



**DEVELOPING THE DIGITAL MODELS FOR ALL LIFE-CYCLE STAGES OF THE CIVIL AND INDUSTRIAL CAPITAL FACILITIES**

Clashes in Construction

Missed Communication

Compliance & Safety

Outdated Data

Material Wastage

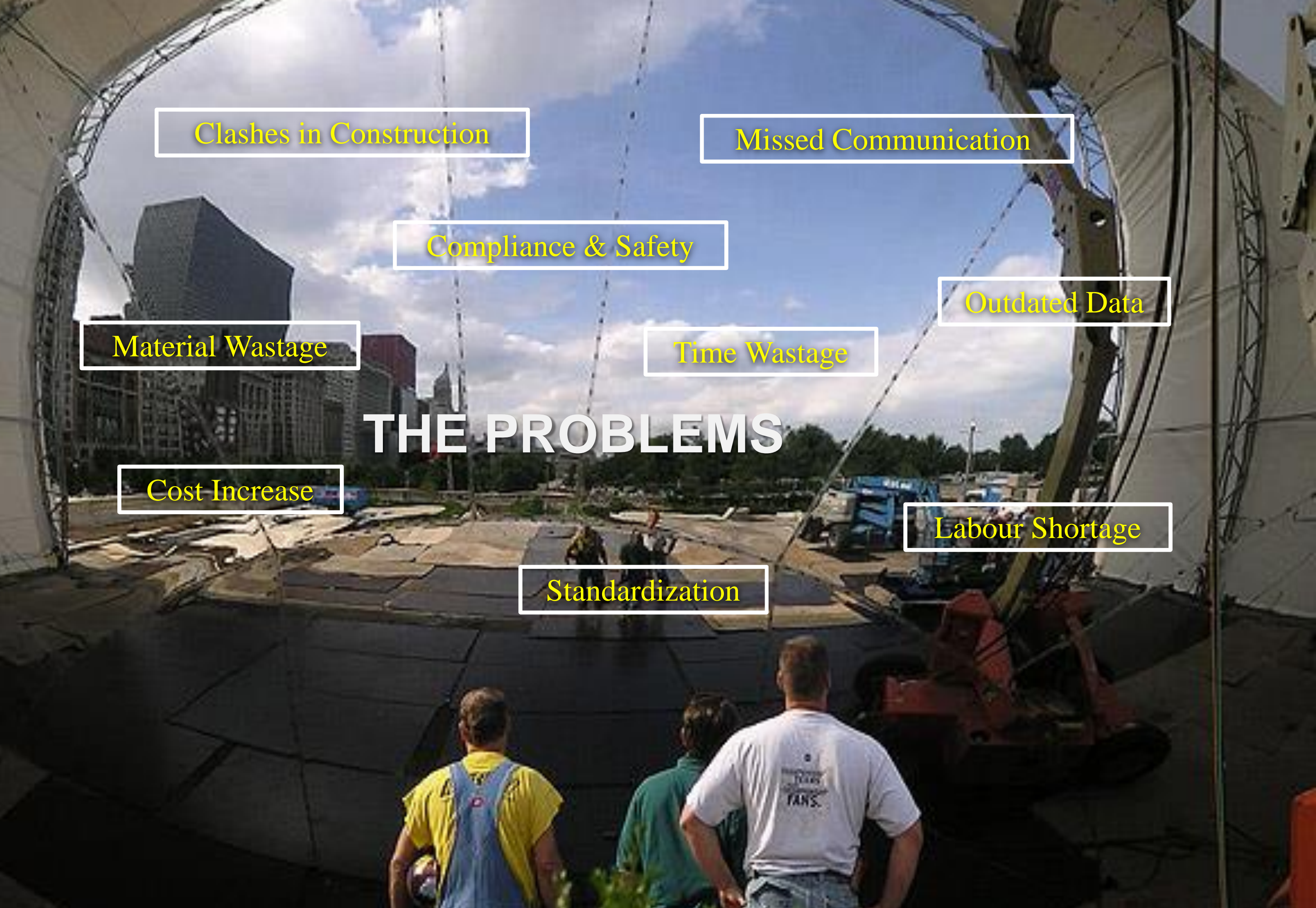
Time Wastage

# THE PROBLEMS

Cost Increase

Labour Shortage

Standardization



# Life cycle Management

One thing applies to all of them: The importance to look at their whole lifecycle






Main Contractor / Consultants



Facility Manager / CAFM



-  Responsible
-  Support Function
-  Consulting

# The Whole Life- Cycle Approach



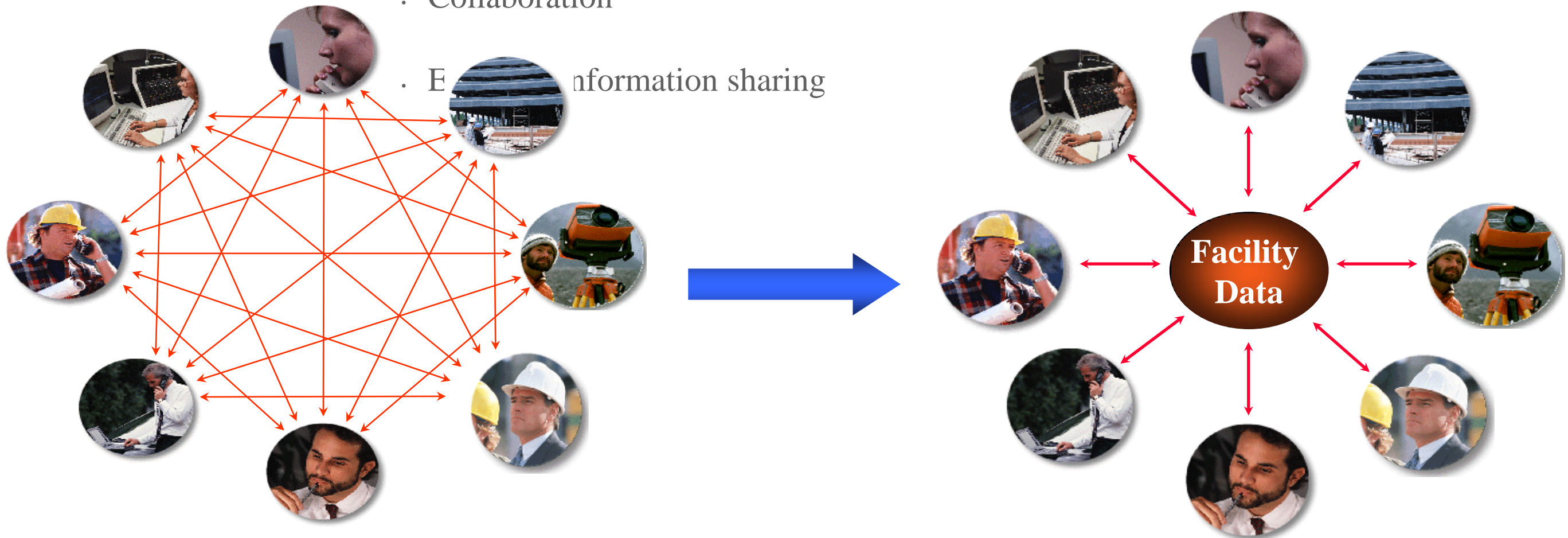
**TCO (Total Cost of Ownership) = CAPEX+OPEX**

Diagram from  
 DR. ASSEM AL-HAJJ,  
 Heriot-Watt University Dubai

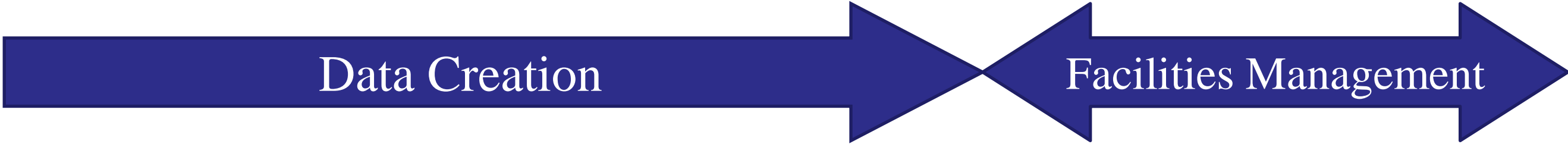
# The Facilities Profession...

...needs solutions that address

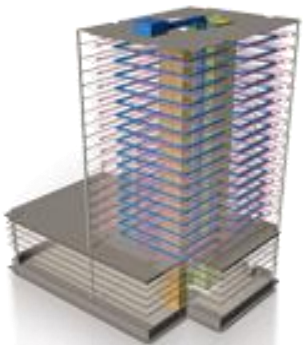
- . Communication
- . Coordination
- . Collaboration
- . E information sharing



# Building Process



ARCHITECTS



MEP SYSTEMS  
ENGINEERS



STRUCTURAL  
ENGINEERS



BUILDERS



OWNERS

Design

Build

Operate and  
Manage

# Building Life Cycle



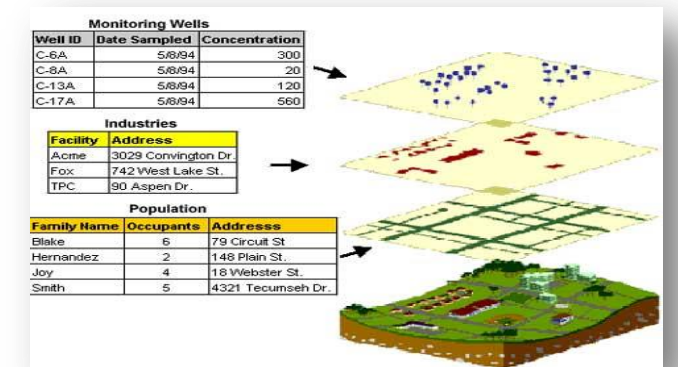
# Begin with the End in Mind



Building Information Model (BIM)

## Current State of Affairs:

- Non-integrated FM Software and Hardware Solutions
- Multiple Stakeholders (Capital Projects, FM Services, Real Estate, Energy, HR, Procurement, etc.)



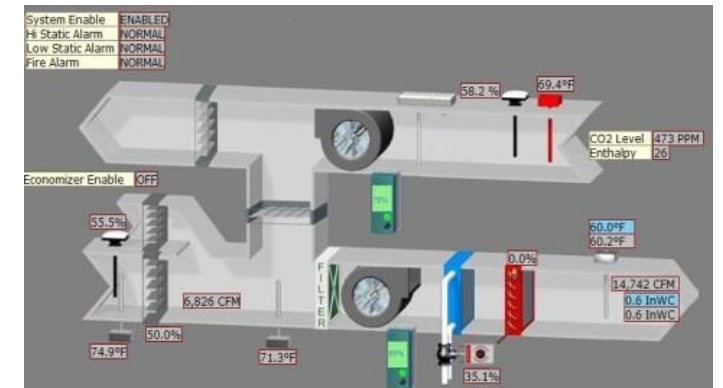
Geographical Information System (GIS)



Computerized Maintenance Mgmt System (CMMS)

## What's Needed:

- Decisions should be made on complete information from all these systems working *together*
- Interests of all stakeholders should be considered and matched



Building Automation System (BAS)



Computer Aided Facility Management (CAFM)



Enterprise Resource Planning (ERP)



# You Need Complete Information



**Building Information Model (BIM)**

**Lifecycle BIM  
ties it all together**

Well ID	Date Sampled	Concentration
C-6A	5/8/94	300
C-8A	5/8/94	20
C-13A	5/8/94	120
C-17A	5/8/94	560

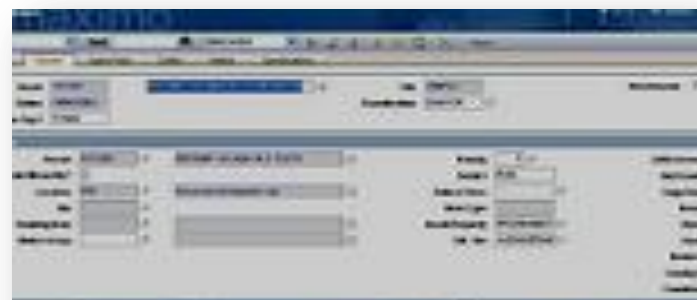
  

Facility	Address
Acme	3029 Convington Dr.
Fox	742 West Lake St.
TPC	90 Aspen Dr.

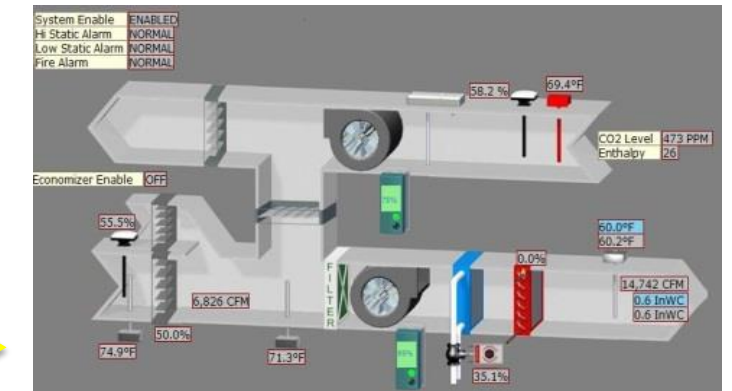
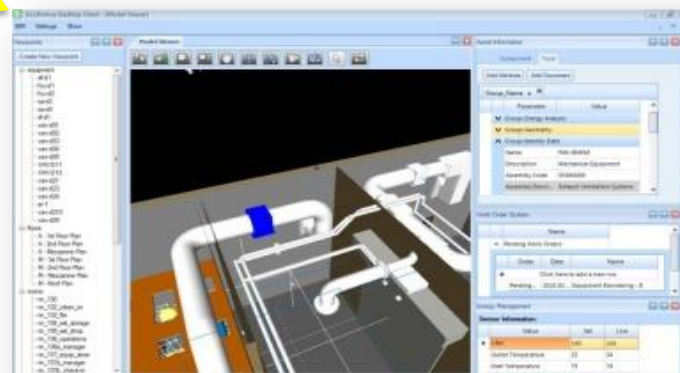
  

Family Name	Occupants	Address
Blake	6	79 Circuit St.
Hernandez	2	148 Plain St.
Joy	4	18 Webster St.
Smith	5	4321 Tecumseh Dr.

**Geographical Information System (GIS)**



**Computerized Maintenance Management System (CMMS)**



**Building Automation System (BAS)**



**Computer Aided Facility Management (CAFM)**



**Enterprise Resource Planning (ERP)**



**Lifecycle Building Support Provider**

# INTEGRATED PROJECT DELIVERY (IPD) AND BIM

**IPD** as "a project delivery method that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to reduce waste and optimize efficiency through all phases of design, fabrication and construction"



- **BIM** is an **process** that allows **owner, architects, engineers and builders** to explore a project digitally before it is built.
- **Coordinated, consistent information** is used throughout the process to:
  - ✓ Design innovative projects
  - ✓ Accurately visualize physical appearance
  - ✓ Simulate real-world performance
  - ✓ Integrate with regulatory, safety, health and technical compliances for buildings.

# Top Business Benefits for Owners

As the entities ultimately responsible for project outcomes, owners have their own unique perspective on what constitutes an internal benefit of BIM on infrastructure projects.

- **Tied for first place at 44%, overall better project outcomes and reduced rework are significant benefits of BIM.**

This is understandable because both are highly visible on projects in an owner organization and reflect directly on the individuals responsible. This is especially the case with reduced rework because unbudgeted changes on projects that result in rework are, in many cases, avoidable and indicate gaps in the project delivery process. A process enhancement, such as BIM, that can positively impact this perennial problem will be highly valued. Not surprisingly, a large percentage of owners of vertical projects in MHC's 2009 *Business Value of BIM SmartMarket Report* also find these benefits important.

- **Fewer claims/litigation is owners' next most important internal benefit.**

Claims and litigation may rank highly with owners because of their visibility and the potential financial risk they involve.

## Top Internal Business Benefits of Using BIM for Infrastructure Projects for Owners

Source: McGraw-Hill Construction, 2012

Overall Better Project Outcomes



Reduce Rework



Fewer Claims / Litigation



Reduce Errors in Documents



Reduce Workflow Cycle Time



Reduce Project Duration



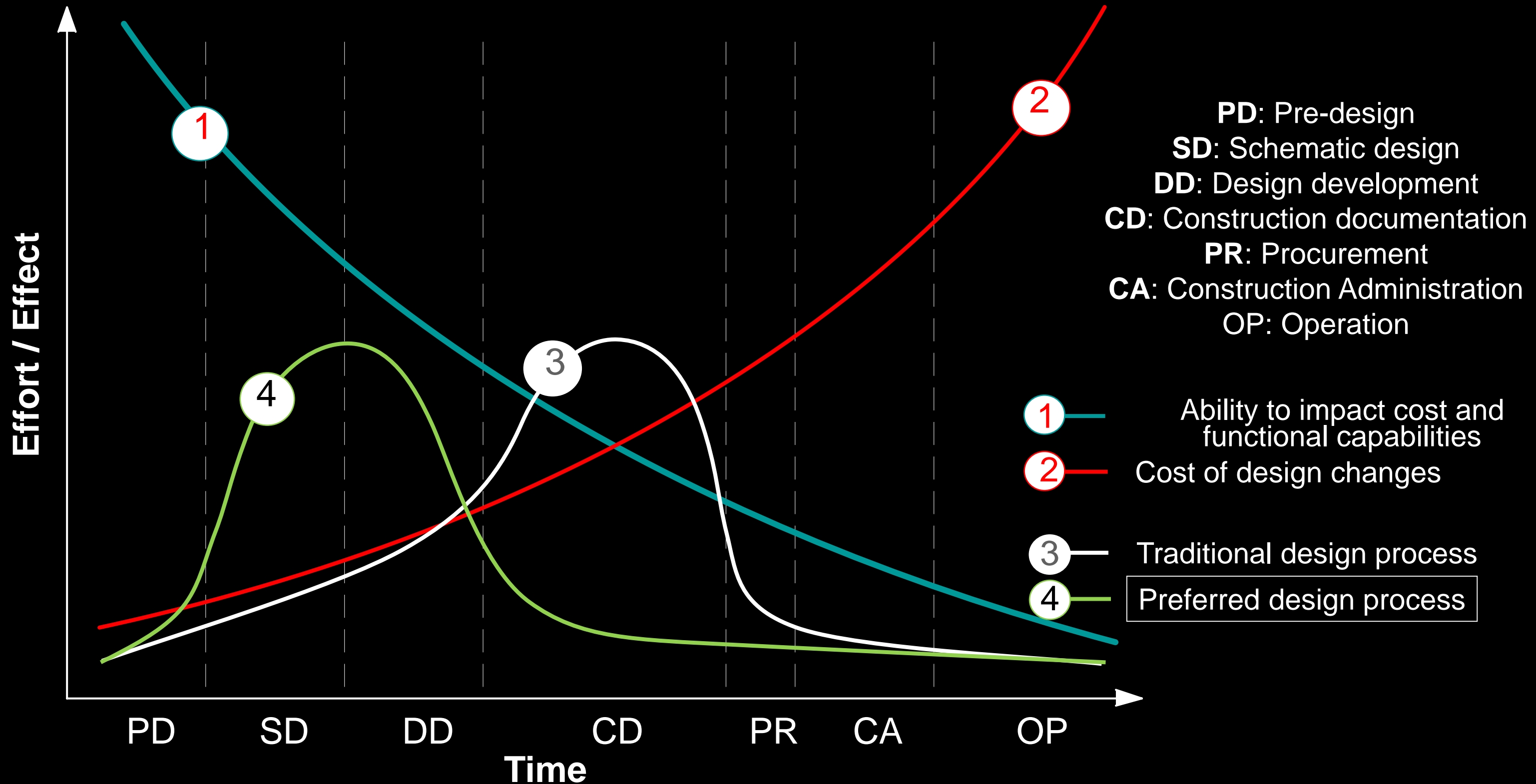
Reduce Construction Cost



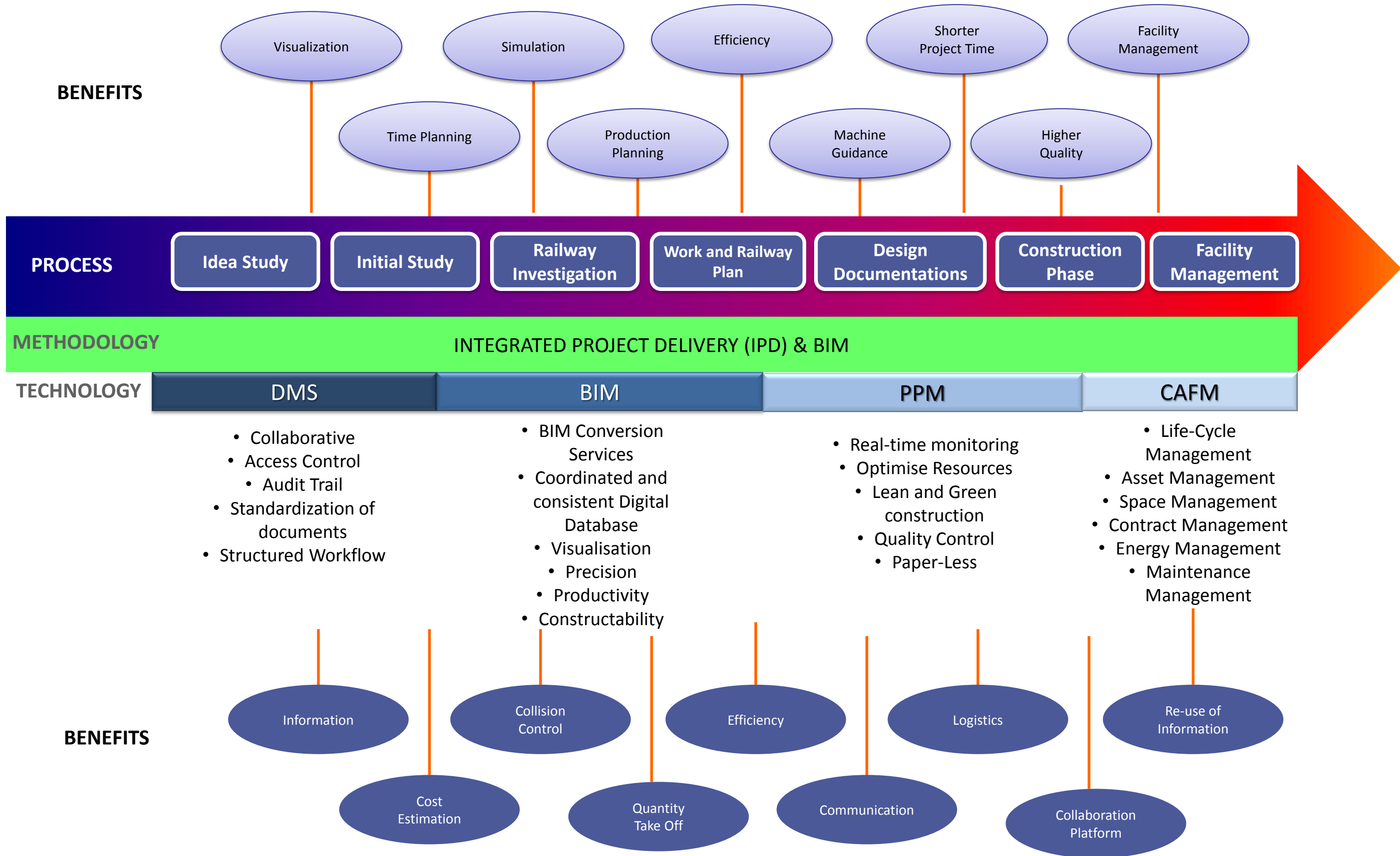
# Why Integrated Project Delivery & BIM is important ?

Greater IMPACT to the Project COST

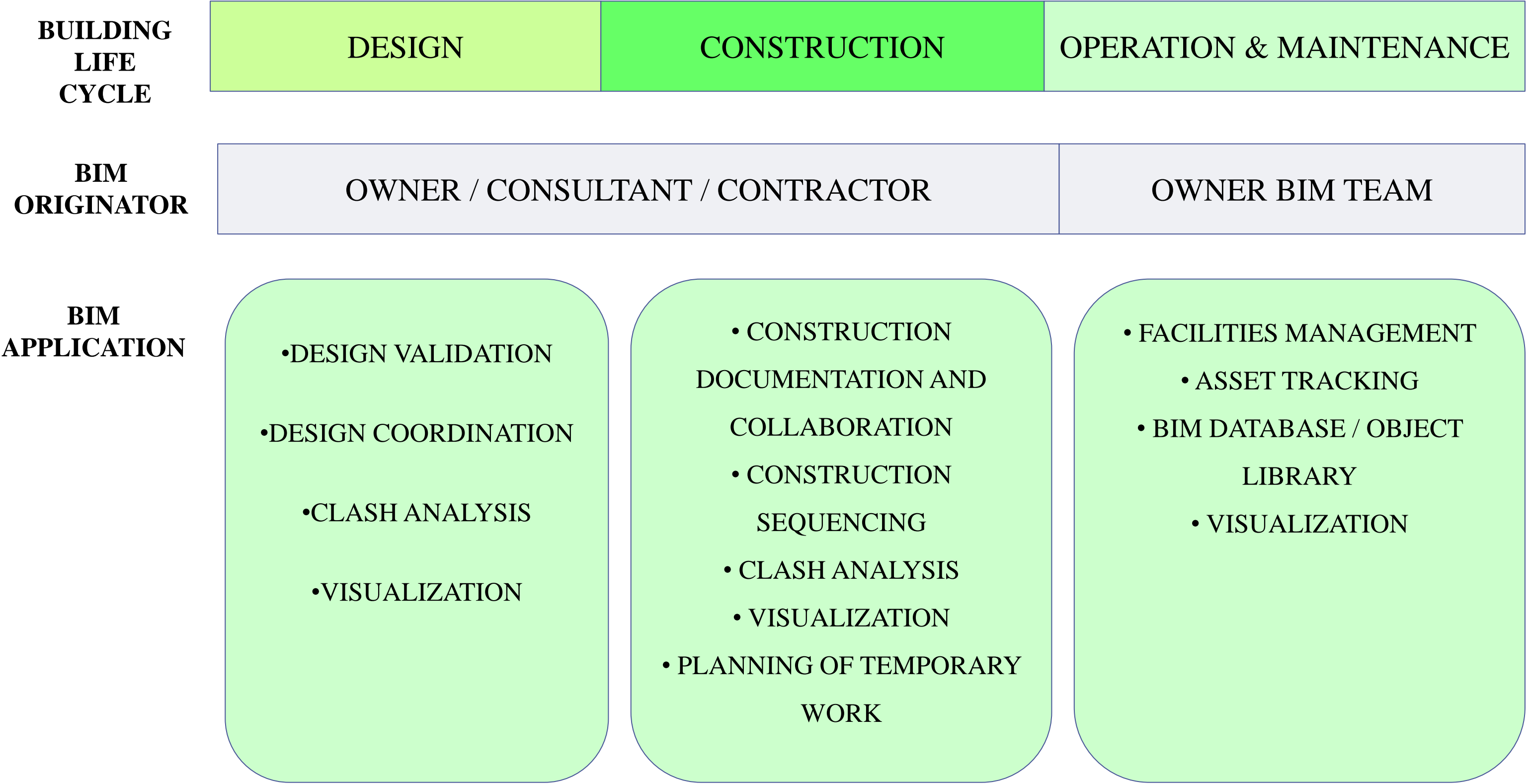
*when collaborative design process are not brought in earlier to key stake-holders !*



# THE PROCESS OF RAILWAY PLANNING AND CONSTRUCTION



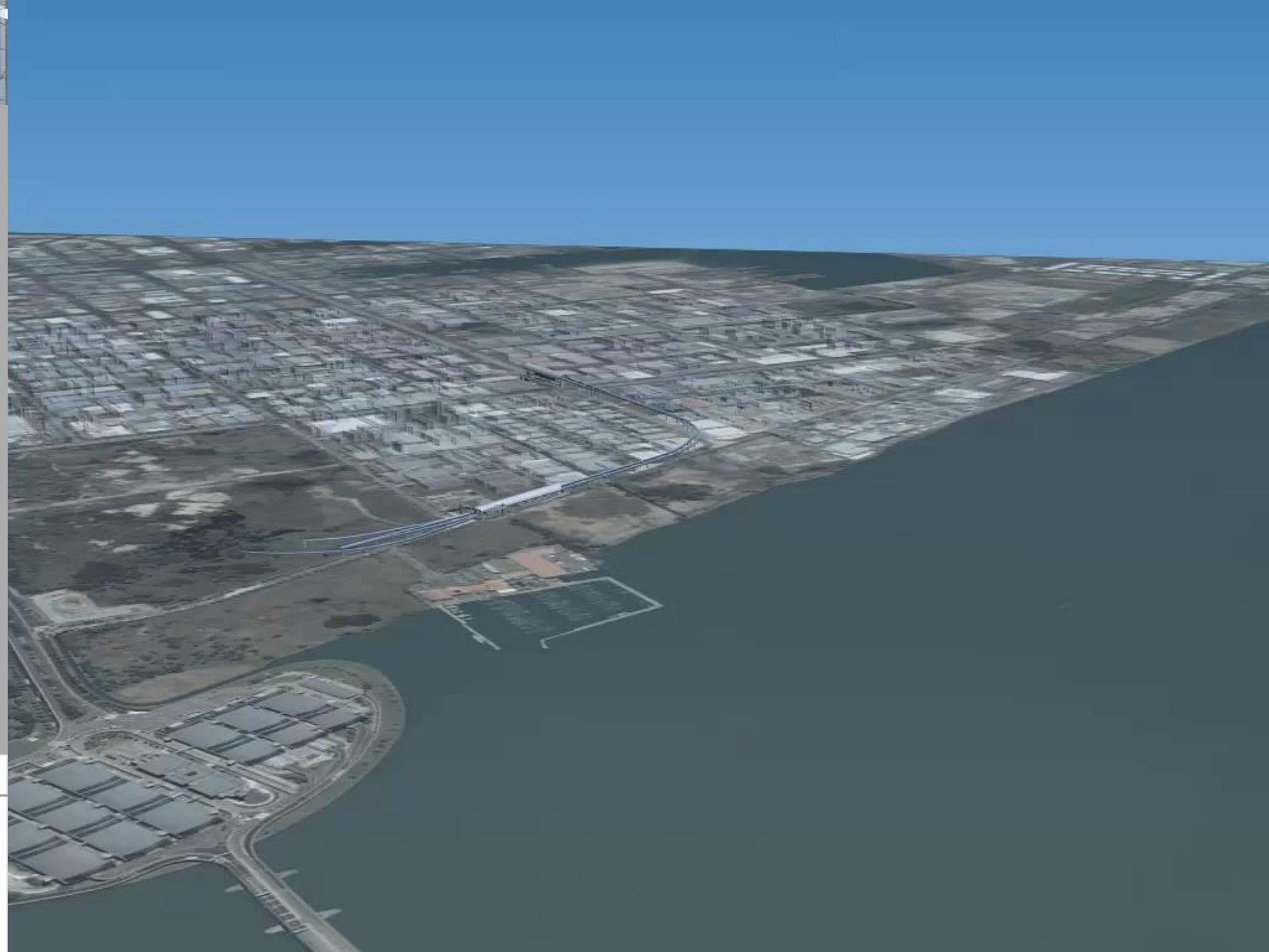
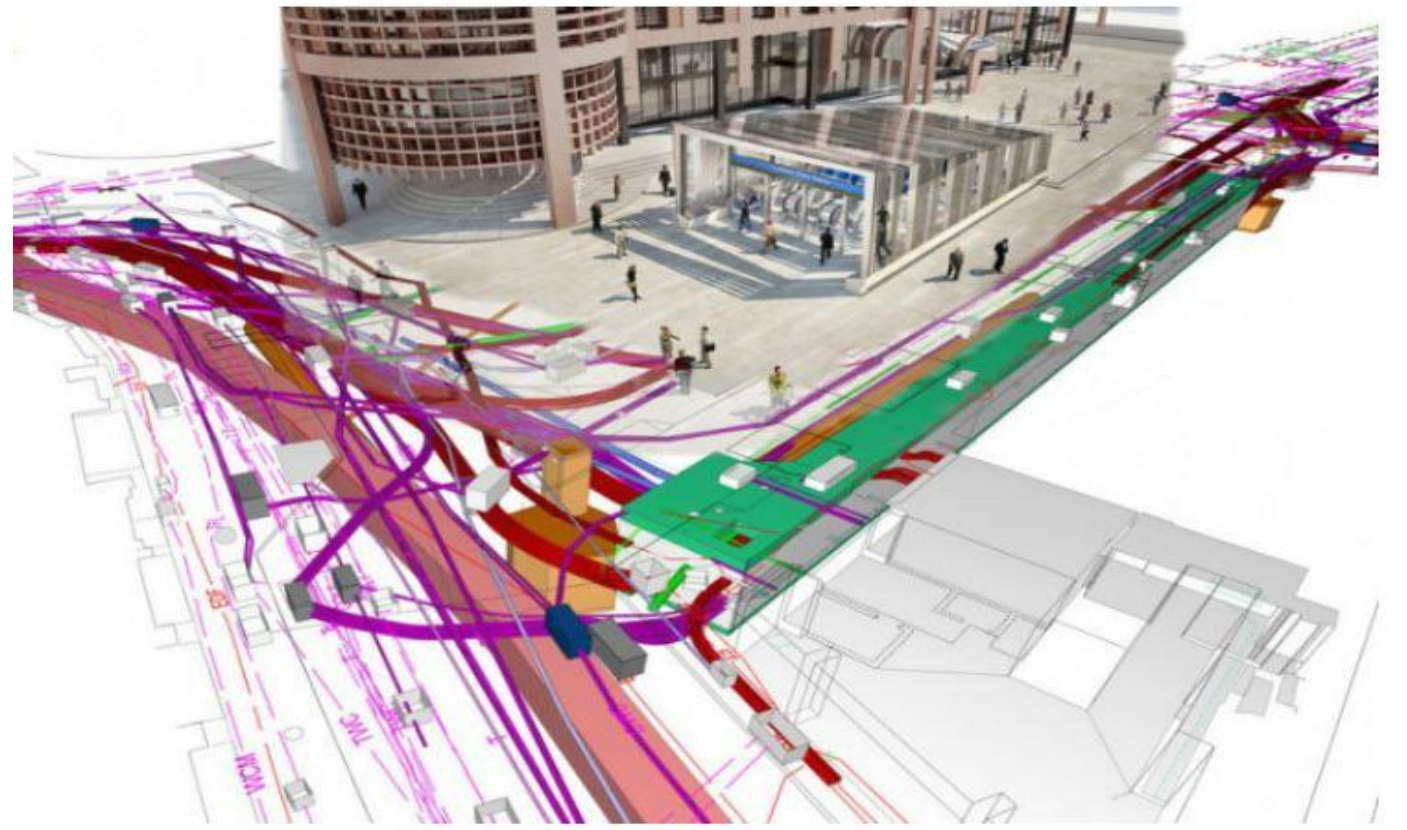
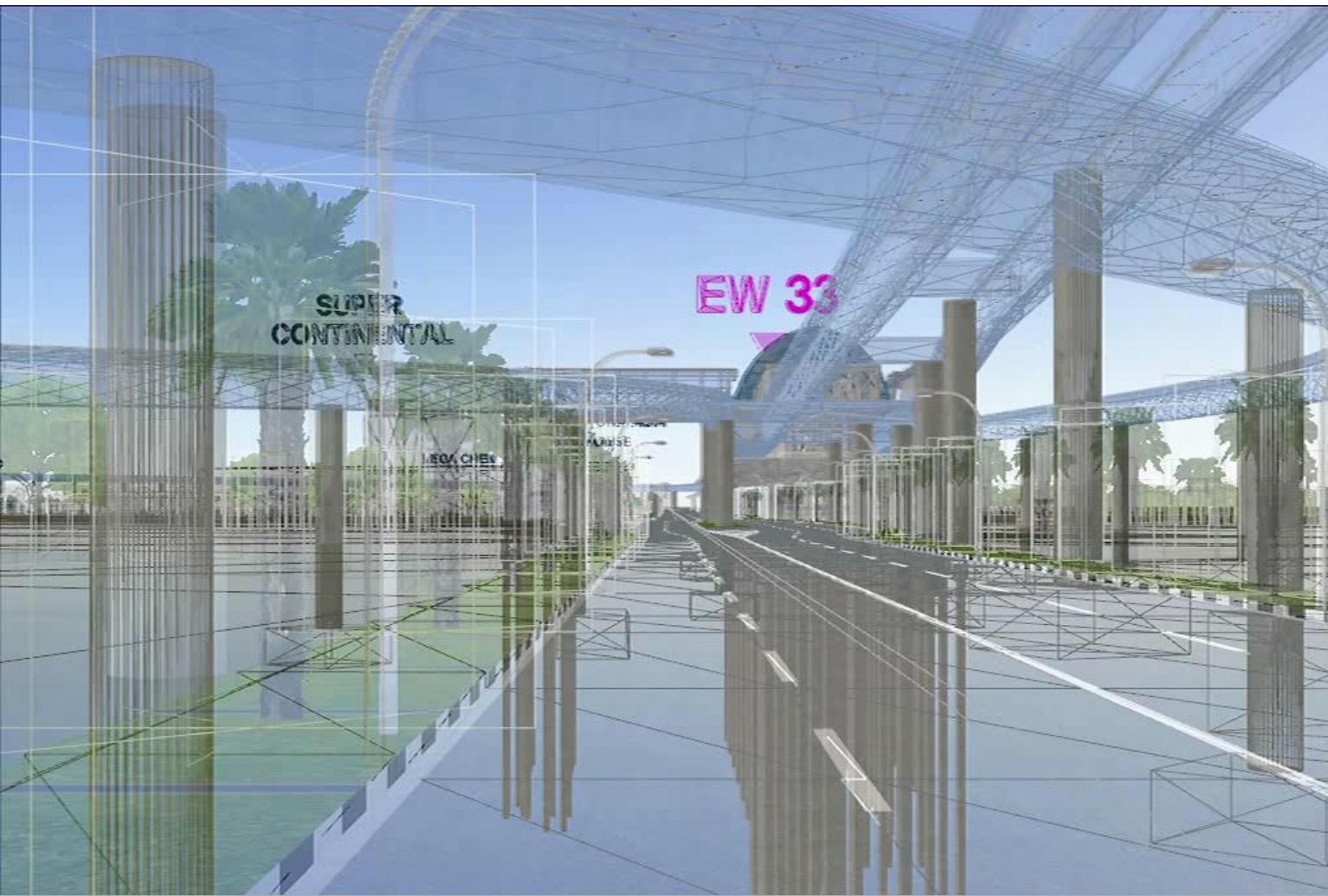
# BIM APPLICATION FOR CIVIL & INFRA PROJECTS



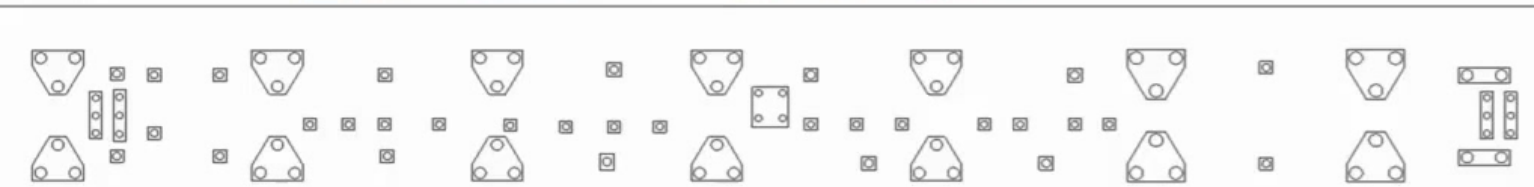


# FEASIBILITY STUDY AND ANALYSIS





Plan view      Piling ■ Rig 01    ■ Rig 02      Pilecap ■ Team 01    ■ Team 02





# INTEGRATION OF BIM AND SURVEY DTM

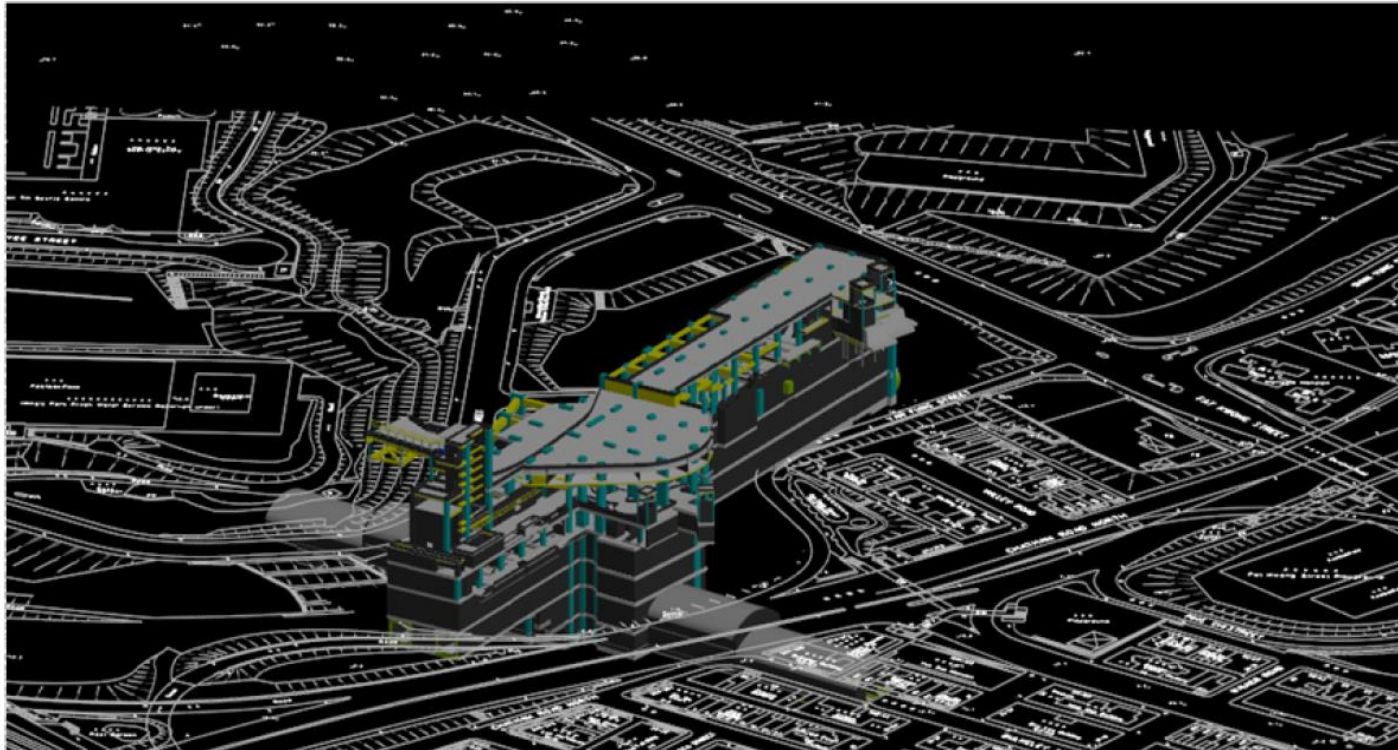


0.7 M m<sup>3</sup>

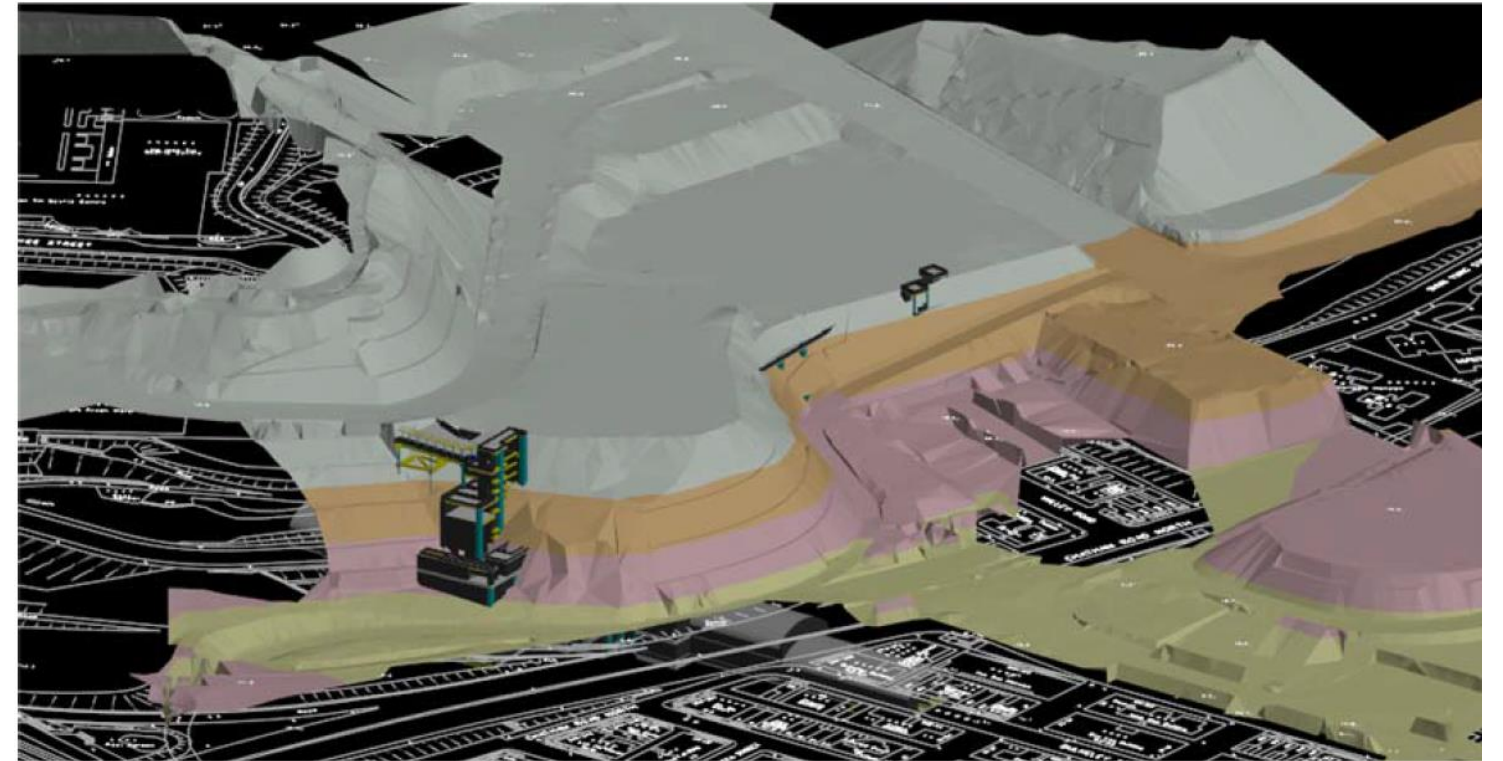
Kwun Tong Line Extension (KTE), Hong Kong

# INTEGRATION OF BIM AND SURVEY DTM

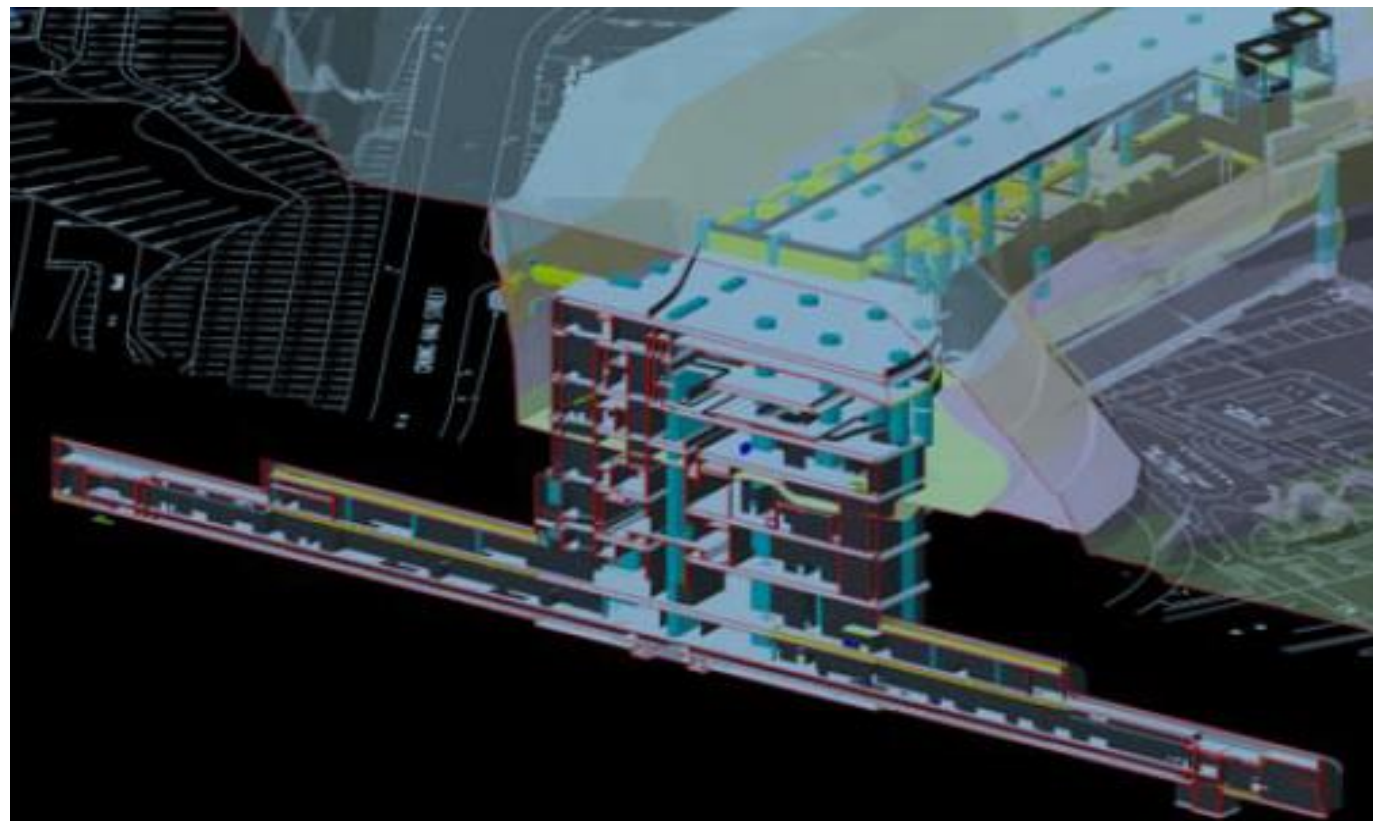
Kwun Tong Line Extension (KTE), Hong Kong



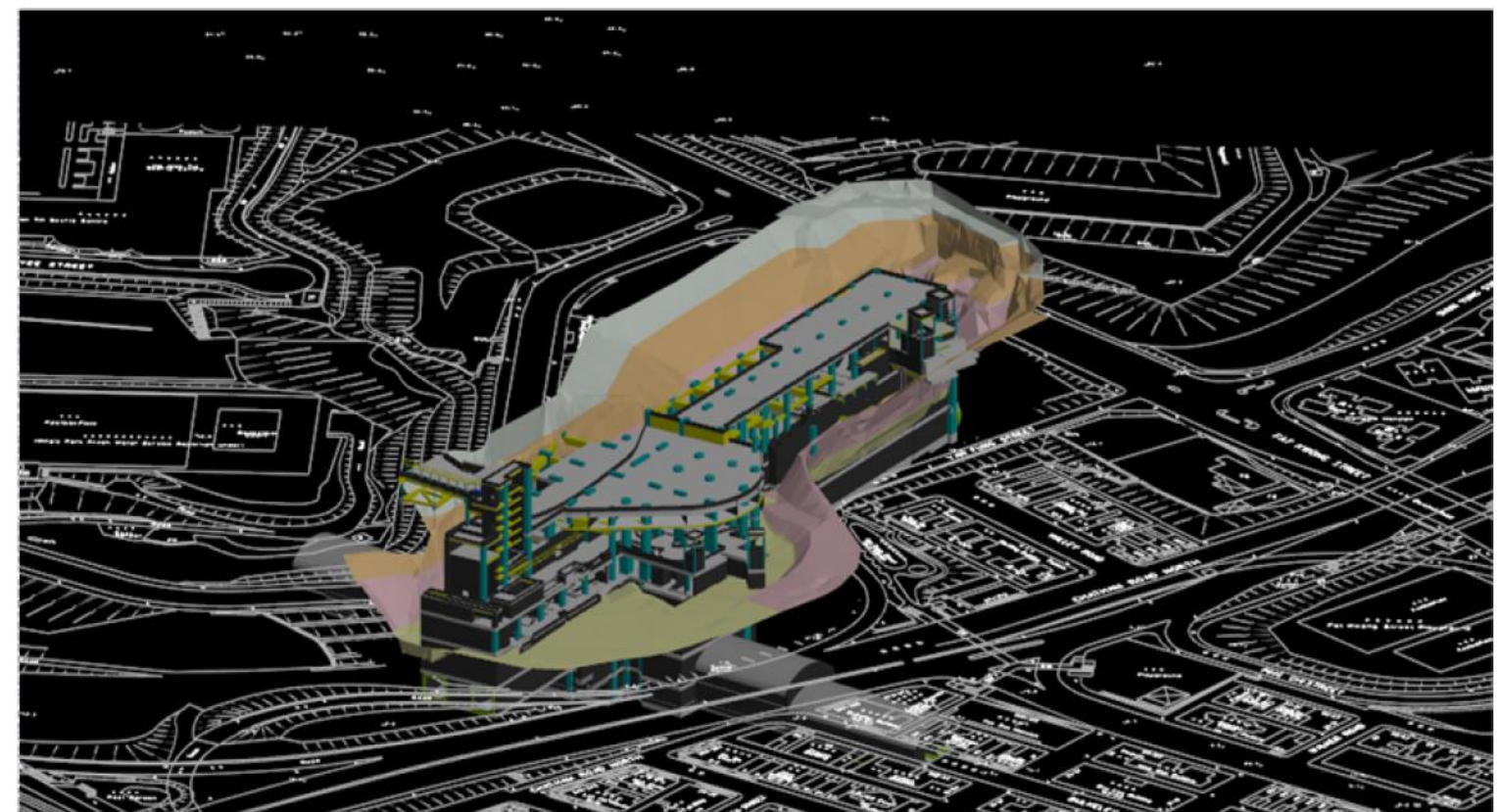
Ho Man Tin Station Structural Model



Survey DTM dated 14 May 2012

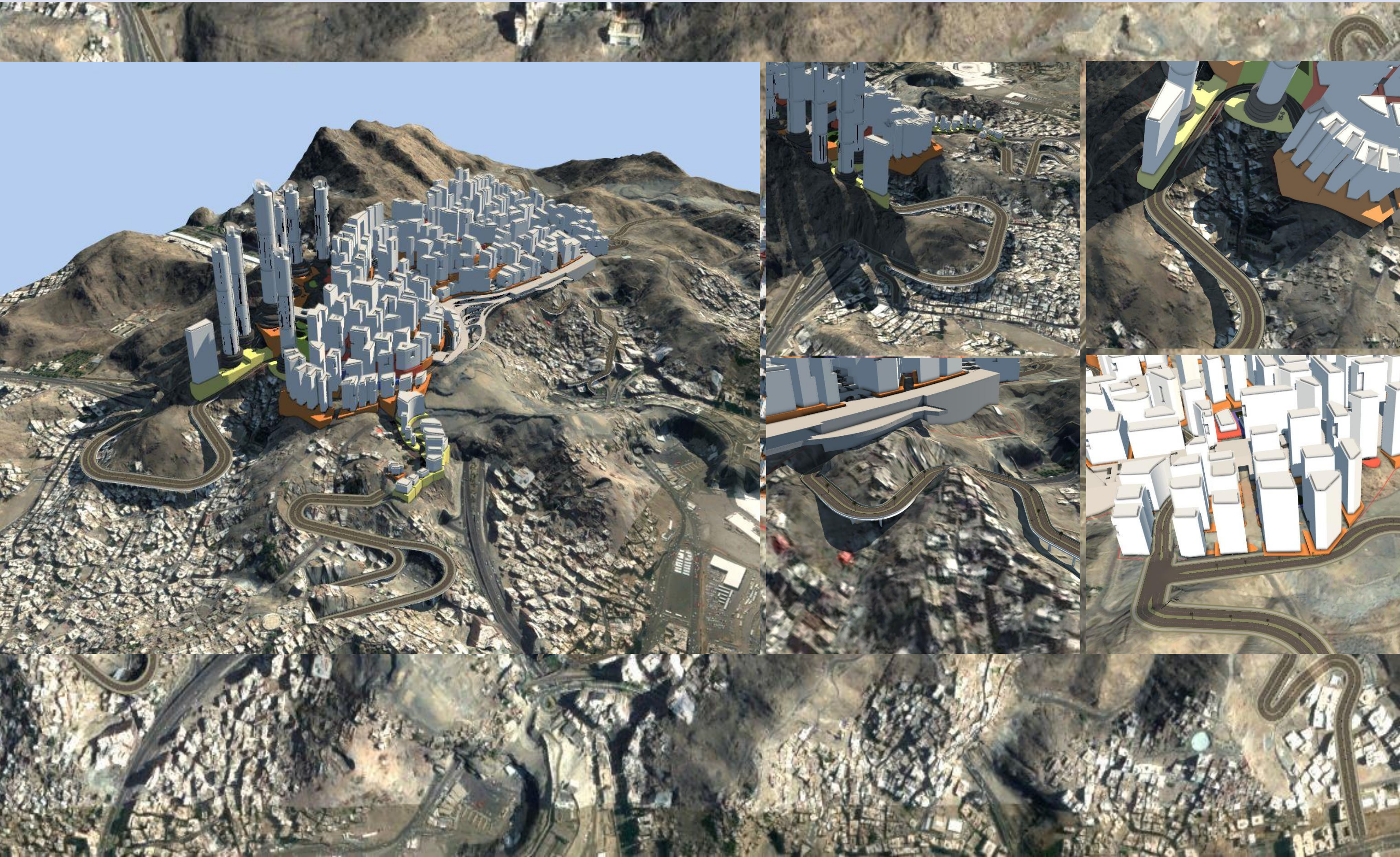


KTE Station Section



Survey DTM dated 22 Feb 2013

# Design Study of the Access Roads



# Design Study of the Access Roads

## Option 1 - Embankment



## Option 2 - Bridge



# DESIGN TO CONSTRUCTION



# 3D BIM Model

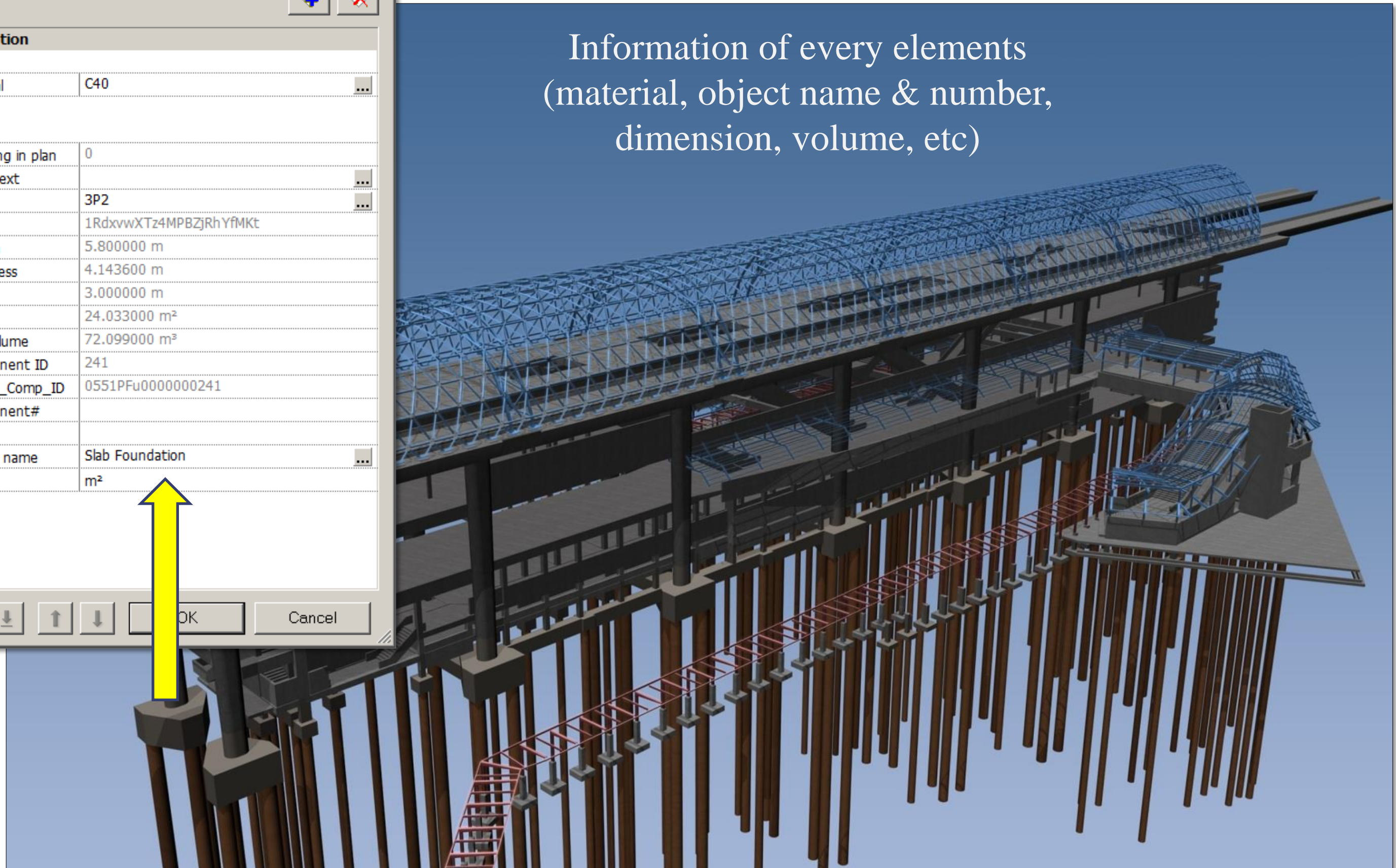
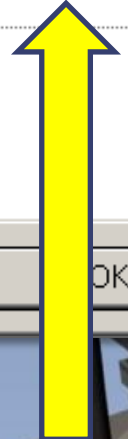
Information of every elements  
(material, object name & number,  
dimension, volume, etc)

Assign, Modify Object Attributes

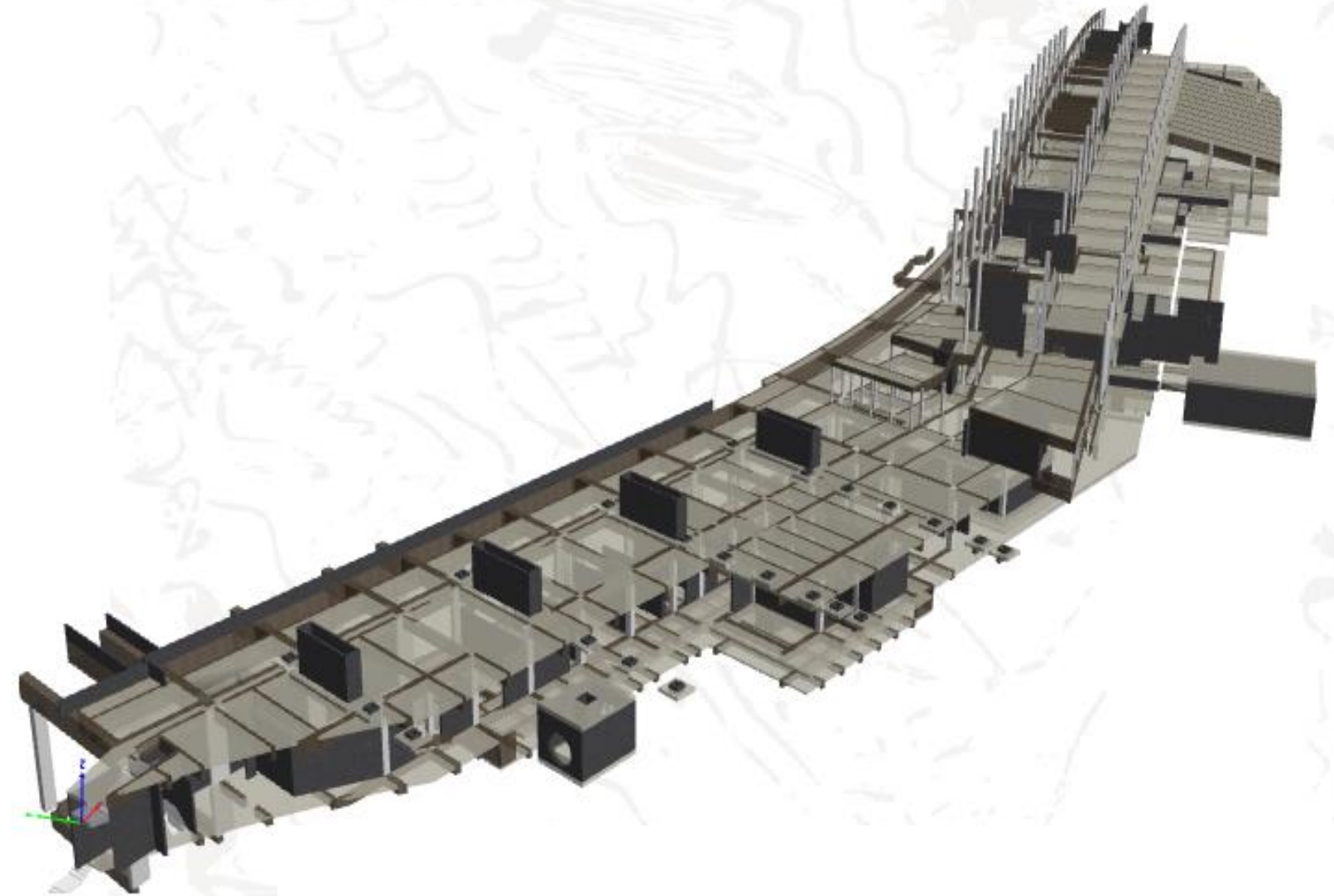
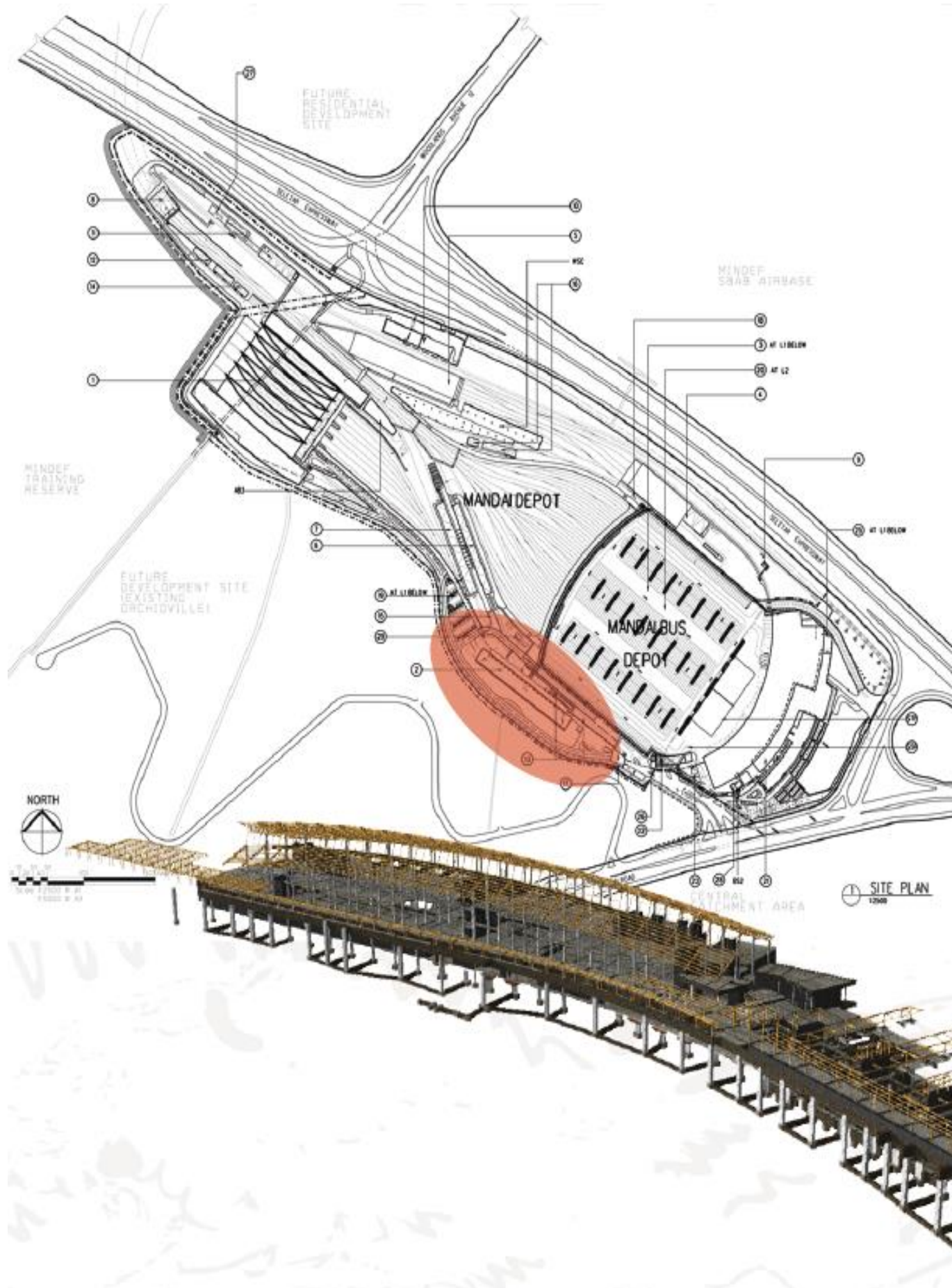
**Slab Foundation**

<input checked="" type="checkbox"/>	Quality	
<input checked="" type="checkbox"/>	Material	C40
<input checked="" type="checkbox"/>	Classification	
<input checked="" type="checkbox"/>	Attributes	
<input checked="" type="checkbox"/>	Hatching in plan	0
<input checked="" type="checkbox"/>	Code text	
<input checked="" type="checkbox"/>	Text1	3P2
<input checked="" type="checkbox"/>	Ifc ID	1RdxvwXTz4MPBZjRhYfMkt
<input checked="" type="checkbox"/>	Length	5.800000 m
<input checked="" type="checkbox"/>	Thickness	4.143600 m
<input checked="" type="checkbox"/>	Height	3.000000 m
<input checked="" type="checkbox"/>	Area	24.033000 m <sup>2</sup>
<input checked="" type="checkbox"/>	Net volume	72.099000 m <sup>3</sup>
<input checked="" type="checkbox"/>	Component ID	241
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<input checked="" type="checkbox"/>	Component#	
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<input checked="" type="checkbox"/>	Object name	Slab Foundation
<input checked="" type="checkbox"/>	Unit	m <sup>2</sup>

OK Cancel

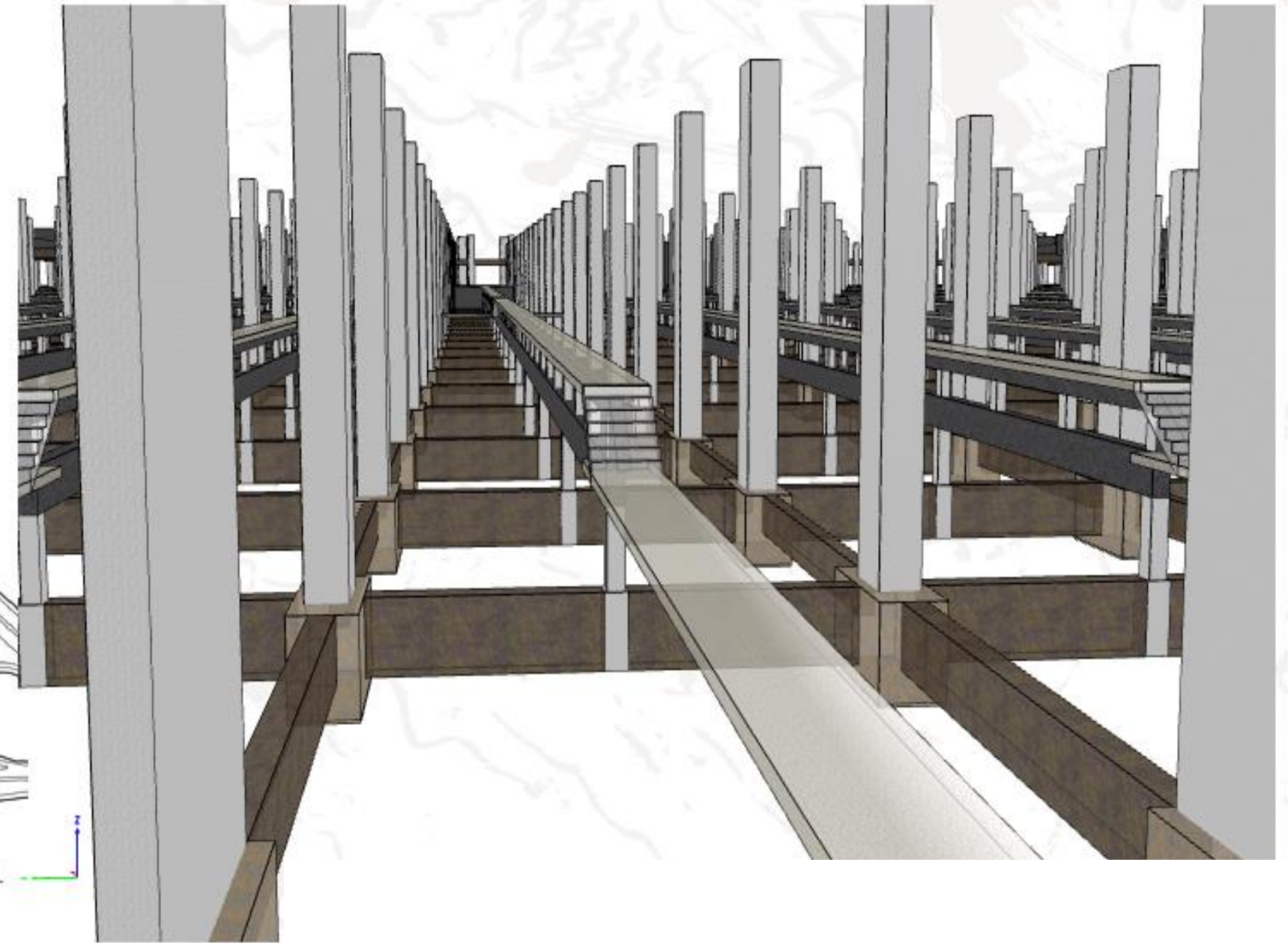
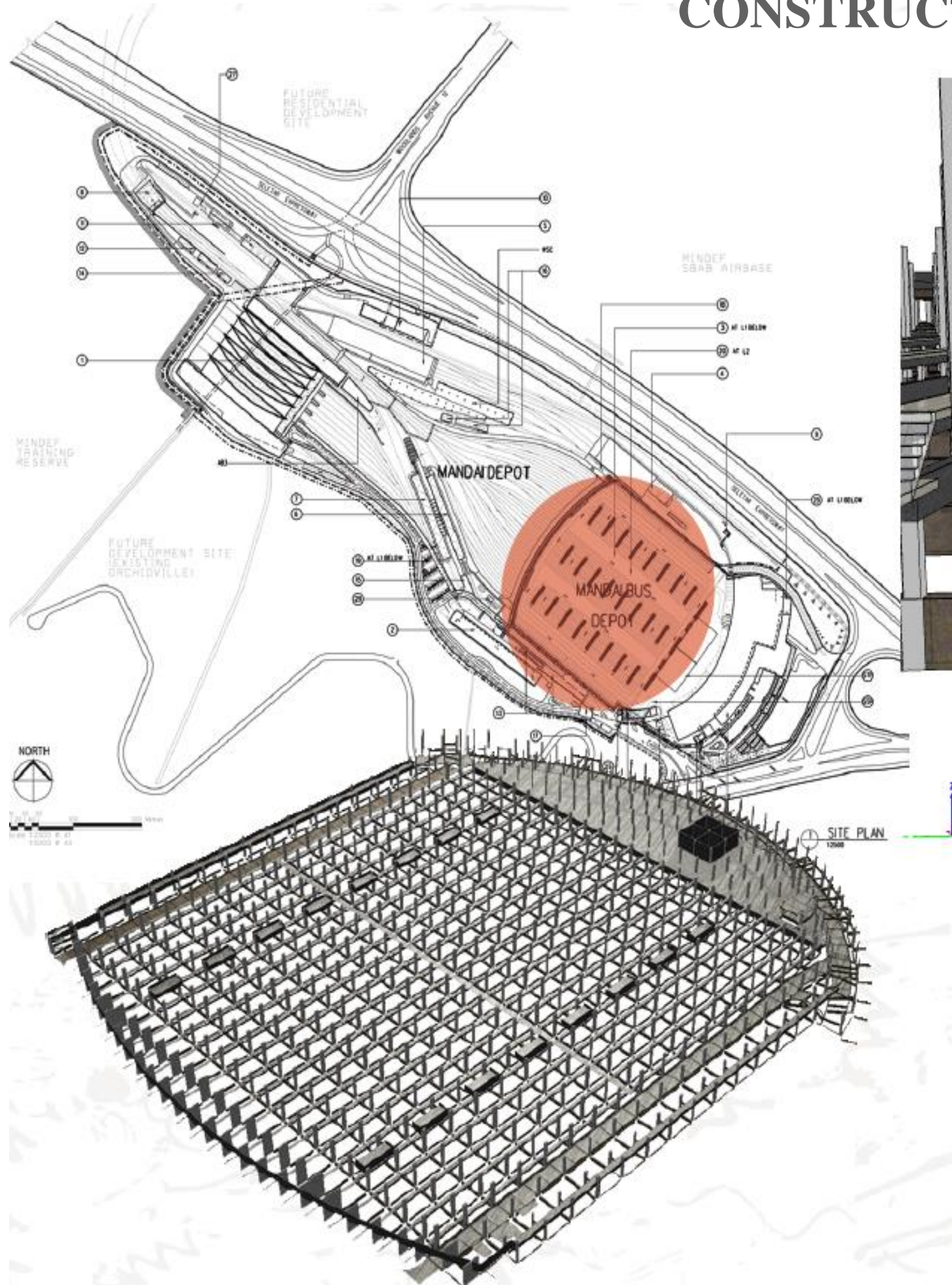


# CONSTRUCTION OF DEPOT



**RAIL  
ADMINISTRATION**

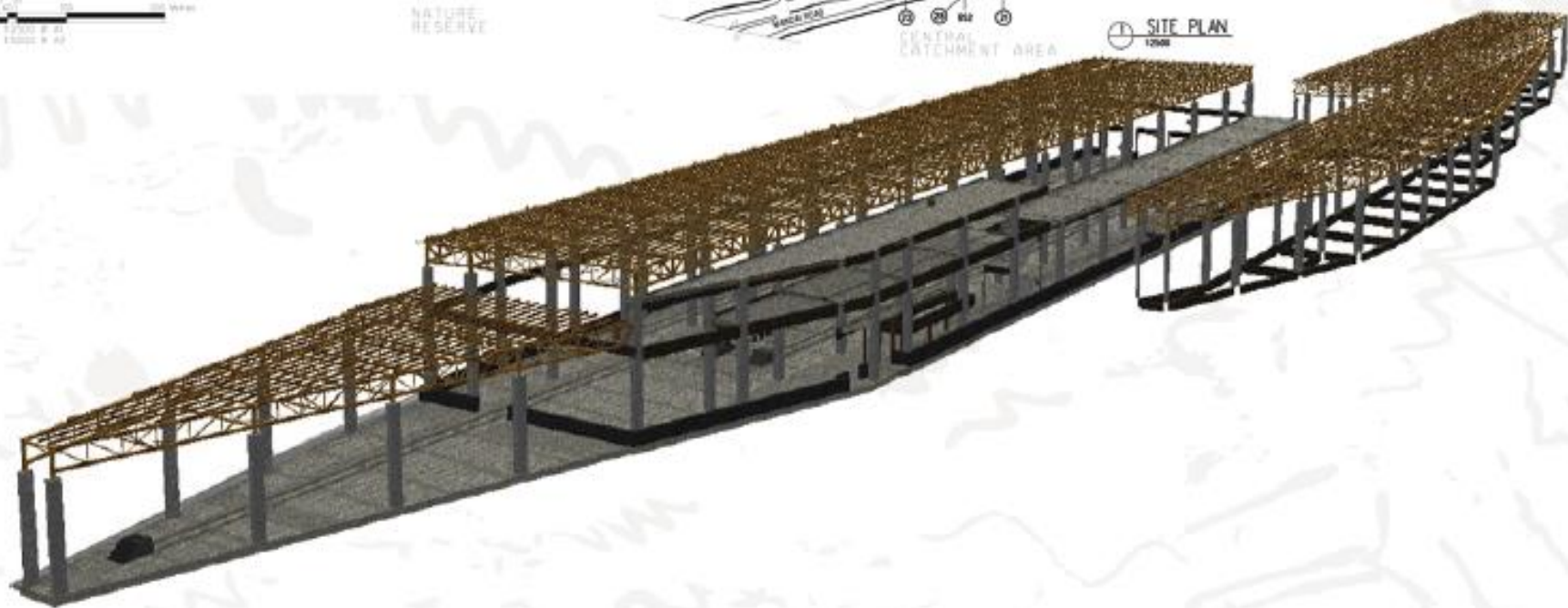
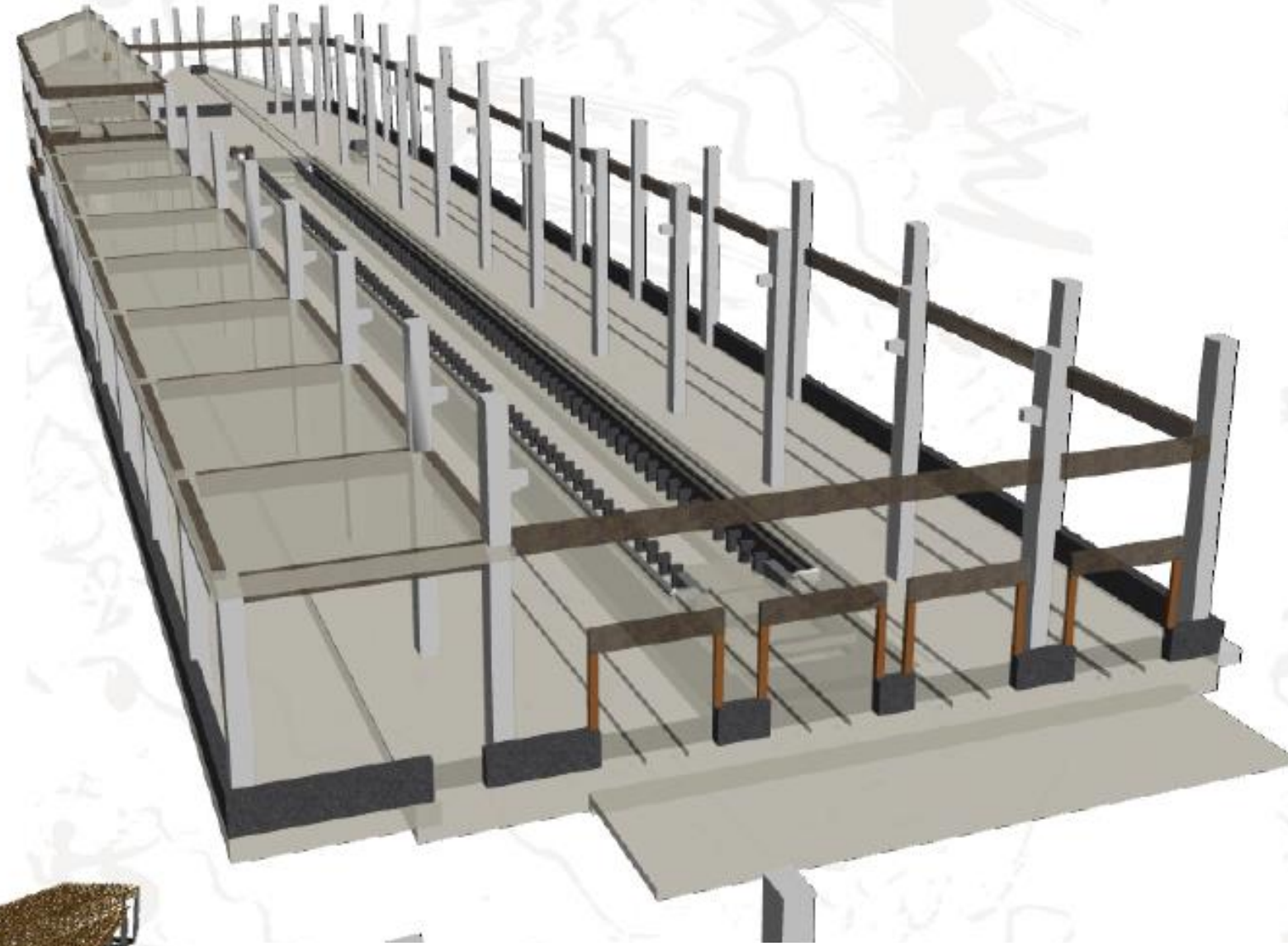
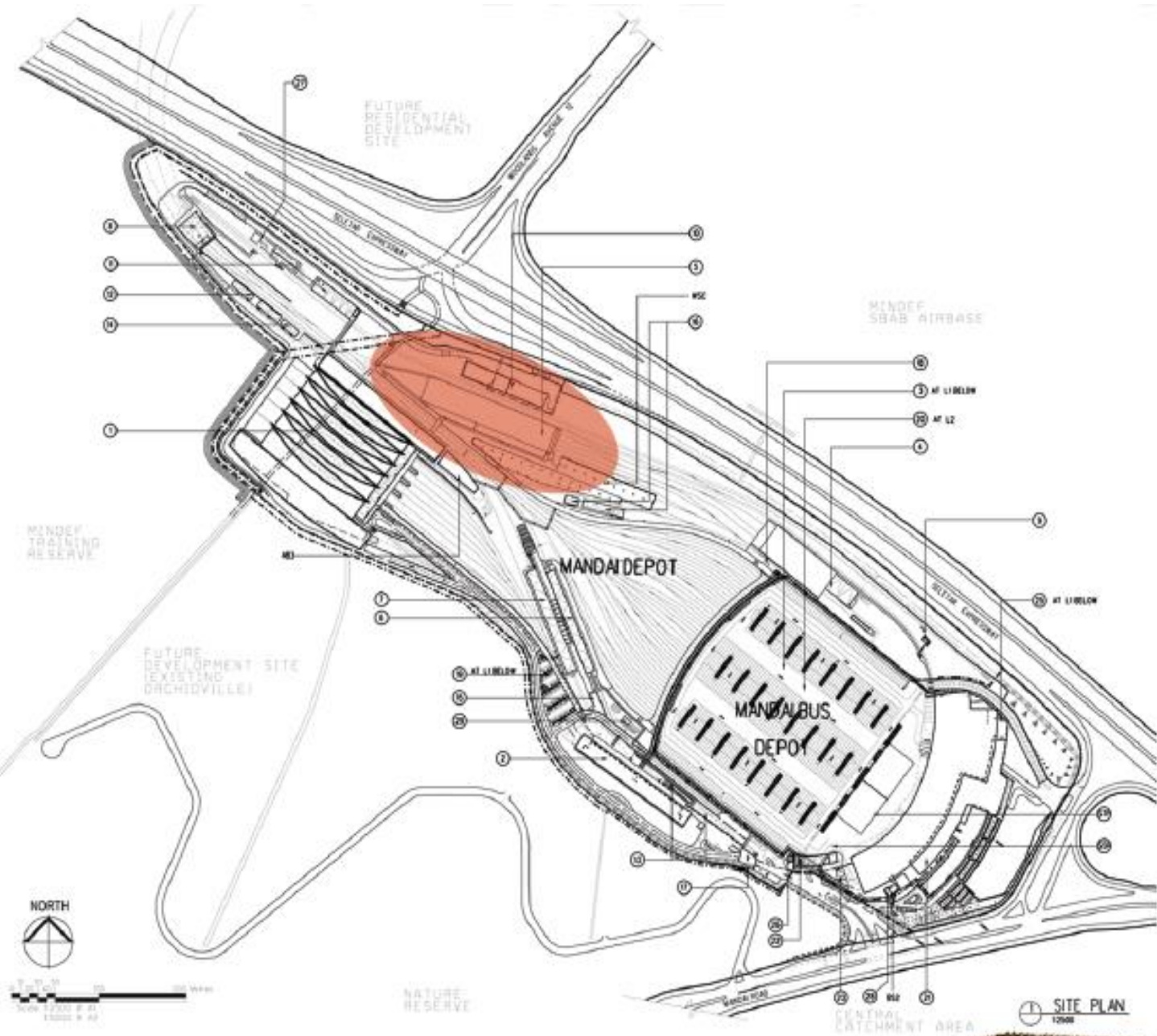
# CONSTRUCTION OF DEPOT



## STABLING YARD



# CONSTRUCTION OF DEPOT

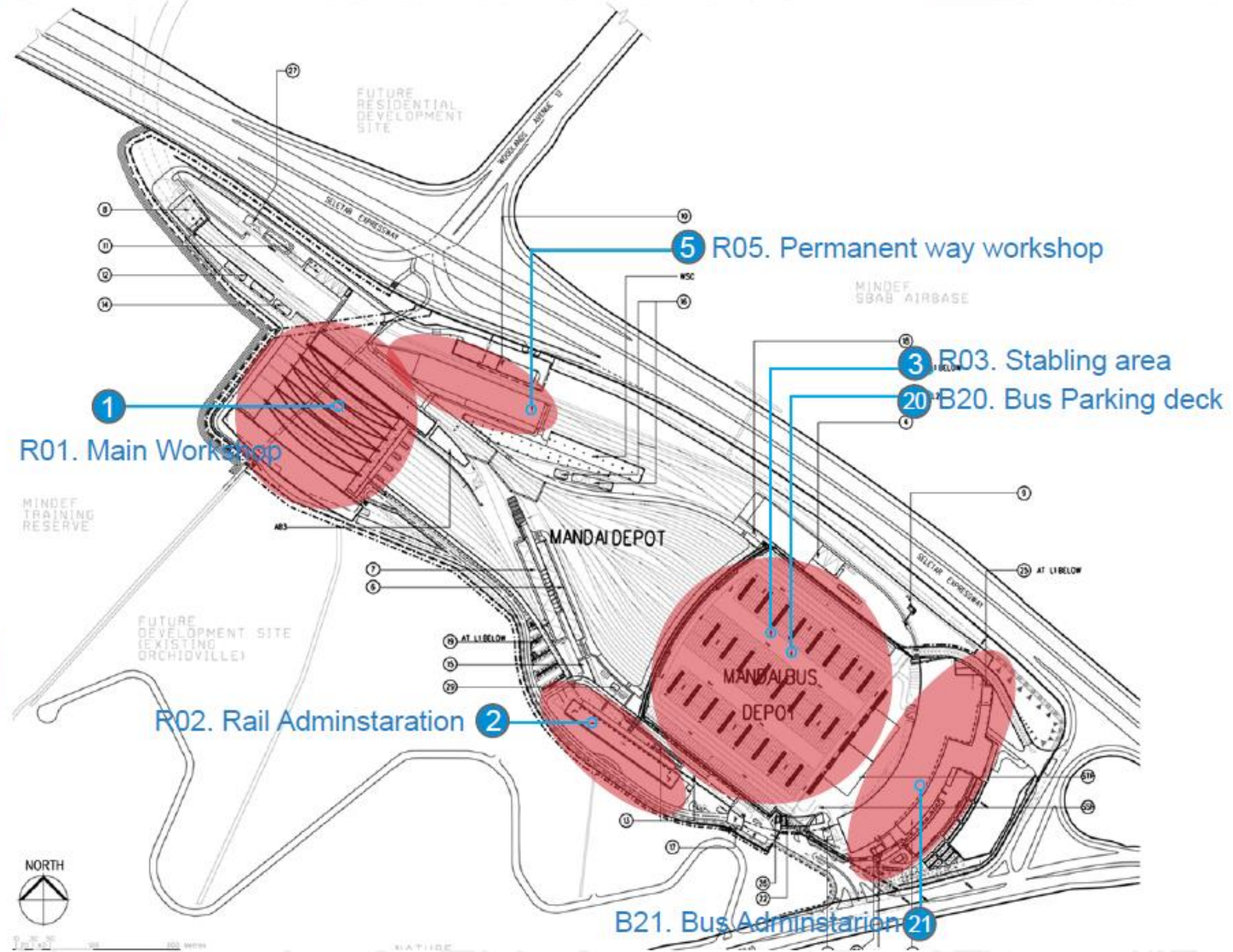


**PERMANENT WAY WORKSHOP  
& LOCOMOTIVE STABLING**

LEGEND

RAIL (R) BUS (B)	BUILDING	DESCRIPTION	ABB.
R	01	MAIN WORKSHOP	MWS
R		ANCILLARY BUILDING 3	AB3
R	02	RAIL ADMINISTRATION	RAD
R	03	STABLING AREA	STA
R		STABLING AREA STORE ROOM	SSR
R		HYDRANT TANK & PUMP ROOM	STP
R	04	LOCOMOTIVE WORKSHOP	LWS
R	05	PERMANENT WAY WORKSHOP	PWS
R		LOCOMOTIVE & WAGON STABLING CANOPY	WSC
R	06	MANUAL TRAINWASH	MTW
R	07	AUTOMATIC TRAINWASH	ATW
R	08	TUNNEL VENTILATION FAN	TVF
R	09	TEST TRACK CONTROL	TTC
R	10	SPPG 66KV SUBSTATION	SPS
R	11	LOAD CENTER 1	LC1
R	12	ANCILLARY BUILDING 1	AB1
R	13	ANCILLARY BUILDING 2	AB2
R	14	WASTE WATER TREATMENT PLANT-1	WT1
R	15	WASTE WATER TREATMENT PLANT-2	WT2
R	16	THERMIT STORE, SPRINKLER TANKS & PUMP ROOM	THS
R	17	RAIL SECURITY GATE HOUSE	RSG
R	18	RAIL UNDERGROUND DIESEL TANK & CONTROL ROOM	DTR
R	19	LOAD CENTER 2	LC2
B	20	BUS PARKING DECK	BPD
B	21	BUS MAINTENANCE / ADMINISTRATION	BMA
B	22	BUS SECURITY GATE HOUSE 1	BS1
B	23	BUS UNDERGROUND DIESEL TANK	BDT
-	24	NOT USED	-
B	25	BUS DEPOT WATER TANK ROOMS	BWT
R	26	RAIL DEPOT REFUSE STORE	RST
R	27	BULK & SCRAP STORE	BSS
B	28	SPPG 22KV SUB-STATION	SSB
R	29	CONDENSER UNIT ROOM	CUR
B	30	BUS SECURITY GATE HOUSE 2	BS2

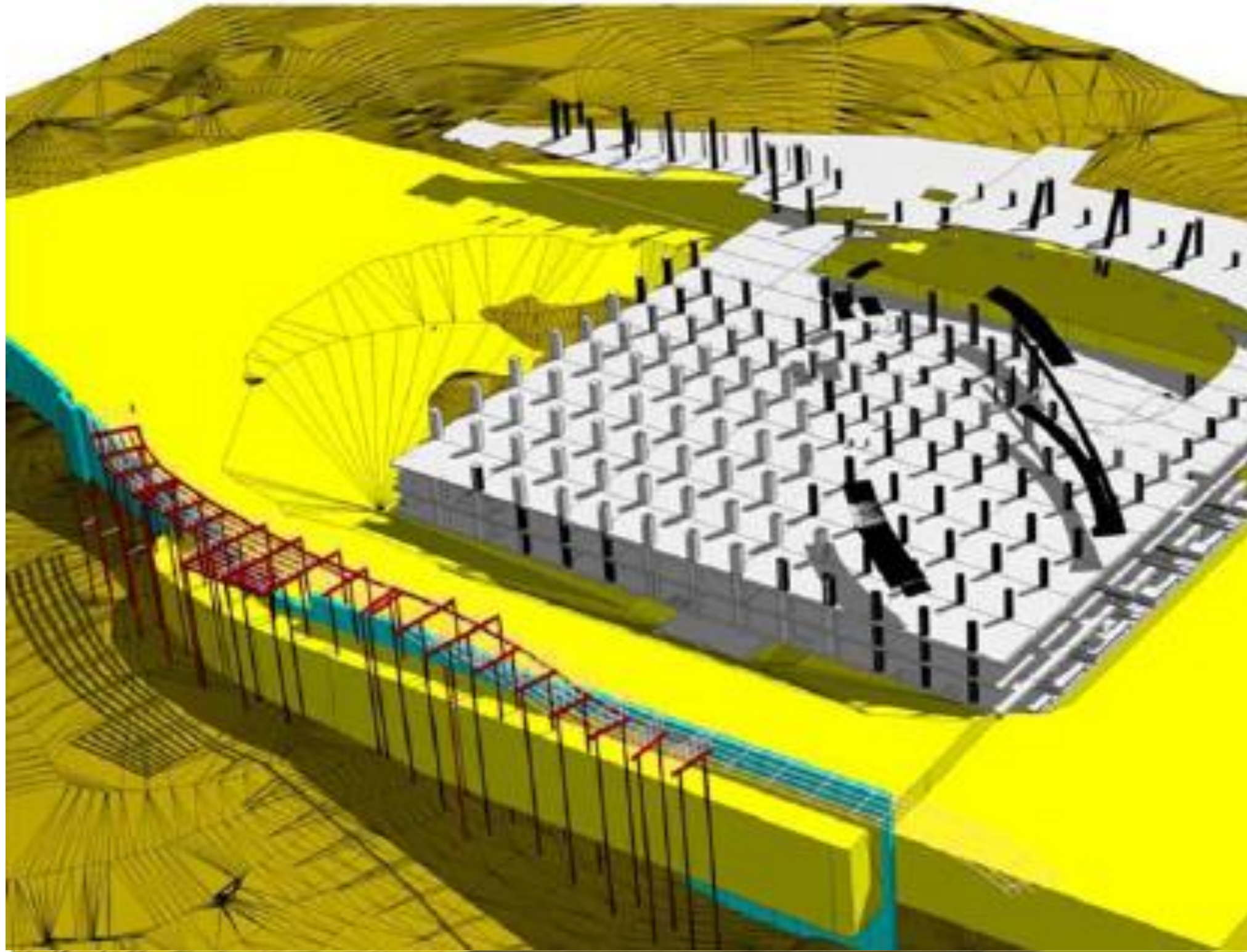
# CONSTRUCTION OF DEPOT



# TRAFFIC / SAFETY SIMULATION

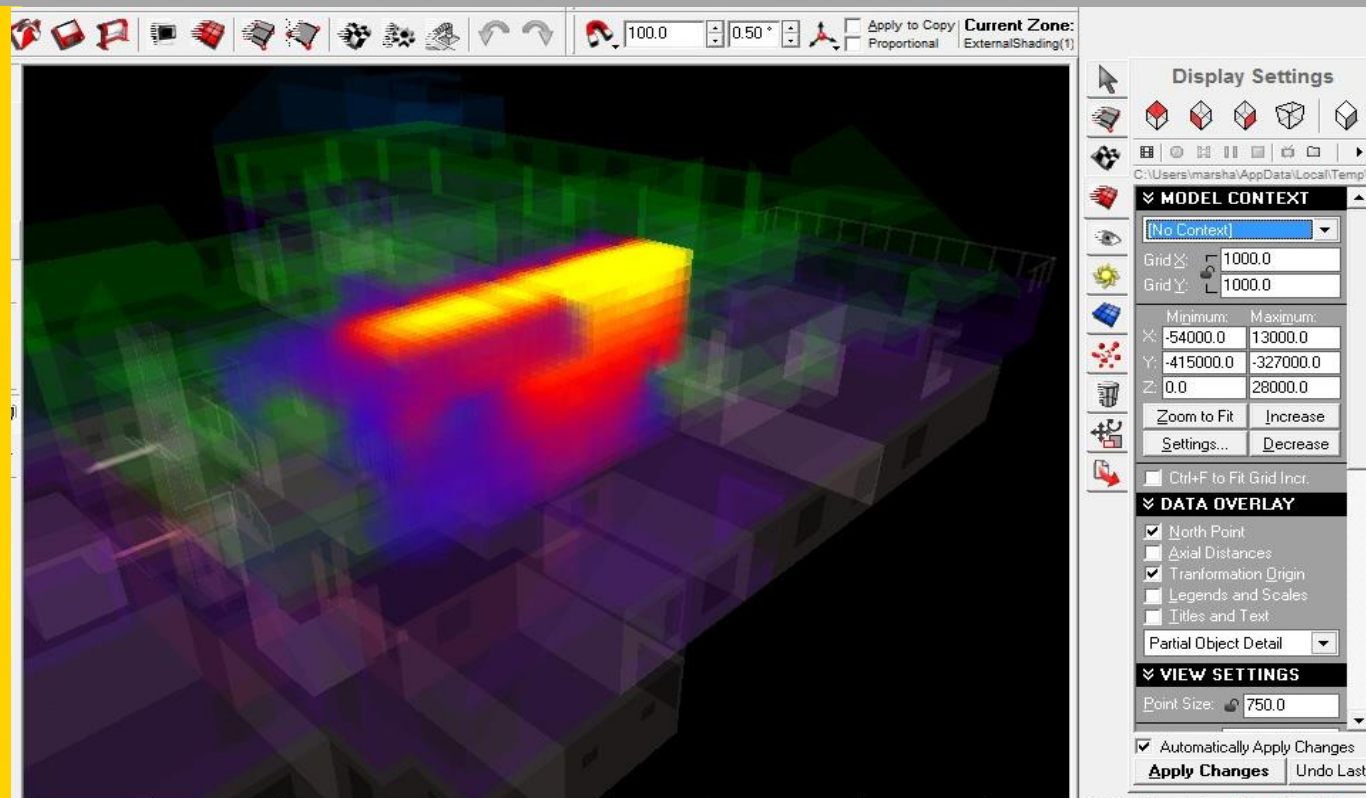
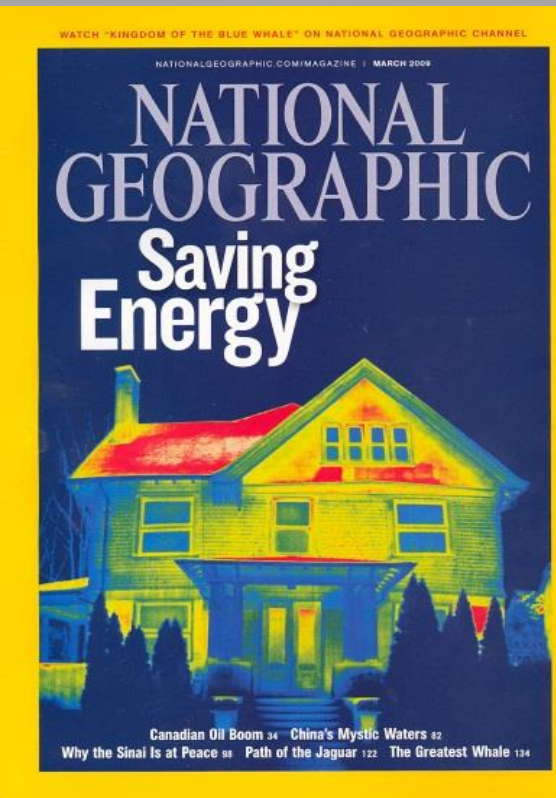


## 4D Analysis of Excavation Sequence



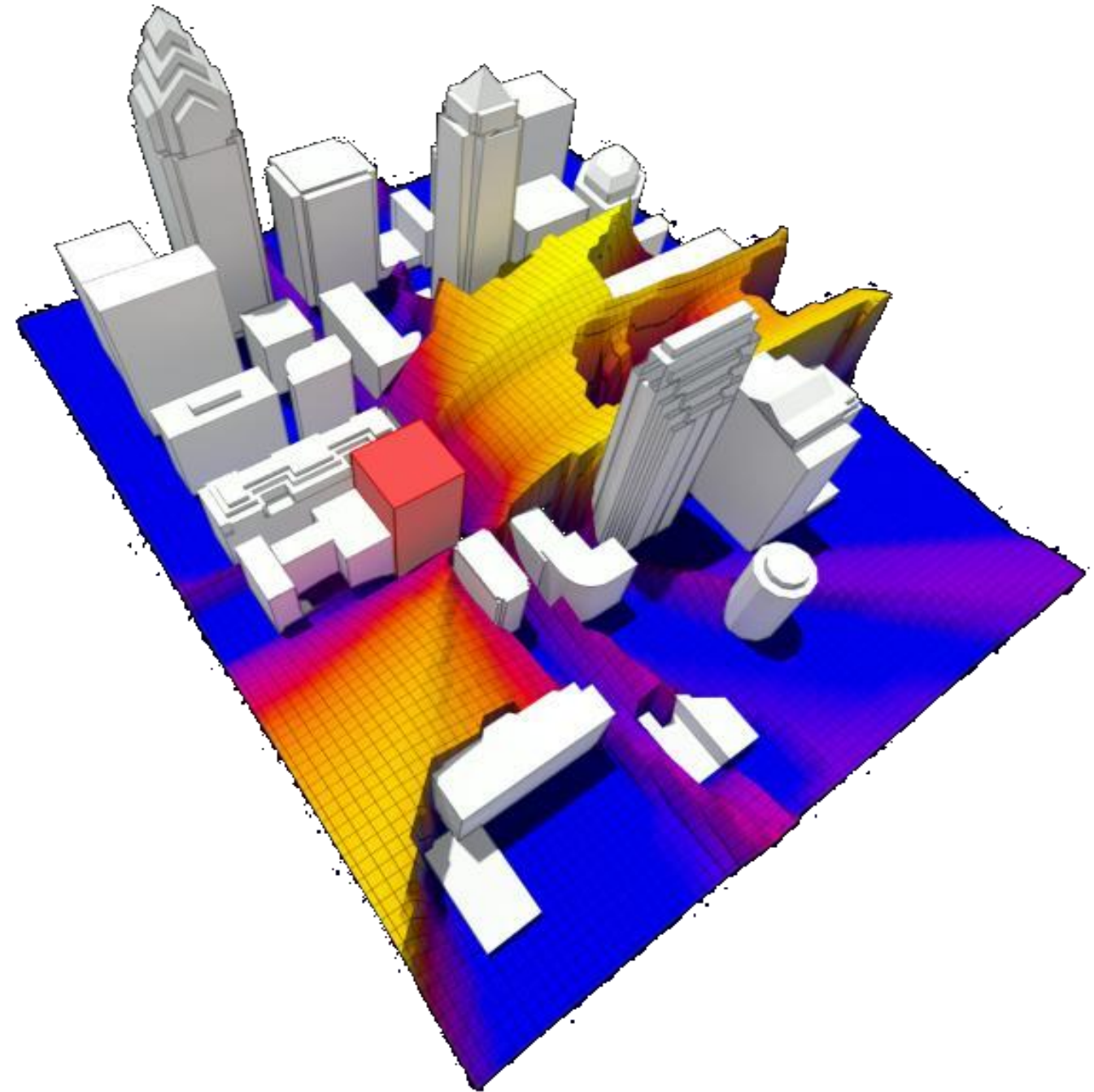


# SUSTAINABLE DESIGN

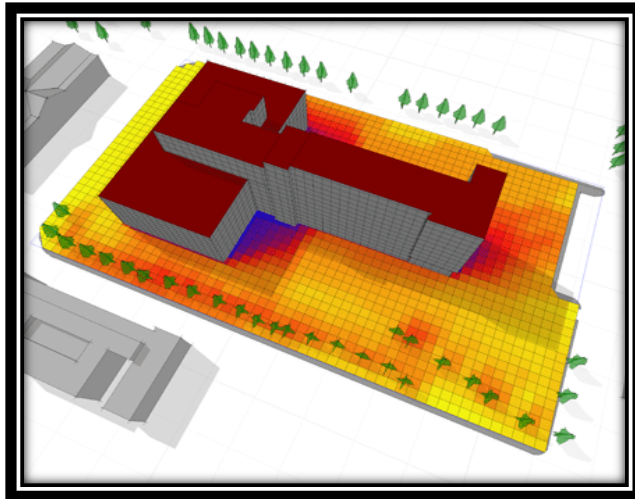


# Visualize and Simulate Environmental Performance

- Building performance and site analysis software
- Simulate and analyze environmental factors
- Solar, shading, day lighting, thermal
- Analyze design concepts such as basic form and building orientation, internal layout, and external materials
- Powerful visual feedback enables you to interact with your data

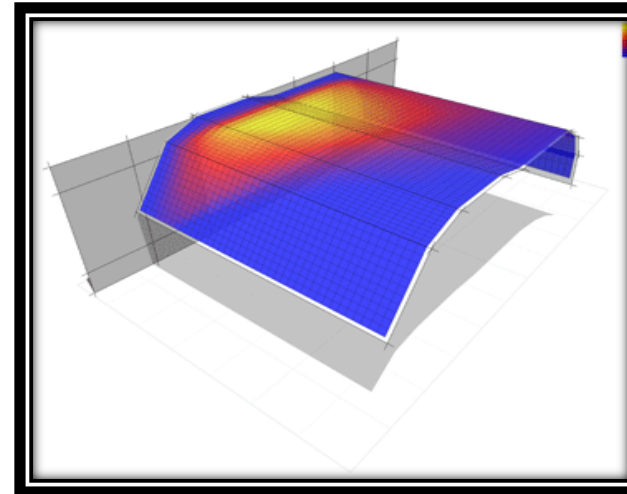


# Visualize and Simulate Design Performance



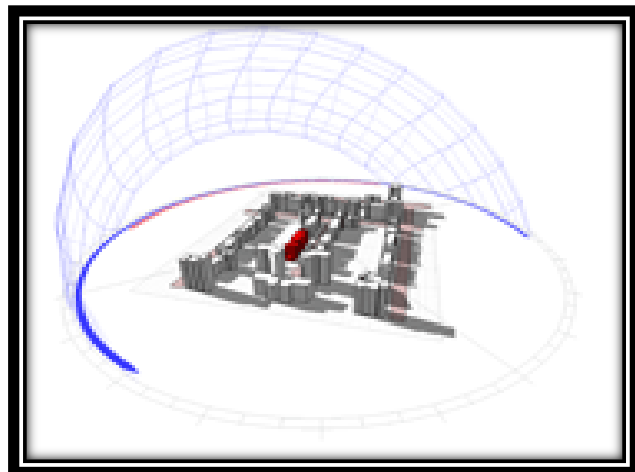
## Solar Radiation

Visualize solar radiation on windows and surfaces, showing differential incident solar radiation calculated over any period



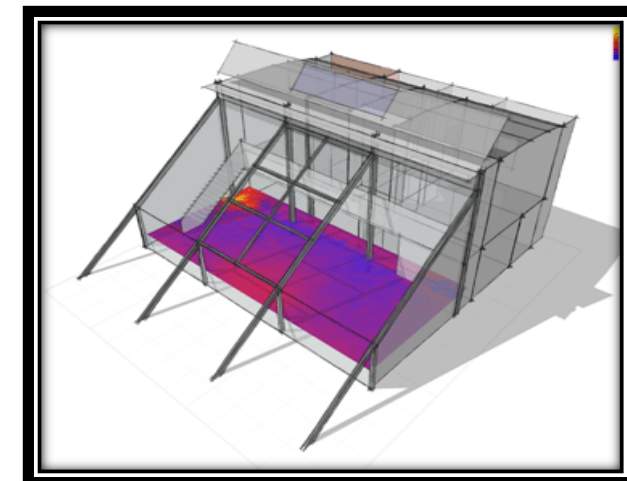
## Shading Design

Design shading devices to optimally shade a window and calculate solar radiation for the window over time period



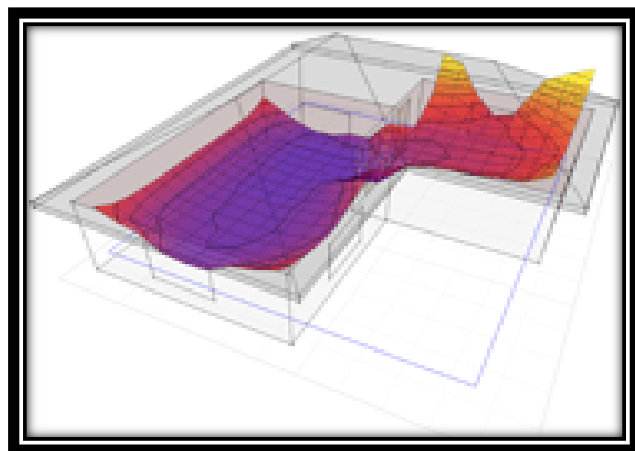
## Shadows and Reflections

Interactively view shadows, sun penetration, and reflections



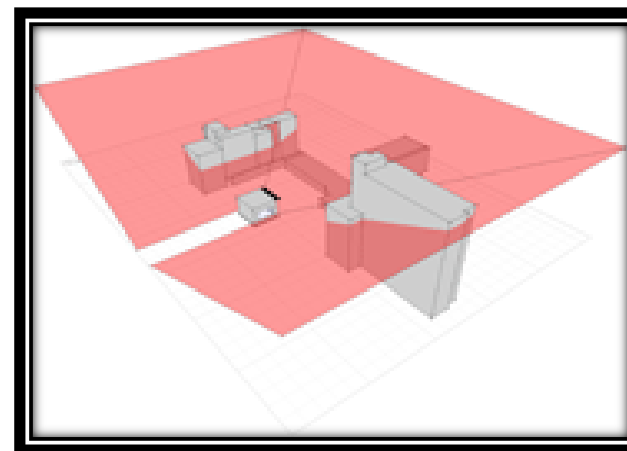
## Daylighting

Natural and artificial light level calculations together with daylight factor and vertical sky component analysis



## Thermal

Calculate heating and sensible cooling loads for models with any number of zones or type of geometry



## Right to Light

Analyze site projection angles and assess obstructions, calculate vertical sky components, visualize the no-sky line

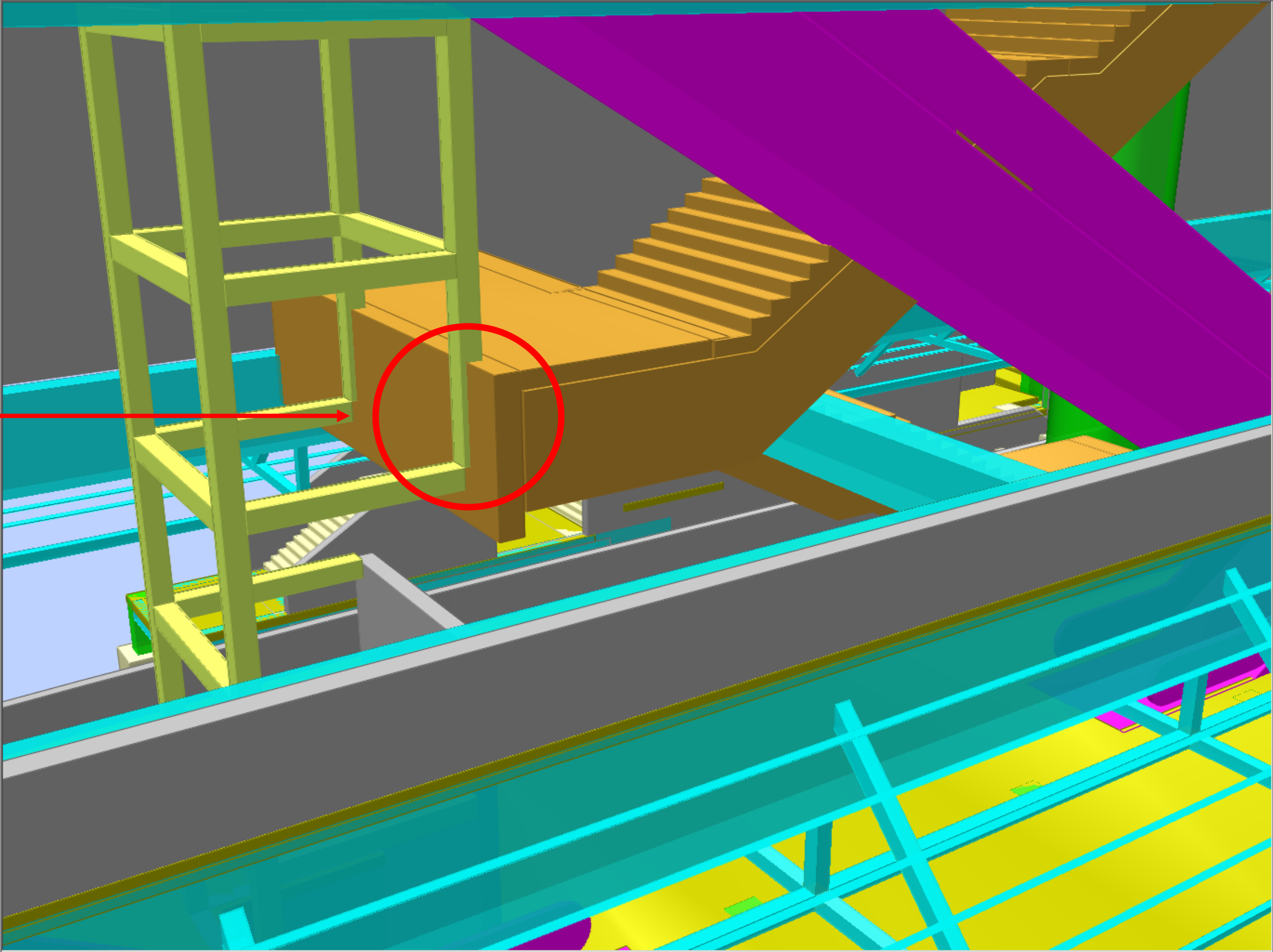
A high-angle photograph of a construction professional wearing a yellow hard hat, pointing with their right index finger at a set of architectural blueprints spread out on a table. The blueprints show detailed floor plans and elevations of a building. The scene is set against a dark, textured background, possibly a concrete floor. A yellow banner with black text is overlaid across the middle of the image.

# CONSTRUCTABILTY AND CLASH DETECTION Using BIM

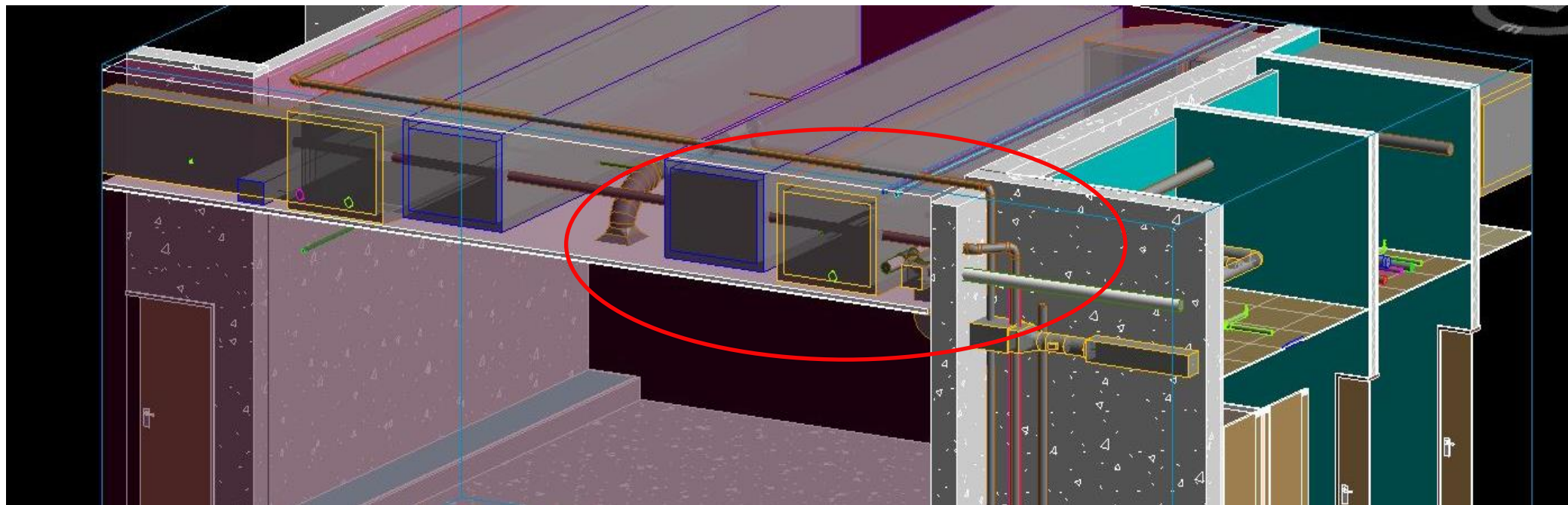
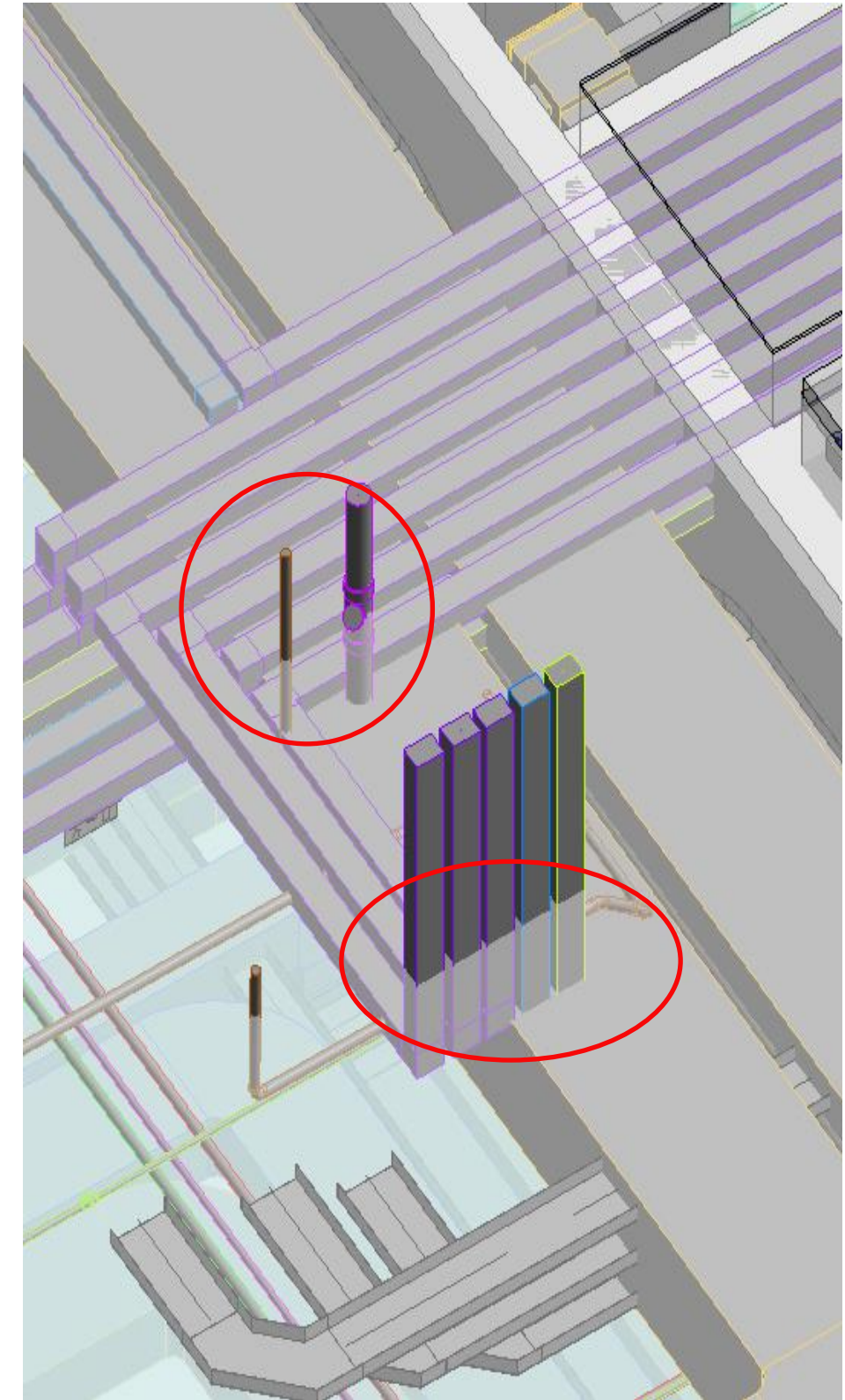
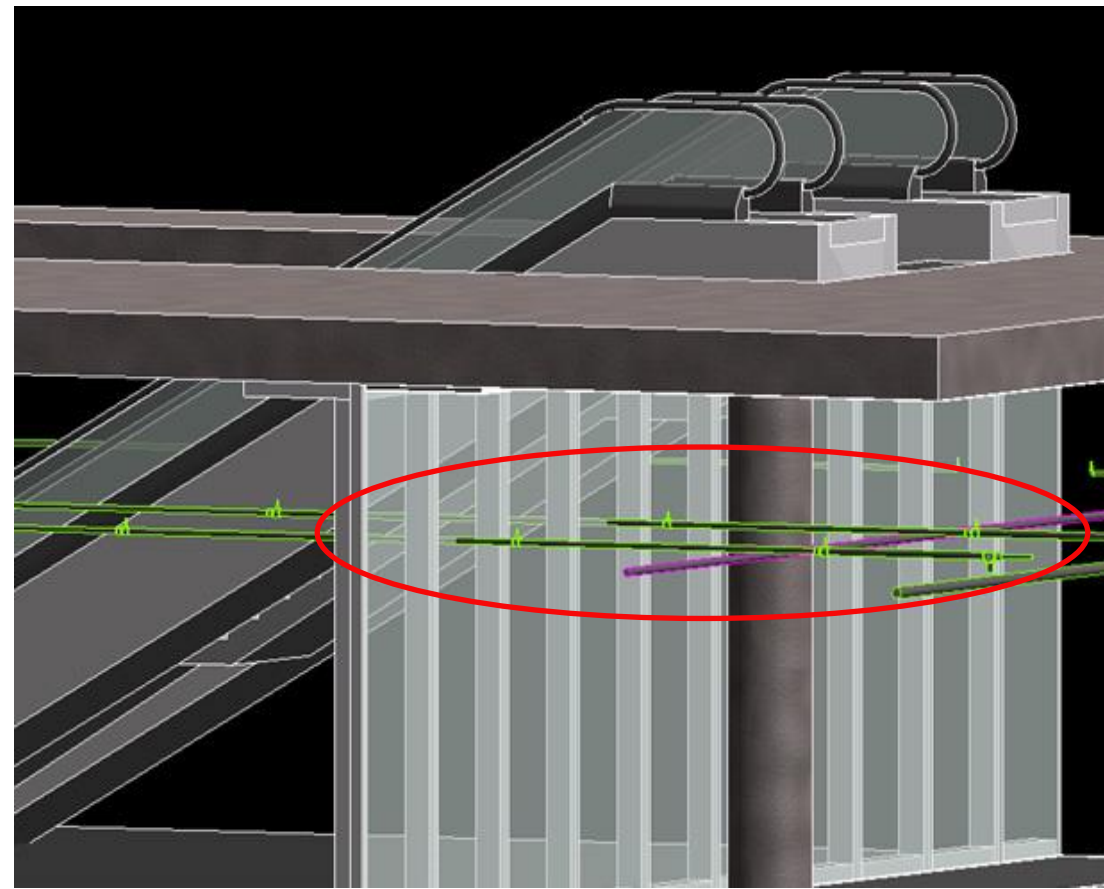
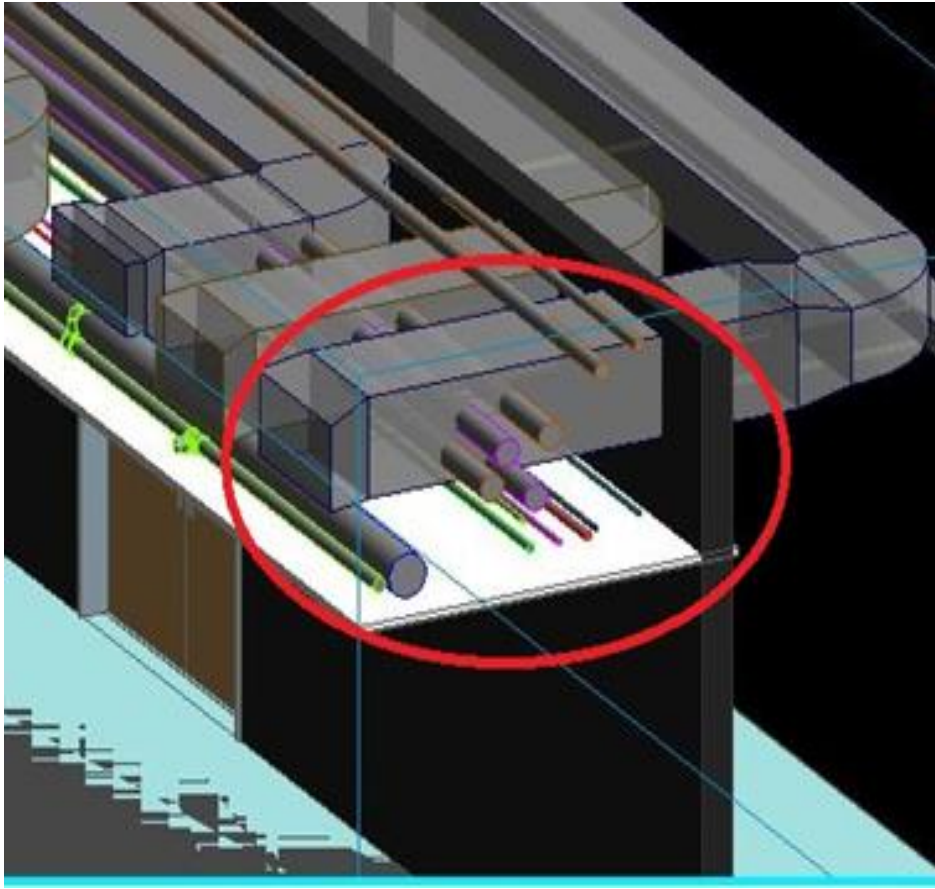


# LIFT CORE DETAIL DRAWING

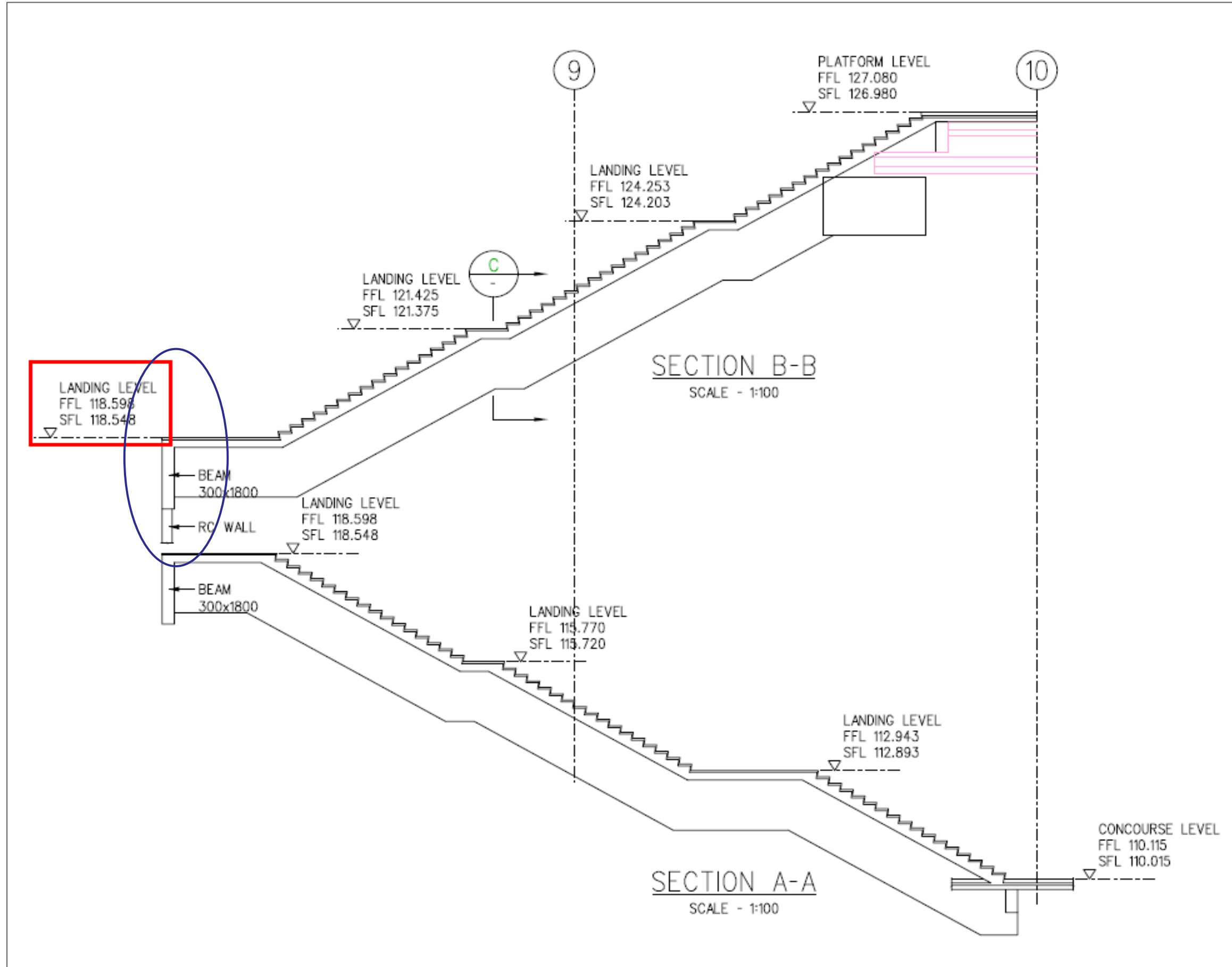
Collision  
Detection



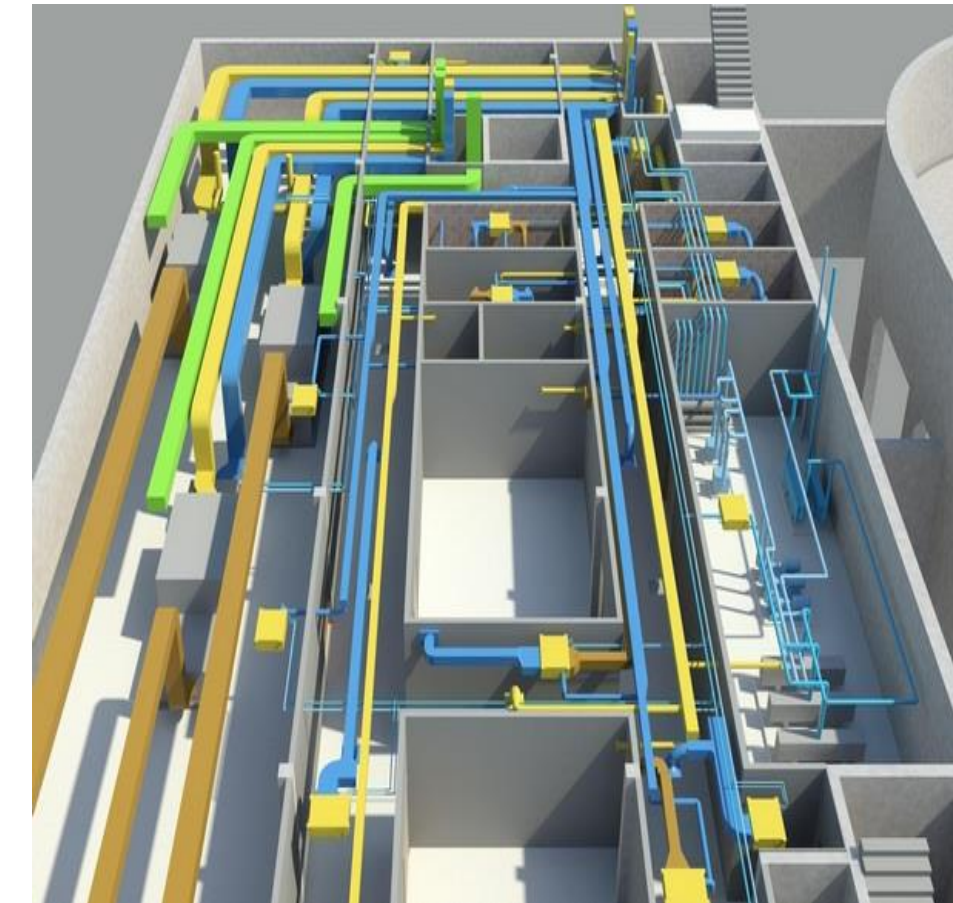
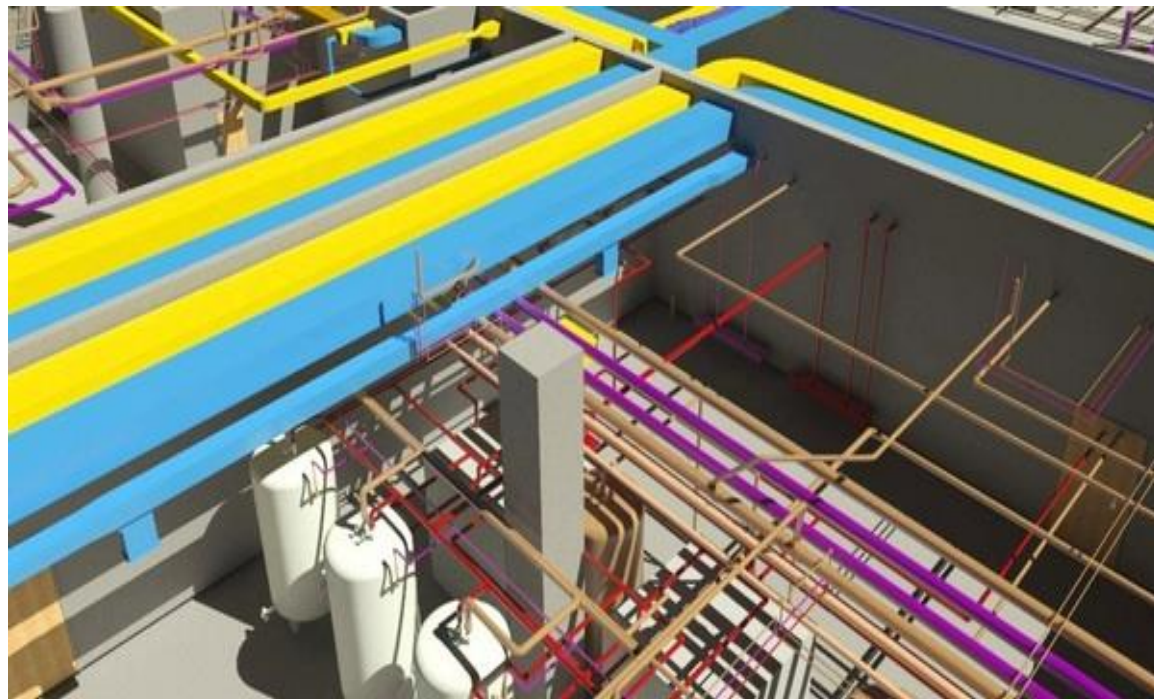
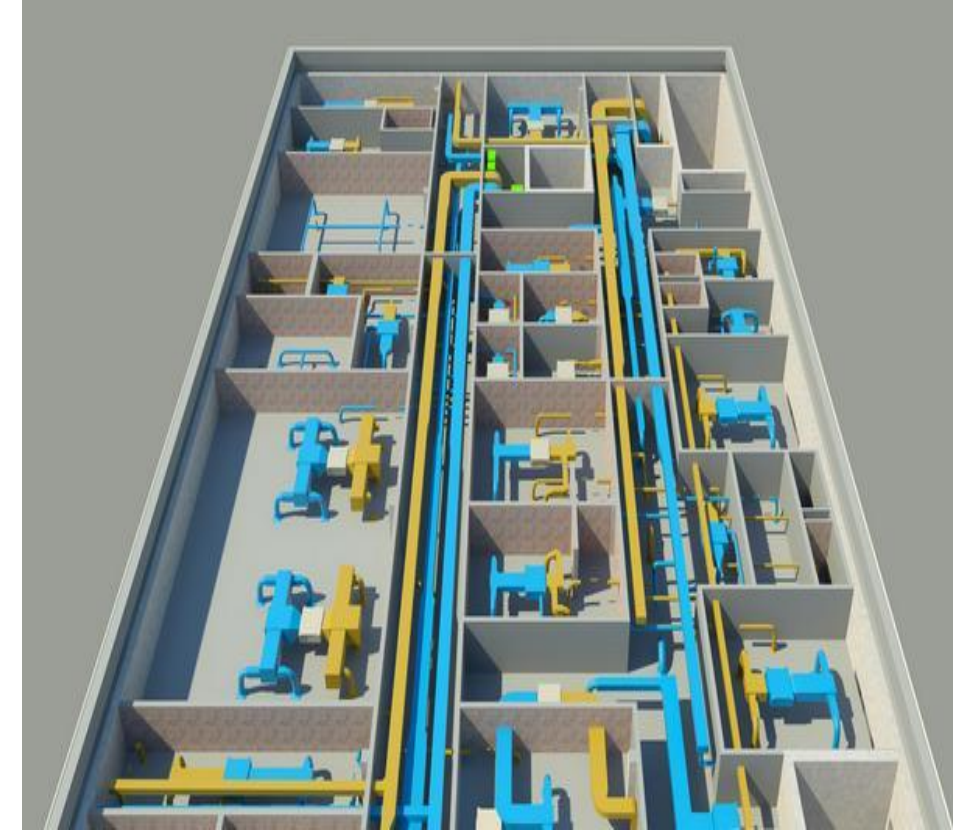
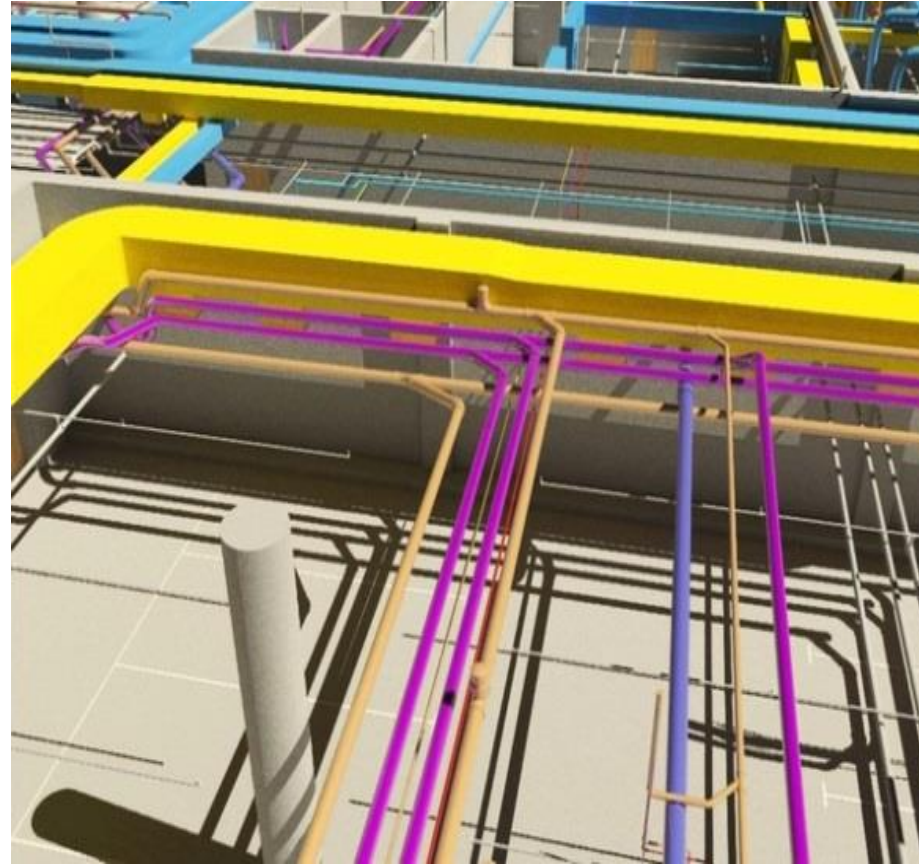
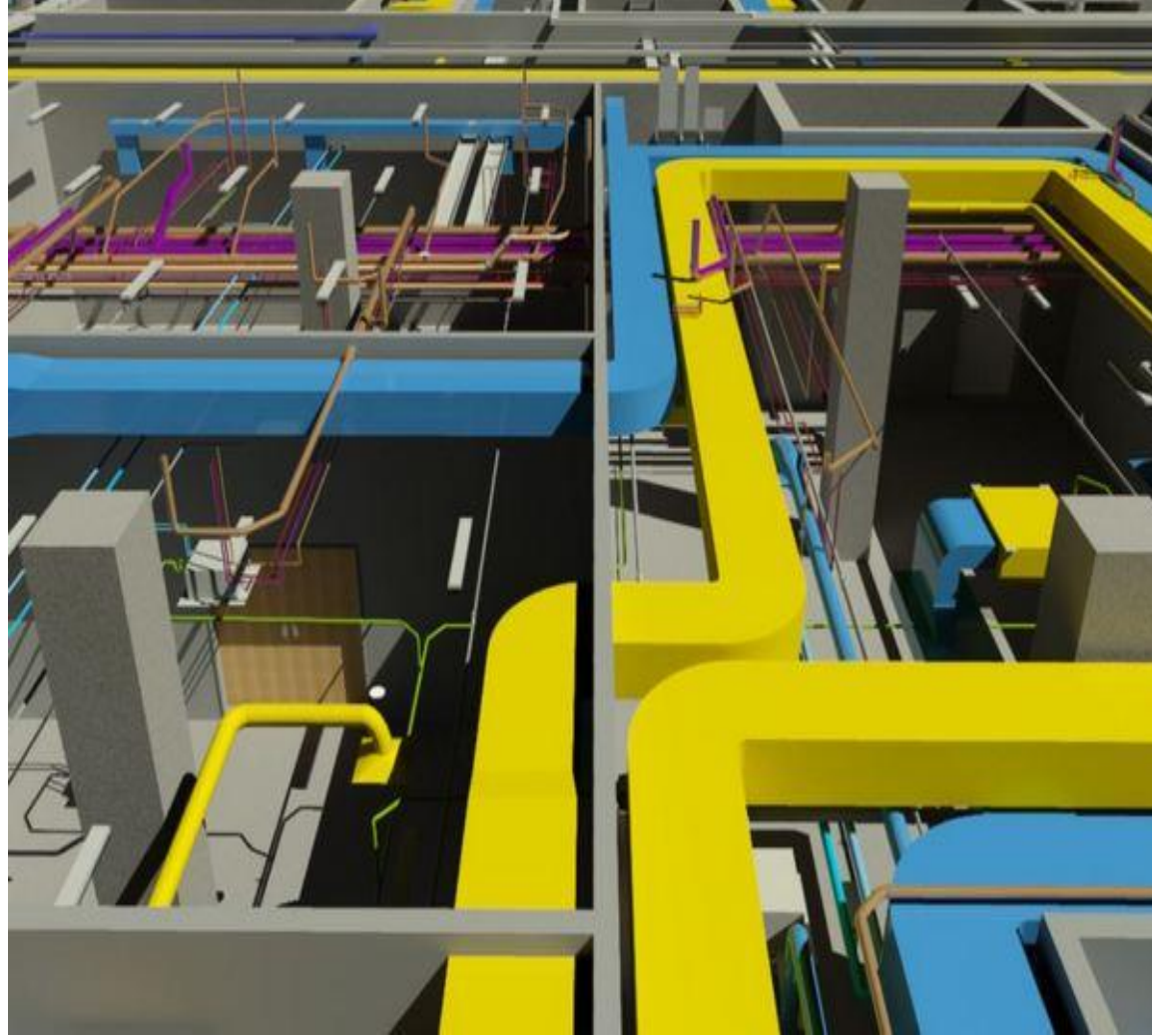
# CLASH DETECTION



# CONSTRUCTABILITY ISSUE



# MEP OPTIMISATION

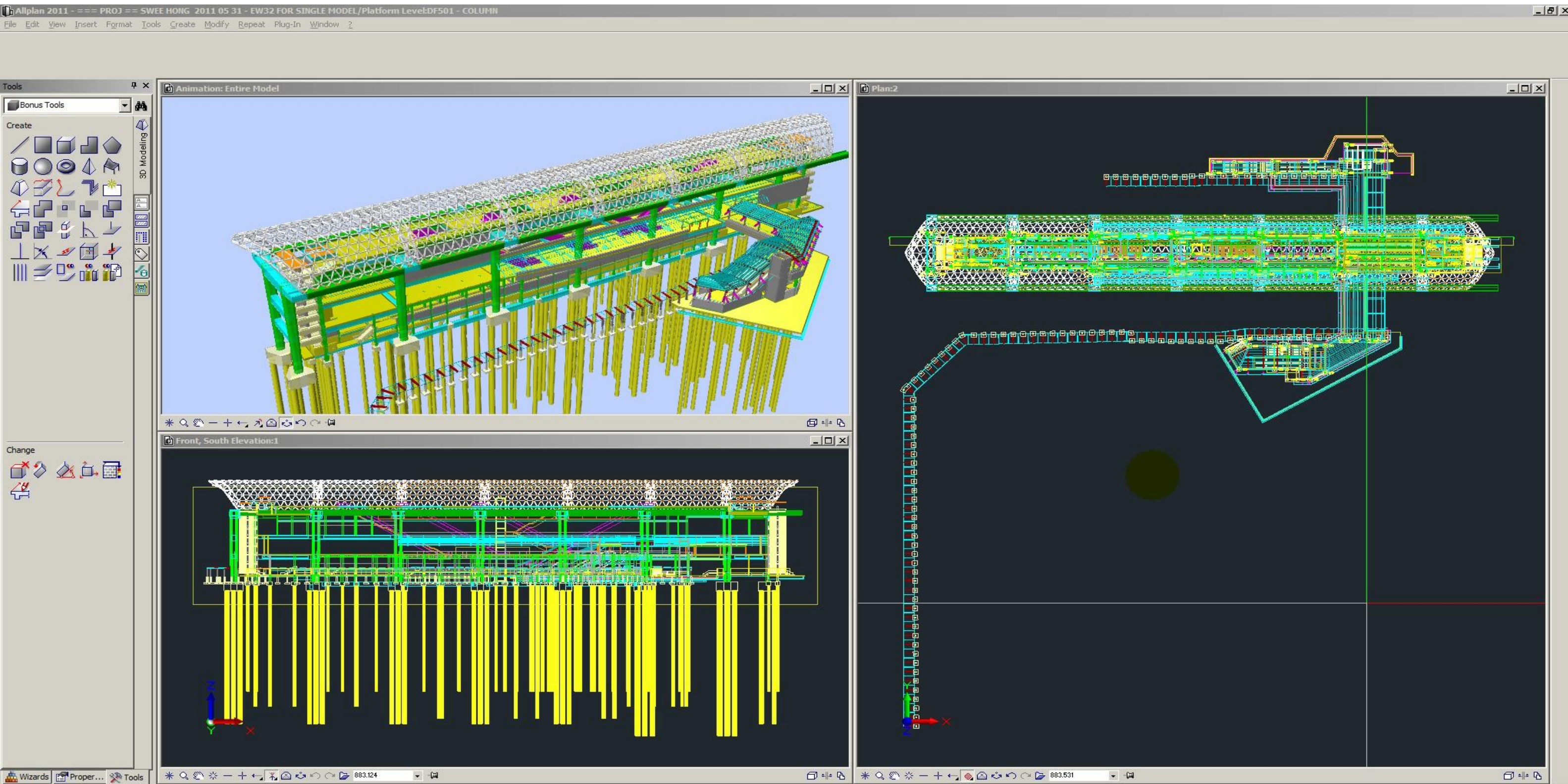




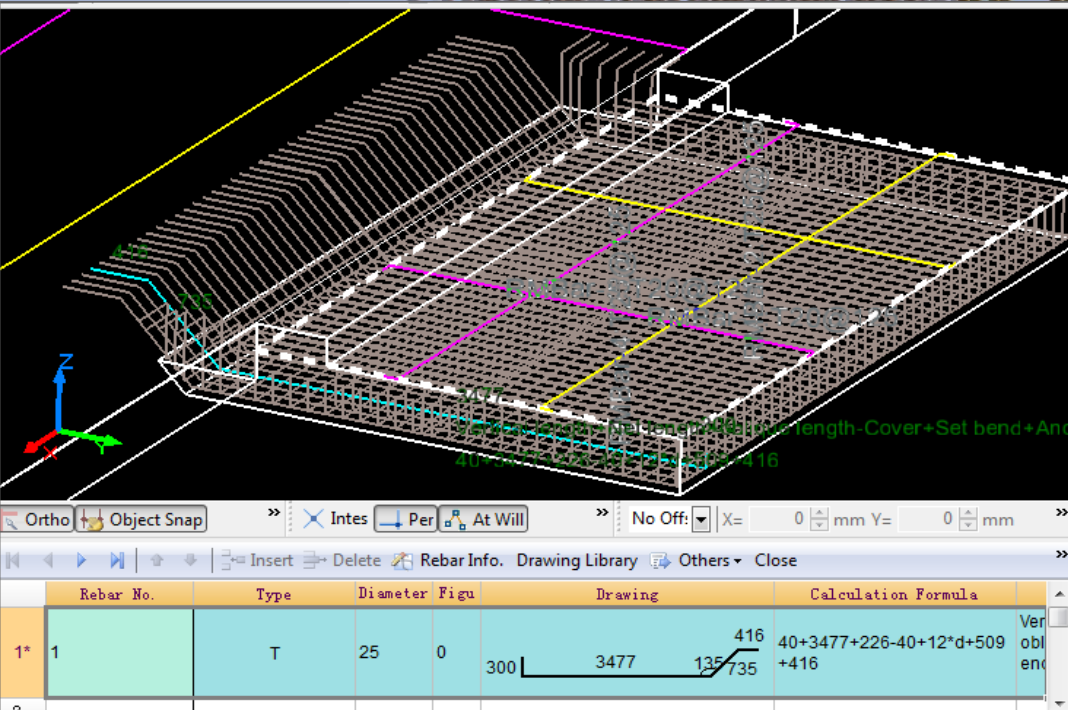
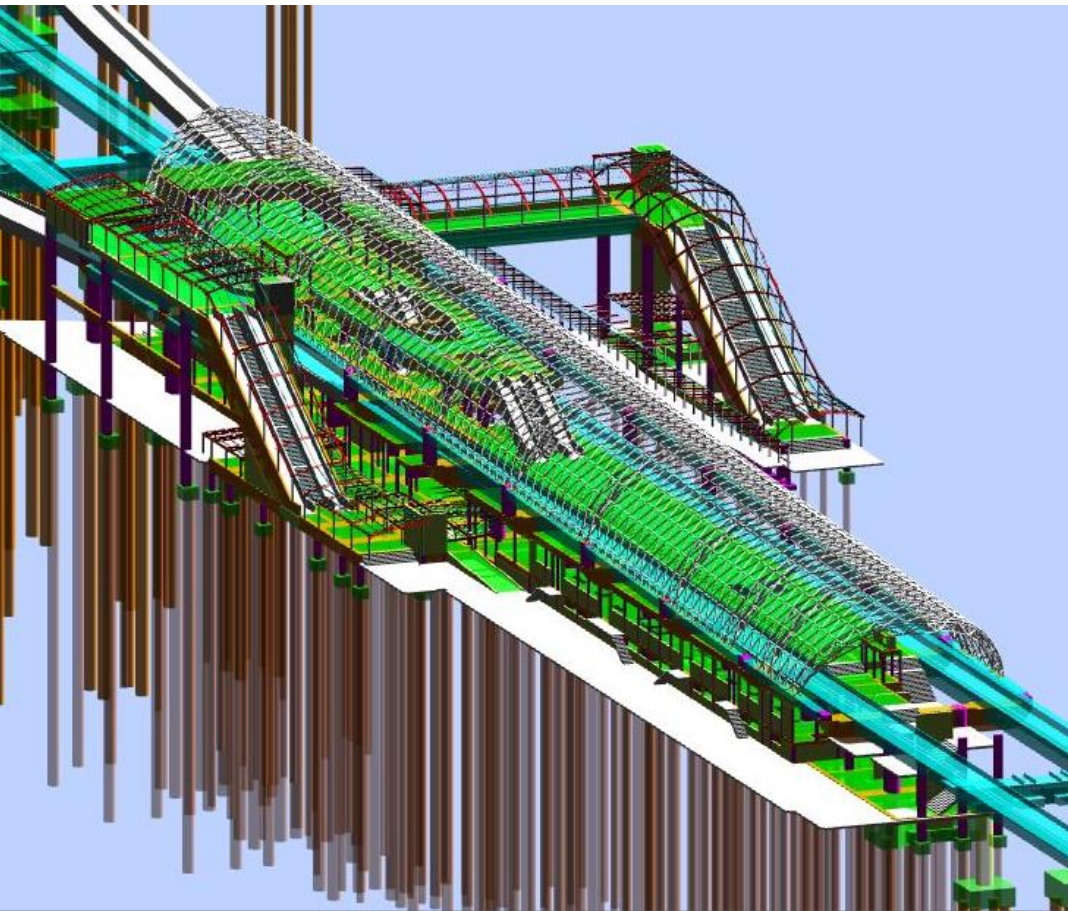
# COST ESTIMATION FROM BIM



# Extraction of Quantity for COST ESTIMATE



# Extraction of Quantity for COST ESTIMATE



GBQ2013-Tenderer Vehicle-[Cheras-Plot A2-Block B.GB12]

Table Report

Price Details Show/Hide Columns  
Price Painter Set Rate Adjustment Ratio  
Apply Price Find Export to Excel  
Operate

	Description	Unit	Type	Qty	Net rate	Net amt	Mk up ratio	Mk up rate	Amount	Remarks
1	<b>FRAME</b>		<b>Heading</b>						<u>2,193,284.2</u>	
2	Note:		Note							
3	1. All vertical element starts from Level 5		Note							
4	2. All horizontal element starts from Level 6		Note							
5	<b>Vibrated reinforced concrete Grade 35 as described in</b>		<b>Heading</b>						<u>511,966.86</u>	
	Suspended floor beam (including RC parapet)	m3	Bill Item	1,163	430.98	501,229.74	1	430.98	501,229.74	
7	Roof beam (Water tank level)	m3	Bill Item	59	156.39	9,227.01	1	156.39	9,227.01	
8	Upper roof beam (Lift motor room level and above)	m3	Bill Item	3	157.35	472.05	1	157.35	472.05	
9	Stiffener (Lift motor room) (Provisional)	m3	Bill Item	6.57	158	1,038.06	1	158	1,038.06	
10	<b>Hot rolled steel reinforcement mild steel minimum yield 250N/mm2 in</b>		<b>Heading</b>						<u>336,685.58</u>	
11	<b>Stiffener (Provisional)</b>		<b>Heading</b>						<u>14,520.9</u>	
12	6mm Diameter as links	kg	Bill Item	82.08	125.36	10,289.55	1	125.36	10,289.55	
13	10mm Diameter ditto	kg	Bill Item	28.73	147.28	4,231.35	1	147.28	4,231.35	
14	<b>Suspended floor beam</b>		<b>Heading</b>						<u>70,053.23</u>	
	6mm Diameter as stirrups	kg	Bill Item	156.43	430.98	67,418.2	1	430.98	67,418.2	
16	10mm Diameter as stirrups	kg	Bill Item	16.65	158.26	2,635.03	1	158.26	2,635.03	
17	<b>Roof beam</b>		<b>Heading</b>						<u>67,517.29</u>	
	6mm Diameter as stirrups	kg	Bill Item	19.74	430.98	8,507.55	1	430.98	8,507.55	
19	10mm Diameter as stirrups	kg	Bill Item	1,065.35	55.39	59,009.74	1	55.39	59,009.74	
20	<b>Upper roof beam</b>		<b>Heading</b>						<u>184,594.16</u>	
	6mm Diameter as stirrups	kg	Bill Item	426.05	430.98	183,619.03	1	430.98	183,619.03	
22	10mm Diameter as stirrups	kg	Bill Item	20.21	48.25	975.13	1	48.25	975.13	
23	<b>Hot rolled steel deformed reinforcement high yield 60, minimum yield 460N/mm2 in</b>		<b>Heading</b>						<u>1,194,311.8</u>	
24	<b>Stiffener (Provisional)</b>		<b>Heading</b>						<u>98,775.34</u>	
	10mm Diameter	kg	Bill Item	59	430.98	25,427.82	1	430.98	25,427.82	
26	25mm Diameter	kg	Bill Item	1,552	47.26	73,347.52	1	47.26	73,347.52	
71	<b>Total Estimated Sum: 2,193,284.21</b>									

# CONSTRUCTION METHODOLOGY & APPROACH

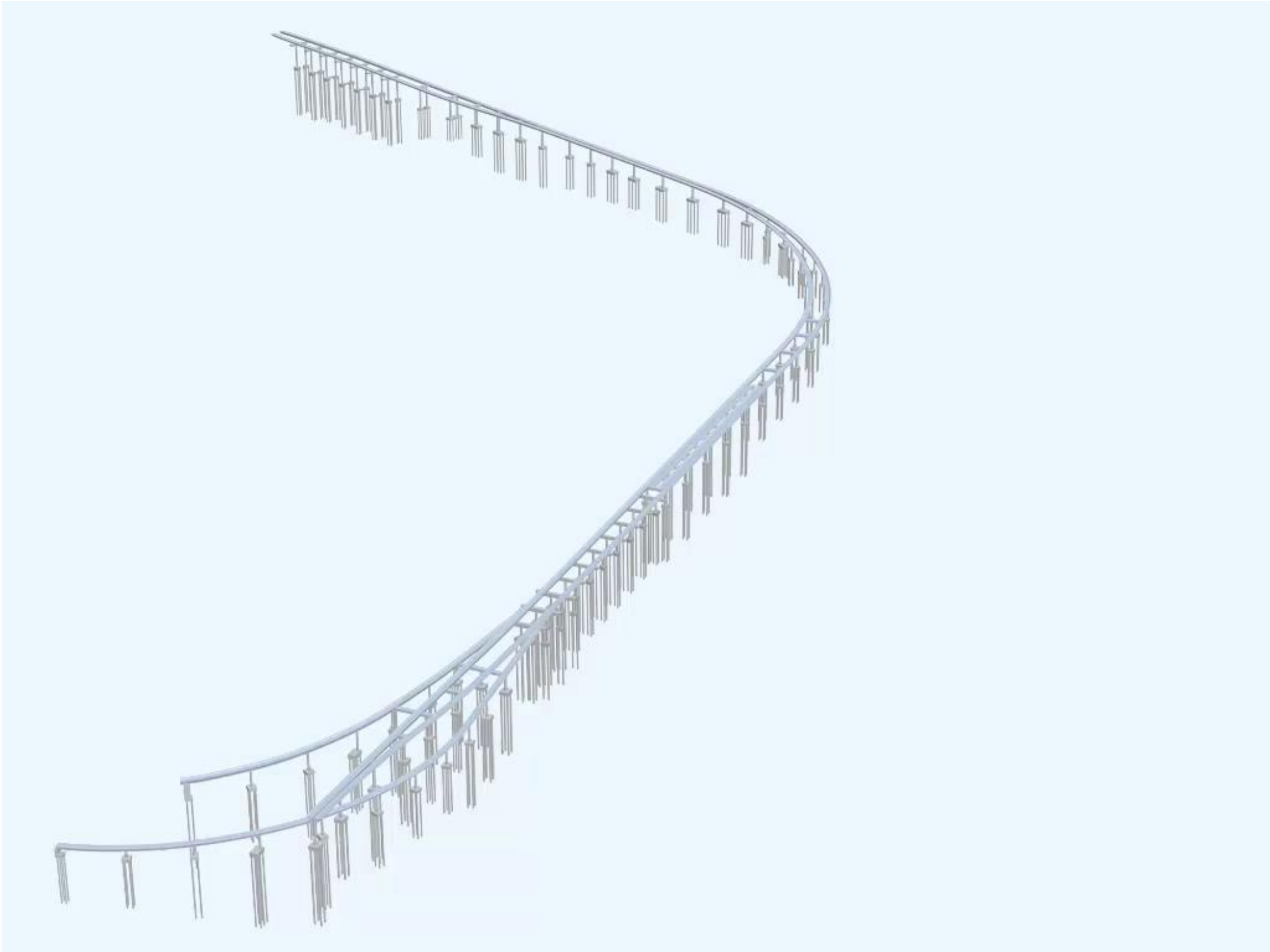




# 4D Simulation Sequence of bored piling and Pile Cap construction



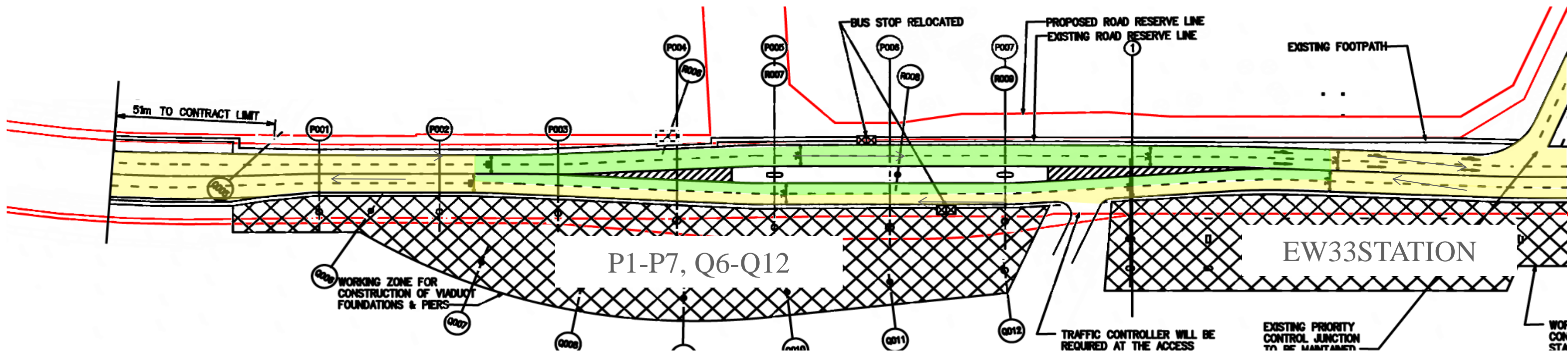
# 4D Simulation Sequence of construction for the rail viaduct structures



# Traffic Diversion Proposal - Road diversion/ Foundation & Substructures Construction



# ROAD DIVERSION SIMULATION



1. TRAFFIC DIVERSION STAGE 1-1 @ TUAS WEST DRIVE R6-R9 (MAY12)
2. CONSTRUCTION OF FOUNDATION & PIERS @ R6-R9, Q5 (MAY12-JUN12)
3. TRAFFIC DIVERSION STAGE 1-2 @ TUAS WEST DRIVE (AFTER COMPLETION OF PIERS R6-R9,Q5) (JUL12)
4. CONSTRUCTION OF FOUNDATION & PIERS @ P1-P7, Q6-Q12, EW33 STATION (JUL12-MAY13)



speed: 70 km/h  
width: 3.00 m

# 4D Construction Simulation + Traffic Detour Analysis

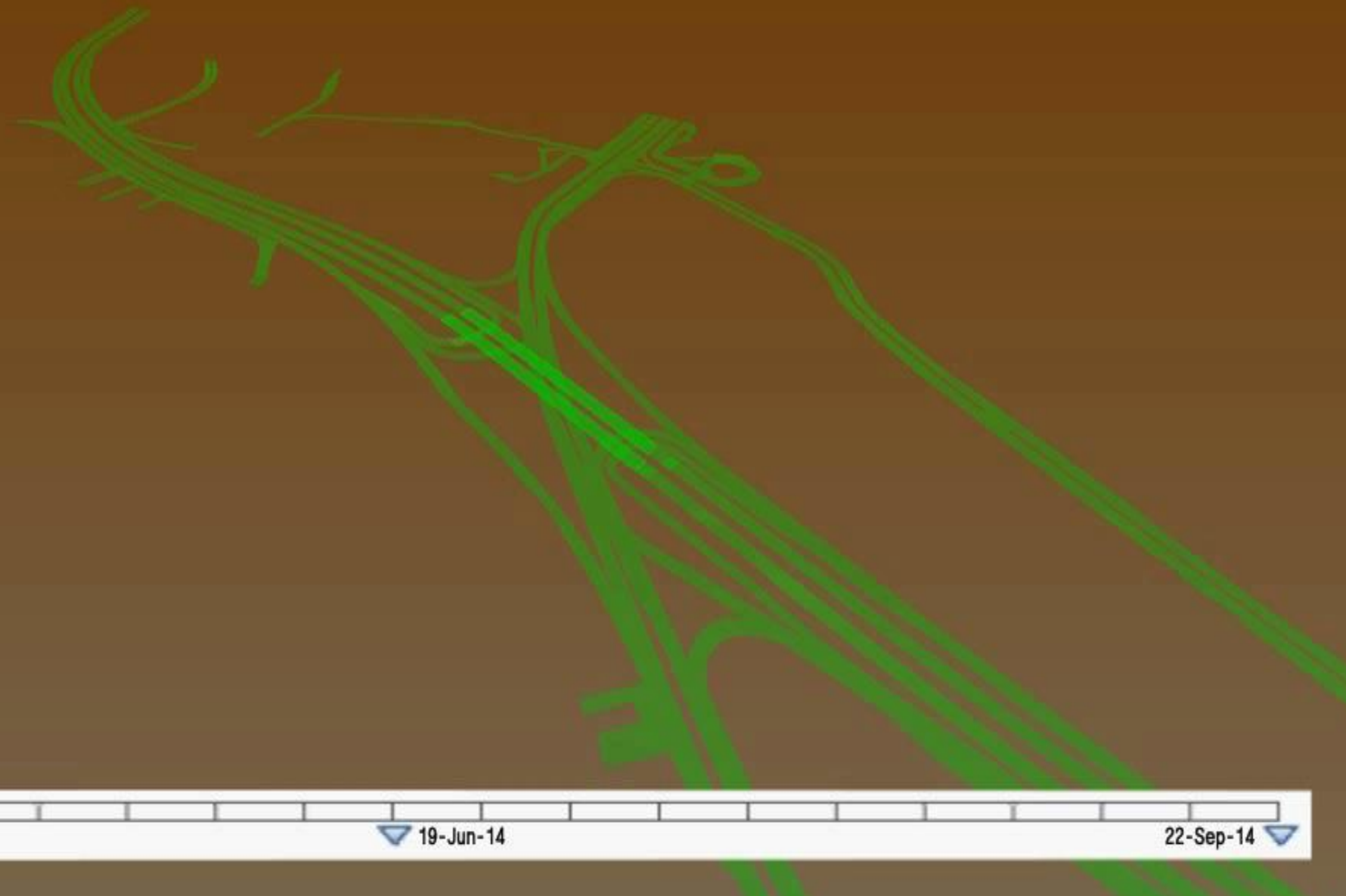
Kudye Project  
14-03-2014  
Kudye [0%]  
Existing Road [construct 0%]

Site Utilization  
Planning

Identifying Time-  
Based Clashes

Construction  
System Design  
(Virtual  
Mockups)

Materials  
Planning and  
Management



# BIM Audit

# Regulatory Code Compliance Checking

PROCESS



Standards & Code Compliance

S...	Action	Title	Version	Date Last U
1			1	12 Jan 2015
2		Model 01	1	12 Jan 2015
3		5 STOREY HOTEL ver3	1	12 Jan 2015
4		rac_basic_sample_project_corridor2	1	07 Jan 2015
5		rac_basic_sample_project_corridor	1	07 Jan 2015
6		4 Storey Office Building	1	10 Dec 2014
7		5 Storey Hotel	1	1 Nov 2014

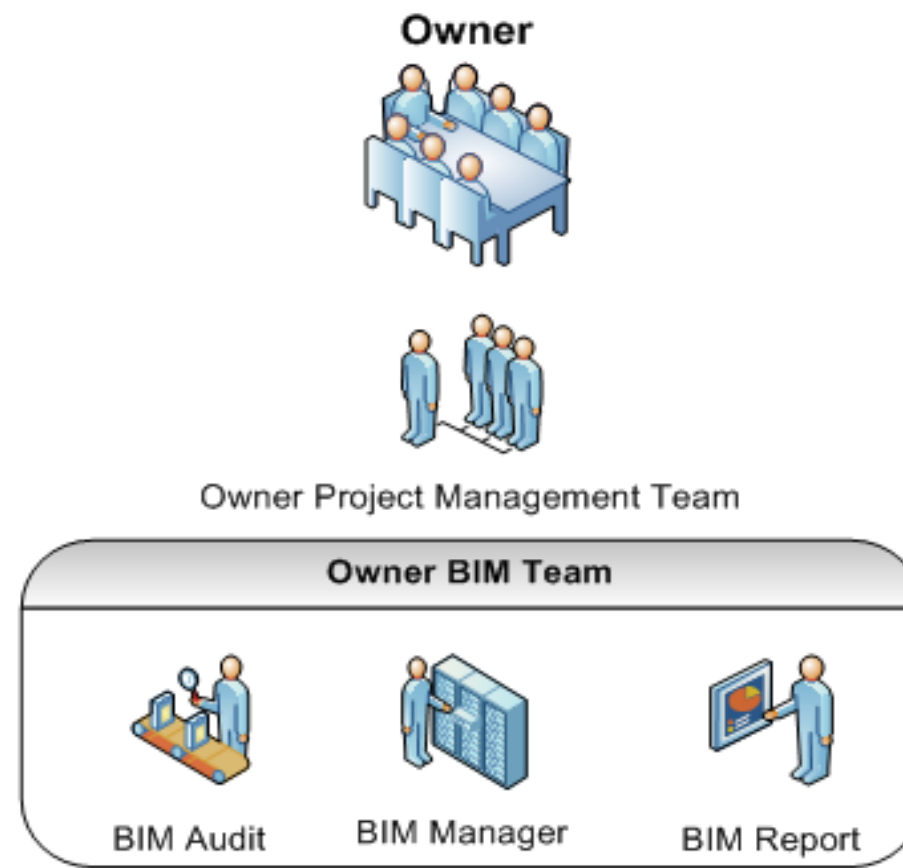
Level 1 Space Types					
AIR_CONDITION_SHAFT	: 0	AIR_HANDLING_ROOM	: 1	AIR_WELL	: 2
AIRLOCK	: 3	ALCOVE	: 4	ALLEY	: 5
ANTEROOM	: 6	ARCADE	: 7	ATRIUM	: 8
BALCONY	: 9	BATHROOM	: 10	BEDROOM	: 11
BIN_CENTER	: 12	BOILER_ROOM	: 13	CARPARK	: 14
CINEMA	: 15	CIVIL_DEFENCE_SHELTER	: 16	COLD_ROOM	: 17
COMMON_TOILET	: 18	CONCERT_HALL	: 19	CONCOURSE	: 20
COOLING_TOWER	: 21	CORONARY_CARE_UNIT	: 22	CORRIDOR	: 23
COURTYARD	: 24	DRIVEWAY	: 25	EATINGAREA	: 26
ESCAPE_BED_LIFT_SHAFT	: 27	EXIT_PASSAGEWAY	: 28	EXIT_STAIRCASE	: 29
EXTERNAL_BALCONY	: 30	EXTERNAL_CORRIDOR	: 31	EXTERNAL_EXIT_PASSAGEWAY	: 32
EXTERNAL_EXIT_RAMP	: 33	EXTERNAL_EXIT_STAIRCASE	: 34	EXTERNAL_PASSAGEWAY	: 35
FEMALE_TOILET	: 36	FIRE_FIGHTING_LOBBY	: 37	FIRE_LIFT	: 38
FIRE_LIFT_LOBBY	: 39	FIVE_FOOT_WAY	: 40	FOYER	: 41
GARAGE	: 42	GENERATOR_ROOM	: 43	GENTS	: 44

Submit BIM Models

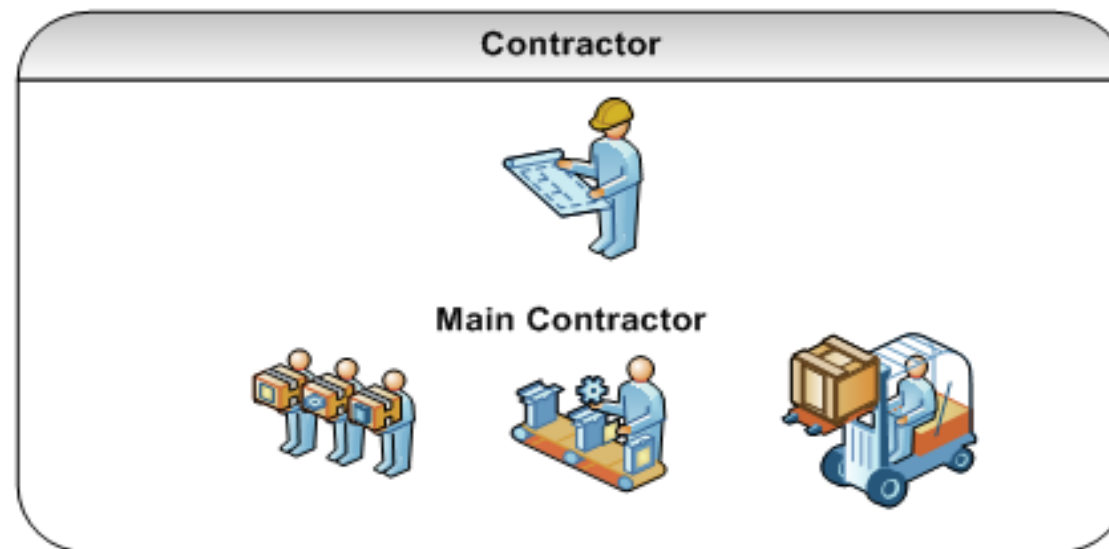
Approved BIM Models

Deliverables

# BIM ROLE FOR OWNER

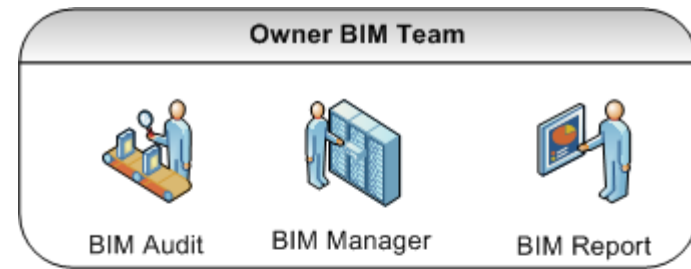


## BIM REQUIREMENT FROM OWNER SPECIFICATION





# BIM SPECIFICATION BASED ON OWNER REQUIREMENT



## ❖ BIM EXECUTION PLAN

The purpose of the BIM Execution Plan is to outline the plan and processes in which BIM will be implemented throughout the project lifecycle to meet the BIM requirements of the Project. Team collaboration and coordination shall be maximized through the use of BIM.

## ❖ BIM OBJECTIVES, RESPONSIBILITIES AND DELIVERABLES

BIM Models, BIM services and other BIM related deliverables provided throughout the contract phases shall at minimum meet the BIM objectives and requirements of this BIM Requirements (Design) document.

## ❖ BIM SPECIFICATION AND LEVEL OF DETAILS

## ❖ BIM MODELING REQUIREMENTS

Modeling Guidelines for BIM Elements  
Clear Modeling Fundamentals, guidelines and quality control plans shall be established and documented in BIM execution Plan to ensure modeling standard and quality of model.

## ❖ BIM SOFTWARE AND FORMATS FOR EXCHANGE AND SUBMITTAL

## ❖ BIM PROCESSES AND PROCEDURES

Processes and procedures required to achieve BIM Objectives and to meet the requirements of BIM Requirements (Design) shall be establish and implemented.

# **OUR APPROACH TO BIM IMPLEMENTATION**

# SUCCESSFUL BIM IMPLEMENTATION

PROCESS



TECHNOLOGY



RESOURCE



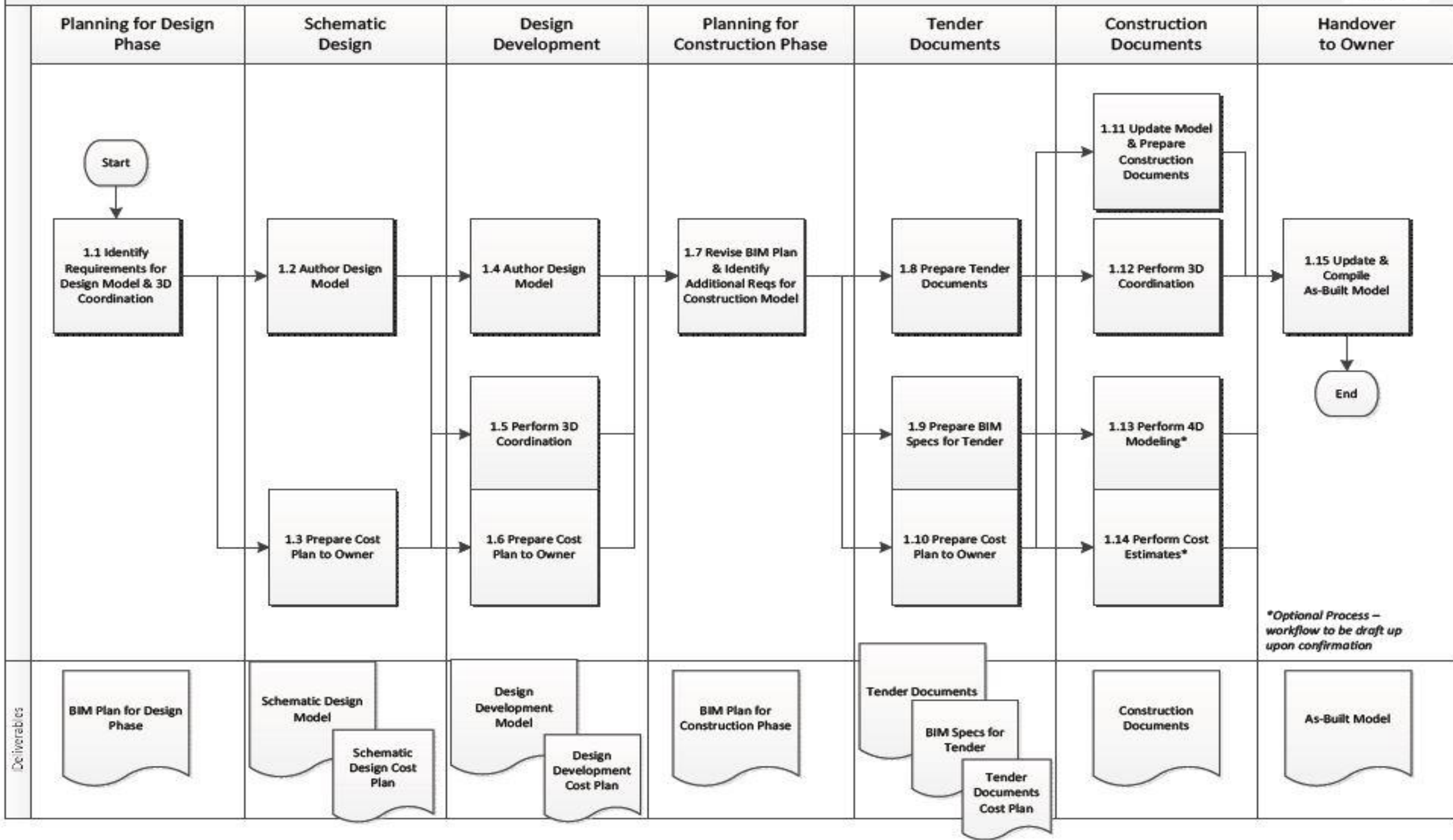
# **BIM PROCESS**

IMPERATIVE TO SUCCESSFUL BIM IMPLEMENTATION

# BIM PROCESS



## 1.0 Overall BIM Process

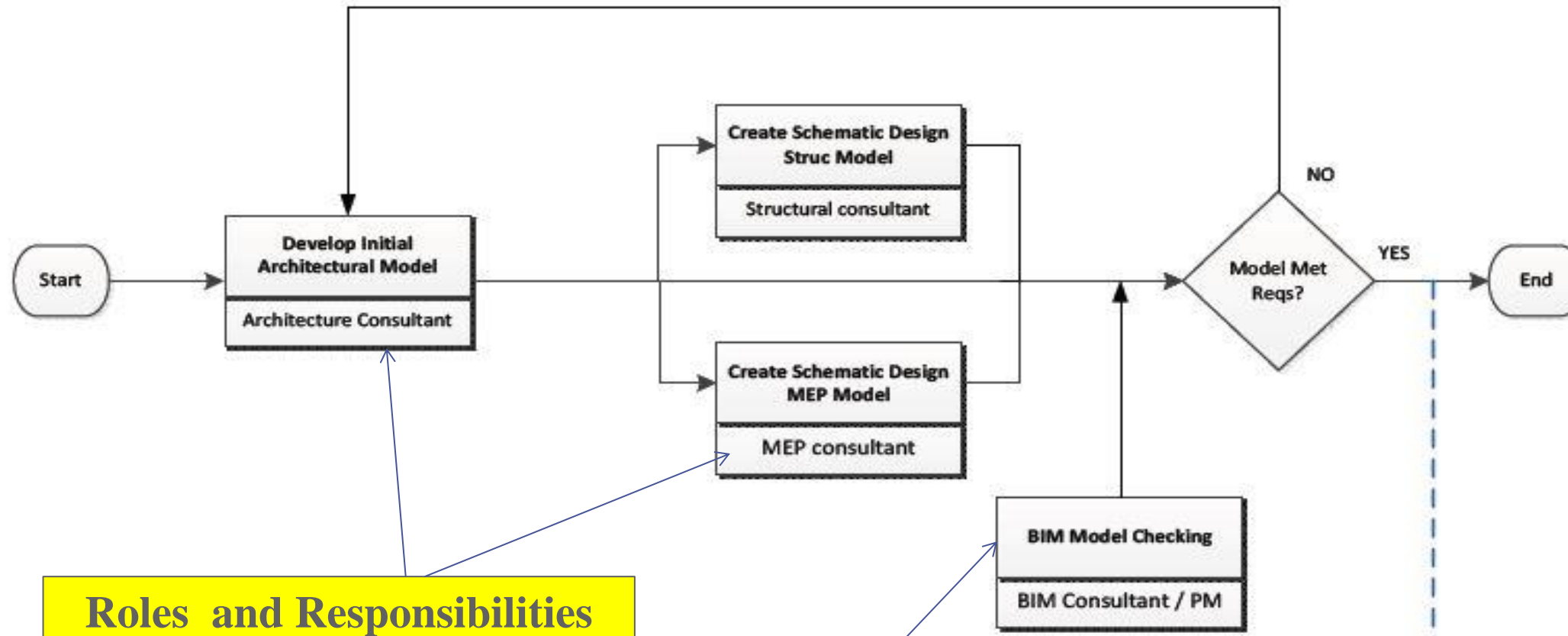


# BIM PROCESS

## 1.2 Author Design Model



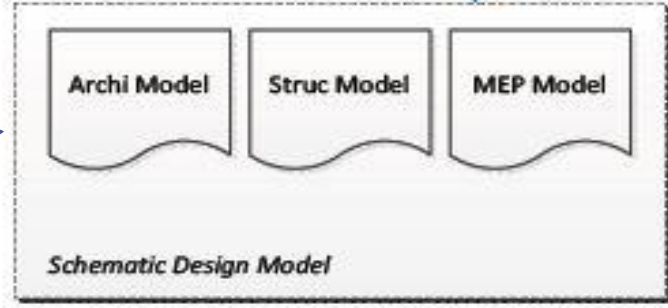
Schematic Design



**Roles and Responsibilities**

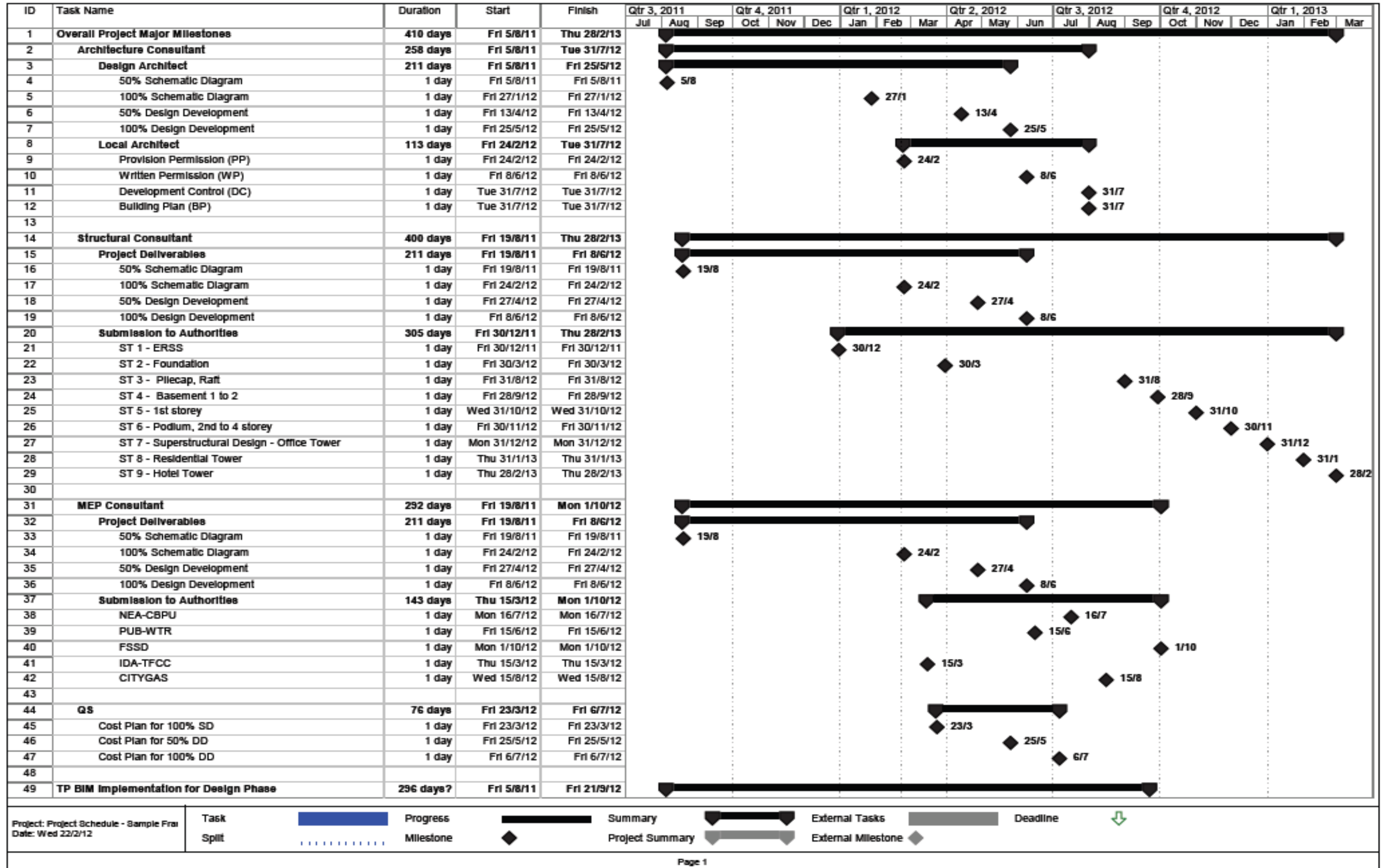
**Mapping BIM Best Practise**

**Set Milestones and Deliverable at each stage**



Information Exchanged

# BIM PROCESS



# **BIM TECHNOLOGY**

IMPERATIVE TO SUCCESSFUL BIM  
IMPLEMENTATION



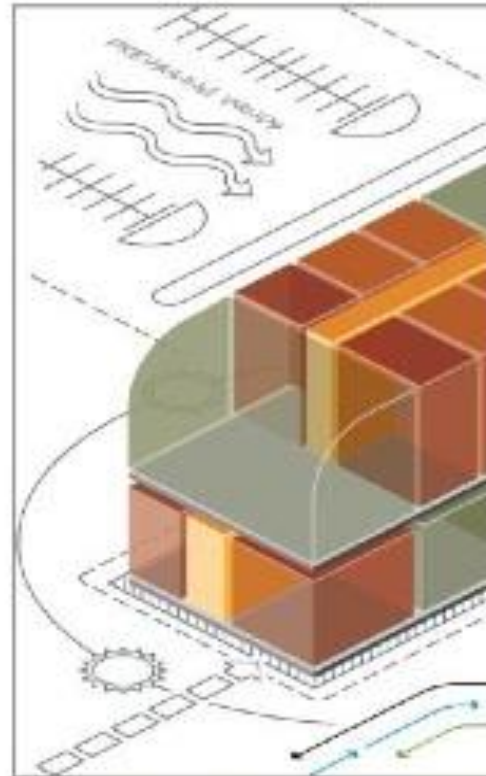
# BIM

PLANNING

DESIGN DEVELOPMENT

CONSTRUCTION

MANAGEMENT



Conceptualization



Design



Implementation  
Docs



Construction

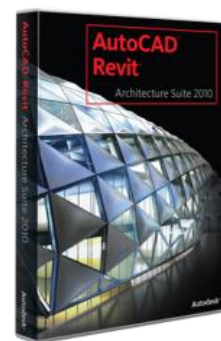


Own/Operate

The use of BIM in an integrated environment enables new ways of working that result in more predictable, accurate and responsible building outcomes.

## FORNAX

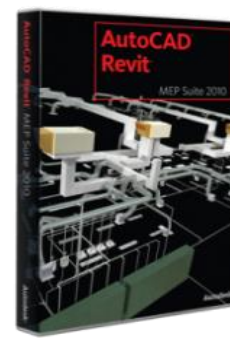
## CLOUD



Autodesk® Revit®  
Architecture



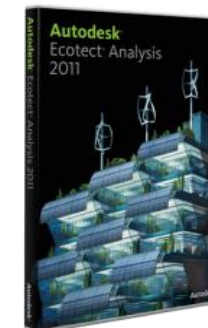
Autodesk® Revit®  
Structure



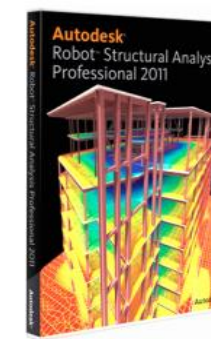
Autodesk® Revit®  
MEP



Autodesk®  
Navisworks



Autodesk®  
Ecotect



Autodesk® Robot  
Analysis

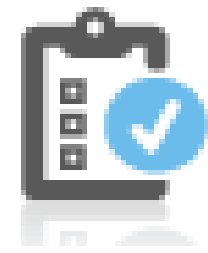


## Ready-to-Deploy e-Biz Components

Ease to deploy, Ready to adapt



Document Management



Workflow Management



Message Management

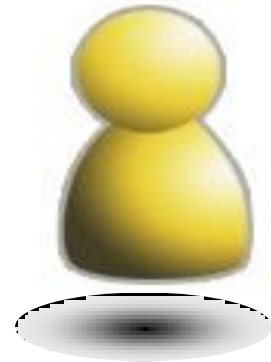


Reporting



## Serving Internal Staffs and External Partners

Keeping every stakeholders on the same page



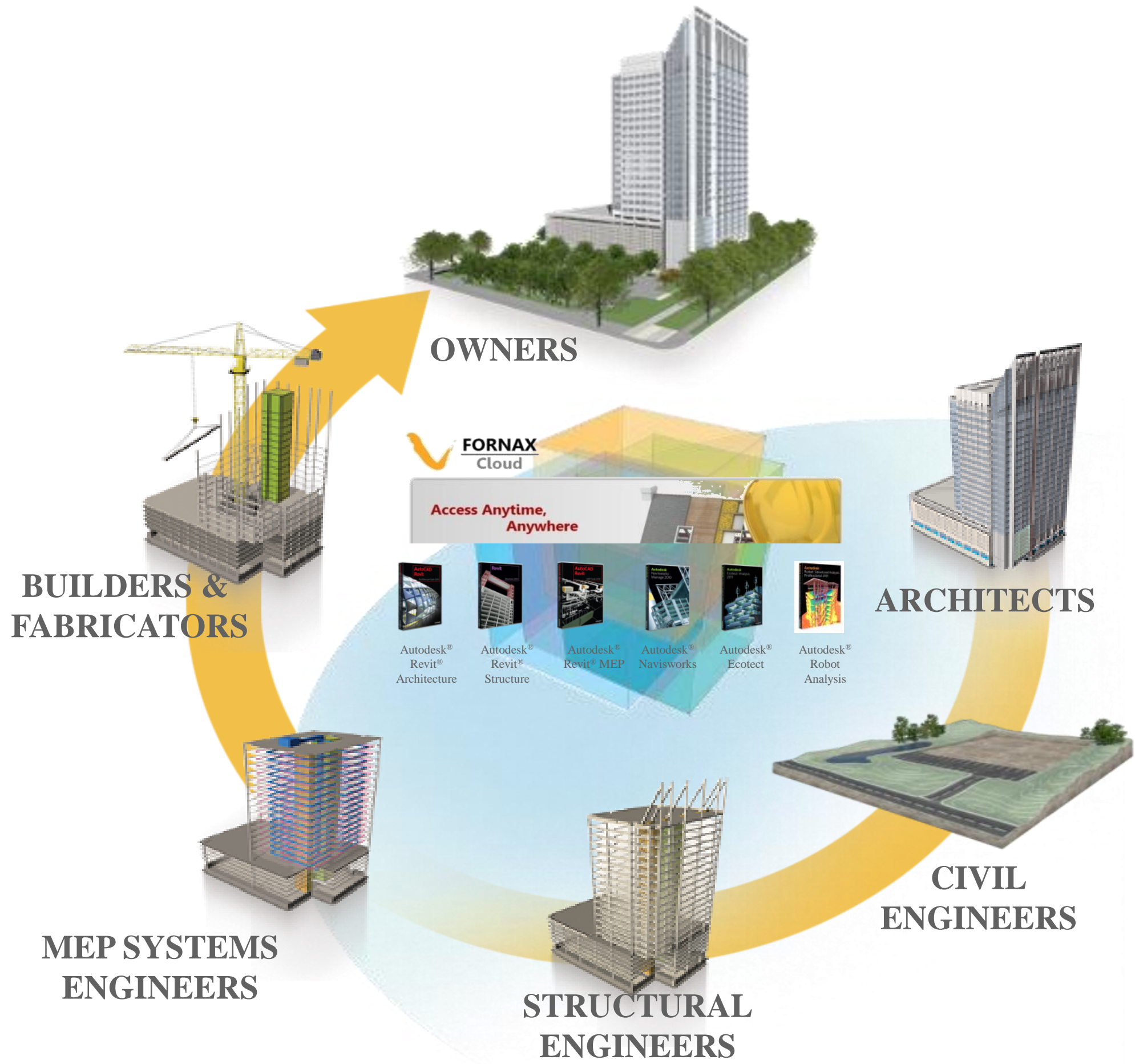
Developer



Consultants



Contractors



# BEYOND 5D BIM

FACILITIES MANAGEMENT WITH BIM

# Space Management – Integrate with GIS from ESRI

**MANHATTAN** Campus Viewer

Buildings: All Buildings | Level: Level 1 | Color By: Function | Home | Refresh | Satellite

**Search Filters**

Search by Radius  
Radius: 100 | Select Search Point

Search Options  
 Current View Only  
 Visible Floors Only

Space Status: equals  
Space Function: equals  
Space Type: equals  
Space Tenant: equals  
1 Division: starts  
2 Department: starts  
3 Group: starts  
4 Team: starts

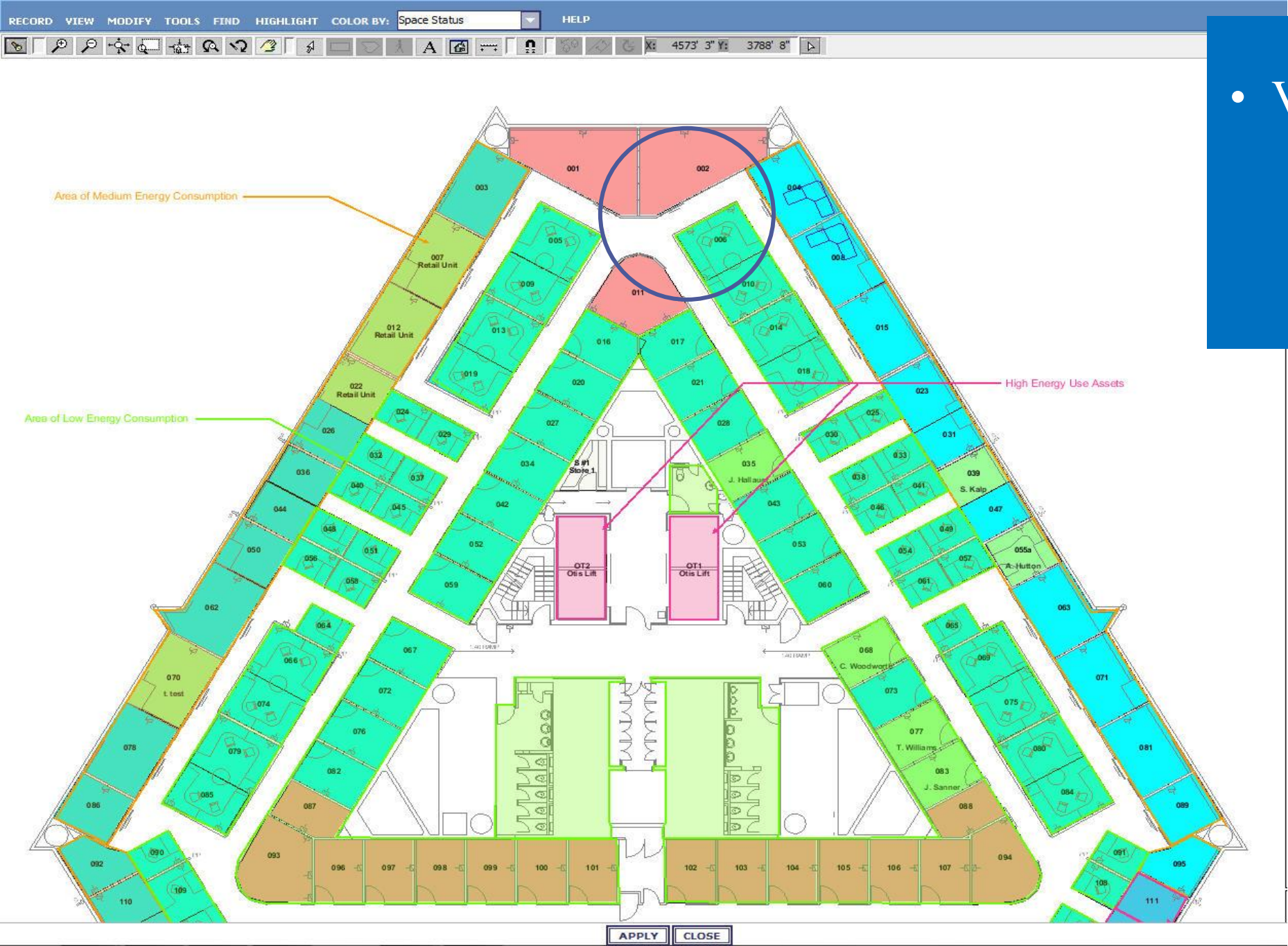
Run Search

**Legend**

- BLDG MAINT
- COMPUTER RM
- CONFERENCE RM
- CORP SERV
- CORRIDOR
- LAB
- LOBBY
- OFFICE
- PENETRATION
- QA-space function1
- QA-space function2
- QA-space function3
- RESTROOM
- SUPPORT
- Test
- WORKSTATION
- miki-common
- miki-misc
- miki-office

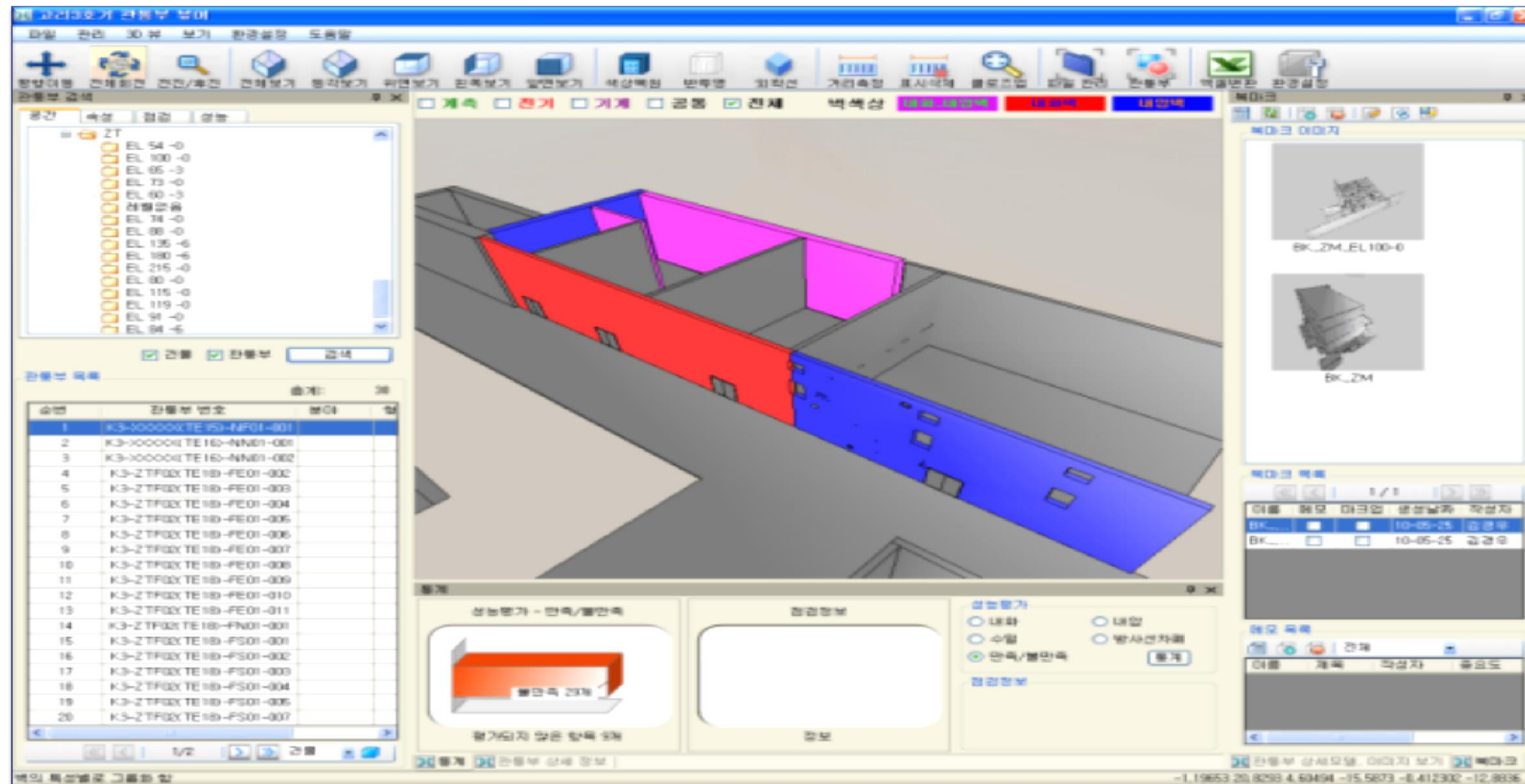
POWERED BY **esri**

# Space Management – Viewing CAD Plans, Cost Centers and Space Allocation



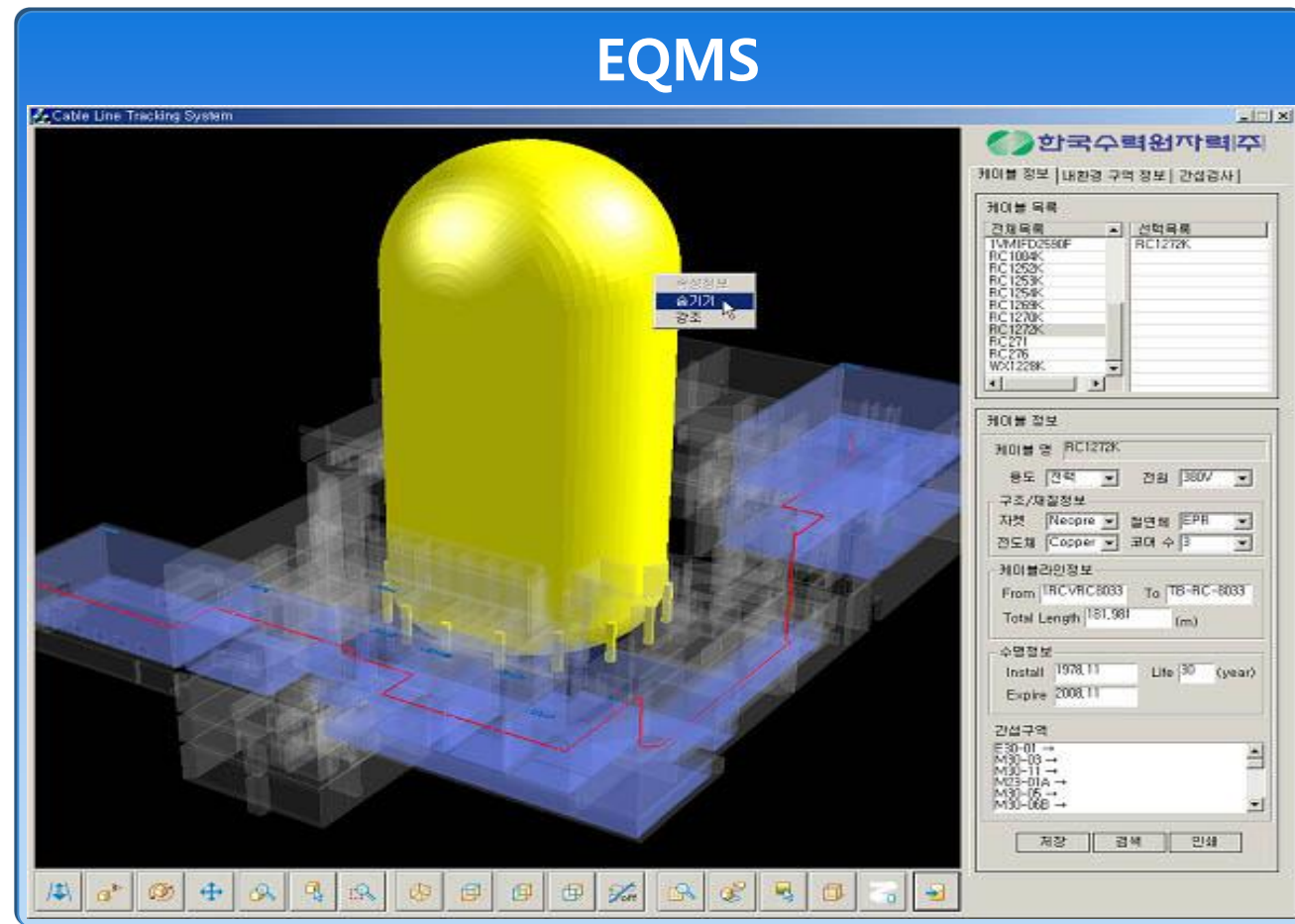
- View the entire campus and then zoom to a specific building, floor and space etc...

# Space Management

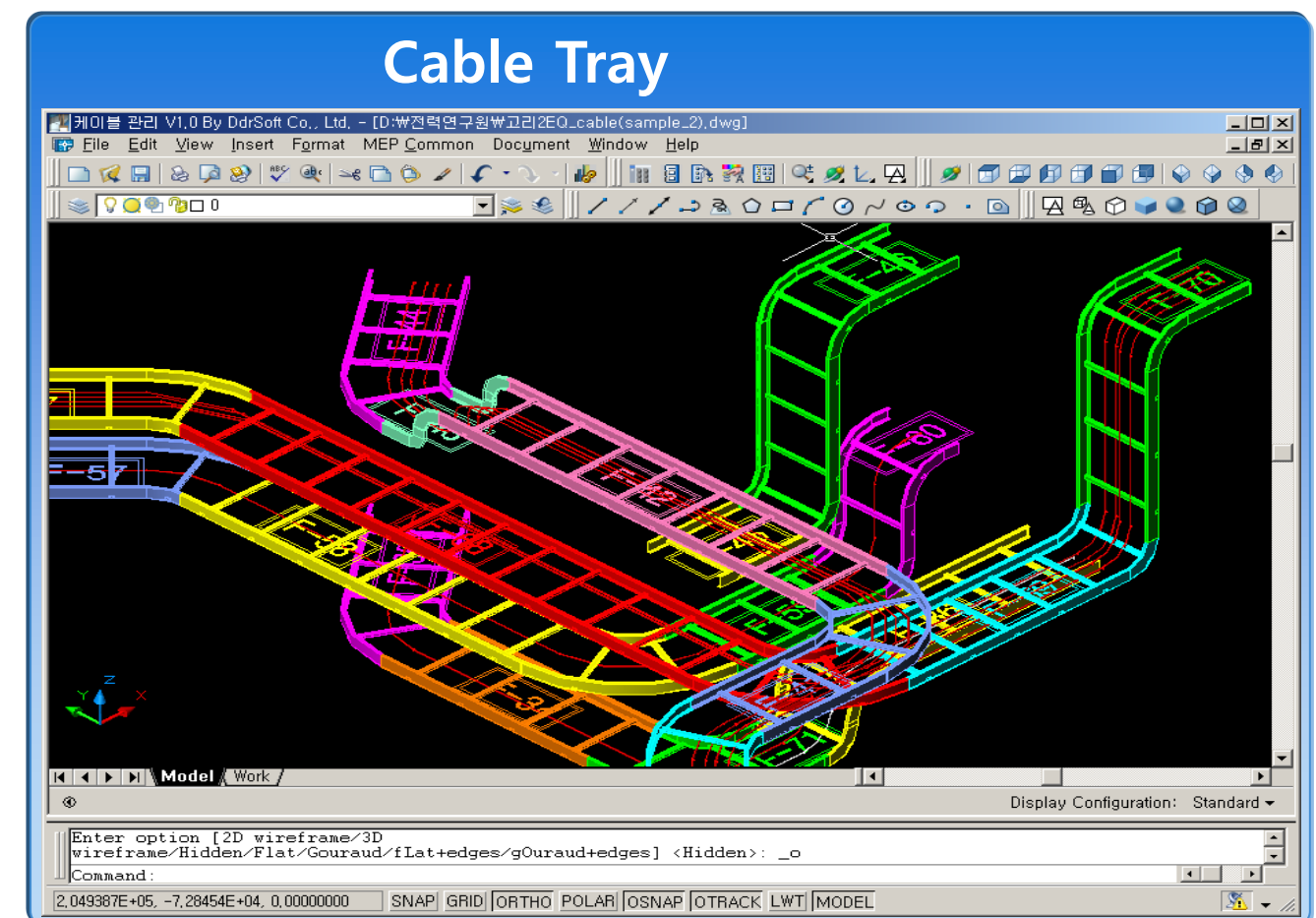


- Visualize the distinction of each structure (penetration, wall, floor etc)
  - 20,000 penetrations of each plant
  - Visualize info of penetration using TAG
  - Provide info to the fire protection system

# Cable Management



- Management of safety-related cables
- Generate space inform that each cable passes through
- Control facility management history



- Manage cable tray and related equipments
  - Measure location and distance
  - Various navigation functions



# Underground Utility Management

## Pipeline/equipment/property search



- 30 systems of underground utilities
- Collaboration in network environment
- Automatic generation of reports

## Area search

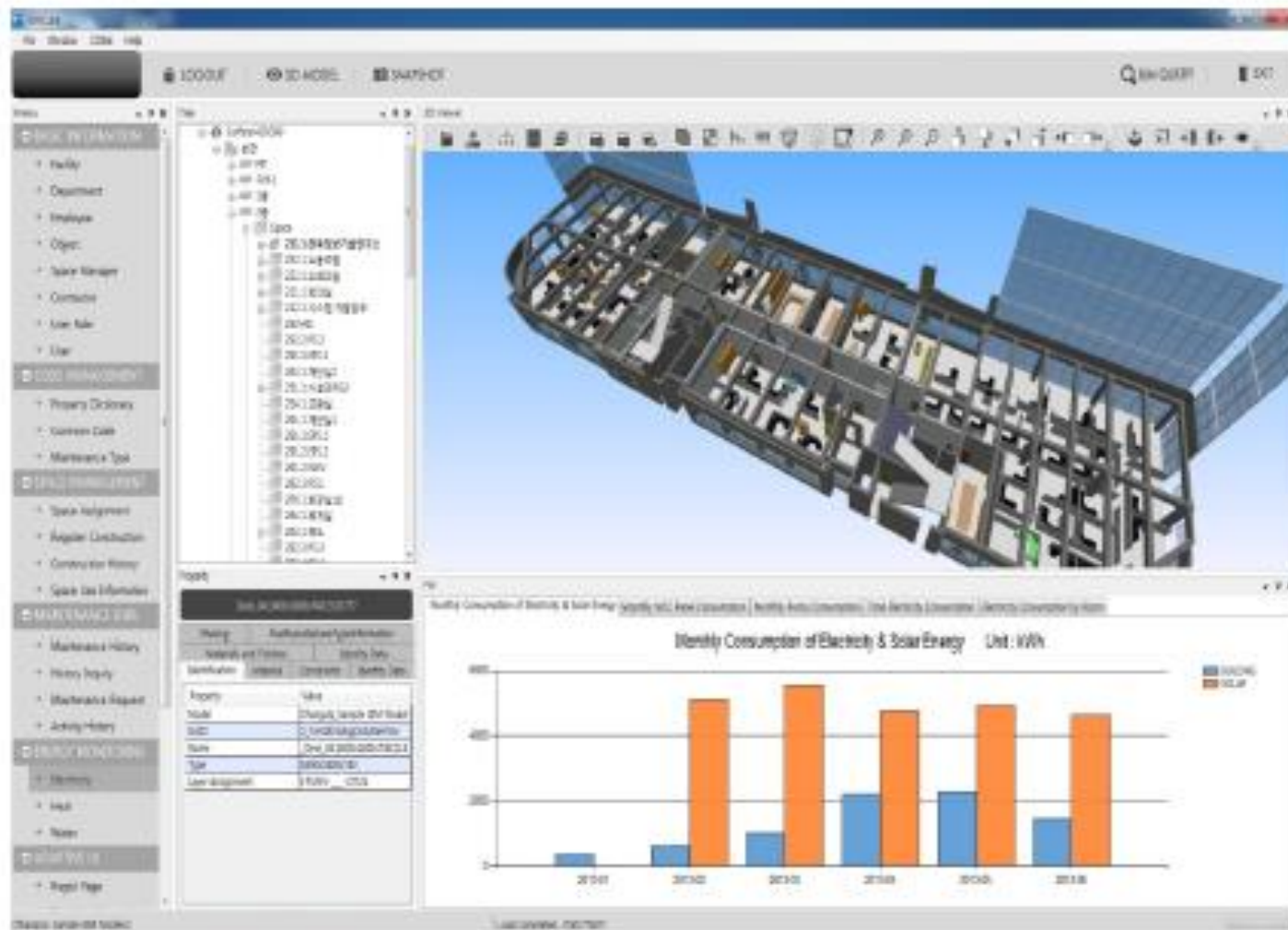


- Real time loading of the utilities in the selected area

# Monitoring

Value  
Point

Energy usage ration and 3D visualization  
Using ETL service for energy information control



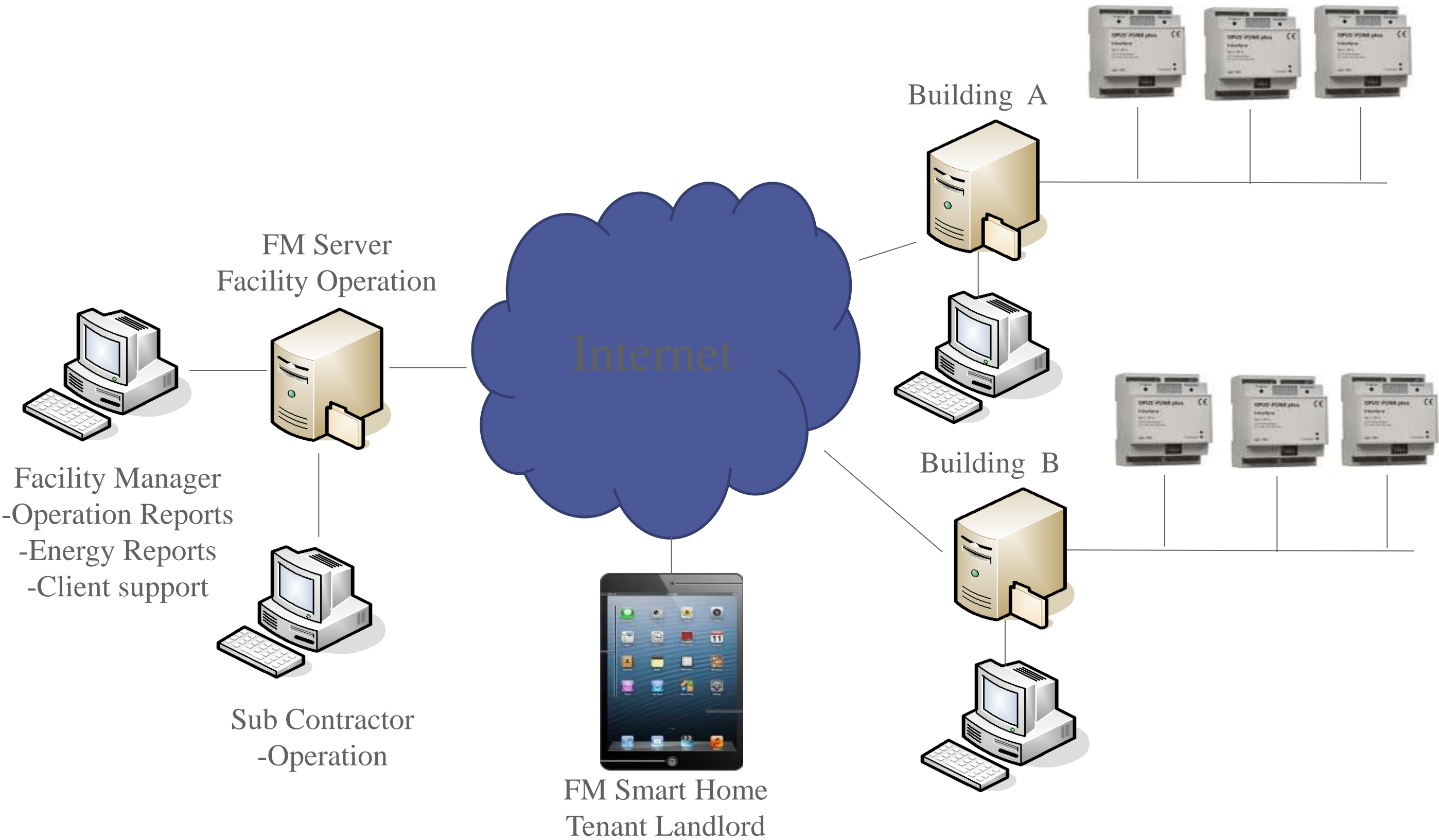
Energy usage statistics

Using ETL service

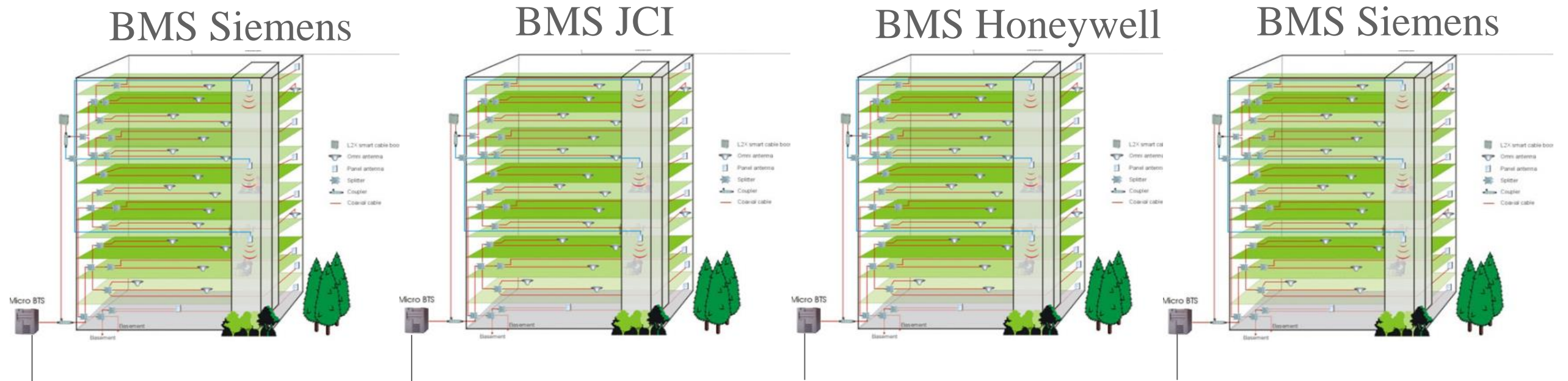
Provides multiple statistics  
information

Analyze external statistics  
function

# Function Overview FM/BMS Integration

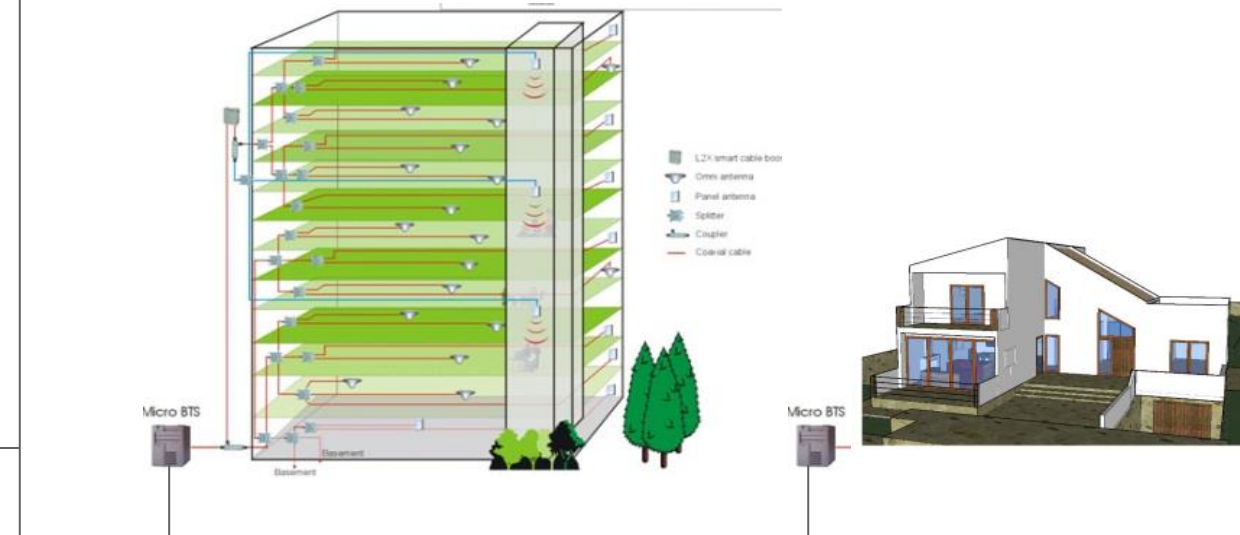
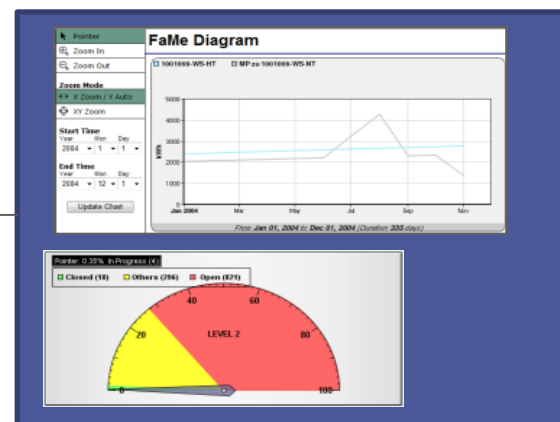


# BMS Integration



Internet/ Intranet

Central novaFM IWMS



iPAD Smart Home  
Tenant/Landlord

# Sensor Device Monitoring

**Value  
Point**

**Air-conditional facilities, Lightning facilities, Fire extinguishing facilities,  
Elevator 3D real-time monitoring**



**BIM & Device linked**

**Group facility monitoring**

**Scenario based monitoring**

**BIM objects & alert system linked**

**Dash board monitoring**

# Space Management – Integrate with GIS from ESRI

**MANHATTAN** Campus Viewer

Buildings: All Buildings | Level: Level 1 | Color By: Function | Satellite

**Search Filters**

Search by Radius  
Radius: 100 | Select Search Point

Search Options  
 Current View Only  
 Visible Floors Only

Space Status: equals  
Space Function: equals  
Space Type: equals  
Space Tenant: equals  
1 Division: starts  
2 Department: starts  
3 Group: starts  
4 Team: starts

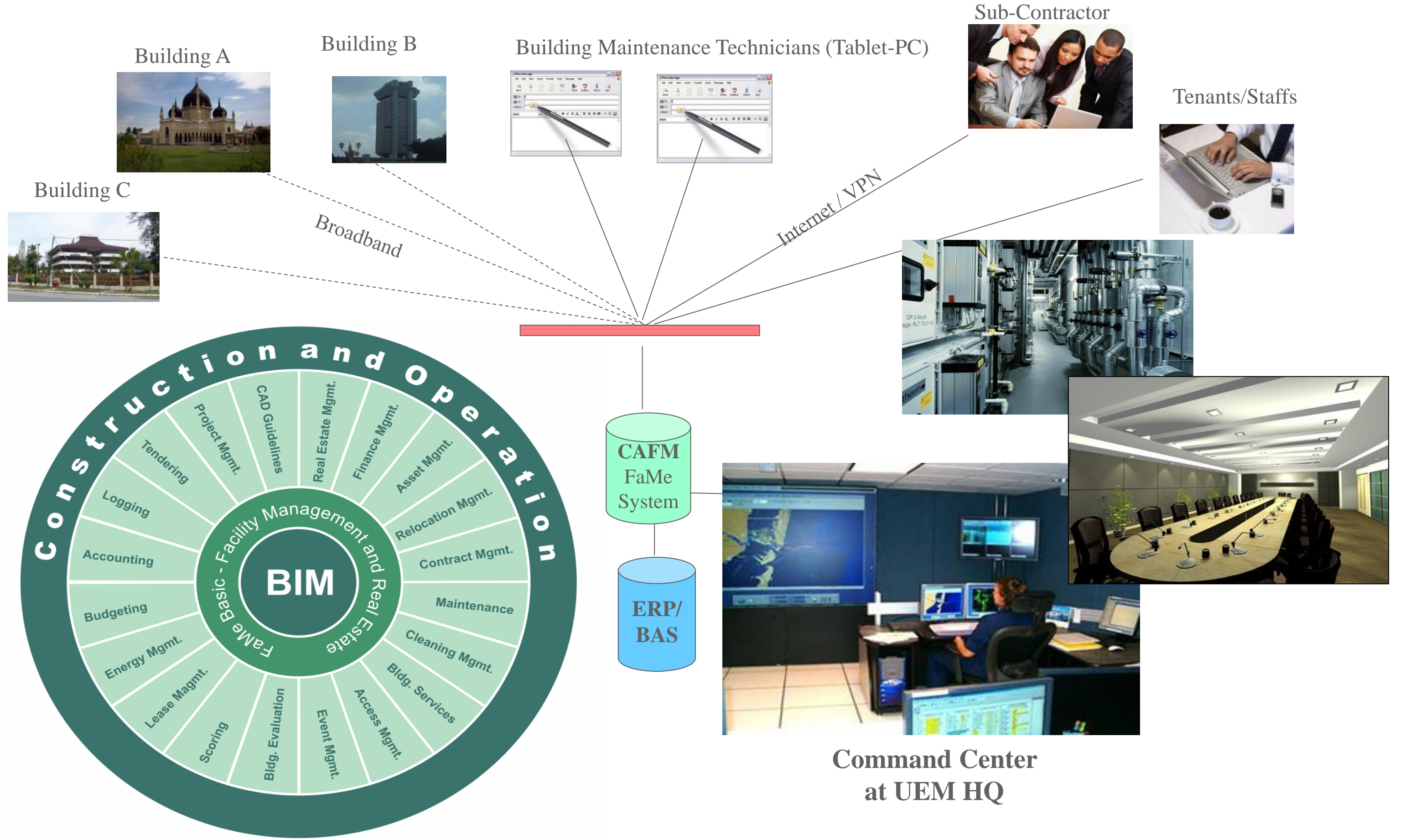
Run Search

**Legend**

- BLDG MAINT
- COMPUTER RM
- CONFERENCE RM
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- CORRIDOR
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- LOBBY
- OFFICE
- PENETRATION
- QA-space function1
- QA-space function2
- QA-space function3
- RESTROOM
- SUPPORT
- Test
- WORKSTATION
- miki-common
- miki-misc
- miki-office

POWERED BY **esri**

# Centralized and Integrated Asset & Facilities Management for all existing infrastructures & buildings.



# **BIM RESOURCE AND TRAINING**

IMPERATIVE TO SUCCESSFUL BIM IMPLEMENTATION





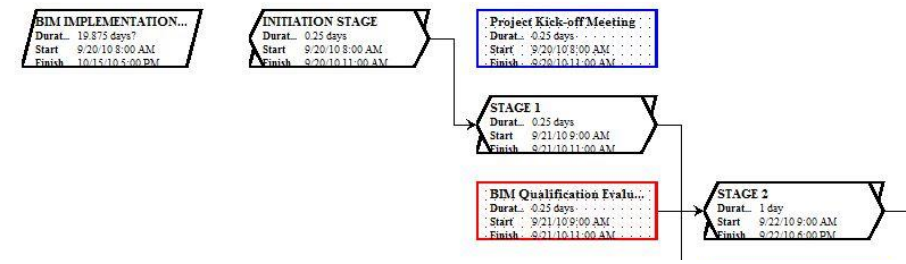
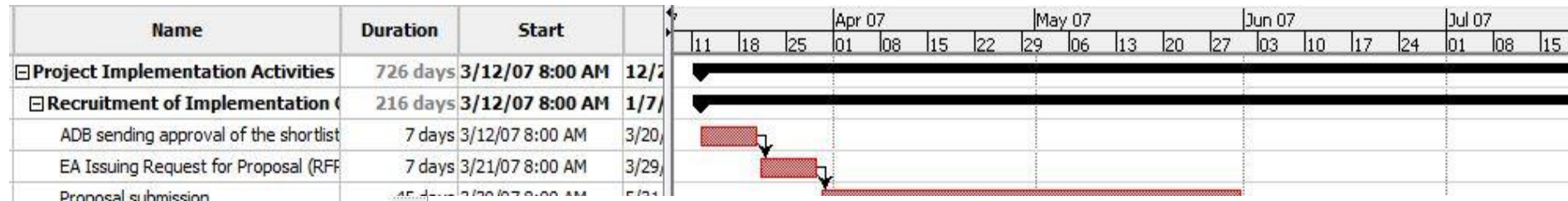
# BIM CORE TEAM



BIM Champion



# EVALUATION & REPORT



Name	Duration	Start	Finish
Project Implementation Activities	726 days	3/12/07 8:00 AM	12/2/07 8:00 AM
Recruitment of Implementation	216 days	3/12/07 8:00 AM	1/7/08 8:00 AM
ADB sending approval of the shortlist	7 days	3/12/07 8:00 AM	3/20/07 8:00 AM
EA Issuing Request for Proposal (RFP)	7 days	3/21/07 8:00 AM	3/29/07 8:00 AM
Proposal submission	15 days	3/29/07 8:00 AM	4/14/07 8:00 AM
EA CSC-Evaluation meeting	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
EA submitting technical evaluation report	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
ADB CSC-Evaluation meeting	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
Signing of CSC-Evaluation meeting minutes	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
ADB sending approval of technical evaluation report	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
EA Issuing invitation for public opening	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
Public Opening	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
EA signing of overall ranking minutes	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
ADB-CSC-Overall Ranking meeting	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
Signing of CSC-Overall Ranking meeting minutes	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
ADB sending approval of overall ranking minutes	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
EA issuing invitation for contract negotiation	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
Commencement of contract negotiations	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
Completion of contract negotiations	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
EA submitting negotiated contract to ADB	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
ADB approval of the negotiated contract	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
EA signing of the contract	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM
Consultant mobilisation	1 day	3/29/07 8:00 AM	3/29/07 8:00 AM

Resource Filter: No Filter

- Edmund Lau
- Jasper Laguerta
- Rochelle Bailon
- Mary Ann Roxan Samaniego

Work: Actual, Remaining, Baseline

Resource ID	Resource	Resource ID	Assignment Units	Work	Actual Work	Remaining
1	Edmund Lau	1	100%	8 hours	0 hours	8 hours
	Edmund Lau	1	100%	2 hours	0 hours	2 hours
	Edmund Lau	1	100%	4 hours	0 hours	4 hours
				14 hours	0 hours	14 hours

Resource ID	Resource	Resource ID	Assignment Units	Work	Actual Work	Remaining
2	Jasper Laguerta	2	100%	8 hours	0 hours	8 hours
	Jasper Laguerta	2	168%	8 hours	0 hours	8 hours
	Jasper Laguerta	2	100%	2 hours	0 hours	2 hours
	Jasper Laguerta	2	100%	8 hours	0 hours	8 hours
	Jasper Laguerta	2	100%	8 hours	0 hours	8 hours
	Jasper Laguerta	2	100%	2 hours	0 hours	2 hours
	Jasper Laguerta	2	100%	8 hours	0 hours	8 hours
				44 hours	0 hours	44 hours

Resource ID	Resource	Resource ID	Assignment Units	Work	Actual Work	Remaining
3	Rochelle Bailon	3	100%	2 hours	0 hours	2 hours
	Rochelle Bailon	3	100%	18 hours	0 hours	18 hours
				20 hours	0 hours	20 hours
	Rochelle Bailon	3	100%	18 hours	0 hours	18 hours
	Rochelle Bailon	3	100%	2 hours	0 hours	2 hours
				20 hours	0 hours	20 hours

# MANAGEMENT REPORTS



## Shortcomings and Solutions

Project Shortcoming	Recommended Solution
Lack of preparation for setting up the training room especially for the projector. This caused delay for the training.	IT department should check facilities a day before.
Something wrong with the computer settings, some settings are wiped out after computer reboot.	IT department must find causes this.
Trainees asked to end the training earlier even without finishing the scheduled lessons. They said that the covered topics are too much for them for the day and they might get confused if trainer goes further.	We might need to have training session to cover topics.
Data gathered during the first day for project setting up are not sufficient, Eng. Khalid passed plan drawings and advised me to extract from there the information I need such as layers, window types, door types, etc.	-
Computers are not sufficient for the project implementation. There are only 9 computers running archicad 13.	We need at least 6 more for the project (total 15) so that 3 departments have 5 participants on the pilot project.

## Notable Achievements/Progress

Project Success	Factors That Supported
Trainees are good and can relate the modeling principles/concept on their current CAD knowledge.	Good knowledge in CAD

### \*NOTES:

For the pilot project, I would suggest to upgrade the computers to a higher the processor and ram. On our experience, using Intel i5 or i7 and 6 to 12GB handling big projects and save us a lot of time. Maybe not all must have the optimized and make everyone more productive, this is what we can advise.

### Approvals:

Prepared by: **Jasper L. Laguerta**  
BIM Implementer

Approved by: **Diyane Koseoglu**  
BIMES Coordinator

Hassan Saffarini  
Client/Executive Sponsor



### Attendees

Name
Eng. Khalid m. ...
Arafat Mahmoud
Moayad K. AL Janab
Omar Aasem
Ahmed Kadhem Alwan
Ellas Ahmed
Mohd Fathe
Arch. Mohammad Wadi
Eng. Mohammed Abdu
Arch. Ali-Ziad Natcher A. Sall
Arch. Jay Carlo B. Gecana

### Location

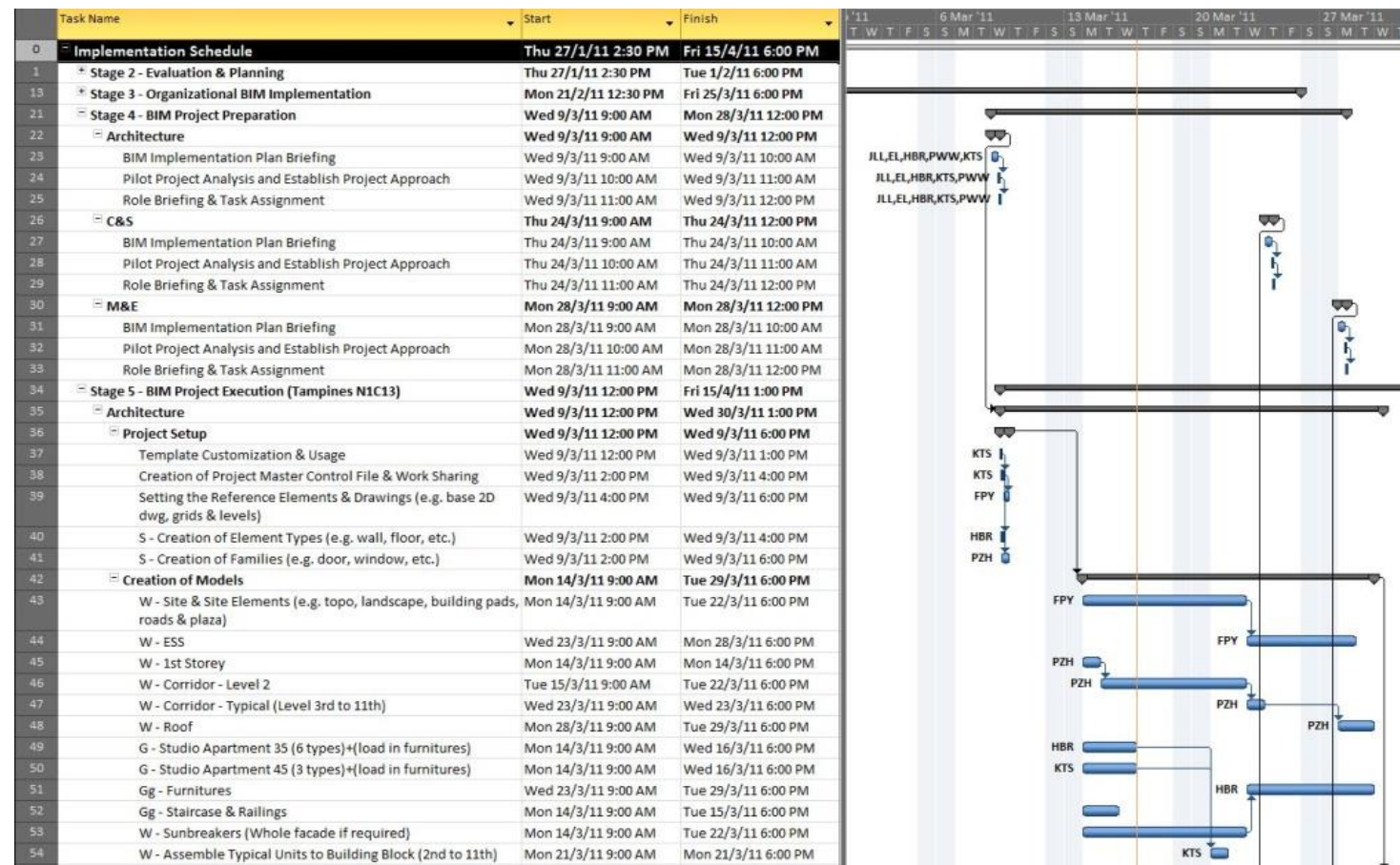
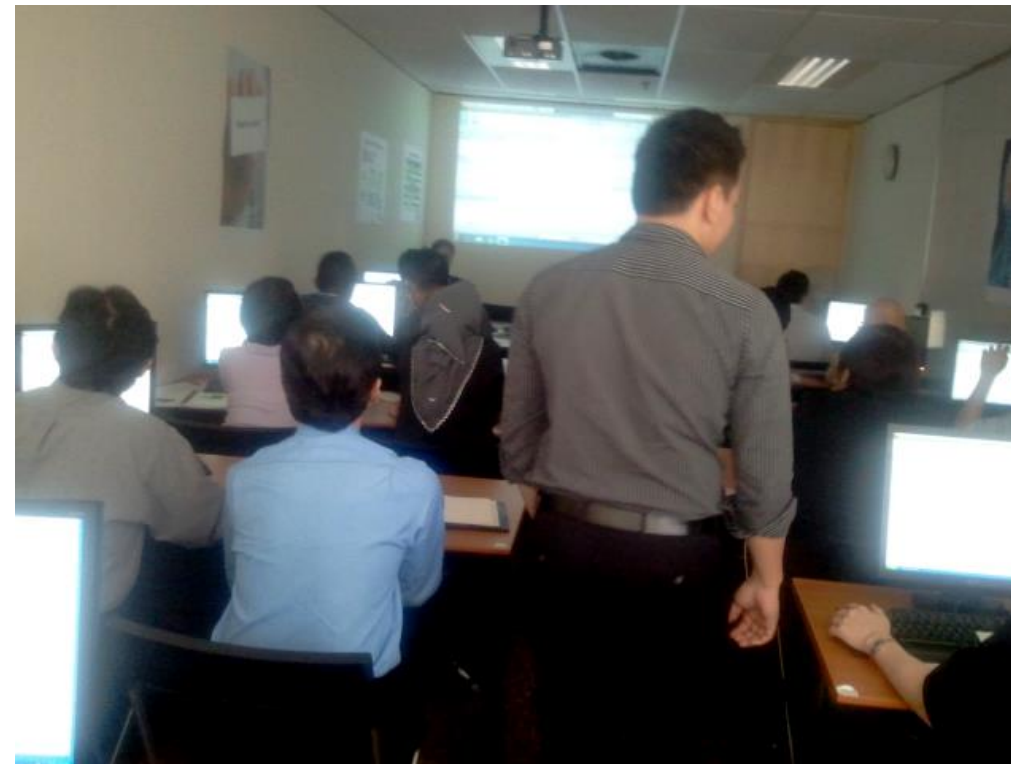
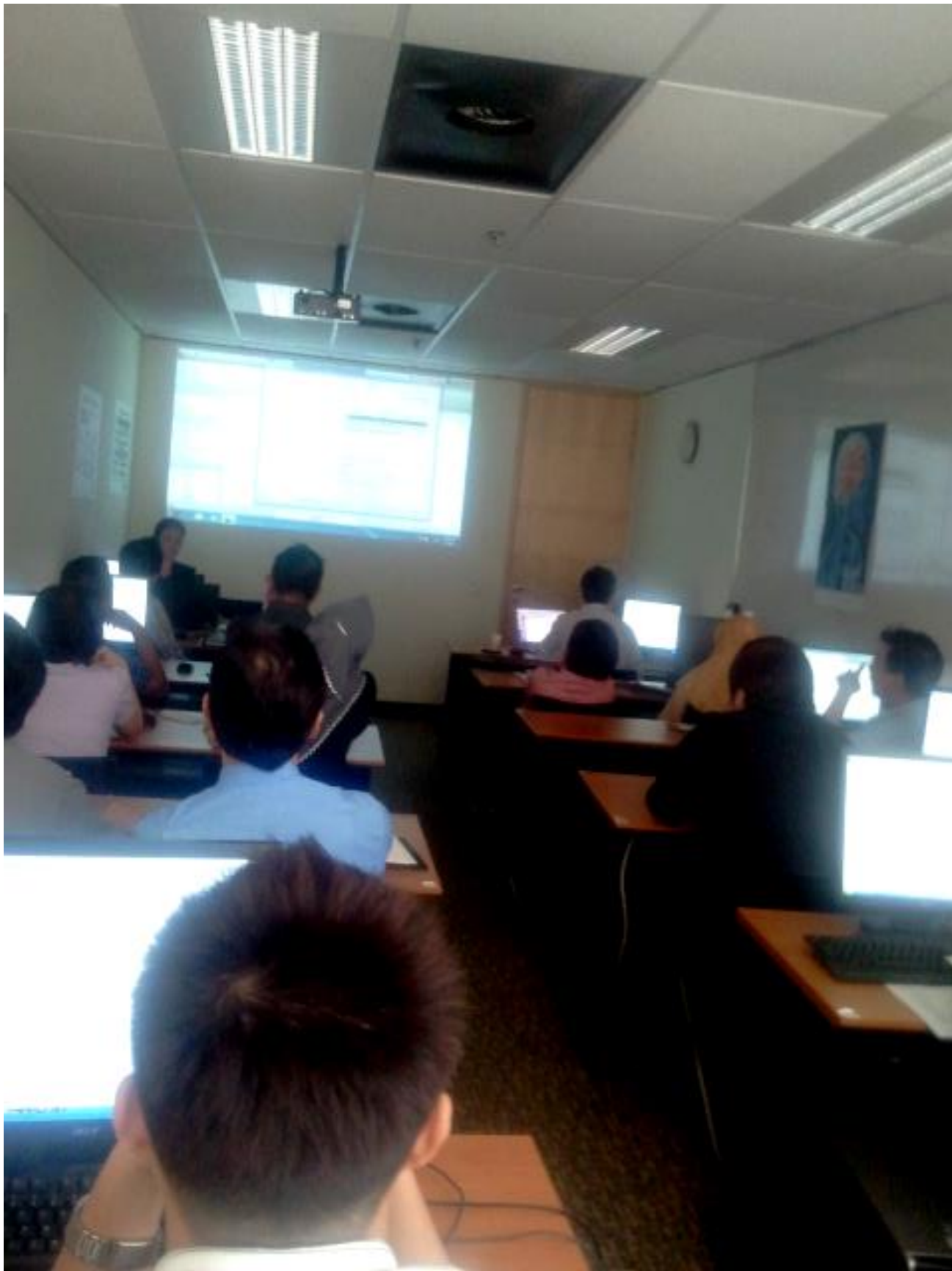
Room and Facilities	Room Condition

## Scope & Timeframe

Our Scope is to open the door for Adnan Saffarini Engineering Consultant to successfully use BIM for their projects by training the Architecture, Structure and MEP departments and provide guidance from starting a pilot BIM project up to completion of Architecture & Structure BIM model and Shop drawings stage. BIMES in collaboration with CONSOF Asia - Singapore, are given 4 weeks to successfully implement BIM and assist the departments to finish the pilot project.

The purpose of this document is to provide a general framework on implementing BIM and to give an overview of the benefits from it. This document is tailored to promote a smooth transition strategy and guideline for successful BIM implementation.

## Scope & Timeframe



# TRAINING, MENTORING & PROJECT EXECUTION PLAN

**THANK YOU**