

Entry 12

Klang Valley MRT Blue Line, Kuala Lumpur

BIM Award Submission

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Synopsis

We have submitted the Klang Valley Blue Line MRT Project in Kuala Lumpur for the BIM award as we believe that it excels in the stipulated criteria. The project consists of 3 underground stations: Pasar Rakyat; Cochrane; and Maluri, all are being developed with BIM

We have a demanding client, who insists on the most efficient, cost effective solution possible. Without the enhanced efficient design team working offered with BIM, the management of this project would not have been possible within the tight delivery programme.

The specific discipline teams located around the world required innovative interoffice working and a specific structure of collaborative workflows to allow delivery of this major infrastructure project.

Furthermore, the interoffice workflows setup for this project form an efficient basis that will allow future Mott MacDonald projects to move forward with BIM.

The client is so impressed with the modelling and design output that we are currently providing advice on developing our relationship further into the project, including the potential for further station BIM development and other services, specifically in 4D (programming) and 5D (cost).

For Mott MacDonald this project marks a significant step in the development of remote multidisciplinary working using BIM.



Collaboration

BIM is used as the central collaboration resource in the project. GoToMeeting sessions were scheduled on a weekly basis, to analyse and progress the design using the model as the focus for discussion. GoToMeeting was also used on a daily basis between team members, to resolve live issues.

Presentation using Autodesk Revit (the chosen platform for BIM delivery on the project) and GoToMeeting allowed early identification of problems, and early resolution..

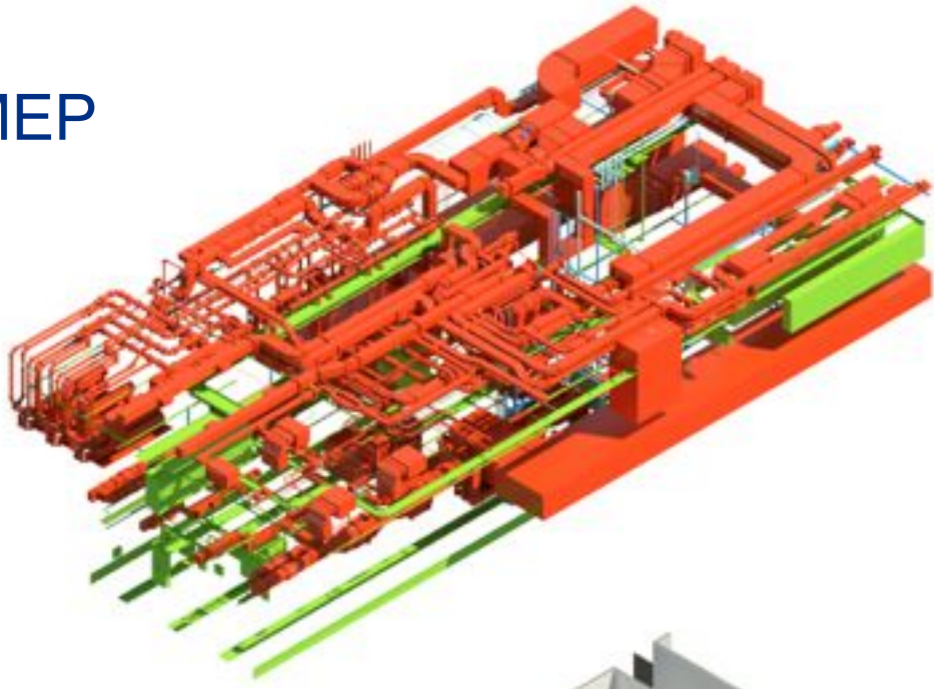
It was agreed that due to the fast pace of the project that 'live' connections were preferable to keep each discipline's model up to date and to manage change across the Design Team.

We achieved "live" collaboration by developing a UNC (unified network connection) file path to each model server which allowed everyone to work on the fully co-ordinated model. Certain issues with slow connection speeds to Asia were identified when working live was noted as a major infrastructure problem. To resolve this issue we are currently implementing Revit Server to the project. Revit Server creates a server-based worksharing for BIM across a WAN network. This enhances model sharing to create a truly 'live' collaboration setup and reduce connection time.

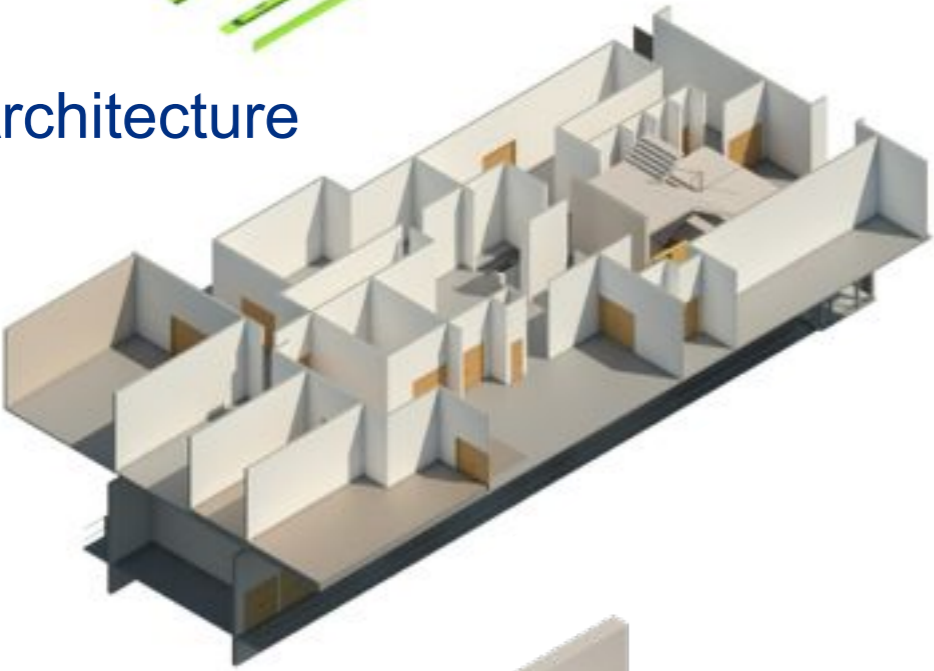
We are also implementing Autodesk Bluestreak; an online collaboration system. This tracks project team activities for constant communication, and is used to apply relevant change control measures.

Navisworks continues to be used for clash detection of the models to generate reports and enhance interdisciplinary coordination. As well as contributing to the development of the design, the clash detection is important in order to minimise further change.

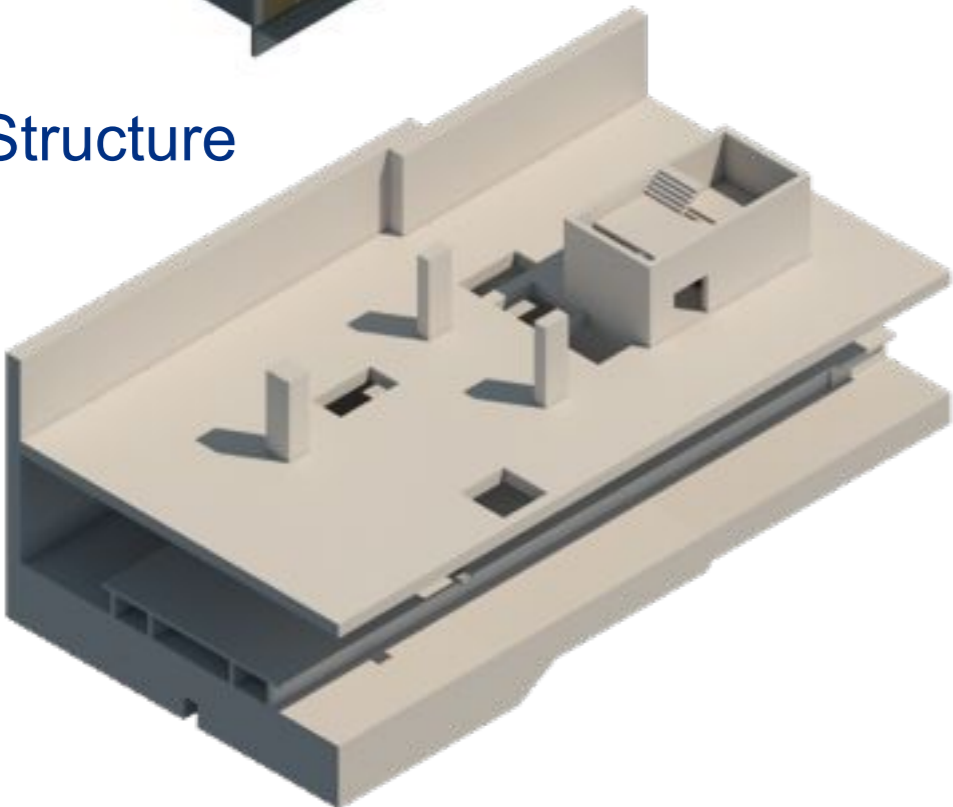
MEP



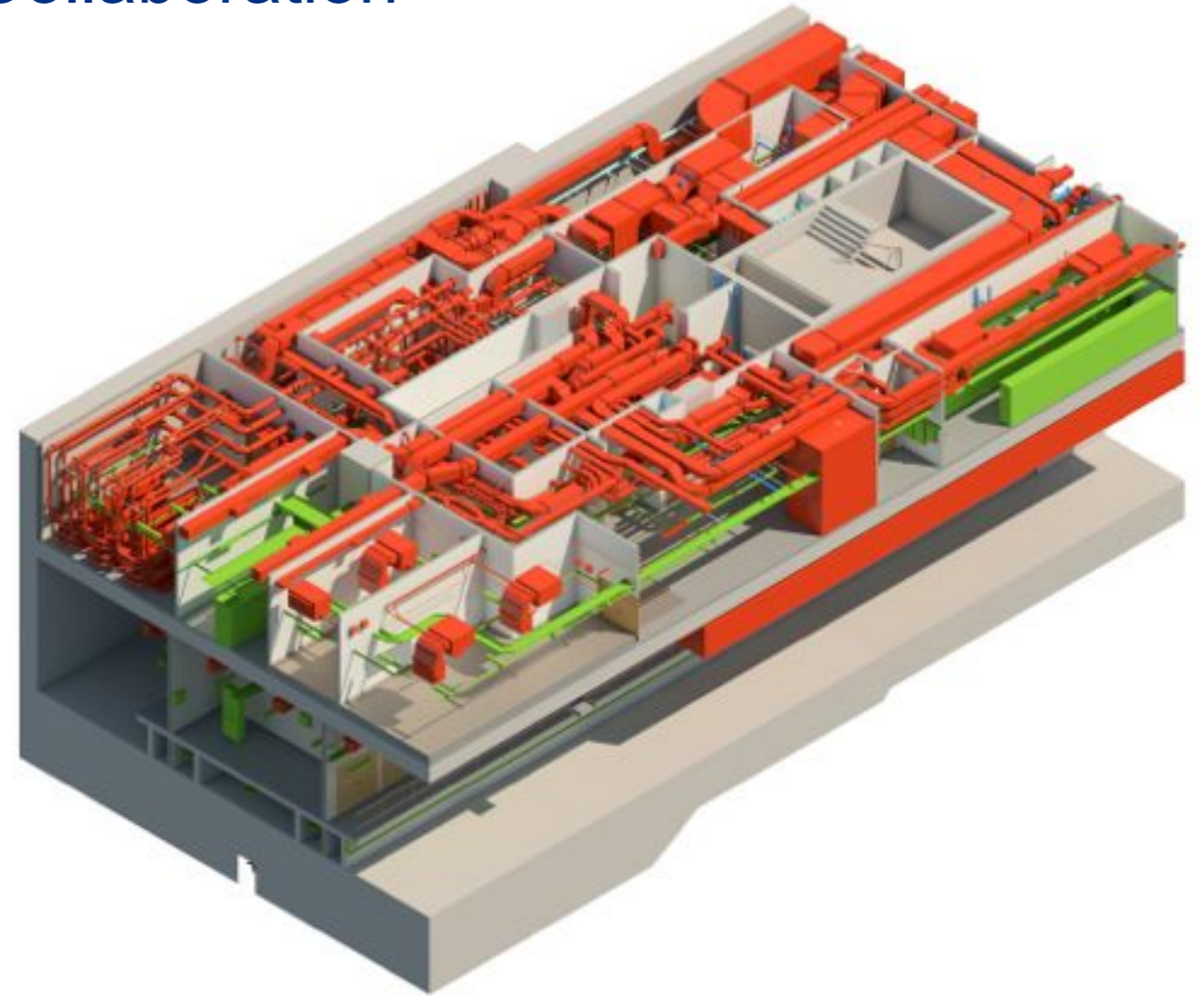
Architecture

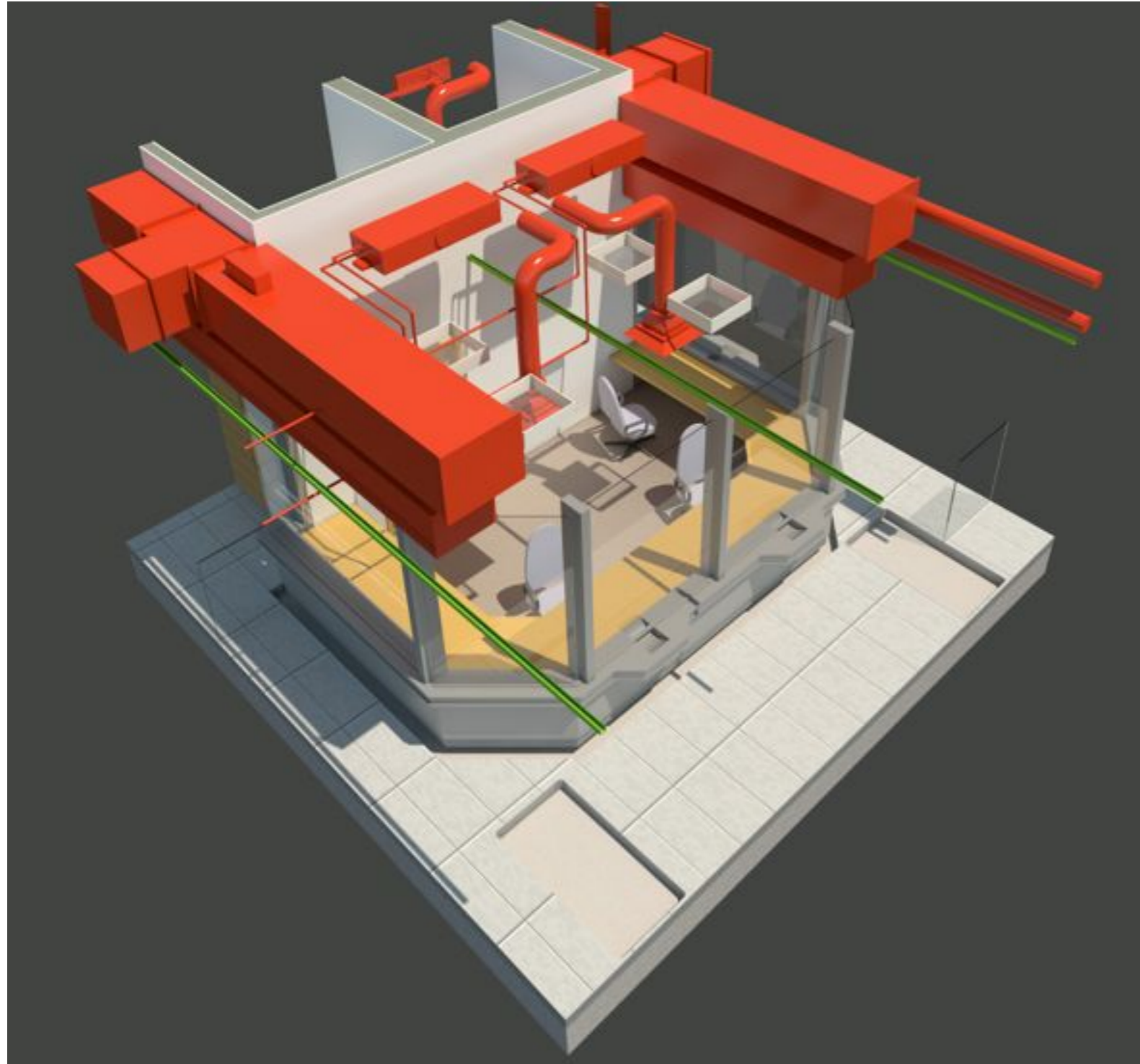


Structure



Collaboration





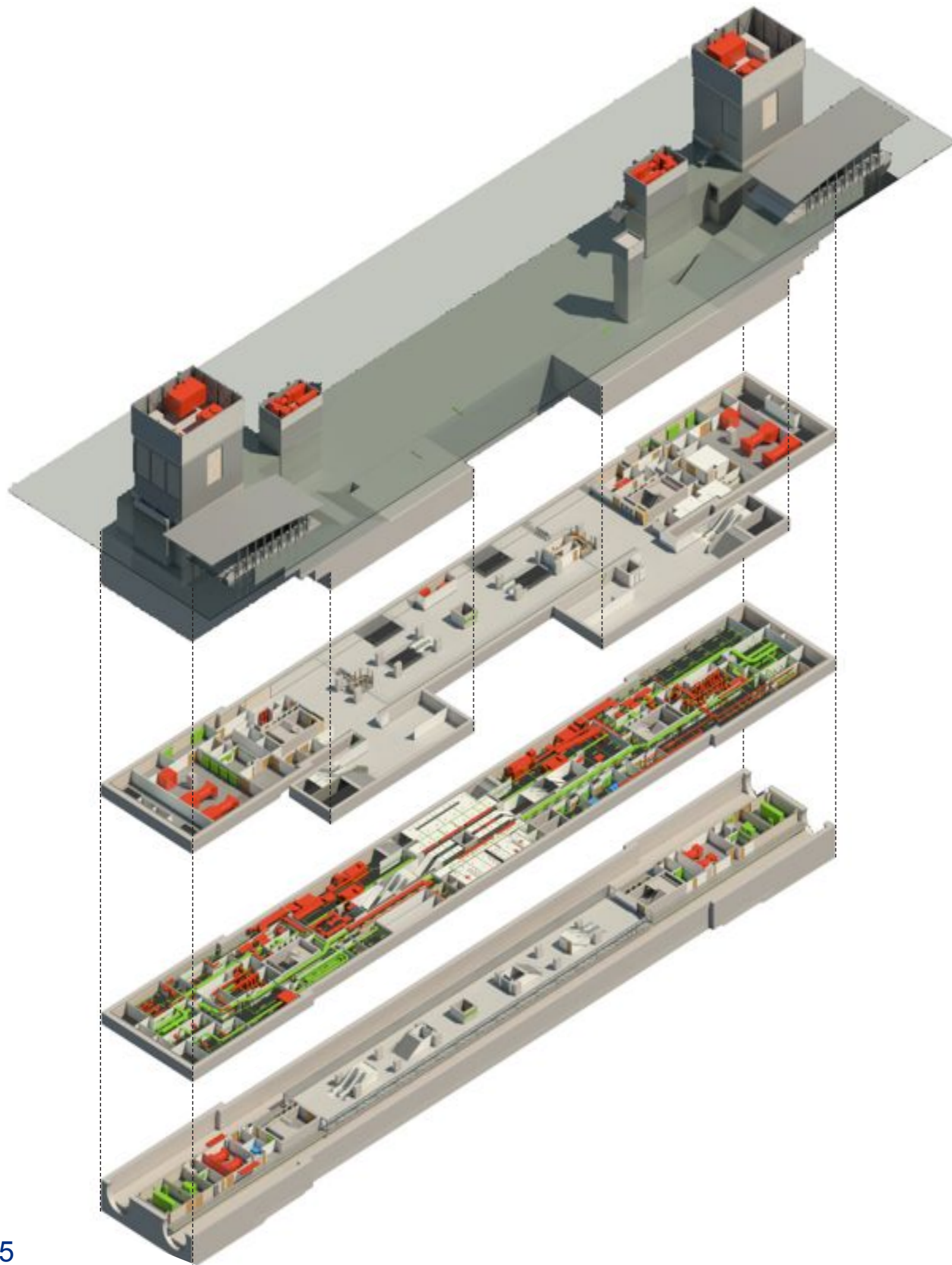
Workflow

Specific workflows were required to allow for global working on the models

A central location in the UK was noted at the time as the best solution, due to the UK bias for the Revit users, thus keeping connection speeds optimised for efficient working. This was only a temporary solution while Revit was confined to the UK.

Remote desktop facilities were set up within the Birmingham office so that staff in Kuala Lumpur (or anywhere globally) could 'log-in' to fast BIM computers. Up to 6 members of staff can log into a single powerhouse computer rather than relying on their own machine.

If speeds can be increased to provide sufficient bandwidth and we continue with the implementation of Revit Server, then this type of 'cloud' computing should allow access to more staff of more powerful machines. This principle of using 'power hubs' could be adopted as best practice for provision of a powerful BIM computer resource for significantly reduced financial outlay.

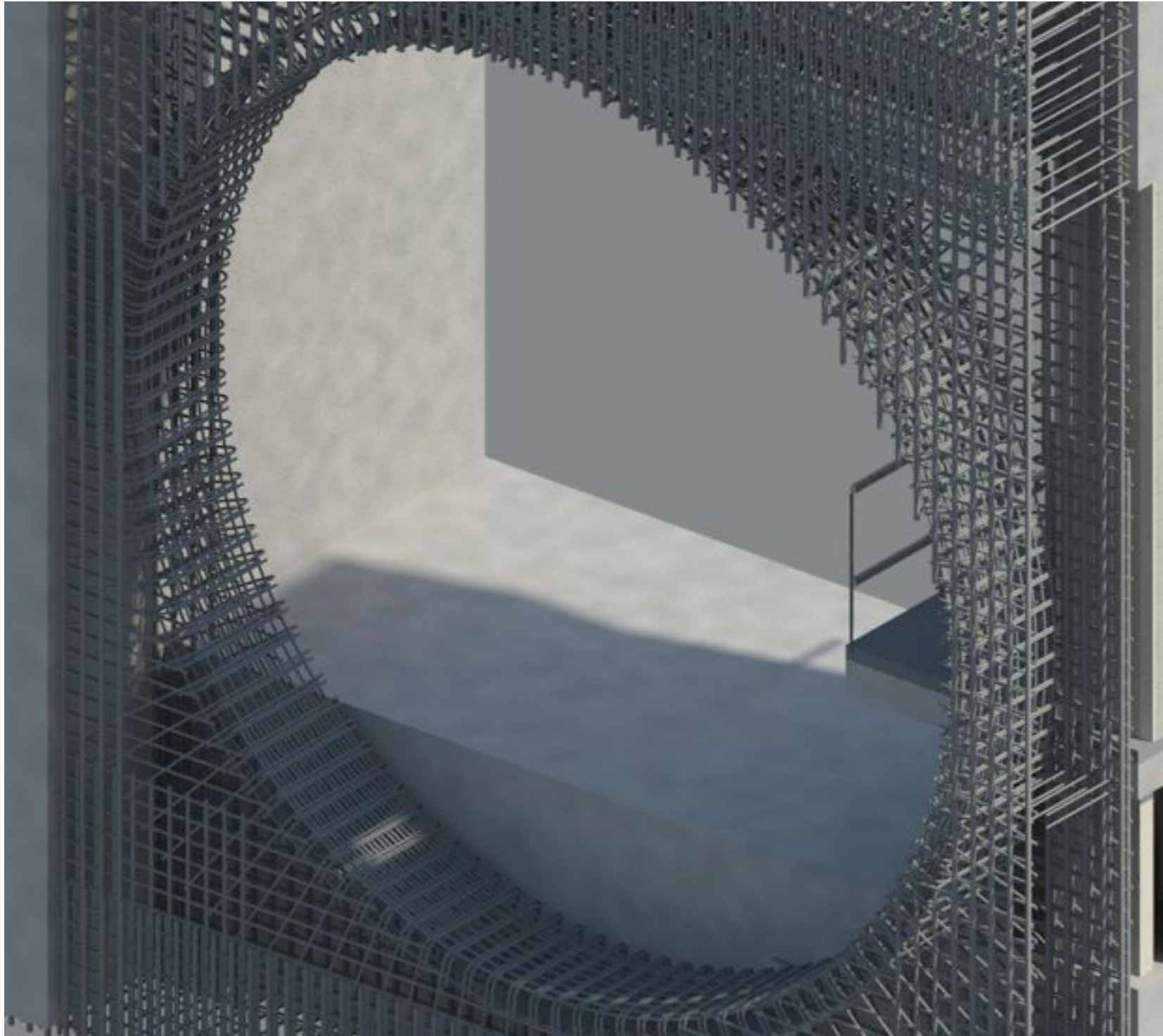


Adding Value

The initial 2D deliverables were developed in AutoCAD for station planning. The original Building Information Model was created within a week to analyse the design.

The client has been very demanding of the design team and at numerous stages has required the most efficient and optimised solution. Adopting Revit allows a faster reaction to client driven changes. Modeling the MEP services highlighted a number of potential problems which we were able to rectify early in the design.

One of the main benefits is the ability to interrogate structural elements in the model. BIM allowed the detail of reinforcement for large areas quickly. Schedules were generated automatically, together with the total weights of reinforcement so that the client had an accurate cost estimate. This work is usually sub-contracted out to an external consultant. Instead this has been undertaken by a team of five Mott MacDonald staff, generating internal profit.



Interoperability

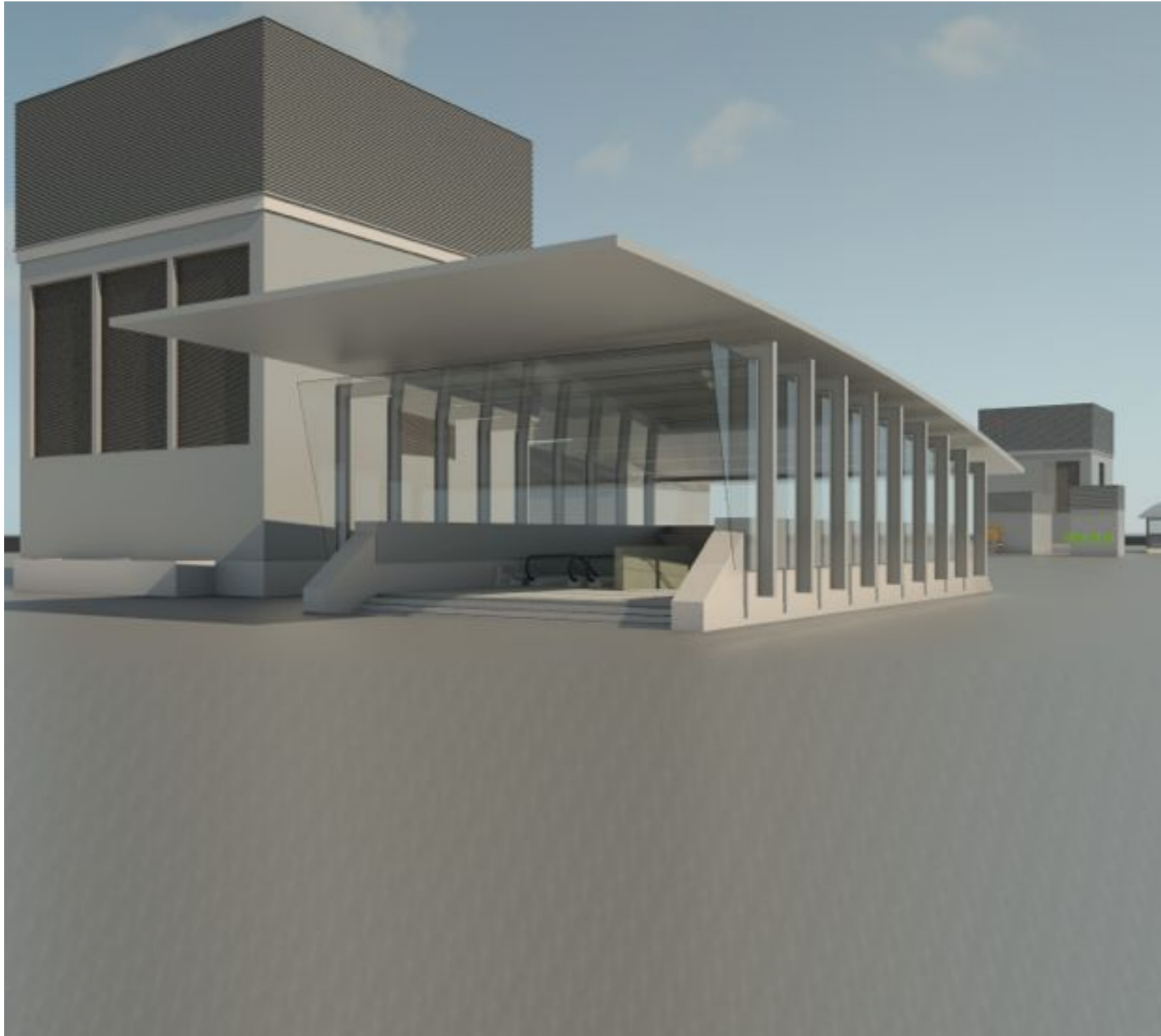
Various separate design exercises require export and import into different software packages for example:- pedestrian modelling, M&E services, IES lighting

The software platform was chosen based on its performance and interoperability with other software. IFC (Industry Foundation Class) is an industry standard open BIM format which can be exported from the model. BIM is also used to export GBXML format straight from Revit for lighting and ventilation calculations

BIM has been integrated into STEPS pedestrian modelling software for analysis to ensure pedestrian flow compliance.

We also queried whether we can integrate the issue of Room Data sheets straight from the BIM. As the Revit model is a database of the building; can this be utilised to generate the room data? We therefore are utilising Microsoft Access to link the Revit database and produce spread sheets for issue. On receipt of the sheets back from the client the data can be written back into the model.

In structural modelling, we liaised closely with Autodesk and Excitech (distributor) to resolve problems whilst completing the RC modelling. Autodesk has since taken cognisance of our comments and included this into their updated software release.



Client Relationship

It cannot be underestimated how much our profile with the client has been boosted through our use of BIM.

With our assistance, Gamuda is now more aware of the benefits that BIM can bring to their projects,.

We are currently assisting Gamuda in the development of their own in-house BIM resource to take this process into future stages of the project life cycle.

This project is a fully multidisciplinary project developed by Mott MacDonald and used in presentations for other clients as a demonstration of our BIM ability. This project has also been presented to the Glasgow Revit User Group (GRUG) as a benchmark of our experience.



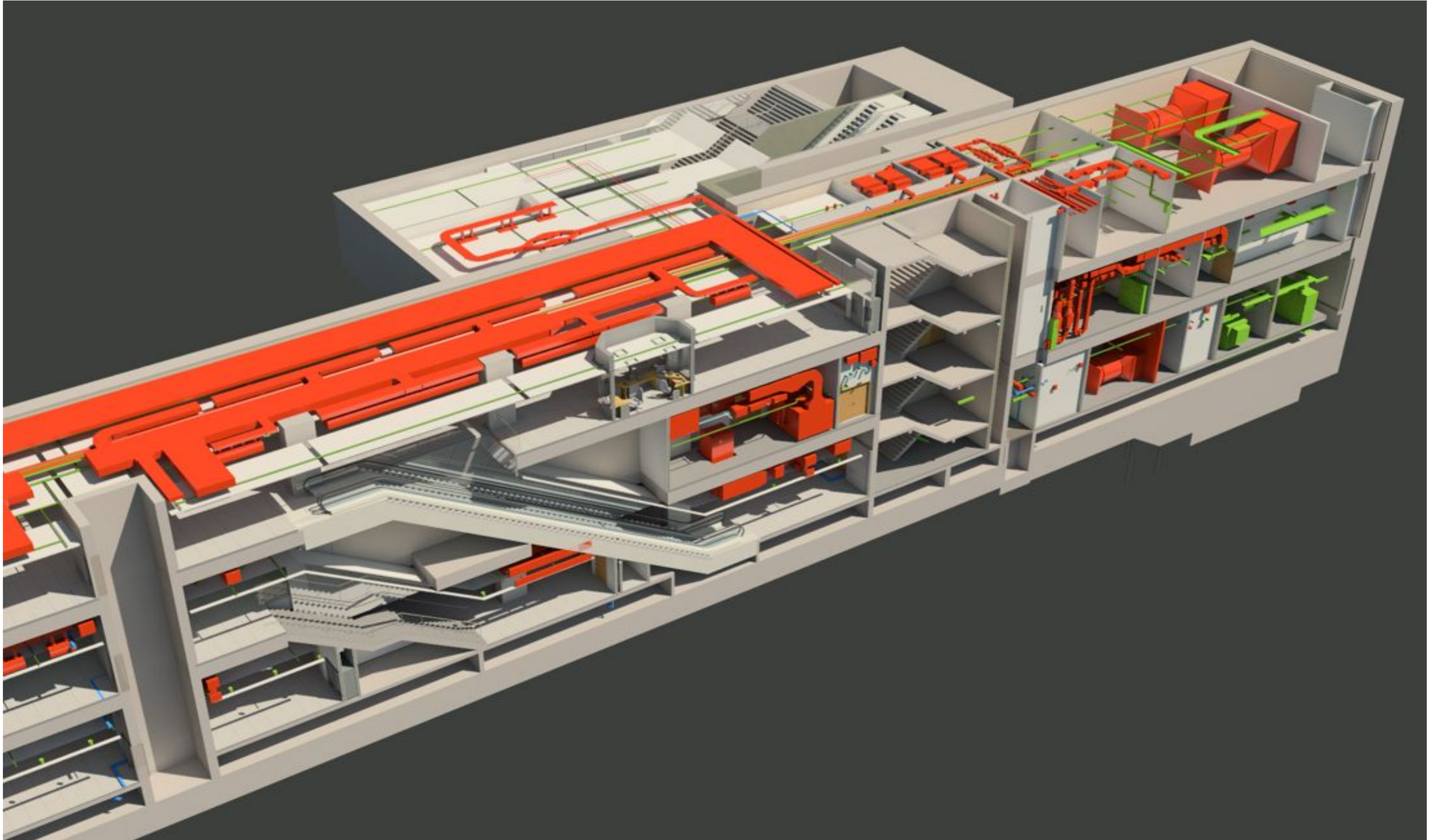
Leadership

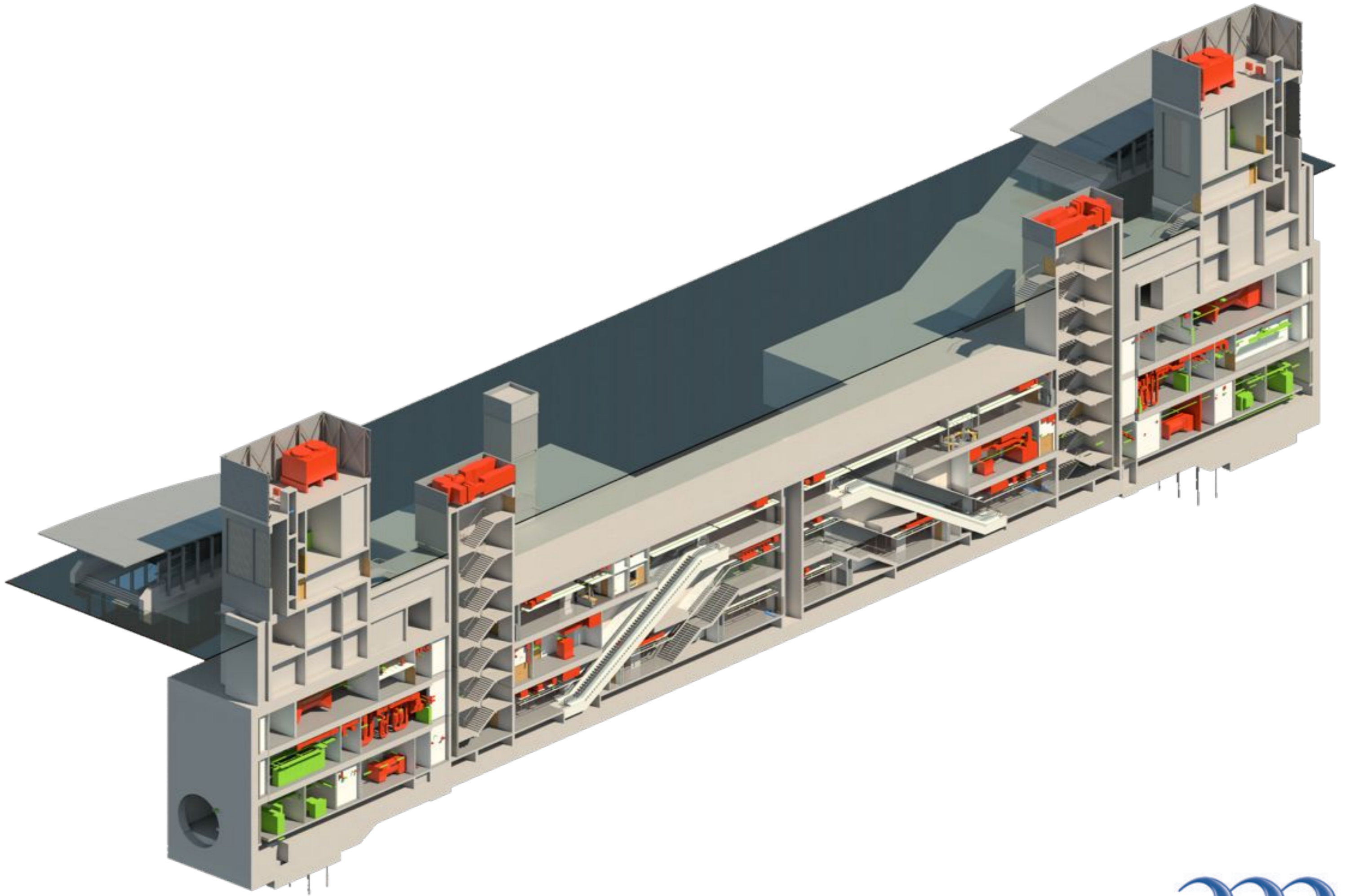
It is important to note that BIM is an extremely useful process for project delivery, but the strong management of this is vital. BIM was fully embraced by the management structure and Directors of the project.

Team members have also shown leadership qualities regarding enhancing our interoffice working through the setup of the remote desktop facility and implementation of Revit Server.

Within Mott MacDonald, everyone who has worked on the project has benefited from the use of BIM, as numerous members of staff have been trained to provide the required project resource. This has benefited each of the local offices around the UK and Kuala Lumpur and developed our skills base for future projects.

This project has created strong inter-disciplinary relationships throughout Mott MacDonald on a global scale







Staff List

Project Office

Kuala Lumpur

APNA, MLY

Jonathan Davies	Project Director
Sati Bhogal	Project Director
Philip Chay	Project Director
John Robinson	Project Manager
Jon Glanville	Project Manager
Karn Supaviriyakul	UG2 Project Coordinator
Guido Malpartida	Kuala Lumpur Architect
Nigel Dunn	Document Controller
Kowloong Kow	Structures
Yu Choo Dang	Structures
Eric Cillie	M&E
Tony Koo	M&E

BIM Architecture

Glasgow

EUNA, BNI, BSE

David Stillie	Associate
Kevin Haggarty	Senior Architect - Team Leader
Colin Hutton	Senior Revit Architectural Coordinator/ Technician
Darren Reat	Senior Architectural Technician
Peter Stinson	Architectural Technician

BIM Structures & RC Detailing

UK

EUNA, BNI, WTD

Paul Cowin	Birmingham
Haydn Thomas	Birmingham
Alan Dowell	Birmingham - Coordinator/ Trainer & Modeller RC champion
Matt Smart	Sheffield (EST)
Karen Harkness	Belfast (SNI)
Miaad Shafik	Aberdeen (SNI)
Tom Marsh	Cardiff
Daniel Wheatland	Birmingham
John Kelly	Birmingham

BIM MEP

Croydon

EUNA, BNI, BSE

Felix Risley	Director
Ian Twydell	Associate
Ray Rogers	Associate
Grayham Roper	MEP Revit technician/ BIM Champion
Thomas Clack	MEP Revit technician
Tom Roberts	MEP Revit technician
Chris Sumner	MEP Revit technician (EST)