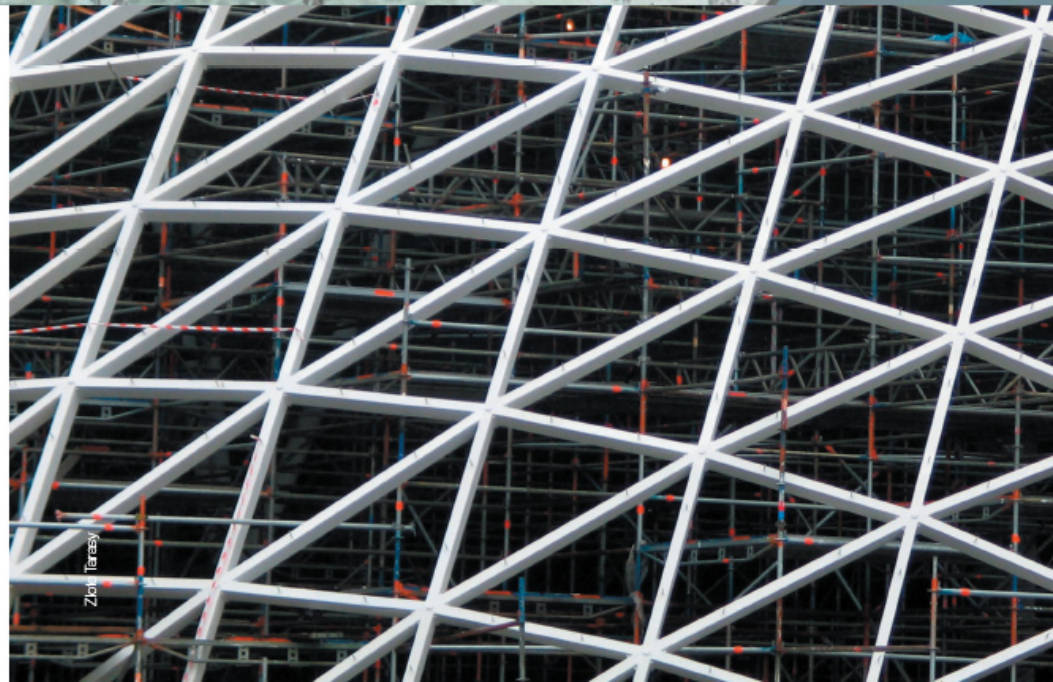
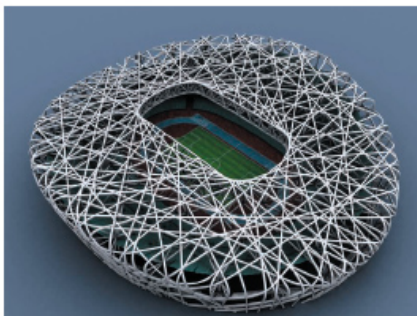
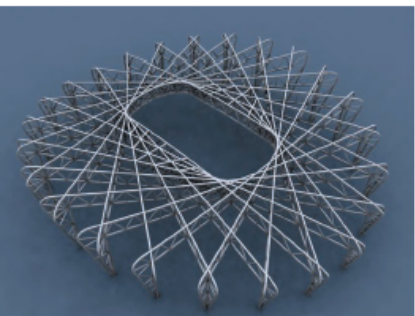
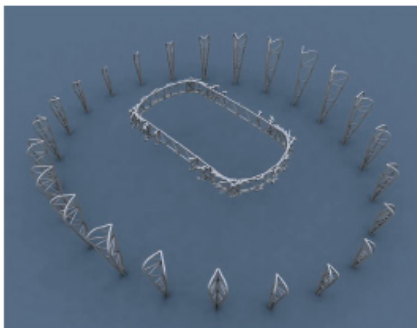
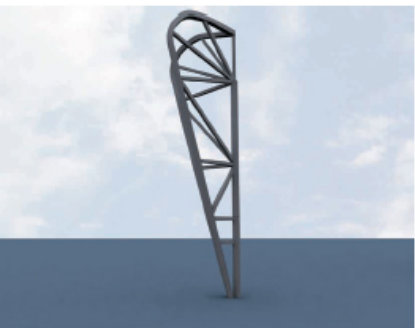
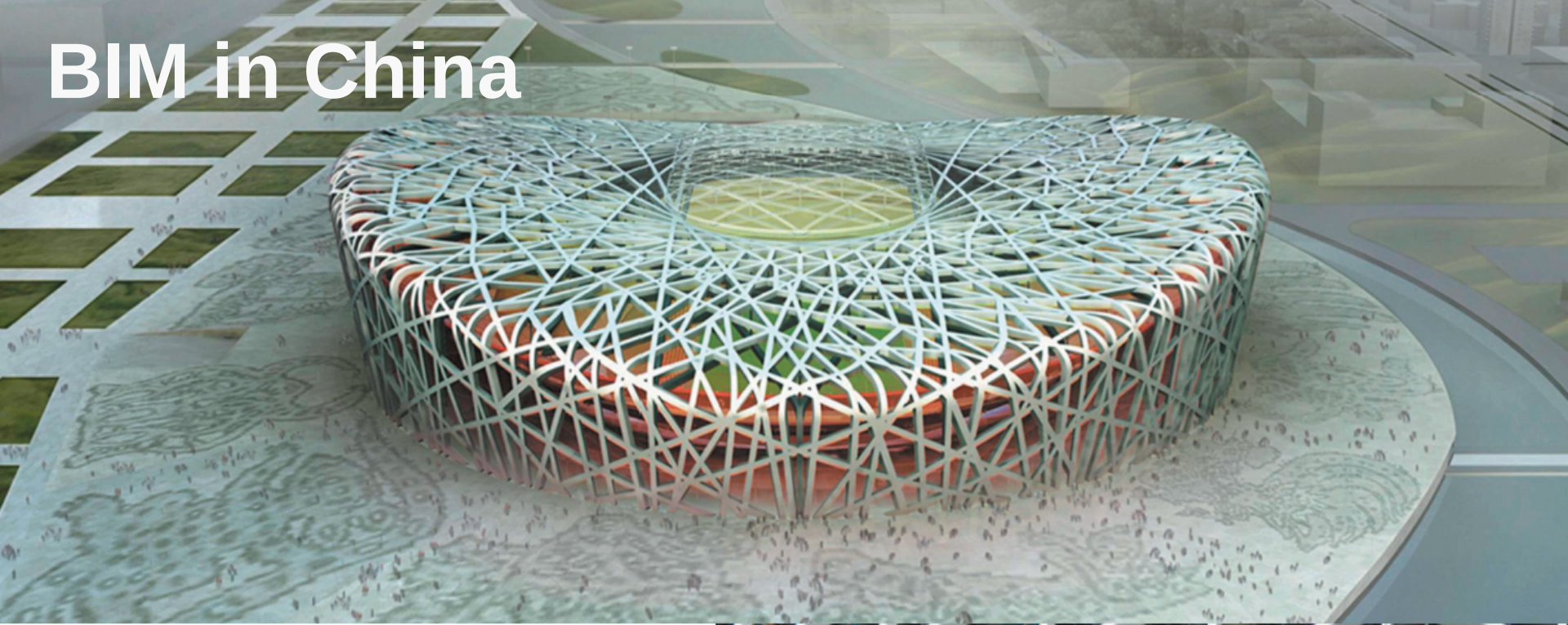


File Help

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- FloorStruct_450mm_THK
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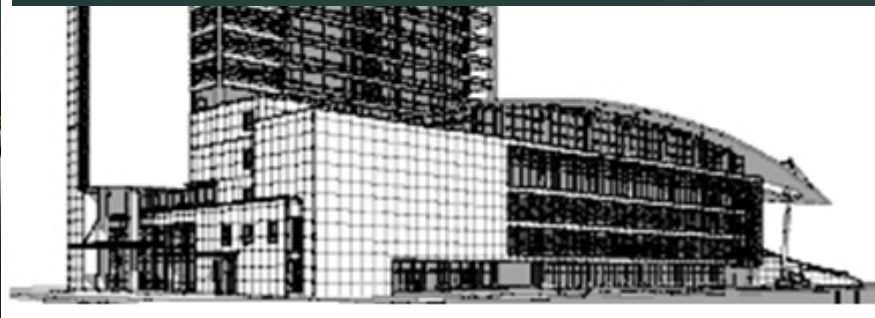
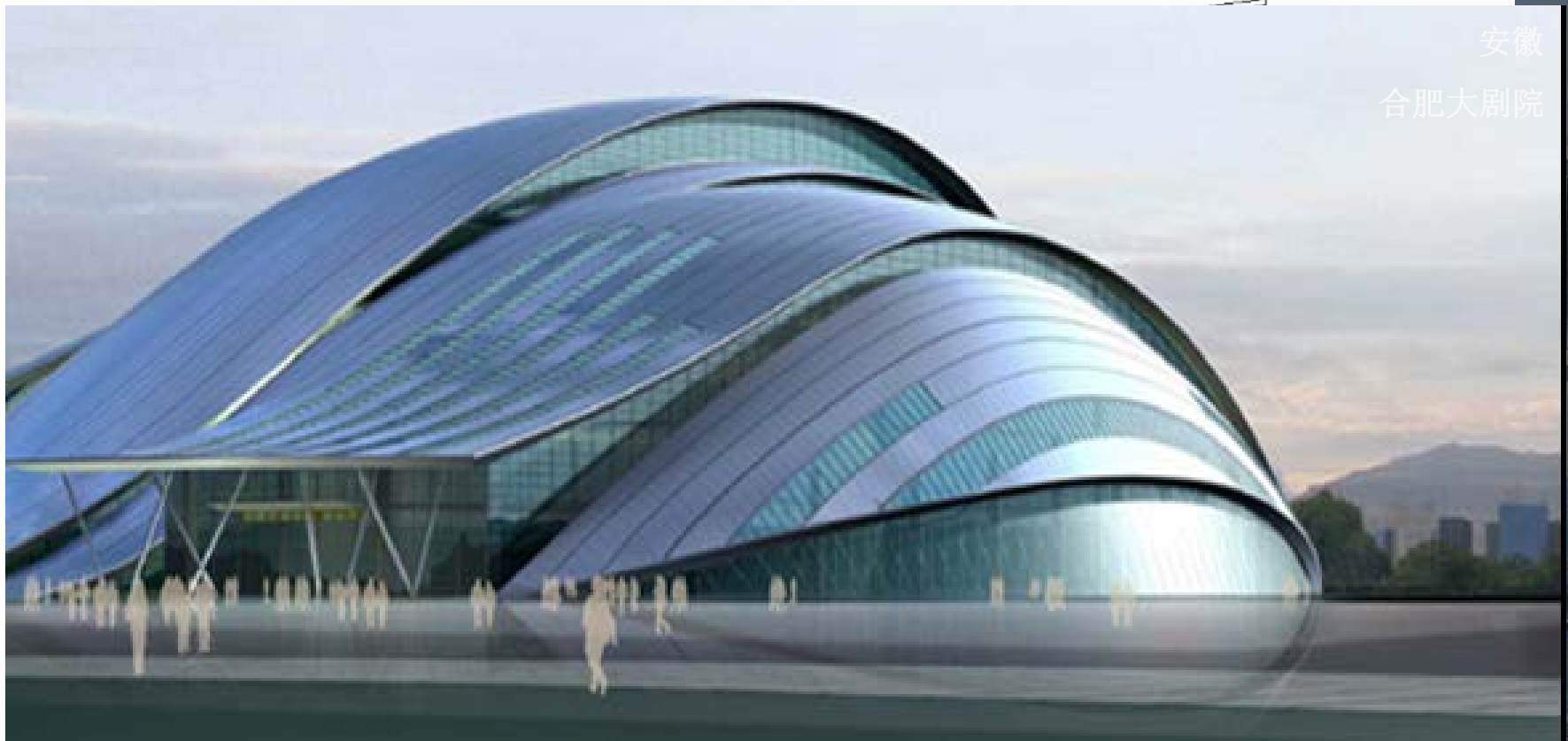


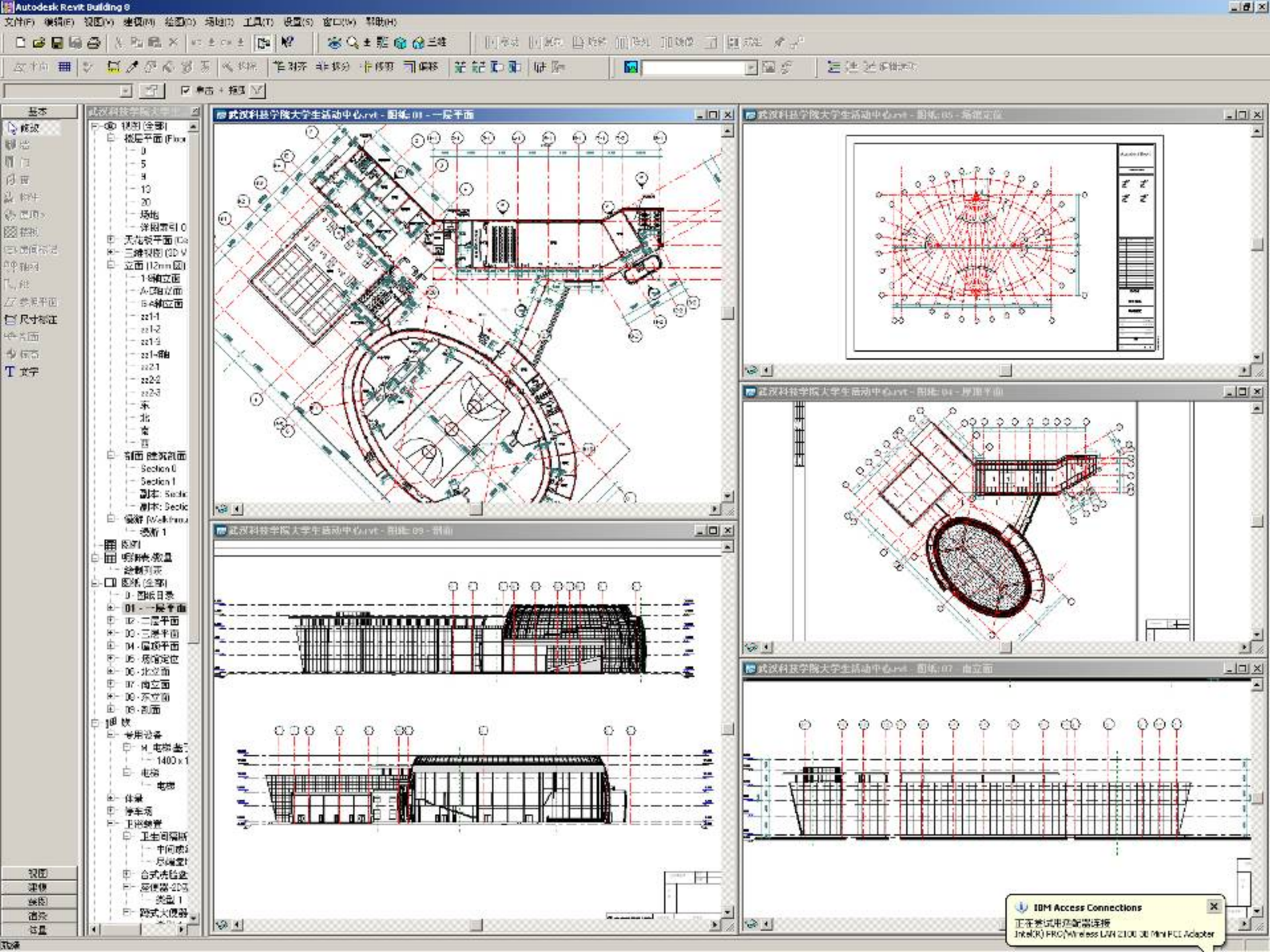
BIM in China

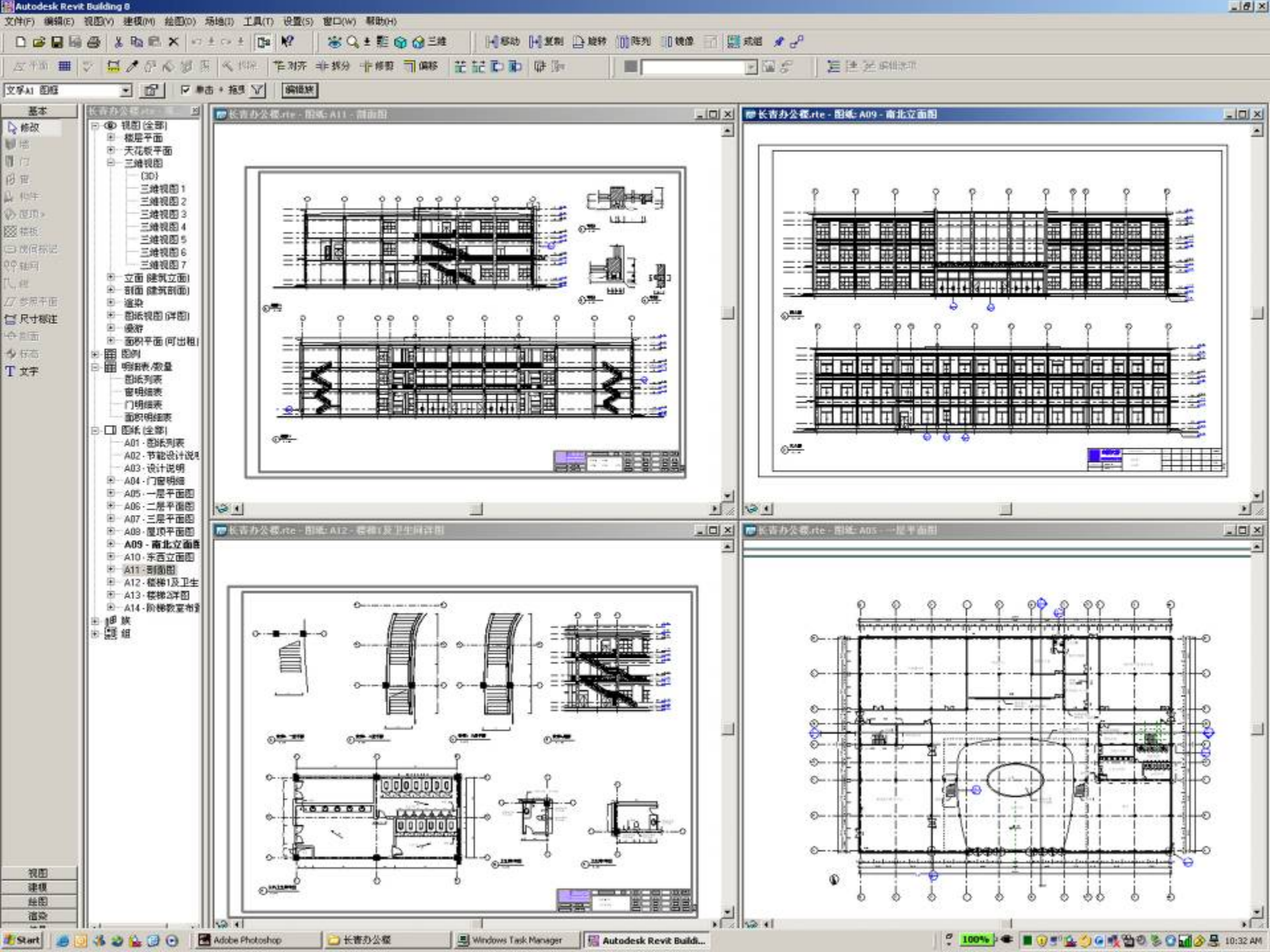


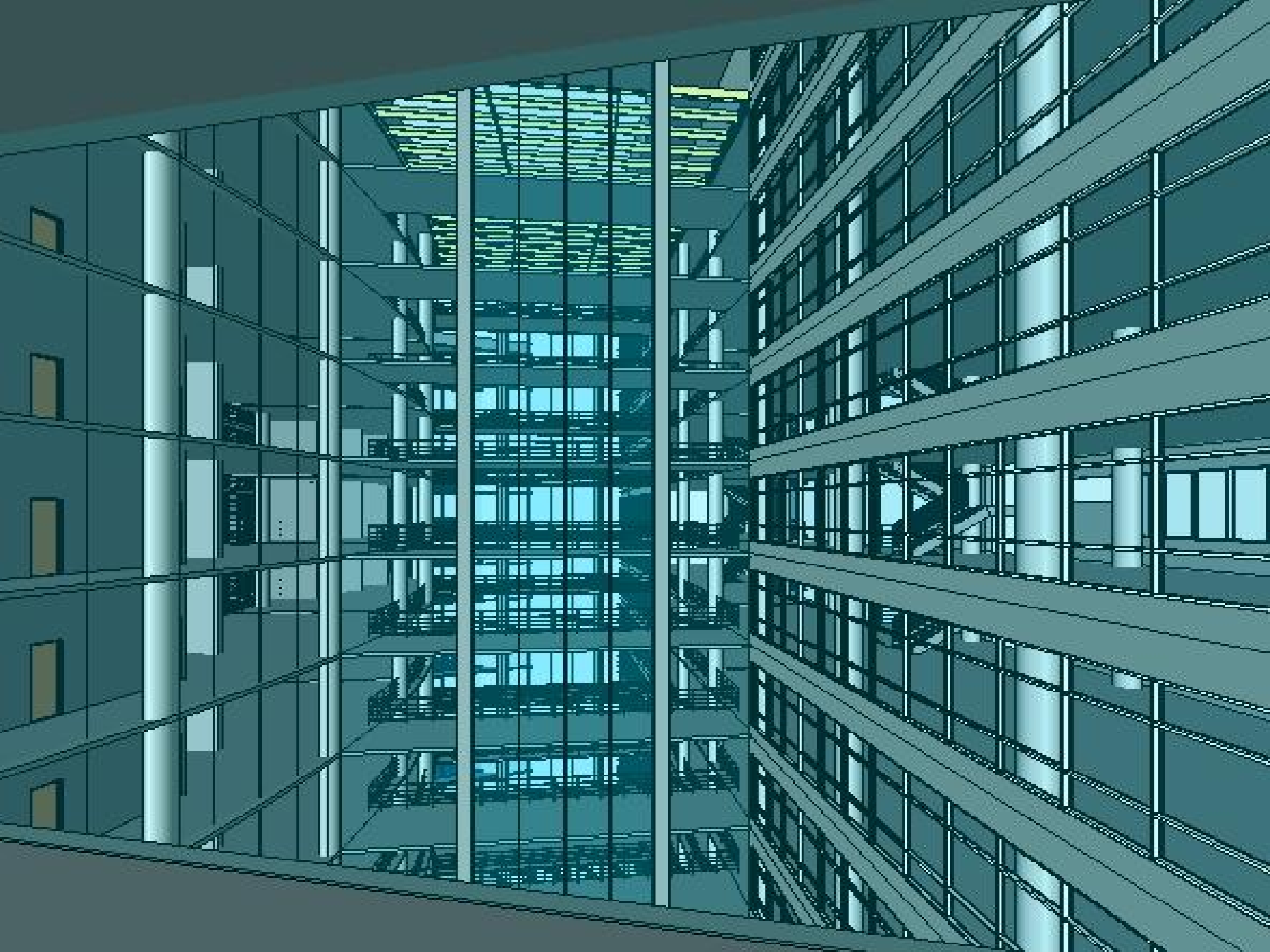
BIM in China

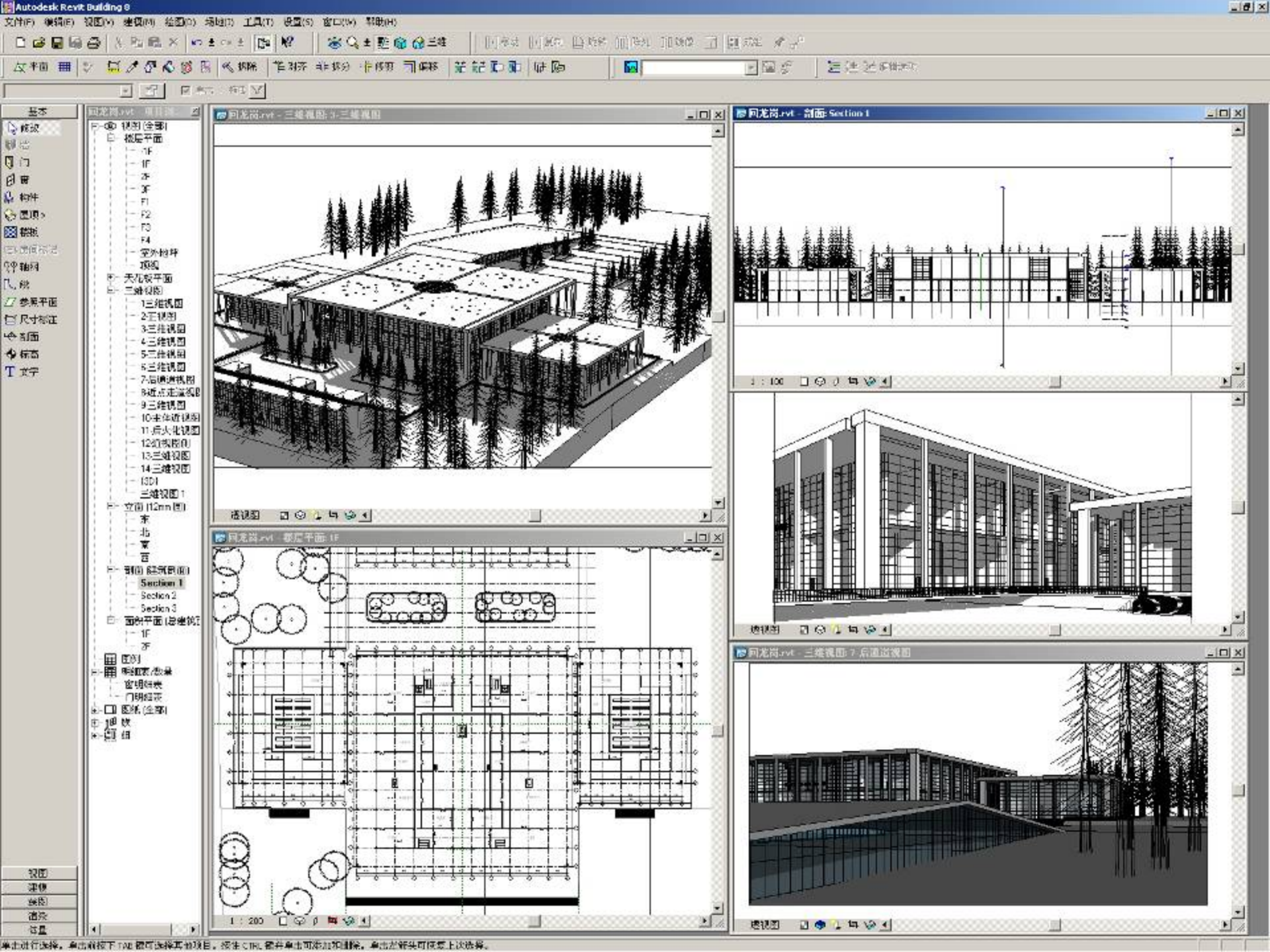
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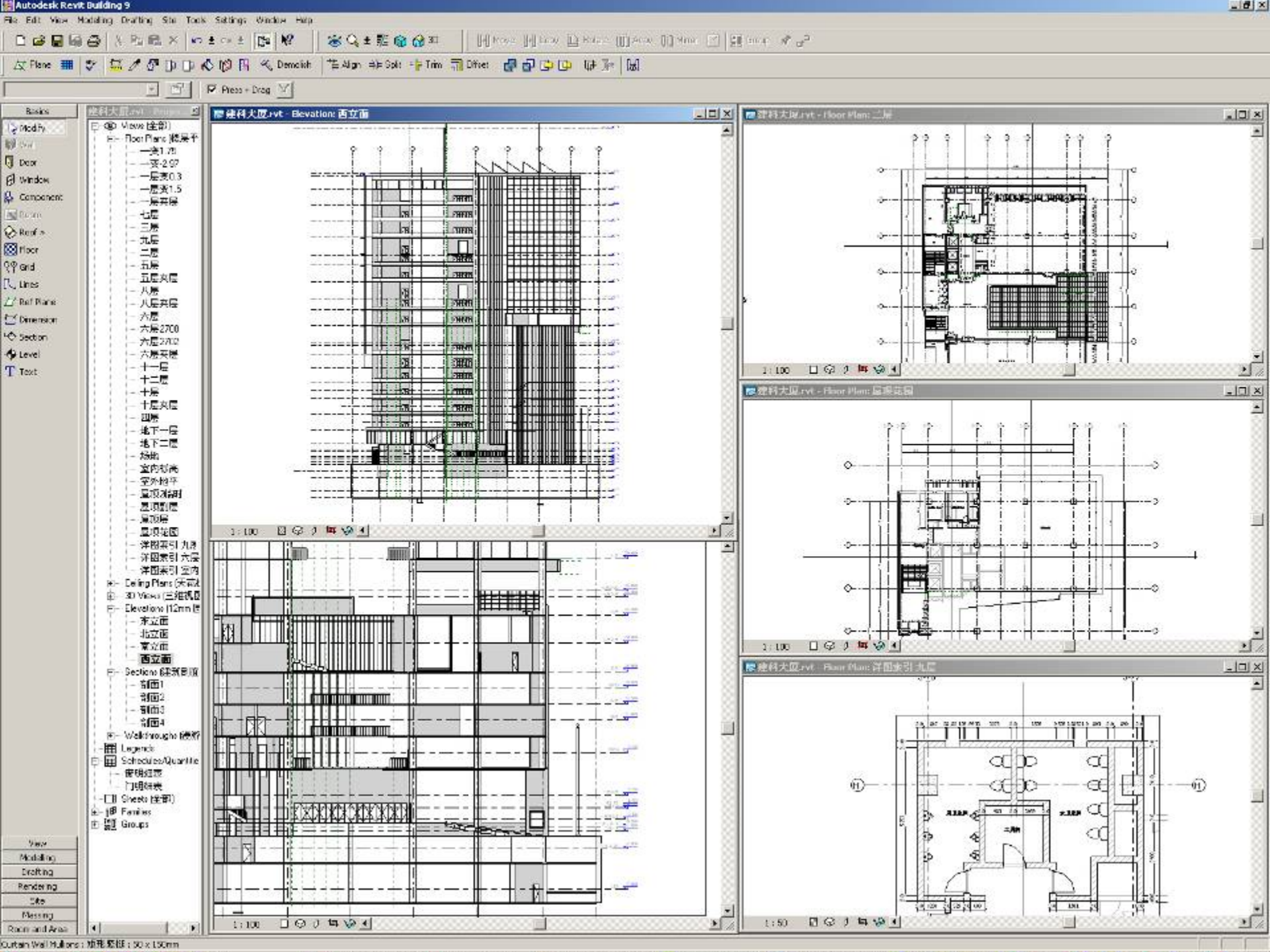


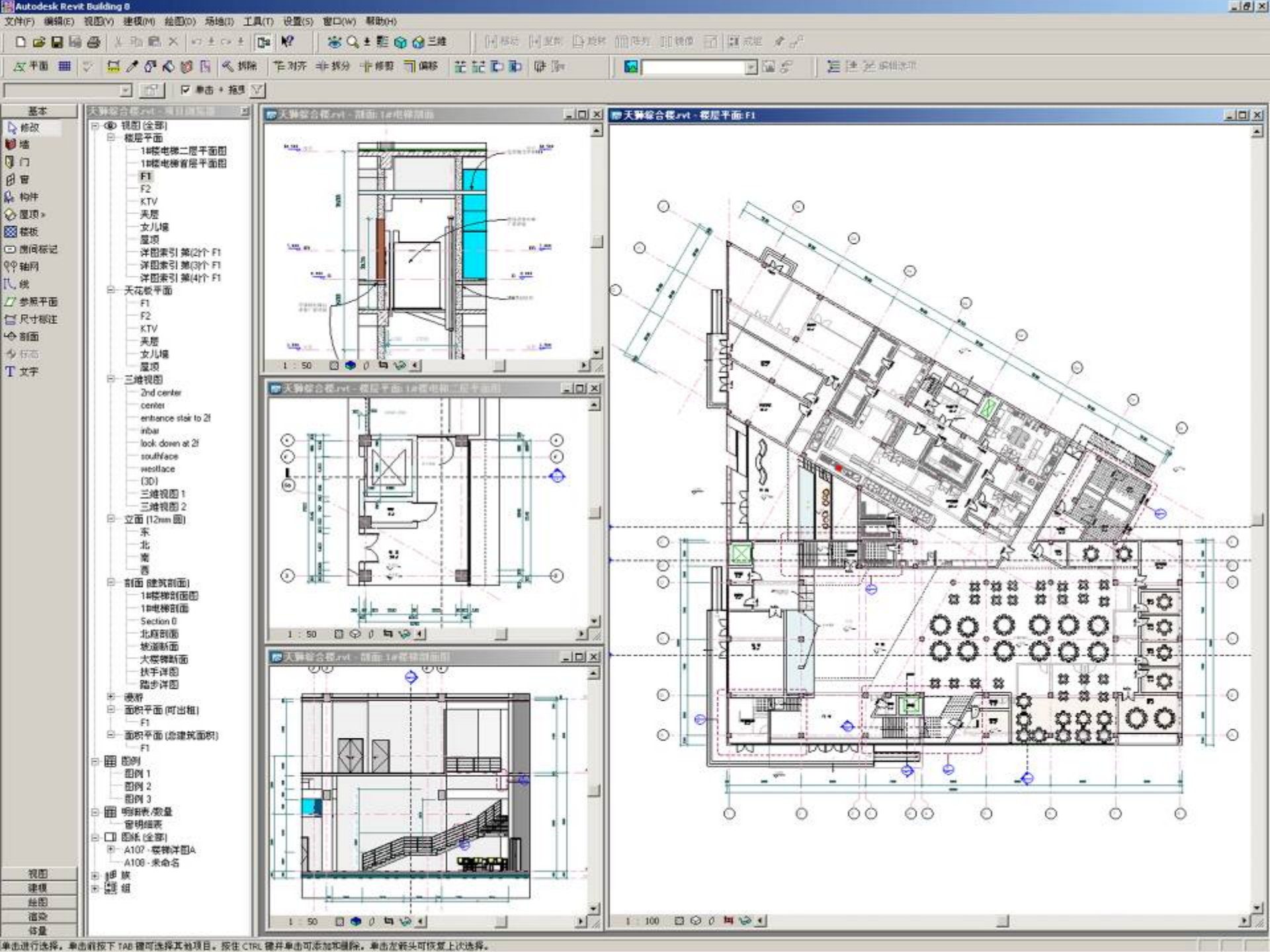


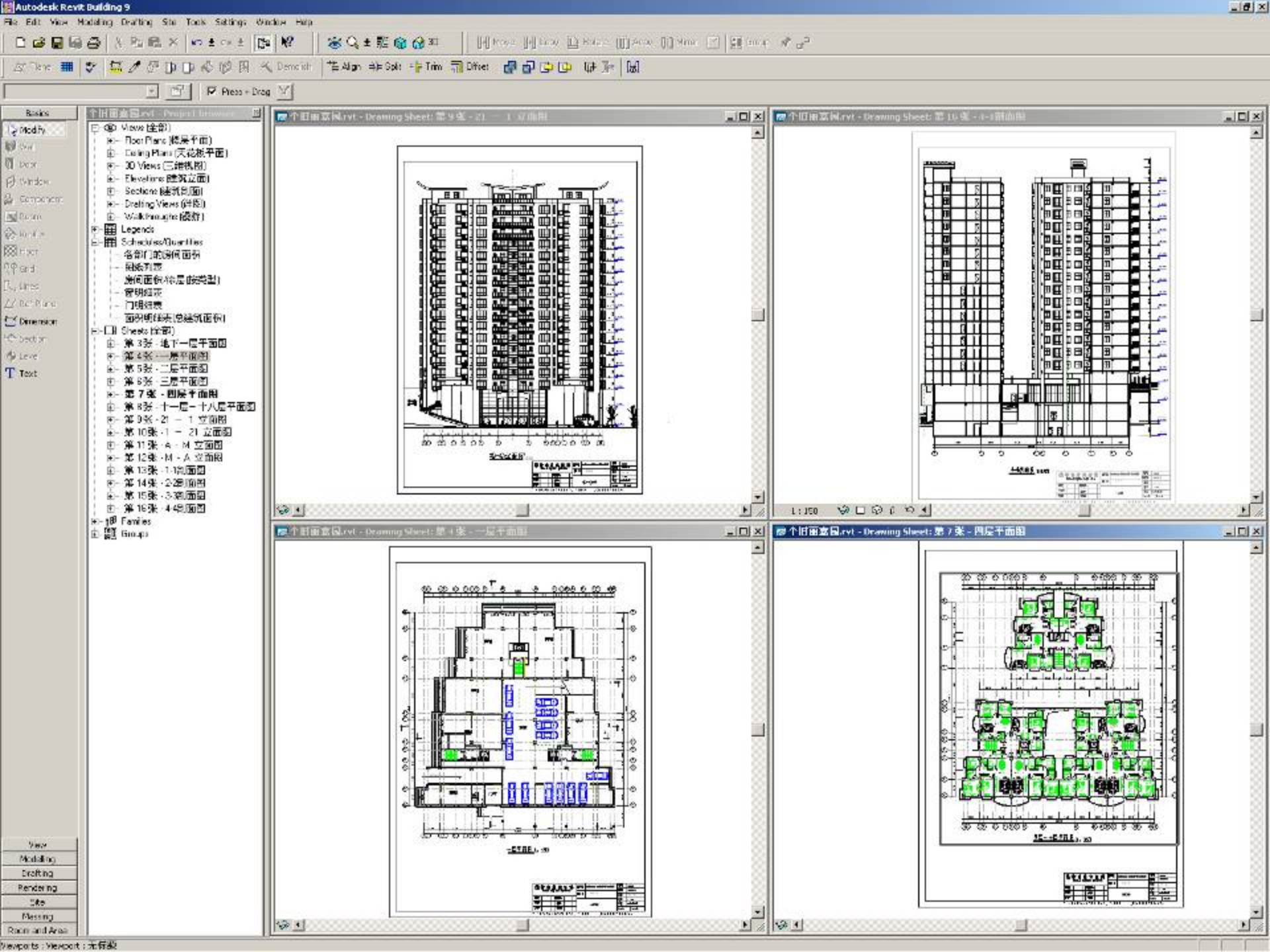


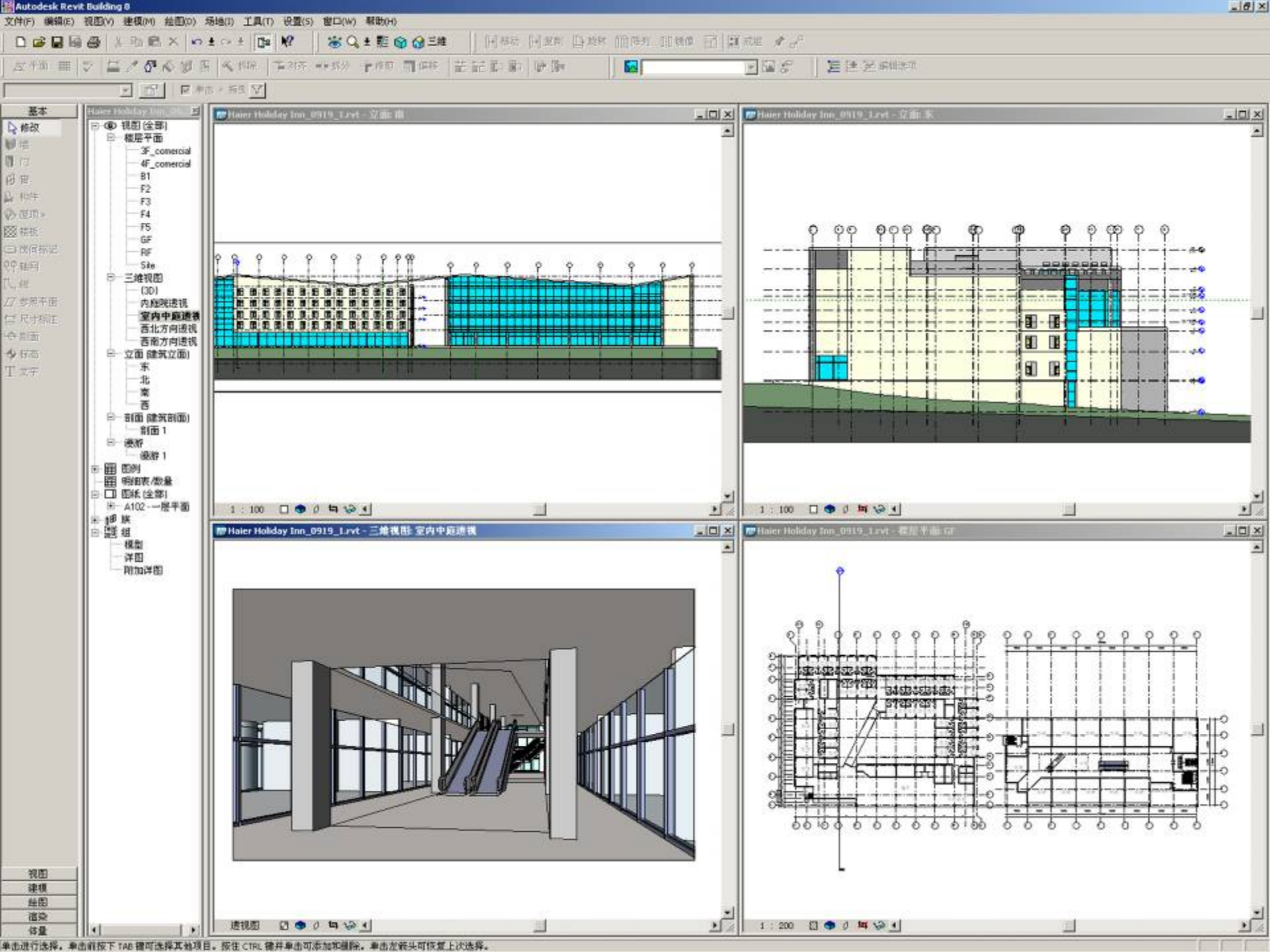




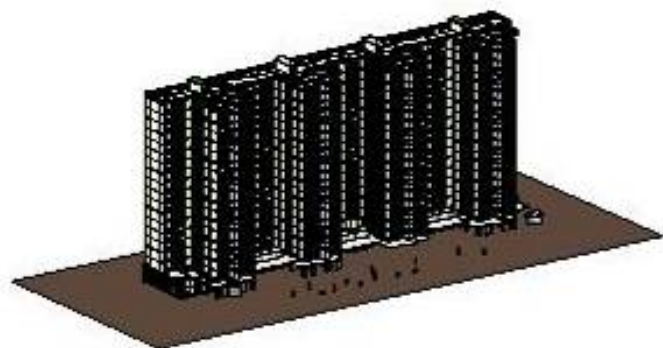
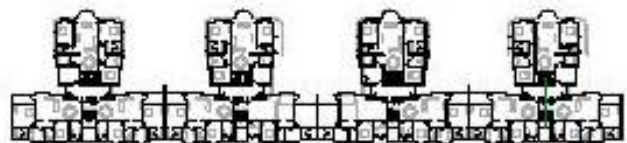








广东省建筑设计研究院 建筑师：郑凯帆



1 : 100



1 : 100

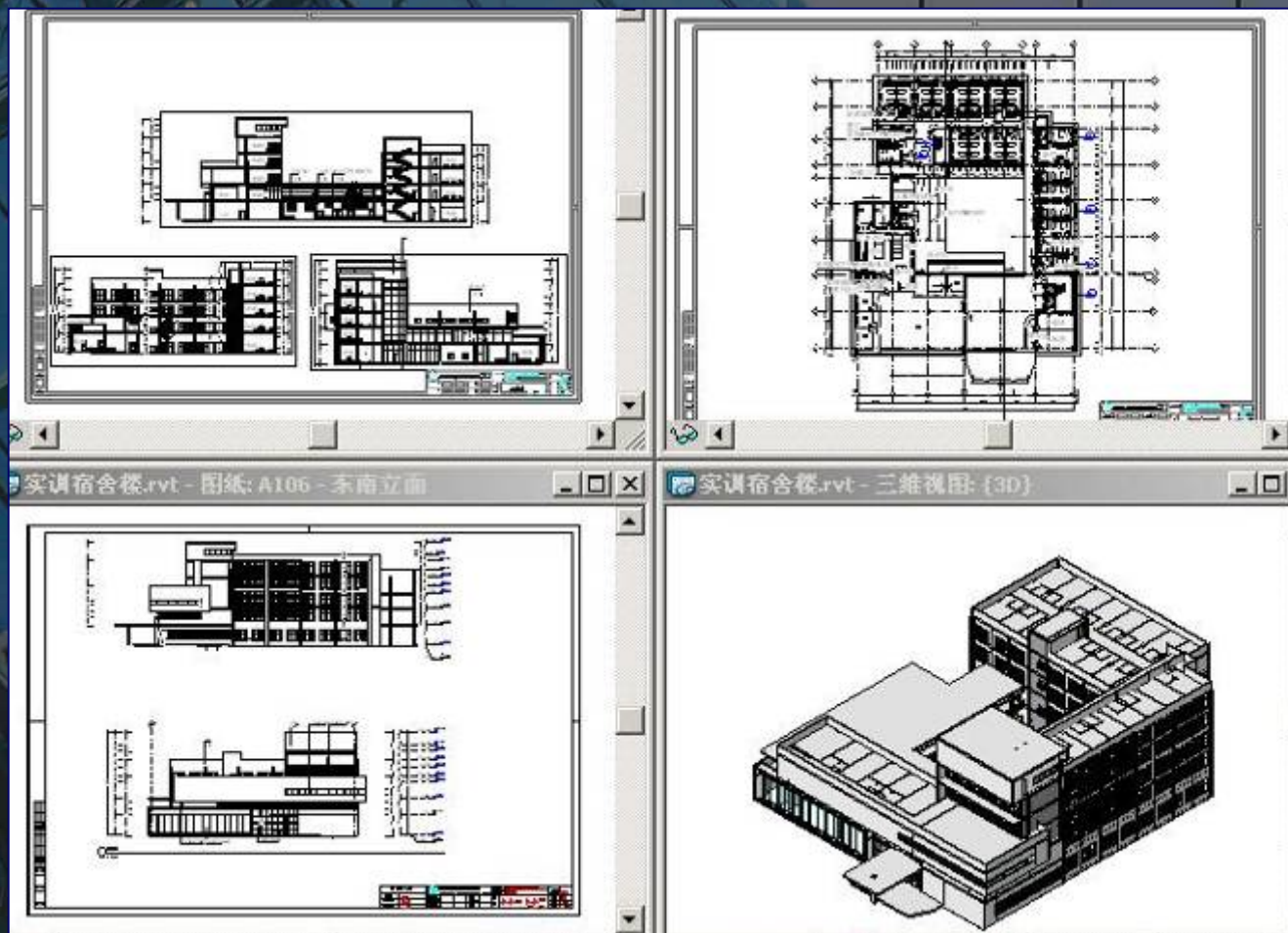


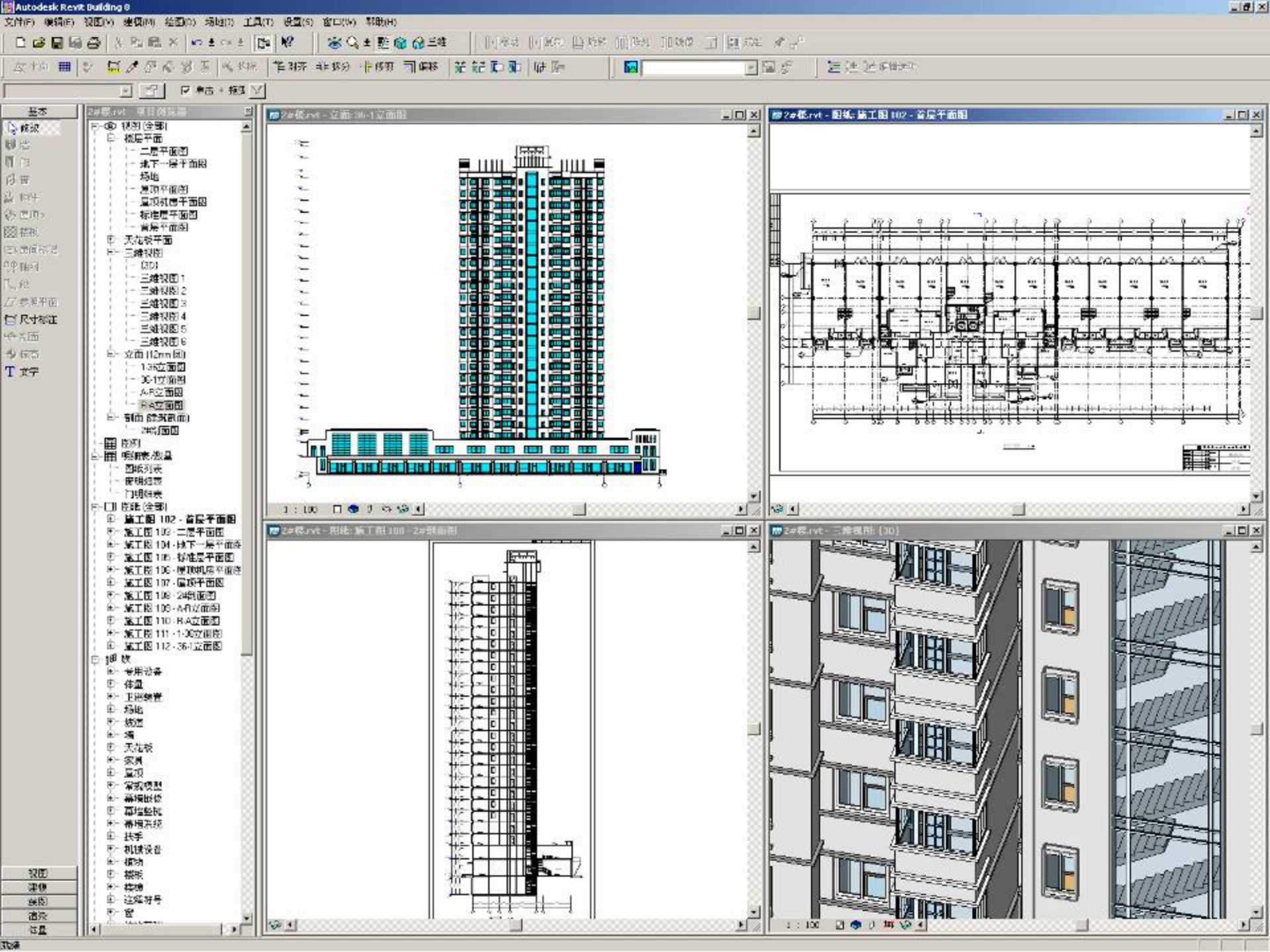
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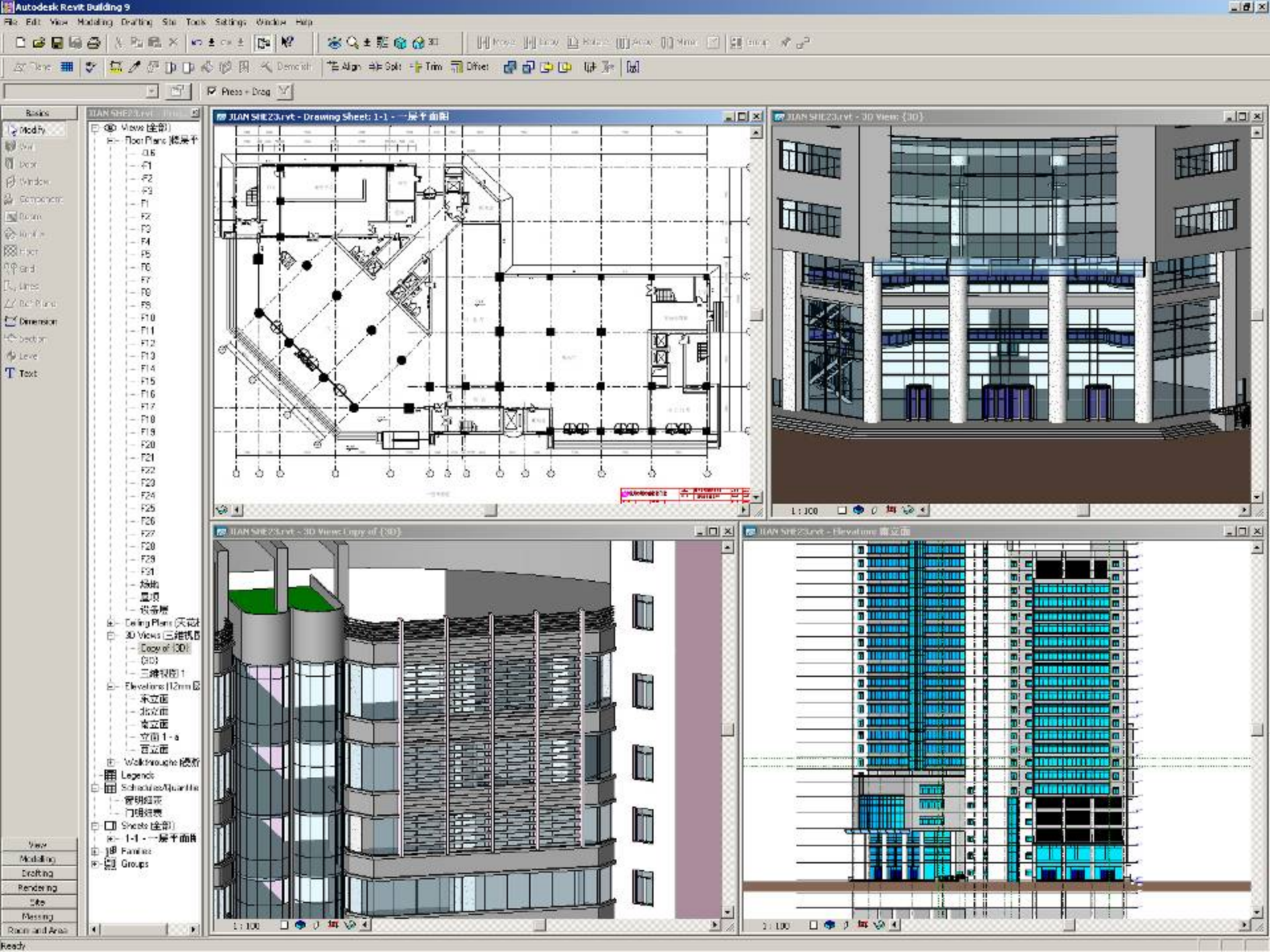


盛邦（上海）咨询有限公司成都分公司 建筑师：许燕

- 中国民航飞行学院模拟机训练中心



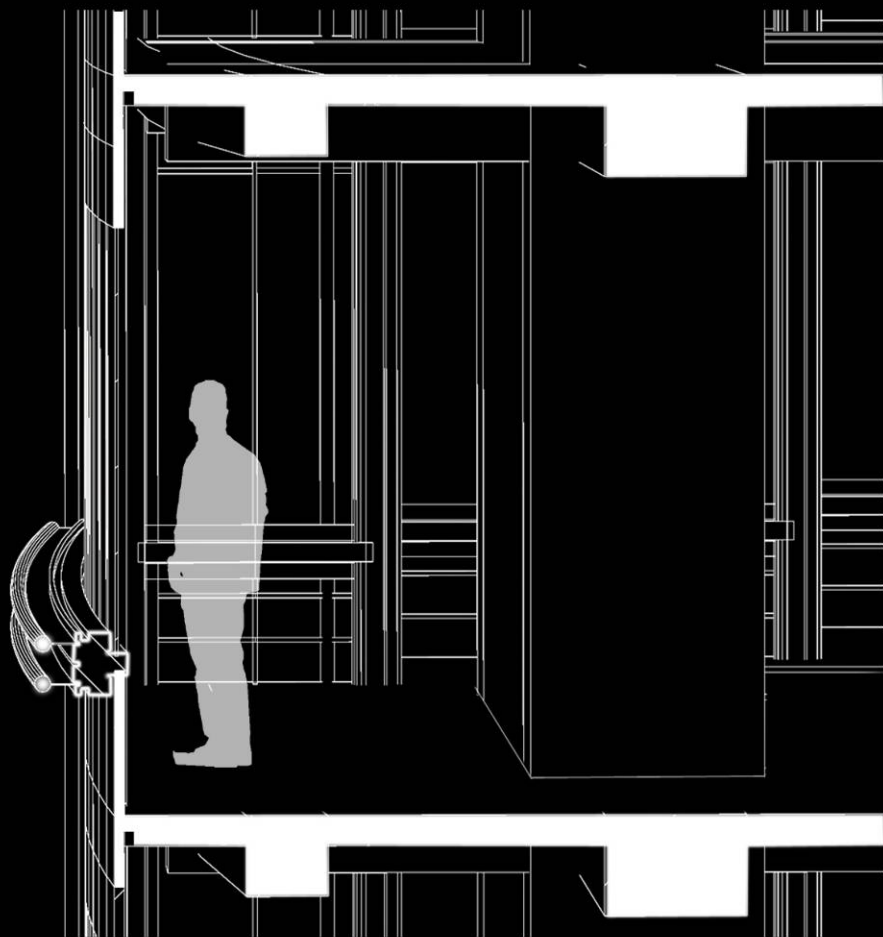






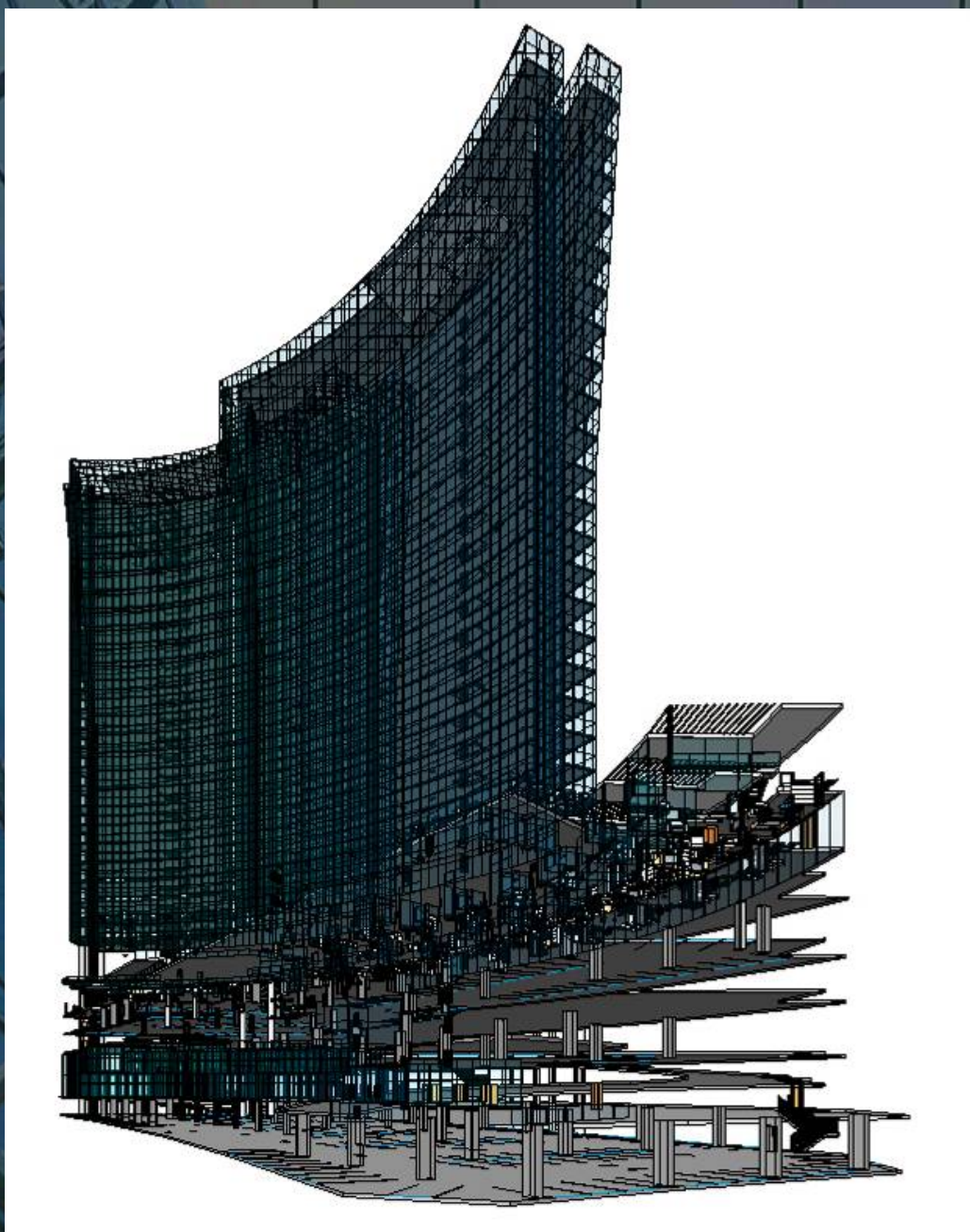
廣州辦公室項目

FAÇADE DESIGN and CO-ORDINATION



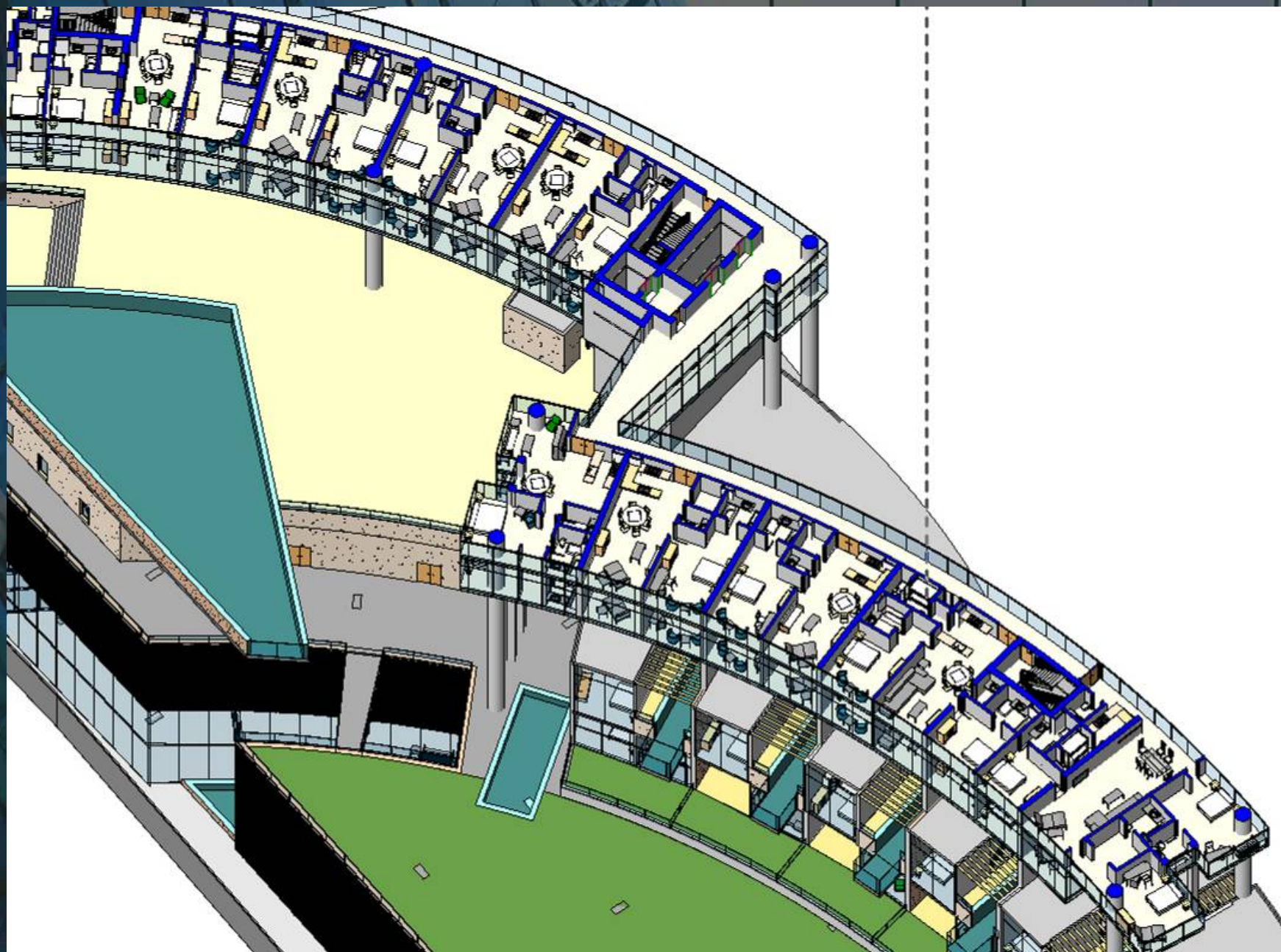
廣州辦公室項目

FAÇADE DESIGN and CO-ORDINATION



中東酒店項目

HORIZONTAL REPETITION / MODULARIZATION



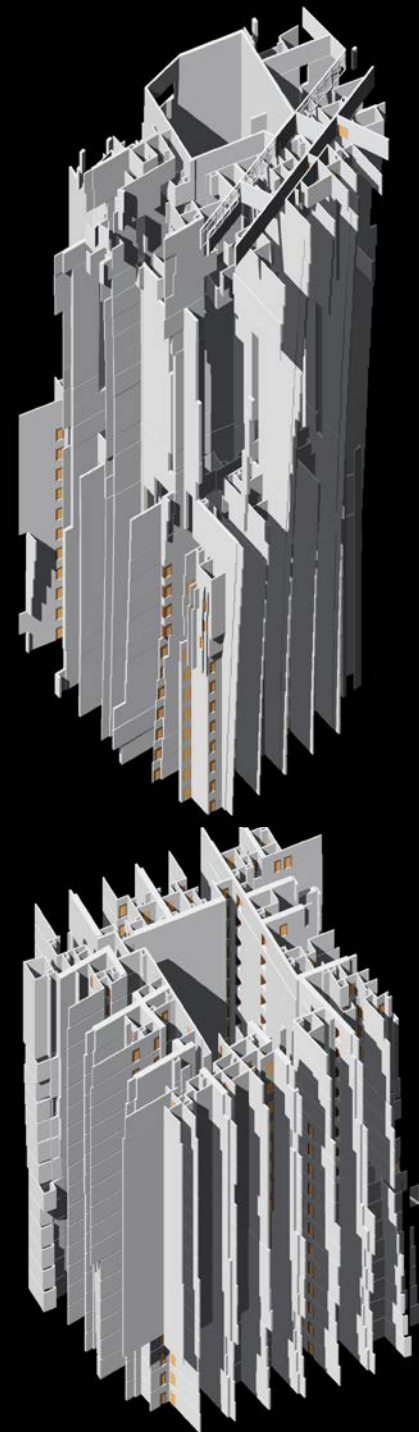
中東酒店項目

MODULAR DESIGN

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

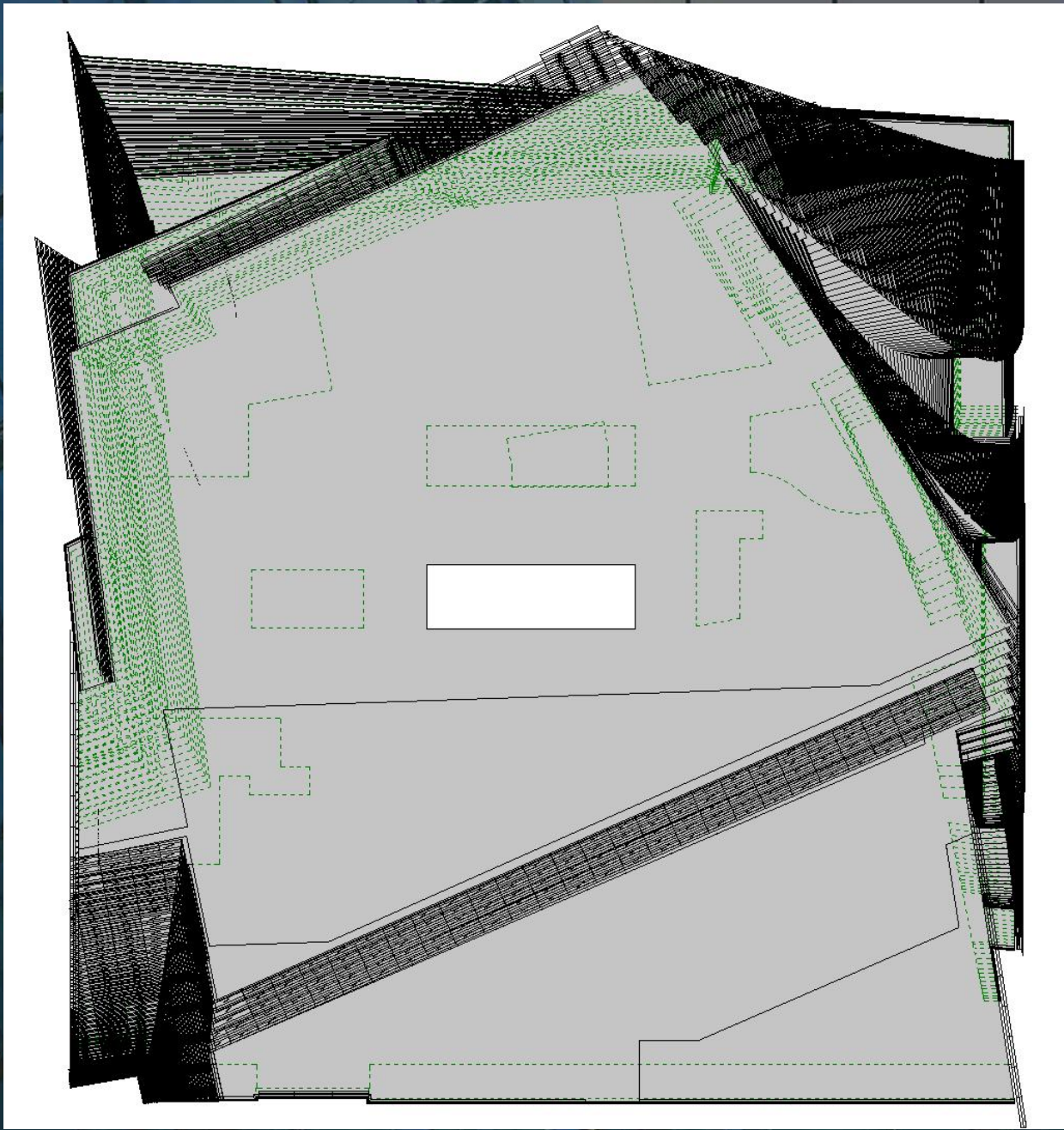


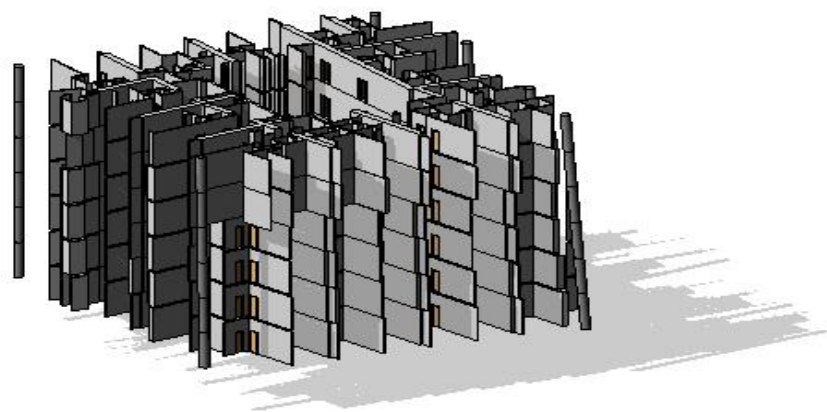
Dubai **Ocean Heights One**

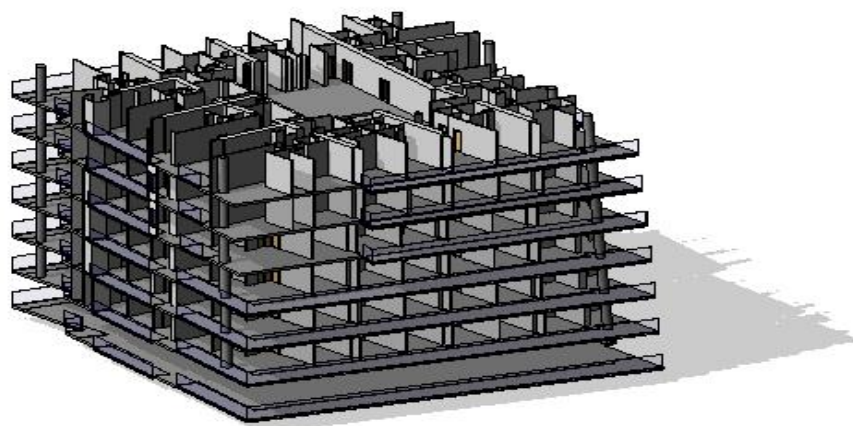


中東住宅項目

COMPLEX GEOMETRY





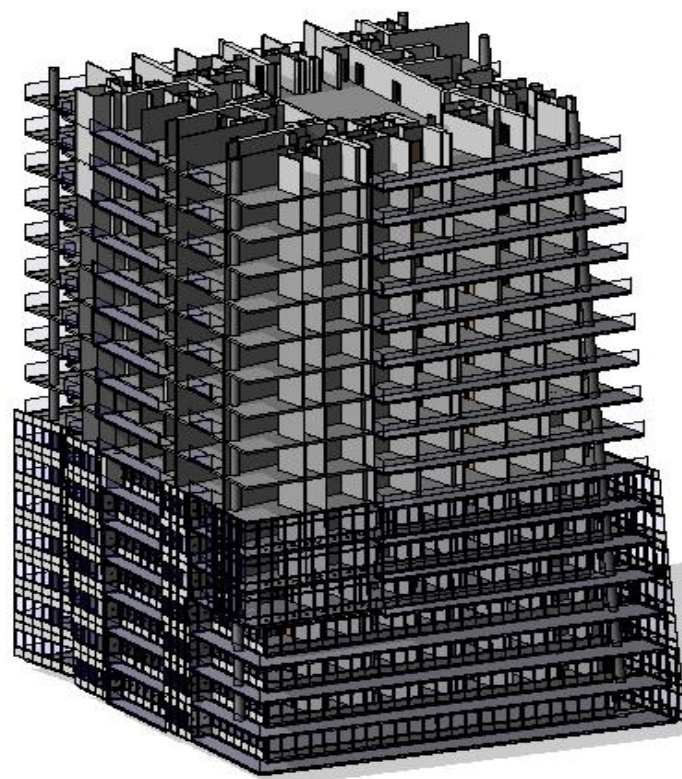










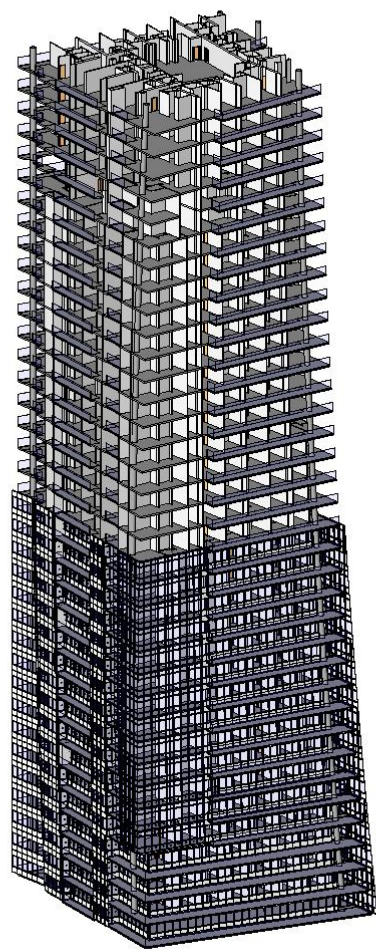


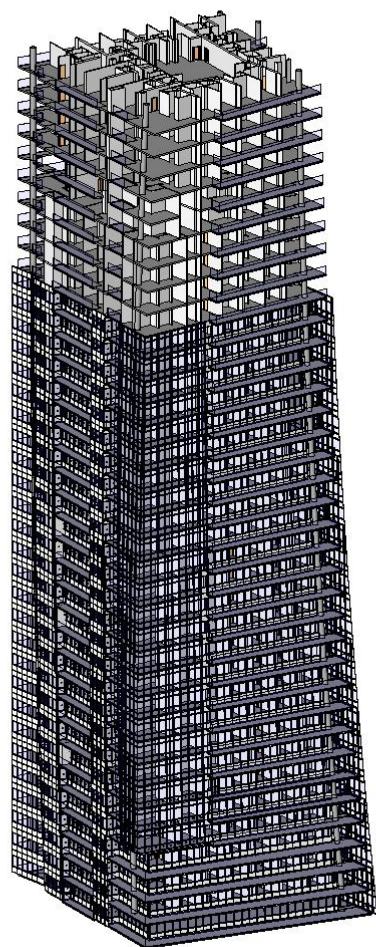


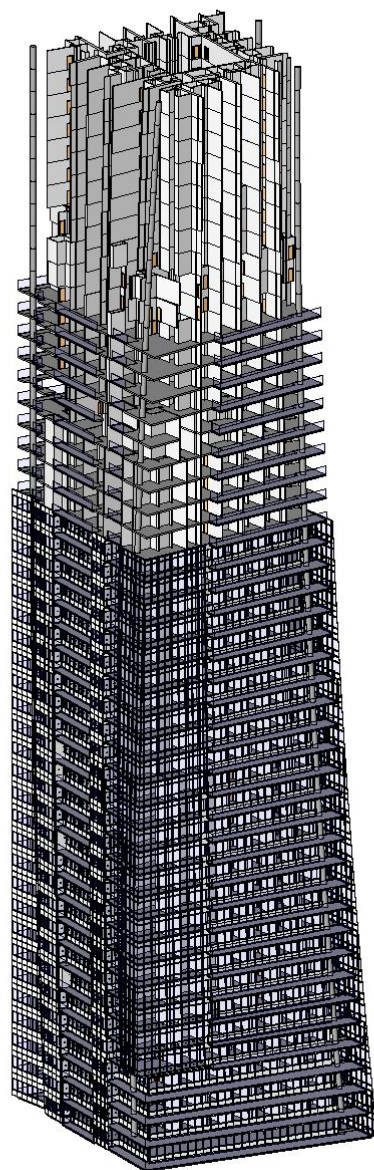


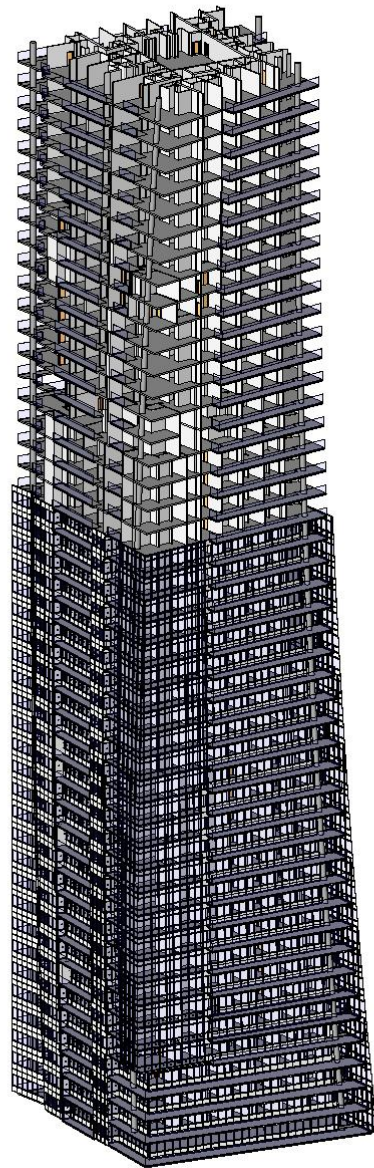


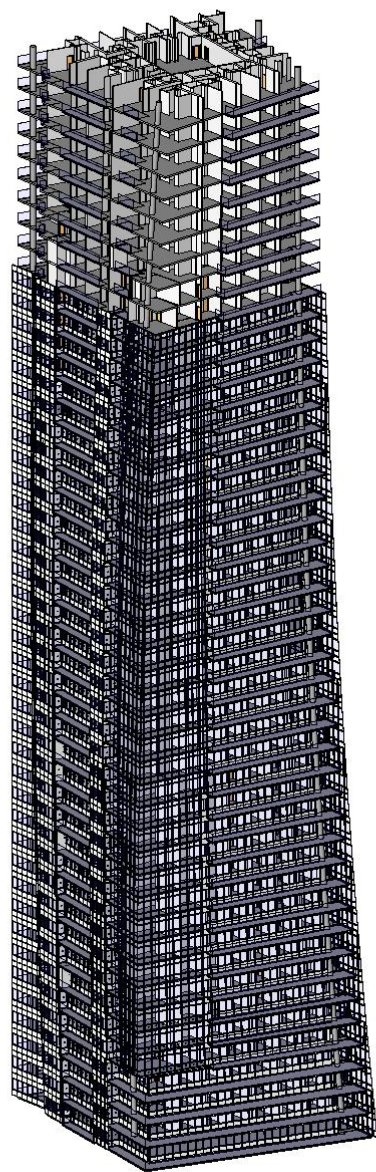


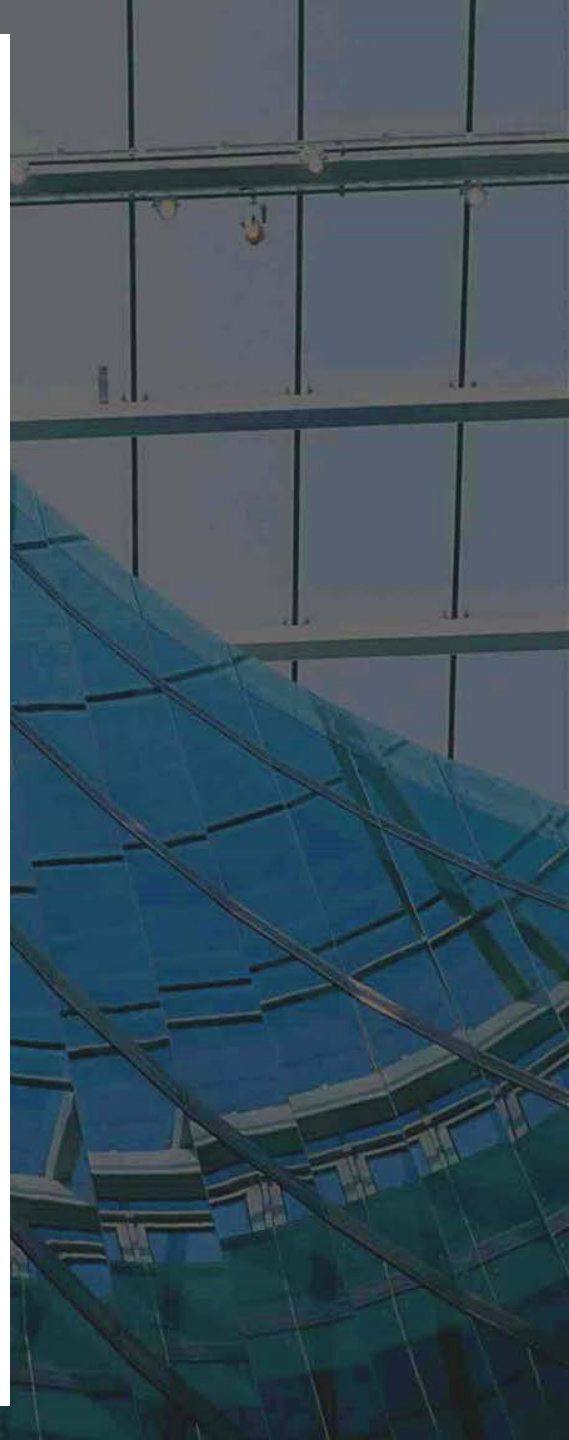
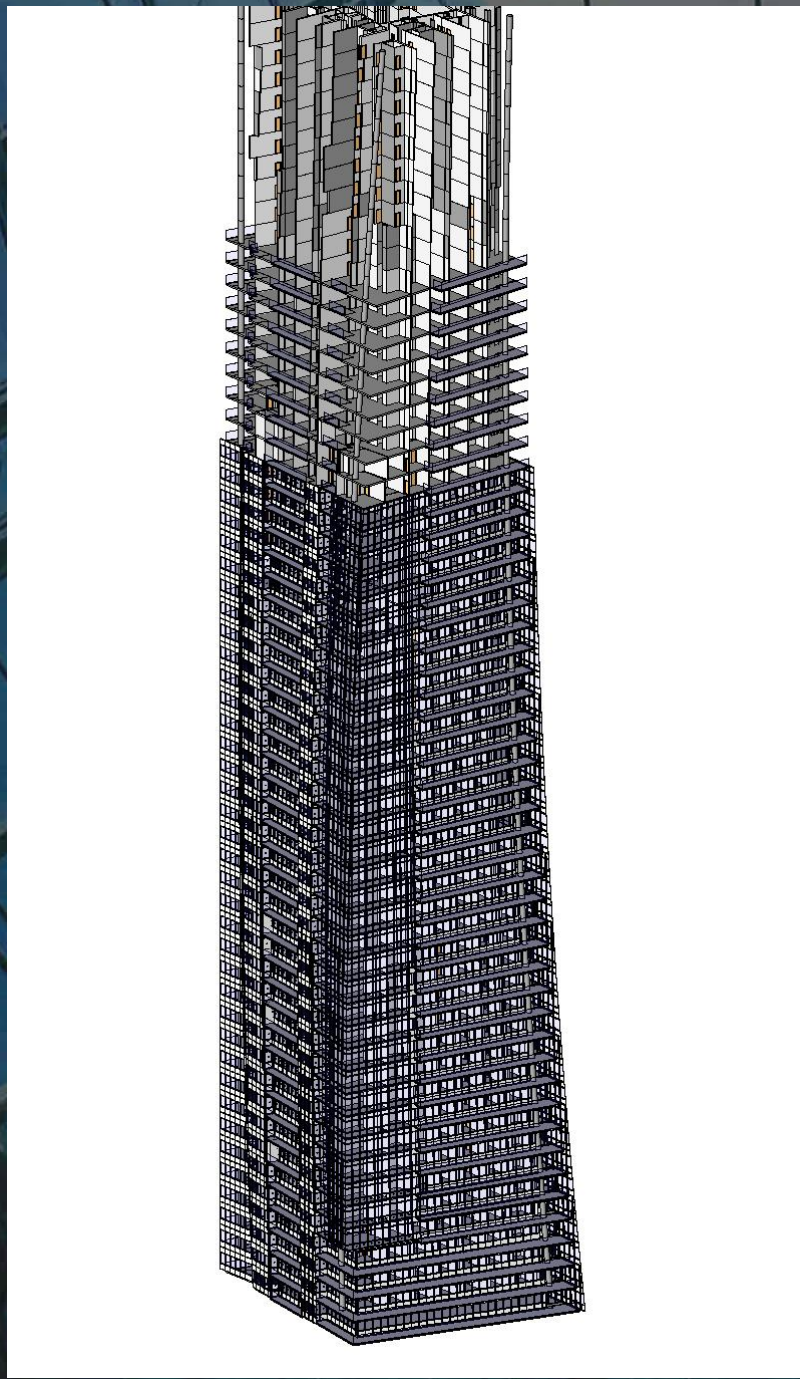


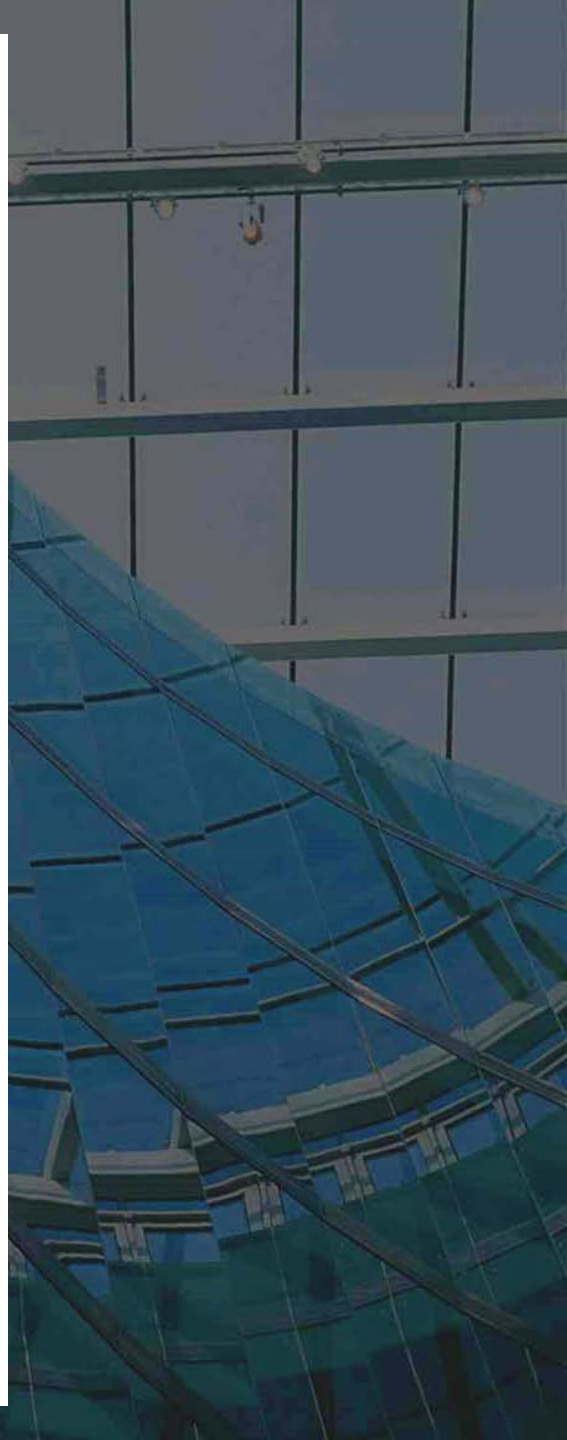
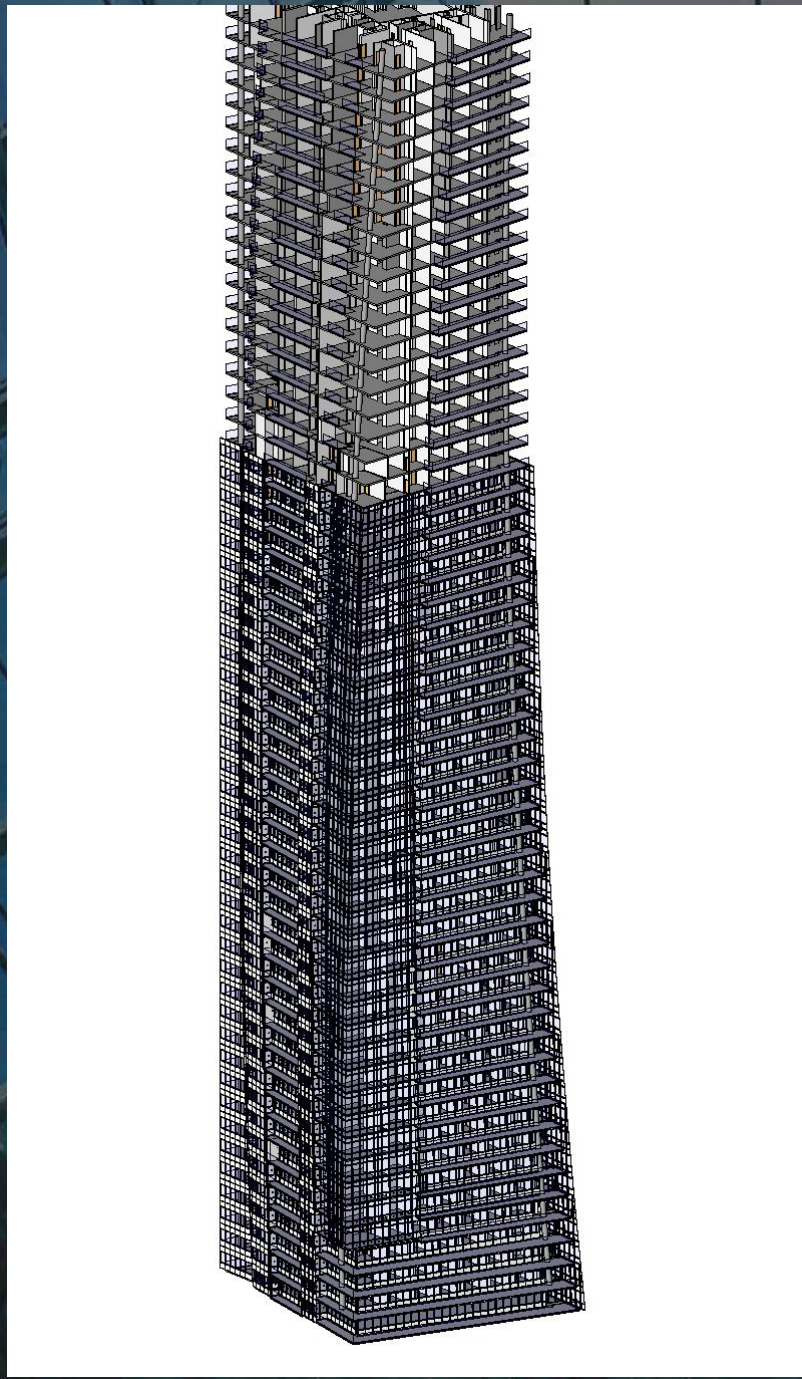


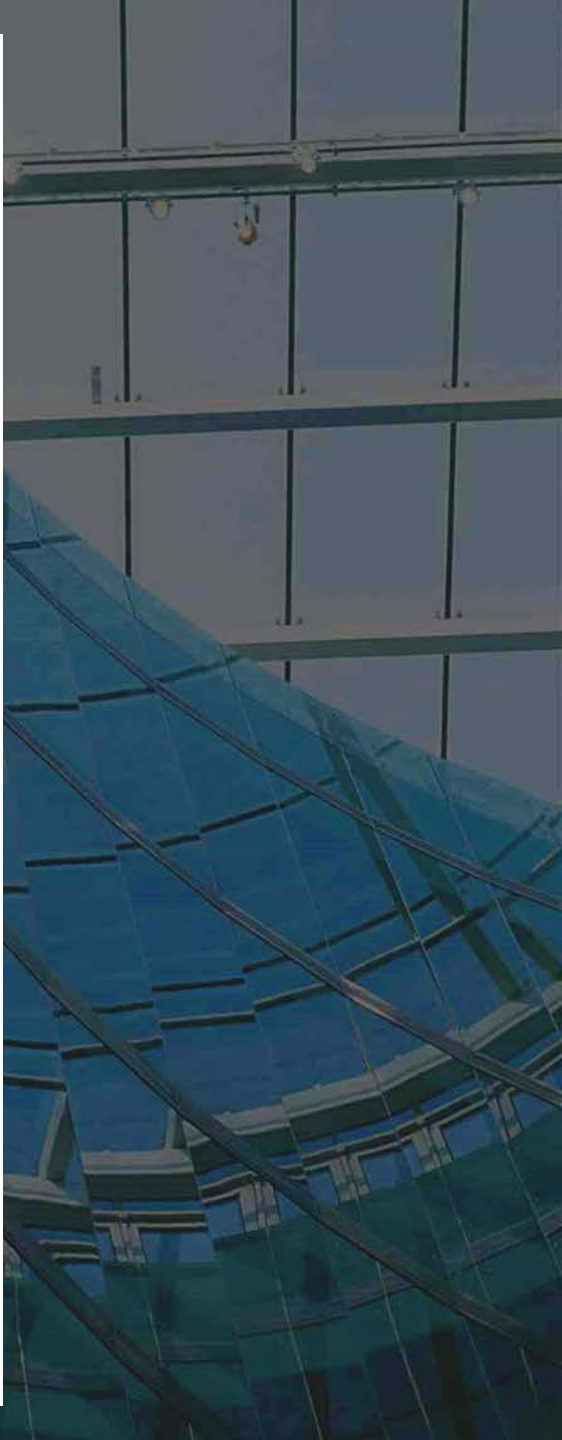
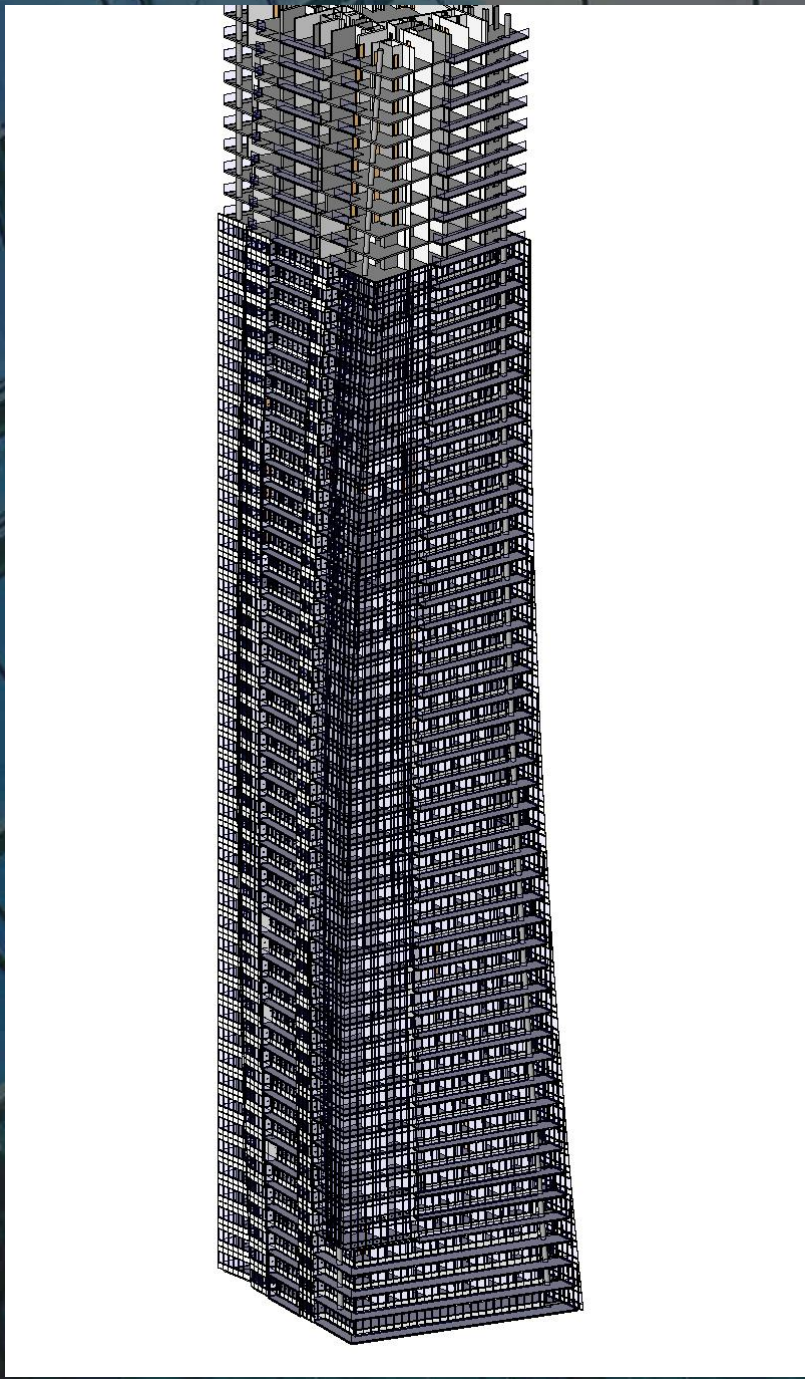


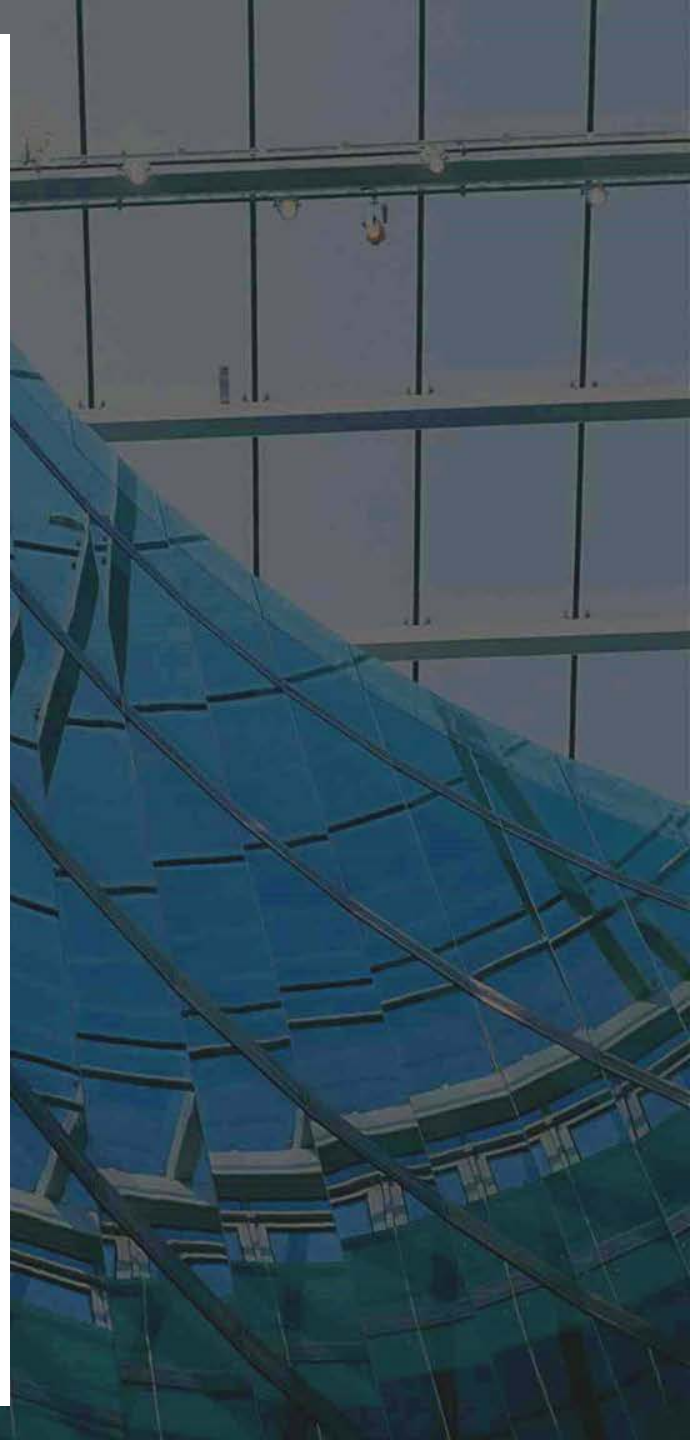


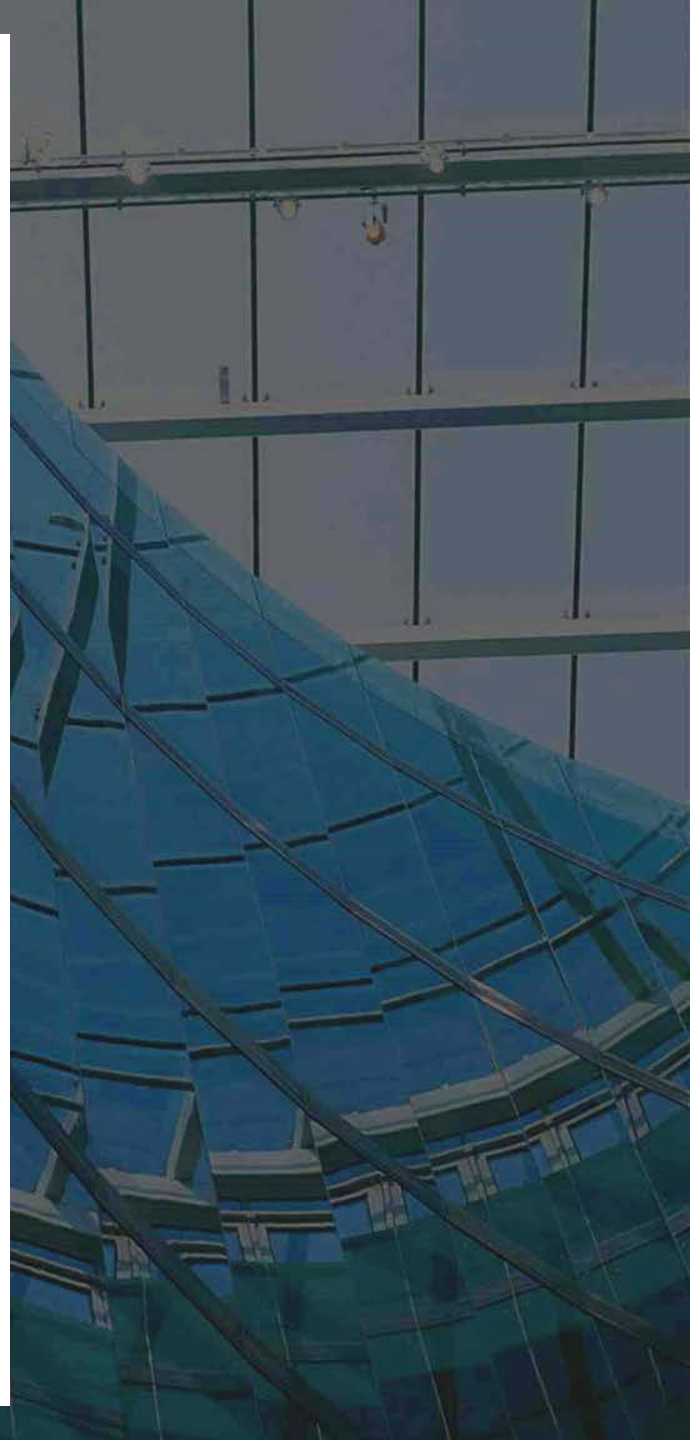


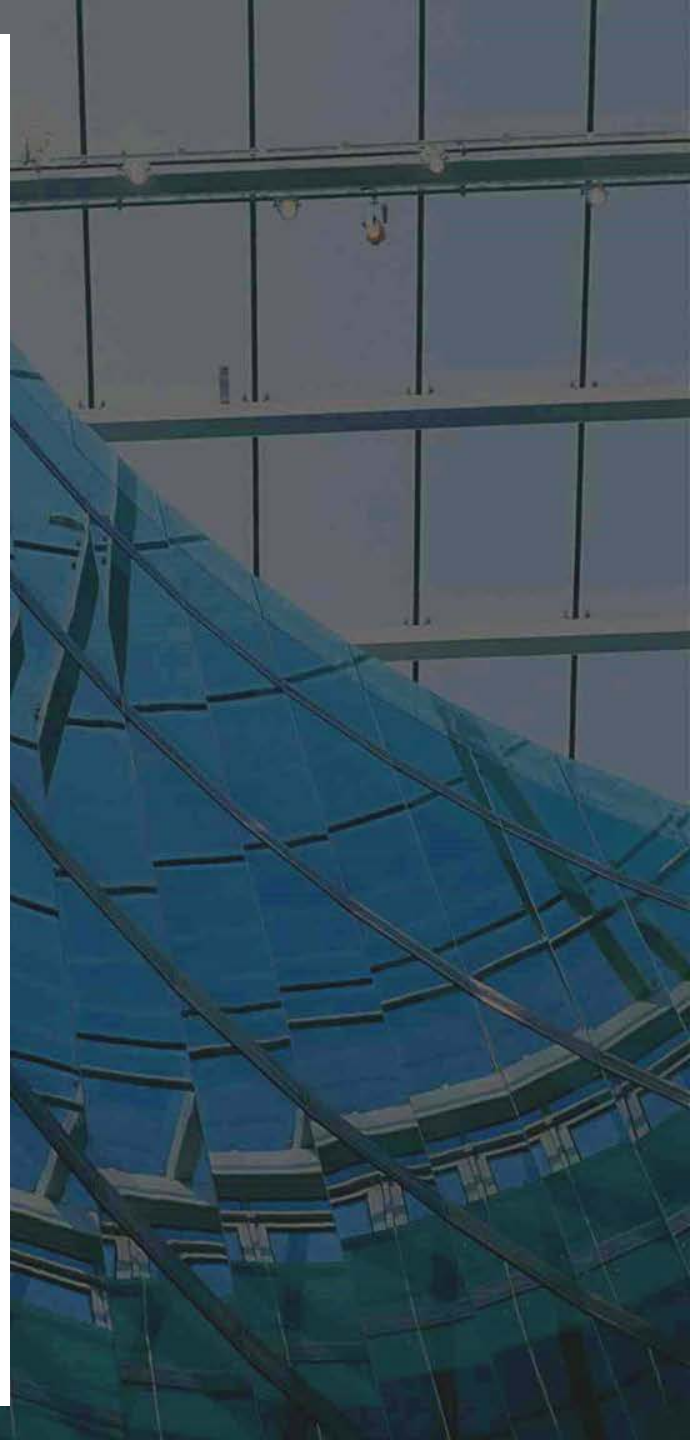


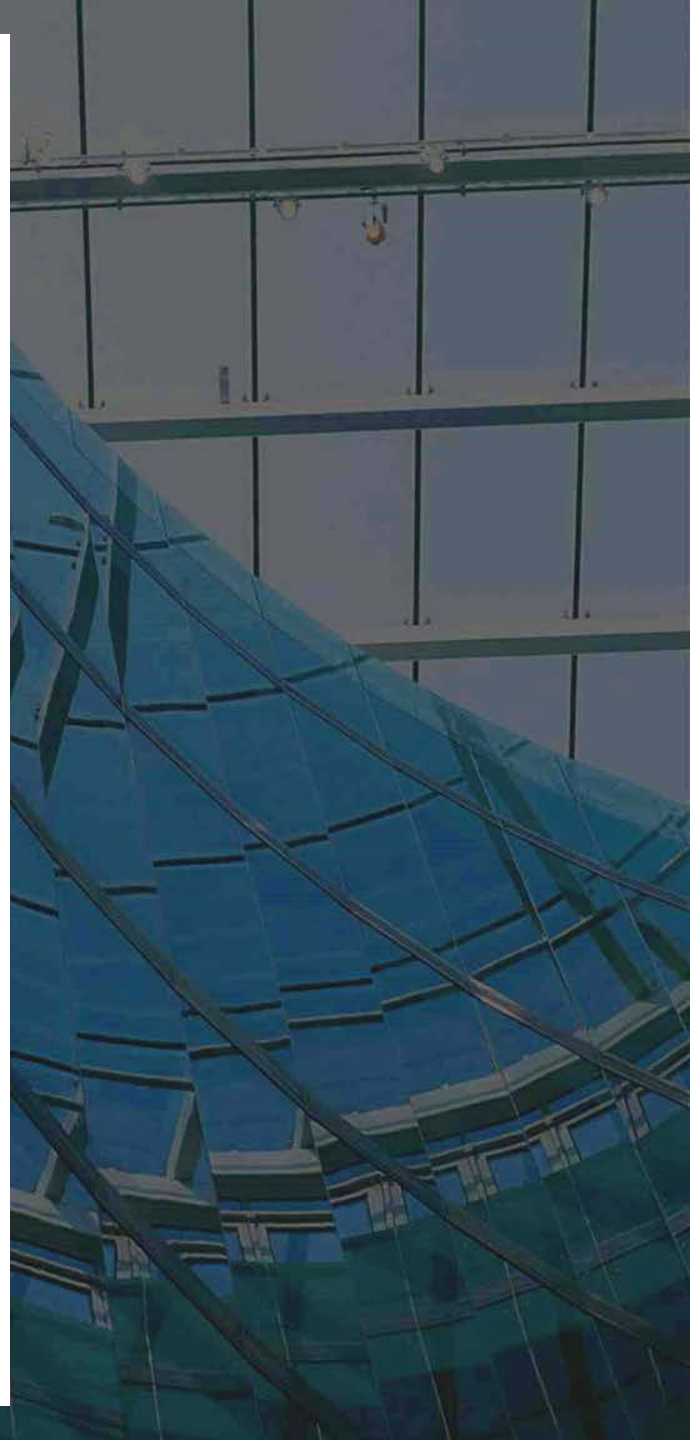


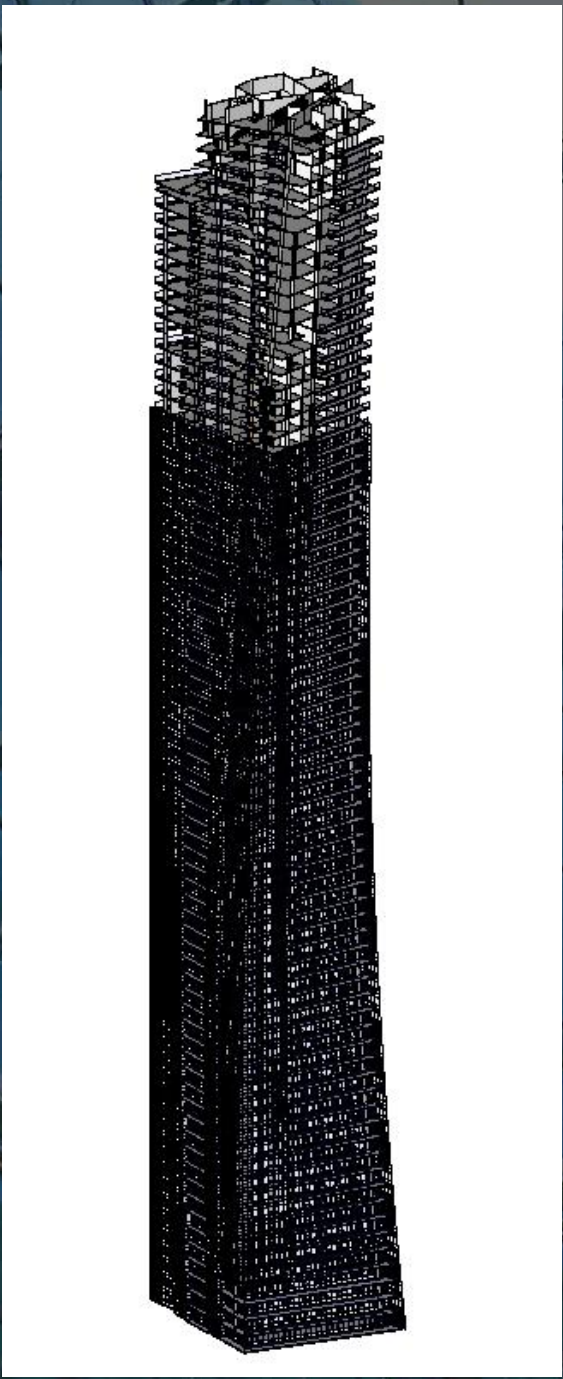


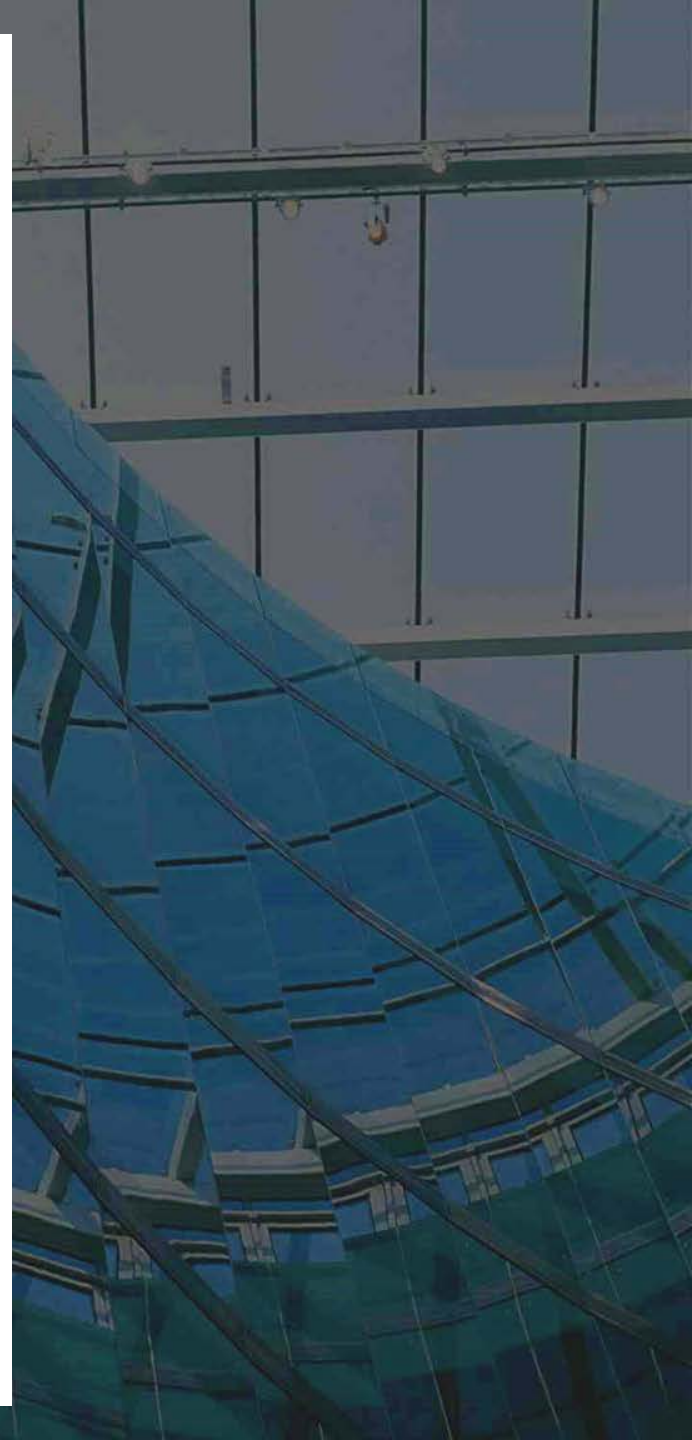


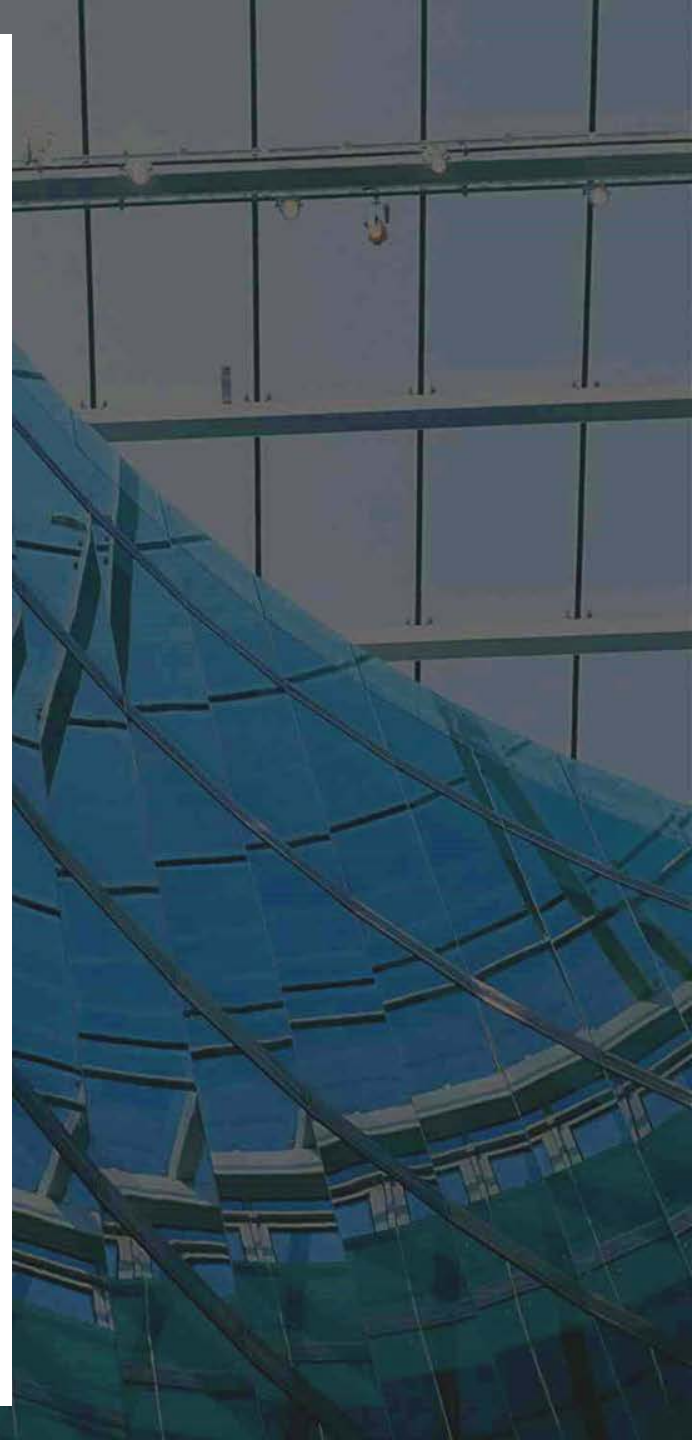


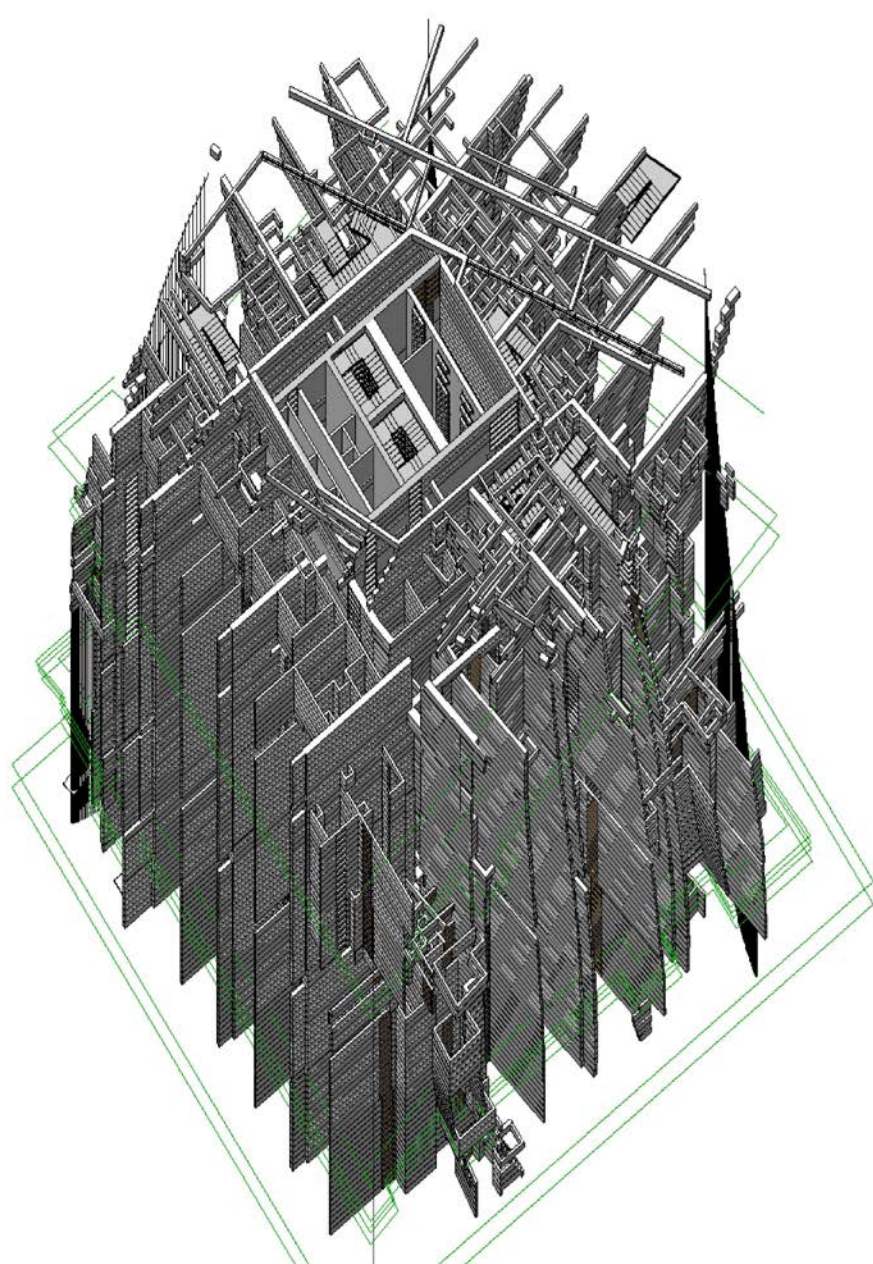
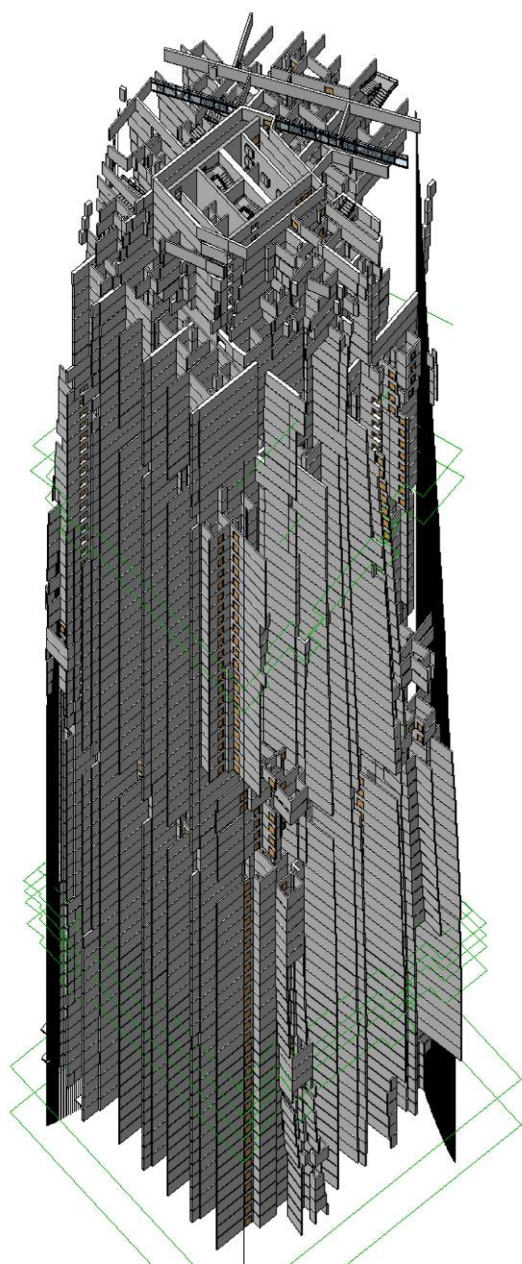






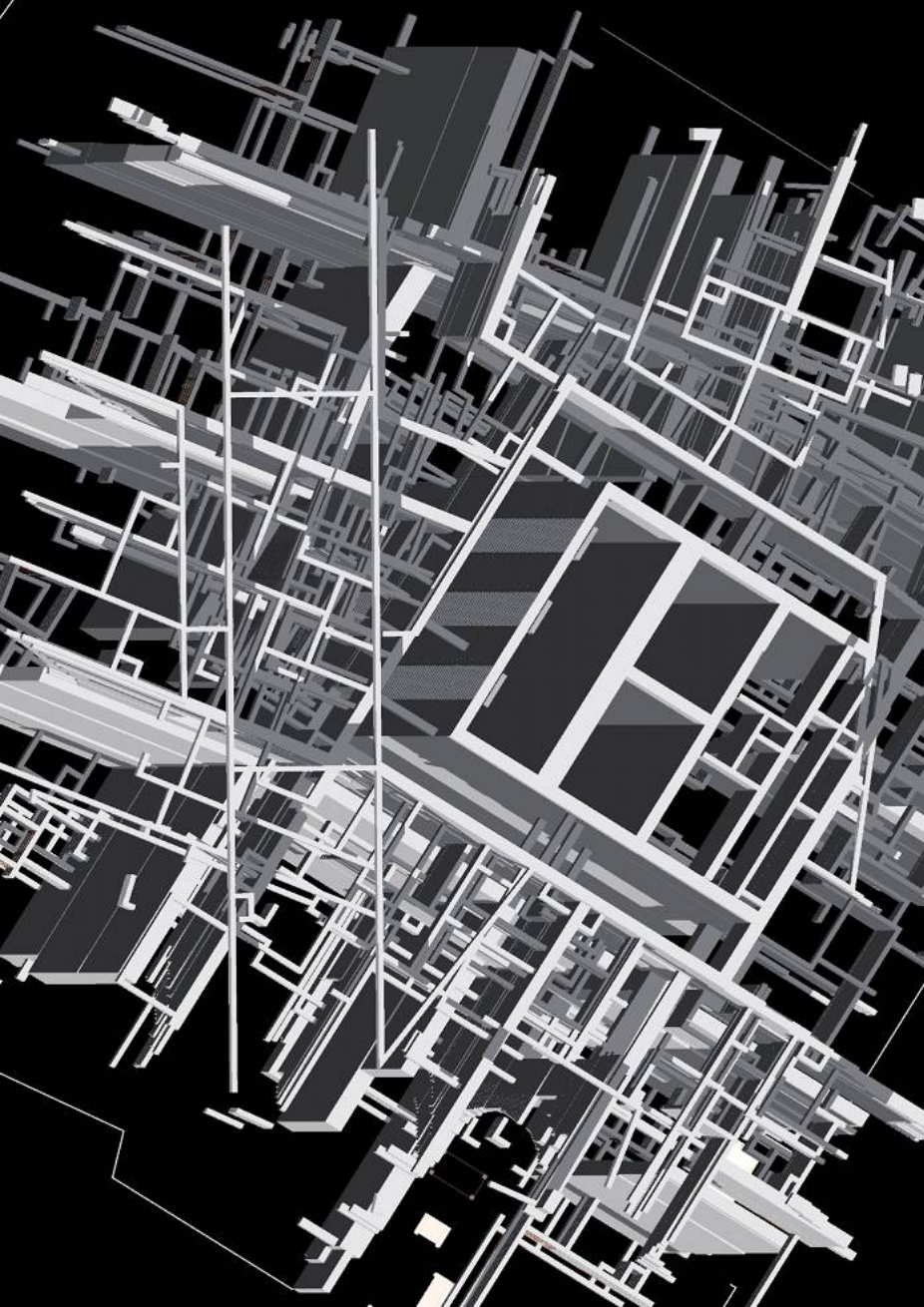




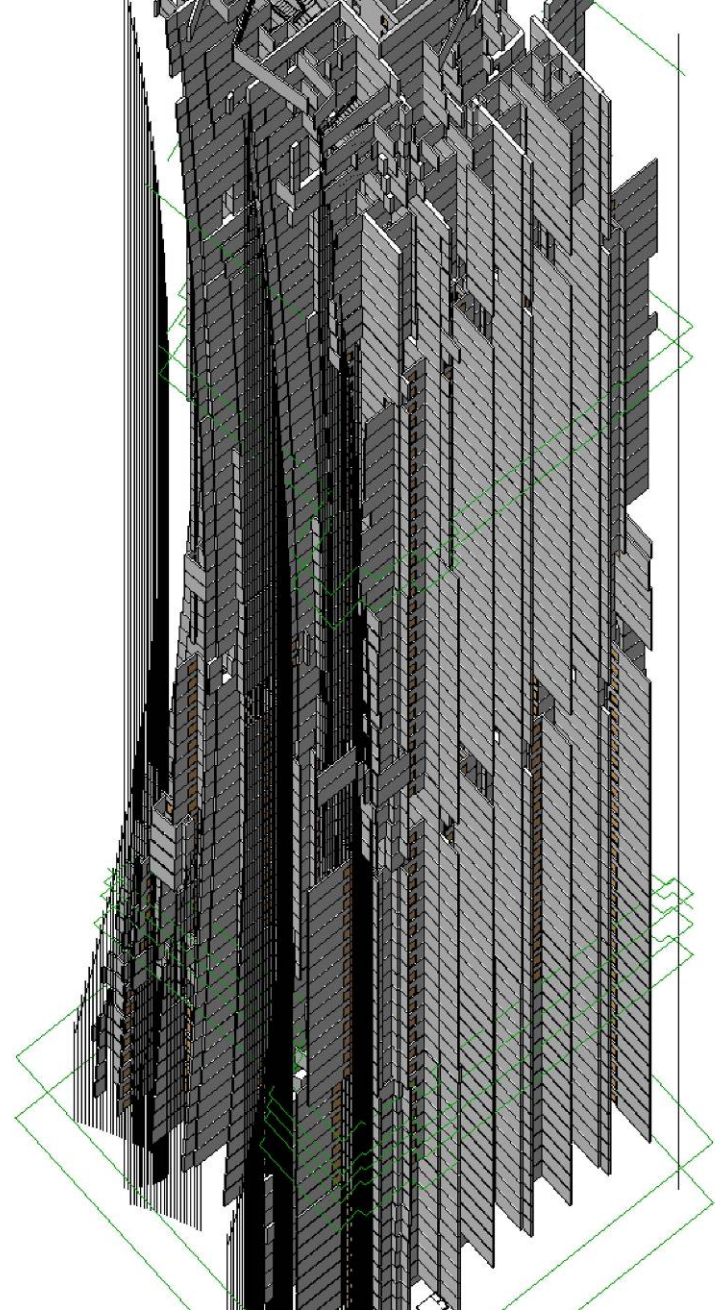


中東住宅項目

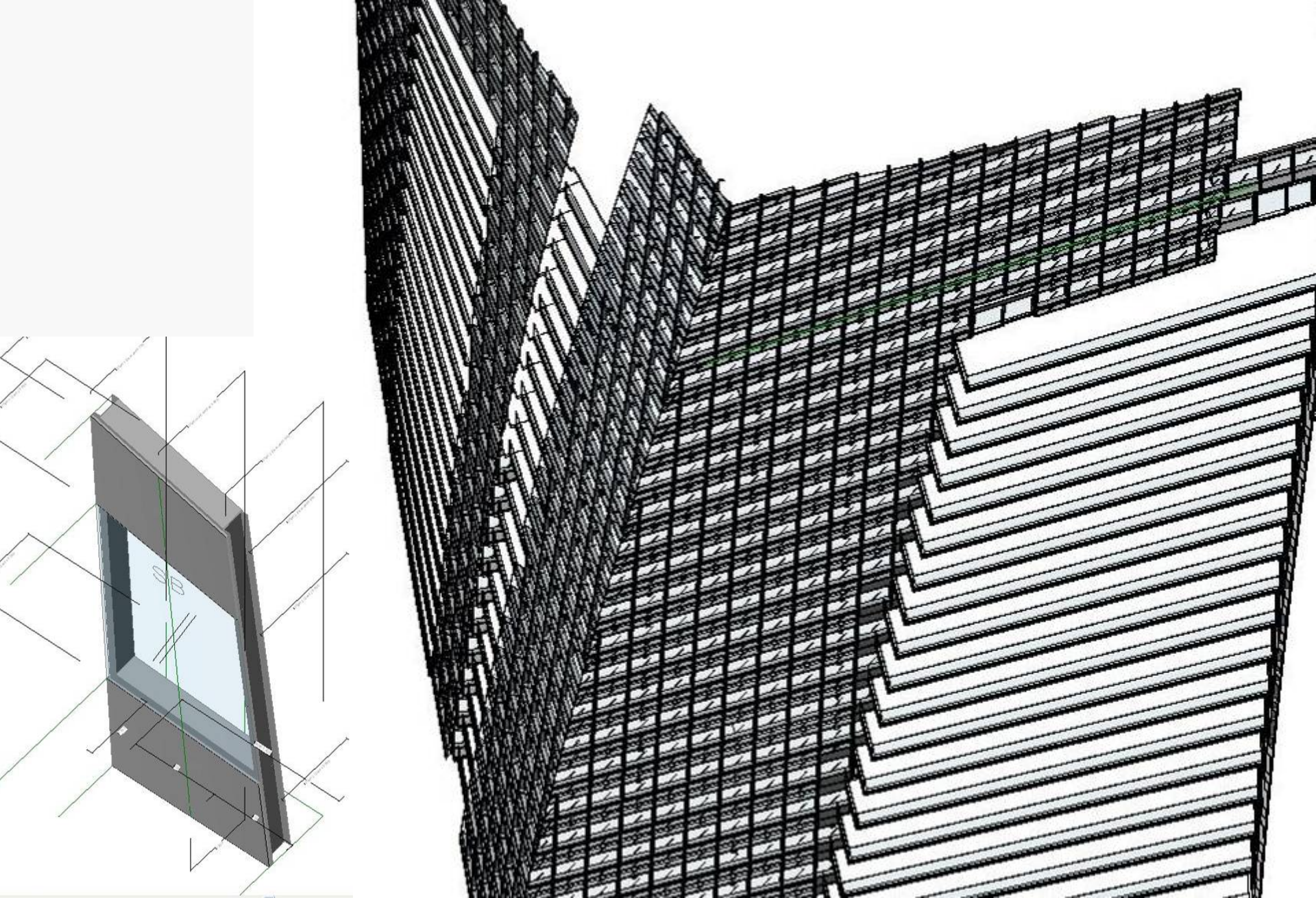
VERTICAL CO-ORDINATION



中東住宅項目



INTERNAL vs EXTERNAL



中東住宅項目

COMPLICATED CURTAIN WALL

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



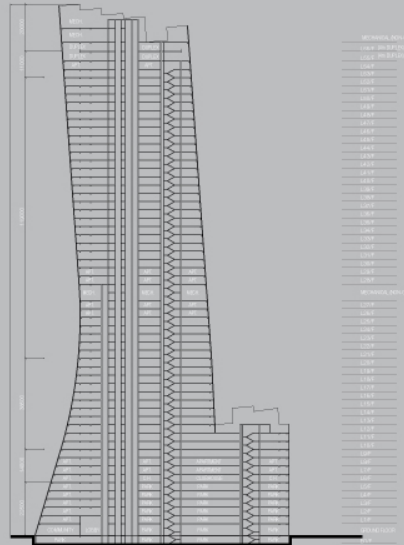
Mass Divisions



Strip Shifting



Strip Bending



Program: Residential, Site Area 7,007 sqm
Floor Area 90,206 sqm, Building Height 235 m

Abu Dhabi Empire Tower

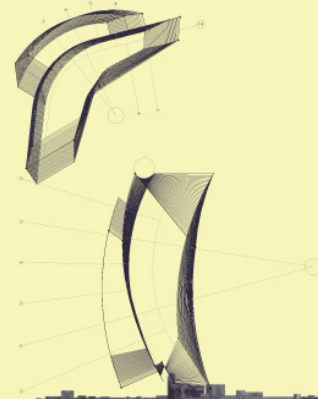
Abu Dhabi Dancing Towers

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**

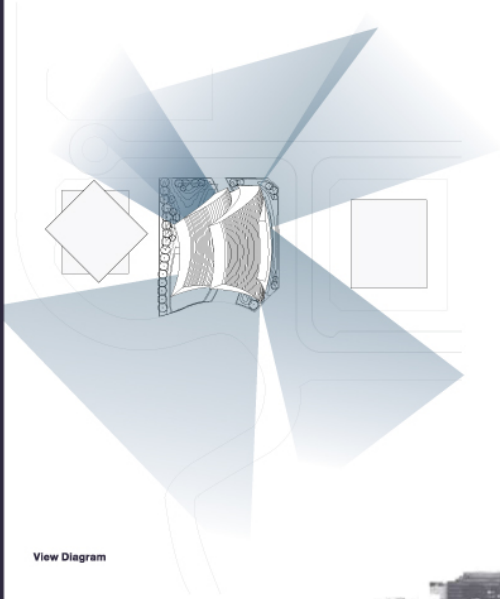


中東住宅項目

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.

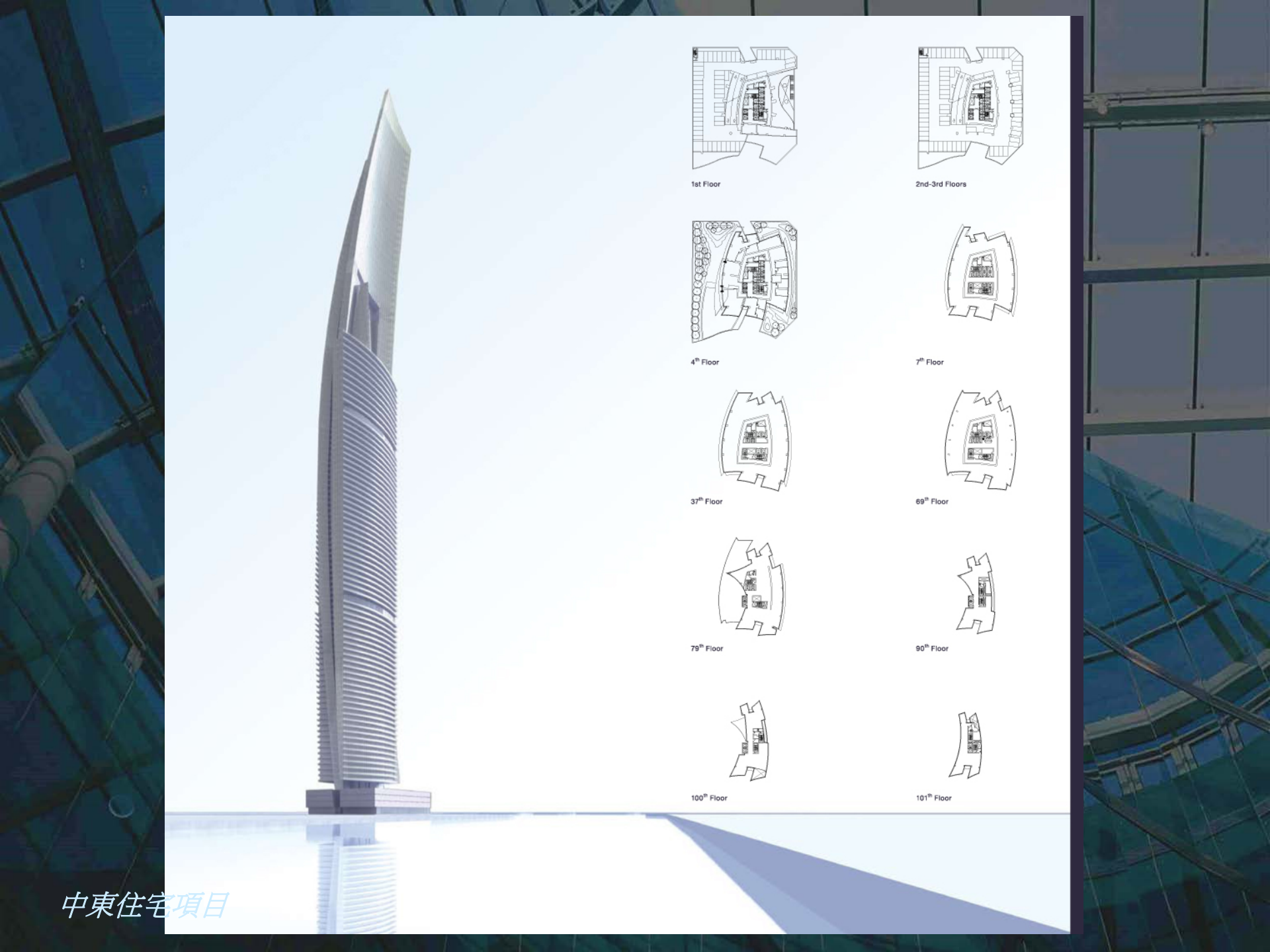
The first 60th floors of the tower are intended to be service apartments, which in order to be marketable, needed to have the majority of units standardized. The curved shape of the tower improves views past its densely located neighbors. The playfulness of this tower was concentrated into the two most 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 3,443sqm
Floor Area 197,975 sqm Building Height 460 m

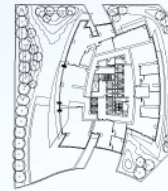
Dubai Ocean Heights Two



1st Floor



2nd-3rd Floors



4th Floor



7th Floor



37th Floor



69th Floor



79th Floor



90th Floor

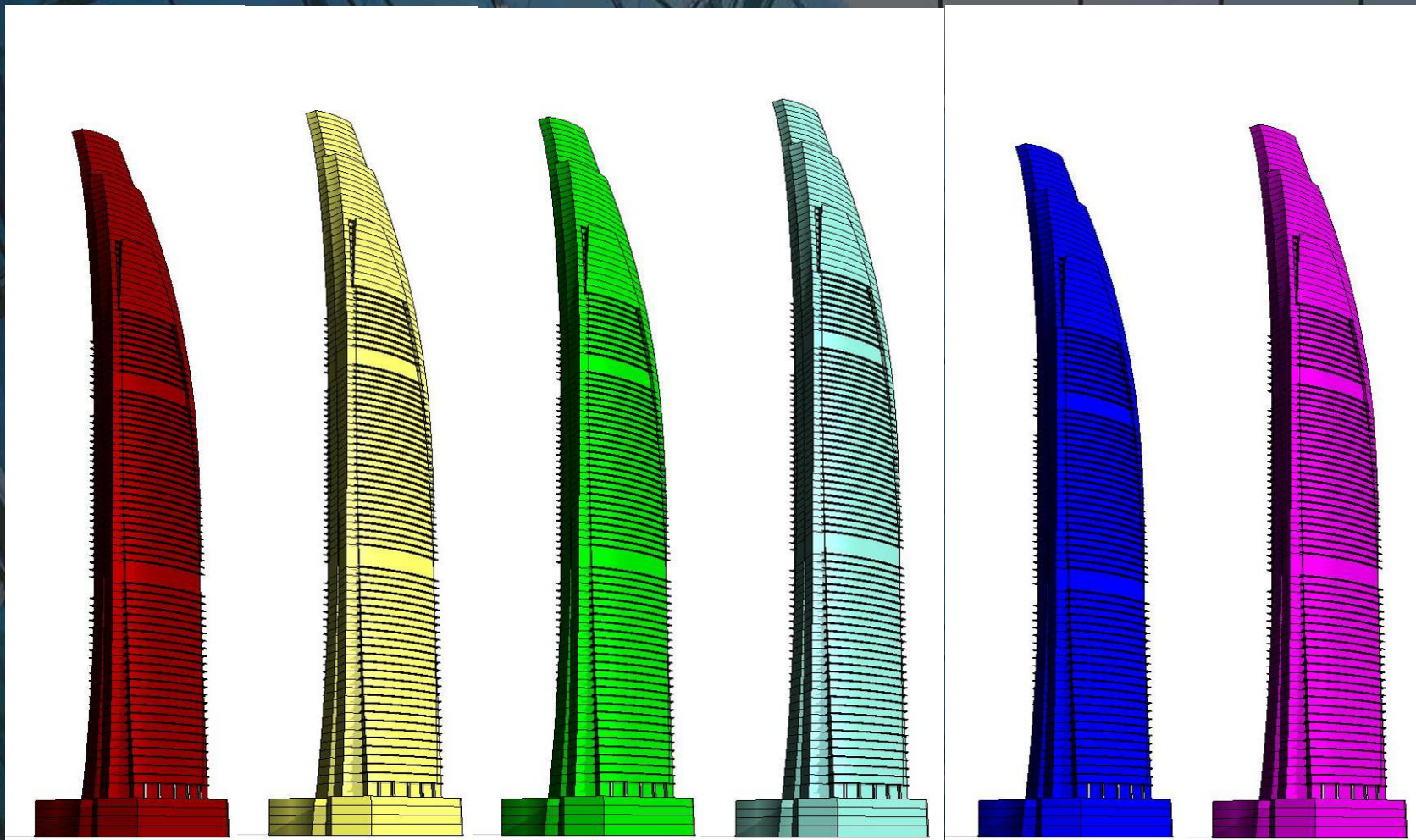


100th Floor

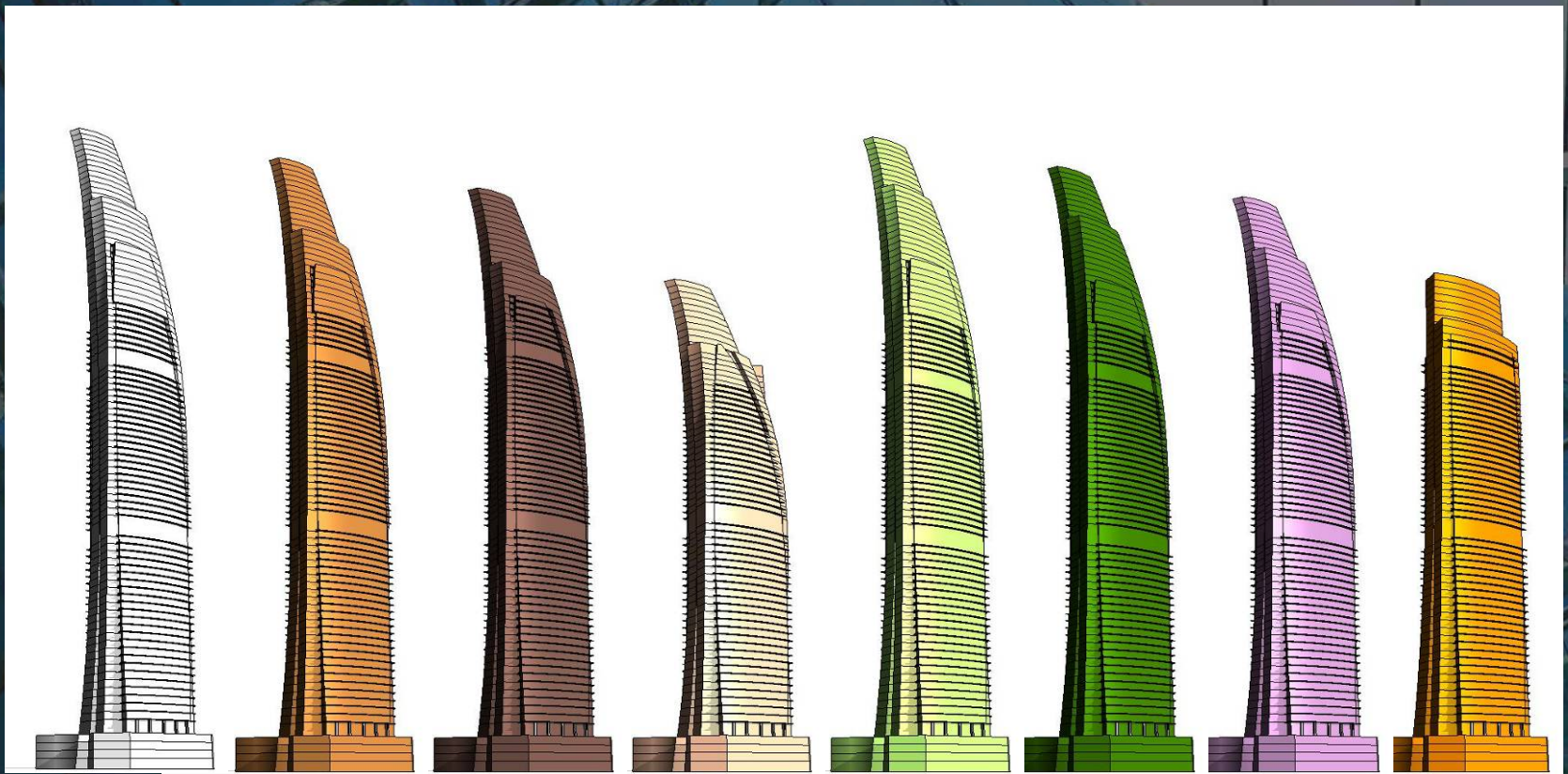


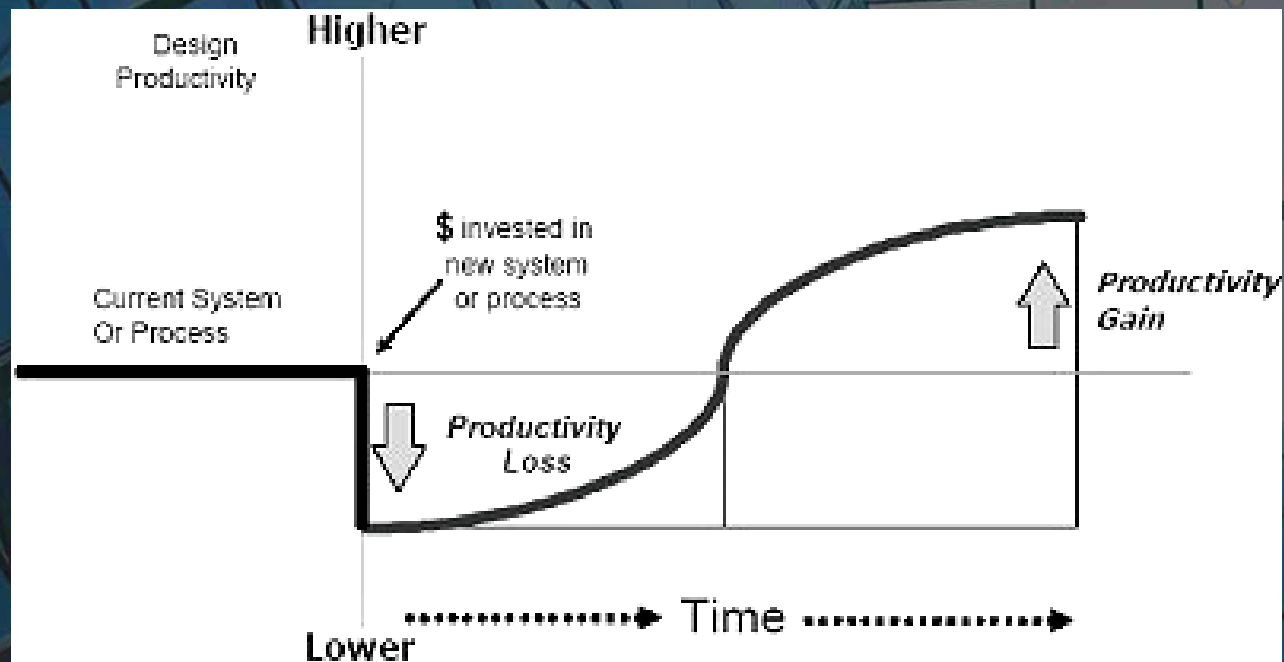
101th Floor

Ocean Heights II – Options



Ocean Heights II – Options





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

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

Source 26/1/07:

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

PRODUCTIVITY
>60%



Design and Construction

• Overview

• Architecture & Engineering

• CAD Standards

▶ 3D-4D Building Information Modeling

3D-4D-BIM Overview

Spatial Program Validation

4D Phasing

3D Laser Scanning

Energy and Sustainability

BIM Library

• Commissioning

• Construction Excellence

• Design Excellence and the Arts

• Facility Access for the Disabled

• Sustainable Design

• Urban Development

• Design and Construction Delivery Process

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

3D-4D Building Information Modeling

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

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

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

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

BIM Program Flyer

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

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

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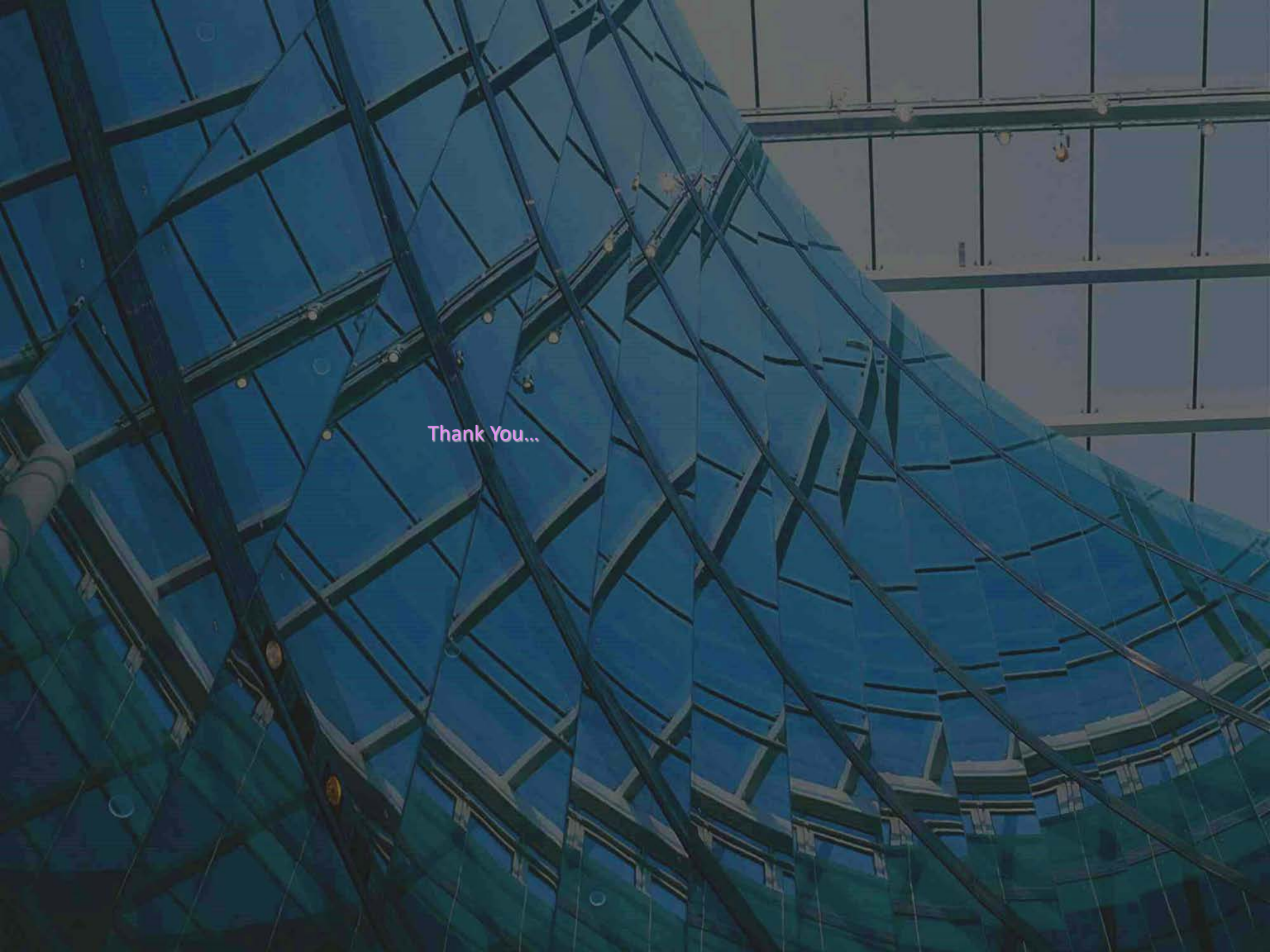
QuickLinks

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

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

Challenges from the Technology to the Industry

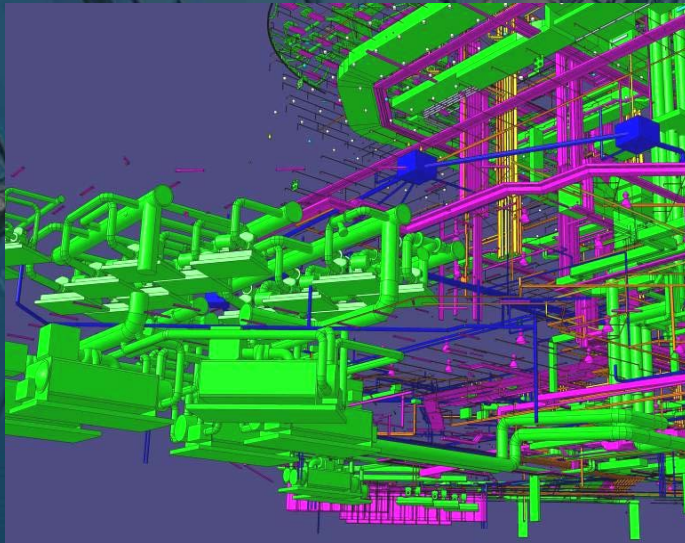
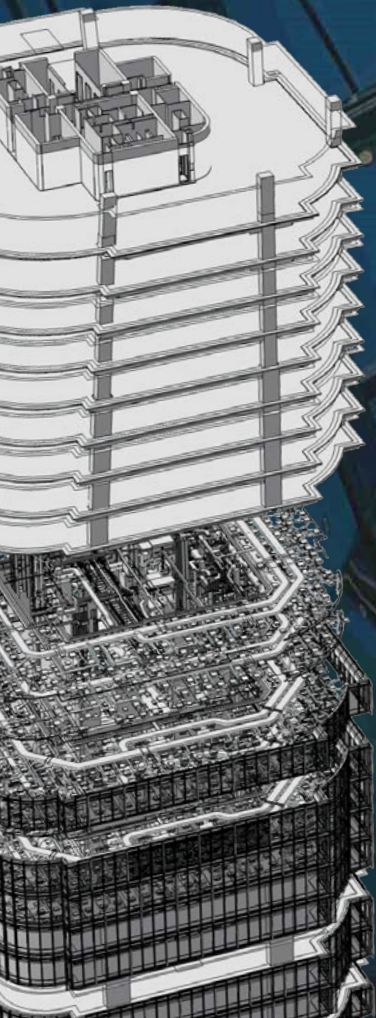
- Participation of all participants
- Redefinition of roles of all Building Industry Participants
- Project Delivery Time
- Fee Structure
- Standard Contract Provision – position of BIM model
- Contractual Relationship
- Other supports – Government, Professional Bodies, Education
- BIM Authorities – Standards and Certification
-



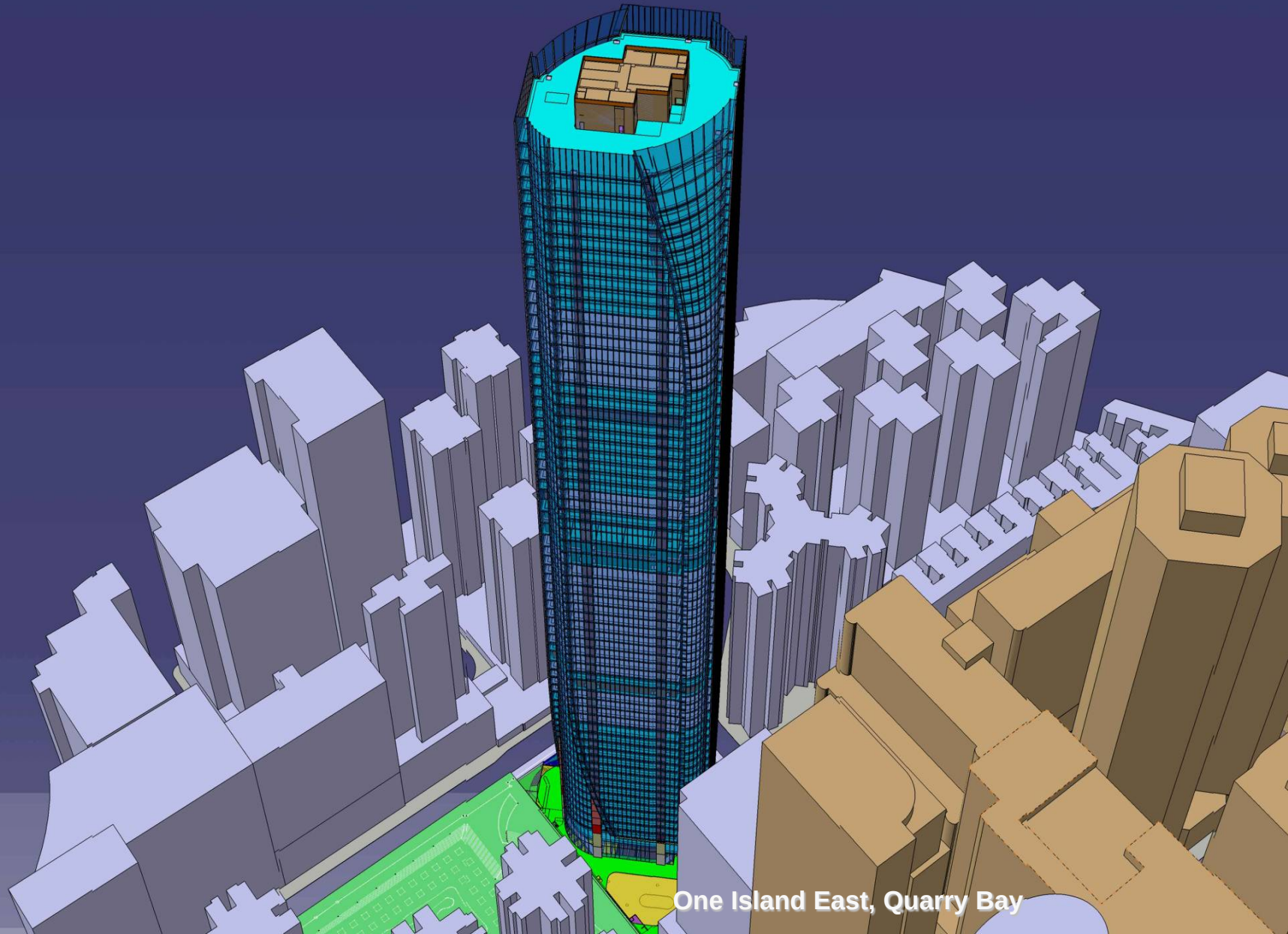
Thank You...

Pilot Projects

- One Island East

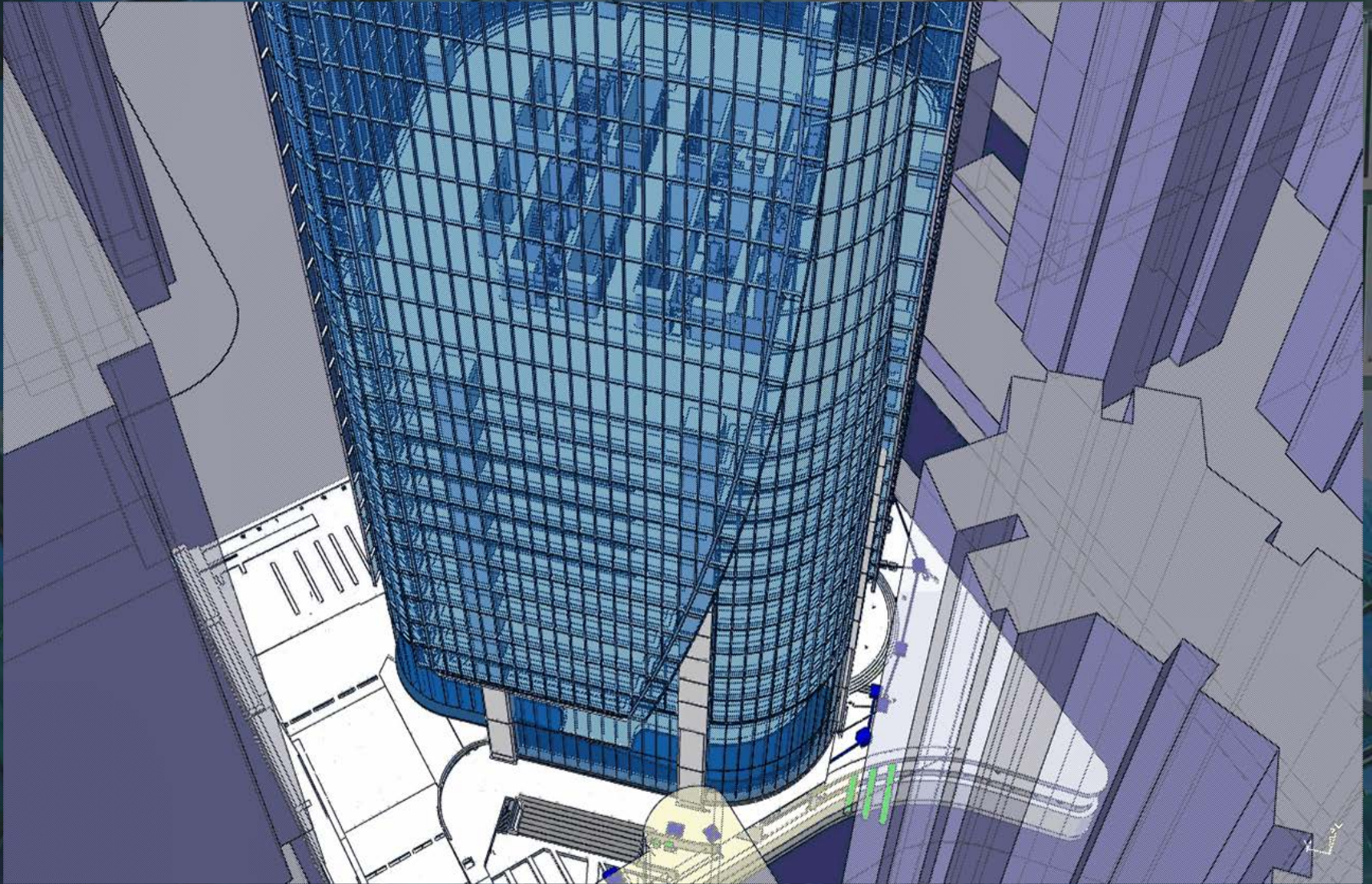


Tender Model by Consultants



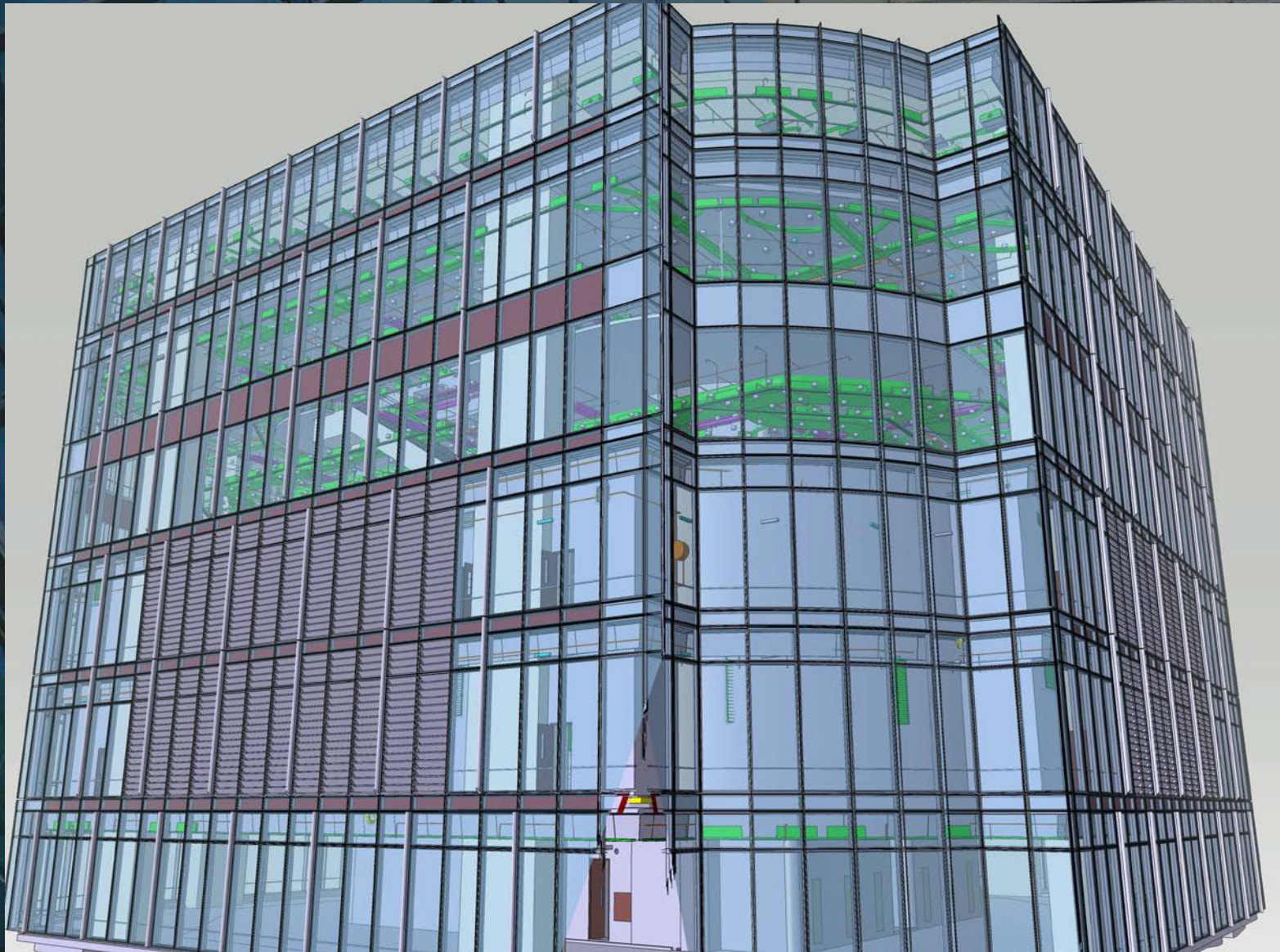
One Island East, Quarry Bay

One Island East

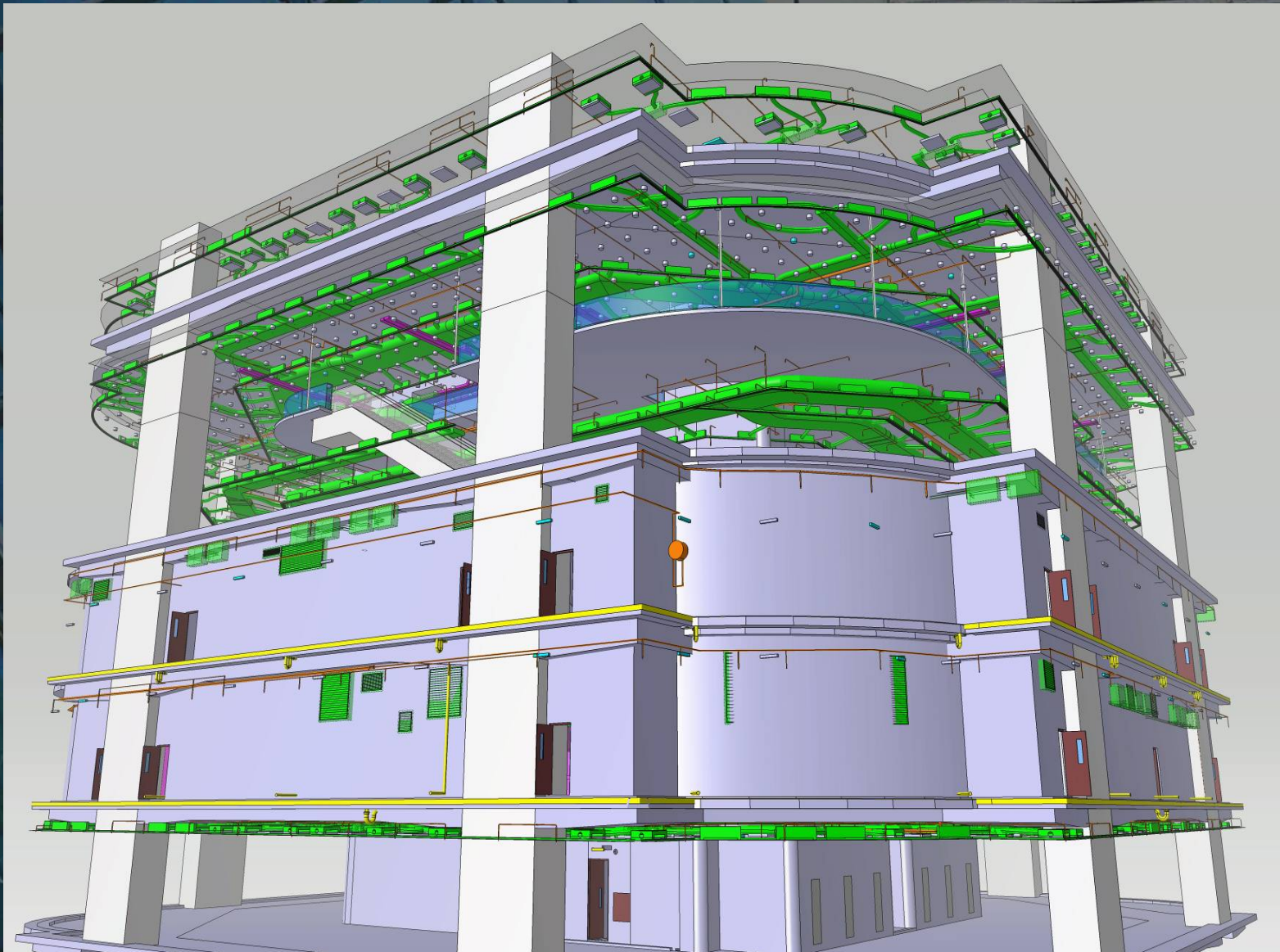


BIM Architectural Configuration

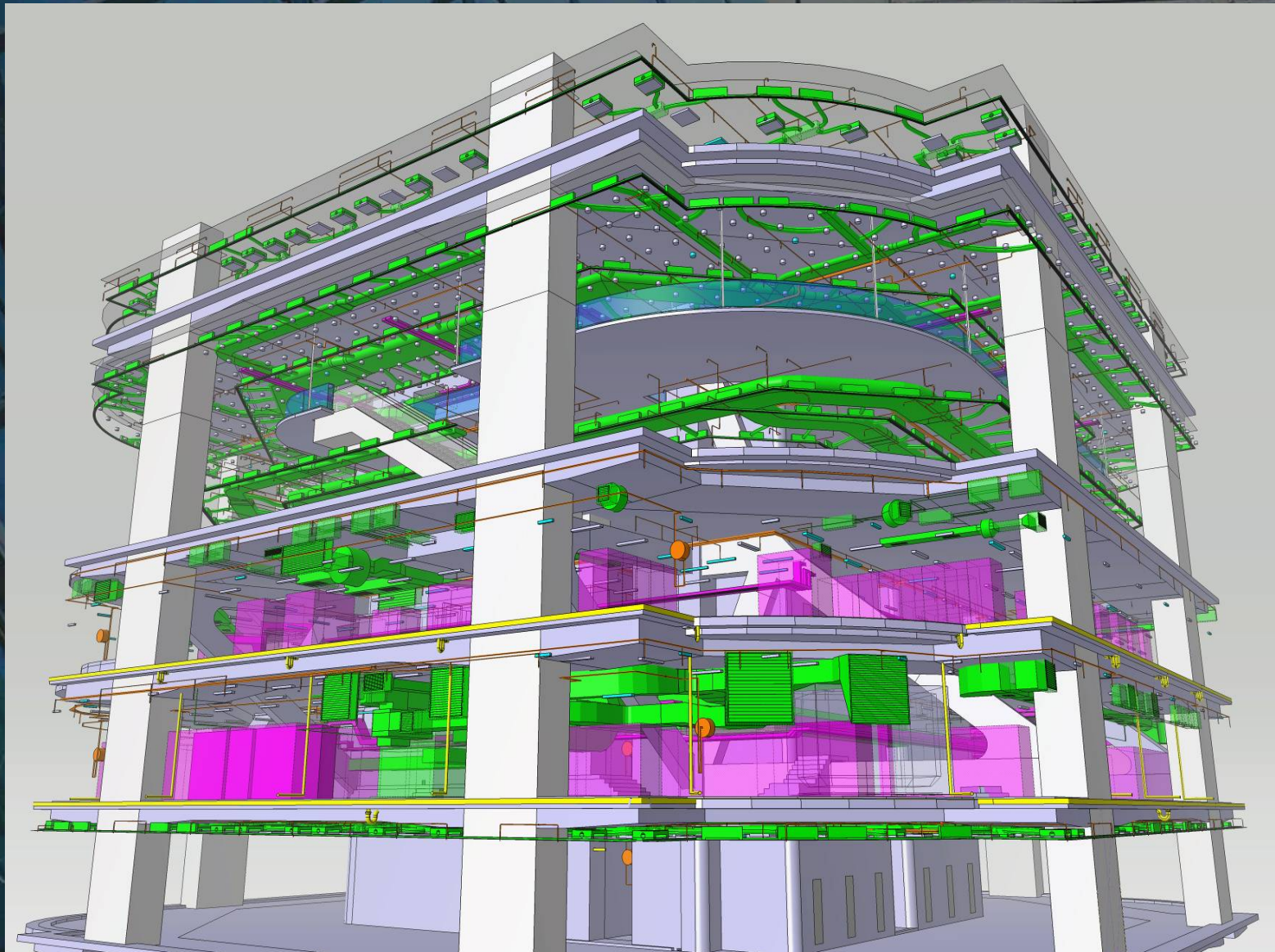
One Island East



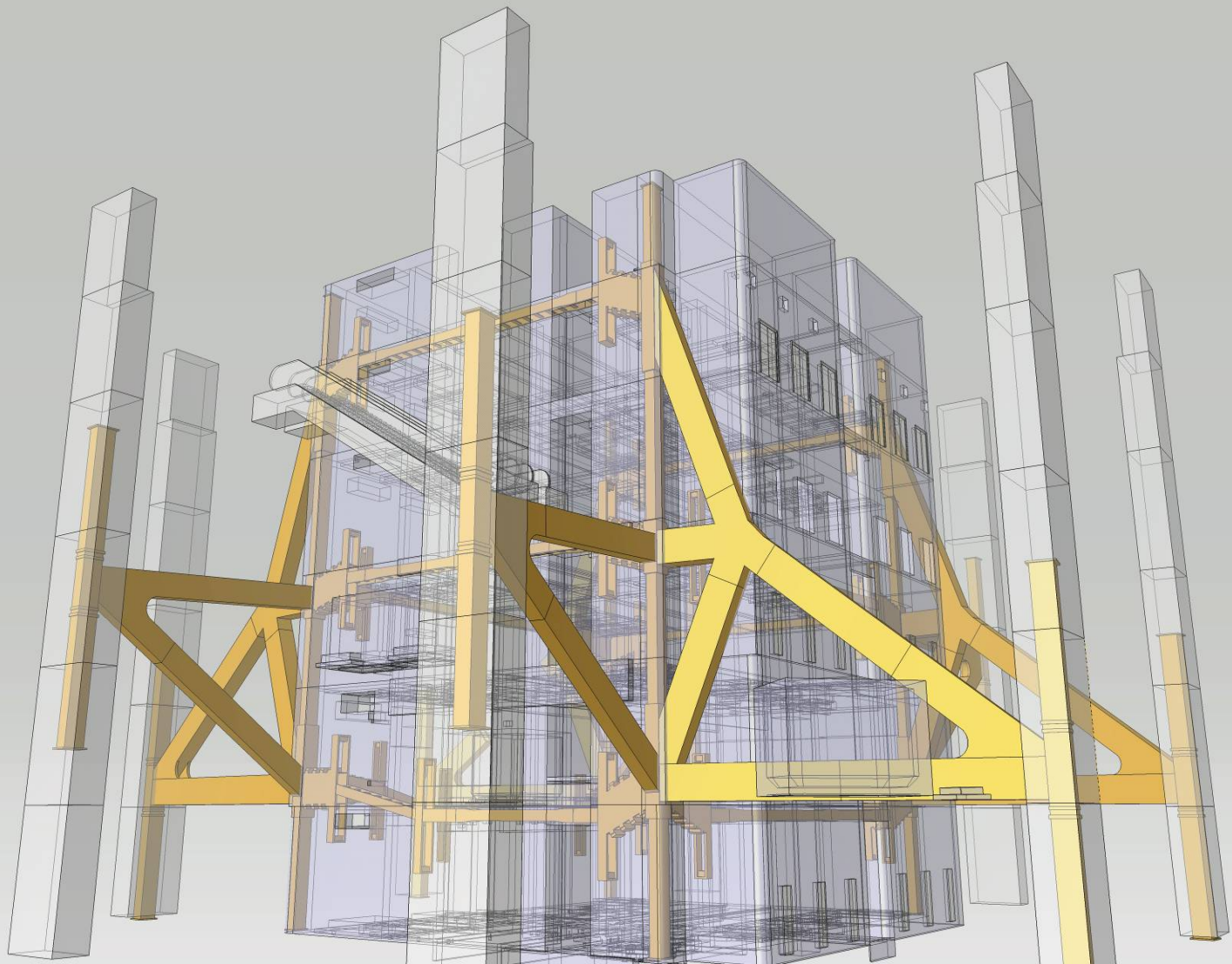
One Island East



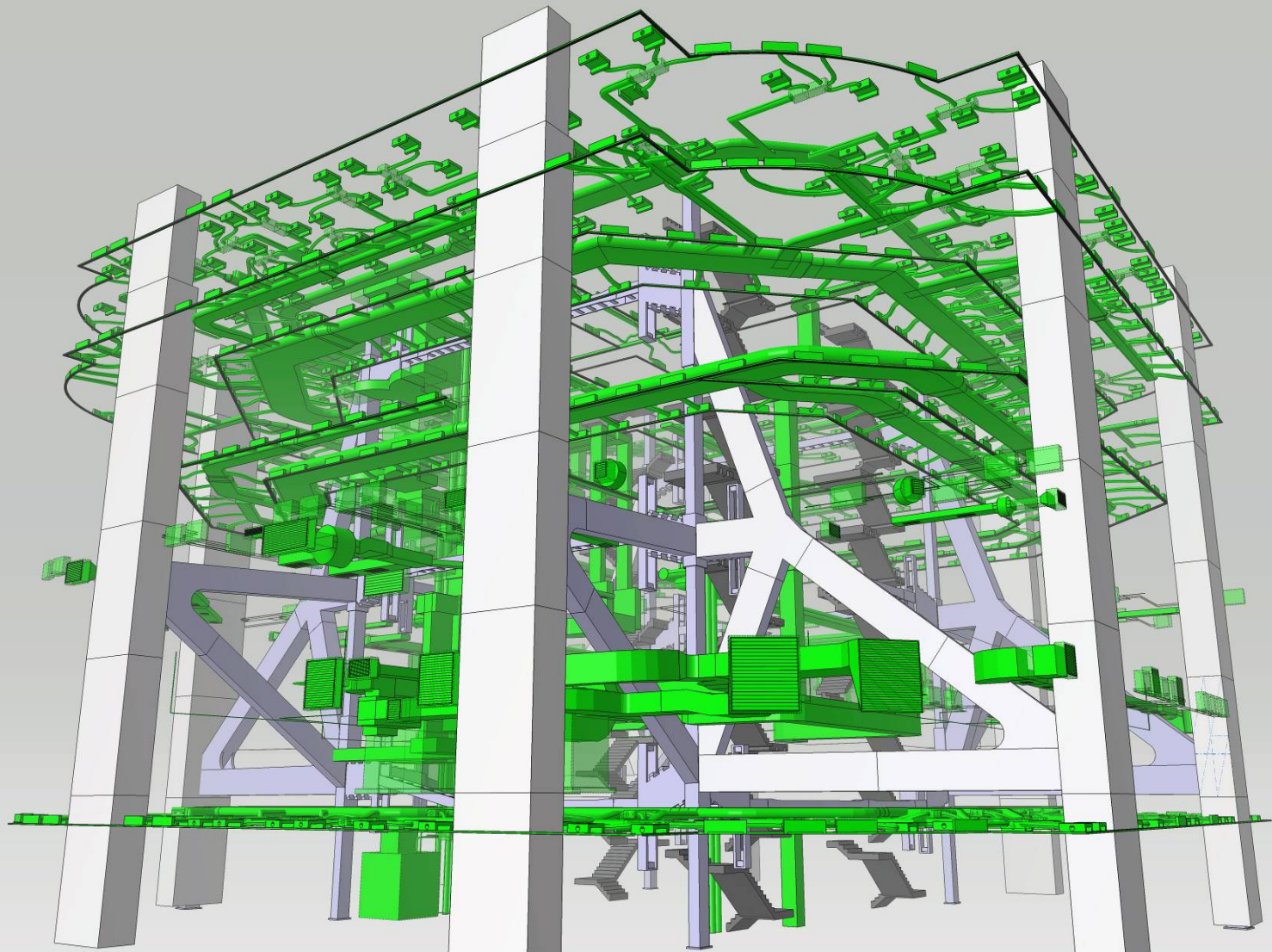
One Island East



One Island East

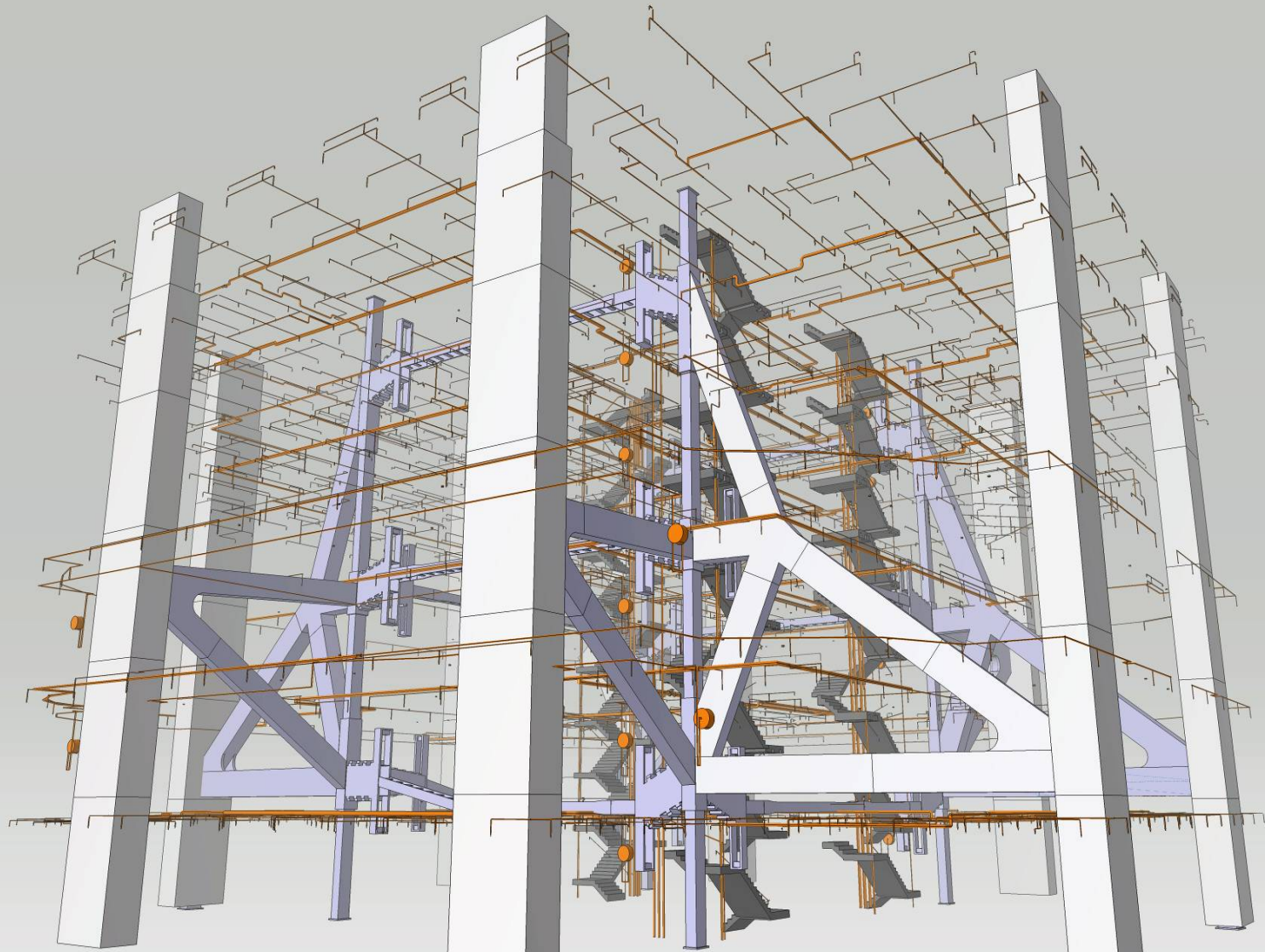


One Island East



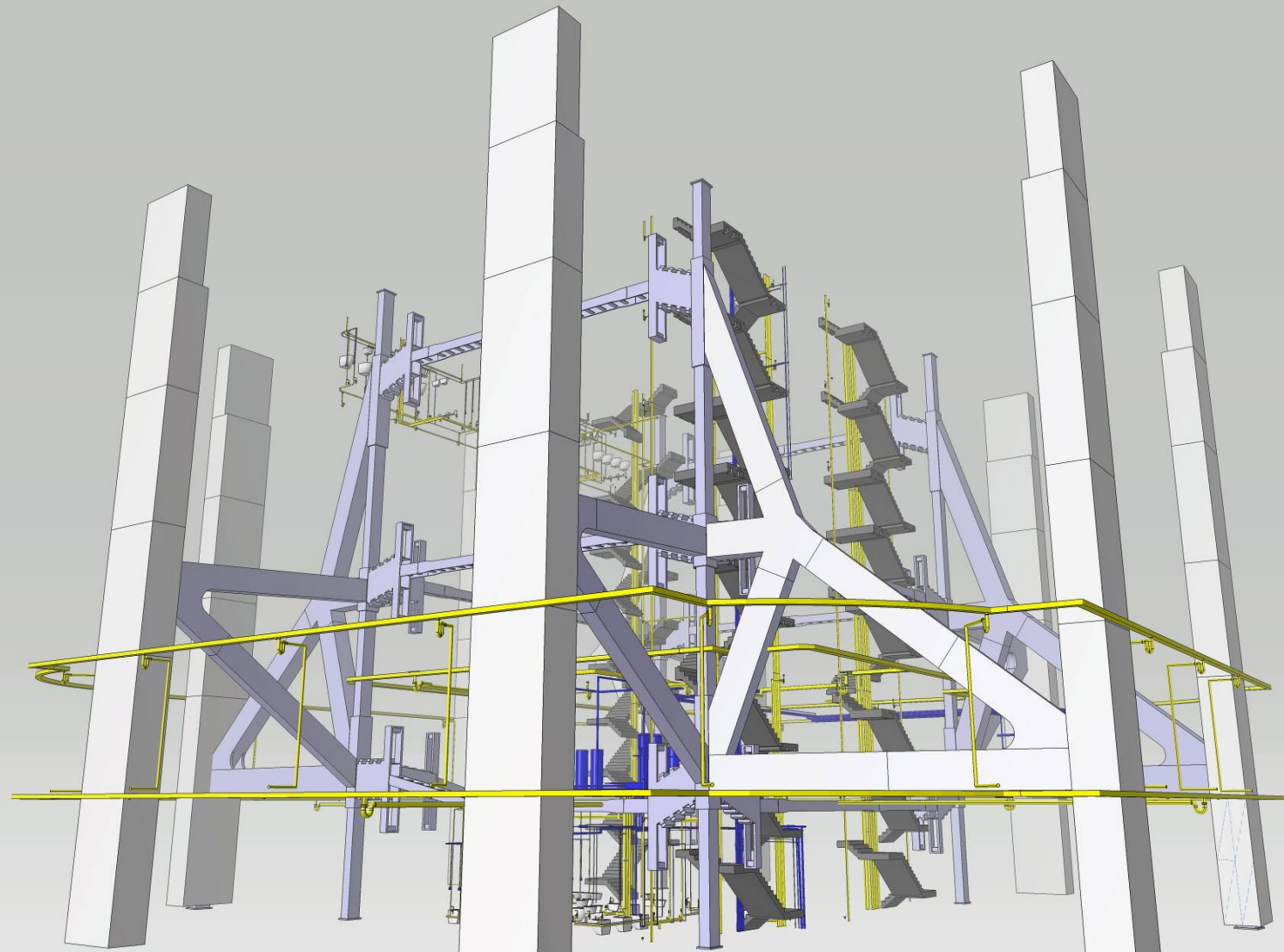
BIM HVAC Configuration

One Island East



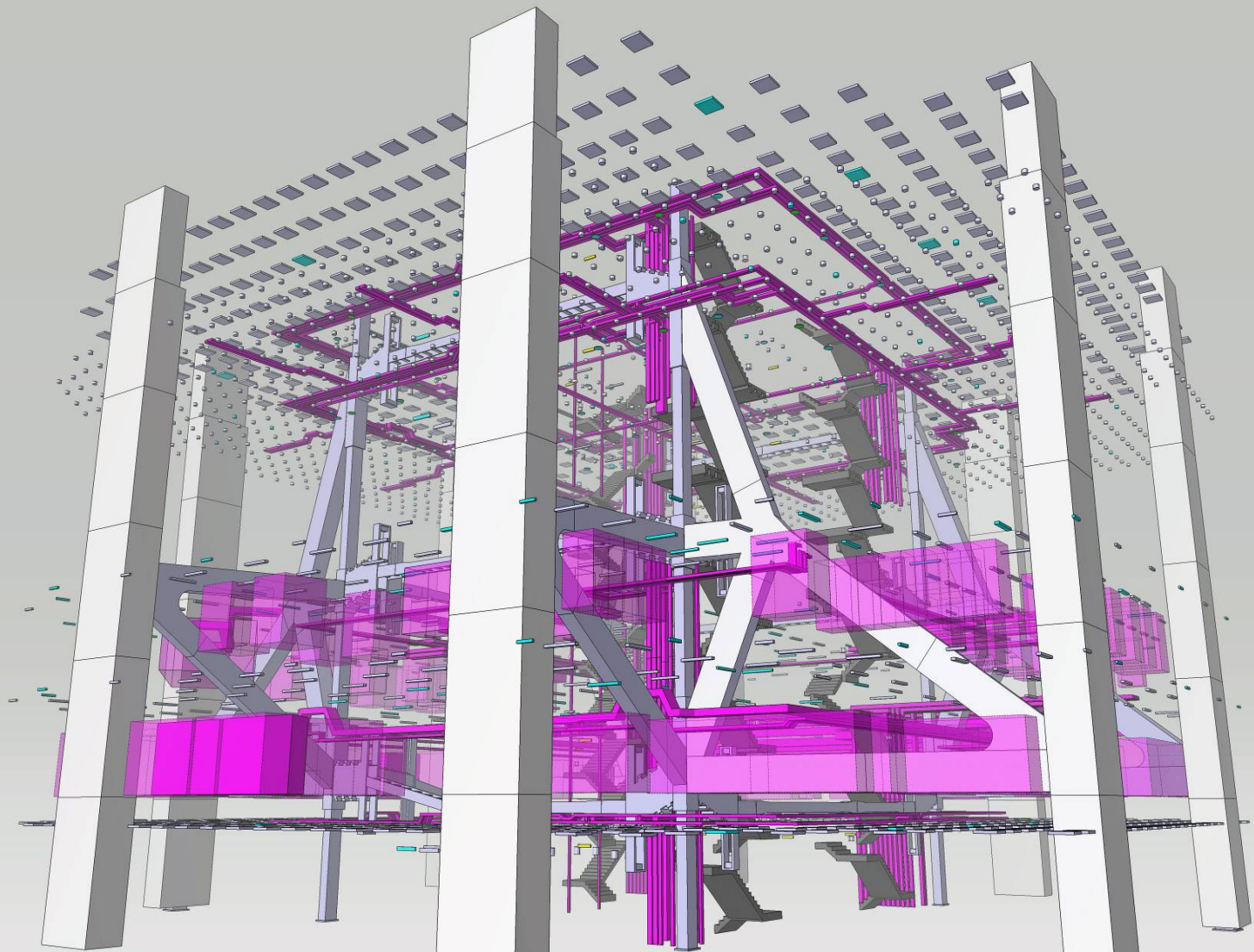
BIM FS Configuration

One Island East



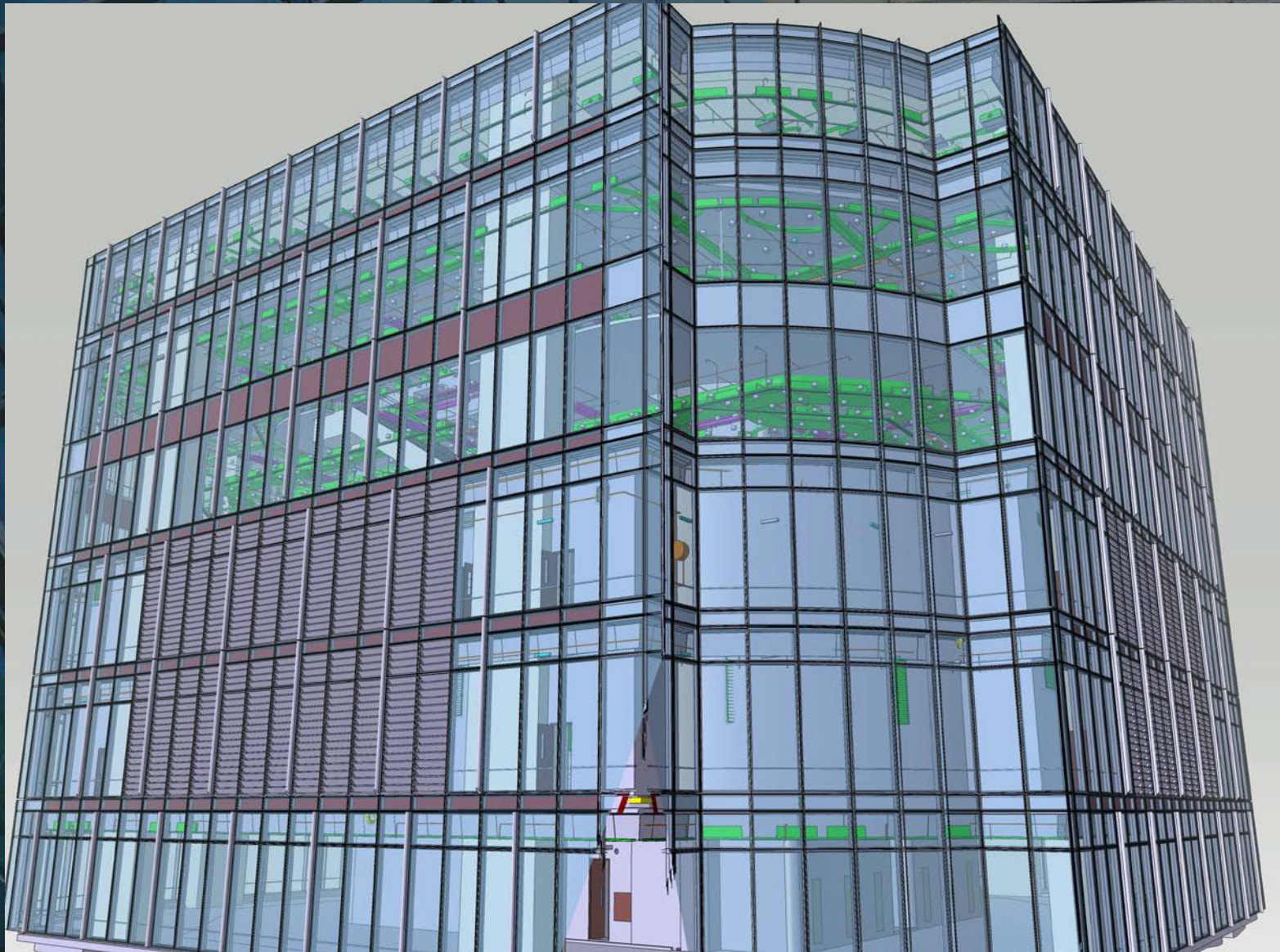
BIM Plumb & Drainage Configuration

One Island East



BIM ELEC Configuration

One Island East

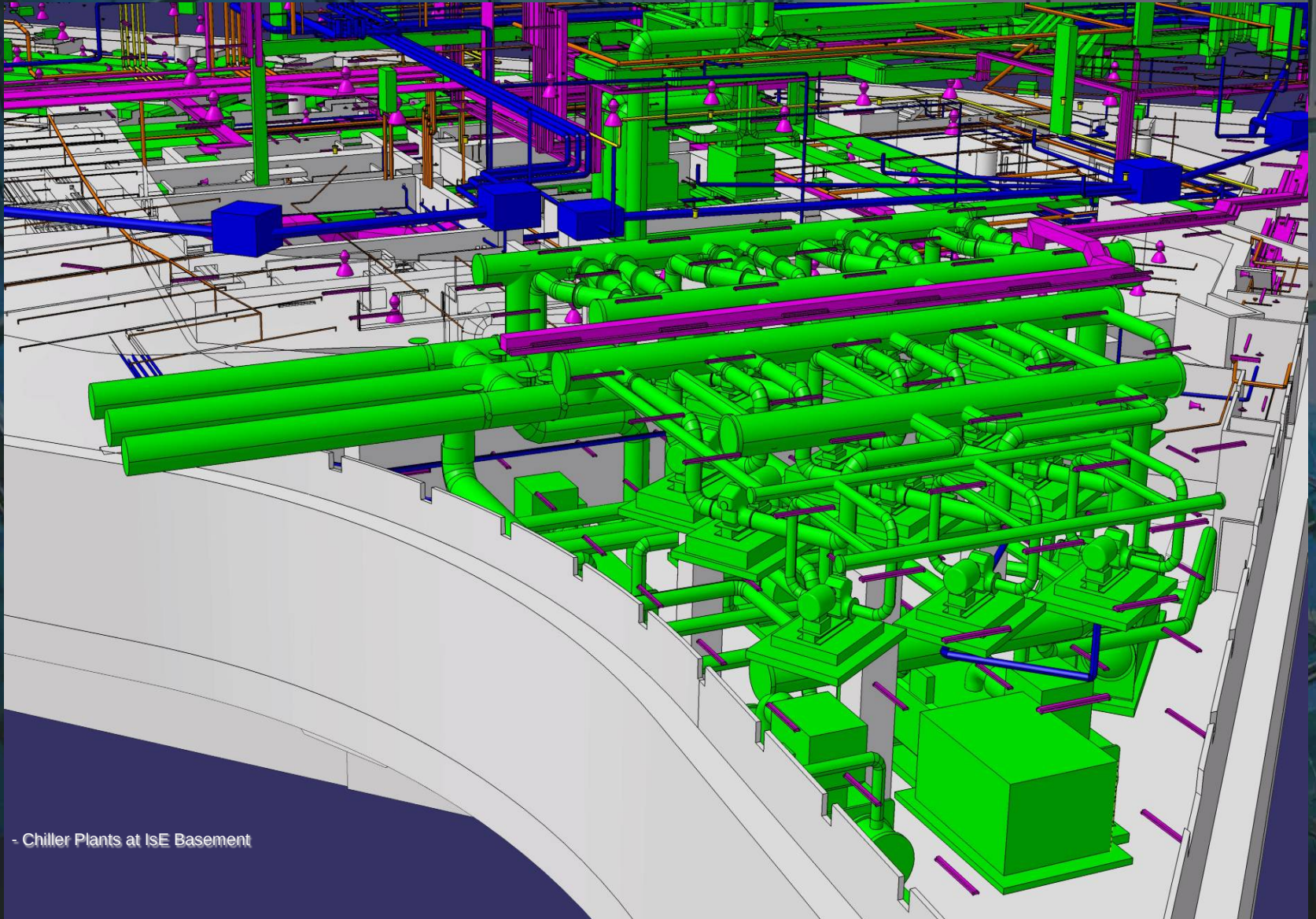


Application of BIM



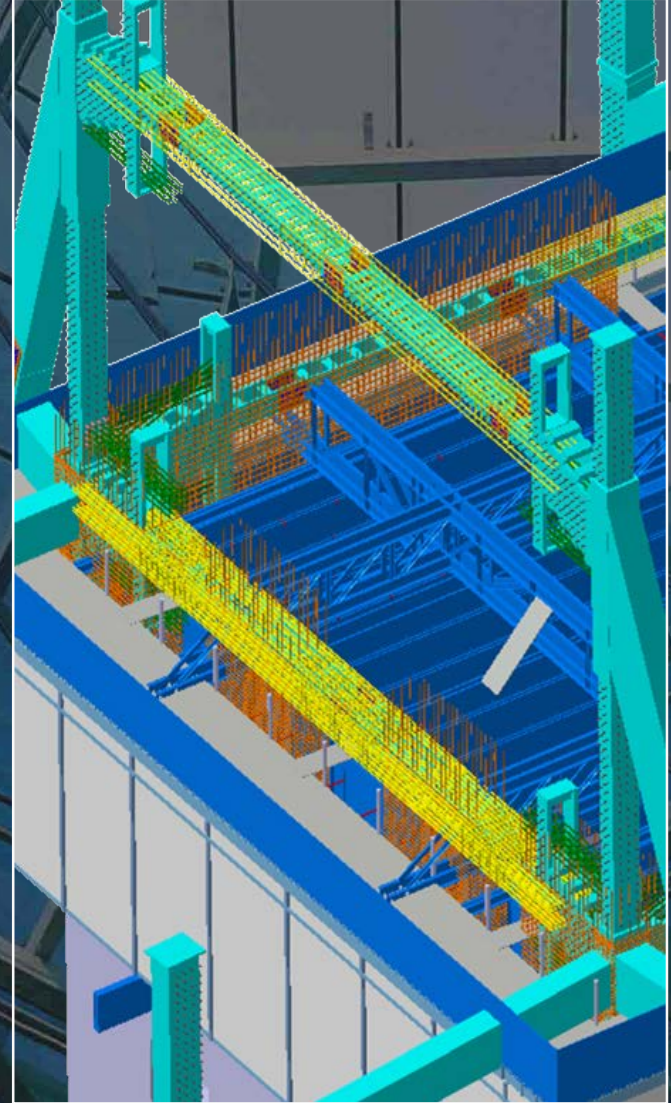
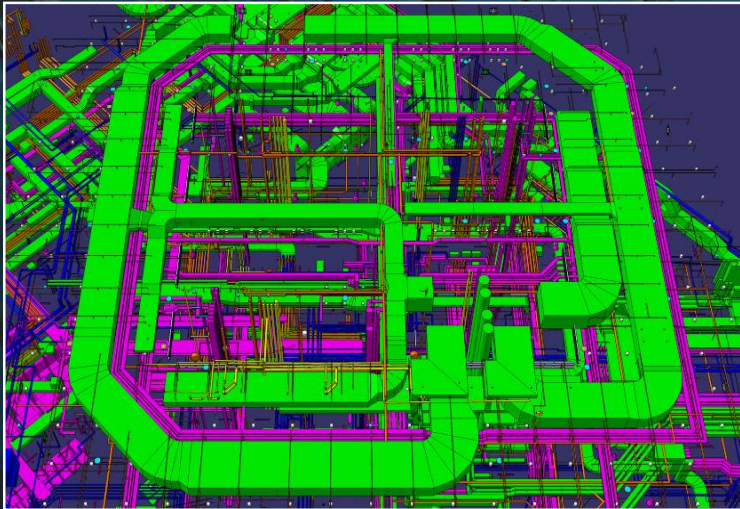
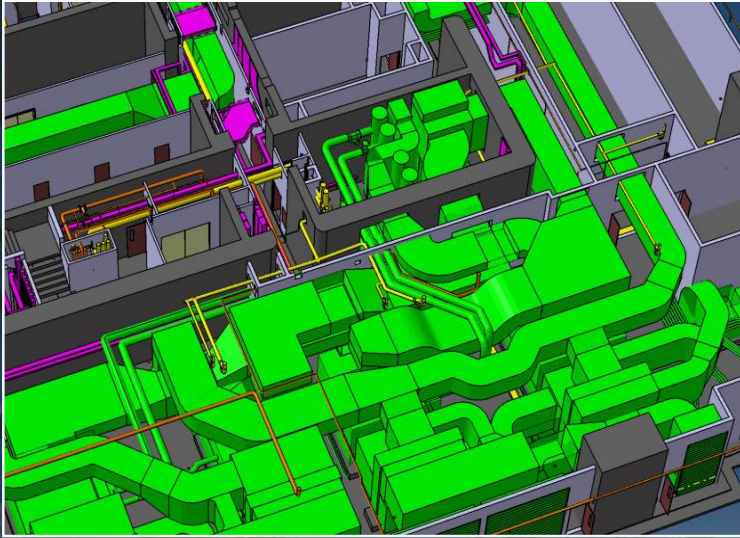
One Island East, Quarry Bay

Detail Design and Coordination



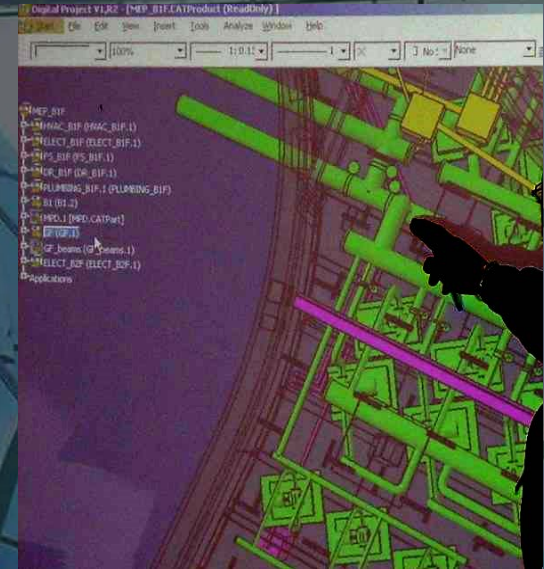
- Chiller Plants at IsE Basement

Detail Design and Coordination



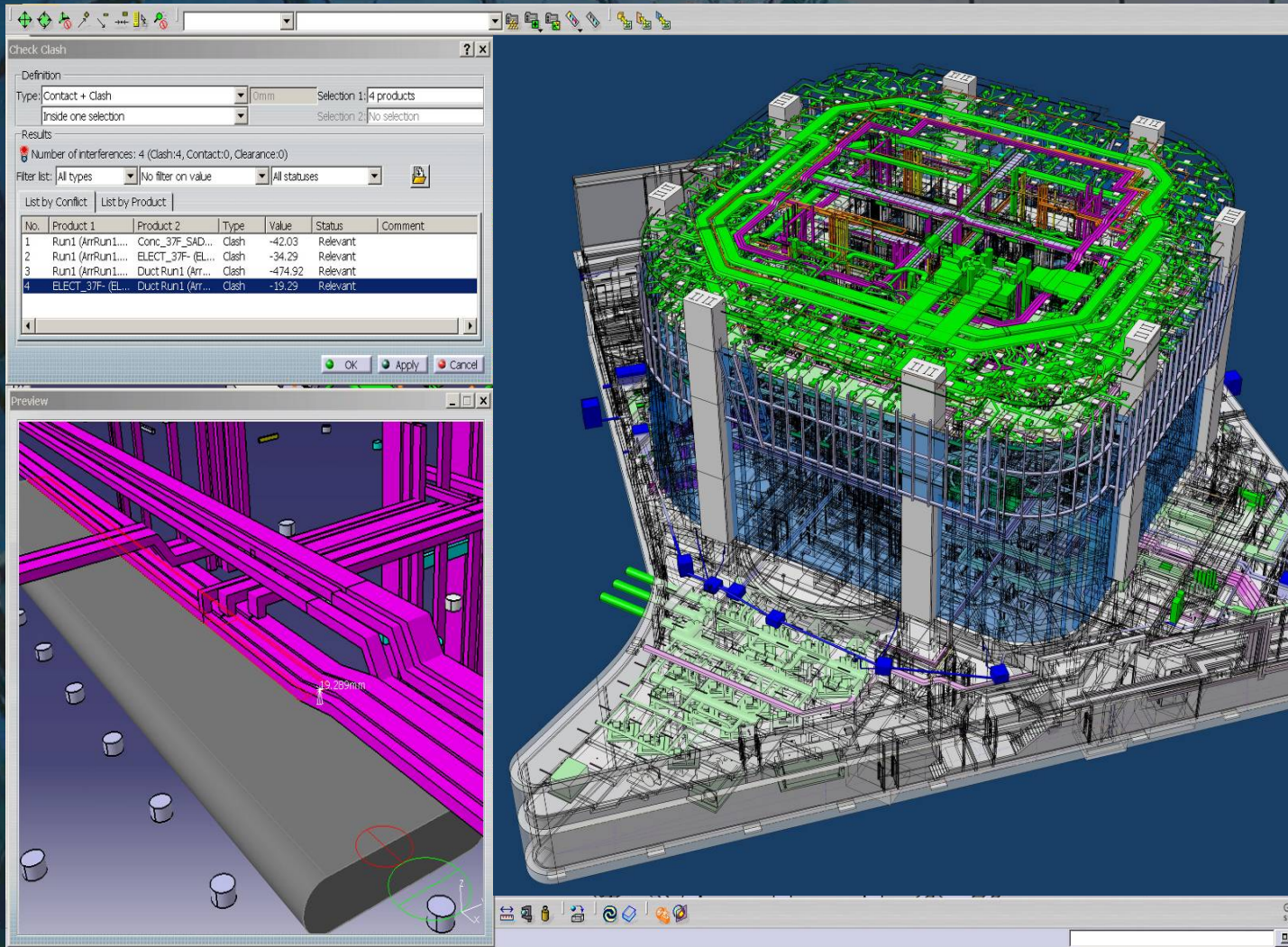
Project-wide multi-discipline design coordination

Detail Design and Coordination



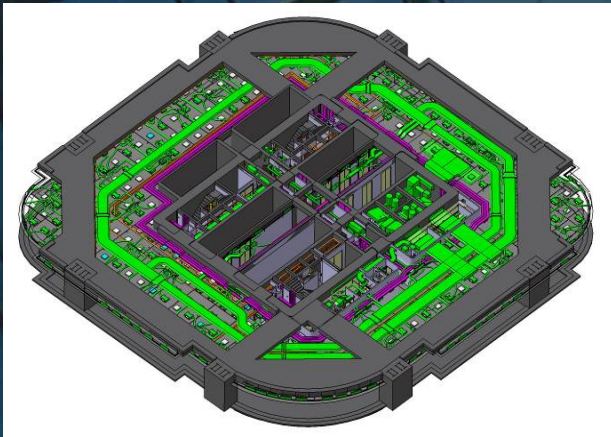
Owner, Architect, Structural, MEP, QS working in the same room on the same Contract 3D Building Information Model

Detail Design and Coordination

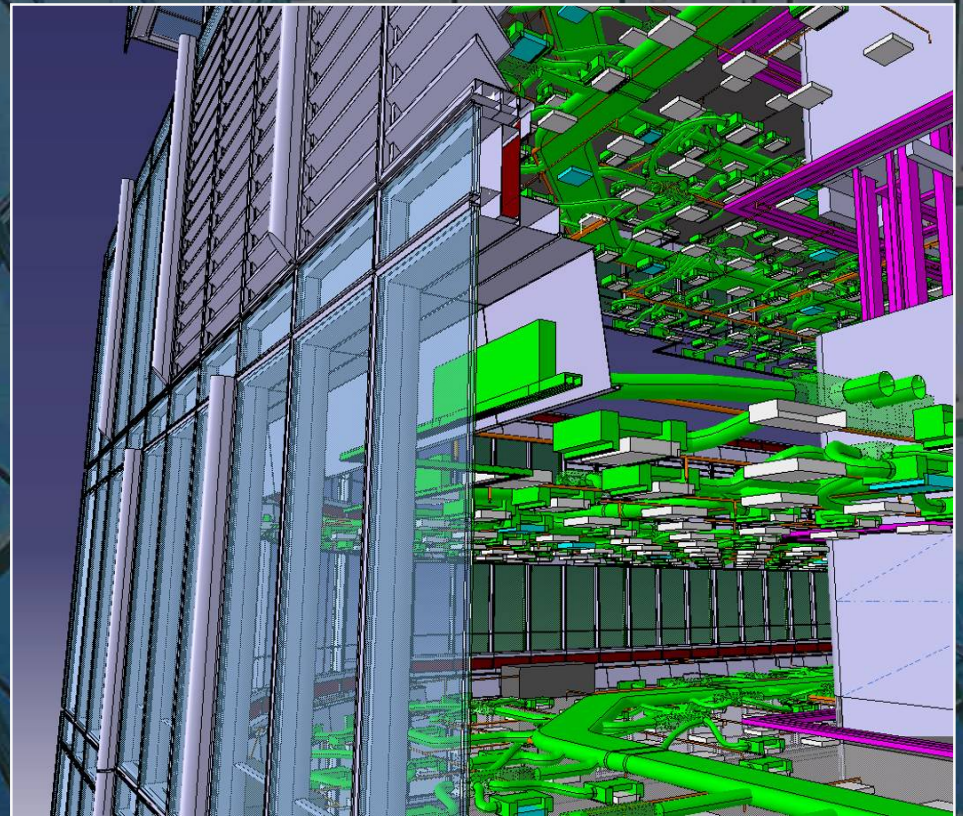
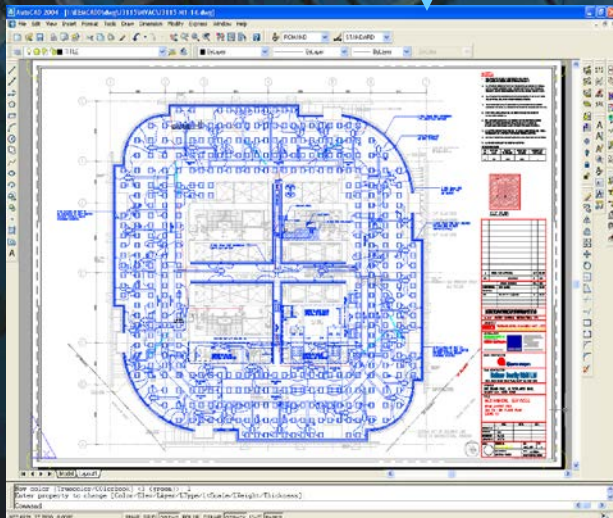


Automatic Clash Identification and Management

Work Document Coordination



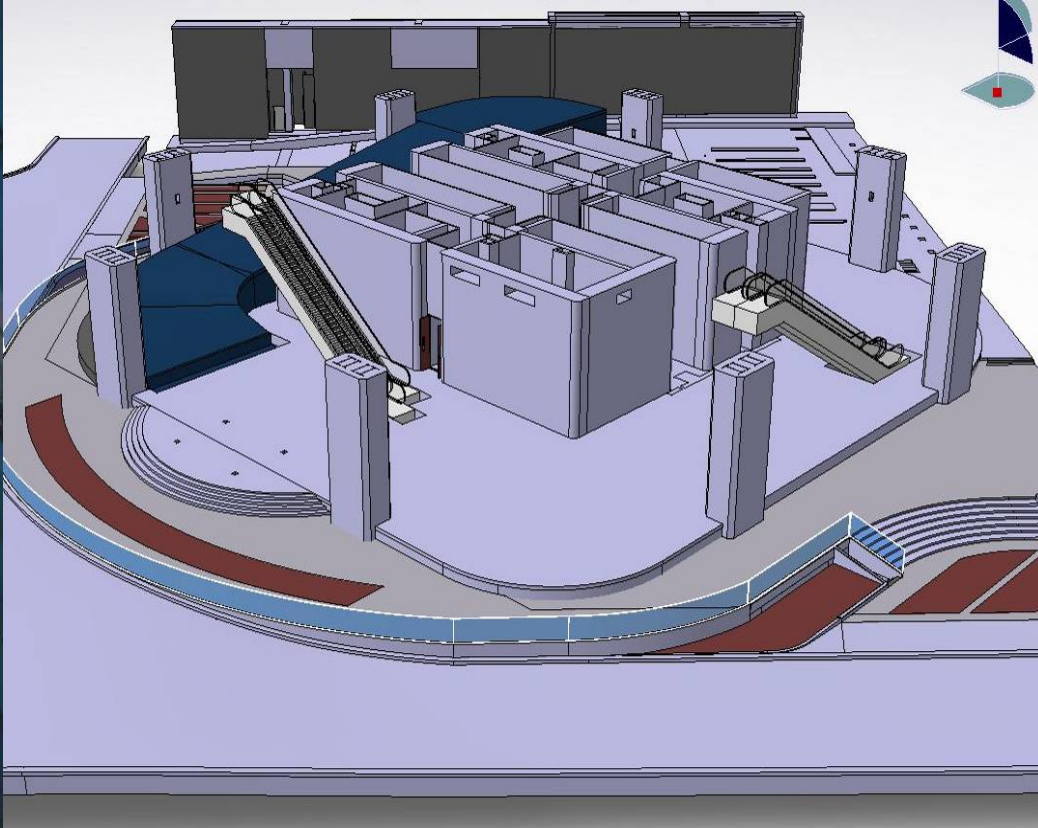
Coordinated 3D geometries



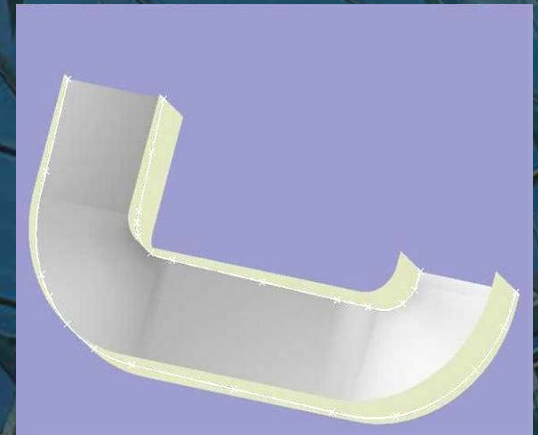
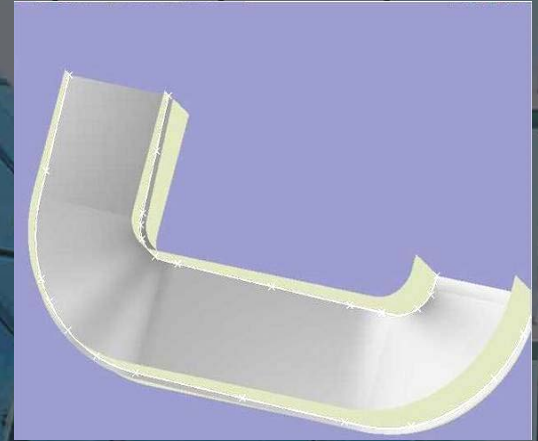
Live Sectioning

2D geometries output to ACAD for further coordination

Facilitate Design Development

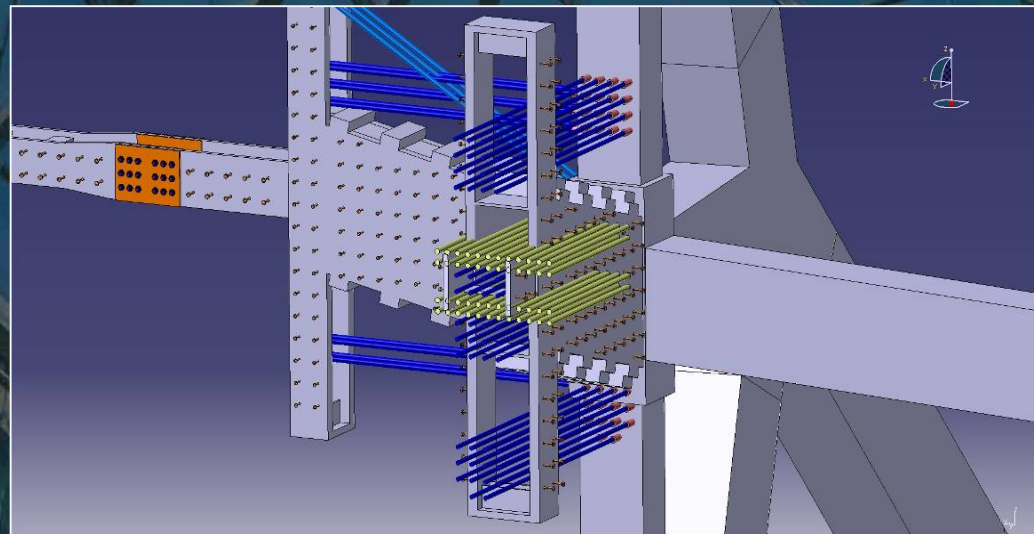
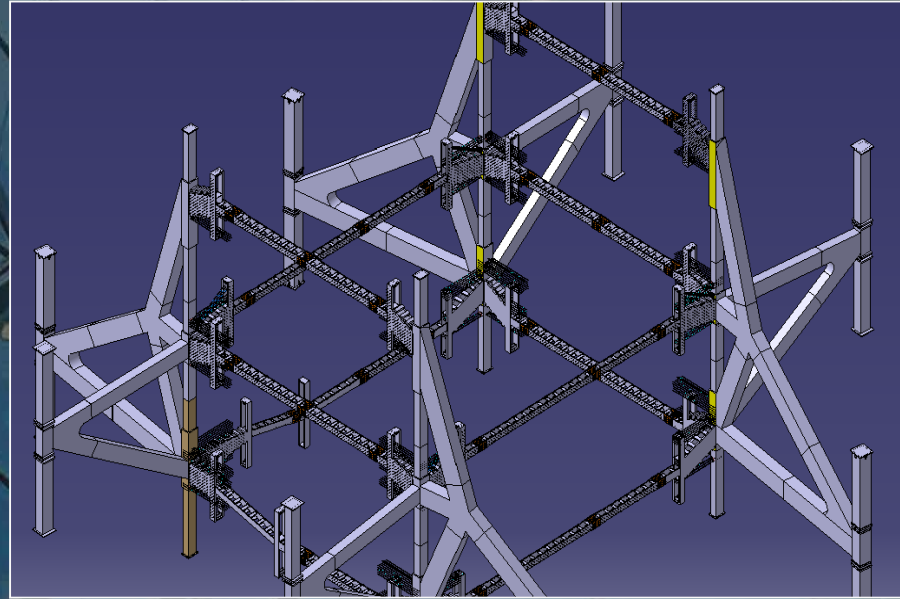


Road Curb Design Review



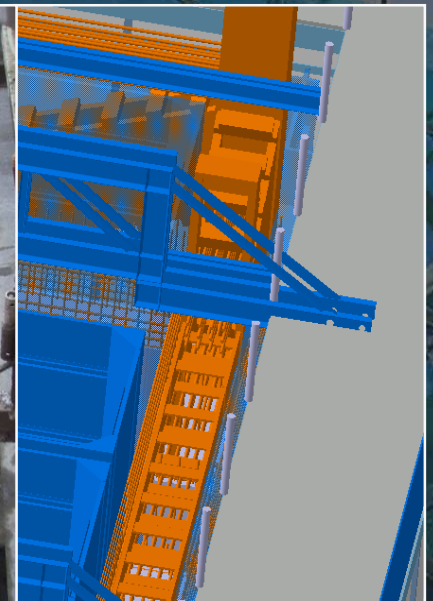
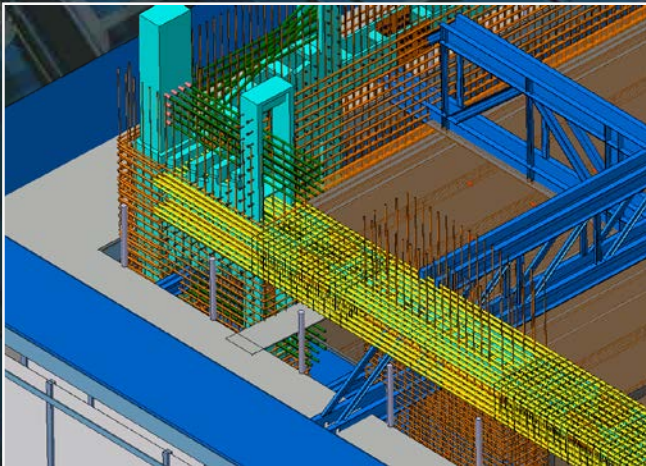
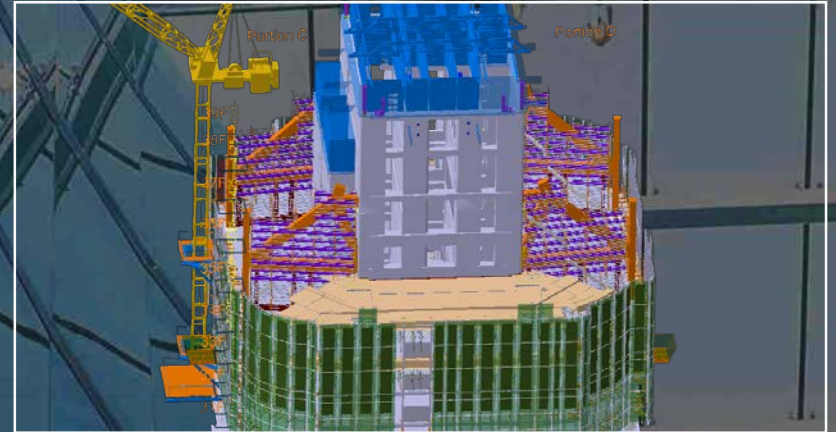
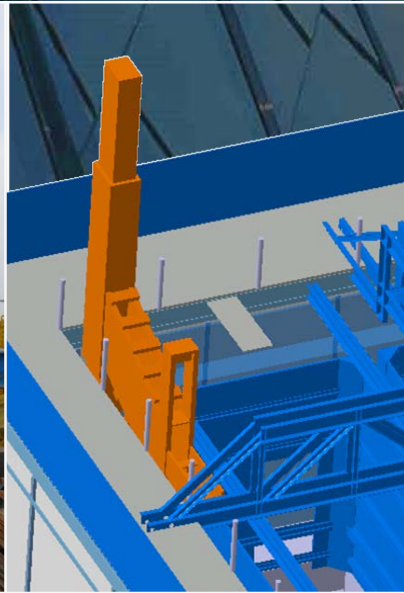
Car-ramp Design Review

Critical Structural Detail Checking



Steel Outrigger and Rebars

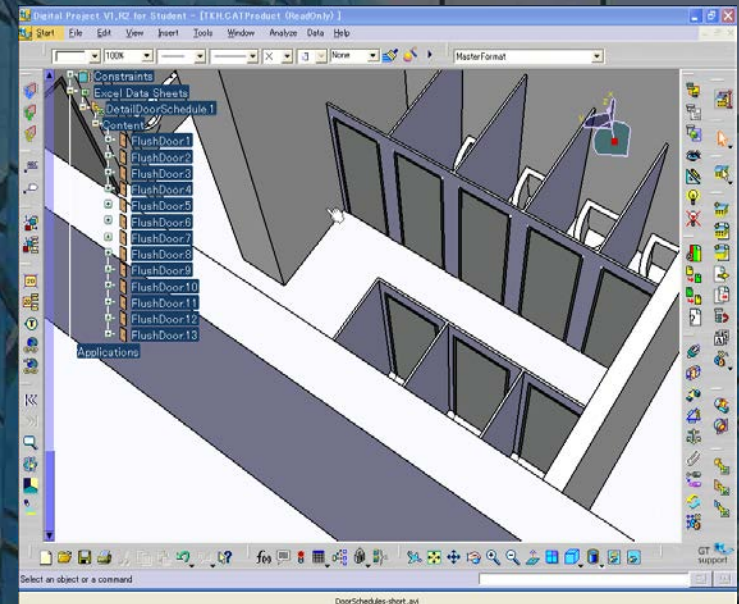
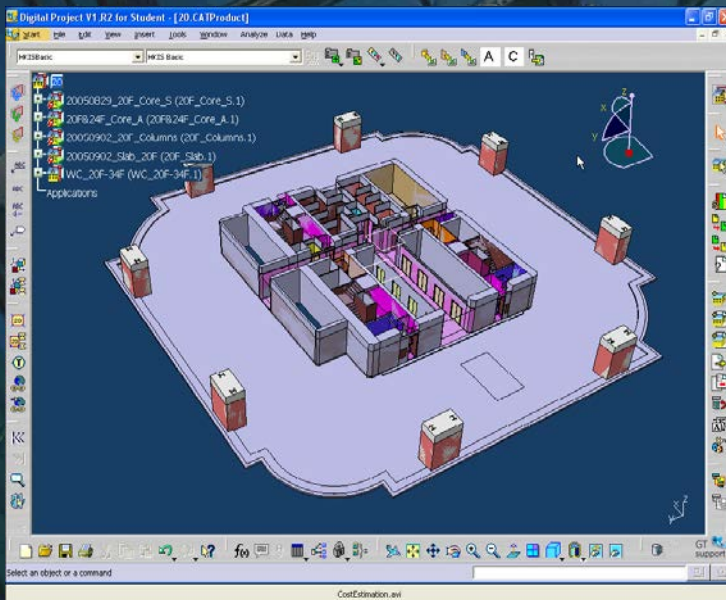
Critical Structural Detail Checking



Steel Outrigger

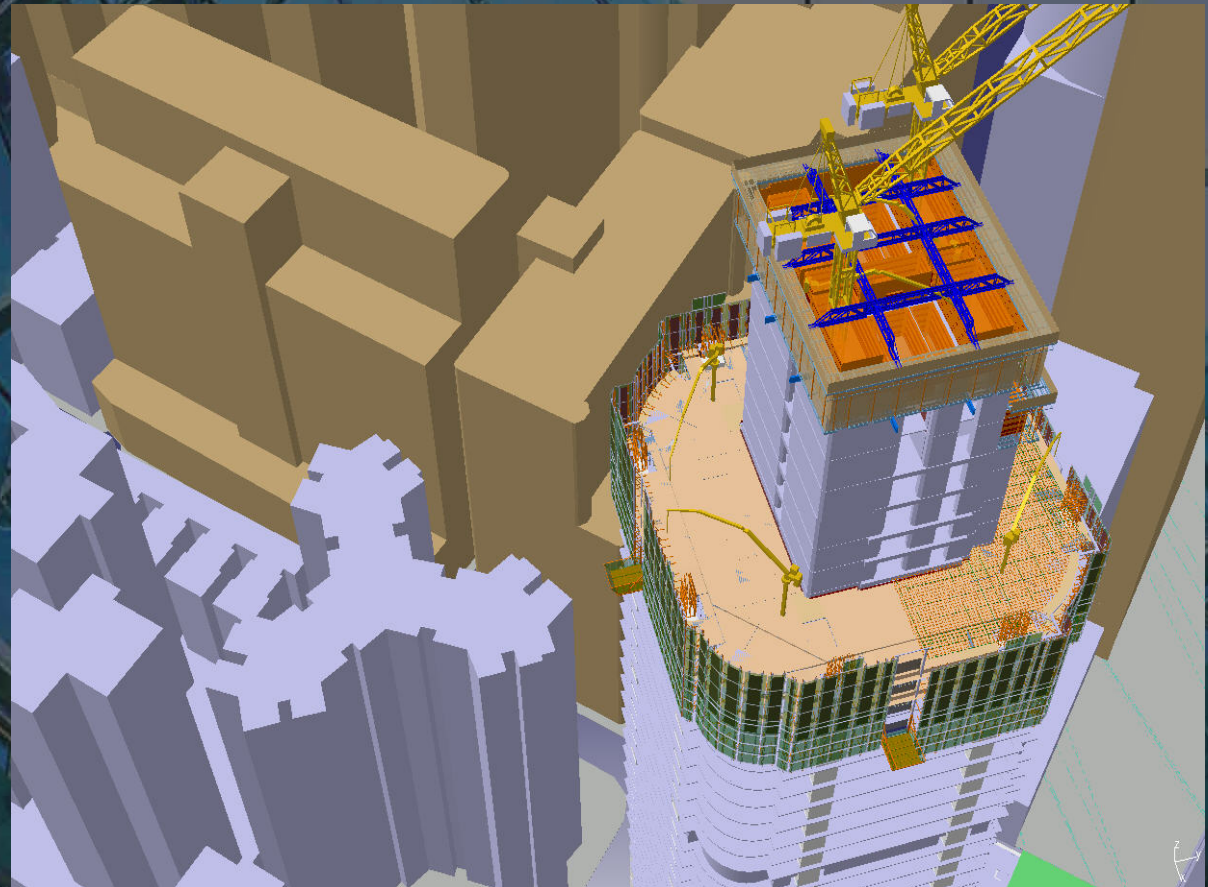
Scheduling and Data Extraction

- Quantity Extraction from BIM
- Work Scheduling utilizing BIM



Virtual Prototyping (4D Model)

- Detail study on the critical process
 - 4-day floor cycle



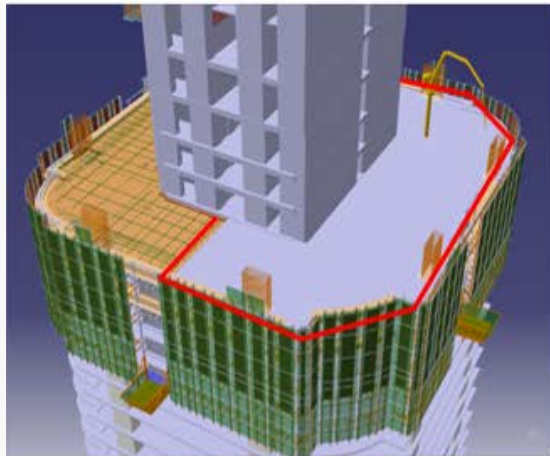
Morning



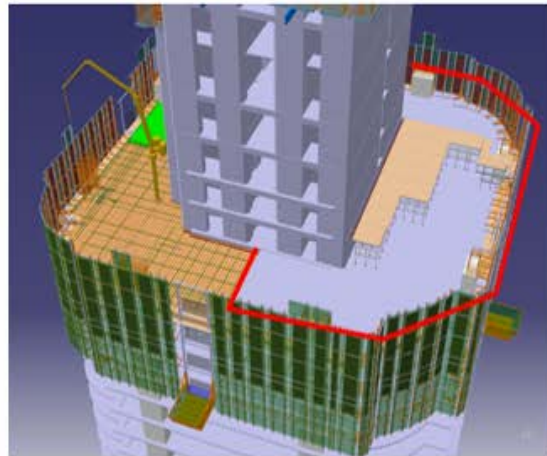
Afternoon



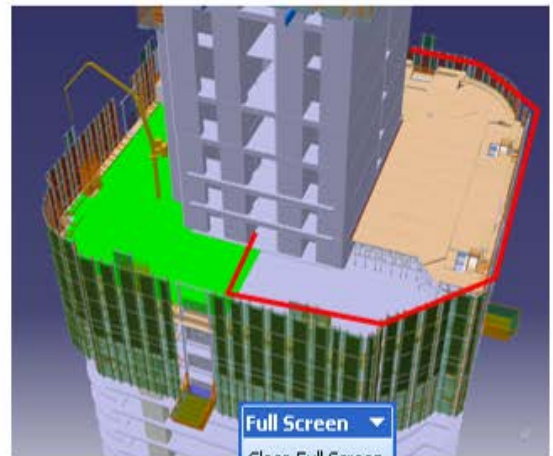
Evening



1. Set Up Table Form
2. Lift Safety Screen
3. Fixing Column Form



1. Set Up Table Form
2. Lift Safety Screen
3. Fixing Column Form

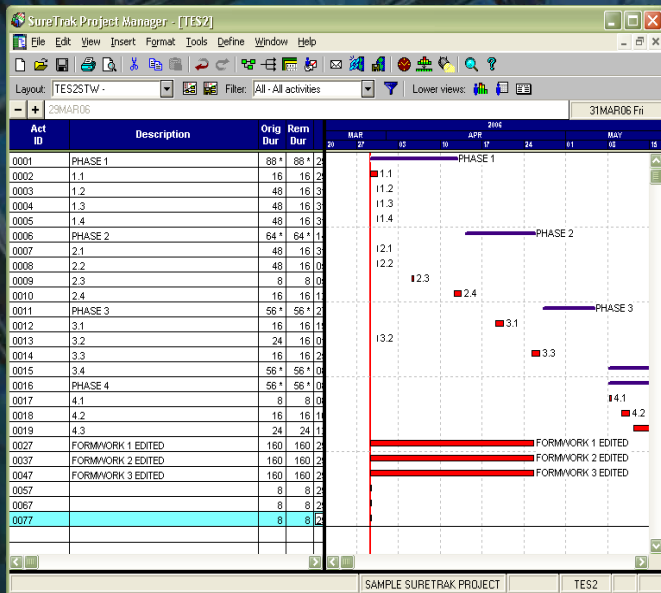


1. Set Up Table

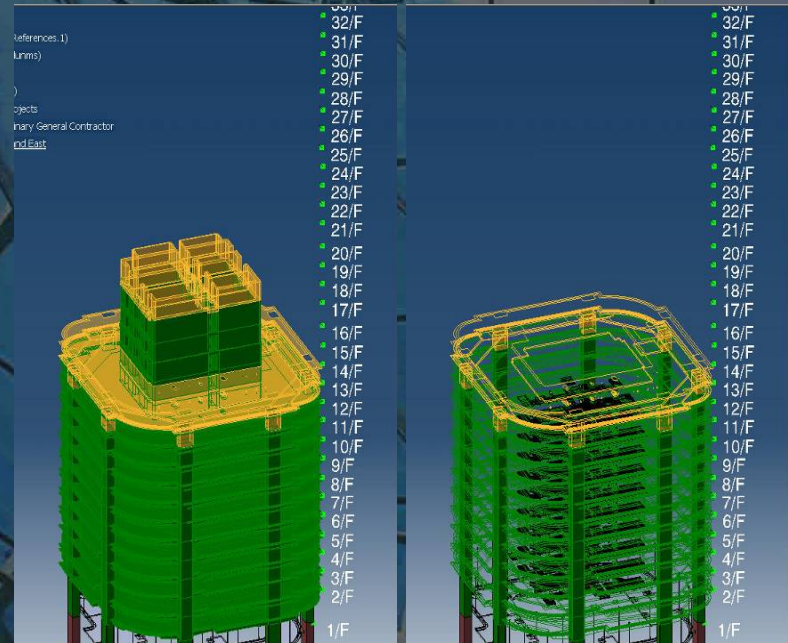
Full Screen
Close Full Screen

Visualize Master Progress with 4D Model

Data exchanging between Primavera and Digital Project



Primavera

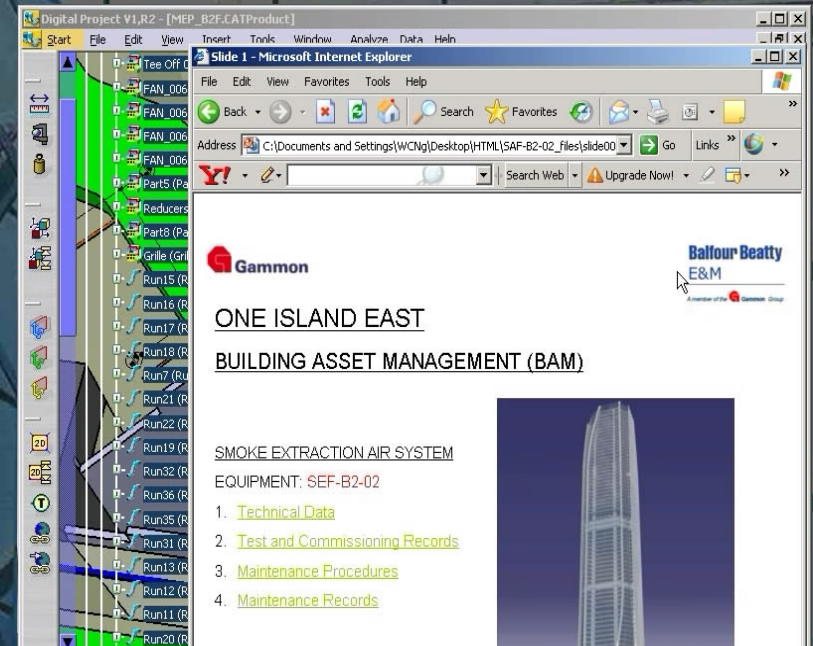


Digital Project

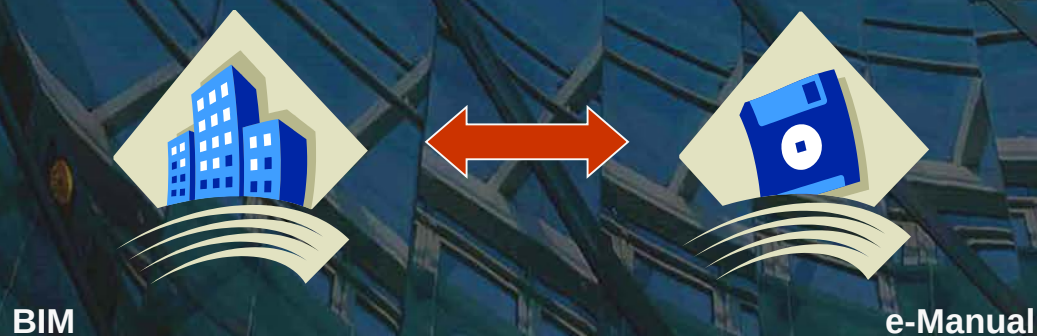
BIM for As-built Documentation & Facility Management

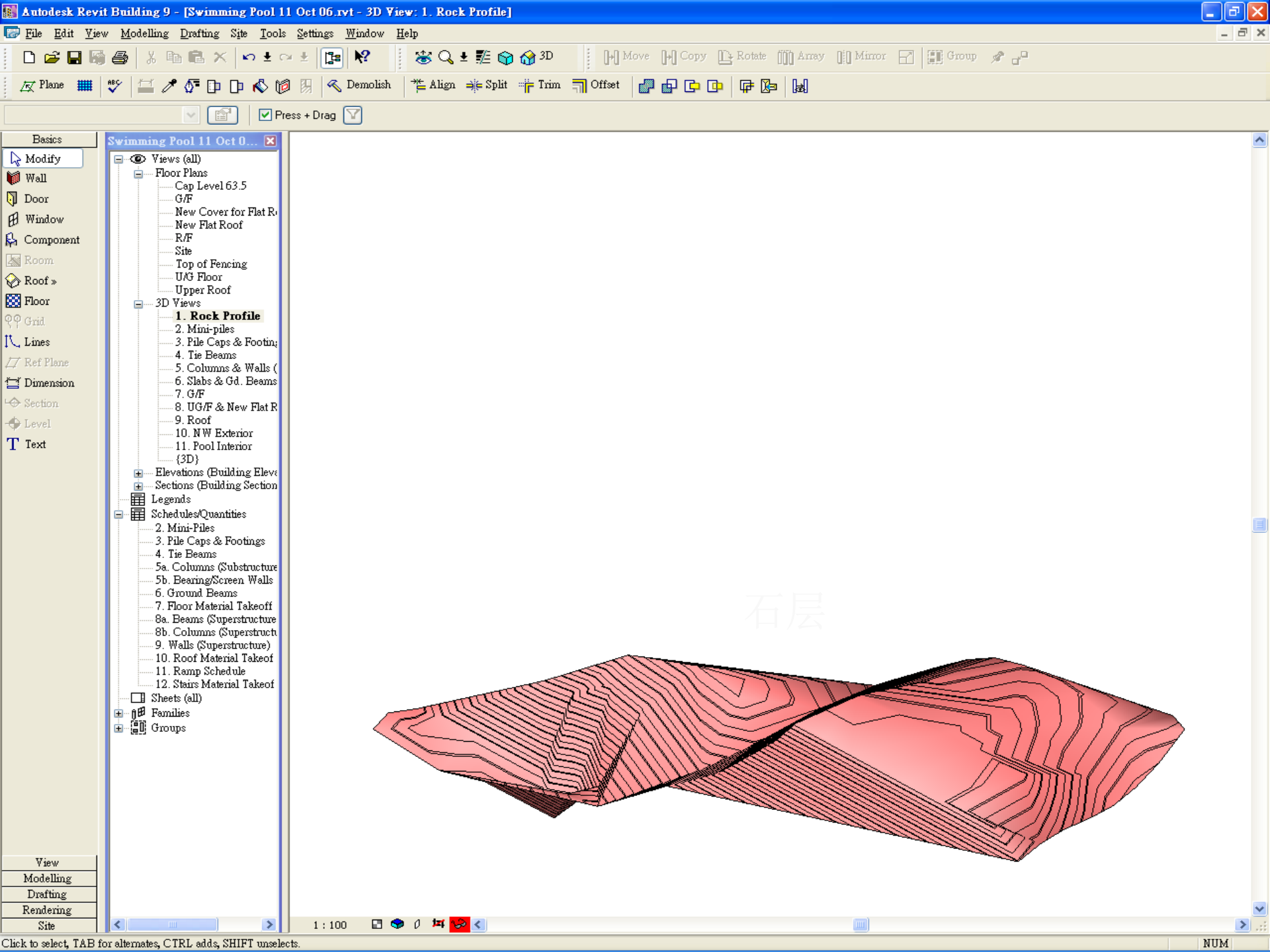


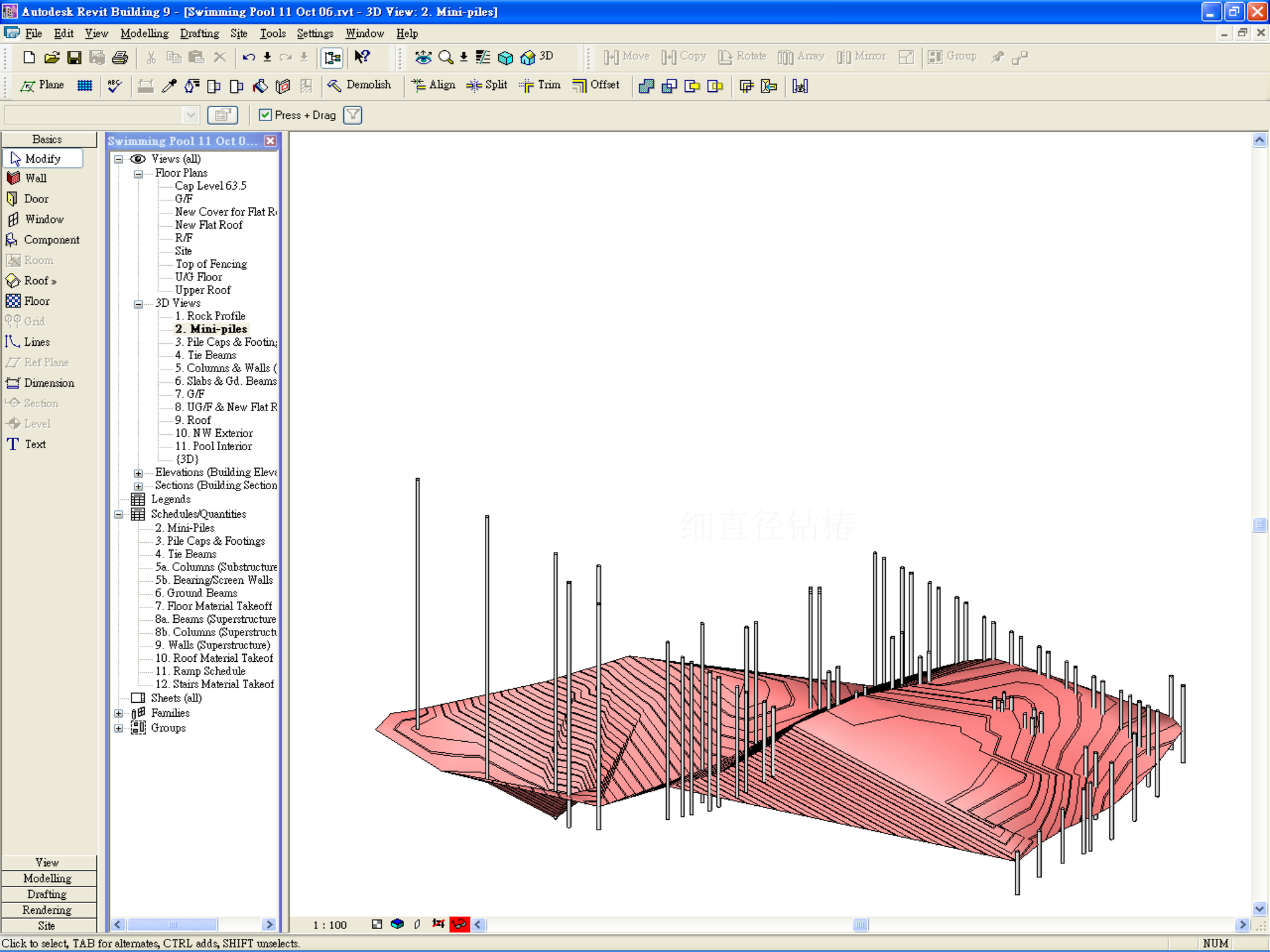
Data Linkage to BIM

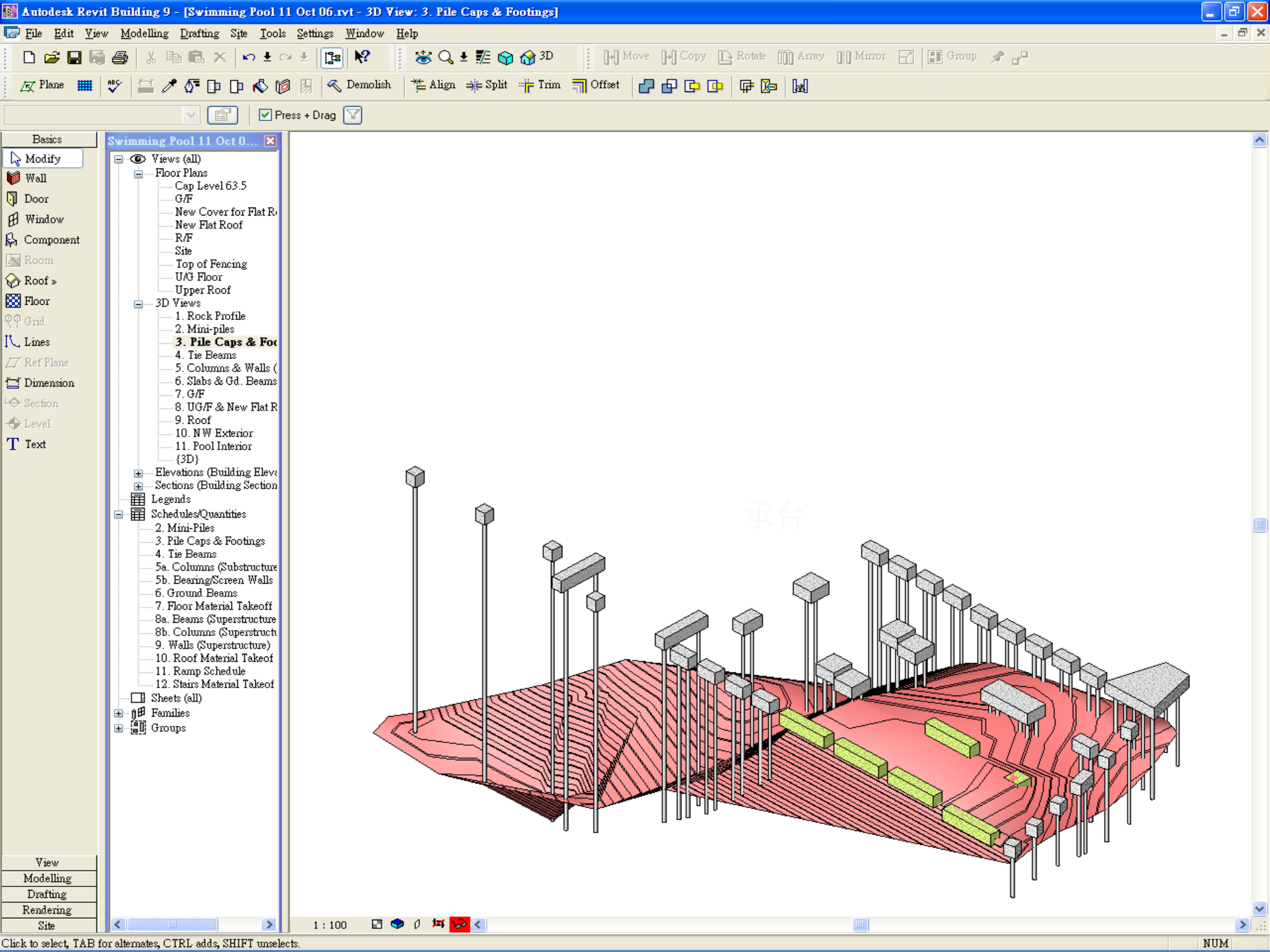
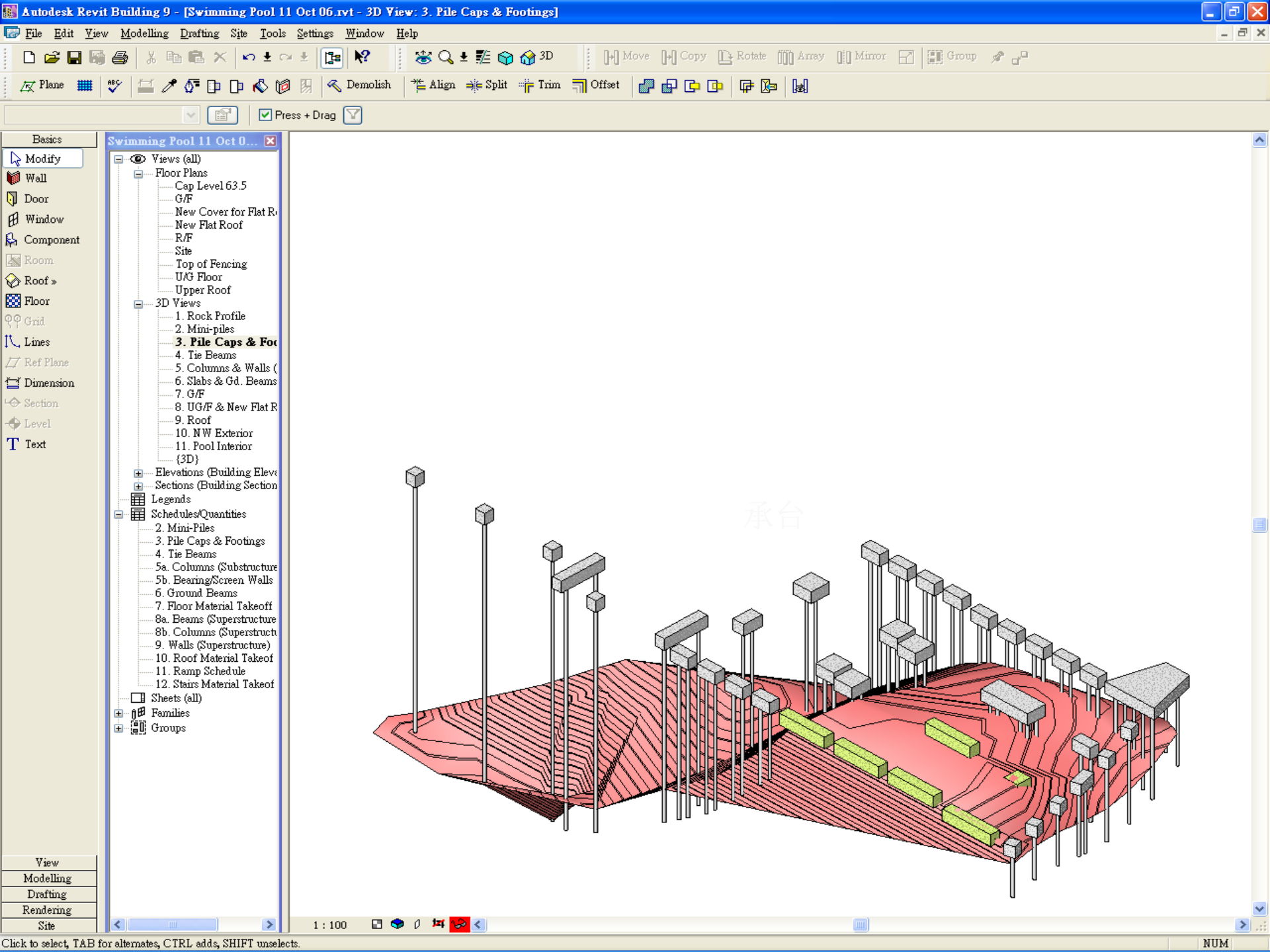


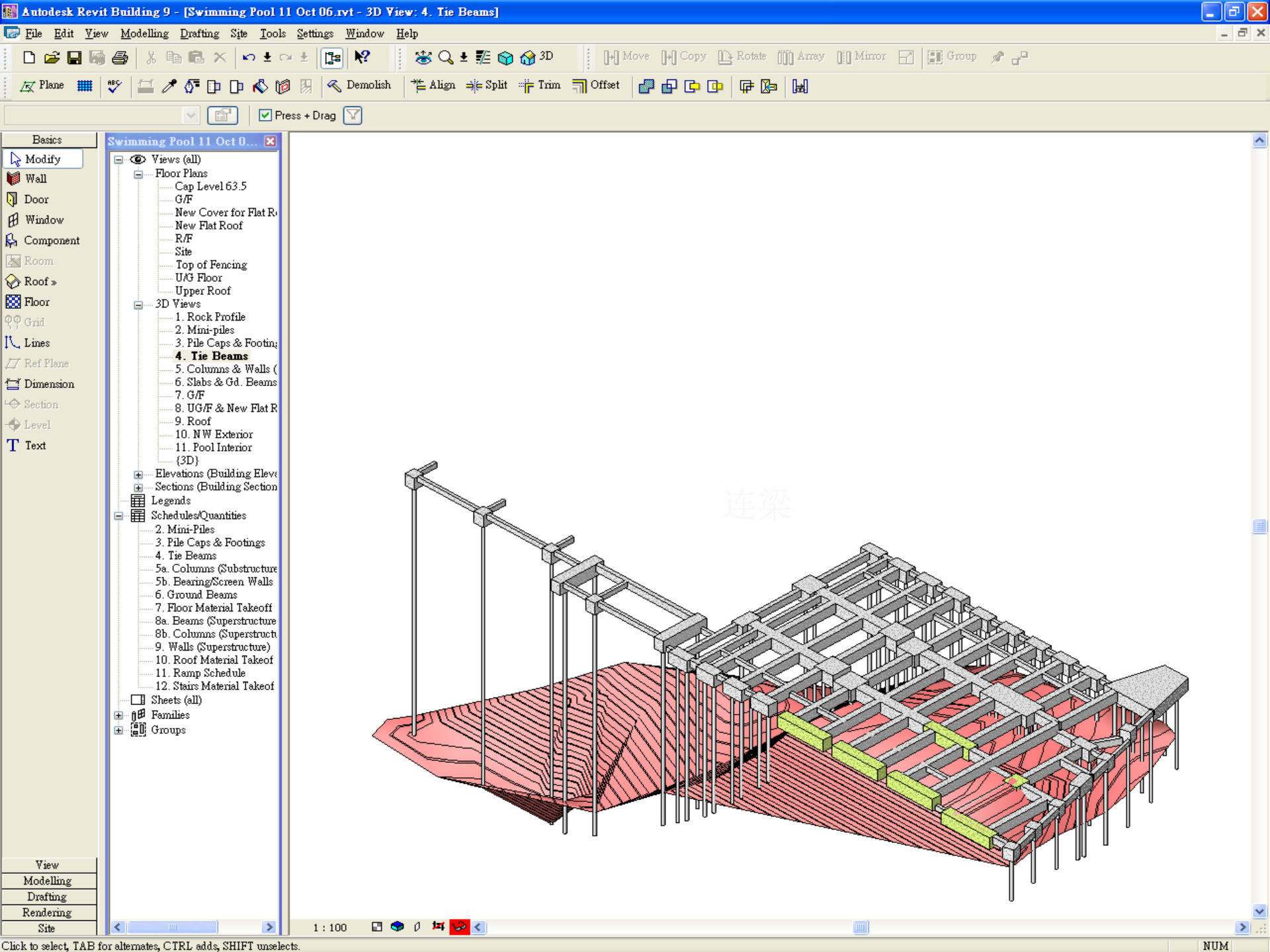
2-way Interactive Data Query

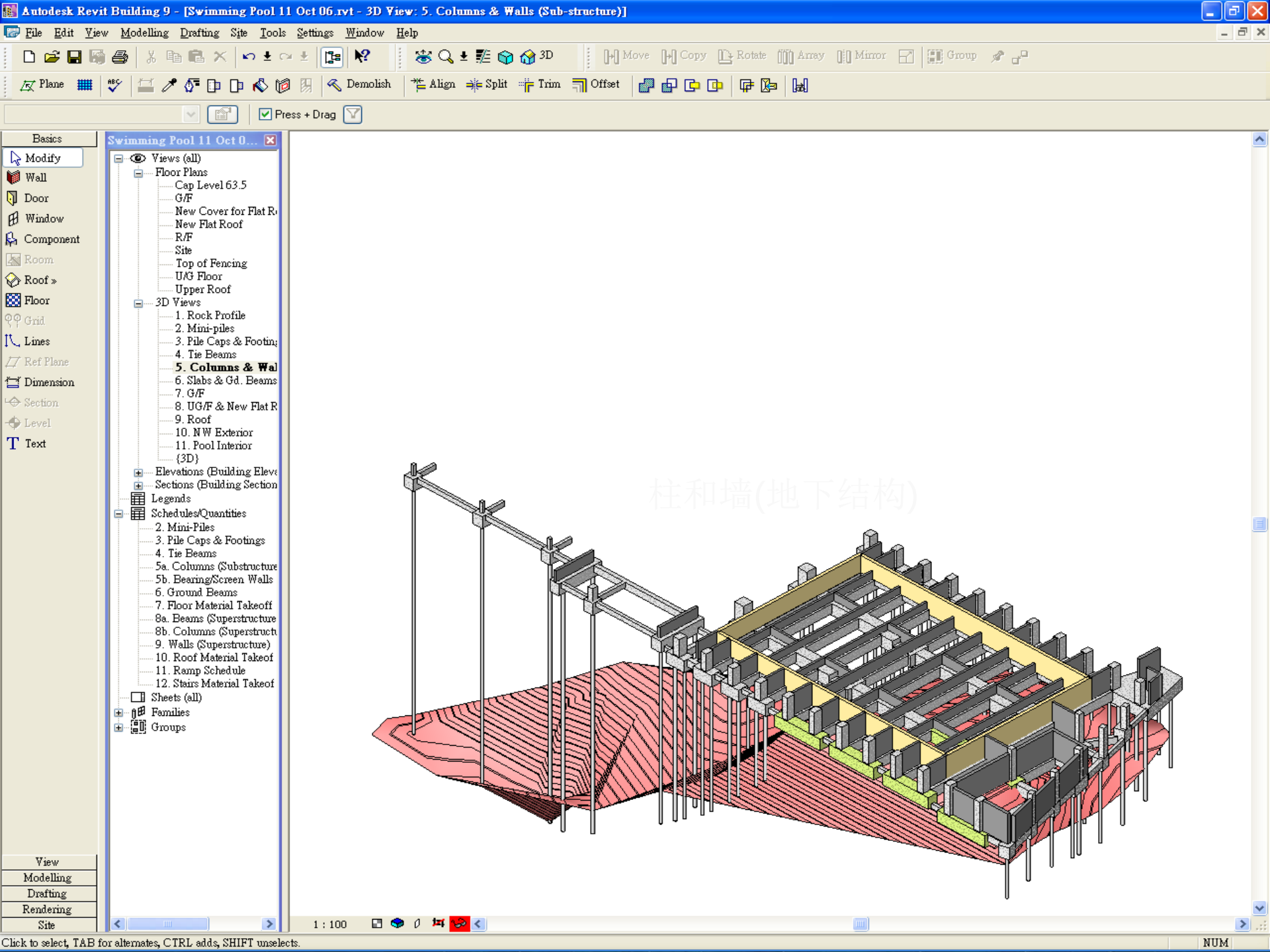
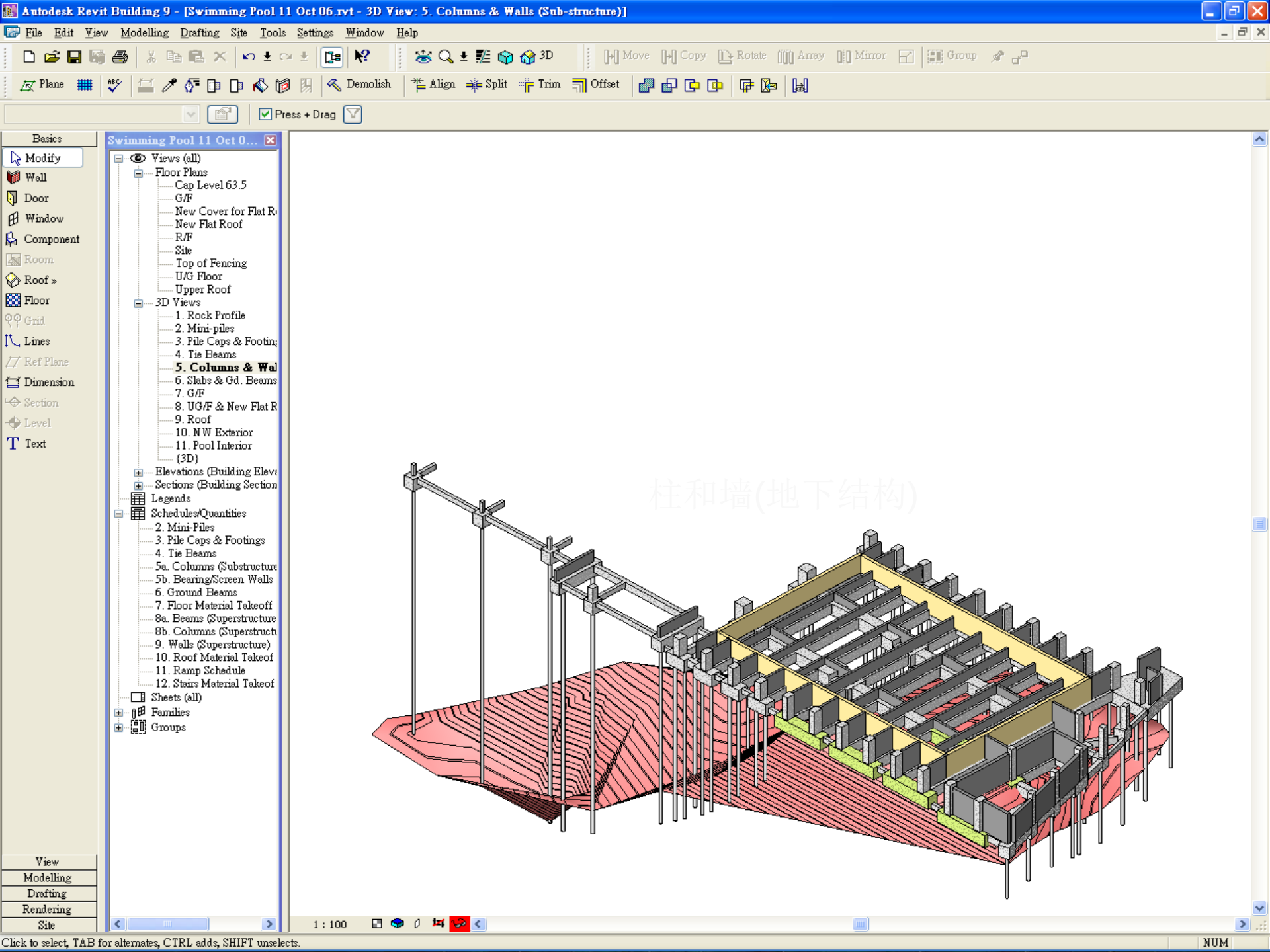


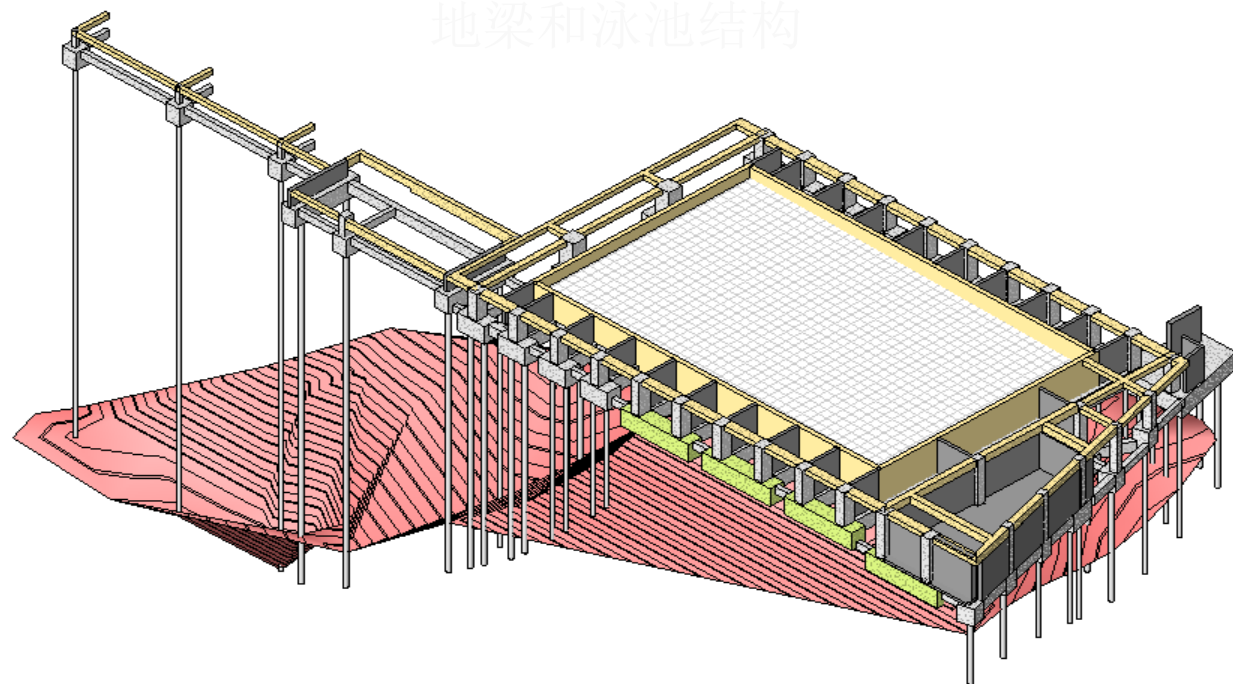
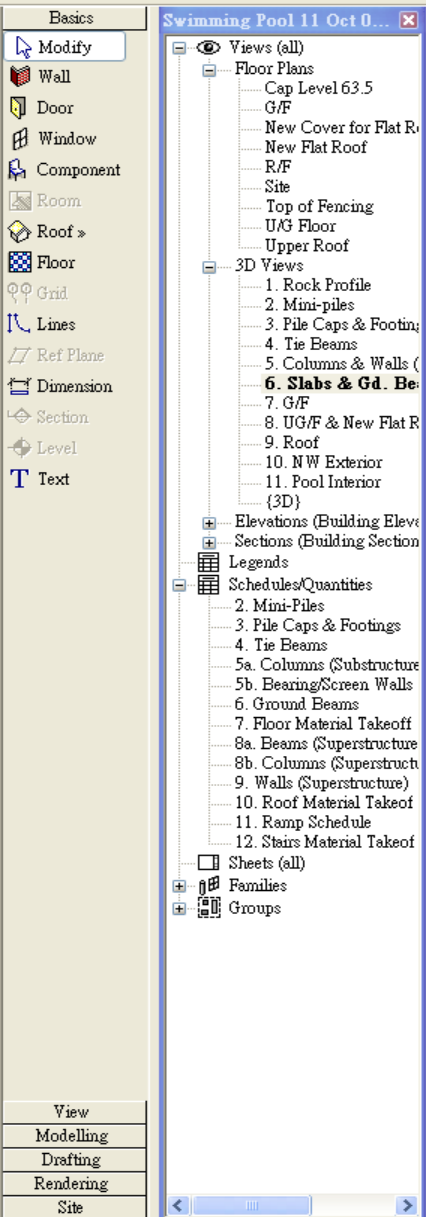
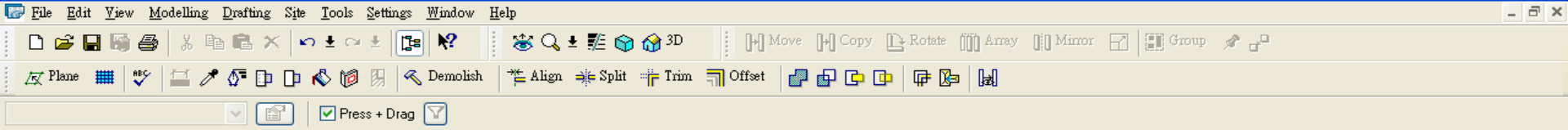














Basics

Modify

Wall

Door

Window

Component

Room

Roof >

Floor

Grid

Lines

Ref Plane

Dimension

Section

Level

Text

Swimming Pool 11 Oct 06.rvt - 3D View: 7. G/F

Views (all)

Floor Plans

- Cap Level 63.5
- G/F
- New Cover for Flat R
- New Flat Roof
- R/F
- Site
- Top of Fencing
- UG Floor
- Upper Roof

3D Views

- 1. Rock Profile
- 2. Mini-piles
- 3. Pile Caps & Footings
- 4. Tie Beams
- 5. Columns & Walls (
- 6. Slabs & Gd. Beams
- 7. G/F**
- 8. UG/F & New Flat R
- 9. Roof
- 10. NW Exterior
- 11. Pool Interior (3D)

Elevations (Building Elev

Sections (Building Section

Legends

Schedules/Quantities

- 2. Mini-Piles
- 3. Pile Caps & Footings
- 4. Tie Beams
- 5a. Columns (Substructure
- 5b. Bearing/Screen Walls
- 6. Ground Beams
- 7. Floor Material Takeoff
- 8a. Beams (Superstructure
- 8b. Columns (Superstruct
- 9. Walls (Superstructure)
- 10. Roof Material Takeof
- 11. Ramp Schedule
- 12. Stairs Material Takeof

Sheets (all)

Families

Groups

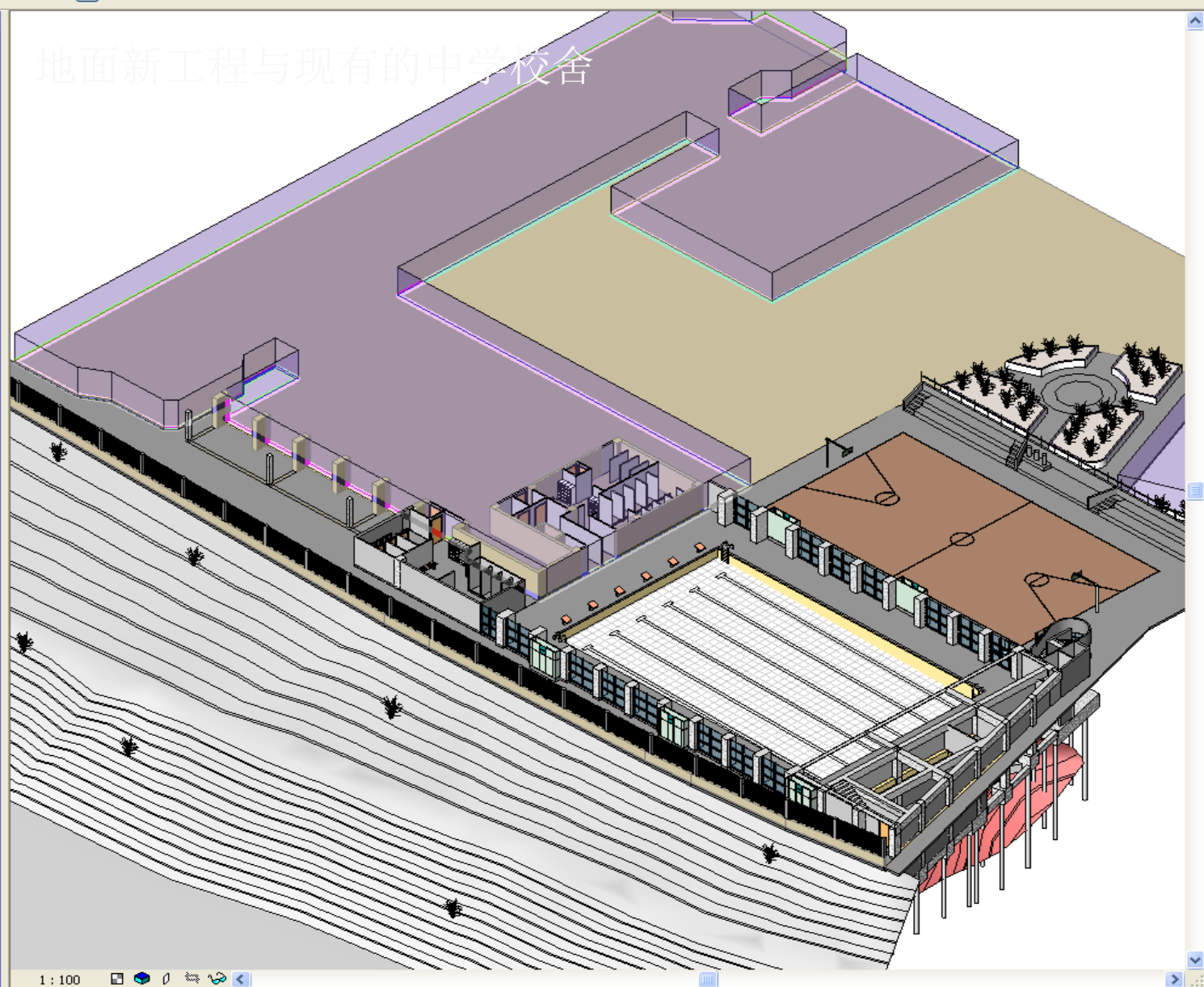
View

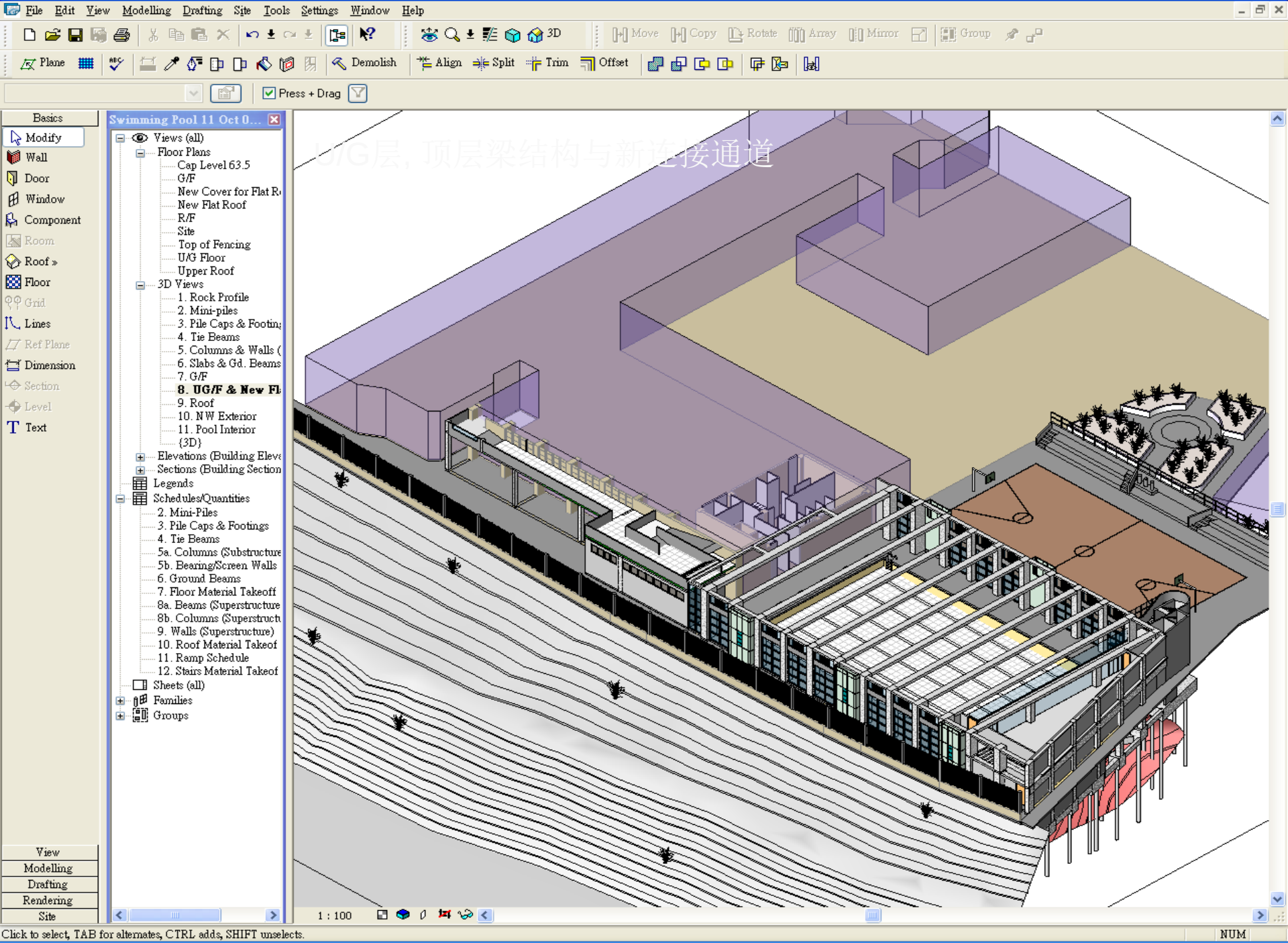
Modelling

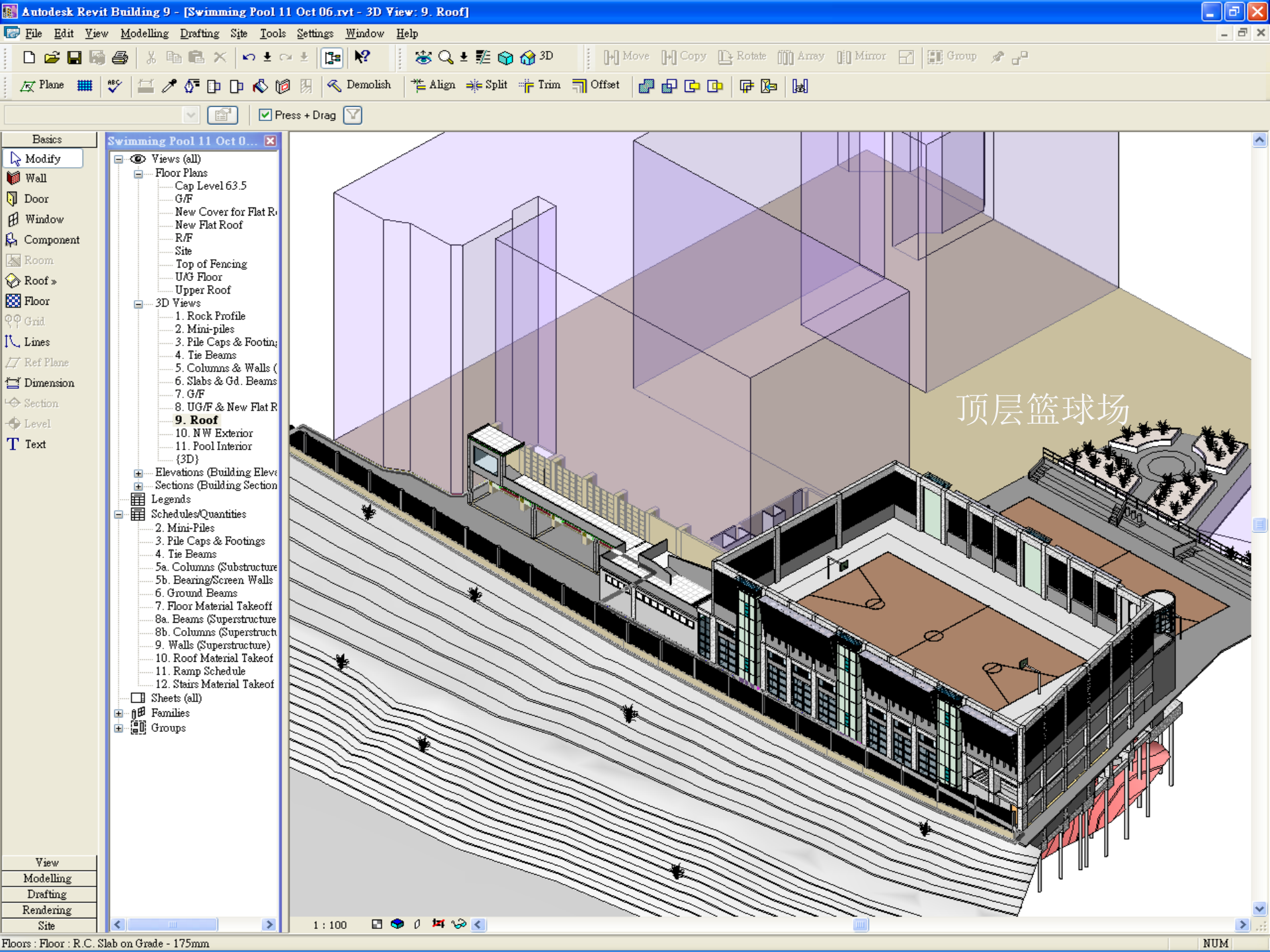
Drafting

Rendering

Site







Swimming Pool 11 Oct 06.rvt - 3D View: 10. NW Exterior

Views (all)

- Floor Plans
 - Cap Level 63.5
 - G/F
 - New Cover for Flat R
 - New Flat Roof
 - R/F
 - Site
 - Top of Fencing
 - UG Floor
 - Upper Roof
- 3D Views
 - 1. Rock Profile
 - 2. Mini-piles
 - 3. Pile Caps & Footings
 - 4. Tie Beams
 - 5. Columns & Walls (
 - 6. Slabs & Gd. Beams
 - 7. G/F
 - 8. UG/F & New Flat R
 - 9. Roof
 - 10. NW Exterior**
 - 11. Pool Interior (3D)
- Elevations (Building Elevations)
- Sections (Building Sections)
- Legends
- Schedules/Quantities
 - 2. Mini-Piles
 - 3. Pile Caps & Footings
 - 4. Tie Beams
 - 5a. Columns (Substructure)
 - 5b. Bearing/Screen Walls
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 - 9. Walls (Superstructure)
 - 10. Roof Material Takeoff
 - 11. Ramp Schedule
 - 12. Stairs Material Takeoff
- Sheets (all)
- Families
- Groups

View

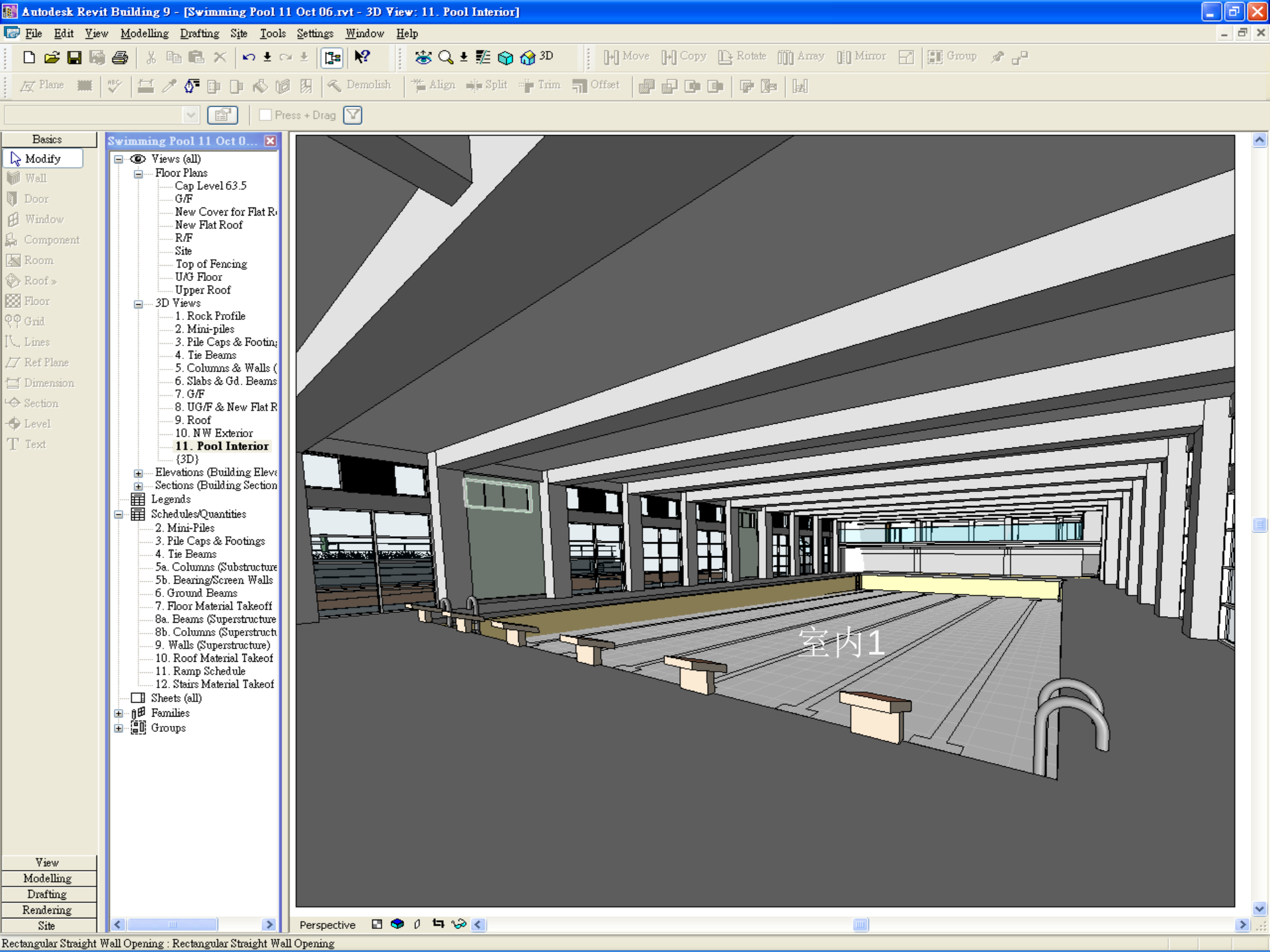
Modelling

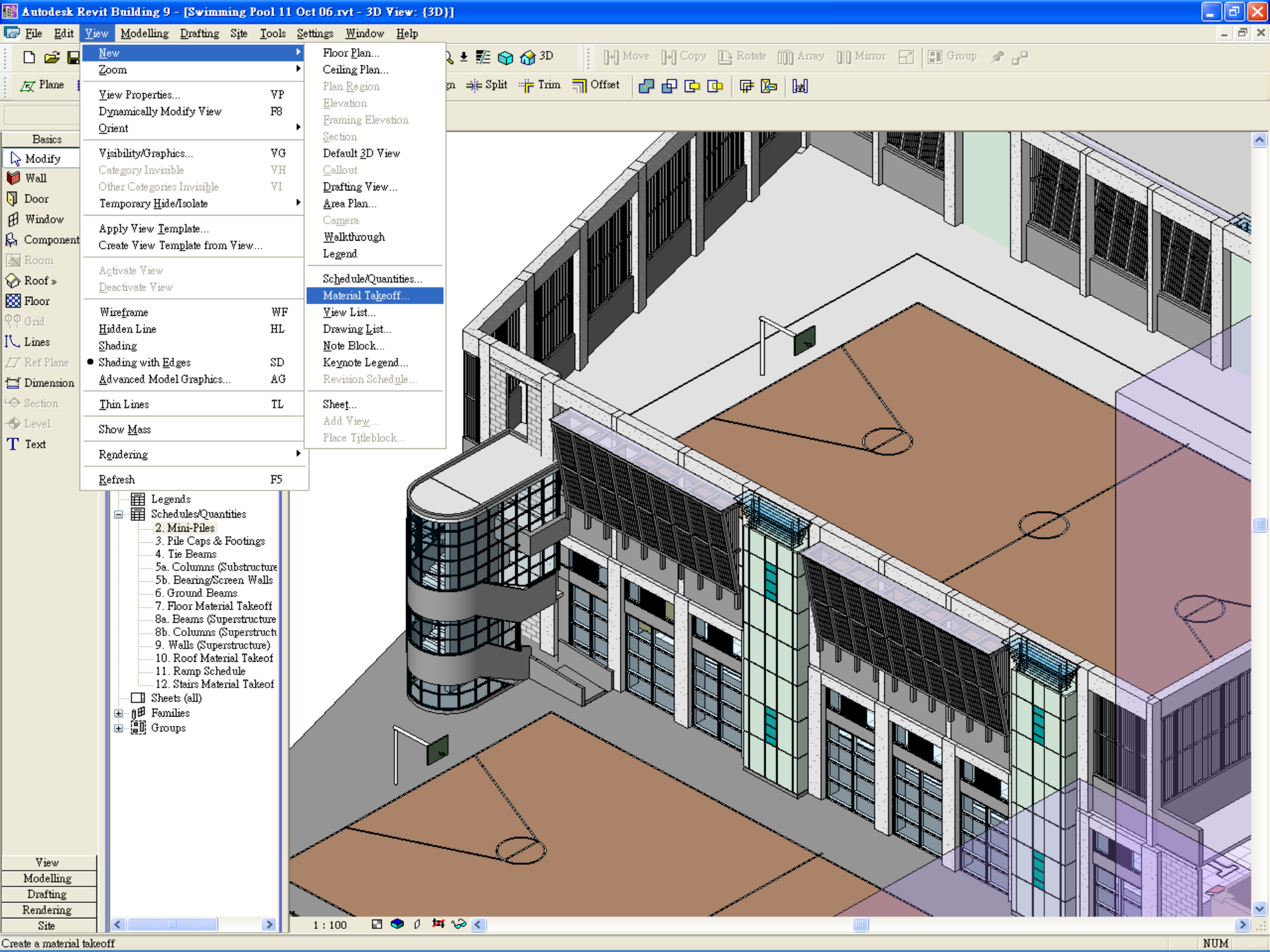
Drafting

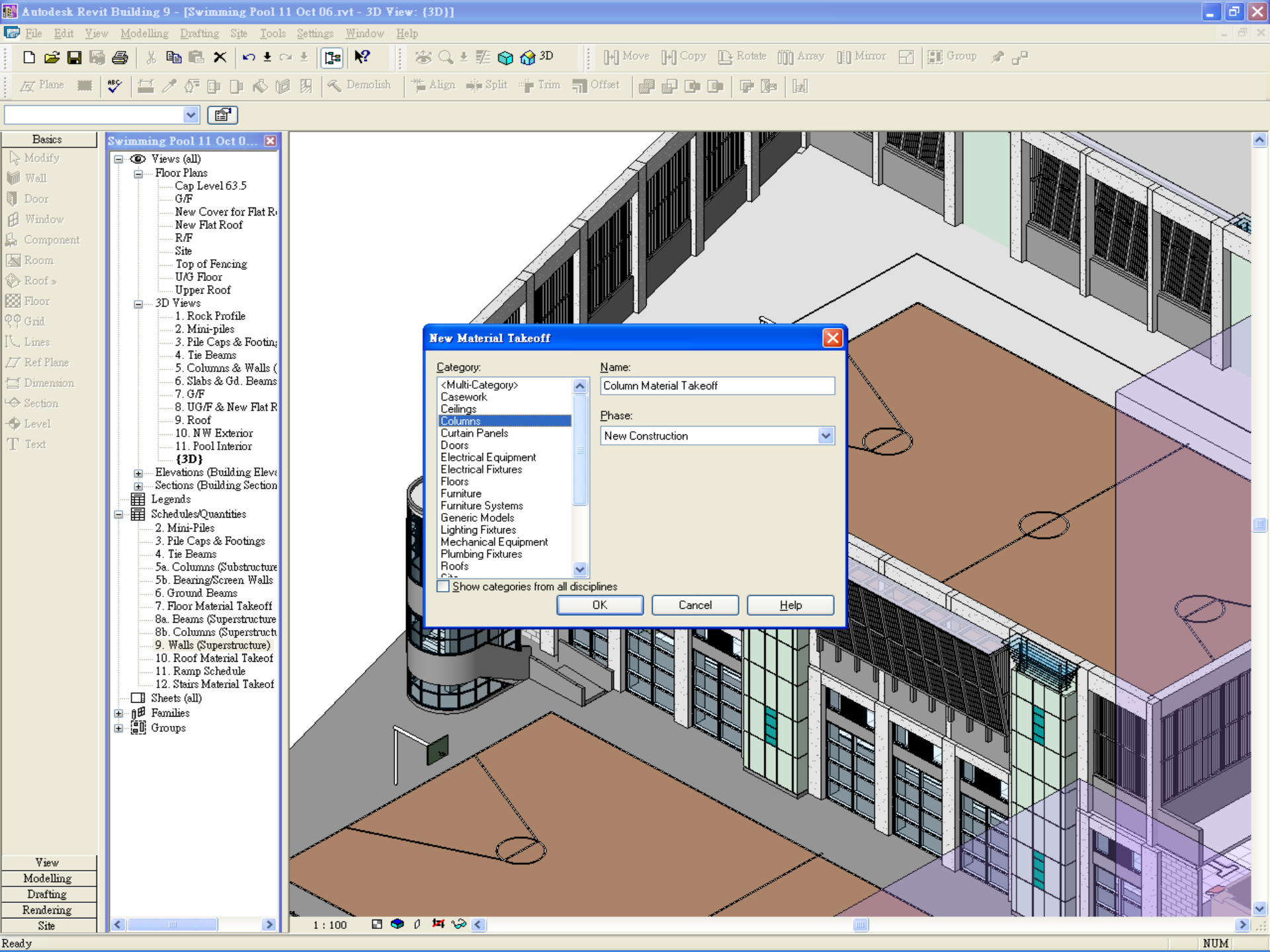
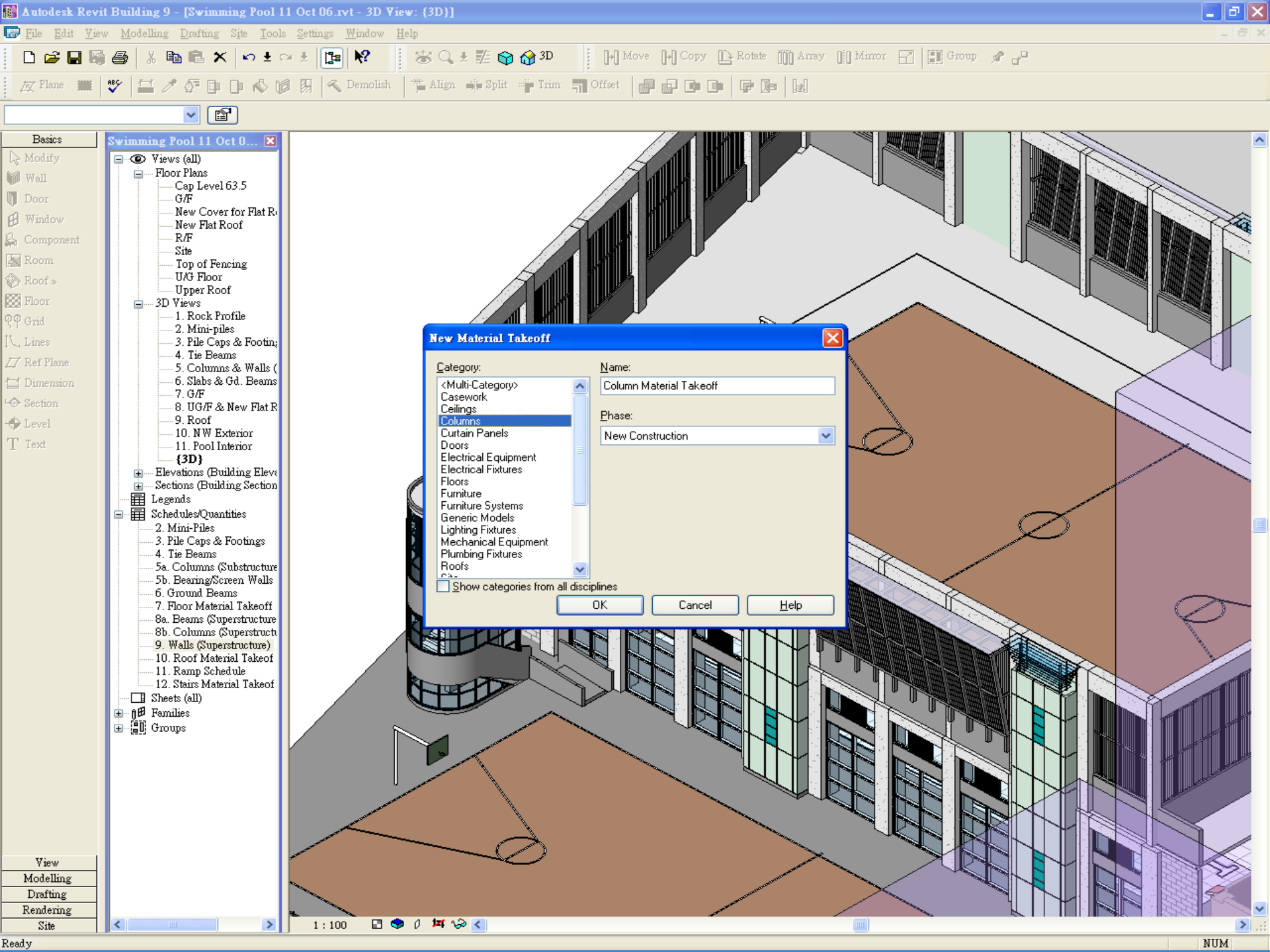
Rendering

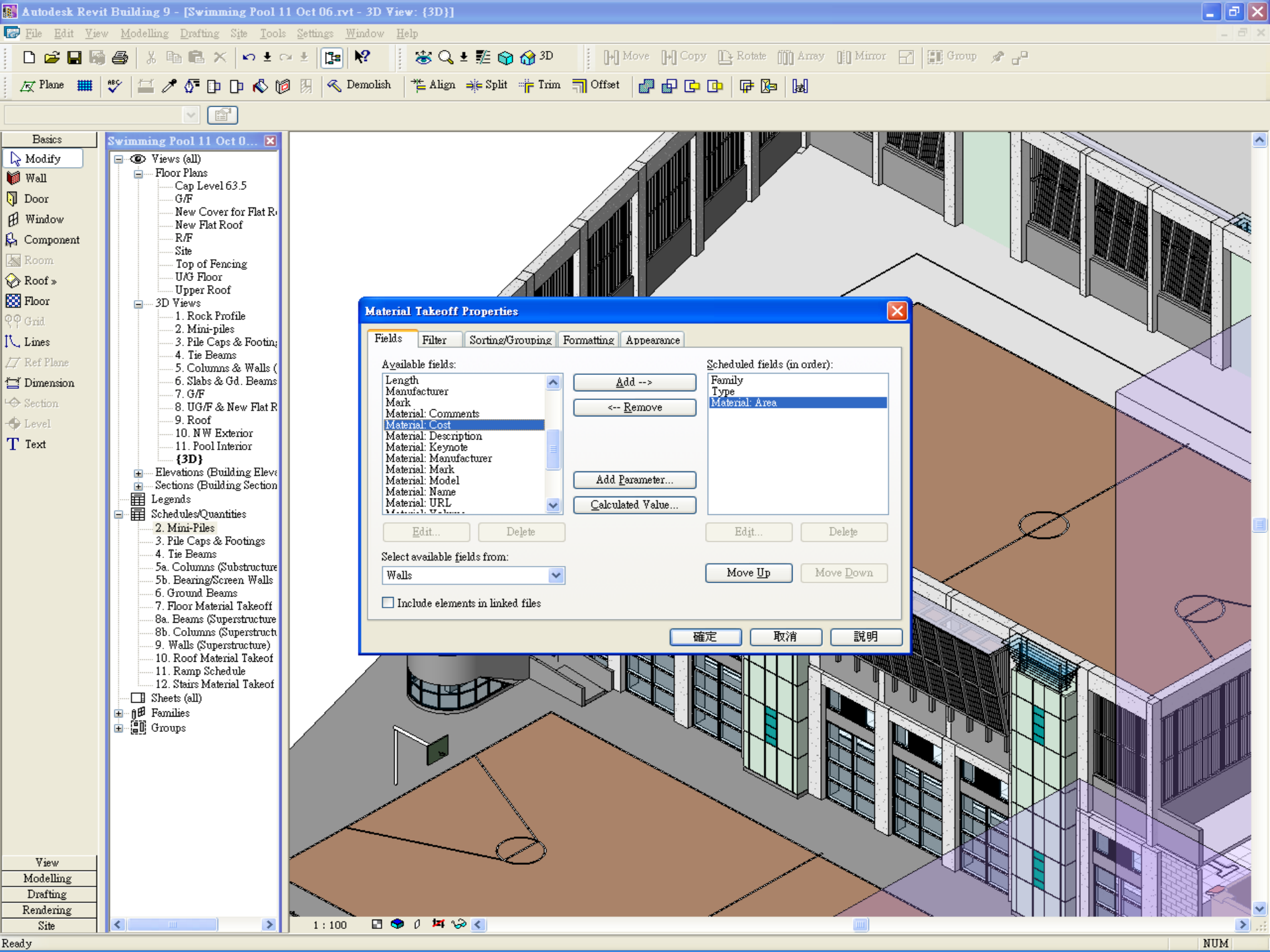
Site











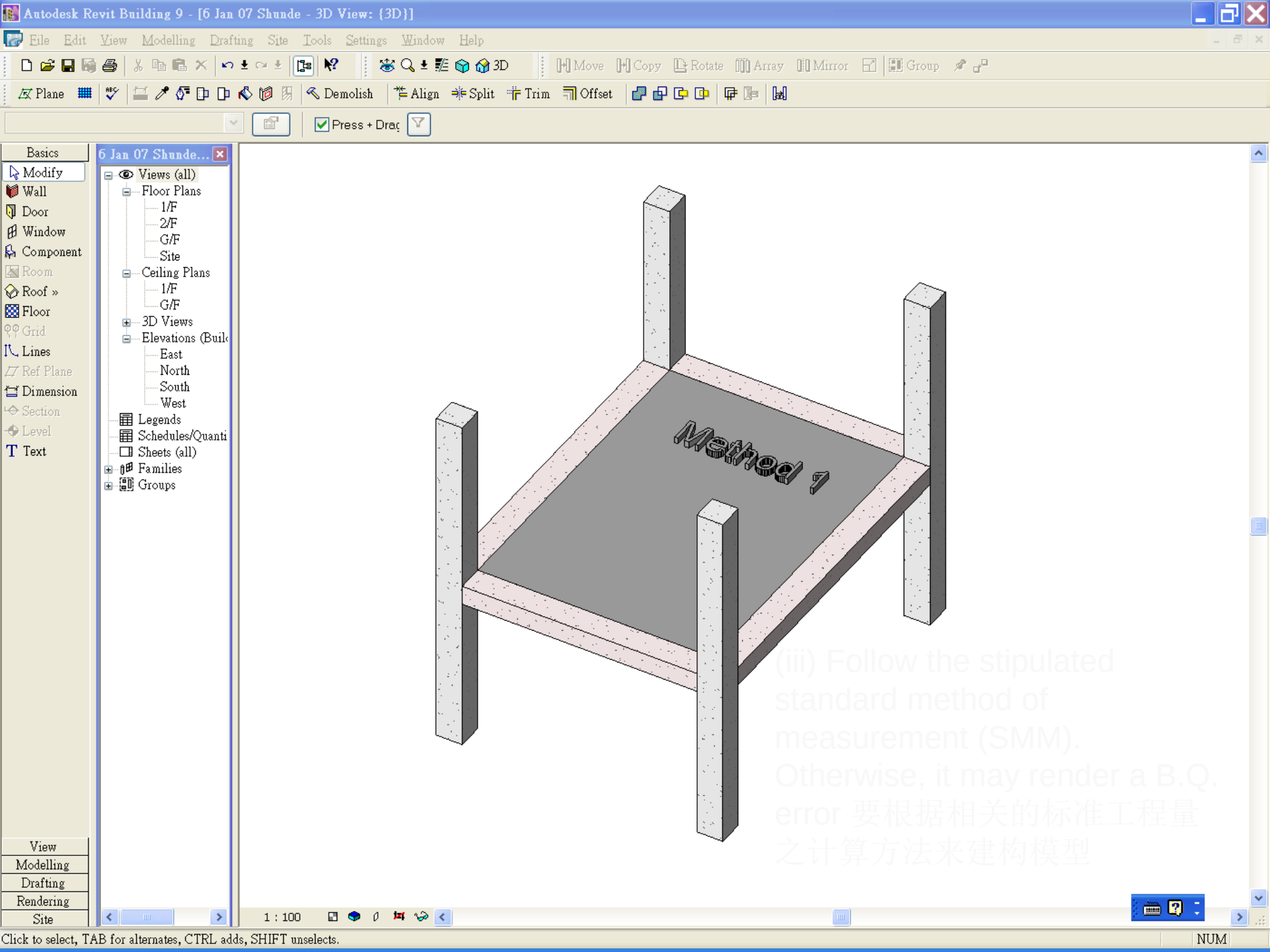
Default Model Quantities Explained

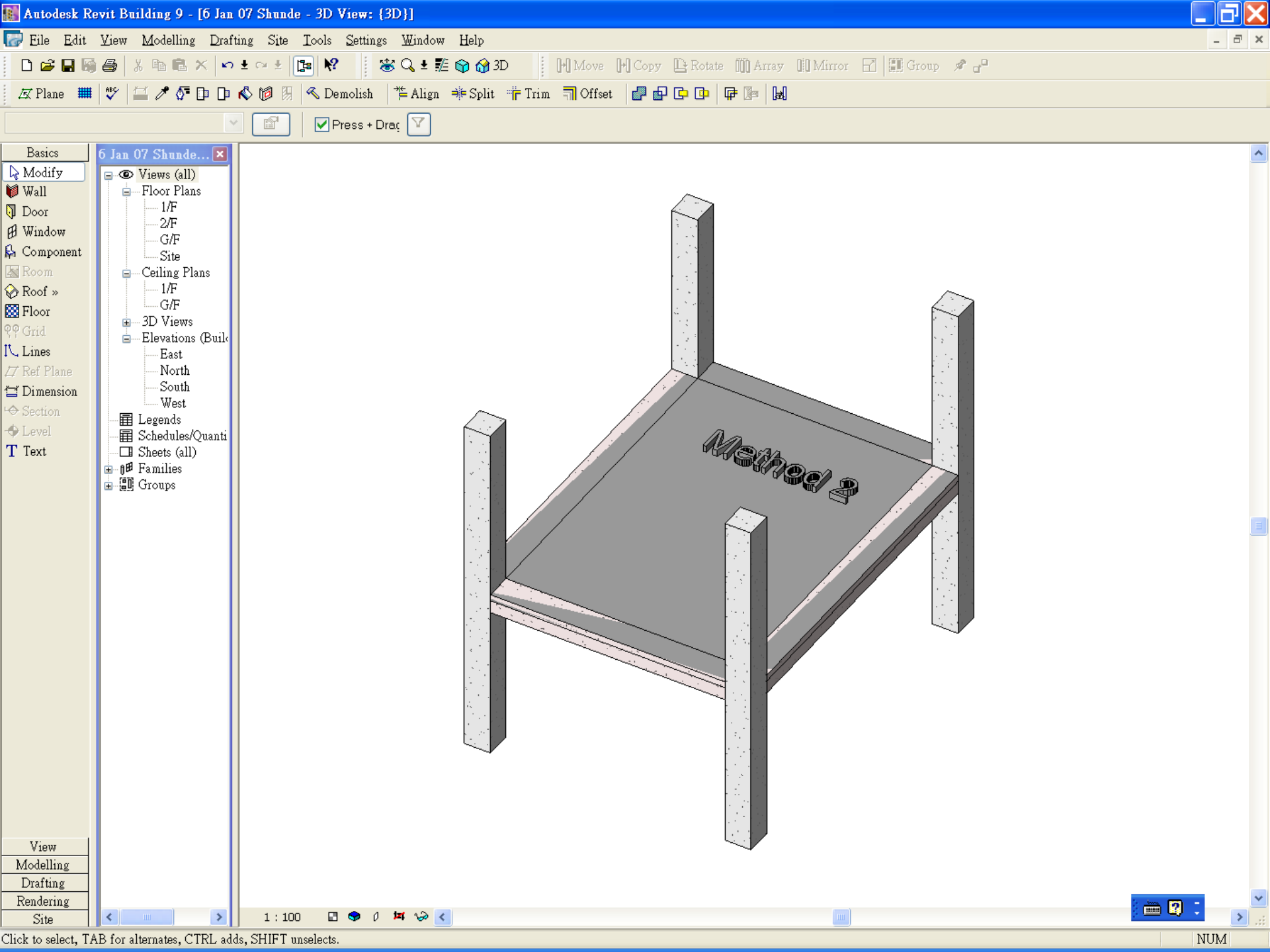
模型材料量的解释

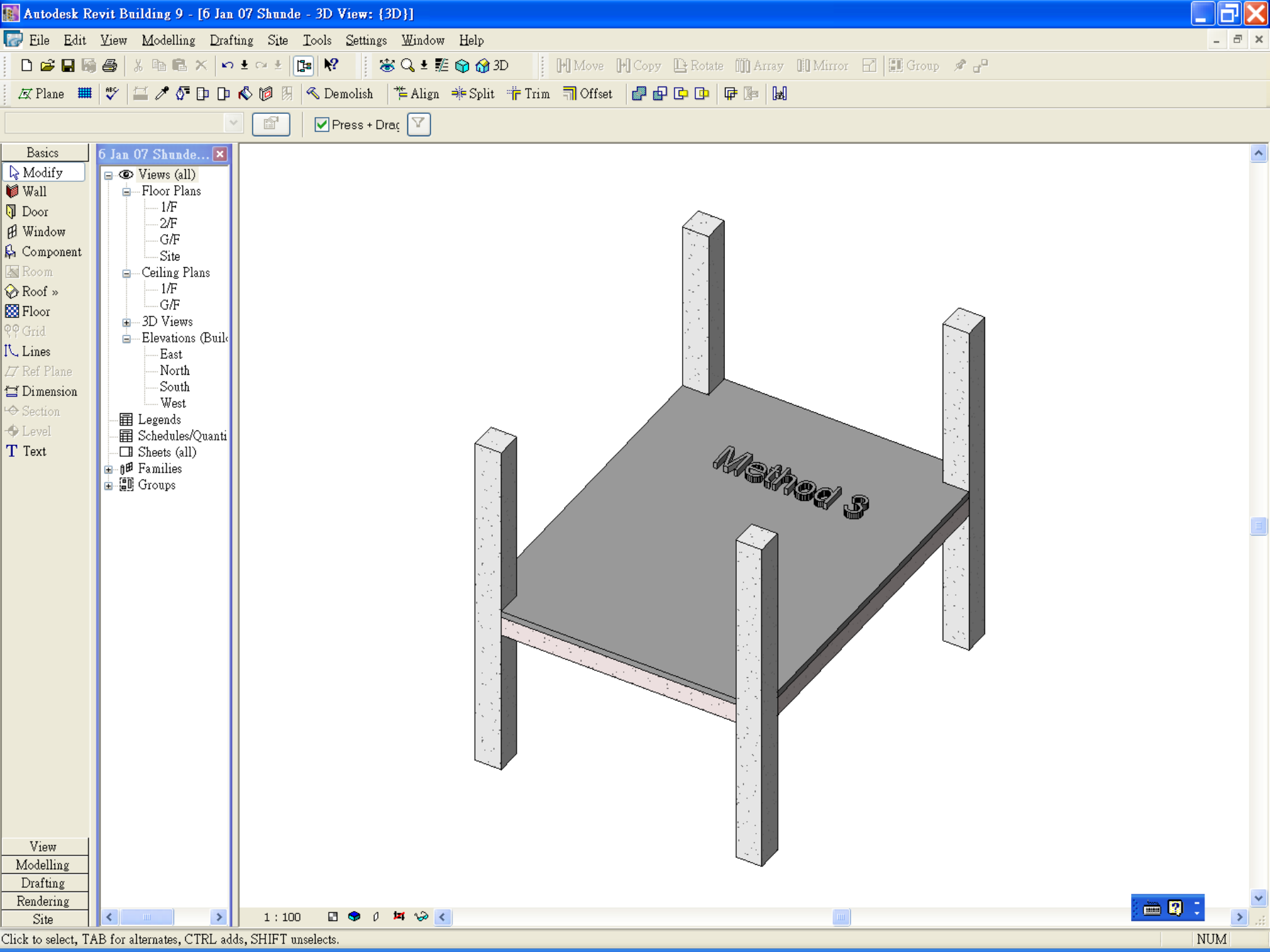
	Area	Volumn	Length
Concrete Wall	1 vertical face (LxH) 一垂直面	LxWxH 长x阔x高	L
Concrete Structural Column	4 vertical faces 四垂直面 [2(L+W)xH]	LxWxH 长x阔x高	L
Concrete Floor	1 horizontal face 一平面 (LxW)	LxWxT 长x阔x厚	n/a

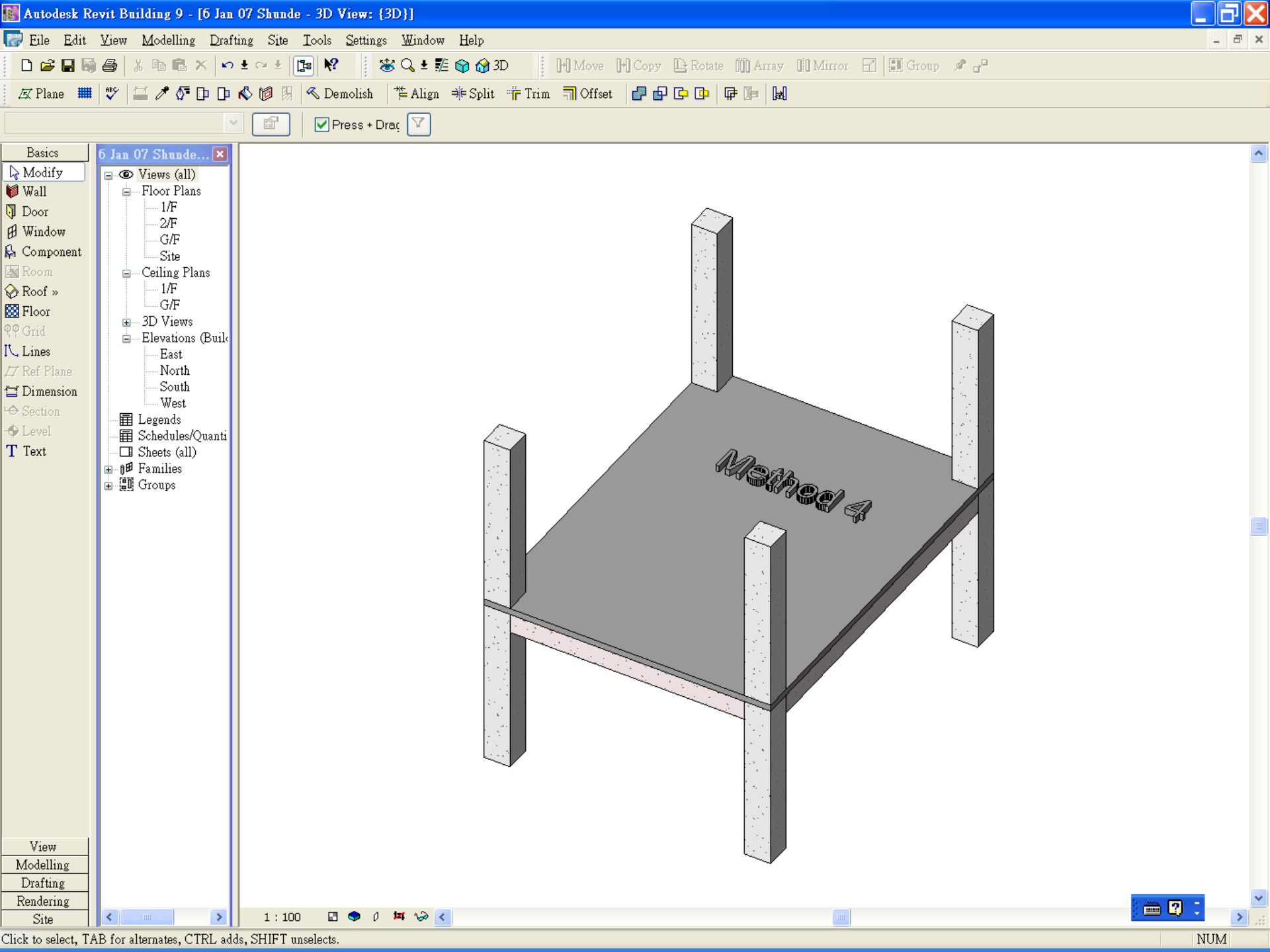
Material Take-Off with BIM - Key Issues (Courtesy from Mr. Kenny Tse)

- (i) The default schedules only list out the objects which are appear in the model, i.e. No object → No quantity
- (ii) Use the correct object, e.g. An *Architecture Column* (no quantity parameter) vs. a *Structural Column*
- (iii) Follow the stipulated standard method of measurement (SMM)? Otherwise, it may render a B.Q. error
- (iv) The model quantity may not necessary equal to the B.Q. quantity









Department of Building & Surveying
Hong Kong Polytechnic, Kowloon, Hong Kong



Author: Aston M.A.(1991)

Measurement of Building Works
for
Bills of Quantities
in
Hong Kong

Intermediate Level

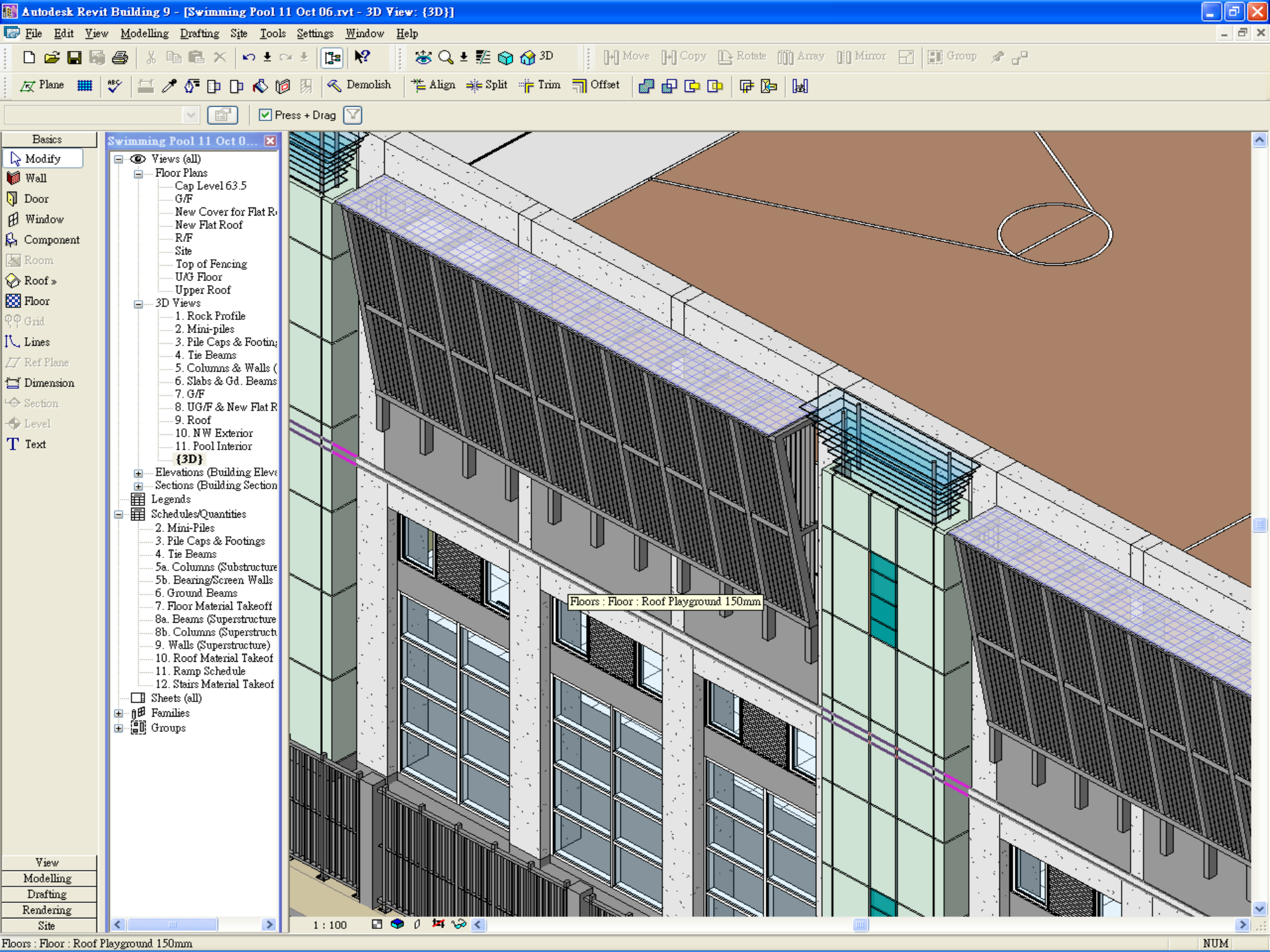
Book II

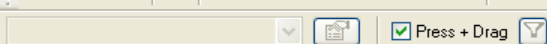
The Superstructure

香港工程量计算方法
的教科书

Concrete Measurement 混凝土量的计算方法

- 1) Suspended slabs are measured over everything, including over beams and column heads.* 楼板量的计算以楼板覆盖所有构件,包括梁及柱头
- 2) Columns before walls and beams.
- 3) Beams before walls except at end and intermediate bearings.
- 4) Primary beams before secondary beams, etc.
- 5) Staircases (waist and treads in flights) measured between suspended slabs and landings.
- 6) Staircase beams measured below staircase landings and waists.
- 7) Upstand beams measured above suspended slabs.





Basics

- Modify
- Wall
- Door
- Window
- Component
- Room
- Roof »
- Floor
- Grid
- Lines
- Ref Plane
- Dimension
- Section
- Level
- Text

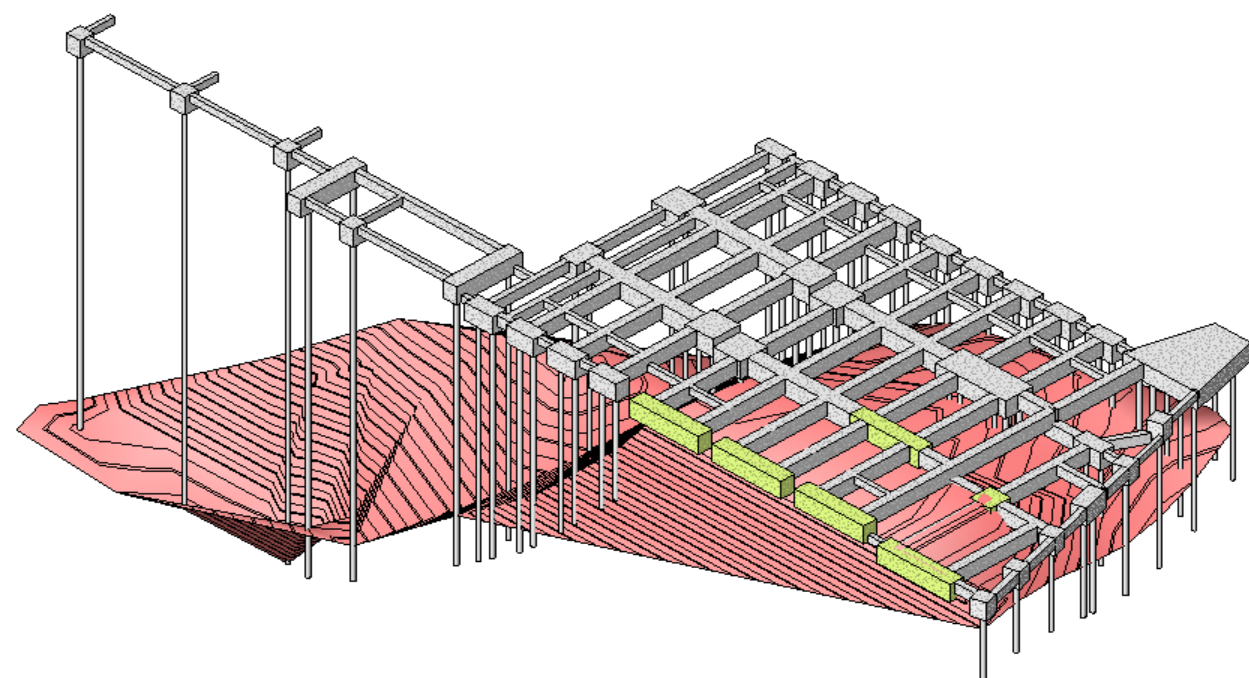
Swimming Pool 11 Oct 0...

- Views (all)
 - Floor Plans
 - Cap Level 63.5
 - G/F
 - New Cover for Flat R
 - New Flat Roof
 - R/F
 - Site
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 - (3D)
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 - 9. Walls (Superstructure)
 - 10. Roof Material Takeof
 - 11. Ramp Schedule
 - 12. Stairs Material Takeof
 - Sheets (all)
 - Families
 - Groups

View

- Modelling
- Drafting
- Rendering
- Site

(iv) The model quantity may not necessary equal to the B.Q. quantity 模型材料量并不一定与工程清单量相等

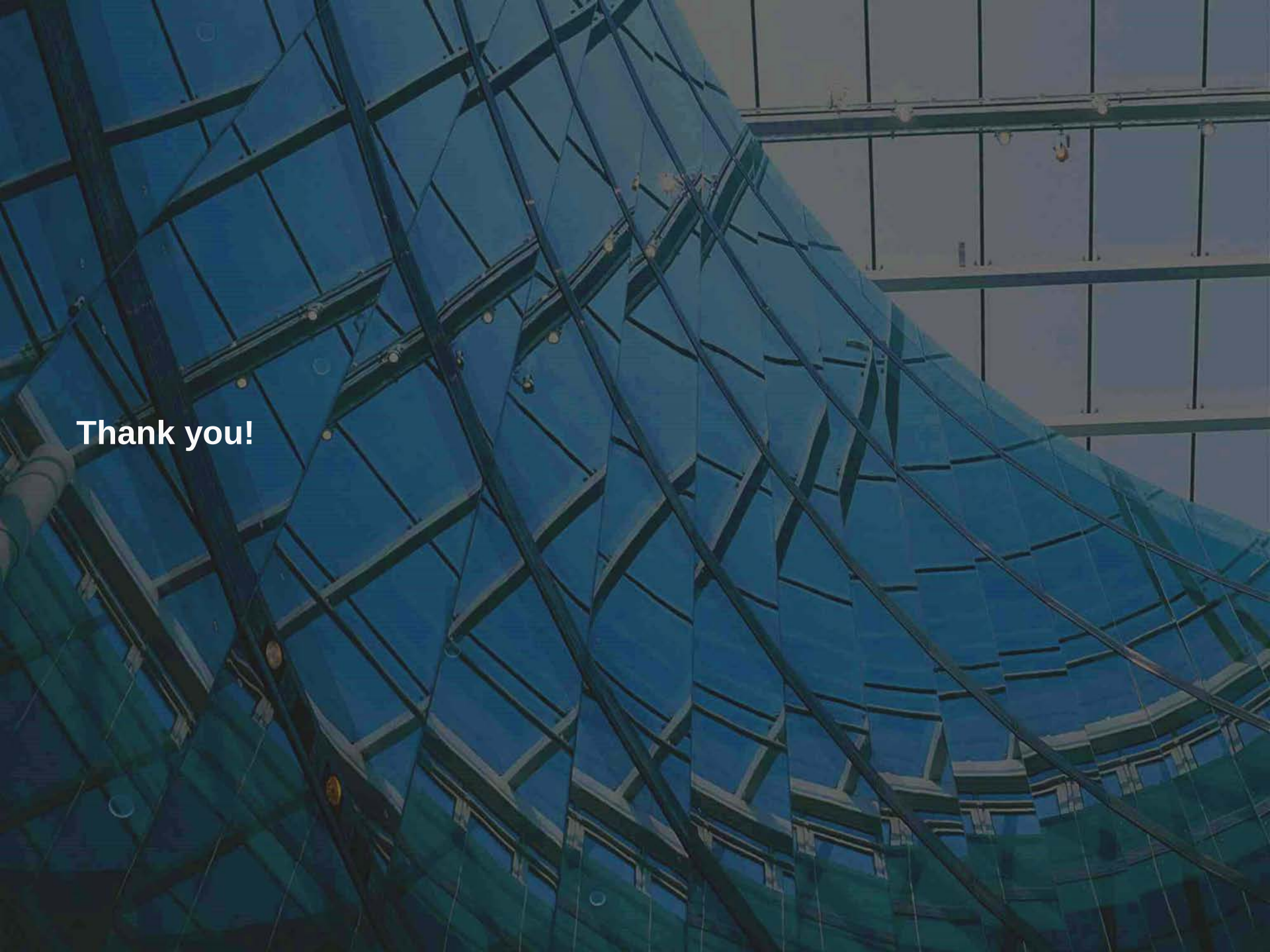


Microsoft Excel - Mini-Piles.xls																			
File Edit View Insert Format Tools Data Window Help Adobe PDF																			
新細明體 12 B I U																			
85%																			
A1 Mini-Piles																			
1	Mini-Piles																		
2	Family	Type	Mark	Base Level	Base Offset	Top Level	Top Offset	Length	Distance between top level and existing ground level	Total Length	E.O. for Rock Socket								
3								= P - E									+ 65.5	Existing Ground Level	
4	Mini-Pile	273mm	24P1	Cap Level 62.23	-5830	Cap Level 62.23	-1200	4.63	3.27	9.10	3.3								
5	Mini-Pile	273mm	23P1	Cap Level 62.23	-5530	Cap Level 62.23	-1200	4.33	3.27	8.80	3.3								
6	Mini-Pile	273mm	25P1	Cap Level 62.23	-6630	Cap Level 62.23	-1200	5.43	3.27	9.90	3.3								
7	Mini-Pile	273mm	26P1	Cap Level 62.23	-7730	Cap Level 62.23	-1200	6.53	3.27	11.00	3.3								
8	Mini-Pile	273mm	26P2	Cap Level 62.23	-8030	Cap Level 62.23	-1200	6.83	3.27	11.30	3.3								
9	Mini-Pile	273mm	27P1	Cap Level 62.23	-8930	Cap Level 62.23	-1200	7.73	3.27	12.20	3.3								
10	Mini-Pile	273mm	22P1	Cap Level 62.23	-7930	Cap Level 62.23	-1200	6.73	3.27	11.20	3.3								
11	Mini-Pile	273mm	22P2	Cap Level 62.23	-7430	Cap Level 62.23	-1200	6.23	3.27	10.70	3.3								
12	Mini-Pile	273mm	28P1	Cap Level 63.0	-10000	Cap Level 63.0	-1200	8.80	2.50	12.50	3.3								
13	Mini-Pile	273mm	29P1	Cap Level 63.0	-9800	Cap Level 63.0	-1200	8.60	2.50	12.30	3.3								
14	Mini-Pile	273mm	29P2	Cap Level 63.0	-9300	Cap Level 63.0	-1200	8.10	2.50	11.80	3.3								
15	Mini-Pile	273mm	29P4	Cap Level 63.0	-9000	Cap Level 63.0	-1200	7.80	2.50	11.50	3.3								
16	Mini-Pile	273mm	29P5	Cap Level 63.0	-8600	Cap Level 63.0	-1200	7.40	2.50	11.10	3.3								
17	Mini-Pile	273mm	29P7	Cap Level 63.0	-8300	Cap Level 63.0	-1200	7.10	2.50	10.80	3.3								
18	Mini-Pile	273mm	29P3	Cap Level 63.0	-9000	Cap Level 63.0	-1200	7.80	2.50	11.50	3.3								
19	Mini-Pile	273mm	29P6	Cap Level 63.0	-8600	Cap Level 63.0	-1200	7.40	2.50	11.10	3.3								
20	Mini-Pile	273mm	21P1	Cap Level 63.0	-7800	Cap Level 63.0	-1200	6.60	2.50	10.30	3.3								
21	Mini-Pile	273mm	21P2	Cap Level 63.0	-7600	Cap Level 63.0	-1200	6.40	2.50	10.10	3.3								
22	Mini-Pile	273mm	20P1	Cap Level 63.0	-7200	Cap Level 63.0	-1200	6.00	2.50	9.70	3.3								
23	Mini-Pile	273mm	20P2	Cap Level 63.0	-7100	Cap Level 63.0	-1200	5.90	2.50	9.60	3.3								
24	Mini-Pile	273mm	18P1	Cap Level 63.0	-7100	Cap Level 63.0	-1200	5.90	2.50	9.60	3.3								
25	Mini-Pile	273mm	18P2	Cap Level 63.0	-7100	Cap Level 63.0	-1200	5.90	2.50	9.60	3.3								
26	Mini-Pile	273mm	17P1	Cap Level 63.0	-7400	Cap Level 63.0	-1200	6.20	2.50	9.90	3.3								
27	Mini-Pile	273mm	17P2	Cap Level 63.0	-7700	Cap Level 63.0	-1200	6.50	2.50	10.20	3.3								
28	Mini-Pile	273mm	16P1	Cap Level 63.0	-8200	Cap Level 63.0	-1200	7.00	2.50	10.70	3.3								
29	Mini-Pile	273mm	16P2	Cap Level 63.0	-8700	Cap Level 63.0	-1200	7.50	2.50	11.20	3.3								
30	Mini-Pile	273mm	13P2	Cap Level 63.0	-5100	Cap Level 63.0	-1200	3.90	2.50	7.60	3.3								
31	Mini-Pile	273mm	13P1	Cap Level 63.0	-5100	Cap Level 63.0	-1200	3.90	2.50	7.60	3.3								
32	Mini-Pile	273mm	19P2	Cap Level 63.0	-6200	Cap Level 63.0	-1200	5.00	2.50	8.70	3.3								
33	Mini-Pile	273mm	19P1	Cap Level 63.0	-5900	Cap Level 63.0	-1200	4.70	2.50	8.40	3.3								
34	Mini-Pile	273mm	19P4	Cap Level 63.0	-5800	Cap Level 63.0	-1200	4.60	2.50	8.30	3.3								
35	Mini-Pile	273mm	19P3	Cap Level 63.0	-5500	Cap Level 63.0	-1200	4.30	2.50	8.00	3.3								
36	Mini-Pile	273mm	14P2	Cap Level 63.0	-7500	Cap Level 63.0	-1200	6.30	2.50	10.00	3.3								
37	Mini-Pile	273mm	14P1	Cap Level 63.0	-7300	Cap Level 63.0	-1200	6.10	2.50	9.80	3.3								
38	Mini-Pile	273mm	5P1	Cap Level 63.5	-16800	Cap Level 63.5	-1200	15.60	2.00	18.80	3.3								
39	Mini-Pile	273mm	5P2	Cap Level 63.5	-16800	Cap Level 63.5	-1200	15.60	2.00	18.80	3.3								
40	Mini-Pile	273mm	4P2	Cap Level 63.5	-17300	Cap Level 63.5	-1200	16.10	2.00	19.30	3.3								
41	Mini-Pile	273mm	4P1	Cap Level 63.5	-16600	Cap Level 63.5	-1200	15.40	2.00	18.60	3.3								
42	Mini-Pile	273mm	8P2	Cap Level 63.5	-15200	Cap Level 63.5	-1200	14.00	2.00	17.20	3.3								

Microsoft Excel - Bill No. 4 - Piling.xls								
File Edit View Insert Format Tools Data Window Help Adobe PDF								
新細明體 12 B I U \$ % , .00 .00								
A1								
	A	B	C	D	E	F	G	H
1							BILL NO. 4	
2							PILING	
3								
4	Item	Description	Quantity	Unit	Rate	Total		
5								
6		Bill No. 4						
7		PILING						
8								
9		MINI-PILE FOUNDATION						
10								
11	A	Vertical pile 273mm diameter including drilling, steel casing, steel reinforcement, coupler and grouting		m				
12								
13	B	Extra over for drilling in rock socket (PROVISIONAL)		m				
14								
15	C	Raking pile 273mm diameter including drilling, steel reinforcement and grouting		m				
16								
17	D	Extra over for drilling in rock socket (PROVISIONAL)		m				
18								

Conclusion (Courtesy from Mr. Kenny Tse)

- BIM is a tool to facilitate material take-off
- Save resources in material take-off; could use the saved resources to enhance other services of quantity surveyors
- The default material schedules only list out the objects which are appear in the model
- Use the correct object
- Pay attention to the stipulated standard method of measurement (SMM).
- Model Quantities are not necessarily = Bill of Quantities
- BIM in Material take-off: QS's domain knowledge is essential



Thank you!