



1 Causes of accidents

- Excessive speed
- Alcohol
- Fatigue
- Distraction

AGENDA

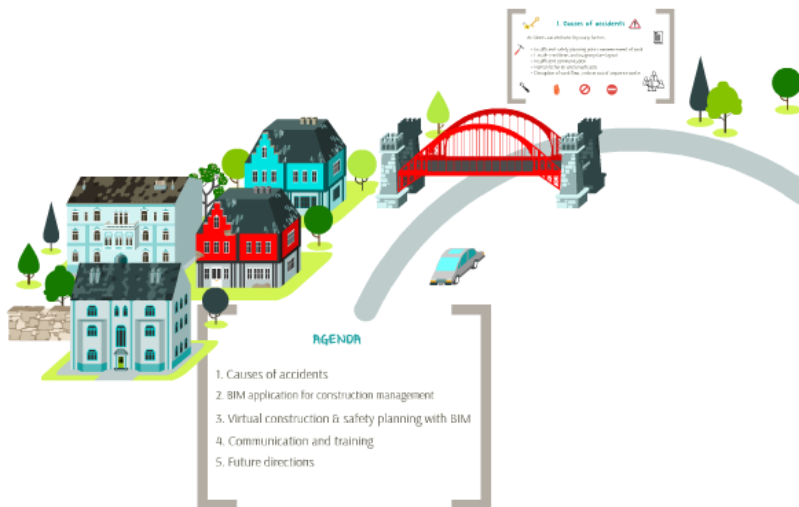
1. Causes of accidents

1. Causes of accidents
2. BIM application for construction management
3. Virtual construction & safety planning with BIM
4. Communication and training
5. Future directions



Effective construction planning and risk mitigation with BIM

By Mr. Lun Tim-Ho





AGENDA

1. Causes of accidents
2. BIM application for construction management
3. Virtual construction & safety planning with BIM
4. Communication and training
5. Future directions



I. Causes of accidents



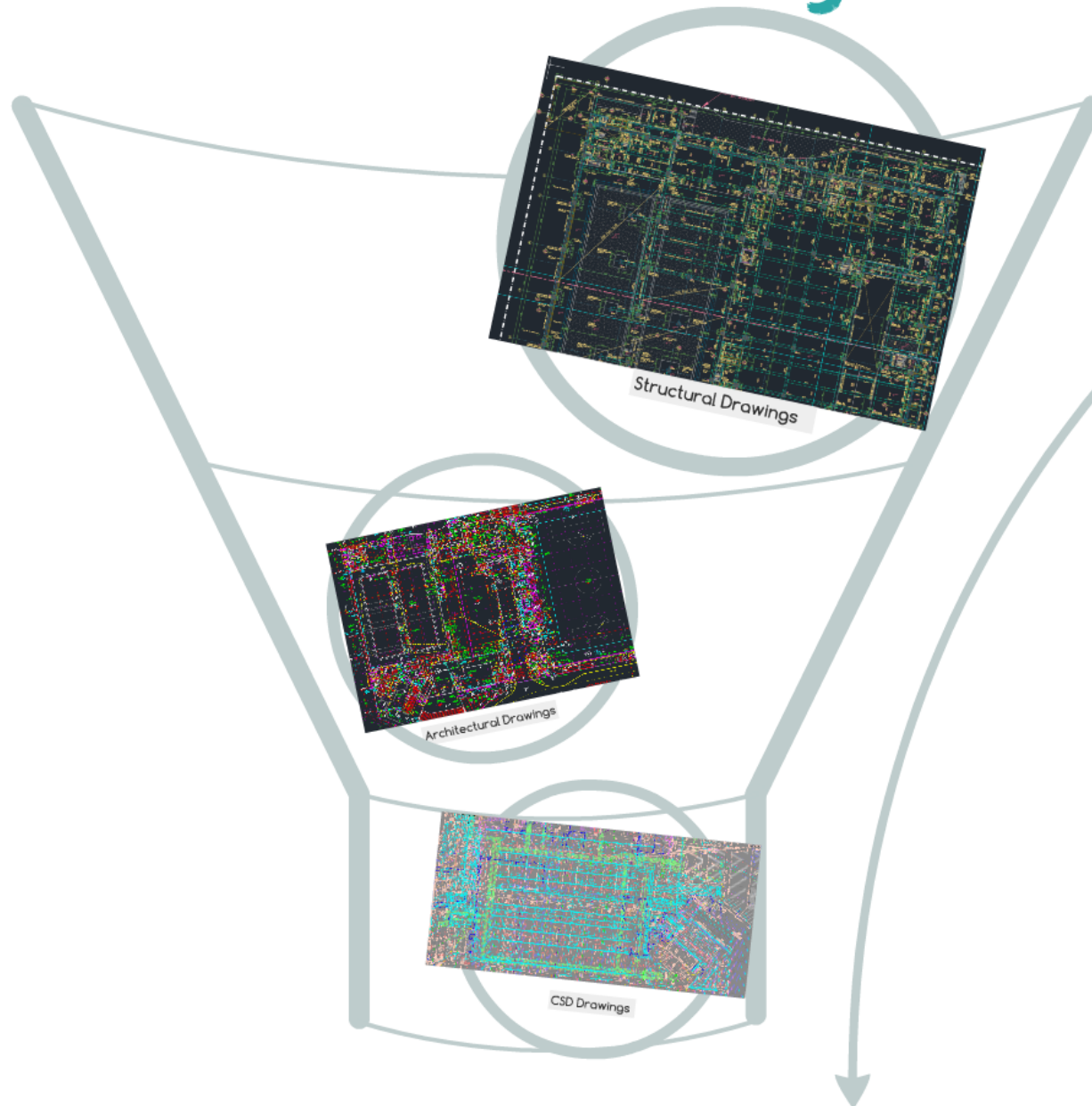
Accidents are attributed by many factors:



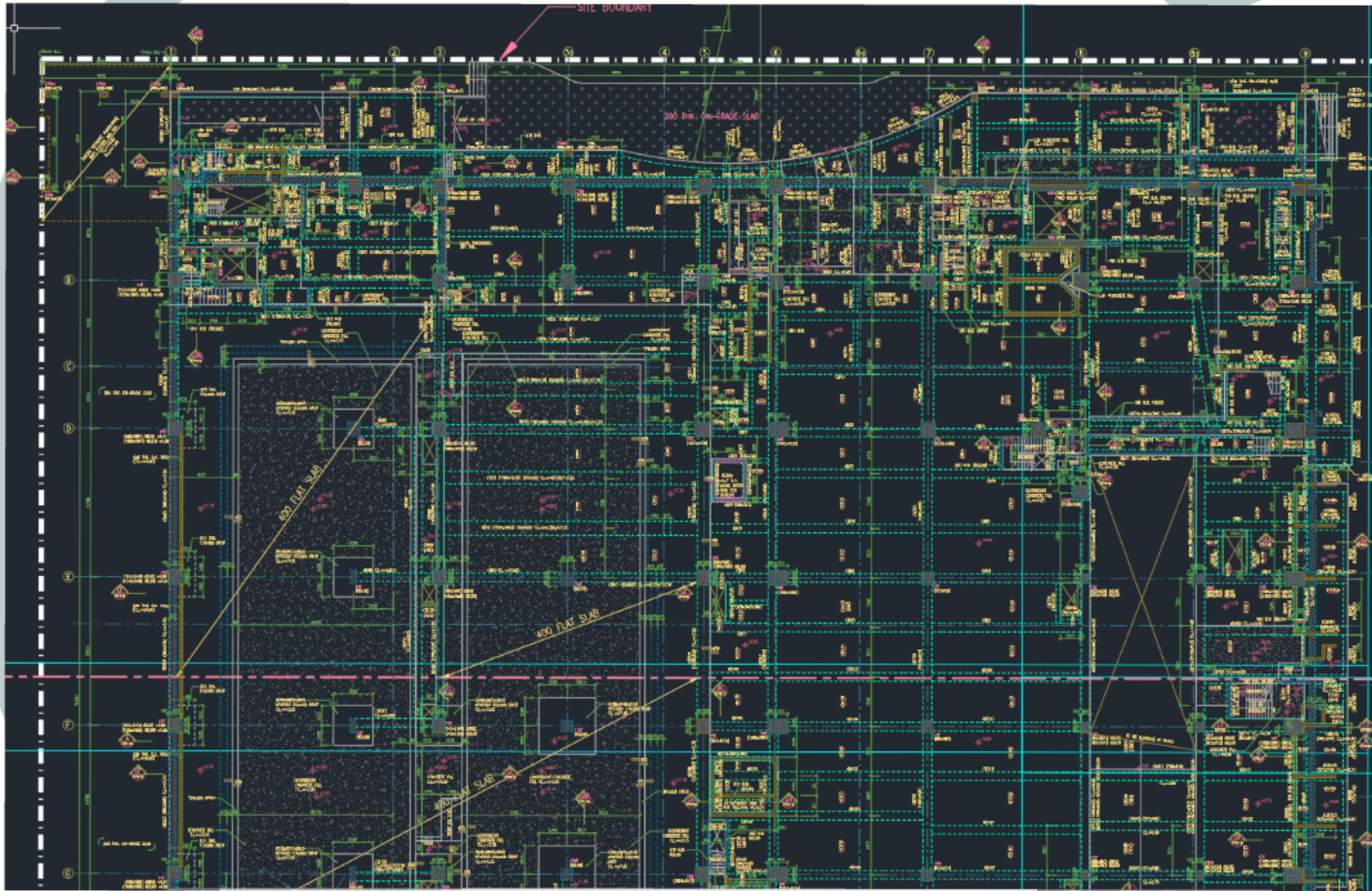
- Insufficient safety planning prior commencement of work
- Unsafe conditions and inappropriate layout
- Insufficient communication
- Human behavior and unsafe acts
- Disruption of work flow , redo or out of sequence works



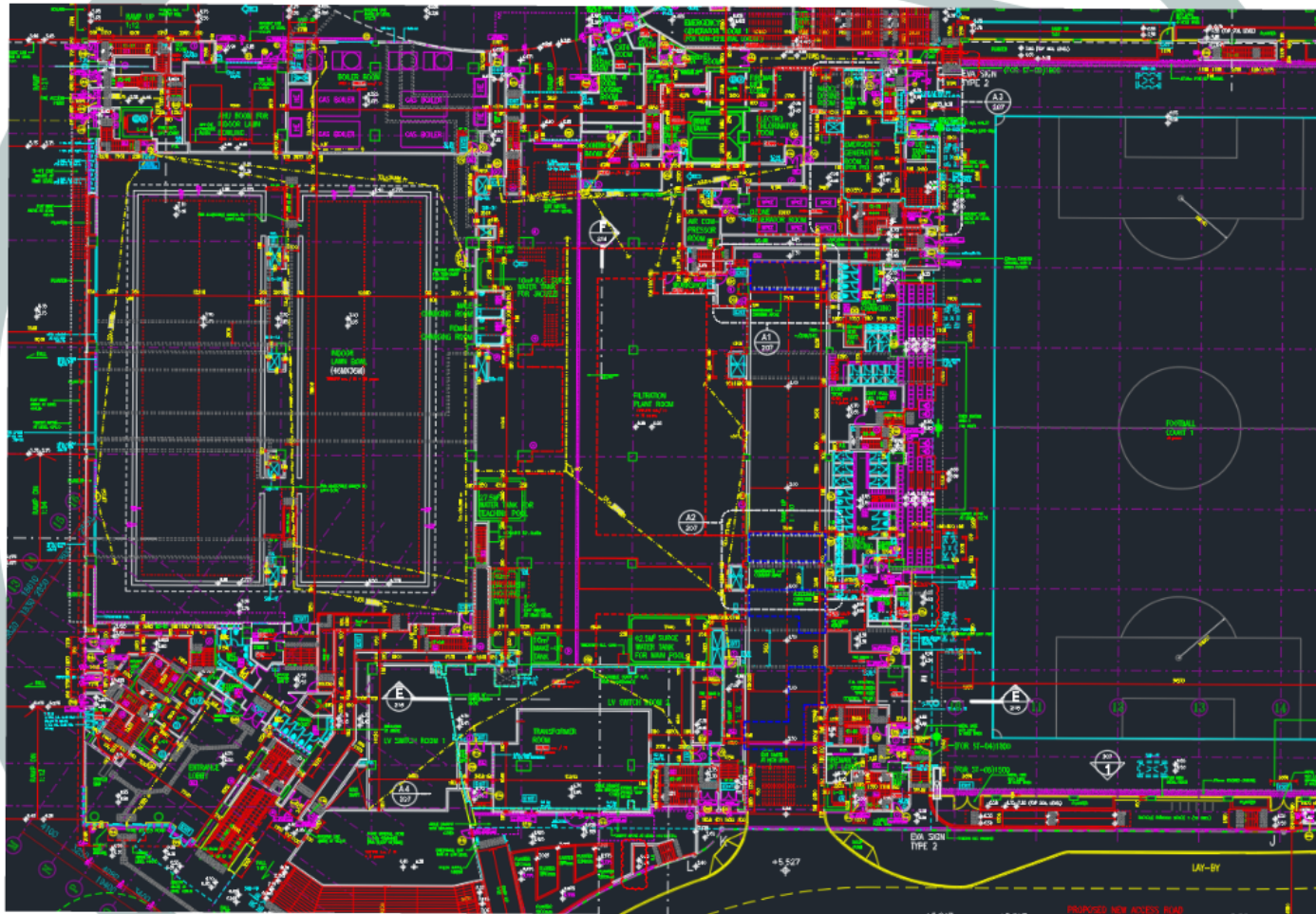
BIM application for construction management



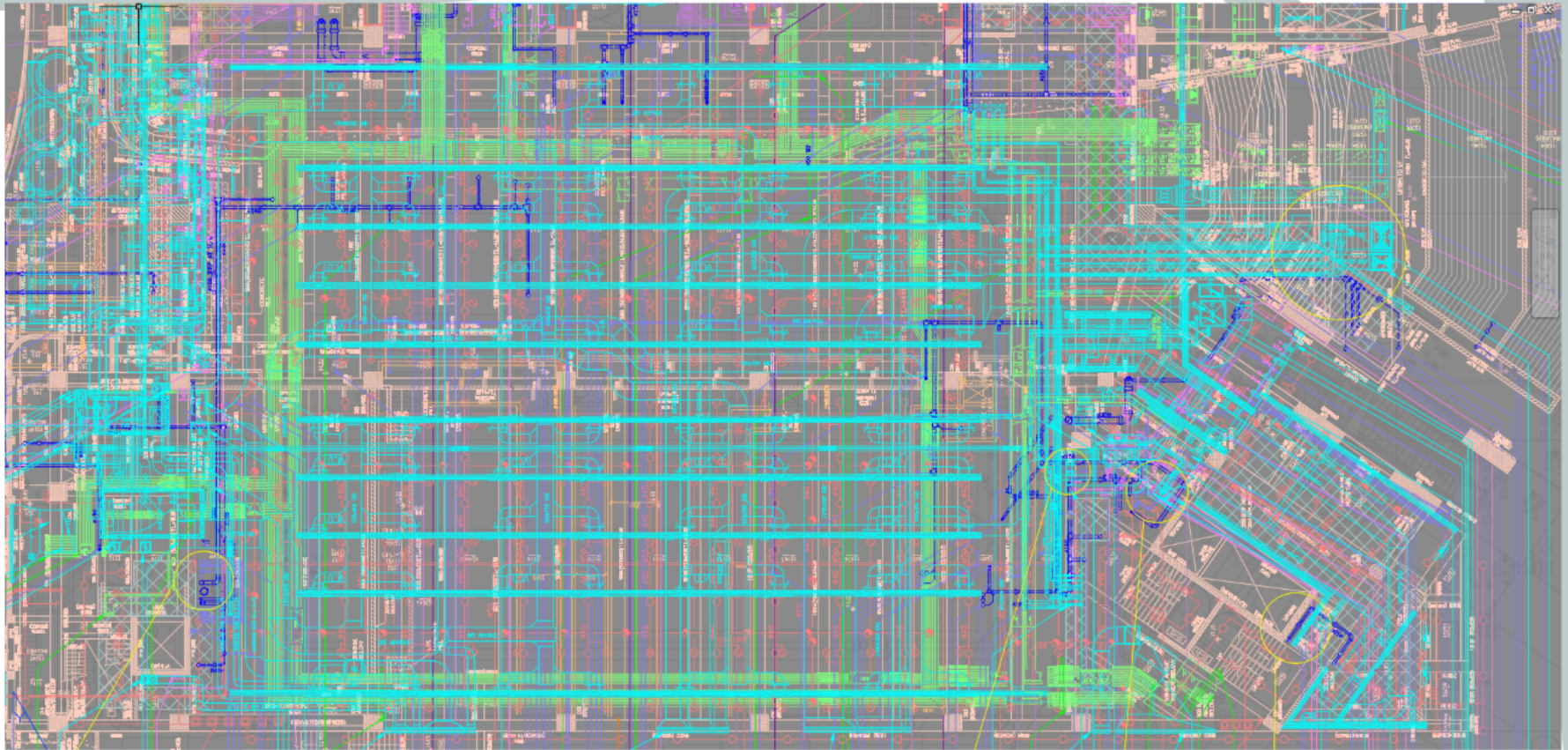
Project:	Construction
Contract No.:	20-2002
Rev.	Rev. 1
85	Major BIM plan
90	Design & floor
91	1.5 feet plan
92	Water main
93	Construction
94	Major building
95	Electrical net
96	T&E net
97	Telecom net
98	Gas pipe net
99	US and optical
100	TEB room (B)
101	Switch room
102	Emergency gen
103	1.0 shed Net
104	Lift machine net
105	B&M installation
106	Forming net
107	Drainage net
108	4" water line
109	2" water line
110	2" gas line
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200	2" gas line



Structural Drawings



Architectural Drawings

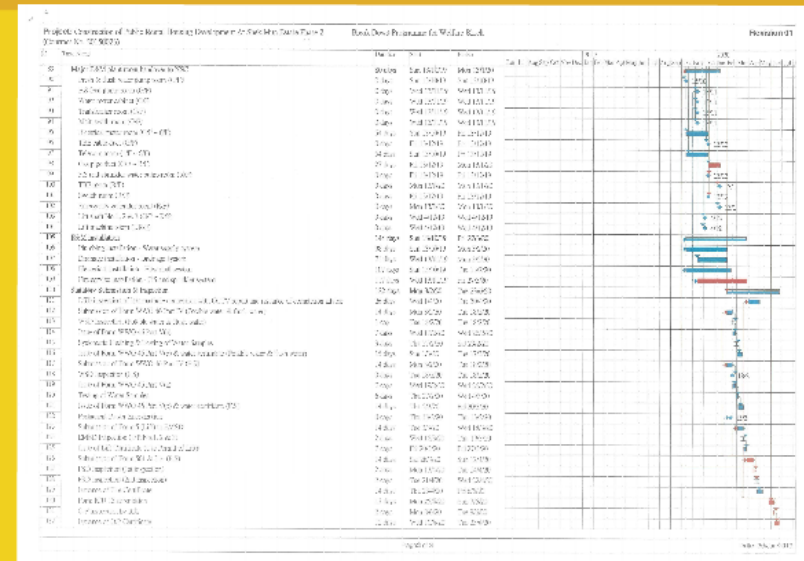
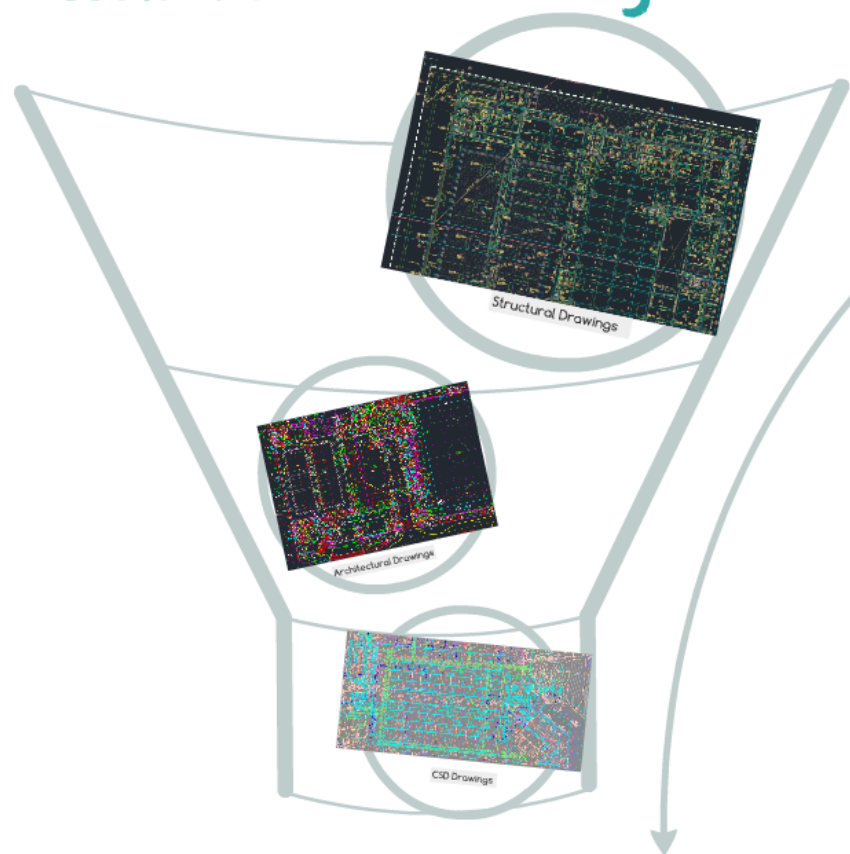


CSD Drawings

And other writing
Such as mark up, specific

Complicated construction information are collected from different disciplines:

BLM application for construction management



Master Programme

And other written documents.....

Such as mark up, specification, schedule...

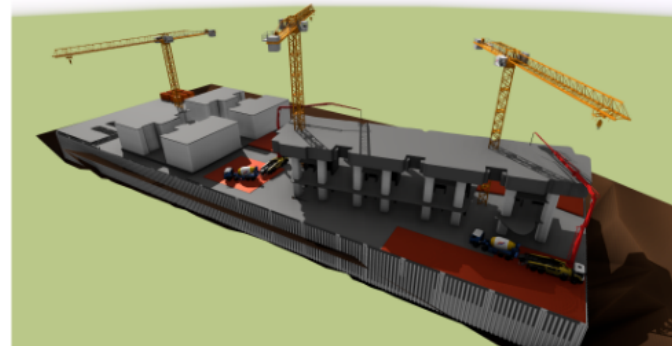
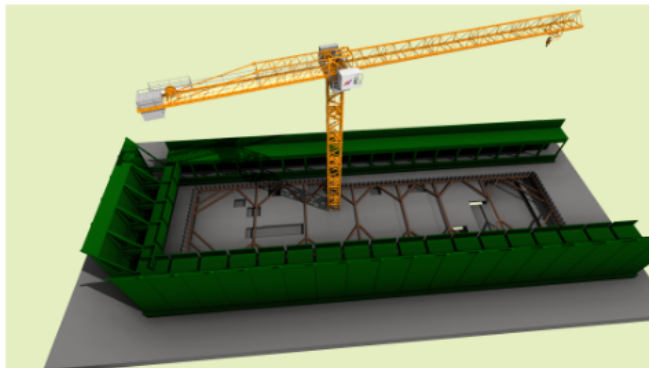
Revision 01

Rev	Date	Description	By	App
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02	10/10/2010
03	10/10/2010
04	10/10/2010
05	10/10/2010
06	10/10/2010
07	10/10/2010
08	10/10/2010
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96	10/10/2010
97	10/10/2010
98	10/10/2010
99	10/10/2010
100	10/10/2010



Advantages of BIM

- One 3D model combine with information with documentation
- Collaboration information from different professional disciplines
- Visualization of the project details
- Information discrepancies to be identified easily
- 3D navigation and section view generation





Visualisation

- Visualisation of the proposed building and the relationship between different parts
- Building models are linked with construction time program to generate a 4D BIM
- Use 4D BIM to review work place, sequence reasoning and correctness



Virtual construction

- PLAN
Building the project model and resources input plan
- DO
Simulation and virtual construction and training
- CHECK
Method and planning
- ACT
Method revision and control



g and correctness



Virtual construction & safety planning with BIM

- PLAN

Building the project model, device method statement, work sequencing and resources input plan

- DO

Simulation and virtual construction(4D BIM), communication and training

- CHECK

Method and planning

- ACT

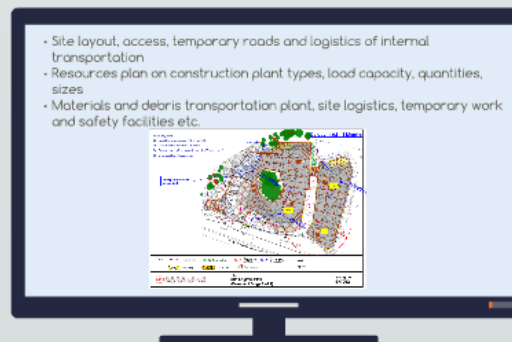
Method revision and correction action

constr

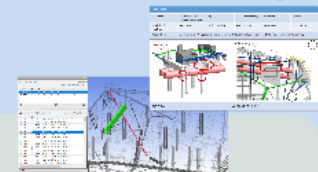
• Review & t

construction information review

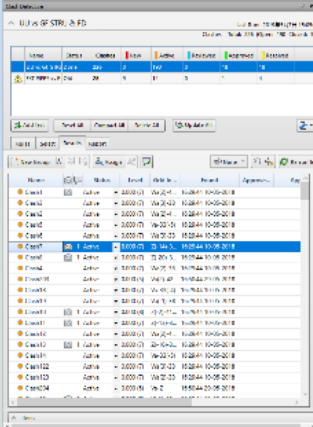
- Review the project characteristics and work scope
- Structure construction method
 - Casting formwork system
 - Off-site prefabrication
 - Mechanisation to reduce on-site labour work
- Establish work phasing, construction sequence and schedule of work

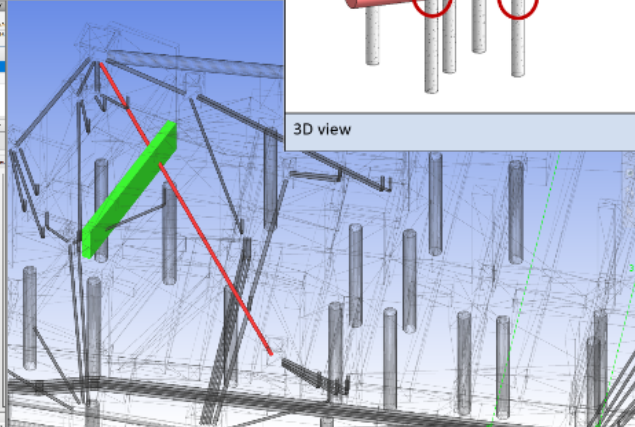


- Review project information and work plan formation
- Design information availability checking and collaboration to avoid disturbance to work flow, hold up of or double handling of work

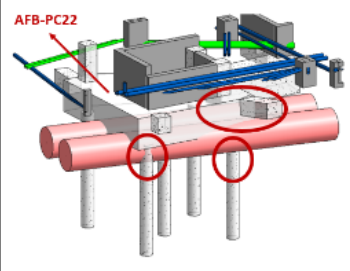


- Review project information and work plan formation
- Design information availability checking and collaboration to avoid disturbance to work flow, hold up of or double handling of work

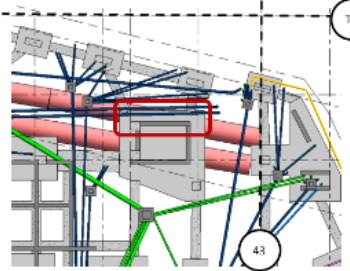




Clash Detail					
Location:	Underground Grid 40/Ua – 42/Ua	Type:	Clash/Discrepancy	Issue No.:	UU011
Discipline(s) involved:	ARC, STR, BS	Action parties:	ARC/STR/BS	Issue Date:	23/05/2018
Description:	Ø1350mm existing steel pipe is clashed with 1500mm foundation cap (AFB-PC22) and two Ø570mm piles				



3D view



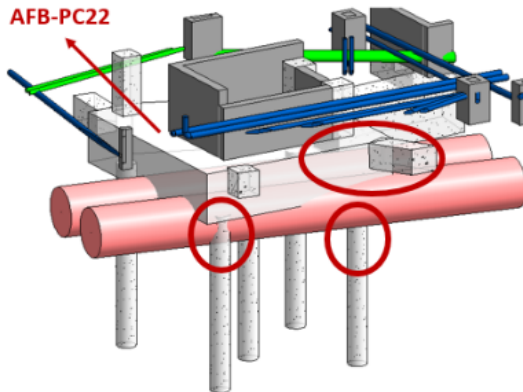
Location on Plan

collaboration to avoid disturbance to ow, hold up of or double handling of v

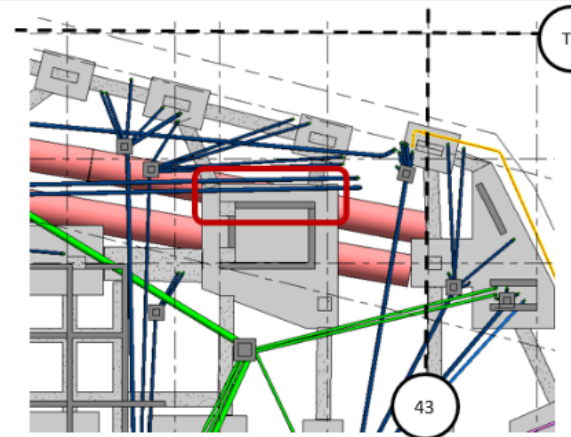
Clash Detail

Location:	Underground Grid 40Ua – 42Ua	Type:	Clash/Discrepancy	Issue No.:	UU011
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AFB-PC22



3D view



Location on Plan

Clash Detective

UU vs GF STRU & FD

Last Run: 2018/05/17 15:05:24

Clashes - Total: 226 (Open: 190 Closed: 36)

Name	Status	Clashes	New	Active	Reviewed	Approved	Resolved
UU vs GF STRU	Done	226	0	190	0	15	15
DT PIPES vs F. Old	28	9	14	0	1	4	

Add Test Revert All Compact All Delete All Update All

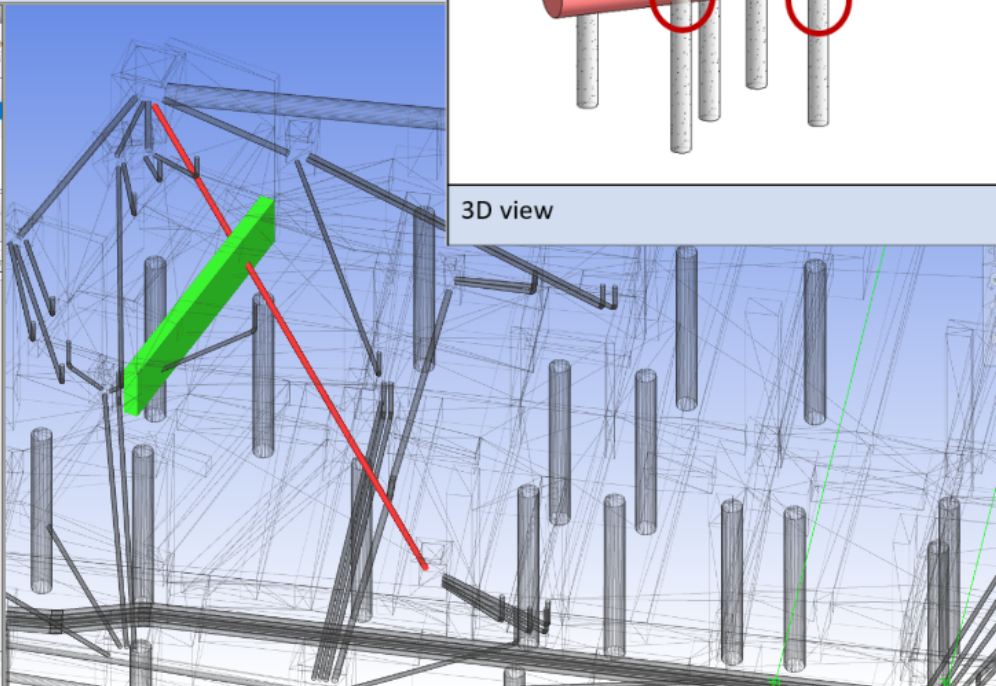
Rules Select Results Report

New Group Assign

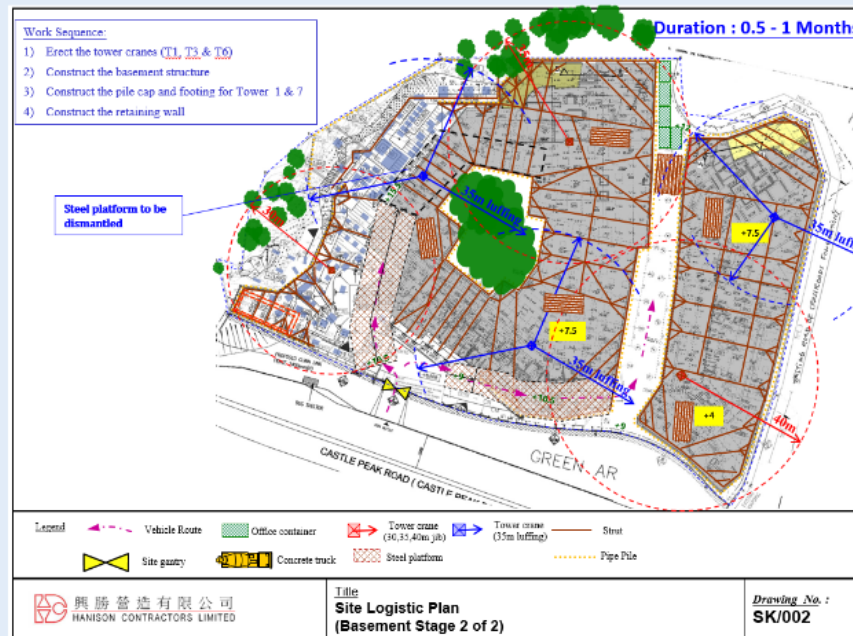
Name Status Level Grid In... Found Approve... App...

- Clash1 Active 0.000 (7) Wa(2)-L... 16:29:44 10-05-2018
- Clash3 Active 0.000 (7) Wa(3)-38 16:29:44 10-05-2018
- Clash2 Active 0.000 (7) Wa(2)-L... 16:29:44 10-05-2018
- Clash5 Active 0.000 (7) Va-33(-5) 16:29:44 10-05-2018
- Clash6 Active 0.000 (7) Wa(3)-38 16:29:44 10-05-2018
- Clash7 1 Active 0.000 (7) Zi-14(-3)... 16:29:44 10-05-2018
- Clash8 1 Active 0.000 (7) Zi-20(-3)... 16:29:44 10-05-2018
- Clash4 Active 0.000 (7) Wa(2)-38 16:29:44 10-05-2018
- Clash203 Active 0.000 (5) Va(2)-42 16:50:44 29-05-2018
- Clash18 Active 0.000 (7) Va-33(-4) 16:29:44 10-05-2018
- Clash19 Active 0.000 (7) Va-10-38 16:29:44 10-05-2018
- Clash10 1 Active 0.000 (8) Zi-7(-4)... 16:29:44 10-05-2018
- Clash11 1 Active 0.000 (7) Zi-13(-3)... 16:29:44 10-05-2018
- Clash12 Active 0.000 (7) Wa(2)-L... 16:29:44 10-05-2018
- Clash13 1 Active 0.000 (7) Zi-16(-3)... 16:29:44 10-05-2018
- Clash14 Active 0.000 (7) Va-33(-5) 16:29:44 10-05-2018
- Clash122 Active 0.000 (7) Wa(3)-38 16:29:44 10-05-2018
- Clash123 Active 0.000 (7) Wa(2)-38 16:29:44 10-05-2018
- Clash204 Active 0.000 (5) Va-Z 16:50:44 29-05-2018

Items



- Site layout, access, temporary roads and logistics of internal transportation
- Resources plan on construction plant types, load capacity, quantities, sizes
- Materials and debris transportation plant, site logistics, temporary work and safety facilities etc.



- 3D model helps to:
 - simulate the construction process
 - foresee planning deficiency and execution problems
 - test the sufficiency and correctness of planned resources of plant, labour and safety facilities for work.



labour and safety facilities for work.



8/30/2019 0:00:00

Week 1

Day 1 (Friday)

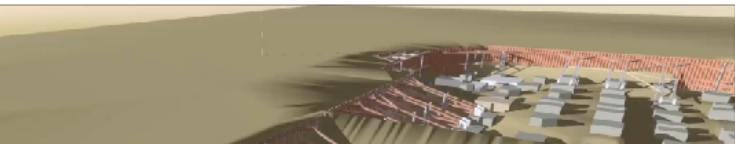


Examples include:

a) site layout, internal logistic, and temporary set up.



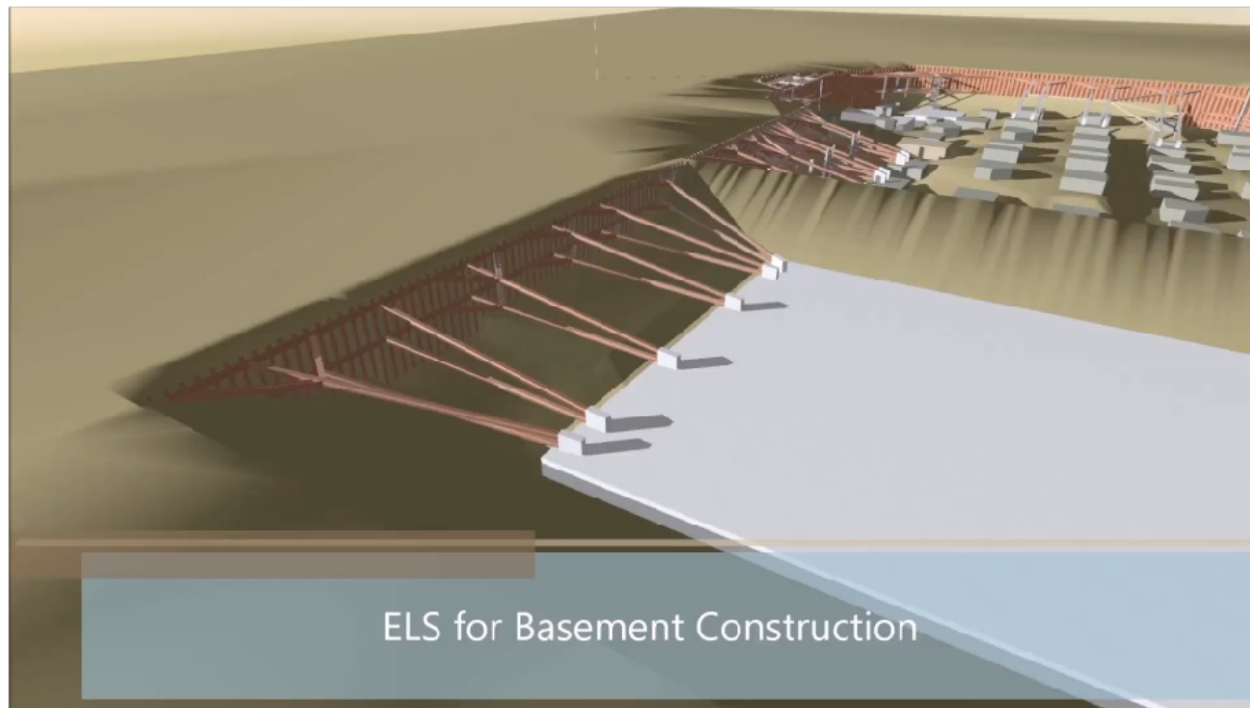
nd excavation work sequence



temporary set up.

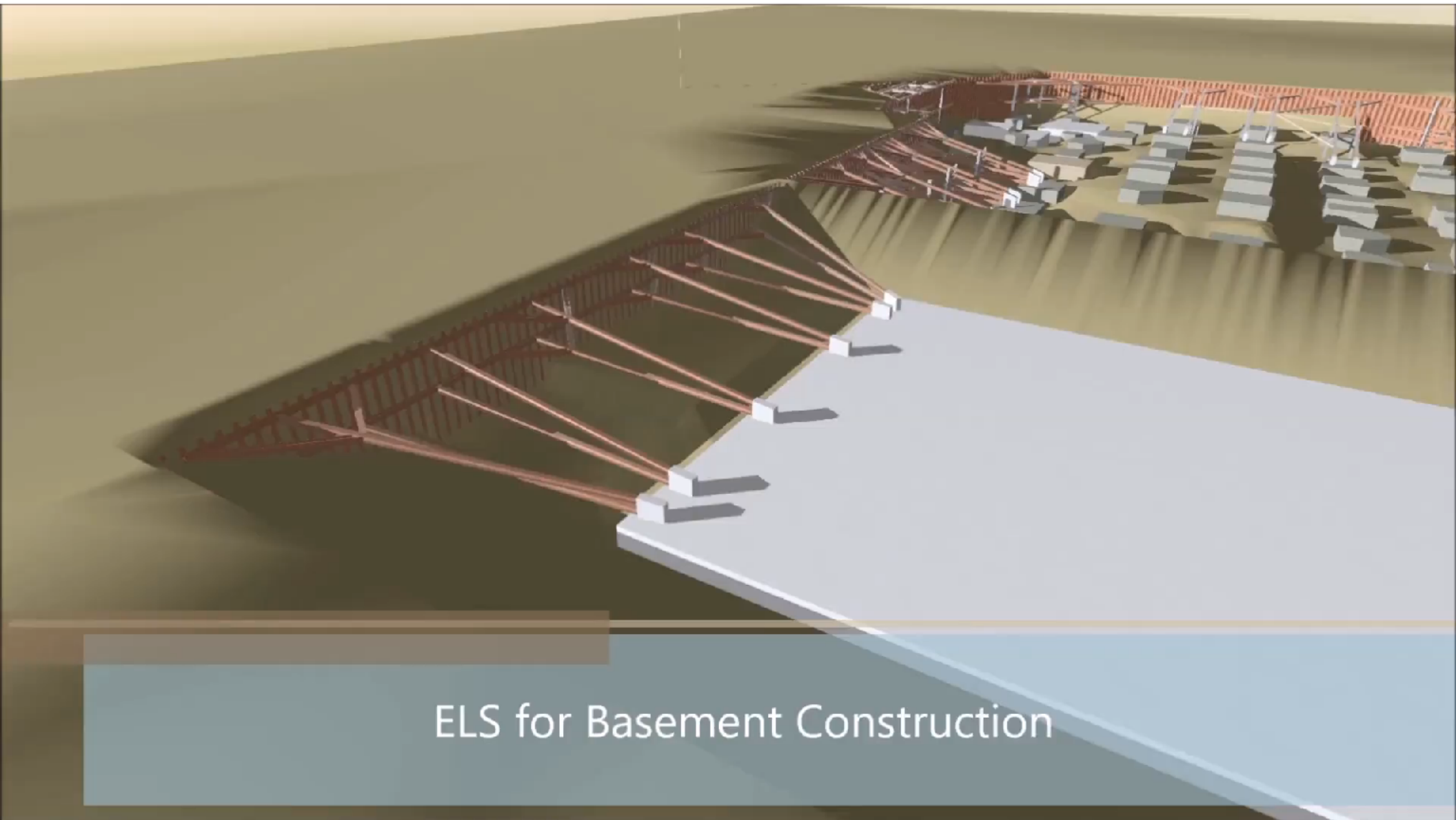


b) ELS and excavation work sequence

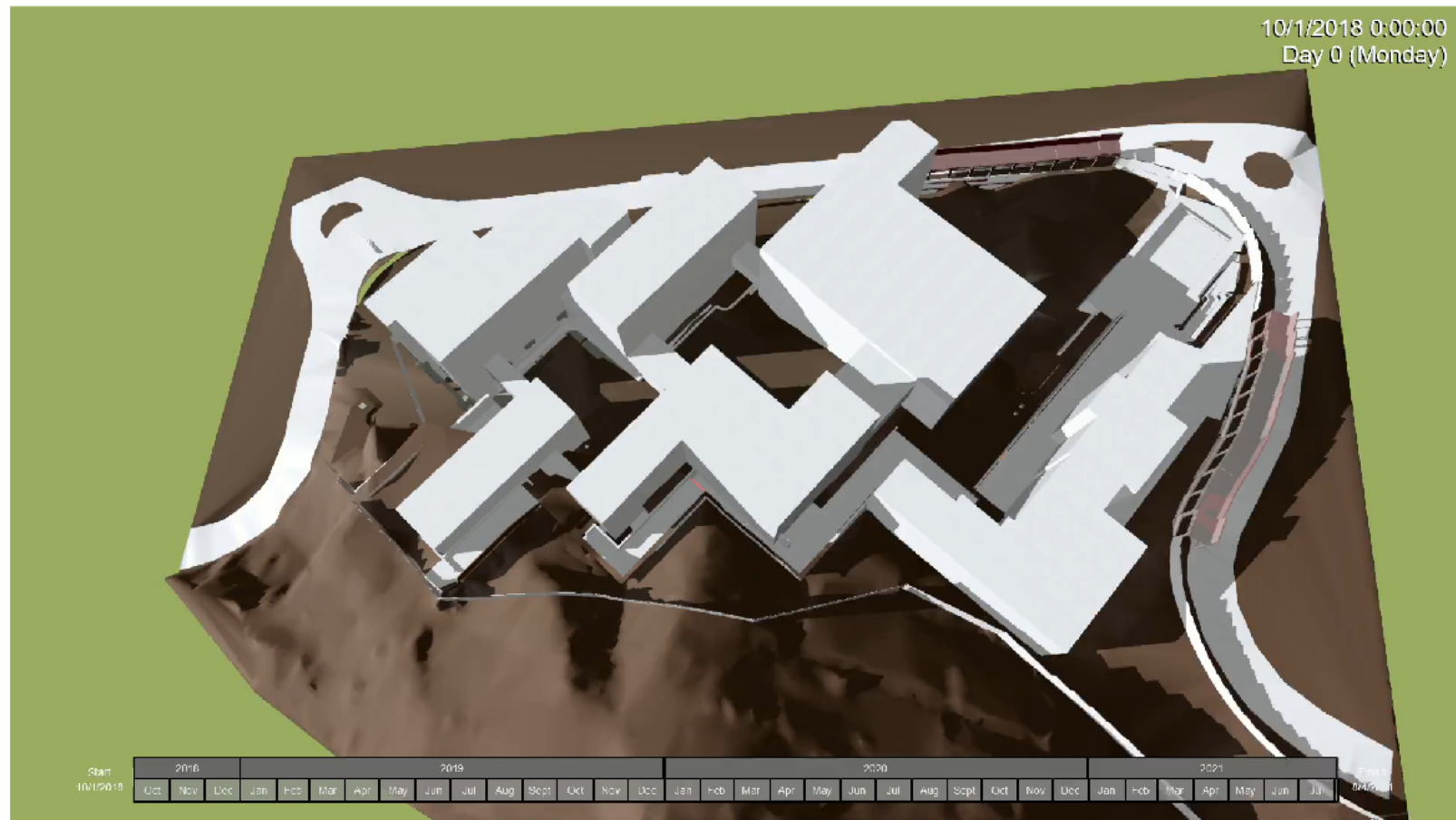


c) Site
work

ELS and excavation work sequence

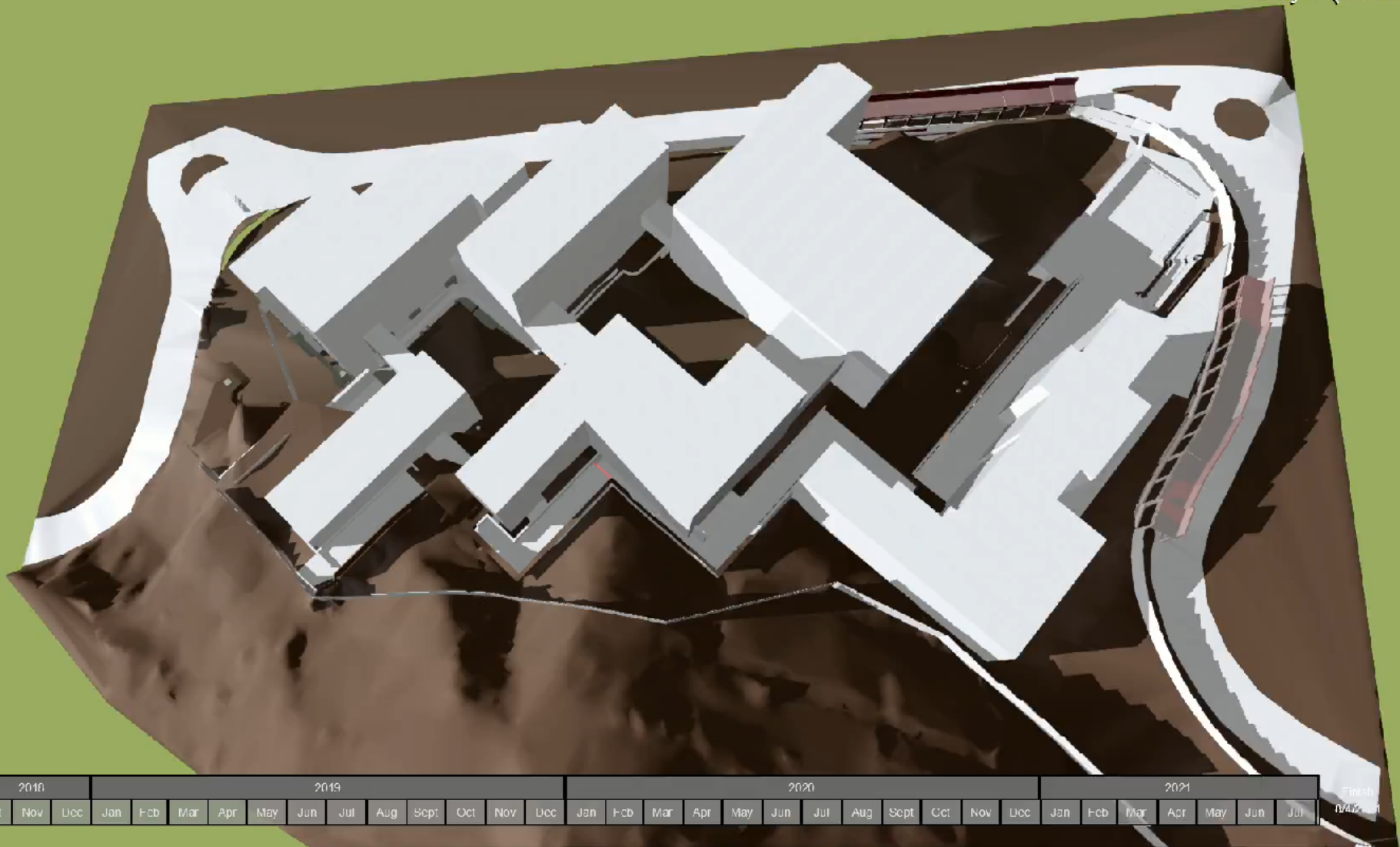


c) Site formation and complicated work process analysis



Work process analysis

10/1/2018 0:00:00
Day 0 (Monday)

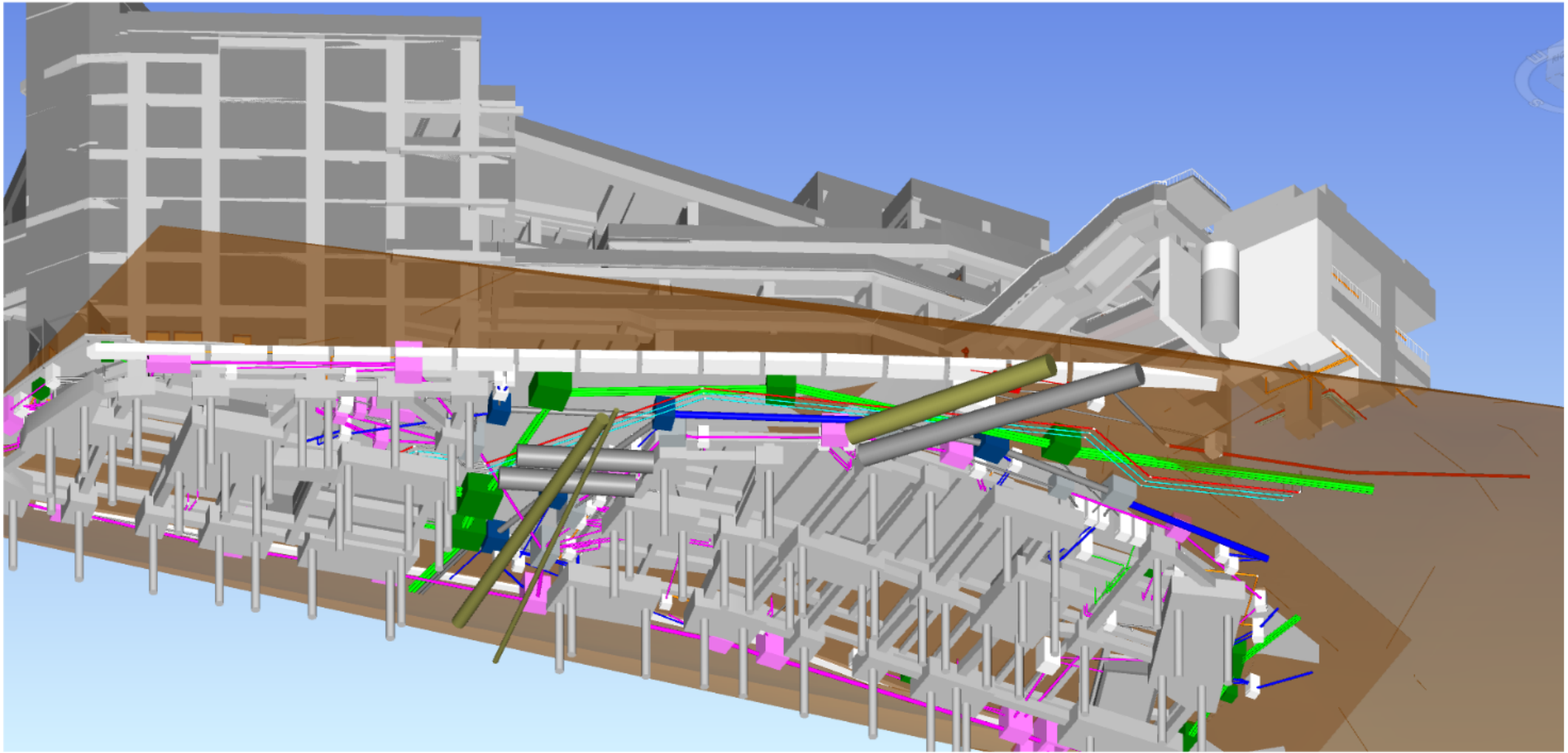


Start
10/1/2018

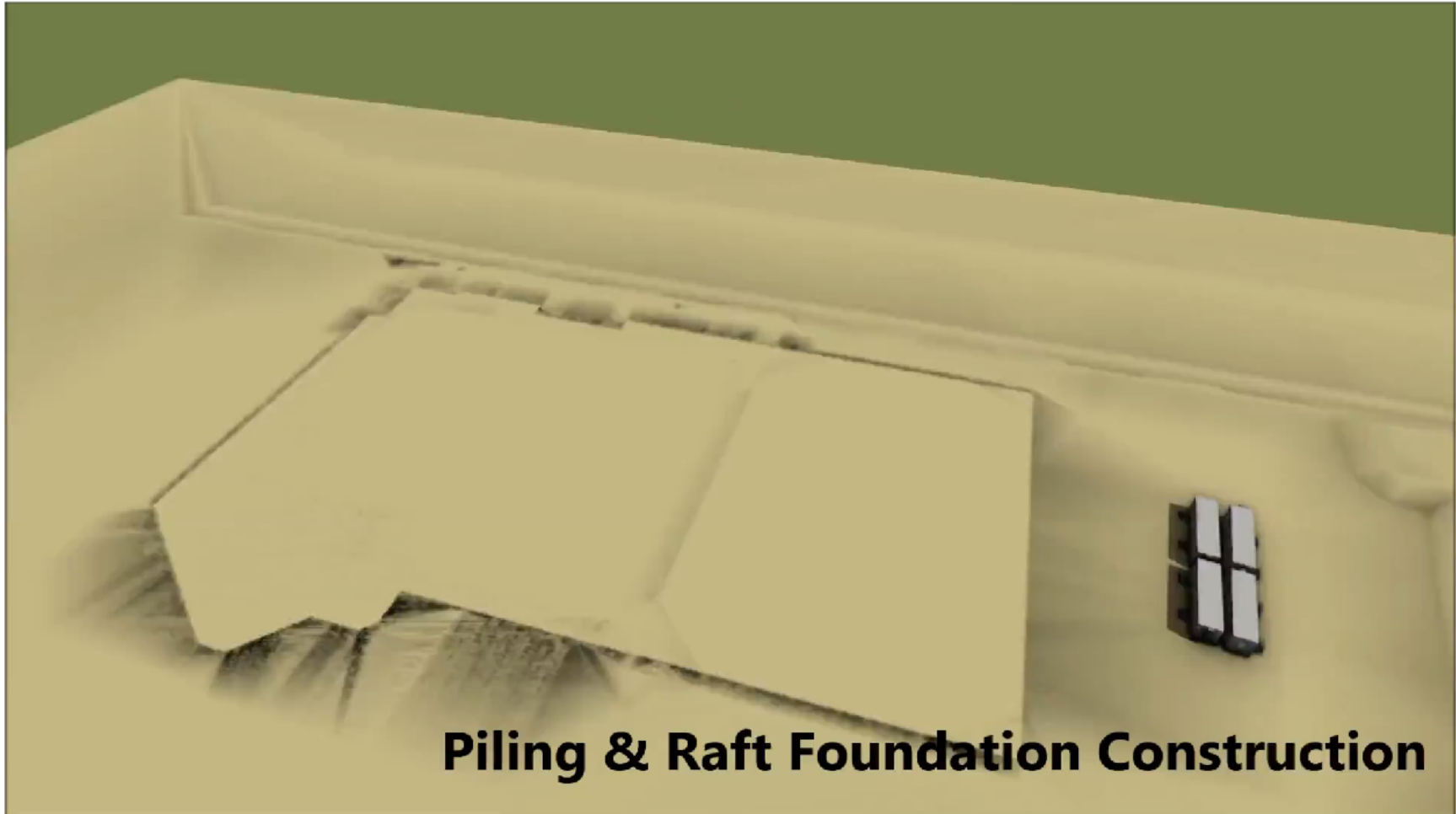
2018			2019												2020												2021						
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul

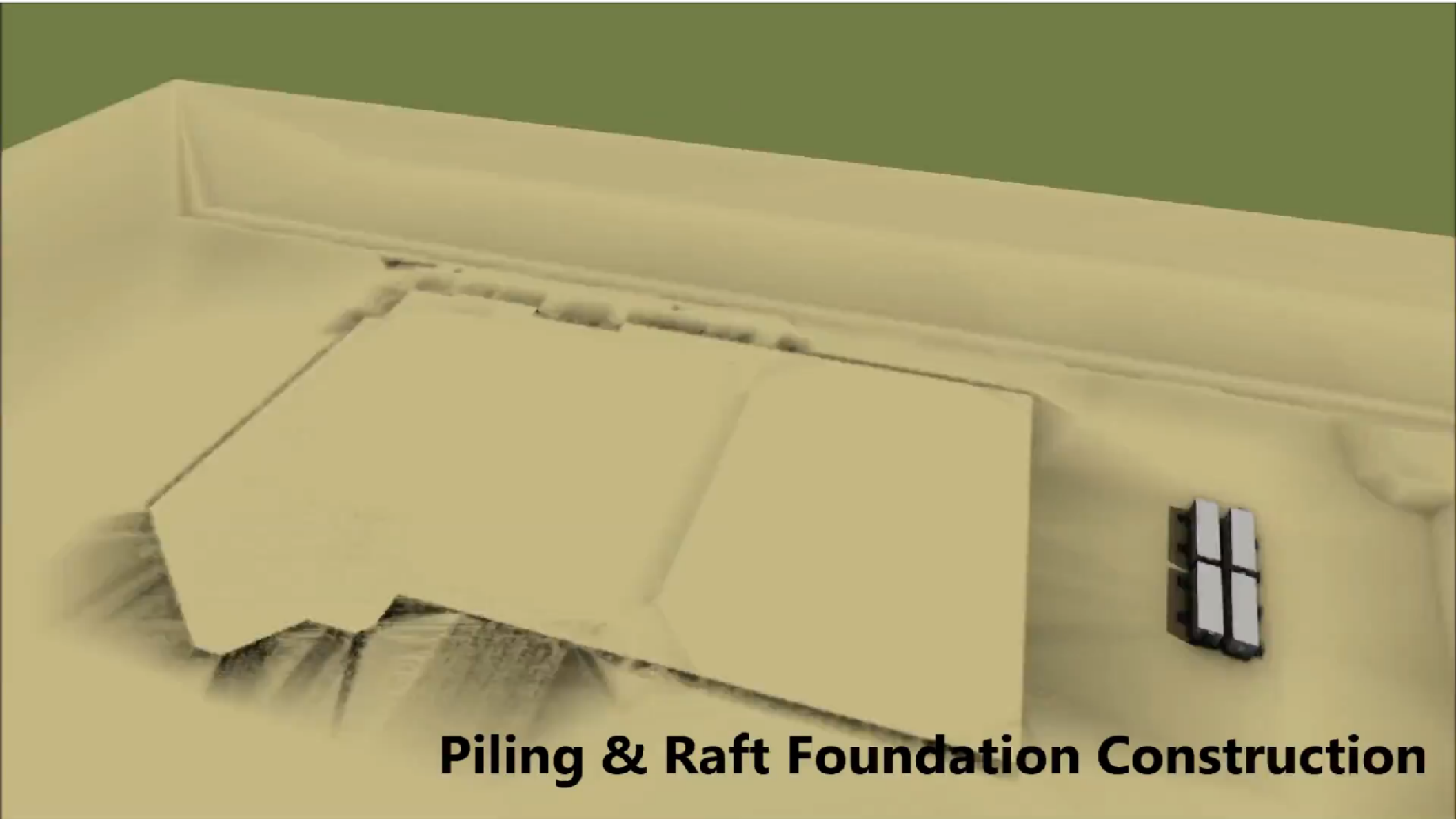
End
04/2/2021

d) Method study with BIM on removal of unexpected underground obstruction



e) Method statement plan for critical or more risky work





Piling & Raft Foundation Construction

- Convert complex description and construction work procedures in approved drawings to visual image or 4D simulation - greatly improve the communication among different parties in the project team
- Information can be shared quickly to reduce effort and time to go through a lot of drawings and document
- Project familiarisation and troubleshooting among project team members at kick off and day to day meeting

BIM

- Review and discuss early work plan for integrated take off among construction, architecture and interior design
- Constructive training for subcontractors, plant drivers and related parties on site
- Allow getting operation officers to familiarise themselves with site situation before work is carried out on site



Visualisation

- Visualisation of the proposed building and the relationship between different parts
- Building models are linked with construction time program to generate a 4D BIM
- Use 4D BIM to review work place, sequence reasoning and correctness

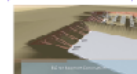


Examples include:

- a) site layout, internal logistic, and temporary set up.



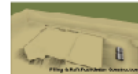
- b) BLS and excavation work sequence



- c) Site formation and complicated work process analysis



- d) Method statement for critical access way work

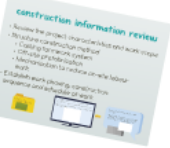


- e) Method study with BIM on removal of unexpected underground obstruction



Virtual construction & safety planning with BIM

- BIM: Building the project master device method statement, work sequencing and resource input plan
- 3D: Location and work construction (CRM), communication
- 4D: Method and planning
- 5D: Method review and collaboration



4. Communication and training

- Convert complex description and construction work procedures in approved drawings to visual image or 4D simulation - greatly improve the communication among different parties in the project team
- Information can be shared quickly to reduce effort and time to go through a lot of drawings and document
- Project familiarisation and troubleshooting among project team members at kick off and day to day meeting

And...

And...

- Review and discuss safety work plan for risky/special tasks among main contractor, subcontractor and relevant parties
- Orientation training to subcontractors, plant drivers and relevant parties with simulation and visual aids
- Allow actual operation officers to familiarise the on-site situations before work is carried out on-site

Use Virtual Reality lens or other visual aids

- to view animated images or project models
- to communicate correct practices, information and raise the safety awareness of supervision staff and workers



Future directions

1. BIM become widely accepted, adopted and used by different groups of stakeholders in the building industry

- Client & design team
- Main contractors
- Specialist subcontractors
- Safety and site operation officers
- Property management

2. Integration of the BIM technology and application into working processes of design, construction and facility management

- Convert complex description and construction work procedures in approved drawings to visual image or 4D simulation - greatly improve the communication among different parties in the project team
- Information can be shared quickly to reduce effort and time to go through a lot of drawings and document
- Project familiarisation and troubleshooting among project team members at kick off and day to day meeting

- BIM...**
- Review and discuss early work plan for integrated take off among construction, architecture and interior design
 - Constructive training for subcontractors, plant drivers and related parties on site
 - Allow getting operation officers to familiarise themselves with site situation before work is carried out on site



Visualisation

- Visualisation of the proposed building and the relationship between different parts
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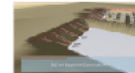


Examples include:

- a) site layout, internal logistic, and temporary set up.



- b) BLS and excavation work sequence



- c) Site formation and complicated work process analysis



- d) Method statement for the critical access way work



- e) Method study with BIM on removal of unexpected underground obstruction



- Virtual construction & safety planning with BIM**
- BIM
 - Building the project master device method statement, work sequencing and minimum input plan
 - BIM
 - Location and critical construction (CRS), communication
 - BIM
 - Method analysis
 - BIM
 - Method review and collaboration

