



Construction BIM Management is a project-specific role, integrated with the construction team.

The core focus of this role is to de-risk the construction process through working with the construction supply-chain to coordinate fabrication and construction information, providing a foundation for activities such as penetration location identification, digital site set-out, and the progressive fabrication of steelwork

## Construction BIM Management services provided

### Construction Phase BIM Requirements and Strategy

We will work with the Construction team, and sub-contractors where required, to develop all relevant Construction Phase BIM requirements and the overarching BIM Strategy. This includes a Construction Phase BIM Execution Plan (BEP), As-built specifications, construction tolerances for 3D model coordination.

### Production of Construction Phase Federated Models

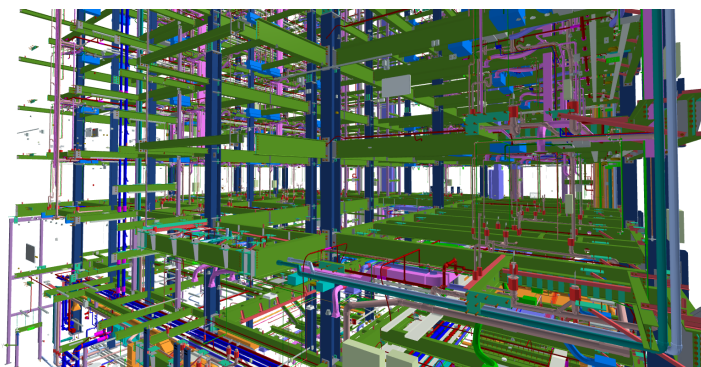
We will produce a Federated Model for the Construction Phase. This would include 3D models and data such as IFC design models, Construction 3D models (i.e. temporary works and earthworks), sub-contractor shop drawings (i.e. MEP, Structural Steel), site and survey data and models.

As construction progresses, this model will be updated in-line with the project programme.

### Sub-contractor Model Coordination

We will facilitate regular sub-contractor model review meetings, progress, and compliance reports. This will provide all sub-contractors, the design manager, and any other stakeholders with complete visibility of the project. The process will address issues rather than just 'clash' numbers. All issues will be assigned a hierarchy of importance and be designated a specific trade or organisation for resolution. Progress reports will communicate how many issues are being resolved, created, or ignored.

Construction BIM coordination workshops or meetings will be structured to make sure issues are highlighted and a relevant stakeholder is accountable for the resolution of each issue.



Example of 3D service and structural steel shop drawings

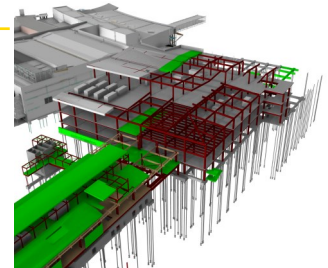
### Management of Sub-contractor Modelling

Where the sub-contractors do not have the in-house capability to 3D model shop drawings, we can provide the modelling support to complete this. This involves taking 2D shop drawings and specification information and developing 3D models to support 3D coordination and as-built modelling.

Upon completion of the job, we can also take red pen as-built mark ups or point clouds to update the model to reflect the as-built state.

### 4D Construction Sequencing

To aid the coordination of complex or highly congested areas we federate sub-contractor models and integrate the model with the construction programme. Implementing digital rehearsals of the construction sequence (4D BIM) we can optimize the construction sequence and make sure that equipment is installed sequentially to avoid issues during construction.



4D Sequencing Example

### Penetration Coordination

As part of the model coordination process we identify any required penetrations in fire walls, structural steelwork structural walls, floors, and roofs, assigning these requests to specific trades or organisations as 'issues' to be resolved. This identification process is undertaken once per coordination review. If required, we can produce penetration schedules using the 3D modelled information.

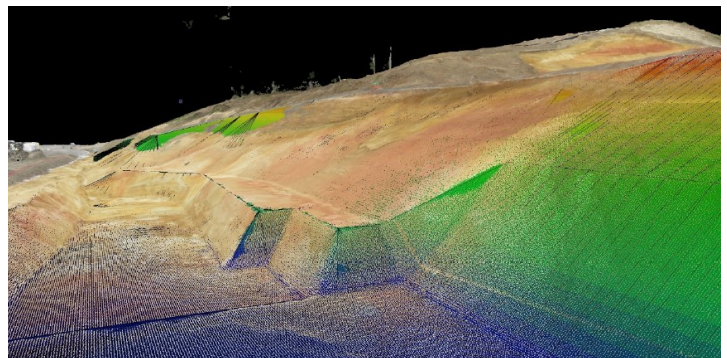
### Model-based Machine Control

We can leverage design 3D models and 3D earthworks models to enable model-based machine control. This improves productivity and accuracy, allowing earthworks to be accelerated and reducing the risk of re-work.

By working with the main contractors and earthworks contractor, we will identify which platforms and tools are best suited to the project needs, and how these are best implemented on the project.

### VR for safety and constructability

Using the visualisation technologies and processes used in the design phase, we can take the construction phase 3D models and use them for safety and constructability reviews. We can support the construction team to capture any hazards or issues found during this review within a central digital platform. Issues will have an owner assigned, and as part of the coordination process these will be reviewed and updated as resolved.



Machine controlled earthworks as-built with point clouds, and compared to design model for accuracy



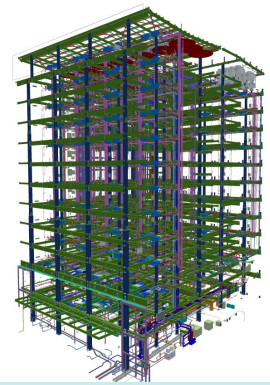
# Project Examples | BIM Management - Construction Phase

## Hotel Grand Chancellor - Construction BIM Management

Client | NZ Strong Ltd

Project Duration | 2021 - 2023

Project Role | Construction BIM Management • 3D shop drawing coordination • Seismic Restraint Modelling and coordination



### Project Description

Beca began as the BIM Managers on Hotel Grand Chancellor during the design stage, and were subsequently appointed by the main contractor, NZ Strong, as the Construction BIM Managers.

In this role, we were responsible for 3D coordinating the services shop drawing models (Hydraulics, Fire Protection, Mechanical and Electrical) and the structural steel fabrication model, to resolve clashes progressively up the building allowing for steel procurement and fabrication to be undertaken prior to the service locations being finalised. This involved regular coordination meetings with main and sub-contractors, upskilling of NZ Strong and the subcontractors to use platforms such as BIM360 and Revizto, and developing dashboards to communicate coordination issues found during the review.

Beca have also been responsible for modelling of the non-structural seismic restraints, and coordination of these elements to minimise the risk of on site clashes and potential rework and delays.

Delivering this project included undertaking the following activities:

- 3D coordination of services (Hydraulics, Fire Protection, Mechanical and Electrical) shop drawing models and structural models
- Upskilling of NZ Strong team and subcontractor modelling teams to use tools and processes for decision making, design management and resolving coordination issues
- Facilitating coordination meetings with NZ Strong and the subcontractors to resolve issues identified
- Resolving interoperability issues between Tekla (structural modelling tool) and Revit to allow coordination of service penetrations through steelwork
- Developing penetration schedules to assist with pricing
- Seismic restraint design, modelling and coordination against the services and structural construction models
- Identifying other opportunities to use the federated construction model for activities such as fire wall penetration review

### Approach

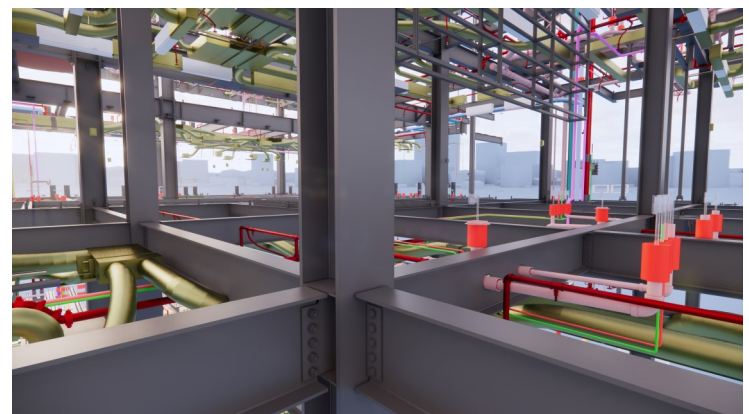
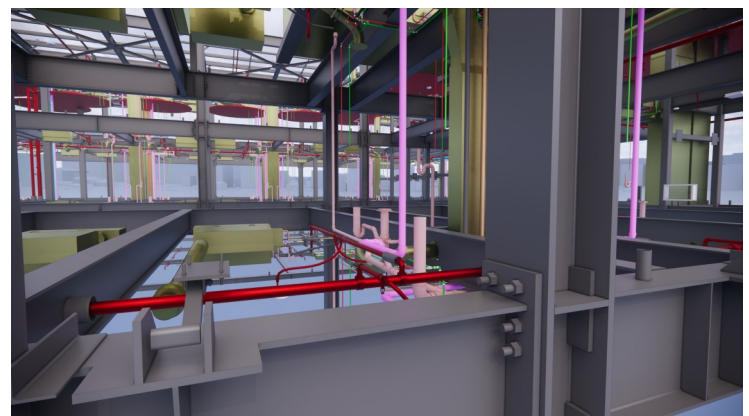
Our approach was to engage with NZ Strong and the subcontractors to develop a clash matrix specific to the construction stage of the project. This matrix defined which trades will be coordinated against which, the criticality of each of these clash sets, tolerances and issue severity definitions. Issue severity type definitions were key to avoiding “false positives” and making sure that efforts are spent on resolving real issues.

Coordination was undertaken in eight stages and broken into zones, such as the basements, public floors and typical hotel rooms, to allow critical path items, such as structural steel to be resolved first.

For each round of coordination, two coordination meetings were held with the full services trade team and NZ Strong to agree how to resolve clashes or other constructability issues identified.

### Benefits Realised

- Onsite coordination issues identified early, and were resolved prior to first fix starting to reduce onsite delays
- Improved coordination and collaboration between Main Contractor and subcontractors
- A significant shift in the subcontractors, with buy in and support of BIM processes
- Valuable clearance test checks for early service installation issue identification



Examples of coordinated shop drawing models