

ONE CROWN PLACE

 **mace**

IBSECAD

PROJECT CASE STUDY



DIGITAL CONSTRUCTION WEEK
LONDON 17 - 18 OCT 2018
INNOVATION IN THE BUILT ENVIRONMENT



@DigiConWeek

#DCW2018





Gareth Berridge
Senior Design Manager



Richard Baglow
Business Development
Director

Speakers

- 1. Overview**
- 2. BIM Strategy**
- 3. PCSA – Technical Model Management**
- 4. PCSA – Site Logistics**
- 5. PCSA – Early Engagement**
- 6. PCSA – Builderswork Strategy**
- 7. Main Contract**
- 8. Sub-Contractor Development**
- 9. Onsite Digital Construction**
- 10.Q & A**

Agenda



Overview

Project Team

AlloyMtd

C L I E N T

CBRE

M A N A G E M E N T

 **mace**

M A I N
C O N T R A C T O R

GT GARDINER
& THEOBALD

C O S T
C O N S U L T A N T

KPF

A R C H I T E C T

AECOM

M E P
C O N S U L T A N T



S T R U C T U R A L
E N G I N E E R

IBSECAD

T E C H N I C A L M O D E L
M A N A G E R

Aworth
SURVEY CONSULTANTS

R E T A I N E D F A Ç A D E
S U R V E Y S

O'KEEFE

SKANSKA



**COX
GOMYL**

 **Severfield**



PERMASTEELISA GROUP

Ambar Kelly



STONEBATHWEAR



TClarke



BDL
Dry Lining

emico

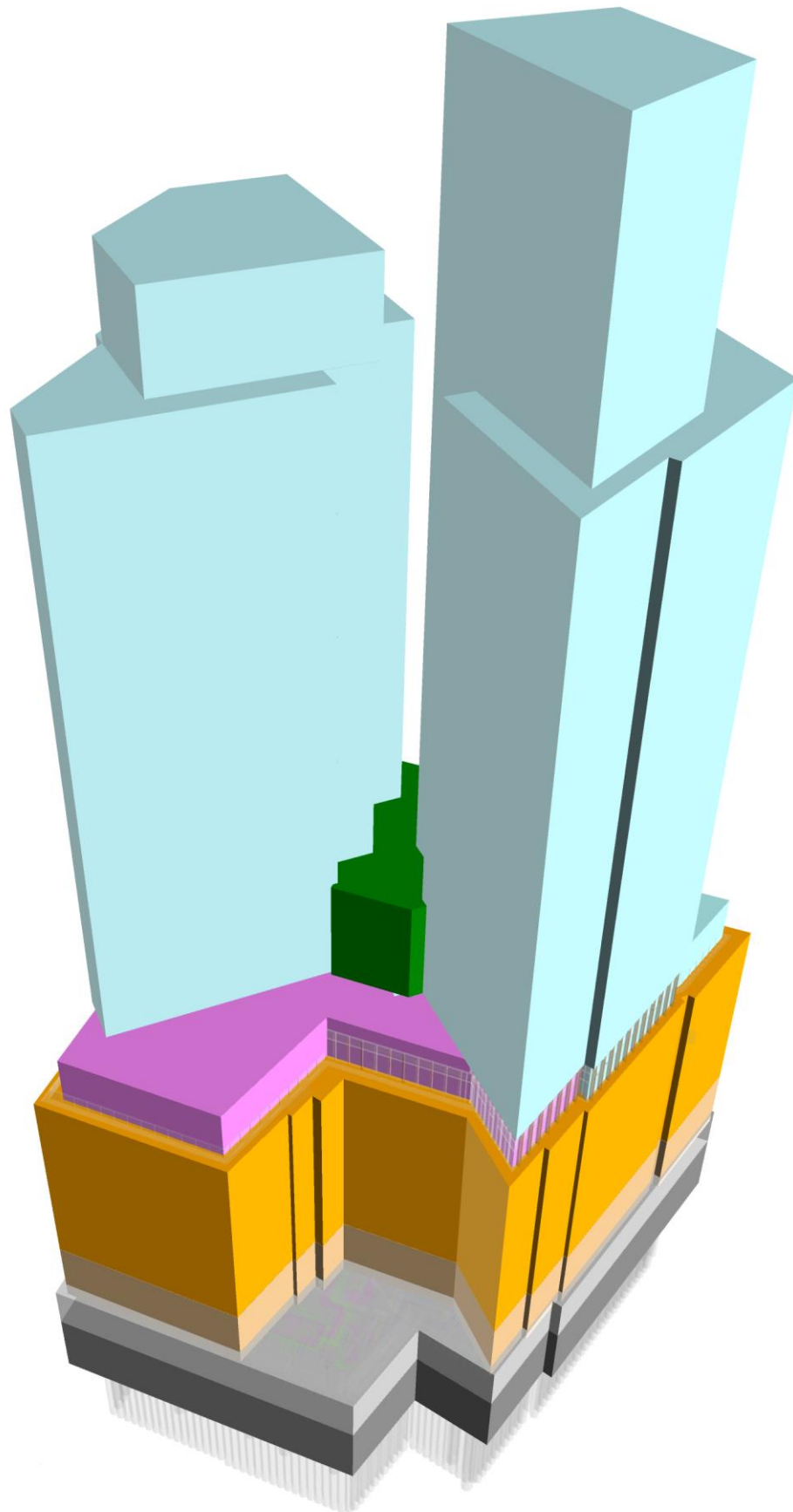
S U B & T R A D E
C O N T R A C T O R S S O F A R ...

Project Location



**ONE CROWN
PLACE**

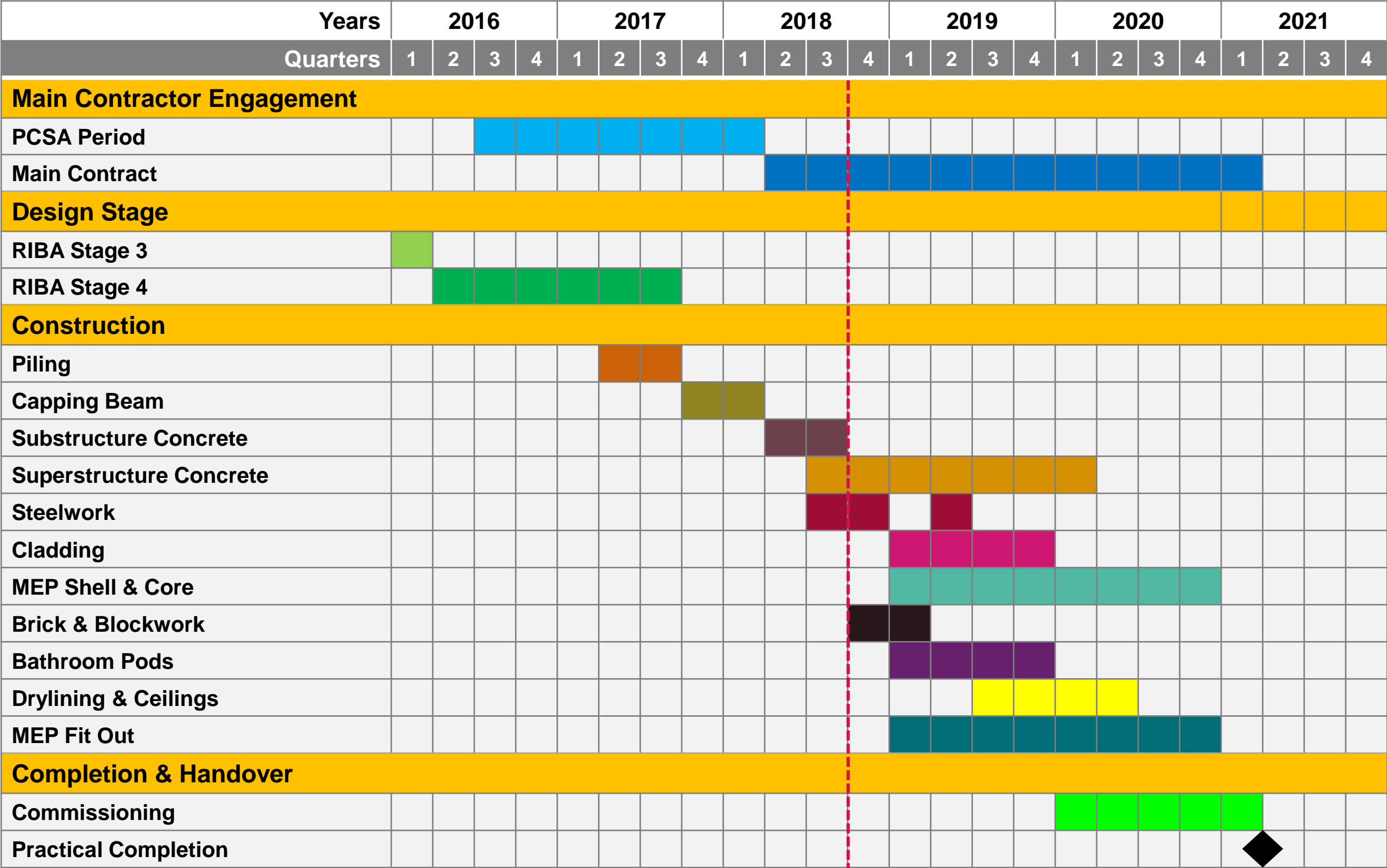
Project Overview



- Mixed Use Scheme
- Mace Major Projects
- Circa £230M Construction Cost
- North Tower – 30 Storeys
- South Tower – 35 Storeys

	B2 Plant
	B1 Plant/Cycle Store/Changing
	Ground Retail/Office/Entrances
	L1 – L6 CAT A Offices
	L7 Amenities & Plant
	L10 Plant
	Risers
	235No. Residential Units

Programme Overview





BIM Strategy

The BIM Strategy

Building Information Modelling (BIM) policy statement

This statement sets out Mace's strategic Building Information Modelling (BIM) commitments.

Our goal is to redefine how we can better create and care for the built environment. We are committed to making a difference through Building Information Modelling and digitally integrated working.

Our commitment:

At Mace we believe our customers should receive the very best experience. The purpose of the Mace BIM delivery model ALI360 is to optimise outcomes and service delivery for our clients at all stages of the project life cycle.



In support of these objectives we have formulated a set of ALI360 commitments that we will deliver to each of our customers, project teams and stakeholders:

- Enhance outcomes in safety, efficiency and sustainability through a collaborative and connected BIM working environment.
- All projects should have a digital strategy (by using BIM) which is aimed at reducing risk and add value through enhanced 3D communication and transparent data transactions.
- Develop cross-discipline digital enabled workflows and provide training to ensure Mace staff are equipped with the skill necessary to delivery digitally driven projects.
- Use BIM tools and techniques to optimise the design and delivery of Mace projects. Enabling a digitally integrated process, where we build twice, once virtually and once on the site.
- Actively engage and support our supply chain to help them develop their BIM capability and share knowledge in



- Create a digital strategy (using open data standards) allowing for the creation of structured data sets which can be used to enhance our efficiency in delivery and aftercare of projects.
- To develop methods for Mace to be recognised as a leader in the changes being created by the move to a digitally driven built environment.
- Continue to drive BIM Level 2 across the wider industry over the next 2 years (to meet 2020 agenda). To further form the essential foundations for a shift to Level 3 BIM (Digital Built Britain) and IoT (Internet of Things) as we move towards 2025.
- Ensure Mace maintain necessary accreditation as an independently verified BIM Level 2 company and gain further accreditation under PAS1192:3+ & BS EN ISO 19650: Part 1 & 2.
- Go 'beyond delivery', striving for operational stage soft landings powered by BIM.

Footnotes:

1. Building Information Modelling (BIM) is a process involving the generation and management of digital representation of physical and functional characteristics of an asset. BIM is a shared knowledge resource for information about an asset forming a reliable basis for decisions during its entire life cycle.
2. Level 2 BIM maturity is a series of domain and collaborative federated models, consisting of both 3D geometrical and non-graphical data, prepared by different parties during the project life cycle within the context of a common data environment. The project participants provide defined, validated outputs via digital data transactions using proprietary information exchanges between various systems in a structured and reusable form.
3. PAS1192:2:2013 is the specification for information management for the capital/delivery phase of construction projects using Building Information Modelling.
4. PAS1192:3:2014 is Specification for information management for the operational phase of assets using building information modelling.

Mace Project BIM Strategy Document



Mace Project BIM Strategy Proposal

Project Name: One Crown Place

Dated: 07 April 2016

Prepared by: Gareth Berridge

REVIEWED AND AGREED WITH PROJECT TEAM 03 OCTOBER 2016
CHRIS PETTY

Note: The following document has been prepared to identify the proposed primary objectives for the use of Building Information Modelling (BIM) on the project. This is a written response to the assessment of the tender information and the questions contained in the BIM Go / No Go assessment.

The intended purpose is to agree the level and extent of any BIM Modelling to be applied to the project.

This strategy is to be revisited at the prestart workshop.

Note: This strategy document is not intended to be used as a contractual document and should not be used to replace the project BIM Execution Plan which will still need to be produced.

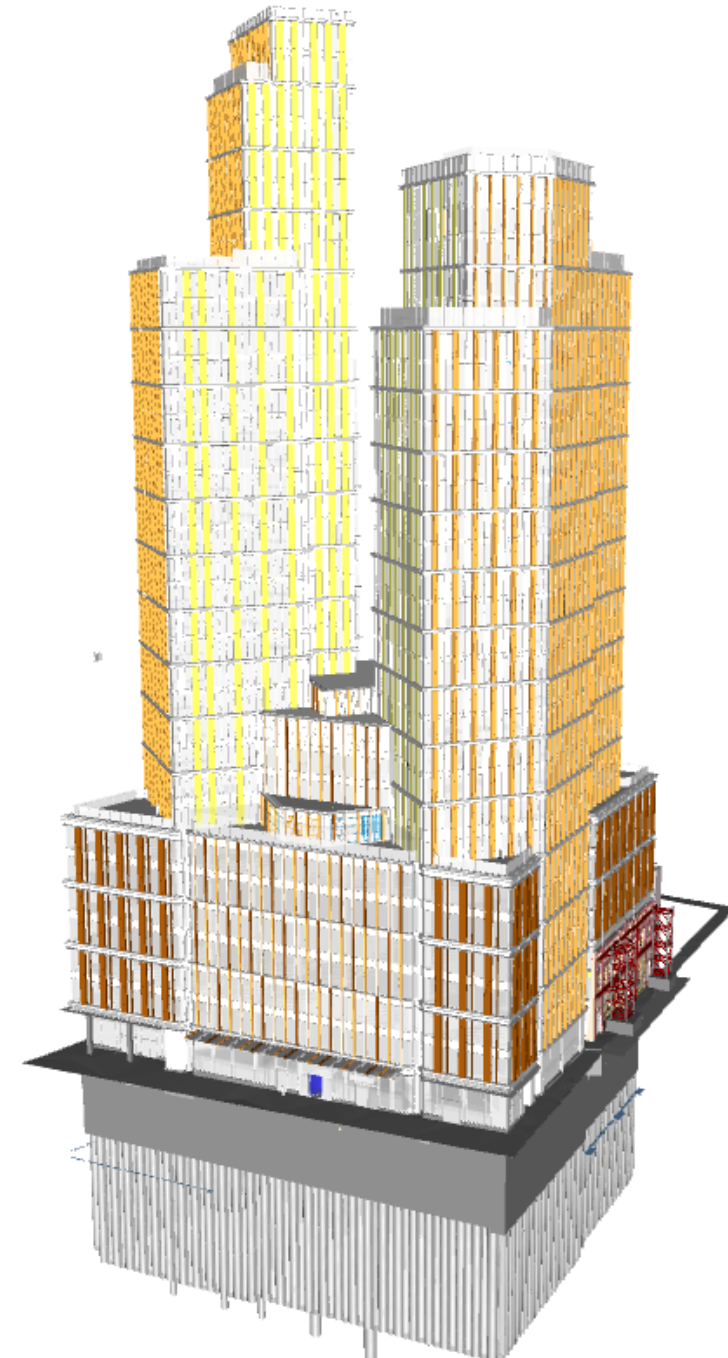
Note: Highlighted comments to be amended / deleted

DOCUMENT NUMBER	REV	DATE	DESCRIPTION	STATUS

MP-DM-FM-060

Classification: Unclassified

Pages: 1 / 13

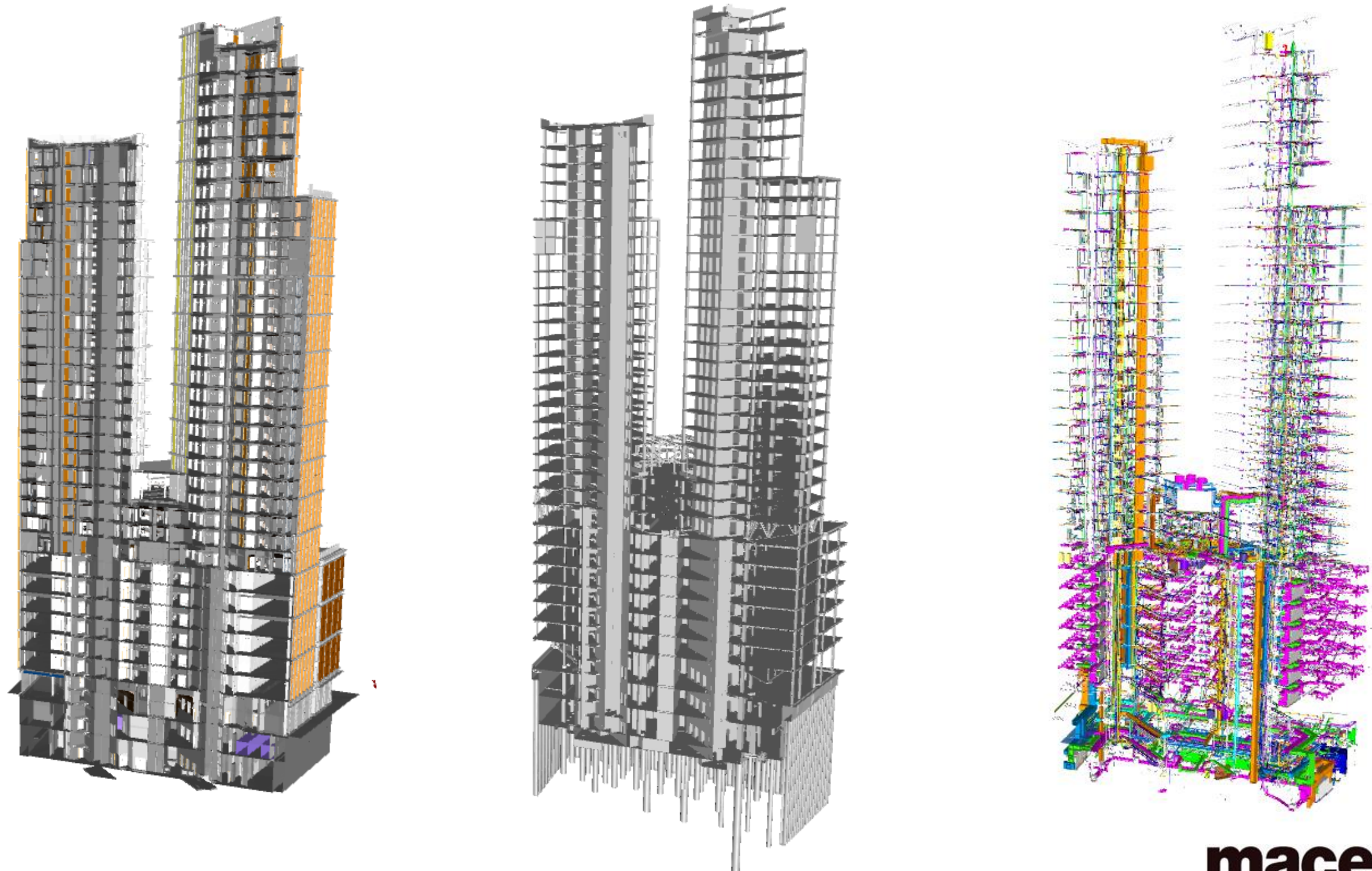


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One Crown Place

The BIM Strategy

PCSA

- Model to LOD300 (Stage 4 Design) – led initially by CBRE and design team



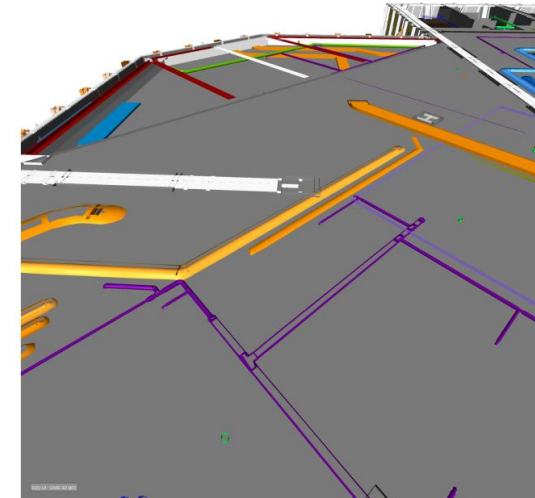
The BIM Strategy

PCSA Continued

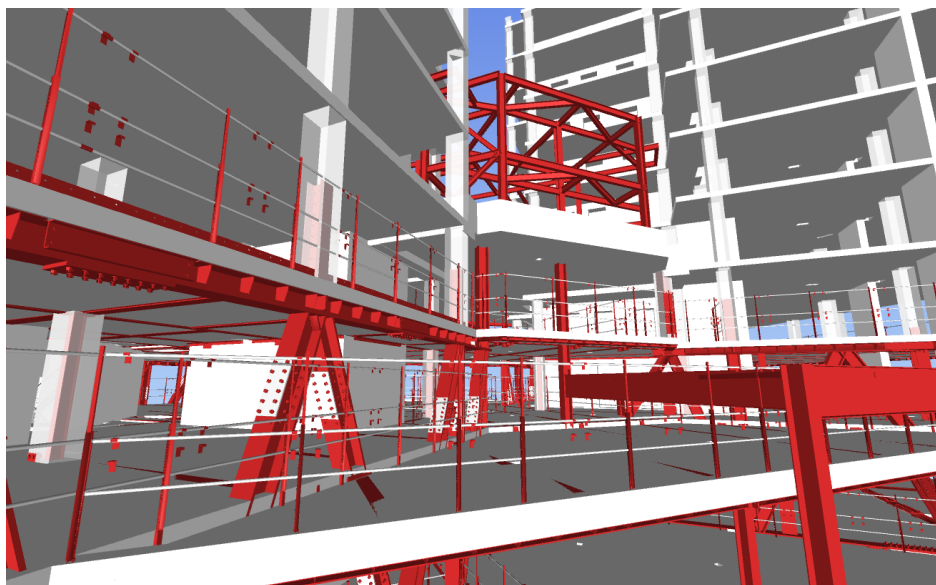
- Appoint Technical Model Manager
- Consultant model coordination - risk percentage
- Model logistics - de-risk interfaces
- Establish Builderswork budget
- Model high risk MEP areas to LOD400

IBSECAD VIEWPOINT			
VIEWPOINT REF.	45	PREVIOUS ACTION	CURRENT PROGRESS ON ACTION
VIEWPOINT TYPE	VISUAL/CLASH	SOFFIT INSULATION CLASHES - TO REVIEW IN FEDERATION MEETING. INSULATION HAS BEEN INCREASED. KPF TO REVIEW AND STATE THAT INSULATION THICKNESS IS 250mm.	
DATE ISSUED	08/06/17		
RESPONSE REQUIRED	KPF/AEC		
LOCATION	07	SCREENSHOT	

KEY PLAN:



Slide 48
Date 23/08/2017



Main Contract

- Subcontractors LOD400 model – final coordination
- BIM to field – quality and progress monitoring
- Sequencing of key areas

3

PCSA
Technical Model
Management

Technical Model Management

SCOPE OF WORKS

BIM Strategy; Protocols & Execution Plan

Model Federation; Reporting & Solution Driven Workshops

Logistics & Temporary Works Authoring

Design for Manufacture & Assembly Study

Evaluate Supply Chain capabilities

Main point of contact for all BIM Management processes

OBJECTIVES

Enhanced Collaboration through RIBA Stages

Robust Design prior to Sub-Contractor Appointment

Conflict resolution through RIBA Stages

Improve on Site Co-ordination

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Model Federation

- PCSA BIM Strategy & Design Support during VE
- PCSA Model Federation & Workshops

April 2016 – September 2016

October 2016 – November 2017

One Crown Place

Project Number: 33260

BIM Execution Plan

The following document is prepared to set out the process for managing the BIM design process for the One Crown Place Project

The BIM Execution Plan can only be revised by the appointed BIM Model Manager. It is approved by the Mace Project Manager / Operations Director.

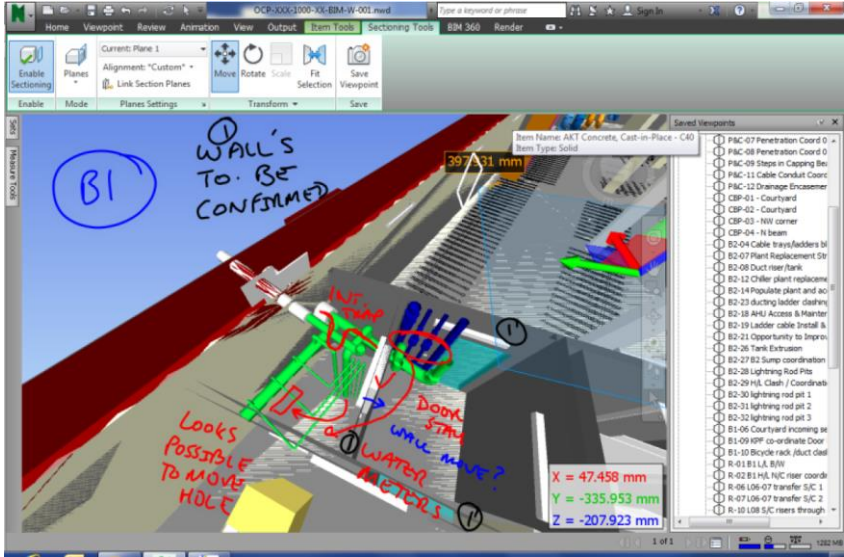
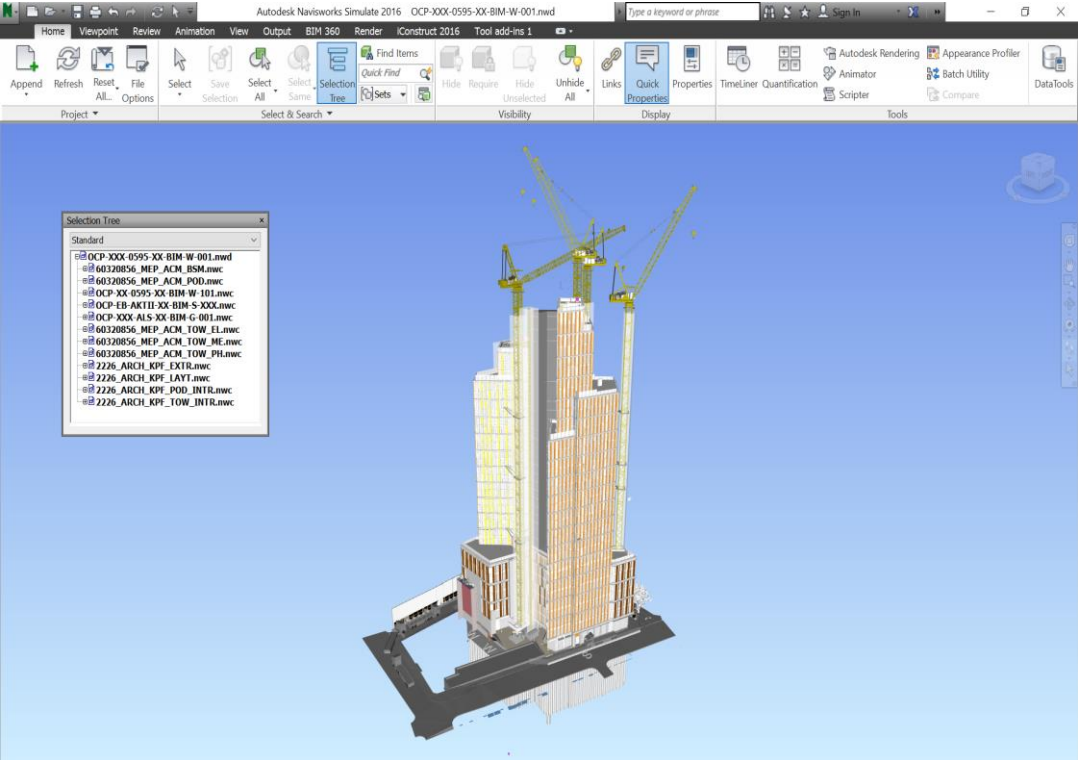
Revision History

DOCUMENT NUMBER	REV	DATE	DESCRIPTION	STATUS	SUITABILITY
ARDEIR-BEP	P01	12.09.16	Draft	WIP	S0
ARDEIR-BEP	P02	08.11.16	Issued for comment	WIP	S3
OCP-XXX-1000-XX-PC-Z	P03	09.01.17	Issued for comment	WIP	S2
OCP-XXX-1000-XX-BEP-W-001	P04	03.07.17	Issued for information	WIP	S2
OCP-XXX-1000-XX-BEP-W-001	P05	31.07.17	Issued for information	WIP	S2

Mace Document Classification: Unrestricted/Unrestricted delete as appropriate

Form: MP-DM-FM-020 v8

Page 1 of 46



Report Issued

Target = Reduce risk % into Main Contract

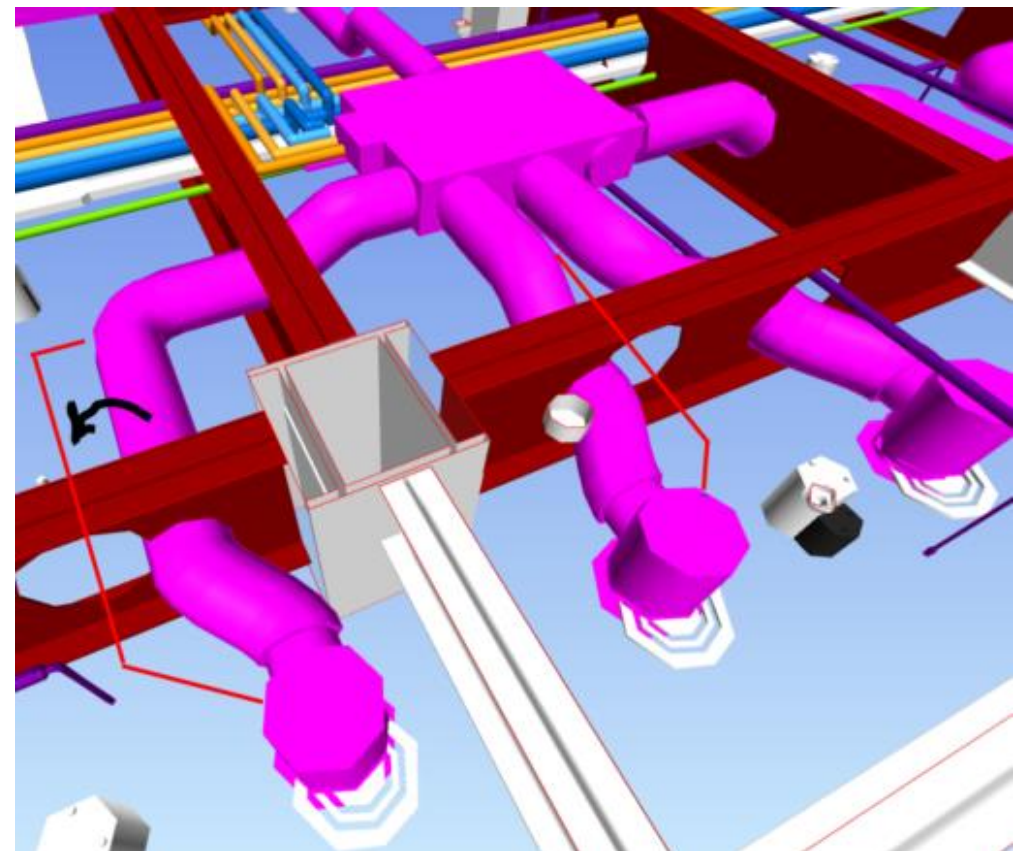
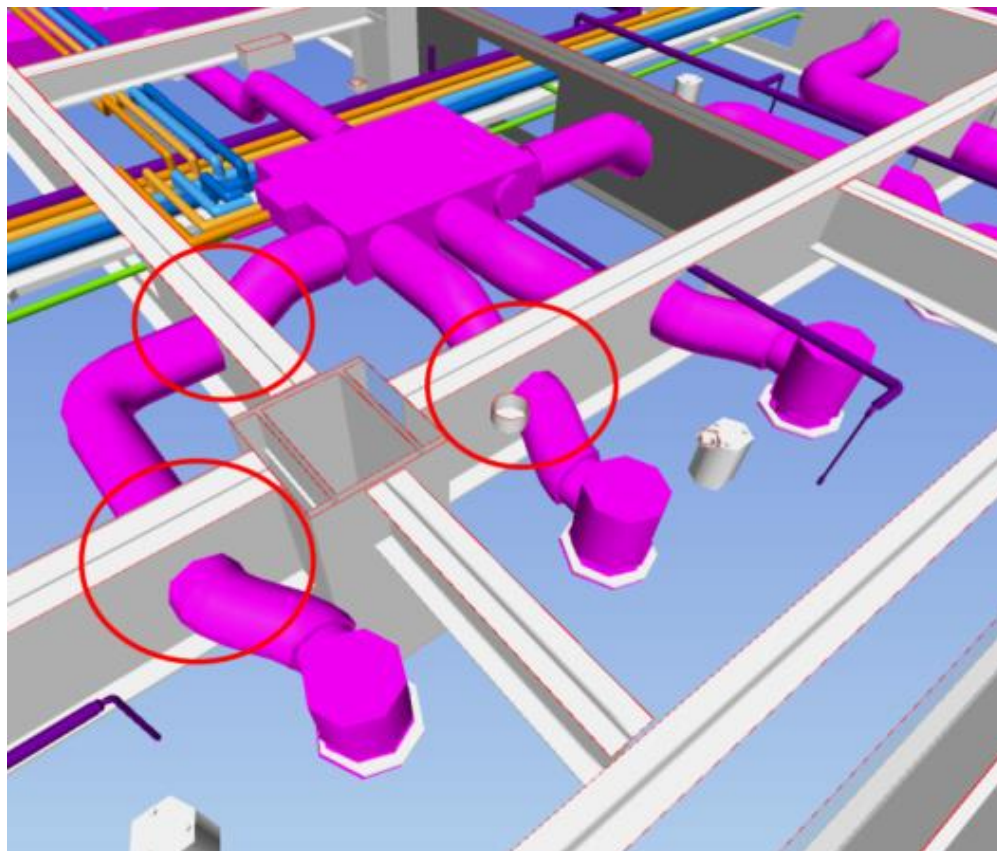
	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
WK 1	IBSECAD federate models and review model progress		BIM federation meeting	Model Stakeholders update models in line with agreed actions			
WK 2	Model Stakeholders update models in line with agreed actions		Model Stakeholders upload revised models to coniect	Mace QA uploaded model files	IBSECAD download updated Stakeholder models		

IBSECAD CLASH REPORT									
CLASH REPORT REF.		OCP-XXX-0595-BSM-RP-W-001							
LOCATION		BASEMENT							
Name	Status	Clashes	New	Active	Reviewed	Approved	Resolved		
OCP-BSM-DUCT&EQUIP vs DUCT & EQUIP	Done	535	0	27	0	508	0		
OCP-BSM-PH vs PH	Done	1	0	0	0	1	0		
OCP-BSM-ELEC vs ELEC	Done	0	0	0	0	0	0		
OCP-BSM-PIPE vs PIPE	Done	108	0	47	0	61	0		
OCP-BSM-PH vs DUCT&EQUIP	Done	15	0	15	0	0	0		
OCP-BSM-PIPE vs DUCT&EQUIP	Done	53	0	50	0	3	0		
OCP-BSM-ELEC vs DUCT&EQUIP	Done	1	0	0	0	1	0		
OCP-BSM-PIPE vs ELEC	Done	3	0	3	0	0	0		
OCP-BSM-PH vs ELEC	Done	0	0	0	0	0	0		
OCP-BSM-PIPE vs PH	Done	7	0	7	0	0	0		
Name	Status	Clashes	New	Active	Reviewed	Approved	Resolved		
OCP-BSM-AKTI WALLS vs AEC	Done	73	0	26	0	47	0		
OCP-BSM-AKTI FLOORS vs AEC	Done	405	0	363	0	42	0		
OCP-BSM-AKTI COLUMNS vs AEC	Done	68	0	68	0	0	0		
OCP-BSM-AKTI FRAMING vs AEC	Done	59	0	59	0	0	0		
Name	Status	Clashes	New	Active	Reviewed	Approved	Resolved		
OCP-BSM-KPF FLOORS vs AEC	Done	338	0	240	0	98	0		
OCP-BSM-KPF WALLS vs AEC	Done	638	0	140	0	498	0		
OCP-BSM-KPF CEILING vs AEC	Done	16	0	16	0	0	0		

Solution Driven Workshops

Steelwork Cellular Openings

- Complex Steelwork design through Podium levels required detailed penetration reviews.
- Multiple instances of missing openings captured by design team which repeated through all the Floors and BOH areas at Ground Floor.
- All Openings Incorporated with AKTII prior to Steelwork package being tendered.

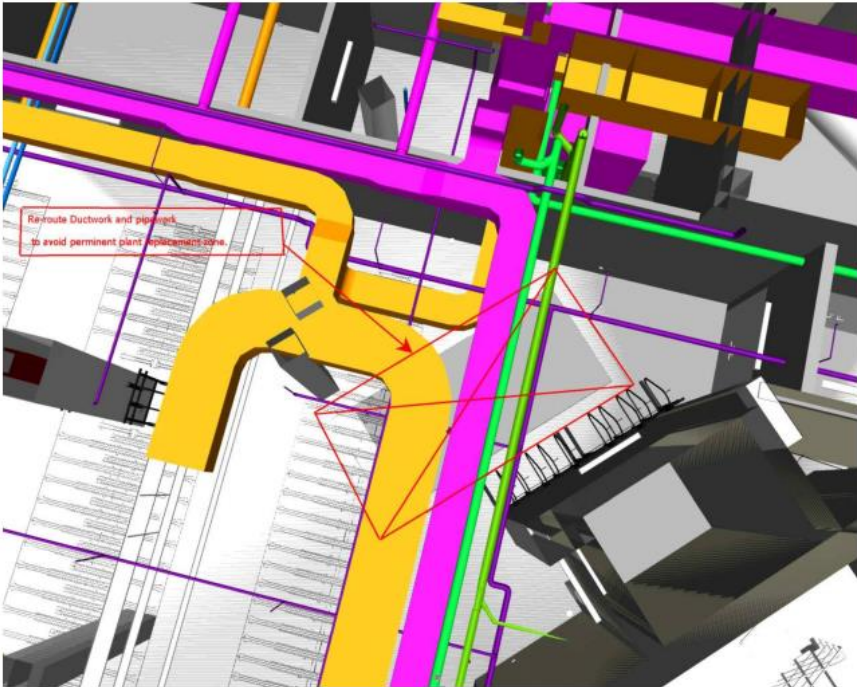
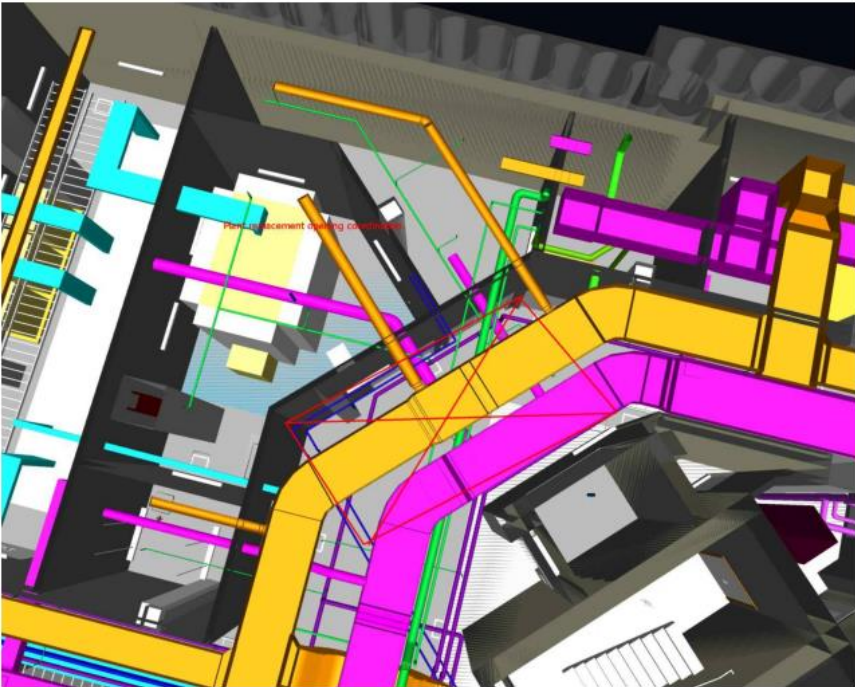


Solution Driven Workshops

Basment Plant Installation & Replacement Route

- Ground to Basement 2 “mole-hole” created for all Plant Installation and future major Plant Replacement.
- Highlighted, tested and reviewed throughout Stage 4 design co-ordination capturing required changes prior to tender package completion.

IBSECAD VIEWPOINT		
VIEWPOINT REF.	V003 & 004	DESCRIPTION
VIEWPOINT TYPE	LOGISTICS	
DATE ISSUED	20/01/2017	H/L MEP Services at B1 & B2 run through the plant replacement access. Services to be re-routed around plant replacement opening as far as practicable.
RESPONSE REQUIRED	INFO ONLY	
LOCATION	N/A	SCREENSHOT

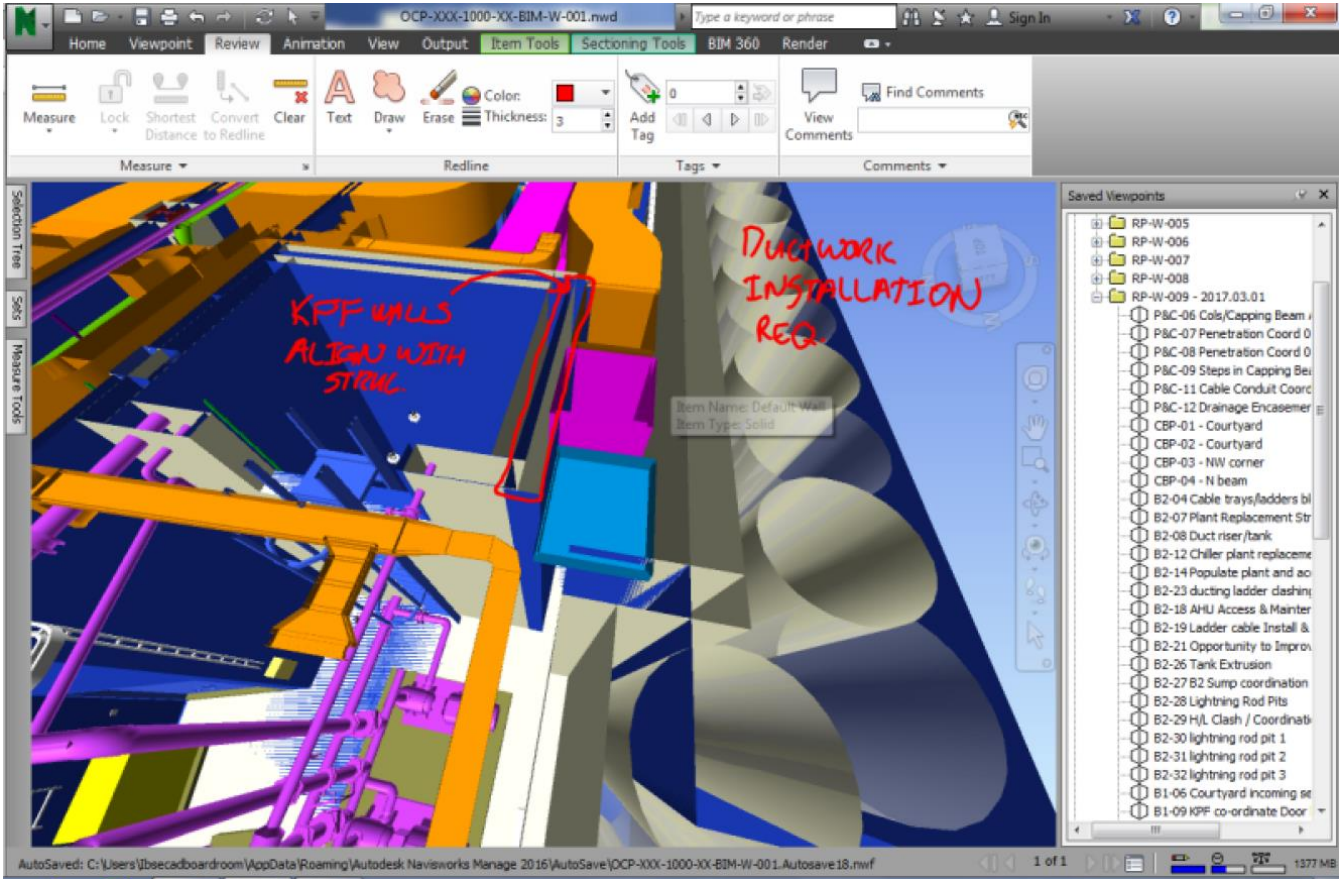
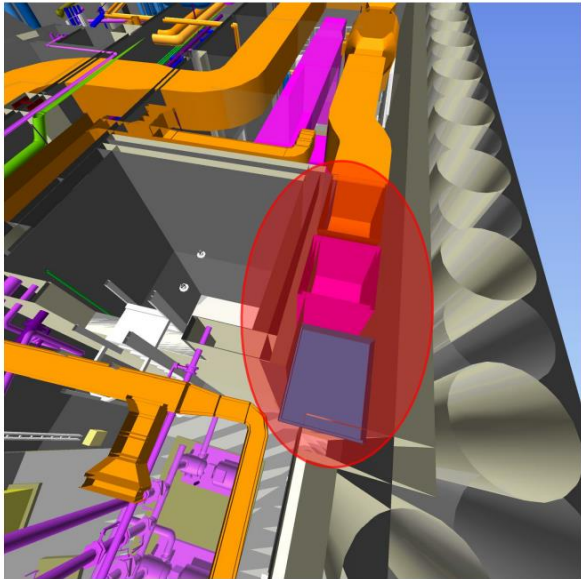


Solution Driven Workshops

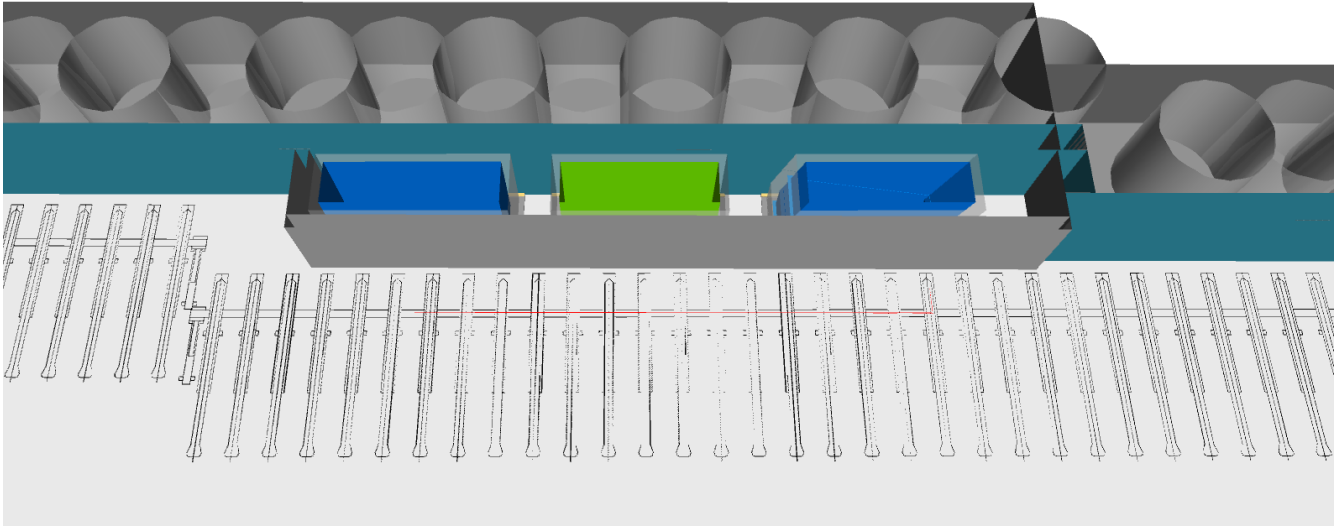
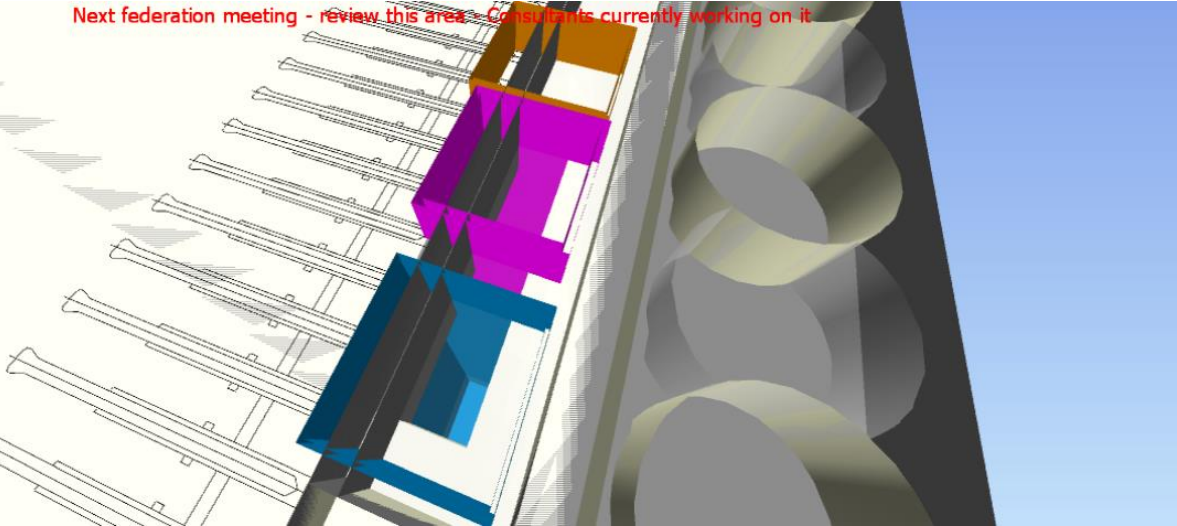
Key Structural Builderswork co-ordination

- Finalising large structural openings were key in the Basement areas in particular.
- Example of multiples Interfaces with MEP & Architecture key around Bike Store at B1.

IBSECAD VIEWPOINT			
VIEWPOINT REF.	B2-08	PREVIOUS ACTION	CURRENT PROGRESS ON ACTION
VIEWPOINT TYPE	CLASH AND COORDINATION	DUCTWORK CLASHING WITH TANK ROOM R.C. WALL & RISER AT B1.	DUCT CLASHES WITH CONCRETE TO BE RESOLVED. BICYCLE STORAGE CANNOT BE REDUCED AT B1, AKTII CONFIRM BUILDERS WORK OPENING CANNOT BE 1 STRIP AND MAY NEED INDIVIDUAL HOLES FOR THE DUCTS. +/- 300mm RC STRIP BETWEEN OPENINGS.
DATE ISSUED	24/01/17	POSSIBLE ADJUSTMENT TO TANK WALLS DUE TO BLOCKWORK KPF TO CONFIRM.	
RESPONSE REQUIRED	AEC/KPF		
LOCATION	BASEMENT B2 H/L	SCREENSHOT	



Slide 24
Date 15/03/2017



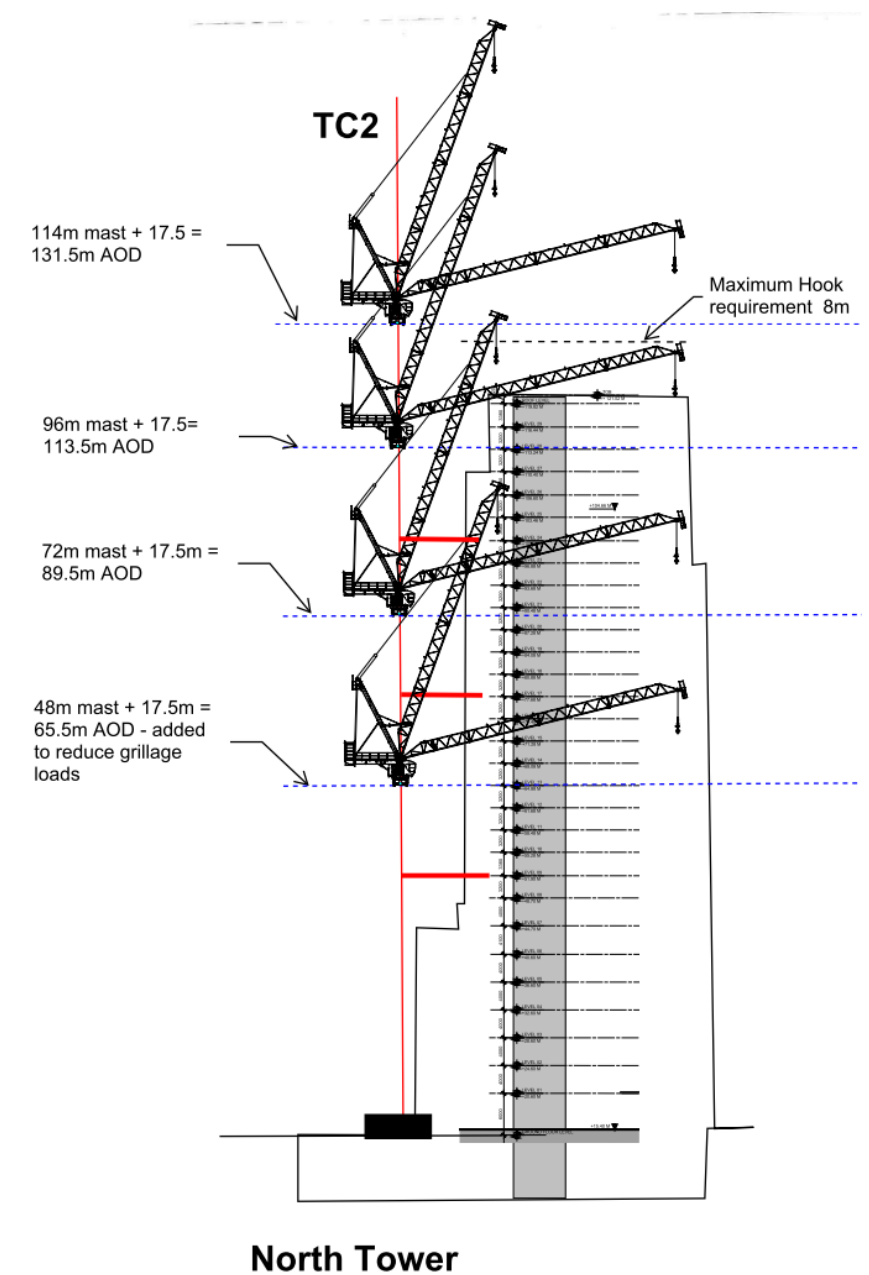
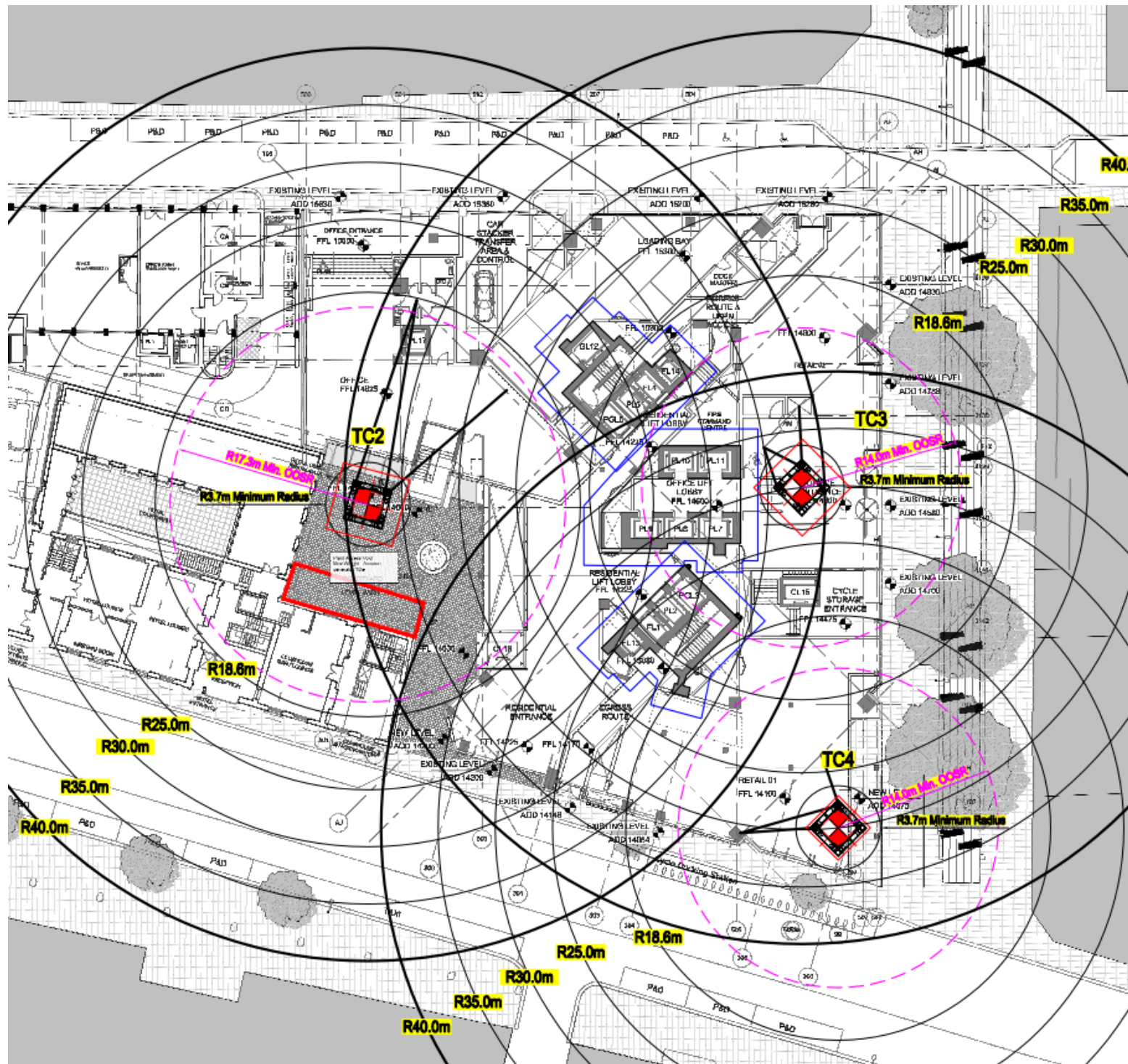
4

PCSA

Site Logistics

Breaking the Mould

- Avoid a traditional “2D” approach to Logistics & Temporary Works by creating 3D elements to carry out detailed planning within the Federated Model environment.



Logistics Model

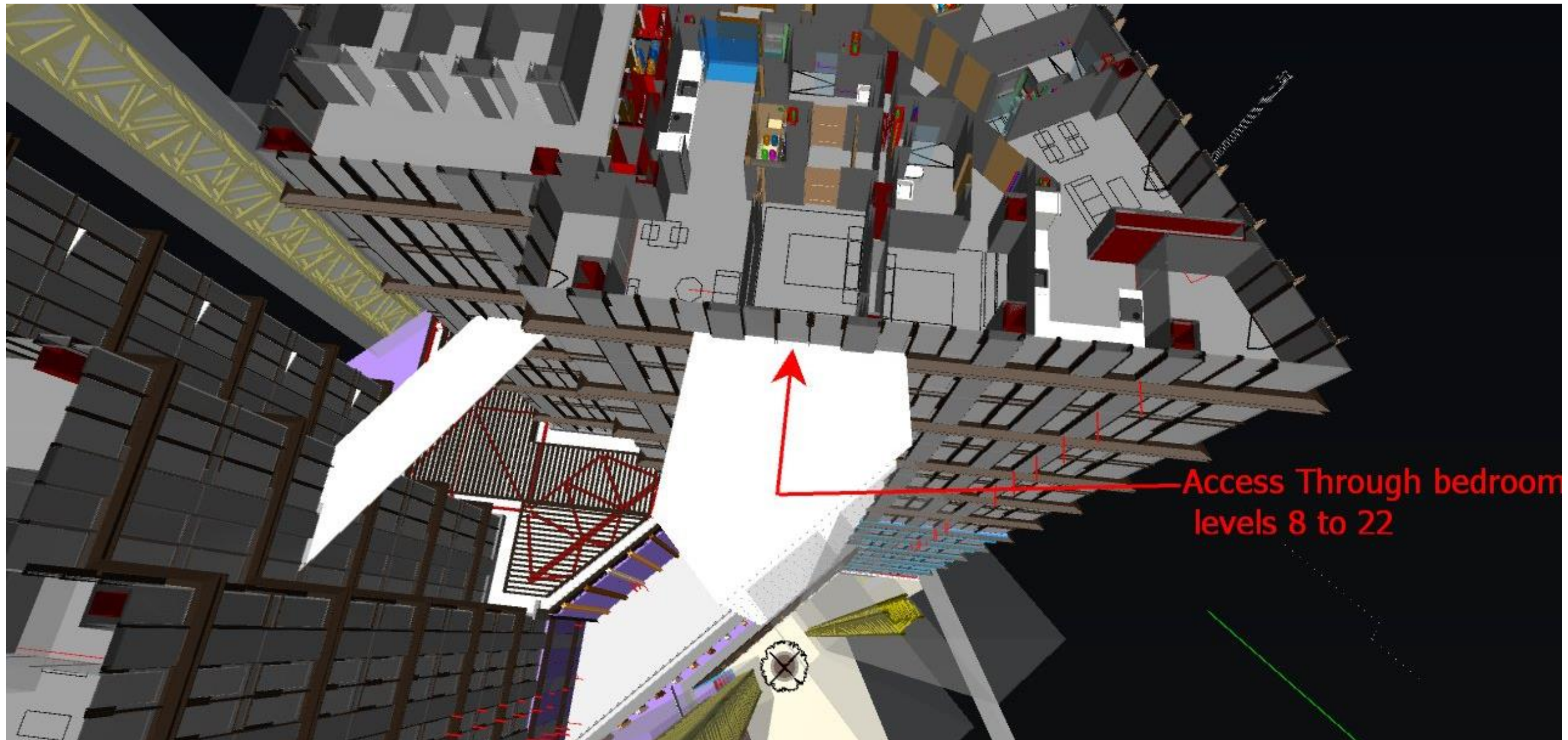


3D Model included;

- **3No. Tower Cranes**
- **Tower Crane Grillage**
- **Tower Crane Ties**
- **Basement Props**
- **Hoarding Lines**
- **Hoists & Scaffold Access Towers**
- **Hoist Ties**
- **Gantries**
- **Temporary & Permanent Steelwork**

Detailed Planning

- Speed of iteration for optimal hoist solution
- Complete buy-in from the team.
- Clear advantage over equivalent, drawing based, method.



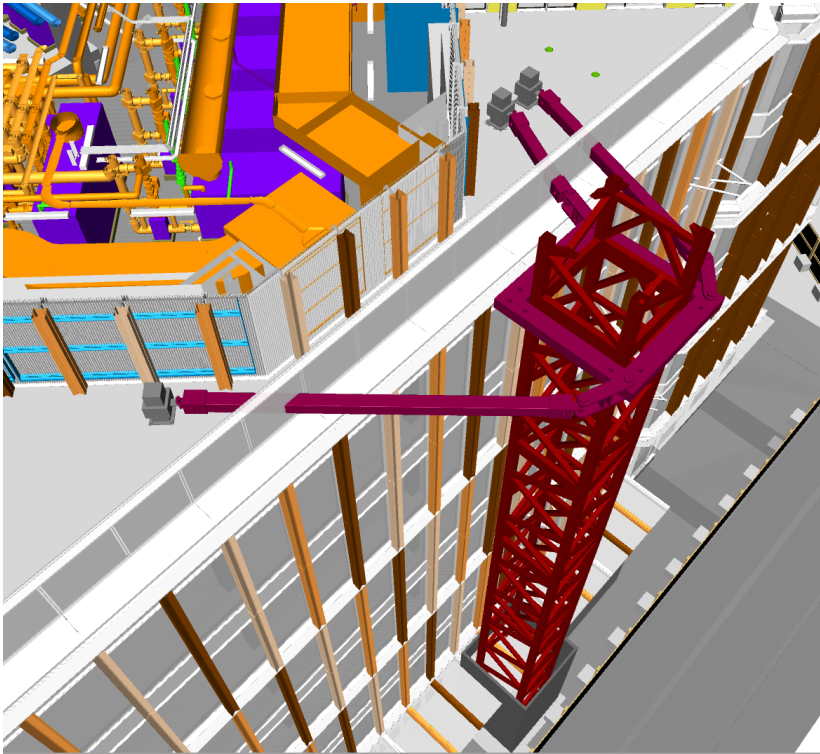
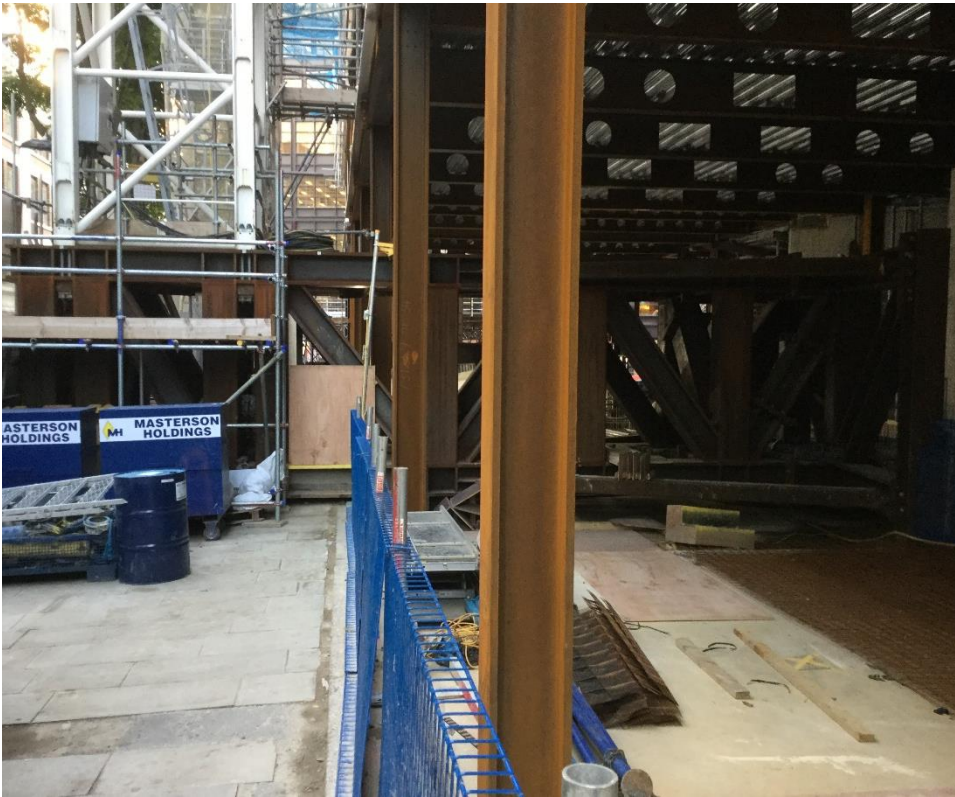
Detailed Planning

TOWER CRANE CO-ORDINATION

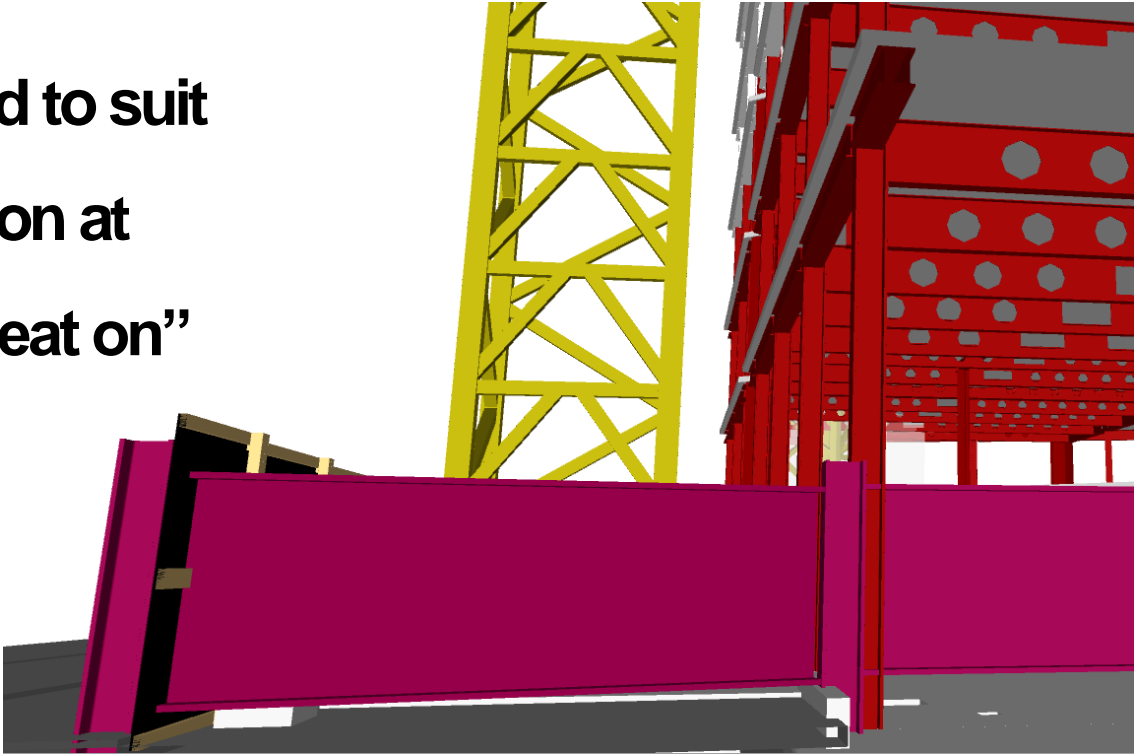
IBSECAD VIEWPOINT

VIEWPOINT REF.	TC03-04	DESCRIPTION
VIEWPOINT TYPE	LOGISTICS	
DATE ISSUED	23/11/16	Tower Crane – TC03 Level 7 Plant Room
RESPONSE REQUIRED	INFO ONLY	
LOCATION	N/A	SCREENSHOT



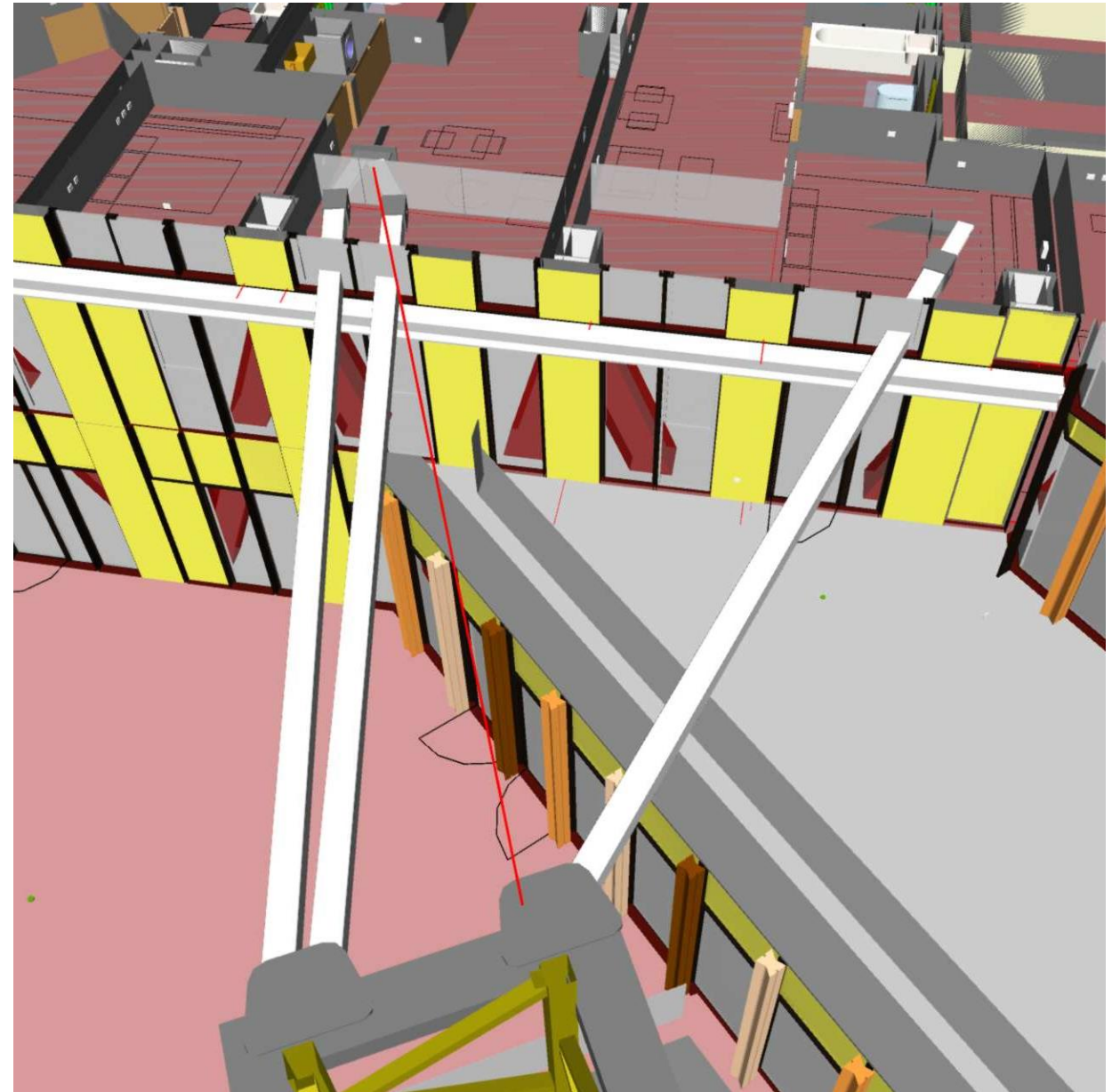
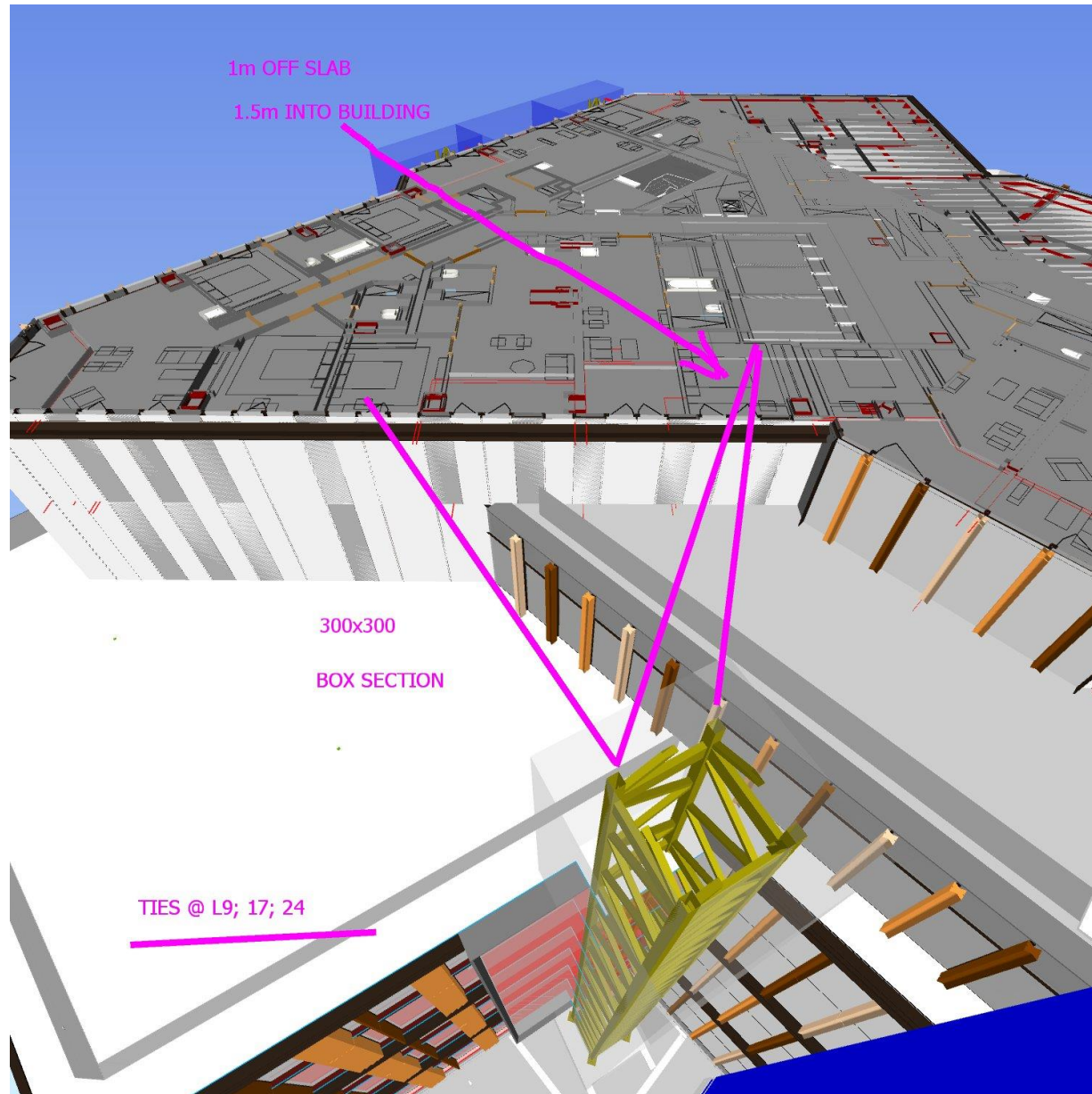


**TC3 location adjusted to suit
LTHW Plant Installation at
Level 7 and avoid “Heat on”
Programme issue.**



Detailed Planning

CRANE TIES SET TO MISS CLADDING MULLIONS



CRANE TIES SET TO AVOID BATHROOM PODS

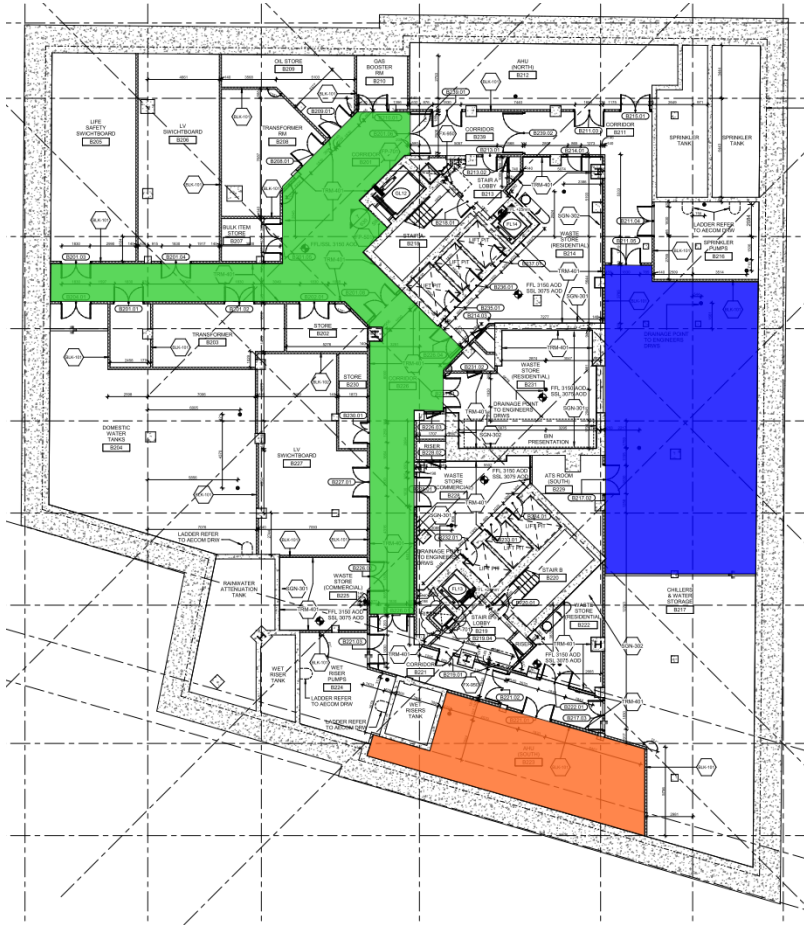
Planned vs Actual



PCSA
Early
Engagement

Pinch Point Validation

- As part of the Stage 4 Sign off and agreement on Risk Percentage, Ibsecad were instructed to complete key area MEP Co-ordination to LOD400 working alongside the Design team.



BASEMENT L2

Main BOH Corridors

Chiller Room

South AHU Room

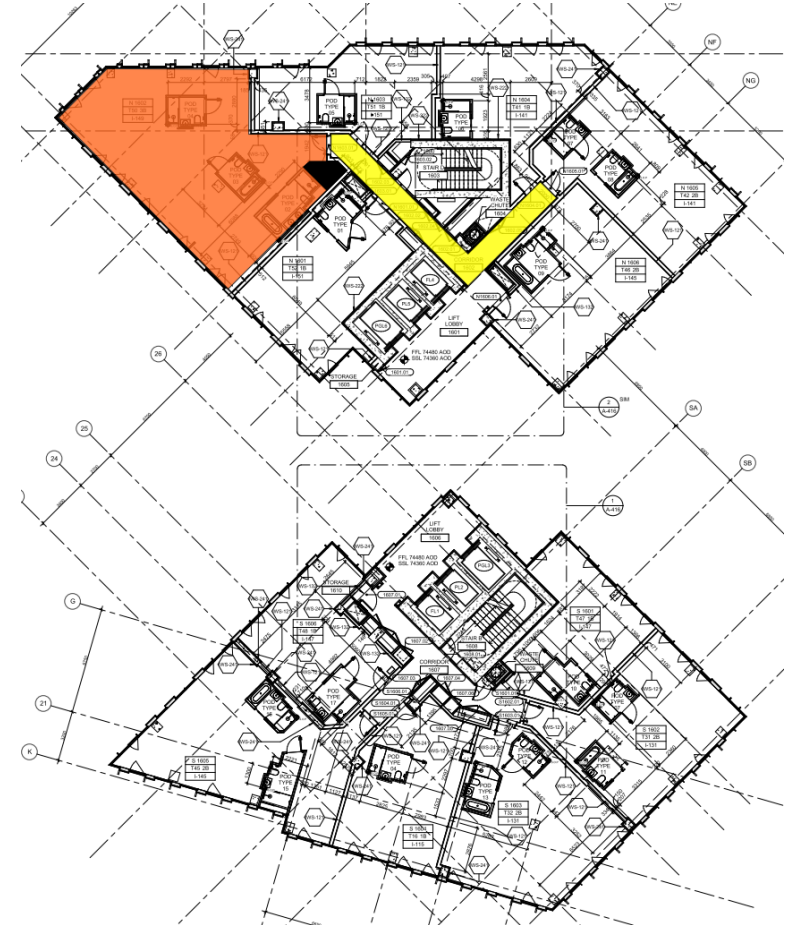


LEVEL 3

CAT A Typical Bay

CAT A AHU Room

North & South Risers



LEVEL 16

Residential Lobby

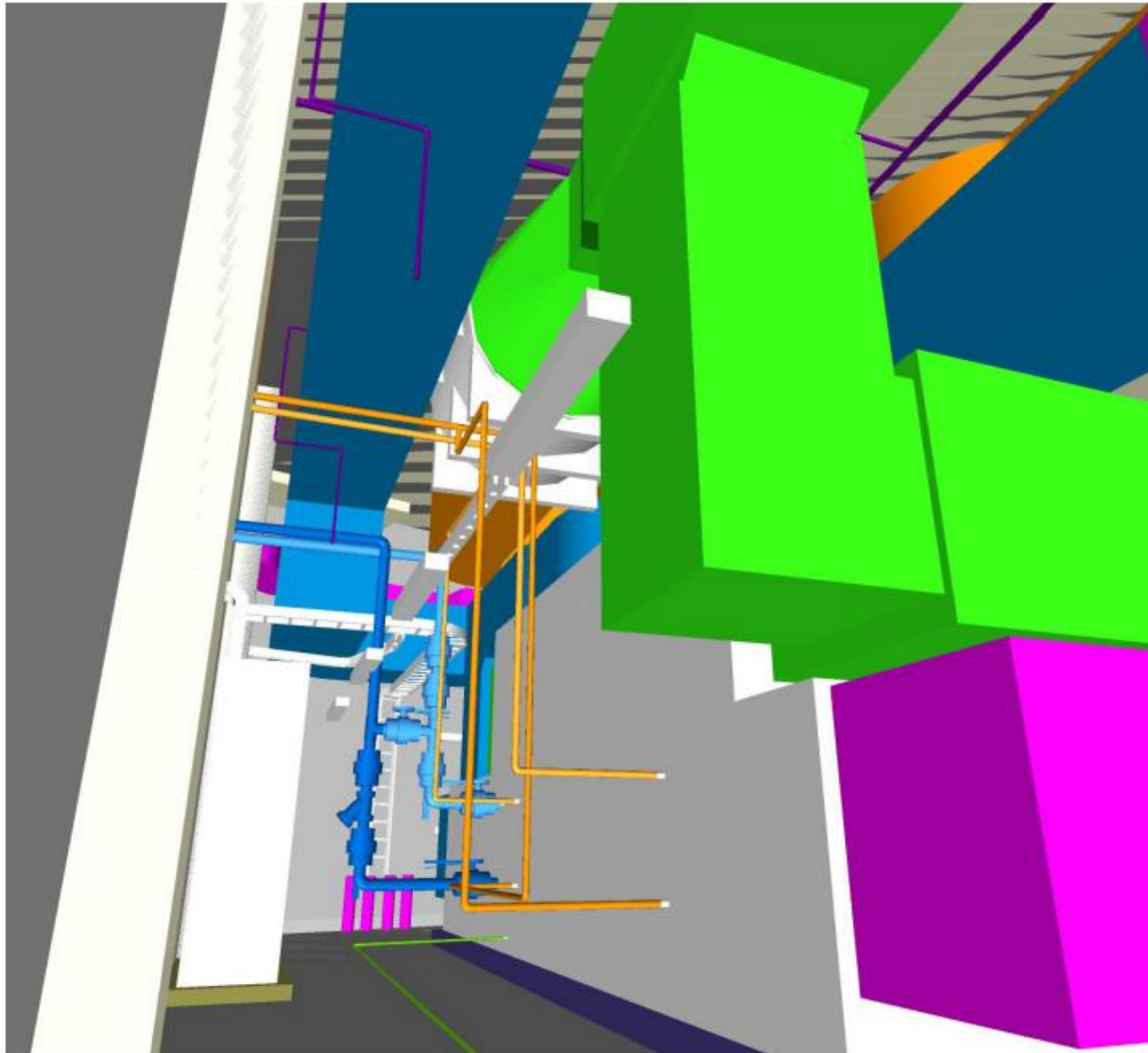
3 Bed Apartment Type

Utility Cupboard

Value Added Co-ordination

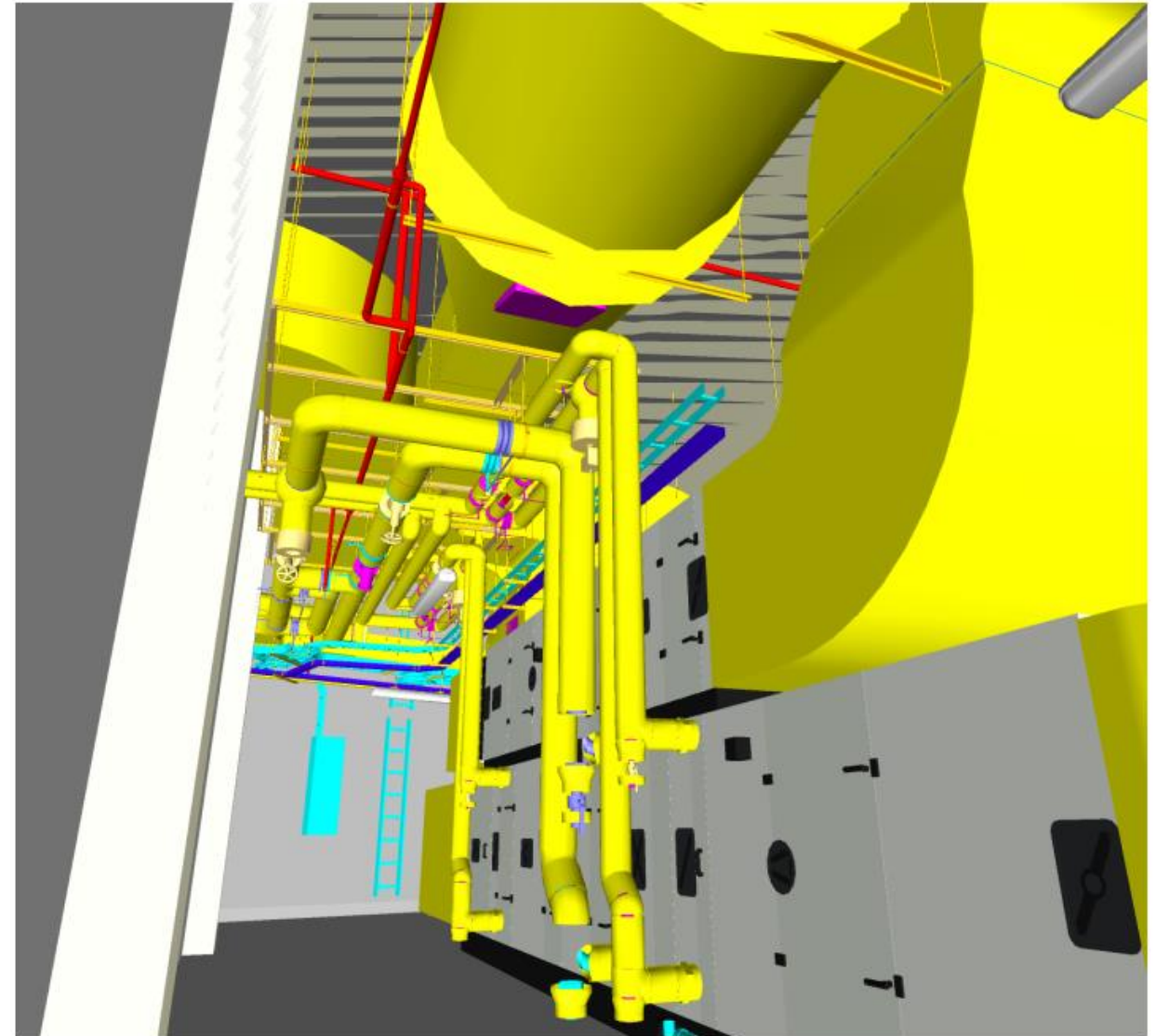
- Improving Plant Access & Maintenance

BEFORE



Aecom design model

AFTER



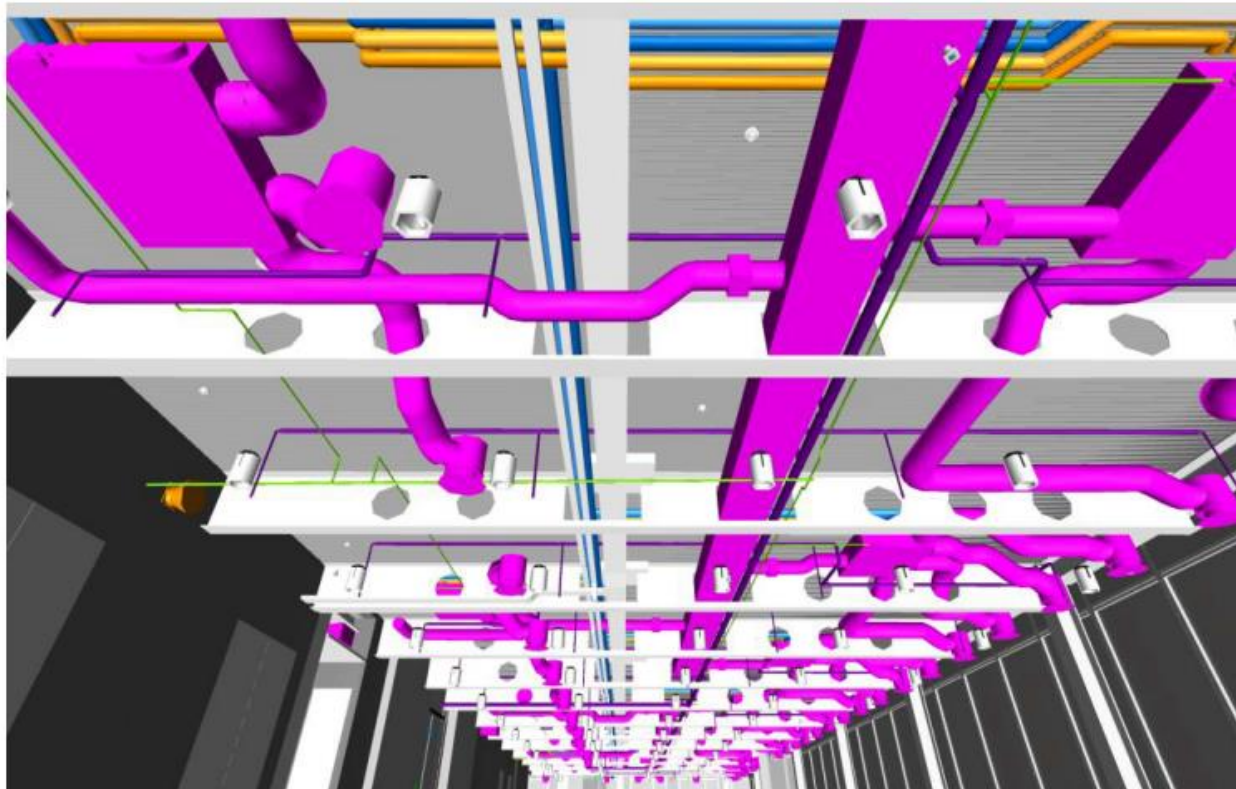
Ibsecad Coordinated Model

Value Added Co-ordination

- CAT A Office crossover co-ordination improved
- Reflected services layout principles agreed with client

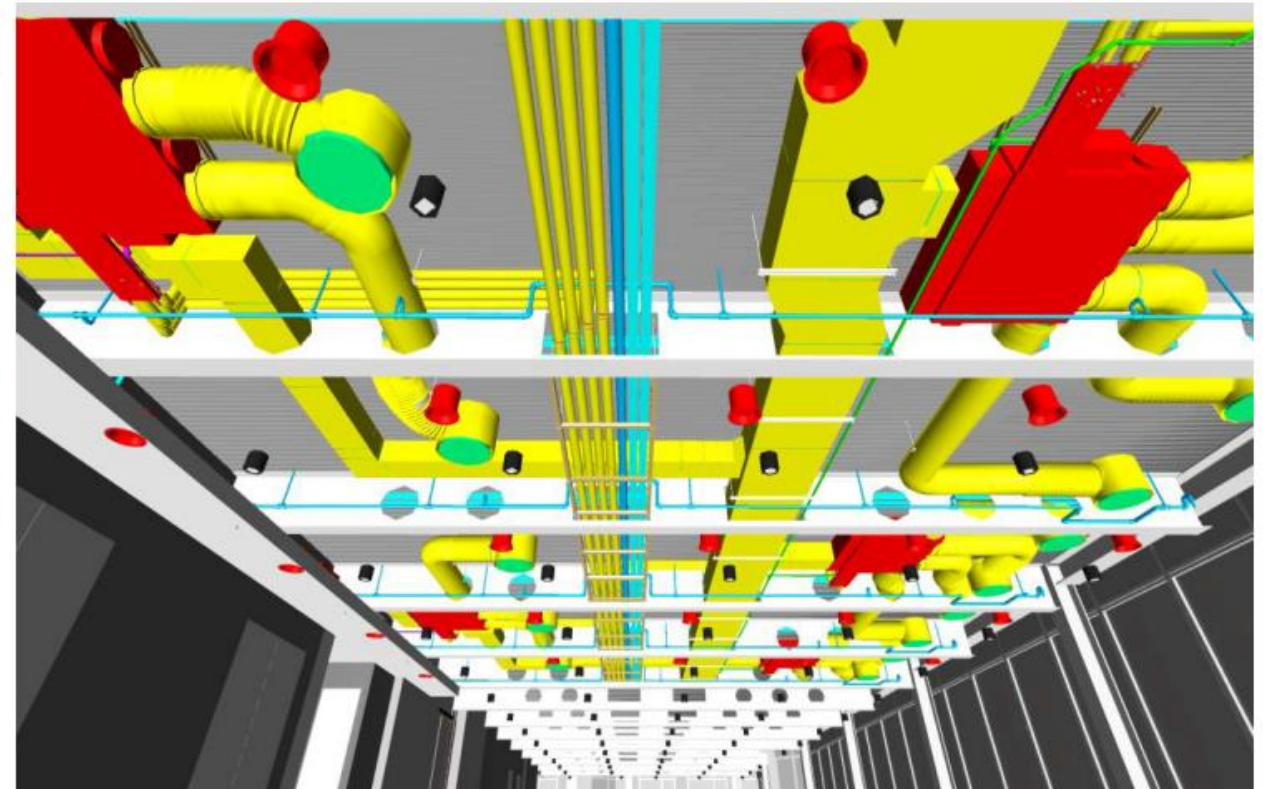
BEFORE

Aecom design model



AFTER

Ibsecad Coordinated Model



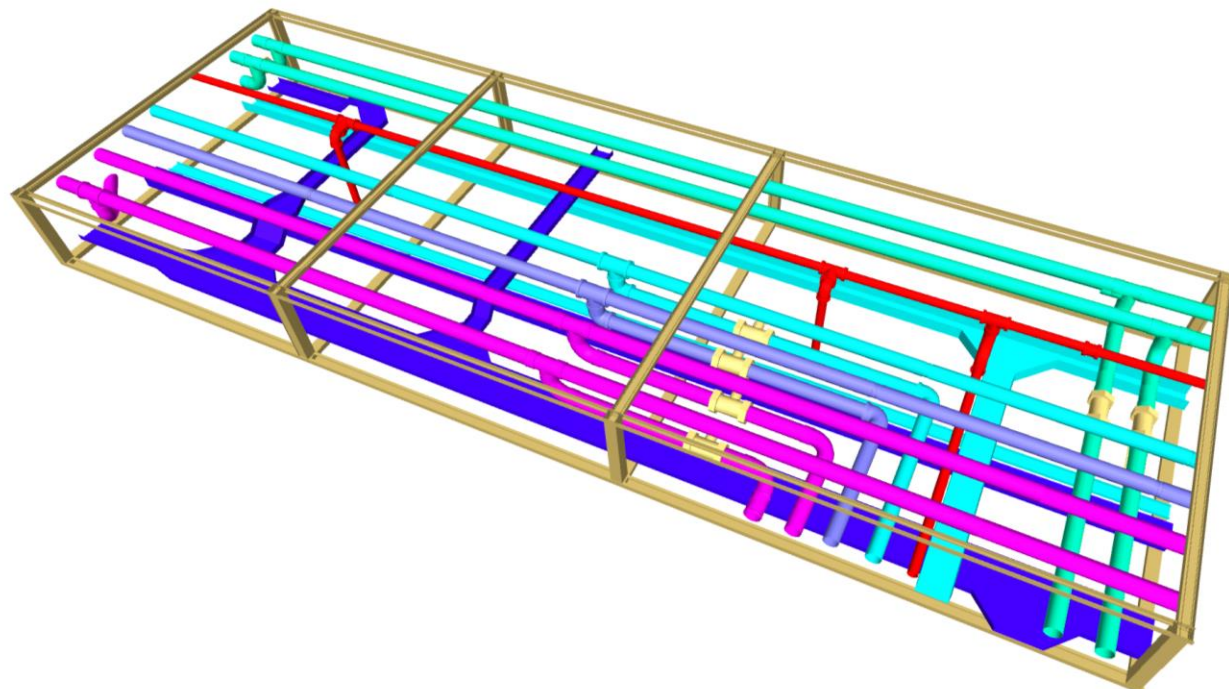
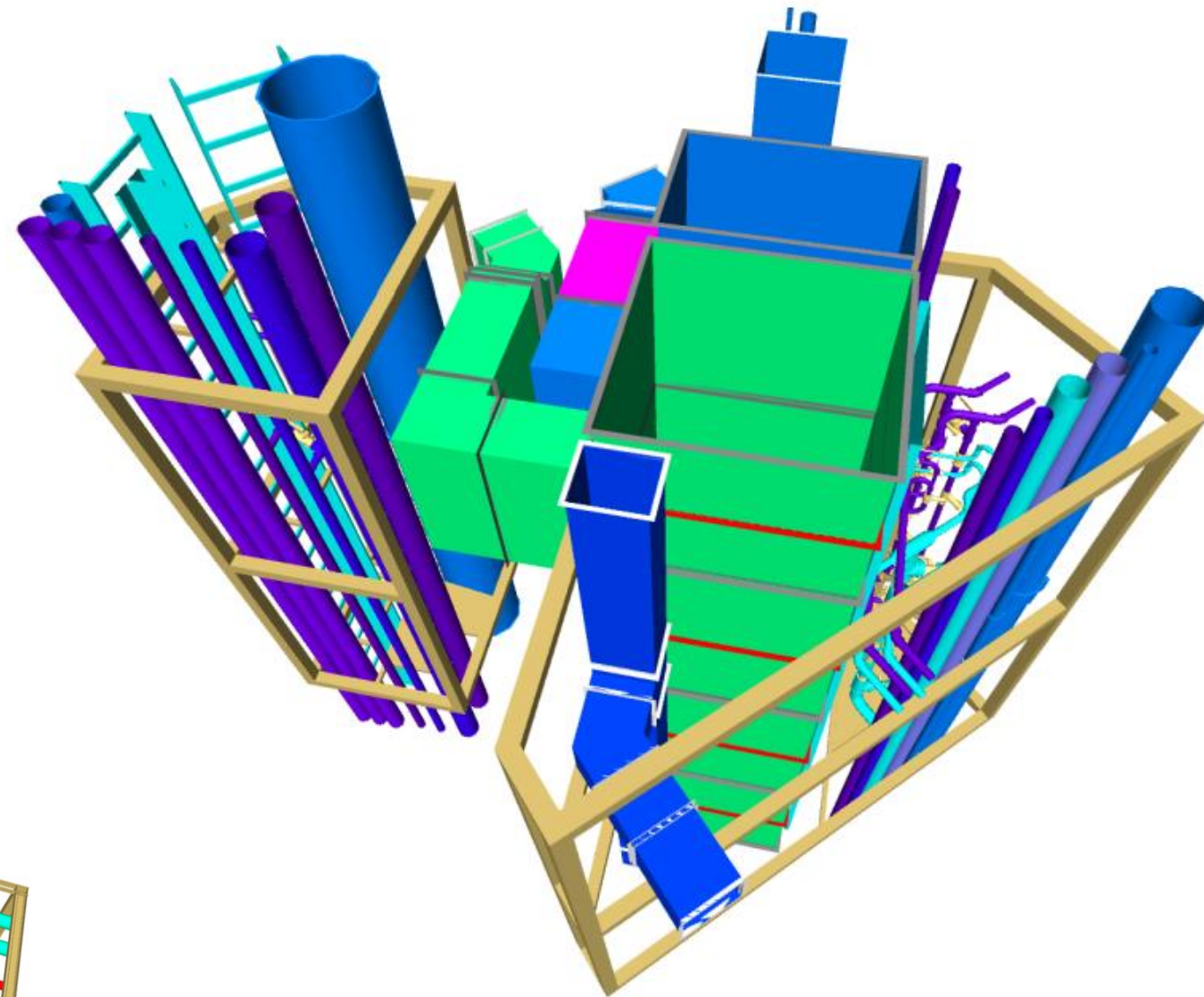
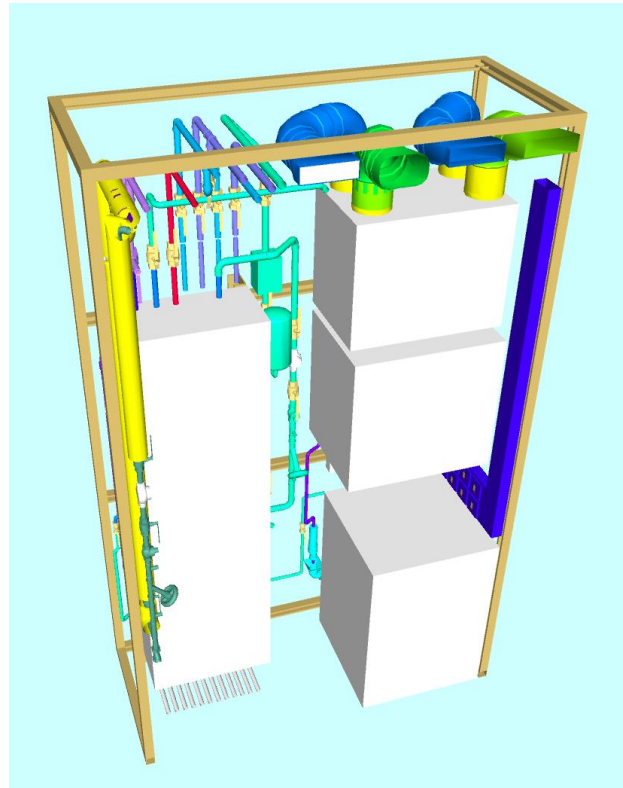
Value Added Co-ordination

- CAT A Office Rendering for Client agreement



Design for Manufacture & Assembly

- Early Engagement also allowed for the DfMA Principles & Prototypes to be formulated into a Project Strategy for future Sub-Contractor tendering.



Risk...Confidence

THIS EXERCISE GAVE THE CLIENT & MACE CONFIDENCE THAT THE STAGE 4 DESIGN WAS ROBUST AND REDUCED THE RISK AGAINST SPATIAL CO-ORDINATION ISSUES.

BEFORE



Aecom design model

AFTER



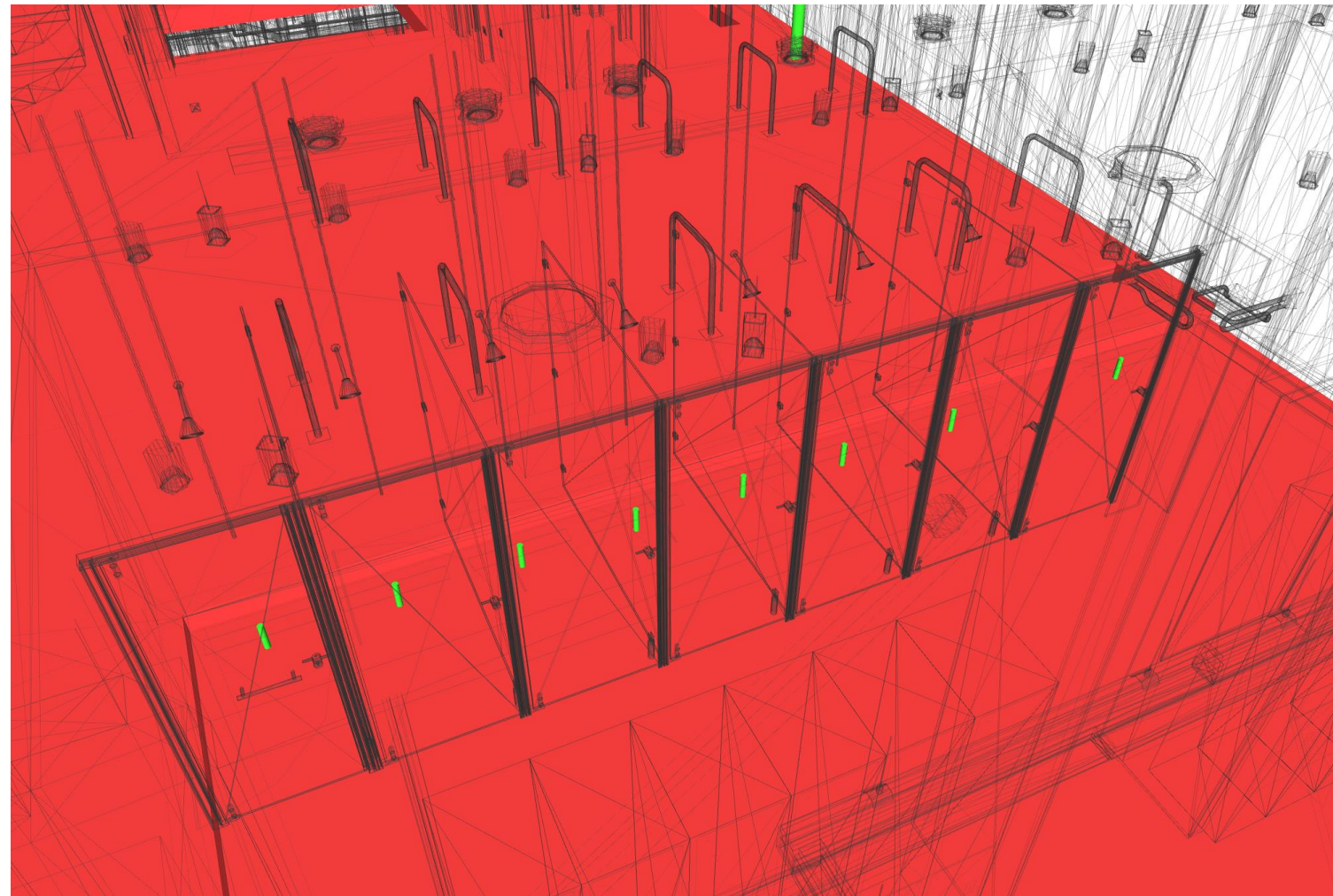
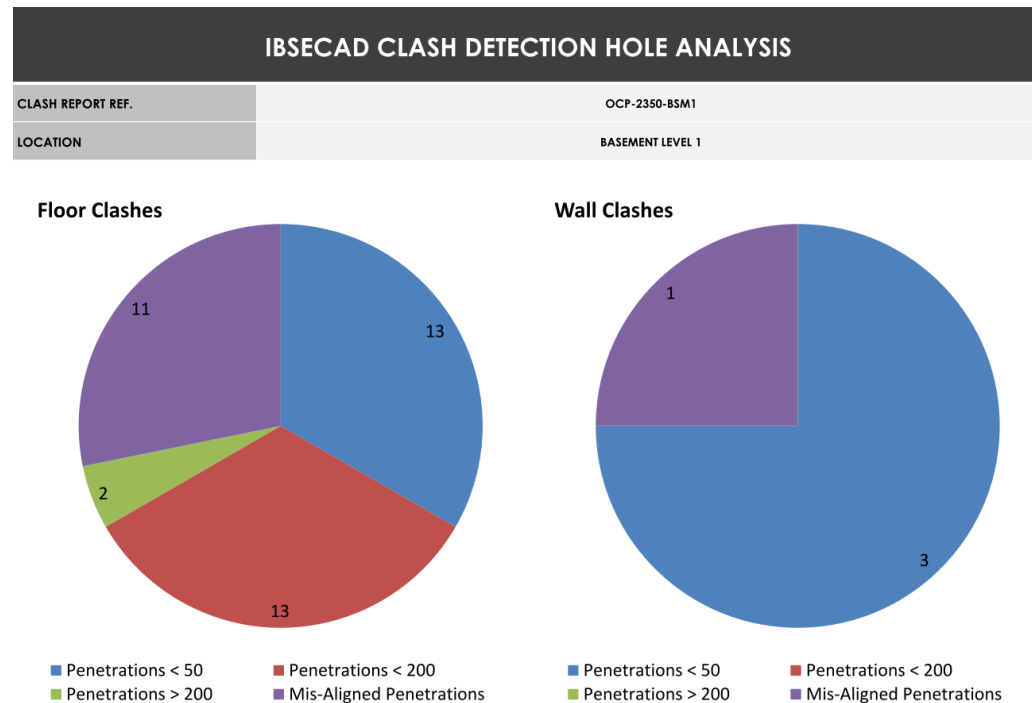
Ibsecad Coordinated Model



PCSA Builderswork Strategy

Builderswork Strategy

- NO UNPLANNED CORE HOLE DRILLING ON SITE
- Mace BWIC < 200mm dia.
- Clash detection to derive a budget for agreement in fixed price

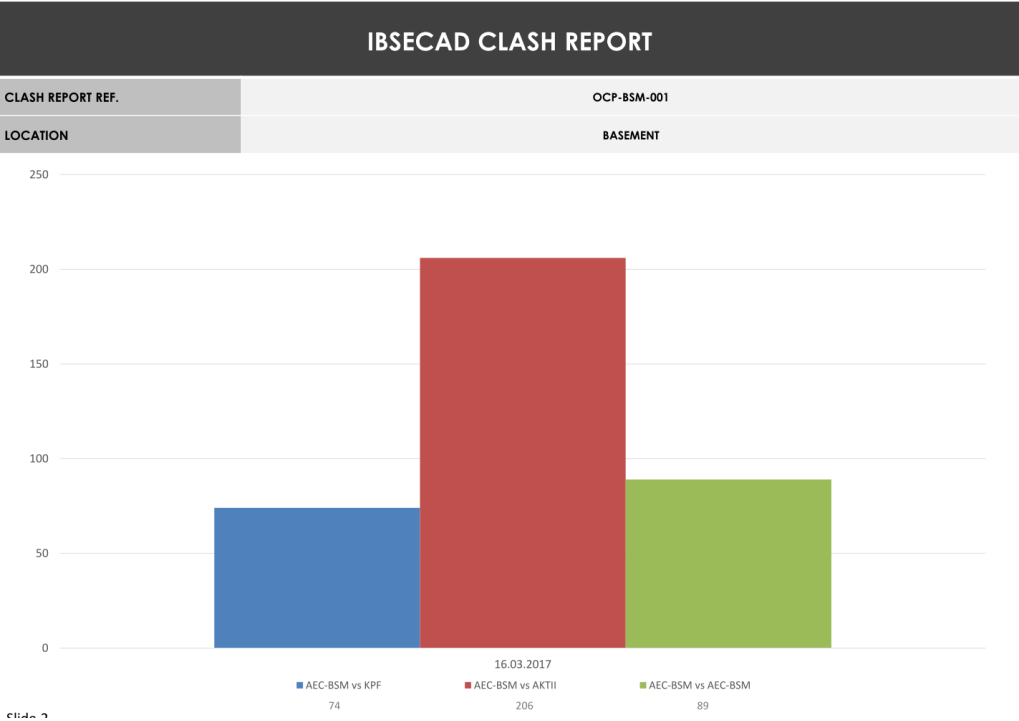




Main Contract

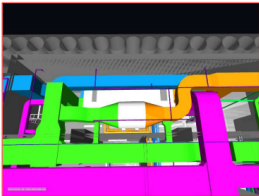
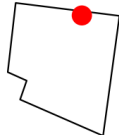
Transition to Main Contract

- Clash Detection – False positives need filtering and prioritising to communicate the state of coordination.
- Remaining Issues Log

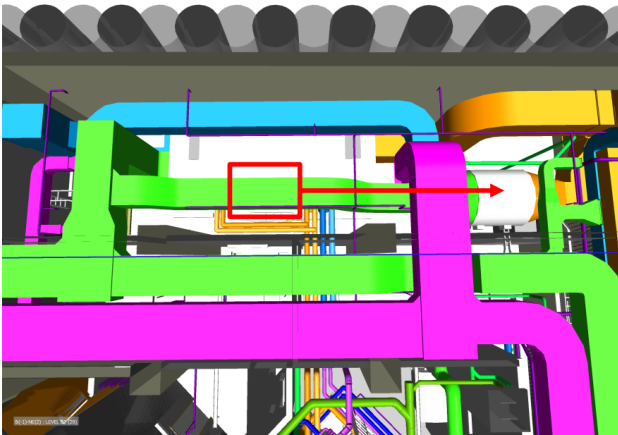


IBSECAD VIEWPOINT			
VIEWPOINT REF.	01	DESCRIPTION	STATUS
MODEL VIEWPOINT NAME	06	Currently to remove the fan (for maintenance) at high level in the north AHU plantroom would require that the AHU is shut down and all pipework and containment be drained and removed. We do not believe that this is as the intended plant replacement strategy. There is a space created to the east of the room following removal of a separating wall (due to an unrelated issue) which we believe the fan could be moved to. There is also redundant ductwork into the room which has been left following removal of the wall.	Resolved. No architectural impact. Design coordination relayed to MEP sub-contractor. <u>ITEM CLOSED</u>
DATE ISSUED	10.10.18		
LOCATION	B2		
SCREENSHOT			

KEY PLAN



CONTRACT ISSUE MODEL



OCP-XX-0595-XX-SCH-W-001 Consultant Model Assessment for Main Contract			
Model item	Model Viewpoint Name	Description	Mace Comment
OCP-XXX-0595-XX-RP-W-018: STAGE 4 CLOSE OUT REPORT			
1	8	Currently to remove the fan (for maintenance) at high level in the north AHU plantroom would require that the AHU is shut down and all pipework and containment be drained and removed. We do not believe that this is as the intended plant replacement strategy. There is a space created to the east of the room following removal of a separating wall (due to an unrelated issue) which we believe the fan could be moved to. There is also redundant ductwork into the room which has been left following removal of the wall.	Mace can resolve the plantroom as part of the early modelling work being funded from the MMEP PCSA pre-construction instruction.
2	9	Rodding eye access to the B1 commercial shower drains is obstructed by services. We suggest that the drainage is changed to slot drain with one outfall pipe.	We agreed in the review meeting on 17 Jan 18 that the drains in the showers could be changed to a single channel drain. Mace can coordinate this with the subcontractors.
3	10	We do not believe that the B1 water meter room can be coordinated by the subcontractors and request that further work is done by the design team to develop this further	Mace can complete the design of the water meter room but cannot commit to achieving the surrounding architectural layout. Suggest this is workshopped through subcontractor design with the design team.
4	11	The generator shaft from the B1 generator room which terminates in the ground floor courtyard façade does not currently appear to work. Aecom to confirm opening size at ground floor is sufficient for intake/exhaust plenums. Ducts are twice the size in the generator room.	AECOM advised in the review meeting that the hole size is correct. Mace will complete the MEP design according to the Requirements and if a greater hole size is required would expect this to be a change.
5	12	The retained façade has not been modelled in the permanent condition so we have been unable to check its coordination with the rest of the building.	The retained façade is currently planned to be a provisional sum. The contract price can be firmed up once the design team have completed the design of it.
6	23	The air intake and exhaust ducts at the ground floor louvre next to the retained façade appear to be too close together and may short circuit.	AECOM confirmed this was not an issue.
7	31/36	It appears that the services in Earl Street have now all been modelled but we have not been able to check their coordination due to their relatively late inclusion.	The services have now been modelled. IBSECAD are going to do a final check of this item but we don't currently foresee a problem.
8	38	The cladding on the west elevation of the East Building has been designed to coordinate with the planning stage 54 Wilson Street design. If the west elevation of the east building needs to change as a result of the final 54 Wilson Street design this could impact the cladding design periods.	Agreed with CBRE that the 54 Wilson Street design would need to avoid altering the west elevation of the east building.
9	45, 46 and 47	Level 07 plant room services have significant clashes with acoustic screens, wall linings and façade louvers.	Mace can complete the MEP design in the plant room but advise that the room may need to get larger to accommodate the result which may impact on surrounding layouts. If this option were pursued we would need the MEP design we produce to be instructed to us to form the MEP Requirement.
10	47	The acoustic ceiling in the gym appears to clash with drainage transfers.	AECOM advised in the meeting on 17 Jan 18 that they would re-organise the ceiling MEP layouts to avoid the drainage pipes. We suggest this is done by them, acting for the Client, since it appears to be tied up with ceiling heights in the gym.
11	49	There is a significant lack of alignment between the AKT concrete structure and the cladding at the south tower BMU enclosure. It appears that the columns have been copied up in the same plan location from the floor below but they need to be offset. This may require the slab to be strengthened locally.	We suggest that AKTII update the structural design to coordinate it with the architecture since it could impact ceilings or services zones below.
12	51	The satellite farms on the South Tower roof do not have any support shown in the model so we are unable to review how they coordinate.	It has not been possible to check that the satellite support structure coordinates here since it has not been modelled. Mace can design but the roof layout may need to change to accommodate.
13	58	The plant replacement zone in the B2 chiller plantroom requires clarification. The "tube" replacement zone and route out of the plantroom appears tight if front withdrawal; side access appears to be preferable but would require a soft spot in the blockwork walls.	We will review the plant spec and maintenance requirements and advise.
14	59	There does not currently appear to be enough space in the B2 north AHU plant room for AHU coil replacement. We suggest a soft spot could be allowed in the blockwork wall but this needs confirming in the Requirements.	Mace can resolve this through MEP subcontractor design.
16	68	There appears to be access problems in the L10 plant room which means that access to the chillers is compromised. This appears to especially be the case for the westernmost chiller.	We recommend this is reviewed by the design team acting for the Client. There appear to be a number of issues with access for plant maintenance in the plantroom.

Sub & Trade Contractor Federation

O'KEEFE

SKANSKA



PERMASTEELISA GROUP

Ambar Kelly



STONEBATHWEAR



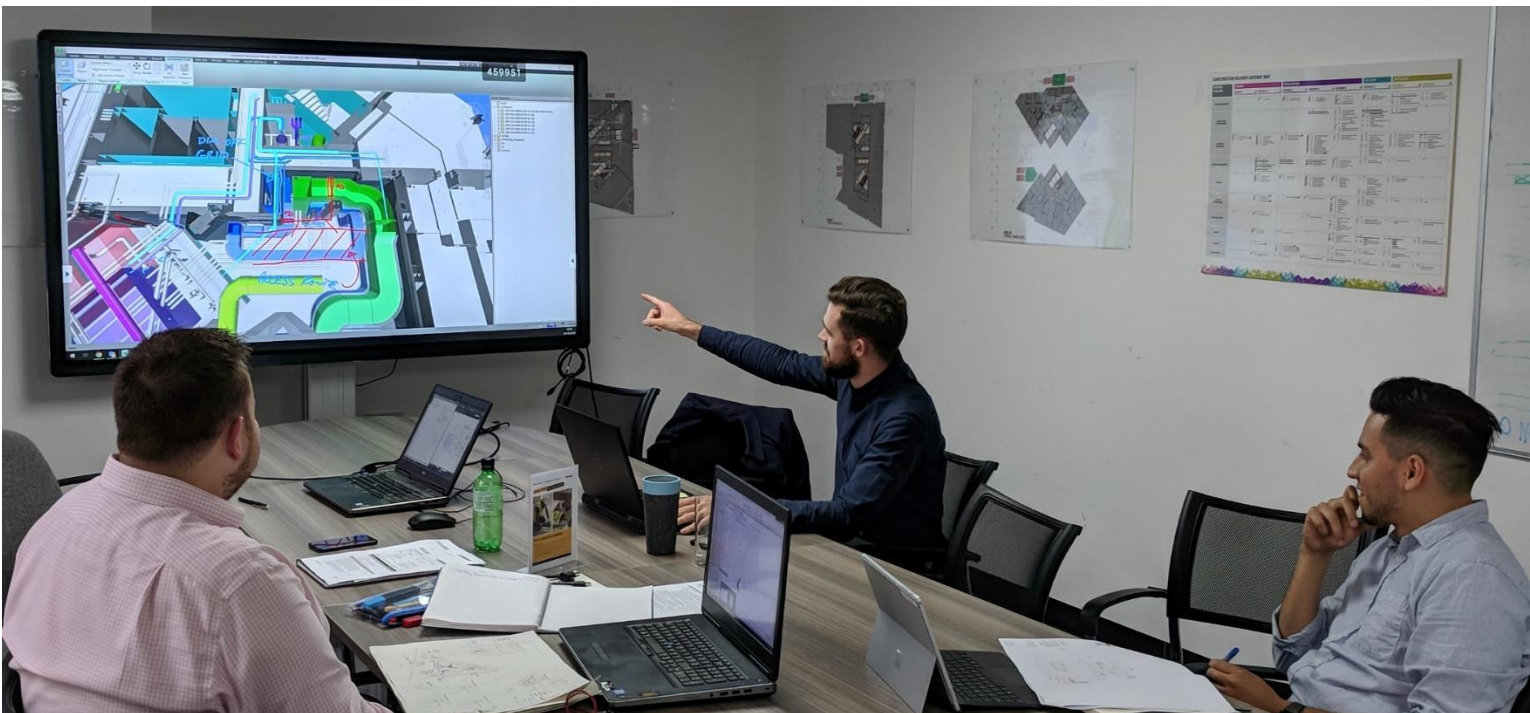
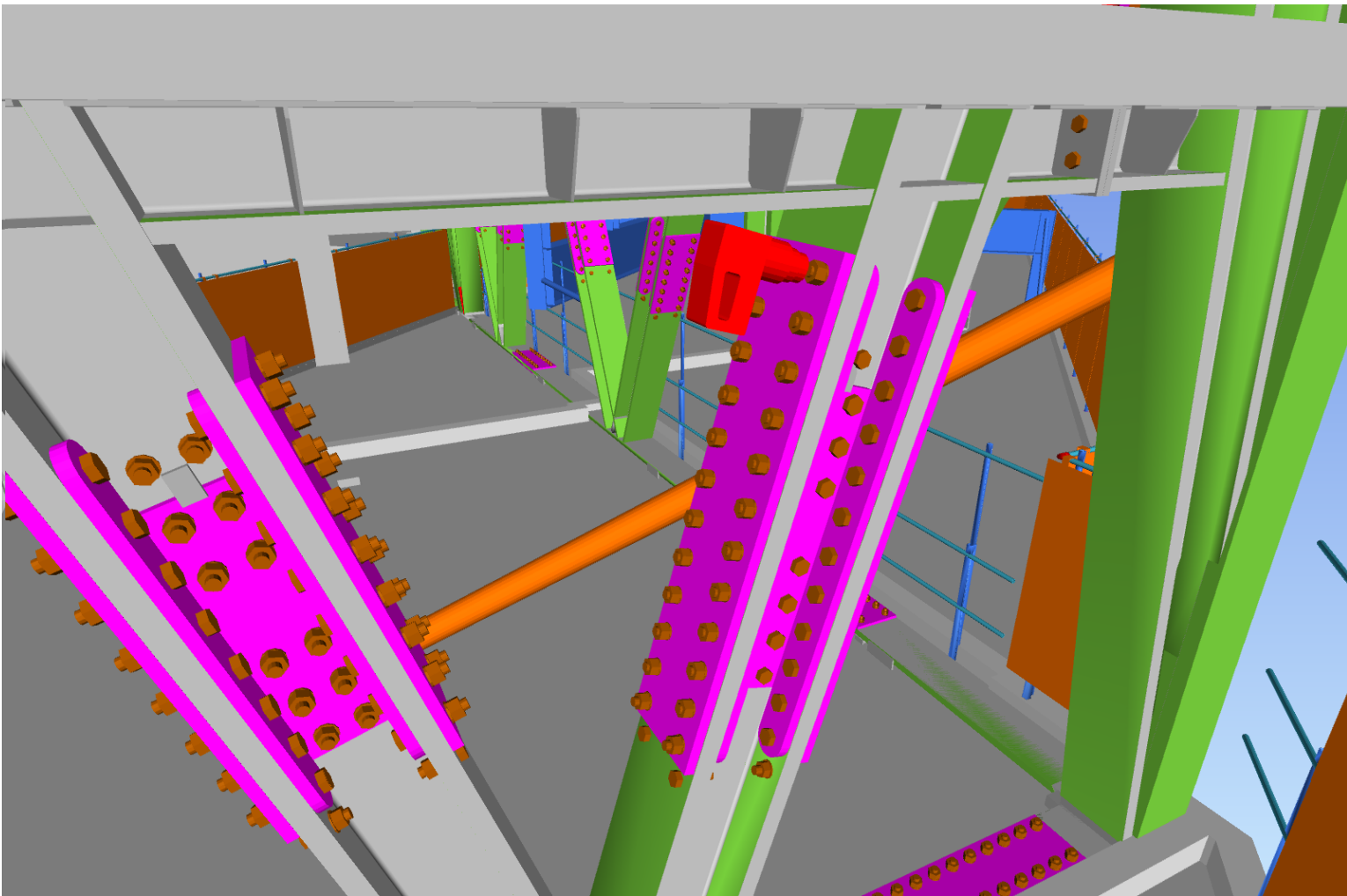
TClarke



LESTER ROSE BUILDERS



SUB & TRADE
CONTRACTORS SO FAR...

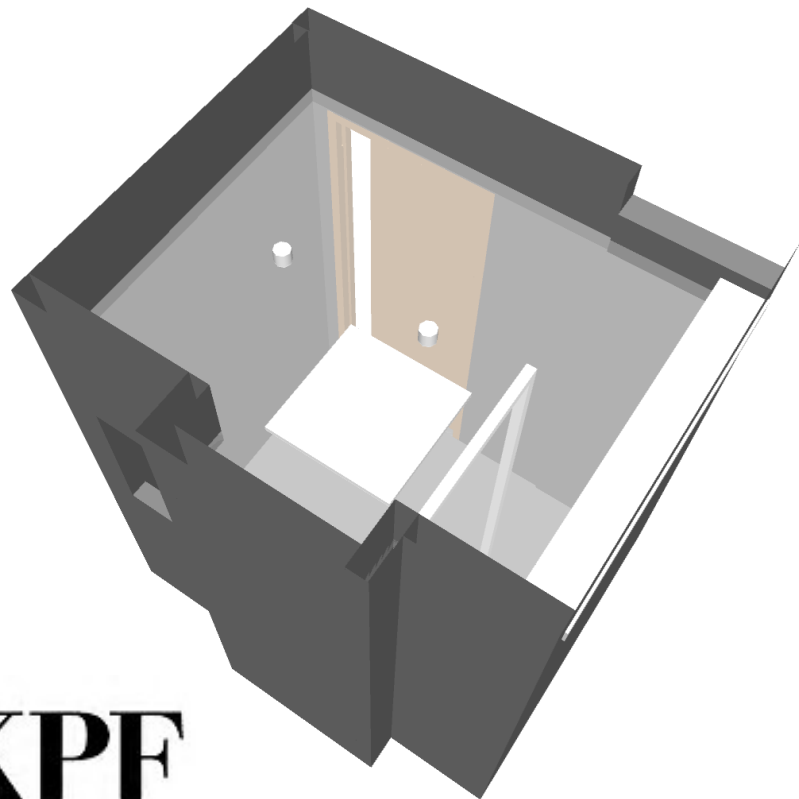


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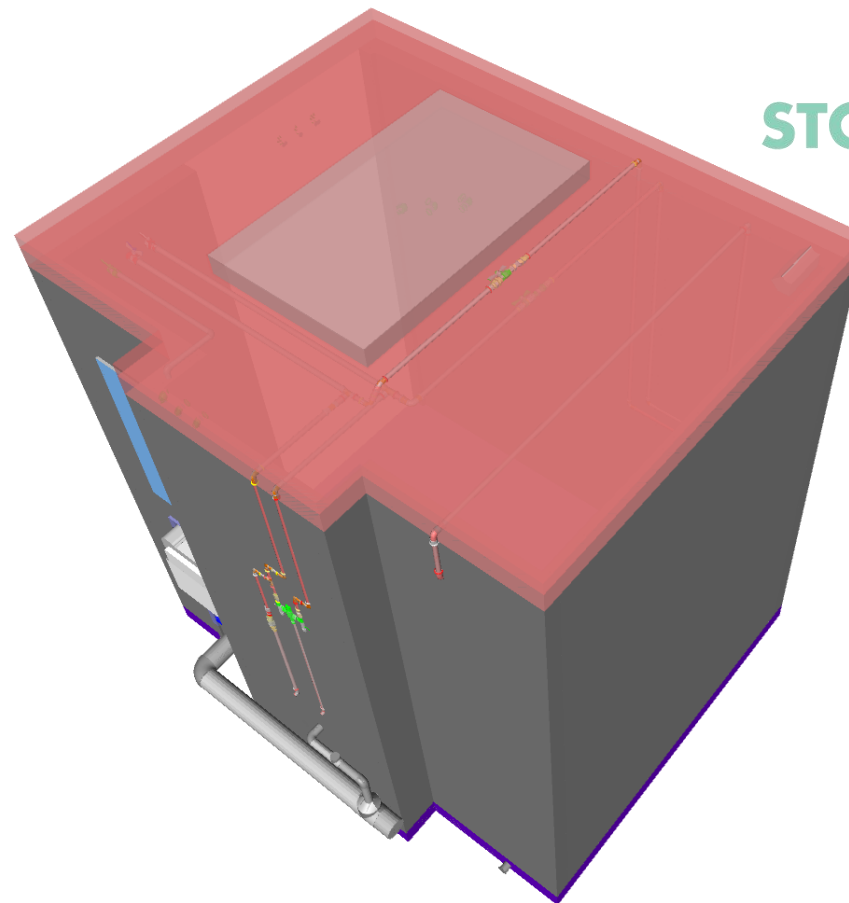
Sub Contractor Development

Stonebathware – POD's

- Residential Bathroom POD's were a client led decision incorporated during the Stage 4 design and previously reviewed as part of our Technical Model Management role.
- POD Co-ordination & Fabrication activities were on critical path on programme
- Early engagement taken to develop LOD400 Modelling for POD & Fit Out MEP
- Stonebathware appointed to develop and deliver POD package
- Ahead of MEP Fit Out Procurement; Ibsecad appointed to develop LOD400 MEP



KPF

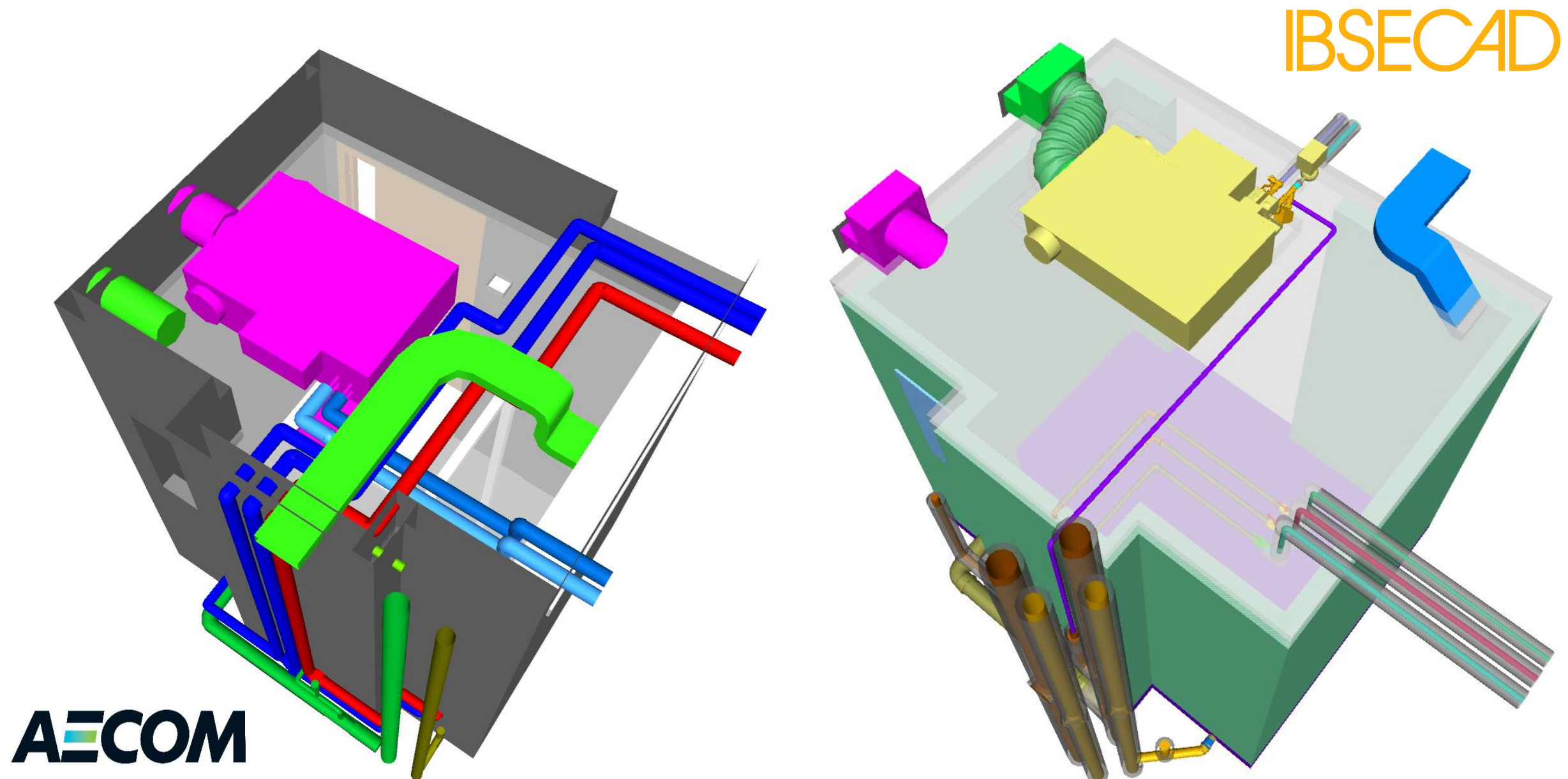



STONEBATHWEAR

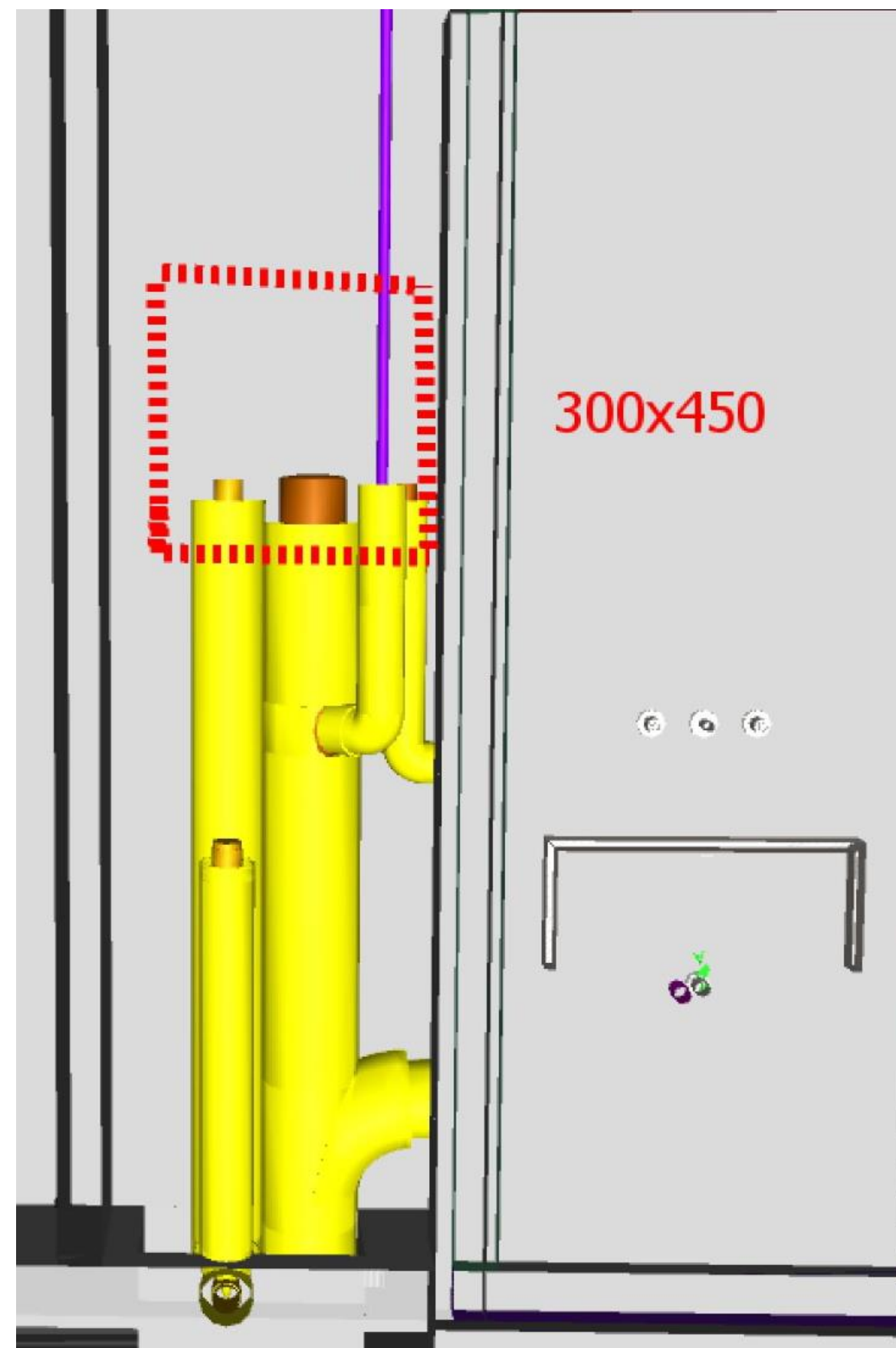
mace **IBSECAD**
One Crown Place

Stonebathware – POD's

- Due to the constraints of ceiling and slab to slab heights; MEP services above and around the POD would need to be installed prior to Installation.
- Designed MEP routes, whilst co-ordinated, needed to change to allow for easier install, once POD was installed.

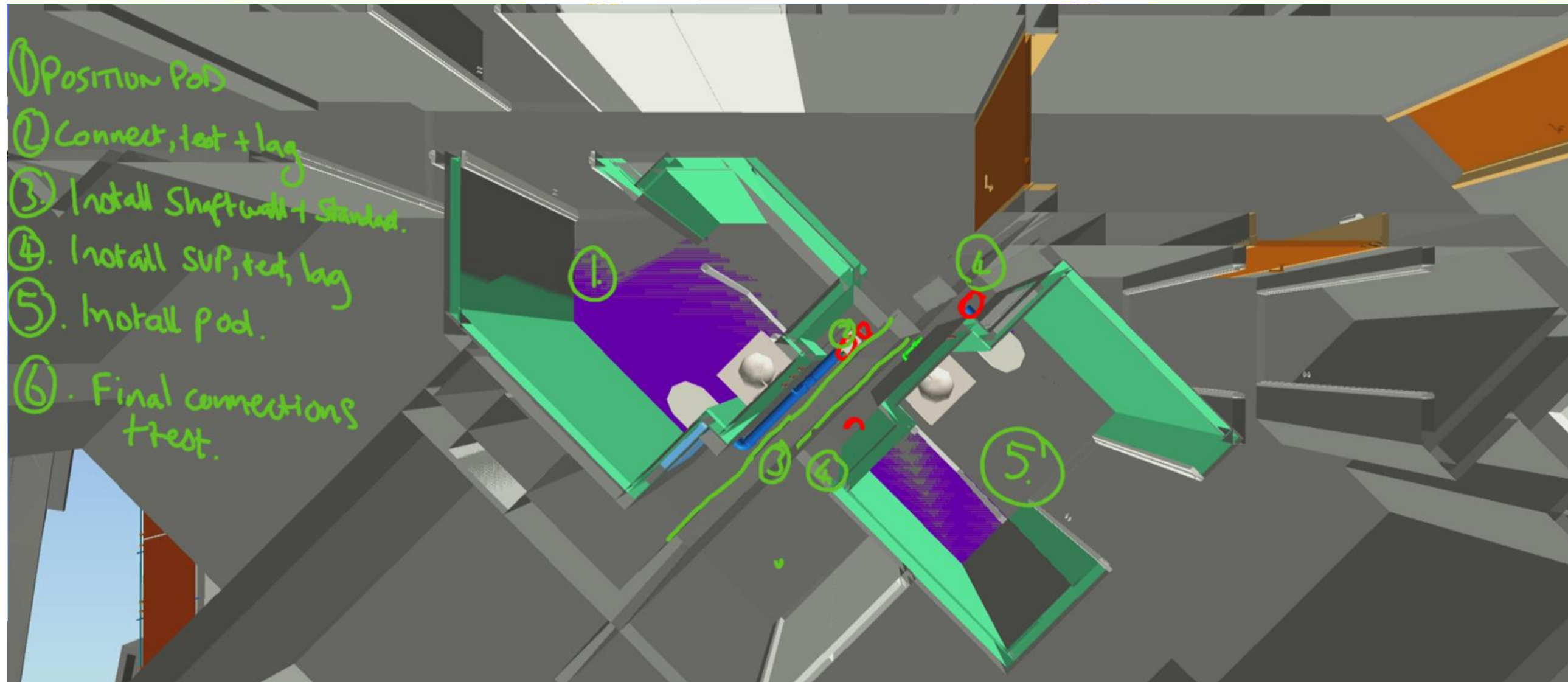


Stonebathware – POD's



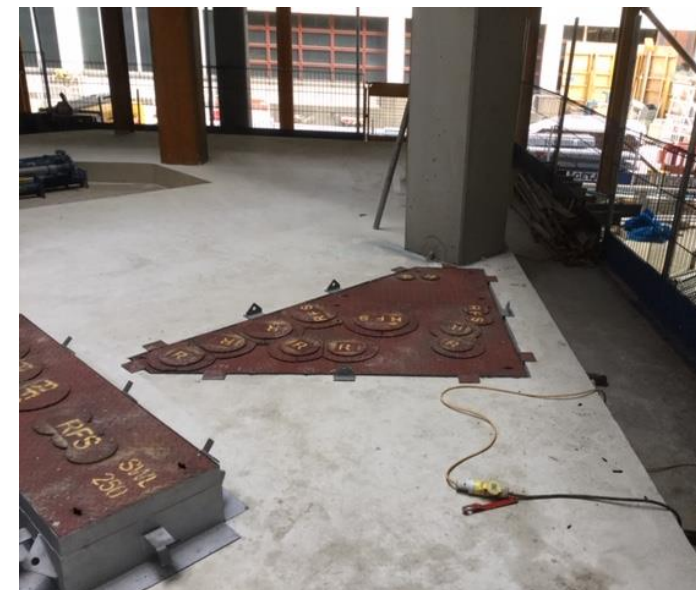
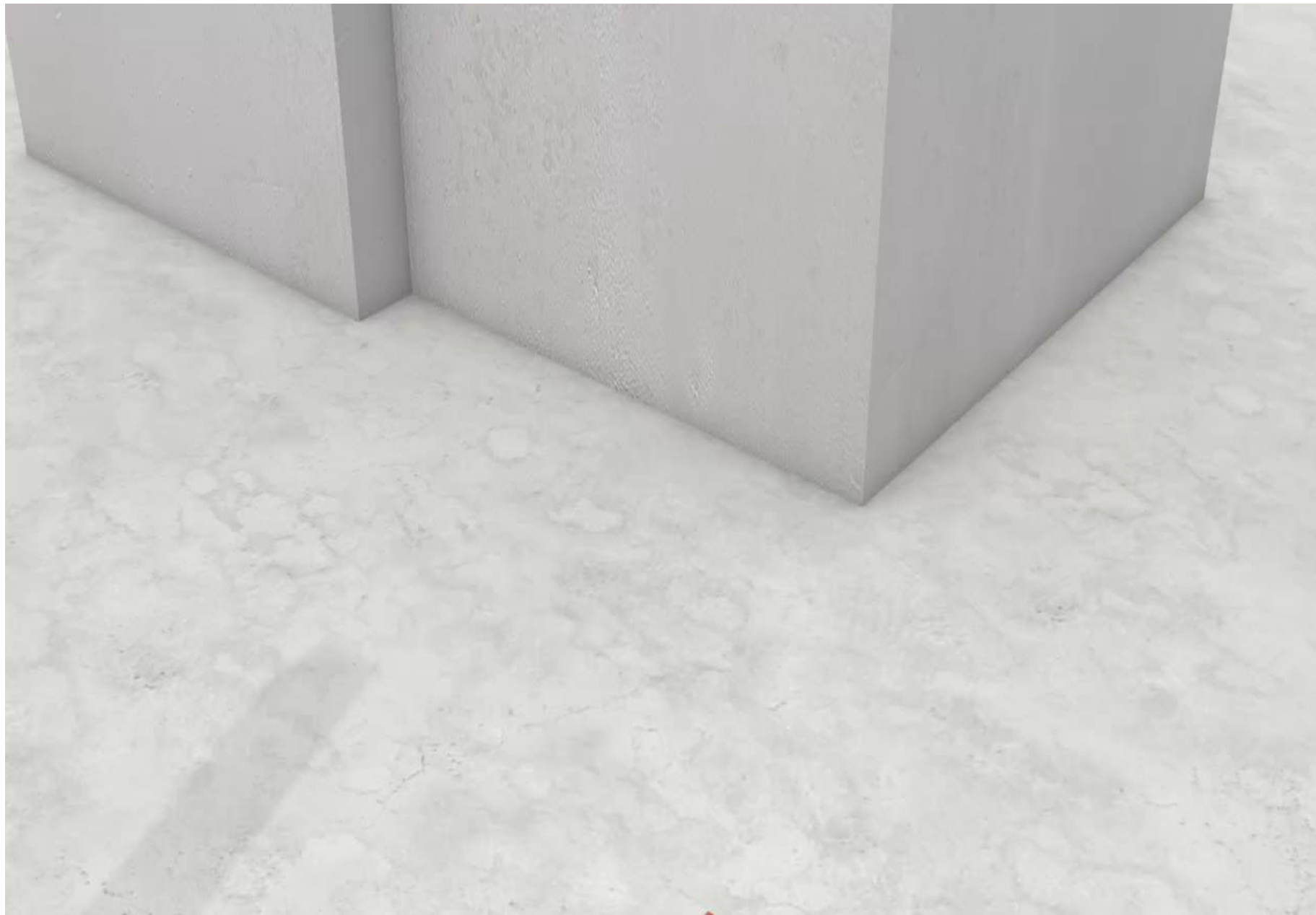
Stonebathware – POD's

- All POD types have been developed to this LOD and co-ordinated in advance of Manufacture and Install.
- MEP is now being validated by the appointed MEP Fit Out Contractor.
- Access Panels have been incorporated for all services within the POD.
- Next Phase of works now involves creating a “playbook” 4D Sequence of the key floors.



Ambar Kelly – RiserSafe®

- On Site safety featured heavily with the MACE team, and as part of the Riser Strategy there was an opportunity to utilise the RiserSafe® product; implementing on all risers.
- Early engagement of the MEP co-ordination with Sub-Contractor Structural design made all of this possible and is providing a major benefit to site safety with no need for barriers.





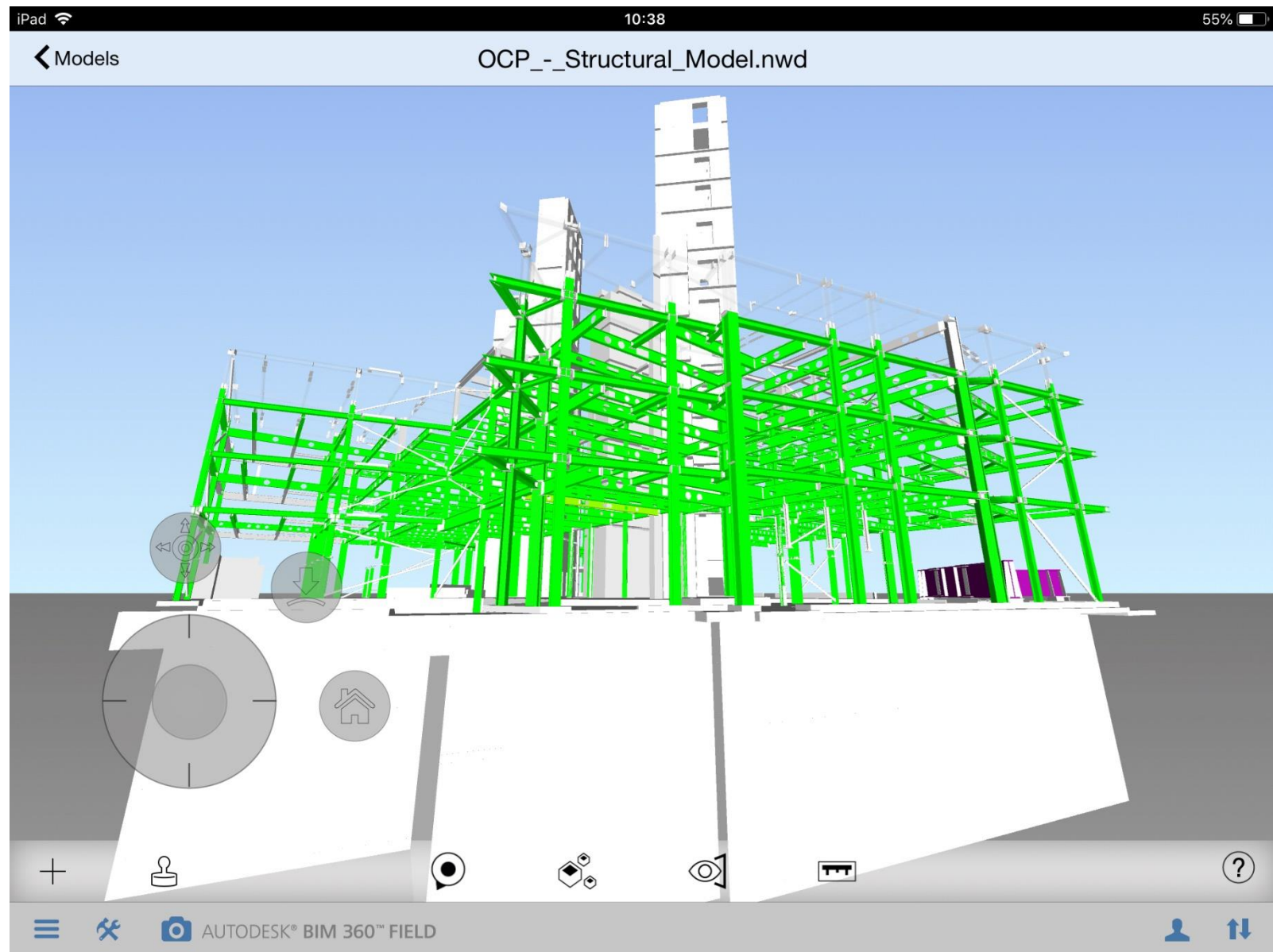
On Site Digital Construction

Digital Construction

- **Maximise the value of modelled information during fabrication and construction**
- **Provide timely information to our teams during manufacture and construction in a format they can act on.**
- **Examples;**
 - **BIM360 Field**
 - **AI onsite Progress with Disperse**
 - **Point Cloud Scanning Structure & Builderswork Validation**
 - **Fit Out Package Trimble Setting out**
 - **QR Coding**
 - **R&D Drone Surveys**

BIM360 Field

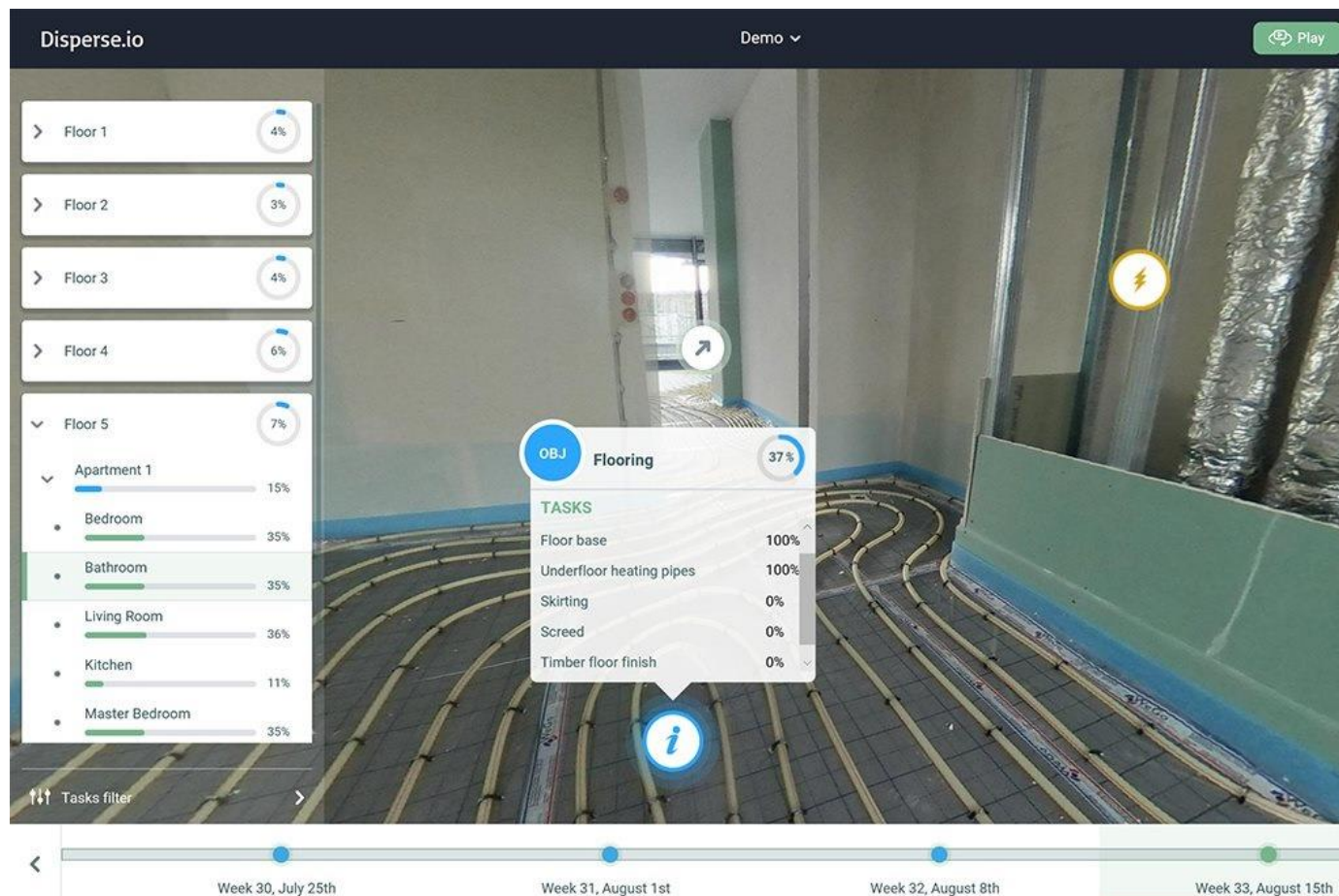
- Daily site diaries collected on site digitally and stored in one place – easily searchable
- Site progress reporting



mace **IBSECAD**
One Crown Place

AI Onsite Progress - Disperse

- 10 apartment handovers / week
- Requires accurate feedback on progress
- 235 apartments vs handful of construction managers
- Solution = AI!



NEWS

MACE EMPLOYS AI ISSUE DETECTION TO TRACK ONSITE PROGRESS

0 Comments

11 JULY 2018 | BY BIM+ STAFF

Mace has become the latest contractor to adopt an artificial intelligence (AI) -powered issue detection system which tracks onsite progress.

The move comes after construction tech start-up Disperse piloted its product concurrently with Canary Wharf Contractors (CWCL) and Kier.

Disperse's system employs safety-trained site scanners which use 360 degree cameras in every room across all floors to capture progress on a project, before the firm's Computer Vision technology detects changes week-on-week, measures progress, and identifies anomalies.

So far, the pilots have covered a 327-unit residential tower in London for CWCL and a 120-room hotel in Reading for Kier, with the system analysing the projects using the 360-degree imagery. Disperse said its goal is to create an issue detection system comparable to those used in manufacturing plants.

It is now due to be used on 15 largescale projects by the end of 2018, including new projects with CWCL and Kier, as well as with Mace.

"AS PART OF OUR DIGITAL STRATEGY AND IN THE PURSUIT OF A BETTER WAY, THE RESIDENTIAL BUSINESS OF MACE GROUP HAS REVIEWED THE INNOVATIVE TECHNOLOGY AND REPORTING THAT DISPERSE CAN PROVIDE ACROSS OUR PROJECTS."
- PAUL CONNOLLY, MACE RESIDENTIAL TECHNICAL SERVICES

Trial Drone Survey for Logistics

- Trial drone survey to investigate uses for logistics and spatial planning.
- Over 200 images taken and 3D point cloud produced via photogrammetry.
- Point cloud accuracy 30 to 50mm – Able to validate clearances to adjacent buildings.



Photogrammetry Captures



Point Cloud Federation



Point Cloud Federation



Q & A