4 BIM COLLABORATION

4.1 Collaboration Procedures

The success of a BIM enabled project delivery process is highly dependent on the level at which the entire design/construction team can collaboratively produce and manage information throughout the project period. There is hardly any project in Hong Kong which can be carried out by a single person or discipline, and therefore, collaboration is essential.

4.2 Collaboration Standards

The purpose of collaboration is to obtain the latest published information from all other relevant parties so that a certain design discipline can work with the information and produce relevant design input. A collaborative information management standard in the Project Execution Plan (PXP) shall address the followings: -

- lines of responsibility
- modes of communication
- reporting procedures
- approval and sign-off procedures
- information management and exchange protocols, and model sharing protocols
- model coordination procedures
- procedures for numbering models and drawings and their successive versions.

4.3 Common Data Environment (CDE)

A collaborative platform is usually referred as the Common Data Environment (CDE), which can be as simple as an online place for collecting, managing and sharing information as the amongst team members working on a project.

Within same discipline: Common file folder which every Project Team member can access

Across different disciplines: Shared Folder which different disciplines of Project Team members can access.

In cases where internal security policy prevents sharing among different disciplines, a Shared Folder in each discipline shall be established to store the latest information transmitted (Refer to Section D.COL-2).

4.4 Federated Model Creation

The BIM Manager shall manage the process of bringing various models together into a single “federated model”, which means a model consisting of linked but distinct component models and other data sources that do not lose their identity or integrity by being so linked. A change to one component model in a federated model does not create a change in another component model in that federated model.

If all designers are using the same modelling platform, then this could be undertaken within the native file format, or through export into an open transfer format (e.g., IFC).

If different platforms are used, project review tools should be used to integrate and validate merged models. There may be benefits in using a specific review software such as Design Review, even if all team members are using the same platform.

The method for creating and managing the federated model should be agreed and documented in the BIM PXP.

4.5 Facilitating BIM Coordination Meetings

Face-to-face meetings in which BIM models are used for design review and clash detection/ coordination are the preferred means of facilitating technical discipline coordination. However, different project circumstances will determine the most appropriate approach. Remote means of conducting BIM coordination, such as web conferencing, should only be considered when no other practical alternatives exist.

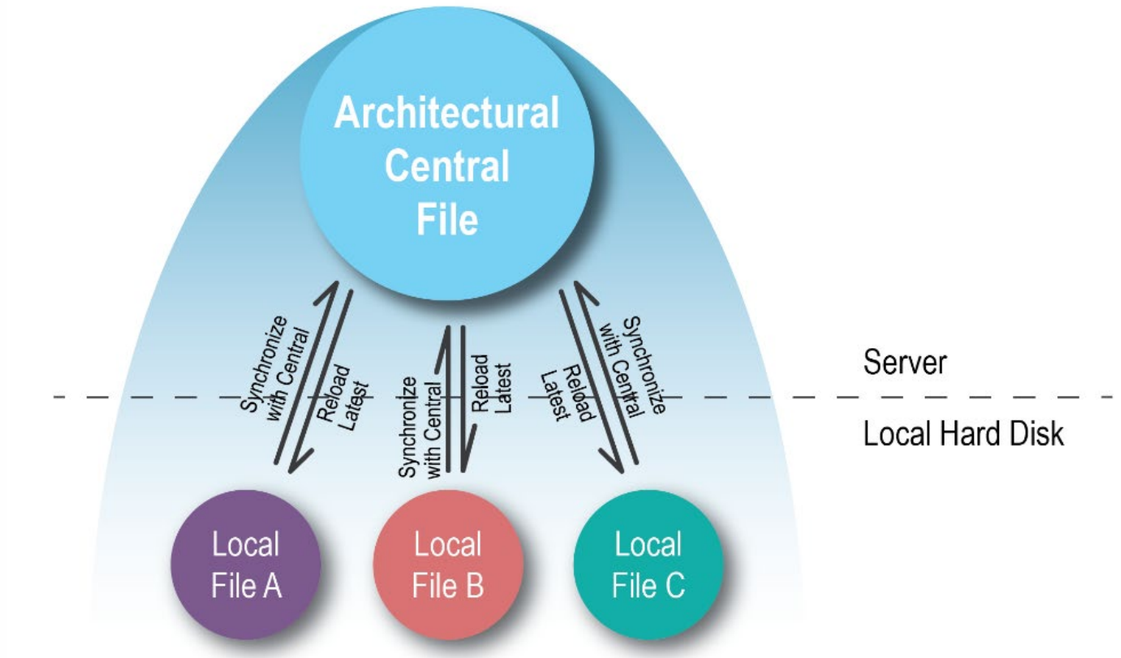
Consideration should be given to establishing a BIM Coordination Room (typically a physical room set aside for this purpose) configured and equipped to allow multiple parties to view the federated models. Coordination sessions should include all designers. Where clashes are detected, resolution should be agreed and those parties which are impacted should make the changes required in their respective models (not within the federated model).

The party responsible for providing the facilities shall be determined during the development of the BIM PXP. Typically, it is done by the BIM Manager. A current clash detection matrix shall be produced and circulated to all parties (key stakeholders) before each meeting, then be updated once the revised models have been released into the federated model and a new clash detection process undertaken. Trends of clash detection shall be recorded to show the BIM progress.

D.COL-1 Internal Collaboration

Internal Collaboration refers to collaboration among different users within the same discipline.

Revit projects can be subdivided into worksets to accommodate such circumstance. Users can enable worksharing by creating a central file. Then, other users can create their own local file of the central file to work on the project.



Internal Collaboration (within the same discipline)

When worksharing is enabled, the central file stores all the ownership information for all the worksets assigned to the model and is the main distribution point for all changes made to the model by all the local users.

A user saves his/her own local file, edit the local file, then synchronizes it with the central file to update his/her changes made so that other users can see them.

Moreover, a user can reload the latest central file to update his/her local file.

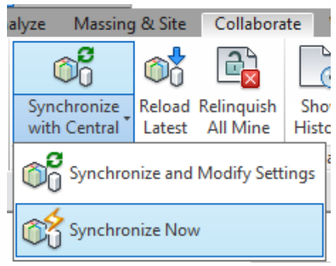
Note that the Central file shall never be opened, but only copied to create local files. It should be recreated at regular intervals in order to eliminate redundant data retention.

Enable Worksets:

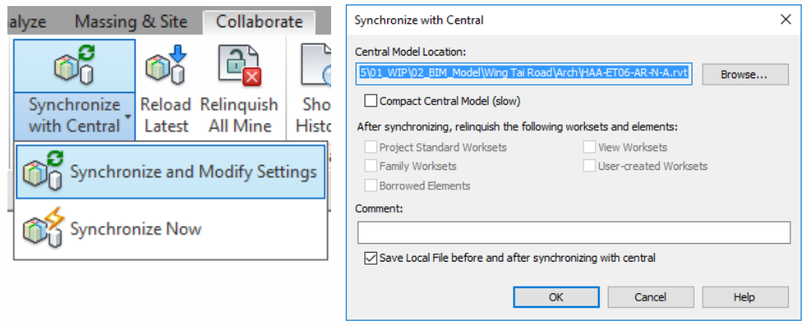
When a user works on a workshared project, he/she should specify an active workset. Each new model element he/she adds to the project is then contained in the active workset.

D.COL-1.1 Synchronize with Central

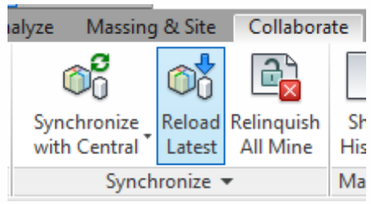
When working on a worksharing project, use the Synchronize with Central tool to save local changes to the central model.



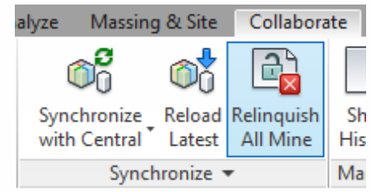
Modify the Synchronize with Central settings before synchronize with central.



Load updates from the central model without publishing your changes to the central model.

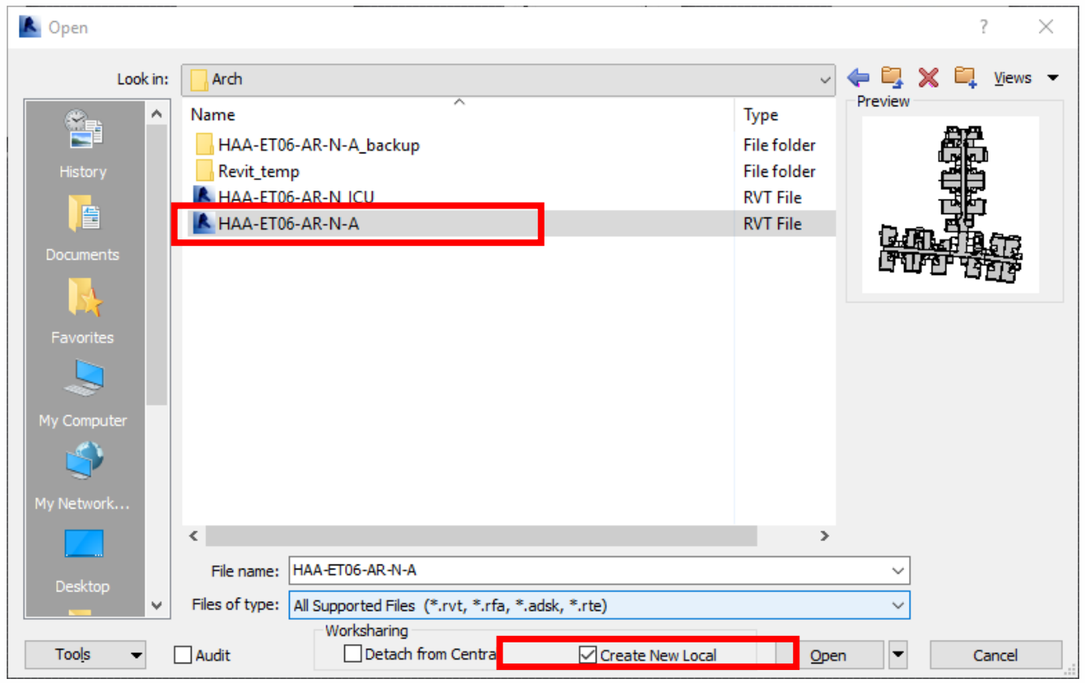


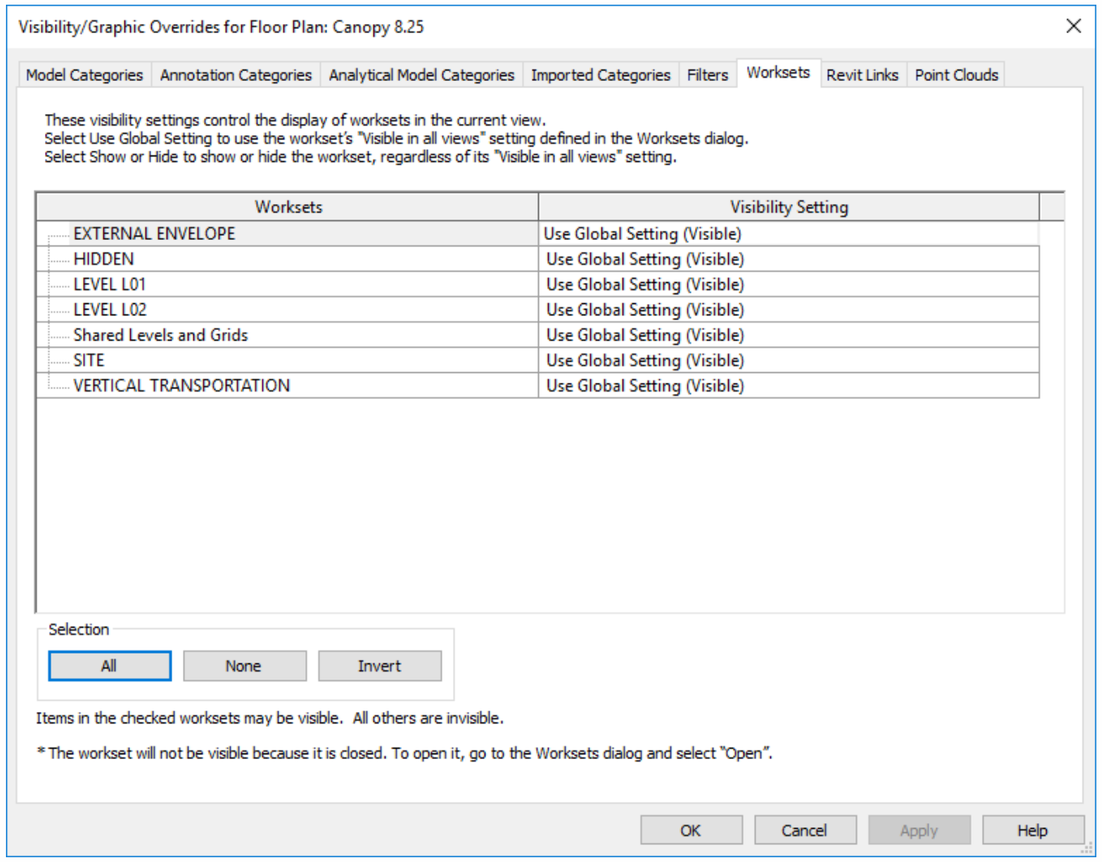
After the save has been completed, from the Collaborate tab click the Relinquish All Mine tool. This will release ownership of all model elements and is an important step to allow other users to work with the model.



D.COL-1.2 Local File

It is good practice for users to create a local copy of the central model every day. Creating a new local copy ensures a local copy is always on your hard drive each time you begin modifying a project.





The Worksets button and drop-down list and the Editing Requests icon are displayed in the status bar by default.

These visibility settings control the display of worksets in the current view.

D.COL-1.3 Workset

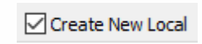
Workset has primarily two functions – Categorization and Responsibility. Any project with more than 1 person working on it will involve workset.

Firstly, worksets help organize the project in an orderly and controllable manner, especially in drawing productions where workset are widely used to control the amount of information to be displayed in the drawings.

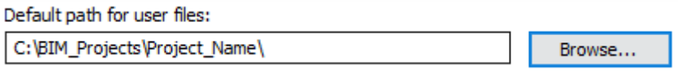
Secondly, worksets allow multiple users to simultaneously work on a model file through the use of a CENTRAL file and synchronised LOCAL copies. Properly utilised, worksets can significantly improve efficiency and effectiveness on large and multi-user projects.

Never open or edit the CENTRAL file directly. All modification shall be carried out via LOCAL files.

- Appropriate worksets shall be established and elements assigned, either individually or by category, location, task allocation, etc.
- To improve hardware performance, only the required worksets shall be opened. Revit ensures that elements contained in closed worksets are still updated if changes made in open worksets impact them during model regeneration.
- Once worksets are enabled, filenames shall be suffixed with either –CENTRAL or –LOCAL.
- A LOCAL copy of the model shall be created by COPYING the original onto a local hard-drive via Windows Explorer; or by opening the CENTRAL file with the Create New Local option ticked.



- Before creating the local file by opening the central file and doing a “Save As”, please specify the local folder path. See section 5 D.MET 2.1 for local folder structure.



Workset Naming

Worksets should be named in a consistent and logical manner to aid navigation through the project.

Revit elements in the project shall be categorised into different worksets. Project without workset is similar to having all elements in one single layer in the CAD system and will be difficult to control in Drawing Production.

- By Content

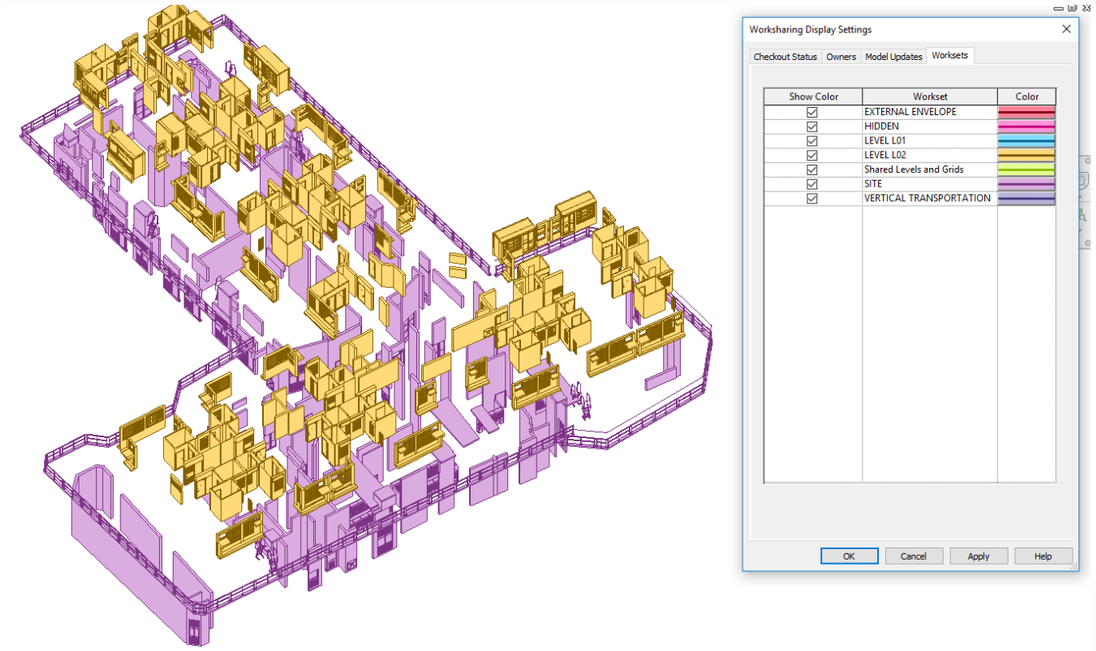
  Description of workset content; categorised by the responsibility.

- By Zone

  Larger projects can be divided horizontally or vertically into zones / levels and so this should be identified in the workset naming where applicable.

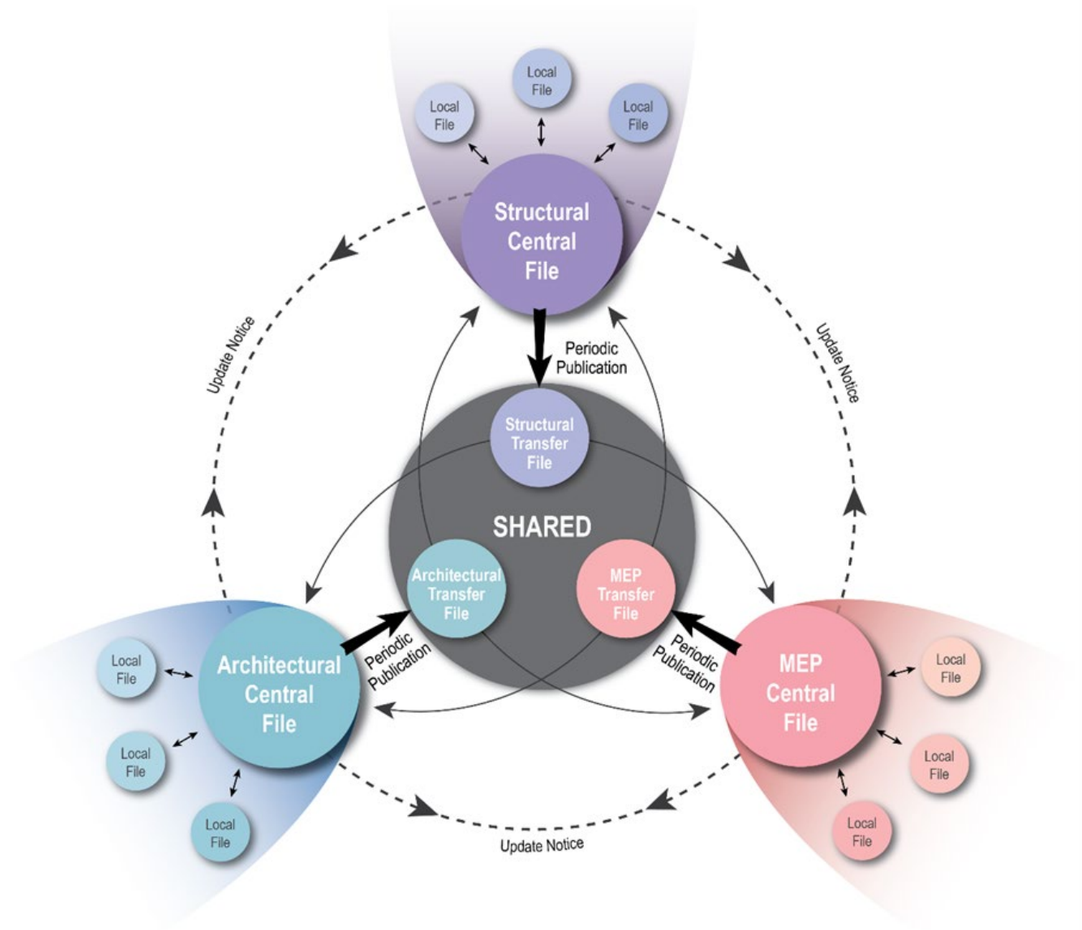
Workset Name (Architecture)	Example of use
External Envelope	Exterior walls, facade and architectural elements attached to facade
Shared Levels and Grids	Level lines and gridlines
Site	Site elements not related to building, such as topography, landscaping
Hidden	A workset to store architectural elements that will be replaced by Structural elements from the Structural models in the Detailed Design Phase. E.g. Architectural Wall, Architectural Column, Architectural Floor, Architectural Stair
Vertical Transportation	Stairs, escalators, elevators
Structure	Structural slabs and columns within Architectural file in early stage

LB1	Architectural elements in Basement B1/F, Rooms in B1/F, Area in B1/F
L00	Architectural elements in G/F, Rooms in G/F, Area in G/F
L11	Architectural elements in 11/F, Rooms in 11/F, Area in 11/F
Lxx ……	Each floor has its own workset for individual planning design and individual visibility control



D.COL-2 Cross-Discipline Collaboration

Worksharing is a design method that allows multiple users to work on the same project mod el at the same time.



Cross-discipline collaboration

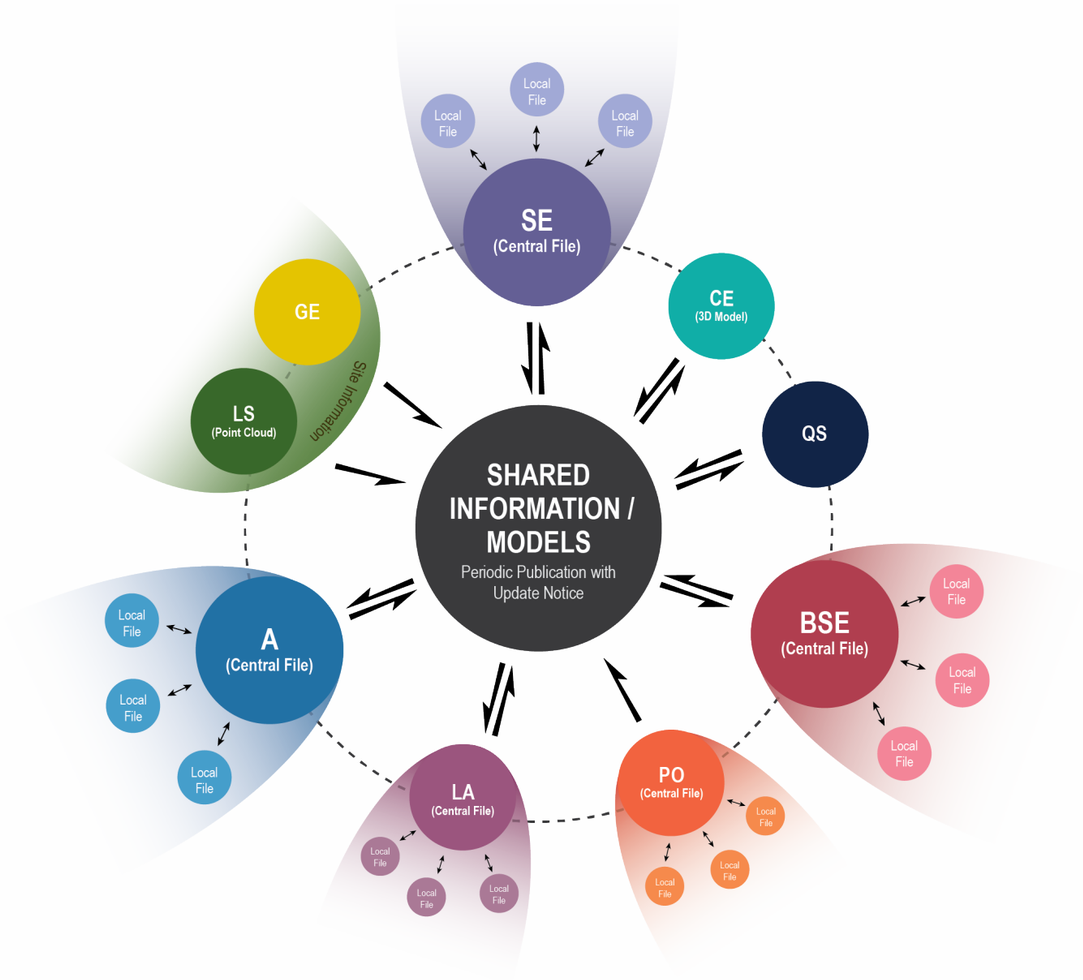
Periodic Publication

It is good practice for each discipline to upload its central model to the Shared Folder every week. The transfer file should be linked to the central file for the reference of different disciplines.

Copy central file to this folder:\\02_Shared\02_BIM_Model

Purpose Driven BIM

The Shared Folder shall also act as the repository for formally issued data provided by external organisations that are to be shared across the project.

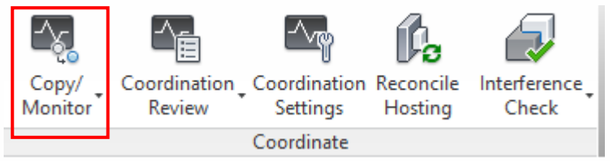


For Design / Coordination, link the different disciplines' transfer files to central file.

For Documentation / Drawing Production / Analysis, create the new file for drawing. Also, link all the discipline packaged central model to sheet file.

D.COL-2.1 Copy/ Monitor

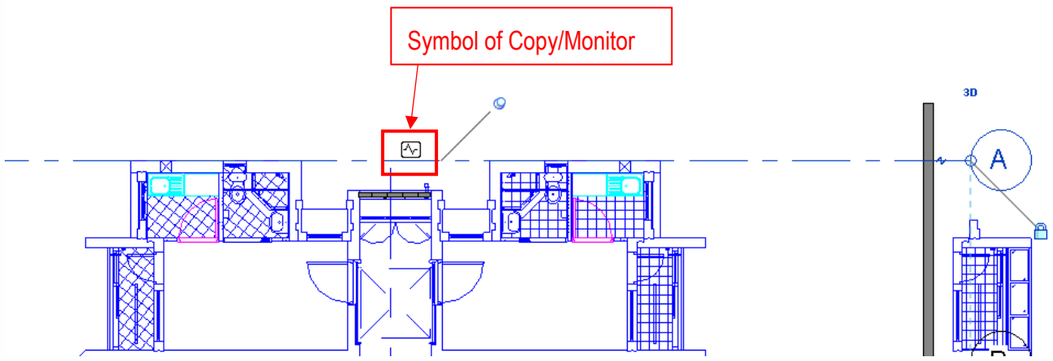
Copy/Monitor is a powerful built-in tool in all Revit platforms and is considered the most intelligent coordination tools.



When the Architect is responsible for setting up Grids and Levels for the project, other disciplines should Copy/Monitor the Grids and Levels from the Architectural model. This allows tracked coordination between different models.

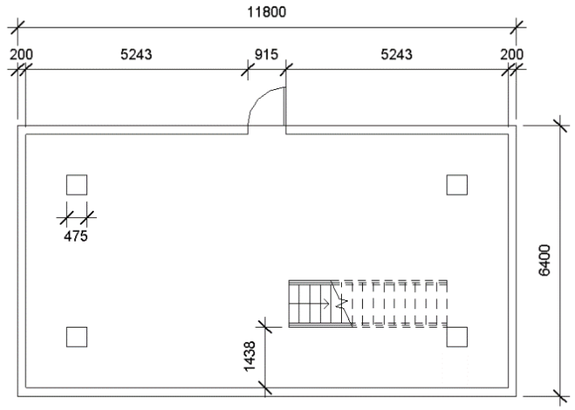
When multiple disciplines collaborate on a project, effectively monitoring and coordinating work can help to reduce mistakes and expensive rework. Use the Copy/Monitor tool to ensure that design changes are communicated across disciplines.

However, it is recommended that the Copy/Monitor function should be limited and carefully planned is necessary according to project needs. Abusive use of the function will slow down the model performance significantly.



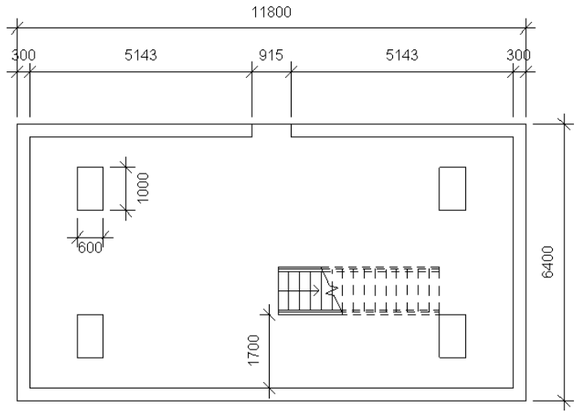
D.COL-2.2 From Preliminary Phase to Detail Design Phase

During Preliminary Phase of a project, architects may need to model certain basic structural elements, e.g. walls, columns, stairs, to illustrate the design intent. At detail design stage, structural engineers will take over the ownership of these structural elements.



Architectural model sample during preliminary phase

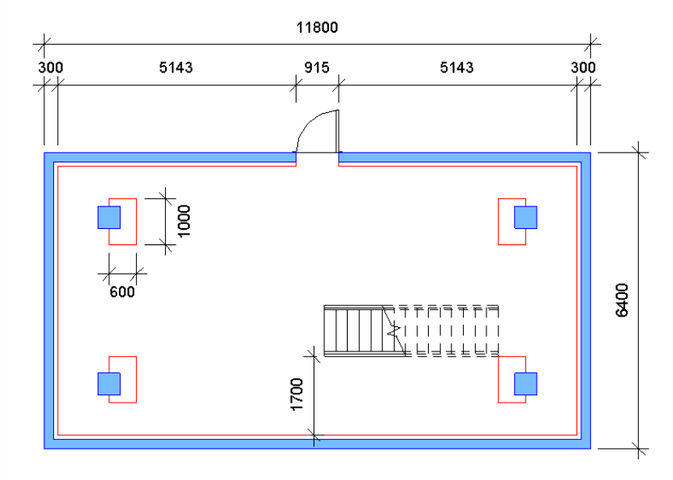
It is recommended to place these intended structural elements into a 'Hidden Workset', i.e., architects can hide them after the structural model is created by structural engineers and is linked into the architectural model. (Refer *D.COL-3 From Modular Flat to Project, Workflow*.)



Structural model sample during detail design phase

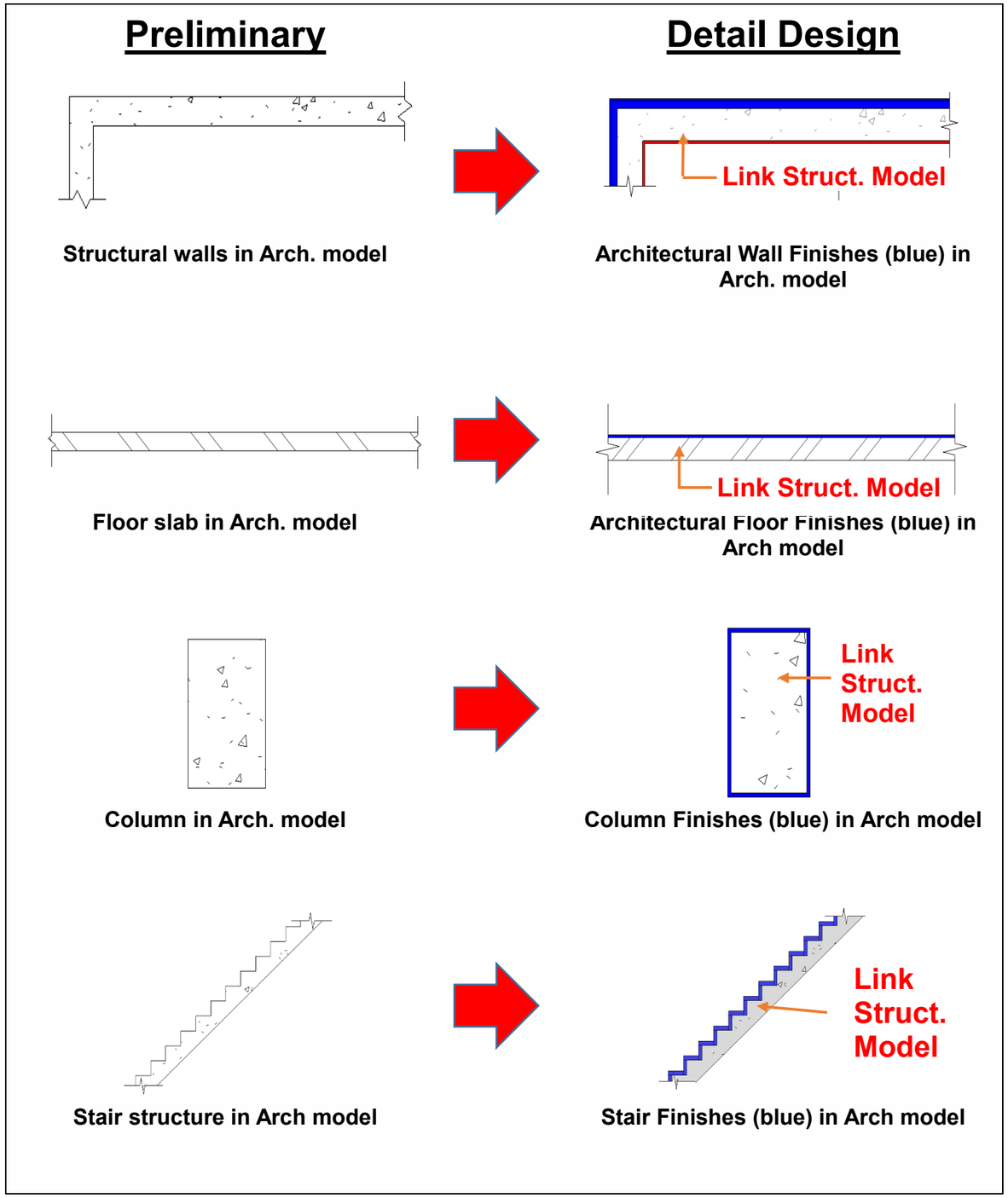
Sizes and positions of structural elements may change during development of scheme, e.g. structural engineers have found that bigger columns are needed, or overall dimensions of the walls have become thicker after taking architectural finishes into account.

Upon the samples shown in the previous page, comparison is illustrated below:



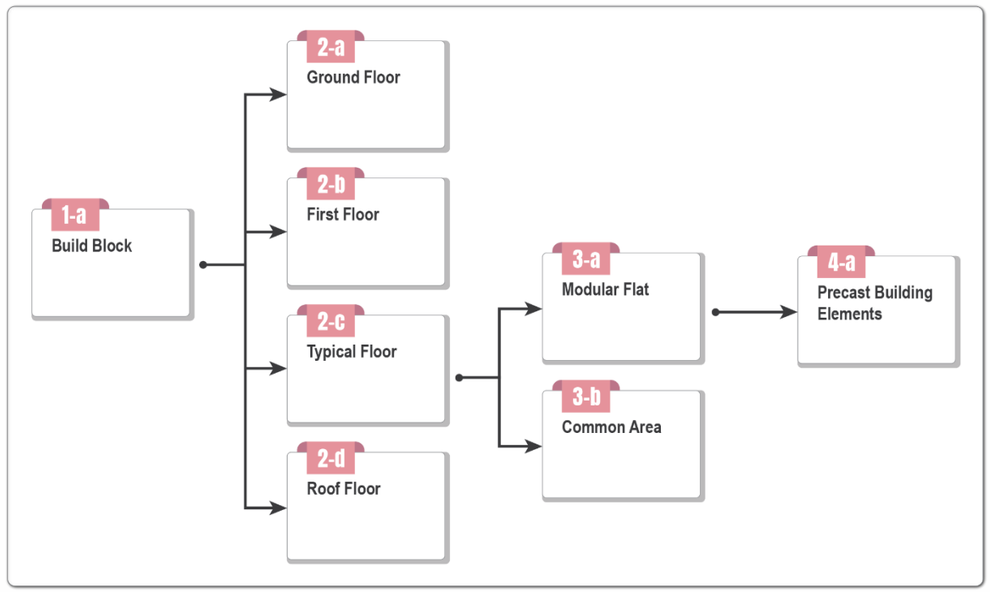
Blue shades show the Architectural model during Preliminary Phase, Red lines being the architectural finishes during Detail Design Phase.

These preliminary elements shall then be converted into Architectural finishes as new family types, illustrated below:



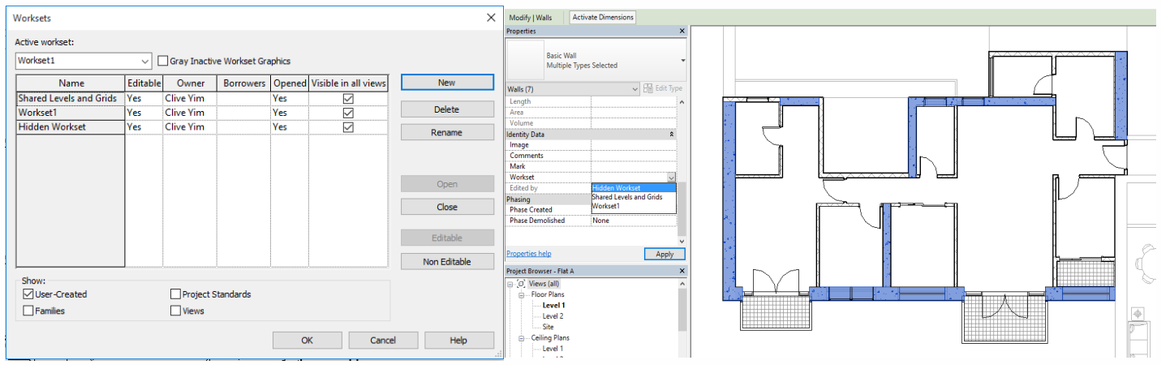
D.COL-3 From Modular Flat to Project

From a Modular Flat to a Building Project, Building Block Model is organized in a hierarchical structure.

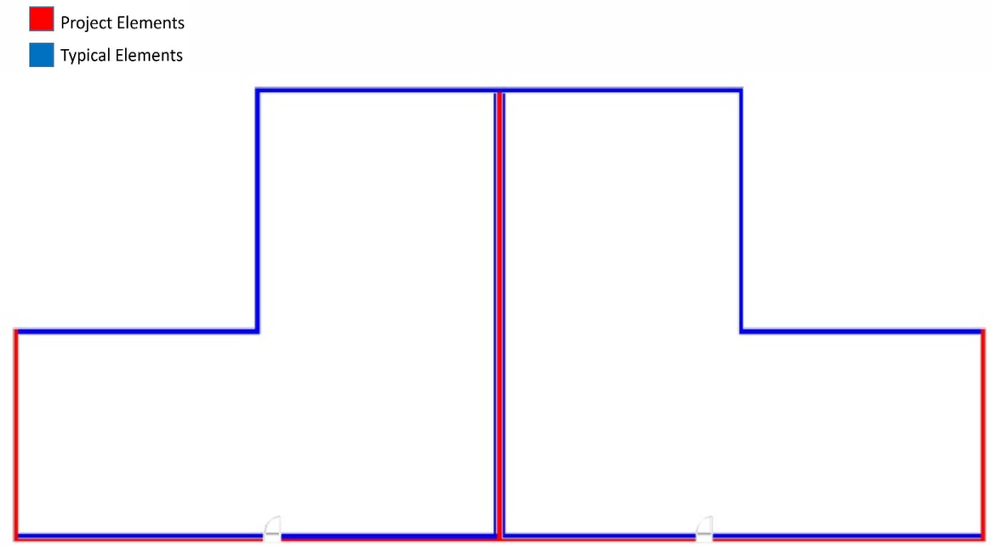


Workflow

1. Create a project file.
2. Create a “Hidden Workset” for the purpose of collaborating the architectural and structural elements at later stage.
3. Put all intended structural walls into Hidden Workset to allow different parties to have control on switching the structural walls on and off easily.
4. Build up the common corridors, building core and common walls between modular flats in another project file.

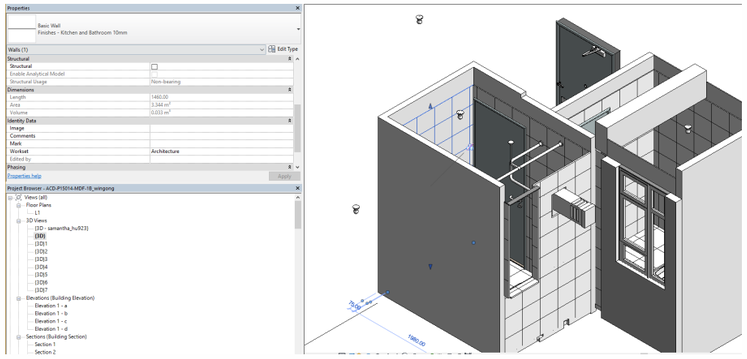


5. Link CAD into new project and build up the Modular Flat accordingly, each type of unit should be saved as an independent project file.
6. Create a Modular Flat file to build up the independent walls and wall finishes of the modular flats.

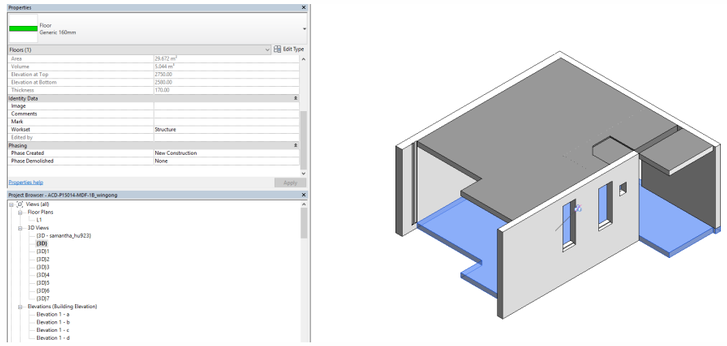


7. Assign different categories of information into respective worksets such as “Finishes” and “Precast Units”.

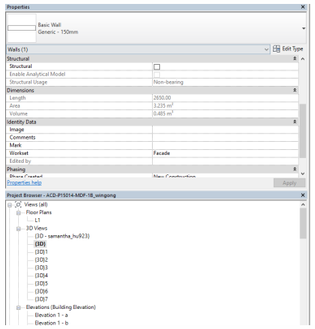
All finishes shall be assigned to the “Architecture Workset”

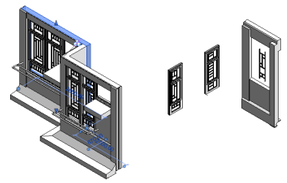


All Structure elements shall be assigned to “Structure Workset”

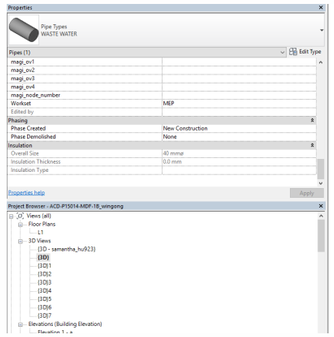


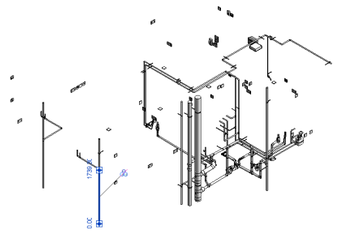
All precast façade panels shall be assigned to “Facade Workset”



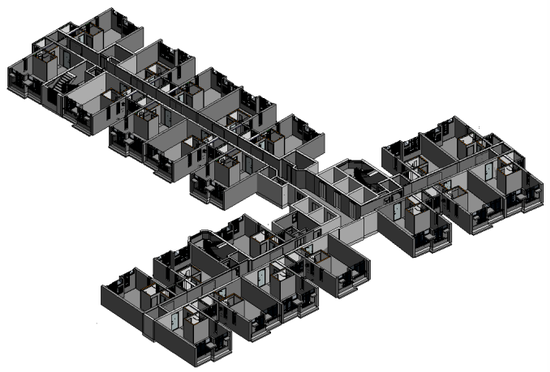


All MEP shall be assigned to “MEP Workset”

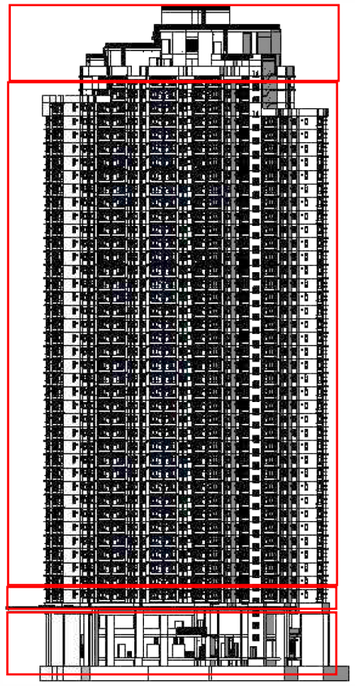




8. Link modular flats file into a project file to create typical floor model file.
9. Link the typical floor model in the Building Block Model File and multiply it up to the intended height (number of storeys) by using “Copy to Clipboard” and “Paste > Aligned to Selected Levels” command.



10. Link the Ground Floor, First Floor and Roof Floor model into the Building Block Model File to complete a single Tower.



Roof Floor

Typical Floor

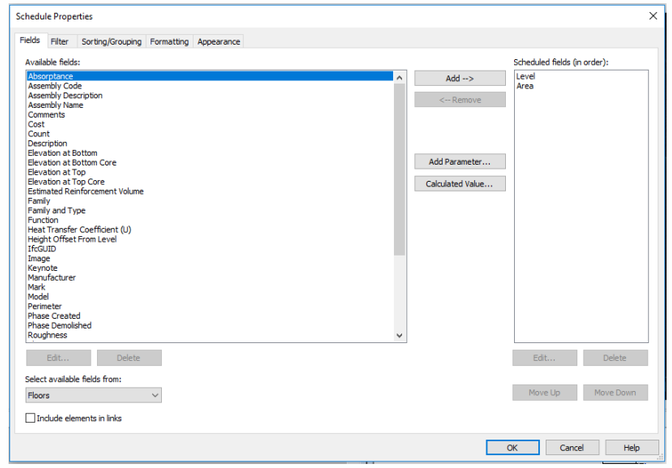
First Floor

Ground Floor

11. Create a Schedule by adding necessary parameters such as “Level” and “Area” into the Schedule Fields.

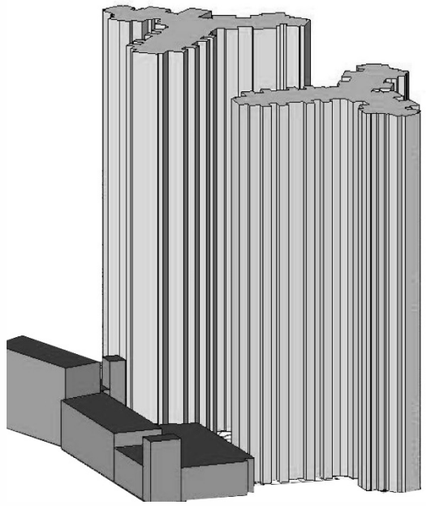
<floor_schedule_table>
<Floor Schedule>

A	B
Level	Area
Level 1	600 m²
Level 2	600 m²
Level 3	600 m²
Level 4	600 m²
Level 5	600 m²
Level 6	600 m²
Level 7	600 m²
Level 8	600 m²
Level 9	600 m²
Level 10	600 m²
Level 11	600 m²
Level 12	600 m²
Level 13	600 m²
Level 14	600 m²
Level 15	600 m²
Level 16	600 m²
Level 17	600 m²
Level 18	600 m²
Level 19	600 m²
Level 20	600 m²
Level 21	600 m²
Level 22	600 m²
Level 23	600 m²
Level 24	600 m²
Level 25	600 m²
Level 26	600 m²
Level 27	600 m²
Level 28	600 m²
Level 29	600 m²
Level 30	600 m²
Level 31	600 m²
</floor_schedule_table>

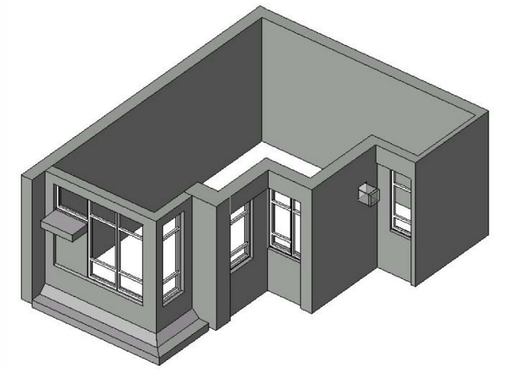


Level of Details (LD) of a Modular Flat is separated into 4 levels

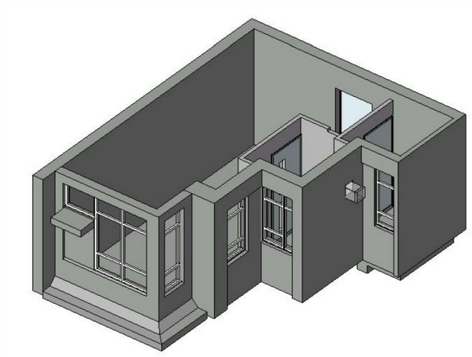
LD 0 - Massing Blocks



LD 1 - Model without internal partitions (for generating elevations)

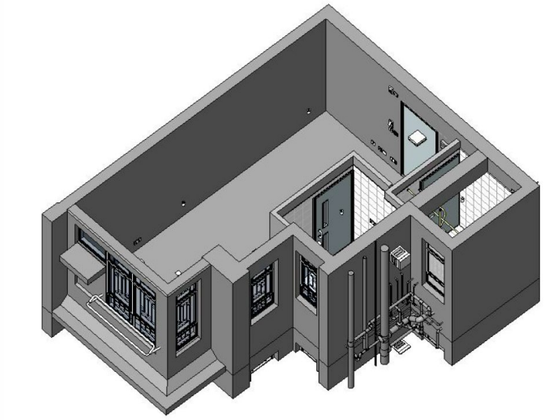


LD 2 - Model with Internal partitions but no details (for generating sections)



LD 3 - Model with all internal details (for generating working drawings). Models at LD3 Level to facilitate:

a. Generation of working drawings.
b. BIM-based cost estimating.



Note that for the purpose of ICU or GBP Submission, LD of the model between LD 2 and LD 3 is required. The following items will need to be modelled on top of LD 2 to satisfy the submission requirement::

- Kitchen and bathroom
- Sanitary fitment
- Wall and floor tiles

Refer to Annex 7 for further information regarding submission requirements.

Liability of individual disciplines (A, SE, BSE)

- Each professional discipline creates its own models and files.
- It has ownership and data responsibility for the information provided in the models.
- Models should not be amended by other parties or disciplines without the model owner's permission.
- The author of models or details should be easily identified by users.

Workset In Modular Flat

File	Workset	Contents	Disciplinary Liability
Master	-	Link all Models for visualization	Architect
Arch	Architectural	Partition walls, internal finishes, doors, gate sets, sanitary fittings, etc.	Architect
	Fabric Mesh	Fabric mesh (loose bars not included)	
	MEP	(For linking in building service files, such as WS, DR, etc.)	
	Opening	(For pipes and water heater's openings)	
	Precast Façade	Precast facades (including windows, window grilles, finishes, drying rack on precast façade)	
	Structural Horizontal	Semi-precast and full precast slab, in-situ topping, beam, etc.	
	Structural Vertical	Structural walls, columns	
	VPB Architectural	VPB finishes, waterproofing, non-structural walls, curtain rail	
	VPB Structural	VPB Structural walls, slabs, structural grout	
	Waterproofing	Waterproofing membrane, moisture sealer, angle fillet	
	Windows	Windows, window grilles (excluding windows, window grilles on precast façade)	
DR	External		Architect
	Internal		
AC	-	No workset	
WS*	External		Building Services Engineer
	Internal		
GAS	External		
	Internal		
EL	-	No workset	