HONG KONG HOUSING AUTHORITY

Building Information Modelling
Standards and Guidelines (HABIMSG)

- Volume 1 of 2 – Introduction and Quick Guide
- **Volume 2 of 2 – Detail Guide**
- Annex

Version 3.1

Important Points to Note:

The primary purpose of this Guide is to standardize various practices on the adoption of BIM in HA projects. It is therefore necessary to prescribe a set of standardized requirements on the modelling methodology and technical details for various parties engaged in HA projects to follow. Some of the requirements listed in this Guide are mandatory while others are recommended best practices only.

However, it is hereby stressed that whilst HA endeavours to ensure the accuracy and adequacy of the content in this Guide, user has the ultimate responsibility over the work they produced and should ensure that it meets project requirements. The use of this guide shall not relieve the users from such liabilities or obligations and HA accepts no responsibilities in this regards.

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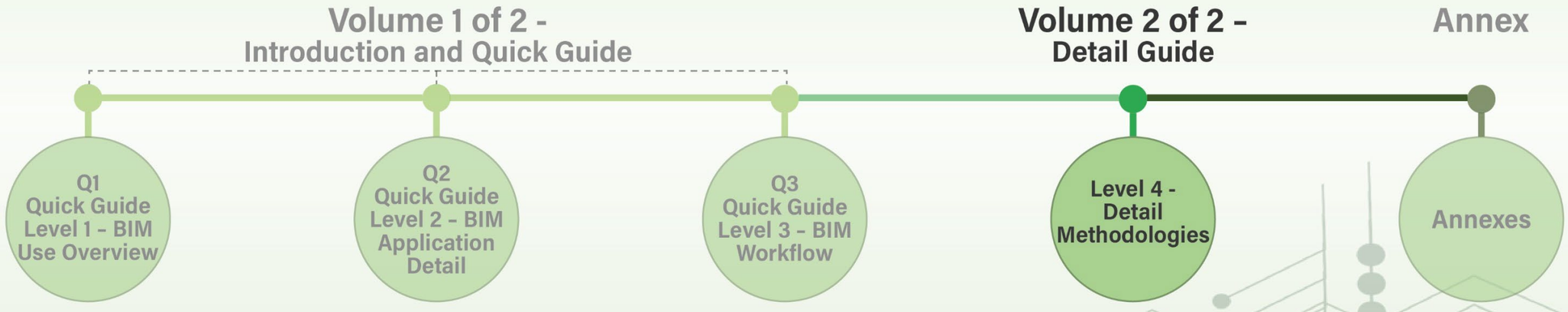
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D1 LEVEL OF DEVELOPMENT (LOD)

D1.1 Adoption

HA LOD Responsibility Matrix aims to define the practice of Level of Development for each project stage.

For LOD specifications, HA adopts Hong Kong CIC BIM Standards, which contains prevailing LOD specifications under different publications. Users may download the latest LOD specifications in related CIC BIM Standards (for *Architectural and Structural Engineering, MEP and Underground Utilities)* from CIC's website at:

https://bim.cic.hk/en/resources/publications

BIM Forum is the leading international organization for LOD definition, and the latest edition can be found at: ***https://bimforum.org/LOD/***.

Note that, however, BIM Forum's LOD specifications shall serve as additional reference only for elements not covered under CIC BIM Standards, since it does not differentiate LOD-G and LOD-I.

D.LOD-1.1 What is LOD?

LOD shall be referred to "**Level of Development**". Level of Development is the degree to which the element's graphical representation and attached non-graphical information are being thought through and the degree to which model authors may rely on the information when using the model.

LOD definition serves as a communication tool between model authors (such as Technical staff, Professional Service Provider, Contractor) and model reviewers (such as Professional staff). It allows model authors to define their model elements and enables downstream users to clearly understand the usability and limitations of the models they receive.

LOD describes model elements but not models as a whole. There is no such thing as an "LOD ### Model." Project models at any stage of delivery will contain elements and assemblies at various levels of development.

To align with the principle of "Purpose Driven BIM," it is recommended that attributes of a BIM element be determined to meet their intended usage without over specifying. Team members shall use this LOD guide as a starting point for model exchange and, as the project progresses, shall continue to identify the need for an LOD that would define model elements sufficiently developed to enable detailed coordination between disciplines.

D.LOD-1.2 Fundamental LOD Definitions

(References made to the 2.6 Level of Information Need from CIC BIM Standards – General (Version 2 – December 2020)

Developing BIM Uses and having a flexible approach to information modelling drives the need to investigate different ways to deliver the relevant information and ensure it is fit for purpose. The LOD defined in HA refers to the following three components of the Information Model:

Level of Graphics (LOD-G)

CIC Definition: The Level of Graphics (LOD-G) refers to the graphical representation which deals with geometric representation, symbology and visualisation. This is generally related to the deliverable (scale of documentation) which controls the graphical precision of the elements represented. This in turn enables identification of which parts of the objects can be disregarded or simplified while keeping the object functional to meet the BIM Uses.

Level of Information (LOD-I)

CIC Definition: The Level of Information (LOD-I) identifies the properties to be attached to each type of object to meet the intended uses. Properties can include requirements, specifications, product definitions, object methods, parametric parameters, materials, generic or manufactured product criteria, etc. The LOD-I requirements should be associated with the AIR identified for a specific project stage which should be fulfilment of one specific use case.

Inter-relationship between LOD-G and LOD-I

The concepts of LOD-G and LOD-I are not mutually exclusive. For instance, the degree of accuracy or precision of one level could also be linked to the other level. The needs for each level can be driven by the different purposes and parties who may have their own specific requirements of accuracy, geometry and information.

It should be noted that the LOD has nothing to do with the status of the information in the delivery process, but is related to the granularity of the information required for a dedicated purpose such as a BIM Use or deliverables against a milestone.

D.LOD-1.3 Level of Graphics (LOD-G)

Graphical representation can mean many things within a model and should be subdivided as there can be different needs for modelling (3D), drawing (2D), and visualisation. The geometry for drawings is often dependent upon symbology which sometimes varies depending on the selected scale. Four generic levels of graphical representation are identified as LOD-G notations.

LOD-G 100

CIC Definition: The model element may be graphically represented in the model with a symbol or other generic representation.

HA Interpretation: The elements are **not geometric representations**. Information attached to model elements or symbols showing the existence of a component but does not include its shape, size, or precise location.

LOD-G 200

CIC Definition: The model element is graphically represented within the model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation.

HA Interpretation: The elements are **generic placeholders**. They may be recognizable as the components they represent, or they may be volumes for spatial reservation.

LOD-G 300

CIC Definition: The model element is graphically represented within the model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. The model shall include details of the spaces required for handling installation, operation and maintenance, and the interface details for checking and coordination with other models / objects.

HA Interpretation: The **quantity, size, shape, location, and orientation** of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs. The project origin is defined and the element is located accurately with respect to the project origin.

LOD-G 400

CIC Definition: The model element is graphically represented within the model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing for fabrication, assembly, and installation.

HA Interpretation: The element is modelled at sufficient detail and accuracy for **fabrication**. The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs.

D.LOD-1.4 Level of Information (LOD-I)

Level of Information (LOD-I) is the description of non-graphical information in a model element and will evolve as the project progresses. LOD-I requirements should be defined and agreed beforehand as identified within the AIR. It is recommended that the LOD-I required for the model elements shall be determined to meet their intended usage and NOT over specified. This section indicates a suitable approach for adoption by giving examples of minimum LOD-I associated with typical elements/objects at five levels from LOD-I 100 to LOD-I 500 as shown in the table below. (where R means “Required”.)

Type	Description	Example of Attributes	LOD-Information				
			100	200	300	400	500
General Properties	General information about the object may include identification of its category / type, name and locations, etc.	Category / Type	R	R	R	R	R
		Name	R	R	R	R	R
		Locations		R	R	R	R
Design Properties	Design information varies among different types of BIM objects.	Material (for architectural and structural elements)		R	R	R	R
		Concrete Grade (for structural elements)		R	R	R	R
		Cooling Capacity (for chiller)		R	R	R	R
		Rated power input (for MEP equipment)		R	R	R	R
		Ironmongery Set (for door)			R	R	R
Classification Properties	Classification title and code to be adopted	Classification title			R	R	R
		Classification No. / System Code			R	R	R
Manufacturer’s Equipment Properties	Manufacturer’s equipment information and parameters of the objects. In general, these are essential during the construction stage but not necessarily required during the design stage.	Brand Name				R	R
		Manufacturer Name				R	R
		Model Number of element / equipment				R	R
Condition Properties	Installation information including month/year, latest testing / commissioning month/year, life expectancy	Commission Date				R	R
		Installation Date				R	R
		Life expectancy				R	R
Verification Properties	Field-verification method used for verifying the as-built element	Laser Scanning (Yes/No)					R
			R: Required				

D.LOD-1.5 Field Verification

Field verification of the model elements is important for most projects in Hong Kong. In most local and international BIM standards, "field verified" is the key interpretation for the definition of "LOD 500". However, in terms of geometry, a model element cannot be modelled with more details than those required for fabrication (LOD-G 400). Therefore, the criterion for field verification of a model element should preferably be detached from LOD-500, e.g. a model element with LOD-G 300 can also be field verified. **"LOD 500" / "LOD-G 500" is no longer used or defined in this Guide**

Field Verification method

Two field verification methods are mentioned and results of which may be feedback for necessary adjustment to the Construction BIM model for preparing As-built BIM model:

- **Method A**: Visual inspection on general quantity, arrangement against approved drawings/ model.
- **Method B**: Accurate measured verification such as site surveying.

D.LOD-1.6 LOD Explained by Example

In simpler terms, **LOD-G / LOD-I 100** represent a conceptual level. For example, in a massing model, where the interior walls may not yet be modelled, but the architect can use the approximate floor area to generate an area-based interior construction cost. The interior walls are not modelled so **LOD-G is Not Applicable** (if the walls are laid out as symbolic lines they may be regarded as LOD-G 100) and are **LOD-I 100** – the General Properties about the walls can be obtained from elements that are modelled (e.g. the floors) coupled with other information (e.g. area-based cost tables).

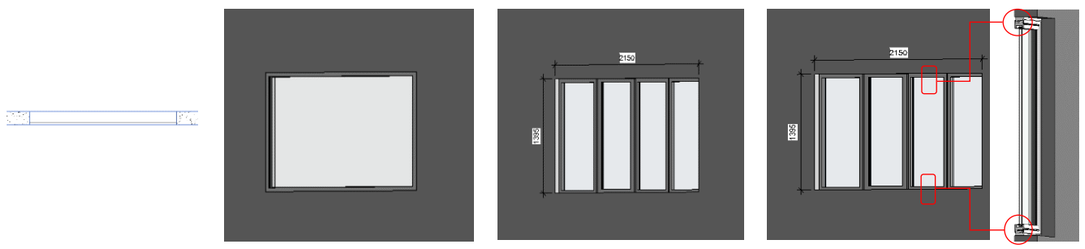
To continue with the wall example, a floor plan is often first laid out using generic walls. The walls can now be measured directly but the specific wall assemblies are not known and the quantity, thickness, and location measurements are approximate. The walls are now at **LOD-G 200**. The wall may be retained at **LOD-I 100, or at LOD-I 200** if further generic Design Properties such as material, have been input.

At **LOD-G 300**, the wall element is modelled as a specific composite assembly, with information about its framing, wallboard, insulation if any, etc. The element is modelled at the thickness of the specified assembly, and is located accurately within the model. Often alongside with the LOD-G, the wall at this stage (e.g. for Statutory Submission) shall also be at **LOD-I 300**, i.e. non-graphical Design Properties such as material and fire rating may be attached as well. It is not necessary to model every component of the wall assembly—a solid model element with accurate thickness and location and other information usually included in a wall type definition satisfy the requirements of LOD-G + LOD-I 300.

LOD-G 400 would be similar to the information usually found in shop drawings, i.e. for fabrication and construction. Similarly, **LOD-I 400** requires non-graphical Manufacturer's and Condition Properties to be input into the model elements, also serving the fabrication and construction purposes.

For the model element to be **field-verified**, the As-built BIM model shall compare the Construction BIM model with the actual construction works being built. If the as-built condition is confirmed to be same as the Construction BIM model, no re-modelling work is needed. Otherwise, the Contractor shall revise the information for the model element for the As-built BIM model.

The images below illustrate an example of how the model of a Window may look like with LOD-G 100 – 400:



LOD-G 100 LOD-G 200 LOD-G 300 LOD-G 400

D.LOD-1.7 LOD of Level 4 Detail Guide

The modelling standard and methodology as described in **Section D4** of this Guide aims to enable users to produce drawings for professional deliverables. These methodologies largely satisfy LOD-G and LOD-I 300, or LOD-G 400 for curtain walls. Under each section / model element in **Section D4**, users may regard provision under **"Information Requirements" as LOD-I requirements**, and provision under **"Model Authoring" as methodologies that satisfy LOD-G requirements**.

If certain BIM use requires LOD above those as required for their deliverables, the concerned disciplines shall raise request to the model originators for agreement. The final decision shall be documented in the PxP.

While lower LOD are usually required in earlier project stages, model authors are encouraged to use more advanced families when available to facilitate BIM Uses such as visualisation, quantity take-off, etc.

D1.2 LOD Responsibility Matrix

The LOD Responsibility Matrix tables serve as templates for PTs / PSPs / Contractors to specify which LOD (LOD-G and LOD-I) is typically expected for each model element at the completion of each project stage. The pre-filled values are provided as a starting point for further adjustment by model authors and receivers as project progresses.

PTs / PSPs / Contractors shall review the LOD Responsibility Matrix in PxP from time to time, especially at project milestones, to ensure that LODs specified and delivered suit project needs.

The Matrix contains the following acronyms:

- **CIC Model Category** refers to corresponding responsibility matrixes from CIC BIM Standards - Architecture and Structural Engineering (**ASE**), Mechanical, Electrical and Plumbing (**MEP**), or Underground Utilities (**UU**)-specific model categories to facilitate users to find relevant LOD specifications.
- **Model Elements** refer to the specific type of objects within BIM models.
- **AUT** refers to the model's authors. For HA in-house project, Project Teams shall refer to the Author's Field of D3.3 D.MET-3.2 Naming Conventions. For Professional Service Provider employed by HA, the Consultant shall use the Consultant's Agent Responsible Code. For Construction and As-built stages, the Contractor shall use the Contractor's Agent Responsible Code.
- **LOD r**efers to Level of Development required, which includes:
    - **G** refers to **Level of Graphics (LOD-G)**
    - **I** refers to **Level of Information (LOD-I)**
    - **V** refers to the **Method for field verification** of the object/equipment. It is project-specific and subject to the agreement of the project client. Method **A** refers to field verified by **visual inspection**, while Method **B** refers to field verified by a **measured survey**. Also refer to the As-built Model Verification Report in the **Model Compliance Checklist** at ANN 1.2b

D.LOD-2.1 Architectural Model

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
Architectural Model																						
Massing model of adjacent areas or surrounding buildings	ASE-AR	Y/N	MAS	HAA	100	100																
Building massing model	ASE-AR	Y/N	MAS	HAA	100	100	HAA	100	100													
Room space, corridor, plant & equipment room	ASE-AR	Y/N	SPA	HAA	100	100	HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Elevator shaft space	ASE-AR	Y/N	LAE				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Floor, slab, ramp, roof (architectural placeholder)	ASE-AR	Y/N	FLR	HAA	100	100	HAA	200	100	HAA	300	300	HAA	300	300							
Feature roof and special building forms	N/A	Y/N	FEA				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Cladding	N/A	Y/N	CLA				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Basic structural columns and walls (architectural placeholder)	ASE-AR	Y/N	COL				HAA	200	100	HAA	300	300	HAA	300	300							
Basic structural beams and framing (architectural placeholder)	ASE-AR	Y/N	SBS				HAA	200	100	HAA	300	300	HAA	300	300							
Exterior wall	ASE-AR	Y/N	EWL	HAA	100	100	HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Interior wall / partition / non-structural wall	ASE-AR	Y/N	IWL				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Curtain wall, including shading devices	ASE-AR	Y/N	CTM	HAA	100	100	HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Precast facade (architectural placeholder)	ASE-AR	Y/N	CLD				HAA	200	100	HAA	300	300	HAA	300	300							
Door	ASE-AR	Y/N	DOR				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Window	ASE-AR	Y/N	WDW				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Louver	ASE-AR	Y/N	LOU				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Skylight	ASE-AR	Y/N	SKY				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Ceiling	ASE-AR	Y/N	CLG				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Stairs, steps (architectural)	ASE-AR	Y/N	STE				HAA	200	100	HAA	300	300	HAA	300	300							
Railing, balustrade, handrail	ASE-AR	Y/N	BAL				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Bollard & crash gate (architectural)	N/A	Y/N	CRA				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Access ladder and catwalk	ASE-AR	Y/N	LAD				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Building maintenance unit	ASE-AR	Y/N	BMU				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
Furniture, fixtures & fittings including desks, workstations, casework, cabinets, appliances, loose equipment	ASE-AR	Y/N	FUR				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Signage (architectural)	N/A	Y/N	SGN				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Roller shutter	N/A	Y/N	ROL				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Barrier free element	N/A	Y/N	BAR				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Phone booth, guard house	ASE-SI	Y/N	PHB				HAA	200	100	HAA	300	200	HAA	300	300	CTR	400	400	CTR	300	500	A
Drainage Installation																						
Drainage pipe	MEP-FS	Y/N	DWP				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Manhole	UU-GF	Y/N	SMH				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Trap gully	UU-GF	Y/N	TRG				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Storm water inlet	N/A	Y/N	SWI				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Floor drain inlet	N/A	Y/N	FDI				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Sump-pit	N/A	Y/N	SPT				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A
Sump pump	N/A	Y/N	SPP				HAA	200	100	HAA	300	300	HAA	300	300	CTR	400	400	CTR	300	500	A

Drainage is also the modelling scope of Architectural discipline and shall be included in Architectural LOD.
Refer to Vol.1 BIM Workflow Q3 for details.

D.LOD-2.2 Structural Model

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
Structural Model																						
Foundations (piles, pile caps, tie/ground beams & footings)	ASE-ST	Y/N	SFO	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Diaphragm wall, retaining wall	ASE-ST	Y/N	DWL	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Excavation & lateral stability system (sheet pile/pipe pile walls, waling, strutting, kingpost, etc.)	ASE-ST	Y/N	ELS	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Beam	ASE-ST	Y/N	SBS	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Columns (bearing post or hanger post etc.)	ASE-ST	Y/N	COL	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Wall (screen walls, parapet walls, planter walls etc.)	ASE-ST	Y/N	SWL	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Slab (floor slabs, access ramp, etc.)	ASE-ST	Y/N	SLA	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Transfer structures (transfer plates and transfer beams etc.)	ASE-ST	Y/N	TRN	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Stairs (steps, risers, threads, landings)	ASE-ST	Y/N	STE	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Ties and bracing	ASE-ST	Y/N	BRA	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Temporary works (temporary steel platforms, scaffoldings and propping etc.)	ASE-ST	Y/N	TMP	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A
Tunnel structure (tunnel box, subway, utilities tunnel)	ASE-ST	Y/N	TUN	HAS	100	100	HAS	200	200	HAS	300	300	HAS	300	300	CTR	400	400	CTR	300	500	A

Housing practice mark: Remark: It is usually not recommended to model 3D rebar in project, whereas, DS-U 08 provided some reference guidelines for 3D rebar modelling; however, rebar information maybe required to be inputted as attributes in some of the pile and other structural elements to facilitate BIM uses such as drawing productions, cost estimation, etc. Please refer to D4.4 Standard Approach of Modelling (SAM) of Superstructure and D4.5 Foundation for further details of the information requirement.

D.LOD-2.3 Building Services Model

ACMV

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
BS-ACMV																						
Chiller	MEP-HS	Y/N	CHL				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Heat pump	MEP-HS	Y/N	HTP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Boiler	MEP-HS	Y/N	BLR				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Cooling tower	MEP-HS	Y/N	COT				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Heat exchanger	N/A	Y/N	HEX				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Calorifier	N/A	Y/N	CAL				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Chilled water pump	N/A	Y/N	CHP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Heating water pump	N/A	Y/N	HWP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
VRV/DX outdoor unit	N/A	Y/N	VRO				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
VRV /DX indoor unit	N/A	Y/N	VRI				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Air-conditioner	MEP-HS	Y/N	AIC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Primary air unit (PAU)	N/A	Y/N	PAU				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Air-handling unit (AHU)	MEP-HS	Y/N	AHU				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fan-coil unit (FCU)	MEP-HS	Y/N	FCU				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Ventilation fan	MEP-HS	Y/N	VEF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Booster fan	N/A	Y/N	BOF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Jet fan	N/A	Y/N	JEF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Rotary fan (fixed type)	N/A	Y/N	ROF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Ceiling fan	N/A	Y/N	CEF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
UV sterilizer (standalone fixed type)	N/A	Y/N	UVS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Air purifier (standalone fixed type)	N/A	Y/N	APU				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Constant air volume box /air valve	N/A	Y/N	CAV				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Variable air volume box /air valve	MEP-HS	Y/N	VAV				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Hood	MEP-HS	Y/N	HOD				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Air duct	MEP-HS	Y/N	AID				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Chilled water supply pipe	N/A	Y/N	CWS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Chilled water return pipe	N/A	Y/N	CWR				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Heating water pipe	N/A	Y/N	HWP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Condensate drain pipe	N/A	Y/N	CDP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Water pipe (others)	MEP-FS	Y/N	WP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Valve	MEP-FS	Y/N	VLV				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Air damper	MEP-HS	Y/N	ADA				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fire /smoke damper	MEP-HS	Y/N	FID				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Air diffuser /grille	MEP-HS	Y/N	DIF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Direct digital control (DDC) panel	N/A	Y/N	DDC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
CCMS server /server rack	N/A	Y/N	ITE				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Control console	N/A	Y/N	CTC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A

Remarks: For specified items applicable for digital fabrication - including but not be limited to prefabrication of BS/MEP installations, MiC (Off-site Prefabrication), DfMA, or as appropriate, LOD-G 400 should be applied for Construction Stage and be carried on for preparation of As-built Models.

Electrical (EL)

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
BS-Electrical																						
Transformer (customer owned)	MEP-EL	Y/N	TRN				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
LV Switchboard	MEP-EL	Y/N	LVS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Cut-out supply panel	N/A	Y/N	CSP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Motor control centre	MEP-EL	Y/N	MCC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Motor control panel	N/A	Y/N	MCP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Uninterruptible power supply unit (>1kVA)	MEP-EL	Y/N	UPS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Variable speed drive (standalone)	MEP-EL	Y/N	VSD				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
MCCB /MCB board	N/A	Y/N	MCB				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Socket outlet	N/A	Y/N	SKO				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Floor box	N/A	Y/N	FLB				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fuse spur unit	N/A	Y/N	FSU				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Electric vehicle charging panel /station	N/A	Y/N	EVP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Generator set	MEP-EL	Y/N	GEN				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fuel tank	N/A	Y/N	FTK				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fuel pump	N/A	Y/N	FPP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fuel pipe	N/A	Y/N	FUL				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fuel valve	N/A	Y/N	FVV				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Photovoltaic panel	N/A	Y/N	PVP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Capacitor bank cubicle	N/A	Y/N	CBC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Harmonic filter cubicle	N/A	Y/N	HMF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Control /metering panel	N/A	Y/N	PAN				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Luminaire /light fitting	MEP-EL	Y/N	LGD				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Lamp pole / bollard	N/A	Y/N	LAP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Stage lighting bar	N/A	Y/N	SLB				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Occupancy /daylight sensor	N/A	Y/N	DLS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Power busduct	MEP-EL	Y/N	PBD				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Cable ladder	MEP-EL	Y/N	CBL				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Cable tray	MEP-EL	Y/N	CBT				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Trunking	MEP-EL	Y/N	TRK				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Consumer Unit	N/A	Y/N	CSU				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Domestic Switches	N/A	Y/N	DOS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Motion/ Photocell Sensor	N/A	Y/N	MPS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
BS-Broadcast Reception																						
Aerials	N/A	Y/N	AER				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Preamplifier /Amplifier	N/A	Y/N	AMP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fibre optical panel	N/A	Y/N	FOP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Outlet	N/A	Y/N	OLT				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
BS-Burglar Alarm and Security																						
Drop arm barrier	N/A	Y/N	ADB				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Mechanical road block	N/A	Y/N	MDB				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Access card reader	N/A	Y/N	ACR				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Door release button	N/A	Y/N	DRB				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Emergency breakglass unit	N/A	Y/N	EBG				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Doorphone unit/ Panel/ Handset	N/A	Y/N	SEC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
CCTV camera	MEP-FO	Y/N	CCTV				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Movement detector	N/A	Y/N	MOV				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Glass break detector	N/A	Y/N	GBD				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Watchman tour patrol point	N/A	Y/N	WAT				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Centralized security system server /rack	N/A	Y/N	CSS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
CCTV video recorder /rack	N/A	Y/N	DVR				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
CCTV control console	N/A	Y/N	CCC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
CCTV system display panel	N/A	Y/N	SDP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Security system control panel	MEP-FO	Y/N	SSC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Temporary Refuge Space (TRS) Panel	N/A	Y/N	TRS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Carpark Control and Management System	N/A	Y/N	CMS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A

Remarks: For specified items applicable for digital fabrication - including but not be limited to prefabrication of BS/MEP installations, MiC (Off-site Prefabrication), DfMA, or as appropriate, LOD-G 400 should be applied for Construction Stage and be carried on for preparation of As-built Models.

Fire Services and Water Pump (FSWP)

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
BS-Fire Services and Water Pump (FSWP)																						
Street fire hydrant	N/A	Y/N	SFH				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fire hydrant	MEP-FO	Y/N	FIH				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Hose reel	N/A	Y/N	HOR				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Sprinkler control valve	N/A	Y/N	SCV				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Sprinkler pre-action valve set	N/A	Y/N	SPV				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Sprinkler flow switch	N/A	Y/N	SFW				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Sprinkler head	MEP-FO	Y/N	SPH				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Drencher spray head	N/A	Y/N	DSH				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fire /Smoke /Heat /Beam detector	MEP-FO	Y/N	SHD				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Breakglass unit	N/A	Y/N	BGU				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Alarm bell	N/A	Y/N	ALB				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Visual fire alarm	MEP-FO	Y/N	VFA				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fire alarm panel	MEP-FO	Y/N	FAP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Battery panel	N/A	Y/N	BTP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Portable fire extinguisher	MEP-FO	Y/N	PFE				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fixed automatically operated appliance	N/A	Y/N	FAA				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Exit /Directional sign	N/A	Y/N	EXS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Emergency luminaire	N/A	Y/N	ELG				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Water pump	MEP-FS	Y/N	FSP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Water tank	MEP-FS	Y/N	FST				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Water pipe	MEP-FS	Y/N	FHP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Valve	MEP-FS	Y/N	SVA				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Pressurization fan	N/A	Y/N	SPF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Smoke extraction fan	N/A	Y/N	SEF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Smoke extraction air duct	N/A	Y/N	SED				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Pump Control Panel	N/A	Y/N	PCP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Rainwater tank	N/A	Y/N	RTK				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Sand filter	N/A	Y/N	SFR				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Carbon filter	N/A	Y/N	CBR				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Cartridge filter	N/A	Y/N	CFR				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
UV chamber	N/A	Y/N	UVC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A

Remarks: For specified items applicable for digital fabrication - including but not be limited to prefabrication of BS/MEP installations, MiC (Off-site Prefabrication), DfMA, or as appropriate, LOD-G 400 should be applied for Construction Stage and be carried on for preparation of As-built Models.

Lift and Escalator (LE)

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
BS-Lift and Escalator																						
Lift car	MEP-CS	Y/N	LIF				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Lift landing call panel	N/A	Y/N	LIP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fireman's switch	N/A	Y/N	FMS				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Escalator	MEP-CS	Y/N	ESC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Passenger conveyor	N/A	Y/N	PSC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Vertical lifting platform	N/A	Y/N	VLP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Stairlift	N/A	Y/N	STL				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A

Remarks: For specified items applicable for digital fabrication - including but not be limited to prefabrication of BS/MEP installations, MiC (Off-site Prefabrication), DfMA, or as appropriate, LOD-G 400 should be applied for Construction Stage and be carried on for preparation of As-built Models.

Water Services (WS)

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
BS-Plumbing																						
Water tank	MEP-FS	Y/N	PTK				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Water pump set	MEP-FS	Y/N	PMP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Pneumatic tank	MEP-FS	Y/N	PTK				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Water pipe	MEP-FS	Y/N	PWP				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Valve	MEP-FS	Y/N	PVV				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Fibre glass tank	N/A	Y/N	FGT				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A
Plumbing Pump Control Panel	N/A	Y/N	PPC				HAB	100	100	HAB	200	200	HAB	200	300	CTR	300	400	CTR	300	500	A

Remarks: For specified items applicable for digital fabrication - including but not be limited to prefabrication of BS/MEP installations, MiC (Off-site Prefabrication), DfMA, or as appropriate, LOD-G 400 should be applied for Construction Stage and be carried on for preparation of As-built Models.

D.LOD-2.4 Landscape Model

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
Landscape Model																						
Planter	ASE-SI	Y/N	PTR				HAA	200	100	HAA	300	200	HAA	300	300	CTR	400	400	CTR	300	500	A
Bollard	ASE-SI	Y/N	BOL				HAA	200	100	HAA	300	200	HAA	300	300	CTR	400	400	CTR	300	500	A
Signage (landscape)	ASE-SI	Y/N	LSG				HAA	200	100	HAA	300	200	HAA	300	300	CTR	400	400	CTR	300	500	A
Planting: tree	N/A	Y/N	PLT				HAA	200	100	HAA	300	200	HAA	300	300	CTR	400	400	CTR	300	500	A
Planting: shrub	N/A	Y/N	PLS				HAA	200	100	HAA	300	200	HAA	300	300	CTR	400	400	CTR	300	500	A
Hard landscape (hard-paved areas, walkways, stairs/steps, community play area, wood deck, ball court)	N/A	Y/N	HDS	HAA	100	100	HAA	200	100	HAA	300	200	HAA	300	300	CTR	400	400	CTR	300	500	A
Greening feature (lawn, green roof, grass paver, vertical green, planter, tree pit, ZiS planter, community farm)	N/A	Y/N	SSS	HAA	100	100	HAA	200	100	HAA	300	200	HAA	300	300	CTR	400	400	CTR	300	500	A
Landscape feature / furniture	N/A	Y/N	LAF				HAA	200	100	HAA	300	200	HAA	300	300	CTR	400	400	CTR	300	500	A

Remarks: For specified items applicable for digital fabrication - including but not be limited to prefabrication of BS/MEP installations, MiC (Off-site Prefabrication), DfMA, or as appropriate, LOD-G 400 should be applied for Construction Stage and be carried on for preparation of As-built Models.

D.LOD-2.5 Civil Model

Public Roadworks

Civil Model																						
Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
Public Roadworks																						
Bituminous pavement	ASE-SI	Y/N	BPV	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Concrete pavement	ASE-SI	Y/N	CPV	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Kerbs, edgings, quadrant, concrete backing	ASE-SI	Y/N	KEB	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Road marking	ASE-SI	Y/N	MAK	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Marker posts	ASE-SI	Y/N	MKP	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Bollards	ASE-SI	Y/N	BOL	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Concrete profile barriers	ASE-SI	Y/N	KRB	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Beam barrier	ASE-SI	Y/N	BBR	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Railing, balustrade, handrail	ASE-SI	Y/N	BAL	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Shelter	ASE-SI	Y/N	RST	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Noise barrier	ASE-SI	Y/N	NSB	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A
Traffic sign, support, gantry, etc□RS	ASE-SI	Y/N	TRS	HAC	100	100	HAC	200	200	HAC	300	300	HAC	300	300	CTR	400	400	CTR	300	500	A

Remarks: For LOD / LOIN requirements on Civil Engineering models to be handed-over to other departments / works departments, please also refer to the CEDD's BIM Typo Specification, if applicable, and the BIM Harmonisation Guidelines for Works Departments by DEVB.

UU-Gravity flow network

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
UU-Gravity flow network																						
Manhole	UU-GF	Y/N	DMH	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Pipe	UU-GF	Y/N	DPI	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Gully	UU-GF	Y/N	DGY	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Box Culvert	UU-GF	Y/N	DCT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Inlet	UU-GF	Y/N	DIT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Outlet	UU-GF	Y/N	DOT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Sand Trap	UU-GF	Y/N	DTP	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Catchpit	UU-GF	Y/N	DPT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Petrol Interceptor	UU-GF	Y/N	DPR	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A

Remarks: For LOD / LOIN requirements on Civil Engineering models to be hand-overed to other departments / works departments, please also refer to the CEDD's BIM Particular Specification, if applicable, and the BIM Harmonisation Guidelines for Works Departments by DEVB.

UU-Pressure network

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
UU-Pressure network																						
Flushing Water Main	UU-PN	Y/N	SWP	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Fresh Water Main	UU-PN	Y/N	WSM	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Gas Main	UU-PN	Y/N	GAS	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Oil/Fuel Piping	UU-PN	Y/N	FUP	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Gate Valve	UU-PN	Y/N	VLV	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Double Air Valve	UU-PN	Y/N	DVL	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Chamber	UU-PN	Y/N	CHM	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Fitting	UU-PN	Y/N	FIT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Rising Main	UU-PN	Y/N	RSM	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Fire Hydrant	UU-PN	Y/N	FHD	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Thrust and anchor blocks	UU-PN	Y/N	BLK	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A

Remarks: For LOD / LOIN requirements on Civil Engineering models to be hand-overed to other departments / works departments, please also refer to the CEDD's BIM Particular Specification, if applicable, and the BIM Harmonisation Guidelines for Works Departments by DEVB.

UU-Electricity

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
UU-Electricity																						
Electricicity cable duct	UU-EL	Y/N	EDT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Lighting	UU-EL	Y/N	ELT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Draw pit	UU-EL	Y/N	EPT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Trench	UU-EL	Y/N	ETH	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A

Remarks: For LOD / LOIN requirements on Civil Engineering models to be hand-overed to other departments / works departments, please also refer to the CEDD's BIM Particular Specification, if applicable, and the BIM Harmonisation Guidelines for Works Departments by DEVB.

UU-Telecom

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
UU-Telecom																						
Telecom cable duct	UU-TE	Y/N	TDT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Trench	UU-TE	Y/N	UTH	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Draw pit	UU-TE	Y/N	UPT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A

Remarks: For LOD / LOIN requirements on Civil Engineering models to be hand-overed to other departments / works departments, please also refer to the CEDD's BIM Particular Specification, if applicable, and the BIM Harmonisation Guidelines for Works Departments by DEVB.

UU-Others

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
UU-Others																						
SCADA	UU-OT	Y/N	UOT	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A
Common Utility Tunnel	UU-OT	Y/N	UTL	HAC	100	100	HAC	200	100	HAC	200	200	HAC	200	300	CTR	300	400	CTR	300	500	A

Remarks: For LOD / LOIN requirements on Civil Engineering models to be hand-overed to other departments / works departments, please also refer to the CEDD's BIM Particular Specification, if applicable, and the BIM Harmonisation Guidelines for Works Departments by DEVB.

D.LOD-2.6 Geotechnical Model

Geotechnical Model

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
Geotechnical Model																						
Topography (existing site and surrounding land use)	ASE-SI	Y/N	TOP	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Topography (site formation)	ASE-SI	Y/N	SIT	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Natural slope	ASE-SI	Y/N	NSL	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Man-made slop	ASE-SI	Y/N	MMS	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Flexible barrier net	ASE-SI	Y/N	FBR	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Flexible barrier post	ASE-SI	Y/N	FBR	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Flexible barrier cable rope	ASE-SI	Y/N	FBR	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Rigid barrier	ASE-SI	Y/N	RBR	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Retaining wall	ASE-ST	Y/N	RET	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Baffle	N/A	Y/N	BAF	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Massing model of surrounding structures	ASE-SI	Y/N	MAS	HAG	100	100	HAG	200	200	HAG	-	-	HAG	-	-	CTR	-	-	CTR	-	-	A
Geological model	ASE-SI	Y/N	GEO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fill	N/A	Y/N	FIL	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	300	400	CTR	300	500	A
Marine deposits	N/A	Y/N	MAD	HAG	200	200	HAG	200	200	HAG	300	300	HAG	300	300	CTR	-	-	CTR	-	-	A
Alluvium	N/A	Y/N	ALL	HAG	200	200	HAG	200	200	HAG	300	300	HAG	300	300	CTR	-	-	CTR	-	-	A
Colluvium	N/A	Y/N	COL	HAG	200	200	HAG	200	200	HAG	300	300	HAG	300	300	CTR	-	-	CTR	-	-	A
Residual soil	N/A	Y/N	RES	HAG	200	200	HAG	200	200	HAG	300	300	HAG	300	300	CTR	-	-	CTR	-	-	A
Completely decomposed rock	N/A	Y/N	CDR	HAG	200	200	HAG	200	200	HAG	300	300	HAG	300	300	CTR	-	-	CTR	-	-	A
Highly decomposed rock	N/A	Y/N	HDR	HAG	200	200	HAG	200	200	HAG	300	300	HAG	300	300	CTR	-	-	CTR	-	-	A
Bedrock	N/A	Y/N	BED	HAG	200	200	HAG	200	200	HAG	300	300	HAG	300	300	CTR	-	-	CTR	-	-	A
Compacted fill	N/A	Y/N	COF	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	300	400	CTR	300	500	A
Design groundwater profile	N/A	Y/N	GRW	HAG	200	200	HAG	200	200	HAG	300	300	HAG	300	300	CTR	-	-	CTR	-	-	A
Soil Nail	N/A	Y/N	SON	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Raking Drains	N/A	Y/N	RKD	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A

Remarks: For LOD / LOIN requirements on GE models to be hand-overed to other departments, e.g. CEDD, please also refer to the GEO's BIM Particular Specification, if applicable, and the BIM Harmonisation Guidelines for Works Departments by DEVB.

Structural Works (within Geotechnical Model)

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
Structural Works (within Geotechnical Model)																						
Skin Wall	N/A	Y/N	SWL	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Mass concrete infill (including no-fine concrete)	N/A	Y/N	MAC	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Steel access ladder	N/A	Y/N	SAL	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Maintenance Access (including concrete stairway/berm)	N/A	Y/N	CMS	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Steel handrailing (to maintenance stairway on slope)	N/A	Y/N	SRL	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Steel staircase	N/A	Y/N	SST	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Steel Gate	N/A	Y/N	SGA	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Cushioning Materials	N/A	Y/N	CUM	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A

Remarks: For LOD / LOIN requirements on GE models to be hand-overed to other departments, e.g. CEDD, please also refer to the GEO's BIM Particular Specification, if applicable, and the BIM Harmonisation Guidelines for Works Departments by DEVB..

Drainage (within Geotechnical Model)

Model elements	CIC Model Category	Required	CAT Code	Inception & Feasibility			Scheme Design			Detailed design			Tender			Construction			As-Built			
				Public Consultation, DipCON, AAP, EAP, PDRC (1) & SPC			PDRC (2), SOM, BSDRP (1), BC & DDRP (1), Public Consultation			BDSRP (2), DDRP (2), Statutory Submission			Tender, Housing Department Tender Board, Tender Committee			Contract Commencement			Contract Completion			
				AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	AUT	G	I	V
Drainage (within Geotechnical Model)																						
Surface Channel	UU-GF	Y/N	RWC	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Catchpit	UU-GF	Y/N	RCP	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Sand Trap	UU-GF	Y/N	STP	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Manhole	UU-GF	Y/N	SMH	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A
Storm water pipe	UU-GF	Y/N	RWP	HAG	100	100	HAG	200	200	HAG	300	300	HAG	300	300	CTR	400	400	CTR	300	500	A

Remarks: For LOD / LOIN requirements on GE models to be hand-overed to other departments, e.g. CEDD, please also refer to the GEO's BIM Particular Specification, if applicable, and the BIM Harmonisation Guidelines for Works Departments by DEVB.

D2 BIM COLLABORATION

D2.1 Collaboration Procedures

As all HA projects are interdisciplinary in nature, collaborations within and between disciplines are essential. This section contains HA-specific collaboration standards, platforms (CDEs), and 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.

To setout Intradisciplinary and Interdisciplinary collaboration procedures, the Information and Technology layer shall be considered in particular. Refer to **D2.6** and **D2.7** for further elaboration.

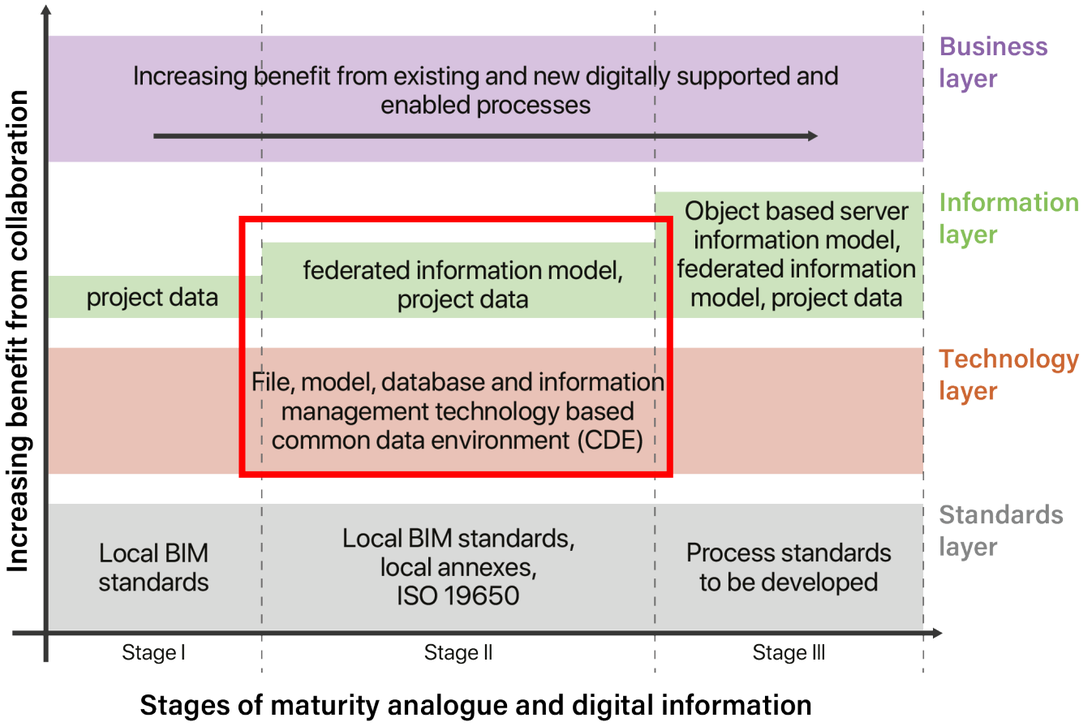


Figure 4-1 Information and Technology Layers of ISO 19650 Stage II Maturity

D2.2 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 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.

D2.3 Common Data Environment (CDE)

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

For **intradisciplinary collaboration (within same discipline)**, common file folder which every team member can access shall be provided.

For **interdisciplinary coordination (across different disciplines)**, Shared Folders which every team member of different disciplines can access shall be provided. In the rare case where sharing among different disciplines is prevented by internal security policy, a Shared Folder in each discipline shall be established to store the shareable information transmitted. (Refer to Section **D2.7** for details.)

CDE setup shall follow the principle set out as shown in the figure below, based on principles set out in PAS1192 and ISO 19650. Access right shall be set up to ensure that only the approved information is shared, the authorised information is published, and the verified information is archived.

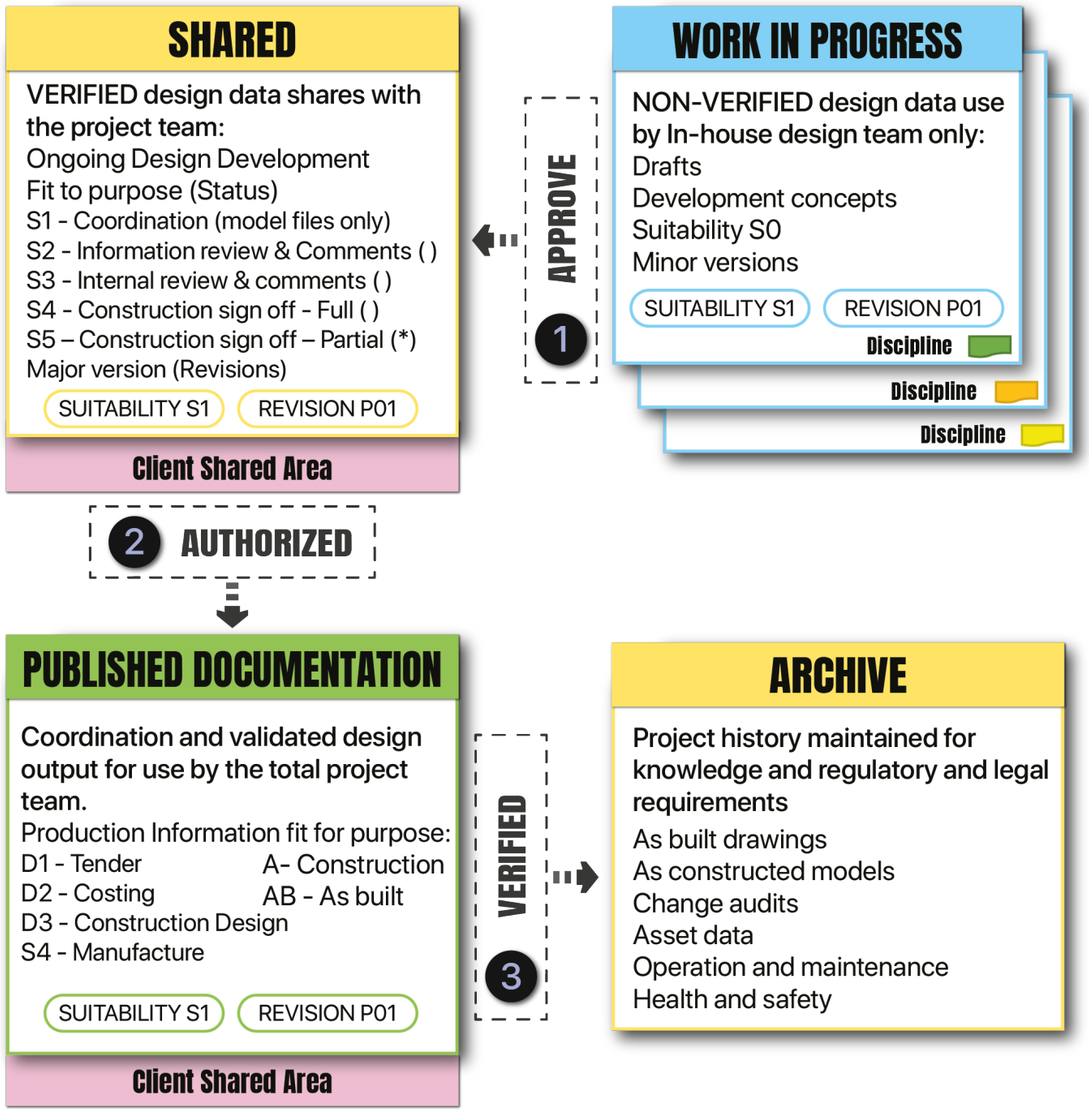


Figure 4-2 CDE Setup

D2.4 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.

The federated model shall be created in agreed exchange formats such as **viewer format** (e.g. nwc, nwf, nwd) and **open format** (e.g. IFC), or in specified CDE viewer.

The method for creating and managing the federated model shall be agreed and documented in the PxP.

D2.5 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. Project-specific BIM goals, requirements and limitations shall determine the most appropriate approach. Remote means of conducting BIM coordination such as web conferencing may be considered when no other practical alternatives exist.

Considerations shall 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 shall include all designers. Where clashes are detected, resolution shall be agreed and those parties which are impacted shall 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.

D2.6 Intradisciplinary Collaboration

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

To work on the same Revit file simultaneously, users may enable Worksharing in Revit projects by first creating a central file. Other users can then create their own local file of the central file to work on the project.

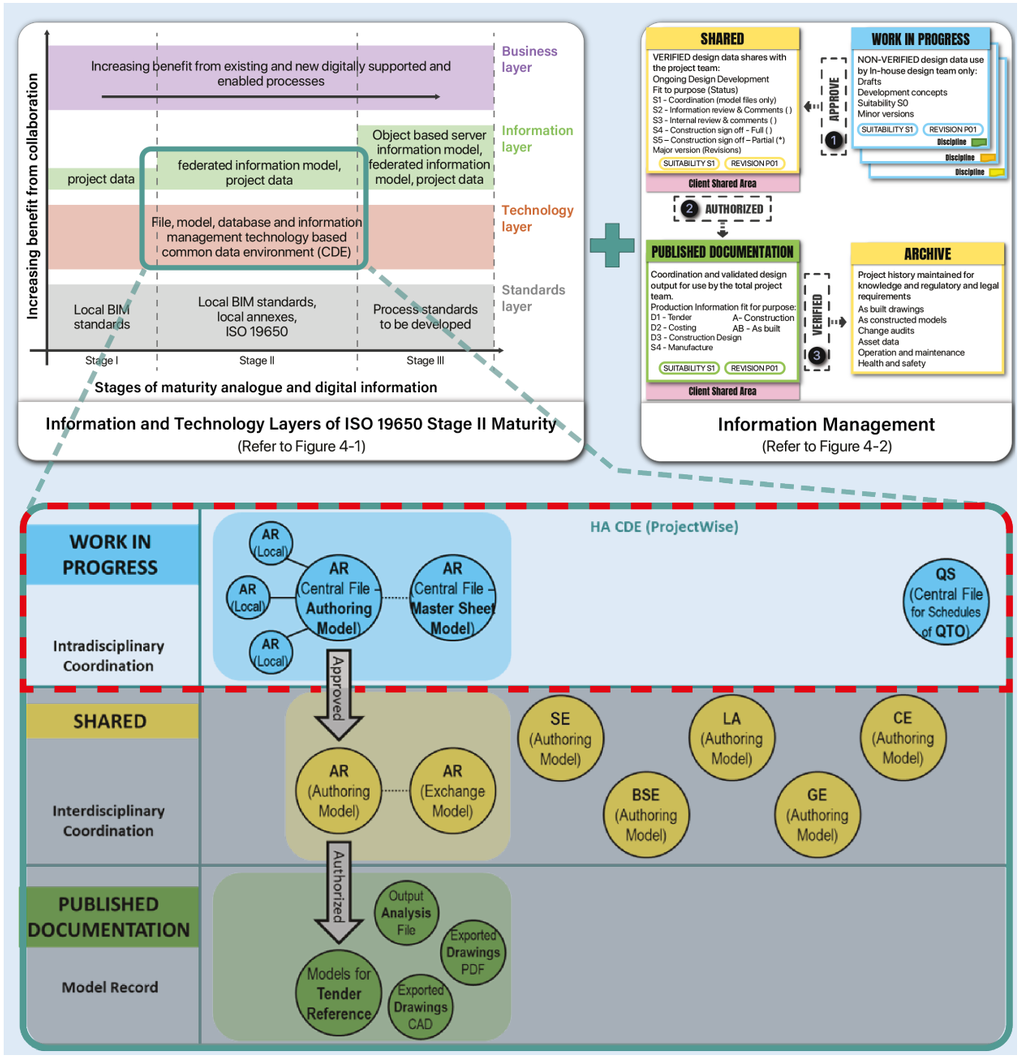


Figure 4-3 Intradisciplinary Collaboration

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.

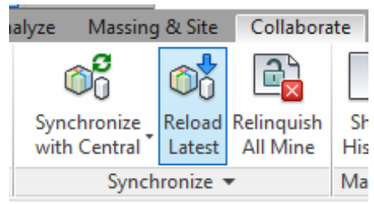
A user saves his/her own local file, edit the local file, then synchronizes it with the central file to update his/her changes made so that other users can see them.

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

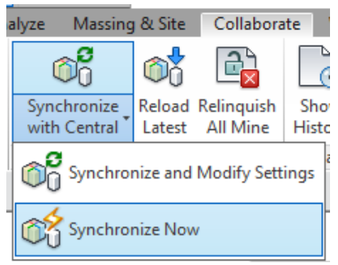
Note that the Central file shall never be opened, but only copied to create local files. It shall be recreated at regular intervals in order to eliminate redundant data retention.

D.COL-1.1 Synchronize with Central

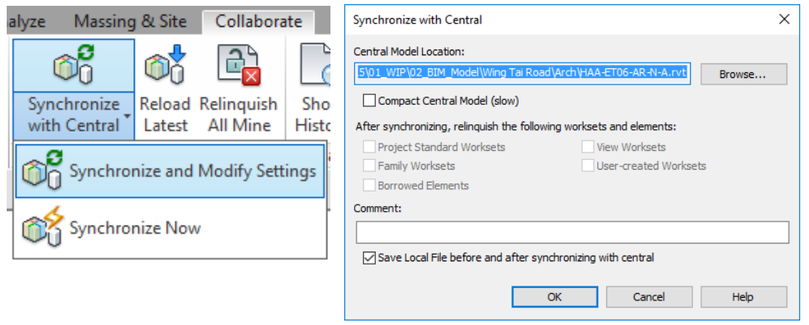
Load updates from the central model without publishing your changes to the central model.



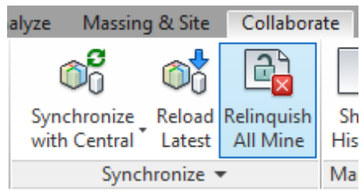
When working on a Worksharing project, use the Synchronize with Central tool to save local changes to the central model.



Modify the Synchronize with Central settings before synchronizing with central.

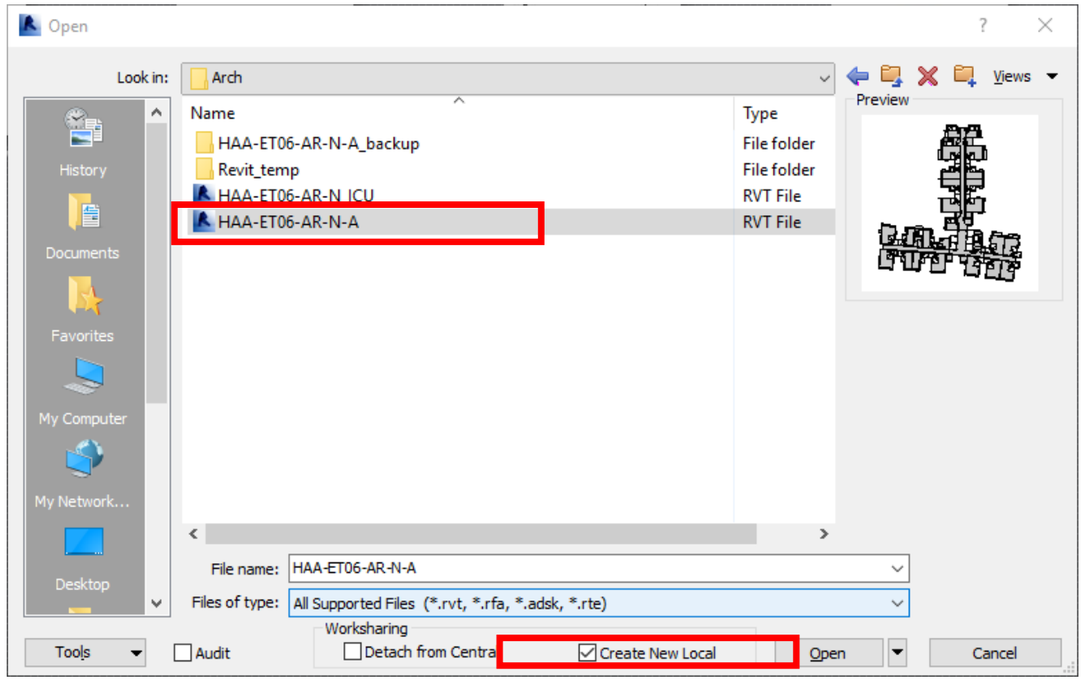


After the save has been completed, from the Collaborate tab click the Relinquish All Mine tool. This will release ownership of all model elements and is an important step to allow other users to work with the model.



D.COL-1.2 Local File

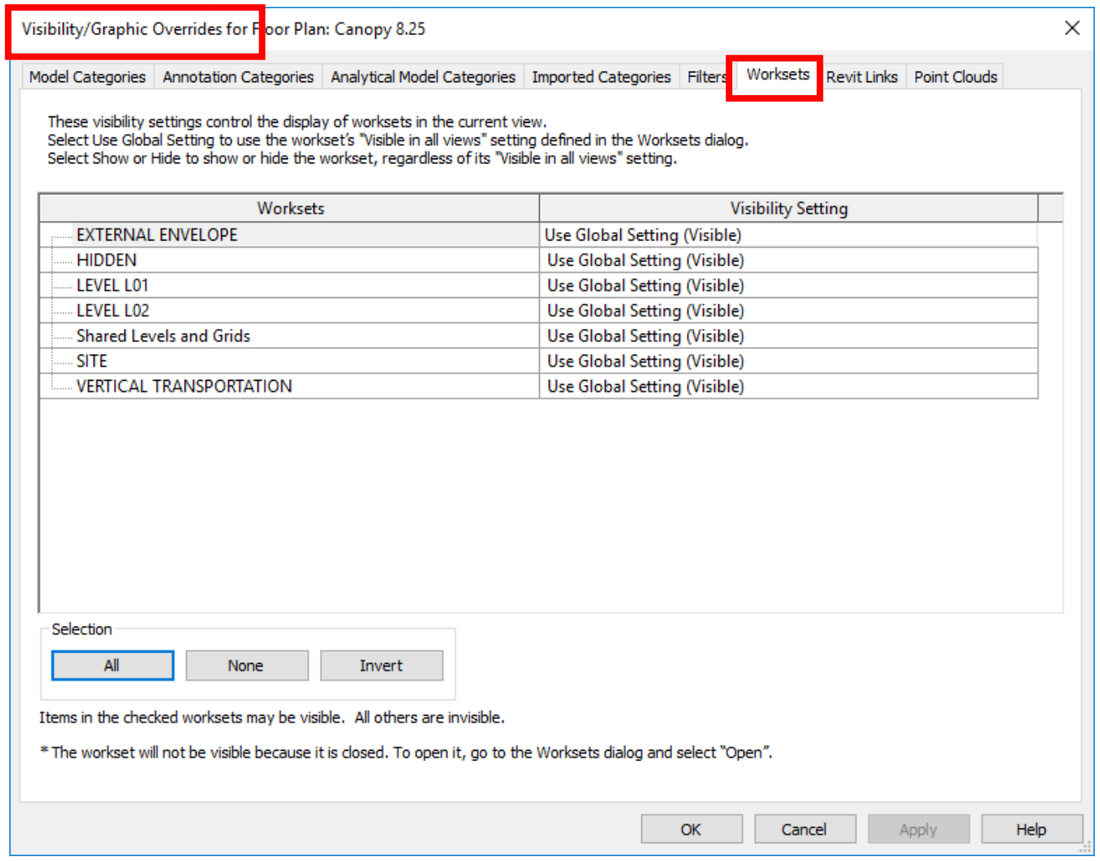
It is good practice for users to create a local copy of the central model every day. Creating a new local copy to ensure a local copy is always on your hard drive before you begin modifying a project.



The Worksets button and drop-down list and the Editing Requests icon are displayed in the status bar by default. The workset shall be well defined before modelling.



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



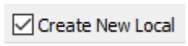
D.COL-1.3 Workset

Worksets have three primary functions:

a) Categorization: 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.
b) Responsibility Assignment: Worksets also 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.
c) Facilitation of Other BIM Uses, such as Drawing Generation, Statutory Submission and Interdisciplinary Collaboration.

When working on a Workset-enabled project, **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 **D3.3 D.MET 3.1 Folder Structure** for local folder structure.



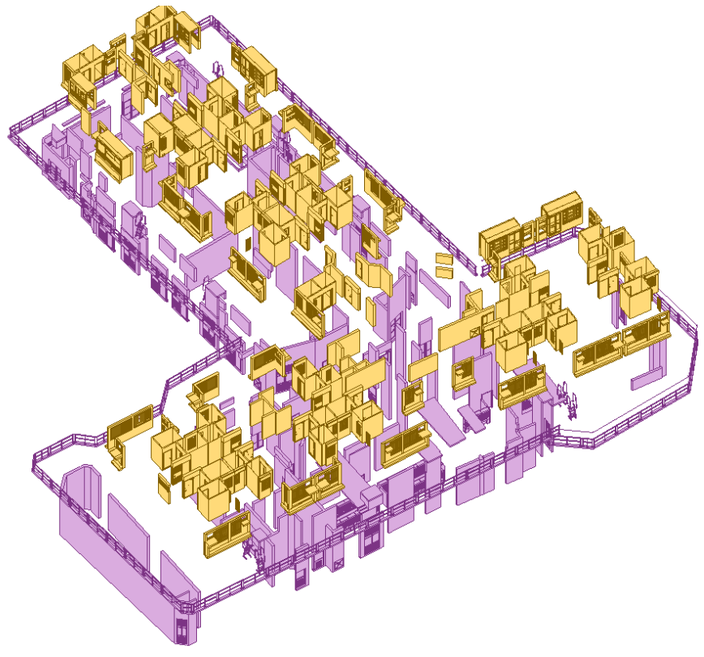
Workset Naming

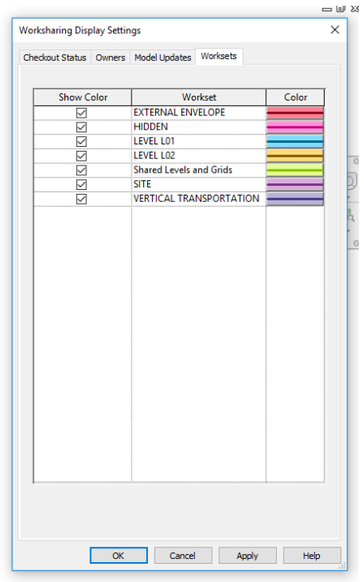
Worksets shall be named in a consistent and logical manner to aid navigation through the project.

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	By Zone
Description of Workset content; categorised by the responsibility.	Larger projects can be divided horizontally or vertically into zones / levels and so this shall be identified in the Workset naming where applicable.

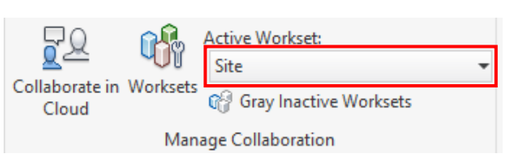
Workset Name (Architecture)	Example of Use
External Envelope	Exterior walls, facade and architectural elements attached to facade
Shared Levels and Grids	Level lines and gridlines
Site	Site elements not related to building, such as topography, landscaping
Hidden	A Workset to store architectural elements 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
Placeholder	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
Link Revit	Reference Revit links
Link CAD	Reference CAD links
MFD	Modular flat design model elements
General Modelling	Renamed from “Workset 1”, elements apart from above classification.



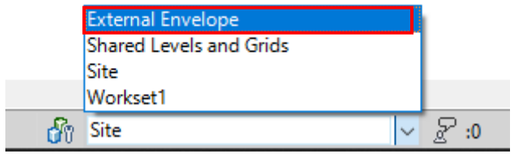


Active Workset

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



or



D2.7 Interdisciplinary Collaboration

Note: Under PSP agreement, there is no specific requirements for inter-disciplinary collaboration, but PSP shall establish a BIM collaboration and information sharing methodology and workflows, and be defined in the Design Stage BIM PxP. Content in this section serves as reference only.

Information becomes shareable to other disciplines upon approval by individual disciplines. Shared models may include Authoring Models and Exchange Models.

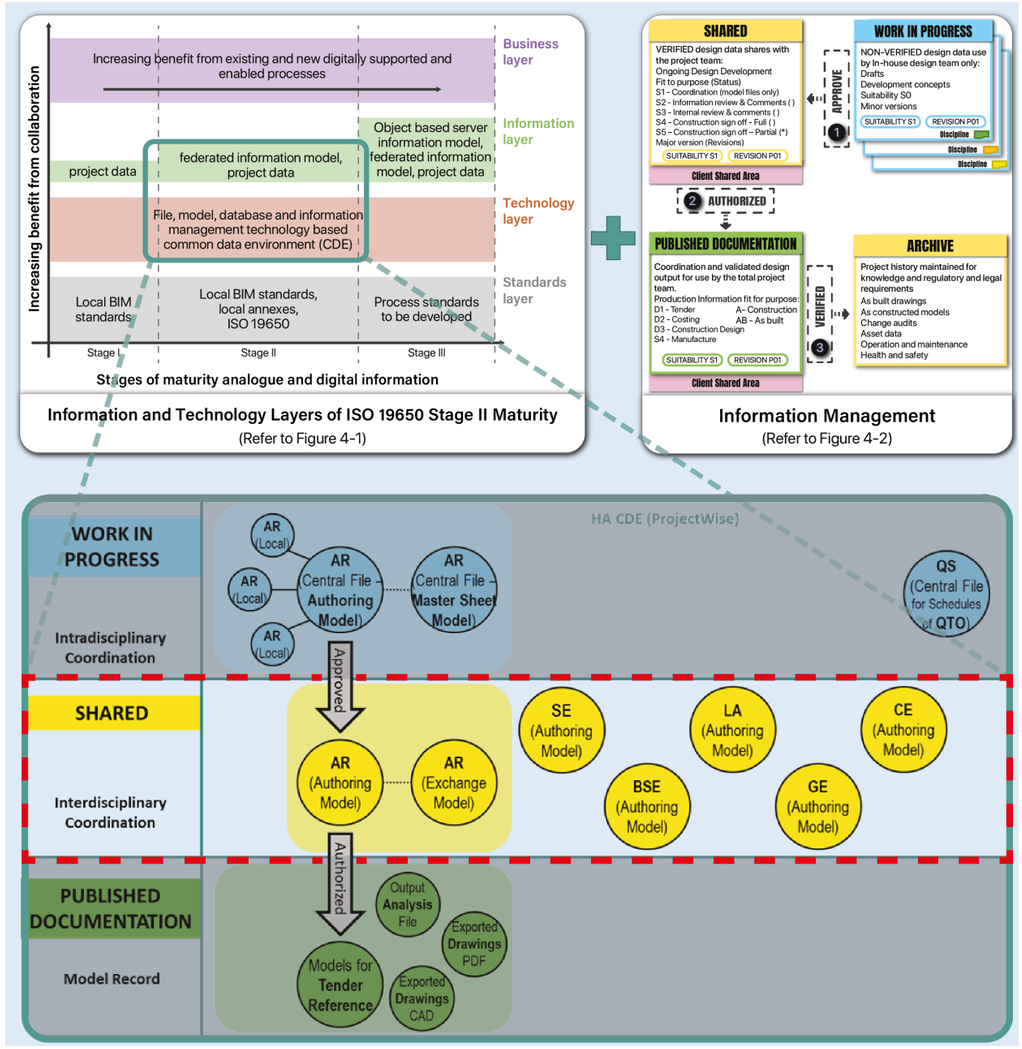


Figure 4-4 Intradisciplinary Collaboration

Liability of individual disciplines (AR, 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 shall not be amended by other parties or disciplines without the model owner's permission.
- The author of models or details shall be easily identified by users.

D.COL-2.1 Common Data Environment (CDE) Adoption

PSP / Contractor shall observe the clauses on BIM collaboration and CDE requirements stated in the PSP agreement / Works contract preliminaries specification and follow the technological infrastructure as agreed to establish project-specific workflows in similar manner to the workflow diagram shown here and documented in PxP, and shall therefore be finalised after PxP draft is made available.

1.PSP Agreement

Under the PSP agreement, there is no specific requirement on CDE, however, as stated in the agreement, PSP shall establish a BIM collaboration and information sharing methodologies and workflows.

2.Foundation and Building Works Contract

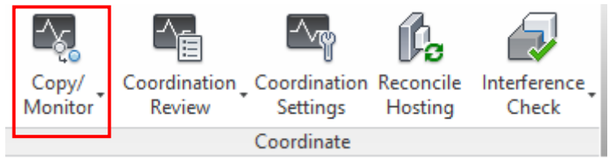
For Foundation and Building Contractor, the Works contract preliminaries specification on clauses regarding BIM CDE requirements shall be referred.

3.HA In-house Project

For HA in-house project, HA currently adopts ProjectWise as the CDE for planning and design stages. It mainly serves as document repository.

D.COL-2.2 Copy/ Monitor

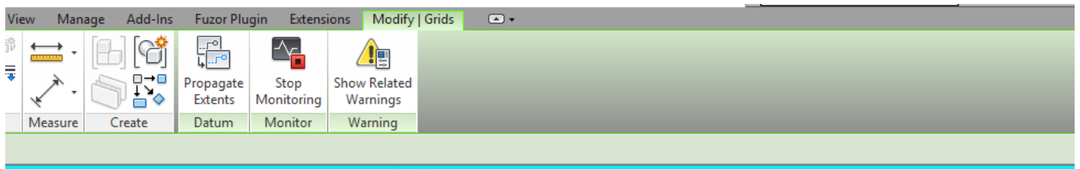
Copy/Monitor is a powerful built-in tool in all Revit platforms and is considered the most intelligent coordination tools.

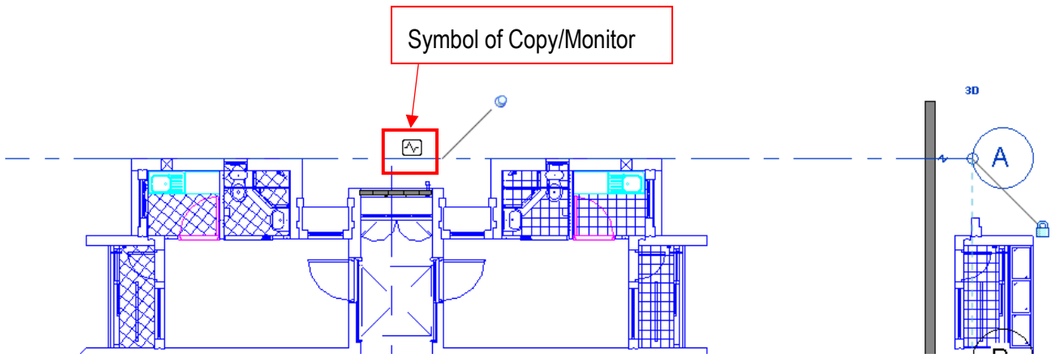


When the Architect is responsible for setting up Grids and Levels for the project, other disciplines shall Copy/Monitor the Grids and Levels from the Architectural model. This allows tracked coordination between different models.

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 shall 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-2.3 Placeholders of Architectural and Structural Model Elements

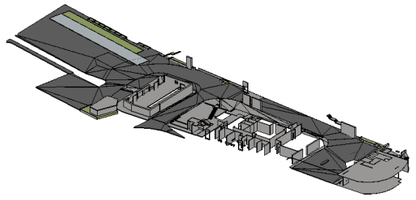
1.3d

There are some common model elements in both architectural model and structural model, which the collaboration of theses model elements is important. This section describes an advanced collaboration of model elements.

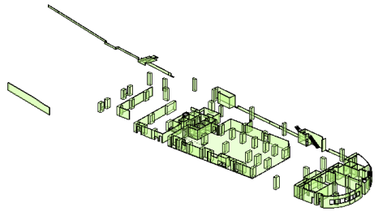
For example, an architectural design is a consideration of all architectural elements and some general structural elements as spatial arrangements, such as structural columns and walls. Under the approach, these general structural elements would be common in both architectural and structural model. While the ultimate ownership of the related structural elements are still under structural engineer, the elements existing in architectural model are therefore classified as "placeholder". By applying the concept of placeholder in collaboration, it helps to:

- Make a clearer model elements ownership
- Distinguish structural elements in an architectural model
- Standardise the production, usage and collaboration of BIM model of two disciplines
- Serve as host for wall-based architectural families hosted on structural elements, e.g. Door and window located in structural wall.

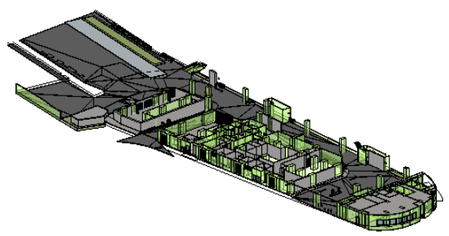
Illustration of Architectural Model



View showing architectural model elements only
(By turning off the "Placeholder" workset in Visibility/Graphic Overrides setting for the view)



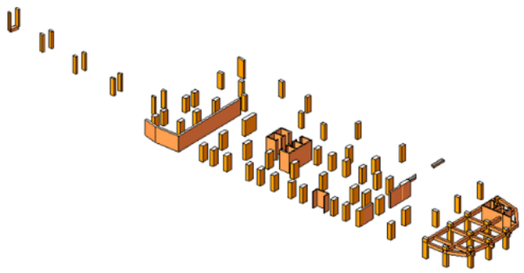
View showing structural elements placeholder
(By turning off worksets other than the "Placeholder" workset, and optionally, apply colour and transparency overrides in Visibility/Graphic Overrides setting for the view)



View showing both architectural model elements and structural elements placeholder

Under the concept of placeholder for collaboration, architectural model shall contain all architectural model elements and selected structural elements as placeholders. Structural model shall contain all structural model elements only.

Illustration of Structural Model



View showing structural model elements

The table below briefly explains the collaboration of placeholder and how the models are developed throughout a simplified design flow.

Discipline /Stage	i) Architectural design development	ii) Structural design development	iii) Coordinating design	iv) Design coordinated
Architect	• Develop architectural design • Including the first input of general arrangement and structural allowances	Wait for the structural design development	Coordinate design with structural engineer	Design coordinated
Structure Engineer	Wait for general arrangement of structural elements by architect	Develop structural design based on the general arrangement	Coordinate design with architect	Design coordinated
Status of BIM Models				
Architectural BIM Model	Includes • All architectural model elements • Structural placeholder for indication	N/A	• All architectural model elements updated as per latest coordination • Structural placeholder to be aligned with latest structural design	• Architectural model finalized • Structural placeholder be updated during coordination and be frozen upon design finalized
Structural BIM Model	N/A	Includes all structural model elements	All structural model elements updated as per latest coordination	Structural model finalized

Differentiation of Architectural and structural elements in Architectural model

- "Placeholder" workset shall be created in Architectural model to contain selected structural elements as placeholders.
- For structural walls in architectural model, Architectural discipline should use Structural Material parameter to differentiate the architectural walls and the placeholder structural walls in AR model. Refer to **DA-01** in **D4.3** of **HABIMSG Vol.2** for details.

Benefits of this approach include:

- A similar collaboration approach as using CAD drawings and 2D sketches.
- Easier to initiate and share design options and changes to structural engineers or other disciplines.
- Architectural designers have full pictures of their design.
- Structural engineers are clearer of what to receive from architectural model.
- Architectural model has hosts for window, door, louver etc.
- Drawing production relies on each discipline's own BIM models for easier responsibility ownership and quality control.

D3 COMMON MODELLING STRATEGY

The HABIMSG is designed to specify, manage and assess BIM deliverables by architects, engineers and surveyors. This section of the HKBIMSG provides information on how to enable model development and build-up which will facilitate the efficient use or re-use of BIM data and models with modelling data consistency within a single discipline or across disciplines.

This section covers:

- Definition of "how" each BIM model shall be created, developed and shared with another discipline aiming to enable efficient use and re-use of BIM data with modelling data consistency.
- Model division and model structure (e.g. structure, zones, levels systems, etc)
- Requirement for Statutory submission and tender.
- Difficulties in modelling compared to CADD.

Modelling is the process of creating a digital building information model. Building Information Modelling replaces traditional 2D drafting and documentation. In practice, those who wish to model would need to have modelling tools and those who have responsibility for coordination and construction processes would need to have tools for these purposes.

The purpose of the model shall be clearly and unambiguously defined before construction of a model is commenced:

- What is the purpose of the model?
- Who will use the model?
- How shall the information in the model be communicated to others?

If the purpose is only to make a good visualization or basic drawings, it would hardly be appropriate to model a BIM at a detailed level involving a substantial emphasis on the correct technical construction and the information contained in the model. However, if the purpose of the BIM is to make good drawings, prepare a cost calculation or execute an energy simulation, then the need for a precise and "correctly" modelled BIM is crucial to achieving a simple work process and a good result.

For feasibility and scheme design stages, a model for simple drawings and visualizations may be acceptable. For detailed designs, construction and as-built models, an accurate BIM is required.

In order to develop a model that will, for example, be used for quantity take-off, it is a requirement that the model shall be a close approximation of the building which will actually be built. Good modelling practices thus involves the incorporation of technical solutions which will actually be used in the construction of the building.

This section sets out specific requirements that all disciplines shall follow for the production of the Building Information Models (BIM) for a project. The BIM Coordinators shall create and manage separate models for each design discipline. These system specific models will allow each discipline to model their systems separately and also thorough coordination checks.

D3.1 Best BIM Modelling Practices

The following good practices shall be followed:

Software Language

- Only **English version** of Revit and Civil 3D software shall be used. Opening and authoring BIM files in Chinese version will implant Chinese parameters and settings, thereby affecting parameter-related BIM applications such as Visibility / Graphics Filters, Schedule headings, drawing generation and automation using Dynamo. For example, "Length" and "長度" will be considered as two types of parameters and thus adversely impacting information integrity.

Model Maintenance Best Practices

- Conduct weekly selective Purge of Unused elements and Audit of ALL files first thing on (Select a Date).
- Purge shall also apply to any linked AutoCAD files.
- Conduct weekly Compaction of the Central file.
- Unnamed or uncategorized views shall be deleted weekly.
- Review outstanding warnings regularly and resolve important issues.
- All detail groups shall be removed and purged as applicable.
- Always check family sizes for large file sizes.
- Design Options – Archive and then accept primary as soon as possible.

Modelling Best Practices

- Files shall be opened via **File > Open** within BIM software. Never open Revit Files directly from Window Explorer or My Computer. Always open the file in Revit. In Sharing mode this will allow user to create a New Local File.
- Never open the Central file but only create and work on local files.
- User's models shall be re-created on daily basis to eliminate redundant data retention.
- Equipment shall show clearance boxes.
- All elements shall be modelled accurately in all three spatial dimensions.
- All dimensions shown on models or CAD drawings shall be generated automatically by the modelling or CAD software and shall not be overwritten or disassociated. Dimensions that are explicitly shown on the Contract Documents will take priority.
- All building elements will be modelled with actual and not nominal dimensions. This rule shall not be applicable to tubular works and plumbing works for sizes of pipes. Nominal size is adopted for pipework and tubular works except pipework for drainage work.
- Only use the "Generic Model" category to create a new object as the last resort, as it reduces the functionality of visibility and graphic overrides. If you must use it, create a subcategory for each major type of element represented. Creating subcategories also applies to the creation of Specialty Equipment.
- Modelling in-place families shall be avoided as much as possible, except for custom components generally built "on site" or for building massing during design. Create component families instead.
- Use model groups sparingly and strategically. If a model group is temporarily used and then ungrouped, be sure to Purge the unused group to remove it. Include hosts with hosted elements.
- Use simplified objects as place-holding families until the project is developed and more specific pieces are identified.
- Assign the proper level of detail to a given view.
- Close hidden windows to increase computer speed.
- Resolve errors regarding room boundaries overlapping.

- Don’t import hatch and patterns from AutoCAD.
- Don’t explode AutoCAD files in Revit.
- Don’t model exclusively in plan views, be sure to watch the 3D view of elements in order to prevent delays caused by unexpected results.
- Check your available RAM [You shall have at least 5 GB free].
- Verify your active Workset each time you begin to add or move things, especially when switching the discipline you are working on.
- Use default view templates. [Coordinate with BIM project coordinator before adjusting views/templates].
- Create reference planes sparingly.
- Create new section views sparingly for coordination purposes [delete once you have finished using them, or NAME them!]
- Always begin the design by understanding the applicable information requirements, such as pipe/duct insulation, separation distances, and tolerances, etc.
- Make sure Press + Drag is un-ticked by default (on the options bar) to avoid moving elements by mistake.
- Always draw elements in a consistent direction on plan. Either top to bottom or bottom to top. Either left to right or right to left
- Amend rather than delete if possible - If an object is hosting other objects (e.g. a wall hosting windows, doors or ductwork) and needs to be amended, it is best to do just that and avoid deleting and re-drawing the element completely since this will break the associative hosting between objects.
- Use copy / monitor for specific architect-driven building datum like levels and grids. This enables the architect’s model to automatically drive major changes [floor-to-floor height, etc.].
- Be clear on what shall and shall not be modelled. Refer to the project LOD (Level of Development) scope matrix on what you are trying to achieve.
- Minimize view depth, in elevations, plans, and section views.
- The methods adopted for data segregation shall be considered and be agreed by all internal and external disciplines to be involved in the modelling.
- No more than one building shall be modelled in a single file.
- A model file shall contain data from one discipline only (although exceptions may apply to Building Services where multiple disciplines converge).
- Further segregation of the geometry may be required to ensure that model files remain workable on available hardware.
- To avoid duplication or co-ordination errors, clear definition of data ownership throughout the life of the project shall be defined and documented.
- Element ownership may be transferred during the project time-line – this shall be explicitly identified in the Project BIM Execution Plan Document.
- Where multiple models make up a single project, a container model whose function is to link the various assemblies together for coordination / clash detection purpose shall be considered.

D3.2 Model Segregation Strategy

3.1a It is impractical to model all the elements in one project model. To maintain a healthy BIM model and enhance the navigation and operation, it is important to segregate the model by discipline, by zone and by purpose systemically.

3.1b D.MET-2.1 Disciplines Model Segregation

Discipline Models:

AR - Site Model
Site Survey Map or Toposurface, Existing Model (Massing Block)

GE - Site Formation Model
Ground Condition, Site Formation

CE - ELS Model
ELS, Temporary Work



AR - Block Model
Tower Model, Typical Floor, Modular Flat Design Model

SE - Block Model
Foundation Model, Superstructure Model

BSE - Block Model
WS Model, ACMV Model, FSWP Model, Electrical Model, Lift and Escalator Model, Utilities Model

SE - External Works Model (Structure)
Walkway, Trellis, Fence walls, etc.

CE - Civil Model
Public Road, Underground Utilities, Drainage Works, Water Supply at External Area

LA - Landscape Model
Hard Landscape and Greening Features; Soft Landscape and Landscape Features / Furniture

D.MET-2.2 Architectural BIM Models

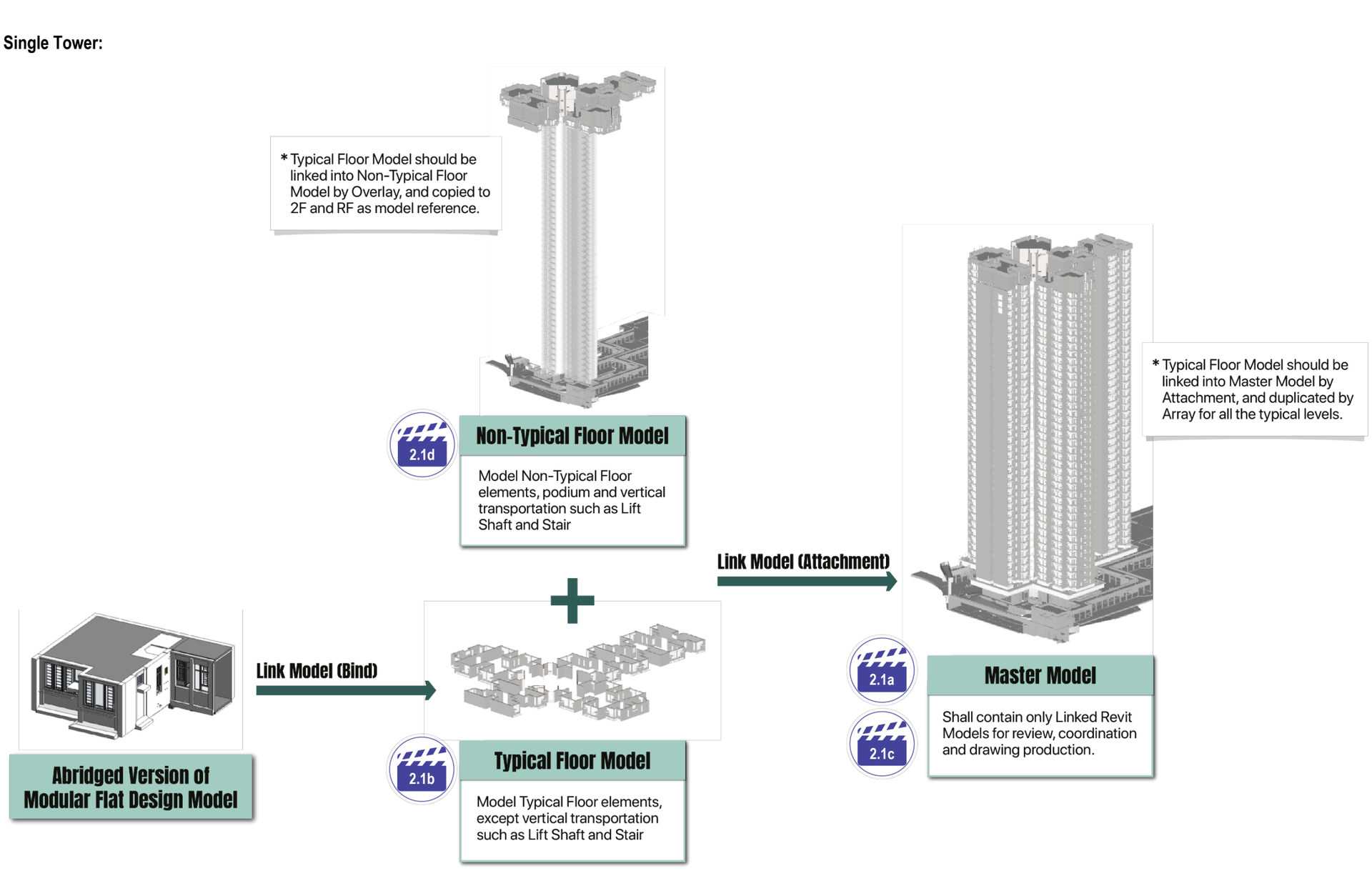
Design Stages

During Design, abridged version of Modular Flat Design (MFD) models shall be applied for generating layouts for domestic floors. Since the layout and arrangement of the modular flats would be revised frequently in Schematic Design Stage, it is advised to link the MFD models into the Typical Floor and domestic Non-Typical Floor Model first. Then bind the modular flat design model links as different groups.

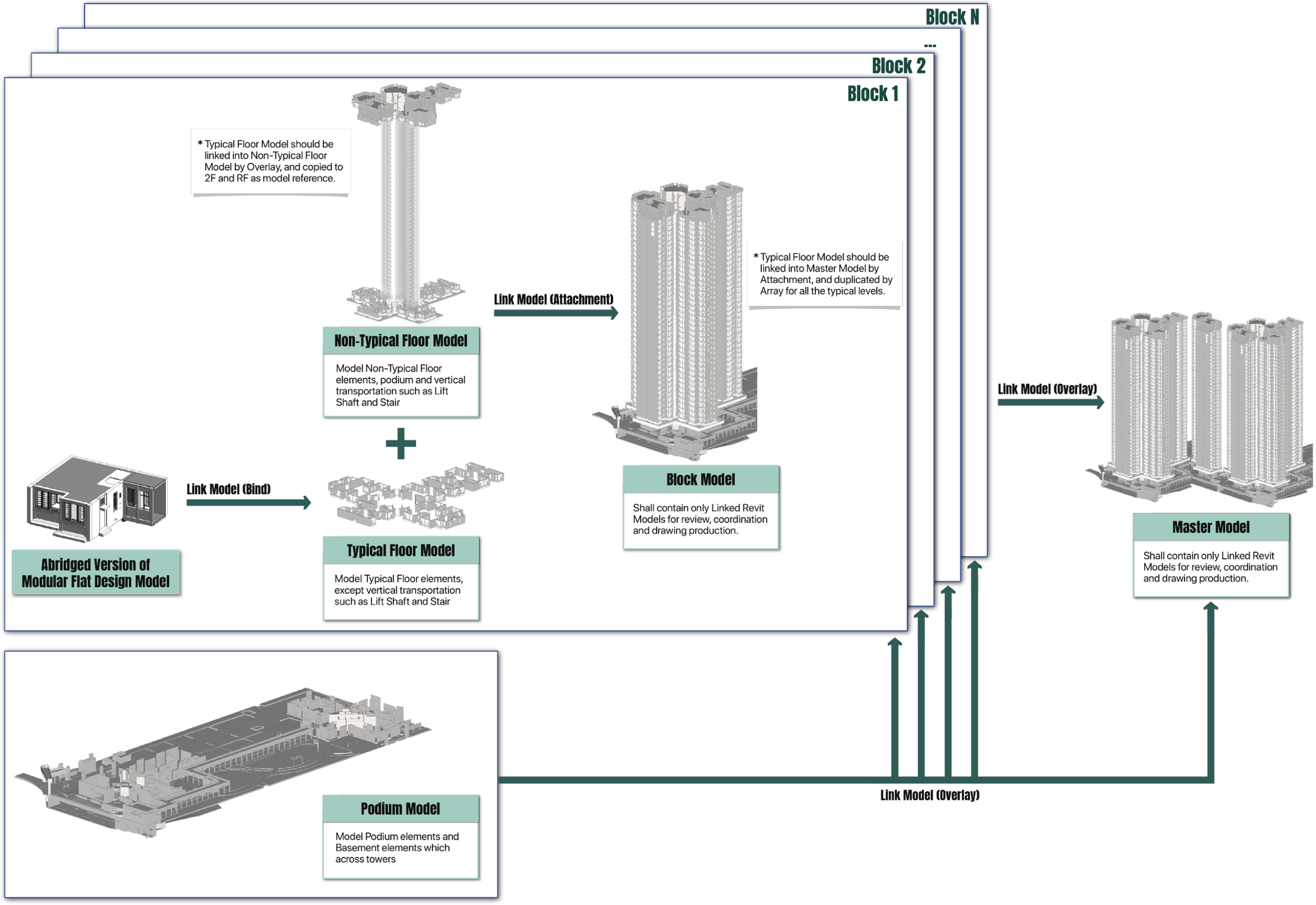
Construction Stage

The Design BIM models shall be passed to the construction team for further Construction BIM models development. Therefore same model segregation mentioned above shall be adopted in the Construction Stage.

Project Models for Single Tower:



Project Models for Estate:



D.MET-2.3 Structural BIM Models

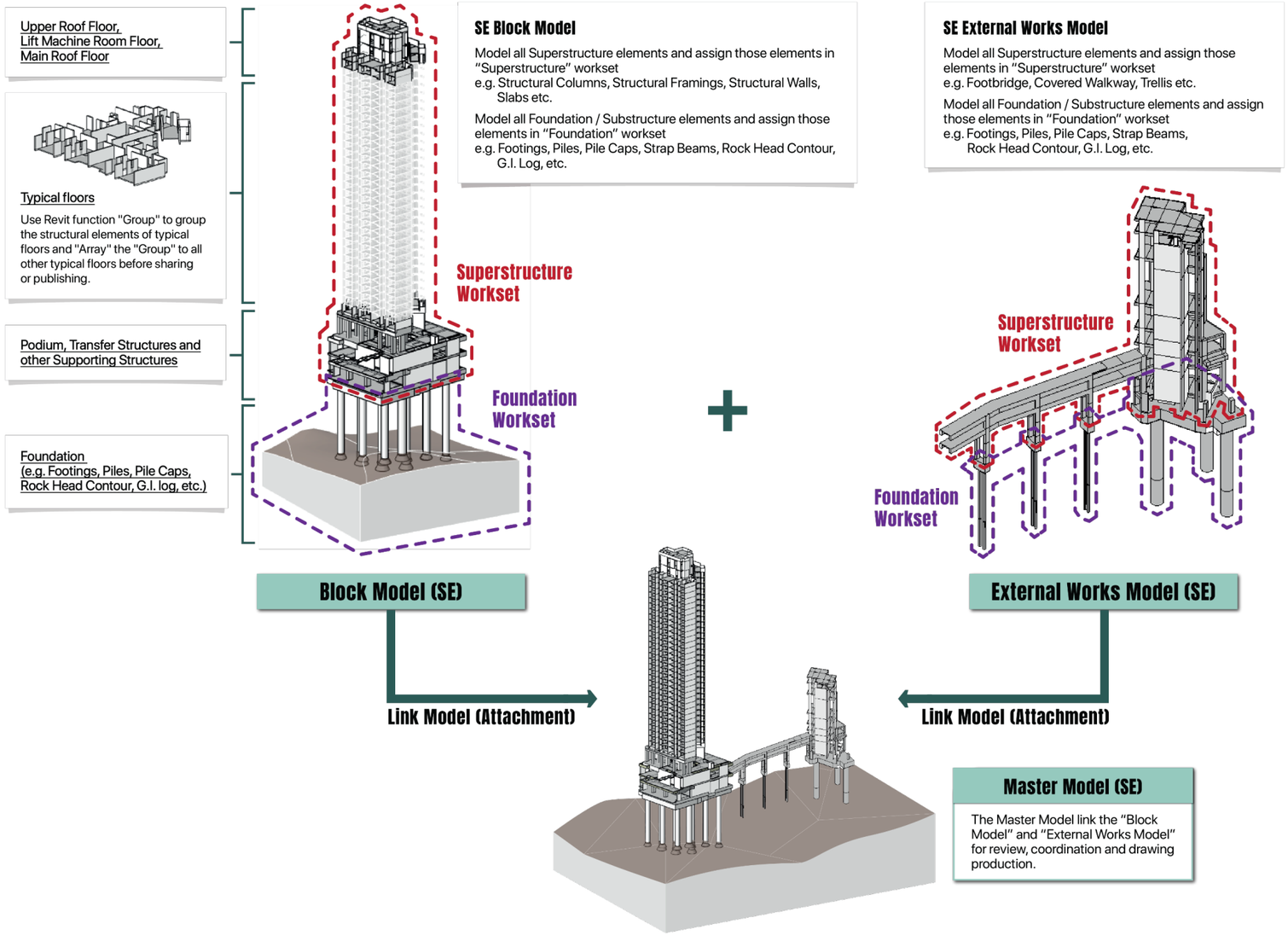
Design Stage

In general, domestic blocks and external works are modelled separately and published as SE Block Model(s) and/or SE External Works Model containing all the required BIM elements (e.g. columns, walls, slabs, beams, piles, etc.). The authors shall assign appropriate worksets (i.e. foundation workset, superstructure workset, vertical transportation workset, etc.) as per the categories of the BIM elements. The SE Master Model shall "link" the SE Block Model(s) and/or SE External Works Model for the purpose of design review, coordination and drawing production.

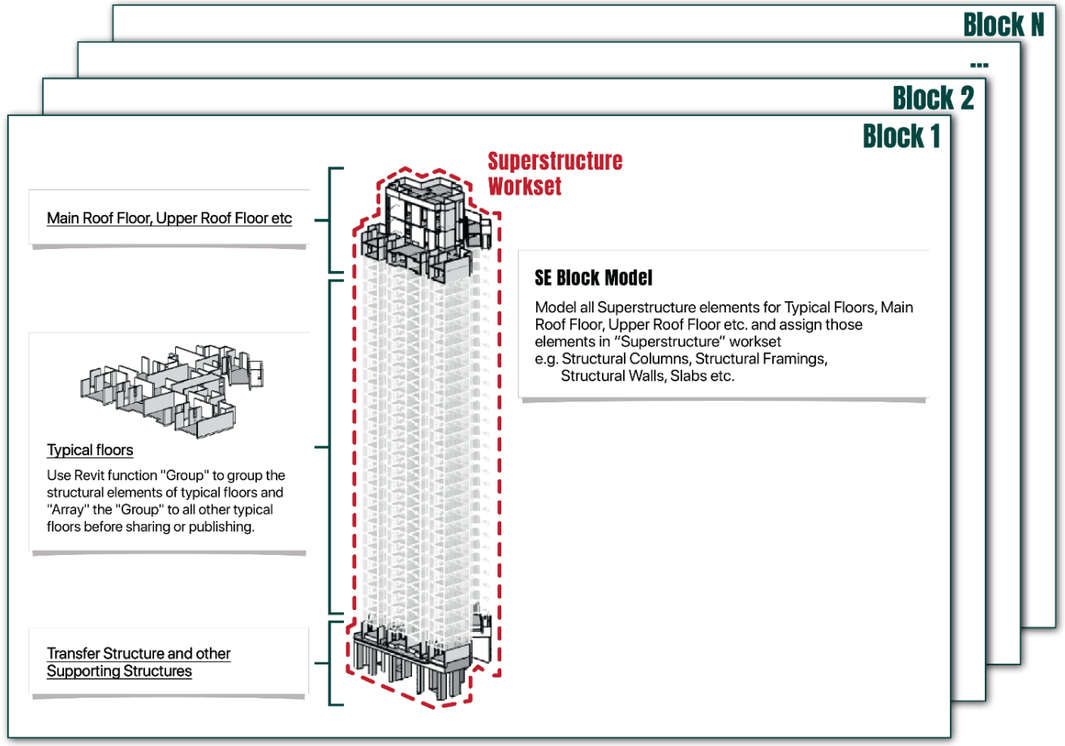
Construction Stages (Scenario #1: Combined Building and Foundation Works Contract)

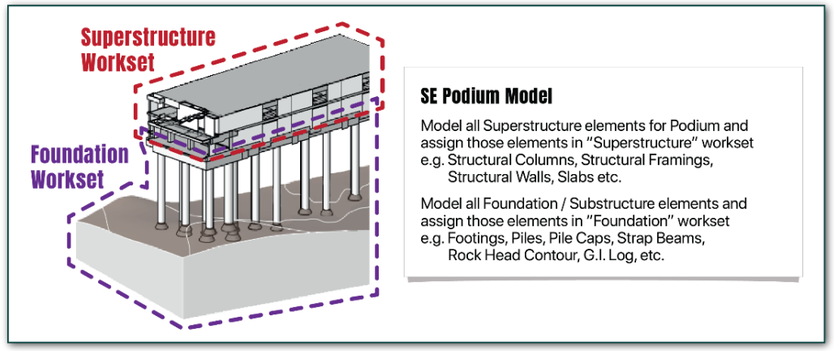
The building contractor procured for the combined works contract is responsible for authoring the Construction BIM Model(s), containing all the BIM elements of foundation, superstructure and external works and therefore, modelling segregation method mentioned above shall be adopted for this scenario of works contracts arrangement.

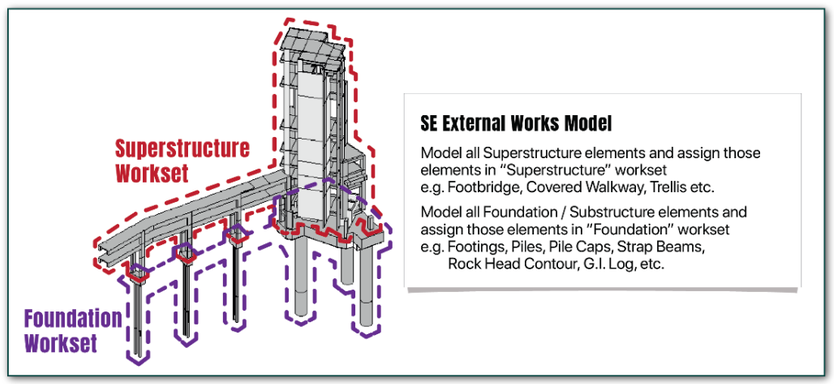
Project Models (i.e. Design BIM Model(s) & Construction BIM Model(s) (in Scenario #1)) for Domestic Block and External Works:



Project Models (i.e. Design BIM Model(s) & Construction BIM Model(s) (in Scenario #1)) for Estate (i.e. when there are multiple domestic blocks) and External Works:

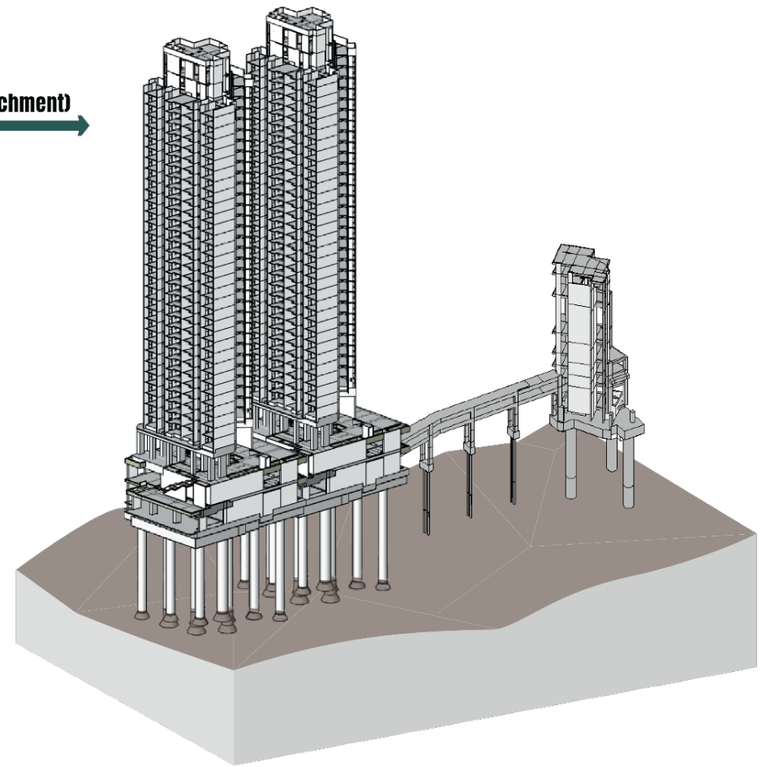






Link Model (Attachment)

Link Model (Attachment)



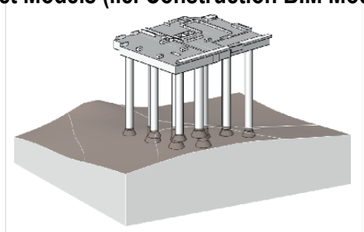
Master Model

The Master Model link the "Block Model", "Podium Model" and "External Works Model" for review, coordination and drawing production.

Construction Stage (Scenario #2: Separated Building and Foundation Works Contract)

In this scenario of works contracts arrangement, the Construction BIM Model(s) will be separately produced and authored by the foundation and building contractors respectively so that the modelling liability and responsibility shall belong to the corresponding contractors. For example, the foundation contractor produces and authors “SE Block Model [Foundation Contract]”, which contains only the BIM elements relating to the domestic blocks and are within the scope of the foundation contract. Similarly, the building contractor produces and authors “SE Block Model [Building Contract]”, which contains only the BIM elements relating to the domestic blocks and are within the scope of the building contract, so on and forth.

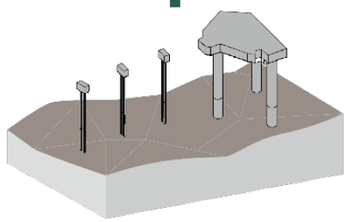
Project Models (i.e. Construction BIM Model(s) (in Scenario #2)) for Domestic Block and External Works:



SE Block Model [Foundation Contract]

Model all Foundation / Substructure elements and assign those elements in “Foundation” workset
e.g. Footings, Piles, Pile Caps, Rock Head Contour, G.I. Log, etc.

Model all Superstructure elements (i.e. Structural Columns and Structural Walls) at 500mm (approx.) above the Pile Caps or Footings Level and assign those elements in "Superstructure" workset

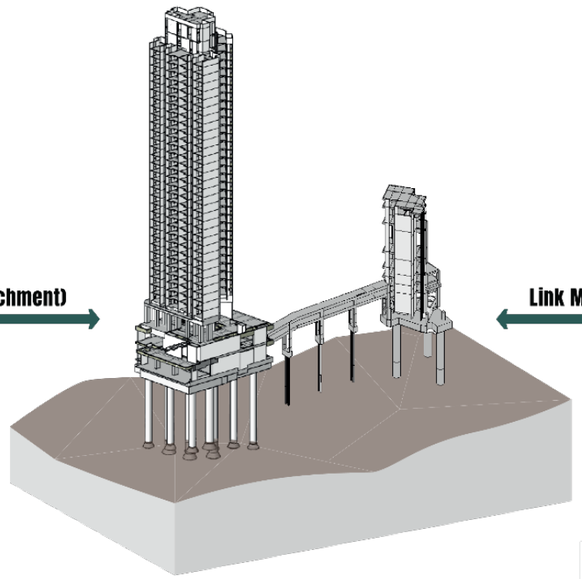


SE External Works Model [Foundation Contract]

Model all Foundation / Substructure elements and assign those elements in "Foundation" workset
e.g. Footings, Piles, Pile Caps, Rock Head Contour, G.I. Log, etc.

Model all Superstructure elements (i.e. Structural Columns and Structural Walls) at 500mm (approx.) above the Pile Caps or Footings Level and assign those elements in "Superstructure" workset

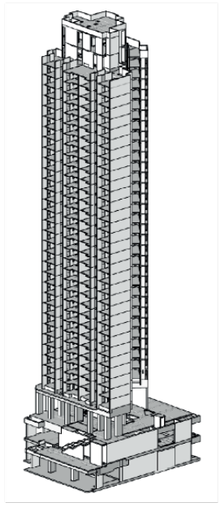
Link Model (Attachment)



Master Model (SE)

The Master Model link the “Block Model” and “External Works Model” for review, coordination and drawing production.

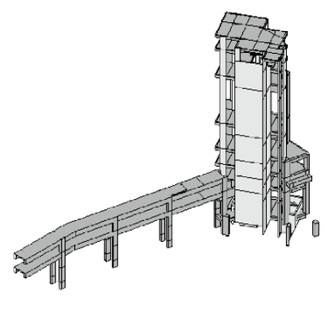
Link Model (Attachment)



SE Block Model [Building Contract]

Model all Superstructure elements and assign those elements in “Superstructure” workset
e.g. Structural Columns, Structural Framings, Structural Walls, Slabs etc.

Model all Foundation / Substructure elements under the building contract’s scope (if any) and assign those elements in “Foundation” workset
e.g. Footings, Piles, Pile Caps, Strap Beams, Rock Head Contour, G.I. Log, etc.

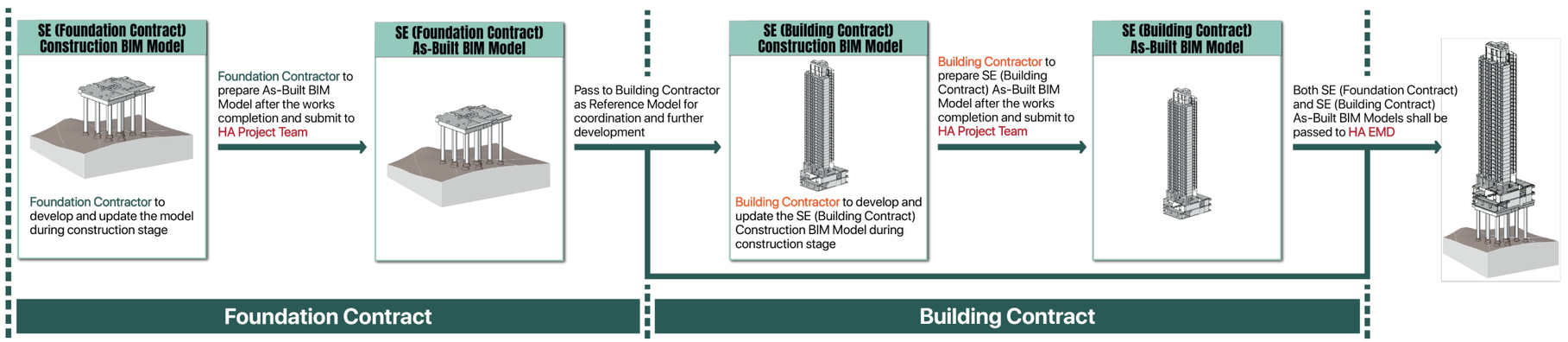


SE External Works Model [Building Contract]

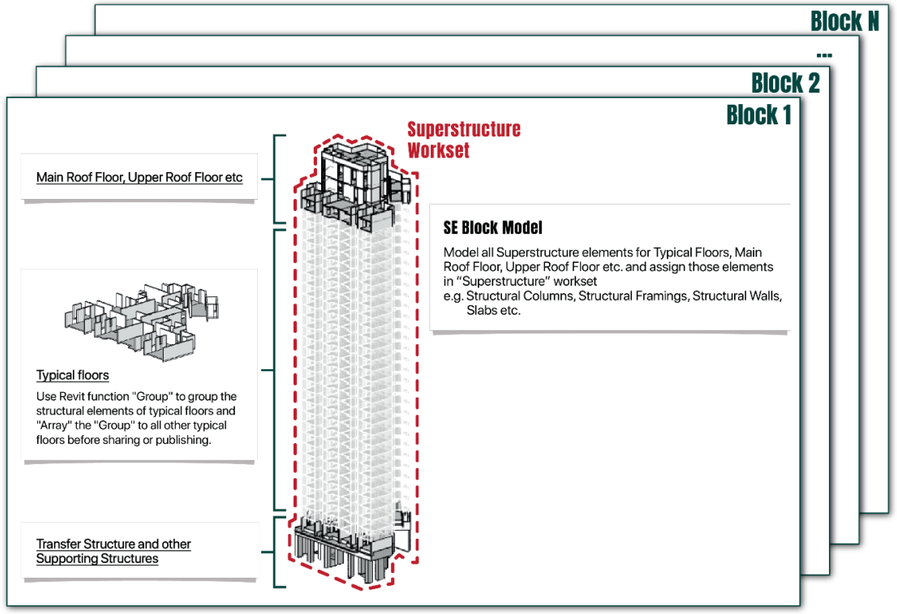
Model all Structural elements and assign those elements in "External Works" workset
e.g. Footbridge, Covered Walkway, Trellis etc.

Model all Foundation / Substructure elements under the building contract’s scope (if any) and assign those elements in “Foundation” workset
e.g. Footings, Piles, Pile Caps, Strap Beams, Rock Head Contour, G.I. Log, etc.

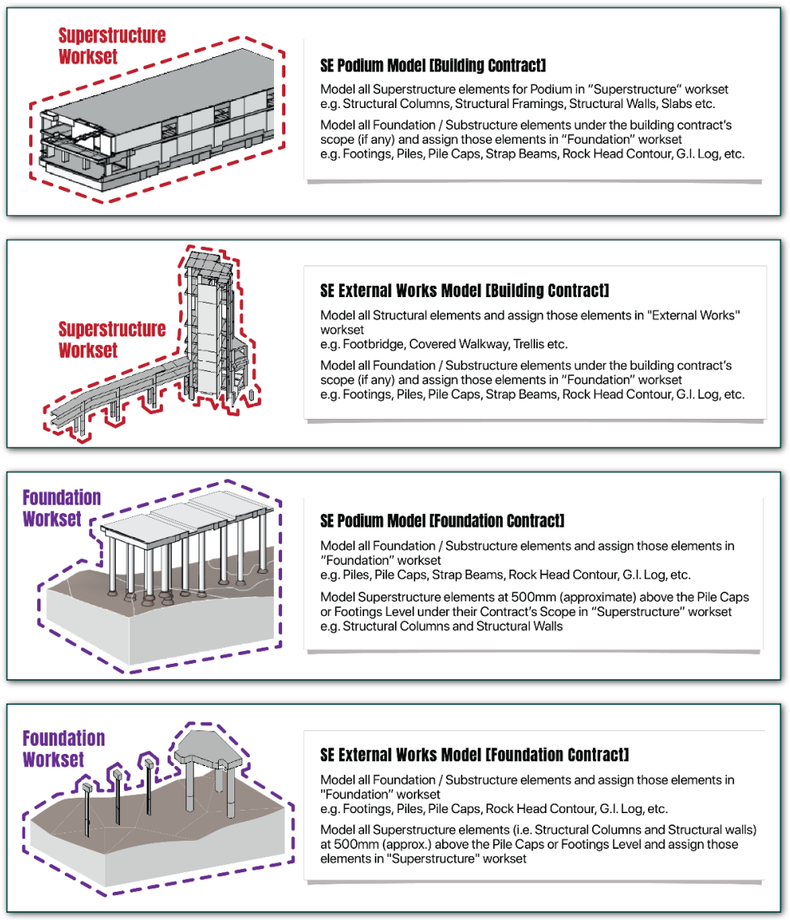
Typical Timeline of Development of Construction BIM Model(s) (in Scenario #2):



Project Models (i.e. Construction BIM Model(s) (in Scenario #2)) for Estate (i.e. when there are multiple domestic blocks) and External Works:



Link Model (Attachment)

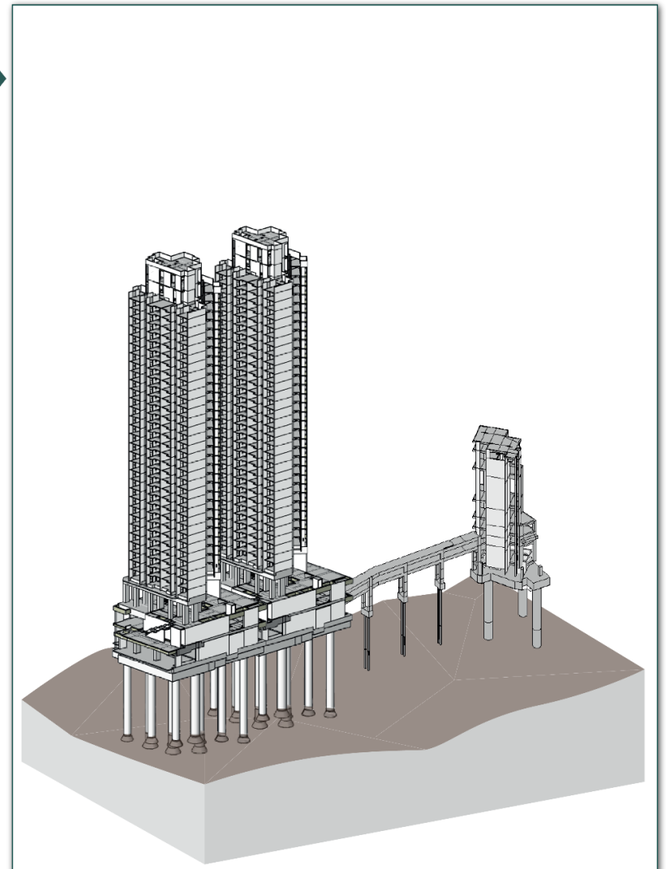


Link Model (Attachment)

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Link Model (Attachment)



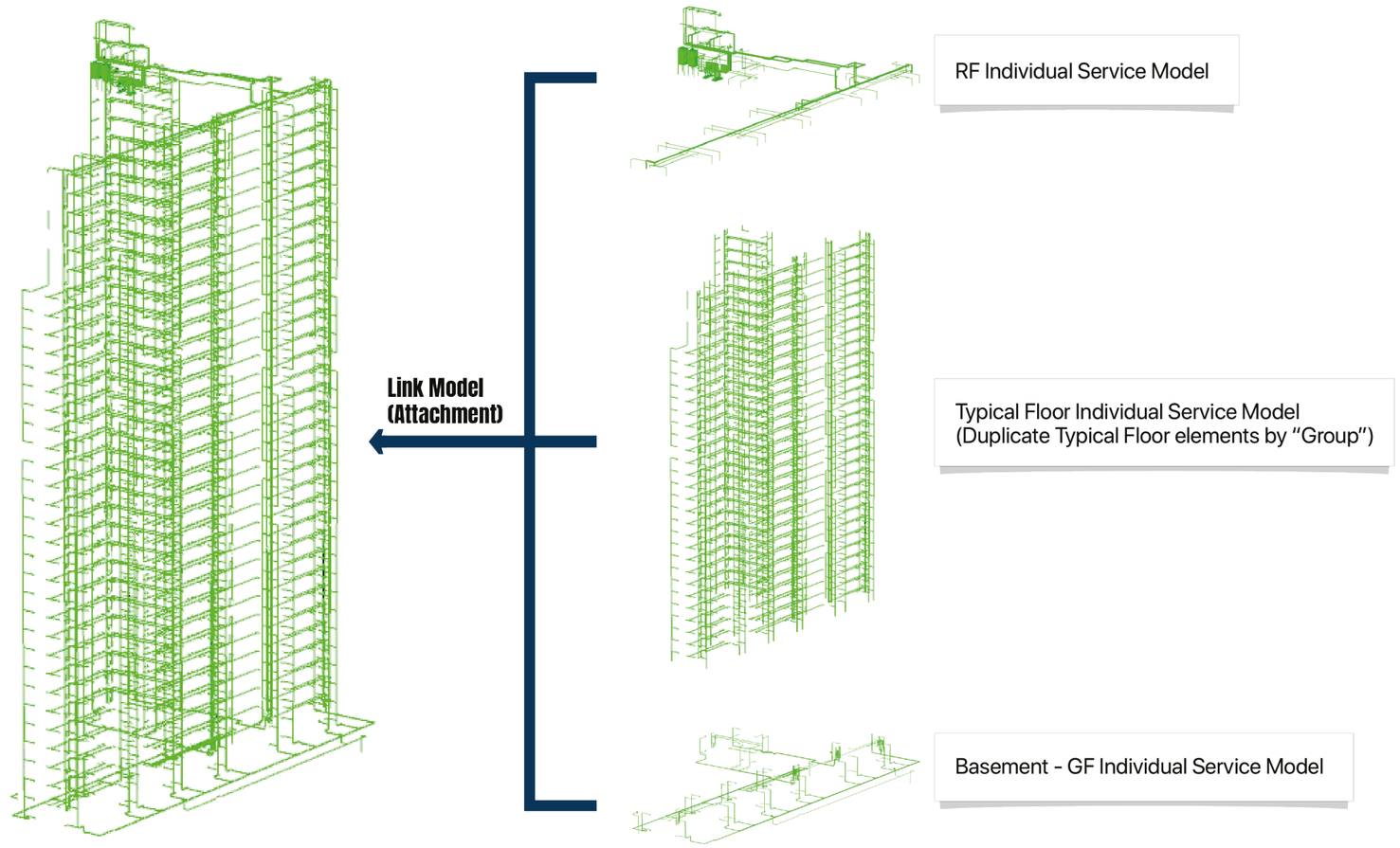
Master Model (SE)

The Master Model link the "Block Model", "Podium Model" and "External Works Model" for review, coordination and drawing production.

D.MET-2.4 Building Services BIM Models

Design Stages

Building Services Block Models shall be federated by System Models (i.e. ACMV, WS, FSWP, EL, DR etc.). However, building services modelling in Revit may cause slow navigation and operation. Therefore, it is recommended to further segregate the individual service model into zones.



Master Model

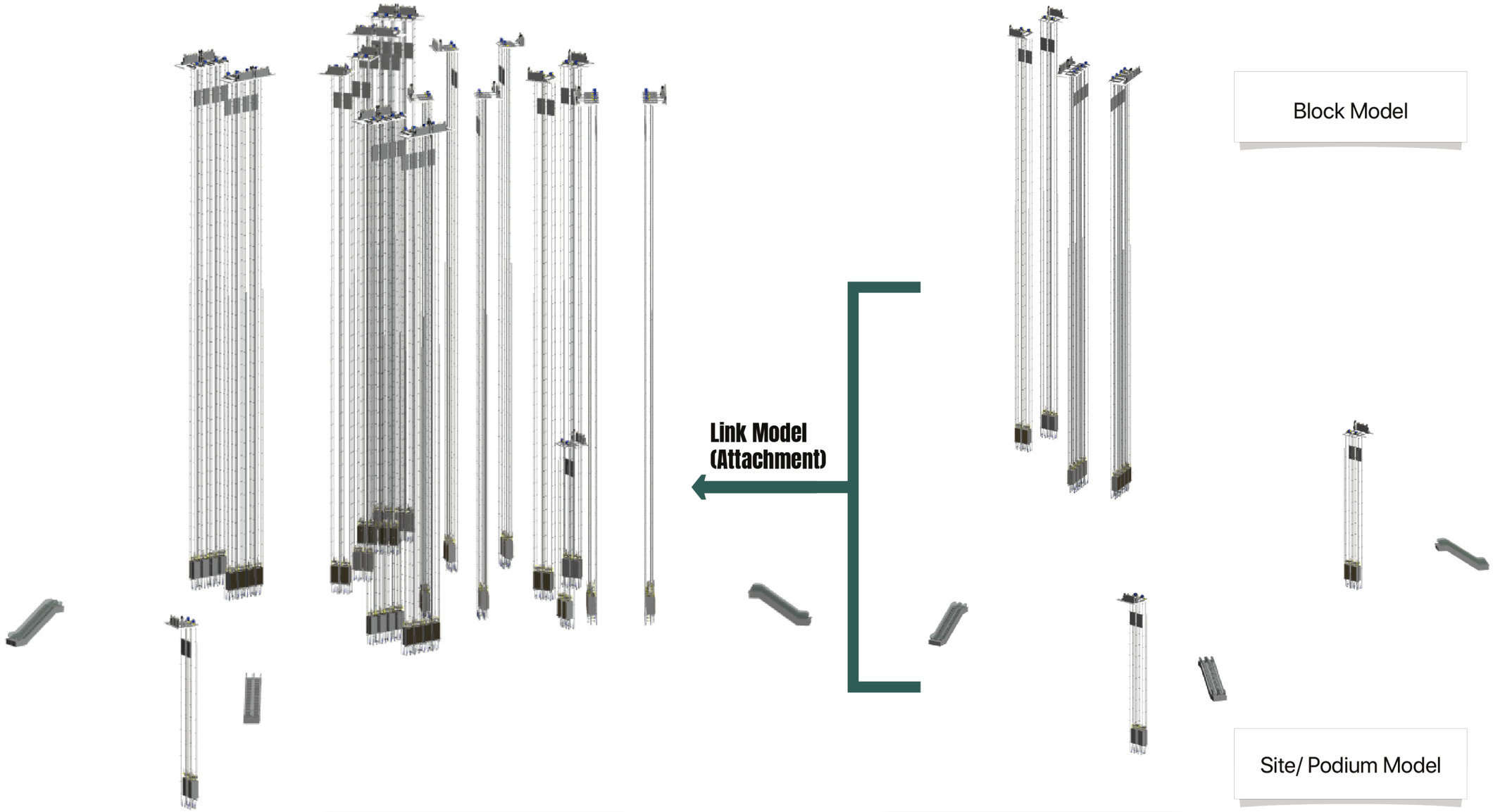
Shall contain only Linked Revit Models for review, coordination and drawing production.

Zone Models

The Individual Service Model could further split into zones due to project file size and navigation limitation. Model all the elements within the Zone, including builder works (openings).

Design Stages

Lift and Escalator Models shall be federated by Blocks and Site.



Master Model

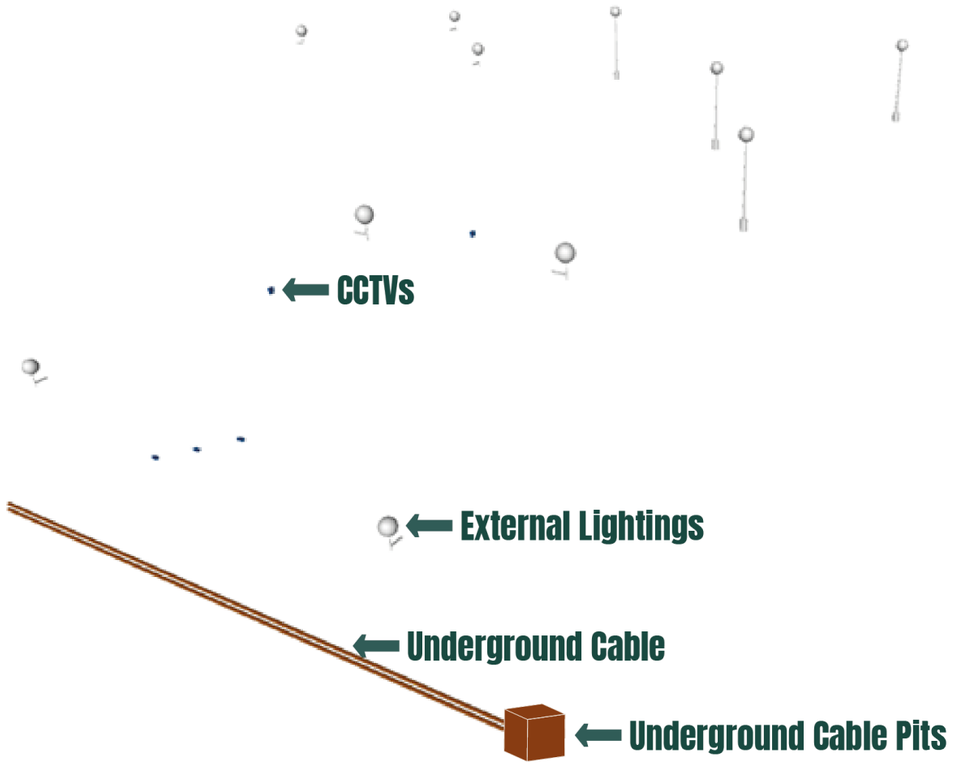
Shall contain only Linked Revit Models for review and coordination.

Services Zone Models

Model all the elements within the Services Zone Models.

Design Stages

BS site model (BS installations at external area, e.g. CCTVs, external lightings, underground cable pits etc) shall be modelled within one project model for the site.

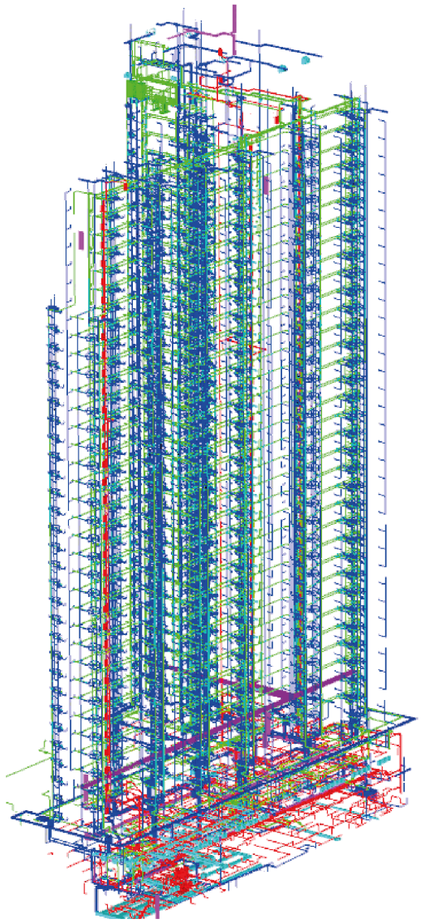


Master Model

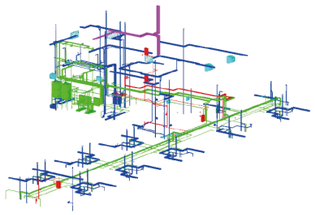
Model all the elements within the Master Model for design, coordination and drawing production.

Construction Stage

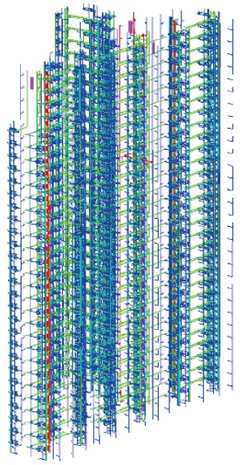
The Design BIM models shall be passed to the construction team for further Construction BIM models development. However, considering the detail cross-disciplines coordination in the construction stage, a different model segregation is introduced, preparing Combined Services Model by zones. However, all the services element should be assigned to appropriate worksets..



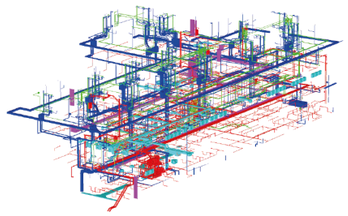
Link Model (Attachment)



RF Combined Services Model



Typical Floor Combined Services Model
(Duplicate Typical Floor elements by "Group")



Basement - GF Combined Services Model

Master Model

Shall contain only Linked Revit Models for review and coordination.

Zone Models

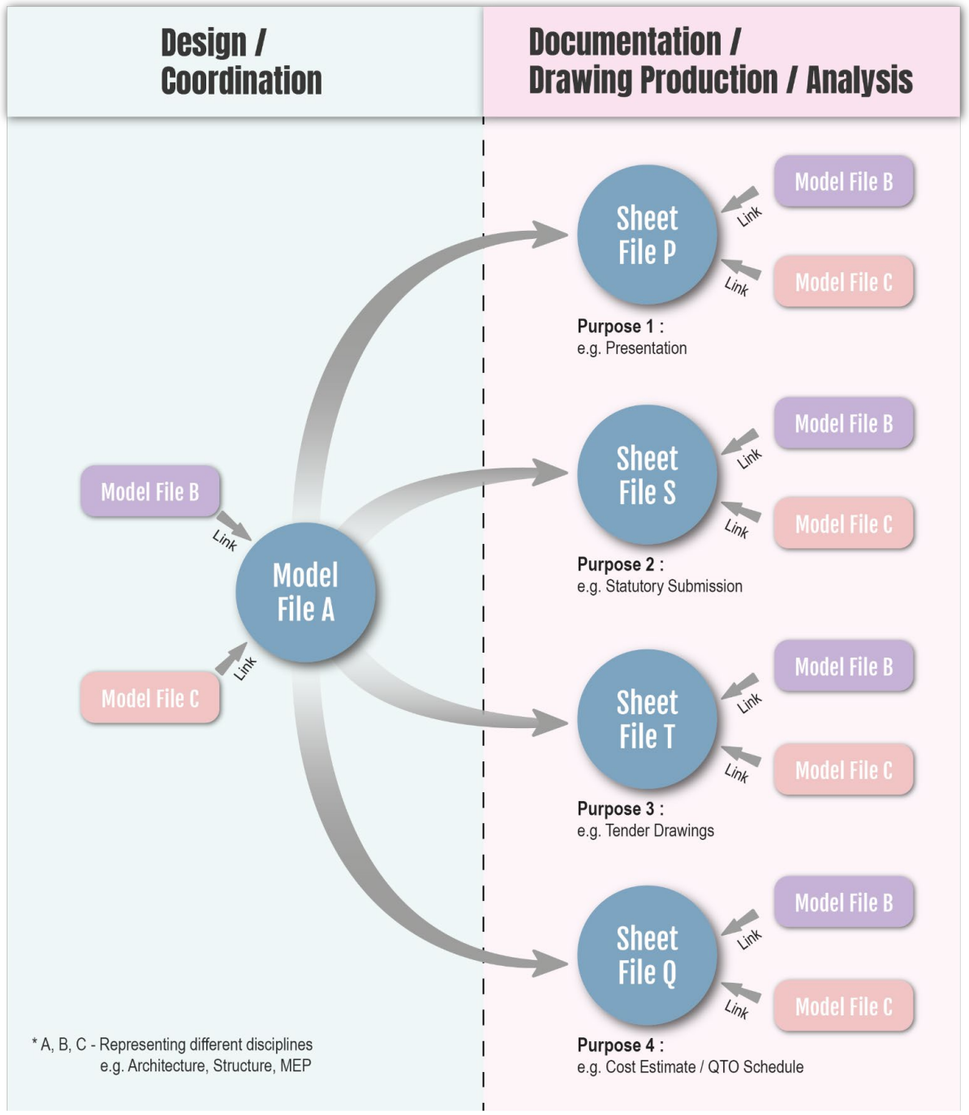
The Combined Services Model could further split into zones due to project file size and navigation limitation. Model all the elements within the Zone under correct worksets such as,

- Model WS elements in WS Workset
- Model FSWP elements in FSWP Workset
- Model BS installations at external area in Site Workset
- Model Builder works (openings) in Builder Works Workset

To have better control on drawing production and coordination, the drawing setup shall be prepared in the same Zone Model.

D.MET-2.5 Drawing Model Segregation Strategy

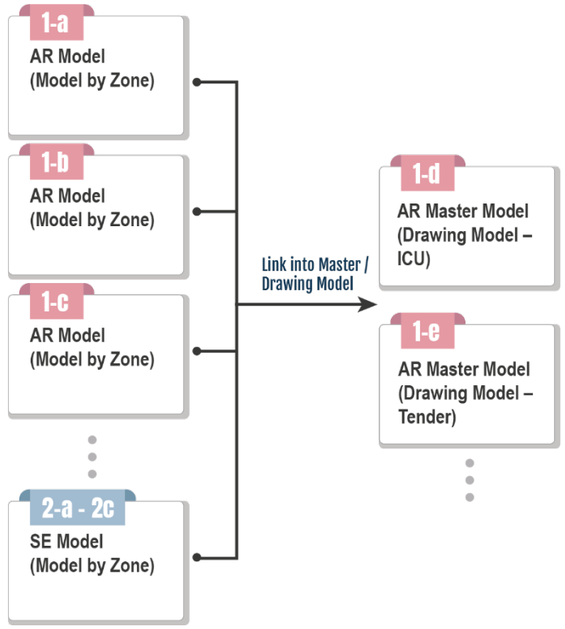
Federation shall facilitate design coordination, documentation, drawing production and analysis:



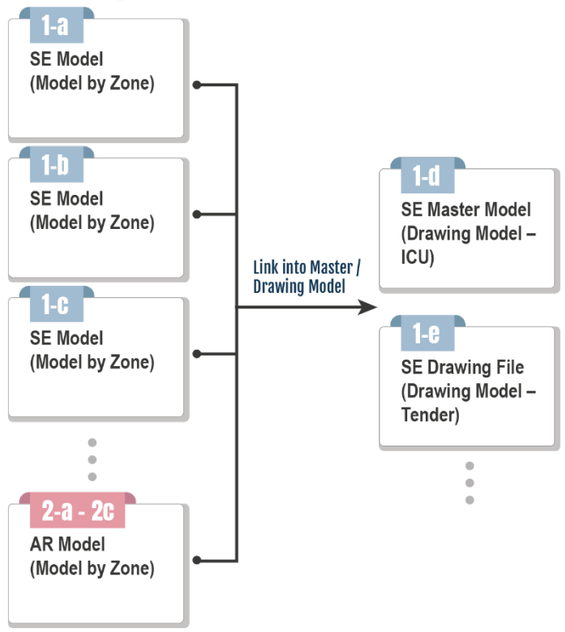
Breakdown Structure for Information Containers

The diagrams for each discipline model and drawing file clearly illustrate the model division as below:

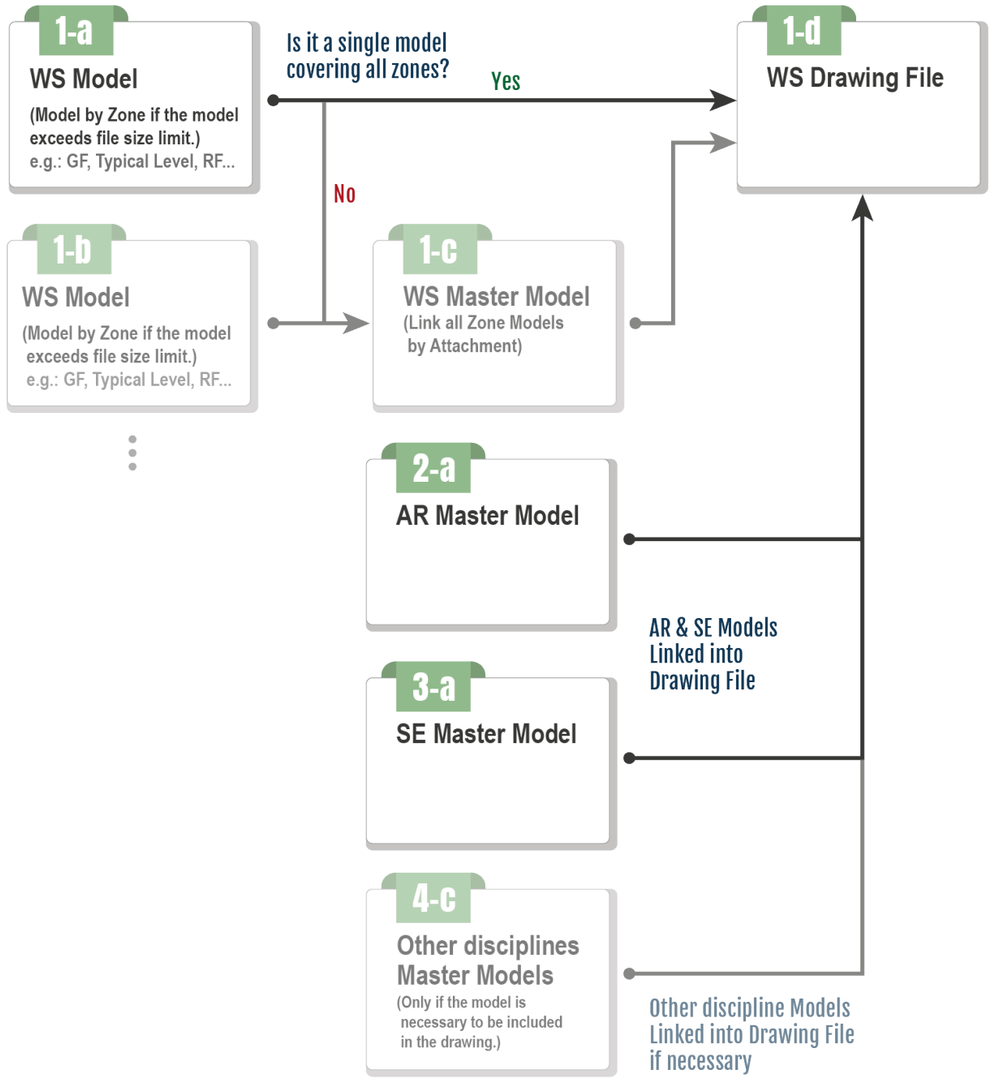
AR Drawing File:



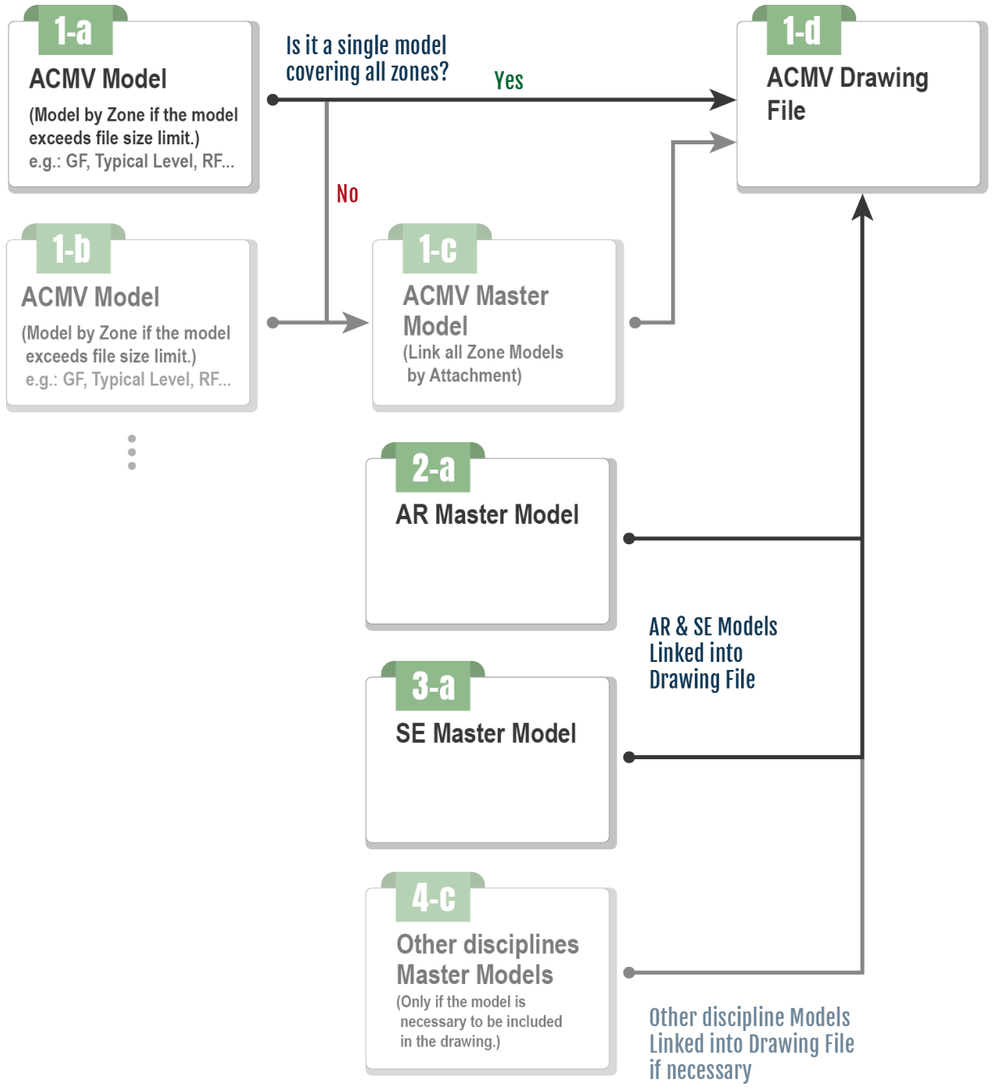
SE Drawing File:



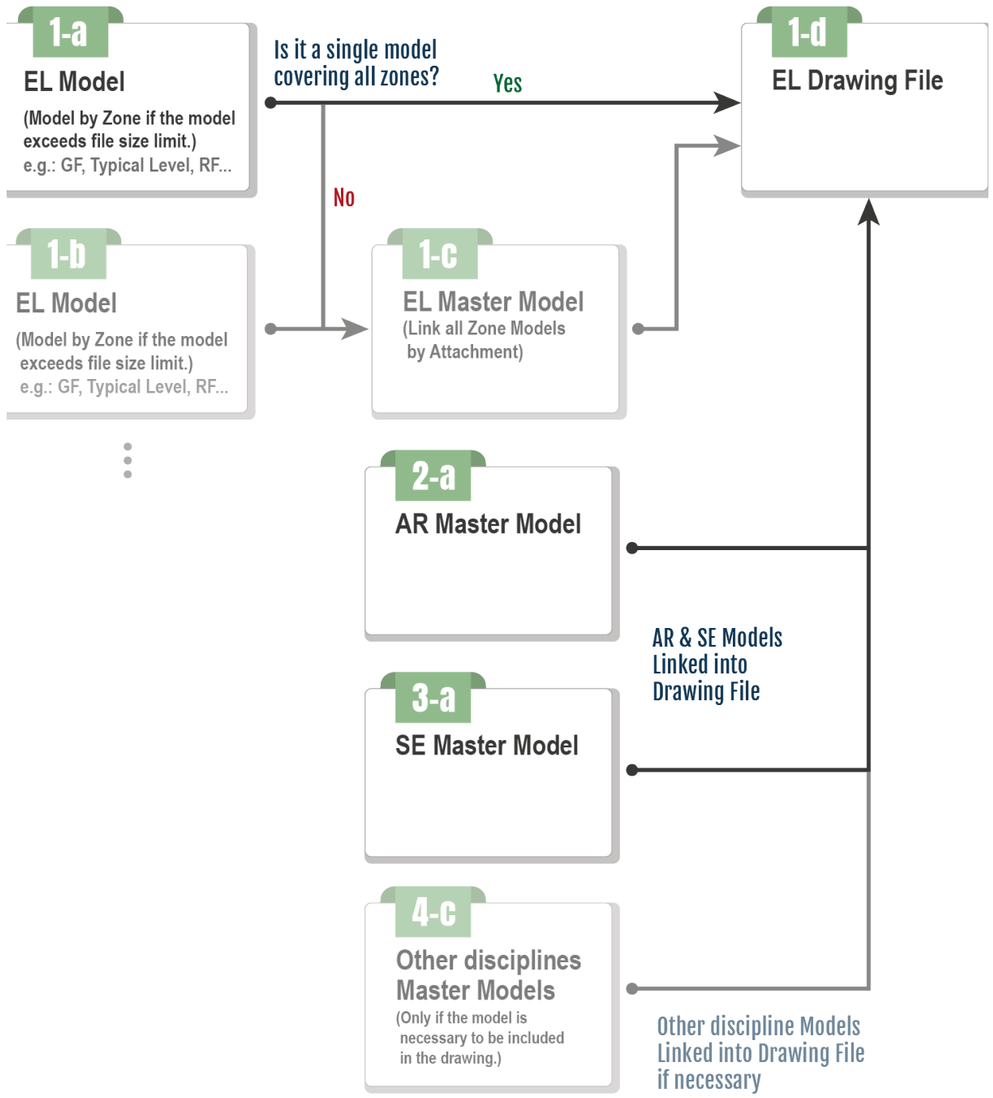
WS Drawing File:



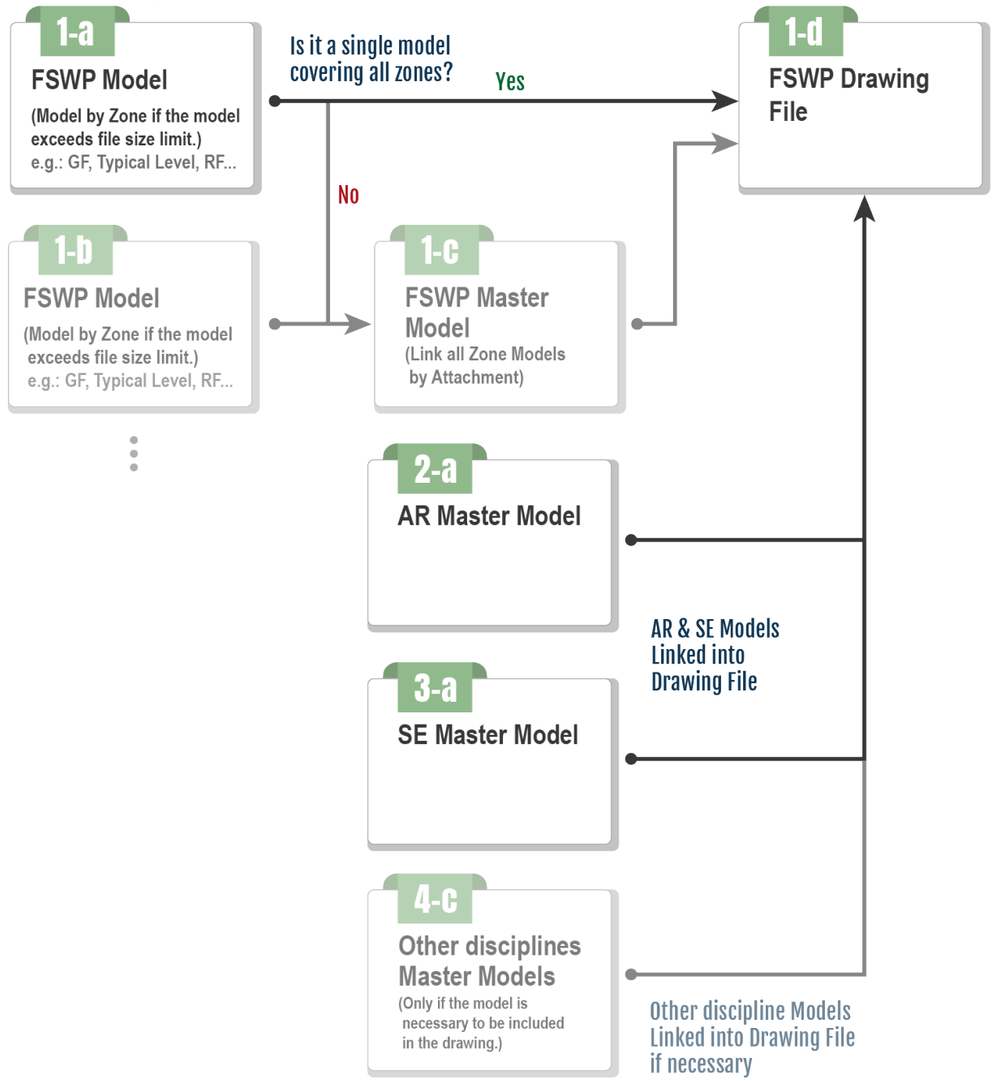
ACMV Drawing File:



EL Drawing File:

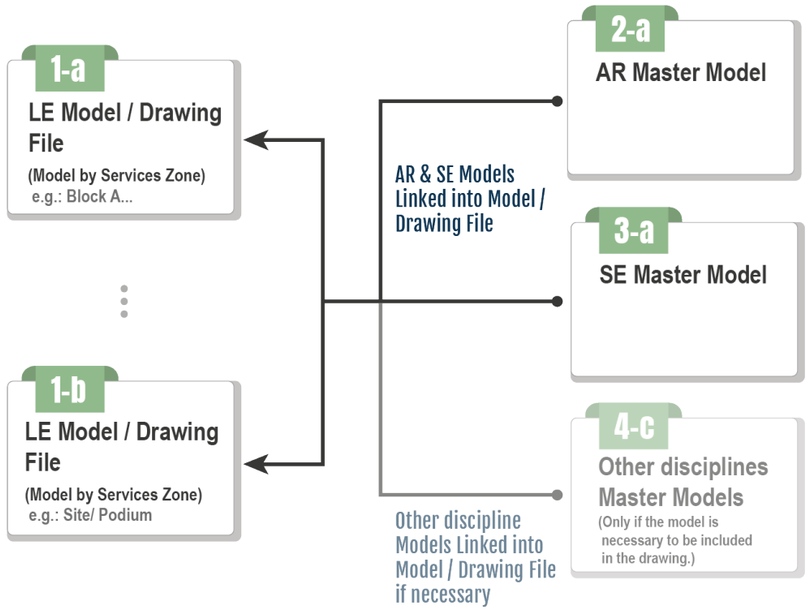


FSWP Drawing File:



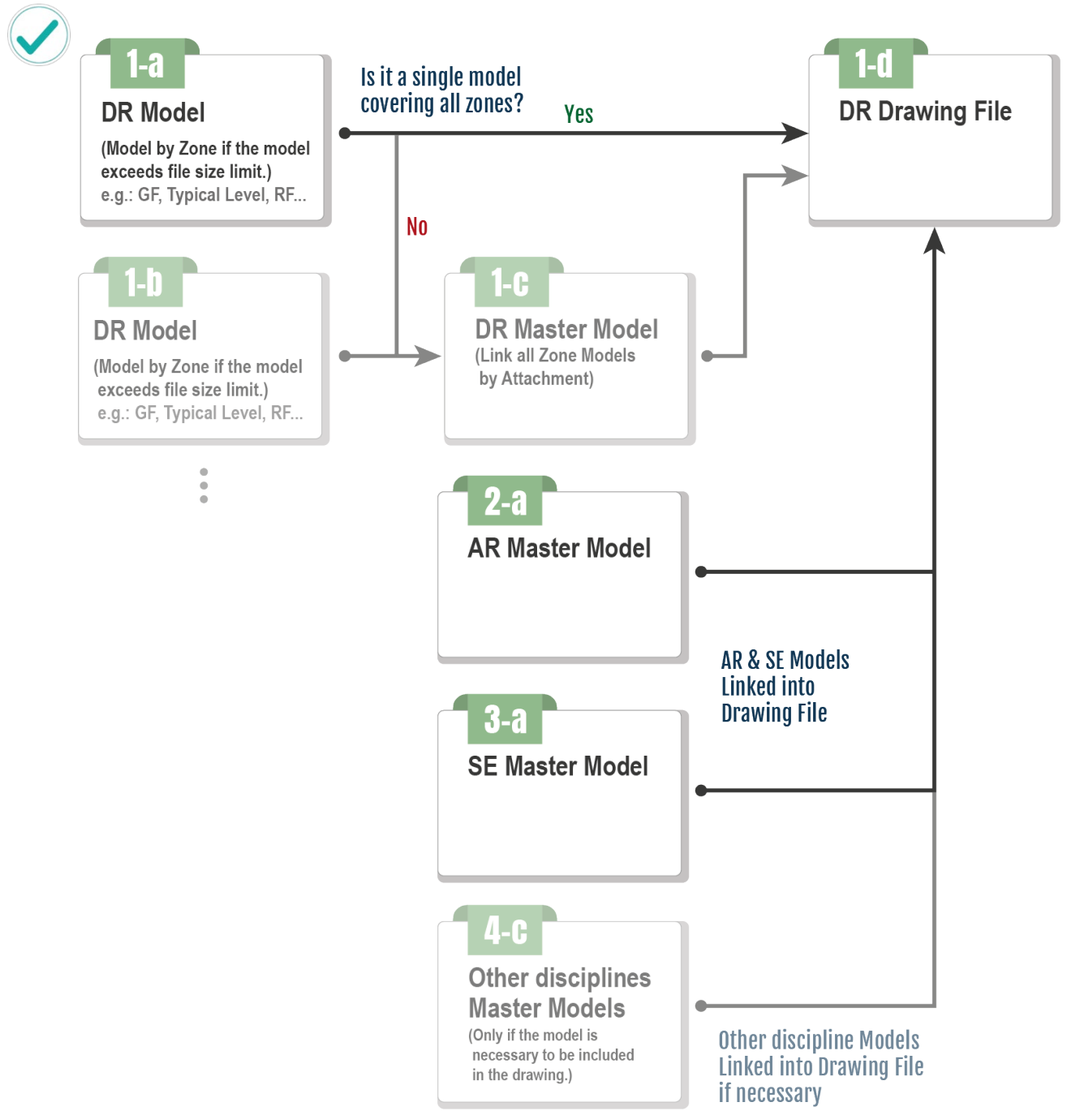
*Those ACMV elements to be provided and installed by the Electrical Nominated Sub-contractor could be modelled in EL Model under “ACMV” workset.

LE Drawing File:



* Due to the simplicity of LE model, it is suggested to prepare the LE drawing in the same LE model.

DR Drawing File:



* DR model shall be prepared by HA Architectural Discipline for in-house projects.

D3.3 System Setup

D.MET-3.1 Folder Structure

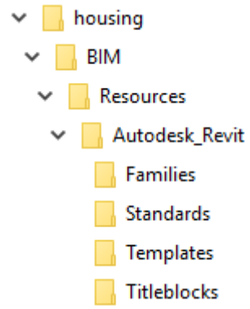
This section defines how BIM data shall be stored within the project filing system. All project model files, drawings, references and data, regardless of project size or type, shall be organised and filed into a standard folder structure on a central server. During daily working of a model, a copy of the model could be placed on a local workstation (local files).

All models shall be stored on a central server to ensure that backup and disaster recovery facilities are provided to safeguard the models and databases. Subfolder structure under the central server shall be standardized and set up by the System Administrator. In general, other users are restricted from modifying the folder structures. If there are any special needs, PT / PSP / Contractor members can discuss with the administrator to set up optional subfolders.

Resource Folder Structure

Project templates, family library, shared parameter file and other non-project-specific data shall be held within the server-based Central Resource Library, with restricted write access.

The Central Resource Library shall be organised by software and version. Resources for each product and version of the Central BIM Resource Library, shall be maintained within each folder.



Project Folder Structure

All project data shall be held within the standard project folder structure located on central network servers. This includes all work in progress files, components or assemblies.

The defined structure may follow the principles of BS1192:2007's 'Work in Progress (WIP)', 'Shared', 'Published' and 'Archived' segregation of data within a designated set of folders.

Where a project comprises of a number of separate elements such as multiple buildings, zones or areas, the BIM structure shall be maintained within a set of designated sub-folder representing the various project elements.

- **BIM Project Reference**	
- **Projects**	
- **Project Name (Project Number)**	
- **01-WIP**	**[BIM data repository]**
- 01.1-ARCH	
- 01.1.1-CAD	[CAD files (incl. 'Modified)]
- 01.1.2-BIM	[Design Models (incl. 'Modified')
- 01.1.3-SheetFiles	[Sheet/rvt files]
- 01.1.4-Export	[Export data e.g. gbXML or images]
- 01.1.5-Families	[Components created during this project]
- 01.1.6-TSA	[WIP Temporary Shared Area (TSA)]
- 01.2-BSE	
- 01.3-CE	
- 01.4-GE	
- 01.5-LA	
- 01.6-STR	
- 01.7-QS	
- **02-Shared**	**[Verified Shared data]**
- **03-Published**	**[Published Data]**
- **04-Archived**	**[Archived Data repository]**
- **05-Incoming**	**[Incoming Data repository]**
- **06-Resource**	**[Project BIM Resource Library]**

Color Legend

Document Security
- Read
- File Read
Work Area\Folder Security
- Read

Document Security
- Create
- Delete
- Read
- Write
- Change Workflow State
- File Read
- File Write
- Free
Work Area\Folder Security
- Create subfolders
- Delete
- Read
- Write

Local Folder Structure

Local copies of central project models / drawings do not need to be backed up as changes are regularly synchronised with the central model. They shall be stored on the user's hard drive – not in 'My Documents'- according to the folder structure below.



D.MET-3.2 Naming Conventions

(a) File Naming

Referencing & Naming Convention

1.1 Referencing for Modelling

A standardized file numbering system shall be adopted for easy identification of models and collaboration between disciplines / parties.

1.1.1 File Naming Convention

All BIM files, regardless of authoring or exchange software, shall follow the naming standard described in this section. HA's model naming standards which derives from section 1.5.5.4 File Naming Convention in *CIC Building Information Modelling Standards (Phase One) and HA's CAD Standards for DCD.*

The file name consists of 7 fields:

Field	1	2	3	4	5	6	7
HA Customization	Job Number	Phase	Author	Building Type	Level/ Zone	Model Code	Custom Description
No. of Characters in HA Standard	4	5	3	2-4	2-3	2	1-8

General guidelines are as followed.

- Do NOT use spaces in any part of the file name.
- Use only uppercase letters A-Z, hyphen, underscore and numbers 0-9 for all fields except Custom Description field.
- All fields shall be separated by a hyphen character '-'. Do NOT use spaces.
- Within Custom Description field, either Camel Case or an underscore '_' shall be used to separate words.
- A single period character '.' shall be used to separate the file name from the extension. This character shall not be used anywhere else in the file name.
- The file extension shall not be amended or deleted.
- The letter '_' shall be used if the file does not refer to a single specific "Phase", "Building Type", "Level/Zone" and "Model Code".
- The scheme for zone and level sub-division shall be agreed with other project professionals and documented in Project Execution Plan.
- Elements where a naming convention is not explicitly defined by the Standards and Guidelines shall adopt the existing naming convention of elements.

HA standard codes are as followed:

A list of HA standard codes for each field is as followed.

In the case a standard code does not exist to serve project-specific needs, additional codes may be proposed and documented in the PxP.

FIELD 1: JOB NUMBER (4 characters)

Job Number (Public Housing Development Programme (PHDP) Project Reference) refers to the first 4 characters of the Project Number in HOMES (i.e. without 5th and 6th characters).

Job Number	Description
FL07	Fanling Area 47B
HK16	Hing Wah
KL13	Upper Ngau Tau Kok
KS22	San Kwai Street

FIELD 2: PHASE (5 characters)

Phase denotes phase number of the project, aligning with PHDP.

Phase	Description
01	Phase 1
02	Phase 2
11&12	Phase 11 & 12
_	Projects with no phases assigned

FIELD 3: AUTHOR (3 Characters)

Author denotes the HA discipline, outside party (PSP) or Contractor responsible for model authoring.

Author	Description
HAA	Housing Authority-Architecture & Landscape
HAB	Housing Authority-Building Services Engineering
HAC	Housing Authority-Civil Engineering
HAG	Housing Authority-Geotechnical Engineering
HAP	Housing Authority-Planning
HAQ	Housing Authority-Quantity Surveying
HAS	Housing Authority-Structure
HAV	Housing Authority-Land Surveying
HAA	Cross-discipline Model or Master Model

FIELD 4: BUILDING TYPE (2-4 characters)

Building Type	Description
Example of Individual Blocks / Buildings	
BL1	Block 1
BL2	Block 2
PD	Podium
CC	Commercial Centre
CP	Car Park
CH	Community Hall
FB	Footbridge
LP	LP Gas Store
LT	Lift Tower
MT	Market
PTI	Public Transport Interchange
RCP	Refuse Collection Point
Example of Other Facilities / Information	
SITE	Site Profile
EX	External Works
_	Project (overall project file not specific floor / building / facility)

FIELD 5: LEVEL/ ZONE (2-3 characters)

Level	Description
Example of Models Divided Vertically by Level	
B1	Basement Level 1
GF	Ground Floor
TF	Typical Floor
13F	13th Floor
RF	Roof
_	All

Zone	Description
Example of Models Divided by Zone	
PF	Podium Floor
HZ	High Zone
LZ	Low Zone

FIELD 6: MODEL CODE (2 characters)

Model Code	Description
Example of Model Code	
AR	Architecture
SE	Structural Engineering
BS	Building Services
AC	Air Conditioning and Mechanical Ventilation
FS	Fire Services and Water Pump
EL	Electrical
DR	Drainage
TG	Town Gas
WS	Water Services
LE	Lift and Escalator
CE	Civil Engineering
LS	Land Survey

Model Code	Description
Example of Model Code	
RO	Road Works
BR	Bridge
GE	Geotechnical Engineering
LA	Landscape
MF	Modular Flat Design Model
MI	Miscellaneous

FIELD 7: CUSTOM DESCRIPTION (1-8 characters or omitted)

User defined description for the content of file which may be omitted. Users are recommended to keep the custom description as precise and short as possible (1-8 letters) to mitigate operational error caused by exhaustive file and folder names

Custom	Description
Example of Custom Description	
ICU	ICU Submission
TND	Tender

File Naming Example

Below is an example of applying model naming convention to a specific project (Sai Kwai Street / KS22 and Upper Ngau Tau Kok / KL13):

Job Number		Phase Number		Author		Building Type		Level/ Zone		Model Code		Custom Description		File Ext.	Description
KS22	-	_	-	HAA	-	_	-	_	-	AR		(omitted)	.	rvt	Architecture model of whole project by in-house
KS22	-	_	-	HAA	-	BLK1	-	GF	-	AR		(omitted)	.	rvt	Architecture model of ground floor
KS22	-	_	-	HAG	-	BLK2	-	SITE	-	GE	-	RW	.	rvt	Retaining wall model of Geotechnical discipline
KL13	-	01	-	HAB	-	BLK3	-	TF	-	EL	-	DIALUX	.	rvt	Typical floor electrical model for dialux analysis

Job Number		Phase Number		Author		Building Type		Level/ Zone		Model Code		Custom Description		File Ext.	Description
KL13	-	01	-	HAB	-	BLK1	-	RF	-	BS		(omitted)	.	rvt	Building services (combined) roof model
KL13	-	11&12	-	HAB	-	BLK3	-	TF	-	FS		(omitted)	.	rvt	Fire services roof model
KS22	-	_	-	HAA	-	EX	-	_	-	LA	-	EX_TREE	.	nwc	Landscape imported survey file of important existing trees
KS22	-	_	-	HAA	-	BLK1	-	RF	-	LA		(omitted)	.	rvt	Landscape design model
KS22	-	_	-	HAB	-	CC	-	_	-	BS		(omitted)	.	rvt	Combined BS master model for commercial center
KS22	-	_	-	HAA	-	BLK1	-	TF	-	AR		ICU	.	rvt	Sheet Model for Typical Floor ICU Submission
KS22	-	_	-	HAA	-	BLK1	-	TF	-	AR		TND	.	rvt	Sheet Model for Typical Floor Tender Drawing
KS22	-	_	-	HAS	-	SITE	-	_	-	LS	-	LASER	.	las or rcp	Laser scanned survey model
KS22	-	_	-	HAB	-	_	-	_	-	_		(omitted)	.	nwd or nwf	Combined BS Navisworks model

(b) Family Naming

As per ***CIC Production of BIM Object Guide General Requirements*** published in August 2019, Family Naming Conventions ensure that Families can be identified in BIM software by the real-world items that they create. The naming convention include short forms of category, functional type and descriptors that allow the user to search for Families by elements, by originator, and/or by size.

Guidelines

- Create unique names for each Family. For example, a fixed window Family and a fixed door Family cannot share the same name.
- Use 'title casing' (as with the tile of a book) for Family names, as they are case sensitive.
- Keep file names as short as possible. Family names must display in dialogs and in the Type Selector.
- When adding optional descriptors to Family file names, consider the order in which the descriptors are listed to ensure that Family files display in the Project Browser in the most logical and intuitive order.
- Do not use space between words in the file names. To separate words within a syntax element (e.g., Manufacturer or Descriptor), use the underscore character (_).
- If a hyphen (-) is used to include a performance range, enclose the range in parentheses, for examples, (23-250_Ton).
- If a type catalogue is to be used with a Family, name the type catalogue (.txt file) with the same name as the Family.
- Maximum 30 characters for the entire name, including hyphen marks. File names exceeding 30 characters may result in invalid file paths due to computer operating system limitations.

Format

<Category> - <Functional Type> - <Originator> - <Descriptor 1> - <Descriptor 2>

Family	DOR-SGL-HAA-Wood-w_Louver.rfa	Descriptions
Category *	**DOR**-SGL-HAA-Wood-w_Louver.rfa	A Door, DOR is the short form of the functional type "**door**"
Functional Type	DOR-**SGL**-HAA-Wood-w_Louver.rfa	A Single Door, SGL is the short form of the sub-type "**single**"
Originator	DOR-SGL-**HAA**-Wood-w_Louver.rfa	HAA is the short form of the **Housing Authority Architecture**. It can be replaced by the name of the creator in short form of three characters.
Descriptor 1 #	DOR-SGL-HAA-**Wood**-w_Louver.rfa	A door is made of **Wood** (Material). An optional descriptive text.
Descriptor 2 #	DOR-SGL-HAA-Wood-**w_Louver**.rfa	A door is built **with Louver**. This text further describes the Family
File Extension	DOR-SGL-HAA-Wood-w_Louver.**rfa**	**R**evit **F**amily File Extension

* Category field may be omitted for System Family in Revit which has not mentioned in CIC BIM Object Guide.

\# The descriptor fields shall indicate the critical characteristic of the BIM object.

Type Naming Conventions

Refer to Section 5 of the CIC BIM Object Guide General Requirements (2019), Naming Conventions under Functional Requirements.

All Families must include one predefined type. Unless they represent nominal sizes, type names shall include units or capacity, and include a unit indicator.

When naming a Family type, use the guideline below:

Guidelines

- Do not include the Family name or category in the type name.
- Type names shall mirror actual usage.
- Type names shall indicate the key differences between types (size, count, material) and, where applicable, reflect standard sizes. In some cases, you may base names on size difference, but use common terms rather than numbers.
- When types are named by size, use dimensions only. Avoid the use of characters or words. (h, w, d, or height, width, depth)
- Type names shall include units or capacity and a unit indicator, unless they represent nominal sizes.
- Metric types shall reflect the local unit standard, unless the types are intended to be generic.
- Keep type names as short as possible. Type names must display in dialogs and in the Type selector.

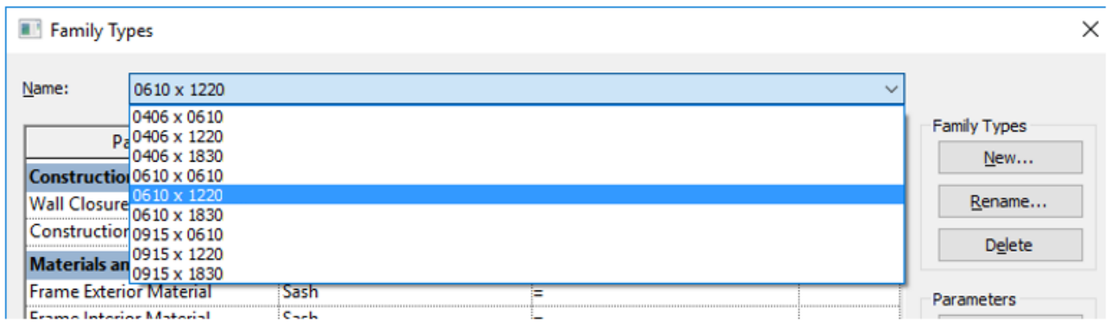
Format

Unless there is a market-specific reason to do otherwise, use the following general order in type names:

For doors and windows: <width> x <height>

For casework and furniture: <width> x <depth> x <height>

Below is an example of a Window Family with different Family Types



(c) Parameter Naming

Guidelines

- Use 'title casing' (as with the title of a book) for parameter names, excluding articles/ prepositions such as "an", "in", "of" etc., (e.g., "**E**mbedment **L**ength", "**P**ile **L**ength **i**n **S**oil")
- Use descriptive parameter names; names shall describe the parameter meaning rather than describe the parameter type.
- No space allowed at the end of parameter.
- Keep parameter names as short as possible.
- Avoid abbreviation and truncation, if possible.
- Avoid using symbols in parameter names, including: **+ - / \ * ( ) " ' < > | ^ $ { } [ ].**
- **Do not** include units in the name of a parameter (e.g., "Supply Air Flow ~~CFM~~").
- Using the term Actual or Design:
  - **Actual** – describes the actual value the system definition requires. "Actual" parameters are linked to connectors and are often used for parameters that define flow rates, for example, Actual Supply Air Flow; Actual Chilled Water Flow.
  - **Design** – describes what the product is designed to do, for example, Design Ventilation Air Flow; Design Return Air Flow.
- Name Yes/No parameters so they imply that they return a Yes/No value, for example:
  - Has Handle
  - Is Energy Efficient
  - Show Hoods

A) Parameters that apply to the entire Family Format:

<Type of measurement/ Descriptor>

Examples:

Casement Window:

- Height
- Default Sill Height
- Width Engineering Equipment:
- Actual Heater Gas Flow
- Full Load Current
- Compressor Type

B) Parameters that describe a measurement value of a sub-component Format:

<Function/Object> <Type of measurement/ Descriptor>

Examples:

- Heat Pump Coil Face Area
- Exhaust Fan Blade Speed

C) Parameters that describe the Linear Dimension of a sub-component (Connector) Format:

<Function/Object> Connection <Type of measurement/ Descriptor>

Examples:

- Hot Gas Bypass Connection Diameter
- Condenser Water Connection Diameter
- Supply Air Connection Width

(d) Material Naming

Finish material naming conventions organize the material by manufacturer and general description to more specific description. Depending on the type of material, a finish material name may include a colour, code, finish type, or identification number.

Guidelines

Finish names shall indicate the key differences between materials (manufacturer, type, colour, finish) and, where applicable, reflect standard sizes. In some cases, you may base names on size difference, but use common terms rather than numbers.

Metric finish names shall reflect the local unit standard, unless the materials are intended to be generic.

Keep finish names as short as possible.

RECOMMENDATION: To optimize the file size for families with a large number of available materials, provide only the most common materials in the family, and provide the remaining materials in a separate finish library. See the Finishes part type guide for more information.

Individual Finish Materials (Stored Inside Projects) Format:

<Finish Type> - <Manufacturer> - <Code> - <Descriptor>

Examples:

- Paint – AEC Paint – AC440 – Vintage Brown Matte
- Glass – AEC Glazing – Series 1205 – Clear
- Aluminium – AEC Metal – AC120 – Anodized (Clear)
- Fabric – AEC Fabrics –AC F820 – Hounds tooth – Black/White

Strucutral Concrete Materials (Stored Inside Projects) Format:

<Concrete Grade> - < Descriptor>

Examples:

- 45/20_Mass Fill

Concrete grade should be stated in the built-in parameter "Structural material". If only the concrete grade (e.g. 45D/20) is stated without the specific concrete type (e.g. Mass Fill), the material stated shall mean reinforced concrete. Otherwise, in addition to the concrete grade, the specific concrete type shall also be stated (e.g. 30D/20_Mass Fill)

Individual Finish Materials Using an External Image File

Materials requiring external images, bump maps and cutout shall be stored in a location that can be shared by multiple Revit Product installs.

For Windows 10:

C:\Documents and Settings\All Users\Application Data\Revit Manufacturer Library\Materials\<MFG>

Guidelines

Create unique names for each unique material image.

Capitalize the leading letters in each portion of the family name.

Do not use spaces between words in file names. Use the underscore character (_).

Acceptable file formats for material images include: **bmp, jpg, jpeg and png.**

Provide a readme to describe where the image files must be located and how to map Revit to the **"Revit Manufacturer Library"** folder in the Rendering Options dialog.

Individual Finish Materials Images

Format:

Material Image:

<Finish Type>-<Manufacturer>-<Code>-<Descriptor> + file extension

Bump maps:

<Finish Type>-<Manufacturer>-<Code>-<Descriptor>-bump + file extension

Cutouts:

<Finish Type>-<Manufacturer>-<Code>-<Descriptor>-cutout + file extension

Examples:

- Satin–AEC_Windows–Natural_Wood_Finish.jpg
- Satin–AEC_Windows–Natural_Wood_Finish**–bump**.jpg
- Aluminum–AEC_Fencing–AC120–Anodized**–cutout**.jpg

(e) View Naming

Conventions in the naming and use of views are necessary to coordinate team activity and prevent inadvertent changes in the output documents.

This standard is limited to drafting views and sheet views although the Project Browser includes other kinds of elements; Working views do not necessarily follow this.

View naming shall be consistent across all references to that view. Renaming of views shall be carried out with care as any changes will be automatically reflected across all documentation.

1	2	3
View Purpose	Scale	Content

Field 1: View Purpose

Purpose of the view (S-Statutory Submission, P-Presentation, T-Tender, C-Construction)

Field 2: Scale

Scale of the view (50 / 100 / 500)

Field 3: Content

Location + Concise description of the content

Examples:

Views (Default)	Name	Description
Floor Plan	S_100_L01	Level 1 floor plan in 1:100 for GBP submission purpose
Reflect Ceiling Plan	T_100_L01	Reflected Ceiling Plan in 1:100 for tender purpose
Detail Plan	C_50_3/F Detail Plan at Elevator 1	Detail plan of Elevator 1 at Level 3 in 1:50 for construction
Elevation	P_100_South	South elevation in 1:100 for presentation purpose
Section	T_100_A	Section A in 1:100 for tender purpose

- The Revit functionality that allows for the Title on Sheet to be different to the view name shall be used.
- The Title on Sheet is subject to the designer, hence a descriptive name of Title on Sheet is preferable.
- Level names are spelled out as they need to appear in a room schedule (as well as how they will appear in sections and elevations.) Do not pad the level number with leading zeros.
- Views shall not be named to make them sort or group more logically in the Project Browser as the grouping and filtering setting will take care of that automatically (i.e., the prefixing of level names by sequential numbers).
- View names shall be written in uppercase.
- Creation of temporary working views is encouraged, but please be sure that WORKING VIEW is added as the prefix of the view name to distinguish from other views.

Special Views

Plan views differ in Revit from other views because they can be duplicated (without reproducing their reference mark as is necessary with elevations and sections.) This results in many special-purpose plans that are temporary or perhaps never placed on title-sheets.

The following are exceptions to the view naming conventions described above.

View Type	Naming Convention	Examples
Colour Plans	**COLOUR - <modifier>**	**COLOUR – L1** **COLOUR – LEVEL 1 PRIMARY**
Views created in order to communicate an information relating to elements which meet specific criteria.		
Export Views	**EXPORT - <modifier>**	**EXPORT – L1** **EXPORT – LEVEL 1 ELECTRICAL BACKGROUND**
Special configurations may be required for supplying graphical information which is specific for a particular discussion. These views shall show information relating to the origin and date/time of the extract as described.		
Import Views	**IMPORT - <modifier>**	**IMPORT – L1** **IMPORT – LEVEL 1 ELECTRICAL**
A dedicated view shall be used for attaching linked and imported material that needs to be segregated from other views. (This requirement helps to avoid technical problems and make it easier to control visibility.)		

(f) Sheet Number

Sheet number shall be based on the file naming.

Sheet naming shall be based on the Document and Drawing Numbering Protocols established for the project. These names automatically match the text as it appears in the titleblock and any schedules.

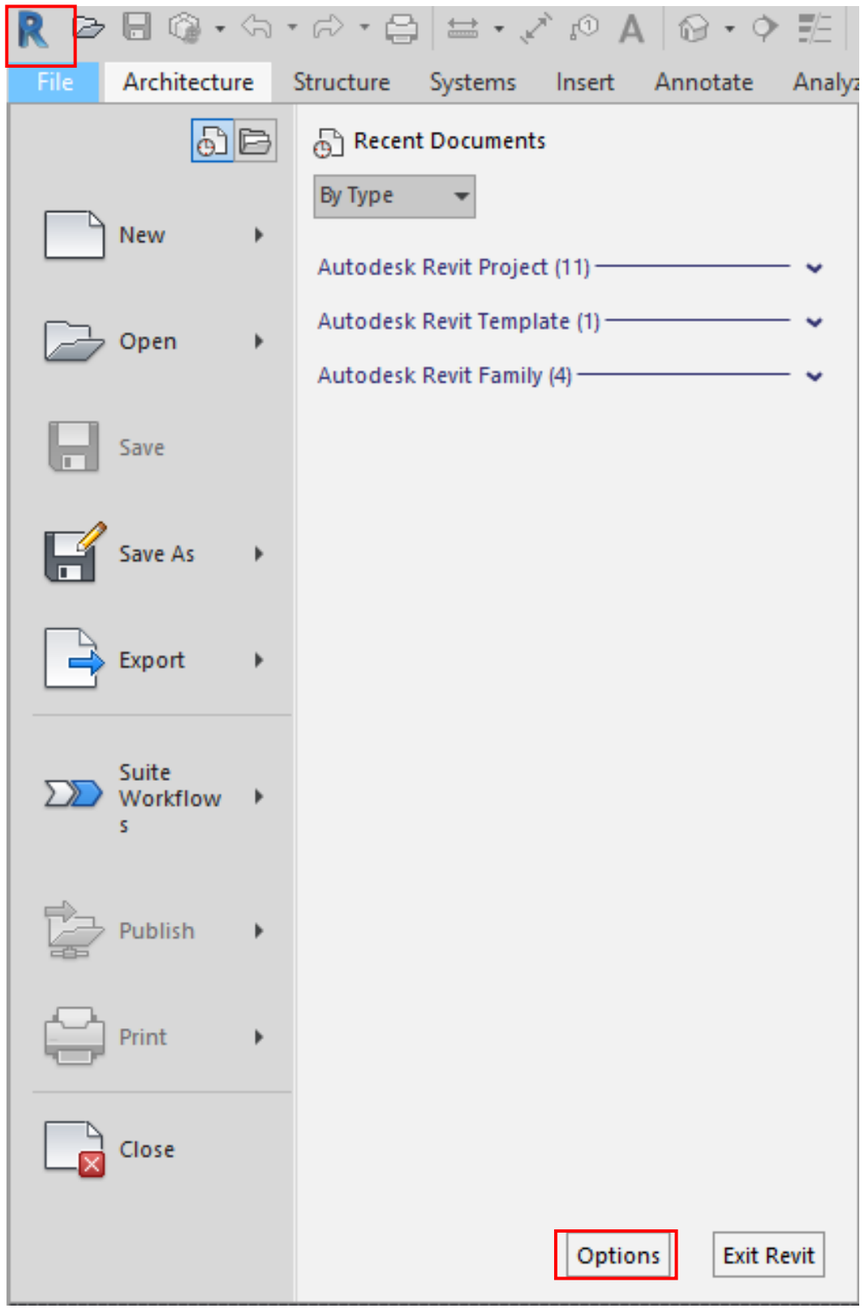
For HA in-house project:

PROJECT NUMBER	/	PHASE NUMBER	/	BUILDING TYPE	/	DISCIPLINE	/	CODE	/	REVISION
1 2 3 4	/	1 2	/	1 2 3 4	/	1	/	1 2 3 4 5 6	/	1
Example										
FL07	/	03	/	BLK1	/	A	/	ICU-03	/	B
Description										
Fanling Area 47B		Phase 3		Block 1		Architectural		Floor plan for L03 for ICU Submission		Rev. B

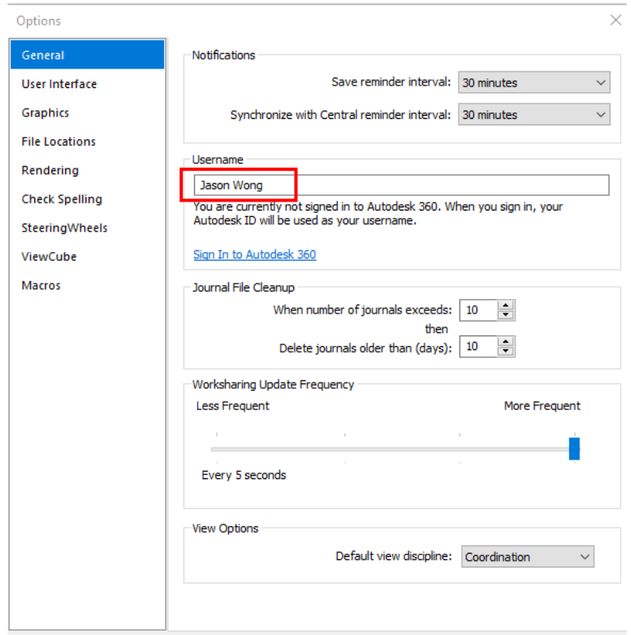
D.MET-3.3 System Settings

Important System settings are to be observed.

These setting can be found in “Options” tab.

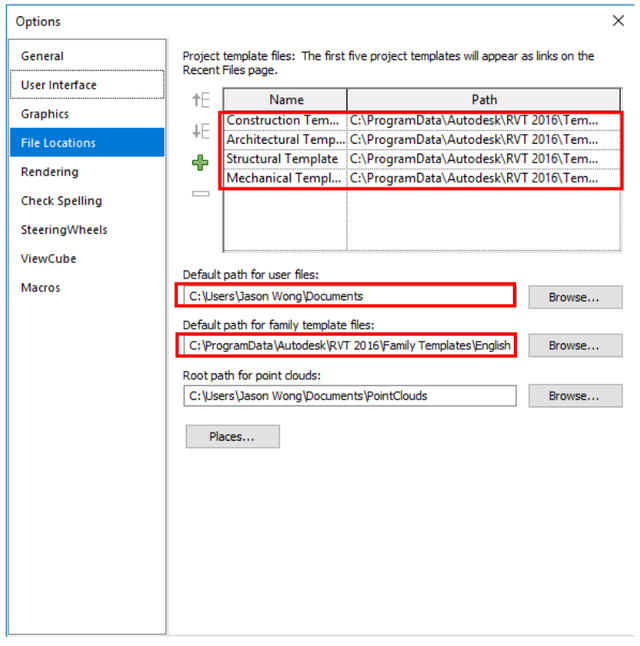


1. Username – this allows identification of ownership in a Worksharing file.



2. Project template files locations. (HA users shall map the project template path as HA Family Library. (Refer to Section 2.4 Starting a BIM Project in HABIMSG-Vol.1 Quick Guide))

3. Default path for user files and family template files.



D.MET-3.4 View List / Drawing List Scheduling

Three pre-defined schedules are included in the templates to manage the views, namely the Publication View List, the WIP View List and the Drawing List which contain columns for the following data:

Publication View List				
View Name	**Title on Sheet**	**Scale Value 1:**	**Sheet Number**	**Sheet Name**

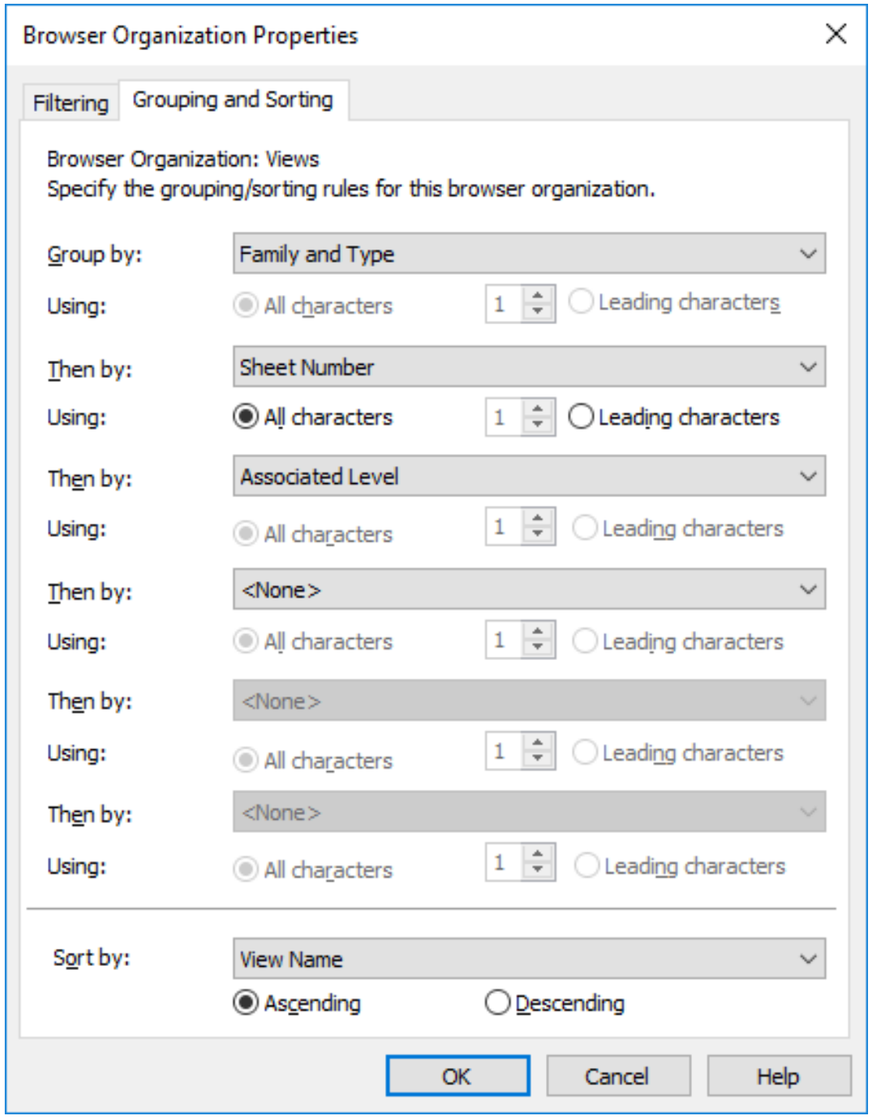
WIP View List		
View Name	**Scale Value 1:**	**Detail Level**

Drawing List					
Drawing number	**Drawing title**	**Revision**	**Issue date**		

D.MET-3.5 Project Browser Organization

The Project Browser in Revit provides an organisational structure to the views and components within the project. The following rules are defined within the templates to automatically sort WIP views from Publication views.

- View folders shall be grouped by Family and Type and sorted by Associated Level in ascending order.
- The Views shall be filtered by Sheet Name which shall be Equal to a value of none. View section will now show only views not allocated to a drawing sheet.
- Sheet folders shall be grouped by Sheet Number using 1 Leading Character and sorted by Sheet Number in ascending order.
- No filters shall be applied to Sheets.



Model Hierarchy & Data Structures

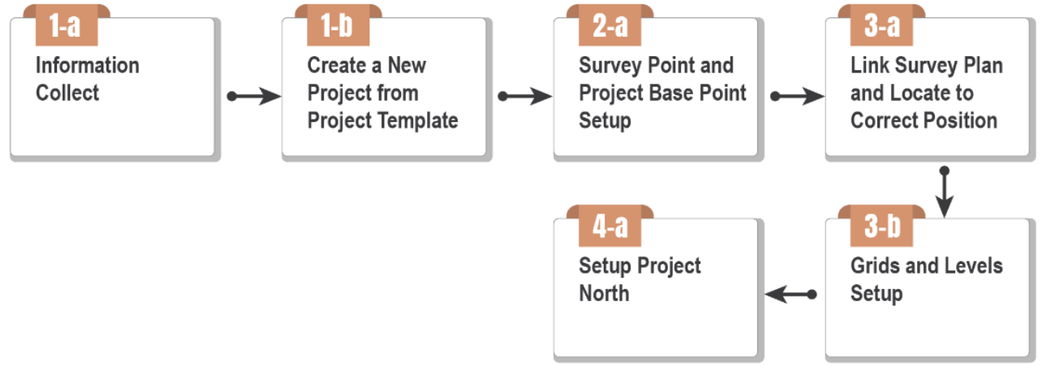
For a BIM project, it is NOT recommended to create a single large model and embed all the details in a single file. The project shall be divided into logical groups (e.g. by discipline, by trade) and the models shall be linked in logical hierarchy for easy handling.

This section deals with the principles of subdividing a model for the purposes of:

- Multi-user access.
- Operational efficiency on large projects.
- Inter-disciplinary collaboration.

D3.4 Project Setup

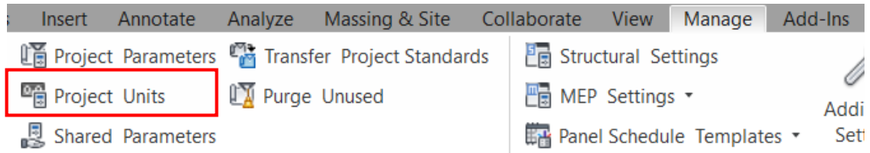
Project Setup Workflow:

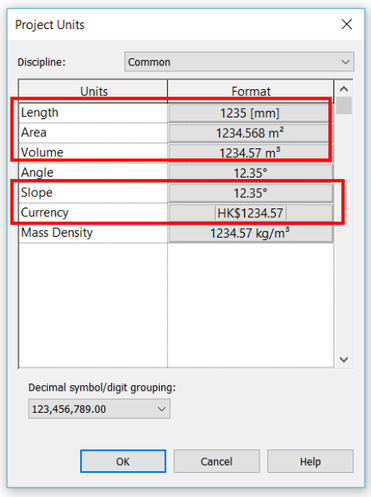


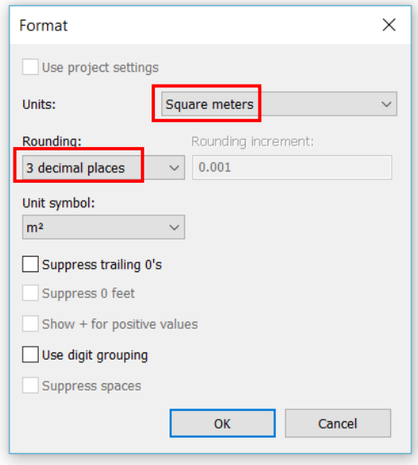
D.MET-4.1 Project Unit

Set Unit to Metric, with appropriate decimal places.

Note: three decimal places for areas.







D.MET-4.2 Project Coordinates

2.1a(1) 2.1b(1) 2.2a

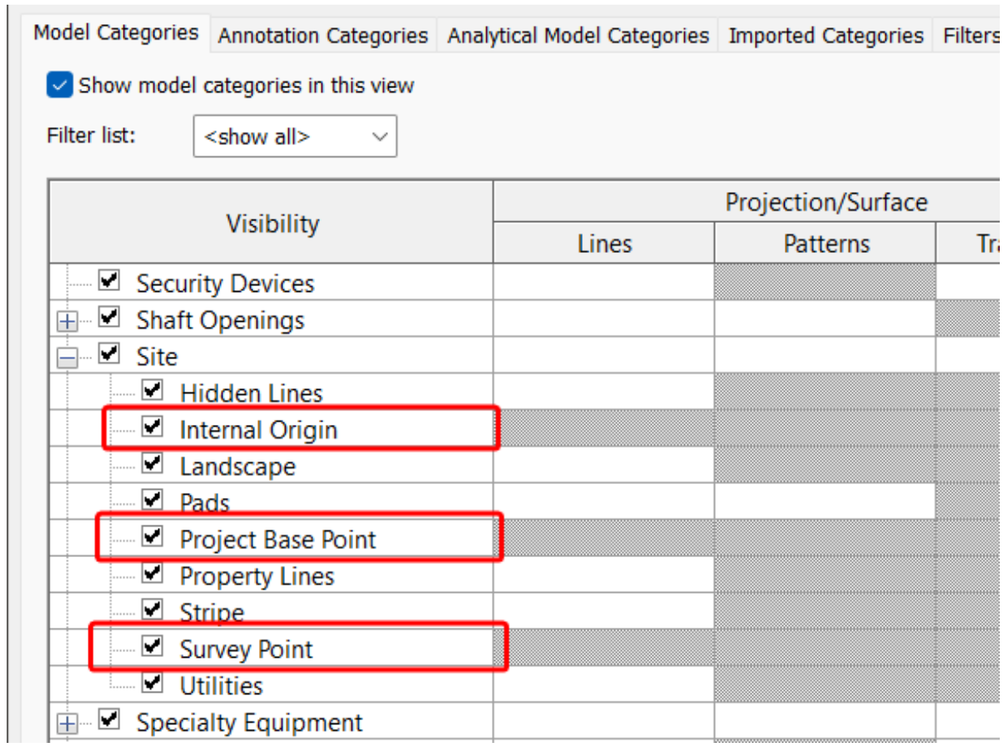
Discipline	All Disciplines
Family	System Family
Category	Internal Origin / Survey Point / Project Base Point
Workset	N/A
Naming Convention	N/A

Model Authoring

(Note: This section is written based on Revit 2020 or later version.)

Every project shall have an **internal origin,** a **project base point** and a **survey point**, although they might not be visible in all views because of visibility settings. They cannot be deleted.

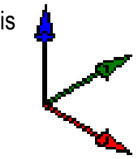
They can be turned on in a view under Visibility/Graphic Overrides > Model Categories > Site:



All model files in a project from all disciplines shall share the same project coordinates setup, so that the federation of models for coordination and other BIM Uses can be performed in the most efficient and accurate manner.

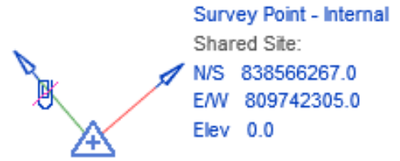
- **Internal Origin** is the starting point for the internal coordinate system, which provides the basis for positioning all elements in the model.

  Note that the location of the Internal Origin never moves.



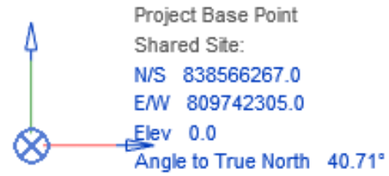
- **Survey Point** is absolute – It refers to the true co-ordinates of a project surveyed by a Land surveyor; the values shall match exactly as the surveyor information.

  The elevation (z) of the Survey Point shall be set at 0.0mPD.



  The survey point can be (clipped) or (unclipped). Moving an unclipped survey point moves only the survey point relative to the shared coordinate and the project coordinate systems, and vice versa. Under normal circumstances, the project coordinate system shall not be altered by moving the survey point, i.e. survey point shall be unclipped before attempt to reposition the survey point only.

- **Project Base Point** is relative – It refers to a point common to all stakeholders which is typically set at a point in the boundary line, or the intersection of two gridlines. As separate model files are done by different disciplines, the common Project Base Point is of paramount importance.



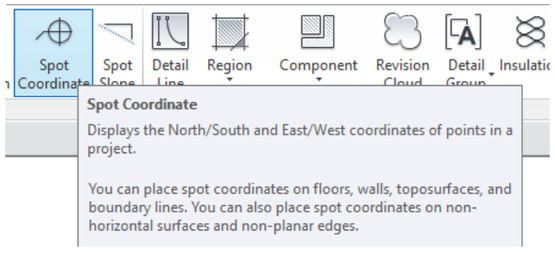
For ease of management, the Project Base Point shall be fully aligned (x,y,z) with the Internal Origin to ensure the Internal Origin are also at the same point among different disciplines' models.

1980 Grid System & Coordinate

- The origin or base point and orientation of the project shall be based on the project location and its reference to the Hong Kong 1980 Grid.

- Hong Kong 1980 Grid System uses the Hong Kong 1980 geographic 2D Coordinate Reference System (CRS) as its base CRS and the Hong Kong 1980 Grid (Transverse Mercator) as its projection. Hong Kong 1980 Grid System is a CRS for Large scale topographic mapping, cadastral and engineering survey. It was defined by information from Survey and Mapping Office, Lands Department.

- Spot coordinates report the North/South and East/West coordinates of points in a project. In drawings, you can add spot coordinates on floors, walls, toposurfaces, and boundary lines.



- The correct coordinate shall be same as following:

N 814264939
E 843010563
EL 38460

*N=Northing Coordinate, E=Easting Coordinate and EL= Elevation

D.MET-4.3 True North & Project North

Discipline	All Disciplines
Family	N/A
Category	N/A
Workset	N/A
Naming Convention	N/A

Information Requirement

- **Project North**: The building will be oriented the way an Architect wants to display on a sheet for the ease of dimensions and documentations.

- **True North**: Actual North in the real world. With North pointing up vertically in this view, the building will be oriented relative to the North in the real world.

Model Authoring

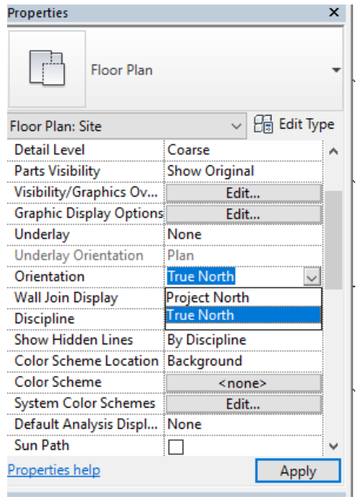
The project coordinates setup according to D.MET-4.2 above should be based on **True North**, i.e., how the project is positioned and oriented in the real world.

Project North is typically based on the predominant axis of the building geometry. It affects how you sketch in views and how views are placed on sheets. Project North shall be aligned with the top of the drawing area, which simplifies the modelling and drawing production process.

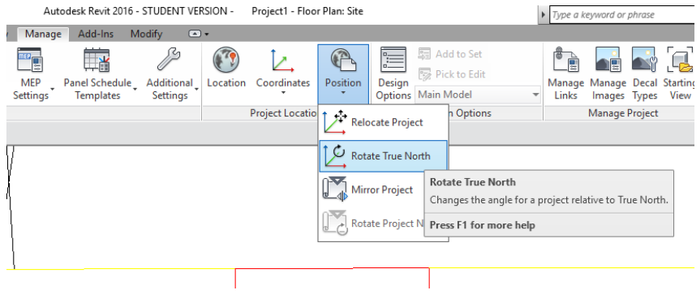
All models start with Project North and True North aligned with the top of the drawing area. We can perform **Rotate True North** to adjust the angle between True North and Project North.

Besides to represent accurate site conditions and coordinates, rotating True North also ensures that natural light falls on the correct sides of the building model and that the sun's path through the sky is accurately simulated.

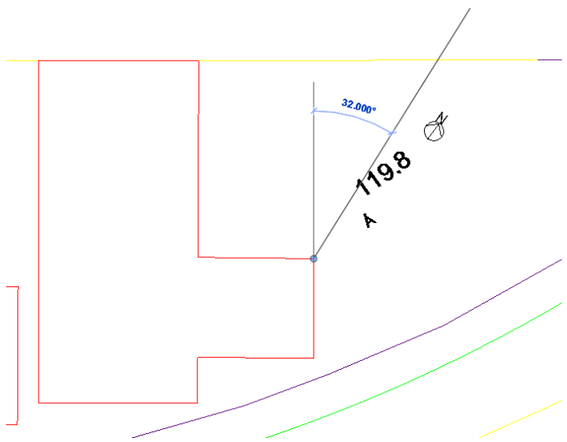
1. Access view properties and change the view orientation to “True North”. This change allows you to see accurate shadows in the plan view.



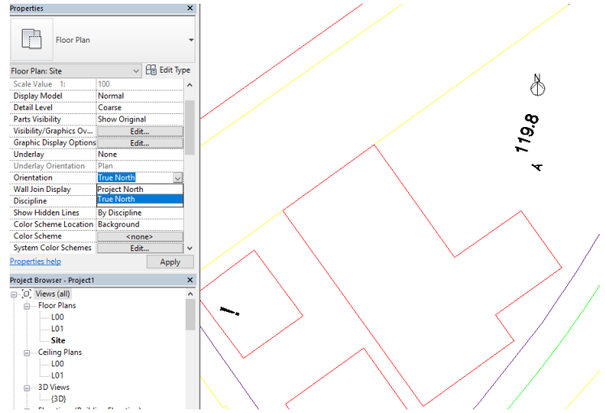
2. Click “Rotate True North” to rotate the orientation of project.



3. Rotating a building model in a plan view that is oriented to True North



4. Plan view with the building model rotated to True North

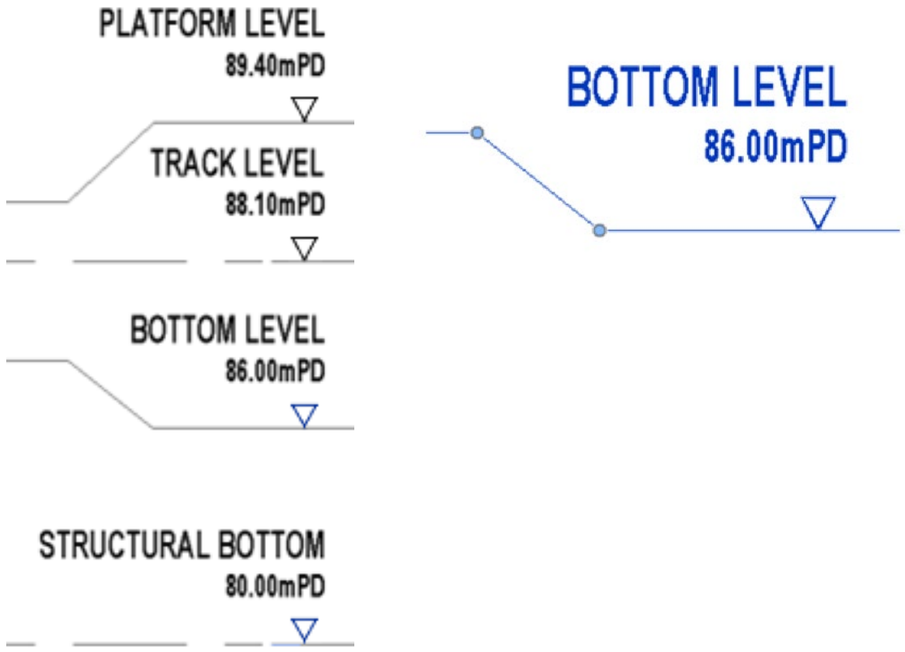


D.MET-4.4 Grids and Levels

Workflow

General requirements:

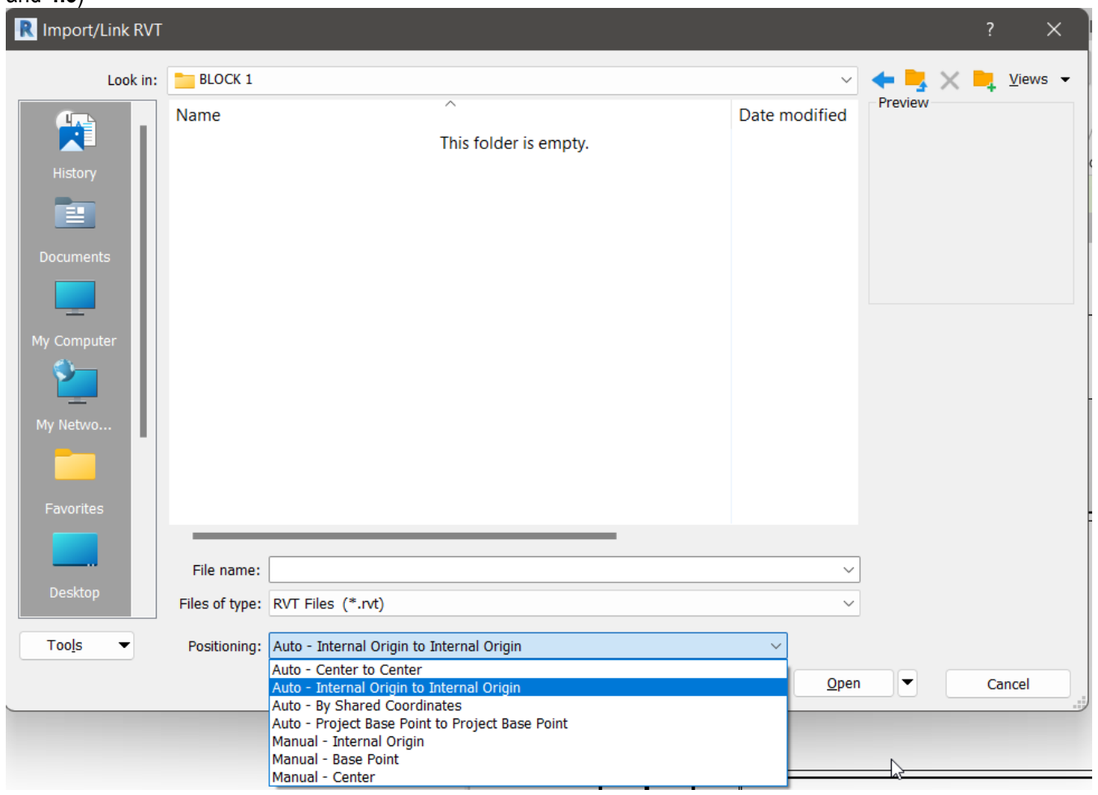
- Make sure the 3D extent of Grids and Levels match the extent of the model.
- If tower and podium are built in separate model files, the grids and levels served for these parts of buildings are to be built in separate model files.
- Grid and Levels are included in the Shared Levels and Grids Workset and do not require explicit Workset definitions due to the standard behaviour of Revit.
- Levels shall be set up in mPD levels.
- There shall only be one set of level across all disciplines in a project, which shall be based on the **Structural Levels** of the project. Elements with architectural finishes shall be hosted to the Structural Levels and assign offset so that their top surface is at the architectural finishes levels.



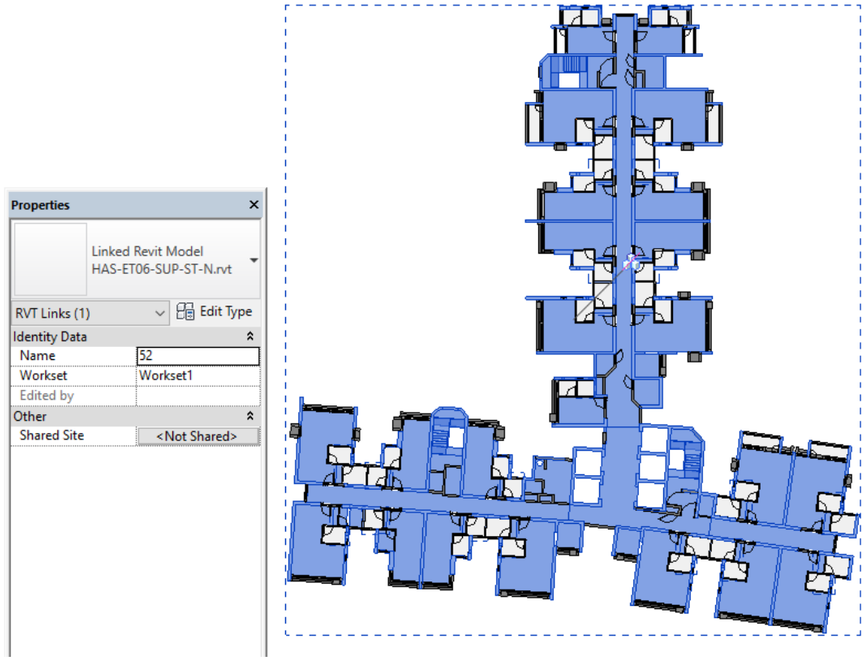
D.MET-4.5 Link Revit File

General Requirements

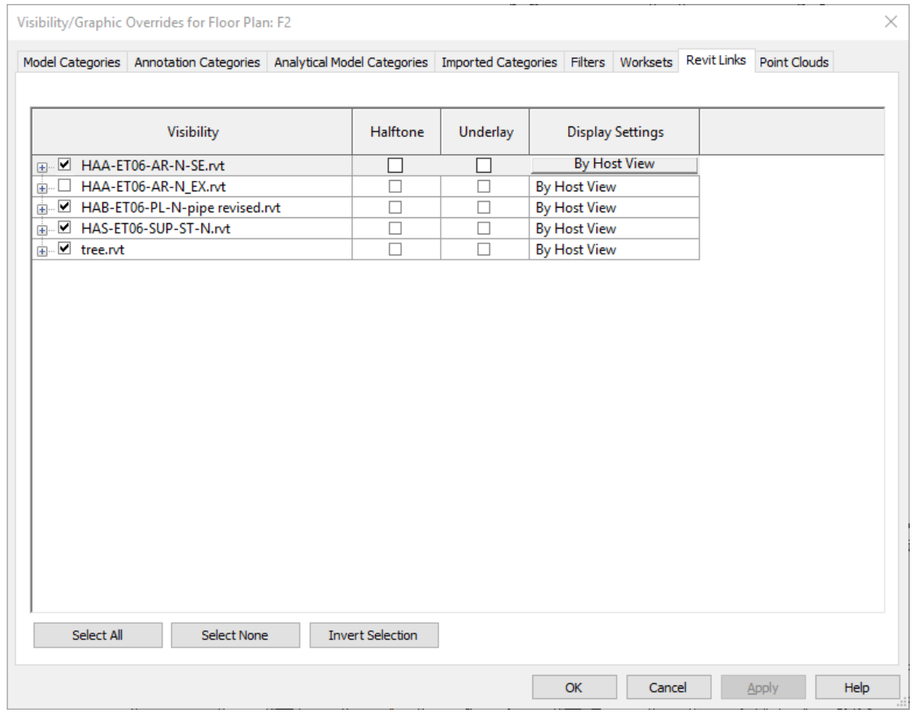
- Internal Origin to Internal Origin or Project Base Point to Project Base Point shall be selected for the positioning of a Revit Link File.
  (Please make sure to follow the same methodology in setting up the project coordinates. Refer to **D.MET-4.2** and **4.3**)



- The most straightforward method to insert a Revit link is to use the Link Revit tool on the Insert tab.
- This will take a different approach instead of using existing geometry in the project and converting it to two Revit links. Linking also provides support for the Interference Check, Copy/Monitor, and Coordination Review tools.



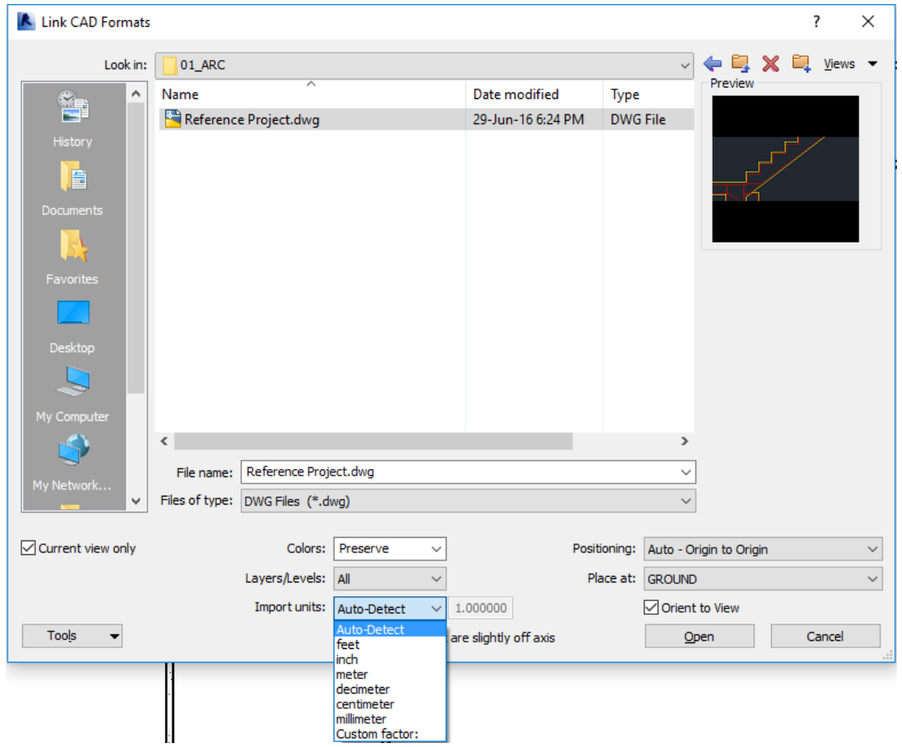
- The data can also be controlled and shown in any manner appropriate to the use.
- In the Visibility/ Graphic Overrides dialog, users can turn Revit link files on or off, half-tone and underlay the data, or enhance it with colour or line pattern overrides.



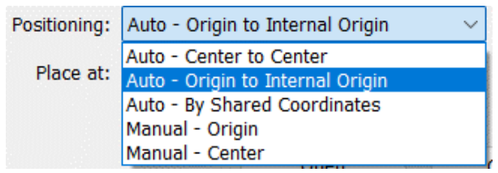
D.MET-4.6 Link CAD File of Survey Map

General Requirements

It is strongly recommended to set the appropriate Import Units when positioning of the CAD file, when the unit of the CAD file is known. “Auto-Detect” may fail to detect whether the CAD file is, for example, in millimeter or meter, which will lead to incorrect scale of the CAD file inserted into Revit.



- Set the appropriate positioning when linking the CAD file.



- For further details and methodologies, refer to Section 4.7.2 of the *BIM Standards and Modelling Guidelines for Statutory and Building Control Submission of General Building Plan, Foundation Plan and Superstructure Plan, published by the Independent Checking Unit (ICU).*

D3.5 From Modular Flat Design Model to Project

2.1b(2)

2.1b(4)

2.1c

HA's Architectural Block Models are organized in a hierarchical structure:

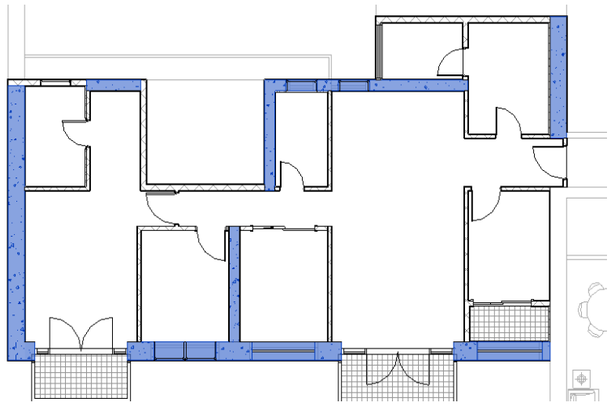
The first federation level is composed of Typical Floor and Non-Typical Floor Model which includes all the elements in Basement (if any), Ground Floor, First Floor and Roof Floor.

Within Typical Floors, the second federation level contains the MFD and Common Area.

Within Modular Flat Design models, Precast Building Elements oftentimes exist.

Typical workflow for creating an Architectural Block Model

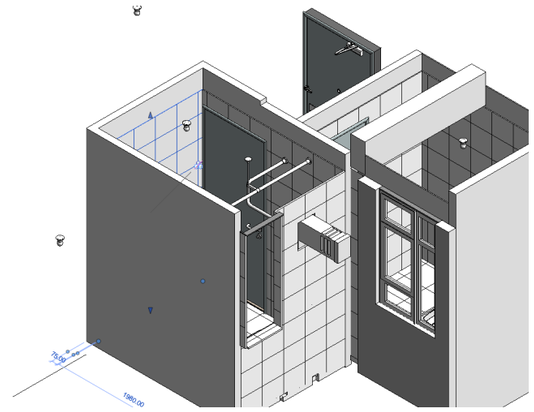
1. Create a project file.
2. Create a "Placeholder" workset for the purpose of collaborating the architectural and structural elements at later stage.
3. Put all intended structural walls into "Placeholder" workset to allow different parties to have control on switching the structural walls on and off easily.
4. Build up the common corridors, building core and common walls between modular flats in the typical floor and domestic non-typical floor project files.



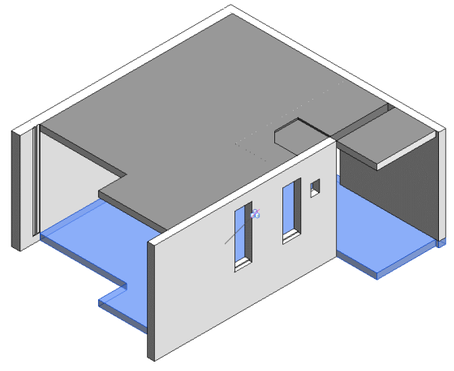
5. Link the abridged version of MFD models into the domestic floors models. (Refer to **D.MET-5.1** in this Section if MFD models shall be created)
6. When design reaches certain maturity that substantial design changes are not anticipated, bind the MFD models to the domestic floor models.

7. Assign different categories of information into respective Worksets such as "Finishes" and "Precast Units":

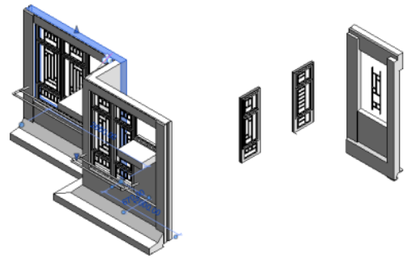
All finishes (floor and wall tiles in kitchen and bathroom) shall be assigned to the "Architecture Workset"



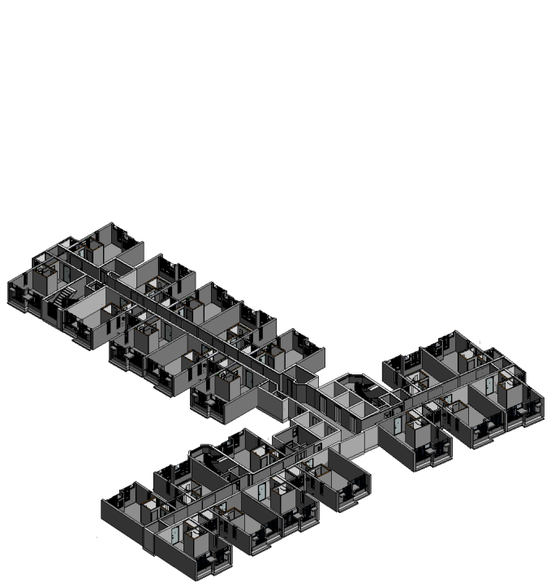
All Structural elements shall be assigned to "Placeholder Workset"



All precast façade panels shall be assigned to "Facade Workset"



8. 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 or “Array” command.



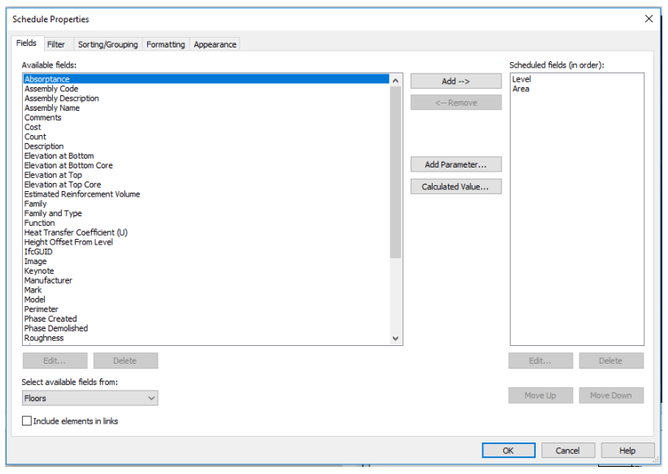


9. Link the Non-Typical Floor models into the Domestic Block Master Model File to complete a single Tower.
(Refer to D.MET-2.2 Architectural Block Model)

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

<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



D.MET-5.1 Modelling of MFD

Should model authors find that no MFD templates are available due to difference in design, they should create their own MFD models, adhering to the following criteria:

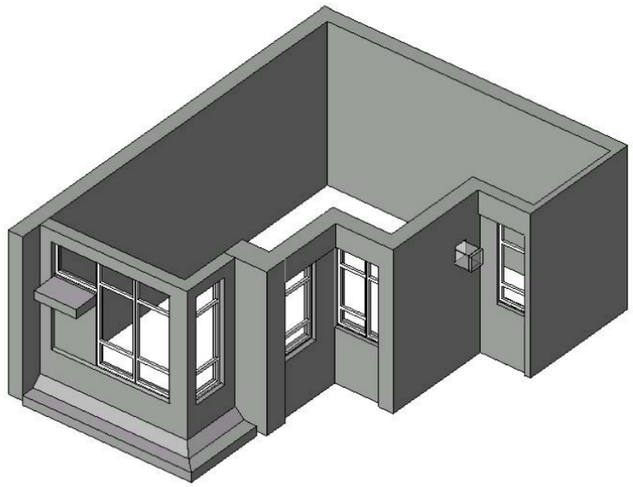
1. It is recommended to start the new MFD models by modifying existing abridged version of MFD templates, instead of initiating from a new project file.
2. Do NOT over-model and keep the file sizes to minimum. Only essential elements which shall serve certain purposes. (e.g. drawing production and facilitate QTO) should be modelled:
   a. No finishes (except wall tiles in kitchen and bathroom) should be drawn
   b. No reinforcement and waterproofing details should be drawn
   c. No soffit should be drawn
3. Elements under HA BIM QTO scope (refer to **ANN-1.4** of HABIMSG Annex) should be modelled.
   a. Doors, windows, sanitary fitments and signages should contain the information required as stated in the corresponding SAM sections under D4.3 of this Guide, i.e. the families should be QTO-enabled.
   b. Unitised domestic elements, such as cloth drying rack and curtain rails, grab rails, laundry racks, cooking bench units, shall be included in the MFD models.
4. In case if handed version of MFD need to be created, the associated handed families (e.g. Door, Window, etc.) shall NOT be created by the “flip” or “mirror” function. Variation of the handed version family should be created as a different family and type instead. For example, if window family type MW-X1 is included in the MFD, use type MW-X1R for the handed version MFD.

Level of Details (LD) of a MFD model

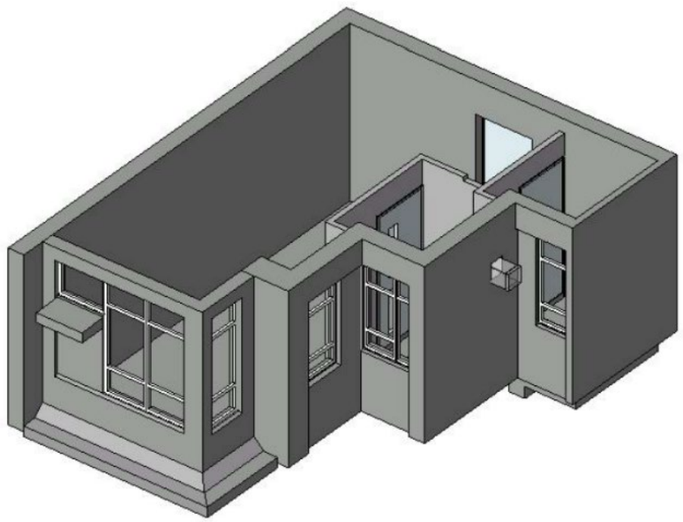
(Note: Level of Development (LOD) concept applies to individual BIM object instead of describing the model as a whole. While MFD shall be modelled as a project file with a collection of categorised model elements, for avoidance of doubts, the term “Level of Details (LD)” is used specifically for MFD model only in HABIMSG context, illustrating its various stages of maturity.)

The LD of a MFD model can be broadly differentiated into **four** levels:

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



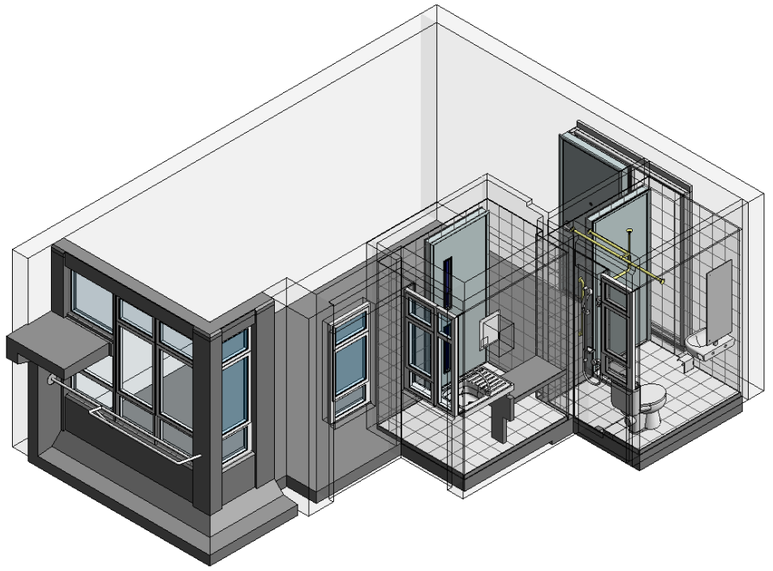
LD 2 - Model with Internal partitions but no details (sufficient for generating sections)



LD 1 and LD 2 MFD model may be used during preliminary design stages, where overall layout and arrangement of domestic floors are of primary concern.

LD 3 - HA MFD templates are typically modelled at this level. The following items shall be modelled on top of LD 2:

- Sanitary fitment
- Signage at flat entrance
- Unitised domestic elements, such as cloth drying rack and curtain rails, grab rails, laundry racks, cooking bench units
- Wall and floor tiles in kitchen and bathroom

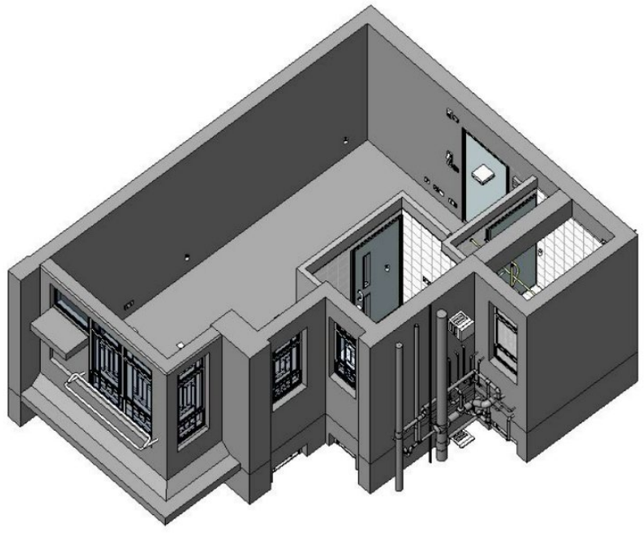


LD 3 MFD model is considered to be optimum for sufficiently serving several purposes, yet not oversized and can be used for linking into the Architectural Block models for:

a. Generation of ICU GBP submission and tender drawings
b. Satisfying current HA BIM QTO scope

LD 4 - Model with all internal details (for generating working drawings). Models at LD3 Level to facilitate:

a. Generation of working drawings (for standalone MFD only)
b. Detailed BIM-based cost estimating.



Note that LD 4 model should only be used as standalone model only, and should not be used for linking into the Architectural Block models since it contains too much details and would cause the block models unworkable.

D4 STANDARD APPROACH OF MODELLING (SAM)

This section aims to establish a HA-specific standard approach of modelling (SAM) for assembling Building Information Modelling (BIM) models with the incorporation of ARC, SE and E&M design concept. The resulting BIM model compliant with SAM can facilitate cross-disciplinary coordination and collaboration at design and drawings production stages (including plans, sections and elevations). It also serves as a guide for creating a BIM model, which are ready for exporting to other structural analytical / design / visualisation software as required by project-specific BIM uses.

Some modelling techniques to facilitate quantities extraction from the BIM model have also been incorporated. However, the listed parameters (Information for QTO) are prepared for BIM QTO only and stated herein for professionals information only. Project Quantity Surveyor shall further verify the accuracies to suit individual project needs. Details please refer to **D4.17** Information Extraction SAM.

To ensure consistent collaboration, each discipline shall acquire the family library of other disciplines when authoring models. For example, architectural discipline shall acquire BS families such as pipes and pipe fittings for drainage design.

D4.1 Site Planning SAM

DP-01 Property Line

Discipline	Architectural
Family	N/A
Category	Property Lines
Workset	Site
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	N/A, Type naming of Property Line is not editable.

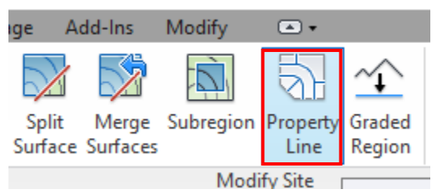
Information Requirement

List of Built-in Parameters

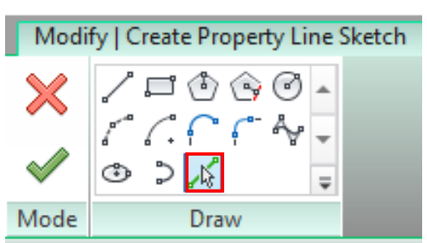
Parameter name	Information	Remark	Example
Name	Boundary Name	Usually input project name	PUBLIC HOUSING DEVELOPMENT AT SAN KWAI STREET
Area	Area of site boundary	Area of site boundary	955.71m^2

Model Authoring

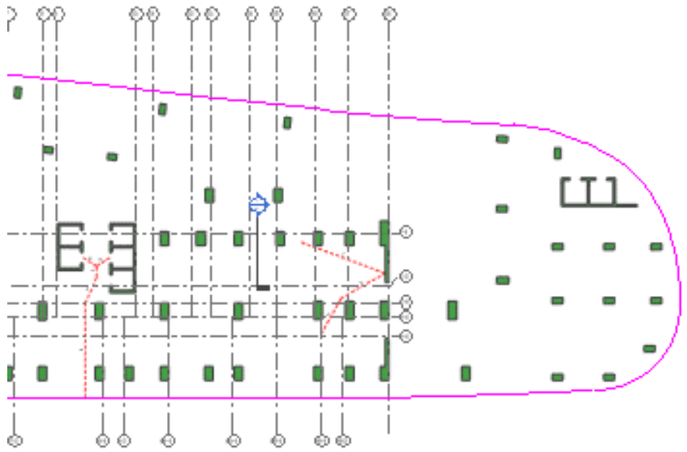
1. Click Massing & Site > Property Line and select Create by sketching.



2. Click (Pick Lines) or other sketch tools to sketch lines.



3. Sketch the property lines.



- Lines shall form a closed loop. If you sketch an open loop, and click Finish Property Line, Revit issues a warning that it will not calculate the area. You can either ignore the warning so as to continue, or close the loop.

DP-02 Toposurface of Existing Condition

Discipline	Architectural
Family	System Family
Category	Topography
Workset	Site
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	N/A, type naming of Toposurface is not editable.

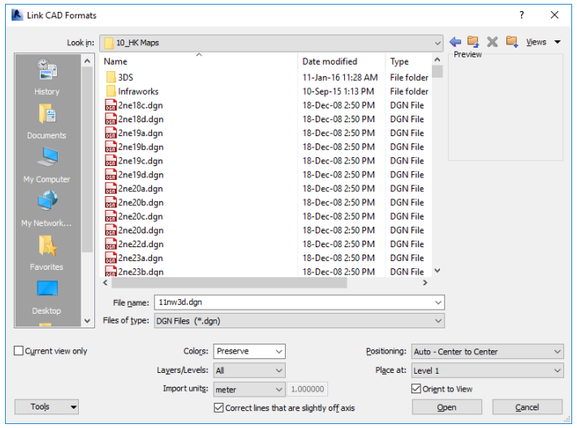
Information Requirement

List of Built-in Parameters

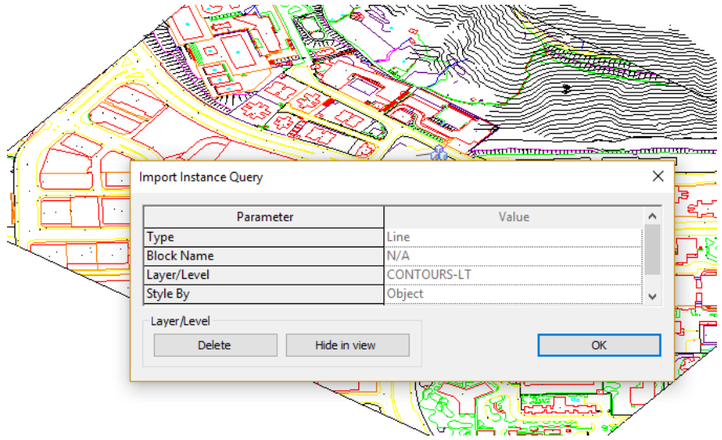
Parameter name	Information	Remark	Example
Material	Toposurface Material	Specify the material of toposurface	Grass, Rock…
Surface Area	Surface area of toposurface	Surface area of toposurface	955.71m^2
Phase Created	Phase Created	Phase Created	Phase 1, Existing…
Phase Demolished	Phase Demolished	Phase Demolished	Phase 2, New Construction…

Model Authoring

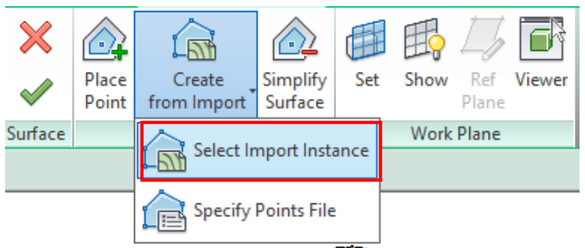
1. Setup the project base point and relocate to correct location.
(Refer to D.MET-4.2, D.MET-4.3, D.MET-4.6)



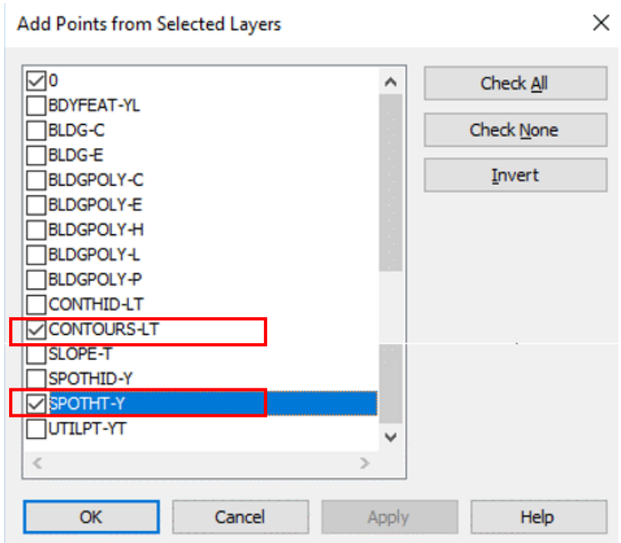
1. After relocating the map to correct position as per HK1980 Grid, contour lines and spot elevations shall be used to set up the toposurface.



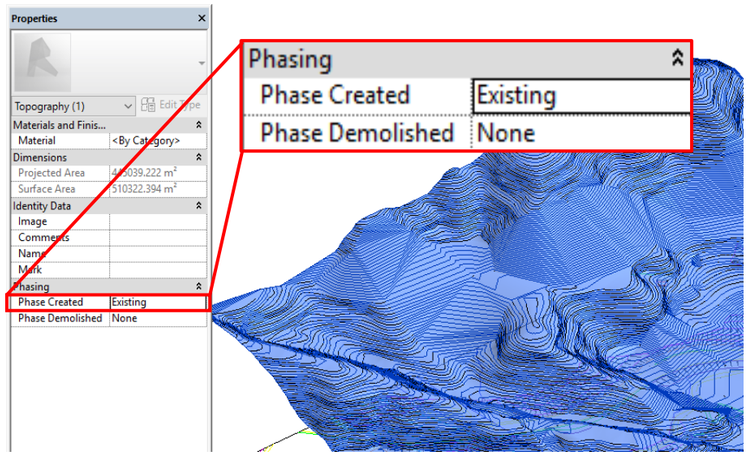
2. It is recommended to use Select Import Instance to create the topography.



3. It is recommended to select Layer 0, CONTOURS-LT and SPOTHT-Y.



4. Toposurface shall be created under existing phase.



DP-03 Building Pad

Discipline	Architectural
Family	System Family
Category	Pads
Workset	Site
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	PAD-(Functional Type)-HAA-Material-Thickness

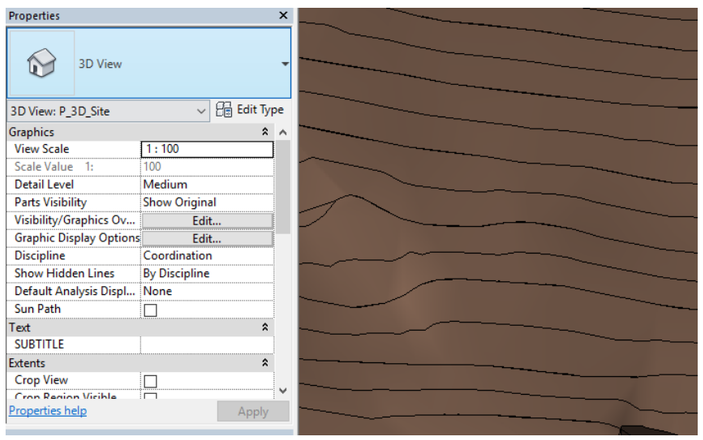
Information Requirement

List of Built-in Parameters

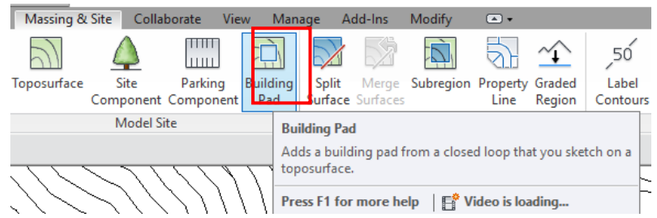
Parameter name	Information	Remark	Example
Level	Level	The level to which the building pad is constrained.	0.0, G/F…
Height Offset From Level	Height Offset From Level	Specify offset distance from base level	5000.0
Area	Area	Area of building pad	17.55m^2
Volume	Volume	Volume of building pad	5.55m^3

Model Authoring

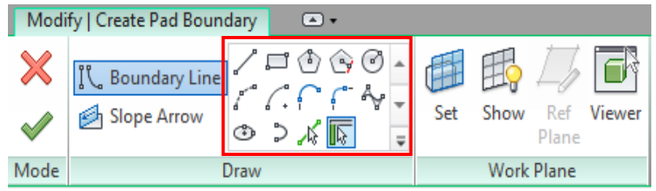
1. Open a site plan view.



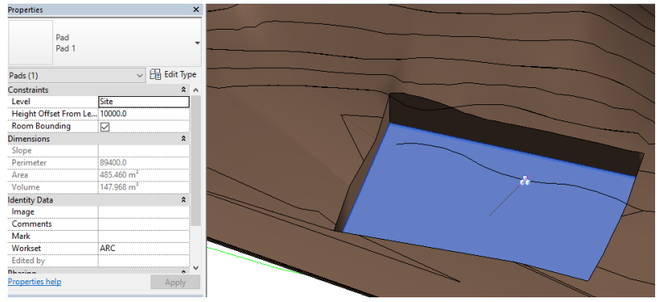
2. Click “Building Pad” under “massing Space & Site”



3. Use the drawing tools to sketch the building pad as a closed loop.



4. On the Properties palette, set the Height Offset From Level and other building pad properties as needed.



DP-04 Cut and Fill

Discipline	Architectural
Family	N/A
Category	N/A
Workset	Site
Family Naming Convention	N/A
Type Naming Convention	N/A

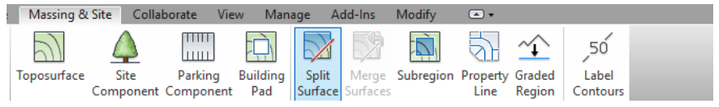
Information Requirement

List of Built-in Parameters

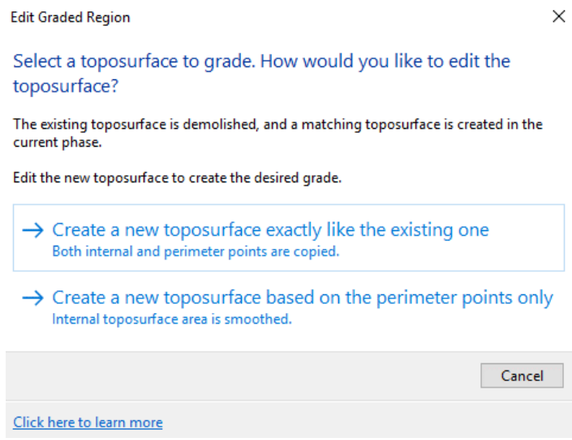
Parameter name	Information	Remark	Example
Name	Name of Toposurface	Name the toposurface according to phase created, or use materials name	Phase 1, Phase 2…
Material	Toposurface Material	Specify the material of toposurface	Grass, Rock…
Cut	Cut	the volume removed (where the later surface is lower than the earlier surface).	-16.330m^3
Fill	Fill	the volume added (where the later surface is higher than the earlier surface).	-16.330m^3
Net Cut and Fill	Net Cut and Fill	Net Cut/Fill value comes from subtracting the cut value from the fill value.	-16.330m^3
Phase Created	Phase Created	Phase of Toposurface created	Phase 1, Existing…
Phase Demolished	Phase Demolished	Phase of Toposurface demolished	Phase 2, New Construction…

Model Authoring

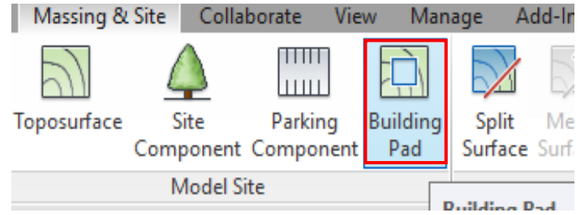
1. Click “Split Surface” under massing & site tab.



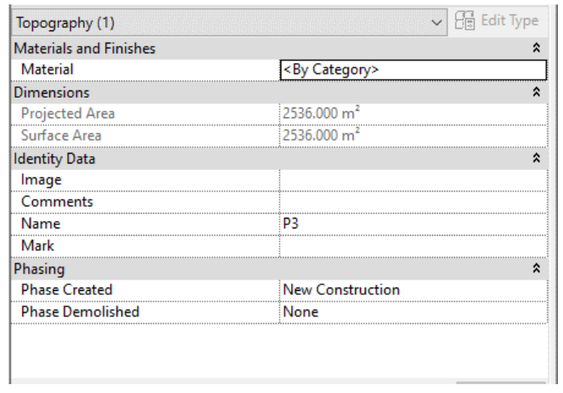
2. Click “Graded Region”. In the Edit Graded Region dialog, select Create a new toposurface exactly like the existing one, then select the toposurface. This step demolishes the original surface and creates a copy that occupies the same boundary as the original.



3. Click “Building Pad” to define cut and fill area under new construction phase in order to calculate the cut and fill volume.



4. Rename the toposurface as appropriate.



5. Prepare schedule for cut and fill volume.

<Topography Schedule>

A	B	C	D
Name	Cut	Fill	Net cut/fill
P1	95.379 m²	46.041 m²	-49.338 m²
P2	209.870 m²	448.952 m²	239.082 m²
P3	10410.066 m²	7673.558 m²	-2736.508 m²
P4	1121.482 m²	116.354 m²	-1005.128 m²
Grand total: 4	11836.797 m²	8284.905 m²	-3551.892 m²

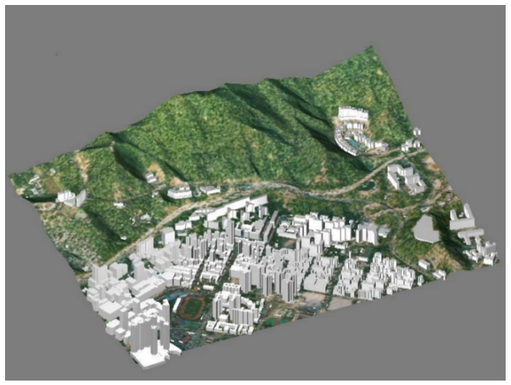
DP-05 GIS and BIM

Information Requirement

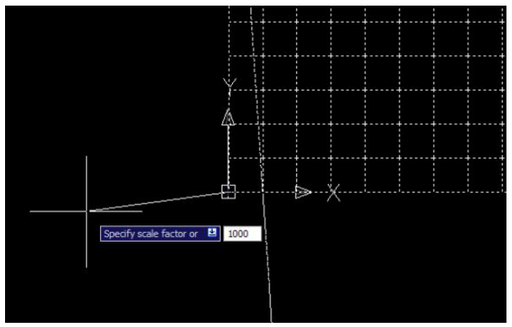
Information requirement shall follow project-specific BIM Uses.

Model Authoring

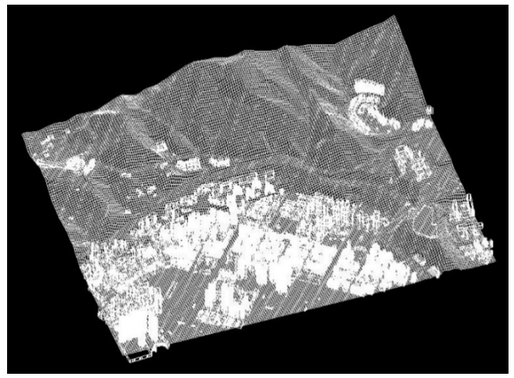
1. Import 3D spatial data from Lands Department in to AutoCAD.



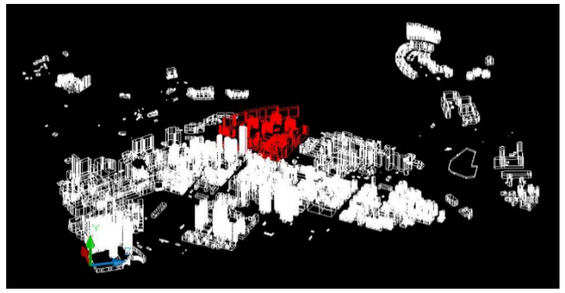
2. Relocate the 3DS model to correct coordinates, and re-scale the file to 1:1 (since the files from Lands Department are 1:1000 or 1:5000, normally 1:1000).



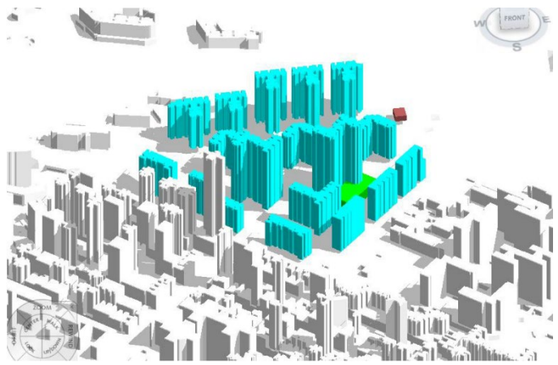
3. Delete the terrain (toposurface) in the CAD file and purge.



4. Delete the building within site boundary (RED) and purge.



5. Import this CAD file into Revit and relocate to correct coordinate.



6. Revit model is now with building mass and context, which is ready for feasibility study.

DP-06 Conceptual Mass and Feasibility Study

Information Requirement

List of Built-in Parameters

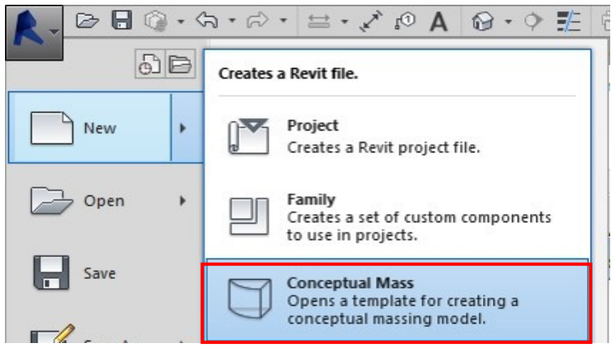
Parameter name	Information	Remark	Example
Level	Level of mass floor	Name of each level	G/F, 1/F
Gross Surface Area	Gross Surface Area	Total surface area	85.860m2
Gross Floor Area	Gross Floor Area	Total floor area	355.760m2
Gross Volume	Gross Volume	Total mass floor volume	6880.35m3
Floor Perimeter	Floor Perimeter	Floor Perimeter of each level	85.860m
Floor Area	Floor Area	Floor are of each level	355.760m2
Floor Volume	Floor Volume	Volume between 2 level	6880.35m3
Phase Created	Phase Created	Phase of Toposurface created	Phase 1, Existing…
Phase Demolished	Phase Demolished	Phase of Toposurface demolished	Phase 2, New Construction…

List of Shared Parameters

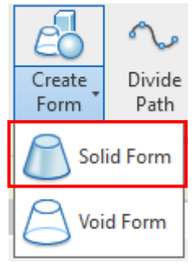
N/A

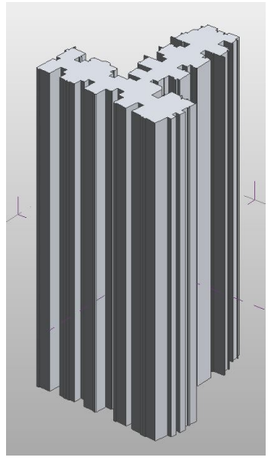
Model Authoring

1. Create a Conceptual Mass > Metric Mass family template.

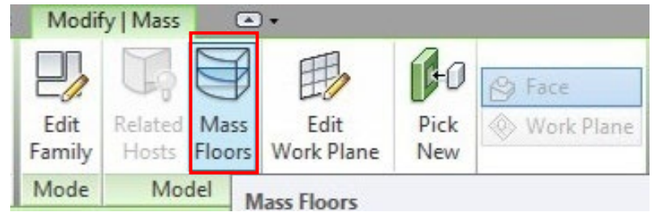


2. Create solid form in template and load into project.

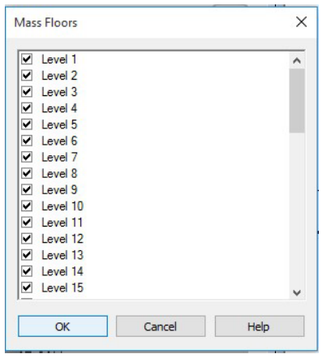




3. In project file, Select the mass, and Edit Mass > Mass floors to convert mass into mass floors.

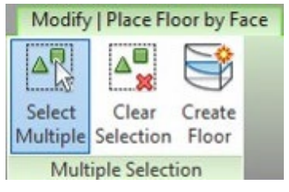


4. Select all levels in Mass Floors Dialog.

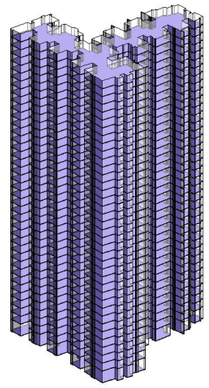


5. Convert mass floors into floors of building elements. Click Massing & Site > Floor by Face > Select Multiple.





6. Select the faces of mass floors.



7. Create schedule for mass floor to obtain the floor area schedule.

<Floor Area Schedule>

A	B
Level	Area
F36	1055 m²
F35	1055 m²
F34	1055 m²
F33	1055 m²
F32	1055 m²
F31	1055 m²
F30	1055 m²
F29	1055 m²
F28	1055 m²
F27	1055 m²

DP-07 Sun and Shadow Analysis

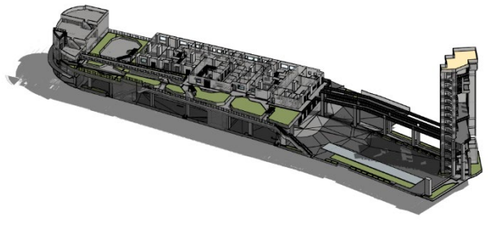
Information Requirement

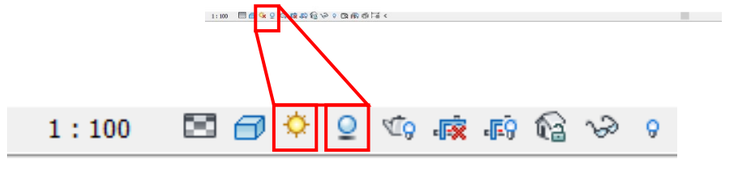
List of Built-in Parameters

Parameter name	Information	Remark	Example
Location	Site location	Location of site/ buildings	Hong Kong, Hong Kong SAR
Date	Date	Select single day for solar study	12/21/2010…
Time/ Duration	Start time and end time	Specify the start and end time for simulation	10:00AM, 4:00PM…
Level	Ground plane at level	Specify ground level	G/F, 0.0…

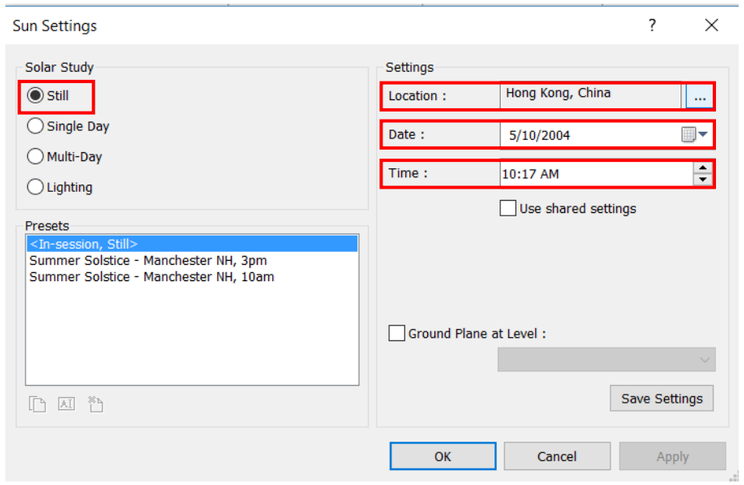
Model Authoring

1. In 3D View, switch to Shadow On mode.

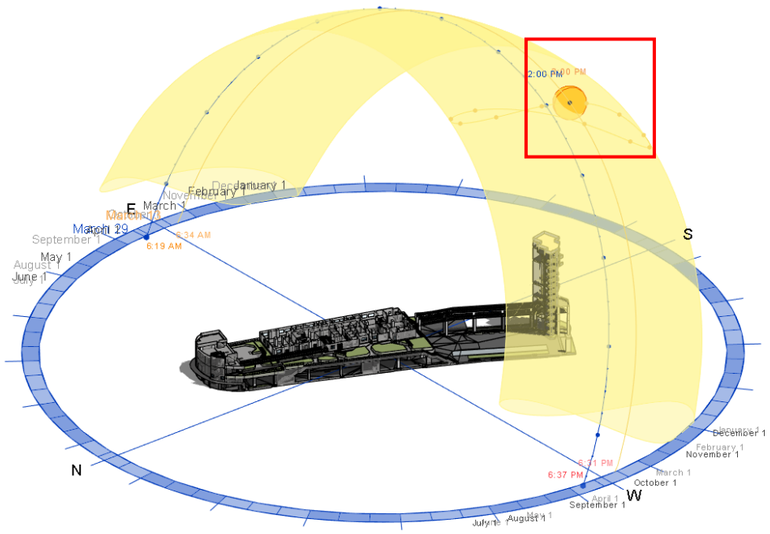




2. Edit Sun Settings to change the Location, Time and Date for Sun and Shadow Analysis. Click Still under Solar Study.



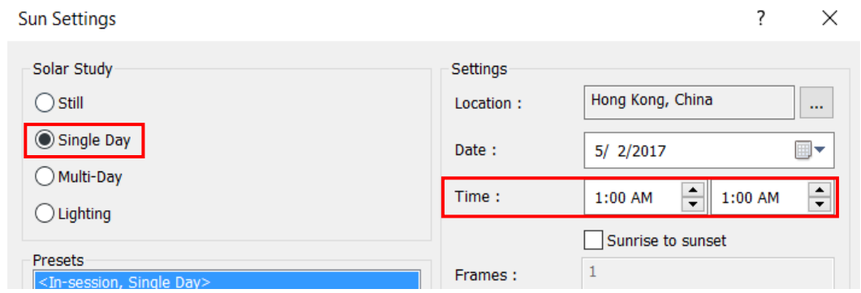
3. Move the cursor on top of the , click, hold and move the cursor to change the location of the sun.



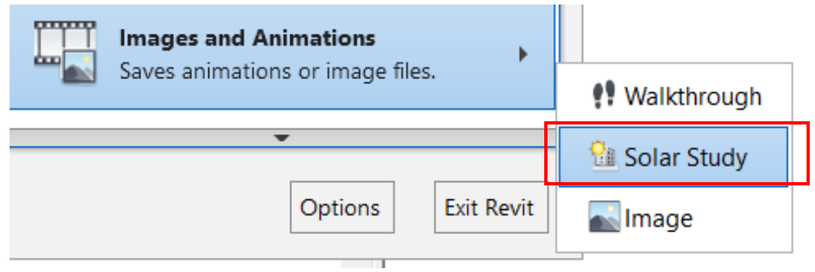
4. By specifying different date and time, the behaviour of the sun and shadow can be analysed.



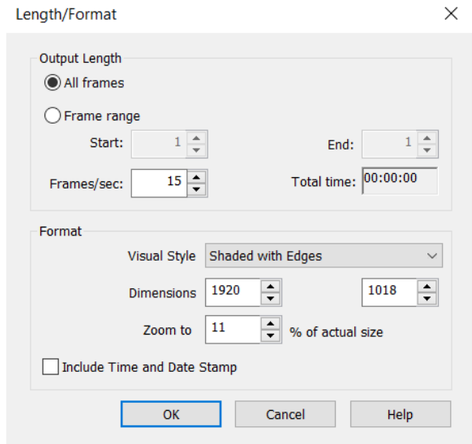
5. In order to simulate the solar study within a day, change the Sun setting into Single Day and set the duration of time.



6. Export the animation, click File > Export > Images and Animation >Solar Study.



7. Modify the format and Length of the animation.



- Noted that Revit can only perform qualitative analysis. Quantitative Lighting Analysis such as lux level can be performed using external software such as **Dialux** or **3ds Max**.

D4.2 Landscape SAM

DL-01 Planting

Discipline	Architectural
Family	Loadable Family
Category	Planting
Workset	Site
Family Naming Convention	PLT-<Functional Type>-HAA-<Descriptor 1>
Type Naming Convention	<Species>-<size>

	Short form	**Description**
Category	PLT	Planting
Functional Type	CTE	Coniferous_Tree
	DTE	Deciduous_Tree
	XPL	Exterior_Plant
	SHU	Shrub
	OTR	Other
Originator	HAA	Housing Authority-Architecture & landscape
Descriptor 1	Tree_Fall	Tree Fall
	Tree_Tropical	Tree Tropical
	Plant_Tropical	Plant Tropical

Example

Family name								**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**	**Descriptor 2**	**Type**		**Size**
PLT	-	XPL	-	HAA	-	Tree_Tropical	- N/A	Agave	-	0.5m

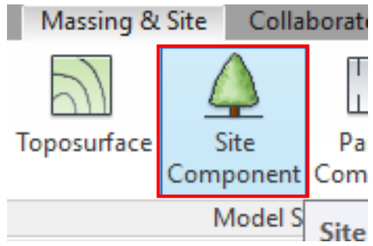
Information Requirement

List of Built-in Parameters

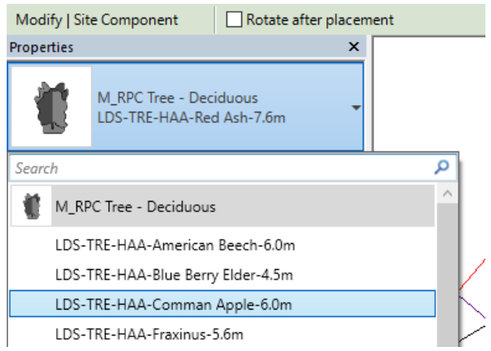
Parameter name	**Information**	**Remark**	**Example**
Height	Plant height	Specify plant height	0.5m^2
Render Appearance	Appearance of planting in rendering	Appearance of planting in rendering	Agave

Model Authoring

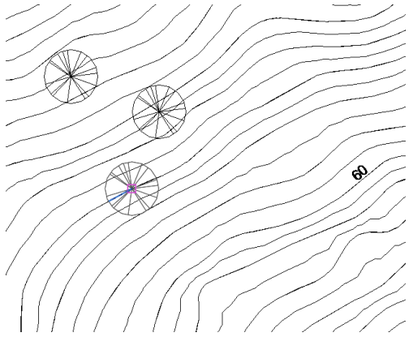
1. Click “Site Component” in “Model Site Panel” under “Massing Space & Site”



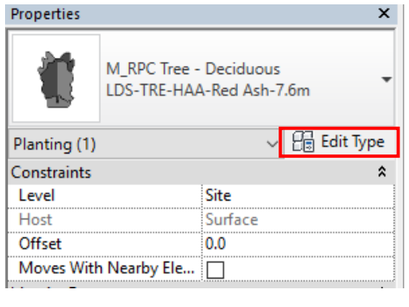
2. Select the desired tree component from the “Type Selector”



3. Place tree components on drawing area.



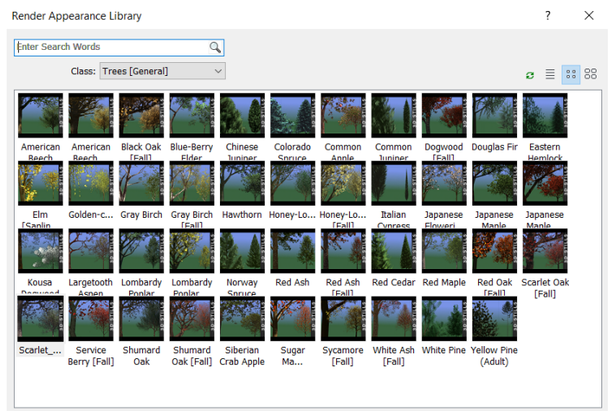
4. The tree components can be modified. In components properties panel click “Edit Type”



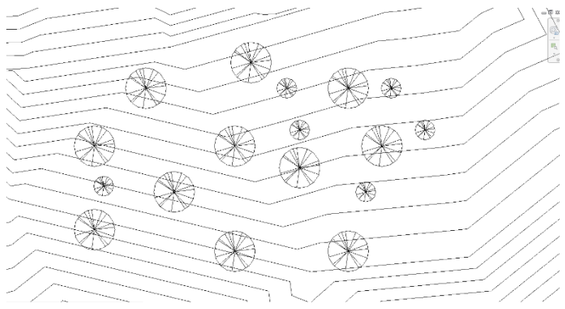
5. In the Type Properties dialog, for Height, enter a value to indicate the new height of the plant and click ok.



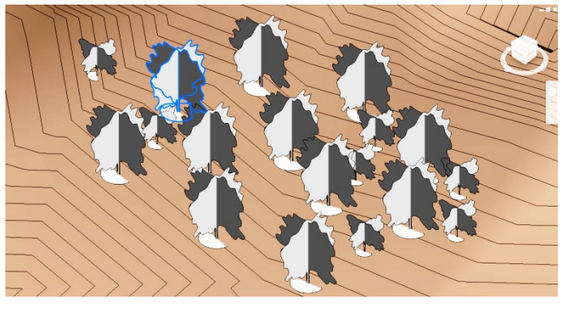
6. Species appearance can be chosen in the Type Properties. When change model display into “Realistic” mode, the appearance of the plans can be shown.



7. RPC trees show in Plan View.



8. Switch model display into 3D Shaded Mode to check the base of plantings is following the contour, not floating in air.



D4.3 Architecture SAM

The objective of this section is to assist model authors in the developing Revit models to meet requirements of production of professional deliverables such as production of drawings, other analysis and other BIM users. It describes the standard approach to modelling in architecture and the step-by-step workflow / guide to apply them into the project.

The Standard Approach of Modelling in Architecture creates a basic structure to assist the model authors in preparing the BIM models for production and drawings. It is by no means an exhaustive template and model authors are allowed to edit / change accordingly to suit. For any additional requirements that require customisations to a certain extent, model authors are also advised to make reference to relevant BIM Standards published by *Construction Industry Council* for any enquiries on the application.

The architect shall carry out the modelling at each stage of the project and Level of Development (LOD) of building elements produced at each stage to be specified at the beginning of the project. The LOD for each architectural element is described in ***D1. Level of Development*** *of the HABIMSG Vol.2*.

Architectural Modelling Best Practices

- The building or feature elements shall be created using the correct software tools and components for walls, slabs, doors, windows etc. If the BIM authoring tools are not sufficient for modelling a feature element, then it shall be created using other appropriate objects family and defined with an appropriate "Type" name, so as to differentiate the non-standard components. These functionalities may be available as the software develops.
- Building or feature elements shall be modelled separately for each floor level of a project.
- 2D lines and symbols may be used to complement the model when small elements are not modelled in 3D. Model author can evaluate based on the needs. For example, small elements that do not interfere the 3D coordination and not of concern with its quantities may not need to be modelled as 3D objects. 2D standard details may be used on drawings produced using BIM authoring tools to complement overall drawing packages.
- If architect need to model structural elements in the ARC model, the size and location shall be as per the information from the structural engineers (SE). It is recommended that the architect uses the structural model as a reference within the architectural model to avoid duplication of building elements when the structural model is available.
- Naming of **Structural Material** parameter shall be used for differentiating architectural and structural elements in architectural models. The principle application shall be as followed:
  a) If the architectural element is in reinforced concrete, concrete grade without specific concrete type (e.g. Mass Fill) shall be stated. (e.g. 35D/20)
  b) If the architectural element is in specific concrete type other than reinforced concrete, concrete grade and the specific concrete type shall be stated. (e.g. 30D/20_Mass Fill)
  c) For placeholder structural elements in the architectural models, generic name without specifying concrete grade shall be stated. (e.g. Concrete)
- Whenever possible, the architect shall use the actual dimension, thickness or detail to model an element accurately. The model elements shall contain the information and data available at each stage.
- For collaboration, architects shall acquire HA Family Library prepared by BIMST before modelling.
- The "Disallow Join" function shall not be used for jointing between walls and other elements, except for separating the jointing of walls with different materials.

DA-01 Architectural Walls

Discipline	Architectural
Family	System Family
Category	Architectural Wall
Workset	External Envelop – For External Walls Individual Levels
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	<Functional Type>-HAA-<Material / description>-<Thickness>

	Short form	Description
Functional Type	AWL	Architectural wall
	AWF	Architectural wall finishes
	AWP	Architectural Partition
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
	HAB	Housing Authority-Building Services Engineering
Descriptor 1 (Material / description)	Concrete	Material
	Render	Render
	Paint	Paint
Descriptor 2 (Thickness)	200mm	Thickness of the wall

Remarks:
*For consistency, all filter setup for automatic colouring in GBP submission views in HA Project Template use **Type Name** for Material / Description as the filter rules, i.e., wordings for the Material / Description, such as "Concrete", "Timber", "Metal", "Glass", "SanFit", shall be included in the type names for applicable model elements.

Type name example

Functional type		Originator		Descriptor 1		Descriptor 2
AWL	-	HAA	-	Concrete	-	300mm

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Concrete Block Wall, Panel Wall, R.C. Wall…
Base Constraint	Base level	Specify base constraint level	1F, 2F……
Base Offset	Base offset	Specify offset distance from base level	0.0, 100, 200, 250,…
Top Constraint	Top level	Specify top constraint level	2F, 3F……
Top Offset	Top offset	Specify offset distance from top level.	0.0, 100, 200,250……
Unconnected Height	Wall height	If top constraint is specified, unconnected height shall be generated by system	2590mm
Length	Length of wall	Length of wall	1250mm
Width	Wall thickness	Wall thickness	200mm
Structural Material	Wall material	Wall material	Concrete Block Wall, Panel Wall, 30D/20 ...
Area	Wall area	Wall area	1250m^2
Volume	Volume of wall geometry	Volume of wall geometry	300m^3

Model Authoring

Wall SAM includes:

A) Creating Wall

B) Controlling Wall Top

C) Joining Wall at Corner Junction

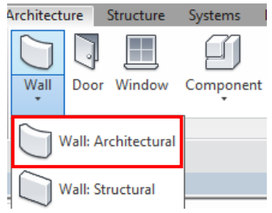
D) Creating Different Shape of Wall

E) Creating Wall Finishes

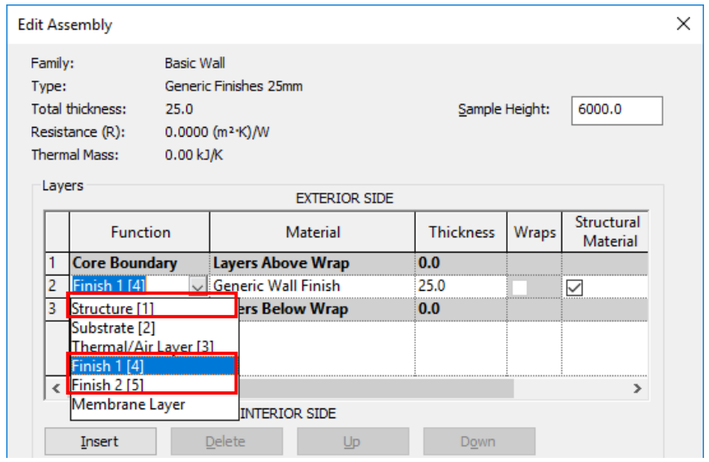
- Walls include: Structural walls in Architectural model, non-structural full height partition walls, non-structural non-full height partition walls, parapet walls, curbs, hanger walls etc.
- Architectural discipline shall use Architectural Wall but not Structural Wall to draw the Architectural Wall.
- Architectural walls shall be separated into Interior wall finish; wall core and exterior wall finish **after** preliminary design.
- Commonly used wall types shall be set up to standardize within office. Properties information including structure, width, structural material, fire rating shall be specified.

A) Creating wall

9. Select Architecture > Wall: Architectural



10. Under properties > Edit Type > Construction > Structure, details of wall composition can be setup.



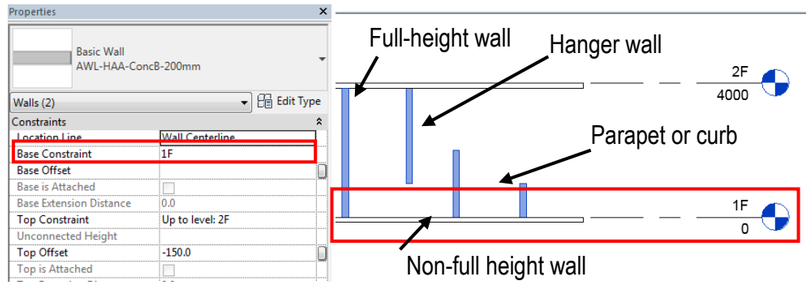
Where structural walls are included in architectural model as "placeholder" (refer to **D.COL-2.3**), different wall types shall be assigned to differentiate between structural and non-structural walls.

Use Type: **AWL**-HAA-(ARC Wall), **SWL**-HAA-(placeholder)

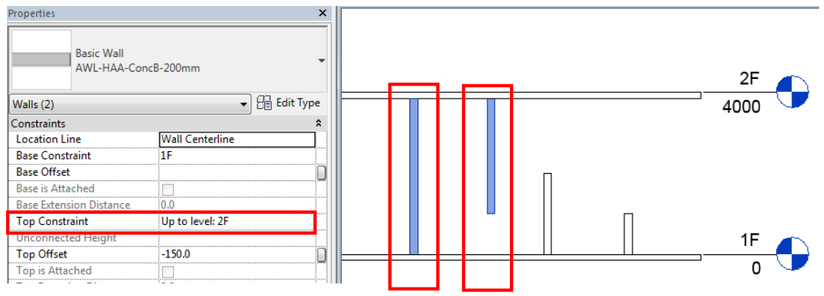
Architectural discipline should use **Structural Material** parameter to differentiate the architectural walls and the placeholder structural walls in AR model, i.e. Structural Material of architectural walls shall be properly assigned (e.g. 30D/20, wall tiles.

Note: For architectural concrete walls in AR model, concrete grade, for example, **30D/20** shall be applicable. For concrete placeholder structural walls in AR model, generic name for Structural Material, e.g. **Concrete**, shall be assigned to allow easy differentiation.

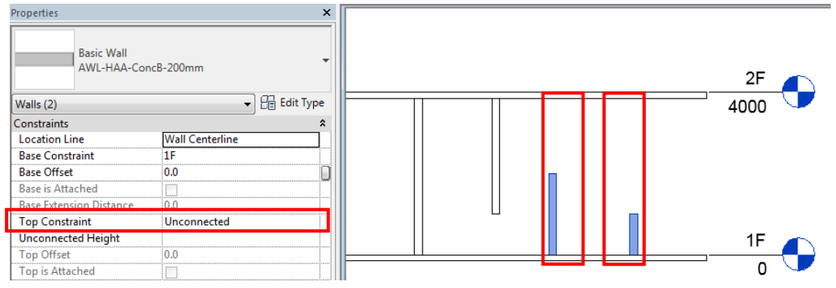
11. Set the level of wall Base Constraint under Properties > Constraint > Base Constrain. The Base Constrain shall be set to the level where walls are sitting on



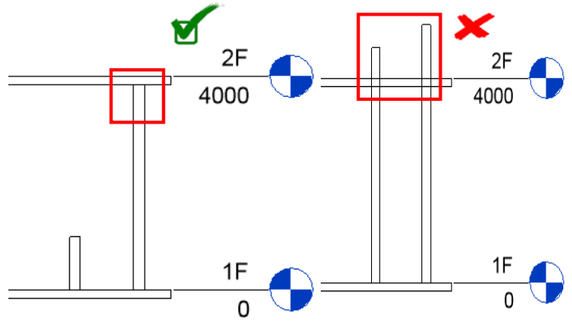
12. a) Top Constraint shall be set to **"Up to level**" (floor level above) for full-height wall and hanger wall.



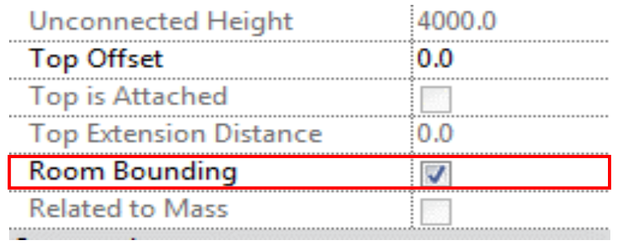
b) "**Unconnected**" for non-full-height walls, parapets and curbs.



13. No wall shall span more than 1 storey. In typical circumstances, the wall shall be modelled from top of the structural slab up to the bottom of the slab of the level above.

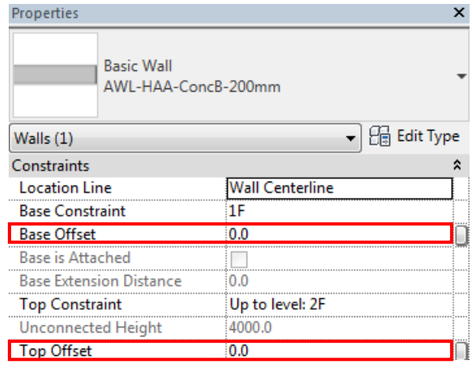
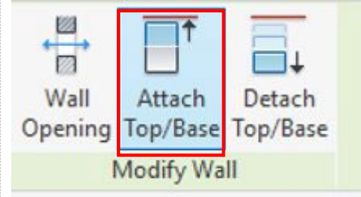
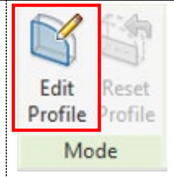


14. Set Room Bounding to ON unless there are special space definition requirement otherwise specified.



B) Controlling Wall Top

There are 3 suggested methods for controlling the top edge of a wall.

Method 1 (*)	**Method 2**	**Method 3**
Top Constraint and Top Offset	Attach Top/ Base	Edit Wall Profile
		
It is a manual input that need to be updated manually after the slab thickness changed.	The wall is attached to the soffit of floor slab. Also, the measurement of Area and Volume also be automatically updated according to the shape of geometry (but noted that the "Unconnected Height" will NOT be updated accordingly.) The method may be applicable when the top/base is sloped or irregular in shape according to the elements to be attached, e.g. wall under staircase or sloped roof.	Only use this method when the first two methods cannot suit the purpose, e.g. standalone (i.e. without top / base to be attached to) feature wall that are in irregular shape.

(*) Method 1 shall be adopted, otherwise justification and notification to the project team in required.

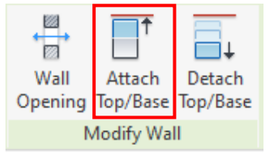
Method 1 – Input Top Constraint & Top Offset

1. Control the wall top by deducting the thickness of floor slab at "Top Offset" in wall properties.



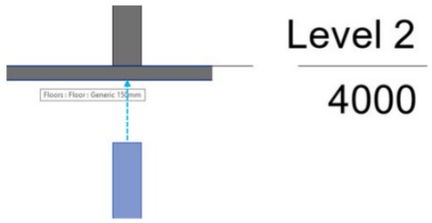
Method 2 – Use "Attach Top/Base"

1. Select the wall(s) need to be attached to the floor.



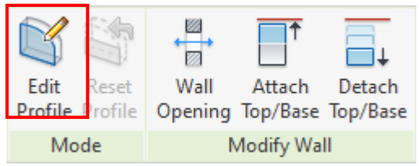
2. Click the "Attach Top/Base" under "Modify| Walls"

3. Select the floor that the walls to be attached.



Method 3 – Edit Wall Profile

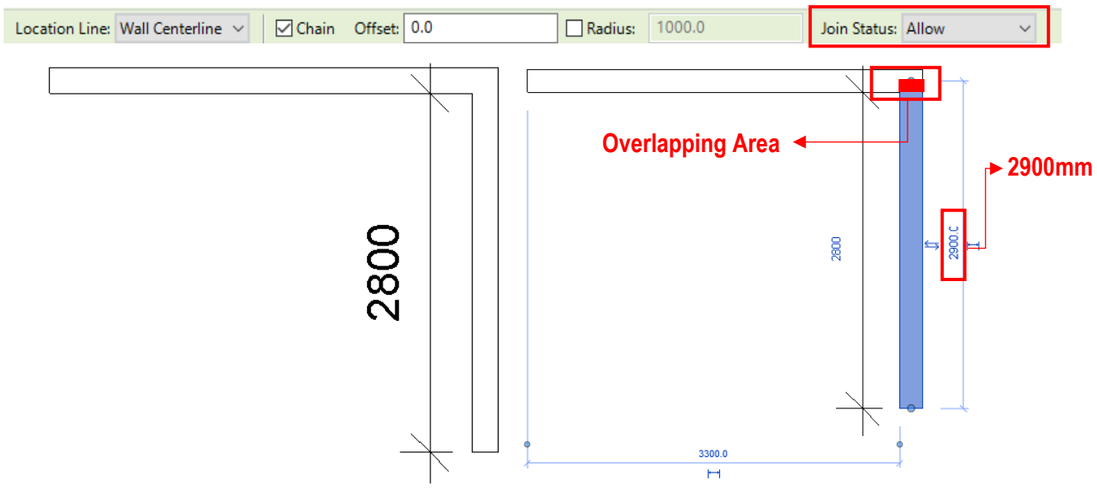
1. Edit wall profile with "Draw" tool to suit special local situation.



C) Joining Wall at Corner Junction

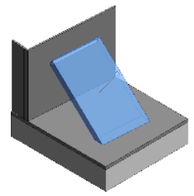
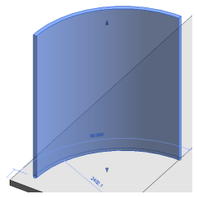
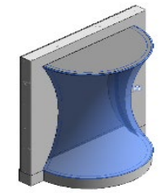
Under typical circumstances, please make sure the Join Status set to "Allow" before placing the wall. The wall will be joined together automatically. The joining approach of architectural wall ("Join and Overlap" method, where two walls extend and overlap at the corner to be joined) should be followed unless otherwise specified.

R.C. wall and architectural walls (e.g. panel wall, block wall, etc.) shall be separated by "unjoin wall".



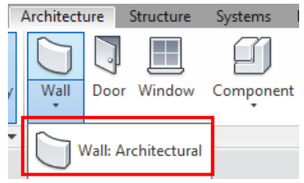
Note: The "Disallow Join" function shall not be used for joining between walls , except separating the jointing of walls with different materials. Since this may affect the quantity information of the wall elements.

D) Create Different Shape of Wall

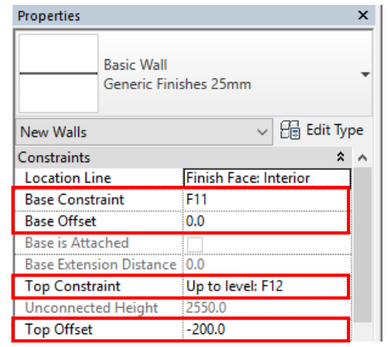
Wall Type	Straight Wall	Slope Wall	1-Way Curve Wall	2-Way Curve Wall
3D View				

Straight Wall

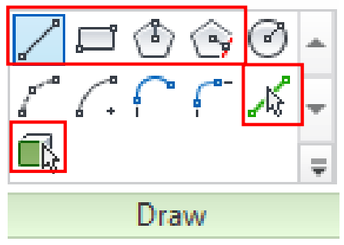
1. Click "Wall: Architectural" under Architecture > Wall



2. Define Base Constraint, Top Constraint, Base Offset and Top Offset.



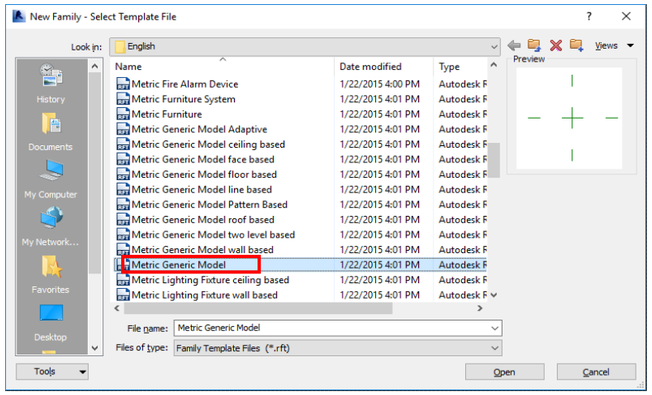
3. In Project Browser, select the floor plan view of "Base Constraint" in step 2 above.
4. Select the drawing method under "Modify | Place Wall > Draw" and draw on plan.



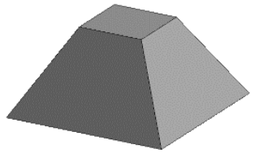
Slope Wall

- It is suggested to use Modify | Place Wall > Draw > Pick Faces from mass or generic model family.

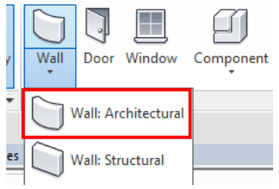
1. Select a Generic Model family.



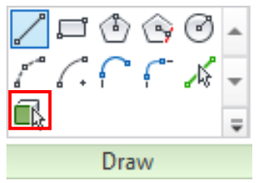
2. Create a slope form (the generic model family) and load into the project.



3. Click “Wall: Architectural” under Architecture > Wall.

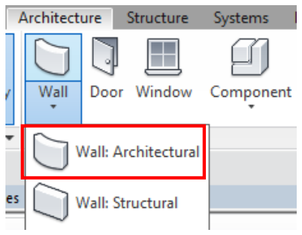


4. Select Pick Faces under “Modify | Place Wall > Draw, then select the slope face where you want to build the wall.

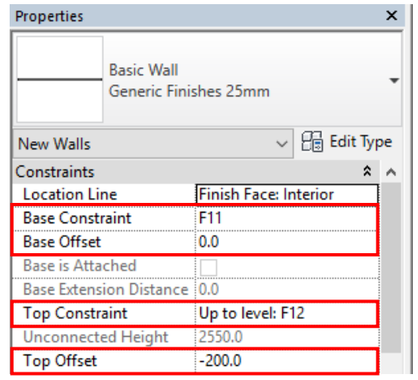


1-Way Curve Wall

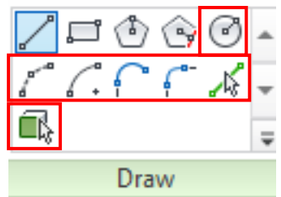
1. Click “Wall: Architectural” under Architecture > Wall.



2. Define Base Constraint, Top Constraint, Base Offset and Top Offset.
3. In Project Browser, select the floor plan view of “Base Constraint” in step 2 above.



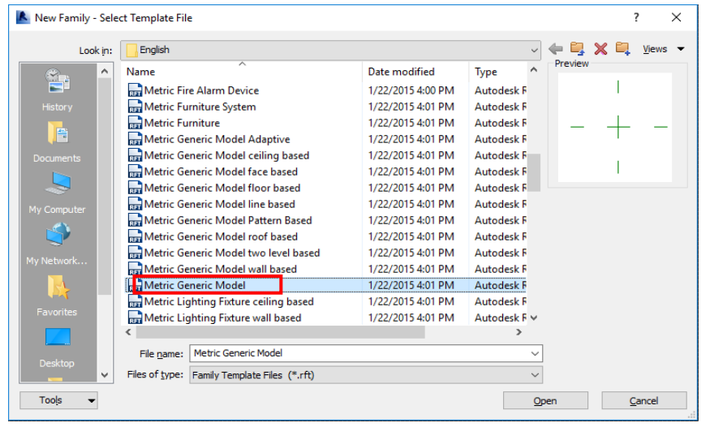
4. Select the drawing method under “Modify | Place Wall > Draw” and draw on plan.



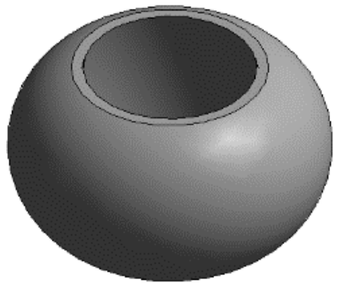
2-Way Curve Wall

- There are 2 different methods to create a 2-Way Curve Wall:
  - Architectural > Component > Model In-place
  - Wall by Pick Faces from loading mass or generic model family.
- It is suggested to use wall by Pick Faces from generic model family.

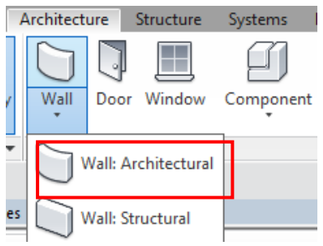
1. Select a generic family



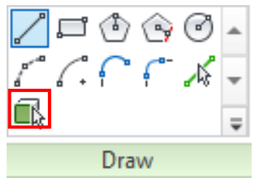
2. Create a 2-way curve form you want and load it (the generic model family) into the working project.

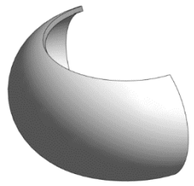


3. Click “Wall: Architectural” under Architecture > Wall.



4. Select the “Pick Faces” button under “Modify | Place Wall > Draw” then select the 2-Way Curve Face where you want to build the wall.

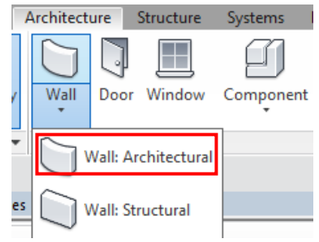




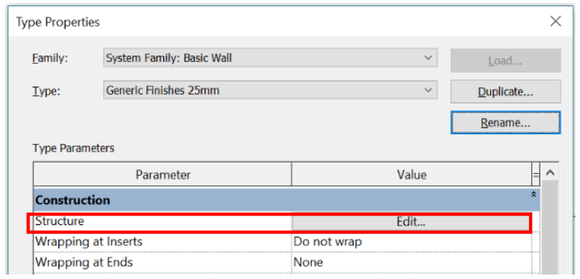
E) Creating Wall Finishes

- **Wall finishes will not be modelled for LOD-G 300**. However, to facilitate better design and visualization, it is advised finishes shall be modelled for special areas such as lobbies in public areas.
- Architectural Finishes shall be modelled separately from the architectural wall as another wall type. Do NOT use wall type with multi-layers.

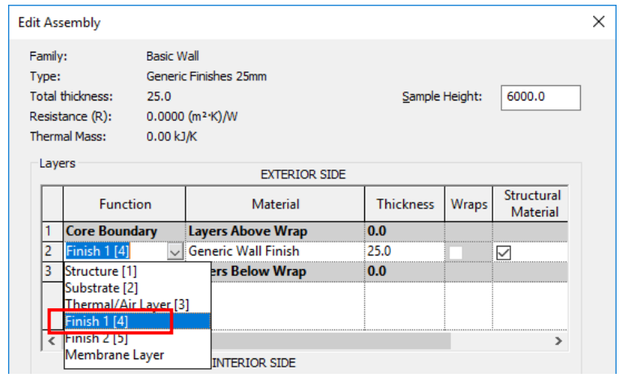
1. Click “Wall: Architectural” under Architecture > Wall.



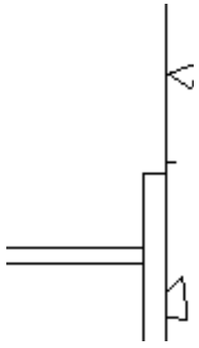
2. Edit Wall Type, select Wall > Type Properties > Structure >Edit



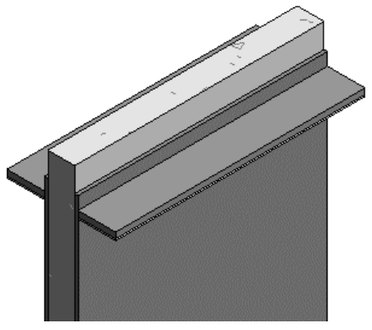
3. Add Finish to architectural wall.



4. Architectural finishes wall shall extend 100mm above bottom of ceiling.

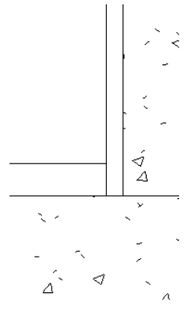


Section View

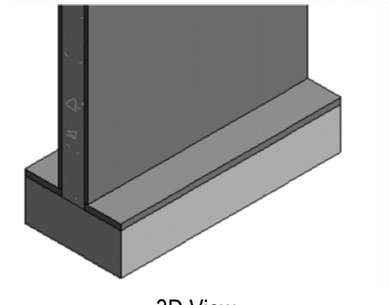


3D View

5. Wall finishes and floor finishes do not overlap with each other.



Section View



3D View

6. Wall finishes schedule shall be generated by Room. See DA-32.

DA-02 Wall Opening

Discipline	Architectural
Family	Loadable Family / System Family
Category	Generic Models / Wall Opening
Workset	For Method 1, follow the host wall For Method 2, N/A – will be same as the host wall
Family Naming Convention	For Method 1, GMD-<Functional>-HAA-<Opening Shape>-<Descriptor 2 (Optional)> For Method 2, N/A, name of system family is not editable.
Type Naming Convention	For Method 1, <Size> For Method 2, N/A, type naming of Wall Opening is not editable.

For Method 1 (Void Family)

	Short form	Description
Category	GMD	Generic Models
Functional Type	AWO	Wall Opening
Originator	HAA	Housing Authority-Architecture & landscape
Descriptor 1	Rectangular	Rectangular Shape
	Round	Round Shape

Example

Family name								**Type name**
Category		**Functional type**		**Originator**		**Descriptor 1**	**Descriptor 2**	**Size**
GMD	-	AWO	-	HAA	-	Rectangular	(Optional)	450mmx450mm
GMD	-	AWO	-	HAA	-	Round	(Optional)	Diameter_150mm

Information Requirement

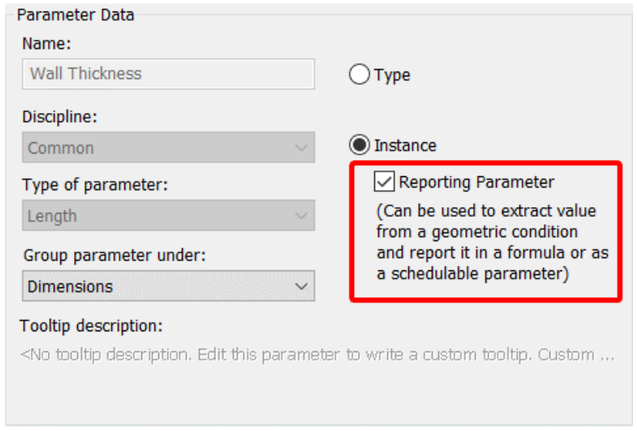
List of Built-in Parameters (Applicable to Method 2 only)

Parameter name	Information	Remark	Example
Base Constraint	Base level	Specify base constraint level	1F, 2F……
Base Offset	Base offset	Specify offset distance from base level	0.0, 100, 200, 250,……
Top Constraint	Top level	Specify top constraint level	2F, 3F……
Top Offset	Top offset	Specify offset distance from top level for a wall opening	0.0, 100, 200,250……

List of Shared Parameter (Applicable to Method 1 only)

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
Length	Length of Rectangular Opening	Common	Length	Dimensions	Type	450mm
Height	Height of Rectangular Opening	Common	Length	Dimensions	Type	450mm
Radius	Radius of Round Opening	Common	Length	Dimensions	Type	75mm
Wall Thickness	Wall (Host) Thickness	Common	Length	Dimensions	Instance (Reporting)(*)	150mm

(*) Wall Thickness shall be set as **Instance-Reporting Parameter** and tie to the hosting element in the family, so that when used in project model, the family can acquire the thickness of its host, i.e. the wall.



Model Authoring

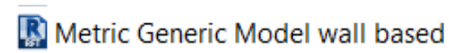
There are 3 methods to make a wall opening, “Wall Opening” command, “Edit Profile”, and use void object family.

Wall Type	Method 1 (*) Void Family	Method 2 Wall Opening Command	Method 3 Edit Wall Profile
Pros	• Dimension parameter for scheduling purposes • No Room separation line need to manually draw for room bounding	• No addition void family need to be created	• Can create irregular shape easily
Cons	• Tailor made void family for irregular shape of opening	• Can only create rectangle Void shape • Room separation line need to manually draw for room bounding • Cannot schedule	• Not convenient to edit • Cannot schedule

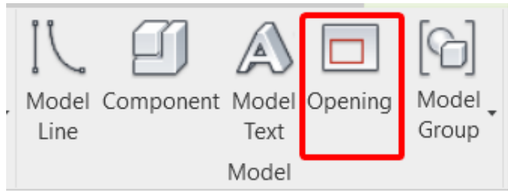
(*) Method 1 shall be adopted, otherwise justification and notification to the project team is required.

For Void Family

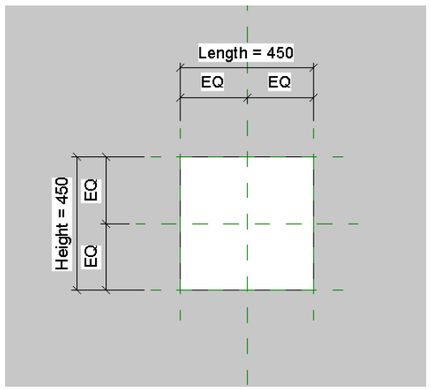
1. Use family (empty **Generic Model wall based**) to create the opening.



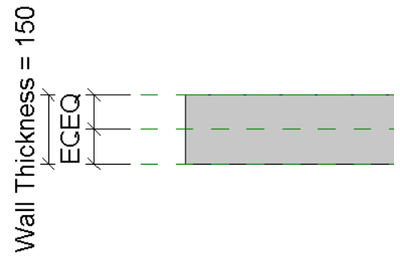
2. Create **Opening Cut** to the host (Wall)



3. Type Name, Wall Thickness and dimensional parameters (e.g. Length and Height for rectangular opening, Radius for round opening) shall be setup within the family.

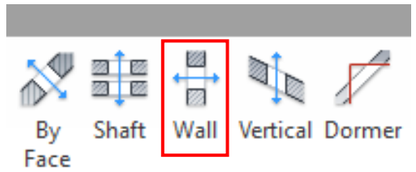


4. Wall Thickness shall be tied to the hosting element (i.e. the Wall) in the family.

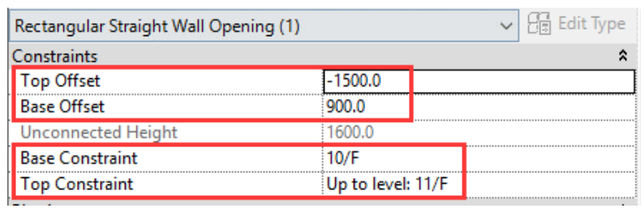


For Wall Opening Command

1. Use Wall Opening under Architecture > Opening.

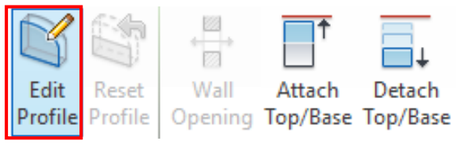


2. Set "Top Offset/Constraint" and "Base Offset/Constraint" to define the opening size.

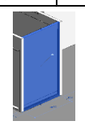
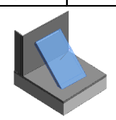
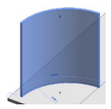
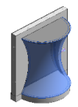


For Edit Profile

1. Use Edit Profile to create a wall opening.



Wall Opening methods suggestion:

Wall Type	Straight Wall		Slope Wall		1-Way Curve Wall		2-Way Curve Wall	
Schedule	×	✓	×	✓	×	✓	×	✓
Graphic								
Method Prefer	wall opening	Void Object Family	Void Object Family	Void Object Family	Void Object Family	Void Object Family	Void Object Family	Void Object Family

DA-03 Curtain System / Curtain Wall

Discipline	Architectural
Family	System Family
Category	Architectural Wall / Curtain System
Workset	Individual Levels
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	<Functional Type>-HAA-<Curtain Wall Material>-<Curtain Wall Geometry>

	Short form	Description
Functional Type	CUW	Curtain wall
	SFT	Storefront
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
	HAB	Housing Authority-Building Services Engineering
Descriptor 1	Glass	Glass (Curtain Wall Material)
Descriptor 2	Flat	Flat (Curtain Wall Geometry)

Type name example

Functional type		Originator		Descriptor 1		Descriptor 2
CUW	-	HAA	-	Glass	-	Flat

Information Requirement

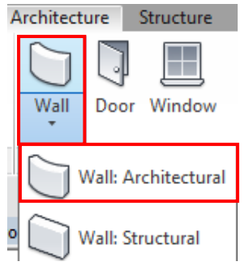
List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Curtain Wall
Base Constraint	Base level	Specify base constraint level	1F, 2F……
Base Offset	Base offset	Specify offset distance from base level	0.0, 100, 200,250,……
Top Constraint	Top level	Specify top constraint level	2F, 3F……
Top Offset	Top offset	Specify offset distance from top level.	0.0, 100, 200,250……
Length	Length of wall	Length of wall	1250mm
Type	Wall type	Wall type	Curtain wall

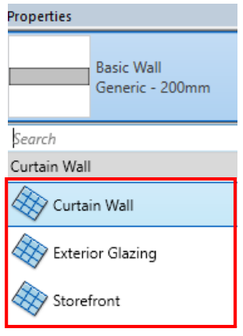
Parameter name	Information	Remark	Example
Area	Wall area	Wall area	1250m^2
Angle	Vertical/ horizontal grid angle of alignment	Vertical/ horizontal grid angle of alignment	15°
Offset	Vertical/ horizontal grid offset from justification	Vertical/ horizontal grid offset from justification	200mm
Horizontal Grid	Grid layout and spacing	Specify horizontal grid layout and spacing method	Fixed Distance
Vertical Grid	Grid layout and spacing	Specify vertical grid layout and spacing method	Fixed Distance
Curtain Panel	Curtain panel	Specify default curtain panel for specific type of curtain wall	Glazed
Vertical Mullions	Vertical Mullions	Specify vertical mullion type	Rectangular mullion:50x50mm
Horizontal Mullions	Horizontal Mullions	Specify horizontal mullion type	Rectangular mullion:50x50mm

Model Authoring

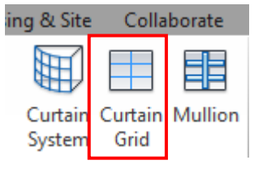
1. Curtain wall shall be created by Architecture > Wall > Wall: Architectural,

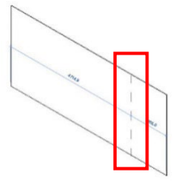


2. Curtain wall types in default includes: curtain Wall, exterior glazing and storefront.

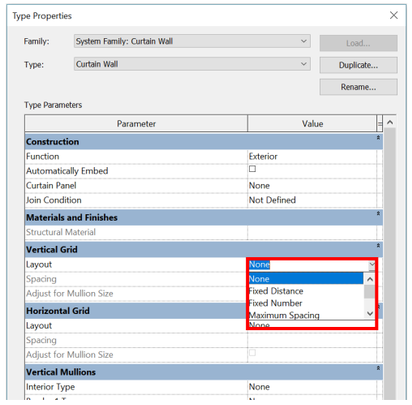


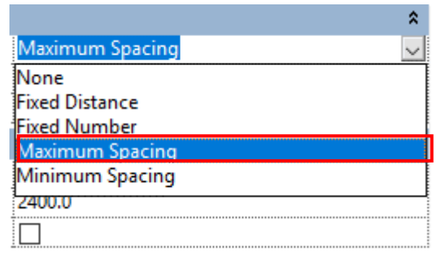
3. Use Curtain grid is to divide curtain panels.



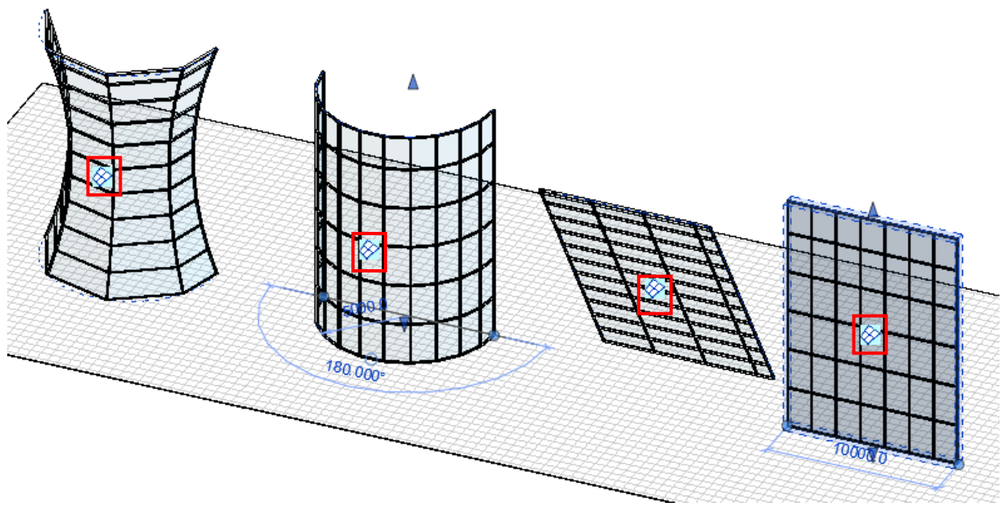


4. Alternately use different layout under curtain wall Type Properties.

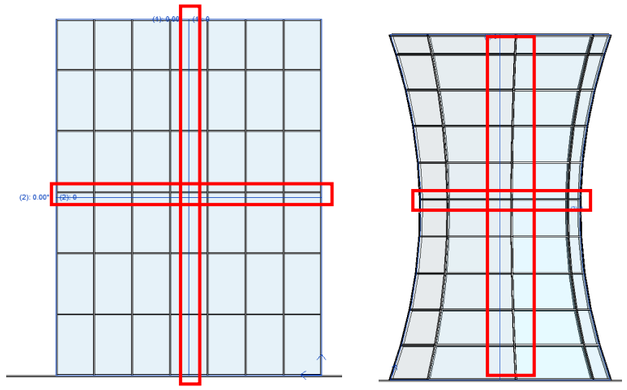




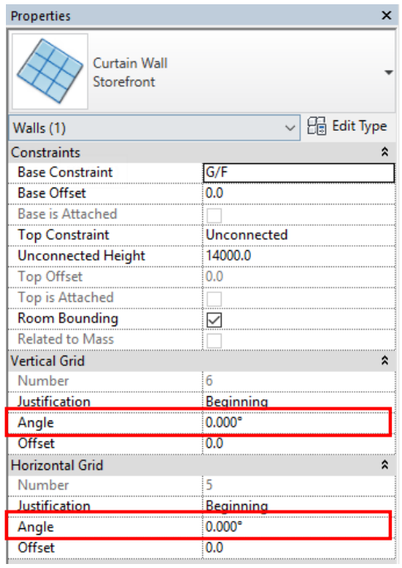
5. After select layout type, curtain grid layout can be adjusted by click on "Configure Grid Layout".



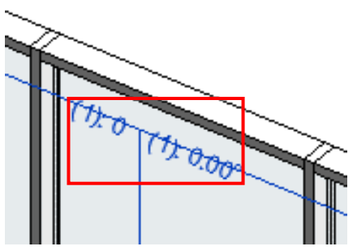
6. Different types of curtain wall (whether it is straight curtain wall, slope curtain wall, curve curtain wall or 2-way curtain wall) all have 2 types of curtain grid layout which default as horizontal and vertical.



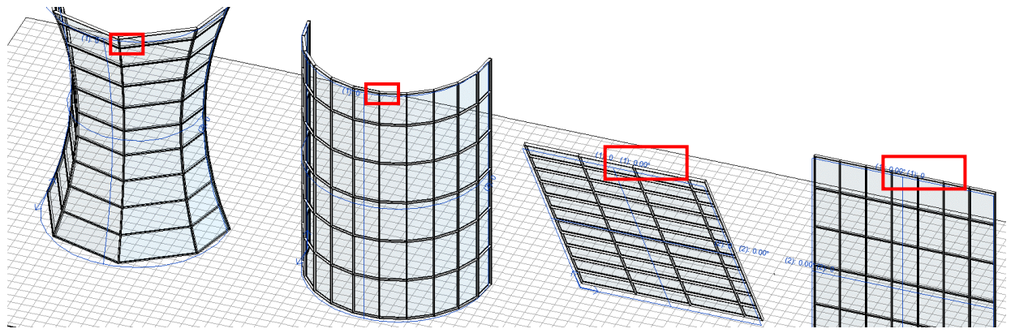
7. Change the angle and offset of curtain grid. Click curtain wall properties > Configure Grid Layout.



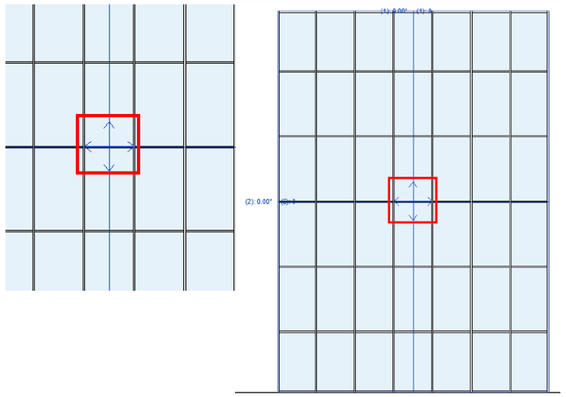
8. it also shows on “Configure Grid Layout” .(Left: offset; right: angle)



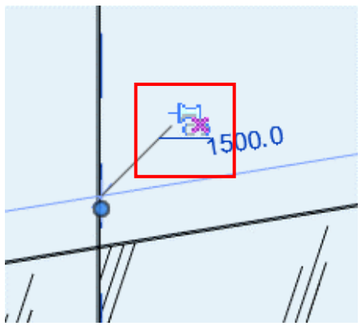
9. The angle of curtain grid only can adjust for straight curtain wall and slope curtain wall.



10. The origin point and layout setting define the mullion grid direction and offset distance.

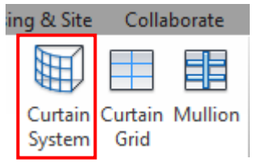


11. If it is necessary to adjust part of curtain grid within the layout setting above, one needs to select the curtain grid and unpin it first.

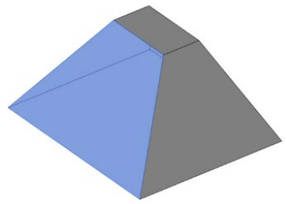


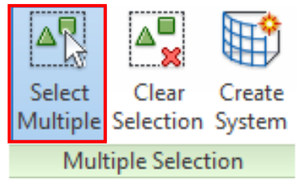
Curtain System

1. Select Architecture > Curtain System,



2. Pick face of a mass or generic model family object.





3. Onward operations are similar to Curtain Wall.

DA-04 Curtain Panel

Discipline	Architectural
Family	Loadable Family
Category	Curtain Panel
Workset	N/A – will be same as the host Curtain System / Curtain Wall
Family Naming Convention	CTP-<Functional Type>-HAA-<Descriptor 1>-<Descriptor 2>
Type Naming Convention	<Type>-<Size>

	Short form	Description
Category	CTP	Curtain Panel
Functional Type	CTP	Curtain Panel
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
	HAB	Housing Authority-Building Services Engineering
Descriptor 1	Curtain_Panel	Curtain Panel
	Door	Door
	Windows	Windows
Descriptor 2	Louvres	Curtain panel with louver
	Frame	Curtain panel with framed support
	Spider	Curtain panel with spider

Example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**	**Type**		**Size**
CTP	-	CTP	-	HAA	-	Curtain_Panel	-	Louvers	Glass	-	5mm

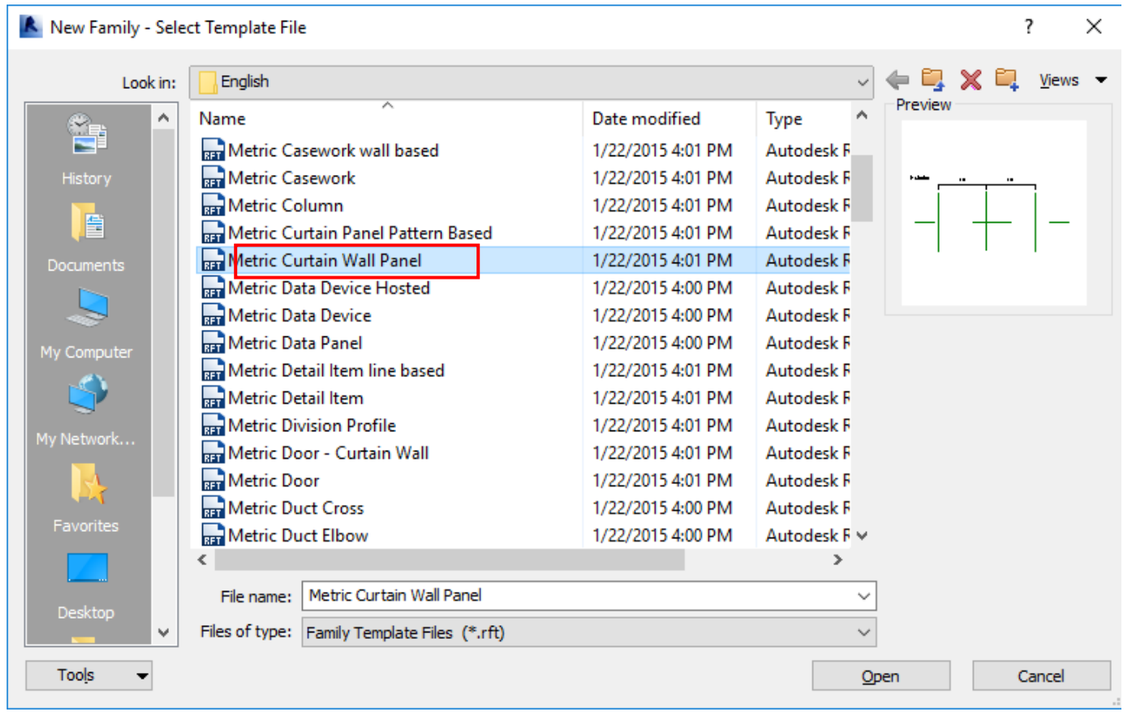
Information Requirement

List of Built-in Parameters

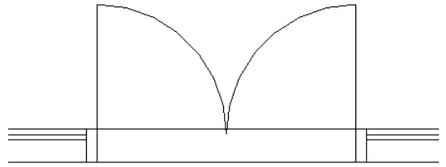
Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Curtain panel
Height	Curtain panel height	Curtain panel height	7121mm
Width	Curtain panel width	Curtain panel width	5869mm
Area	Curtain panel area	Curtain panel area	18.23m2

Model Authoring

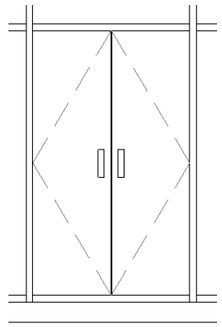
1. Curtain wall panel is a loadable family and can be created from: Curtain Wall Panel family.



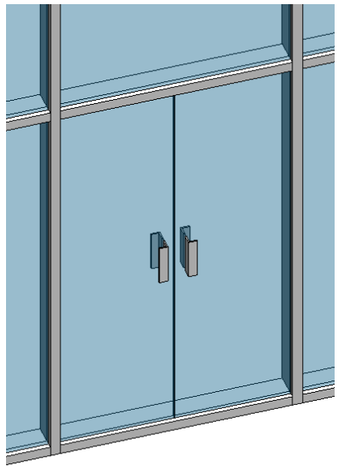
2. Use Curtain Wall Panel family for Curtain Wall with spider clamp fixing.
3. Use Generic Model family to create Spider clamp, and then Loaded into the Curtain Wall Panel family.
4. Use Door – Curtain Wall Family to create doors within curtain wall.



Plan View



Elevation



3D View

DA-05 Mullion

Discipline	Architectural
Family	System Family
Category	Curtain Wall Mullion
Workset	N/A – will be same as the host Curtain System / Curtain Wall
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	CWM-HAA-<Mullion Type>-<Dimension>

	Short form	Description
Functional Type	CWM	Curtain wall mullion
Originator	HAA	Housing Authority-Architecture & landscape
	HAS	Housing Authority-Structure
Descriptor 1	Circular	Circular Mullion
	L_Corner	L Corner Mullion
	Quad_Corner	Quad Corner Mullion
	Rectangular	Rectangular Mullion
	Trapezoid_Corner	Trapezoid Corner Mullion
	V_Corner	V Corner Mullion
Descriptor 2	50x150mm	Dimension of profile
	D90	Border mullion profile at 90 degrees

Type name example

Functional type		Originator		Descriptor 1		Descriptor 2
CWM	-	HAA	-	Rectangular	-	50x100mm

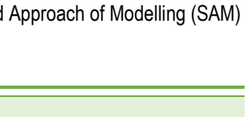
Information Requirement

List of Built-in Parameters

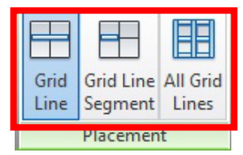
Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Rectangular mullion
Profile	Mullion profile	Mullion profile	Rectangular
Material	Mullion material	Mullion material	Aluminium
Angle	Mullion angle of placement	Specify angle difference between mullion and curtain wall work plane	15°
Offset	Mullion offset from curtain wall work plane	Specify distance difference between mullion and curtain wall work plane	200mm
Width	Width of mullion	Width of mullion	50mm
Length	Length of mullion	Length of mullion	1250mm
Thickness	Thickness of mullion	Thickness of mullion	25mm

Model Authoring

1. Create Curtain Wall Mullion, select Architecture > Mullion. Mullions will only hold on curtain grid.

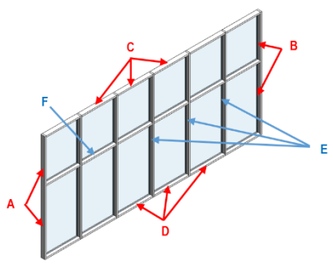


2. There have 3 types of mullion placement methods.

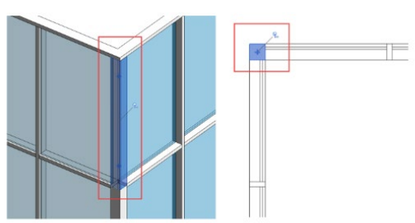


3. The type of mullion can be changed on curtain wall properties.

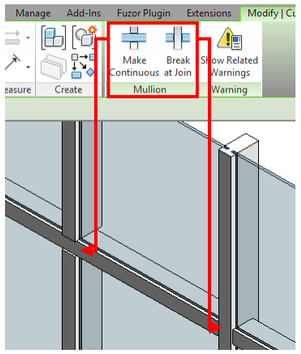
Vertical Mullions		
Interior Type	Rectangular Mullion : 50x150mm	E
Border 1 Type	Rectangular Mullion : 50x150mm	A
Border 2 Type	Rectangular Mullion : 50x150mm	B
Horizontal Mullions		
Interior Type	Rectangular Mullion : 50x150mm	F
Border 1 Type	Rectangular Mullion : 50x150mm	C
Border 2 Type	Rectangular Mullion : 50x150mm	D



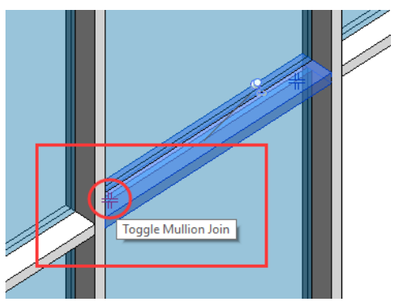
4. Shape of border mullion is different from the interior mullion.



5. Use Make Continuous or Break at Join to change the mullion join status.



6. When a mullion is selected, the mullion join status can be changed by clicking Toggle Mullion Join icon between Make Continuous and Break at Join options



DA-06 Curtain Mullion Profile

Discipline	Architectural
Family	Loadable Family
Category	Profile Mullion
Workset	N/A – will be same as the host Curtain Mullion
Family Naming Convention	PRF- <Functional Type>-HAA-<Section Shape>-<Descriptor 2 (optional)>
Type Naming Convention	<Type (optional)>-<Size>

	Short form	**Description**
Category	PRF	Profile
Functional Type	MUL	Mullion
	REL	Reveal
Originator	HAA	Housing Authority-Architecture & landscape
Descriptor 1	Rectangular	Rectangle
	Round	Round

Example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**	**Type**		**Size**
PRF	-	MUL	-	HAA	-	Rectangular	-	N/A	N/A	-	50x50x5mm

Information Requirement

List of Built-in Parameters

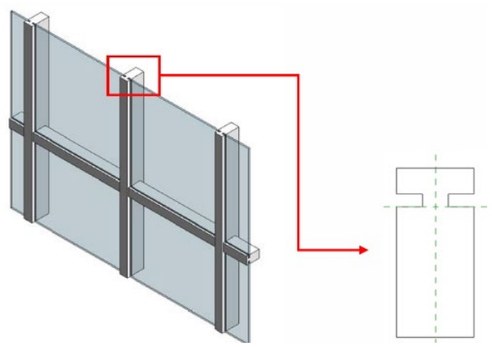
Parameter name	**Information**	**Remark**	**Example**
Section Shape	Section shape of profile	Section shape of profile	Rectangular
Profile Usage	Profile usage	Specify the usage of profile	Mullion
Length	Profile length	Mullion profile length	50mm
Width	Profile width	Mullion profile width	50mm
Diameter	Profile diameter	Profile diameter if it is circular profile	50mm

Model Authoring

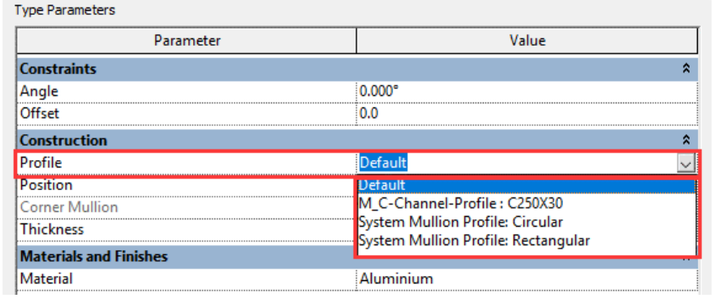
1. Use Metric Profile – Mullion to create Curtain Wall Mullion.



2. Profile is used to define the size and shape of a mullion. Apart from profile-mullion, profile family also helps to define the shape of rail, sweep and reveal on wall etc.



3. Define the mullion shape by select the profile under Mullion Construction.



DA-07 Doors

Discipline	Architectural
Family	Loadable Family
Category	Doors
Workset	Individual Levels
Family Naming Convention	DOR-<Functional Type>-HAA-<Material / Type Mark>-<Descriptor 2 (optional) >
Type Naming Convention	<ICU filter>_<Type>-<Size / optional description>

	Short form	Description
Category	DOR	Door
Functional Type	SGL	Single door
	DBL	Double door
Originator	HAA	Housing Authority-Architecture & landscape
Descriptor 1	MWD_2	Type (combination of “Door Mark” and “Door Number”, separated by “_” underscore)

Example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**		**ICU filter_ Type**		**Door (S.O.) /_Optional Description**
DOR	-	SGL	-	HAA	-	MWD_2	-	(Optional)		Timber_MWD_2	-	910x2150mm

Remarks:
*For consistency, all filter setup for automatic colouring in GBP submission views in HA Project Template use **Type Name** for Material / Description as the filter rules, i.e., wordings for the Material / Description, such as “Concrete”, “Timber”, “Metal”, “Glass”, “SanFit”, shall be included in the type names for applicable model elements.

Optional description may be added to the Type Name, but only if necessary and shall be kept minimum and precise.

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family; Family Type Name	Type of family	Door; Timber_MWD_2-910x2150mm
Level	Door level	The level to which the door is constrained.	L01
Mark (if applicable)	Door number	Door number	-
Sill Height (if applicable)	Base offset from reference level	Base offset from reference level	-
Thickness	Thickness of door panel	Thickness of door panel	50mm
Width	Structural opening width	As-modelled door width; shall be equal Structural opening width	910mm
Height	Structural opening height	As-modelled door height; shall be equal Structural opening height	2150mm

List of Shared Parameter

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
Door Mark	Door Type Mark (for Door Tag)#	Common	Text	Text	Type	MWD
Door Number	Door Type Number (for Door Tag)#	Common	Text	Text	Type	2
Location	Location of door in terms of application (for Door Assembly)#	Common	Text	Text	Type	Kitchen
Frame Width	Width of Door Frame (for Door Assembly)#	Common	Length	Dimensions	Type	900mm
Frame Height	Height of Door Frame (for Door Assembly)#	Common	Length	Dimensions	Type	2070mm
Construction (if applicable)	Metal Door Construction Method (for Door Assembly)#	Common	Text	Text	Type	-
Door Type	Timber Door Type (for Door Assembly)#	Common	Text	Text	Type	TYPE '3'
Frame (if applicable)	Metal Door Frame (for Door Assembly)#	Common	Text	Text	Type	-
Jamb	Door Jamb (for Door Assembly)#	Common	Text	Text	Type	MJ5, MJ14
Head	Door Head (for Door Assembly)#	Common	Text	Text	Type	MH2
Threshold	Threshold (for Door Assembly)#	Common	Text	Text	Type	MC2
Hinges	Door Hinges (for Door Assembly)#	Common	Text	Text	Type	H2 1 1/2 PAIRS **
Closer	Door Closer (for Door Assembly)#	Common	Text	Text	Type	-
Lock/Latch	Door Lock/Latch (for Door Assembly)#	Common	Text	Text	Type	-
Push/Pull	Door Push/Pull (for Door Assembly)#	Common	Text	Text	Type	1 NO. 1mm THICK 100X300mm H. S.S. PUSH PLATE FIXED ON THE PUSH SIDE OF DOOR AND 1 NO. P6 PULL HANDLE FIXED ON THE OTHR SIDE OF DOOR.

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
Door Stop	Door Stop (for Door Assembly)#	Common	Text	Text	Type	S1
Misc.	Misc. (for Door Assembly)#	Common	Text	Text	Type	-
Ironmongery (if applicable)	Metal Door Ironmongery (for Door Assembly)#	Common	Text	Text	Type	-
Master Keying (if applicable)	Metal Door Master Keying (for Door Assembly)#	Common	Text	Text	Type	-
Remarks	Remarks (for Door Assembly)#	Common	Text	Text	Type	FRR OF NOT LESS THAN -/30/30 SELF CLOSING DOOR. DOOR OPENED INWARD. GLAZED PANEL MIN. 15mm THK. FIRE RATED & INSULATED GLASS. ELEVATION OF DOOR VIEW FROM LIVING ROOM.
Door Material	Material of Door	Common	Material	Material and Finishes	Type	Timber – Door
Door Frame Material	Material of Door Frame	Common	Material	Material and Finishes	Type	Timber – Door
Glazing Panel Material	Material of Glazing Panel	Common	Material	Material and Finishes	Type	Glass - Fire Rate & Insulated
Glazing P1 (if applicable)	Material and thickness of glazing pane	Common	Material	Material and Finishes	Type	-
Glazing P2 (if applicable)						-
Glazing P3 (if applicable)						-
Glazing P4 (if applicable)						-
Glazing P5 (if applicable)						-
Glazing Window (if applicable)	Material of Glazing Window	Common	Material	Material and Finishes	Type	Glass, 6mm Patterned Wired Glazing
Door Height	Door Panel Height (for Door Assembly)#	Common	Length	Dimensions	Type	2035mm
Door Width	Door Panel Width (for Door Assembly)#	Common	Length	Dimensions	Type	836mm
Thickness (Door Plate) (if applicable)	Door Metal Plate Thickness	Common	Length	Dimensions	Type	1.5mm
Door Type Mark	The combination of “Door Mark” and “Door Number”	Common	Text	General	Type	MWD-2
Height of Structural Opening	Structural Opening Height (=Height)	Common	Length	General	Type	2150mm
Width of Structural Opening	Structural Opening Width (=Width)	Common	Length	General	Type	910mm
Louvre (if applicable)	Component of door	Common	Yes/No	General	Type	-
FRR (if applicable)	Metal Door Fire Rating	Common	Yes/No	General	Type	-
Door Leaf_Single Leaf	Single Leaf Door	Common	Yes/No	General	Type	Yes
Door Leaf_Double Leaf (if applicable)	Double Leaf Door	Common	Yes/No	General	Type	-
Door Leaf_Triple Leaf (if applicable)	Triple Leaf Door	Common	Yes/No	General	Type	-

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
Door Leaf_Quadruple Leaf (if applicable)	Quadruple Leaf Door	Common	Yes/No	General	Type	-
Door Operation_Sliding (if applicable)	Sliding Door	Common	Yes/No	General	Type	-
Door Operation_Folding (if applicable)	Folding Door	Common	Yes/No	General	Type	-
Door Operation_Swing	Swing Door	Common	Yes/No	General	Type	Yes
Door with Glazing Panel	Door with Glazing Panel	Common	Yes/No	General	Type	Yes
FRR Requirement	Timber Door Fire Rating	Common	Text	General	Type	-/30/30
No. of Louvre Blade (if applicable)	No. of Louvre Blade	Common	Integer	Other	Type	-
No. of Louvre Panel (if applicable)	No. of Louvre Panel	Common	Integer	Other	Type	-
Glazing Thickness (if applicable)	Thickness of glazing	Common	Length	General	Type	15mm

Remark: Parameters marked with **#** in the Information column above are linked to Tag / Assembly for Door Schedule. Please pay extra attention to the Parameter naming which will affect the tagging and scheduling.

Model Authoring

Doors SAM includes:

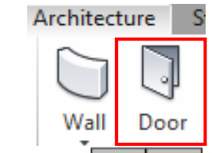
A) Create doors

B) Create ironmongery

Note: Over-modelling should be avoided – modelling of graphical details, such as ironmongery, glass panels and details of louvres are not required.

A) Create doors

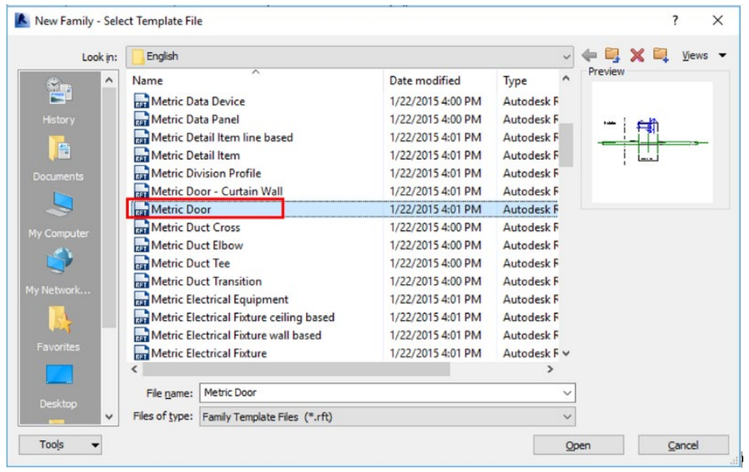
1. Doors are wall hosted components, place door by selecting Architecture > Door.



2. HA Door Family has the following type. Load HA standard Door Family into project. Users should start with HA family and modify for project specific use.

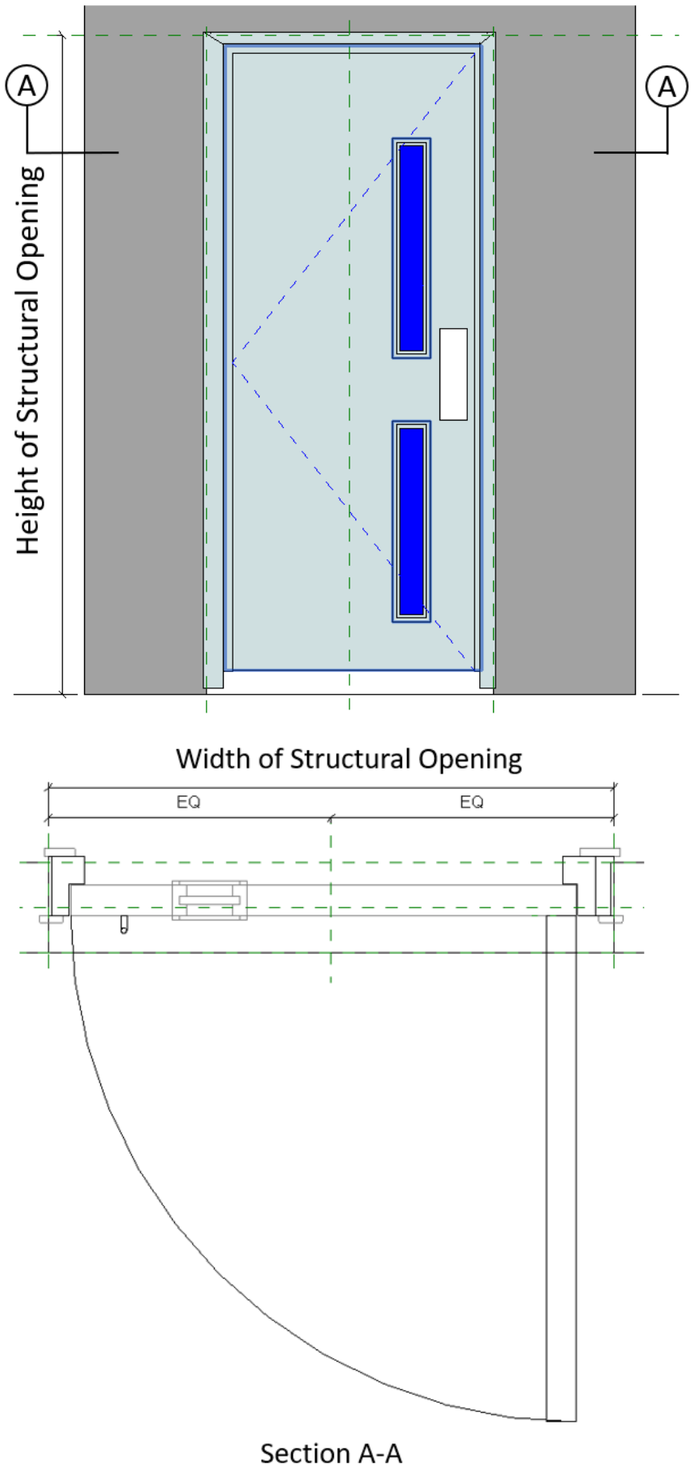


3. Custom Door shall be created by Metric Door Template.

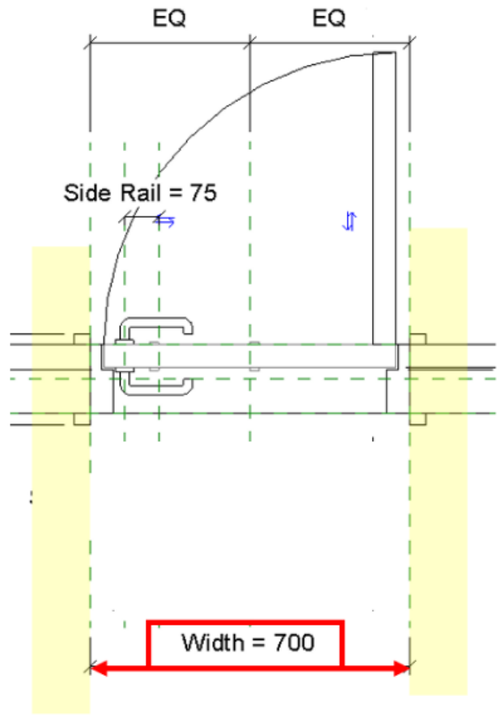


- Use Curtain Panel to create doors in Curtain Walls, details refer to curtain panel section **DA-04**.
- Metal gates and grilles shall be also created by door template.
- In Revit, door width means the structural opening of the door; but in GBP submission, door width means the clear opening width of the door;

Dimensions of Door Family setting shall be modelled as followed:



Revit Door Width shall be as followed.



Remarks:

Height = Height of Structural Opening
Width = Width of Structural Opening

B) Create ironmongery

- In order to extract the Ironmongery Schedule from model, add parameters > Ironmongery (instance) into doors.
- Use HA standard ironmongery for door.
- It is recommended to start with HA family and modify for project specific use.



3D View

DA-08 Shutter/ Fire Shutter

Discipline	Architectural
Family	Loadable Family
Category	Door or Specialty Equipment (for free standing fire shutter only)
Workset	Individual Levels
Family Naming Convention	DOR-FSI-HAA-Fire_Shutter / SPQ-FSI-HAA-Fire_Shutter
Type Naming Convention	<Type>-<Size>

	Short form	**Description**
Category	DOR	Door
	SPQ	Specialty Equipment
Functional Type	FSI	Fire Service Installation
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Fire_Shutter	Fire Shutter

Example

Family name										**Type name**
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**	**Type**	**Size**
DOR	-	FSI	-	HAA	-	Fire_Shutter	-	N/A	Steel	- 1250x2500mm

Information Requirement

List of Built-in Parameters

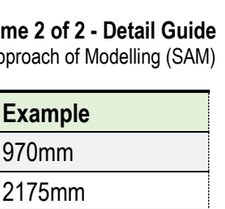
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Shutter
Level	Door level	The level to which the door is constrained.	1/F
Mark	Door number	Door number	10
Sill Height	Base offset from reference level	Base offset from reference level	500mm
Fire Rating	Fire resistance rating	Fire resistance rating	-/60/60
Type Mark	Door mark	Door type mark	Fire Shutter
Thickness	Thickness of door panel	Thickness of door panel	54mm
Width	Structural opening width	Door width	970mm
Height	Structural opening height	Door height	2175mm

List of Shared Parameter

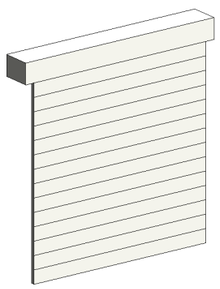
Parameter name	**Information**	**Discipline**	**Type of Parameter**	**Group parameter under**	**Type/ Instance**
Location	Position of door	Common	Text	Others	Instance
Material	Material of door	Common	Text	Others	Type
Fire Rated and Insulated Glass Panel	Component of door; Thickness of glass Panel	Common	Text	Others	Instance
Shutter Box Depth	Depth of Shutter Box	Common	Length	Dimensions	Instance
Shutter Box Height	Height of Shutter Box	Common	Length	Dimensions	Type

Model Authoring

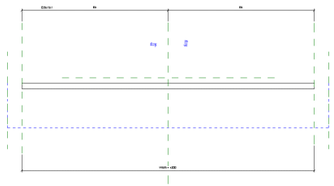
Place Shutter / Fire Shutter by selecting Architecture > Door.



HA Door Family has the following type. Load HA standard Shutter / Fire Shutter Family into project. Users should start with HA family and modify for project specific use.

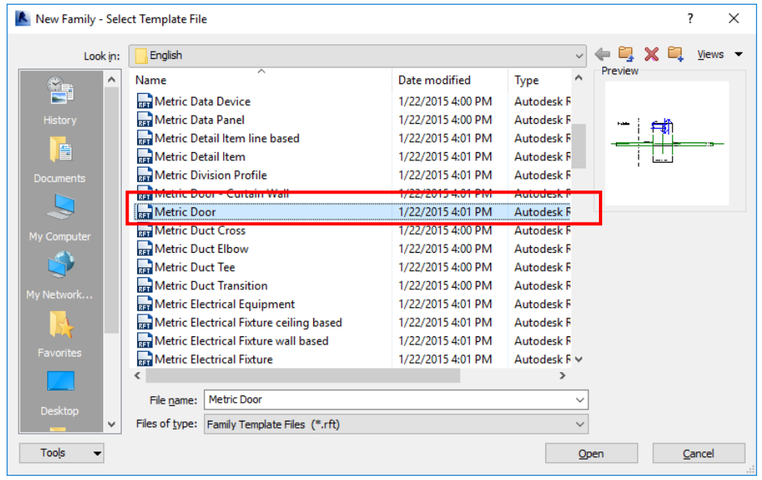


3D View



Plan View

Custom Door shall be created by Metric Door Family.



- Shutter / Fire Shutter shall be created by using Door family template when it is hosted on a wall.
- Shutter / Fire Shutter shall be created by using Specialty Equipment family template when it is free standing.

DA-09 Windows

Discipline	Architectural
Family	Loadable Family
Category	Windows
Workset	Individual Levels
Family Naming Convention	WDW- <Functional Type>-HAA-<Material / Window Type Mark>-
Type Naming Convention	<ICU filter>_<Type>-<Size / Optional Description>

	Short form	**Description**
Category	WDW	Window
Functional Type	CSM	Casement
	AWN	Awning
	FXD	Fixed window
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	MW_X5	Type (combination of “Window Mark” and “Window Number”, separated by “_” underscore)

Example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**		**(ICU Filter)* _Type**		**Window (S.O.) / _Optional Description**
WDW	-	CSM	-	HAA	-	MW_X5	-	(Optional)		Glass_MW_X5	-	0835x1385mm

Remarks:
*For consistency, all filter setup for automatic colouring in GBP submission views in HA Project Template use **Type Name** for Material / Description as the filter rules, i.e., wordings for the Material / Description, such as “Concrete”, “Timber”, “Metal”, “Glass”, “SanFit”, shall be included in the type names for applicable model elements.

Optional description may be added to the Type Name, but only if necessary and shall be kept minimum and precise.

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family, Family Type Name	Window, Glass_MW_X5-835x1385mm
Level	Level of window	The level to which the windows is constrained.	1/F
Sill Height	Base offset from reference level	Base offset from reference level	500mm
Width	Window width (for General); Width of Window Structural Opening (for HA)	As-modelled window width; shall be equal Structural opening width	835mm
Height	Window height (for General); Height of Window Structural Opening (for HA)	As-modelled window height; shall be equal Structural opening height	1385mm
Construction Type	Construction Type	Window located on precast element or not	In-situ Aluminium Window

List of Shared Parameter

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
Window Mark	Window Type Mark (for Window Tag)#	Common	Text	Text	Type	MW
Window Number	Window Type Number (for Window Tag)#	Common	Text	Text	Type	X5
Type of Precast Façade (if applicable)	Type of Precast Façade (for Window Assembly)#	Common	Text	Text	Type	-
Location	Location of window in terms of application (for Window Assembly)#	Common	Text	Text	Type	KITCHEN – TYPE B-2 FLAT
Construction	Construction Method (for Window Assembly)#	Common	Text	Text	Type	50mm CLEAR ANODIZED ALUMINIUM WINDOW SECTIONS WITH 6mm CLEAR FLOAT GLASS/ 6mm TEMPERED GLASS FOR FIXED LIGHT UNDER 1100mm FROM F.F.L.
Window and Structural Opening	Window and Structural Opening (for Window Assembly)#	Common	Text	Text	Type	WIDTH = 825, HEIGHT = 1375 WIDTH = 825(S.O.), HEIGHT = 1385(S.O.)
Remarks (if applicable)	Remarks (for Window Assembly)#	Common	Text	Text	Type	-
Frame	Material of Window frame	Common	Materials	Materials and Finishes	Type	Aluminium
Glazing P1	Material and thickness of glazing pane	Common	Materials	Materials and Finishes	Type	Glass_6mm Clear Glazing
Glazing P2						Glass_6mm Clear Glazing
Glazing P3						Glass_6mm Clear Glazing, Tempered
Glazing P4						Glass_6mm Clear Glazing
Glazing P5						Glass_6mm Clear Glazing, Tempered
Height (S.O.)	Height of Window Structural Opening (=Height)	Common	Length	Dimension	Type	1385mm
Width (S.O.)	Width of Window Structural	Common	Length	Dimension	Type	835mm

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
	Opening (=Width)					
Default Sill Height	Window Sill Height	Common	Length	Dimension	Type	955mm
Off Set from Interior	Offset from Interior	Common	Length	Dimension	Type	150mm
Window Type Mark	The combination of "Window Mark" and "Window Number"	Common	Text	General	Type	MW-X5
Louvre (if applicable)	Component of window	Common	Yes/No	General	Type	-
Sliding (if applicable)	Functional Type of Window	Common	Yes/No	General	Type	-
Window Width (Overall)	Window overall width	Common	Length	General	Type	825mm
Window Height (Overall)	Window overall height	Common	Length	General	Type	1375mm
Fixed Window Width P1	Individual fixed window panel width = Panel Width 1, Panel Width 2, Panel Width 3, …	Common	Length	General	Type	525mm
Fixed Window Width P2						525mm
Fixed Window Width P3						525mm
Fixed Window Height P1	Individual fixed window panel height = Panel Height 1, Panel Height 2, Panel Height 3, …	Common	Length	General	Type	730mm
Fixed Window Height P2						730mm
Fixed Window Height P3						730mm
Openable Window Width P1	Individual openable window panel width = Panel Width 1, Panel Width 2, Panel Width 3, …	Common	Length	General	Type	525mm
Openable Window Width P2						525mm
Openable Window Width P3						525mm
Openable Window Height P1	Individual openable window panel height = Panel Height 1, Panel Height 2, Panel Height 3, …	Common	Length	General	Type	730mm
Openable Window Height P2						
Openable Window Height P3						

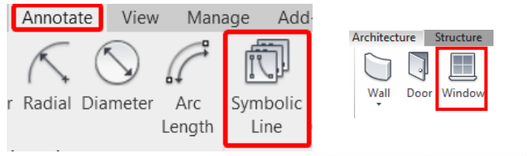
Individual panel number shall be indicated in elevation view of the family for identification.

Remark: Parameters marked with **#** in the Information column above are linked to Tag / Assembly for Door Schedule. Please pay extra attention to the Parameter naming which will affect the tagging and scheduling.

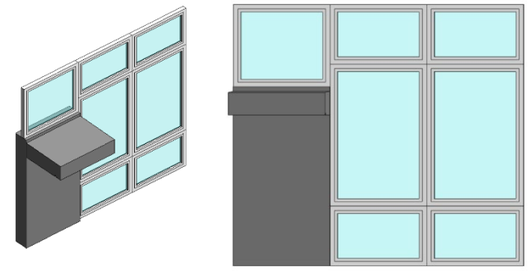
Model Authoring

Note: Over-modelling should be avoided – modelling of graphical details, such as ironmongery, glass panels and details of louvres are not required.

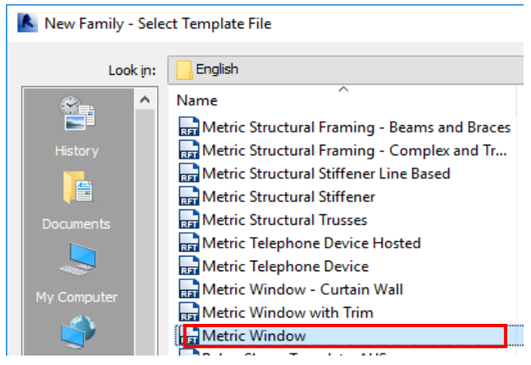
1. Windows are wall host components, place Window by selecting Architecture > Window.



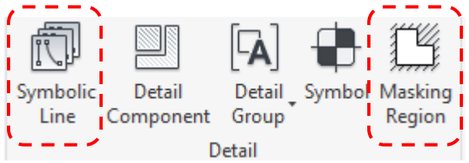
2. Standard Windows Family can be found in Modular Flat Design Model. Users should start with HA family and modify for project specific use.



3. Custom Window shall be created by Metric Windows Family.



4. Symbols, indicated whether a window is openable or fixed, shall be added in the family by using Symbolic Line and Masking Region.



Dimensions of Window Family setting shall be modelled as followed:



Remarks:

Height = Height (S.O.)
Width = Width (S.O.)

DA-10 Floor

Discipline	Architectural
Family	System Family
Category	Architectural Floor
Workset	Individual Levels
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	<Functional Type>-HAA-<Material / description>-<Thickness>

	Short form	Description
Functional Type	AFL	Architectural Floor
	AFF	Architectural Floor Finishes
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
	HAB	Housing Authority-Building Services Engineering
Descriptor 1 (Material / description)	Concrete	Concrete
	Non-absorbent	Impermeable / Non-absorbent
	Tile	Floor tile
	CM	Waterproofing agent mix cement sand
Descriptor 2	150mm	Thickness of the floor
	600x600mm	Floor tile dimension

Type name example

Functional type		Originator		Descriptor 1		Descriptor 2
AFL	-	HAA	-	Slab_Concrete	-	300mm

Remarks:
*For consistency, all filter setup for automatic colouring in GBP submission views in HA Project Template use **Type Name** for Material / Description as the filter rules, i.e., wordings for the Material / Description, such as “Concrete”, “Timber”, “Metal”, “Glass”, “SanFit”, shall be included in the type names for applicable model elements.

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Floor
Level	Level of floor	The level to which the floor is constrained.	1/F
Height Offset From Level	Height offset from level	Height offset from level	0
Area	Area of floor	Area of floor	50m^2
Thickness	Floor thickness	Floor thickness	500mm
Structural Material	Floor;Floor Finishes Material	Floor material	Concrete;HD_Tile-200mm x 200mm
Volume	Volume of floor geometry		300m^3

Model Authoring

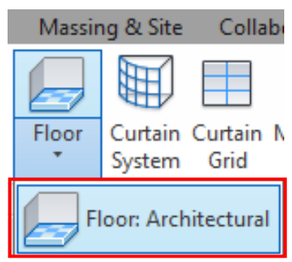
Floor SAM includes:

A) Create floor

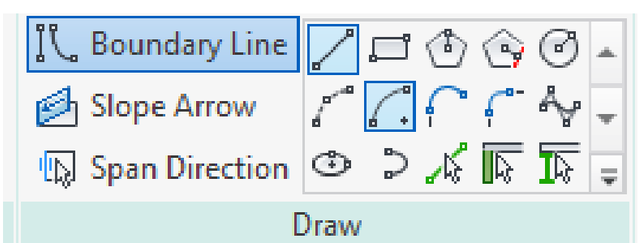
B) Create floor finishes

A) Create floor

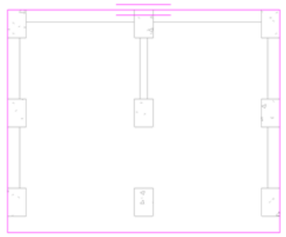
1. Click Architecture > Floor: Architectural.



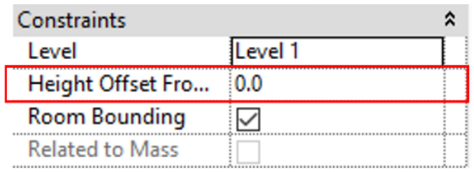
2. Create floor boundary,



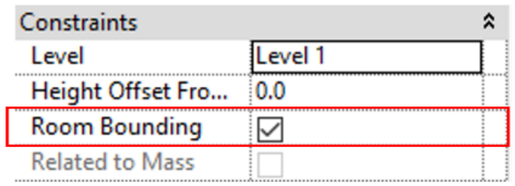
3. Floor boundary shall be drawn along outer edges of floor, regardless of any overlapping columns or structures.



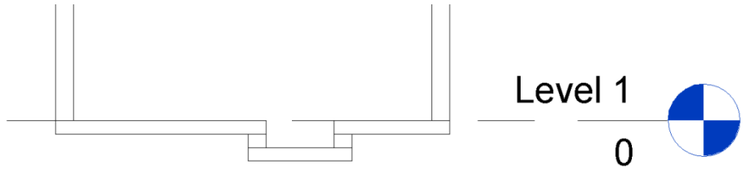
4. Set level and Height Offset from Level at Floor Properties > Constraints. Level shall be where the floor slab is situated, i.e. Raised slab shall have positive offset from a level and sunken slab shall have negative offset from a level.



5. Set Room Bounding to ON unless there is special space definition requirement otherwise specified.



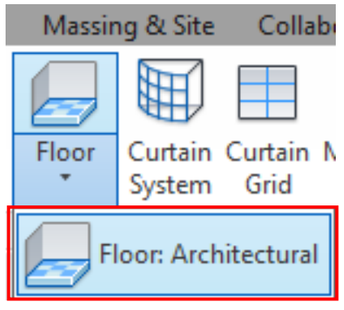
6. Sunken slab shall be modelled as shown below.



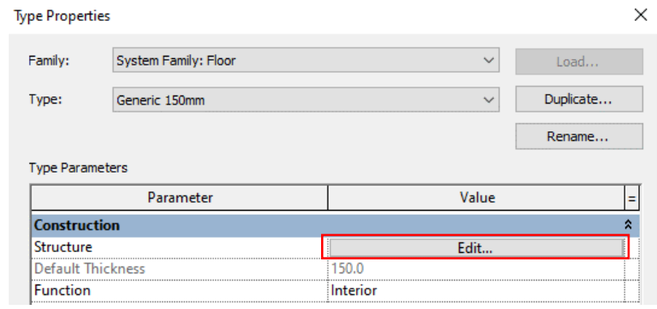
- Since Hong Kong is using Structural Level to indicate building levels, all finishes elements shall be built on top of Structural Floor.
- Architect is required to manage 2 models for architectural discipline and structural discipline (placeholder) for design and drawing production purposes at early stage;
- Commonly used floor types shall be set up to as standard in office standard template file. Information including structure properties and structural material shall be specified.

B) Create floor finishes

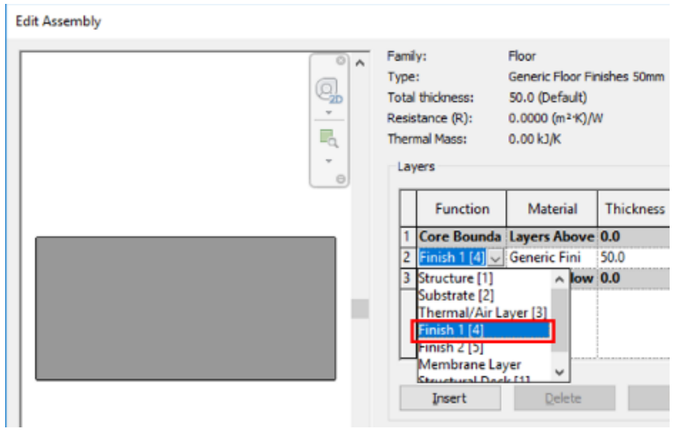
1. Click Architecture > Floor: Architecture.



2. Edit Floor Type, select Floor > Type Properties > Structure >Edit.

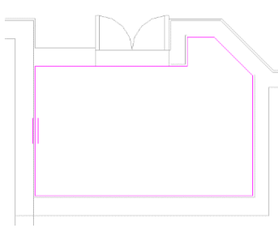


3. Add Finish to architectural floor.

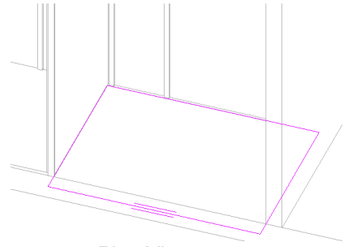


4. Floor finishes boundary to be defined room by room, and to the extent of how the actual construction would be carried out.

Remarks: "Join / unjoin" floors should be avoided under normal circumstances.

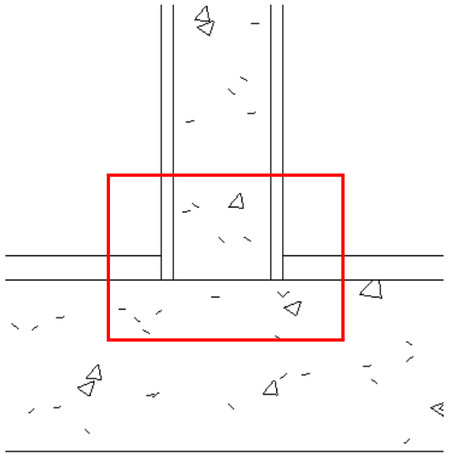


3D View

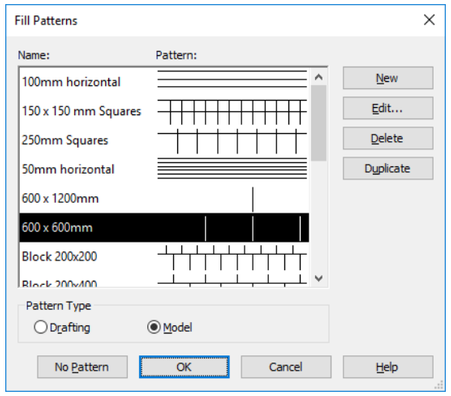


Plan View

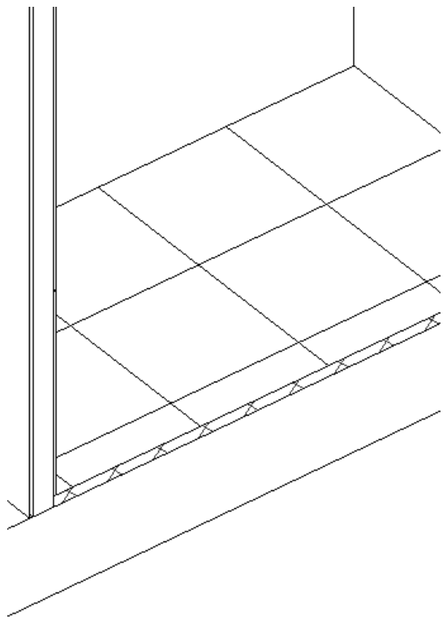
5. Floor finishes shall be built above the structural floor slab level.



6. Model pattern is preferred to be used for tile setting out purpose.



- Material of floor finishes is not critical in preliminary design stage.
- Generic finishes can be applied to facilitate section cut presentation and Finished Floor Level.



DA-11 Floor Opening

Discipline	Architectural
Family	Loadable Family / System Family
Category	Generic Models / Floor Opening
Workset	Vertical Transportation
Family Naming Convention	For Method 1, GMD-<Functional>-HAA-<Opening Shape>-<Descriptor 2 (Optional)> For Method 2, N/A, name of system family is not editable.
Type Naming Convention	For Method 1, <Size> For Method 2, N/A, type naming of Shaft Opening is not editable.

For Method 1 (Void Family)

	Short form	**Description**
Category	GMD	Generic Models
Functional Type	AFO	Floor Opening
Originator	HAA	Housing Authority-Architecture & landscape
Descriptor 1	Rectangular	Rectangular Shape
	Round	Round Shape

Example

Family name										**Type name**
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**		**Size**
GMD	-	AFO	-	HAA	-	Rectangular	-	(Optional)		450mmx450mm
GMD	-	AFO	-	HAA	-	Round	-	(Optional)		Diameter_150mm

Information Requirement

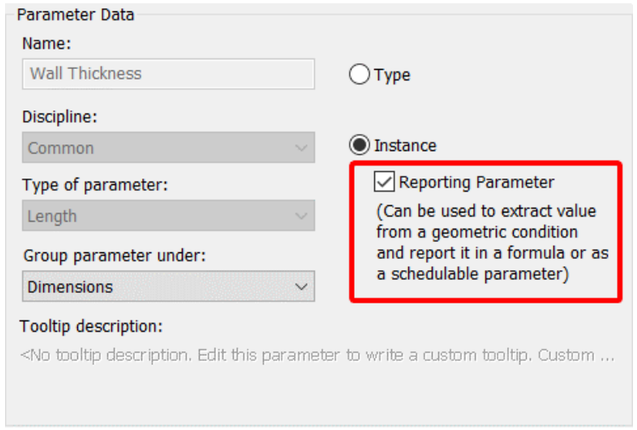
List of Built-in Parameters (Applicable to Method 2 only)

Parameter name	**Information**	**Remark**	**Example**
Base Constraint	Base level	Specify base constraint level	1F, 2F……
Base Offset	Base offset	Specify offset distance from base level	0.0, 100, 200, 250, ……
Top Constraint	Top level	Specify top constraint level	2F, 3F……
Top Offset	Top offset	Specify offset distance from top level for a floor opening	0.0, 100, 200,250……

List of Shared Parameter (Applicable to Method 1 only)

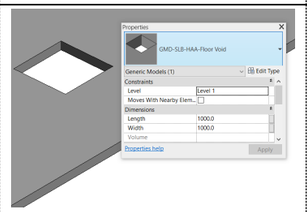
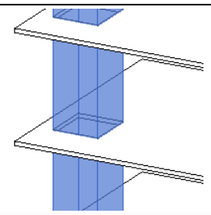
Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
Length	Length of Rectangular Opening	Common	Length	Dimensions	Type	450mm
Width	Height of Rectangular Opening	Common	Length	Dimensions	Type	450mm
Radius	Radius of Round Opening	Common	Length	Dimensions	Type	75mm
Slab Thickness	Floor (Host) Thickness	Common	Length	Dimensions	Instance (Reporting)(*)	150mm

(*) Slab Thickness shall be set as **Instance-Reporting Parameter** and tie to the hosting element in the family, so that when used in project model, the family can acquire the thickness of its host, i.e. the wall.



Model Authoring

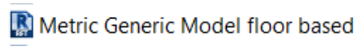
There are 3 methods to make a floor opening – "Void Family (Floor-based)", "Shaft Opening" command and "Edit Profile".

	Method 1 (*) Void Family (Floor-based)	Method 2 Shaft Opening Command	Method 3 Edit Profile
Usage	• Regular opening • Opening that required to be schedulable	• structural opening on floor slab • Lift Shaft • Regular Pipe duct	• Irregular shape opening • Staircase opening
3D View			

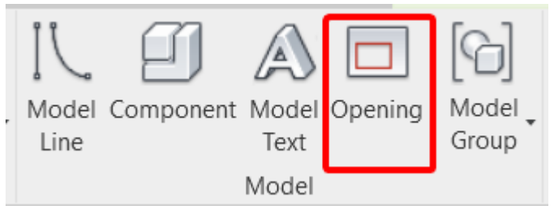
(*) Method 1 shall be adopted, otherwise justification and notification to the project team is required.

For Void Family

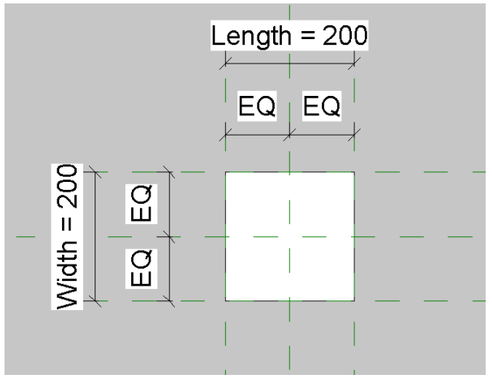
1. Use family (empty **Generic Model floor based**) to create the opening



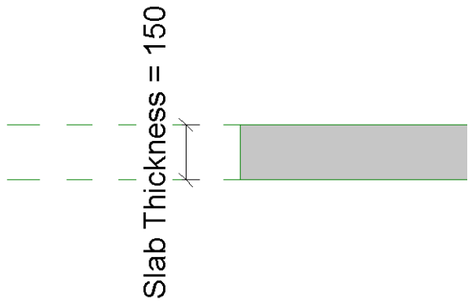
2. Create **Opening Cut** to the host (Floor).



3. Type Name, Slab Thickness and dimensional parameters (e.g. Length and Width for rectangular opening, Radius for round opening) shall be setup within the family.

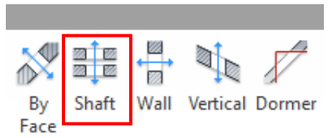


4. Slab Thickness shall be tied to the hosting element (i.e., the Floor) in the family

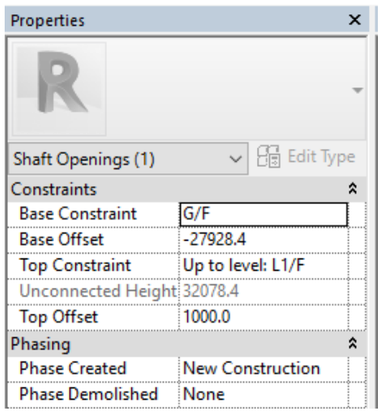


For Shaft Opening Command

1. Use Shaft Opening under Architecture > Opening in Floor plan View.

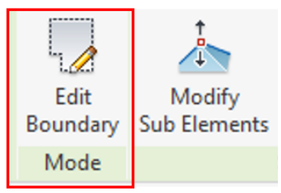


2. Set "Top Offset/Constraint" and "Base Offset/Constraint" to define the shaft opening height.



For Edit Profile

1. Use Edit Boundary to create floor opening.



DA-12 Floor Grating

Discipline	Architectural
Family	Loadable Family
Category	Generic Model
Workset	Individual Levels
Family Naming Convention	GMD- <Functional Type>-HAA-<Type> -<Dimension>
Type Naming Convention	<Type>-<Size>

	Short form	**Description**
Category	GMD	Generic Model
Functional Type	MTL	Metal
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	FloorGrating	Floor Grating

Example

Family name											**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**			**Type**		**Size**
GMD	-	MTL	-	HAA	-	Floor Grating	-	N/A			Type 1	-	350mm

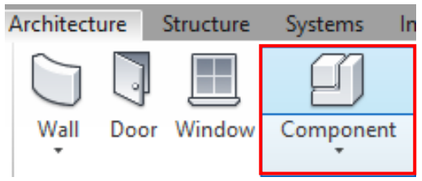
Information Requirement

List of Built-in Parameters

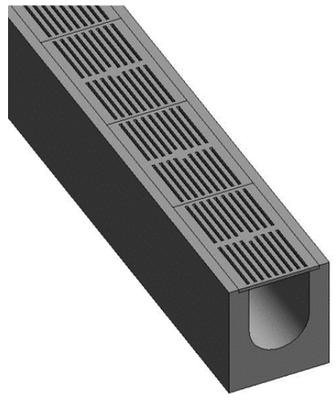
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Floor Grating
Level	Level	The level to which the fire floor grating is constrained.	1/F
Offset	Elevation	Offset from level.	0

Model Authoring

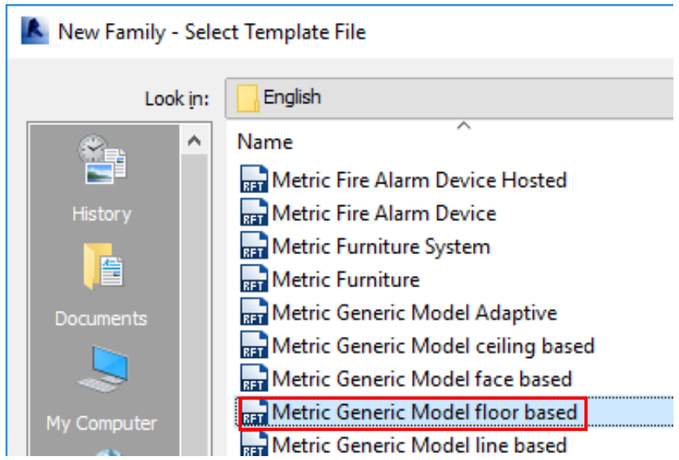
1. Floor Grating is a loadable family. Place Floor Grating by selecting Architecture > Component.



2. HA Floor Grating Family has the following type. Load HA standard family into project. It is recommended to start with HA family and modify for project specific use.



3. Custom Floor Grating shall be created by Generic Model Floor Based template.



DA-13 Roof

Discipline	Architectural
Family	System Family
Category	Roof
Workset	Individual Levels
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	<Functional Type>-HAA-<Material>-<Thickness>

	Short form	Description
Functional Type	BRF	Basic Roof
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
	HAB	Housing Authority-Building Services Engineering
Descriptor 1	ShtMtl	Sheet Metal
	Asphalt	Asphalt
	PPmers	Plastic Polymers
	Tiles	Clay Tiles
Descriptor 2	150mm	Thickness of the roof

Type name example

Functional type		Originator		Descriptor 1		Descriptor 2
BRF	-	HAA	-	Concrete	-	500mm

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Roof Finish
Base Level	Instance	The level to which the roof is constrained.	1/F
Slope	Roof slope	Roof slope	50
Thickness	Thickness of roof	Thickness of roof	300mm
Material	Roof material	Roof material	Tile

Model Authoring

Modelling Type

A) Flat Roof

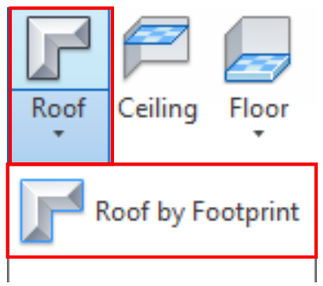
B) Sloped Roof

C) Gable Roof

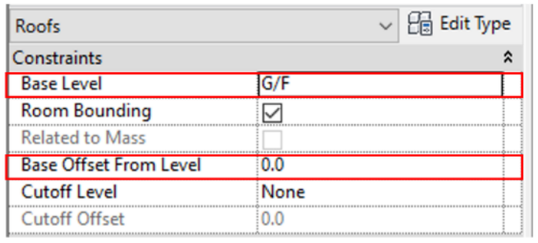
D) Roof by Profile

For Flat Roof

1. Click Architecture > Roof > Roof by Footprint..



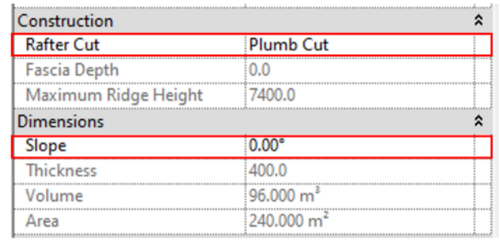
2. In Project Browser, select the floor plan view of “Base Constrain”.



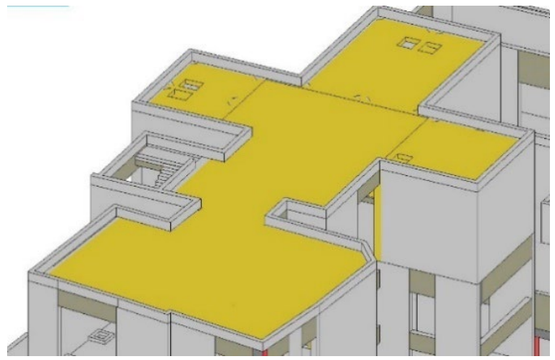
3. Select the drawing method under “Modify | Roof > Draw” and draw on plan.



4. Select Rafter Cut > Plumb Cut and Slope > 0.00.



5. 3D View of Flat Roof.



- Do not use Floor to replace Roof because of the fundamental difference between the two categories (such as layers of materials).
- For typical HA Projects, architectural roof is modelled as flat roof. Minor slope for drainage purpose shall be described in detail items.

DA-14 Skylight

Discipline	Architectural
Family	System Family
Category	Roof
Workset	External Envelop/ Site (depends on location)
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	SGZ-HAA-<Material / Description>-<Thickness>

	Short form	Description
Functional Type	SGZ	Sloped Glazing
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
	HAB	Housing Authority-Building Services Engineering
Descriptor 1	Curtain Panels	Curtain Panel
	Louvres	Curtain panel with louver
	Frame	Curtain panel with framed support
	Spider	Curtain panel with spider
Descriptor 2	8mm	Thickness of the curtain panel

Type name example

Functional type		Originator		Descriptor 1		Descriptor 2
SGZ	-	HAA	-	Curtain Panels	-	8mm

Information Requirement

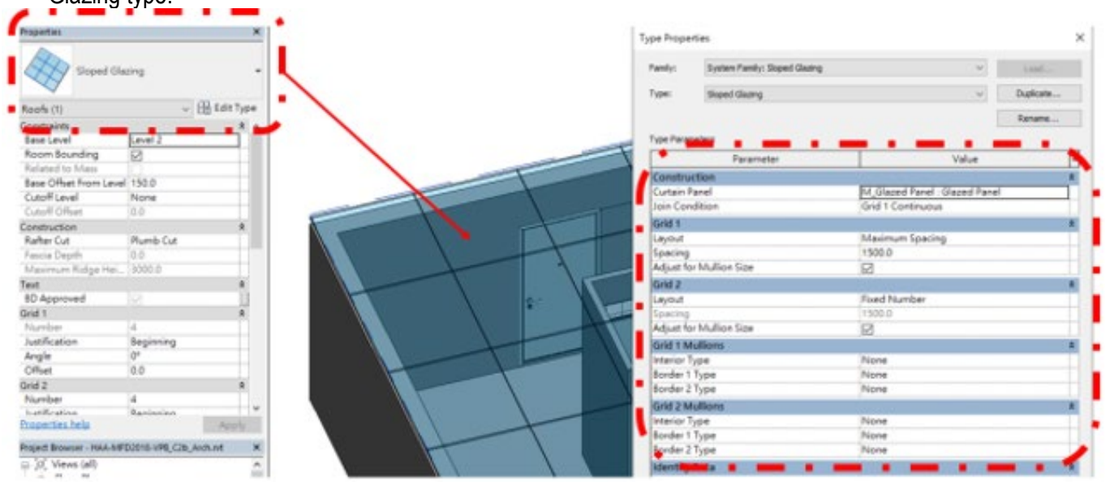
List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Skylight
Angle	Grid 1 / Grid 2 grid angle of alignment	Grid 1 / Grid 2 grid angle of alignment	15°
Offset	Grid 1 / Grid 2 grid offset from justification	Grid 1 / Grid 2 grid offset from justification	200mm
Grid 1	Grid layout and spacing	Specify Grid 1 layout and spacing method	Fixed Distance
Grid 2	Grid layout and spacing	Specify Grid 2 layout and spacing method	Fixed Distance
Curtain Panel	Curtain panel	Specify default curtain panel for specific type of sloped glazing	Glazed
Grid 1 Mullions	Grid 1 Mullions	Specify Grid 1 mullion type	Rectangular mullion:50x50mm
Grid 2 Mullions	Grid 2 Mullions	Specify Grid 2 mullion type	Rectangular mullion:50x50mm

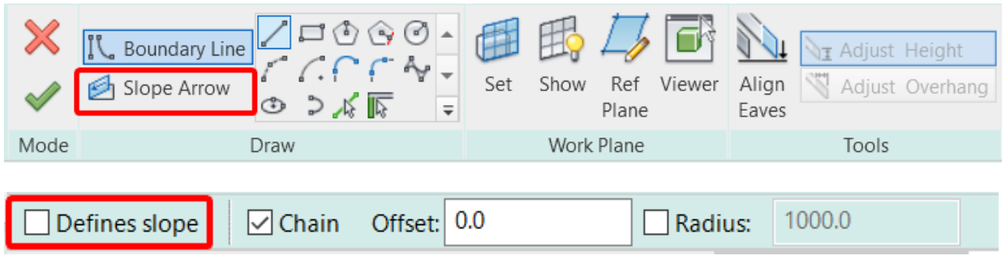
Model Authoring

For skylight with regular geometry

- For flat skylight, follow the same approach for model authoring of flat roof in DA-13, but apply defined Sloped Glazing type.

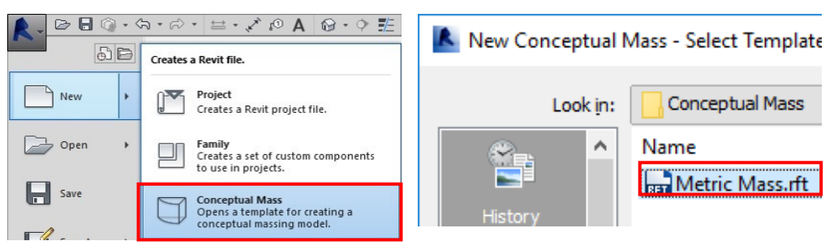


- For regularly sloped skylight, the slope angle and direction can either by applying “Slope Arrow” or “Defines slope” under Edit Footprint:

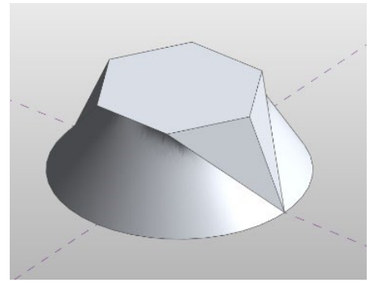


For skylight with irregular / complex geometry to suit special local project condition

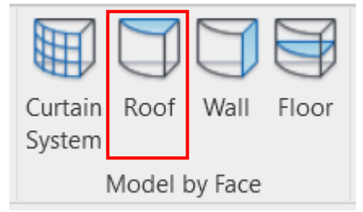
1. Create a Conceptual Mass > Metric Mass family template.



2. Create solid form in template and load into project. (To suit special local project condition only.)

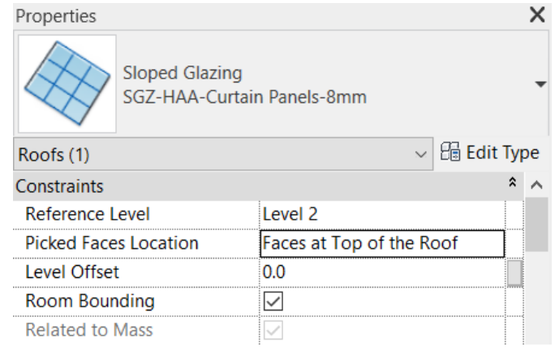


3. Select Massing & Site > Roof (under Model by Face),

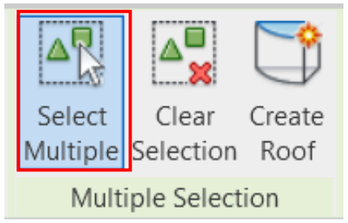


4. Use the defined Sloped Glazing type,

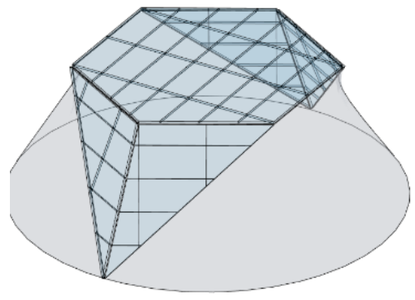
5. Pick Faces Location: whether “Faces at Top of the Roof” or “Faces at Bottom of the Roof



6. Click Multiple Selection > Select Multiple. Pick faces of the mass.



7. Click Create Roof.



- Similar steps for creating mullion and modifying curtain grid, refer to **DA-04** to **DA-06**.

DA-15 Stairs

Discipline	Architectural & Structural
Family	System Family
Category	Stair
Workset	Vertical Transportation
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	<Functional Type>-HAA-<Material / Description>-<Calculation Rule Dimension>

	Short form	**Description**
Functional Type	ASF	Architectural Stair Finishes
	STR	Stair
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
	HAB	Housing Authority-Building Services Engineering
Descriptor 1	Precast	Precast Stair
	Steel	Steel Stair
Descriptor 2	175x260mm	Dimension of riser and tread

Type name example

Functional type		**Originator**		**Descriptor 1**		**Descriptor 2**
STR	-	HAA	-	Precast	-	175x260mm

Information Requirement

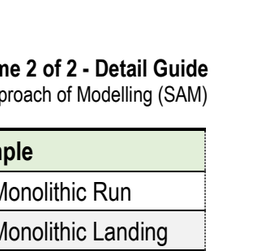
List of Built-in Parameters

Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Cast-In-Place Stair
Minimum Tread Depth	Minimum Tread Depth	Complied with Building Regulations	225mm
Maximum Riser Height	Maximum Riser Height	Complied with Building Regulations	175mm
Minimum Run Width	Minimum Run Width	Complied with Building Regulations	1100mm
Run Type	Run Type	Run Type	Non Monolithic Run
Landing type	Landing type	Landing type	Non Monolithic Landing
Width	Width of stair	Actual Width of stair	1100mm
Tread Thickness	Thickness of tread finishes	Thickness of tread finishes (if applicable)	50mm
Base Constraint	Base level	Specify base constraint level	1F, 2F……
Base Offset	Base offset	Specify offset distance from base level	0.0, 100, 200, 250,……
Top Constraint	Top level	Specify top constraint level	2F, 3F……
Top Offset	Top offset	Specify offset distance from top level.	0.0, 100, 200,250……
Desired Number of Riser	Desired number of riser	Desired number of riser	20
Type Mark	Staircase number	Staircase number	STAIRCASE-01

This section shall read in conjunction with DS-U 06 Staircases for structural staircases.

Model Authoring

1. Create Stair, click Architecture > Stair by Component.

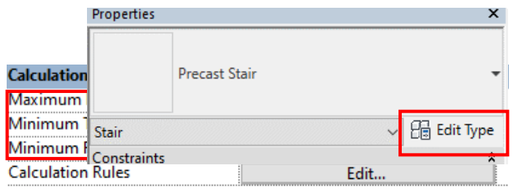


2. Select Type > Precast Stair



3. Click Edit Type Under Properties

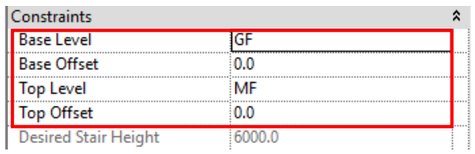
4. Set minimum and maximum stair calculation rules.



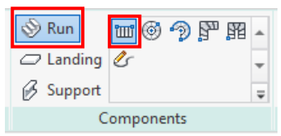
5. Setting of Stair End Connect (Precast Stair) as Straight Cut.



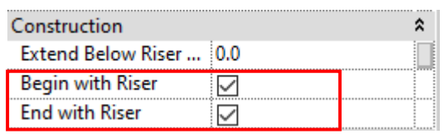
6. Set the Base Level/ Base Offset and Top Level/ Top Offset.



7. Select Components > Run, then place the run of the stairs.



8. Select part of runs of stairs, to change the Setting Construction (Properties) for Stair Run as Begin with Riser and End with Riser.



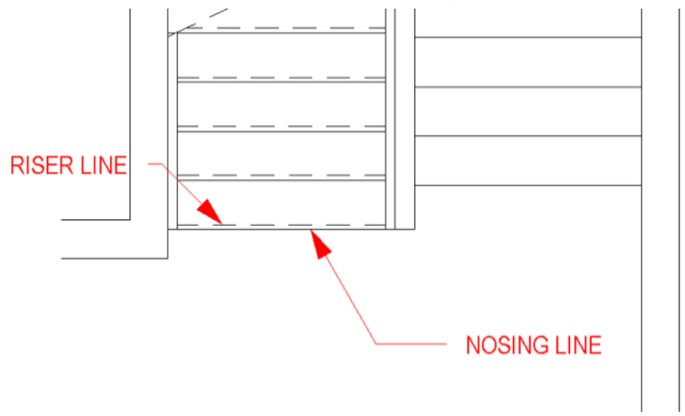
9. Then Click OK.

ICU GBP Submission (DDRP) Annotation / Presentation of Stair

- Use tag to annotate staircase number, the corresponding parameter is under stair Text property.



- Staircase arrow is advised to be turn off at all times.
- Use additional annotation family for staircase arrow.
- For staircase with slanted riser, riser line is advised to be switch off under Visibility and Graphics; otherwise the riser will be shown as hidden line in floor plan with nosing shown as solid line.



Workset

- Workset of stair to be define base on the staircase location and function.
- Indoor stair to be built under Workset Vertical Transportation, or under its own level Workset 1F (ARC-1F);
- External stairs to be built under Workset External Works.

Stair Location	Function	Workset
Indoor	Fire stair	Vertical Transportation
	Steps (for level difference within same storey)	1/F or ARC-1/F
External area	Steps	External Works

DA-16 Ramp

Discipline	Architectural
Family	System Family
Category	Ramp
Workset	Individual Levels / External Work
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	<Functional Type>-HAA-<Material>-<Slope>

	Short form	Description
Functional Type	RAP	Ramp
	ARF	Architectural ramp finishes
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
Descriptor 1	Concrete	Concrete ramp
	Metal	Metal or Steel ramp
Descriptor 2	8	1:8 slope
	12	1:12 slope

Type name example

Functional type		Originator		Descriptor 1		Descriptor 2
RAP	-	HAA	-	Concrete	-	1:8 slope

Remarks:
*For consistency, all filter setup for automatic colouring in GBP submission views in HA Project Template use **Type Name** for Material / Description as the filter rules, i.e., wordings for the Material / Description, such as “Concrete”, “Timber”, “Metal”, “Glass”, “SanFit”, shall be included in the type names for applicable model elements.

Information Requirement

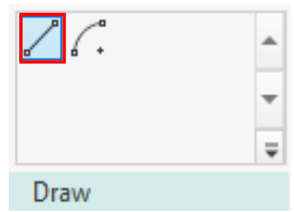
List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Ramp
Slope	Slope of ramp	1:12 for disabled access	1:12 for disabled access
Width	Width of ramp	Be aware of width include or not including handrails	1100mm
Base Constraint	Base level	Specify base constraint level	1F, 2F……
Base Offset	Base offset	Specify offset distance from base level	0.0, 100, 200, 250,……
Top Constraint	Top level	Specify top constraint level	2F, 3F……
Top Offset	Top offset	Specify offset distance from top level.	0.0, 100, 200,250……
Type Mark	Ramp mark	Ramp mark	Ramp-01
Ramp Material	Ramp material	Ramp material	30D/20_Mass Fill
Maximum Incline Length	Maximum incline length	Maximum incline length	2500mm
Ramp Max Slope(1/x)	Type	Ramp max slope(1/x)	1/10

Model Authoring

1. Click Architecture > Ramp

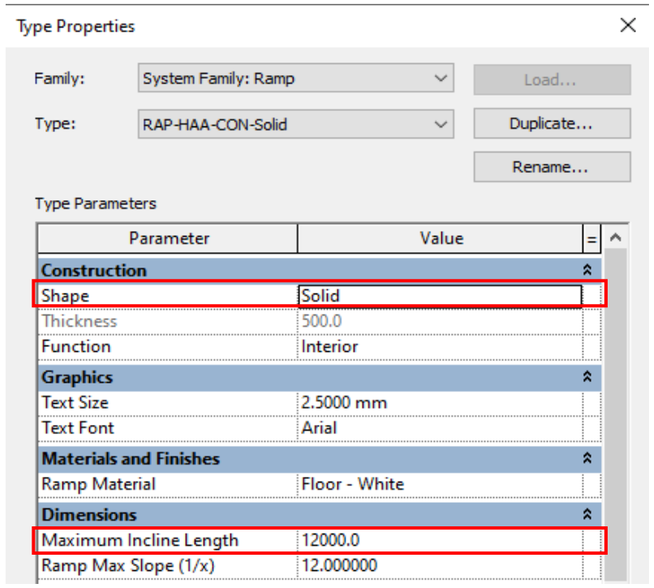
2. Click Modify | Create Ramp Sketch tab > Draw Panel, and select either Line or Center-ends Arc.



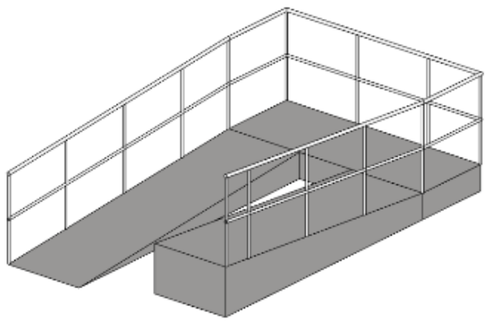
3. Place the cursor in the drawing area, and drag to sketch the ramp run.



4. Click Edit Type, change Shape > Solid and Ramp Max Slope (1/x) > 12.000



5. Click Finish Edit Mode.



DA-17 Railing

Discipline	Architectural
Family	System Family
Category	Railing
Workset	Individual Levels
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	<Functional Type>-HAA-<Material>-<Top rail height>

	Short form	**Description**
Functional Type	ARL	Architectural railing
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Metal	Metal railing
	Glass	Railing with glazing panel
Descriptor 2	900mm	Top rail height at 900mm
	1050mm	Top rail height at 1050mm

Type name example

Functional type		**Originator**		**Descriptor 1**		**Descriptor 2**
ARL	-	HAA	-	Metal	-	1050mm

Remarks:
*For consistency, all filter setup for automatic colouring in GBP submission views in HA Project Template use **Type Name** for Material / Description as the filter rules, i.e., wordings for the Material / Description, such as “Concrete”, “Timber”, “Metal”, “Glass”, “SanFit”, shall be included in the type names for applicable model elements.

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Railing
Base Constraint	Base level	Specify base constraint level for a railing	1F, 2F……
Base Offset	Base offset	Specify offset distance from base level	0.0, 100, 200, 250,……
Length	Length of railing	Length of railing	15000mm
Railing Height	Height of railing	Height of railing	1100mm
Rail Structure (Non-continuous)	Type of rail structure	Type of rail structure	Circle rail
Baluster Placement	Type of baluster	Type of baluster	Circular baluster

Model Authoring

Railing SAM includes:

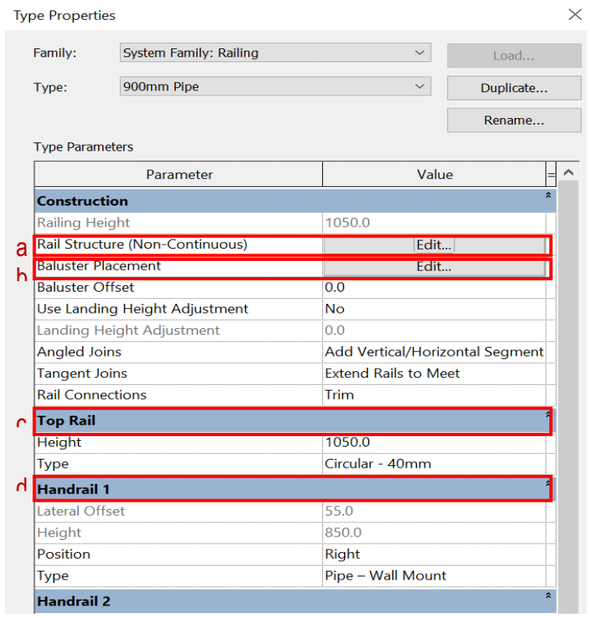
A) Components of railing

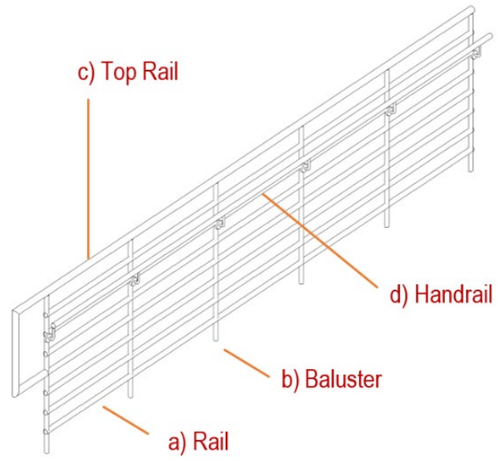
B) Create railing

A) Components of railing

Railing is a composite element made up of the following components:

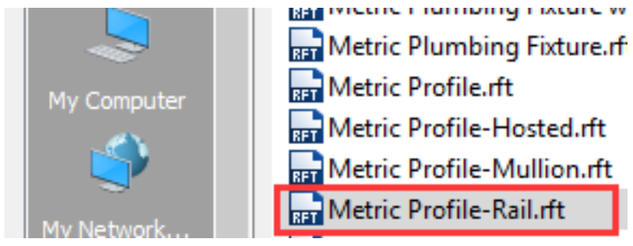
i) Rails (Intermediate)
ii) Baluster
iii) Top Rail
iv) Handrail



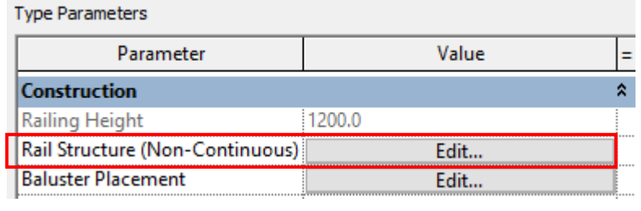


i) Create intermediate rail

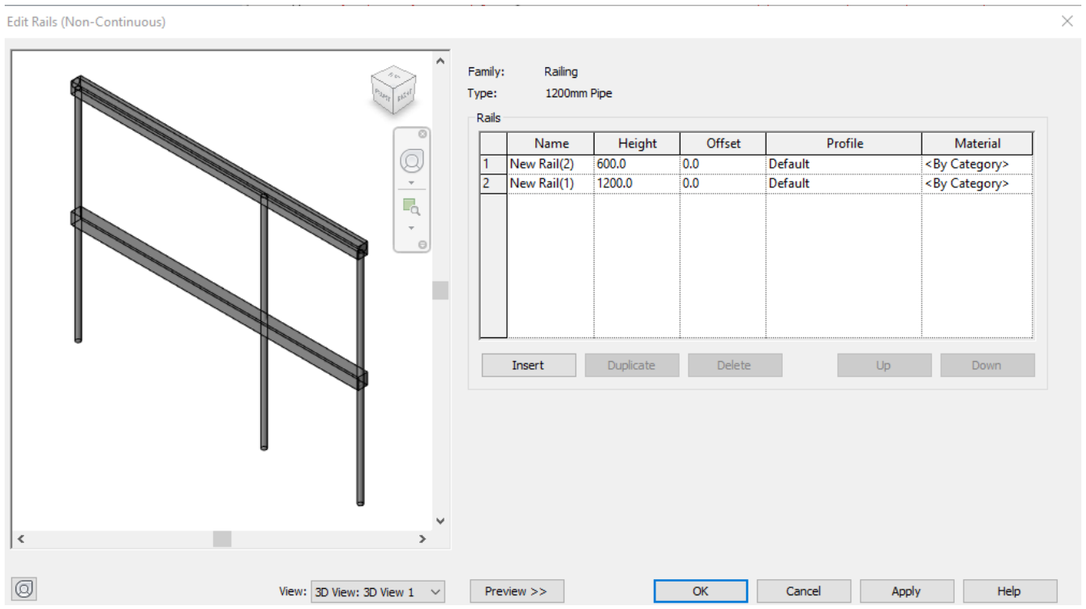
1. Create Rail profile by Metric Profile-Rail and load into projects.



2. Click Rail Structure (Non Continuous) > Edit

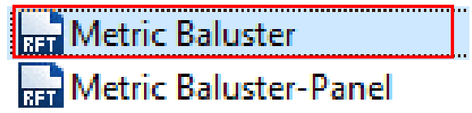


3. Click Insert to add new intermediate rail. Adjust Height, Offset and Profile of rail setting Click Preview to show default 3D view of the railing.

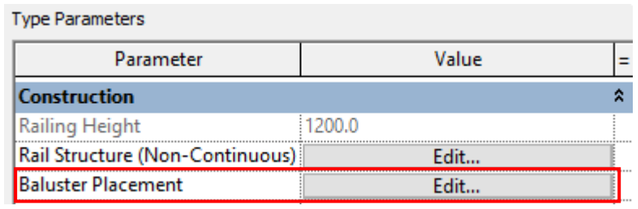


ii) Create baluster

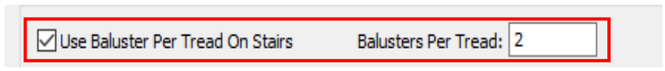
1. Create Baluster by Metric Baluster and load into projects.



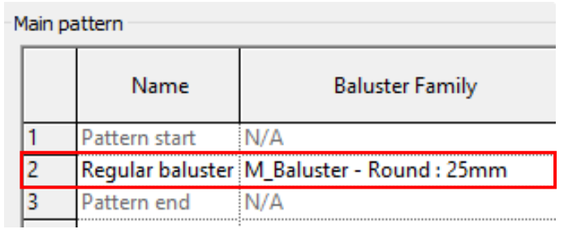
2. Click Baluster Placement > Edit.



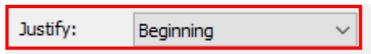
3. Tick the box Use Baluster Per Tread On Stair and set Balusters Per Tread to 2.



4. Set the main pattern of baluster pattern, also turn off Preview can help to understand the change of each setting.

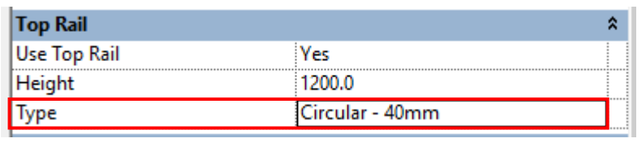


Set the Justify to Beginning

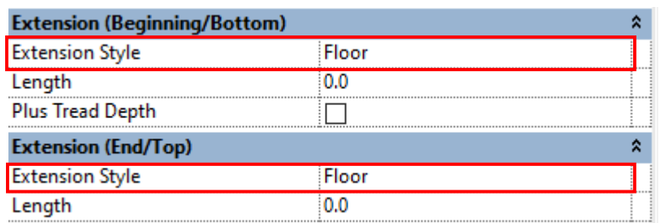


iii) Edit top rail

1. Click Type under Top Rail

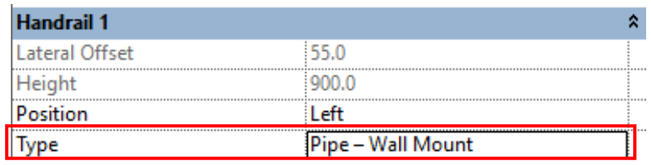


2. Edit Extension for Top Rail

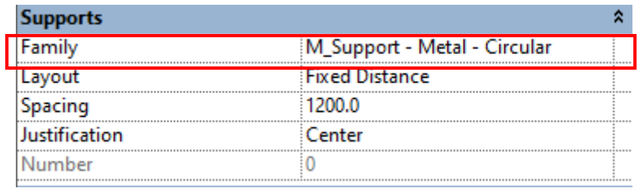


iv) Edit handrail

1. Click Type Under Handrail 1.



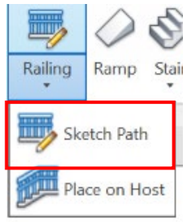
2. Select Supports Family the link the Handrail to the railing.



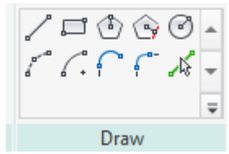
B) Create railing

Railing can be built as either a free-standing element or be an element hosted by wall, slab, stair or ramp.

1. The Railing can be created under Architecture > Circulation > Railing > Sketch Path".



2. Use Draw Tools to create the path.

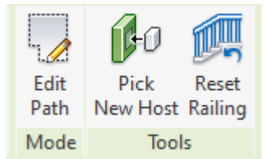


3. Can manual select Type of Slope and value of Height Correction.

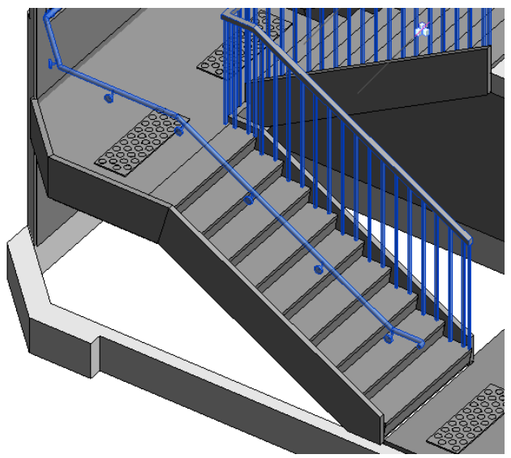


4. Then Click OK.

5. Select the Railing, the click Modify | Railings > Pick New Host.



6. Then click the Stair to host the railing.



DA-18 Tactile

Discipline	Architectural
Family	Loadable Family
Category	Specialty Equipment
Workset	Individual Levels
Family Naming Convention	SPQ-OTR-HAA-Tactile-<Dimension>
Type Naming Convention	<Type>-<Size (optional)>

	Short form	**Description**
Category	SPQ	Special Equipment
Functional Type	OTR	Others
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Tactile	Tactile
Descriptor 2	300x300mm	Dimension of the tactile

Example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**	**Type**		**Size**
SPQ	-	OTR	-	HAA	-	Tactile	-	300x300	Type 1	-	N/A

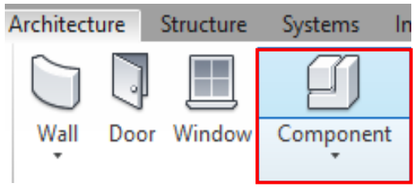
Information Requirement

List of Built-in Parameters

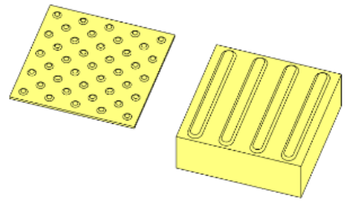
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Hatch
Level	Level	The level to which the tactile is constrained.	1/F
Offset	Elevation	Offset from level.	0

Model Authoring

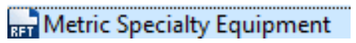
1. Tactile is face based host component, place Tactile by selecting Architecture > Component > Place Component



2. HA Tactile Family has the following type. Load HA standard family into project. Users should start with HA family and modify for project specific use.



3. Custom Tactile shall be created by Specialty Equipment family template.



DA-19 Ceiling

Discipline	Architectural
Family	System Family
Category	Ceiling
Workset	Individual Levels
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	CEL-HAA-<Material>-<Dimension>

	Short form	**Description**
Functional Type	CEL	Ceiling
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	GYM	Gypsum board ceiling
	MTL	Metal ceiling
Descriptor 2	600x600mm	Ceiling grid at 600x600mm
	500x1000mm	Ceiling grid at 500x1000mm

Type name example

Functional type		**Originator**		**Descriptor 1**		**Descriptor 2**
CEL	-	HAA	-	GYM	-	600x600mm

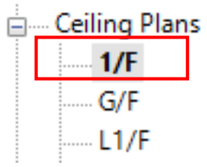
Information Requirement

List of Built-in Parameters

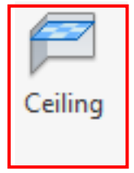
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Ceiling
Level	Level	The level to which the ceiling is constrained.	1/F
Height Offset From Level	Height Offset From Level	Offset from level.	3500mm
Area	Ceiling area	Ceiling area	3908.03m^2
Materials	Ceiling material	Ceiling material	Gypsum Wall Board
Thickness	Ceiling thickness	Ceiling thickness	75mm

Model Authoring

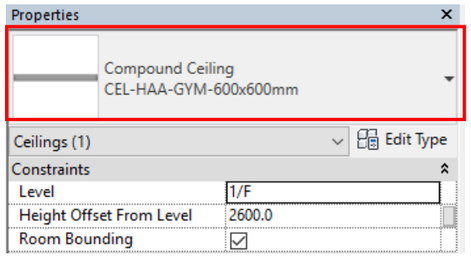
1. Open a ceiling plan view.



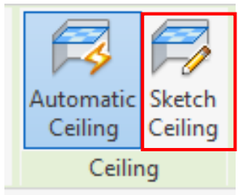
2. Click Architecture > Build > Ceiling.



3. In Type Selector, select a ceiling type.



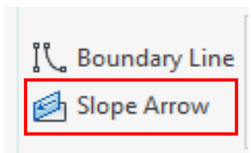
4. Place a ceiling by clicking Sketch Ceiling.



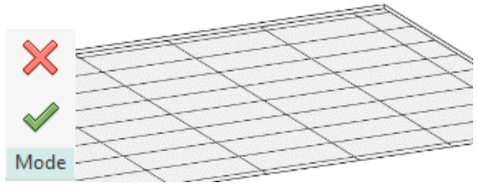
5. Use tools in the Draw panel to sketch the boundary of ceiling.



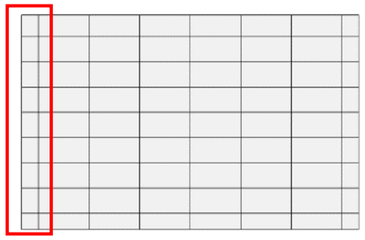
6. Click Slope Arrow to create slope ceiling (optional).



7. Click Finish Edit Mode



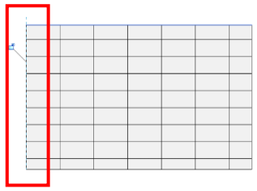
8. To adjust ceiling grid alignment, change Graphic Display Options > Hidden Line.



9. Click Modify > Align.



10. Then align the ceiling grid to the edge of the ceiling boundary.



DA-20 Sanitary Fitment

Discipline	Architectural
Family	Loadable Family
Category	Plumbing Fixtures
Workset	Individual Levels
Family Naming Convention	PLM-<Functional Type>-HAA-<Descriptor 1>-<Descriptor 2>
Type Naming Convention	<ICU Filter>_<Type>-<Size>

	Short form	Description
Category	PLM	Plumbing Fixtures
Functional Type	SNK	Sink / Wash Basin
	WCS	Water Closet
	SHR	Showerset
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Kitchen	(For sink) Location
	Wash_Basin	(For wash basin) Basin
	Showerset	(For Shower Set) Showset
Descriptor 2	Flush_Valve	(Water Closet Type) Flush_Valve
	Single	(Sink Type) Single
	Accessible	Accessible Sanitary Fitment equipment
	Ty1	Type

Example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**	**(ICU Filter)*_Type**		**Size**
PLM	-	SHR	-	HAA	-	Showerset	-	(Optional)	Sanfit_Showerset _Ty1_A	-	(Optional)
PLM	-	SNK	-	HAA	-	Wash_Basin	-	Ty1	Sanfit_Basin_Ty1	-	(Optional)

Remarks:
*For consistency, all filter setup for automatic colouring in GBP submission views in HA Project Template use **Type Name** for Material / Description as the filter rules, i.e., word **"SanFit"** shall be included in the type name for applicable Sanitary Fitment family.

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Wash basin, Sink unit, WC, etc.
Level	Level	The level to which the furniture is constrained	1/F
Offset	Elevation	Offset from level	0

List of Shared Parameter

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
Wash Basin						
Location	Wash Basin Location	Common	Text	Text	Type	Bathroom*
Type	Type	Common	Text	Text	Type	Basin
Basin Material	Material	Common	Material	Material and Finishes	Type	Ceremic – White Vitreous China
Length	Length	Common	Length	Dimension	Type	500mm
Width	Width	Common	Length	Dimension	Type	410mm
Type Mark	Mark	Common	Text	General	Type	B1, B2, B2a
Sink						
Location	Sink Location	Common	Text	Text	Type	Kitchen*
Type	Type	Common	Text	Text	Type	Sink Unit
Material	Material	Common	Material	Material and Finishes	Type	Stainless Steel – Single bowl
Type Mark	Mark	Common	Text	General	Type	MSU-1
Sink Length	Length	Common	Length	General	Type	800mm
Sink Width	Width	Common	Length	General	Type	500mm
Sink Height	Height	Common	Length	General	Type	860mm
Sink Top Slab Thickness	Sink Top Slab Thickness	Common	Length	General	Type	75mm
Water Closet						
Location	Water Basin Location	Common	Text	Text	Type	Bathroom*
Type	Type	Common	Text	Text	Type	W.C.

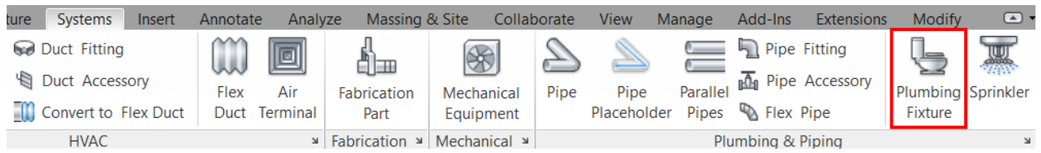
Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
Water Closet						
Capacity	Capacity	Common	Text	Text	Type	6 Litres
Flush Type – Single Flush	Flush Type	Common	Yes/No	Text	Type	
Flush Type – Double Flush	Flush Type	Common	Yes/No	Text	Type	
Material	Material	Common	Material	Materials and Finishes	Type	Ceremic – White vitreous china
Type Mark	Mark	Common	Text	General	Type	WC1, WC2, WC3
Extended Lever	Extended Lever	Common	Yes/No	Other	Type	
Length	Length of water closest	Common	Length	General	Type	670mm
Width	Width of water closest	Common	Length	General	Type	390mm

*The information of “Flat Type” (e.g. C-1(a)) shall be included in the shared parameter of the project.

Model Authoring

Place Plumbing Fixture

- Architectural Plumbing Fixture can be placed by Architecture > Component > Place a component, or by Systems > Plumbing Fixture



- It is suggested to use free-standing Plumbing Fixture family template to create Sanitary Fitment family.

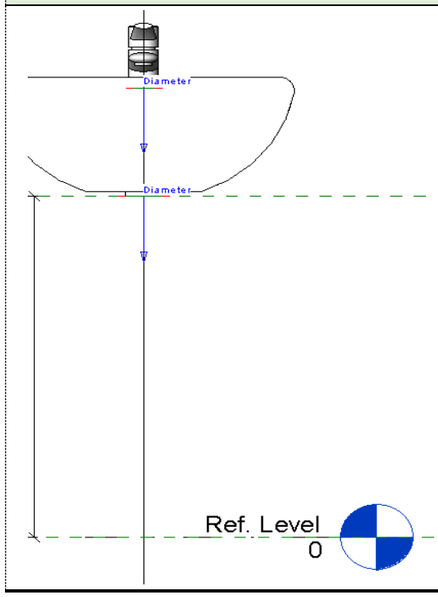
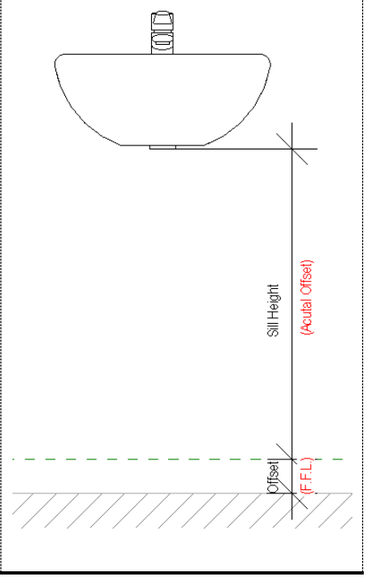
  If the family is created as wall- / floor- / ceiling- / face- based family, the family may be deleted in the project when the host is adjusted or removed.

3D model family

- Fixtures and equipment shall be modelled in proper orientations in each view as same as the products.
- The insertion point (intersection point of two default reference plane in Revit Family) of the equipment’s and fixtures’ families shall be well defined.

- Levels in Revit are regarding to structural floor level, therefore the thickness of floor finished shall be added to the “Offset” when placing a component on plan.

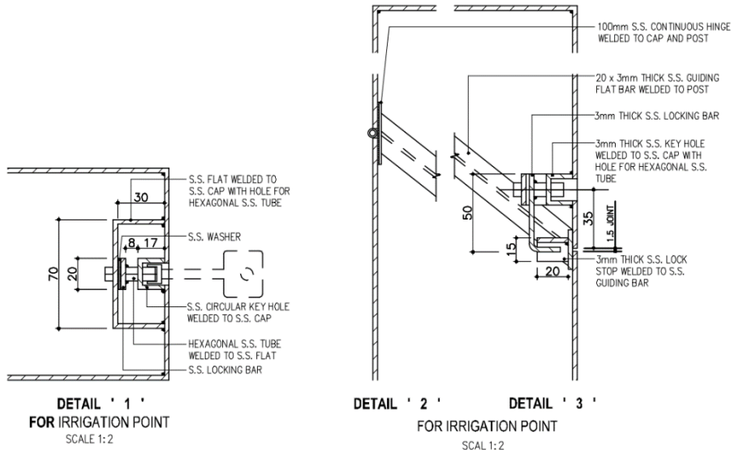


Family	Project
	

- To update the family with new design or adopt the change between design phase and construction phase stated below, load the new family with same family name and insertion point into the project file, the old design will be replaced automatically.
- Update the information of the fixtures and equipment, such as flow rate, pressure drop etc, according to the specifications at construction phase.

Difference between design phase and construction phase in handling Sanitary Fitment family	
Design Phase	Construction Phase
Generic design for equipment’s and fixtures’ families Components cannot contain brand name and supplier’s information.	Detail product model number, type and dimension shall be applied to the components’ families. Detail information including brand name, supplier’s information and properties is required.

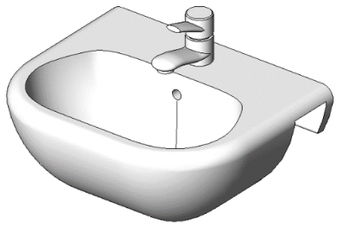
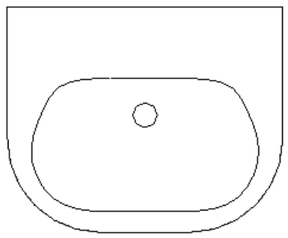
- All installation details such as below figure shall not be modelled on family or project model.



- Installation details shall be drawn in drafting view using Detail Line and other annotations.
- For the existing details in CAD format, refer to Section **PS-12** 2D Details under Section **D5.3** Model and Drawing Detail.

Annotation family (Symbol)

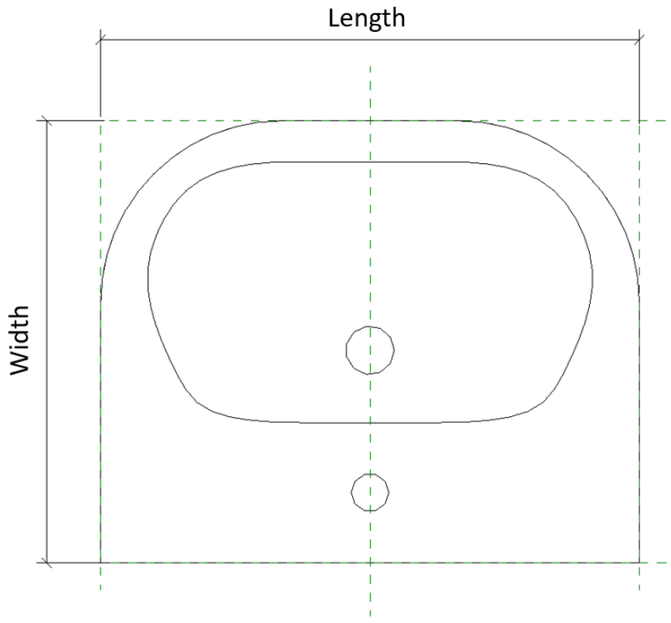
- The visibility setting shall be well set to define the presence of 2D symbol and 3D model in different detail level and views.

Description	3D Model (For elevation and 3D view)	2D Symbol (For plan view only)
Shower		

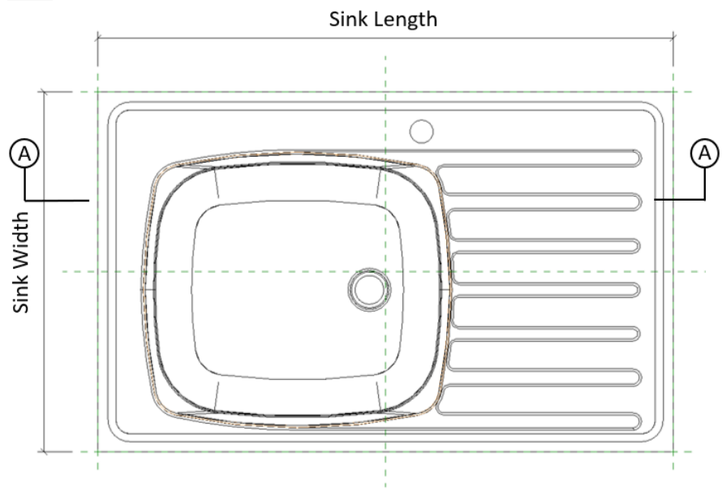
- All symbols shall refer to the HA Standard.

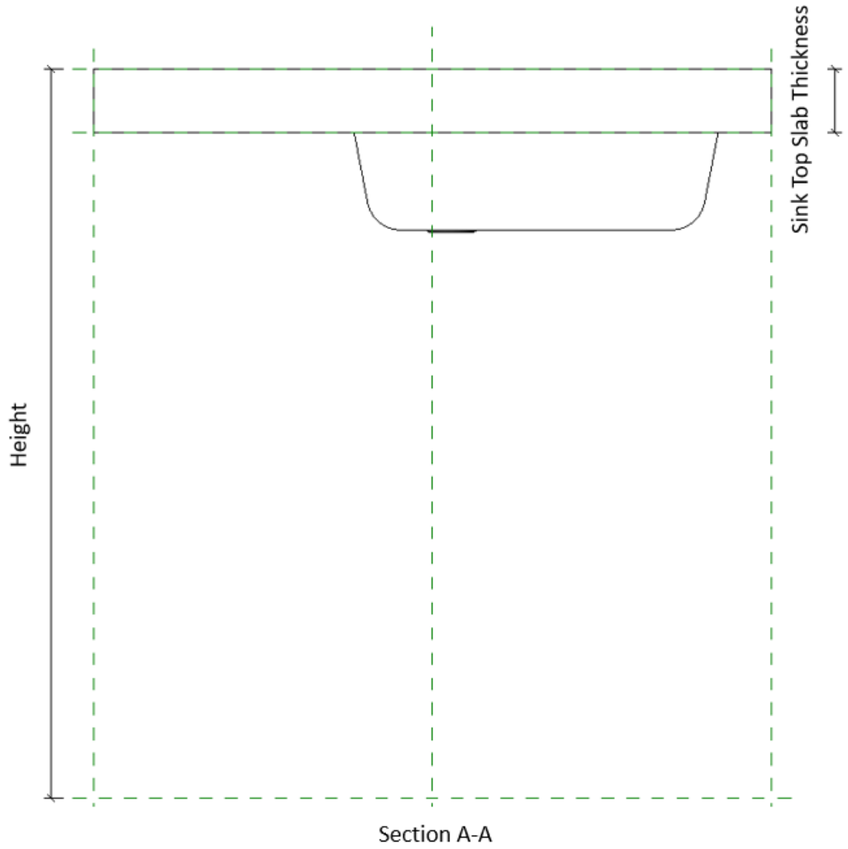
Dimensions of Plumbing Fixture Family setting shall be modelled as followed:

Wash Basin

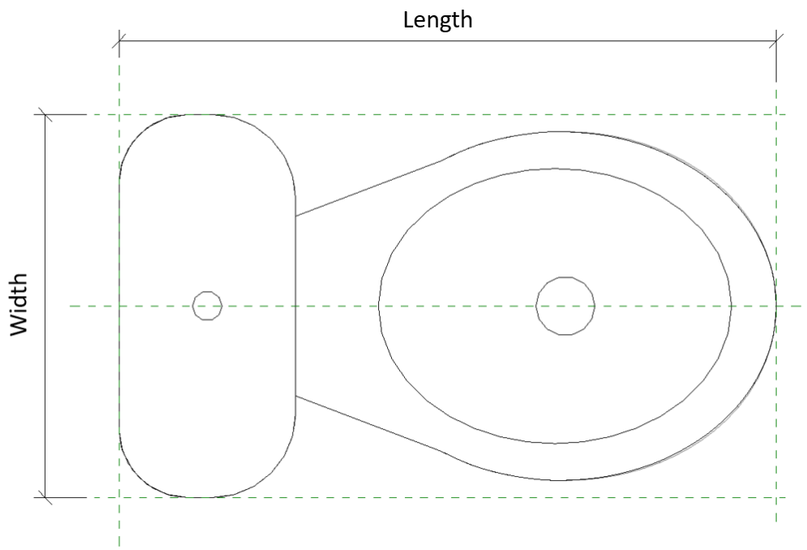


Sink





Water Closet



DA-21 Furniture

Discipline	Architectural.
Family	Loadable Family
Category	Furniture
Workset	Separate Furniture Workset to be allocated for furniture to facilitate visibility in drawing production. To an extreme, when there are large quantities, a separate file to be used to reduce file size.
Family Naming Convention	FUR- <Functional Type>-HAA-<Descriptor 1>-<Dimension>
Type Naming Convention	<Type>-<Size>

	Short form	**Description**
Category	FUR	Furniture
Functional Type	DSK	Desk
	SIT	Seating
	TBL	Table
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Office	Office furniture
	Classroom	Classroom furniture
Descriptor 2	450x800mm	Furniture size at 450x600mm
	450x1000mm	Furniture size at 450x1000mm

Example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**		**Type**		**Size**
FUR	-	DSK	-	HAA	-	Office	-	450x800mm		Wood Desk	-	N/A

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Wood Desk
Level	Level	The level to which the furniture is constrained.	1/F
Offset	Elevation	Offset from level.	0

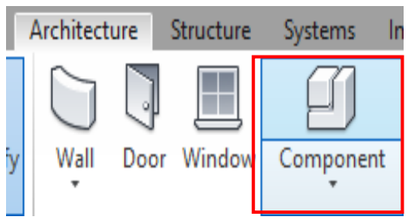
List of Shared Parameter

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Width	Furniture overall width	Common	Length	Dimensions	Type
Length	Furniture overall length	Common	Length	Dimensions	Type
Height	Furniture overall height	Common	Length	Dimensions	Type

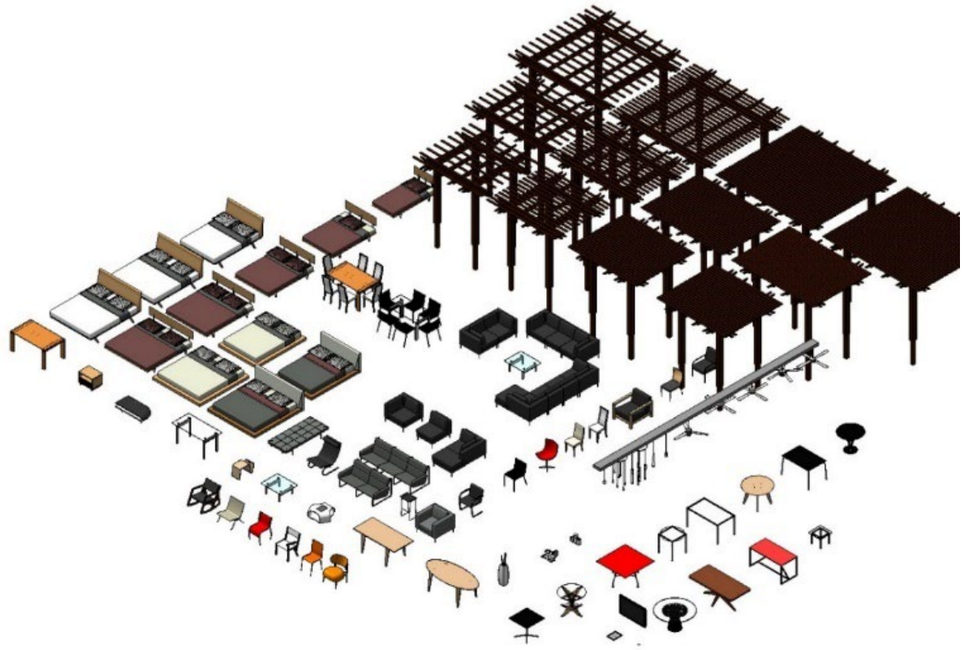
- Overall dimension (width x length x height) is sufficient for furniture parameter input.
- Add Manufacturing and Model Number (Built-in parameters) for Special proprietary furniture in procurements stage.

Model Authoring

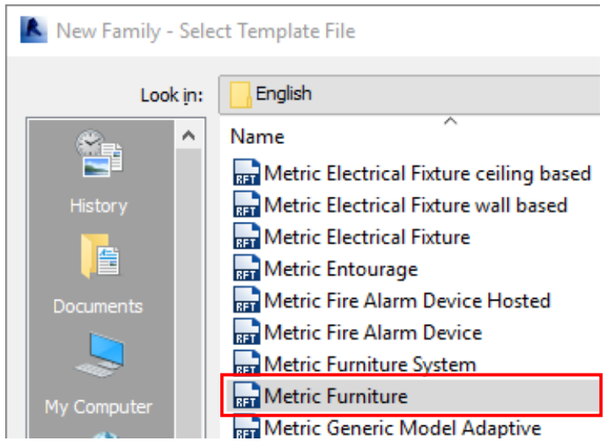
1. Furnitures are loadable families. Place Furnitures by selecting Architecture > Component.



2. Sample HA Furnitures Families have the following types. Load HA standard families into project. It is recommended to start with HA family and modify for project specific use.



3. Custom Furniture shall be created by Metric Furniture Template.



DA-22 Water Tank

Discipline	Architectural & Structural
Family	Loadable Family
Category	Mechanical Equipment
Workset	Individual Levels
Family Naming Convention	MCQ2-WAT-<Originator>-<Material>-<Volume>
Type Naming Convention	<Type>-<Size>

	Short form	Description
Category	MCQ	Mechanical equipment
Functional Type	WAT	Water storage tank
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
Descriptor 1	CONC	Concrete
Descriptor 2	100_cub_met	100 cubic meters in volume

Example

Family name											**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**			**(ICU Filter)*_ Type**		**Size**
MCQ	-	WAT	-	HAA	-	CONC	-	100_cub_met			Concrete	-	10000x10000x 10000mm

Information Requirement

List of Built-in Parameters

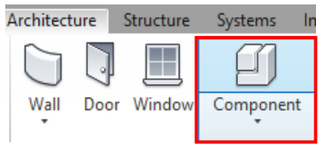
Parameter name	Information	Remark	Example
Type	Type of family	Type of family	Water Tank
Level	Level	The level to which the water tank is constrained.	1/F
Offset	Elevation	Offset from level.	0

List of Shared Parameter

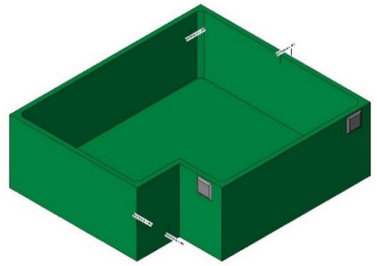
Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Width	Water Tank width	Common	Length	Dimensions	Type
Height	Water Tank Height	Common	Length	Dimensions	Type
Length	Water Tank Length	Common	Length	Dimensions	Type
Thickness	Water Tank Wall Thickness	Common	Length	Dimensions	Type

Model Authoring

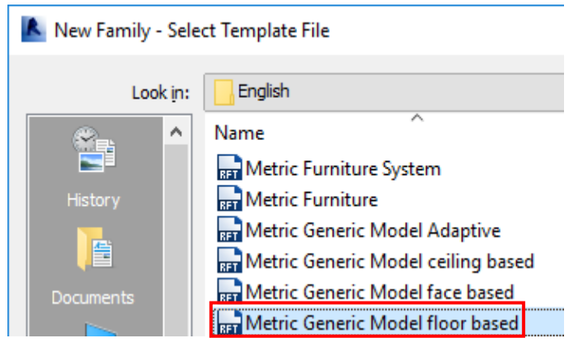
1. RC Water Tank is a loadable family. Place RC Water Tank by selecting Architecture > Component.



2. HA RC Water Tank Family has the following type. Load HA standard family into project. It is recommended to start with HA family and modify for project specific use.



3. Custom RC Water Tank shall be created by Generic Model template (floor based is suggested).



- RC Water Tank shall be placed within a room or surrounded by walls.
- Use parametric RC water tank to control height, width and length.

DA-23 Hatch

Discipline	Architectural
Family	Loadable Family
Category	Generic Model
Workset	Individual Levels
Family Naming Convention	GMD-HAT-HAA/HAS-<Material>
Type Naming Convention	<Type>-<Size>

	Short form	**Description**
Category	GMD	Generic Model
Functional Type	HAT	Hatch
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
Descriptor 1	MTL	Metal

Example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**		**Type**		**Size**
GMD	-	HAT	-	HAA	-	MTL	-	N/A		N/A	-	800x800mm

Information Requirement

List of Built-in Parameters

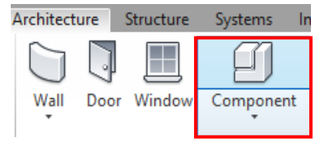
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Hatch
Level	Level	The level to which the hatch is constrained.	1/F
Offset	Elevation	Offset from level.	0

List of Shared Parameter

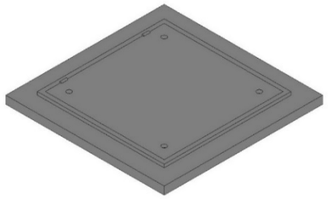
Parameter name	**Information**	**Discipline**	**Type of Parameter**	**Group parameter under**	**Type/ Instance**
Width	Hatch width	Common	Length	Dimensions	Type
Length	Hatch length	Common	Length	Dimensions	Type

Model Authoring

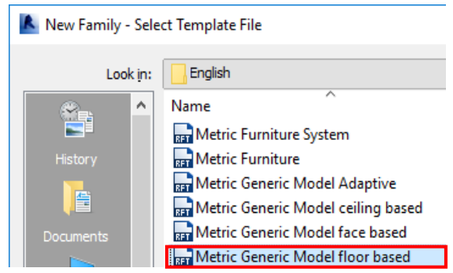
1. Hatch is a loadable family. Place Hatch by selecting Architecture > Component.



2. HA Hatch Family has the following type. Load HA standard family into project. It is recommended to start with HA family and modify for project specific use.



3. Custom Hatch shall be created by Generic Model template (floor based is suggested).



- Use parametric Hatch to control width and length.

DA-24 Cat Ladder

Discipline	Architectural
Family	Loadable Family
Category	Specialty Equipment
Workset	Individual Levels
Family Naming Convention	SPQ-LAD-HAA-Cat_Ladder
Type Naming Convention	<ICU Filter>_<Type>-<Size>

	Short form	**Description**
Category	SPQ	Specialty equipment
Functional Type	LAD	Ladder
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Cat_Ladder	Cat Ladder

Example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**	**(ICU Filter)*_Type**		**Size**
SPQ	-	LAD	-	HAA	-	Cat_Ladder	-	(Optional)	_Type 1	-	3500H

Information Requirement

List of Built-in Parameters

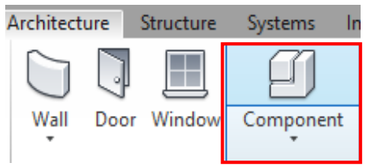
Parameter name	**Information**	**Remark**	**Example**
Type	Type	Type of family	Cat Ladder
Level	Level	The level to which the cat ladder is constrained.	1/F
Offset	Elevation	Offset from level.	0

List of Shared Parameter

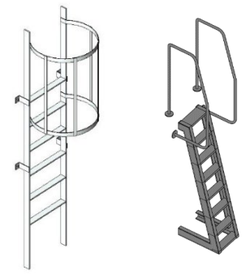
Parameter name	**Information**	**Discipline**	**Type of Parameter**	**Group parameter under**	**Type/ Instance**
Cat Ladder Height	Cat Ladder Height	Common	Length	Dimensions	Type

Model Authoring

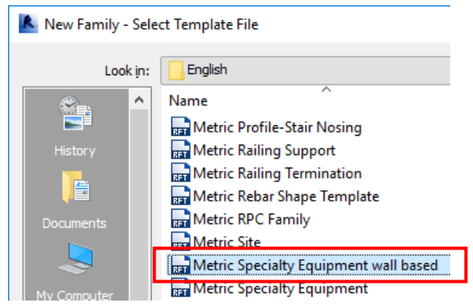
1. Cat Ladder is a loadable family. Place Cat Ladder by selecting Architecture > Component.



2. HA Cat Ladder Family has the following type. Load HA standard family into project. It is recommended to start with HA family and modify for project specific use.



3. Custom Cat Ladder shall be created by Specialty Equipment wall-based Template



- Use parametric Cat Ladder to control height, i.e. number of steps of Cat Ladder.

DA-25 Exit Sign

Discipline	Architectural
Family	Loadable Family
Category	Specialty Equipment
Workset	Individual Levels
Family Naming Convention	SPQ-FSI-HAA-Exit_Sign
Type Naming Convention	<Type>-<Size>

	Short form	**Description**
Category	SPQ	Specialty Equipment
Functional Type	FSI	Fire Service Installation
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Exit_Sign	Exit Sign

Example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**		**Type**		**Size**
SPQ	-	FSI	-	HAA	-	Exit_Sign	-	(Optional)		Type 1	-	N/A

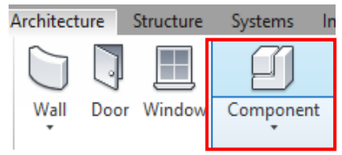
Information Requirement

List of Built-in Parameters

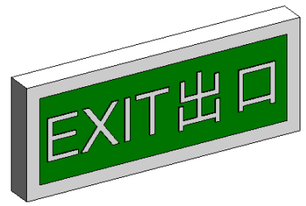
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Exit Sign
Level	Level	The level to which the exit sign is constrained.	1/F
Offset	Elevation	Offset from level.	0

Model Authoring

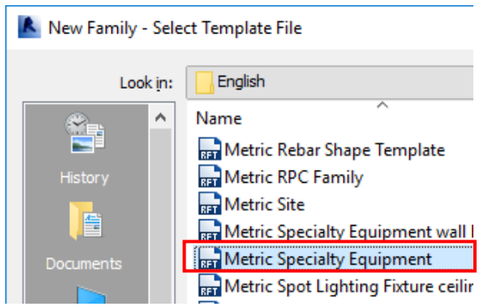
1. Exit Sign is a loadable family. Place Exit Sign by selecting Architecture > Component.



2. HA Exit Sign Family has the following type. Load HA standard family into project. It is recommended to start with HA family and modify for project specific use.



3. Custom Exit Sign shall be created by Metric Specialty Equipment Family.



- Only show Symbolic Line on plan view.

DA-26 Hose Reel

Discipline	Architectural
Family	Loadable Family
Category	Specialty Equipment
Workset	Individual Levels
Family Naming Convention	SPQ-FSI-HAA-Hose_Reel
Type Naming Convention	<Type>-<Size>

	Short form	**Description**
Category	SPQ	Specialty Equipment
Functional Type	FSI	Fire Service Installation
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Hose_Reel	Hose Reel

Example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**	**Type**		**Size**
SPQ	-	FSI	-	HAA	-	Hose_Reel	-	(Optional)	Hose Reel	-	N/A

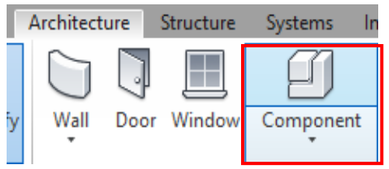
Information Requirement

List of Built-in Parameters

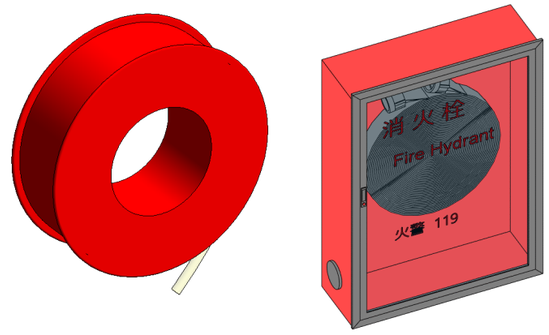
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Hose Reel
Level	Level	The level to which the hose reel is constrained.	1/F
Offset	Elevation	Offset from level.	0

Model Authoring

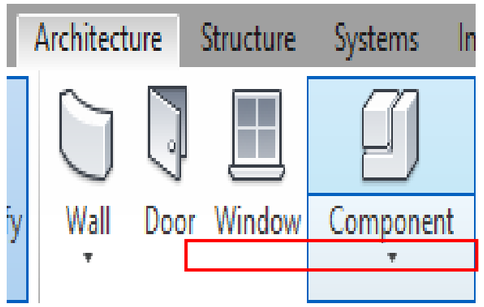
1. Hose Reel is a loadable family. Place Floor Grating by selecting Architecture > Component.



2. HA Hose Reel Family has the following type. Load HA standard family into project. It is recommended to start with HA family and modify for project specific use.



3. Custom Hose Reel shall be created by Metric Specialty Equipment Family.



- Only show Symbolic Line on plan view.

DA-27 Fire Hydrant

Discipline	Architectural
Family	Loadable Family
Category	Speciality Equipment
Workset	Individual Levels
Family Naming Convention	SPQ-FSI-HAA-Fire_Hydrant
Type Naming Convention	<Type>-<Size>

	Short form	**Description**
Category	SPQ	Specialty Equipment
Functional Type	FSI	Fire Service Installation
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Fire_Hydrant	Fire Hydrant

Example

Family name										**Type name**			
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**		**Type**			**Size**
SPQ	-	FSI	-	HAA	-	Fire_Hydrant	-	(Optional)		Fire Hydrant	-		N/A

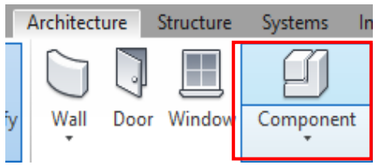
Information Requirement

List of Built-in Parameters

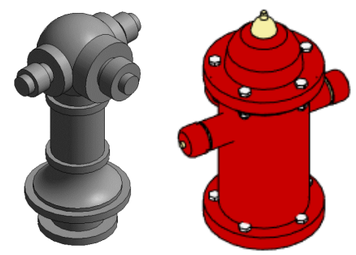
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Street Fire Hydrant
Level	Level	The level to which the fire hydrant is constrained.	1/F
Offset	Elevation	Offset from level.	0

Model Authoring

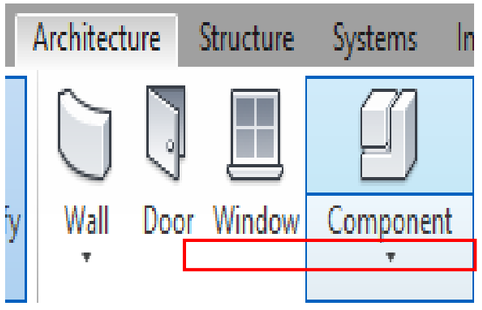
1. Fire Hydrant is a loadable family. Place Fire Hydrant by selecting Architecture > Component.



2. HA Fire Hydrant Family has the following type. Load HA standard family into project. It is recommended to start with HA family and modify for project specific use.



3. Custom Fire Hydrant shall be created by Metric Specialty Equipment Family.



DA-28 Escalator

Discipline	Architectural
Family	Loadable Family
Category	Specialty Equipment
Workset	Vertical Transportation
Family Naming Convention	SPQ-ESC-HAA-Escalator
Type Naming Convention	<ICU Filter>_<Type><Size>

	Short form	**Description**
Category	SPQ	Specialty Equipment
Functional Type	ESC	Escalator
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Escalator	Escalator

Example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**		**(ICU Filter)*_Type**		**Size**
SPQ	-	ESC	-	HAA	-	Escalator	-	Optional		Metal	-	800mm

Information Requirement

List of Built-in Parameters

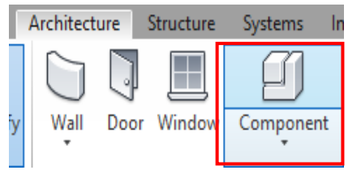
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Escalator
Base Level	Base Level	Specify base constraint level	1F, 2F……
Base Offset	Base Offset	Specify offset distance from base level	0.0, 100, 200, 250,……
Top Level	Top Level	Specify top constraint level	2F, 3F……
Top Offset	Top Offset	Specify offset distance from top level.	0.0, 100, 200,250……

List of Shared Parameter

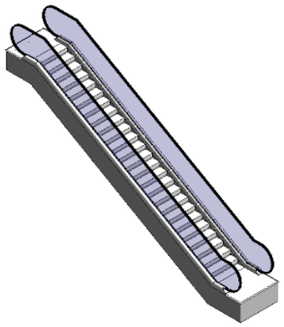
Parameter name	**Information**	**Discipline**	**Type of Parameter**	**Group parameter under**	**Type/ Instance**
Step Width	Step Width	Common	Length	Dimensions	Type
Inclination	Inclination	Common	Angle	Dimensions	Type

Model Authoring

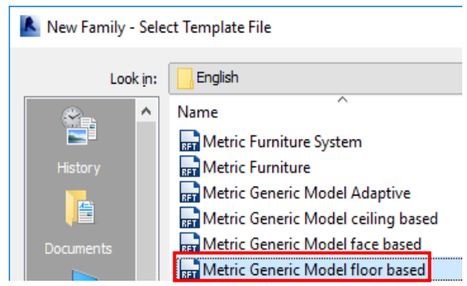
1. Escalator is a loadable family. Place Escalator by selecting Architecture > Component.



2. HA Escalator Family has the following type. Load HA standard family into project. It is recommended to start with HA family and modify for project specific use.



3. Custom Escalator shall be created by Metric Generic Model (optional floor base).



- It is advised to simplified 3D model in early design stage. so that excessive increase of project file size can be avoided.
- Many manufacturers are now providing BIM model files of their products, and ready for download in their website with both specification and 3D model, which can be used directly in projects after download.

DA-29 Lift

Discipline	Architectural
Family	Loadable Family
Category	Specialty Equipment
Workset	Vertical Transportation
Family Naming Convention	SPQ-LAE-HAA-<Descriptor 1>
Type Naming Convention	<Type><Size>

	Short form	**Description**
Category	SPQ	Specialty equipment
Functional Type	LAE	Lift
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	Traction	Traction lift
	Hydraulic	Hydraulic lift
	Fireman_Lift	Fireman Lift
	Passenger_Lift	Passenger Lift

Example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**	**Type**		**Size**
SPQ	-	LAE	-	HAA	-	Fireman_Lift	-	Optional	N/A	-	1850x1650x 2800mm

Information Requirement

List of Built-in Parameters

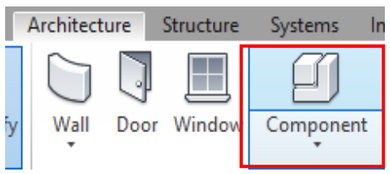
Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Lift
Level	Level	The level to which the lift is constrained.	1/F
Elevation	Elevation	Offset from level.	0

List of Shared Parameter

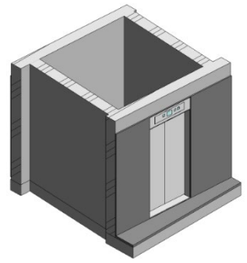
Parameter name	**Information**	**Discipline**	**Type of Parameter**	**Group parameter under**	**Type/ Instance**
Lift Car Width	Lift car width	Common	Length	Identity Data	Instance
Lift Car Depth	Lift car depth	Common	Length	Dimension	Type
Lift Car Length	Lift car length	Common	Length	Dimension	Type
Door Height	Lift car door height	Common	Length	Dimension	Type
Door Width	Lift car door width	Common	Length	Dimension	Type
Materials	Lift car door material	Common	Material	Materials and Finishes	Type

Model Authoring

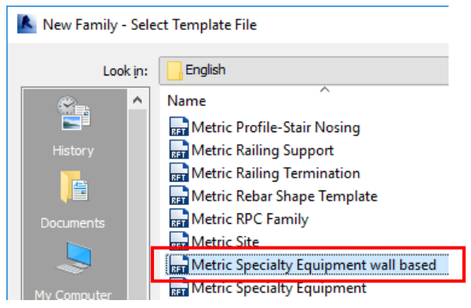
1. Lift is a loadable family. Place Lift by selecting Architecture > Component.



2. HA Lift Family has the following type. Load HA standard family into project. It is recommended to start with HA family and modify for project specific use.



3. Custom Lift shall be created by Metric Specialty Equipment wall based.



- Many manufacturers are now providing BIM model files of their products, and ready for download in their website with both specification and 3D model, which can be used directly in projects after download.

DA-30 Signage

Discipline	Architectural
Family	Loadable Family
Category	Specialty Equipment
Workset	Individual Levels
Family Naming Convention	SPQ-SIG-HAA-<Usage>
Type Naming Convention	<Sign No.>-<Size>

	Short form	**Description**
Category	SPQ	Specialty Equipment
Functional Type	SIG	Signage
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	General	General signage
	Temp_Refuge_Space	Signage for temporary refuge space
	Person_w_Disability	Signage for person with disability

Example

Family name								**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**	**Descriptor 2**	**Type**		**Room**
SPQ	-	SIG	-	HAA	-	General	- Optional	S20	_	Store Room

Information Requirement

List of Built-in Parameters

Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Signage
Level	Level	The level to which the furniture is constrained	1/F
Offset	Elevation	Offset from level	0

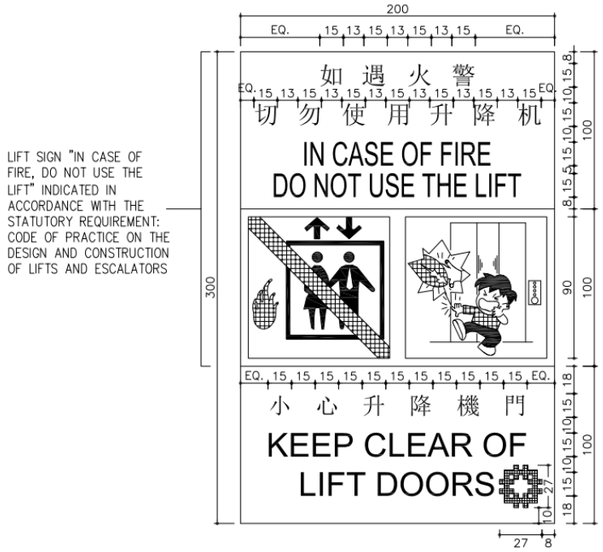
List of Shared Parameter

Parameter name	**Information**	**Discipline**	**Type of Parameter**	**Group parameter under**	**Type/ Instance**	**Example**
Offset from Centre Line	Centre Line Offset from FFL	Common	Length	Dimension	Type	
Offset from Top	Signage Top Offset from FFL	Common	Length	Dimension	Type	
Height	Signage Height	Common	Length	Dimension	Type	
Width	Signage Width	Common	Length	Dimension	Type	
Front Panel Thickness	Front Panel Thickness	Common	Length	Dimension	Type	
Back Panel Thickness	Back Panel Thickness	Common	Length	Dimension	Type	
Overall Thickness	Overall Thickness	Common	Length	Dimension	Type	
Sign Number	Signage Type Mark	Common	Text	Text	Type	S1
Type Mark	Signage Type Mark (= Sign Number)	Common	Text	General	Type	S1
English Text	Signage Description (English)	Common	Text	Text	Type	Transformer Room
Chinese Text	Signage Description (Chinese)	Common	Text	Text	Type	變壓器房
Message Mark	Signage message	Common	Text	Text	Type	MU-6
Arrow	Arrow	Common	Text	Text	Type	
Colour	Colour of the Signage Plate	Common	Text	Text	Type	CF-Black
Panel Module	Panel module of the Signage	Common	Text	Text	Type	P2S
Format	Format of the Signage	Common	Text	Text	Type	FS-7
Material	Material of the Signage Plate	Common	Text	Text	Type	SS
Printing	Printing Method of Signage	Common	Text	Text	Type	P-4
Fabrication of Sign Structure	Fabrication of Sign Structure	Common	Text	Text	Type	F-4
Mounting	Mounting Method	Common	Text	Text	Type	MT-12
Location	Location	Common	Text	Text	Type	G/F Lobby
Remarks	Remarks	Common	Text	Text	Type	
Panel Material	Panel Material	Common	Material	Materials and Finishes	Type	

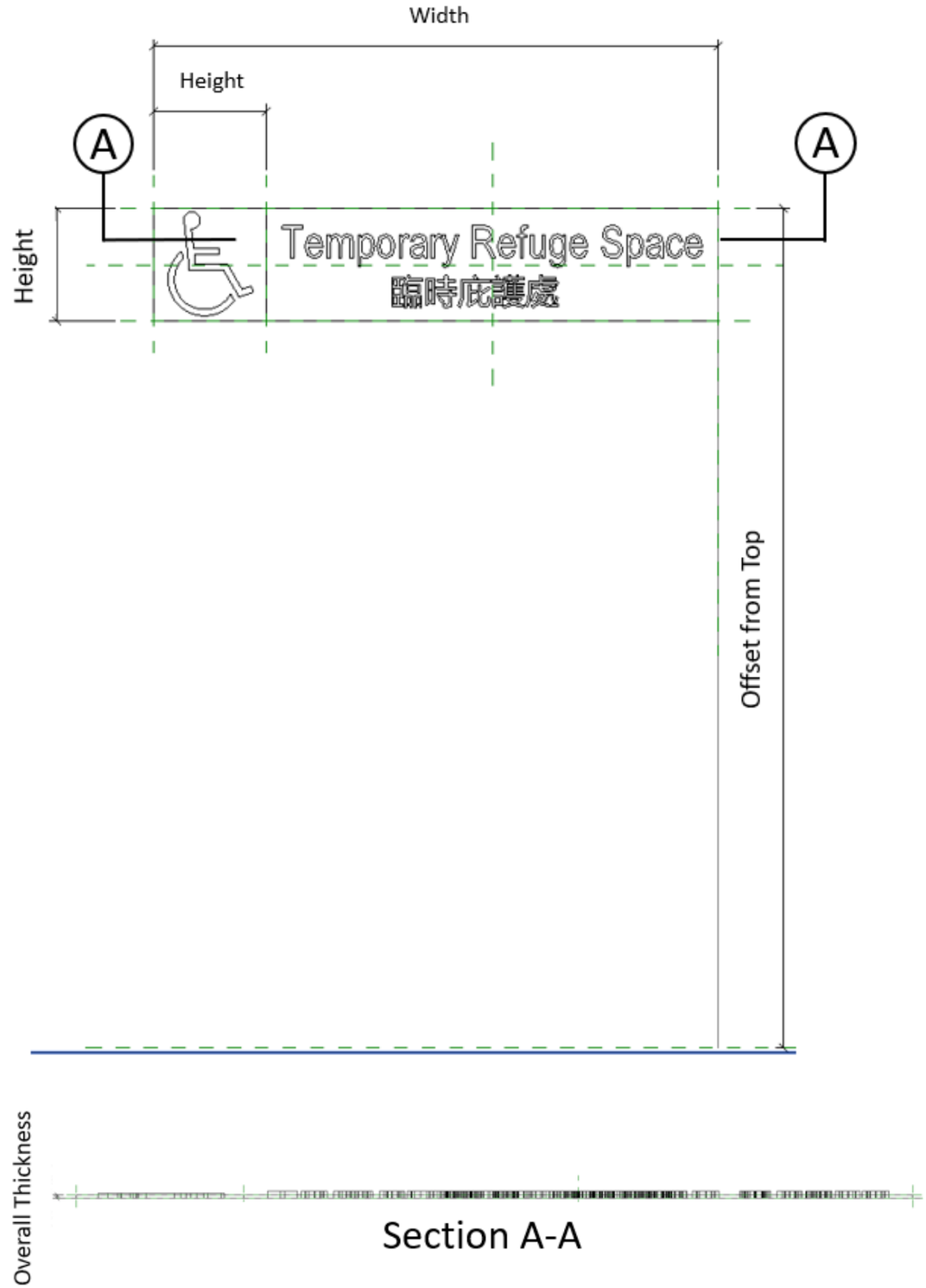
Model Authoring

3D model family

- 3D modelling of signage shall be kept minimum to avoid over-modelling. In terms of geometry, only the **overall shape, dimension and material** is required.
- All signage details such as below figure shall not be modelled in family or project model.
- Signage details shall be drawn in drafting view using Detail Line and other annotations.
- For the existing details in CAD format, refer to Section **PS-12** 2D Details under Section **D5.3** Model and Drawing Detail.



Dimensions of Signage Family setting shall be modelled as follows:



DA-31 Miscellaneous Items in Domestic Flats

Discipline	Architectural
Family	Loaded Family
Category	Generic Model
Workset	Individual Levels
Family Naming Convention	GMD-OTR-HAA-<Descriptor / Type Mark>
Type Naming Convention	<ICU Filter>_<Type>-<Size>_(Descriptor) or <ICU Filter>_<Type>_(Descriptor)

	Short form	**Description**
Category	GMD	Generic Model
Functional Type	OTR	Other
Originator	HAA	Housing Authority-Architecture & Landscape
Descriptor 1	CDR_&_CR	Cloth Drying Rack & Curtain Rail
	Grab_Rail	Grab Rail
	Laundry_Rack_7&10	Laundry Rack_<Type Mark>
	Cooking_Bench_MCB	Cooking Bench Unit_<Type>
	Cooking_Bench_MCB_R	Cooking Bench Unit_<Type> (handed version)

Example

Family name								**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**	**Descriptor 2**	**ICU filter*_ Type**		**Size /_ (Description)**
GMD	-	OTR	-	HAA	-	Cooking_Bench_MCB	(Optional)	Sanfit_MCB_1A	-	730x500x100mm_(VPB)
GMD	-	OTR	-	HAA	-	Laundry_Rack_7&10	(Optional)	Metal_Type_7	-	_(A-1a)(A-1b)Flat

Remarks:
*For consistency, all filter setup for automatic colouring in GBP submission views in HA Project Template use **Type Name** for Material / Description as the filter rules, i.e., wordings for the Material / Description, such as “Concrete”, “Timber”, “Metal”, “Glass”, “SanFit”, shall be included in the type names for applicable model elements.

Information Requirement

List of Built-in Parameters

Parameter name	**Information**	**Remark**	**Example**
Type	Type of family	Type of family	Cloth Drying Rack & Curtain Rail, Grab Rail, Laundry Rack & Cooking Bench Unit
Level	Level	The level to which the furniture is constrained	12/F
Offset	Elevation	Offset from level	0

List of Shared Parameters

Parameter name	**Information**	**Discipline**	**Type of Parameter**	**Group parameter under**	**Type/ Instance**	**Example**
Cloth Drying Rack & Curtain Rail						
Location	Location of Cloth Drying / Curtain Rail in terms of application	Common	Text	Text	Type	Bathroom *
Type	Type	Common	Text	Text	Type	Cloth Drying & Curtain Rails
Material	Material	Common	Material	Material and Finishes	Type	Plastic – Glass reinforced Plastic
Diameter	Cloth Drying / Curtain Rail Diameter	Common	Length	Dimension	Type	30mm
Thickness	Thickness	Common	Length	Dimension	Type	2.5mm
Type Mark	Type Mark	Common	Text	General	Type	Cloth Drying & Curtain Rails
Curtain Rail Length	Curtain Rail Length	Common	Length	General	Type	1438mm
Cloth Drying Rod Length	Cloth Drying Rod Length	Common	Length	General	Type	1450mm
Grab Rail						
Location	Location of Grab Rail in terms of application	Common	Text	Text	Type	Bathroom *
Type	Type	Common	Text	Text	Type	Grab Rail

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance	Example
Material	Material	Common	Material	Material and Finishes	Type	Plastic – Slip-resistant Hollow Tube
Diameter	Grab Rail Diameter	Common	Length	Dimension	Type	32mm
Length	Girth of grab rail	Common	Lenght	Dimension	Type	826mm
Gap Space	Gap Space	Common	Length	Dimension	Type	30mm
Thickness	Thickness	Common	Length	General	Type	1.5mm
Length CL to CL	Grab Rail Length	Common	Length	General	Type	750mm
Type Mark	Type Mark	Common	Text	General	Type	Grab Rail
Laundry Rack						
Location	Location of Laundry Rack	Common	Text	Text	Type	Flat Type *
Type	Type	Common	Text	Text	Type	Laundry Rack Type 7
Material	Material	Common	Material	Materials and Finishes	Type	Aluminium – Satin Finish
Length	Length	Common	Length	Dimensions	Type	1827mm
Width	Width	Common	Length	Dimensions	Type	482mm
Diameter	Laundry Rack Diameter	Common	Length	Dimensions	Type	27mm
Type Mark	Type Mark	Common	Text	General	Type	Laundry Rack Type 7
Cooking Bench Unit						
Location	Location of Cooking Bench Unit in terms of application	Common	Text	Text	Type	Kitchen *
Type	Type	Common	Text	Text	Type	Cooking Bench
Material	Material	Common	Material	Materials and Finishes	Type	12 to 13 mm thick (max) Polymer resin
Width	Width	Common	Length	Dimensions	Type	500mm
Length	Length	Common	Length	Dimensions	Type	860mm
Thickness	Thickness	Common	Length	Dimensions	Type	100mm
Type Mark	Type Mark	Common	Text	General	Type	MCB-1B
Supporting Leg Height	Supporting Leg Height	Common	Length	Dimensions	Type	780mm
Supporting Leg Width	Supporting Leg Width	Common	Length	Dimensions	Type	490mm
Supporting Leg Thickness	Supporting Leg Thickness	Common	Length	Dimensions	Type	60mm

Remarks:

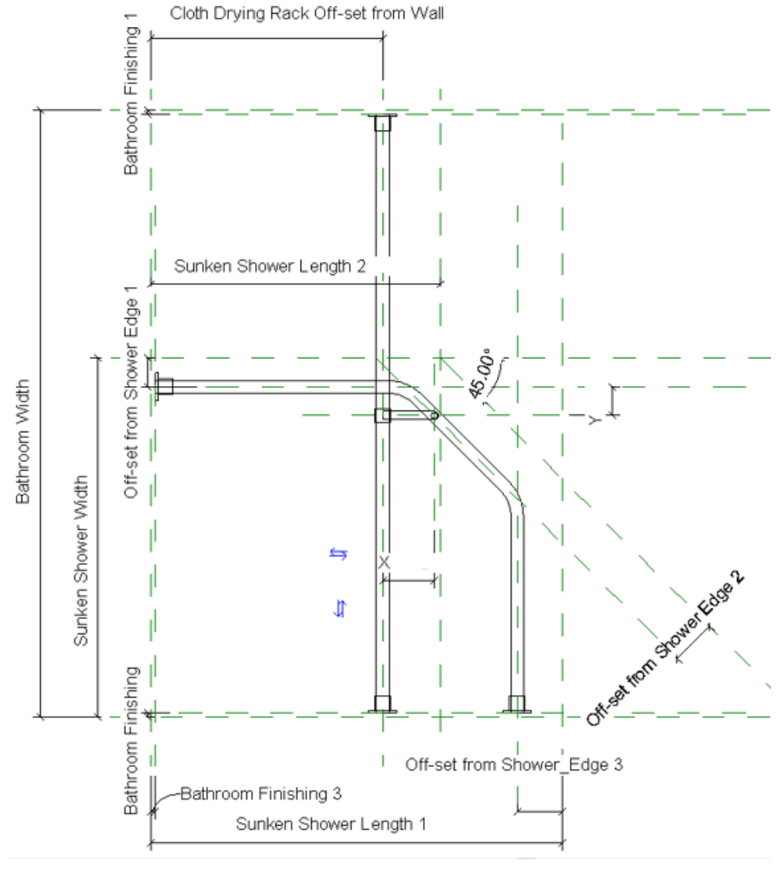
* The information of “Flat Type” (e.g. C-1(a)) shall be included in the shared parameter of the project.

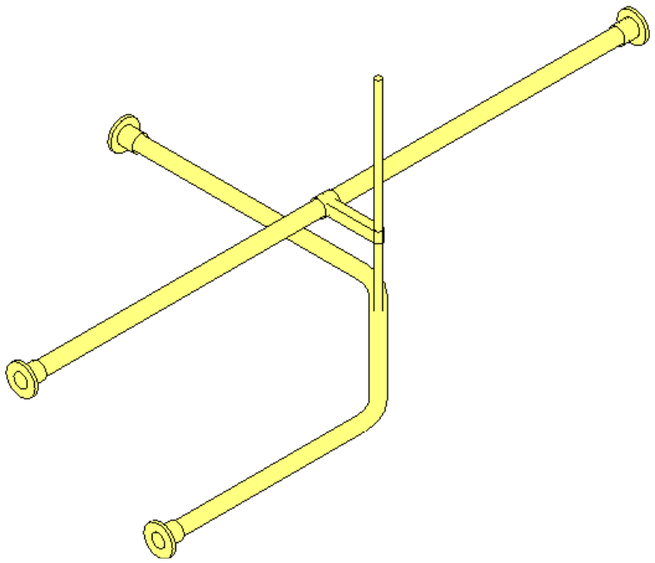
Model Authoring

3D model family

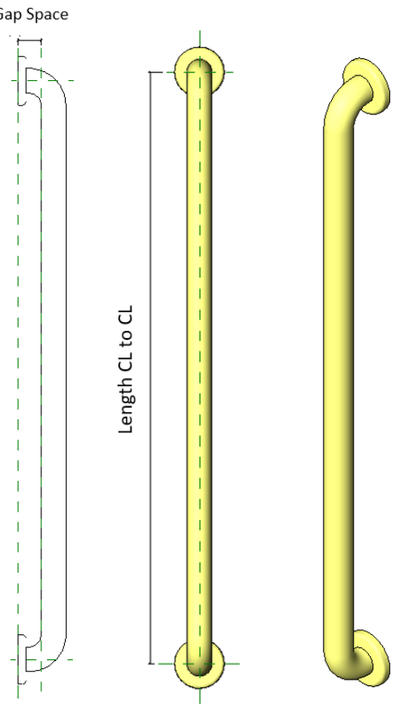
- Sample families for each type of miscellaneous items in domestic flats can be found in the HA Family Library. If variations of these families shall be created, it is recommended to make references to the existing samples, instead of starting from a new family file:

  Cloth Drying Rack & Curtain Rail

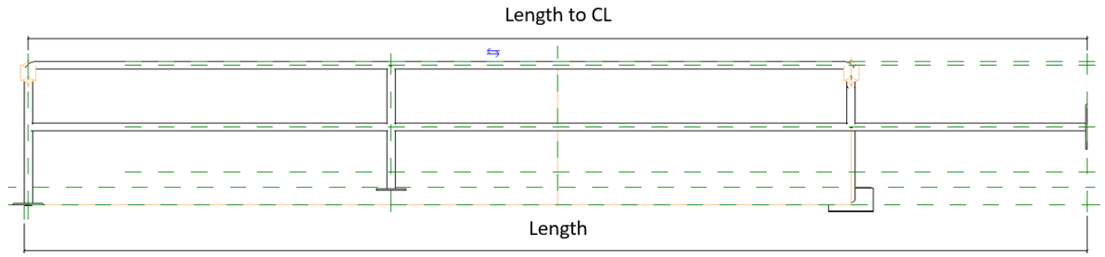


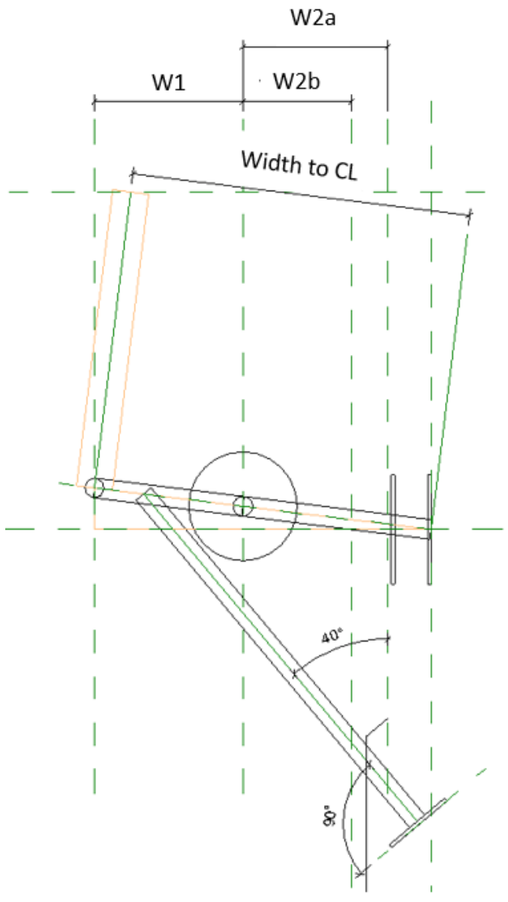


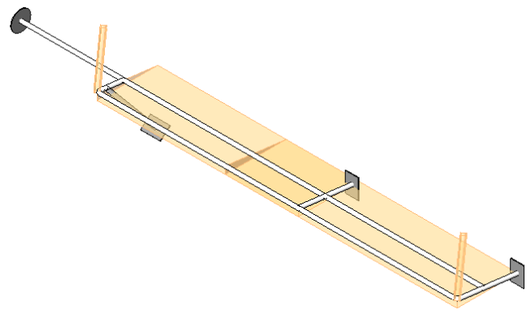
Grab Rail



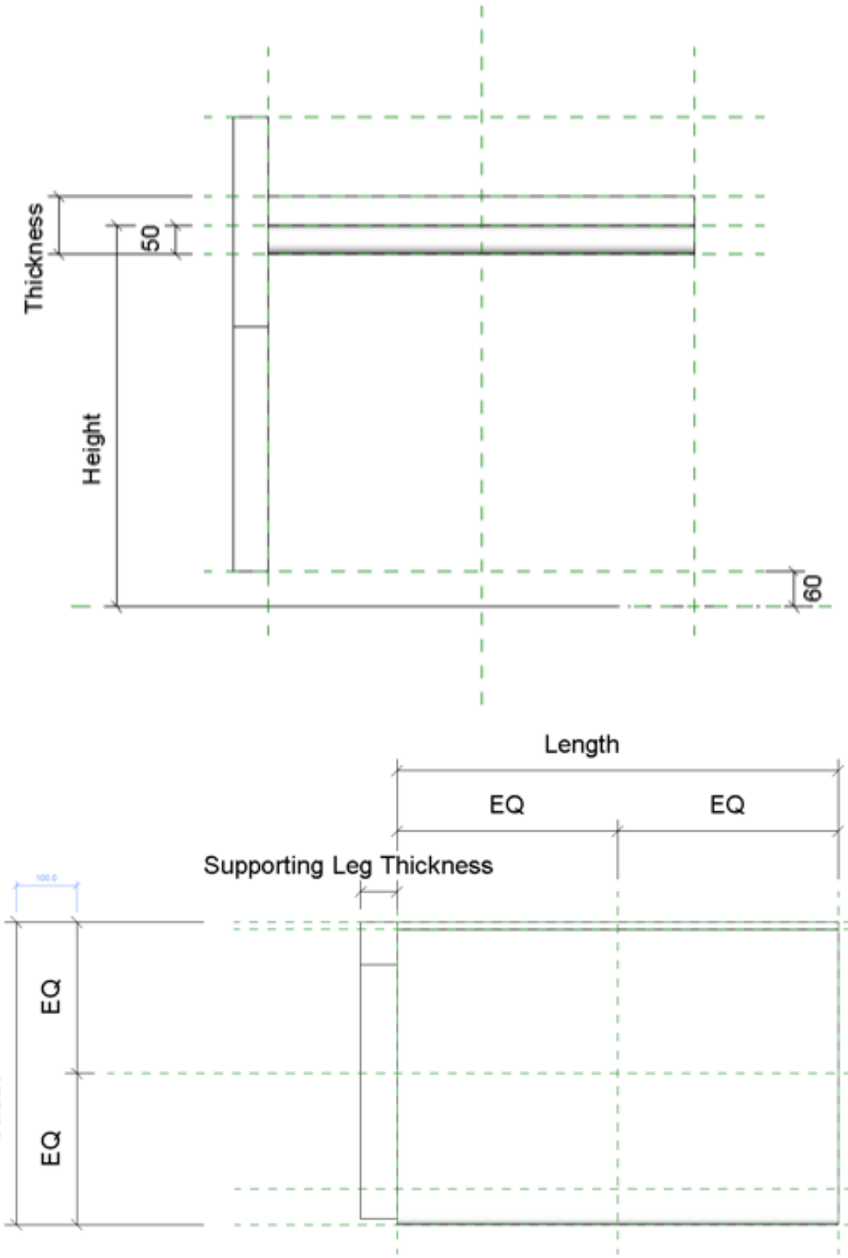
Laundry Rack

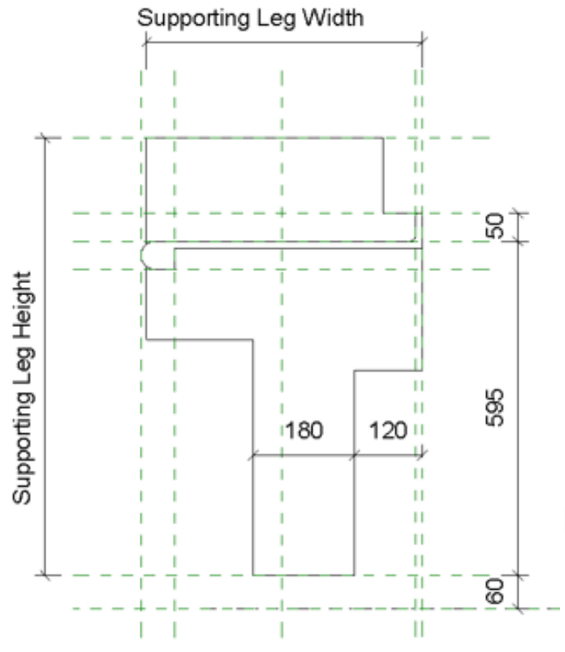


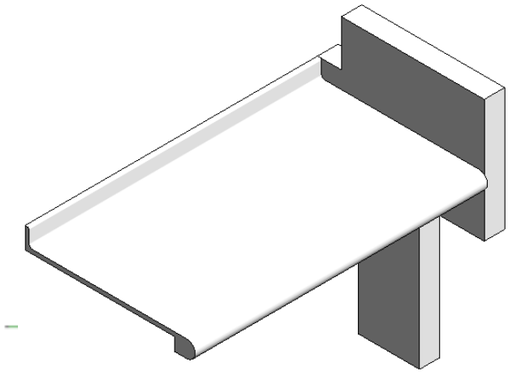




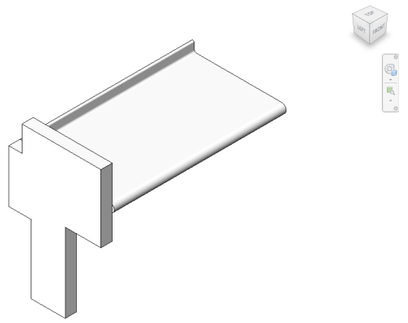
Cooking Bench Unit

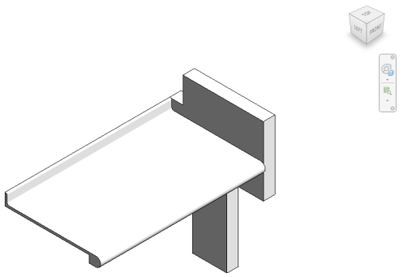






- Do NOT create handed version of families by the “flip” or “mirror” function. Variation of the handed version family should be created as a different family and type instead. For example, illustrations below are taken from two different families:





Cooking Bench Unit: MCB_1BR vs MCB_1B

DA-32 Room

Discipline	Architectural
Family	System Family
Category	Room
Workset	Individual Levels
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	N/A, type naming of Room is not editable.

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Level	Level	Base limit of room bounded	1/F,2/F…
Upper Limit	Upper Limit	Upper limit of room bounded	1/F,2/F…
Limit Offset	Limit Offset	Offset from upper limit	500
Base Offset	Base Offset	Offset from base limit	500
Department	Type of Department	Specify type of department	Flat
Name	Room Name	Specify room name	LIVING ROOM
Number	Room Number	Specify room number	38
Floor Finish	Instance	Specify room floor finish	Tile
Wall Finish	Instance	Specify room wall finish	Paint
Ceiling Finish	Instance	Specify room ceiling finish	Gypsum Board

Model Authoring

Room SAM includes:

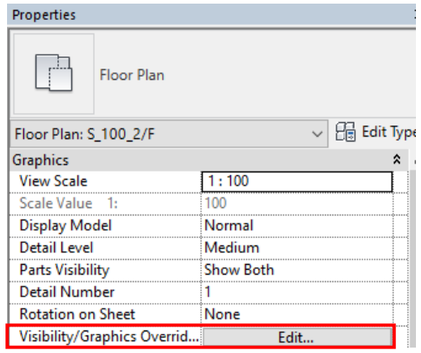
A) Create room

B) Impact of wall finishes on area calculation

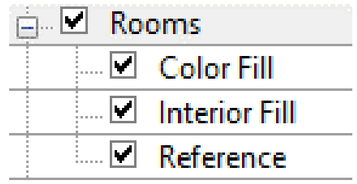
A) Create Room

1. Open a plan view.

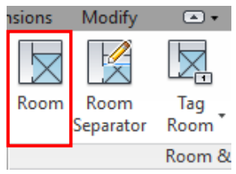
2. Turn on Visibility/ Graphic Overrides for Floor Plan. Click Visibility/ Graphic Overrides > Edit.



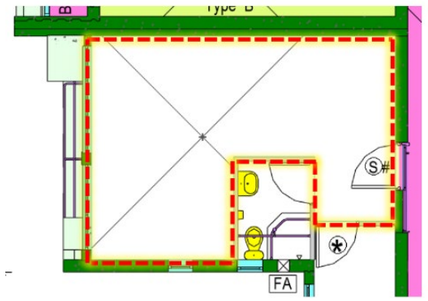
3. On Model Categories, expand Rooms, tick Interior Fill and Reference ON. Then click OK.



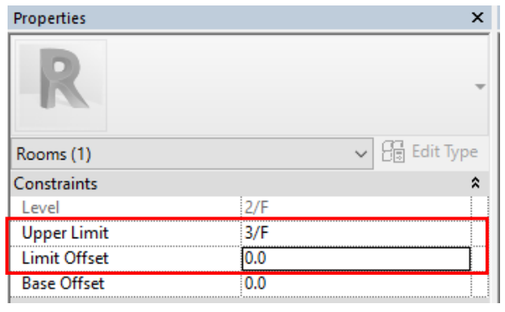
4. Click Architecture > Room & Area Panel > Room.



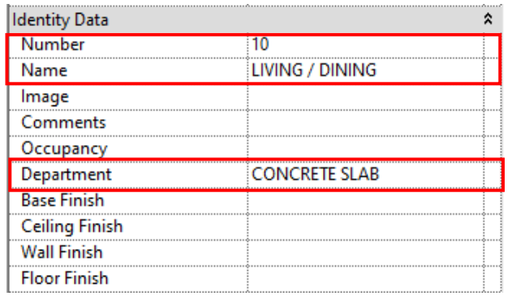
5. Move the cursor until the room boundaries are shown. It indicates the room can be placed.



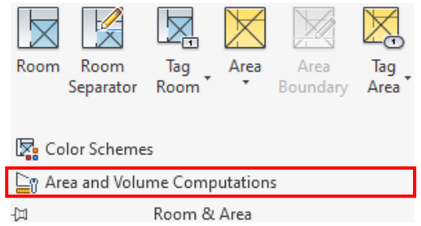
6. Select the room just created, change the Upper Limit to above level and Limit Offset to 0.0 for fall height room.



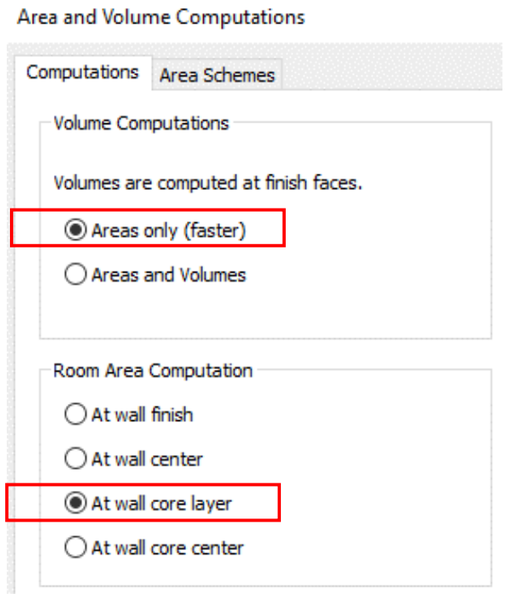
7. Input the Name and Department of Room under Identity Data. Data of Department shall refer to **D5 Presentation Style SAM**.



8. Click Architecture > Room & Area Pull Down > Area and Volume Computations.

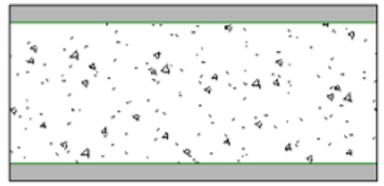
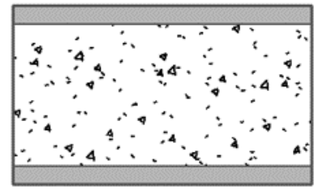
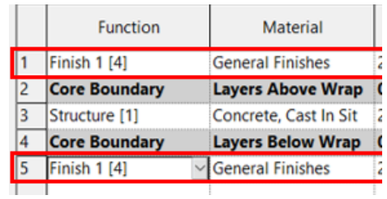
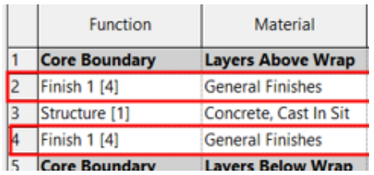
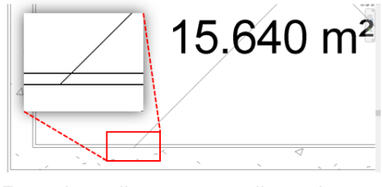
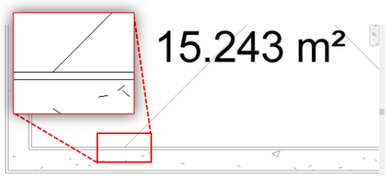


9. Tick Areas only(Faster) under Volume Computations and At wall core layer under Room Area Computation. And click OK.



B) Impact of Wall Finishes on Area Calculation

The impacts of correct and incorrect UFA calculation settings are as follows:

	Correct setting to calculate UFA	**Incorrect** setting to calculate UFA
Setting	Finish outside Core Boundary of wall	Finish inside Core Boundary of wall
Different type of wall layers preview		
Wall layers setting		
Room Area Computation At wall finish At wall center At wall core layer At wall core center Use At wall core layer for Room Area Computation	 Room bounding stop at wall core layer Area of Room is 15.640m²	 Room bounding stop at finish layer Area of Room is 15.243m²

- Only select the Room Bounding option for linked files if they are absolutely needed to bound volumes (rooms and spaces). Revit will need to process these additional boundaries, which can affect model performance.
- Finishes **shall not** be drawn in the Preliminary Design Stage, as their presence is in conflict with the Statutory Submission Requirements.

DA-33 Area (in Area Plan)

Discipline	Architectural
Family	System Family
Category	Area
Workset	Individual Levels
Family Naming Convention	N/A, Name of System Family is not editable.
Type Naming Convention	N/A, type naming of Area is not editable.

Information Requirement

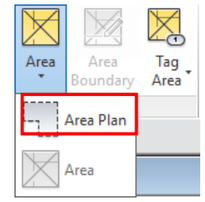
List of Built-in Parameters

Parameter name	Information	Remark	Example
Level	Level	The level to which the Area is constrained.	1/F,2/F…
Name	Area Name	Area Name	GFA
Number	Area Number	Area Number	1,2…
Area	Area	Area	256.3m^2

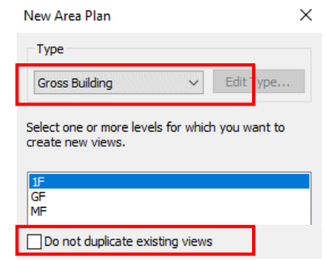
Model Authoring

- Area Plans shall be drawn manually. While plugins such as ACS are available to automate part of the area calculation process, fully automatic calculation is not recommended.
- In a project different Area Plans will be created and named for variant purposes, e.g. GFA, Site Coverage.
- Create Area Plans for Gross Floor Area calculation purpose.
- Area boundary shall be drawn on exterior skin of external wall for GFA calculation.
- Area schedule (Gross Building) to be used for total UFA calculation.

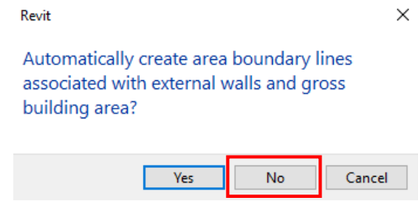
1. Create Area Plan, click Architecture > Area > Area Plan.



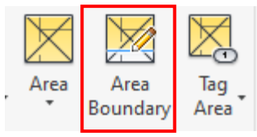
2. Create New Area Plan, Select Gross Building under Type, 1F and uncheck Do not duplicate existing views. Then click OK.



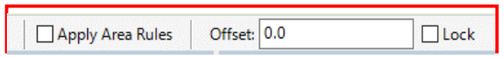
3. Click No for automatically create area boundary lines.



4. Click Architecture > Area Boundary.

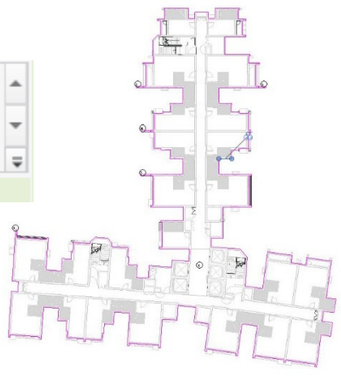


5. Uncheck the box Apply Area Rules and keep the Offset to 0.0.

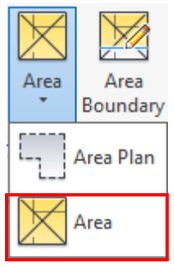


6. Use Drawing Tools to draw the area boundary.

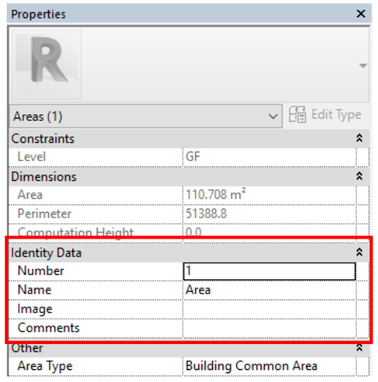




7. Click Architecture > Area > Area, then place the area.



8. Input Identity Data of Area under Properties.



D4.4 Structure – Superstructure SAM

This section of SAM involves structural elements of superstructure only, for foundation elements and lateral support elements, please refer to **D4.5** and **D4.6**. Autodesk Revit has been the modelling tools throughout this document. It is assumed that users shall possess structural engineering knowledge and basic Revit modelling skill when using this guide.

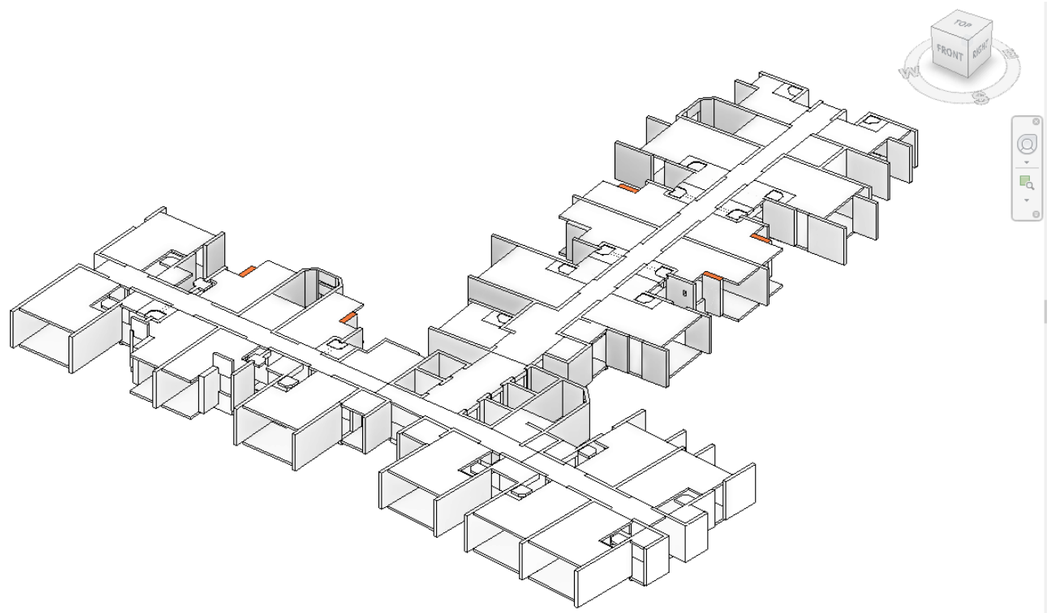
It is advisable that all SE BIM models shall be created based upon HA SE Project Model Template, HA Family and HA Shared Parameter Lists contained in the HA ProjectWise.

PTs/PSP/Contractor shall prepare the SE BIM Models based on the approaches in this section of SAM.

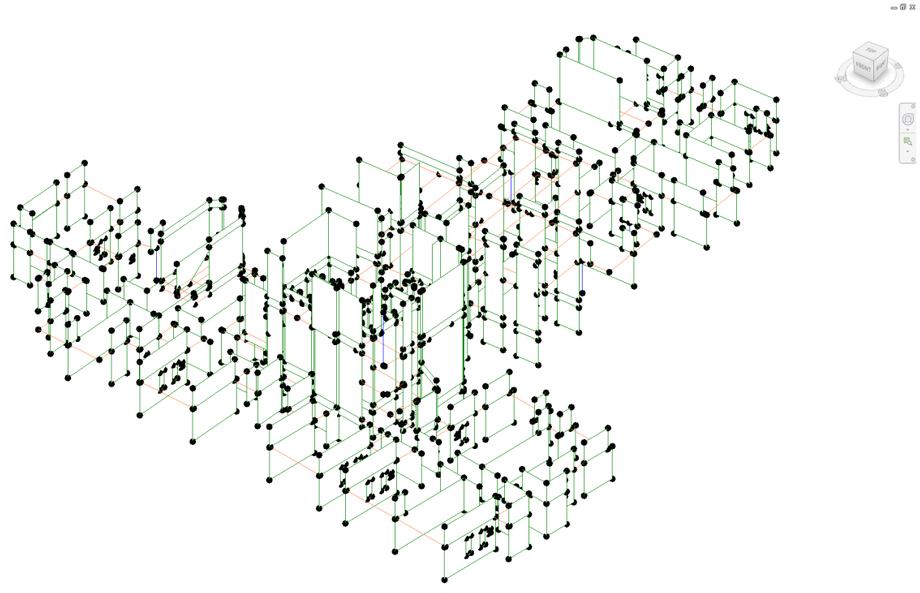
ProjectWise Location of HA SE Revit template please refer to ANN-1.3. Modelling Resources > ANN-1.3a. HA SE Project Model Template.

ProjectWise Location of HA SE Revit Families please refer to ANN-1.3. Modelling Resources > ANN-1.3b. HA Family Library.

ProjectWise Location of HA SE Shared Parameters please refer to ANN-1.3. Modelling Resources > ANN-1.3c. HA Shared Parameter Lists.

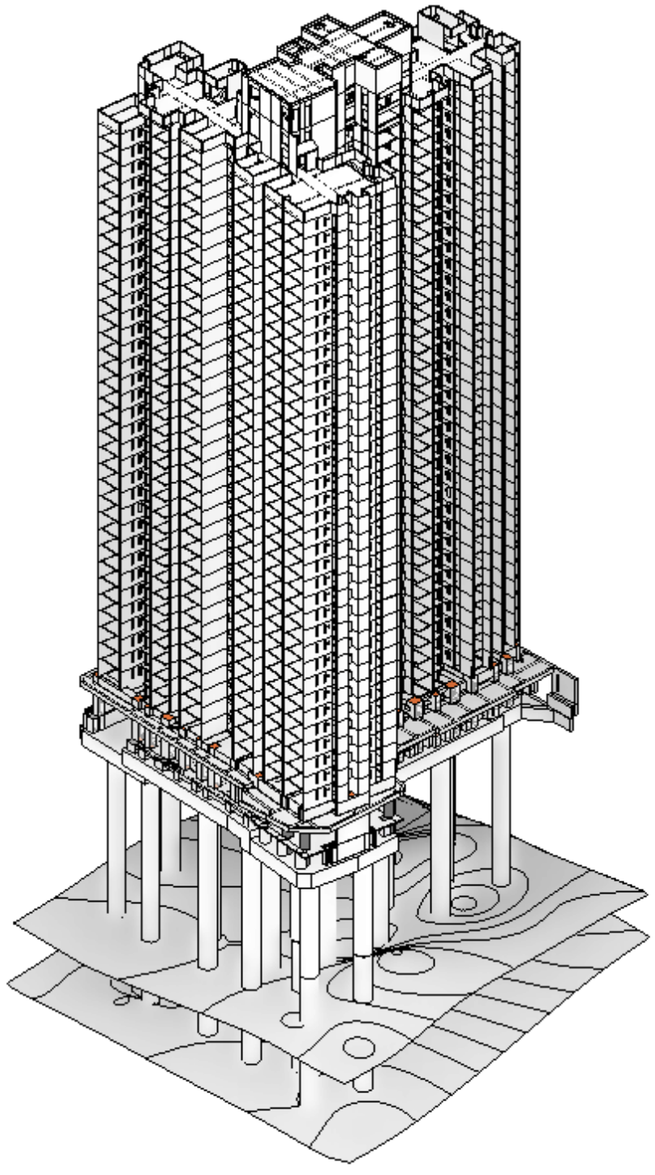


3D view of structural elements (Walls, Slabs, Columns) at typical floor in Revit Structure Model



3D view of Analytical link of typical floor in Revit Structure Model

This Superstructure SAM is to be read in conjunction with other disciplinary section in this guide. For Drawing Production produced by Revit, reference is made based on existing **Computer Aided Drafting Standards for Development & Construction Division (CAD Standards for DCD) Version 4.2.**

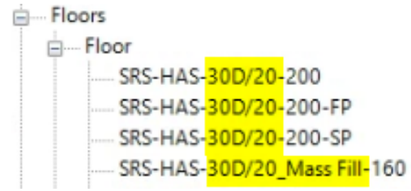


3D view of SE BIM Model (containing both superstructure and foundation elements) for typical domestic blocks of public housing development

Structural Material

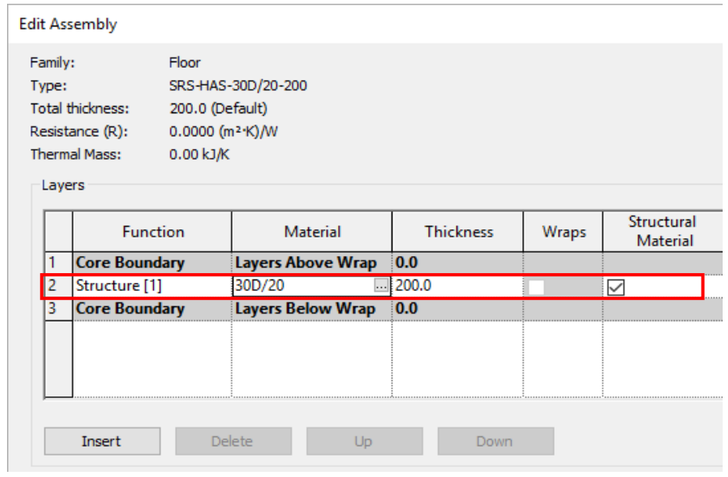
The structural material is an essential information on structural elements for several purposes, e.g. drawing production, design collaboration, structural analysis, facilitating QTO etc..

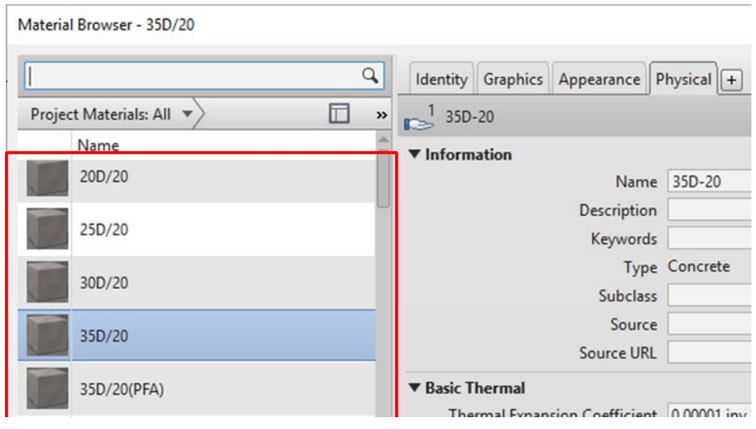
In general circumstances, the structural material shall be specified in element type naming as the “Descriptor”. Please refer to the following example:



Naming convention for model elements of each category is given in the corresponding section.

Also, if the BIM structural model is to be applied for structural analysis software, it is suggested to add Material Name of the Material under default Structural Material parameter, as suffix in the format according to the concrete grade/strength as specified in HA SE Revit template. (For example, 30D/20,35D/20, 45D/20, 30D/20, etc.) If only the concrete grade (e.g. 45D/20) is stated without the specific concrete type (e.g. Mass Fill), the material stated shall mean reinforced concrete. Otherwise, in addition to the concrete grade, the specific concrete type shall also be stated (e.g. 30D/20_Mass Fill).





Revit Family Category for Structural Elements

Structural Elements	Revit Family Category
Column, posts and hangers	Structural Columns
Shear wall, core wall, bearing wall, hanger wall, stud wall, screen wall and parapets	Walls (Structural Wall type)
Gravity wall, piling wall, cantilevered wall, anchored wall and counterfort wall	Structural Foundations
Beams and lintels	Structural Framing / Structural Beam Systems
Structural slab, on-grade slabs, floating slab, suspended slabs, transfer plates	Floors (Structural Floor type)
Pile caps, footings and piles	Structural Foundations
Stair	Stairs
Plinths, mechanical plant bases	Floors (Structural Floor type)
Mass fills	Floors (Structural Floor type)
Fillets and curb	Walls (Structural Wall type)

*Remark: Only under special circumstance such that the use of floor to model mass fill is not feasible, PTs/PSPs/Contractor may model the mass fills by using "model in place" instead.

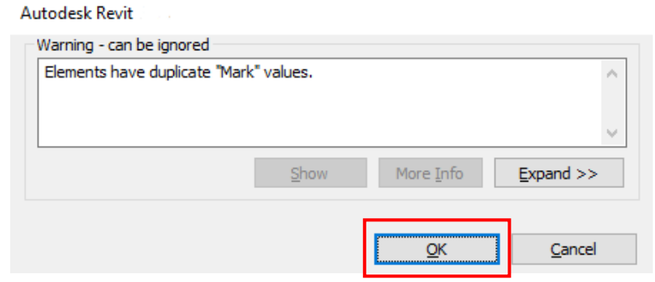
Joining approaches between different structural elements (i.e. beams, columns, walls and floors)

With a view to enhance the consistency of joining approaches among structural elements, users are suggested to follow the recommended joining approaches mentioned in the respective sections of this SAM.

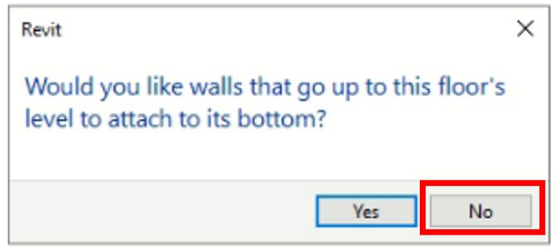
Joining between Floor to Floor (for domestic typical floors)

For drawings production purpose, users shall author the SE Superstructure BIM models with selected levels of typical floors only, to produce corresponding structural framing plans and/or sections. For model federation and/or collaboration with other disciplines, the users should **copy** and **array** the structural elements (please refer to Figure 4-5 on the next page for grouping of elements associated with particular floor) being modelled in those typical floors to all other similar floors to form a completed superstructure BIM model. The joining between the wall/ column base of upper floor and the wall/ column top of lower floor, shall be in-touched and shall remain unjoin.

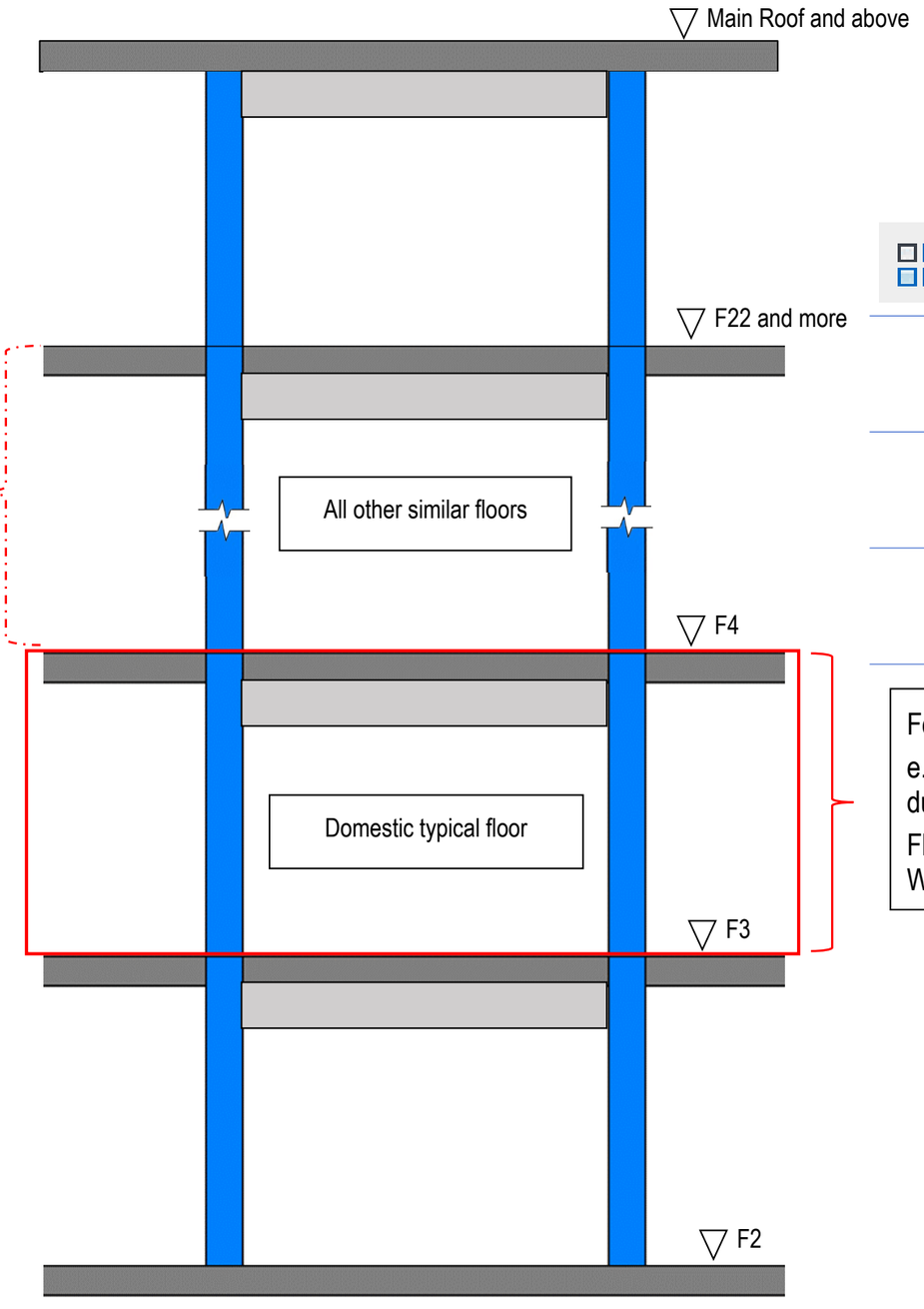
After duplication, users may receive the below warning concerning multiple elements containing the same duplicated "Mark", e.g. beam mark, column mark, wall mark etc. Users could click "OK" to accept the warnings and this would not affect the marks illustrated in the relevant framing plans or drawings.



After duplication of floors and walls, there would be a pop-up message requesting users to indicate whether the top of the walls should attach to the bottom of floors. In general the wall top **should not attach** to the floor's bottom.



To serve the purpose of model federation and/or collaboration with other disciplines, the users should copy the structural elements being modelled in those typical floors to all other similar floors to form a complete superstructure BIM model.



After selecting all elements in the grouping of the domestic typical floor, apply "Array" , define the floor to floor height and number of typical floor to be duplicated.

Formation of grouping of the domestic typical floor:

e.g. when the F4 is a typical floor, the elements to be duplicated includes:

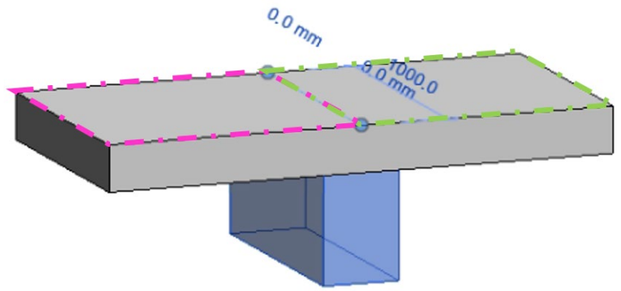
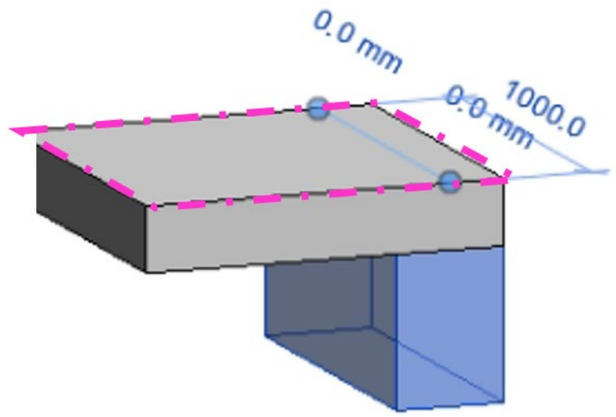
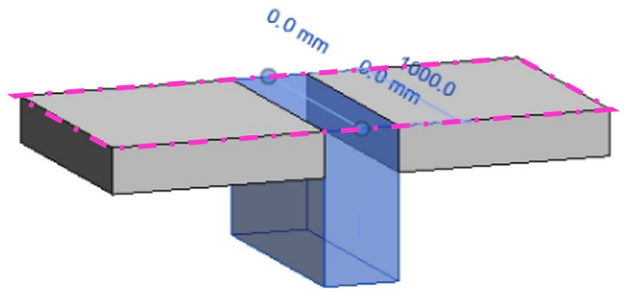
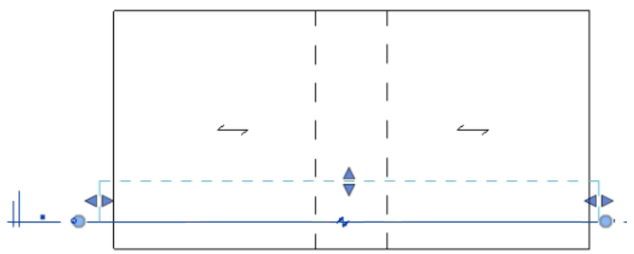
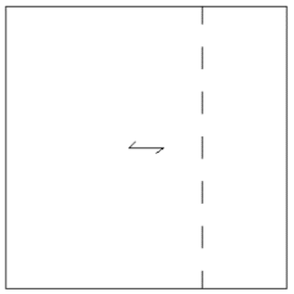
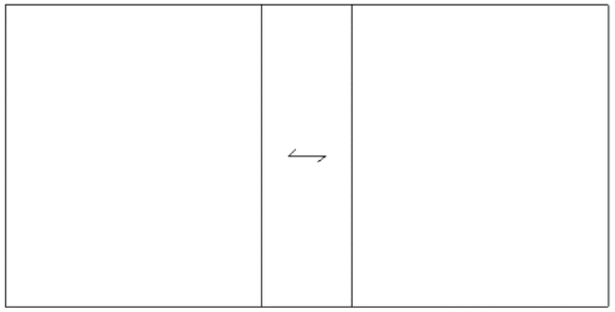
Floors with constraints at F4, Beams, Columns and Walls with top constraints at F4, etc.

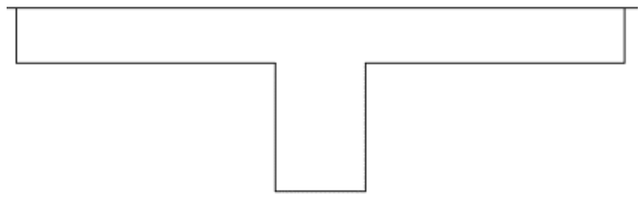
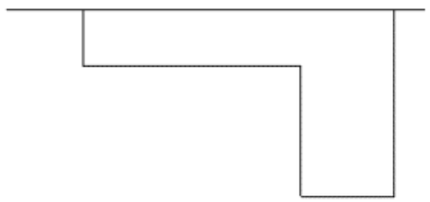
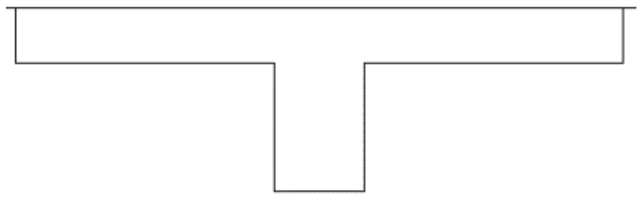
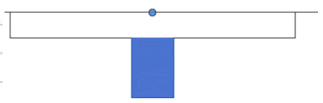
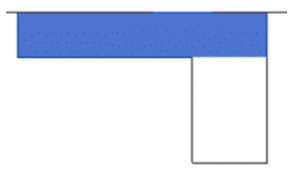
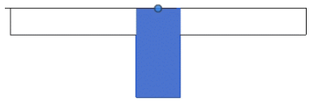
Figure 4-5 Formation of grouping of structural elements at domestic typical floors

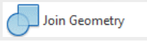
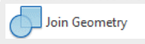
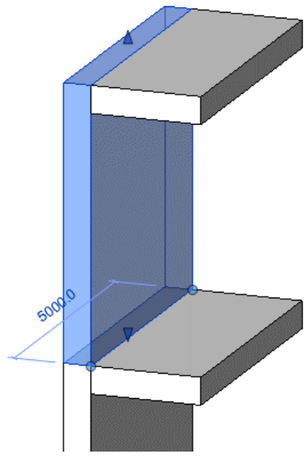
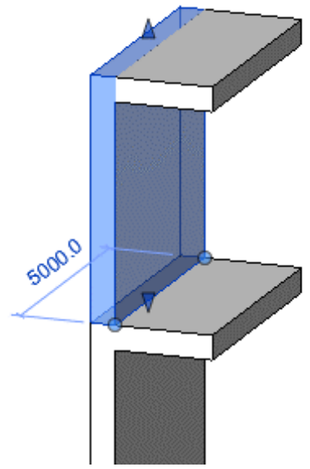
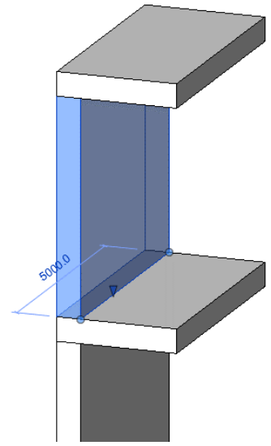
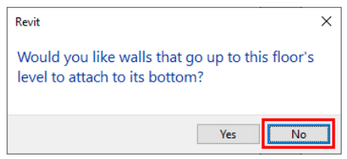
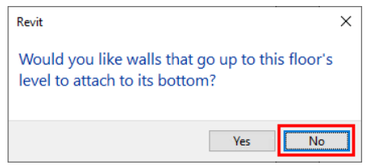
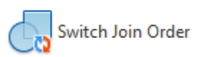
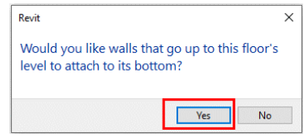
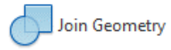
Illustration of Joining Approaches of Structural Elements

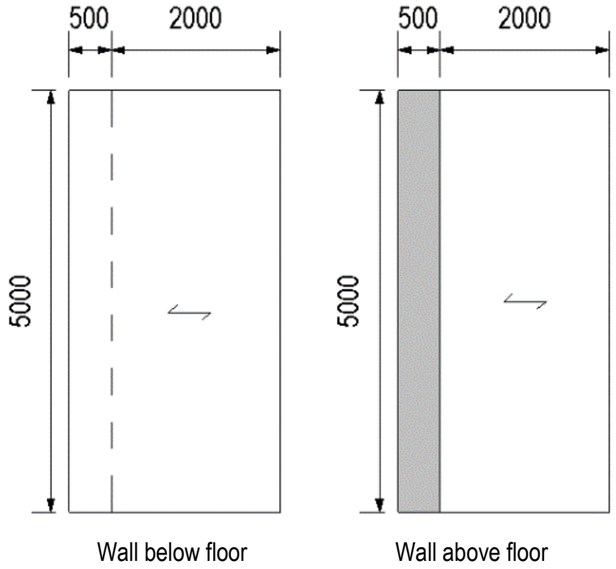
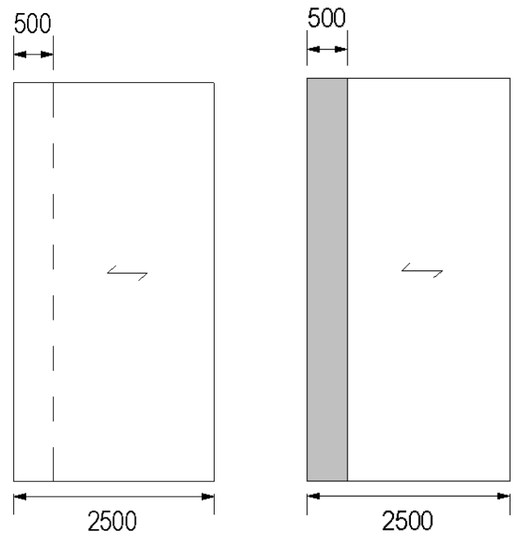
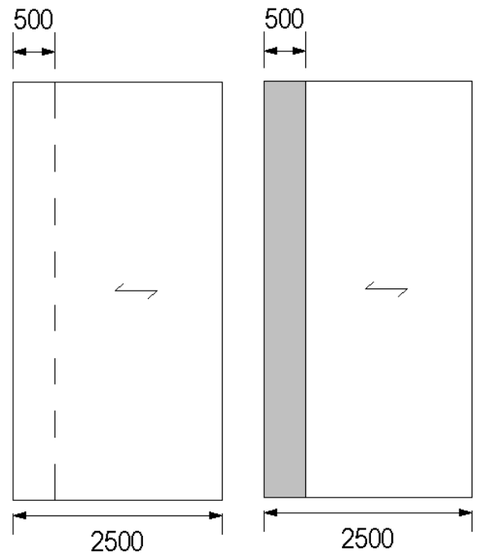
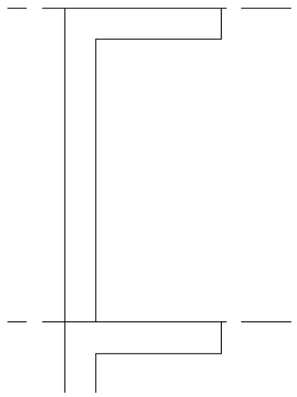
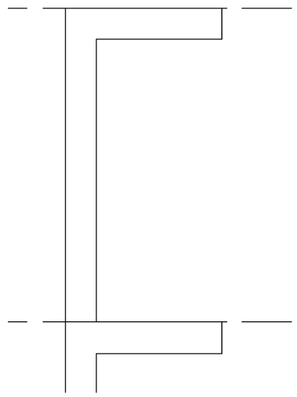
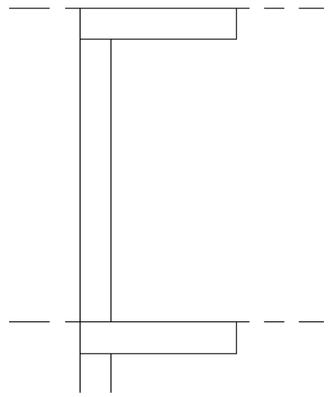
The following table summarises different joining approaches in Revit. Illustration of some common joining scenarios among the following structural elements, beams, floors and walls are provided and showing the difference in presentation and geometry measurements. Please note the stated scenarios shall be applied in HA projects.

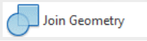
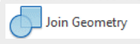
Remark: For sample model illustrated in the table below, model elements are set with same materials.

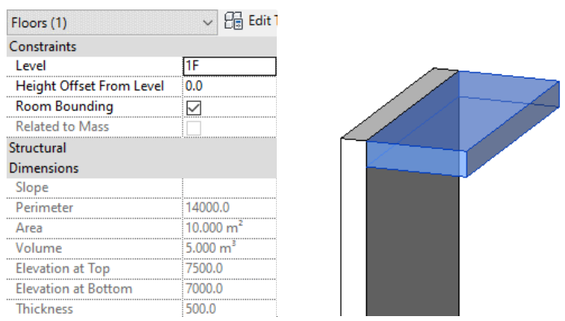
Elements	**Description**	**Scenario I: Individual floors shall be joined manually by using Join Geometry, while floors and beam shall be joined and overlapped**	**Scenario II: Floors and beam shall be joined and overlapped automatically and manually**	**Scenario III: Switch join the beam and single floor by using Switch Join Order**
1. Beam and Floor	**Remarks**	**Shall be applied in HA projects except edge beam**	**Shall be applied in HA projects for edge beam**	**Not applicable for HA projects**
	3D Illustration			
	Description	Floor shall be modelled separately as per its span coverage and followed by Join Geometry manually. The beam shall be modelled at the floor intersection. Geometry of floor takes precedence. (Hidden lines indicate the floor profiles.)	Beam is modelled along the edge of the floor. The geometry of the beam shall join with the structural floor to avoid overlapping. Geometry of floor takes precedence. (Hidden line indicates the floor profile.)	The floor is modelled as one geometry while the beam is modelled within the floor profile. The beam will join with the structural floor, but the joining order is reversed. Thus, there is no overlapped geometries but the geometry of beam takes precedence this time. (Hidden line indicates the floor profile.)
	Plan	 **Plan:** The beam is joined with and under the floor. Hence the beam is shown as hidden line. Since the floor is modelled separately, unique span marks could be generated automatically.	 **Plan:** The beam is joined with and under the floor. Hence the beam is shown as hidden line.	 **Plan:** The joined beam is shown as solid line. Since the floor is modelled as one geometry, only one span mark could be generated automatically.

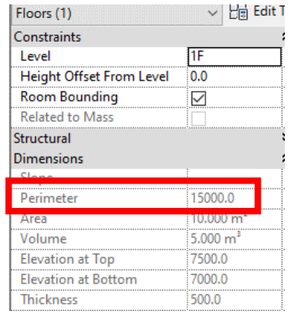
<table>
<tr><th>Elements</th><th>Description</th><th>Scenario I: Individual floors shall be joined manually by using Join Geometry, while floors and beam shall be joined and overlapped</th><th>Scenario II: Floors and beam shall be joined and overlapped automatically and manually</th><th>Scenario III: Switch join the beam and single floor by using Switch Join Order</th></tr>
<tr><td>1. Beam and Floor</td><td>Remarks</td><td>Shall be applied in HA projects except edge beam</td><td>Shall be applied in HA projects for edge beam</td><td>Not applicable for HA projects</td></tr>
<tr><td>(Cont’d)</td><td>Section</td><td> 
Section: No lines indicates the joint geometry portion at “Coarse” detail level. (Blue box with hidden lines in plan view indicates the section extent and applies the same to Scenario II and III.)</td><td> 
Section: No lines indicates the joint geometry portion at “Coarse” detail level.</td><td> 
Section: No lines indicates the joint geometry portion at “Coarse” detail level.</td></tr>
<tr><td></td><td>Quantity Effect (i.e. Changes in dimension or geometry)</td><td>Geometry of floor takes precedence. The volume of beam at the overlapped portion will not be counted in beam object.
Dimensions
Slope
Perimeter 4000.0
Area 1.000 m²
Volume 0.180 m³
Elevation at Top 2500.0
Elevation at Bottom 2320.0
Thickness 180.0
 
*Remark: Volume of 2 floors = 0.18 x 2 =0.36m³
Dimensions
Length 1000.0
Volume 0.126 m³
Elevation at Top 2500.0
Elevation at Bottom 1900.0
  </td><td>Geometry of floor takes precedence. The volume of beam at the overlapped portion will not be counted in beam object.
Dimensions
Slope
Perimeter 4000.0
Area 1.000 m²
Volume 0.180 m³
Elevation at Top 2500.0
Elevation at Bottom 2320.0
Thickness 180.0
 
Dimensions
Length 1000.0
Volume 0.126 m³
Elevation at Top 2500.0
Elevation at Bottom 1900.0
  </td><td>With the switched order and different modelling approach of floor, the geometry of beam takes precedence. All measurements will be different from Scenario I.
Dimensions
Slope
Perimeter 6000.0
Area 1.700 m²
Volume 0.306 m³
Elevation at Top 2500.0
Elevation at Bottom 2320.0
Thickness 180.0
 
Dimensions
Length 1000.0
Volume 0.180 m³
Elevation at Top 2500.0
Elevation at Bottom 1900.0
  </td></tr>
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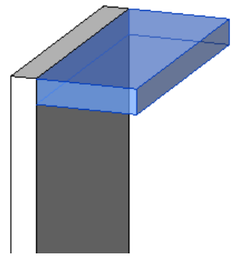
Elements	Description	Scenario I: Non-overlapping profile followed by Join Geometry 	Scenario II: Overlapping profiles followed by Join Geometry and Switch Join Order 	Scenario III: Overlapping profiles and attaching the bottom of floor followed by Join Geometry 
2. Wall and Floor	**Remarks**	**Shall be applied in HA projects for domestic typical floors**	**Shall be applied in HA projects for other locations except domestic typical floors**	**Shall be applied in HA projects for R/F only**
	3D Illustration			
	Description	The geometry of wall and floor should **not** be **overlapped**. **Wall shall be modelled from the top surface of the associated floor to the top surface of the floor above. It should choose "No" in the pop-up message. Then join the elements by "Join Geometry".**  + 	The geometry of wall and floor are overlapped. **It should choose "No" in the pop-up message. Then join the elements by "Join Geometry" and switch the join order by "Switch Join Order".** Thus, geometry of wall takes precedence.  +  + 	Wall profile and floor profile are overlapped. The wall and floor are joined by attaching or Join Geometry manually.  or 

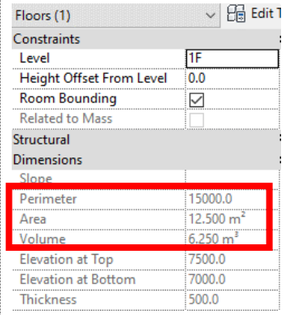
Elements	Description	Scenario I: Non-overlapping profile followed by Join Geometry	Scenario II: Overlapping profiles followed by Join Geometry and Switch Join Order	Scenario III: Overlapping profiles and attaching the bottom of floor followed by Join Geometry
2. Wall and Floor	**Remarks**	**Shall be applied in HA projects for domestic typical floors**	**Shall be applied in HA projects for other locations except domestic typical floors**	**Shall be applied in HA projects for R/F only**
(Cont'd)	**Plan**	 Wall below floor Wall above floor **Plan:** The wall below floor will be presented in hidden line while the wall below is shown as solid line.	 Wall below floor Wall above floor **Plan:** The wall under floor will be presented in hidden line while the wall below is shown as solid line.	 Wall below floor Wall above floor **Plan:** The wall under floor will be presented in hidden line while the wall below is shown as solid line.
	Section	 **Section:** No line is shown between the joined wall and floor.	 **Section:** No line is shown between the joined wall and floor.	 **Section**: Lines from wall and floor are intersected.

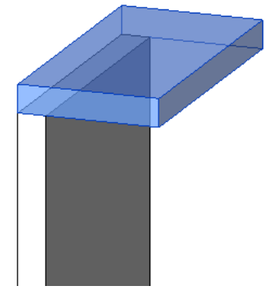
Elements	Description	Scenario I: Non-overlapping profile followed by Join Geometry 	Scenario II: Overlapping profiles followed by Join Geometry and Switch Join Order 	Scenario III: Overlapping profiles and attaching the bottom of floor followed by Join Geometry 
2. Wall and Floor	**Remarks**	**Shall be applied in HA projects for domestic typical floors**	**Shall be applied in HA projects for other locations except domestic typical floors**	**Shall be applied in HA projects for R/F only**
(Cont'd)	**Quantity Effect (i.e. Changes in dimension or geometry)**	Since the geometry of wall and floor doesn't overlapped, the sizes and volumes for the wall and floor are the identical as their isolated size.	Although the geometry of floor joined with wall, where wall takes precedence, the Perimeter of slab represents the original geometry of floor (including the overlapping portion with wall). The volume of wall and floor represent the joined geometry of elements.	Since the geometry of floor takes precedence after joined with wall, the Perimeter and Volume of slab represent the original geometry of floor (including the overlapping portion with wall). The volume of wall has been deducted the overlapping portion.

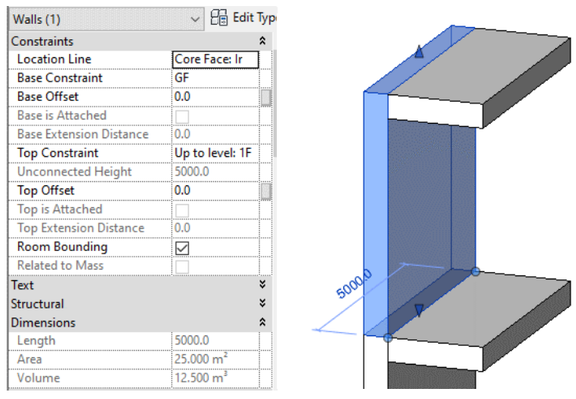


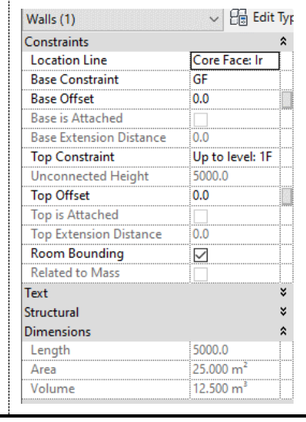


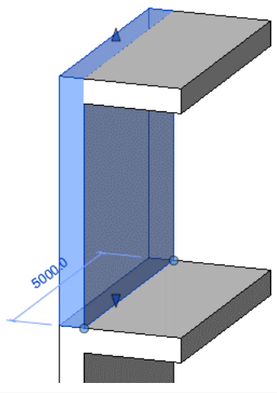


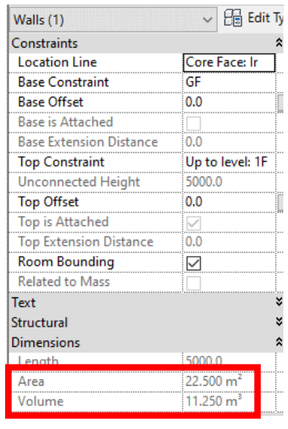


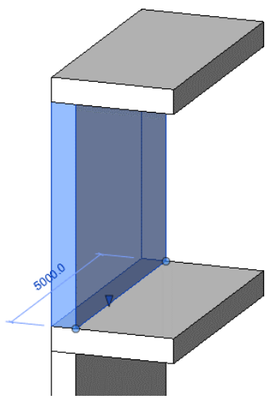


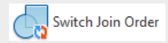
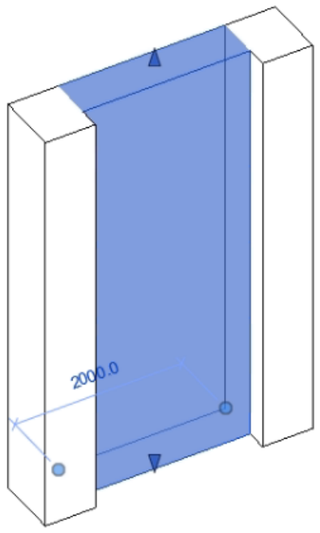
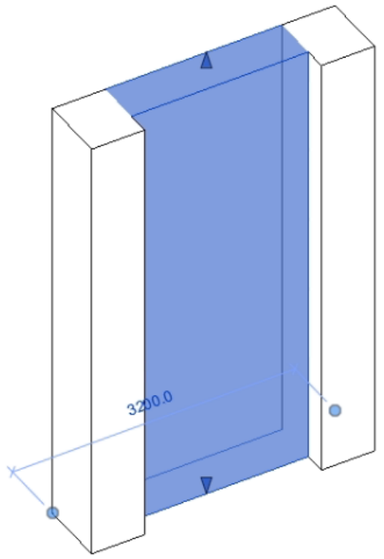
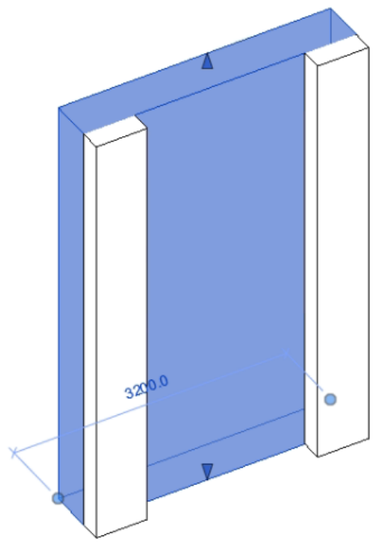
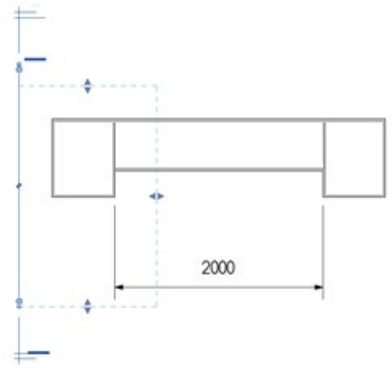
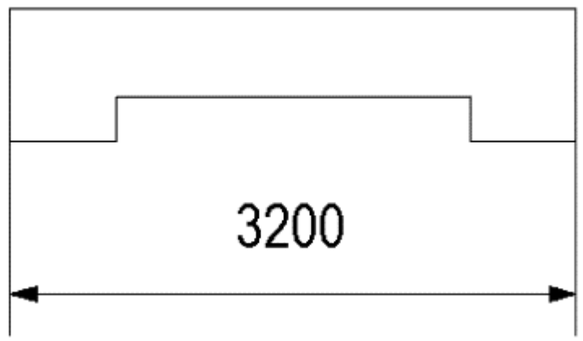
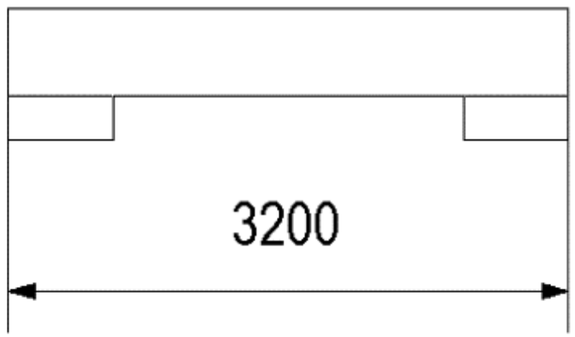


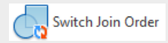
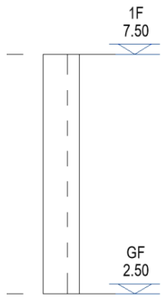
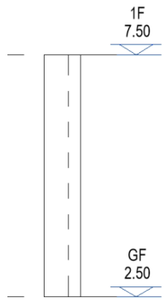
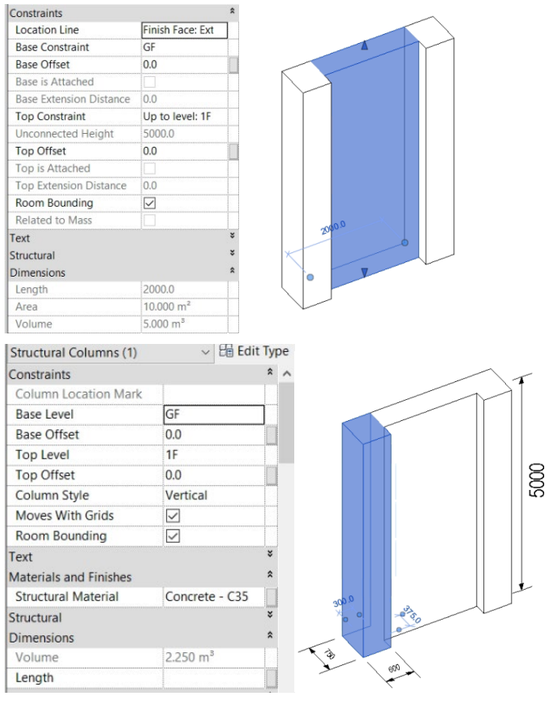
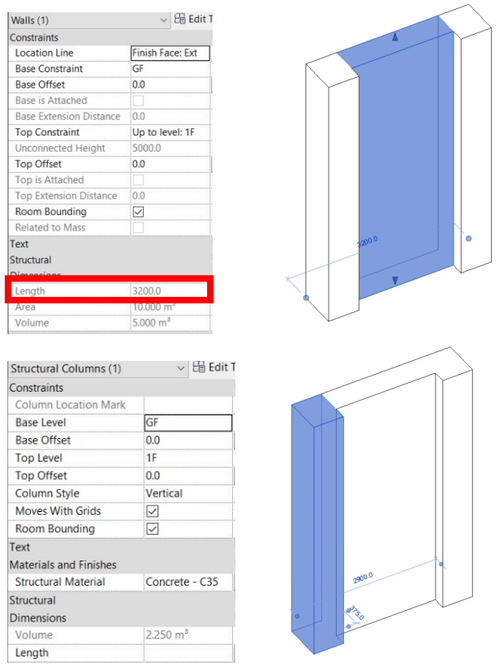
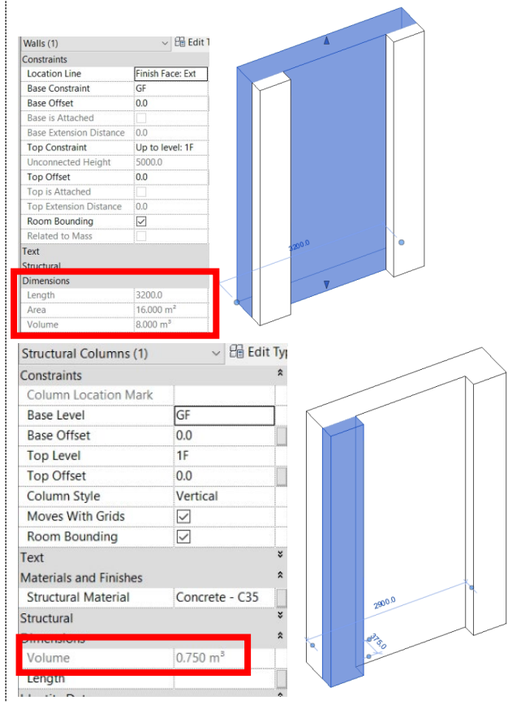


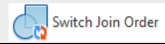
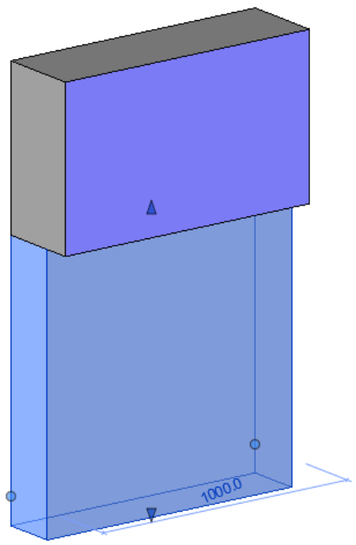
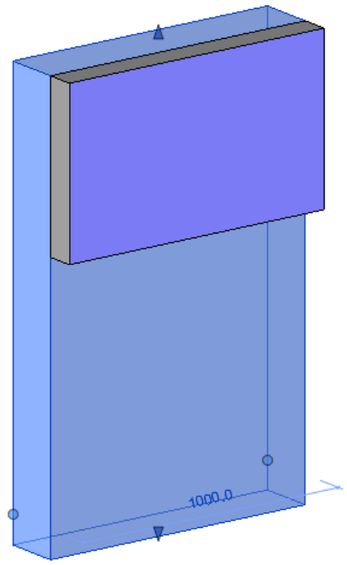
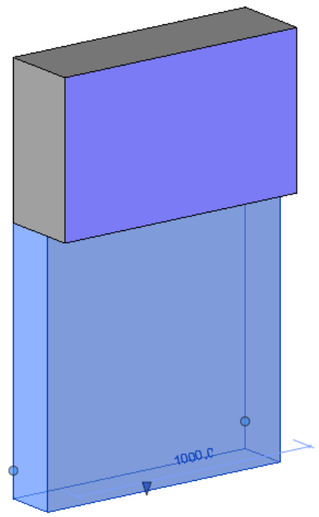
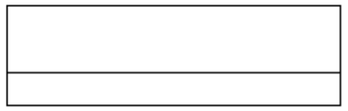
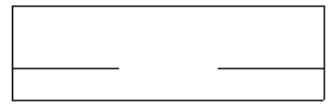


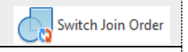
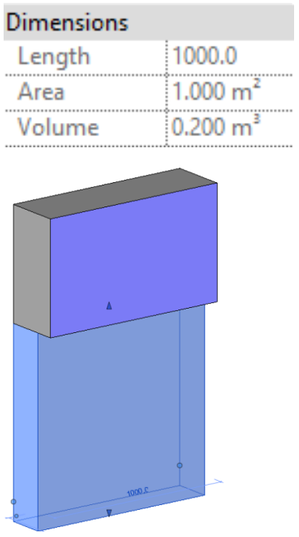
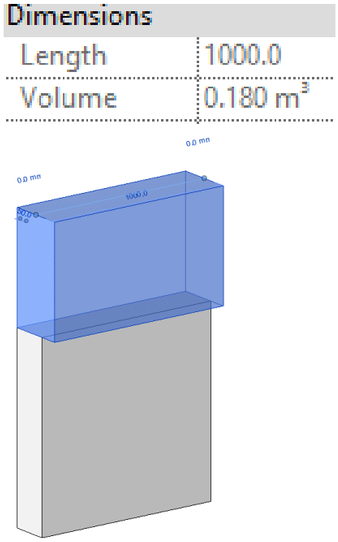
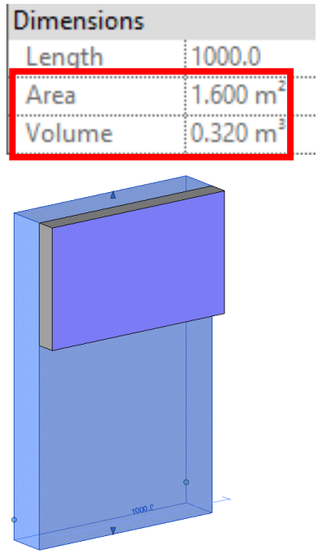
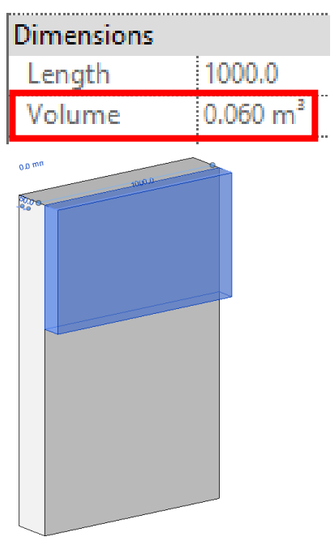
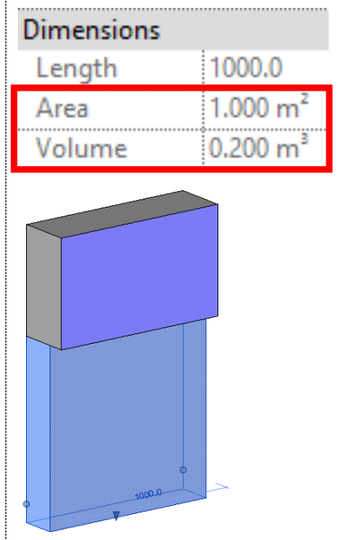
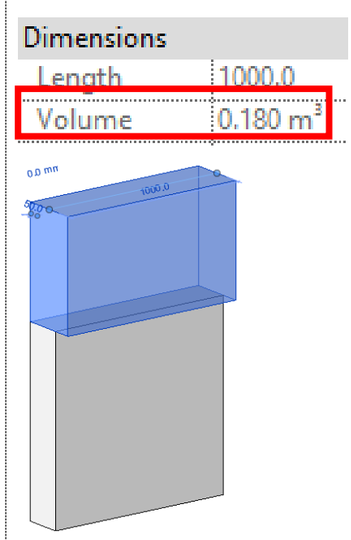




Elements	Description	Scenario I: Wall and column shall be non-overlapped and joined automatically	Scenario II: Wall overlaps with columns and are joined automatically followed by Switch Join Order 	Scenario III: Overlapping profiles and attaching the bottom of floor followed by Join Geometry
3. Wall and Column	**Remarks**	**Shall be applied in HA projects**	Not applicable for HA projects	Not applicable for HA projects
	3D Illustration			
	Description	Wall is drawn from “close” edge of column. They are non-overlapped.	The wall is joined with the column, but the joining order is switched. Thus, geometry of column takes precedence.	Wall is still joined with the column. Geometry of wall takes precedence.
	Plan	 Lines indicate the actual shape of the elements	 **Plan**: No lines indicates the joint geometry portion at “Coarse” detail level.	 **Plan**: No lines indicates the joint geometry portion at “Coarse” detail level.

Elements	Description	Scenario I: Wall and column shall be non-overlapped and joined automatically	Scenario II: Wall overlaps with columns and are joined automatically followed by Switch Join Order 	Scenario III: Overlapping profiles and attaching the bottom of floor followed by Join Geometry
3. Wall and Column	**Remarks**	**Shall be applied in HA projects**	Not applicable for HA projects	Not applicable for HA projects
(Cont'd)	**Section**	 **Section:** Wall is indicated as hidden line. Hidden line is shown as the wall geometry is behind the column. (Blue box with hidden lines in plan view indicates the section extent and applies the same to Scenario II and III.)	 **Section**: Wall is indicated as hidden line. Hidden line is shown as the wall geometry is behind the column.	 **Section**: The solid line of wall appears when elements are joined with wall geometry takes precedence.
	Quantity Effect (i.e. Changes in dimension or geometry)	Since the wall and column aren't overlapped, the sizes and volumes for the wall and column are the identical as their isolated size. 	Since the wall profile overlaps on the column, the Length reflects the actual length of the wall modelled. Column takes precedence after switch join order, the volume of wall would be deducted by the overlapping portion. However, the volume of wall and column would be the same as Scenario I. 	Since the wall profile overlaps on the column, and the wall takes precedence, the length, area and volume reflect the actual size of the wall. However, the volume of column decreases by the overlapping portion. 

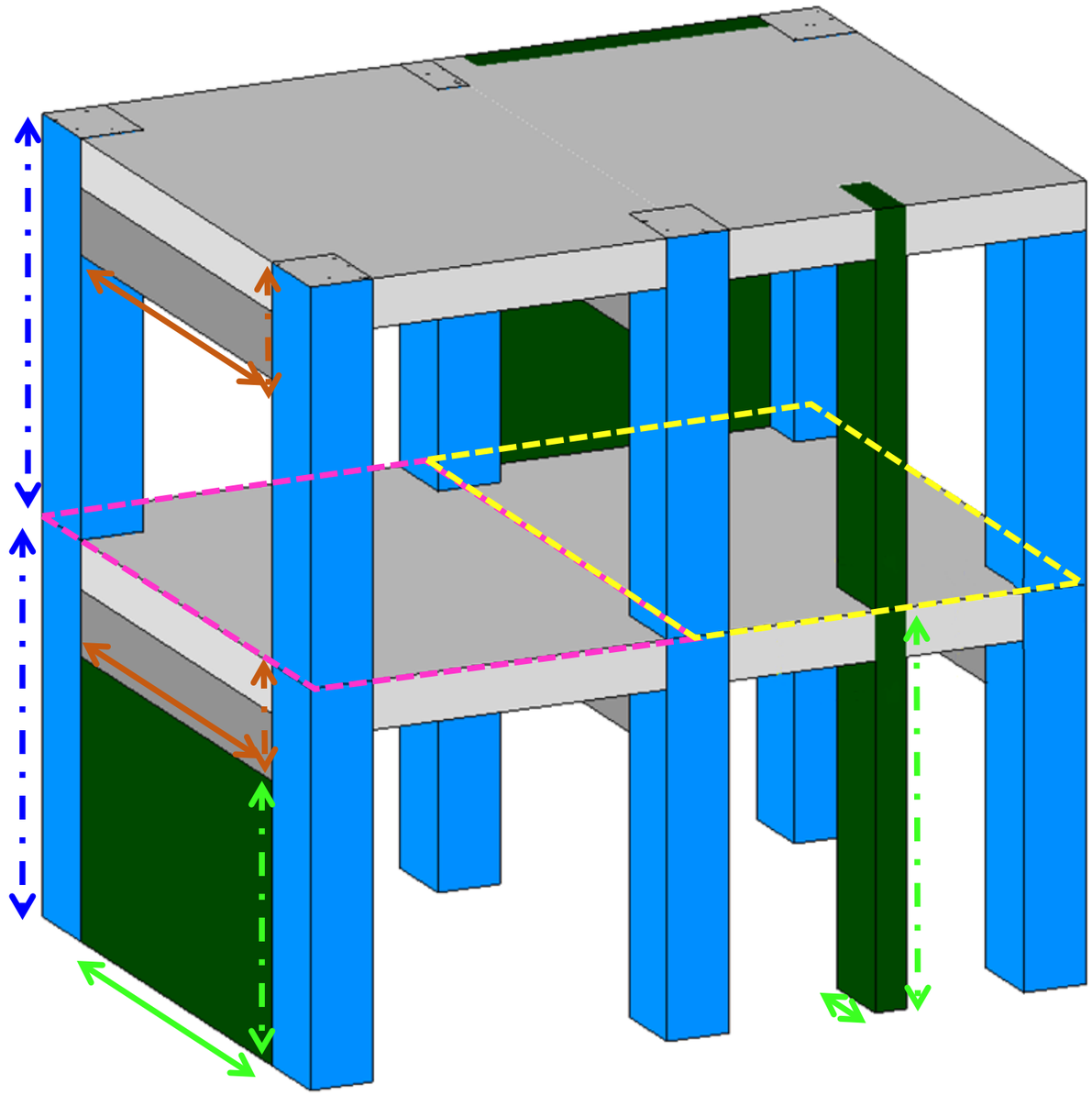
Elements	Description	Scenario I: Wall and Beam shall be non-overlapped and joined automatically	Scenario II: Wall overlaps with beam and are joined automatically	Scenario II: Wall overlaps with beam and are joined automatically followed by Switch Join Order 
4. Wall and Beam	**Remarks**	**Shall be applied in HA projects**	Not applicable for HA projects	Not applicable for HA projects
	3D Illustration			
	Description	Top of wall is modelled under the bottom of the beam. They are non-overlapped.	The wall is joined with beam. The geometry of wall takes precedence.	The wall is joined with the beam, but the joining order is switched. Thus, geometry of beam takes precedence.
	Plan	 **Plan**: Hidden line is shown as the wall geometry is under the beam.	 **Plan**: Solid line of wall appears when elements are joined with wall geometry takes precedence.	 **Plan**: Hidden line is shown as the wall geometry is under the beam.
	Section	 **Section:** The horizontal solid line between wall and beam appears at the intersection.	 **Section**: The vertical solid line of wall appears when elements are joined with wall geometry takes precedence.	 **Section**: The horizontal solid line between wall and beam appears at the intersection.

Elements	Description	Scenario I: Wall and Beam shall be non-overlapped and joined automatically	Scenario II: Wall overlaps with beam and are joined automatically	Scenario II: Wall overlaps with beam and are joined automatically followed by Switch Join Order 
4. Wall and Beam	**Remarks**	**Shall be applied in HA projects**	Not applicable for HA projects	Not applicable for HA projects
(Cont'd)	**Quantity Effect (i.e. Changes in dimension or geometry)**	Since the wall and beam aren't overlapped, the sizes and volumes for the wall and column are the identical as their isolated size.  Dimensions Length 1000.0 Area 1.000 m² Volume 0.200 m³  Dimensions Length 1000.0 Volume 0.180 m³	Since wall and beam are joined and wall takes precedence, the overlapped portion is counted in wall.  Dimensions Length 1000.0 Area 1.600 m² Volume 0.320 m³  Dimensions Length 1000.0 Volume 0.060 m³	Since wall and beam are joined and beam takes precedence, the overlapped portion is counted in beam.  Dimensions Length 1000.0 Area 1.000 m² Volume 0.200 m³  Dimensions Length 1000.0 Volume 0.180 m³

This diagram below illustrates the joining principals for multi-categories structural elements.

Legend:

Arrow Type	Remarks	Arrow Type	Remarks
	Beam Length		Wall Length
	Beam Depth		Wall Height
	Floor 1 Profile		Column Height
	Floor 2 Profile		



DS-U 01 Structural Columns

Discipline	Structural
Family	Loadable Family
Family category	Structural Columns
Workset	Individual Levels
Family naming convention	SCL-<Functional Type>-HAS-<Descriptor 1 (Section shape)>-<Descriptor 2 (Optional)>
Type naming convention	<Structural material>-<Size>

Naming example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Section shape)**		**Descriptor 2 (Optional)**	**Structural material**		**Size (mm)**
SCL	-	RCL	-	HAS	-	Rectangular	-	<Not used>	35D/20	-	800x600 (Depth x Width)
SCL	-	RCL	-	HAS	-	Circular	-	<Not used>	45D/20	-	800 (Diameter)
SCL	-	STC	-	HAS	-	Universal_column	-	<Not used>	S355	-	356x406x634 (Depth x Width x Mass per meter Kg/m)
SCL	-	STC	-	HAS	-	Universal_beam	-	<Not used>	S355	-	1016x305x487(Depth x Width x Mass per meter Kg/m)

Functional type example

Functional type	**Description**
RCL	Reinforced Concrete column
STC	Steel column

Section Shape example

Section shape	**Dimension parameters**
Rectangular	Width x Depth
Circular	Diameter
Universal_column	Depth x Width x Mass per meter Kg/m
Universal_beam	Depth x Width x Mass per meter Kg/m
RHS (Rectangular Hollow Section)	Width x Depth x Thickness

Information Requirement

List of Built-in Parameters

Parameter name	**Information**	**Remark**	**Example**
Type	Family type	Under using the correct family, choosing the type with correct size.	Rectangular: 40D/20-800x600 Circular: 40D/20-800
Base Level	Base level	Specify base constraint level for a column.	1F, 2F, ……
Base Offset	Base offset	Specify offset distance from base level.	0mm, 100mm, 200mm, 250mm, ……
Top Level	Top level	Specify top constraint level for a column.	2F, 3F, ……
Top Offset	Top offset	Specify offset distance from top level.	0mm, 100mm, 200mm, 250mm, ……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	45D/20, 30D/20_Mass Fill, 30D/20_PFA, 30D/20_Waterproofing ……
Mark	Column mark	This parameter was added to column tag families to annotate the column. This value must be unique for each type of column usage in a project.	Refer to the table below
Shape	Column Shape	Specify the column shape	Rectangular, Circular …..
Volume	Column Volume	Volume of column	0.5m^3, 10m^3, ……

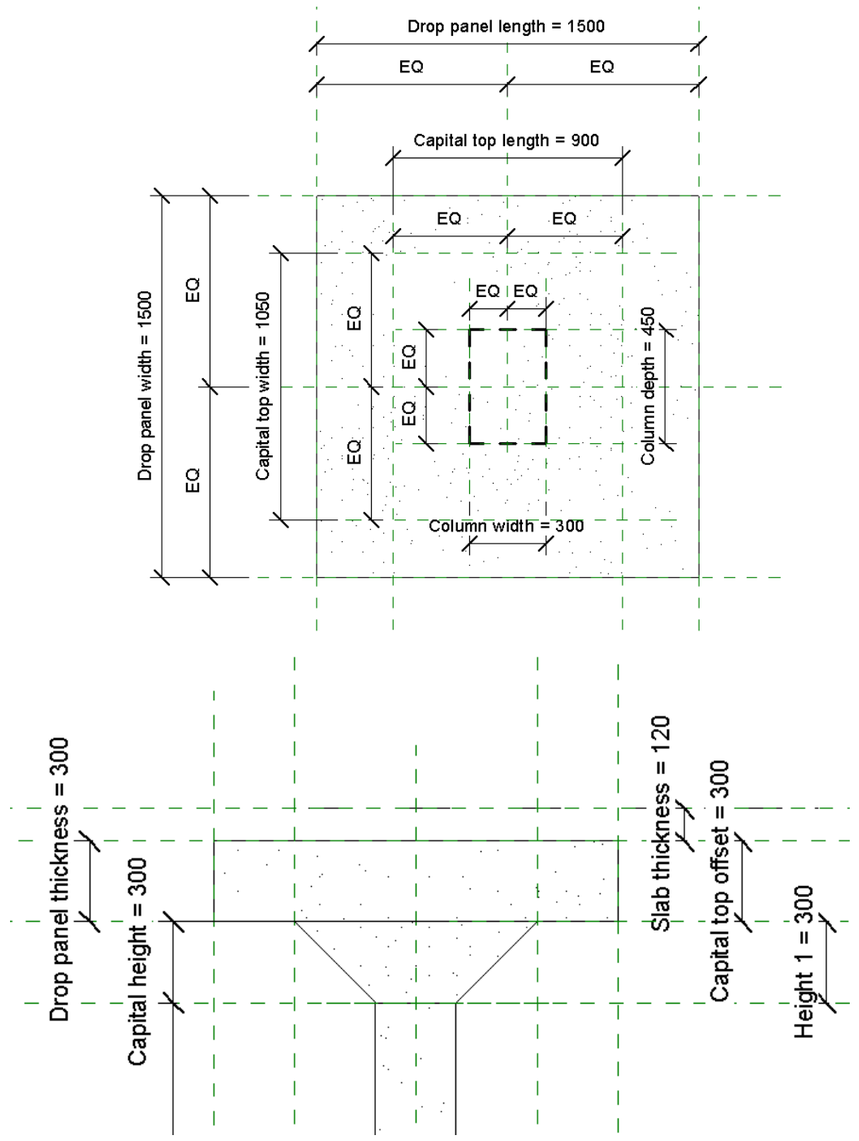
The following table indicates some examples on the classification of different type of column usage. For individual project, the classification of column marks shall be indicated in the structural drawings.

Mark	**Classification**	**Remark**
C01, C02…	Column	
CP01, CP02…	Column Post	
CA01, CC02	Column under transfer	Column in Wing A, Column in Wing C

List of Shared Parameter

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Shape	Column Shape	Common	Text	General	Type
Column Width	Width of rectangular section	Common	Length	Dimension	Type
Column Depth	Depth of rectangular section	Common	Length	Dimension	Type
Column Diameter	Diameter of circular section	Common	Length	Dimension	Type
Drop Panel Width	Width of drop panel	Common	Length	Dimension	Type
Drop Panel length	length of drop panel	Common	Length	Dimension	Type
Drop Panel thickness	Depth of drop panel	Common	Length	Dimension	Type
Capital Top width	Width of capital top	Common	Length	Dimension	Type
Capital Top length	Length of capital top	Common	Length	Dimension	Type
Capital Height	Height of capital top	Common	Length	Dimension	Type

Remark: Parameters in grey colour are parameters for the column drop as the sample indicated in next page.

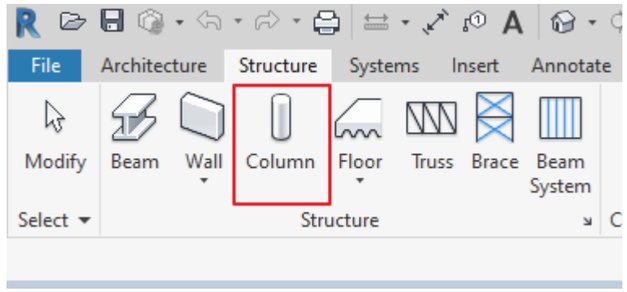


Parameters set for column with column dropo

Model Authoring

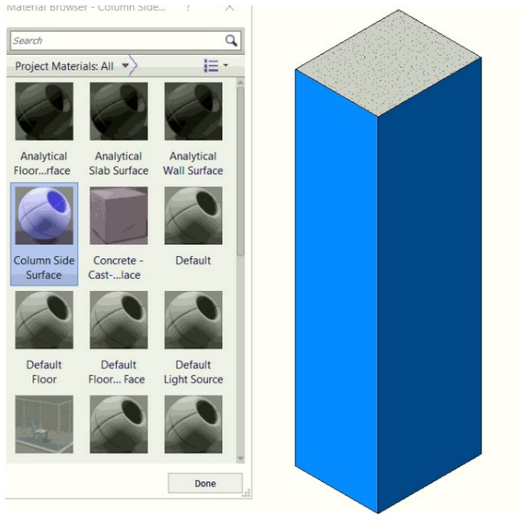
General requirements for modelling

All Structural Column shall be modelled as Structure > (Column)



All Columns shall be modelled with appropriate Structural Column category family elements selected according to their sectional shape.

All vertical faces of columns shall be painted with material/finishes, named as “Column Side Surface”.



*Remark: “Column Side Surface” are the summarisation of side surfaces area generated automatically.

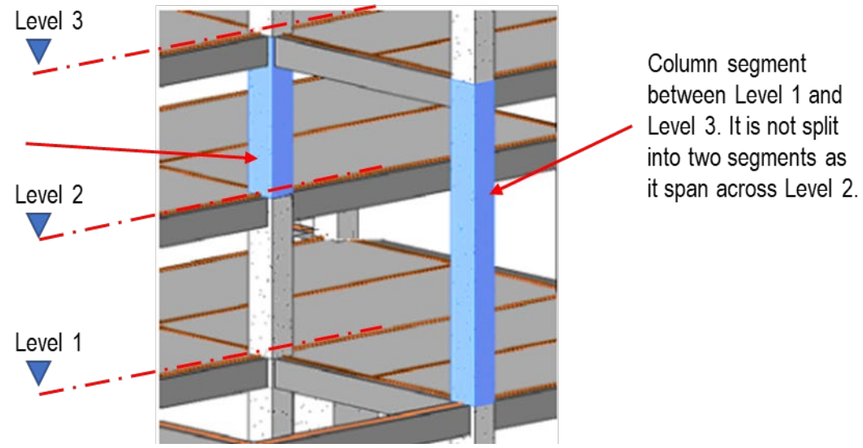
Joining approaches to domestic typical floors

The geometry of column shall be in-touched and joined with wall and horizontal elements (e.g. slabs and beams etc.), where columns take precedence.

Joining approaches to other locations except domestic typical floors

The geometry of column shall be in-touched and joined with wall and horizontal elements (e.g. slabs and beams etc.), where columns take precedence.

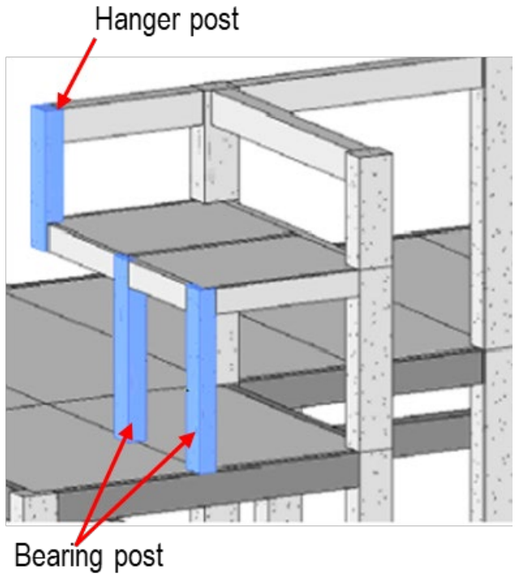
All columns shall be split into segments at different floor levels unless it spans across more than one level.



Modelling details between column and slab, and column and beam refer to **DS-U 05 Structural Floor** and **DS-U 04 Strucutrual Framing** respectively.

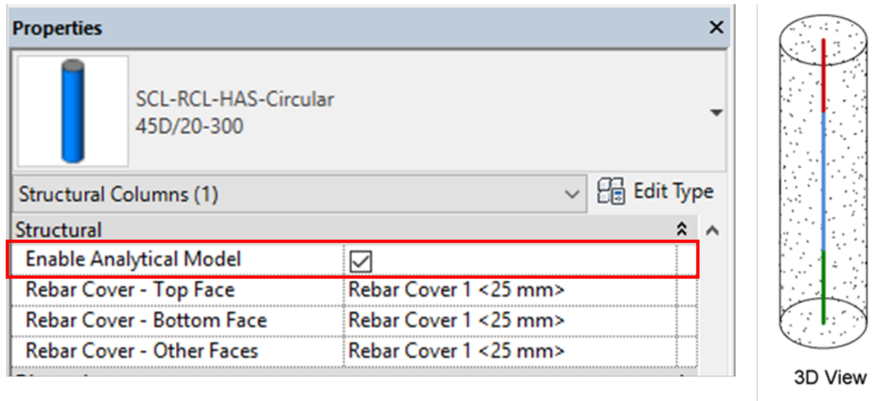
Modelling of hanger post and bearing post

For hanger post and bearing post, the column height shall be controlled by the wall top/ bottom constraint and offset.



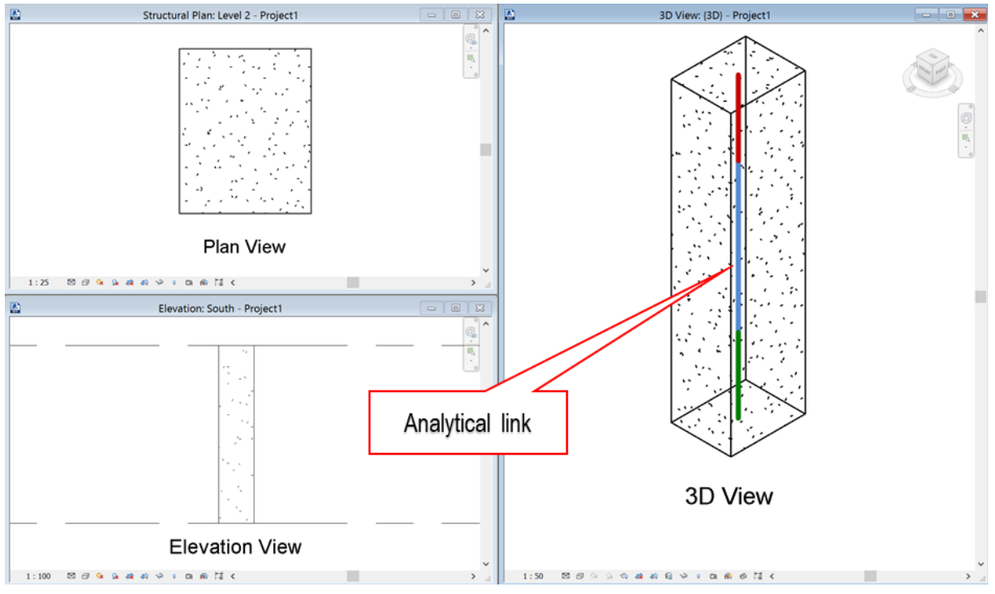
Analytical Links

For those elements to be included into the building structure analytical model, modeller shall click the element instance property Enable Analytical Model.



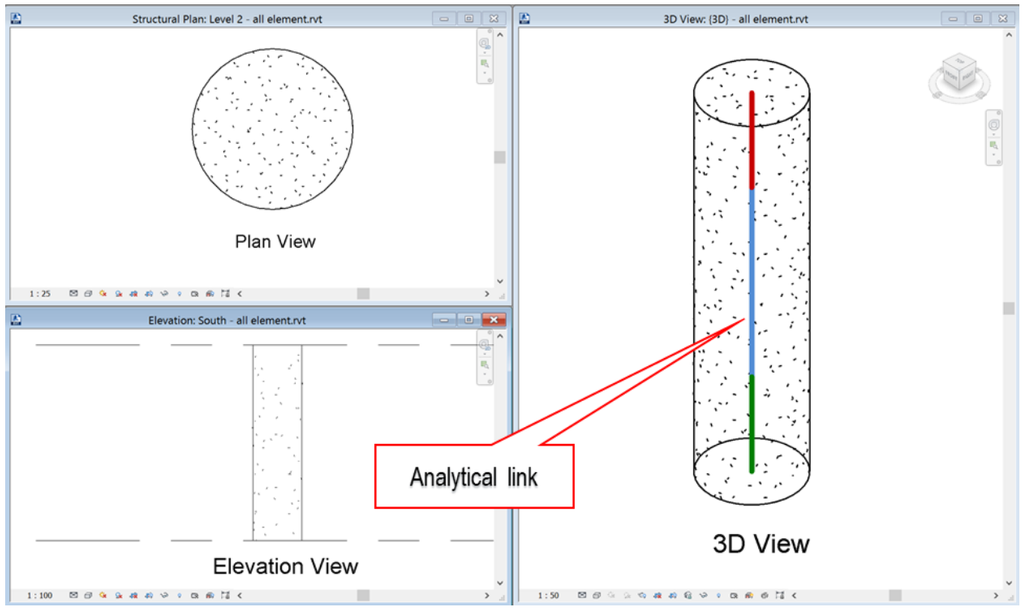
Rectangular Column

Please note on 3D View – The analytical link can be switched off by turning off the analytical link categories.



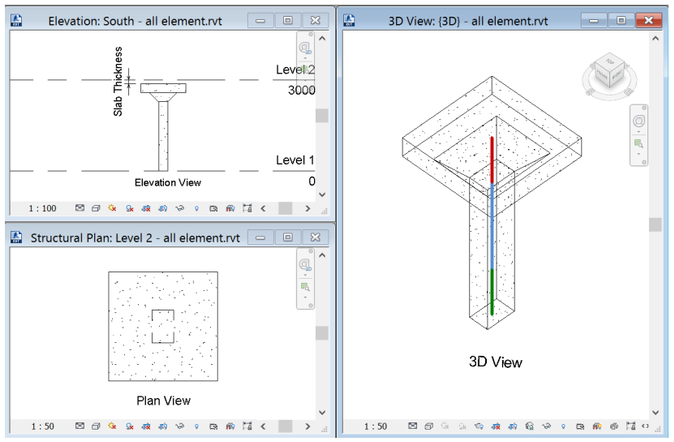
Circular Column

Please note on 3D View – The analytical link could be switched off by turning off the analytical link categories.



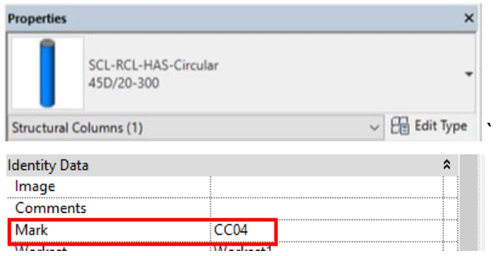
Column with Drop Head

Column with drop head shall be modelled as Structure > (Column). Column Head and Floor intersection shall be reversed the way as Modify > Join > (Switch Join Order)



Mark

To enable subsequent generation of drawing production and schedule, all columns in the Project Revit Structure model shall be assigned with a unique column mark. This column mark can be input in the “Mark” field of “Identity Data” in the Properties Palette.



DS-U 02 Structural Wall

Discipline	Structural
Family	System Family
Family Category	Wall (Basic Wall)
Workset	Individual Levels
Family Naming Convention	Basic Wall (Name of System Family is not editable.)
Type Naming Convention	SWL-HAS-<Descriptor 1 (Structural material)>-<Descriptor 2 (Wall thickness)>

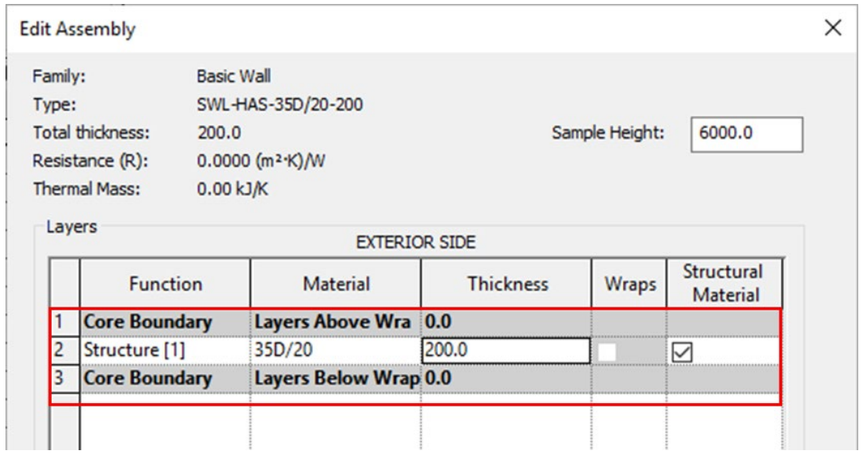
Type name example

Functional type		Originator		Descriptor 1 (Structural material)		Descriptor 2 (Wall thickness (mm))
SWL	-	HAS	-	40D/20	-	300
SWL	-	HAS	-	30D/20	-	200
SWL	-	HAS	-	30D/20_Mass Fill	-	200

Functional type example

Functional type	Description
SWL	Structural wall

All Wall family type shall be defined with single structure layer only with required thickness and concrete grade. Thickness of other layers (e.g. Core Boundary) shall be zero.



Information Requirement

List of built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	SWL-HAS-30D/20-200
Base Constraint	Base level	Specify base constraint level for a wall	1F, 2F……
Base Offset	Base offset	Specify offset distance from base level	0mm, 100mm, 200mm, 250mm,……
Top Constraint	Top level	Specify top constraint level	2F, 3F……
Top Offset	Top offset	Specify offset distance from top level.	0mm, 100mm, 200mm, 250mm, ……
Unconnected Height	Wall height	If top constraint is specified, unconnected height shall be generated by system.	3500mm, 4000mm, ……
Length	Length of wall	Length of wall	1000mm, 2000mm, ……
Width	Wall thickness	Wall thickness	160mm, 200mm, ……
Area	Wall area	The large side of wall area	0.10m^2, 0.20m^2, ……
Volume	Wall volume	Volume of wall geometry	0.1m3, 0.20m^3, ……
Structural material	Structural material	Structural material information shall be consistent with the structural material information in Family Type Name.	30D/20,35D/20_Mass Fill, 30D/20_PFA, 30D/20_Waterproofing
Mark	Wall mark	This parameter was added to wall tag families to annotate the walls. This value must be unique for each type of wall in a project.	Refer to the table below

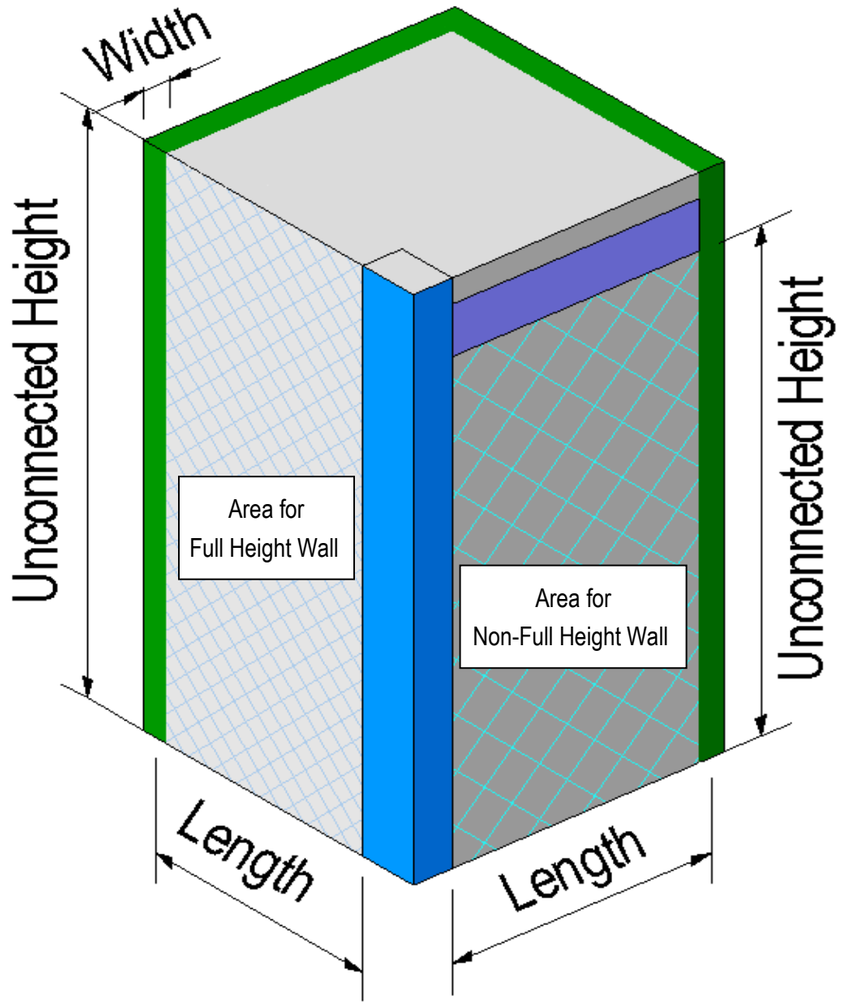
The following table indicates some examples on the classification of different type of wall. For individual project, the classification of wall marks shall be indicated in the structural drawings.

Mark	Classification	Remark
HW01	Hanger Wall	
SW01	Screen Wall	
CW01	Core Wall	
WA01, WB01a, WB01b	Wall (in domestic blocks)	(Wall at Wing A, B, etc.)
400 BW	Bearing Wall	
200 FW	Fence wall	

List of Shared Parameter

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Join Status	Wall's Join Status	Common	Text	General	Instance

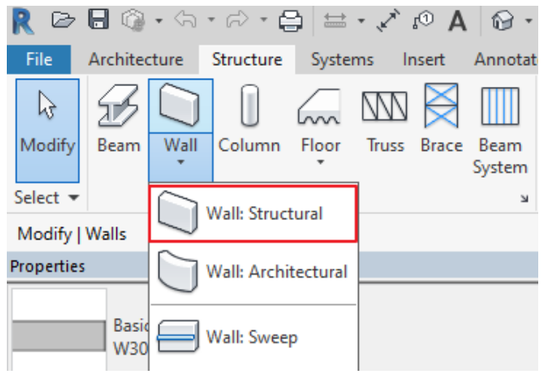
Below image illustrates the relationship between parameters in wall.



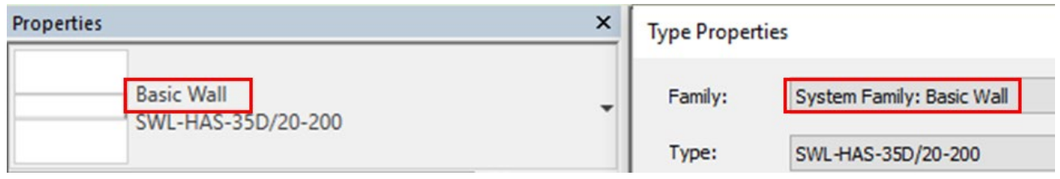
Model Authoring

General requirements

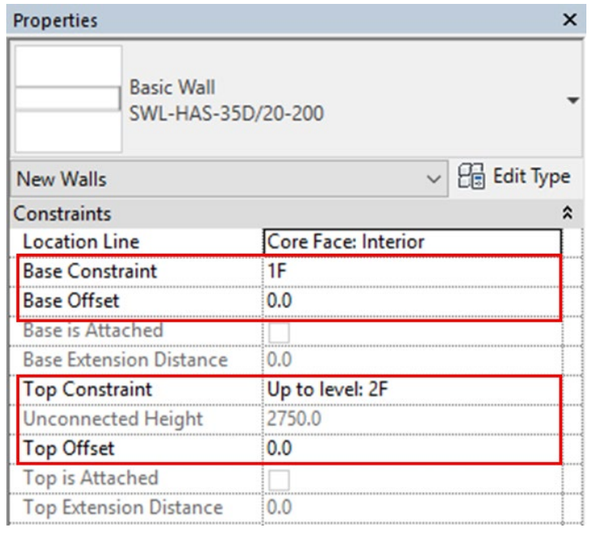
The structural wall can be achieved by selecting Revit Structure Ribbon → Wall (dropdown list) → Wall: Structural when creating a wall.



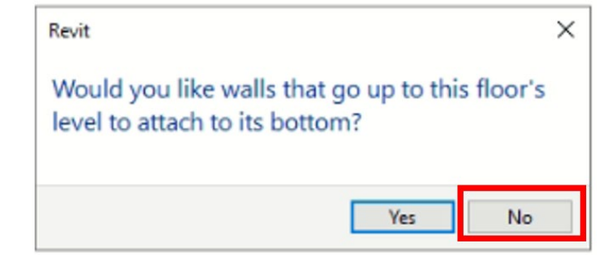
All structural walls shall be modelled with appropriate types from Wall system family of sub-category “Basic Wall”.

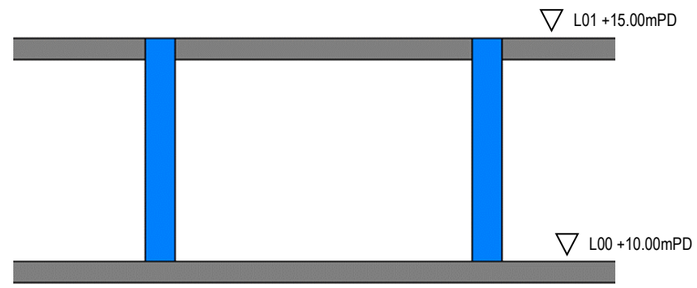


All walls shall be defined with Top and Base Constraints between the levels where they serve as support for other elements and top of their supporting elements. Offset can be applied as appropriate.



In general, the walls shall be modelled from the top surface of the associated floor to the top surface of the floor supported above instead of to the bottom of floor. User should select “**No**” for the warning below.





Joining approaches between walls elements

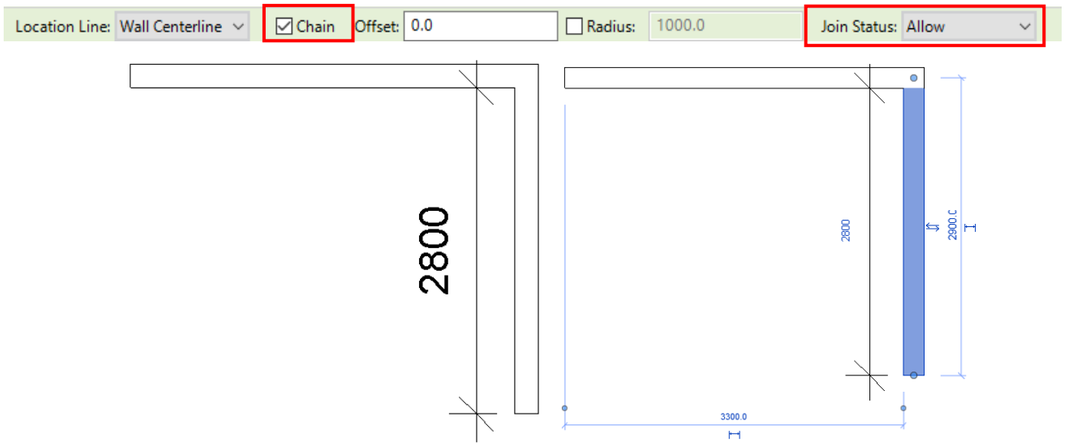
With a view to maintain the consistency of wall joins between walls elements as far as practicable, users shall pay attention to below requirements when determining the which joining approaches to be adopted for wall joins during BIM modelling.

1. General rules of wall joining

Users shall adopt the Revit's default rules of wall joining approach i.e. Revit will automatically join the wall elements being modelled "in-chain". This general rule of joining wall elements is so-called as "Join & Overlap" approach. Users' attentions are drawn that by using the "Join & Overlap" approach, there will be no "wall demarcation line" can be produced to differentiate walls elements being assigned with the same structural materials.

Scenario 1: Walls modelled at corner junction

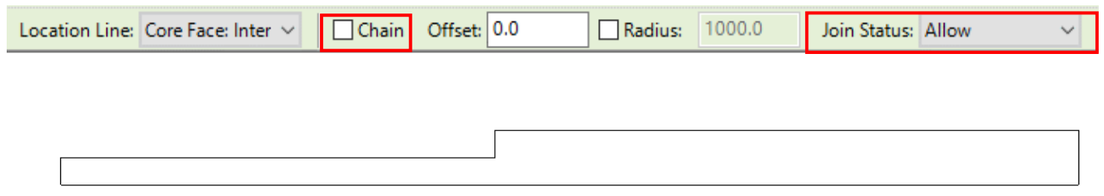
In this scenario, users are required make sure the Join Status set to "Allow" before placing the wall element so that Revit will automatically join the wall being modelled and its adjacent wall element with the default "Join and Overlap" approach. Then, two walls at the corner junction will be extended and overlapped each other at the corner junction as illustrated in below figure.



Walls modelled at corner junction

Scenario 2: Walls of different thickness modelled in a row

In this scenario, users are required to make sure the Join Status set to "Allow" before placing the wall element so that Revit will automatically join the wall being modelled and its adjacent wall element of different thickness by the default "Join and Overlap" approach as illustrated in below figure.



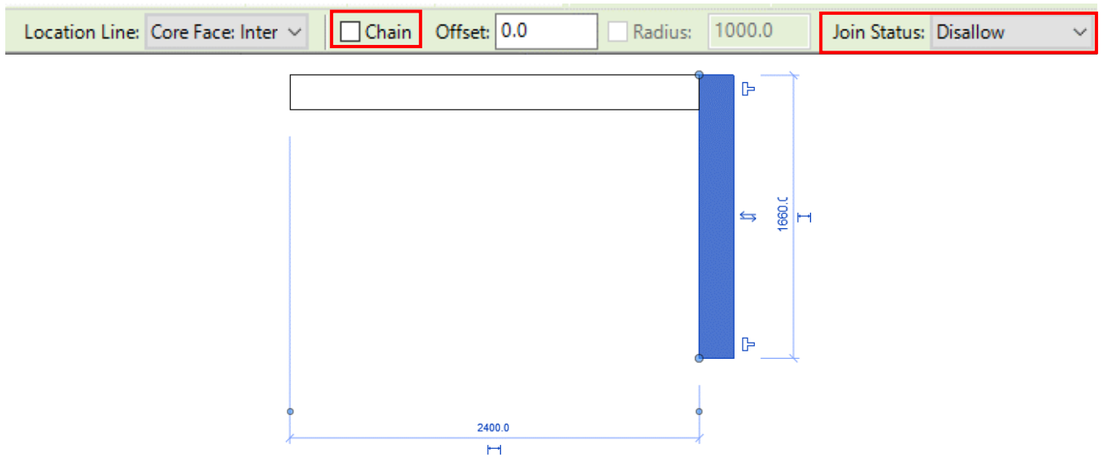
Wall of different thickness modelled in a row

2. Use of "Disallow Join" for wall joining

Users shall use "Disallow Join" cautiously only in circumstances where demarcation lines are required to be shown on plans and/or sections to differentiate different wall elements. To avoid concrete volumes of wall elements being taken-off inaccurately, users should not use "Join" to repeatedly join those wall elements which were previously separated by using the "Disallow Join". If it is necessary, users shall remove or delete those walls previously assigned with join status "Disallow Join" and shall re-model a new wall element and join with the adjacent existing wall elements by using the default "Join and Overlap" approach.

Scenario 1: Walls modelled at corner junction

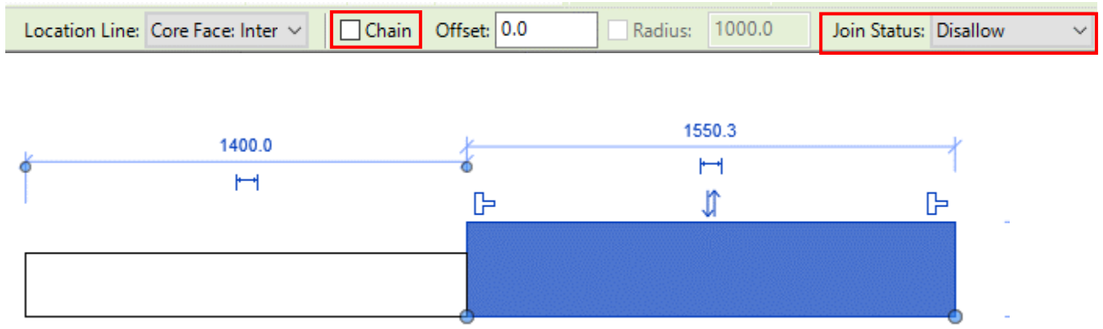
When the users are required to comply with certain drawing presentation requirements, users could consider to use "Disallow Join" to produce the "wall demarcation line" in order to highlight that the which wall shall take precedence at the corner junction as illustrated in below figure.



Walls modelled at corner junction

Scenario 2: Wall of different thickness modelled in a row

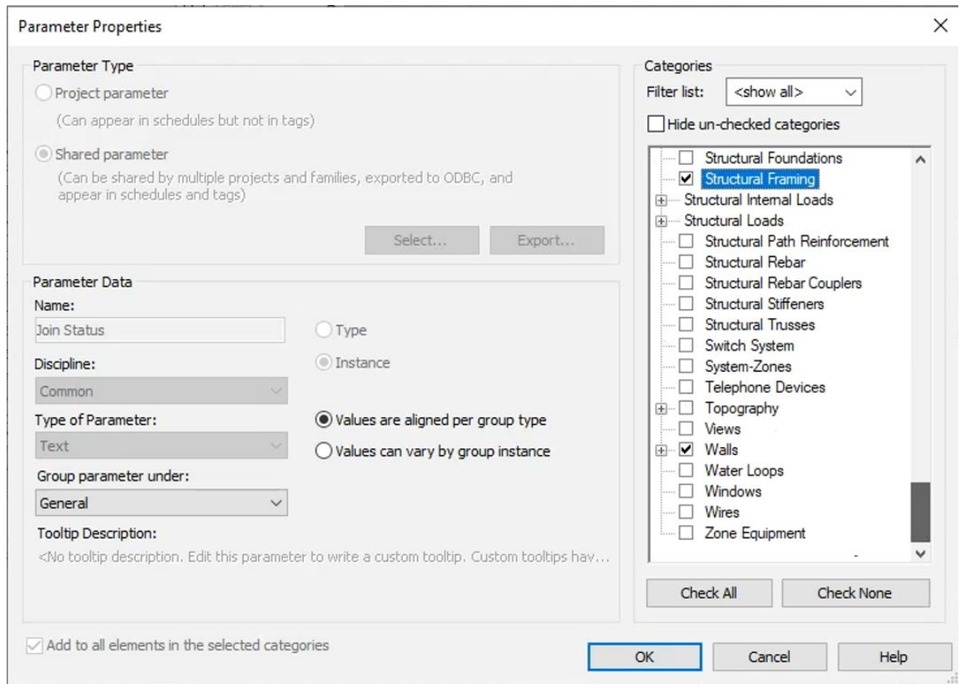
When the users are required to comply with certain drawing presentation requirements, users could consider to use "Disallow Join" to produce the "wall demarcation line" in order to highlight that the walls of different thickness are not considered as one joined wall element but considered as two un-joined walls elements as illustrated in below figure.



Wall of different thickness modelled in a row

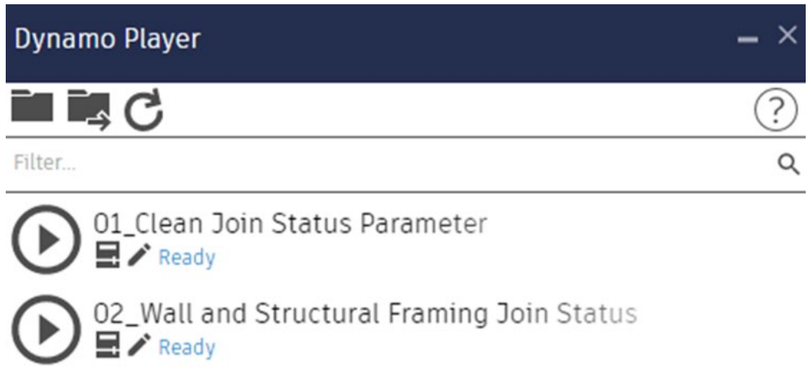
Specifying the join status of walls

Since the use of “Disallow Join” could affect the quantity of concrete volume of wall elements, users are reminded to specify the join status as “Disallow Join” under the Shared Parameter “Join Status” for those unjoined walls elements. It is pre-loaded in the SE BIM template as illustrated in below figure.

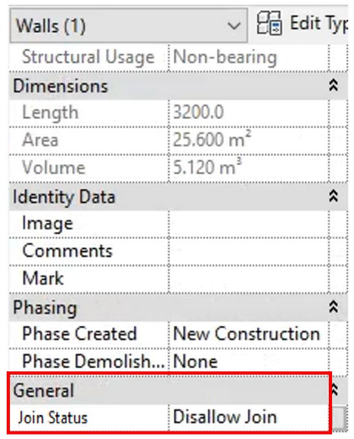


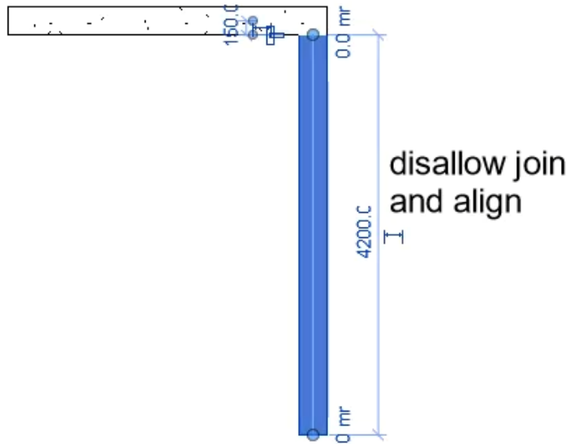
“Join Status” shared parameter

To automate the process of assigning the correct join status as “text” to the shared parameter, it is **required** to run the prepared Dynamo scripts before transfering the BIM models to QS.



Dynamo Player Interface

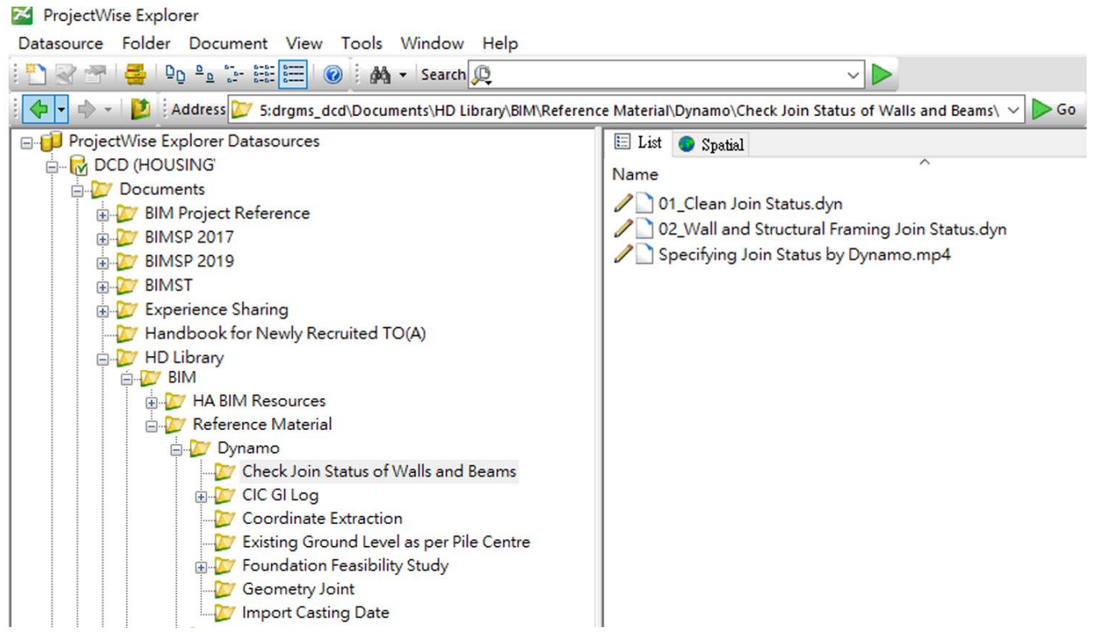




Specifying the “Disallow Join” as text in the shared parameter “Join Status”

The Dynamo scripts and guidance video could be retrieved from below location at ProjectWise:

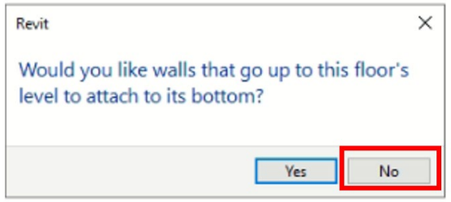
pw:\\PRDDRGS15:drgms_dcd\Documents\HD Library\BIM\Reference Material\Dynamo\Check Join Status of Walls and Beams\



Dynamo Materials for Specifying Join Status

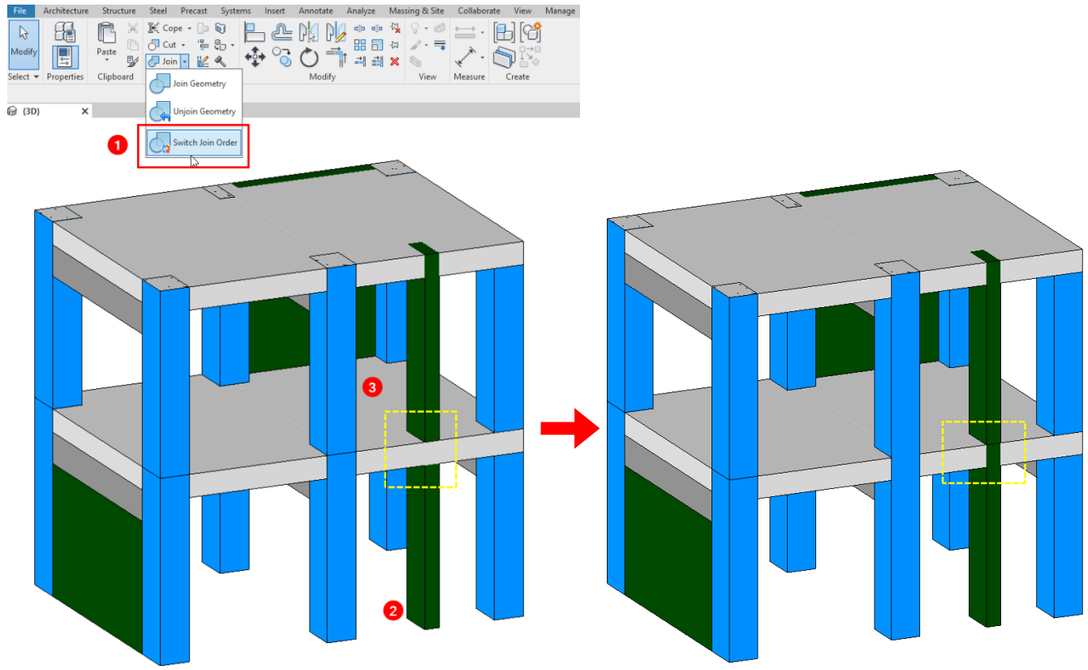
Joining approaches between wall and floor (for other locations except domestic typical floors)

3. After drawing a floor above the wall, there is a pop-up warning on the attachment clarification. The wall **should not attach** to the floor's bottom.

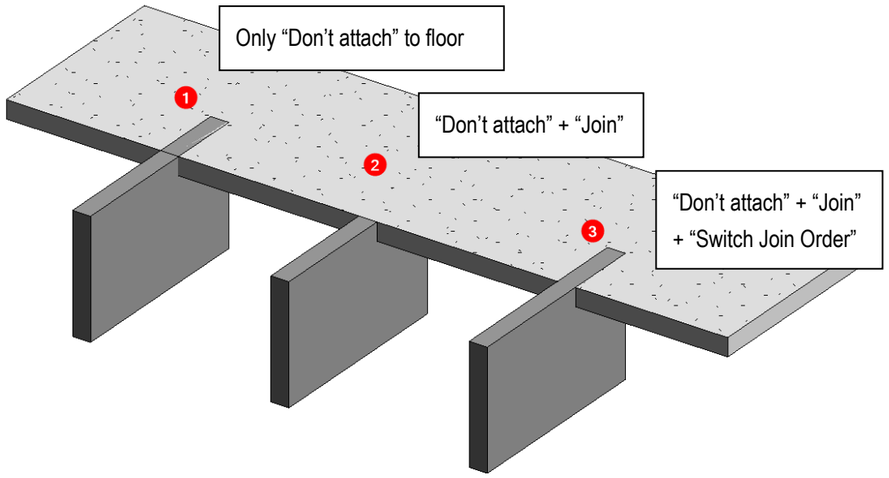


4. User is required to join all the wall and floor using **Join** command. 

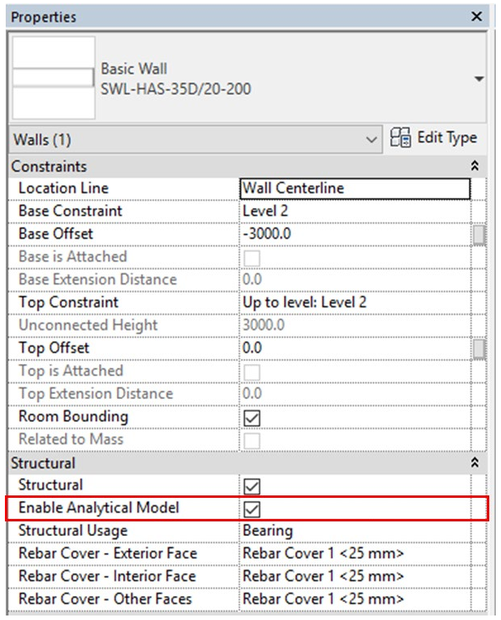
5. User then is required to switch join the wall and floor using **Switch Join Order** command.  , in order to present the wall from the top of host level to the level above.



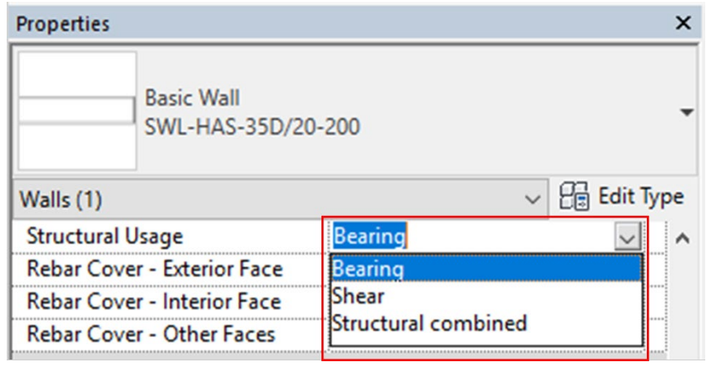
The diagram below illustrates the different presentations when different functions are applied to the relationship of wall and floor.



For those elements to be included in analytical model, modeller shall check the element property Enable Analytical Model check box.



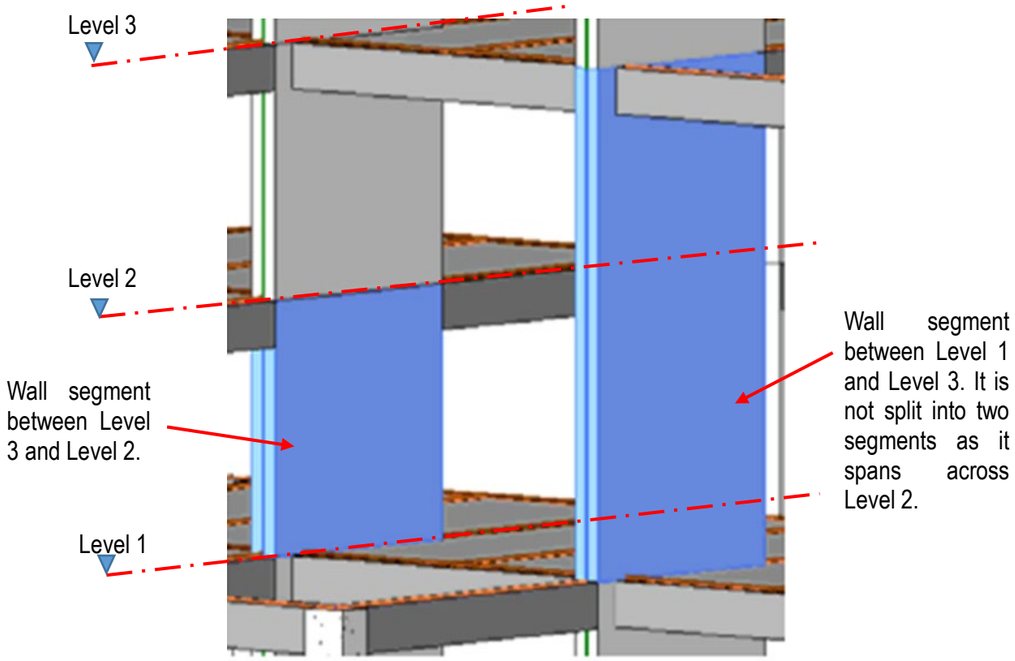
Users shall subsequently set their usage to “Bearing”, “Shear”, or “Structural Combined” depending on their usage in structural analysis. Some structural analysis program will recognise the selected Structural Usage and then carrying out the analysis in correct manner.



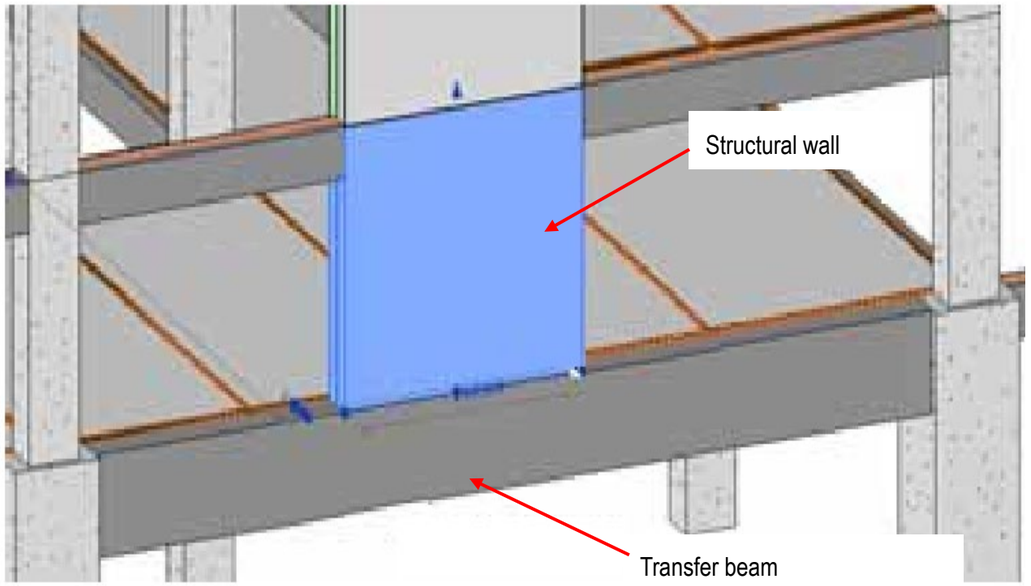
Definition of the Structural Usage in Revit:

Structural Usage	Definition
Shear	Rigid planar surfaces that inherently resist lateral thrusts of shear.
Bearing	Walls that support a vertical load in addition to their own weight.
Non-bearing	Walls that define and divide spaces and support no vertical load except their own weight.
Structural combined	Walls that serve more than one purpose.

For full height wall, the Base Constraint and Top Constraint should be made reference to the corresponding levels. Wall shall be split into segments at different floor levels unless it spans across more than one level.

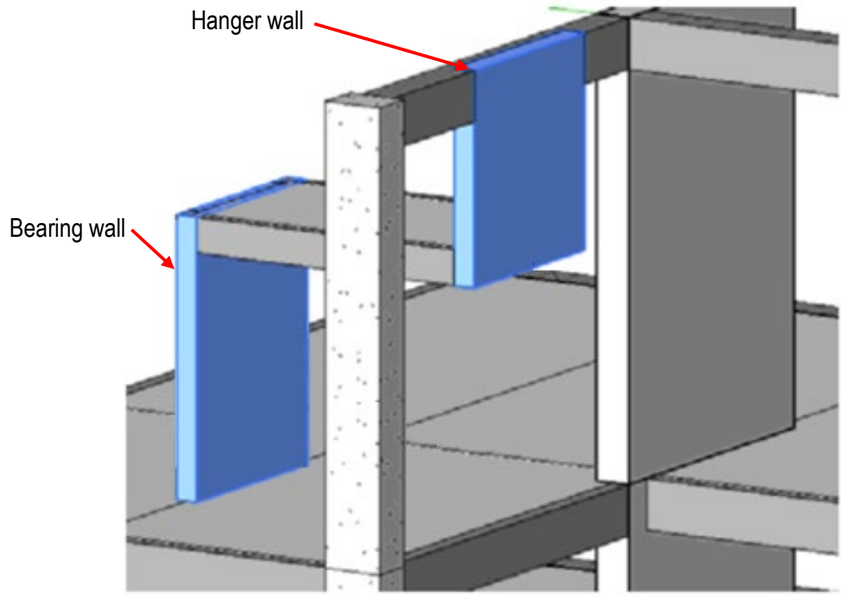


Structural Wall shall be aligned with adjacent elements either by side or centre to allow flexibility for future wall thickness changes, such that wall will not require re-alignment when its thickness changes.



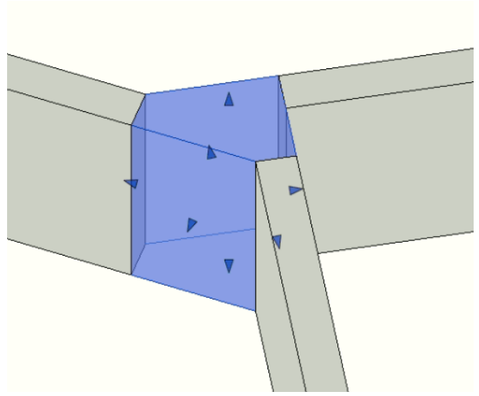
Modelling of hanger wall and bearing wall

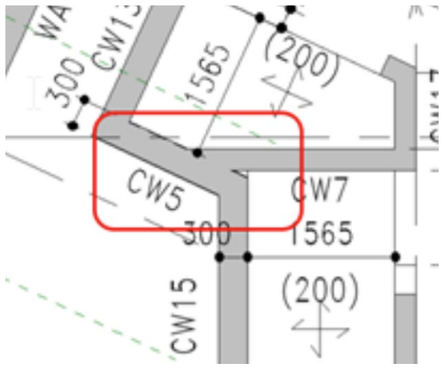
For hanger wall and bearing wall, the Base Constraint or Top Constraint should be made reference to the corresponding levels while the wall height should be controlled by Unconnected Height.



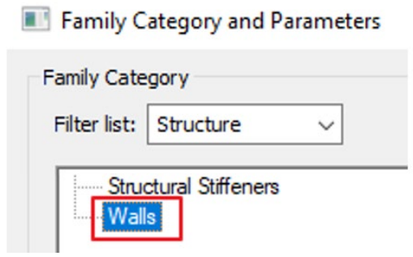
Modelling of walls with irregular shape

For wall with irregular shape, modeller may consider preparing an entire irregular shape wall by In-Place model family.

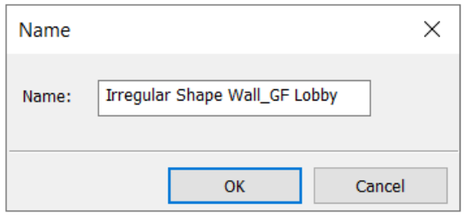




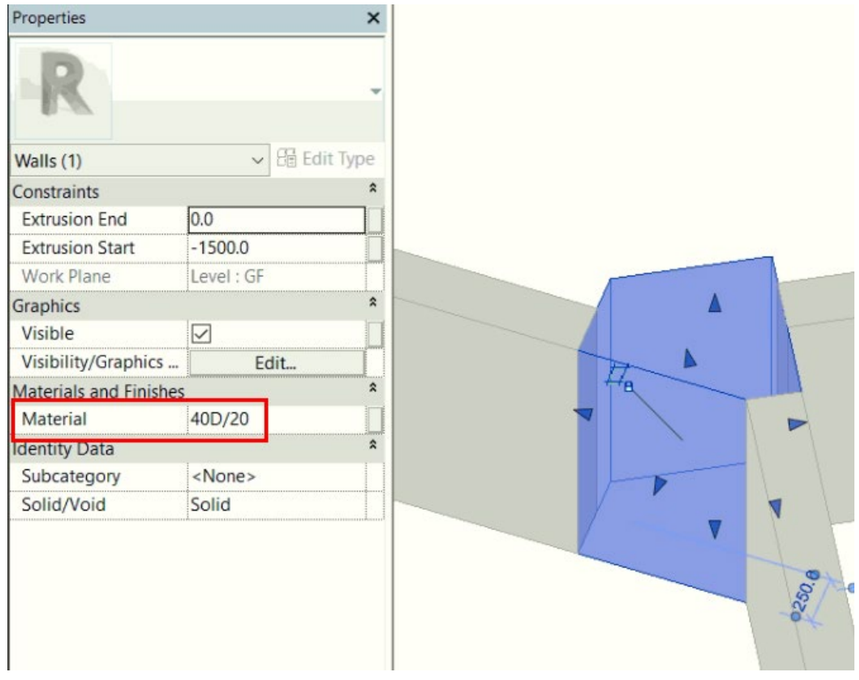
In this case, the irregular shape wall can be modelled as an In-Place model under Walls category.



The In-Place model shall be provided with a family name like “Irregular Shape Wall_<Location>”.

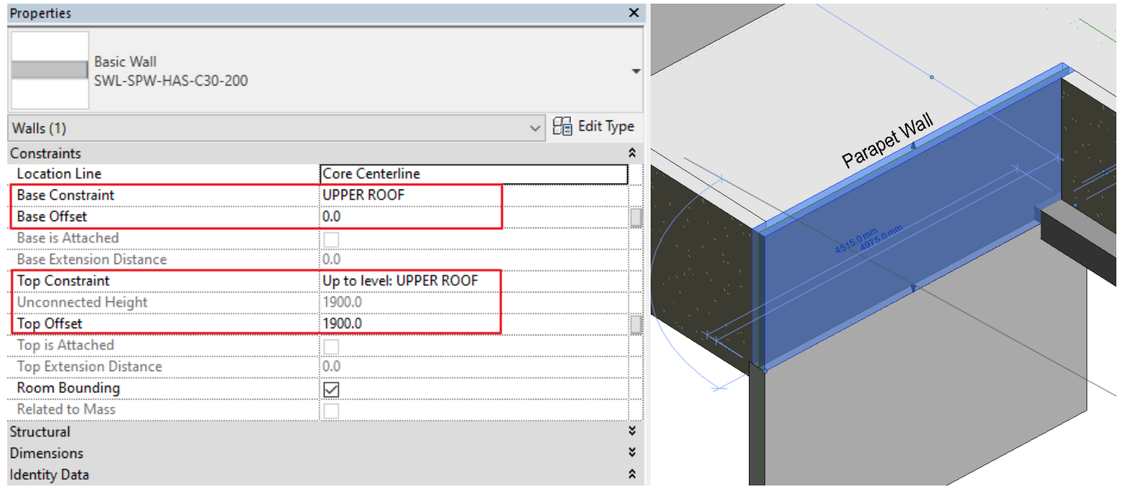


The geometry within the In-Place model shall be assigned with appropriate materials for the geometry such 40D/20.



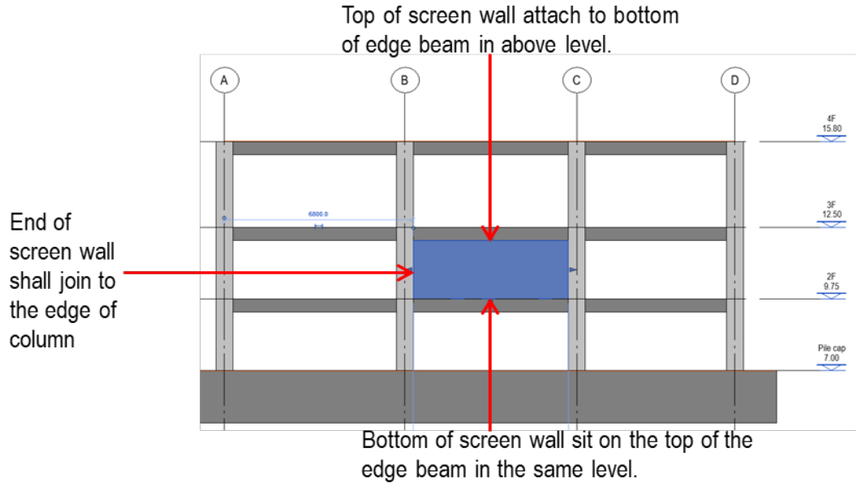
Modelling of parapet walls

Both Top Level and Base Level of parapet walls shall be assigned with identical level together with the Top Offset made equal to the required parapet height.

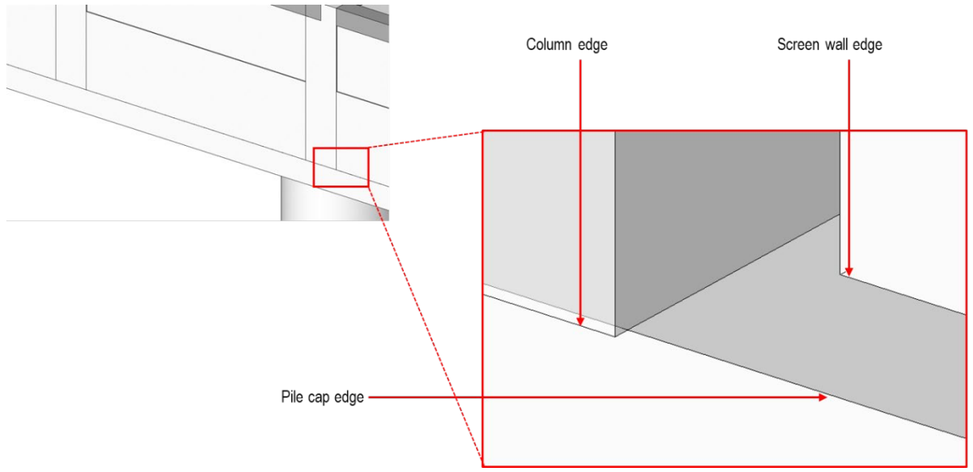


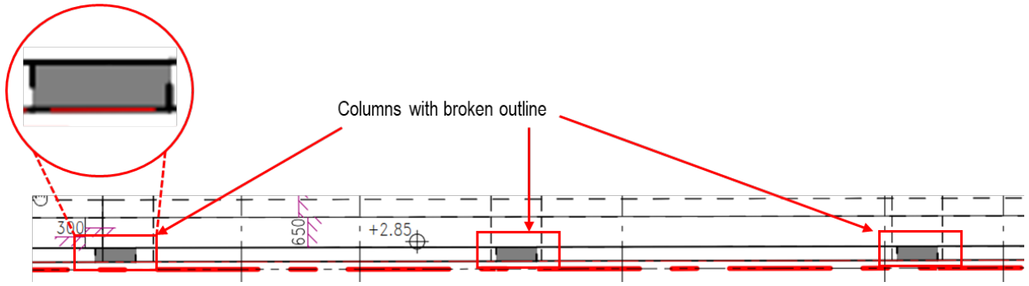
Modelling of screen walls

All screen walls shall be modelled panel by panel. Generally, they should sit on the top of the edge beam and the top should attach to the bottom of side beam in above level.

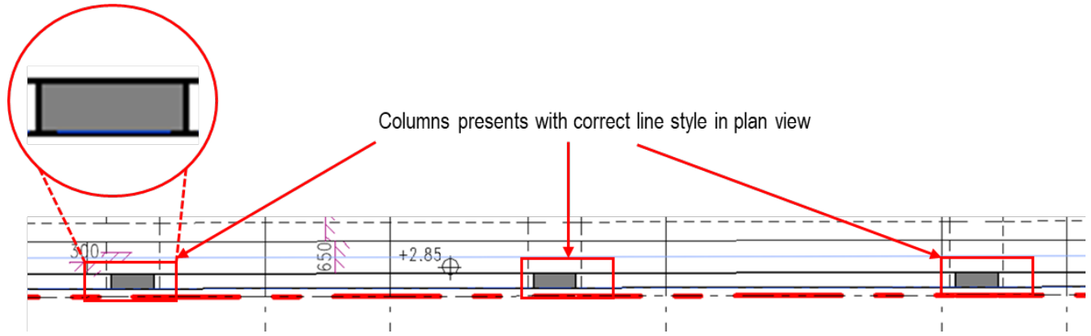


The edges of screen wall, column, supported beam/pile cap should be aligned. If the edges are not aligned as below figure(Example of incorrect model-edges of screen wall, column, and pile cap are not aligned), incorrect line style will be presented in the plan view as below figure(Example of incorrect presentation style in the plan view).

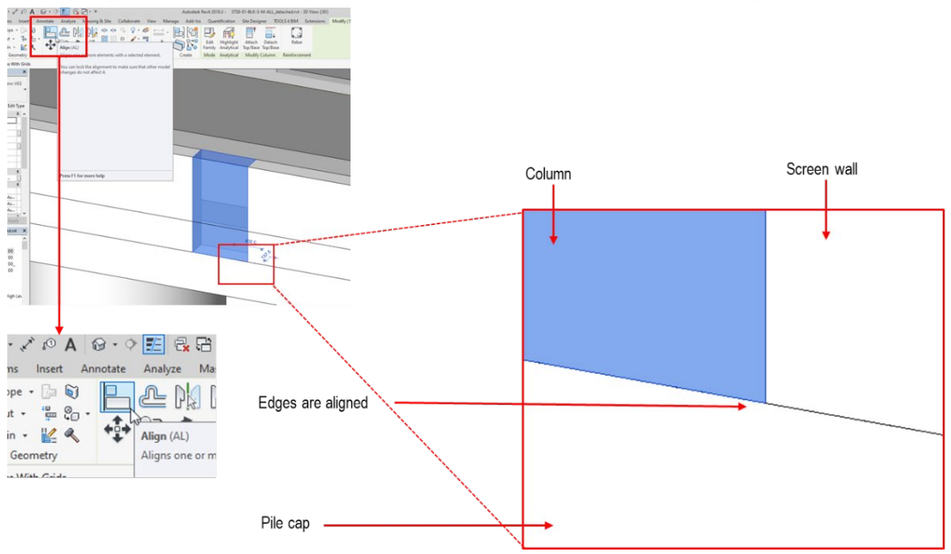




After aligning the edges, the lines in the plan view are presented in correct style.



User can use Align command under Modify>Modify to align the edges as below figure:



DS-U 03 Structural Opening on Walls

Discipline	Structural
Family	System Family
Category	Rectangular Straight Wall Opening
Workset	Individual Levels
Naming Convention	Rectangular Straight Wall Opening(name of system family is not editable.)
Type Naming Convention	Rectangular Straight Wall Opening(same as family name, type naming of Rectangular Straight Wall Opening is not editable.)

Information Requirement

List of built-in Parameter

Parameter name	Information	Remark	Example
Base Constraint	Base level	Specify base constraint level for a wall	1F, 2F……
Base Offset	Base offset	Specify offset distance from base level	0.0mm, 100mm, 200mm,250mm,……
Top Constraint	Top level	Specify top constraint level	2F, 3F……
Top Offset	Top offset	Specify offset distance from top level.	0.0mm, 100mm, 200mm,250mm, ……

List of Shared Parameter

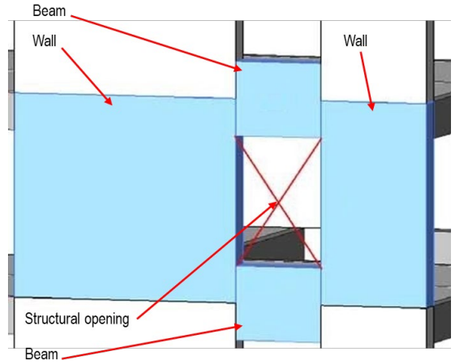
N/A.

Model Authoring

There are three methods to prepare wall opening:

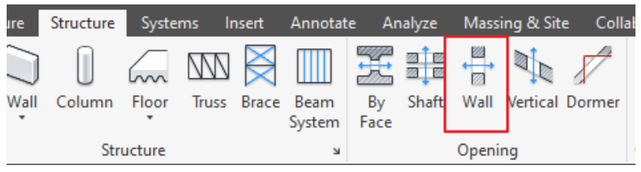
1. Rectangular Wall Opening by "Void"

Rectangular wall openings for doors and windows can be modelled as two aligned walls with a lintel beam spanned between them if lintel beam is required for structural analysis purpose. The size of the structural opening shall be equal to the size of surrounding concrete fill of the door and window. The surrounding concrete fill model shall be included into the architecture model.

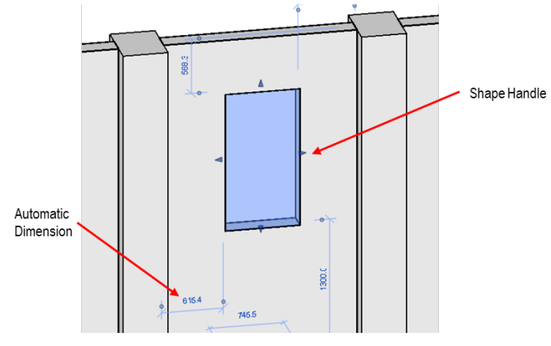


2. Rectangular Wall Opening by "Wall Opening"

In general, rectangular wall opening can be formed by adding Wall Opening (under Structure > Opening >Wall opening) to wall element.



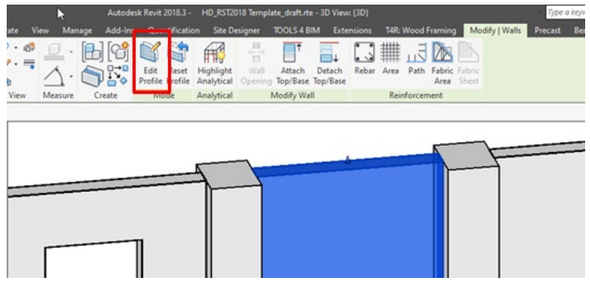
After activating the wall opening command, select a wall to place the opening. User can adjust the opening size and location by dragging the shape handles and specifying specific values to the Automatic sketch dimensions



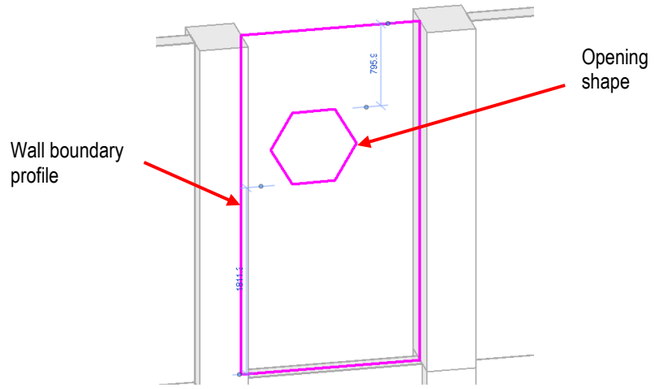
3. Irregular shaped wall opening

User can create irregular shape wall opening (e.g. circular, hexagon, irregular shapes, etc.) by following steps:

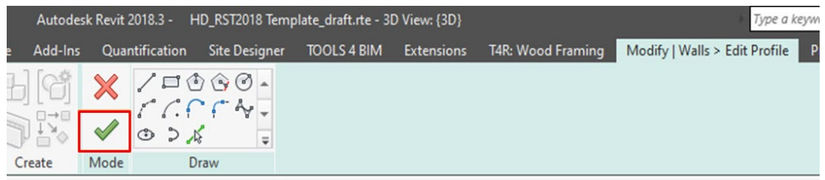
Step 1. Select the wall to be added opening, then click Edit Profile command.

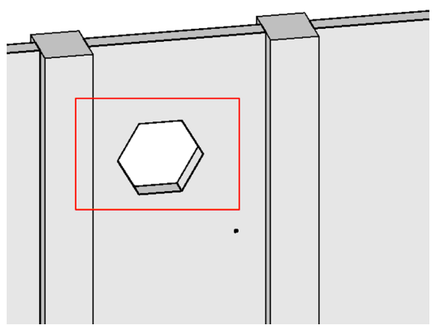


Step 2. Drawing the opening shape profile within the wall boundary



Step 3. After drawing the opening shape, click the Finish Edit Mode icon to end modelling of irregular wall opening.





DS-U 04 Structural Framing

Discipline	Structural
Family	Loadable Family
Family Category	Structural Framing
Workset	Individual Levels
Family Naming Convention	SFM-<Functional Type>-HAS-<Descriptor 1 (Section shape)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Size>

Naming Example

Family name											**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Section shape)**		**Descriptor 2 (Optional)**			**Structural material**		**Size (mm)**
SFM	-	RCB	-	HAS	-	Rectangular	-	N/A			30D/20	-	800x600 (Depth x Width)
SFM	-	RCB	-	HAS	-	T_shape	-	Inverted			35D/20	-	500x450 (Depth x Width)
SFM	-	RCB	-	HAS	-	Rectangular	-	Tapered			40D/20	-	800x400 (Depth x Width)
SFM	-	RCB	-	HAS	-	Rectangular	-	Cranked			60D/20	-	800x400 (Depth x Width)
SFM	-	RCB	-	HAS	-	Rectangular	-	Stepped			60D/20	-	800x400 (Depth x Width)
SFM	-	RCB	-	HAS	-	Rectangular	-	Haunched			60D/20	-	800x500 (Depth x Width)
SFM	-	STB	-	HAS	-	Universal_beam	-	N/A			S355	-	305x165x40 (Depth x Width x Mass per meter Kg/m)

Functional type example

Functional type	**Description**
RCB	Reinforced concrete beam
STB	Steel beam

Section Shape example

Section shape	Dimension parameters
Rectangular	Depth x Width
Universal_beam	Depth x Width x Mass per meter
Parallel_flange_channel	Depth x Width x Mass per meter
L_angle	Angle length x Angle length x Mass per meter

Information Requirement

List of built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Rectangular: 30D20-300x600mm
Reference Level	Beam constraining level.	Reference Level is a read-only value when it is the same as the Work Plan on which the beam is placed.	L1, L2,……
Start Level Offset	Beam start point level offset	The distance of beam start point form the reference level	-100mm, 0.0mm, 150mm,……
End Level Offset	Beam end point level offset	The distance of the beam endpoint from the reference level.	-100mm, 0.0mm, 150mm,……
Length	Length of Beam	The original geometry of beam from the starting point to the end point.	1200mm
Cut Length	Cut length of Beam	The clear span (physical geometry) of beam between the supports.	1000mm
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	30D/20, 35D/20_Mass Fill, 30D/20_PFA, 30D/20_Waterproofing
Description	Beam sharp	Type of beam shape	Inverted, Tapered, Cranked, Stepped…
Mark	Beam mark	This parameter was added to beam tag families to annotate beams. This value must be unique for each type of beam in a project.	Refer to the following table

The following table indicates some examples on the classification of different types of beam usage. For individual project, the classification of beam marks shall be indicated in the structural drawings.

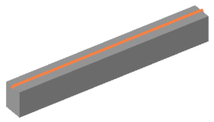
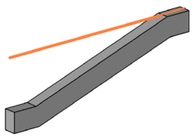
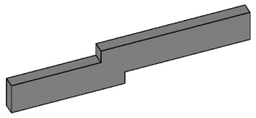
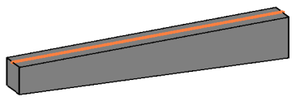
Mark	Classification	Remark
B01	Cranked / Stepped / Tapered Beam	
GBA01	Ground Beam	Ground Beam near Wing A
PBB1(1)	Podium Beam	Podium beam near wing B no.1 at sheet 1 of 15
TBB01	Transfer Beam	Transfer Beam near wing B beam 01

List of Shared Parameter

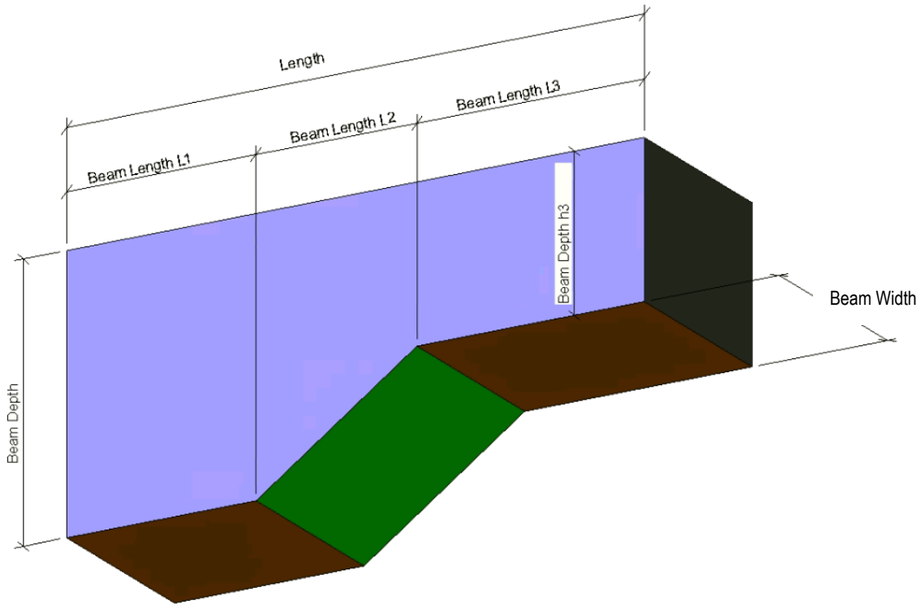
Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Beam Width	Width of rectangular section	Common	Length	Dimension	Type
Beam Depth	Depth of rectangular section	Common	Length	Dimension	Type
Cantilever Beam	Select to indicate it is “Cantilever Beam”.	Common	Yes/No	General	Instance
Inverted	Select to indicate it is “Inverted Beam”.	Common	Yes/No	General	Type
Join Status	Beam’s Join Status	Common	Text	General	Instance

Model Authoring

Details of different type of beams

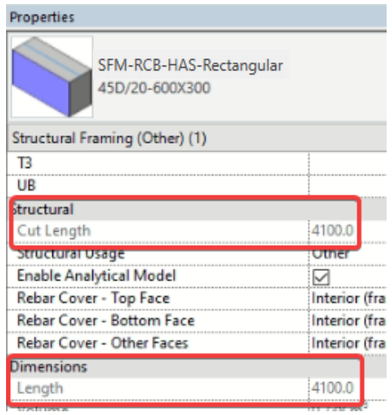
Type of beams	3D view	Plan view	Elevation
Rectangular beam			
Cranked beam			
Stepped beam			
Tapered beam			

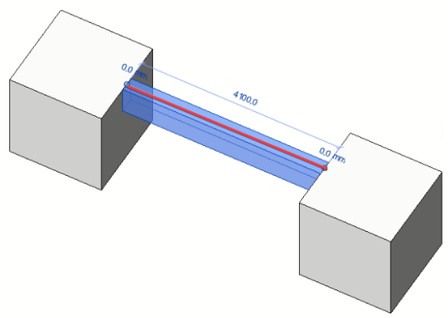
Below image illustrates the relationship between parameters in a tapered beam family as sample. However, the parameters such as Beam Length and Beam Depth etc may be assigned differently according the beam type characteristics.



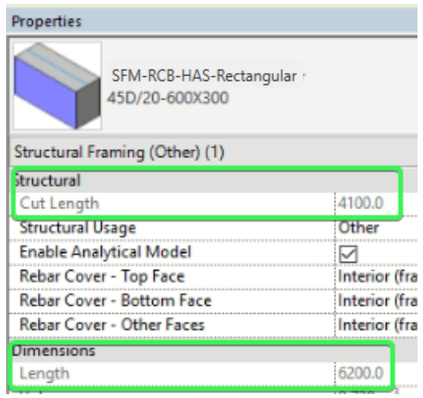
The scenarios below indicate the difference in “Cut Length” and “Length” value when the modelling of beam’s extension. The Cut Length reflects the net distance between the connected pile cap.

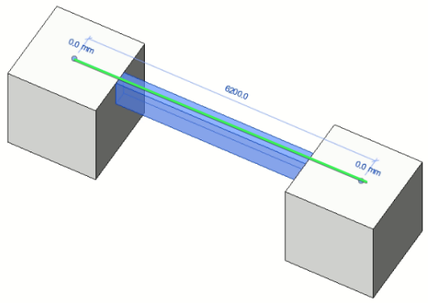
1) When beam is modelled to the edge of pile caps, the length and cut length of beam is the same.





2) When beam is modelled to the center of pile caps, the length is representing the original geometry of beam but the cut length is representing the clear span between pile caps.



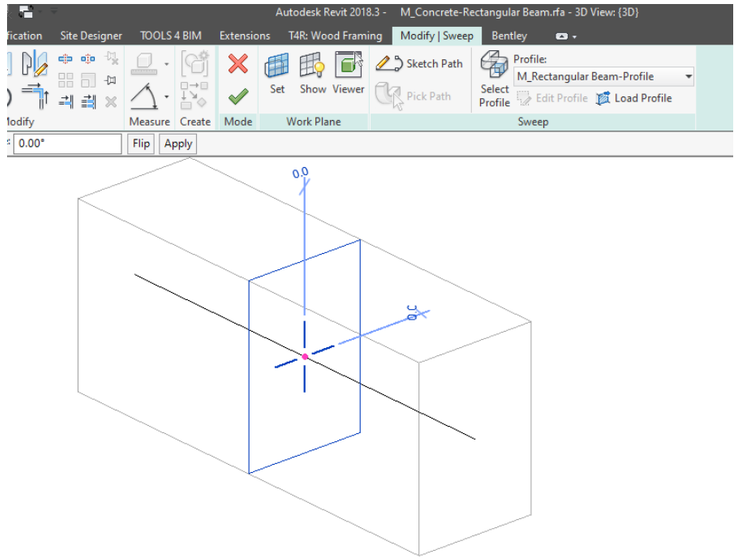


Irregular Shaped Beam

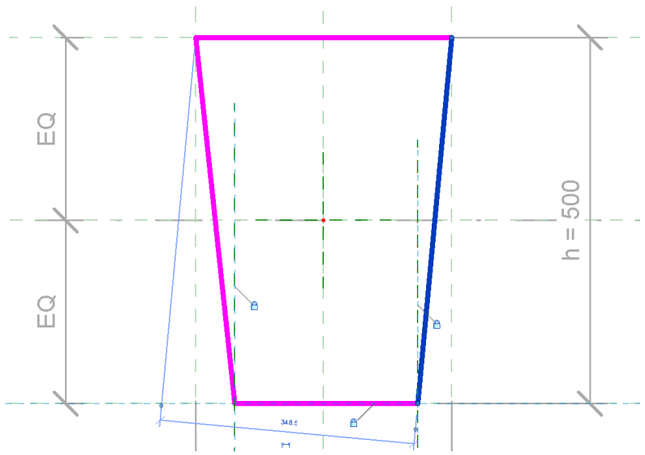
For irregular shaped beam which can't be found in HA Family or HA SE Revit template, modeller shall create the beam family. The Descriptor 1 of the family name should be named as "Irregular". The key steps are described as below:

Step 1. It is recommended to start with an existing beam family, then save as a new type of beam family file.

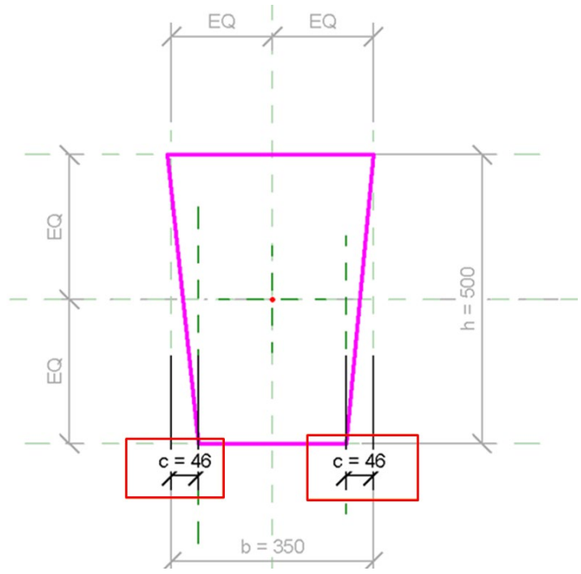
For example, below case starts with an existing rectangular beam family.



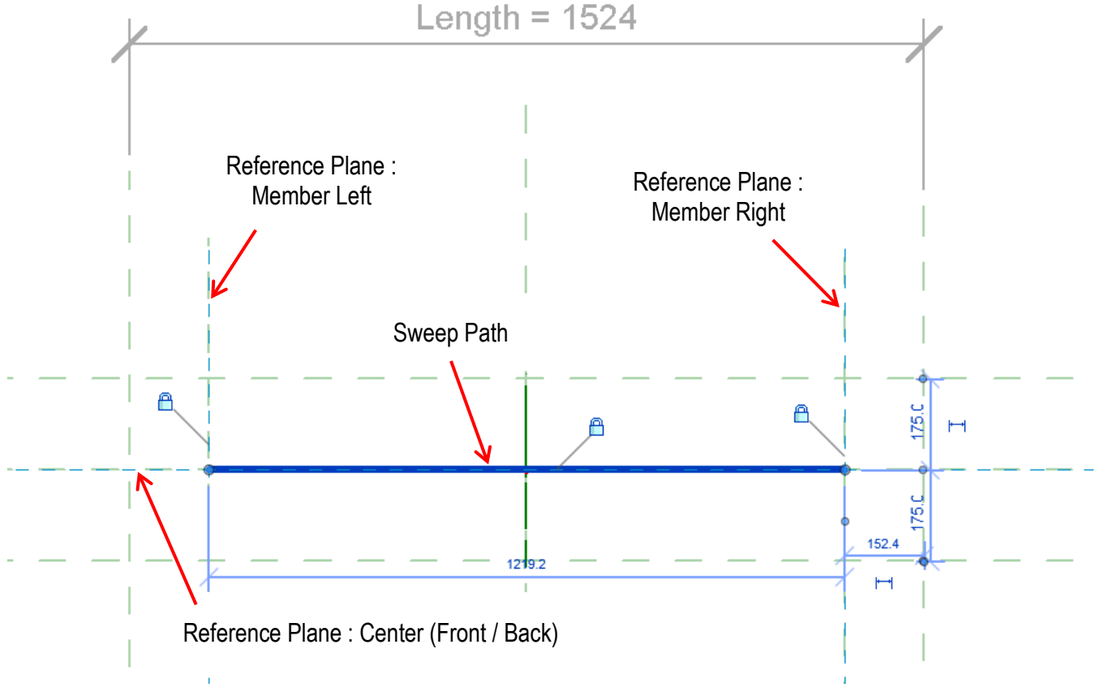
Step 2. Edit the Sweep by re-drawing the cross section of the beam to the proposed irregular shape. Please make sure the section profile lines are locked by the Reference planes which are used for controlling the dimensions of the shape.



Step 3. Add dimensions between profile line and reference planes, assign parameters to the dimension to make the family parametric.

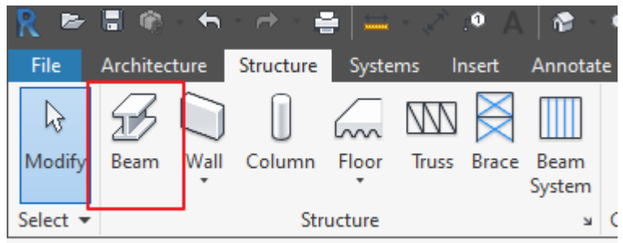


Step 4. Make sure the Sweep Path is locked by Reference Planes to fix and control the defined shape. Below there are three locks applied in the front and back of the beam which are Member Left, Right and Center.



General requirements

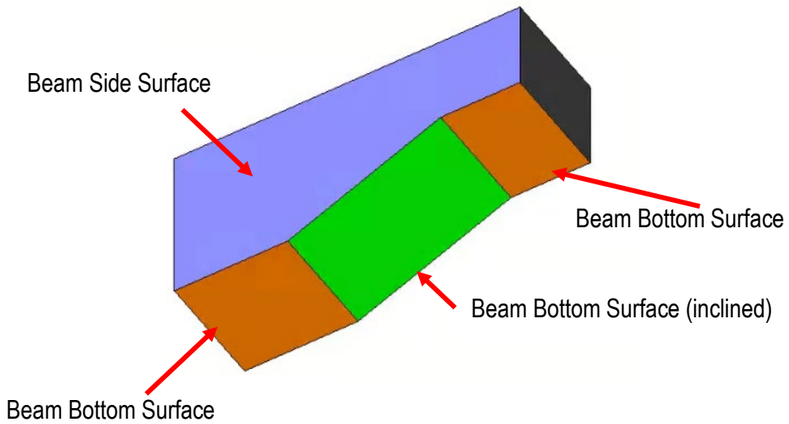
All Beams shall be modelled as Structure > (Beam)



All beams shall be modelled with appropriate family type from Structural Framing category

All continuous beams shall be modelled span by span.

All beams shall be painted with material/finishes as indicated in the below image.



Both sides and bottom of the family are painted with specific material, named as “Beam Side Surface”, “Beam Bottom Surface” and “Beam Bottom Surface (inclined)”, such that the areas of sides and bottom of beam in different location can be extracted.

*Remark: The above “Surfaces” are the summarisation of painted surfaces area generated automatically.

Joining approaches for beams elements with other beams/walls/columns

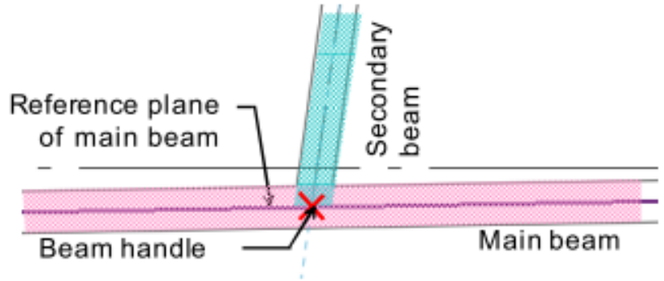
With a view to maintain the consistency of beams joins with other elements of beams/walls/columns as far as practicable, users shall pay attention to below requirements when determining which joining approaches to be adopted for beams elements joined with other elements of beams/walls/columns during BIM modelling.

1. General rules of beam joins

Users shall adopt the Revit’s default rules of beam joining approach i.e. Revit will automatically join the beam elements being modelled with other beams/walls/columns being in-touch. This default join method is called as “Join & Overlap” approach.

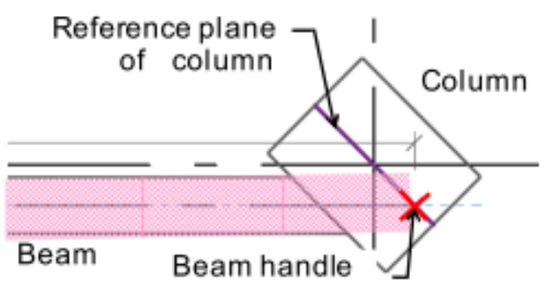
Scenario 1: Secondary beams supported by main beams

The starting/ end handle of the secondary beam shall be connected and joined to the reference plane of its supporting main beam. In general, the reference planes of beams are defined along the centrelines of structural framing/beam families.



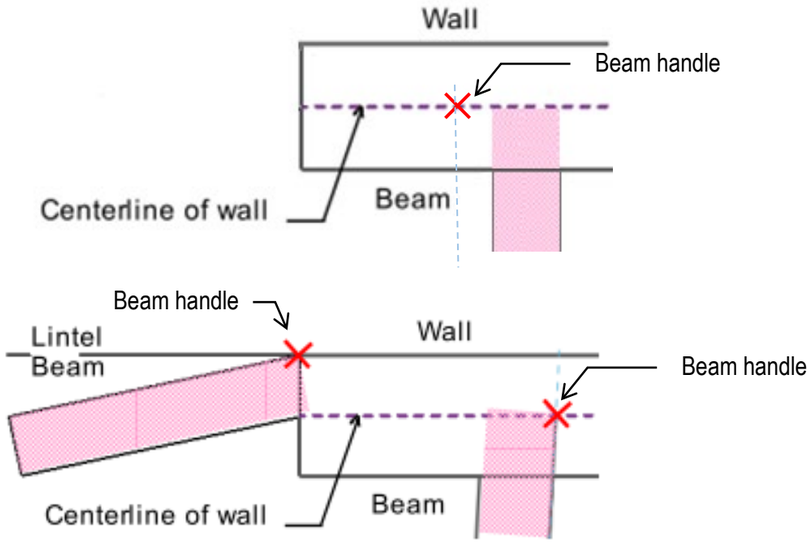
Scenario 2: Beams supported by columns

When beams are supported by columns, users shall connect or join its starting/end handle to any one of the reference planes of the column. In general, the reference planes are defined along the major and minor axis of the column section. Users’ attention is drawn when the beams are joined with columns, the geometry of columns shall take precedence over beams.



Scenario 3: Beams supported by walls

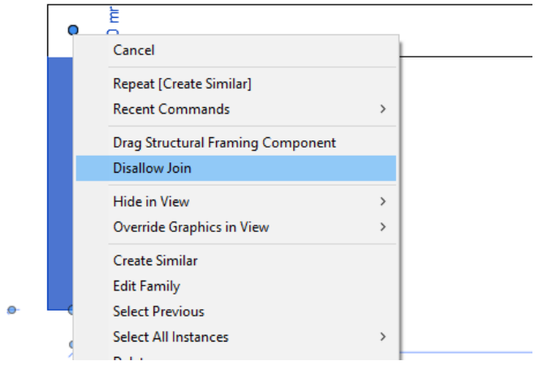
In general, starting/end beam handle shall be connected or joined to the centreline of its supporting walls, except in the case for lintel beams, which would the exterior/interior face shall be aligned with the exterior/interior face of the supporting walls. Users' attention is drawn when the beams are joined with walls, the geometry of walls shall take precedence over beams.



For more scenarios of beams being modelled and joined with other structural elements, users could refer to "Illustration of Joining Approaches of Structural Elements" in **D4.4 Structure – Superstructure SAM**.

2. Use of "Disallow Join"

Users shall use "Disallow Join" cautiously only in circumstances where demarcation lines are required to be shown on plans and/or sections to differentiate different beam elements. To avoid concrete volumes of beam elements being taken-off inaccurately, users should not use "Join" to repeatedly join those beam elements which were previously separated by using the "Disallow Join". If it is necessary, users shall remove or delete those beams previously assigned with join status "Disallow Join" and shall re-model a new beam element and join with the adjacent existing beam elements by using the default "Join and Overlap" approach.



Scenario 1: Secondary beams supported by main beams

When the users are required to comply with certain drawing presentation requirements, users could consider to use "Disallow Join" to produce the demarcation line to differentiate the beams being modelled with the adjacent beams.

Scenario 2: Beams supported by columns

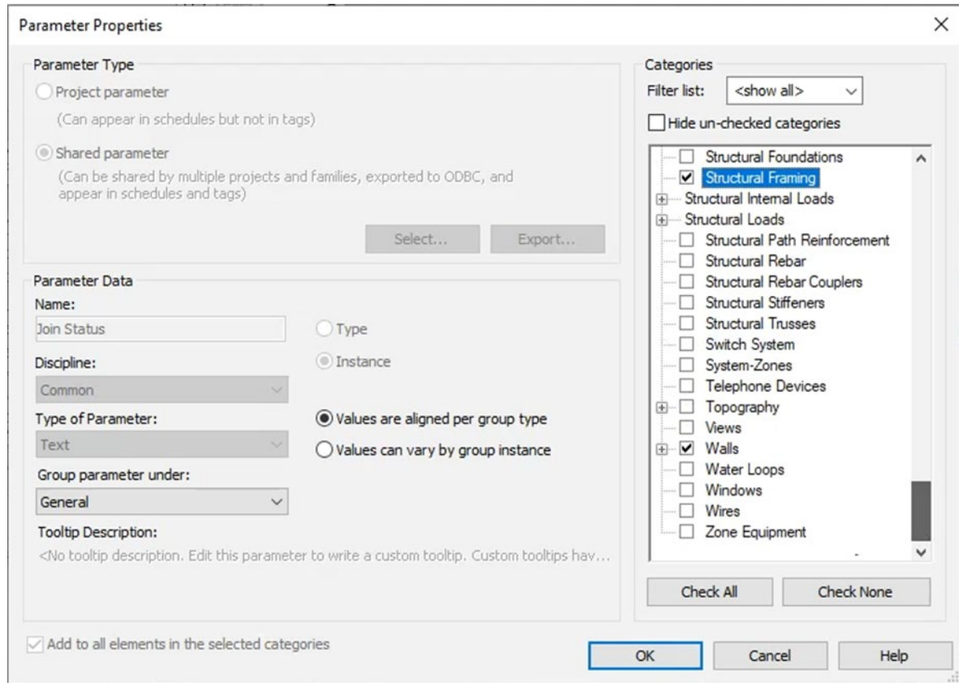
This scenario would not warrant the use of "Disallow Join" to produce the required demarcation line between beams and columns and therefore, all beams shall be "Join and Overlap" with columns.

Scenario 3: Beams supported by walls

This scenario would not warrant the use of "Disallow Join" to produce the required demarcation line between beams and walls and therefore, all beams shall be "Join and Overlap" with walls.

Specifying the join status of beams

Since the use of "Disallow Join" could affect the quantity of concrete volume of beam elements, users are reminded to specify the join status as "Disallow Join" under the Shared Parameter "Join Status" for beams elements. It is pre-loaded in the SE BIM template as illustrated in below figure.

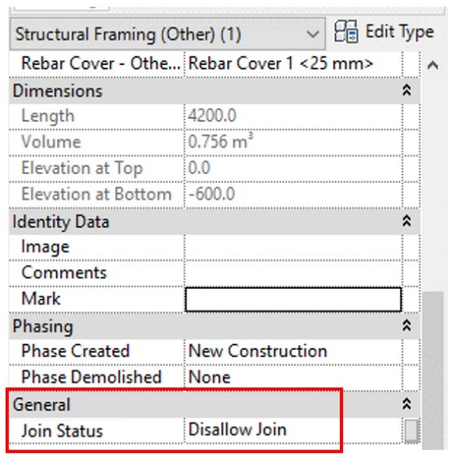


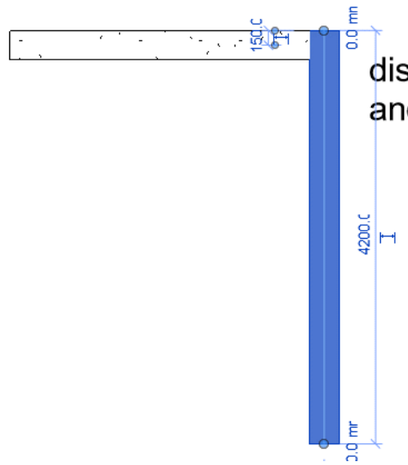
"Join Status" shared parameter

To automate the process of assigning the correct join status as “text” to the shared parameter, it is **required** to run the prepared Dynamo scripts before transfering the BIM models to QS.



Dynamo Player Interface

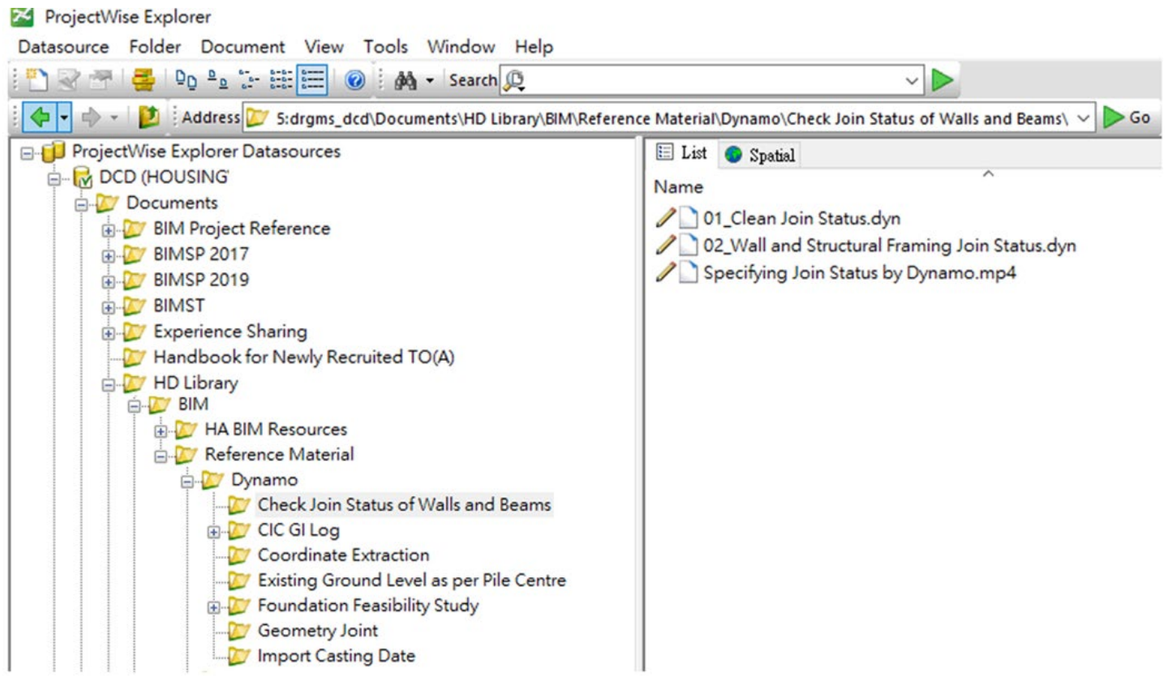




Specifying the “Disallow Join” as text in the shared parameter “Join Status”

The Dynamo scripts and guidance video could be retrieved from below location at ProjectWise:

pw:\\PRDDRGS15:drgms_dcd\Documents\HD Library\BIM\Reference Material\Dynamo\Check Join Status of Walls and Beams\

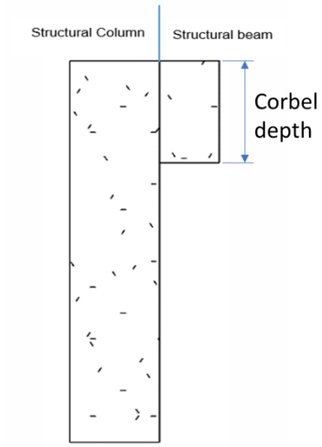


Dynamo Materials for Specifying Join Status

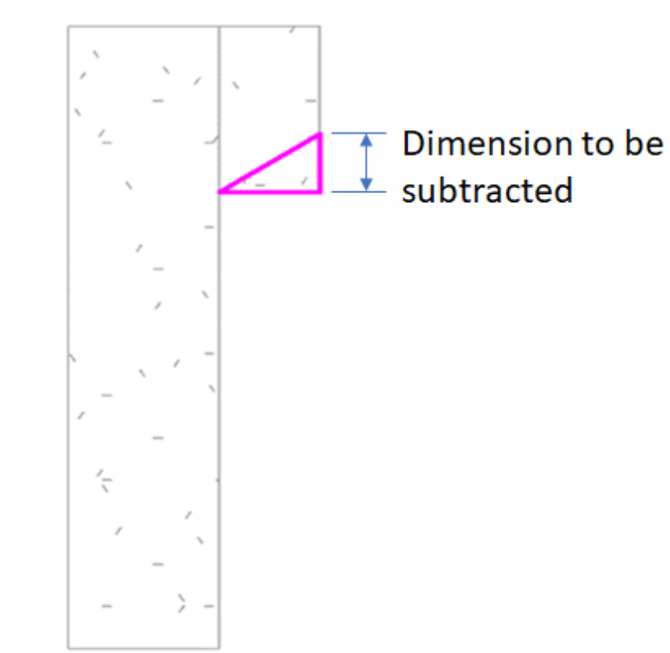
Creating a corbel

Corbel part shall be modelled by using a structural beam placed in adjacent to the column. Dimension of corbel is the beam depth subtract by the appropriate dimension using “Cut by face” at Structure under Opening Tab. Steps for creating a corbel are specified as below:

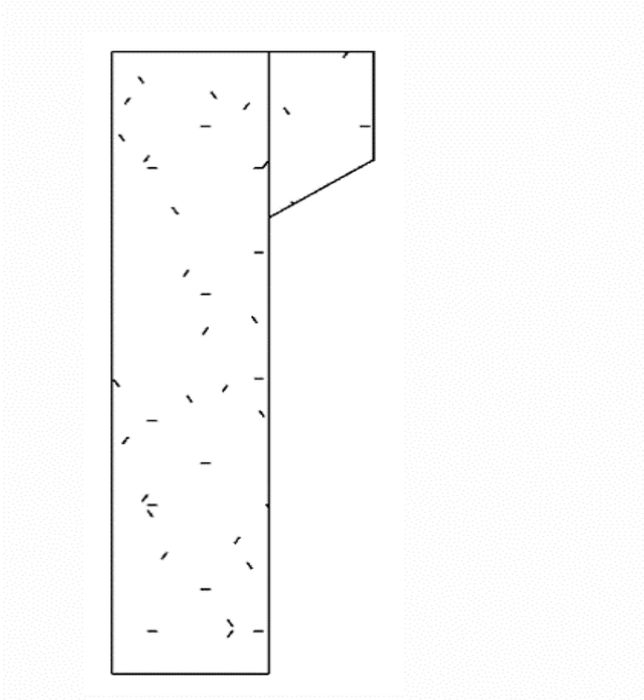
Step 1. Create a structural short beam connected to the column



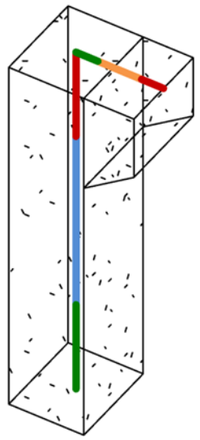
Step 2. Use command Structure > Opening> Opening by Face to subtract the chamfer



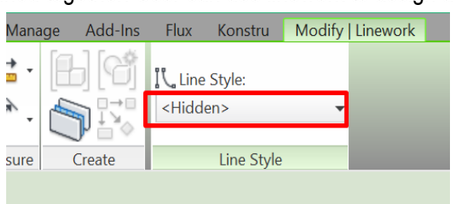
Step 3. A corbel structure is formed after the short beam chamfer is subtracted



Beam shall be connected to column so that the analytical links are correct in place.



As the beam concrete grade may not the same as column concrete grade, unwanted line may be displayed in views even the beam and column are joined together. User can use linework to assign a hidden line for the intersection.



DS-U 05 Structural Floor

Discipline	Structural
Family	System Family
Family Category	Floors
Workset	Individual Levels
Family Naming Convention	Floor (Name of System Family is not editable.)
Type Naming Convention	<Functional Type>-HAS-<Descriptor 1 (Structural material)>-<Descriptor 2 (Floor thickness)> -<Descriptor 3 (Precast)>

Type name example

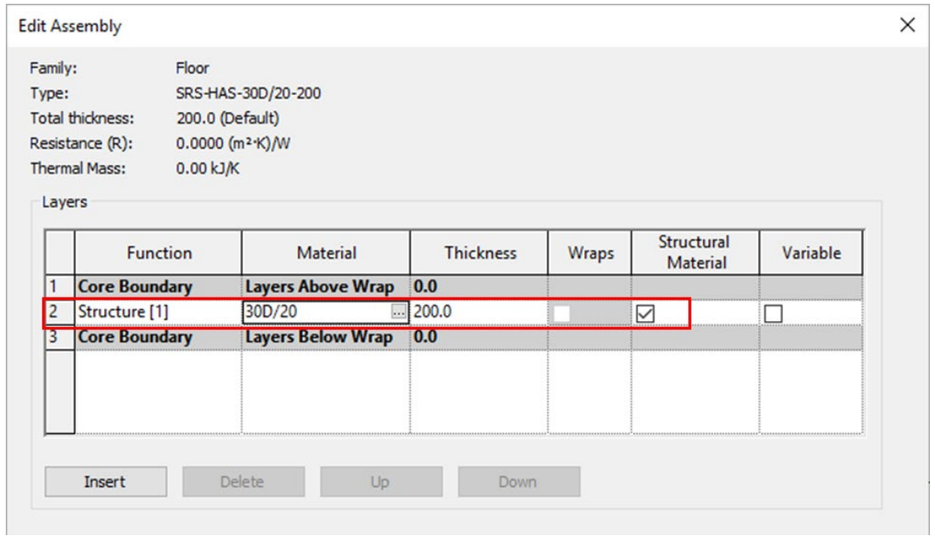
Functional Type		Originator		Descriptor 1 (Structural material)		Descriptor 2 (Floor thickness (mm))		Descriptor 3 (Precast)
SRS	-	HAS	-	30D/20	-	200	-	N/A
SRS	-	HAS	-	30D/20	-	200	-	SP
SRS	-	HAS	-	30D/20	-	200	-	FP
SRS	-	HAS	-	30D/20_Planking	-	300	-	N/A
SRS	-	HAS	-	30D/20_Mass Fill	-	400		

Remark: The structural floor is regarded as in-situ unless specified in Descriptor 3. SP denotes Semi-Precast while FP denotes Full Precast.

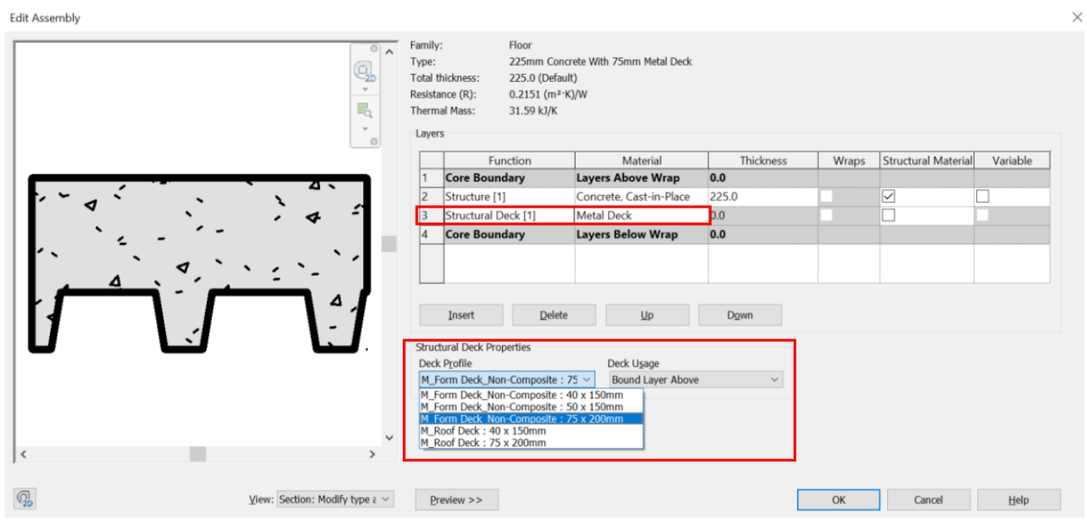
Functional Type Example

Functional type	Description
SRS	Structural slab

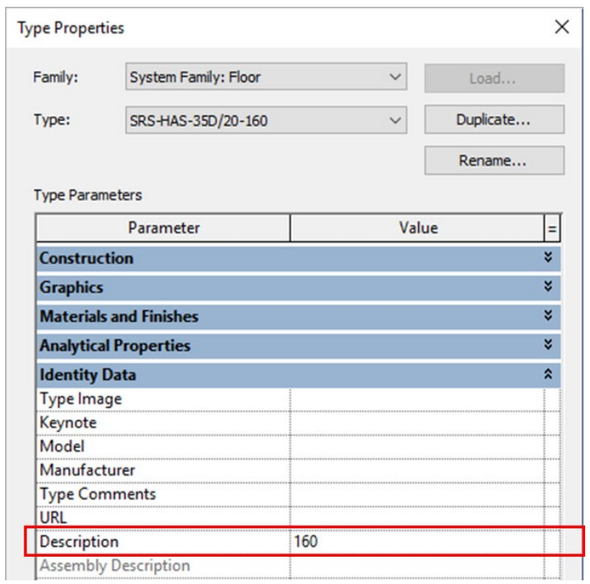
Generally, Family Types for structural floor without planking shall be composed of structure layer only and assigned with suitable concrete material and floor thickness.



For structural slab with planking, the components shall include one layer for Structure layer and one layer for Structural Deck.



The slab thickness shall be inputted into the **Description** tab under Identity Data so that it can be shown when applying **Span Direction** to slab elements.



Information Requirement

List of Built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	SRS-HAS-30D/20-200
Level	Floor level	The level to which the floor is constrained.	1F, 2F……
Default Thickness	Floor thickness	Specifies the thickness of the floor	200
Height Offset from Level	Floor offset distance from Level	Specifies the elevation of the top of the floor relative to the Level parameter.	-50, 0.0, 100, 200, 250,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	30D/20, 40D/20_Mass Fill, 30D/20_PFA, 30D/20_Waterproofing
Area	Top surface area of floor	Area of floor	0.55m^2
Volume	Volume of floor	Volume of floor	5m^3
Mark	Floor mark	This value must be unique for each element in a project.	SF01, SF02, ……

List of Shared Parameter

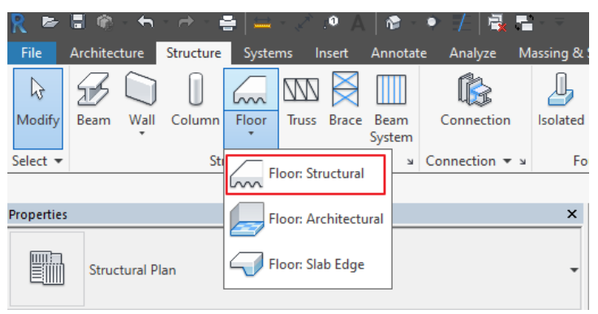
Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Precast	Construction method of floor	Common	Text	General	Type

Remark: The structural floor is regarded as in-situ unless specified in “Precast”. SP denotes Semi-Precast while FP denotes Full Precast.

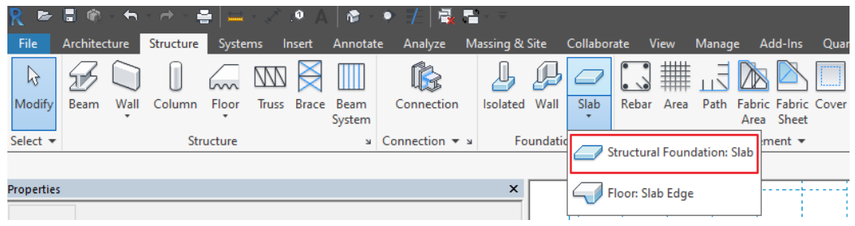
Model Authoring

General requirements:

Superstructure floor shall be modelled by **Floor (Structural)**



Foundation slab shall be modelled by **Structure Foundation: Slab**.



Floor modelling in Domestic Typical Floor

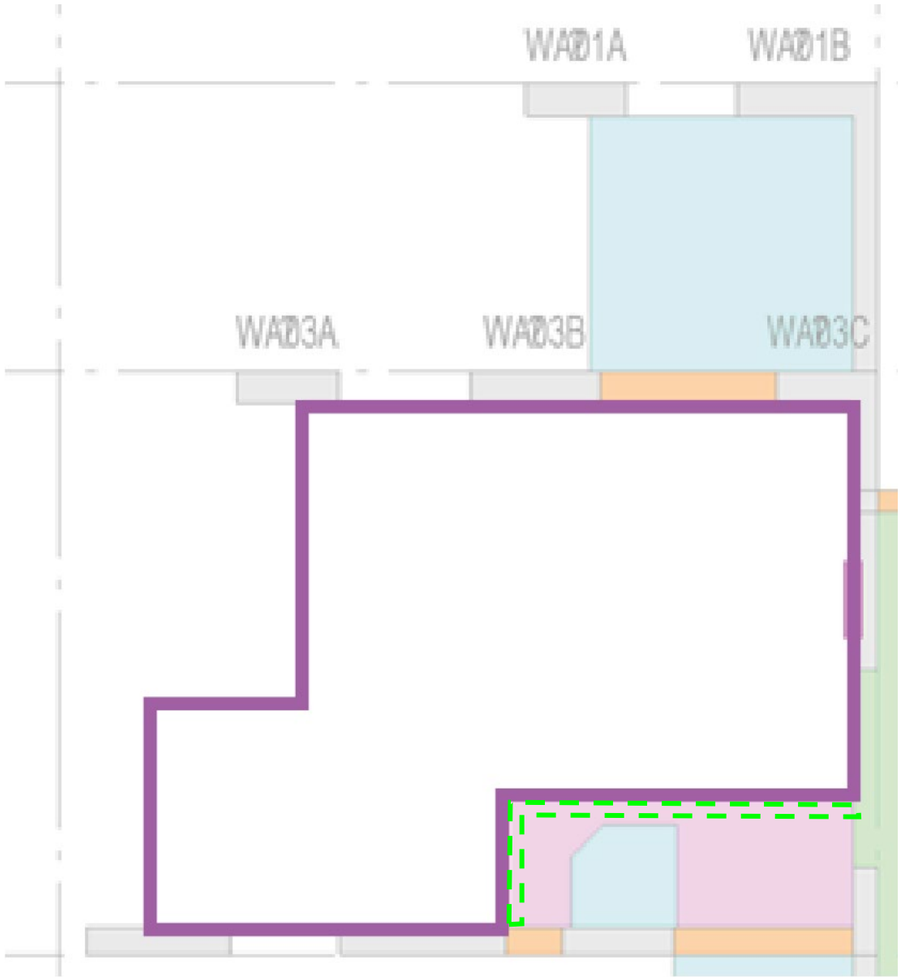
In the domestic typical floor, the floor is prepared by below profile sketching and specific floor thickness unless otherwise specified. The floor profiles are in-touched with the adjacent elements, including floors, walls and beams. The joining between floors shall not be joined.

For joining between floors and walls, it shall be joined with the structural wall in-touch by Join Geometry manually, selecting the floor and in-touched structural wall. Detail refers to the table of Illustration of Joining Approaches of Structural Elements in D4.4 Structure – Superstructure SAM (Scenario I of Wall and Floor).

Purple solid line indicates the recommended floor profile while green hidden line indicates the Architectural walls for reference.

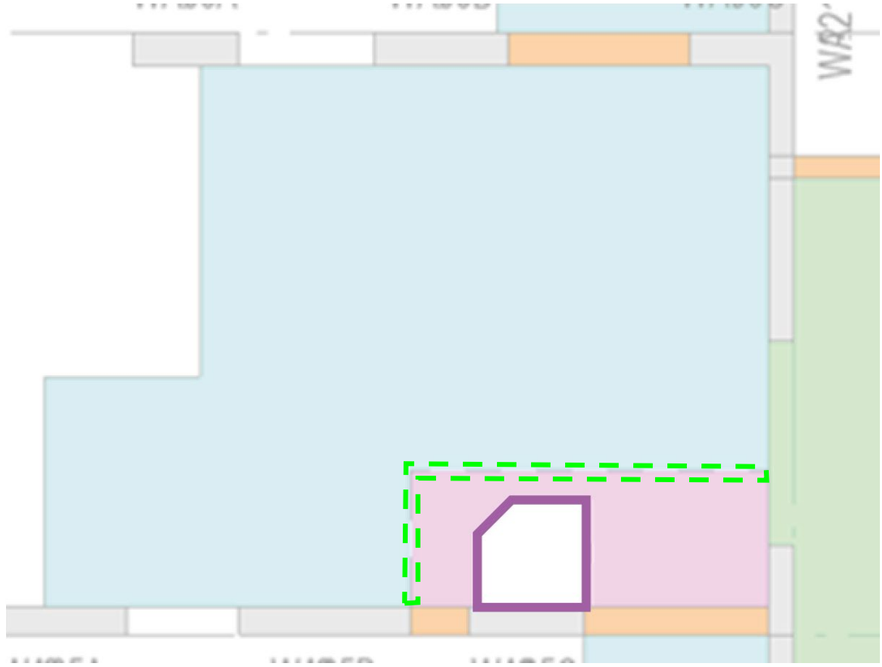
Floor inside flat

The floor profile is sketched according to the room boundary with thickness in 160mm.

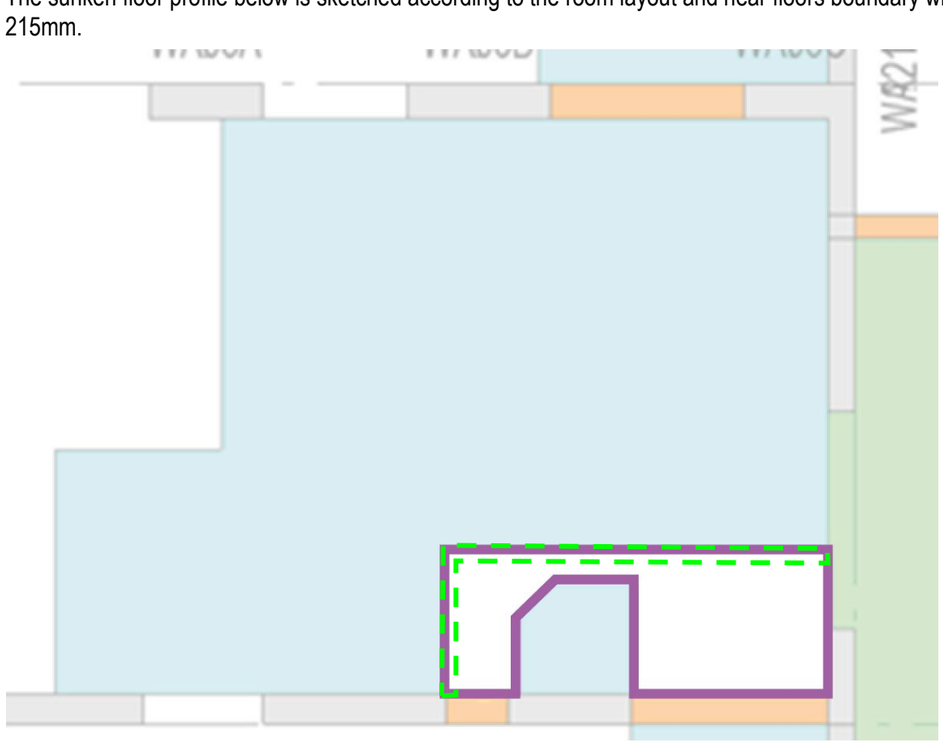


Sunken Floor inside flat

The sunken floor profile below is sketched with thickness in 160mm.

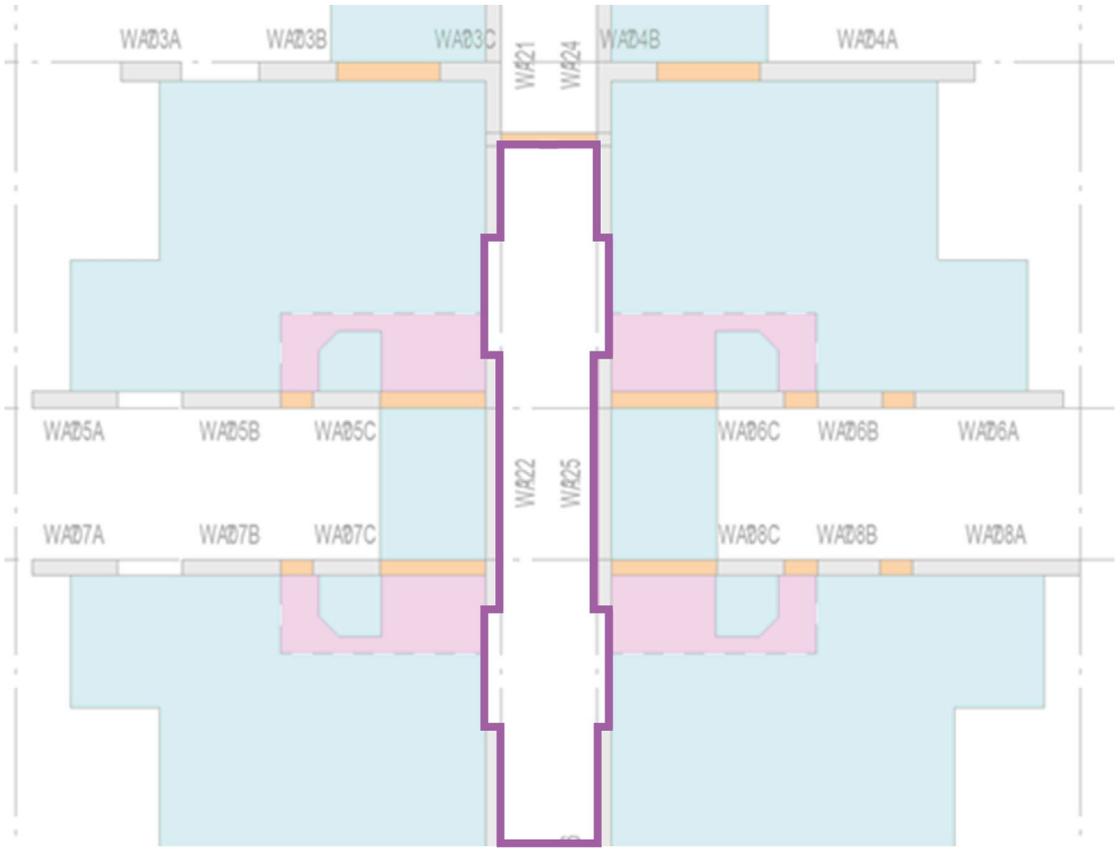


The sunken floor profile below is sketched according to the room layout and near floors boundary with thickness in 215mm.



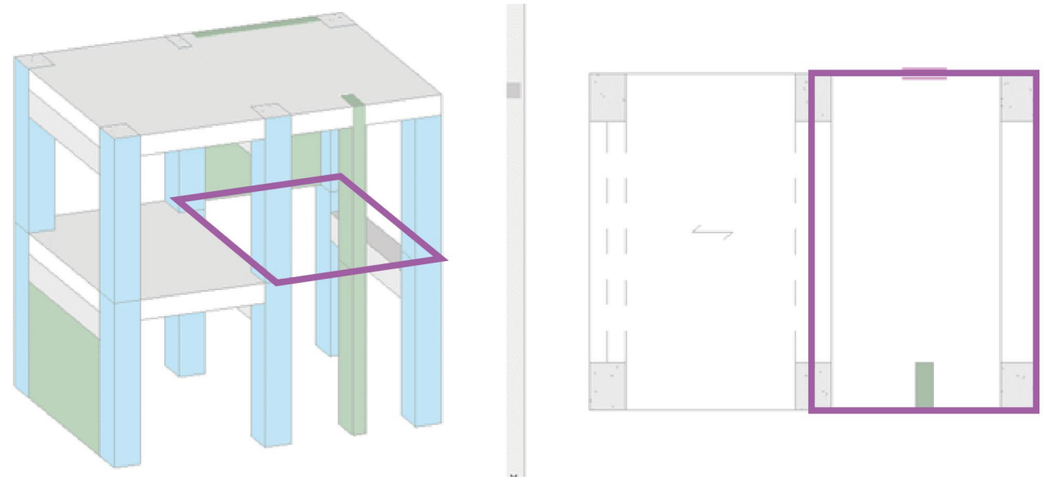
Floor outside flat

The floor profile is sketched according to the layout and wall boundary with thickness in 350mm.

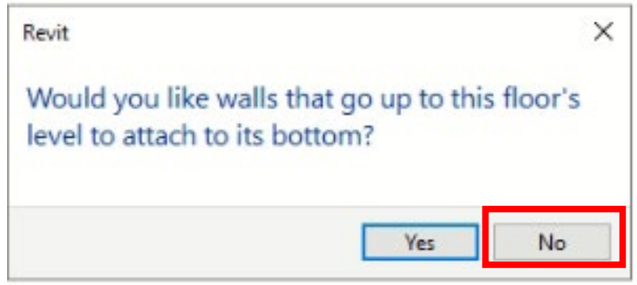


Floor modelling in for other locations except domestic typical floors

Structural Floor element (i.e. slab) shall be modelled individually and shall not be joined with each other in order to assign unique slab span direction. The floor profile should outline along the wall layout and the centre of the beam (except edge beam). The geometry of floors is joined over / across beams and joined to walls, where wall takes precedence.

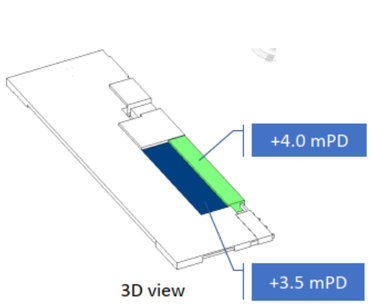


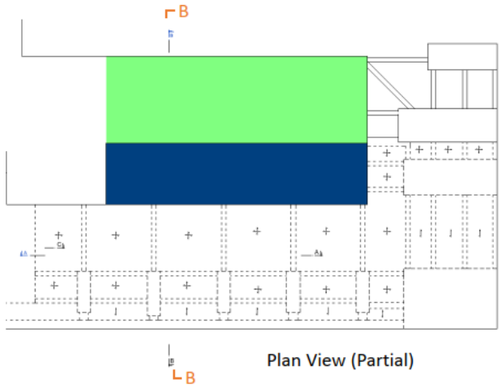
User shall choose “No”, not to attach the wall to the floor’s level if the warning below pops up after completion of floor profile. Then it is required using “Join Geometry” and “Switch Join Order” to join the elements with required geometry. The detail modelling approaches between wall and slab refers to DS-U 02 Structural Wall.



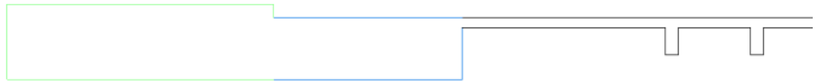
Same technique would be applied when below occasions are encountered.

- Floors with level difference:



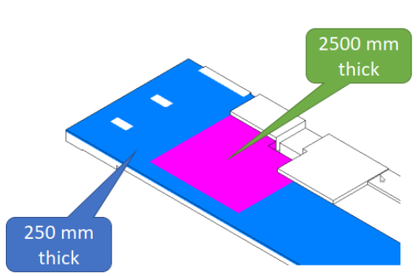


Plan View (Partial)

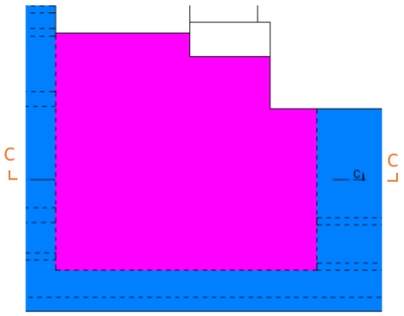


Section B-B

- Different structural floor element thickness;



3D view

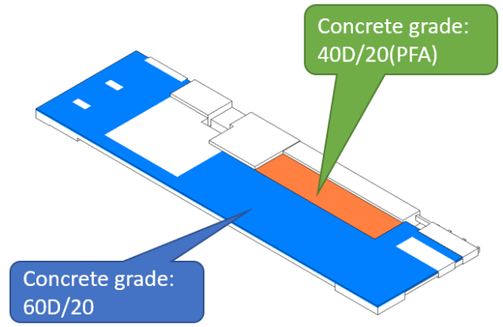


Plan View (Partial)

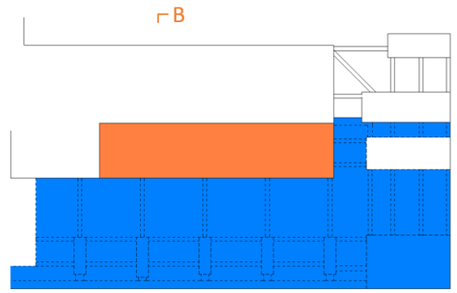


Section C-C

- Different concrete grade or material types;



3D view

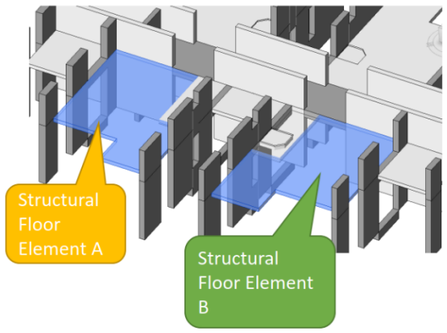


Plan View (Portion)

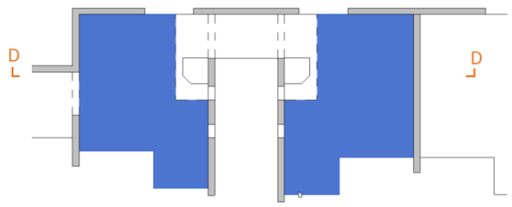


Section View

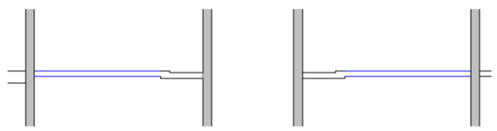
- The structural floor elements are physically unconnected in space.



Although elements A and B have the same thickness, floor levels and concrete grade materials, they are modelled separately as individual element because they are physically unconnected in space.



Plan View (Partial)

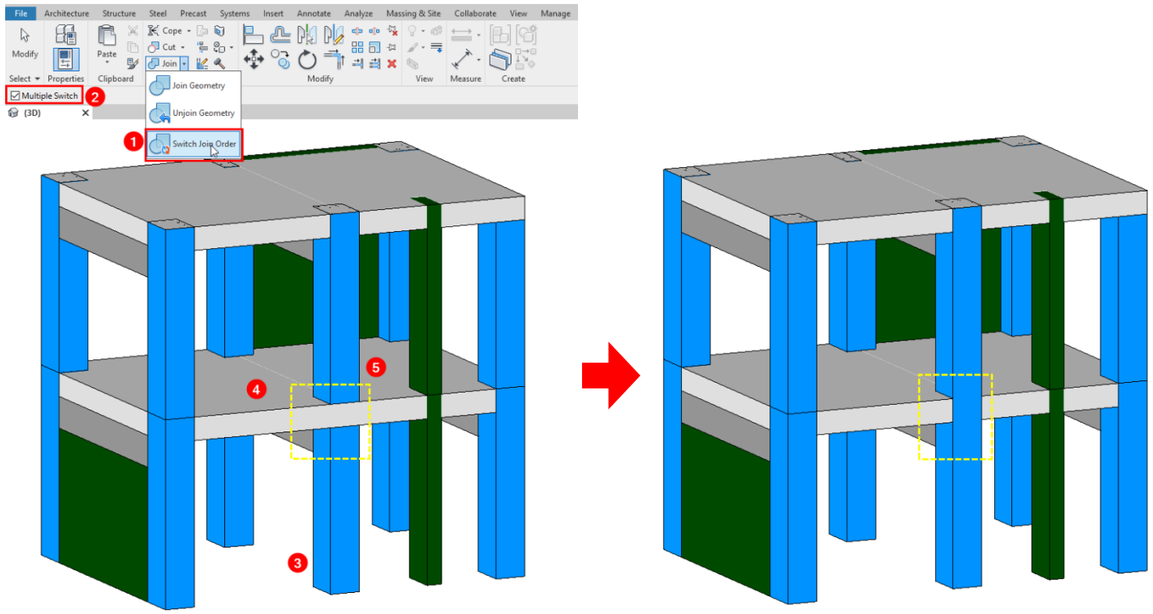


Section D-D

Joining approaches between slab and column

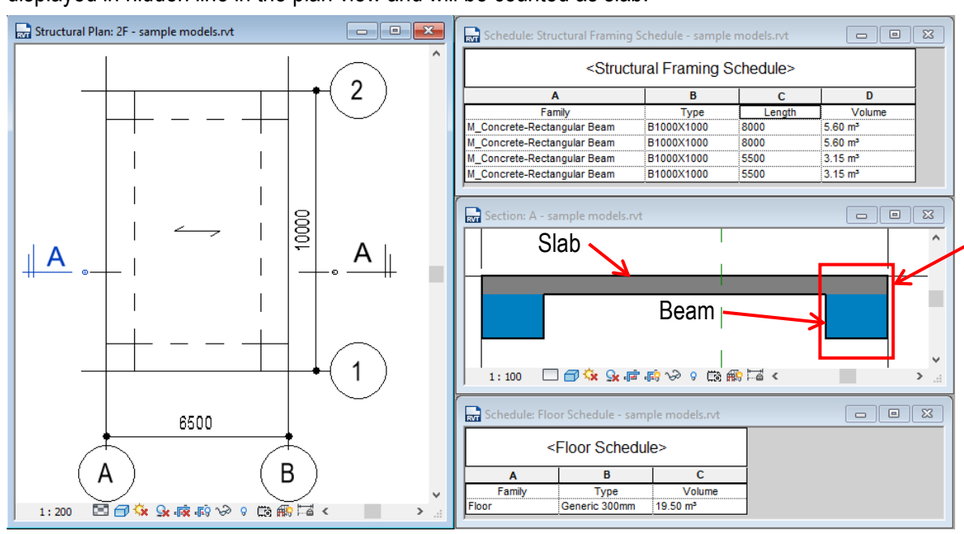
The geometry of slab shall be joined with column, where column takes precedence.

User is required to use Switch Join Order (Modify > Join >) command to change the join order between the slab and column, in order to presented the column from the top of host level to the level above. (Modelling details of column refer to **DS-U 01** Structural Columns.)



Joining approaches between slab and beam

The geometry of slab shall be joined with beams where slab takes precedence. The overlapped part will be displayed in hidden line in the plan view and will be counted as slab.

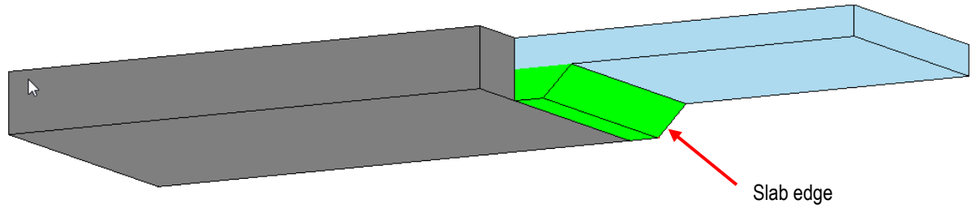


Overlapped part is counted as slab.

Slab Edge

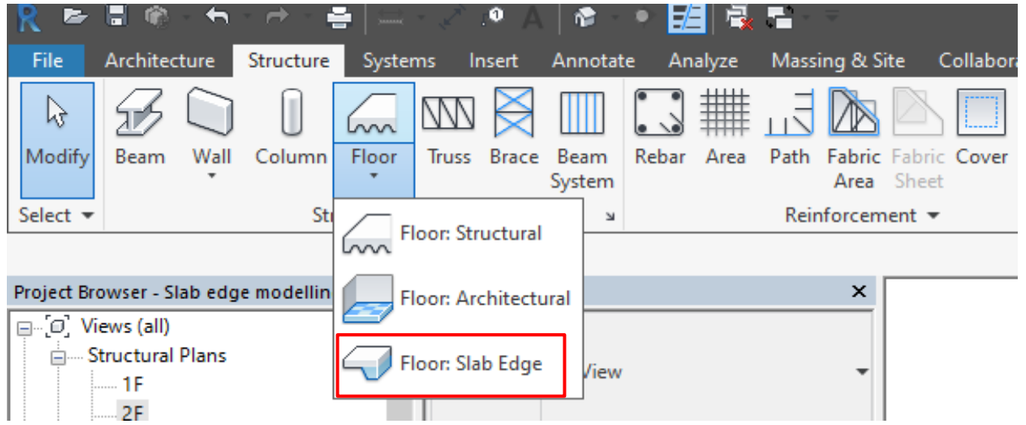
Slab Edge shall be modelled as Structure > Floor > (Floor: Slab Edge)

Sloping soffit at the change of soffit level shall be modelled as “Slab Edge”.



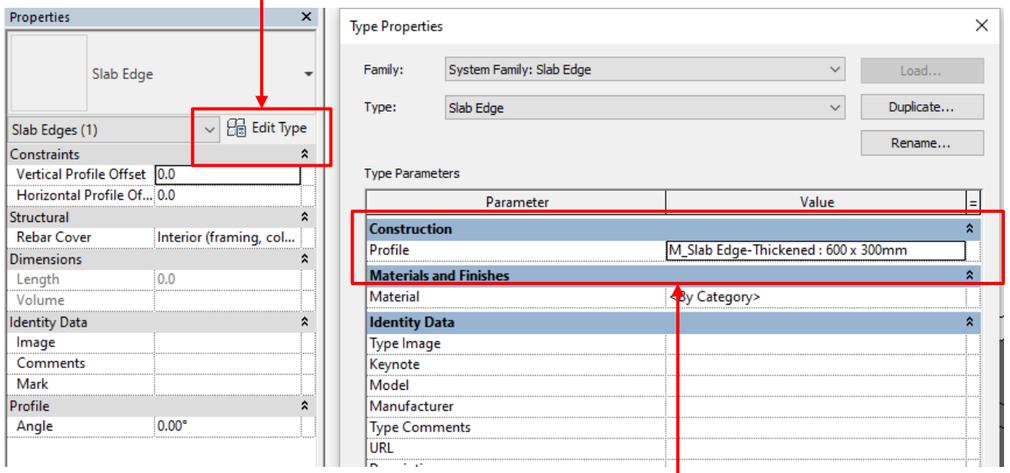
Key steps for creating a slab edge are described as below:

Step 1. Click slab edge command under Structure > Floor > Floor: Slab Edge.



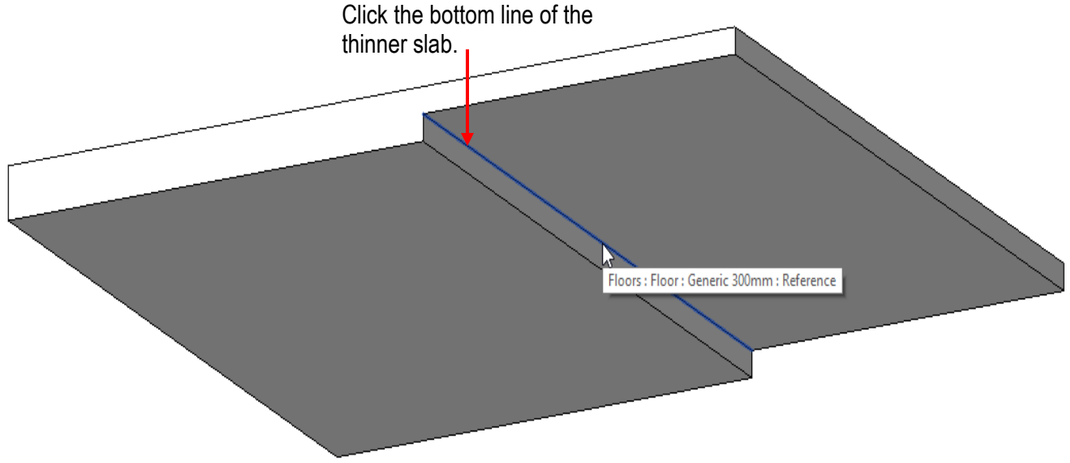
Step 2. In the Properties dialog, click Edit Type, then in the Type Properties dialog, select a profile family for the slab edge.

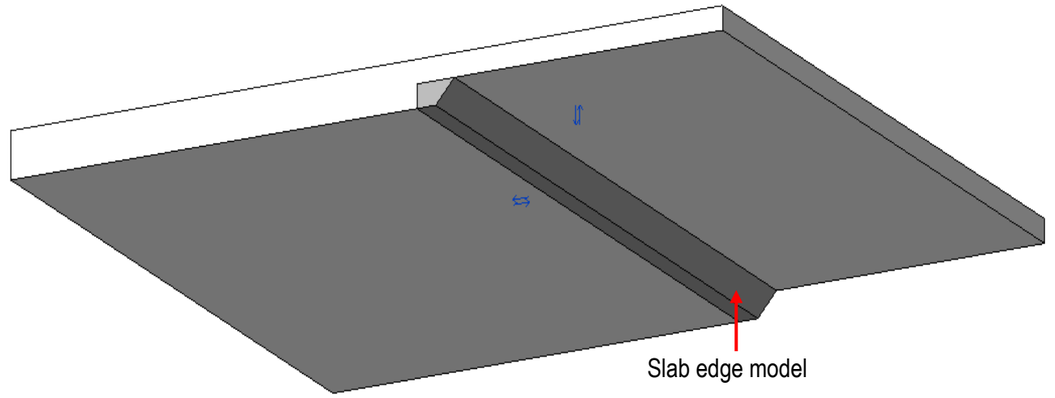
1). In the Properties dialog, click Edit Type



2). In the Type Properties dialog, select a profile family for the slab edge

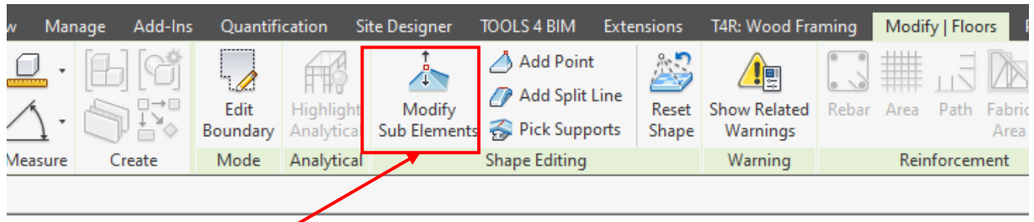
Step 3. In the 3D view, click the bottom line of the thinner slab





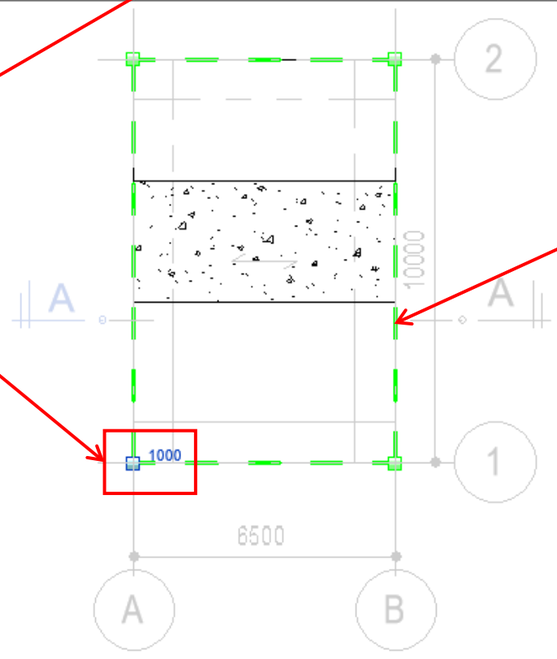
Ramp

Ramp shall be modelled as “Floor” with “Modify Sub-elements” to change levels of shape handles of the slab. Make sure “Line Element” are added between nodes to ensure sub-divisions are formed by 4 nodes.

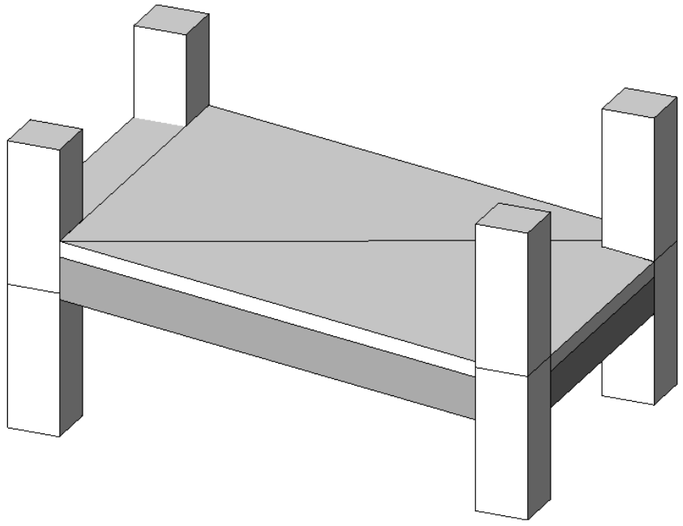


Step 1.
Click after selecting the slab.

Step 2.
Change levels of shape handle



Step 3. Make sure the “Line Elements” are added between Shape handles.



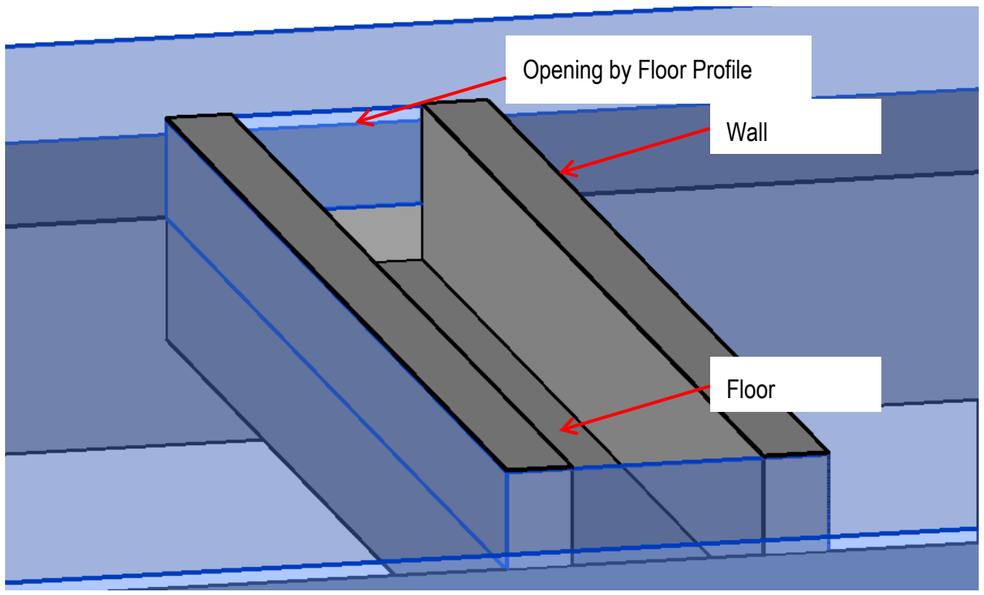
Mass Fill Concrete

The mass portion shall be modelled by floor as usual but with floor type name “SRS-HAS-<Concrete Grade>_Mass Fill-<Thickness>”.

If the staircase is constructed by mass fill, it should be modelled by stair with “SCS-HAS-<Concrete Grade>_Mass Fill-<Run thickness>”. Detail refers DS-U 06 Staircases.

Trenches modelling

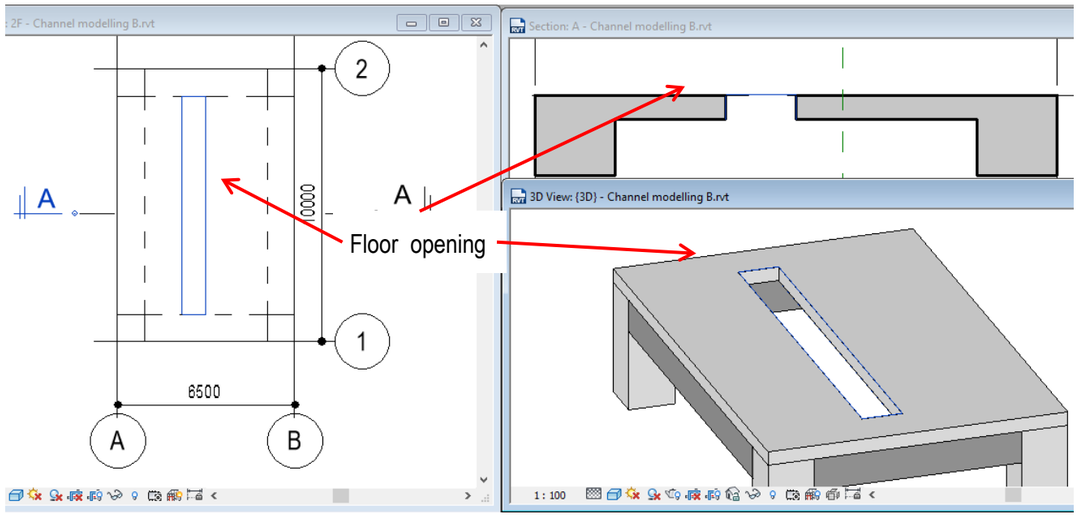
In general, the trench should be modelled by walls and floors and floor opening by editing the floor profile.



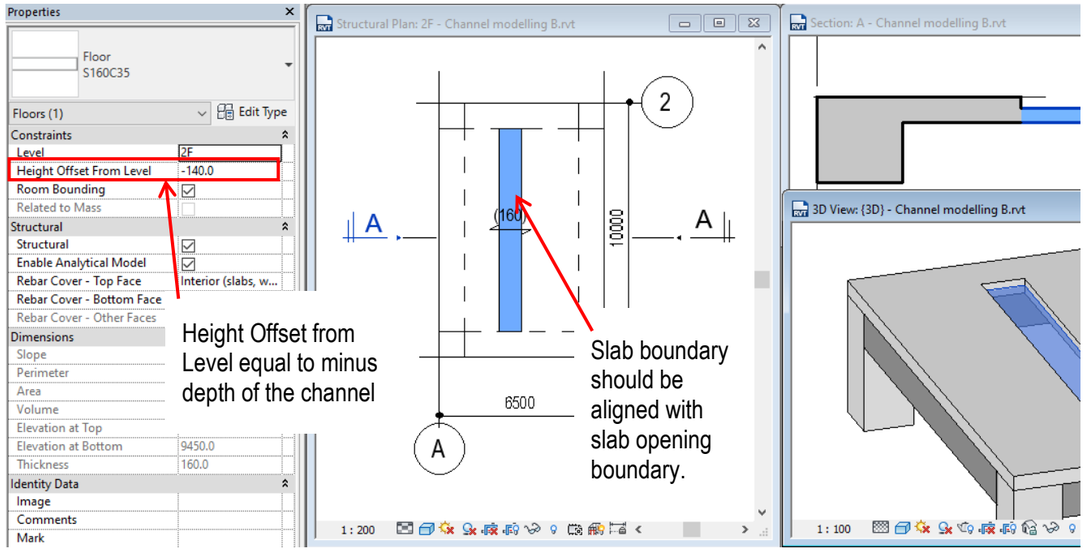
Channels Modelling

Use floor opening and bottom slab to form the channel

1. Create a slab opening by editing the floor profile layout aligned with channel inner boundary



2. Create bottom slab for the channel



DS-U 06 Staircases

The section shall read in conjunction with **D4.3** Architectural SAM – Staircase at Section **DA-15**. For ordinary reinforced concrete stair, the following settings shall be used.

Discipline	Structural
Family	System Family
Family Category	Stairs
Workset	Vertical Transportation
Family Naming Convention	Assembled Stair, Cast-In-Place Stair, Precast Stair (Name of System Family is not editable.)
Type Naming Convention	<Functional type>-HAS-<Descriptor 1 (Structural material)>-<Descriptor 2 (Thickness)>

Staircase Type Name Example

Functional Type		Originator		Descriptor 1 (Structural material)		Descriptor 2 (Run thickness (mm))
SCS	-	HAS	-	30D/20	-	160
SCS	-	HAS	-	40D/20	-	160
SCS	-	HAS	-	Mass_Fill	-	N/A

Run Type Name Example

Functional Type		Originator		Descriptor 1 (Structural material)		Descriptor 2 (Run thickness (mm))
SRN	-	HAS	-	30D/20	-	160

Landing Type Name Example

Functional Type		Originator		Descriptor 1 (Structural material)		Descriptor 2 (Run thickness (mm))
SLD	-	HAS	-	30D/20	-	160

Functional type example

Functional type	Description
SCS	Structural concrete stair
STS	Steel stair
SRN	Run of staircase
SLD	Landing of staircase

Information Requirement

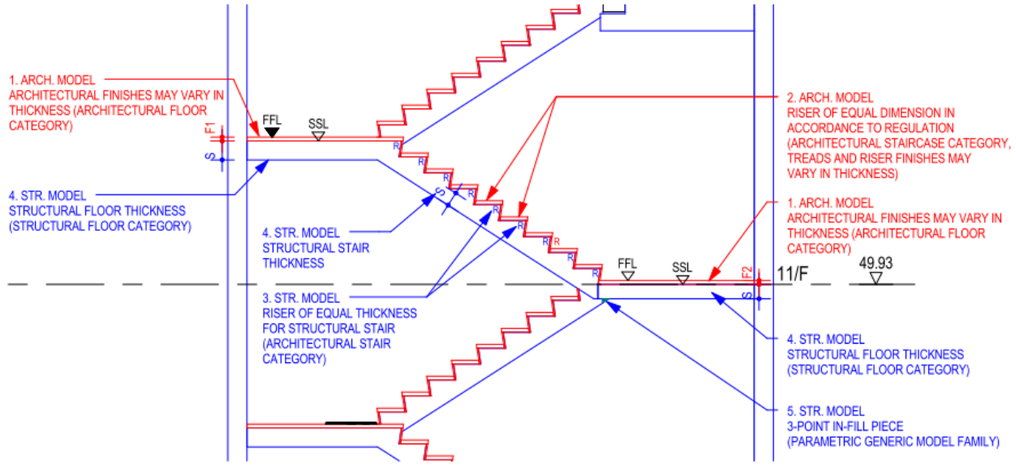
List of Built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size.	SCS-HAS-30D/20-300
Base Level	Base level of the stairs	To set the base level for the stairs.	1F, 2F……
Base Offset	The offset level of the stair base.	To set the offset of the stairs from the base level.	-50, 0.0, 100, 200, 250,……
Top Level	Top level of the stairs	To set the level for the top of stairs.	2F,3F……
Top Offset	The offset level the stair top	To sets the offset of stairs from the top level.	-50, 0.0, 100, 200, 250,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	30D/20, 40D/20, ……
Maximum Riser Height	Maximum Riser Height	Sets the maximum height of each riser on the staircase. It shall be compliant Building Regulation.	175
Minimum Tread Depth	Minimum Tread Depth	Sets the initial value for the Actual Tread Depth instance parameter. If the Actual Tread Depth value exceeds this value, Revit issues a warning. It shall be compliant with Building Regulation.	250
Minimum Run Width	Minimum Run Width	Sets the initial value for the width of a common run. This parameter does not affect the creation of a sketched run.	1000
Run Type	Family for run	Defines the type for all runs in the stair elements.	SRN-HAS-30D/20-160
Landing Type	Family for landing	Defines the type for all landing in the stair elements.	SLD-HAS-30D/20-160
Mark	Stair mark	Information to be added to structural floor elements This value must be unique for each element in a project.	1SS1

Model Authoring

This section shall read in conjunction with Architectural' s Staircases.

Demarcation of Architectural and Structural Discipline



Staircase is a combination of Architectural finishes and Structural stair and landing slab.

Users are advised to model the structural part in blue colour as above in Revit Structural Template in an individual file. This file to be imported to Architecture file for coordination and GBP drawing production in a separate Revit file.

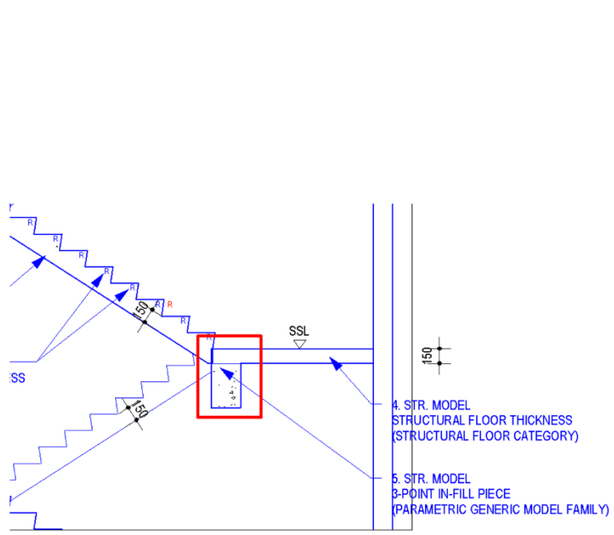
Collaboration

When conducting structural staircase modelling work, below basic staircase information should fed in from Architect:

- Stair bottom level and top level
- Number of risers
- Riser height
- Number of treads
- Tread depth
- Run width
- Headroom requirement
- Stair setting out, etc.

Structural engineers are required to produce staircase model including the calculation of structural stair thickness for coordination with Architects' references.

The drawing production for staircase with beam or other supports can be produced based on the model within Structural Discipline.



Please refer to **D2.6** and D**2.7** for intradisciplinary collaboration and inter-disciplinary collaboration.

Modelling details

Settings	Value
Run Type	Monolithic Run
Run Type Name	Describe the thickness
Underside Surface	Smooth
Structural Depth	Run thickness
Nosing Length	0.0
Slanted	Unchecked
Landing Type	Monolithic Landing

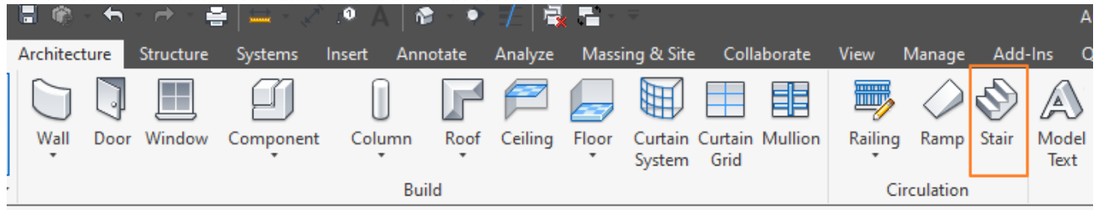
Settings	Value
Monolithic Thickness	Landing thickness
Minimum Tread Depth	225mm (complied with Building Regulations)
Maximum Riser Thickness	175mm (complied with Building Regulations)
Extend Below Base	-150mm (to bottom side of adjacent slab or landing)
Begin with Riser	Y
End with Riser	Y

Setting of creating Staircase

Stair can be modelled in either architectural or structural model (or both) depends on its nature.

For the case of reinforced concrete stair in typical buildings, the reinforced part of the Stair shall be modelled in structural model.

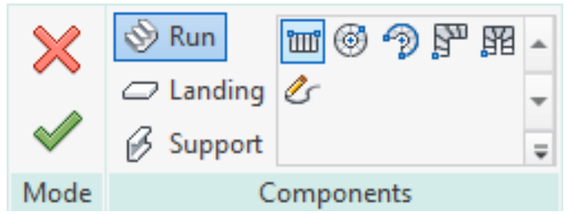
All the stairs within this guideline are based on Stair by Component under Architectural > Circulation > Stair. This section focuses on the structural view of Stairs in Revit.



Finishes and cladding for stairs shall be modelled in architectural model.

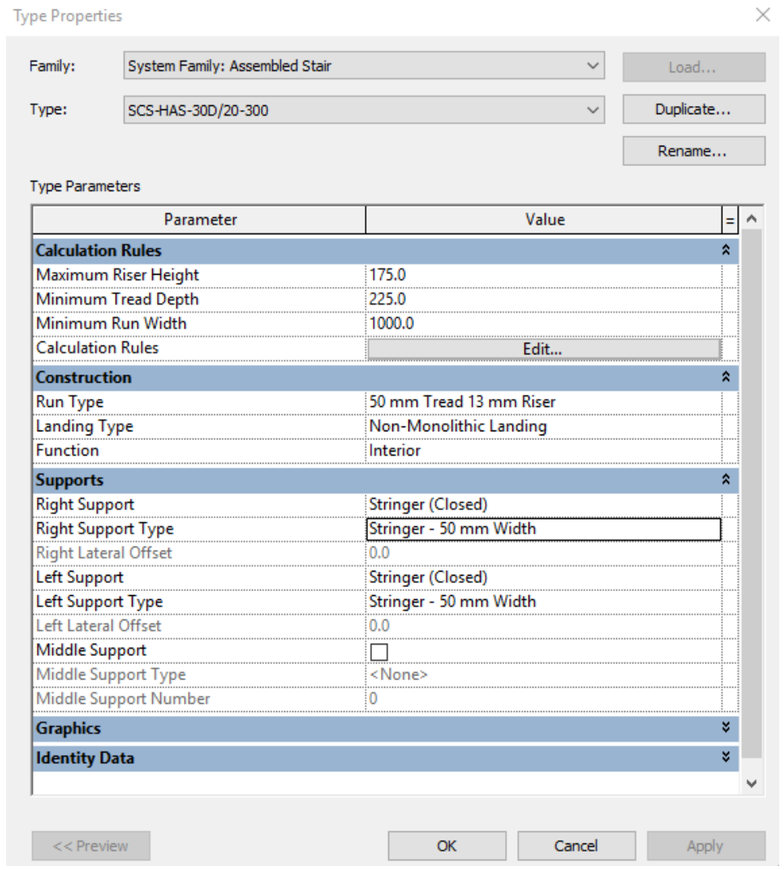
In Autodesk® Revit® version 2018 and above, stair with equal riser height shall be modelled as one element with "Run" Run and "Landing" Landing modelled to assemble the whole stair from its bottom level to its top level

In case if detailed elevation for each (or some) landing is provided, the stair shall be modelled separately from landing to landing.

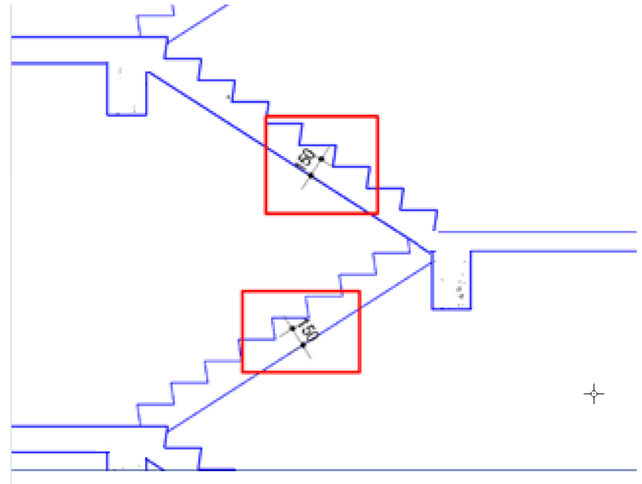


Upper "Landing" Landing shall be modelled together with "Run" Run.

Waist thickness has to be input into the property **Description**.



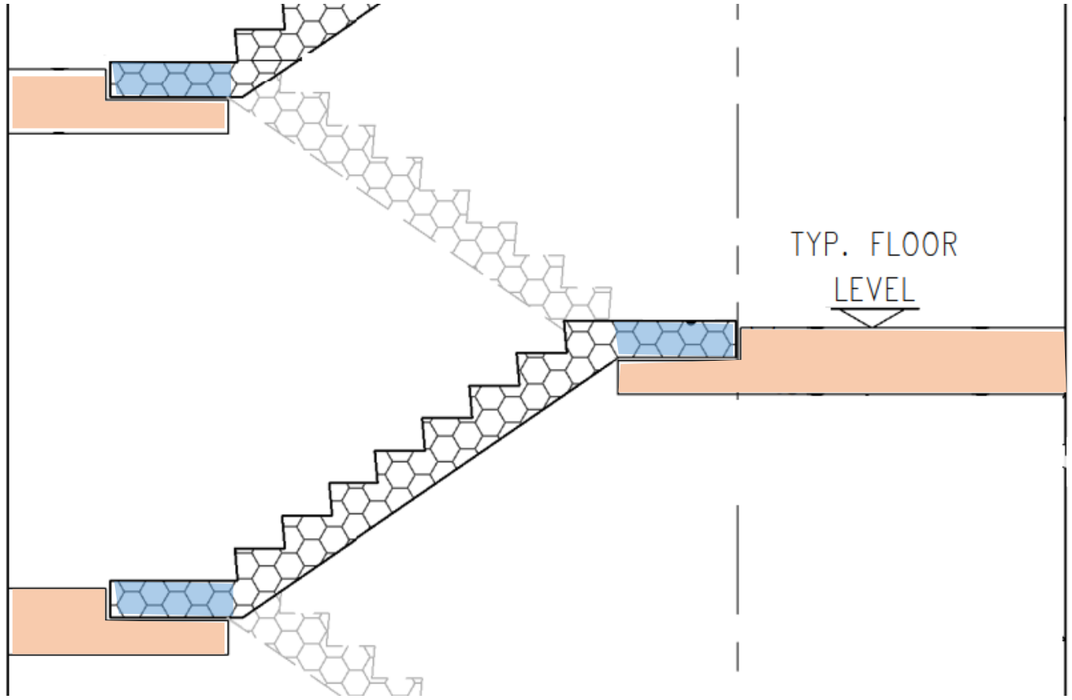
For design purpose, it is required to indicate the thickness of structural staircase in section view for easier coordination.



Preparation of staircase for domestic floors

It is suggested to prepare the staircase for typical floor by using “Stair” and “Floor” for HA projects.

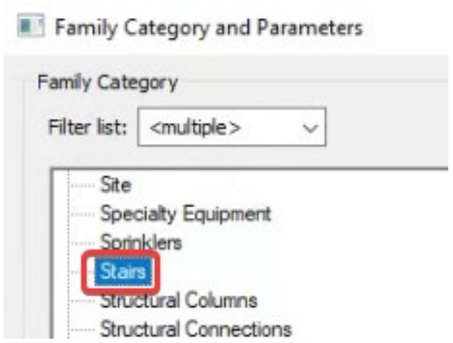
The diagram below indicates the combination of “Floors” (highlighted in orange), “Stair Flight” (hatched) and “Stair landing” (highlighted in blue with hatch) in the modelling.



Preparation of mass fill stair

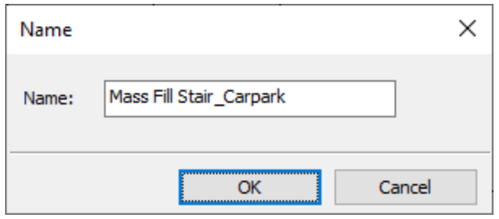
Since the stair types in Revit are limited, for all the mass fill stairs which could not be prepared by “Stair” function with the good 3D gemotry presentation. Modeller may consider preparing the mass fill stair by In-Place model family.

In this case, the mass fill stair can be modelled as an In-Place model under Stairs category.

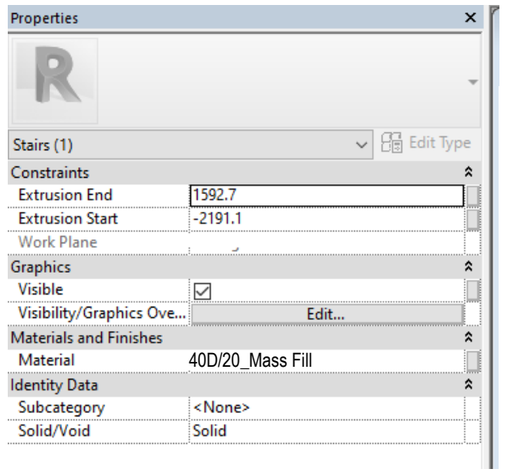


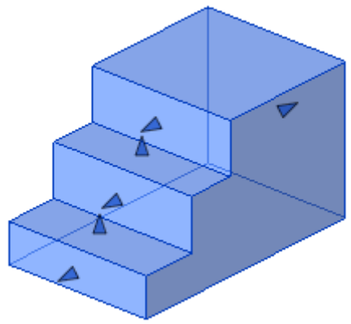
However, the family category should be assigned to “Stairs” while materials for mass fill concrete should be assigned to the stair geometry.

The In-Place model shall be provided with a family name like “Mass Fill Stair_<Location>”.



The geometry within the In-Place model shall be assigned with appropriate materials for the geometry such 40D/20_Mass Fill.





DS-U 07 Water Tank

Families for walls, slabs and beams of water tanks

The general components of water tank shall be composed of standard elements such as side walls, top and bottom slabs, beams and fillet.

Information Requirement

For essential parameters of wall, slab and beam, additional parameter for water tank below should be input. Others please refer to previous sections of **DS-U 02**, **DS-U 04** and **DS-U 05**.

List of built-in Parameter

Parameter name	Information	Remark	Example
Comments	Type of usage	A piece of optional information to be added for indicating the type of usage of a structural element when necessary.	WKT01

Model Authoring

The SAM for water tank general components such as wall, slab and beam, please refer to previous sections of **DS-U 02**, **DS-U 04** and **DS-U 05**.

Families for fillet of water tanks

Discipline	Structural
Family	In-Place Family
Family Category	Wall
Workset	Individual Levels
Family Naming Convention	SWL-Fillet-HAS-<Descriptor 1(Structural material)>-<Descriptor 2 (Fillet thickness)>
Type Naming Convention	Same as family name

As fillets need to maintain relationships to slab and wall, and are usually unique geometry, it is flexible to select in-place element as family types to create fillet models. However, unlike system families and loadable families, you can't duplicate in-place family types to create multiple types.

Family Name Example

Category		Functional Type		Originator		Descriptor 1 (Structural material)		Descriptor 2 (Fillet thickness)
SWL	-	Fillet	-	HAS	-	40D/20	-	400

Information Requirement

The following tables list out the essential parameters for water tank fillets.

List of built-in Parameter

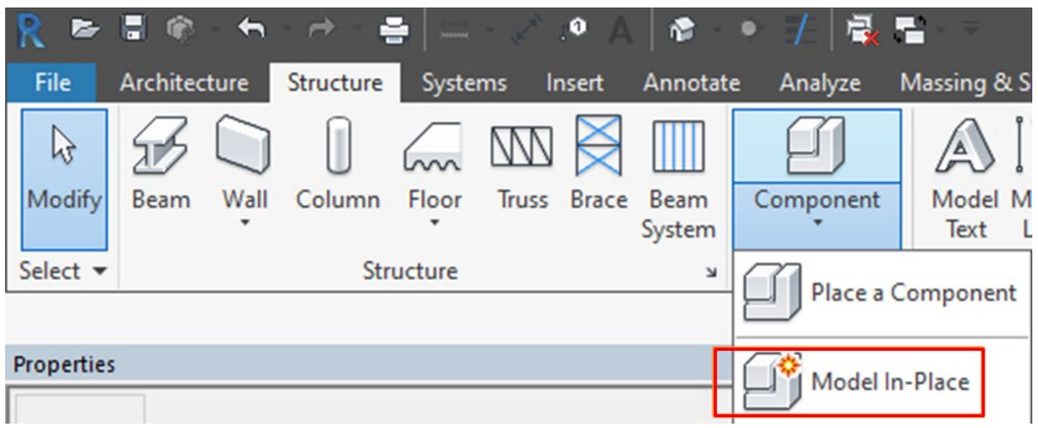
Parameter name	Information	Remark	Example
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	30D/20, 40D/20, ……
Mark	Fillet mark	Optional information to be added to structural elements This value must be unique for each element in a project.	FLT01, FLT02, ……
Comments	Type of usage	A piece of optional information to be added for indicating the type of usage of a structural element when necessary.	WKT01

List of Shared Parameter

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Location	Fillet location	Common	Text	Identity Data	Instance

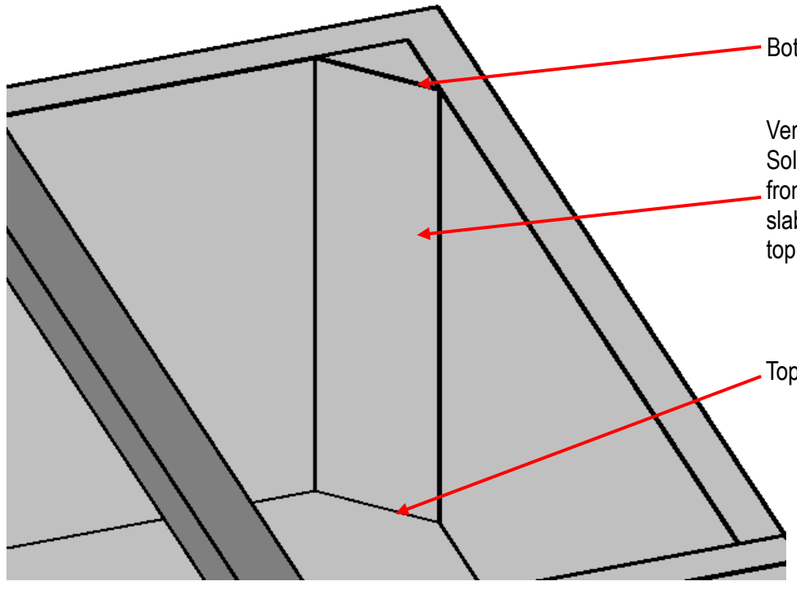
Modelling of Fillet

Fillets can be modelled in Model In-Place command (Model In-Place) under Structure > Component > Model In-Place.

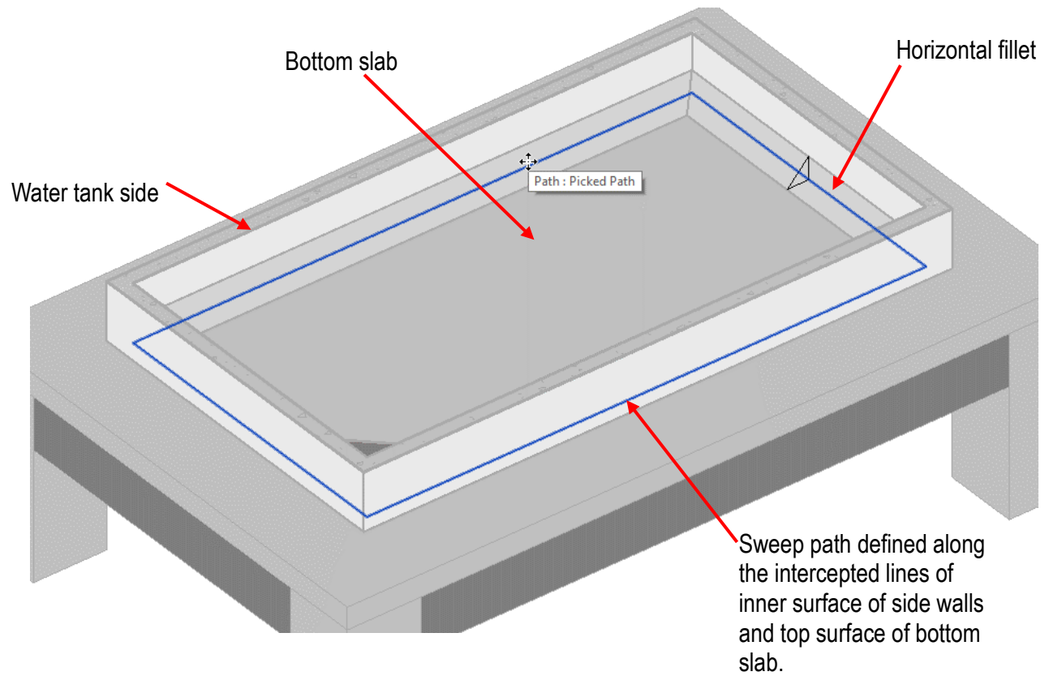


Family category for fillets shall be Wall.

Vertical fillets can be formed by Solid Extrusion extruded from top level of the bottom slab to bottom level of the top slab.

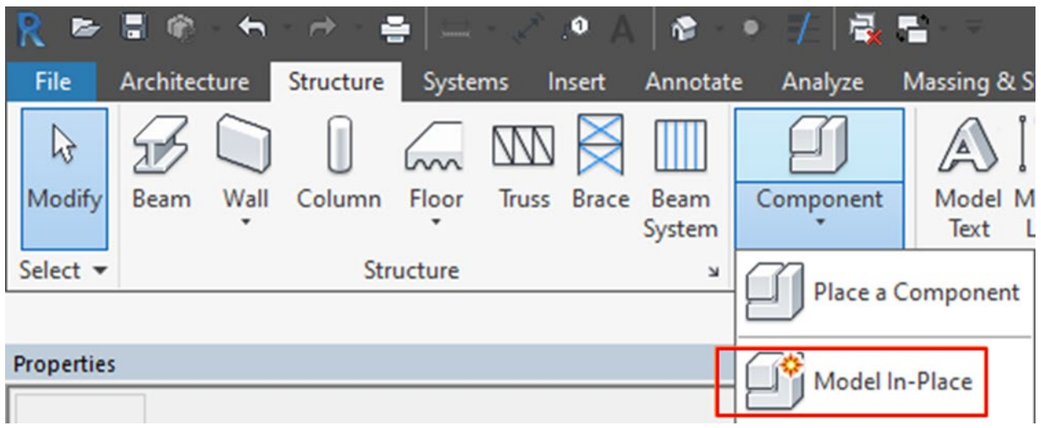


Horizontal fillets can be formed by Solid Sweep with its path defined along the intercepted lines of inner surface of side walls and top surface of bottom slab.



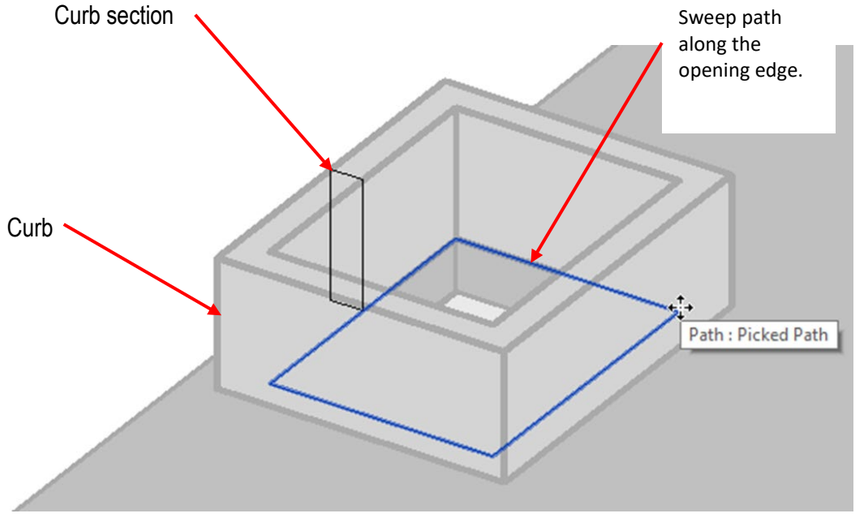
Modelling of curbs surrounding water tank opening

The curb can be modelled with Model In-Place command (Model In-Place) under Structure > Component > Model In-Place.



Family category for curb shall be Wall.

Curb can be formed by Solid Sweep with its path defined along the opening edge.



DS-U 08 Structural Reinforcement

This section outlines the structural reinforcement modelling standard for model in housing Project.

Reference is made on **"SE Discipline: Guide for Drawing Practice" by the HA**. However, the use of terms shall strictly follow Revit's parameter names instead of the CAD naming.

Warning: The size of the reinforcement rebar model may be quite large and it is NOT recommended to model 3D rebar in project. This section is for reference only in case 3D Rebar model are required such as rebar used in pre-cast unit (modular flats) and some concrete joints (Beam-column Joints).

Discipline	Structural
Family	System Family
Family Category	Structural Rebar
Workset	Individual Levels
Family Naming Convention	Rebar Bar (Name of System Family is not editable.)
Type Naming Convention	<Rebar type><Rebar Diameter>

Type name example

Rebar type	Rebar Diameter
T	10
T	12
T	16
T	20
T	25
T	32
T	40
T	50

Information Requirement

List of built-in Parameter

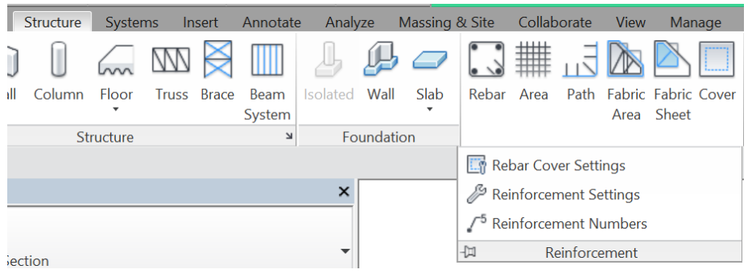
Parameter name	Information	Remark	Example
Schedule Mark	Schedule mark for rebar	Specifies rebar instances with a rebar schedule mark. The mark improves scheduling and organization.	01,02,03,04,……
Shape	Shape of rebar	Specifies the identification number of the rebar shape.	00,01,11,12,13,14,15…
Hook At Start	Hook type at rebar start	Lists appropriate rebar hook types for the hook at rebar start.	None, Standard Hook-90 deg., Standard Hook-180 deg.,…….
Hook At End	Hook type at rebar end	Lists appropriate rebar hook types for the hook at rebar end .	None, Standard Hook-90 deg., Standard Hook-180 deg.,…….
Layout Rule	Layout rule of rebar arrangement	Specifies the type of rebar layout.	Single, Fix number, Maximum Spacing, Number with Spacing, Minimum Clear Spacing.
Quantity	Quantity of rebar	Specifies the number of rebar instances within the rebar set. This parameter is only accessible when the Fixed Number or Number with Spacing Layout Rule is selected.	10, 15, 20,……
Spacing	Spacing of rebar	Specifies the spacing for the rebar placed within the rebar set. This parameter is not accessible when the Single or Fixed Number Layout Rules are selected.	100mm, 150mm, 200mm,……

Model Authoring

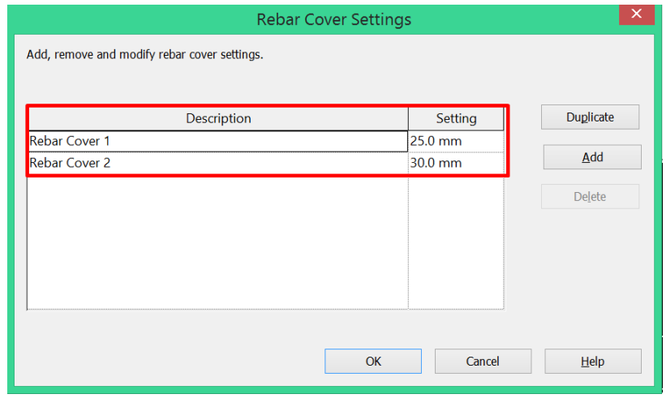
Important: Rebars for beams, columns, and walls are only available at **Sectional / Elevation View** before placing on the model. (Except for Slabs of Area reinforcement and free form rebar)

Reinforcement Settings:

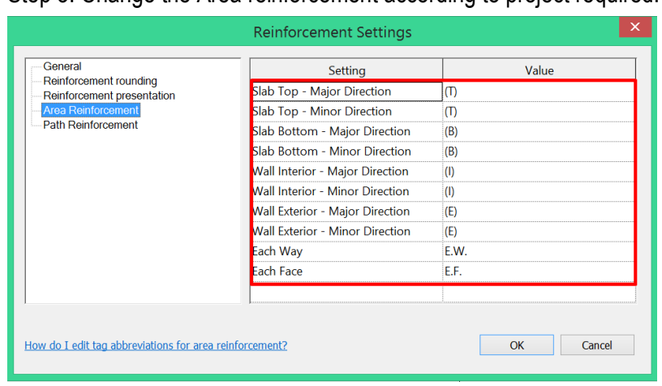
Step 1. Expand the Reinforcement Tab under Structure.



Step 2. Go to Rebar Cover. Set the Cover dimension.

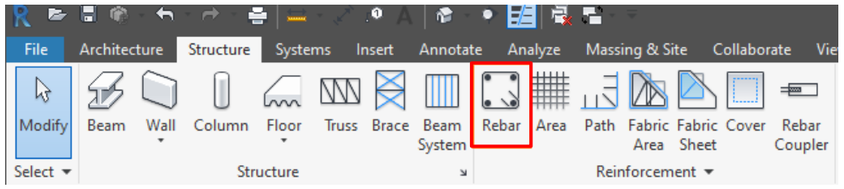


Step 3. Change the Area reinforcement according to project required. For example:

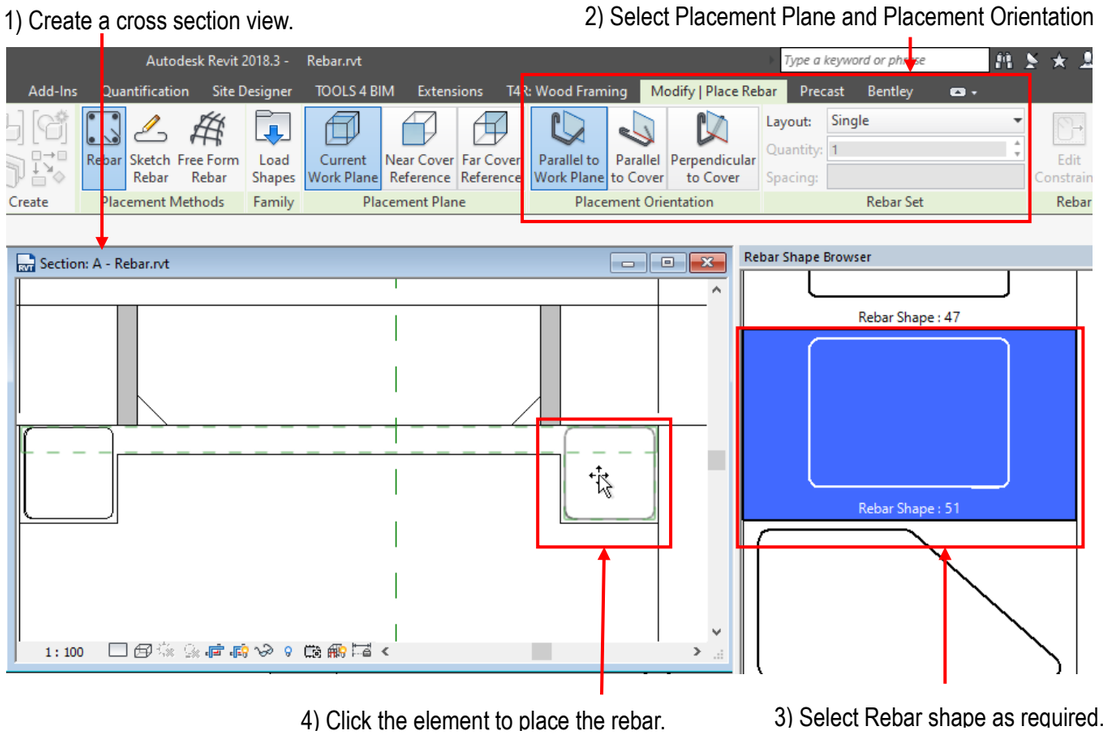


Place rebar by selecting rebar shape from Rebar Shape Browser

Step 1. Before placing a rebar with defined rebar shape, User shall create a cross section view of the concrete elements. Then activate the Rebar command under Structure > Reinforcement > Rebar

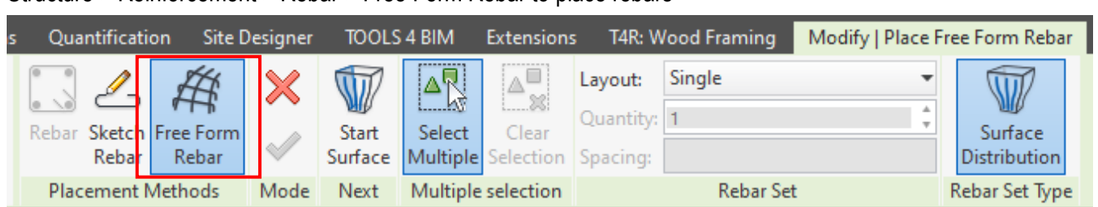


Step 2. In the cross-section view, select rebar shape from Rebar Shape Browser, then place the rebar to the elements.



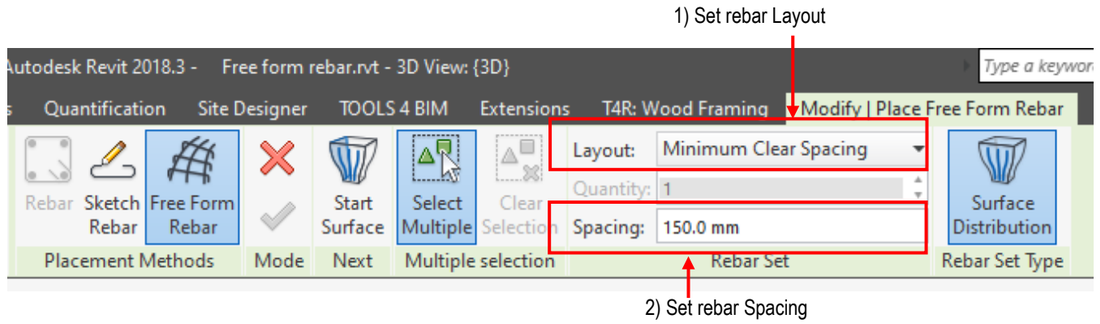
Place Free Form Rebar

For elements with irregular shape (e.g. retaining wall), modeller can use Free Form Rebar command under Structure > Reinforcement > Rebar > Free Form Rebar to place rebars

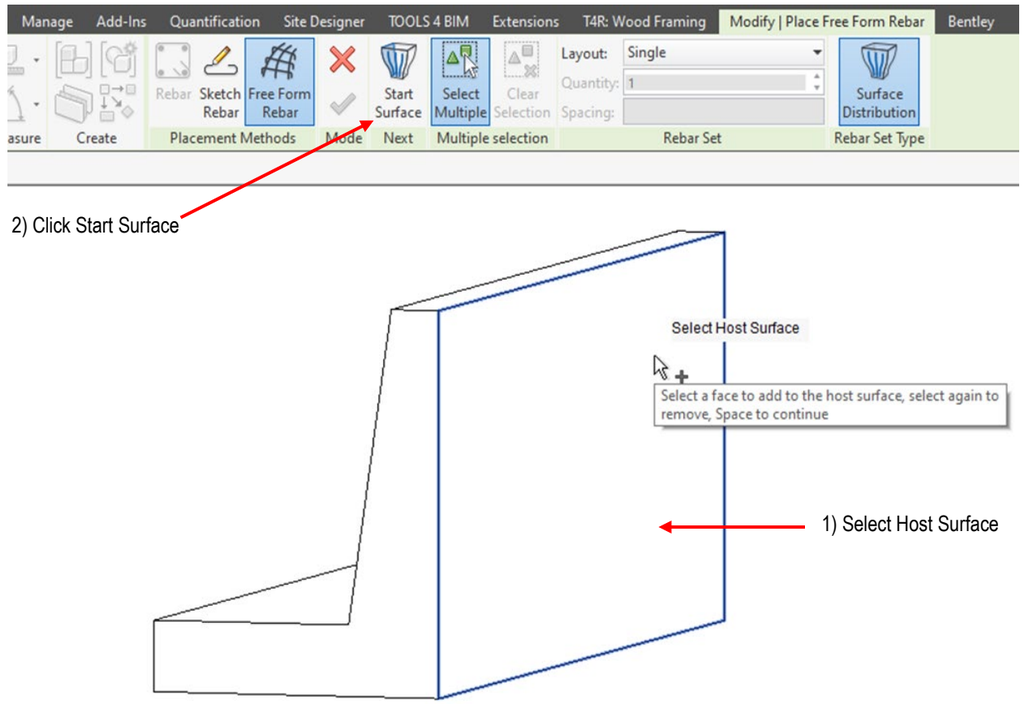


The major step for placing Free Form Rebar are described as below:

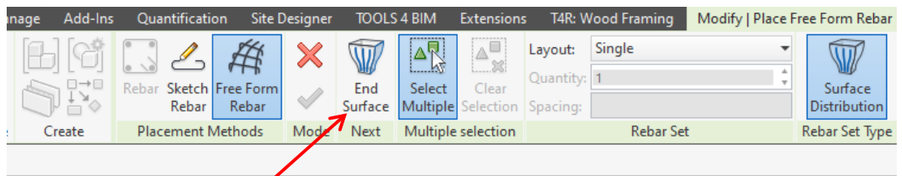
Step 1. Activate the Free Form command and set the rebar layout and spacing.



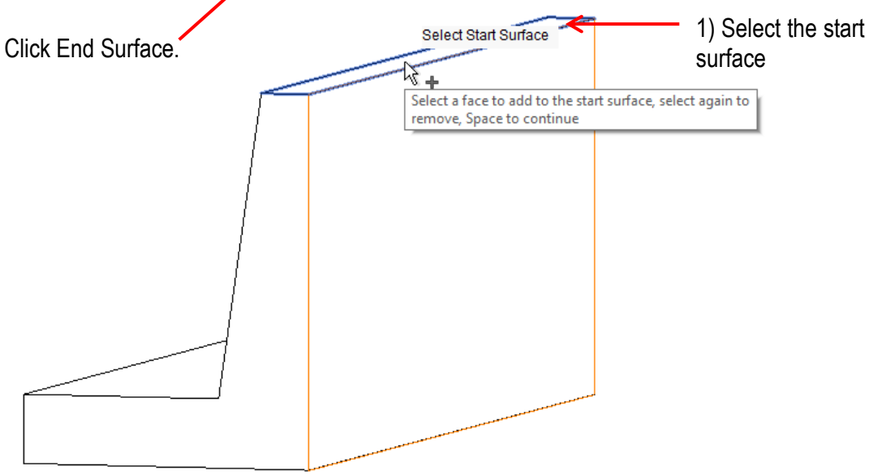
Step 2. In the 3D view, select the rebar Host Surface.



Step 3. In the 3D view, select the Start Surface (select surface from which the free form rebar set begins).

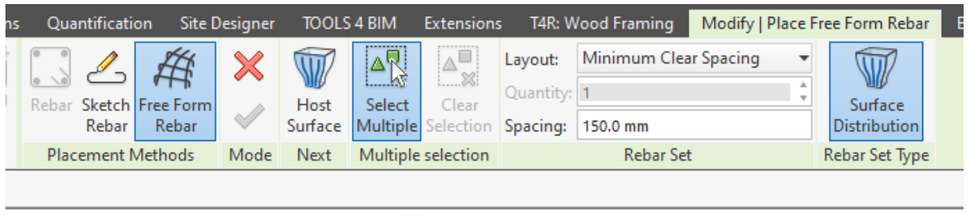


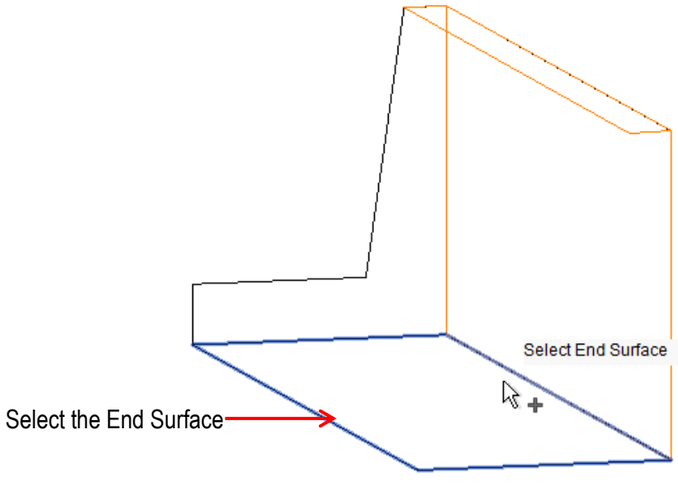
2) Click End Surface.



1) Select the start surface

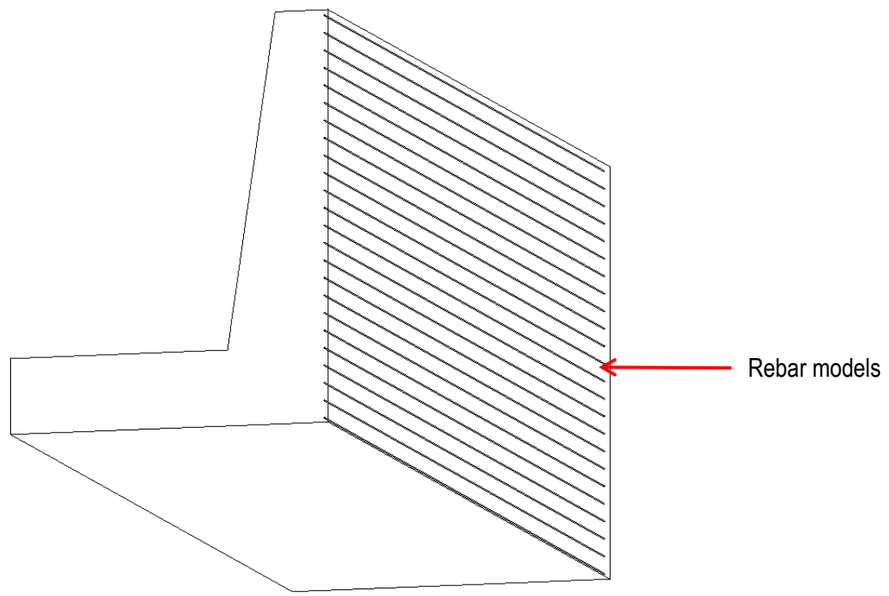
Step 3, In the 3D view, select the End Surface





Select the End Surface

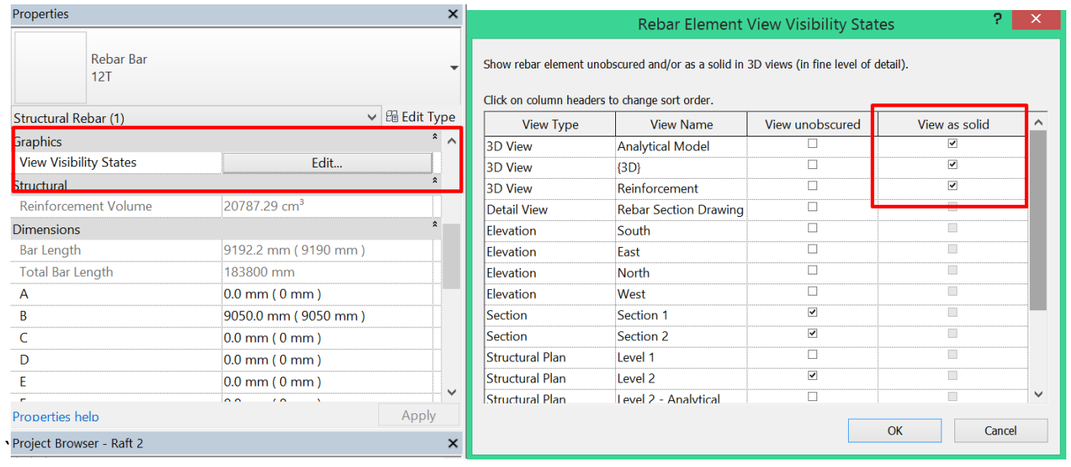
Step 4. Press Enter to complete the rebar modelling



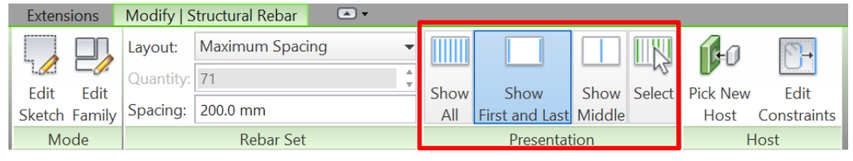
Rebar models

Display 3D rebars

To display the rebars in 3D view, click on any rebars, choose "**View visibility states**" and choose "**View as solid**".



For shear reinforcement, choose "Show First and Last" on the presentation Tab for better RC drawing presentation.



DS-U 09 Steel Structrues

Steel Columns

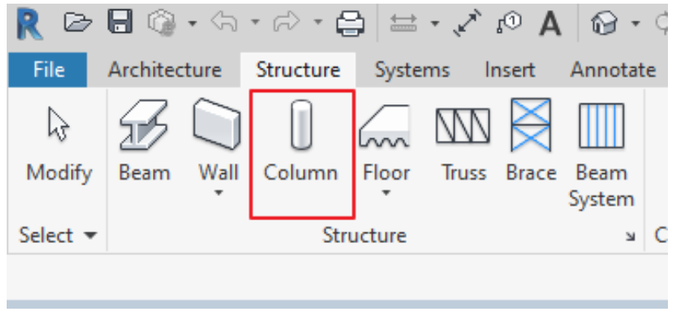
For steel column family, please refer to **DS-U 01** Structural Columns.

Information Requirement

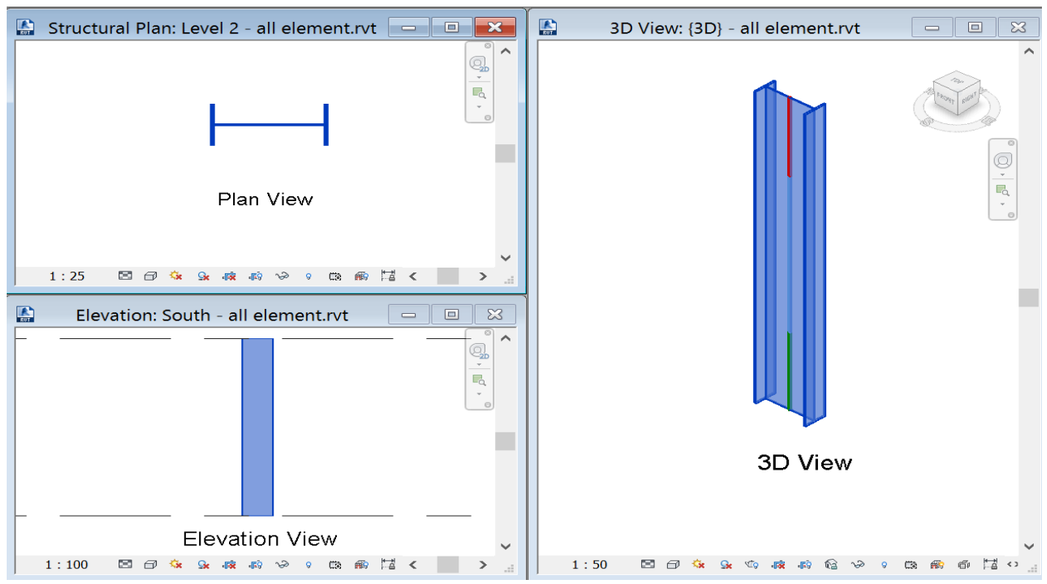
Refer to **DS-U 01** Structural Columns.

Model Authoring

All Structural Steel Column shall be modelled as Structure > (Column).



- Universal Columns (UC)



Steel Beam and Steel Connection

For Steel Beam Families, please refer to **DS-U 04** Structural Framing.

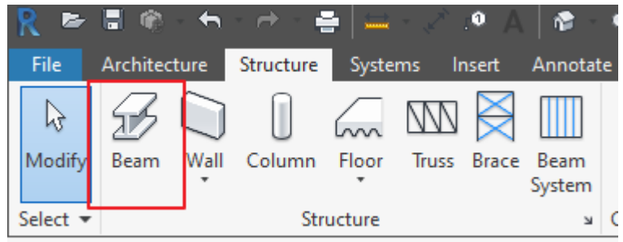
Information Requirement

Refer to **DS-U 04** Structural Framing.

Model Authoring

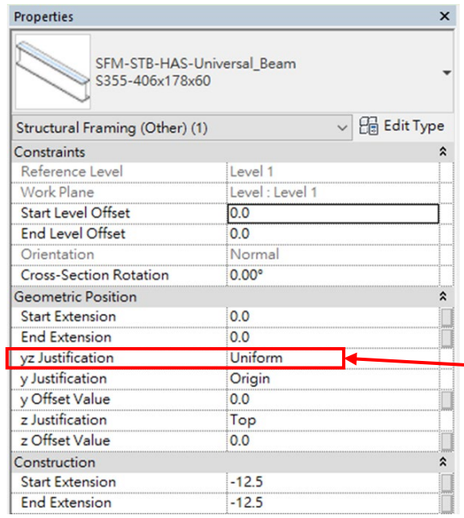
Setting of creating a Steel Beam

All Beams shall be modelled as Structure > (Beam)



Place a Steel Beam

In general, Centre shall be selected in “y Justification”; Top shall be selected in “z Justification”.



Select “Top” for “Z Justification”

Beam offset value shall be entered in “Start Level Offset” and “End Level Offset”. If the steel beam supports structural slab, the offset value should be minus

ELS, Wailing, Main Strut, Sub Strut, Short Strut shall be modelled by Steel Beam.

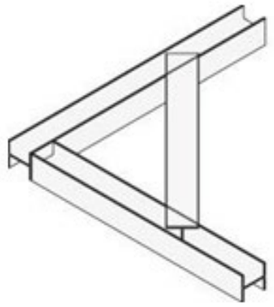
For some Cases of wailings, steel beams shall be modelled by 90 degrees rotate using “Cross-Section Rotation”.

Steel Beam Join and Cut

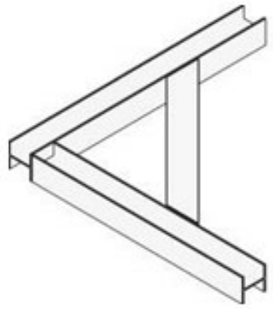
All Steel Beams intersection points shall be adjusted by “Start Join Cutback”/ “End Join Cutback”

And then it shall be joined as Modify > Cope > (Apply Coping).

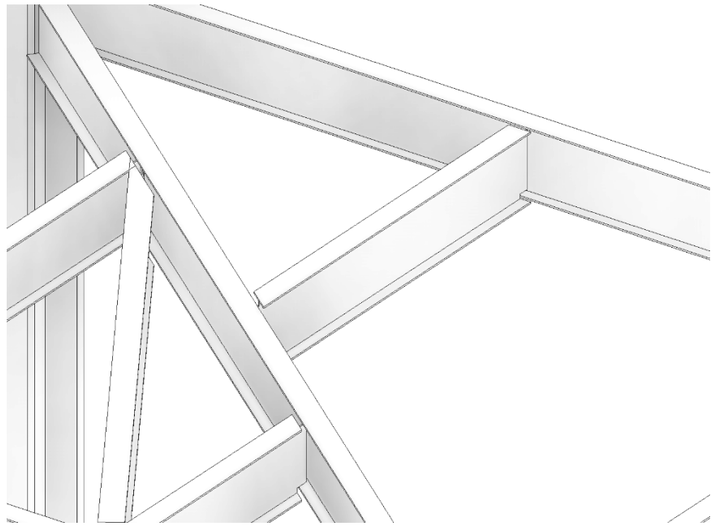
Steel beam shall be entering to 0 by “Coping Distance”.



Wrong



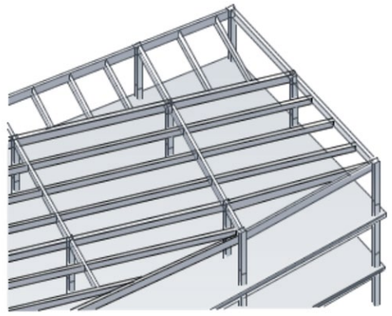
Correct



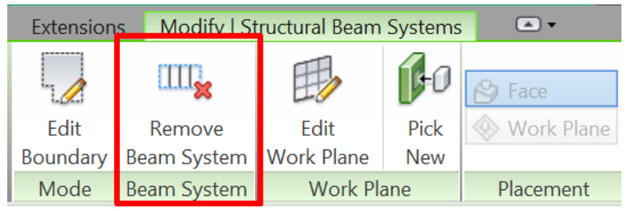
Beam System

The Beam System in model shall be created when secondary beams with similar sizes are required. Use beam system tools to add a single structural framing element that contains a series of individual beams placed in parallel to a building model.

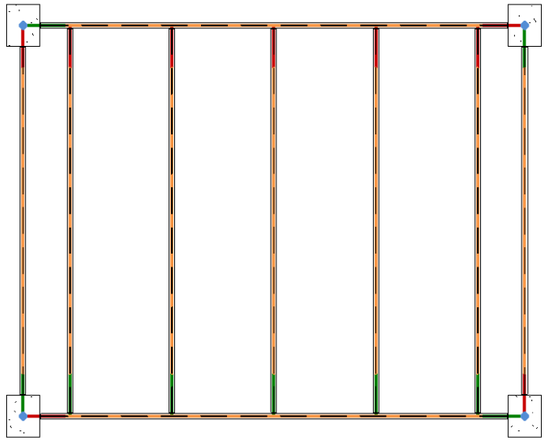
Structure tab ➤ Structure panel ➤ (Beam System)



To adjust the spacing of individual beams in the system, please remove the beam system first.

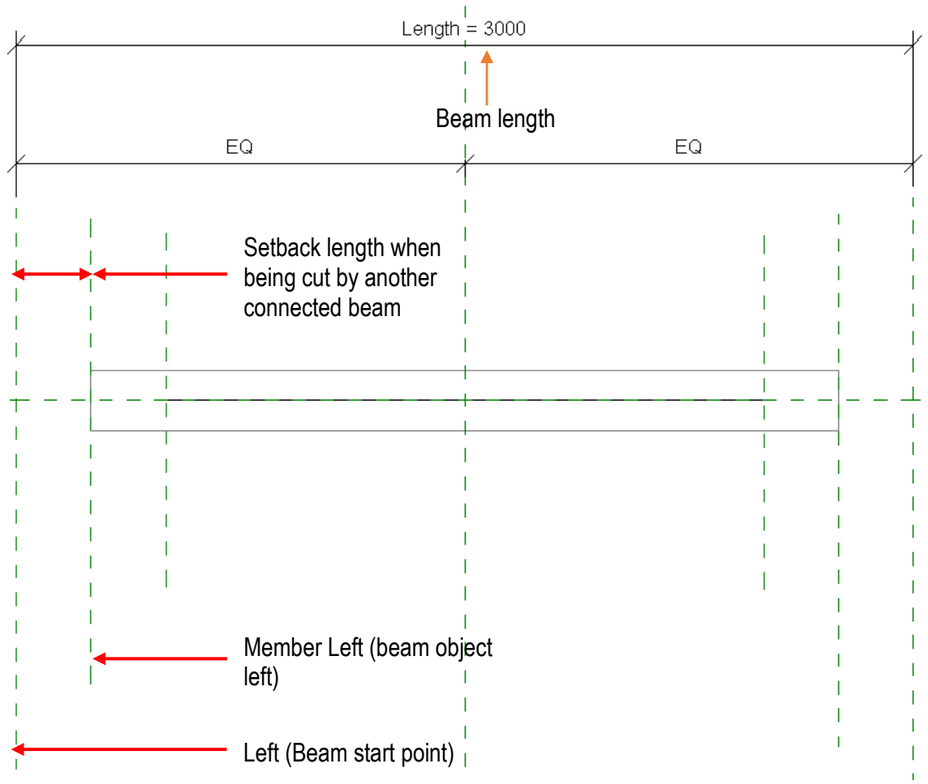


Please make sure the analytical links are in place while moving the beams.

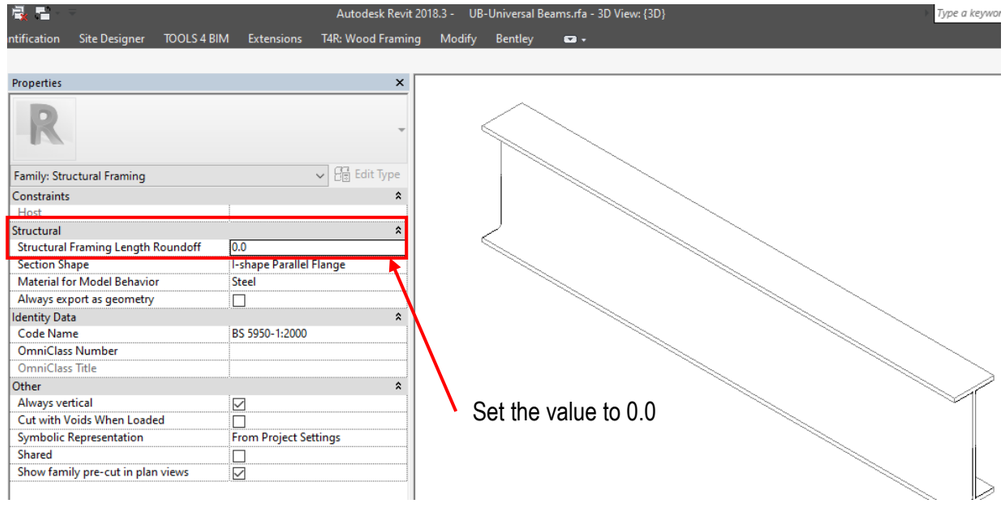


Steel Beam Family:

In the structural framing template, Revit default the beam have distance to beam length because it can auto setback to join another beam

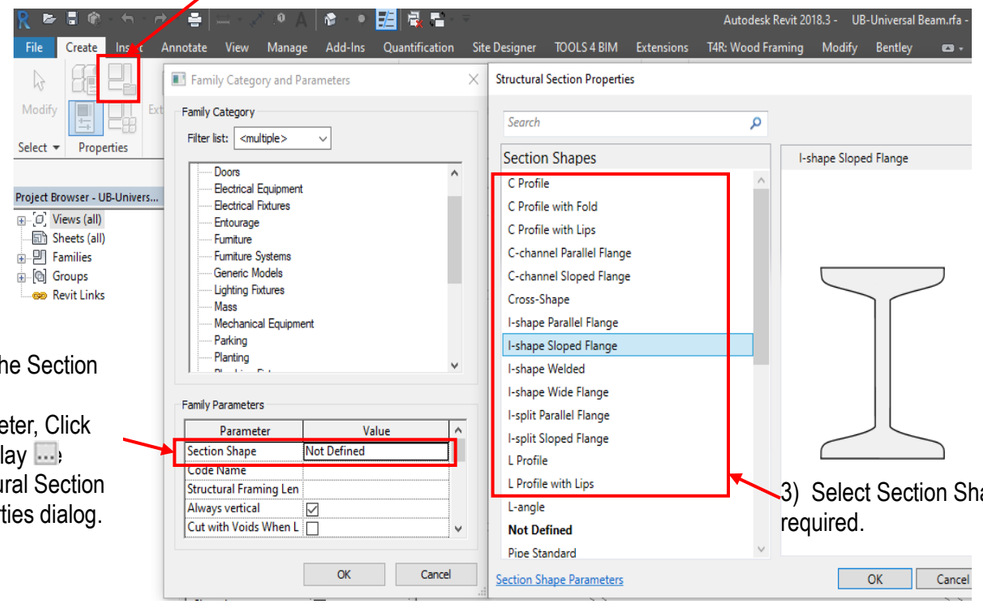


In Structural Framing family parameters, the structural framing length round off is defaults 1mm, please change to 0.0mm.



Section shape parameters provide additional dimensions and structural properties with which you can implement external analysis and code checking applications. You can follow below steps to apply Section Shape Parameters to Framing Elements.

- Click Family Category and Parameters



2) In the Section Shape parameter, Click to display ... Structural Section Properties dialog.

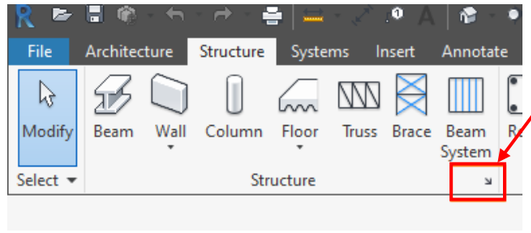
3) Select Section Shape as required.

By applying a section shape category to structural framing families, you can improve data integrity within BIM workflows and guarantee consistent parameters.

Section shapes and their resulting properties helps ensure accurate data exchange with structural analysis software, code checking, and steel detailing

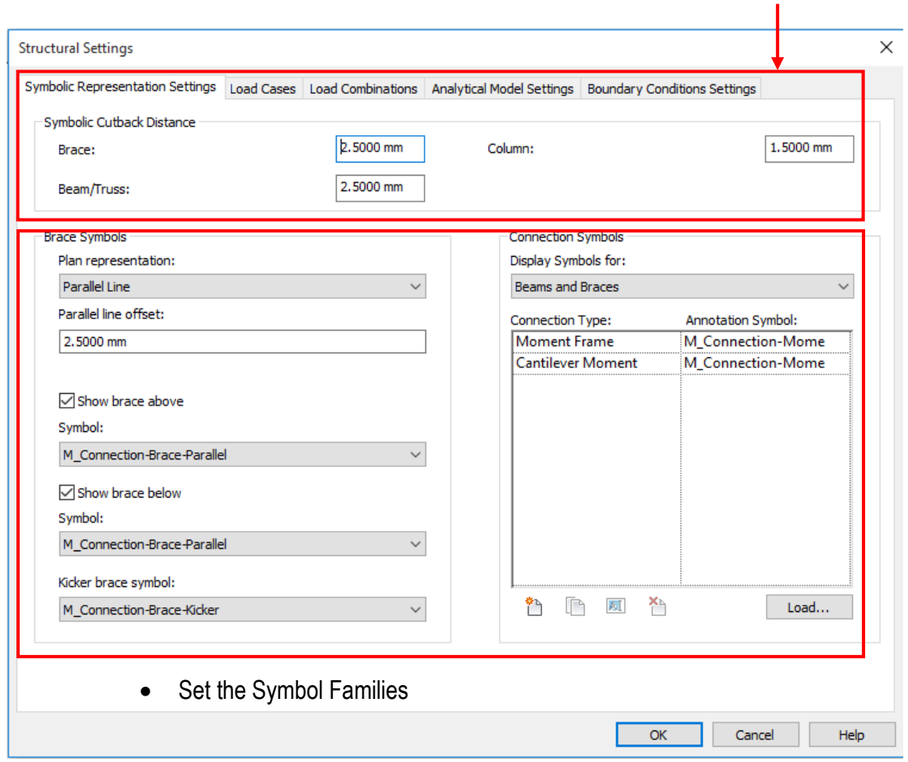
Beam connection symbol

The Connection Symbols is a kind of loadable family (Generic Annotations) which can be loaded to a project and can be applied to Annotation Symbol in Structural Setting dialog (please refer to above figure). In Detail level "Coarse", the beam has cutback distance of symbolic and the distance can change in structural settings



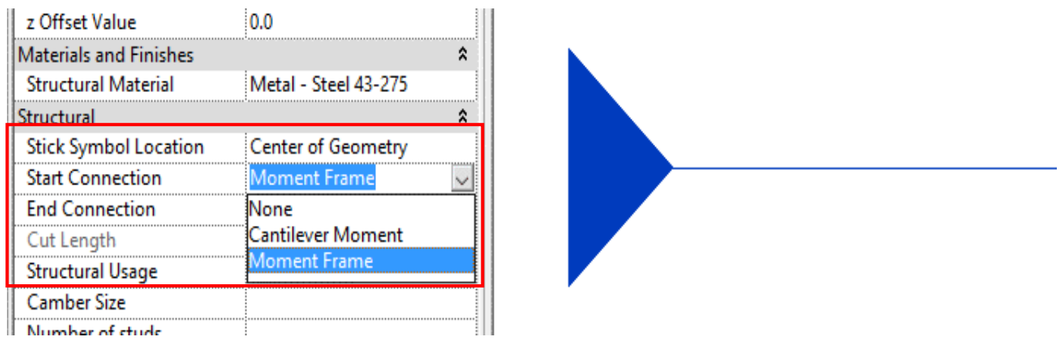
A) Click to open the Structural Settings dialog.

B) Set the Symbolic Cutback Distance.



- Set the Symbol Families

Beam connection symbols can be edited in the Properties palette, under Structural > Start Connection/ End Connection, after selecting the symbol families, click Apply to update the display of beam connections in the plan view.



DS-U 10 Steel Truss

Discipline	Structural
Family	Loadable Family
Family Category	Structural Framing
Workset	Individual Levels
Family Naming Convention	STR-<Functional Type>-HAS-<Style>-Descriptor
Type Naming Convention	<Structural material>-<Structural Framing Type>

Naming Example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Style**		**Descriptor**		**Structural material**		**Section shape Size**
STR	-	BLT	-	HAS	-	Cambered	-	N/A		S355	-	305x165x40

Functional type example

Functional type	**Description**
STR	Structural Trusses
BLT	Baltimore Truss
BWT	Bowstring Truss
BXT	Box Truss
FNT	Fan Truss
FKT	Fink Truss
HWT	Howe Truss
KTR	K Truss
PKT	Parker Truss
PTT	Pratt Truss
SCT	Scissor Truss
SWT	Sawtooth Truss
WRT	Warren Truss

Truss style example

Truss style	**Description**
Cambered	Cambered
Subdivided	Subdivided

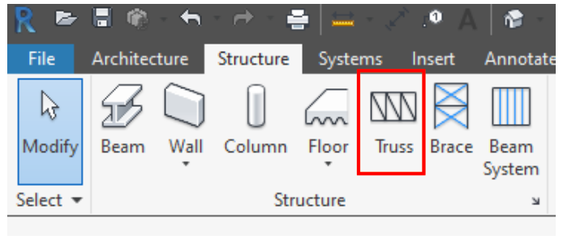
Information Requirement

List of built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	S355-305x165x40
Reference Level	Truss constraining level.	Reference Level is a read-only value when it is the same as the Work Plan on which the beam is placed.	L1, L2,.....
Start Level Offset	Truss start point level offset	The distance of beam start point form the reference level	-100mm, 0.0mm, 150mm, 200mm, 250mm,.....
End Level Offset	Truss end point level offset	The distance of the beam endpoint from the reference level.	-100mm, 0.0mm, 150mm, 200mm, 250mm,.....
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	S355,.....
Mark	Truss mark	This parameter was added to beam tag families to annotate beams. This value must be unique for each element in a project.	TRS01, TRS02...

Model Authoring

Truss model can be created by using Truss command under Structure > Structure > Truss.



All types within a truss family share the same profile layout. Individual types specify other parameters such as the structural framing families used for modelling chords and web members. Placed them on the layout lines specified for the selected family.

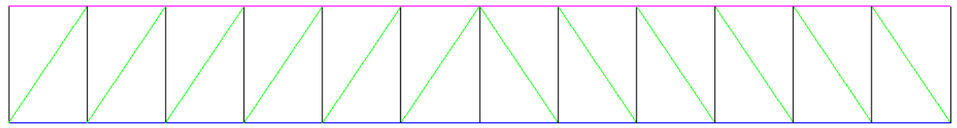
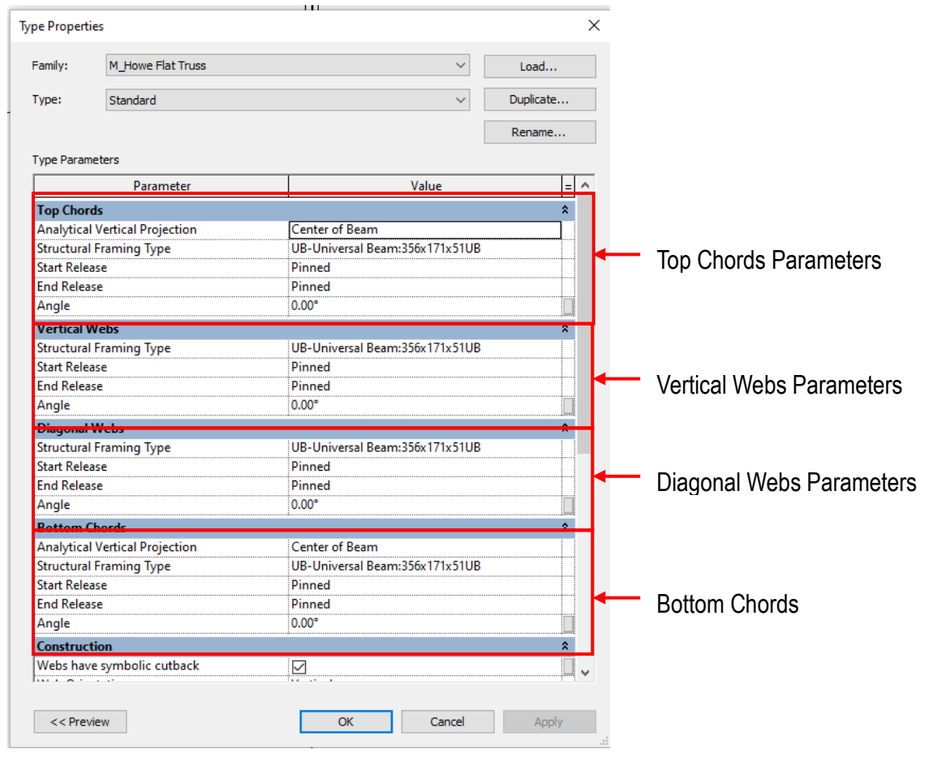


Figure 4-6 Truss profile layout



D4.5 Structure – Foundation SAM

This section of SAM involves structural elements of foundation only, for superstructure elements and lateral support elements, please refer to **D4.4** and **D4.6**. Autodesk Revit has been the modelling tools throughout this document. It is assumed that users shall possess structural engineering knowledge and basic Revit modelling skill when using this guide.

It is advisable that all structural models shall be created using of HA SE Revit template, HA SE Revit families/component library and HA SE shared parameters files developed by this SAM. These files are saved in HA ProjectWise library folder. For detailed ProjectWise link of the library folder, please refer to **D4.4**.

The standard in-house workflow, i.e. BIM-enabled Systematic Approach to Foundation Design (BIM-SAFD), to model the foundation BIM model are as follows:

1. Provide locations of pile centres with true coordinates.

2. Generate more 24 nodes around perimeter of pile shaft and 24 nodes around perimeter of bellout, if any. From these 49 nodes to

   - Determine the lowest inferred rockhead at pile shaft (vertical and raking);
   - Assess the steep bedrock effect on each pile;
   - Evaluate and summarize the pile stepping effects.

4. Provide pile capacity utilization by Revit.

5. Import borehole logs and inferred bedrock surface to foundation BIM model by use of site investigation data in form of AGS data format and surface map of bedrock in form of Grid file of "Surfer" from PGE respectively.

6. Use Revit to provide section cut for submission

A foundation report shall be approved before the foundation BIM model is ready for interdisciplinary coordination and statutory submission.

The BIM-SAFD foundation report template could be retrieved from below locations at HOMES:

Knowledge Management > Structural Engineering > H. BIM > "BIM SAFD User Guide - Volume 1 &2"

DS-F 01 Structural Foundation General Approach

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundation
Workset	Individual Levels
Family Naming Convention	SFD-<Functional Type>-HAS-<Descriptor 1 >-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Dimension>

Naming example

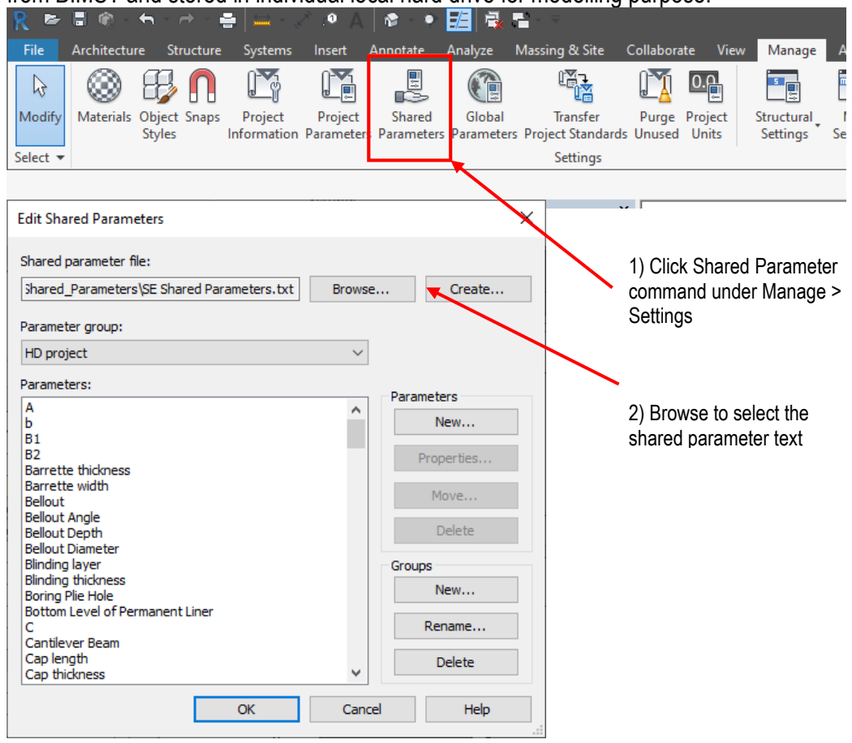
Refer to **DS-F 02** to **DS-F 09**.

Functional type example

Functional type	Description
DWL	Diaphragm wall, retaining wall
ELS	Excavation and lateral support
FBM	Foundation beam
FCA	Foundation cap
FDF	Foundation footing
FPL	Foundation pile

Structural elements in Revit family category

- Unless otherwise specified, all pile caps and footings should be modelled using "Foundation Slab" under "Structural Foundation" category with appropriate Type Naming.
- The embedment length shall be assigned with a parameter labelled “Embedment Length”. The pile founding level shall be defined as the lowest level of the pile.
- All splicing details, reinforcement and other steel tubes in bored piles, as well as other associated temporary works shall be excluded from the Revit family models. However, steel bars in mini-pile are to be included in the family model.
- All parameters defined in the foundation families shall be of shared parameters. The parameters used in the project Revit Structure model shall be linked up with these shared parameters so as to enable the generation of schedules.
- These shared parameters are stored in the text file name: SE Shared Parameters.txt which can be obtained from BIMST and stored in individual local hard drive for modelling purpose.



1) Click Shared Parameter command under Manage > Settings

2) Browse to select the shared parameter text

Note on Reinforcement:

To optimize the Revit model’s file size, shear bars and couplers in all reinforced concrete foundation elements normally will NOT be included in the Revit Structure model. It shall be described by text or drawn in 2D drafting view in case needed.

Materials

All foundation elements shall be assigned with the designed construction material (i.e. concrete for reinforced concrete structure, grade of structural steel and reinforcement for steel H-pile and mini-piles respectively). The material applied shall be customized with appropriate mechanical properties to the prevailing Codes of Practice. All materials used shall be named accordingly for easy reference. Refer to **D.MET-3.2** (e) Material Naming in this Guide.

Concrete grade should be stated in the built-in parameter "Structural material". If only the concrete grade (e.g. 45D/20) is stated without the specific concrete type (e.g. Mass Fill), the material stated shall mean reinforced concrete. Otherwise, in addition to the concrete grade, the specific concrete type shall also be stated (e.g. 30D/20_Mass Fill)

In case new foundation families are to be included in the HA BIM Family/Component Library, they shall be accompanied with explanatory notes. These notes shall include:

- The family category;
- Description of its application;
- Components included and method of modelling;
- Meaning of each parameter assigned;
- Scope and steps of application;
- Limitations and points to note; and
- Ways to extract data for material QTO.

Ground condition, geological profile and site formation

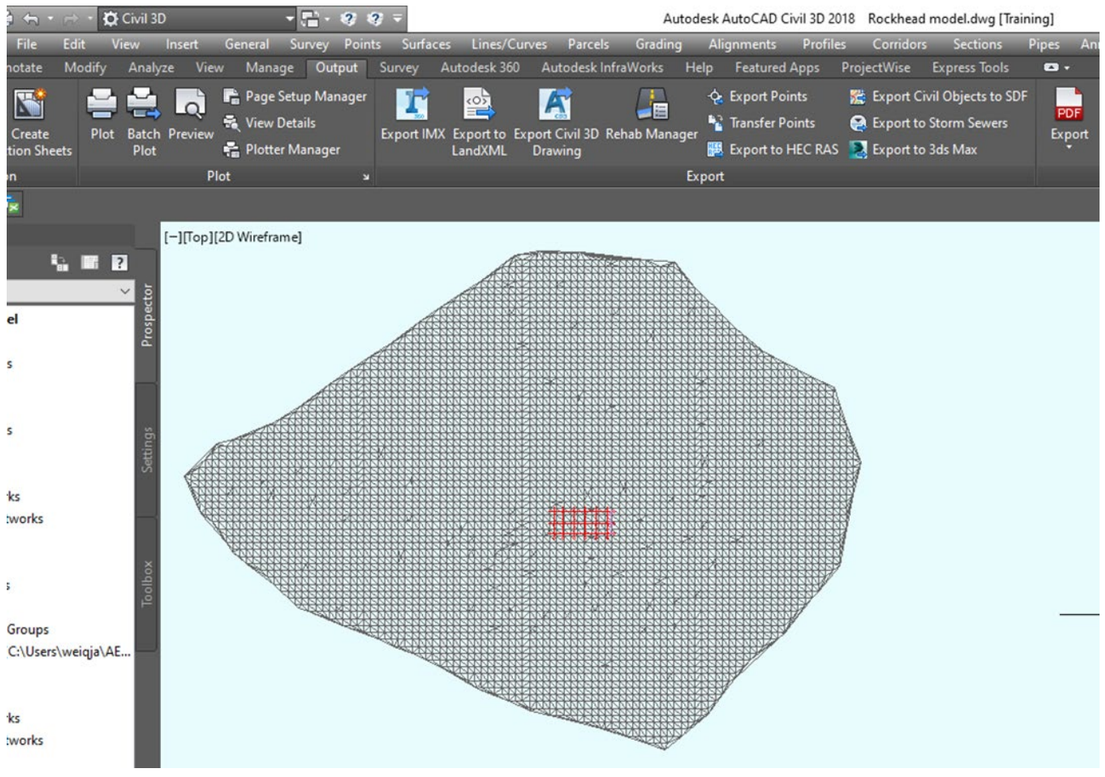
The GE Section uses Civil 3D as the authoring tool to create the models of existing topography, ground condition, geological profile and site formation. For related workflow and detailed SAM, please refer to Quick Guide Level 3 **Q3-02.5** and **D4.14 Geotechnical Engineering SAM**. These models can be exported to Revit for subsequent design of foundation and earth retaining structures.

Key steps for importing Civil 3D model into Revit are described with rockhead model as sample below.

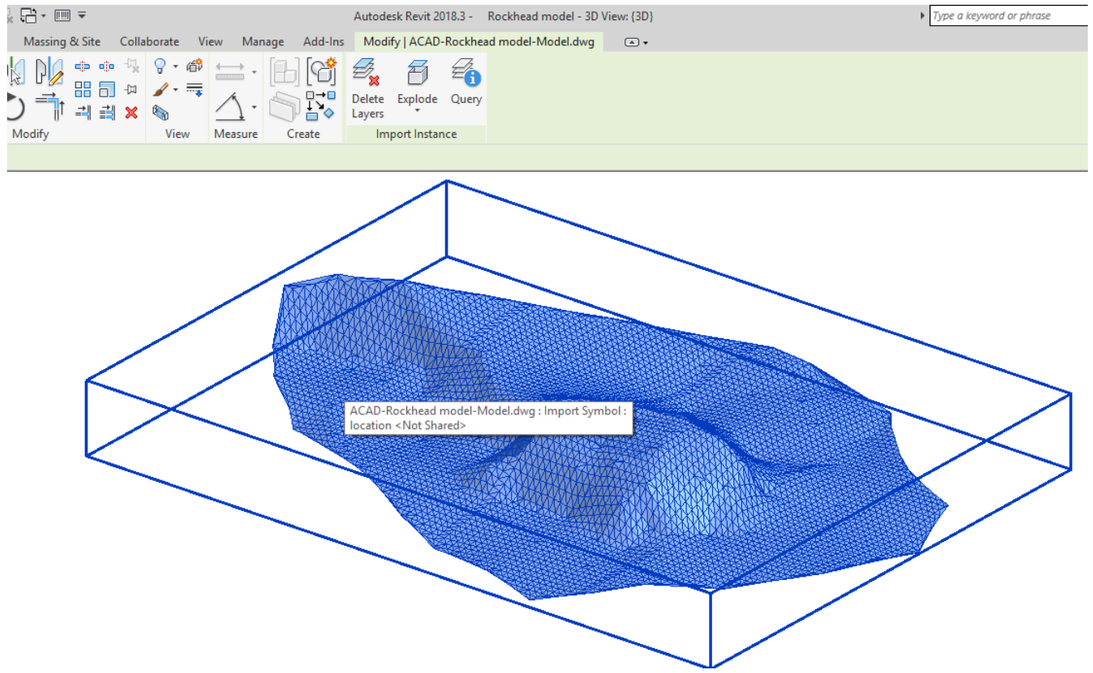
SE could obtain the Grid file (*.grd) and Surfer file (*.srf) or in other compatible file formats, that containing the topography of founding stratum, from GE to determine the founding level of piles by using BIM-SAFD approach.

Project teams could request HA's Land Surveying Unit (LSU) for assistance if they consider 3D models of ground features or terrains are necessary in addition to the 3D topographic survey plans.

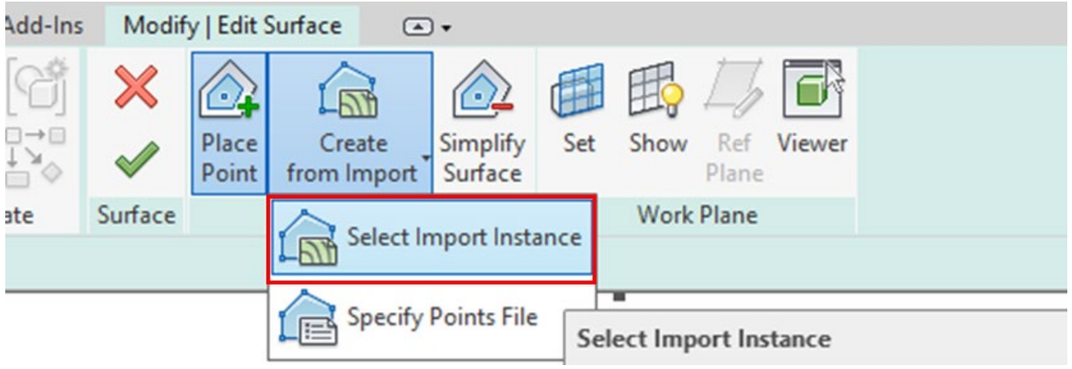
Step 1. Export Civil 3D rockhead model to dwg as triangle form.



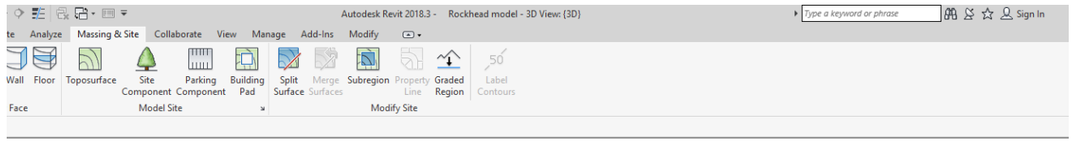
Step 2. Insert the CAD file of rockhead to Revit in correct location

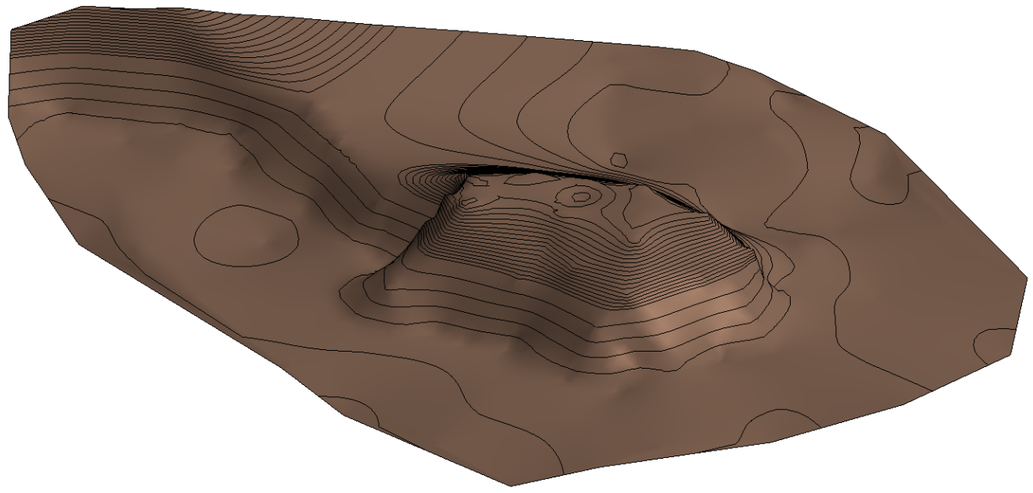


Step 3. Create a topography model for rockhead in Revit by using “Create from Import > Select Import Instance” command.



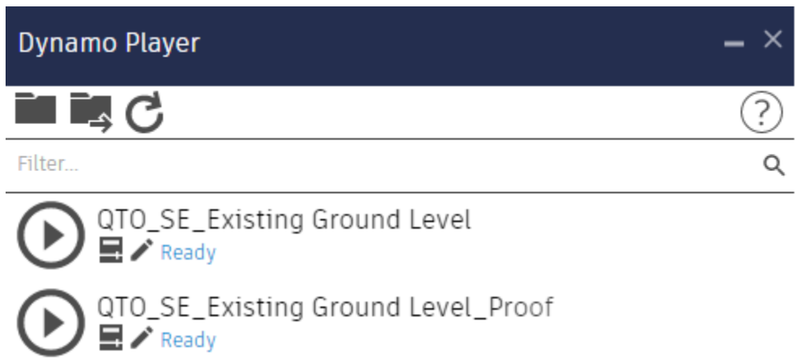
Step 4. Select the imported rockhead dwg model and the topography model for rockhead is created as below.



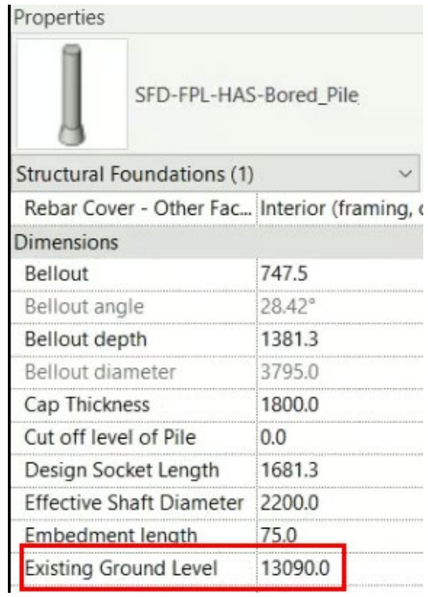


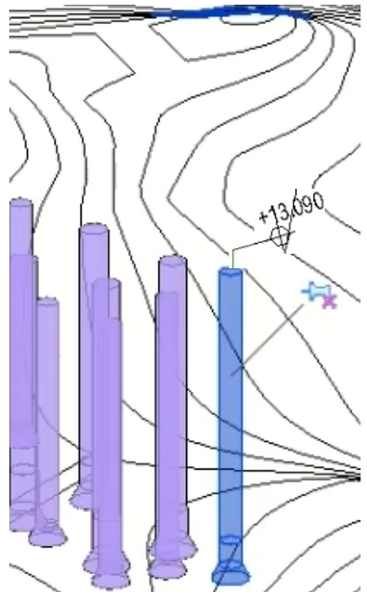
Same approach as above can also be applied for exporting ground condition model or site formation model from Civil 3D to Revit.

After updating the toposurface and pile layout, the level of point of entry into ground for each pile may vary. Users are required to specify the level in "Existing Ground Level" parameter for each pile for pile schedules before exporting the drawings. However, users could specify the information manually, or by some automated Dynamo scripts prepared as illustrated in below figure to ensure the accuary and reduce the human effort.



Dynamo Player Interface

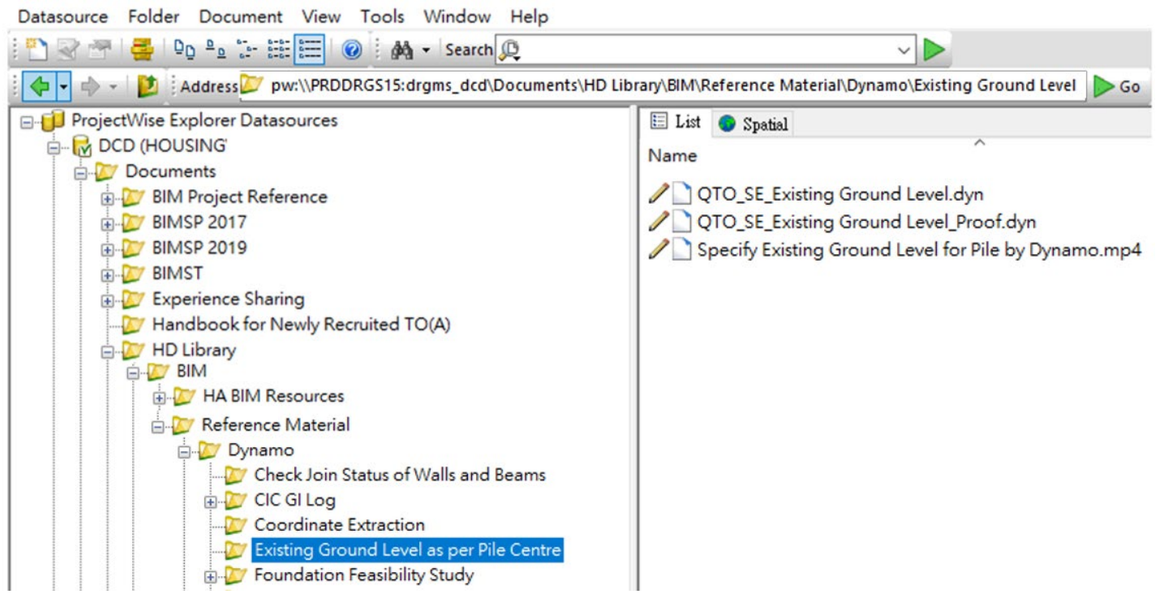




Specifying "Existing Ground Level" for the piles

The Dynamo scripts and guidance video could be retrieved from below location at ProjectWise:

pw:\\PRDDRGS15:drgms_dcd\Documents\HD Library\BIM\Reference Material\Dynamo\Existing Ground Level as per Pile Centre\



Dynamo Materials for Specifying "Existing Ground Level" for the piles

DS-F 02 Bored Piles

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-FPL-HAS-<Descriptor 1 (Bored_Pile)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Diameter>

Naming example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Bored pile)**		**Descriptor 2 (Optional)**		**Structural material**		**Diameter (mm)**
SFD	-	FPL	-	HAS	-	Bored_Pile	-	<Not used>		30D/20	-	3000

Information Requirement

List of built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	30D/20-2500
Level	Bored pile reference level	The level to which the bored pile is constrained.	Foundation Level
Height Offset From Level	Bored pile offset level	Specifies the offset distance between top of the bored pile and the level.	-100mm, -200mm, -250mm,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	25D/20, 30D/20, 40D/20
Mark	Bored pile mark	This parameter was added to HA tag families to annotate the bored pile. This value must be unique for each element in a project.	BP01, BP02…

List of Shared Parameter

Please follow the list of shared parameters below. Value of these parameters should be input correctly such that related information can be retrieved for the use by other model users.

R	Parameter name	Information	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
	Information of level						
✓	Existing Ground Level	Level of point of entry into ground for boring pile	Manual / **Auto-Calculated by Dynamo**	Common	Length	Dimensions	Instance
	Cut-off Level	Specified level for cutting the pile	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Tentative Founding Level	Bottom level of pile	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Inferred Bedrock Level	Level of point of reach the rock mass of specified grade	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Inferred Completely Decomposed Rock Level		**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Pile cap information						
✓	Top Level of Pile Cap	Associated pile cap's top level	Manual	Common	Length	Dimensions	Instance
✓	Pile Cap Thickness	Associated pile cap thickness	Manual	Common	Length	Dimensions	Instance
✓	Pile_Pile Cap Mark	Associated pile cap mark	Manual	Common	Text	Identity Data	Instance
	Pile dimension information						
✓	Embedment Length	Length of pile embedded into pile cap	Manual	Common	Length	Dimensions	Instance
✓	Pile Length in Soil	Length of pile in soil	Manual	Common	Length	Dimensions	Instance
✓	Pile Length in Completely Decomposed Rock	Length of pile in Completely Decomposed Rock	Manual	Common	Length	Dimensions	Instance
✓	Design Socket Length	Length between inferred bedrock level and tentative founding level	Manual	Common	Length	Dimensions	Instance

R	Parameter name	Information	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
	Net Length of Pile	Length between cut-off level of pile and tentative founding level	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	Effective Shaft Diameter	Effective shaft diameter	Manual	Common	Length	Dimensions	Instance
	Shaft Length in Rock Socket	Shaft length in rock socket	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Effective Shaft Diameter in Rock Socket	Effective shaft diameter in rock socket	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	Diff btw Effective Shaft Diameter_Rock Socket	Difference between effective Shaft diameter and effective Shaft diameter in rock socket	Manual	Common	Length	Dimensions	Instance
	Information of bellout						
✓	Pile with Bellout	Select to indicate it is “a pile with bellout”	Manual	Common	Yes/No	Visibility	Instance
✓	Bellout Size	Size of bellout	Manual	Common	Length	Dimensions	Instance
	Bellout Angle	Angle of bellout	**Auto-Calculated by formula**	Common	Angle	Dimensions	Instance
	Bellout Diameter	Maximum diameter of bellout shape enlarged base	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	Bellout Depth	Depth of bellout	Manual	Common	Length	Dimensions	Instance
	Information of permanent steel lining						
	Permanent Steel Lining Diameter	Permanent steel lining diameter	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Permanent Steel Lining Length	Length of permanent steel lining	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	Thickness of Permanent Steel Lining	Thickness of permanent steel lining	Manual	Common	Length	Dimensions	Instance
✓	Embedded Length of Permanent Steel Lining in CDR	Minimum distance between Inferred Completely Decomposed Rock level and tentative bottom level of permanent steel lining (Usually Min. =1000mm)	Manual	Common	Length	Dimensions	Instance
	Tentative Bottom Level of Permanent Steel Lining	Bottom level of Permanent Steel Lining	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Materials_Steel Lining	Material of Steel Lining	Manual	Common	Material	Materials and Finishes	Type
	Information of sleeving						
✓	Pile with Sleeving	Select to indicate whether “Sleeving” is included	Manual	Common	Yes/No	Visibility	Instance
	Pile Sleeving Length	Length of the outer steel lining of permanent double walled steel lining	Manual	Common	Length	Dimensions	Instance
✓	Thickness of Double Walled Steel Lining Sleeving	Thickness of the outer steel lining of permanent double walled steel lining	Manual	Common	Length	Dimensions	Instance
	Pile Sleeving Outer Diameter	Pile Sleeving Outer Diameter	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Termination Level of Sleeving	Bottom level of Sleeving	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Material_Pile Sleeving	Material of Pile Sleeving	Manual	Common	Material	Materials and Finishes	Type
	Information for pile schedule						
	Outer Layer Vertical Reinforcement		Manual	Common	Text	Text	Instance
	Second Layer Binder		Manual	Common	Text	Text	Instance
	Inner Layer Vertical Reinforcement		Manual	Common	Text	Text	Instance
	First Layer Binder		Manual	Common	Text	Text	Instance
	Borehole Mark		Manual	Common	Text	Text	Instance

	Information for QTO					
	Boring Pile Hole	**Auto-Calculated by formula**	Common	Length	General	Instance
	Single Walled Steel Lining	**Auto-Calculated by formula**	Common	Length	General	Instance
	Coring Before Commencement	**Auto-Calculated by formula**	Common	Length	General	Instance

Remarks: SE and modellers could control the families using the parameters with ✓ in column **R**.

Please follow the list of family parameters below. Value of these parameters shall be input correctly such that related setting can be applied to facilitate the 2D pile presentation:

Parameter name	**Remark**	**Discipline**	**Type of Parameter**	**Group parameter under**	**Type/ Instance**
Information for drawing presentation					
Symbol Diameter	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
Symbol_Fill Pattern	Manual	Common	Yes/No	Other	Instance
Symbol_line hidden	Manual	Common	Yes/No	Other	Instance
Symbol_line	Manual	Common	Yes/No	Other	Instance
Visible_Rigid Insulation	Manual	Common	Yes/No	Other	Instance
Visible_Bellout	Manual	Common	Yes/No	Other	Instance
Visible_Brick	Manual	Common	Yes/No	Other	Instance
Visible_Concrete	Manual	Common	Yes/No	Other	Instance
Visible_Bellout_Hidden	Manual	Common	Yes/No	Other	Instance

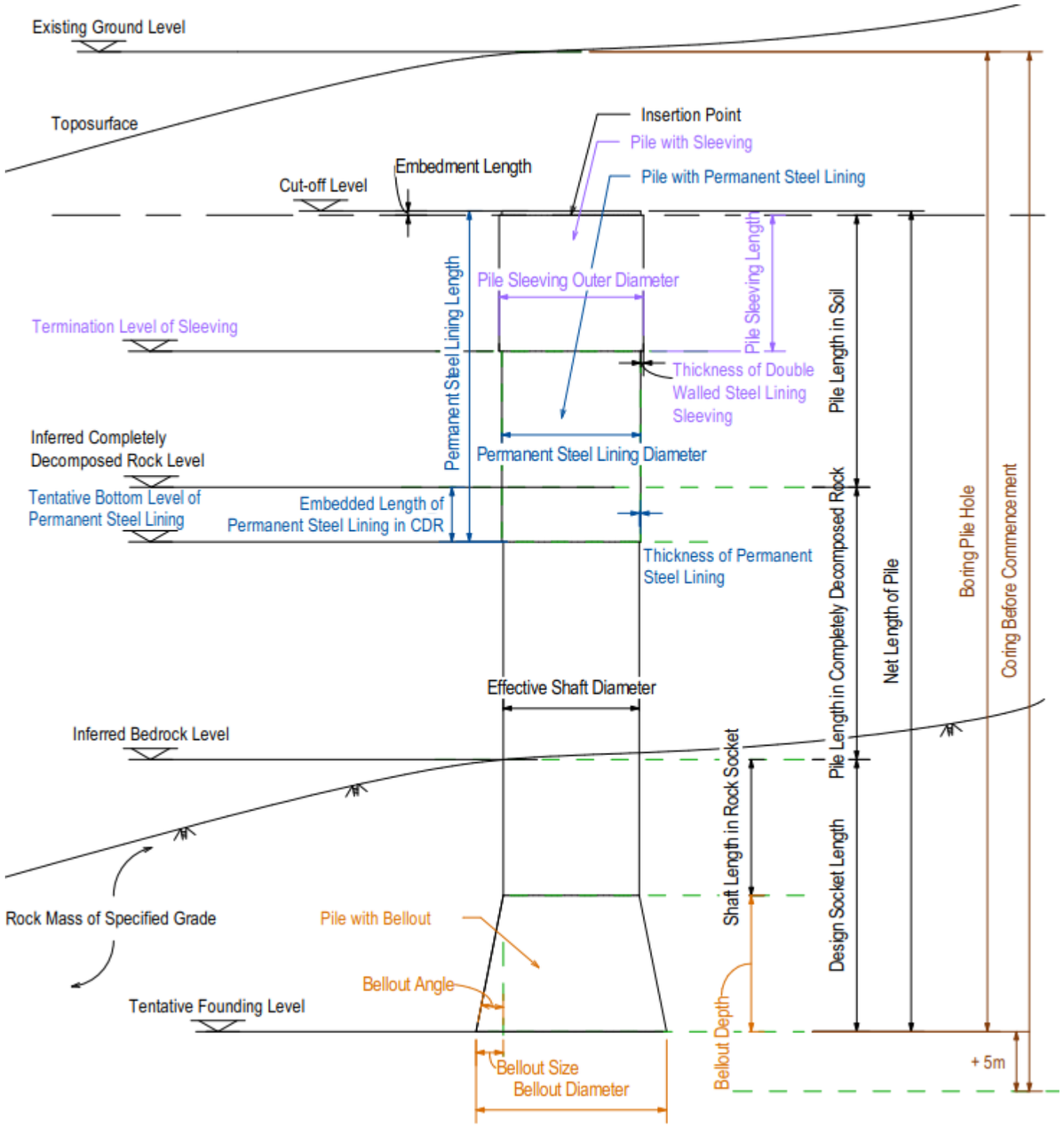
Auto-calculated Parameters

For the Bored Pile family in HA Family Library, the parameters are automatically calculated based on the input values of parameters in the tables above with equation formula as shown below. Please do not remove or modify the setting of these parameters or its equation formula.

Inferred Bedrock Level (default)	-10000.0 mm	= [Cut-off Level] - Embedment Length - Pile Length in Soil - Pile Length in Completely Decomposed Rock
Inferred Completely Decomposed Rock Level (default)	-5000.0 mm	= [Cut-off Level] - Embedment Length - Pile Length in Soil
Length		=
Net Length of Pile (default)	15075.0 mm	= Embedment Length + Pile Length in Soil + Pile Length in Completely Decomposed Rock + Design Socket Length
Permanent Steel Lining Diameter (default)	2550.0 mm	= Effective Shaft Diameter + Thickness of Permanent Steel Lining
Permanent Steel Lining Length (default)	6075.0 mm	= Pile Length in Soil + Embedded Length of Permanent Steel Lining in CDR + Embedment Length
Pile Cap Thickness (default)	0.0 mm	=
Pile Length in Completely Decomposed Rock (default)	5000.0 mm	=
Pile Length in Soil (default)	5000.0 mm	=
Pile Sleeving Length (default)	2500.0 mm	=
Pile Sleeving Outer Diameter (default)	2650.0 mm	= Effective Shaft Diameter + Thickness of Double Walled Steel Lining Sleeving + Thickness of Permanent Steel Lining
Shaft Length in Rock Socket (default)	2500.0 mm	= Design Socket Length - if(Pile with Bellout, Bellout Depth, 0 mm)
Symbol Diameter (default)	3500.0 mm	= (Bellout Size * 2) + Effective Shaft Diameter
Tentative Bottom Level of Permanent Steel Lining (default)	-6075.0 mm	= [Cut-off Level] - Embedment Length - Permanent Steel Lining Length
Tentative Founding Level (default)	-15000.0 mm	= [Cut-off Level] - Embedment Length - Pile Length in Soil - Pile Length in Completely Decomposed Rock - Design Socket Length
Termination Level of Sleeving (default)	-2500.0 mm	= [Cut-off Level] - Embedment Length - Pile Sleeving Length
Thickness of Double Walled Steel Lining Sleeving (default)	100.0 mm	=
Thickness of Permanent Steel Lining (default)	50.0 mm	=
Top Level of Pile Cap (default)	0.0 mm	=
Width	0.0 mm	=
General		
Boring Pile Hole (default)	15000.0 mm	= Existing Ground Level - Tentative Founding Level
Coring Before Commencement (default)	20000.0 mm	= Existing Ground Level - Tentative Founding Level + 5000 mm
Single Walled Steel Lining (default)	0.0 mm	= if(Pile with Sleeving, Tentative Bottom Level of Permanent Steel Lining - Termination Level of Sleeving + Embedment Length, 0 mm)

Detailed formulae are documented in the pile family folder saved in HA Family Library. For ProjectWise Location of HA SE Revit Families, please refer to ANN-1.3. Modelling Resources > ANN-1.3b. HA Family library.

Below image illustrates the relationship between key parameters in Bored Pile Family and terminologies in HA Standard Drawing. For more details of the Standard Drawing used, please refer to the drawing *Typical Notes and Details for Large Diameter Bored Pile* of Drawing No. STD/LDBP/S/EG-001/H and STD/LDBP/S/EG-002/E.



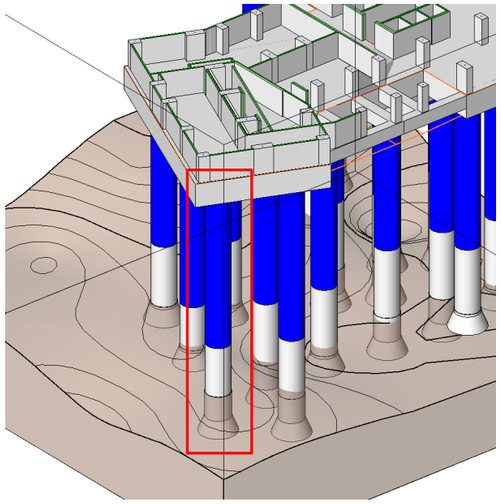
Remark: Parameter names in brown colour are the parameters for BIM QTO only and illustrated herein for SE information only.

Model Authoring

General requirements

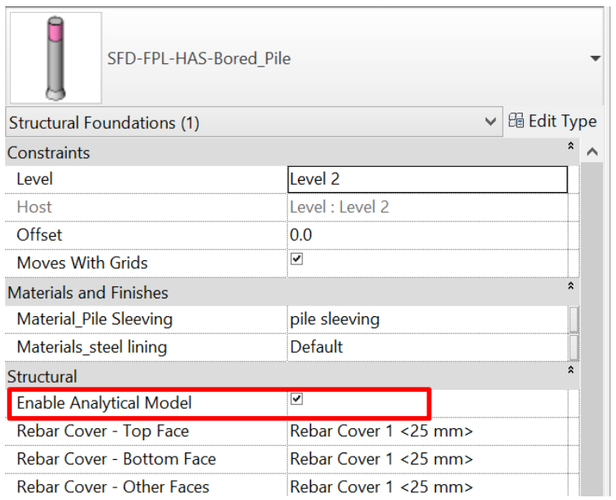
Parameters set in the Bored Pile Families

- e usually consists of temporary steel casing, concrete pile shafts, bellout, permanent g. Unless otherwise specified, the pile diameter shown shall be deemed as the effective shaft diameter".
- Temporary steel casings are NOT included in the bored pile families.



Analytical Links

When bored piles are involved in the analytical model of the building structure, their instance properties in the field of "Enable Analytical Model" shall be toggled.

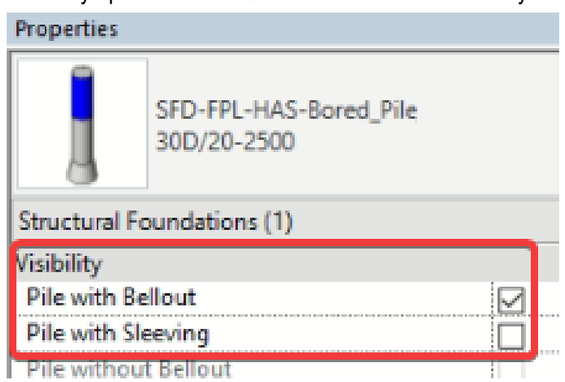


Visibility options for selecting bored pile families

The bored pile families provide visibilities options settings for the bell out and permanent steel lining as below: -

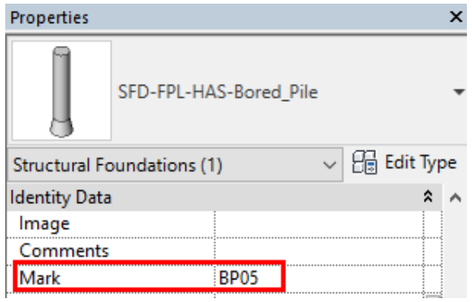
Scenario	Pile with bellout	Pile with sleeving	Model
Pile with steel lining	No	No	
Pile without bellout but with steel lining and sleeving	No	Yes	
Pile with steel lining, bellout but without sleeving	Yes	No	
Pile with steel lining, bellout and sleeving	Yes	Yes	

"Visibility options" for the Bored Pile should be correctly checked.



Mark

All bored pile families in the Project Revit Structure model shall be assigned with a unique pile mark for piling schedule generation. This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.



DS-F 03 Barrette Piles

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-<FPL>-HAS-<Descriptor 1(Barrette_pile)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Section shape size>

Naming example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Barrette pile)**		**Descriptor 2 (Optional)**	**Structural material**		**Size (mm x mm)**
SFD	-	FPL	-	HAS	-	Barrette_pile	-	N/A	40D/20	-	2800x800 (Width x Thickness)

Information Requirement

List of built-in Parameter

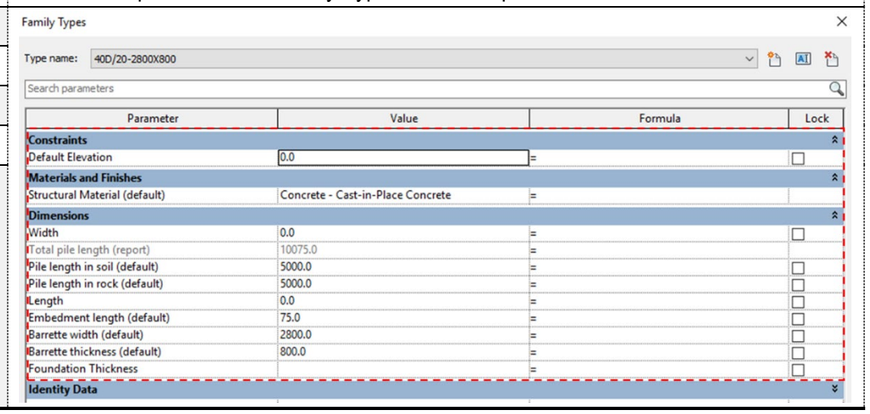
Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	40D/20-800x2800
Level	Barrette pile top level	The level to which the barrette pile is constrained	Foundation level
Height Offset From Level	Pile offset level	Specifies the offset distance between top of the barrette pile and the level	-100mm, -200mm, -250mm,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	35D/20, 40D/20, ……
Mark	Barrette pile mark	This parameter was added to HA tag families to annotate the barrette pile. This value must be unique for each element in a project.	BR01, BR02…

Other Parameters

Calculation of Pile Length:

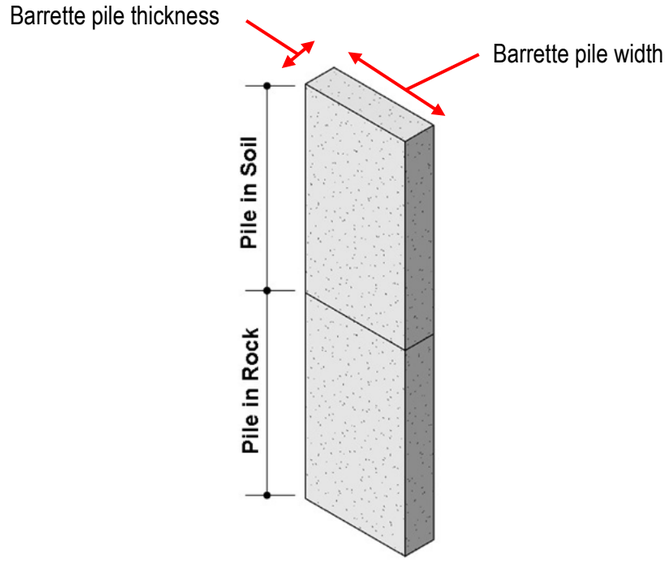
Pile Type	Total Pile Length
For Barrette pile	Embedment length + Pile length in soil + Pile length in rock + 300mm.

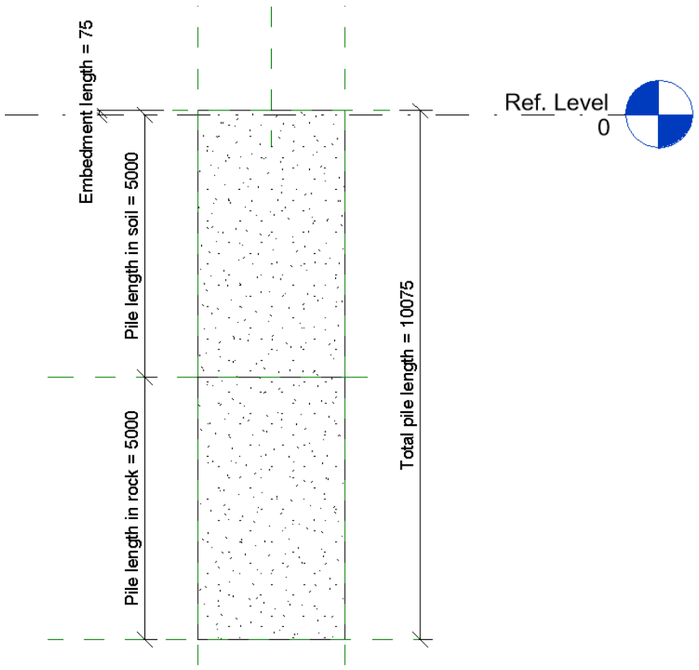
Parameters in barrette pile family

Barrette pile family	
Shared Parameters	Customized parameters in Family Type of Barrette piles
Barrette thickness	
Barrette width	
Pile length in soil	
Pile length in rock	
Embedment length	

Minimum socket length requirement as per Hong Kong Code of Practice for Foundations:

Piles Type	Requirements	Length of Pile Requirements
Barrette pile	Pile base is at least 300mm deep into bedrock	The length of pile shall be measured from the cut-off level down to the inferred lowest bedrock level plus the minimum rock socket length.

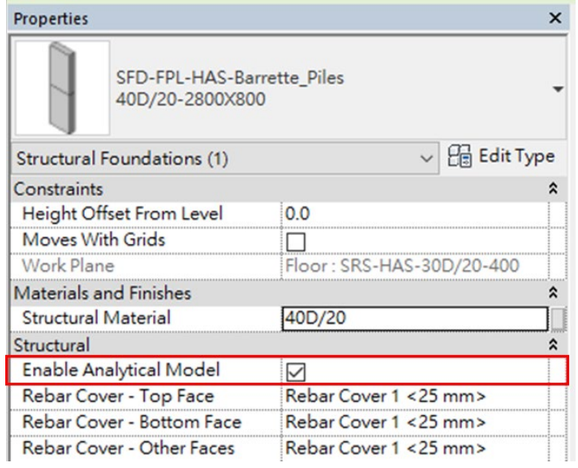




Model Authoring

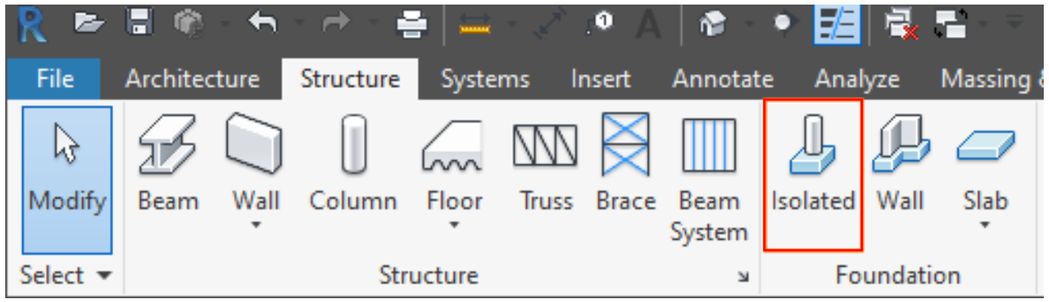
Analytical Links

When barrette piles are involved in the analytical model of the building structure, their instance properties in the field of “Enable Analytical Model” shall be toggled.

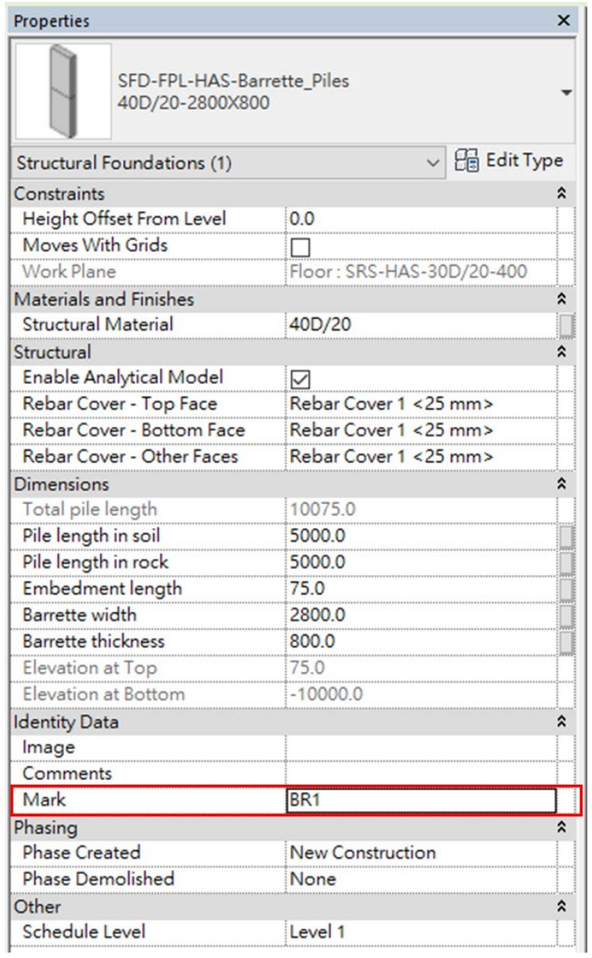


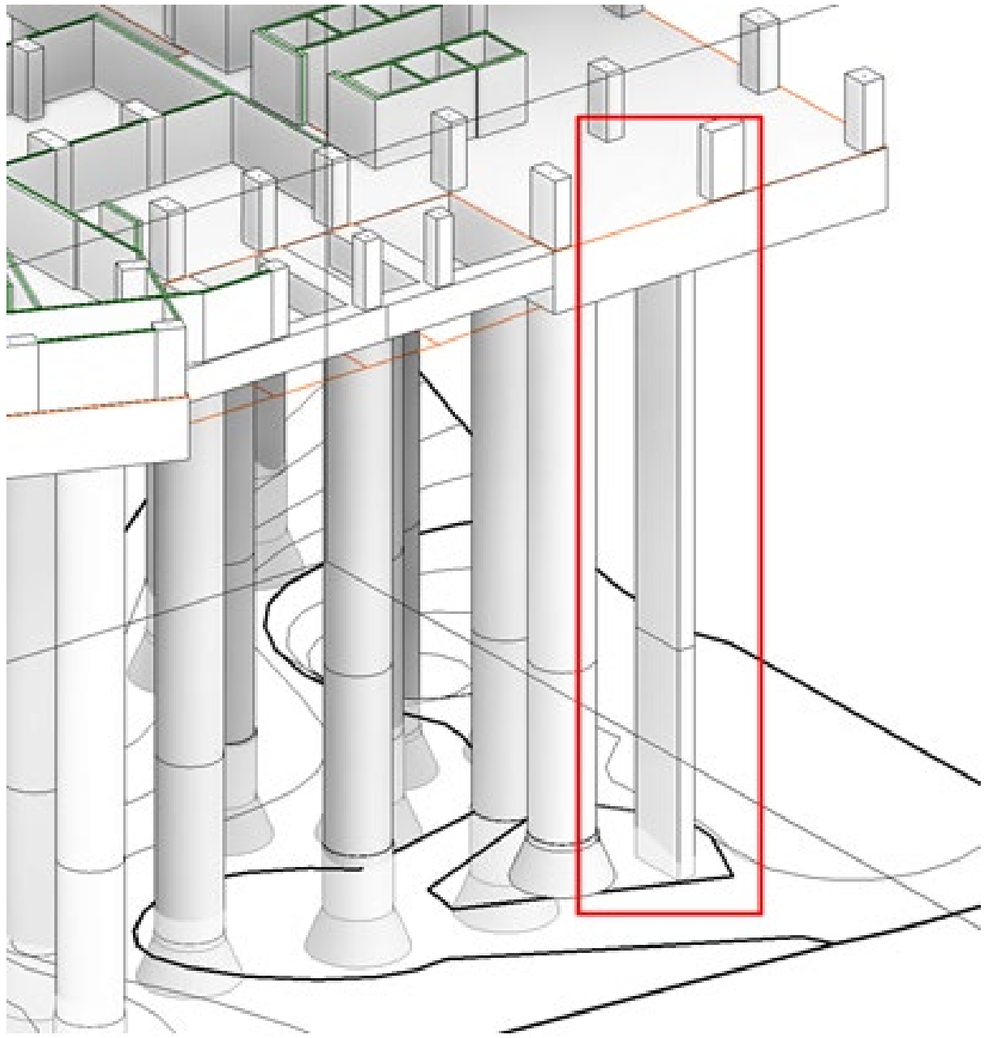
Place a barrette pile

A barrette pile will consist of a reinforced concrete shaft only. It can be created by using **Structural Foundation: Isolated** command as below image:



The barrette pile family in the Project Revit Structure model shall be assigned with a unique pile number for generation of pile schedule. This pile number can be input in the “Mark” field of “Identity Data” in the Properties Palette.





DS-F 04 Driven Steel H-Piles

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-FPL-HAS--<Descriptor 1 (Driven_H_pile)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Section Shape Size>

Example

Family name								**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Driven H-pile)**	**Descriptor 2 (Optional)**	**Structural material**		**Size (Depth x Width x Mass per meter)**
SFD	-	FPL	-	HAS	-	Driven_H_Pile	<Not used>	S275 / S355 / S450	-	305x305x223 UBP

Information Requirement

List of built-in Parameter

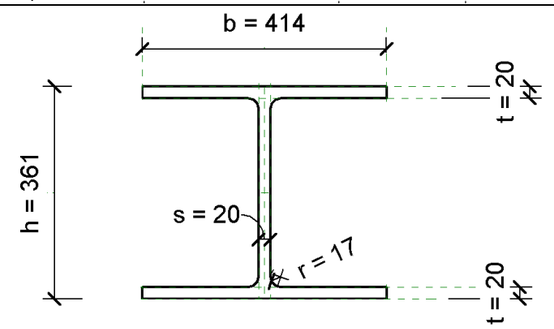
Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size.	S355-305x305x223 UBP
Level	Pile reference level	The level to which the pile is constrained.	Foundation level
Height Offset From Level	Pile offset level	Specifies the offset distance between top of the driven steel H-pile and the level.	-100mm, -200mm, -250mm,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	S275, S355, S450,……
Mark	Driven steel H-pile mark	This parameter was added to HA tag families to annotate the driven steel H-pile. This value must be unique for each element in a project.	HP01, HP02…

List of Shared Parameter

Please follow the list of shared parameters below. Value of these parameters should be input correctly such that related information can be retrieved for the use by other model users.

R	Parameter name	Information	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
	Information of level						
✓	Existing Ground Level	Level of point of entry into ground for driving pile	Manual / **Auto-Calculated by Dynamo**	Common	Length	Dimensions	Instance
	Cut-off Level	Specified level for cutting the pile	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Tentative Founding Level	Bottom level of pile	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	Inferred Bedrock Level *	Level of point of reach grade III or better rock with total core recovery of more than 85%	Manual	Common	Length	Dimensions	Instance
	Pile dimension information						
✓	Embedment Length	Length between cut-off level of H-pile and bottom level of cap	Manual	Common	Length	Dimensions	Instance
✓	Pile Length	Length between bottom level of cap and tentative founding level	Manual	Common	Length	Dimensions	Instance
	Net Length of Pile	Length between cut-off level and tentative founding level	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	H-Pile Size	Size of steel H-pile	Manual	Common	Text	Dimensions	Type
	Pile cap information						
✓	Top Level of Pile Cap	Associated pile cap's top level	Manual	Common	Length	Dimensions	Instance
✓	Pile Cap Thickness	Associated pile cap thickness	Manual	Common	Length	Dimensions	Instance
✓	Pile_Pile Cap Mark	Associated pile cap mark	Manual	Common	Text	Identity Data	Instance

R	Parameter name	Information	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
✓	b	Width for H-section in Driven Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type
✓	h	Height for H-section in Driven Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type
✓	t	Flange thickness for H-section in Driven Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type
✓	r	Turning radius for H-section in Driven Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type
✓	s	Web thickness for H-section in Driven Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type



Typical H-section in Driven Steel H-Pile

	Information of capping plate						
✓	Capping Plate Length	Length of capping plate to pile head	Manual	Common	Length	Dimensions	Instance
✓	Capping Plate Width	Width of capping plate to pile head	Manual	Common	Length	Dimensions	Instance
✓	Capping Plate Thickness	Thickness of capping plate to pile head	Manual	Common	Length	Dimensions	Instance
	Mild Steel Capping Plate	Volume of Capping Plate	**Auto-Calculated by formula**	Common	Volume	General	Instance

R	Parameter name	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
	Information for QTO					
	Drive Steel H-Pile	**Auto-Calculated by formula**	Common	Length	General	Instance
	Coring Before Commencement *	**Auto-Calculated by formula**	Common	Length	General	Instance
	Capping Plate to Pile Head	**Auto-Calculated by formula**	Structural	Mass	General	Instance

Remarks: The parameters with * apply to Driven Steel H-piles drive into bedrock only (Revit Family: SFD-FPL-HAS-Driven_H_Pile_Bedrock).

Remarks: SE and modellers could control the families using the parameters with ✓ in column **R**.

Auto-calculated Parameters

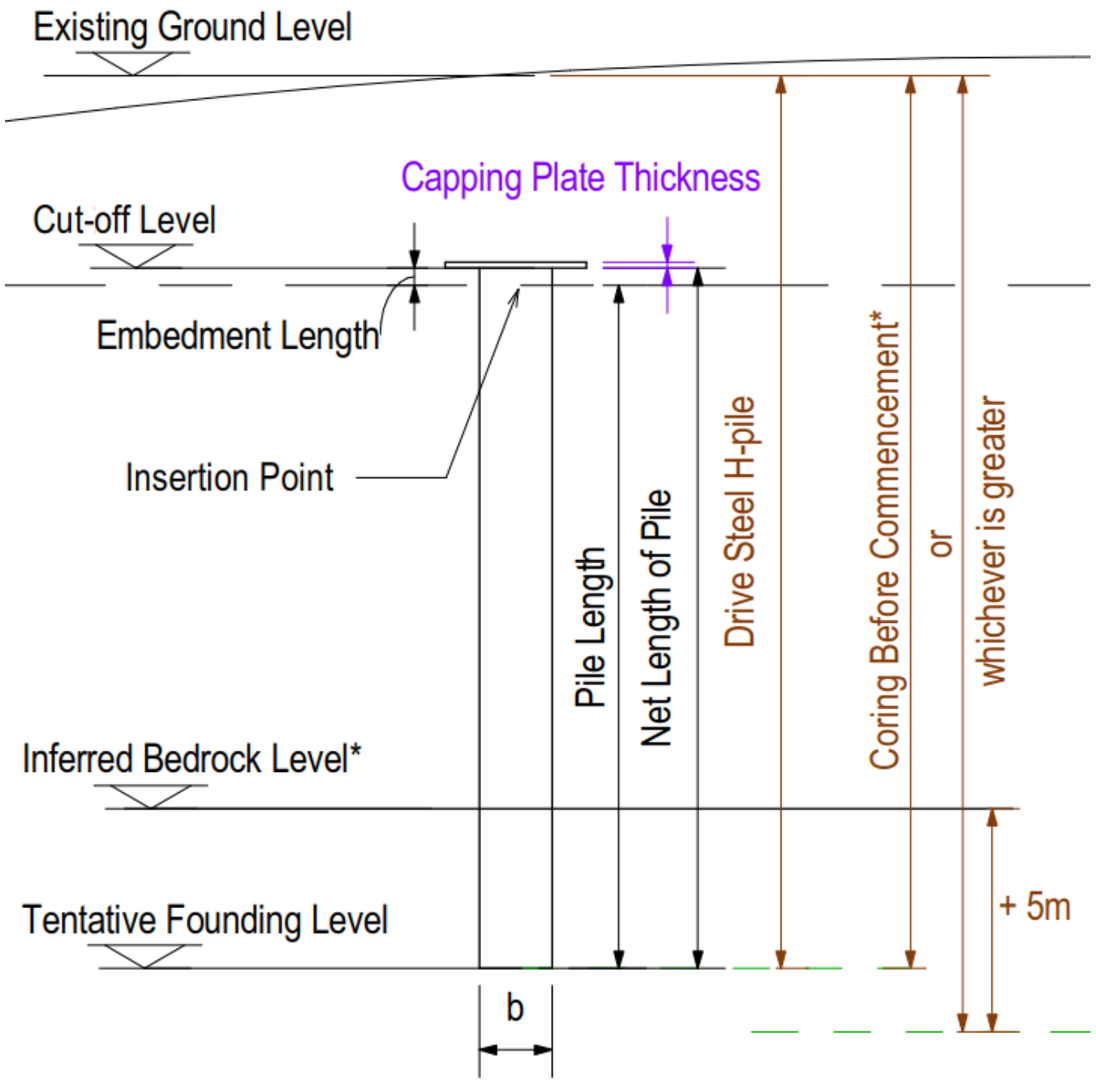
For the Driven Steel H-Pile family in HA Family Library, the parameters are automatically calculated based on the input values of parameters in the tables above with equation formula as shown below. Please do not remove or modify the setting of these parameters or its equation formula.

General		
Capping Plate to Pile Head (default)	75.371 kg	= (Capping Plate Length * Capping Plate Thickness * Capping Plate Width) / (1 m^3) * 7843 kg
Coring Before Commencement (default)	3000.0	= if(Inferred Bedrock Level = 0 mm, [Drive Steel H-Pile], if(((Existing Ground Level - Inferred Bedrock Level + 5000 mm) > [Drive Steel H-Pile], Existing Ground Level - Inferred Bedrock Level + 5000 mm,
Drive Steel H-Pile (default)	3000.0	= Existing Ground Level - Tentative Founding Level

Detailed formulae are documented in the pile family folder saved in HA Family Library. For ProjectWise Location of HA SE Revit Families, please refer to ANN-1.3. Modelling Resources > ANN-1.3b. HA Family library.

Below image illustrates the relationship between key parameters in Driven Steel H-Pile Family and terminologies in HA Standard Drawing. For more details of the Standard Drawing used, please refer to the drawing *Typical Notes and Details for Driven Steel H-Pile of Drawing Nos. STD/DRHP/S/EG-001/C and STD/DRHP/S/EG-002/B.*

Parameters set in the Driven Steel H-Pile Families

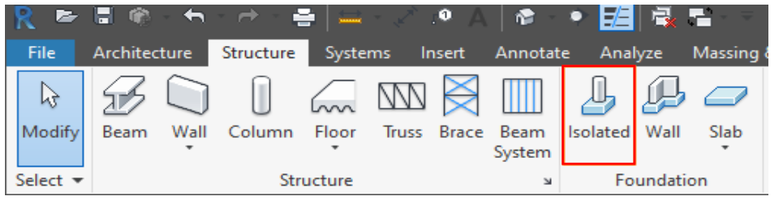


Remark: Parameter names in brown colour are the parameters for BIM QTO only and illustrated herein for SE information only.

Model Authoring

Place a driven steel H-pile

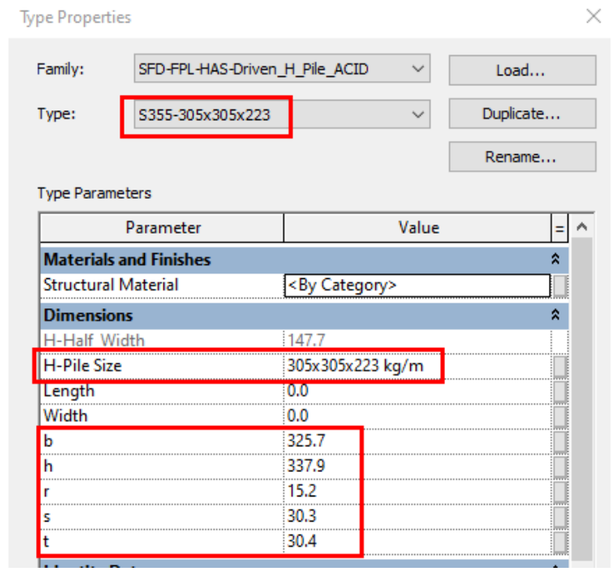
A driven steel H-pile can be created by using **Structural Foundation: Isolated** command as below image:



The steel H-pile family types contained in HA Family Library are those commonly adopted in Hong Kong as followed:

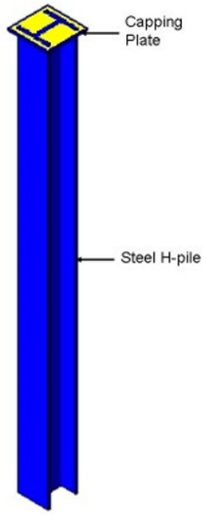
Commonly used Size of Universal Bearing Piles (UBP)
305 x 305 x 180 kg/m
305 x 305 x 223 kg/m

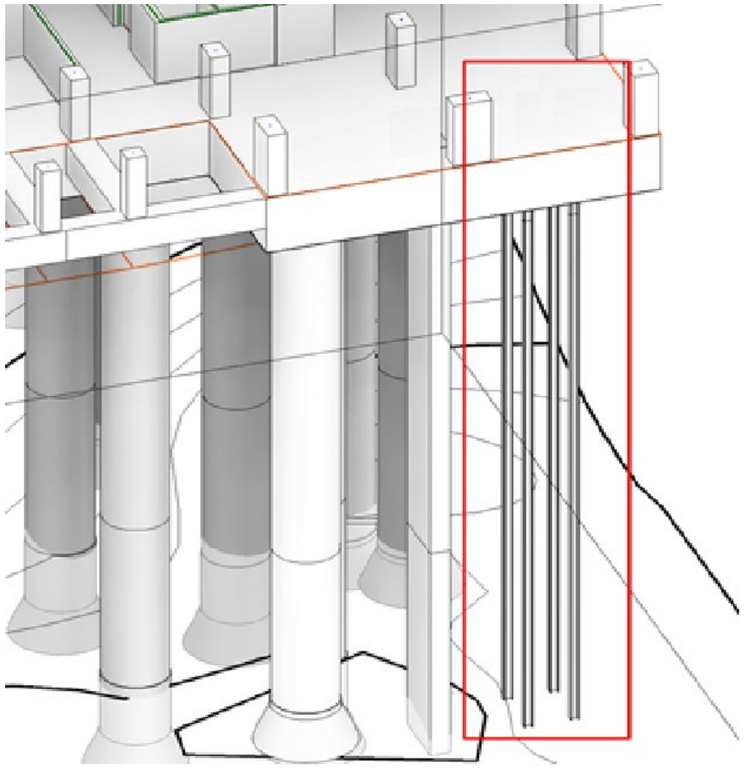
In case the library does not have the required bearing pile type as above, the properties of the Universal Bearing Pile can be added according to the steel database properties by changing family parameters value:



These steel H-pile family types have been modelled according to their sectional dimensions and properties under the Category of “Structural Foundations”.

Steel capping plate shall be modelled as part of the steel H-pile.



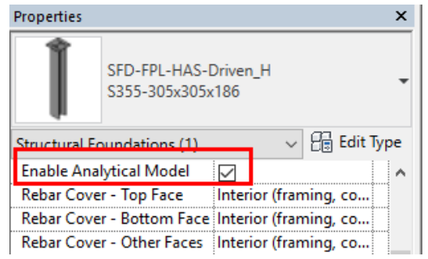


Note on detailing:

Pile toe details shall not be included in the model.

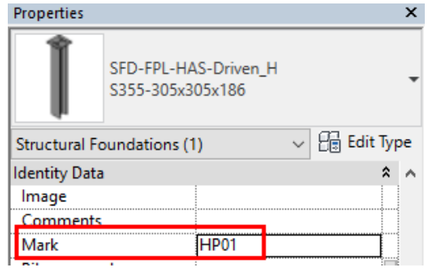
Analytical Links

When steel H-piles are involved in the analytical model of building structure, their instance properties in the field of "Enable Analytical Model" shall be toggled.



Mark

All Driven Steel H-Pile families in the Project Revit Structure model shall be assigned with a unique pile mark for piling schedule generation. This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.



DS-F 05 Socketed Steel H-Piles

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-FPL-HAS-<Descriptor 1 (Socketed_H_Pile)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Section Shape Size>

Example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Socket H-pile)**		**Descriptor 2 (Optional)**	**Structural material**		**Size (Depth x Width x Mass per meter)**
SFD	-	FPL	-	HAS	-	Socketed_H_Pile	-	<Not used>	S275 / S355 / S450	-	305x305x223 UBP

Information Requirement

List of built-in Parameter

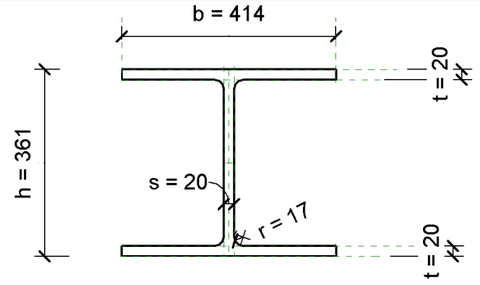
Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	S355-305x305x223 UBP
Level	Pile top level	The level to which the socketed steel H-pile is constrained	Foundation level
Height Offset From Level	Pile offset level	Specifies the offset distance between top of the socketed steel H-pile and the level.	-100mm, -200mm, -250mm,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	S275, S355,S450,……
Mark	Socketed steel H-pile mark	This parameter was added to HA tag families to annotate the socketed steel H-pile. This value must be unique for each element in a project.	SP01, SP02……

List of Shared Parameter

Please follow the list of shared parameters below. Value of these parameters should be input correctly such that related information can be retrieved for the use by other model users.

R	Parameter name	Information	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
	Information of level						
✓	Existing Ground Level	Level of point of entry into ground for boring pile hole	Manual / **Auto-Calculated by Dynamo**	Common	Length	Dimensions	Instance
	Cut-off Level	Specified level for cutting the pile	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Tentative Founding Level	Bottom level of pile	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Inferred Bedrock Level	Level of point of reach grade III or better rock with total core recovery of more than 85%	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Effective Rock Socket Top Level	Level of point of reach grade III or better rock with total core recovery of more than 85% + Casing Length in Rock (500mm)	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Pile dimension information						
✓	Embedment Length	Length between cut-off level of socketed steel H-pile and bottom level of cap	Manual	Common	Length	Dimensions	Instance
	Slanted Embedment Length	Length between cut-off level of socketed steel H-pile and bottom level of cap (for raking pile case)	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	Pile Diameter	Effective Shaft diameter	Manual	Common	Length	Dimensions	Instance
✓	Pile Length in Soil	Length between bottom level of cap and inferred bedrock level	Manual	Common	Length	Dimensions	Instance
✓	Casing Length in Rock	Length between inferred bedrock level and effective rock socket top level (min. 500mm)	Manual	Common	Length	Dimensions	Instance

R	Parameter name	Information	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
✓	Rock Socket Length	Length between effective rock socket top level and tentative founding level	Manual	Common	Length	Dimensions	Instance
	Pile Length	Length between bottom level of cap and tentative founding level	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Net Length of Pile	Pile Length + Slanted Embedment Length	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	Raking Angle	Degree of inclination	Manual	Common	Angle	Dimensions	Instance
✓	Pile with Permanent Steel Casing	Select to indicate it is “a pile with permanent steel casing”	Manual	Common	Yes/No	Visibility	Instance
	Pile with Temporary Steel Casing	Select to indicate it is “a pile with temporary steel casing”	**Auto-Calculated by formula**	Common	Yes/No	Visibility	Instance
✓	H-Pile Size	Size of steel H-pile	Manual	Common	Text	Dimensions	Type
✓	b	Width for H-section in Socketed Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type
✓	h	Height for H-section in Socketed Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type
✓	t	Flange thickness for H-section in Socketed Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type
✓	r	Turning radius for H-section in Socketed Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type
✓	s	Web thickness for H-section in Socketed Steel H-Pile (refer to the figure below)	Manual	Common	Length	Dimensions	Type



Typical H-section in Socketed Steel H-Pile

R	Parameter name	Information	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
	Pile cap information						
✓	Top Level of Pile Cap	Associated pile cap's top level	Manual	Common	Length	Dimensions	Instance
✓	Pile Cap Thickness	Associated pile cap thickness	Manual	Common	Length	Dimensions	Instance
✓	Pile_Pile Cap Mark	Associated pile cap mark	Manual	Common	Text	Identity Data	Instance
	Information of capping plate						
✓	Capping Plate Length	Length of capping plate to pile head	Manual	Common	Length	Dimensions	Instance
✓	Capping Plate Width	Width of capping plate to pile head	Manual	Common	Length	Dimensions	Instance
✓	Capping Plate Thickness	Thickness of capping plate to pile head	Manual	Common	Length	Dimensions	Instance
	Information for QTO						
	Coring Before Commencement		**Auto-Calculated by formula**	Common	Length	General	Instance
	Coring During Installation		**Auto-Calculated by formula**	Common	Length	General	Instance
	Capping Plate to Pile Head		**Auto-Calculated by formula**	Structural	Mass	General	Instance
	Boring Pile Hole		**Auto-Calculated by formula**	Common	Length	General	Instance
	Permanent Steel Casing		**Auto-Calculated by formula**	Common	Length	General	Instance

Remarks: SE and modellers could control the families using the parameters with ✓ in column **R**.

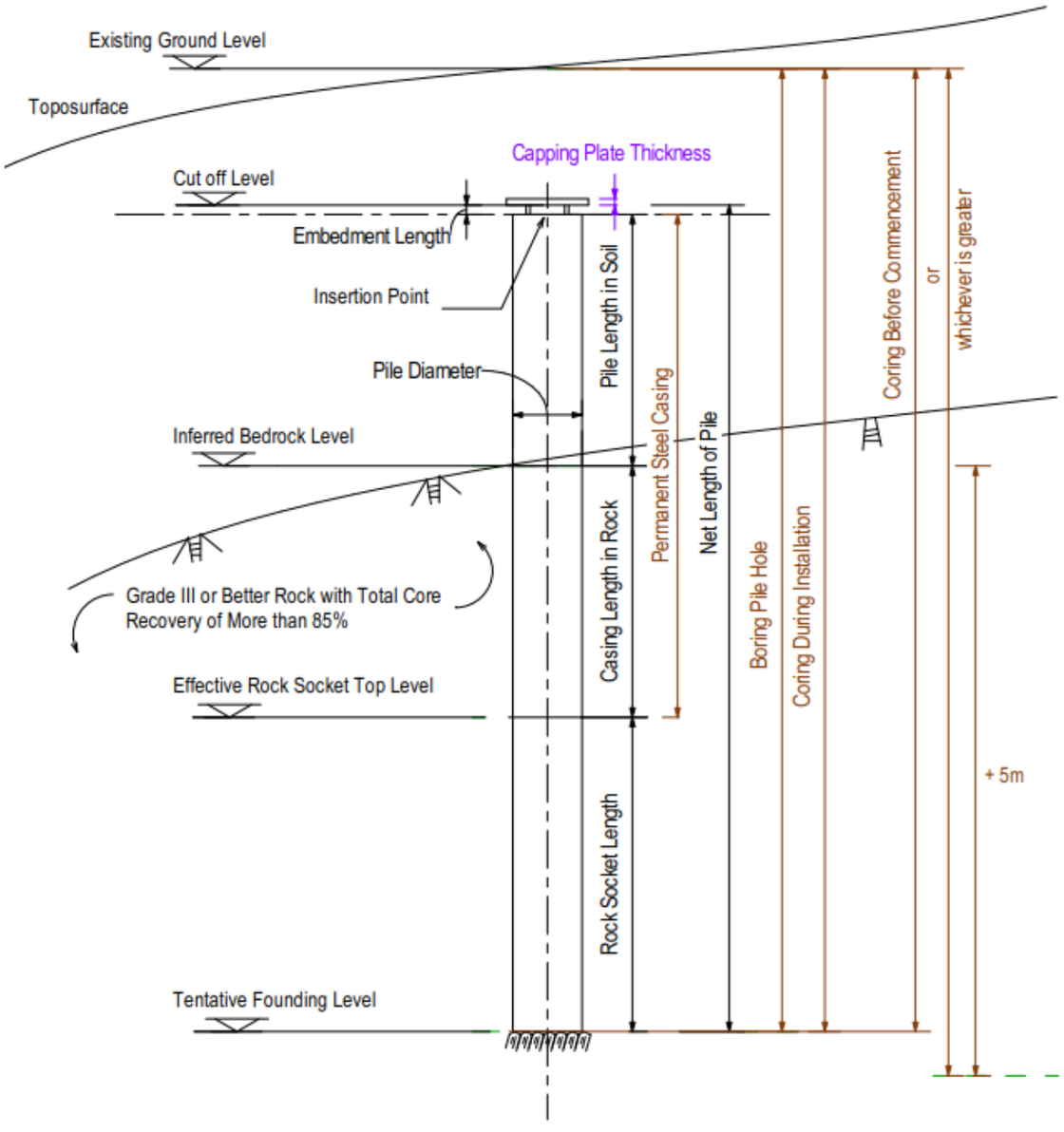
Auto-calculated Parameters

For the Socketed Steel H-Pile family in HA Family Library, the parameters are automatically calculated based on the input values of parameters in the tables above with equation formula as shown below. Please do not remove or modify the setting of these parameters or its equation formula.

General		
Boring Pile Hole (default)	3500.0	= (Existing Ground Level - Tentative Founding Level) / sin(Reverse Angle)
Capping Plate to Pile Head (default)	165.683 kg	= (Capping Plate Length * Capping Plate Thickness * Capping Plate Width) / (1 m³) * 7843 kg
Coring Before Commencement (default)	6000.0	= if(((Existing Ground Level - Inferred Bedrock Level) + 5000 mm) > Coring During Installation, Existing Ground Level - Inferred Bedrock Level + 5000 mm, Coring During Installation)
Coring During Installation (default)	3500.0	= Existing Ground Level - Tentative Founding Level
Permanent Steel Casing (default)	1500.0	= if(Pile with Temporary Steel Casing, 0 mm, Casing Length in Rock + Pile Length in Soil)
Ratio 1 (default)	1	= 1
Ratio 2 (default)	1	= abs(Adj / Opp)
Data		
Visibility		
Pile Arrow (default)	☐	= if(Reverse Angle < 90°, 1 = 1, 1 = 2)
Pile with Permanent Steel Casing (default)	☑	=
Pile with Temporary Steel Casing (default)	☐	= not(Pile with Permanent Steel Casing)

Detailed formulae are documented in the pile family folder saved in HA Family Library. For ProjectWise Location of HA SE Revit Families, please refer to ANN-1.3. Modelling Resources > ANN-1.3b. HA Family library.

Below image illustrates the relationship between key parameters in Socketed Steel H-Pile Family and terminologies in HA Standard Drawing. For more details of the Standard Drawing used, please refer to the drawing *Typical Notes and Details for Socketed Steel H-Pile of Drawing Nos. STD/SKHP/S/EG-001/D and STD/SKHP/S/EG-002/C*.



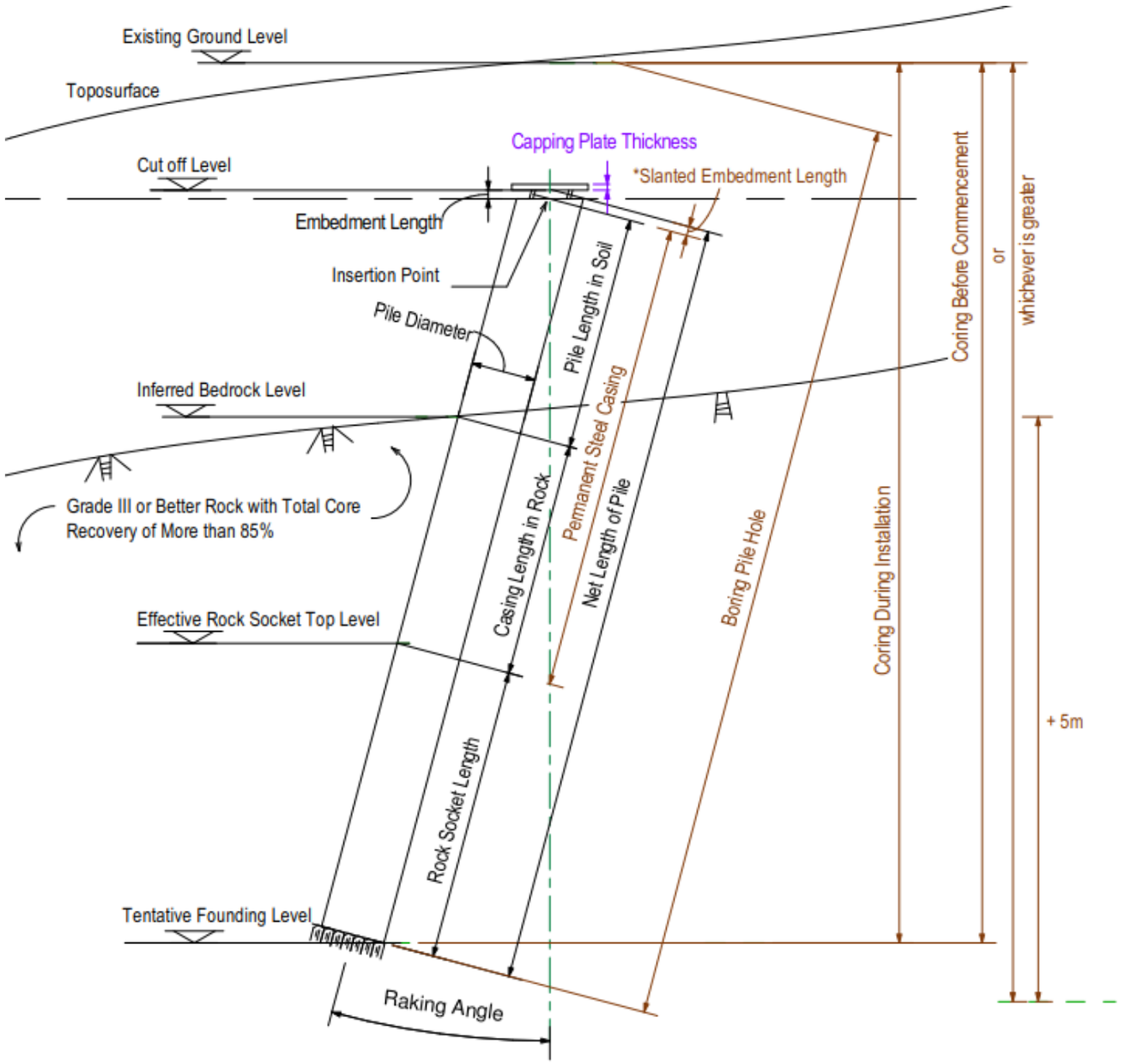
Vertical Socketed Steel H-Pile

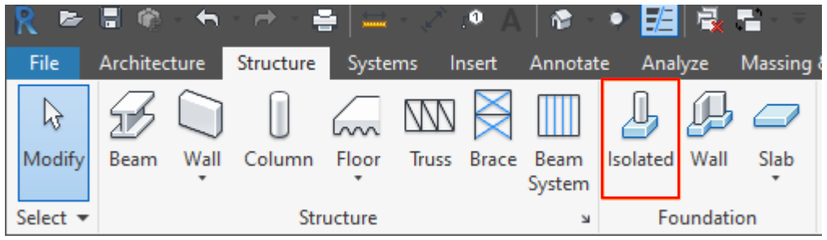
Raking Socketed Steel H-Pile

Remark: Parameter names in brown colour are the parameters for BIM QTO only and illustrated herein for SE information only.

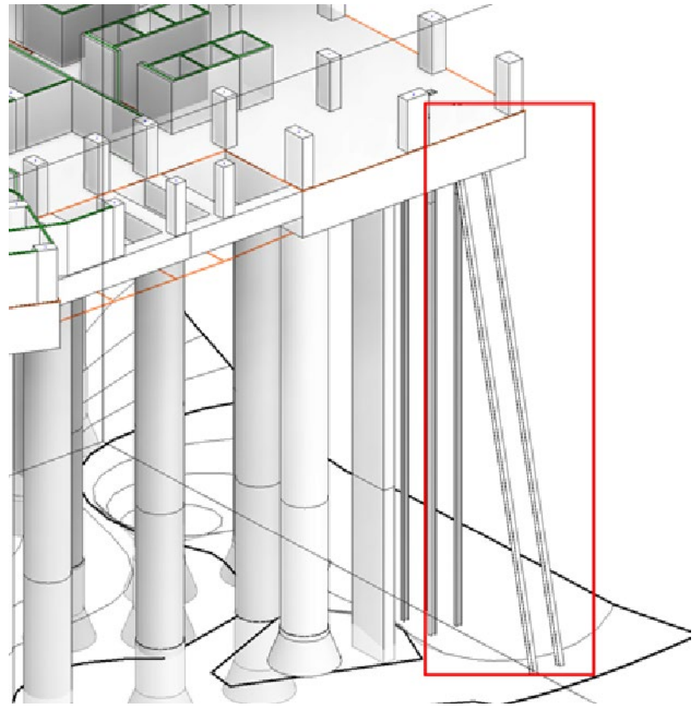
Parameters set in the Socketed Steel H-Pile Families

ated embedment length for raking pile. This parameter if for BIM





These socketed steel H-pile family types have been modelled according to their sectional dimensions and properties under the Category of “Structural Foundations”.



Model Authoring

Place a socketed steel H-pile

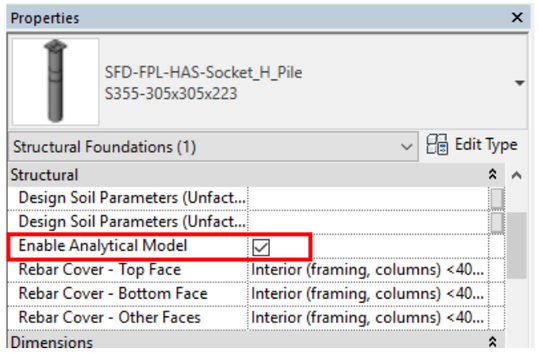
A socketed steel H-pile can be created by using **Structural Foundation: Isolated** command as below image:

Note on pile details

- The pile head details including dowel bars and shear key (shear bars) to steel H-piles within the rock socket shall be excluded from the model.
- The following geometric modellings were excluded from the socketed steel H-pile:
  - Pile head details including bar spreader and couplers etc
  - Pile typical details of capping plate details such as vent hole and weld hole, spacers welding, etc.
  - Sleeving details, epoxy paint, permanent steel case, etc.
  - Non-shrink grout
- The minimum clearance (cover) between the temporary steel casing and the steel H-pile is **40mm**.
- The pile diameter (effective shaft diameter) shall be the internal diameter of the steel casing.
- The capping plate is made of mild steel and shall be modelled as part of the steel H-pile.

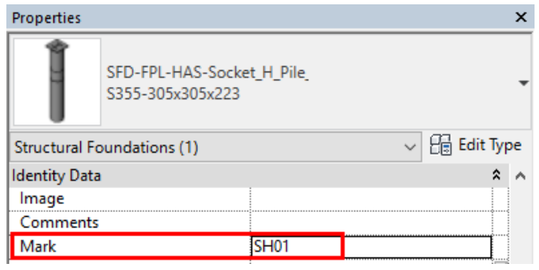
Analytical Links

When Socketed Steel H-piles are involved in the analytical model of building structure, their instance properties in the field of "Enable Analytical Model" shall be toggled.



Mark

All Socketed Steel H-Pile families in the Project Revit Structure model shall be assigned with a unique pile mark for piling schedule generation. This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.



DS-F 06 Mini-Piles

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-FPL-HAS-<Descriptor 1 (Mini_Pile)>-< Descriptor 2 (No. of rebar)>
Type Naming Convention	<Diameter>

Example

Family name									**Type name**
Category		**Functional type**		**Originator**		**Descriptor 1 (Mini pile)**		**Descriptor 2 (No. of rebar)**	**Diameter (mm)**
SFD	-	FPL	-	HAS	-	Mini_Pile	-	4T50	273

Information Requirement

List of built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	273
Level	Mini pile top level	The level to which the mini pile is constrained or inserted	Pile Cap Top Level
Height Offset From Level	Mini pile offset level	Specifies the offset distance between top of the mini pile and the level	-100mm, -200mm, -250mm,……
Structural material	Structural material	Grouting	10……
Model	Type of mini pile	Specifies the reinforcement type of mini pile	4T50, 5T50
Mark	Mini pile mark	This parameter was added to HA tag families to annotate the mini pile. This value must be unique for each element in a project.	MP01, MP02…

List of Shared Parameter

Please follow the list of shared parameters below. Value of these parameters should be input correctly such that related information can be retrieved for the use by other model users.

R	Parameter name	Information	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
	Information of level						
✓	Existing Ground Level	Level of point of entry into ground for boring pile hole	Manual / **Auto-Calculated by Dynamo**	Common	Length	Dimensions	Instance
	Cut-off Level	Specified level for cutting the steel casing	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Tentative Founding Level	Bottom level of pile	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Inferred Bedrock Level	Level of point of reach the grade III or better rock with total core recovery of more than 85%	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
	Pile dimension information						
✓	Embedment Length	Length between bottom of capping plate and cut off level of steel casing	Manual	Common	Length	Dimensions	Instance
	Slanted Embedment Length	Length between bottom of capping plate and cut off level of steel casing (for raking mini pile case)	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	Pile Diameter	Pile diameter	Manual	Common	Length	Dimensions	Instance
✓	Pile Length in Soil	Pile length in soil	Manual	Common	Length	Dimensions	Instance
✓	Casing Length in Rock	Extended length (minimum 100mm) below Inferred bedrock level	Manual	Common	Length	Dimensions	Instance
✓	Min Socket Length	Length between bottom of casing to tentative founding level	Manual	Common	Length	Dimensions	Instance
	Pile Length	Length between cut off level of steel casing and tentative founding level	**Auto-Calculated by formula**	Common	Length	Dimensions	Instance
✓	Raking Angle	Degree of inclination	Manual	Common	Angle	Dimensions	Instance
✓	Diameter of Ribbed Steel Reinforcing Bars	Diameter of ribbed steel reinforcing bars	Manual	Common	Length	Dimensions	Instance
	Grout	Grout material	Manual	Common	Material	Materials and Finishes	Instance
	Pile cap information						
✓	Top Level of Pile Cap	Associated pile cap's top level	Manual	Common	Length	Dimensions	Instance
✓	Pile Cap Thickness	Associated pile cap thickness	Manual	Common	Length	Dimensions	Instance
✓	Pile_Pile Cap Mark	Associated pile cap mark	Manual	Common	Text	Identity Data	Instance
	Information of capping plate						
✓	Capping Plate Length	Length of capping plate to pile head	Manual	Common	Length	Dimensions	Instance
✓	Capping Plate Width	Width of capping plate to pile head	Manual	Common	Length	Dimensions	Instance
✓	Capping Plate Thickness	Thickness of capping plate to pile head	Manual	Common	Length	Dimensions	Instance

R	Parameter name	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
	Information for QTO					
	Coring Before Commencement	**Auto-Calculated by formula**	Common	Length	General	Instance
	Coring During Installation	**Auto-Calculated by formula**	Common	Length	General	Instance
	Capping Plate to Pile Head	**Auto-Calculated by formula**	Structural	Mass	General	Instance
	Mild Steel Plate	**Auto-Calculated by formula**	Structural	Mass	General	Instance
	M.S. Plate_A	**Auto-Calculated by formula**	Structural	Mass	General	Instance
	M.S. Plate_B	**Auto-Calculated by formula**	Structural	Mass	General	Instance
	Boring Pile Hole	**Auto-Calculated by formula**	Common	Length	General	Instance
	Length of Ribbed Steel Reinforcing Bars	**Auto-Calculated by formula**	Common	Length	General	Instance
	Total Length of Ribbed Steel Reinforcing Bars	**Auto-Calculated by formula**	Common	Length	General	Instance
	Supply and Install Steel Pile Casing	**Auto-Calculated by formula**	Common	Length	General	Instance

Remarks: SE and modellers could control the families using the parameters with ✓ in column **R**.

Please follow the list of family parameters below. Value of these parameters shall be input correctly such that related setting can be applied to facilitate the 2D pile presentation:

Parameter name	Remark	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Information for drawing presentation					
Plan Symbol_4T50		Manual	Common	Yes/No	Other
Plan Symbol_5T50		Manual	Common	Yes/No	Other
Arrow angle	Raking direction on plan	Manual	Common	Angle	Dimensions
Arrow head length	Raking direction on plan	Manual	Common	Length	Dimensions
Arrow length	Raking direction on plan	Manual	Common	Length	Dimensions
Arrow offset from pile center	Raking direction on plan	Manual	Common	Length	Dimensions
Arrow symbol	Raking direction on plan	Manual	Common	Yes/No	Other

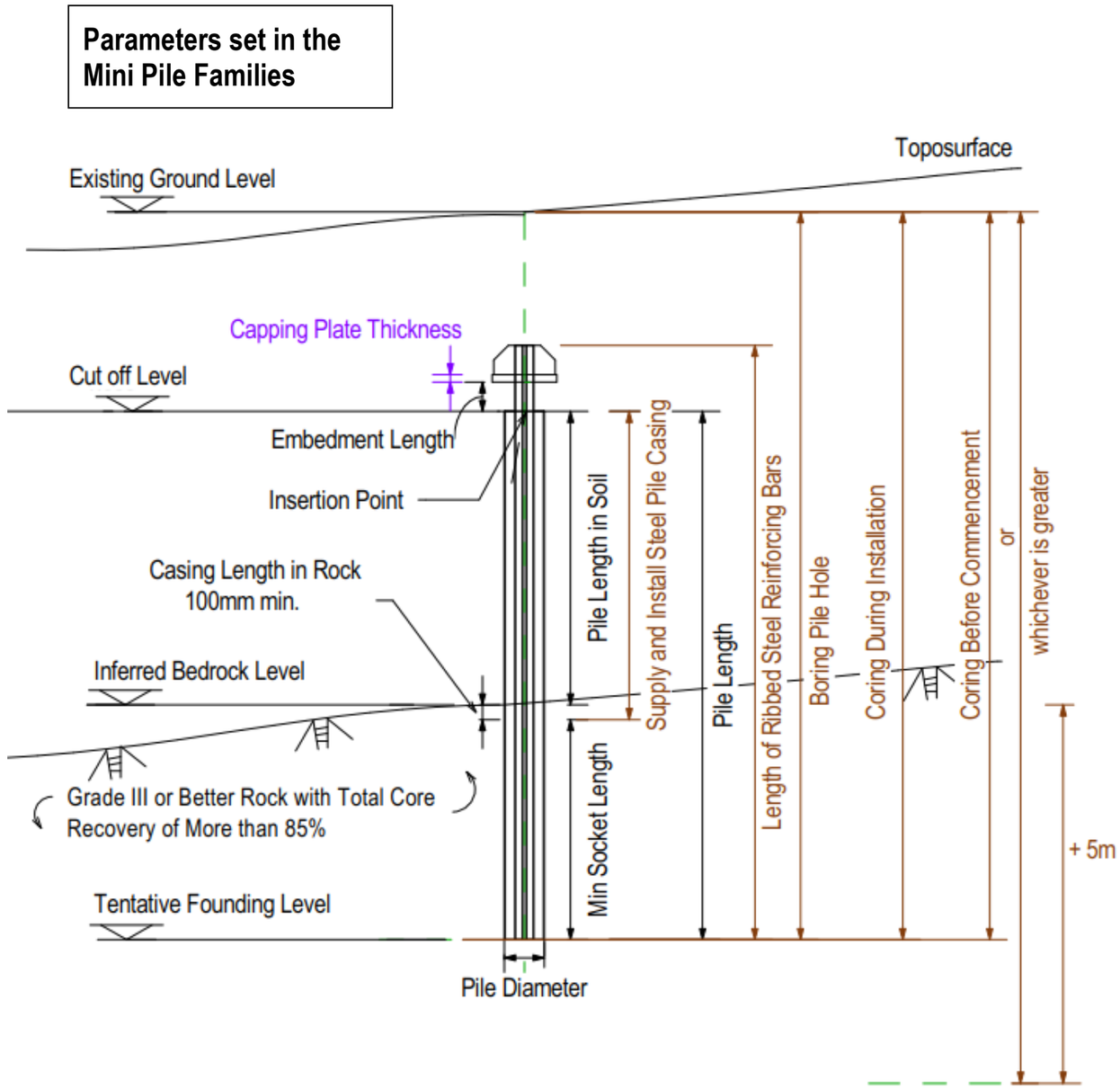
Auto-calculated Parameters

For the Mini Pile family in HA Family Library, the parameters are automatically calculated based on the input values of parameters in the tables above with equation formula as shown below. Please do not remove or modify the setting of these parameters or its equation formula.

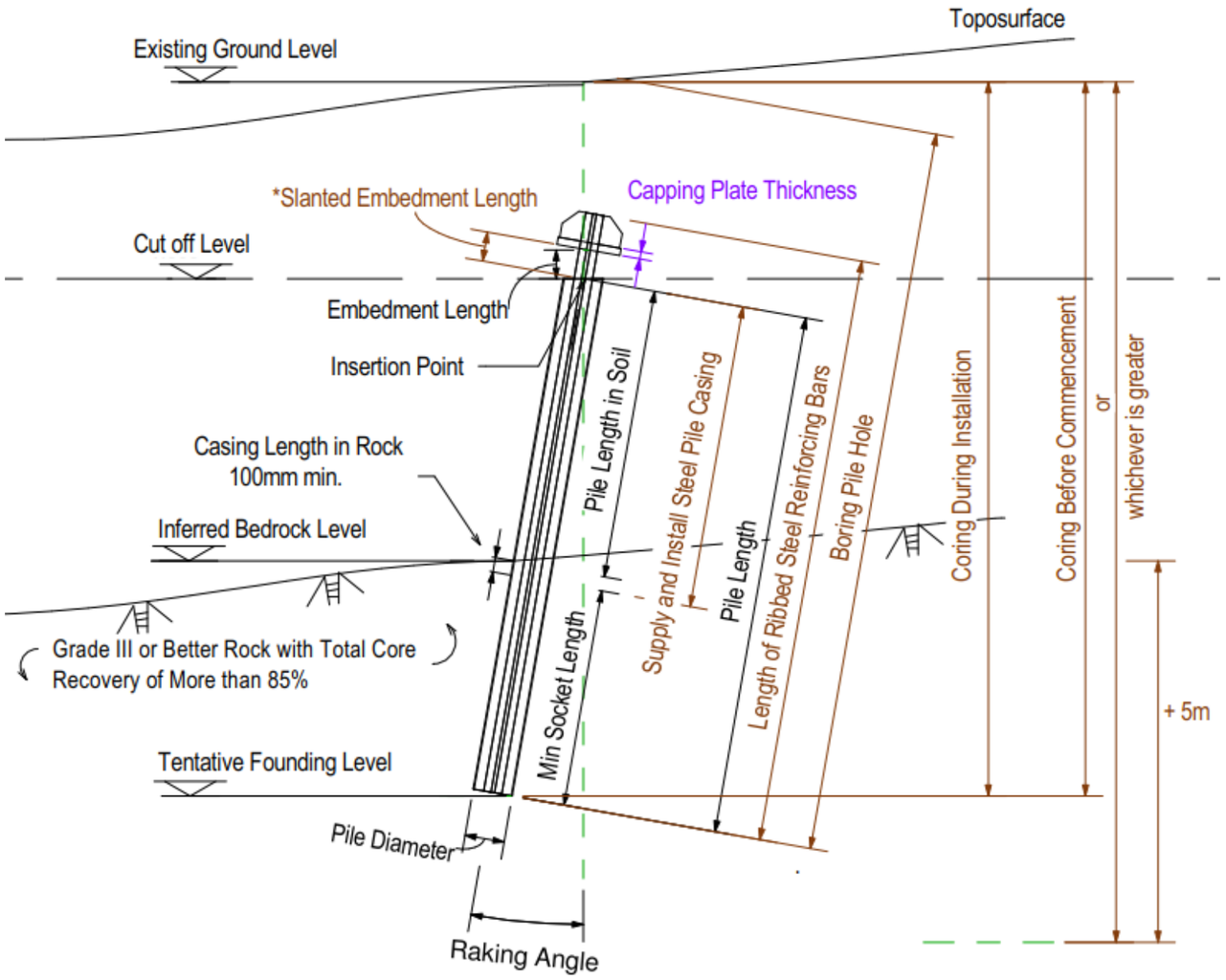
General		
Boring Pile Hole (default)	2900.0	= (Existing Ground Level - Tentative Founding Level) / sin(Reverse Angle)
Capping Plate to Pile Head (default)	75.920 kg	= (Capping Plate Length * Capping Plate Thickness * Capping Plate Width) / (1 m³) * 7843 kg
Coring Before Commencement (default)	6800.0	= if((Existing Ground Level - Inferred Bedrock Level + 5000 mm) > Coring During Installation, (Existing Ground Level - Inferred Bedrock Level + 5000 mm), Coring During Installation)
Coring During Installation (default)	2900.0	= Existing Ground Level - Tentative Founding Level
Length of Ribbed Steel Reinforcing Bars (defau	3350.0	= Pile Length + Slanted Embedment Length + Capping Plate Thickness + B1 + B2
M.S. Plate_A (default)	14.510 kg	= (A * (B1 + B2) - 2 * (B1 * C / 2)) * D / (1 m³) * 7843 kg
M.S. Plate_B (default)	6.765 kg	= ((A - D) / 2 * (B1 + B2) - (B1 * C / 2)) * D / (1 m³) * 7843 kg
Mild Steel Plate (default)	28.039 kg	= if([4T50], M.S. Plate_A + 2 * M.S. Plate_B, 5 * M.S. Plate_B)
Ratio 1 (default)	1	= 1
Ratio 2 (default)	1	= abs(Adj / Opp)
Supply and Install Steel Pile Casing (default)	1900.0	= Pile Length - Min Socket Length
Total Length of Ribbed Steel Reinforcing Bars (	13400.0	= if([4T50], (Pile Length + Slanted Embedment Length + Capping Plate Thickness + B1 + B2) * 4, (Pile Length + Slanted Embedment Length + Capping Plate Thickness + B1 + B2) * 5)

Detailed formulae are documented in the pile family folder saved in HA Family Library. For ProjectWise Location of HA SE Revit Families, please refer to ANN-1.3. Modelling Resources > ANN-1.3b. HA Family library.

Below image illustrates the relationship between key parameters in Mini Pile Family and terminologies in HA Standard Drawing. For more details of the Standard Drawing used, please refer to the drawing *Typical Notes and Details for Mini-pile of Drawing Nos. STD/MINIP/S/EG-001/C and STD/MINIP/S/EG-002/C*.



Vertical Mini Pile



Raking Mini Pile

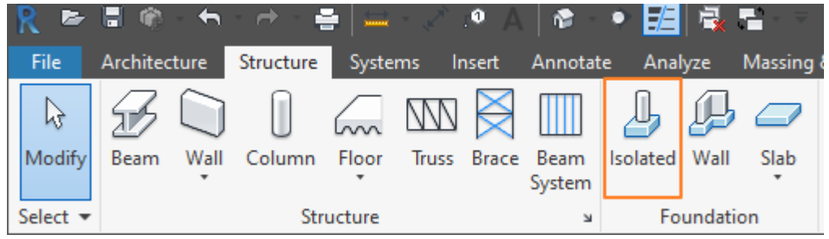
Remark: Parameter names in brown colour are the parameters for BIM QTO only and illustrated herein for SE information only.

Remark: *Slanted Embedment Length is a calucated embedment length for raking pile. This parameter if for BIM QTO illustration only.

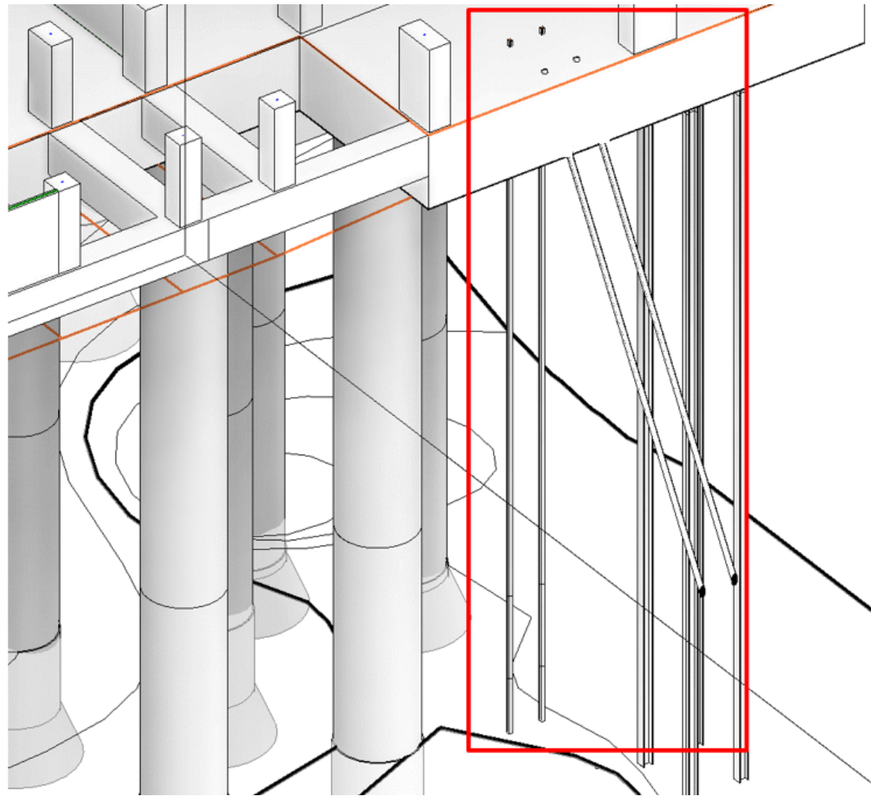
Model Authoring

Place a mini-pile

A mini-pile can be created by using **Structural Foundation: Isolated** command as below image:

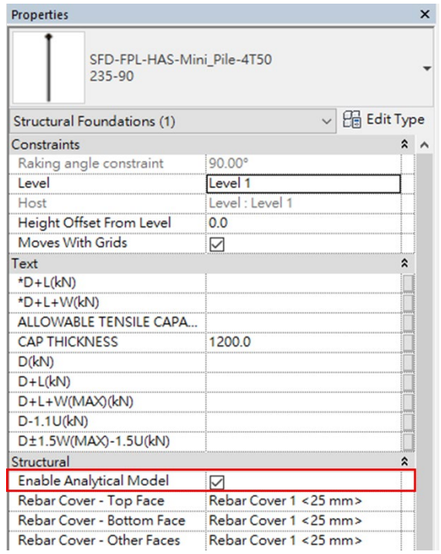


The Mini-pile family types contained in HA Family Library ranging from 273mm to 323mm in diameter are those commonly adopted in HK.



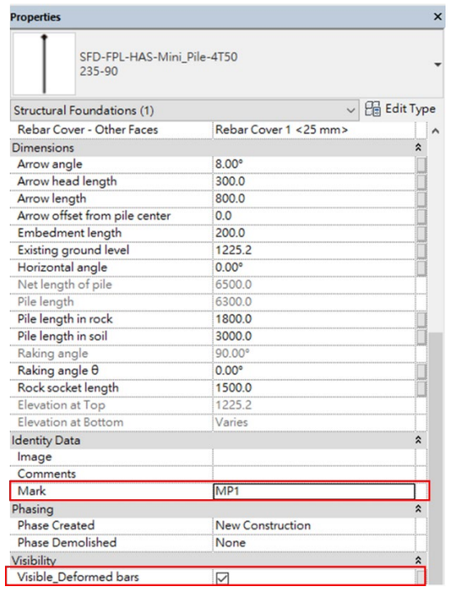
Analytical Links

When Vertical and Raking Mini piles are involved in the analytical model of building structure, their instance properties in the field of “Enable Analytical Model” shall be toggled.



Pile mark

All mini pile families in the Project Revit Structure model shall be assigned with a unique pile mark for piling schedule generation. This pile number can be input in the “Mark” field of “Identity Data” in the Properties Palette.



Note on detailing:

- The following geometric modellings were excluded from the Mini Pile families:
  - Pile head details including bar spreader and couplers etc
  - Pile typical details of capping plate details such as vent hole and weld hole, spacers welding, etc.
- Steel rebars inside the mini-pile are to be included in the family model.
- The minimum grout cover (portion above rock socket) in the mini pile families is 50mm. PSE may adjust the grout cover under different environment condition on project basis.
- Pile diameter is equal to the outside diameter of casing i.e. 273mm or 323mm circular hollow section.
- Capping plates at pile head is to be grade S355 class I (complying with BSEN10025 Part 1-6:2004).

DS-F 07 Pile Caps

Discipline	Structural
Family	System Family
Family Category	Structural Foundations – Foundation Slab
Workset	Individual Levels
Family Naming Convention	N/A
Type Naming Convention	SFD-FCA-HAS-<Descriptor 1 (Structural Materials) >-<Descriptor 2 (Thickness)>

Naming example

Type name								
Category		**Functional type**		**Originator**		**Descriptor 1 (Structural Materials)**		**Descriptor 2 (Thickness)**
SFD	-	FCA	-	HAS	-	40D/20	-	2500

Information Requirement

List of built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	SFD-FCA-HAS-40D/20-2500
Level	Pile cap top level	The level to which the pile cap is constrained	Foundation level
Height Offset From Level	Pile cap offset level	Specifies the offset distance between top of the pile cap and the level	0mm, -100mm, -200mm, -250mm,……
Structural material	Structural material	Concrete grade	40D/20, 40D/20_Mass Fill……
Thickness	Thickness	Thickness of pile cap	2000m, 2500m, 2750mm…
Volume	Volume	Volume of pile cap	3000m^3, 5000m^3…
Mark	Pile cap mark	This parameter was added to HA tag families to annotate the pile cap. This value must be unique for each element in a project.	PC01, PC02…

Model Authoring

The Structural Design Practice of the HA requirements:

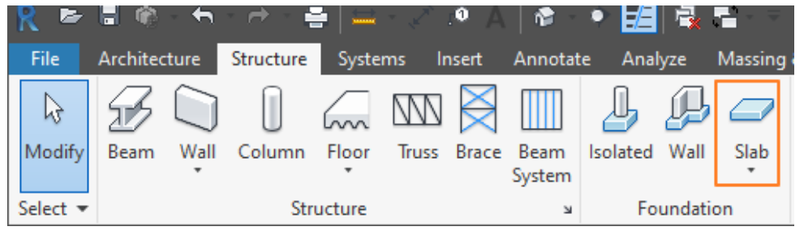
Piles Type	Requirements	Function
All Pile Cap	Top level of each pile cap is usually 1.5m below the proposed ground level	Allow for the installation of underground services/utilities and drainage routings

Modelling of pile cap elements

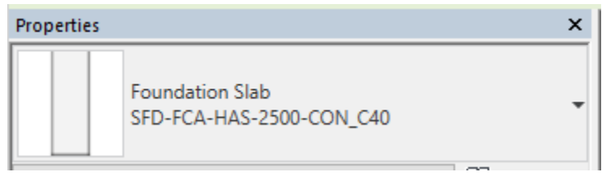
Unless otherwise specified, all pile caps should be modelled using "Foundation Slab" under "Structural Foundation" category with appropriate Type naming above.

Steps for modelling of pile cap using Foundation Slab is similar with Floor.

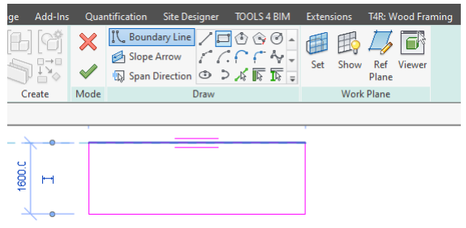
Step 1. Activate the **Structural Foundation: Slab** command.



Step 2. Select the family type



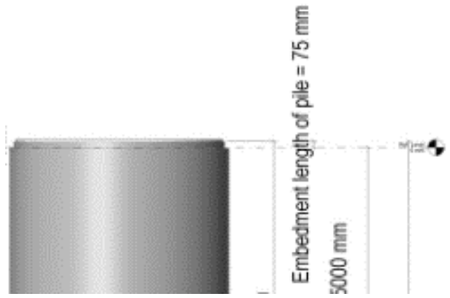
Step 3. Drawing the foundation slab boundary



Step 4. Click  to finish foundation slab modelling

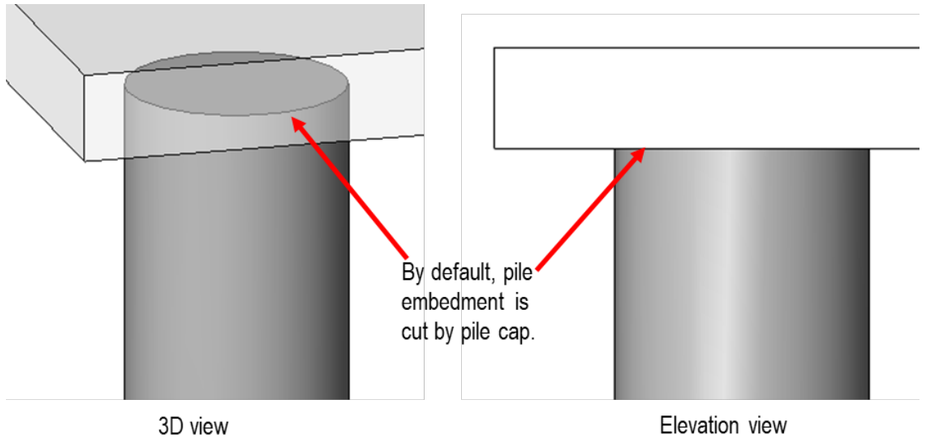
Pile cap and Bored Pile connection

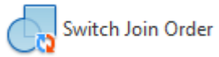
Normally, part of the bored pile is embedded into pile cap. The portion refer to that indicated by “Embedment Length” as shown below. (Details refer to **DS-F 02** Bored Piles SAM)



By default, this embedded part, or the overlapped geometry of bored pile will be cut by the connected pile cap.

Hence, the overlapped geometry are counted as part of pile cap, as the pile cap takes precedence over bored pile in Revit by default.



“Switch Join Order” 

shall be used to switch the precedence. Such that the bored pile family takes precedence and the overlapped geometry are counted under bored pile, instead of the pile cap as shown below.

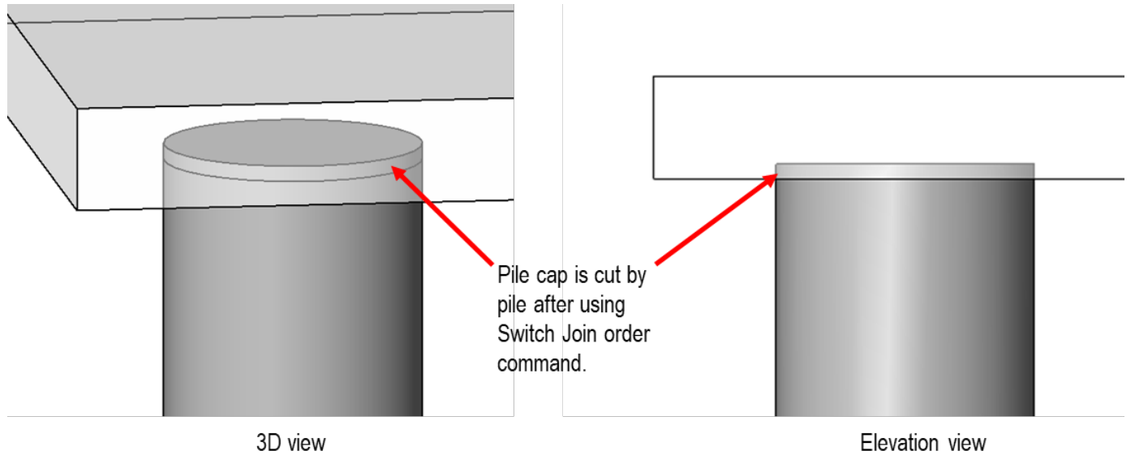


Figure 4-7 A pile cap is cut by a pile

Pile cap and tie beam connection

By default, a tie beam will be joined by connected pile caps. (Details refer to **DS-F 09** Foundation Beams SAM)

Unless otherwise specified, this default setting shall be adopted (i.e. tie / strap beams shall be joined to caps / footings.)

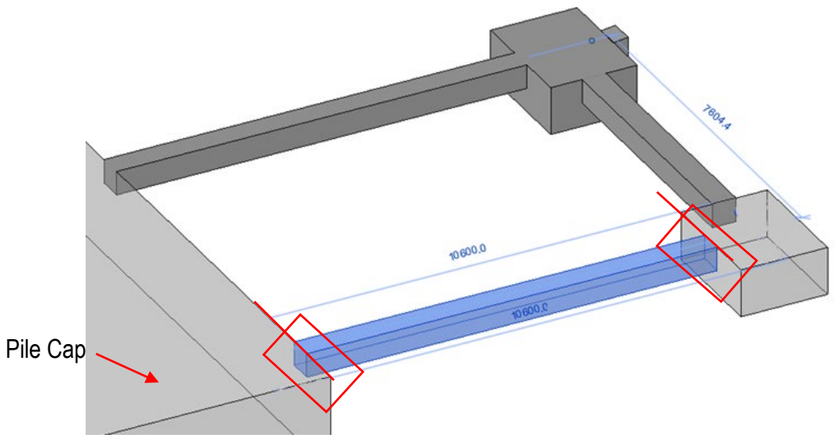
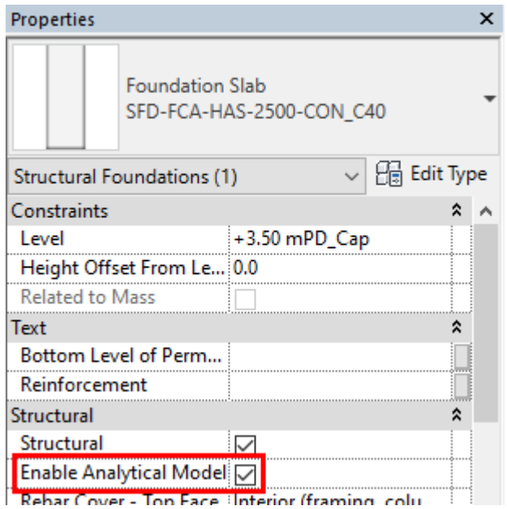


Figure 4-8 A tie beam is cut by pile caps

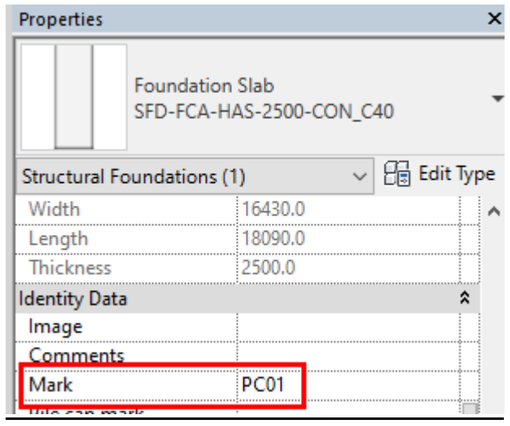
Analytical model

When footings are involved in the analytical model of building structure, their instance properties in the field of "Enable Analytical Model" shall be toggled.



Mark

To enable subsequent generation of piling schedule, all pile cap in the Project Revit Structure model shall be assigned with a unique pile cap number. This pile cap number can be input in the "Mark" field of "Identity Data" in the Properties Palette.



DS-F 08 Footings

Discipline	Structural
Family	System Family/ Loadable Family
Family Category	Structural Foundations – Foundation Slab/ Footing
Workset	Individual Levels
Family Naming Convention	N/A
Type Naming Convention	SFD-FDF-HAS-<Descriptor 1 (Structural Materials) >-<Descriptor 2 (Thickness)>

Naming example

Type name								
Category		**Functional type**		**Originator**		**Descriptor 1 (Structural Materials)**		**Descriptor 2 (Thickness)**
SFD	-	FDF	-	HAS	-	40D/20	-	2500

Information Requirement

List of built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	SFD-FDF-HAS- 40D/20-2500
Level	Pile cap top level	The level to which the footing is constrained	Foundation level
Height Offset From Level	Pile cap offset level	Specifies the offset distance between top of the footing and the level	-1000mm, -2000mm, -2500mm,……
Structural material	Structural material	Concrete grade	40D/20, 40D/20_Mass Fill……
Thickness	Thickness	Thickness of footing	2000m, 2500m, 2750mm…
Volume	Volume	Volume of footing	3000m^3, 5000m^3…
Mark	Footing mark	This parameter was added to HA tag families to annotate the footing. This value must be unique for each element in a project.	F01, F02…

Model Authoring

Note on detailing:

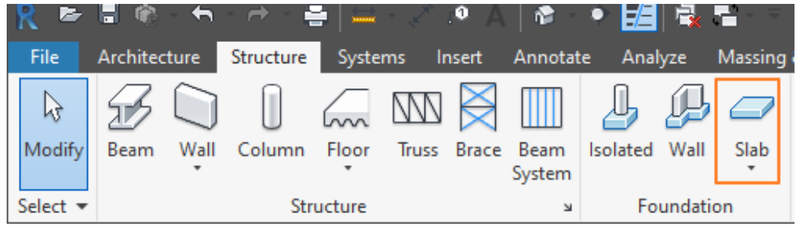
According to the prevailing design practice of HA, the top level of each footing shall be at least 1.5m below the proposed ground level so as to allow for the installation of underground services/utilities and drainage routings.

Modelling of footing elements - Foundation Slab

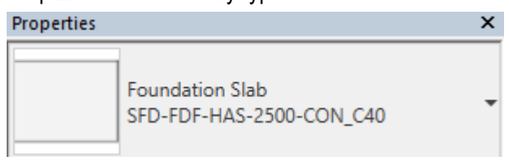
Unless otherwise specified, all footings should be modelled using "Foundation Slab" under "Structural Foundation" category with appropriate Type naming above.

Steps for modelling of footing using Foundation Slab is similar with Floor.

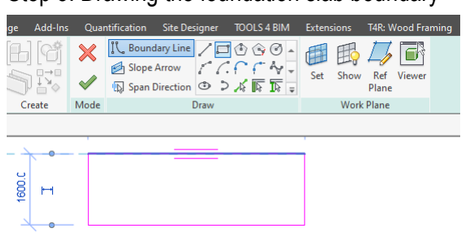
Step 1. Activate the **Structural Foundation: Slab** command.



Step 2. Select the family type



Step 3. Drawing the foundation slab boundary

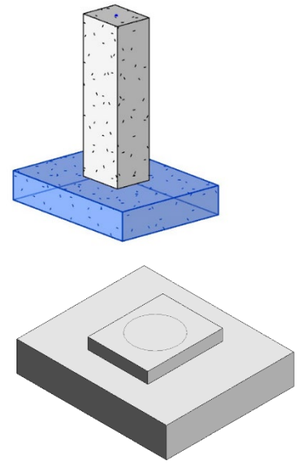
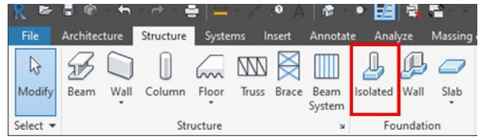
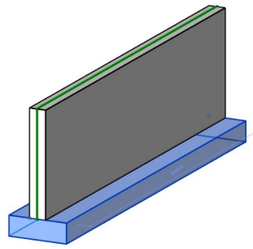
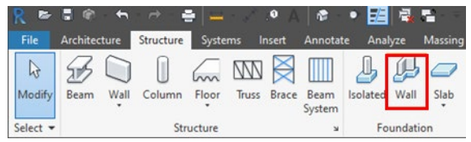
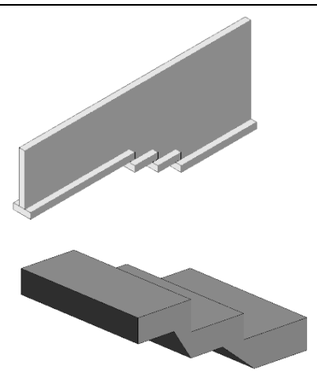
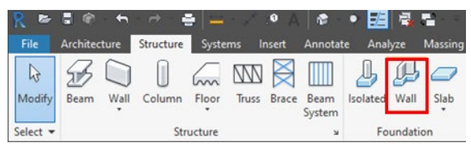


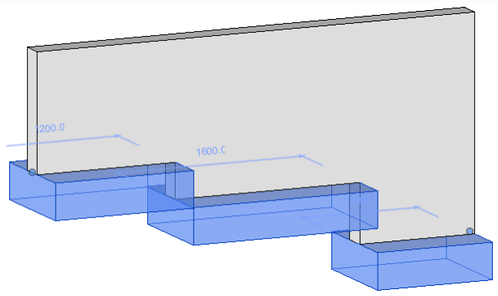
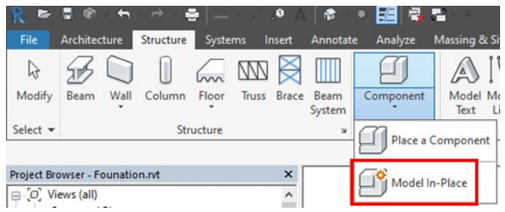
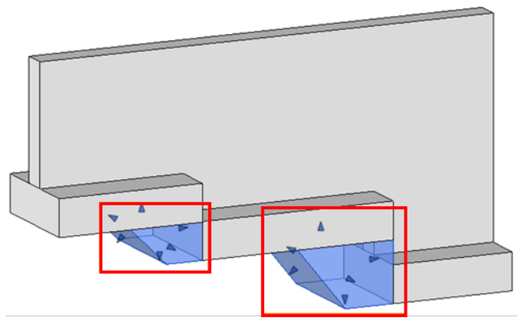
Step 4. Click ✔ to finish foundation slab modelling

- The volume of footing can be retrieved automatically.
- Since the pile cap / footing is prepared by Revit system family – Structural Foundation_Foundation Slab, no default paint material could be pre-assigned to the pile cap / footing element. The measurement of formwork and blinding layer quantity for pile cap / footing cannot be retrieved automatically.

Modelling of footing elements – Custom Footing Family

If the project team decides to use custom Footing family, please refer to the Footing type and relative key steps specified in below table:

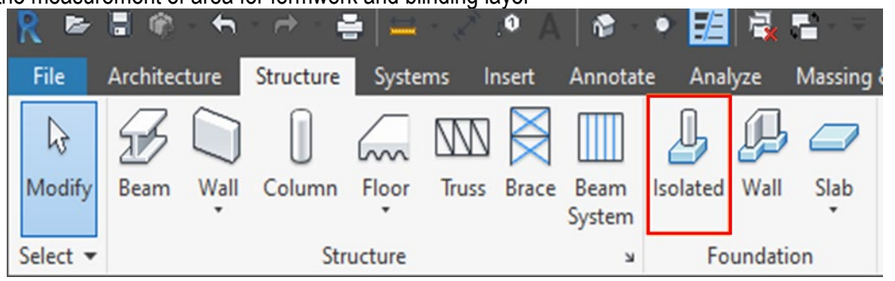
Footing Types	3D view	Key steps for modelling
Pad Footings		Step 1. Activate the **Structural Foundation: Isolated** command.  Step 2. Select the family type and place the footing family to correct location
Strip Footings		Step 1. Activate the **Structural Foundation: Wall** command.  Step 2. Select the family type and pick the wall to place the foundation.
Step Footings		Step 1. Activate the **Structural Foundation: Wall** command.  Step 2. Select the family type and pick the wall to place the foundation.

Footing Types	3D view	Key steps for modelling
		 Step 3. Slopping soffit at the level difference location can be generated using Model In-Place command under Structure > Model > Component > Model In-Place.  Use Solid Extrusion command to create Forms as below 

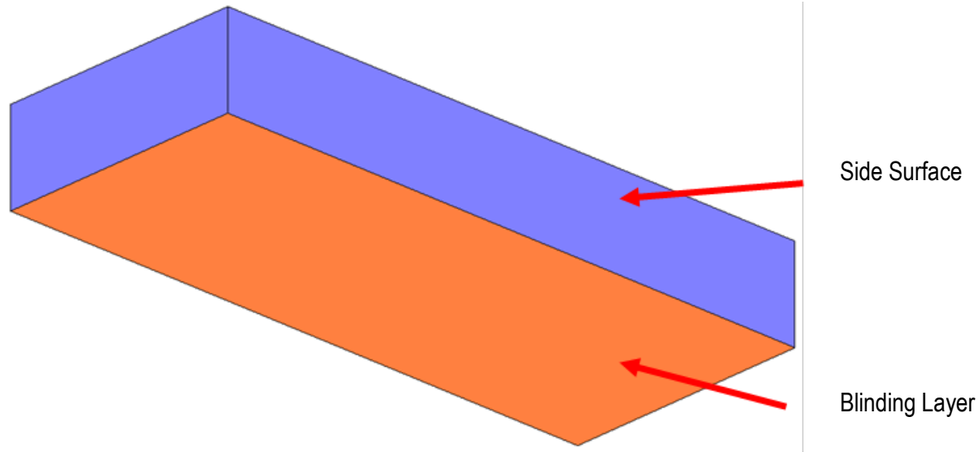
For all footing modelling, the columns/walls shall be joined to the footing by which they are supported. The footings shall take precedence over columns/walls.

If the project team decides to use custom Footing family, please refer to the key steps specified below for preparation for the measurement of formwork and blinding layer.

- Pre-setting of loadable families (for those footing modelled by “Isolated Foundation” only) by the method below enables the measurement of area for formwork and blinding layer



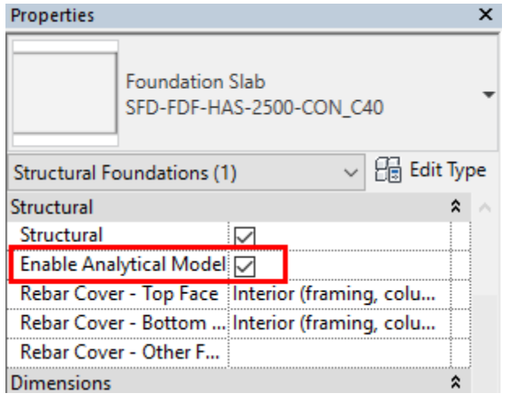
- Vertical faces of foundations families to be painted with material/finishes “Side Surface” and the bottom faces to be painted with material/finishes “Blinding Layer”.



- A sample family of footing with this setting is available in HA Family Library. The file name of the family is “SFD-FDF-HAS-Rectangular.rfa”
- When these families are applied for model authoring, estimated area of formworks and blinding layer can be derived therefrom by appropriate adjustments.

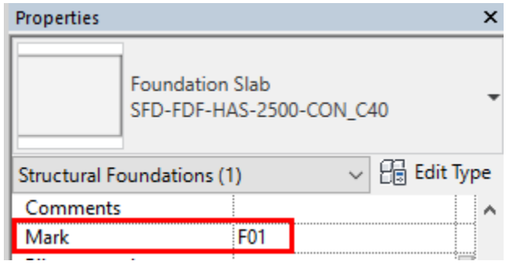
Analytical model

When footings are involved in the building structure analytical model, their instance properties in the field of “Enable Analytical Model” shall be toggled.



Mark

To enable subsequent generation of material schedules, all footing families in the Project Revit Structure model shall be assigned with a unique footing number. This footing number can be input in the “Mark” field of “Identity Data” in the Properties Palette.



DS-F 09 Foundation Beams

Discipline	Structural
Family	Loadable Family
Family Category	Structural Framing
Workset	Individual Levels
Family Naming Convention	SFD-FBM-HAS-<Descriptor 1 (Section shape)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Size>

Naming Example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Section shape)**		**Descriptor 2 (Optional)**		**Structural material**		**Size (mm x mm)**
SFD	-	FBM	-	HAS	-	Rectangular	-	<Not used>		30D/20	-	800x600 (Depth x Width)
SFD	-	FBM	-	HAS	-	Rectangular	-	Tapered		40D/20	-	800x400 (Depth x Width)
SFD	-	FBM	-	HAS	-	Rectangular	-	Cranked		60D/20	-	800x400 (Depth x Width)
SFD	-	FBM	-	HAS	-	Rectangular	-	Stepped		60D/20	-	800x400 (Depth x Width)

Information Requirement

List of built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Rectangular: 30D/20-800x600
Reference Level	Foundation beam constraining level.	Reference Level is a read-only value when it is the same as the Work Plan on which the beam is placed.	Foundation Level
Start Level Offset	Foundation beam start point level offset	The distance of beam start point form the reference level	-100mm,0mm,150mm, 200mm,250mm,……
End Level Offset	Foundation beam end point level offset	The distance of the beam endpoint from the reference level.	-100mm, 0mm,150mm, 200mm,250mm,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	30D/20, 40/20_Mass Fill, 30D/20_PFA, 30D/20_Waterproofing …
Mark	Foundation beam mark	This parameter was added to beam tag families to annotate beams. This value must be unique for each element in a project.	TB1

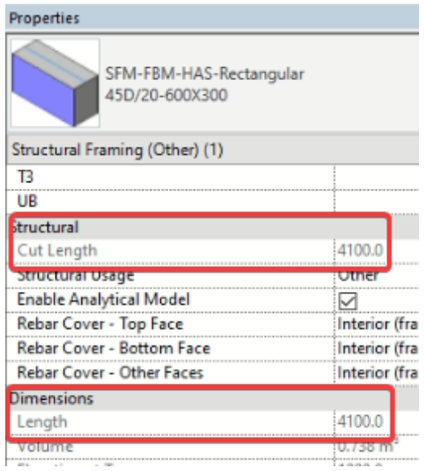
Model Authoring

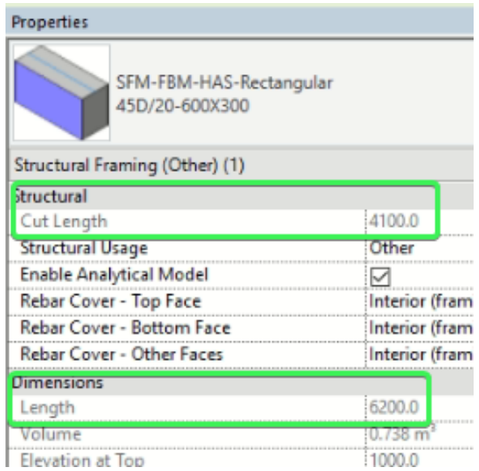
Modelling of tie beam/ strap beam

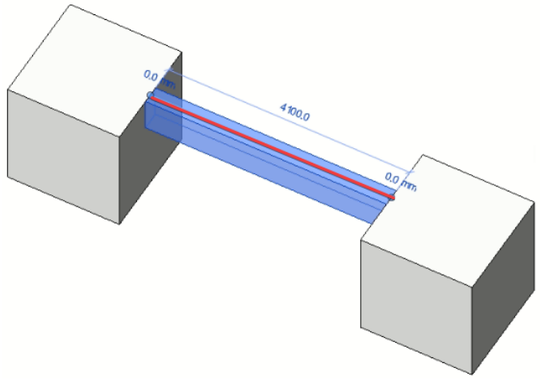
All foundation beams shall be modelled under the category families of “Structural Framing”.

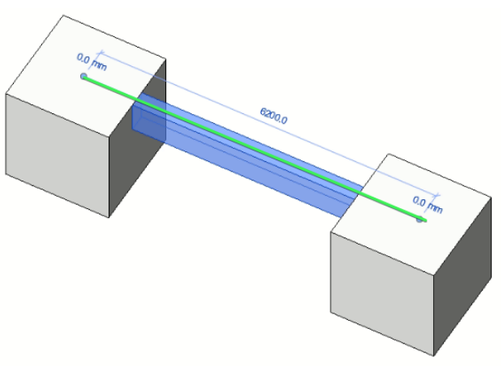
If beam is perpendicular to the footing or pile cap, the tie beams and strap beams shall be connected and joined together to the edge of footing/pile cap.

The scenarios below indicate the difference in “Cut Length” and “Length” value when the modelling of beam’s extension. The Cut Length reflects the net distance between the connected pile cap.

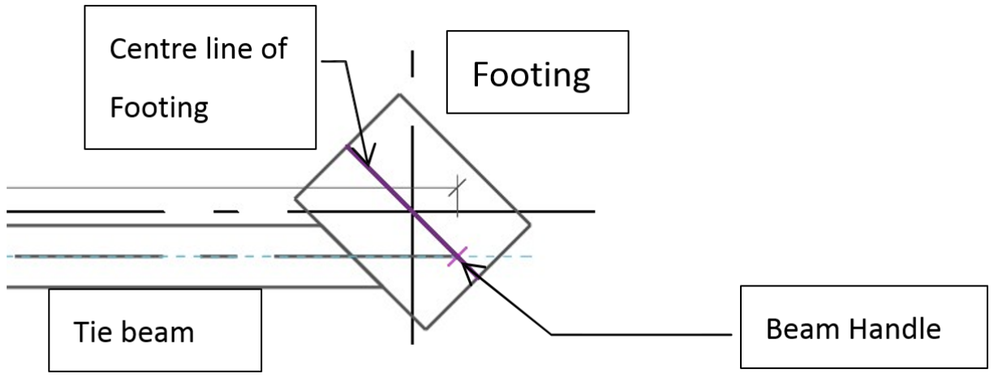




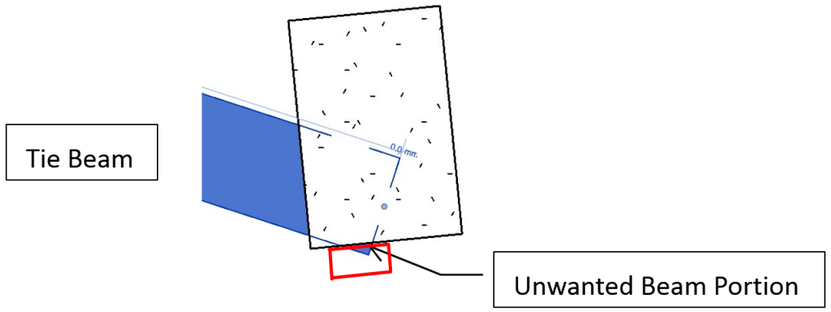




If the beam is not perpendicular to the footing or pile cap, tie beams and strap beams shall be connected and joined together to the centre of footing/pile cap. Normally, they are along the major and minor axes of the footing section.

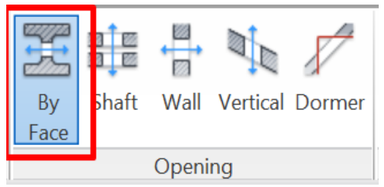


For angle of beam and footing intersection is not at 90º, the beam shall join to the centre of the footing. Some extra extruding beam portion will be noticed. User can use “Cut by Face” under “Structure - Opening” Tap to cut the unwanted portion.

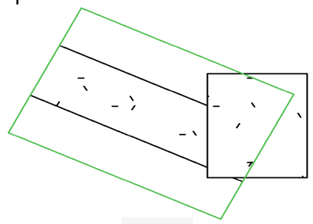


Steps for remove the unwanted portion

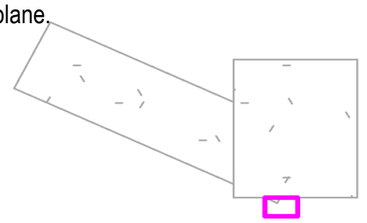
Step 1. Choose Cut ”By Face”



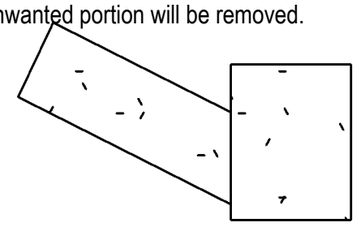
Step 2. Choose the Beam’s Planar Face



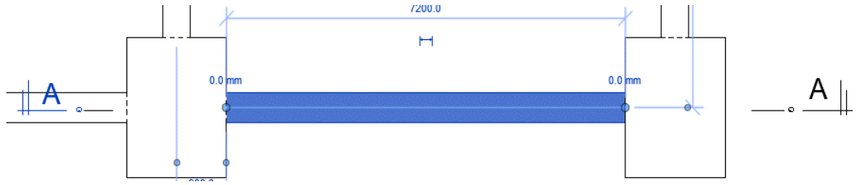
Step 3. Choose Rectangular as cutting plane.



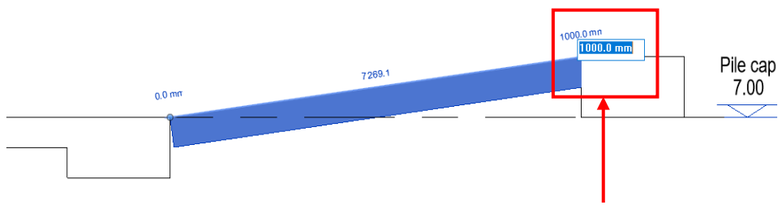
Step 4. Click  to finish the edit mode, unwanted portion will be removed.



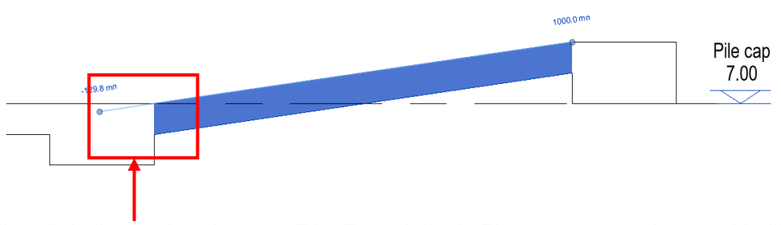
For slanted tie beam, modelling steps are illustrated in below figure:



Step 1. In the plan view, drawing the tie beam connected to the edges of the two pile caps



Step 2. In the section view, adjust the tie beam offset levels to align with pile cap levels.

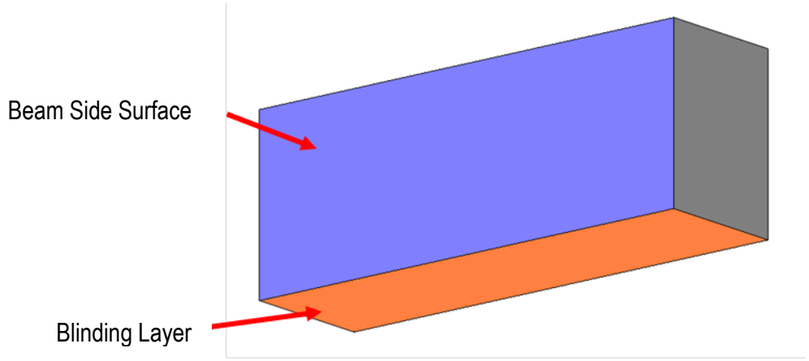


Step 3. In the section view, use Trim/Extend Single Element command (under Modify > Modify > Trim/Extend Single Element)  to join tie beam and pile cap.

Figure 4-9 Steps for creating a slanted tie beam

For other modelling requirements, DS-U 04_Structural Framing shall generally be followed.

- Pre-setting of loadable Revit families of structural framings (for foundation beams) by the method below enables the measurement of area for formwork and blinding layer (similar to the method depicted in DS-U 04 of Superstructure SAM).
- Vertical faces (except ends of beam) of foundation beam families to be painted with material/finishes “Beam Side Surface” and the bottom faces to be painted with material/finishes “Blinding Layer”.



- A sample Revit family of beam with this setting is available in HA Family Library. The file name of the family is “SFD-FBM-HAS-Rectangular.rfa”.
- When these families are applied for model authoring, area of formworks and blinding layer can be derived therefrom by appropriate adjustments.

Marks

An unique beam mark shall also be given under “Mark” to each instance element for easy tracking and identification. This description can facilitate other model user to sort out elements according to their structural usage within a model.

Dimensions	
Length	5700.0
Volume	1.560 m^3
Elevation at Top	3500.0
Elevation at Bottom	2750.0
Identity Data	
Image	
Comments	
Mark	TB11

D4.6 Structure – Excavation and Lateral Support SAM

This section of SAM involves structural elements of lateral support only, for superstructure elements and foundation elements, please refer to **D4.4** and **D4.5**. Autodesk Revit has been the modelling tools throughout this document. It is assumed that users shall possess structural engineering knowledge and basic Revit modelling skill when using this guide.

It is advisable that all structural models shall be created using of HA SE Revit template, HA SE Revit families/component library and HA SE shared parameters files developed by this SAM. These files are saved in HA Family Library. For detailed ProjectWise link of the library folder, please refer to **D4.4**.

DS-E 01 Earth Retaining Structure

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-RWL-HAS-<Descriptor 1 (Sub-type)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Size>

Naming example

Family name								**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Sub-type)**	**Descriptor 2 (Optional)**	**Structural material**		**Size(mm)**
SFD	-	RWL	-	HAS	-	Diaphragm _Wall	- <Not used>	30D/20	-	3000(Thickness)

Functional type example

Functional of earth retaining structural	**Description**
RWL	Retaining wall

The Earth Retaining Structures can be classified as below:

Type of Walls	**Formation**
Permanent retaining walls	Usually of reinforced concrete construction.
Temporary retaining walls	Usually formed by structural steel components.

Information Requirement

List of Built-in Parameter

Remark: Parameters in grey colour is optional parameters

Parameter name	**Information**	**Remark**	**Example**
Type	Family type	Under using the correct family, choosing the type with correct size	30D/20-800x800x600
Level	Retaining structure level	The level to which the retaining structure is constrained.	L1, L2……
Height Offset from Level	Offset distance from Level	Specifies the elevation of the top of the retaining structure relative to the constrained level.	-50mm,0.0mm,100mm, 200mm,250mm,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	30D/20,35D/20,40D/20, 30D/20_PFA, 30D/20_Waterproofing …
Mark	Retaining structure mark	Optional information to be added to retaining structure elements This value must be unique for each element in a project.	RTW01, RTW02, ……

Note on Shared Parameter:

Shared parameters are stored in a text file named: Foundation_Shared_Parameters.txt which can be obtained from BIMST and stored in an individual local hard drive for modelling purpose:

Note on Materials:

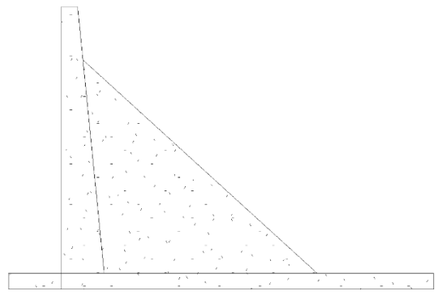
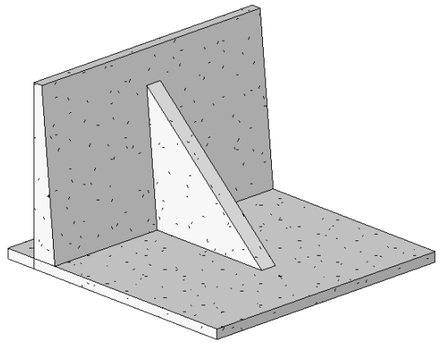
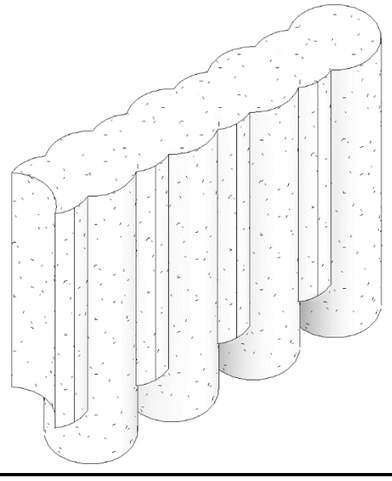
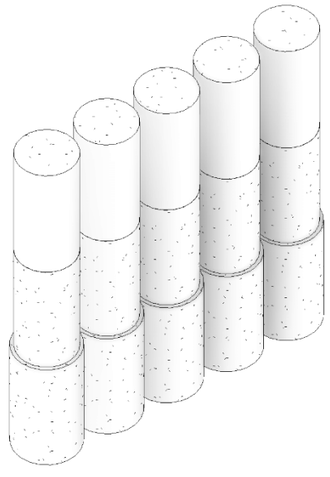
- All retaining wall elements shall be assigned with the designed construction material (i.e. concrete for reinforced concrete retaining walls.
- All materials used shall be named accordingly for easy reference. Refer to **D.MET-3.2** (e)Material Naming
- All retaining wall families within a project template shall be named with convention stated in this HABIMSG so that they can be distinguished from the default ones.
- In case new retaining wall families are to be included in the SAM Family/Component Library, they shall be accompanied with explanatory notes. These notes shall include:

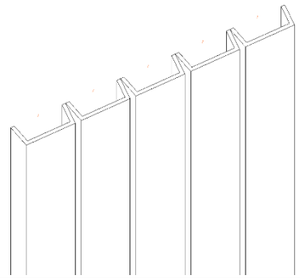
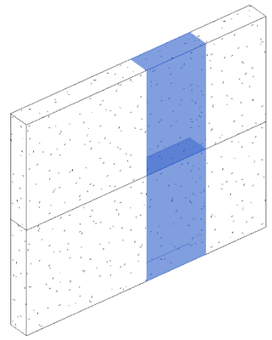
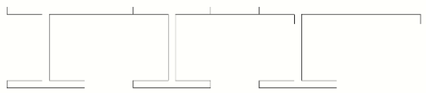
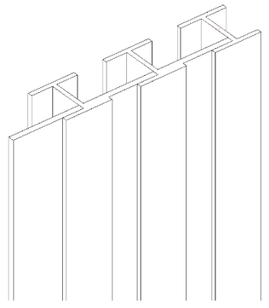
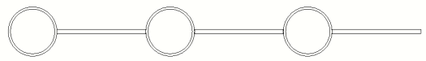
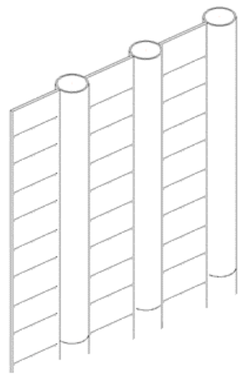
The family category

- Description of its application;
- Components included and method of modelling;
- Meaning of each parameter assigned;
- Scope and steps of application; and
- Limitations and points to note.

Model Authoring

Retaining Walls Families

R.C. Cantilevered Retaining Wall	R.C. Counterfort Retaining Wall
	
Secant Pile Wall	**Contiguous Bored Pile Wall**
	

Steel Sheet Piles	Diaphragm Wall
 	
Solider Pile Wall	**Pipe Pile Wall**
 	 

- All earth retaining structures shall be modelled under the Category of “Structural Foundation”. All foundation elements shall be modelled with consistent units.

Descriptions	Units
Dimension	Millimetres (mm)
Angles	Degree (º)
Level (including cut-off levels, founding levels, cap/footing top levels..etc)	Meter above Principal Datum (mPD)

Analytical Plane

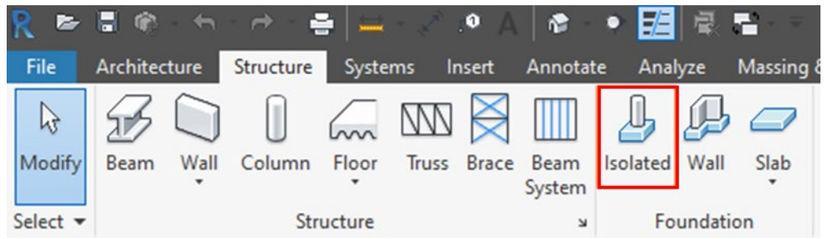
- Earth retaining structures are standalone structural elements which will NOT take part in the structural analysis.

Notes on Reinforcements:

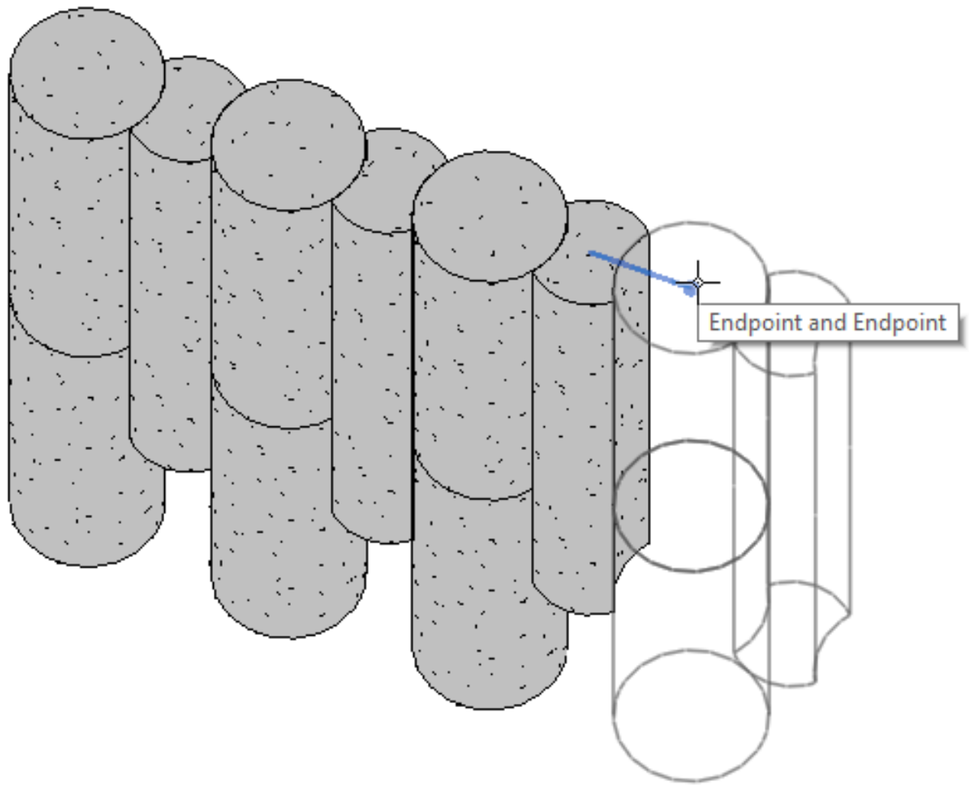
- Reinforcement, construction joints, drainage provisions, backfilling material etc. in all retaining wall structures will be excluded from the Revit Structure model.

General modelling steps for Earth Retaining Structure

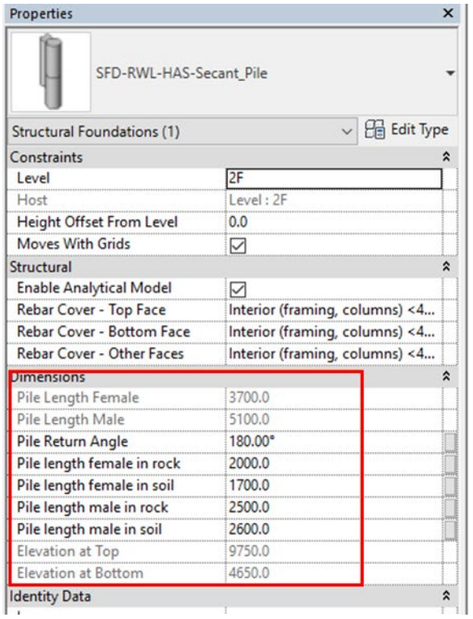
Step 1. Click Structural Foundation : Isolated command under Structure > Foundation > Isolated

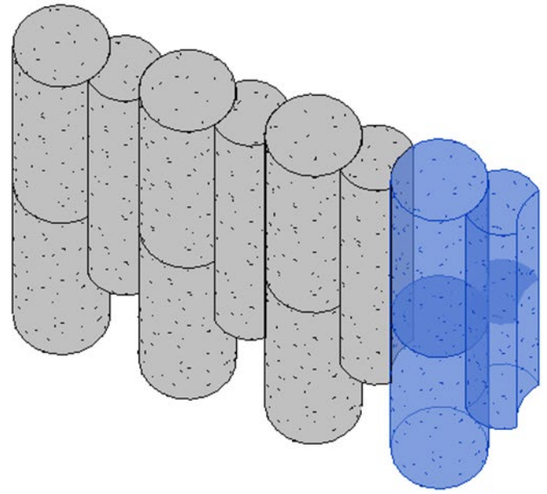


Step 2. Select earth retaining structure family and place it to correct location.



Step 3, Update the properties of earth retaining structure elements if any.





Detailed steps for each type of retaining wall refer to **DS-E 02 to DS-E 08**.

DS-E 02 Retaining Wall

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-RWL-HAS-<Descriptor 1 (Sub-type)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Wall thickness>

Naming example

Family name										**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Sub-type)**		**Descriptor 2 (Optional)**		**Structural material**		**Wall thickness (mm)**
SFD	-	RWL	-	HAS	-	Cantilevered_Retaining_Wall	-	<Not used>		30D/20	-	500
SFD	-	RWL	-	HAS	-	Counterfort_Retaining_Wall	-	<Not used>		30D/20	-	1000

The reinforced concrete cantilevered retaining wall commonly adopted in HA is made from an internal stem of reinforced, cast-in-place concrete which is often in the shape of an inverted T. The cantilevered walls may include counterforts on the back to improve their structural strength, rigidity and stability.

The cantilevered retaining wall shall be modelled according to its sectional size under the Category of "**Structural Foundations**".

Information Requirement

List of Built-in Parameter

Refer to **DS-E 01** Earth Retaining Structure

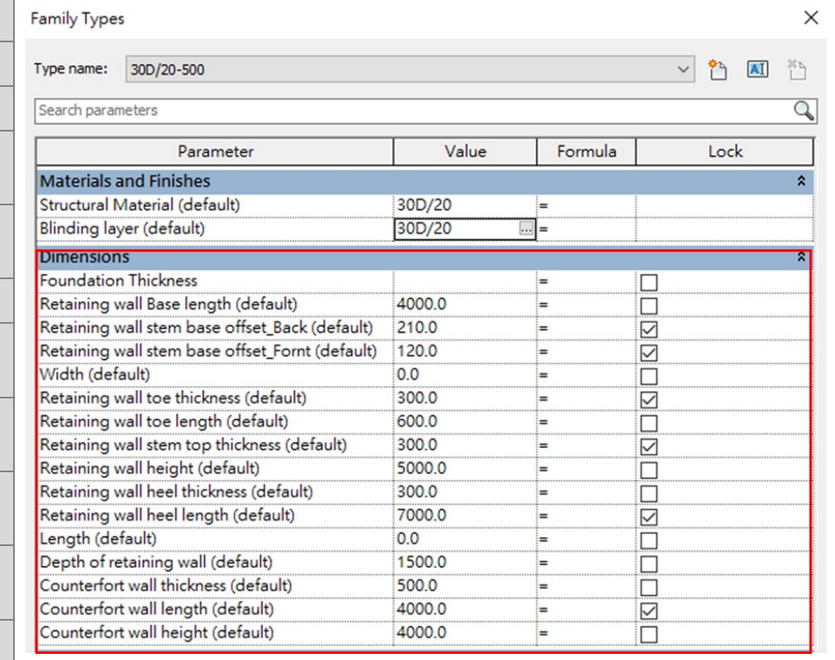
List of Shared Parameter

Refer to **DS-E 01** Earth Retaining Structure

Shared Parameter of the Family:

A shared parameter labelled as "**Depth of retaining wall**" is used to control the top level of the wall base below the proposed ground level.

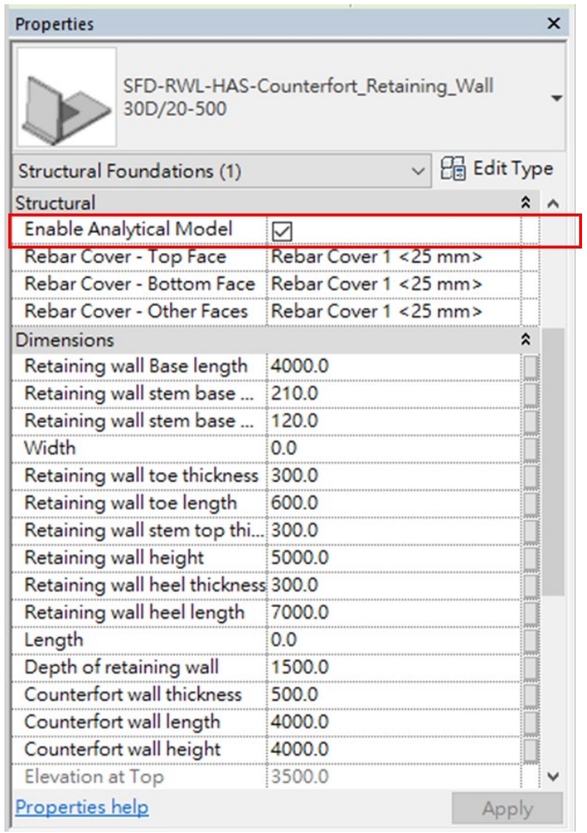
Retaining Wall Family	
Shared Parameters	Customized parameters in Family Type
Retaining wall length	
Retaining wall height	
Depth of retaining wall	
Retaining wall stem top thickness	
Retaining wall stem base thickness	
Retaining wall toe length	
Retaining wall toe thickness	
Retaining wall heel length	
Retaining wall heel thickness	
Counterfort wall thickness	
Counterfort wall height	
Counterfort wall length	



Model Authoring

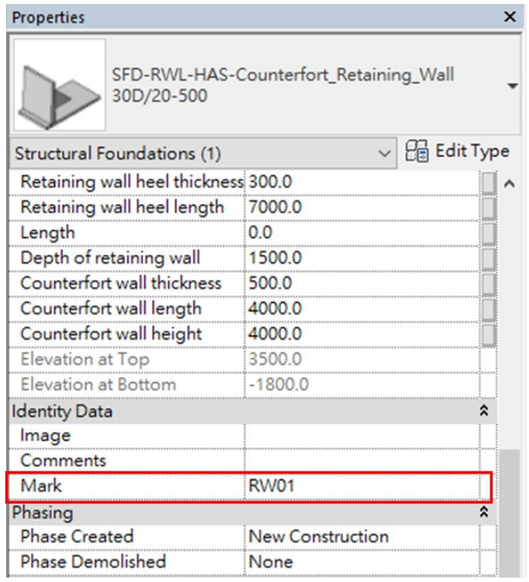
Analytical Links

- The cantilevered retaining walls are usually independent from the analytical model of the building structure. Thus, their instance properties in the field of “Enable Analytical Model” shall be unchecked.



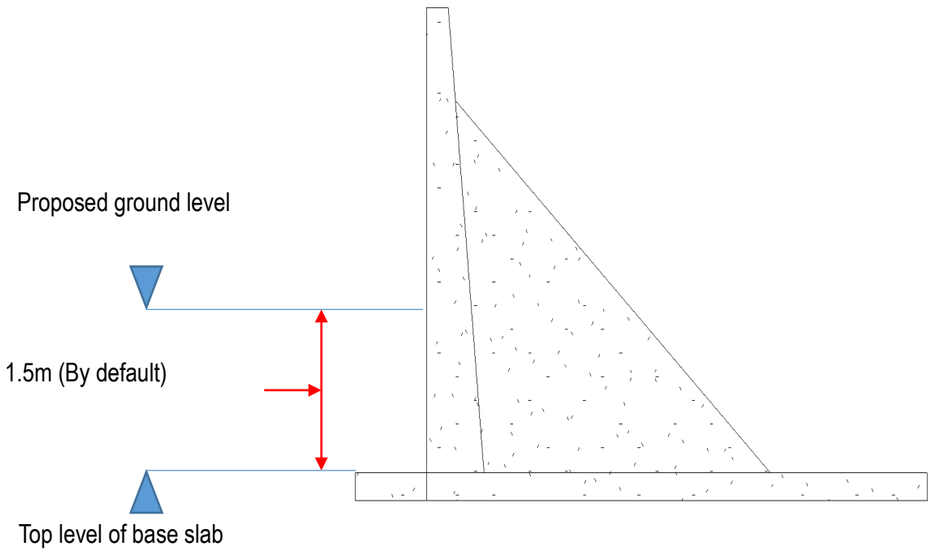
Marks and Comments:

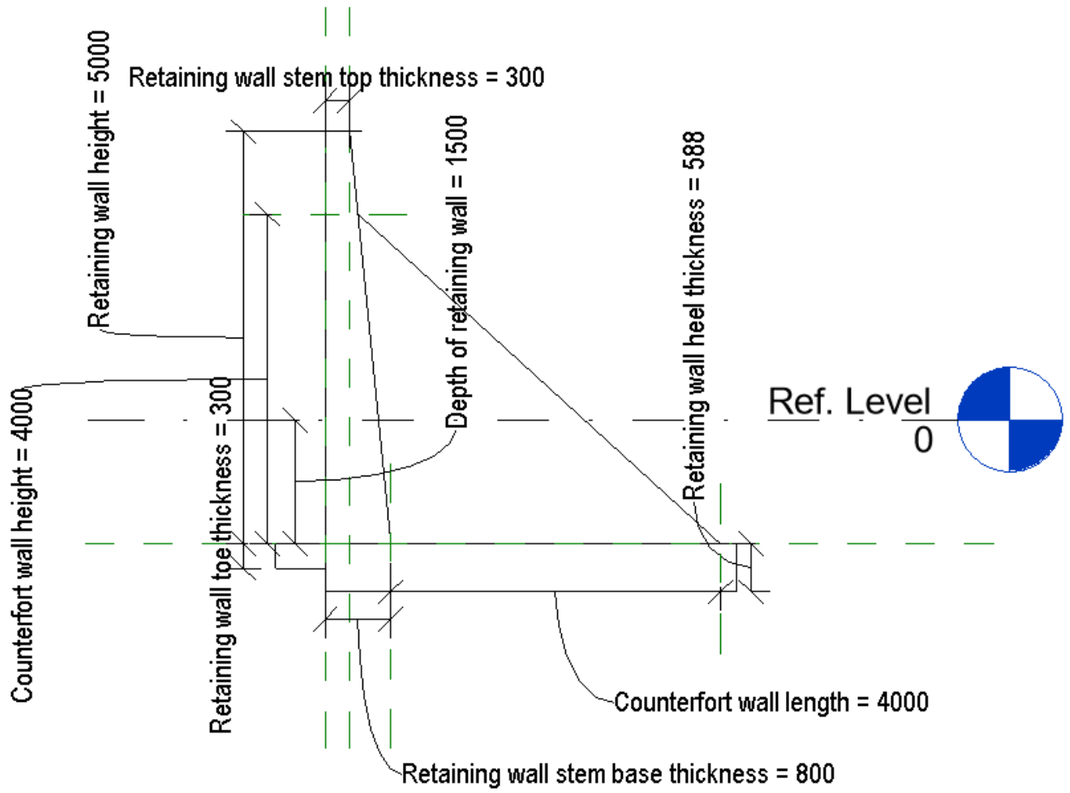
- To enable subsequent generation of material schedules, all R.C. cantilevered retaining wall families in the Project Revit Structure model shall be assigned with a unique wall mark. This wall mark can be input in the “Mark” field of “Identity Data” in the Properties Palette.
- It is also advised to specify the usage of the element in its Properties palette under the “Comments” field such as “**Cantilevered Retaining Wall**”. Such description can facilitate other model user to sort out the elements according to their structural usage within a model.



Note on Foundation level:

- The top of the base slab of the retaining wall is by default set to 1.5m below the proposed ground level.





- The Reference Level shall be the proposed ground floor level which is set to 0.0 mPD by default. Model authors shall amend the level of proposed ground level to suit the architectural requirements.

DS-E 03 Contiguous Bored Pile Wall

The contiguous bored pile wall is constructed by employing bored piling technique with small gaps between adjacent piles and the size of these gaps is determined by the nature of the soils.

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-RWL-HAS-<Descriptor 1 (Sub-type)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Bored pile diameter>

Naming example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Sub-type)**		**Descriptor 2 (Optional)**	**Structural material**		**Bored pile diameter (mm)**
SFD	-	RWL	-	HAS	-	Contiguous _Bored_Pile_ Wall	-	<Not used>	30D/20	-	1000

Information Requirement

List of Built-in Parameter

Refer to **DS-E 01** Earth Retaining Structure

List of Shared Parameter

Refer to **DS-E 01** Earth Retaining Structure

Shared Parameter and Family:

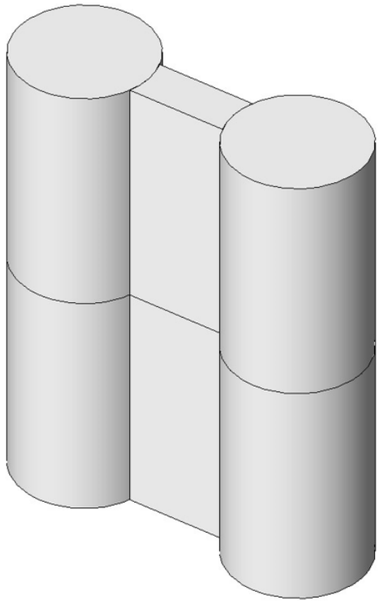
Contiguous Bored Pile family	
Shared Parameters	Customized parameters in Family Type
Pile diameter	
Lag length	
Lag thickness	
Pile length in soil	
Pile length in rock	

Parameter	Value	Formula	Lock
Constraints			
Default Elevation	0.0 mm	=	☐
Materials and Finishes			
Structural Material (default)	30D/20	=	
Liner (default)	Steel, Paint Finish, Blue	=	
Dimensions			
Width	0.0 mm	=	☐
Total pile length (report)	10000.0 mm	=	
Pile length in soil (default)	5000.0 mm	=	☐
Pile length in rock (default)	5000.0 mm	=	☐
Pile diameter (default)	3000.0 mm	=	☑
Length	0.0 mm	=	☐
Lag thickness (default)	1000.0 mm	=	☐
Lag length (default)	2000.0 mm	=	☐
Foundation Thickness		=	☐
Identity Data			

Model Authoring

Modelling of contiguous bored pile wall

This method of retaining wall construction is usually used in permanent work as free standing cantilevered structure.

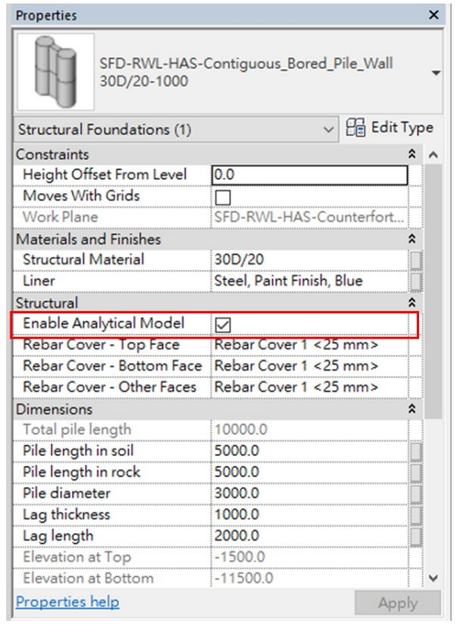


Note on Details:

- Unless otherwise specified, the pile diameter of the bored pile wall shall be the effective shaft diameter.
- Temporary steel casings used for the construction of bored piles shall NOT be included in the bored pile wall families.
- No capping beam shall be included in the bored pile wall families.

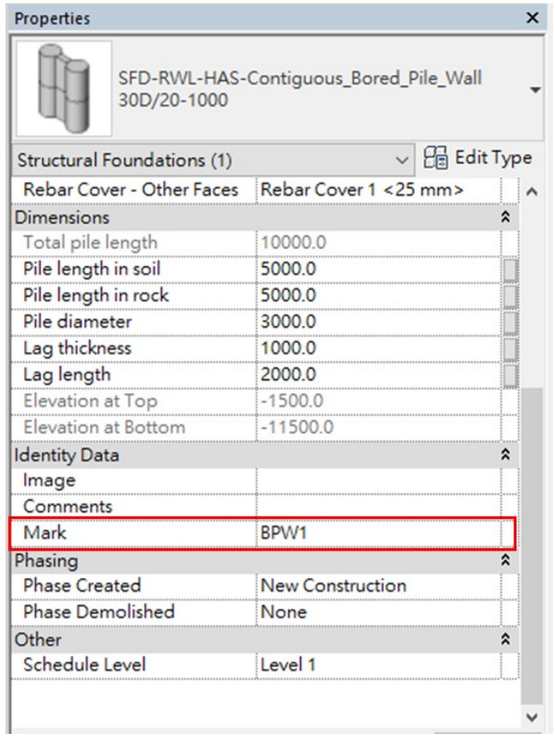
Analytical Links

When bored pile walls are involved in the analytical model of the building structure, their instance properties in the field of “Enable Analytical Model” shall be toggled.



Marks and Comments:

- To enable subsequent generation of piling schedule, all bored piles of the piled wall families in the Project Revit Structure model shall be assigned with a unique pile number. This pile number can be input in the “Mark” field of “Identity Data” in the Properties Palette.
- It is advised to specify the usage of the element in its Properties palette under Comments filed such as “Contiguous Bored Pile Wall”. Such description can facilitate other model user to sort out the elements according to their structural usage within a model.



Quantity Take-off

The total pile length shall be a value calculated by adding the two length parameters, i.e. (“Pile length in soil” + “Pile length in rock”).

For subsequent material take-off, the total volume of soil and rock excavation per pile shall be calculated by multiplying the concrete portion of the pile and the “Pile length in soil” and “Pile Length in rock” respectively.

Bored Pile Wall Type	Volume of soil excavation	Volume of Rock excavation
Contiguous Bored Pile Wall	Concrete portion of the pile x Pile length in soil	Concrete portion of the pile x “Pile length in rock”

DS-E 04 Secant Pile Wall

Secant pile walls are constructed such that space is left between alternate 'female' piles for the subsequent construction of 'male' piles.

Construction of 'male' piles involves boring through the concrete in the 'female' piles hole in order to key 'male' piles in between.

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-RWL-HAS-<Descriptor 1 (Sub-type)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Pile Diameter>

Naming example

Family name										Type name		
Category		**Functional type**		**Originator**		**Descriptor 1 (Sub-type)**		**Descriptor 2 (Optional)**		**Structural material**		**Pile Diameter (mm)**
SFD	-	RWL	-	HAS	-	Secant_Pile_Wall	-	<Not used>		30D/20	-	1000

Information Requirement

List of Built-in Parameter

Refer to **DS-E 01** Earth Retaining Structure

List of Shared Parameter

Refer to **DS-E 01** Earth Retaining Structure

Shared Parameter and Family:

Secant Pile Wall Family	
Shared Parameters	Customized parameters in Family Type
Female pile diameter	
Male pile diameter	
Lap length	
Female pile length in soil	
Male pile length in soil	
Female pile length in rock	
Male pile length in rock	

Parameter	Value	Formula	Lock
Materials and Finishes			
Structural Material	30D/20	=	
Dimensions			
Foundation Thickness		=	☐
Length	0.0	=	☑
Pile Crs	700.0	=	☐
Pile Length Female (default)	3700.0	= Pile length female in rock + Pile length female in soil	☐
Pile Length Male (default)	5100.0	= Pile length male in rock + Pile length male in soil	☐
Pile Return Angle (default)	180.00°	=	☐
Pile Size Female	800.0	=	☐
Pile Size Male	1200.0	=	☐
Pile length female in rock (default)	2000.0	=	☐
Pile length female in soil (default)	1700.0	=	☐
Pile length male in rock (default)	2500.0	=	☐
Pile length male in soil (default)	2600.0	=	☐
Width		=	☑
Other			
Pile Female (default)	☑	=	
Identity Data			

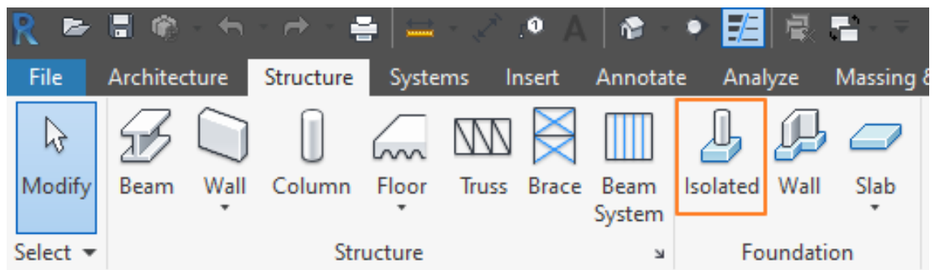
Model Authoring

Modelling of secant pile wall

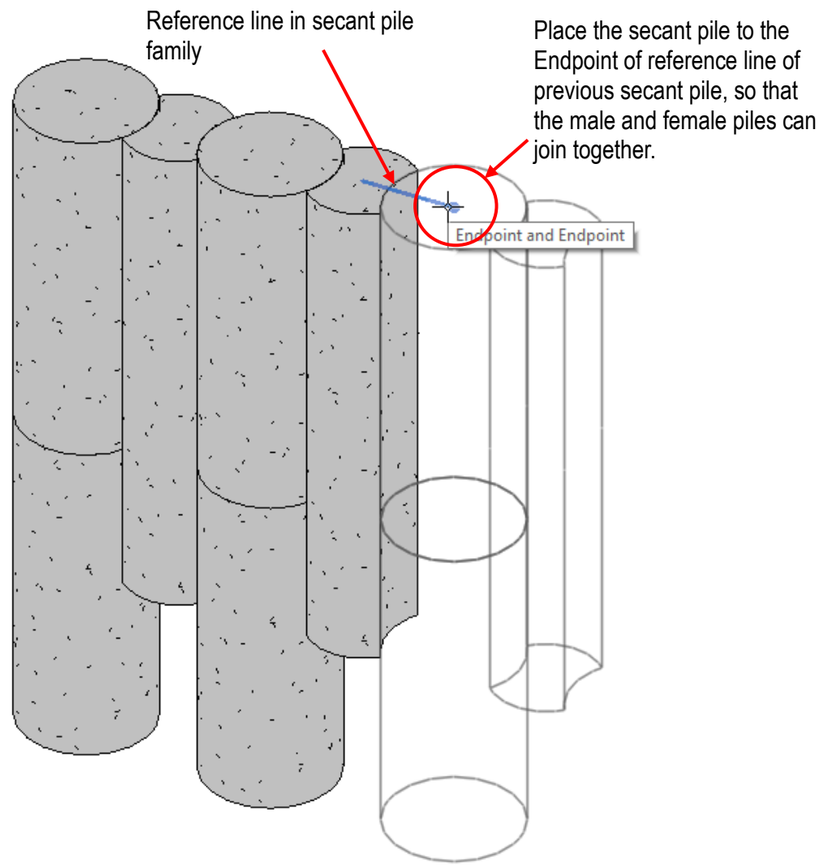
The male pile is the one where steel reinforcement cages are installed, though in some cases the female piles are also reinforced.

Key steps for modelling of secant pile wall are specified as below:

Step 1. Click Structural Foundation : Isolated command under Structure > Foundation > Isolated



Step 2. Select earth retaining structure family and place the secant pile to correct location.



Note on details:

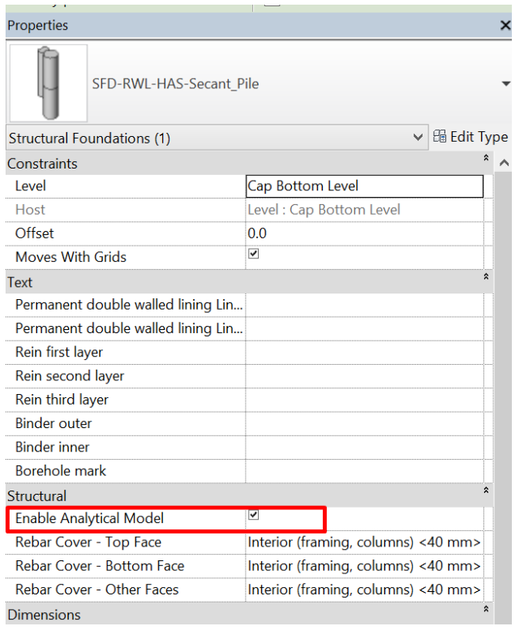
- Unless otherwise specified, the pile diameters of the secant pile wall shall be the effective shaft diameters of the 'female" and male' piles.
- Temporary steel casings used for the construction of bored piles shall NOT be included in the secant pile wall families.
- No capping beam shall be included in the secant pile wall families.

Note on Foundation level:

The Reference Level shall be the proposed ground floor level and is set to 0.0 mPD by default. Model authors shall amend the level of proposed ground level to suit the architectural requirements.

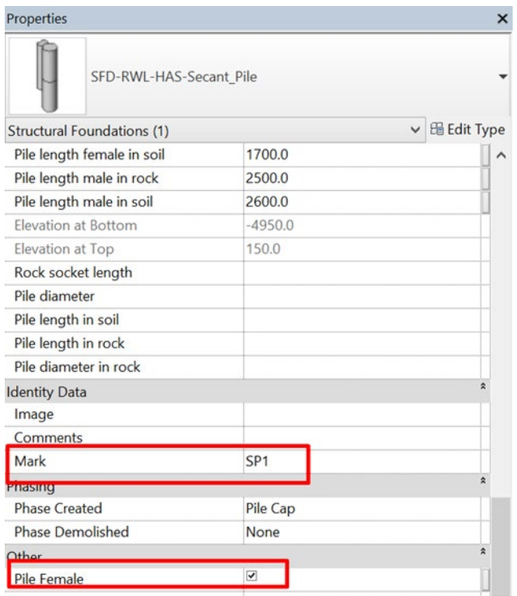
Analytical Links

When secant pile walls are involved in the analytical model of the building structure, their instance properties in the field of “Enable Analytical Model” shall be toggled.



Marks

- To enable subsequent generation of piling schedule, all 'female' and 'male' piles of the secant piled wall families in the Project Revit Structure model shall be assigned with a unique secant pile number. This pile number can be input in the “Mark” field of “Identity Data” in the Properties Palette.



Quantity Take-off

The total pile length shall be a value calculated by adding the two length parameters, i.e. (“Pile length in soil” + “Pile length in rock”).

Total volume for Material Take-off in Schedule:

Pile Wall Type	Volume of soil excavation	Volume of Rock excavation
Secant Pile Wall	Concrete portion of the pile x Pile length in soil	Concrete portion of the pile x “Pile length in rock”

DS-E 05 Diaphragm Wall

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-RWL-HAS-<Descriptor 1 (Sub-type)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Size>

Naming example

Family name								**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Sub-type)**		**Descriptor 2 (Optional)**	**Structural material**	**Size (mm x mm)**
SFD	-	RWL	-	HAS	-	Diaphragm_ wall	-	<Not used>	30D/20	-	3000x1000

Information Requirement

List of Built-in Parameter

Refer to **DS-E 01** Earth Retaining Structure

List of Shared Parameter

Refer to **DS-E 01** Earth Retaining Structure

Other Parameters

The following parameters under 'Constraints' shall be set in family

Parameter	Type / Instance	Description	Schedule
b	Type	Width of wall	Y
L	Instance	Length of wall	Y
h	Instance	Overall height of wall	Y
h1	Instance	Wall height of soil	Y
h2	Instance	Wall height at rockbed	Y

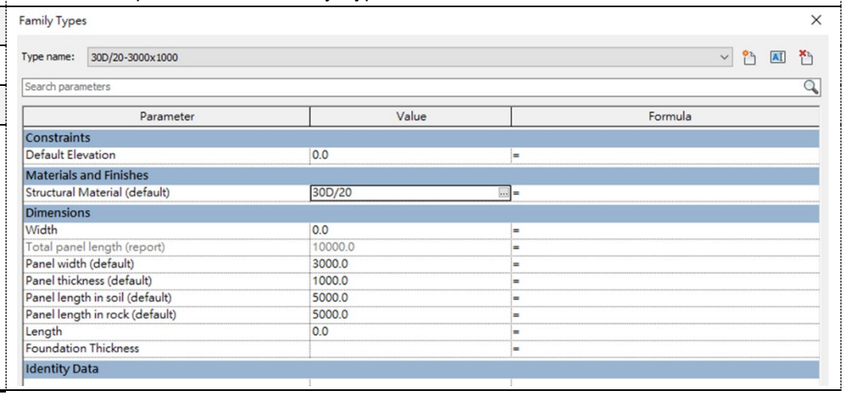
The following parameters under 'Materials and Finishes' shall be set in family:

Parameter	Type / Instance	Description	Schedule
Wall	Type	Material of wall	N
Soil Excavation	Type	Material of wall by soil part	N
Rock Excavation	Type	Material of wall by Rock part	N

The following parameters under 'Other' shall be set in family:

Parameter	Type / Instance	Description	Schedule
Calc_Area	Instance	Section Area	Y
Wall_Diaphragm wall	Type	Filter by Schedule	Y

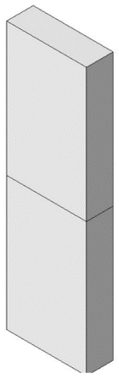
Shared Parameter and Family:

Diaphragm Wall Family	
Shared Parameters	Customized parameters in Family Type
Panel thickness	
Panel width	
Panel length in soil	
Panel length in rock	

Model Authoring

Modelling of diaphragm wall

The diaphragm wall is formed by the alternate construction of primary and secondary reinforced concrete panels. Thus, the diaphragm wall in the Project Revit Structure model shall be made of a series of diaphragm wall panels.

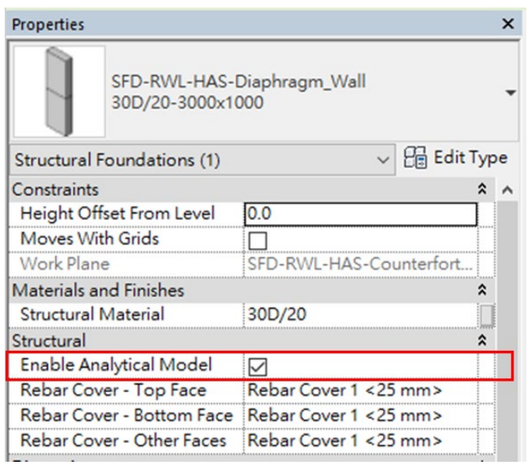


Note on details:

- Capping beam, guide-wall, reinforcement and bentonite slurry shall be excluded in the diaphragm wall families.
- The diaphragm wall family (i.e. diaphragm wall panel) shall be modelled according to the proposed design section and modelled under the Category of Structural Foundations.
- The Reference Level shall be the proposed ground floor level and is set to 0.0 mPD by default

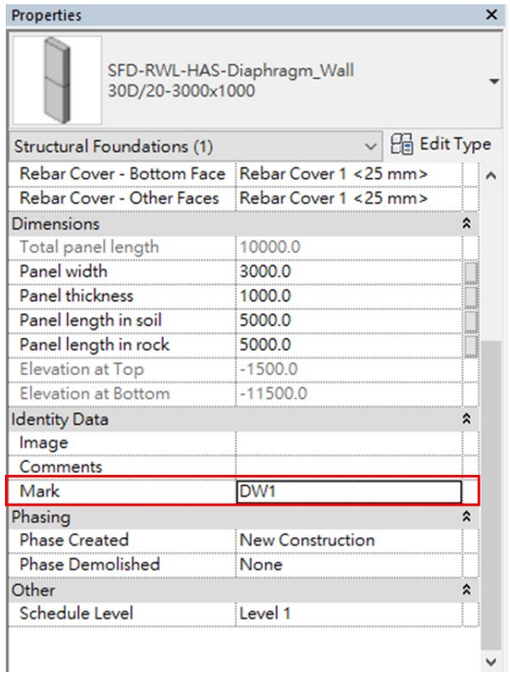
Analytical Plan Link

When diaphragm walls are involved in the analytical model of the building structure, their instance properties in the field of “Enable Analytical Model” shall be toggled.



Marks

- To enable subsequent generation of pile schedule, the diaphragm wall family in the Project Revit Structure model shall be assigned with a unique pile number. This pile number can be input in the “Mark” field of “Identity Data” in the Properties Palette.



Quantity take-off

The total panel length shall be a value calculated by adding the two length parameters, i.e. (“Panel Length in Soil” + “Panel Length in Rock”)

Total volume for Material Take-off in Schedule:

Wall Type	Volume of soil excavation	Volume of Rock excavation
Panel Wall	Concrete portion of the pile x Panel length in soil	Concrete portion of the pile x “Panel length in rock”

DS-E 06 Steel Sheet Piles

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-RWL-HAS-<Descriptor 1 (Sub-type)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Size>

Naming example

Family name								**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Sub-type)**	**Descriptor 2 (Optional)**	**Structural material**		**Size (mm x mm x mm)**
SFD	-	RWL	-	HAS	-	Sheet_pile	<Not used>	S355	-	700x315x8.5

Information Requirement

List of Built-in Parameter

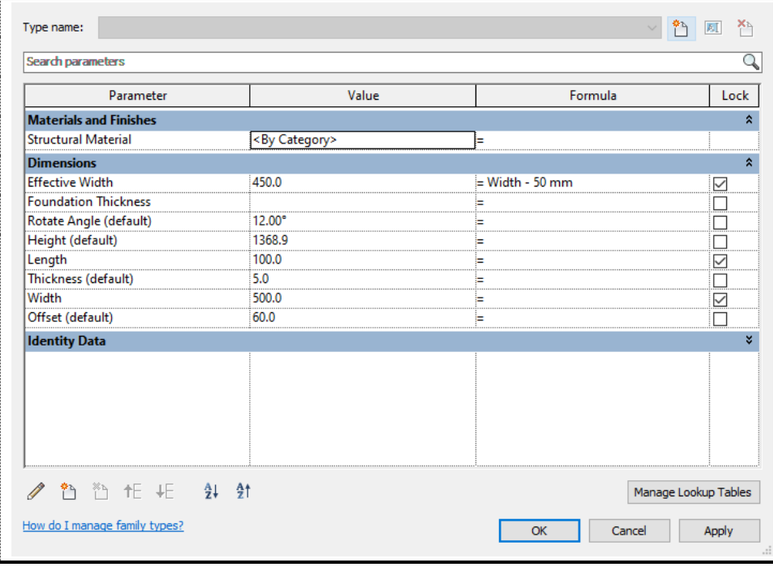
Refer to **DS-E 01** Earth Retaining Structure

List of Shared Parameter

Refer to **DS-E 01** Earth Retaining Structure

Shared Parameter and Family:

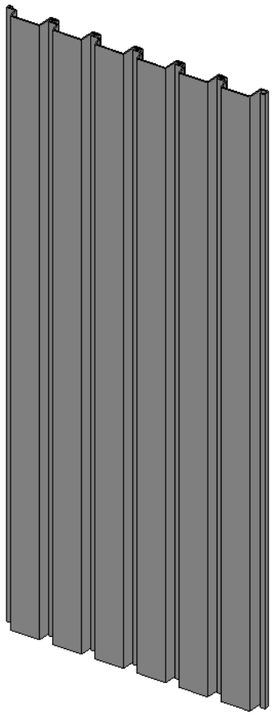
Steel Sheet Pile Family	
Shared Parameters	Customized parameters in Family Type
Effective Width	
Rotation Angle	
Height	
Length	
Thickness	
Width	
Offset	



Model Authoring

Modelling of sheet piles

The steel sheet piles used in the Project Revit Structure model are of temporary construction.



Notes on Details:

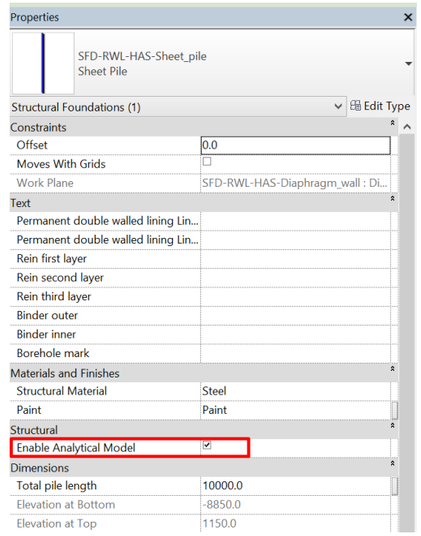
- The steel sheet pile family types shall be modelled according to their sectional dimensions and properties under the Category of “Structural Foundations”.
- No calculation for volume of excavation shall be required.

Note on Foundation level:

The Reference Level shall be the proposed ground floor level and is set to 0.0 mPD by default

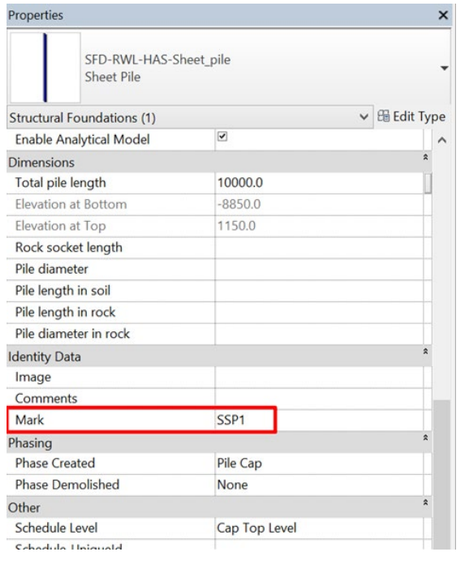
Analytical Links

The steel sheet piles are normally not involved in the building structure analytical model, their instance properties in the field of “Enable Analytical Model” shall be unchecked.



Marks

To enable subsequent generation of steel piling schedule, all steel sheet piles in the Project Revit Structure model shall be assigned with a unique sheet pile number. This sheet pile number can be input in the “Mark” field of “Identity Data” in the Properties Palette.



DS-E 07 Soldier Piles

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-RWL-HAS-<Descriptor 1 (Sub-type)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Size>

Naming example

Family name								**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Sub-type)**		**Descriptor 2 (Optional)**	**Structural material**		**Size (mm x mm x m)**
SFD	-	RWL	-	HAS	-	Soldier_Pile	-	<Not used>	S355	-	305x305x24.8

Information Requirement

List of Built-in Parameter`

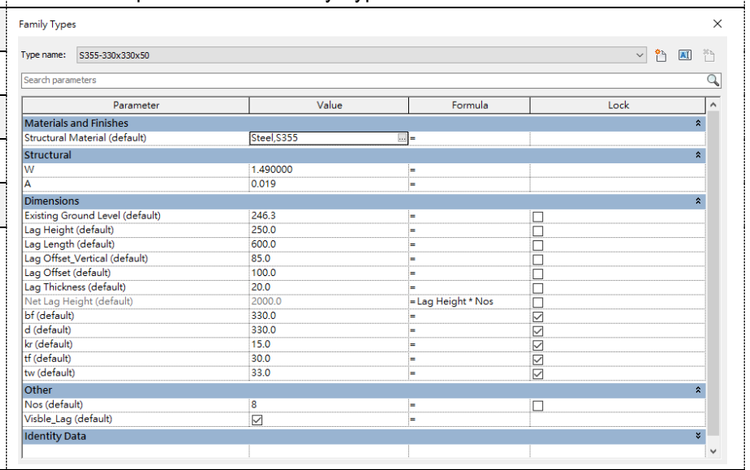
Refer to **DS-E 01** Earth Retaining Structure

List of Shared Parameter

Refer to **DS-E 01** Earth Retaining Structure

Shared Parameter and Family:

Soldier Wall Family	
Shared Parameters	Customized parameters in Family Type
Existing Ground Level	
Lag Height	
Lag length	
Lag thickness	
Nos	
H-pile parameters: bf, d, kr, tf, tw	



Model Authoring

- The soldier piles, also known as king piles, are constructed of wide flange steel H sections spaced about 2 to 3 m apart and are driven prior to excavation.
- As the excavation proceeds, horizontal timber sheeting or steel section (lagging) is inserted behind the H-pile flanges with the required timber grade.
- Thus, the soldier piles used in the Project Revit Structure model are of temporary construction.

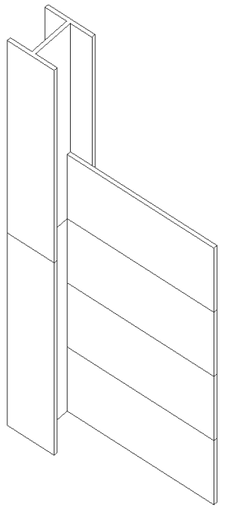
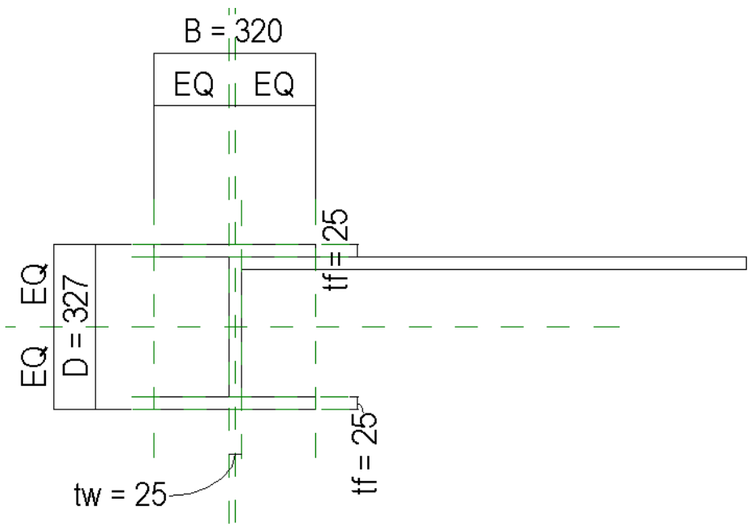
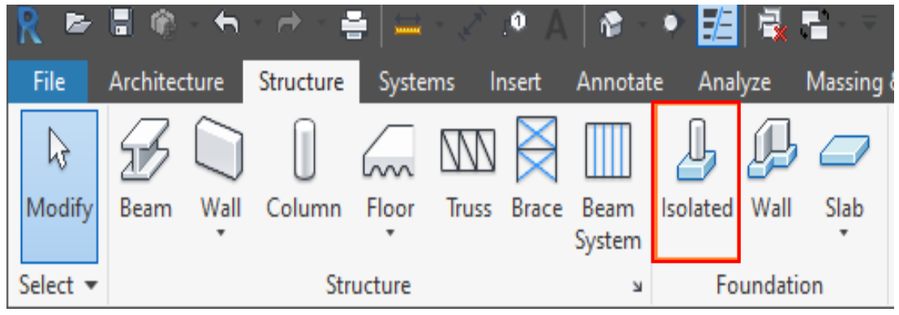


Figure 4-10 Solider pile wall family 3D view

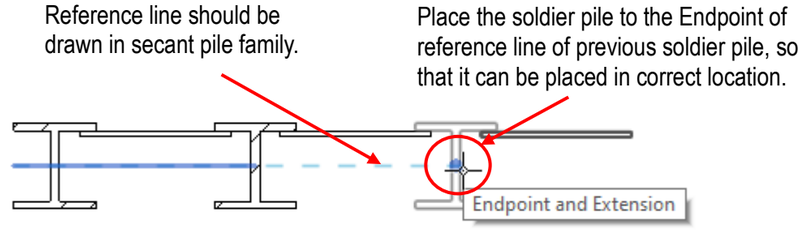


Steps for creating solider pile wall

Step 1. Click Structural Foundation : Isolated command under Structure > Foundation > Isolated



Step 2. Select earth retaining structure family and place the secant pile to correct location.



Note on details:

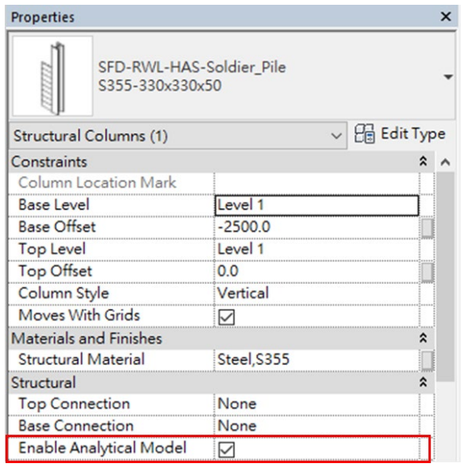
- The soldier piles family shall be composed of two components, the steel H-pile and the lagging either made structural steel sections.
- The soldier pile family types shall be modelled according to their sectional dimensions and properties under the Category of "**Structural Foundations**".
- No calculation for volume of excavation shall be required

Note on Foundation level:

The Reference Level shall be the proposed ground floor level and is set to 0.0 mPD by default

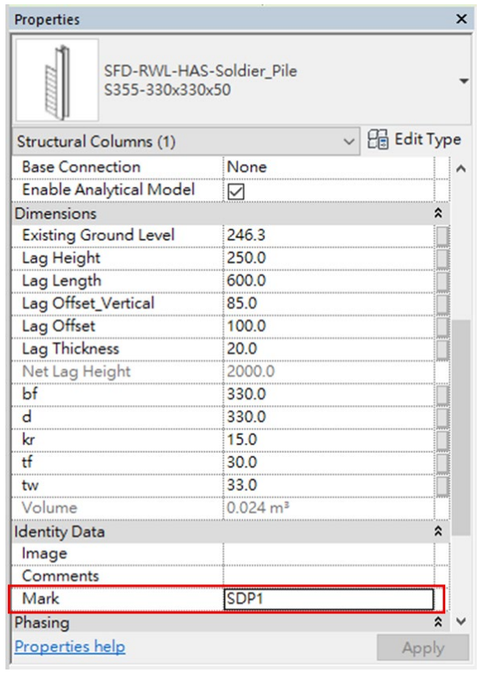
Analytical Links

The solider piles are normally NOT involved in the building structure analytical model; their instance properties in the field of “Enable Analytical Model” shall be unchecked.



Marks

To enable subsequent generation of soldier piling schedule, all steel H-piles in the Project Revit Structure model shall be assigned with a unique pile number. This pile number can be input in the “Mark” field of “Identity Data” in the Properties Palette.



Quantity Take-off

The length of pile shall be measured from the existing ground level to the pile founding level.

DS-E 08 Steel Pipe Piles

Discipline	Structural
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD-RWL-HAS-<Descriptor 1 (Sub-type)>-<Descriptor 2 (Optional)>
Type Naming Convention	<Structural material>-<Pile Diameter>

Naming example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1 (Sub-type)**		**Descriptor 2 (Optional)**	**Structural material**		**Pile Diameter (mm)**
SFD	-	RWL	-	HAS	-	Pipe_pile	-	<Not used>	S355	-	600

Information Requirement

List of Built-in Parameter

Refer to **DS-E 01** Earth Retaining Structure

List of Shared Parameter

Refer to **DS-E 01** Earth Retaining Structure

Other Parameters

Shared Parameter and Family:

Steel Pipe Pile Wall Family

Shared Parameters	Customized parameters in Family Type
Existing Ground Level	
Lag Height	
Lag Length	
Lag Offset	
Lag Thickness	
Net length Of Pile	
Pile External Diameter	
Pile Internal Diameter	
Nos	
Visble_Lag	

Family Types

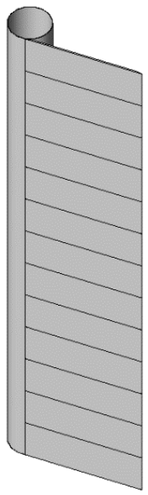
Type name: S355-600

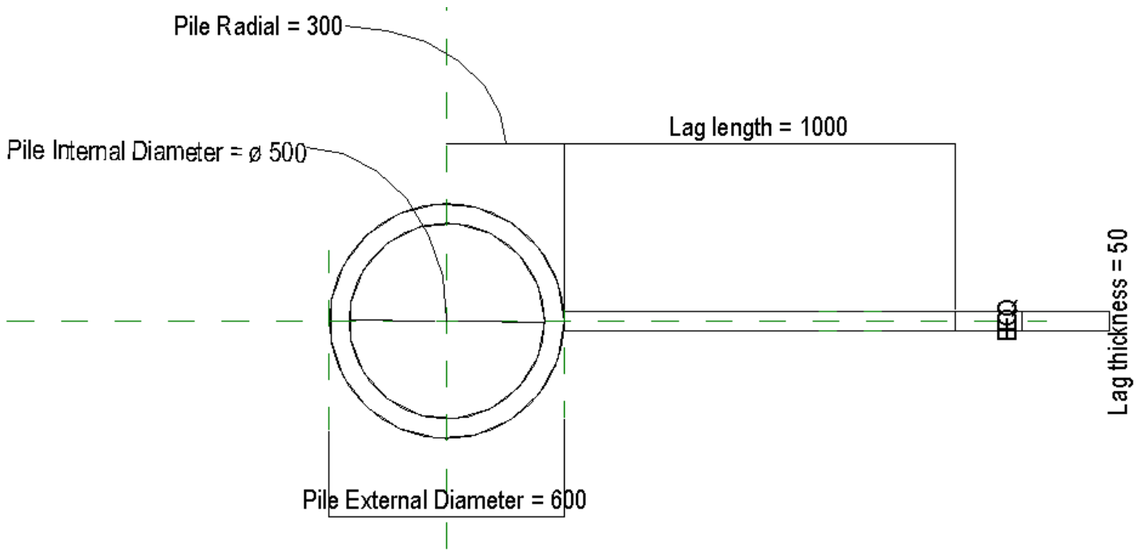
Search parameters

Parameter	Value	Formula	Lock
Constraints			
Default Elevation	1219.2	=	☐
Materials and Finishes			
Structural Material (default)	Steel Grade S355	=	
Dimensions			
Existing Ground Level (default)	800.0	=	☐
Foundation Thickness		=	☐
Lag Height (default)	615.4	= Net length Of Pile / Nos	☐
Lag Length (default)	1800.0	=	☐
Lag Offset (default)	280.0	=	☐
Lag Thickness (default)	20.0	=	☐
Net length Of Pile (default)	8000.0	=	☐
Pile External Diameter (default)	610.0	=	☐
Pile Internal Diameter (default)	600.0	=	☐
Length		=	☑
Width		=	☑
Other			
Nos (default)	13	=	☐
Visble_Lag (default)	☑	=	
Identity Data			

Model Authoring

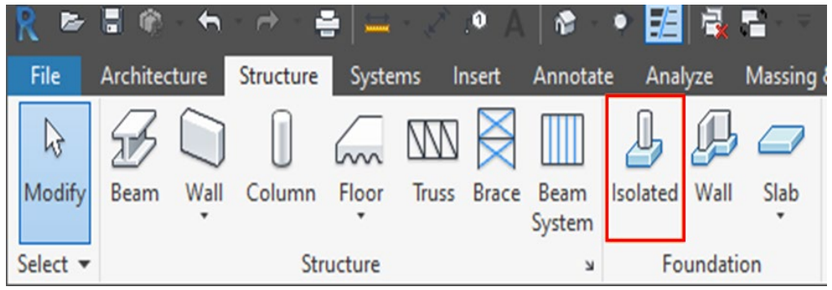
The pile diameter shall be the external diameter of the steel casing



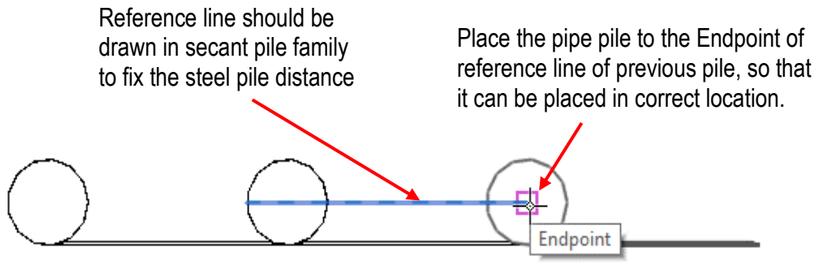


Steps for modelling of steel pipe pile

Step 1. Click Structural Foundation : Isolated command under Structure > Foundation > Isolated



Step 2. Select earth retaining structure family and place the secant pile to correct location.



Note on Details:

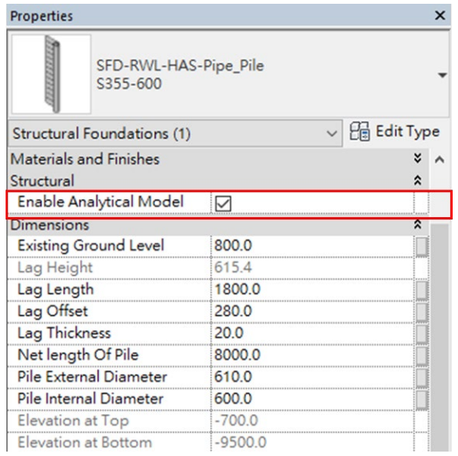
- The steel pipe pile family types shall be modelled according to their sectional dimensions and properties under the Category of "*Structural Foundations*".
- The length of steel pipe pile shall be measured from the existing ground level to the pile founding level.

Note on Foundation Level

The Reference Level shall be the existing ground level and is set to 0.0 mPD by default.

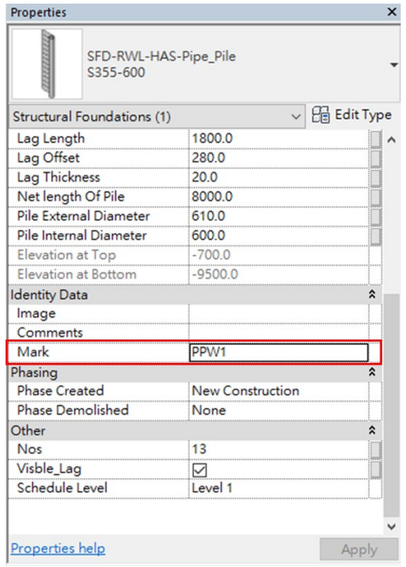
Analytical Links

The steel pipe piles are normally not involved in the building structure analytical model, their instance properties in the field of “Enable Analytical Model” shall be unchecked.



Marks

To enable subsequent generation of steel piling schedule, all steel pipe piles in the Project Revit Structure model shall be assigned with a unique sheet pile number. This pipe pile number can be input in the “Mark” field of “Identity Data” in the Properties Palette.



Quantity Take-off

Total Steel Pipe Pile Length:

For subsequent material take-off, the total volume of soil excavation per pipe pile shall be calculated by multiplying the “Pile external diameter” and the “Total pile length”.

Total Volume of pipe pile:

The total volume of grout per pipe pile shall be calculated by multiplying the “Pile internal diameter” and the “Total pile length”.

D4.7 Building Services SAM

Building Services model includes different trades of models and the scope of elements to be modelled can be referred to **Section Q3-02.3** Building Services Engineering (BSE) Modelling. This section outlines the general practice which applies to all individual trade.

Revit MEP setting including mechanical, electrical and plumbing can be found in **DM-P 01** for pipe setting, **DM-M 01** for duct setting and **DM-E 01** for electrical setting. This detail guide also suggests family category for major elements which minimize the use of **Generic Model**.

The primary objective on using BIM for model authoring is to deliver drawings directly from BIM, key procedure for BS drawing production can be referred to **D5** Presentation Style.

Major procedures include:

- Layout Plan (by View Template)
- 2D symbol in Family
- Colour plan (Setting up Filter by Parameters)
- Special setting (e.g. amendment plan, revision schedule etc)

BS-01 Setup "Colour Fill Legend" for Plant Room Colouring

Discipline	All BS Disciplines
Family	System Family
Category	Space
Workset	/

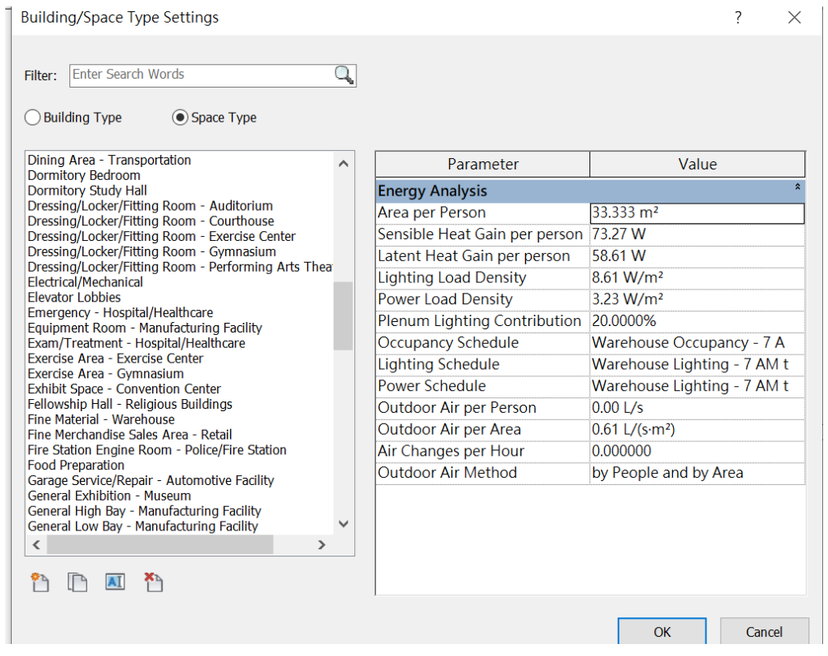
Information Requirement

List of Built-in Parameters

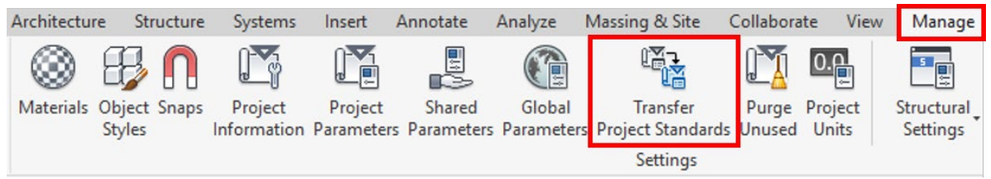
Parameter	Information	Remark	Example
Name (Space)	Name of Space		
Number (Space)	Number of Space		
Space Type	Type of Space		

For generation of layout drawings for BSDRP submission and BEEO submission etc., the irrigation areas for planter and lighting areas could be highlighted by means of space and colour fill legend.

To assign a colour to a designated plant room or space, there are many options to add "Colour Fill Legend" including using Space Name, Remark or other parameters. It suggested to use "Space Type" to group different space name with the same BS's trade.

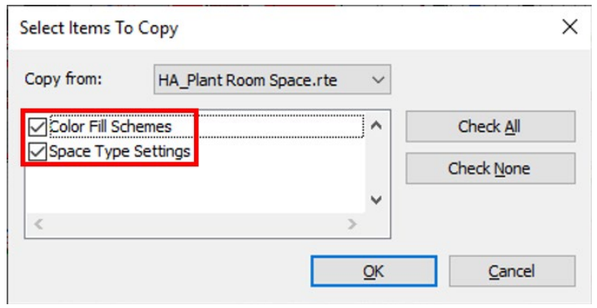


The Space Type and Colour setting can be transferred from Revit Template that contains such information, if it is not yet available from the project file.



Under Manage tab, click “Transfer Project Standards”

Note: Open the Revit template file at the same Revit session and select the Template file in the “Copy from:” tab



Select “Colour Fill Schemes” and “Space Type Settings” under Select Items To Copy window.

Space Colour Table and the sample Space Name is list in below table.

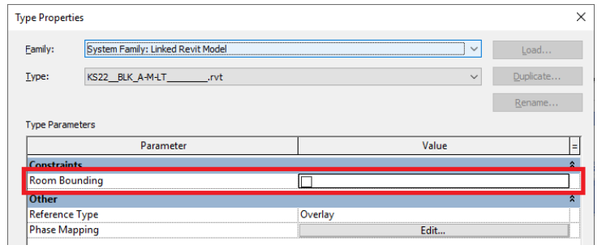
Category	Sample Space Name	Space Type	Preferred Colour	RGB Value
Space	Transformer Room	HA_Electrical Plant Room		255,127,000
	Electrical Meter Room	HA_Electrical Meter		221,221,000
	Fan Room	HA_ACMV Plant Room		000,255,000
	Emergency Generator Room	HA_FS & Emergency Plant Room		255,000,000
	Fresh Water Pump Room	HA_PL Plant Room		000,255,255
	Pipe Duct	HA_Pipe Duct		255,191,000
	FS Pump Room	HA_FS & Emergency Plant Room		255,000,000
	Lift Machine Room	HA_Lift Plant Room		255,000,255
	TBE Room	HA_TBE Room		000,000,255

Model Authoring

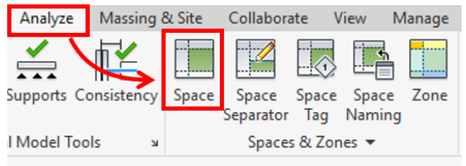
Place Space

Spaces are exclusively used for the MEP disciplines to analyse space volume. They contain parameters that maintain information about the areas in which they have been placed. This information is used for performing a heating and cooling loads analysis.

“Room Bounding” in Linked Architectural model shall be enabled in order to facilitate placing Space.

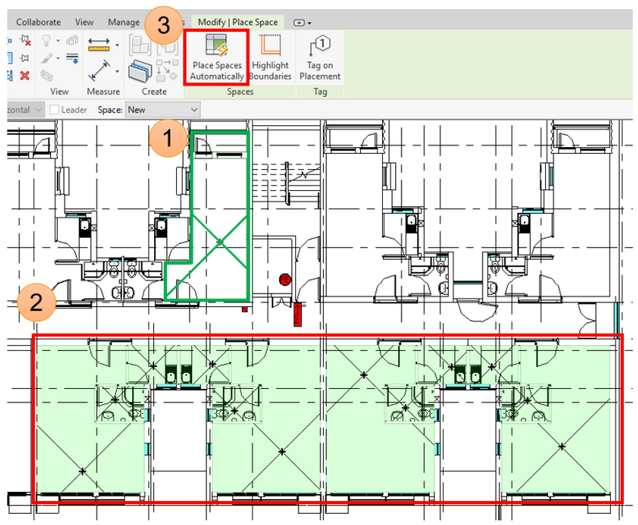


Space can be placed manually or automatically if Rooms are already placed. Click Analyze tab -> “Space” in Spaces & Zones panel.

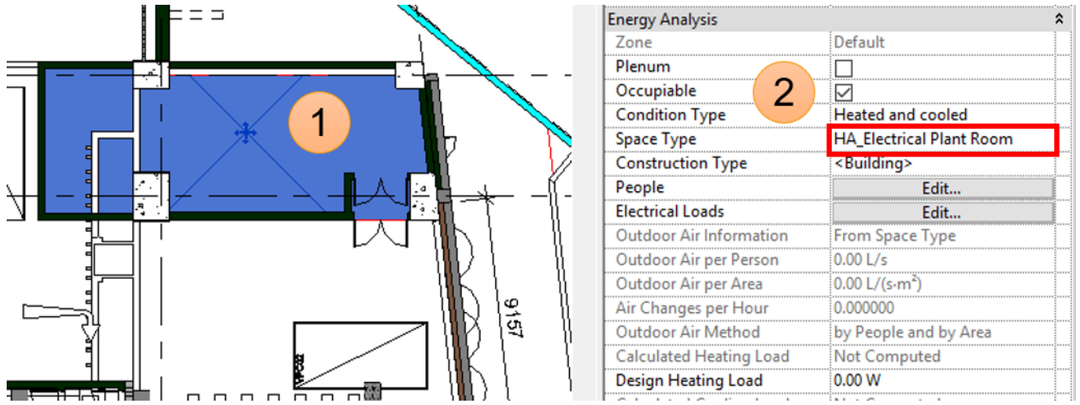


Once clicked “Space”, additional tab “Modify | Place Space” will be shown and below screen shows:

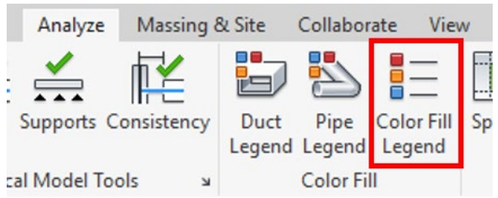
1. Boundary of Space
2. Spaces already be placed
3. Place Spaces Automatically



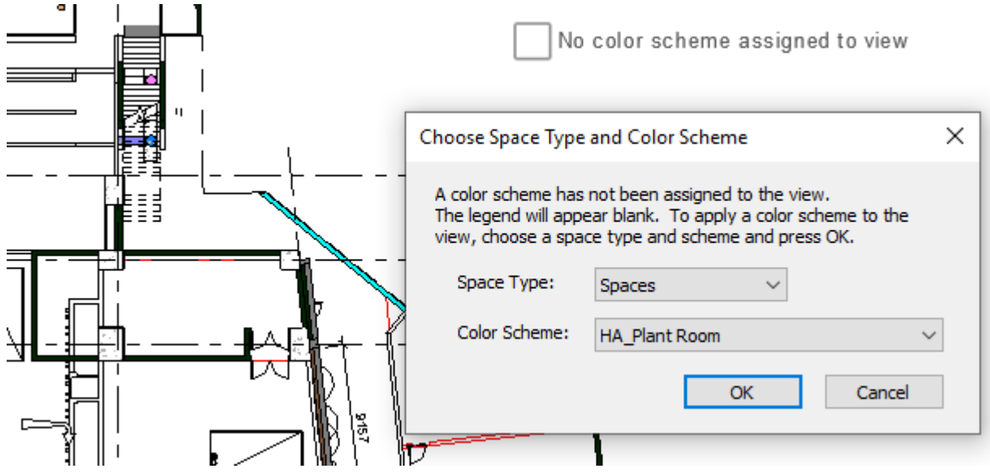
Once the spaces are placed, click on the Space and input “Space Type” in properties.



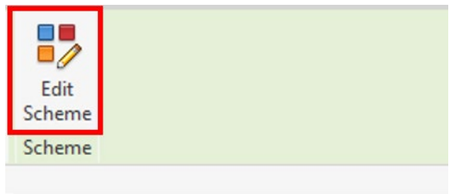
The next step is to add “Colour Fill Legend” from Analyze Tab as shown in below.

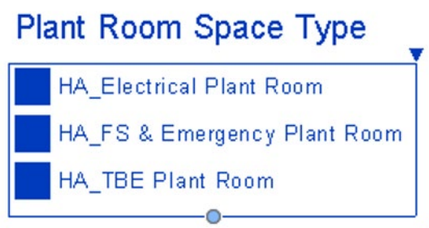


If colour scheme has been loaded from “Transfer Click to select “HA_Plant Room” as the colour scheme in the “Choose Space Type and Colour Scheme” window.

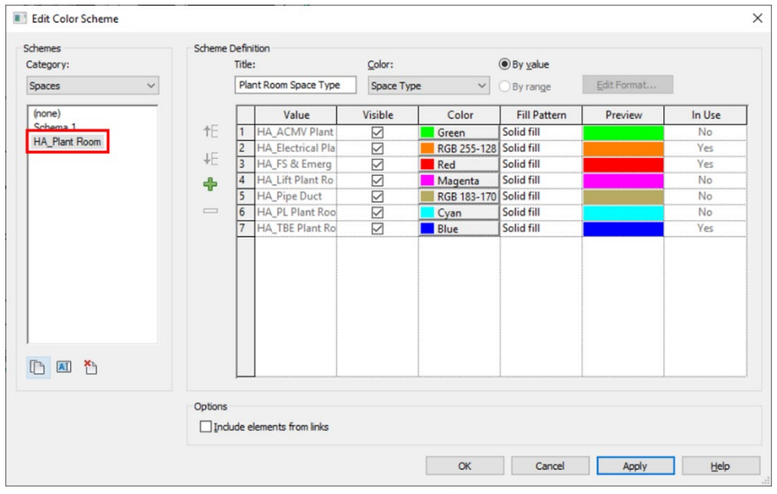


For detail setting of the Colour Scheme, click to select the colour scheme and click “Edit Scheme”.





The Colour Scheme in the template used Space Type as selection and applied default plant room colour. Additional plant room type and colour scheme can be set in this location.





D4.8 Water Services SAM

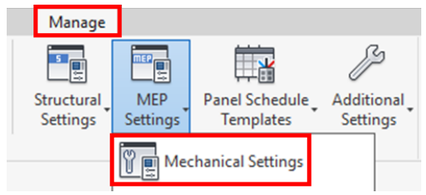
This section describes the standard approach to modelling in Water Services discipline and the step-by-step workflow / guide to apply them into the project.

All Building Services disciplines are regarded as MEP Systems in Revit. To retrieve appropriate information of the systems and elements, Systems for different discipline services shall be well prepared before modelling. This guide will cover mechanical setting, pipe fittings, pipes, pipe accessories and relative appliances modelling. For preparing the application of water supply with BIM f or submission to WSD, the requirements of modelling the water supply elements and BIM models should refer to "Guidelines for Electronic Submission of Application for Water Supply with Building Information Modelling" issued on December 2021 or the latest version published by WSD.

Refer **D5** Presentation Style for preparing drawing production.

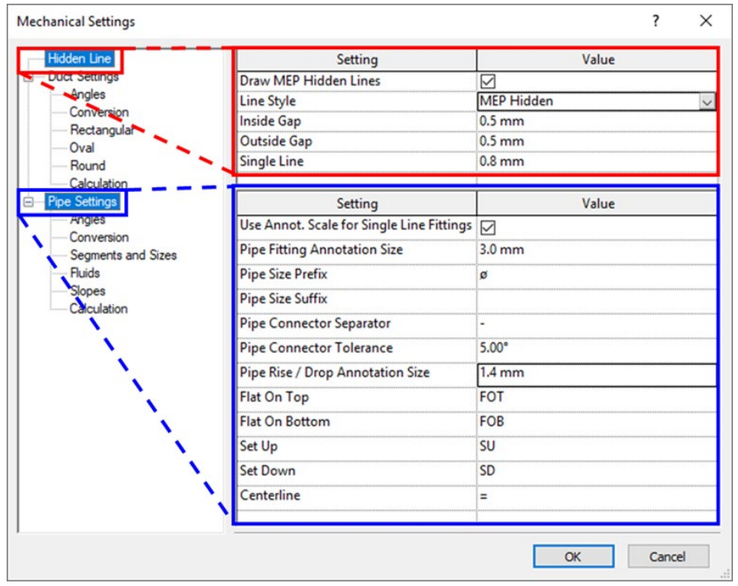
DM-P 01 Mechanical Setting for Pipe

Mechanical Settings can be found from Manage tab -> MEP Settings -> Mechanical Settings



Mechanical Settings for Pipe mainly involve below two settings:

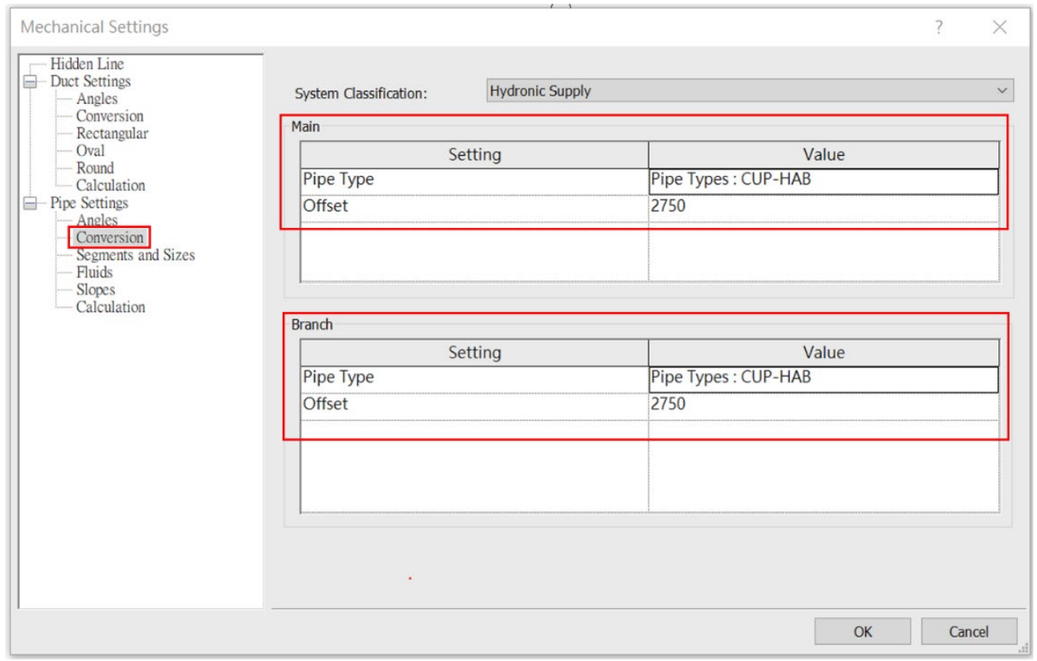
1. Hidden Line controls line style when two pipes crossing each other.
2. Pipe Settings provide details settings for pipe 2D display, angles, conversion, slopes, segments and sizes. Fluids and Calculation are not commonly used in HK, it will not be covered here.



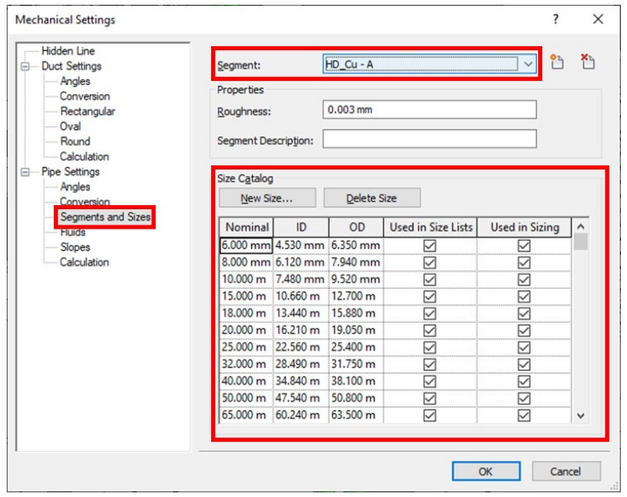
The following properties are suggested for pipe setting.

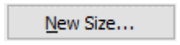
Setting	Value
Hidden Line	Draw MEP Hidden Lines Single Line gap: 0.8 mm
Pipe Rise/ Drop Annotation Size	Pipe Rise/ Drop Annotation Size: 1.4 mm (i.e. Annotation size for pipe rise and drop is limited to this value and do not change according to actual pipe size)
Fitting Angles	To be closer to reality, the fittings among pipes shall be fit an angle in 90°, 45°, 22.5°. It shall not be in the other angle or choose “Use any angle” use in the layout.

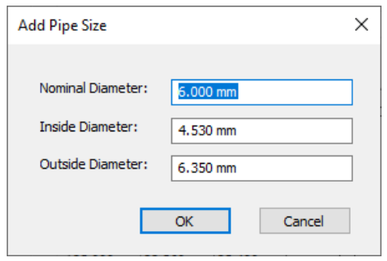
Conversion provides the default pipe type for this system specification, this settings can set the default pipe type for main and branch pipework and its default offset level.



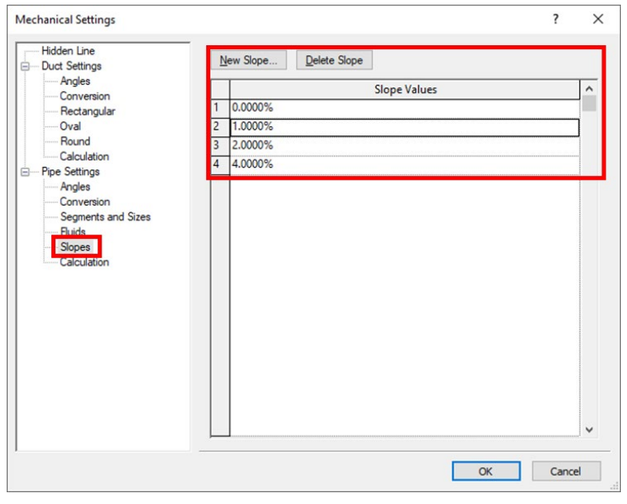
Segment (pipe material) and sizes control the setting of pipe type naming and its sizes.



If the segment type is not enough, click  to create new segment type. Click  to create new size with inner and outer diameter.



Slopes in Pipe settings provide slopes displayed in percentage. For example a pipe with 1:100 fall shown as 1% in Revit.



DM-P 02 Add Plumbing Fixture

Discipline	Water Services Depend on the function and system of the fixture
Family	Loadable Family
Category	Plumbing Fixture
Workset	/
Naming Convention	PLM-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Plumbing Fixture Table

Category	Examples
Plumbing Fixture	Tap, Drain, Fountain, Shower etc.

Information Requirement

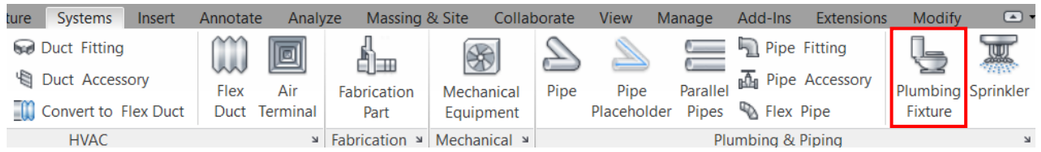
List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	80mm, 100mm…
Level	Level of Plumbing Fixture	Level of Plumbing Fixture	G/F, L1/F, L2/F
Mark	Plumbing Fixture Mark	This parameter can be utilized to add HA tag families to annotate the Plumbing Fixture.	PF1, PF2…
Comment	Custom information	Users can add custom information with this parameter.	For disabled toilet……

Remark: Parameters in grey colour is optional parameter.

Model Authoring

Place Plumbing Fixture

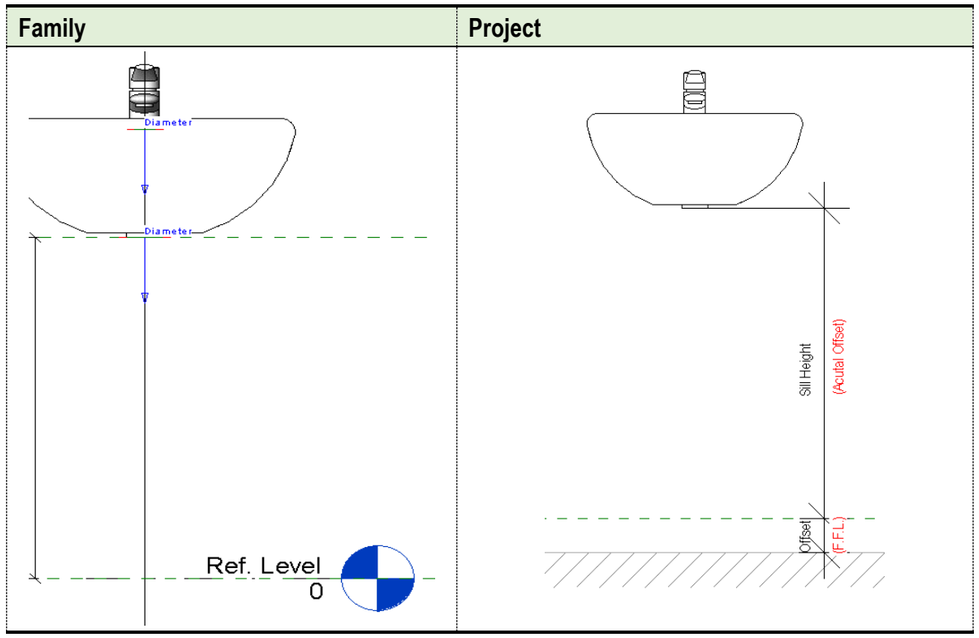


- In collaboration, Architectural file will be linked into MEP project files. However, wall-, floor- or ceiling-based family cannot recognised linked wall, floor or ceiling as host. Even if the family is prepared by face-based template, the existing elements may be free-standing or deleted in the project once the linked host is adjusted or removed. Therefore, most components are suggested to use a Plumbing Fixture family template (free-standing).
- All MEP families shall be nested with a 3D model family and an annotation family (symbol) (if necessary). Appropriate tag family shall be prepared at the same time (if necessary).
- All family naming conventions refer to Family Naming Convention under **Section D.MET-3.2 Naming Conventions**.

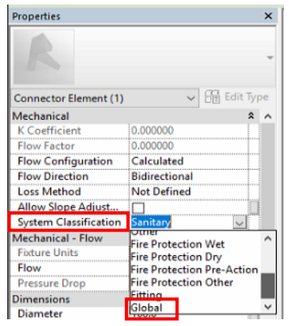
(i) 3D model family

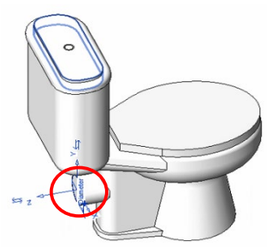
- Most fixtures and equipment shall be parametric families, using shared parameters to control the dimensions and visibilities. Variations of types and dimensions can be generated easily.
- Fixtures and equipment shall be modelled in proper orientations in each view as same as the products.
- The insertion point (intersection point of two default reference plane in Revit Family) of the equipment's and fixtures' families shall be well defined.
- Levels in Revit are regarding to structural floor level, therefore the thickness of floor finished shall be added to the "Offset" when placing a component on plan.

Offset	0.0



- For tender stage, it is suggested to set up a Key schedule to list out all the specifications for the fixtures and equipment, such as flow rate, pressure drop etc. Apply the suitable information to the fixture and equipment.
- The system classification of connectors shall be defined correctly, otherwise it shall be set as "Global" with insufficient information of the fixture or equipment.



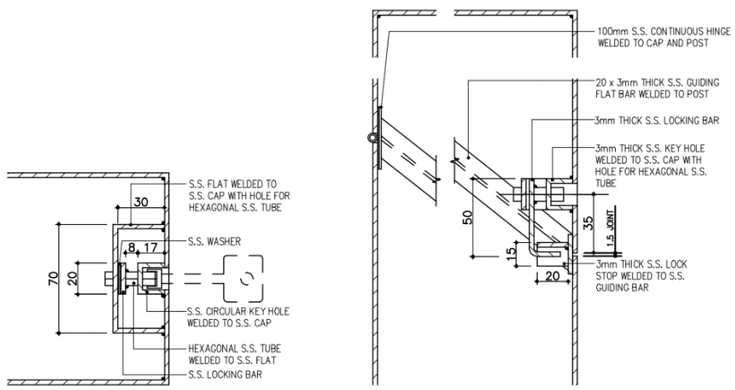


- To update the family with new design or adopt the change between design phase and construction phase stated below, load the new family with same family name and insertion point into the project file, the old design will be replaced automatically.

- Contractor to update the information of the fixtures and equipment, such as flow rate, pressure drop etc, according to the specifications at construction stage.

Difference between design stage and construction stage in handling MEP model	
Design Stage	Construction Stage
Generic design for equipment's and fixtures' families Components cannot contain brand name and supplier's information.	Detail product model number, type and dimension shall be applied to the components' families. Detail information including brand name, supplier's information and properties is required.

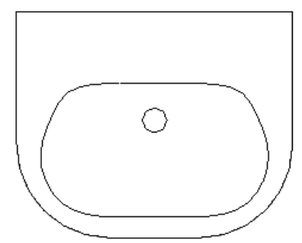
- All installation details such as below figure shall not be modelled on family or project model.



- Installation details shall **be drawn in drafting view using Detail Line and other annotations.**
- For the existing details in CAD format, refer to Section **PS-12** 2D Details under **D5.3** Model and Drawing Detail.

(ii) Annotation family (Symbol)

- The visibility setting shall be well set to define the presence of 2D symbol and 3D model in different detail level and views.
- All 2D symbols please refer to the HA's CAD Standards for the DCD.

Description	**3D Model (For elevation and 3D view)**	**2D Symbol (For plan view only)**
Shower		

(iv) Tag family

- Use tag to **annotate the information of the fixtures and equipment.**
- All tag shall refer to the HA's CAD Standards for DCD.
- The composition of labels (shared parameters) in the tag family **shall refer to the requirements in drawing production.**

DM-P 03 Add Pipe with Pipe System

Discipline	Water Services Air Conditioning and Mechanical Ventilation Fire Services and Water Pump Utility Services Drainage and Sewage Services Depend on the function and system of the pipework
Family	System Family
Category	Piping Systems
Workset	/
Naming Convention	(Functional Type)-HAB-Descriptor 1-Descriptor 2

Piping System (System Classification) Table

	Sub-category in Revit	Short form	Description
Functional Type (System)	Domestic Cold Water	FRWP	Fresh Water Pipe
	Domestic Cold Water	FLWP	Flushing Water Pipe
	Domestic Hot Water	HWP	Hot Water Pipe
	Other	IRWP	Irrigation Water Pipe
	Other	RWP	Rain Water Pipe

Discipline	Water Services Air Conditioning and Mechanical Ventilation Fire Services and Water Pump Utility Services Drainage and Sewage Services Depend on the function and system of the pipework
Family	System Family
Category	Pipe Types
Workset	/
Naming Convention	(Functional Type)-HAB-Descriptor 1-Descriptor 2

Pipe Type (Material) Table

	Short form	Description
Functional Type (Pipe Material)	CPV	Chlorinated Polyvinyl Chloride (PVC-C)
	CUP	Copper
	DIP	Ductile Iron
	GIP	GI
	GIC	GI with PVC-C lining
	GIU	GI with PVC-U/ PE lining
	PBP	Polybutylene (PB)
	PEP	Polyethylene (PE)
	PEX	Crosslinked polyethylene (PE-X)
	SST	Stainless Steel
	UPV	Unplasticized Polyvinyl Chloride (PVC-U)

Information Requirement

List of Built-in Parameters

Parameter	Information	Remark	Example
System Abbreviation	System abbreviation of specific piping system	Input the abbreviation of piping system	FRWP, FLWP, HWP, RWP……
Type	Material of Pipe	Material of Pipe	Copper, Ductile Iron……
Diameter	Size of Pipe	Size of Pipe	20mm, 25mm, 50mm, 100mm……
Length	Length of Pipe	Length of Pipe	1500, 2750, 5000……
Level	Level of Pipe	Level of Pipe	G/F, L1/F, L2/F, R/F……
Insulation Thickness	Thickness of insulation	Thickness of insulation	5mm, 10mm….
Other Information_L/L	Extra information of Pipe	Users can assign extra information or description of the lower part of pipe.	F/B, T/B, F/B TO L/L……
Other Information_H/L	Extra information of Pipe	Users can assign extra information or description of the upper part of pipe.	F/A, T/A, F/A TO H/L……
Comment	Custom information	Users can add custom information with this parameter.	Located at corridor……

List of Shared Parameter

Please follow the list of shared parameters below. Value of these parameters should be input correctly such that related information can be retrieved for the use by other model users.

Parameter name	Information	Remark	Example
Position	Position of pipe	Identify the position of pipe whether it is at external or internal area of the building	External / Internal

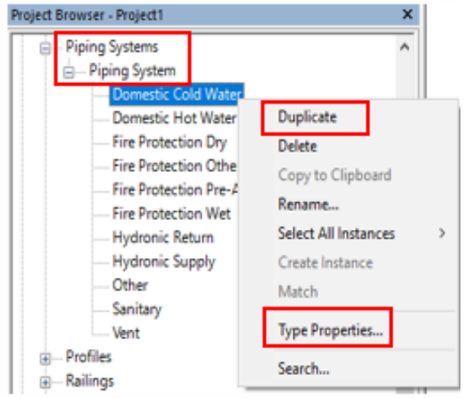
Model Authoring

- In Revit, Pipe, Piping System and Pipe Type are defined as System Families, while Pipe Fittings and Pipe Accessories are Loadable Families.
- Most of the parameters and functions for system family cannot be edited or modified by users, except by the settings as mentioned on the next page.

- Before starting the plumbing project, Piping System and Pipe Type shall be well established.
- Piping System indicates the served system of the pipework.
- Pipe Type indicates the material of the pipe.

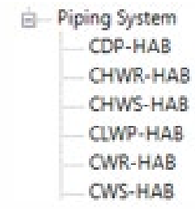
Create Piping System

Different sub-category piping system contain unique settings in Revit. Duplicate and edit suitable Pipe system (Sub-Category) according to Piping System (Sub-Category) Tables in various DM sections.

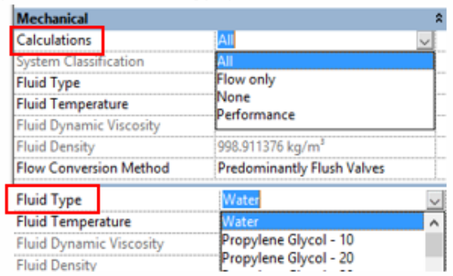


a. In Project Browser → Piping System.
b. Duplicate suitable Pipe system to create a new Piping System.
c. Establish Type Properties (Fluid Types, Calculations, Abbreviation, Rise/Drop Symbol).

Rename Piping System according to **Piping System (System Classification Table)**



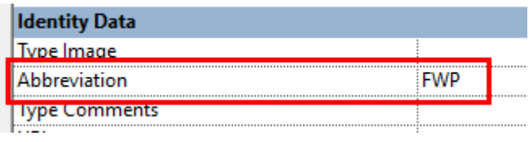
Select the appropriate option for pipe systems (Calculations, Flud Type)



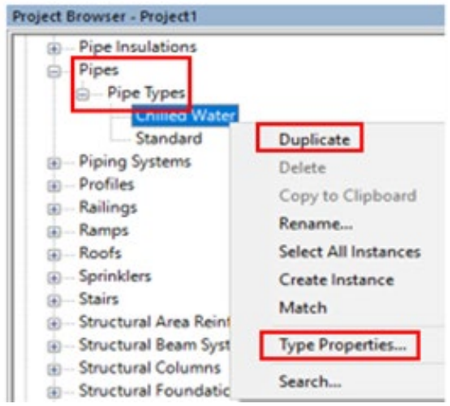
Set Rise/ Drop Symbol

Rise / Drop	
Two Line Drop Symbol	Bend - ¾ Circle
Two Line Rise Symbol	Outline
Single Line Drop Symbol	Bend - ¾ Circle
Single Line Rise Symbol	Outline
Single Line Tee Up Symbol	Outline
Single Line Tee Down Symbol	Tee - Half Circle

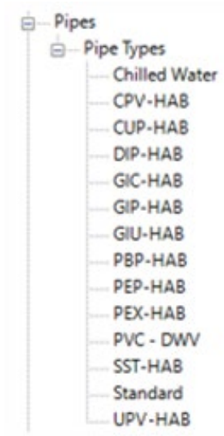
Establish your own abbreviation for Piping System by Abbreviation for Drawing Production (After all system have been modelled and before producing drawing)



Create Pipe Type (Basic)

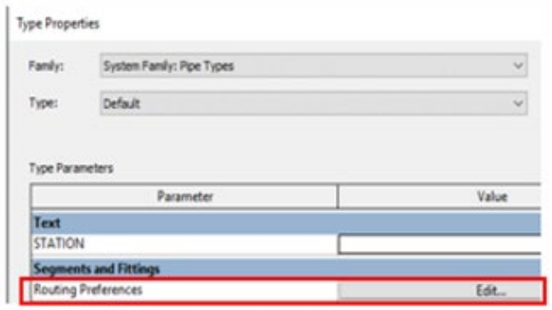


Rename Pipe Type suggested in below table.

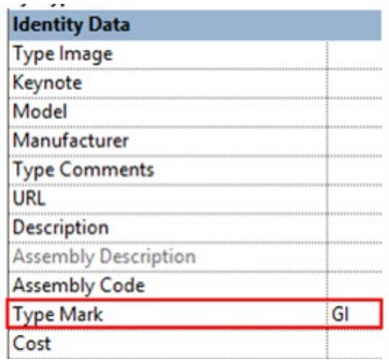


a. In Pipe Browser → Pipes → Pipe Types.
b. Right-Click → Rename/Select Duplicate to create a new Pipe Type.
c. Establish Pipe Type's information (Routing Preference, Pipe Segment, Type Mark).

Edit Routing Preferences and assign pipe segment and fittings with same materials.



Establish you own abbreviation for Pipe Type by Type Mark.

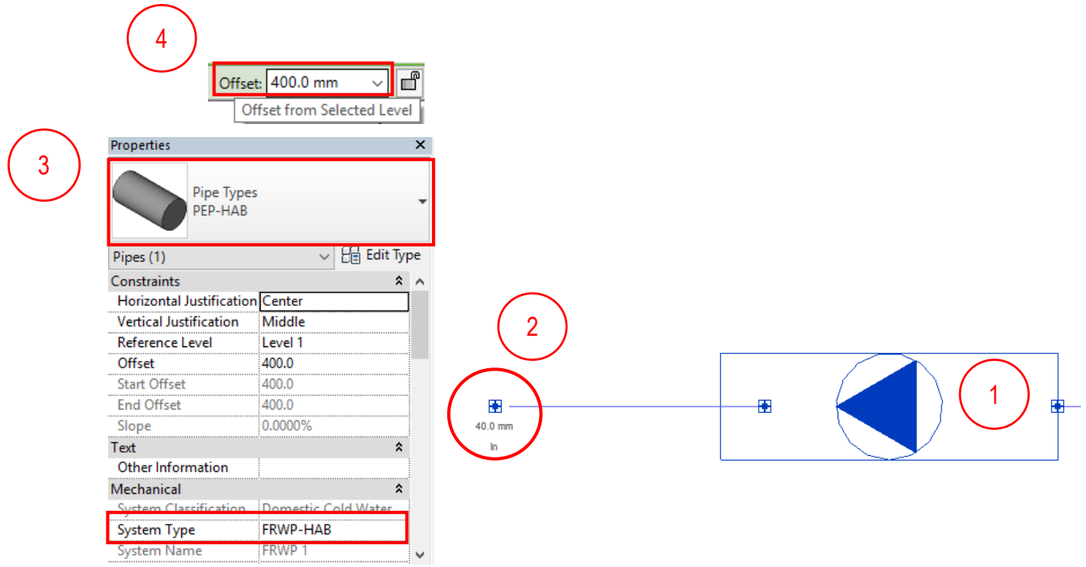


Identity Data	
Type Image	
Keynote	
Model	
Manufacturer	
Type Comments	
URL	
Description	
Assembly Description	
Assembly Code	
Type Mark	GI
Cost	

Create Pipe Type (Practical)

Based on the Material Pipe Type created above, set of practical pipe type for each piping system shall be prepared. For example: material of drainage pipe (diameter below 40mm) is UPVC while material for diameter greater than 40mm is Epoxy C.I. This combination for drainage pipe shall be incorporated with suitable Routing Preference with reference to Pipe Type (Basic)'s Routing Reference.

- Before drawing the pipework, fixtures and equipment shall be modelled and placed first.
- Fixtures' and equipment's families shall be modelled with pipe connectors. Refer to Section **DM-P 02** Add Plumbing Fixture under **D4.8** Water Services SAM.
- All pipework shall be modelled as a closed/ complete system.
  - Model pipe with fixtures/ equipment within Plumbing project file
    - Draw pipe from the connectors ➢ Set suitable system type and pipe type ➢ Set Offset/ Adopt default offset by clearing the Offset value.

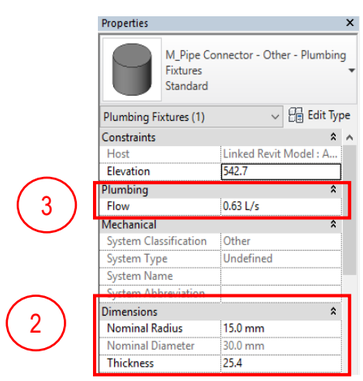


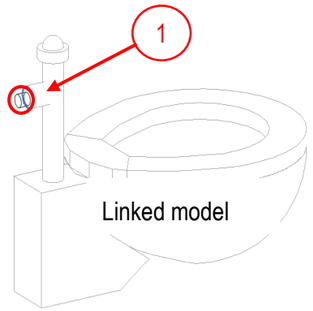
- If System Classification of connector is set as "Global", reverse the Step 2 and 3.
- To retrieve the actual elevation according to mPD level, select "Datum" as Reference Level.

- Model pipe with fixtures/ equipment in Linked Revit model

Add appropriate connector families to the fixtures

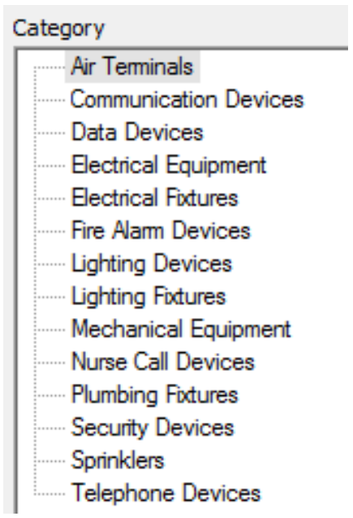
- Add appropriate connector on the surface of the fixtures/ equipment (linked model) ➤ Set dimensions for the connect ➤ Input the mechanical information of the fixture/ equipment to the connector ➤ Model pipe referring to the procedure stated above.



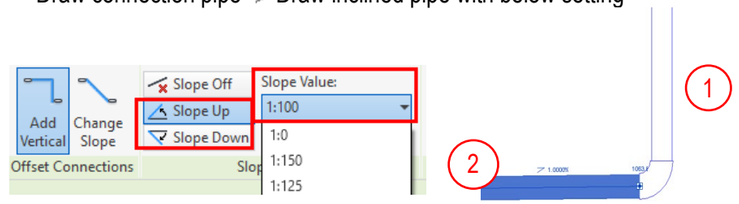


Using Copy/ Monitor for the connector

- After adding connector families, using Copy/ Monitor tool to create a relationship between the linked models and connectors. This provides a location check once the elements in linked model have been moved. All categories listed below can applied the Copy/ Monitor function.

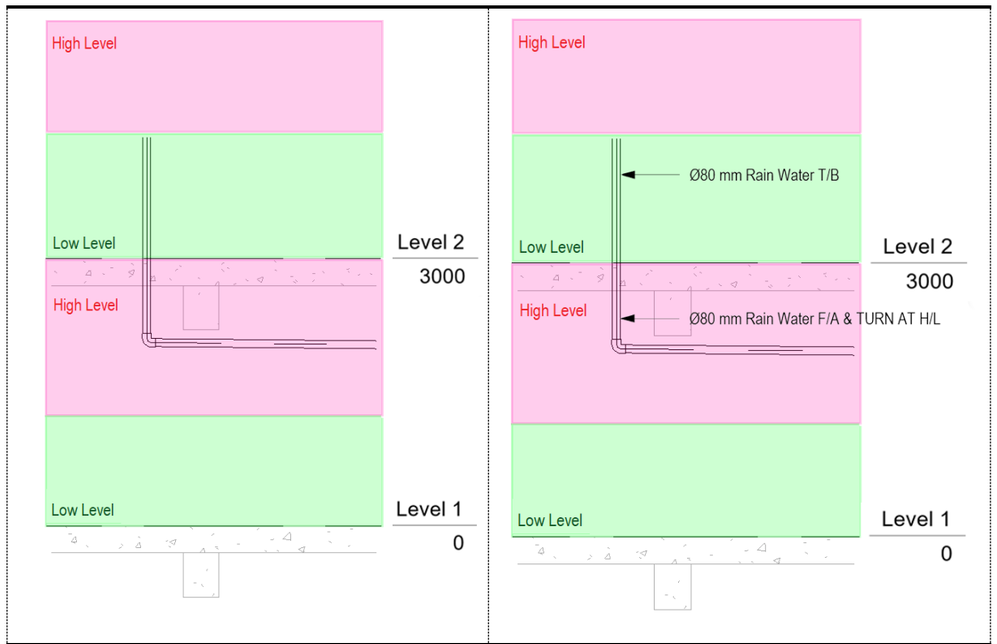


- Model inclined pipe
  - Inclined pipe could be modelled in elevation view.
  - Inclined pipe could also be modelled on floor plan.
    - Draw connection pipe ➤ Draw inclined pipe with below setting

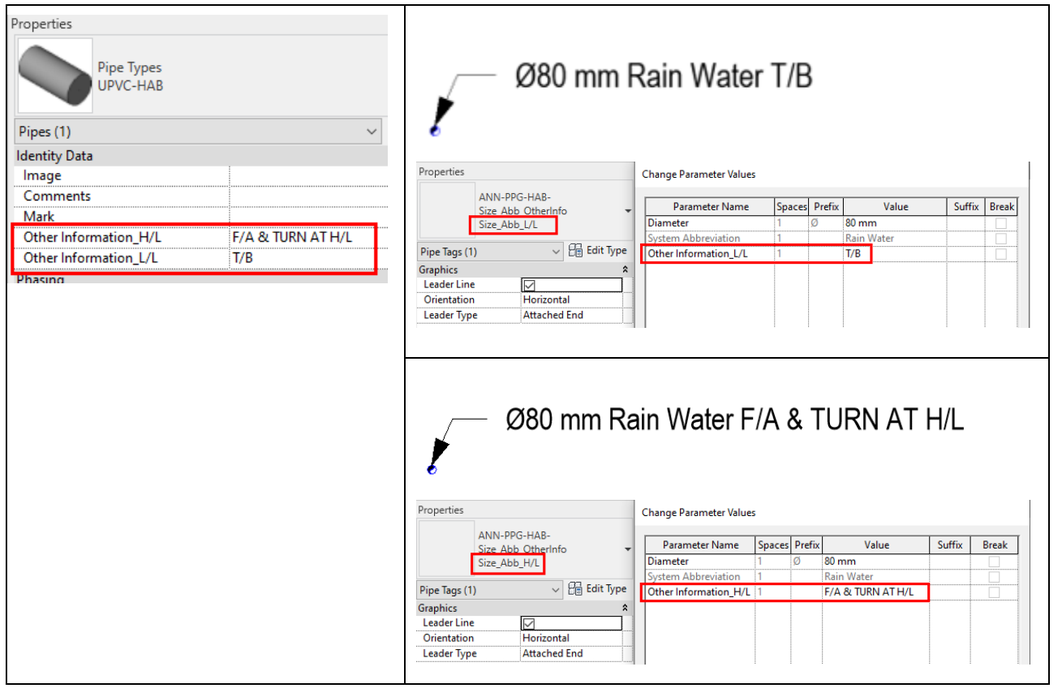


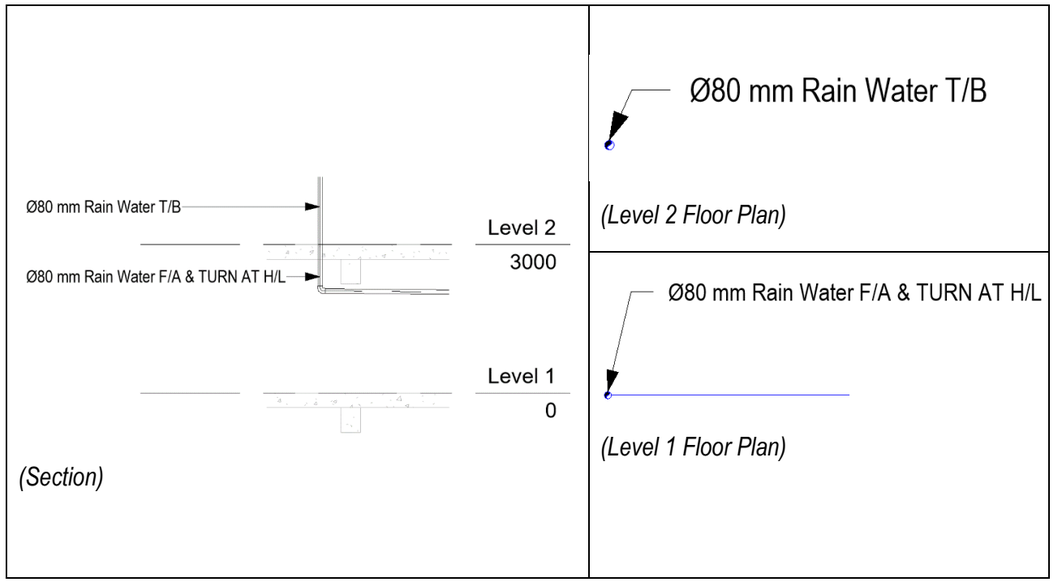
*Remark: After completion of inclined pipe, users are advised to select "Slope Off" to prepare for pipe modelling without slope.

- After all pipeworks have been modelled, information for drawing production shall be assigned to pipes.
- Risers (vertical pipe crossing levels) may have different versions of information for drawing production, the appropriate information should be assigned to parameters below carefully:
  "Other Information_H/L" and;
  "Other Information_L/L".
- Assign appropriate information to corresponding parameters on the same elements.



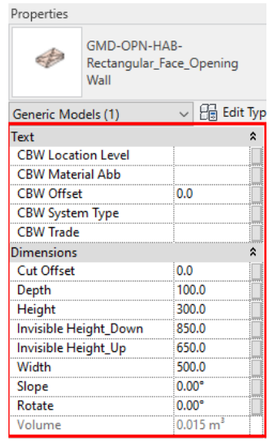
- Tag out the information using appropriate tags.

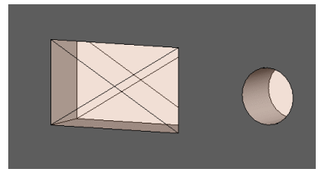


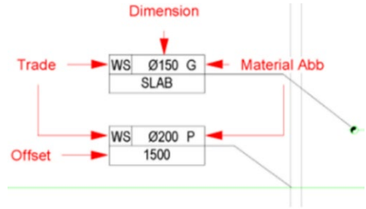


- **Manage Builder's Work Legend**

- After all pipeworks have been modelled in detailed design stage, the necessary slab/ wall openings shall be modelled and corresponding information shall be input to the opening family, including trade, opening dimension and material etc. Opening smaller than 100mm shall not be modelled.
- For critical opening, its information such as size and shape shall be passed to Architects/ Structure Engineers accordingly.
- Use suitable tag to indicate Builder's Work Legend.







Annotation/ Presentation

- Setup standard filter for different pipe systems on plan view and 3D view.

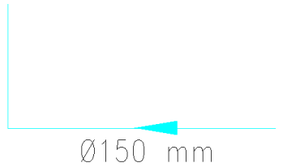
System type	Preferred colour		RGB Colour System
Fresh Water Pipe (FRWP)	CYAN		000, 255, 255
Flushing Water Pipe (FLWP)	GREEN		000, 255, 000
Hot Water Pipe (HWP)	RED		255, 000, 000
Irrigation Water Pipe (IRWP)	MAGENTA		255, 000, 255
Rain Water Pipe (RWP)	ORANGE		255, 128, 000

- Above filter shall be applied to pipes, pipe fittings, pipe accessories and pipe insulation.

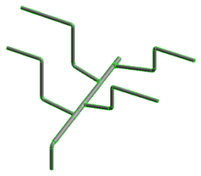
- Presentation style for pipework can only be in dash or dotted lines. Prepare different line patterns and legend for each system type.
- However, words cannot be assigned within the line pattern in Revit. To show the traditional presentation format, apply the tag on the pipework manually.



- Use tag to annotate the flow direction for inclined pipe controlled by visibility.



- For complex pipework design, a section view and 3D view are suggested to be added for reference.



- For Schematic diagram, please refer to **D5.5 MEP Drawing Production**.
- Length, material and system of pipe can be retrieved from the 3D model directly.

Schedule -

Pipe Schedule

System Abbreviation	Type	Diameter	Length	Insulation Thickness	Other information	Count
FRWP	DIP-HAB	32 mm	899	0 mm	F/B & TO U/G (SW7)	1
FRWP	DIP-HAB	150 mm	6452	0 mm	FROM F/A TO H/L	1
FRWP	DIP-HAB	150 mm	6452	0 mm		1

DM-P 04 Add Pipe Fittings

Discipline	Water Services Air Conditioning and Mechanical Ventilation Fire Services and Water Pump Utility Services Drainage and Sewage Services Depend on the function and system of the pipework
Family	Loadable Family
Category	Generic Model → Pipe Fittings
Workset	/
Naming Convention	PPF-(Functional Type)-HAB-Descriptor 1(Material)-Descriptor 2

Functional Type Table

	Short form	Description
Functional Type (Fitting Type)	PBD	Pipe Bend
	PBC	Pipe Branch_Connection
	PCP	Pipe Cap
	PCL	Pipe Coupling
	PCR	Pipe Cross
	PEB	Pipe Elbow
	PFG	Pipe Flange
	PPG	Pipe Plug
	PRD	Pipe Reducer
	PTE	Pipe Tee
	PTR	Pipe Transition
	PTP	Pipe Trap
	PWY	Pipe Wye
Descriptor 1 (Fittings' Material) **Refer to Pipe Type (Material) Table.**	DIP	Ductile Iron

Information Requirement

List of Built-in Parameters

Parameter	Information	Remark	Example
System Abbreviation	System abbreviation of specific piping system	Input the abbreviation of piping system	FRWP, FLWP, HWP, RWP……
Diameter	Diameter of Pipe Fitting	Size of Pipe Fitting	20mm, 25mm, 50mm,100mm…
Type	Material of Pipe Fitting	Material of Pipe Fitting	Copper, Ductile Iron……
Level	Level of Pipe Fitting	Level of Pipe Fitting	G/F, L1/F, L2/F, R/F……
Insulation Thickness	Thickness of insulation	Thickness of insulation	5mm, 10mm….

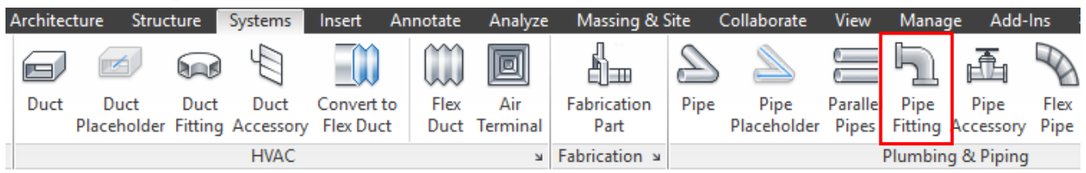
List of Shared Parameter

Please follow the list of shared parameters below. Value of these parameters should be input correctly such that related information can be retrieved for the use by other model users.

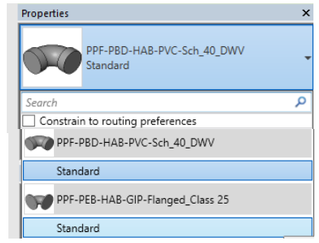
Parameter name	Information	Remark	Example
Position	Position of pipe fittings	Identify the position of pipe fittings whether it is at external or internal area of the building	External / Internal

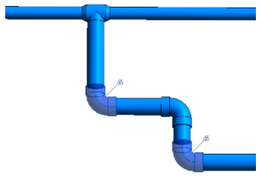
Model Authoring

Place Pipe Fittings



- Typical fitting types shall be set as routing preference. Therefore, pipe fittings can be generated automatically while drawing pipework.
- Assign the material for specific (material) pipe fittings after the pipework has been modelled.

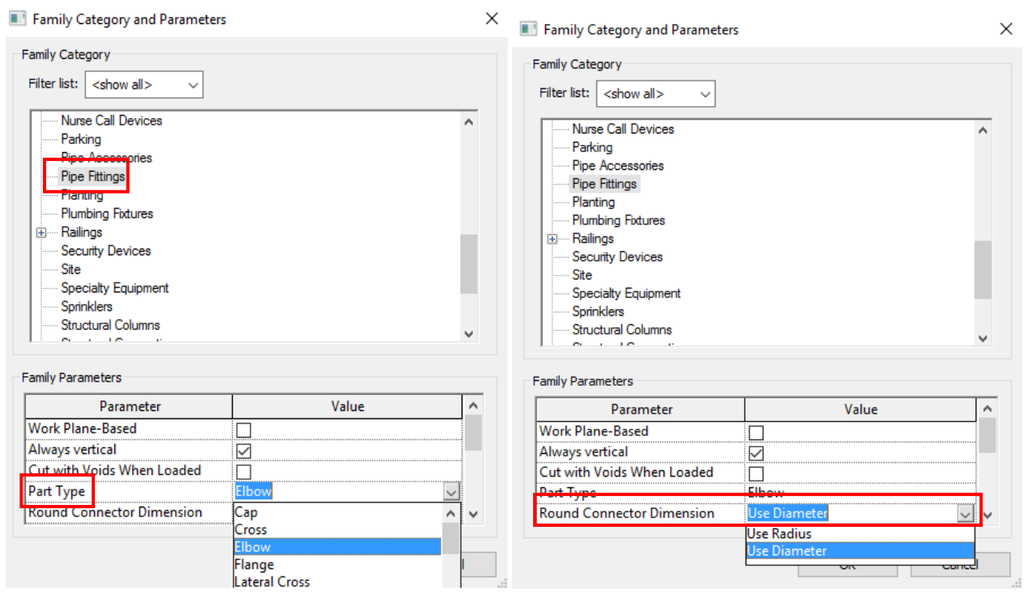




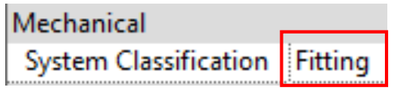
- It is **NOT suggested to create a fitting family** unless there is insufficient fitting design in Revit family library.
- It is suggested to adopt the reducing fittings from Revit Library for Pipe routing preference, in order to provide accurate outlet sizes to facilitate Quantity Take-Off. Modifying Grey Iron reducing fittings would be a good starting point.

(i) 3D model family

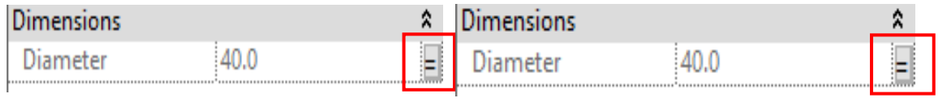
- Define suitable Pipe Fittings for family category and Part Type for family creation.
- Use Diameter for all family as Hong Kong Practices

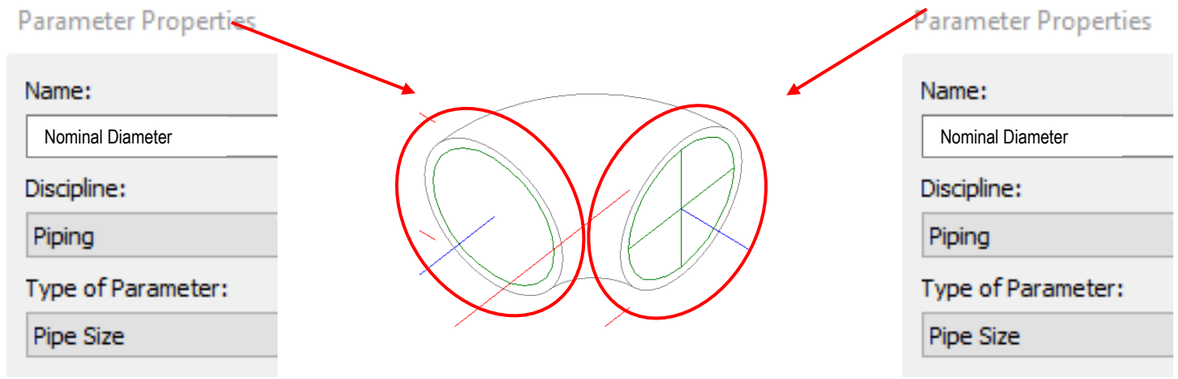


- Pipe connectors shall be modelled and assigned as Fitting for the System Classification in family.



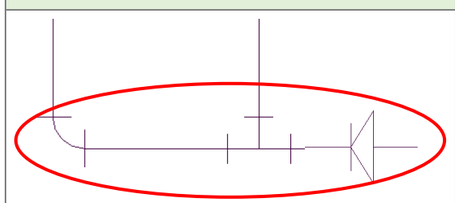
- The diameters of the pipe fitting outlets and corresponding connectors shall be controlled by formulated instance parameters.



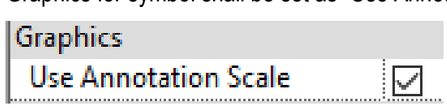


(ii) Annotation family (Symbol)

- All pipeworks shall be presented in single line format for submission.
- Modify the detail items (detail lines) for all pipe fittings to match with documentation format.
- The extra lines shall be either deleted or set as invisible.
- All 2D symbols please refer to the HA's CAD Standards for DCD.

Annotation of Pipe Fittings in Revit	Annotation of Pipe Fitting for documentation format
	

- Graphics for symbol shall be set as "Use Annotation Scale".



DM-P 05 Add Pipe Accessories

Discipline	Water Services Air Conditioning and Mechanical Ventilation Fire Services and Water Pump Utility Services Drainage and Sewage Services Depend on the function and system of the pipework
Family	Loadable Family
Category	Generic Model → Pipe Accessories
Workset	/
Naming Convention	PPA-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct material and size *	Gate Valve – Cast iron, Ø100mm
Level	Level of Pipe Accessories	Level of Pipe Accessories	G/F, L1/F, L2/F
Insulation Thickness	Thickness of insulation	Thickness of insulation	5mm, 10mm….
System Type	System type of specific piping system	Type of piping system	FRWP-HAB, FLWP-HAB, IRWP-HAB...
Material	Materials of pipe accessories	Materials of pipe accessories	Cast Iron…
Size	Size of pipe accessories	Size of pipe accessories	Ø80mm, 100mm…

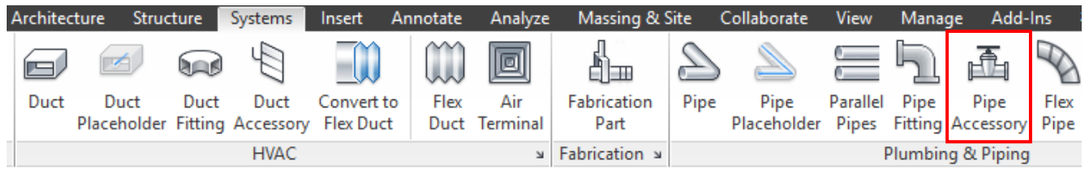
*The pipe accessories shall be of the same nominal size as the pipe in which they are installed unless otherwise specified. In case they are not the same (e.g. a 15mm diameter stop cock connected to 20mm pipe), a new Type of the accessory family shall be created stating the designed size of connecting pipe in Type Name (e.g. Stop Cock - S.S. 316, Ø15mm (connected to 20mm pipe)).

List of Shared Parameter

Please follow the list of shared parameters below. Value of these parameters should be input correctly such that related information can be retrieved for the use by other model users.

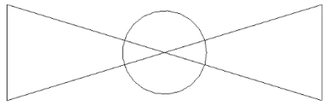
Parameter name	Information	Remark	Example
Position	Position of pipe accessories	Identify the position of pipe accessory whether it is at external or internal area of the building	External / Internal

Model Authoring

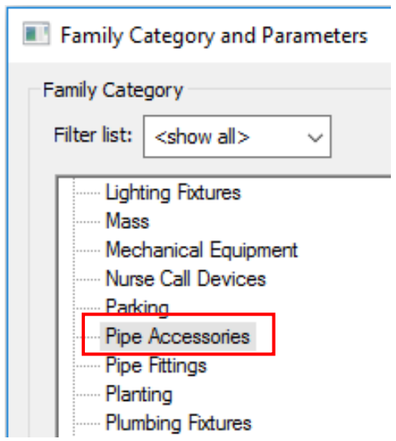


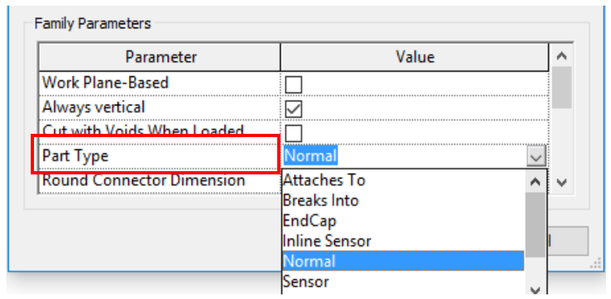
Place Pipe Accessory

- Add pipe accessories after the pipework has been modelled.
- All pipe accessory families shall be nested with a 3D model family and an annotation family (symbol).

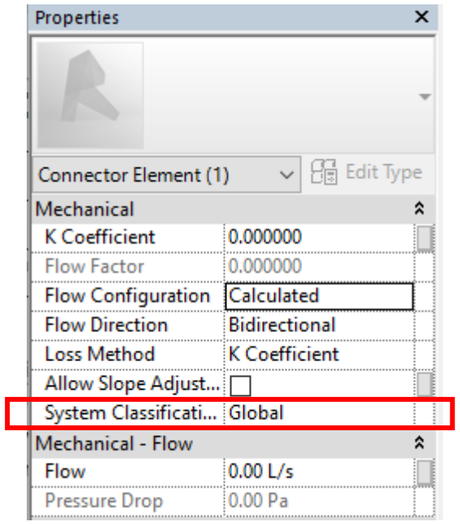
Description	3D Model (For elevation and 3D view)	2D Symbol (For plan view only)
Globe Valve		

(i) 3D model family





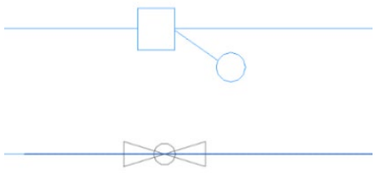
- Define suitable Part Type for family creation.
- All appropriate pipe connectors shall be modelled in family.
- Specification of the pipe accessories shall be input into the parameters of the connectors, such as flow, system classification etc.
- System classification of the pipe connectors shall be well assigned; otherwise it shall be set as "Global".



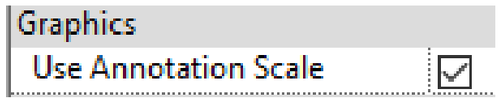
- Pipe accessory shall not be over-modelled.

(ii) Annotation family (Symbol)

- Symbol for pipe accessory shall use Annotation family template, which can be varied according to the scale.



- Graphics for symbol shall be set as "Use Annotation Scale".



- The visibility setting shall be well set to define the presence of 2D symbol and 3D model in different detail level and views.
- All 2D symbols please refer to the HA CADD Symbol Table.

D4.9 Air Conditioning and Mechanical Ventilation SAM

This section describes the standard approach to modelling in Air Conditioning and Mechanical Ventilation discipline and the step-by-step workflow / guide to apply them into the project.

All MEP disciplines are regarded as Systems in Revit. To retrieve appropriate information of the systems and elements, Systems for different discipline services shall be well prepared before modelling. This guide will cover mechanical setting, duct fittings, ducts, duct accessories, pipework and relative appliances modelling.

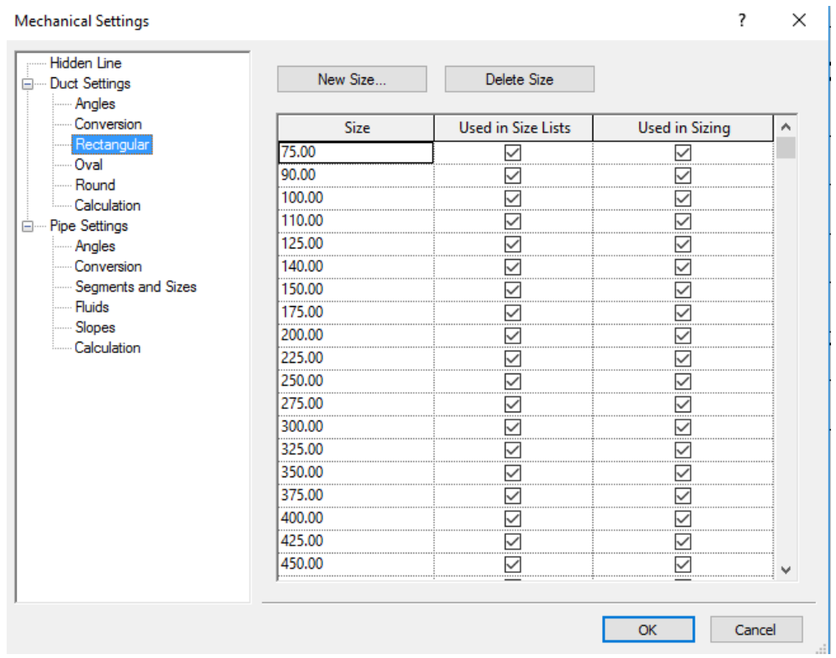
Refer **D5** Presentation Style for preparing drawing production.

DM-M 01 Mechanical Setting for Duct

The following properties are suggested for duct setting.

Hidden Line	Draw MEP Hidden Lines Single Line gap: 0.8 mm
Pipe Rise/ Drop Annotation Size	Duct Rise/ Drop Annotation Size: 1.4 mm (i.e. Annotation size for duct rise and drop is limited to this value and do not change according to actual duct size)
Fitting Angles	To be closer to reality, the fittings among pipes shall be fit an angle in 90°, 45°, 22.5°. It shall not be in the other angle or choose “Use any angle” use in the layout.

Determined pipe materials (Segment) and sizes:



DM-M 02 Add Mechanical Equipment

Discipline	Air Conditioning and Mechanical Ventilation Fire Services and Water Pump Utility Services Depend on the function and system of the equipment
Family	Loadable Family
Category	Mechanical Equipment
Workset	/
Naming Convention	MCQ-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Mechanical Equipment Table

Category	Examples
Mechanical Equipment	Air-handling units (AHU), Heat pumps, Water tanks etc.

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	65-160, 1.5kw_90L……
Level	Level of Mechanical Equipment	Level of Mechanical Equipment	G/F, L1/F, L2/F
Mark	Mechanical Equipment Mark	This parameter can be utilized to add HA tag families to annotate the Mechanical Equipment.	AHU1, HP2……
Comment	Custom information	Users can add custom information with this parameter.	Air-cooled……

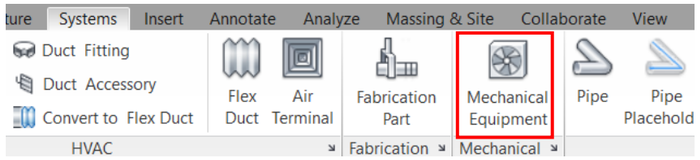
Remark: Parameters in grey colour is optional parameter.

- All required specifications of Mechanical Equipment in equipment schedule shall be built in the family as Information Requirement accordingly.

Model Authoring

Place Mechanical Equipment

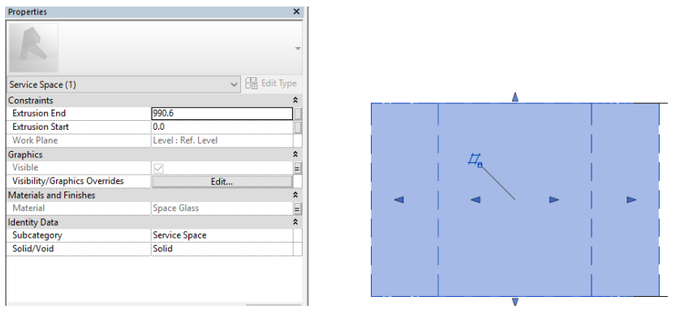
Mechanical Equipment can be found in System Ribbon -> Mechanical Panel -> Mechanical Equipment.



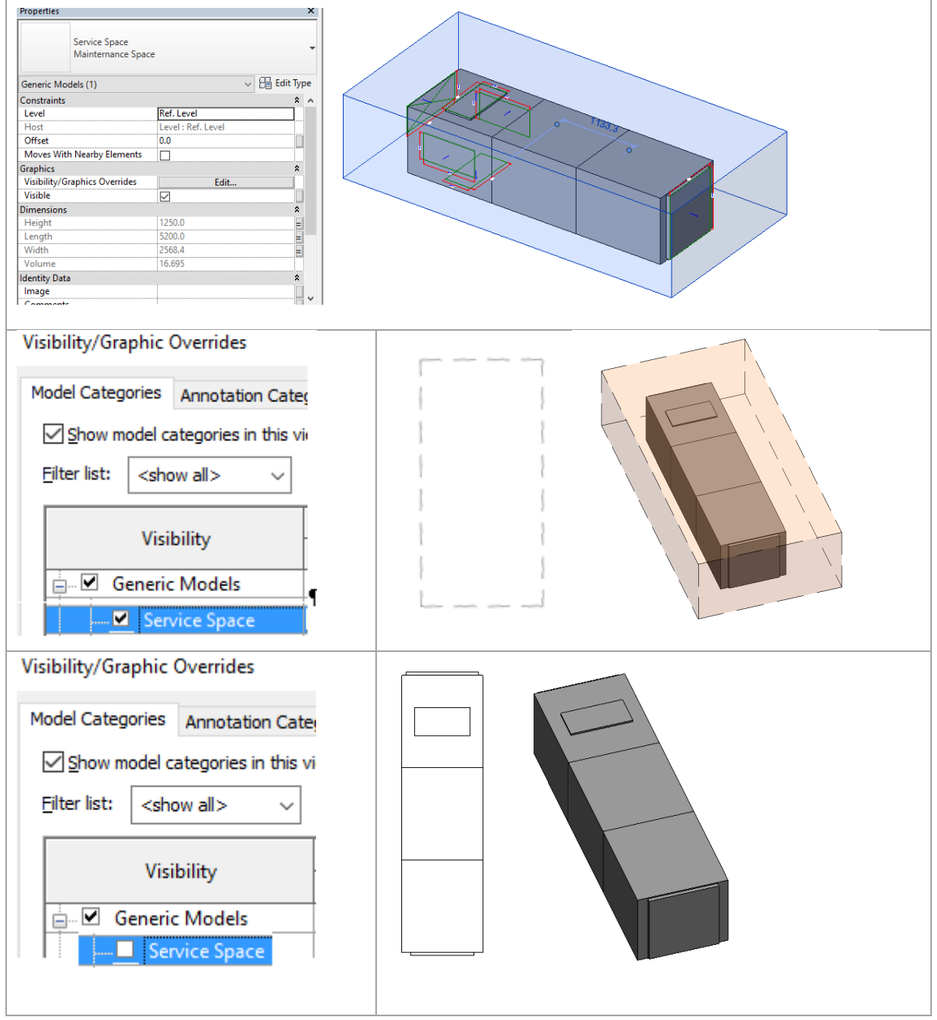
The modelling requirements of Mechanical Equipment on creation of model in Family, annotation symbol and tagging are similar to the detail steps in Plumbing Fixture. Refer to **DM-P 02** Add Plumbing Fixture under **D4.8** Water Services SAM.

- Select a suitable hosting type for the components as it cannot be changed to other hosting types afterwards.
- For large equipment, a service space/ maintenance space shall be modelled as LOD-I 300.
- A generic service space family with service space/ maintenance space sub-category is suggested to nested with large equipment family. Dimension of the generic service space family shall be controlled by shared parameters. This approach can benefit and facilitate the visibility control for the service space across different categories.

Generic Service Space family



Large equipment family nested with Generic Service Space family



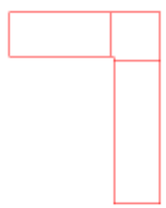
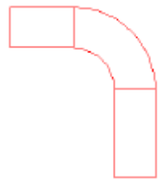
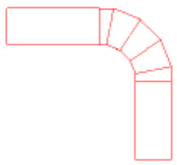
DM-M 03 Add Duct with Duct System

Discipline	Air Conditioning and Mechanical Ventilation
Family	System Family
Category	Ducts/ Duct System
Workset	/
Naming Convention	(Functional Type)-HAB-Descriptor 1-Descriptor 2

Duct System (System Classification) Table

	Sub-category in Revit	Short form	Description
Functional Type (System)	Exhaust Air	EAD	Exhaust Air Duct
	Return Air	RAD	Return Air Duct
	Supply Air	FAD	Fresh Air Duct
	Supply Air	SAD	Supply Air Duct
	Supply Air	TAD	Transfer Air Duct
	Supply Air	PAD	Primary Air Duct
	Exhaust Air	KED	Kitchen Exhaust Duct
	Exhaust Air	TED	Toilet Exhaust Duct

Duct Type (Material) Table

	Short form	Description
Functional Type (Duct Material)	PVC	Polyvinyl Chloride (PVC)
	PFD	Phenolic Foam Ductboard
	SSD	Sheet Metal
	GFD	Glass Fibre
Descriptor 1(Elbow design)	Mitered	
	Radius	
	Gored	

Information Requirement

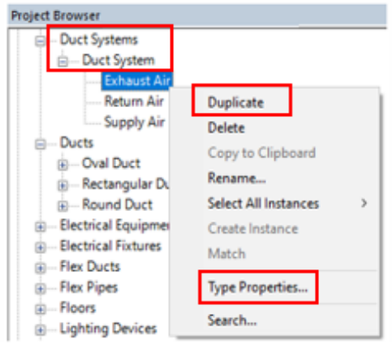
List of Built-in Parameters

Parameter	Information	Remark	Example
System Abbreviation	System abbreviation of specific piping system	Input the abbreviation of piping system	EAD, RAD, FAD……
Size	Size of Duct	Size of Duct	400x300, 1000x1200……
Length	Length of Duct	Length of Duct	2800.54,4255.33, 12500.25……
Reference Level	Level of Duct	Level of Duct	G/F, L1/F, L2/F, R/F……
Insulation Thickness	Thickness of insulation	Thickness of insulation	5mm, 10mm….
Other Information_L/L	Extra information of Pipe	Users can assign extra information or description of the lower part of pipe.	F/B, T/B, F/B TO L/L……
Other Information_H/L	Extra information of Pipe	Users can assign extra information or description of the upper part of pipe.	F/A, T/A, F/A TO H/L……
Comment	Custom information	Users can add custom information with this parameter.	For shop/ retail……

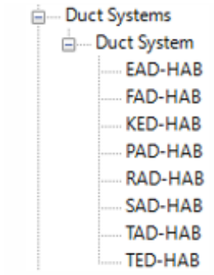
Model Authoring

- In Revit, Ducts, Duct Systems and Duct Type are defined as System Families, while Duct Fittings and Duct Accessories are Loadable Families
- Most of the parameters and functions for system family cannot be edited or modified by users, except by below settings.
- Before starting the ACMV project, Duct System and Duct Type shall be well established.
- Duct System indicates the function of the complete ductwork.
- Duct Type indicates the shape and material of the duct.

Create Duct System



Rename Duct System according to **Duct System (System Classification Table)**



Set Rise/ Drop Symbol

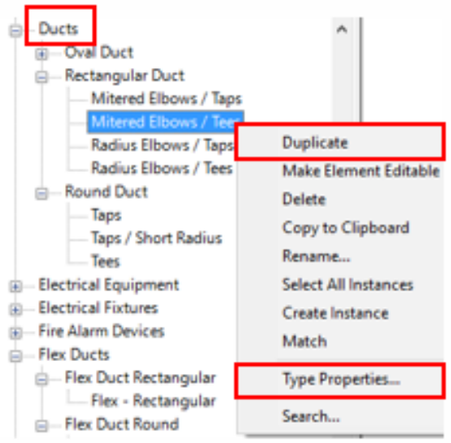
Duct System	Rise/ Drop Symbol
SAD/PAD/ FAD/TAD	Cross - Filled
RAD	Slash - Filled
EAD/KED/TED	Wye

a. In Project Browser → Duct System.
b. Duplicate suitable Pipe system to create a new Duct System.
c. Establish Type Properties (Fluid Types, Calculations, Abbreviation, Rise/Drop Symbol).

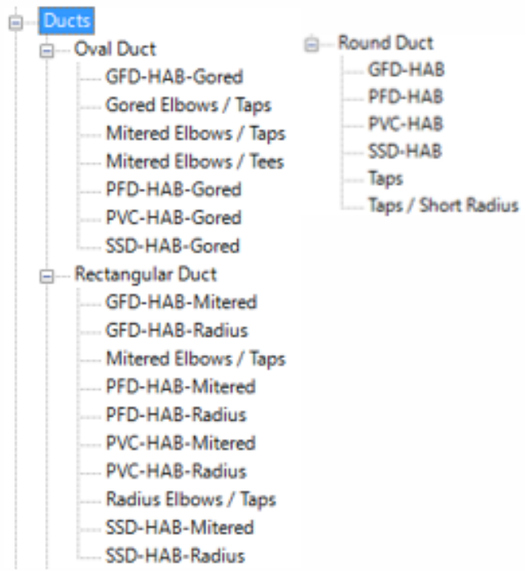
Establish your own abbreviation for Duct System by Abbreviation for Drawing Production (After all system have been modelled and before producing drawing)

Identity Data	
Type Image	
Abbreviation	EAD
Type Comments	

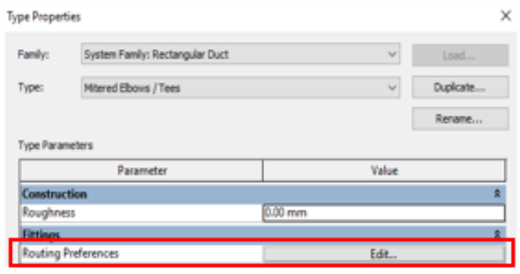
Create Duct Type



Rename Duct (Types) suggested in below table.



Edit Routing Preferences and assign duct fittings with same material.

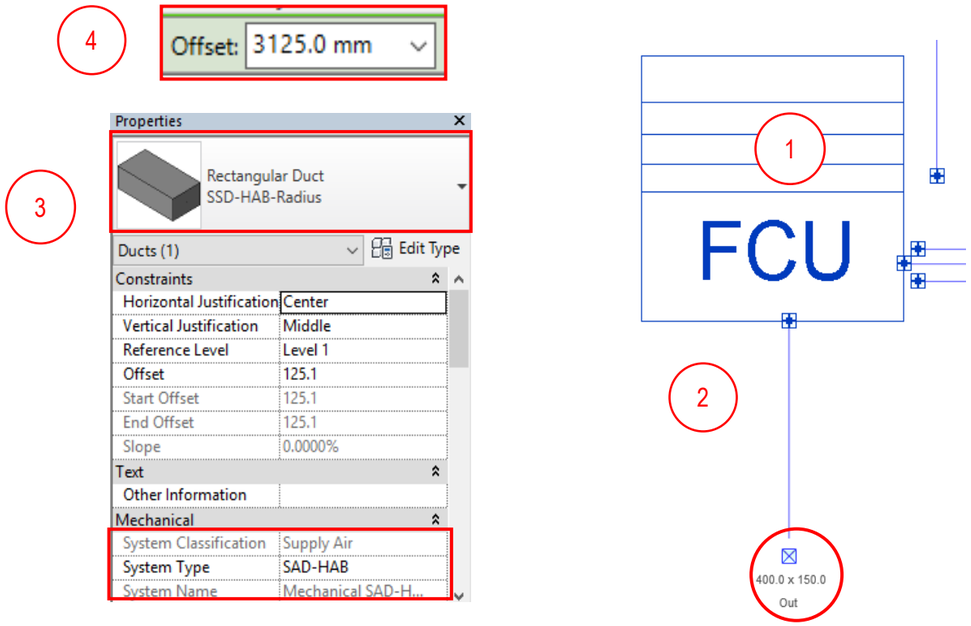


a. In Project Browser → Ducts
b. Right-Click (Suitable Duct shape) →Rename/Select Duplicate to create a new Duct Type (Tees)
c. Establish Duct Type's information (Routing Preference, Type Mark).

- Before drawing the ductwork, fixtures and equipment shall be modelled and placed first.
- Fixtures' and equipment's families shall be modelled with duct connectors. Refer to Section **DM-M 02** Add Mechanical Equipment under **D4.9** Air Conditioning and Mechanical Ventilation SAM.
- All ductwork shall be modelled as a closed/ complete system.

Model duct with fixtures/ equipment within ACMV project file

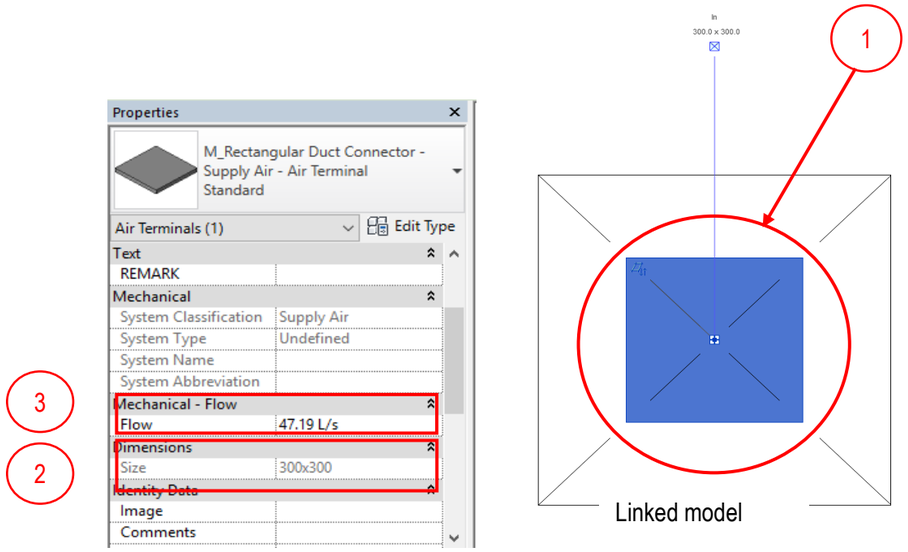
- Draw Duct from the connectors ➤ Set suitable system type (System) and pipe type (Material and Shape) ➤ Set Offset/ Adopt default offset by clearing the Offset value.



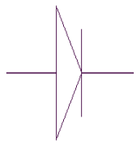
- If System Classification of connector is set as “Global”, reverse the Step 2 and 3.
- To retrieve the actual elevation according to mPD level, select "Datum" as Reference Level.

Model Duct with fixtures/ equipment in Linked Revit model

- Add appropriate connector to the fixtures/ equipment in linked model ➤ Set dimensions for the connect (directly/ By Edit Type) ➤ Input the mechanical information of the fixture/ equipment to the connector ➤ Model duct referring to the procedure stated above.



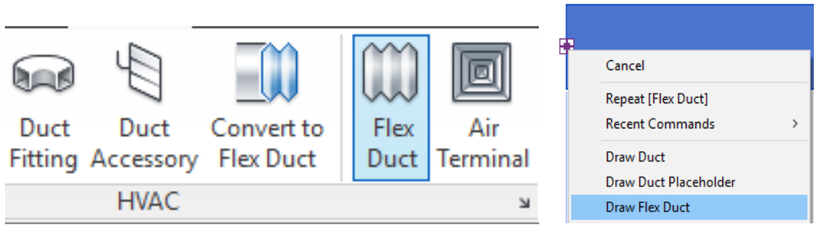
- After applying a connector, using Copy/ Monitor tool to create a relationship between the linked models and connectors. This provides a location check once the elements in linked model have



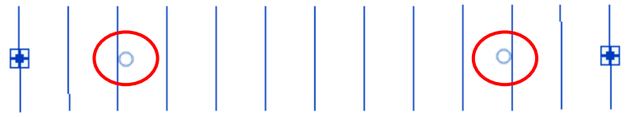
been moved. All categories listed below can applied the Copy/ Monitor function.

- Inclined ductwork shall be drawn in elevation view. The angle of the fitting shall refer to the mechanical setting.

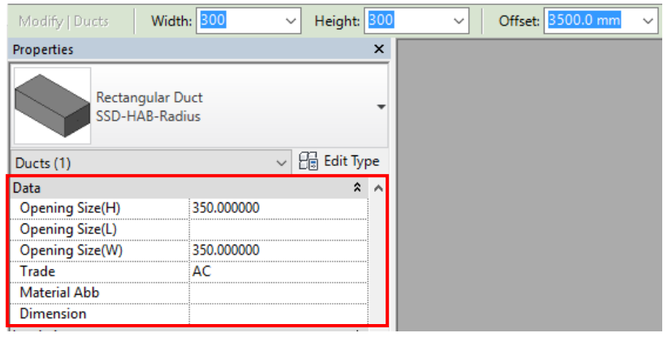
Model Flex Duct

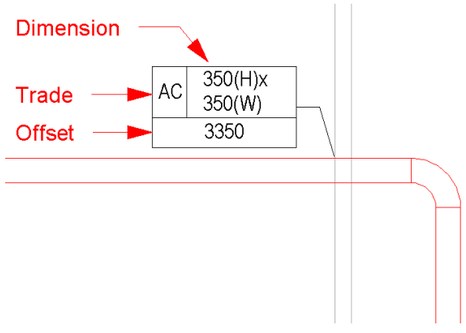


- There are only two types of Flex Duct, Rectangular and Round.
- The modelling method is the same as Duct tool.
- The orientation of Flex Duct can be adjusted by the control circles.



- Manage Builder's Work Legend
  - After all ductwork have been modelled in detailed design stage, information of the slab/ wall opening shall be input to the shared parameters of the pipe, including trade, opening dimension and material etc. Opening smaller than 100mm shall not be modelled.
  - For critical opening, its information such as size and shape shall be passed to Architects/ Structure Engineers accordingly.
  - Use suitable tag to indicate Builder's Work Legend.





DM-M 04 Add Duct Fittings

Discipline	Air Conditioning and Mechanical Ventilation
Family	Loadable Family
Category	Duct Fittings (Cross/ Elbow/ Tee/ Transition)/ Generic Model → Duct Fittings
Workset	/
Naming Convention	DUF-(Functional Type)-HAB-Descriptor 1(Shape)-Descriptor 2(Material)

Functional Type Table

	Short form	Description
Functional Type (Fitting Type)	DCR	Duct Cross
	DEB	Duct Elbow
	DEM	Duct Elbow_Mitered
	DER	Duct Elbow_Radius
	DEC	Duct Endcap
	DTE	Duct Tee
	DTR	Duct Transition
	DUN	Duct Union
Descriptor 1 (Shape) **(Descriptor 1 for Multi-shape Transition)**	RECT	Rectangular
	OVL	Oval
	RND	Round
	RECT to OVL	Rectangular to Oval
Descriptor 2 (Material) **Refer to Duct Type (Material) Table.**	SSD	Sheet Metal

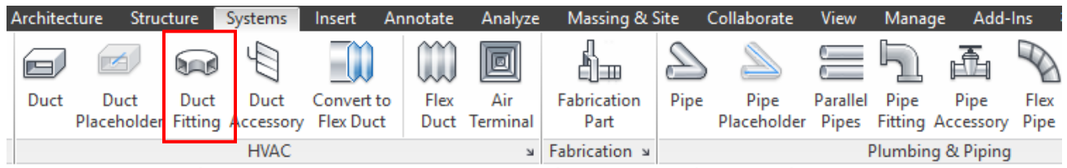
Information Requirement

List of Built-in Parameters

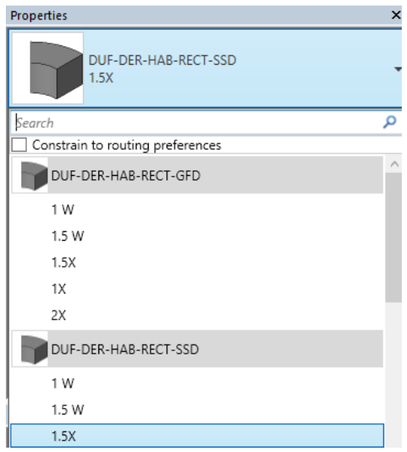
Parameter	Information	Remark	Example
System Abbreviation	System abbreviation of specific piping system	Input the abbreviation of piping system	EAD, RAD, FAD……
Size	Size of Duct	Size of Duct	400x300, 1000x1200……
Length	Length of Duct	Length of Duct	2800.54,4255.33, 12500.25……
Reference Level	Level of Duct	Level of Duct	G/F, L1/F, L2/F, R/F……
Insulation Thickness	Thickness of insulation	Thickness of insulation	5mm, 10mm….

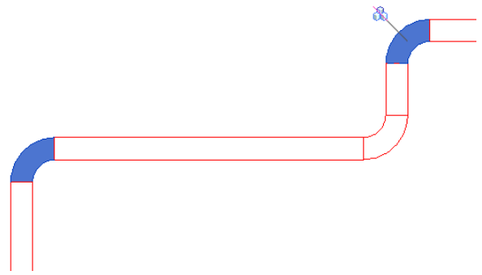
Model Authoring

Place Pipe Fittings

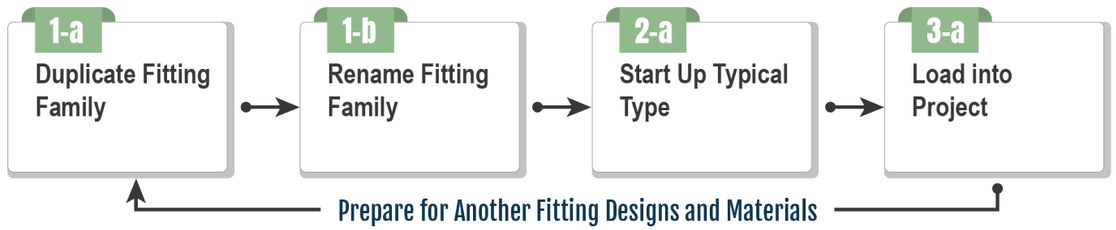


- Typical fitting types shall be set as routing preference. Therefore, duct fittings can be generated automatically while drawing ductwork.
- Assign the material for specific (material) duct fittings after the pipework has been modelled.





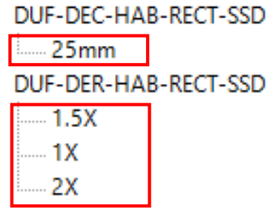
- It is **NOT suggested to create a fitting family** unless there is insufficient fitting design in Revit family library.
- Please follow the below procedure to modify the fittings provided from Revit Library for Hong Kong Practices for **Design Stage only**.



Prepare Typical Type

Duct Fitting Type Naming Convention

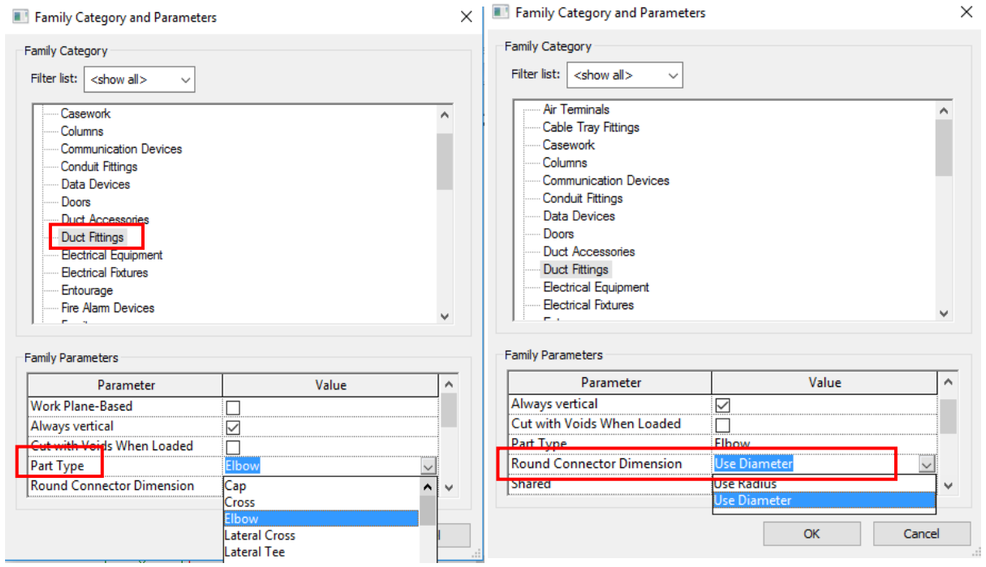
- There are type parameters “Radius Multiplier” and “Duct Length: for Duct Elbow_Radius and Duct Endcap respectively.
- Type name of Loadable Family shall be able to present the dimension or characteristic of the type.



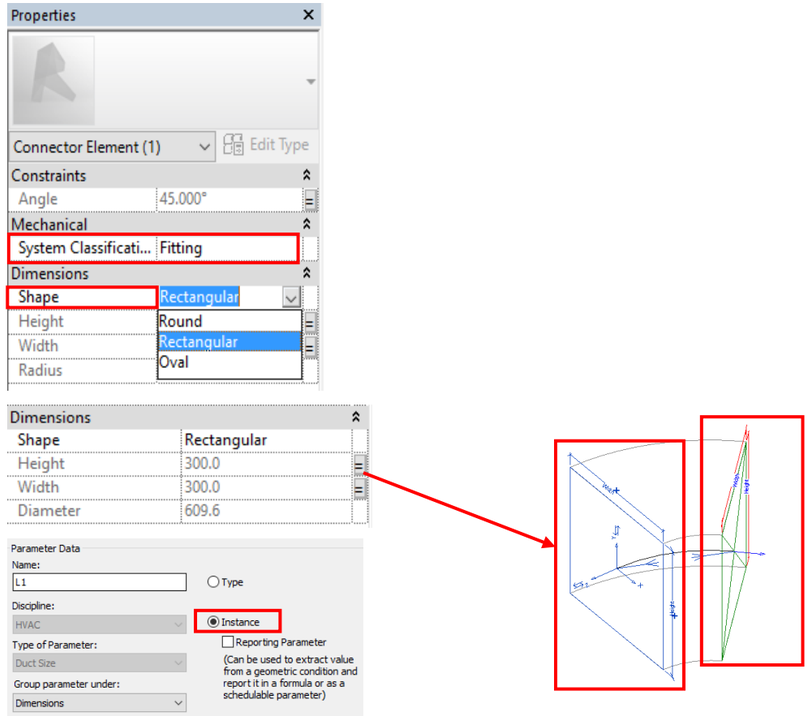
3D model family

- Extracting the material properties of the duct fittings from their family name to facilitate Quantity Take-Off is proposed.
- Define suitable Duct Fittings for family category and Part Type for family creation.

- Use Diameter for all family as Hong Kong Practices.



- Duct connectors shall be modelled and assigned as Fitting for the System Classification in family.
- Define the shape and dimensions for duct connector



- The diameters of the pipe fitting outlets and corresponding connectors shall be controlled by formulated instance parameters.

DM-M 05 Add Duct Accessories

Discipline	Air Conditioning and Mechanical Ventilation
Family	Loadable Family
Category	Duct Accessories
Workset	/
Naming Convention	DUA-(Functional Type)-HAB-Descriptor 1(Shape)-Descriptor 2(Material)

Information Requirement

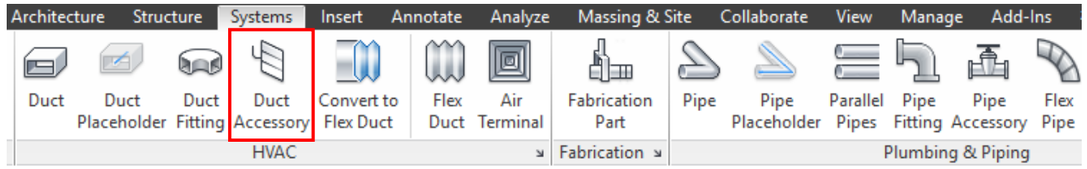
List of Built-in Parameters

Parameter	Information	Remark	Example
System Abbreviation	System abbreviation of specific piping system	Input the abbreviation of piping system	EAD, RAD, FAD……
Size	Size of Duct Accessories	Size of Duct Accessories	400x300, 1000x1200……
Length	Length of Duct Accessories	Length of Duct Accessories	2800,4250, 8500……
Level	Level of Duct Accessories	Level of Duct Accessories	G/F, L1/F, L2/F, R/F……
Insulation Thickness	Thickness of insulation	Thickness of insulation	5mm, 10mm….
Comment	Custom information	Users can add custom information with this parameter.	For shop/ retail……

Remark: Parameters in grey colour is optional parameter.

Model Authoring

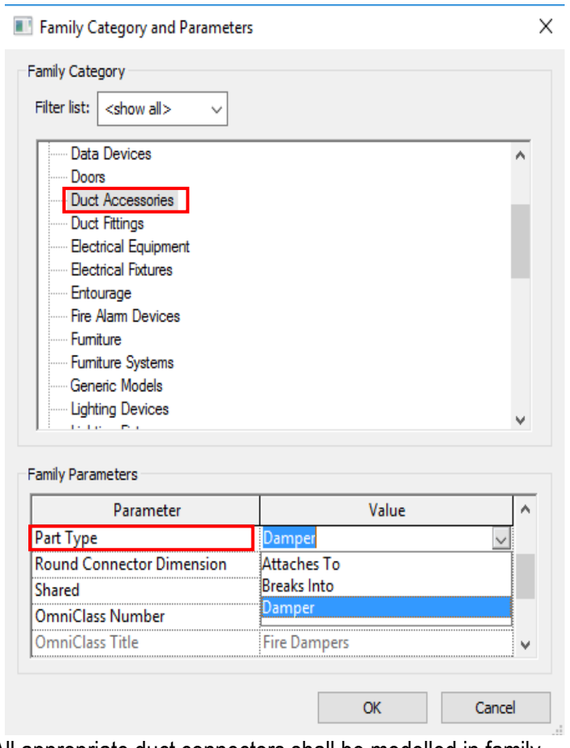
Place Duct Accessory



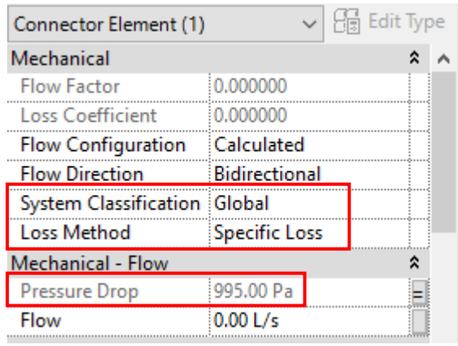
- Add duct accessories after the ductwork has been modelled.
- All duct accessory families shall be nested with a 3D model family and an annotation family (symbol).

(i) 3D model family

- Define suitable Part Type or insertion method for family creation.



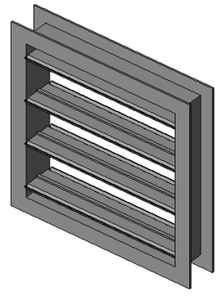
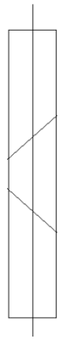
- All appropriate duct connectors shall be modelled in family.
- Specification of the duct accessories shall be input into the parameters of the connectors, e.g. Damper offers pressure drop, set only one of the connectors with Loss Method: Specific Loss, and define the Pressure Drop.
- System classification of the duct connectors shall be well assigned; otherwise it shall be set as "Global".



- Using a Type parameter to control pressure drop. This is a good practice for Family Types Creation.
- Duct accessory shall not be over-modelled

(ii) Annotation family (Symbol)

- The visibility setting shall be well set to define the presence of 2D symbol and 3D model in different detail level and views.
- All 2D symbols please refer to the HA's CAD Standards for DCD.

Description	3D Model (For elevation and 3D view)	2D Symbol (For plan view only)
Volume Control Damper		

DM-M 06 Add Air Terminals

Discipline	Air Conditioning and Mechanical Ventilation
Family	Loadable Family
Category	Generic Model → Air Terminals
Workset	/
Naming Convention	ART-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Air Terminals Table

Category	Examples
Air Terminals	Diffuser, Grill, Hood etc.

Information Requirement

List of Built-in Parameters

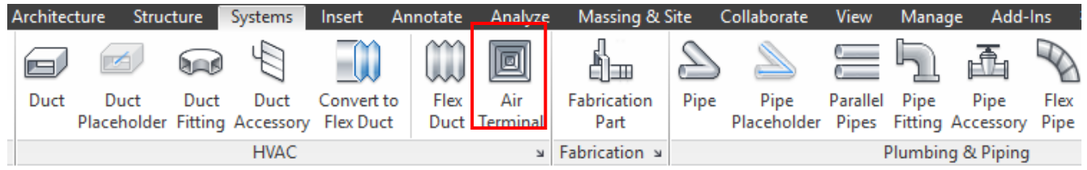
Parameter	Information	Remark	Example
System Abbreviation	System abbreviation of specific piping system	Input the abbreviation of piping system	EAD, RAD, FAD……
Size	Size of Air Terminals	Size of Air Terminals	400x300, 1000x1200……
Length	Length of Air Terminals	Length of Air Terminals	2800,4255, 12500……
Level	Level of Air Terminals	Level of Air Terminals	G/F, L1/F, L2/F, R/F……
Description	Air Terminals Mark	This parameter can be utilized to add HA tag families to annotate the air terminal.	EAG, FAG…….
Comment	Custom information	Users can add custom information with this parameter.	For shop/ retail……

Remark: Parameters in grey colour is optional parameter.

- All required specifications of Air Terminals in equipment schedule shall be built in the family as Information Requirement accordingly.

Model Authoring

Place Air Terminal



- Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.
- Air Terminals hosted on ceiling shall be modelled in ARC Ceiling model file and collaborated with Architects.
- Air Terminals mounted to walls or other elements shall use Face-based or Generic-based family template.
- The modelling requirements of Air Terminal are similar to that of Plumbing Fixture. Refer to Section **DM-P 02 Add Plumbing Fixture** under **D4.8 Water Services SAM**.

(i) Annotation / Presentation

- Use detail item (symbolic line) or symbol to represent the Air Terminals on floor plan view. Refer to MEP Symbol for symbol modelling techniques.
- Use tag to annotate the information.
- All symbols and tag shall refer to the HA's CAD Standard for DCD.

DM-M 07 Add Water Side Pipework with Pipe System

The setting and modelling on pipe system in ACMV discipline is similar to Plumbing discipline. Refer to Section **DM-P 03** Add Pipe with Pipe System under **D4.8 Water Services SAM**.

Information Requirement

Piping System (Sub-Category) Table

Sub-category	Functional type	Functional Type (short form)
Other	Condensate Drain Pipe	CDP
Hydronic Return	Chilled Water Return Pipe	CHWR
Hydronic Supply	Chilled Water Supply Pipe	CHWS
Hydronic Return	Condenser Water Return Pipe	CWR
Hydronic Supply	Condenser Water Supply Pipe	CWS

Standard filter for different pipe systems on plan view and 3D view.

System type	Preferred colour		RGB Colour System
Condenser Drain Pipe (CDP)	ORANGE		255, 128, 000
Chilled Water Return Pipe (CHWR)	GREEN		000, 255, 000
Chilled Water Supply Pipe (CHWS)	YELLOW		255, 255, 000
Condenser Water Return Pipe (CWR)	DARK GREEN		000, 128, 064
Condenser Water Supply Pipe (CWS)	LAKE PLACID BLUE		000, 128, 255

Conduct Preliminary Heating/ Cooling Load Analysis

Revit provide preliminary Heating and Cooling Loads Analysis **for quick reference** in the very beginning stage for project loading estimation.

Details of Heating and Cooling load analysis can be referred to Autodesk website as below:

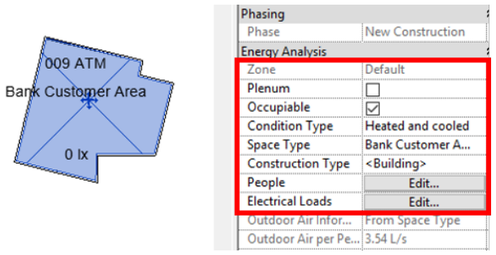
Calculation Reference for Heating and Cooling Loads

https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/CloudHelp/cloudhelp/2019/ENU/Revit-Analyze/files/GUID-B3E90100-0CC9-4874-AEFC-079727ECDA12-htm.html

Edit Space Type and Space Properties

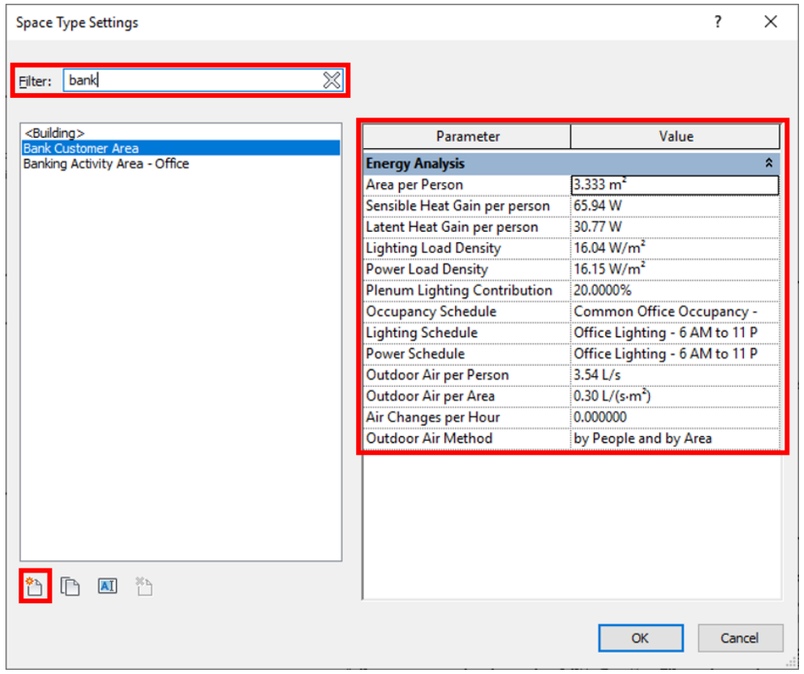
After placing spaces, space type and the detail building material can be further set to reflect actual condition of each space.

- Click to select “Space Type”
- In the Properties, scroll down to the Energy Analysis group, click to edit “Condition Type”, “Space Type” and “Construction Type”.



- Once the requirements are setup in Space Type, People and Electrical Loads will be set accordingly.

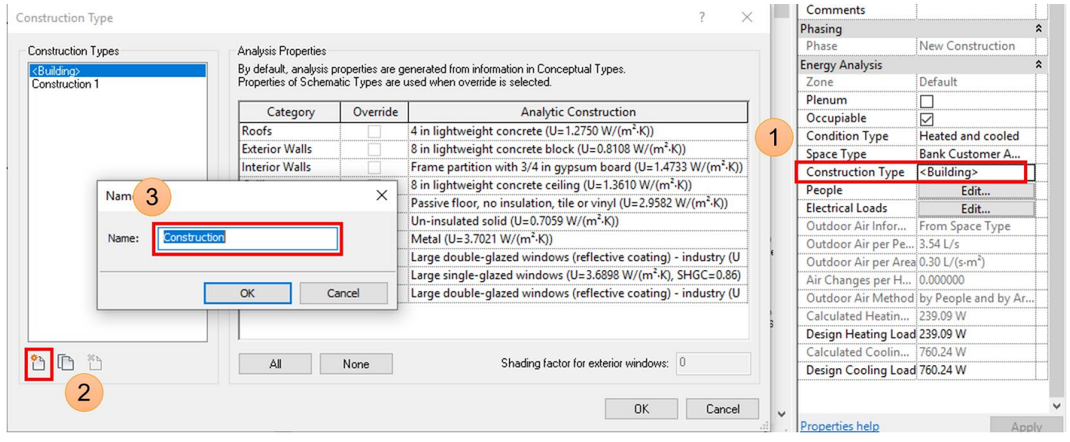
- Click on Space Type and the Space Type Setting pop-up window will be popped up.



- Simply search in the Filter area with the most match space type.
- If there is no space match, click on  to create new space.
- In the right pane of Space Type Setting, input required information to facilitate further analysis.

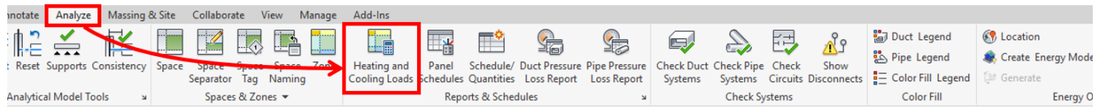
Edit Construction Type in Space Properties

- Click on Construction Type in Space Properties
- The default building material and its u-value is shown in the table.
- Click New to create new Construction Type
- Enter new name for the construction type.



Heating and Cooling Loads

Click Analyze tab -> Heating and Cooling Loads and then below window will be popped up.



In the pop-up window, there two tabs for more settings. General and Details shows project setting and individual spaces settings respectively.

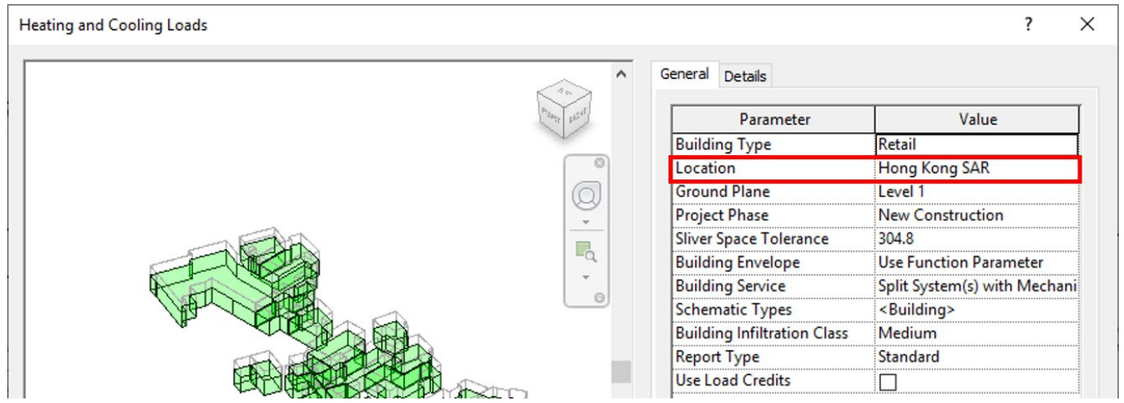
General Tab provides key settings for the project. There are three main settings needed to be set before going to Details tab.

Building Type: Specifies the type of building according to the gbXML schema 0.37 (similar to ASHRAE)

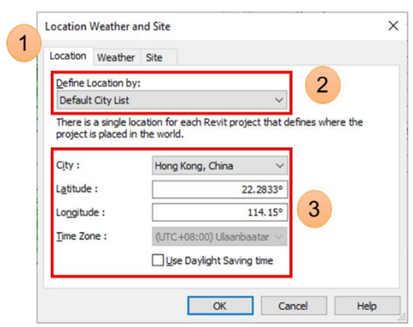
Location: Specifies the geographic location for the model. The location establishes the climate and temperatures used in loads calculation.

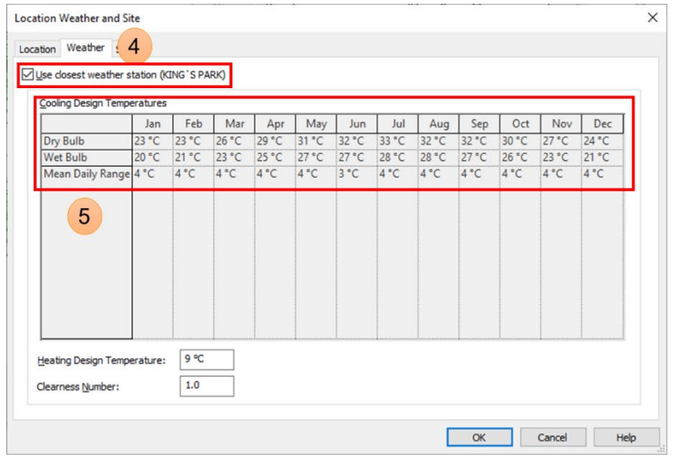
Schematic Types: Specifies the constructions type for the building. Click to open the Schematic Types dialog if it is not finished setting in previous section. There can specify the materials and insulation (U-values) for the building.

Click on “Location” under General Tab to adjust location and weather data.



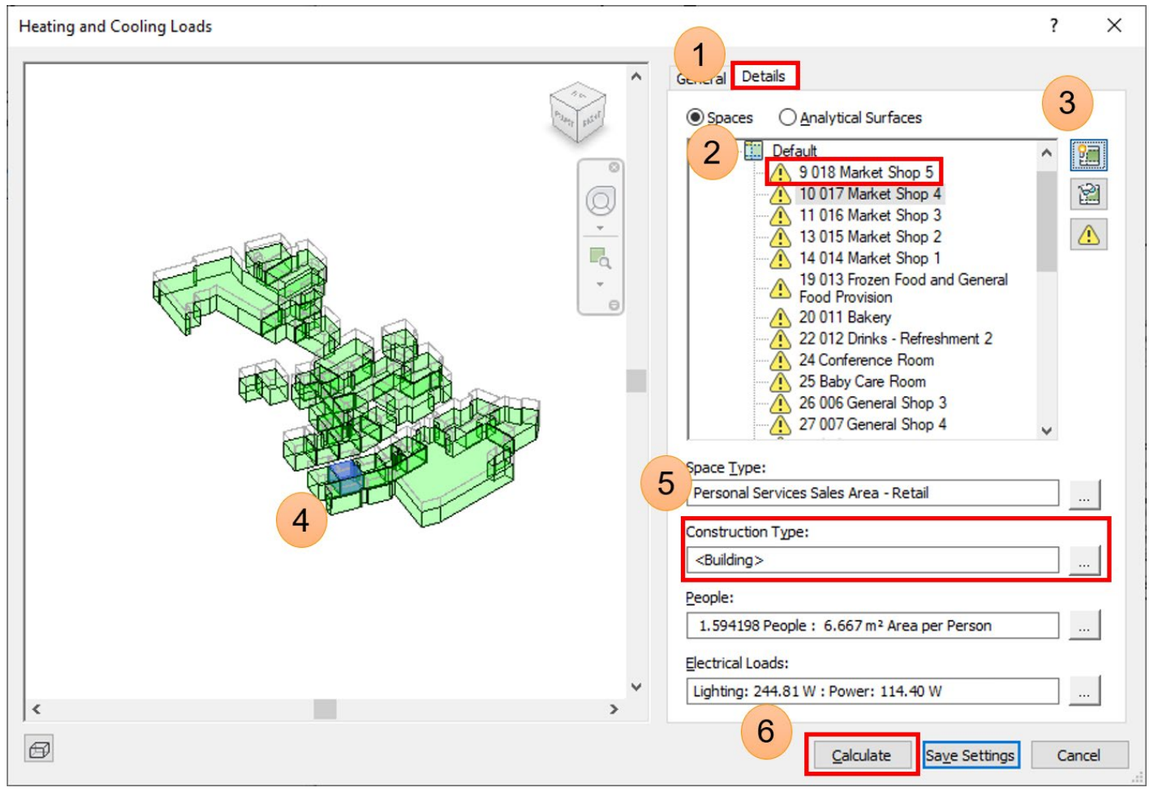
Below shown the setting after clicking Location.



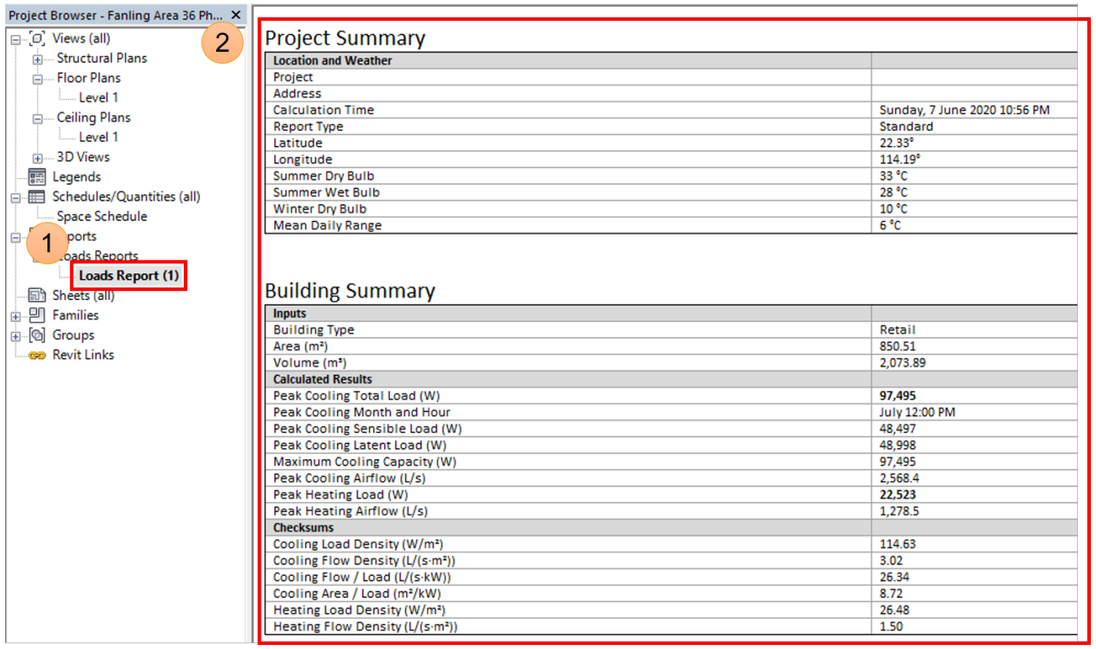


1. Click on Location tab.
2. In the Define Location by:, select “Default City List”
3. Click to select “Hong Kong, China” in City, the Latitude and Longitude information will be updated.
4. Click on Weather Tab. The default setting uses “Use closest weather station (KING’s PARK)”.
5. You can uncheck the default box and manual input Cooling Design Temperature.

Below shown the settings in Details tab.



1. Click on Details tab.
2. Click one of the space in the available spaces
3. Click “Highlight”  at the right side.
4. The Space selected will be highlighted in the viewing area.
5. Click on “Construction Type” to fine tuning the construction material specific of this space. This enables further adjustment to amend u-value of building material if it deviates from overall setting in the project.
6. Click “Calculate” to proceed “Heating and Cooling Loads” analysis.



The calculation process is relatively fast.

1. Once completed the analysis, the report will be located under Loads Reports of Project Browser.
2. Click on the Loads Report, a detail report with result will be shown.

D4.10 Electrical SAM

This section describes the standard approach to modelling in Electrical discipline and the step-by-step workflow / guide to apply them into the project.

All Building Services disciplines are regarded as MEP Systems in Revit. To retrieve appropriate information of the systems and elements, Systems for different discipline services shall be well prepared before modelling. This guide will cover mechanical setting, cable tray fittings, cable tray, trunking fittings, trunking, conduits fittings, conduits, relative appliances and circuit modelling.

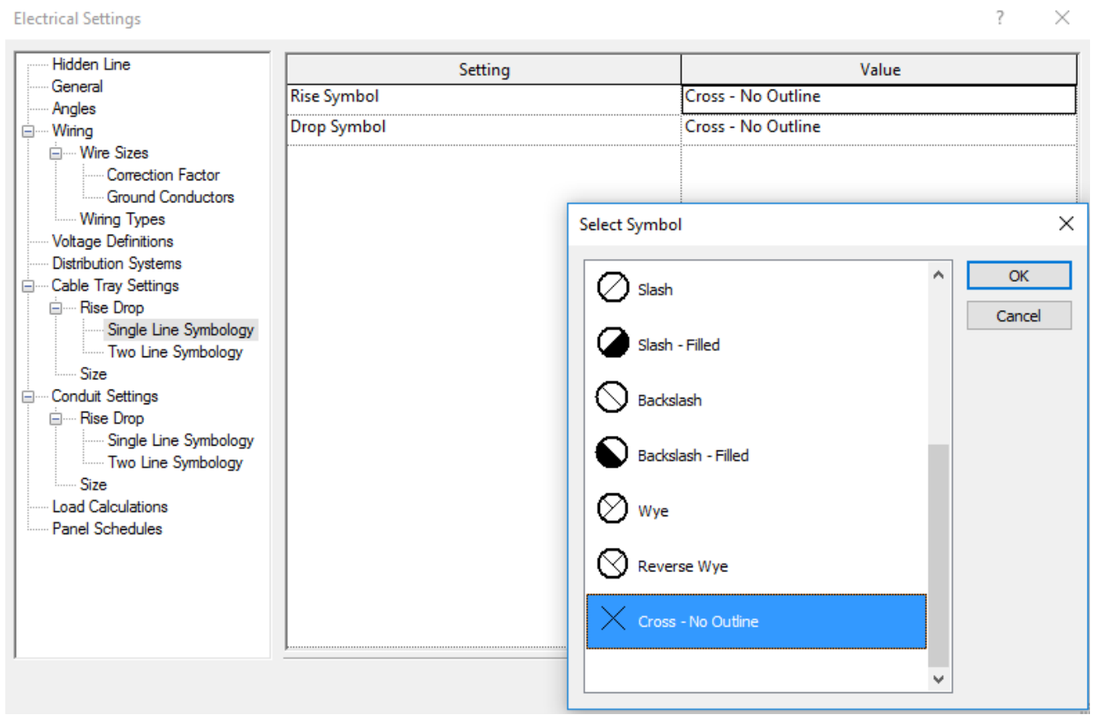
Refer to **D5 Presentation Style** for preparing drawing production.

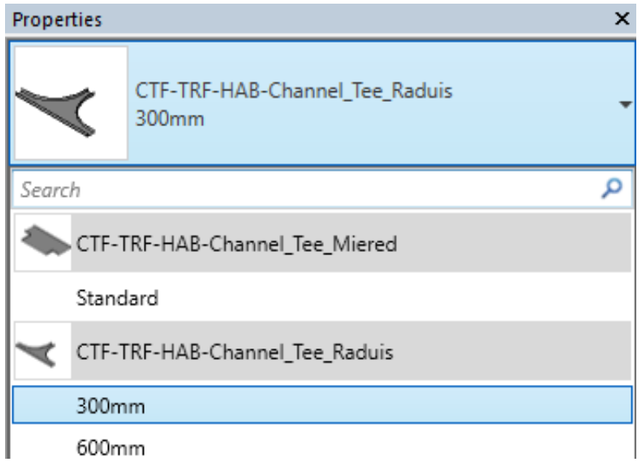
DM-E 01 Electrical Setting for Cable Tray and Conduit

Following properties are suggested for electrical setting.

Setting	Value
Hidden Line	Draw MEP Hidden Lines Single Line gap: 0.8 mm
Fitting Angles	To be closer to reality, the fittings among pipes shall be fit an angle in 90°, 45°, 22.5°. It shall not be in the other angle or choose “Use any angle” use in the layout.
Wiring	Show Tick Marks: Always
Rise/ Drop Annotation Size	Cable Tray/ Conduit Rise/ Drop Annotation Size: 1.4 mm (i.e. Annotation size for cable tray/ conduit rise and drop is limited to this value and do not change according to their actual size)

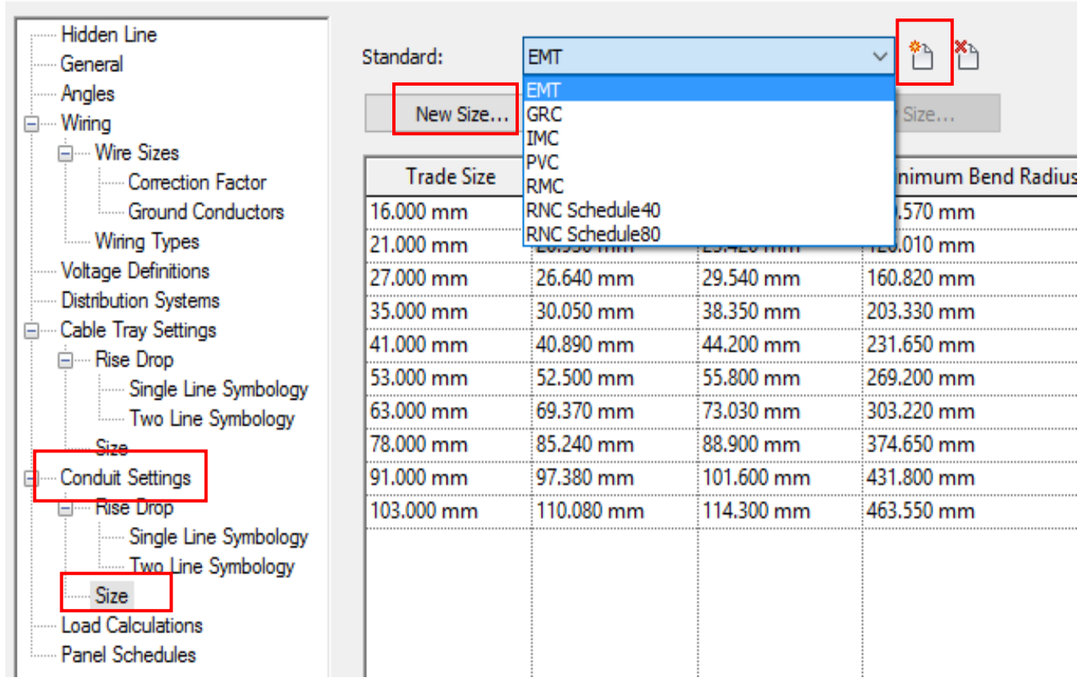
Determined Rise/ Drop Symbol for Cable Tray and Conduit:

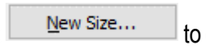


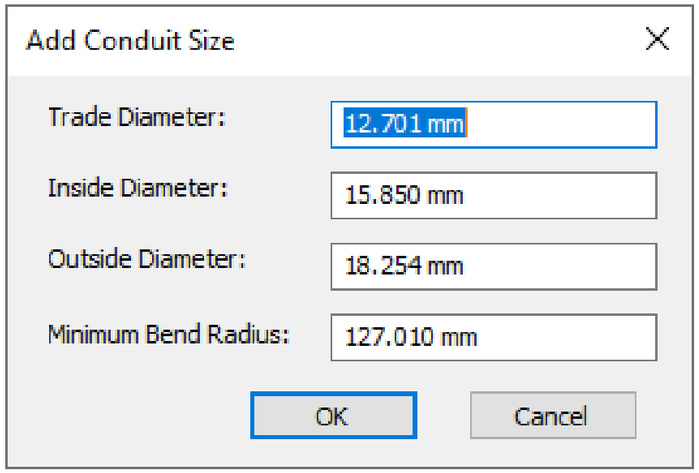




Determined Standard (Material) and size for Conduit Type:



If the conduit type is not enough, click  to create new conduit type. Click  to create new size with inside, outside diameter and minimum bend radius.



DM-E 02 Add Electrical Equipment

Discipline	Electrical Lift and Escalator Depend on the function and system of the equipment
Family	Loadable Family
Category	Electrical Equipment
Workset	/
Naming Convention	ELQ-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Mechanical Equipment Table

Category	Examples
Electrical Equipment	LV Switch Board, Transformer, Emergency Generator etc.

Information Requirement

List of Built-in Parameters

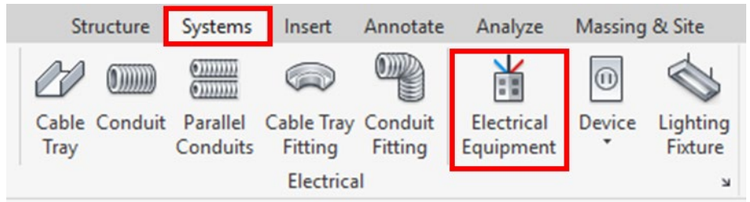
Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Panel……
Level	Level of Electrical Equipment	Level of Electrical Equipment	G/F, L1/F, L2/F
Type Mark	Panel Type Name	Name of Panel Type to be visualised in 3D geometry by 3D text	MCB, MCCB, LMCP……
Mark	Electrical Equipment Mark	This parameter can be utilized to add HA tag families to annotate the electrical equipment.	LVSB1, TX1….
Comment	Custom information	Users can add custom information with this parameter.	Emergency use…

Remark: Parameters in grey colour is optional parameter.

Model Authoring

Place Electrical Equipment

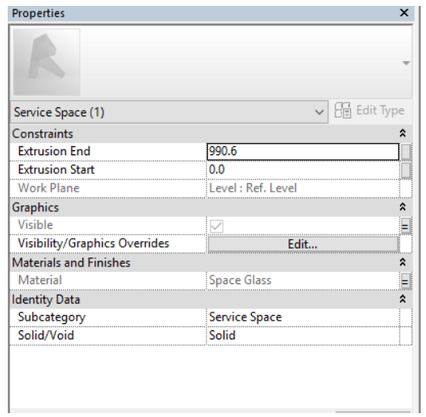
Electrical Equipment can be found in System Ribbon -> Electrical Panel -> Electrical Equipment.

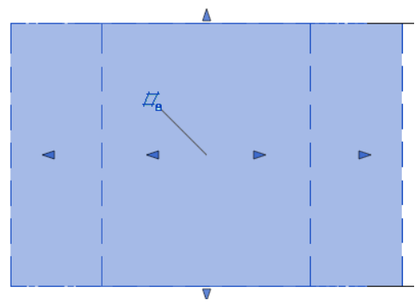


The modelling requirements of Electrical Equipment on creation of model in Family, annotation symbol and tagging are similar to the detail steps in Plumbing Fixture. Refer to **DM-P 02** Add Plumbing Fixture under **D4.8** Water Services SAM.

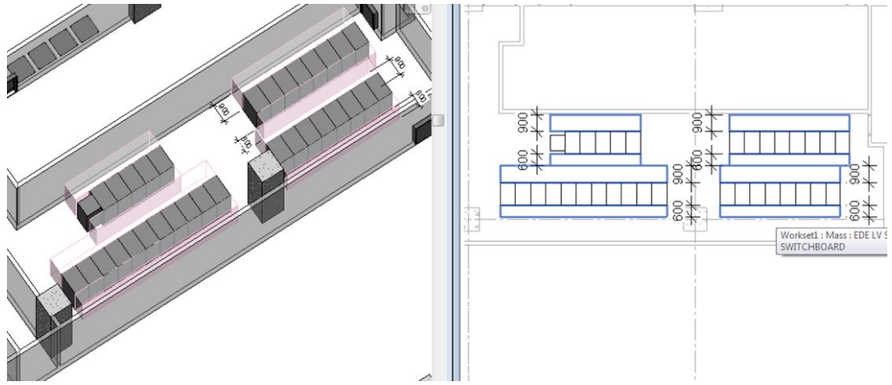
- Select a suitable hosting type for the components as it cannot be changed to other hosting types afterwards.
- For large equipment, a service space/ maintenance space shall be modelled as LOD-I 300.
- A generic service space family with service space/ maintenance space sub-category is suggested to nested with large equipment family. Dimension of the generic service space family shall be controlled by shared parameters. This approach can benefit and facilitate the visibility control for the service space across different categories.

Generic Service Space family





Large equipment family nested with Generic Service Space family



DM-E 03 Add Electrical Components

Discipline	Electrical
Family	Loadable Family
Category	According to Electrical components (Sub-Category) Table
Workset	/
Naming Convention	ELQ-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Electrical components (Sub-Category) Table

Category	Sub- Category	Examples
Device	Electrical Fixture	Power Socket, Junction Box, Electrical Cable Pit, Switch
	Communication device	Microphone, Speaker
	Data device	Junction Box, Data Outlet
	Fire alarm device	Smoke Detector, Fire Alarm Horn
	Lighting device	Dimmer, Occupancy Sensor
	Nurse Call device	Staff Station, Toilet Station
	Security device	Electric Lock, Security Alarm
	Telephone device	Telephone Outlet, Junction Box

Information Requirement

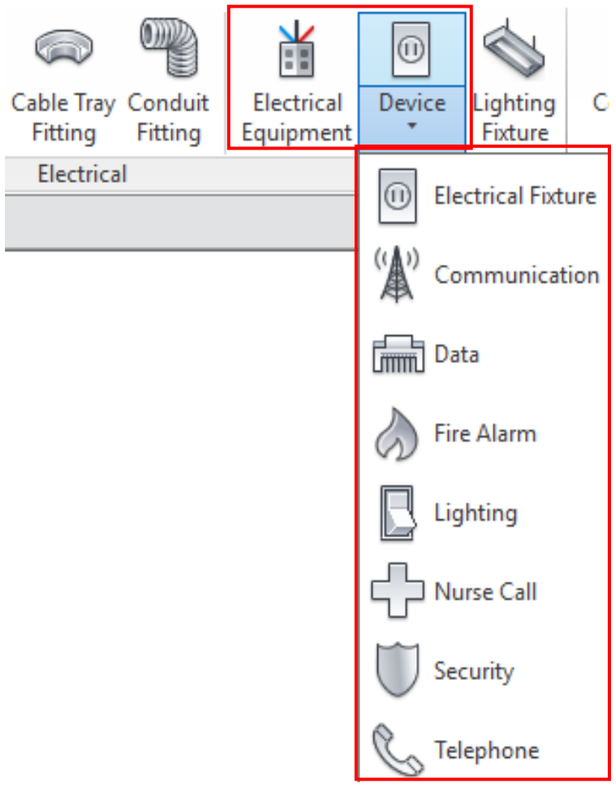
List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Panel……
Level	Level of Electrical Components	Level of Electrical Components	G/F, L1/F, L2/F
Mark	Electrical Components Mark	This parameter can be utilized to add HA tag families to annotate the electrical components.	EF1, FA2……
Comment	Custom information	Users can add custom information with this parameter.	Public lighting……

Remark: Parameters in grey colour is optional parameter.

Model Authoring

Place Electrical components
Click System Tab ➢ Electrical Panel ➢ Electrical Equipment, Device



- Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.
- However, different categories templates contain specific parameters for calculation. Therefore, use appropriate category templates for family creation, refer to Electrical components (Sub-Category) Table.
- The modelling requirements of electrical components are similar to that of Plumbing Fixture. Refer to Section **DM-P 02** Add Plumbing Fixture under **D4.8** Water Services SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to **D4.9 DM-M 02** Add Mechanical Equipment.
- All required specifications of electrical components in equipment schedule shall be built in the family as Information Requirement accordingly.

DM-E 04 Add Lighting Fixture

Discipline	Electrical
Family	Loadable Family
Category	Lighting Fixture
Workset	/
Naming Convention	Category-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Lighting Fixture Table

Category	Sub- Category	Examples
Lighting Fixture		Wall, Ceiling and Recessed lights

Information Requirement

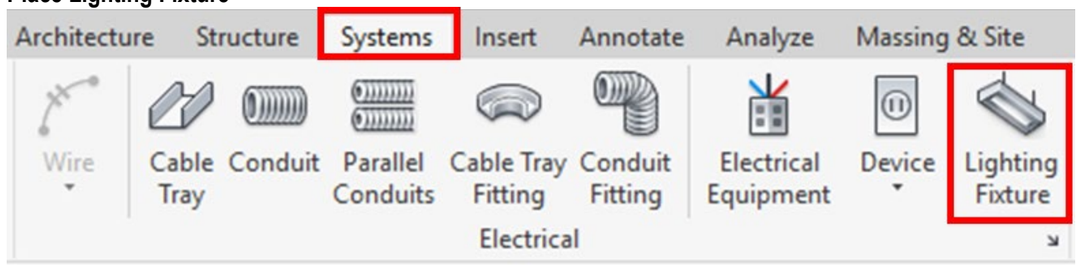
List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	SF8……
Level	Level of Lighting Fixture	Level of Lighting Fixture	G/F, L1/F, L2/F
Mark	Lighting Fixture Mark	This parameter can be utilized to add HA tag families to annotate the lighting fixture.	LF1, LF2…
Comment	Custom information	Users can add custom information with this parameter.	Emergency lighting……

Remark: Parameters in grey colour is optional parameter.

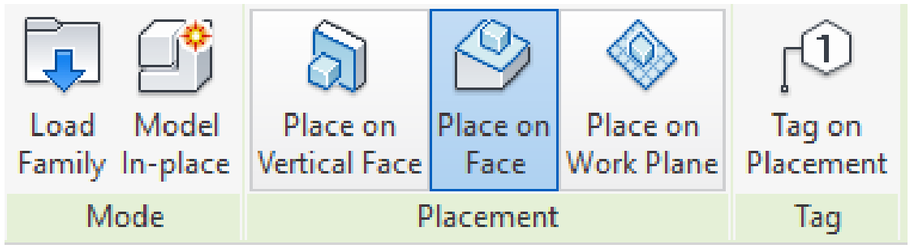
Model Authoring

Place Lighting Fixture



Click System Tab ➢ Electrical Panel ➢ Lighting Fixture

- Select a suitable hosting type for the components as it cannot be changed to other hosting types afterwards.
- In collaboration, Architectural file will be linked into MEP project files. However, wall-, floor- or ceiling- based family cannot recognised linked wall, floor or ceiling as host. Therefore, most components are suggested to use a Face-based or Generic-based family template.



- The modelling requirements of Lighting Fixture are similar to that of Plumbing Fixture. Refer to Section **DM-P 02** Add Plumbing Fixture under **D4.8** Water Services SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to **D4.9 DM-M 02** Add Mechanical Equipment.

- All required specifications of electrical components in equipment schedule shall be built in the family as Information Requirement accordingly.
- Optional lighting calculation on “Average Estimated Illuminance” can be taken as reference in **DM-E 12** Conduct Preliminary “Average Estimated Illuminance”. Models can also be exported in STF or gbXML format for analysis in DiaLux or other software. **DM-E-13** shows an optional way to develop lighting layout by exchange data between Revit and Dialux for reference.

DM-E 05 Add Cable Tray

Discipline	Electrical
Family	System Family
Category	Cable Trays
Workset	/
Naming Convention	(Functional Type)-HAB-CT-Descriptor 2

Information Requirement

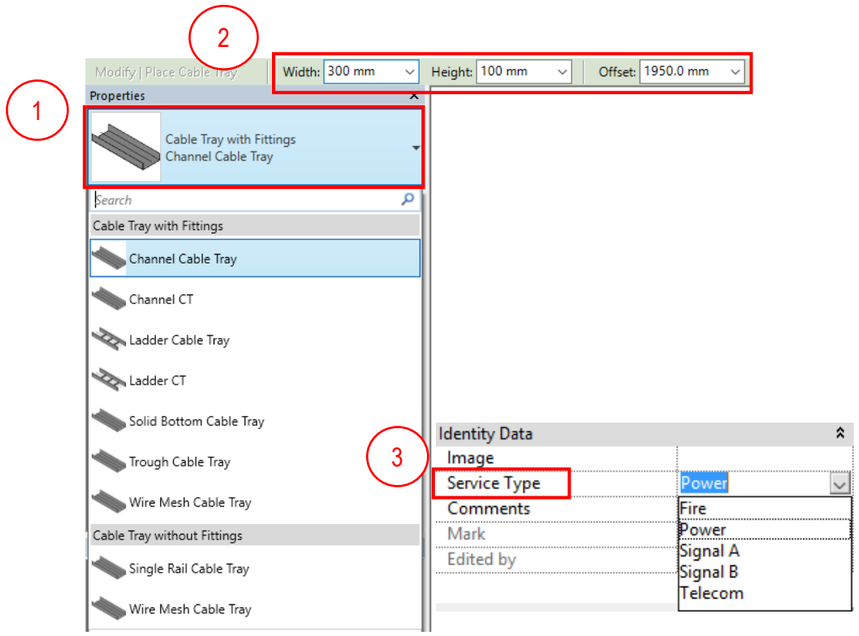
List of Built-in Parameters

Parameter	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Channel Cable Tray, Ladder CT……
Size	Size of Cable Tray	Size of Cable Tray	400x50, 800x200……
Length	Length of Cable Tray	Length of Cable Tray	2800.54,4255.33, 12500.25……
Reference Level	Level of Cable Tray	Level of Cable Tray	G/F, L1/F, L2/F, R/F……
Other Information_L/L	Extra information of Pipe	Users can assign extra information or description of the lower part of pipe.	F/B, T/B, F/B TO L/L……
Other Information_H/L	Extra information of Pipe	Users can assign extra information or description of the upper part of pipe.	F/A, T/A, F/A TO H/L……
Service Type	Cable Tray Service Type	This parameter can be utilized to add HA tag families to annotate the cable tray.	LTG, ELV…….
Comment	Custom information	Users can add custom information with this parameter.	Telecom use……

Remark: Parameters in grey colour is optional parameter.

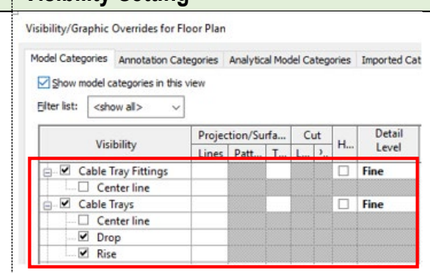
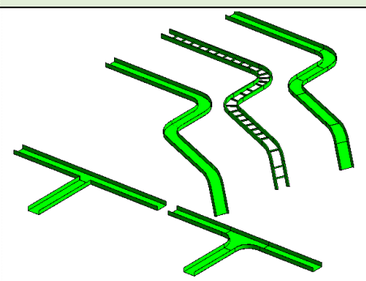
Model Authoring

- Model Cable Tray
  - Select Cable Tray ➤ Set suitable Cable Tray type ➤ Set dimensions and offset ➤ Define Service Type



- To retrieve the actual elevation according to mPD level, select "Datum" as Reference Level.

- Inclined Cable Tray shall be drawn in elevation view. The angle of the fitting shall refer to the Electrical Setting, otherwise specify the special fitting angle in Remarks as reference to facilitate Quantity Take-Off or drawing production.

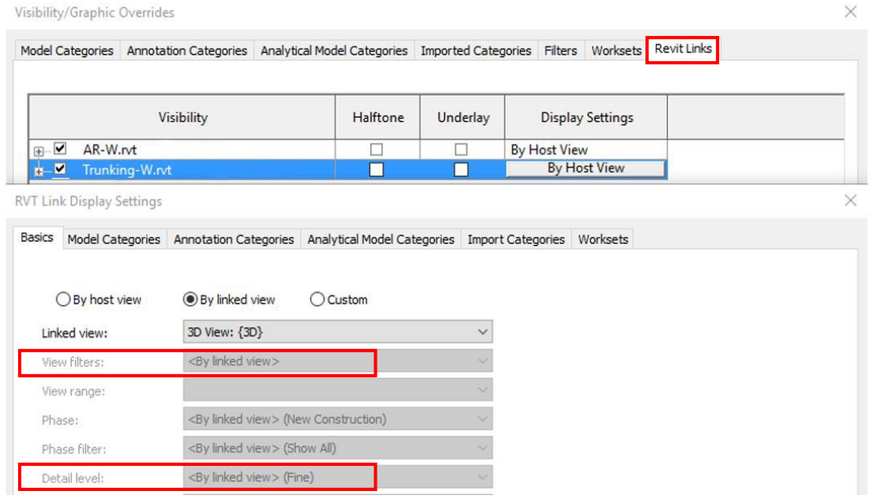
Detail Level	Visibility Setting	3D Model
Fine	 Uncheck Centre line	

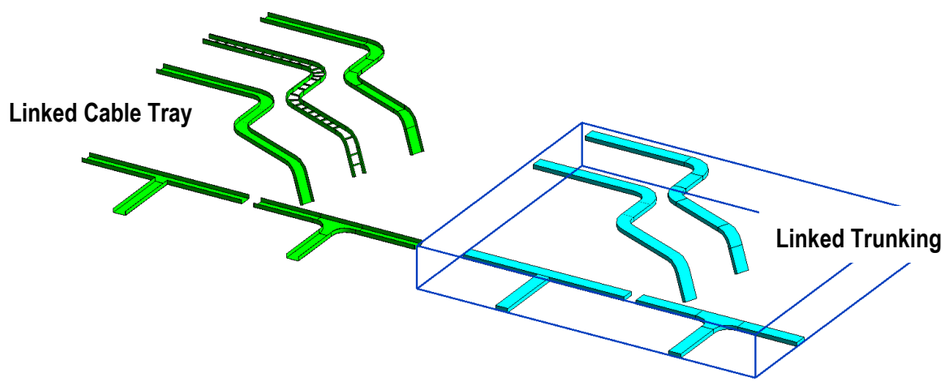
- After all Cable Tray have been modelled in detailed design stage, information of the slab/ wall opening shall be passed to Architects/ Structure Engineers accordingly. Trade, opening shape, dimension, offset and material shall be included.

- Manage Builder's Work Legend
  - The setting on Builder's Work Legend for Cable Tray is similar to the setting for Duct. Refer to Section **DM-M 03** Add Duct with Duct System under **D4.9** Air Conditioning and Mechanical Ventilation SAM

Collaboration Within discipline/ cross-discipline

- In the MEP model file (Central), by controlling the display settings of Revit Links (Cable Tray model file and trunking model file), both Cable Tray and Trunking can be presented in the same view with appropriate presentation format.





DM-E 06 Add Cable Tray Fittings

Discipline	Electrical
Family	Loadable Family
Category	Generic Model → Cable Tray Fittings
Workset	/
Naming Convention	CTF-(Functional Type)-HAB-CT-Descriptor 2

Information Requirement

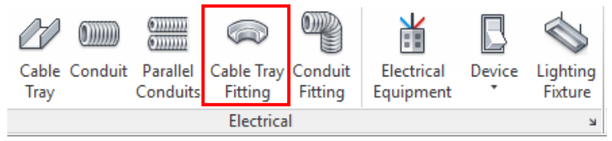
List of Built-in Parameters

Parameter	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Channel Cable Tray, Ladder CT……
Size	Size of Cable Tray Fittings	Size of Cable Tray Fittings	400x50, 800x200……
Reference Level	Level of Cable Tray Fittings	Level of Cable Tray Fittings	G/F, L1/F, L2/F, R/F……
Service Type	Cable Tray Service Type	This parameter can be utilized to add HA tag families to annotate the cable tray fittings.	LTG, ELV…….
Comment	Custom information	Users can add custom information with this parameter.	Telecom use……

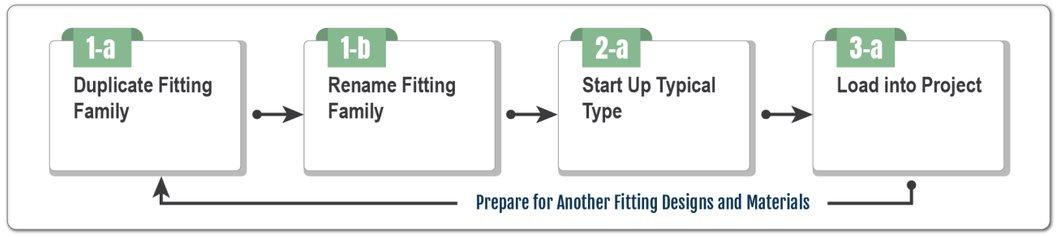
Remark: Parameters in grey colour is optional parameter.

Model Authoring

Place Cable Tray Fitting



- Typical fitting types shall be set as routing preference. Therefore, cable tray fittings can be generated automatically while drawing cable tray work.
- Assign the material for specific (material) cable tray fittings after the cable tray work has been modelled.
- It is **NOT suggested to create a fitting family** unless there is insufficient fitting design in Revit family library.
- Please follow the below procedure to modify the fittings provided from Revit Library for Hong Kong Practices for **Design Stage only**.



Prepare Typical Type

Cable Tray Fitting Type Naming Convention

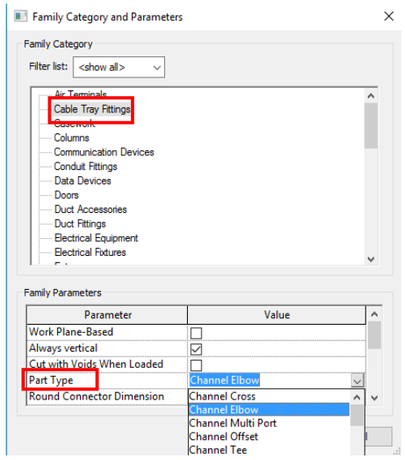
- There are type parameters “Radius Multiplier” and “Cable Tray Length” for different types.
- Type name of Loadable Family shall be able to present the dimension or characteristic of the type.

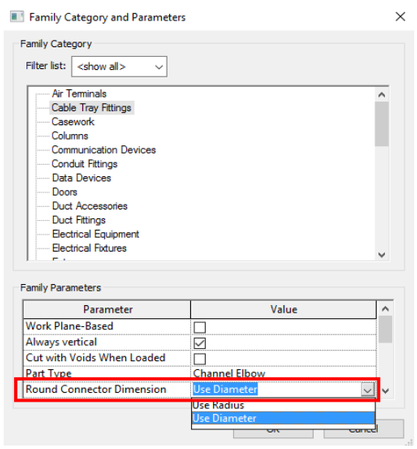
CTF-CHN-HAB-Horizontal_Tee-Raduis
300mm

(i) 3D model family

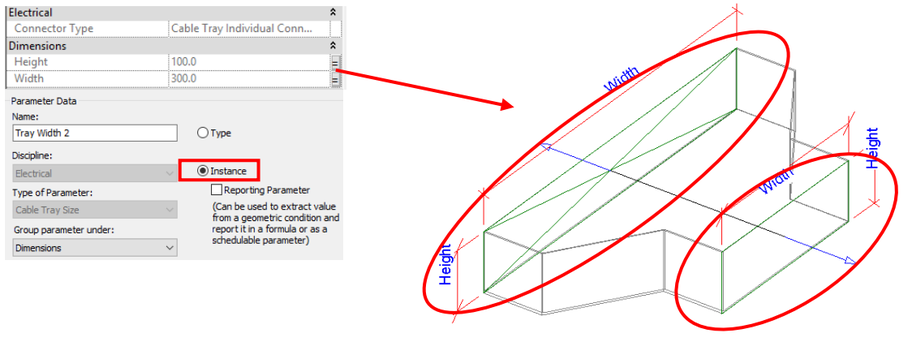
- Extracting the material properties of the Cable Tray fittings from their family name to facilitate Quantity Take-Off is proposed.
- Define suitable Cable Tray Fittings for family category and Part Type for family creation.

- Use Diameter for all family as Hong Kong Practices.





- Cable Tray connectors shall be modelled in family.
- The diameters of the cable tray fitting outlets and corresponding connectors shall be controlled by formulated instance parameters.



DM-E 07 Add Trunking

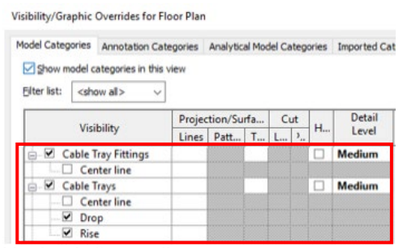
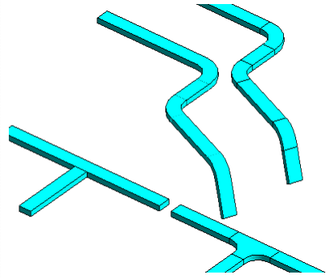
Information Requirement

Discipline	Electrical-Trunking
Family	System Family
Category	Cable Trays
Workset	/
Naming Convention	(Functional Type)-HAB-TRK-Descriptor 2

- Refer to **D4.10 DM-E 05**, Model Cable Tray under Section Electrical SAM

Model Authoring

- There is no direct tool for drawing Trunking in Revit. To perform electrical properties, Trunking shall be modelled by using Cable Tray tool. Must sure appropriate

Detail Level	Visibility Setting	3D Model
Medium	 Uncheck Centre line	

- Refer to **D4.10 DM-E 05**, Model Cable Tray under Section Electrical SAM

DM-E 08 Add Trunking Fittings

Discipline	Electrical-Trunking
Family	Loadable Family
Category	Generic Model → Cable Tray Fittings
Workset	/
Naming Convention	CTF-(Functional Type)-HAB-TRK-Descriptor 2

Information Requirement

Refer to **D4.10 DM-E 06** Add Cable Tray Fittings.

DM-E 09 Add Conduits

Discipline	Electrical
Family	System Family
Category	Conduits
Workset	/
Naming Convention	(Functional Type)-HAB-Descriptor 1-Descriptor 2

Conduit Type (Material) Table

	Short form	Description
Material	GIC	Concealed G.I. surface/ Concealed Conduit
	PVC	Concealed PVC Conduit

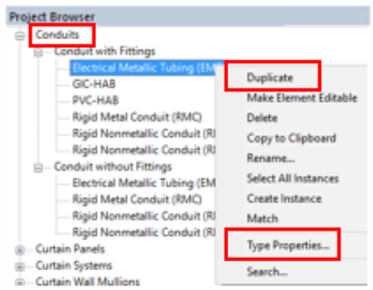
Information Requirement

List of Built-in Parameters

Parameter	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	PVC, GIC……
Size	Size of Conduits	Size of Conduits	400x50, 800x200……
Length	Length of Conduits	Length of Conduits	2800.54,4255.33, 12500.25……
Reference Level	Level of Conduits	Level of Conduits	G/F, L1/F, L2/F, R/F……
Other Information_L/L	Extra information of Pipe	Users can assign extra information or description of the lower part of pipe.	F/B, T/B, F/B TO L/L……
Other Information_H/L	Extra information of Pipe	Users can assign extra information or description of the upper part of pipe.	F/A, T/A, F/A TO H/L……
Comment	Custom information	Users can add custom information with this parameter.	Exposed conduit……

Model Authoring

- Unless there is requirement on conduit drawing production, conduits shall not be modelled.
- Before conduit modelling, Conduit Type and Conduit Fitting shall be well established.
  - **Manage Conduit Type**



Rename Conduit Type suggested in below table

- Conduits
  - Conduit with Fittings
    - GIC-HAB
    - PVC-HAB
    - Rigid Metal Conduit (RMC)
    - Rigid Nonmetallic Conduit (RNC Sch 80)
  - Conduit without Fittings
    - GIC-HAB
    - PVC-HAB
    - Rigid Metal Conduit (RMC)
    - Rigid Nonmetallic Conduit (RNC Sch 80)

a. In Project Browser ➤ Conduit
b. Right-Click ➤ Rename/ Select Duplicate to create a new Conduit Type
c. Establish Type Properties (Standard, Fittings (Preferences) and Type Mark)

Set appropriate Standard (Materials) and Edit Fitting Preferences with same material for Conduit

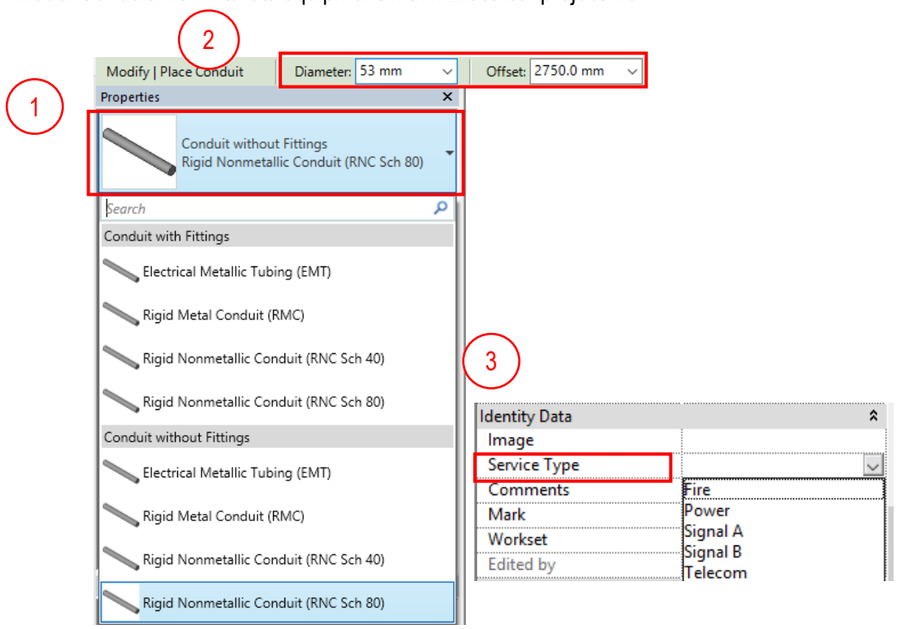
Electrical	
Standard	PVC
Fittings	
Bend	COF-CEB-HAB-PVC-Plain_End: Standard
Tee	CDF-CTE-HAB-JBX-PVC: Standard
Cross	CDF-CCR-HAB-JBX-PVC: Standard
Transition	CDF-CTR-HAB-JBX-PVC: Standard
Union	CDF-CCP-HAB-PVC: Standard

Establish your own abbreviations for Conduit by Type Mark for Drawing Production

Type Mark	CONCEALED G.I. SURFACE/ CONCEALED CONDUIT

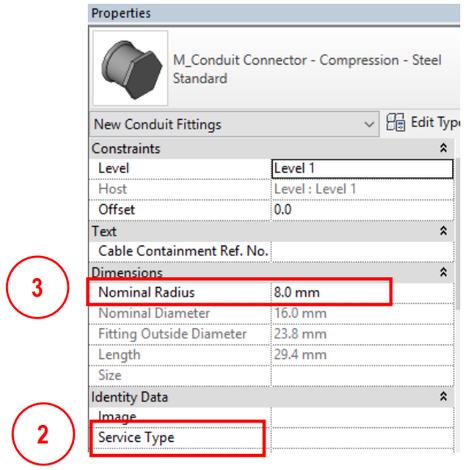
All Conduits shall be modelled as a closed/ complete system.

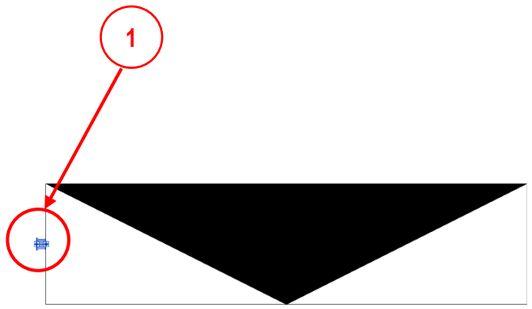
- Model Conduit with fixtures/ equipment within Electrical project file



- Select Conduit ➤ Set suitable Conduit type ➤ Set dimensions and offset ➤ Define Service Type

- To retrieve the actual elevation according to mPD level, select "Datum" as Reference Level.
- Model Conduit with fixtures/ equipment in Linked Revit model
  - Add appropriate connector to the fixtures/ equipment in linked model ➤ Set dimensions for the connect (directly/ By Edit Type) ➤ Input the electrical information of the fixture/ equipment to the connector ➤ Model duct referring to the procedure stated above.





Linked model

- After applying a connector, using Copy/ Monitor tool to create a relationship between the linked models and connectors. This provides a location check once the elements in linked model have been moved. All categories listed below can applied the Copy/ Monitor function.

- Inclined Conduit shall be drawn in elevation view. The angle of the fitting shall refer to the Electrical Setting, otherwise specify the special fitting angle in Remarks as reference to facilitate Quantity Take-Off or drawing production.

DM-E 10 Add Conduits Fittings

Discipline	Electrical
Family	Loadable Family
Category	Generic Model → Conduit Fittings
Workset	/
Naming Convention	CDF-(Functional Type)-HAB-Descriptor 1(Shape)-Descriptor 2(Material)

Conduit Fitting Table

	Short form	Description
Functional Type (Fitting Type)	CCP	Conduit Cap
	CCR	Conduit Cross
	CEB	Conduit Elbow
	CEM	Conduit Junction Box Elbow
	CER	Conduit Elbow_Radius
	CEC	Conduit Endcap
	CTE	Conduit Tee
	CTR	Conduit Transition
	CUN	Conduit Union
Descriptor 1 (Shape) **(Descriptor 1 for Multi-shape Transition)**	RECT	Rectangular
	OVL	Oval
	RND	Round
	RECT to OVL	Rectangular to Oval
Descriptor 2 (Material) **Refer to Duct Type (Material) Table.**	SSD	Sheet Metal

Information Requirement

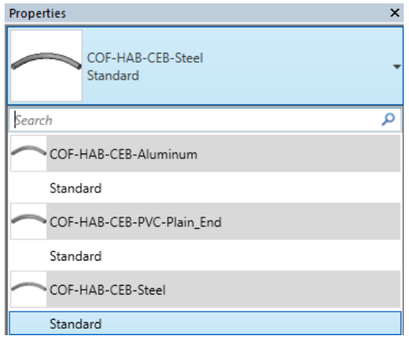
List of Built-in Parameters

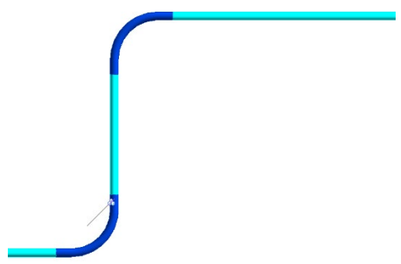
Parameter	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	CCP, CCR, CEB……
Size	Size of Conduits Fittings	Size of Conduits Fittings	400x50, 800x200……
Reference Level	Level of Conduits Fittings	Level of Conduits Fittings	G/F, L1/F, L2/F, R/F……
Comment	Custom information	Users can add custom information with this parameter.	Exposed conduit……

Model Authoring

Typical fitting types shall be set as routing preference. Therefore, conduit fittings can be generated automatically while drawing conduit work.

- Assign the material for specific (material) conduit fittings after the conduit work has been modelled.



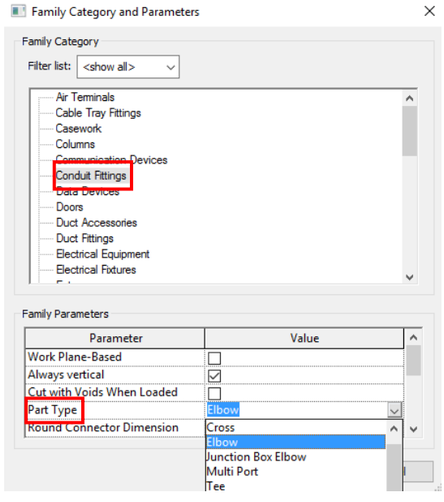


- It is **NOT suggested to create a fitting family** unless there is insufficient fitting design in Revit family library.
- Please follow the below procedure to modify the fittings provided from Revit Library for Hong Kong Practices for **Design Stage only**.
- Prepare Typical Type

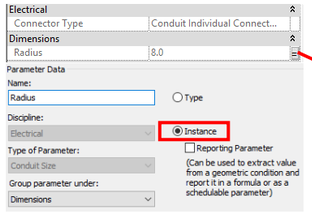
For conduit coupling, elbow, union, junction box for tee and cross etc., set up appropriate size lookup table in conduit fitting family.

(i) 3D model family

- Define suitable Conduit Fittings for family category and Part Type for family creation.



- Conduit connectors shall be modelled in family.
- Only Radius is adopted for connector dimension in Revit. Please be aware of dimension parameter control.
- The diameters of the conduit fitting outlets and corresponding connectors shall be controlled by formulated instance parameters.





DM-E 11 Add Circuit (Layout)

Information Requirement

Discipline	Electrical
Family	System Family
Category	Circuit
Workset	/
Naming Convention	/

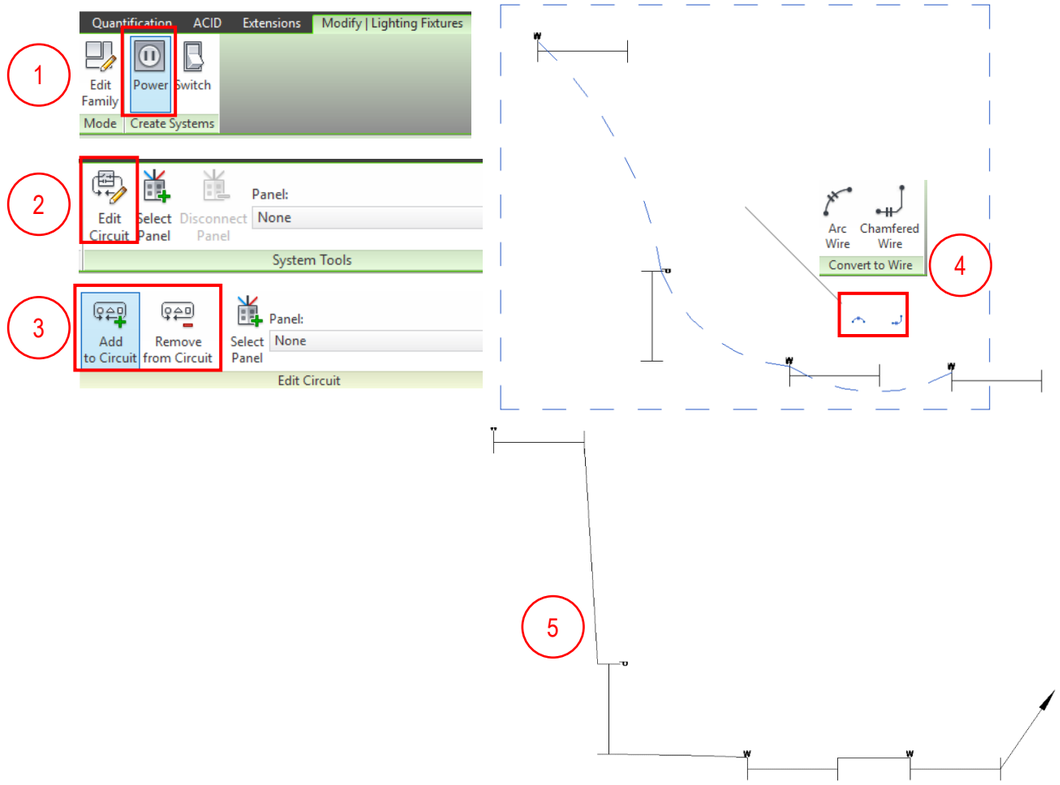
List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Circuit……
Level	Level of Circuit	Level of Circuit	G/F, L1/F, L2/F
Mark	Circuit Mark	This parameter can be utilized to add HA tag families to annotate the circuitry.	CC1R, CC2Y……
Comment	Custom information	Users can add custom information with this parameter.	For public area……

Remark: Parameters in grey colour is optional parameter.

Model Authoring

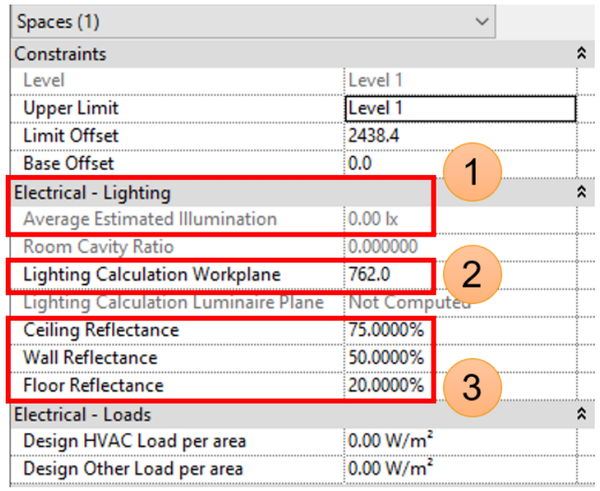
- Before creating a circuit system for layout plan, all electrical components shall be placed.
- Electrical components shall be built with electrical connectors in order to create circuit system.



- Select all equipment and components with same voltage load in the circuit ➤ Select Create Power System ➤ Select Edit Circuit ➤ Add/ Remove components into the circuit ➤ Set suitable Wire for Circuit System ➤ Adjust wire layout
- Use Wire tool in Electrical Panel to draw wiring directly.
- Wiring with arrow shall be modelled after the whole circuit system is built.
- Name the circuit in a shared parameter “Schedule Circuit Notes”.

DM-E 12 Conduct Preliminary "Average Estimated Illuminance"

When MEP Lighting Fixture family with Photometric information is used, it can further help to calculate the "Average Estimated Illuminance" of a Space. Space provides more information than Room in Revit which enables BSE to assign and get more information through BIM model.

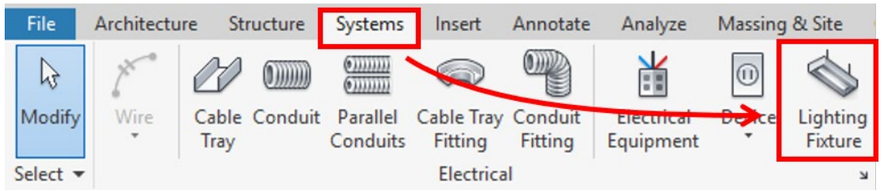


When a Space is selected in the project, the above information will be shown in properties palette.

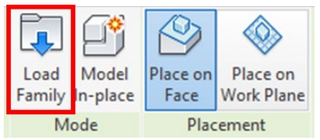
1. Average Estimated Illumination, it is automatic calculation result if Lighting Fixture families with photometric information is used and placed in a Space.
2. Lighting Calculation Workplane shows the work plane level that the calculation is using.
3. Percentage of Ceiling, Wall and Floor Reflectance can be further adjusted if the default value is not the same as the material used in the Space.

The Average Estimated Illumination (AEI) for each space is calculated by determining the Lumens contributed by each fixture at the lighting calculation work plane, and dividing by the space's area.

The additional formulas used to calculate the average estimated illumination for the space include i) Lumens at Work Plane ii) Room Cavity Height and iii) Room Cavity Ratio.

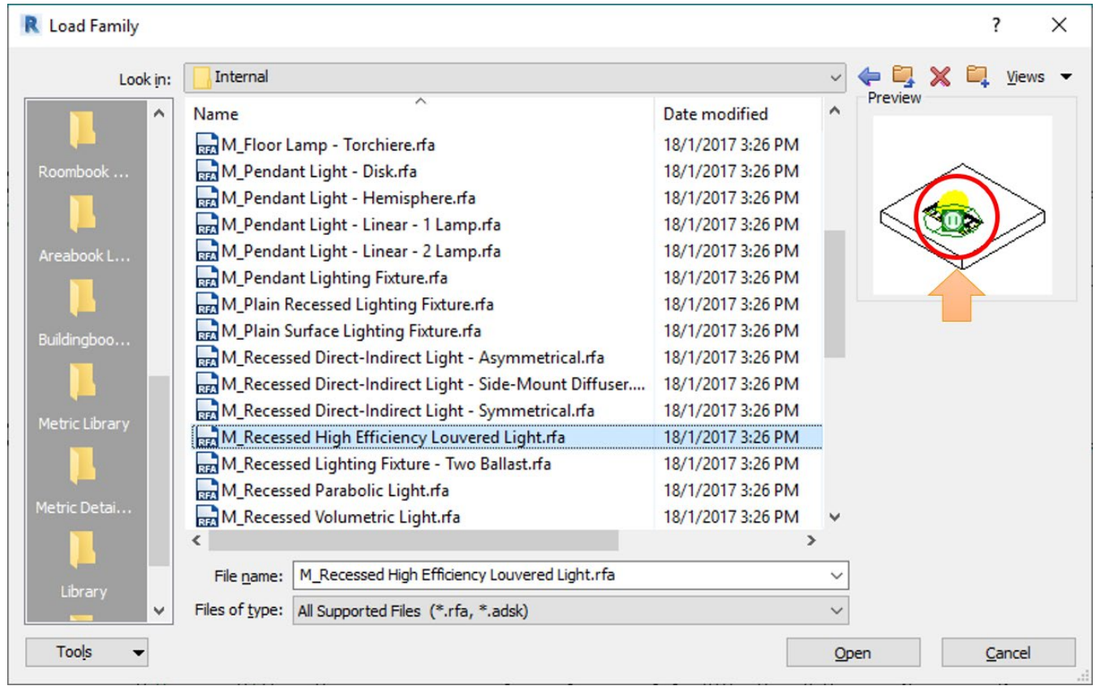


Click System tab and select Lighting Fixture. If there is no Lighting Fixture Family with Photometric file added, click "Load Family" and browse for proper family.



The default path of MEP Lighting Fixture family is located at: C:\ProgramData\Autodesk\RVT 2018\Libraries\South Asia\Lighting\MEP

ProjectWise Location of HA BSE Revit Families please refer to ANN-1.3. Modelling Resources > ANN-1.3b. Family library.

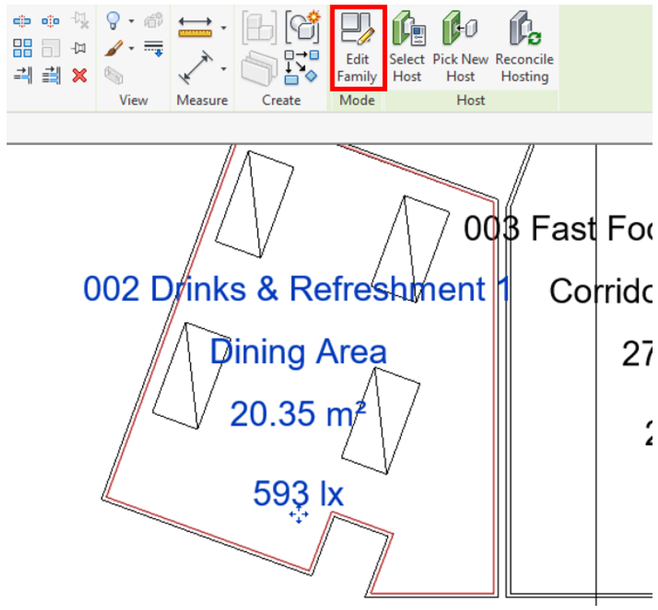


In the preview area, the Lighting Fixture family shows the photometric profile which carries photometric data for average lighting illuminance calculation. Once the lighting fixture family is placed, the lux level in the Space will be automatically calculated.

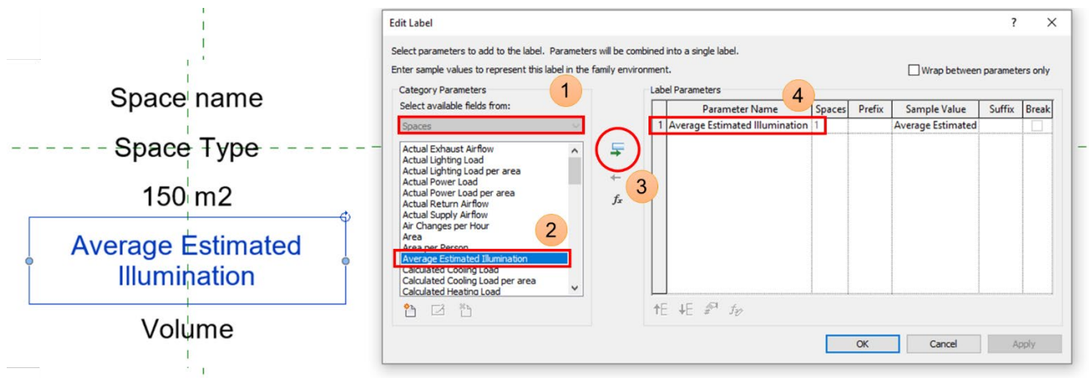


There are two points to note:

1. Average Estimated Illuminance can be displayed in "Space Tag"
2. If the Average Estimated Illuminance cannot be shown, it may due to the Lighting Fixture exceeded the Space Upper Limit which cannot counted in the Space.

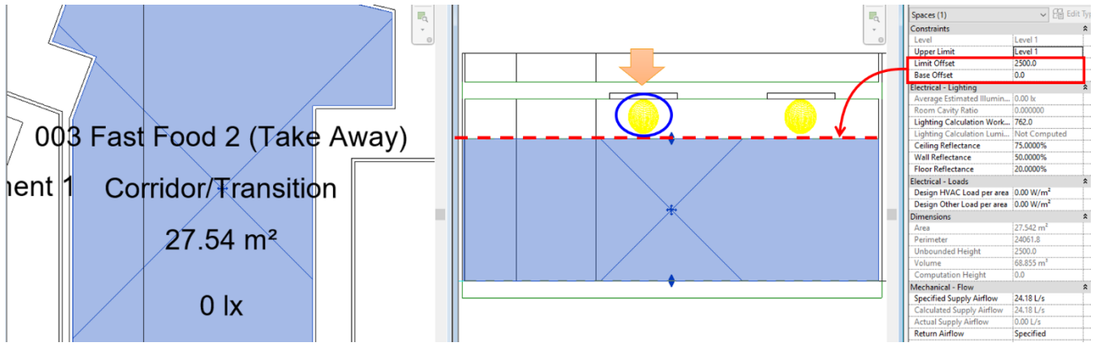


Select Space Tag and click Edit Family.



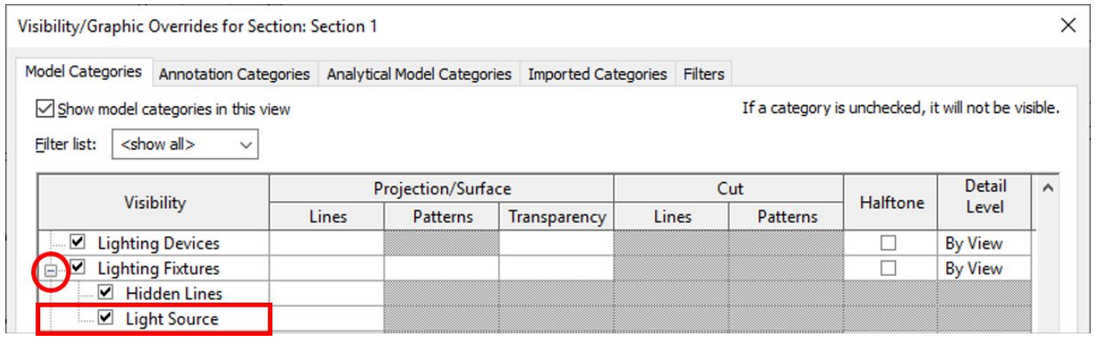
In the Family Editor mode, click on the Label  to add additional Label.

1. In Edit Label Window, Space Parameter can be selected from the list.
2. Click to select “Average Estimated Illuminance.
3. Click “Add Parameter to label”  .
4. The selected parameter will be shown in the Label Parameters list.



If lighting fixture is placed but lux level cannot be displayed, it may due to Space Upper limit offset. Click on Space and adjust its upper offset.

To display Light Source. Click to expand Lighting Fixture in Visibility/Graphic Override and then check Light Source.

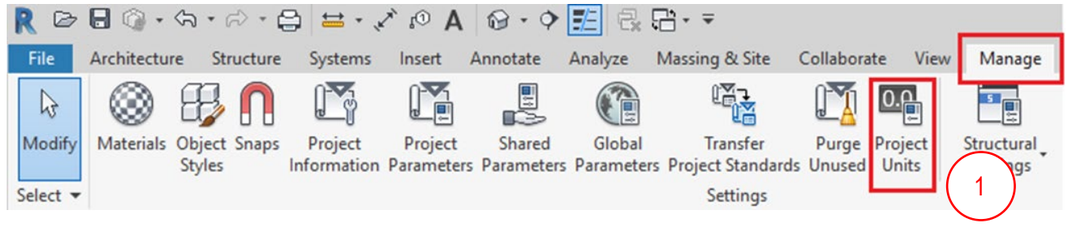


DM-E 13 Optional Way to Develop Lighting Layout by Exchanging Data Between Dialux and Revit

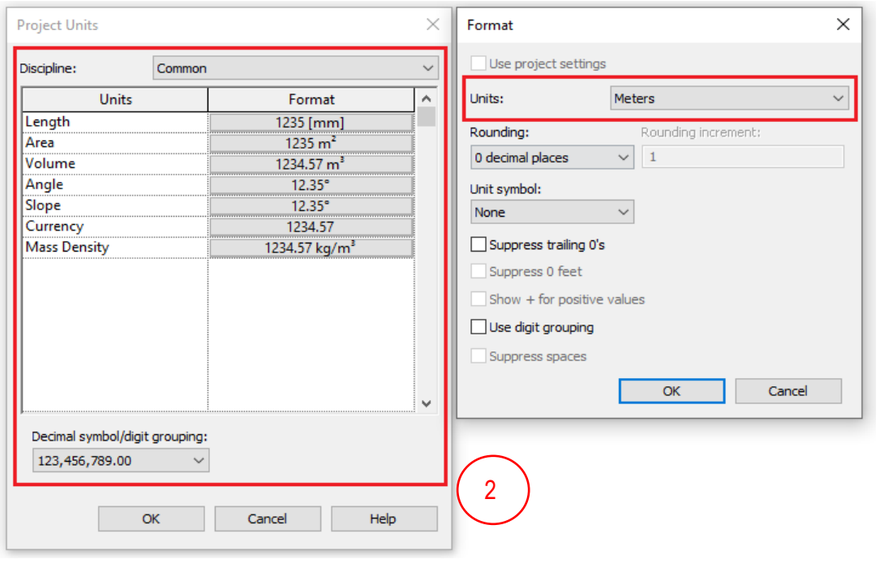
Revit can have several exchange methods to work with Dialux. Revit model data can be exported to .gbxml format and then conduct lighting analysis in Dialux and distribute lighting fitting. Once the calculation and distribution model in Dialux, the result can then be exported as .stf format. With Dynamo script, the result from Dialux can be imported back to Revit with corresponding lighting fixture family to match with the luminaire that used in Dialux.

Export Data to Dialux for lighting analysis

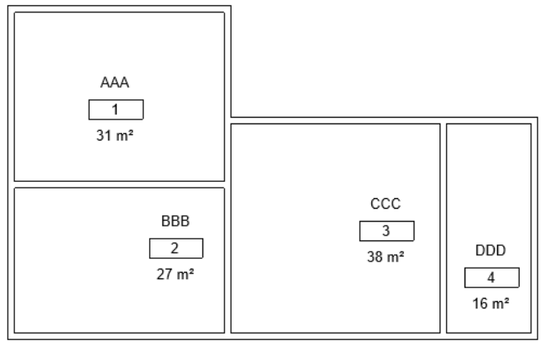
Revit - Setup



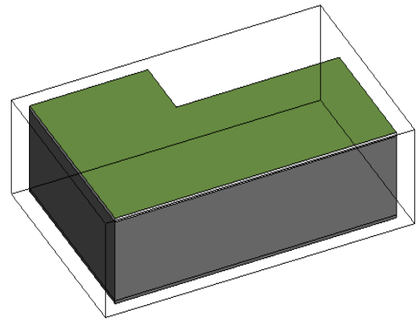
Open Revit, firstly it needs to check the project units is set as “metric”.



For Example: Create a project including wall, floor & roof and create the room and add the Room Tag.

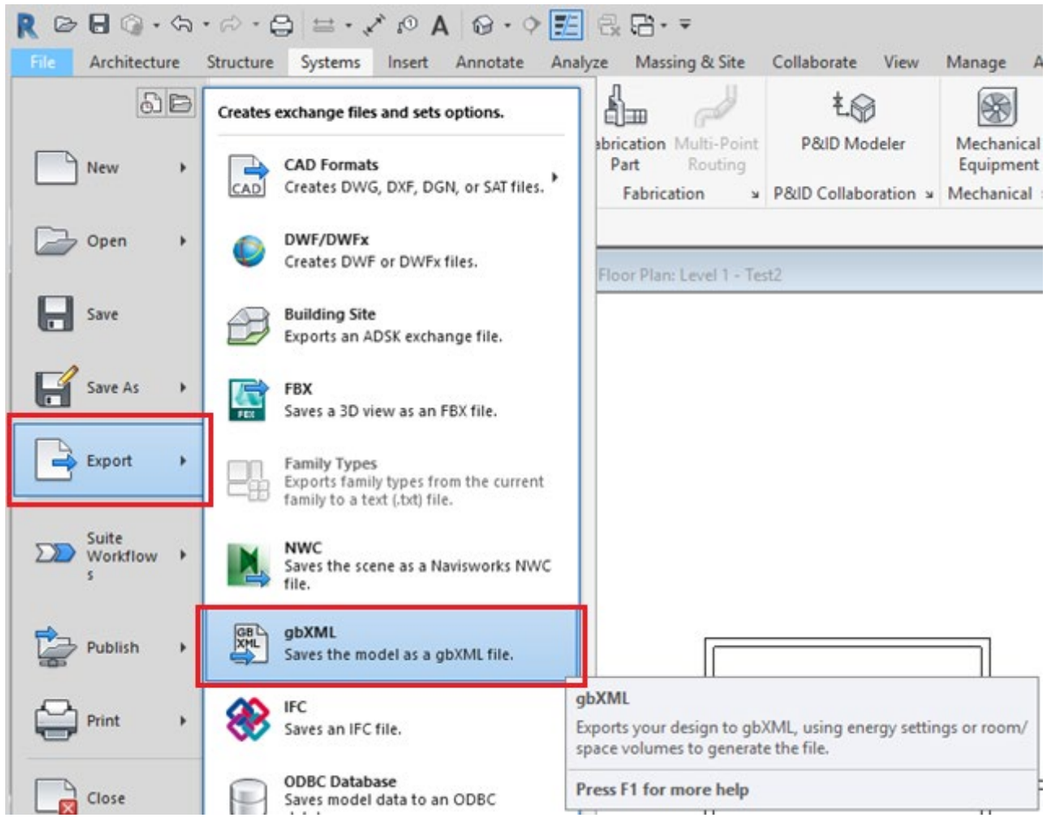


(a) Floor Plan View

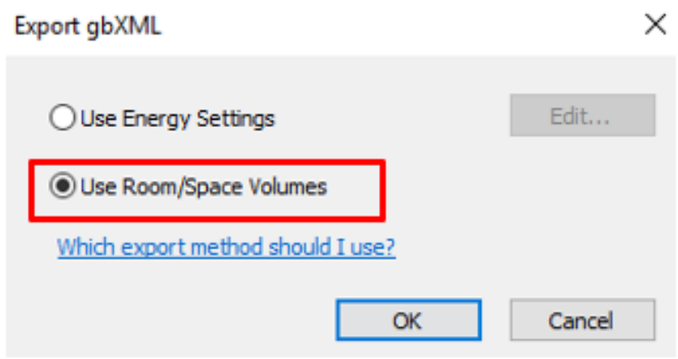


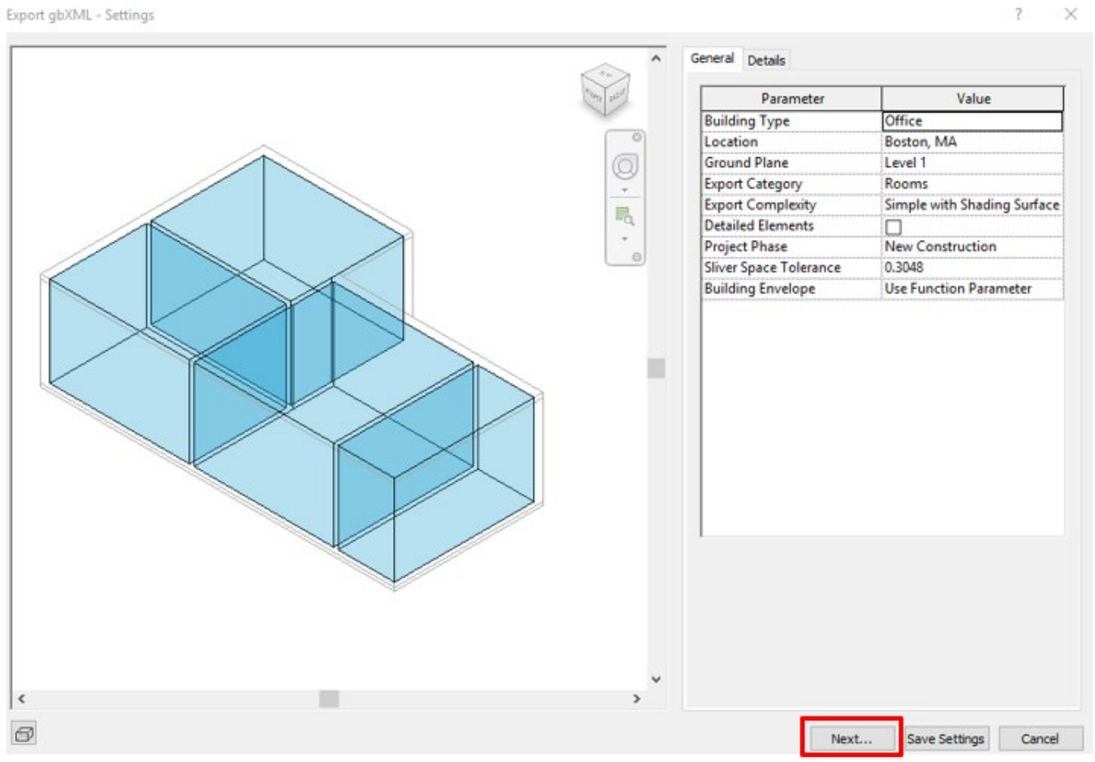
(b) 3D View

Choose 3D View, Export “gbXML”



In the “Export gmXML” dialog box, choose “Use Room/Space Volumes” , “Next” and save the .xml file.



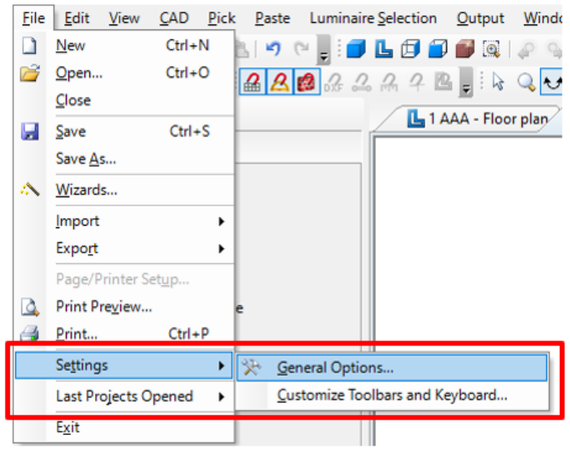


Operation in Dialux and export lighting layout to Revit

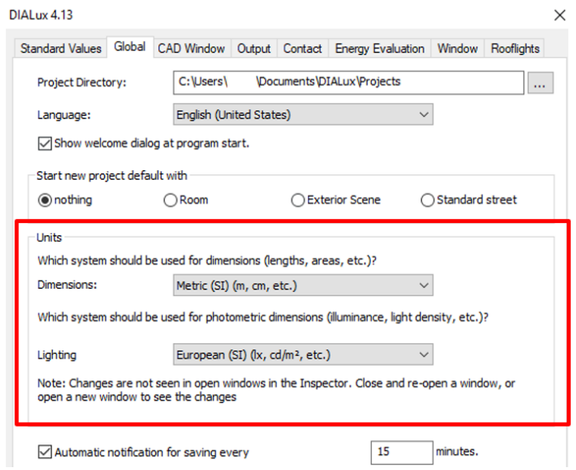
In Dialux program, the below settings and steps illustrated a method to use the model data (gbXML) from Revit as import for geometry generation.

DIALux—Setup

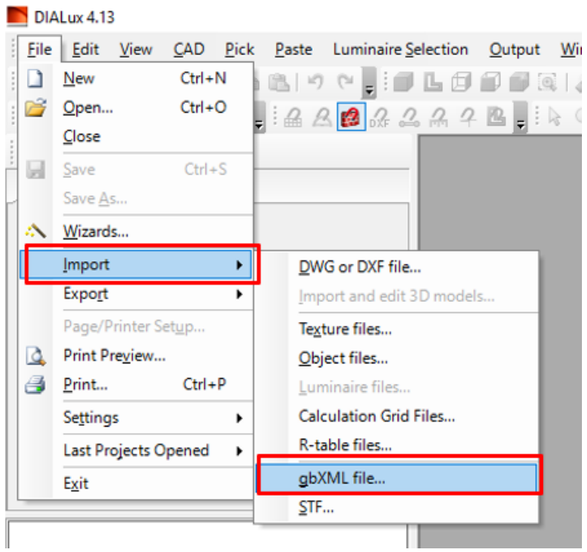
Same setting has to be set the unit in Dialux to Metric & import gbXML file. Click File -> Settings -> General Options.



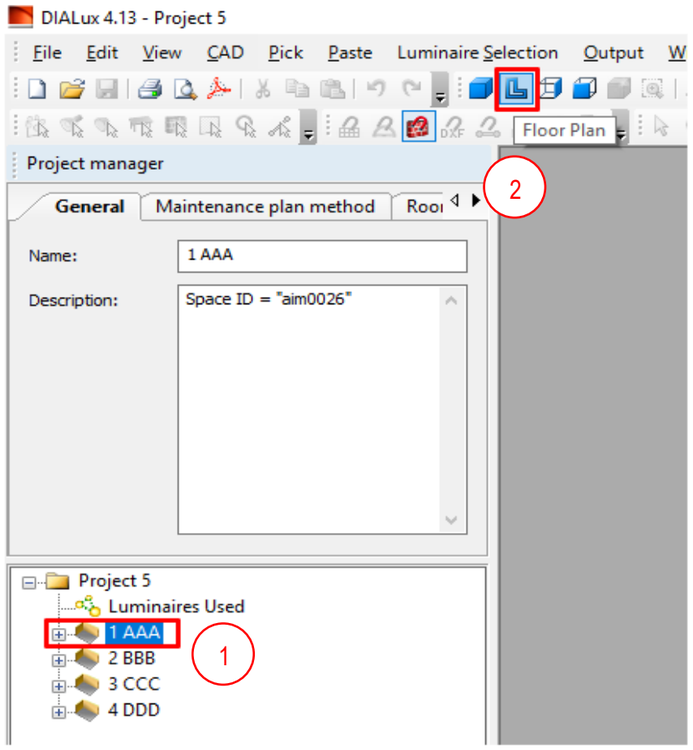
In the dialog window, check Units and set to Metric.



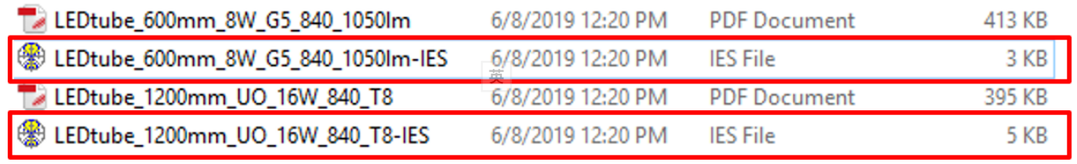
Click File -> Import -> gbXML file.

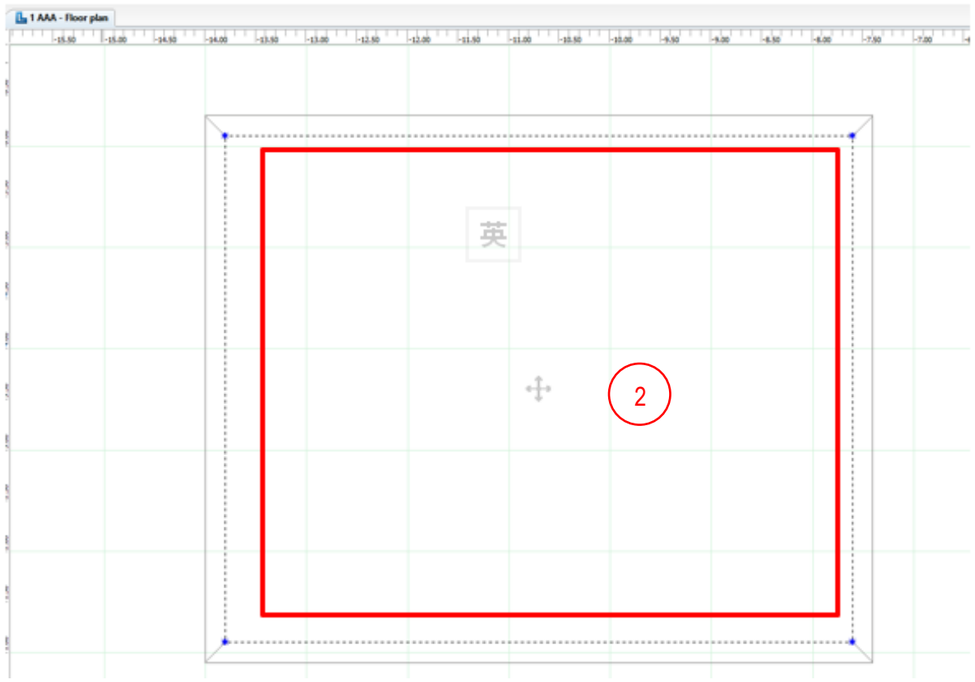


Choose one room, and Open the floor plan

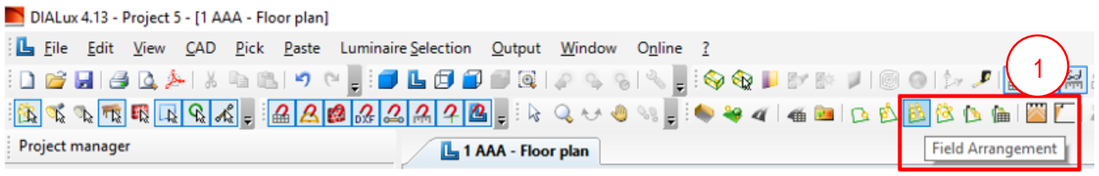


1. Prepare IES files about the light (for DIALux use), and
2. put into DIAlux (floor plan).

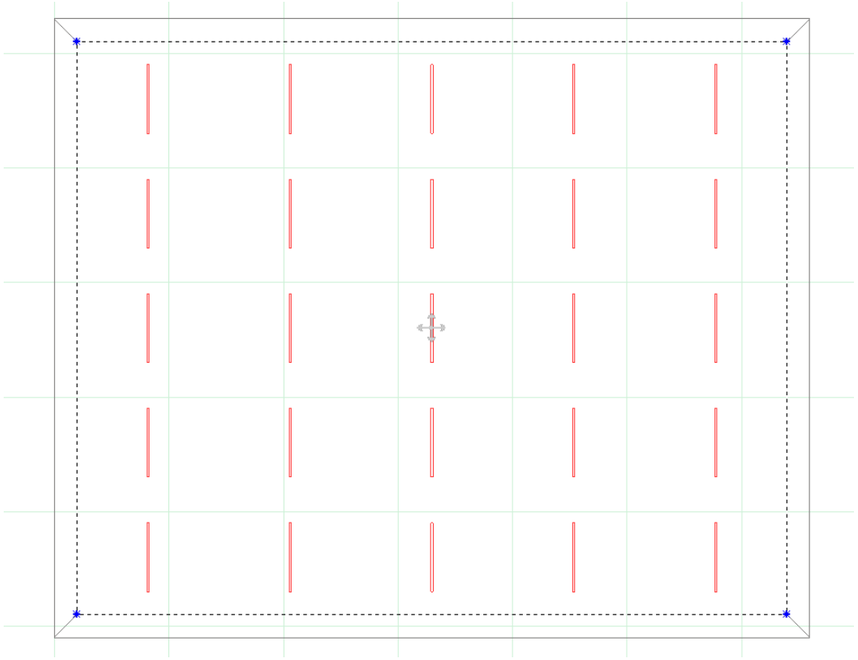




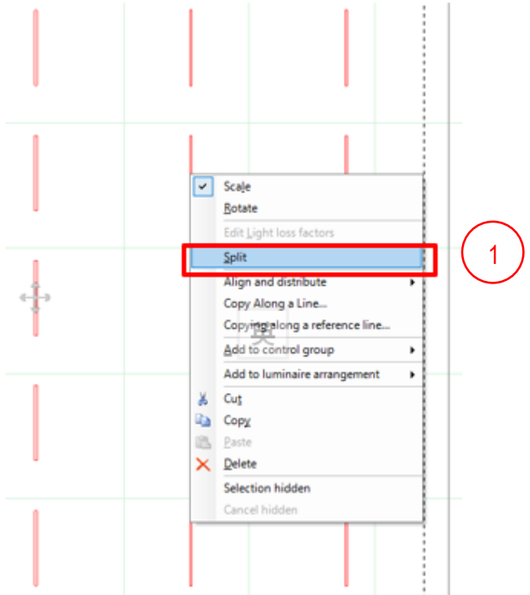
Then, click the “Field arrangement” button to design how many lights you need in the room.

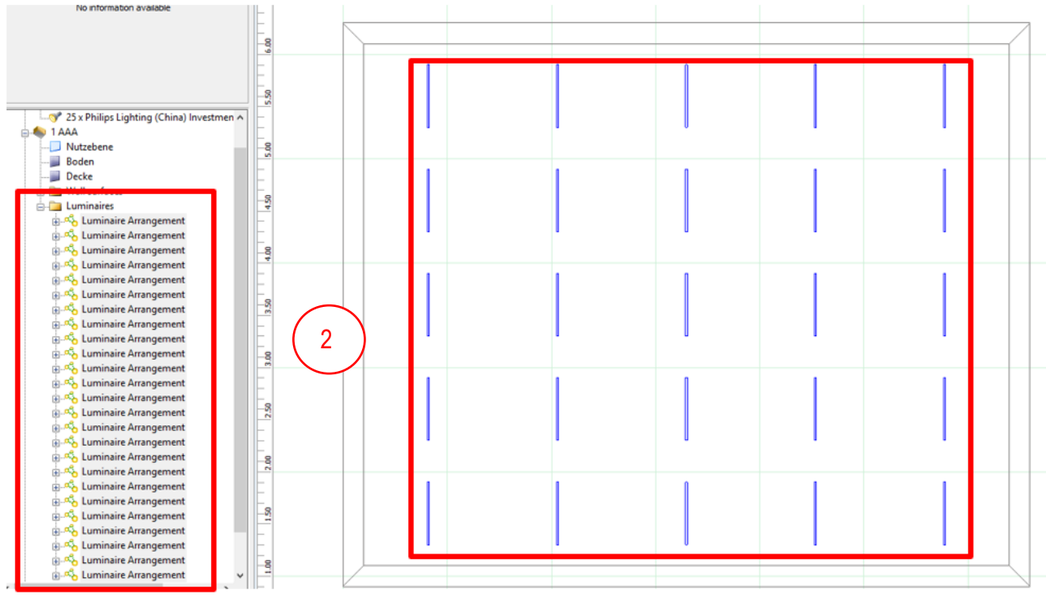


The lighting fitting can be arranged based on different field arrangement setting.



Right Click the light, choose “Split”. Then start calculate for you need. The lighting will be shown as individual luminaire.

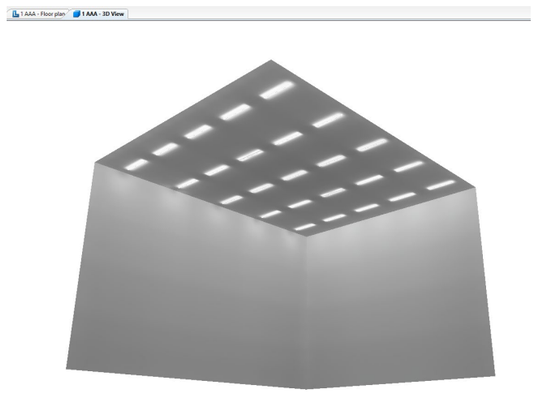


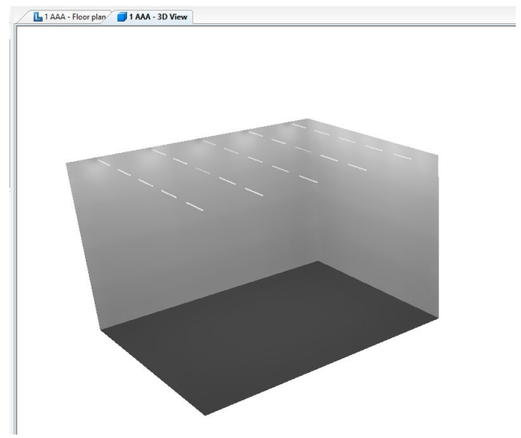


Click “Calculate” to proceed calculation.

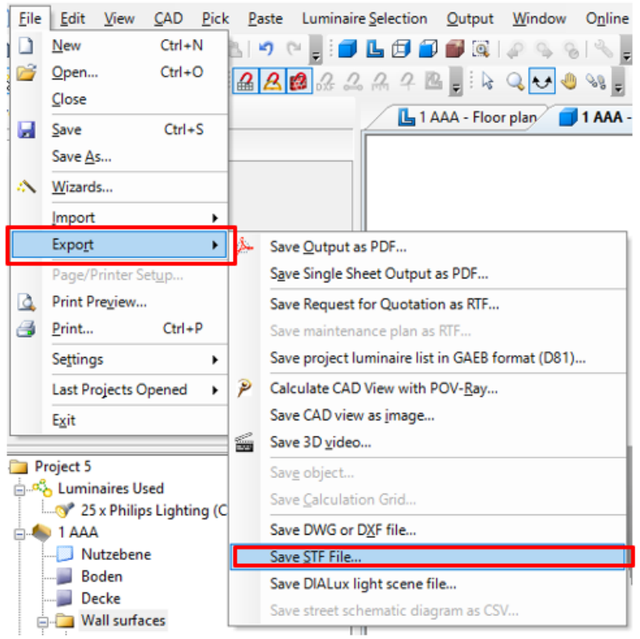


Finish the Calculation, there is a 3D view to show the result.



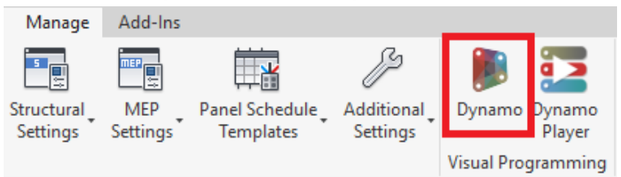


Click File -> Export -> Save STF file.

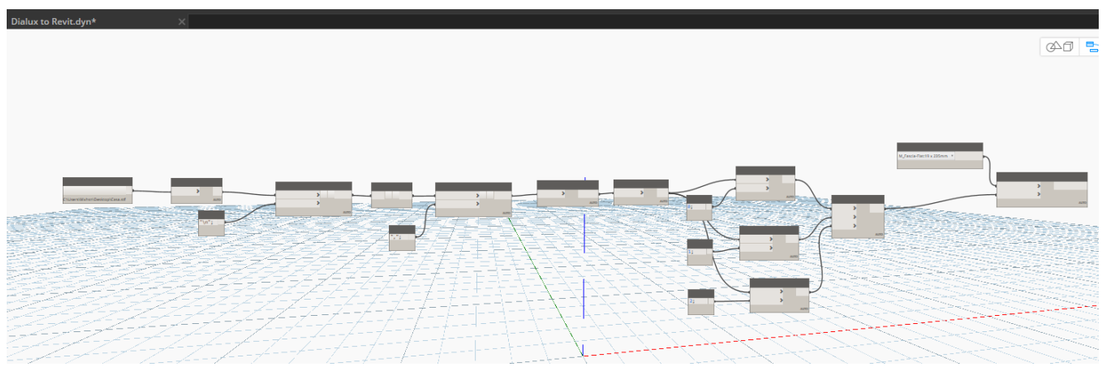


Re-build lighting layout to Revit by Dynamo

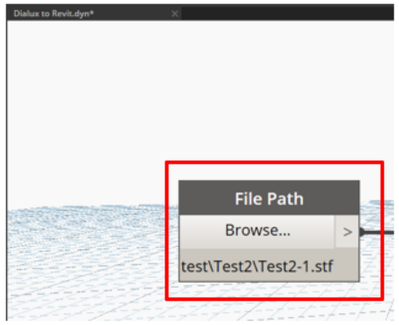
Once the STF file has been exported from Dialux, it can then be imported back to Revit via dynamo.
In Revit, click Dynamo from Manage Tab.



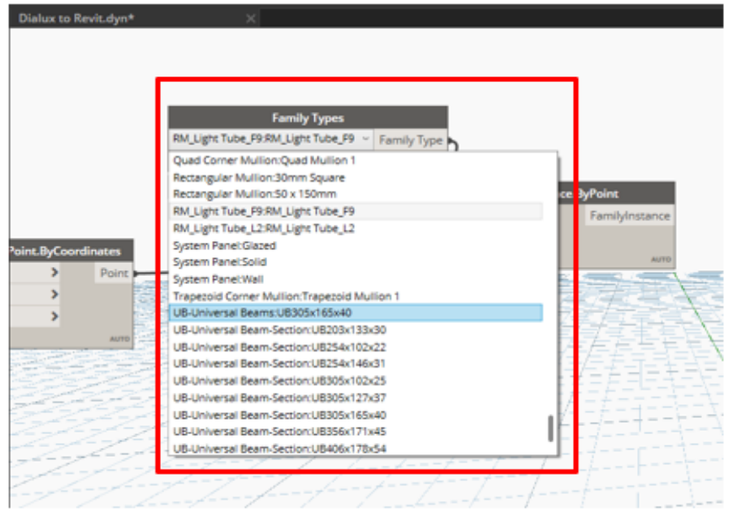
- Return to Revit, Open Dynamo and dynamo script – “Dialux to Revit.dyn”



- Choose the .stf file before export from DIALux.

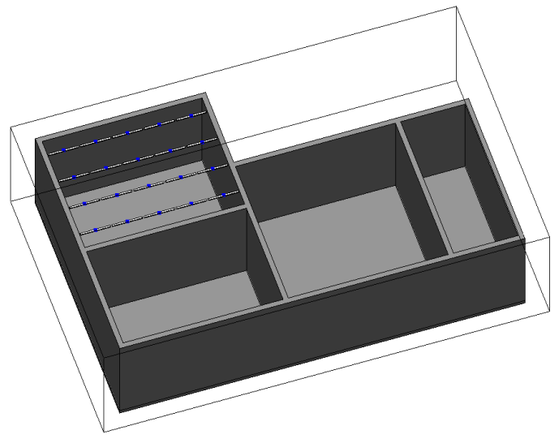


In the Family Types node, click to choose the lighting fixture family needed to be used in Revit. Then “RUN”.





The lighting fixture family will be placed based on the calculated result and arrangement in Dialux.



D4.11 Fire Services and Water Pump SAM

This section describes the standard approach to modelling in Fire Services and Water Pump discipline and the step-by-step workflow / guide to apply them into the project.

All Building Services disciplines are regarded as MEP Systems in Revit. To retrieve appropriate information of the systems and elements, Systems for different discipline services shall be well prepared before modelling. This guide will cover pipework and relative appliances modelling. Refer **D5** Presentation Style for preparing drawing production.

DM-F 01 Add Fire Services Equipment

Discipline	Fire Services and Water Pump
Family	Loadable Family
Category	According to Fire Services Equipment (Sub-Category) Table
Workset	/
Naming Convention	Category-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Fire Services Equipment (Sub-Category) Table

Category	Examples
Electrical Equipment	FS Control Panel, Local Control Panel for Water Pump
Mechanical Equipment	Water Pump

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Panel……
Level	Level of Fire Services	Level of Fire Services	G/F, L1/F, L2/F
Mark	Fire Services Mark	This parameter can be utilized to add HA tag families to annotate the fire services equipment.	FS1, FS2……
Comment	Custom information	Users can add custom information with this parameter.	Emergency…

Remark: Parameters in grey colour is optional parameter.

- All required specifications of electrical components in equipment schedule shall be built in the family as Information Requirement accordingly.

Model Authoring

- Fire Services Equipment is divided into two main categories in Revit, i.e. FS Control Panel and Local Control Panel under Electrical Equipment and Water Pump under Mechanical Equipment.
- The modelling requirements of Electrical Equipment refer to Section **DM-E 02**, Add Electrical Equipment Fixture under **D4.10** Electrical SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to **D4.9 DM-M 02** Add Mechanical Equipment.

DM-F 02 Add Water Pump Room Equipment

Discipline	Fire Services and Water Pump
Family	Loadable Family
Category	According to Water Pump Room Equipment Table
Workset	/
Naming Convention	Category-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Water Pump Room Equipment Table

Category	Examples
Mechanical Equipment	Water Pump
Electrical Equipment	Local Control Panel for Water Pump

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Water Pump……
Level	Level of Water Pump Room Equipment	Level of Water Pump Room Equipment	G/F, L1/F, L2/F
Mark	Water Pump Room Equipment Mark	This parameter can be utilized to add HA tag families to annotate the water pump room equipment.	WPRE1, WPRE 2……
Comment	Custom information	Users can add custom information with this parameter.	FS duty pump……

Remark: Parameters in grey colour is optional parameter.

- All required specifications of water pump room equipment in equipment schedule shall be built in the family as Information Requirement accordingly.

Model Authoring

- Fire Services Equipment is divided into two main categories in Revit, i.e. FS Control Panel and Local Control Panel under Electrical Equipment and Water Pump under Mechanical Equipment.
- The modelling requirements of Electrical Equipment refer to Section **DM-E 02**, Add Electrical Equipment Fixture under **D4.10** Electrical SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to **D4.9 DM-M 02** Add Mechanical Equipment.

DM-F 03 Add FS Pipework with Pipe System

The setting and modelling on pipe system in FS discipline is similar to Plumbing discipline. Refer to **DM-P 03** Add Pipe with Pipe System under **D4.8** Water Services SAM.

Piping System (Sub-Category) Table

Sub-category	Functional type	Functional Type (short form)
Fire Protection Wet	Fire Services Pipe	FSP
Fire Protection Wet	Sprinkler Pipe	SPR
Fire Protection Wet	Sprinkler Drain Pipe	SPD

Standard filter for different pipe systems on plan view and 3D view.

System type	Preferred colour		RGB Colour System
Fire Services Pipe (FSP)	RED		255, 000, 000
Sprinkler Pipe (SPR)	RED		255, 000, 000
Sprinkler Pipe (SPD)	RED		255, 000, 000

DM-F 04 Add Fire Services Components and Devices

Discipline	Fire Services and Water Pump
Family	Loadable Family
Category	According to Fire Services Component (Sub-Category) Table
Workset	/
Naming Convention	Category-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Fire Services Component (Sub-Category) Table

Category	Sub- Category	Examples
Specialty Equipment		Fire Extinguisher, Fire Hose Reel
Device	Electrical Fixture	Power Socket, Junction Box, Electrical Cable Pit, Switch
	Data device	Junction Box, Data Outlet
	Fire alarm device	Smoke Detector, Fire Alarm Horn
Sprinklers		Sprinkler Head

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Hose Reel, CO_2 Extinguisher……
Level	Level of Fire Services Components and Devices	Level of the element	G/F, L1/F, L2/F
Mark	Fire Services Components and Devices Mark	This parameter can be utilized to add HA tag families to annotate the water fire services components and devices.	FSC1, FSC2……
Comment	Custom information	Users can add custom information with this parameter.	Inside FS control room……

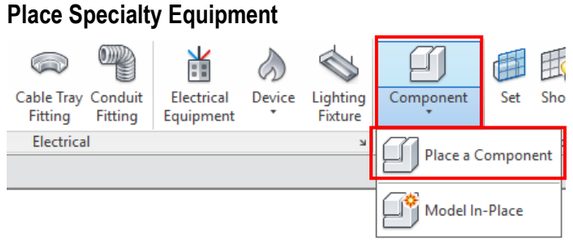
Remark: Parameters in grey colour is optional parameter.

- All required specifications of electrical components in equipment schedule shall be built in the family as Information Requirement accordingly.

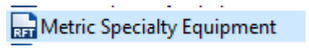
Model Authoring

- Fire Services Components are divided into two main categories in Revit, i.e. Sprinkler and Fire Alarm Device under Electrical Equipment.
- Fire Protection components, such as fire extinguisher etc., are under Specialty Equipment; Fire Alarm Device refers to **D4.10 DM-E 03** Add Electrical components under Section Electrical SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to **D4.9 DM-M 02** Add Mechanical Equipment.

Place Specialty Equipment



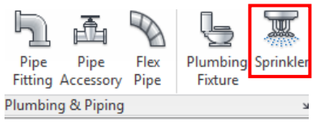
- Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.
- Fire Protection component is suggested to use a Generic family template under Specialty Equipment.



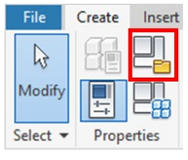
- The detail modelling guide on Hose Reel shown in **DA-26**.

Place Sprinkler

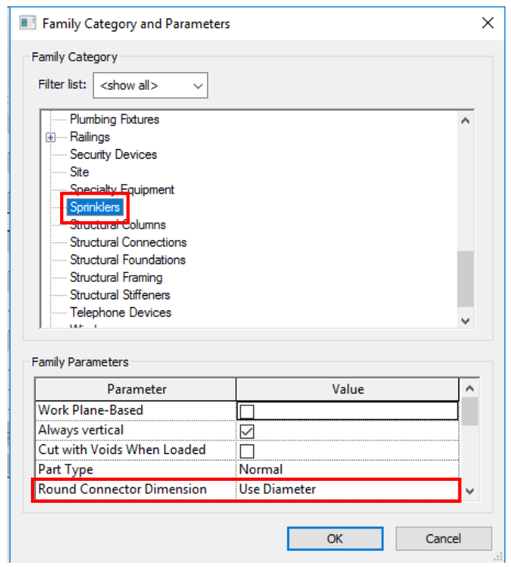
Click System Tab ➢ Plumbing & Piping Panel ➢ Sprinkler



- Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.
- Most of the sprinklers hosted on ceiling shall be placed in ceiling model file shared with Architects.
- Other sprinkler layouts and Fire Protection equipment shall be drawn on floor plan under Fire Services discipline with suitable setting on View range.
- In Family Editor mode, select “Family Category and Parameters”.

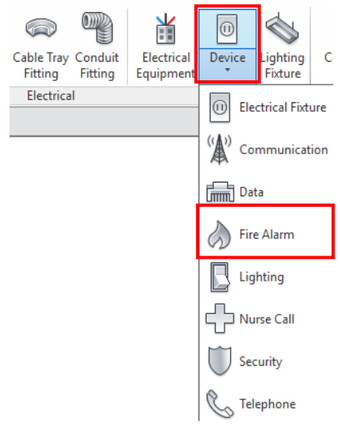


- Generic Model Family Template and define Sprinklers for Family Category to create sprinkler family.



Place Electrical components

Click System Tab ➢ Electrical Panel ➢ Fire Alarm Device



D4.12 Lift and Escalator SAM

DM-L 01 Add Lift and Escalator Equipment

Discipline	Lift and Escalator Depend on the function of the equipment
Family	Loadable Family
Category	Generic Model → Specialty Equipment
Workset	/
Naming Convention	Category-(Functional Type)-HAB-Descriptor 1-Descriptor 2

Specialty Equipment Table

Category	Examples
Specialty Equipment	Lift, Escalator, Fire Shutter etc.

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Lift, Escalator……
Level	Level of Lift and Escalator Equipment	Level of Lift and Escalator Equipment	G/F, L1/F, L2/F
Mark	Lift and Escalator Equipment Mark	This parameter can be utilized to add HA tag families to annotate the lift and escalator equipment.	LE1, LE2……
Comment	Custom information	Users can add custom information with this parameter.	For carpark……

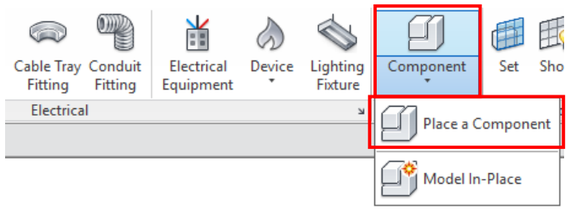
Remark: Parameters in grey colour is optional parameter.

Al ired specifications of electrical components in equipment schedule **shall be built in the family as Information Requirement accordingly.**

Model Authoring

Place Specialty Equipment

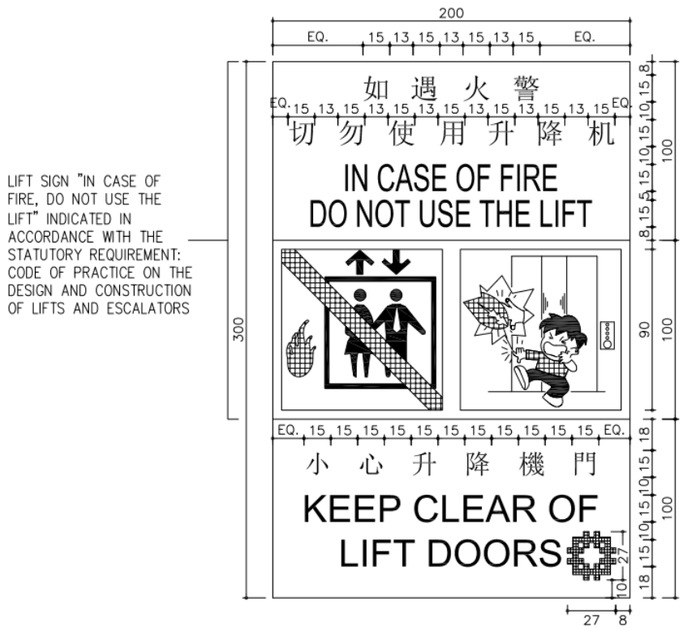
- Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.
- The modelling requirements of electrical components are similar to that of Plumbing Fixture. Refer to Section **DM-P 02** Add Plumbing Fixture under **D4.8** Water Services SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to **D4.9 DM-M 02** Add Mechanical Equipment.



Lift and Escalator

- Location of lift and escalator are assigned by Architects. Detail SAM can refer to **DA-28** Escalator and **DA-29** Lift.
- For lift, engineers can place their Lift Car 3D family into the lift shaft as necessary to facilitate their drawing production.
- An instant parameter shall be set for controlling the offset of Lift Car.
- Details of lift system for section drawing production, such as counterweight, pully and cables, may be included in the family or drawn on sheet directly.
    - All signage details shall **not** be modelled in family or project model.
    - Signage details shall be drawn in drafting view using Detail Line and other annotations.

- For the existing details in CAD format, refer to Section **PS-12** 2D Details under **D5.3** Model and Drawing Detail.



- The modelling requirements of equipment are similar to that of Plumbing Fixture. Refer to Section **DM-P 02** Add Plumbing Fixture under **D4.8** Water Services SAM.

- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to **D4.9 DM-M 02** Add Mechanical Equipment.

D4.13 Utility Services SAM

This section describes the standard approach to modelling in Utility Services discipline and the step-by-step workflow / guide to apply them into the project.

All Building Services disciplines are regarded as MEP Systems in Revit. To retrieve appropriate information of the systems and elements, Systems for different discipline services shall be well prepared before modelling. This guide will cover pipework and relative appliances modelling. Refer **D5** Presentation Style for preparing drawing production.

DM-U 01 Add Pipework – Underground or Overhead Cable of Power Supply Companies, Underground Cable Pipe for Telecommunication Services Providers, Electrical Cable, Towngas Pipe

The setting and modelling on pipe system in Utility Services discipline is similar to Plumbing discipline. Refer to **DM-P 03** Add Pipe with Pipe System under **D4.8** Water Services SAM.

Piping System (Sub-Category) Table

Sub-category	Functional type	Functional Type (short form)
Other	Town Gas Pipe	GAS

Standard filter for different pipe systems on plan view and 3D view**.**

System type	Preferred colour		RGB Colour System
Town Gas Pipe (GAS)	CYAN		000, 255, 255

The setting and modelling on cable in Utility Services discipline is similar to Electrical discipline. Refer to **DM-E 05** Add Cable Tray and **DM-E 07** Add Trunking under **D4.10 Electrical SAM**.

DM-U 02 Add Utility Equipment

Information Requirement

List of Built-in Parameters

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	Based on Utility Equipment
Level	Level of Utility Equipment	Level of the element	G/F, L1/F, L2/F
Mark	Utility Equipment Mark	This parameter can be utilized to add HA tag families to annotate the utility equipment.	UE1, UE2……
Comment	Custom information	Users can add custom information with this parameter.	For TBE……

Remark: Parameters in grey colour is optional parameter.

- All required specifications of electrical components in equipment schedule shall be built in the family as Essential Parameters accordingly.

Model Authoring

- Utility Services cover a wide range of components. Some of the equipment is built as site component in the family, such as pit, Cable connection etc. Then, you may add it through the Structure view or create a new family under a suitable category.

D4.14 Geotechnical Engineering (GE) SAM

DG-01 Preliminary Existing Topography Model (Civil 3D)

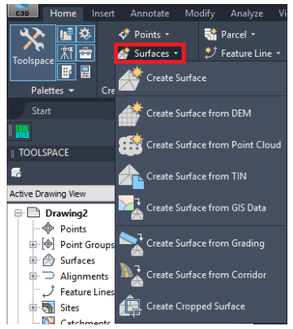
Information Requirement

Common Parameter in Surfaces

Tab	Parameter	Description
Information	Name	Define the name of the surface
	Description	Remark notes for the surface
	Surface Style	Specify the display style of the surface
Definition	Exclude elevations less than	Define the elevation in which information shall be excluded if it is below that defined elevation
	Exclude elevations greater than	Define the elevation in which information shall be excluded if it is above that defined elevation
	Operation Type	Tick to applied the self-defined parameter into the surface, or untick to cancel the self-defined parameter applied in the surface
Analysis	Analysis type	Specify which the way of analyzing the corridor
	Ranges	Specify the amount of ranges shall be divided and shown
	Range Details	Define the ranges of the surface and specify the colour of the ranges
Statistics	Minimum X coordinate	Display the min. X coordinate of the surface
	Minimum Y coordinate	Display the min. Y coordinate of the surface
	Maximum X coordinate	Display the max. X coordinate of the surface
	Maximum Y coordinate	Display the max. Y coordinate of the surface
	Minimum elevation	Display the min. elevation of the surface
	Maximum elevation	Display the max. Elevation of the surface
	2D surface area	Display the surface area calculated in 2D
	3D surface area	Display the surface area calculated in 3D

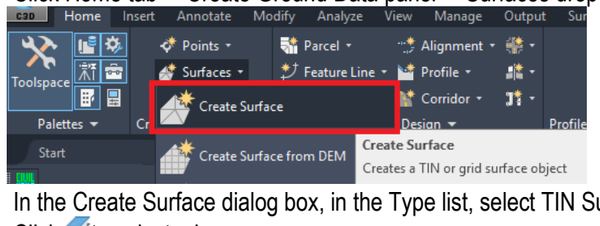
Model Authoring

A surface is a central object for AutoCAD Civil 3D, it can be created with a combination of points, breaklines, boundaries, and contours; and can be referenced by alignments, parcels, and other objects throughout the design process.



To Create a TIN Surface:

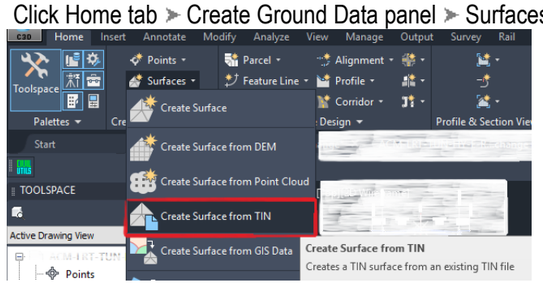
- Click Home tab ➤ Create Ground Data panel ➤ Surfaces drop-down ➤ Create Surface Find.



- In the Create Surface dialog box, in the Type list, select TIN Surface.
- Click to select a layer.
- If you do not select a layer, the surface is placed on the current layer.
- To name the surface, click its default name and enter a new name, or use the Name Template.
- Click OK to create the surface.
- The surface name is displayed under the Surfaces collection in the Prospector tree.

To Create a Surface from a TIN File:

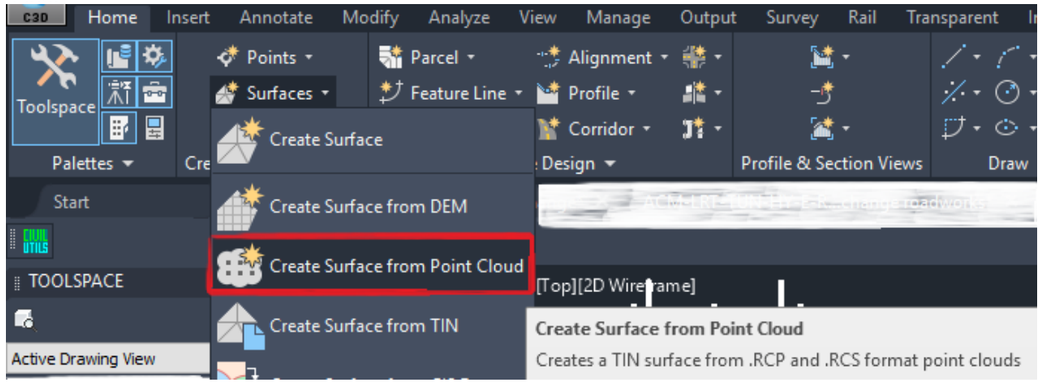
- Importing a TIN file creates a surface object on which you can perform all the standard data operations and editing.
- Click Home tab ➤ Create Ground Data panel ➤ Surfaces drop-down ➤ Create Surface From TIN Find.



- In the Create Surface From TIN dialog box, browse to the location of the TIN file and select it.
- Click Open to add the surface to the current drawing.
- The surface name is displayed under the Surfaces collection in the Prospector tree.

To Create a Surface from Point Cloud Data:

- A TIN surface from points within RCS format point cloud scan file and RCP format point cloud project files created with Autodesk® ReCap™.
- When using this command, you can select entire point clouds or areas of point clouds to include in the surface.
- You can select areas of point clouds by using window selections, by defining polygon areas, or by selecting existing closed polylines in the drawing.
- If the quantity of points in all the selected point cloud areas exceeds two million points, then the areas are subdivided for faster point cloud processing.
- Attach one or more RCS point cloud scans or RCP point cloud projects to the drawing.
- Click Home tab ➤ Create Ground Data panel ➤ Surfaces drop-down ➤ Create Surface From Point Cloud Find.



- Select a point cloud, or use one of the command line selection options to select an area of one or more point clouds. The Create TIN Surface from Point Cloud wizard is displayed.
- Click Create Surface.

Data Definition

- The data definition for a surface comprises the data components that you can add to a surface.
- The following table illustrates the data categories that are supported for each surface type. If the surface type does not support a data type, the data type is not available in the surface Definition collection in the Prospector tree.

Category	Description	TIN surfaces	Grid surfaces	TIN volume surfaces	Grid volume surfaces
Boundaries	Polygons that define outer, hide, and show surface boundary types.	Yes	Yes	Yes	Yes
Breaklines	Includes standard, proximity, non-destructive, and wall breaklines. You can define breaklines from objects in the drawing or import them from a file.	Yes	No	No	No
Contours	Includes contour data that you can define from polyline objects.	Yes	No	No	No
DEM Files	Includes USGS Digital Elevation Model DEM files. Note: To use SDTS files, first convert them into DEM files.	Yes	Yes	Yes	Yes
Drawing Objects	Includes Line, Point, Block, Text, 3D Faces, and Polyfaces. Used for creating surface points from AutoCAD entities.	Yes	No	No	No
Point Files	Includes ASCII point files and comma-separated file (txt. file or csv. File etc).	Yes	No	No	No
Point groups	Includes previously defined point groups.	Yes	No	No	No

DG-02 Drill Hole Stick Model

Housing GE team has developed an AutoCAD plug-in for plotting GI logs with colour. The plug-in details are specified in below table.

Details of the AutoCAD Plug-in for Plotting GI Logs with Colour (for AutoCAD Civil 3D 2018)

Plug-in Name	Version	Functions	File path
DrillHole.dll	Ver.2.0 (Sep 2016)	Plot GI logs with colour	D:\AutoCAD v16\Debug

Information Requirement

List of custom parameter for log generation

Parameter name	Information	Remark	Example for drawing scale in 1:500
Drill hole radius	The radius of drill hole stick model	Under Parameter Setting window, the default value is 0.2m	0.4
Text font size	Text font size for annotation of drill hole stick	Under Parameter Setting window, the default value is 0.08m	0.4
Text offset	The text offset value from the centre point of drill hole stick	Under Parameter Setting window, the default value is 0.03m	0.03
Annotation line length	Annotation line length	Under Parameter Setting window, the default value is 0.2m	0.2

Model Authoring

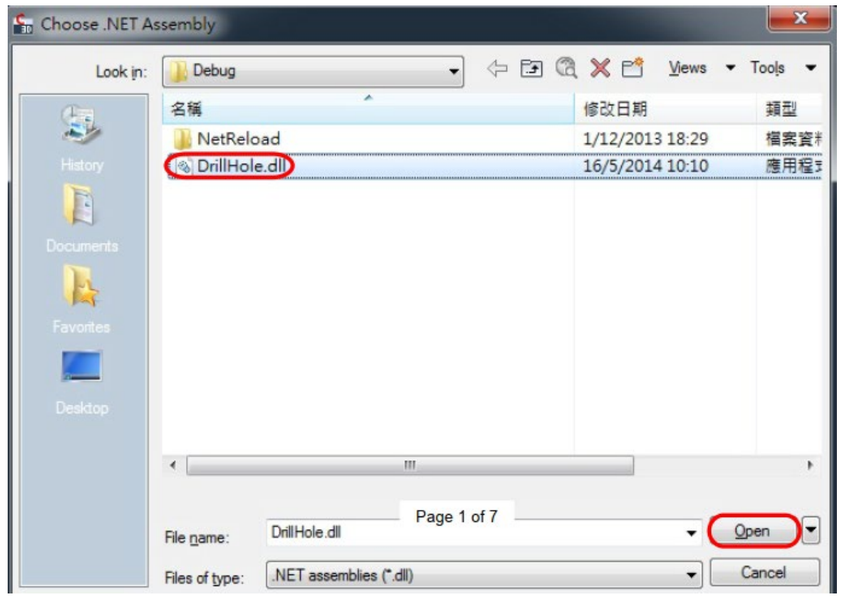
Detailed steps for running the AutoCAD plug-in for plotting GI logs with colour

Step 1. Start AutoCAD for creating a blank drawing.

Details for how to start AutoCAD for creating a blank drawing can be refer to Autodesk official tutorial at this link:
http://help.autodesk.com/view/ACD/2020/ENU/?guid=GUID-5B6347C1-B458-4336-AB2A-C16AF161B755

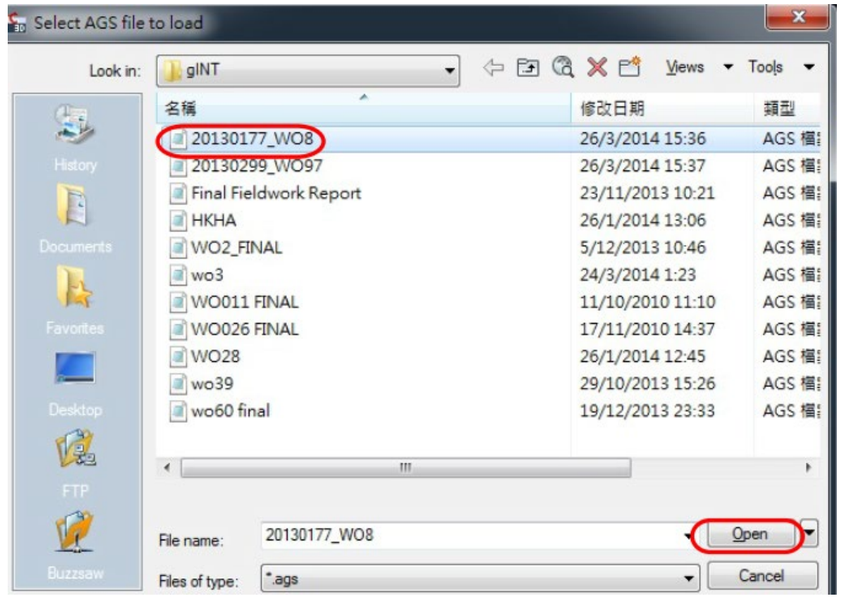
Step 2. Load the plug-in into AutoCAD.

Type **netload** on the AutoCAD command-line followed by <Enter>. In the file dialog that appears, navigate to the location of the .NET DLL. The plug-in was saved in D:\AutoCAD v16, this will be D:\AutoCAD v16\ Debug;
Select the DrillHole.dll file and click Open.

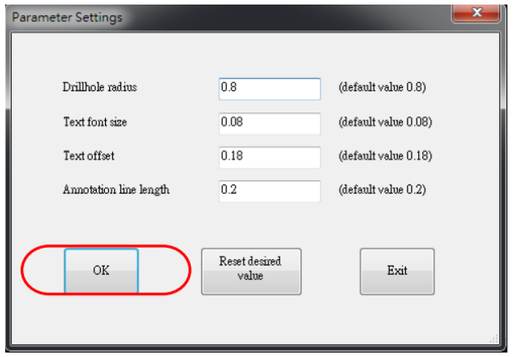


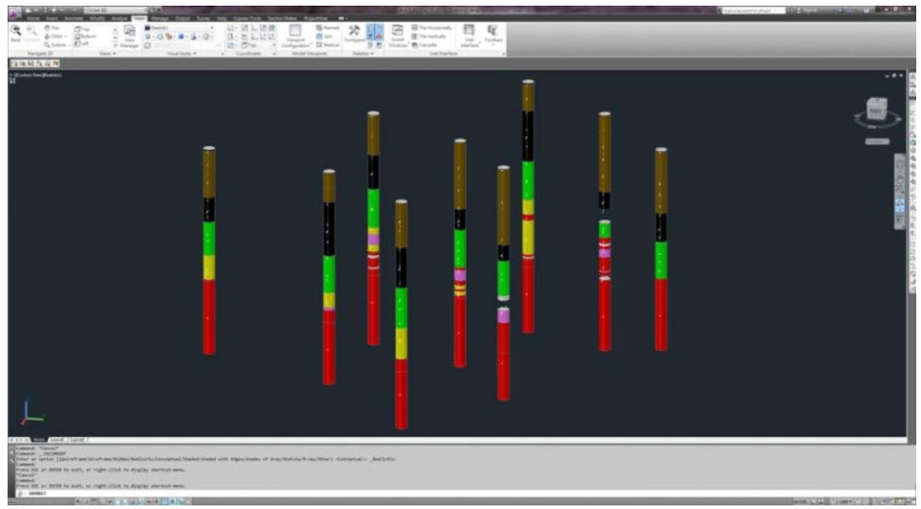
Step 3. Test the plug-in.

Type **dh** at the command-line and hit <Enter>.
Select an .ags file and open it.



Step 4. Custom parameters for log generation in the following windows form.





Step 5. Assign different colours for different types of materials.

There is a text file as a database file for storing the colours of the materials from each of the imported .ags files. It is **Colours.txt**. The content of **Colours.txt** is listed as follows:

CONCRETE #CCCCCC
FILL #7F5F00
SILT #FF7FFF
ASPHALT #282B2A
CLAY #00FF00
SAND #FFFF00
GRAV #FFFF00
TUFF #FF0000
BLANK #FFFFFF
CBBL #FFFF00
BLDR #FFFF00
WASHING #F0ECDE

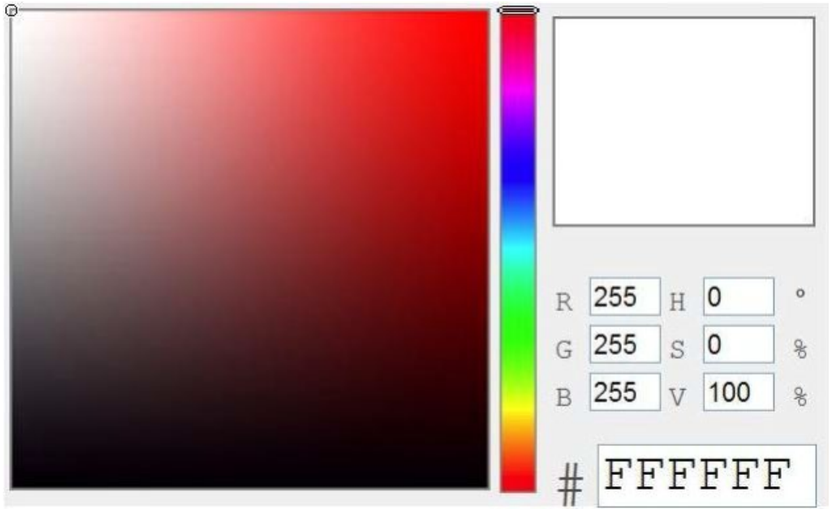
Step 6. Append the newly added types of rocks.

There is a text file as a database file for storing the names of the different kinds of rocks. It is **RockTypes.txt** and appends the newly defined rocks from each of the imported ags files to this text file, if any. The content of **RockTypes.txt** is listed as follows:

AGGLOM
BASALT
BRECCIA
CLAYSTON
CONGLOM
DOLOMITE
GABBRO
GNEISS
GRANITE
LST
LSTSLT
MARBLE
METACON
METAREG
MUDSTONE
PEGMTITE
PHYLLITE
QUARTZIT
RHYOLITE
SANDSTON
SCHIST
SHALE
SILTSTON
SKARN
SYENITE
TRACHYTE
TUFF
TUFFFINE

Step 7. Check whether there are colour values assigned to different types of materials and rocks which are stored in Colours.txt file or not.

Type **matl** on the AutoCAD command-line followed by <Enter>. The materials are shown in the imported ags file and their colour codes are checked accordingly.
You can get the colour code by visiting the web site at http://html-colour-codes.info/
Colours are defined using a hexadecimal (hex) notation for the combination of Red, Green, and Blue colour values (RGB).



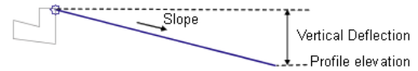
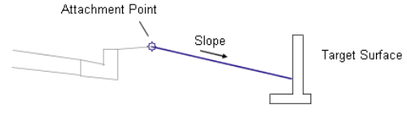
The hex value is obtained from the above conversion table and this value corresponding to the soil material is appended to the text file (**Colours.txt**).

DG-03 Slope and Platform

Information Requirement

Common Parameter in Subassembly

Following Subassemblies are default subassemblies in Civil 3D.

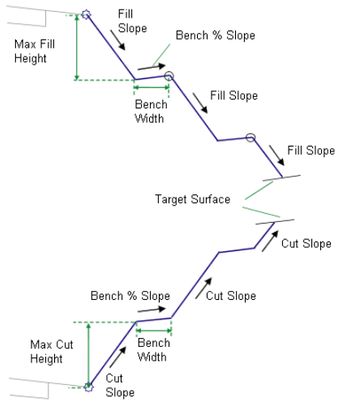
Subassembly	Common Uses	Input Parameter	Target Parameter
LinkSlopeAndVerticalDeflection ADVANCED Parameters Link Slope 100.000 Version R2019 Superelevation Axis... Unsupported Side Right Use Superelevation... No Slope Direction Away from Crown Slope 10000.00% Vertical Deflection 3.000m Point Codes P2 Link Codes Top,Datum Omit Link No	Creates a link from the attachment point to a given vertical direction along a given slope 	Side Slope Direction Slope Vertical Deflection Point Codes Link Codes Omit Link	Vertical Deflection
LinkSlopeToElevation ADVANCED Parameters Link Slope 0.020 Version R2019 Superelevation Axis... Unsupported Side Right Use Superelevation... No Slope Direction Away from Crown Slope 2.00% Target Elevation 0.000m Point Codes P2 Link Codes Top,Datum Omit Link No	Creates a link from the attachment point to a given elevation along a given slope 	Side Slope Direction Slope Target Elevation Point Codes Link Codes Omit Link	Target Elevation
LinkSlopeToSurface ADVANCED Parameters Link Slope 0.020 Version R2019 Superelevation Axis... Unsupported Side Right Use Superelevation... No Slope Direction Away from Crown Slope 2.00% Add Link in Cut and Fill Point Codes P2 Link Codes Top,Datum Omit Link No	Creates a link from the attachment point to a given surface along a given slope 	Side Slope Direction Slope Point Codes Link Codes Omit Link	Target Surface

Subassembly	Common Uses	Input Parameter	Target Parameter
DaylightBench	Creates cut of fill slopes with repeating benches as needed	Side Cut Slope Max Cut Height Fill Slope Max Fill Height Bench Width Bench % Slope	Daylight Surface

ADVANCED

Parameters

Version	R2019
Side	Right
Cut Slope	2.00:1
Max Cut Height	3.000m
Fill Slope	2.00:1
Max Fill Height	3.000m
Bench Width	1.500m
Bench Slope	2.00%
Rounding Option	None
Rounding By	Length
Rounding Parameter	0.500m
Rounding Tessellati...	6
Place Lined Material	None
Slope Limit 1	1.00:1
Material 1 Thickness	0.300m
Material 1 Name	Rip Rap
Slope Limit 2	2.00:1
Material 2 Thickness	0.150m
Material 2 Name	Rip Rap
Slope Limit 3	4.00:1
Material 3 Thickness	0.100m
Material 3 Name	Seeded Grass

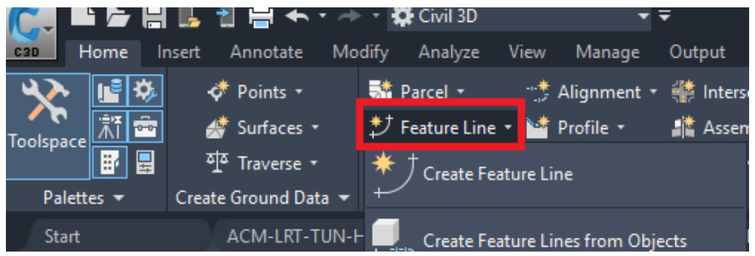


Model Authoring

Feature Lines

Feature lines are 3D objects which can be used as grading footprints, surface breaklines, and as corridor baselines.

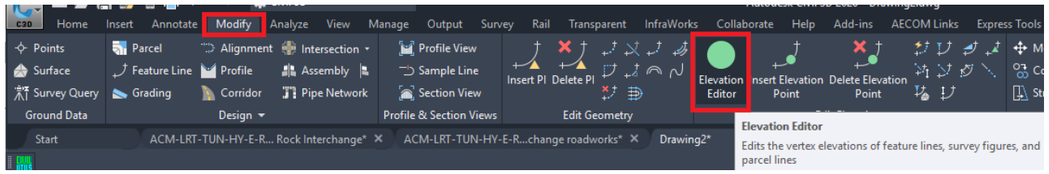
- You can draw feature lines, convert feature lines from existing objects, and extract feature lines from alignments or corridors.



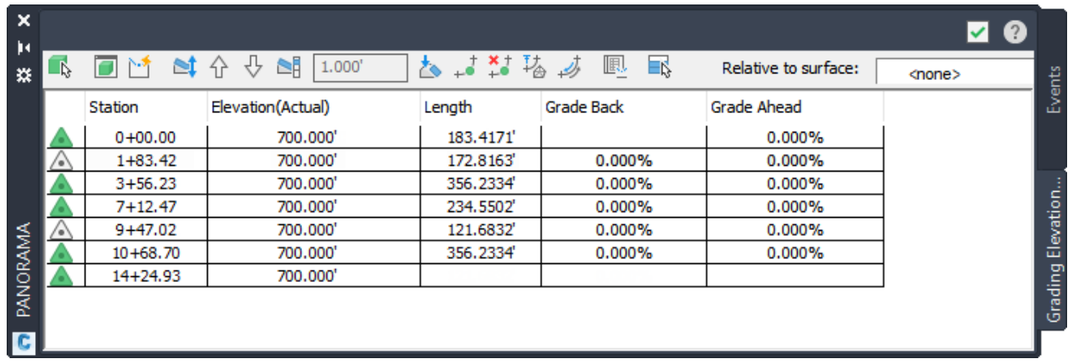
- The primary point that defines the geometry of the feature lines is called a point of intersection (PI). It is represented by a triangle symbol in the Elevation Editor, or when a feature line editing command is used. The PI appears as a standard square grip when grip editing a feature line.
- You can insert elevation points along a feature line to define grade breaks.

To edit the Grading Elevation:

- Click Modify tab ➤ Edit Elevations panel ➤ Elevation Editor Find.



- The Elevation Editor shows the following grading settings for each corner of the feature line in a clockwise direction. The starting point is the upper left corner.
  - Station: Distance from the start of the feature line.
  - Elevation (Actual): Elevation of the current point.
  - Length: Distance to the next point.
  - Grade Ahead: Grade toward the next point. Adjusting this setting holds the elevation of the current point and adjust the elevation of the next point for the new grade.
  - Grade Back: Grade from the previous point. Adjusting this setting affects the elevation of the current point, holding the elevation of the next point for the new grade.



- Click ✔ to close the Grading Elevation Editor after finished editing.

To Add a Feature Line to a Surface as a Breakline:

- to select one or more feature lines from a drawing and add them to a surface. You can use breaklines to define features, such as retaining walls, curbs, tops of ridges, and streams.
- Right-click a feature line ➤ Add To Surface As Breakline.
- In the Select Surface dialog box, select a surface, and click OK. Or, select the Add button to create a new surface.
- In the Add Breaklines dialog box, specify the breakline options. Click OK.

DG-04 Permanent Retaining Structure (Civil 3D)

Information Requirement

Common Parameter in Corridor

Parameter	Purpose
Name	View and edit the name of the corridor baseline and region
Horizontal Baseline	Specify the horizontal baseline (can be feature line or alignment) for the corridor
Vertical Baseline	Specify the vertical baseline (can be feature line or profile) for the corridor
Assembly	Specify the assembly for the corridor
Start Station	Define the start station of the corridor region
End Station	Define the end station of the corridor region
Frequency	Specify the frequency of applying the assemblies in specified corridor region
Target	Specify corridor target

Common Parameter in Subassembly

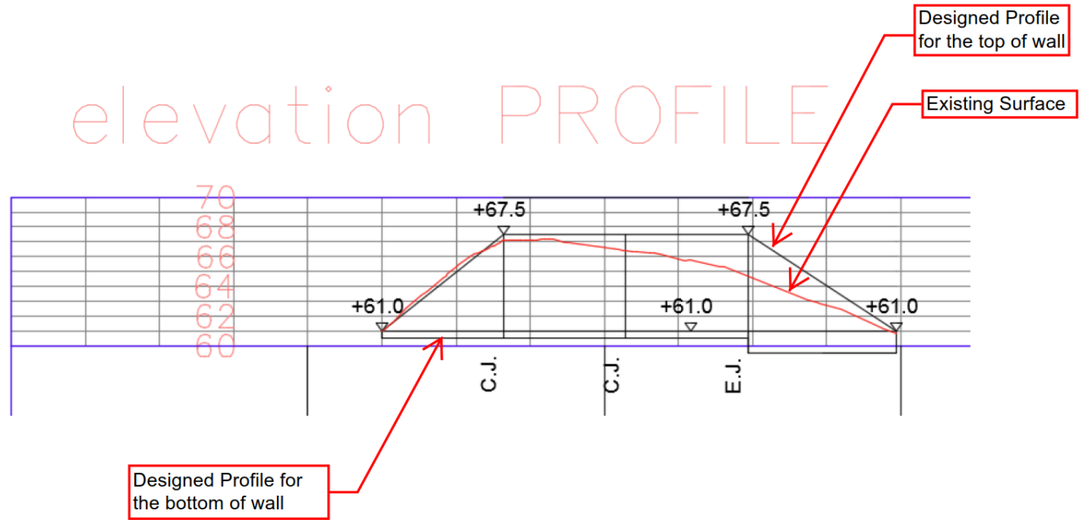
Following Subassemblies are default subassemblies in Civil 3D.

Subassembly:	Common Uses:	Input Parameter	Target Parameter:
RetainWallToLowSide	Creates a link from the attachment point to a given vertical direction along a given slope	Side	Wall Height
		Wall Top Width	Target Surface
		Top Height	
		Footing Cover	
		Key	
RetainWallVertical	Creates a link from the attachment point to a given elevation along a given slope	Side	Wall Height
		Wall Width	Target Elevation
		Top Height	
		Footing Cover	
		Key	

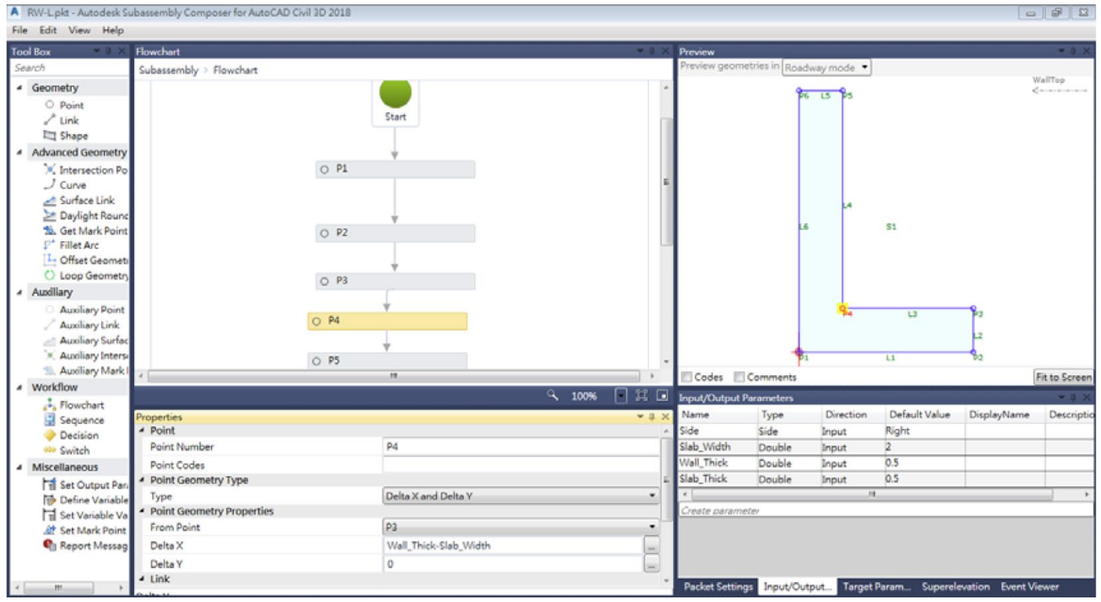
Using Subassembly Composer for a custom assembly

This function will show simple and effective methods for easily using Subassembly Composer software in AutoCAD Civil 3D software to create corridor as the variable-height retaining walls.

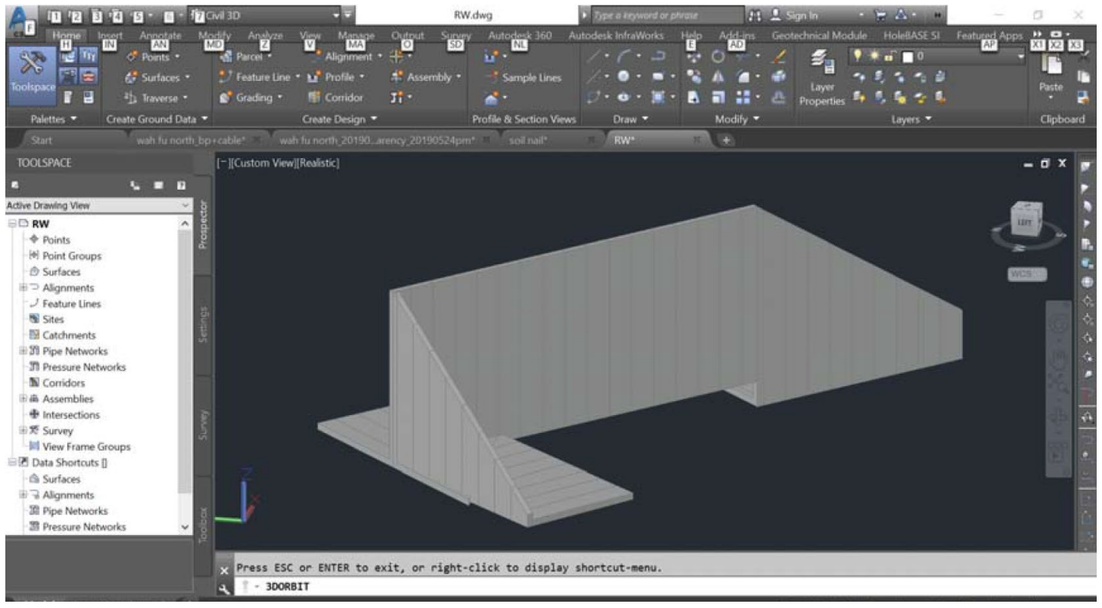
User needs to design your own subassemblies through Subassembly Composer software that will provide an interface for composing and modifying complex subassemblies, without the need for programming; and work out the logic of the flow chart for taking points, links and shapes to create geometry of subassemblies.



Then setup the input and target parameters of subassemblies to control geometry of desired shape of a Retaining Wall solid model, target a designed profile for top and bottom of wall, and allow the footings to be stepped and the footing widths to change based on height or user criteria.



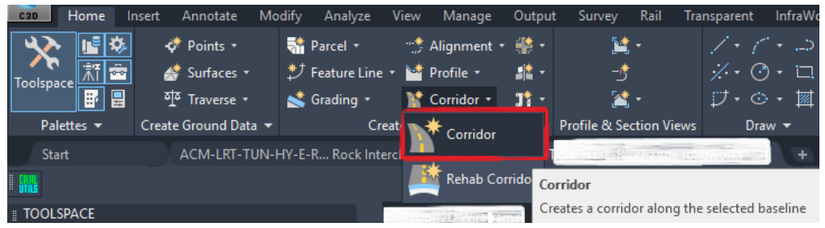
After that, import the retaining wall model .pkt file into AutoCAD. The 3D solid for retaining wall will be created in .dwg file format.



Model Authoring

Corridor

A corridor model builds on and uses various Autodesk Civil 3D objects and data, including subassemblies, assemblies, surfaces, feature lines, alignments, and profiles. The corridor manages the data, tying various assemblies (applied for different ranges of stations) to the baselines and their finished grade profiles.



Building and Updating Corridors:

- To build a corridor, a horizontal baseline, vertical baseline and assembly is needed. Horizontal baseline can be feature line or alignment, whereas vertical baseline can be feature line or profile.
- If the horizontal baselines, vertical baselines and assemblies of the corridors are updated, rebuild the corridors to update the corridors unless the corridors are set with automatically rebuild.

Corridor Baselines and Regions:

- To build a corridor with different baselines, various baselines can be added into the corridor. A corridor can contain various baselines.
- To build a corridor with different assemblies with same baselines, new region can be added into the corridor. A corridor baseline can contain various of regions, but regions in a baseline cannot be overlapped.
- To build a corridor with regions overlapped, more than one baseline shall be set because regions in a baseline cannot be overlapped

Corridor Frequency:

- To build a corridor with smooth turning position, set a higher frequency for the application of assemblies in the corridor in the corresponding region.
- Corridor with higher frequency will be more complexed, and more time is needed for the computer to generate any updates for the corridor

Corridor Target:

- Most common subassemblies can set target parameter for building the corridor with corridor target, for the corresponding target parameter, please refer to the Common Parameter in Subassemblies in DC-R 03 Assemblies for Pavement and Kerb.
- Different objects can be used as targets for different target type. Common target types include:

Target Type	Object types that can be used as targets
Widths or Offsets	alignments, polylines, feature lines, or survey figures Note: Polylines, feature lines, and survey figures can be selected from xrefs.
Elevations	profiles, 3D polylines, feature lines, or survey figures Note: 3D polylines, feature lines, and survey figures can be selected from xrefs.
Surfaces	surfaces

DG-05 Permanent Retaining Structure (Revit)

Retaining Wall Families

Discipline	Geotechnical
Family	Loadable Family
Family Category	Structural Foundations
Workset	Individual Levels
Family Naming Convention	SFD- RWL -HAG-<Sub-type>-Descriptor
Type Naming Convention	<Structural material>-<Descriptor >

Naming example

Family name								**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**	**Descriptor 2**	**Structural material**		**Wall thickness (mm)**
SFD	-	RWL	-	HAG	-	Cantilevered Retaining Wall	- N/A	30D/20	-	500
SFD	-	RTW RWL	-	HAG	-	Counterfort Retaining Wall	- N/A	30D/20	-	1000

- The reinforced concrete cantilevered retaining wall commonly adopted in HA is made from an internal stem of reinforced, cast-in-place concrete which is often in the shape of an inverted T. The cantilevered walls may include counterforts on the back to improve their structural strength, rigidity and stability.
- The cantilevered retaining wall shall be modelled according to its sectional size under the Category of "**Structural Foundations**".

Information Requirement

List of Built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	30D/20-800x800x600
Level	Retaining structure level	The level to which the retaining structure is constrained.	L1, L2……
Height Offset from Level	Offset distance from Level	Specifies the elevation of the top of the retaining structure relative to the constrained level.	-50, 0.0, 100, 200, 250,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	30D/20, 40D/20, ……
Mark	Retaining structure mark	Optional information to be added to retaining structure elements This value must be unique for each element in a project.	RTW01, RTW02, ……
Comments	Type of usage	An optional information to be added for indicating the type of usage of a retaining structure element, when necessary	Basement retaining wall, permanent retaining wall, temporary retaining wall, ……

List of Shared Parameter

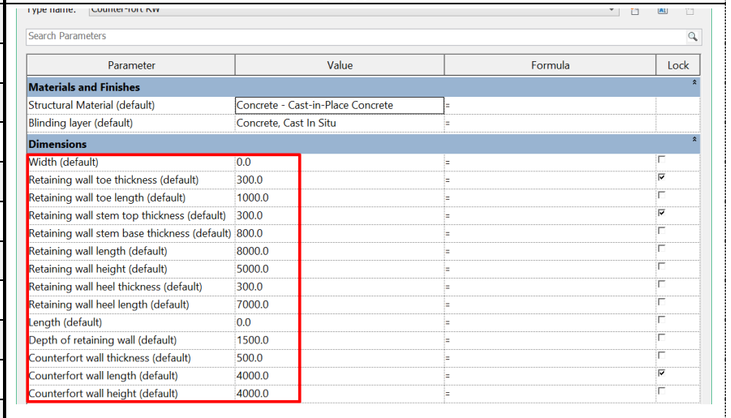
Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Location	Retaining wall location	Common	Text	Identity Data	Instance

Other Parameters

Shared Parameter of the Family:

A shared parameter labelled as "**Depth of retaining wall**" is used to control the top level of the wall base below the proposed ground level.

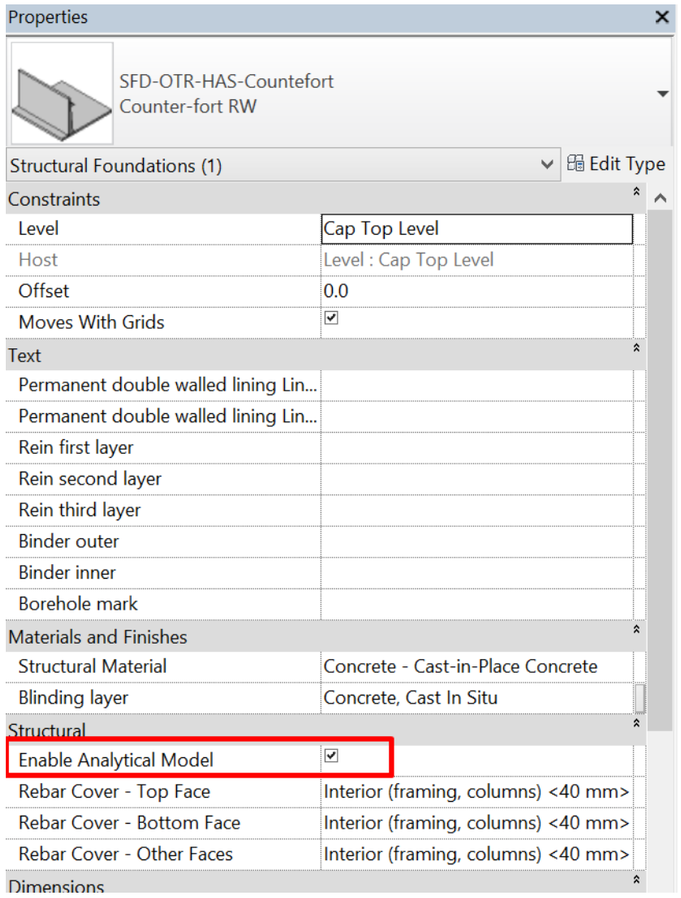
Retaining Wall Family	
Shared Parameters	Customized parameters in Family Type
Retaining wall length	
Retaining wall height	
Depth of retaining wall	
Retaining wall stem top thickness	
Retaining wall stem base thickness	
Retaining wall toe length	
Retaining wall toe thickness	
Retaining wall heel length	
Retaining wall heel thickness	
Counterfort wall thickness	
Counterfort wall height	
Counterfort wall length	



Model Authoring

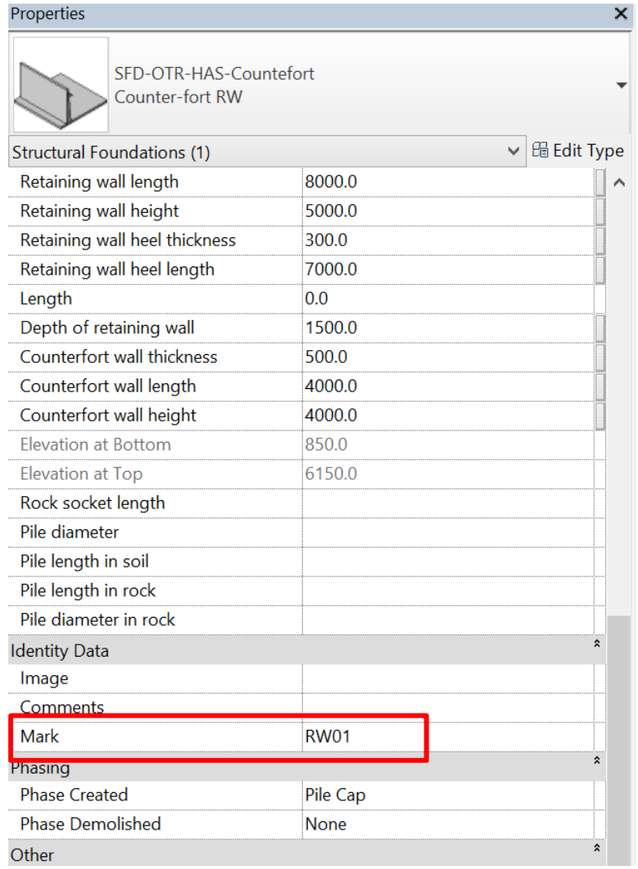
Analytical Links

- The cantilevered retaining walls are usually independent from the analytical model of the building structure. Thus, their instance properties in the field of “Enable Analytical Model” shall be unchecked.



Marks and Comments:

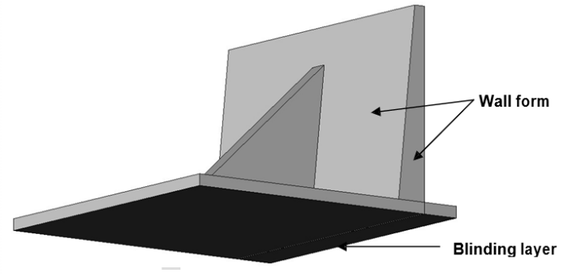
- To enable subsequent generation of material schedules, all R.C. cantilevered retaining wall families in the Project Revit Structure model shall be assigned with a unique wall mark. This wall mark can be input in the “Mark” field of “Identity Data” in the Properties Palette.
- It is also advised to specify the usage of the element in its Properties palette under the “Comments” field such as “**Cantilevered Retaining Wall**”. Such description can facilitate other model user to sort out the elements according to their structural usage within a model.



Note on Foundation level:

- The top of the base slab of the retaining wall is by default set to 1.5m below the proposed ground level.
- The Reference Level shall be the proposed ground floor level which is set to 0.0 mPD by default. Model authors shall amend the level of proposed ground level to suit the architectural requirements.

Material Taking-off in schedule:

Description	Model
All side faces of the retaining wall as well as the soffit of the base slab shall be provided with paints named “Wall form“ and “Blinding layer” respectively so as to facilitate subsequent material takeoff for the amount of formwork and blinding layer material.	

DG-06 Soil Nail

Discipline	Geotechnical
Family	Loadable Family
Family Category	Structural Foundations
Workset	Slope works
Family Naming Convention	SFD- SLN -HAG-<Soil nail head type>-Descriptor
Type Naming Convention	<Structural material>-<Soil nail head size>

Naming example

Family name									**Type name**		
Category		**Functional type**		**Originator**		**Descriptor 1**		**Descriptor 2**	**Structural material**		**Soil nail head size (Length x Depth)**
SFD	-	SLN	-	HAG	-	General soil nail	-	N/A	30D/20	-	500 x 250
SFD	-	SLN	-	HAG	-	For sprayed concrete slope	-	N/A	30D/20	-	600 x 300
SFD	-	SLN	-	HAG	-	For hydroseeding surface	-	N/A	30D/20	-	800 x 350

Information Requirement

List of Built-in Parameter

Parameter name	Information	Remark	Example
Type	Family type	Under using the correct family, choosing the type with correct size	30D/20-800x350
Level	Constraint level	The level to which the soil nail is constrained.	L0, L1…..It is recommended to set the soil nail constrained level to a 0 mPD Level. When adjusting the soil nail elevation, we just need to input the true elevation of soil nail to the field of Height Offset from Level.
Height Offset from Level	Offset distance from Level	Specifies the elevation of the top of the soil nail relative to the constrained level.	5500, 6000,……
Structural material	Structural material	Structural material information shall be consistent with the Structural material information in Family Type Name.	30D/20, ……
Mark	Soil nail mark	Optional information to be added to retaining structure elements This value must be unique for each element in a project.	SLN01, SLN02, ……
Comments	Type of usage	An optional information to be added for indicating the type of usage of a soil nail element, when necessary	Normal soil nail; Soil nail for sprayed concrete slope surface; Soil nail for rock surface; Soil nail for concrete wall surface; ……

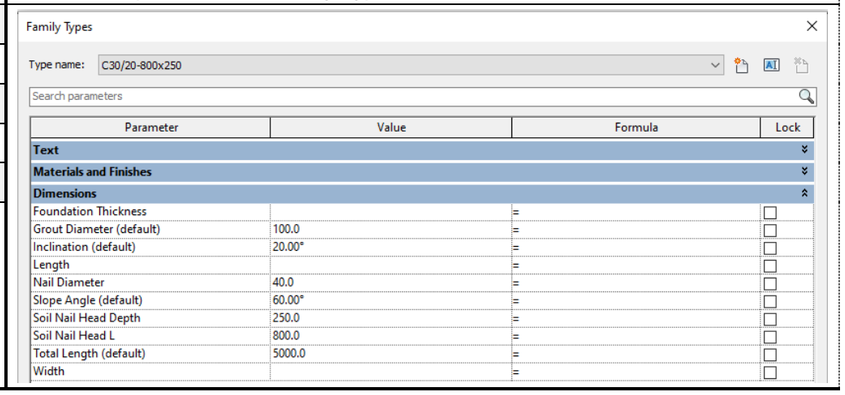
List of Shared Parameter

Parameter name	Information	Discipline	Type of Parameter	Group parameter under	Type/ Instance
Location	Retaining wall location	Common	Text	Identity Data	Instance

Other Parameters

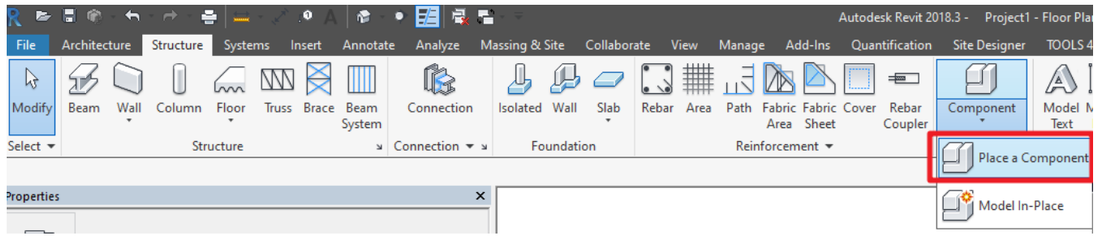
Parameters of the Family:

A group of parameter data is set in the family to control the sharps and orientation of soil nail.

Soil nail Family	
Parameters	Customized parameters in Family Type
Soil Nail Head Length	
Soil Nail Head Depth	
Total Length	
Slope Angle	
Inclination	
Grout Diameter	

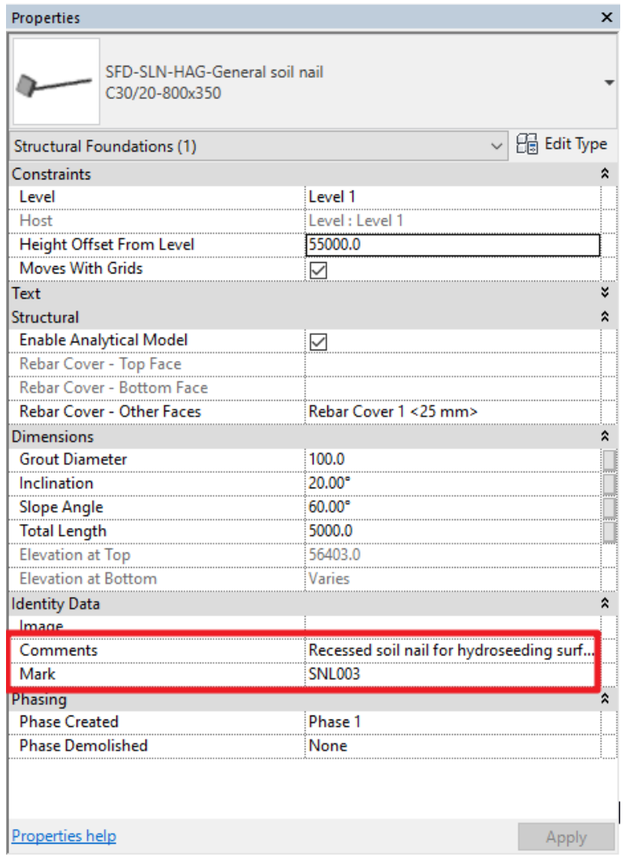
Model Authoring

Soil nails can be modelled as Structure > Component > Place a Component



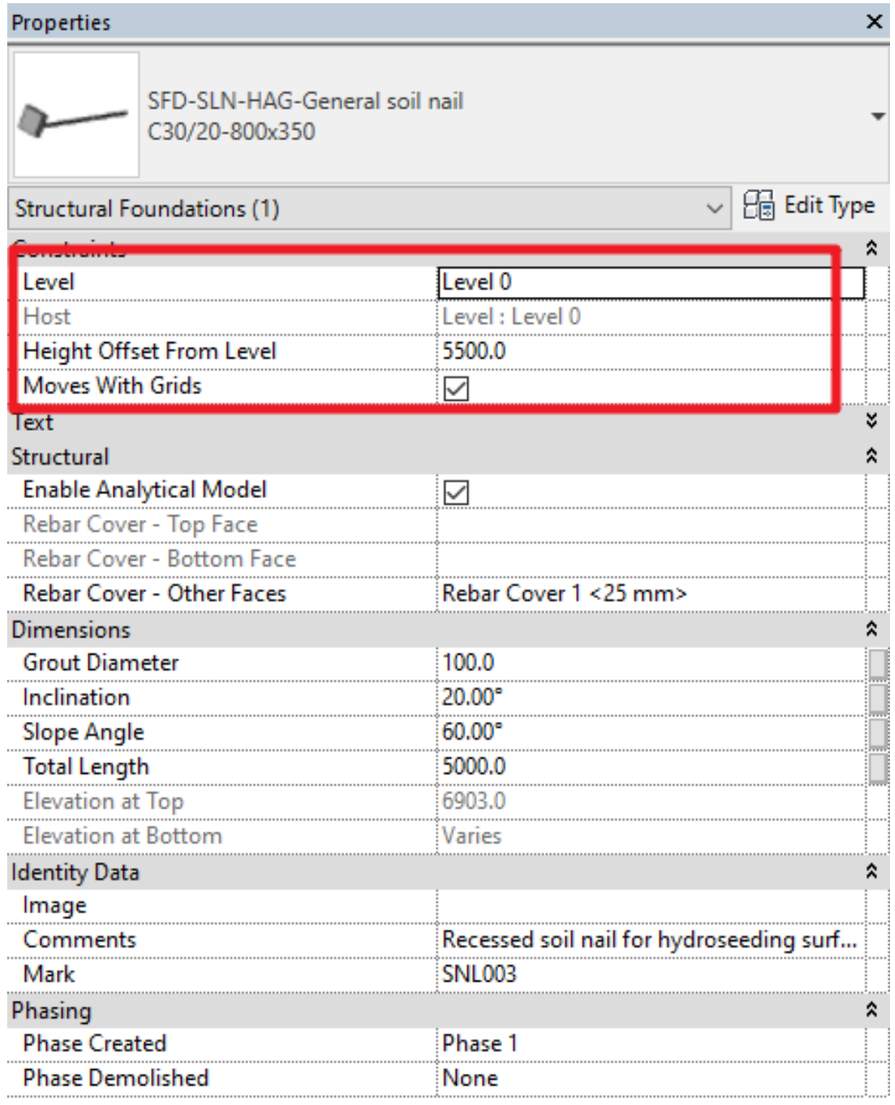
Marks and Comments:

- To enable subsequent generation of material schedules, all soil nail model elements shall be assigned with a unique mark. This soil nail mark can be input in the "**Mark**" field of "**Identity Data**" in the Properties Palette.
- It is also advised to specify the usage of the soil nail element in its Properties palette under the "Comments" field such as "Recessed soil nail for hydroseeding surface with non-biodegradable erosion control mat". Such description can facilitate other model user to sort out the elements according to their structural usage within a model.



Note on soil nail level:

- The Constrained Level shall be Level 0 which is set to 0.0 mPD.
- Height Offset From Level shall be amended to the slope surface level.



D4.15 Civil Engineering (CE) SAM

This section describes the standard approach to modelling in Civil Engineering model outside Housing site boundary and the step-by-step workflow / guide with Civil 3D to apply them into the project.

For drainage works within Housing site boundary, refer to **D4.16** Drainage and Sewage SAM, and subsequently mainly to **D4.8** Water Services SAM of **HABIMSG Vol.2**.

Civil Engineering model (outside Housing site boundary) consists of the following major components and illustrated methods to create corresponding models.

- For Cable Ducts And Pits For Power Cable And Public Utilities, **Draw pits** are modelled by using **Part List** and **Pipe Network Creation Tools**; **Ducts** are formed by creating **Corridors**.

- For Pipe Network For Drainage Works, Structure parts like **Manhole, Gullies, Inlet and Outlet**, and Pipe parts like **Box culverts and Pipes** of the drainage works are formed by using **Part List** and **Pipe Network Creation Tools**

- For Pressure Networks For Gas Main, Pressure Pipes part like **Gas Main Pipes**, and Fittings part like **Joints** of Gas Main are formed by using **Pressure Network Creation Tools**

- For Pressure Networks For Water Main, pressure pipes part like **Water Main Pipes**, Fittings part like **Joints** of Water Main, and Appurtenances like **Wash Out Chamber, Fire Hydrant, Plug End and Valves** are formed by using **Pressure Network Creation Tools**

DC-U 01 Cable Ducts and Pits for Power Cable and Public Utilities

Information Requirement

Common Parameter for Cable Duct Typical Section Production

- Typical Section of the Cable Duct is formed by assemblies and subassemblies
- Subassembly is used to combine with other subassemblies or stay alone to form an assembly, while assembly is acting like a typical section in making a linear object called corridor.
- Subassembly Composer is used for making custom subassemblies.
- For cable duct production, custom rectangular and circular subassemblies shall be created for the production of the **rectangular and circular ducts**

Geometry Tool in Subassembly Composer

'Geometry tools' in Subassembly Composer are common tools in drawing geometry to form subassemblies. There are 3 types of Geometry tools with parameters:

Geometry tool:	Parameter:	Purpose:
Point	Point Number	Define the name of the point by number
	Point Codes	Define the code of the point for Civil 3D to read during the production of subassemblies and corridors
	Point Geometry Type	Define the type of parameter that controls the position of the point
	Point Geometry Properties	Define the position of the point
Link	Link Number	Define the name of the link by number
	Link Codes	Define the code of the link for Civil 3D to read during the production of subassemblies and corridors
	Start Point	Define the starting point of the link
	End Point	Define the end point of the link
Shape	Shape Number	Define the name of the shape by number
	Shape Codes	Define the code of the shape for Civil 3D to read during the production of subassemblies and corridors
	Links	Define which links are included to form a shape

Common Parameter for Cable Ducts Alignment Production

- Cable Ducts Alignment is the centreline of the cable ducts, which can be used in drawing production of cable duct

Alignment Properties

Tab:	Purpose:	Parameter:	Description:
Information	Specifies name, description, and object style	Name	Define the name of the alignment
		Object style	Specify the display style of the alignment
Station Control	Displays alignment length and raw stationing as well as options to change the station reference point, and apply station equations	Reference point	Display the coordinate of the reference point of the alignment
		Reference point station	Define the station of the reference point of the alignment
		Station information	Display the start station, end station and the length of the alignment
Masking	Specifies one or more regions of the alignment that can be suppressed from display	Region	Display the chronological number of the masking region
		Mask	Specify if the masking function applied
		Start Station	Define the start station of the masking region
		End Station	Define the end station of the masking region

Common Parameter for Cable Duct Production

- After preparing the typical section (assemblies and subassemblies) and the cable duct alignment, they can combined to form cable duct by a function called 'Create Corridor'

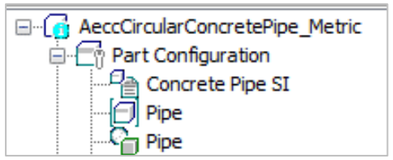
Cable Duct Corridor Properties

Parameter	Purpose
Name	View and edit the name of the corridor baseline and region
Horizontal Baseline	Specify the horizontal baseline (can be feature line or alignment) for the corridor
Vertical Baseline	Specify the vertical baseline (can be feature line or profile) for the corridor
Assembly	Specify the assembly for the corridor
Start Station	Define the start station of the corridor region
End Station	Define the end station of the corridor region
Frequency	Specify the frequency of applying the assemblies in specified corridor region
Target	Specify corridor target

Common Parameters for Draw Pit Production

- Draw Pit of the public utilities are created by applying a **Part List** in a **Pipe Network**
- **Part List** contains **Part Families,** they can be created and modified by **Part Builder**
- **Pipe Network** modelling are mention in the 'modelling' section of this chapter

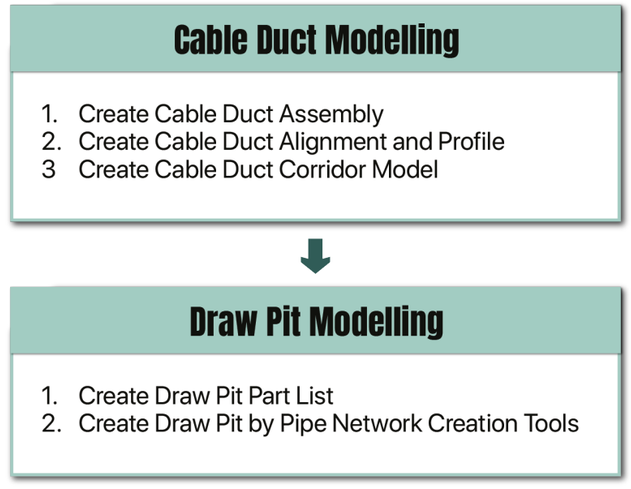
Part Builder



Parameter:		Description:	Examples:
Part Name		Control the name of the part showing in the part builder.	Concrete Pipe SI, Concrete Box Culvert SI, etc.
Part Description		Describes the part family.	Pipe (user defined)
Part Domain	Pipe	Part files in Pipe Catalog are defined as pipes part domain	Pipe/ Structure
	Structure	Part files in Structure Catalog are defined as structures part domain	

Model Authoring

Key Steps

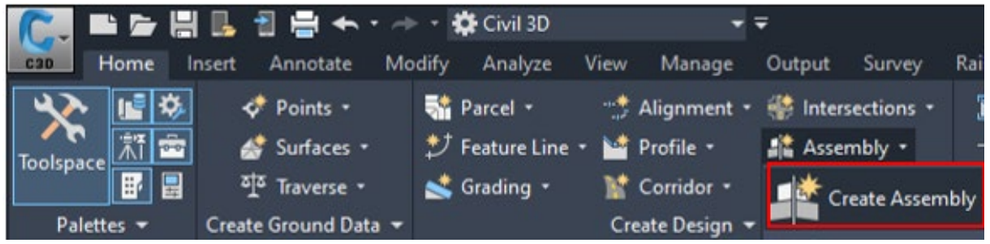


Cable duct modelling

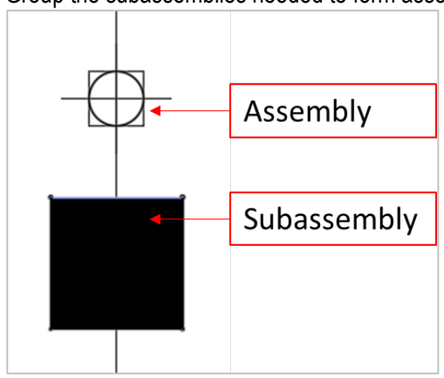
- Cable duct modelling is using the combination of Civil 3D objects like '**Subassembly**', '**Assembly**', '**Alignment**', '**Profile**' and '**Corridor**'
- By using the command '**Create Corridor**', objects above mentioned can be combined together to form a cable duct
- A **Corridor** is a linear object formed by applying an **Assembly** along a 3D path called **Alignment** while an Assembly is an object similar to a typical section. An assembly is formed by one or more **subassemblies**, in which a subassembly is a basic element with geometric properties in the assemblies.

Cable Duct Assembly

- Create a custom subassembly of the **rectangular and circular ducts** in Autodesk Subassembly Composer
- Create Assembly

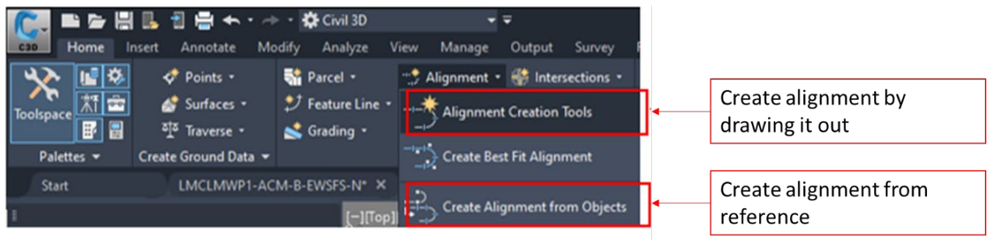


- Group the subassemblies needed to form assemblies for corridor modelling

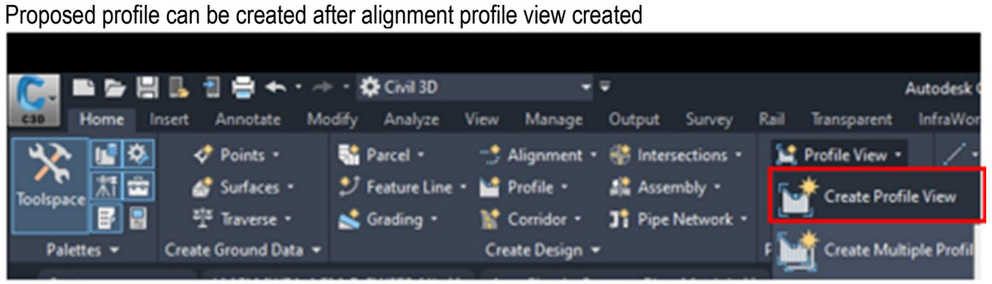


Cable Duct Alignment and Profile

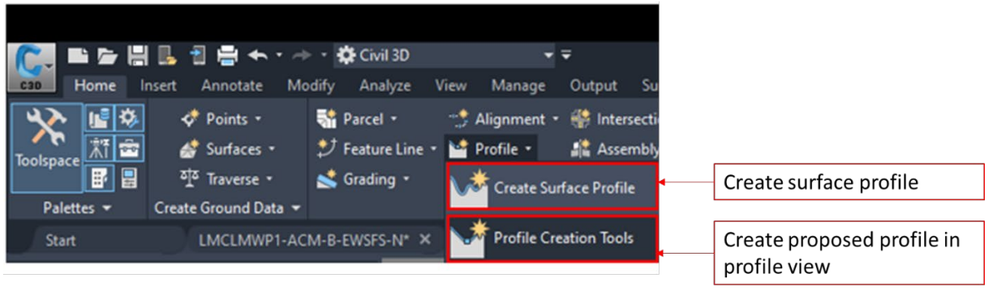
- Alignment can be created from reference or by drawing it out



- Proposed profile can be created after alignment profile view created

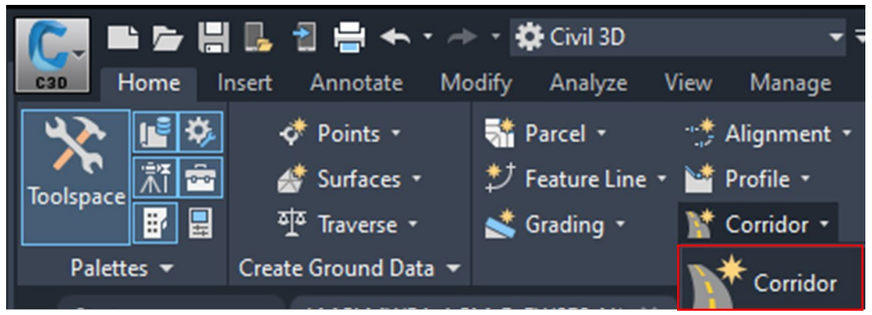


- Create surface profile for the alignment if necessary

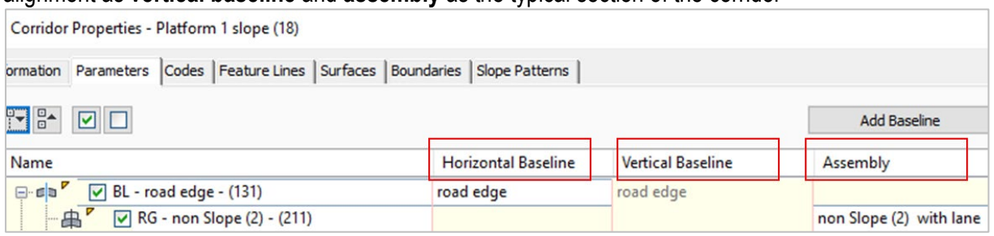


Cable Duct Corridor Model Creation

- Ducts of **telecommunication** and **electrical** system are formed by **corridors**



- Apply alignment as **horizontal baseline** (as shown in the photo above) of the corridor, profile of the alignment as **vertical baseline** and **assembly** as the typical section of the corridor

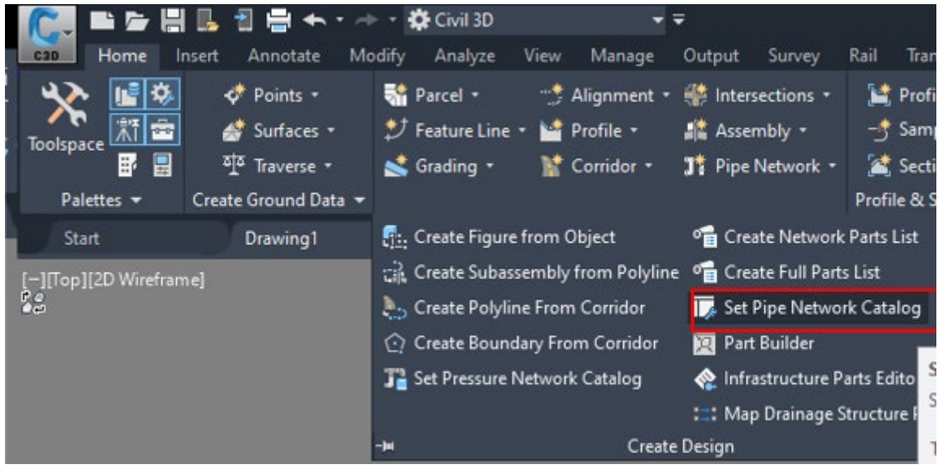


Draw Pit modelling

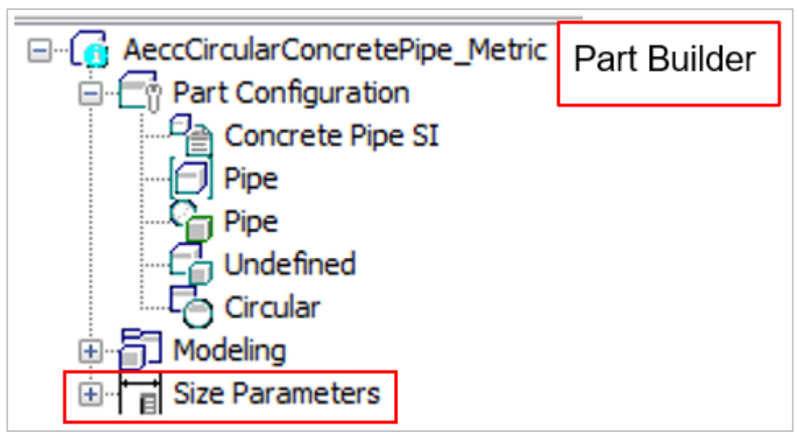
- Draw pit modelling is to create pits by **Part Builder**, **Pipe Network Creation Tools** and **Network Layout Tools**
- **Part Builder** is used in forming a **Part List**, and **Pipe Network Creation Tools** and **Network Layout Tools** are used in adding the pits (structure) into the model

Draw Pit Part List

- Set **Pipe Network Catalog** in the model before create the **Part List**



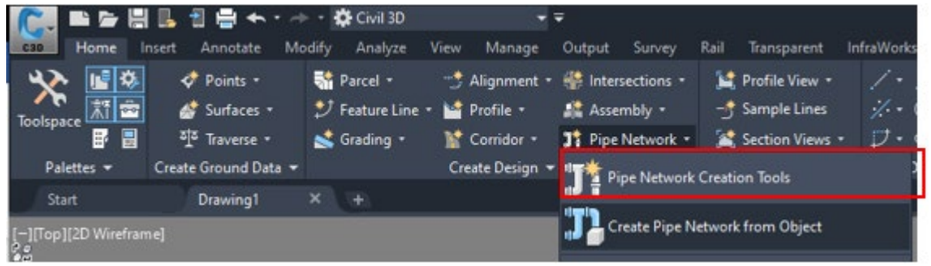
- **Pipe Network Catalog** is a folder contains definitions for all the pipe network parts that you can insert into a drawing
- Default Pipe and Structure Network Catalog folder is in C:\ProgramData\Autodesk\C3D <version>\enu\Pipes Catalog
- A **Parts List** contains a set of pipe network parts – pipes and structures – that you can use in a pipe network
- If there are no target size in the default pipe network part, **Part Builder** can be used to create new size
- New part size can be added in **Size Parameter** in **Part Builder**



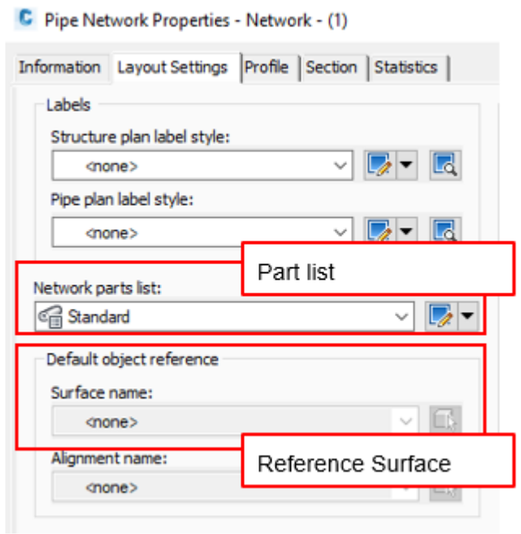
- A full part list can be created by using 'CreateNetworkPartsListFull' command to add all part in the target catalog folder into the part list, prepared for pit creation

Draw Pit Creation by Pipe Network Creation Tools

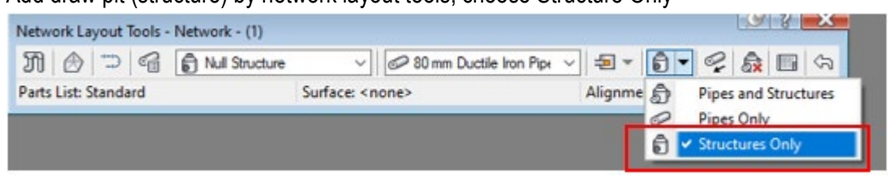
- Create Pipe Network



- Apply part list prepared and reference surface in the pipe network



- Add draw pit (structure) by network layout tools, choose Structure Only



DC-U 02 Pipe Networks for Drainage works

Information Requirement

Common Parameters for Pipe Network Production

- Structure parts like **Manhole, Gullies, Inlet and Outlet**, and Pipe parts like **Box culverts and Pipes** of the drainage works are created by applying a **Part List** in a **Pipe Network**
- **Part List** contains **Part Families,** they can be created and modified by **Part Builder**
- **Pipe Network** modelling are mention in the 'modelling' section of this chapter

Part Builder

- Please refer to **DC-U 02**

Model Authoring

Key Steps

Manhole, Gullies, Inlet and Outlet Modelling

1. Create Part List for Target Manhole, Gullies, Inlet and Outlet
2. Create Manhole, Gullies, Inlet and Outlet by Pipe Network Creation Tools

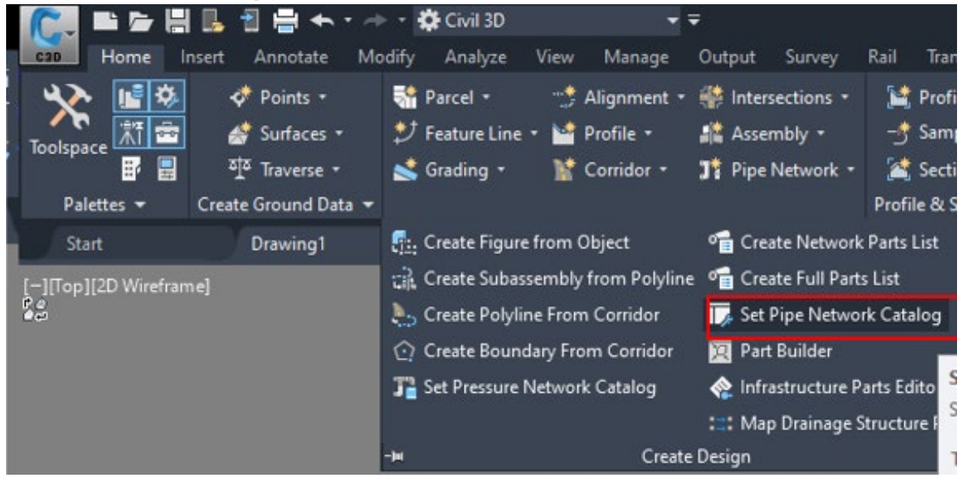
⬇

Box Culvert and Pipe Modelling

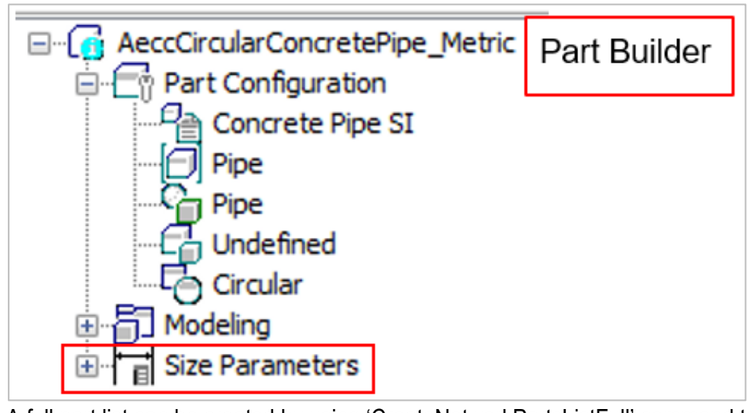
1. Create Part List for Target Box Culvert and Pipe
2. Create Box Culvert and Pipe by Pipe Network Creation Tools

Part List for Pipe Network

- Set **Pipe Network Catalog** in the model before create the **Part List**



- **Pipe Network Catalog** is a folder contains definitions for all the pipe network parts that you can insert into a drawing
- Default Pipe and Structure Network Catalog folder is in C:\ProgramData\Autodesk\C3D <version>\enu\Pipes Catalog
- A **Parts List** contains a set of pipe network parts – pipes and structures – that you can use in a pipe network
- If there are no target size in the default pipe network part, **Part Builder** can be used to create new size
- New part size can be added in **Size Parameter** in **Part Builder**

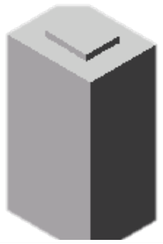
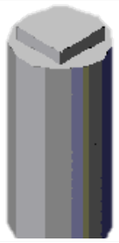
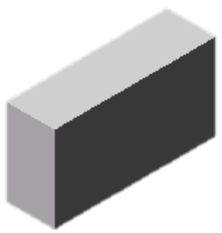


- A full part list can be created by using 'CreateNetworkPartsListFull' command to add all part in the target catalog folder into the part list, prepared for pit creation

Manhole, Gullies, Inlet and Outlet Modelling

- Default Metric Structure Catalog can be used to form Part List for Manhole, Gullies, Inlet and Outlet Modelling

Common Part Families in Default Metric Structure Catalog

Part Domain:	Part Families:	Part Shape:	Example Appearance:
Structures	Inlet-Outlet	Rectangular	
	Junction with Frames	Rectangular	
		Cylindrical	
	Junction without Frames	Rectangular	
		Cylindrical	

*This graph only shows the part family in default Metric Structure Catalog that commonly used. Customized size can be set up by using **Part Builder**.

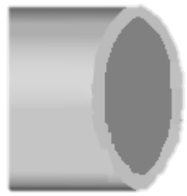
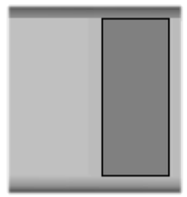
Manhole, Gullies, Inlet and Outlet Creation by Pipe Network Creation Tools

- Please refer to **DC-U 01: Draw Pit Creation by Pipe Network Creation Tools**

Box Culvert and Pipe Modelling

- **Default Metric Pipe Catalog** can be used to form Part List for Box Culvert and Pipe modelling
- Rectangular pipe part families can be used for box culvert modelling
- Circular pipe part families can be used for pipe modelling

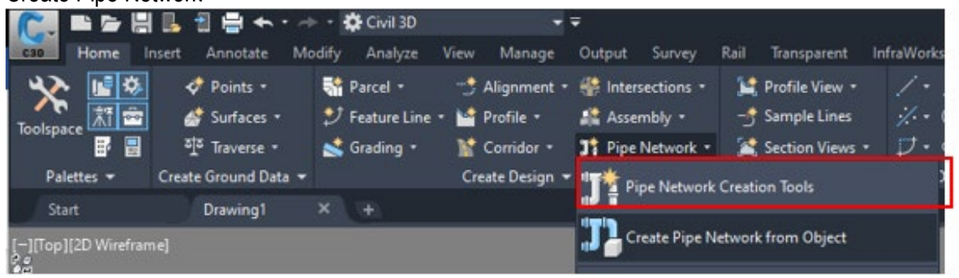
Common Part Families in Default Metric Pipe Catalog

Part Domain:	Part Families:	Part Shape:	Appearance:
Pipes	Concrete Pipe SI	Circular	
	Ductile Iron Pipe SI		
	PVC Pipe SI		
	Concrete Box Culvert SI		
	Rectangular Junction Structure NF SI	Rectangular	

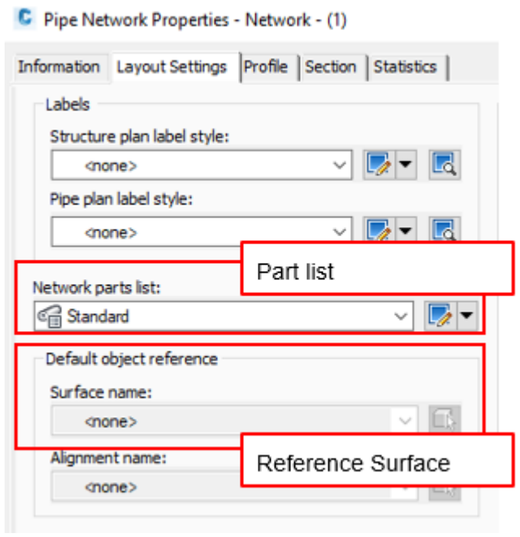
*This graph only shows the part family in default Metric Pipe Catalog that commonly used. Customized size can be set up by using **Part Builder**.

Box Culvert and Pipe Creation by Pipe Network Creation Tools

- Create Pipe Network



- Apply part list prepared and reference surface in the pipe network



- Add box culvert and pipe by network layout tools, choose Pipe Only



DC-U 03 Pressure Networks for Gas Main

Information Requirement

Common Parameter for Gas Main Modelling

- Properties of the gas main can be set in Pressure Pipe Properties

Pressure Pipe Properties

Parameter:	Purpose
Reference Surface	Specify the reference surface to control the depth of the pressure pipe
Start Pipe Invert Elevation	Specify the invert level of the pressure pipe connecting to the start part
End Pipe Invert Elevation	Specify the invert level of the pressure pipe connecting to the end part
Start Outside Crown Elevation	Specify the invert level of the pressure pipe connecting to the end part
End Outside Crown Elevation	Specify the invert level of the pressure pipe connecting to the end part
2D Length	Display the length of the pressure pipe in plan view
3D Length	Display the length of the pressure pipe in 3D view
Slope	Display the percentage slope of the pipe
Start Part	Display the part that the pressure pipe connected to in the start of the pipe
End Part	Display the part that the pressure pipe connected to in the end of the pipe

Model Authoring

Key Steps

Create Pressure Network Part List for Gas Main Modelling

↓

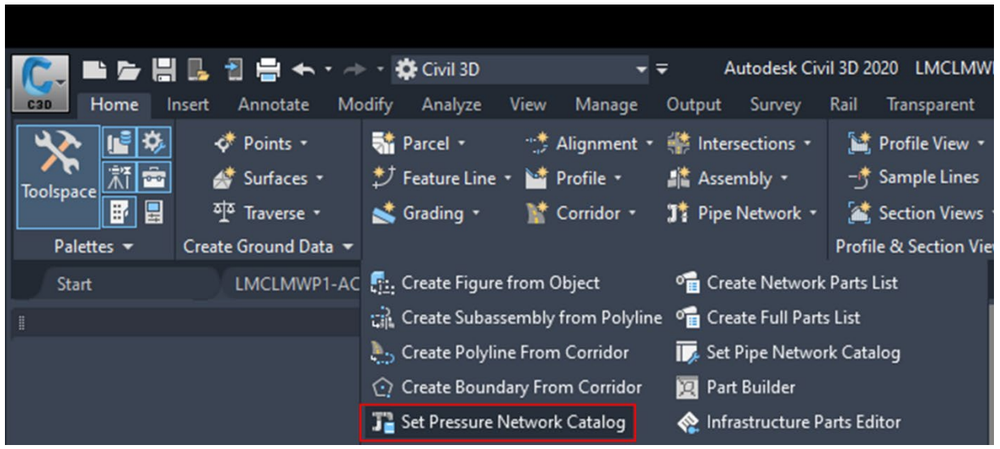
Create Gas Main by Pressure Network Creation Tools

↓

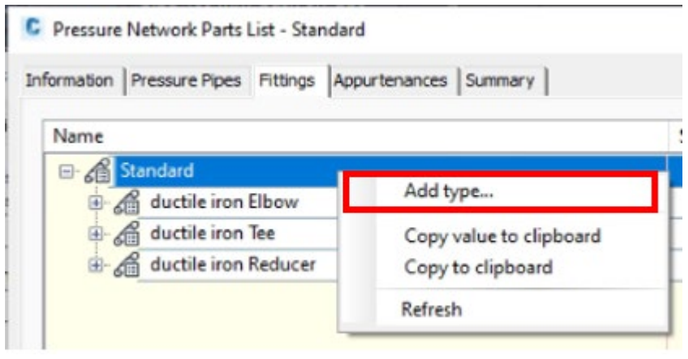
Adjust the Gas Main Elevation in Profile View

Create Pressure Network Part List for Gas Main

- Pressure Network Catalog shall be set before creating the Part List for gas main modelling
- The default pressure network catalog contain a wide variety of pressure network parts. Parts in a catalog can include pipes, fittings (such as bends and tees joints), and appurtenances (such as valves)
- Set Pressure Network Catalog in the model



- Add the part families in the pressure network catalog into the part list



Common part families in default Pressure Network Catalog Databases Catalog:

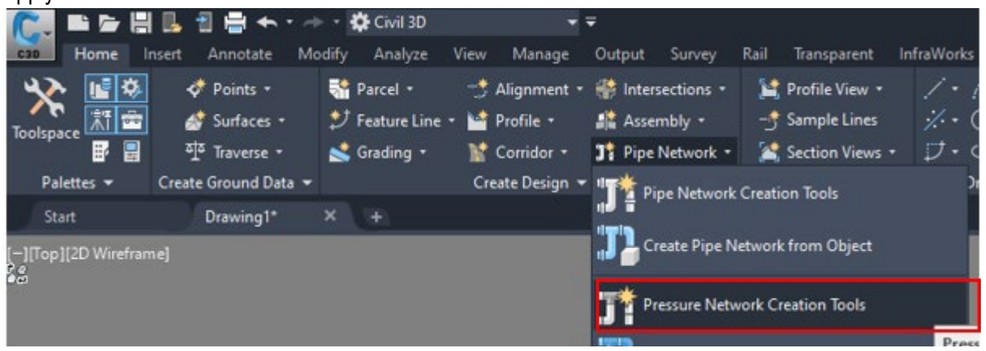
Metric_AWWA_PushOn

Part:	Part Families:	Purpose:	Size:
Pressure Pipes	ductile iron	For Gas Main pipes production	Dia. 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1200, 1500, 1600 (mm)
Fittings	ductile iron Elbow	For joints production between pressure pipes	Turning degree 11.25°, 22.5°, 45°, 90° Dia. 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1200, 1500, 1600 (mm)
	ductile iron Tee		100x80, 100x100, 150x80, 150x100, 150x150, 200x80, 200x100, 200x200, 250x80, 250x100, 250x150, 250x200, 250x250, 300x100, 300x150, 300x200, 300x300, 350x100, 350x150, 350x200, 350x300, 350x350, 400x200, 400x250, 400x300, 400x350, 400x400, 450x100, 450x150, 450x200, 450x250, 450x300, 450x350, 450x400, 450x450, 500x100, 500x150, 500x200, 500x250, 500x300, 500x350, 500x400, 500x450, 500x500, 600x100, 600x150, 600x200, 600x250, 600x300, 600x350, 600x400, 600x450, 600x500, 600x600, 700x100, 700x150, 700x200, 700x300, 700x400, 700x500, 700x600, 700x700, 800x100, 800x150, 800x200, 800x300, 800x400, 800x500, 800x600, 800x700, 800x800, 900x100, 900x150, 900x200, 900x300, 900x400, 900x500, 900x600, 900x700, 900x800, 900x900, 1000x100, 1000x150, 1000x200, 1000x300, 1000x400, 1000x500, 1000x600, 1000x700, 1000x800, 1000x900, 1000x1000, 1200x100, 1200x150, 1200x200, 1200x300, 1200x400, 1200x500, 1200x600, 1200x700, 1200x800, 1200x900, 1200x1000, 1200x1200, 1400x100, 1400x200, 1400x400, 1400x600, 1400x800, 1400x1000, 1600x100, 1600x200, 1600x400, 1600x600, 1600x800, 1600x1000, 1600x1200, 1600x1400, 1600x1600 (mm dia. of pressure pipe x mm dia. of perpendicular pressure pipe)
Appurtenances	gate valve-push on-ductile iron-16 bar	for gate valves production	Dia. 100, 150, 200, 250, 300 (mm)

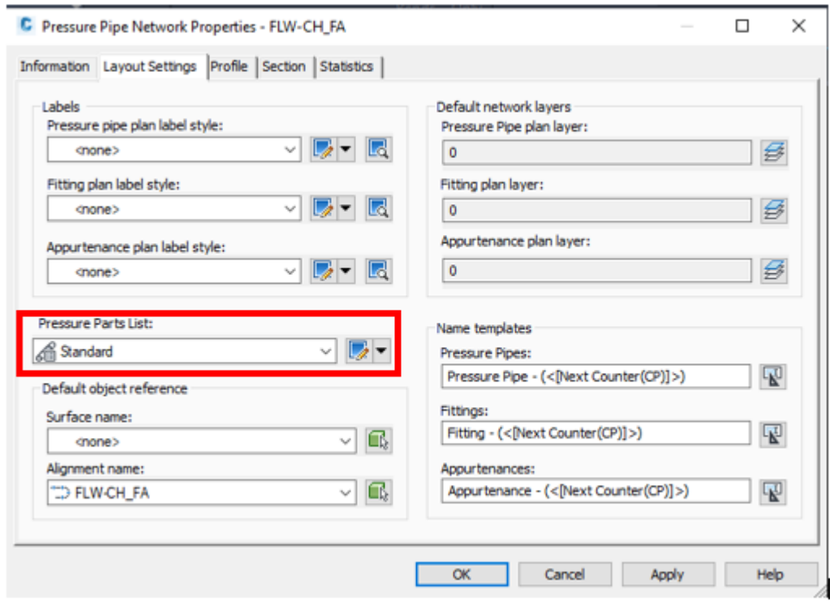
Gas Main Modelling

Create Gas Main by Pressure Network Creation Tools

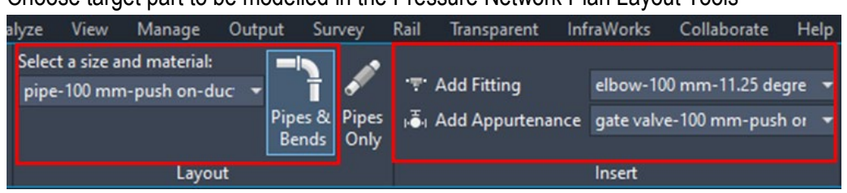
- Apply Pressure Network Creation Tools to create water main



- Set reference surface for the network before modelling

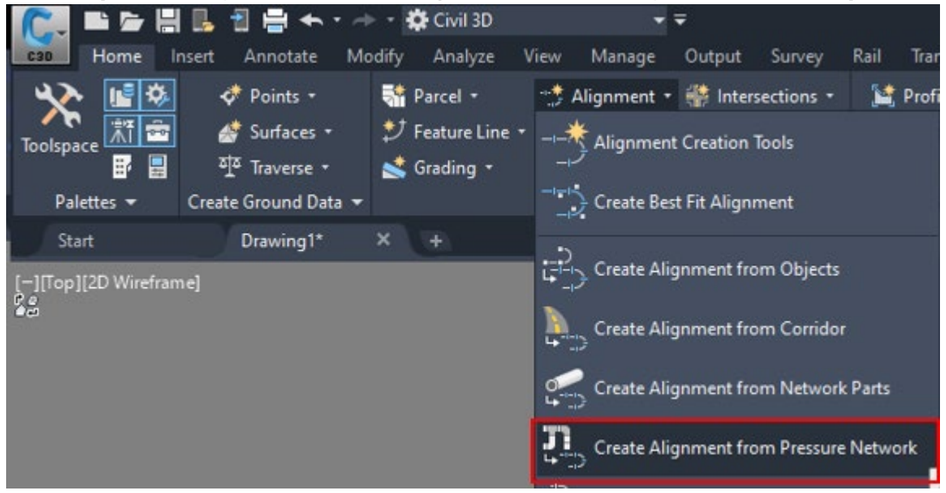


- Choose target part to be modelled in the Pressure Network Plan Layout Tools

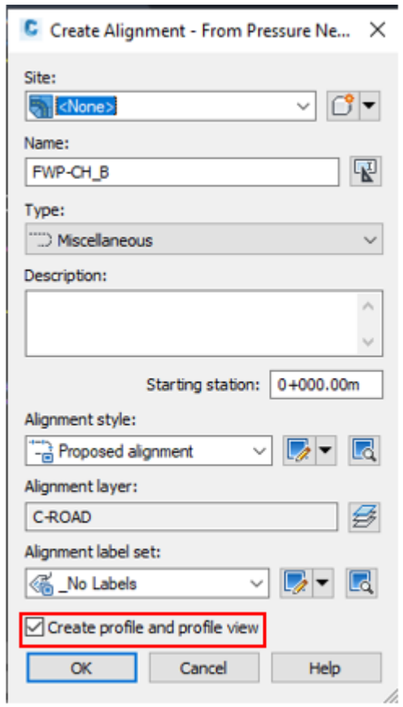


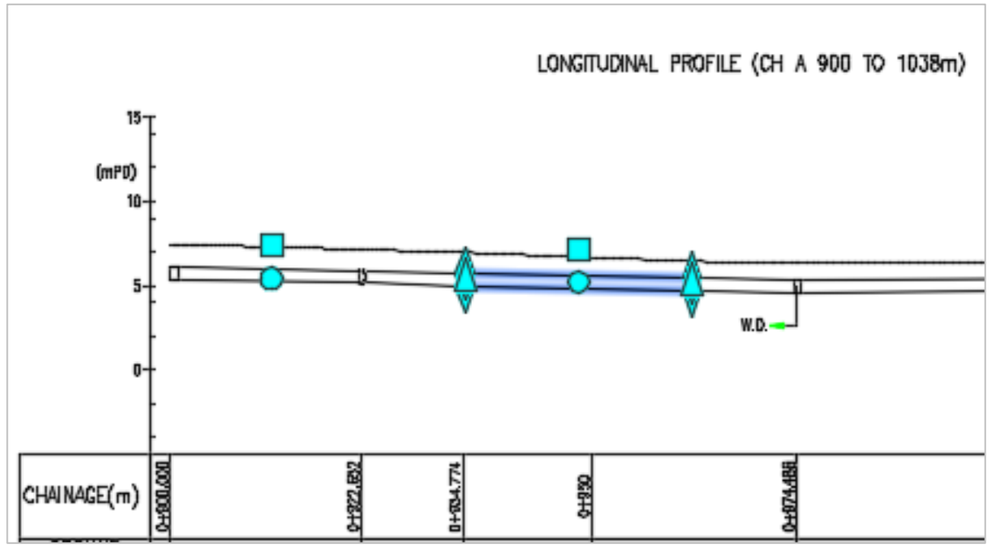
Adjust the Gas Main Elevation in Profile View

- Create alignment from pressure network to adjust the network in the profile view of the alignment



The alignment created can stick to the centreline of the pressure pipes no matter their position are changed



- Adjust the elevation of the gas main in profile view
- 

- The pressure network can be modified by editing the alignment horizontally and the profile view vertically

DC-U 04 Pressure Networks for Water Main

Information Requirement

Common Parameter for Water Main

Pressure Pipe Properties

- Please refer to **DC-U 03 – Essential Parameter – Common Parameter for Gas Main**

Common Parameter for Longitudinal Profile of Water Main

- Profile view setting is not just essential in elevation adjustment for water main, but also in longitudinal profile drawing production
- Profile view format can be set in Profile View Properties

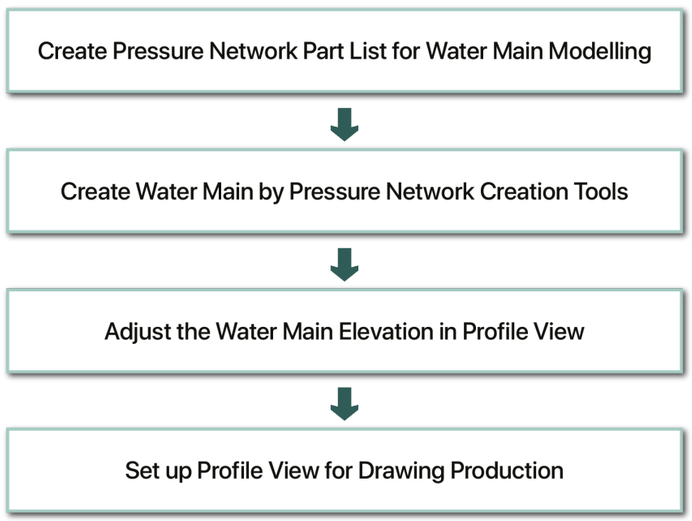
Profile View Properties

Tab:	Purpose:	Parameter:	Description:
Information	View or edit the profile view name, description, and object style	Name	Define the name of the alignment
		Description	Allow users to remark
		Object style	Specify the display style of the profile view
Stations	Set the range of stations displayed in the profile view	Automatic station range	Display all station range of the alignment in profile view
		User specified range	Define the start and end station range of the alignment to be displayed in the profile view
Elevations	Set the range of elevations displayed in the profile view. If the profile view is split, you can use this tab to specify the stations and styles for the split segments	Automatic height	Display all elevation range of the alignment in profile view
		User specified height	Define the minimum and maximum elevation range of the alignment to be displayed in the profile view
Profiles	Specify which profiles to display in the profile view	Description	Allow users to remark
		Update mode	Specify if the profile is updated automatically (dynamic) or manually (static)
		Layer	Specify the layer of the profile
		Style	Specify the display style of the profile
		Station Start	View the start station of the profile
		Station End	View the end station of the profile
		Elevation Minimum	View the min. elevation of the profile

Tab:	Purpose:	Parameter:	Description:
		Elevation Maximum	View the max. elevation of the profile
Bands	Specify which data bands to include in the profile view and whether they are placed along the top or bottom of the grid	Band type	Specify the type of data to be shown in the band
		Select band style	Specify the display style of the band
Hatch	Specify the style and location of hatching between surfaces, which shows cut regions and fill regions in the vertical design	Hatch area	View the upper and lower boundary for hatching
		Profile	Specify the upper and lower boundary for hatching
		Shape style	Specify the hatching style
Pipe Networks	Specify which pipes or structures to display in the profile view as well as their styles, style overrides, and layer placement. The Pipe Networks tab is displayed only when there is one or more pipe networks in the drawing	Name	View the name of the part
		Draw	Specify if the corresponding part shall be drawn in the model
		Description	View the description of the part
		Layer	Specify the layer of the part
		Style	Specify the display style of the part
Projections	Specify objects from plan view to project into the profile view, including AutoCAD objects and Autodesk Civil 3D objects		

Model Authoring

Key Steps



Create Pressure Network Part List for Water Main Modelling

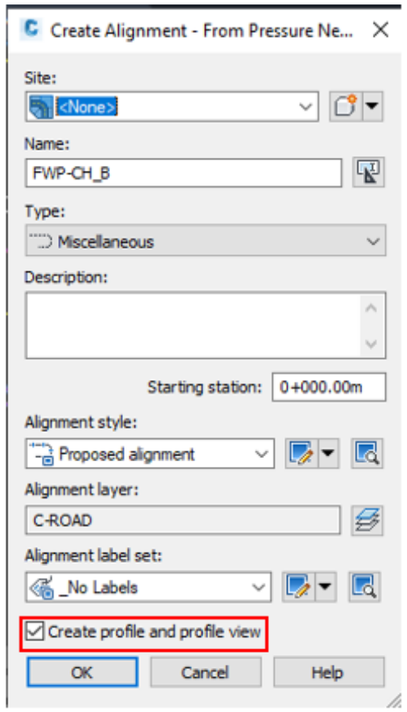
- Please refer to **DC-U 03 – Modelling - Create Pressure Network Part List for Gas Main Modelling**

Water Main Modelling

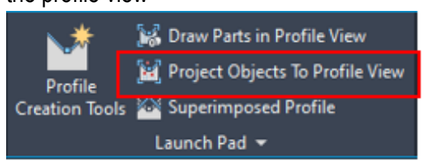
- Please refer to **DC-U 03 – Modelling – Gas Main Modelling**

Profile View Setting

- Set the style of the profile view and band set in **Profile View Properties** needed that show the information like chainage, elevation of ground level, invert level, etc.
- Create referenced surface profile in the profile view during the creation of the profile view
- By using **"Create Alignment From Pressure Network"** command, parts in pressure network will be created into the profile view automatically if **"Create Profile And Profile View"** option is ticked



- **"Project Objects To Profile View"** command can be also used for adding the pressure network parts into the profile view



D4.16 Drainage and Sewage SAM

The objective of this section is to assist model authors in preparing Revit models for tender submission. It describes the standard approach to modelling in Drainage and Sewage discipline and the step-by-step workflow / guide with Revit to apply them into the project.

All MEP disciplines are regarded as Systems in Revit. To retrieve appropriate information of the systems and elements, Systems for different discipline services shall be well prepared before modelling. This guide will cover pipework and relative appliances modelling. Refer **D5** Presentation Style for preparing drawing production.

DM-D 01 Pipework

The setting and modelling on pipe system in Drainage discipline is similar to Plumbing discipline. Refer to **D4.8** Water Services SAM.

Piping System (Sub-Category) Table

Sub-category	Functional type	Functional Type (short form)
Sanitary	Waste Pipe	WP
Vent	Vent Pipe	VP

Standard filter for different pipe systems on plan view and 3D view**.**

System type	Preferred colour		RGB Colour System
Waste Pipe (WP)	CYAN		000, 255, 255
Vent Pipe (VP)	CYAN		000, 255, 255

DM-D 02 Drainage Equipment

Information Requirement

Parameter	Type / Instance	Description	Schedule
Family	Type		Y
Type	Instance		Y
Cover Level	Instance		Y
Invert Level	Instance		Y
Depth	Type		Y
Length	Type		Y
Width	Type		Y
Other information	Instance	Description of fixture and equipment for tagging	Y

All required specifications of electrical components in equipment schedule shall be built in the family as Information Requirements accordingly.

Model Authoring

- Drainage plan including pipeworks, fixture and equipment shall be created under Drainage and Sewage discipline.
- Some of the equipment is built as site component in the family, such as Manhole. Then, you may add it through the Structure view or create a new family under a suitable category.
- The modelling requirements of equipment are similar to that of Plumbing Fixture. Refer to Section **DM-P 02** Add Plumbing Fixture under **D4.8** Water Services SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to **D4.9 DM-M 02** Add Mechanical Equipment.

D4.17 Information Extraction SAM

This section aims at providing general guidance on how to make use of Revit built-in scheduling functions for information extraction from the project models. Revit schedule can be useful for designers, contractors and quantity surveyors to review and evaluate the design and the models in terms of information / parameter, and to facilitate BIM QTO process.

Current HA scope for BIM Quantity Take-off (QTO) items is listed in **ANN-1.4 in ANN-1 of HABIMSG Annex**.

Although this Guide does not limit PQS use of other software for model information extraction, the techniques covered in this section shall be applicable for both designers and PQS to review the information. Extra attention shall therefore be paid to model elements fall into the scope of HA BIM QTO as listed in **ANN-1.4 in ANN-1 of HABIMSG Annex**.

When extracting information from the BIM models following the related Level 3 BIM Workflows under **Section Q3-02.7,** following principles shall also be noted:-

- BIM QTO process may be facilitated by using Revit Schedules for information extraction. After Revit Schedules are prepared, PQS may extract information in the schedules by exporting the data as text file for further data handling in other software, such as Excel.
- All necessary and required parameters, i.e. information, are tabulated in "**Information Requirement**" of corresponding model categories under **D4. Standard Approach of Modelling (SAM).**

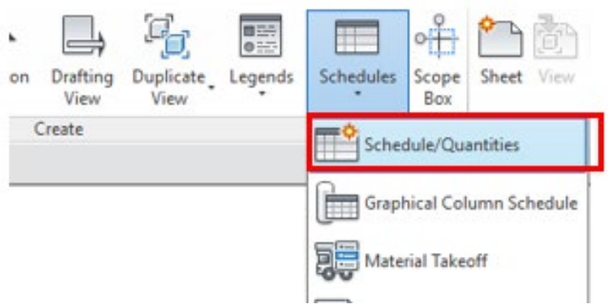
Information Requirement

- While such information may not directly fulfil the QTO purposes as required by PQS, some calculation process might be needed for making use of the information to achieve their professional deliverables.

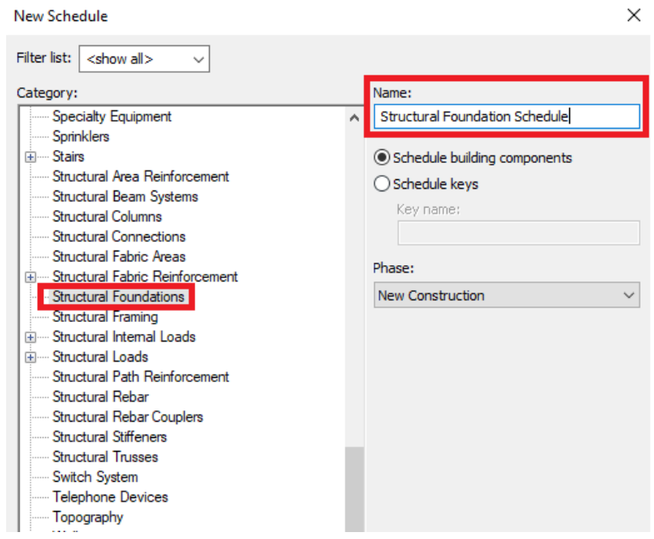
This section introduces the common techniques in Revit scheduling. The methodology below describes key steps of creating and manipulating Revit Schedules to extract parameter value. Certain model categories are used as examples for illustration, but the same methodology shall also be applicable to other model categories.

Create Revit Schedule for Information Extraction

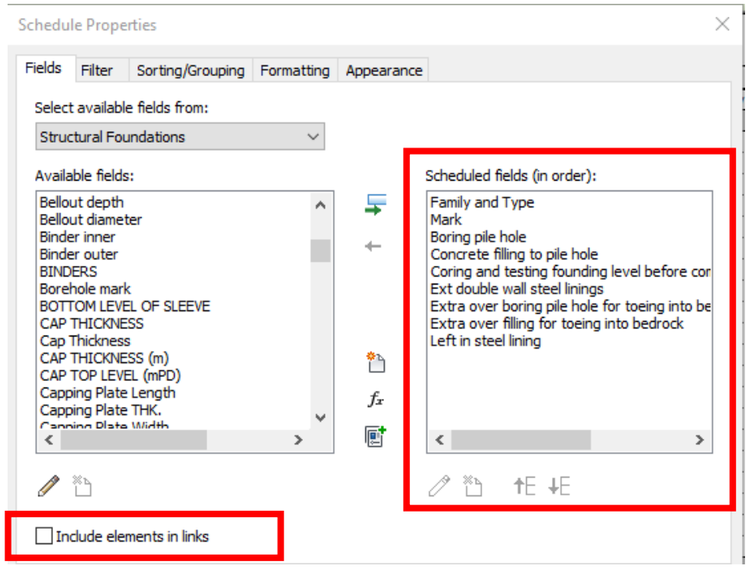
i. Click "Schedule/ Quantities"



ii. Create Revit Schedule of a selected Revit Category (for example of Structural Foundation)

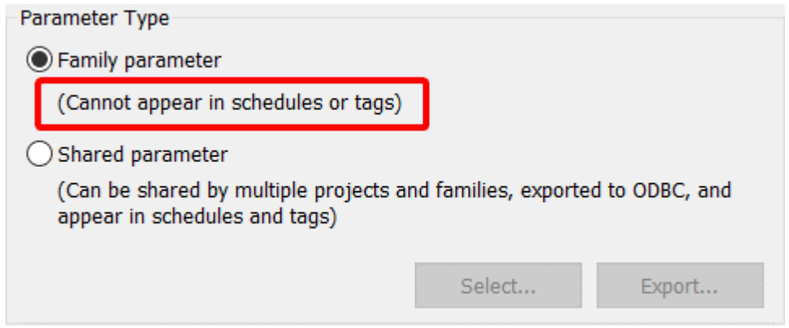


iii. Select and add the appropriate fields into "Scheduled fields" with the order
The example of schedule setting for Bored Pile is shown below.



Check "Include elements in links" if linked model is needed for information extraction.

Remark: Be aware that Family parameter (parameter created within Family file) cannot appear in schedules. Shared parameter or project parameter should be used if the parameter is required to appear in schedules.

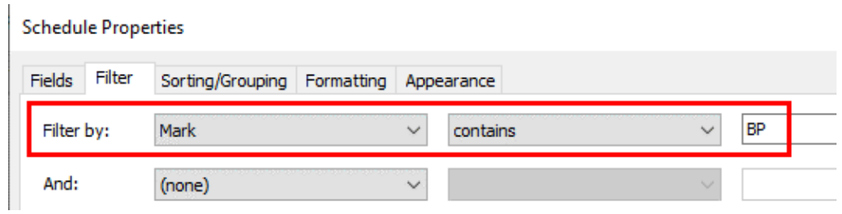


1.3c

For HA QTO enabled families, the QTO parameters are prepared by Shared Parameters. It is required to assign the same Shared Parameters with correct name and type from HA Shared Parameter Lists to the constraints. Otherwise, the pre-set schedule and formula may not retrieve the correct data from the family.

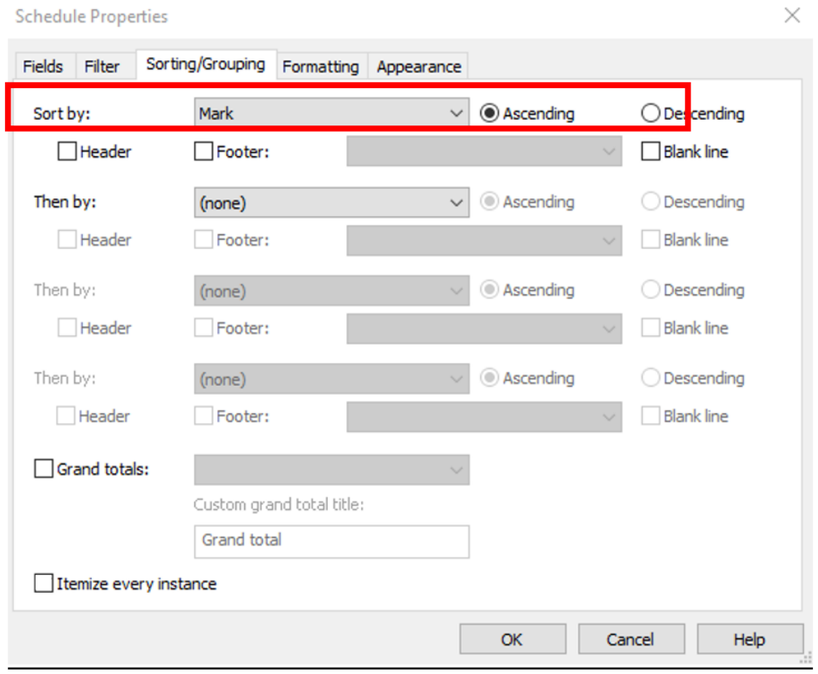
Implications refer to Shared Parameter under section **D4.18 Family Library Component FL-03 Parameters**.

iv. Filter the model elements by project needs
By adding other parameters as additional fields, "Filter" of information could help to deliver organized result and turn off unwanted result.



v. Sort or group the model elements by project needs

The suggested setting of "Sorting/ Grouping" are summarized below, It is optional to check "Itemize every instance" which depends on the information are needed by item or group.



Showing **grouped** caps and footings by element types ("Itemize every instance" is disabled)

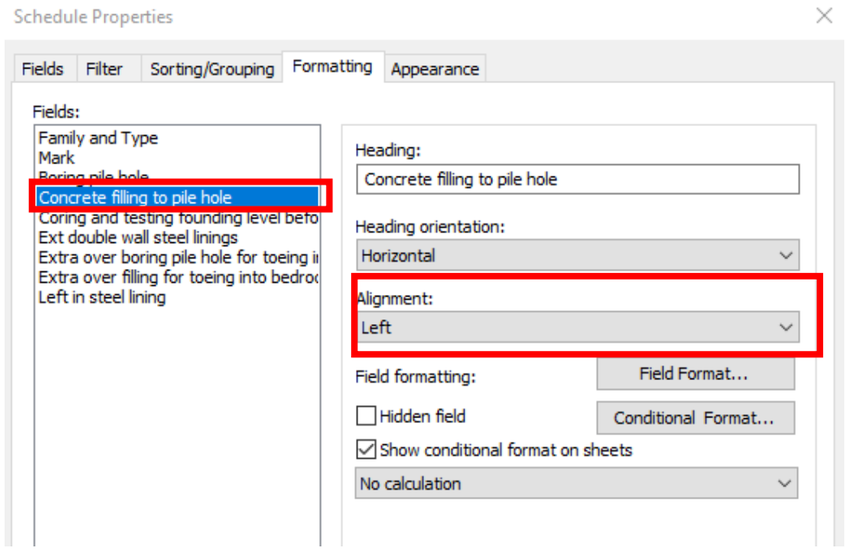
A	B	C	D	E
Family and Type	Structural Material	Foundation Thick	Volume	Count
Reinforced Concrete - C35				
Foundation Slab: SFD-HAS-C35-4650mm	Reinforced Concrete - C35	4650	785.27 m³	1
Foundation Slab: SFD-HAS-C35-4650mm	Reinforced Concrete - C35	4650	785.27 m³	1
Foundation Slab: SFD-HAS-C35-4650mm	Reinforced Concrete - C35	4650	785.27 m³	1
Reinforced Concrete - C40				
Foundation Slab: SFD-HAS-C40-1500mm	Reinforced Concrete - C40	1500	244.51 m³	1

vi. Formatting of information shown in the fields

"Formatting" can control the display of text, unit or calculate totals

Controlling the unit of a field

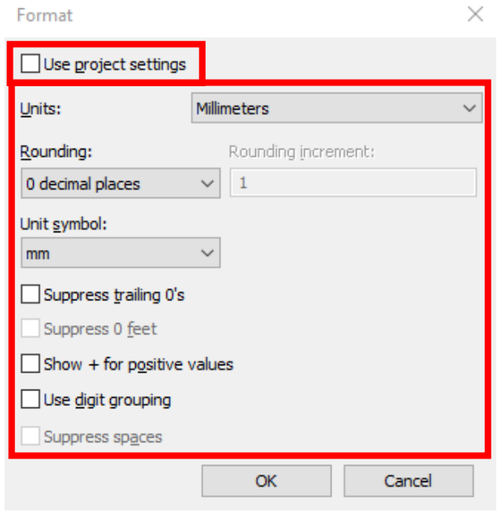
Take "Bored Pile" as example, select "Field Format", a dialog box for controlling format will pop up.



By default, all fields will "use project settings" and the default format of units of some common fields are tabulated below.

Format	Length	Area	Volume
Default project unit (Default symbol)	Millimeter (Unit symbol not shown)	Meter square (m^2)	Meter cube (m^3)

Unchecking "Use project settings" if opt to not use the default project settings, the units (e.g. mm, m, km for length), rounding of units and the unit symbol can be selected by purpose.

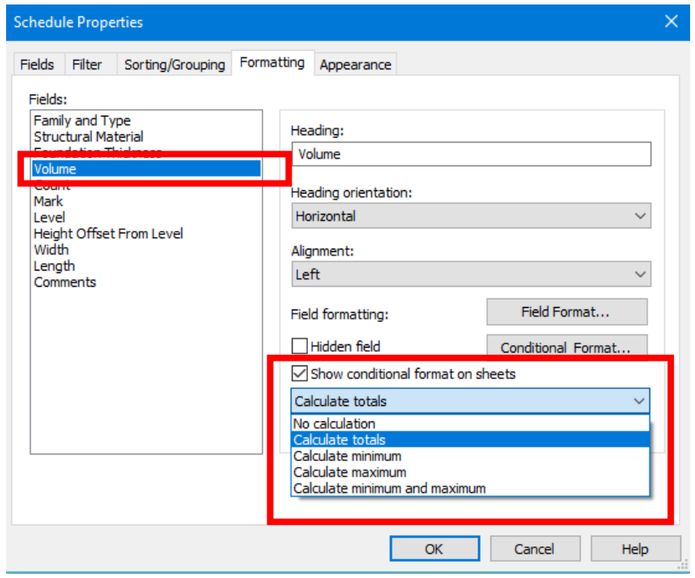


In the sample below, The format of field "Concrete filing to pile hole" is customized with selecting "mm" for Unit symbol. As you may see the values under "Boring pile hole" are without unit.

A	B	C	D
Family and Type	Mark	Boring pile hole	Concrete filling to pile hole
SFD-FPL-HAS-Bored_Pile_QS PS2	BP01	18036	16036 mm
SFD-FPL-HAS-Bored_Pile_QS PS2	BP02	18407	16407 mm
SFD-FPL-HAS-Bored_Pile_QS PS2	BP03	17965	15965 mm
SFD-FPL-HAS-Bored_Pile_QS PS2	BP04	18759	16759 mm
SFD-FPL-HAS-Bored_Pile_QS PS2	BP05	16043	14043 mm
SFD-FPL-HAS-Bored_Pile_QS PS2	BP06	15006	13006 mm
SFD-FPL-HAS-Bored_Pile_QS PS2	BP07	15446	13446 mm
SFD-FPL-HAS-Bored_Pile_QS PS2	BP08	18637	16637 mm
SFD-FPL-HAS-Bored_Pile_QS PS2	BP09	16071	14071 mm
SFD-FPL-HAS-Bored_Pile_QS PS2	BP10	15050	13050 mm

"Calculate totals" for fields

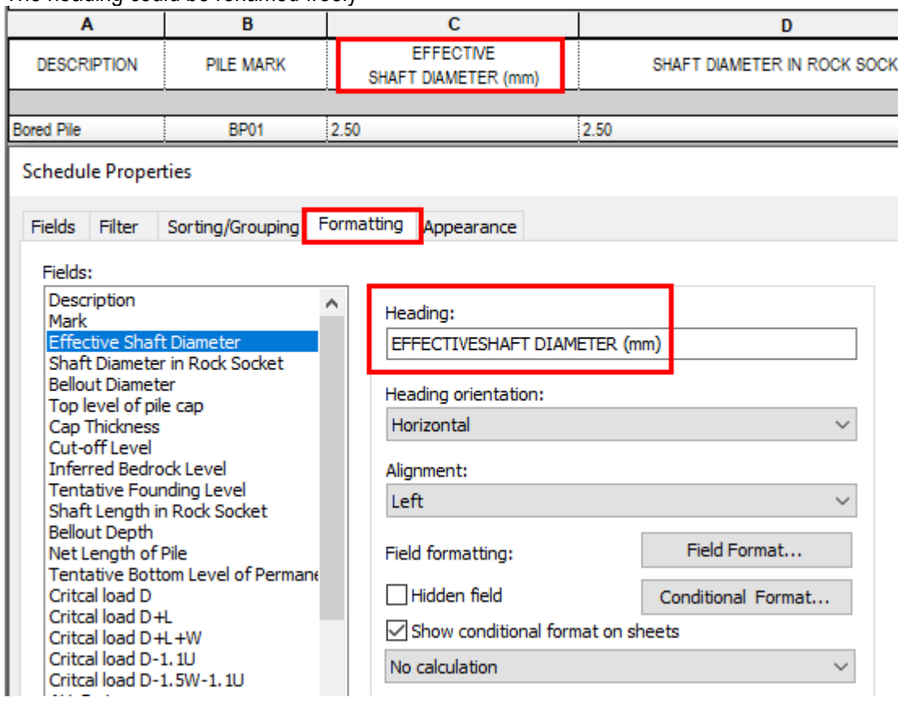
Take "Structural Foundation" as example, select "Calculate totals" to display the totals of concrete volume.



A	B	C	D
Family and Type	Structural Material	Volume	Count
SFM-CCB-HAS-Rectangular: B2000X1000			
SFM-CCB-HAS-Rectangular: B2000X1000	Reinforced Concrete - C40	13.95 m³	1
		13.95 m³	1
SFM-CCB-HAS-Rectangular: B1500X1250			
SFM-CCB-HAS-Rectangular: B1500X1250	Reinforced Concrete - C40	1.63 m³	1
		1.63 m³	1
SFM-CCB-HAS-Rectangular: B1500X1000			
SFM-CCB-HAS-Rectangular: B1500X1000	Reinforced Concrete - C40	90.54 m³	8
		90.54 m³	8
SFM-CCB-HAS-Rectangular: B1000X800			
SFM-CCB-HAS-Rectangular: B1000X800	Reinforced Concrete - C40	118.31 m³	25
		118.31 m³	25
		366.64 m³	72

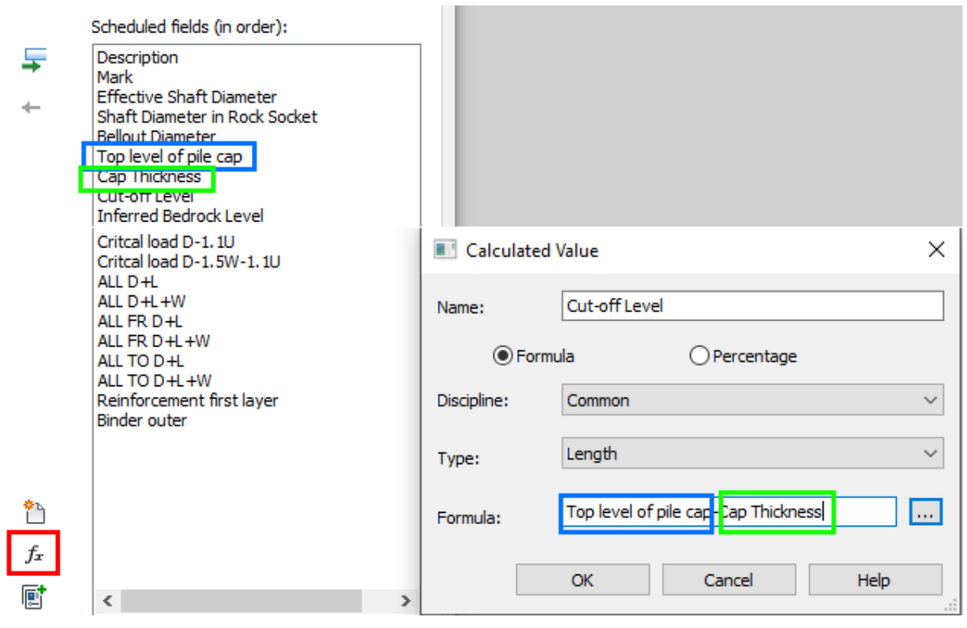
Rename the heading for scheduled field

The heading could be renamed freely



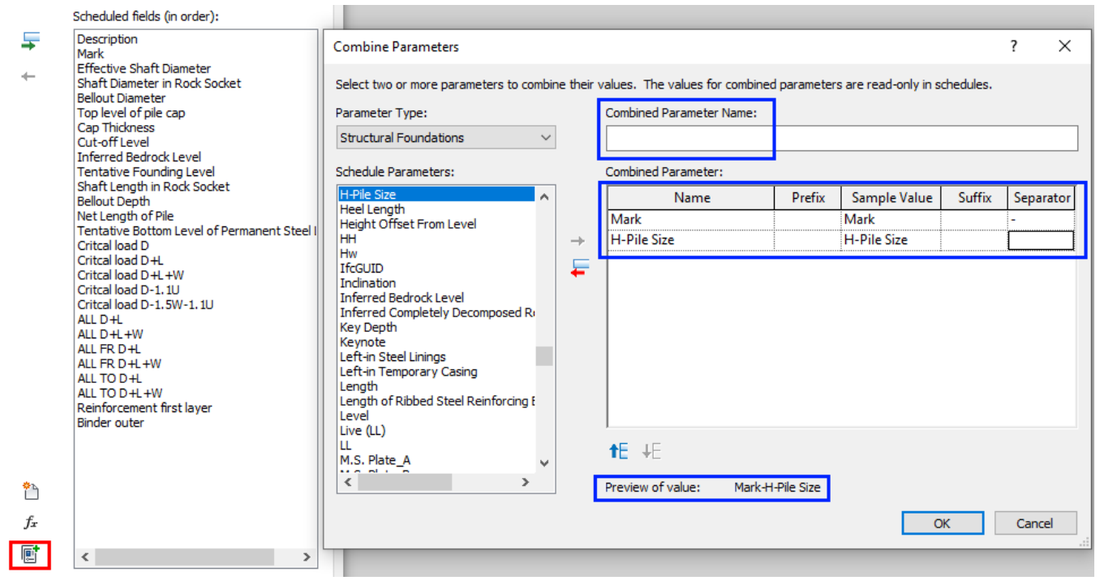
vii. Create calculated value

If there is no pre-set parameter to do the calculation, it is acceptable to create a tentative “calculated value” by writing a formula using the selected parameters in the scheduled fields. However, the result could not be used for annotation. Furthermore, if the formula is essential for multiple families and projects, it is recommended to prepare within the families ahead.



viii. Create combined parameter

If it is required to string the parameter value together as a new data, users could create a combined parameter with prefix, suffix and separator setting. However, the result could not be used for annotation.



D4.18 Family Library Component

A family is a group of elements with a common set of properties, called parameters, and a related graphical representation.

When an element is created in a project with a specific family and family type, an instance of the element is used. Each element instance has a set of properties, in which some element parameters are independent of the family type parameters. These changes apply only to the instance of the element, the single element in the project. Any change in the family type parameters applies to all element instances created with that type.

There are 3 kinds of families in Revit: System Families, Loadable Families, and In-place Families.

The most commonly used elements in the projects are system families and loadable families. Loadable families can be combined to create nested and shared families. Non-standard or custom elements are created using in-place families.

FL-01 System Family

System families contain family types for basic building elements such as walls, floors, ceilings, and stairs in the building models. System families also include project and system settings, which affect the project environment and include types for elements such as levels, grids, sheets, and viewports.

System families are predefined and saved in templates and projects, not loaded into templates and projects from external files. They can be duplicated and then modified within the template and project files.

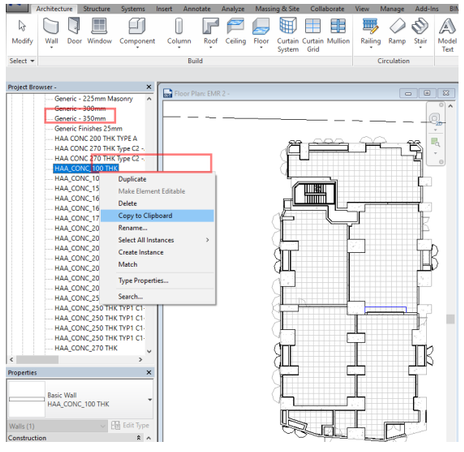
Follow this workflow to determine whether the existing system family types can be adopted.

- Determine the system family types required.
- Identify whether system family types needed is in Revit templates or the HA templates.
- If a family is appropriate but not the specific type, create a new type.
- If a system family type is similar to the needed family type, modify it.
- If suitable system family type is not available, create a new family type.

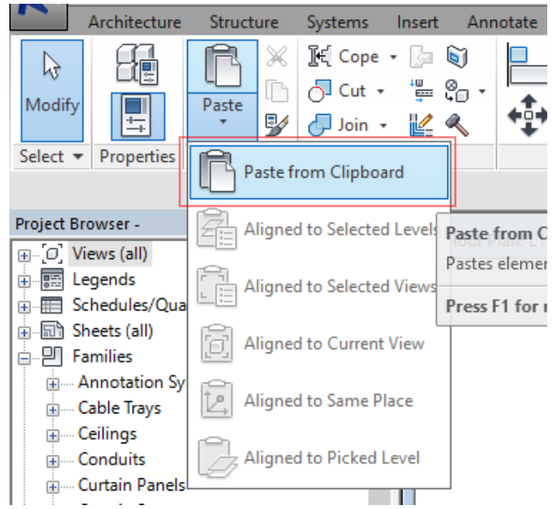
Because system families are predefined in Revit, you can only load system family types in projects or templates.

To load system family types:

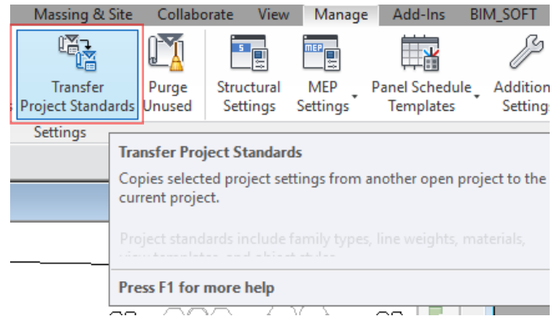
- Copy one or more selected types from one project



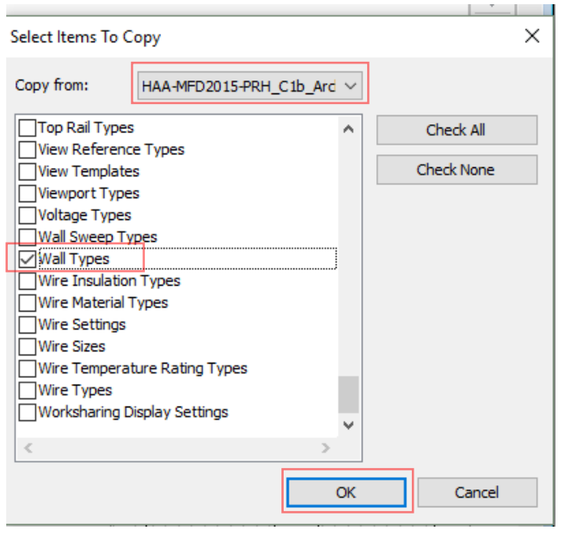
- Paste to another project



- Transfer all system family types of a selected system family from one project to another



- This is recommended and effective if multiple system families need to be transferred.



FL-02 Loadable Family Components

Unlike system families, loadable families are created in external RFA files and imported in the projects.

Loadable families are commonly used to create the following:

- Building components that would usually be purchased, delivered, and installed in and around a building, such as windows, doors, casework, fixtures, furniture, and planting
- System components that would usually be purchased, delivered, and installed in and around a building, such as boilers, water heaters, air handlers, and plumbing fixtures
- Some annotation elements that are routinely customized, such as symbols and title blocks

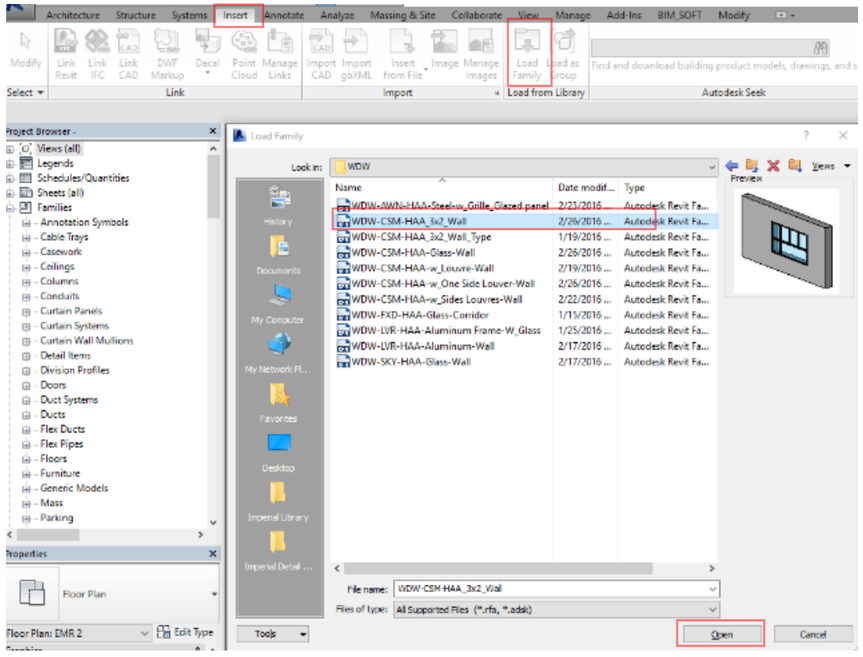
Follow this workflow to determine whether the existing families can be adopted. Loadable families are the most extensive and customizable families in Revit. Families can be customized for projects while a number of families are ready for use in the Revit family library.

- Determine the family type required for the project.
- Identify whether the loadable family needed is in library, on the Web, in Revit templates, or in the HA templates.
- If a family is appropriate but not the specific type, create a new type.
- If a family is similar to the needed family, modify it.
- If suitable family is not available, create a new family.

To create a loadable family, the geometry and size of the family are defined, using an appropriate family template. The family can be saved as a separate Revit family file (.rfa file) and loaded into any project.

To load family:

- Click Insert tab > Load from Library > Load Family
- Select the family



FL-03 Parameters

Parameters store and communicate information about all elements in a project. They are also used to define and modify elements, as well as to communicate model information in tags and schedules.

Parameters can be customized for a project, and for any element or component category in the project.

Parameters that you create display in the Properties palette or Type Properties dialog under the group you define and with the values you define.

This table describes the types of custom parameters:

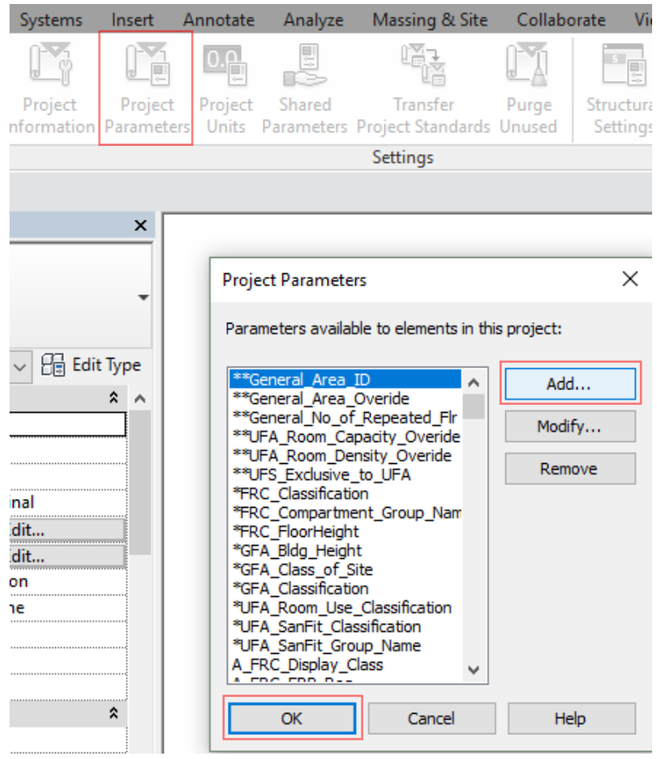
Parameter Type	Description	Examples
Project Parameter	Project parameters are specific to a single project file. They are added to elements by assigning them to multiple categories of elements, sheets, or views. Project parameters are also used for scheduling, sorting, and filtering in a project.	A project parameter can be used to categorize views within a project.
Family Parameter	Family parameters control variable values of the family, such as dimensions or materials. They are specific to the family. Family parameter can also be used to control a parameter in a nested family by associating the parameter in the host family to the parameter in the nested family.	Family parameters such as Width and Height may be used in a Door family to control the dimensions of the different door types.
Shared Parameter	Shared parameters are parameter definitions that can be used in multiple families or projects. With shared parameter definition added to a family or project, it can be used as a family or project parameter. Since the definition of a shared parameter is stored in a separate file (not in the project or family), it is protected from change. For this reason, shared parameters can be tagged and scheduled.	If a parameter in a family or project needs to be scheduled or tagged, that parameter must be shared and loaded in both the project (or element family) and the tag family. Shared parameters can be used when elements in 2 different families are scheduled together.

Hierarchy of Parameters	
Project Parameter: It contains information defined and added to multiple categories of elements in a project. Project parameter is specific to a single project file and cannot be shared with other projects.	Type Parameter: Parameter that applies to the same group (type) of family.
	Instance Parameter: Parameter that can be customized for each family of the same type used in a project.
Shared Parameter: Parameter that can be used in multiple families or projects. Shared parameters are saved in a text file in a shared area. The project can reference only one shared parameter file at a time.	Type Parameter: ditto
	Instance Parameter: ditto
Family Parameter: Parameter that is specific to one family.	Type Parameter: ditto
	Instance Parameter: ditto

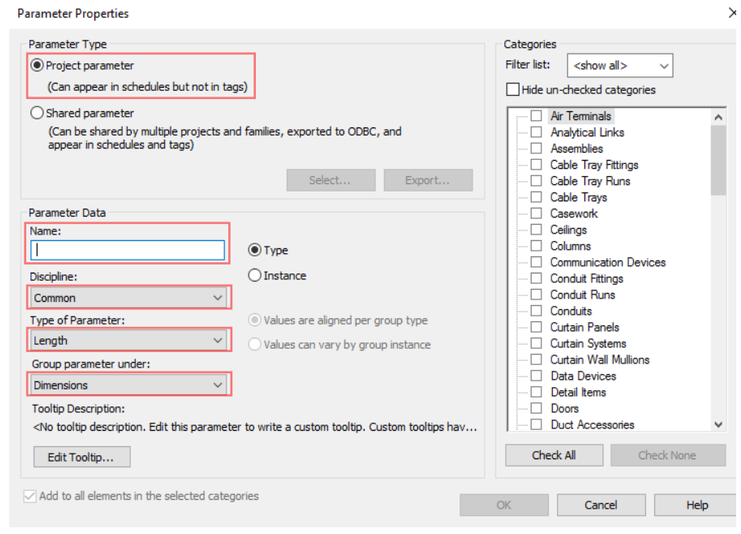
Project Parameter

To add custom information to a system family, project parameters are needed since system families are not loaded into the project.

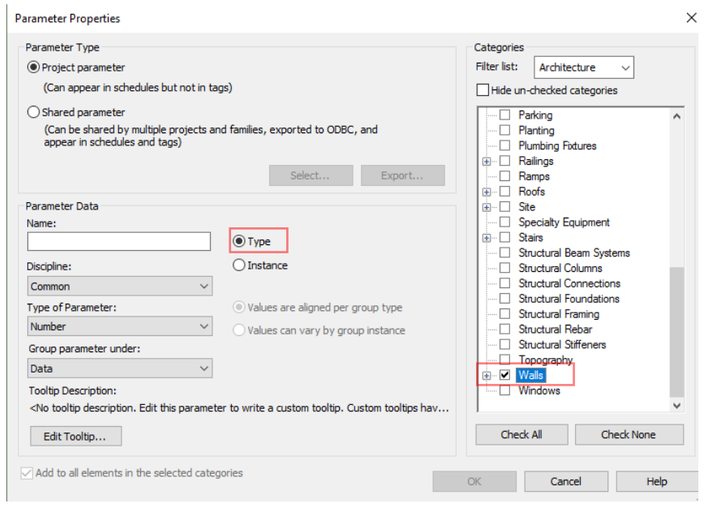
- Add the new Project Parameters in the Project Parameters dialog
- Name the new Project Parameter



- Select the Discipline
- Select the Parameter Type
- Under Group Parameter, select the heading under which the parameter shall display on the Properties palette or in the Type Properties dialog



- Determine whether the parameter is stored by Instance or Type
- Select the element Categories to which this parameter shall be applied

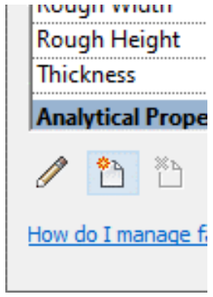


Family Parameter

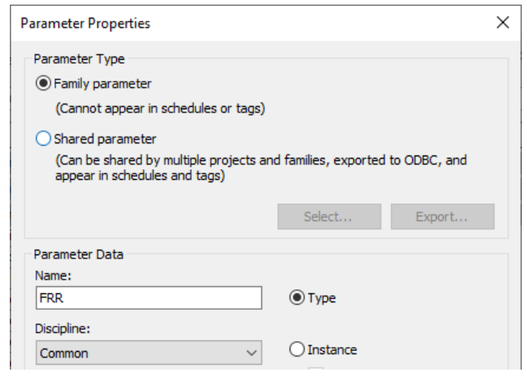
New instance parameters or type parameters for any family type can be created.

By adding new parameters, more control over the information contained in each family instance or type is possible. Dynamic family types for increased flexibility within the model can also be created with the use of family parameters.

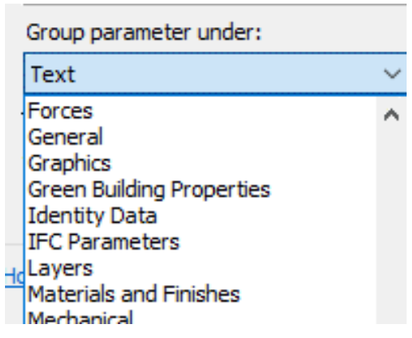
- Click Create tab in the Family Editor > Properties panel > Family Types
- Click Add under Parameters



- In the Parameter Properties dialog, under Parameter Type, select Family Parameter
- Name the new parameter
- Select the Discipline

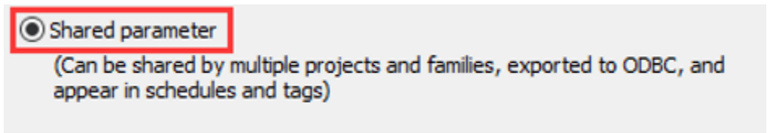


- Select the type of parameter
- Select the value for the Group Parameter, which determines the group header that parameter displays on the Properties palette
- Determine whether the parameter is stored by Instance or Type



Shared Parameter

Shared parameters are parameter definitions that can be used in multiple families or projects. Shared parameter definitions are stored in a text file independent of any family file or Revit project; so that access to the file is possible from different families or projects. However, the information defined in one family or project using the shared parameter will not be automatically applied to another family or project using the same shared parameter.



There are 3 purposes to set up shared parameter:

1. Schedule out the desired shared parameters;
2. Tag out the desired shared parameters' information for drawing production; and
3. Prepare "common" and "general" parameters (e.g., "Width", "Length", "Height", "Depth" etc.) in order to avoid repetitive parameter creations or typo.

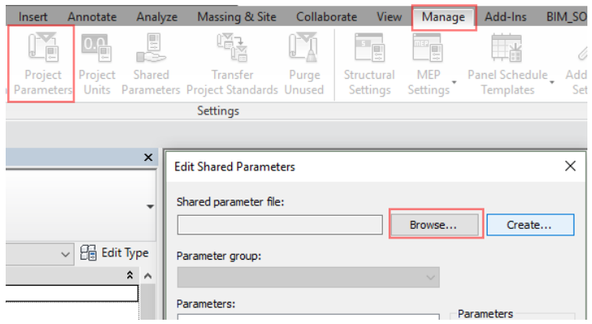
PT's / PSP's / Contractor **must** copy the HA shared parameter lists from the HA Family Library (refer to **Section 2.4** Starting a BIM Project in HABIMSG-Vol.1 Quick Guide) before modelling. The existing parameters in the shared parameter lists shall be made good use for updating and creation of the project specific families and schedules. Project team could further develop the project specific shared parameter list base on existing one.

The project shared parameter list(s) shall be saved to the project-specific location for access by the PT's / PSP's / Contractor's BIM Manager. Each project (even each discipline) shall map the shared parameter list to the Revit projects correctly.

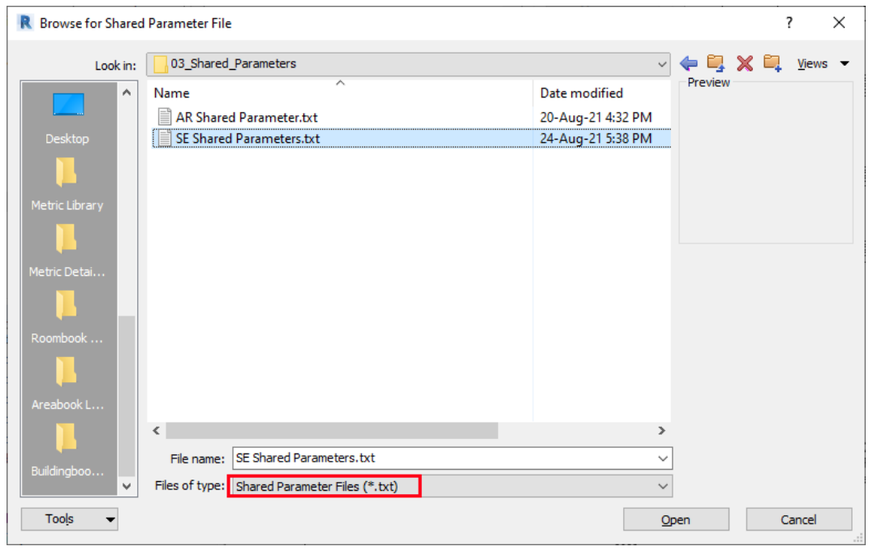
For naming convention of shared parameter, please refer to Parameter Naming in D.MET-3.2 Naming Conventions.

To map shared parameter file:

- Click Manage tab > Settings panel > Shared Parameters
- Click Create in the Edit Shared Parameters dialog

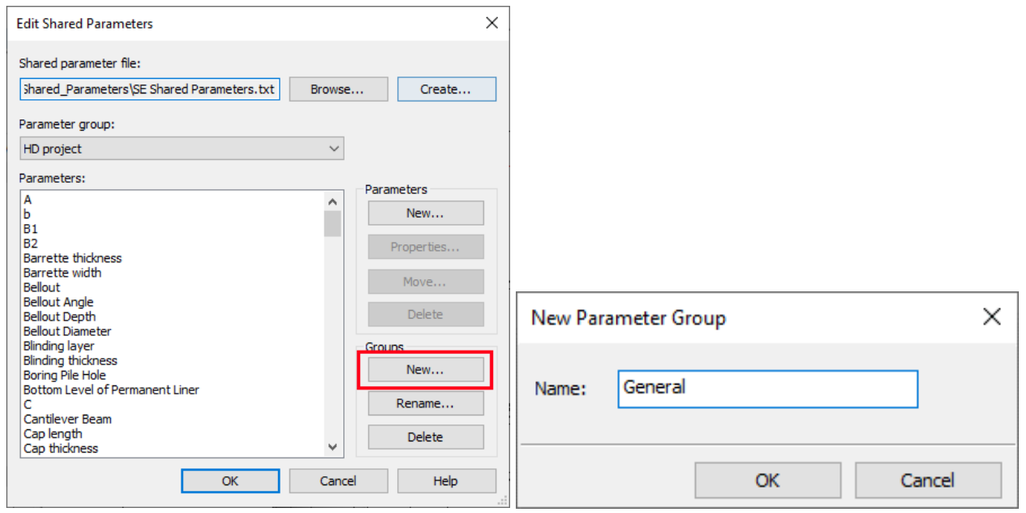


- Open the project-specific location (within the project folder is recommended)
- This shall be protected from change
- The file is to be accessed, edited and managed by the BIM team



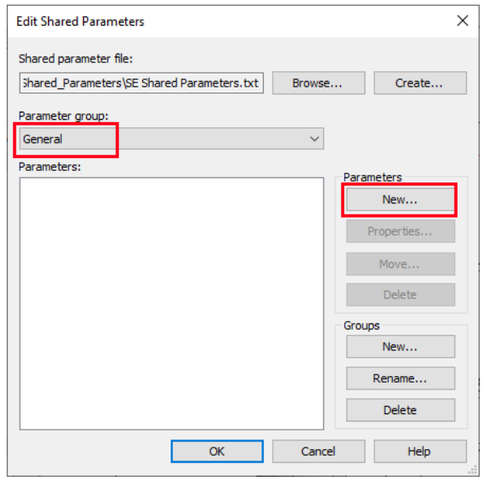
To add parameter group:

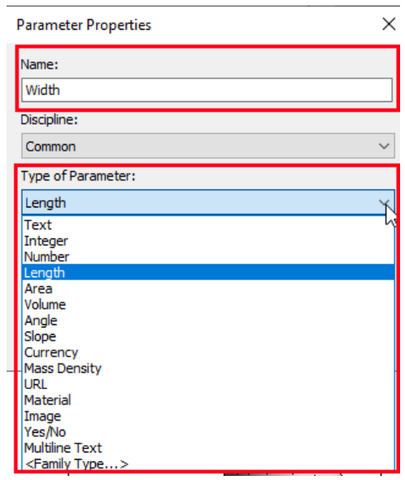
- Add and name the Parameter Group
- It is recommended to have "General" for common and general parameters.



To create new shared parameter:

- Select appropriate Group from the Parameter Group
- Click New in the Parameters Group box
- Enter the Name and Discipline
- Select the Type for the Parameter, which specifies the format of the information available for the parameter value





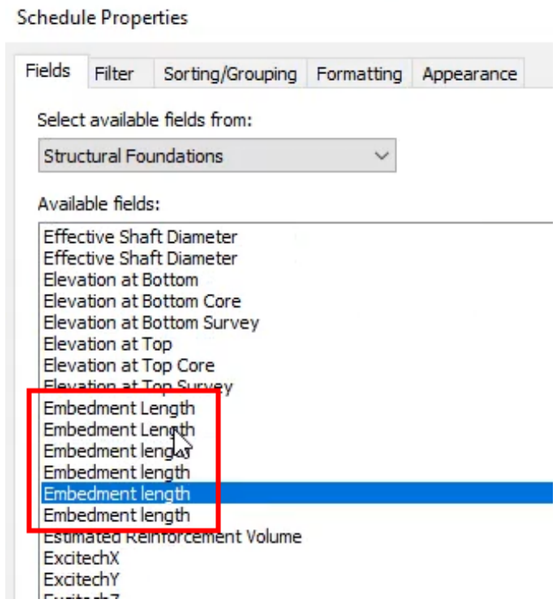
Quantity Take-off

For HA QTO enabled families, the QTO parameters are prepared by Shared Parameters. Therefore the information could be scheduled out and even for drawing annotation.

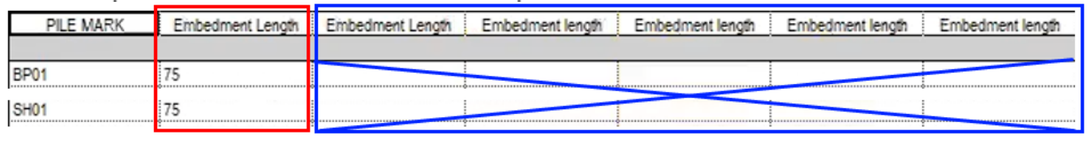
If you need to create a new QTO enabled family, you should refer to “List of Shared Parameters” of your family’s category listed in **D4** Standard Approach of Modelling. Furthermore, assign the same Shared Parameters with correctly name and type from HA Shared Parameter Lists to the constraints. Otherwise, the pre-set schedule and formula may not retrieve the correct data from the family.

Below samples illustrated the differences and impacts of not using the HA shared parameter lists.

Even the “custom” shared parameters with same name and settings, Revit would regard as different parameters (source). It leads a lot of confusion.



Furthermore, the pre-set schedule cannot reflect the data in the blue highlighted shared parameters columns.



PILE MARK	Embedment Length	Embedment Length	Embedment length	Embedment length	Embedment length	Embedment length
BP01	75					
SH01	75					

(HA Library Location refer to Section 2.4 Starting a BIM Project in HABIMSG-Vol.1 Quick Guide.)

FL-04 Design Guidelines

This section is a guideline for users using and creating Family of Revit. The content below follows The FLIP Guideline (Ver.1.0) from Family Library Interchange Program (FLIP). (http://www.aiab.org/index.php/flip-guideline)

Recommended File Size

Efficient geometry creation, judicious use of parametric constraints, and carefully planned detail and visibility settings can reduce the performance impact a Family will have on the projects in which it is used.

For example, a window Family that is intended to be used hundreds of times in a large commercial project will have a smaller file size if it contains only basic schematic and design development representations. The Impact on the project size will be minimised.

Conversely, a different window Family intended for use in a small residential project may contain a high-quality rendering representation that will increase project file size when the Family is added, but because the windows it creates are added to the project only a few times, the increase in file size is manageable.

To provide content creators with a tangible guideline for Family file size, some common Family types and their recommended file sizes are listed below.

Architecture Family:

Simple Level: 200 – 300 KB

Complex Level: 500 – 600 KB

Structure Family:

Simple Level: 180 – 200 KB

Complex Level: 450 KB

MEP Family:

Simple Level: 200 – 400 KB

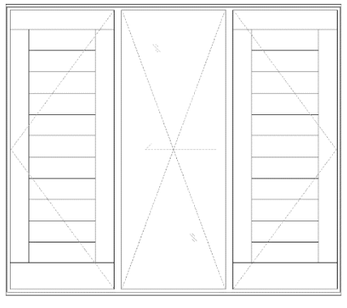
Complex Level: 800 – 1000 KB

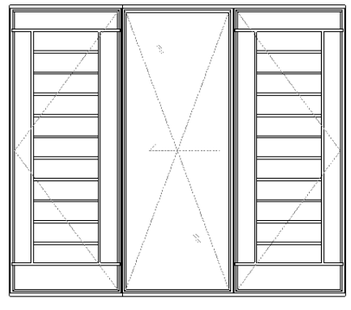
IMPORTANT: To help reduce the file size, in Revit, click File→Purge Unused to delete items that are not in use, click File menu→Save As, and verify that the Compact File option is selected when saving the file.

Detail Level

Detail levels determine which pieces of Family geometry display in different types of project views. When a Revit element is created with a Family and added to a project view, the current detail level of the view (coarse, medium, or fine) displays the appropriate Family geometry.

A Window displayed in both Coarse and Fine detail





Adopt the following principles when deciding what level of detail shall be shown:

- Don't model geometry that will not be visible when the Family is added to a building model. For example, for a table Family that includes a drawer, model the face only, not the entire drawer.
- Depending on the type of Family, use the guideline below when modelling geometry.

If the geometry is…	Set the detail level to …
Smaller than 300mm	Fine
300mm to 1000mm	Medium
Larger than 1000mm	Coarse

- Do not duplicate geometry that can be used for different levels of detail.

IMPORTANT: The intent is to build the family based on the expected fine representation, then remove detail to create the lower levels of detail. This approach improves the performance of the family in lower levels of detail views in the project, but still provides the required graphics for proper documentation of a project. The intent is not to build each level of detail incrementally or additionally.

Family Template

Revit provide many family templates by family category and host-based setting. Please follow the guide below to select suitable family template.

- Determine the family category to be created and expectation of host behaviour.
- In project environment, all host-based families except face-based ones cannot host on the object which is in the linked model. For example, a wall-based light switch cannot host on the wall in MEP model because the wall is linked from architecture model. Therefore, if the family will be used in different disciplines or model linking workflow, select a face-based template.
- If template of that category and host-based is provided, select it.
- If template of that category does not have suitable host-based, select appropriate host-based generic model family template and change category after opening.
- If category dialog in generic model family does not provide the required category, use the right category template for management purpose.

Insertion Point

The insertion point of BIM object is a 3D coordinate to locate the family in project environment. Each family template has several pre-defined reference planes and the insertion point is the cross point of these reference planes. Also, these reference planes have a default setting of “Defines Origin” property. Please follow the guide below to determine the family insertion point.

- Normally, the default insertion point from template shall not be modified in order to avoid an unexpected error. Create or modify 3D geometry based on default insertion point.
- Consider the insertion point of user convenience, that is, family shall be easy to place in the project without manual adjustment.
- On plan view (known as XY plane), the insertion point shall normally be located at the centre or one side edge of the entire 3D geometry.
- On elevation view (known as XZ or YZ plane), the insertion point shall normally be located at the top, centre or bottom of the entire 3D geometry.

Parametric Modelling

Applying parametric modelling into BIM object creation will allow the family to change its size and shape by type without creating a new family. A well designed parametric family is able to be applied for various project and different purposes. However, parametric modelling will increase the risk of an unexpected error, increase the difficulty of modification and decrease the speed of computer calculation.

Guide to applying parametric modelling:

- Only apply parametric modelling when necessary, such as multiple sizes.
- Every parametric dimension shall be applied on the reference planes or reference lines rather than 3D geometry.
- Use align and lock command to constrain 3D geometry to reference planes and vary them by parameters.

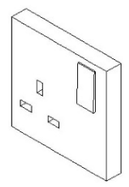
Element Visibility

Typically, the geometry of an element created by a family will change depending on the current project view. The visibility settings of the Family determine in which project view an element created with the family will display.

For instances, a flashing light has a symbolic 2D Annotation shown on Plan View for preparing construction drawing and it contains a 3D geometry shown on 3D View for rendering



Visibility on Plan View



Visibility on 3D View

In a plan view, you may want to see a 2D representation of the element. In a 3D or elevation view, you may want to display a fully detailed 3D representation of the element. In other views, you may want to hide the element. Limiting the visibility of highly detailed Family geometry to only certain views can improve project performance.

Nesting Family

A nested family is one that has been loaded into another family. In some cases, it can be convenient to represent parts of the nested family separately from the main Family model. Nesting Recommendations:

- Instead of nesting, consider creating all of the necessary geometry in the family. Use reference lines and labels to lock geometry in place.
- Limit nesting to 2 levels - The deeper that families are nested, the longer they will take to update in the project file.
- Only nest high-value content that may be used in several different Families, such as a door handle.
- Prepare 2D symbols in annotation Family, then nested into the 3D Family. This will provide full control of 2D/ 3D visibility that may be required in different project presentations.

IMPORTANT: It is important to understand that nesting Families increases the file size and affects performance, specifically the regeneration process of the Family views.

Planning a Revit Model Family

Planning Families prior to creation can save time and prevent errors. The following questions shall be considered while planning the Family.

Will the Family need to accommodate multiple sizes?

For a window that is available in several pre-set sizes, or a bookshelf that can be built in any length, create a standard component Family.

How shall the Family display in different views?

The way the object shall display in views determine the 3D and 2D geometry that you need to create, as well as how to define the visibility settings. Determine whether the object shall display in a plan view, elevation view, and/or sectional views.

Does this Family require a host?

For objects typically hosted by other components, such as a window or light fixture, start with a host-based template. How the Family is hosted (or what it does or does not attach to) determines which template file shall be used to create the Family.

How much detail shall be modelled?

In some cases, you may not need 3D geometry. You may only need to sketch a 2D shape to represent your Family. Also, you may simplify the 3D geometry of your model to save time in creating the Family. For example, less detail is required for a wall outlet that will only be seen in interior elevations from a distance, than for a door with raised panels and a sidelight that will be seen in an interior rendering.

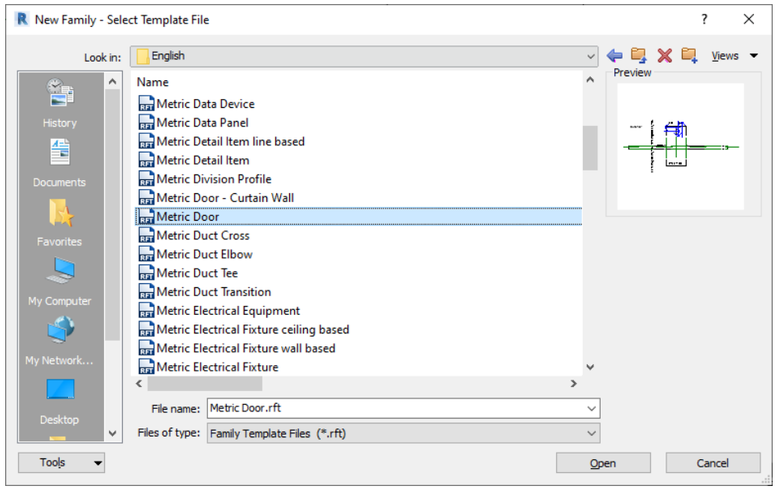
What is the insertion/ origin point of this Family?

The insertion/origin point is the point at which you want to place the Family in a project (indicated by the cursor position). The insertion point may change based on use case. For example, the insertion point for windows and doors is the center of the geometry, so that the content parametrically expands out from the center. For a countertop, the insertion point is at a corner and the content expands with the instance length in one direction. Determining the appropriate insertion point will help users place the Family in a project.

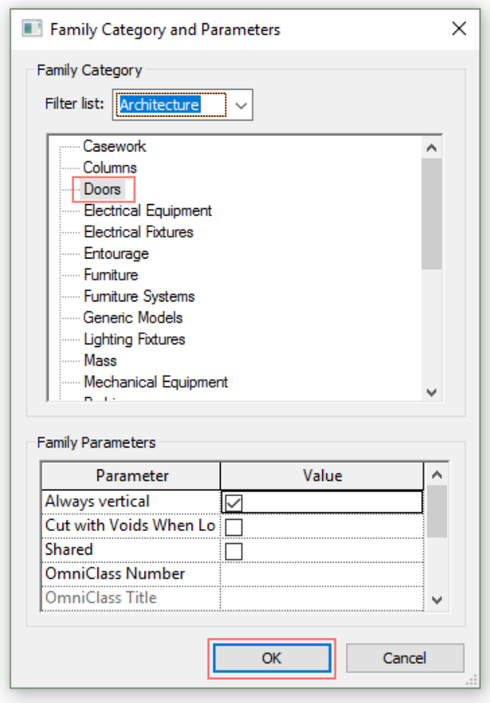
Workflow for Family Creation

To ensure that the content is created in the most efficient and least error-prone manner, review and use the best practice workflow below before creating a model family.

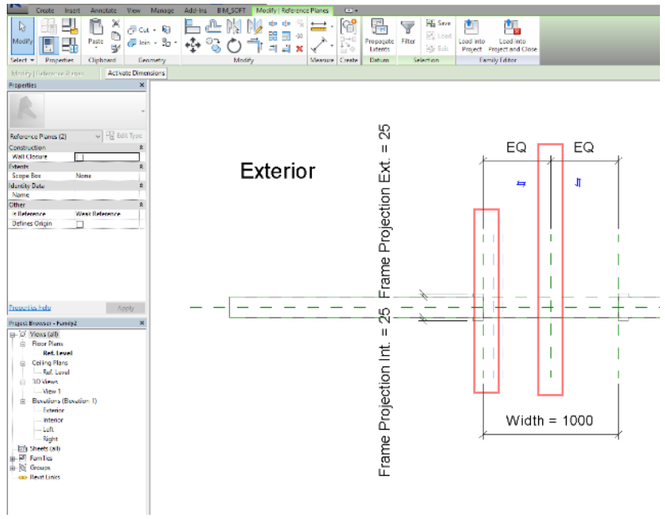
- Create a new family file (*.rfa) with the appropriate family template



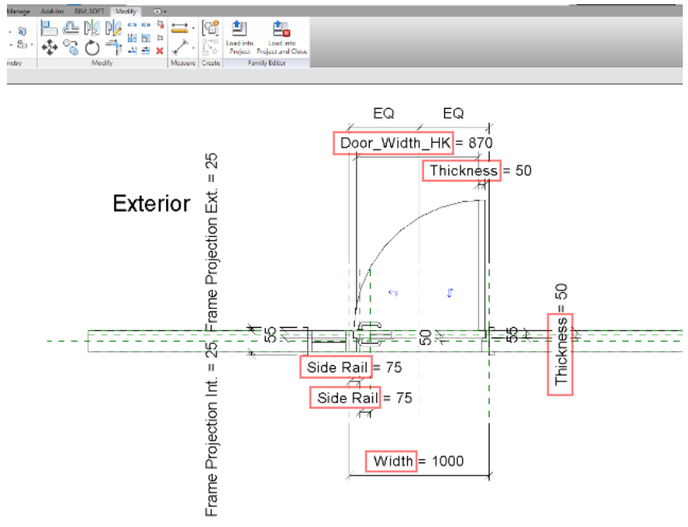
- Define subcategories for the family to help control the visibility of the family geometry



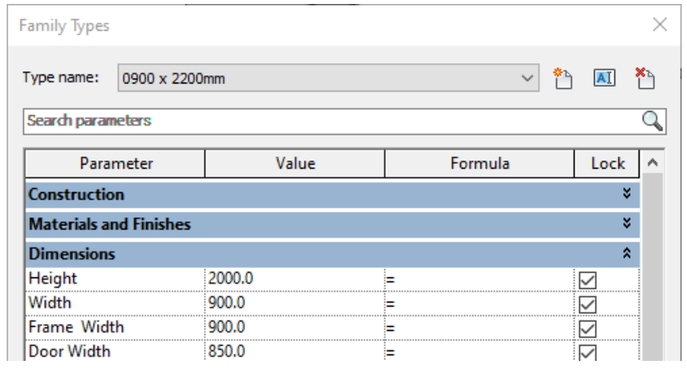
- Create the family framework:
  i. Define the origin (the insertion point) of the family
  ii. Layout reference planes to snap to when sketching component geometry



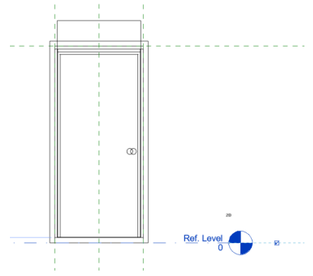
  iii. Add dimensions to specify parametric relationships
  iv. Label dimensions to create type of instance parameter or 2D representation



- Define family type variations by specifying different parameters



- Add a single level of geometry in solid and voids, and constrain the geometry to reference planes.



- Save the family, and then test it in project.
- Flex the new model (types and hosts) to verify correct component behaviour.
- Specify 2D and 3D geometry display characteristics with subcategory and entity visibility settings.
- Save the family, and then test it in project.

Family Units

Although Families can be created as unit-specific (imperial or metric), Revit software stores all coordinates in universal units and displays specific units according to user preference. This means that:

- Units can be set to display as necessary for a target audience (i.e., display as decimal units for a civil engineering drawing or fractional units for an architectural drawing).
- Families created in imperial units may be loaded into and used in metric projects and vice versa.

For information on changing the display of units, see “Project Units” in the Revit Help.

To use an imperial or metric family in a project with different base units, use one of the following options:

- Load the family in the project where it will use the current project units. However, any imperial- or metric-specific text in the family name, type names, and parameter names will still display as metric unless explicitly changed. Standards sizes may also need to be adjusted.
- Duplicate the types within a metric or imperial family to create both imperial and metric types within the family.
- Open the family, save it as a new family, and change the units.

Category and Sub-category Standards and Usage

All families, including generic families, must be assigned to appropriate categories and subcategories. When a family is created, it is assigned a category. The category defines its top level of identification (for example, Door, Window, or Casework) within the project environment. When the family is used in a project, the family can be located in the Project Browser under its category, and elements created by the family types will schedule by its category. The line weight, line colour, line pattern, and material assignment of the family geometry can also be assigned to by category.

To display different line weights, line colours, line patterns, and material assignments for different geometric components of the family (for example, the frame, sash, mullions, and glass that comprise a window), the components can be assigned to subcategories within the family category.

Categories are predefined in Revit software and cannot be created or changed by the user. Sub-categories are predefined in some families (See Revit Master Subcategory List), but other sub-categories can be created in families as needed.

Sub-category Naming Conventions

- Create unique names for each sub-category.
- Use natural language to name the sub-category. The sub-category name shall describe how the sub-category is identified in the real world (i.e., in catalogues, by manufacturer, etc.)
- Do not include the family category in the sub-category.
- Keep sub-category names as short as possible.
- Capitalize the leading letters of the words that form the sub-category name.

Approved Parameter Usage

Families contain parameters that not only create the family geometry but identify or classify the elements that are created by the family. All families have predefined parameters that you assign values or data to, but you can add parameters that are not predefined in Revit software (that are not system parameters).

IMPORTANT: If you want to display the names and values of custom parameters in a schedule, they must be defined as shared parameters in a text file that is independent of family and project files.

REQUIREMENT: To promote consistency in model content (particularly for manufacturer content that is shared on FLIP), use parameters as they are explicitly defined in the approved shared parameters file. If a required parameter is not in the file, add it to your content as necessary. It is also recommended to include the shared parameter file containing the additional parameters with your content package. When creating custom parameters, refer to the next chapter 12 Parameter Naming Conventions.

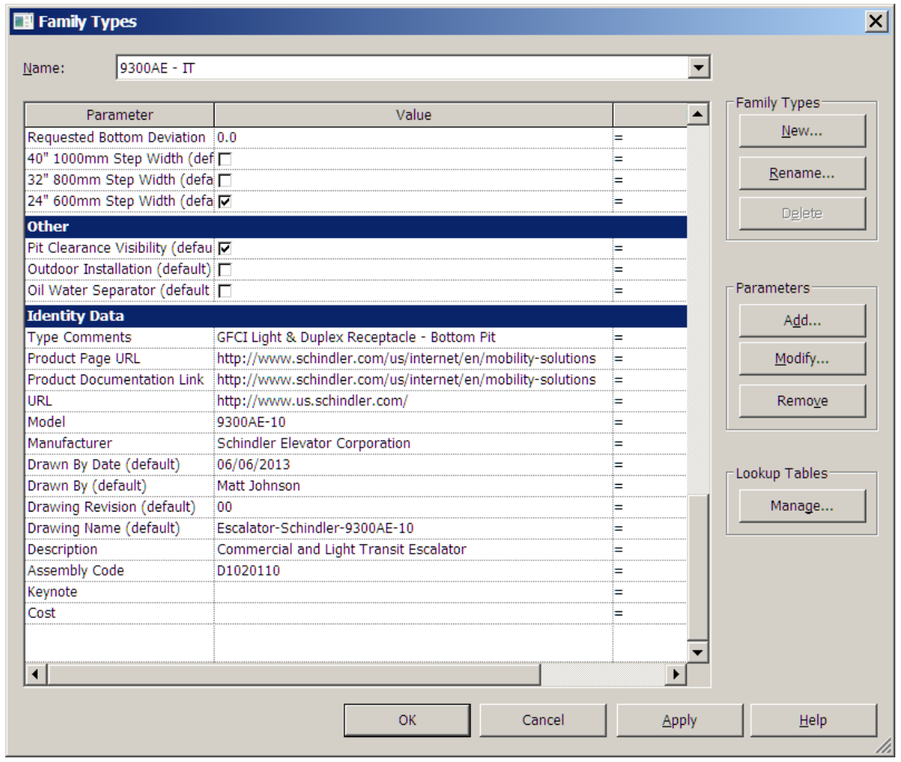
Refer to the master shared parameters file (*Revit Master Shared Parameters*) for the list of Autodesk-approved shared parameters. This file contains most of the shared parameters that you will need to add to your families. A spreadsheet (Revit Master Parameter List.xls) that lists these parameters by family category, along with applicable predefined system parameters is also available for your reference.

Adding Manufacturer Data to Families during Construction Stage

Identity Data parameters in families can include manufacturer data, including information such as the model, description, assembly code, cost, and manufacturer URL. When elements are created with the family in a project, the parameters and associated values can be included in schedules.

Typical manufacturer data in Family:

Parameter	Description	Type of Parameter
Manufacturer	Manufacturer name	System
Model	Model name or number	System
Product Page URL	URL to product page	Shared (see shared parameter list)
Product Documentation Link	URL to product	Shared (see shared parameter list)
URL	URL to manufacturers web site	System



Identity data parameters for an Escalator that include values for manufacturer data.

Type Catalog Standards and Usage

A type catalog is comma-delimited txt file that, when placed in the same directory as a family, displays a list of family types before the family is loaded into a project. You can select and load only the family types that the current project requires, avoiding the unnecessary increase in project size from unused types and a long list of types in the Type Selector. The type catalog also provides an external means of editing the family, as you can remove and add parameters and types in the catalog file (txt).

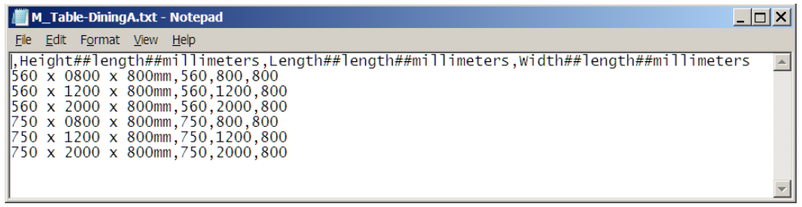
Type Catalog Standards

Use the following standards when creating type catalog:

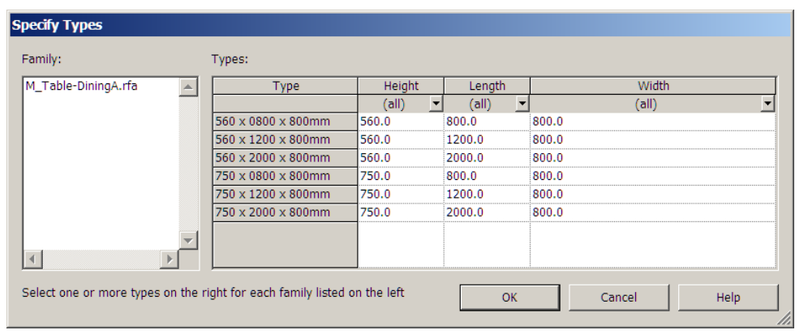
- Use any text editor to create type catalog.
- Create type catalog for families that contain six or more types.
- Name a type catalog file (.txt) with the same name as the family file (.rfa) that it supports.
- Ensure that parameters in type catalog are test loaded by the family for which you create the type catalog. If the parameters are not used, the family will not load.

Example

A type catalog (txt file) for a table Family



Dialog displayed by the type catalog when the door family is loaded



MEP Symbol

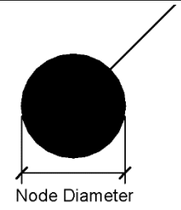
There are many techniques in preparing an annotation family. Apply the following modelling methods to create an intelligent annotation family for drawing production.

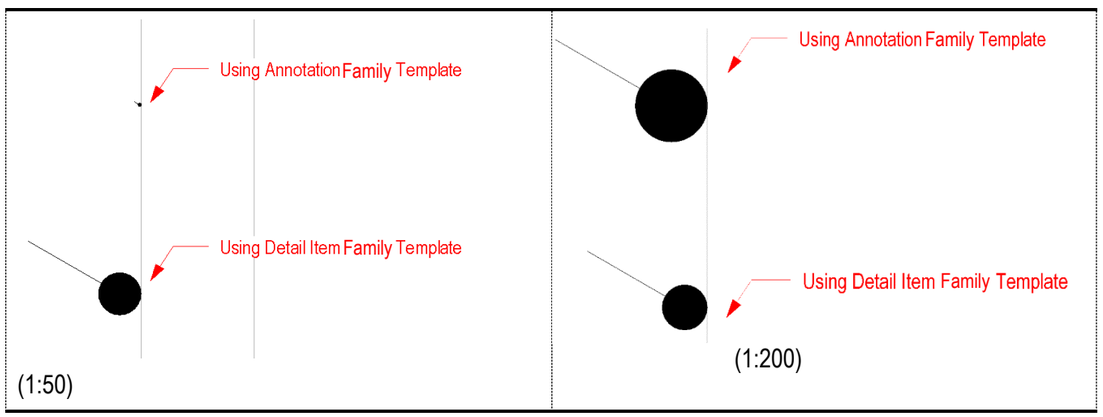
Scale-dependent Symbol

- Detail Item family template and Annotation family template both can be used to create the symbol. However, symbols using Annotation family template are varied according to the annotation scale in Revit and cannot be assigned individually. Please use a suitable family template for different presentation style.
- Detail Item family will be a good starting point. However, text note cannot appear in Detail Item family when loaded into the project. Please refer to the topic “2D Symbol Text”.
- Preparing 2 sets of symbol size for 1:100(1:200) and 1:50(1:20) is a good practice.

Example

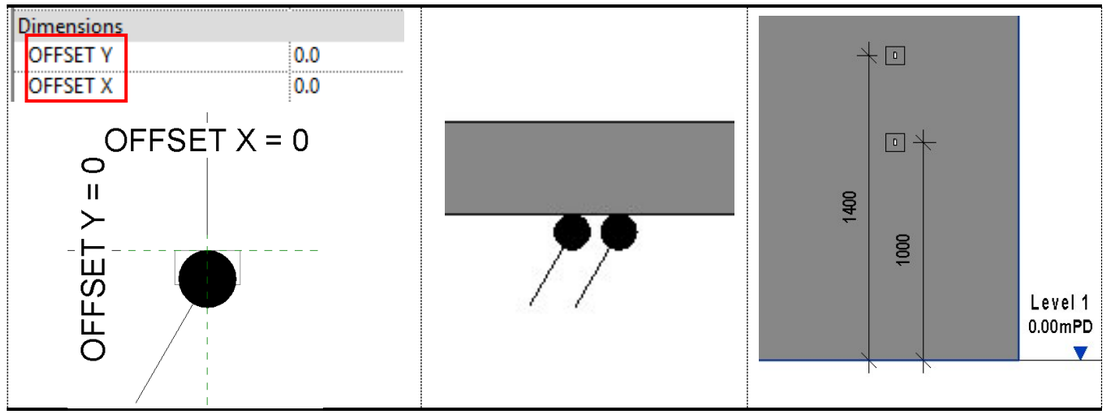
A light switch 2D symbol draw by Detail Item family template and Annotation family template.

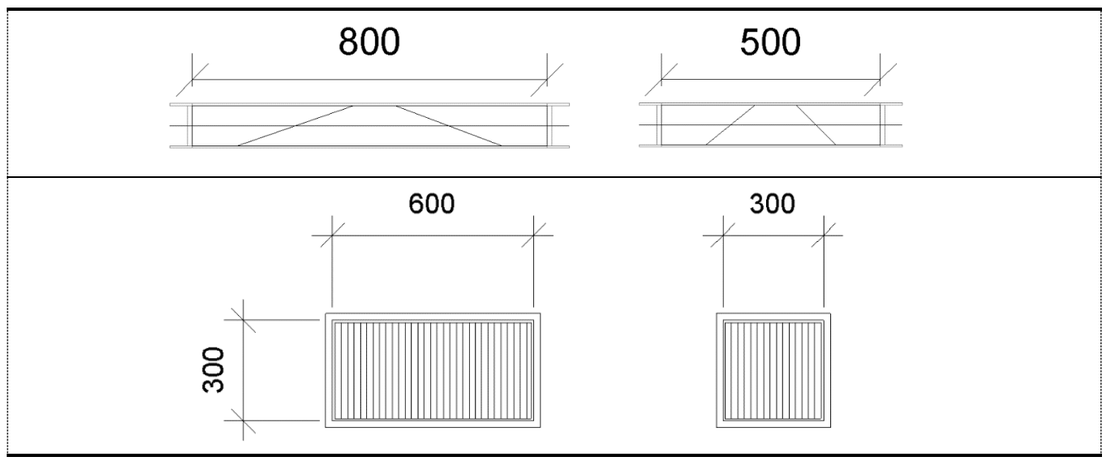
 Node Diameter	Node Diameter sketch in family editor (mm)	In Project Environment				
		Formula	Node Diameter measure as 1:20 (mm)	Node Diameter measure as 1:50 (mm)	Node Diameter measure as 1:100 (mm)	Node Diameter measure as 1:200 (mm)
Detail Item family	600	Do not change	600	600	600	600
Annotation family	6	Sketch size * Scale	120	300	600	1200



2D Symbol Offset

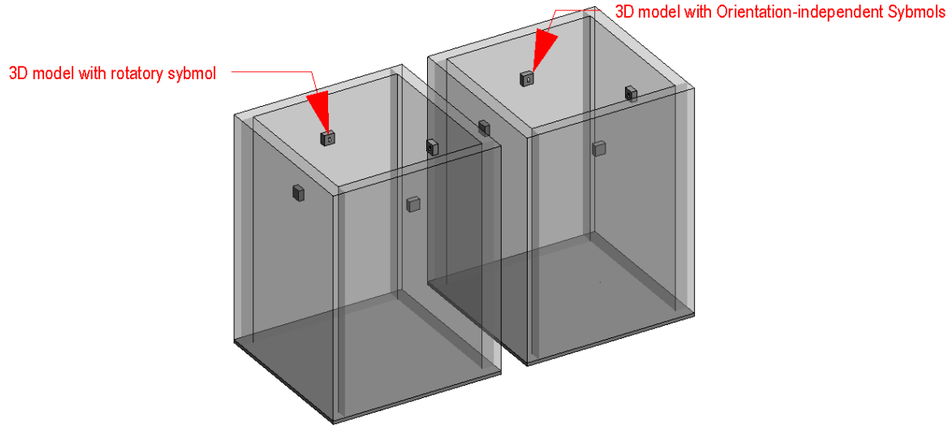
- Apply offset parameters to control the location of the annotation family in order to avoid the overlapping of 2D symbols in MEP drawing production.



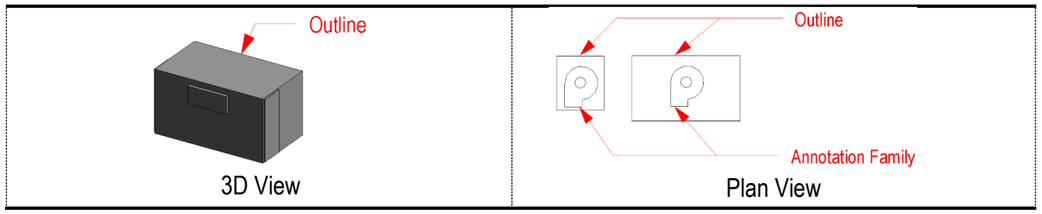


Size-dependent Symbols

- For those families and corresponding symbols which are able to vary their dimensions, the symbols shall be drawn within the family by using Symbolic Line and locked with 3D model.

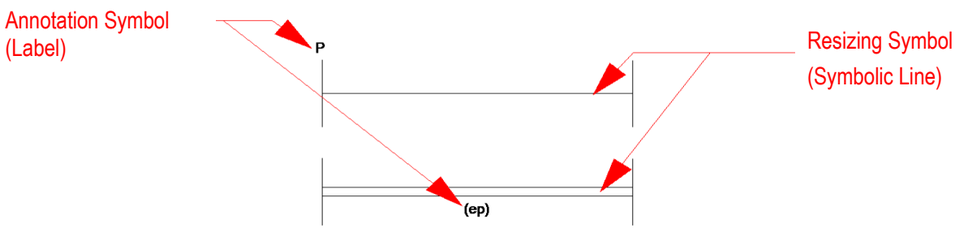


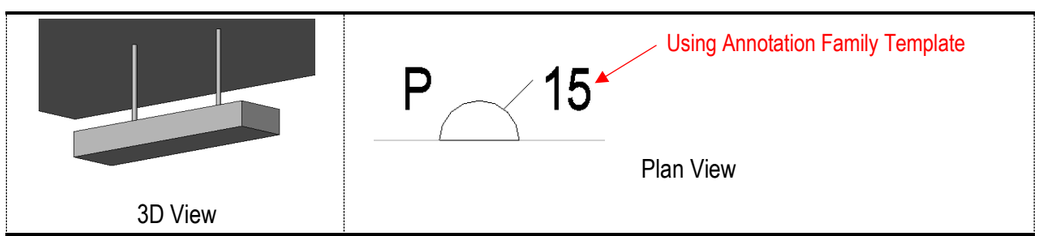
- Make use of the outline of the family as a placeholder for the symbol. Turn off the visibility for useless 3D solids for plan view.



2D Symbol Text

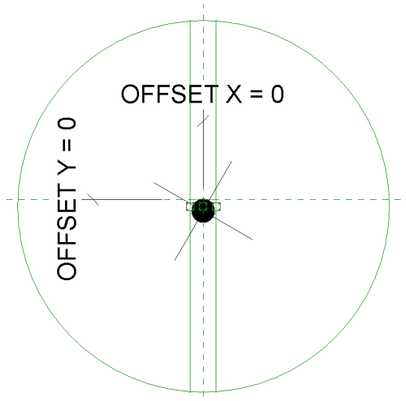
- Annotation family template shall be used for symbols which contain text.
- Label is suggested as it can provide a flexible control of the content.
- If a family requires a non-scaling symbol (using Detail Item family template), text created in Detail Item family cannot be visible in project. A label or text created in Annotation family template shall be nested into the Detail Item family first. Then apply the nested 2D symbols into the 3D family and load into the project.

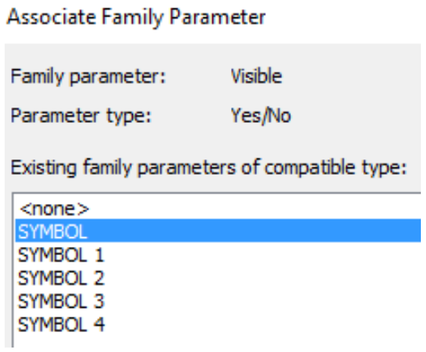


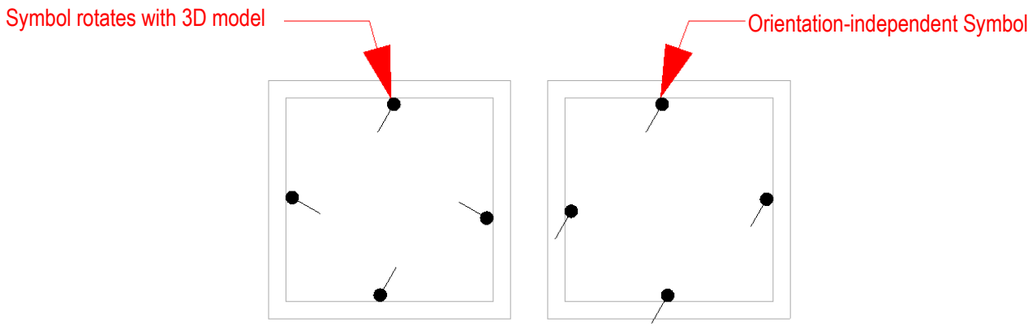


Orientation-independent Symbols

- As 2D Symbol is nested with 3D model, it rotates corresponding to the 3D model in project.
- Where all the symbols on plan are arranged in the same orientation, the model is required to be nested with more than 1 symbols or parameters are to be used to control the orientation of the symbols.



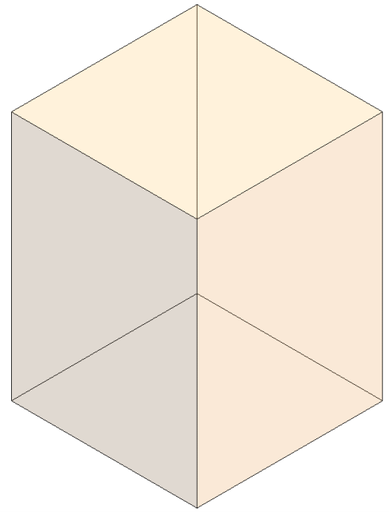
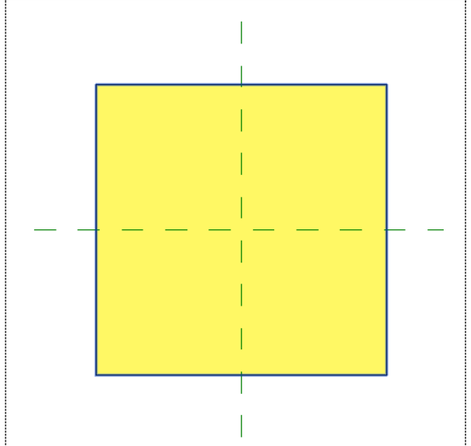
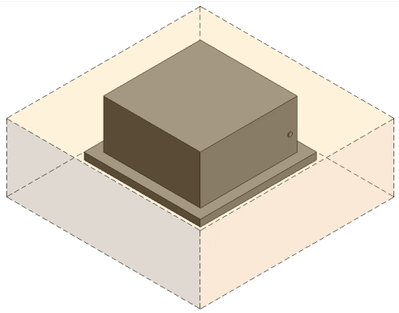
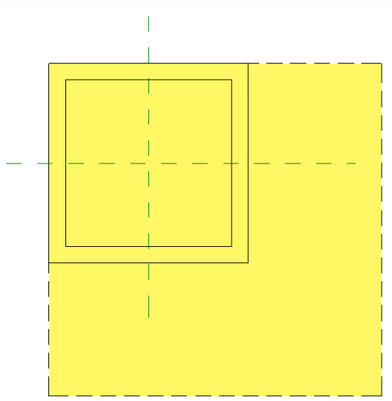




Maintenance Space

Maintenance Space, known as clearance space, is a spare space for equipment and any object which might need maintenance or safety requirements. No other object is allowed to be placed in the maintenance space. The maintenance space normally does not form a part of drawing production but is proposed for user convenience. Please follow the guide below to create maintenance space.

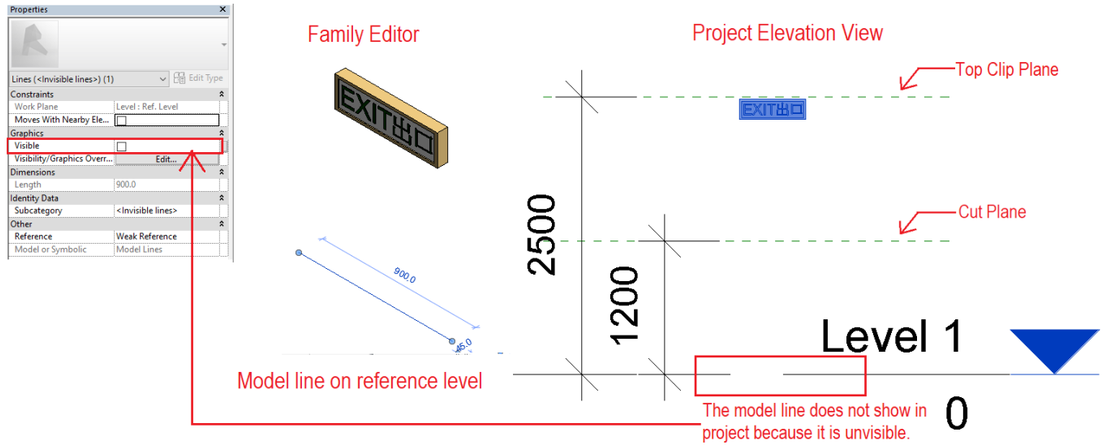
- The maintenance space shall be created as a sperate family and nested into equipment family.
- The maintenance space shall use a generic model and be set as a "**Shared**" family and a sub-category such as "Maintenance Space". This method allows user to control all maintenance space visibility by sub-category under a generic model without limitation of different equipment family categories. Also, use sub-category to control the maintenance space edge line displaying on plan view and elevation view.
- The maintenance space shall be created by parametric modelling to allow user to change its size in equipment family.
- The maintenance space shall be transparent in the 3D view, normally set as 80% in material.
- The maintenance space shall provide a parameter to control its visibility.

	3D View	Plan View
Maintenance Space Family in Family Editor		
Equipment Family in Family Editor		

Issue of Plan View Cut Plane

- For Specialty equipment and Generic Model, if a family is placed above the cut plane but below the top clip plane, which together the defined view range setting, it will not display on the plan view unless its categories are window, casework or generic model.
- However, in some cases, user will wish to show the family's symbol on the plan view without modify the cut plane setting to achieve this, create one model line on the reference level and set its "Visible" property to false.

Example:



FL-05 Family Library Component Report

Report layout as per diagram below, and please include this information within the Family report

1. 3D Model	• Views to be shown in the report (plan view, front and side elevation view, 3D view) • Parameter setting table
2. 2D family – Symbol	
3. 2D family (Annotation) – Tag	
4. Views on drawing sheets with purpose:	• Plan view and elevation view for presentation purpose • Plan view and elevation view for Statutory / Authority Submission purpose • Plan view and elevation view for tender / construction purpose • Family schedule with the shared parameter
5. Remarks	• Modelling • Deliverables

D5 PRESENTATION STYLE

D5.1 Drawing Sheet Compilation

This section focuses on the techniques for drawing sheet compilation within Revit.

As per CIC BIM Standards, the key principle is that the architects, engineers and others involved in a project can produce good quality and consistent drawings from the model databases.

Where drawings are a product of the BIM process, traditional drawing conventions still apply.

Each drawing shall contain design information solely for the purpose of the intended use of the drawing. To maximize efficiency, a policy of minimum detailing without compromising quality and integrity shall be adopted and repetition of details shall be eliminated.

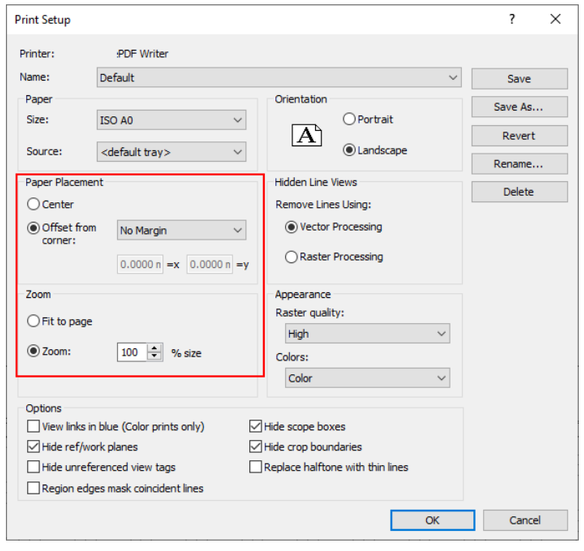
The numbers of drawings shall be kept to a minimum and organised in logical manner.

D5.2 Preparation for Publication

Before transmittal of the model, the file contents and structure need to be agreed upon. Drawing sheets from Revit shall be published to DWF (preferred), or stay in raw format (*.rvt), where they can be checked, approved, issued and archived.

Printing

Sheets shall be exported in appropriate paper size to PDF format through Print Setup. The Paper Placement should be set as “No Margin” for Offset from corner and 100% zoom size for correct scale.



D5.3 Model and Drawing Detail

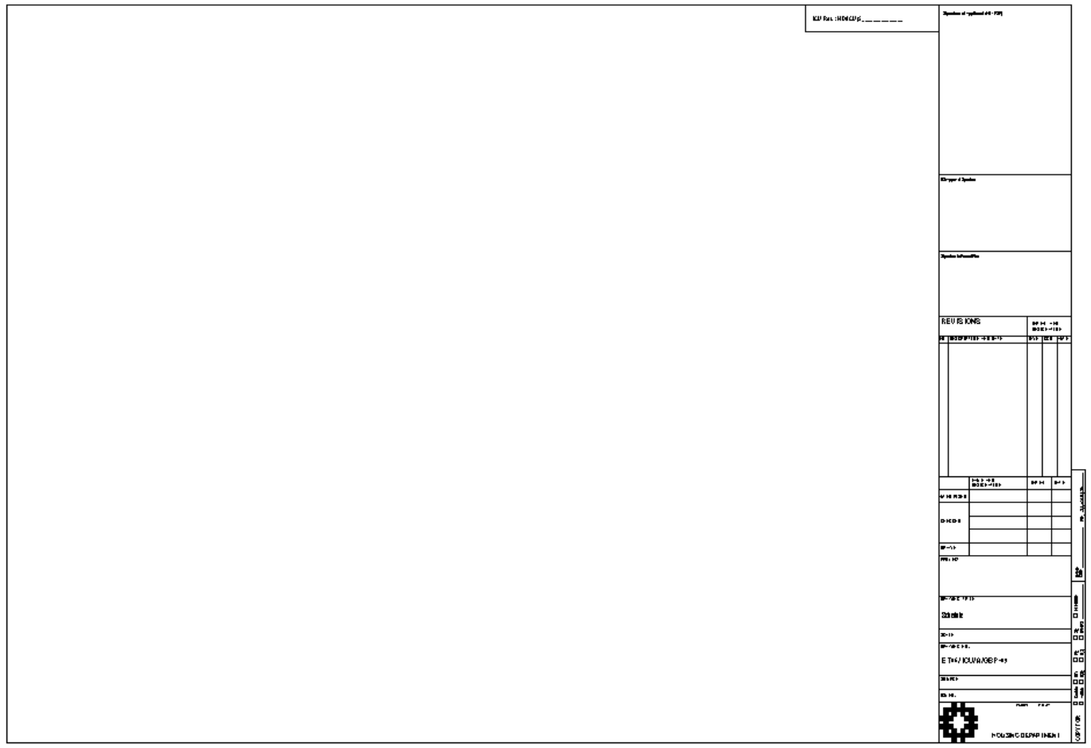
As per CIC BIM Standards, the maximum level of development shall be given beforehand. See **D1 of Level 4** - Level of Development (LOD) for the general recommended level of development. PT / PSP / Contractor shall formulate the details by studying the project purpose.

PS-01 Title Block

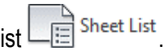
- Title block family is available in central resource folder.
- Title block family may be edited to suit project's requirement.
- The modified title block family is to be saved under project resources folder.

Shared Parameter in title blocks:

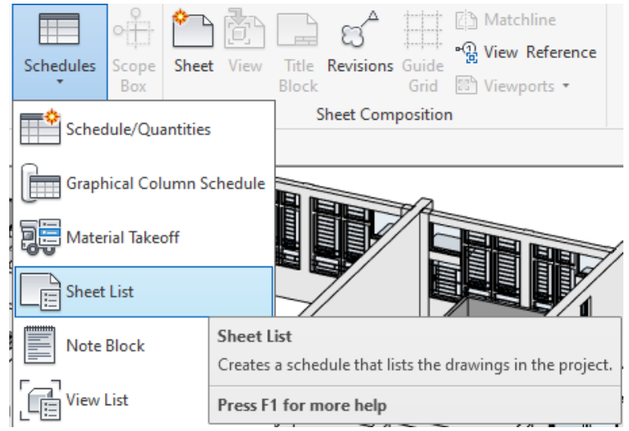
Parameter Function	Display Name	Parameter Type
Project Name	Project	Type parameter
Drawing Title	Drawing Title	Instance parameter
Drawing Number	Drawing No.	Instance parameter
Scale	Scale	Instance parameter
Revision / Description / Date / Issued By	Revision / Description / Date / By	Instance parameter
Drawn By / Checked By / Authorised By	Drawn / Checked / Authorised	Instance parameter
ICU Number	ICU No.	Instance parameter
Source	Source	Instance parameter



PS-02 Drawing List

Information of drawing list shall be managed by using Sheet List under View > Schedule > Sheet List 

.



DRAWING LIST	
DRAWING NO.	DRAWING NAME
ET06/ICU/A/GBP-01	GENERAL NOTES
ET06/ICU/A/GBP-02	LOCATION PLAN & NOTES
ET06/ICU/A/GBP-03	DRAINAGE
ET06/ICU/A/GBP-04	GENERAL NOTES OF F.S
BIMSG - P	L11 - Plan
ET06/ICU/A/GBP-05	L11-Plan
BIMSG - 02	Construction Drawing
ET06/ICU/A/GBP-07	Schedule
BIMSG - P - DA1	Architectural Walls
BIMSG - P - DA2	Wall Finishes
BIMSG - P - DA3	Wall Opening
BIMSG - P - DA4	Precast Facade Panels
BIMSG - P - DA5	Curtain System/ Curtain Wall
BIMSG - P - DA6	Curtain Panel

Figure 4-11 Example of general drawing list for GBP submission

DRAWING LIST	
DRAWING NO.	DRAWING NAME
FL07/01/LDBP/S/EG-0010	Standard Fixing Details
FL07/01/LDBP/S/EG-001	General Notes for Foundation
FL07/01/FDN/S/EG-001	Standard Fixing Details
FL07/01/PD/S/EF-001	Layout Plan at Foundation
FL07/01/FDN/S/EG-002	Standard General Details
FL07/01/PD/S/EF-011	Loading schedule at top of foundation
FL07/01/PD/S/EF-021	Piling Layout Plan
FL07/01/PD/S/EF-101	Starter Bar Details
FL07/01/PD/S/EF-041	Pile Cap Layout Plan
FL07/01/PD/S/EF-051	Pile Cap Sections

Figure 4-12 Example of general drawing list for foundation plan submission

DRAWING LIST	
DRAWING NO.	DRAWING NAME
FL07/01/PD/S/EG-002	Standard General Details
FL07/01/PD/S/EF-011	Loading Key Plan
FL07/01/LDBP/S/EG-002	General Notes for superstructure
FL07/01/PD/S/EL-001	Basement Floor Framing Plan
FL07/01/PD/S/EL-008	Basement Floor Part Framing Plan For Water Tank
FL07/01/PD/S/EL-011	Ground Floor Framing Plan
FL07/01/PD/S/EL-021	First Floor Framing Plan
FL07/01/PD/S/EL-031	Second Floor Framing Plan
FL07/01/PD/S/EL-041	Roof Framing Plan
FL07/01/PD/S/EL-051	Upper Roof Plan
FL07/01/PD/S/EL-061	Staircase Sections
FL07/01/PD/S/EL-071	Podium Sections
FL07/01/BLK1/S/EL-001	Block Lower Ground Floor Framing Plan
FL07/01/BLK1/S/EL-002	Block Ground Floor Framing Plan
FL07/01/BLK1/S/EL-003	Block First Floor Framing Plan
FL07/01/BLK1/S/EL-005	Block Typical Floor Framing Plan
FL07/01/BLK1/S/EL-006	Block Main Roof Framing Plan
FL07/01/BLK1/S/EL-007	Block Upper Roof & Top Roof Framing Plan
FL07/01/BLK1/S/EL-021	Block Staircase Sections
FL07/01/BLK1/S/EL-023	Block Sections
FL07/01/BLK1/S/EL-051	Block First Floor Light Weight Concrete Fill Layout Plan

Figure 4-13 Example of general drawing list for superstructure plan submission

PS-03 General Notes, Legends and Abbreviations

General Notes

General Notes are prepared on Drafting View/ Legends using text notes.

Legend

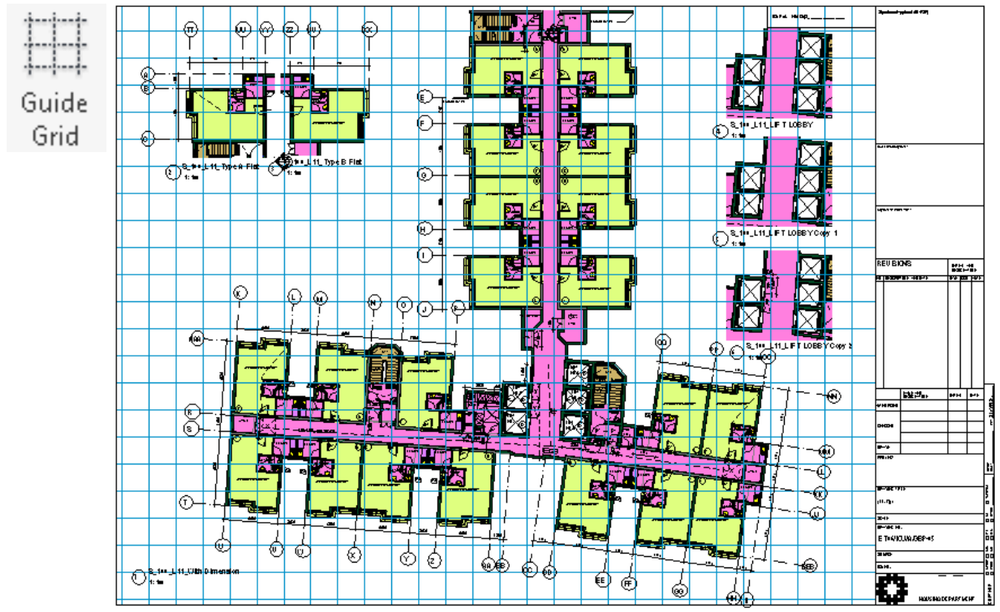
Legend shall be created by using Detail Components, Legend Components with view settings, Detail Line, Filled Region and Text Notes to indicate the 2D presentation.



PS-04 Sheet Composition

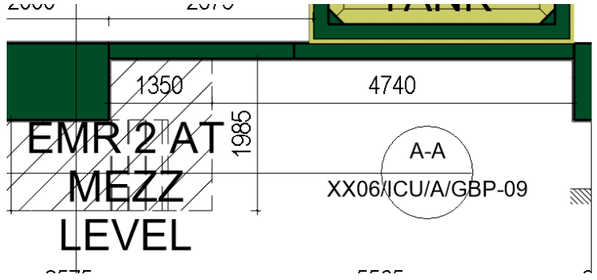
Guide Grid

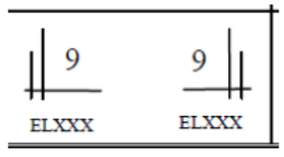
In Revit, the viewport of views placing on sheet cannot be assigned by coordinates as in CAD. However, Guide Grid can help in referencing sheets for an organized presentation. Plans views of different floors can be placed at the same spot across different sheets.



Cross Reference

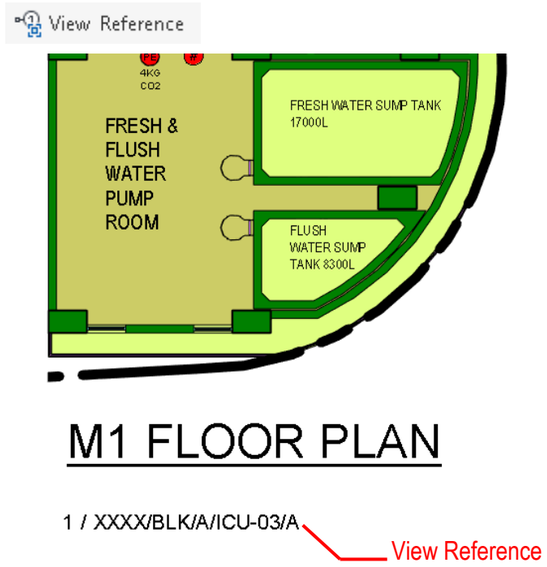
The section mark shall have capacity to retrieve the corresponding sheet number and the view number. By double clicking the View Reference, the target view opens. This can reduce typo errors and enhance productivity.





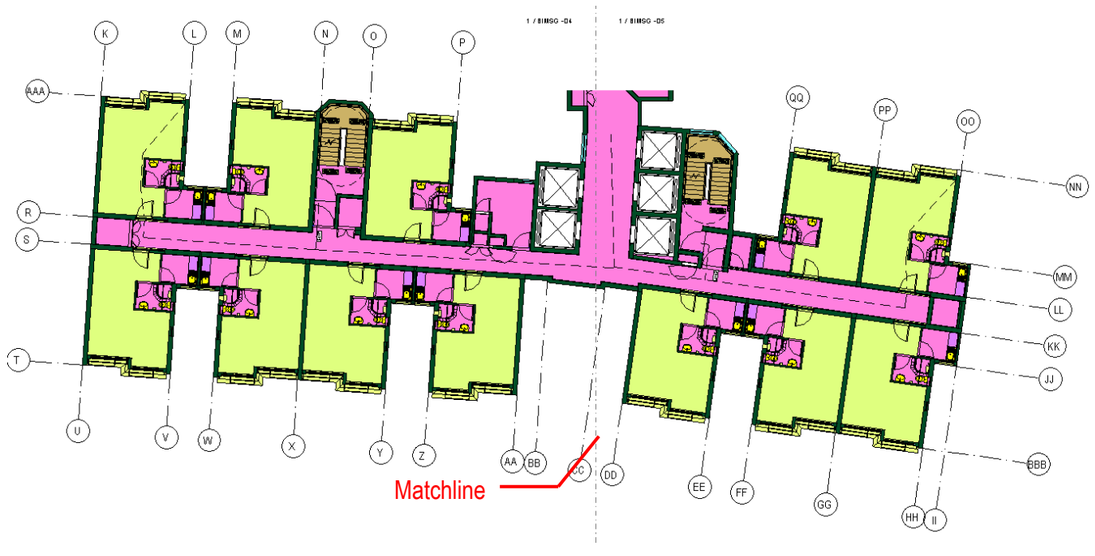
View Reference

View number and sheet number for corresponding view can be shown on plan using View Reference. By defining the correct view for the View Reference, it will be updated automatically when the information of the corresponding view number and sheet number is changed. By double clicking the View Reference, the target view opens. This can reduce typo errors and enhance productivity.



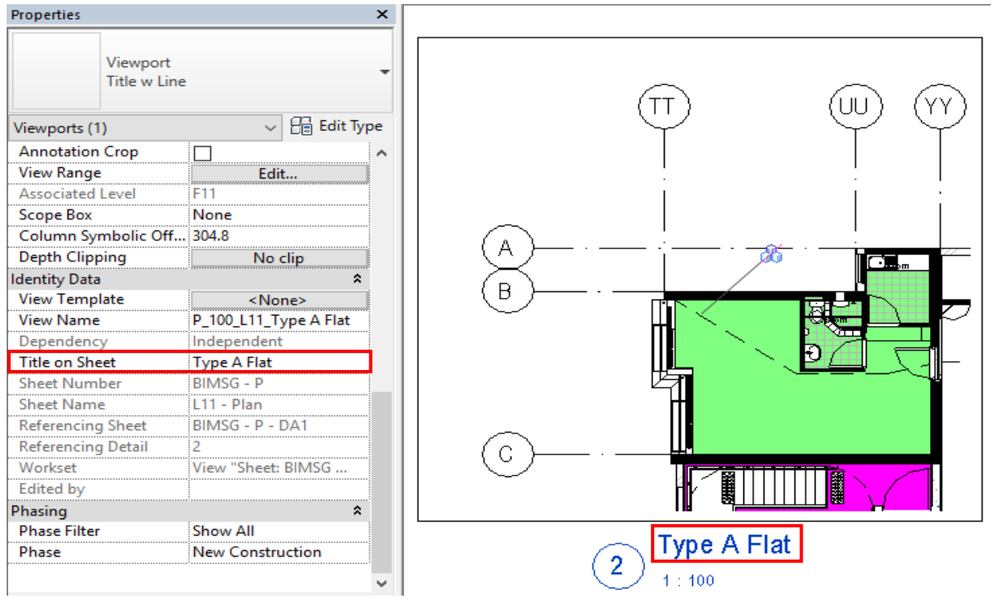
Matchline

Matchline should be applied to split up a large view into 2 or more views. After creating Matchline, corresponding dependent views with appropriate crop region shall be prepared and assigned with correct View Reference.



Title on Sheet

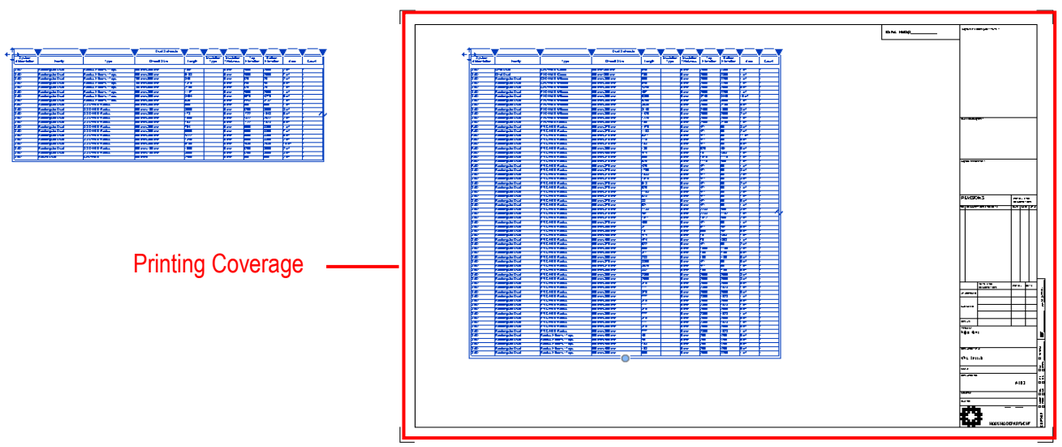
Titles of the views on sheet can be managed by Title on Sheet for the viewport. The information of Title on Sheet can be independent of the corresponding view name.



Scheduling on Sheet

In Revit, only schedule view can be inserted into the sheet more than once. If there is not enough space for scheduling on the sheet, the second portion shall be placed outside the titleblock as it cannot be deleted. Furthermore, repeat the previous procedure for the first portion on another sheet.

Make sure the printing coverage is within the titleblock before proceeding to print out.



PS-05 View

Crop Region

Crop Region can control the boundaries for the view. Datum elements such as levels and grids can adjust automatically according to the crop boundary. The size of the viewport on the sheet can be modified by using Crop Region.

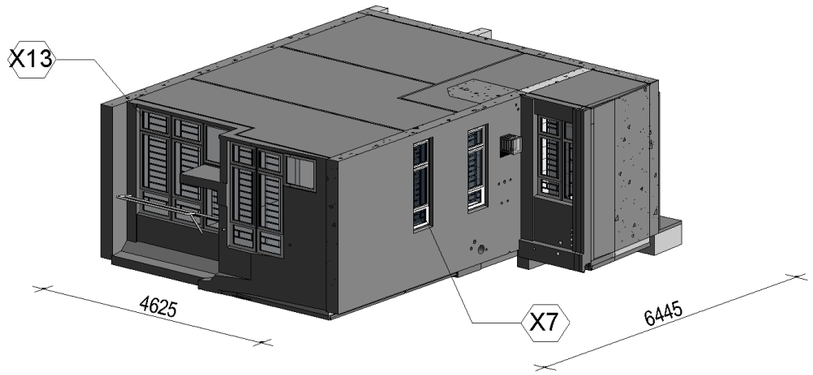
Annotation Crop Region

Annotation Crop Region can control the annotation boundaries in the view. By default, it only displays in dependent views and callout views, but not in primary view.



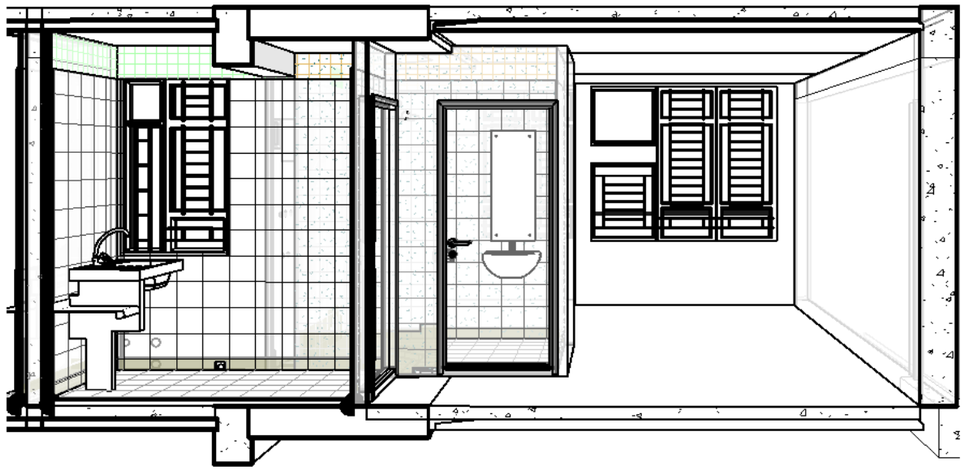
Annotation in 3D view

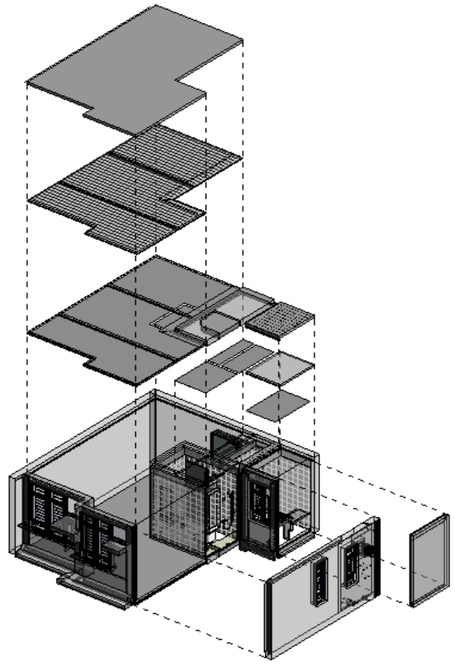
The 3D view shall be locked and the 3D view's workplane shall be defined before applying annotations, such as dimensions and tags.



Sectional Perspective

Sectional Perspective view can be created by using the camera (Perspective view) and section box. Perspective point of view can be adjusted by Eye and Target Elevation.





Displace Elements

Relationship between the elements in model can be presented clearly with 3D exploded views by Displace Elements and with Displacement Set Path (if necessary). However, all 2D elements such as dimensions, annotations and tags cannot be displaced.

Components cannot be modified in the exploded view by applying Displace Elements, unless the displacement set is reset.

PS-06 View Control

All the view controls only apply to current view.

Scale

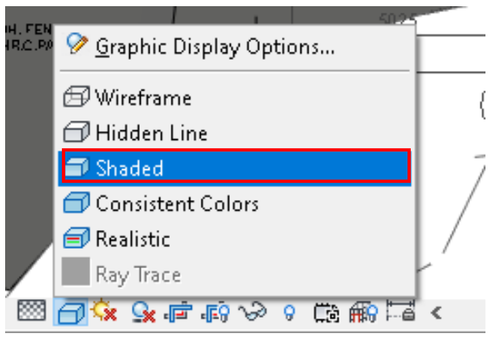
All model files are modelled at 1:1 Scale. The Scale command in Revit mainly affects the scaling on annotations in a drawing.

Detail Level

Detail Level can be used to control the geometry of the elements displayed in the view. For example, different levels of the structure (layers) of the basic wall and presentation style for pipe, duct and cable tray can be presented with different detail level. Therefore, appropriate detail level shall be well defined for each deliverable. Generally, it is recommended to set Fine level in order to have all spatial dimensions and the highest detail level of families as this will apply to all the elements in the view. For drawing production purpose, refer to **PS-07** Visibility Overrides.

Visual Styles

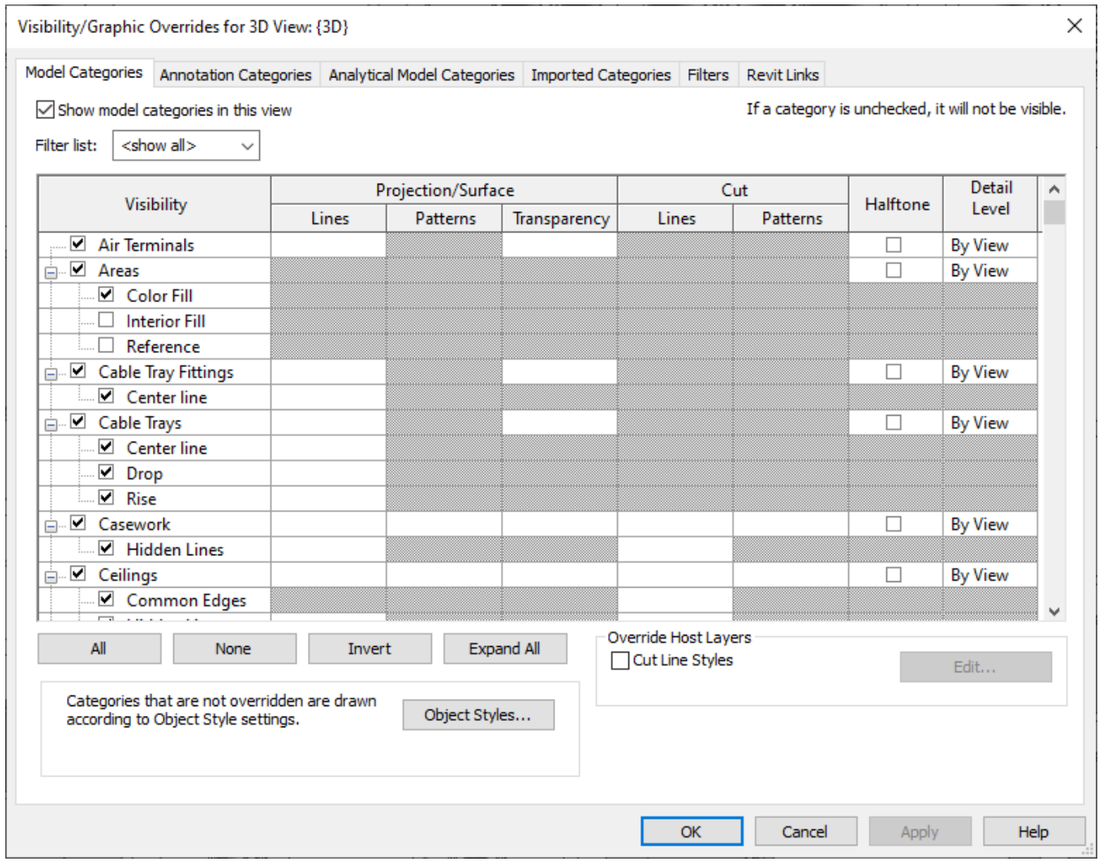
Visual Style is the setting for graphic styles. For drawing production, Hidden line style is commonly used to show the filled colour of components and lines. By applying Shaded Visual Style or Realistic Visual Style, the elements can be displayed with the colours of its materials.



PS-07 Visibility Overrides

View-specific visibility and graphic display such as colouring, patterns, and line style etc. can be assigned using Visibility Overrides according to Model Categories, Annotation Categories, Filters, Worksets and Revit Links. In Revit, Filters have the highest priority in Visibility Override.

Special arrangements for specific categories in detail level are suggested to be set in Visibility Overrides for drawing production purpose. It is recommended to create a view template with the setting shown below and apply it to all plan drawing productions. However, it shall be in Fine level for section and 3D in order to have the spatial dimension. Filter list under Model Categories can be used to filter categories by discipline.



PS-08 View Templates

As all the view control and Visibility Overrides can only apply to the current view, View Templates for different deliverables shall be prepared in order to facilitate drawing production. View Template is frequently used for controlling the consistency of a certain batch of views for drawing production.

Naming Conversion

1	2	3
Drawing Purpose	Scale	View Type

Field 1: Drawing Purpose:

Drawing submission purpose (P-Presentation, S-Statutory Submissions, T-Tender, C-Construction)

Field 2: Scale

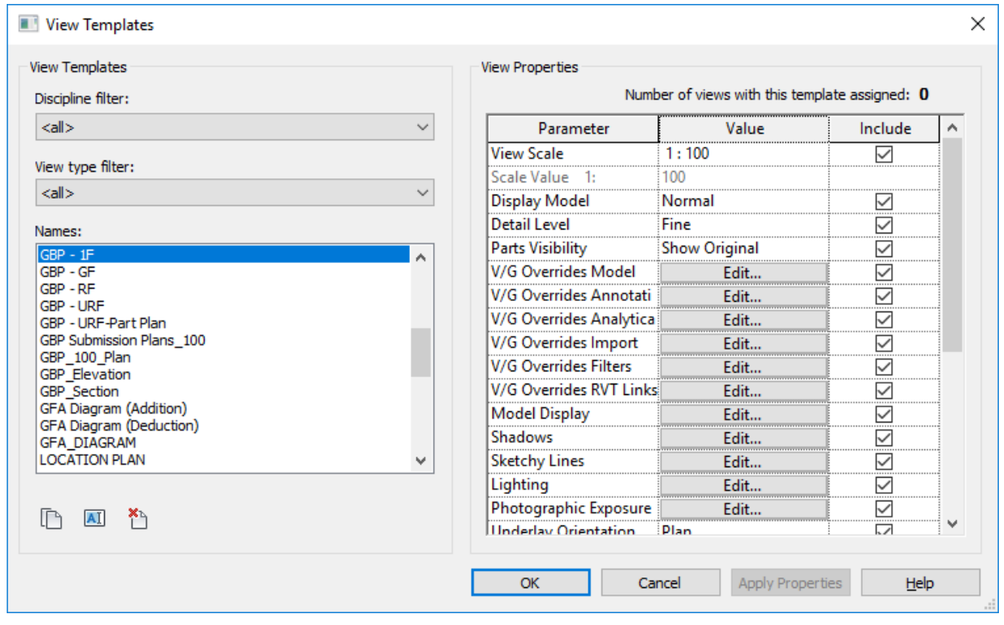
The scale of the view (50 / 100/ 500)

Field 3: View Type

Type of the views (Plan, Area Plan, Section, Elevation)

Examples:

Name	Description
S_100_Plan	View template for floor plan in 1:100 for GBP submission purpose
T_50_Section	View template for section in 1:50 for tender submission purpose
C_100_Elevation	View template for elevation in 1:100 for construction purpose



View scale

General view scales for structural drawing are listed in below table

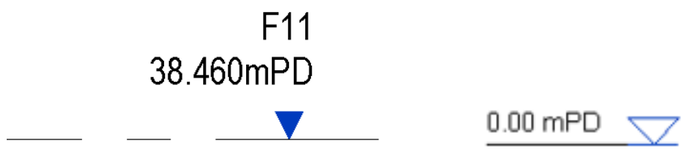
View types	Scale
Foundation plan	1:100 or 1:125
Superstructure plan	1:100 or 1:125
GI Section view	1:100 or 1:50
Loading key plan	1:300
Pile cap section view	1:100 or 1:50
Piling layout plan	1:100 or 1:125
Piling section view	1:100 or 1:50
Superstructure section view	1:100 or 1:50
Framing plan for steel structure	1:100 or 1:50
Section view for steel structure	1:100 or 1:50

General scales for detail views of specific elements are listed in below table

Elements	Elevation view scale	Plan view scale	Section view scale
Slabs	N/A	1:50 or 1:75	1:25
Beams	1:50	N/A	1:25
Columns	1:50	N/A	1:25
Walls	1:50	N/A	1:25
Foundations	N/A	1:50 or 1:100	1:25 or 1:50
Stairs	N/A	1:50 or 1:75	1:25
Water tanks	1:50	1:50	1:25

PS-09 mPD Level

Appropriate level marks shall be prepared before starting a project. Suitable symbols (such as structure floor level mark and finished floor level mark) and mPD shall be required.



The elevation base of the level mark shall be set as **Survey Point.**

PS-10 Annotation

Annotation includes:

- Symbols and Logos
- Tags
- Text assignments
- Dimension, etc.

According to the CIC BIM Standards, Text Style shall be **ARIAL NARROW** where no pre-defined text standards exist. The appearance of text shall be consistent across a set of drawings. Annotation shall be legible, clear and concise. An opaque background shall be considered as an aid to clarity. Text shall remain legible when drawings are plotted at reduced size. Wherever practical, lettering shall not be placed directly on top of lines or symbols. Dot style arrowheads shall be used instead of closed filled arrowheads when calling up hatched/shaded areas.

Symbols and Logos

Suitable symbols shall be made available from within the project or central Resource folder.

Tags

Only shared parameters and some family parameters provided by family templates shall appear in tags.

Only tags for listed categories such as the following may be assigned with a rotatory parameter:

Parameter
Rotate with component

Walls, Curtain Walls, Doors, Windows, Railings, Ramps, Stairs (Runs, Landings and Supports), Structural (Framing, Braces and Trusses), Property Boundary, Property Line Segments, Planting, Parking, Duct System, Pipe System etc.

One rotatory and one non-rotatory tag shall be prepared for each tag design.

Text Assignment

All text shall be restricted to the following sizes:

Text height (mm) Plotted full size	Line Weight Allocation	Usage
1.8	2	General text, dimensions, notes – used on A3 & A4 size drawings
2.5	3	General text, Dimensions notes
3.5	4	Sub-headings
3.5	5	General text, dimensions, notes – A0 drawings
5.0	7	Normal titles, drawing numbers
7.0	8	Major titles

Alternative text sizes shall not be used without the consent of the BIM Co-ordinator.

Name	Annotation Symbol
Spot Elevation Symbol on Plans	46.925
Level Symbol on Elevations and Sections	+74.250 F24

Line Weights

4.1b

Line weights in all the HA templates shall be set as follows according to CSWP.

Once the line weight has been set, it may be changed in very exceptional circumstances only. When the final production requires a different line weight, change the pen assignment but not the line thickness. E.g. use Pen 4 instead of Pen 3 for an element that requires thicker line weight.

Model Line Weights

	1 : 10	1 : 20	1 : 50	1 : 100	1 : 200	1 : 500	1 : 2000
1	0.1300 mm	0.1300 mm	0.1300 mm	0.0600 mm	0.0600 mm	0.0600 mm	0.0600 mm
2	0.1500 mm	0.1500 mm	0.1500 mm	0.1300 mm	0.0600 mm	0.0600 mm	0.0600 mm
3	0.1800 mm	0.1800 mm	0.1800 mm	0.1500 mm	0.1300 mm	0.0600 mm	0.0600 mm
4	0.2000 mm	0.2000 mm	0.2000 mm	0.1800 mm	0.1500 mm	0.1300 mm	0.0600 mm
5	0.2500 mm	0.2200 mm	0.2200 mm	0.2000 mm	0.1800 mm	0.1500 mm	0.0600 mm
6	0.3500 mm	0.2500 mm	0.2500 mm	0.2200 mm	0.2000 mm	0.1800 mm	0.1300 mm
7	0.4000 mm	0.3500 mm	0.3500 mm	0.2500 mm	0.2200 mm	0.2000 mm	0.1500 mm
8	0.5000 mm	0.4000 mm	0.4000 mm	0.3500 mm	0.2500 mm	0.2200 mm	0.1800 mm
9	0.6000 mm	0.5000 mm	0.5000 mm	0.4000 mm	0.3500 mm	0.2500 mm	0.2000 mm
10	0.7000 mm	0.6000 mm	0.6000 mm	0.5000 mm	0.4000 mm	0.3500 mm	0.2200 mm
11	1.0000 mm	0.7000 mm	0.7000 mm	0.6000 mm	0.5000 mm	0.4000 mm	0.2500 mm
12	1.4000 mm	1.0000 mm	1.0000 mm	0.7000 mm	0.6000 mm	0.5000 mm	0.3500 mm
13	2.0000 mm	1.4000 mm	1.4000 mm	1.0000 mm	0.7000 mm	0.6000 mm	0.4000 mm
14	3.0000 mm	2.0000 mm	2.0000 mm	1.4000 mm	1.0000 mm	0.7000 mm	0.5000 mm
15	4.0000 mm	3.0000 mm	3.0000 mm	2.0000 mm	1.4000 mm	1.0000 mm	0.6000 mm
16	5.0000 mm	4.0000 mm	4.0000 mm	3.0000 mm	2.0000 mm	1.4000 mm	0.7000 mm

Perspective Line Weights

1	0.0600 mm
2	0.1300 mm
3	0.1500 mm
4	0.1800 mm
5	0.2000 mm
6	0.2200 mm
7	0.2500 mm
8	0.3500 mm
9	0.4000 mm
10	0.5000 mm
11	0.6000 mm
12	0.7000 mm
13	1.0000 mm
14	1.4000 mm
15	2.0000 mm
16	3.0000 mm

Annotation Line Weights

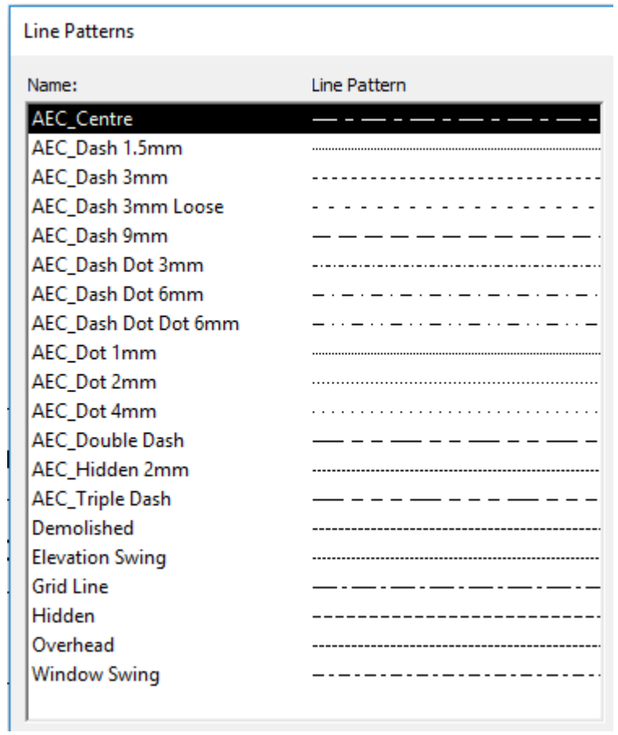
1	0.0600 mm
2	0.1300 mm
3	0.1500 mm
4	0.1800 mm
5	0.2000 mm
6	0.2200 mm
7	0.2500 mm
8	0.3500 mm
9	0.4000 mm
10	0.5000 mm
11	0.6000 mm
12	0.7000 mm
13	1.0000 mm
14	1.4000 mm
15	2.0000 mm
16	3.0000 mm

4.1b

Line Patterns

Typical line patterns are defined below:

Name	Pattern															
	1		2		3		4		5		6		7		8	
	Type	Value	Type	Value	Type	Value	Type	Value	Type	Value	Type	Value	Type	Value	Type	Value
AEC_Centre	Dash	12	Space	4	Dash	4	Space	4								
ARC_Dash 1.5mm	Dash	1.5	Space	1.5												
ARC_Dash 3mm	Dash	3	Space	3												
ARC_Dash 3mm Loose	Dash	3	Space	6												
ARC_Dash 9mm	Dash	9	Space	4												
ARC_Dash Doc 3mm	Dash	3	Space	2	Dot		Space	2								
ARC_Dash Dot 6mm	Dash	6	Space	4	Dot		Space	4								
ARC_Dash Dot Dot 6mm	Dash	6	Space	4	Dot		Space	4	Dot		Space	4				
ARC_Dot 4mm	Dot		Space	4												
ARC_Dot 1mm	Dot		Space	1												
ARC_Dot 2mm	Dot		Space	2												
ARC_Double Dash	Dash	15	Space	4	Dash	6	Space	4	Dash	6	Space	4				
ARC_Hidden 2mm	Dash	2	Space	1												
ARC_Triple Dash	Dash	15	Space	4	Dash	6	Space	4	Dash	6	Space	4	Dash	6	Space	4
Demolished	Dash	3	Space	1.5												
Elevation Swing	Dash	2	Space	1												
Grid Line	Dash	12	Space	3	Dash	3	Space	3								
Hidden	Dash	4	Space	2												
Overhead	Dash	2.5	Space	1.5												
Window Swing	Dash	6	Space	3	Dash	3	Space	3								



Line Styles

4.1b

Typical line styles are defined below:

Line Styles

Line Styles

Category	Line Weight Projection	Line Color	Line Pattern
Lines	1	RGB 000-166-000	Solid
<Area Boundary>	6	RGB 128-000-255	Solid
<Beyond>	1	Black	Solid
<Centerline>	1	Black	AEC_Centre
<Demolished>	1	Black	Demolished
<Fabric Envelope>	1	RGB 127-127-127	AEC_Dash 3mm
<Fabric Sheets>	1	RGB 064-064-064	Solid
<Hidden>	1	Black	Hidden
<Overhead>	1	Black	Overhead
<Room Separation>	1	Black	AEC_Dash 3mm
<Sketch>	3	Magenta	Solid
<Space Separation>	1	Black	AEC_Dash 3mm
AEC_1-Solid	1	Black	Solid
AEC_3-Soild	3	Black	Solid
AEC_5-Soild	5	Black	Solid
AEC_6-Soild	6	Black	Solid
AEC_7-Soild	7	Black	Solid
AEC_8-RNF_Mesh	8	Black	AEC_Dash Dot 6mm
AEC_8-Soild	8	Black	Solid
AEC_9-Soild	9	Black	Solid
AEC_10-DPC	10	Magenta	Solid
AEC_10-DPM	10	RGB 000-128-000	AEC_Double Dash
AEC_10-Soild	10	Black	Solid
AEC_11-Rebar	11	Black	Solid
Axis of Rotation	6	Blue	AEC_Centre
Hidden Lines	1	RGB 000-161-000	AEC_Dash 3mm
Insulation Batting Lines	1	Black	Solid
Lines	1	RGB 000-161-000	Solid
Medium Lines	3	Black	Solid
Thin Lines	1	Black	Solid
Wide Lines	5	Black	Solid

Dimensioning

Default dimension styles exist in the accompanying templates and new styles shall be added only if authorised by the BIM Co-ordinator.

- Where practical, all dimensioning shall be created using relevant software dimensioning tools. The dimension text shall not be exploded or overridden but can be appended to e.g. “1200 (Typ.)”.
- Where practical, avoid duplicate dimensioning either within a drawing or within a set of drawings.
- Where practical, dimension lines shall not be broken and shall not cross other dimension lines.
- In general, dimensions shall be placed on a drawing so they may be read from the bottom or right-hand side of the drawing.
- In general, dimension text shall be placed above the dimension line and shall be clear of other lines so that they are legible.
  - In general, dimension styles shall adopt standard engineering style dimensioning using closed filled 20° arrow head. (Deviation: Architectes may use diagonal tick style)
  - Dimension units shall be predefined within the style, and not left to default to the project units.
  - Default dimension styles shall not be overridden.

Dimension style naming convention

Field 1	Field 2	Field 3	Field 4	Filed 5
Text size	String type / Fonts	Tick mark	(Units)	Description

Field 1: **Text Size**

Size of text used on the dimension in the appropriate units.

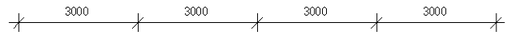
1.8 1.8mm

2.5 2.5mm

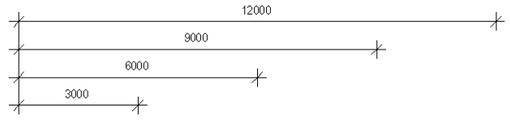
Field 2: **String Type** (optional)

Dimension String Type

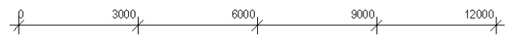
CON Continuous



BAS Baseline



ORD Ordinate



If the string type is fixed for the entire project, string type is not a necessary part of dimension naming.

Font (optional)

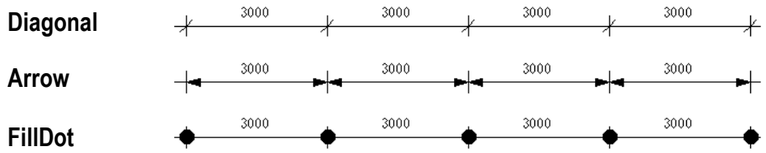
ALN Arial Narrow

ARL Arial

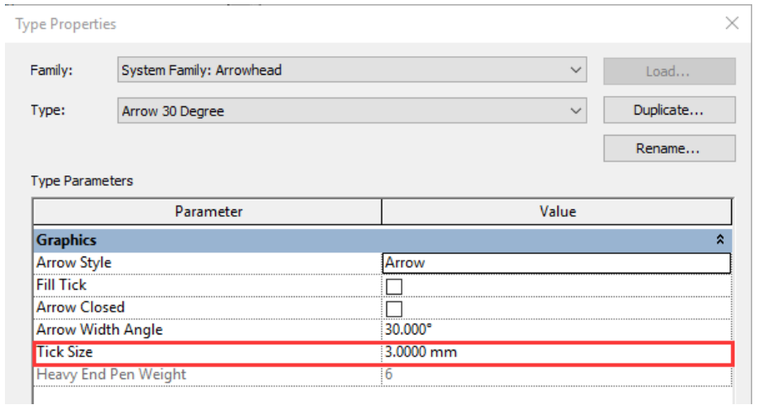
If the font is fixed for the entire project, font is not a necessary part of dimension naming.

Field 3: **Tick Mark**

Description of the tick mark used on the dimension style such as Dot, Arrow or diagonal tick marks.

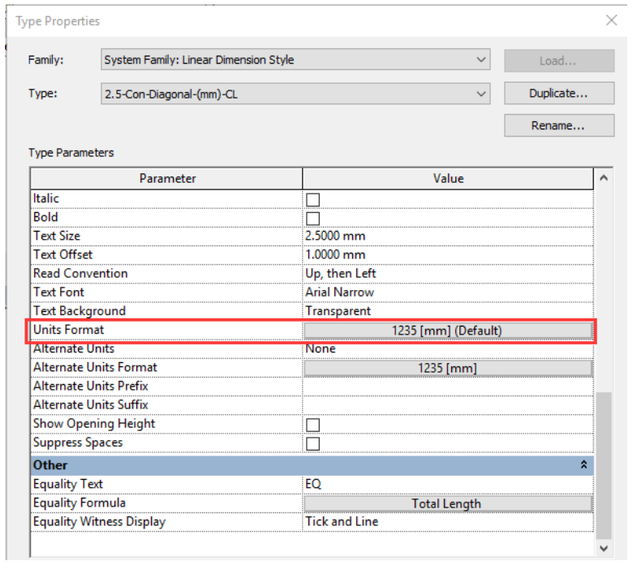


If the size of the available tick mark is not suitable, you could revise the tick mark size under Settings – Additional Settings – Arrowhead



Field 4: **(Units)**

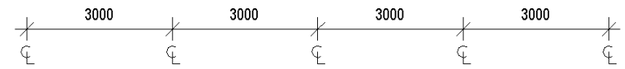
The reporting units of the dimension style is “mm”



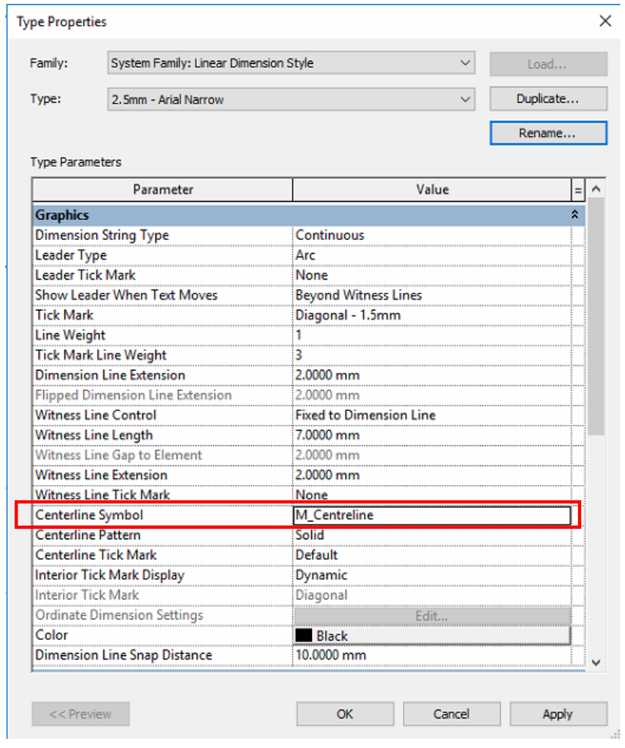
Field 5: **Description** (Optional)

Provision for distinguishing specific dimension styles.

CL Centreline



Make sure the Generic Annotation Family, such as M_Centreline from Revit Library/Annotation, is loaded into the Revit project.





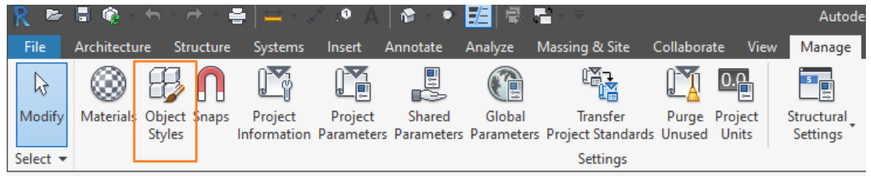
Examples:

Name	Description
1.8-Con-Arrow-(mm)	Continuous arrow with text size at 1.8mm
2.5-Con-Diagonal-(mm)-CL	Continuous diagonal centreline with text size at 2.5mm
2.5-Arrow-(deg)	Degree arrow with text size at 2.5

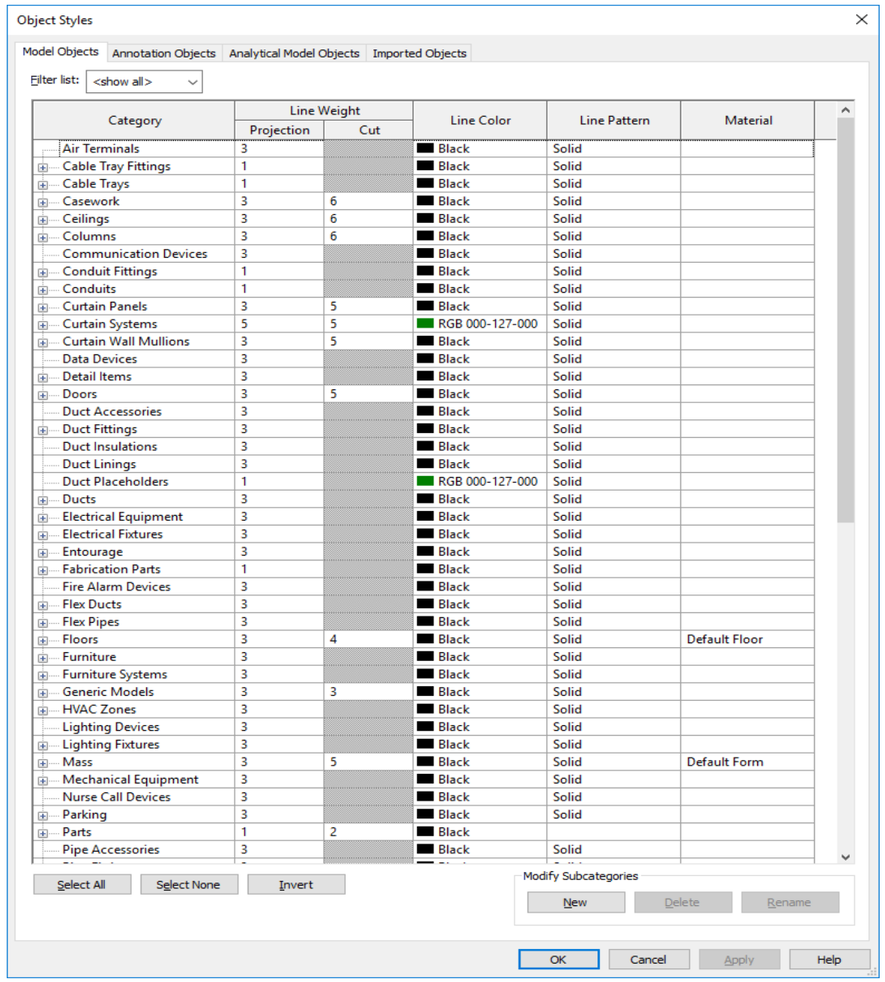
PS-11 Object Styles – Model

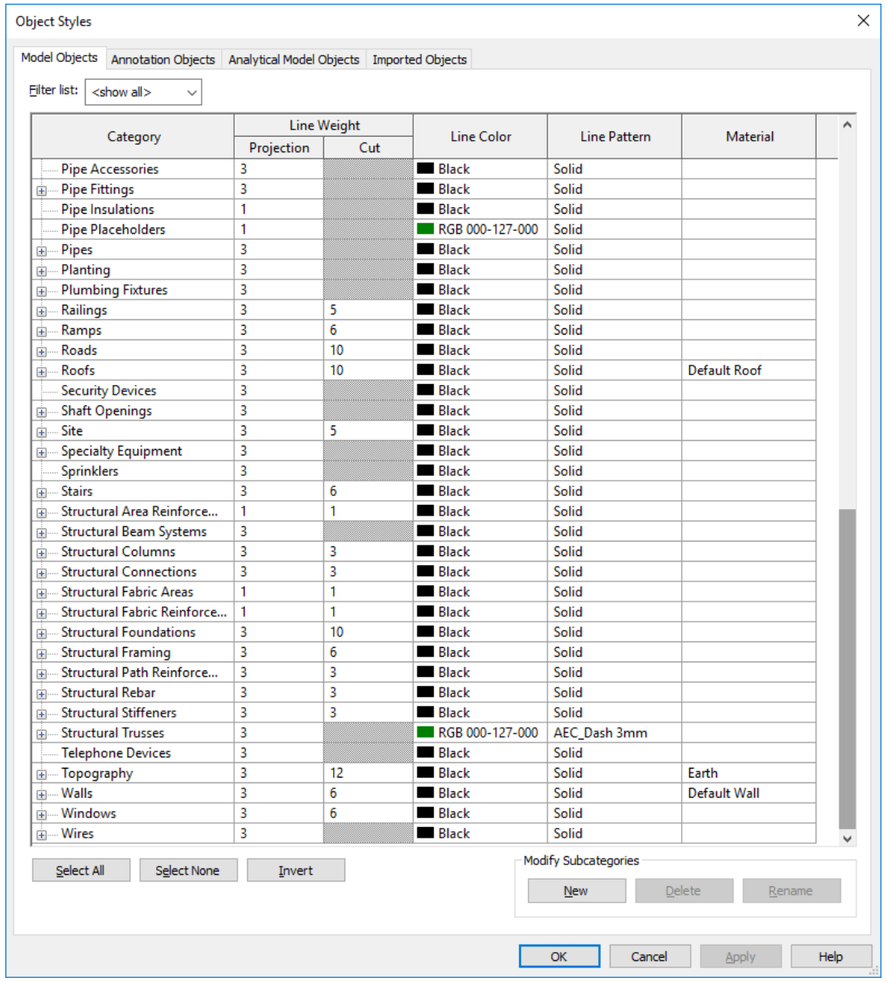
General

For structural BIM object presentation styles, modeller can make reference to Appendix C – HKHA AutoCAD Layering System of HA CAD standard – Computer Aided Drafting Standards for Development & Construction Division (CAD Standards for DCD).
Object style settings can be found under Manage > Settings > Object Style.



Typical Object Styles are defined below:





PS-12 2D Details

General

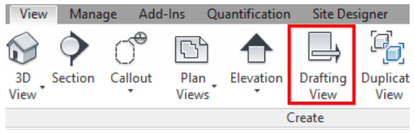
Although CIC standard suggests that fully assemble compilation of views and sheets within the BIM environment is preferable, it is not necessary to build full set of drawing compilation within Revit.

- Most of the details in 1:20, 1:10 or 1:5 could be sourced from CAD database. It is only necessary to keep a blank sheet in a sequence to occupy the drawing number.
- Make sure the titleblock in CAD and Revit are identical.
- All other drawings setting from CAD and Revit are identical, e.g. font style and size, annotation setting, line weight and line type.

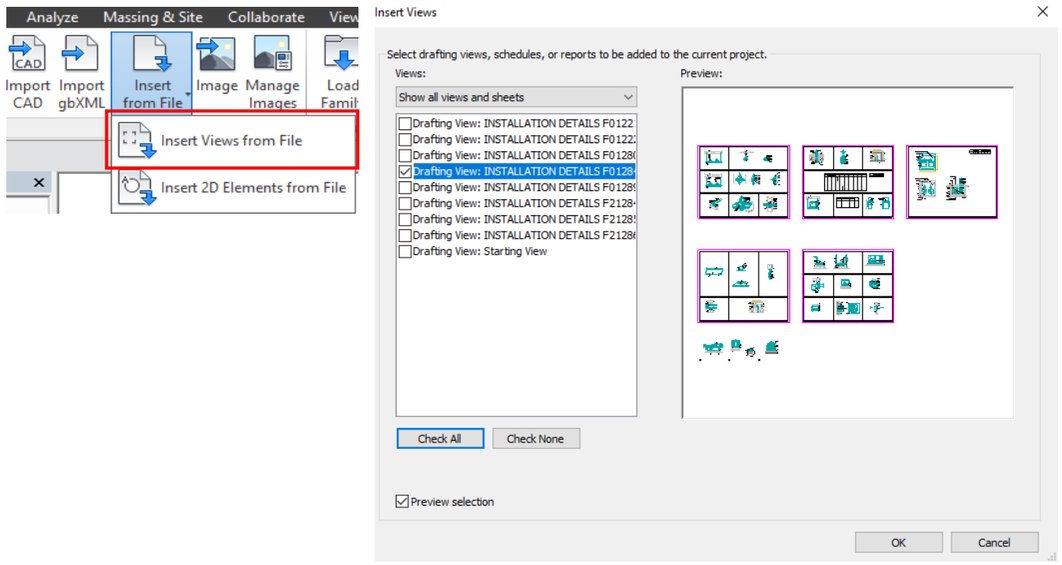
The following guidance demonstrate how to prepare and manage the detail drawings within Revit.

Detail Views Management

- Detail View model file mastering all the detail views for each discipline shall be created.
- Insert existing details in CAD format into Drafting View in Detail View model file.



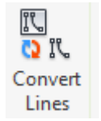
- All the presentation style for the imports, such as text, line weight and colour fill etc, shall be modified according to the presentation requirements.
- During drawing production, suitable details can be added to the drawing file by “Insert Views from File” from corresponding Detail View file.

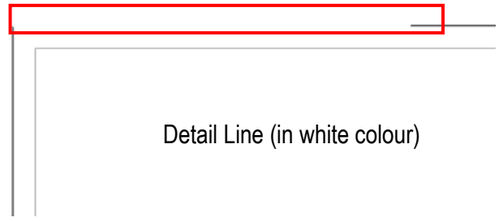


- Common details drawn in Revit files or existing projects shall be inserted back to the Detail View model file by using the same insertion approach mentioned above.

Using 2D Details to Facilitate Drawing Compliance

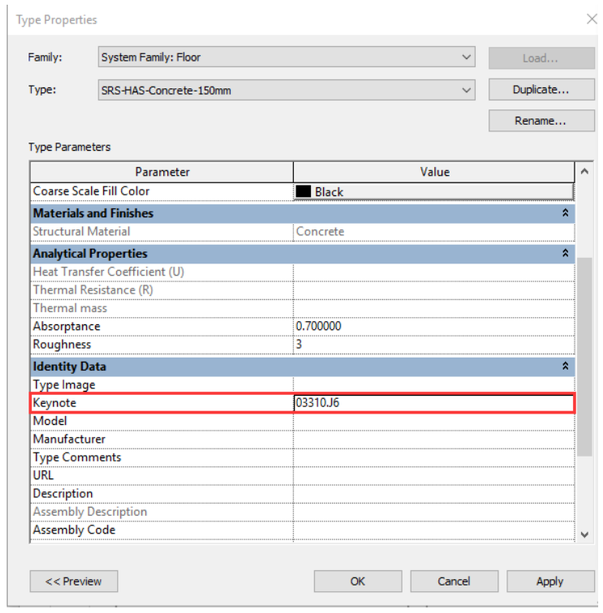
- Use line weight to hide additional redundant lines.
- Create a line type in white colour, then convert the line to detail line.



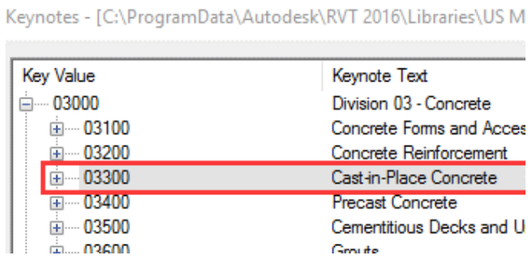


PS-13 Keynote

- Keynote is a parameter available for all model elements (including detail components) and materials. The parameter could be tag by using a keynote tag family. The keynote value is derived from a separate text file that contains a list of keynotes.
- Keynote files are text files that define the categories and keynote values assigned to element types, material and individual elements.
- Keynote is a database which could be linked to E-spec for tendering specification preparation.
- Default keynoting data provided in Revit are based on the 1995 Construction Specification Institute (CSI) Master format system, which use 16 divisions to organise construction processes and materials. This system is widely used in the United States.



Keynote in elements



Keynote database

D5.4 Drawing Set-up for ICU Submission

In 2019, Buildings Department (BD) published ***Guidelines for Using Building Information Modelling in General Building Plans Submission***. The Guidelines specify the expected quality of drawings, views and data generated from BIM as well as source models.

In September 2020, Independent Checking Unit (ICU) published ***BIM Standards and Modelling Guidelines for Statutory and Building Control Submission of General Building Plan, Foundation Plan and Superstructure Plan.*** This document provides step-by-step tutorials on developing models whose contents and settings are adequate for producing GBPs, Foundation Plans and Superstructure Plans.

For preparation of ICU submission drawings from BIM models, users shall refer to the above-mentioned BIM Standards and Modelling Guidelines published by ICU.

This section aims to document supplementary guidance notes for users' additional information.

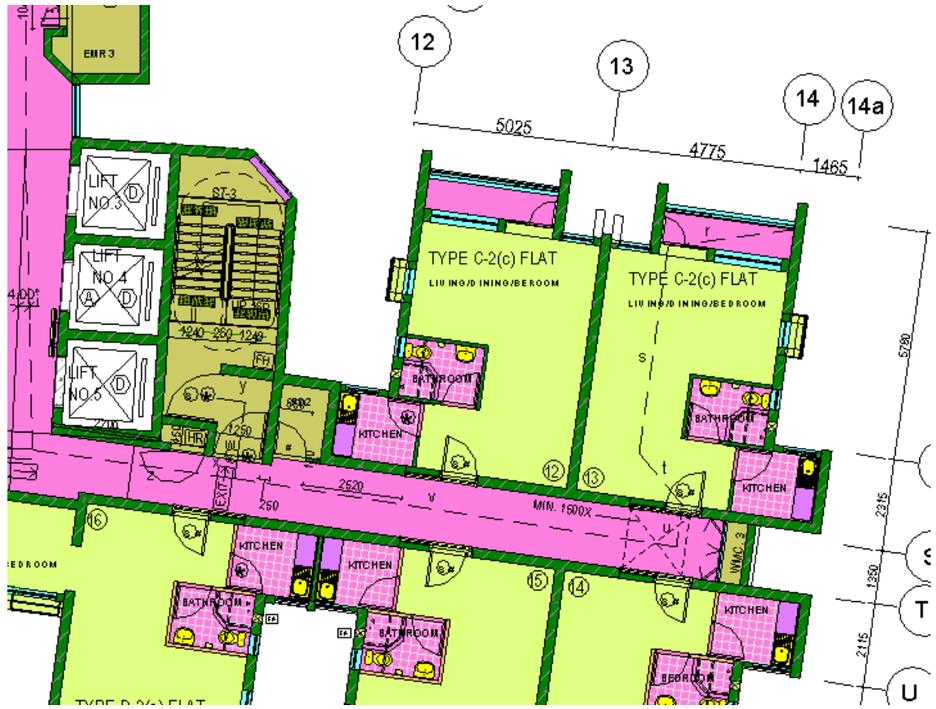
Points to note

- All annotations such as dimensions and tags shall be added in Drawing Files. Refer to **D.MET-2.5 of D3.2** for further details.
- To control visibility / graphic settings solely for ICU views and drawings, apply suitable **filters** to different categories and elements and override the visibility setting for Revit Links if necessary.
- (Applicable for Revit 2018 or early version only) For complicated presentation styles, such as more than one hatch for a category, duplicate of views with wireframe visual style and suitable visibility settings shall be prepared. By overlapping the views on same sheet and position using Grid Guide (similar concept as layers in CAD), the drawings can fulfil the authority requirements.

a) ICU GBP Submission (DDRP)

i. Annotation / Presentation

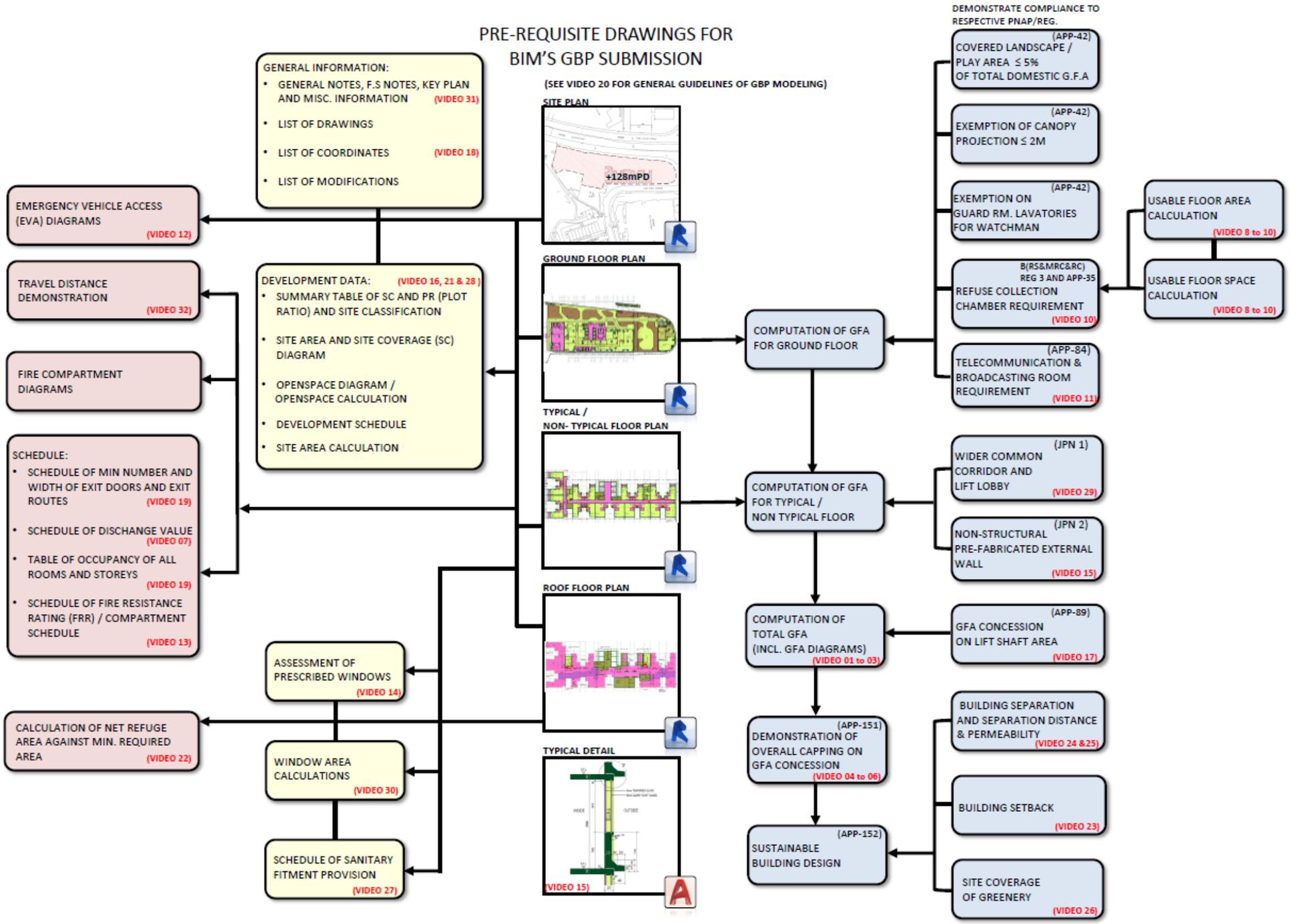
Below show a typical example of the expected output of a ICU GBP Submission typical floor plan:



To facilitate preparation of ICU GBP Submission, presentation settings for GBP Submission can be found from the HA Architectural Template, which can be found from HA ProjectWise. For location of the file, refer to ANN-1.3a of ANN-1 in HABIMSG Annex.

ii. Pre-requisite Drawings for BIM's GBP Submission

- Users may also refer to ICUSG "Pre-requisite Drawings for BIM's GBP Submission" for a list of training videos and their sequential relationships.



b) Foundation Plan Submission Set-up

i. General view settings

General view properties such as View scale, Detail Level, Visibility/Graphic Overrides, etc. are set in "Structural Foundation Plan" view template in HA SE Revit template. User can base on this settings to further develop a project-specific view template for structural foundation plan drawing production, if necessary.

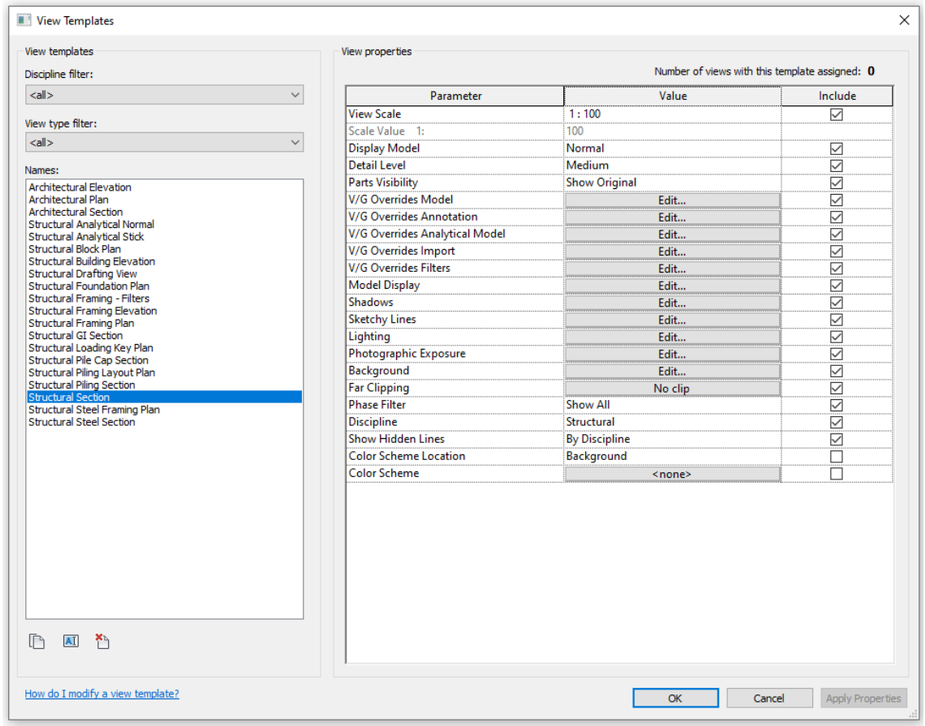


Figure 4-14 View Properties of Structural Foundation Plan view template

ii. General Object style setting for structural foundation elements

Structural foundation element Object style properties such as Line Weight, Line colour and Line Pattern are set in HA SE Revit template.

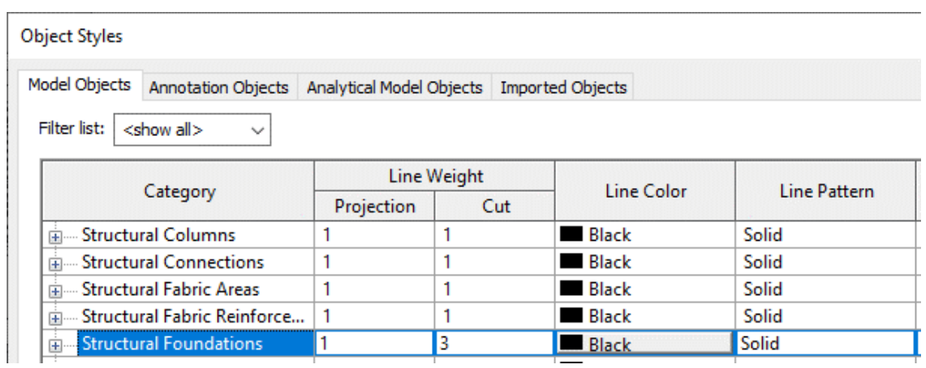
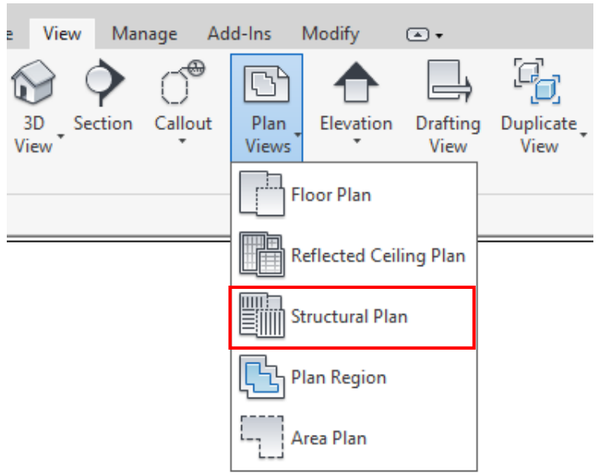


Figure 4-15 Object Style setting for Structural Foundation

iii. Key steps for generation of a foundation plan

Before conducting the foundation plan generation, please make sure the model is correctly created and no conflict or error is found. View template for foundation plan generation may needs updates subject to project specific requirement, for example, the View Scale, View Range, etc., may need adjustments.

Step 1. Create a plan view for foundation layout plan by using Structure Plan command under View > Plan Views > Structural Plan.



Foundation plan view will be created with default presentation styles as below figure.

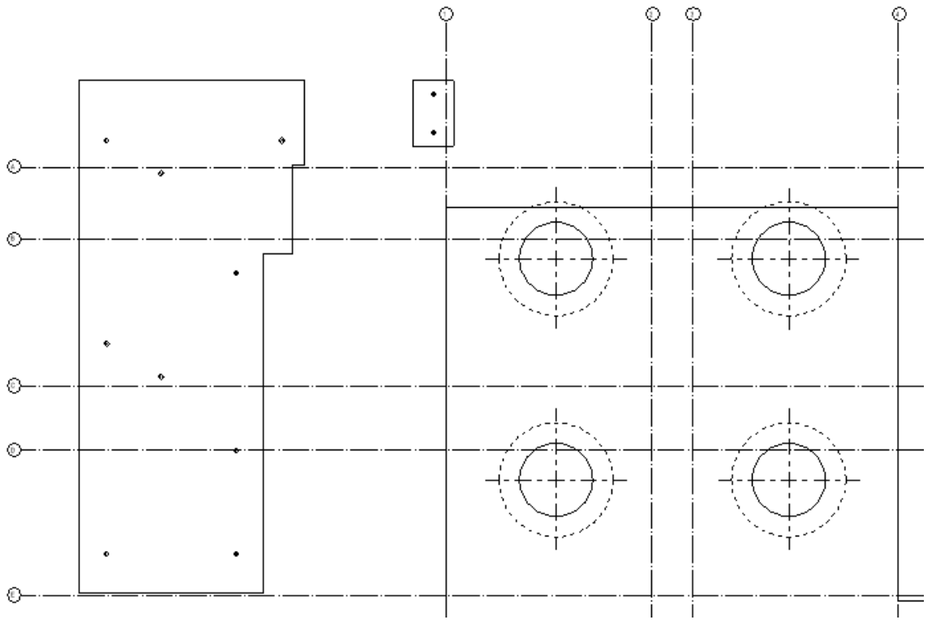
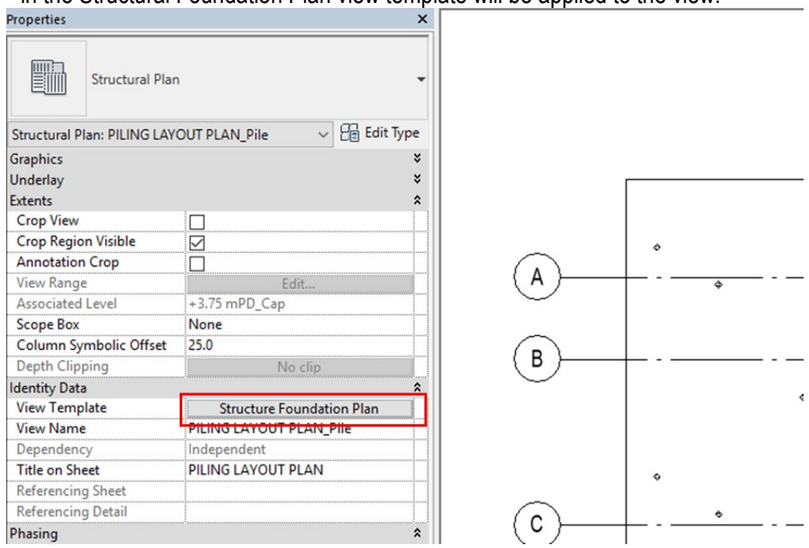
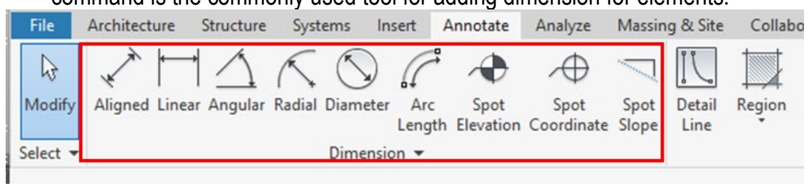


Figure 4-16 Example of default foundation plan view

Step 2: Apply Structural Foundation Plan view template to the foundation plan view so that the settings in the Structural Foundation Plan view template will be applied to the view.



Step 3: Add dimension by using Dimension tools under Annotate > Dimension. Aligned command is the commonly used tool for adding dimension for elements.



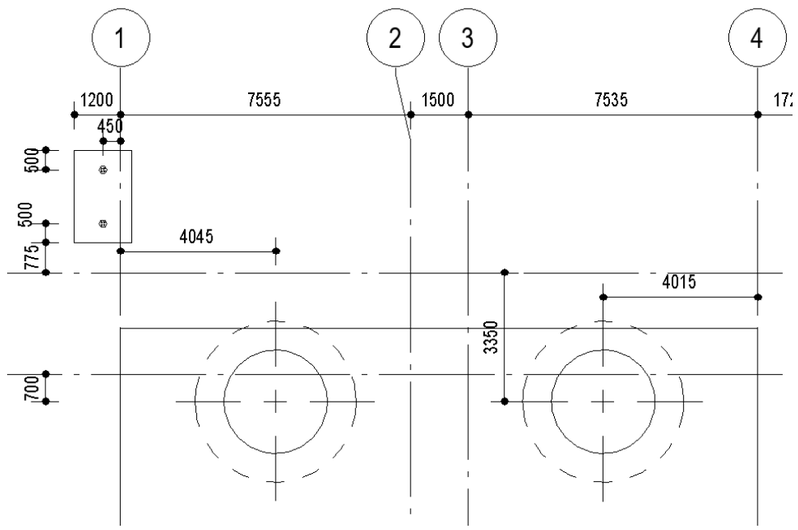


Figure 4-17 Example of dimensions added by using Dimension tools

Step 4: Add contour line labels using Label contours command 
.

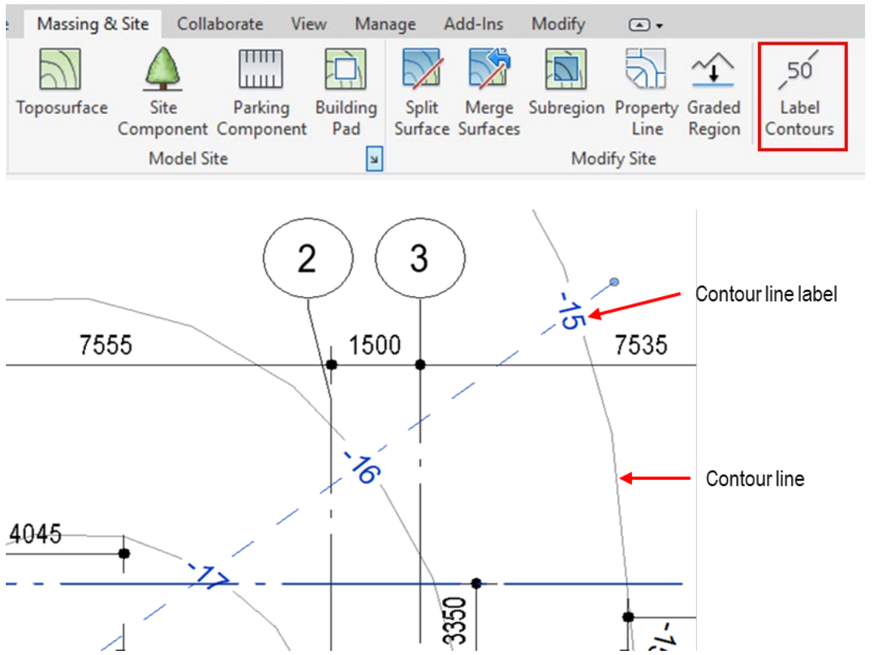
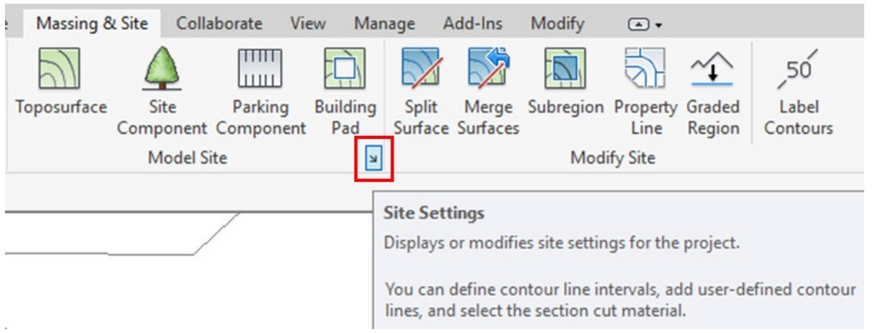


Figure 4-18 Example of contour line label added by using Label Contours tool

Step 5: Set rockhead contour line interval under Massing & Site > Model Site > Site Settings



In the Site Setting dialog, set the contour line intervals at the Contour Line Display items. Please note that the units of Intervals are mm by default.

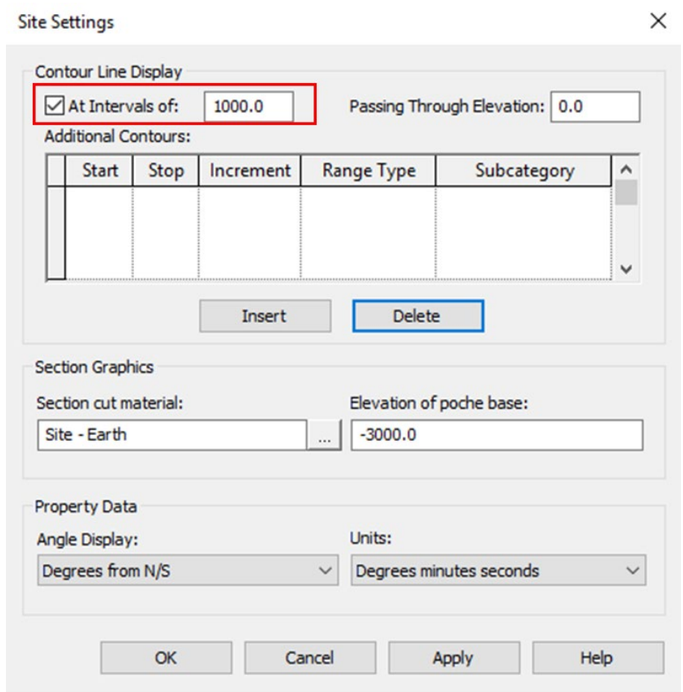


Figure 4-19 Rockhead contour line interval settings

Step 6: Drawing site boundary by using Detail Line

under Annotate > Detail > Detail Line.

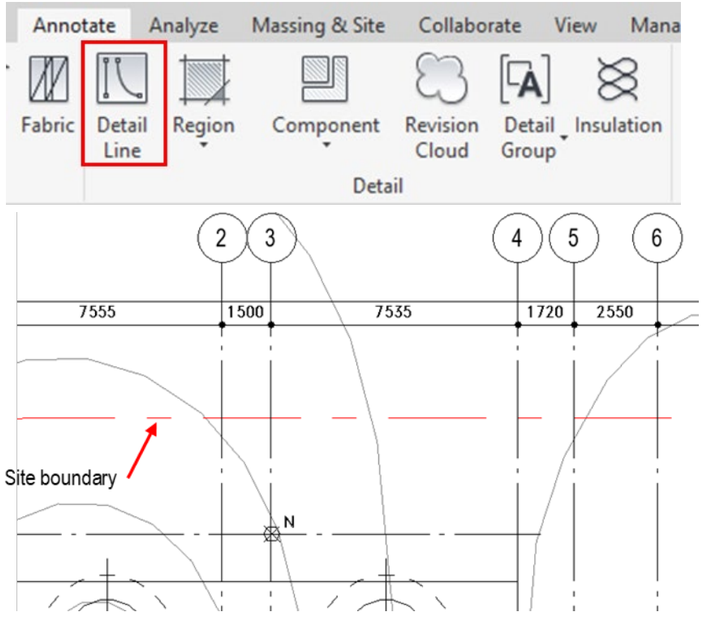


Figure 4-20 Example of site boundary drawn by using Detail Line

Step 7: Place drill hole mark by using Symbol 

under Annotate > Symbol > Symbol

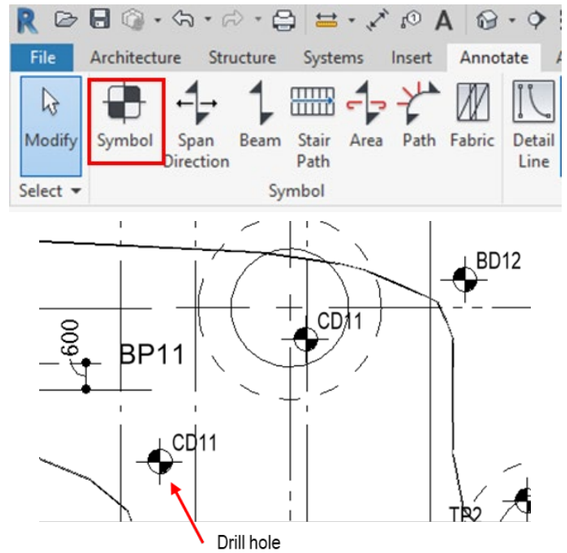
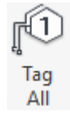


Figure 4-21 Example of drill hole mark created by using Symbol command

Step 8: Add tags to elements by using Tag All command 

under Annotate > Tag > Tag All. Location of some tags needs adjustment.

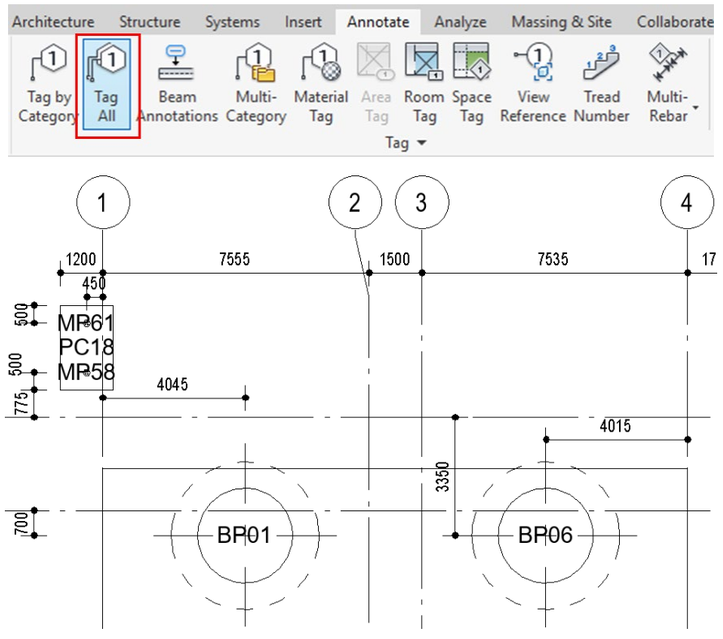


Figure 22 Example of pile tags added by Tag All command, which need location adjustment

Step 9: Adjust the tag location by dragging the tags.

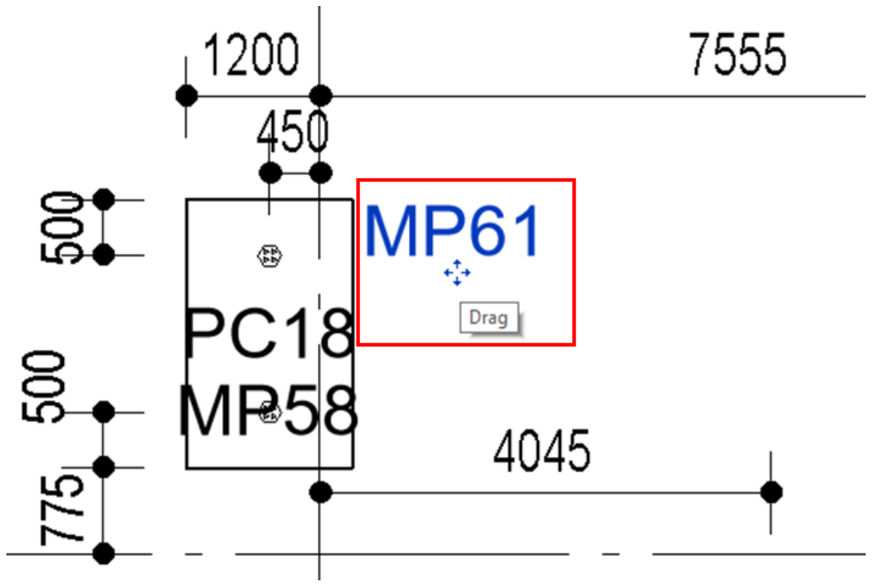


Figure 4-23 Adjust tags location by dragging

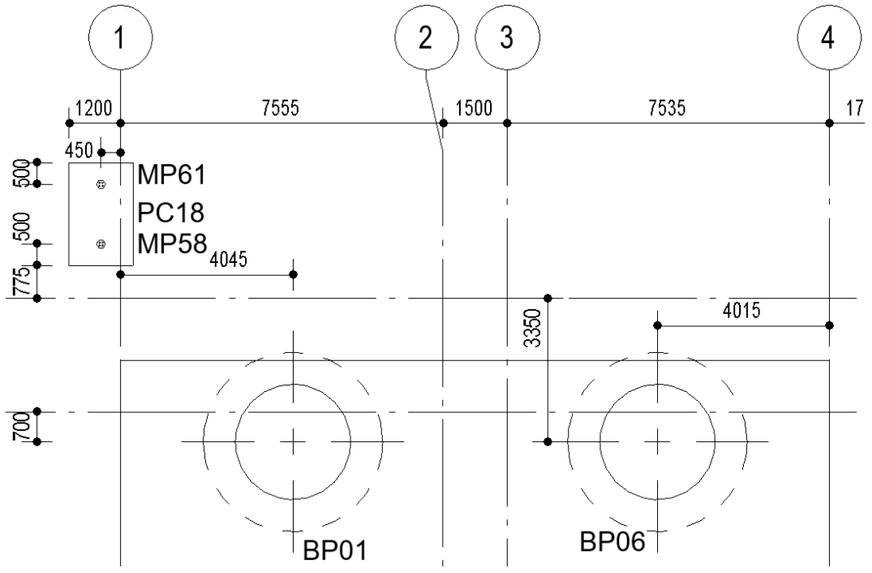


Figure 4-24 Pile tags after location adjustment

After above step 1 to 9, the foundation layout plan is generated as below example:

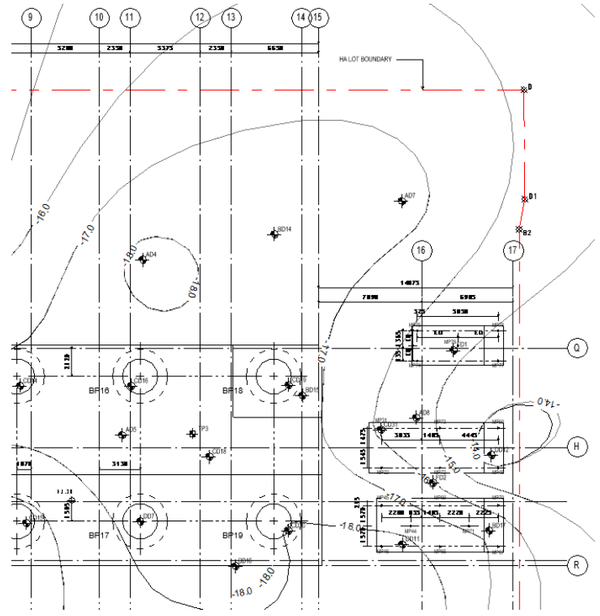
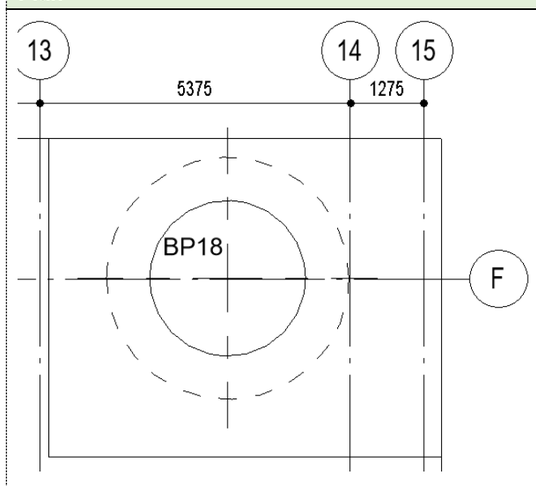
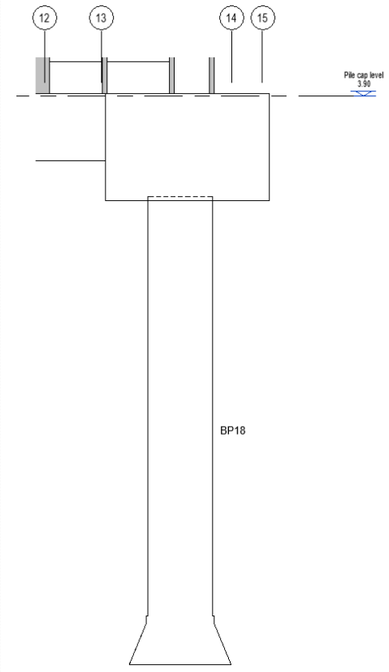


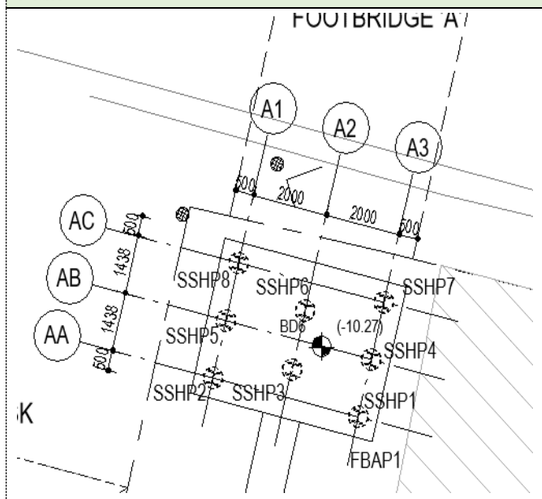
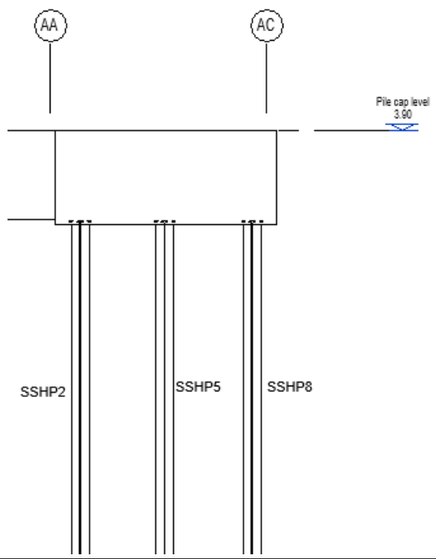
Figure 4-25 Example of foundation layout plan(partial)

iv. Presentation style of key foundation elements

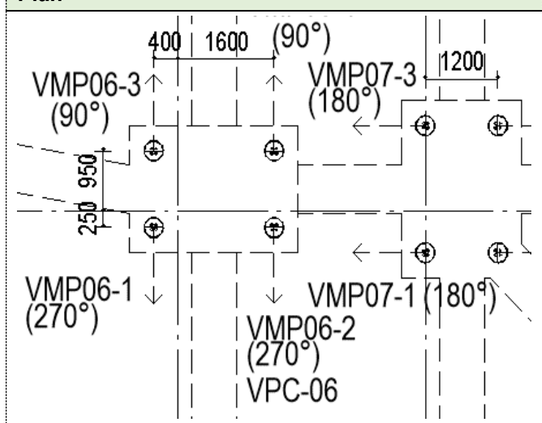
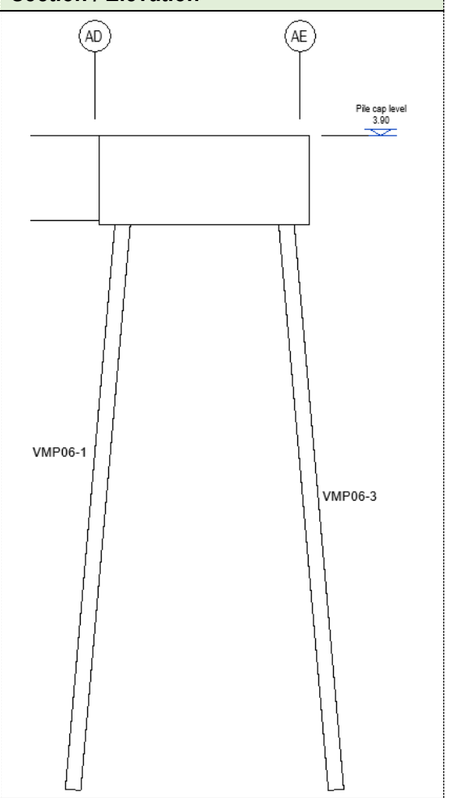
Bored Piles

Plan	Section / Elevation
	

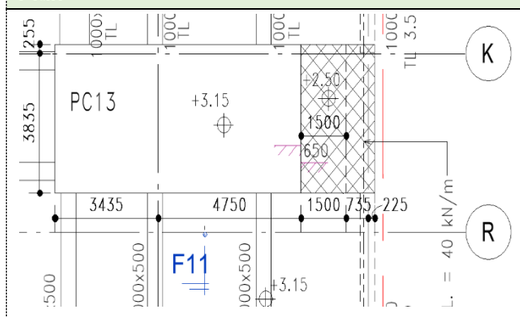
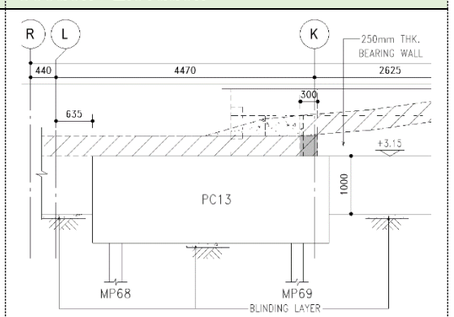
Socketed Steel H Piles

Plan	Section / Elevation
	

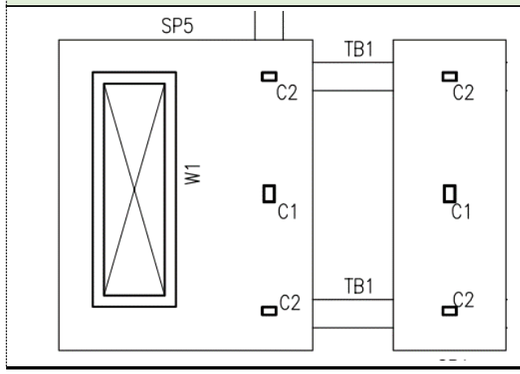
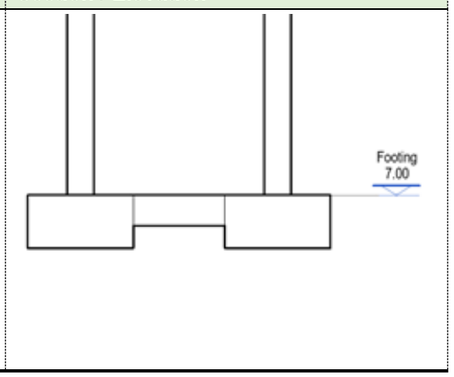
Mini-Piles

Plan	Section / Elevation
	

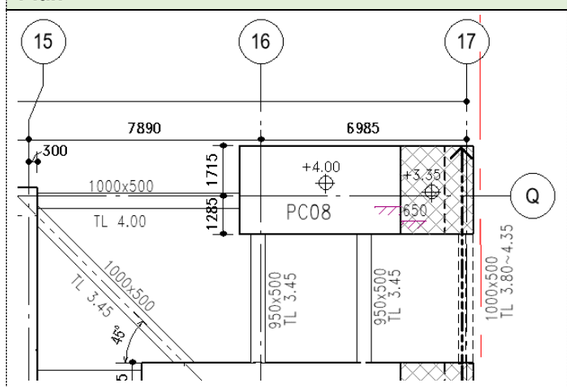
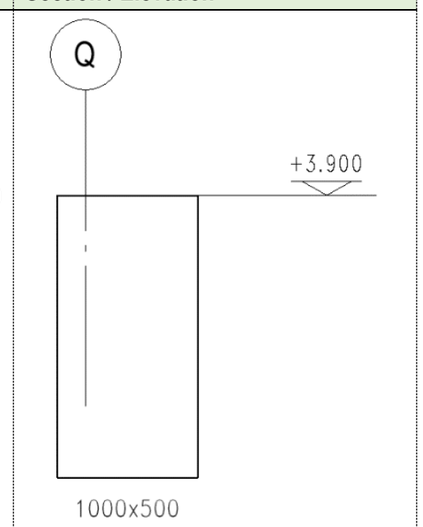
Pile Caps

Plan	Section / Elevation
	

Footings

Plan	Section / Elevation
	

Tie Beam

Plan	Section / Elevation
	

c) Superstructure Plan Submission Set-up

i. General view settings

General view properties such as View scale, Detail Level, Visibility/Graphic Overrides, etc. are set in "Structural Framing Plan" view template in HA SE Revit template. User can base on this settings to further develop a project-specific view template for superstructure plan drawing production, if necessary.

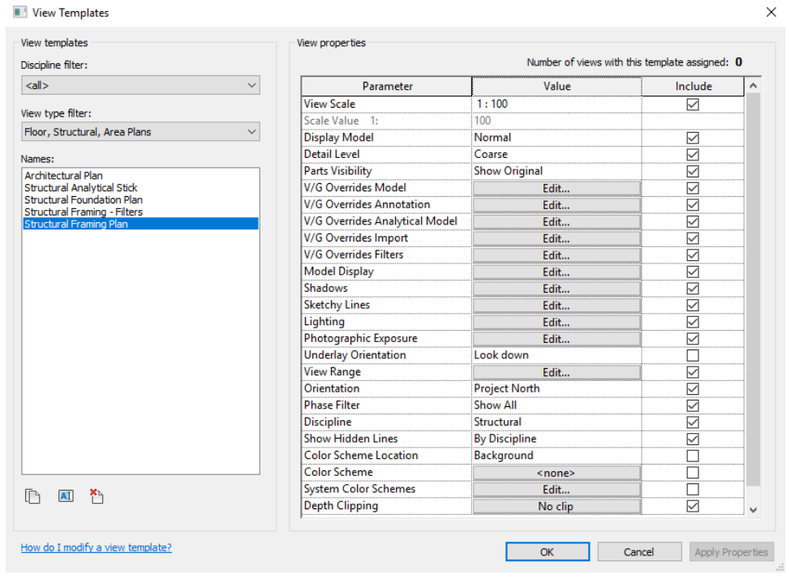


Figure 4-26 View Properties of Structural Framing Plan view template

ii. General Object style setting for superstructure elements

Superstructure elements Object style properties such as Line Weight, Line colour and Line Pattern are set in HA SE Revit template.

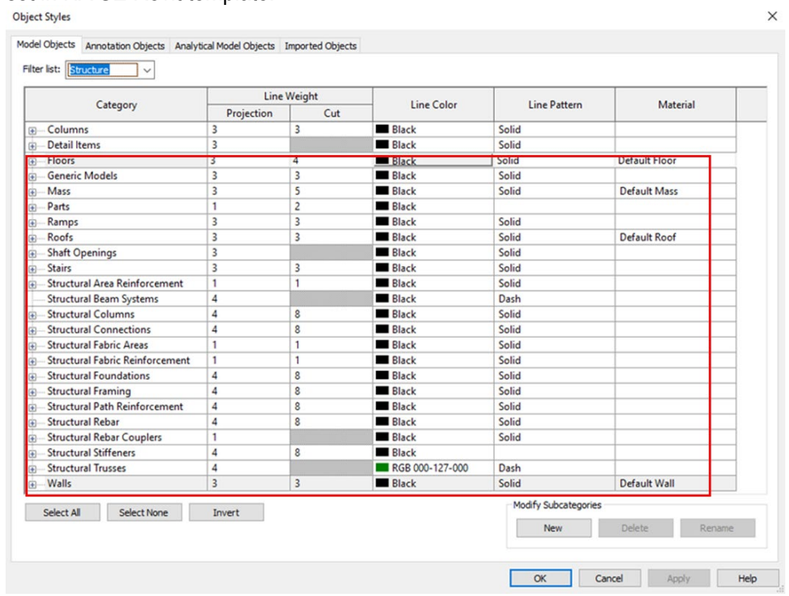
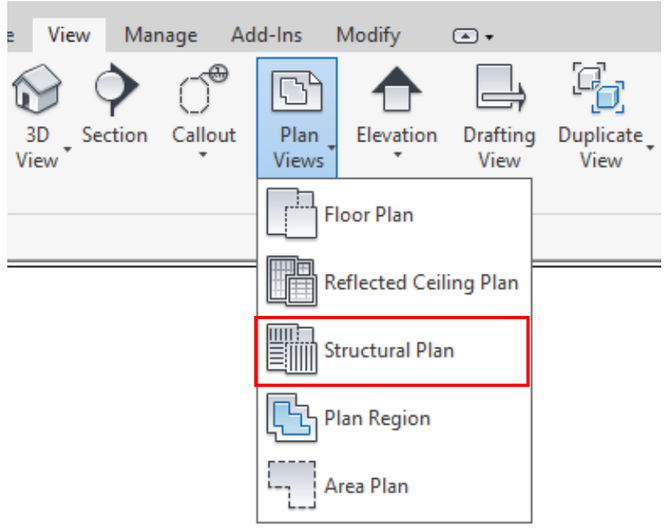


Figure 4-27 Object Style settings for superstructure elements

iii. Key steps for generation of a superstructure plan

Steps for generation of a superstructure plan is similar with steps for generation of a foundation plan. Before conducting the superstructure plan generation, please make sure the model is correctly created and no conflict or error is found. View template for superstructure plan generation may needs updates subject to project specific requirement, for example, the View Scale, View Range, etc., may need adjustments.

Step 1: Create a plan view for foundation layout plan by using Structure Plan command under View > Plan Views > Structural Plan.



A structural framing plan view will be created with default presentation style as below figure.

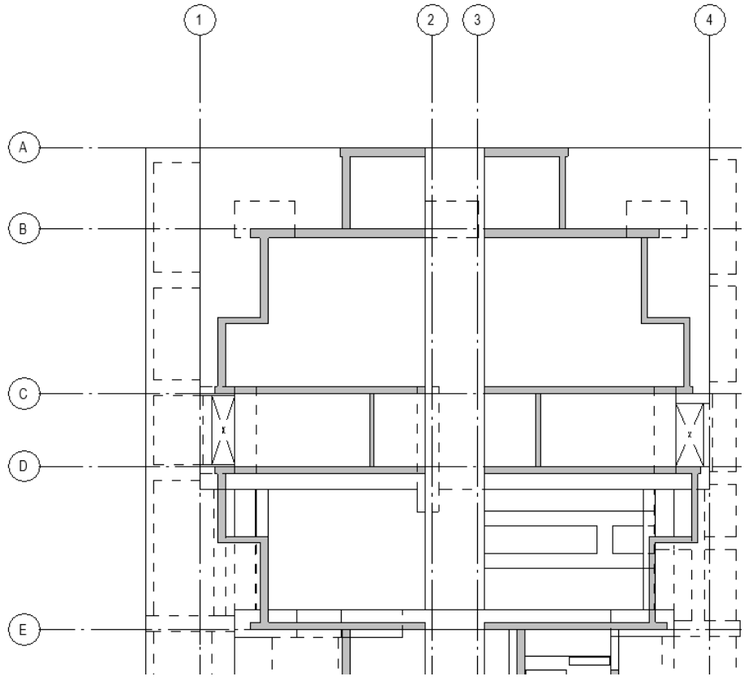


Figure 4-28 Example of a structure framing plan generated by default settings

Step 2: Apply Structural Framing Plan view template to the structural framing plan view so that the settings in the Structure Framing Plan view template will be applied to the view.

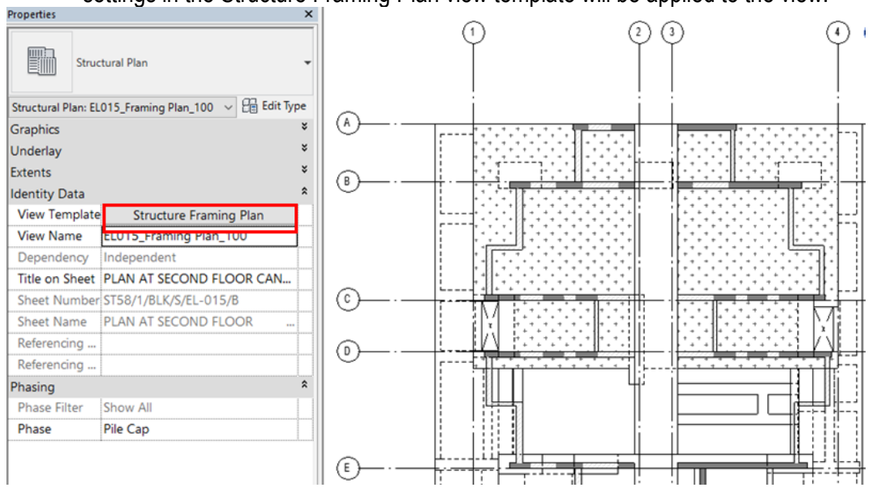
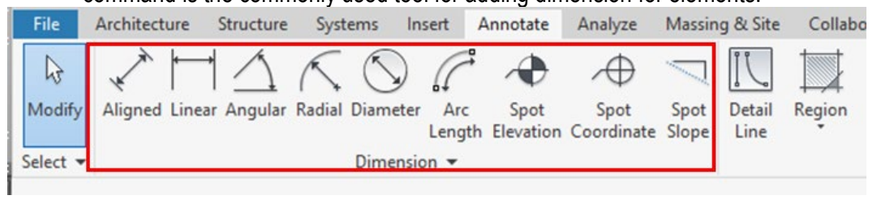


Figure 4-29 Example of structural framing plan after applying Structural Framing Plan view template

Step 3: Add dimension by using Dimension tools under Annotate > Dimension. Aligned command is the commonly used tool for adding dimension for elements.



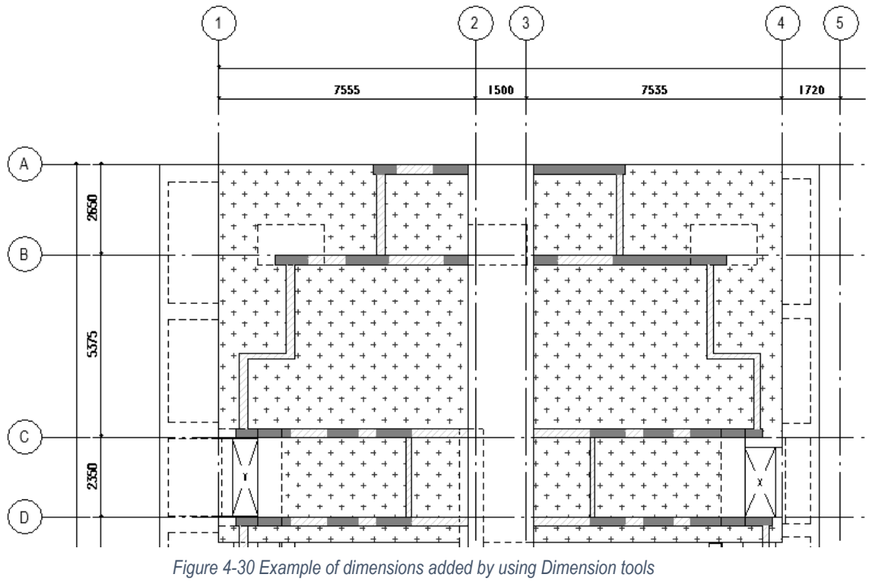


Figure 4-30 Example of dimensions added by using Dimension tools

Step 4: Add tags to elements by using Tag All command under Annotate > Tag > Tag All. Location of some tags needs adjustment.

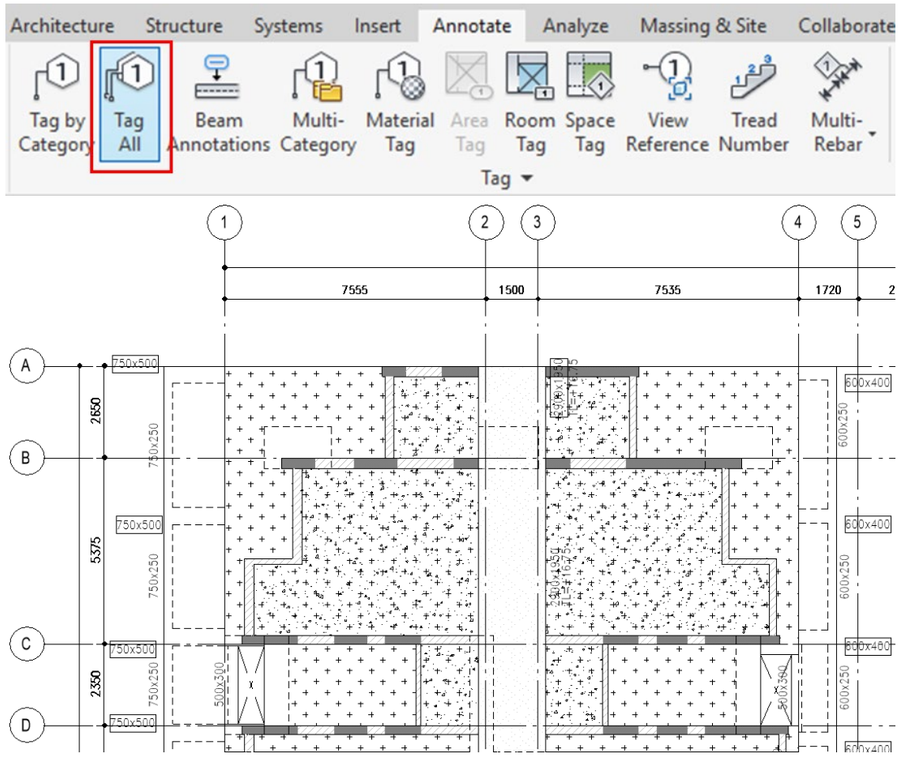


Figure 4-31 Example of beam marks added by Tag All command, which need location adjustment.

Step 5: Adjust the tag location by dragging the tags.

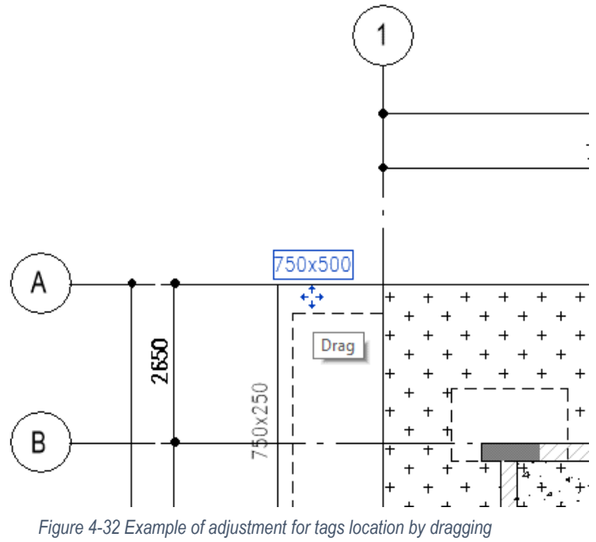


Figure 4-32 Example of adjustment for tags location by dragging

Step 6: Add Span Mark by using Span Direction tool under Annotate > Symbol > Span Direction.

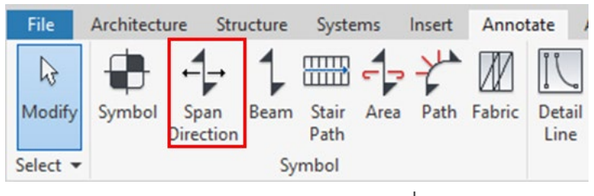
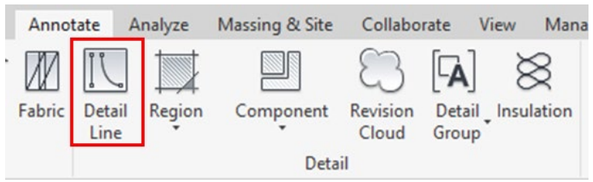


Figure 4-33 Example of span mark added by using Span Direction command

Step 7: Draw opening symbols by using Detail Line under Annotate > Detail > Detail Line.



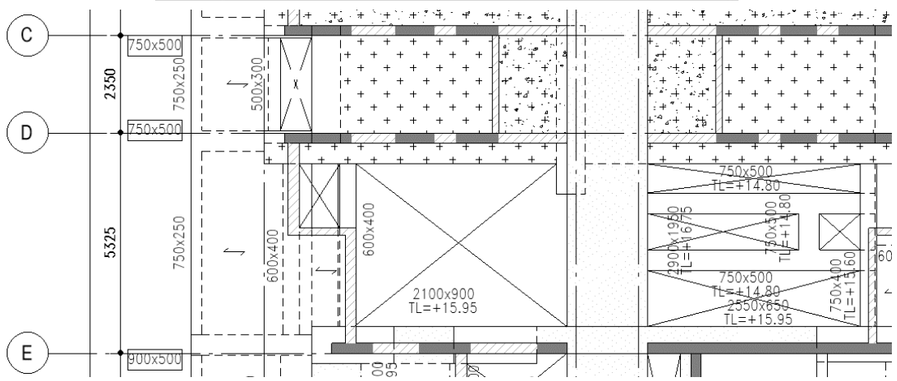
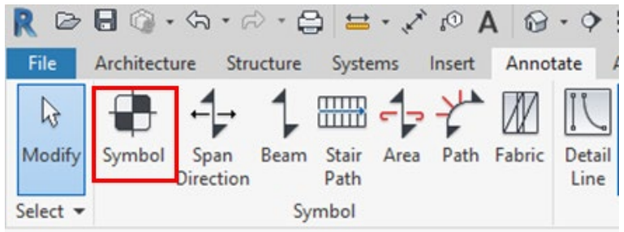


Figure 4-34 Example of opening drawn by using Detail Line

Step 8: Place slab step symbol by using Symbol under Annotate > Symbol > Symbol



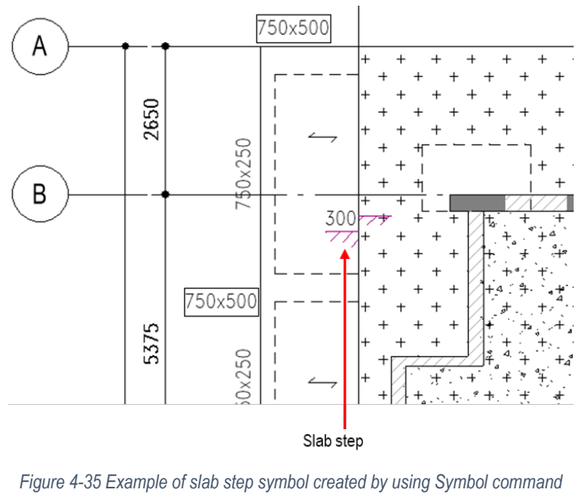
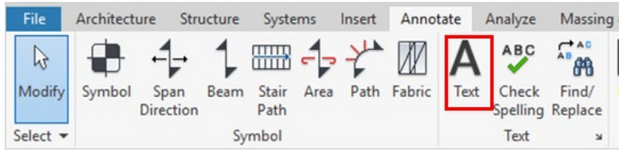


Figure 4-35 Example of slab step symbol created by using Symbol command

Step 9: Add note by using Text command under Annotate > Text > Text.



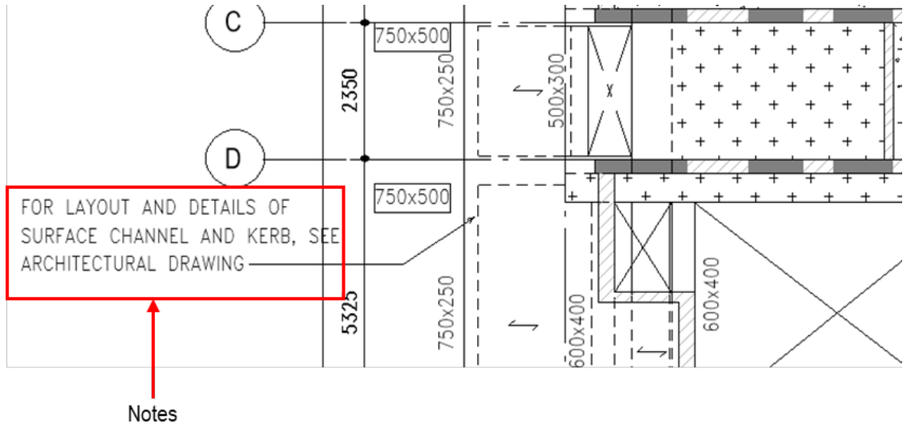


Figure 4-36 Example of Note added by Text command

After above step 1 to 9, a structural framing plan is generated as below example:

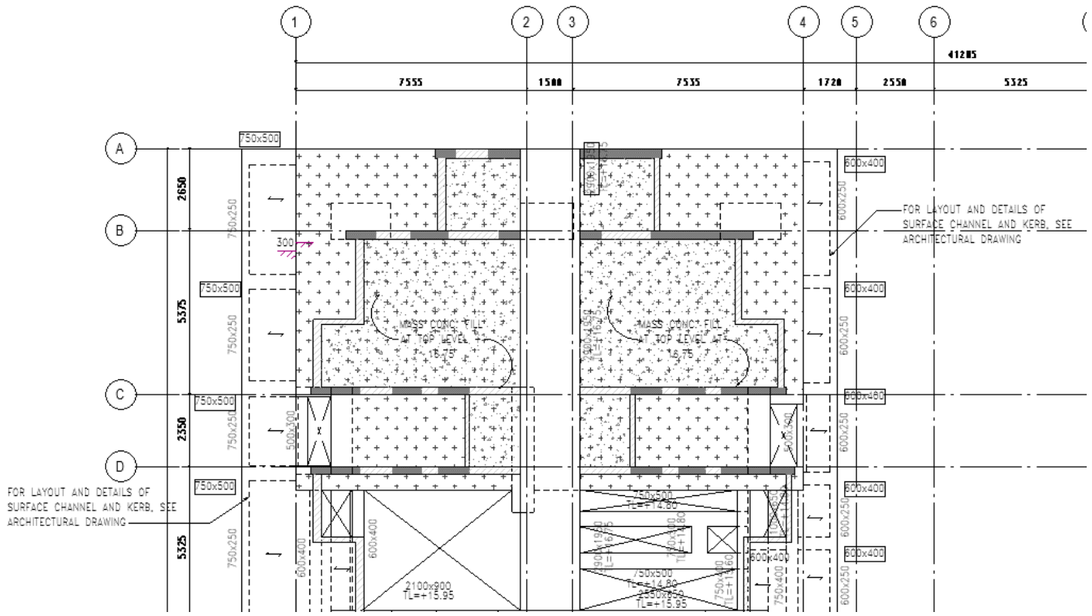
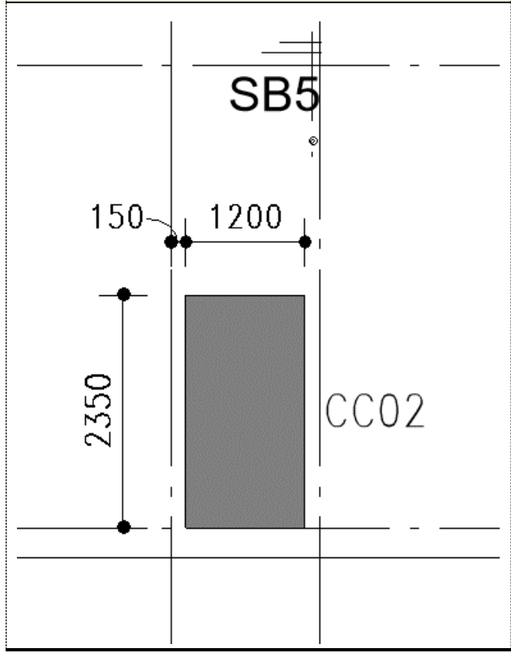
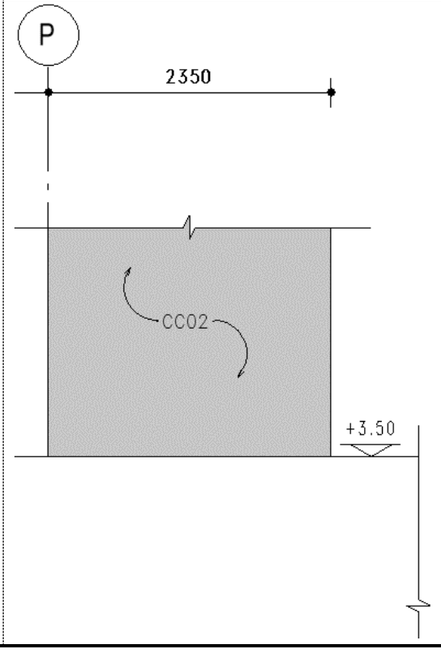


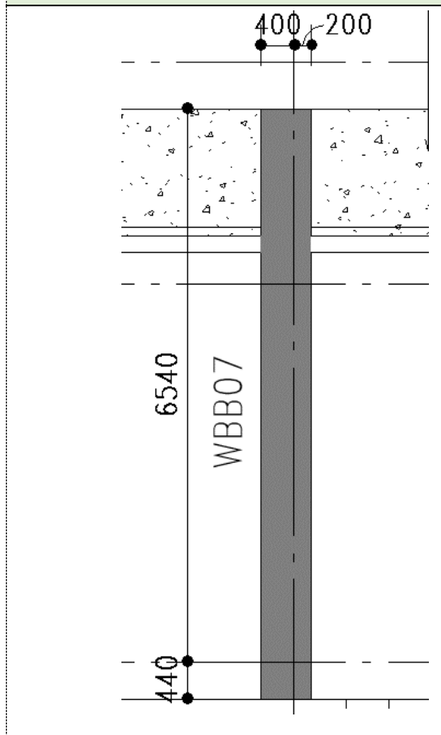
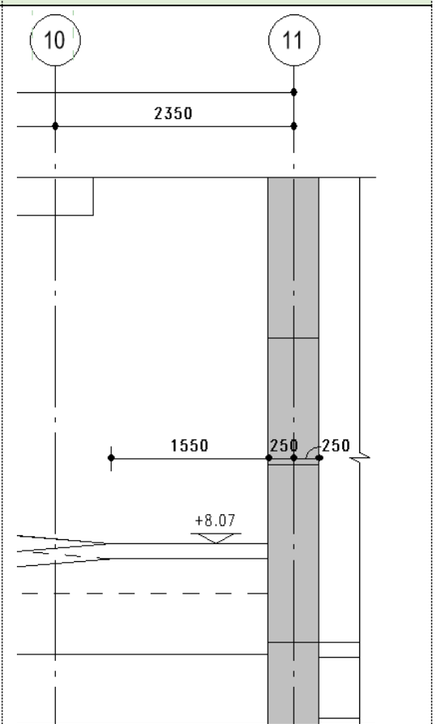
Figure 4-37 Example of a structural framing plan(partial)

iv. Presentation style of key superstructure elements

Structural Column

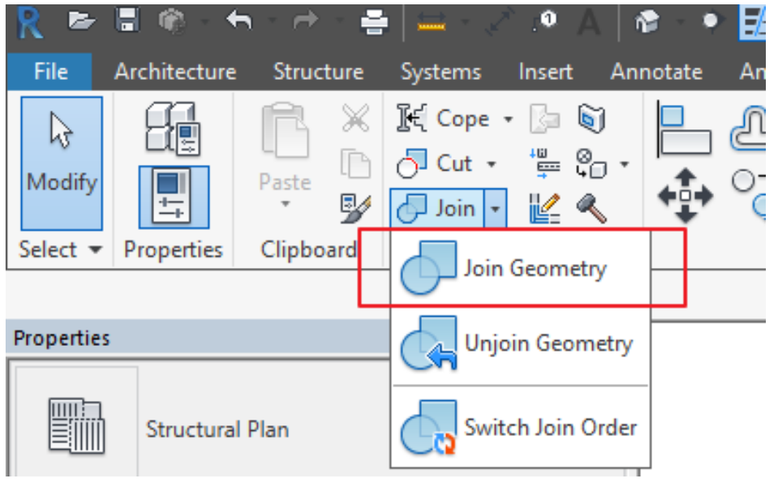
Plan	Section / Elevation
	

Structural Wall

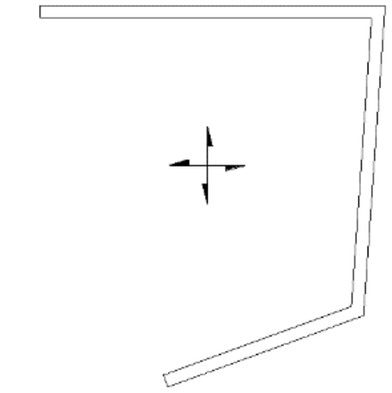
Plan	Section / Elevation
	

Showing wall hidden line

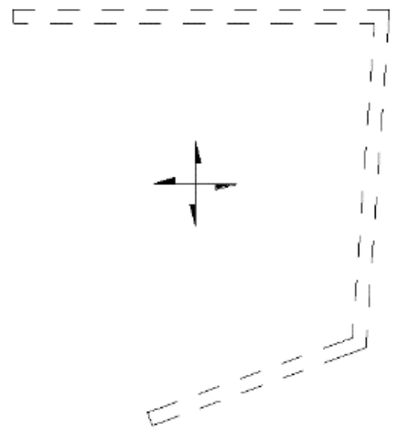
For walls under roof slab, top level of the wall will be connected to top of the roof slab by default. Modeler can Join Geometry command to show hidden lines on drawing.



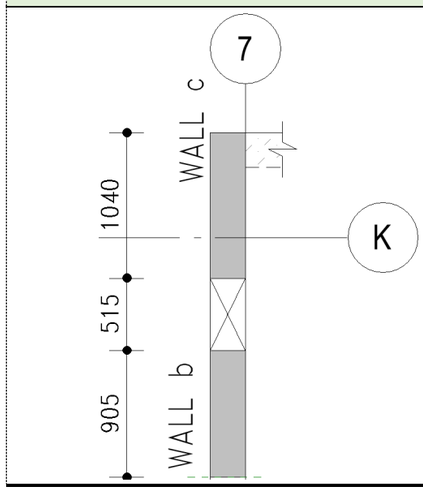
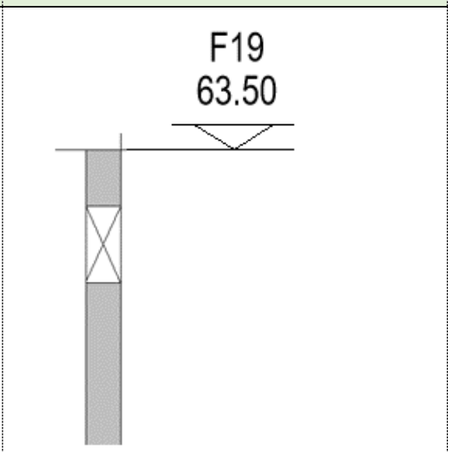
Before joining the slab to wall, the wall line are as below image. Hidden lines are not shown.



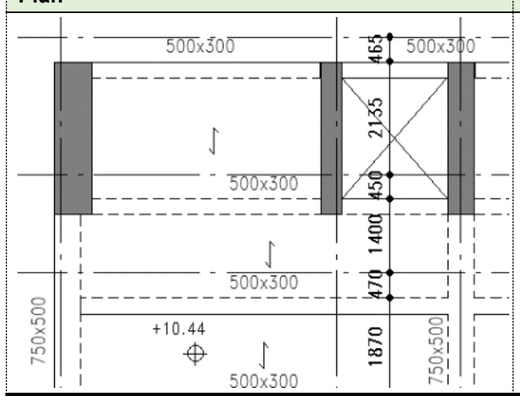
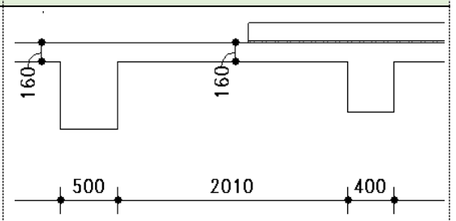
After joining the slab to wall, the wall line is as below image. Hidden lines are shown in the plan.



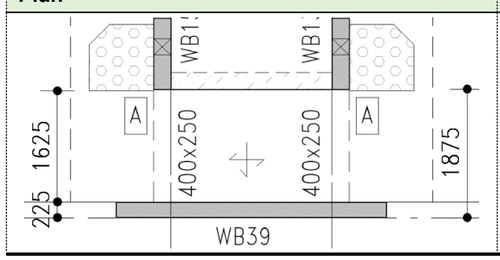
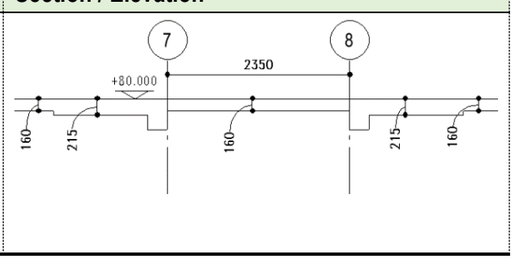
Structural Opening on Walls

Plan	Section / Elevation
	

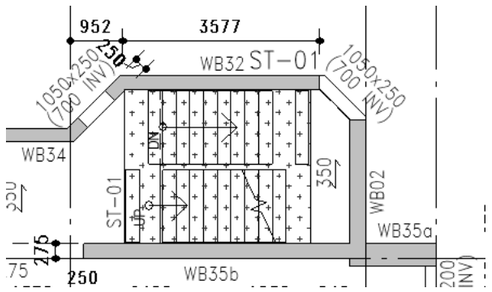
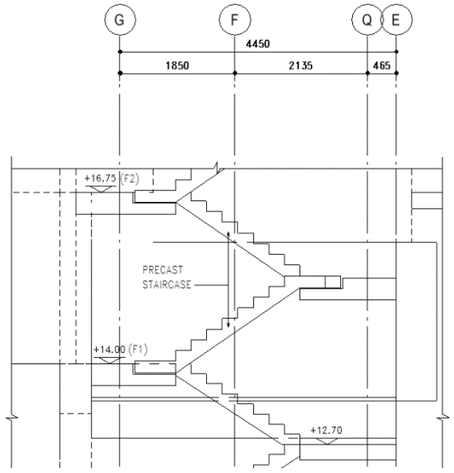
Structural Framing

Plan	Section / Elevation
	

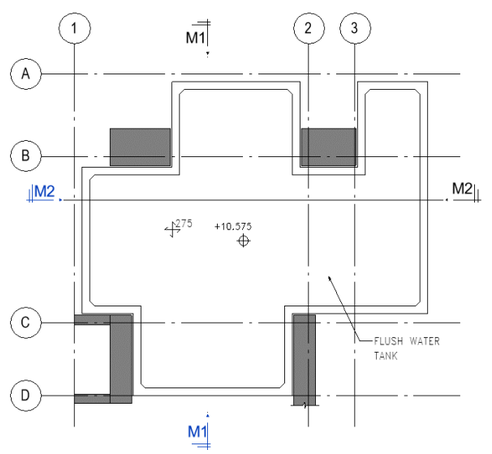
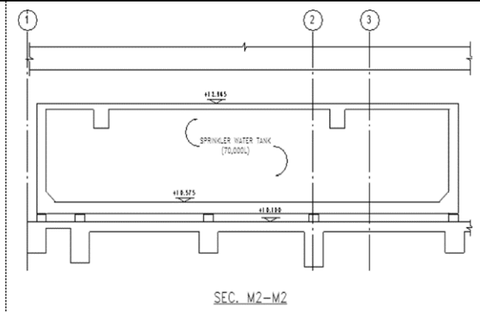
Structural Floor

Plan	Section / Elevation
	

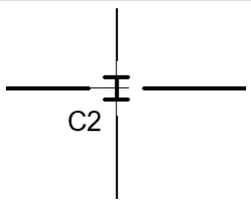
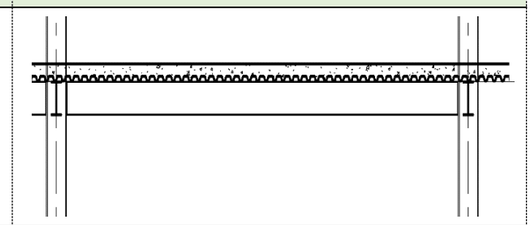
Staircases

Plan	Section / Elevation
	

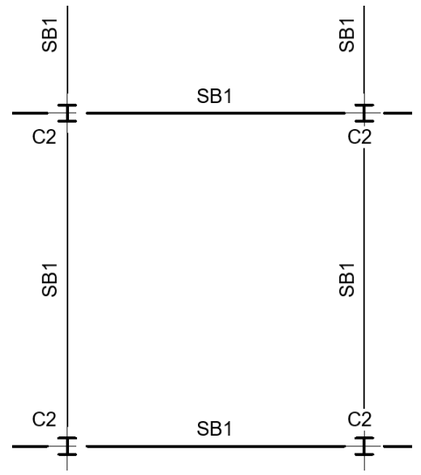
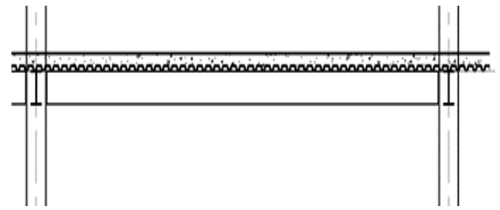
Water Tank

Plan	Section / Elevation
	

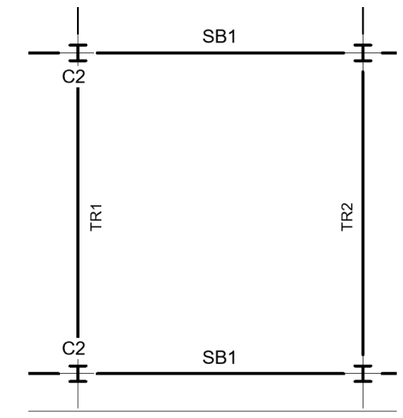
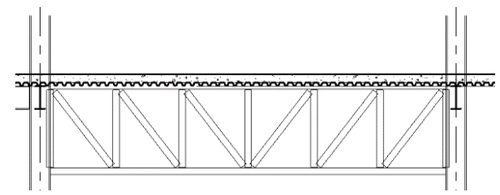
Steel Column

Plan	Section / Elevation
	

Steel Beam

Plan	Section / Elevation
	

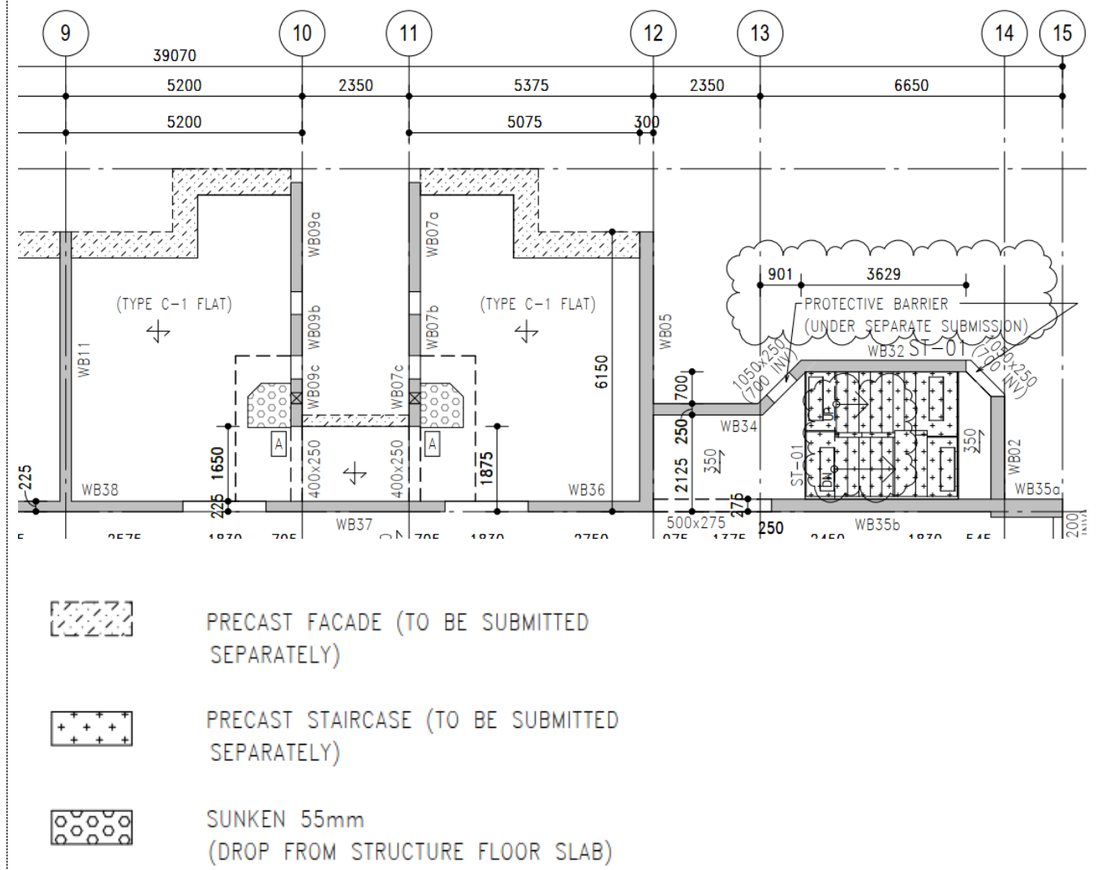
Steel Truss

Plan	Section / Elevation
	

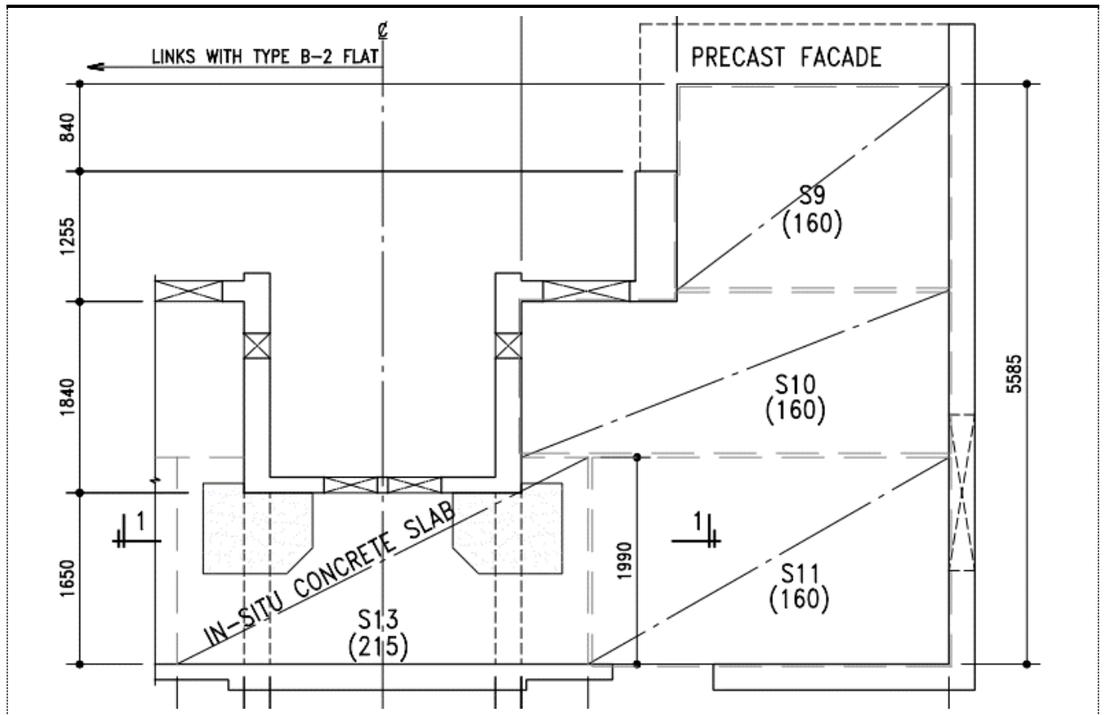
Remarks:

For production of ICU submission of Superstructure Plans, "Fill Region" function in the BIM authoring software is used to represent the extent and location of the precast facades in typical framing plans whilst "Filtering" function in the BIM authoring software is used to produce the required hatch pattern representing the extent and location of semi-precast in a relevant key-plan drawings. Please refer to below for the sample submission drawings which involved illustration of these precast elements.

Plan



Sample submission drawing of precast façade, staircase and sunken area



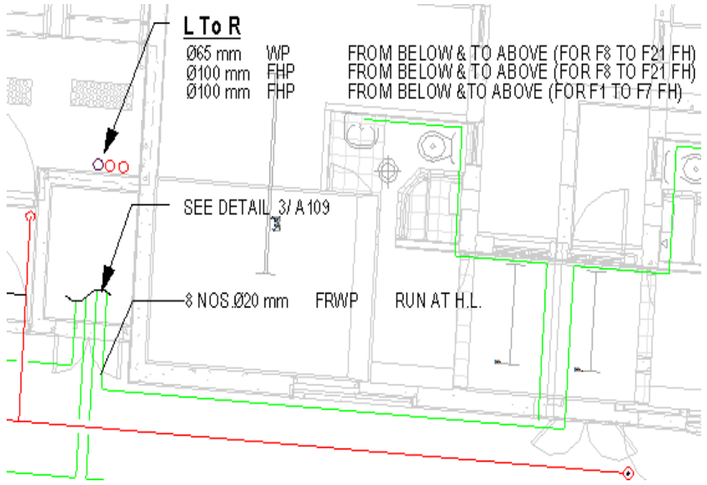
Sample submission drawing of semi-precast slab

D5.5 MEP Drawing Production

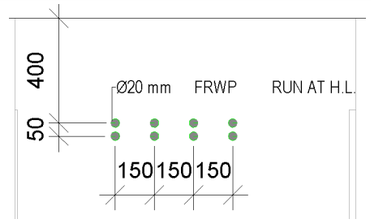
Presentation Style and Schedule of Key Elements

Pipe

Plan



Section / Elevation



Pipe Fittings

Plan



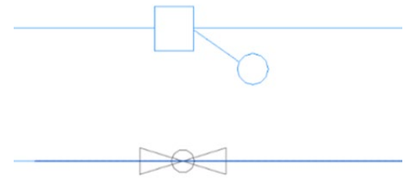
Schedule

Pipe Fitting Schedule

Family	Type	System Abbreviation	Size	Insulation Type	Insulation Thickness	Other Information	Count
PPF-PGR-HAB-Tee-Reducing-Thread_Type	Standard	FWP	50 mmø-32 mmø-32 mmø		0 mm		1
PPF-PGR-HAB-Tee-Reducing-Thread_Type	Standard	FRWP	50 mmø-32 mmø-32 mmø		0 mm		1
PPF-PGI-HAB-Tee-Reducing-Thread_Type	Standard	FWP	50 mmø-32 mmø-32 mmø		0 mm		1
PPF-PGI-HAB-Tee-Reducing-Thread_Type	Standard	FRWP	50 mmø-32 mmø-32 mmø		0 mm		1
PPF-PBD-HAB-PVC-Sch_40_DWV	Standard	FWP	32 mmø-32 mmø		0 mm		1
PPF-PBD-HAB-PVC-Sch_40_DWV	Standard	FRWP	32 mmø-32 mmø		0 mm		1

Pipe Accessories

Plan



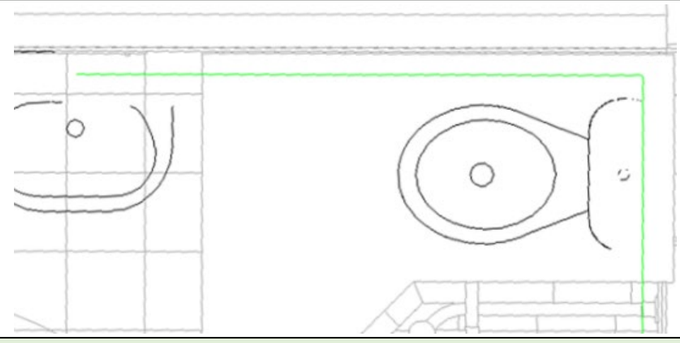
Schedule

Pipe Accessory Schedule

Family	Type	Flange Radius	Size	Insulation Type	Insulation Thickness	System Abbreviation	Count
PPA-VLV-HAB-Ball-50-150mm	150 mm		150 mmø-150 mmø		0 mm	FWP	1
PPA-VLV-HAB-Globe	Standard		100 mmø-100 mmø		0 mm	FRWP	1
PPA-WMT-HAB-Master_Set	Standard	20	20 mmø-20 mmø		0 mm	FRWP	1

Plumbing Fixture

Plan



Schedule

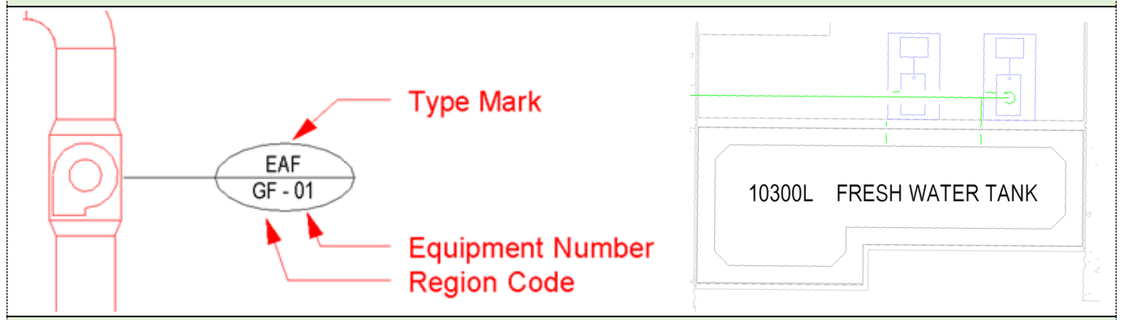
Plumbing Fixture Schedule

Type Mark	Family	Type	Remark	Count
SHOWER	PLM-SHR-HAB-Mixer	Standard		16
SINK	PLM-SNK-HAB	Standard		20
TANK	PLM-WCS-HAB-Flush_Tank	Standard		1

- The quantity of the fixtures and equipment can be retrieved in schedule directly.
- In drawing file, please use filter to schedule out the lifts from appropriate link files by “Type Mark” from Plumbing Fixture Schedule.

Mechanical Equipment

Plan



Schedule

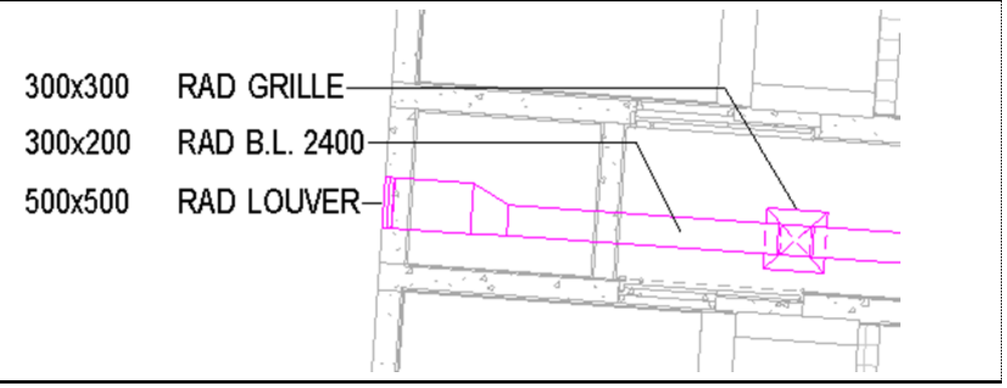
Mechanical Equipment Schedule

Purpose	NO.OF PUPM	Type Mark	Rate of discharge multi-stage (L/S)	Discharge head (m)	Maximum speed (REV/SEC)	SIZE OF RISER(BY PLUMBING(Mc1)SUB-CONTRACTOR)	Minmum Efficiency(%)
FRSH WATER PUPM	1	MULTI-STAGE(HORIZONTAL TYPE)	33	133	25	80	60
F.S.WATER PUMP	1	MULTI-STAGE(HORIZONTAL TYPE)	8	133	25	60	55

- Particular specifications shall be built in the family as parameter (Family parameter/ Shared parameter) in order to produce the schedule. The quantity and information of the fixtures and equipment can be retrieved in schedule directly.
- In drawing file, please use filter to schedule out the lifts from appropriate link files by “Type Mark” from Mechanical Equipment Schedule.

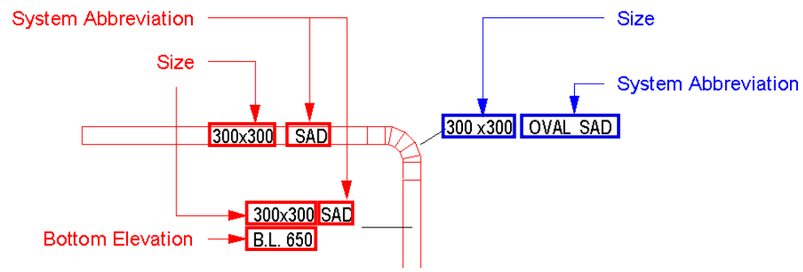
Duct

Plan



Annotation/ Presentation

- Use Duct Tag to annotate the dimension of duct, system abbreviation, bottom elevation and other information. (Tags in Red colour)
- Use Duct Fitting Tag to annotate the dimension of duct fitting, system abbreviation, bottom elevation and other information. (Tags in Blue colour)



- For complex ductwork design, a section view and 3D view are suggested to be added for reference.

Schedule

Duct Schedule

System Abbreviation	Family	Type	Overall Size	Length	Insulation Type	Insulation Thickness	Top Elevation	Bottom Elevation	Area	Count
SAD	Rectangular Duct	GFD-HAB-Mitered	300 mmx300 mm	665		0 mm	2500	2200	1 m²	1
SAD	Rectangular Duct	GFD-HAB-Mitered	300 mmx300 mm	945		0 mm	2500	2200	1 m²	1
SAD	Rectangular Duct	GFD-HAB-Mitered	300 mmx300 mm	4849		0 mm	2900	2600	6 m²	1
FAD	Rectangular Duct	PFD-HAB-Mitered	500 mmx300 mm	748		0 mm	2650	2350	1 m²	1
FAD	Rectangular Duct	PFD-HAB-Mitered	500 mmx300 mm	2125		0 mm	2650	2350	3 m²	1
FAD	Rectangular Duct	PFD-HAB-Mitered	500 mmx300 mm	519		0 mm	2650	2350	1 m²	1
RAD	Rectangular Duct	PFD-HAB-Mitered	300 mmx200 mm	24969		0 mm	2600	2400	25 m²	1

- Length, material and system of duct can be retrieved from the 3D model directly. However, the area of duct from Revit is not the same to facilitate Quantity take-off according to the SMM.

Duct Accessory

Schedule

Duct Accessory Schedule

Type Mark	Family	Type	System Abbreviation	Overall Size	Count
VSD	DUA-DAM-HAB-Fire-VSD	Standard	RAD	550 mmx375 mm-550 mmx375 mm	1
VCD	DUA-DAM-HAB-Fire-VCD-No_Louver	Standard	RAD	550 mmx375 mm-550 mmx375 mm	1
SIL	DUA-DAM-HAB-Fire-SIL-Rectangular	Standard	SAD	550 mmx375 mm-550 mmx375 mm	1
SIL	DUA-DAM-HAB-Fire-SIL-Rectangular	Standard	SAD	300 mmx300 mm-300 mmx300 mm	1
NRD	DUA-DAM-HAB-Fire-NRD	Standard	SAD	550 mmx375 mm-550 mmx375 mm	1
NRD	DUA-DAM-HAB-Fire-NRD	Standard	FAD	500 mmx300 mm-500 mmx300 mm	1
MFD	DUA-DAM-HAB-Fire-MFD-Section	Standard	SAD	550 mmx375 mm-550 mmx375 mm	1

Air Terminals

Schedule

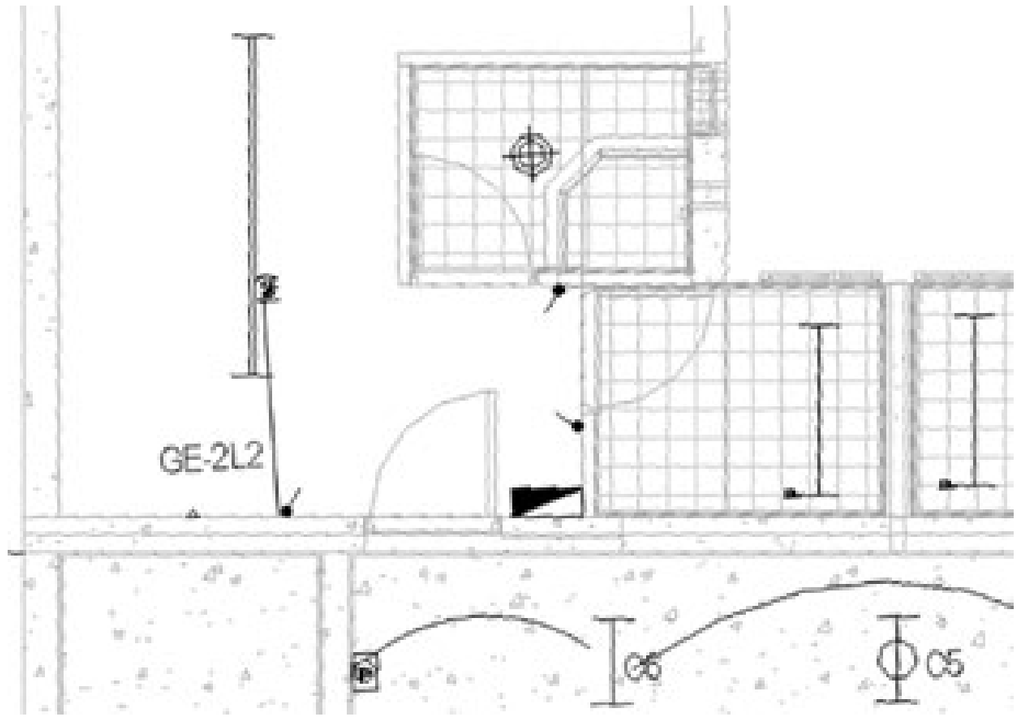
Air Terminal Schedule

Family	Type	Type Mark	Remark	Count
ART-AIR-HAB-EAG	Standard	EAG		1
ART-AIR-HAB-RAG	Standard	RAG		1
ART-AIR-HAB-SAG	Standard	SAG		1
ART-AIR-HAB-FAG	Standard	FAG		1
ART-HOD-HAB-LDP	Standard	LDP		1

- Particular specifications shall be built in the family as parameter (Family parameter/ Shared parameter) in order to produce the schedule. The quantity and information of Air Terminals can be retrieved in schedule directly.

Electrical Component

Plan



Schedule

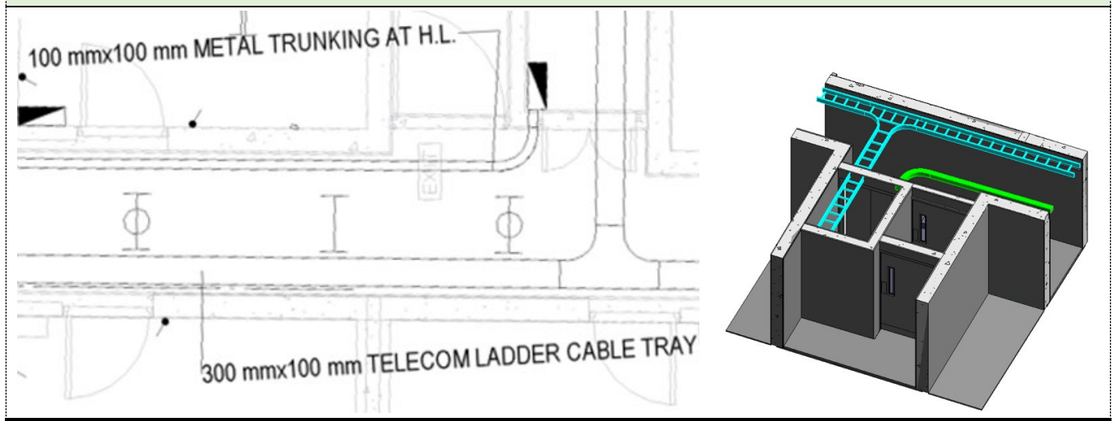
Electrical Oulet Schedule

Type Mark	Level	Family	Electrical Data	Count
Outlet	F11	ELF-OLT-HAB-UNSW_SO-S	220V/ 220-240VA	1
Outlet	F11	ELF-OLT-HAB-UNSW_SO-S	220V/ 220-240VA	1

- Particular specifications shall be built in the family as parameter (Family parameter/ Shared parameter) in order to produce the schedule. The quantity and information of the fixtures and equipment can be retrieved in schedule directly.
- In drawing file, please use filter to schedule out the lifts from appropriate link files by “Type Mark” from Electrical Equipment Schedule.

Cable Tray

Plan



Annotation/ Presentation

Electrical Components	Preferred colour		RGB Colour System
Cable Tray and Cable Tray Fittings	GREEN		000, 255, 000

- Setup standard filter for Cable Tray on plan view and 3D view.
- Setup detail level and visibility setting for Cable Tray on 3D view.
- Use Cable Tray Tag to annotate the dimension of Cable Tray, Service Type and other information.
- For complex Cable Tray design, a section view and 3D view are suggested to be added for reference.

Schedule

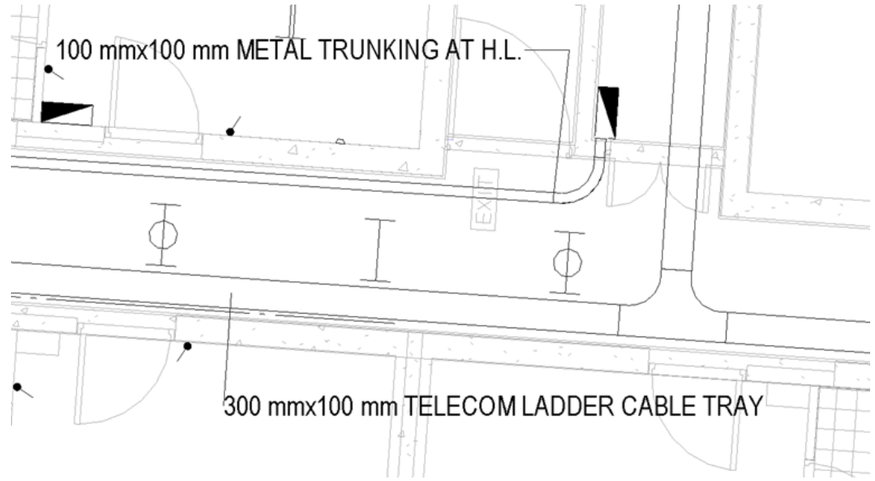
Cable Tray Schedule

Service Type	Family	Type	Length	Size	Bend Radius Multiplier	Top Elevation	Bottom Elevation	Count
Power	Cable Tray with Fittings	Channel Cable Tray	2475	300 mmx100 mm	1	2800	2700	1
Power	Cable Tray with Fittings	Channel Cable Tray	702	300 mmx100 mm	1	2800	2700	1
Power	Cable Tray with Fittings	Channel Cable Tray	1525	300 mmx100 mm	1	2800	2700	1
Power	Cable Tray with Fittings	Channel Cable Tray	573	300 mmx100 mm	1	2494	1930	1
Power	Cable Tray without Fittings	Single Rail Cable Tray	4000	300 mmx100 mm	1	2000	1900	1
Power	Cable Tray without Fittings	Single Rail Cable Tray	1900	300 mmx100 mm	1	2000	1900	1
Power	Cable Tray without Fittings	Single Rail Cable Tray	5100	300 mmx100 mm	1	2000	1900	1
Power	Cable Tray with Fittings	Ladder Cable Tray	5100	300 mmx100 mm	1	2000	1900	1
CLP	Cable Tray with Fittings	Channel Cable Tray	3800	300 mmx100 mm	1	2000	1900	1
CLP	Cable Tray with Fittings	Channel Cable Tray	740	300 mmx100 mm	1	2000	1900	1

- Dimension, type and Service Type of Cable Tray can be retrieved from the 3D model directly.

Cable Tray Fittings

Plan



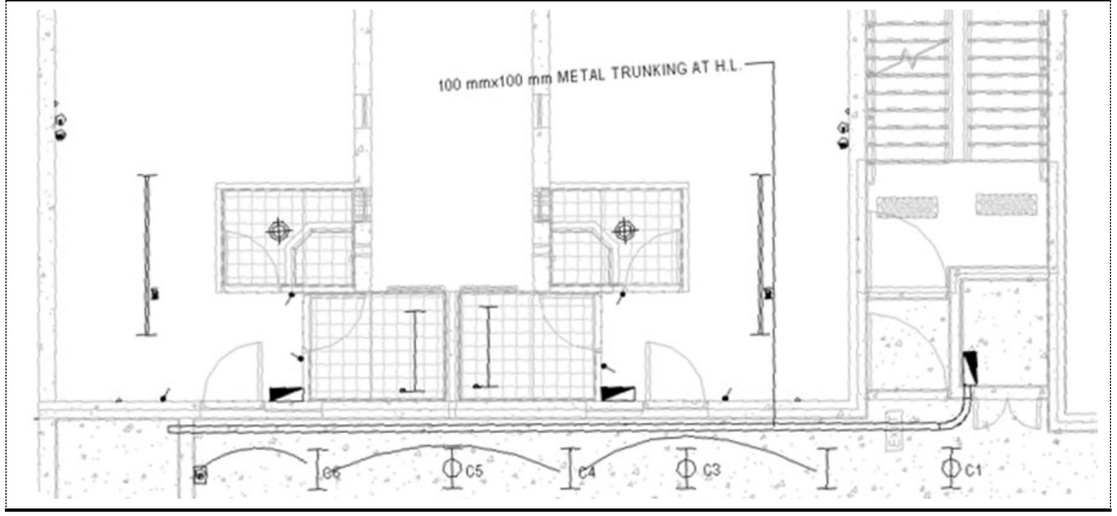
Schedule

Cable Tray Fitting Schedule

Service Type	Family	Type	Size	Bend Radius	Count
Fire	CTF-CHN-HAB-Horizontal_Bend	Standard	800 mmx36 mm-400 mmx36 mm	300 mm	1
Fire	CTF-CHN-HAB-Horizontal_Tee-Chamfer	Standard	400 mmx36 mm-300 mmx36 mm-200 mmx36 mm	300 mm	1
Fire	CTF-CHN-HAB-Horizontal_Tee-Raduis	300mm	300 mmx100 mm-300 mmx100 mm-300 mmx100 mm		1
Fire	CTF-LDR-HAB-Horizontal_Bend	Standard	300 mmx100 mm-300 mmx100 mm	300 mm	1
Fire	CTF-LDR-HAB-Horizontal_Bend	Standard	300 mmx100 mm-300 mmx100 mm	300 mm	1
Power	CTF-CHN-HAB-Horizontal_Tee-Mitered	Standard	400 mmx30 mm-400 mmx30 mm-400 mmx30 mm		1
Power	CTF-CHN-HAB-Horizontal_Tee-Raduis	300mm	300 mmx100 mm-300 mmx100 mm-300 mmx100 mm		1
Power	M_Channel Horizontal Bend	Standard	300 mmx100 mm-300 mmx100 mm	300 mm	1
Power	M_Channel Horizontal Bend	Standard	300 mmx100 mm-300 mmx100 mm	300 mm	1
Power	M_Channel Vertical Outside Bend	Standard	300 mmx100 mm-300 mmx100 mm	300 mm	1
Telecom	CTF-CHN-HAB-Horizontal_Tee-Raduis	300mm	300 mmx100 mm-300 mmx100 mm-300 mmx100 mm		1

Trunking

Plan



Annotation/ Presentation

- Setup standard filter for Trunking on plan view and 3D view.

Electrical Components	Preferred colour		RGB Colour System
Trunking	CYAN		000, 255, 255

- Setup detail level and visibility setting for Trunking on 3D view.
- Create a Cable Tray Tag for trunking file to annotate the dimension of Trunking, Service Type and other information.

Schedule

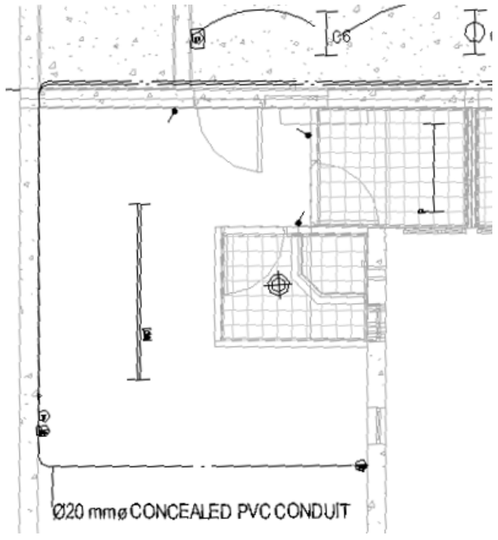
Trunking Schedule

Type Mark	Service Type	Family	Type	Length	Size	Top Elevation	Bottom Elevation	Count
METAL TRUNKING	TELECOM	Cable Tray with Fittings	Channel Cable Tray	2475	300 mmx100 mm	2800	2700	1
METAL TRUNKING	TELECOM	Cable Tray with Fittings	Channel Cable Tray	3800	300 mmx100 mm	2500	2400	1

- Dimension, type and Service Type of Trunking (Cable Tray) can be retrieved from the 3D model directly.

Conduit

Plan



Annotation/ Presentation

- Setup standard filter for Conduit on plan view and 3D view.

Electrical Components	Preferred colour		RGB Colour System
Conduit and Conduit Fittings	CYAN		000, 255, 255

- Create a Conduit Tag to annotate the dimension of conduit, Service Type and other information.

Schedule

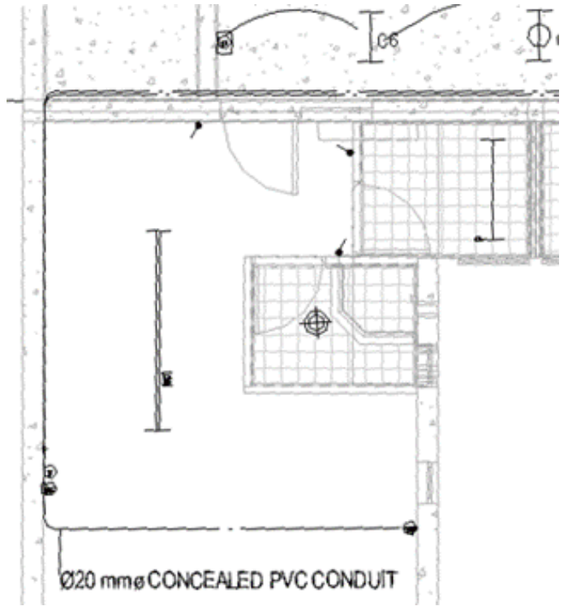
Conduit Schedule

Family	Type	Standard	Inside Diameter	Outside Diameter	Size	Length	Top Elevation	Bottom Elevation	Type Mark	Count
Conduit with Fittings	GIC-HAB	GRC	50 mm	50 mm	50 mmø	324	150	100	CONCEALED G.I. SURFACE/ CONCEALED CONDUIT	1
Conduit with Fittings	GIC-HAB	GRC	20 mm	20 mm	20 mmø	220	2760	2740	CONCEALED G.I. SURFACE/ CONCEALED CONDUIT	1
Conduit with Fittings	GIC-HAB	GRC	20 mm	20 mm	20 mmø	290	2760	2740	CONCEALED G.I. SURFACE/ CONCEALED CONDUIT	1

- Dimension, type and Service Type of Conduit can be retrieved from the 3D model directly.

Conduit Fittings

Plan

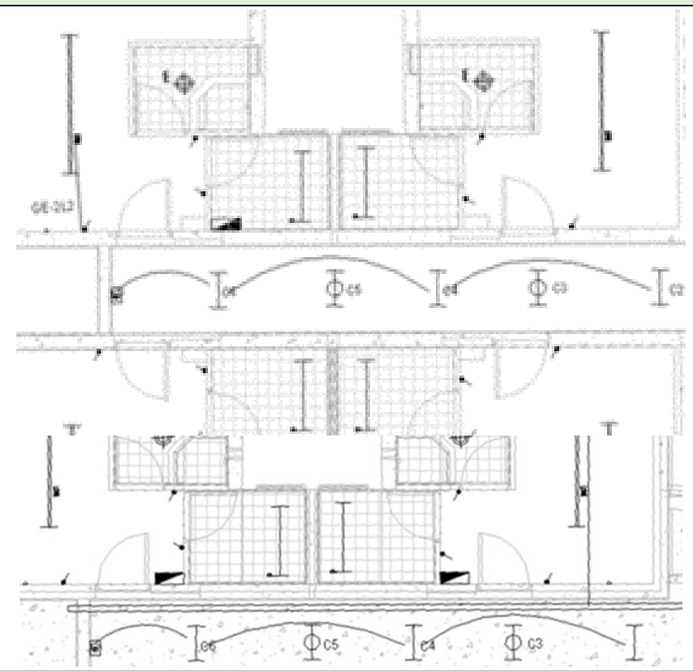


Schedule

Conduit Fitting Schedule				
Family	Type	Size	Bend Radius	Count
COF-HAB-CEB-Steel	Standard	53 mmø-53 mmø	292 mm	1

Circuitry

Plan



Annotation/ Presentation

- Setup standard filter for Wire on plan view and 3D view.

Electrical Components	Preferred colour		RGB Colour System
Wires	CYAN		000, 255, 255

- To present different circuit layouts, filters with different constraints and line patterns are suggested.
- Create a Wire Tag to annotate the Circuit of Wiring System and other information.

Schedule

SCHEDULE 5B – CIRCUITRY FOR (F1 – F39) PUBLIC LIGHTING

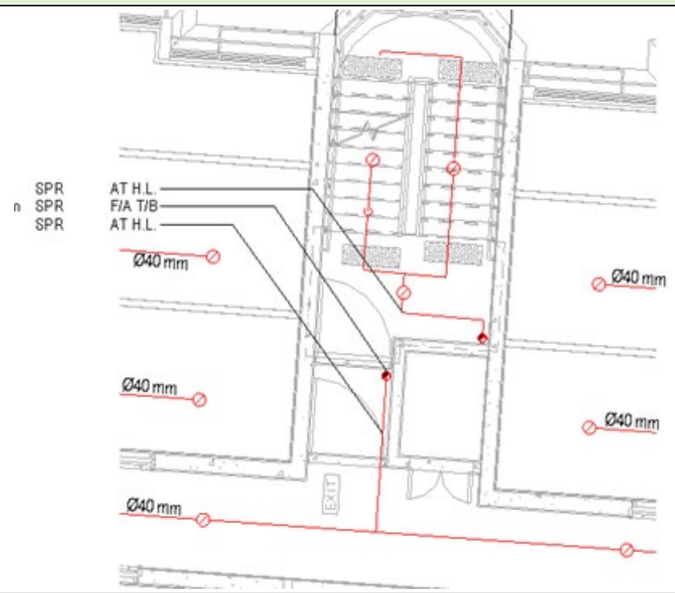
LOCATION	LIGHTING FITTING		CIRCUITRY NO.							REMARKS
	LAMP NO.	TYPE	F1	(F2 – F5)	(F6 – F12)	(F13 – F18)	(F19 – F25)	(F26 – F32)	(F33 – F39)	
TELECOM ROOM	T1	* SF11A		LEP–3L2	LEP–4L2	MEP–3L2	MEP–4L2	HEP–3L2	HEP–4L2	
CABLE DUCT	T2(F3 ONLY)	* SF33A		LEP–3L2(F3 ONLY)						
RS&MMR	RR1	* SFM35A		LE–11L1	LE–12L1	ME–11L1	ME–12L1	HE–11L1	HE–12L1	
	RR2	* SFM35A		LE–13L1	LE–14L1	ME–13L1	ME–14L1	HE–13L1	HE–14L1	
PASSAGE TO RS&MMR	RR3	* SFM50		LH–15L1		MH–15L1		HH–15L1		
	RR4	* SFM50		LE–6L1		ME–6L1		HE–6L1		
WATER METER CUPBOARD (1)	WM1	* SF8		LH–12L1	LH–13L1	MH–12L1	MH–13L1	HH–12L1	HH–13L1	
WATER METER CUPBOARD (2)	WM2	* SF8	LH–12L2		LH–13L2	MH–12L2	MH–13L2	HH–12L2	HH–13L2	
WATER METER CUPBOARD (3)	WM3	* SF8		LH–12L3	LH–13L3	MH–12L3	MH–13L3	HH–12L3	HH–13L3	
ELECT. METER ROOM (1)	MR1	* SF11A		LEP–1L2	LEP–2L2	MEP–1L2	MEP–2L2	HEP–1L2	HEP–2L2	
WORKING PLAFORM	CD1	* SF11A	LEP–1L2							
ELECT. METER CUPBOARD	MR1	* SF11A	LEP–1L2							
ELECT. METER ROOM (2)	MR2	* SF11A	LEP–1L3		LEP–2L3	MEP–1L3	MEP–2L3	HEP–1L3	HEP–2L3	
ELECT. METER ROOM (3)	MR3	* SF11A		LEP–1L1	LEP–2L1	MEP–1L1	MEP–2L1	HEP–1L1	HEP–2L1	
WORKING PLAFORM	CD3	* SF11A	LEP–1L1							
ELECT. METER ROOM (4)	MR4	* SF11A		LEP–3L3	LEP–4L3	MEP–3L3	MEP–4L3	HEP–3L3	HEP–4L3	
CABLE DUCT	CD4	* SF11A	LEP–3L3							

FOR SCHEMATIC WIRING DIAGRAM, SEE DRAWING. NO. KE08/1/BLK1/B/EL–07, EL–08 & EL–09 * LIGHTING FITTING WITH ELECTRONIC BALLAST

Above schedule format cannot be applied in Revit. Therefore, this schedule can only be prepared by traditional method.

Fire Services Component

Plan



Annotation / Presentation

- Standard filter for different pipe systems on plan view and 3D view.

Category	Preferred colour		RGB Colour System
Sprinkler	RED		255, 000, 000

Schedule

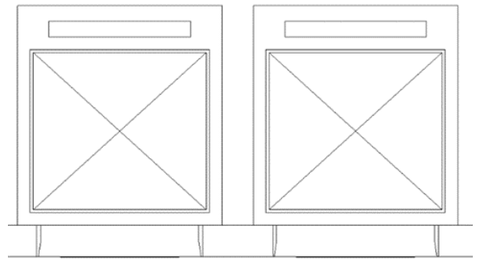
Sprinkler Schedule

Level	Space: Name	Space: Number	Family	Type	Type Mark	Count
F11	Zone	1	SRK-PDT-ACD-Fast_Respond	30mm FLUSH MOUNTED	68°C	2
F11	Zone	2	SRK-PDT-ACD-Fast_Respond	30mm FLUSH MOUNTED	68°C	4
F11	Zone	3	SRK-PDT-ACD-Fast_Respond	30mm FLUSH MOUNTED	68°C	4
F11	Zone	4	SPR-PDT-HAB	32mm	57°C	3
F11	Zone	4	SRK-PDT-ACD-Fast_Respond	30mm FLUSH MOUNTED	68°C	2

- Particular specifications shall be built in the family as parameter (Family parameter/ Shared parameter) in order to produce the schedule. The quantity and information of the fixtures and equipment can be retrieved in schedule directly.

Lift and Escalator

Plan



Schedule

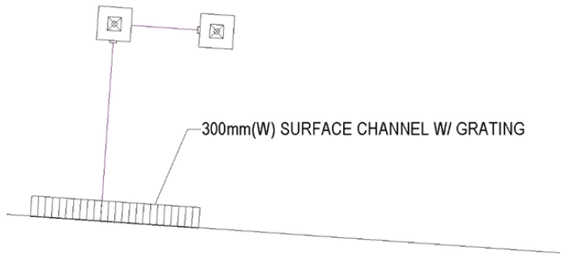
Lift Schedule

RVT Link: File Name	LIFT No.	Family	Type	FEATURE	No.of Passengers Nos.	No. OF STOPS ABOVE G/F	TOTAL TRAVEL DISTANCE	Type Mark	RATED SPEED(m/s)	CONTROL	LIFT CAR DIMENSION W (mm)	LIFT CAR DIMENSION D (mm)	LIFT SHAR DIMENSION W (mm)	LIFT SHAFT DIMENSION D (mm)
HAB- -MRL	1	SPQ-LFT-HAB	Lift Door TYPICA R1L	PASSEN GER	12	10	111035	Lift	2.5	DUPLEX DOWN COLLECTIVE	2065	2065	2265	2365
HAB- -MRL	2	SPQ-LFT-HAB	Lift Door TYPICA R1L	PASSEN GER	12	15	46235	Lift	1.6	DUPLEX DOWN COLLECTIVE	2065	2065	2265	2365

- In drawing file, please use filter to schedule out the lifts from appropriate link files by “RVT Link: File Name” and “Type Mark” from Specialty Equipment Schedule.
- Particular specifications shall be built in the family as parameter (Family parameter/ Shared parameter) in order to produce the schedule. The quantity and information of the fixtures and equipment can be retrieved in schedule directly.

Utility Equipment

Plan



Schedule

Gully Schedule								
Family	Type	Type Mark	Outlet Pipe	Length	Width	Depth	Invert Level	Cover Size
STE-STU-HAB-Gully	OTG 200x200	OTG	100	200	200	200	330	225x225
STE-STU-HAB-Gully	OTG 300x300	OTG	150	300	300	300	380	300x300

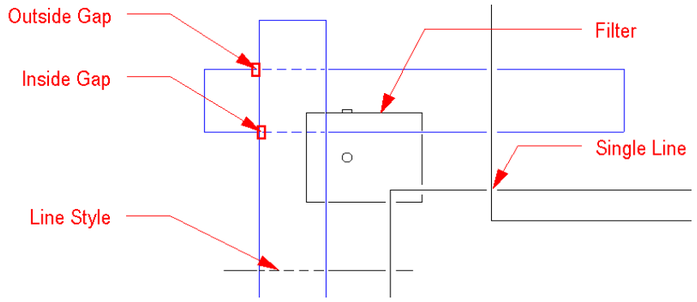
View Range

- Please set appropriate setting for floor plan within model files in order to produce suitable drawing production.

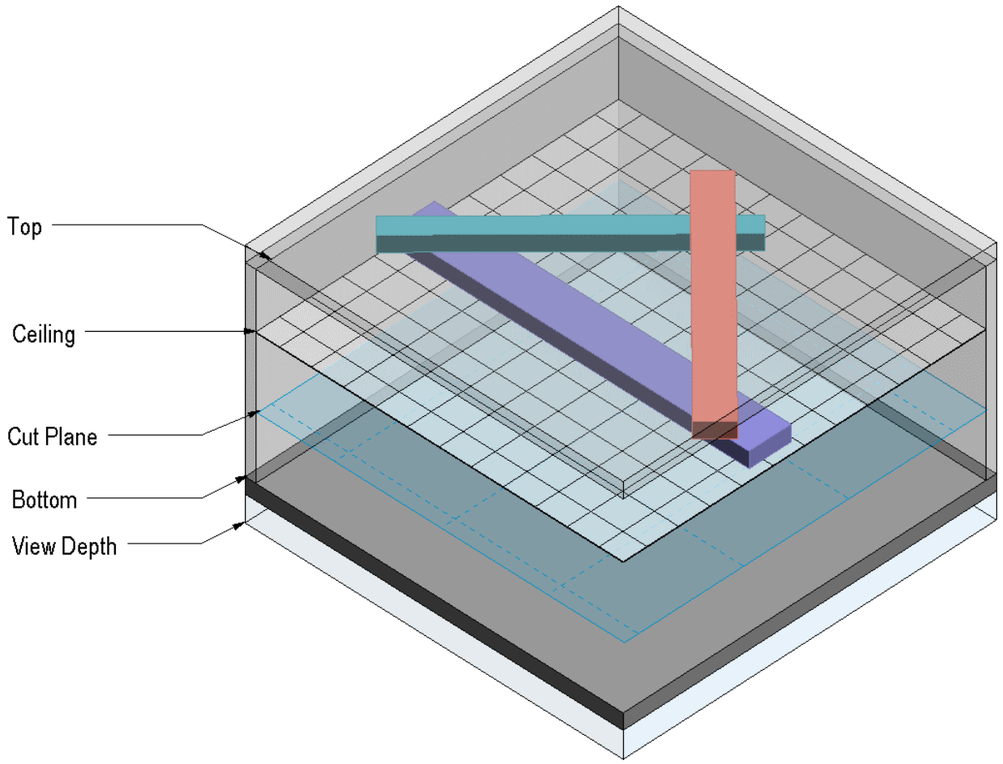
Setting	Value
Show Hidden Lines	By Discipline
View Range	Top: Level Above Cut Plane: 1200 Bottom: Associated Level View Depth: Associated Level
Visual Style	Hidden Line

Hidden Line Presentation

- The figures below indicate the corresponding settings in Revit. Please set appropriate setting according to the requirements of the drawing production.



Setting	Value
Draw MEP Hidden Lines	☑
Line Style	MEP Hidden
Inside Gap	0.4 mm
Outside Gap	0.4 mm
Single Line	0.8 mm



Show different MEP disciplines on sheet

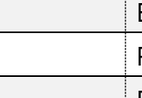
- Apply visibility settings below for Revit Links on the views (Floor Plan)

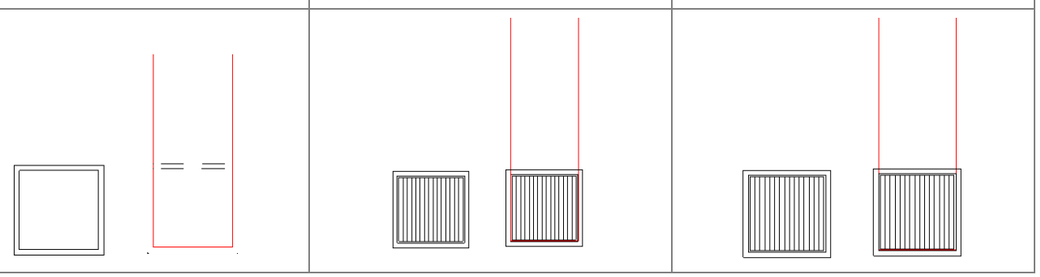
	Discipline	Detail Level
Water Services	Plumbing	Medium
Air Conditioning and Mechanical Ventilation	Mechanical	Medium
Electrical	Electrical	Fine
Lift and Escalator	Electrical	Fine
Fire Services and Water Pump	Plumbing	Medium
Utility Services	Plumbing	Medium
Drainage and Sewage	Plumbing	Medium

Revit Links	Halftone	Underlay	Display Settings
ARC Link	Y	N	By Linked View/ Custom
ARC Ceiling	Y	Y	By Linked View
SE Link	Y	Y	By Linked View/ Custom
Different MEP disciplines Link	N	N	By Linked View/ Custom

- Extra visibility settings for linked files can be applied in Drawing File to override the presentation style. However, relative display setting shall be set as “By Host View”/ “Custom”.

	Method 1	**Method 2**
	Set transparency for corresponding category	Wireframe

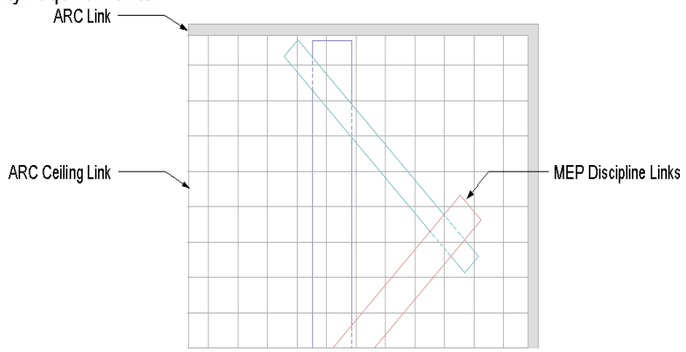




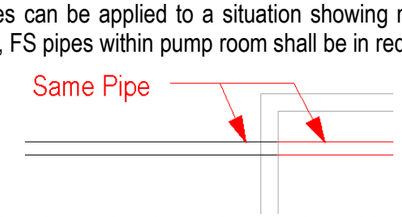
Drawing Preparation

- For Size-dependent Presentation:
  - Annotation presented using the top view of family or size-dependent symbols shall be prepared within the family using detail items.
  - If there is an extrusion or object located on top of the family, its size-dependent symbols (detail items) cannot be shown properly.
  - Following suggestions can solve the problem. However, be aware of the effects to other families and objects.

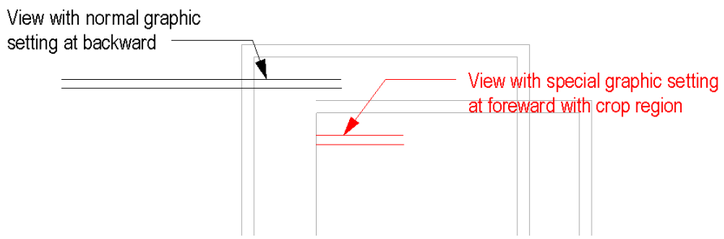
- By overlapping the views and corresponding Ceiling Plans on sheet using Guide Grid, the drawings can fulfil the authority requirements.



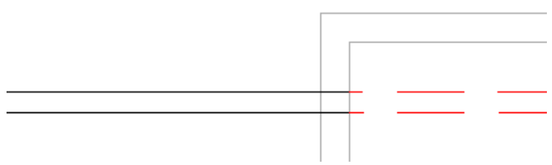
- Overlapping views techniques can be applied to a situation showing more than one view settings in same category. For example, FS pipes within pump room shall be in red colour.



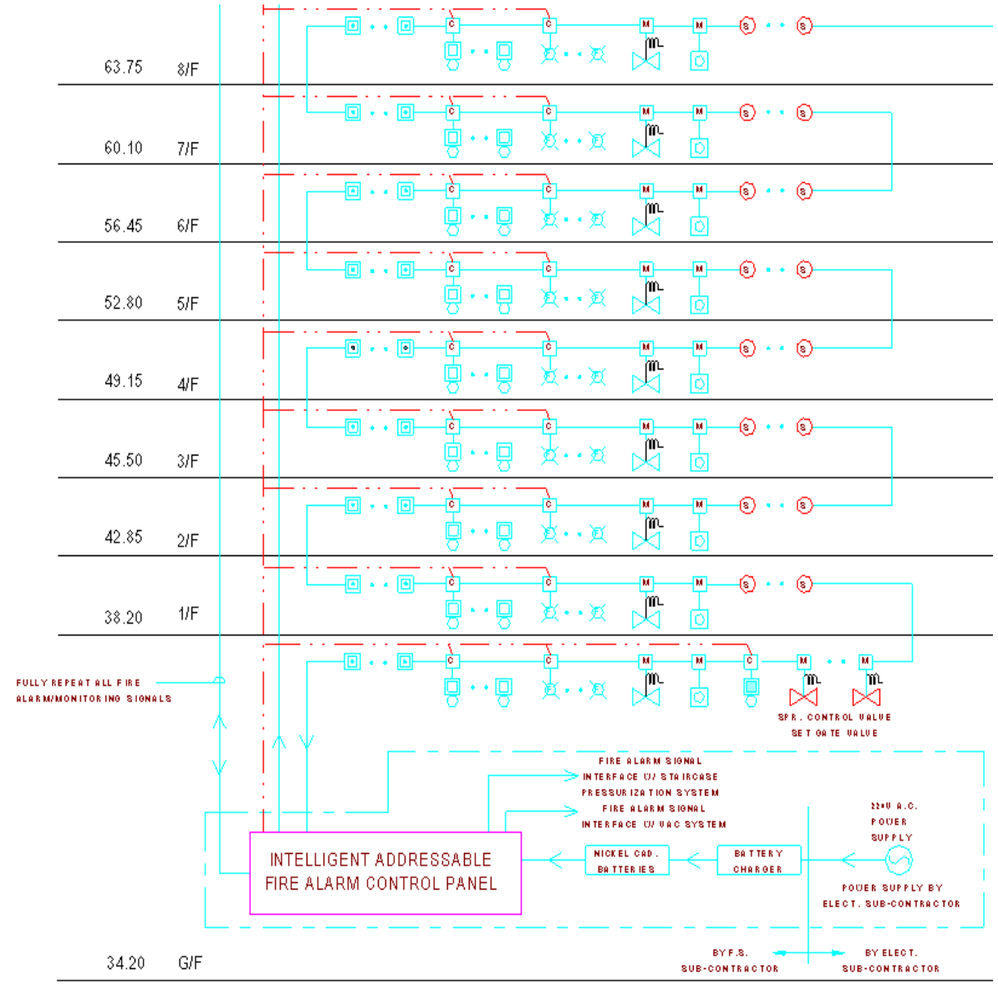
- To achieve above presentation, insert the view with normal graphic setting into the sheet and then overlap it by the view with other special graphic setting. Please be careful on the order of the view insertion, the last view inserted into the sheet is on the top. Therefore, it is not necessary to split the pipeworks and assign relevant information.



- If line style is required to be hidden, adding a masking region in the normal view is suggested to cover the overlapped portion and set the red pipe with hidden line pattern. Then apply the above techniques.



Schematic Diagram



- Since no tool can convert the 3D model into schematic diagram directly in current Revit version, users are advised to draw an independent schematic diagram in AutoCAD or Drafting Views by using Detail Line. This production method is almost the same method as used in AutoCAD. Insert existing details in CAD format into Drafting View in Detail View model file.
- Using appropriate line style and line weight to draw the diagram. Examples of Schematic Diagram created in Revit are shown below:

MEP System Colour Filter Set Up

- Setup standard filter for different discipline on plan view and 3D view for collaboration.

Discipline Model	Preferred colour		RGB Colour System
ACMV	CYAN		000, 255, 255
Electrical Services	GREEN		000, 255, 000
Fire Services and Water Pump	RED		255, 000, 000
Lift and Escalator	RED		128, 000, 128
Water Services	BLUE		000, 000, 255
Drainage Services	MAGENTA		255, 000, 255

MEP Sub-System Colour Filter Set Up

- Setup standard filter for different duct systems on plan view and 3D view.
- Above filter shall be applied to ducts, duct fittings, duct accessories and duct insulation.

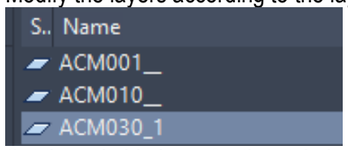
System type	Preferred colour		RGB Colour System
Fresh Water Pipe (FRWP)	CYAN		000, 255, 255
Flushing Water Pipe (FLWP)	GREEN		000, 255, 000
Hot Water Pipe (HWP)	RED		255, 000, 000
Irrigation Water Pipe (IRWP)	MAGENTA		255, 000, 255
Rain Water Pipe (RWP)	ORANGE		255, 128, 000
Supply Air Duct (SAD)	CYAN		000, 255, 255
Exhaust Air Duct (EAD)	GREEN		000, 255, 000
Fresh Air Duct (FAD)	BLUE		000, 000, 255
Return Air Duct (RAD)	MAGENTA		255, 000, 255
Transfer Air Duct (TAD)	LAKE PLACID BLUE		000, 128, 255
Primary Air Duct (PAD)	ORANGE		255, 128, 000
Kitchen Exhaust Duct (KED)	RED		255, 000, 000
Toilet Exhaust Duct (TED)	GRAY		192, 192, 192
Condenser Drain Pipe (CDP)	ORANGE		255, 128, 000
Chilled Water Return Pipe (CHWR)	GREEN		000, 255, 000
Chilled Water Supply Pipe (CHWS)	YELLOW		255, 255, 000
Fire Services Pipe (FSP)	RED		255, 000, 000
Sprinkler Pipe (SPR)	RED		255, 000, 000
Town Gas Pipe (GAS)	CYAN		000, 255, 255
Waste Pipe (WP)	CYAN		000, 165, 165
Vent Pipe (VP)	CYAN		000, 255, 255
Condenser Water Return Pipe (CWR)	DARK GREEN		000, 128, 064
Condenser Water Supply Pipe (CWS)	LAKE PLACID BLUE		000, 128, 255
Cable Tray and Cable Tray Fittings	GREEN		000, 255, 000
Conduit and Conduit Fittings	CYAN		000, 255, 255
Wires	CYAN		000, 255, 255
Sprinkler	RED		255, 000, 000

D5.6 Drawing Production with AutoCAD Civil 3D

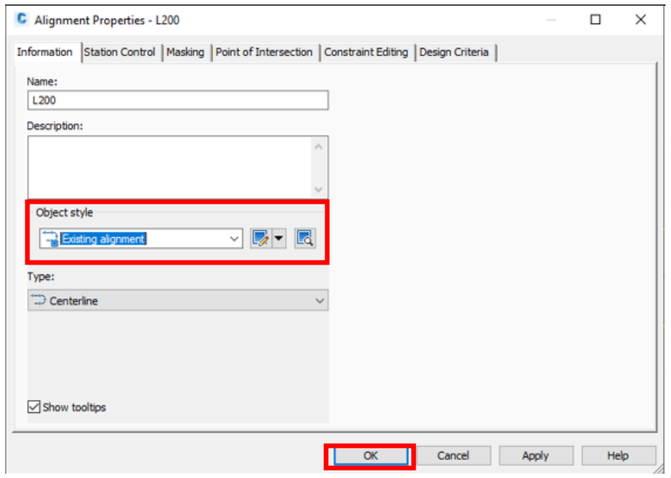
AutoCAD Civil 3D is based on the same workflow with conventional AutoCAD drawings. AutoCAD Civil 3D provides more object base content which controlled by “Object Style” on each element. The following shows the typical setting for changing the object style for drawing production purpose.

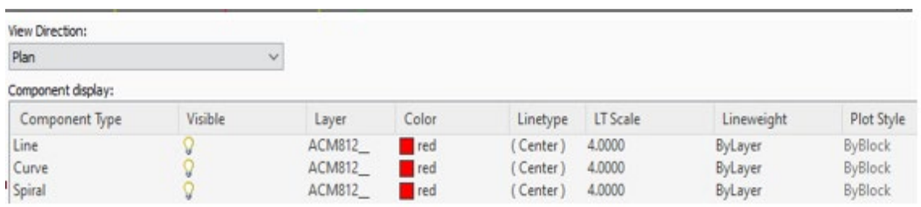
Settings for drawing presentation

- Modify the plan style of the Civil 3D objects in the model according to the CAD standard
  a. Modify the layers according to the layer naming convention and standard linestyle



  b. Set the suitable layer for the style in plan view of the objects
  c. Set suitable legend for objects by controlling the style in plan view





- Open a new dwg. File for drawing production

- Reference relevant dwg. Files
  a. Reference the road layout drawing
  b. Reference the site boundary drawing
  c. Reference the model with its plan set to suit the CAD standard

- Set up paper space
  a. Select a frame with target paper size (e.g. A1, A3, etc.)
  b. Reference the frame based on the paper size of the drawing into the paper spaces
  c. Set up the paper size of the paper spaces
  d. Control the line type in the paper spaces by controlling the layers of drawing referenced in the paper spaces
- Plot
  a. Print the paper spaces / E-transmit to export the drawings into a collection of AutoCAD DWG files

D6 BIM Quality Assurance

PTs / BIMSPs / PSPs / Contractors are required to establish a **BIM Quality Assurance (QA) Plan** for BIM and include it into the BIM PxP (refer to Section Q3-01.1 of Vol. 1 BIM Project Execution Plan (PxP)) to ensure appropriate checks on information integrity and data accuracy. This section provides guidance in response to this requirement with regard to the BIM QA roles and responsibilities, and Level of Quality Assurance.

Items covered by the BIM Quality Assurance Plan shall include, but not be limited to:

i. Compliance with the requirements set out in this Guide or other applicable BIM-related standards or guidelines
ii. Compliance with the requirements set out in the BIM PxP,
iii. Format, such as software language, version and extension,
iv. Naming, such as name of files and their corresponding folders,
v. General settings, such as line style, levels, grid, survey point, project base point, Internal Origin Point, shared coordinates and coordinate system, shared parameters, attributes,
vi. Compliance of geometry of the model components with the required LOD-G level at the corresponding project stage,
vii. BIM model cleanliness checked to ensure that there are no unintended model components and the design intent has been followed,
viii. Clash detection carried out to detect and resolve any interference/clashes between building components virtually prior to actual construction, and
ix. Consistency of documentation such as drawings and reports generated from the BIM model being a single source of truth.

BIM Quality Assurance Report shall be submitted to demonstrate that the building geometry, attributes of components / families, project settings, etc. and other information as listed above are in order with each submission of the BIM models and certify that checking has already been conducted in accordance with the Quality Assurance Plan. **HA BIM Quality Assurance (QA) Checklists**, refer to **ANNEX ANN-1.2**, is required to be part of Quality Assurance Report. The HA BIM QA Checklists consist of the BIM Project Startup Checklist and BIM Model Compliance Checklist, and they would be updated from time to time.

- **ANN-1.2a HA BIM Project Startup Checklist** (in PDF format) should be submitted HA project professionals before the BIM Kick-off Meeting, and until all the check items have been settled.
- **ANN-1.2b HA BIM Model Compliance Checklist** (in PDF format) is mandatory for all work in progress (WIP) submission at different stages, and for the Finalized Design BIM Models and as-built BIM Models at project completion, BIM Model Compliance Checklist for all work in progress checklists should be submitted to HA project professionals:
  a) together with each submission of BIM Models or
  b) at least every 3 months.
  The final BIM QA report, including the Project Startup Checklist and Model Compliance Checklist, shall be submitted to accompanied the Finalized Design BIM Models and as-built BIM Models.
  Contractors shall also complete the as-built model verification report in the HA BIM Model Compliance Checklist for submission of the as-built BIM Model.

Following sections of this Guide shall be read in conjunction with this section for a holistic perspective:

- Q3-05 BIM Quality Control and Quality Assurance (QC / QA)
- Section 9 of ANN-1.1 BIM Project Execution Plan (PxP) Template
- ANN-1.2 HA BIM Quality Assurance (QA) Checklists

D6.1 BIM Quality Assurance Responsibility

The **author of the model** has the responsibilities on self verification and to demonstrate for BIM Quality Assurance. The author can be BIMSPs / PSPs / Contractors or HA Project Team, depends on the project stages/ contractual arrangement of the project. Further reference can be made to the “Responsibility Column” in the table in D6.2 below.

D6.2 Level of BIM Quality Assurance Checks

The table below provides recommendations on BIM Quality Assurance Checks and definition, responsibility, methodology and frequency each check shall be carried out.

Level of BIM Quality Assurance Checks

Checks		Definitions	Responsibility	Methodology	Frequency
1	**Visual check (LOD-G)**	Ensure there are no unintended model components and the design intent has been followed; Observe unreasonable modelling errors. Geometry satisfied required LOD-G level at the corresponding phase.	Own Discipline BIM Coordinator	Walk Through Meetings among stakeholders using Authoring, Viewing or collaboration platform / CDE	Bi-Weekly or before Information exchange and end of each work stage.
2	**Interference check, Clash detection (LOD-G)**	Detect problems in the model where two building components are clashing including soft and hard	BIM Coordinator / BIM Manager of party responsible for federating the BIM models	Utilising Clash Detection Software or Collaboration Platform, CDE Discuss and review during BIM Coordination Meeting	Bi-Weekly or before Information exchange and the end of each work stage.
3	**Standards check (LOD-I)**	Ensure that Project Agreement / Works Contract, HABIMSG and BIM PxP have been followed (e.g. fonts, dimensions, line styles, levels, file naming and room numbering.) Object Standards Object Naming, Classification, Consist of 3D Geometry, Property / Parameters, 2D Symbol, Tag / Label / Annotation	Own Discipline BIM Coordinator	Review standards; Utilising automated plugin tools / code-checking software	Bi-Weekly or before Information exchange and the end of each work stage.
4	**Model data Integrity check (LOD-I)**	The process used to ensure that the project data set has no undefined, incorrectly defined or duplicated elements and satisfied the required LOD-I at the corresponding phase. Reporting process on non-compliant elements and corrective action plans.	Own Discipline BIM Coordinator	Scheduling out from the Information Model for each category with metadata; Use of data analytic tools to compare with controlling standards and information requirements. Use of customised Automated plugins.	Bi-Weekly or before Information exchange and the end of each work stage.
5	**Document Deliverable Check**	Ensure documentations are generated from the Single Source of Truth Information Model.	Own Discipline Leader. Corresponding domain knowledge required.	Verify published documentation such as drawings and reports with Information directly generated from the BIM models	Before each publication to document submission.