



CitA

Meet your peers this year  
in Athlone at Gathering '23



# Gathering23

Accelerating BIM adoption

CitA BIM Gathering 2023

# September:2023

Reserve your place now at [bimgathering.ie](http://bimgathering.ie)



CITA

**Can we predict the impact of AI on construction,  
by drawing insights from the last 20 years  
of digital transformation?**

Meet your peers this year  
in Athlone at Gathering '23

Gathering23

Accelerating BIM adoption

September:2023

Reserve your place now at [bimgathering.ie](http://bimgathering.ie)

# WHAT IMPACT WILL AI HAVE IN CONSTRUCTION?

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- ▶ **BIM** is used on less than 25% of projects today. **Why?**
- ▶ BIM is a foundation to unlocking a lot of value from new technologies, so, how do we **demonstrate the value of AI & BIM?**

CitA BIM Gathering 2023

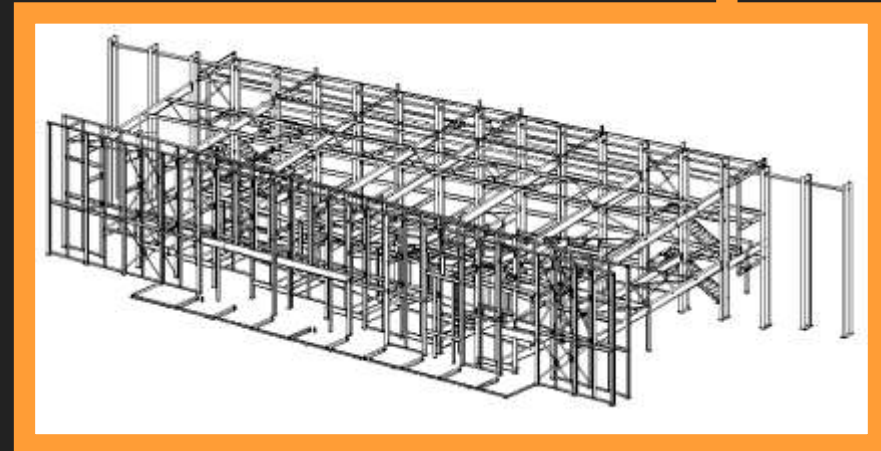
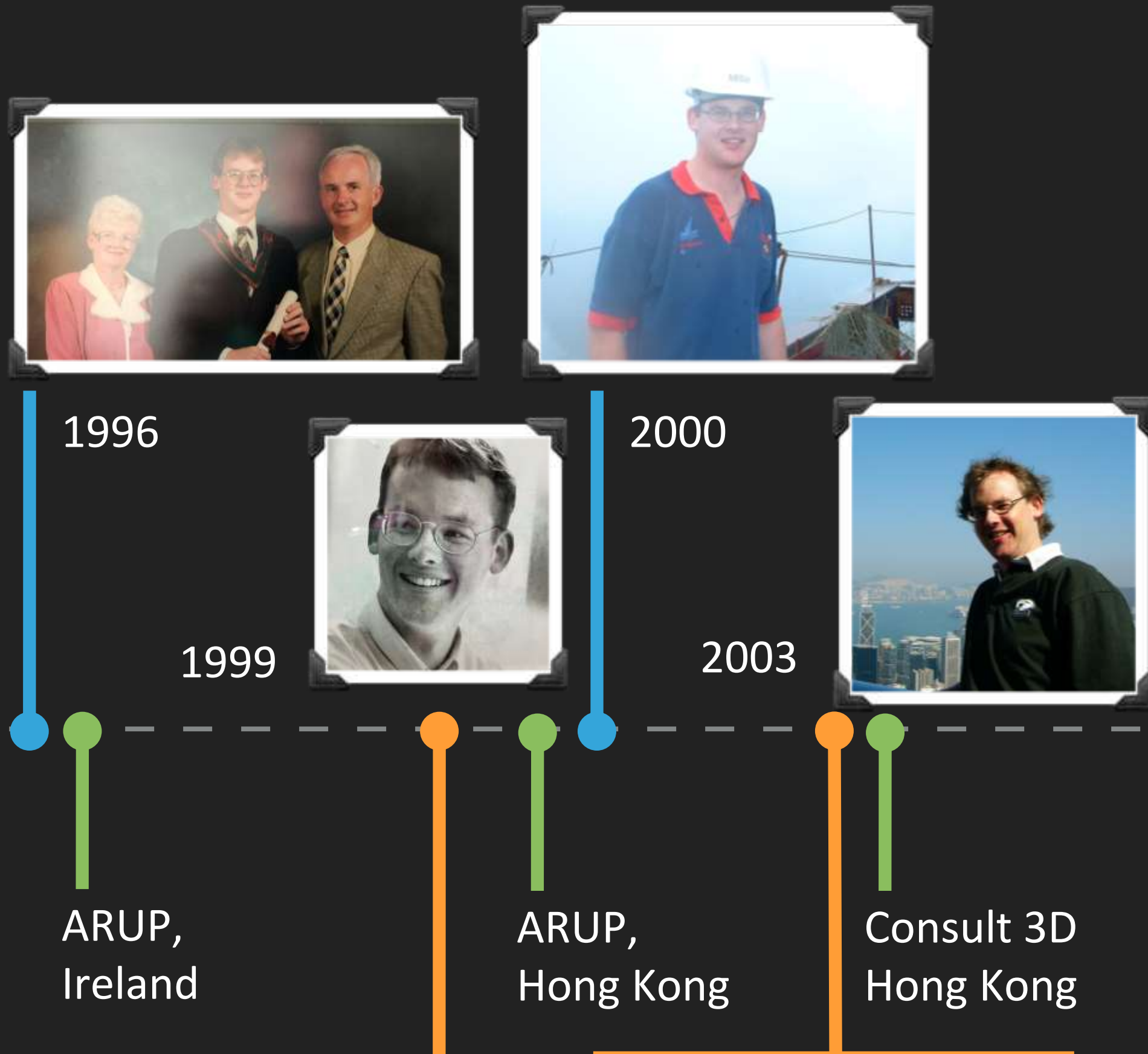
- ▶ AI will propel some firms forward, while others will struggle.  
**Are You Ready for the changes AI will bring?**



# Are You Ready for the changes AI will bring ... to modelling & design?

My MISSION in 2003 ...

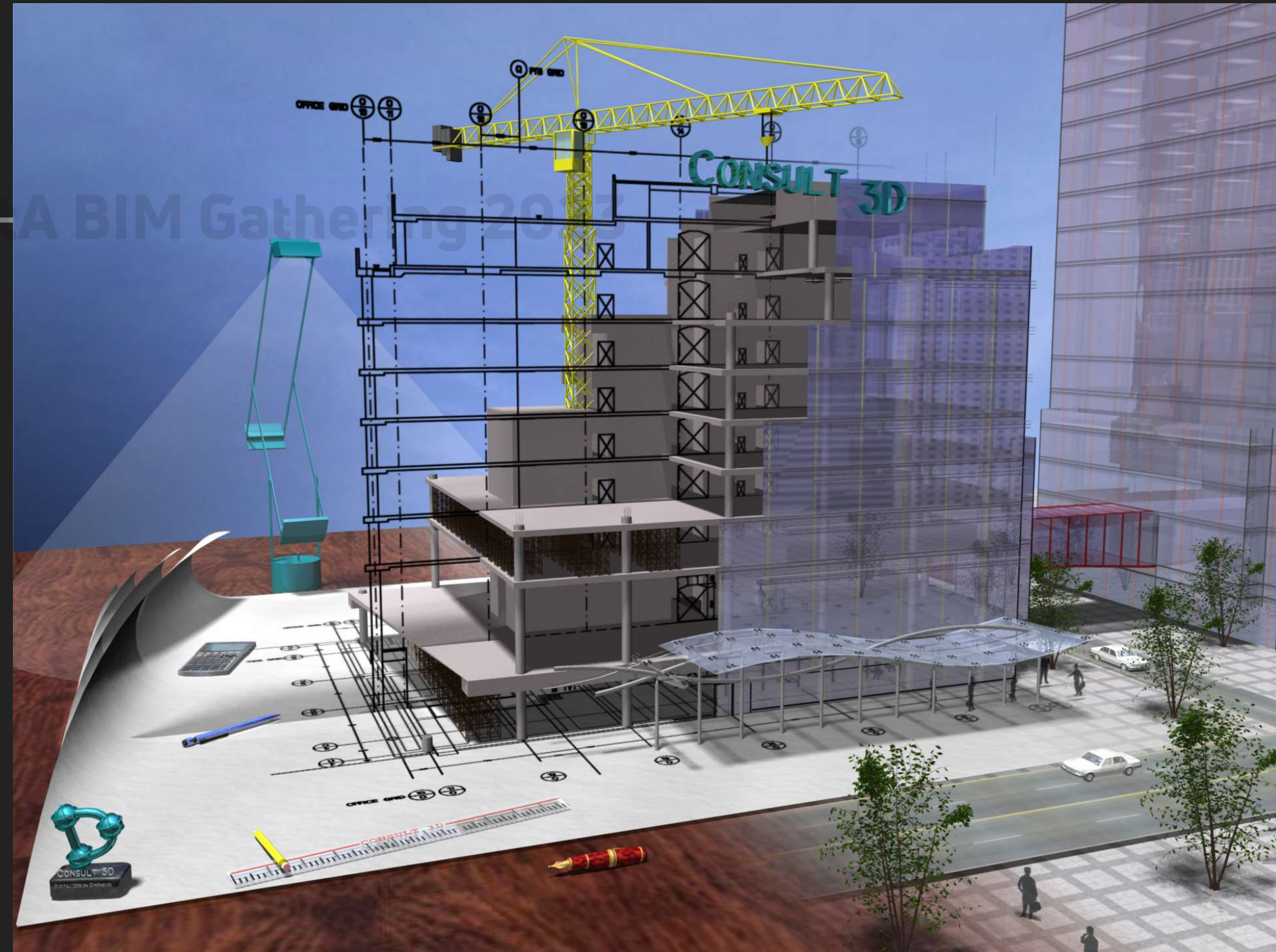
Use detailed 3D models to reduce construction costs and ensure buildings are completed on time.



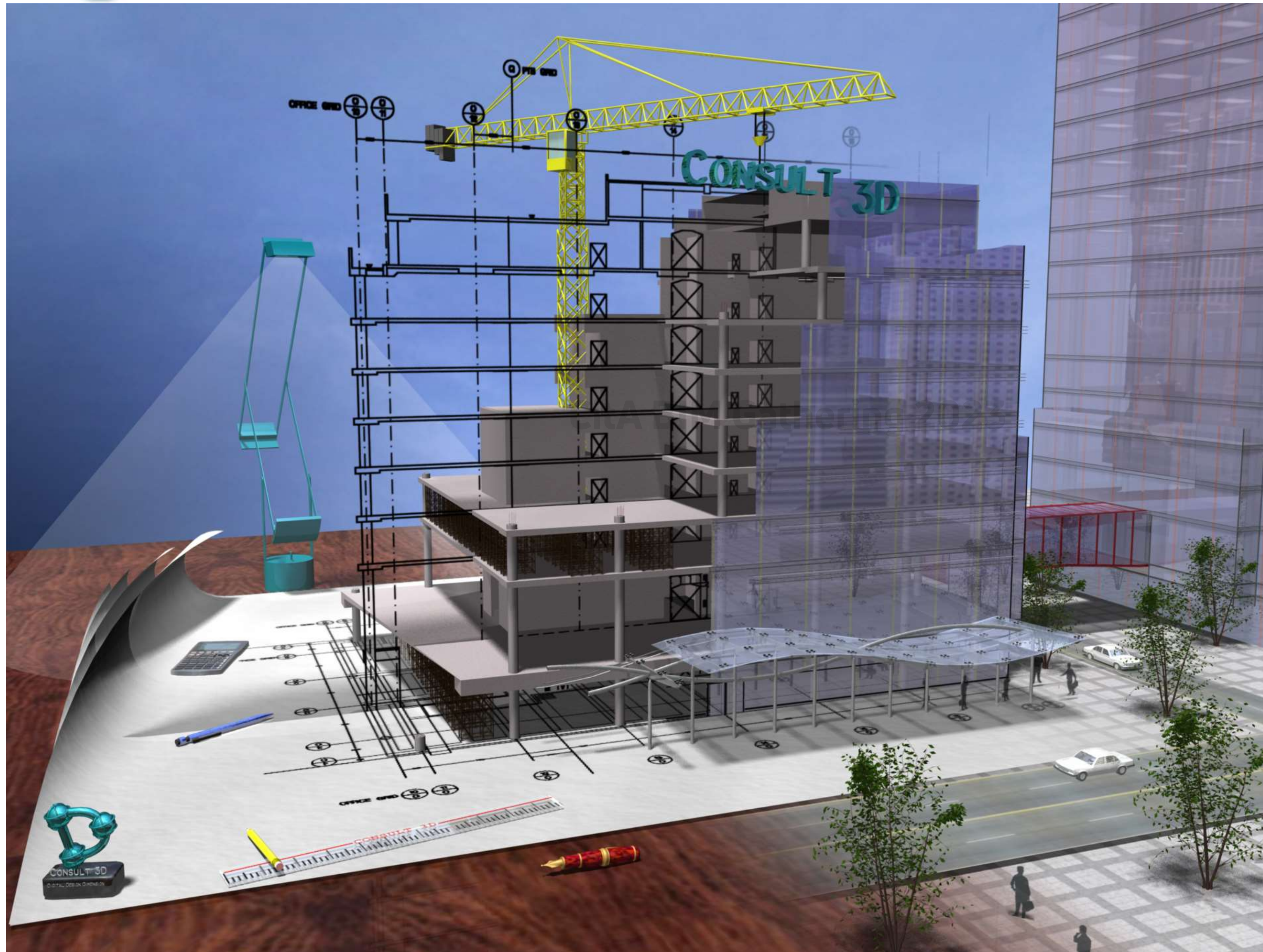
EXPO 2000



2003, My First Office







3D  
MODELLING  
PROCESS

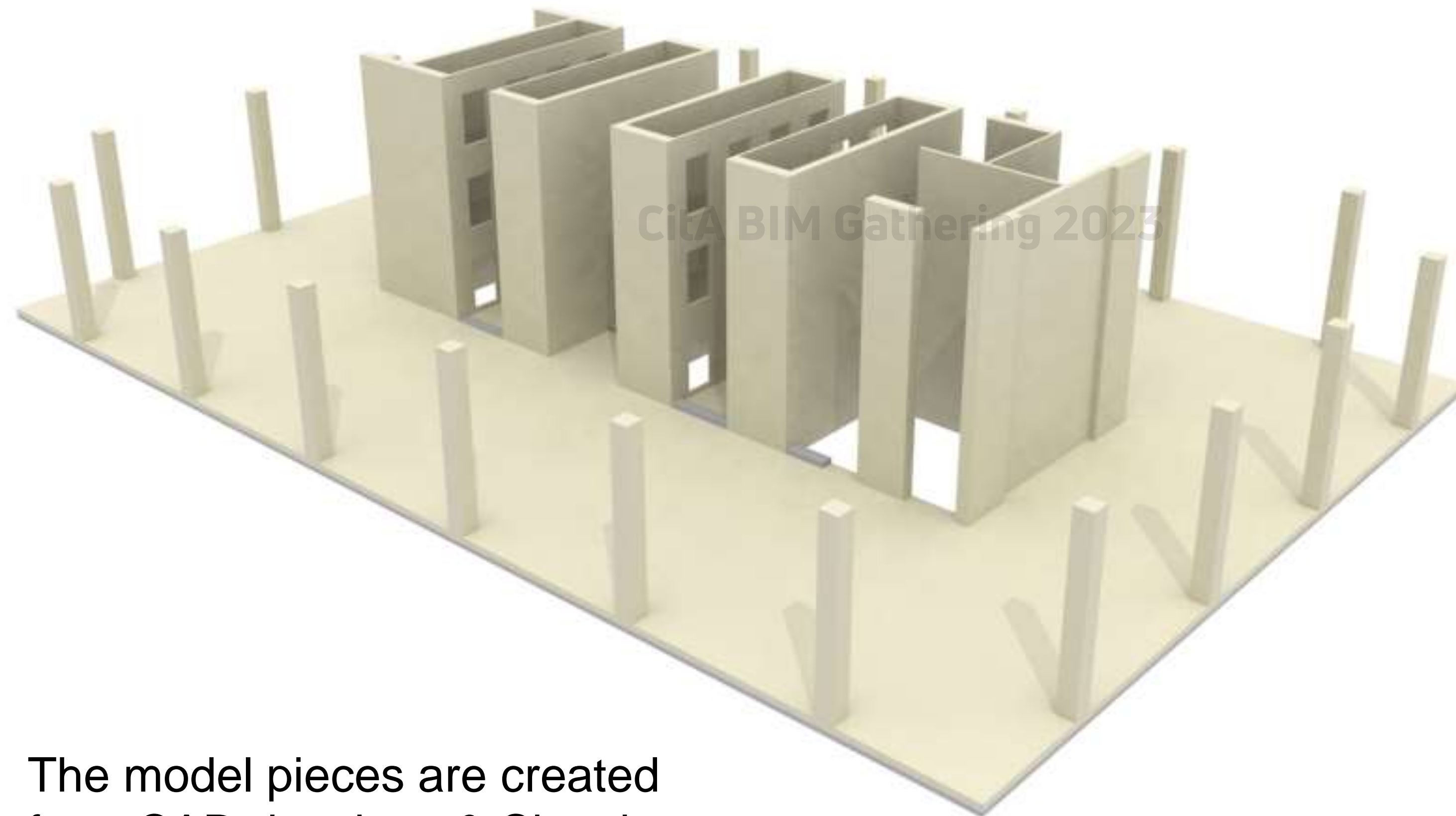
2005





## CIVIL & STRUCTURAL COMPONENTS

### CORE WALLS & COLUMNS



MODELLING  
PROCESS

CIVIL &  
STRUCTURAL

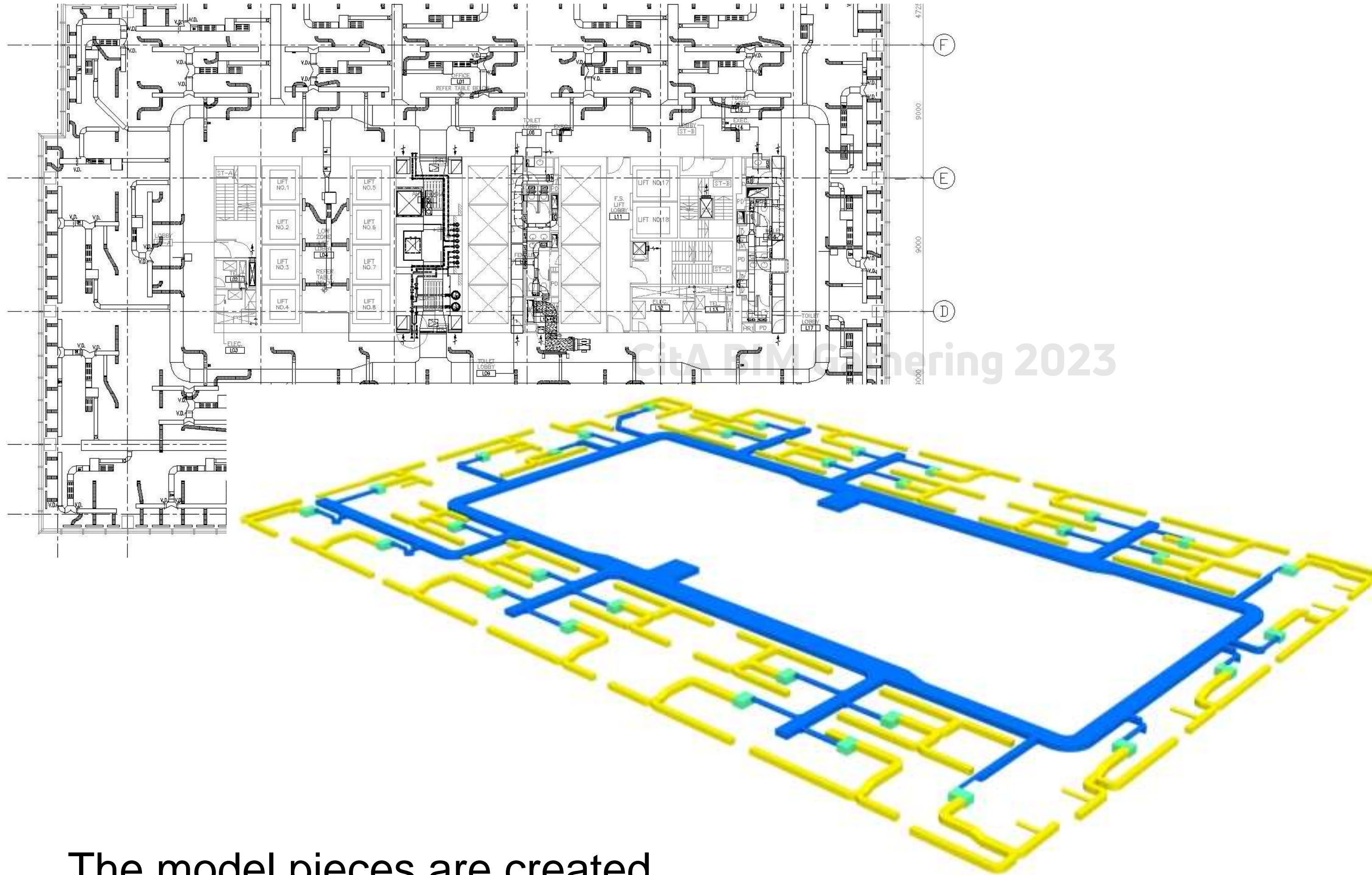
2005

The model pieces are created  
from CAD drawings & Sketches





## MECHANICAL COMPONENTS



MODELLING  
PROCESS

DUCTWORK  
CREATED  
FROM CAD  
PLAN  
DRAWING

2005

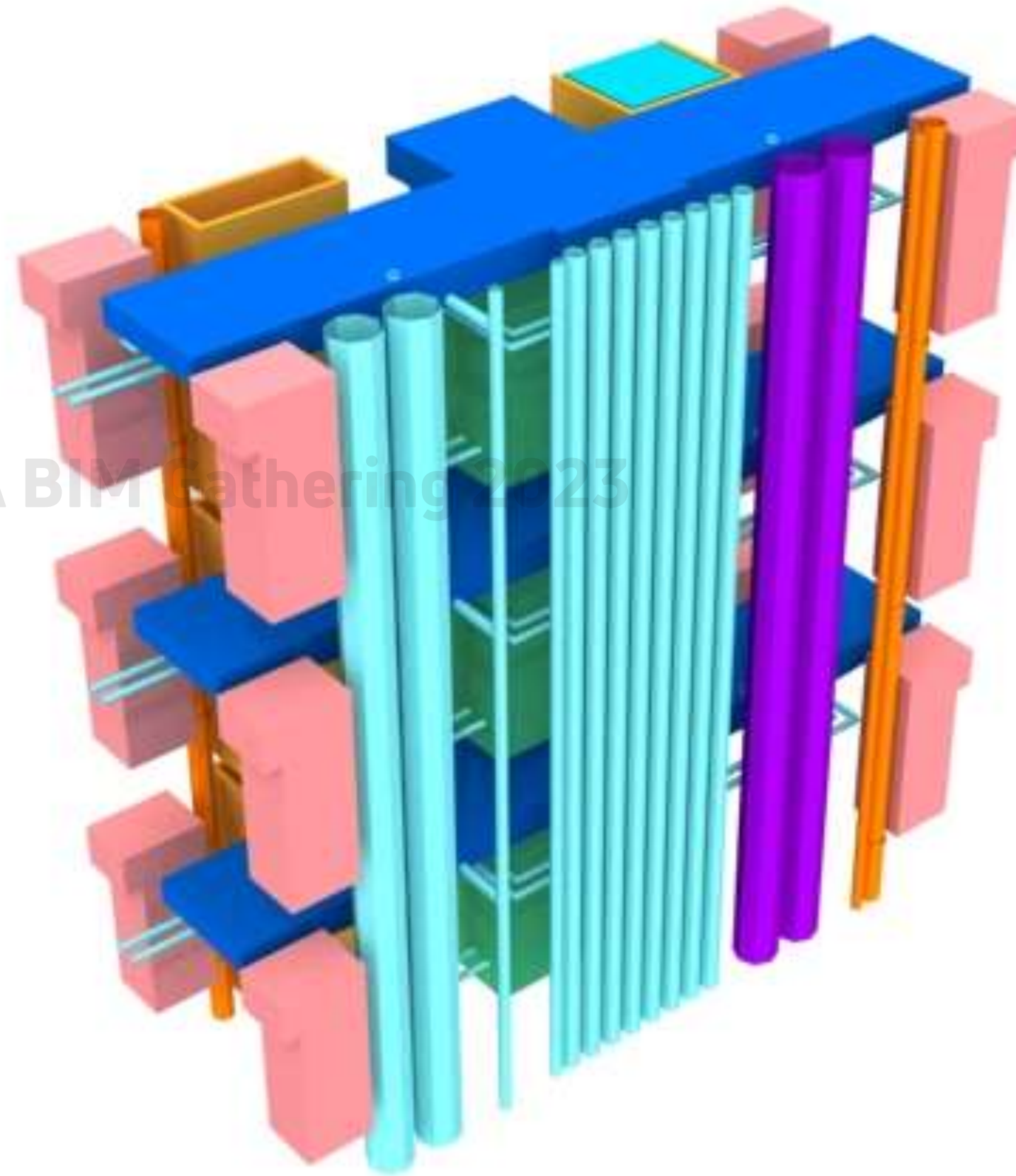
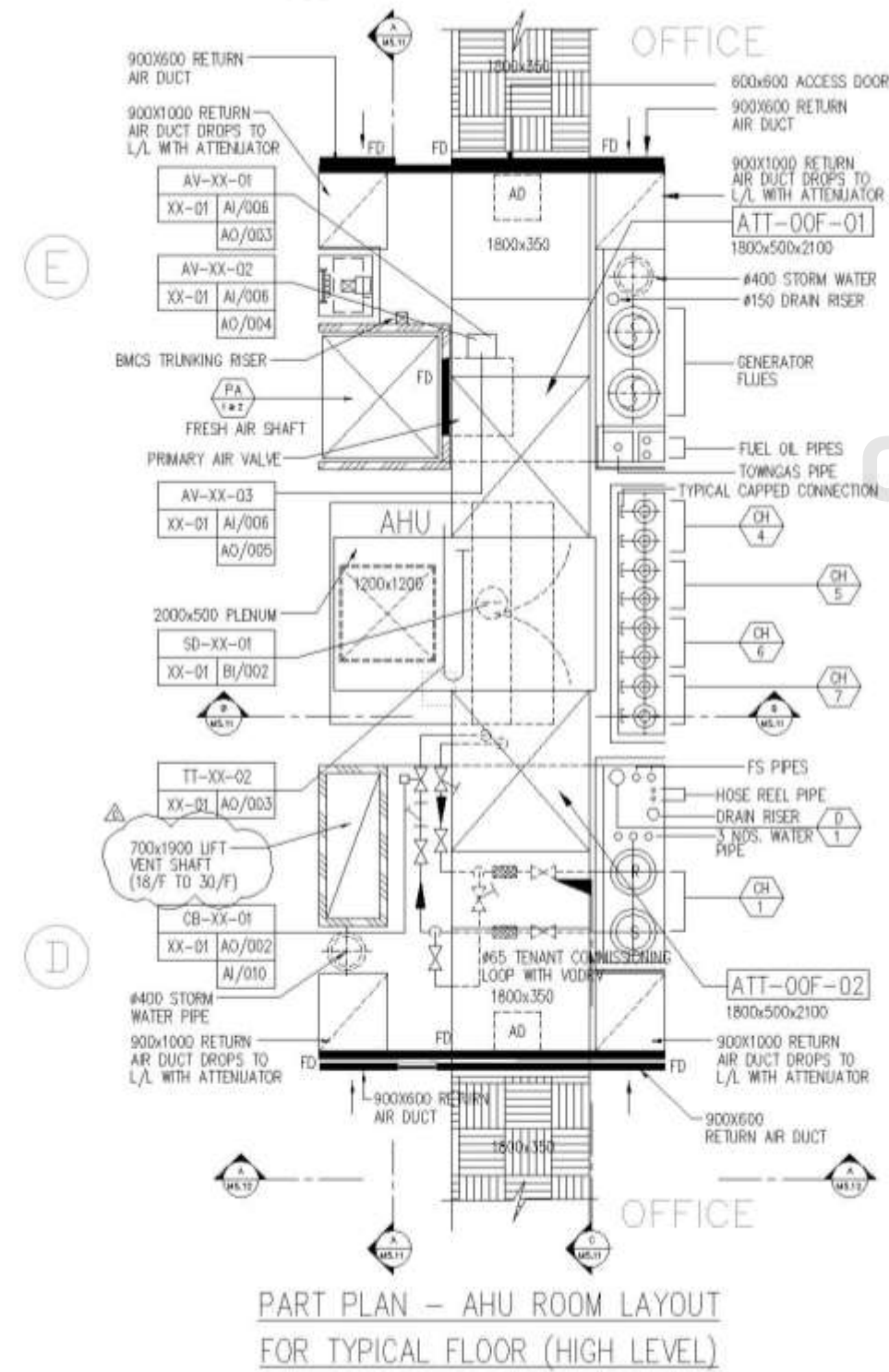
The model pieces are created  
from CAD drawings & Sketches





## MECHANICAL COMPONENTS

### AHU PLANTROOMS



MODELLING  
PROCESS

MECHANICAL



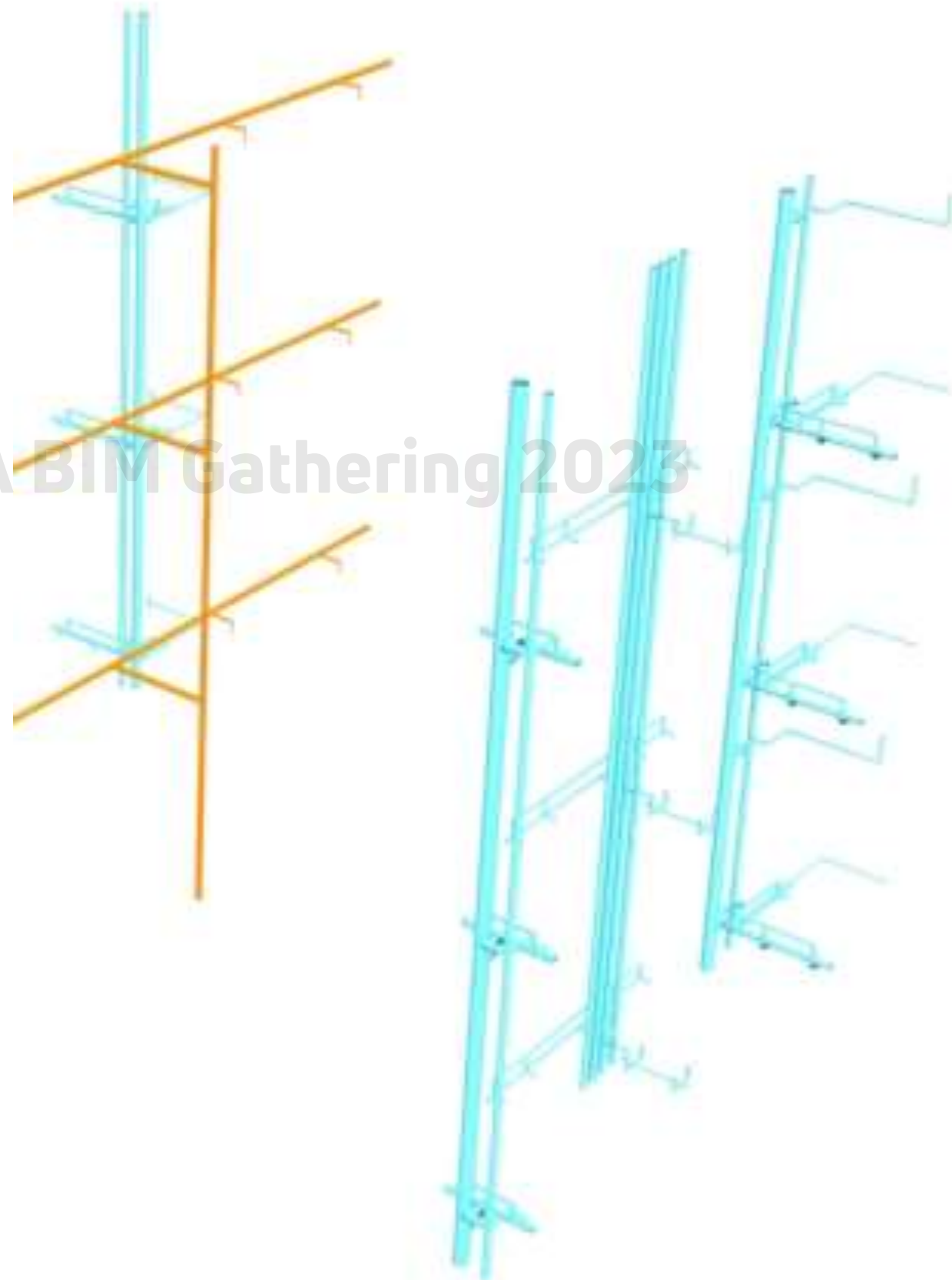
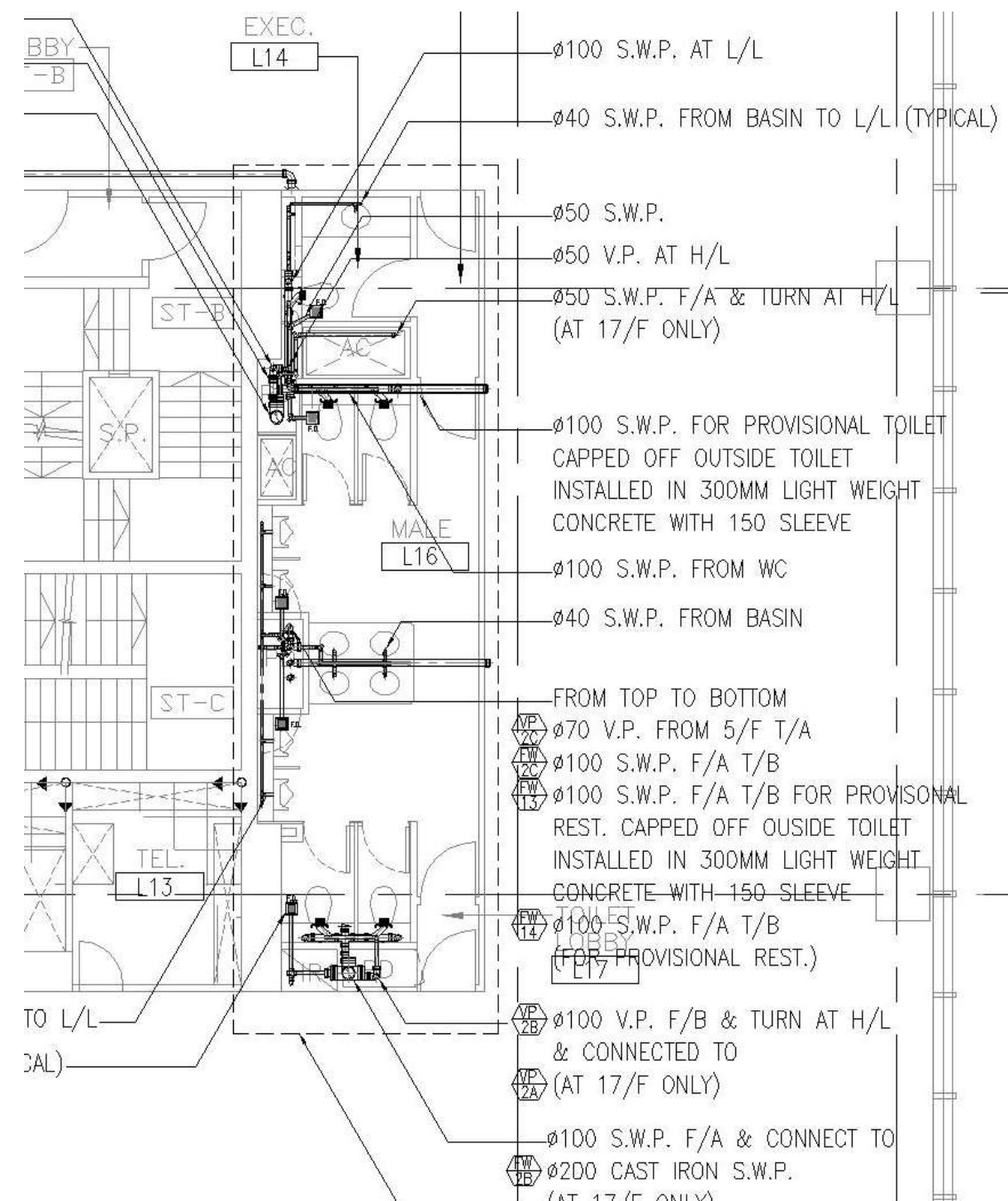
Layers of elements are created for each floor level





## DRAINAGE COMPONENTS

### PIPEWORK



MODELLING  
PROCESS

DRAINAGE

2005

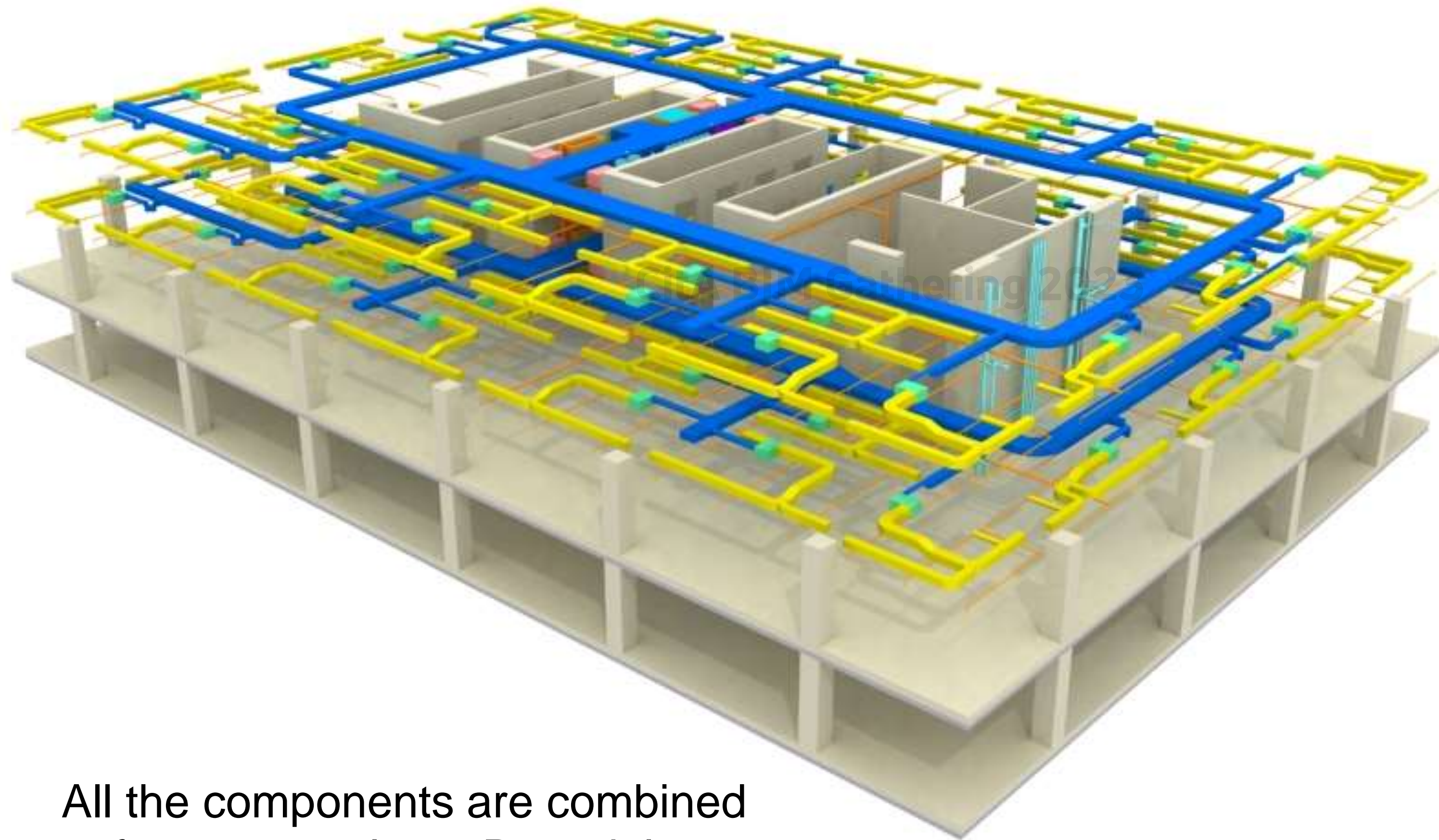
Layers of elements are created for each floor level





MODELLING  
PROCESS

COMBINED  
3D MODEL



All the components are combined  
to form a complete 3D model

2005

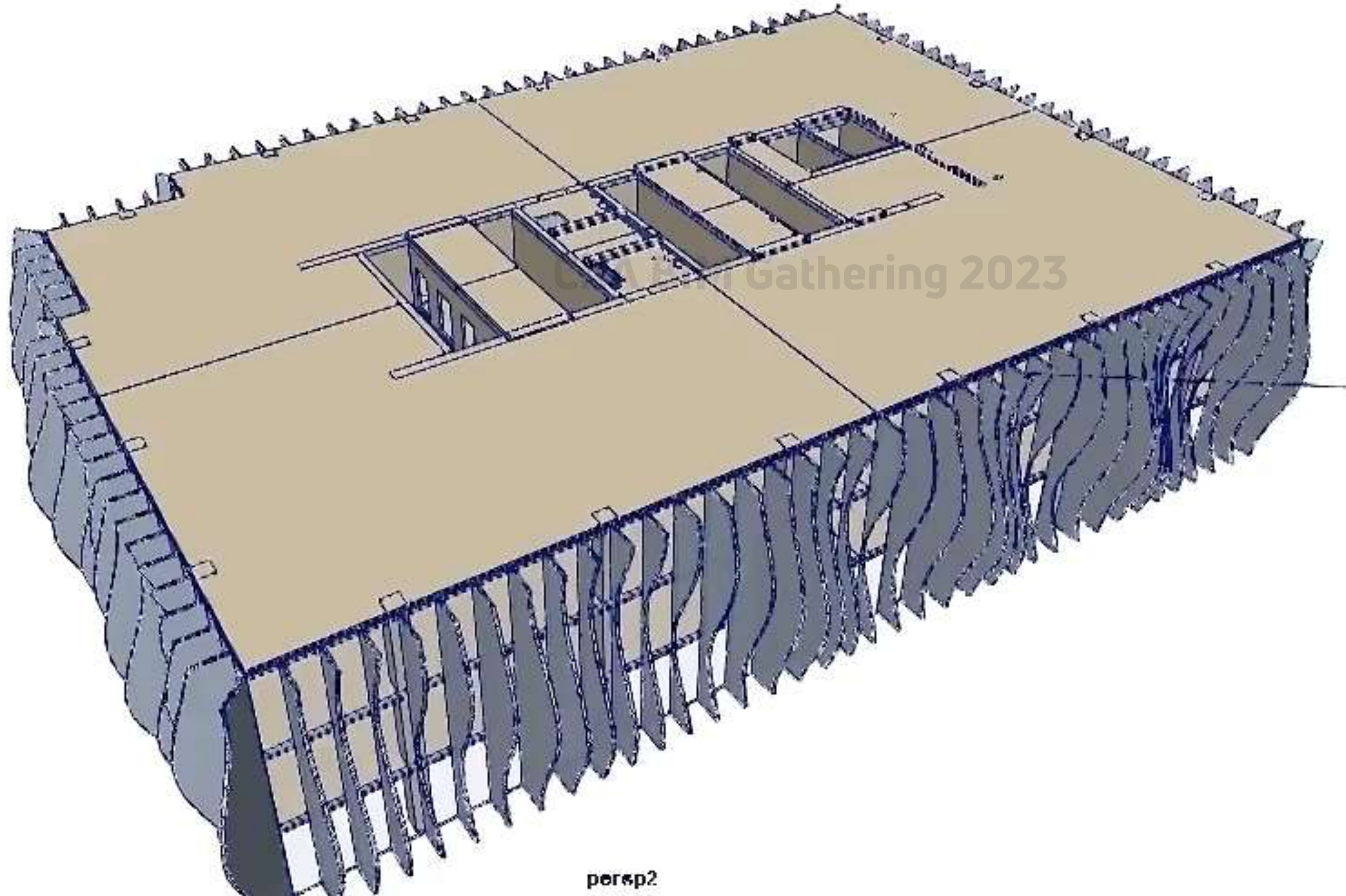




CLASH  
DETECTION

PLAY BLAST  
SHOWS

DRAINAGE  
PIPE WORK  
INSIDE DUCT  
IN  
PLANTROOM



2005



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## CitA BIM Gathering 2023



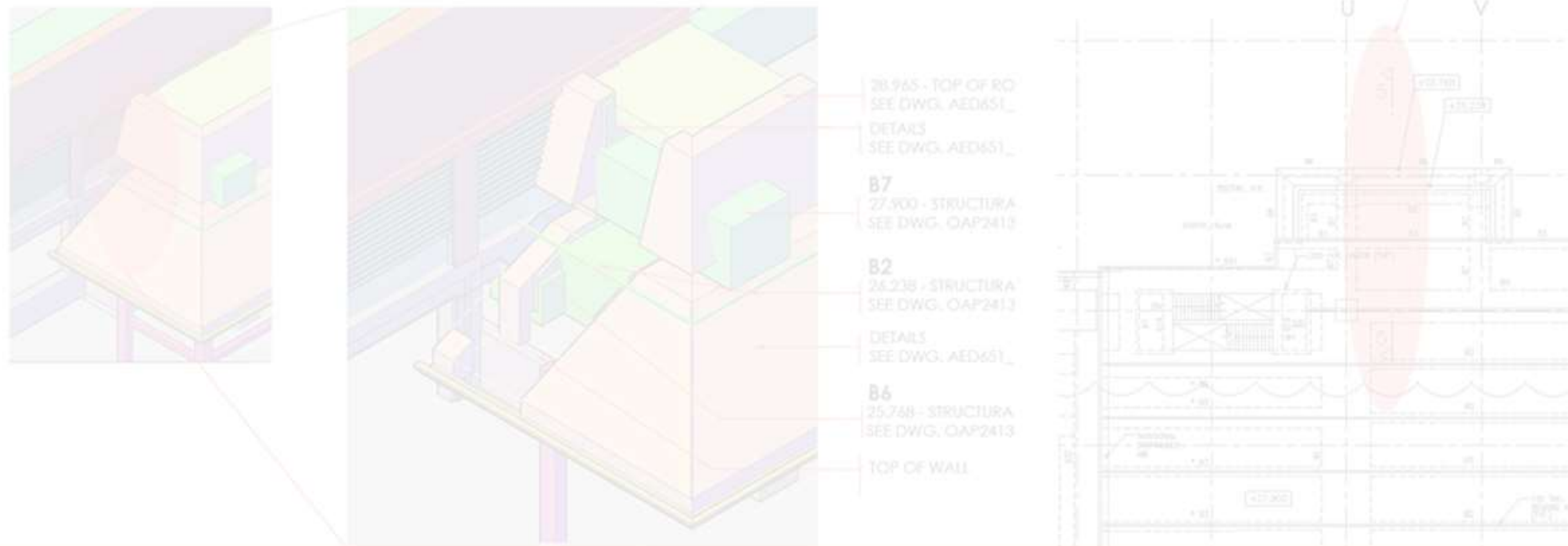




## Building Information Modelling

## Intelligent 3D Design Tools

CitA BIM Gathering 2023

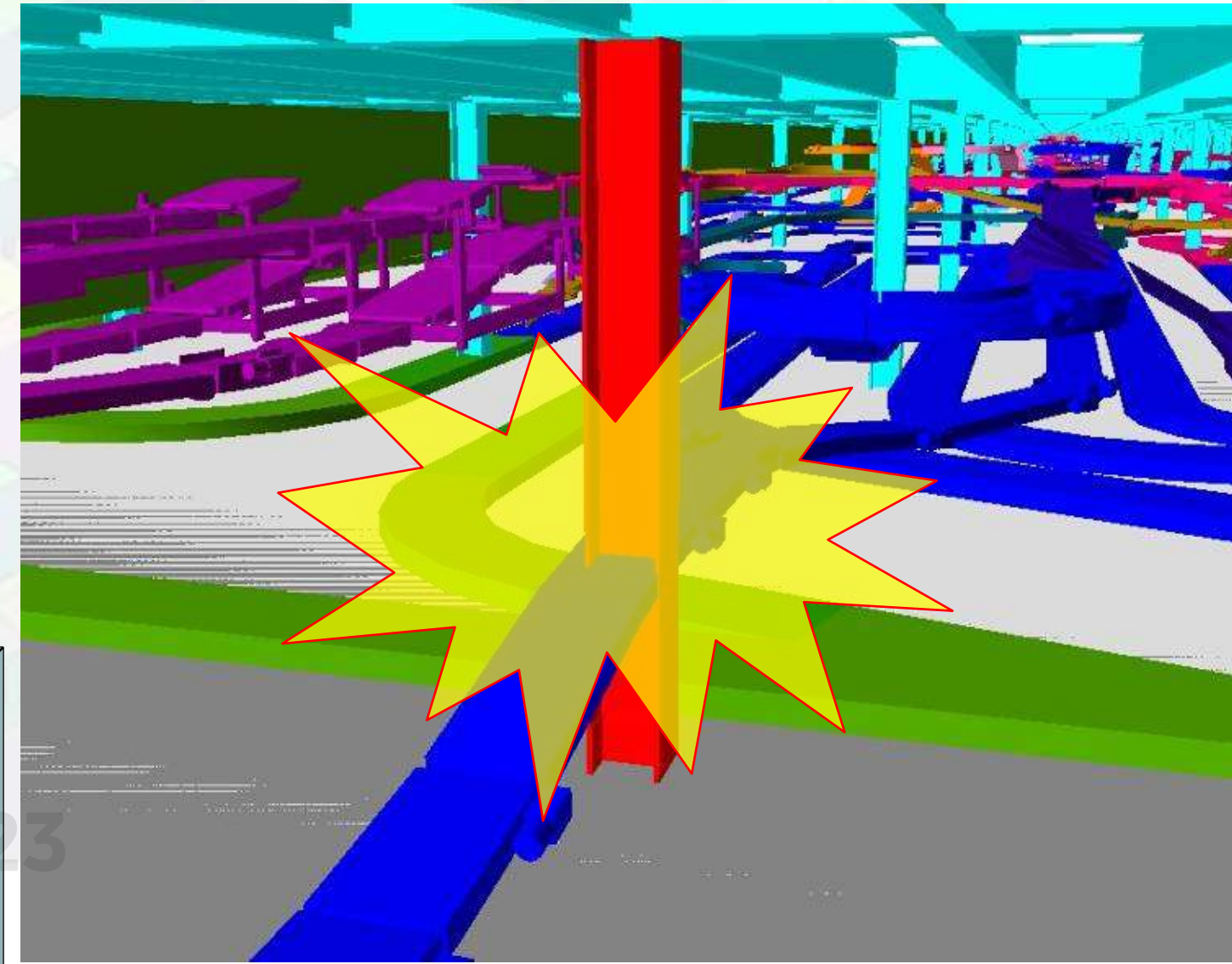
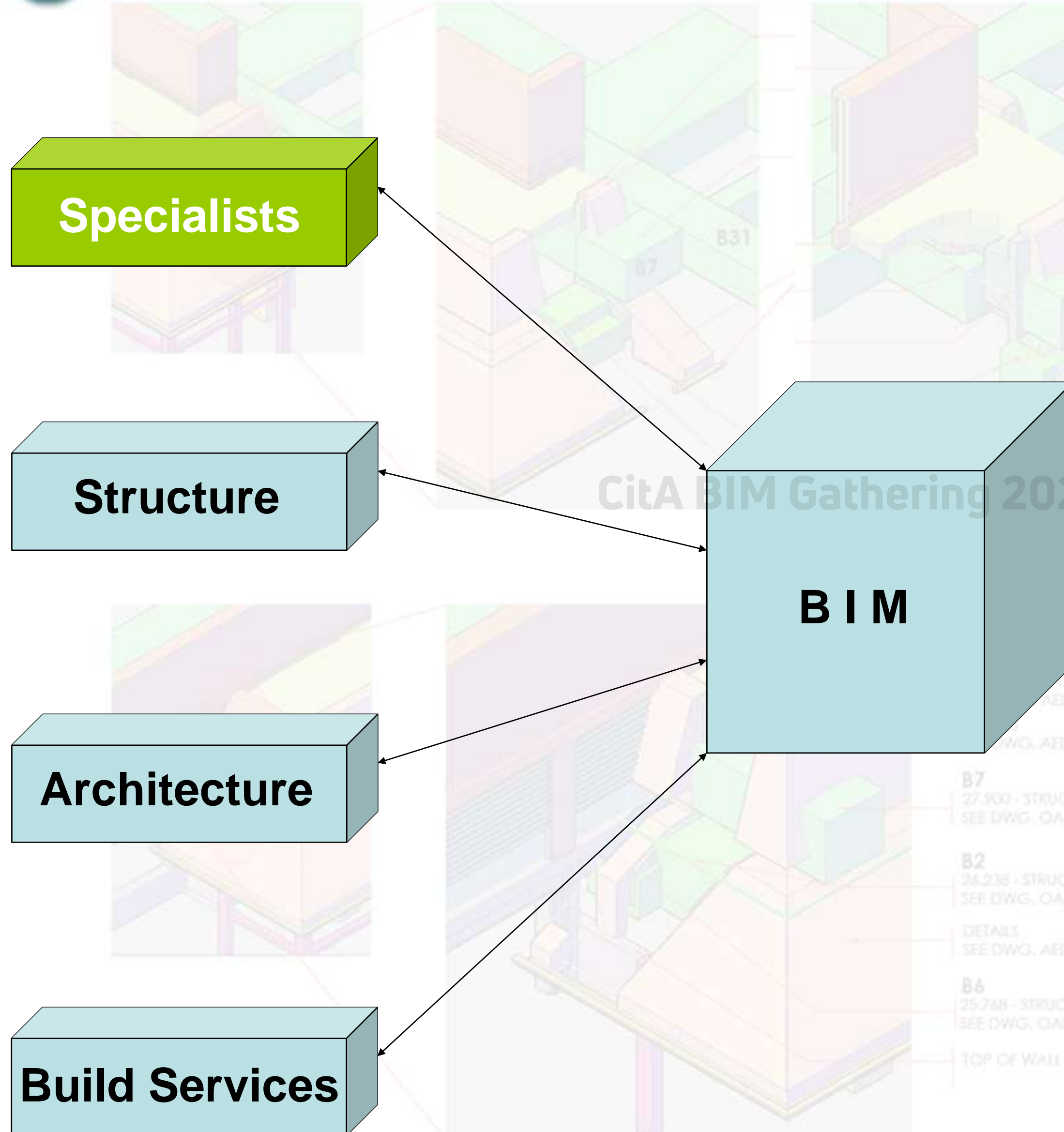






# Clash Analysis

CONSULT 3D  
DIGITAL DESIGN DIMENSION



- Design Co-ordination
- Clash Analysis



CitA BIM Gathering 2023

B7  
27.900 - STRUCTURA  
SEE DWG. OAP2413

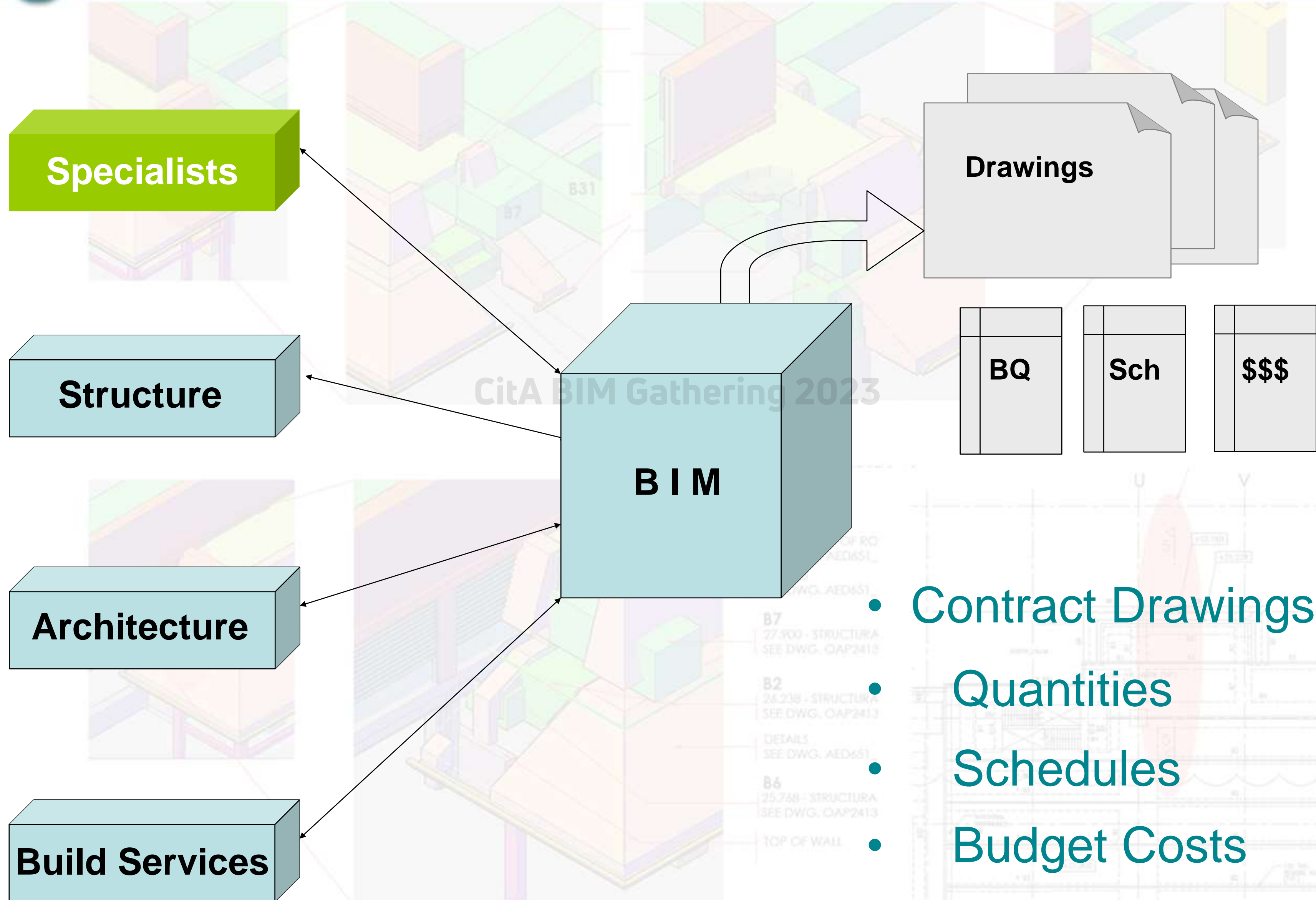
B2  
26.238 - STRUCTURA  
SEE DWG. OAP2413

DETAILS  
SEE DWG. AED651

B6  
25.768 - STRUCTURA  
SEE DWG. OAP2413

TOP OF WALL



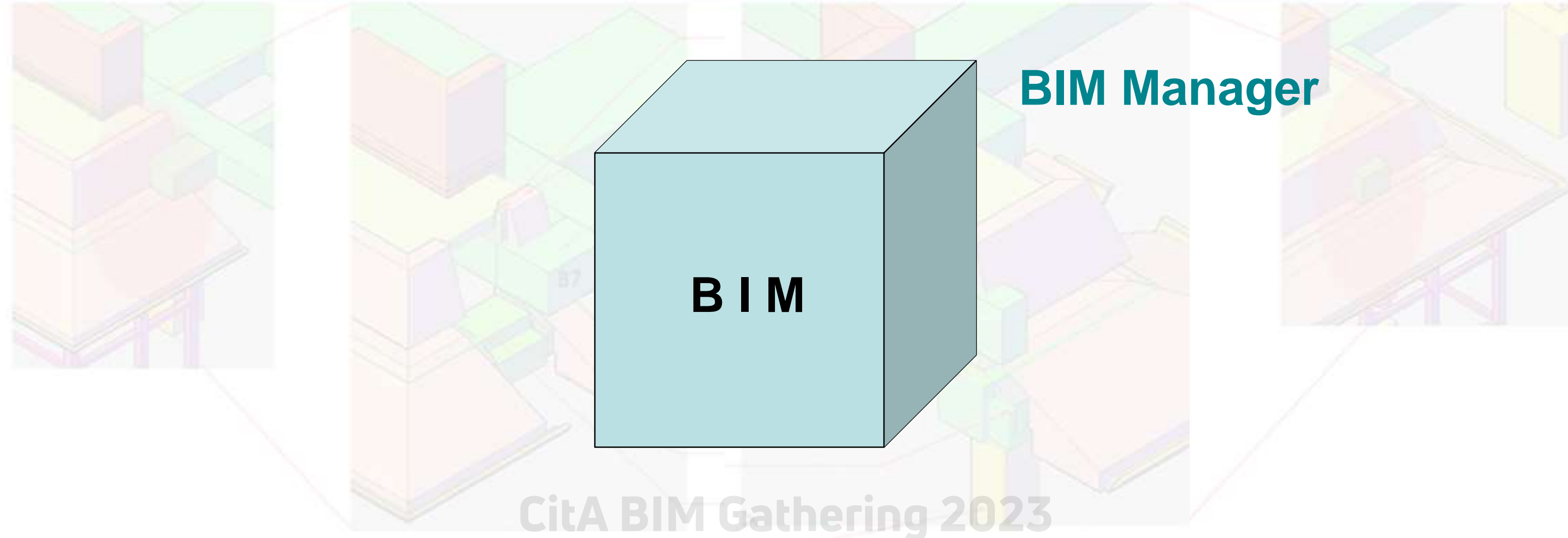






# BIM Team

CONSULT 3D  
DIGITAL DESIGN DIMENSION



## Specialists

### Structure

### Architecture

### Build Services

Civil Engineer  
Structural Engineer  
3D CAD Technician

Architect  
3D CAD Technician  
3D CAD Technician

Mechanical Engineer  
Electrical Engineer  
3D AC Technician  
3D Elec Technician  
3D P&D Technician  
3D FS Technician







1996



2000



1999

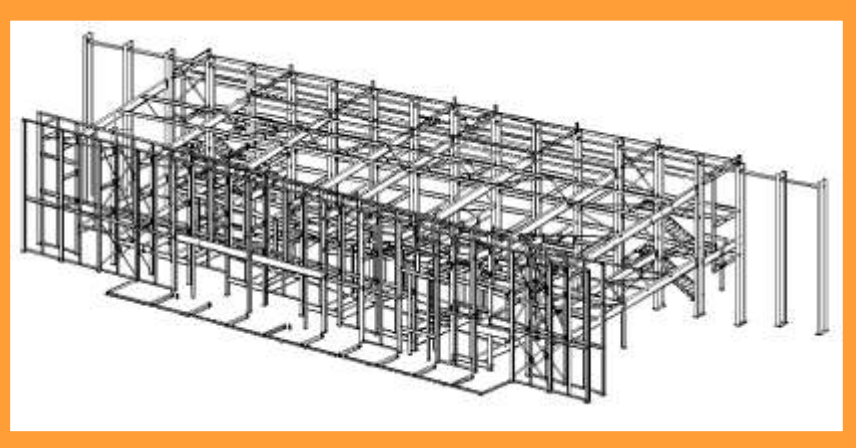


2003

ARUP,  
Ireland

ARUP,  
Hong Kong

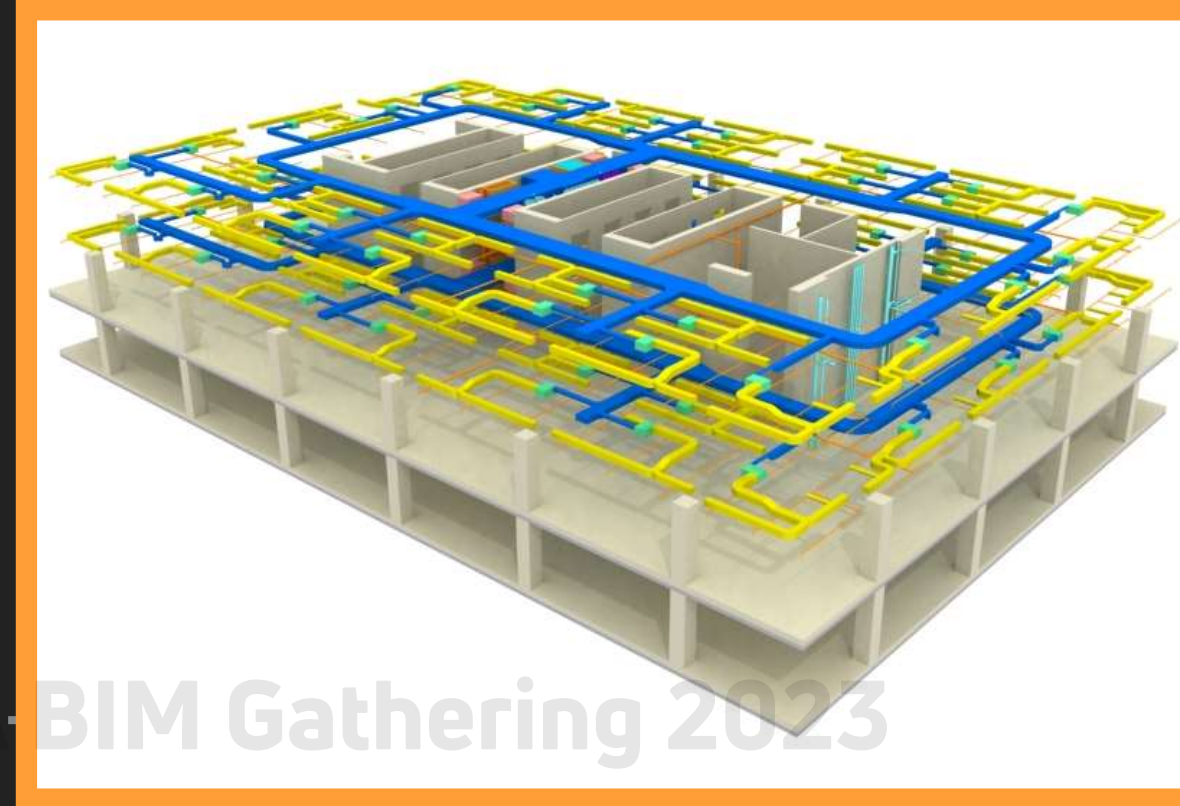
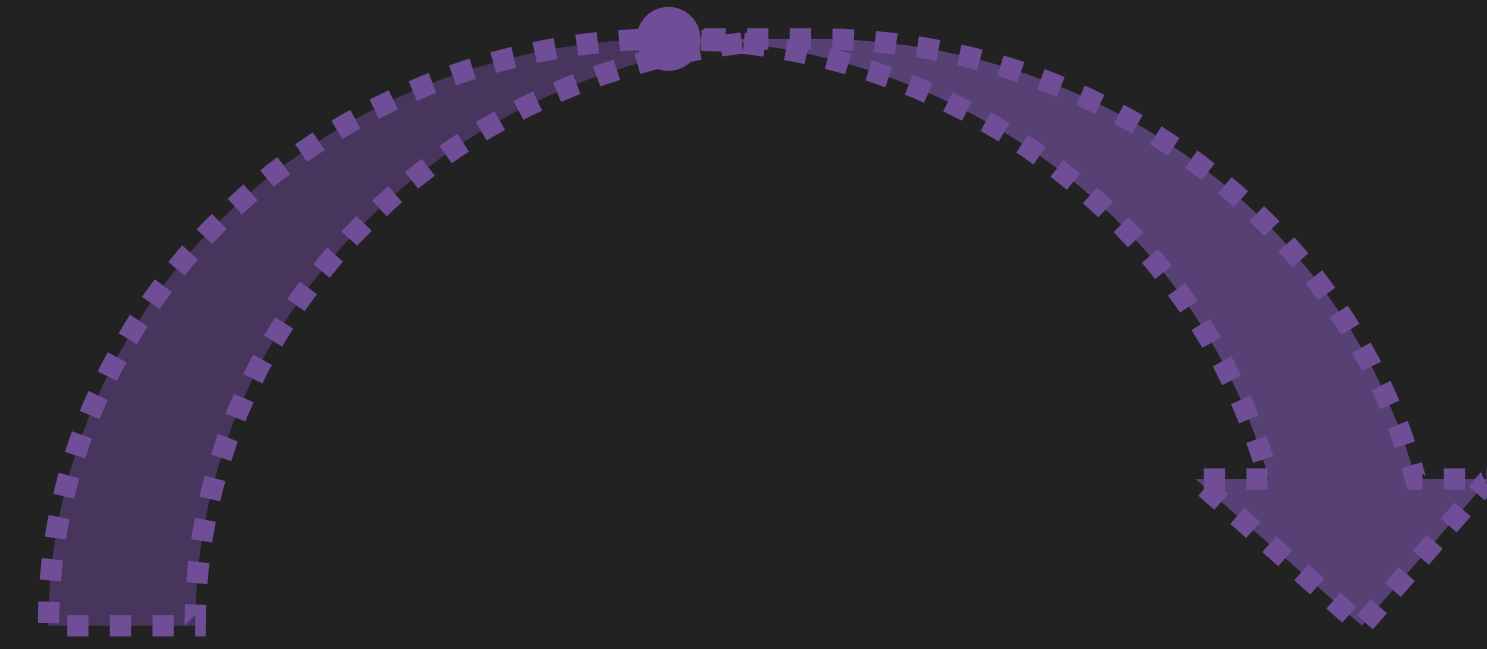
Consult 3D  
Hong Kong



EXPO 2000



2003, My First Office



BIM Gathering 2023

2003/2007



2023

**Autodesk Forma** is an ambitious project to reimagine how the AECO industry works across all disciplines and phases of planning, design, construction, and operations.



# **AUTODESK** **Forma**

Autodesk are going to **bet big on AI**

Advance the mission to reimagine the way customers **capture, utilize, and exchange data.**

**Empowering the AEC industry** by transforming how AEC professionals use data to capture knowledge, inform decisions, and deliver projects.

Introduce new **data workflows** for customers. Define how AEC data is stored and exchanged between teams, companies, and applications and **foster the creation** of the data infrastructure on which Autodesk's future AEC products will be built.



Are You Ready for the changes AI will bring  
... to engineering & design coordination?



1996



2000



2007



2008



1999

2003

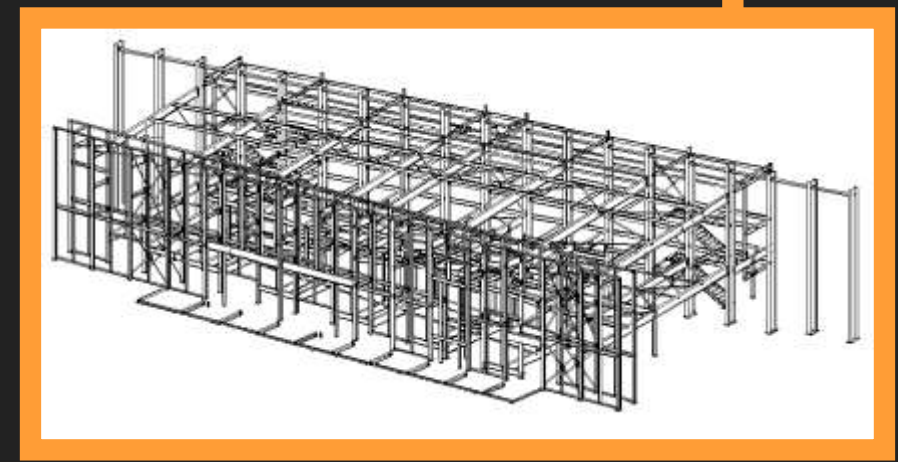


ARUP,  
Ireland

ARUP,  
Hong Kong

Consult 3D  
Hong Kong

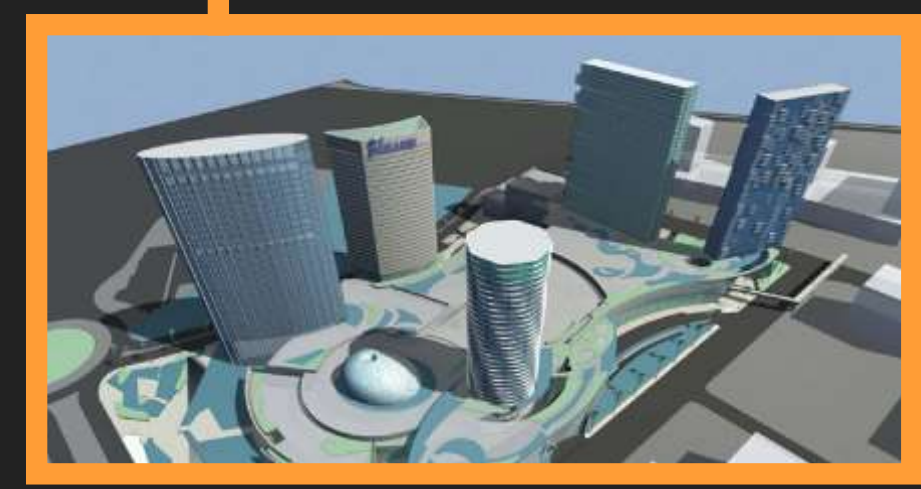
InteliBuild  
Hong Kong



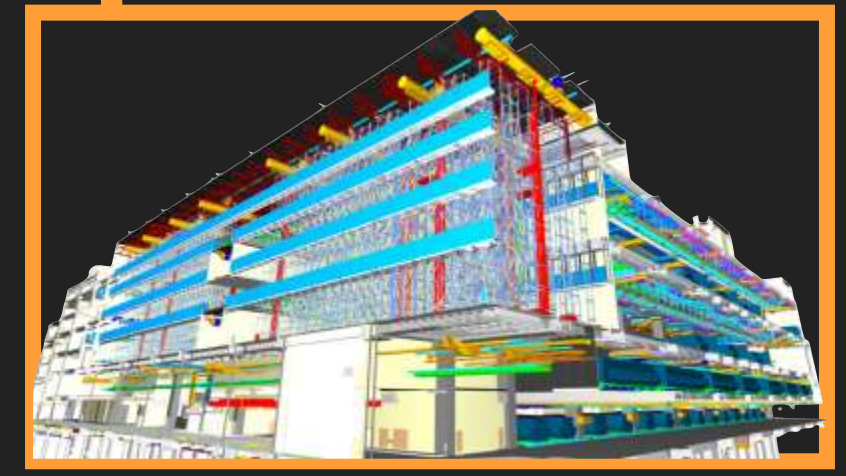
EXPO 2000 Pavilion



3D Modelling & 4D Simulations



City of Dreams Macau

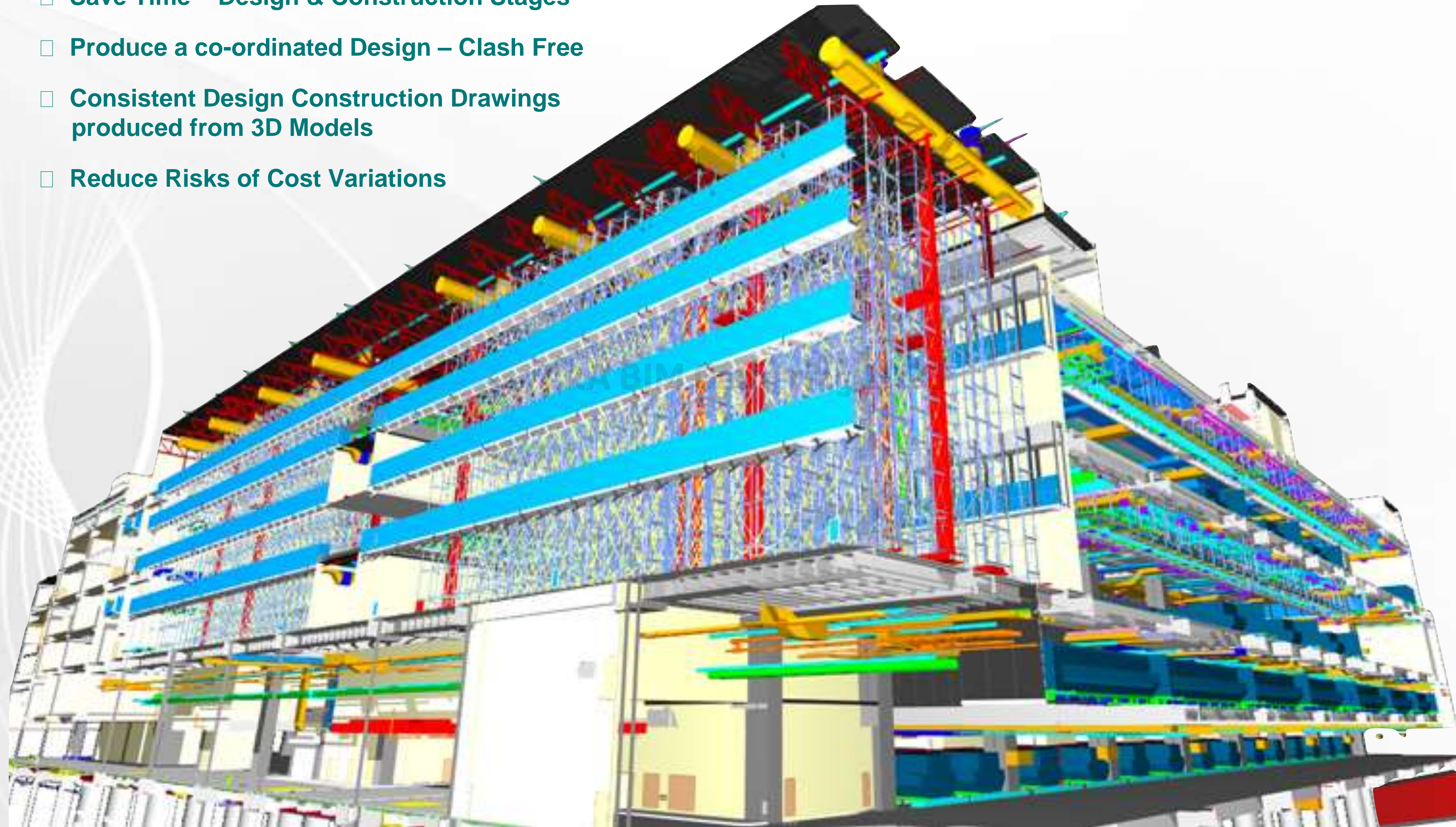


CX Air Cargo Terminal



# Cathay Pacific Cargo Terminal, Hong Kong

- Save Time – Design & Construction Stages
- Produce a co-ordinated Design – Clash Free
- Consistent Design Construction Drawings produced from 3D Models
- Reduce Risks of Cost Variations



**INTELIBUILD**

Virtual Design and Construction  
Virtual Design and Construction

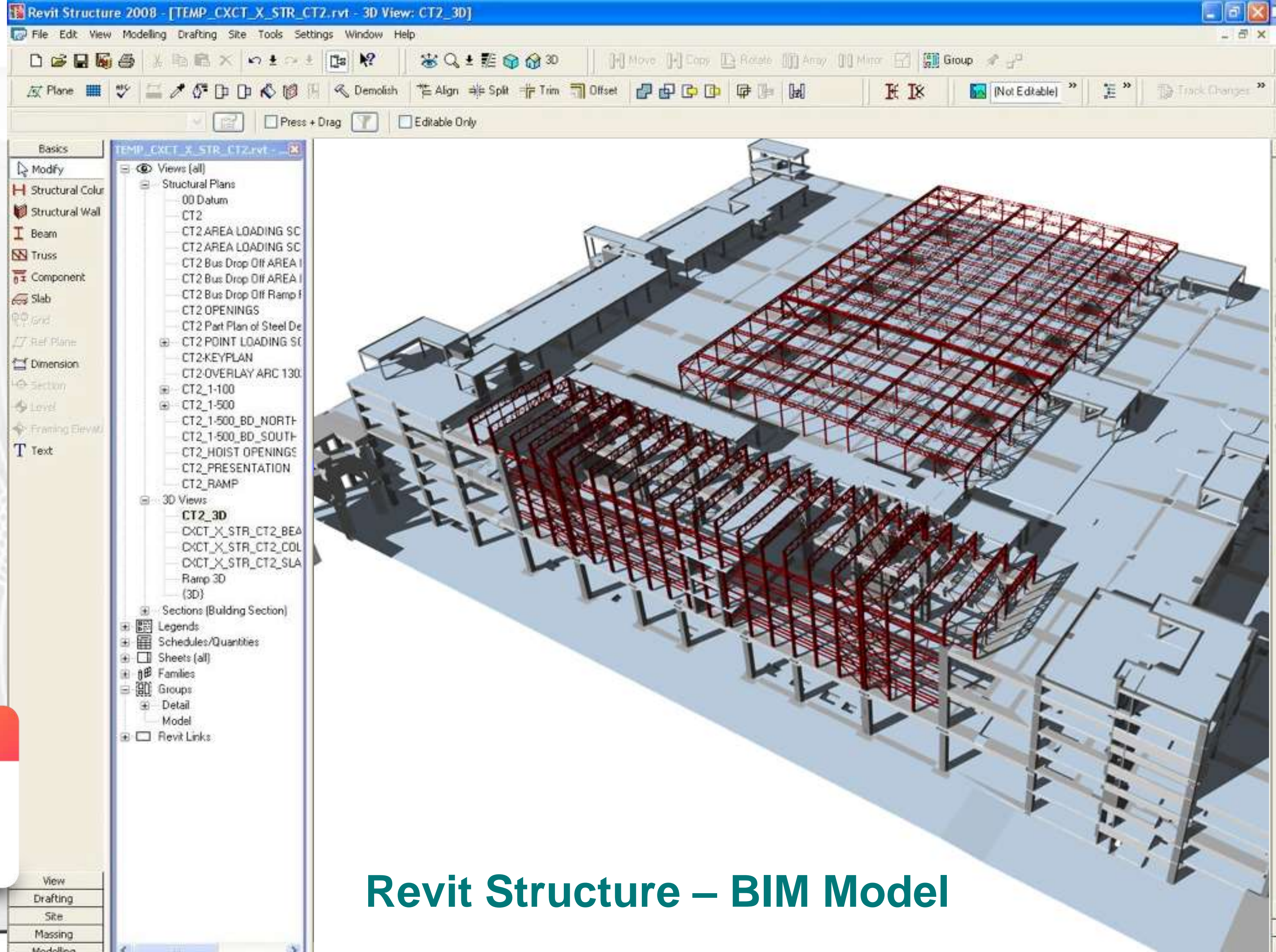


CT1



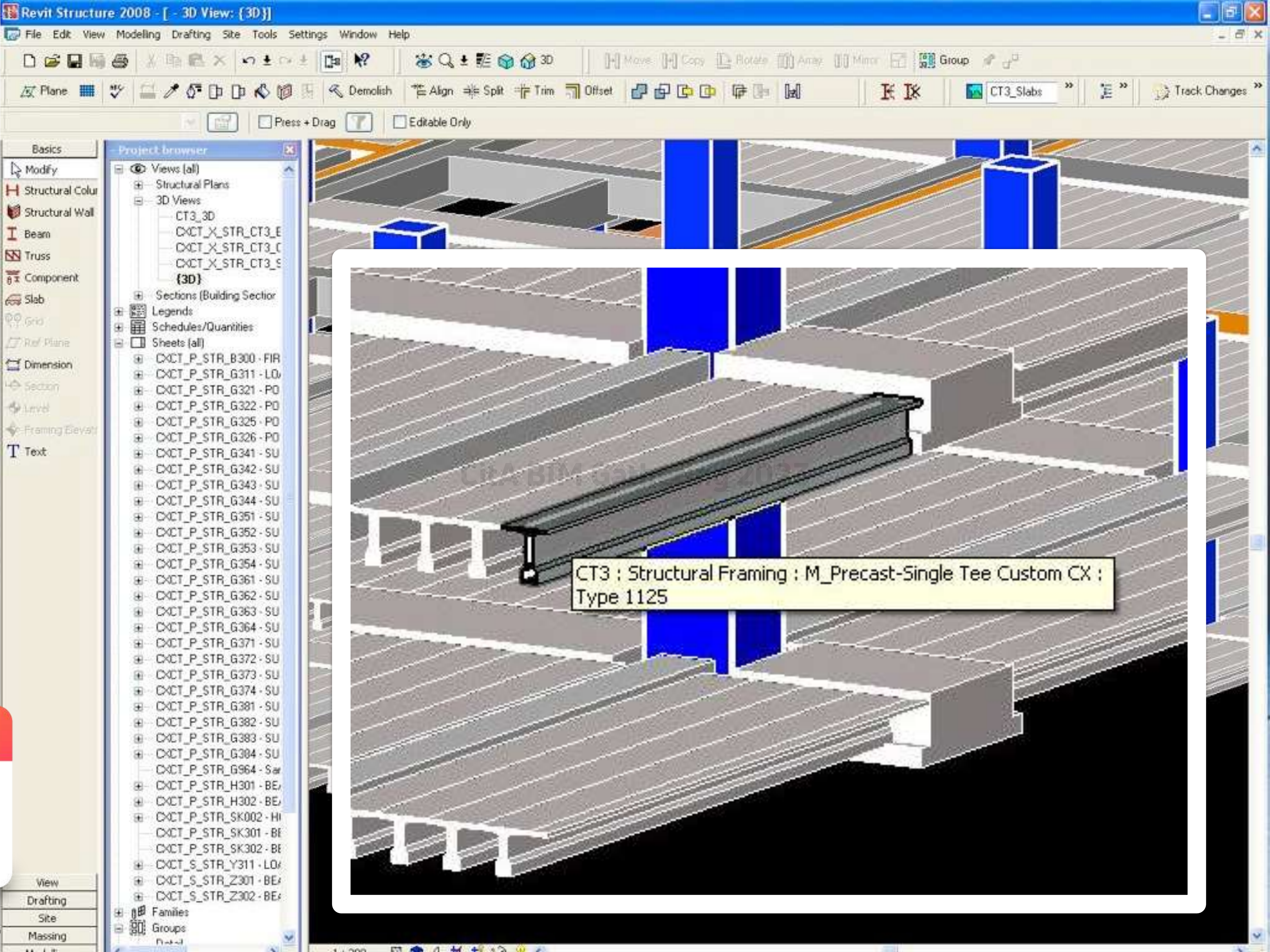
# Digital Twin !!





**Revit Structure – BIM Model**

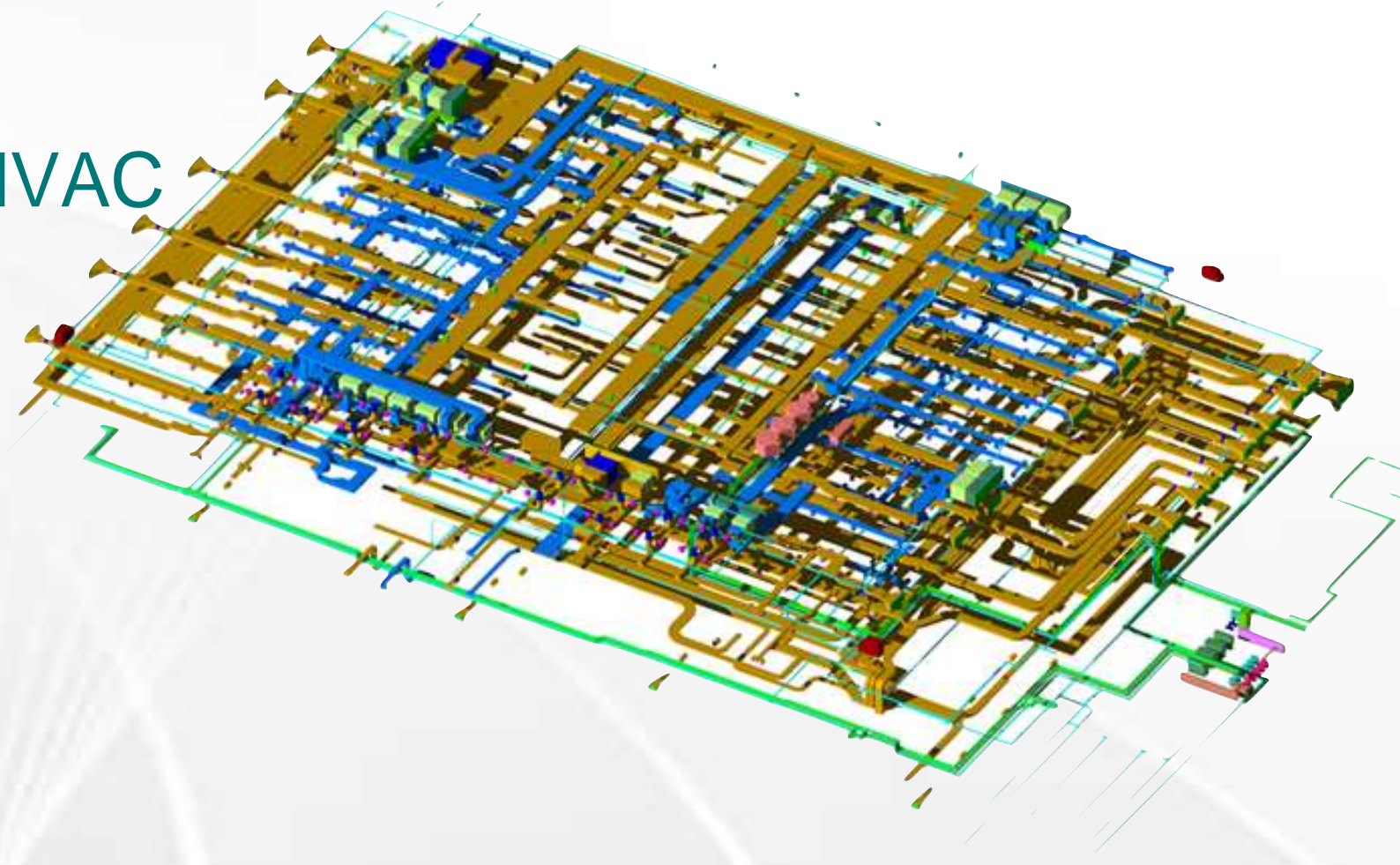




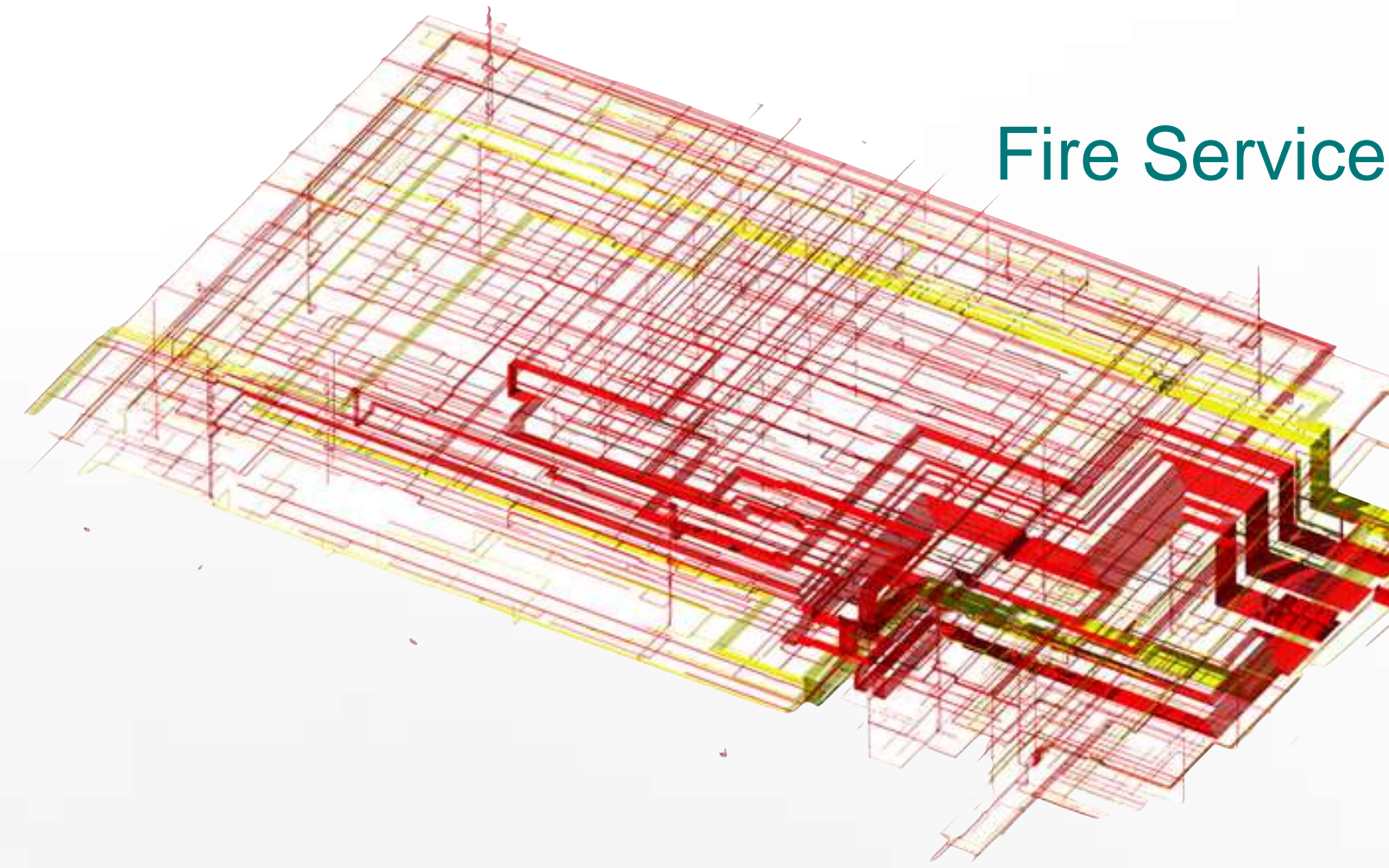


# MEP Co-ordination Models

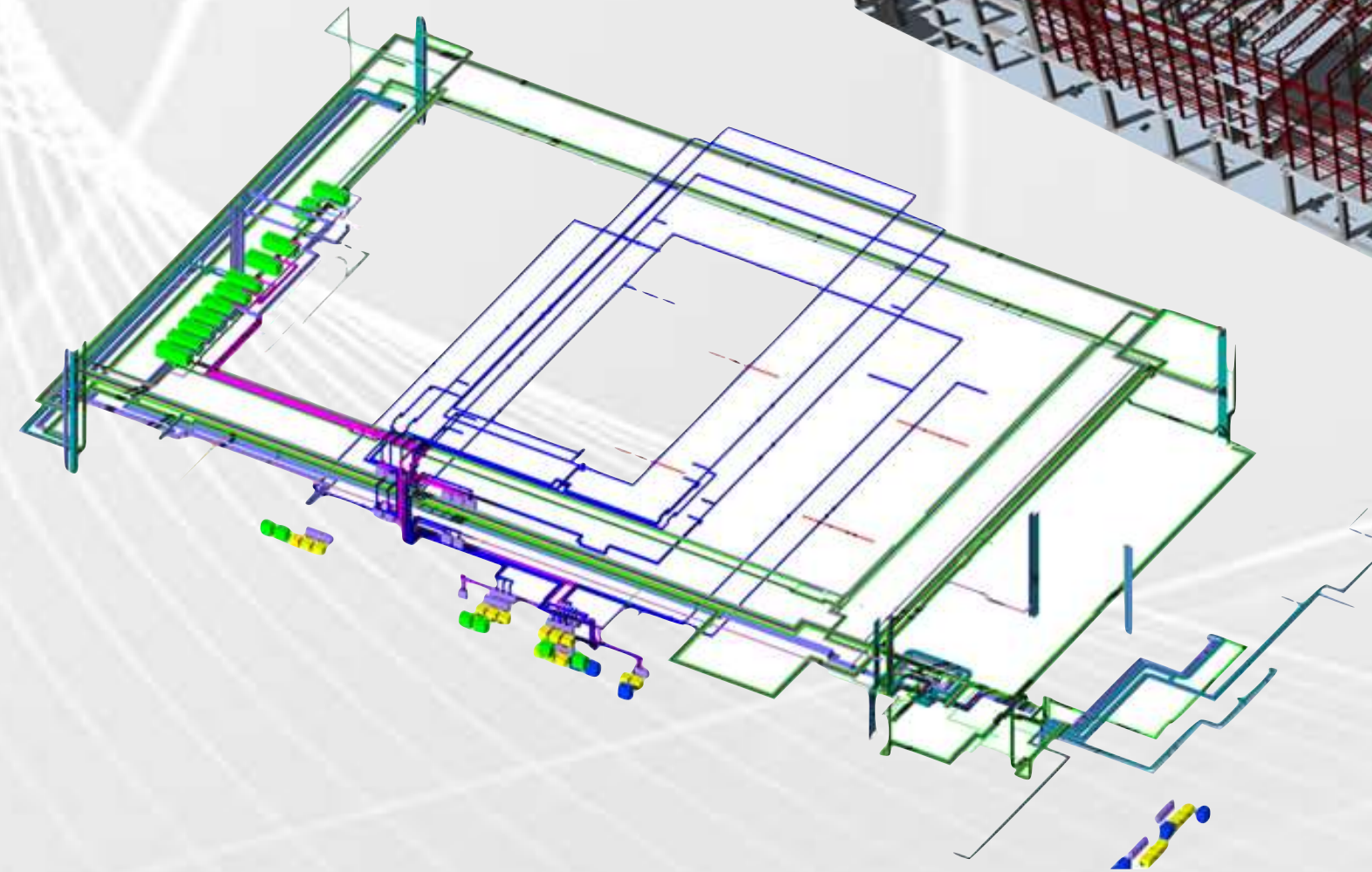
MVAC



Fire Services

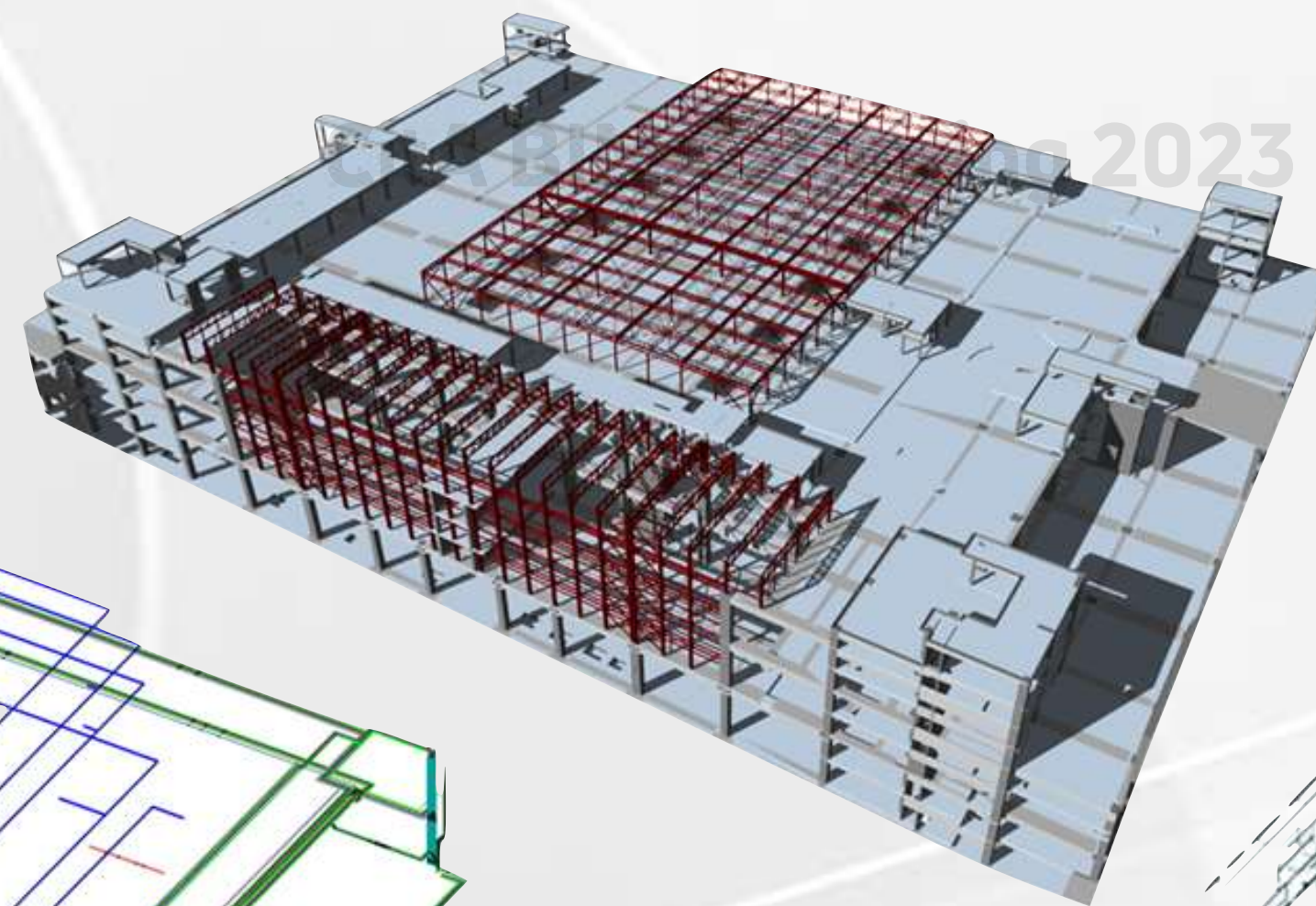


Electrical

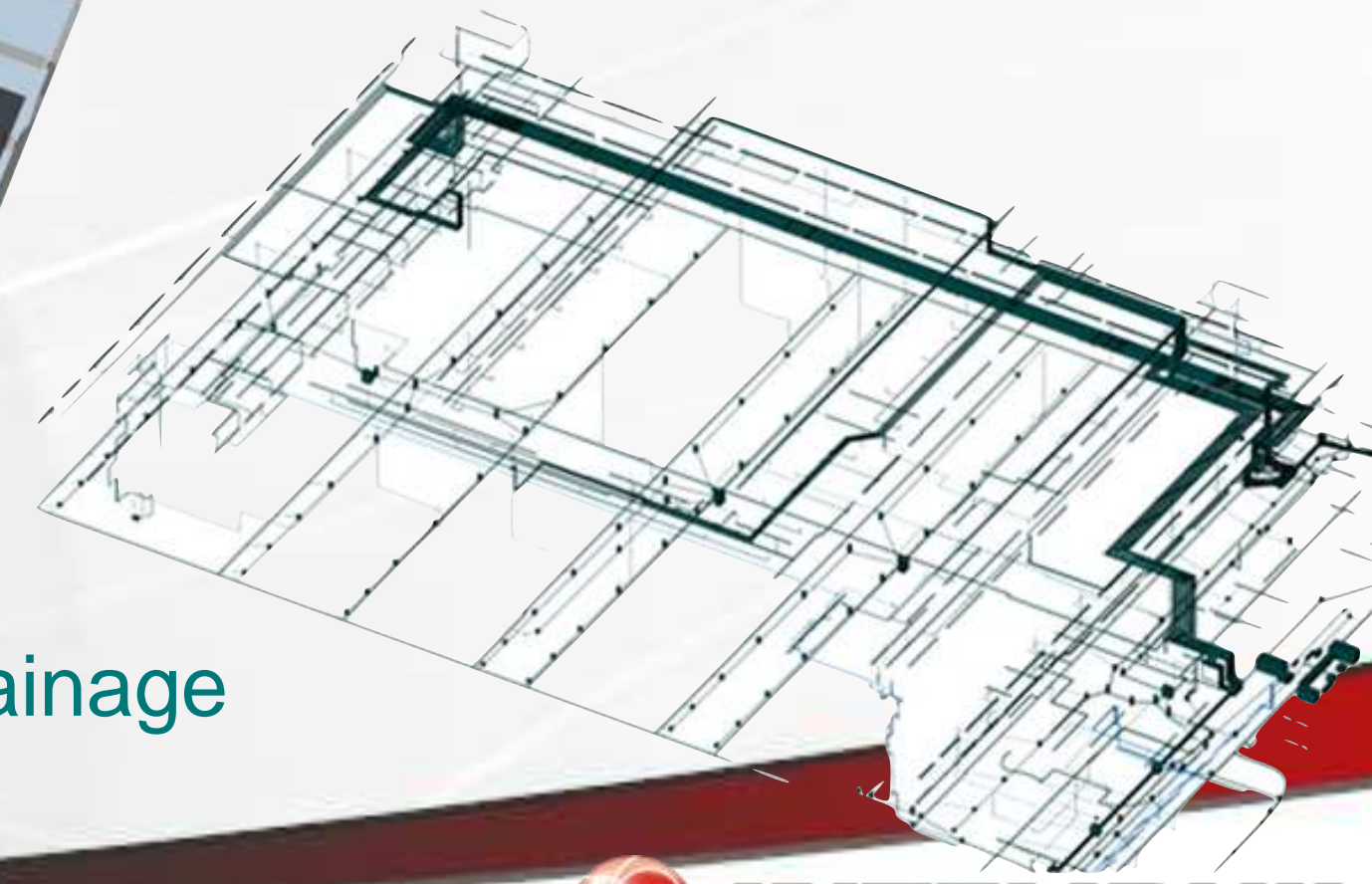


2023

Structure



Drainage





# MVAC - 3D Systems

No.	Definition	Y	N	Attributes*	Quantity	Cat. ID
<b>Mechanical Elements</b>						
	Different sheet metal ductwork systems will be modelled excluding hangars; Exhaust air ducts, Fresh air ducts, Supply air ducts, Return air ducts, Transfer air ducts	Y Y Y Y Y		m, t, s	m	EAD FAD SAD RAD TAD
	Exhaust or extract air fans	Y		t, s	No.	EAF
	Fresh air fans	Y		t, s	No.	FAF
	Other fans such as jet fans	Y		t, s	No.	FAN
	Diffusers, air-boots, air grilles, air filters, registers	Y		t, s	No.	AIR
	Fire dampers, motorized dampers, volume control dampers	Y		t	No.	DAM
	Fan Coil unit	Y		t	No.	FCU
	Air Handling unit	Y		t, s	No.	AHU
	Chiller unit	Y		t	No.	CHL
	Variable refrigerant unit	Y		t	No.	VRV
	Cooling Tower	Y		t	No.	COT
	Split-type indoor & outdoor air conditioning units	Y		t	No.	ACU
	Chilled water supply pipes incl connections, fittings & valves	Y		t, s	m	CWS
	Chilled water return pipes incl connections, fittings & valves	Y		t, s	m	CWR
	Condensate drain pipes incl connections, fittings & valves	Y		t, s	m	CDP
	Switch boards, control, BMS & DDC panels, BMS control & monitoring modules	Y		t	No.	PAN

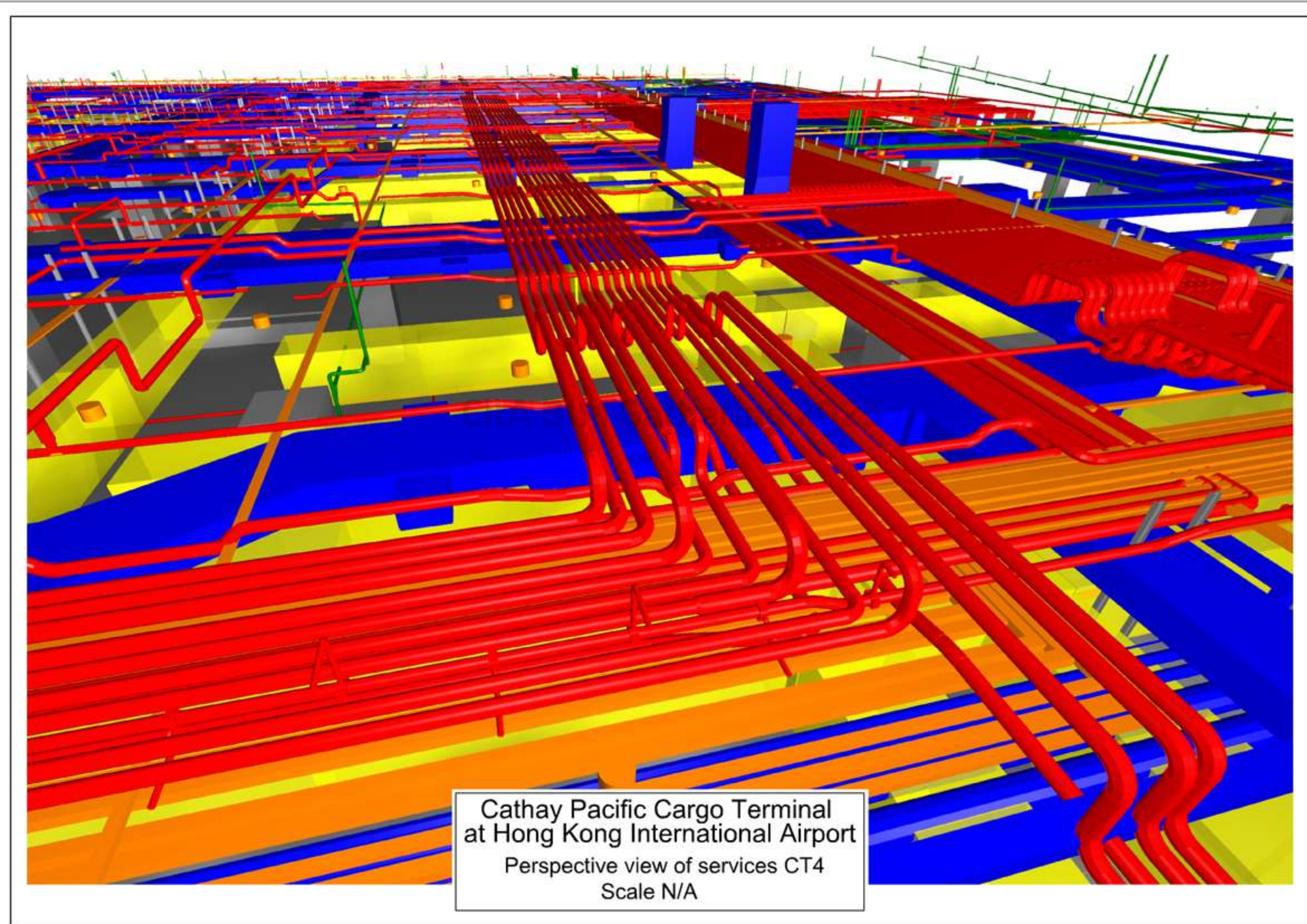
CIA BIM Gathering 2023



2007

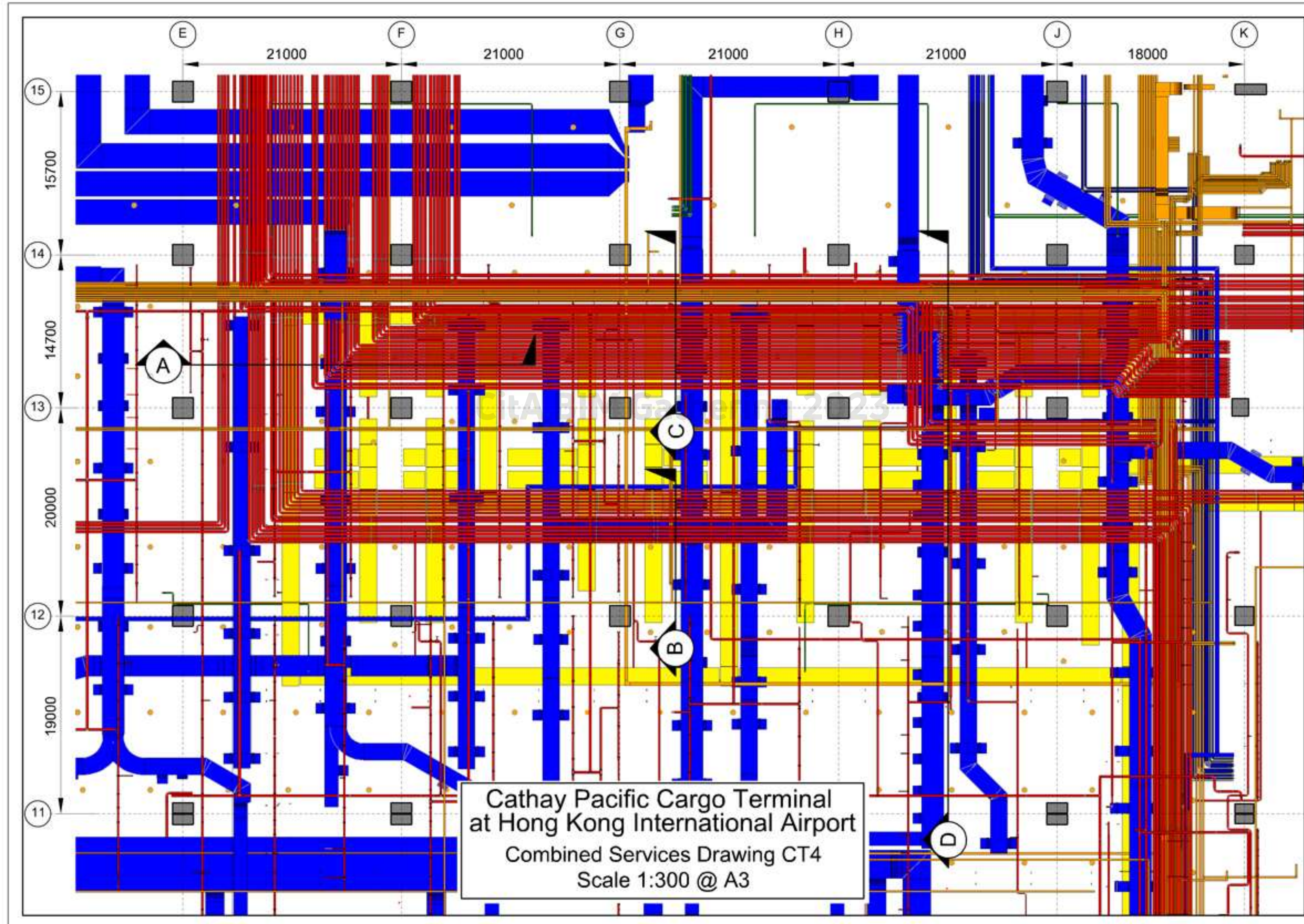


# Drawings from 3D Models

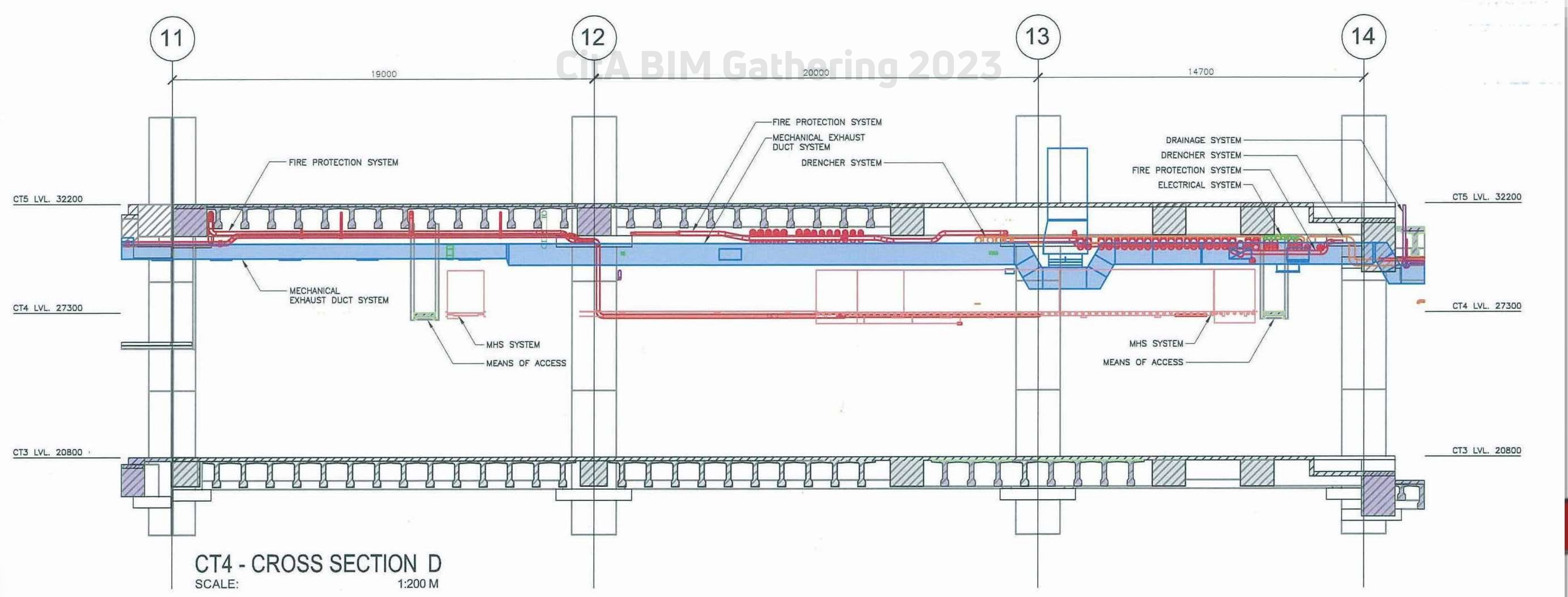
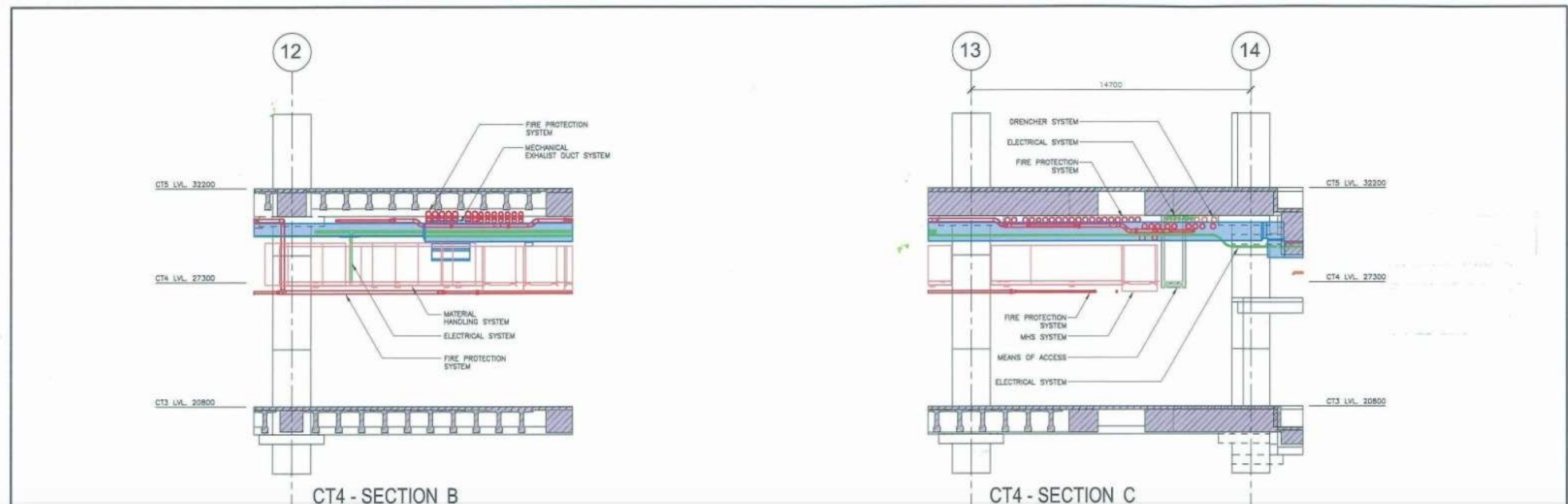




# DESIGN STAGE CSD



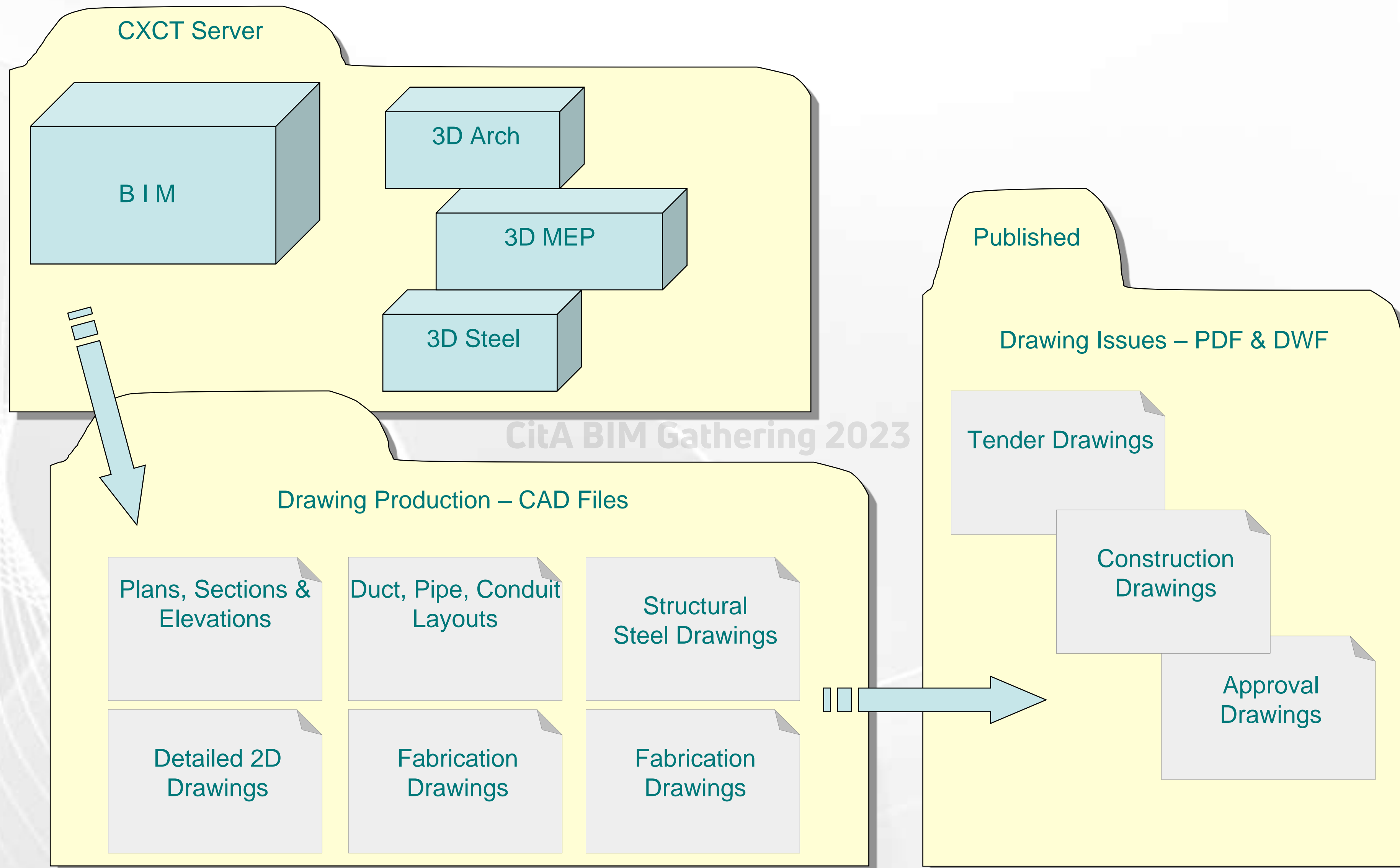




CIA BIM Gathering 2023

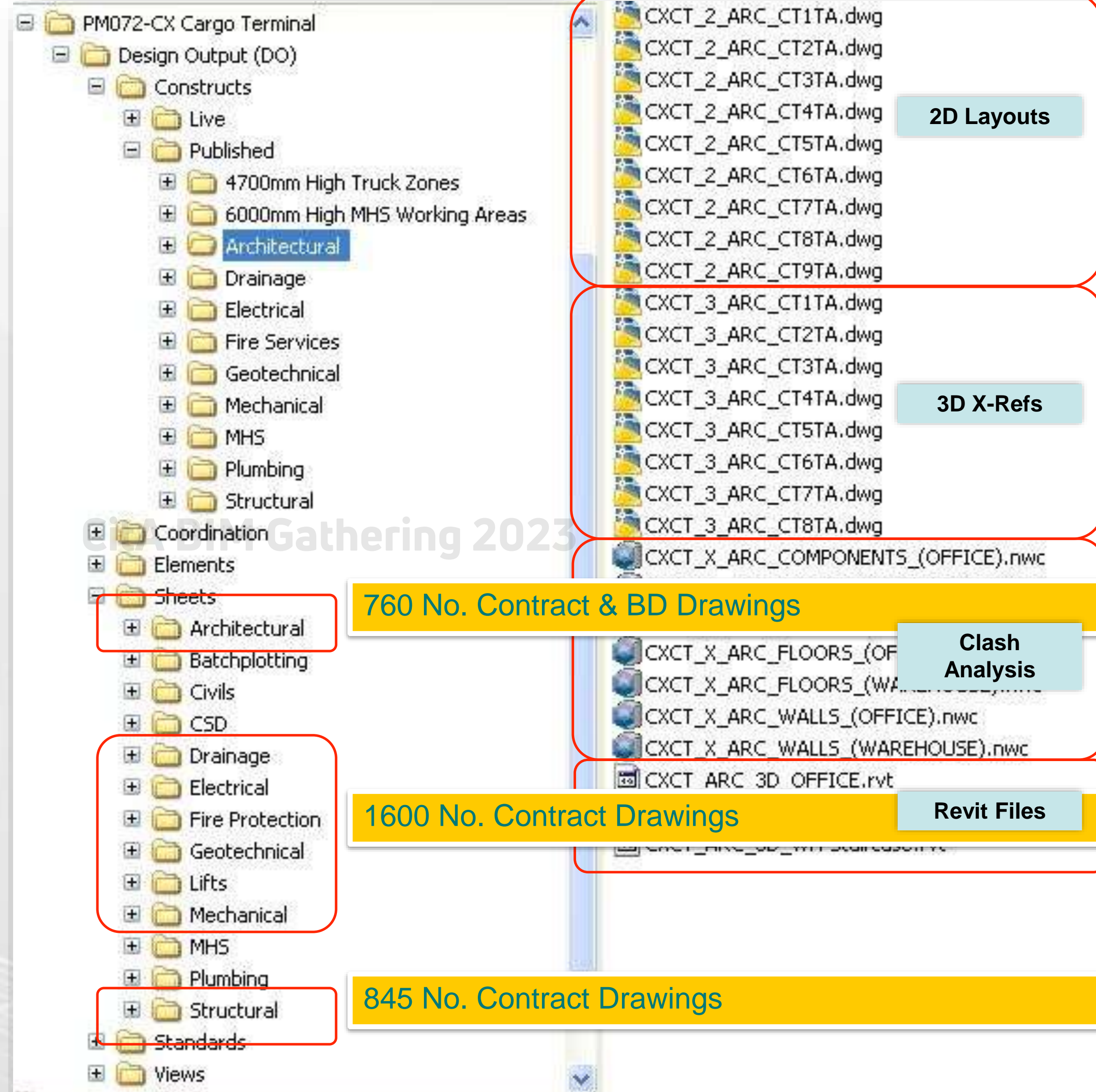
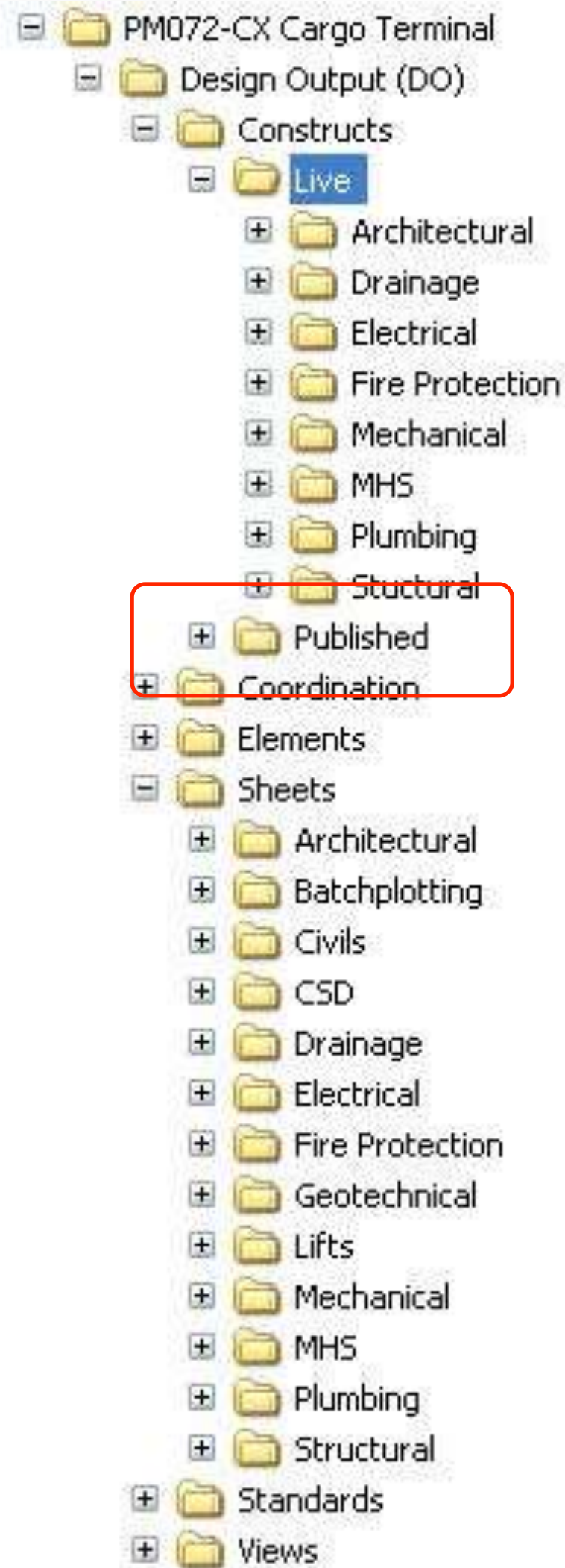


# Drawing Production Management





# Project Information Management



2D Layouts

3D X-Refs

760 No. Contract & BD Drawings

Clash Analysis

1600 No. Contract Drawings

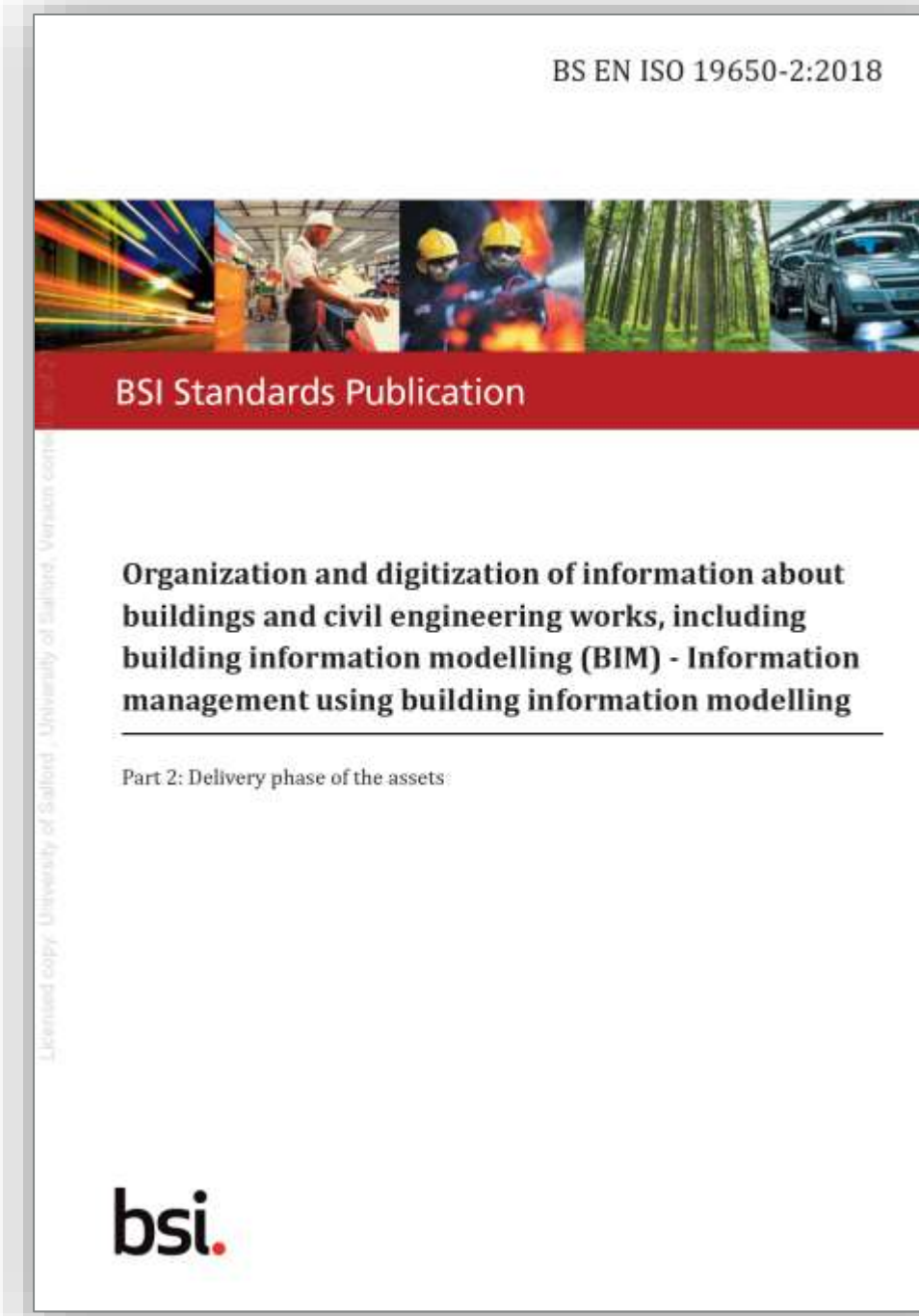
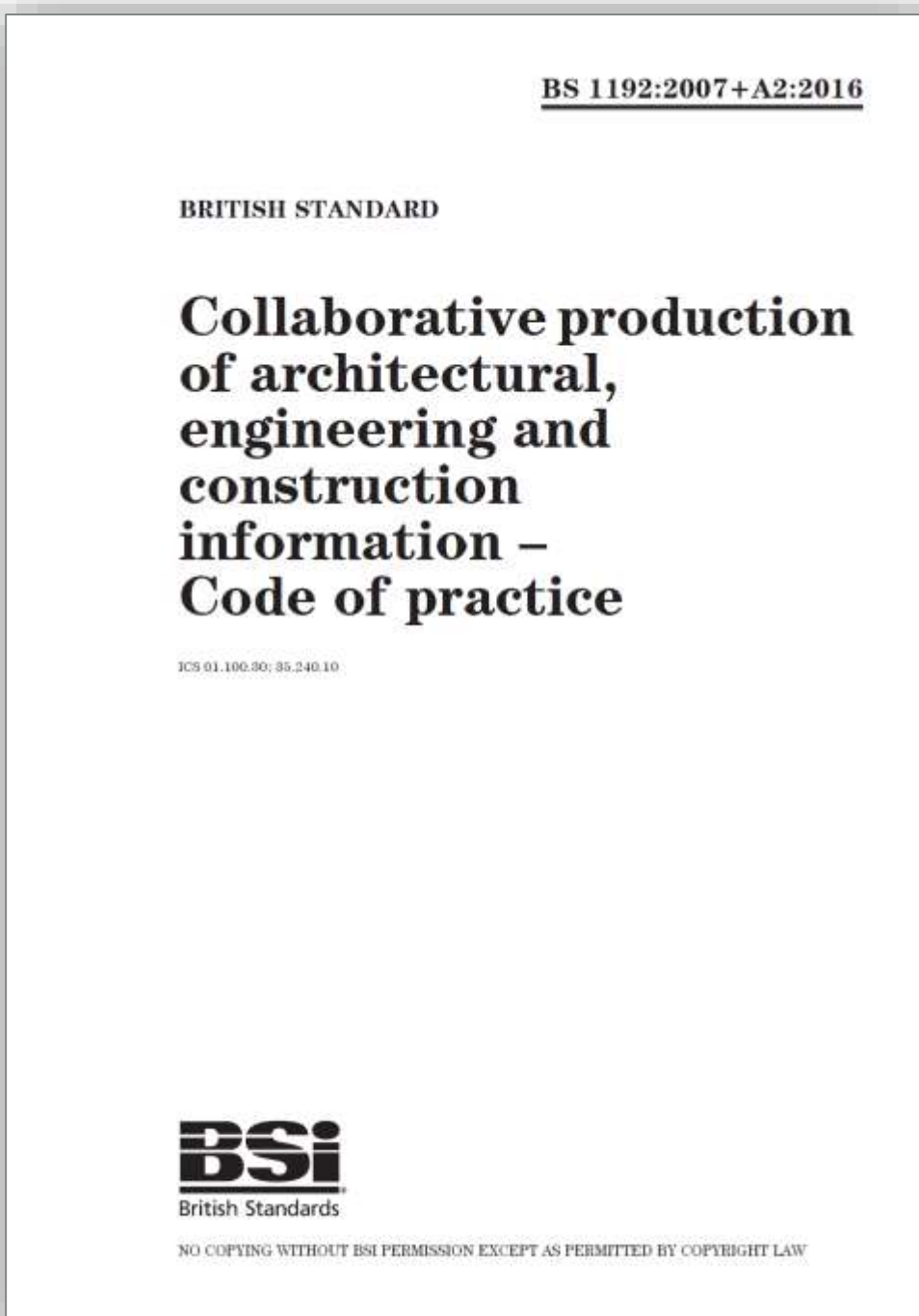
Revit Files

845 No. Contract Drawings





# PROJECT INFORMATION STANDARDS





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## CitA BIM Gathering 2023





# Clash Detection Matrix

Clash Identifications & Tolerances	6.0m Working Areas		MHS Equipment (8 series)					STR Cols & Walls			ARC Walls		Drainage					HVAC		Electrical		Fire Protection		Plumbing	
	4.7m Truck Paths		1-A	1-B	N/A 2	3	N/A	STR Cols	STR Beams (incl corbels)	STR Foundations	STR Slabs	ARC Walls	ARC Components	Drainage	HVAC	Electrical	Fire Protection	Plumbing							
STR Cols	N/A		1-A 50 C	1-B 10 H	N/A 2 50 C	3 50 C	N/A																		
STR Beams (incl corbels)	4-B 10 H		5-A 50 C	5-B 10 H	6 TBC	7-A 50 C	7-B 10 H																		
STR Foundations	N/A	N/A			9 50 C	N/A	N/A																		
STR Slabs	N/A	N/A	10-A 10 H	10-B 10 H	11 50 C	12 50 C	N/A																		
ARC Walls	13-A 10 H	13-B 10 H	14-A 50 C	14-B 50 C	N/A	15-B 50 C	19 10 H	N/A	N/A	N/A															
ARC Components	16-A 10 H	16-B 10 H	17-A 50 C	17-B 50 C	N/A	18-A 50 C	18-B 50 C	18-C 10 H	N/A	N/A															
Drainage	21-A 50 C	21-B 50 C	22-A 50 C	22-B 50 C	N/A	23-A 50 C	23-B 50 C	36 50 C	37 50 C	75 C	47 50 C	48 50 C	49 50 C												
HVAC	24-A 75 C	24-B 75 C	25-A 75 C	25-B 75 C	N/A	26-A 50 C	26-B 50 C	39 50 C	40 50 C	N/A	N/A	57 50 C	58 75 C												
Electrical	27-A 50 C	27-B 50 C	28-A 50 C	28-B 50 C	N/A	29-A 50 C	29-B 50 C	41 50 C	42 50 C	N/A	N/A	52 50 C	53 50 C	75 C											
Fire Protection	30-A 25 C	30-B 25 C	31-A 25 C	31-B 25 C	N/A	32-A 50 C	32-B 50 C	43 25 C	44 25 C	N/A	N/A	54 25 C	55 25 C	61 75 C											
Plumbing	33-A 50 C	33-B 50 C	34-A 50 C	34-B 50 C	N/A	35-A 50 C	35-B 50 C	45 50 C	46 50 C	47 75 C	N/A	56 50 C	57 50 C	64 75 C	65 75 C	66 75 C									

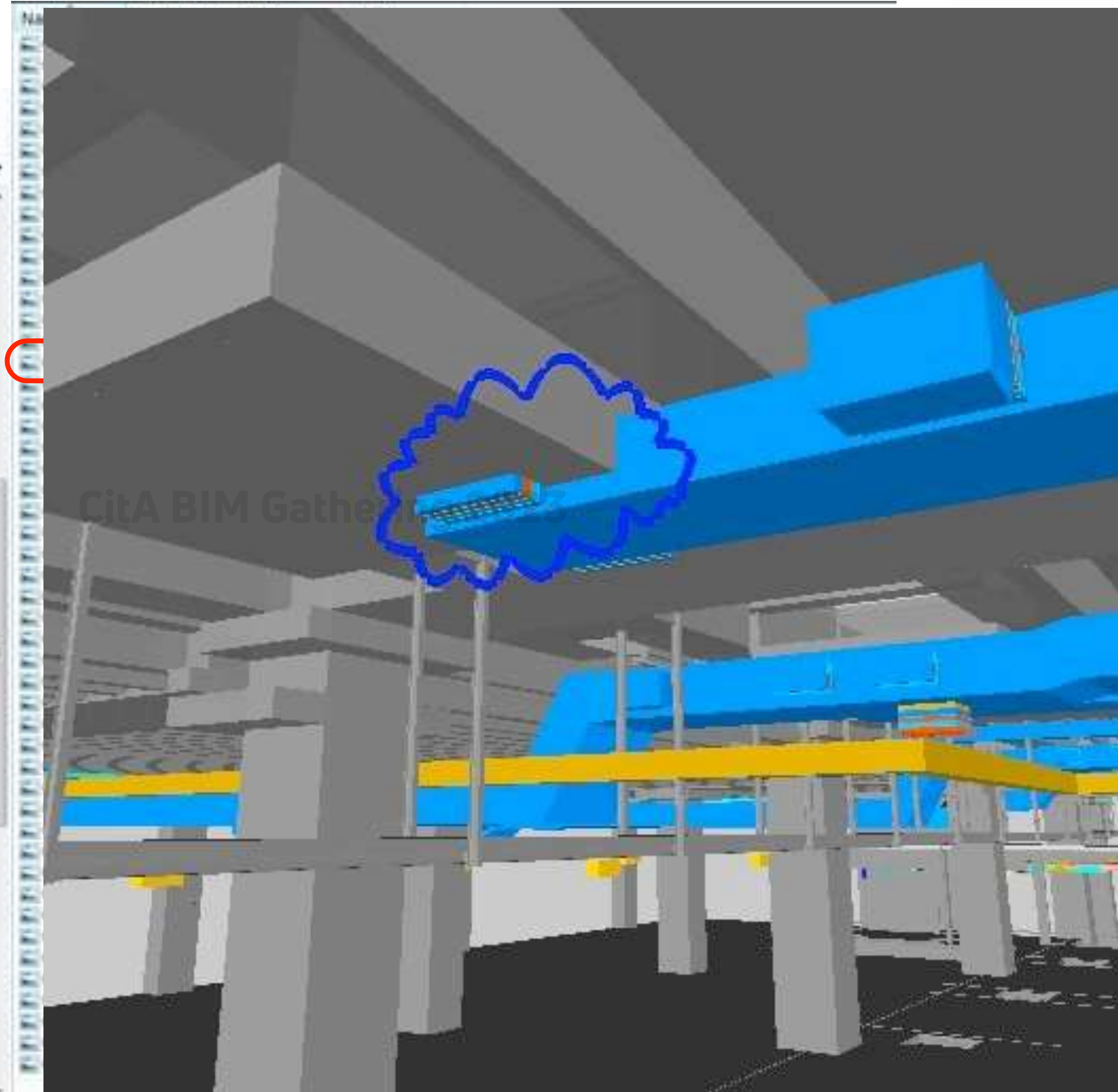
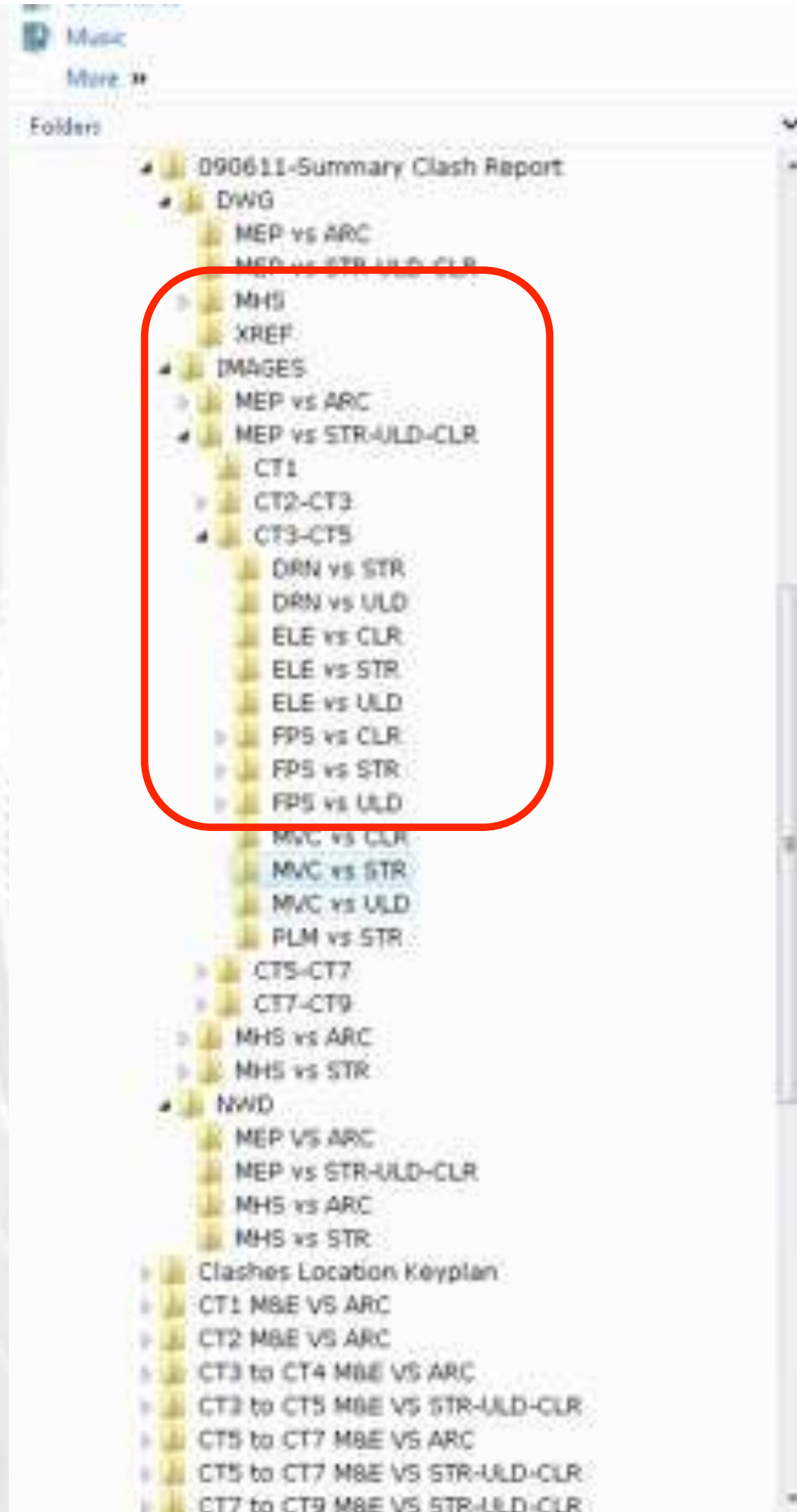
HIGHEST PRIORITY



LOWER PRIORITY



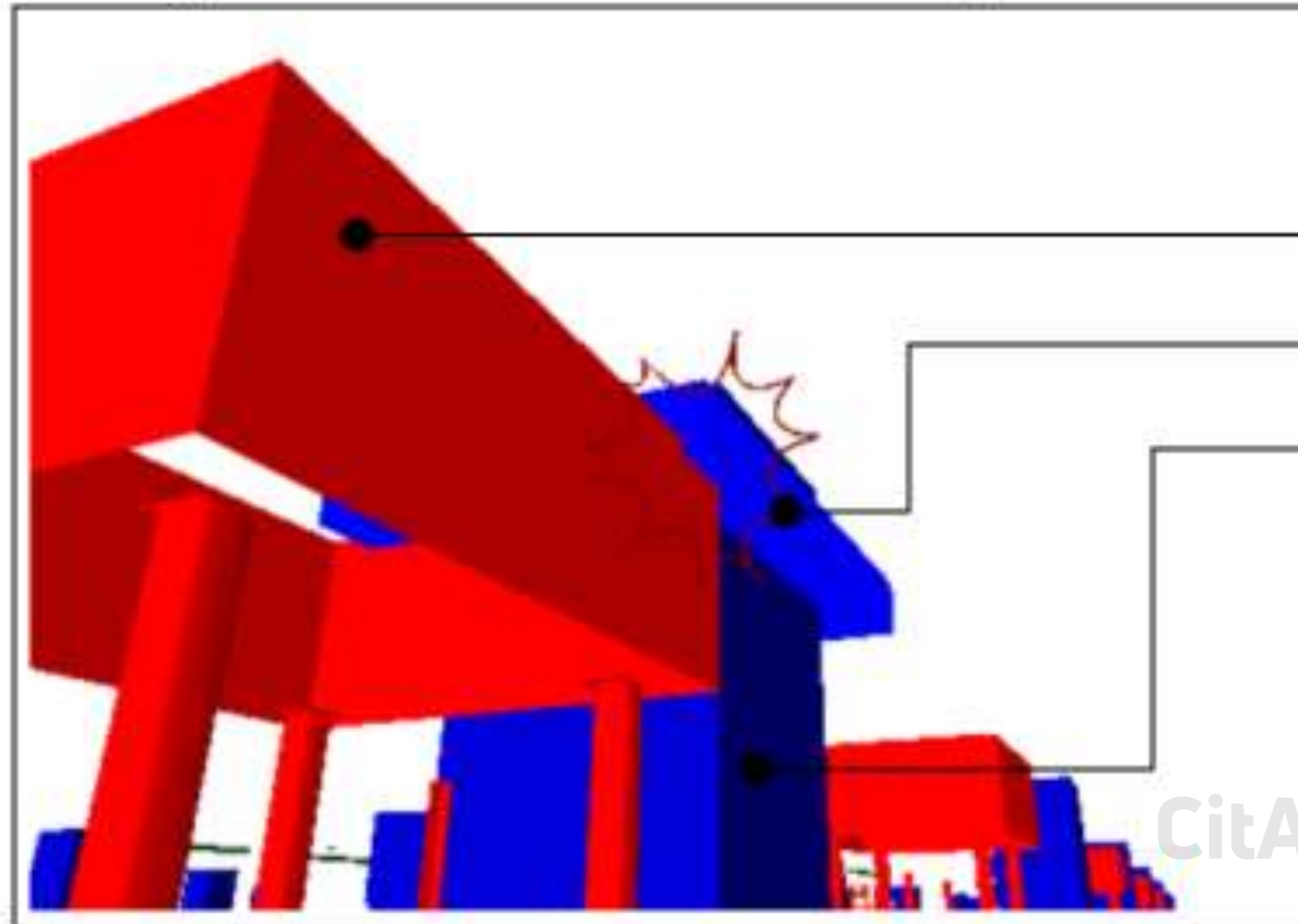
# Co-Ordination = Communication





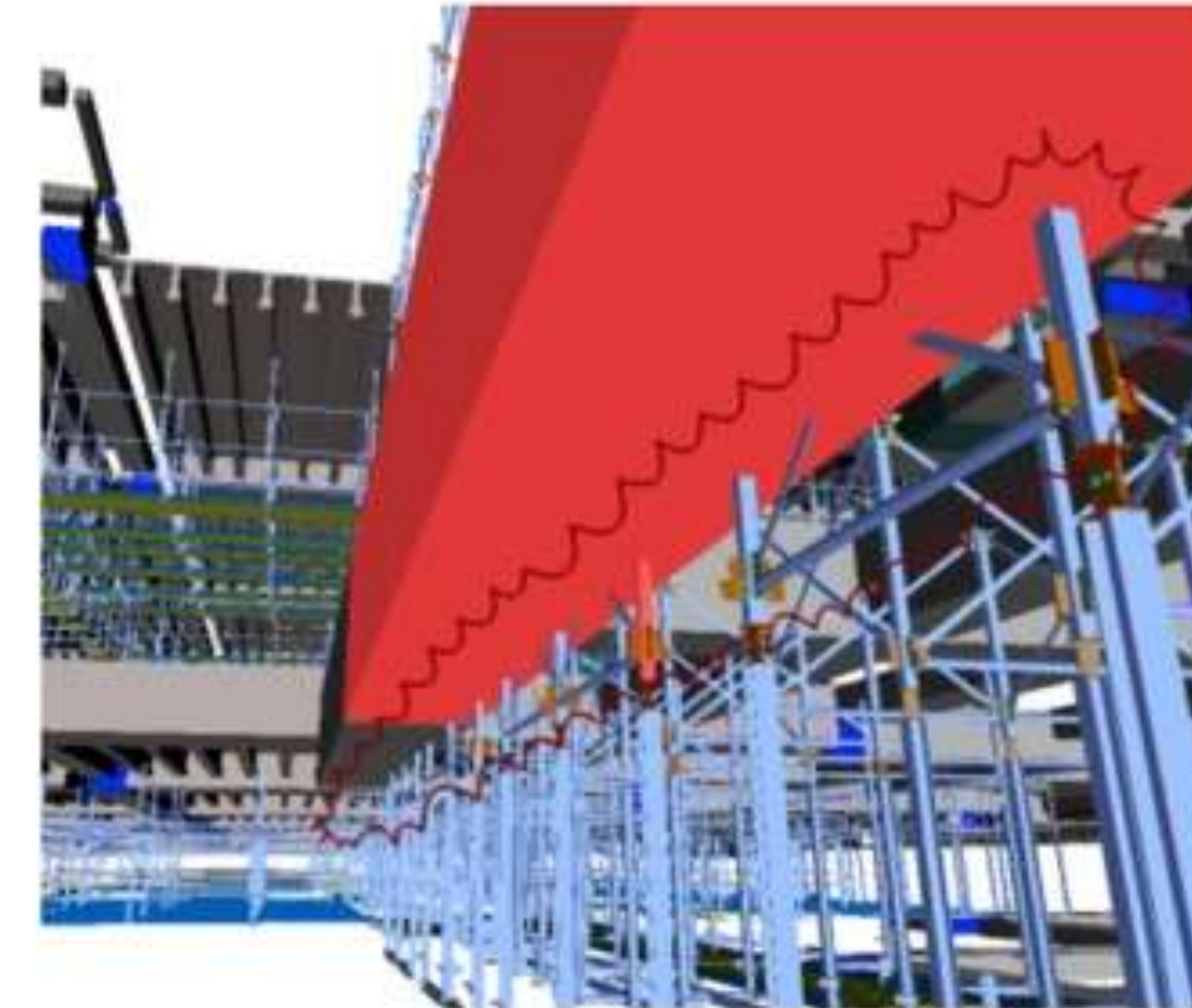
# Clash Resolution Process

Image: 03-07-13 CT3 - ASRS Top vs Corbel

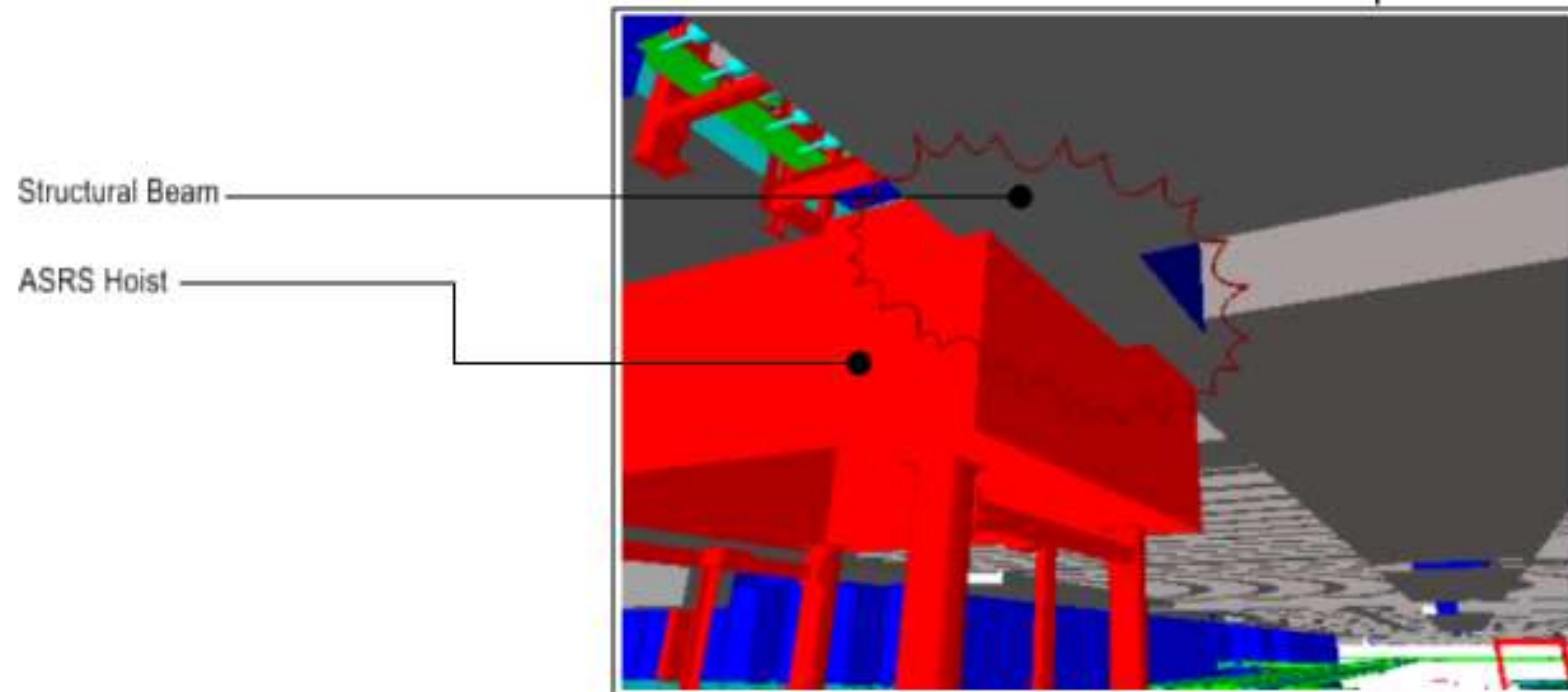


ASRS Hoist  
Structural Corbel  
Structural Column

04-11-08 STR Beams vs BHS I - typ



04-10-11 CT5 Beam vs ASRS Top I



Structural Beam  
ASRS Hoist









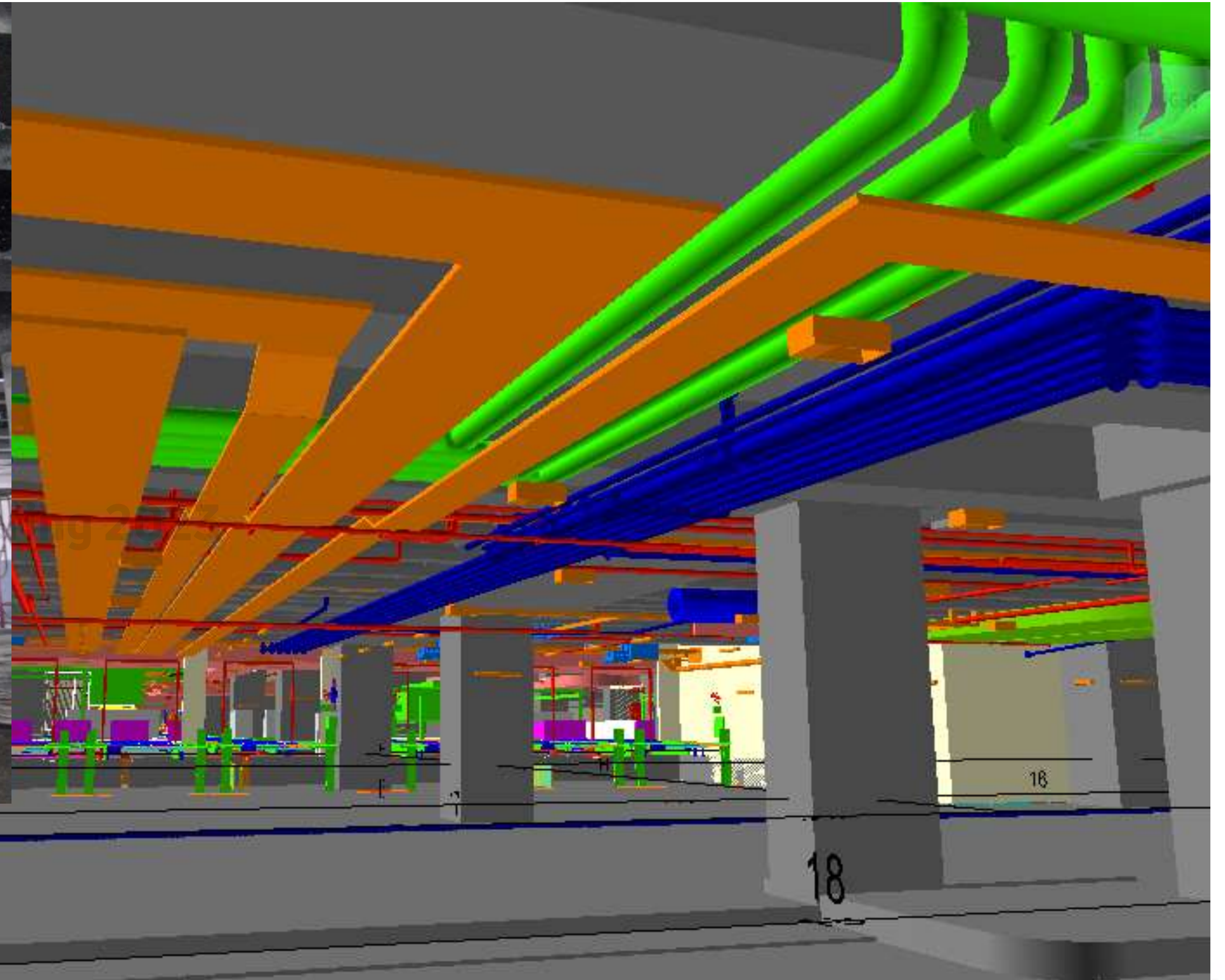
# Cathay Cargo Site - MEP Coordination



2009

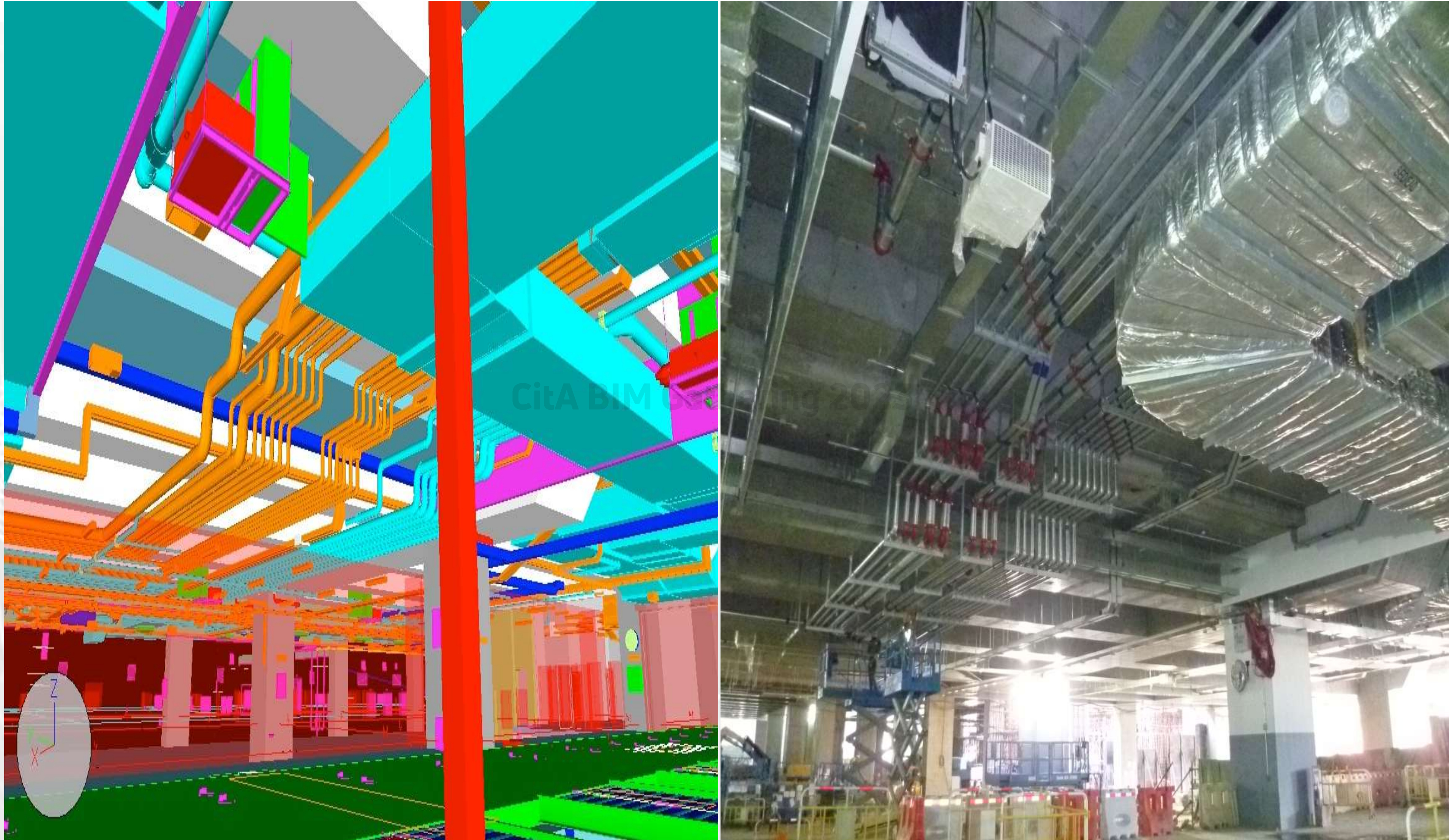


# Cathay Cargo Site - MEP Coordination





# Cathay Cargo Site - MEP Coordination







1996



2000



1999



2003



2007

2008



2009

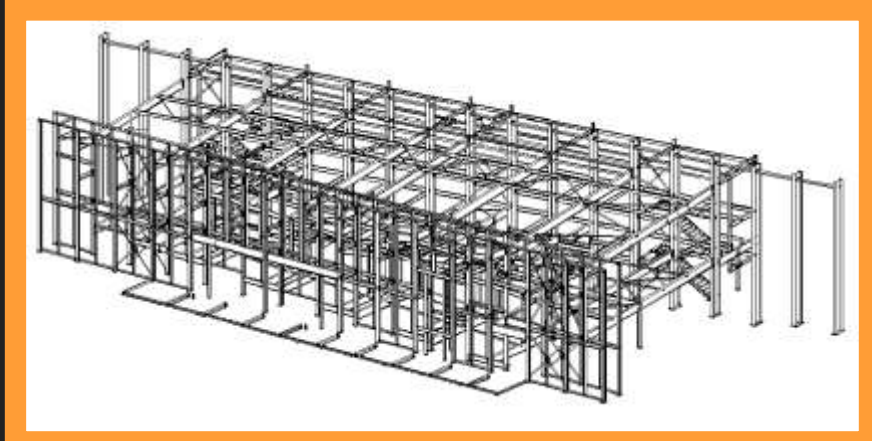
2019

ARUP,  
Ireland

ARUP,  
Hong Kong

Consult 3D  
Hong Kong

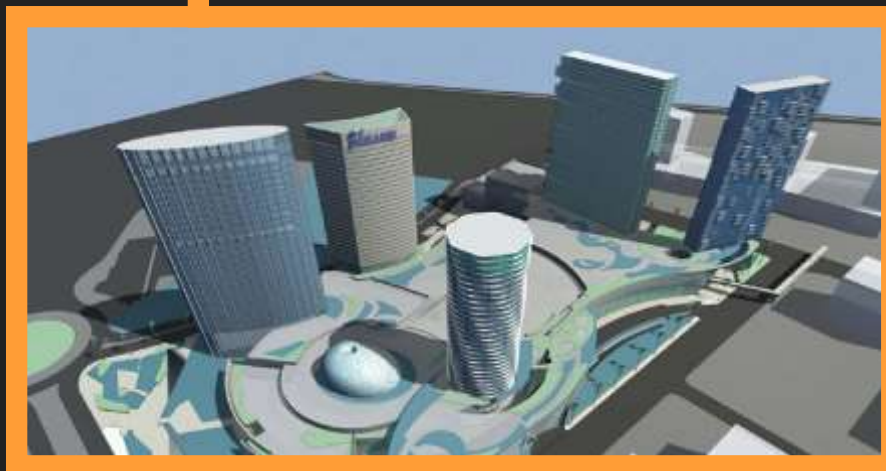
InteliBuild  
Hong Kong



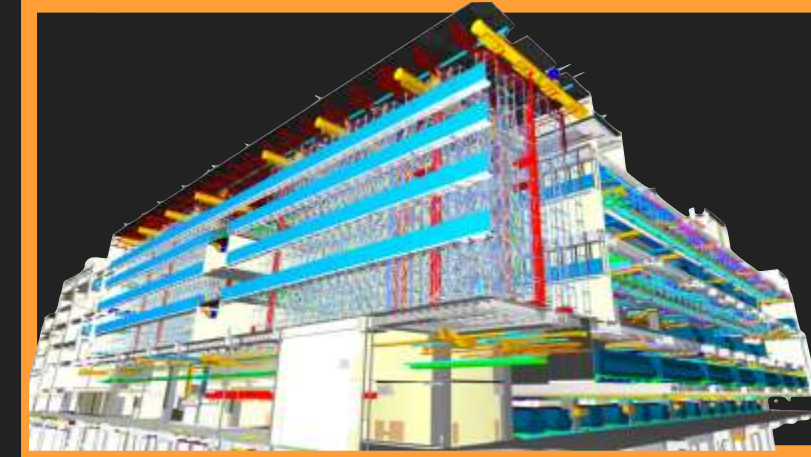
EXPO 2000 Pavilion



3D Modelling & 4D Simulations



City of Dreams Macau



CX Air Cargo Terminal



MRT Line 2, KL



*“Competency Drives Innovation”*

# BIMAR

Construction Validation

BIM to Site using Augmented Reality  
*Reducing risks of errors on site*

BIM Gathering 2023



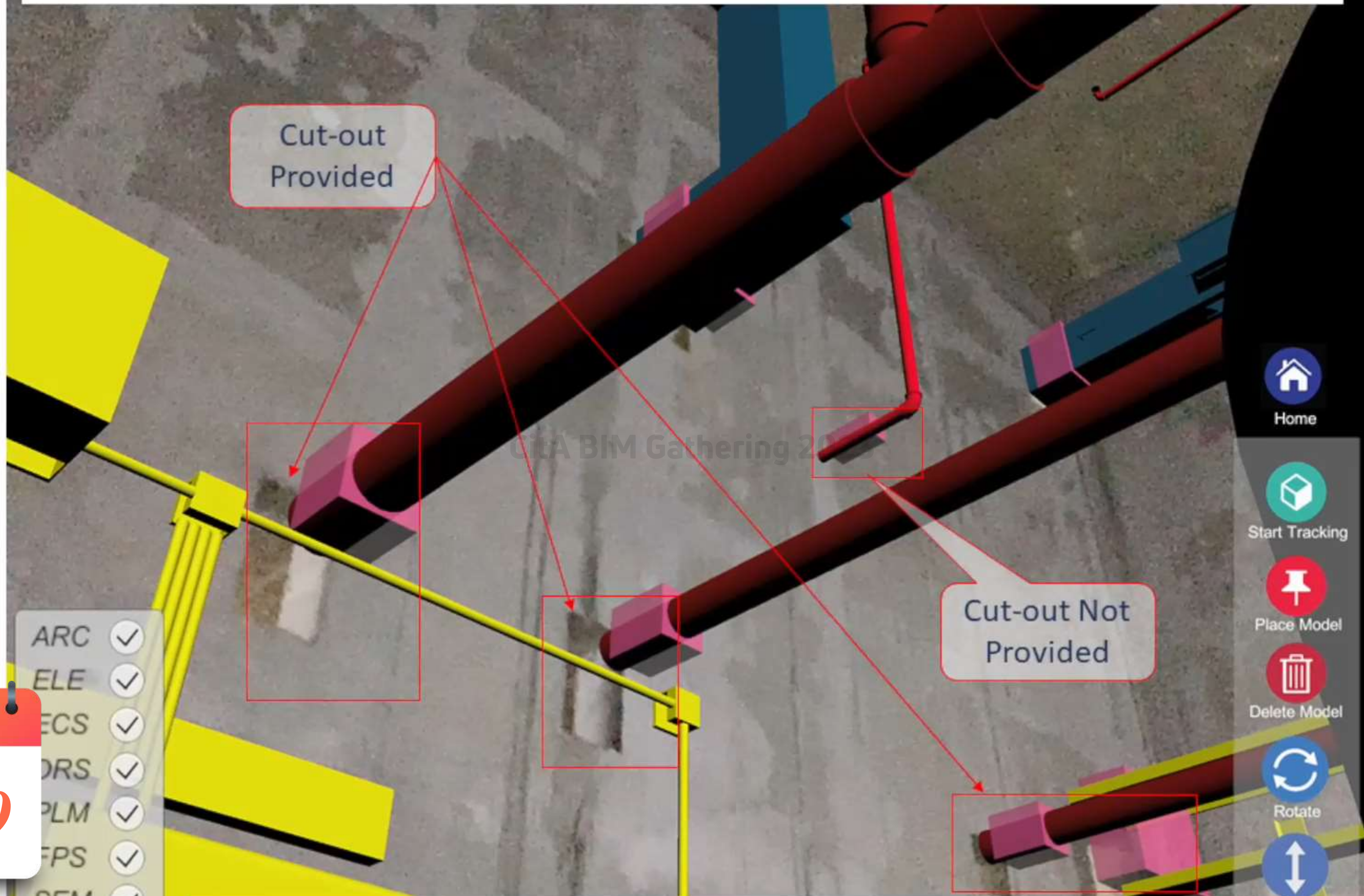


# Real time construction check by CLYS (Conlay Station) engineers using AR





# AR IPAD SITE APPLICATION - BIM 3D MODELS OVERLAID ON AS-BUILT STRUCTURE

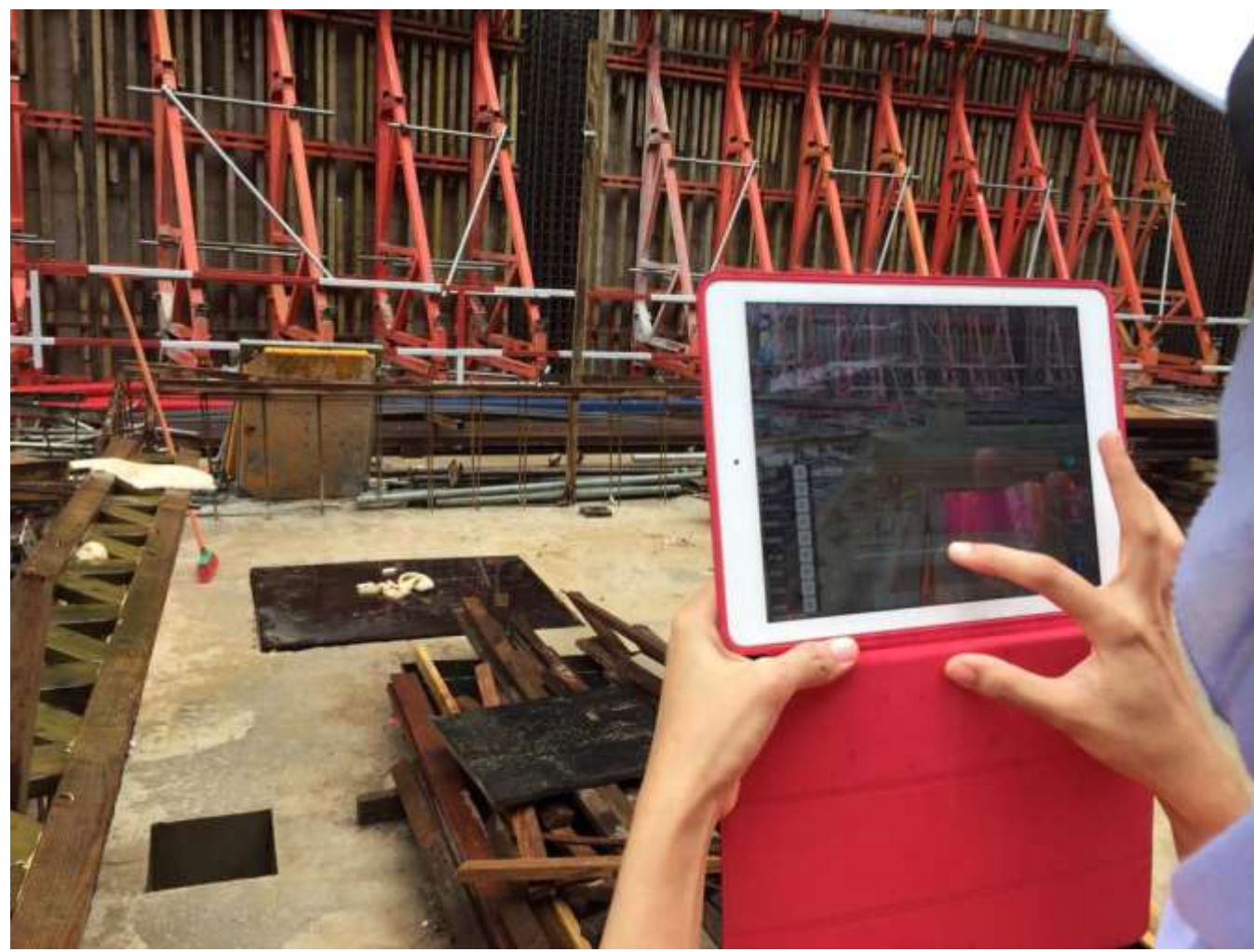


2019

STWS - LOWER CONCOURSE LEVEL - EJECTOR ROOM



# Site Training and Rollout with OPS Team Engineers, BIM Team and Survey Team

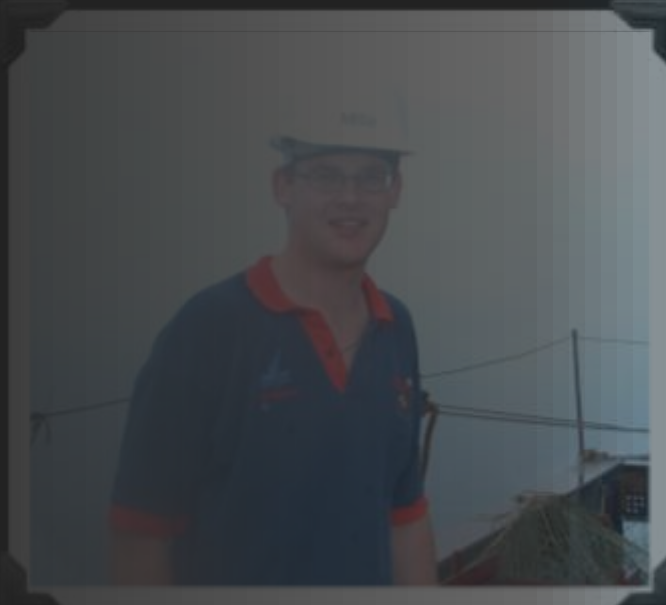


CITA BIM Gathering 2023

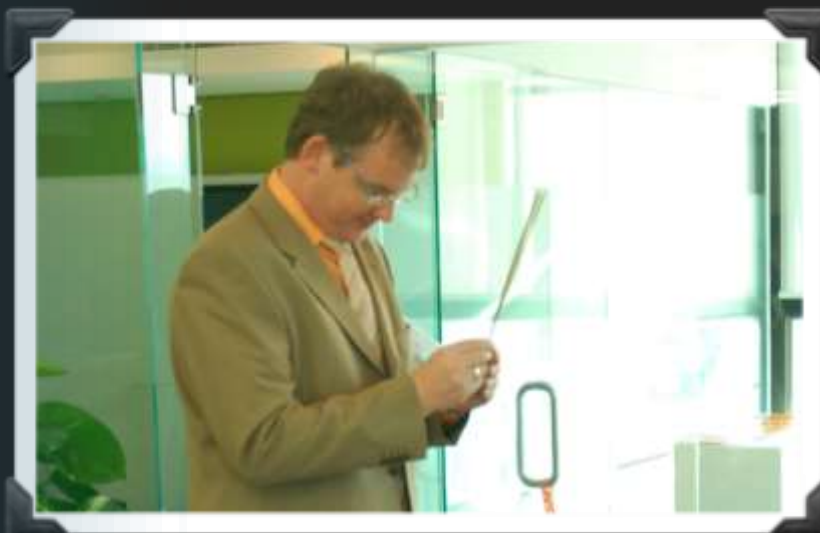


2019

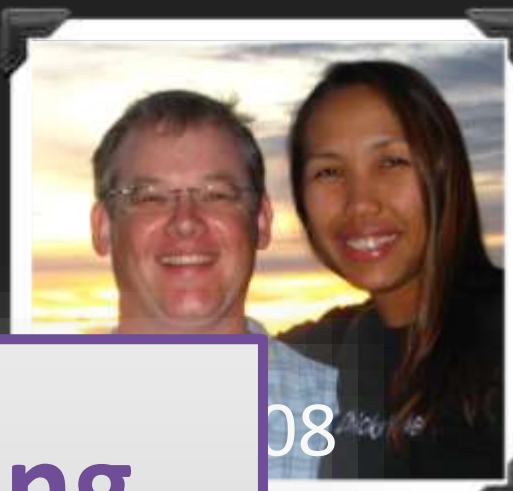




2000



2012



08

Are You Ready for the changes AI will bring  
... Laser Scanning, Drones, Reality Capture?

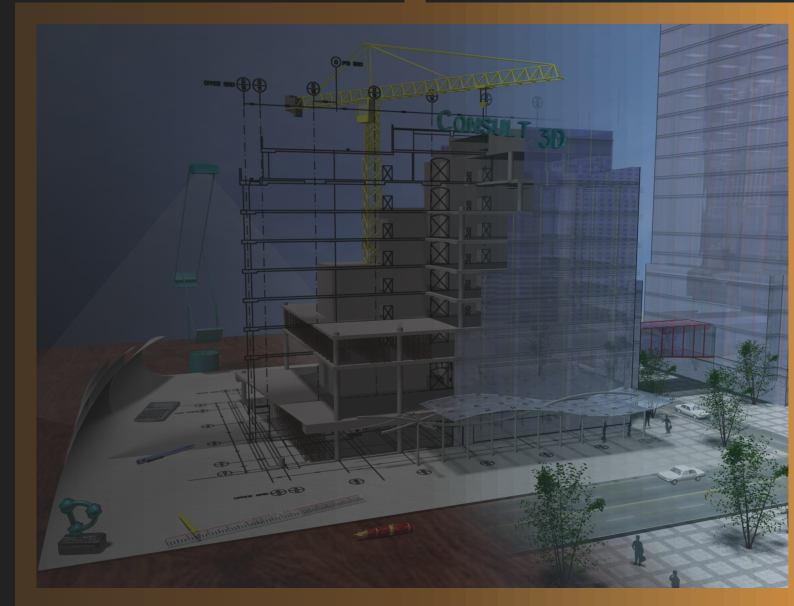
ARUP,  
Hong Kong

Consult 3D  
Hong Kong

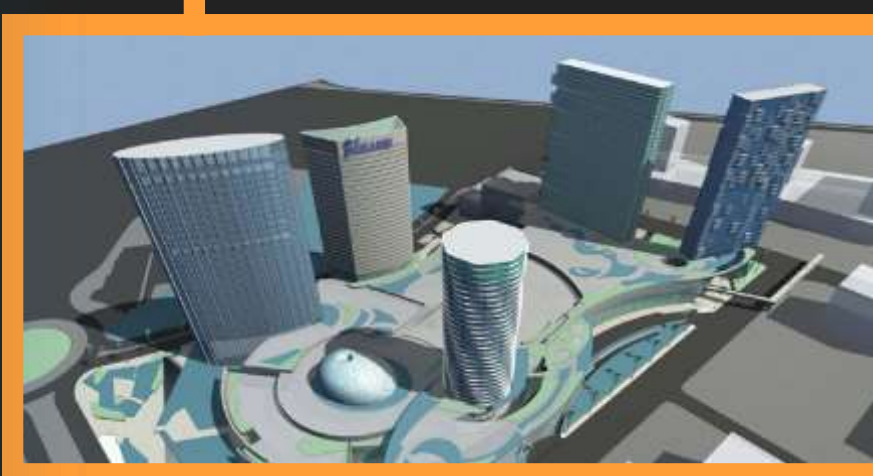
InteliBuild  
Hong Kong



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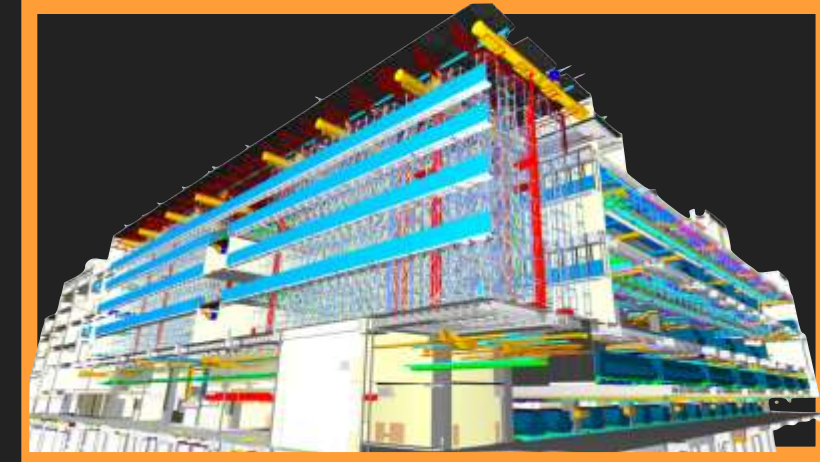
3D Modelling & 4D Simulations



City of Dreams Macau



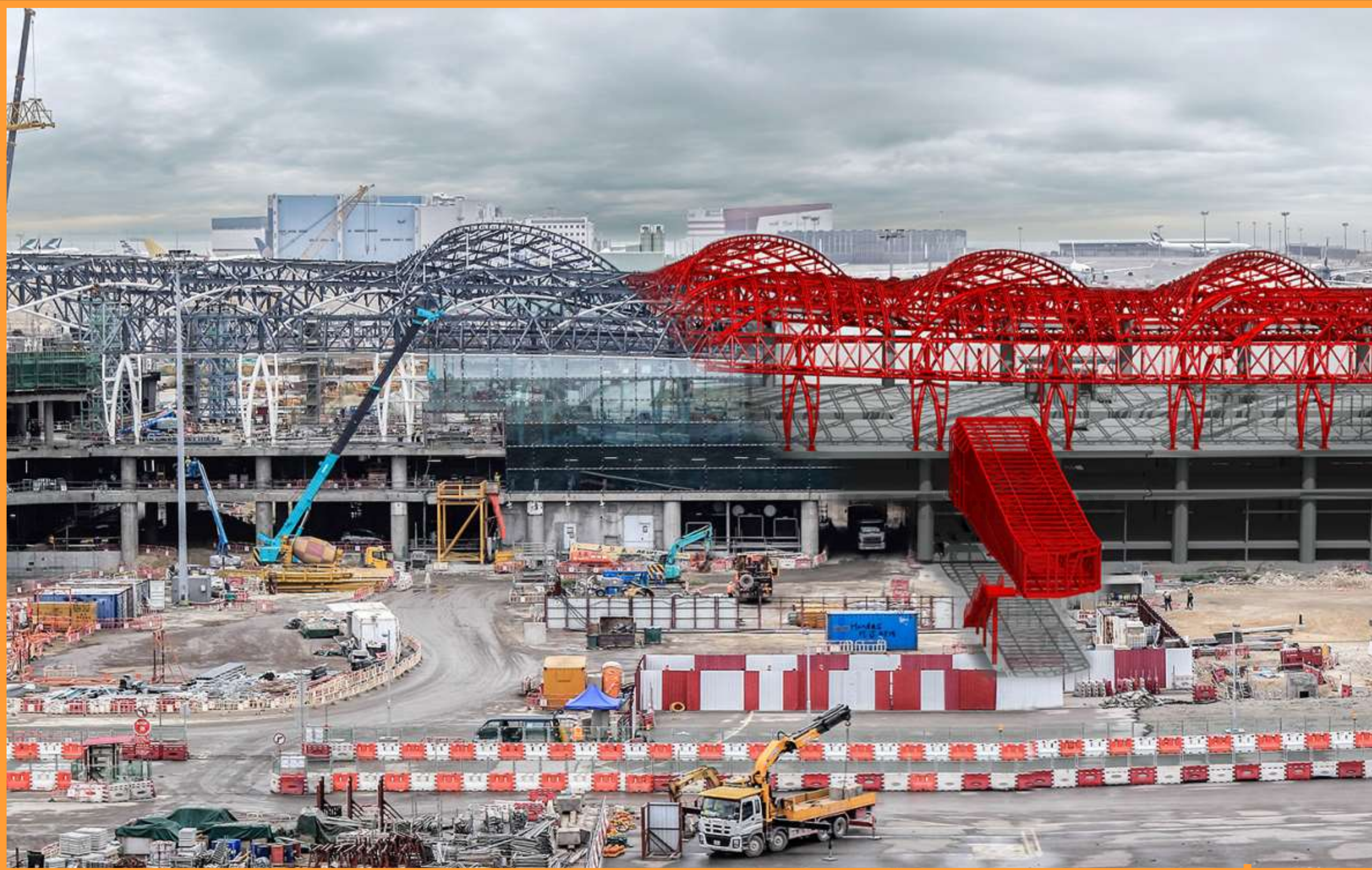
Midfield Concourse



CX Air Cargo Terminal



**BIM = Best If Managed**  
Midfield Concourse  
Hong Kong International  
Airport





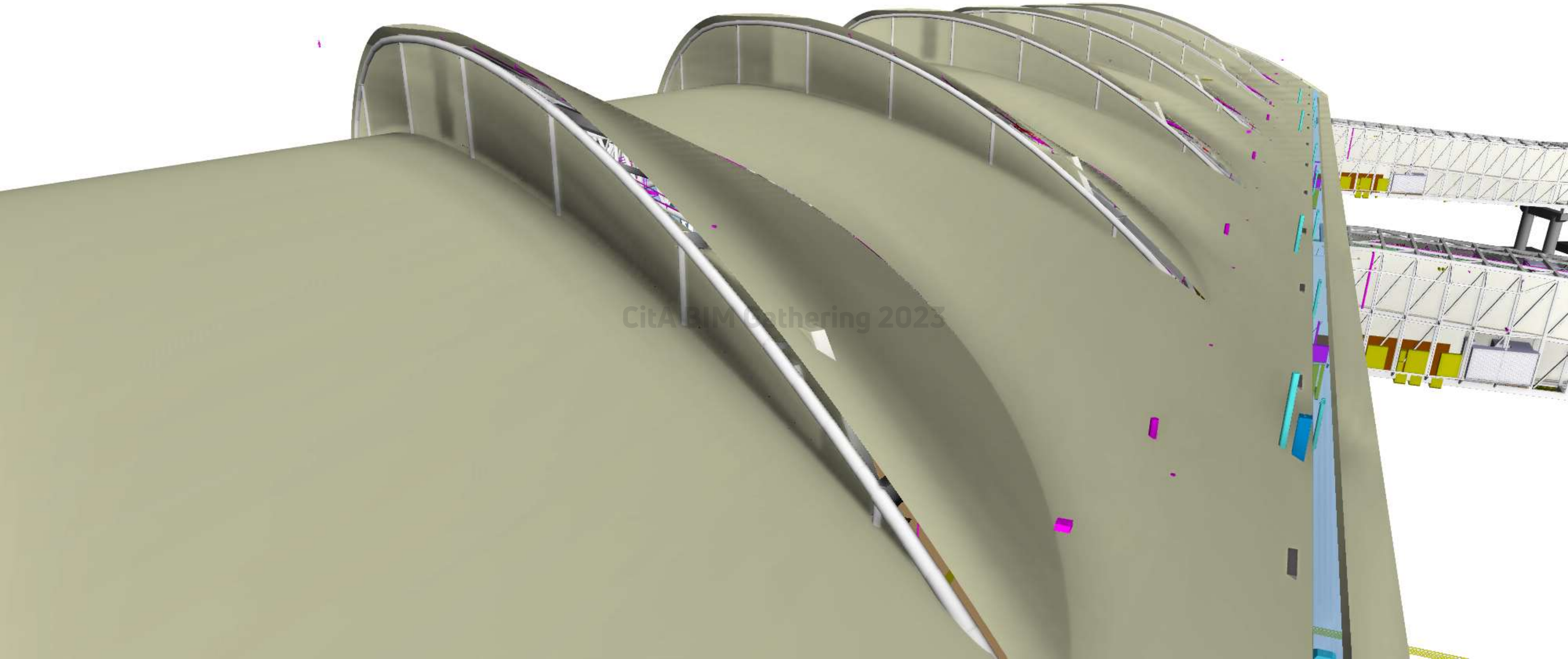


**BIM for Construction  
Lessons Learned**



# DESIGN MODEL

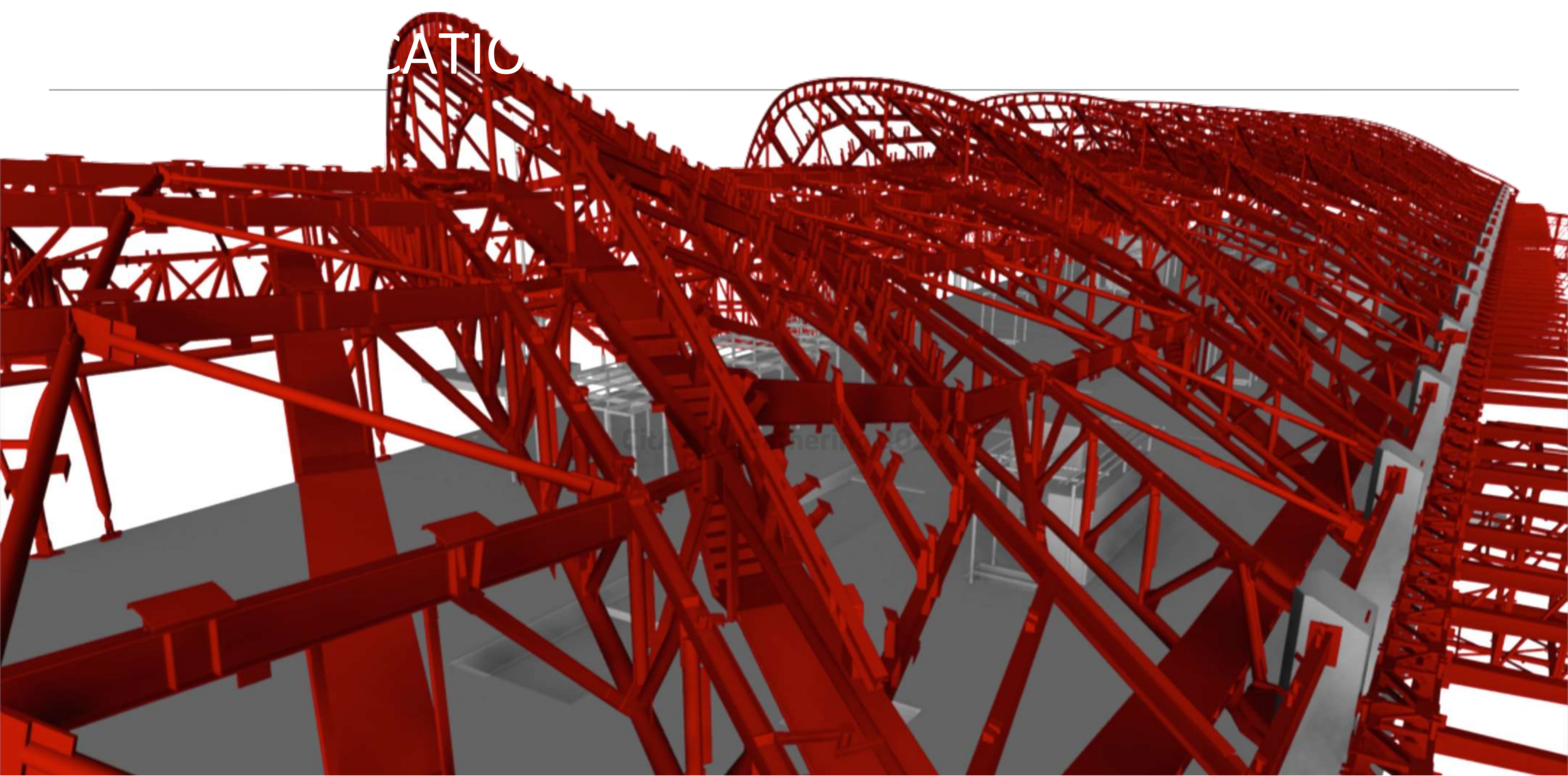
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CATIC

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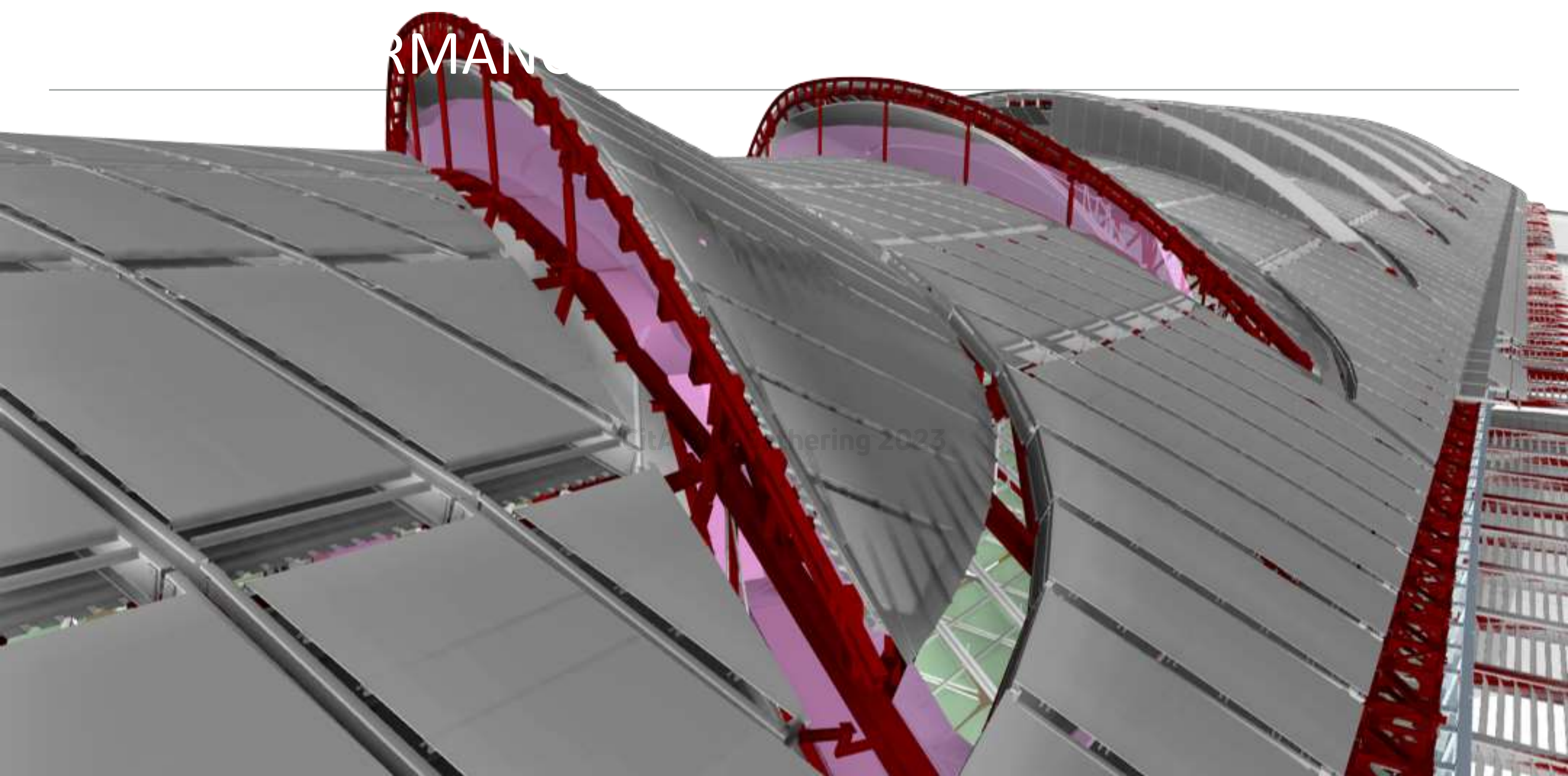


PORT





# PERMANENT

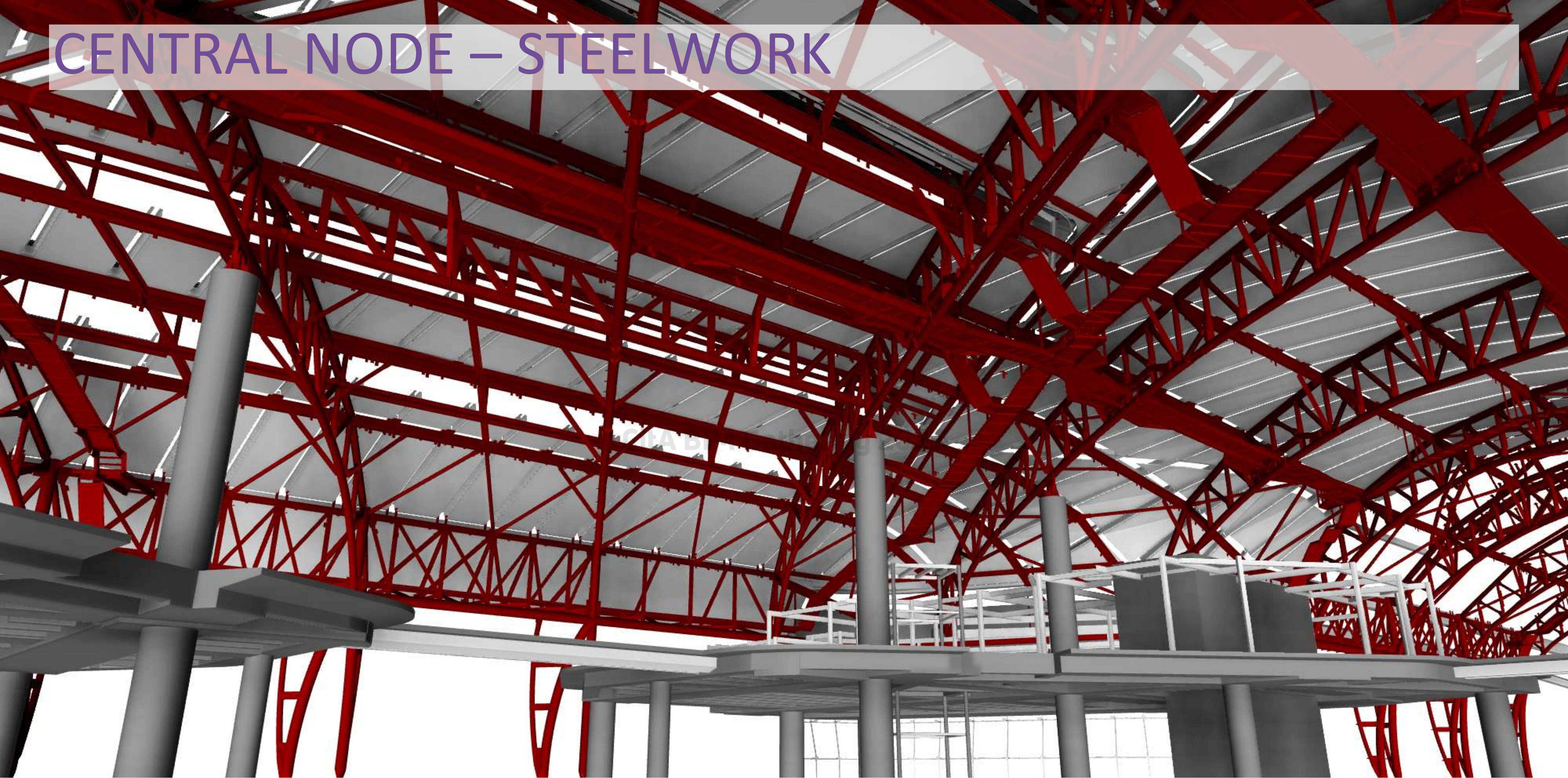


Project / Meeting 2023



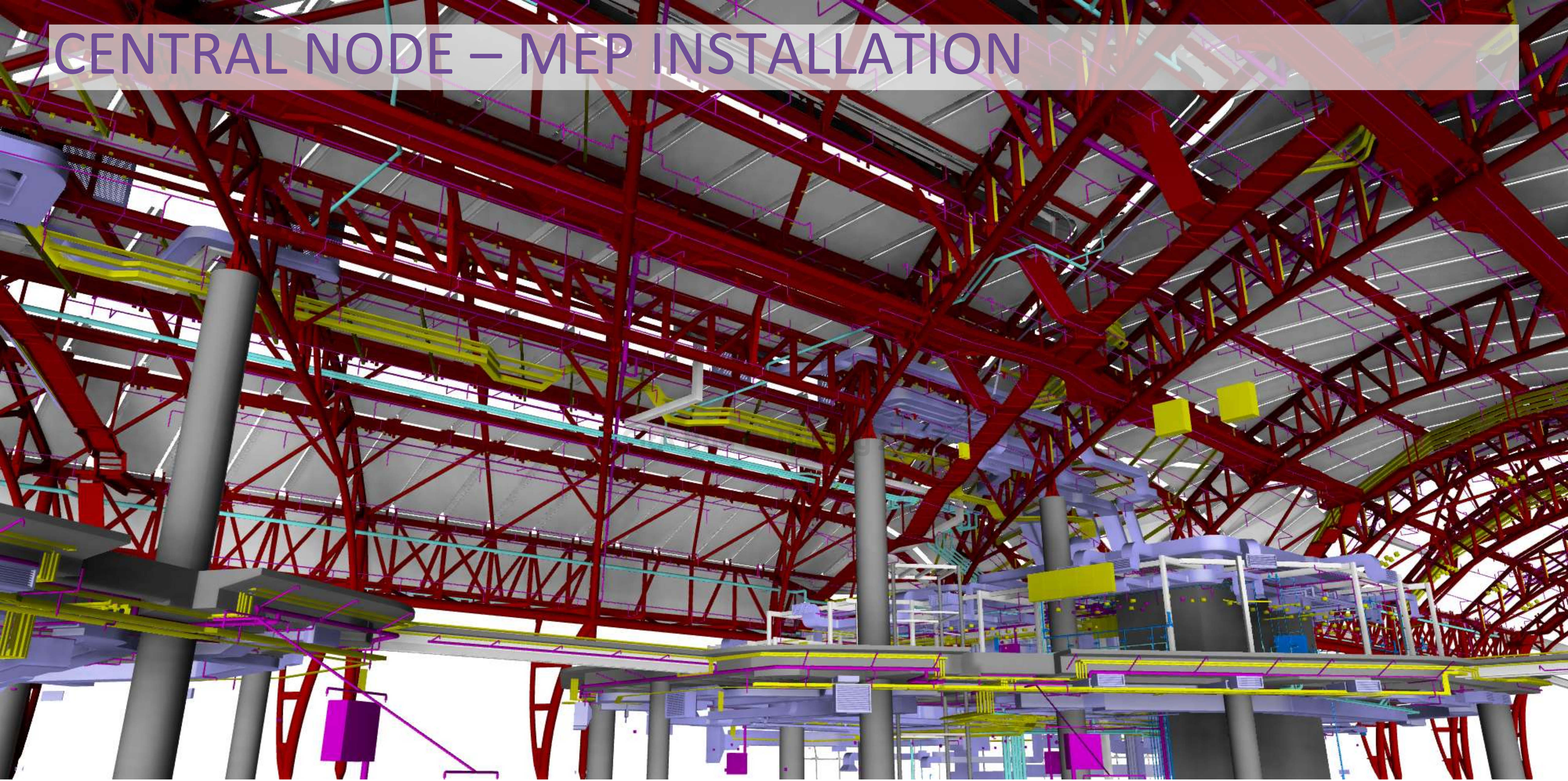


# CENTRAL NODE – STEELWORK





# CENTRAL NODE – MEP INSTALLATION



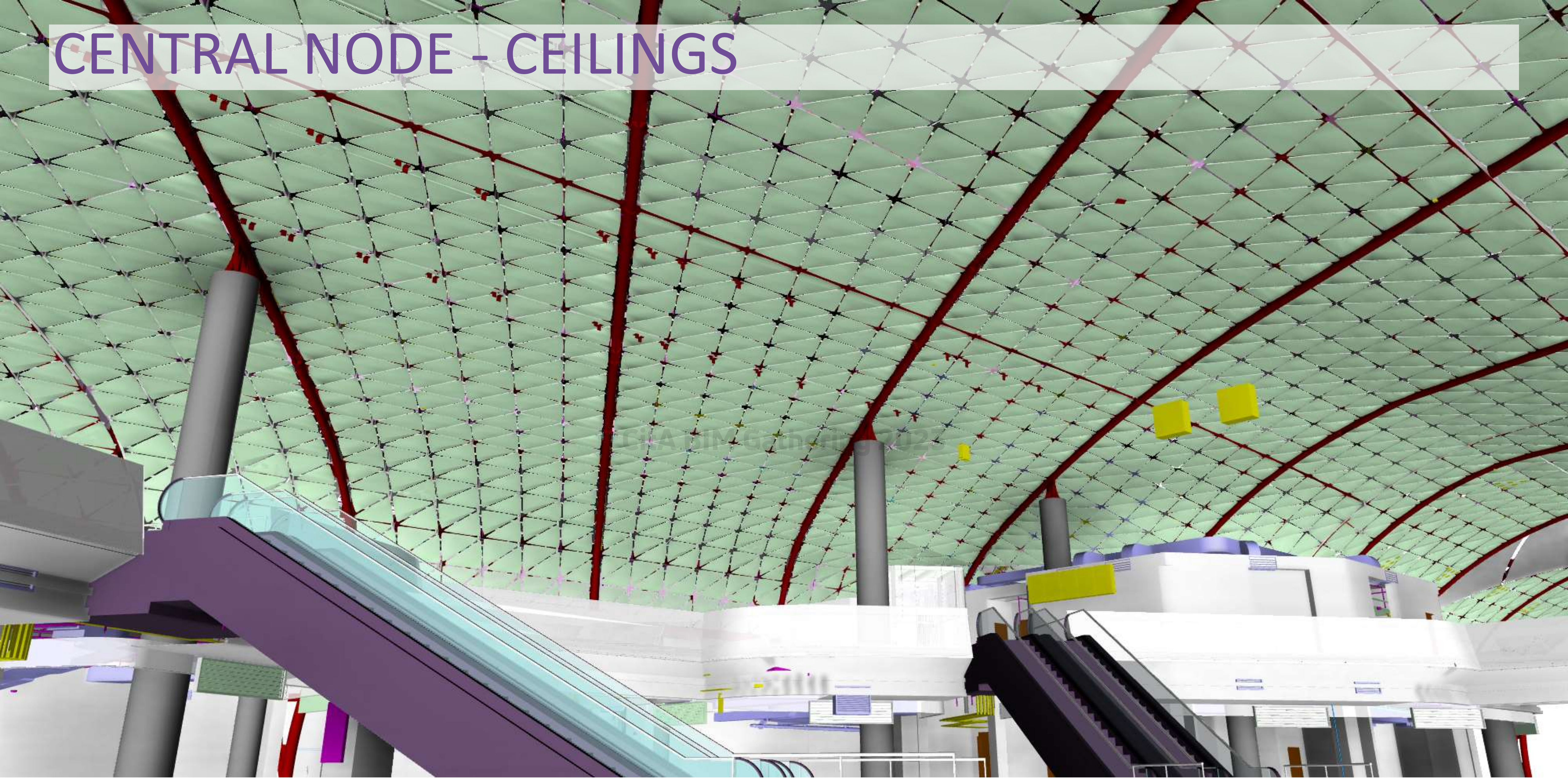


# CENTRAL NODE – CEILING SUPPORTS





# CENTRAL NODE - CEILINGS







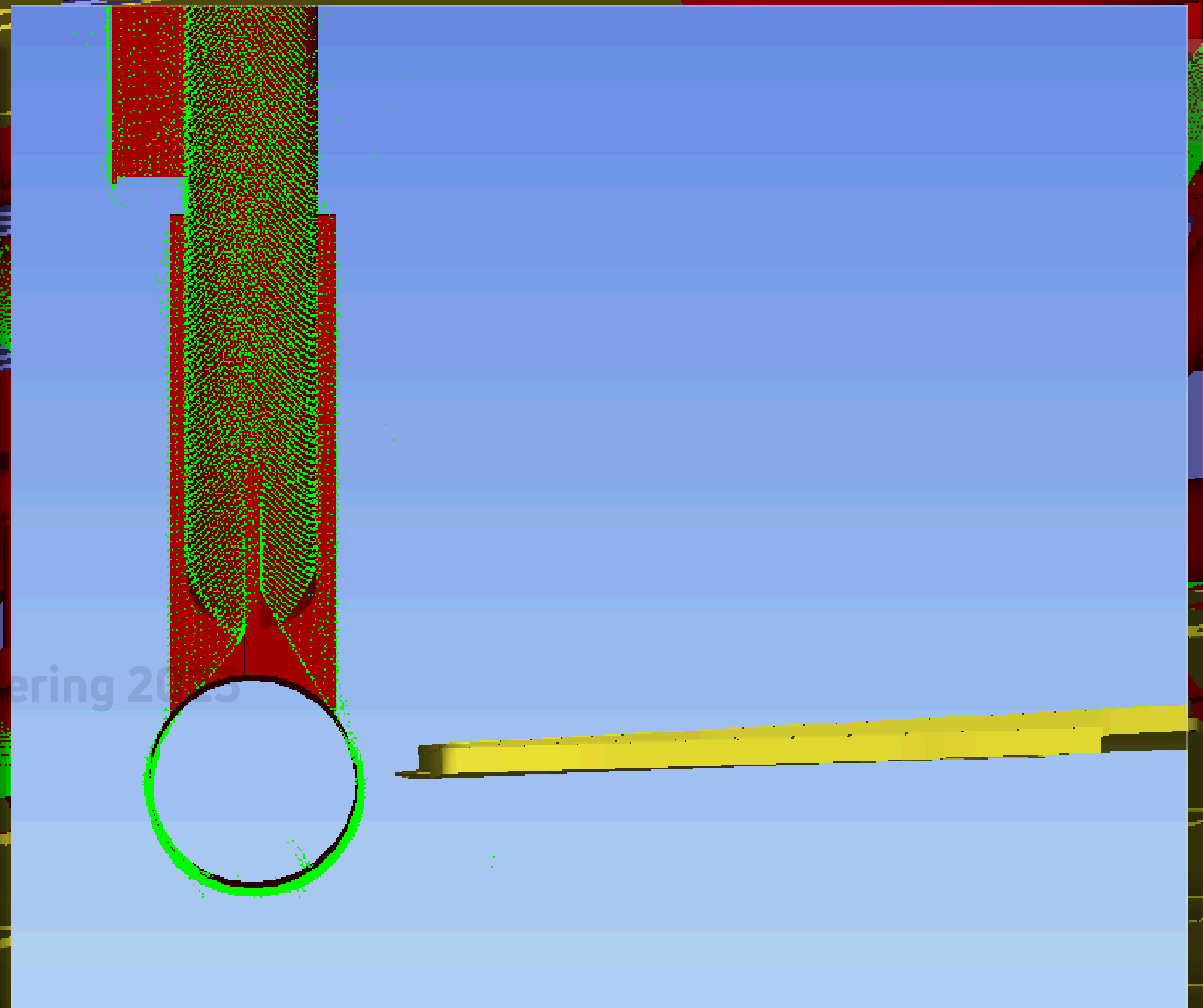
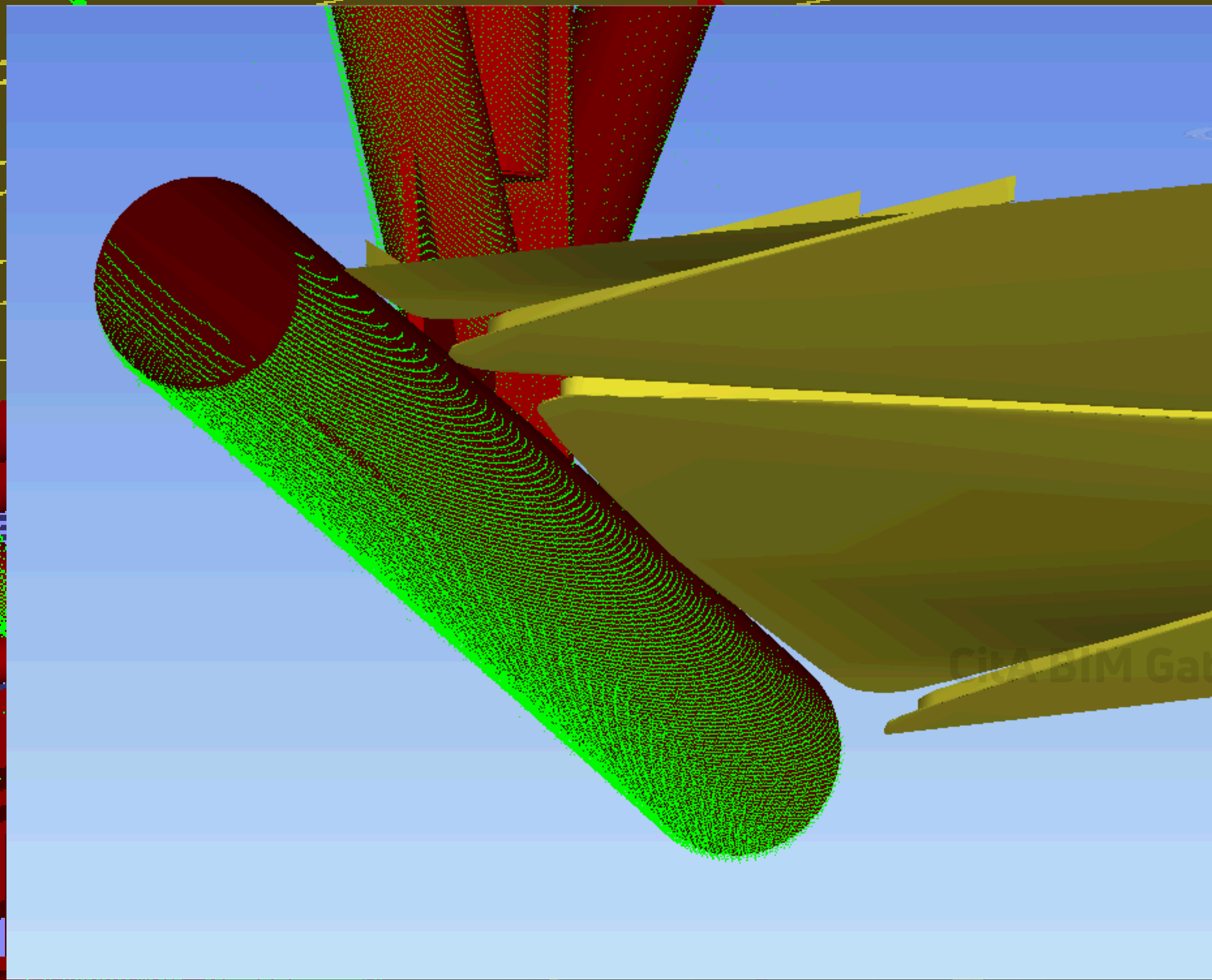
# Concourse - Ceilings



# MONITOR SITE PROGRESS







# Point Cloud Laser Scanning

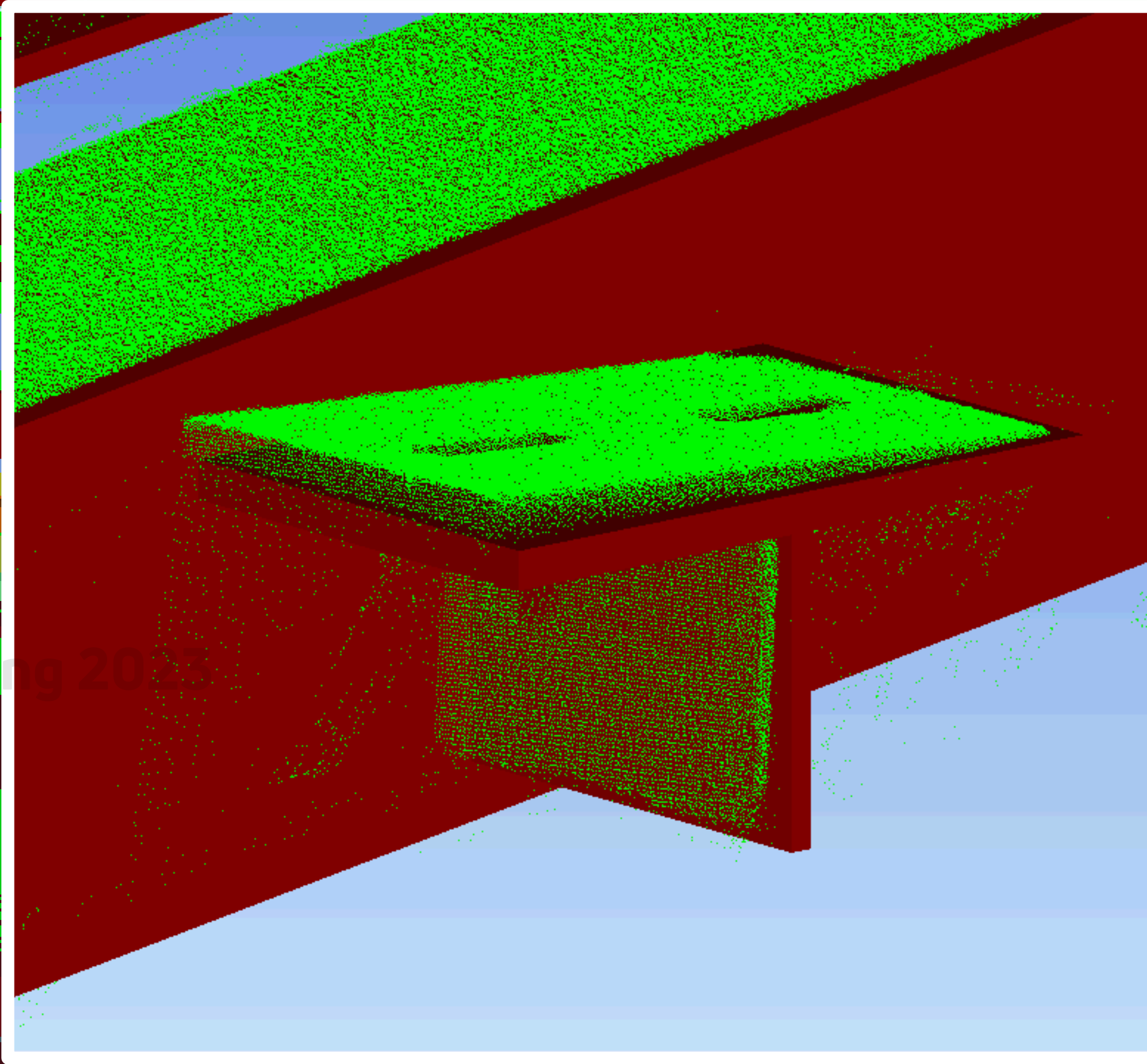
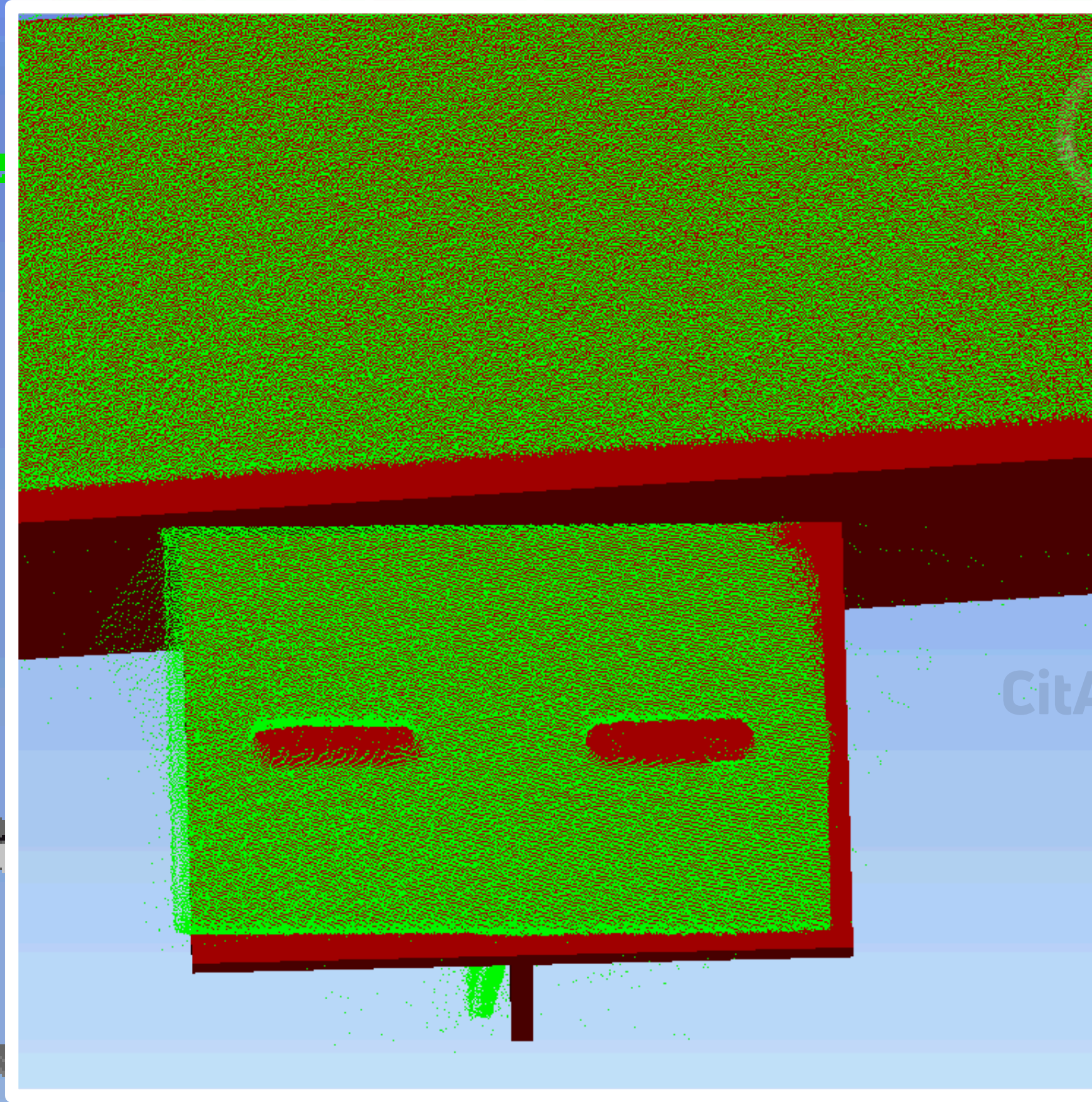




Gathering 20

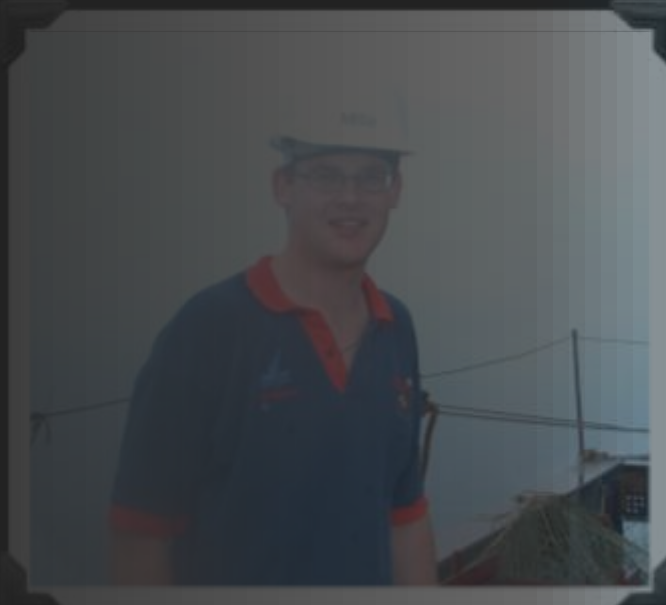
# Point Cloud Laser Scanning



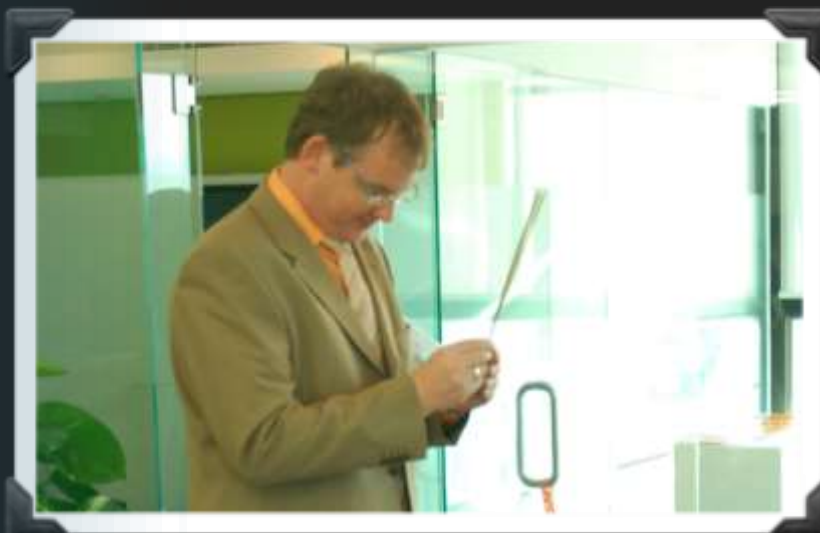


CitA Interiors 20





2000



2003



2007



2012



2016

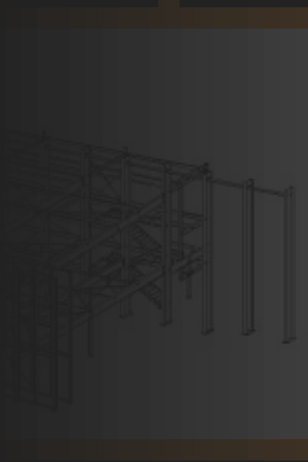
2019

ARUP,  
Hong Kong

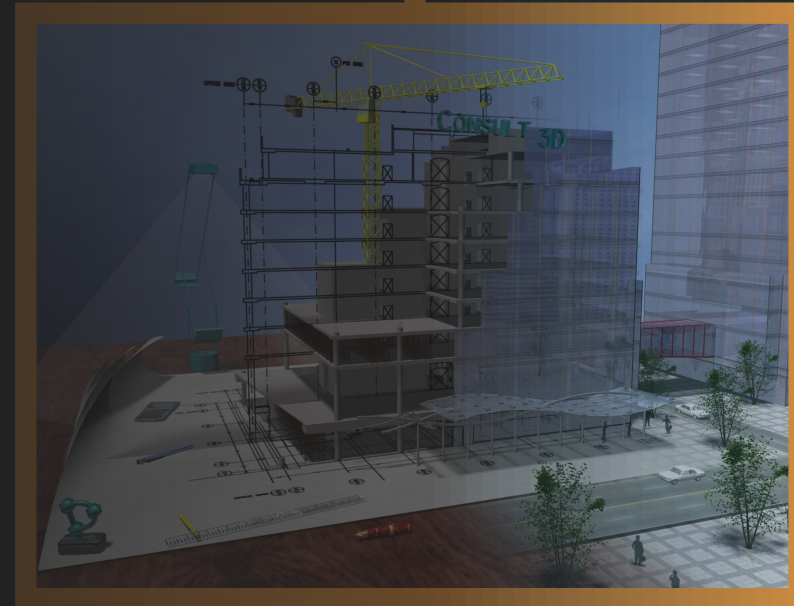
Consult 3D  
Hong Kong

InteliBuild  
Hong Kong

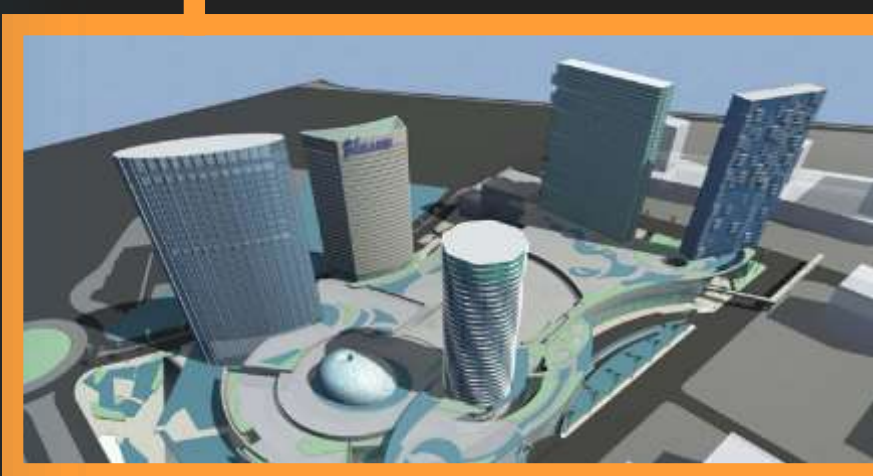
Gamuda  
Malaysia



ilion



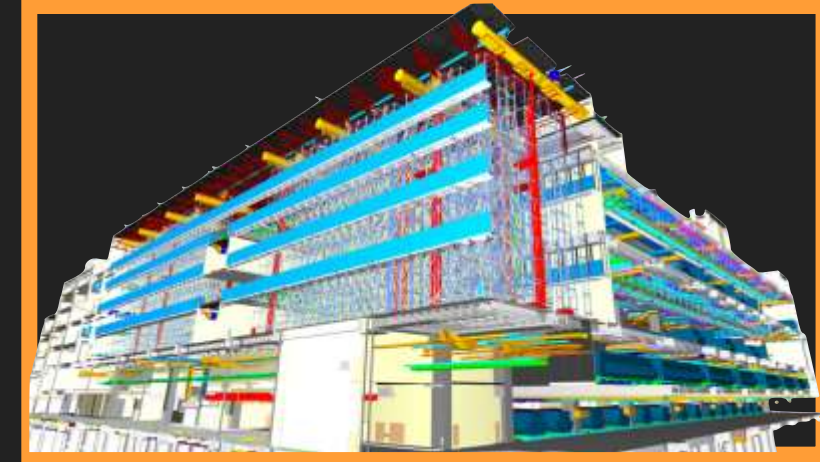
3D Modelling & 4D Simulations



City of Dreams Macau



Midfield Concourse



CX Air Cargo Terminal



MRT Line 2, KL



*“Competency Drives Innovation”*

Building Models using Point Clouds & Drones  
***Photogrammetry combined with BIM***







- 75%
- 16
- 60m
- 6m/s
- 161m
- 0:17



Image Capture by Drones

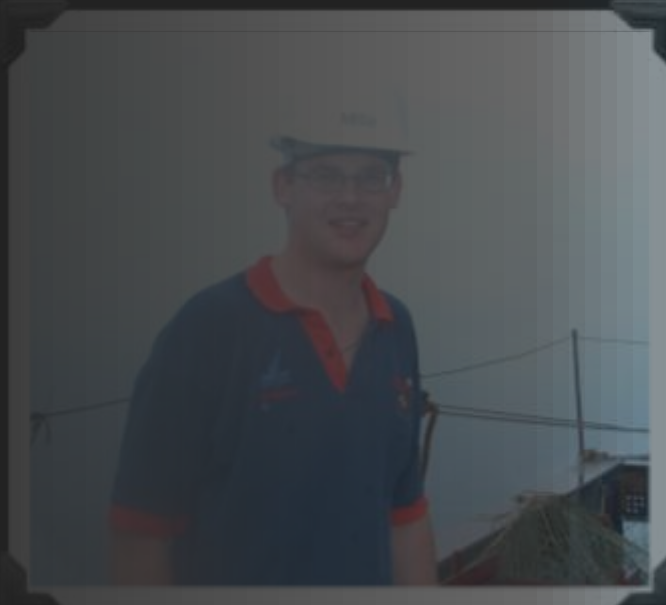


July 2018

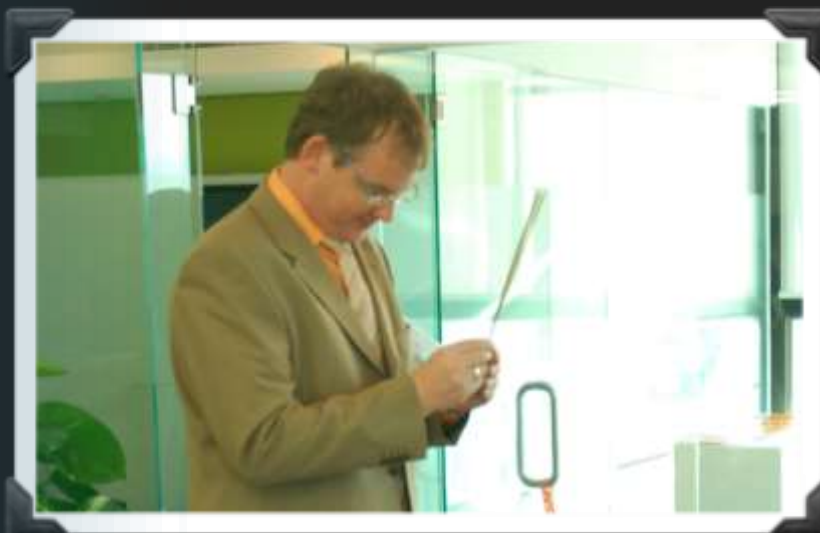


CSLS BIM INTEGRATION





2000



2007



2012



2014



2003



2016

2019

2021

2023

ARUP,  
Hong Kong

Consult 3D  
Hong Kong

InteliBuild  
Hong Kong

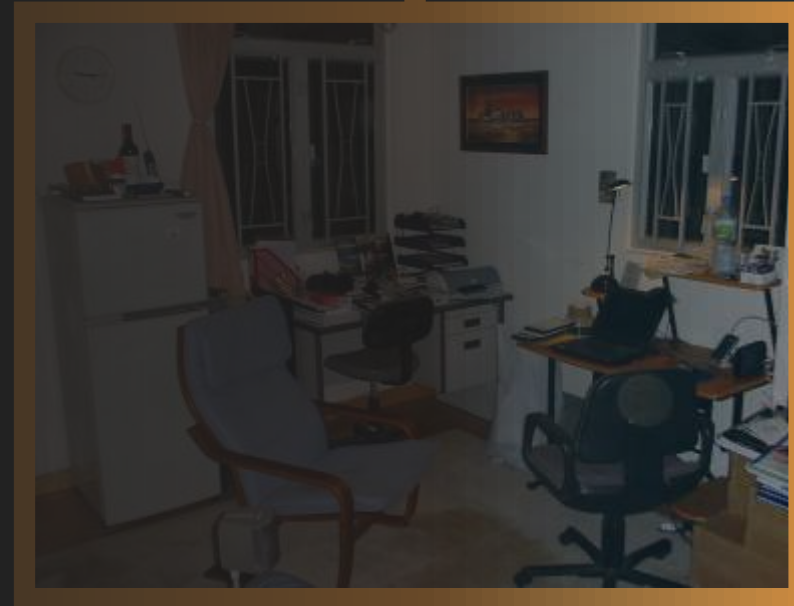
Gamuda  
Malaysia

Red Sea Co  
Saudi Arabia

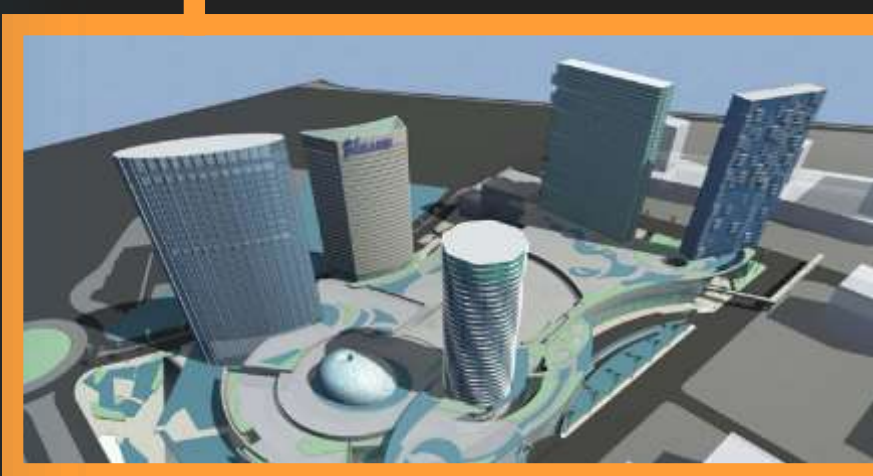
HSS  
Saudi Arabia



ilion



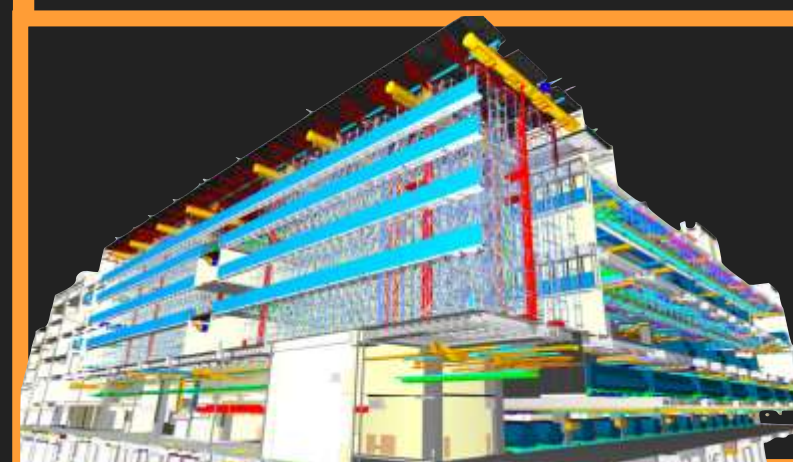
2003, My First Office



City of Dreams Macau



Midfield Concourse



CX Air Cargo Terminal



MRT Line 2, KL





2012



2014



2019 2021 2023

Are You Ready for the changes AI will bring?

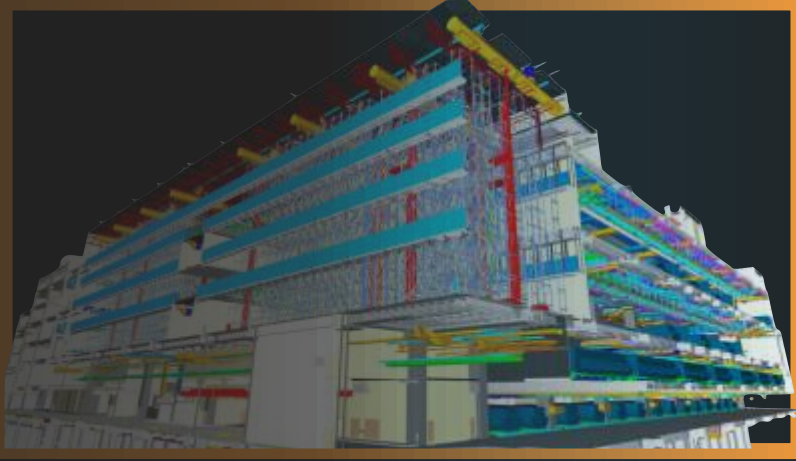
Build  
Kong



ms Macau



Midfield Concourse



CX Air Cargo Terminal

Gamuda  
Malaysia



MRT Line 2, KL

Red Sea Co  
Saudi Arabia





# ARE YOU READY FOR THE CHANGES AI WILL BRING?

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- ▶ AI will propel some firms forward, while others will struggle.  
**Are You Ready for the changes AI will bring?**
- ▶ **Define** your problem or issue.  
*CitA BIM Gathering 2023*
- ▶ **Develop** a plan of attack, KPI's and potential solutions
- ▶ **Deploy** on projects, train staff, provide support & **Evaluate**.