



# The Integrated Project Delivery – 1 Team, 1 Dream

Iria Carreira & Luke Vance  
BIM Manager, Lendlease Construction

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# Iria Carreira – BIM Manager - Lendlease



- Construction Manager and Technical Architect by the Copenhagen School of Design and Technology – KEA
- Career started in Copenhagen working as Technical Architect. Worked mainly in commercial buildings applying BIM for FM in London for the last 4 years
- BIM user since 2008
- I worked 2 years at the IQL project currently  
 [@okimacarreira](https://twitter.com/okimacarreira)  
a different project



# Luke Vance – BIM Manager – Lendlease Construction

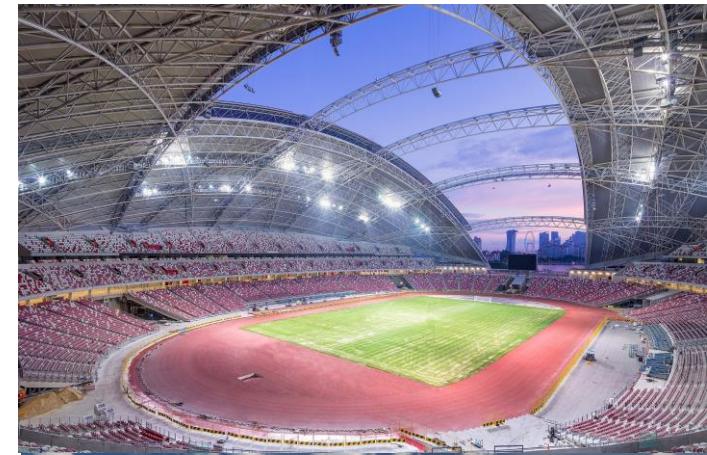
- Born and raised in Australia in a small north-west Victorian town
- Career started in Melbourne working as a Junior Structural Drafter, now 10 years later have worked on major commercial schemes across Australia, Singapore and United Kingdom
- Have been developing and implementing BIM tools for the last 10 years
- Now working for Lendlease Construction, implementation and managing BIM on a regeneration scheme



ARUP

irwinconsult  
shape the present – enrich the future

Cardno  
Shaping the Future





# lendlease

**F**ounded in Australia in the 1950s and listed on the Australian Securities Exchange, Lendlease is a world leader in delivering end-to-end property solutions. Our fully integrated model is built on our core strengths in development, construction, infrastructure, fund management and asset management. Our teams add value by being safer, greener and more customer focused. No other company operating in Europe today has our breadth of capabilities.

Our vision is to create the best places. We specialise in developing large, complex, mixed-use regeneration schemes and have particular strengths in partnering with the public and private sector, naturally targeting projects with long-term duration. Our fully integrated capability means that we take projects from cradle to grave, deriving value throughout the property value chain.

## Americas



## Europe



## Asia

Lendlease is a global company with 12,400 employees across 12 countries around the world, having delivered some of the world's most iconic projects safely and sustainably.

- Global profit after tax of £327.9 million (\$618.6 million)
- £9.2 billion (\$17.3 billion) construction backlog revenue
- £11.3 billion (\$21.3 billion) funds under management

We are a world leader in sustainable urban regeneration with:

- a proven track record and capability in delivering large-scale projects in global gateway cities
- 12 urban regeneration projects currently under development
- £23.8 billion (\$44.9 billion) estimated end value of global development pipeline
- 83,000 residential units backlog
- a reputation for partnering with governments across the world to deliver world-class solutions

All figures are as at 30 June 2015

# THE INTERNATIONAL QUARTER

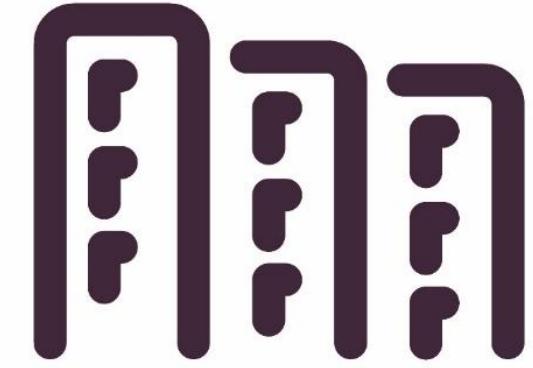
**lendlease**



The International Quarter is a major new business location located at the gateway to Queen Elizabeth Olympic Park in Stratford. Offering four million square feet of flexible and sustainable office space, over 25,000 people will work there once completed in 2025. Construction is well under way on the site's first four buildings. Residential tower Glasshouse Gardens will feature 333 apartments, a range of shops, cafes and childcare and community facilities.

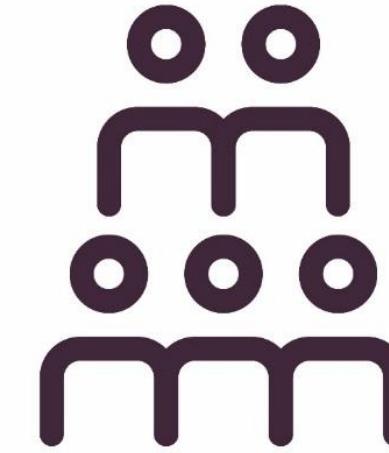
**Partner: LCR  
Value: £2.3bn  
Completion: 2023**

# IQL in numbers



**4,000,000**

sq. ft. of new office space



**25,000**

people will work here



**333**

new residential homes



**22 acre**

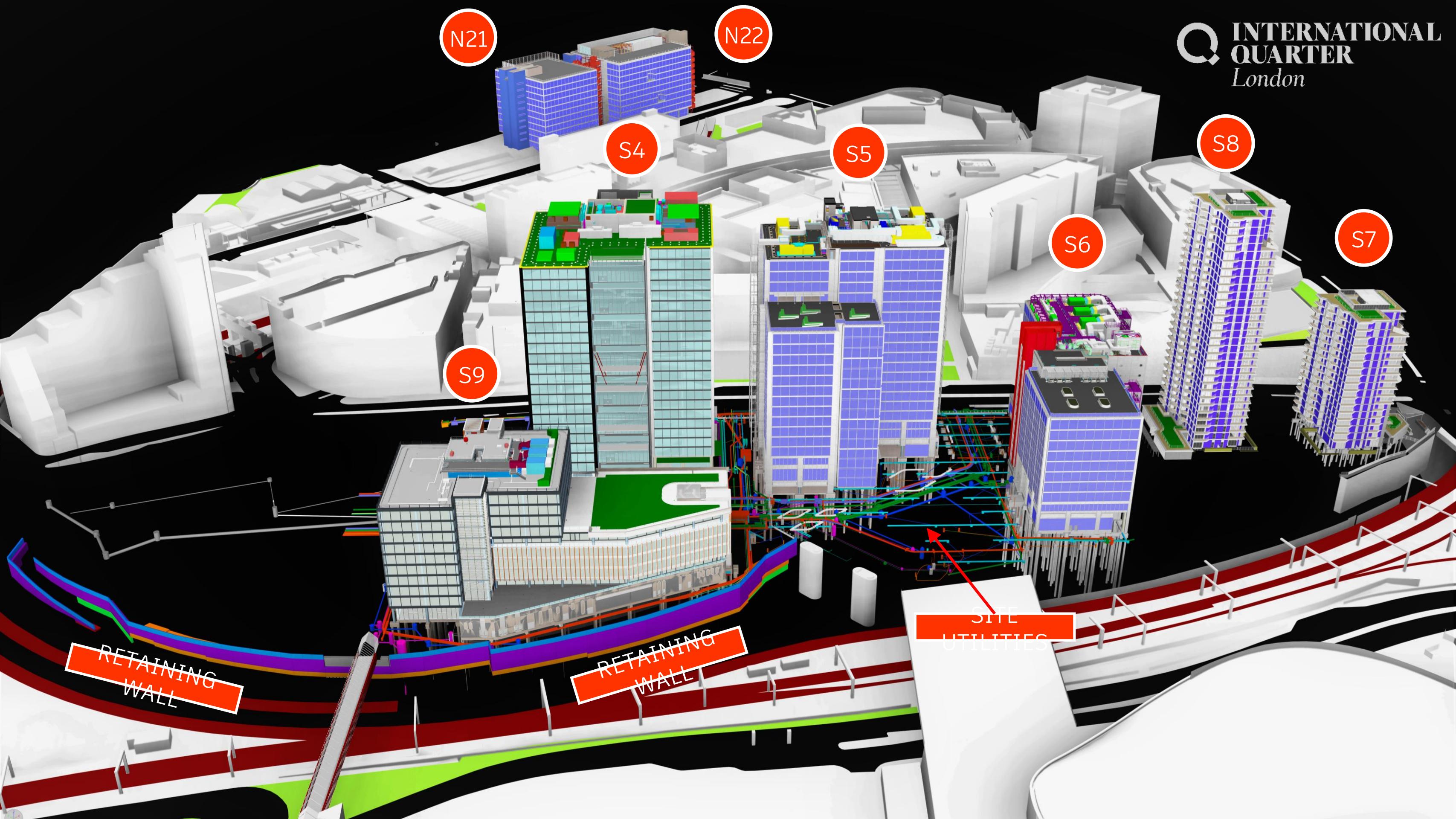
mixed-use development



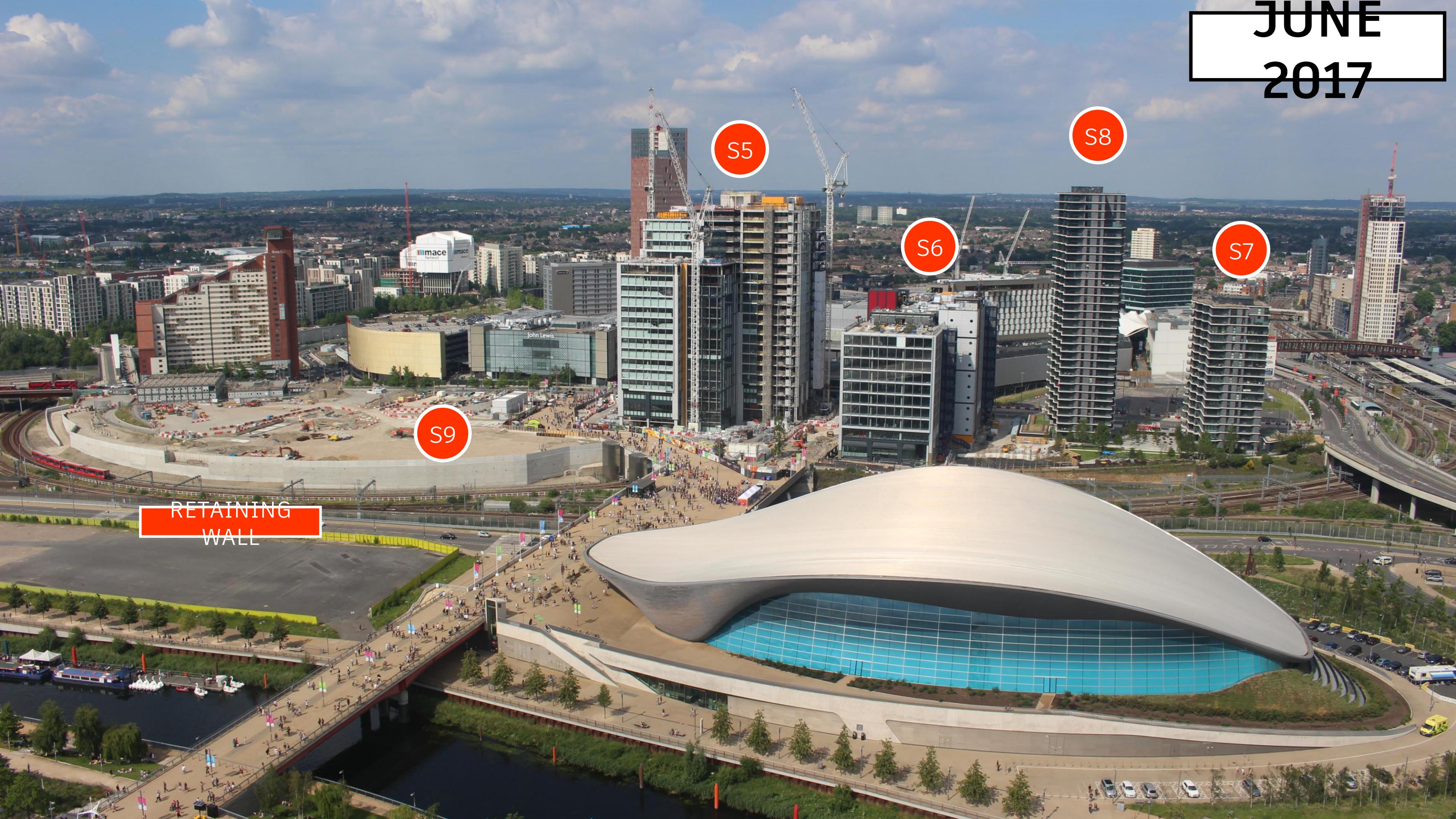
**£2.4bil**

gross development value





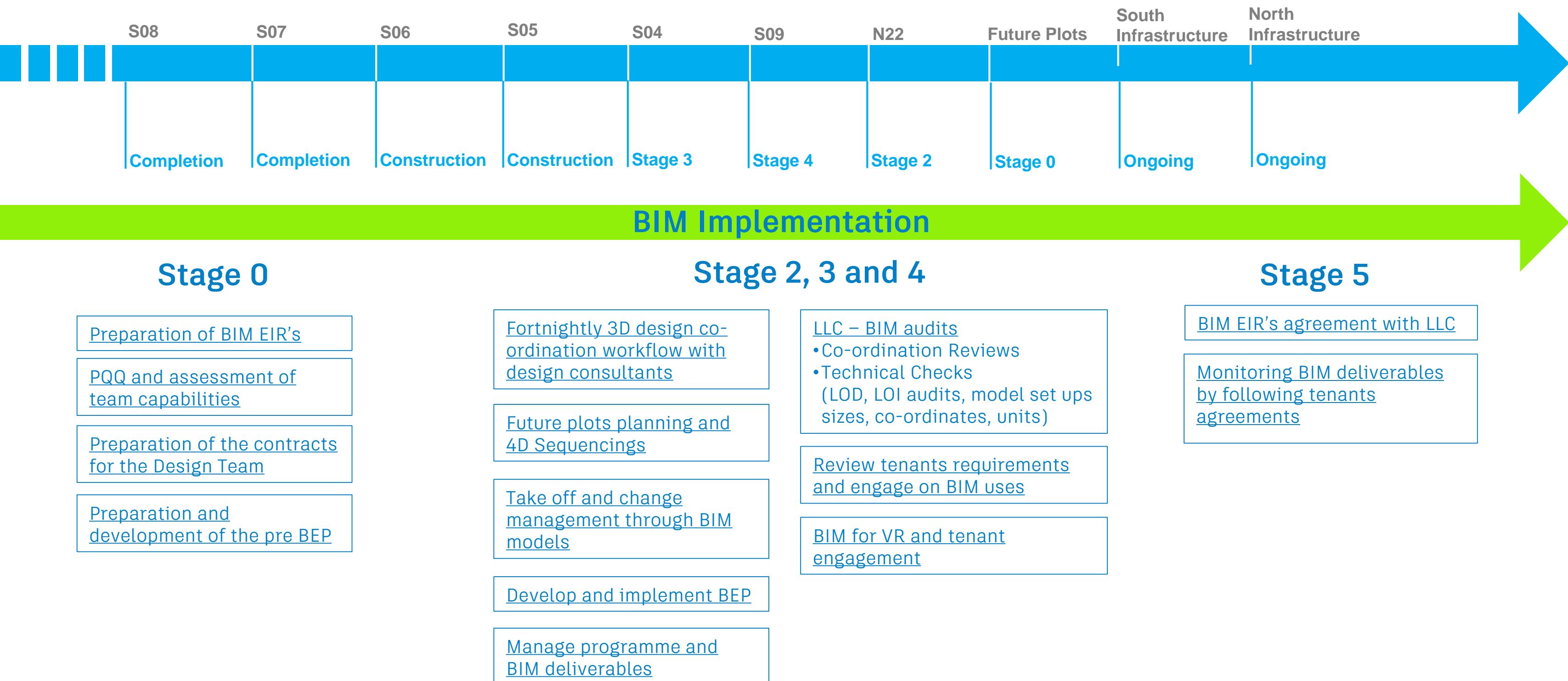
JUNE  
2017



# BIM in Development

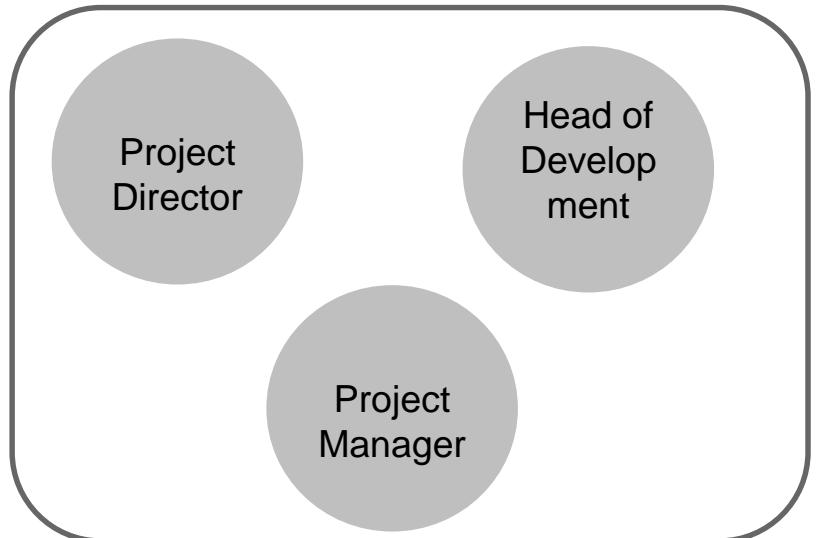
# BIM for Development and PM

## – Implementation BIM

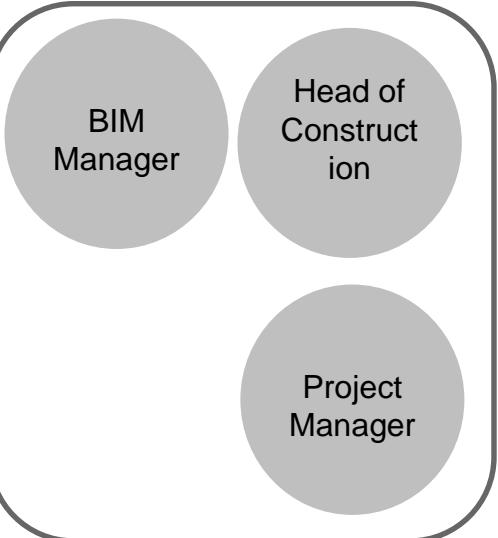


# What we learn from our first fail?

Lendlease  
Development



Lendlease  
Construction



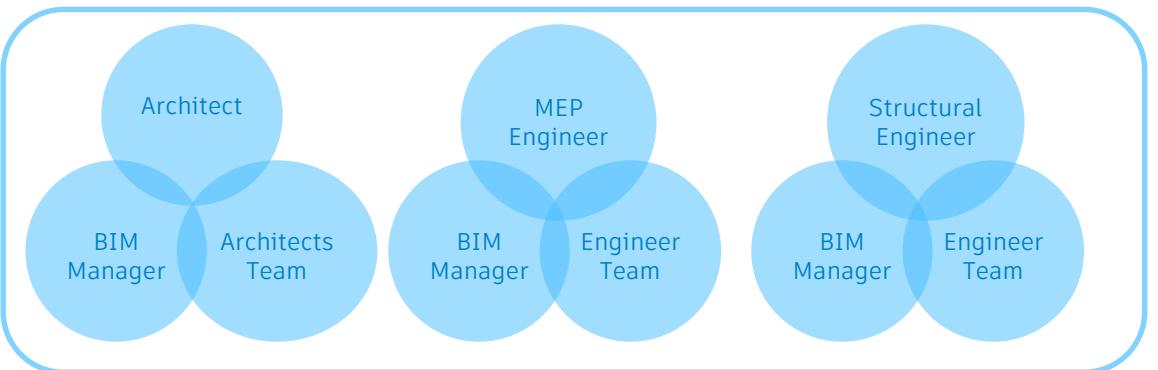
EIR's



PQQ and BIM  
Assessment Forms



Consultants



BIM Implementation  
Plan

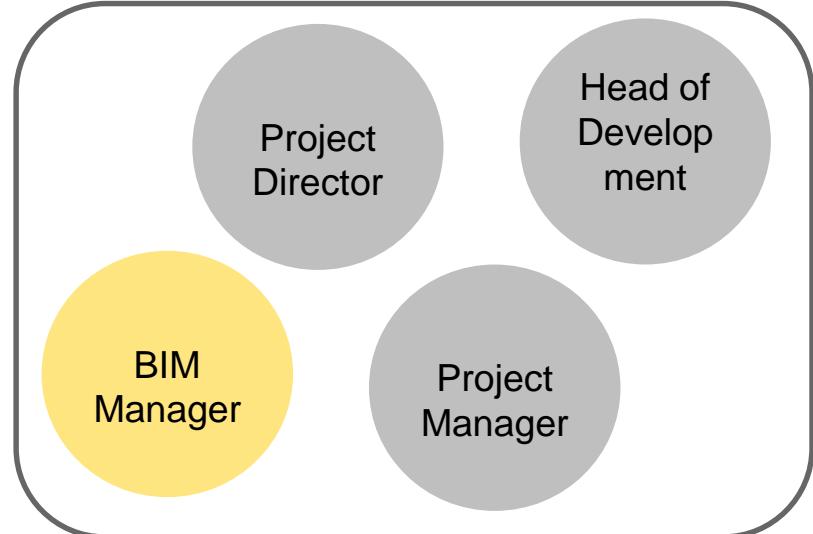


Contract

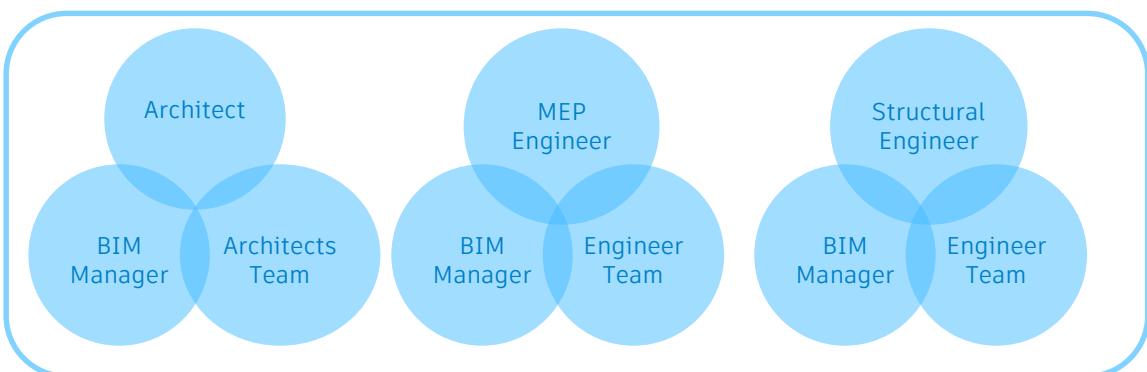


# What we learn from our first fail?

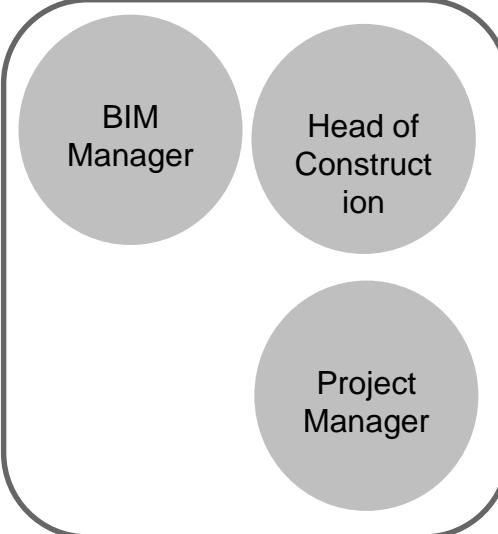
Lendlease  
Development



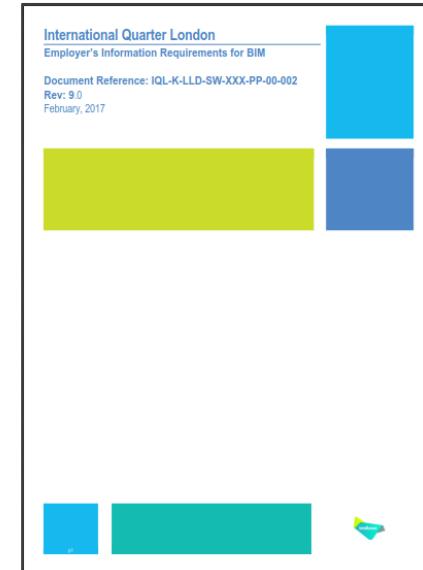
Consultants



Lendlease  
Construction



EIR's



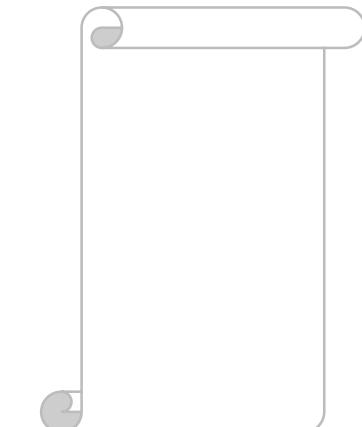
PQQ and BIM  
Assessment Forms



BIM Implementation  
Plan



Contract



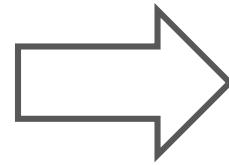
# Client BIM framework

## EIR's

- Overall project strategy
- Goals and Uses
- DPoW
- BIM Deliverables
- CDE
- Software Requirements
- File Formats

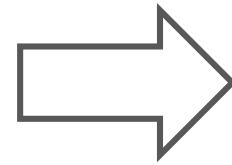
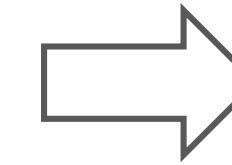
## PQQ and BIM Assessment Forms

- Resources
- Experience
- Awareness

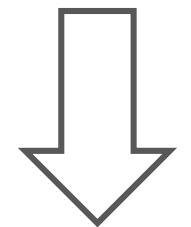


## BIM Implementation Plan

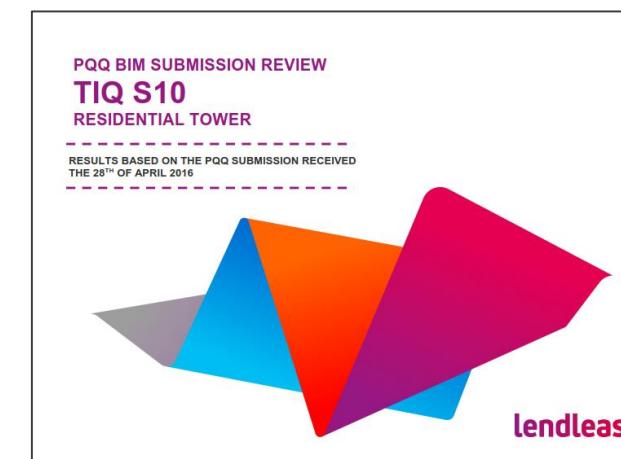
- How are they going to achieve the goals
- BIM Strategy
- BIM roles
- BIM models reviews



## Contract

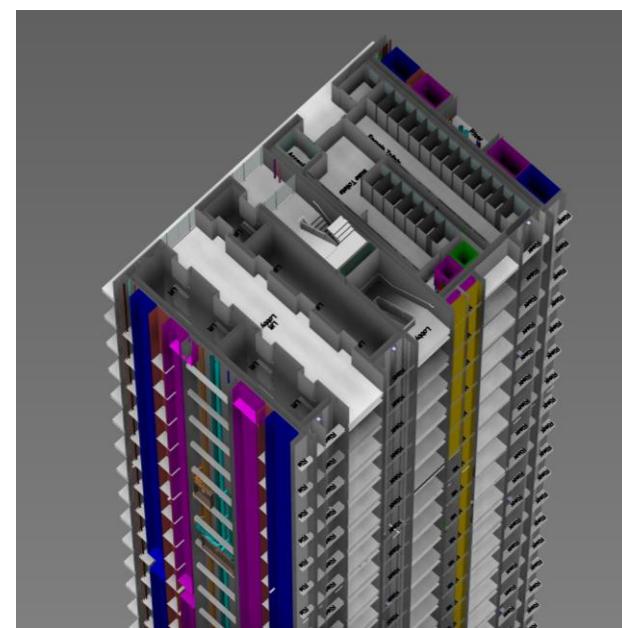
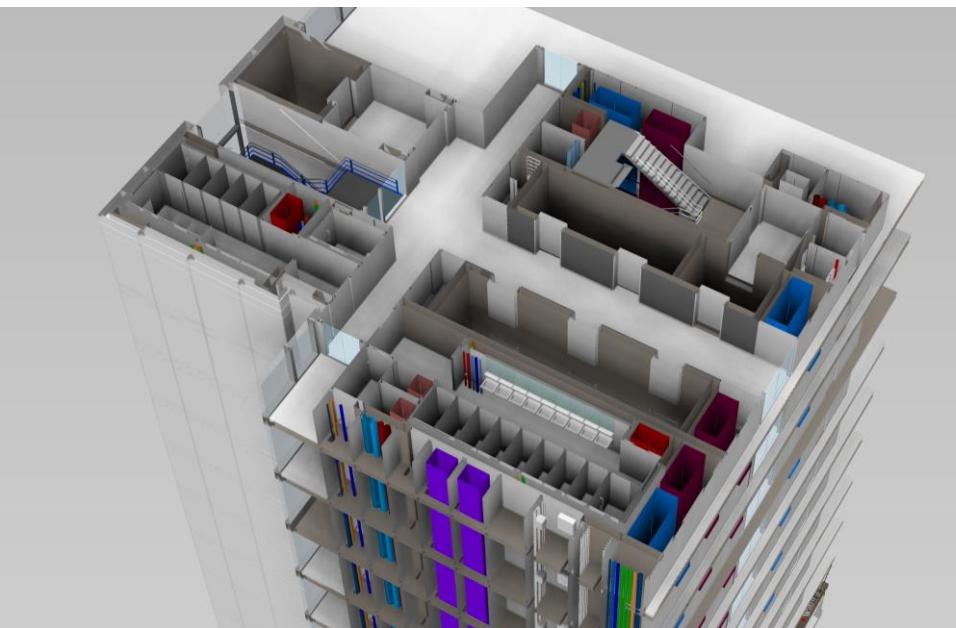
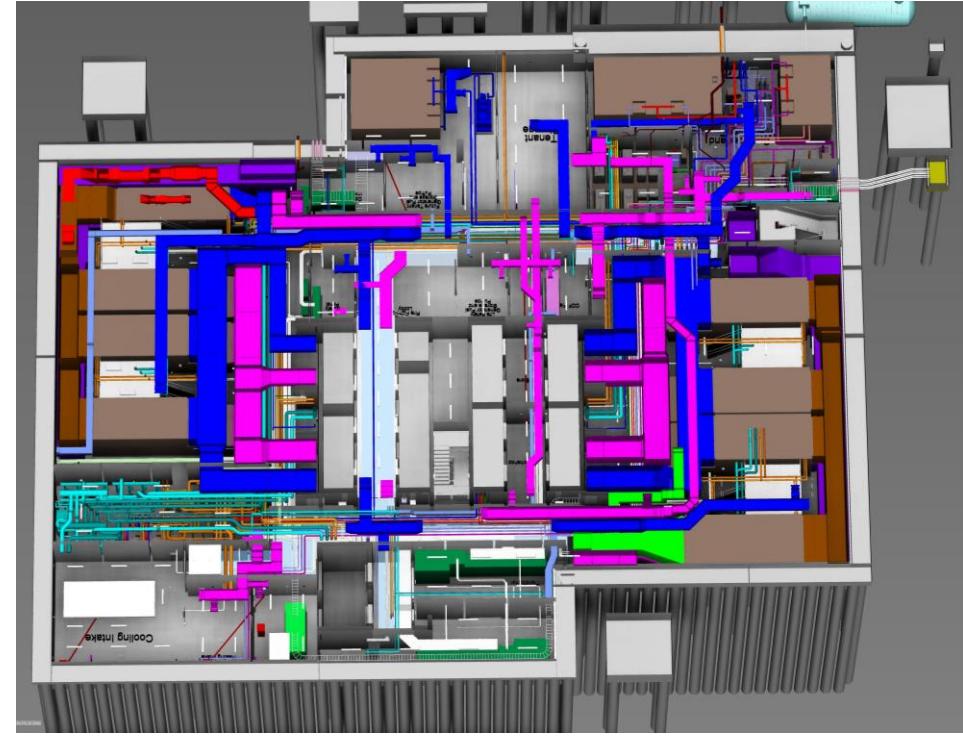
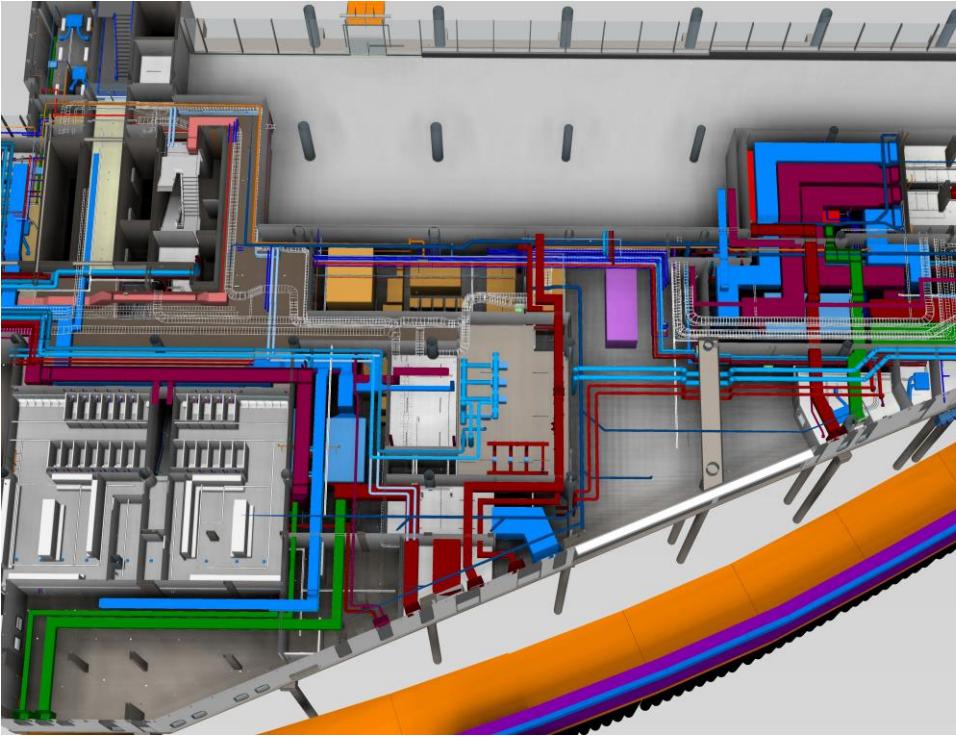


## BEP



# Quality Design – Learning from Data

- Commercial
- Shell & Core – CAT A
- Area space
- Design coordination
  - Cores (Risers)
  - Plant Rooms
  - Roof areas



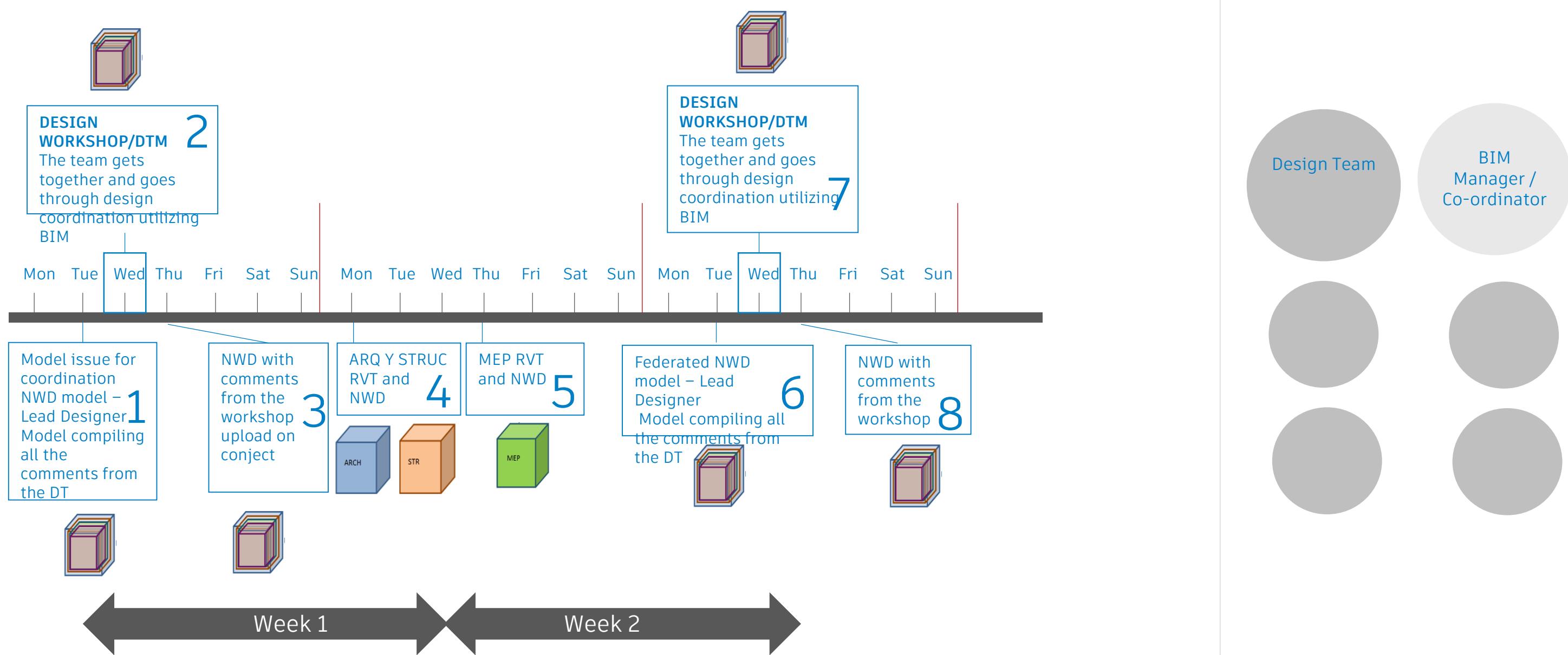
# Strategy of LLD (Client PM)

- Quality design
- Cost certainty
- FM product at the end of the project to offer to our tenants
- Efficient construction
- Health and safety
- Future planning

# Quality Design

- BEP defines the uses and goals of BIM
- BEP defines best practice
- Table specifying elements to model following design programme
- Calendar of DTW
- Calendar of technical meetings

# Quality Design – Co-ordination Workflow

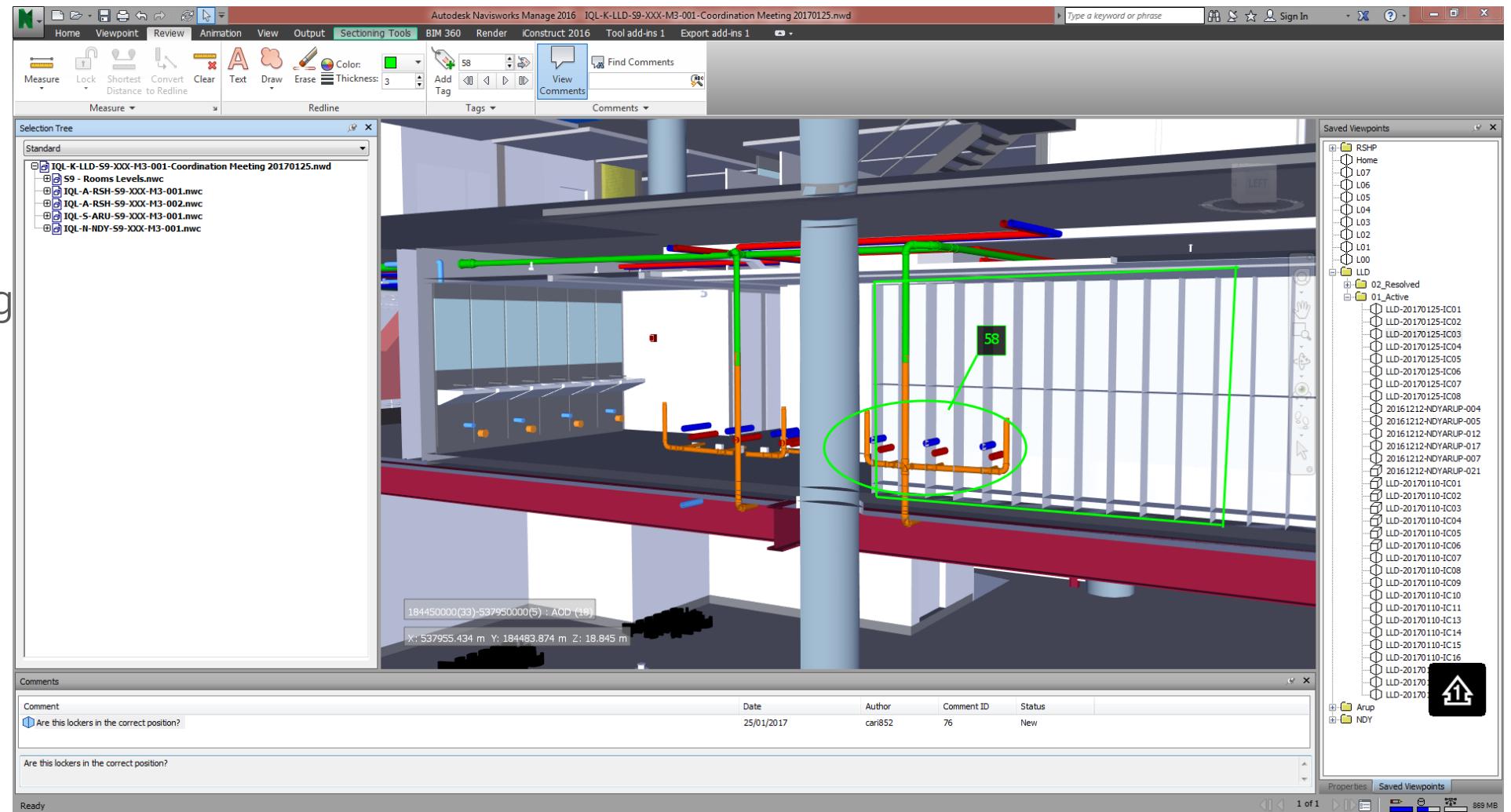


# Quality Design – Co-ordination Workflow

- Calendar of DTW specifying BIM Reviews
- Naming convention for viewpoints
- XML exports of each discipline viewpoints
- Federate models and xml prior the meeting

M	T	W	R	F
<b>January</b>				
		4	5	6
Issue.rvt Issue.nwc	Coordn Wkshp	Issue.xml	DTW BIM Review	RSHP Issue.rwd
16	17	18	19	20
Issue.rvt Issue.nwc	Coordn Wkshp	Issue.xml	DTW BIM Review	Stage 3 WIP GA internal issue RSHP Issue.rwd
30	31			

M	T	W	R	F
<b>February</b>				
	1	2	3	
Issue.xml	DTM Issue.rvt Issue.nwc			
6	7	RSHP Issue.rwd	9	10
Coordn Wkshp BIM Review		Stage 3 DRAFT general issue (RSHP/NDY/Arup)		
13	14	Issue.rvt Issue.nwc	15	16
Coordn Wkshp		DTM	Issue.xml	17
20	21	RSHP Issue.rwd	22	23
Coordn Wkshp BIM Review		DTW		24
27	28			
DT Exchange .rvt files prior to final				



Single Discipline Models Issue through CDE

Federated models on Navisworks and comments from each discipline

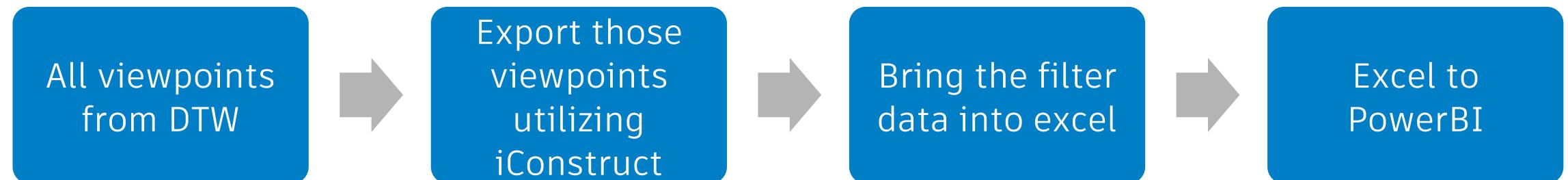
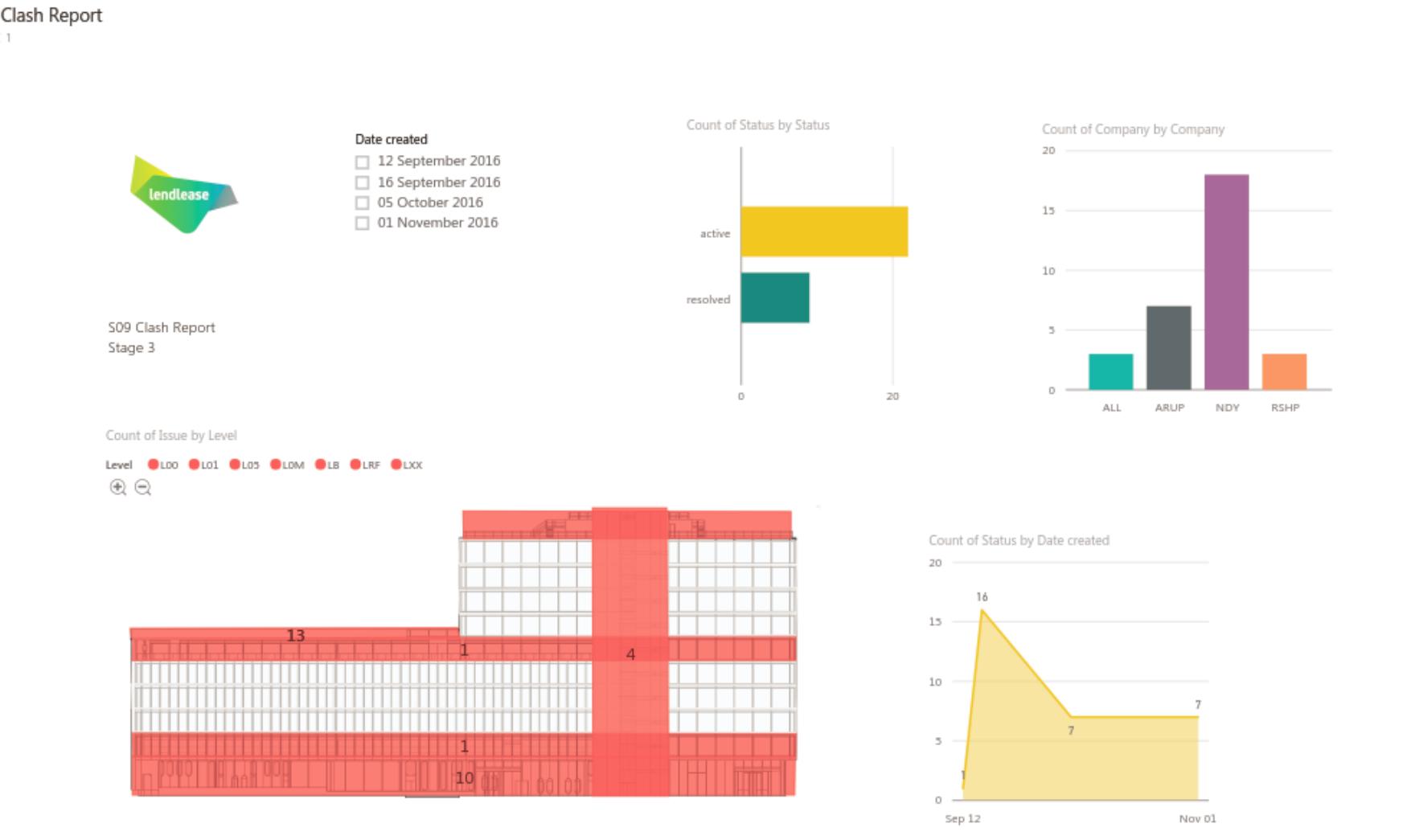
Send comments as XML format to the Lead Designer

Designer compiles all XML with the viewpoints in preparation

Top 5 issues from each discipline are review in the meeting and actioned for the next DTW

# Quality Design – Learning from Data

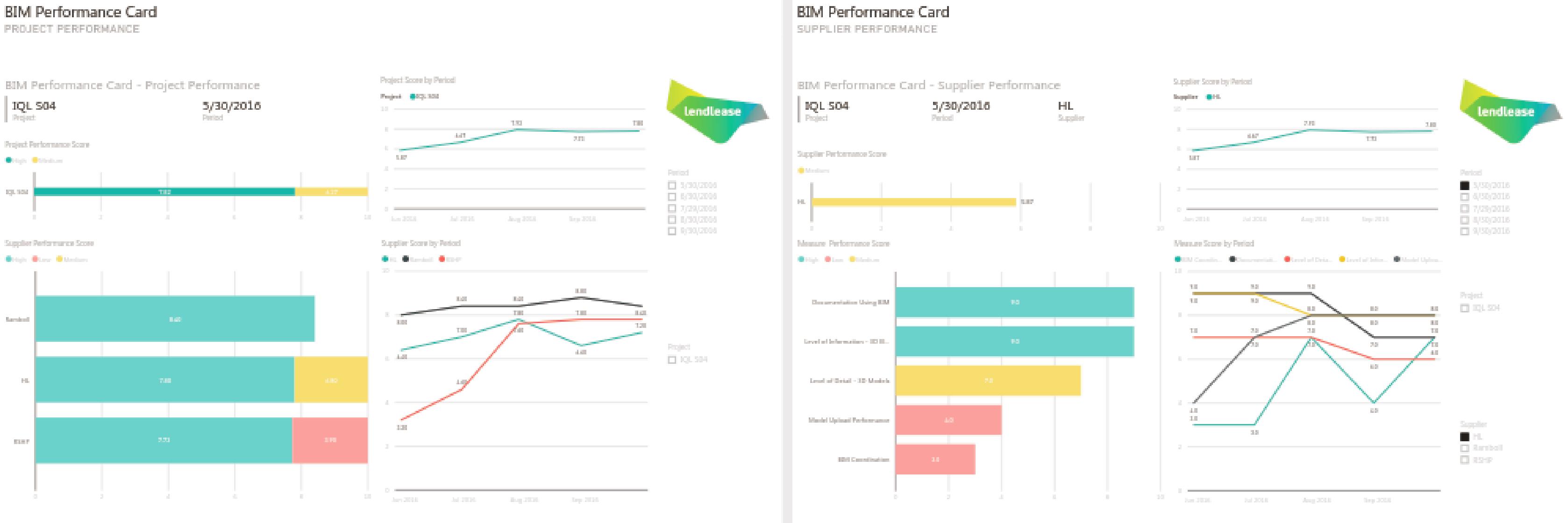
- Data visualization tools as coordination analytics
- Export Navisworks coordination issues
- Map the issues to the specific areas of the building



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 REFRESH LOGIN

# Quality Design – Performance Review



# Quality Design – VR

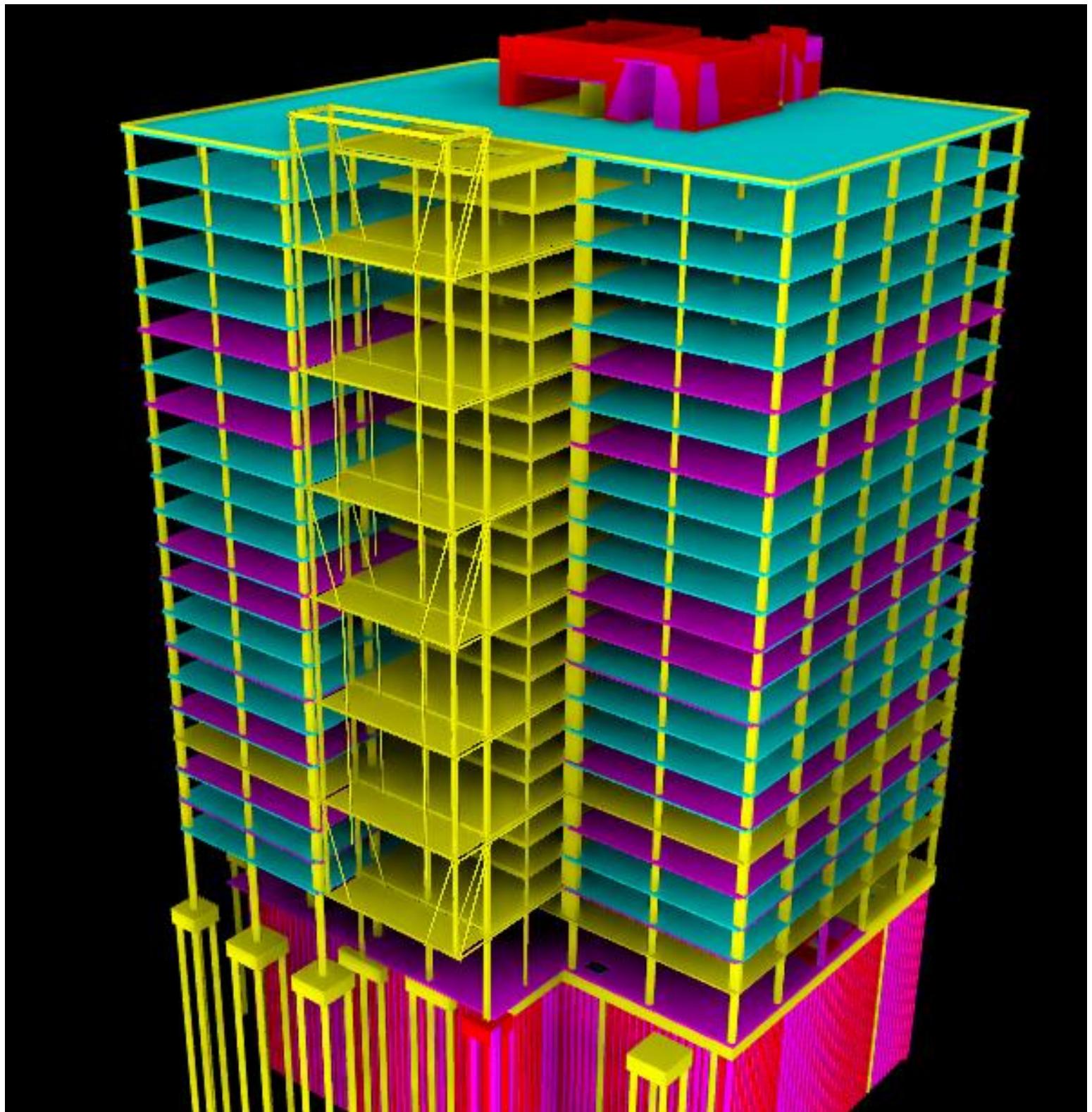
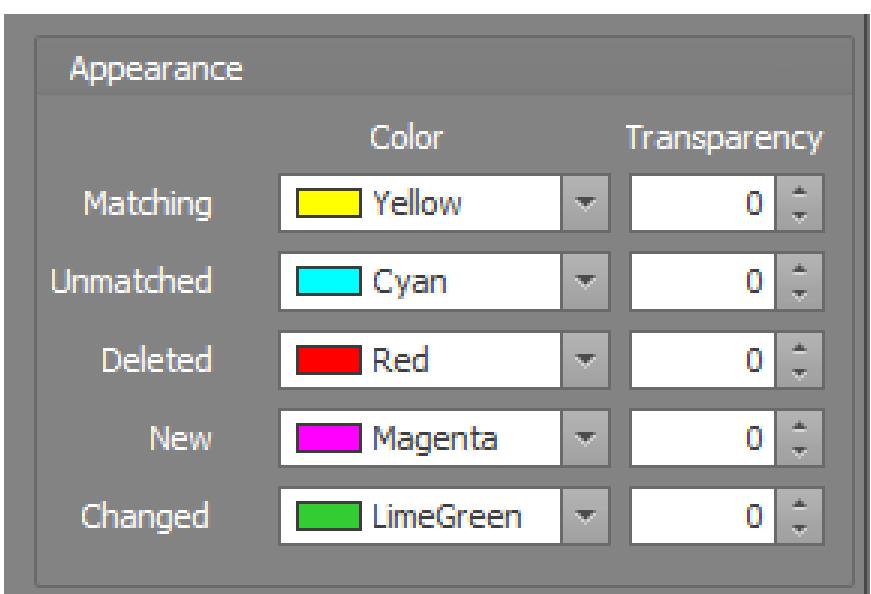
- Visualization and experience the scale in a better way than BIM models
- Future tenant engagement
- Review design



Cityscape VR

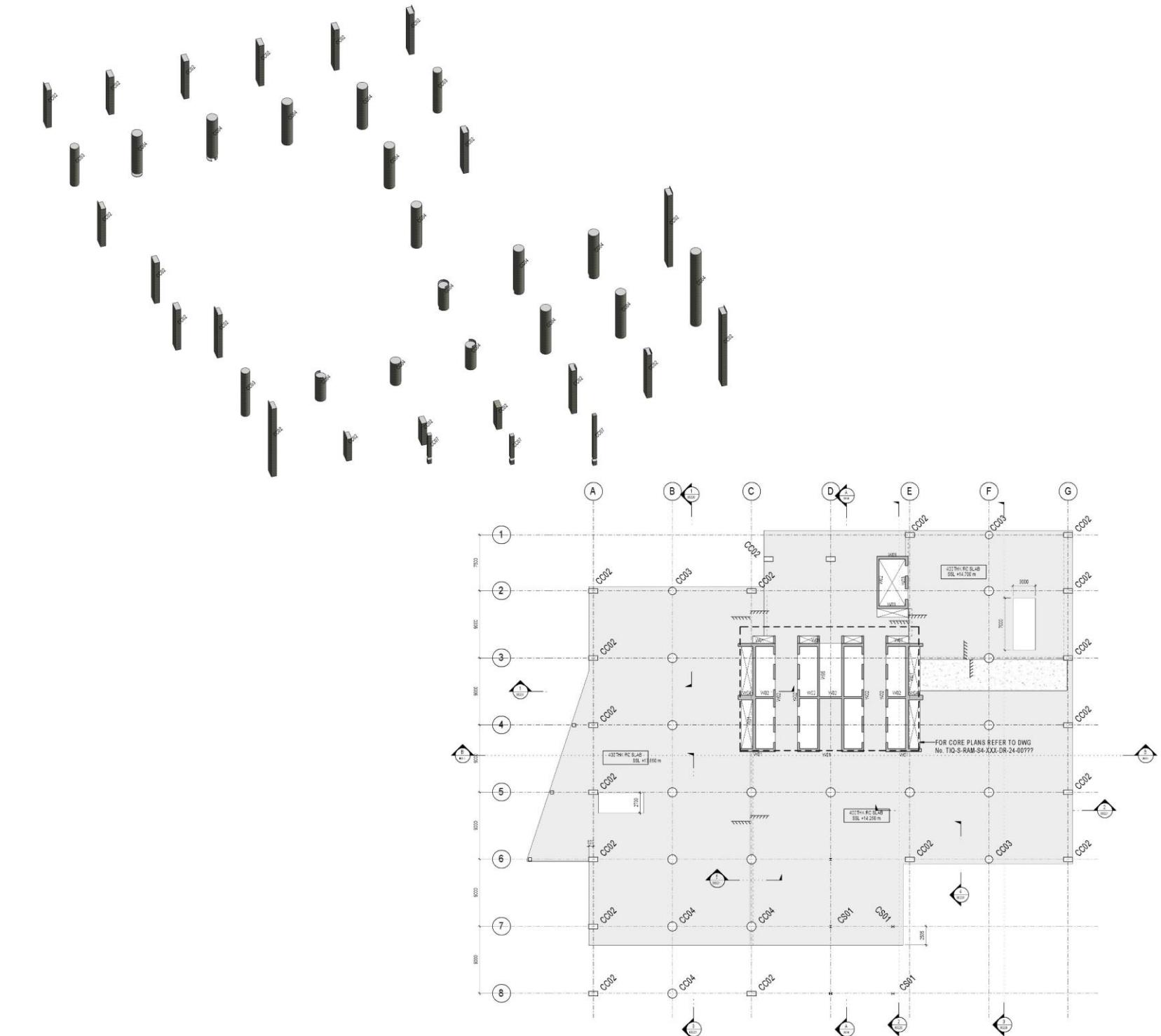
# Cost Certainty – Change Management

- Comparison of models
- iConstruct model compare tool
- Update to cost plan team of fortnightly basis
- Introduction from stage 3

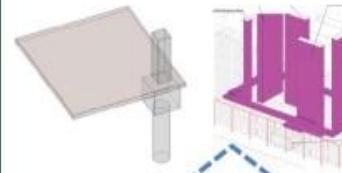
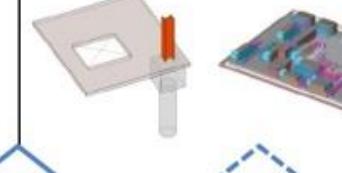
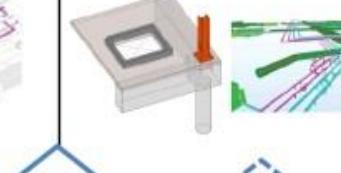
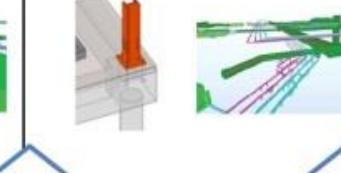


# Cost Certainty - Take Off

Structural Column Schedule	S04	16/05/2016	
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	3700 2.57 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	3700 2.55 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	3700 2.55 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	6150 4.39 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	6150 4.39 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	6150 4.39 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	6150 4.39 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	6600 4.73 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	6600 4.73 m <sup>3</sup>
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CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	6600 4.73 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	7000 5.05 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	7000 5.04 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	7000 5.05 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	10900 7.95 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	11500 8.40 m <sup>3</sup>
CC02	RUK-Concrete Rectangular: 625x1200	LEVEL 00	11500 8.40 m <sup>3</sup>
CC03	RUK-Concrete Round: 10250	LEVEL 00	6150 4.83 m <sup>3</sup>
CC03	RUK-Concrete Round: 10250	LEVEL 00	6600 5.20 m <sup>3</sup>
CC03	RUK-Concrete Round: 10250	LEVEL 00	7000 5.53 m <sup>3</sup>
CC04	RUK-Concrete Round: 12500	LEVEL 00	3700 4.19 m <sup>3</sup>
CC04	RUK-Concrete Round: 12500	LEVEL 00	3700 4.17 m <sup>3</sup>
CC04	RUK-Concrete Round: 12500	LEVEL 00	3700 4.19 m <sup>3</sup>
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CC04	RUK-Concrete Round: 12500	LEVEL 00	6600 7.73 m <sup>3</sup>
CC04	RUK-Concrete Round: 12500	LEVEL 00	6600 7.73 m <sup>3</sup>
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LEVEL 00: 40			220.01 m <sup>3</sup>



# FM product

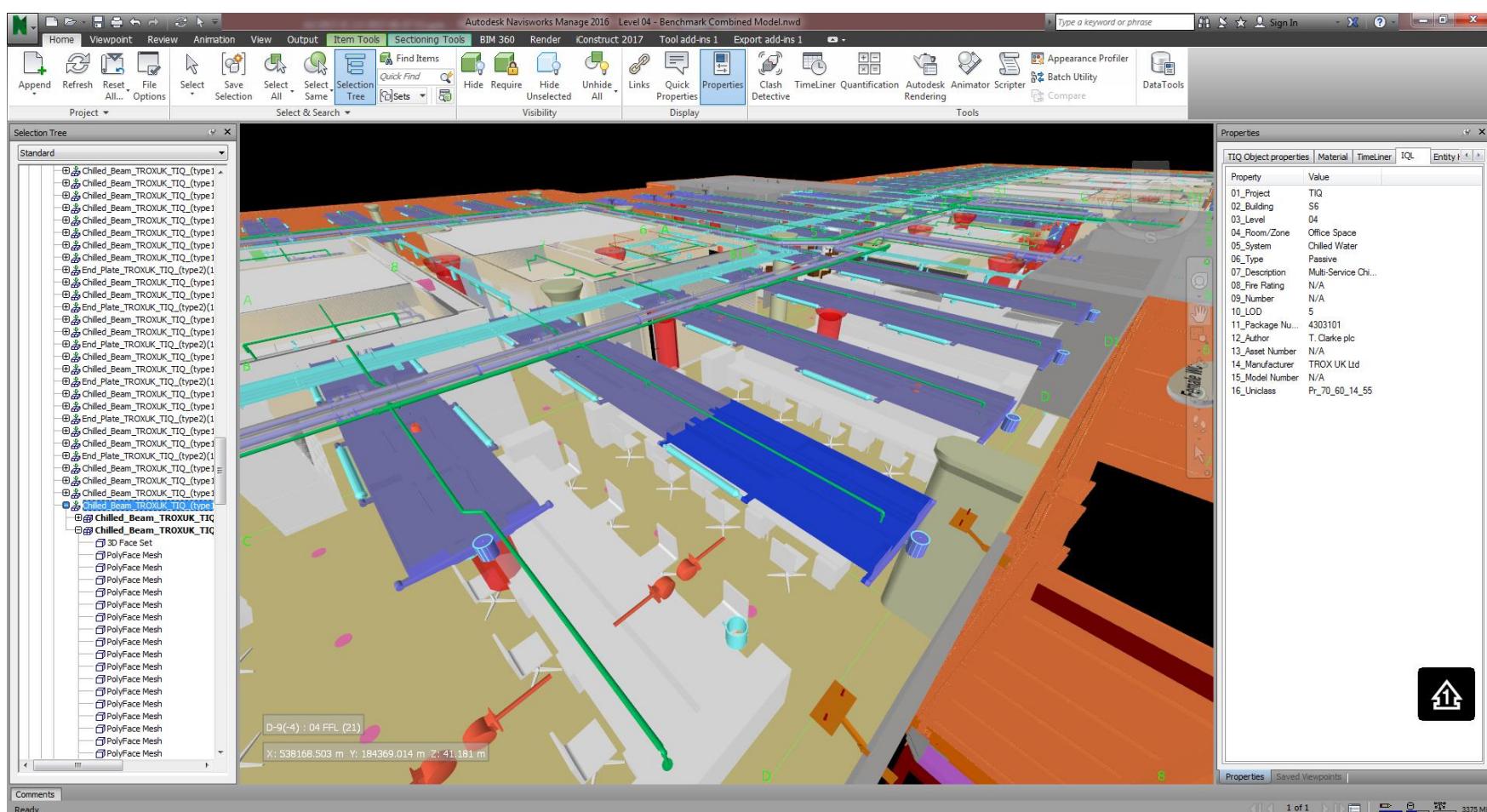
RIBA Stage of Works	RIBA Stage 2 (Concept Design)	RIBA Stage 3 (Developed Design)	RIBA Stage 4 (Technical Design)	RIBA Stage 5 (Construction)	RIBA Stage 6 (Handover)
<b>LOD</b> (Level of Detail) 3D Geometry	<b>LOD 2</b> Minimum 1:200 scale details in 3D geometry  <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">   <b>QA Checks</b> </div> <div style="text-align: center;">   <b>EXCHANGE 1</b> </div> </div>	<b>LOD 3</b> Minimum 1:100 scale details geometry  <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">   <b>QA Checks</b> </div> <div style="text-align: center;">   <b>EXCHANGE 2</b> </div> </div>	<b>LOD 4</b> Minimum 1:50 scale details in 3D geometry  <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">   <b>QA Checks</b> </div> <div style="text-align: center;">   <b>EXCHANGE 3</b> </div> </div>	<b>LOD 5</b> Minimum 1:20 scale details in 3D geometry  <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">   <b>QA Checks</b> </div> <div style="text-align: center;">   <b>EXCHANGE 4</b> </div> </div>	<b>LOD 6</b> Minimum 1:20 scale details in 3D geometry  <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">   <b>EXCHANGE 5</b> </div> </div>
<b>LOI</b> (Level of Information) Data Attributes	<b>LOI 2</b> <u>ATTRIBUTES DIMENSIONAL</u> width, length, area, volume <u>ELEMENT</u> Project Building * Level * Object category Uniclass <u>ROOM</u> Level Zone Name Number Description Area	<b>LOI 3</b> <u>ATTRIBUTES DIMENSIONAL</u> width, length, area, volume <u>ELEMENT</u> Project Building * Level * Material** Object category Uniclass <u>ROOM</u> Space/Room/Zone * System (MEP only) Type Description Element Specification * Fire Rating * Element Number (ie Door Number)* <u>ROOM</u> Level Zone Name Number Description Area	<b>LOI 4</b> <u>ATTRIBUTES DIMENSIONAL</u> width, length, area, volume <u>ELEMENT</u> Project Building * Level * Material** Object category Uniclass <u>ROOM</u> Space/Room/Zone * System (MEP only) Type Description Element Specification * Fire Rating * Element Number (ie Door Number) * <u>ROOM</u> Level Zone Name Number Description Area	<b>LOI 5</b> <u>ATTRIBUTES DIMENSIONAL</u> width, length, area, volume <u>ELEMENT</u> Project Building * Level * Material** Object category Uniclass <u>ROOM</u> Space/Room/Zone * System (MEP only) Type Description Element Specification * Fire Rating * Element Number (ie Door Number) * Lend Lease Work Package Number <u>ROOM</u> Level Zone Name Number Description Area <u>ASSETS (MEP only)</u> Asset Number Manufacturer Model Number	<b>LOI 6</b> <u>ATTRIBUTES DIMENSIONAL</u> width, length, area, volume <u>ELEMENT</u> Project Building * Level * Material** Object category Uniclass <u>ROOM</u> Space/Room/Zone * System (MEP only) Type Description Element Specification * Fire Rating * Element Number (ie Door Number) * Lend Lease Work Package Number <u>ROOM</u> Level Zone Name Number Description Area <u>ASSETS (MEP only)</u> Asset Number Manufacturer Model Number
<b>Model use</b>	Model can be used for site analysis, co-ordination, sequencing and concept estimating. Models which communicate the initial response to the brief, aesthetic intent and outline performance requirements. The model can be used for early design development, analysis and co-ordination. Model content is not fixed and may be subject to further design development. The model can be used for co-ordination, sequencing and estimating purposes.	Model can be used for analysis, design development and reviews, co-ordination, scheduling and estimating. A dimensionally correct and co-ordinated model which communicates the response to the brief, aesthetic intent and some performance information that can be used for analysis, design development and early contractor engagement. The model can be used for co-ordination, sequencing and estimating purposes including the agreement of a first stage target price.	A dimensionally correct and co-ordinated model that can be used to verify compliance with planning and regulatory requirements and which can be used as the start point for the incorporation of specialist contractor design models. The model can be used for co-ordination, sequencing and estimating purposes, including the agreement of a target price/GMP.	An accurate model of the asset before and during construction incorporating co-ordinated specialist subcontract design models and associated model attributes. The model can be used for co-ordination of fabrication models, sequencing of installation and capture of as installed information.	An accurate model of the asset before and during construction incorporating co-ordinated specialist subcontract design models and associated model attributes. The model can be used for co-ordination of fabrication models, sequencing of installation, operation and maintenance, capture of as installed information.

\* Denotes Data Attributes may not be applicable in certain objects.

\*\* Material attribute for wall, floor, ceiling, roof, slabs, primary and secondary structure elements must have accurate name of the material including all layers.

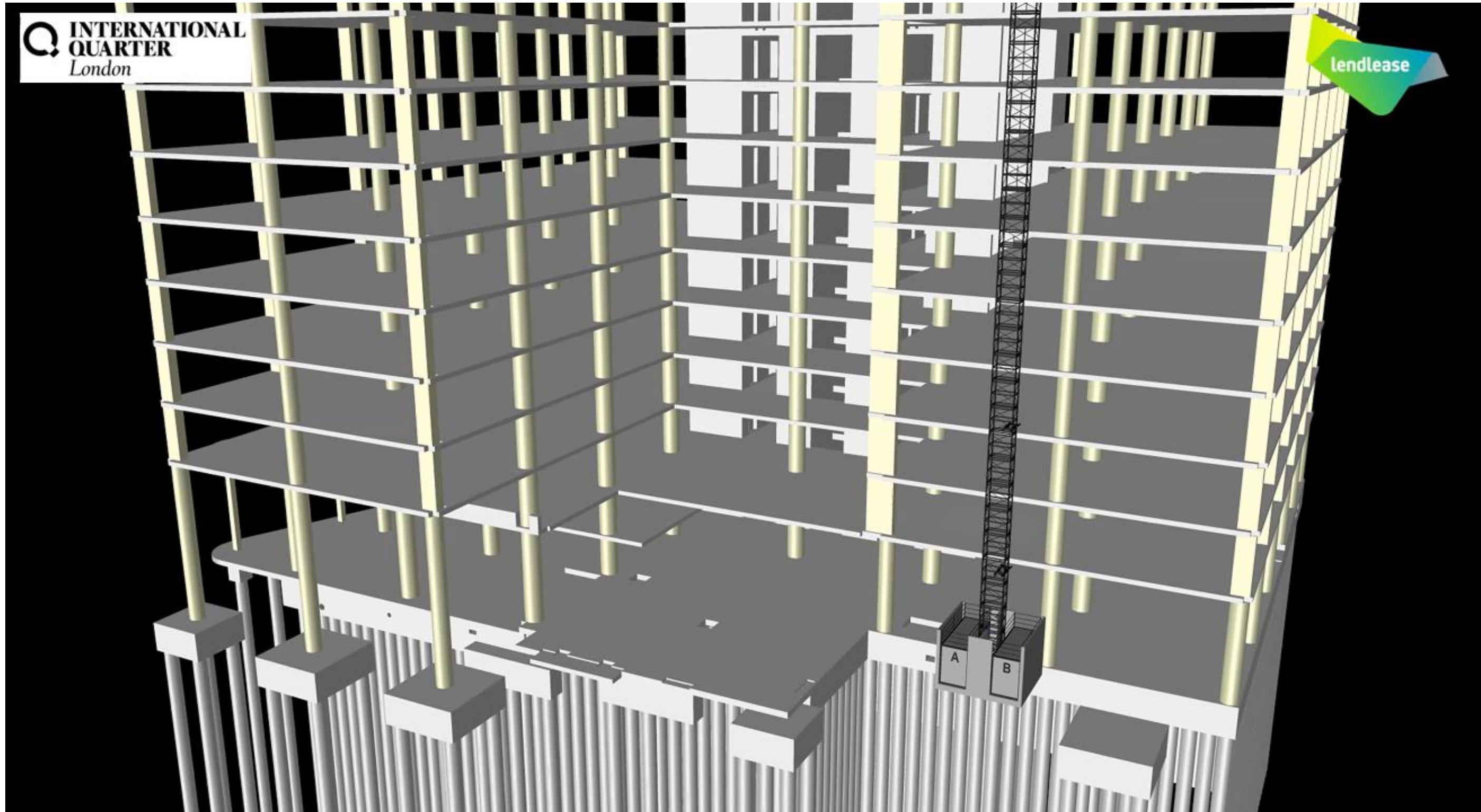
# FM product

IQL_01_Project	IQL_02_Building	IQL_03_Level	IQL_04_Room/Zone	IQL_05_System	IQL_06_Type	IQL_07_Description	IQL_08_Fir	IQL_09_Nu	IQL_10_Lo	IQL_11_Pa	IQL_12_Author	IQL_13_As	IQL_14_Manufacturer	IQL_15_Model Number	IQL_16_Unclass
TIQ	S6	4	OFFICE SPACE	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	IGUZZINI	MB32.12918	
TIQ	S6	4	4BMR01	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	OPTELMA	QUAD 62 RECTANGLE	
TIQ	S6	4	OFFICE SPACE	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	IGUZZINI	MB32.12918	
TIQ	S6	4	4RMR03	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	OPTELMA	QUAD 62	
TIQ	S6	4	OFFICE SPACE	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	IGUZZINI	MB32.12918	
TIQ	S6	4	4RMR04	Ss_70_80_33_35	ELECTRICAL	-	N/A	N/A	5	431101	PHOENIX ME	N/A	OPTELMA	QUAD 62	
TIQ	S6	4	OFFICE SPACE	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	IGUZZINI	MB32.12918	
TIQ	S6	4	4RC01	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	SIMMTRONIC	SPX.	
TIQ	S6	4	4GMR01	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	SIMMTRONIC	SPX.	
TIQ	S6	4	OFFICE SPACE	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	SIMMTRONIC	SPX.	
TIQ	S6	4	4RC02	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	SIMMTRONIC	SPX.	
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TIQ	S6	4	4RMR04	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	SIMMTRONIC	SPX.	
TIQ	S6	4	4BMR01	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	SIMMTRONIC	SPX.	
TIQ	S6	4	4BC02	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	SIMMTRONIC	SPX.	
TIQ	S6	4	4BC01	Ss_70_80_33_35	ELECTRICAL	LIGHTING	N/A	N/A	5	431101	PHOENIX ME	N/A	SIMMTRONIC	SPX.	
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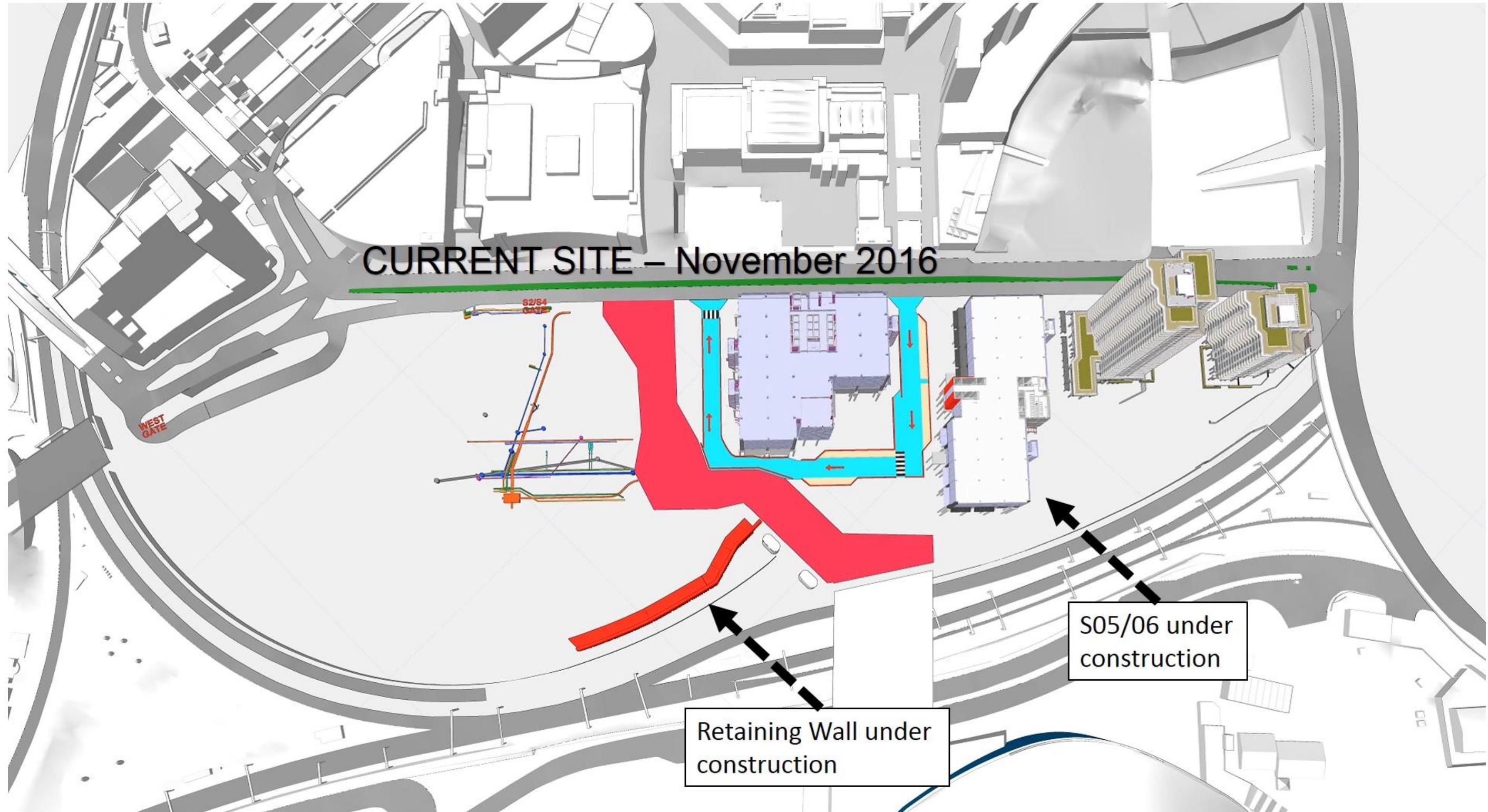


Properties	
TIQ Object properties	
Property	Value
01_Project	TIQ
02_Building	S6
03_Level	04
04_Room/Zone	Office Space
05_System	Chilled Water
06_Type	Passive
07_Description	Multi-Service Chi...
08_Fire Rating	N/A
09_Number	N/A
10_LOD	5
11_Package Nu...	4303101
12_Author	T. Clarke plc
13_Asset Number	N/A
14_Manufacturer	TROX UK Ltd
15_Model Number	N/A
16_Unclass	Pr_70_60_14_55

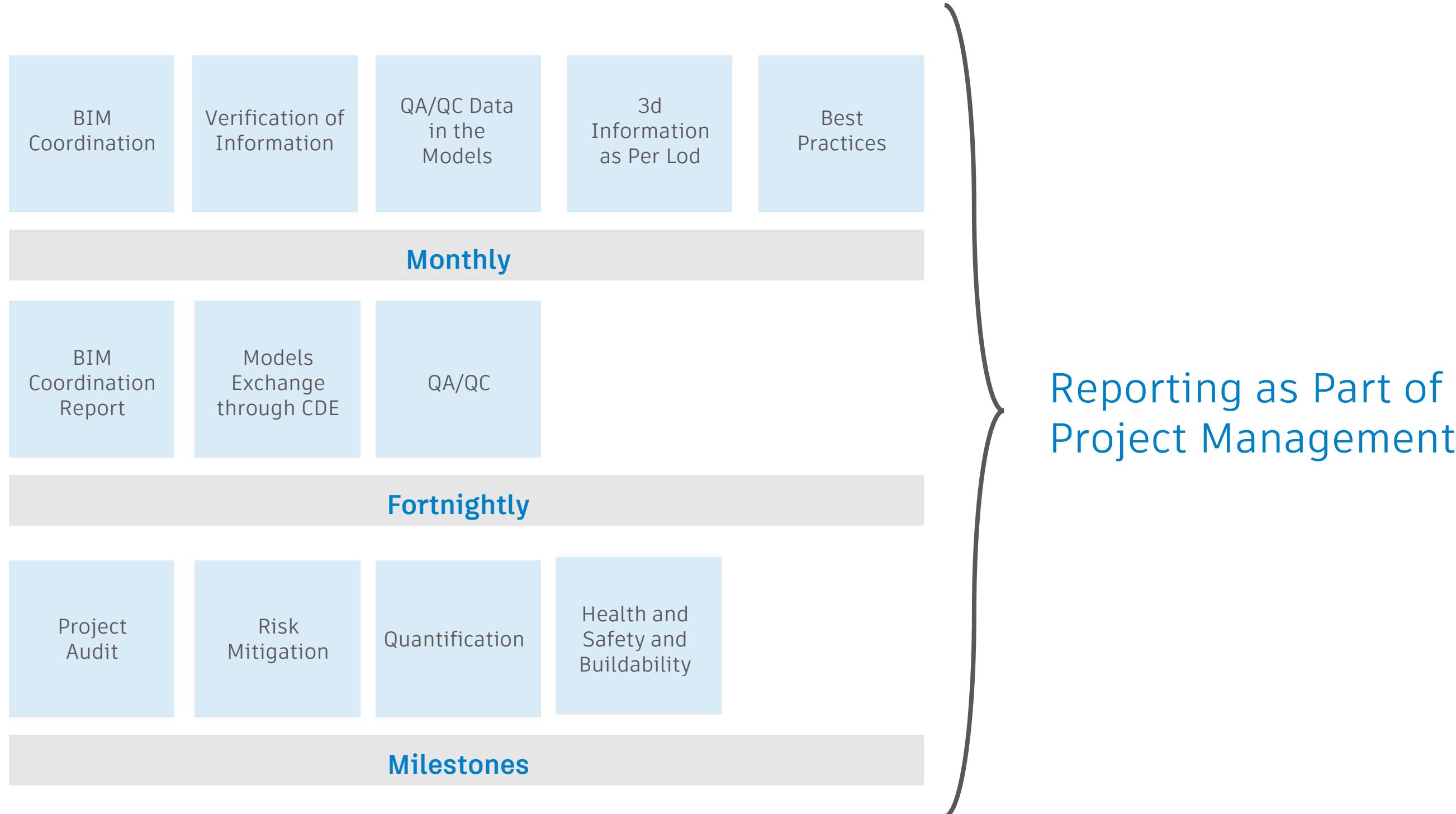
# Health and Safety during Design Phases

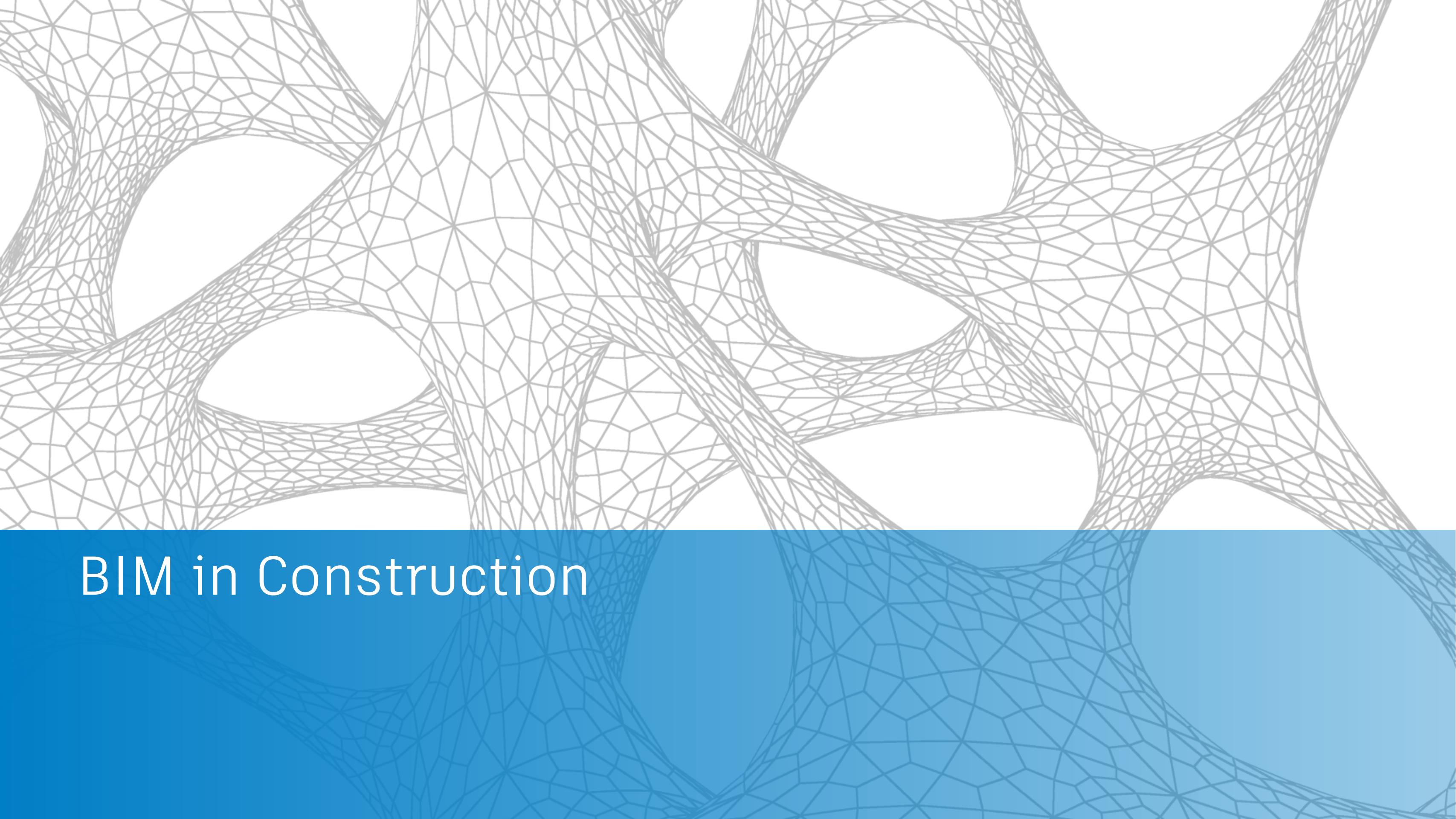


# Future Plots Planning



# BIM in Development Project Management





# BIM in Construction

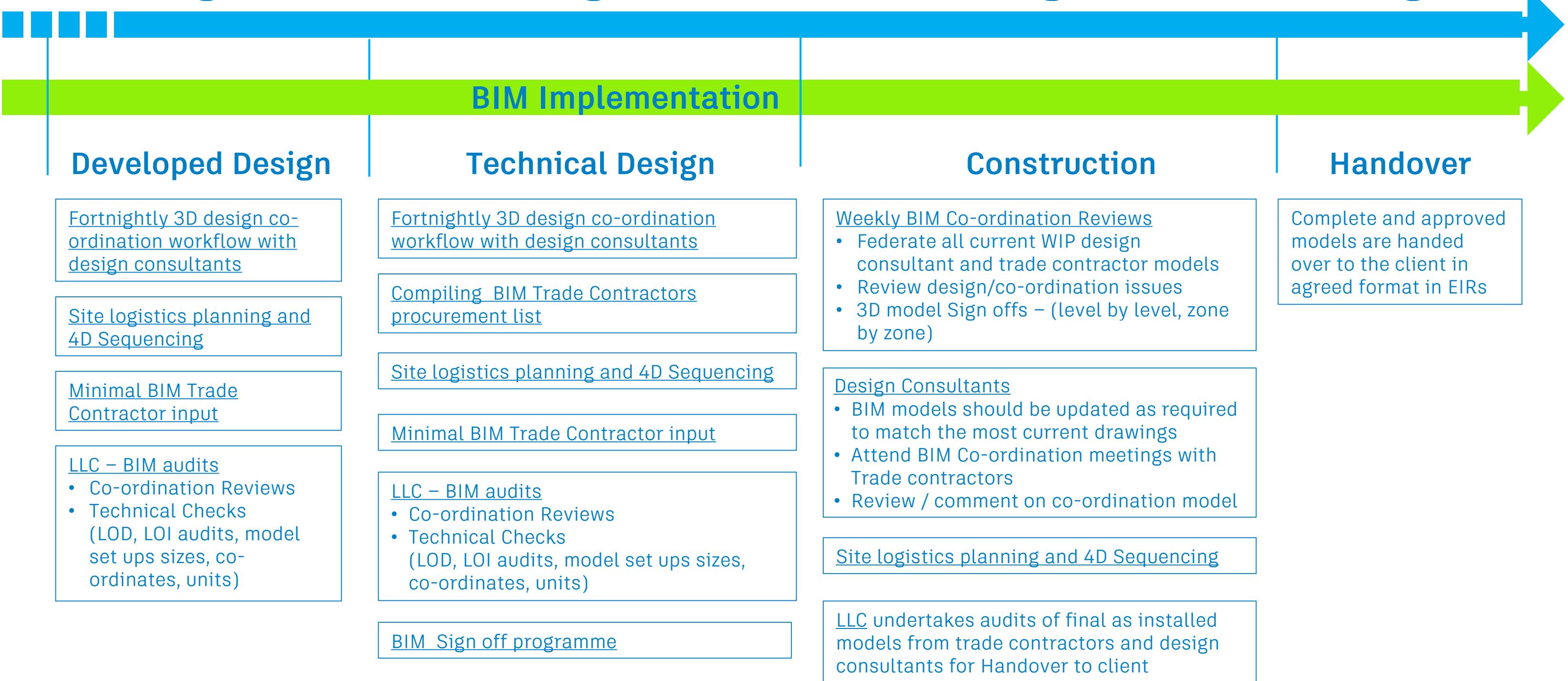
# BIM for Construction – Implementation of BIM

Stage 3

Stage 4

Stage 5

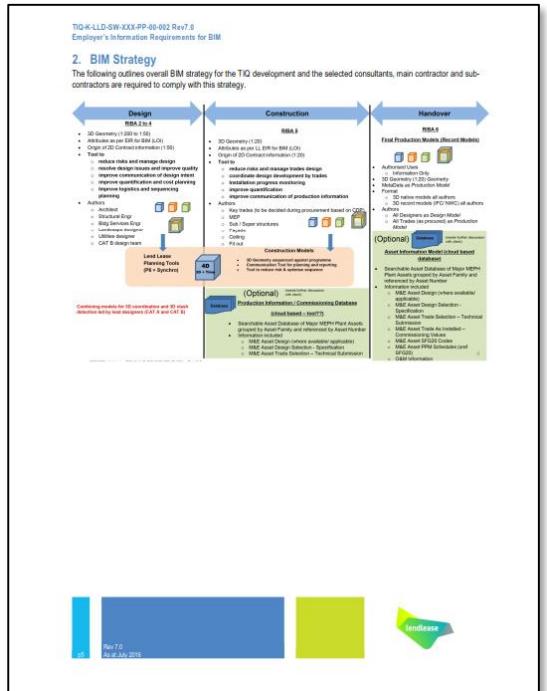
Stage 6



# BIM for Construction – First Steps...

- Reviewing of EIRs for BIM
- What does the client want?
- Can we achieve this?
- What do we need?
- Understanding what the end user wants
- Managing expectations

EIRs for BIM

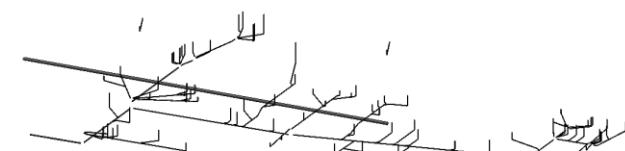
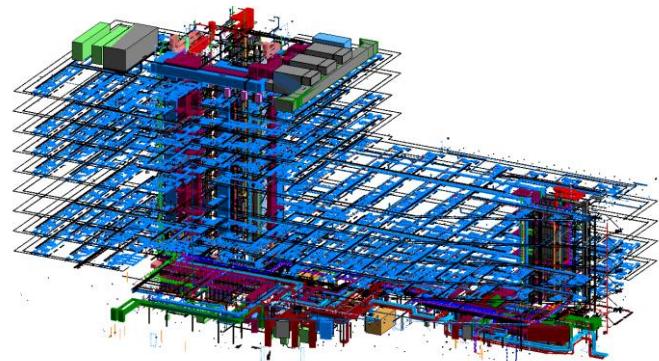
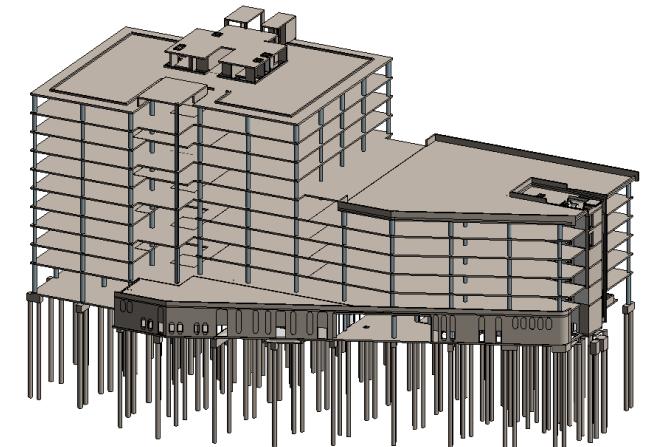
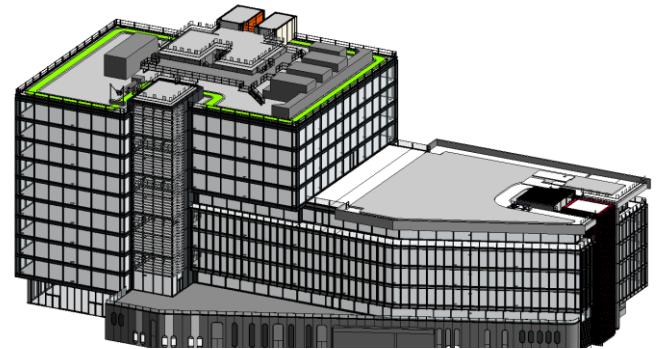


# BIM for Construction – First Steps...

- Reviewing Stage 4 Design Models from LLD...
- What are we looking for?

## Key Review Items

- Design/Co-ordination issues which still need to be resolved in Stage 4 design or Stage 5
- Construction Critical Items- fire stopping, builders work co-ordination, health and safety, design and buildability issue
- Cost!?



# BIM for Construction – Buying BIM from Trades

- Selecting what trade contractor for BIM input
- What trade contractors do we need BIM from?  
What is critical for the project?
- Buying BIM on a budget... educating the supply chain... in-house resources? Validating BIM Assessment forms
- In-house modelling? What needs to be done for the project
- How well advanced was the stage 4 design model?
- Educating supply chain

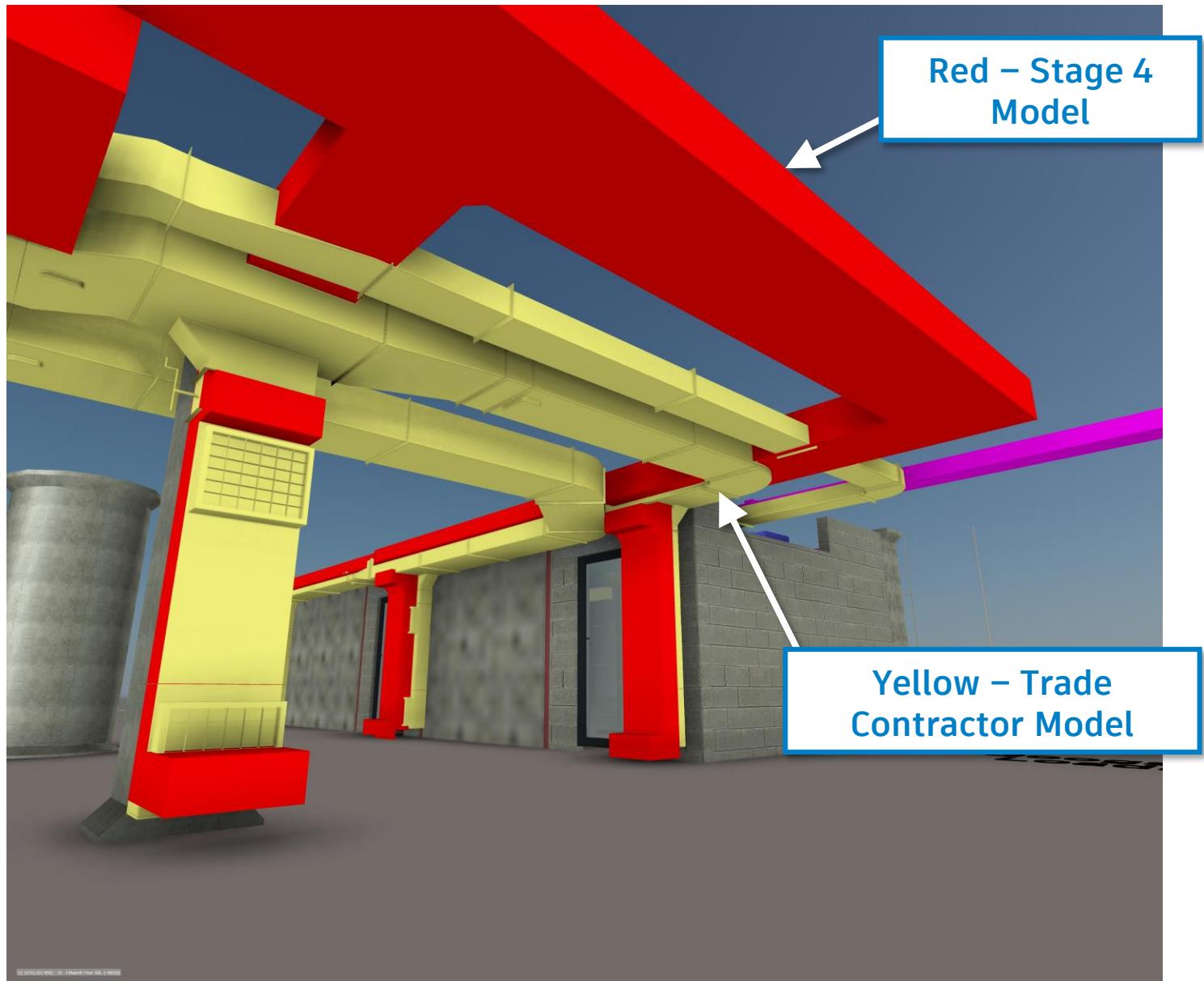
THE INTERNATIONAL QUARTER BIM IMPLEMENTATION PLAN LENDLEASE CONSTRUCTION - BUILDING S9 SHELL AND CORE	
<b>5.0 CONSTRUCTION BIM STRATEGY</b>	
The International Quarter Lendlease Construction will procure construction Stage 5/6 BIM models. The list of model elements for each construction package is defined in the Model Elements Table which is included in this document as Appendix A.	
<b>Construction BIM models</b>	<b>Attributes</b>
Sub-Superstructure Frame	Standard object identification
Facades	Architectural items - Standard object identification
MEP Items - Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A	MEP Items - Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
Lifts	Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
Mechanical Services - Waterside	Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
Mechanical Services - Airside	Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
Electrical Services	Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
Sprinklers	Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
Fire Alarms	Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
BMS	Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
BMU	Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
Brick and Blockwork	Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
Toilet Fit Out	Standard object identification
Roof Finishes	Architectural items - Standard object identification
Raised Access Flooring	MEP Items - Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A
Carpentry and Joinery	Standard object identification
Drylining and Ceilings	Standard object identification
Marble Staircases	Standard object identification
Glazed Partitions/Doors	Standard object identification
Atrium/Glass Balustrades	Standard object identification
Reception Fit Out	Architectural items - Standard object identification
Architectural Metalwork	MEP Items - Asset management attributes for the maintainable assets as listed in the Model Element Matrix in appendix A



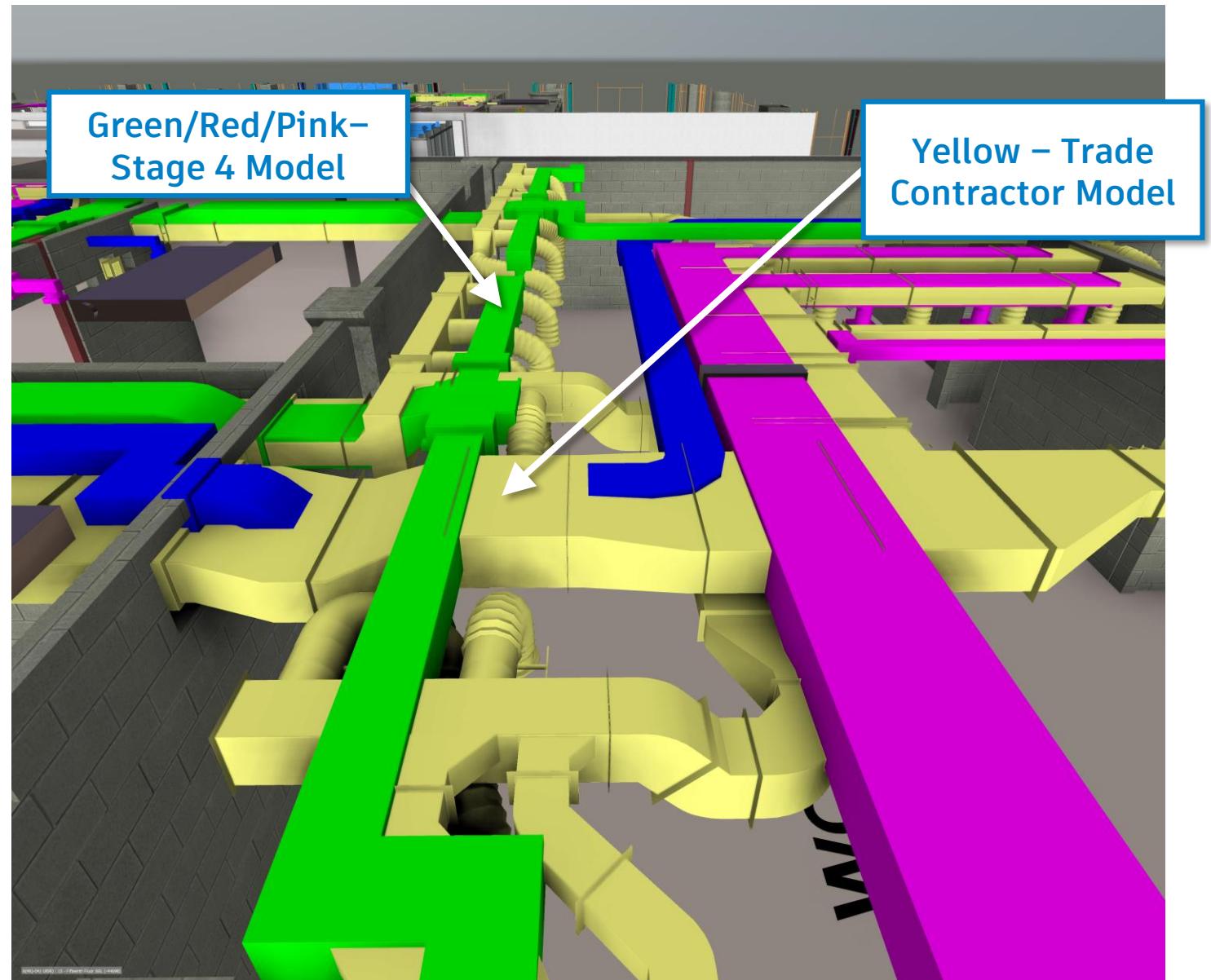
# BIM for Construction – Why do we need it?

## Design Consultant vs Trade Contractor Model

Ductwork Package



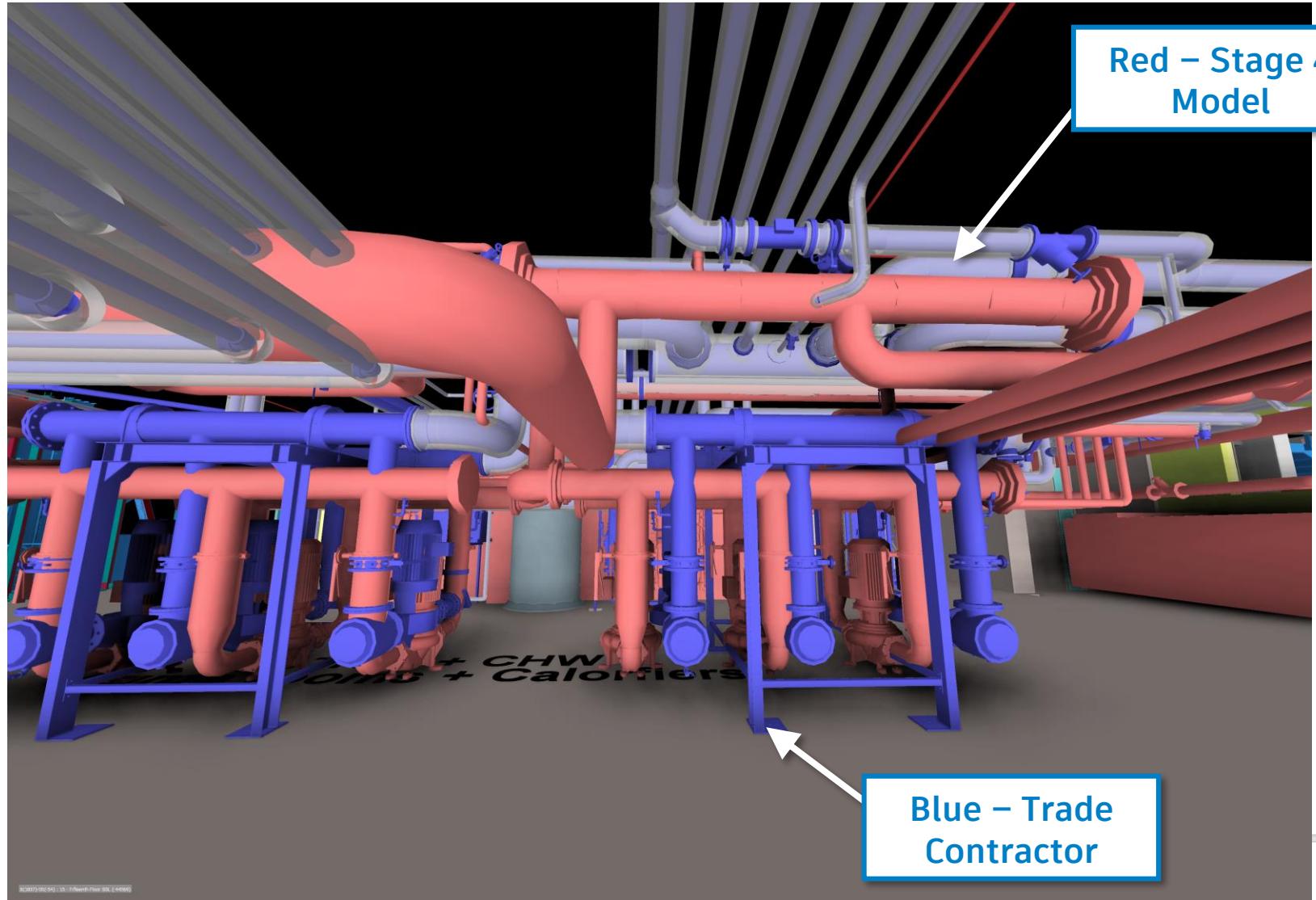
Ductwork Package



# BIM for Construction – Why we do we need it?

## Design Consultant v Trade Contractor Model

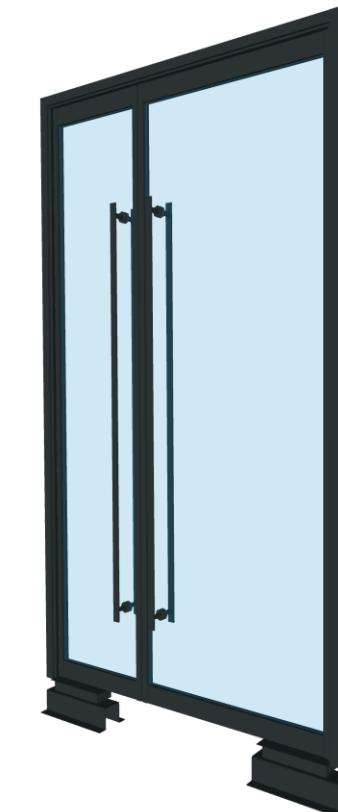
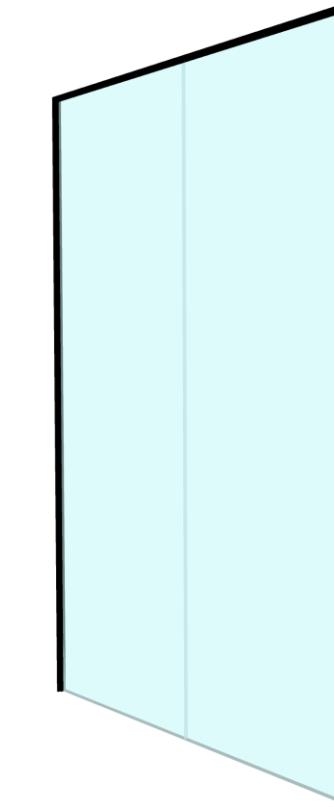
### Mechanical Package



### Glazed Door Package

Stage 4 Model

Trade Contractor Model



# BIM for Construction – Buying BIM from Trades



TClarke



**BDL®**  
THE BDL GROUP PLC



**ELLMER**  
CONSTRUCTION



**ETON**  
GROUP

ARUP

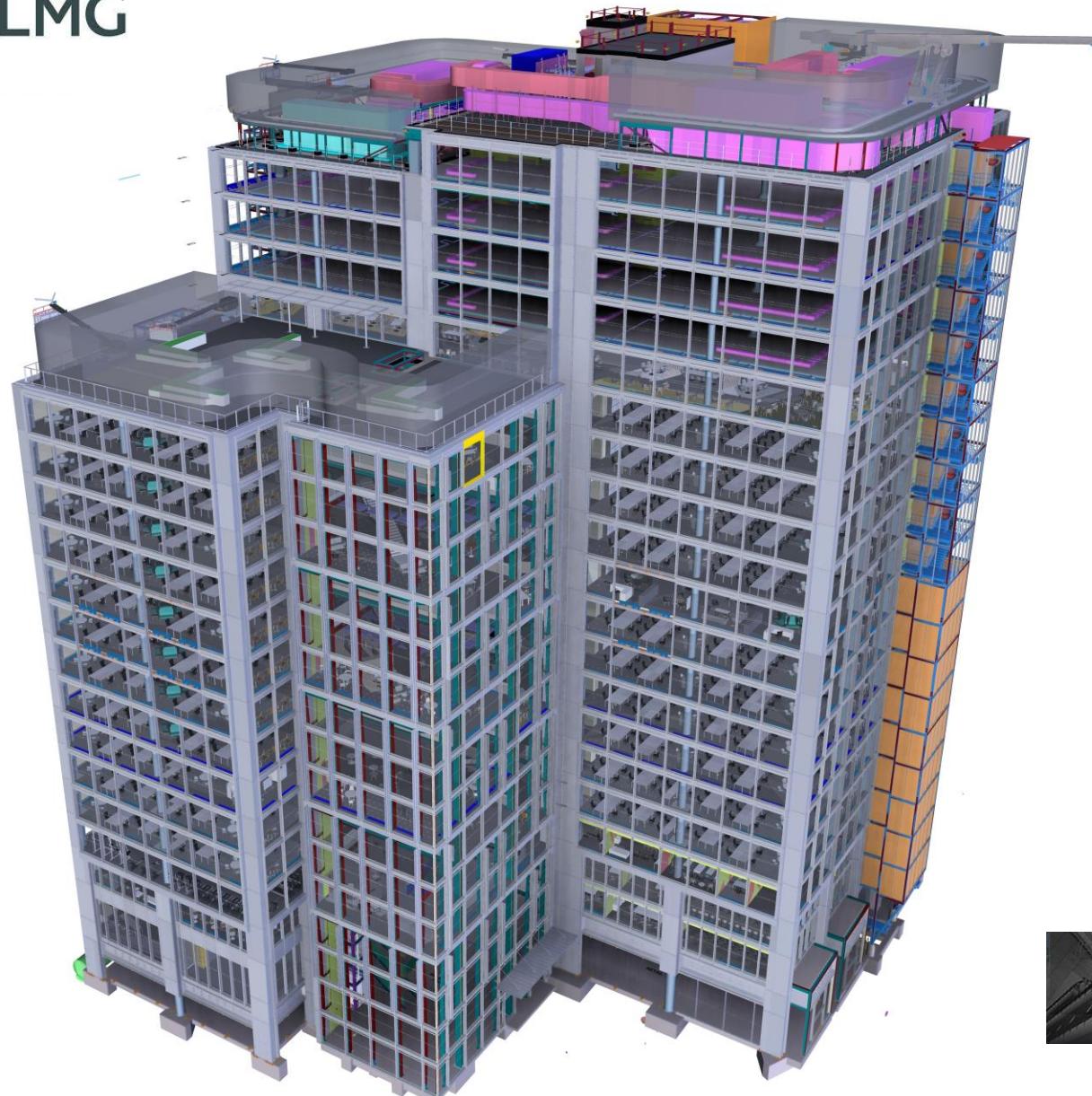


**Kingspan**

**STEWART  
FRASER**



Co-ordination Model



TClarke



**PRATER**  
ENVELOPE • DESIGN • CONSTRUCT  
A Lindner Group Company



**KONE**

**SCHELDEBOUW**

**SHERLOCK**

**COX GOMYL**

**LW**  
LEE WARREN  
ARCHITECTURAL METAL & GLASS

**H&K**  
Hall & Kay Fire Engineering

**CAREYS**  
WE CARE

**coopers**  
EST. 1963  
LEADING THE WAY IN FIRE PROTECTION

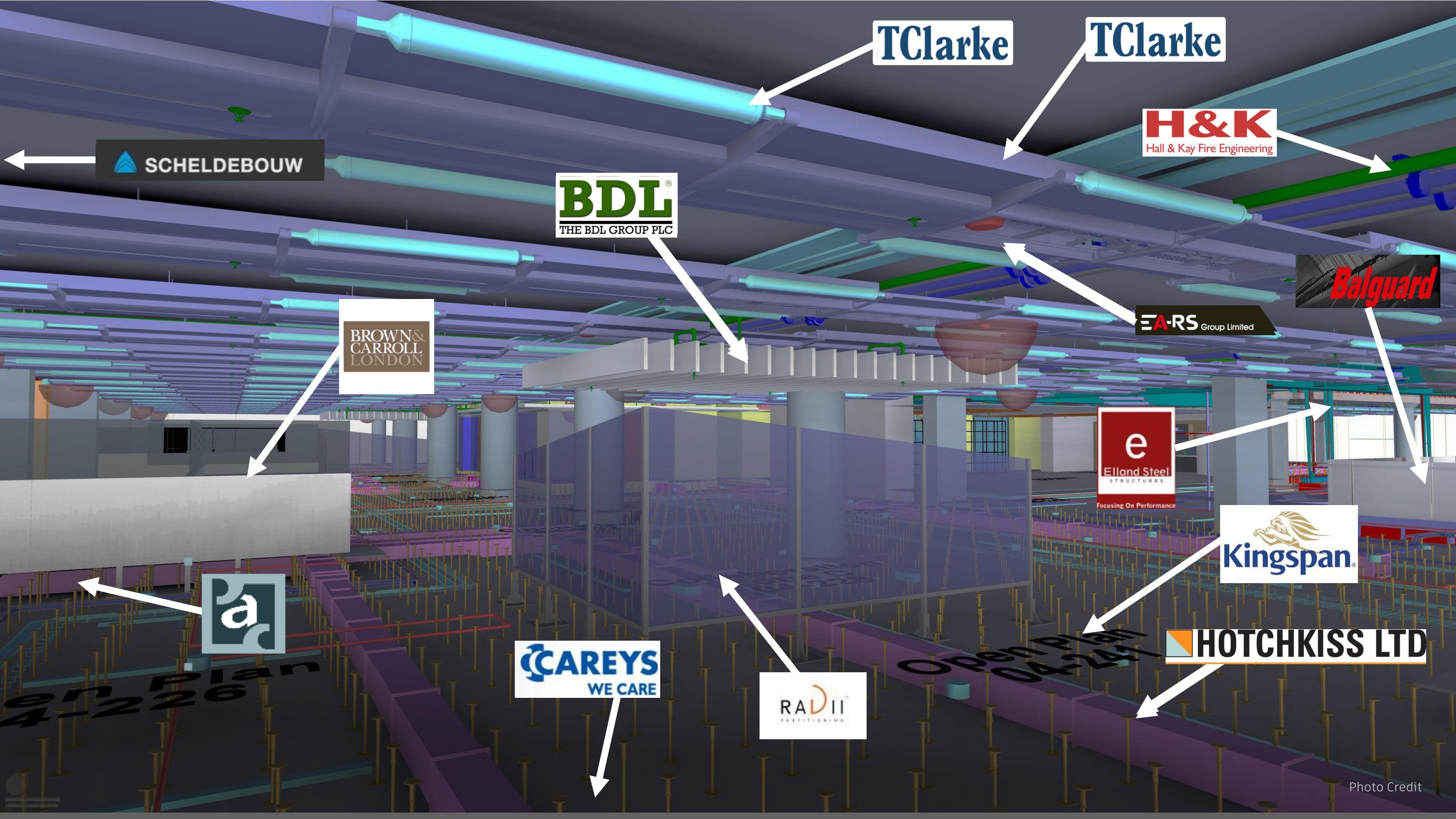
**C&C**  
C&C Catering Equipment Ltd



**RADI**  
PARTITIONING

**Balguard**

**HOTCHKISS LTD**



SCHELDEBOUW

TClarke

H&K  
Hall & Kay Fire Engineering

**BDL**  
THE BDL GROUP PLC

EA-RS Group Limited

BROWN &  
CARROLL  
LONDON

e  
Elland Steel  
STRUCTURES  
Focusing On Performance

Kingspan

ad

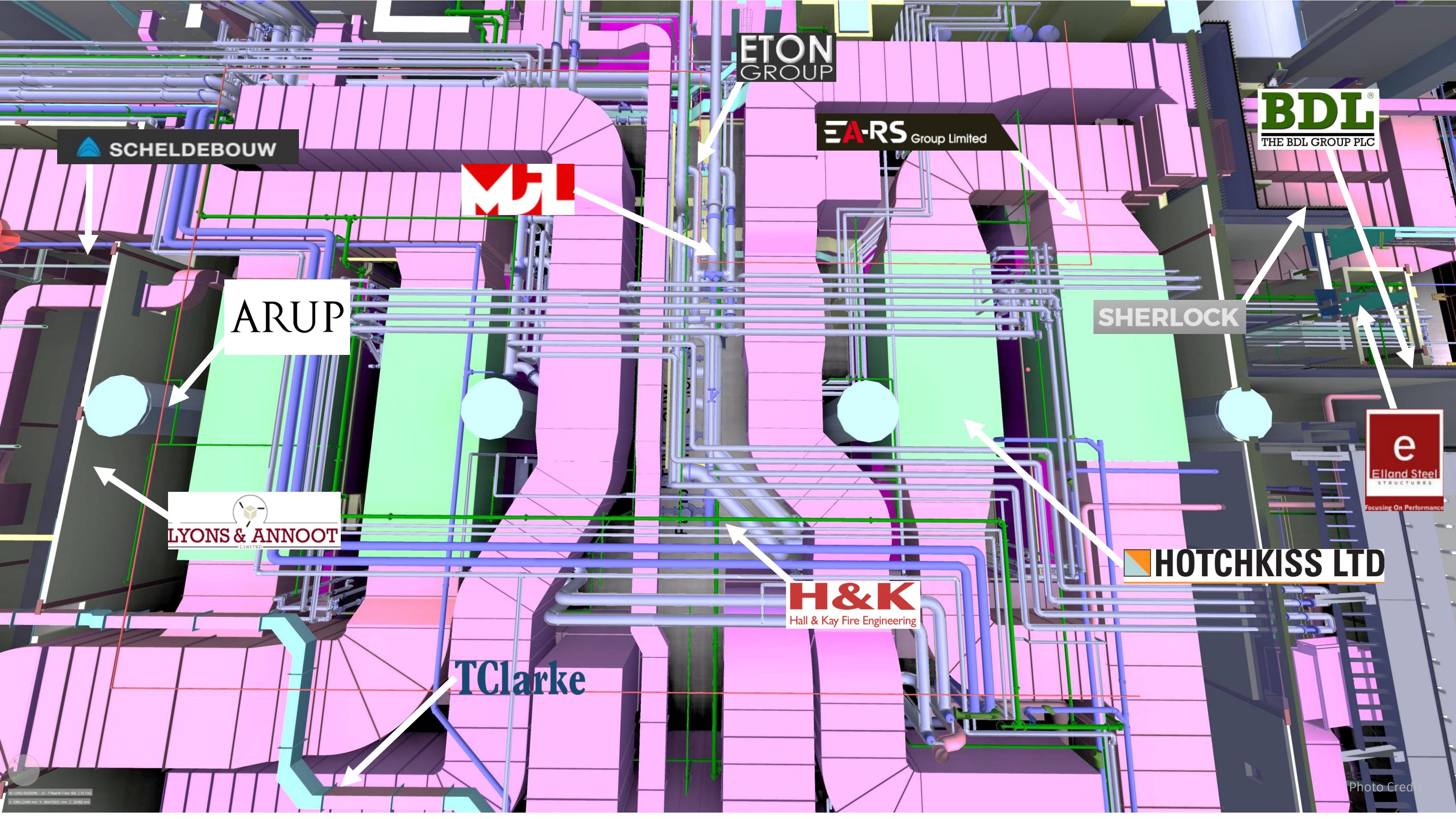
CAREYS  
WE CARE

Open Day  
04-04-2017

RADII  
PARTITIONING

**HOTCHKISS LTD**

Photo Credit



# BIM for Construction – BIM Scopes / Deliverables

- Compiling the BIM scopes for the trade contractor packages. Buying the correct model elements at the right LOD
- Ensure BIM deliverables are in contracts! No excuses
- Developing and reviewing the programme and procurement strategy. Will we be coordinating models at the correct times? Will service models be signed off before walls are built?

The document is titled "BIM Scope of Work" for Project IQL - N22, Package 43031.02, Revision 00, dated 18/05/2016. It includes sections for Introduction, Tender Deliverables, Lead Coordinator responsibilities, and Deliverables. It also contains tables for LOD 5 attributes and LOD 6 attributes.

**Introduction**  
You, the subcontractor, are required to comply with the Building Information Modelling (BIM) requirements set out in this scope of works. This document should be read in conjunction with the following documents:

- Conject PCS Protocol [TIO-W-LLC-N22-XXX-PP-00-001]
- BIM Execution Plan [TIO-W-LLC-N22-XXX-PP-01-002]
- EIR for BIM [TIO-K-LLD-SW-XXX-PP-00-002\_Rev7.0]
- BS1192:2007 [Industry standard]
- PAS1192-2:2013 [Industry standard]

**Tender Deliverables**  
The following outlines your trade specific BIM deliverables at the tender stage:

1. BIM Implementation Plan outlining how you will execute BIM on this project and deliver a "record" model at the end of your installation. This should include, but not be limited to, how you will develop your BIM model progressively as part of your design development, integrate with other discipline models, avoid clashes using 3D BIM, and utilise your in-house skills, hardware, software, and internal BIM protocols and procedures.
2. Completed Lend Lease BIM Capability Assessment form.
3. BIM sample model file from previous a project, showing Level of Information and Level of detail within the model.

**Lead Coordinator**  
As Services Lead Co-ordinator, you will be responsible for

- Create and maintain a combined services model sign off calendar ensuring all service trade contractors have agreed to meeting the sign off dates.
- Compile all service trade BIM models – review design and co-ordination issues and issue fortnightly BIM clash reports to Lendlease for review.
- Maintain a BIM service trade co-ordination tracker document to highlight and track issues. This will be issued to Lendlease prior to BIM Co-ordination meetings.

**Deliverables**  
You are required to:

- Produce your package-specific 3D BIM model(s) that include the elements specified in Model Element Table in this document.
- Name and number BIM models in accordance with the model naming convention shown in this document and Conject PCS protocol as listed above.
- Regularly update BIM models to reflect material/component selections.
- Ensure your supply chain (sub-subcontractors, sub-consultants and suppliers) are aware of the BIM requirements for the project and ensure those parties fully comply with the BIM Execution Plan and produce or contribute information to any BIM models as may be required.
- Develop your trade specific 3D BIM model(s) as part of your design development and use 3D BIM model(s) as a primary source to generate 2D drawings.

IQL-N22-BIM Scope of Works-Ventilation-MEP Lead Coordinator.docx  
Page 1 of 6

The document is titled "Appendix A – IQL Digital Plan of Works". It includes a table for "BIM Scope of Work" and "Appendix A – IQL Digital Plan of Works".

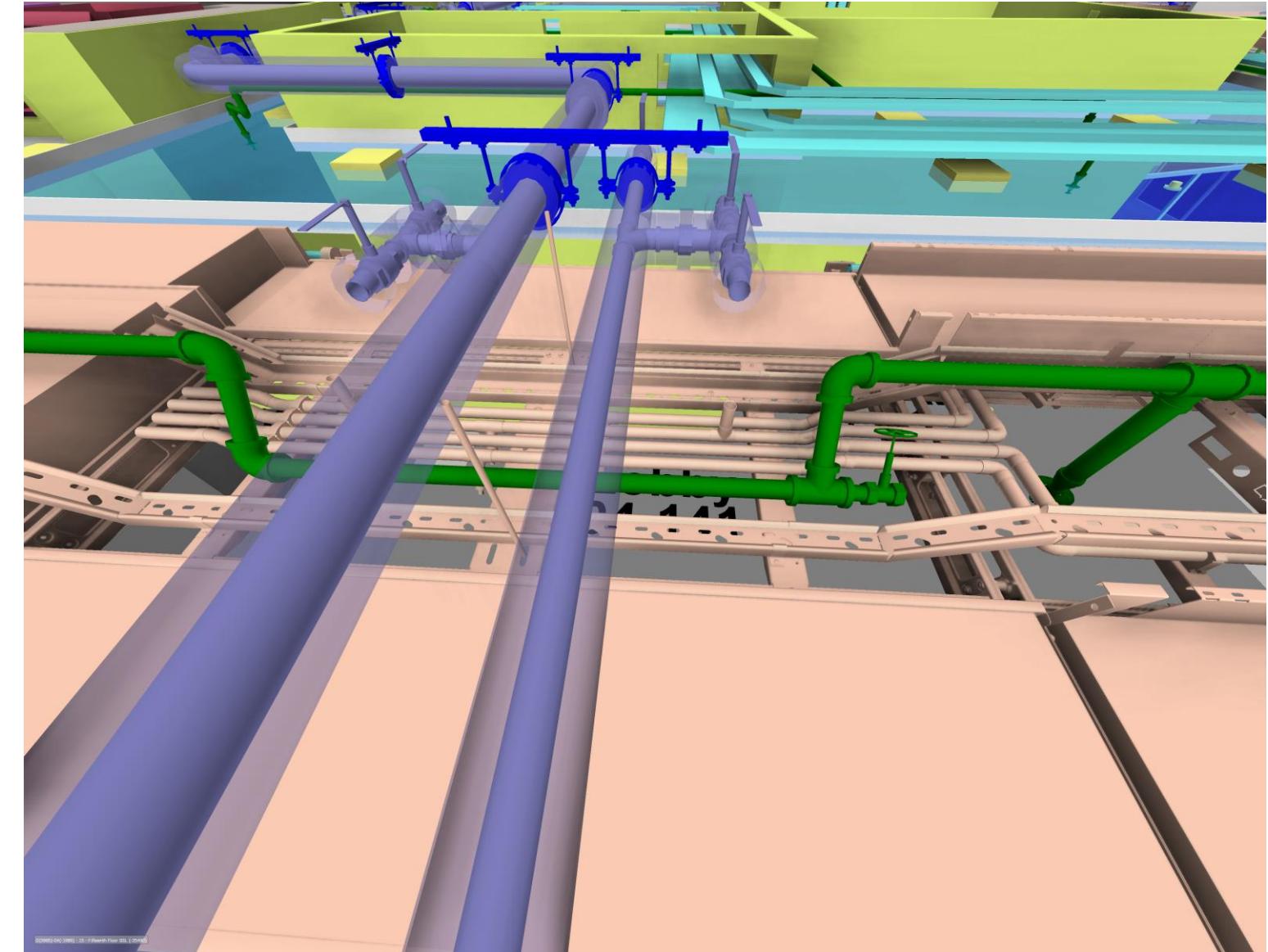
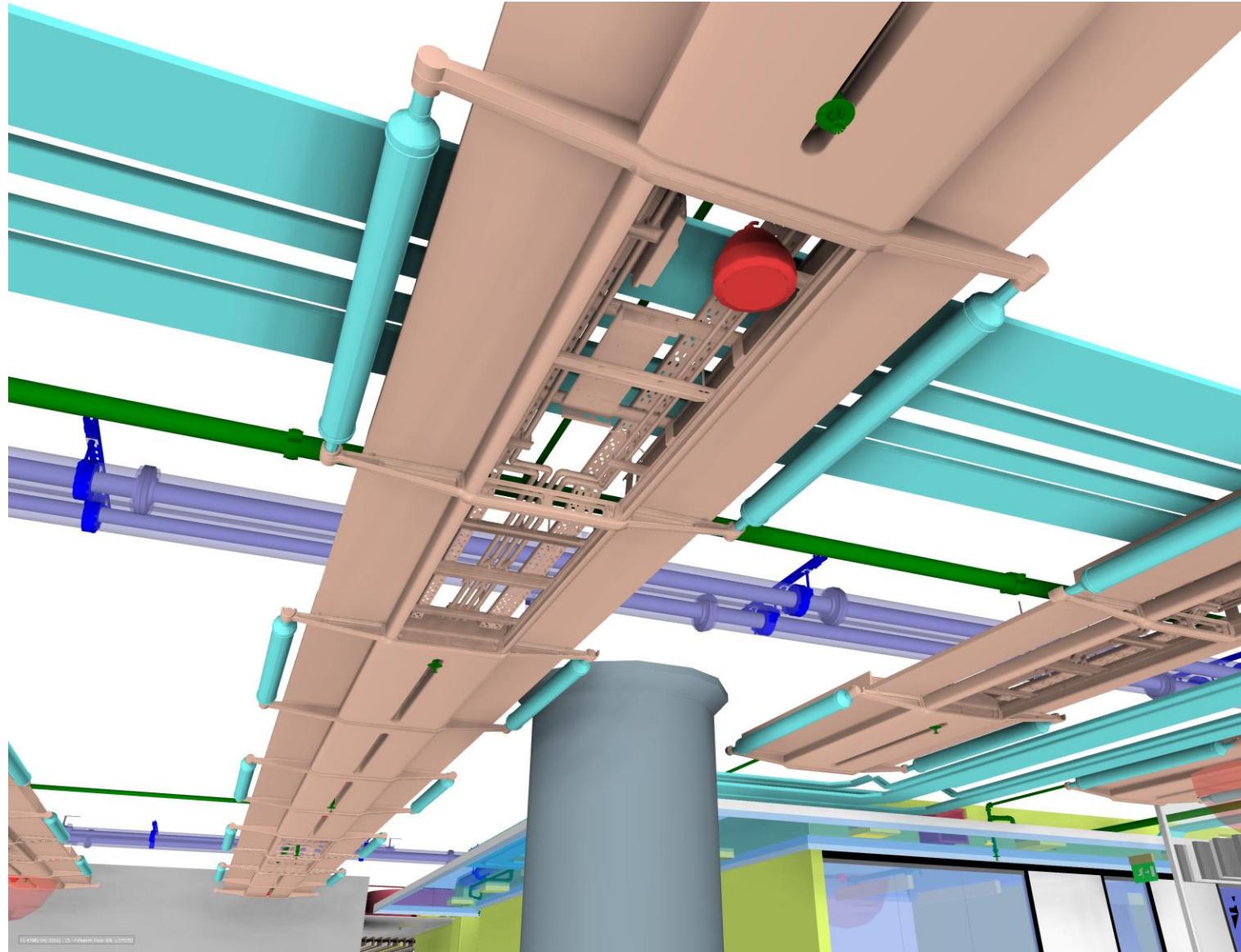
**Appendix A – IQL Digital Plan of Works**

LOD 5 (Level of Detail)	LOD 5 (Level of Geometry)	LOD 5 (Level of Detail)	LOD 5 (Level of Geometry)
LOD 5 ATTRIBUTES	LOD 5 ATTRIBUTES	LOD 5 ATTRIBUTES	LOD 5 ATTRIBUTES
ASMTS (Mechanical)	ASMTS (Mechanical)	ASMTS (Mechanical)	ASMTS (Mechanical)

**Model Data**  
An accurate model of the asset before and during construction incorporating co-ordinated associated subcontract design models and associated model attributes. The model can be used for co-ordination of the asset during construction, assessing of feasibility, and capture of as-built information.

IQL-N22-BIM Scope of Works-Ventilation-MEP Lead Coordinator.docx  
Page 5 of 6

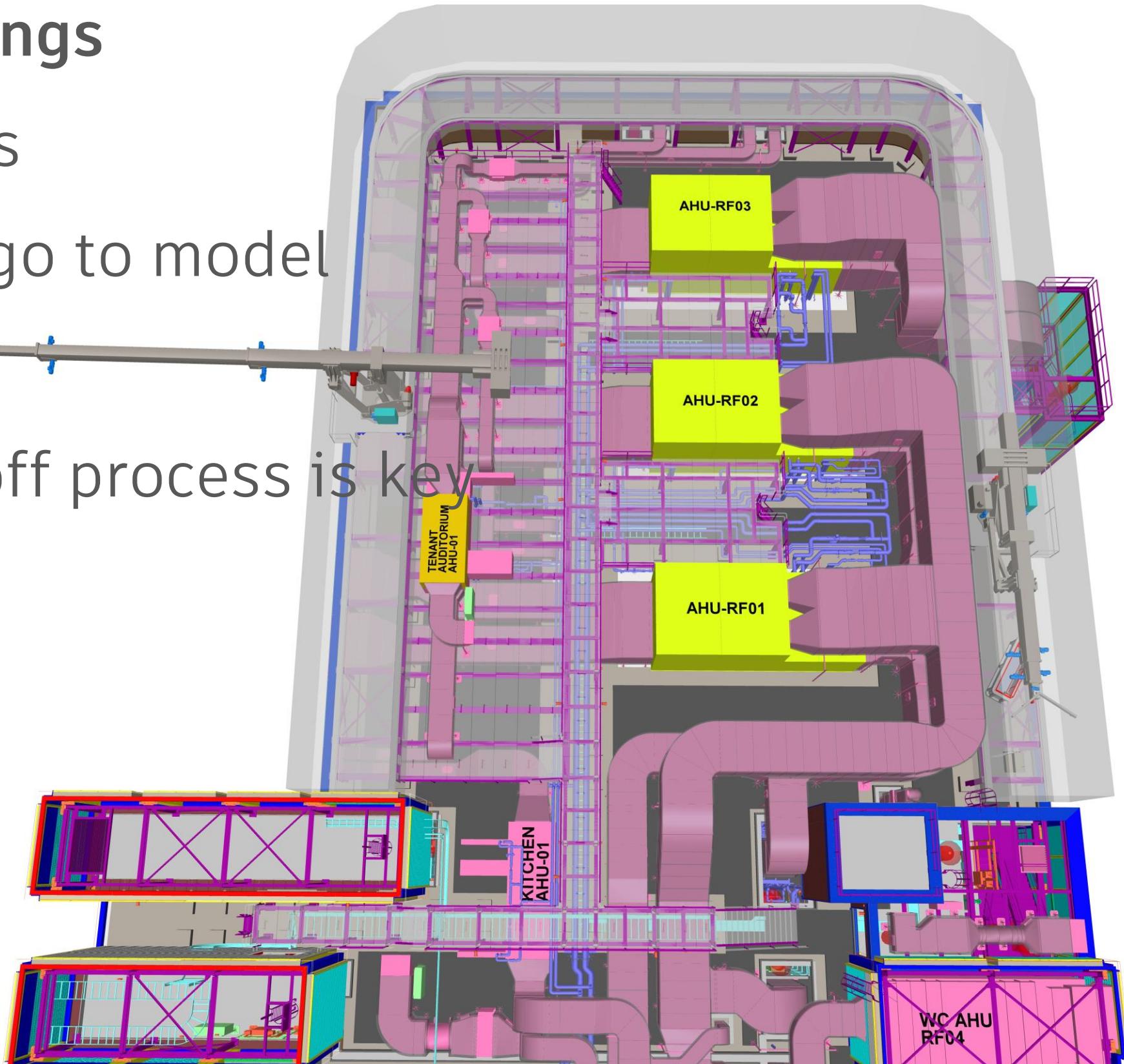
# BIM for Construction – BIM Scopes / Deliverables



# BIM for Construction – Trade Co-ordination

## Weekly BIM Co-ordination meetings

- No excuses not to issue models
- 1 source of information → the go to model
- Part of the design process
- BIM programme / model sign off process is key



# BIM for Construction – BIM Sign Off

- Are we coordinated? Have all trade contractors finalised their models, all content in the models? Stage 3 sign off process. Not just clash detecting  
for the sake of it!

**PHASE 1**

## PHASE 2

PHASE 3

### 3D CLASH AVOIDANCE (NO CLASH DETECTION)

## 3D CLASH DETECTION

FIRST PASS  
MODELS

FIRST REVIEW

## BIM Co-ordination meeting

-Trade, design  
consultants, LLC

Trades review design consultants models and drawings, and produce first pass models

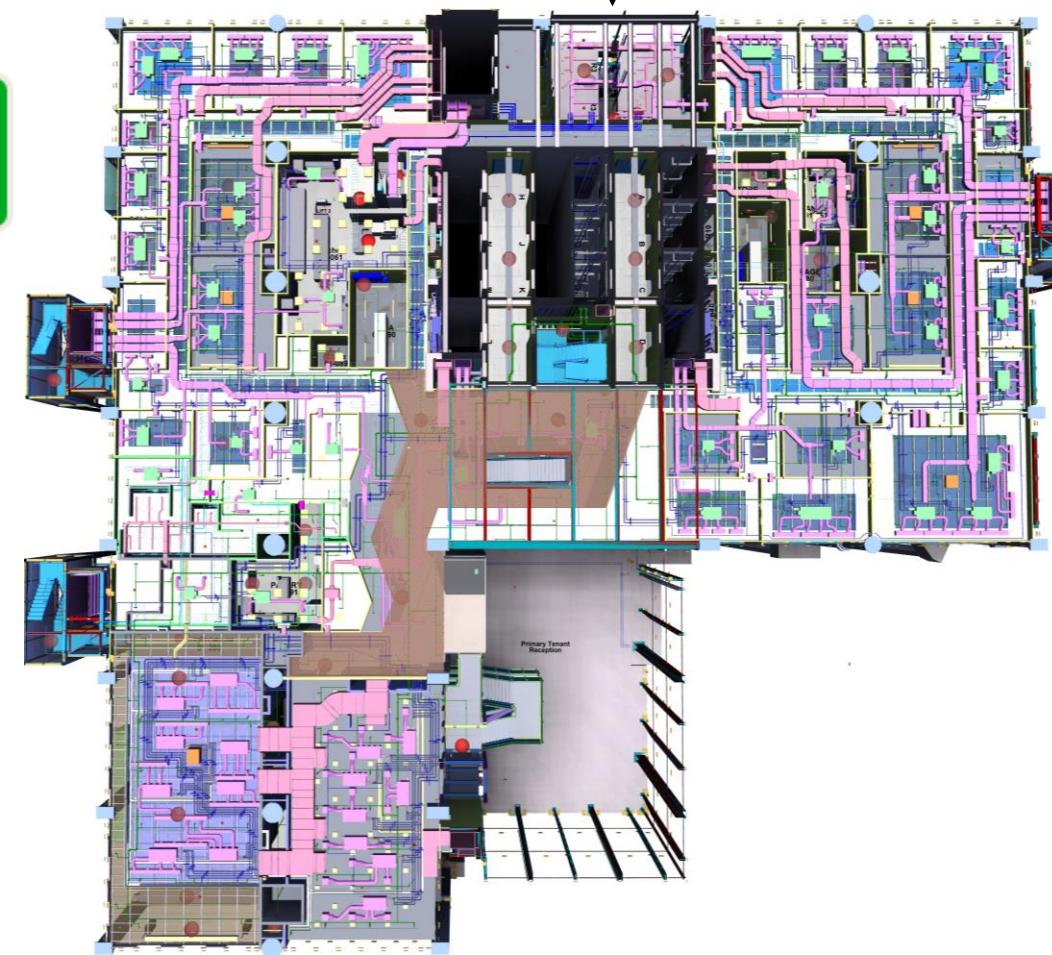
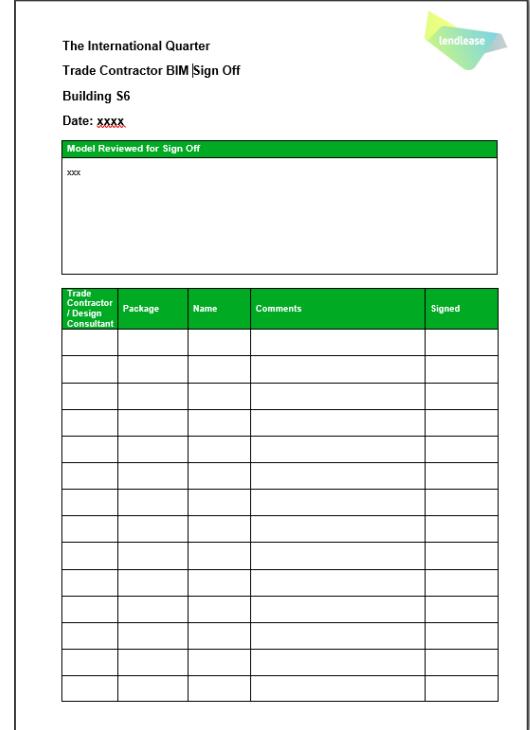
## BIM Co-ordination meeting -Trade, design consultants, LLC

Review of first pass models where trades can highlight any areas of concern.

FINAL  
CONTENTS  
MODELS

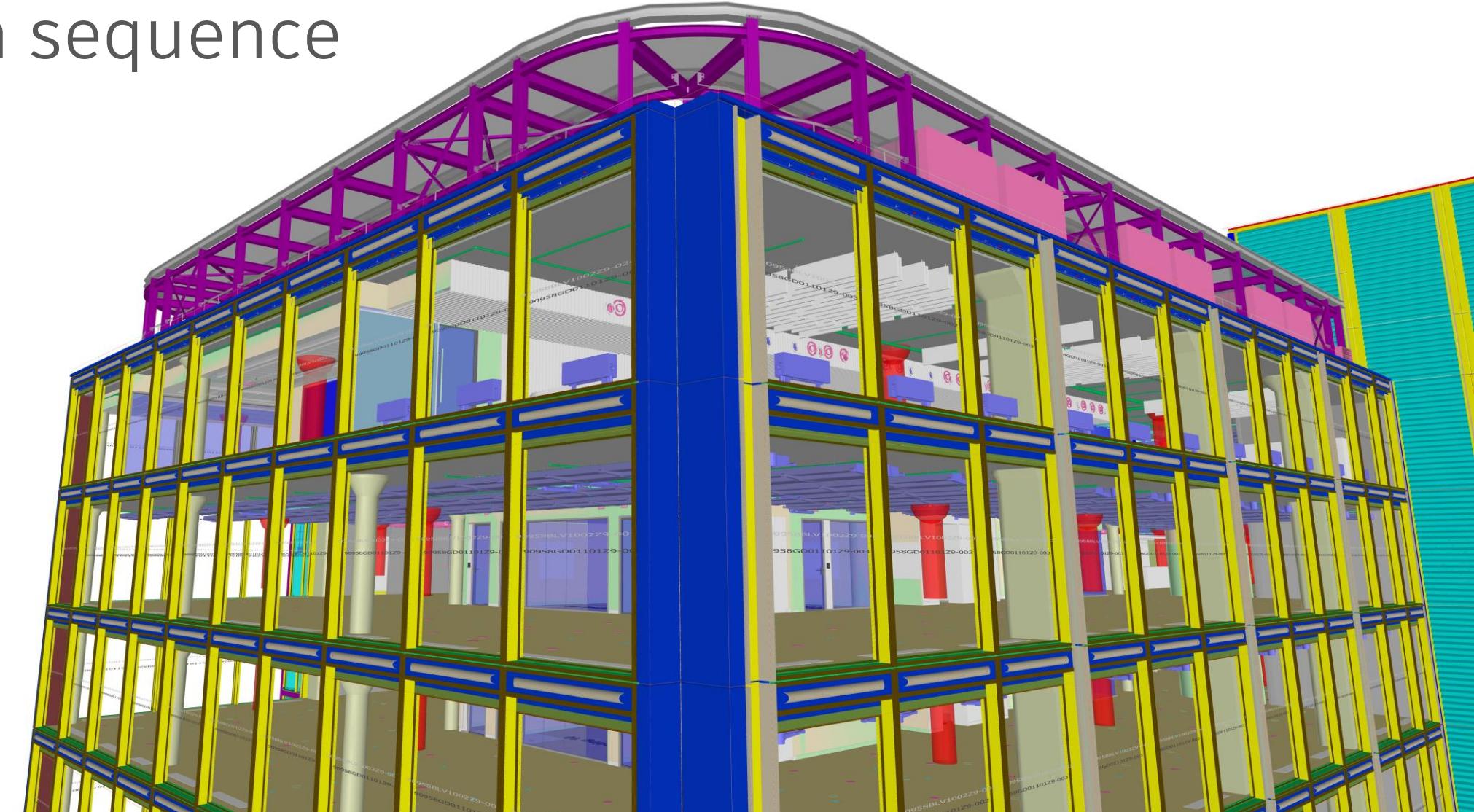
**CLASH  
DETECTION  
CHECK**

DRAWINGS  
CUT FROM  
MODEL



# BIM for Construction – BIM Programme

- Developing a robust BIM Programme
- Ensuring trades are procured at the correct time
- Coordinating correct trades at the right time depending on construction sequence
- Mapping out lead trade contractor coordinator for areas / zone inside the building (e.g Sprinkler Tank Room, HV / Transformer Rooms, AV / IT rooms, plant rooms)



# BIM for Construction – Planning and Sequencing

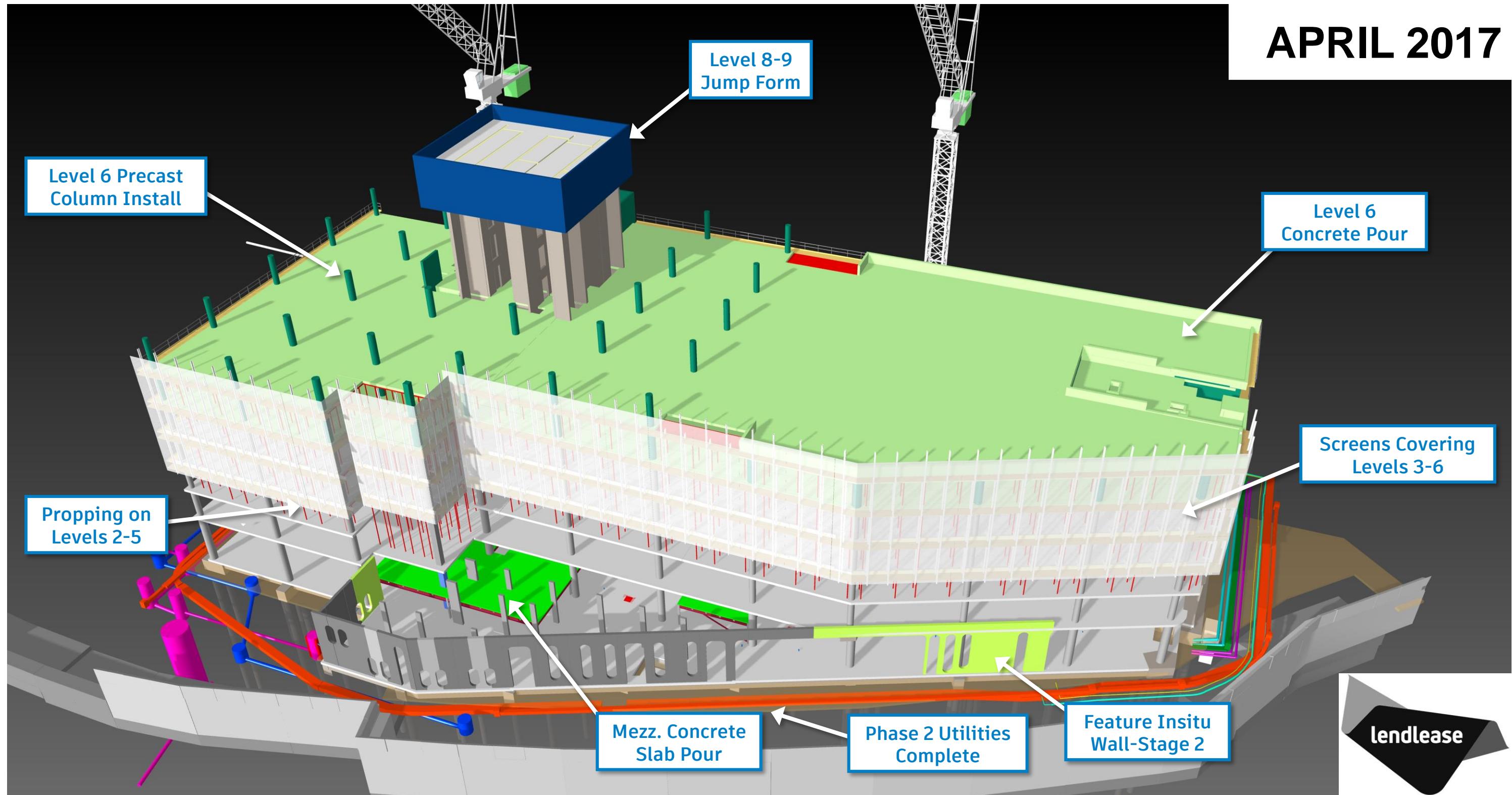
Monthly look aheads

- Breaking up the 4D models into difference aspects, full building sequencing, fit-out / commission sequence, using colours and simple objects for visualisations
- Typical Floor Plate Sequencing – the digital rehearsal
  - optimising trade interfaces



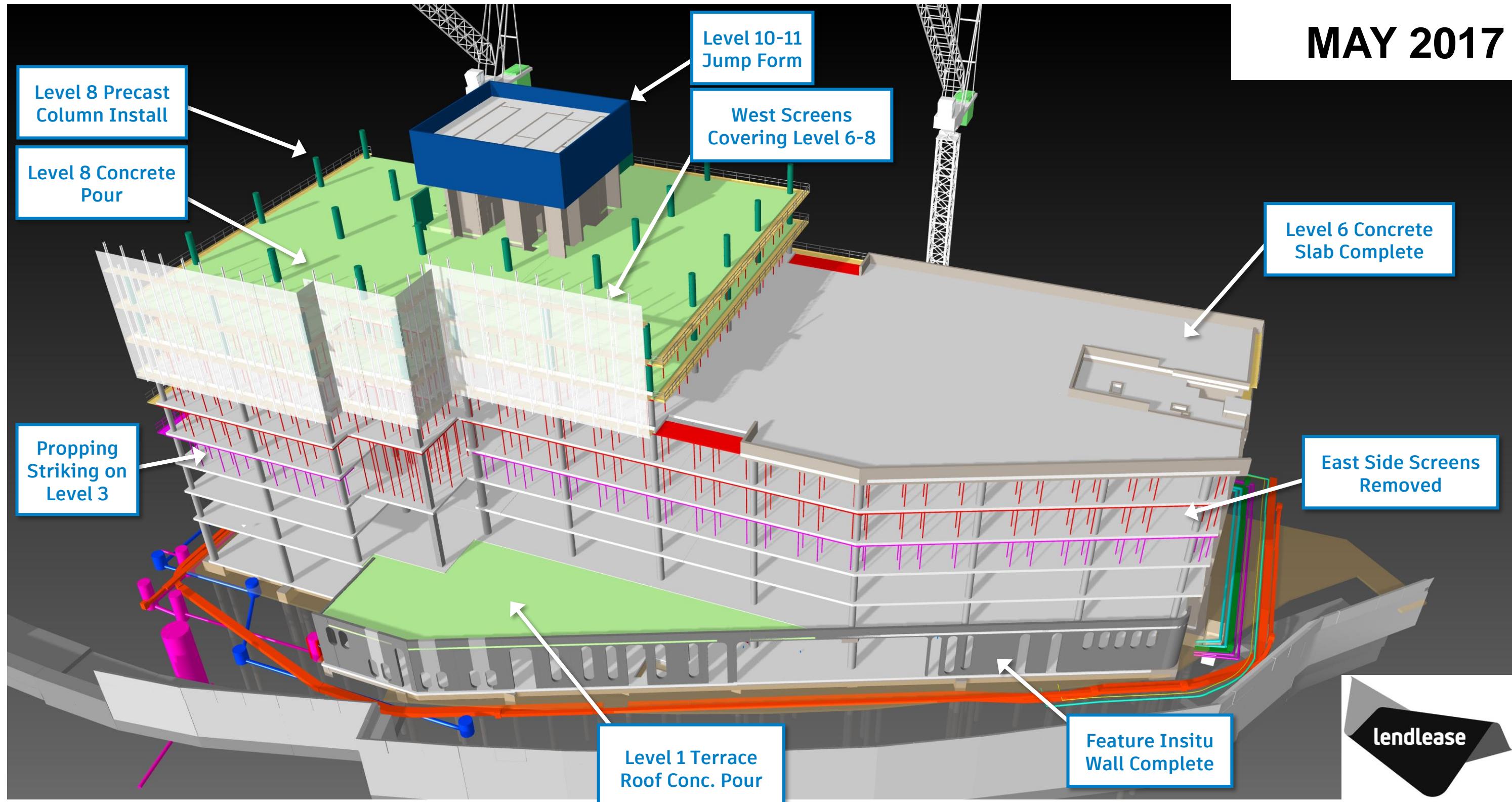
# BIM for Construction – Planning and Sequencing

APRIL 2017



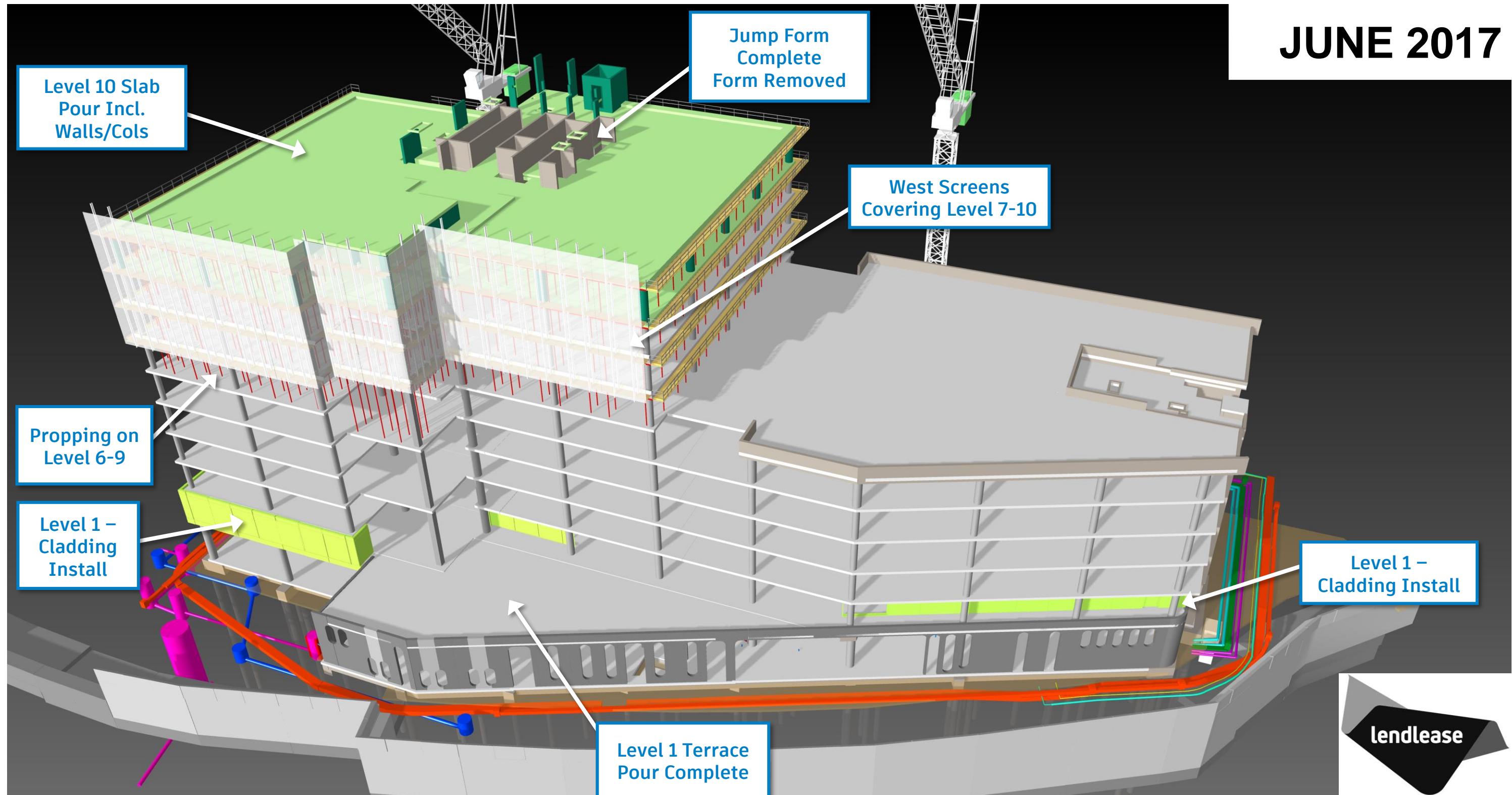
# BIM for Construction – Planning and Sequencing

MAY 2017



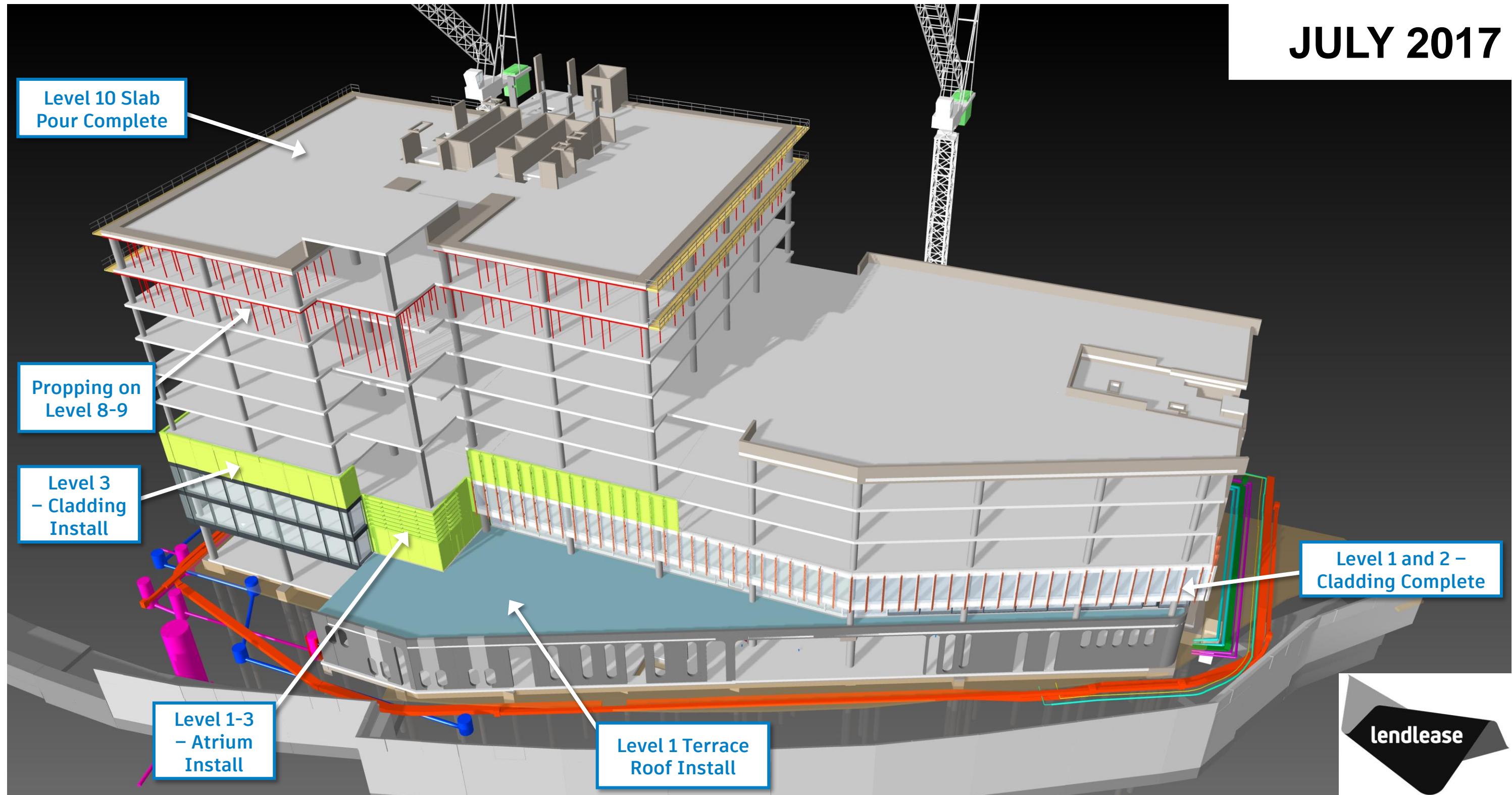
# BIM for Construction – Planning and Sequencing

JUNE 2017



# BIM for Construction – Planning and Sequencing

JULY 2017

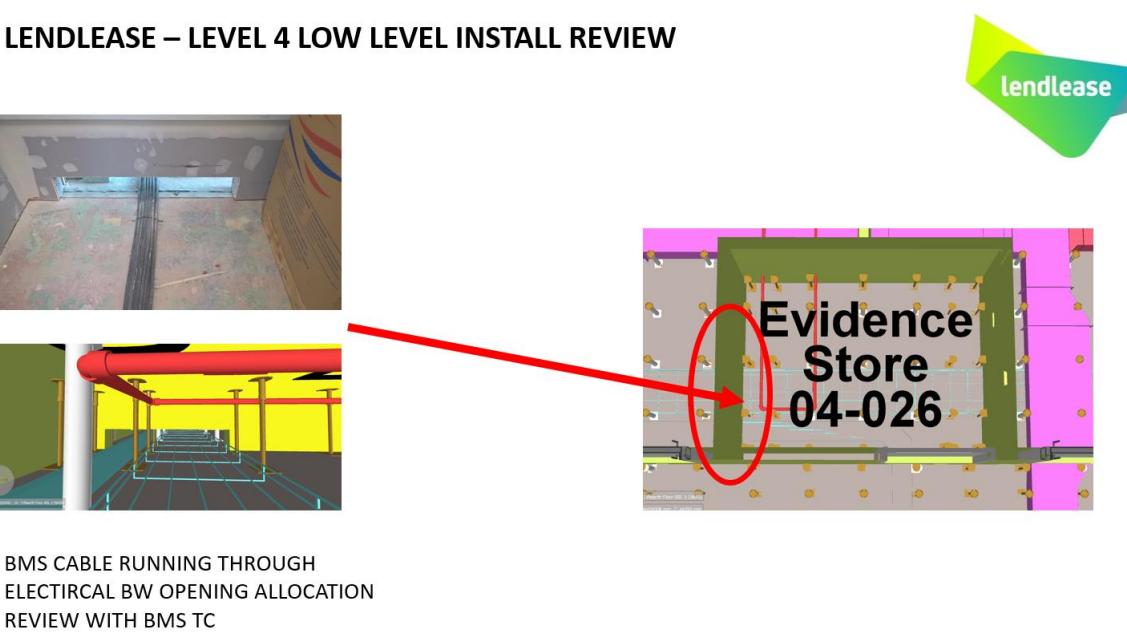


# BIM for Construction – Install Validation

- Checking trade contractor install with design model
- Co-ordination Model → one source of truth
- Ensuring quality onsite
- Assisting Onsite Team
- Manual checking at this stage, tablet technology / onsite laptop → better system ?
- Reporting – Install V Design → send to trades to review onsite

# BIM for Construction – Install Validation

LENDLEASE – LEVEL 4 LOW LEVEL INSTALL REVIEW



BMS CABLE RUNNING THROUGH ELECTRICAL BW OPENING ALLOCATION REVIEW WITH BMS TC

lendlease

LENDLEASE – LEVEL 4 LOW LEVEL INSTALL REVIEW

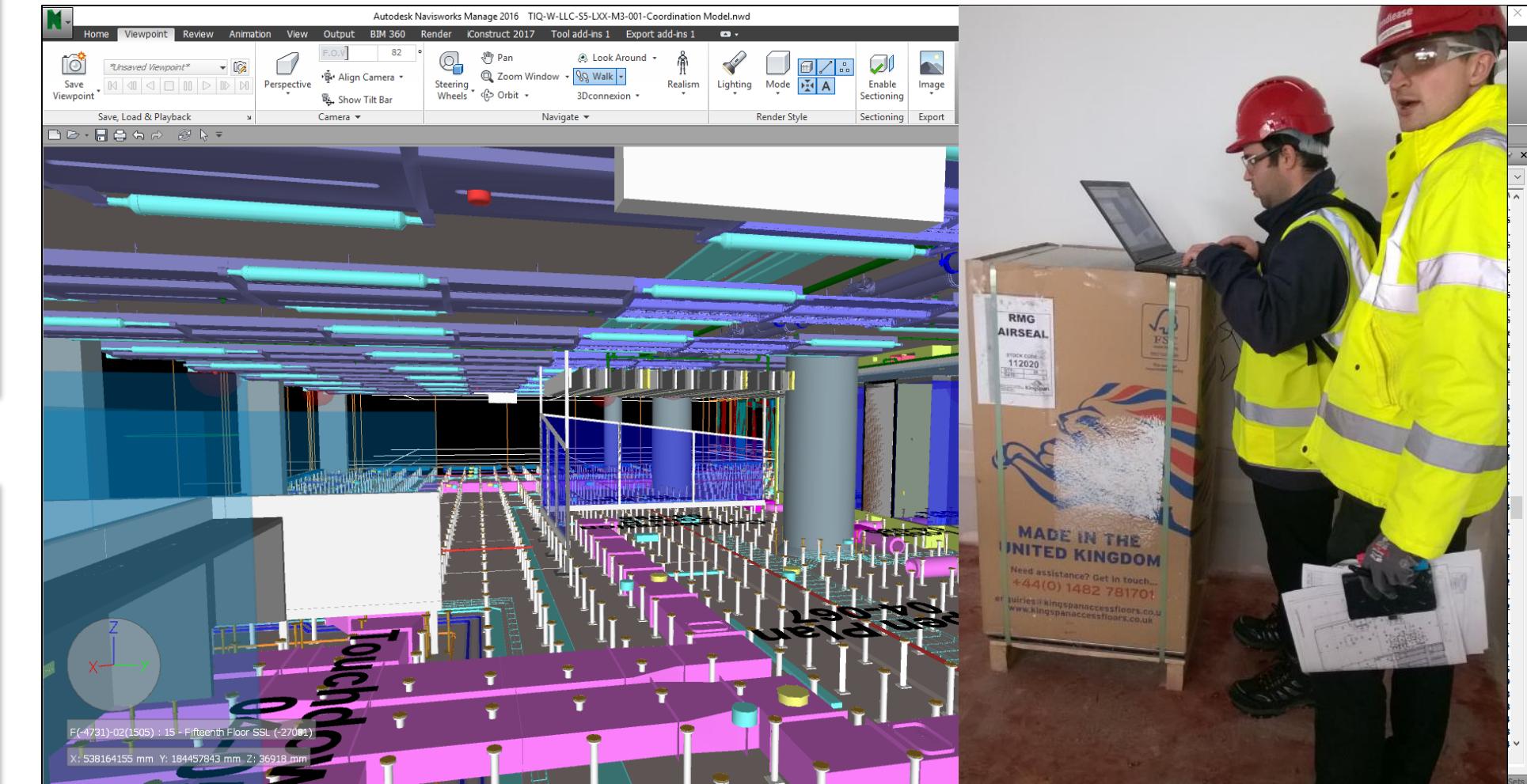


Trench heating pipe not installed

Check height and location of hole

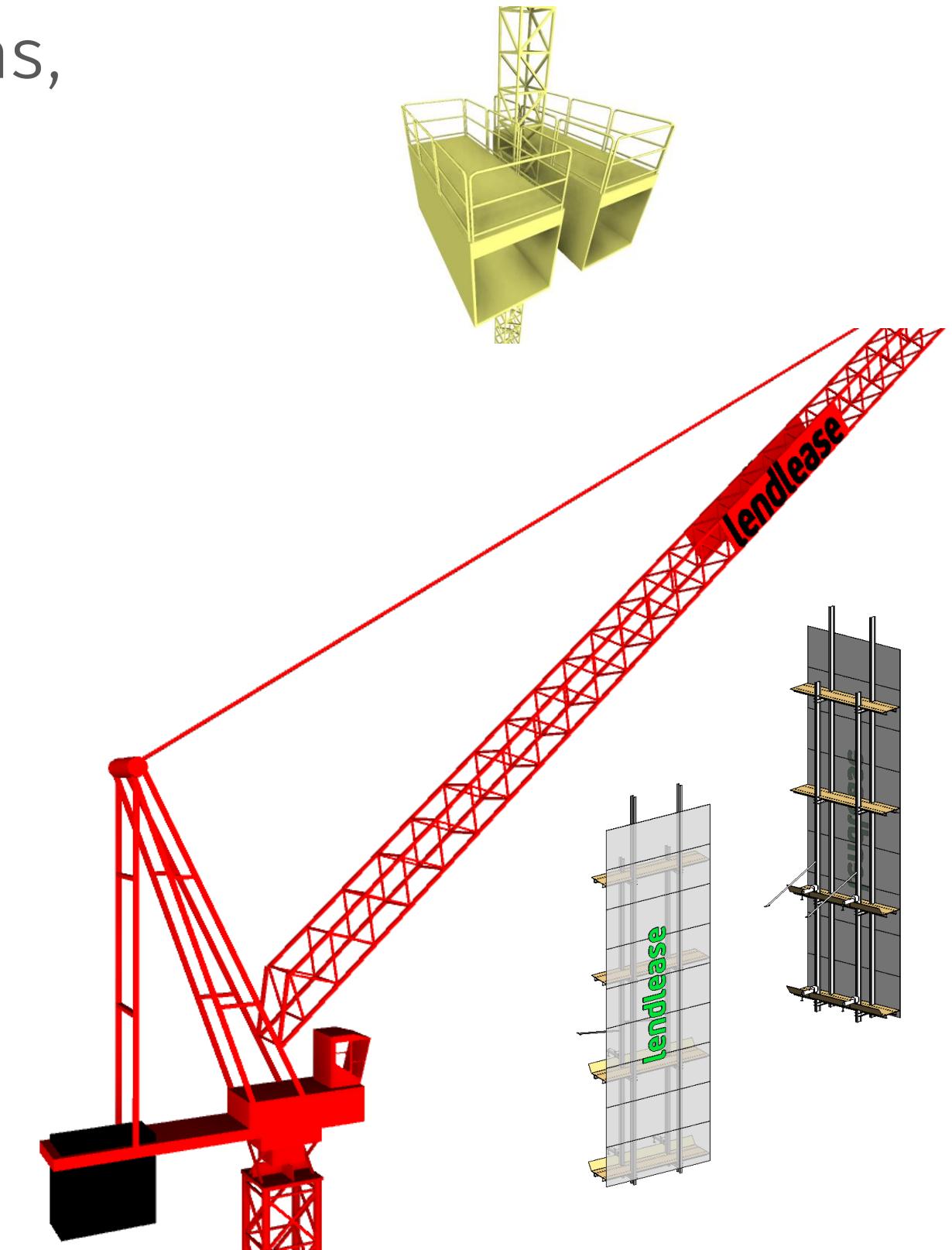
Case Prep Room 04-009

lendlease

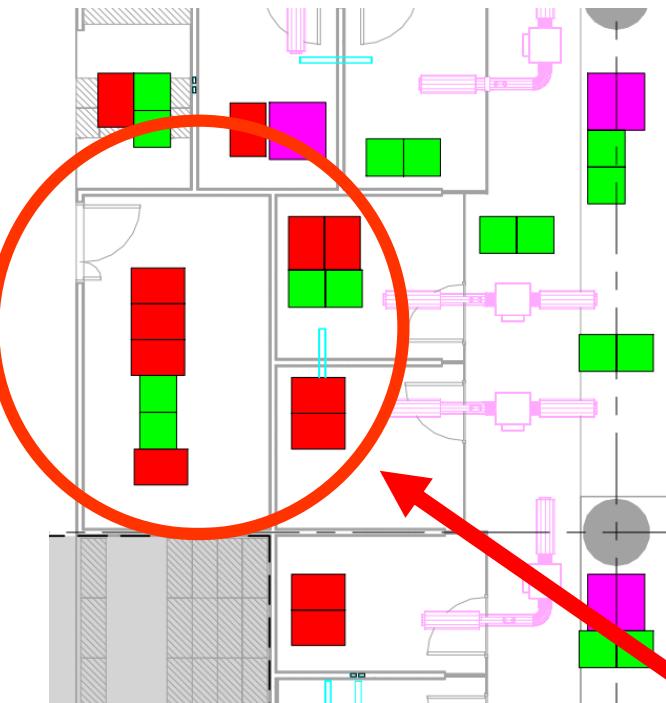
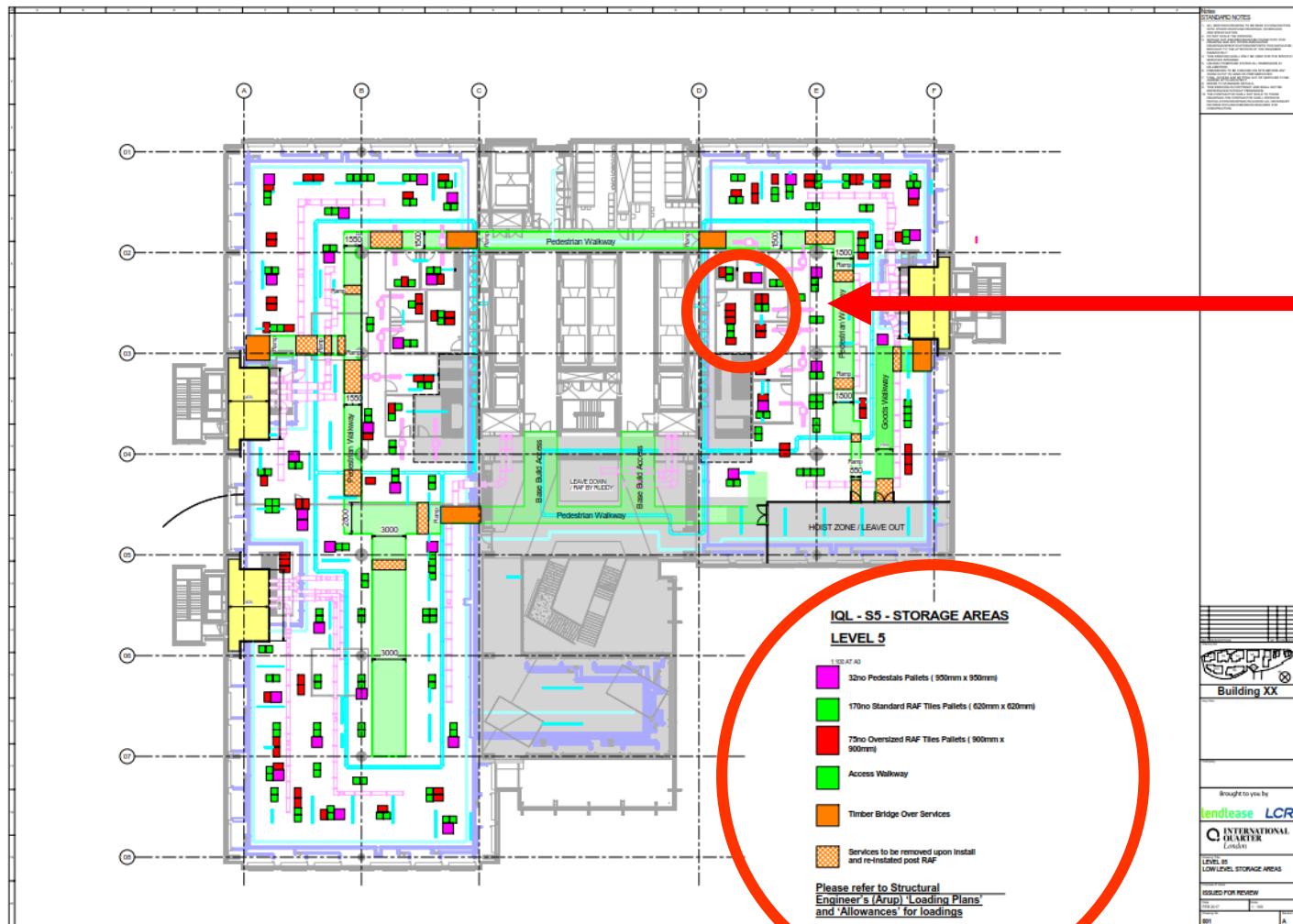


# BIM for Construction – Logistics Modelling

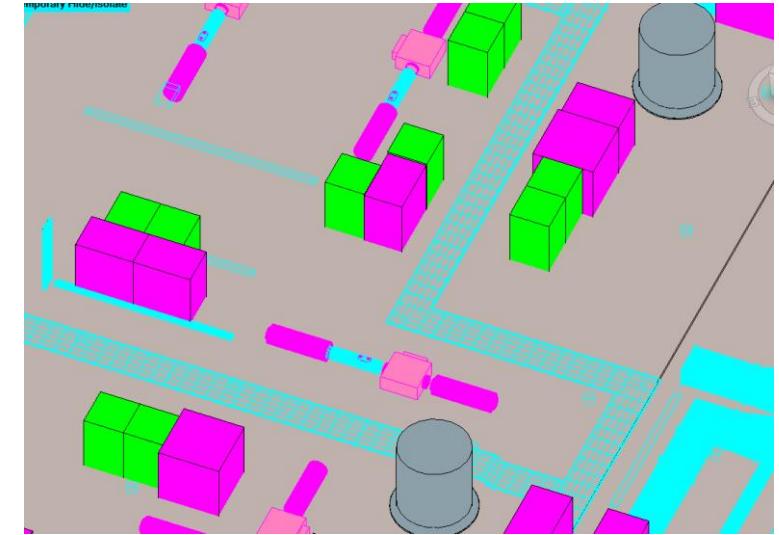
- Site logistics modelling-cranes, hoists, screens, site planning, storage zones, transport movements, etc.
- Model links to site logistics phasing plans → to 4D model → to Construction programme
- Storage Zones – floor load out planning and co-ordination
- Quantifications and locating designated trade zones
- Co-ordinating for trade install sequencing
- Safety – minimises double handling



# BIM for Construction – Logistics Modelling



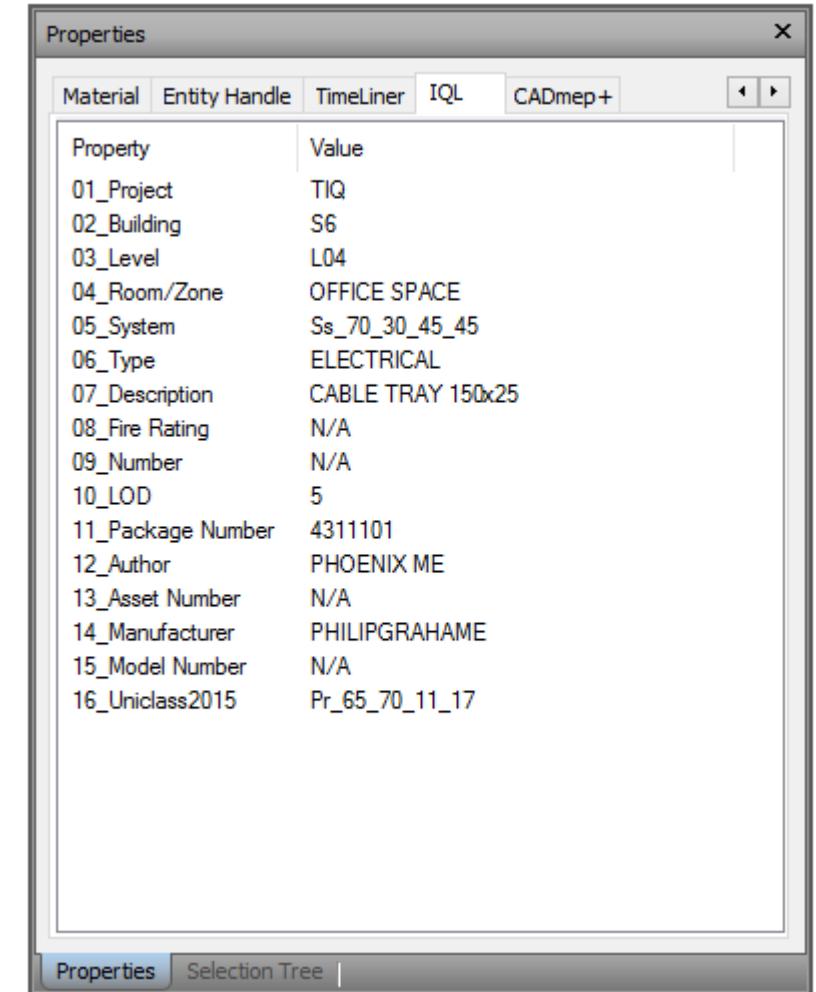
- 1:100 AT A0
- 32no Pedestals Pallets ( 950mm x 950mm)
  - 170no Standard RAF Tiles Pallets ( 620mm x 620mm)
  - 75no Oversized RAF Tiles Pallets ( 900mm x 900mm)
  - Access Walkway
  - Timber Bridge Over Services
  - Services to be removed upon install and re-instated post RAF

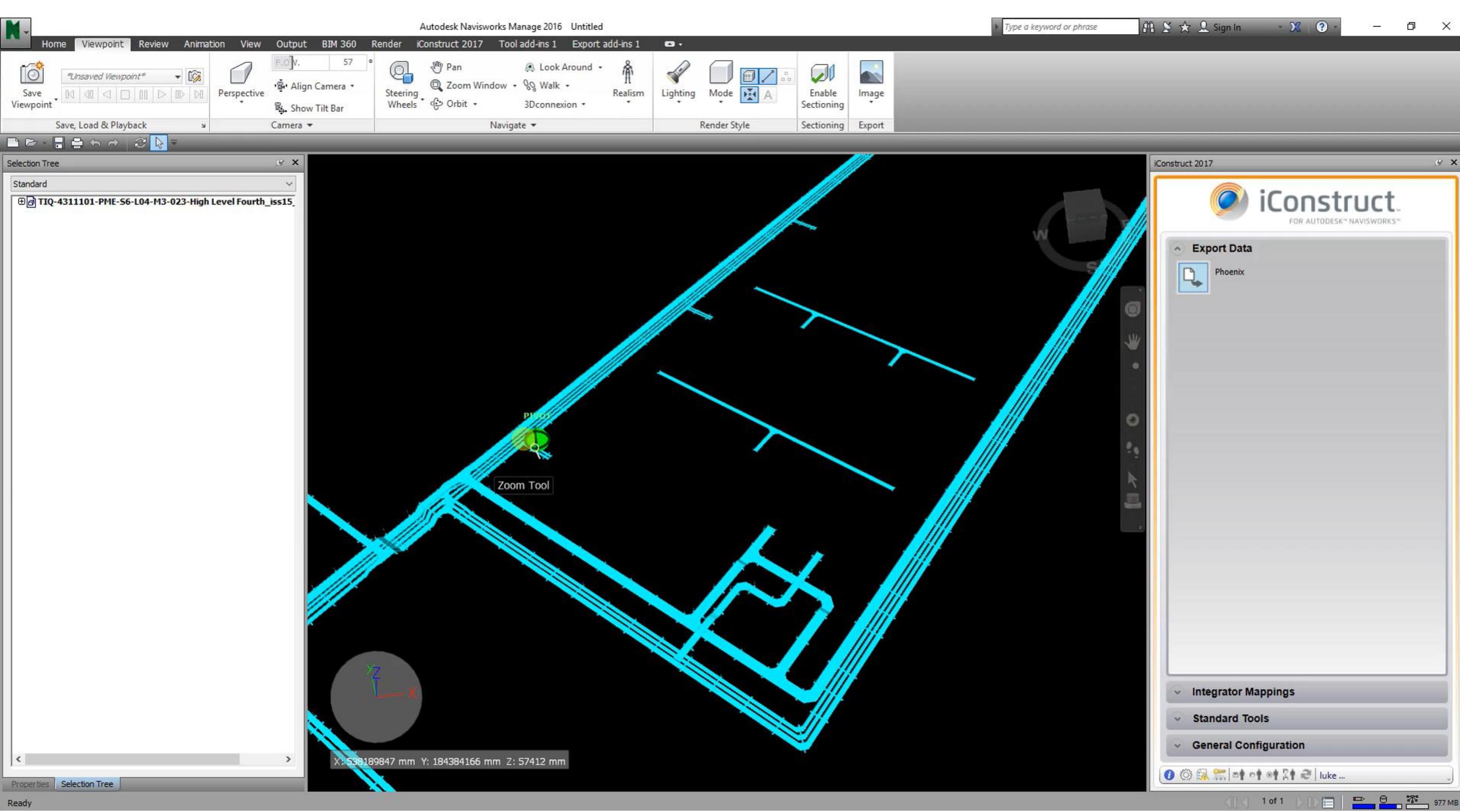


# BIM for Construction – Hand Over

## Reviewing models for LOIs

- Ensuring BIM deliverables are met by all trade contractors
- Attributes are checked through trade design with the use of iConstruct add-in
- Creating excel reports from Navisworks with object IDs / GUIDS for model interrogation
- Software Limitations makes workflows inconsistent





# Thank you



Make anything.