6 STANDARD APPROACH OF MODELLING (SAM)

The aim of this section is to establish a standard approach of modelling (SAM) for assembling Building Information Modelling (BIM) models with the incorporation of ARC, STR and E&M design concept. Through the SAM, the resulting BIM model 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 is ready for exporting to other structural analytical / design software when the data interlinking process becomes mature and practical.

This standard approach has incorporated some modelling technique to facilitate quantities extraction from the BIM model.

For each discipline, these guidelines provide recommendations on how Revit model / project should be modelled at different project stage.

6.1 Site Planning SAM

DP-01 Property Line

Discipline	Architecture
Family	N/A
Category	Property Lines
Workset	Site
Naming Convention	N/A



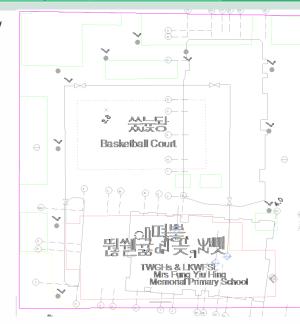
1. Click "Property Line" and select "Create by sketching".



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



 Sketch the property lines. Lines should 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.



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APPENDIX

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Name	Instance	Boundary Name	Υ
Area	Instance	Area of site boundary	Υ

B Drawing Production



DP-02

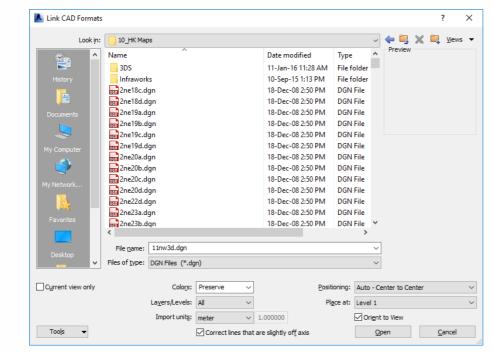
Toposurface

Discipline	Architectural
Family	System Family
Category	Topography
Workset	Site
Naming Convention	N/A



Modelling

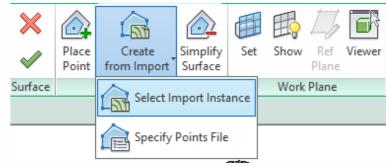
 Setup the project base point and relocate to correct location (Refer to D.MET-3.2, D.MET-3.3, D.MET-3.6)



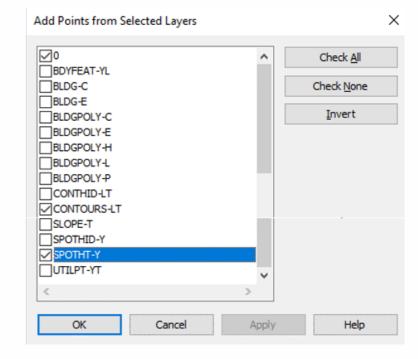
 After relocating the map to correct position as per HK1980 Grid, the 2.5D contour line and spot elevation can be used to set up the toposurface.



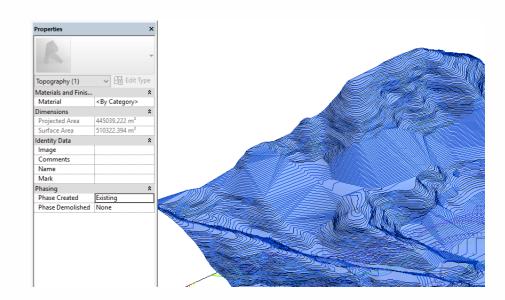
3. It is recommended to use Select Import Instance to create the topography.



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



5. Toposurface shall be created under existing phase.



Essential Parameter

B Drawing Production

General requirements

• The import unit is METER when importing a .dgn map file.

The following parameters under 'Text' shall be set:

Parameter	Type / Instance	Description	Schedule
Platform	Instance	Platform Name	

The following parameters under 'Identity Data' shall be set:

Parameter	Type / Instance	Description	Schedule
Name	Instance	Phase Name	

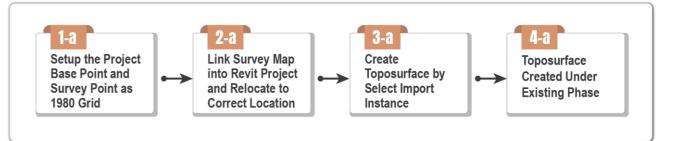
The following parameters under 'Other' shall be set:

Parameter	Type / Instance	Description	Schedule
Phase	Instance	Phase number	Υ

The following parameters under 'Phasing' shall be set:

Parameter	Type / Instance	Description	Schedule
Phase Create	Instance	Phase	Υ

Workflow



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SENDIXES

DP-03

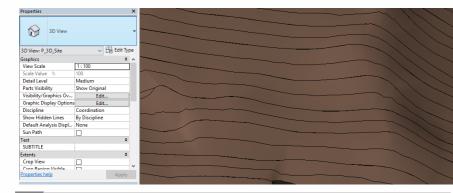
Building Pad

Discipline	Architectural
Family	System Family
Category	Pads
Workset	Site
Naming Convention	PAD-(Functional_Type)-HAA-Material-Thickness

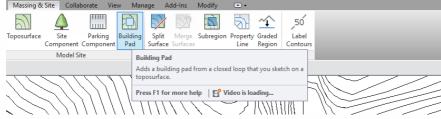


Modelling

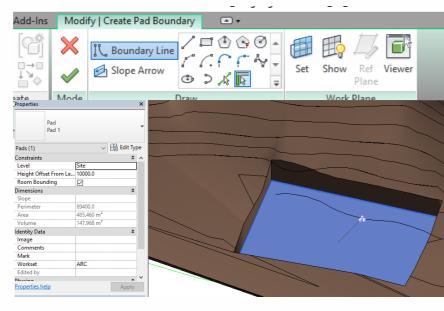
1. Open a site plan view.



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.



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Level	Instance	NA	Υ
Height Offset From Level	Instance	NA	Υ
Area	Instance	Area of building pad	Υ
Volume	Instance	Volume of building pad	N
Mark	Instance	NA	N



Drawing Production

N/A

DP-04

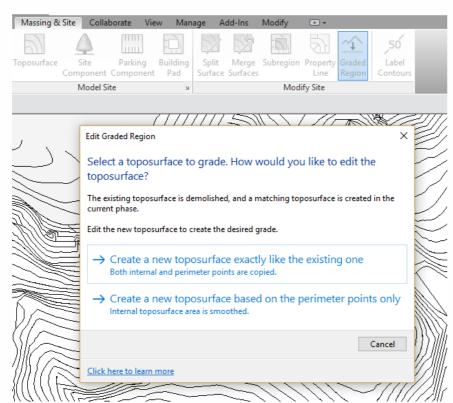
Discipline	Architectural
Family	N/A
Category	N/A
Workset	Site
Naming Convention	N/A



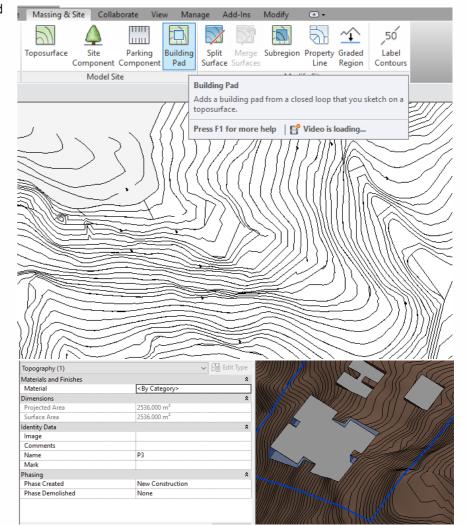
1. Click "Split Surface" under massing & site tab.



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.



 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=""></topography>					
Α	A B C D				
Name	Cut	Fill	Net cut/fill		
P1	95.379 m³	46.041 m ³	-49.338 m³		
P2	209.870 m³	448.952 m³	239.082 m³		
P3	10410.066 m ³	7673.558 m³	-2736.508 m³		
P4	1121.482 m³	116.354 m³	-1005.128 m³		
Grand total: 4	11836.797 m³	8284.905 m ³	-3551.892 m³		

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NNEXES

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Name	Instance	NA	
Cut	Instance	the volume removed (where the later surface is lower than the earlier surface).	
Fill	Instance	the volume added (where the later surface is higher than the earlier surface).	
Net cut and Fill	Instance	Net Cut/Fill value comes from subtracting the cut value from the fill value.	

B

Drawing Production

N/A

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S APPEND

DP-05

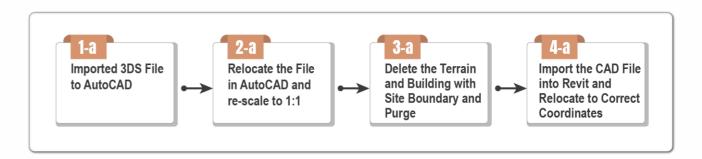
GIS and BIM



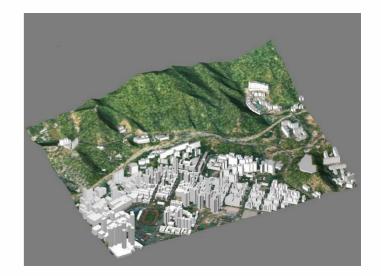
Modelling

General requirements

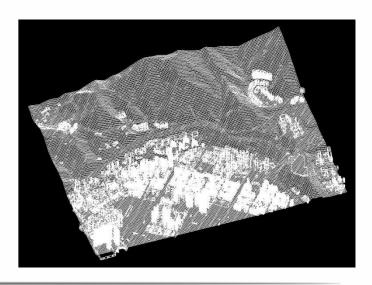
Workflow



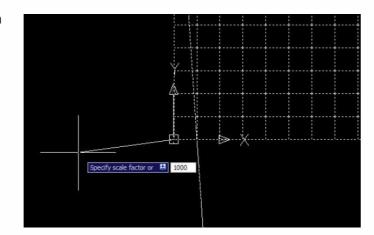
 Import 3D spatial data from Lands Department in to AutoCAD



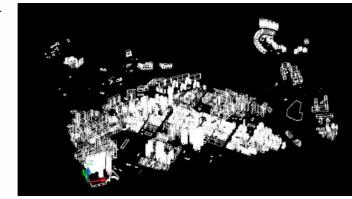
2. Relocate the 3DS model to correct coordinates, and rescale the file to 1:1 (since the files from Lands Department are 1:1000 or 1:5000, normally 1:1000)



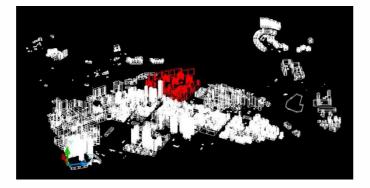
3. Toposurface to be built in Revit file, so delete the terrain in the CAD file and purge.



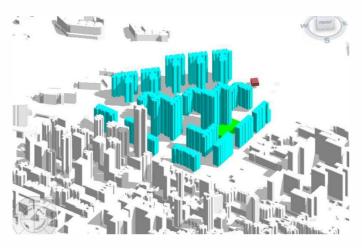
4. Delete the building within site boundary (RED) and purge.



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.





Essential Parameter

Standard Approach for Essential Parameter is to be developed.



Drawing Production

Standard Approach for Drawing Production is to be developed.

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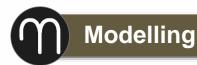
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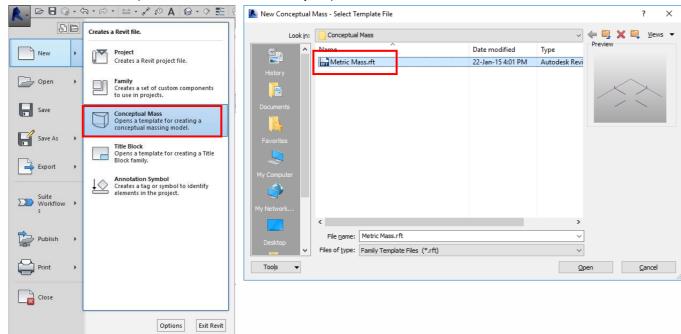
ENDIXES

Conceptual Mass and Feasibility Study

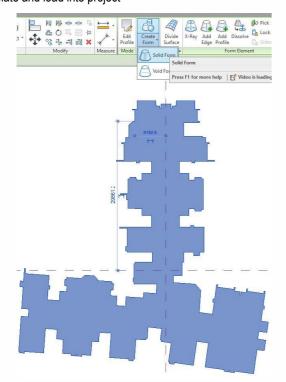


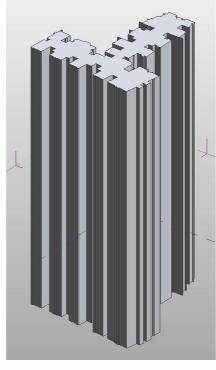
General requirement:

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

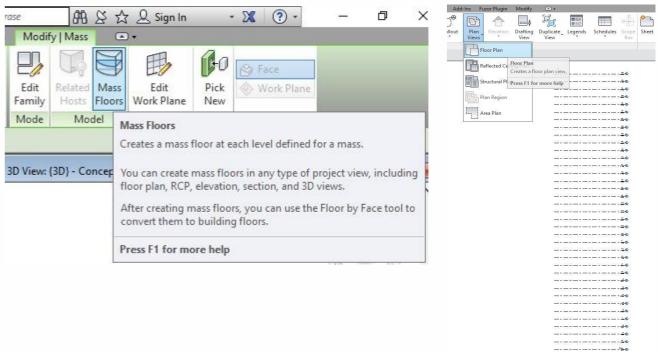


2. Create solid form in template and load into project

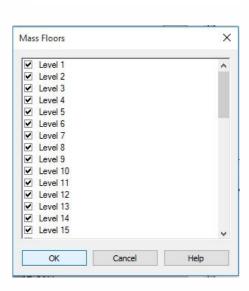


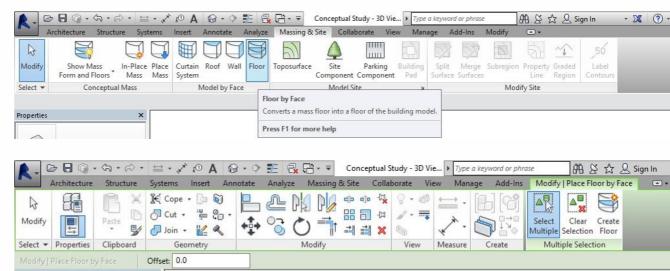


3. Add level to and create mass floor

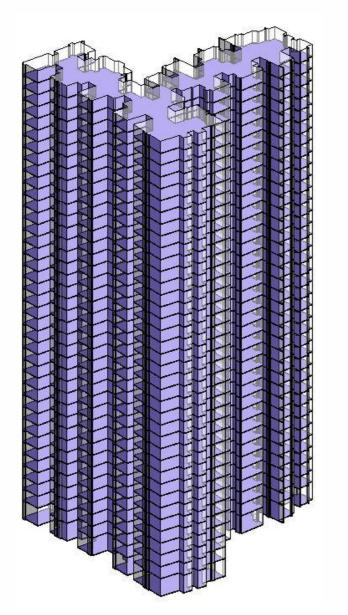


4. Convert all mass floor to floor slab





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



Α	В
Level	Area
36	1055 m²
35	1055 m²
34	1055 m²
33	1055 m²
32	1055 m²
31	1055 m²
30	1055 m²
29	1055 m²
28	1055 m²
27	1055 m²
26	1055 m²
25	1055 m²
24	1055 m²
23	1055 m²
22	1055 m²
21	1055 m²
20	1055 m²
19	1055 m²
18	1055 m²
17	1055 m²
16	1055 m²
15	1055 m²
14	1055 m²
13	1055 m²
12	1055 m²
11	1055 m²
10	1055 m²
9	1055 m²
8	1055 m²
7	1055 m²
6	1055 m²
5	1055 m²
4	1055 m²
3	1055 m²
2	1055 m²
01	1055 m²
	1055 m²
anopy	1055 m²
Frand total	40095 m²



Essential Parameter

N/A



N/A

DP-07 Sun & Shadow Analysis



Modelling

1:100







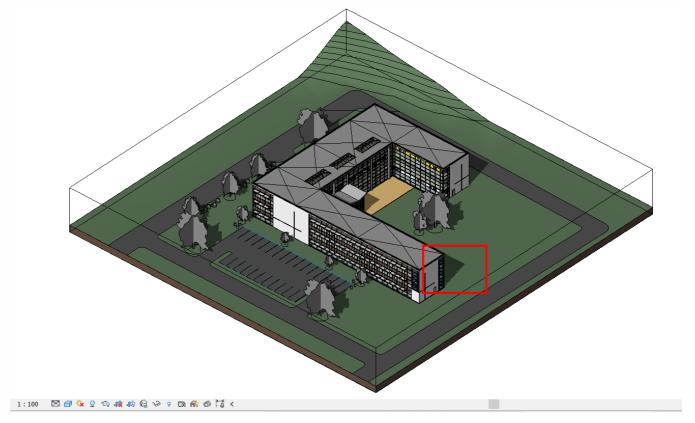






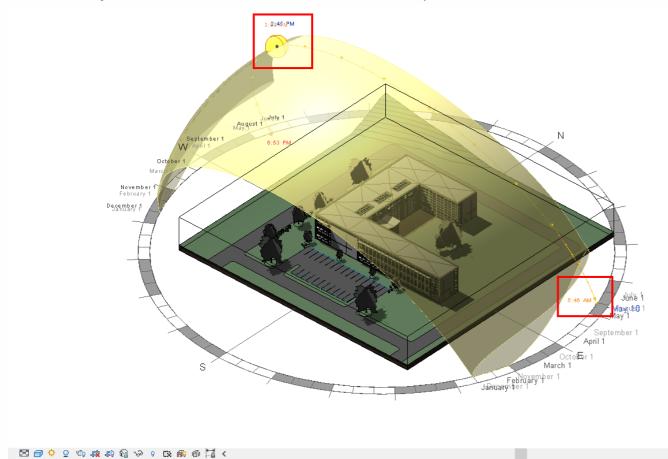


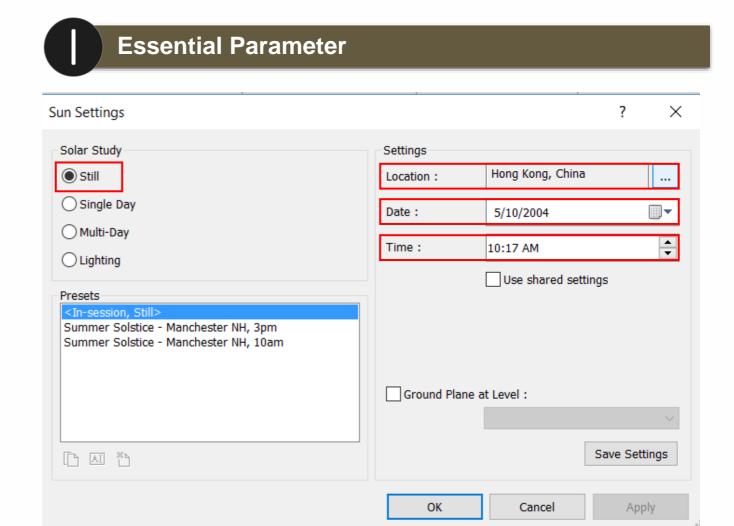
In 3D View, switch on Shadow On mode



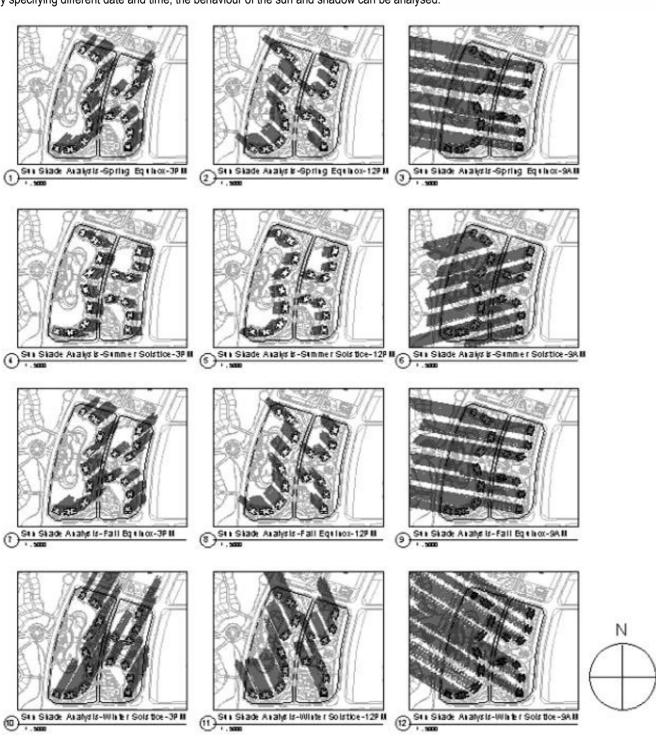
STANDARD APPROACH OF MODELLING (SAM)

Turn on Sun Settings to define the Location, Time and Date for Sun and Shadow Analysis



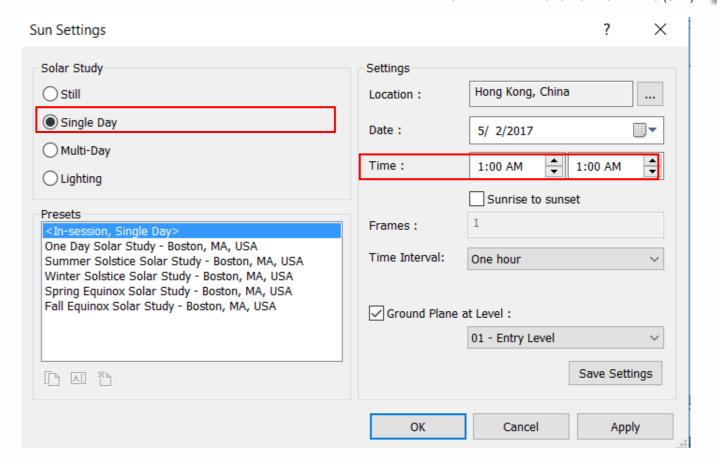


By specifying different date and time, the behaviour of the sun and shadow can be analysed.



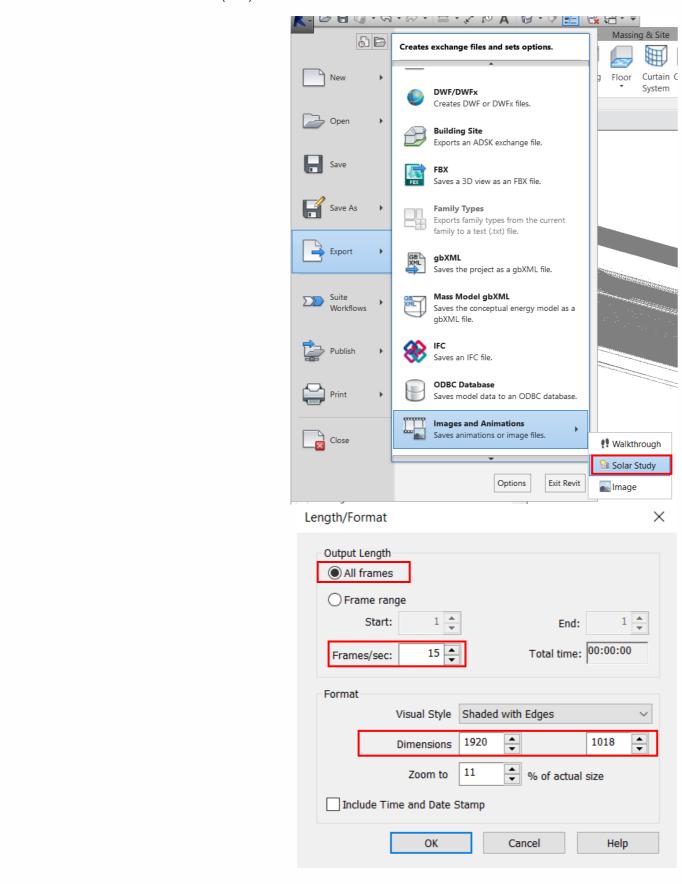
Sun Shading Diagram

Animation of one Single Day



Video can be exported for the analysis for a certain time period.

It shall be noted that Revit can only perform qualitative analysis. Quantitively Lighting Analysis such as lux level can be performed using external software such as Dialux or 3D Max.



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6.2Landscaping SAM

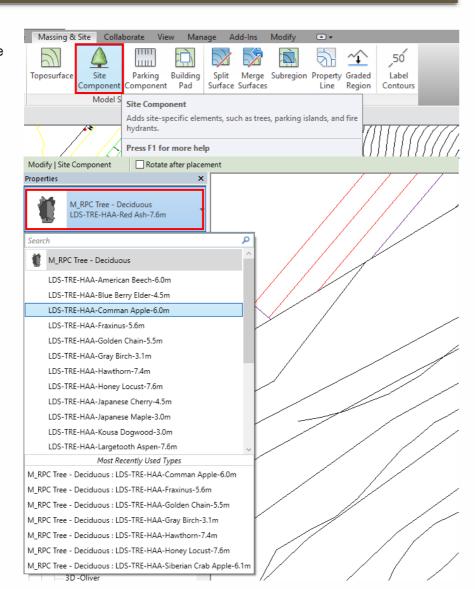
DL-01 Planting (Soft Landscape)

Discipline	Landscaping Architecture	
Family	Loadable Family	
Category	Planting	
Workset	Site	
Naming Convention	LDS-(Functional_Type)-HAA-Species-Height	



Modelling

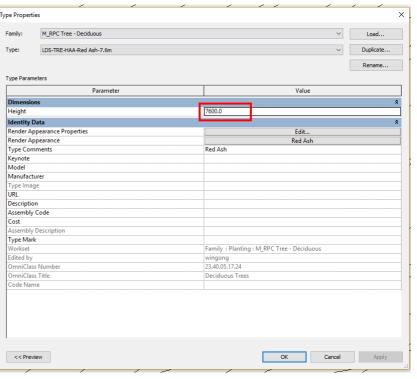
- 1. Click "Site Component" in "Model Site Panel" under "Massing Space & Site"
- 2. Select the desired tree component from the "Type Selector"



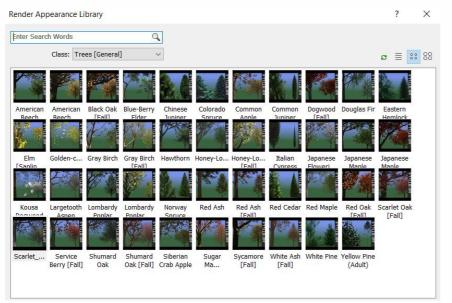
4. The tree components can be modified. In components properties panel click "Edit Type"



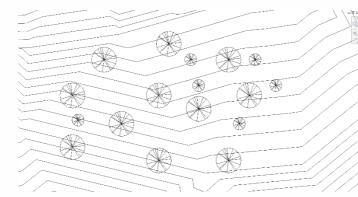
5. In the Type Properties dialog, for Height, enter a value to indicate the new height of the plant and click ok.



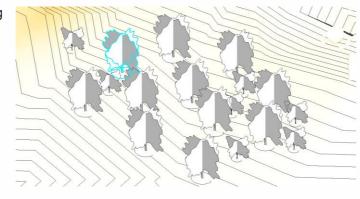
6. Species appearance can be chosen in the Type Properties. When display in "Realistic" mode or rendered view, the appearance of the plans can be indicated.



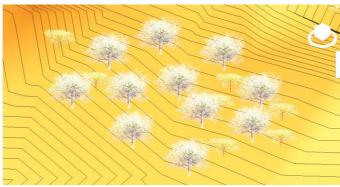
7. Plan View



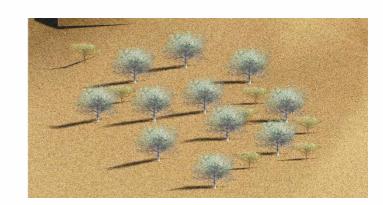
8. 3D Shaded Mode (Note that base of plantings is following the contour, not floating in air)



9. Realistic Mode



10. Rendered Mode (Note the leaves and shadow)



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Height	Instance	Tree Height	Υ
Render Appearance	N/A	Appearance of planting in rendering	N

Schedule -			
N/A			

6.3 Architecture SAM

The objective of this section is to assist project teams in the developing Revit models to meet requirements of production of professional deliverables such as production of drawings and other analysis. 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 to Modelling in Architecture creates a basic structure to assist the project teams in preparing the BIM models for production and drawings. It is by no means an exhaustive template and project teams are allowed to edit / change accordingly to suit. For any additional requirements that require customizations to a certain extent, project teams are also advised to make reference to the Construction Industry Council Building Information Modelling Standards (Phase One) 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 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 objects 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 smaller elements are not modelled in 3D. for example, when elements are smaller than 50mm in size, it may not need to be modelled. 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.

The Level of Development for each architectural element is described in section 3 of the HABIMSG.

Whenever possible, the architect should 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 should acquire MEP family library prepared by MEP discipline before modelling

DA-01

Naming Convention

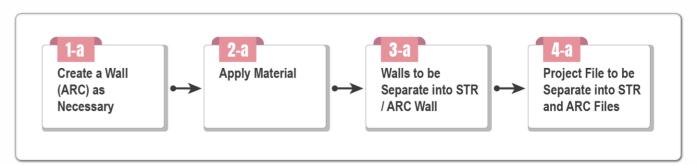
Architectural Walls

Discipline	Architectural. Note the difference between Architectural Wall and Structural Wall! Cannot be confused.
Family	System Family
Category	Architectural Wall
Workset	External Envelop – For External Walls
	Individual Levels

(Functional_Type)-HAA-Material-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	
1st_Descriptor (Material)	ConcB	Material – e.g. Concrete Blockwork	
	Render	Render	
	Paint	Paint	
2 nd _Descriptor (Thickness)	200mm	Thickness of the wall	

Wall creation workflow



Architects are required to manage 2 models for architectural discipline (ARC models) and structural discipline (STR models) for design and drawing production purposes at early stage;

- Non-structural: Architect
- Structural: Structural Engineer

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- Base on the section under Modelling, Structural Walls in an Architectural file should be put in a different workset (before SE on board).
- After Structural Engineers on board and develop their own STR Model, Architects shall link the STR model developed by SE into ARC Model for drawing production purpose;
- Architect may keep a "Hidden Workset" to hold the Structural elements for temporary / minor adjustment on drawing.
- Structural wall inside architectural wall could be retained before structural model developed.



Modelling

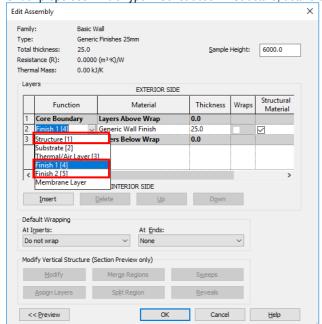
"Walls" in general includes: Structural walls, non-structural full height partition walls, non-full height partition walls, parapet walls, curbs, hanger walls etc.

Architectural discipline shall use Architectural Wall but not Structural Wall

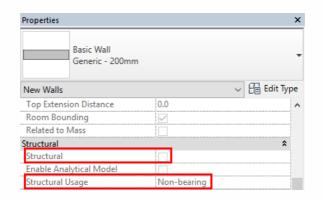


- Architectural walls should be separated into Interior wall finish; wall core and exterior wall finishes after preliminary design.

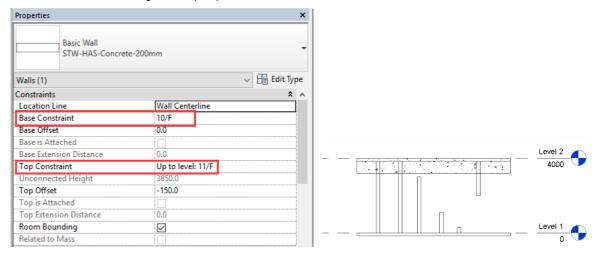
Under properties > Edit Type > Construction > Structure, details of wall composition can be setup, shown here under.



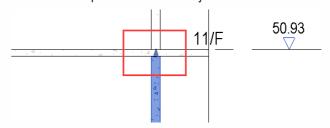
- Structural Properties of Architectural Wall should be non-structural and non-bearing.



- Base constraints should be set to the level where walls are sit on.
- Top constraints should be set to either the floor level immediately above for full height walls and hanger walls, or unconnected for non-full height walls, parapets and curbs.



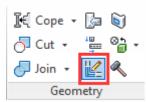
- For full height walls, it should only be built up to **soffit of slab immediately above**, i.e. top offset from top constraints should **be minus upper floor slab thickness**, regardless whether there is a beam or not.
- No wall should span more than 1 storey.



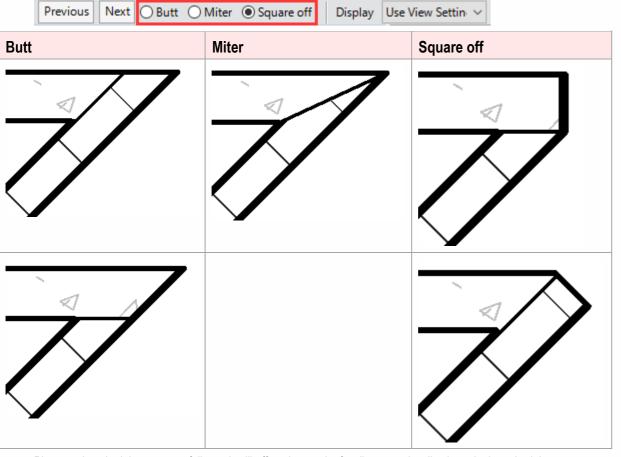
- Room Bounding should be set to ON unless there are special space definition requirement otherwise specified.
- Commonly used wall types should be set up to standardize within office. Properties information including structure, width, structural material, fire rating should be specified.

Wall joint

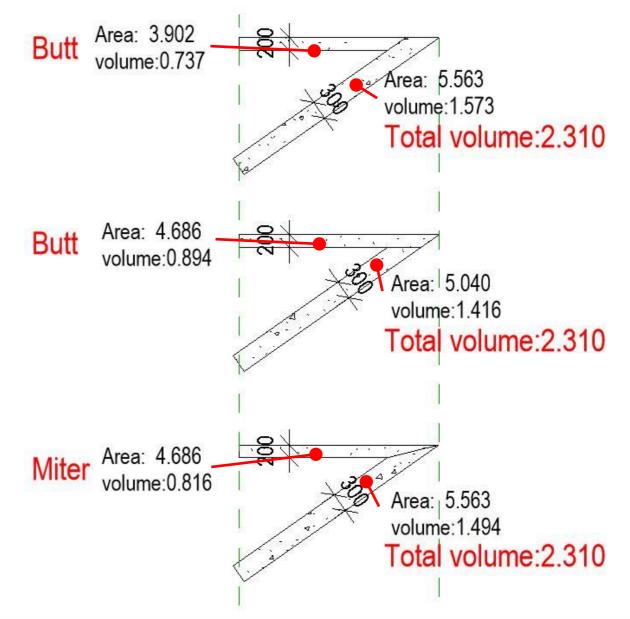
• The "Wall Joins" command under Modify > Geometry helps to modify the wall joints method to the appropriate type.



• Different types of wall joint could be obtained by select among Butt, Miter or Square off.

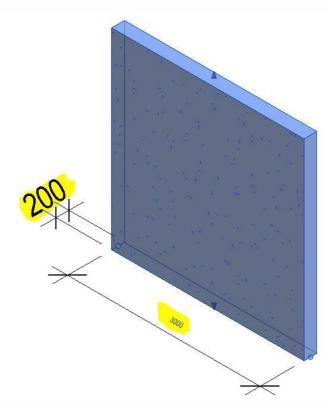


- Please select the joint type carefully, as it will affect the result of wall area and wall volume in the schedule.



It should be noted that for quantity take-off purpose, different wall joint methods do not affect or do not have significant impact on the total volumes.

Basic Wall AWL-ACD-Con-<mark>200m</mark> V Edit Type Walls (1) Wall Centerline G/F Location Line Base Constraint Base Offset Base Extension Di Up to level: G/F Top Constraint Top Offset Top is Attached Room Bounding \square Related to Mas Structural Dimensions Length Area Identity Data Image Comments Mark Phasing Phase Created Phase Demolished Project Browser - Project1 ☐ [O] Views (all) ☐ Floor Plans



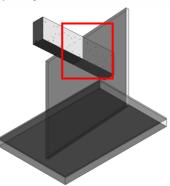


However, the Revit's built-in definition for "Area" appears to be calculated from the product of length and height of the wall reference line, for a standard rectangular standalone wall, i.e., this will be the wall surface area of one face only instead of both faces. Where two walls are joined and there are different surface areas for two faces, the area also represents either one side of the face only, depends on the wall joint method being applied. Users should be aware of the systematic difference if extracting the area data for QTO or other purposes.

Joint Geometry

Join Geometry is one of the essential commands between join elements, although from elevation of these 2 walls seems no difference, but the actual geometry and the schedule shows the difference between the un-join wall and the join wall.

a) Unjoin wall:

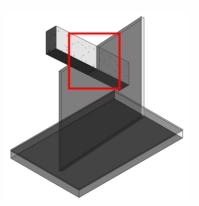


3D view

		Wall Schedule						
Family and Type	Width	Area	Unconnecte d Height	Volume	Function	Length	Mark	Phase Created
Basic Wall: STW-HAS-Concrete-200mm	1	40.040 m²	3850	8.008 m³	Interior	10400		New Construction

Area and volume of the wall shown in wall schedule of "Unjoin Wall"

Join wall



3D view

		Wall Schedule						
Family and Type	Width	Area	Unconnecte d Height	Volume	Function	Length	Mark	Phase Created
Basic Wall: STW-HAS-Concrete-200mm	200	39.780 m²	3850	7.956 m³	Interior	10400		New Construction

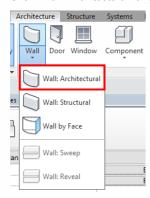
Area and volume of the wall shown in schedule of "Join Wall"

b) The join and un-join geometry cases could apply to many other elements, such as wall and column, beam and slab etc.

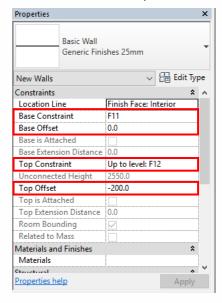
Straight Wall

Modelling Method:

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 Constrain" in step 2 above.
- 4. Select the drawing method under "Modify | Place Wall > Draw" and draw on plan.

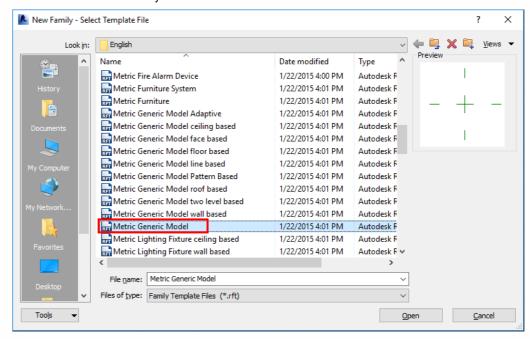


Slope Wall

- There are different methods to create a slope wall, such as under Architectural > Component > Model In-place, Modify | Place Wall >
 Draw > Pick Faces from mass or generic model family.
- It is suggested to use "Pick Faces" from generic model family method

Modelling Method:

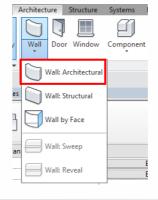
1. Create a Generic Model family



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



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





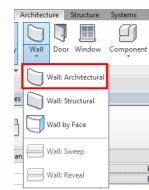
4. Select the "Pick Faces" button under "Modify | Place Wall > Draw", then select the slope face where you want to build the

1-Way Curve Wall

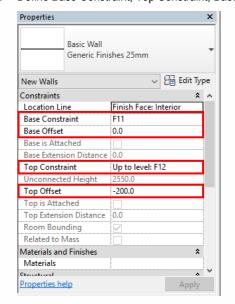
• There are different methods to create a 1-Way Curve Wall, such as use Architectural > Component > Model In-place, Wall by Pick Lines from loading mass, generic model or other object families.

Modelling Method:

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 Constrain" in step 2 above.
- 4. Select the drawing method under "Modify | Place Wall > Draw" and draw on plan.

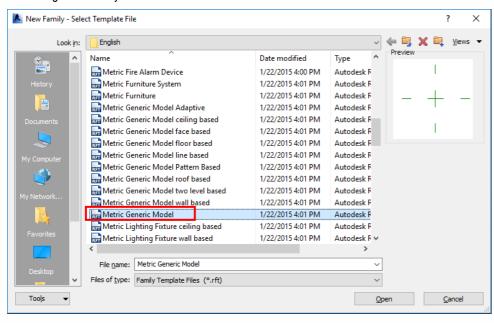


2-Way Curve Wall

- There are different methods to create a 2-Way Curve Wall, such as use 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

Modelling Method:

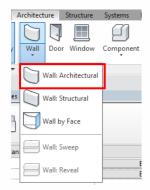
1. Create a generic family



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



B. 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



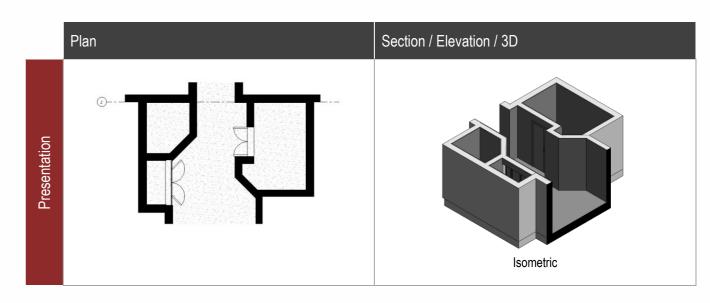


Essential Parameter

Parameter	Type / Instance	Description	Schedule
Base Constraint	Instance	Base Level	Υ
Top Constraint	Instance	Top Level	Y
Unconnected Height	Instance	Wall Height	Υ
Length	Instance		Y
Thickness	Туре		Υ
Material	Туре	Material	Y
Туре	Туре	Type Name	Υ
Area	Instance	Wall Area	Υ

B Drawing Production

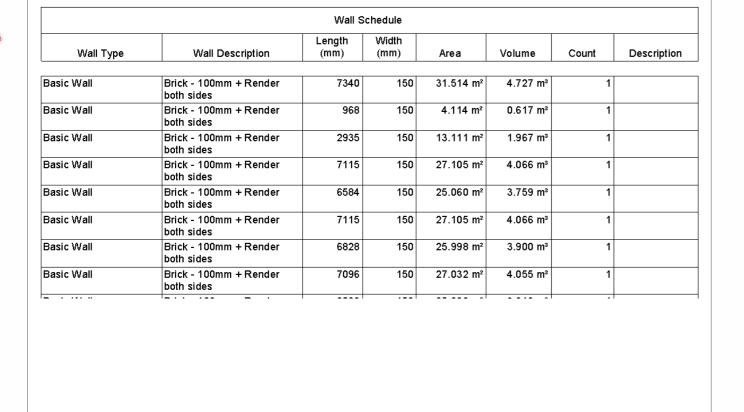
Use of Visibility Graphics (VG or VV) to override the Wall colour and pattern as per statutory requirement.



250 1510 200 1754 200 1821 250 25 200 17 1 Section View Tender 200 1225 250 1360 250 500 200 1800 250

Schedule -

****!\



DA-02 Wall Finishes

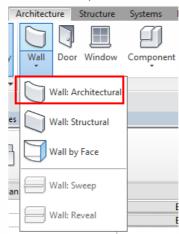
Discipline Architectural	
Family	System Family
Category Architectural Wall	
Workset Individual Levels	
Naming Convention (Functional_Type)-HAA-Material-Thickness	



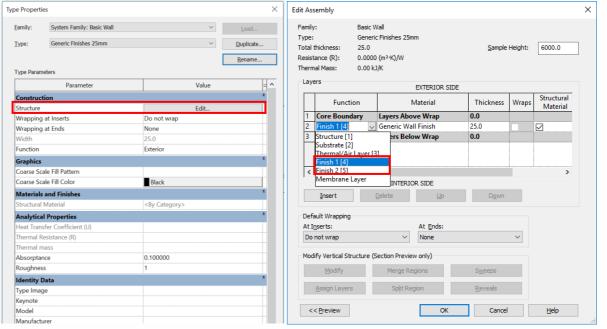
Modelling



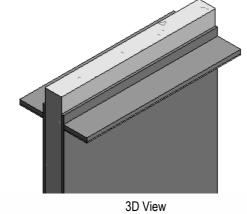
Wall finishes (also floor and ceiling finishes) will not be modelled for LOD300. However, to facilitate better design and visualization, it is advised finishes should be modelled for special areas such as lobbies in public areas.



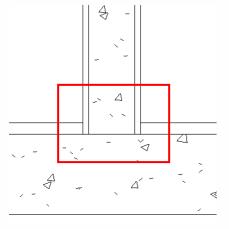
Wall finishes only applies to Architectural model.

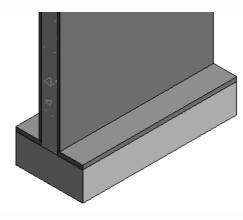


Architectural finishes wall shall extend 100mm above bottom of ceiling.



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





Section View

3D View

Essential Parameter

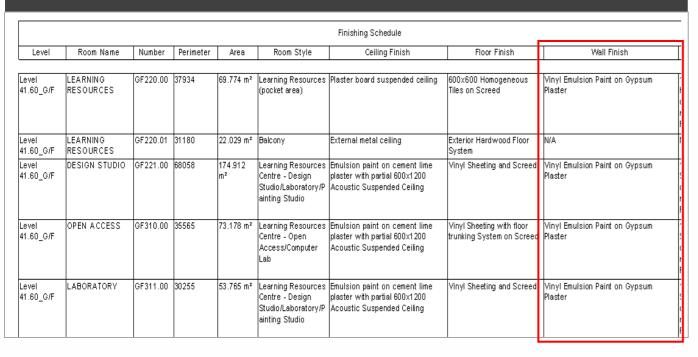
Parameter	Type / Instance	Description	Schedule
Top Constraint	Instance	Top Level	Υ
Base Constraint	Instance	Base Level	Υ
Unconnected Height	Instance		N
Туре	Туре		Υ
Length	Instance		N
Thickness	Туре		Υ
Material	Туре	Generic material only. No need to specify in SD. May consider only in partial CD phase.	N

B

Drawing Production

	Plan	Section / Elevation / 3D
Presentation	N/A Wall finishes is not required to appear on presentation drawing. Wall finishes shall be put under a separate workset for controlling the visibility.	N/A
Submission	N/A Wall finishes is not required to appear on presentation drawing. Wall finishes shall be put under a separate workset for controlling the visibility.	N/A
Tender	+38.510 ▼ 25mm THK. JOINT FILLER Generic Wall Finish	

Schedule -



DA-03 Wall Opening

Discipline	Architectural / MEP	
Family	System Family	
Category	Wall Opening	
Workset	Individual Levels	
Naming Convention	AWL- (Functional_Type)-HAA-dimension	

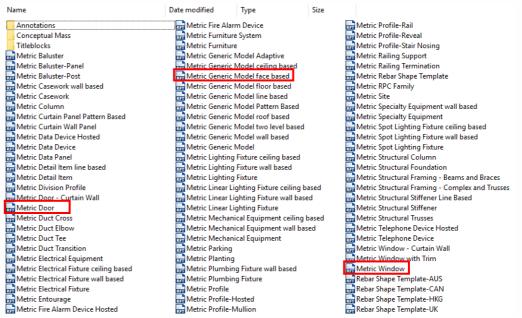


Modelling

For Architectural Design:

There is a number of method to make a wall opening, such as "Wall Opening" command, "Edit Profile", use void object family etc.

- It is suggested to use family (empty window family, empty door family or create a void object in generic model with face based etc.) to create opening in other shapes.



Dimension parameter (under shared parameter for scheduling purposes) to be setup within family.





- It is not preferred to use "Edit Profile" to create a wall opening as it is not convenient to edit.



Q1

Wall Type	Straigh	nt Wall	Slope Wall		ppe Wall 1-Way Curve Wall		2-Way Curve Wall	
Schedule	×	✓	*	✓	×	✓	×	✓
Graphic								
Method	wall ananing	Void Object	Void Object	Void Object	Void Object	Void Object	Void Object	Void Object
Prefer	wall opening	Family	Family	Family	Family	Family	Family	Family

For MEP Builder's Work:

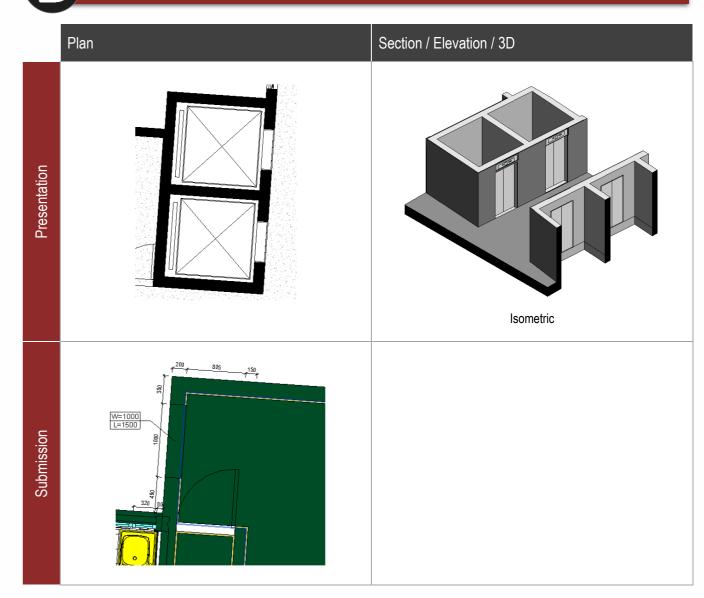
- If the opening is smaller than 100mm, it should not be modelled.
- Wall Opening for Builder's Work requested by MEP disciplines should be created by a wall opening family using Window Family Template.
- Wall opening family should be capable in shape changing, i.e. rectangular, circular etc, and dimension control by using Shared Parameters.
- Information for the Builder's Work Legend should not be built into the wall opening family in ARC model files.



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Top Offset	Instance		Υ
Base Offset	Instance		Υ
Unconnected Height	Instance	Wall Opening Height	N
Base Constraint	Instance	Location of Level	Υ

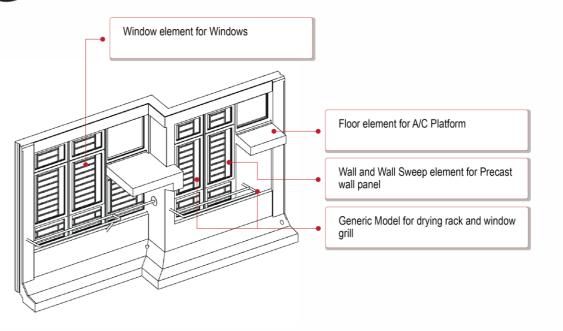
Prawing Production



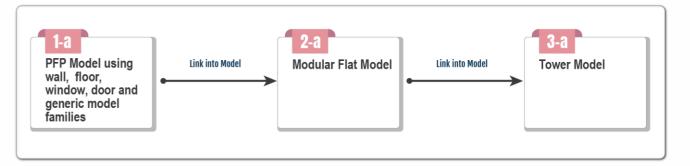
DA-04 Precast Façade Panels

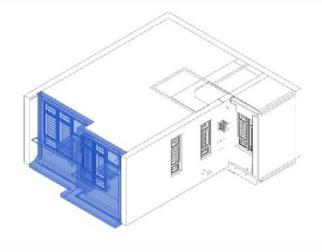
Discipline	Architectural
Family	N/A
Category	Revit Project File
Workset	Individual Levels
Naming Convention	GMD-(Functional_Type)-HAA-Material-Dimension

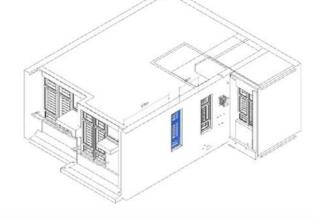
Modelling



- To schedule building elements in Precast Façade Panels (PFP) in a project, a PFP modular should be created as a Revit project file, but not a generic model family file.
- PFP file will be linked into "Modular Flat File" or a Master Model file directly. In a Master Model File, other than windows or doors have been embedded into the PFP link file, there are also windows and doors, which are created as loadable families, since the windows and doors in the PFP link file are normal windows and doors family elements, in the Master Model File, all windows and doors can be scheduled properly

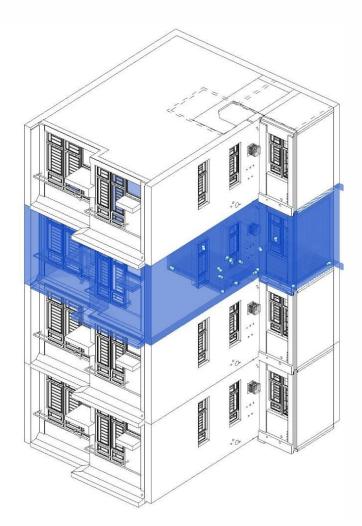






Windows embedded in Precast Façade Panel

Window create loadable family, placed in the Modular Flat



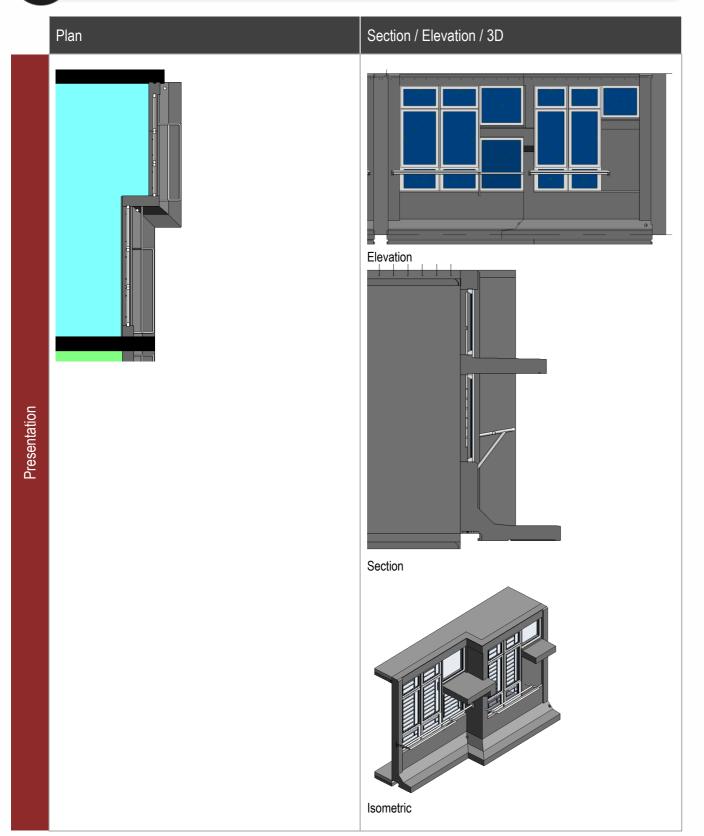
Link Modular Flat into Tower Model File and Multiply according to design.

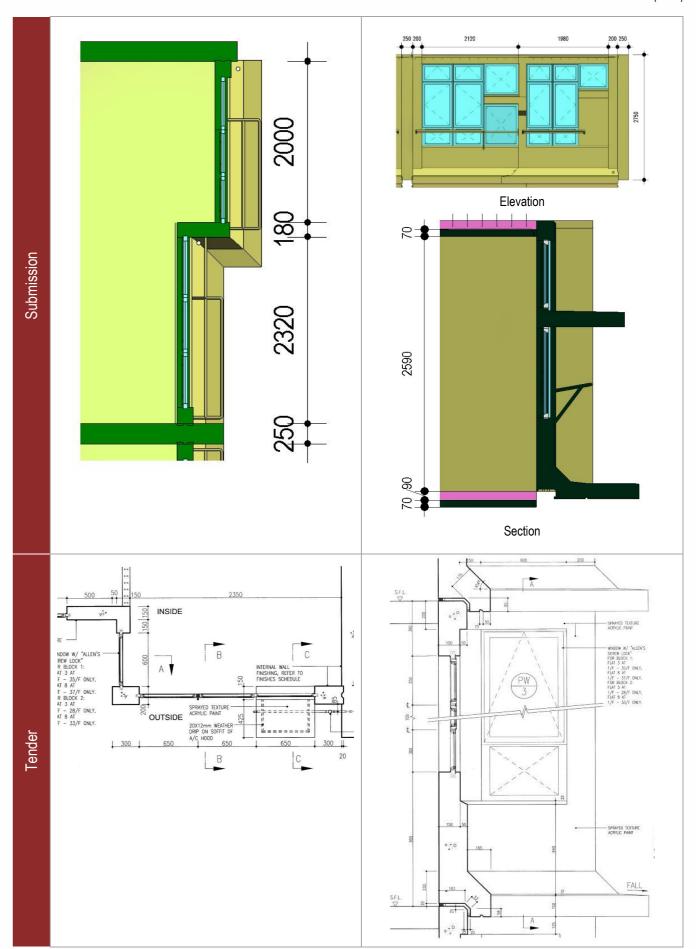


Essential Parameter

Parameter	Type / Instance	Description	Schedule
Level	Instance	Location	Υ
Sill Height	Instance	Base offset from reference level	Υ
Materials	Instance		Υ
Туре	Туре		N
Height	Туре		N
Width	Туре		N
Location	Instance		N

B Drawing Production





Schedule -		
N/A		

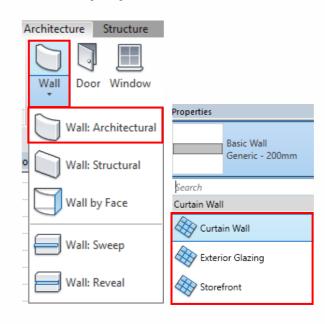
DA-05 Curtain System / Curtain Wall

Discipline	Architectural
Family	System Family
Category	Architectural Wall
Workset	Individual Levels
Naming Convention	(Functional_Type)-HAA-Shape of Curtain Wall-Dimension

	Short form	Description
Functional Type	CUW	Curtain wall
	SFT	Shorefront
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
	HAB	Housing Authority-Building Services Engineering
1st_Descriptor	Flat	Flat Shape of curtain wall
	Curve	Curve shape of curtain wall
2nd_Descriptor	1200x600mm	Curtain wall vertical x horizontal grid distance

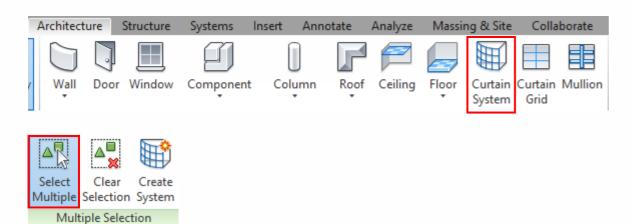
Modelling

• Curtain wall should be created by Architecture > Wall > Wall: Architectural, and curtain wall types in default includes: curtain Wall, exterior glazing and storefront.

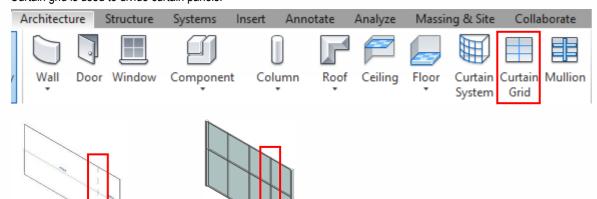




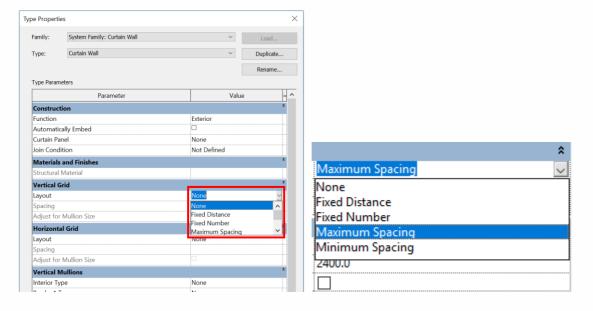
• Curtain System can only apply on a mass or generic model family object.



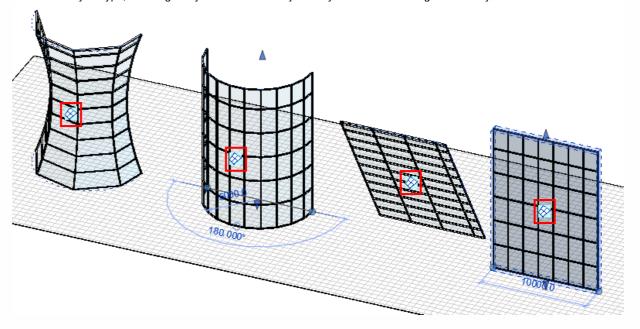
• Curtain grid is used to divide curtain panels.



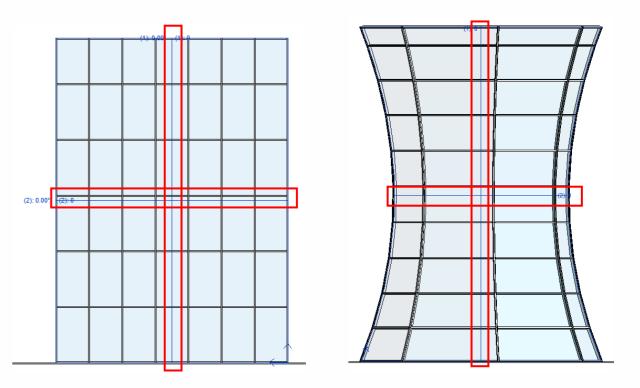
• Curtain panels can also be divided by using different layout under curtain wall Type Properties.



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

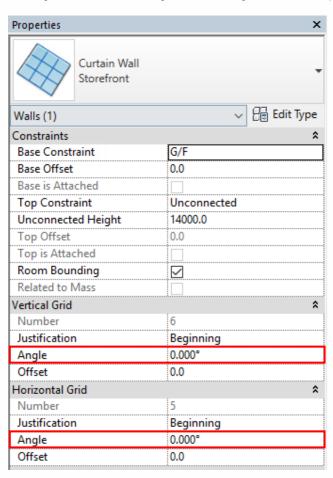


• Different types of curtain wall (whether it is straight curtain wall, slope curtain wall, curve curtain wall or 2-way curtain wall) all have 2 types of curtain grid layout which default as horizontal and vertical.

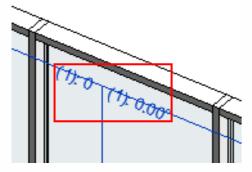


STANDARD APPROACH OF MODELLING (SAM)

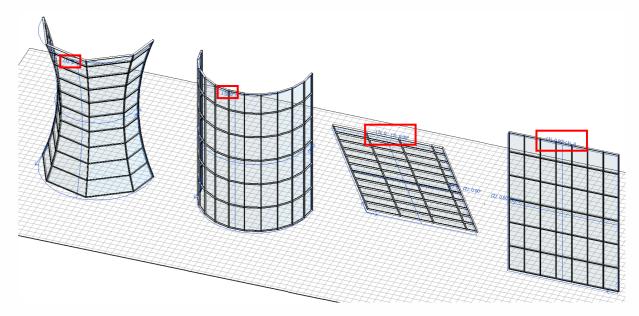
• The angle and offset of curtain grid can be change on curtain wall properties or "Configure Grid Layout"



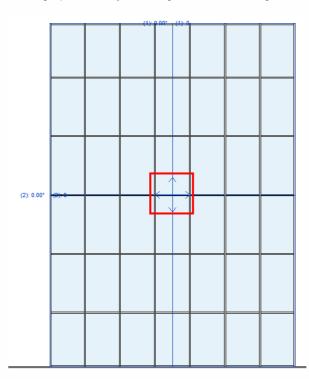
it also shows on "Configure Grid Layout" .(Left: offset; right: angle)



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



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

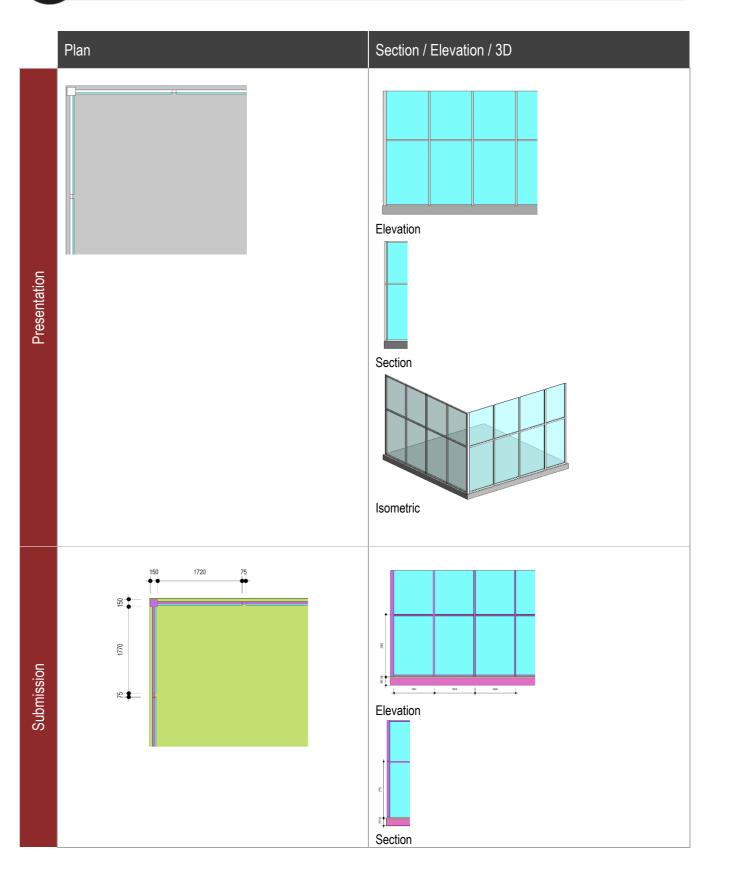


• If it is necessary to adjust part of curtain grid within the layout setting above, one needs to select the curtain grid and unpin it first.

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Curtain_Curved	Туре	Filter by Schedule	Υ
Curtain_Flat	Туре	Filter by Schedule	Υ
Curtain_Sloping	Туре	Filter by Schedule	N
Base Constraint	Instance	Base Level	N
Top Constraint	Instance	Top Level	N
Unconnected Height	Instance	Wall Height	Υ
Length	Instance		Υ
Thickness	Туре		N
Material	Туре	Material	N
Vertical Grid	Instance	Number, Angle, Offset	N
Horizontal Grid	Instance	Number, Angle, Offset	N

B Drawing Production



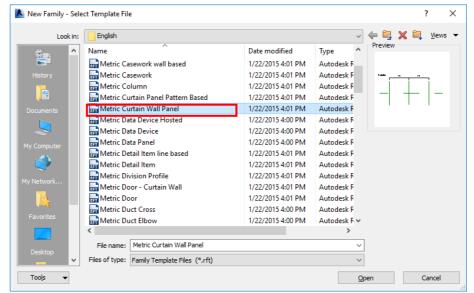
le -					
		Curtain Syst	em Schedule		
Count	Family	Family and Type	Phase Created	Phase Demolished	Туре
1	Curtain System	Curtain System: 2400*2400	New Construction	None	2400*2400
1	Curtain System	Curtain System: 1500 x 3000mm	New Constructio n	None	1500 x 3000mm

DA-06 Curtain Panel

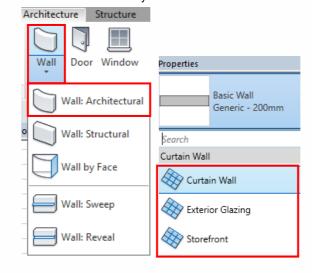
Discipline	Architectural
Family	Loadable Family
Category	Curtain Wall Panel
Workset	Individual Levels
Naming Convention	(Functional_Type)-HAA-Material-Thickness

Modelling

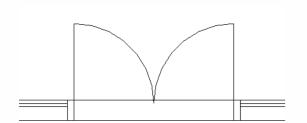
- Curtain wall panel only applies in Architectural model.
- Curtain wall panel is a loadable family and could be created from: Curtain Wall Panel family.



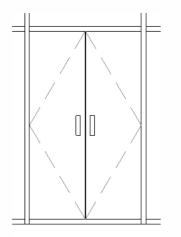
- For Curtain Wall with spider clamp fixing method, fixing should be modelled in Curtain Wall Panel family.
- Spider clamp should be first created with Generic Model family, and then Loaded into the Curtain Wall Panel family
- Doors in a Curtain Wall should be created by "Curtain panel" family. And It is not preferred to create the door by using "Door Curtain Wall" family.



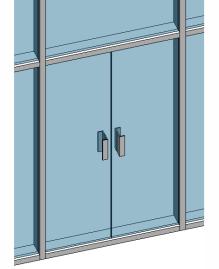




Plan View



Elevation

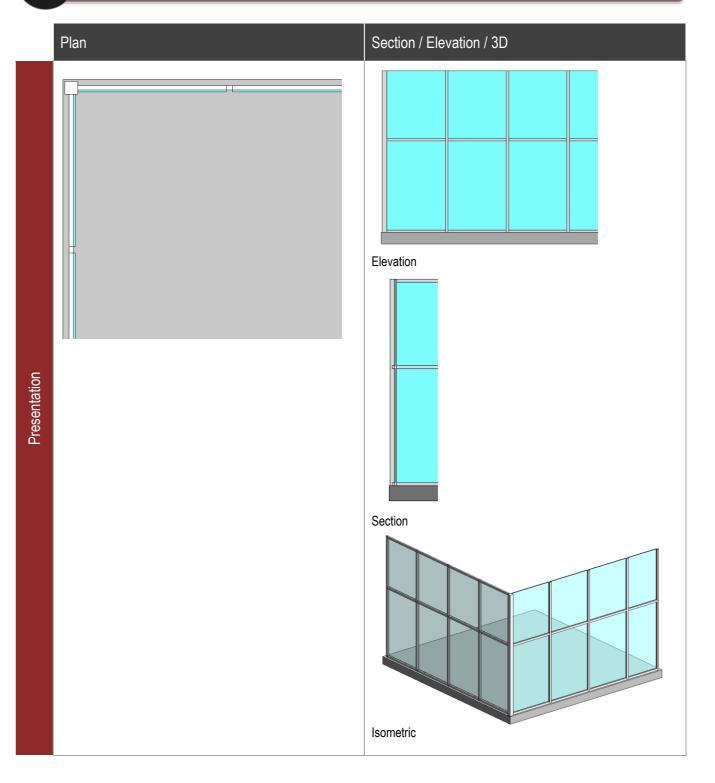


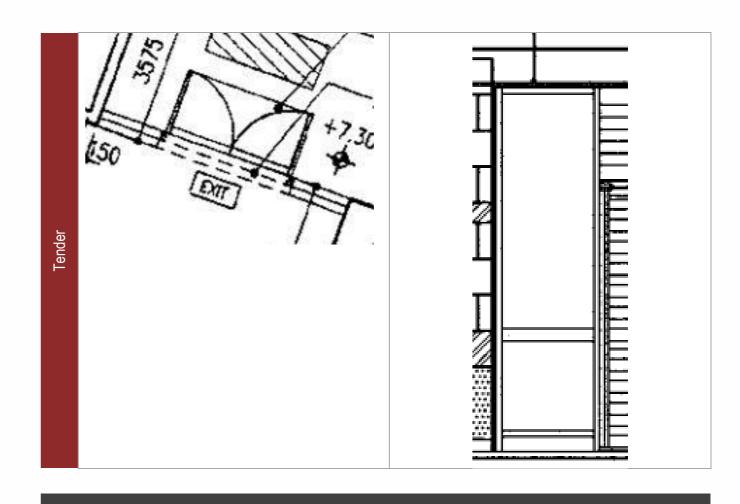
3D View

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Curtain_Curved	Туре	Filter by Schedule	Υ
Curtain_Flat	Туре	Filter by Schedule	Υ
Curtain_Sloping	Туре	Filter by Schedule	N
Length	Туре		Υ
Width	Туре		Υ
Thickness	Туре		Υ
Materials	Туре		N

B Drawing Production





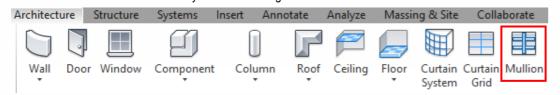
		Panel Sche	dule		
Family	Type	Area	Count	Height	Width
System Panel	Glazed	2.063 m²	1	1875	1100
System Panel	Glazed	1.730 m²	1	1875	923
System Panel	Glazed	2.063 m²	1	1875	1100
System Panel	Glazed	2.063 m²	1	1875	1100
System Panel	Glazed	1.640 m²	1	1875	874
System Panel	Glazed	2.063 m²	1	1875	1100
System Panel	Glazed	2.063 m²	1	1875	1100
System Panel	Glazed	1.640 m²	1	1875	874
System Panel	Glazed	2.063 m²	1	1875	1100
System Panel	Glazed	2.063 m ²	1	1875	1100
System Panel	Glazed	1.640 m²	1	1875	874
System Panel	Glazed	1.348 m²	1	1225	1100
System Panel	Glazed	1.348 m²	1	1225	1100

Discipline	Architectural
Family	System Family
Category	Curtain Wall Mullion
Workset	Individual Levels
Naming Convention	(Functional_Type)-HAA-Mullion Type-Dimension

	Short form	Description
Functional Type	CWM	Curtain wall mullion
Originator	HAA	Housing Authority-Architecture & landscape
	HAS	Housing Authority-Structure
1st_Descriptor	INT	Mullion for interior type
	BOR	Mullion for border type
2nd_Descriptor	50x150mm	Dimension of profile
	D90	Border mullion profile at 90 degrees

Modelling

Curtain Wall Mullion will only hold on curtain grid.

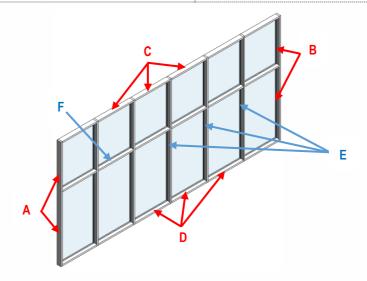


• There have 3 type of mullion placement method

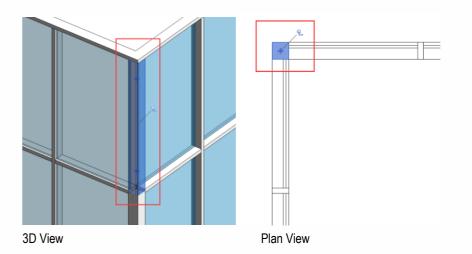
Architecture	Structure	Systems	Insert Ar	notate	Analyze	Massing & S	ite Coll	aborate V	iew Man	age Add-Ins	ACID	Fuzor Plugin
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<u>+</u>	-	Join 🕶	k	+⊕+	ੱ () ¯╗↑ ₌	4 🟥 🗙		* .			Segment Lines
Properties	Clipboard	Geo	metry		ı	Modify		View	Measure	Create		Placement

• The type of mullion can be exchange on curtain wall properties

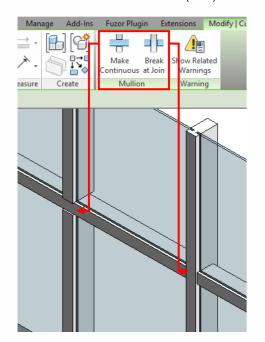
Vertical Mullions		\$
Interior Type	Rectangular Mullion : 50x150mm	
Border 1 Type	Rectangular Mullion : 50x150mm	
Border 2 Type	Rectangular Mullion : 50x150mm	
Horizontal Mullions		\$
Interior Type	Rectangular Mullion : 50x150mm	
Border 1 Type	Rectangular Mullion : 50x150mm	
Border 2 Type	Rectangular Mullion : 50x150mm	



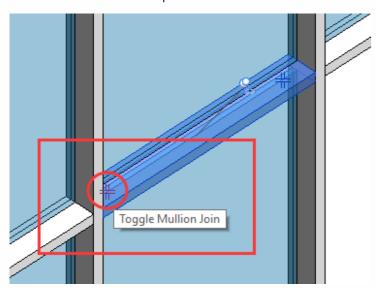
Shape of border mullion is different from the interior mullion.



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



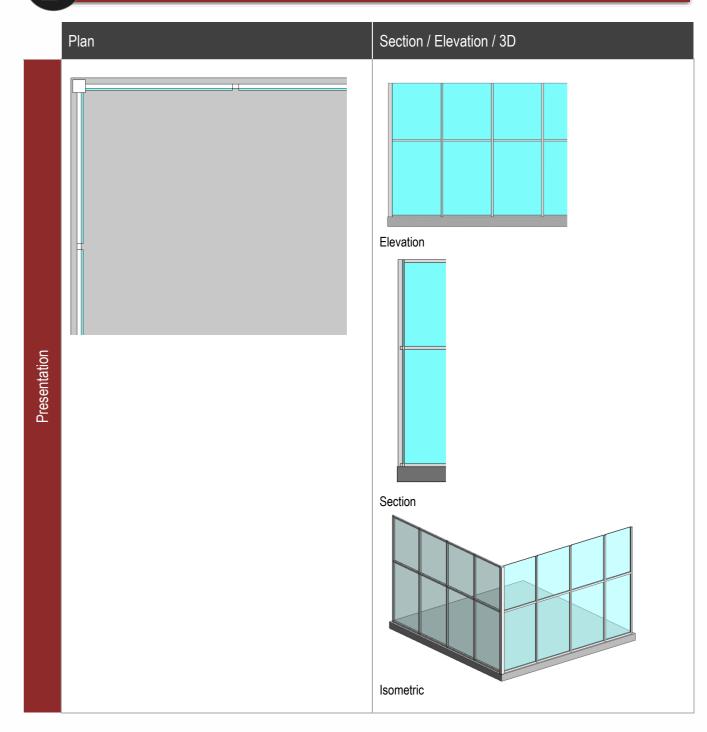
• When a mullion is selected, the mullion join status could be changed by clicking Toggle Mullion Join icon between Make Continuous and Break at Join options



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Length	Instance		N
Material	Туре		Υ
Type Mark	Туре		Υ

B Drawing Production



Schedule -

		_	1	T =:	
Family	Family and Type	Length	Phase Created	Phase Demolished	Туре
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	884	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1190	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1200	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1100	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1100	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	923	New Construction	None	50 x 150mm
Quad Corner Mullion	Quad Corner Mullion: Quad Mullion 1	2065	New Construction	None	Quad Mullion 1
Quad Corner Mullion	Quad Corner Mullion: Quad Mullion 1	1975	New Construction	None	Quad Mullion 1
Quad Comer Mullion	Quad Corner Mullion: Quad Mullion 1	1985	New Construction	None	Quad Mullion 1
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1100	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1100	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	874	New Construction	None	50 x 150mm

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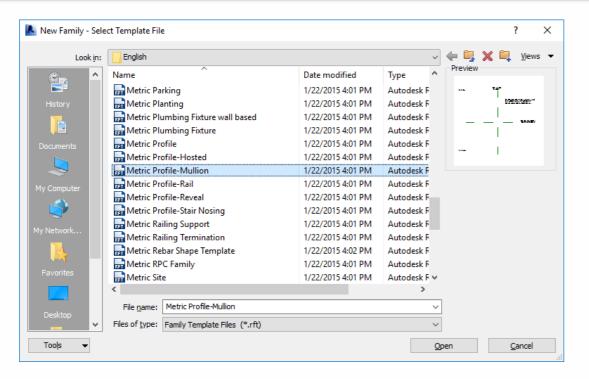
PENDIXES

DA-08 Curtain Mullion Profile

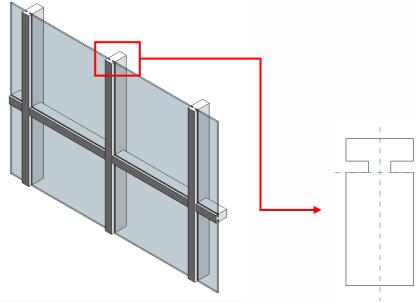
Discipline	Architectural
Family	Loadable Family
Category	Profile Mullion
Workset	Individual Levels
Naming Convention	PRF- (Functional_Type)-HAA-Mullion Type-Dimension

	Short form	Description
Category	PRF	Profile
Functional Type	MUL	Mullion
	REL	Reveal
Originator	HAA	Housing Authority-Architecture & landscape
1st_Descriptor	INT	Mullion for interior type
	BOR	Mullion for border type
2nd_Descriptor	50x150mm	Dimension of profile
	D90	Border mullion profile at 90 degrees

Modelling



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. It is a loadable family and could be created from family template.



Define the mullion shape by select the profile under Mullion Construction

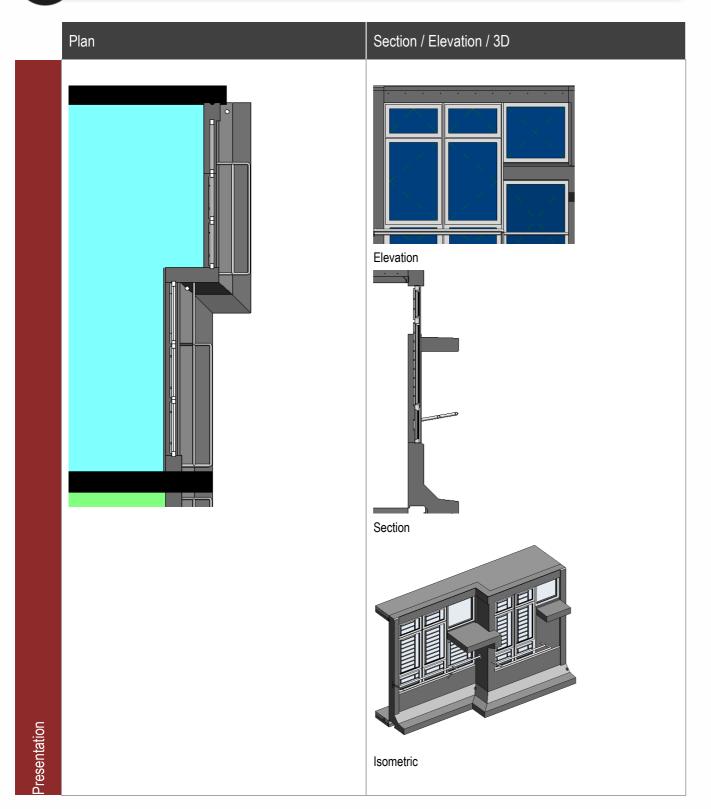
Parameter	Value
Constraints	
Angle	0.000°
Offset	0.0
Construction	
Profile	Default
Position Corner Mullion	M_C-Channel-Profile: C250X30
Thickness	System Mullion Profile: Circular
Materials and Finishes	and the standard
Material	Aluminium

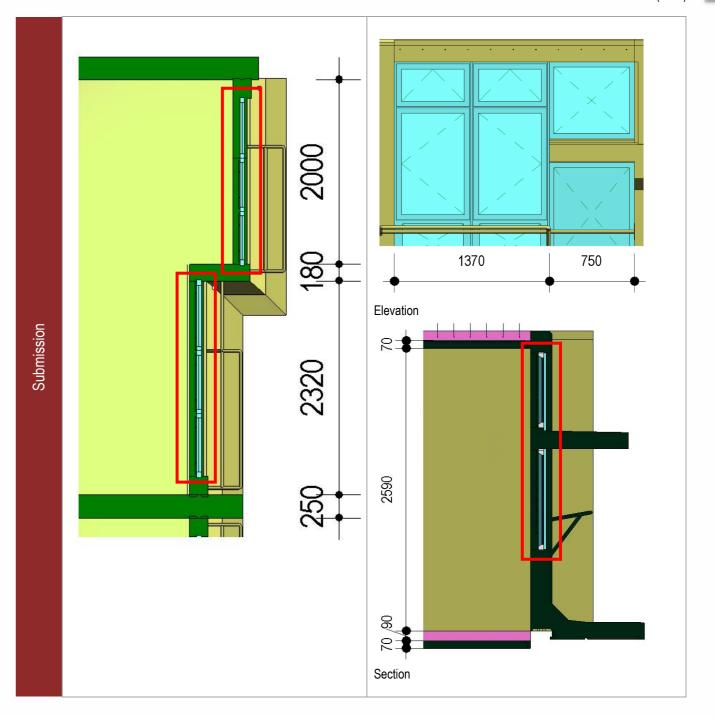


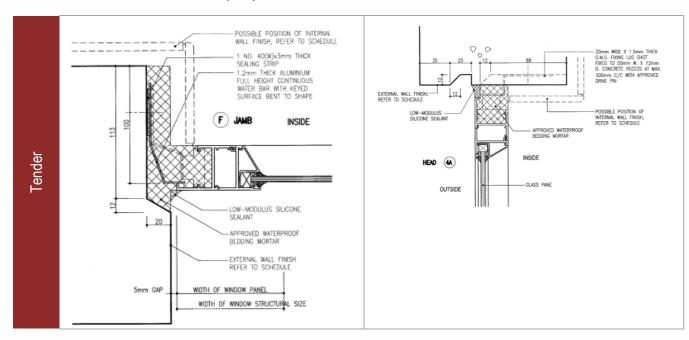
Essential Parameter

Parameter	Type / Instance	Description	Schedule
Length	Туре		N
Width	Туре		N
Height	Туре		N
Diameter	Туре	Profile of Circle	N

B Drawing Production







Schedule -

	Mullion S	chedale			
Family	Family and Type	Length	Phase Created	Phase Demolished	Туре
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	884	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1190	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1200	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1100	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1100	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	923	New Construction	None	50 x 150mm
Quad Corner Mullion	Quad Corner Mullion: Quad Mullion 1	2065	New Construction	None	Quad Mullion 1
Quad Corner Mullion	Quad Corner Mullion: Quad Mullion 1	1975	New Construction	None	Quad Mullion 1
Quad Corner Mullion	Quad Corner Mullion: Quad Mullion 1	1985	New Construction	None	Quad Mullion 1
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1100	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	1100	New Construction	None	50 x 150mm
Rectangular Mullion	Rectangular Mullion: 50 x 150mm	874	New Construction	None	50 x 150mm

DA-09

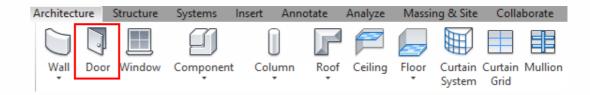
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Discipline	Architectural	
Family	Loadable Family	
Category	Doors	
Workset	Individual Levels	
Naming Convention	DOR- (Functional_Type)-HAA-Material-Door Equipment	

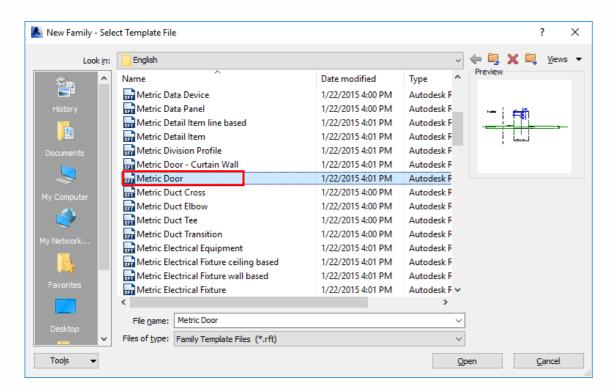
	Short form	Description
Category	DOR	Door
Functional Type SGL Sin		Single door
	DBL	Double door
Originator	HAA	Housing Authority-Architecture & landscape
1st_Descriptor	Steel	Steel door
	Alum	Aluminium frame
	Glass	Glass door
2nd_Descriptor	Louvres	Door with louvre
	Glazed_Panel	Door with glazed panel



Doors are wall hosted components;

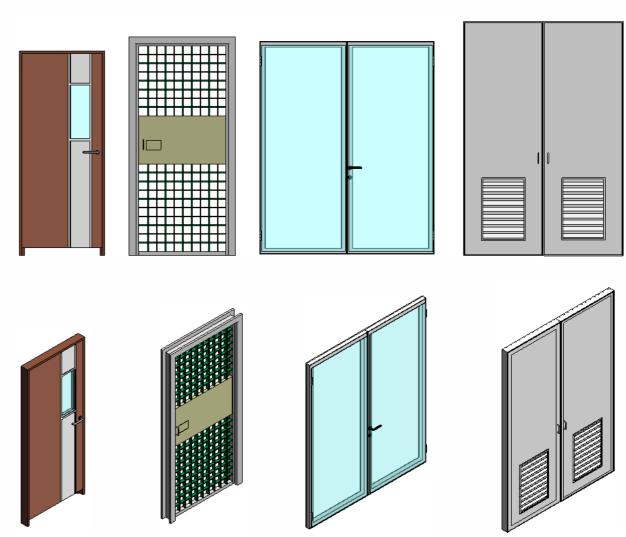


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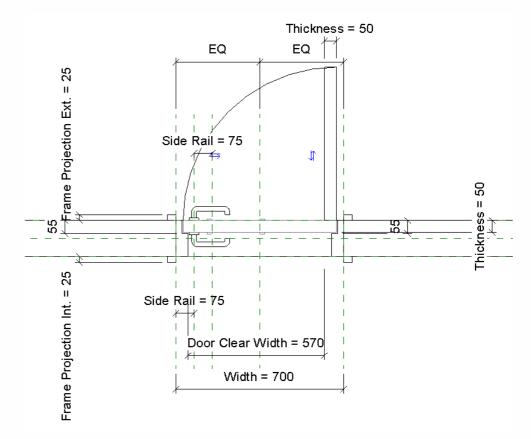
- Doors in curtain wall shall be created from "Curtain Panel", please refer to curtain panel section DA-06.
- Metal gates and grilles are expected to be created by door family.
- In Revit, door width means the structural opening of the door; but in GBP submission, door width means the clear opening width of the door;

Dimensions		
Door Width	920.0	= W - 10 mm
Finish Thickness	54.0	
Structural Opening Height	2135.0	=
Structural Opening Width	980.0	= Width + Thickness + 5 mm + Thickness + Frame Projection Ext.
Top Rail	350.0	=
Thickness	50.0	=
Side Rail	75.0	=
Lite Width	200.0	=
Lite Height	550.0	=
Height	2100.0	=
W	930.0	= Structural Opening Width - Frame Projection Ext Frame Projection Int
Width	850.0	=



Door width in GBP submission is measured from door frame to door panel

• Additional parameter (shared parameter) to be assigned to a door family as clear opening of the door.

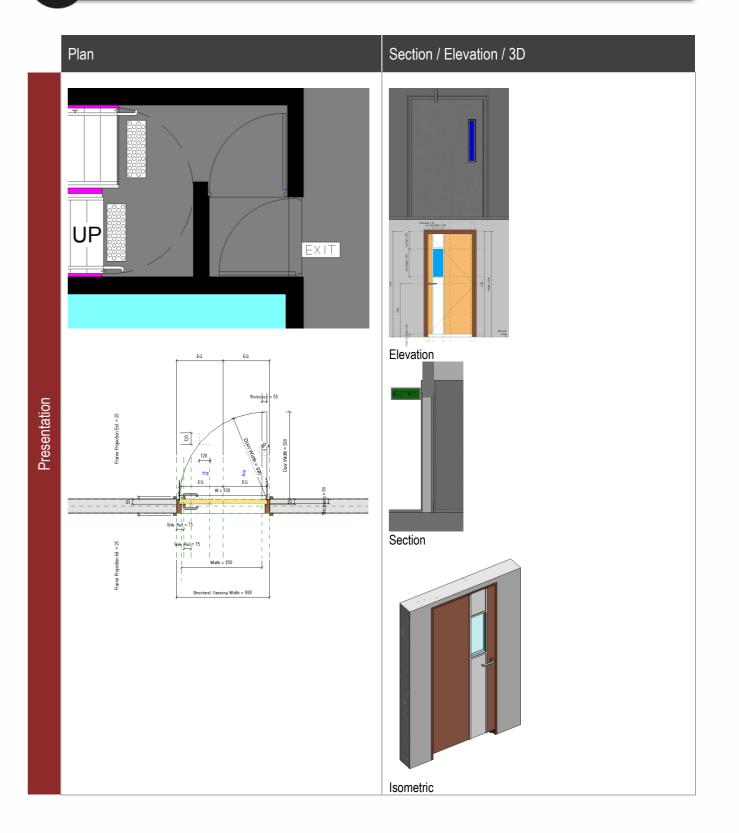


Dimensions			*
Door Clear Width	570.0	=	
Top Rail	180.0	=	▽
Thickness	50.0	=	▽
Side Rail	75.0	=	▽
Lite Width	200.0	į	▽
Lite Height	680.0	į	▽
Height	2100.0	=	▽
Width	700.0	=	▽
Rough Width		=	~
Rough Height		=	▽

Essential Parameter

Parameter	Type / Instance	Description	Schedule
SO Width	Туре	Structural opening width	Υ
Clear Width	Туре	Width to outside of door frame	Υ
SO Height	Туре	Structural opening height	Y
Clear Height	Туре	Height to outside of door frame	Y
Door Thickness	Туре	Door Thickness	N
Sill Height	Instance	Base offset from reference level	N
Type Mark	Туре	Door mark	N
Jamb Thickness	Instance	Jamb Thickness	Y
Construction	Instance		N
Frame	Instance		N
Head	Instance		N
Ironmongery	Instance		N
Location	Instance		N
Master Keying	Instance		N
Threshold	Instance		Υ
Remark	Instance		Υ
Material	Туре	Door Panel, Door Frame	N
Fire Rating	Instance		Υ
Door Number	Instance		Y

B Drawing Production



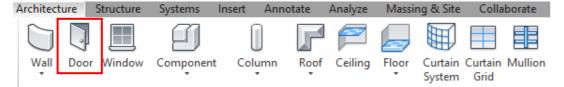
Room No	Door Letter	Room Name	Door Type	Height (mm)	Width (mm)	Thickness (mm)	Fire Rating (hr)	Insulation (hr)	Ironmongery Set	ST Rat
_evel 45.60	1/F		23,775	, ,	,	,	,	,		
01100.00	A	LIFT LOBBY	Type T - Curtain Wall Double	2020	2500	50	1			Т
01110.00	Α	CLASS-30	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	35
01111.00	Α	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	35
01111.00	В	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	35
01112.00	Α	CLASS-40 Type C - Timber_Single_with vision panel			980	50	0	0	IR20b	35
01112.00	В	CLASS-40 Type C - Timber Single with vision panel		2100	980	50	0	0	IR20b	35
01113.00	Α	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	35
01113.00	В	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	35
01114.00	Α	STORE	Type D - Timber_Single	2100	980	50	0	0	IR08b	0
01115.00	Α	CLASS-80	Type D - Timber_Single	2100	980	50	0	0	IR20b	35
	<u></u>	01 + 00 00	F B F 1 8 1	10400	200	FA	^	_	IDAAI	105

DA-10 Shutter/ Fire Shutter

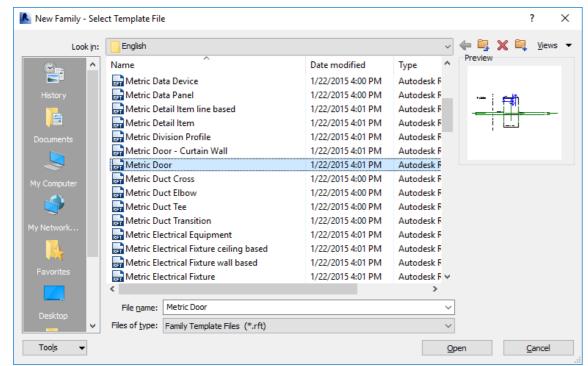
Discipline	Architectural
Family	Loadable Family
Category	Door or Window
Workset	Individual Levels
Naming Convention	SPQ- (Functional_Type)-HAA-Fire_Shutter

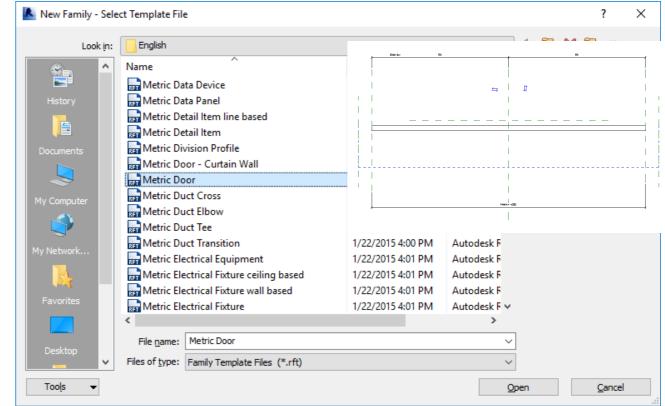
	Short form	Description
Category	SPQ	Specialty equipment
Functional Type	FRP	Fire protection
Originator	НАА	Housing Authority-Architecture & Landscape
1st_Descriptor	Fire_Shutter	Fire Shutter

Modelling



 Shutter / Fire Shutter should be created by using Door family template when it is hosted on a wall, and using Generic model family template when it is free standing







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Essential Parameter

Parameter	Type / Instance	Description	Schedule
Clear Width	Туре	Width to outside of frame	Υ
Clear Height	Туре	Height to outside of frame	Υ
SO Width	Туре	Structural opening width	Υ
SO Height	Туре	Structural opening height	Υ
Fire Rating	Instance		Υ
Material	Туре	Material	N
Offset	Туре	Width of Shutter	N
Frame Thickness	Туре		N
Frame Depth	Туре		N
Shutter Box Depth	Туре	Depth of Shutter Box	N
Shutter Box Height	Туре	Height of Shutter Box	N



Drawing Production

	Plan	Section / Elevation / 3D
Presentation	N/A	Isometric
Submission	LEGEND ROLLER SHUTTER	N/A

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N/A N/A

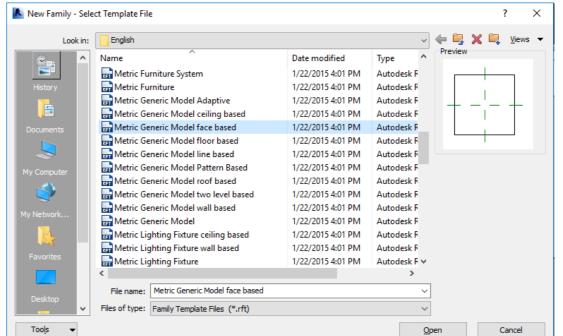
DA-11 Ironmongery

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Modelling

In order to extract the Ironmongery Schedule from model, specific parameters need to be added into
doors and windows families. In a Door Family for example, the parameters of Hinge, Closer, Lock and
Push Bar etc. shall be added.







Essential Parameter

Parameter	Type / Instance	Description	Schedule
Height	Туре		Υ
Diameter	Туре		Υ
Materials	Туре		N

Drawing Production

	Plan	Section / Elevation / 3D
Presentation	N/A	N/A Isometric
Submission	N/A	N/A
Tender	N/A	N/A

Schedul	e -									
			Door Schedule 3 - 1/l	(part 1)						_
Room No	Door Letter	Room Name	Door Type	Height (mm)	Width (mm)	Thickness (mm)	Fire Rating (hr)	Insulation (hr)	Ironmongery Set	STC Rate
Level 45.60	1/F									
	 A	LIFT LOBBY	Type T - Curtain Wall_Double	2020	2500	50	1			+
01110.00	Α	CLASS-30	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	3 5
01111.00	Α	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	3 5
01111.00	В	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	3 5
01112.00	Α	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	1 5
01112.00	В	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	3 5
01113.00	Α	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	3 5
01113.00	В	CLASS-40	Type C - Timber_Single_with vision panel	2100	980	50	0	0	IR20b	3 5
01114.00	Α	STORE	Type D - Timber_Single	2100	980	50	0	0	IR08b	1
01115.00	Α	CLASS-80	Type D - Timber_Single	2100	980	50	0	0	IR20b	3 5

DA-12 Windows

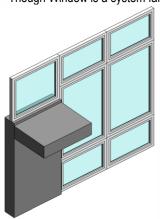
Discipline	Architectural
Family	Loadable Family
Category	Windows
Workset	Individual Levels
Naming Convention	WDW- (Functional_Type)-HAA-Material-Thickness

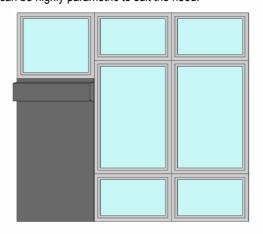
	Short form	Description
Category	WDW	Window
Functional Type	CSM	Casement
	AWN	Awning
	FXD	Fixed window
Originator	HAA	Housing Authority-Architecture & Landscape
1st_Descriptor	Alum	Aluminium frame
	Glass	Glass window
	LVR	Window with louvre
2 nd _Descriptor	8mm	Thickness of glass

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Modelling

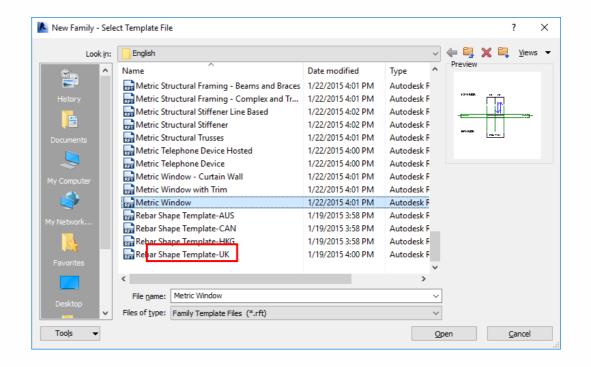
- Windows are wall host components;
- Though Window is a system family, it can be highly parametric to suit the need.



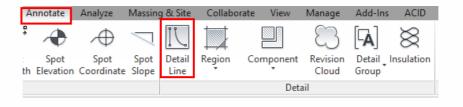


• Windows are hosted components that can be added to any type of wall.





- Window needs to be edited in the family editor with essential parameters added in.
- Window is to be used in the sequent calculation of lighting and ventilation, thus area of window and area of glazing need to be added as parameters of the Window Family.
- Symbols, indicated whether a window is openable or fixed, should be added in the family by using Detail Line.



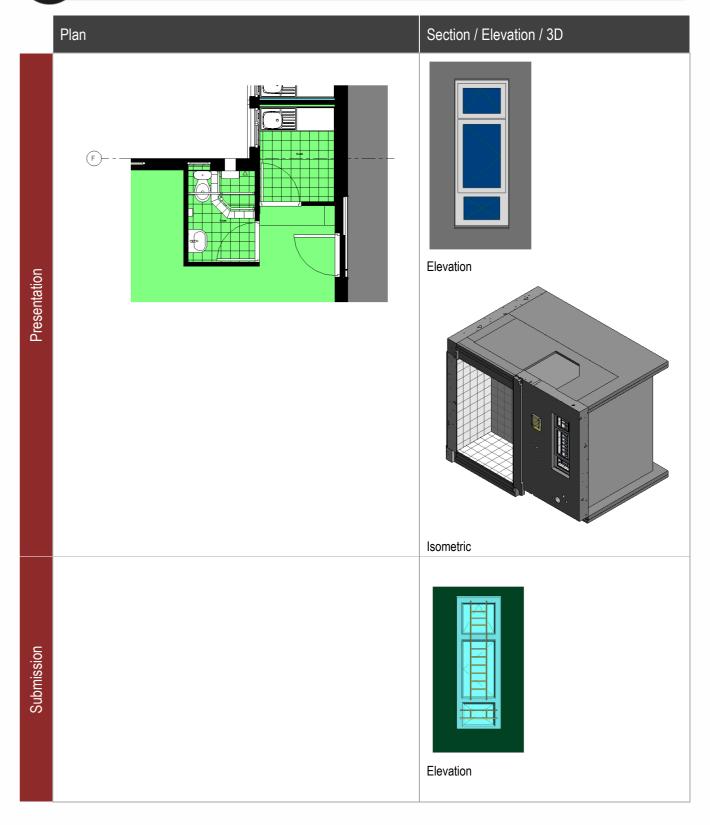
Essential Parameter

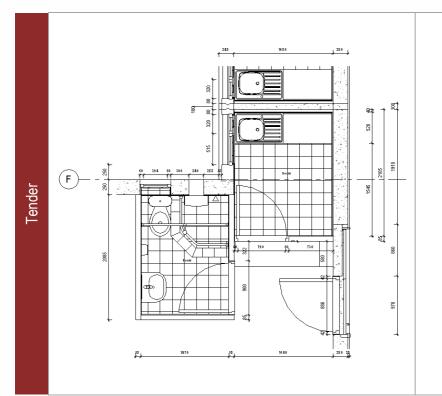
Parameter	Type / Instance	Description	Schedule
Width	Туре	Overall Width of Window	Υ
Height	Туре	Overall Height of Window	Υ
SO Width	Туре	Structural opening width	Υ
SO Height	Туре	Structural opening height	Υ
Frame Width	Туре	Width of Window Frame	N
Frame Height	Туре	Height of Window Frame	N
Frame Thickness	Туре	Thickness of Window Frame	N
Window Width	Туре	Width of Window Panel	N
Window Height	Туре	Height of Window Panel	N
Material	Туре		N
Window Mark	Instance		Υ
Location	Instance		Υ
Construction	Туре		Υ
Type Mark	Туре		Υ
Windows Number	Instance		Υ

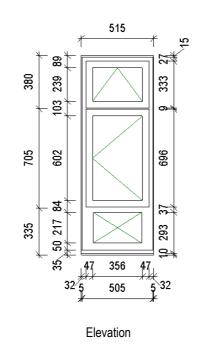
- Windows should be added in ARC model.
- Special Scenarios:
 - 1. When a window is to be open in a Structural Wall, which belongs to STR Model, it cannot be installed in the linked in Structural Model file. And the solution is, open the window (set to architectural workset) in architectural wall (set to a temporary workset), the temporary workset can be turned off when structural model is linked in.
 - 2. Windows cannot be hosted into a Precast Façade Panel which is created with Generic Model Family. And the solution is, to place the window (set to architectural workset) in architectural wall (set to a temporary workset), the temporary workset can be turned off when the window is placed into the Precast Façade Panel.



Drawing Production







Schedule -

				Window Sch	edule					
Count	Family	Family and Type	Head Height	Height	Level	Mark	Phase Created	Sill Height	Width	Window_GI azing_Area _HK
1	WDW-FXD-AEC-2X2	WDW-FXD-AEC-2X2: Dia_1600	2400	1600	F9	1	New Construction	800	1600	1.709 m²
1	WDW-FXD-AEC-2X2	WDW-FXD-AEC-2X2: Dia_1600	2400	1600	F9	2	New Construction	800	1600	1.709 m²
1	WDW-FXD-AEC-2X2	WDW-FXD-AEC-2X2: Dia_1600	2400	1600	F9	3	New Construction	800	1600	1.709 m²
1	WDW-FXD-AEC-2X2	WDW-FXD-AEC-2X2: Dia_1600	2400	1600	F9	4	New Construction	800	1600	1.709 m²
1	WDW-FXD-AEC-2X2	WDW-FXD-AEC-2X2: Dia_1600	2400	1600	F9	5	New Construction	800	1600	1.709 m²
1	WDW-FXD-AEC-2X2	WDW-FXD-AEC-2X2: Dia_1600	2400	1600	F9	6	New Construction	800	1600	1.709 m²
1	WDW-FXD-AEC-2X2	WDW-FXD-AEC-2X2: Dia_1600	2400	1600	F9	7	New Construction	800	1600	1.709 m²

DA-13 Floor

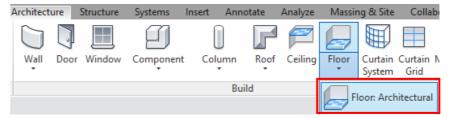
Discipline	Architectural
Family	System Family
Category	Architectural Floor
Workset	Individual Levels
Naming Convention	(Functional_Type)-HAA-Material-Thickness

	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
1st_Descriptor	CON	Concrete
	Tile	Floor tile
	CM	Waterproofing agent mix cement sand
2nd_Descriptor	150mm	Thickness of the floor
	600x600mm	Floor tile dimension



Modelling

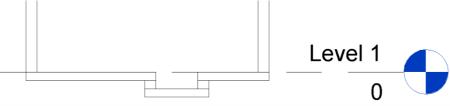
- Category: Floors
- · Architectural discipline shall use Architectural Floor but not Structural Floor



- Architectural discipline shall use Architectural Floor but not Structural Floor, when building ARC Model.
- Level should be set to where the floor slab is situated. I.e. Raised slab should have positive offset from a level and sunken slab should have negative offset from a level.
- Room Bounding should be set to ON unless there is special space definition requirement otherwise specified.
- 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 for design and drawing production purposes at early stage;
- Architect may keep a "Hidden Workset" to hold the STR Elements for temporary or minor adjustment on drawings.
- Base on the section under Modelling, the Structural Floors in ARC Model files should be put in a different workset when SE is not vet on board;
- After SE on board and STR Model is developed, Architect shall link SE's STR Model into ARC Model for drawing production
- Slab boundary should be drawn along outer edges of slab, regardless of any overlapping columns or structures.

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• Sunken slab should be modelled in this way as shown below.



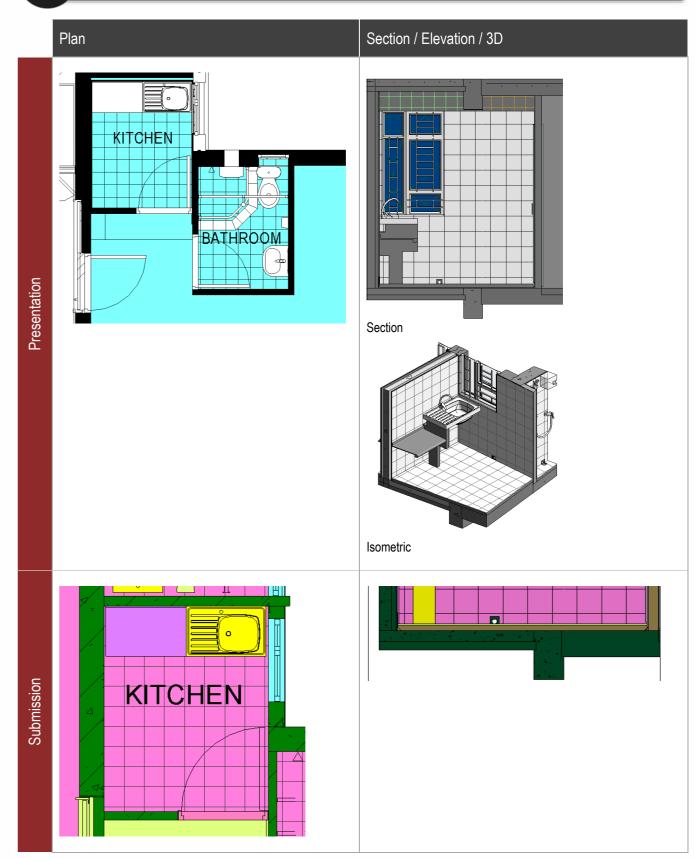
• Commonly used floor types should be set up to as standard in office standard template file. Information including structure properties and structural material should be specified.

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Essential Parameter

Parameter	Type / Instance	Description	Schedule
Level	Instance	Level	Υ
Area	Instance	Area of Floor	Υ
Height Offset From Level	Instance		Υ
Type Mark	Туре		Υ
Thickness	Instance	Thickness	Υ
Material	Туре		



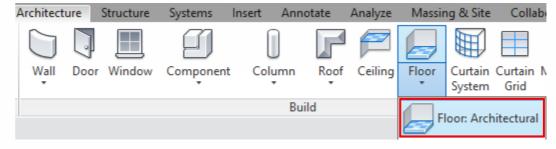


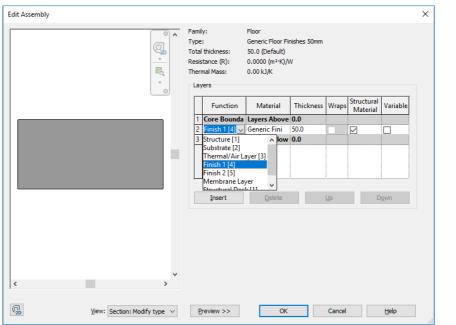
Schedule -				
		FloorS	chedule	
	Are a	Count	Level	Perimeter
			_	
	537.718 m²	1	G/F	99272
	60.258 m²	1	G/F	41219
	449.073 m²	1	G/F	104517
	2.537 m²	1	G/F	6560
	22.703 m²	1	G/F	28050
	8.252 m²	1	G/F	16222
	6.354 m²	1	G/F	13414

DA-14 Floor Finishes

Discipline	Architectural
Family	System Family
Category	Architectural Floor
Workset	Individual Levels
Naming Convention	(Functional_Type)-HAA-Material-Dimension







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GUIDE Level 4

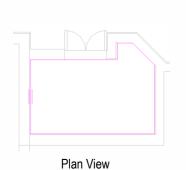
5

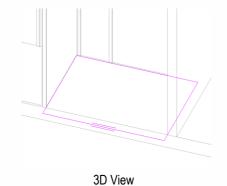
(

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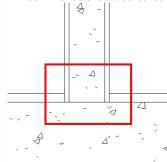
Edit Assembly	Resis	: Gen thickness: 200 tance (R): 0.00 nal Mass: 0.00	r eric 150mm 0 (Default) 100 (m²-K)/W I kJ/K					×
		Function	Material	Thickness	Wraps	Structural Material	Variable	
	1	Structure [1]	Generic Finishes	50.0	_	material		
		Core Boundary	Layers Above Wra				Ш	
	3	Structure [1]		150.0			П	
		Core Boundary	Layers Below Wra					
		Insert	Delete	ц	Down			
· ·								

- Floor Finishes are typically defined in Room schedule, thus material definition in flooring material is not critical in preliminary stage design stage or even later in detail design stage. Generic finishes can be applied to facilitate section cut presentation and Finished Floor Level.
- Floor finishes boundary to be define room by room

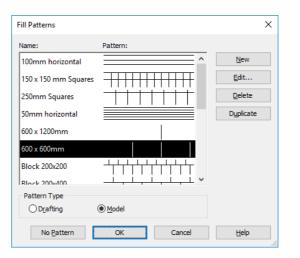


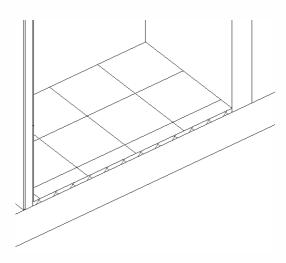


• Floor finishes should be built above the structural floor slab level.



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





Essential Parameter

Parameter	Type / Instance	Description	Schedule
Level	Instance	Level	Υ
Height Offset From Level	Instance		Υ
Area	Instance	Area of Floor	Υ
Type Mark	Туре		Υ
Thickness	Instance	Thickness	Υ
Material	Туре		N

Sample picture to be inserted	Sample picture to be inserted
	Sample picture to be inserted

Schedule -



	Finishing Schedule							
Level	Room Name	Number	Perimeter	Area	Room Style	Ceiling Finish	Floor Finish	Wall Finish
Level 41.60_G/F	LEARNING RESOURCES	GF220.00	37934	69.774 m²	Learning Resources (pocket area)	Plaster board suspended ceiling	600x600 Homogeneous Tiles on Screed	Yinyl Emulsion Paint on Gypsum Haster
Level 41.60_G/F	LEARNING RESOURCES	GF220.01	31180	22.029 m²	Balcony	External metal celling	Exterior Hardwood Floor System	WA.
Level 41.60_G/F	DESIGN STUDIO	GF221.00	68058	174.912 m²	Learning Resources Centre - Design Studio/Laboratory/P ainting Studio	Emulsion paint on cement lime plaster with partial 600x1200 Acoustic Suspended Ceiling	Vinyl Sheeting and Screed	Yinyl Emulsion Paint on Gypsum Haster
Level 41.60_G/F	OPEN ACCESS	GF310.00	35565	73.178 m²	Learning Resources Centre - Open Access/Computer Lab	Emulsion paint on cement lime plaster with partial 600x1200 Acoustic Suspended Ceiling	Vinyl Sheeting with floor trunking System on Screed	Vinyl Emulsion Paint on Gypsum Haster
Level 41.60_G/F	LABORATORY	GF311.00	30255	53.765 m²	Learning Resources Centre - Design Studio/Laboratory/P ainting Studio	Emulsion paint on cement lime plaster with partial 600x1200 Acoustic Suspended Ceiling	Vinyl Sheeting and Screed	Vinyl Emulsion Paint on Gypsum Haster

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APPENDIX

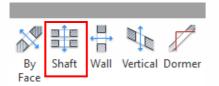
DA-15 Floor Opening

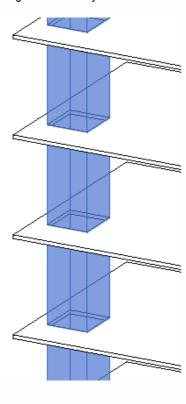
Discipline	Architectural	
Family	System Family	
Category	Floor Opening	
Workset	Vertical Transportation	
Naming Convention	AFL- (Functional_Type)-HAA-Dimension	

Modelling

Floor Opening in ARC Model:

- Shaft opening is preferred to be used to cut structural opening on floor slab, instead of using modify floor boundary to do it.
- Typical usage is lift shaft and regular pipe ducts
- Customized floor opening such as void or staircase opening etc., shall directly edit the floor using "Edit Boundary".





Model opening for MEP Builder's Work:

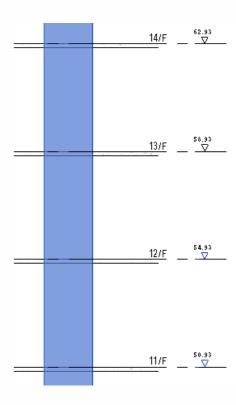
- Opening smaller than 100mm should not be modelled.
- Floor Opening for Builder's Work requested by MEP disciplines should be created by a floor opening family using Generic Model Floor Based Template.
- Floor opening family should be capable of shape changing, such as square, rectangular or circular etc., and dimension control by using Shared Parameters.
- Information for the Builder's Work Legend should not be built into the floor opening family in ARC model files.

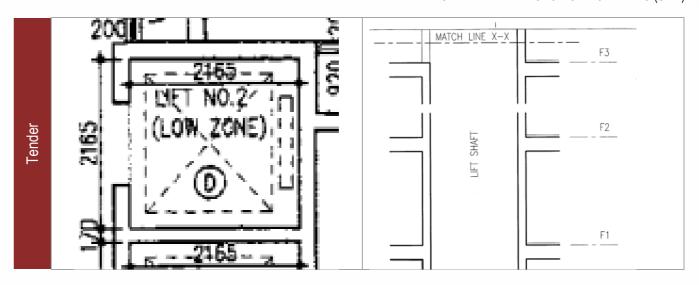


Essential Parameter

Parameter	Type / Instance	Description	Figure (if Applicable)	Schedule
Base Constraint	Instance	Base Level		Υ
Offset	Instance	Offset from Level		Υ
Top Constraint	Instance	Top Level		Υ

Drawing Production





Schedule -
N/A

DA-16 Floor Grating

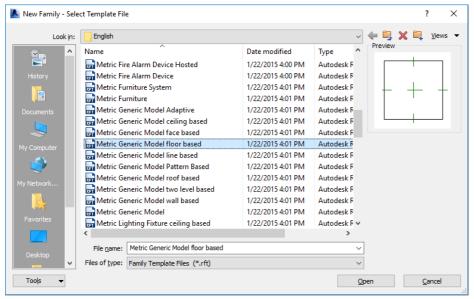
Discipline	Architectural
Family	Loadable Family
Category	Generic Model
Workset	Individual Levels
Naming Convention	GMD- (Functional_Type)-HAA-Type -Dimension

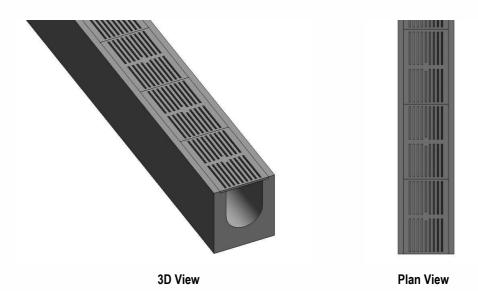


Modelling

• Floor Grating is a kind of loadable family, and it should be created by using "Generic Model Floor Based" template.







Essential Parameter

Parameter	Type / Instance	Description	Schedule
Frame Width	Туре	Dimension Offset from Outer Boundary	Υ
Panel Bar Spacing	Туре	Length of each Panel Bar	Υ
Width	Туре	Width of Frame	N
Clear Width	Туре	Width of Panel	N

	Plan	Section / Elevation / 3D
ر	N/A	N/A
Presentation		
Submission	13	N/A
Tender	20/12 B CONTROL OF GRAING MACH CAN BE MODIFICATION JONE AND CAST IN FACTORY MODIFICATION ZONE STIMP DEEP GROOVE MODIFICATION ZONE MODIFICATION ZONE MODIFICATION ZONE MODIFICATION ZONE PLAN	SECTION B-B THROUGH SLOT/WEB SECTION C-C SECTION D-D THROUGH WEB

Schedule -			
N/A			

DA-17 Roof

Discipline	Architectural	
Family	System Family	
Category	Roof	
Workset	Individual Levels	
Naming Convention	(Functional_Type)-HAA-Material-Thickness	

_	Short form	Description
Functional Type	RFS	Roof Slab
	RFF	Roof finishes
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
	HAB	Housing Authority-Building Services Engineering
1st_Descriptor	ShtMtl	Sheet Metal
	Asphalt	Asphalt
	PPmers	Plastic Polymers
	Tiles	Clay Tiles
2nd_Descriptor	150mm	Thickness of the roof



Modelling



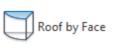
















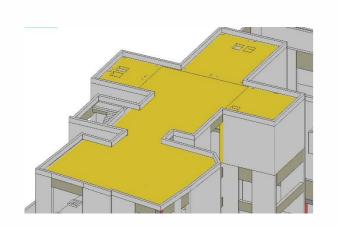
- Roof is in architectural discipline.
- Category: Roof. It is very important that, do not use Floor to replace Roof, when building ARC Model, because of the fundamental difference between the two categories, when layers of materials are added.

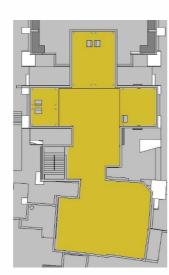


Modelling Type

- Flat Roof
- Sloped Roof
- Gable Roof Roof by Profile







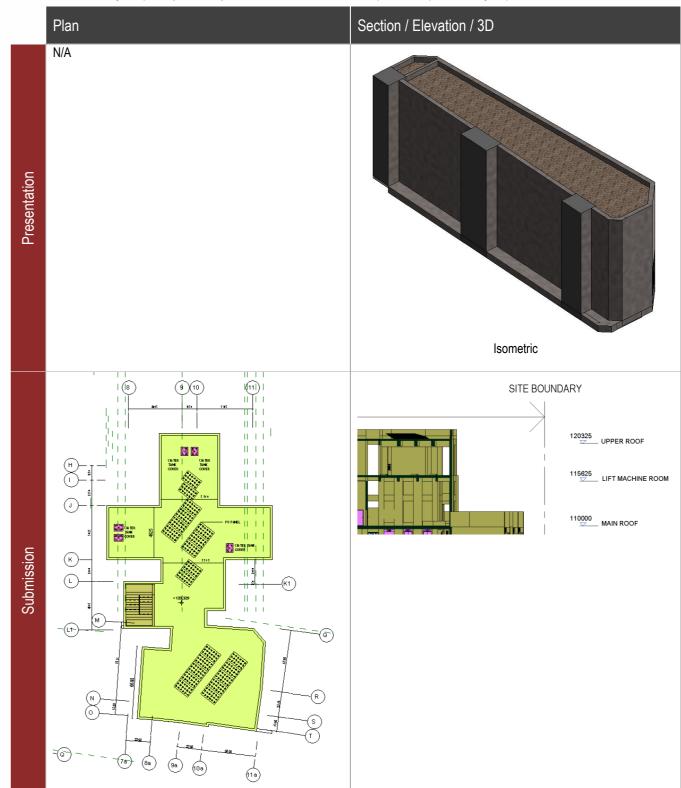
Essential Parameter

Parameter	Type / Instance	Description	Schedule
Base Level	Instance	Level	Υ
Flat Name	Instance	Flat Name	Υ
Room Name	Instance	Room Name	N
Area	Instance	Area of Floor	N
Type Mark	Туре		N
Thickness	Instance	Thickness	N
Material	Туре		N
Level	Instance		Υ
Defines Roof Slope	Instance		N
Offset From Roof Base	Instance		N

B

Drawing Production

• Use of Visibility Graphics (VG or VV) to override the roof colour and pattern as per statutory requirement.



Schedule -		
N/A		

DA-18 Skylight

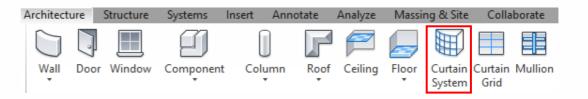
Discipline	External Envelop/ Site (depends on location)	
Family	Loadable Family	
Category	Window/ Face-Base Generic Model	
Workset	Individual Levels	
Naming Convention	WDW- (Functional_Type)-HAA- Material-Thickness	

	Short form	Description
Category	WDW	Windows
Functional Type	SKY	Skylight
Originator	HAA	Housing Authority-Architecture & Landscape
1st_Descriptor	Alum	Aluminium frame
	Glass	Glass window
2nd_Descriptor	8mm	Thickness of glass

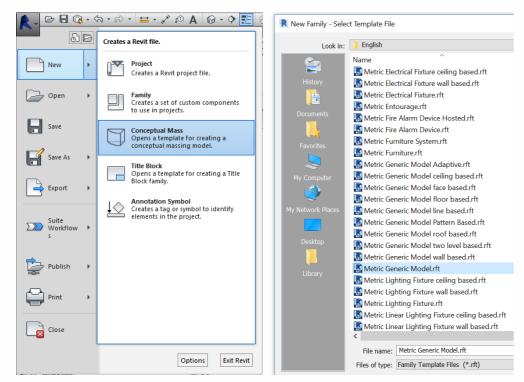


Modelling

- Skylights belongs to architectural elements and should be built in ARC Model
- In Revit there is no specific category for skylight elements.
- Forms of skylight varies greatly in design. However, in general, there are 2 ways to create Skylights.
- Surface based Curtain Wall system first use conceptual mass to create a form, then pick the surface from the mass model to create sloped or curved skylight.



STANDARD APPROACH OF MODELLING (SAM)

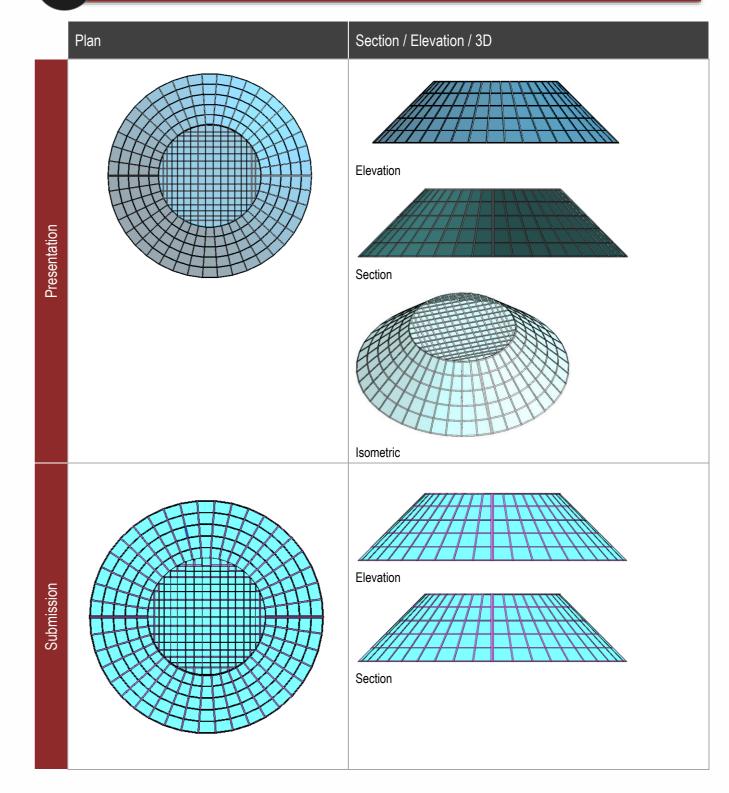


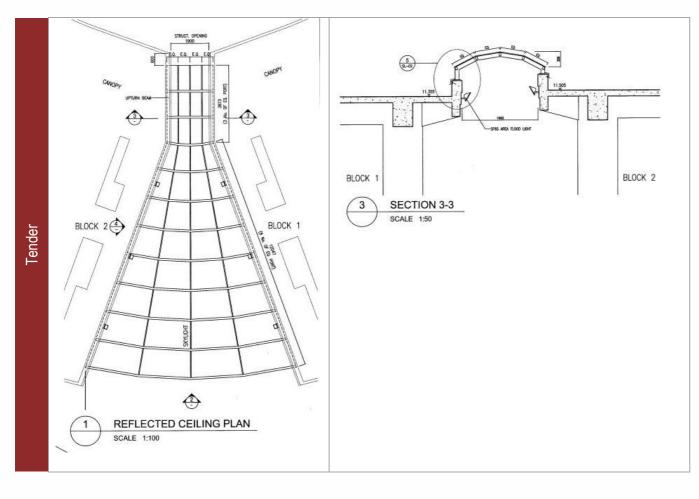
• Generic model – if Skylight forms cannot be built by using curtain wall, then it should be created by using Generic Models Family.

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Materials	Туре		N
Level	Instance		Υ
Base Offset	Instance		N
Height	Туре		Υ
Width	Туре		Υ
Type Mark	Туре		N

B Drawing Production





Schedule -			
N/A			

DA-19 Stairs

Discipline	Architectural & Structural	
Family	System Family	
Category	Stair	
Workset	Vertical Transportation	
Naming Convention	(Functional_Type)-HAA-Material-Dimension	

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

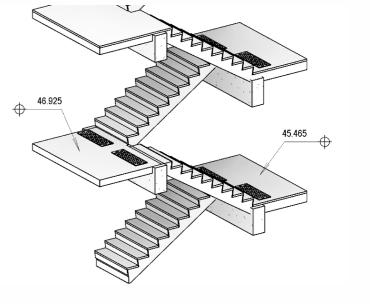
This section shall read in conjunction with DS-U 07 Staircases in Miscellaneous Structural Elements.

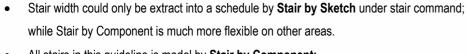


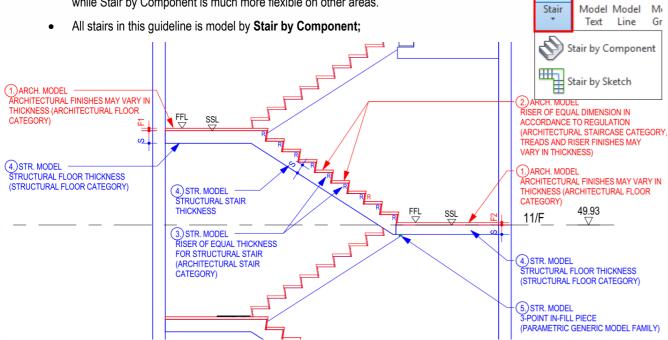
Modelling

Discipline

- Staircase is a combination of Architectural finishes and Structural stair;
- Architect is required to develop structural stair at early stage of project (Inception & Feasibility to Scheme Design stage).
- After structural model (stair) link into architectural model, original structure stair modelled by Architect could be modified to architectural stair finishes by changing the Stair Type setting. Refer to D.Col-2.2 for further explanation.







Collaboration

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a) Within discipline / cross-discipline

- Architect is required to manage 2 models for architectural discipline and structural discipline for design and drawing production purposes at early stage;
- Please refer to Link File section for file relationship within and cross-discipline;

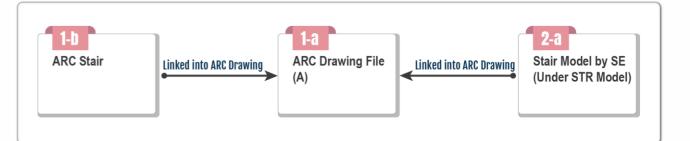
b) Workset

- 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

c) Link file

- Base on the section under Discipline, the RED part goes to architectural model and BLUE part goes to structural model managed by Architect in early design stage (SE not on board).
- After SE on board and develop their own model, Architect shall link Structural Engineer's STR model into Architectural model for drawing production purpose;
- Architect may keep a "Hidden Workset" to hold the STR item for temporary / minor adjustment on drawing.



Essential Parameter

Parameter	Type / Instant	Description	Figure (if Applicable)	Schedule
Stair Type	Туре	Cast-In-Place Stair		Υ
Stair Type Name	Туре	Describe the thickness		Υ
Minimum Tread Depth	Туре	Complied with Building Regulations	225mm	Υ
Maximum Riser Height	Туре	Complied with Building Regulations	175mm	Υ
Minimum Run Width	Туре	Complied with Building Regulations	1100mm	
Run Type	Туре	Structural depth		Υ
Landing type		Landing thickness		Υ
Width	Instance			Υ
Tread Thickness	Туре			N
Materials And Finishes	Туре	Tread,Riser,Stringer		N
Base Level	Instance			Υ
Top Level	Instance			Υ
Type Mark	Туре			Υ

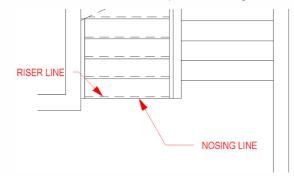


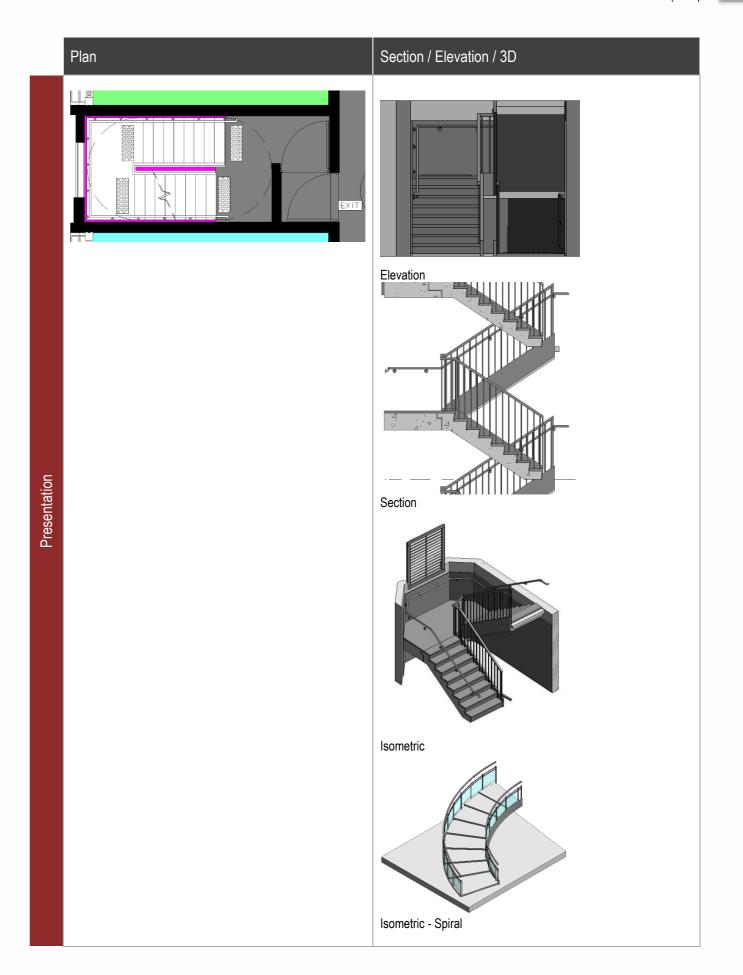
Drawing Production

- a) ICU GBP Submission (DDRP)
 - (i) Annotation / Presentation
 - Use tag to annotate staircase number, the corresponding parameter is under stair Text property.

Text		*
Actual Discharge Value		
Staircase Number	STAIRCASE 1	
Structural		•

- Staircase arrow is advised to be turn off at all times; additional annotation family is provided within architectural template for staircase arrow:
- As staircase finishes, architectural staircase is advised to be turn off in floor plan.
- 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.





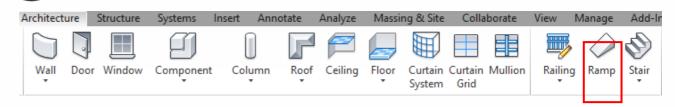
Schedule - N/A

DA-20 Ramp

Discipline	Architectural
Family	System Family
Category	Ramp / Ramp Finishes
Workset	Individual Levels /
	External Work
Naming Convention	(Functional_Type)-HAA-Material-Slope

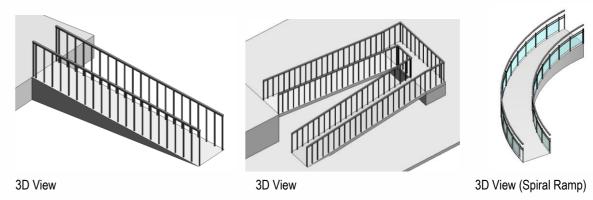
	Short form	Description
Functional Type	RAP	Ramp
	ARF	Architectural ramp finishes
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
1st_Descriptor	CON	Concrete ramp
	STL	Steel ramp
2 nd _Descriptor	8	1:8 slope
	12	1:12 slope

Modelling



- Ramp is a combination of Architectural finishes and Structural Ramp;
- Architect is required to manage 2 models for architectural discipline and structural discipline for design and drawing production purposes at early stage (SE not on board)

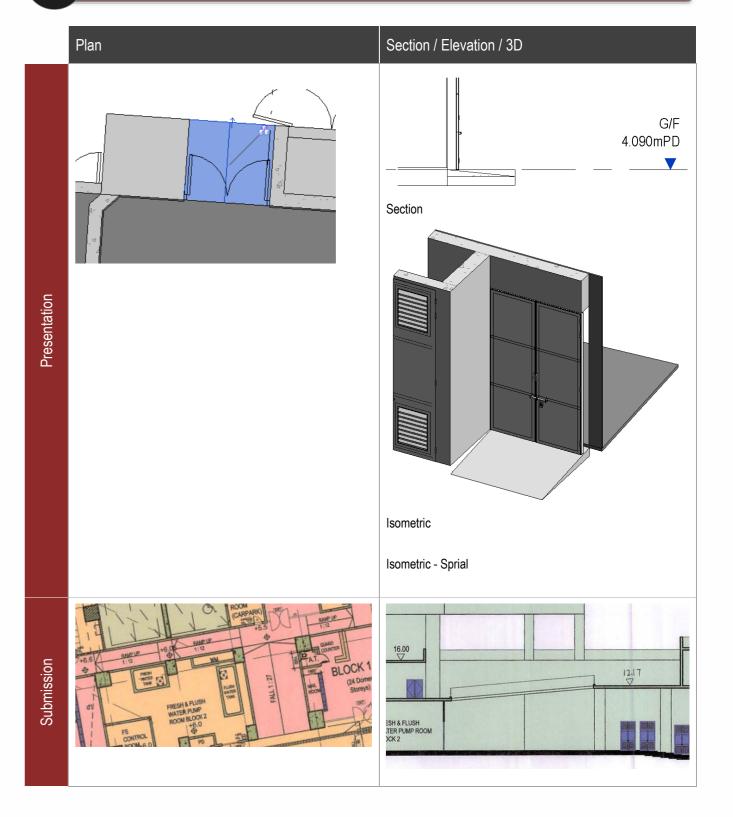
After SE on board, ramp should be divided to ARC Model and STR Model after STR engineer on board, in ARC Modell Ramp is advised to be built as material finishes, and in STR Model concrete ramp is advised to be built as the structural part of the ramp.



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Slope	Instance	1:12 for disabled access	N
Width	Instance	Be aware of width include or not including handrails	N
Base Level	Instance		Y
Top Level	Instance		Υ
Type Mark	Туре		N
Ramp Material	Туре		N
Maximum Incline Length	Туре		N
Rame Max Slope(1/x)	Туре		N

B Drawing Production



Schedule -		
N/A		

DA-21 Railing

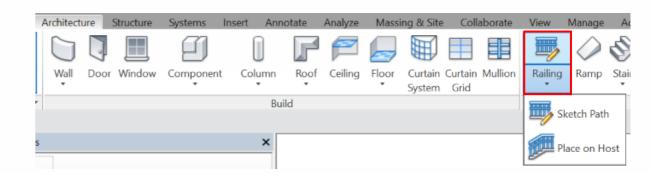
Discipline	Architectural
Family	System Family
Category	Railing/ Baluster/ Profile-Rail
Workset	Individual Levels
Naming Convention	(Functional_Type)-HAA-Material-Top rail height

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



Modelling

- Railing is Architectural element and should be built in ARC Model
- Railing can be built as either a free-standing element or be an element hosted by wall, slab, stair or ramp.
- The Railing can be created under Architecture > Circulation > Railing, and it can be created by two methods: one is by "Sketch Path", the other is by "Place on Host"



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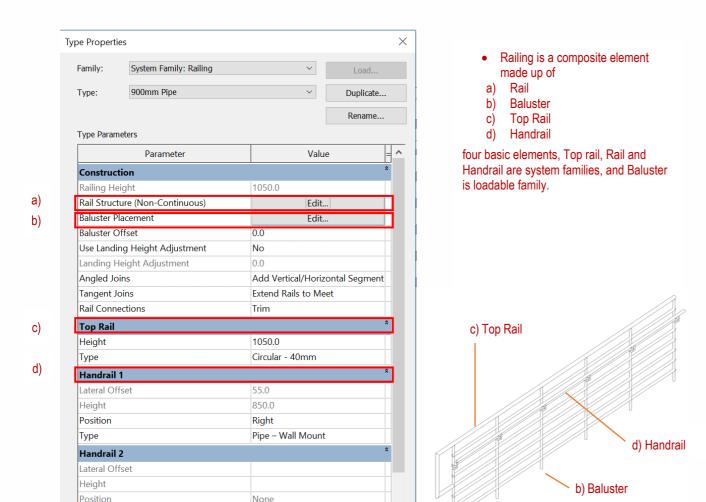
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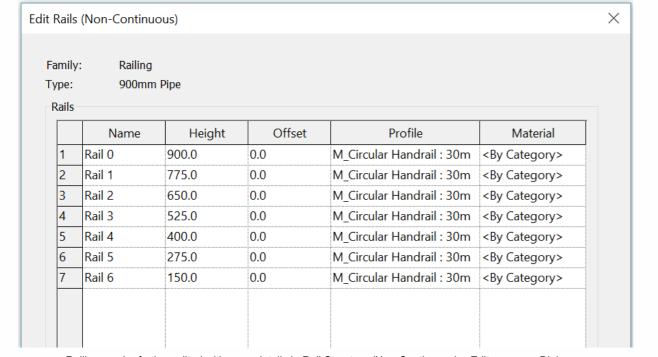
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APPENDIXE





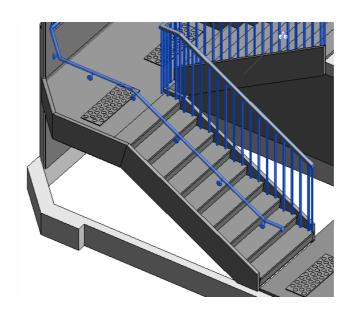
a) Rail

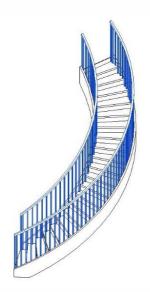
None

Туре

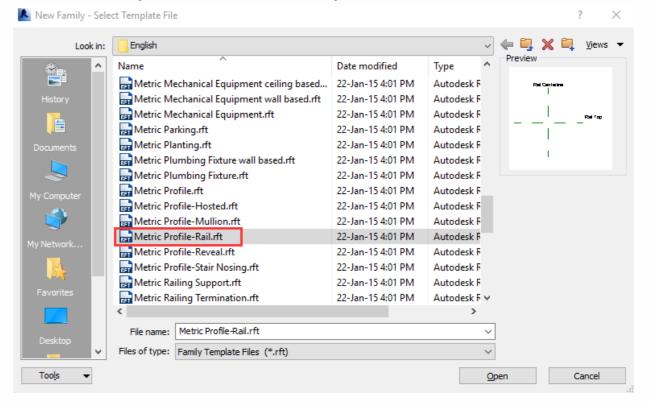
Identity Data

• Railing can be further edited with more details in Rail Structure (Non-Continuous) > Edit... pop up Dialogue





Staircase Railing - Model the 300mm End Return – Using Extension at the end on Handrail



For balustrade, a customized Baluster Family template can be used.

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Base Level	Instance	Level	Υ
Base Offset			Υ
Type Mark			Υ
Length	Instance	Length of Railing	Υ
Railing Height	Туре	Height of Railing	N
Rail Structure (Non-continuous)	Туре		N
Baluster Placement	Туре		N
Materials	Туре		N



B Drawing Production

	Plan	Section / Elevation / 3D
	N/A	
		Elevation
Presentation		Section
		Isometric

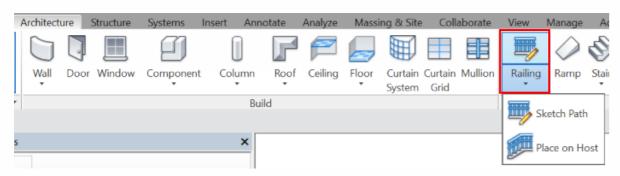
Schedule -		
N/A		

DA-22 Baluster

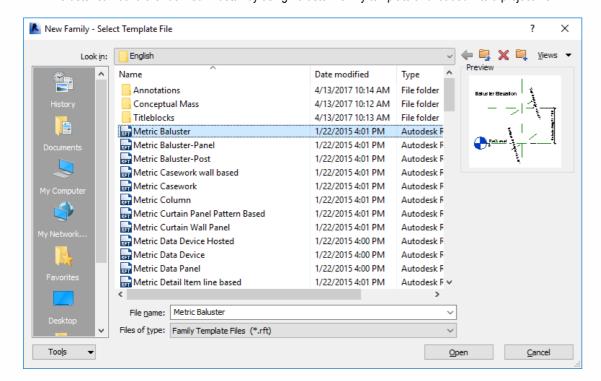
Discipline	Architectural
Family	Loadable Family
Category	Baluster
Workset	Individual levels
Naming Convention	BAL- (Functional_Type)-HAA-Type -Dimension

Modelling

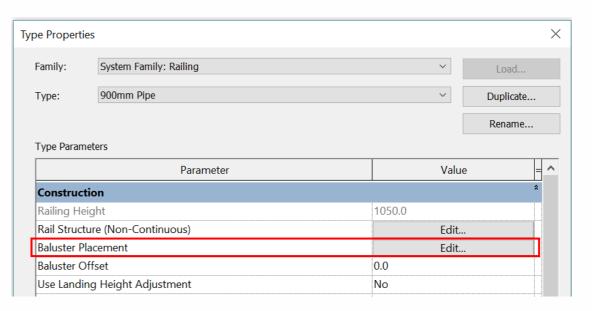
- Balusters is a kind of loadable family, in an ARC Model it is a part of a Railing Structure
- Railing can be created under Architecture > Circulation > Railing



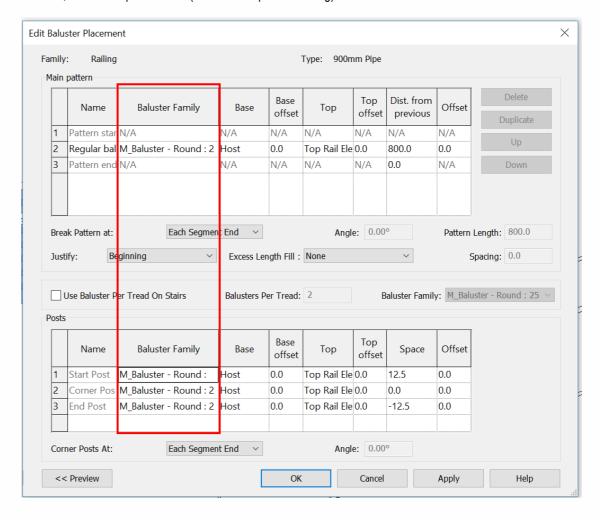
• Baluster can be further defined in detail by using Baluster Family template and loaded into a project file.



- To edit baluster elements of a Railing,
- In Type Properties Dialogue, click on Construction > Baluster Placement > Edit...,



In Edit Baluster Placement Dialogue, click on cells in the table under column Baluster Family, choose the type of baluster that is suitable, in the Main pattern table (in the middle part of a railing) and in the Posts table.



Parameter	Type / Instance	Description	Schedule
Width	Туре	Width of Profile Family	N
Length	Туре	Length of Profile Family	Υ
Materials	Туре		N
Base Offset	Instance		N
Top Offset	Instance		N



	Plan	Section / Elevation / 3D
	N/A	
Presentation		Elevation Section
		Isometric

Schedule -			
N/A			

DA-23 Tactile

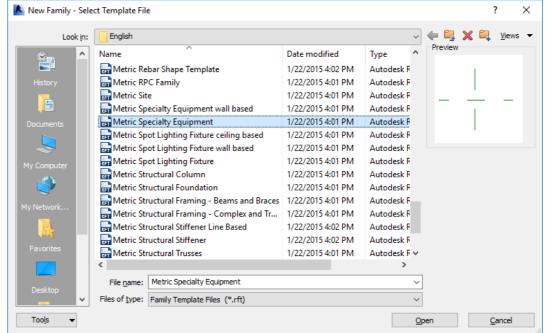
Discipline	Architectural
Family	Loadable Family
Category	Special Equipment
Workset	Individual Levels
Naming Convention	SPQ- (Functional_Type)-HAA-Tactile-Dimension

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

Modelling

• Tactile should be created in ARC Model and it is advised to create this element with Specialty Equipment family template.





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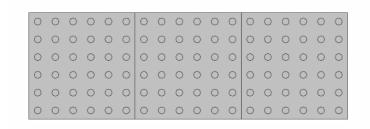
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APPENDIX



3D View Plan View



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Length	Туре		Υ
Width	Туре		Υ
Thickness	Туре		Υ
Materials	Туре		N
Type Mark	Туре		N



Drawing Production

• ICU Submission

- Refer to the diagram below for other necessary annotation / modelling for staircase drawing production in ICU GBP Submission.
- Staircase width is one of the essential figure required for ICU GBP Submission purpose, but this parameter could only be extract from a stair that is modelled by using Stair by Sketch method.

Building Tender

(i) Annotation / Presentation

- Tagging is the preferred option when doing annotation, while information in tags could be update automatically when information updates; Stair riser tag to be used for number of riser tagging;
- UP / DN label could be obtain from Stair Path under Annotation Symbol.

	Plan	Section / Elevation / 3D
Presentation	N/A	N/A
Submission	TACTILE FAMILY (GENERIC MODEL) BREAK LINE (MASK REGION)	N/A
Tender	TACTILE FAMILY (CHANGE DETAIL LEVEL TO FINE TO ACHIEVE) BREAK LINE (MASK REGION)	N/A

Schedule -	
N/A	

DA-24 Ceiling

Discipline	Architectural (Should work closely with M/E consultant, as they will be heavy involve with the ceiling.)	
Family	System Family	
Category	Ceiling	
Workset	Individual Levels	
Naming Convention	(Functional_Type)-HAA-Material-Dimension	

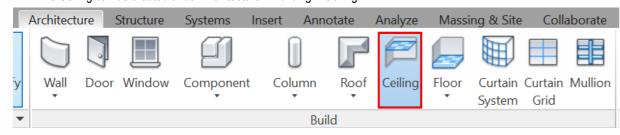
	Short form	Description
Functional Type	CEL	Ceiling
Originator	HAA	Housing Authority-Architecture & Landscape
1st_Descriptor	GYM	Gypsum board ceiling
-	MTL	Metal ceiling
2nd_Descriptor	600x600mm	Ceiling grid at 600x600mm
	500x1000mm	Ceiling grid at 500x1000mm

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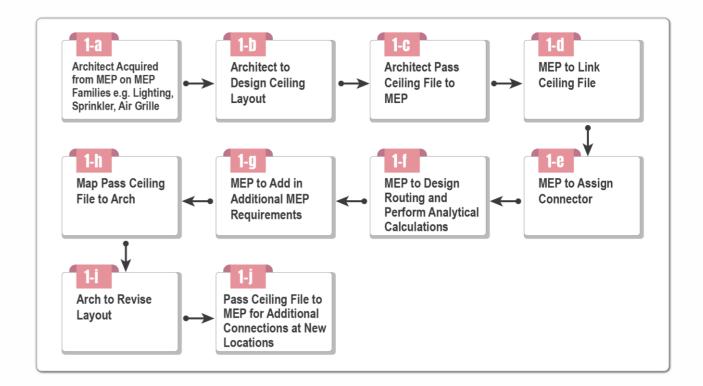
Modelling

a) Discipline

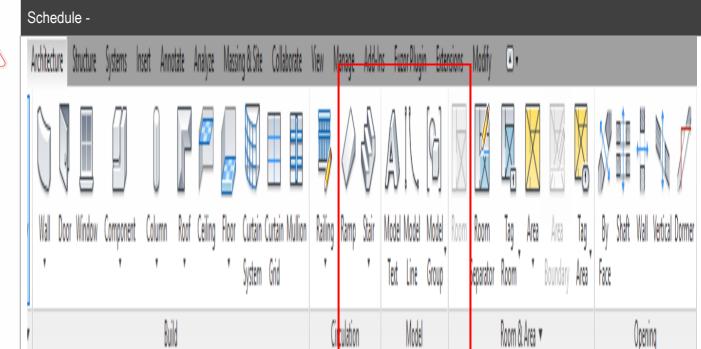
• The Ceiling can be created under Architecture > Building > Ceiling



- Ceiling is one of the major interface between ARC Model and MEP models, as some of the MEP elements are ceiling hosted, during the construction phase, ceiling is recommended to be built in a separate file.
- The Work flow Chart here under shows a typical working process of ceiling in a project and the collaboration and coordination between ARC Model and MEP Models.



Parameter	Type / Instance	Description	Schedule
Level	Instance	Level	Υ
W	Instance	Level for Model in-place	Υ
Area	Instance	F	Υ
Materials	Туре		N
Function	Туре		N
Thickness	Туре		Υ



DA-25 Furniture

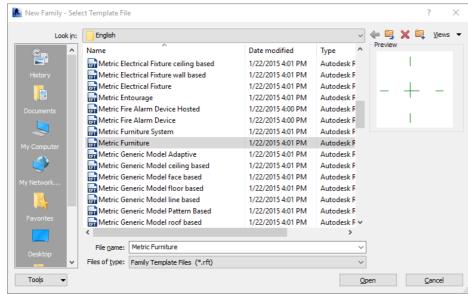
Discipline	Interior furniture belongs to Architectural Discipline. Exterior furniture usually belongs to Landscaping Discipline.		
Family	Loadable Family		
Category	Furniture		
Workset	Separate Furniture workset to be allocated for furniture to facilitate visibility in drawing production. To an extreme, when there are large quantities, a separate file to be used to reduce file size.		
Naming Convention	FUR- (Functional_Type)-HAA-Furniture Type -Dimension		

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

Modelling

• Furniture should be a Loadable Family and can be created with Furniture Family template.







- Parameter varies greatly in Furniture. Typically, overall dimensions are sufficient.
- For Special proprietary furniture using Manufacturer and Model Number are more important parameters in procurements.
- Major furniture manufacturers are now made their products BIM-abled. Usually their webpage can provide their specific BIM models for downloading and directly to be used in projects.

Parameter	Type / Instance	Description	Schedule
Length	Туре	Length	Υ
Width	Туре	Width	Υ
Height	Туре	Height	Υ
Board THK	Туре	Thickness of board	Υ
Glazing Area	Туре	Calculation for the glazing area	Υ
Materials	Туре		Υ

Drawing Production

Furniture models can be complicated and heavy in file size. Usually top view of 3D furniture will be too complicated when viewed in plan views, it is thus necessary to include a simplified 2D furniture symbol in the furniture family and TURN OFF the visibility of 3D presentations in plans.

	Plan	Section / Elevation / 3D
Presentation	N/A	N/A
Submission	N/A	N/A
Tender	5 TOP VIEW SCALE 1:50 (FOR A3)	140mm x 25mm DECKING PLANKS FIX TO 5mm THK G.M.S. PLATE W/ STEEL SCREW FROM BELOW G.M.S. FRAMEWORKS DETAIL TO BE REFERRED TO DETAIL 'B" 200 100 200

Schedule -			
N/A			

DA-26 Water Tank

Discipline	Architectural & Structural	
Family	Loadable Family	
Category	Generic Model	
Workset	Individual Levels	
Naming Convention	MCQ- (Functional_Type)-HAA-Material-Volume	

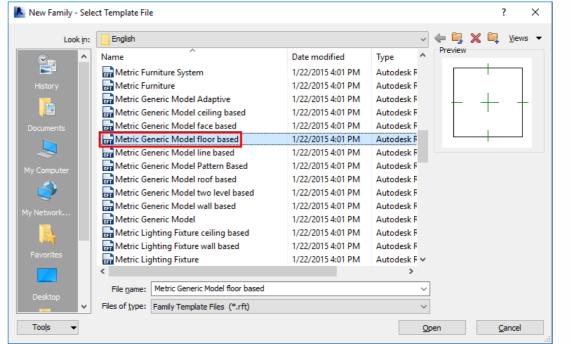
	Short form	Description
Category	MCQ	Mechanical equipment
Functional Type	WAT	Water storage tank
Originator	HAA	Housing Authority-Architecture & Landscape
	HAS	Housing Authority-Structure
1st_Descriptor	CON	Concrete
2nd_Descriptor	100m ³	100 cubic meters in volume

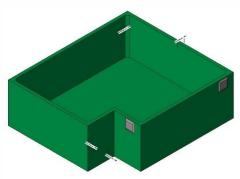


Modelling

• Water tank should be a Loadable Family and can be created with Generic Model floor based template.







• RC Water Tank should be placed within a room or surrounded by walls.

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Material	Туре		Υ
Hardware Finish	Туре	Hardware Finish	Υ
Base Level	Instance		Υ
Top Level	Instance		Υ
Length	Instance		Υ
Thickness	Туре		Υ

Prawing Production

	Plan	Section / Elevation / 3D
	N/A	N/A
Presentation		
Submission	28600L PRESH WATER TANK 2845 720 28600L PRESH WATER TANK 285 13900L FLUSH WATER TANK	N/A
Tender	MIN. 1100H. FROM FFL WATEL RAUNG ON 500H. R.C. CURB MIN. 1100H. FROM FFL MATEL RAUNG ON 500H. ROOF OF F.S. WATER TANK WATER TANK WATER TANK ROOF OF FRESH WATER TANK ROOF OF FRESH WATER TANK ROOF OF FRESH WATER TANK HILLS ROOF OF FRESH WATER TANK HATER TANK HILLS ROOF OF FRESH WATER TANK HATER TANK HATER TANK HILLS HILLS	N/A

Schedule -	
N/A	

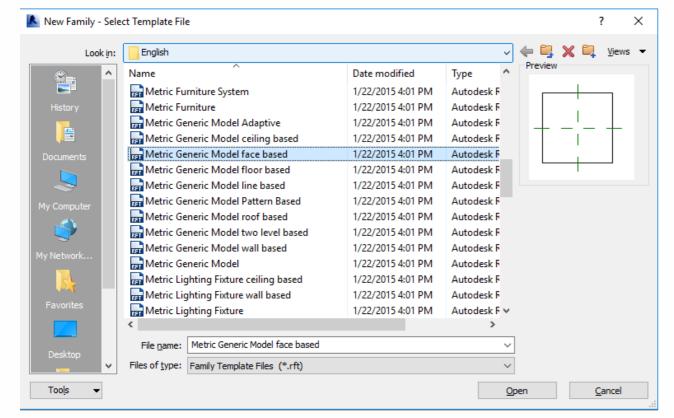
Discipline	Architectural
Family	Loadable Family
Category	Generic Model
Workset	Individual Levels
Naming Convention	GMD- (Functional_Type)-HAA-Material -Dimension

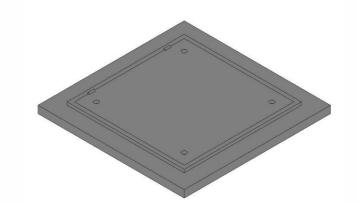


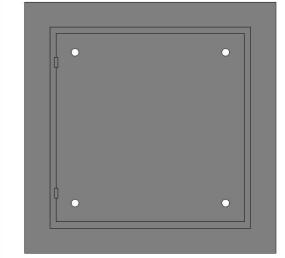
Modelling

• Hatch should be a Loadable Family and can be created with Generic Model face based Template. The Size of Hatch may vary according to design purpose, size parameters can be added to the Hatch family.









Plan View

3D View

Parameter	Type / Instance	Description	Schedule
Material	Туре	Material	Υ
Level	Instance		Υ
Length	Туре		Υ
Width	Туре		Υ
Thickness	Туре		Υ
Type Mark	Туре		Υ

Drawing Production

	Plan	Section / Elevation / 3D
Presentation	N/A	N/A
Submission		N/A
Tender	S.S. COVER	N/A

	chedule -	
ı	A	

DA-28 Cat Ladder

Discipline	Architectural
Family	Loadable Family
Category	Generic Model
Workset	Individual Levels
Naming Convention	SPQ- (Functional_Type)-HAA-Cat_Ladder

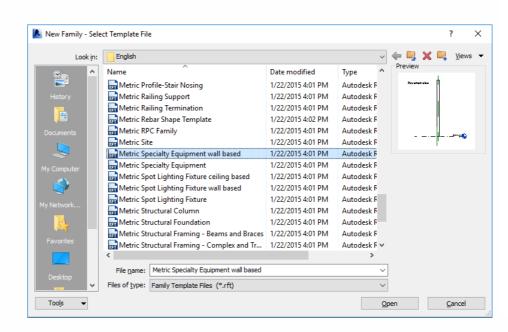
	Short form	Description
Category	SPQ	Specialty equipment
Functional Type	LAD	Ladder
Originator	HAA	Housing Authority-Architecture & Landscape
1st_Descriptor	Cat_Ladder	Cat Ladder



Modelling

• Cat Ladder should be a Loadable Family and can be created with Specialty Equipment wall based Template. Since the height of Cat Ladder may vary according to design purpose, a height parameter can be added in the Cat Ladder family.





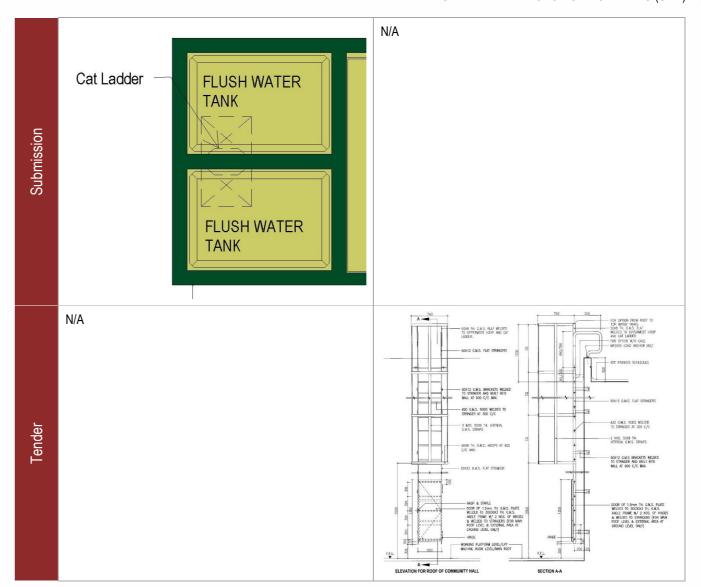


Essential Parameter

Parameter	Type / Instance	Description	Schedule
Material	Туре	Material	Υ
Level			Υ
No. of Steps	Туре	Number of steps	Υ
No. of Brackets	Туре	Number of brackets	Υ
Ladder Run Length	Туре	Length of Ladder run	Υ
Length	Instance	Height of Cat Ladder	Υ
Width	Туре	Width of Cat Ladder	Υ

B Drawing Production

	Plan	Section / Elevation / 3D
	N/A	N/A
c		
Presentation		
Pres		





DA-29 FS Installation

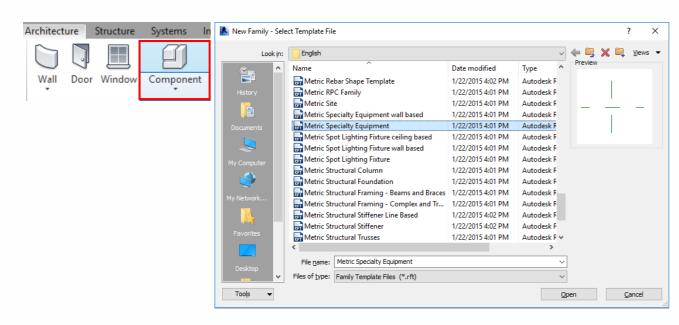
Exit Sign

Discipline	Architectural
Family	Loadable Family
Category	Special Equipment
Workset	Individual Levels
Naming Convention	SPQ- (Functional_Type)-HAA-Exit_Sign

	Short form	Description
Category	SPQ	Specialty Equipment
Functional Type	FRP	Fire Protection
Originator	НАА	Housing Authority-Architecture & Landscape
1st_Descriptor	Exit_Sign	Exit Sign

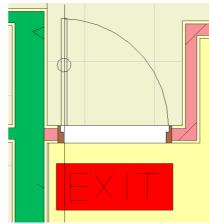
Modelling

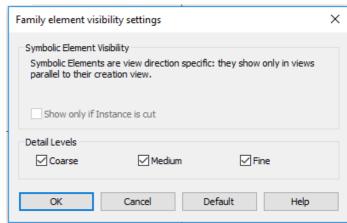
- Exit Sign should be a Loadable Family and can be created with Specialty Equipment Template.
- Since the model should to be shown on both 3D views and Plan views, Family element visibility setting need to be set properly. And symbolic Line will be used to shown Exit Sign on plan view.











Parameter	Type / Instance	Description	Schedule
Length	Туре		Υ
Width	Туре		Υ
Thickness	Туре		Υ
Materials	Туре		N
Type Mark	Туре		N
Level	Instance		N
Offset	Instance		N

Schedule -		
N/A		

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Hose Reel

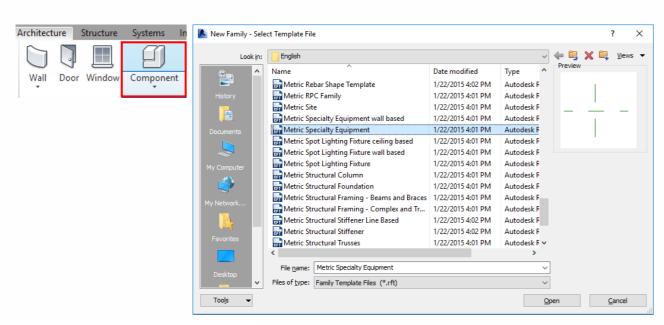
Discipline	Architectural
Family	Generic Model
Category	Speciality Equipment
Workset	Individual Levels
Naming Convention	SPQ- (Functional_Type)-HAA-Fire_Hose_Reel

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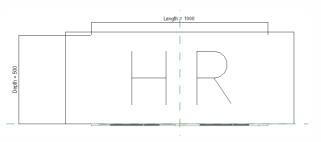
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Modelling

- Hose Reel should be a Loadable Family and can be created with Specialty Equipment Template.
- Since the Hose Reel should to be shown on both 3D views and Plan views, Family element visibility setting need to be set properly., and Symbolic Line will be used to shown Exit Sign on plan view.







3D View Plan View

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Length	Туре		Υ
Width	Туре		Υ
Thickness	Туре		Υ
Materials	Туре		N
Type Mark	Туре		N
Level	Instance		Υ
Offset	Instance		Υ

246

B Drawing Production

	Plan	Section / Elevation / 3D
Presentation	N/A	N/A
Submission	For ICU Submission For FSD Submission	N/A
Tender	HR	N/A

Schedule -		
N/A		

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PENDIXES

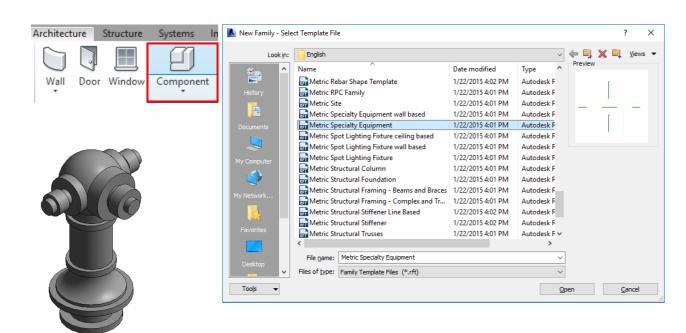
Fire Hydrant

Discipline	Architectural
Family	Generic Model
Category	Speciality Equipment
Workset	Individual Levels
Naming Convention	SPQ- (Functional_Type)-HAA-Fire_Hydrant



Modelling

• Fire Hydrant should be a Loadable Family and can be created with Specialty Equipment Template.



Essential Parameter

Parameter	Type / Instance	Description	Schedule

B Drawing Production

	Plan	Section / Elevation / 3D
	N/A	N/A
Presentation		
	N/A	N/A
Submission		
Tender	N/A	N/A

Schedule -		
N/A		

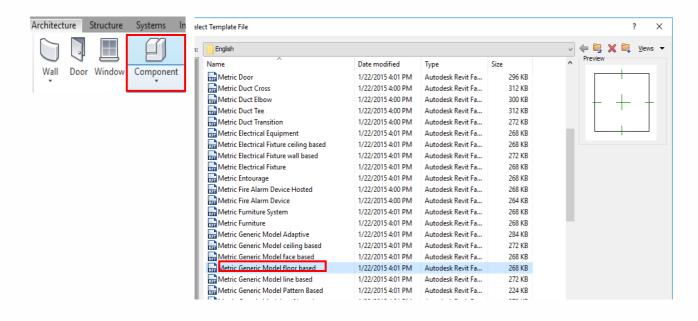
DA-30 Escalator

Discipline	Architecture Related to MEP such as speed	
– 11	·	
Family	Loadable Family	
Category	Specialty Equipment	
Workset	Vertical Transportation	
Naming Convention	SPQ- (Functional_Type)-HAA-Material-Dimension	

	Short form	Description
Category	SPQ	Specialty Equipment
Functional Type	ESC	Escalator
Originator	HAA	Housing Authority-Architecture & Landscape
1st_Descriptor	Alum	Aluminium
	SS	Stainless Steel
2 nd _Descriptor	320x400mm	Dimension of riser and tread

Modelling

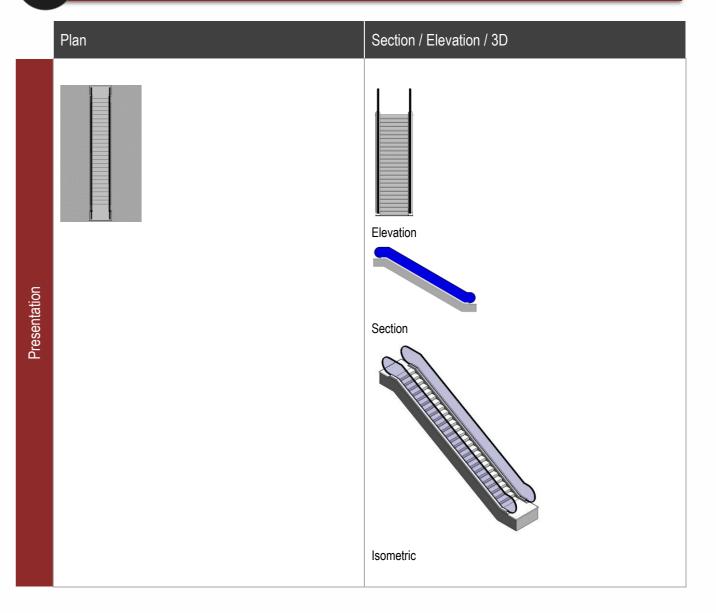
- Escalator should be a Loadable Family and can be created with Generic Model floor base family template. It is advised to simplified 3D model in early design stage. so that excessive increase of project file size can be avoided.
- Many manufacturers are now providing BIM model files of their products,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



Essential Parameter

Parameter	Type / Instance	Description	Schedule

B Drawing Production



DA-31 Lift

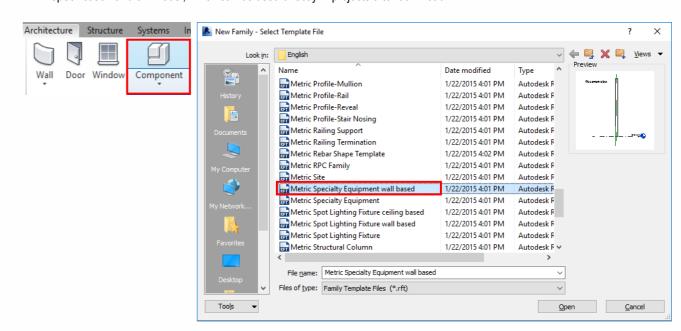
Discipline	Architectural Related to MEP such as speed	
	·	
Family	Family Loadable Family	
Category Specialty Equipment		
Workset Vertical Transportation		
Naming Convention	SPQ- (Functional_Type)-HAA-Lift Type-Dimension	

	Short form	Description
Category	SPQ	Specialty equipment
Functional Type	LFT	Lift
Originator	HAA	Housing Authority-Architecture & Landscape
1st_Descriptor	Traction	Traction lift
	Hydraulic	Hydraulic lift
2 nd _Descriptor	1450x1550mm	Lift car dimension



Modelling

- Lift should be a Loadable Family and can be created with Specialty Equipment wall base family template.
- 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



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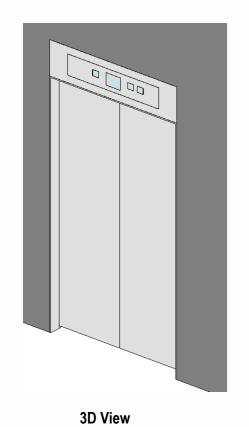
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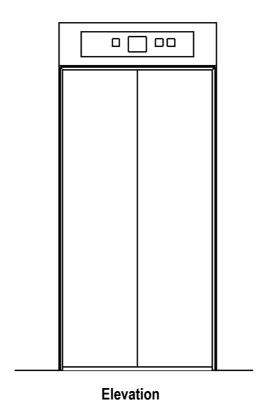
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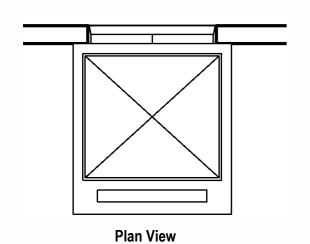
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APPENDIXE

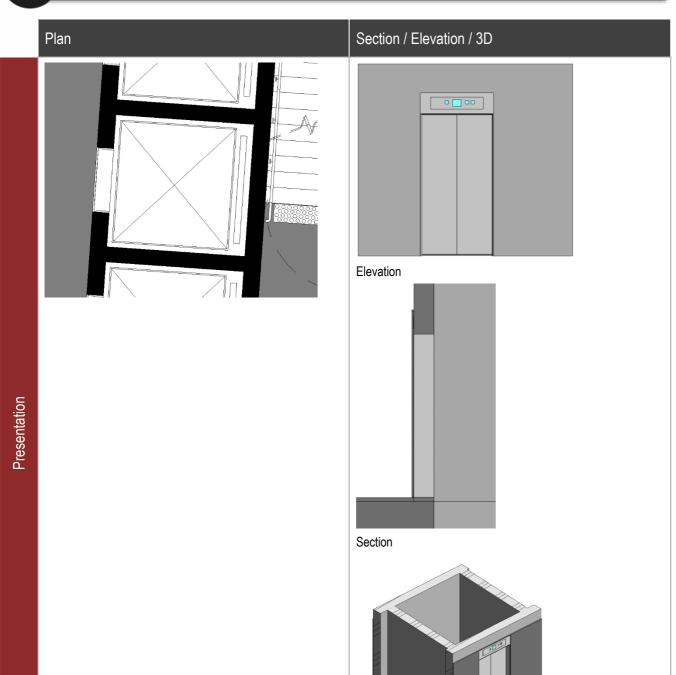




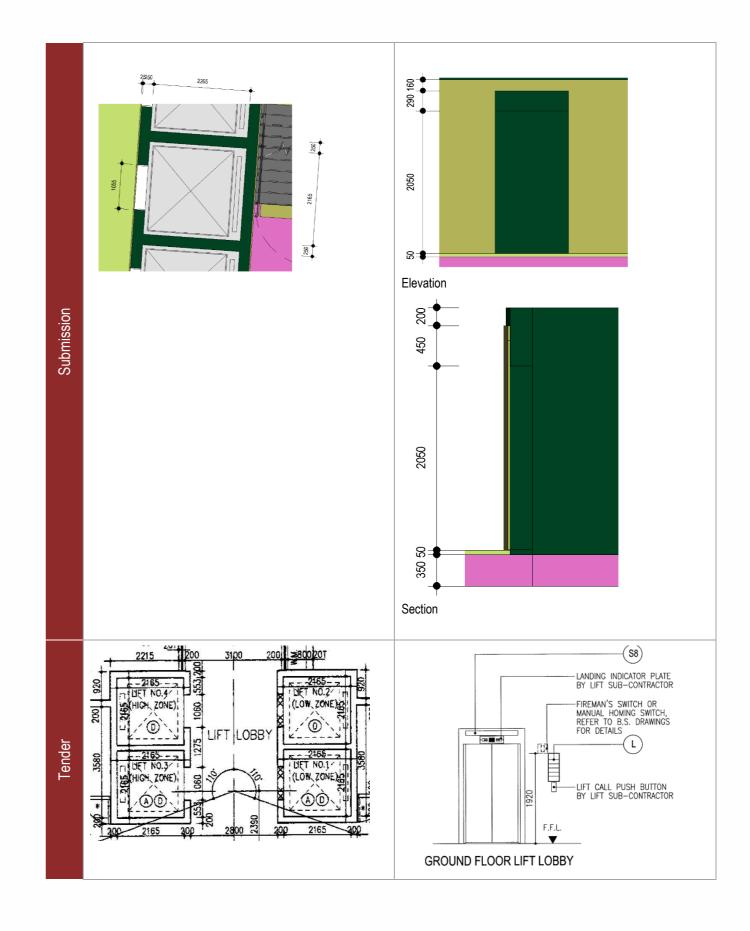




Parameter	Type / Instance	Description	Schedule
Lift Car Width	Instance		Υ
Lift Car Depth	Instance		Υ
Lift Car Length	Instance		Υ
Door Height	Туре		Υ
Door Width	Туре		Υ
Lift Number	Instance		Υ
Materials	Туре		N
Type Mark	Туре		N
Level	Instance		Υ
Elevation	Instance		Υ



Isometric



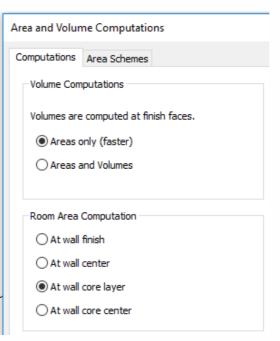
DA-32 Room

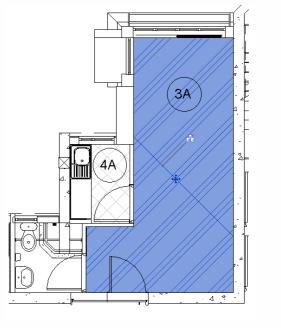
Discipline	Architectural	
Family	System Family	
Category	Room	
Workset	Individual Levels	
Naming Convention	N/A	





- Since UFA calculation is including the wall finishes, therefor all rooms should set the Room Area Calculation to "At wall core layer".
- 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.
- Room area is defined based on the selected element boundary, such as wall finishes, wall centre, wall core layer and wall core centre.





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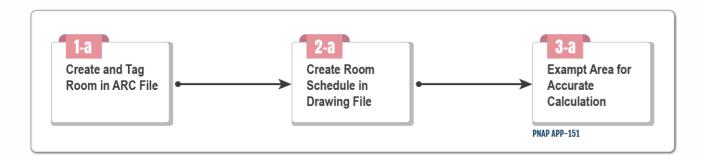
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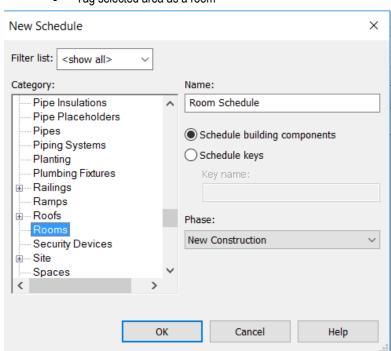
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Usable Floor Area Calculation for GBP Submission

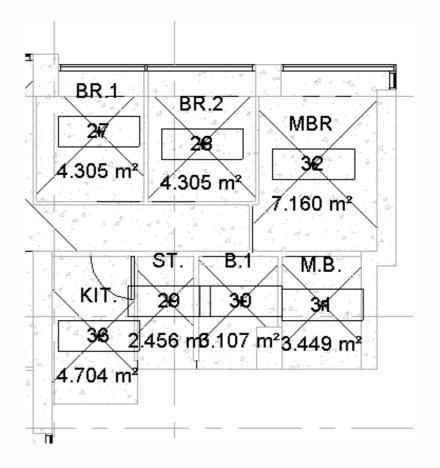


General Requirement:

Tag selected area as a room



Α	В
Area	Name
4.103 m²	KIT
5.376 m²	BR.1
8.965 m²	MBR
3.745 m²	M.B.
3.155 m²	B.1
5.630 m²	DIN.
12.037 m²	LIV.
2.379 m²	LAV.
4.418 m²	KIT.
4.671 m²	READING R
7.176 m²	DIN.
13.936 m²	LIV.
5.486 m²	Room
3.760 m²	B.1
3.280 m²	M.B.
9.520 m²	MBR
12.389 m²	LIFT LOBBY
6.804 m²	BR.3
6.865 m² 15.738 m²	DIN. LIV.
4.305 m²	BR.1
4.305 m² 4.305 m²	BR.2
4.305 m² 2.456 m²	ST.
2.456 m² 3.107 m²	B.1
3.449 m²	M.B.
7.160 m²	MBR
4.704 m²	KIT.
3.631 m²	BAL
3.706 m²	BAL
3.511 m²	BAL
1.600 m²	CABLE DUC
0.335 m²	P.D.
0.335 m²	P.D.
4.224 m²	WIDER LIFT

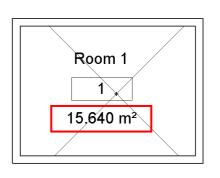


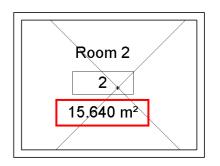
Area Calculation vs Wall Finishes

Impact of wall finishes on area calculation:

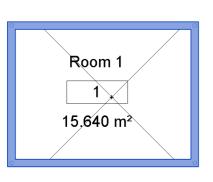
Initially two rooms were generated using same Concrete 200mm think material. Areas for Room 1 and Room 2 are the same

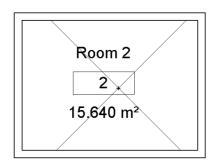






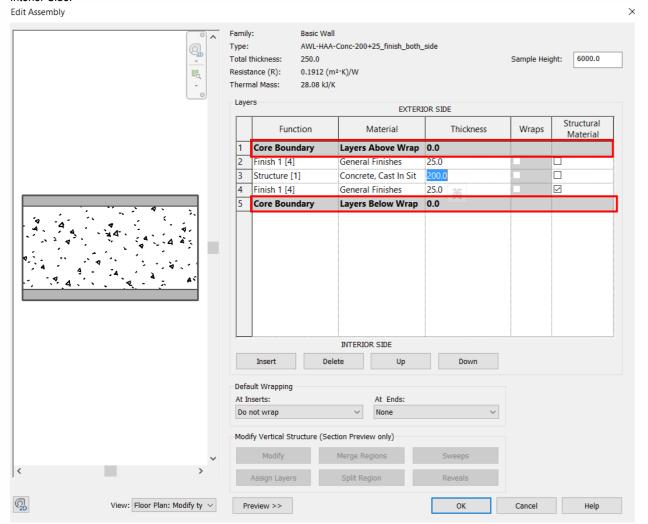
Room1 is using wall substrate only, no finishes.



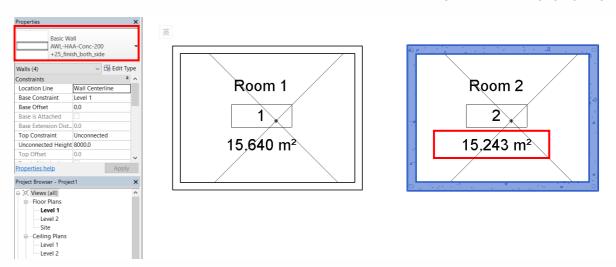


Now that Wall Type for Room 2 is changed to a new type with 25mm finishes on both sides. Note that the finishes are within the Core Boundary, which is a WRONG definition.

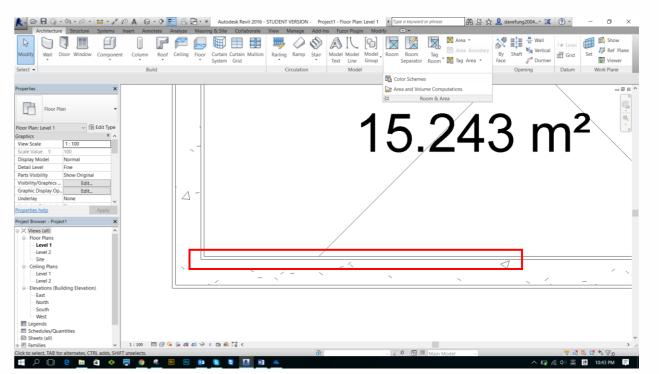
Core Boundary is the definition of the extent of Area Calculation. It shall be noted that the upper end is Exterior Side and the bottom is Interior Side.



After adding finishes at both sides with these settings, the Area of Room 2 has changed.

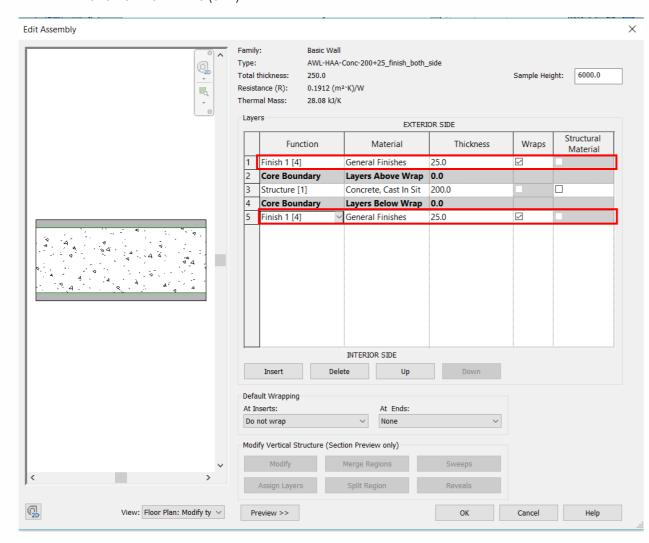


It can be noted that the area stops at the finishes (Core Boundary). The area is WRONG in Hong Kong definition.

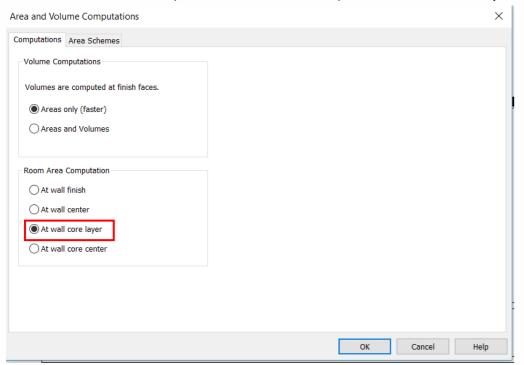


To rectify the situation, two steps is needed:

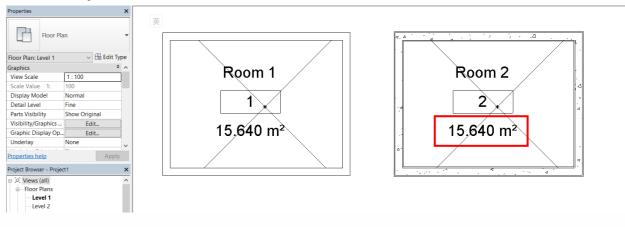
1. Set the Finishes outside of the Core Boundary, so that Room area will ignore the finishes.

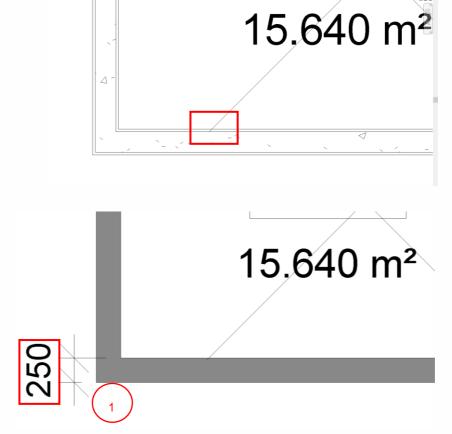


2. Under Area and Volume Computation Rules > Room Area Computation, choose "At wall core layer"



Note the resulting area is now corrected.





Conflict No.1 Finishes as shown in drawings, despite the area can be rectified, the graphics is not a traditional presentation (no finishes)

Conflict No. 2 To indicate with wall without finishes, it can be achieved by changing the Level of Detail to "Coarse", however, the total thickness of wall is a summation of Wall Substrate + Finishes. The overall dimension is wrong

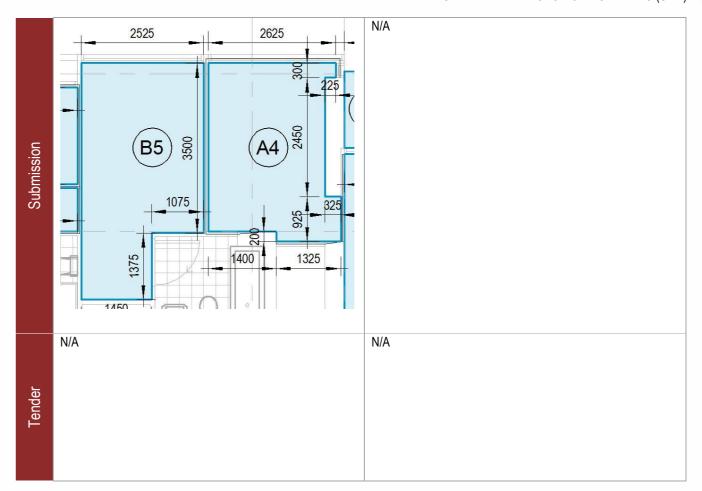
In conclusion, for both cases, finishes cannot be drawn in the Preliminary Design Stage. Otherwise it is in conflict with the Statutory Submission Requirements.

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Level	Instance	Level	Υ
Name	Instance	Room Name	Υ
Department	Instance	Flat Name	Υ
Number	Instance	Room Name	Υ
Area	Instance	Room Area	Υ
Floor Finish	Instance	Text input	Υ
Wall Finish	Instance	Text input	Υ
Ceiling Finish	Instance	Text input	Υ

B Drawing Production

	Plan	Section / Elevation / 3D
	N/A	N/A
Presentation		
Prese		

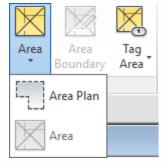


Level	Room Name	Number	Perimeter	Area	Room Style
Level 41.60_G/F	LEARNING RESOURCES	GF220.00	37934	69.774 m²	Learning Resources (pocket area)
Level 41.60_G/F	LEARNING RESOURCES	GF220.01	31180	22.029 m²	Balcony
Level 41.60_G/F	DESIGN STUDIO	GF221.00	68058	174.912 m²	Learning Resources Centre - Design Studio/Laboratory/P ainting Studio
Level 41.60_G/F	OPEN ACCESS	GF310.00	35565	73.178 m²	Learning Resources Centre - Open Access/Computer Lab
	L 45 05 4 7 05 V	0=04400	00055	50.705 0	

DA-33 Area Plan

Discipline	Architectural
Family	System Family
Category	Area
Workset	Individual Levels
Naming Convention	-

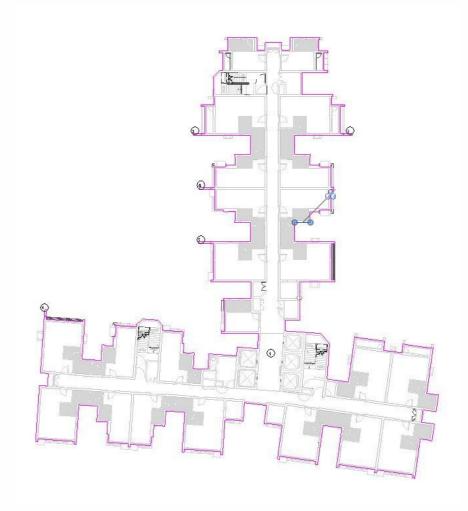
Modelling



In a project different Area Plans will be created and named for variant purposes, e.g. GFA, Site Coverage.

- Area plan should be drawn manually, automatic calculation is not recommended.
- User should consult with professional on the demarcation of the area plans.
- Area plans are views that show spatial relationships based on area schemes and levels in model.
- Create an area plan for Gross Floor Area calculation purpose.
- Use area boundary line to draw or pick the area boundary of the GFA
- Area boundary should be drawn on exterior skin of external wall for GFA calculation
- Area schedule (Gross Building) to be used for total UFA calculation





Parameter	Type / Instance	Description	Schedule
Level	Instance	Level	Υ
Name	Instance	Area Name	Υ
Department	Instance	Flat Name	Υ
Number	Instance	Area Number	Υ
Area Instance			Υ

P Drawing Production

	Plan	Section / Elevation / 3D
Presentation	N/A	N/A
Submission	PART PLAN FOR F36 PART PLAN FOR F35	N/A

	N/A	N/A
Tender		
Ten		

Schedule -

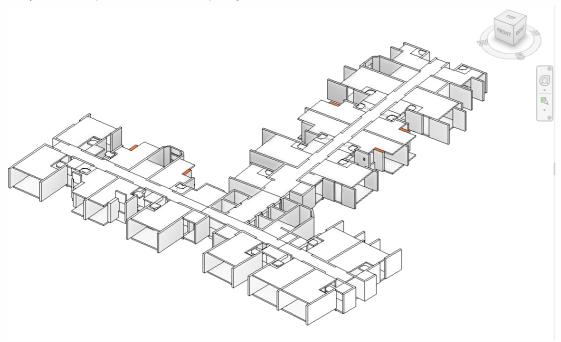
	NON-ACCOUNTABLE GFA OF MAIN ROOF FLOO	RS
PORTION	USAGE	Area (m²)
Α	EMERGENCY GENERATOR ROOM	78.035
В	CABLE ROOM	5.185
С	VENT DUCT ROOM	10.294
D	PIPE DUCT 1 (PD 1)	3.537
E	PIPE DUCT 2 (PD 2)	8.149
F	HOSE REEL	1.006
М	VACANT BAY FOR BUFFER TANK (MAIN ROOF LEVEL)	25.502
N	STAIRCASE TO SERVICE ROOMS (MAIN ROOF LEVEL)	11.986
TOTAL =	,	143.694

STANDARD APPROACH OF MODELLING (SAM)

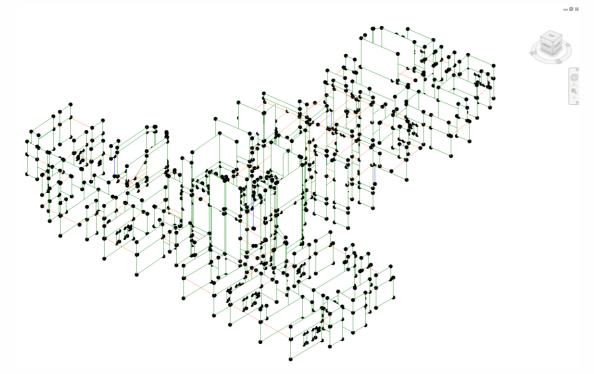
6.4Structure – Superstructure SAM

This section of SAM involves reinforced concrete elements of superstructure only and Autodesk Revit Structure has been the modelling tools throughout this document. It is assumed that users shall possess structural engineering knowledge and Revit Structure modelling skill when using this guide.

It is advisable that all Revit models shall start with the using of SAM Template in the HA Revit Structure project templates, the component library and shared parameters files developed by this SAM.

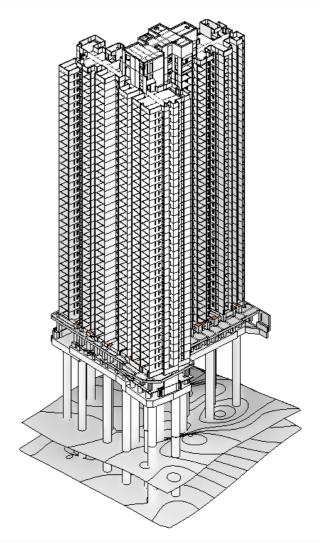


BIM Model in Revit for Drawing Production and Coordination



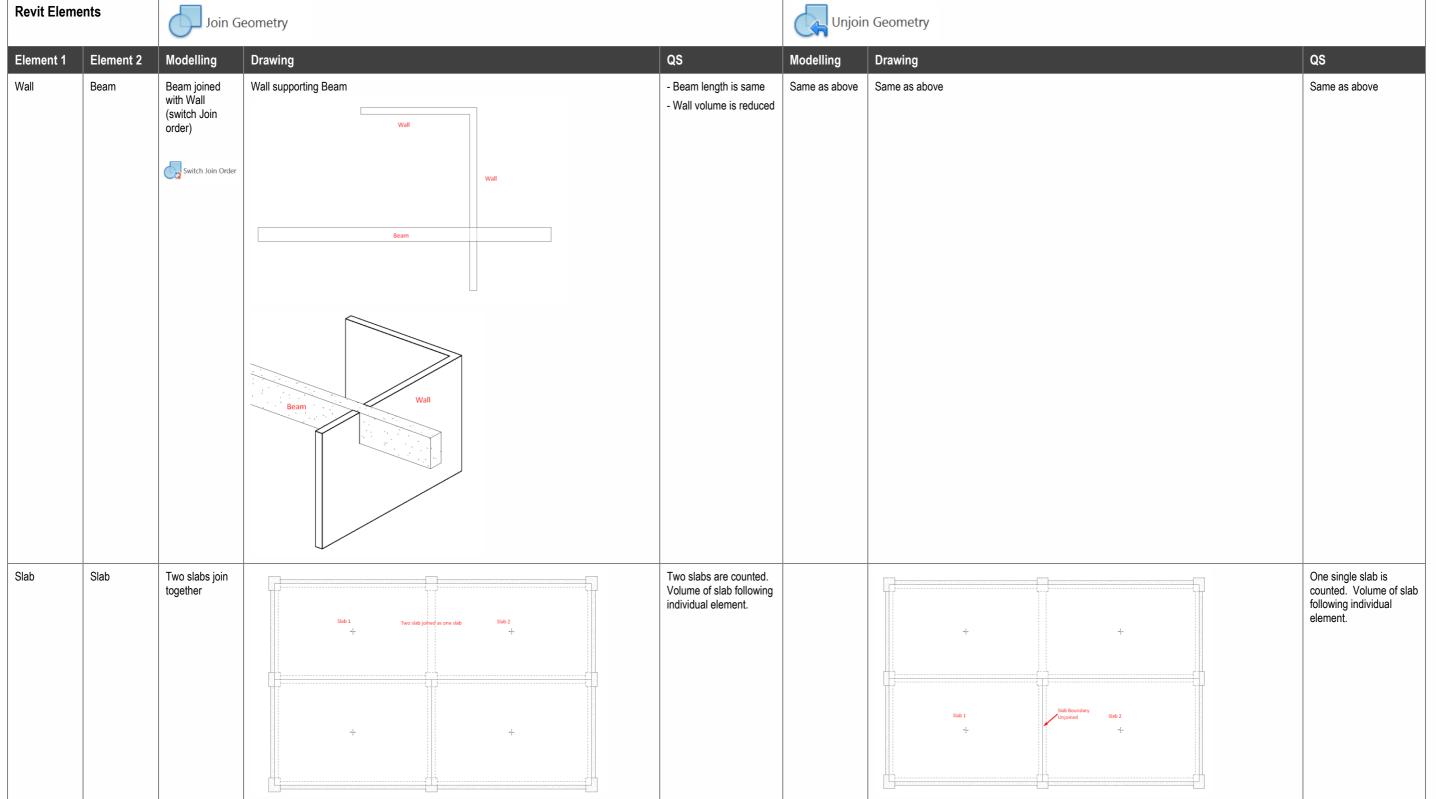
Analytical Model in Revit for linking with Structural Analysis

- This BIM modelling guideline describes the standard approach to modelling (SAM) for Revit built on procedures and
 methodologies from a broad consensus of experienced users from all disciplines, as well as consultants, in addition
 to guidelines defined by other Hong Kong and world-wide standardization initiatives.
- This Structure Standard Approach of Modelling is to be read in conjunction with other disciplinary section in this Standard. 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.
- A complete model example showing all structural element including superstructure and foundation following this SAM.



Joining Approach

Revit Elements Join Geometry			Unjo	oin Geometry			
Element 1	Element 2	Modelling	Drawing	QS	Modelling	Drawing	QS
Wall	Slab	Wall top connected to Floor Bottom (Soffit)	Dotted line Wall Slab Wall Column	- Wall (minus slab thickness) - Slab (Full)	Wall top connected to floor top	Solid line Wall Wall Column	- Wall (full height) - Slab (minus slab thickness)
Wall	Beam	Beam Joined with Wall	Beam connected to wall Wall Wall Wall	- Beam length reduced - Wall is full length	Beam cross wall	Beam Does not connected to wall Wall Beam Wall Wall Wall	- Wall (full length) - Beam (full length)



DS-U 01 Structure Categories

Structural Category



Structural Elements	Revit Family Category		
Column, Posts and Hangers	Structural Columns		
Shear wall, Core wall, bearing wall, Hanger wall, Stud wall, Screen wall, parapets, Gravity wall, Piling wall, Cantilever wall, Anchored wall and Counterfort wall	Wall (Structural Wall type)		
Beams and Lintels	Structural Framing / Structural Beam Systems		
Suspended slabs, transfer plates, and staircase landings	Floors (Structural Floor type)		
Caps, footings and piles	Structural Foundations		
Stair flights	Stairs		
Other elements e.g. plinths, mass fills, fillets and curb, on-grade slabs and mechanical plant basesetc.	Generic Models (Family)		

DS-U 02 Structural Columns

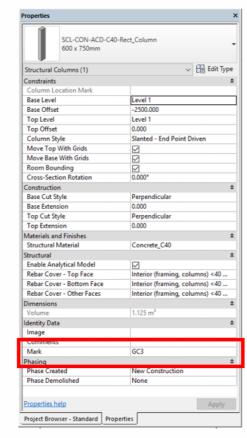
Concrete Columns

Discipline	Structural
Family	Loadable Family
Category	Structural Columns
Workset	Individual Levels
Naming Convention	SCL-(Functional_Type)-HAS-Profile -(2nd_Descriptor)

	Short form	Description		
Category SCL		Structural Column		
Functional Type	CCL	Concrete Column		
	CLH	Concrete Column Head		
	STC	Steel Column (Steel Member)		
Originator	HAS	Housing Authority Structure		
1st_Descriptor (Profile)	Circular	Circular		
	I_Shape	"I" shape		
	Rectangular	Rectangular		
	Specialty_Shape	Custom shape		
2nd_Descriptor				

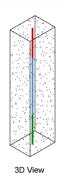
All Structural Column shall be modelled as Structure > 0 (Column)

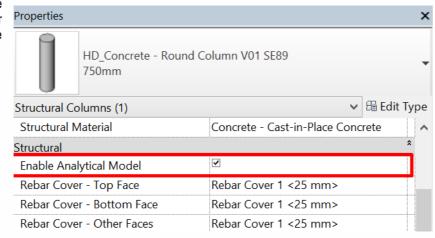
It is recommended to use the parameter "Mark" for the structural columns mark (e.g. GC3) in order to match the annotation of HD Tags for Columns.



All Columns should be modeled with appropriate Structural Column category family elements selected according to their sectional shape.

For those elements to be included into the building structure analytical model, modeler should click the element instance property Enable Analytical Model.

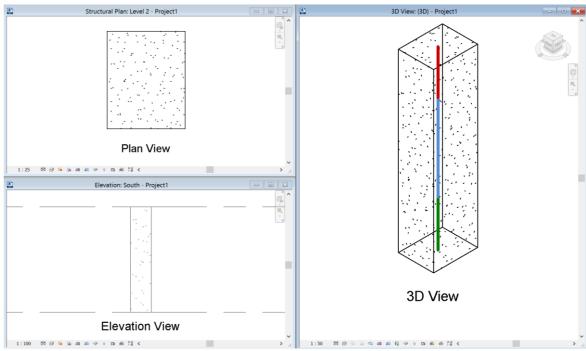






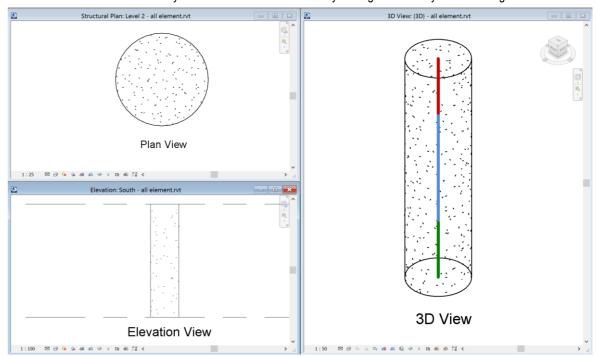
Rectangular Column

• Please note on 3D View – The analytical link could be switched off by turning off the analytical link categories.



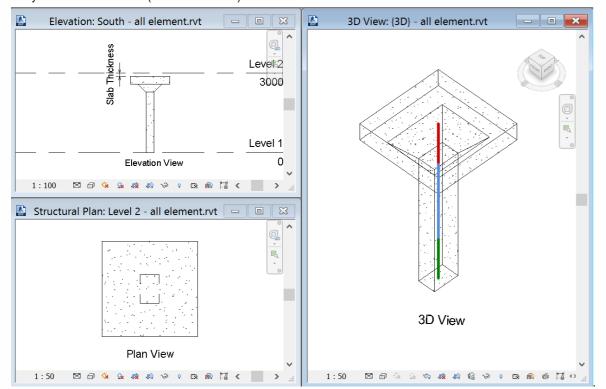
Circular Column

• Please note on 3D View – The analytical link could be switched off by turning off the analytical link categories.



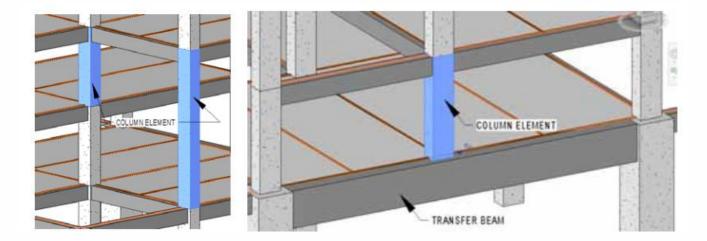
Column with Drop Head

• Column Head shall be modelled as Structure > (Column). Column Head and Slab intersection shall be reversed the way as Modify > (Switch Join Order)



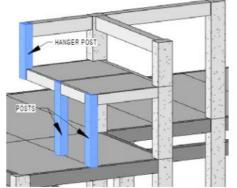
Column Modelling

• All columns should be defined between the levels where they serve as support for other elements and top of their supporting elements (like top of the column / wall / beam and foundation below), with required level offsets.





• A descriptive Comments like "Hanger post" and "Post" is advised to be added to the Comment properties for those elements which are not used as normal columns.

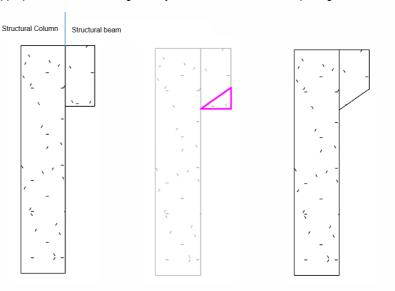


Structural Columns (1)		~	🕮 Edit Ty	pe
Rebar Cover - Top Face	Rebar Cover 1	<25 mm>		^
Rebar Cover - Bottom Face	Rebar Cover 1 <25 mm>			
Rebar Cover - Other Faces	Rebar Cover 1 <25 mm>			
Dimensions			*	
Volume	1.325 m ³			
Identity Data			*	
Image				
Comments	Hanger Post			
Mark	P1			
Phasing		3	*	V

• For QTO purpose of measuring amount of column formwork and costing, all vertical faces should be painted with material/finishes, name as "Column Side Formwork", so that the area of column formworks can be estimated.

Setting of Creating a Corbel

• Corbel part shall be modelled by a structural beam to represent analytically links in place. Dimension of corbel is the beam depth subtract by the appropriate dimension using "Cut by face" at Structure under Opening Tab.



Make a short beam Use opening by Face Form a Corbel to support loading



- Adjust the depth to suit the column height to ensure analytical links are correct in place, analytical links are correctly in place.
 On drawing, user can use linework to assign a hidden line for the intersection.





Essential Parameter

For QTO purpose, the following parameters are considered to be essential parameters to be added to the Column families:

Rectangular Column

The following parameters under 'Constraints' shall be set in family:

Parameter	Type / Instance	Description	Schedule
b	Туре	Column Width	Υ
h	Туре	Column Depth	Υ

The following parameters under 'Materials and Finishes' shall be set in family:

Parameter	Type / Instance	Description	Schedule
Structural Material	Instance	Material	Υ

The following parameters under 'Other' shall be set in family:

Parameter	Type / Instance	Description	Schedule
Column_Rectangular	Туре	Filter by Schedule	Υ

Circular Column

The following parameters under 'Constraints' shall be set in family:

Parameter	Type / Instance	Description	Schedule
Dia	Туре	Column Diameter	Υ

The following parameters under 'Materials and Finishes' shall be set in family:

Parameter	Type / Instance	Description	Schedule
Structural Material	Instance	Material	Υ

The following parameters under 'Other' shall be set in family:

Parameter	Type / Instance	Description	Schedule
Column_Circular	Туре	Filter by Schedule	Υ

Column Drop and Column Head

Parameter	Type / Instance	Description	Schedule
b	Туре	Width of Column Head	Υ
h	Туре	Depth of Column Head	Υ
d	Туре	Height of Column Head	Υ

Schedule

Concrete material that are applied to column for quantity take off purpose.

DS-U 03

Structural Wall

Discipline	Structural	
Family	System Family	
Category	Wall	
Sub-category	Basic Wall	
Workset	Individual Levels	
Naming Convention	(Functional_Type)-HAS-Concrete_grade-Thickness	

	Short form	Description
Functional Type	SWL	Structural Wall
	BSW	Basement_Wall
	DPW	Diaphragm_Wall
	GDW	Guide_Wall
	RTW	Retaining_Wall
	SCW	Screen_Wall
	SLW	Slurry_Wall
	CUB	Curb
Originator	HAS	Housing Authority-Structure
1st_Descriptor	C20	Concrete strength grade = C20
(Concrete grade)	C45	Concrete strength grade = C45
	C60	Concrete strength grade = C60
2nd_Descriptor (Thickness)	200mm	Thickness of the wall

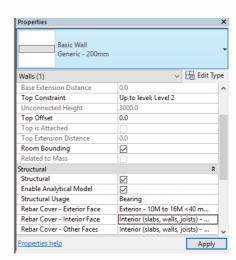
All the above Functional Type refers to FLIP Master Type List ver 1.4.

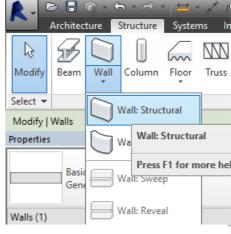


Modelling

Shear/ Core/ Bearing /Hanger/ Stub Walls

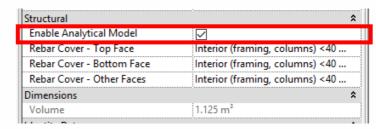
- General requirements: All structural walls should be modelled with appropriate types from Wall system family of subcategory "Basic Wall". Users should subsequently set their usage to "Bearing", "Shear", or "Structural Combined" depending on their usage in structural analysis. Some structural analysis program will recognise the type of wall according the Structural Usage and then carrying out the analysis in correct manner after exported.
- The structural wall can be achieved by selecting Revit Structure Ribbon → Wall (dropdown list) → Wall: Structural when creating a wall.





(a) Wall Properties palette

- (b) Creating structural wall by selecting the corresponding command from Revit ribbon
- For those elements to be included in analytical model, modeller should check the element property Enable Analytical Model check box.



- All walls should 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.
- The top level of walls should be extended to top of slabs being supported instead of to the soffits of slab elements only. (click "No" when prompted as below:







1

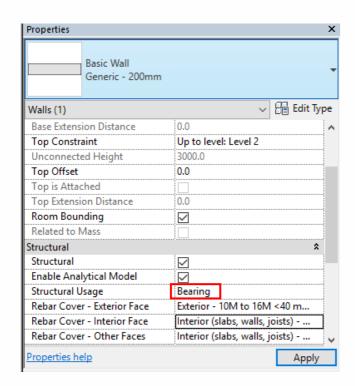
5

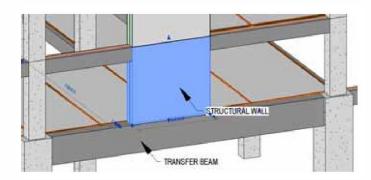
0

8

APPENDIXE

 All structural walls should be modelled with appropriate types from Basic Wall category family with its structural usage property set to "Bearing".





- Wall shall split into sections at different floor levels unless it spans across more than one level.
- Structural Wall shall be aligned to either the side or centre of the wall to allow flexibility for future changes in wall thickness, such that the change in thickness will not require re-alignment of the wall.

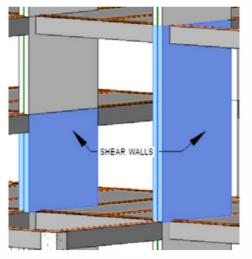


Figure Above: Shear wall elements

Hanger and Stub Wall

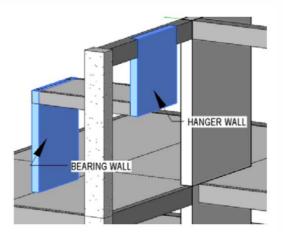


Figure Above: Bearing and hanger walls

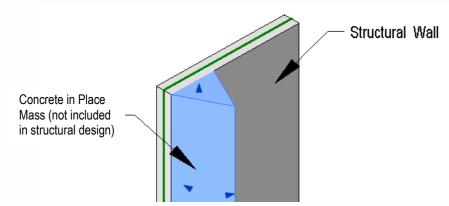
Descriptions like "Hanger wall" and "Stub wall" are required to be added to the **Comments** properties of wall such that their structural usage can be identified.



The Comment and Mark field in wall properties palette

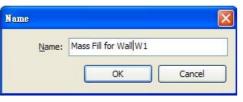
5

For irregular shape wall, modeller may consider such wall as a composition of a regular wall panel with concrete fills for the rest of the wall when the irregular parts are excluded from structural design. In this case, the concrete fill part can be modelled as an In-Place model under Walls category.



Mass fill attached to wall

The In-Place model should be provided with a family name like "Mass Fill for Wall W1" so that it can be recognized as the mass fill for that particular wall. Similar description is also advised to be added to the **Comments** field of its Properties palette.



Family name for mass fill In-Place model

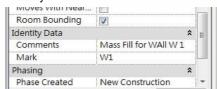


Figure Above: In-Place Model Properties palette

- Both Top Level and Base Level of parapet walls should be assigned with identical level together with the Top Offset made equal to the required parapetheight.
- Parapet wall should be included into the storey model in which the parapetwall is attached.

Screen Walls and Parapets

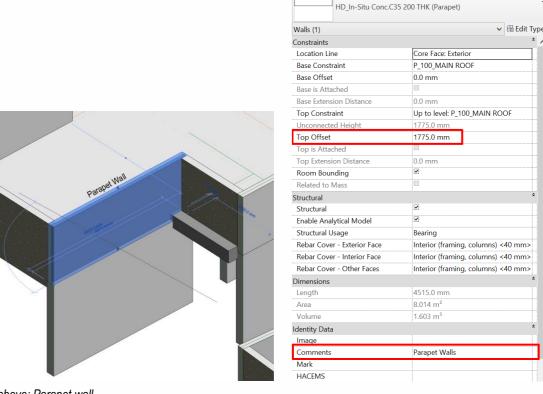


Figure above: Parapet wall

- For parapet walls with piers, they should be modelled as individual wall spanned between piers edge.
- The pier should be modelled with structural column family element. Their *Analyse As* property should be set to "Not for analysis" and a description "Parapet Pier" added to the Comments *property* of the element, subsection refers. Similar to the parapet wall, both Top Level and Base Level of piers should be assigned with identical level together with the Top Offset made equal to the required parapet Height.



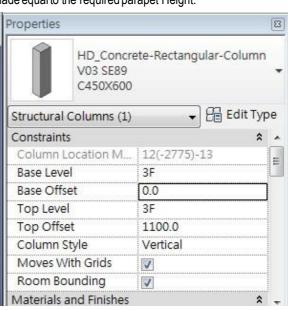


Figure Above: Parapet wall with piers

Screen Walls

All screen walls should be modelled panel by panel such that their top and bottom are s panned between successive levels with its ends joined to the edges of connected columns.

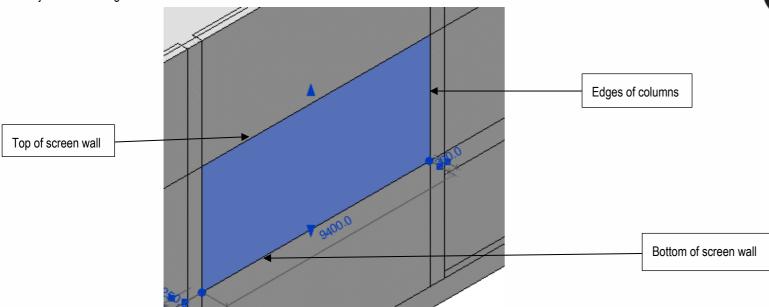
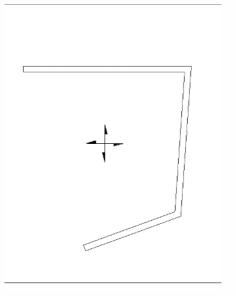


Figure above: Screen wall

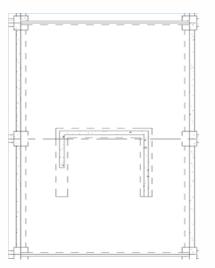
Essential Parameter

Essential Parameter table to be updated.



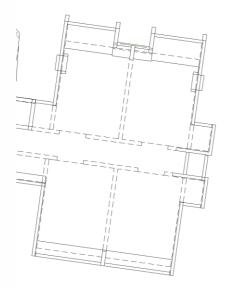


For C-walls under slab above head, top level of the wall shall be connected to top of the Slab. Modeler can join the wall using "Group" command to show hidden lines on drawing.

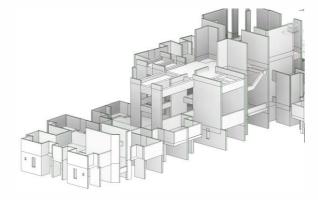


- For walls under slab above head, top level of the wall shall be connected to top of the Slab and join with the slab to show hidden lines on framing plan
- For Wall below the slab thicker than the wall above, join the wall below with slab and Group 3 walls into one group. Ungroup it after done for separating the walls. Hidden line will be kept.

• Use Join wall to Slab to form Hidden line.



• All wall below the slab shall be hidden lined as shown with wall connected to topof slab.



Setting to Define Wall Level:

For example, when modelling a structural wall with base level at Level 3 and top level at Level 4:

• Structural Wall shall be selected as Level 4 in "Top Constraint", Level 3 in "Base Constraint"

- Curb and Upstand shall be selected as Level 4 in "Top Constraint" & "Base Constraint" and making use of 'unconnected height'.
- For structural walls shown on L4 Framing Plan, the Top Constraint shall be set as Level 4.

Wall Edit Profile

- To achieve different BIM purposes, the staircase wall is modelled to different Level of Details. The staircase wall shall be modelled either to the soffit of Structural Slab or soffit of landing which subjects to different BIM purposes and the Level of Details to achieve.

RC

DS-U 04

Structural Opening on Walls

Discipline	Structural
Family	System Family
Category	Rectangular Straight Wall Opening
Workset	Individual Levels
Naming Convention	(Functional_Type)-HAS-Dimension



Door and Window Openings:



- The openings can be modelled as two aligned walls with a lintel beam spanned between them. Even though, the dimensions of the structural opening so formed are larger than the architectural requirement, the surrounding concrete fill around the openings will not be included into the model.
- This model shall be created in "Structural" Workset for structural analysis purpose. Architects shall use the hidden workset to define walls and verify with this structural wall with lintel beams for final collaboration process.

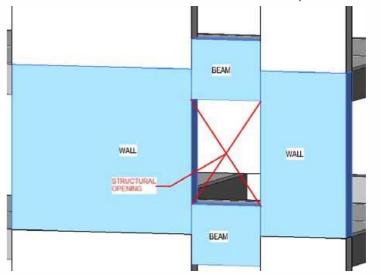


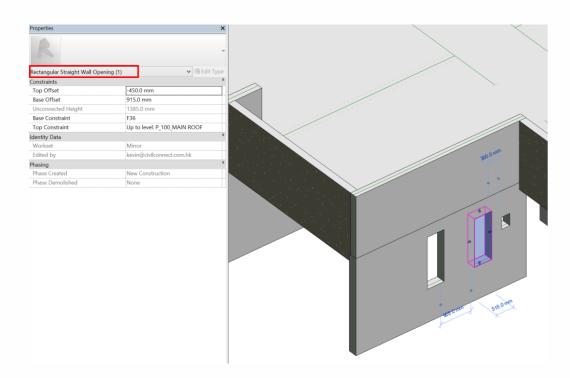
Figure above: Structural opening if Lintel Beam is required for analysis purpose.

Other Openings:

• To be formed by adding Wall Opening (i.e. System Family. Rectangular Straight Wall Opening) to wall element. For opening of other shapes, new wall base generic families have to be created to suit specific needs

Family Customization: Basic Wall (System Family)

• All Wall family type should be defined with single structure layer only with required thickness and concrete grade.



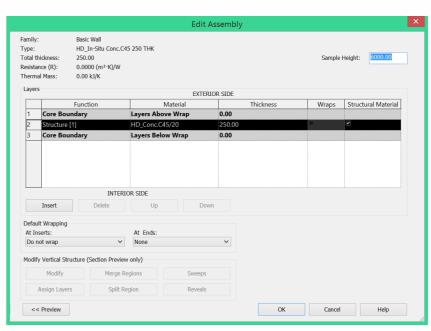


Figure above: Edit Assembly dialog for Basic Wall



N/A. Refer to DS-U 03 Structural Wall



N/A. Refer to DS-U 03 Structural Wall

DS-U 05 Structural Framing

Discipline	Structural	
Family	Loadable Family	
Category	Structural Framing	
Workset	Individual Levels	
Naming Convention	SFM-(Functional_Type)-HAS-Profile-(2nd_Descriptor)	

	Short form	Description
Category	SFM	Structural Framing
Functional Type	CCB	Concrete Beam
	STB	Steel Beam
	OTR	Other
Originator	HAS	Housing Authority-Structure
1st_Descriptor (Profile)	Rectangular	Rectangular Beam
	Cranked	Cranked beam
	Step	Stepped Beam
	Haunched	haunched Beam
	L_Shape / T_Shaped	L Shaped or T Shaped
	Rectangular_Hollow_Section	Rectangular Hollow Section
	Square_Hollow_Section	Square Hollow Section
	Rolled_Steel_Angle	Rolled Steel Angle
	Universal	Universal Beam
2 nd _Descriptor		

Structural Concrete Beams

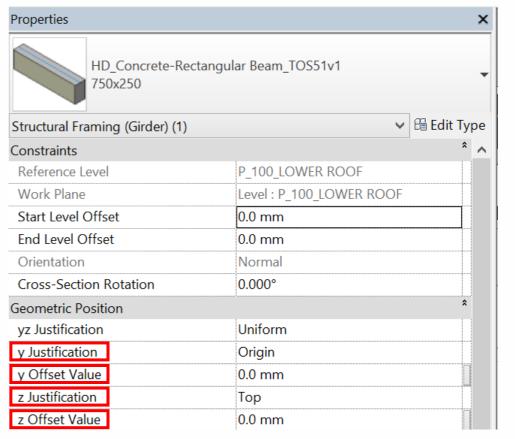
Structural Framing Type: Concrete Beam

All Beams shall be modelled as Structure > 56 (Beam)



Place a Concrete Beam

In general, Centre / Origin shall be selected in "y Justification"; Top shall be selected in "z Justification". Beam offset shall be entered by "z Offset Value"



- For edge beam, Left or Right shall be selected in "y Justification".
- For inverted beam, Bottom shall be selected in "z Justification".

General requirements:

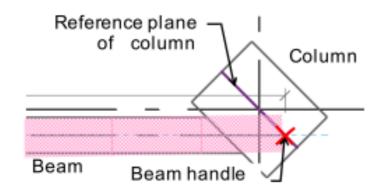
- All beams should be modelled with appropriate family type from Structural Framing category
- All continuous beams should be modelled span by span.
- All beams should be connected to their supports by one of the following methods.

Method A: For Beams supported by Main Beam

The handle of the secondary beam should be connected to the reference plane of its supporting main beams. Normally, it's defined along the centre of a structural framing family.

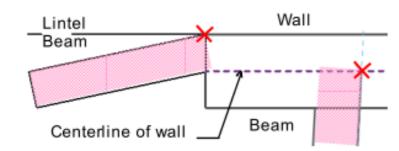
Method B: For Beams supported by column

• Beam supported on column should model with its end handle attached to any one of the reference planes of the column. Normally, they are along the major and minor axis of the column section.



Method C: For Beams supported wall

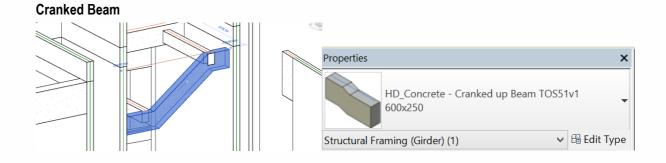
• In general, Beam handle should connect to the centreline of its wall support except lintel beam which can be joined to the end of the wall. In the latter case, the beam handle can attach to edge of the wall end.



 To improve the appearance at the connections with adjacent slab and wall elements, modeller should make the newly placed slab element joined with these beam elements.

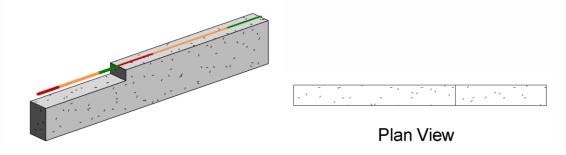
Details of different type of beams modelling as below

Rectangular Beam Properties ** **HD_Concrete-Rectangular Beam_TOS51v1 1050x400** **Index of the control of

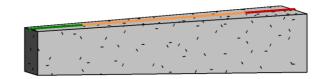


Structural Framing (Girder) (1)

Step Beam



Haunched Beam

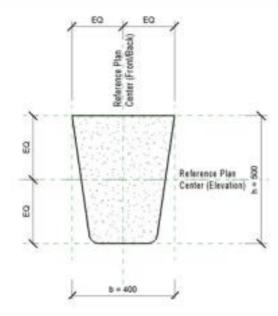




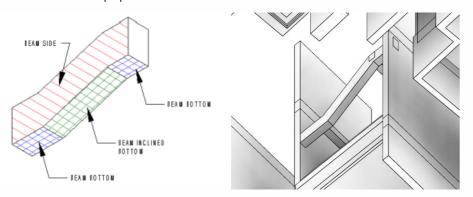
→ ☐ Edit Type

Irregular Shaped Beam

• The reference plane "Centre (Front / Back)" predefined in Revit Structural Framing family template should cut across the beam section and locate at the mid-point of the horizontal overall dimensions.



- The following sharable parameters have to be added to the Family such that they can provide relevant information for other model users or element annotating:
 - Beam width;
 - Beam depth;
 - Features e.g. "Rectangular", "Cranked", "Tapered" and "Stepped" etc.
 - Tag for beam tagging, contents refer to the format adopted in the standards Structural Framing Tags Family adopted.
- Both sides and bottom of the family should be painted with specific material, name as "Beam side formwork", "Beam bottom formwork" and "Beam bottom formwork (inclined)" so that the areas of beam formworks in different location can be extracted for QTO purpose.





Essential Parameter

For slope / ramp, Beam offset shall be entered by "Start Level Offset" and "End Level Offset".

Example	Type / Instance	Description	Schedule
For general beam	Centre	Тор	z Offset Value
For edge beam	Left / Right	Тор	z Offset Value
For inverted beam	Centre	Bottom	z Offset Value
For slope / ramp	Centre	Тор	Start Level Offset and End Level Offset

B

Drawing Production



DS-U 06

Structural Floor

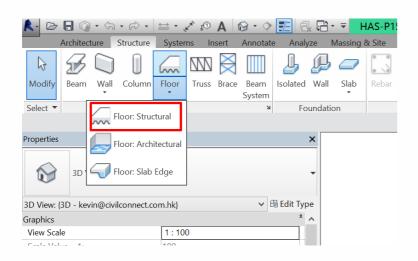
Discipline	Structural
Family	System Family
Category	Floors
Workset	Individual Levels
Naming Convention	(Functional_Type)-HAS-Concrete_Grade-Thickness

	Short form	Description
Functional Type	OGS	On-Grade_Slab
	RFS	Roof_Slab
	SLP	Sloped_slab
	SRS	Structural_Slab
	TRP	Transfer_Plate
	SBE	Slab_Edge
	SKW	Sunken_Wall
Originator	HAS	Housing Authority-Structure
1st_Descriptor (Concrete_Grade)	Grade_30D	Concrete Grade = 30D
2 nd _Descriptor (Thickness)	200mm	Thickness of the Slab

Example: SRS-HAS-Grade 30D -200mm

Suspended Floors

• All these elements should be modelled with appropriate types from Floor category family with its Property Structural Usage set to "Bearing" i.e. select Structure panel → Floor dropdown list → Structural Floor.



- The boundaries of both the structural floors and its binding layer should be defined along the edges of the neighbour elements if any
- Modeler is advised to specify the usage of the element in its Properties palette under Comments as below:
 - "On-Grade Slab"
 - o "Floating Slabs"
 - "Pile Cap"
 - "Raft Footing"; and other similar.
 - By specifying the usage of the floor element, the other model user is able to sort out the elements according to their structural usage within a model. *Only the structural part of slab shall be modelled.
- In floor editing mode, slab must be modelled in a complete and closed-loop boundary.
- Slab shall be automatically joined with beams and columns such that the overlapped part will be counted as Slab according to the QTO
 measurement method
- Slab shall be modelled as one element for all adjacent slabs with the same thickness. No overlapping of slabs shall be allowed. The thickened part of dropped slab (except Sunken Slab) shall be modelled by "Slab Edge" unless beam is shown to support.



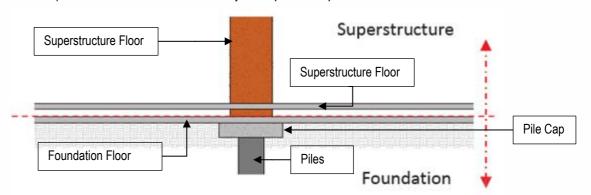
Modelling

General requirements:

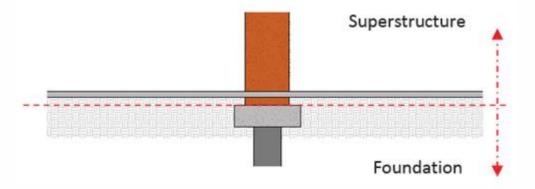
• All these elements should be modelled with appropriate types from Floor category family with its Property Structural Usage set to "Bearing" i.e. in Revit ribbon, select Home tag → Structure panel → Floor dropdown list → Structural Floor.

Demarcation of Superstructure and Foundation

Superstructure floor shall be modelled by Floor (Structural)



• Foundation floor shall be modelled by Foundation Slab.



On-Grade Slab and Suspended Slab

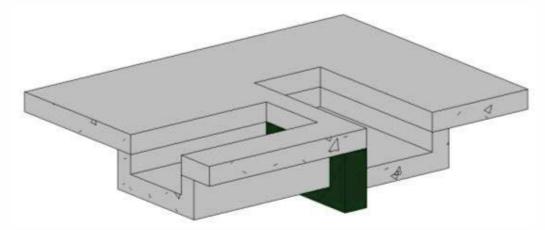
- Additional settings shall be applied to **On-grade slab**, Modify > Join > (Switch Join Order) with structural column or structural framing, such that the overlapped part can be displayed in hidden line in drawing and will NOT be counted as Slab according to the quantities measurement method.
- Local thickening due to level difference of Transfer Plate shall be modelled as a separate "Floor" element with the thickened thickness.
- Sloping soffit at the change of soffit level shall be modelled as "Slab Edge". Sloping slab at ramp shall be modelled as "Floor" with "Modify Sub-elements" to change local spot levels of the slab. "Line Element" shall be added between nodes to ensure sub-divisions are formed by 4 nodes.

Slab Edge

Slab Edge shall be modelled as Structure > (Floor: Slab Edge)

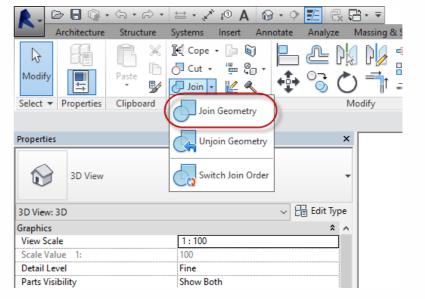


Transfer plate with different thickness shall be modelled by Floor Edge.



Intersection of Slabs with Walls and Beams for Modular Flat

The joining of elements with slabs can be summarized as below:



GUIDE 1-01

C

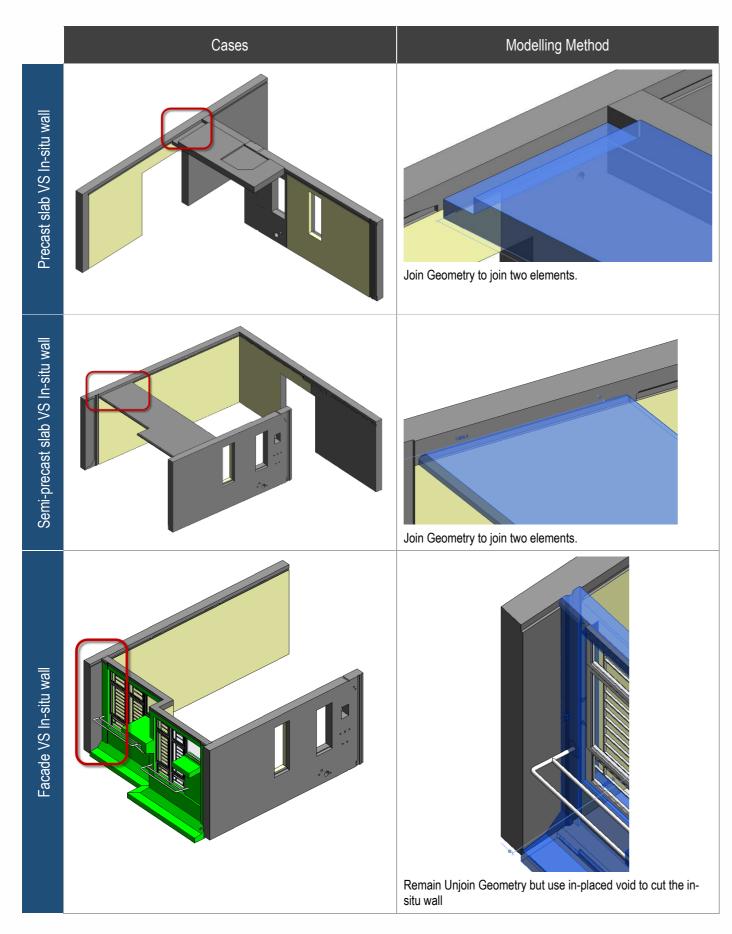
Q

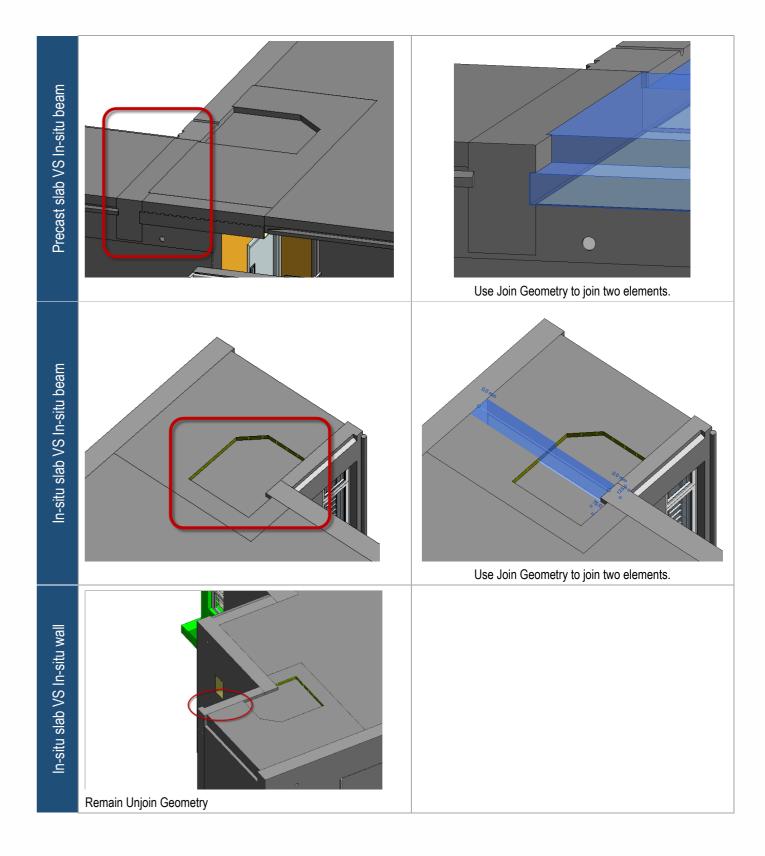
4

5

8

Jointing Method at Specific Locations in Modular Flat Design

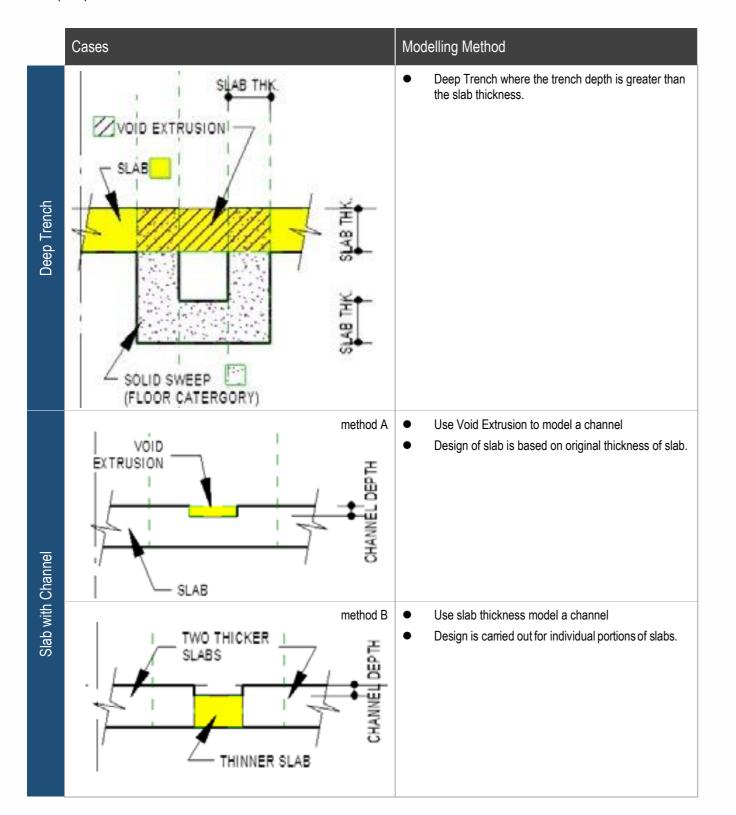


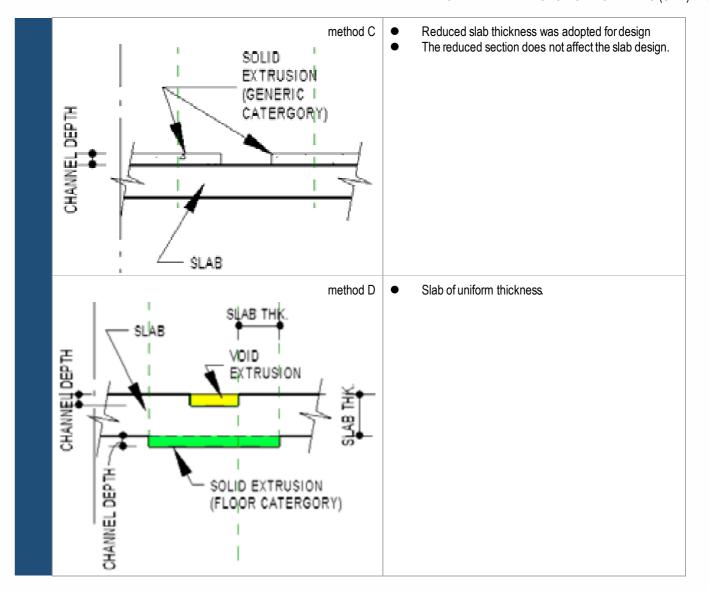


Structural Opening for Channels and Trenches

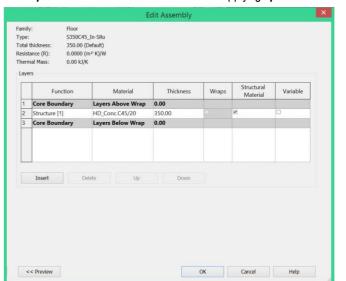


- The Floor Opening shall be modelled as Structure > (Vertical Opening). *DO NOT edit floor boundary to create floor opening.
- Modelling method is greatly relied on the design assumption. The standard methods adopted are listed in the table below. Similar principle should be followed for cases not included in the table.





All the Family Types should be composed of structure layer only and assigned with suitable concrete material and slab thickness. The slab thickness should be inputted in the **Description** tab so that it can be shown when applying **Span Direction** to slab elements.



Essential Parameter

To be updated



Drawing Production

To be updated

DS-U 07

Miscellaneous Structural Elements – Staircases and Water

Staircases

Discipline	Architectural & Structural
Family	Loadable Family
Category	Stairs
Workset	Individual Levels
Naming Convention	GMD- (Functional_Type)-HAS-Material -Dimension



The section shall read in conjunction with Architectural SAM – Staircase at Section DA-19. For ordinary reinforced concrete stair, the following settings shall be used.

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
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	Υ
End with Riser	Υ

Setting of creating Staircase

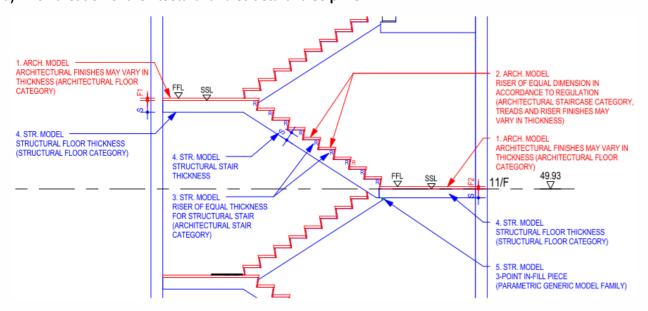
- Stair can be modelled in either architectural or structural model (or both) depends on its nature.
- For the case of reinforced concrete stair in typical buildings, the reinforced part of the Stair shall be modelled in structural model.
- Finishes and cladding for stairs shall be modelled in architectural model.
- In Autodesk® Revit® version 2013 and above, stair with equal riser height shall be modelled as one element with "Run" and "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 should be modelled separately from landing to
- Upper "Landing" shall be modelled together with "Run".





This section shall read in conjunction with Architectural's Staircases.

a) Demarcation of architectural and structural discipline



- Staircase is a combination of Architectural finishes and Structural stair and landing slab;
- Modeller 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.

b) Modelling details

 All the stairs within this guideline is based on Stair by Component (Architectural Discipline). This section focuses on the structural view of Stairs in Revit.



 For design purpose, it is required to indicate the thickness of structural staircase in drawing view for easier coordination.

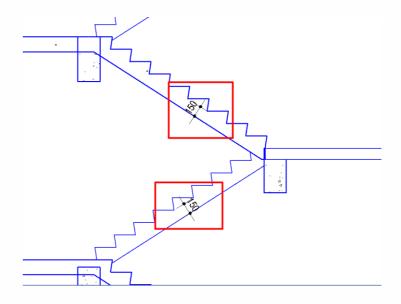


Figure above: Drawing view with thickess of stair flight being switched on

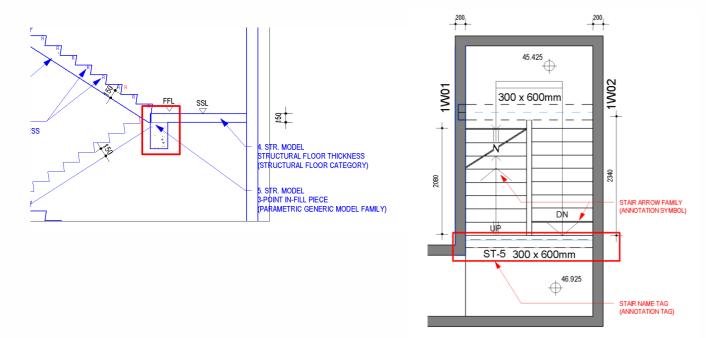
Essential Parameter

Parameter	Type / Instance	Description	Figure (if Applicable)	Schedule
Minimum Tread Depth	Туре	Compliance of Building Regulation	No less than 225mm	Y
Maximum Riser Height	Туре	Compliance of Building Regulation	No more than 175mm	Y
Width	Instance	Stair width for structural calculation	Width of Staircase	Y
Staircase Thickness	Instance	Staircase Flight thickness	According to Calculation	N

Collaboration

a) Within discipline / cross-discipline

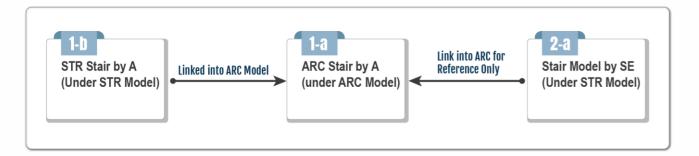
• Structural engineers are required to produce staircase model including the calculation of structural stair thickness for coordination with Architects' references.





Q3

Please refer to BIM Collaboration in Level 4: Detail Guide for Internal/Cross Discipline Collaboration.



Workset

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

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

b) Link file

- Based on the section under Discipline, the RED part at Top goes to architectural model and BLUE part at bottom goes to structural model.
- The structural Engineer also need to manage the staircase flight thickness for structural design purpose.
- The project architect shall link the model from SE for further references on GBP submissions.

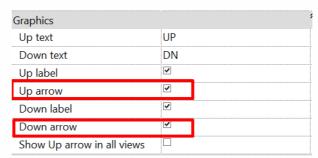


ICU Structural Submission (DDRP) – Import to Architecture Stair workset for GBP Submission drawing output.

- As staircase finishes, architectural staircase is advised to be turn off in floor plan.
- 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.

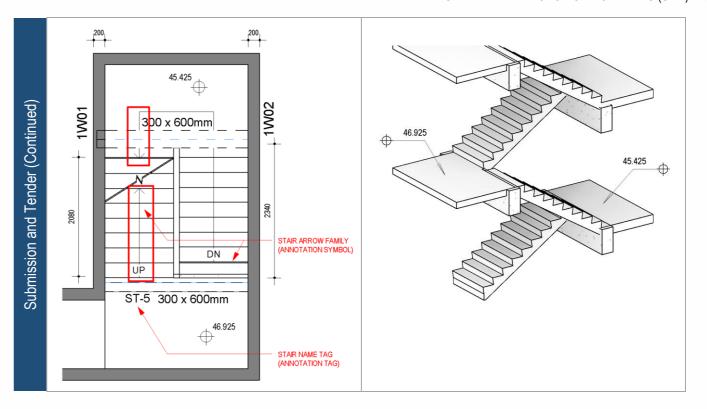
<u>Presentation</u>

For Structural discipline, staircase arrow can be <u>turned ON</u> for Structural drawing production;



Landing

- Landing slab, including half landing, stair beam and stair flight are to be modelled using Structural Floor, Structural Framing and Stair System Families respectively.
- The stair flight should be spanned between the edges of the landing elements.
- Note that the stair flight modelled by Stair System Family belongs to architectural discipline model element.
- In-Place model under Floor category, if required, should be used to supplement the modelling of staircase.
- The floor elements should be specified as "Landing" or "Half-Landing" in its **Comments** property.



Schedule

 Staircase width is one of the essential figure required for ICU STR Submission purpose. All parameters could be extracted from stair model including the following as an example:

		St	air Schedule	2					
Family	Family and Type	Maximum Riser Height	Minimum Tread Depth	Staircase Number	Tread Thickness	Width	Actual Number of Risers	Actual Riser Height	Actual Tread Depth
Precast Stair	Precast Stair: Precast Stair	180	280	ST-2			23	176	280
Stair	Stair: Monolithic Stair	180	280	ST-3	0	1000	23	176	280
Stair	Stair: Monolithic Stair	180	280	STAIRCAS E 1	0	1000	23	176	280
Stair	Stair: 175mm max riser 225mm going	175	225	ST-3	0	1000	20	171	225
Stair	Stair: 175mm max riser 225mm going - finishes	175	225	ST-3	50	1000	21	171	225
Precast Stair	Precast Stair: Precast Stair	180	280				24	125	280

- No schedule is required for Stair in Building Tender Drawings.
- For quantities taking off, filter level at "Run" and landing thickness at "Landing" shall be inputted.
- All staircases are to be modelled as a composition of landings and stair flights

STANDARD APPROACH OF MODELLING (SAM)

Thickness	180.0	
dentity Data		*
Comments	HALF LANDING	
-Mark	- 1SS1	
Phasing		*
Phase Created	New Construction	

Figure above: In-place model applied for staircase modelling

Waist thickness has to be input into the property **Description**.

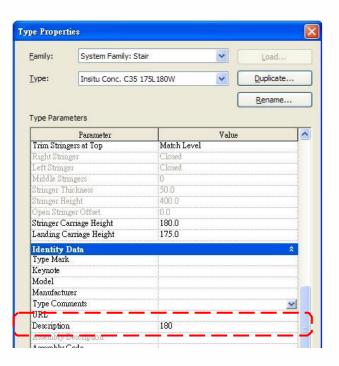


Figure above: Type Properties dialog for Stair Family

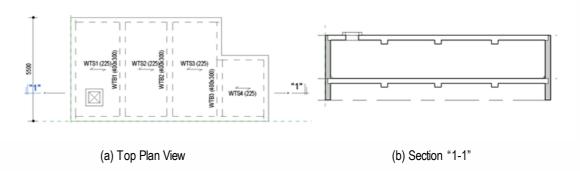
Water Tank

General requirements:

- The general layout of water tank shall be composed of standard component elements such as side walls, top and bottom slabs and, sometimes beams as well. It is advised to build a water tank as a family, further to be discussed in 6.14 Family Library Component section
- Normally, water tanks will not be involved in the structural analytical model. So relevant setting in their element properties palettes should be made in order to exclude them from the analytical model.

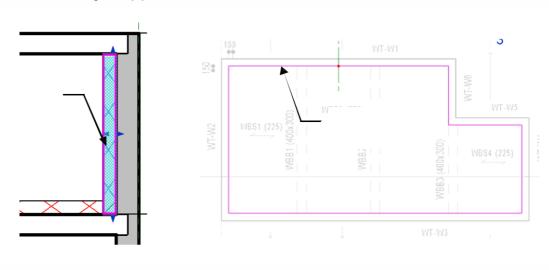
Element	Properties	Setting
Wall	Enable Analytical Model	Uncheck the checker box
Beam	Analyse as frame	Select the "Not for analysis" from the dropdown list
Slab	Structural	Uncheck the checker box

Modelling



- Vertical fillets are formed by Solid Extrusion Spanned from the bottom of top slab extended to top of bottoms slab.
- While horizontal fillets are formed by Solid Sweep with its path defined along the intercept lines between the side walls and top of bottom slab.

Vertical Fillet is using Sweep path for Horizontal Fillet.



(a) Vertical Fillet

(b) Horizontal Fillet

For Water Tank Fillet - Vertical Fillet

Figure below: Interception of Vertical and Horizontal Fillets.

• Curbs surround water tank opening and edges should be modelled with In-place model under Generic family category.



The following parameters under 'Text' shall be set in family water tank:

Parameter	Type / Instance	Description	Schedule
Filter Level	Instance	Level by Schedule	Υ

The following parameters under 'Other' shall be set in family:

Parameter	Type / Instance	Description	Schedule
Water Tank	Туре	Filter by Schedule	Υ

B Drawing Production

	Plan	Section / Elevation / 3D
Presentation	To be updated	To be updated
Submission and Tender	To be updated	To be updated

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DS-U 08

Structural Reinforcement

This section outlines the structural reinforcement modelling standard for model in housing Project.

This section outlines the structural reinforcement modelling standard for model in nodelling riojec

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.

Discipline	Structural
Family	Loadable Family
Category	Structural Rebar
Workset	Individual Levels
Naming Convention GMD- (Functional_Type)-HAS-1st_Descriptor-2nd_Descriptor	

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) for curtailment purposes construction on site.

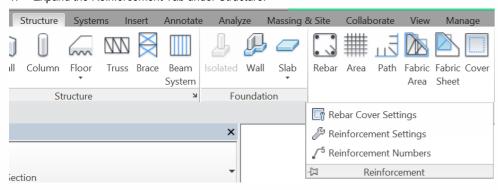


Q3

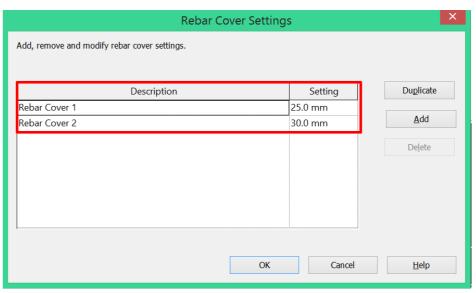
Important: Rebars for beams, columns, and walls are only available at **Sectional / Elevation View** before placing on the model. (Except for Slabs of Area reinforcement)

Reinforcement Settings:

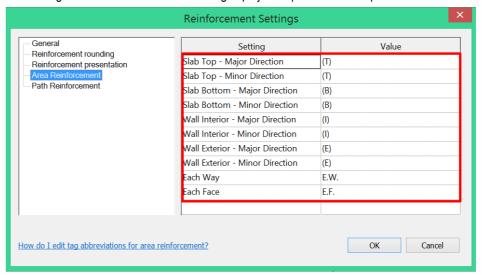
1. Expand the Reinforcement Tab under Structure.



2. Go to Rebar Cover. Set the Cover dimension.

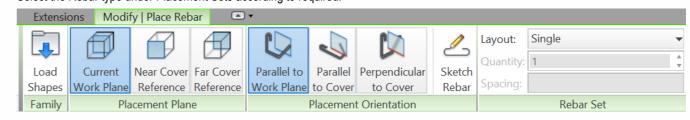


3. Change the Ara reinforcement according to project required. For example:



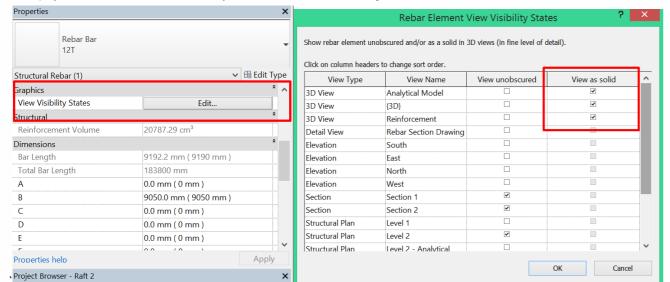


Select the Rebar type under Placement Sets according to required.



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To display the rebars in 3D view, click on any rebars, choose "View visibility states" and choose "View as solid".



Show

All First and Last Middle

Sectional View of Rebars

Edit Edit

Mode

For shear reinforcement, choose "Show First and Last" on the presentation

Tab for better RC drawing presentation.

Show Show Select Pick New Edit

Host Constraints

Host



Essential Parameter

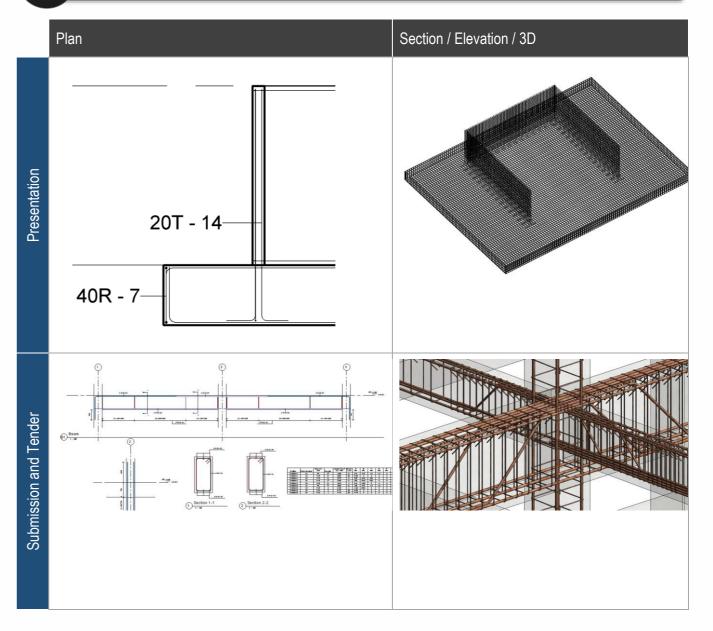
Extensions | Modify | Structural Rebar |

Sketch Family Spacing: 200.0 mm

Layout: Maximum Spacing

N/A

B Drawing Production



DS-U 09

Steel Structrues

Steel Columns

Discipline	Structural
Family	Loadable Family
Category	Structural Columns
Workset	Individual Levels
Naming Convention	SCL-STC-HAS-Profile –(2nd_Descriptor)

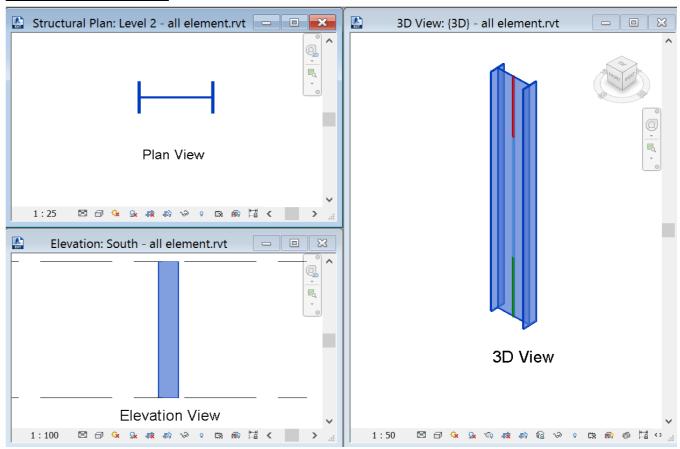
	Short form	Description
Category	SCL	Structural Column
Functional Type	STC	Steel Column (Steel Member)
Originator	HAS	Housing Authority Structure
1st_Descriptor (Profile)	C_Channel	C-Channel
	Parallel_Flange_Channel	Parallel Flange Channel
	Rectangular_Hollow_Section	Rectangular Hollow Section
	Rolled_Steel_Angle	Rolled Steel Angle
	Specialty_Shape	Custom shape
	Square_Hollow_Section	Square Hollow Section
	Universal	Universal
2nd_Descriptor		



Modelling

All Structural Steel Column shall be modelled as Structure > 🗍 (Column)

Universal Columns (UC)

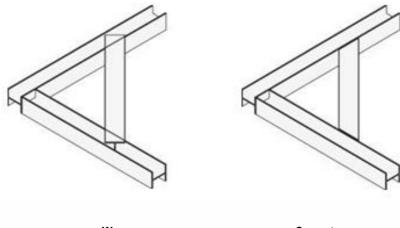


Steel Beam Join and Cut

All Steel Beams intersection points shall be adjusted by "Start Join Cutback"/ "End Join Cutback"



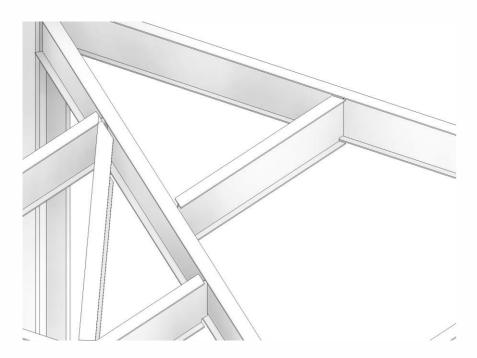
And then it shall be joined as Modify > Let Cope -> Let (Apply Coping). Steel beam shall be entering to 0 by "Coping Distance".



Wrong

Correct

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Essential Parameter

To be updated

Drawing Production

To be updated

Steel Beam and Steel Connection

Discipline	Structural	
Family	Loadable Family	
Category	Structural Framing	
Workset	Individual Levels	
Naming Convention	SCL-SFM-HAS-Profile-(2nd_Descriptor)	

	Short form	Description
Category	SFM	Structural Framing
Functional Type	STB	Steel Beam (Steel Member)
Originator	HAS	Housing Authority-Structure
1st_Descriptor (Profile)	Rectangular_Hollow_Section	Rectangular Hollow Section
	Square_Hollow_Section	Square Hollow Section
	Rolled_Steel_Angle	Rolled Steel Angle
	Universal	Universal Beam
2 nd _Descriptor		

Setting of creating a Steel Beam



Modelling

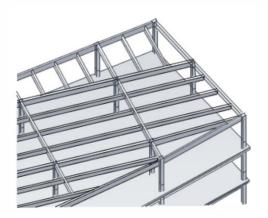
Place a Steel Beam

- In general, Centre shall be selected in "y Justification"; Top shall be selected in "z Justification". Beam offset value shall be entered in
- 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".

Beam System

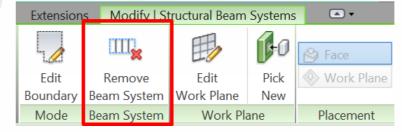
The Beam System in model shall be created when secondary beams with similar sizes are required. Use beam system tools to add a single structural framing element that contains a series of individual beams placed in parallel to a building model.

Structure tab > Structure panel > (Beam System)

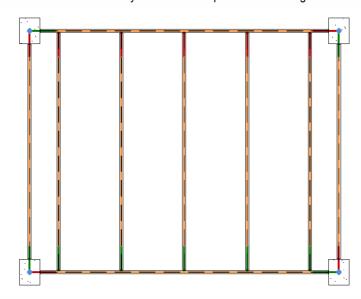




To adjust the spacing of individual beams in the system, please remove the beam system first.



Please make sure the analytical links are in place while moving the beams.

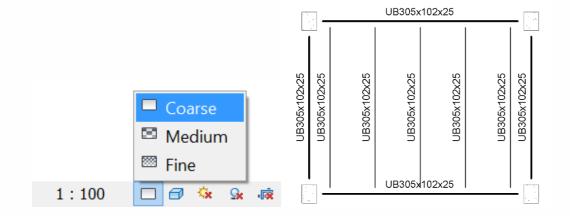




Essential Parameter

To be updated

- Under Annotation, Tag All Structural Framing for the drawing purpose.
- Choose Coarse Details Level for the graphic Illustration.

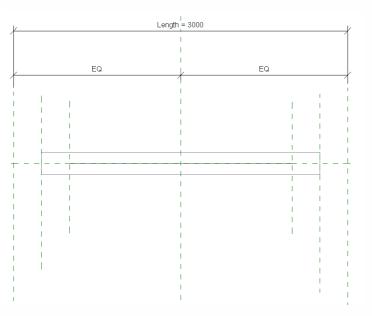


For Steel Frame Family:

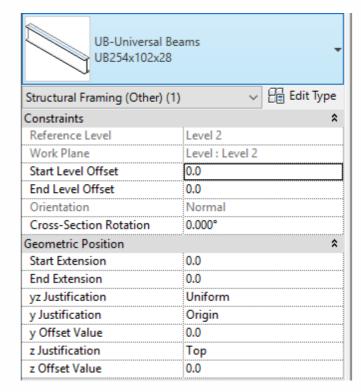
• The tope of steel beam family is follow the work plane.



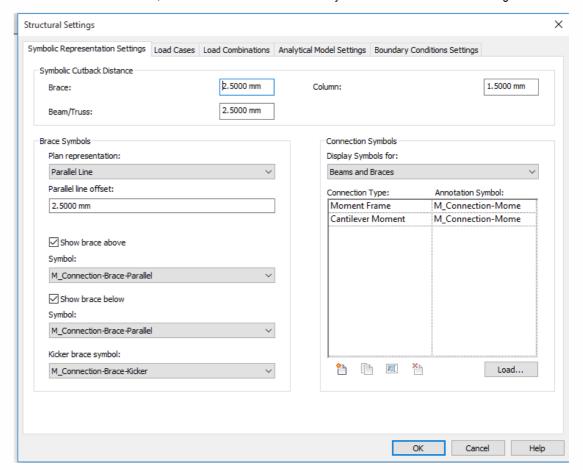
 In the structural framing template, Revit default the beam have distance to beam length because it can auto setback to join another beam



 Start / end extension applies to steel beams only. A dimension that adds beam geometry beyond the start / finish end of the beam



In Detail level "Coarse", the beam has cutback distance of symbolic and the distance can change in structural settings



The Connection Symbols can create type and it can create new family (Generic Annotations) and load into project to change the annotation symbols in the Structural Setting. Also, On the Properties palette, under Structural, select a value for Start Connection or End Connection, and click Apply.

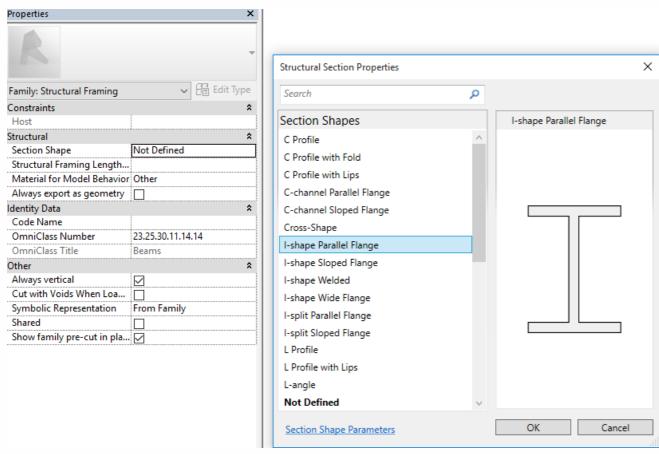
Q1

Q2

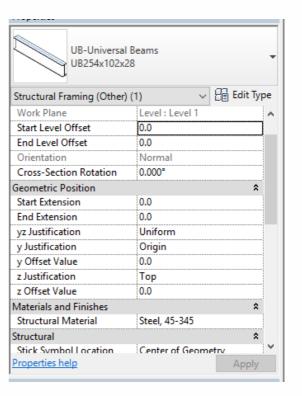


Figure Above: Moment frame symbol (top) and cantilever connection symbol (bottom)

- 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.

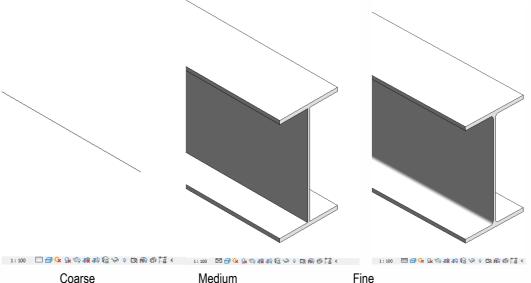


- In Revit, you can assign parameters representing expected characteristics to structural framing and structural column families. This can present unreliable information to external analysis and code checking applications.
- By applying a section shape category to structural framing families, you can 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





- In family properties, the geometric position need setting "z Justification" to "Top"
- In 3D Views, set the detail level to control the Revit default steel graphics



Medium

Fine

Steel Truss

This section introduces a simple modelling approach on creating truss.

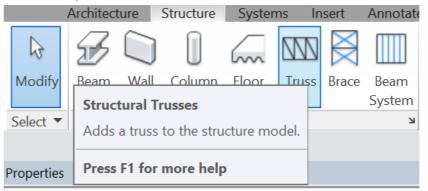
Discipline	Structural
Family	Loadable Family
Category	Structural Trusses
Workset	Individual Levels
Naming Convention	STR-(Functional_Type)-HAS-Style-Span_Length

	Short form	Description
Category	STR	Structural Trusses
Functional Type	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
	OTR	Other
Originator	HAS	Housing Authority-Structural
1st_Descriptor (Style)	Cambered	Cambered
	Subdivided	Subdivided
2 nd _Descriptor (Span_Length)	12000mm	Span Length =12000mm

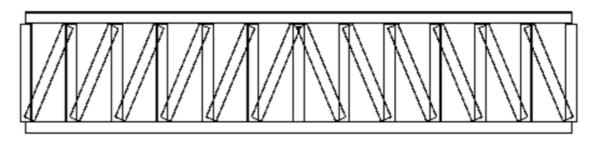
For Example: STR-WRT-HAS-Cambered-12000mm



The truss family can be found under Structure Tab – 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.



Drawing Production

Use Course Details Level to shown for **plan view**:

show the symbol of Truss with Straight line in Drawing. Use box Truss Tag for tagging as



Use Course details Level to show the symbol of Truss with Straight line in Drawing. Use Structural Framing Tag for tagging as shown for **elevation view**.

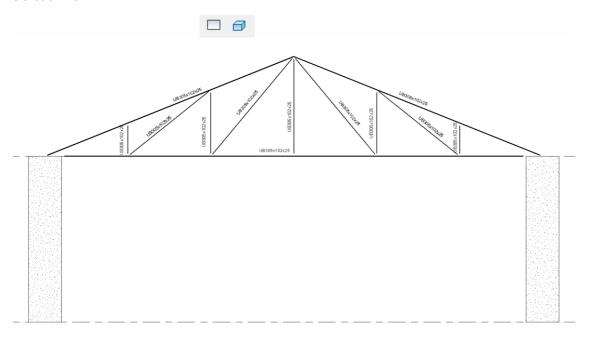
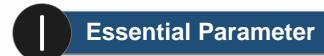


Figure above – Elevation View of Truss in drawing

Note: Adjust view scale in case it's too big or too small. Structural framing elements are created along each of these layout lines.

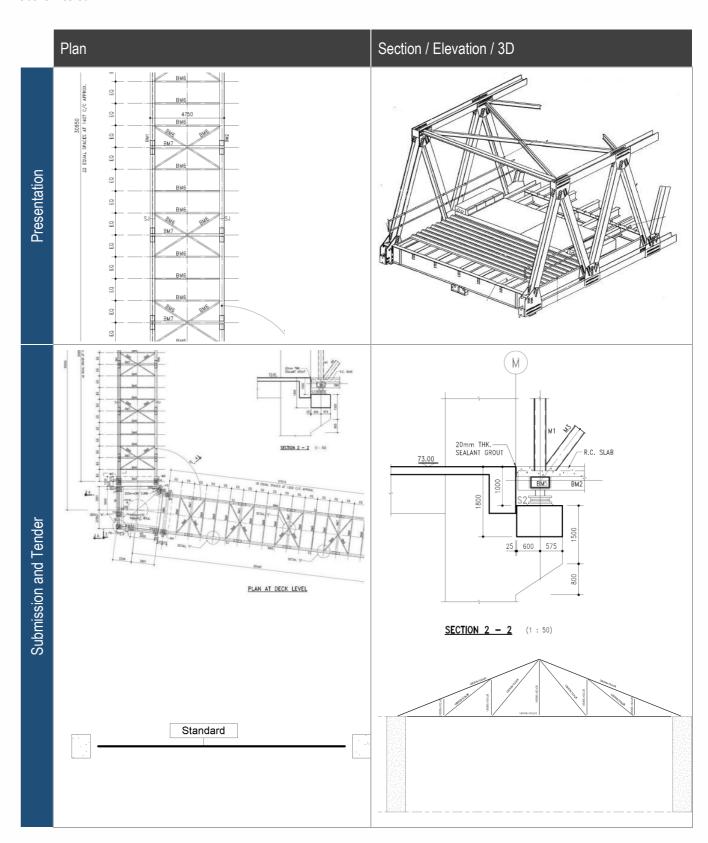
Please note structural members associated with the truss type are included in the geometric layout. These structural members can be changed to a different size, but they must be selected from sizes available within the specific truss family.



To be updated

B Drawing Production

The truss is seldom used by the HA. A common steel structures of footbridge construction is shown for presentation purpose using the above method.



6.5Structure – Foundation SAM

DS-F 01

Structural Foundation Project Setup

General Approach

Discipline	Structural
Family	Loadable Family
Category	Structural Foundations
Workset	Individual Levels
Naming Convention	SFD- (Functional_Type)-HAS-Profile -Material_Grade

	Short form	Description
Category	SFD	Structural Foundation
Functional Type	FBM	Foundation Beam
	FCA	Foundation Cap
	FPL	Foundation Pile
Originator	HAS	Housing Authority-Structure
1st_Descriptor (Profile)	Rectangular	Rectangular
	Octangular	Octangular
	Triangular	Triangular
	Special_Shape	Special Shape
2 nd _Descriptor (Material_Grade)	Grade_45D	Concrete Grade: 45D

Example: SFD-FCA-HAS- Rectangular- Grade_45D



Modelling

All foundation structures shall be modelled with appropriate families and nested families. The default tools to model elements include:

Family Name:	Model:	Purpose:
Footing-Rectangular	Paperties IX Justices December (1905 to 120% a decision (1905 to 120% a	For pad footings
Wall Foundation	Wall foundation Wall foundation Section (2001 x 2001 x 200	For strip footings
Foundation Slab	Manufacture (1) Service (1) S	For on-grade slabs and pile caps
Beam	Security States of East States of Ea	For tie beam and strap beam

Essential Parameter

1) All foundation elements should 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 (m)

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.

Note on Binding Layer:

Blinding layers are to be provided for the construction of footings/pile caps.

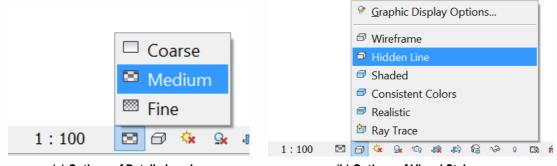
They shall be modelled at the bottom of the footings/pile caps in the form of "Paint" with label "Blinding layer" for subsequent quantity take-off.

Materials

All foundation elements should 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 should be customized with appropriate mechanical properties to the prevailing Codes of Practice. All materials used should be named accordingly for easy reference. Refer to D.MET-2.2 (e) Material Naming in this Guide.

B Drawing Production

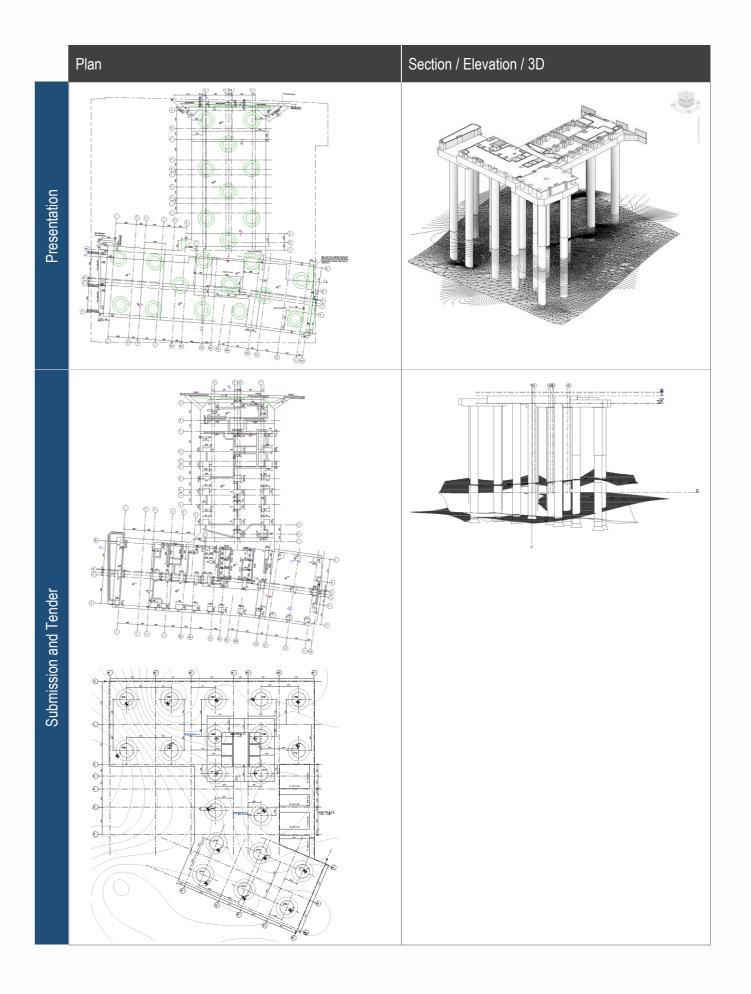
• To show all the details under the pile cap or cut off level, the view depth need to be adjusted on generating the foundation plans. The Detail Level and Visual Style of most of plan views should set to "Medium" and "Hidden Line" respectively depending on the details shown. Some specified drawing will be shown by View Template.



(a) Options of Details Level

(b) Options of Visual Style

Figure above: Visual Control Panel of Revit

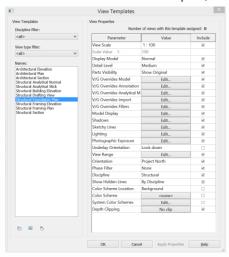


Levels and Grid line setup for Foundation

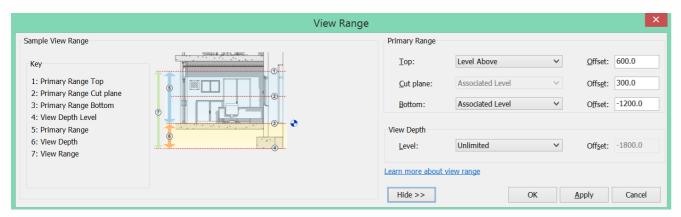


For general approach on project setup, please refer back to Foundation-Modelling (FD-M3) diagram in Quick Guide Level 3 – BIM Workflow.

For Structural Foundation View Template, choose "Structural Foundation Plan"



- View scale: 1:100
- Detail level: Medium / Fine (3D View)
- View range:
 - a. Top should be > 150mm offset (Excavation Depth) above Cut off Level
 - b. View Depth should be set to "unlimited"; for showing the foundation piles.



Discipline: Structural

Structure category

 All foundation structures should be modelled under the Category of "Structural Foundation" family. In case they are involved in the structural analysis. The "Enable Analytical Model" under the Structural field of the Properties Palette should be toggled. Typical examples of Revit Family Categories for foundation elements are shown in table below:

Foundation Elements	Category	Short form
Bored Pile, Mini-pile, Socket Steel H-pile, Driven Steel H-pile, Barrette Pile, Pile Cap & Footing	Structural Foundation	SFD
Tie Beam and Strap Beam	Structural Framing	SFM
Retaining Wall	Structural Wall	STW

Family libraries / template



The naming system of all the components should follow D.MET 2.2 Naming Conventions and FLIP Guidelines). This can establish a
systematic library of all the families and system types indicating its categories, function and material etc.

Structural elements in Revit family category

- Unless otherwise specified, all piles shall be embedded in the pile caps.
- 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. Thus, the total pile length shall be measured from the pile cut-off level down to the founding level which shall include the length of rock socket. Separate length parameters for pile excavated in soil and rock are to be provided to facilitate quantity take-off.
- The top levels of pile caps and footings are by default set to 1.5m below the proposed ground level. A parameter controlling the depth of pile caps/footings below the proposed ground floor level should be provided.
- All pile head details, 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 for subsequent material take-off.
- All parameters defined in the foundation families shall be of shared parameters. The parameters used in the project Revit Structure model should be linked up with these shared parameters so as to enable the generation of schedules and material take-off.
- These shared parameters are stored in the text file name: Foundation_Shared_Parameters.txt which can be obtained from BIMST and stored in individual local hard drive for modelling purpose.

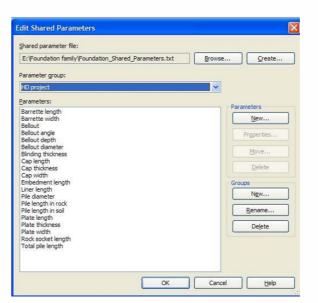


Figure above: Shared Parameter

STANDARD APPROACH OF MODELLING (SAM)

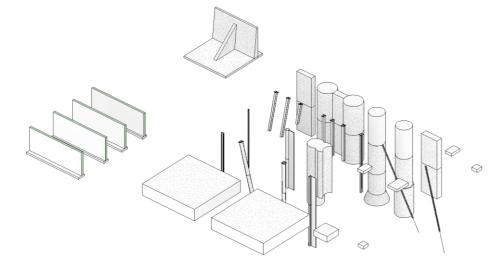
All foundation families (or family types in case of system family), within a project template should be named with prefix "HAS_" so
that they can be distinguished from the default ones.

The definition of rock:

- The bedrock of Grade IV and above are considered as rock while CDG, alluvium, marine deposit and fill etc. are treated as soil. Thus, "Pile length in soil" means the pile length measuring from pile cut-off-level down to the Grade IV rock level. "Pile length in rock" means the pile length measuring from Grade IV rock level down to the "Inferred lowest bedrock level".
- In case new foundation families are to be included in the HA BIM Family/Component Library, they should be accompanied with explanatory notes. These notes should include:
 - a. The family category;
 - b. Description of its application;
 - c. Components included and method of modelling;
 - Meaning of each parameter assigned;
 - e. Scope and steps of application;
 - . Limitations and points to note; and
 - y. Ways to extract data for material QTO

Site Formation

- The GE Section has developed a BIM workflow to streamline the site formation design of the project and enable the generation of 3D underground geological profiles by using the existing bored logs data. These 3D digital topographic models can be exported to Revit for subsequent design of foundation and earth retaining structures. The following modelling rules with regard to the use of the 3D digital topographic model should be adhered to.
 - a. The locations and orientations of the models should be adjusted to suit the Project Origin;
 - b. The underlying soil strata and bedrock profiles contained in the 3D digital topographic models should be made in accordance with all the latest geological information and bored logs data;
 - c. Select "Auto Origin to Origin" for Positioning during the linking of the 3D digital models;



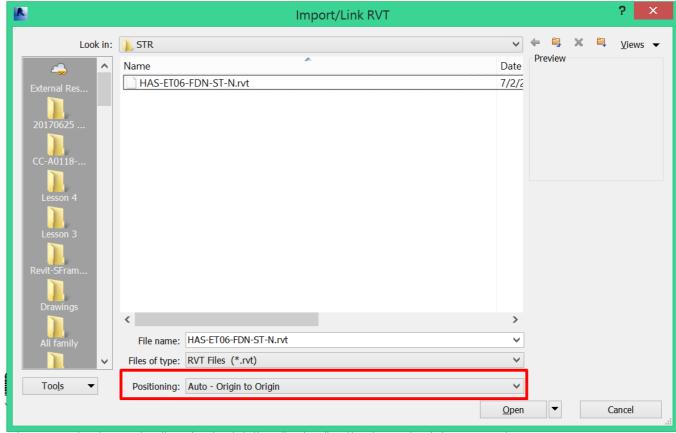


Figure Above: Import/Link RVT dialog

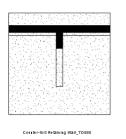
DS-F 02 Foundation Structures

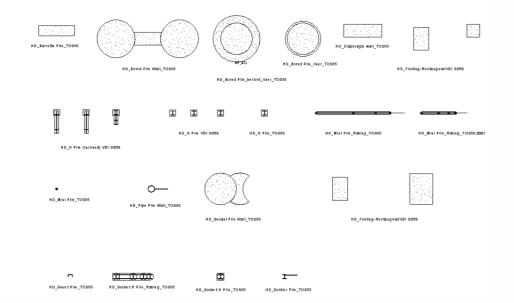
Discipline	Structural	
Family	Loadable Family	
Category	Structural Foundations	
Workset	Individual Levels	
Naming Convention	SFD- (Functional_Type)-HAS-Pile_Type-Concrete_Grade	

The following sections describe the standard modelling approach for major foundation elements which will form part of the BIM Revit Structure model. The standard setting in family customization and necessary parameters are elaborated.

	Short form	Description
Category	SFD	Structural Foundations
Functional Type	FPL	Foundation Pile
	FCA	Foundation Cap
Originator	HAS	Housing Authority-Structural
1st_Descriptor (Pile_Type)	Bored_Pile	Bored Pile
	H_Pile	H Pile
	Pipe_Pile	Pipe Pile
	Sheet_Pile	Sheet Pile
	Socket_H_Pile	Steel socketed H-Pile
2 nd _Descriptor (Concrete_Grade)	Grade_30D	Concrete Grade: 30D
	Grade_45D	Concrete Grade: 45D

Example: SFD-FPL-HAS- Bored_Pile- Grade_30D



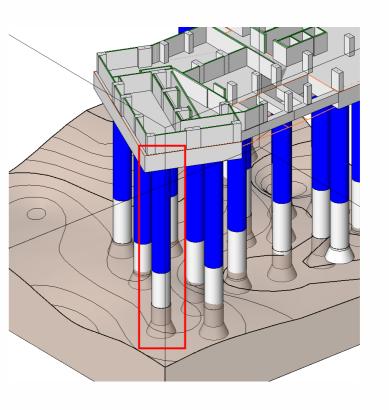


DS-F 03 Bored Piles

Discipline	Structural	
Family	Loadable Family	
Category	Structural Foundations	
Workset	Individual Levels	
Naming Convention	SFD-FPL-HAS-Bored_Pile-(2nd_Descriptor)	

Modelling

- Large Diameter Bored Pile usually consists of temporary steel casing, concrete pile shafts, bellout, permanent steel liner and/or sleeving. 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.
- Temporary steel casings shall be regarded as a finish of the pile and be modelled in the form of "Paint" for the purpose of material



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				R
	1		_	_

Scenario	Bell out	Permanent liner	Model
Pile with neither Bell-out nor permanent liner;	No	No	Pile shaft without Permanent Liner
Pile without Bell-out but with permanent liner;	No	Yes	Pile shaft with Permanent Liner
Pile with Bell-out but without permanent liner;	Yes	No	Pile shaft without Permanent Liner
Pile with Bell-out and permanent liner;	Yes	Yes	Pile shaft with Sieeve



Essential Parameter

Note on The Structural Design Practice of HAS requirements:

Piles Type	Requirements
Pile (NO bell-out)	0.3m deep into bedrock (Dimension K)
Pile (With bell-out)	0.8m deep into bedrock (Dimension J) (Maximum 30° degree bell-out angle will control the socket length when bell-out diameter exceeds shaft diameter by more than 0.92m.)

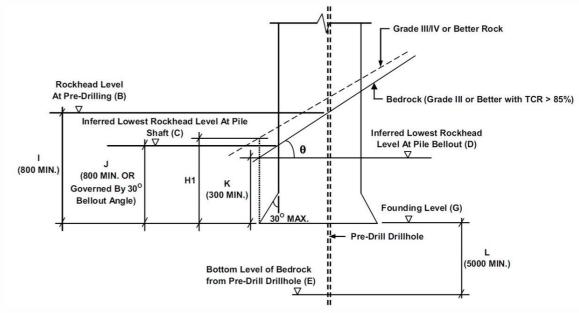


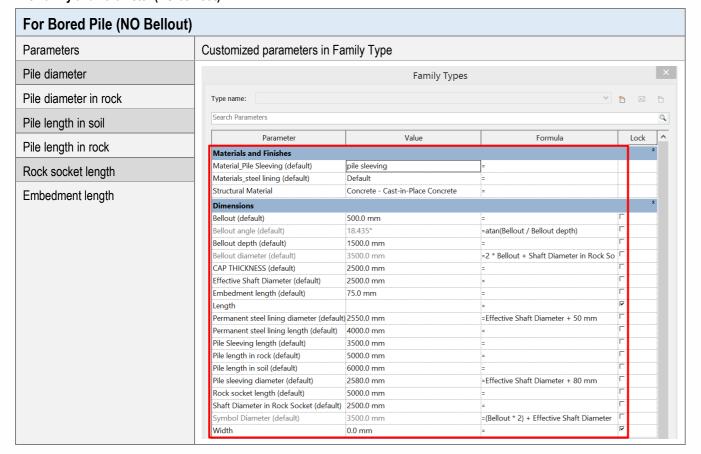
Figure Above: Illustrative Diagram of the Founding Level Criteria extracted from

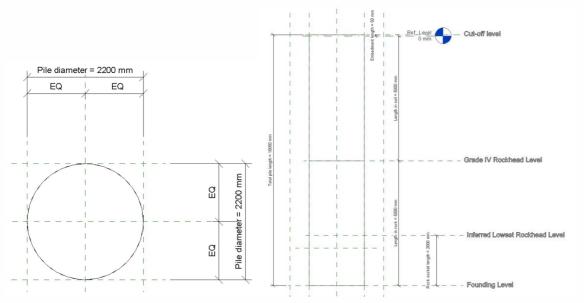
Structural Design Practice of HAS.

All bored pile families should be provided with suitable sharable parameters such that their geometric data can be retrieved for use by other model users.

The following Shared Parameters should be included in all bored pile families to facilitate subsequent scheduling and material take off in the Project's structure model.

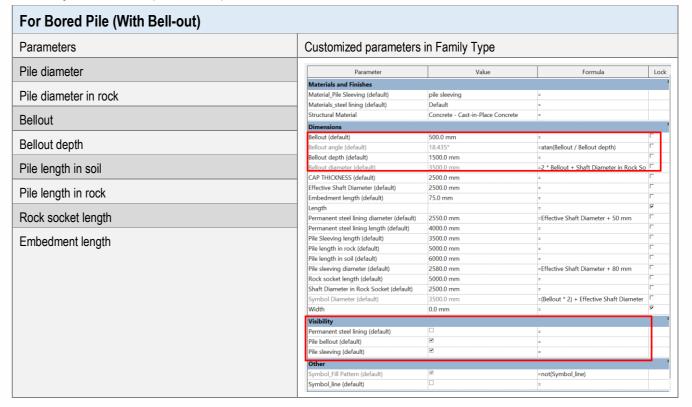
Pile Family and Parameter (NO bell-out):

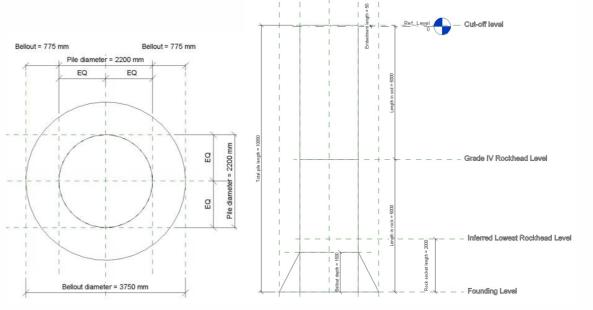




Bored Pile Family (No bell-out): Plan View Bored Pile Family (No bell-out): Elevation View

Pile Family and Parameter (With bell-out):





Bored Pile Family with bell-out: Plan View Bored Pile Family with bell-out: Elevation View **Total volume for Material Take-off in Schedule:**

"Liner" for subsequent material takeoff.

Analytical Links:

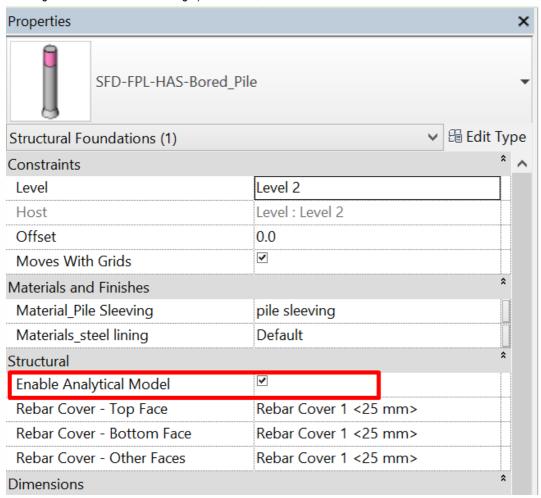
Q2

When bored piles are involved in the analytical model of the building structure, their instance properties in the field of "Enable Analytical Model" should be toggled

The outer face of bored pile with permanent liner from cut-off level to Grade IV rockhead level should be painted with material, name as

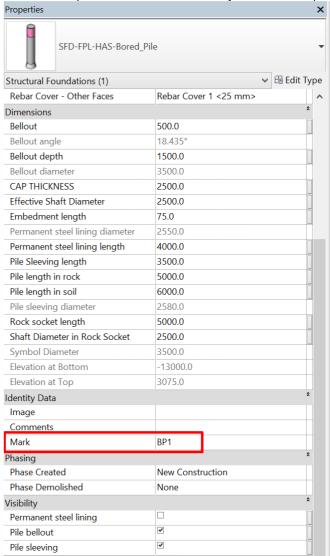
Total volume of soil and rock excavation			
Pile Type	Volume of soil excavation	Volume of Rock excavation	
For pile without permanent line	π x (Pile diameter) ² /4 x (Pile length in soil)	π x (Pile diameter in rock) ² /4 x (Pile length in rock + Rock socket length) + (volume of bell-out portion)	
For pile with permanent line	π x (Pile diameter + 300mm) ² /4 x (Pile length in soil)	π x (Pile diameter in rock) ² /4 x (Pile length in rock + Rock socket length) + (volume of bell-out portion)	

The total pile length shall be a calculated value by summing up the four length parameters, i.e. (Embedment length + Pile length in soil + Pile length in rock + Rock socket length).



All bored pile families in the Project Revit Structure model should be assigned with a unique pile number for piling schedule generation.

This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.



For Bored Pile, additional sub-categories shall include:

Parameter	Type / Instance	Description	Schedule
Pile Length	Instance	Length of Pile	Υ
Bellout Diameter	Туре	Diameter of Bellout	Υ
Excavation Extent	Instance	Offset from Cap bottom level to Excavation Level	Υ

Discipline	Structural	
Family	Loadable Family	
Category	Structural Foundations	
Workset	Individual Levels	
Naming Convention	SFD-FPL-HAS-Barrette_Pile-(2nd_Descriptor)	

A barrette pile will consist of a reinforced concrete shaft only.

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 should be measured from the cut-off level down to the inferred lowest bedrock level plus the minimum rock socket length.

Modelling

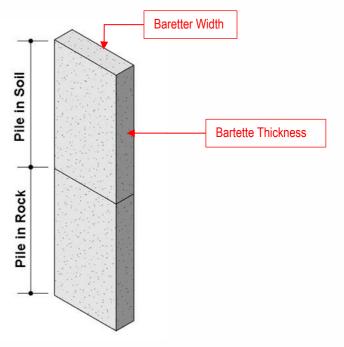
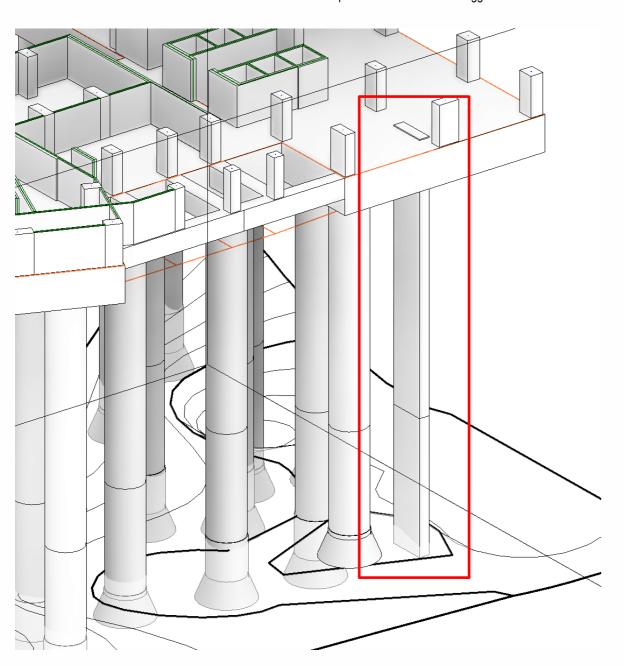


Figure above: Barrette Pile Family

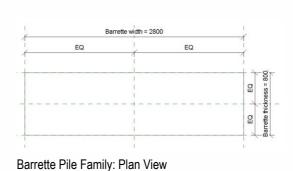
Plan Section / Elevation / 3D Submission and Tender

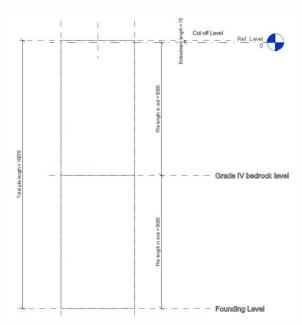
Pile Family and Parameter:

The Reference Level shall be the bottom level of pile cap and is set to 0.0 mPD by default. The barrette pile family should be made shareable. The "Shared" check box in the field of "Other" in the Properties Palette should be toggled.











Essential Parameter

Calculation of Pile Length:

Pile Type	Total Pile Length
For Barrette pile	Embedment length + Pile length in soil + Pile length in rock + 300mm.

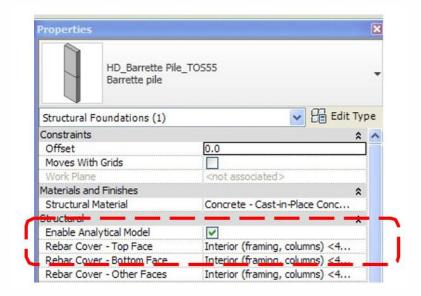
Total volume for Material Take-off in Schedule:

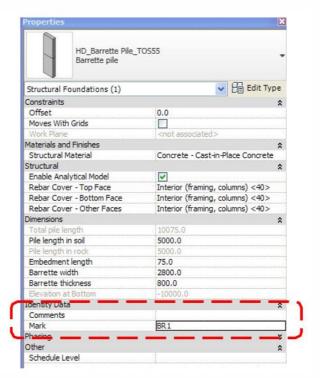
Total volume of soil and rock excavation			
Pile Type	Volume of soil excavation	Volume of rock excavation	
For Barrette pile	Concrete portion of the pile shaft x Pile length in soil	Concrete portion of the pile shaft x (Pile length in rock +300mm)	

The outer face of rectangular pile with permanent liner from cut-off level to Grade IV rockhead level should be painted with material, name as "Liner" for subsequent material takeoff.

Analytical Links:

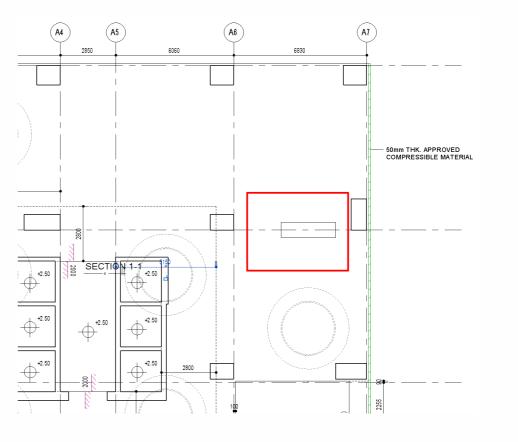
When barrette piles are involved in the analytical model of the building structure, their instance properties in the field of "Enable Analytical Model" should be toggled.







The barrette pile family in the Project Revit Structure model should 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.



Drawing Production

To be updated

DS-F 05

Driven Steel H Piles

Discipline	Structural	
Family	Loadable Family	
Category	Structural Foundations	
Workset	Individual Levels	
Naming Convention	SFD-FPL-HAS-Driven_H_Pile-Steel	

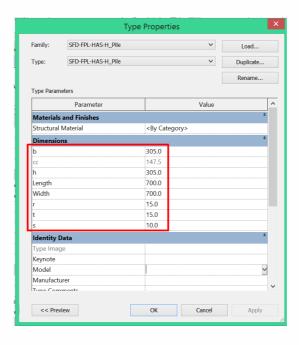


Modelling

The steel H-pile family types contained in HD's BIM Components Library are those commonly adopted in Hong Kong as followed:

Commonly used Size of Universal Bearing Piles (UBP)	Family Type:
305 x 305 x 180 Kg/m	Structural Column nested in Structural Foundation Categories
305 x 305 x 186 Kg/m	Structural Column nested in Structural Foundation Categories
305 x 305 x 223 Kg/m	Structural Column nested in Structural Foundation Categories
356 x 368 x 174 Kg/m.	Structural Column nested in Structural Foundation Categories

In case the library does not have the required bearing pile as above, the properties of the "Structural Column Family" of these Universal Bearing Piles shall 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" with nested family "Structural Column".

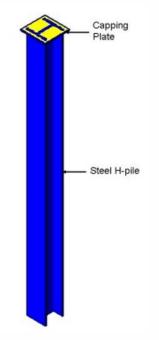
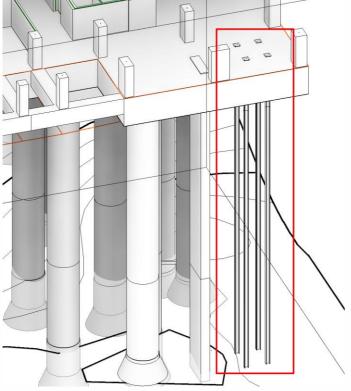


Figure above: Steel Capping Plate on top of Steel H-pile



Note on Volume of excavation:

No calculation for volume of excavation shall be required for Drive Steel H-pile.

Note on detailing:

Pile toe details should not be included in the model.



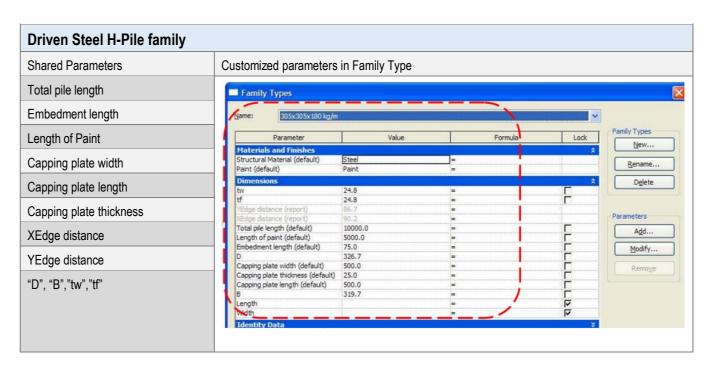
Essential Parameter

Calculation of Pile Length:

Pile Type	Total Pile Length
Driven Steel H-Pile	Pile cut-off level down to the pile founding level.

Pile Family and Parameter:

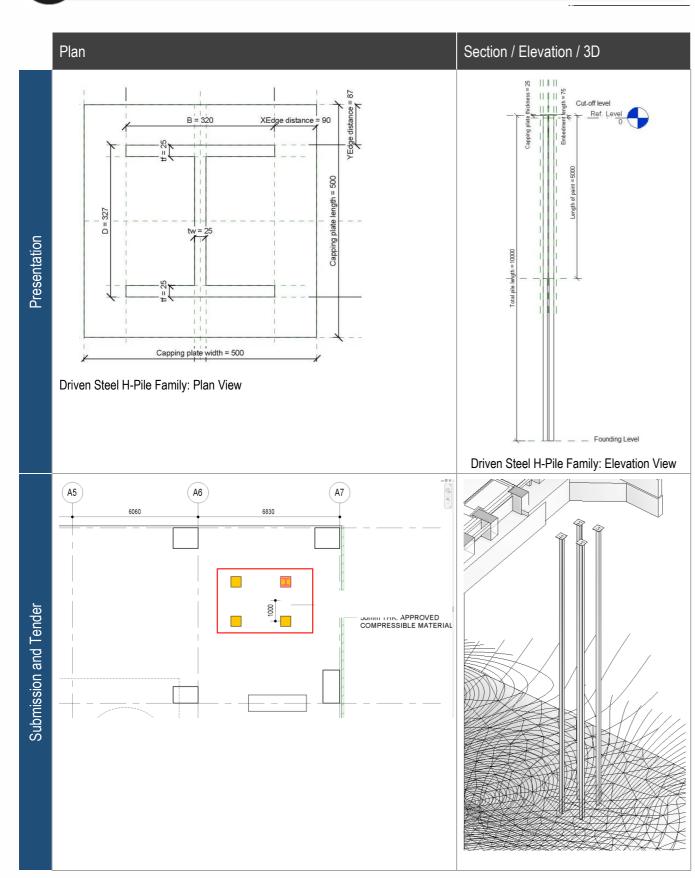
The Reference Level shall be the bottom level of pile cap and is set to 0.0 mPD by default. The Driven Steel H-Pile family should be made shareable. The "Shared" check box in the field of "Other" in the Properties Palette should be toggled.



The application of surface protective coating such as biuminous paint at the topmost portion of the steel H-piles is sometimes required to minimize negative skin friction or load transfer to adjacent structures or to prevent corrosion of pile in the subsoil region where fluctation of water table may be encountered. This protective coating shall be included in the model in the form of "Paint" for subsequent material takeoff.

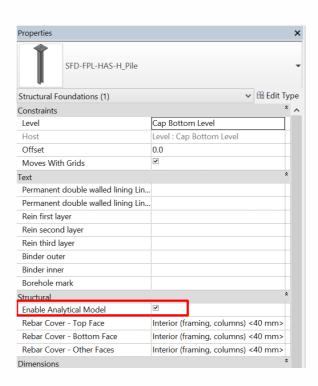
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Drawing Production

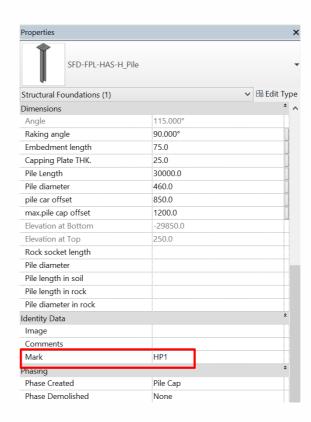


Analytical Links:

When steel H-piles are involved in the building structure analytical model, their instance properties in the field of "Enable Analytical Model" should be toggled.



To enable subsequent generation of piling schedule, all steel H-piles in the Project Revit Structure model should be assigned with a unique pile number. This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.



DS-F 06

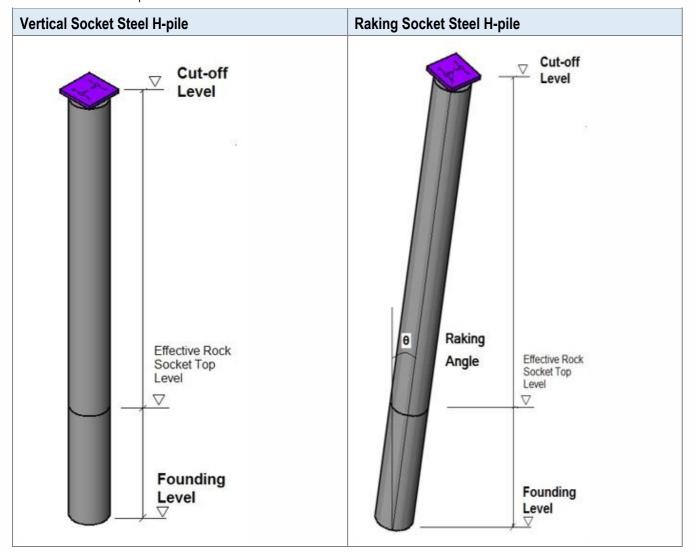
Socket Steel H Piles

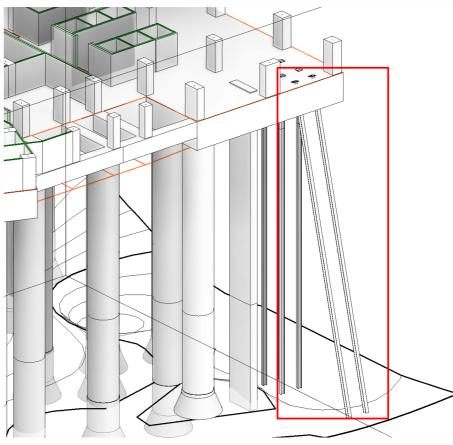
Discipline	Structural
Family	Loadable Family
Category	Structural Foundations
Workset	Individual Levels
Naming Convention	SFD-FPL-HAS-Socket_H_Pile-Steel

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Modelling

- These socket steel H-pile family types have been modelled according to their sectional dimensions and properties under the Category of "Structural Foundations".
- The socket steel H-pile families shall be classified as below:





Note on Steel Casing:

Vertical Socket Steel H-pile	Raking Socket Steel H-pile
No Steel Casing required	Shall be included in form of "Paint"
	for the purpose of material take-off.

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 minimum clearance (cover) between the temporary steel casing and the steel H-pile is **40mm**.
- The pile 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.

Calculation of Pile Length:

Pile Type	Total Pile Length	Note:
Vertical Socket Steel H-pile	Cut-off level down to the founding level which should include the steel casing embedment below the inferred lowest bedrock level (500 mm minimum or such other depths as required by PSE) + Rock socket length	The effective rock socket top level is the bottom level of the temporary/permanent steel casing
Raking Socket Steel H-pile	Cut-off level down to the founding level divided by cos(θ), where θ is the raking angle of the pile. 500mm minimum requirement for steel casing embedment applied to raking Steel H-pile too. (i.e. Embedment length + Pile length in soil + Steel casing embedment + Rock socket length).	The Steel Casing from cut-off level down to the effective rock socket top level should be painted with material, labelled as "Steel casing" for subsequent material takeoff.

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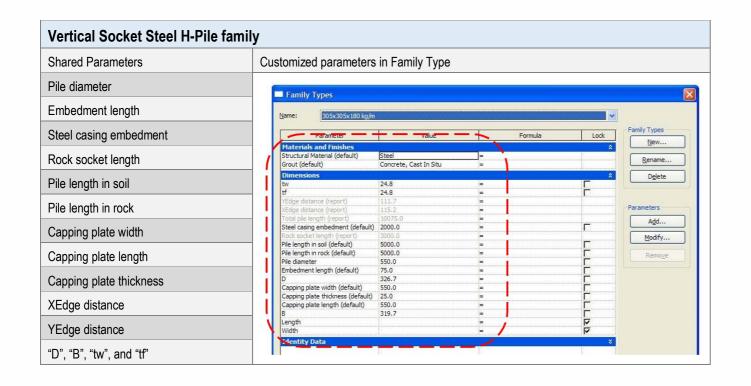
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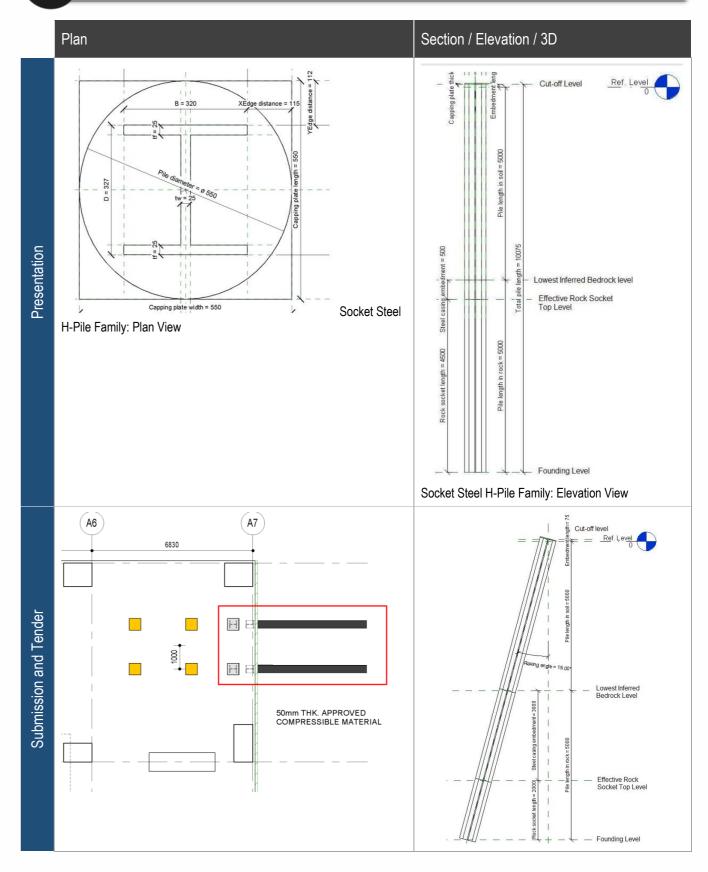
Pile Family and Parameter:

• The Reference Level shall be the bottom level of pile cap and is set to 0.0 mPD by default. The Socket Steel H-Pile family should be made shareable. The "Shared" check box in the field of "Other" in the Properties Palette should be toggled.





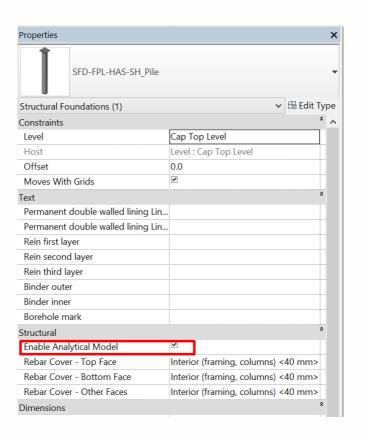
B Drawing Production



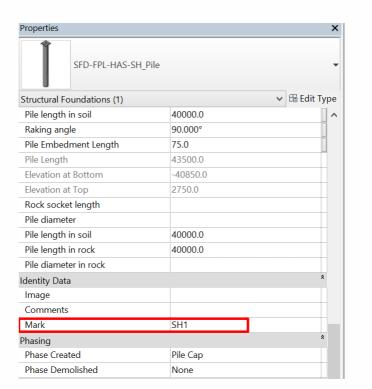
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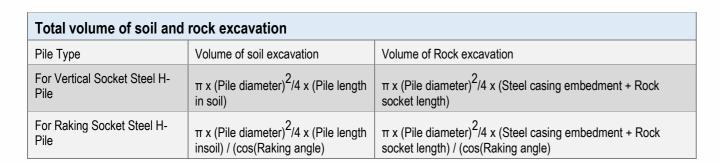
Analytical Links:

• When Socket Steel H-piles are involved in the building structure analytical model, their instance properties in the field of "Enable Analytical Model" should be toggled.



• To enable subsequent generation of piling schedule, all Socket Steel H-piles in the Project Revit Structure model should be assigned with a unique pile number. This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.





Shared Parameters	Customized parameters in Family Type Family Types			
Pile diameter				
Embedment length	Type name:		V 1	ı e
Steel casing embedment	Search Parameters			Q
	Parameter	Value	Formula	Lock
Rock socket length	Materials and Finishes			*
Dila lamath in and	Structural Material	<by category=""></by>]=	
Pile length in soil	Dimensions			*
Dila langth in rook	A	197.5	=(Length - b) / 2	П
Pile length in rock	Angle (default)	115.000°	=Raking angle + 25°	П
Daking Angla	Pile diameter in rock (default)	500.0	=	П
Raking Angle	Pile length in soil (default)	1500.0	=	П
	Raking angle (default)	90.000°	=	П
	b	305.0	=	П
	Capping Plate THK.	25.0	=	П
	h	305.0	=	П
	Length	700.0	=	П
	Pile Embedment Length (default)	75.0	=	П
	Pile Length (default)	5000.0	=Rock socket length + Steel casing e	П
	Pile diameter	500.0	=	П
	Rock socket length	2000.0	=	П
	Steel casing embedment	1500.0	=	
	Width	700.0	=	⊽
	r	15.0	=	П
	t	15.0	=	П
	s	10.0	-	П

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DS-F 07

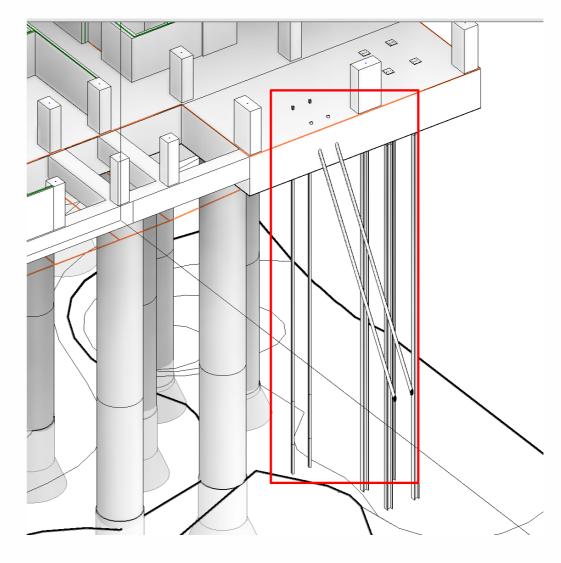
Mini-Piles

Discipline	Structural
Family	Loadable Family
Category	Structural Foundations
Workset	Individual Levels
Naming Convention	SFD-FPL-HAS-Mini_Pile-(2nd_Descriptor)

Modelling

- The Mini-pile family types contained in HD's BIM Family Library ranging from 219mm to 273mm in diameter are those commonly adopted in HK.
- Vertical and raking mini-piles are provided in HD's BIM Family Library as below:

Vertical Mini Pile	Raking Mini Pile
Cut-off Level ✓ Lowest Inferred Bedrock Level Founding Level	Raking Angle Lowest Inferred Bedrock Level Founding Level



Material Take-Off for Steel Casing in Schedule:

Vertical Mini Pile	Raking Mini Pile
Shall be included in form of "Paint"	Shall be included in form of "Paint"
for the purpose of material take-off.	for the purpose of material take-off.

Note on detailing:

- The pile head details including bar spreader and couplers etc. shall be excluded from the family model. The steel rebars inside the mini-pile are to be included in the family model for material take-off.
- The minimum clearance (cover) between the temporary steel casing and the steel rebars H-pile is **40mm**.
- The pile diameter shall be the internal diameter of the steel casing.
- This capping plate is of mild steel and shall be modelled as part of the min-piles.

 The internal diameter of the casing and nos. of steel rebars have to be input in the Description field for annotation purpose.

Calculation of Pile Length for mini-piles:

Pile Type	Total Pile Length	Note:
Vertical mini-pile	Cut-off level down to the founding level which should include the rock socket length.	The Steel Casing from cut-off level down to the lowest inferred bedrock
	i.e. "Embedment length" + "Pile length in soil" + "Pile length in rock" + "Rock socket length".	level should be painted with material, labelled as "Steel casing" for subsequent material takeoff.
Raking mini-pile	Cut-off level down to the founding level divided by $cos(\theta)$, where θ is the raking angle of the pile.	Tor Subsequent material takeon.
	i.e. "Embedment length" + "Pile length in soil" + "Pile length in rock" + "Rock socket length".	



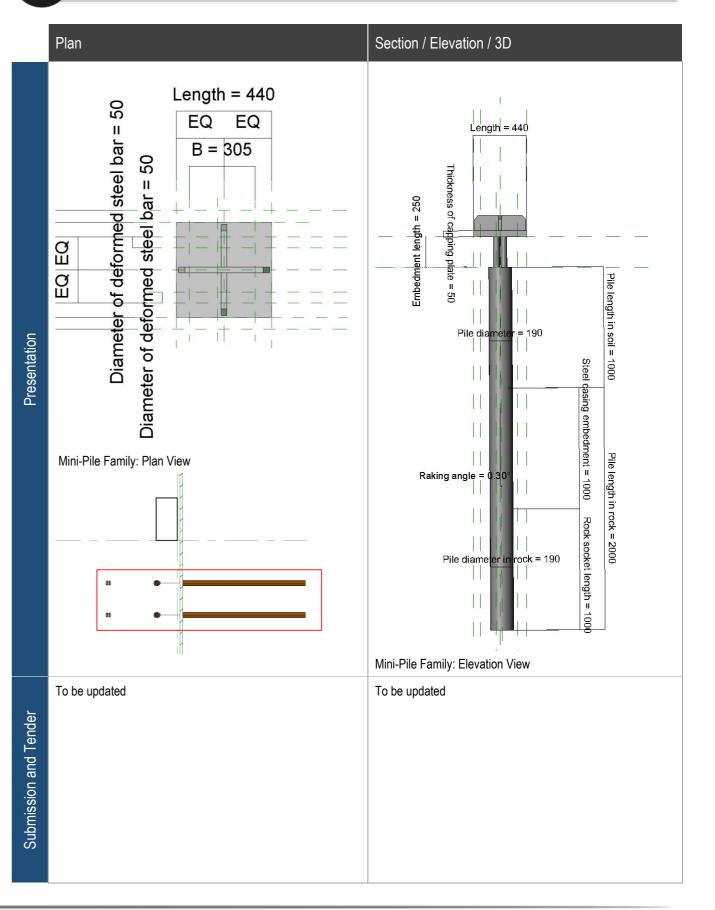
Essential Parameter

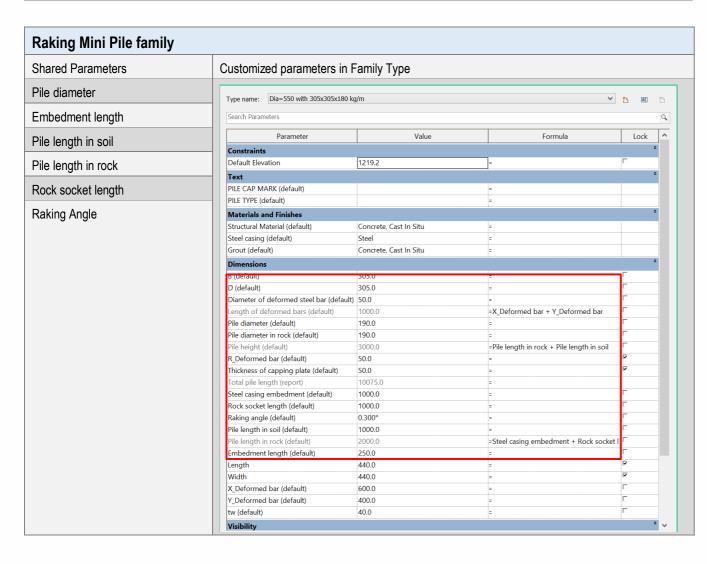
Pile Family and Parameter:

The Reference Level shall be the bottom level of pile cap and is set to 0.0 mPD by default. The Vertical and Raking Mini Pile family should be made shareable. The "Shared" check box in the field of "Other" in the Properties Palette should be toggled.

Shared Parameters	Customized parameters in Family Type			
Pile diameter	Family Types			
Embedment length	Type name: Dia=550 with 305x305x180 kg	Type name: Dia=550 with 305x305x180 kg/m ✓ 🔭 🗷 🖺		
D. 1	Search Parameters			(
Pile length in soil	Parameter	Value	Formula	Lock
Pile length in rock	Constraints			*
r lie length in rock	Default Elevation	1219.2	=	П
Rock socket length	Text			*
Nook socket length	PILE CAP MARK (default)		=	
Existing Ground Level	PILE TYPE (default)		=	
Existing Ground Level	Materials and Finishes			*
Cut-off Level	Structural Material (default)	Concrete, Cast In Situ	=	
Cut-on Level	Steel casing (default)	Steel	=	
Founding Lovel	Grout (default)	Concrete, Cast In Situ	=	
Founding Level	Dimensions			*
	B (default)	305.0	=	П
	D (default)	305.0	=	Г
	Diameter of deformed steel bar (default)	50.0	=	
	Length of deformed bars (default)	1000.0	=X_Deformed bar + Y_Deformed bar	
	Pile diameter (default)	190.0	=	
	Pile diameter in rock (default)	190.0	=	П
	Pile height (default)	3000.0	=Pile length in rock + Pile length in soil	
	R_Deformed bar (default)	50.0	=	P
	Thickness of capping plate (default)	50.0	=	₹
	Total pile length (report)	10075.0	=	
	Steel casing embedment (default)	1000.0	=	Г
	Rock socket length (default)	1000.0	=	П
	Raking angle (default)	0.300°	=	
	Pile length in soil (default)	1000.0	=	П
	Pile length in rock (default)	2000.0	=Steel casing embedment + Rock socket I	
	Embedment length (default)	250.0	=	
	Length	440.0	=	Þ
	Width	440.0	=	Þ
	X_Deformed bar (default)	600.0	=	Г
	Y_Deformed bar (default)	400.0	=	П
	tw (default)	40.0	=	

B Drawing Production





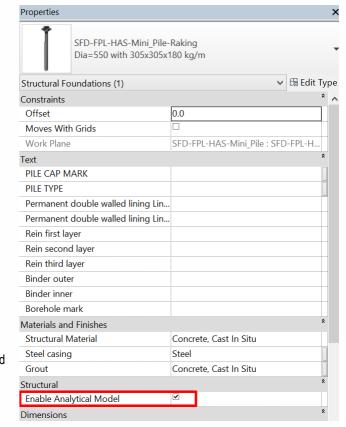
Analytical Links:

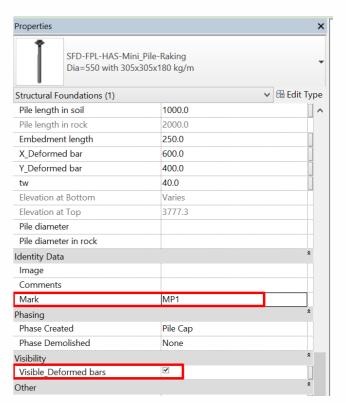
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When Vertical and Raking Mini piles are involved in the building structure analytical model, their instance properties in the field of "Enable Analytical Model" should be toggled.

 To enable subsequent generation of piling schedule, all Vertical and Raking Mini piles in the Project Revit Structure model should be assigned with a unique pile number. This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.





• The Deformed bar can be turned "on" and "Off" by toggling the setting under Visibility.

DS-F 08 Pile Cap

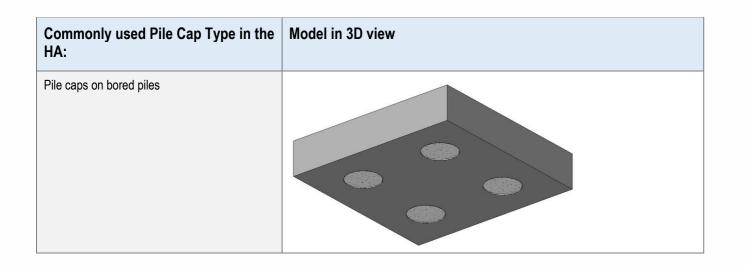
Discipline	Structural
Family	Loadable Family
Category	Structural Foundations
Workset	Individual Levels
Naming Convention	SFD-FCA-HAS-Shape-Concrete_Grade

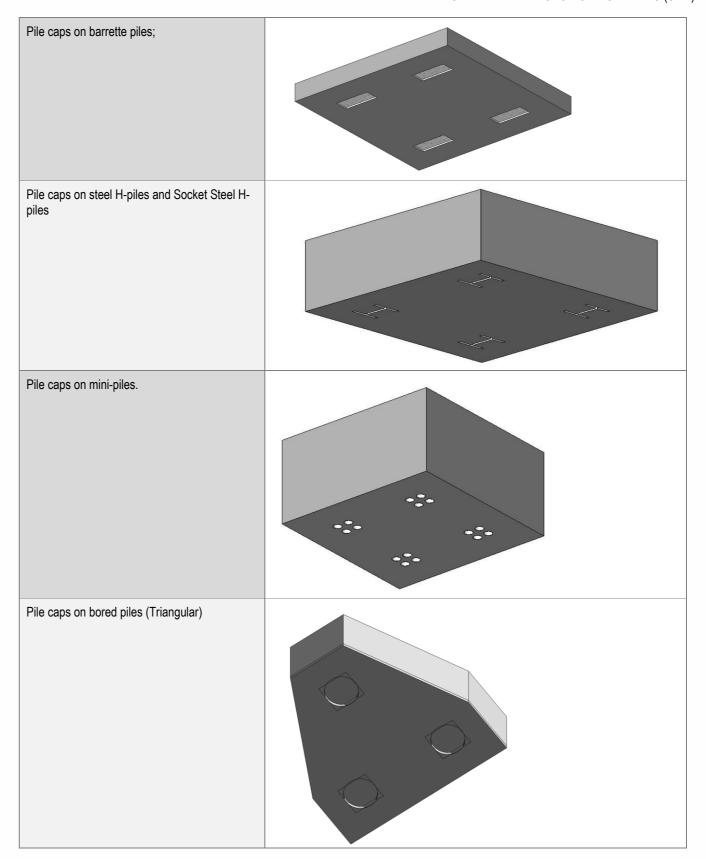
The pile cap families may be created either by Family Editor or by the In-Place Family in the Project Revit Structure model. All pile cap families should be modelled under the category of "Structural Foundations"

	Short form	Description
F	SHOILIOIHI	Description
Category	SFD	Structural Foundations
Functional Type	FCA	Foundation Cap
Originator	HAS	Housing Authority-Structural
1st_Descriptor (Shape)	Octangular	Octangular
	Pentangular	Pentangular
	Rectangular	Rectangular
	Special_Shape	Special Shape
	Triangular	Triangular
2 nd _Descriptor (Concrete_Grade)	Grade_30D	Grade 30D

Example: SFD-FCA-HAS-Rectangular-Grade_30D

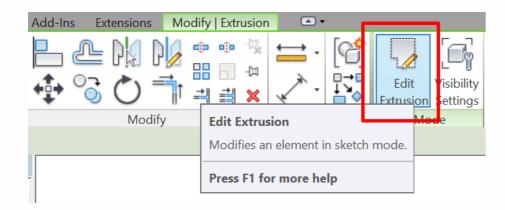
Modelling





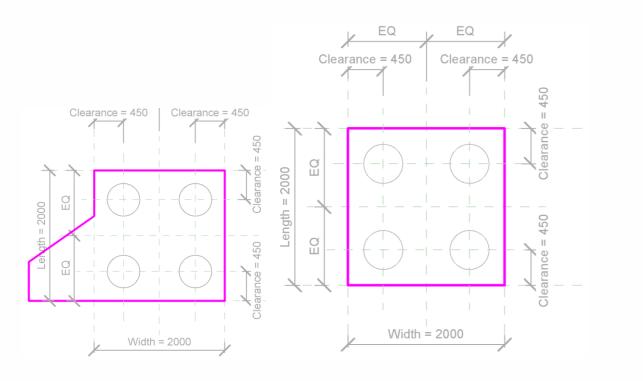
Note on Pile Caps:

- Case 1: Each pile cap shall support only ONE vertical member from superstructure (i.e. column or wall).
- Case 2: in case need change the size to accommodate two or more vertical members from superstructure.



• Modified Shaped on pile cap family shall be used by clicking "Edit family" for above family. Change the Pile Cap shape by click "Edit Extrusion" and save to a new file.

Example showing modified Pile Cap family to support multiple columns.



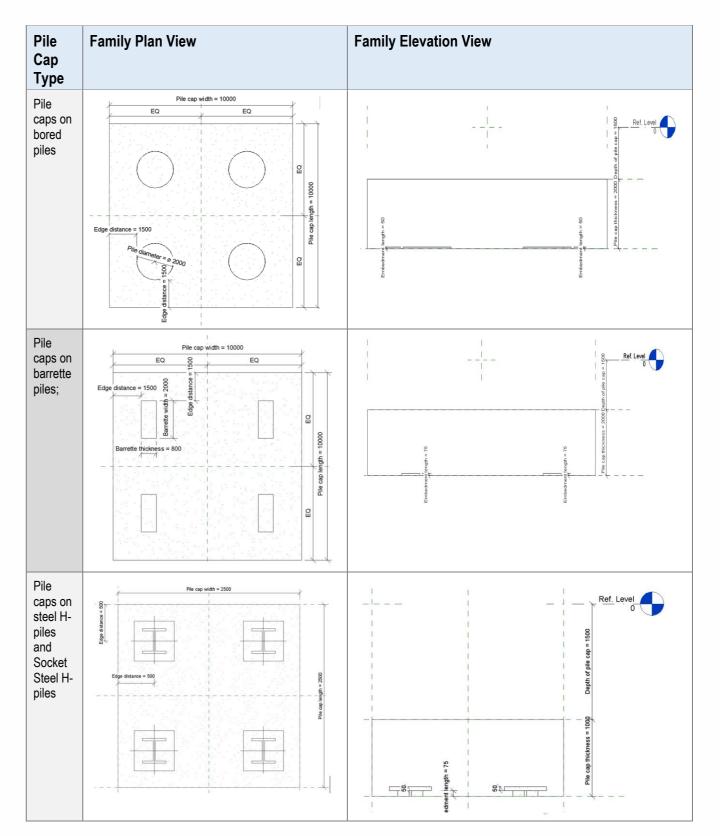
Note on The Structural Design Practice of the HA requirements:

Piles Type	Requirements	Function
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All Pile Cap	Top level of each pile cap shall be at least 1.5m below the	Allow for the installation of underground
	proposed ground level	services/utilities and drainage routings

Note on detailing:

- The pile head details including capping plate, bar spreader and couplers etc. shall be excluded from the family model.
- A shared parameter labeled as "Depth of pile cap" is used to control the pile cap top level below the proposed ground level.



Note on Quantity take-off in Schedule for formwork and blinding layer:

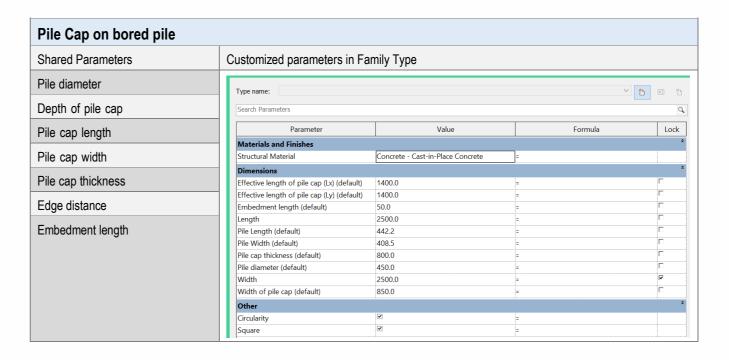
Scenario	Illustration
All side faces as well as the soffit of the Pile Cap should be provided with paints named "Formwork" and "Blinding layer" respectively so as to facilitate subsequent material takeoff.	Formwork Blinding layer
The total concrete volume of the pile cap shall exclude those portions occupied by the embedment of piles underneath.	Portion of concrete occupied by piles should be deducted

Toposurface of existing ground levels should be created according to DP-02 Toposurface, for calculating the volume of excavation for pile caps.

Essential Parameter

Pile Family and Parameter:

The Reference Level shall be the bottom level of pile cap and is set to 0.0 mPD by default. The Pile Cap family should be made shareable. The "Shared" check box in the field of "Other" in the Properties Palette should be toggled.



Pile cap on barrette pil	e				
Shared Parameters	Customized paramet	ers in Family Type			
Barrette width	■ Family Types				
Barrette thickness	Name: 4 BrP cap			~	
Depth of pile cap	Parameter	Value	Formula	Lock	Family Types
· · · ·	raterials and Finishes Structural Material (default)	Concrete - Cast-in-Place Concret		*	<u>13</u> C#
Pile cap length	Formwork (default)	Wood	-[-		Rename
	Blinding layer (default)	Concrete	=	i i	Delete
le cap width	Dimensions			*	
•	Width (default)	0.0			
Pile cap thickness	Pile cap width (default) Pile cap thickness (default)	10000.0			Parameters
no cap unomicos	Pile cap length (default)	10000.0			
dge distance	Length	0.0	= 1	Г	A <u>d</u> d
age distance	Embedment length (default)	75.0	=	Ē	Modify
	Edge distance (default)	1500.0	= I	Г	
Embedment length	Depth of pile cap (default)	1500.0	= .	Г	Remove

Pile cap on steel H-pile / socket steel H-pile			
Shared Parameters	Customized parameters in Family Type		
"D", "B", "tf", "tw",			
Depth of pile cap			
Pile cap length			

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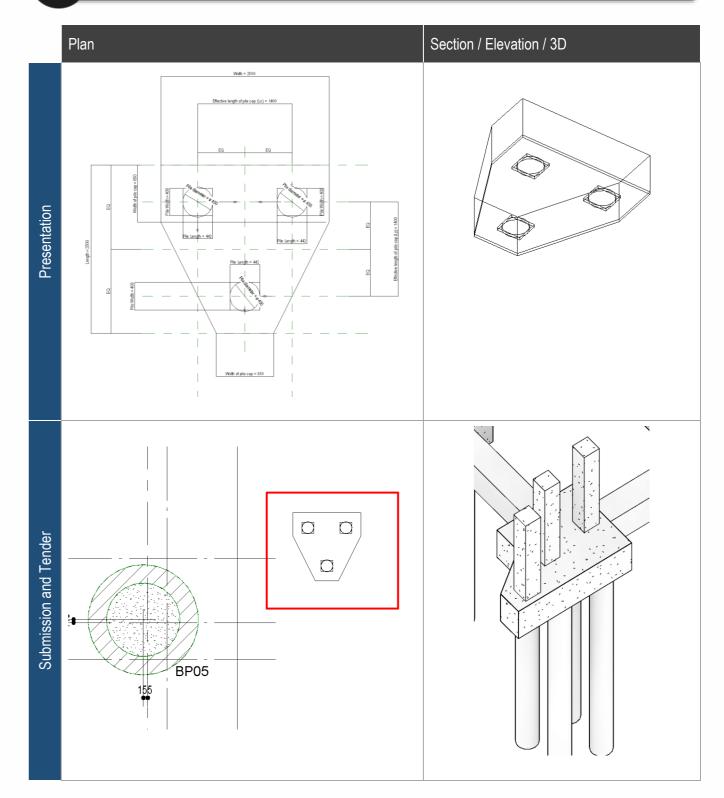
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NNEXES A

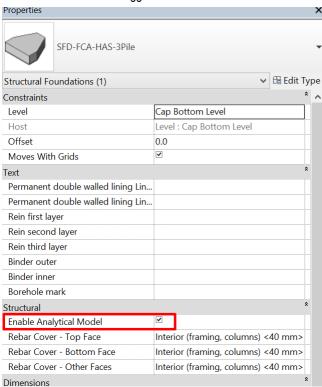
Pile cap on mini-pile					
Shared Parameters	Customized parame	ters in Family Type			
Pile diameter	■ Family Types			•	
Depth of pile cap	Name: 4 MP cap			V	
Pile cap length	Parameter	Value	Formula	Lock	Family Types
Pile cap width	Materials and Finishes Structural Material (default) Formwork (default)	Concrete - Cast-in-Place Concr	ret =	*	Rename.
Pile cap thickness	Blinding layer (default) Dimensions	Concrete		*	Delete
Edge distance	Width (default) Pile cap width (default) Pile cap thickness (default)	0.0 1000.0 500.0	=		Parameters
Embedment length	Pile cap length (default) Length	1000.0 0.0	=		Add
	Embedment length (default) Edge distance (default) Depth of pile cap (default)	200.0 250.0 1500.0			Modify.
	Identity Data	- Partition of the second of t	_/	×	Remove

B Drawing Production

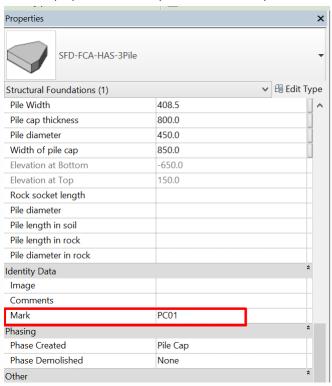


Analytical model:

• When Pile Cap are involved in the building structure analytical model, their instance properties in the field of "Enable Analytical Model" should be toggled.



• To enable subsequent generation of piling schedule, all Pile cap in the Project Revit Structure model should be assigned with a unique pile number. This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.



DS-F 09

Footings

Discipline	Structural
Family	Loadable Family
Category	Structural Foundations
Workset	Individual Levels
Naming Convention	SFD-(Functional_Type)-HAS-Shape-Concrete_Grade

The footing families may be created either by Family Editor or by the In-Place Family in the Project Revit Structure model.

	Short form	Description
Category	SFD	Structural Foundations
Functional Type	FDF	Foundation Footing
	FDS	Foundation Slab
	WFD	Wall Foundation
Originator	HAS	Housing Authority-Structural
1st_Descriptor (Shape)	Square	Square
	Rectangular	Rectangular
2 nd _Descriptor (Concrete_Grade)	Grade_30D	Grade 30D

Example: SFD-FDF-HAS- Rectangular- Grade_30D



Modelling

All footing families should be modelled under the category of "Structural Foundations".

Footing families are classified as below:

Footing Types	Model in 3D by Family Editor
Pad Footings	

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AFFENDIXES

The classifications of footing families:

Footing Type	Supporting Elements
Pad footing	Support one column only
Strip and Step footings	Support a strip of wall or a series of columns
Raft footing	Support more than three superstructure vertical members

Note on detailing:

According to the prevailing design practice of HD, 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.

Note on Quantity take-off in Schedule for formwork and blinding layer:

•	
Scenario	Illustration
All side faces as well as the soffit of the footing should be provided with paints named "Formwork" and "Blinding layer" respectively so as to facilitate subsequent material takeoff.	Formwork Blinding Layer



Pile Family and Parameter:

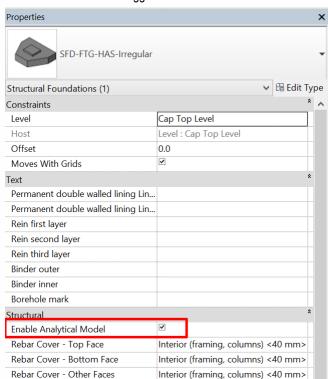
Footing					
Shared Parameters	Customized parameters in Family Type				
Depth of footing	Type name:			V * M ×	
Footing length	Search Parameters			Q	
Footing width	Parameter	Value	Formula	Lock	
Footing width	Materials and Finishes			*	
Footing thickness	Structural Material	Concrete - Cast-in-Place Concrete	=		
1 Ooting trickness	Dimensions				
	Effective length of pile cap (Lx) (default)	1400.0	=	Г	
	Effective length of pile cap (Ly) (default)	1400.0	=	П	
	Embedment length (default)	50.0	=		
	Length	2500.0	=		
	Pile Length (default)	442.2	=	Γ	
	Pile Width (default)	408.5	=	Γ	
	Pile cap thickness (default)	800.0	=	Γ	
	Pile diameter (default)	450.0	=		
	Width	2500.0	=	▽	
	Width of pile cap (default)	850.0	=	П	
	Other			*	
	Circularity	✓	=		
	Square	₹	=		
	Identity Data			8	

B Drawing Production

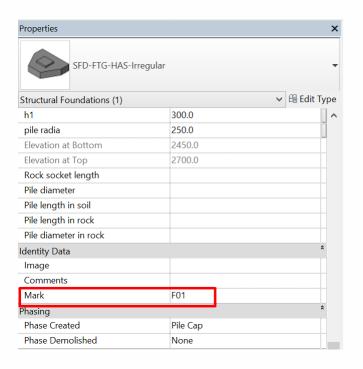
	Plan	Section / Elevation / 3D
Presentation	To be updated	To be updated
Submission and Tender	To be updated	To be updated

Analytical model:

• When footings are involved in the building structure analytical model, their instance properties in the field of "Enable Analytical Model" should be toggled.



• To enable subsequent generation of material schedules, all footing families in the Project Revit Structure model should 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 10

Tie Beams and Strap Beams

Discipline	Structural	
Family	oadable Family	
Category	Structural Framing	
Workset	ndividual Levels	
Naming Convention	SFD-FBM-HAS-Beam_Type -Dimension	

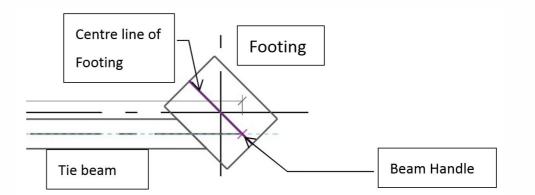
All tie beams and strap beams should be modelled under the category families of "Structural Framing".

	Short form	Description	
Category	SFD	Structural Foundations	
Functional Type	FBM	Foundation Beam	
Originator	HAS	Housing Authority-Structure	
1st_Descriptor	Cranked	Cranked	
(Beam_Type)	Haunched	Haunched	
	Rectangular	Rectangular	
	Step	Step	
2 nd _Descriptor (Concrete_Grade)	Grade_30D	Grade 30D	

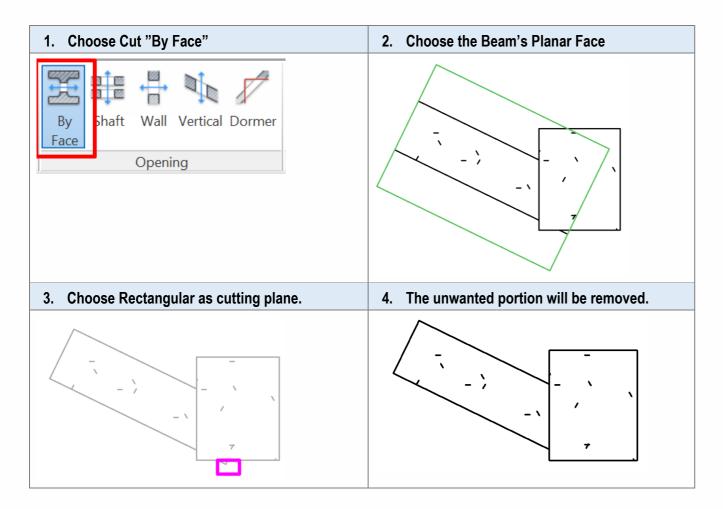
Example: SFD-FBM-HAS- Rectangular- Grade_30D

Modelling

 All tie beams and strap beams should be connected and joined to the centre of footing/pile cap. Normally, they are along the major and minor axes of the footing section.

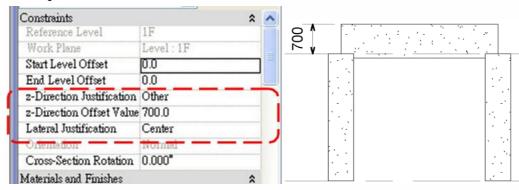


For angle of beam and footing intersection is not at 90°, some extra extruding beam portion will be noticed. Please use "Cut by Face" under "Structure - Opening" Tap to cut the unwanted portion.



Modelling Inverted Beam:

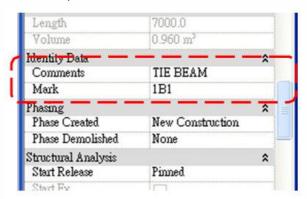
- Tie/strap beams inverted above foundation
- e.g. z-Direction Offset Value = 700.0



Marks and Comments:

To model special element like tie beam, it is advised to specify the structural usage of this element in its Properties palette under Comments as below:

These descriptions can facilitate other model user to sort out elements according to their structural usage within a model.

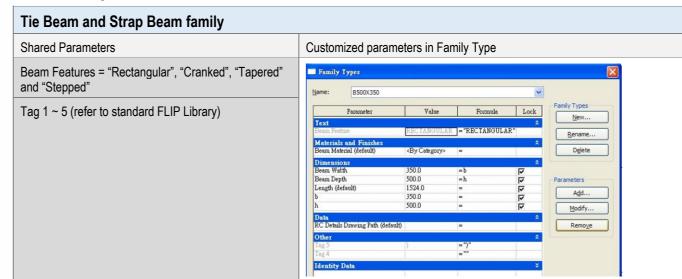




Essential Parameter

Pile Family and Parameter:

The following sharable parameters have to be added to the Family such that they can provide relevant information for other model users or element annotating:



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Note on Quantity take-off in Schedule for formwork and blinding layer:

Scenario	Illustration
Both sides and bottom of the family should be painted with specific material, name as, "Beam side formwork" and "Blinding layer" respectively to facilitate the subsequent material takeoff.	BEAU SIDE BEAU BOTTOU BEAU BOTTOU
The extent of the binding layer (i.e. paint) has to be defined within the clear span of the beam	Ground Beam Blinding

Toposurface of existing ground levels should be created according to DP-02 Toposurface, for calculating the volume of excavation for pile caps.

6.6 Structure - External Works SAM

DS-E 01

Earth Retaining Structure

Discipline	Structural	
Family	Loadable Family	
Category	Structural Foundations	
Workset	Individual Levels	
Naming Convention	RTW- (Functional_Type)-HAS-Permanent/Temporary-Type	

 The following sub-sections describe the standard modelling approach for major earth retaining walls which will form part of the BIM Revit Structure model. Notes for family customization and necessary parameters are elaborated.

	Short form	Description	
Functional Type	RTW	Foundation Footing	
Originator	HAS	Housing Authority-Structural	
1 st _Descriptor (Permanent/Temporary)	Permanent	Permanent retaining walls	
	Temporary	Temporary retaining walls	
2 nd _Descriptor (Type)	Basement_Wall	Basement Wall	
	Diaphragm_Wall	Diaphragm Wall	
	Guide_Wall	Guide Wall	
	Retaining_Wall	Retaining Wall	
	Screen_Wall	Screen Wall	
	Slurry_Wall	Slurry Wall	
	Structural_Wall	Structural Wall	
	Curb	Curb	

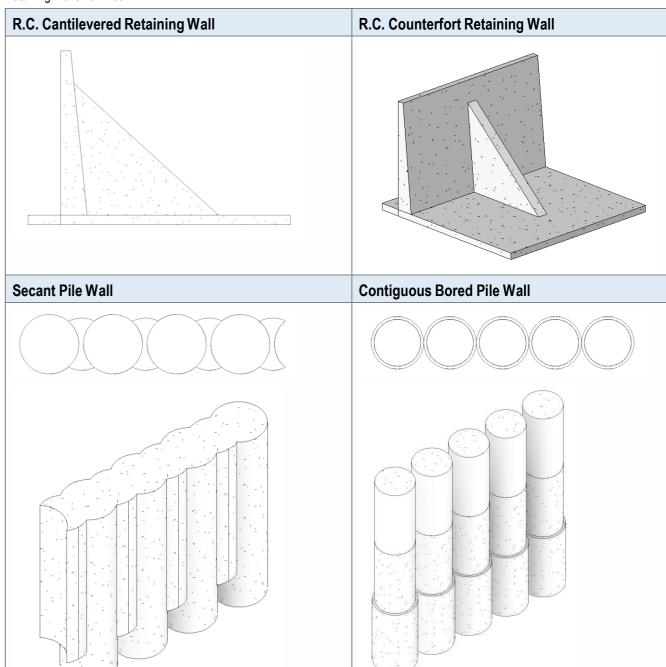
Example: RTW- HAS- Permanent- Basement_Wall

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.	



Retaining Walls Families.



 All earth retaining structures should be modelled under the Category of "Structural Foundation". All foundation elements should be modelled with consistent units.

Descriptions	Units
Dimension	Millimetres (mm)
Angles	Degree (°)
Level (including cut-off levels, founding levels, cap/footing top levelsetc)	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.

Note on Binding Layer:

Blinding layers are to be provided for the construction of the reinforced concrete retaining walls. These blinding layers shall be
modelled as paint and labelled as "Blinding layer" for subsequent quantity takeoff.



Essential Parameter

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 individual local hard drive for modelling purpose:

Note on Materials:

- All retaining wall elements should be assigned with the designed construction material (i.e. concrete for reinforced concrete retaining
 walls and grade of structural steel for steel sheet pile, pipe pile and solider piles). The material applied should be customized with
 appropriate mechanical properties to the prevalent Codes of Practice.
- All materials used should be named accordingly for easy reference. Refer to D.MET-2.2 (e)Material Naming
- All retaining wall families within a project template should 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 should be accompanied with explanatory notes. These notes should include:

The family category

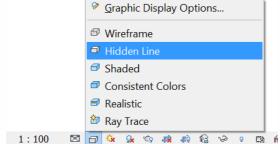
- Description of its application;
- Components included and method of modelling;
- Meaning of each parameter assigned;
- Scope and steps of application;
- Limitations and points to note; and
- Ways to extract data for material quantities take-off.

Drawing Production

To show all the details under the pile cap or cut off level, the view depth need to be adjusted on generating the foundation plans. The Detail Level and Visual Style of most of plan views should set to "Medium" and "Hidden Line" respectively depending on the details shown. Some specified drawing will be shown by View Template.



(a) Options of Details Level



(b) Options of Visual Style

DS-E 02

Retaining Wall

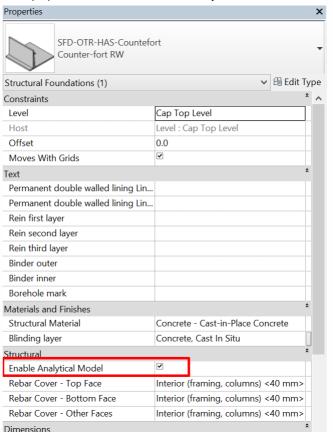
Discipline	Structural	
Family	oadable Family	
Category	Structural Foundations	
Workset	ndividual Levels	
Naming Convention	SFD- (Functional_Type)-HAS-(1st_Descriptor) -(2nd_Descriptor)	

Example: SFD-OTR-HAS-Countefort

- The reinforced concrete cantilevered retaining wall commonly adopted in HD is made from an internal stem of reinforced, cast-inplace 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 should be modelled according to its sectional size under the Category of "Structural Foundations".

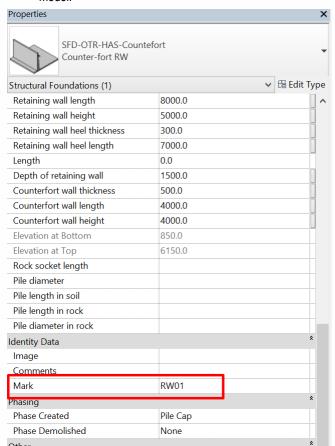
Analytical Links

• 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" should 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 should 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. Project Team shall amend the level
 of proposed ground level to suit the Architectural requirements.

Material Taking-off in schedule:

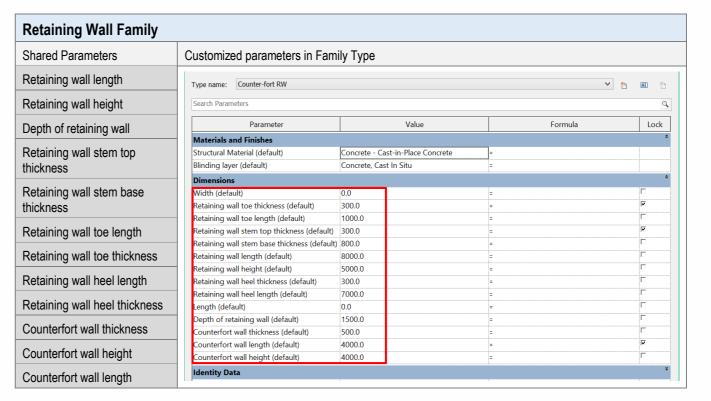
Description	Model
All side faces of the retaining wall as well as the soffit of the base slab should be provided with paints named "Wall form" and "Blinding layer" respectively so as to facilitate subsequent material takeoff for the amount of formwork and blinding layer material.	Wall form Blinding layer



Essential Parameter

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.





Drawing Production

To be updated.

DS-E 03

Contiguous Bored Pile Wall

Discipline	Structural	
Family	Loadable Family	
Category	Structural Foundations	
Workset	Individual Levels	
Naming Convention	SFD-(Functional_Type)-HAS-Type-(2nd_Descriptor)	

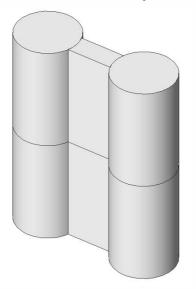
Example: SFD-RWL-HAS-Bored Pipe Wall

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• 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.



This method of retaining wall construction is usually used in permanent work as free standing cantilevered structure.



Note on Details:

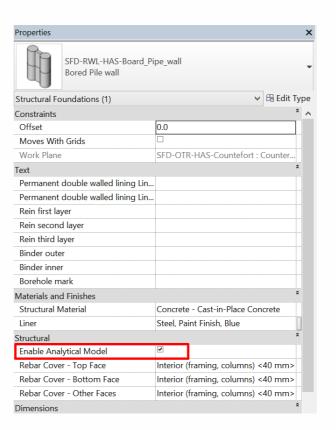
- Unless otherwise specified, the pile diameter of the bored pile wall shall be the effective shaft diameter.
- Temporary steel casings used for the construction of bored piles shall NOT be included in the bored pile wall families.
- No capping beam shall be included in the bored pile wall families.

Note on Foundation level:

The Reference Level shall be the proposed ground floor level and is set to 0.0 mPD by default. Project Team shall amend the level
of proposed ground level to suit the Architectural requirements.

Analytical Links:

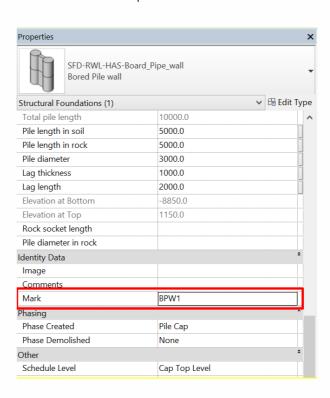
 When bored pile walls are involved in the analytical model of the building structure, their instance properties in the field of "Enable Analytical Model" should be toggled.



Marks and Comments:



- To enable subsequent generation of piling schedule, all bored piles of the piled wall families in the Project Revit Structure model should 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.



Essential Parameter

Shared Parameter and Family:

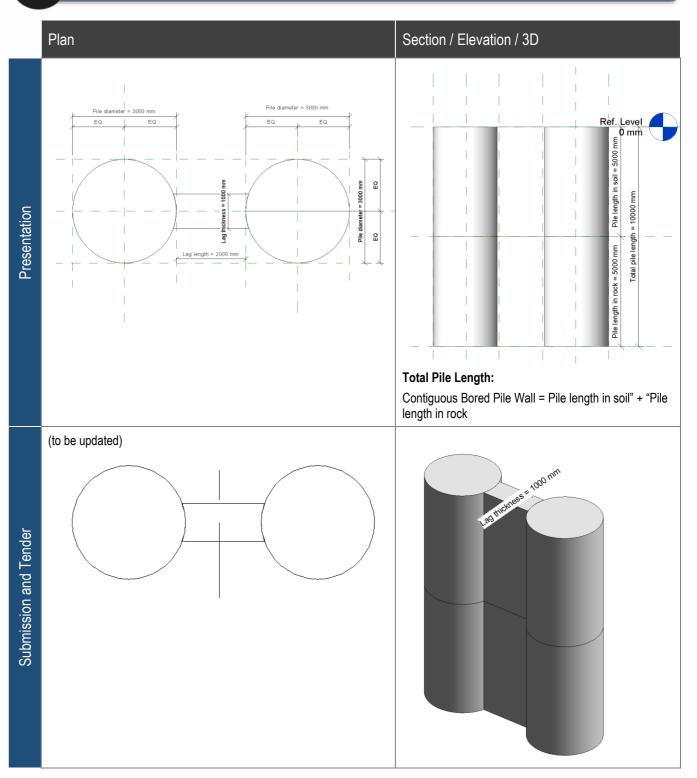
Continguous Bored Pile family				
Shared Parameters	Customized parameters i	Customized parameters in Family Type		
Pile diameter	Parameter	Parameter Value Formula Lock		
Lag length	Constraints	Constraints		
	Default Elevation	0.0 mm	=	
Lag thickness	Materials and Finishes *			
Pile length in soil	Structural Material (default) Concrete - Cast-in-Place Concret =			
riie iengin in son	Liner (default)	Steel, Paint Finish, Blue	=	
Pile length in rock	Dimensions			
	Width	0.0 mm	=	
	Total pile length (report)	10000.0 mm	_	
	Pile length in soil (default)	5000.0 mm	_	Г
	Pile length in rock (default)	5000.0 mm	_	Г
	Pile diameter (default)	3000.0 mm	=	F
	Length	0.0 mm	=	
	Lag thickness (default)	1000.0 mm	=	
	Lag length (default)	2000.0 mm	=	Б
	Identity Data			*

Bored Pile Wall Type	Volume of soil excavation	Volume of Rock excavation
Contiguous Bored Pile Wall	Concrete	Concrete
	portion of the pile x Pile length in soil	portion of the pile x "Pile length in rock"

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 takeoff, 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.

B Drawing Production



DS-E 04

Secant Pile Wall

Discipline	Structural
Family	Loadable Family
Category	Structural Foundations
Workset	Individual Levels
Naming Convention	SFD- (Functional_Type)-HAS-Type -(2nd_Descriptor)

- 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.

Example: SFD-RWL-HAS-Secant_Pile



Modelling

The male pile is the one where steel reinforcement cages are installed, though in some cases the female piles are also reinforced.

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.

Pile Wall Type	Volume of soil excavation	Volume of Rock excavation
Secant Pile Wall	Concrete	Concrete
	portion of the pile x Pile length in soil	portion of the pile x "Pile length in rock"

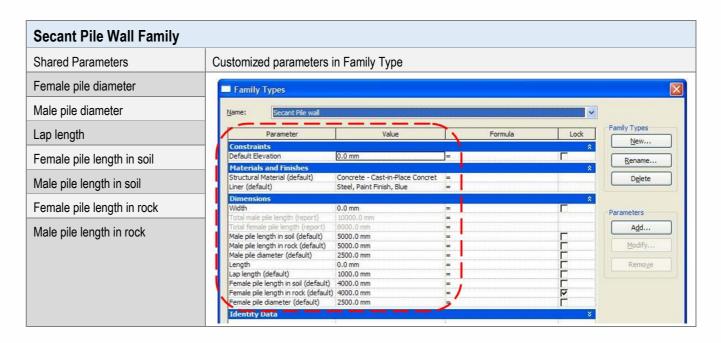
Note on Foundation level:

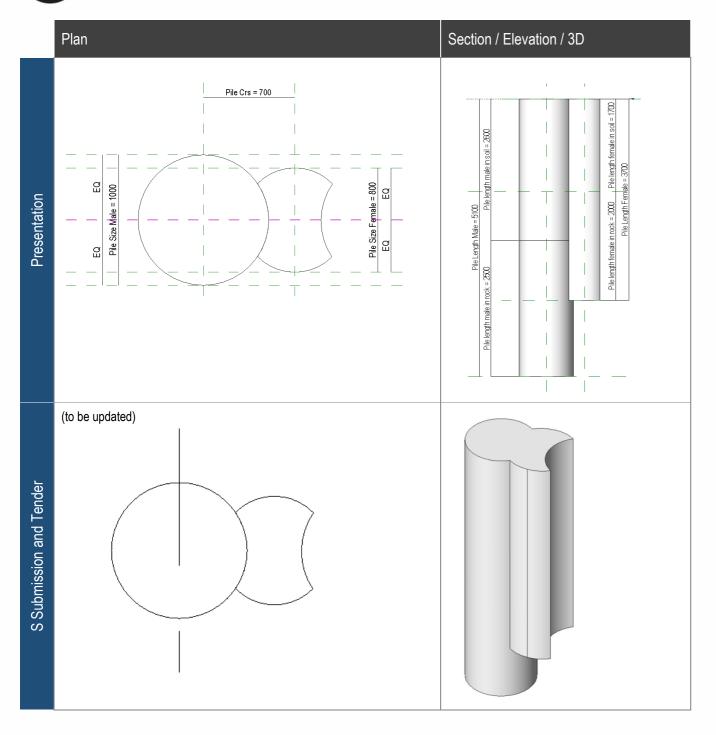
The Reference Level shall be the proposed ground floor level and is set to 0.0 mPD by default. Project Team shall amend the level
of proposed ground level to suit the Architectural requirements.



Essential Parameter

Shared Parameter and Family:





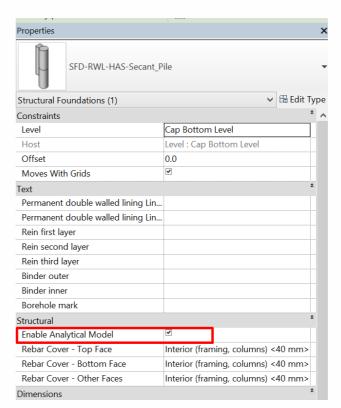
Pile total Length:

• 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:

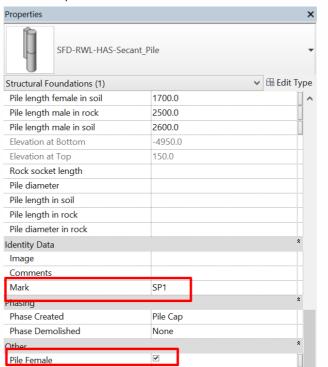
Analytical Links:

• When secant pile walls are involved in the analytical model of the building structure, their instance properties in the field of "Enable Analytical Model" should be toggled.



Marks and Comments:

- To enable subsequent generation of piling schedule, all 'female' and 'male' piles of the secant piled wall families in the Project Revit Structure model should 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.
- It is advised to specify the usage of the element in its Properties palette under Comments filed such as "Secant Pile Wall". Such description can facilitate other model user to sort out the elements according to their structural usage within a model.



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EXES APPE

DS-E 05

Diaphragm Wall

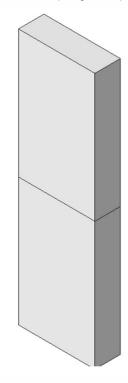
Discipline	Structural
Family	Loadable Family
Category	Structural Foundations
Workset	Individual Levels
Naming Convention	SFD-DWL-HAS-Type-(2nd_Descriptor)

Example: SFD-DWL-HAS-Diaphragm_Wall_Group



Modelling

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) should 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.



Essential Parameter

The following parameters under 'Constraints' shall be set in family

Parameter	Type / Instance	Description	Schedule
b	Туре	Width of wall	Υ
L	Instance	Length of wall	Υ
h	Instance	Overall height of wall	Υ
h1	Instance	Wall height of soil	Υ
h2	Instance	Wall height at rockbed	Υ

The following parameters under 'Materials and Finishes' shall be set in family:

Parameter	Type / Instance	Description	Schedule
Wall	Туре	Material of wall	N
Soil Excavation	Туре	Material of wall by soil part	N
Rock Excavation	Туре	Material of wall by Rock part	N

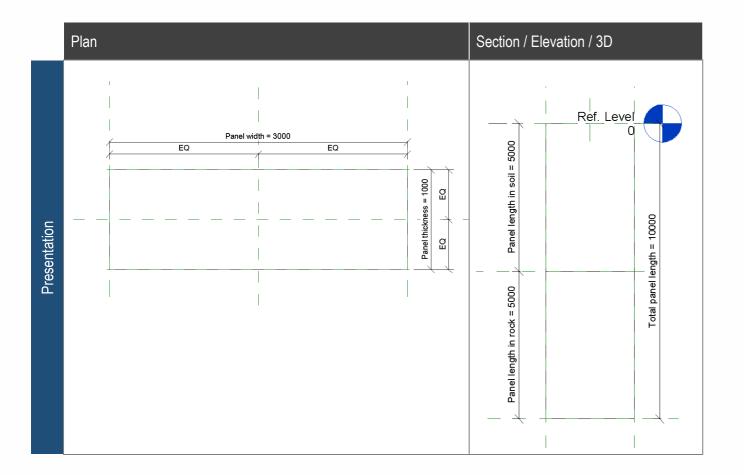
The following parameters under 'Other' shall be set in family:

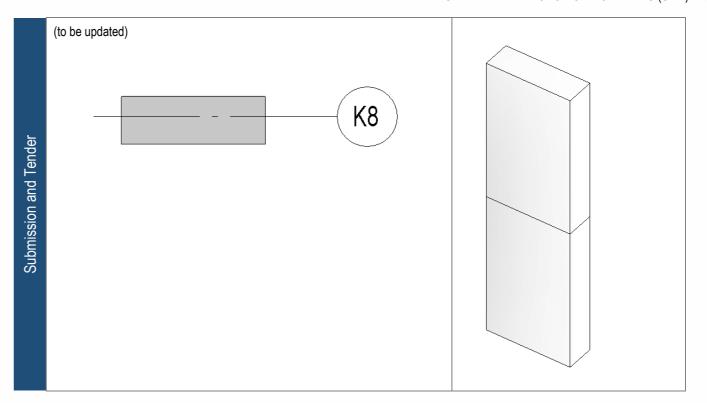
Parameter	Type / Instance	Description	Schedule
Calc_Area	Instance	Section Area	Υ
Wall_Diaphragm wall	Туре	Filter by Schedule	Υ

Shared Parameter and Family:

Shared Parameters	Customized parameters i	Customized parameters in Family Type				
Shared Faranteters	Custoffized parameters i	Customized parameters in Family Type				
Panel thickness	Type name: Diaphragm wall		∨	AI X		
Panel width	Search Parameters					
Panel length in soil	Parameter	Value	Formula	Lock		
Panel length in rock	Constraints			*		
	Default Elevation	0.0]=	П		
	Materials and Finishes			*		
	Structural Material (default)	Concrete - Cast-in-Place Concret	=			
	Dimensions			*		
	Width	0.0	=			
	Total panel length (report)	10000.0	=			
	Panel width (default)	3000.0	=	П		
	Panel thickness (default)	1000.0	=			
	Panel length in soil (default)	5000.0	=	П		
	Panel length in rock (default)	5000.0	=	П		
	Length	0.0	=			

B Drawing Production





Total Panel Length:

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	Concrete
	portion of the pile x Panel length in soil	portion of the pile x "Panel length in rock "

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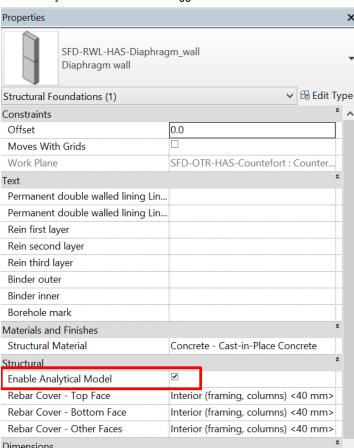
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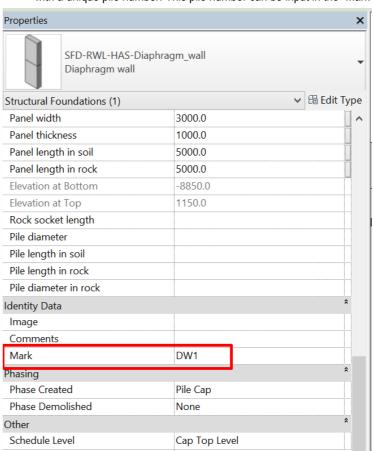
Analytical Plan Link

When diaphragm walls are involved in the analytical model of the building structure, their instance properties in the field of "Enable Analytical Model" should be toggled.



Marks and Comments:

- It is advised to specify the usage of the element in its Properties palette under Comments filed such as "Diaphragm Wall". Such description can facilitate other model user to sort out the elements according to their structural usage within a model.
- To enable subsequent generation of pile schedule, the diaphragm wall family in the Project Revit Structure model should be assigned with a unique pile number. This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.



DS-E 06 Steel Sheet Piles

Discipline	Structural
Family	Loadable Family
Category	Structural Foundations
Workset	Individual Levels
Naming Convention	SFD-RWL-HAS-Type -(2nd_Descriptor)

Example: SFD-RWL-HAS-Sheet_Pile



Modelling

The steel sheet piles used in the Project Revit Structure model are of temporary construction.

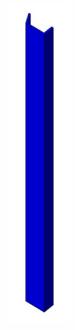


Figure above: Steel Sheet Pile

Notes on Details:

- The steel sheet pile family types should 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

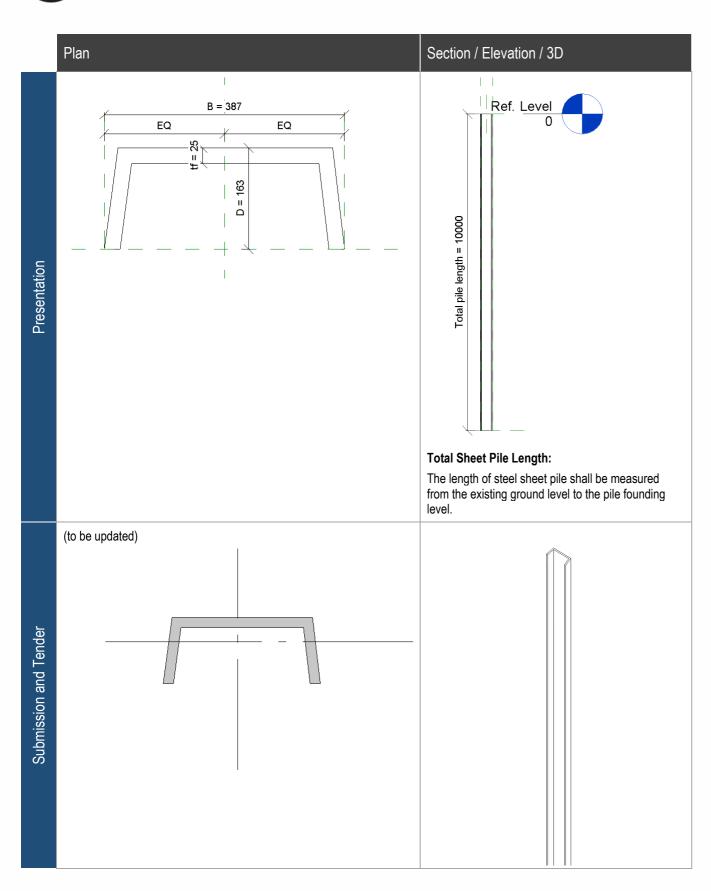


Essential Parameter

Shared Parameter and Family:

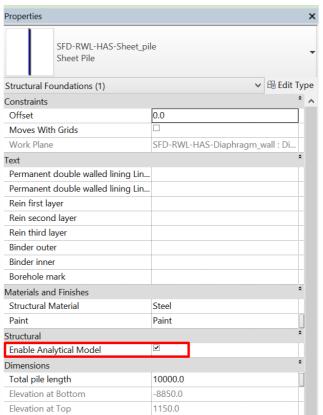
Shared Parameters	Customized parameters i	Customized parameters in Family Type				
Total pile length	Type name: Sheet Pile			•	h AI Xh	
"D", "B","tw","tf".	Type name: Sheet Pile Search Parameters					
	Parameter	Value		Formula	Lock	
	Constraints	·			*	
	Default Elevation	1219.2	=			
	Materials and Finishes				*	
	Structural Material (default)	Steel	=			
	Paint (default)	Paint	=			
	Dimensions				*	
	tw	24.8	=			
	tf	25.0	=			
	Total pile length (default)	10000.0	=			
	D	162.5	=			
	В	387.0	=		П	
	Length		=		₹	
	Width		=		₽	

Drawing Production



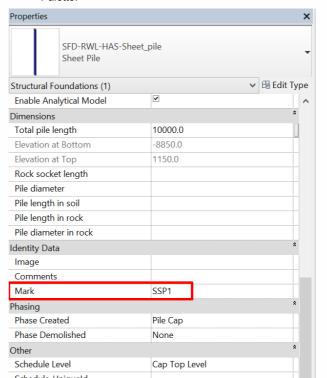
Analytical Links:

The steel sheet piles are normally not involved in the building structure analytical model, their instance properties in the field of "Enable Analytical Model" should be unchecked.



Marks and Comments:

To enable subsequent generation of steel piling schedule, all steel sheet piles in the Project Revit Structure model should 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

	I .
Discipline	Structural
Family	Loadable Family
Category	Structural Foundations
Workset	Individual Levels
Naming Convention	SFD- RWL-HAS-Type-(2nd_Descriptor)

Example: SFD-RWL-HAS-Soldier_Pile



Modelling

- 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.

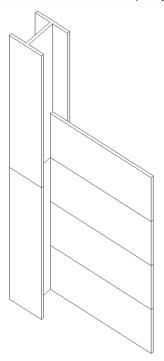


Figure above: Solider Pile Family

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 should be modelled according to their sectional dimensions and properties under the Category of "Structural Foundations".
- No calculation for volume of excavation shall be required

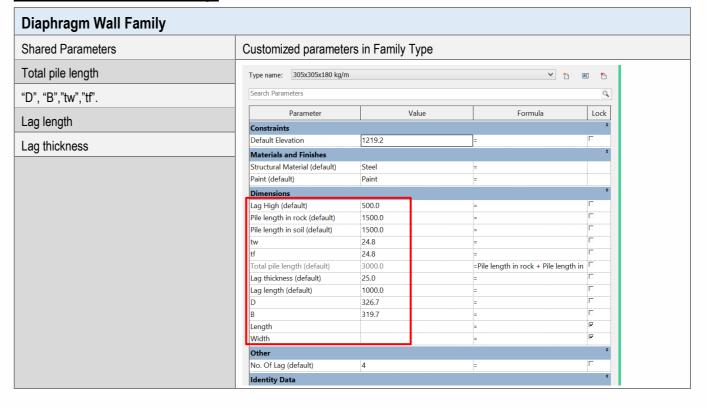
Note on Foundation level:

The Reference Level shall be the proposed ground floor level and is set to 0.0 mPD by default

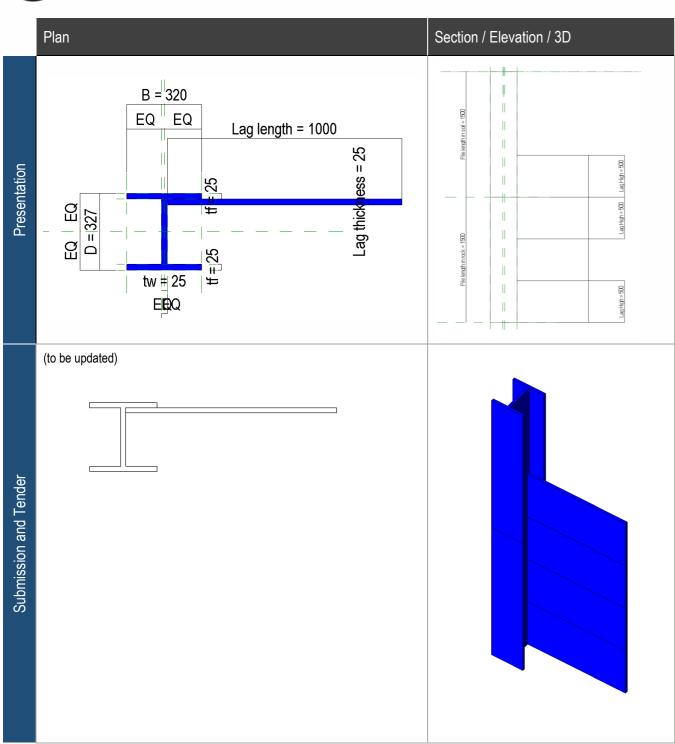


Essential Parameter

Shared Parameter and Family:

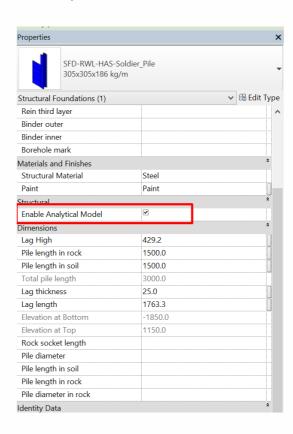


Drawing Production



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" should be unchecked.

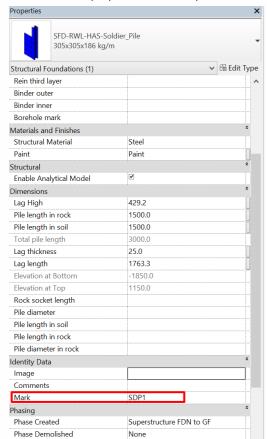


Total Length of Solider Piles:

• The length of pile shall be measured from the existing ground level to the pile founding level.

Marks and Comments:

• To enable subsequent generation of soldier piling schedule, all steel H-piles in the Project Revit Structure model should be assigned with a unique pile number. This pile number can be input in the "Mark" field of "Identity Data" in the Properties Palette.



DS-E 08

Steel Pipe Piles

Discipline	Structural	
Family	dable Family	
Category	uctural Foundations	
Workset	dividual Levels	
Naming Convention	SFD-RWL-HAS-Type -(2nd_Descirptor)	

Example: SFD-RWL-HAS-Pipe_Pile



The pile diameter shall be the external diameter of the steel casing

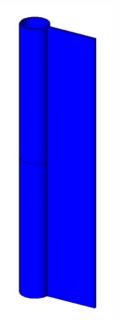


Figure Above: Steel Pipe Pile Family

Note on Details:

- The steel pipe pile family types should 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.

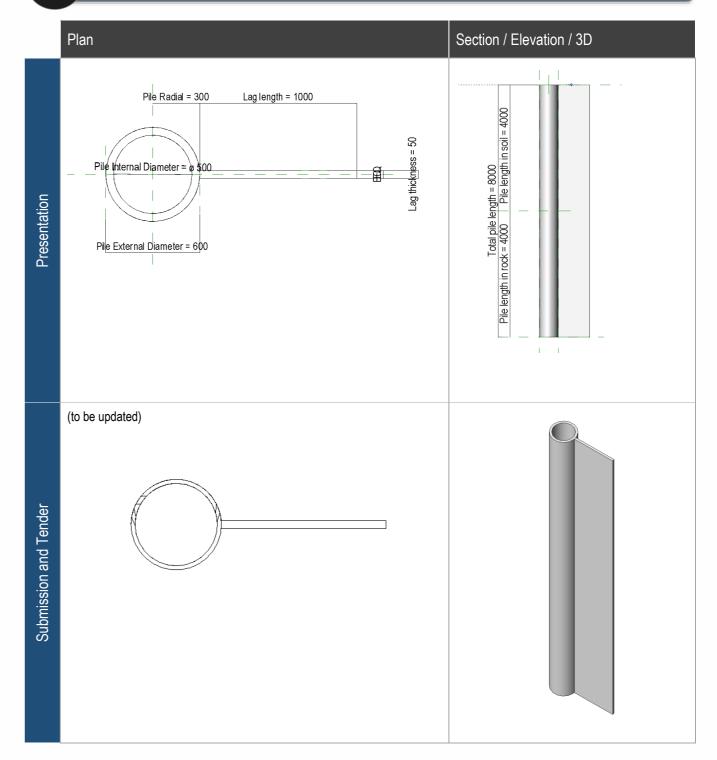
Note on Foundation Level

The Reference Level shall be the existing ground level and is set to 0.0 mPD by default.

Shared Parameter and Family:

Diaphragn	n Wall Family			
Shared Parameters	Customized parameters in Family T	уре		
Pile internal diameter	Type name: Pipe pile wall Search Parameters		•	A X
Pile external diameter	Parameter	Value	Formula	Lock
Total pile	Constraints Default Elevation	1219.2	=	
length	Materials and Finishes	3		*
	Structural Material (default)	Steel	=	
	Dimensions			*
	Pile External Diameter (default)	600.0	=	
	Pile Internal Diameter (default)	500.0	=	Б
	Pile Radial (default)	300.0	=Pile External Diameter / 2	
	Total pile length (report)	8000.0	=	
	Pile length in soil (default)	4000.0	=	
	Pile length in rock (default)	4000.0	=	
	Lag thickness (default)	50.0	=	
	Lag length (default)	1000.0	=	Б
	Length		=	V
	Width		=	V

Drawing Production

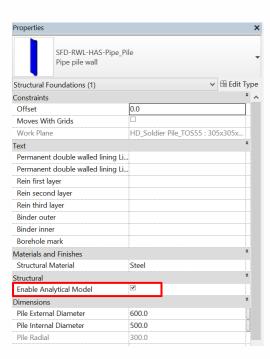


Total Steel Pipe Pile Length:

- 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".

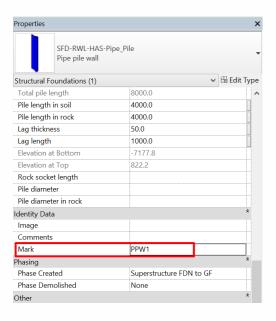
Analytical Links:

• The steel pipe piles are normally not involved in the building structure analytical model, their instance properties in the field of "Enable Analytical Model" should be unchecked.



Marks and Comments:

To enable subsequent generation of steel piling schedule, all steel pipe piles in the Project Revit Structure model should 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.



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6.7 Plumbing and Water Services SAM

The objective of this section is to assist project team in preparing Revit models for tender submission. It describes the standard approach to modelling in Plumbing and Water Services 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 should be well prepared before modelling. This guide will cover mechanical setting, pipe fittings, pipes, pipe accessories and relative appliances modelling.

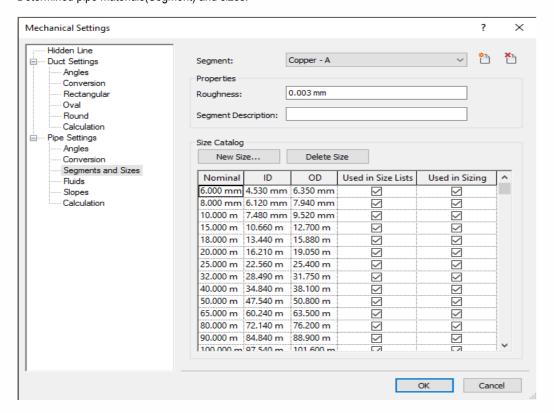
Refer Section 7 Presentation Style for preparing drawing production.

Mechanical Setting for Pipe

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 this value and do not change according to actual pipe size)	
Fitting Angles	To be closer to reality, the fittings among pipes should be fit an angle in 90°, 45°, 22.5°. It should not be in the other angle or choose "Use any angle" use in the layout.	

Determined pipe materials(Segment) and sizes:



DM-P 01 Pipe Fittings

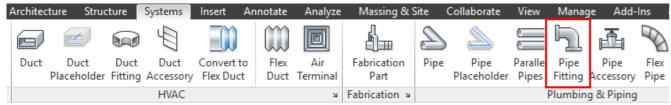
Discipline	Plumbing and Water Services Air Conditioning and Mechanical Ventilation Fire Services and Pump Utility Services Drainage and Sewage Services	
Family	Depend on the function and system of the pipework Loadable Family	
Category	eneric Model → Pipe Fittings	
Workset	External Envelop – for External Pipework	
Naming Convention	PPF-(Functional_Type)-HAB-Material	

	Short form	Description
Functional Type (Fitting	PBD	Pipe Bend
Type)	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
1st_Descriptor (Fittings' Material)	DIP	Ductile Iron
Refer to Pipe Type (Material) Table.		

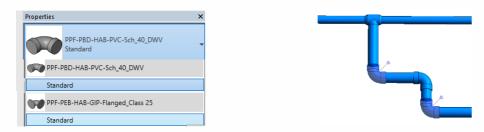
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Modelling

Place Pipe Fittings

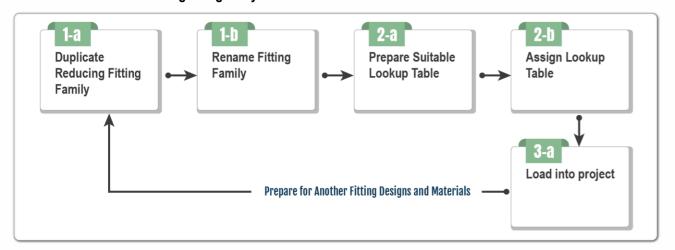


- Typical fitting types should be set as routing preference. Therefore, pipe fittings can be generated automatically while drawing pipework.
- Assign the material for specific (material) pipe fittings after the pipework has been modelled.



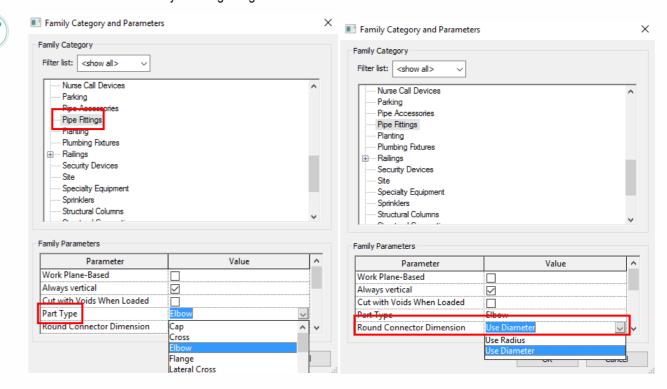


- It is NOT suggested to create a fitting family unless there is insufficient fitting design in Revit family library.
- It is suggested to adopt the reducing fittings from Revit Library for Pipe routing preference, in order to provide accurate outlet sizes for Quantity Take-Off. Modifying Grey Iron reducing fittings would be a good starting point.
- Please follow the below procedure to modify the reducing fittings provided from Revit Library for Hong Kong Practices for **Design Stage only**.



(i) 3D model family

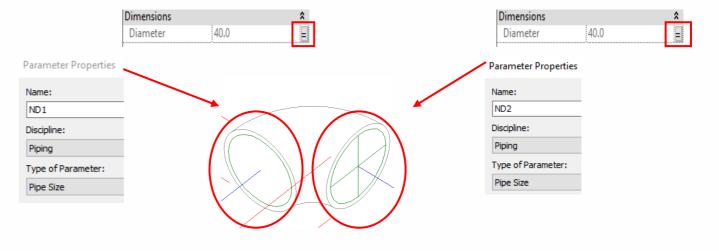
- Define suitable Pipe Fittings for family category and Part Type for family creation.
- Use Diameter for all family as Hong Kong Practices



• Pipe connectors should be modelled and assigned as Fitting for the System Classification in family.

Mechanical
System Classification Fitting

 The diameters of the pipe fitting outlets and corresponding connectors should be controlled by formulated instance parameters.



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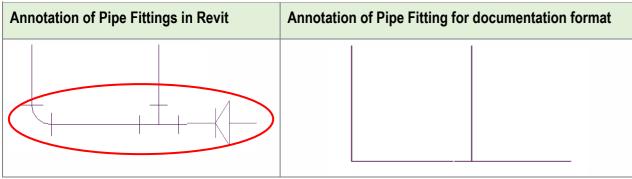
,

(ii) Annotation family (Symbol)

- All pipeworks should 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 should be either deleted or set as invisible.







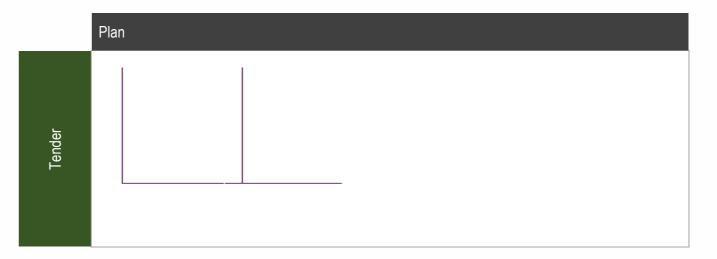
Graphics for symbol should be set as "Use Annotation Scale".

Graphics	
Use Annotation Scale	~

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	-		Υ
Туре	-		Υ
System Abbreviation	Туре		Υ
Size	Instance		Υ
Insulation Type	Instance		Υ
Insulation Thickness	Instance		Υ
Other Information	Instance		Υ
Count	-		Υ

B Drawing Production



Schedule -

Dina Fitting Cahadula						
		e i illing ochedule				
	System		Insulation	Insulation		
Туре	Abbreviation	Size	Туре	Thickness	Other Information	Count
Standard	FWP	50 mmø-32 mmø-32 mmø		0 mm		1
Standard	FRWP	50 mmø-32 mmø-32 mmø		0 mm		1
Standard	FWP	50 mmø-32 mmø-32 mmø		0 mm		1
Standard	FRWP	50 mmø-32 mmø-32 mmø		0 mm		1
Standard	FWP	32 mmø-32 mmø		0 mm		1
Standard	FRWP	32 mmø-32 mmø		0 mm		1
	Standard Standard Standard Standard Standard	System Type Abbreviation Standard FWP Standard FRWP Standard FWP Standard FWP Standard FWP Standard FWP Standard FWP	Type Abbreviation Size Standard FWP 50 mme-32 mme-32 mme Standard FRWP 50 mme-32 mme-32 mme Standard FWP 50 mme-32 mme-32 mme Standard FRWP 50 mme-32 mme-32 mme Standard FWP 32 mme-32 mme	System	System Size Insulation Insulation Type Thickness Standard FWP 50 mme-32 mme-32 mme 0 mm Standard FRWP 50 mme-32 mme-32 mme 0 mm Standard FWP 50 mme-32 mme-32 mme 0 mm Standard FRWP 50 mme-32 mme-32 mme 0 mm Standard FRWP 32 mme-32 mme 0 mm Standard FWP 32 mme-32 mme 0 mm	System

DM-P 02 Pipe

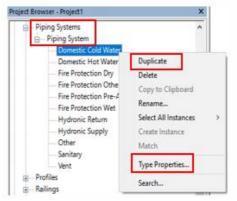
Discipline	Plumbing and Water Services Air Conditioning and Mechanical Ventilation Fire Services and Pump Utility Services Drainage and Sewage Services Depend on the function and system of the pipework
Family	System Family
Category	Piping System
Workset	External Envelop – for External Pipework
Naming Convention	(Functional_Type)-HAB

	Short form	Description
Functional Type	FRWP	Fresh Water Pipe
(System)	FLWP	Flushing Water Pipe
	HWP	Hot Water Pipe
	IRWP	Irrigation Water Pipe
	RWP	Rain Water Pipe

Modelling

- 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 below settings.
- Before starting the plumbing project, Piping System and Pipe Type should be well established.
- Piping System indicates the function of the complete pipework.
- Pipe Type indicates the material of the pipe.

Create Piping System



- a. In Project Browser > Piping System.
- Duplicate suitable Pipe system to create a new Piping System.
- c. Establish Type Properties (Fluid Types, Calculations, Abbreviation, Rise/Drop Symbol).

Different sub-category piping system contain unique settings in Revit. Duplicate and edit suitable Pipe system (Sub-Category) according to Piping System (Sub-Category) Table.

Rename Piping Systems according to Piping System (System Classification) Table

Piping System
— CDP-HAB
— CHWR-HAB
— CHWS-HAB

Set Rise/ Drop Sybmol

Rise / Drop	
Two Line Drop Symbol	Yin Yang
Two Line Rise Symbol	Outline
Single Line Drop Symbol	Bend - 3/4 Circle
Single Line Rise Symbol	Yin Yang - Filled
Single Line Tee Up Symbol	None
Single Line Tee Down Symbol	None

Establish your own abbreviations for Piping System by Abbreviation for Drawing Production (After all systems have been modelled and before producing drawing)

Identity Data			*
Type Image			
Abbreviation		Fresh	
Type Commen	nts		

Piping System (Sub-Category) Table

Sub-category	Functional type (System)	Functional Type (short form)
Domestic Cold Water	Fresh Water Pipe	FRWP
Sanitary	Flushing Water Pipe	FLWP
Domestic Hot Water	Hot Water Pipe	HWP
Other	Irrigation Water Pipe	IRWP
Other	Rain Water Pipe	RWP

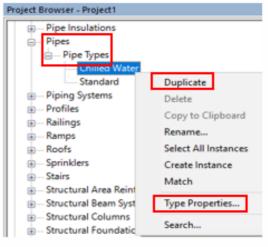
STANDARD APPROACH OF MODELLING (SAM)

Discipline	Plumbing and Water Services
-	Air Conditioning and Mechanical Ventilation
	Fire Services and Pump
	Utility Services
	Drainage and Sewage Services
	Depend on the function and system of the pipework
Family	System Family
Category	Pipes
Workset	External Envelop – for External Pipework
Naming Convention	(Functional_Type)-HAB

Pipe Type (Material) Table

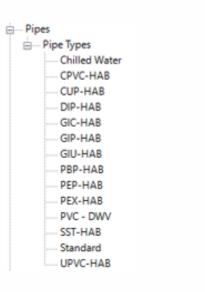
	Short form	Description
Functional Type (Pipe	CPVC	Chlorinated Polyvinyl Chloride (PVC-C)
Material)	CUP	Copper
	DIP	Ductile Iron
	GIP	GI
	GIC	GI with PVC-C lining
	GIU	GI with PVC-U/ PE lining
	PBP	Polybutylene (PB)
	PEP	Polyethylene (PE)
	PEX	Crosslinked polyethylene (PE-X)
	SST	Stainless Steel
	UPVC	Unplasticized Polyvinyl Chloride (PVC-U)

• Create Pipe Type (Basic)

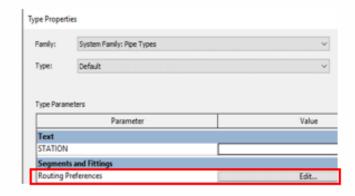


- a. In Project Browser ➤ Pipes
 ➤ Pipe Types.
- B. Right-Click
 \(\mathbb{N} \)
 Rename/
 Select Duplicate to create a new Pipe Type.
- c. Establish pipe type's information (Routing Preference, Pipe Segment, Type Mark).



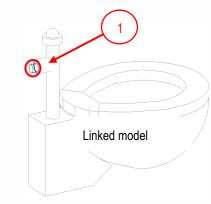


Edit Routing Preferences and assign pipe segment and fittings with same material



Establish your own abbreviations 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	



• Before drawing the pipework, fixtures and equipment should be modelled and placed first.

Fixtures' and equipment's families should be modelled with pipe connectors. Refer to Section DM-P 04,
 Plumbing Fixture under Section 6.7 Plumbing and Water Services SAM.

Based on the Material Pipe Type created above, set of practical pipe type for each piping system should be prepared. For example: material of drainage pipe (diameter below 40mm) is UPVC while material for diameter greater than 40mm is Epoxy

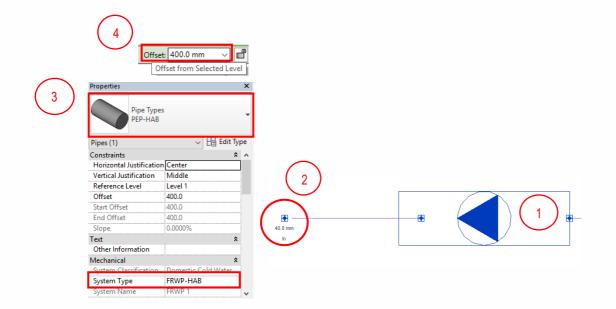
C.I. This combination for drainage pipe should be incorporated with suitable Routing Preference with reference to Pipe Type

• All pipework should be modelled as a closed/ complete system.

Create Pipe Type (Practical)

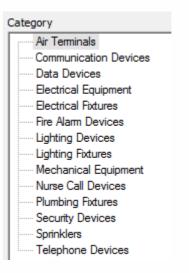
(Basic)'s Routing Reference.

- 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.

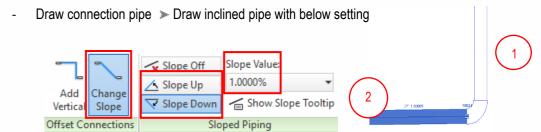


- If System Classification of connector is set as "Global", reverse the Step 2 and 3.
- To retrieve the actual elevation according to mPD level, select "Datum" as Reference Level.
- Model pipe with fixtures/ equipment in Linked Revit model
 - Add appropriate connector to the fixtures/ equipment in linked 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.

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.

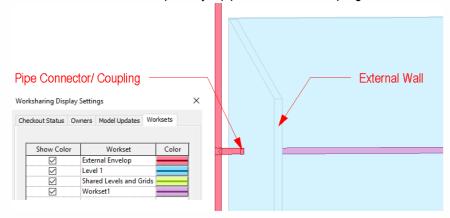


- Inclined pipework should be drawn in elevation view. The angle of the fitting should refer to the mechanical setting, otherwise specify the special fitting angle in Remarks as reference for Quantity Take-Off or drawing production.
 - Model inclined pipe





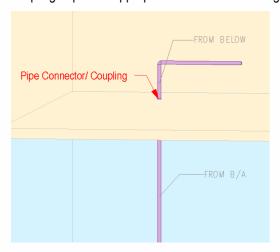
NEXES APPEN



• After all pipeworks have been modelled, information should be assigned to pipes.

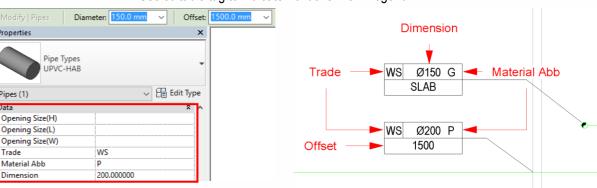


- Only one value can be assigned to each parameter. Therefore, vertical pipe built across floors cannot present different information on different levels' floor plan using Tag.
- Vertical pipe crossing levels should be divided by using Split tool and connected with a pipe connector or coupling. Input the appropriate information and tag corresponding on floor plans.



• Manage Builder's Work Legend

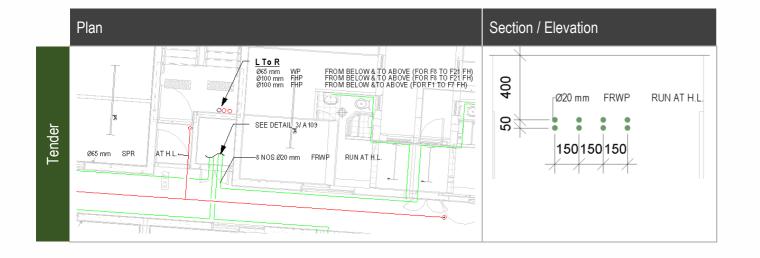
- After all pipeworks have been modelled in detailed design stage, information of the slab/ wall opening should be input to the shared parameters of the pipe, including trade, opening dimension and material etc. Opening smaller than 100mm should not be modelled.
- For critical opening, its information such as size and shape should be passed to Architects/
 Structure Engineers accordingly.
- Use suitable tag to indicate Builder's Work Legend.



Essential Parameter

Parameter	Type / Instance	Description	Schedule
System Abbreviation	Туре	Presentation for documentation	Υ
Туре	-	Pipe material	Υ
Diameter	Instance		Υ
Length	Instance		Υ
Insulation Thickness	Instance		Υ
Other information	Instance	Description for pipe, slope or flow	Υ
Builder's Work Parameters	Instance	Builder's Work Legend	Υ

B Drawing Production



(i) 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 should be applied to pipes, pipe fittings, pipe accessories and pipe insulation.
 - Presentation style for pipework can only be in dash-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.



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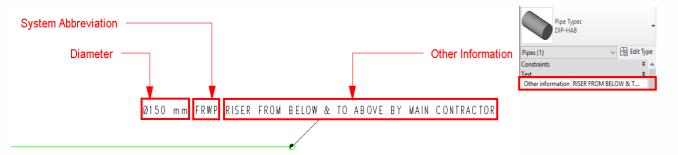
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• Use tag to annotate the flow for inclined pipe controlled by visibility.



• For complex pipework design, a section view and 3D view are suggested to be added for reference.



• For Schematic diagram, refer to 12.2.5 Drawing Production.

Schedule -						
			Pipe Sc	hedule		
System Abbreviation	Туре	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
	1	1	1			

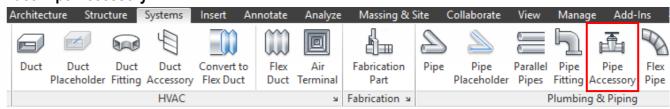
• Length, material and system of pipe can be retrieved from the 3D model directly.

DM-P 03 Pipe Accessories

Discipline	Plumbing and Water Services Air Conditioning and Mechanical Ventilation Fire Services and 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	External Envelop – for External Pipework
Naming Convention	PPA-(Functional_Type)-HAB-1st_Descriptor-2nd_Descriptor

Modelling

Place Pipe Accessory

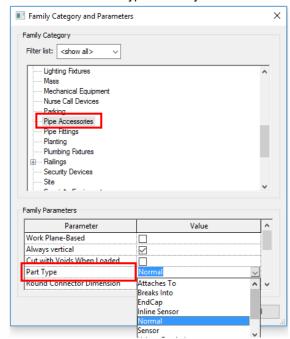


- Add pipe accessories after the pipework has been modelled.
- All pipe accessory families should be nested with a 3D model family and an annotation family (symbol).

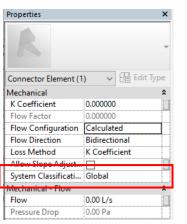
Description	3D Model (For elevation and 3D view)	2D Symbol (For plan view only)
Globe Valve		

(i) 3D model family

• Define suitable Part Type for family creation.



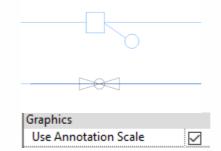
- All appropriate pipe connectors should be modelled in family.
- Specification of the pipe accessories should be input into the parameters of the connectors, such as flow, system classification etc.
- System classification of the pipe connectors should be well assigned; otherwise it should be set as "Global".



Pipe accessory should not be over-modelled.

(ii) Annotation family (Symbol)

- Symbol for pipe accessory should use Annotation family template, which can be varied according to the scale.
- Graphics for symbol should be set as "Use Annotation Scale".



- The visibility setting should 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.



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	-		Υ
Туре	-		Υ
Flange Radius	Туре		Υ
Size	Instance		Υ
Insulation Type	Instance		Y
Insulation Thickness	Instance		Υ
System Abbreviation	Туре		Υ
Count	-		Υ

Drawing Production



Schedule -

		Pipe	Accessory Sch	edule			
Family	Туре	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
	Standard		100 mmø-100 mmø		0 mm	FRWP	1
PPA-VLV-HAB-Globe	Jorania						

DM-P 04

Plumbing Fixture

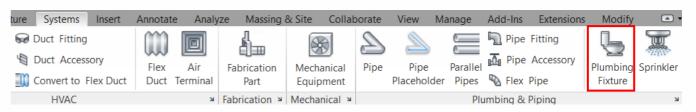
Discipline	Plumbing and Water Services Drainage and Sewage Services	
	Depend on the function and system of the fixture	
Family	Loadable Family	
Category	Plumbing Fixture	
Workset		
Naming Convention	PLM-(Functional_Type)-HAB-1st_Descriptor-2nd_Descriptor	

Plumbing Fixture Table

Category	Examples
Plumbing Fixture	Tap, Drain, Fountain, Shower etc.



Place Plumbing Fixture

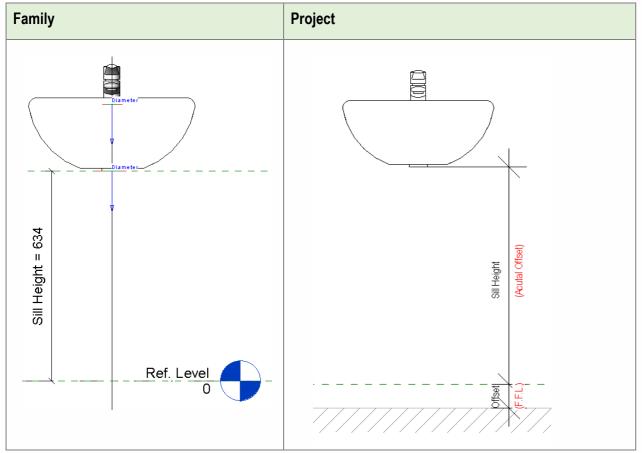


- Select a suitable hosting type for the components as it cannot be changed to other hosting types afterwards.
- In collaboration, Architectural file will be linked into MEP project files. However, wall-, floor- or ceiling- based family cannot recognised linked wall, floor or ceiling as host. Therefore, most components are suggested to use a Face-based or Generic-based family template.
- All MEP families should be nested with a 3D model family and an annotation family (symbol) (if necessary).
 Appropriate tag family should be prepared at the same time (if necessary).
- All family naming conventions refer to Family Naming Convention under Section D.MET-2.2 Naming Conventions.

3D model family

- Most fixtures and equipment should be parametric families, using shared parameters to control the dimensions and visibilities. Variations of types and dimensions can be generated easily.
- Fixtures and equipment should be modelled in proper orientations in each view as same as the products.
- The insertion point of the equipment's and fixtures' families should be well defined.
- Levels in Revit are regarding to structural floor level, therefore the thickness of floor finished should be added to the "Offset" when placing a component on plan.

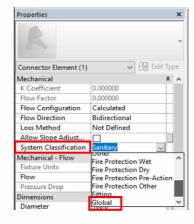
 Offset 0.0
- Using extra parameter to control finished floor level is suggested:
 Sill Height (Shared Parameter) to control the "offset elevation" (A.F.F.L.) and Offset (Family Parameter from Revit after loading the family into project) to control the finished floor level



• 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 should be defined correctly, otherwise it should be set as "Global" with insufficient information of the fixture or equipment.

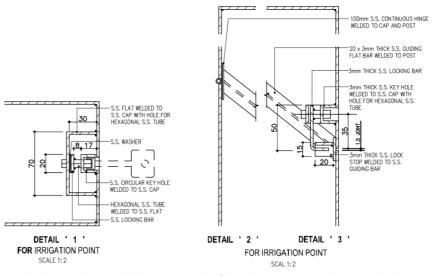




 To update the family with new design or adopt the change between design phase and construction phase stated below, load the new family with same family name and insertion point into the project file, the old design will be replaced automatically.

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

- Update the information of the fixtures and equipment, such as flow rate, pressure drop etc, according to the specifications at construction phase.
- All installation details such as below figure should not be modelled on family or project model.



- Installation details should 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 7.4 Model and Drawing Detail.
- Annotation family (Symbol)



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APPENDIXE

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

• All symbols should refer to the HA Standard.

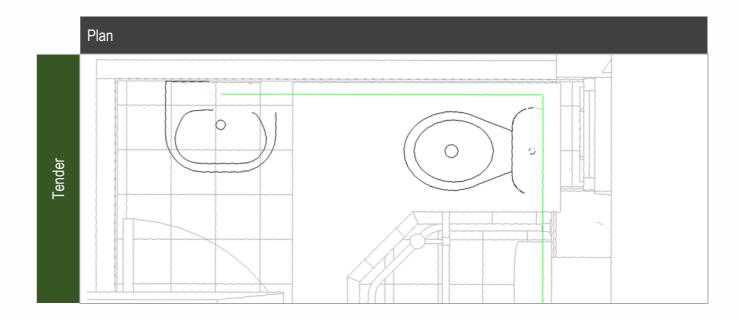
(iii) Tag family

- Use tag to annotate the information of the fixtures and equipment.
- All tag should refer to the HA Standard.
- The composition of labels (shared parameters) in the tag family should refer to the requirements in drawing production.

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	-		Υ
Туре	-		Υ
Type Mark	Туре		Υ
Remark	Instance		Υ
Other information	Instance	Description of fixture and equipment for tagging	Υ
Count	-		Υ

B Drawing Production



Schedule -

Plumbing Fixture Schedule				
Type Mark	Family	Туре	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.

DM-P 05

Mechanical Equipment

Discipline	Plumbing and Water Services Air Conditioning and Mechanical Ventilation Fire Services and Pump Utility Services Drainage and Sewage Services Depend on the function and system of the equipment
Family	Loadable Family
Category	Mechanical Equipment
Workset	
Naming Convention	MCQ-(Functional_Type)-HAB-1st_Descriptor-2nd_Descriptor

Mechanical Equipment Table

Category	Examples
Mechanical Equipment	Air-handling units (AHU), Heat pumps, Water tanks etc.

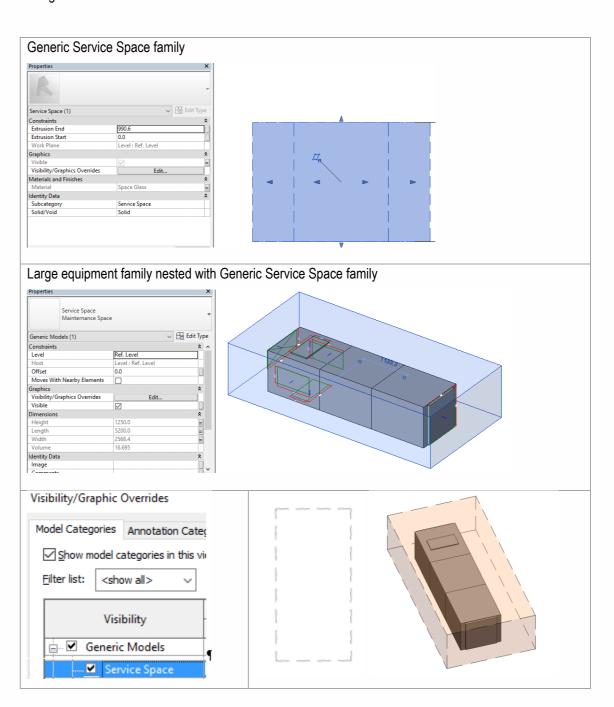


Place Mechanical Equipment



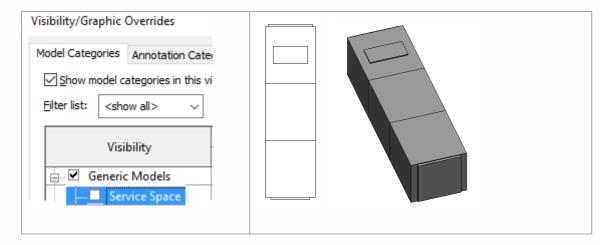
- Select a suitable hosting type for the components as it cannot be changed to other hosting types afterwards.
- The modelling requirements of Mechanical Equipment are similar to that of Plumbing Fixture. Refer to Section 5.7.4, Plumbing Fixture under Section Plumbing and Water Services SAM.

- For large equipment, a service space/ maintenance space should be modelled as LOD 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 should be controlled by shared parameters. This approach can benefit and facilitate the visibility control for the service space across different categories.



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STANDARD APPROACH OF MODELLING (SAM)

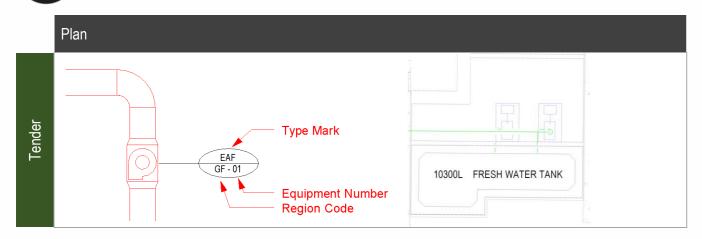


Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	-		Υ
Туре	-		Υ
Type Mark	Туре		Υ
Remark	Instance		Υ
Other information	Instance	Description of fixture and equipment for tagging	Y
Count	-		Υ

• All required specifications of Mechanical Equipment in equipment schedule should be built in the family as Essential Parameters accordingly.

B Drawing Production



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)SU B-CONTRACTOR)	Minmum Efficiency(%)
FRSH WATER PUPM	1	MULTI-STAGE(HO RIZONTAL TYPE)	33	133	25	80	60
F.S.WATER PUMP	1	MULTI-STAGE(HO RIZONTAL TYPE)	8	133	25	60	55

- All specifications should 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.

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6.8Air Conditioning and Mechanical Ventilation SAM

The objective of this section is to assist project team in preparing Revit models for tender submission. It 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 should be well prepared before modelling. This guide will cover mechanical setting, duct fittings, ducts, duct accessories, pipework and relative appliances modelling.



Refer Section 7 Presentation Style for preparing drawing production.

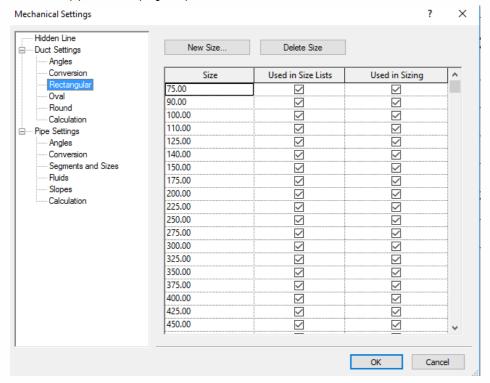
Mechanical Setting for Duct

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 should be fit an angle in 90°, 45°, 22.5°. It should not be in the other angle or choose "Use any angle" use in the layout.

Determined pipe materials(Segment) and sizes:



DM-M 01 Duct Fittings

Discipline	Air Conditioning and Mechanical Ventilation	
Family	oadable Family	
Category	Duct Fittings (Cross/ Elbow/ Tee/ Transition)/ Generic Model → Duct Fittings	
Workset		
Naming Convention	DUF-(Functional_Type)-HAB-Shape-Material	

	Short form	Description
Functional Type (Fitting	DCR	Duct Cross
Type)	DEB	Duct Elbow
	DEM	Duct Elbow_Mitered
	DER	Duct Elbow_Radius
	DEC	Duct Endcap
	DTE	Duct Tee
	DTR	Duct Transition
	DUN	Duct Union
1st_Descriptor (Shape)	RECT	Rectangular
	OVL	Oval
	RND	Round
(1st_Descriptor for Multi- shape Transition)	RECT to OVL	Rectangular to Oval
2 nd _Descriptor (Material)	SSD	Sheet Metal
Refer to Duct Type (Material) Table.		

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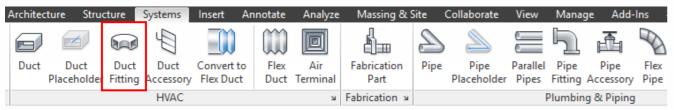
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EXES APP

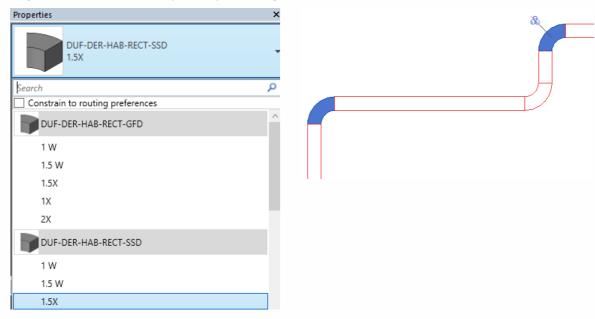


Modelling

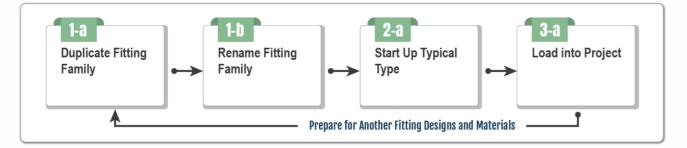
Place Pipe Fittings



- Typical fitting types should 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.



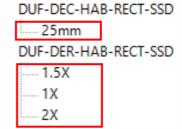
- It is NOT suggested to create a fitting family unless there is insufficient fitting design in Revit family library.
- Please follow the below procedure to modify the fittings provided from Revit Library for Hong Kong Practices for Design Stage only.



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 should be able to present the dimension or characteristic of the type.

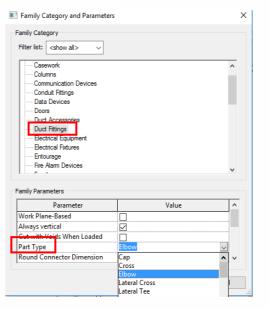


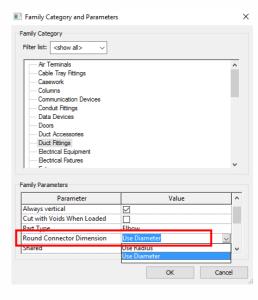
3D model family

- Extracting the material properties of the duct fittings from their family name for Quantity Take-Off is proposed.
- Define suitable Duct Fittings for family category and Part Type for family creation.

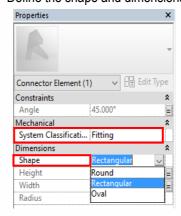


Use Diameter for all family as Hong Kong Practices.





- Duct connectors should be modelled and assigned as Fitting for the System Classification in family.
- Define the shape and dimensions for duct connector





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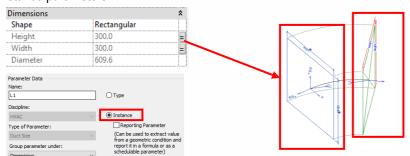
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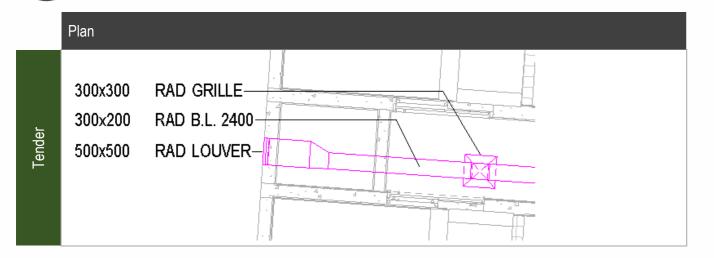
• The diameters of the pipe fitting outlets and corresponding connectors should be controlled by formulated instance parameters.



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	-		Υ
Туре	-		Υ
System Abbreviation	Туре		Υ
Overall Size	Instance		Υ
Insulation Type	Instance		Υ
Insulation Thickness	Instance		Υ
Other Information	Instance		Υ
Count	-		Υ

B Drawing Production



Schedule -

Duct Fitting Schedule						
System Insulation Insulation Family Type Abbreviation Overall Size Type Thickness C					Count	
DUF-DER-HAB-RECT-GFD	1X	FAD	300 mmx300 mm-300 mmx300 mm		0 mm	1
DUF-DER-HAB-RECT-GFD	2X	RAD	300 mmx300 mm-300 mmx300 mm		0 mm	1

DM-M 02 Duct

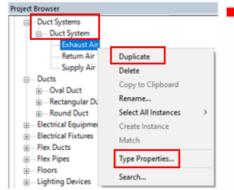
Discipline	Air Conditioning and Mechanical Ventilation	
Family	System Family	
Category	Duct System	
Workset		
Naming Convention	(Functional_Type)-HAB	

	Short form	Description
Functional Type	EAD	Exhaust Air Duct
(System)	RAD	Return Air Duct
	FAD	Fresh Air Duct
	SAD	Supply Air Duct
	TAD	Transfer Air Duct
	PAD	Primary Air Duct
	KED	Kitchen Exhaust Duct
	TED	Toilet Exhaust Duct

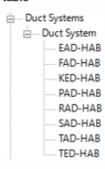
Modelling

- 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 MVAC project, Duct System and Duct Type should 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 Systems suggested in below table

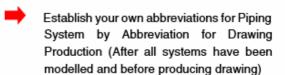




- a. In Project Browser > System
- b. Right-Click > Rename/ Select Duplicate to create a new Duct
- c. Establish Type Properties (Fluid Types, Calculations, Abbreviation, Rise/Drop Symbol)

•	Set Rise/ Drop Sybi	mo
	Duct System	R

	•
Duct System	Rise/ Drop Symbol
SAD/PAD/ FAD/TAD	Cross - Filled 🗶
RAD	Slash - Filled
EAD/KED/TEI) Wye 🚫



Identity Data	
Type Image	
Abbreviation E	
Type Comments	

Duct System (Sub-Category) Table

System Classification	Functional type (System)	Functional Type (short form)
Exhaust Air	Exhaust Air Duct	EAD
Return Air	Return Air Duct	RAD
Supply Air	Fresh Air Duct	FAD
Supply Air	Supply Air Duct	SAD
Supply Air	Transfer Air Duct	TAD
Supply Air	Primary Air Duct	PAD
Exhaust Air	Kitchen Exhaust Duct	KED
Exhaust Air	Toilet Exhaust Duct	TED

Discipline	Air Conditioning and Mechanical Ventilation	
Family	System Family	
Category	Ducts	
Workset	-	
Naming Convention	(Functional_Type)-HAB-Elbow-design	

Duct Type (Material) Table

	Short form	Description	
Functional Type (Pipe	PVC	Polyvinyl Chloride (PVC)	
Material)	PFD	Phenolic Foam Ductboard	
	SSD	Sheet Metal	
	GFD	Glass Fibre	
1st_Desciptor (Elbow design)	Mitered		
	Radius		
	Gored		





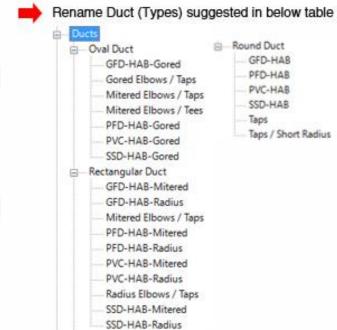


Ducts E Oval Duct Rectangular Duct Mitered Elbows / Taps Radius Elbows / Taps Duplicate Radius Elbows / Tees Make Element Editable Round Duct Delete Copy to Clipboard Taps / Short Radius Rename... ■ Electrical Equipment Select All Instances Electrical Fixtures Create Instance Match Flex Ducts - Flex Duct Rectangular Type Properties... Flex - Rectangular Search... ☐ Flex Duct Round

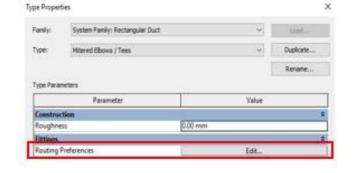
Create Duct Type

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).



Edit Routing Preferences and assign duct fittings with same material

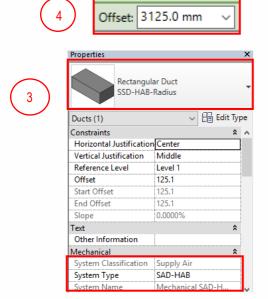


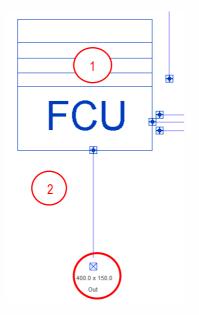
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- Fixtures' and equipment's families should be modelled with duct connectors. Refer to Section DM-M 06, Mechanical Equipment under Section 6.8 Air Conditioning and Mechanical Ventilation SAM.
- All ductwork should be modelled as a closed/ complete system.
 - Model duct with fixtures/ equipment within MVAC 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.





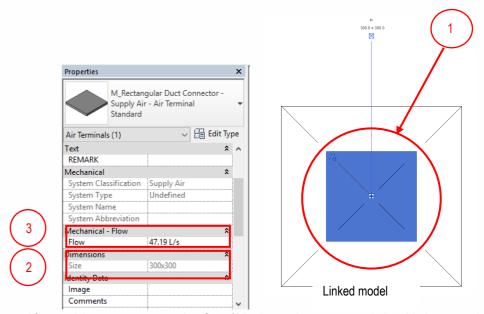


If System Classification of connector is set as "Global", reverse the Step 2 and 3.

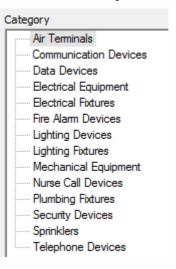


To retrieve the actual elevation according to mPD level, select "Datum" as Reference Level.

- 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.

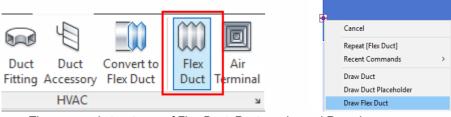


After applying a connector, using Copy/ Monitor tool to create a relationship between the linked models and connectors. This provides a location check once the elements in linked model have been moved. All categories listed below can applied the Copy/ Monitor function.



• Inclined ductwork should be drawn in elevation view. The angle of the fitting should refer to the mechanical setting, otherwise specify the special fitting angle in Remarks as reference for Quantity Take-Off or drawing production.

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

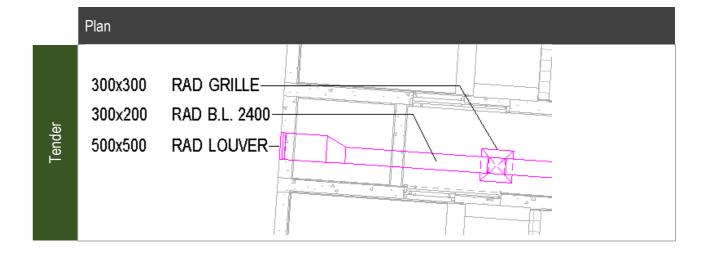
- After all ductwork have been modelled in detailed design stage, information of the slab/ wall opening should be input to the shared parameters of the pipe, including trade, opening dimension and material etc. Opening smaller than 100mm should not be modelled.
- For critical opening, its information such as size and shape should be passed to Architects/ Structure Engineers accordingly.
- Use suitable tag to indicate Builder's Work Legend.



Essential Parameter

Parameter	Type / Instance	Description	Schedule
System Abbreviation	Туре	Presentation for documentation	Υ
Family	-	Duct Material	Y
Туре	-		Y
Overall Size	Instance		Y
Length	Instance		Y
Insulation Type	Instance		Y
Insulation Thickness	Instance		Y
Top Elevation	Туре		Y
Bottom Elevation	Туре		Υ
Area	Instance		Y
Other information	Instance	Description for duct	Y
Builder's Work Parameters		Builder's Work Legend	Y

B Drawing Production

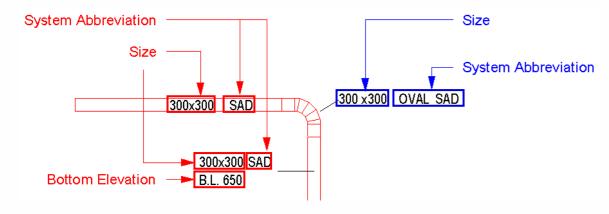


(i) Annotation/ Presentation

• Setup standard filter for different duct systems on plan view and 3D view.

System type	Preferred colour	RGB Colour System
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	128, 128, 128

- Above filter should be applied to ducts, duct fittings, duct accessories and duct insulation.
- 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	Туре	Overall Size	Length	Insulation Type	Insulation Thickness	Top Elevation	Bottom Elevation	Area	Count
SAD	Rectangular Duct	GFD-HAB-Mitered	300 mmx300 mm	945		0 mm	2500	2200	1 m ²	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 for Quantity take-off according to the SMM.

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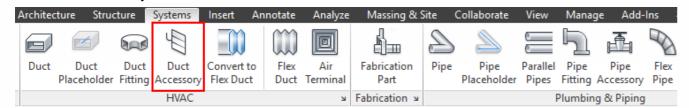
DM-M 03 Duct Accessories

Discipline	Air Conditioning and Mechanical Ventilation
Family	Loadable Family
Category	Duct Accessories
Workset	
Naming Convention	DUA-(Functional_Type)-HAB-Shape-Material



Modelling

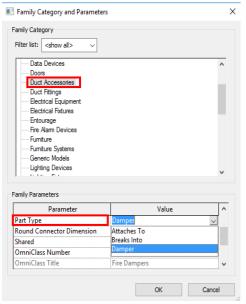
Place Duct Accessory



- Add duct accessories after the ductwork has been modelled.
- All duct accessory families should be nested with a 3D model family and an annotation family (symbol).

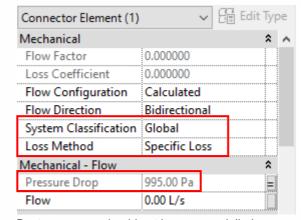
3D model family

Define suitable Part Type or insertion method for family creation.



• All appropriate duct connectors should be modelled in family.

- Specification of the duct accessories should 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 should be well assigned; otherwise it should be set as "Global".
- Using a Type parameter to control pressure drop. This is a good practice for Family Types creation.



• Duct accessory should not be over-modelled.

Annotation family (Symbol)

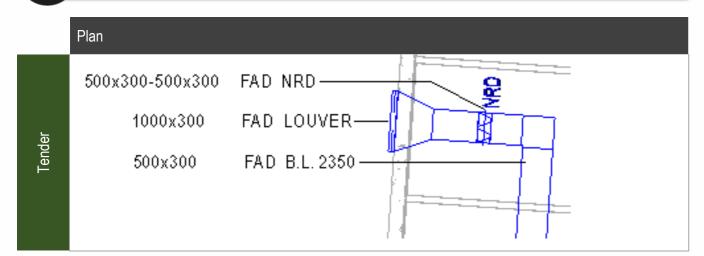
- The visibility setting should be well set to define the presence of 2D symbol and 3D model in different detail level and views.
- All 2D symbols please refer to the HA CADD Symbol Table.

Description	3D Model (For elevation and 3D view)	2D Symbol (For plan view only)
Volume Control Damper		

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Type Mark	-		Υ
Family			Υ
Туре	-		Υ
System Abbreviation	Instance		Υ
Overall Size	Instance		Υ
Other Information	Instance		Υ

Prawing Production



Schedule -

Duct Accessory Schedule									
Type Mark	Family	Туре	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				

DM-M 04 Pipework



The setting and modelling on pipe system in MVAC discipline is similar to Plumbing discipline. Refer to Section DM-P 02, Pipe under Section 6.7 Plumbing and Water Services SAM.

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	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

DM-M 05 Air Terminals

Discipline	Air Conditioning and Mechanical Ventilation
Family	Loadable Family
Category	Generic Model → Air Terminals
Workset	
Naming Convention	ART-(Functional_Type)-HAB-1st_Descriptor-2nd_Descriptor

Air Terminals Table

Category	Examples
Air Terminals	Diffuser, Grill, Hood etc.



Place Air Terminal

A	rchitec	ture S	truc	ture	Systems	Insert	Annotate	Analyze	Massing & S	Site	Collaborate	View	Mana	ge Add-l	lns :
							\mathbb{C}			2			5		Way of the second
	Duct	Duct Placehol	der	Duct Fitting	Duct Accessory	Convert t		Air Terminal	Fabrication Part	Pipe	Pipe Placeholder	Parallel Pipes		Pipe Accessory	Flex Pipe
					HVAC			И	Fabrication 4			l	Plumbin	g & Piping	

- Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.
- Air Terminals hosted on ceiling should be modelled in ARC Ceiling model file and collaborated with Architects.
- Air Terminals mounted to walls or other elements should 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 04, Plumbing Fixture under Section 6.7 Plumbing and Water Services SAM.
- Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.
- Air Terminals hosted on ceiling should be modelled in ARC Ceiling model file and collaborated with Architects.
- Air Terminals mounted to walls or other elements should use Face-based or Generic-based family template.
- The modelling requirements of Air Terminal are similar to that of Plumbing Fixture. Refer to to Section DM-P 04, Plumbing Fixture under Section 6.7 Plumbing and Water Services SAM.

(i) Annotation / Presentation

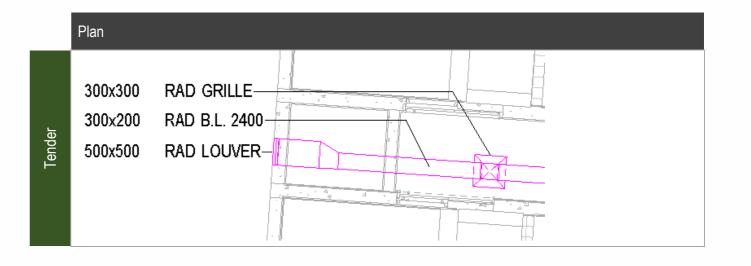
- Use detail item (symbolic line) or symbol to represent the Air Terminals on floor plan view. Refer to MEP
 Symbol for symbol modelling techniques.
- Use tag to annotate the information.
- All symbols and tag should refer to the HA Standard.

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	-		Υ
Туре	-		Υ
Type Mark	Туре		Υ
Remark	Instance		Υ

 All required specifications of Air Terminals in equipment schedule should be built in the family as Essential Parameters accordingly.

B Drawing Production



Air Terminal Schedule					
Family	Туре	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	

All specifications should 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.

DM-M 06 Mechanical Equipment



Refer to 6.7 DM-P 05 Mechanical Equipment

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The objective of this section is to assist project team in preparing Revit models for tender submission. It describes the standard approach to modelling in Electrical 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 should 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.



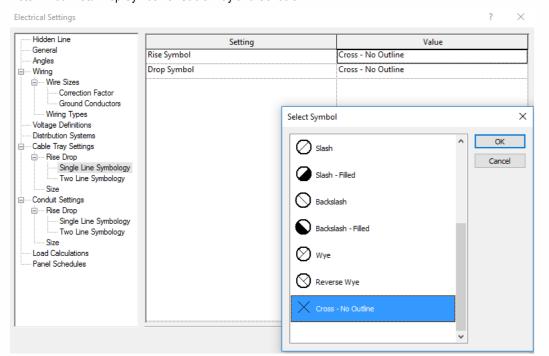
Refer Section 7 Presentation Style for preparing drawing production.

Mechanical Setting for Electrical

Following properties are suggested for electrical setting.

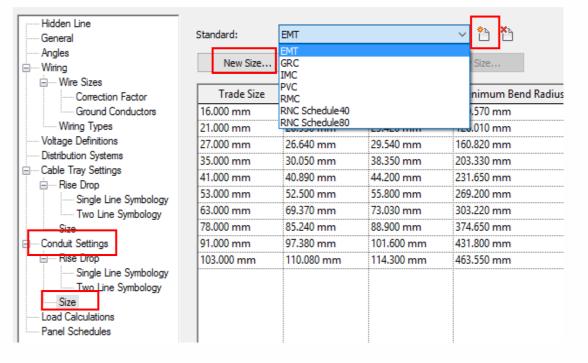
Setting	Value
Hidden Line	Draw MEP Hidden Lines Single Line gap: 0.8 mm
Fitting Angles	To be closer to reality, the fittings among pipes should be fit an angle in 90°, 45°, 22.5°. It should not be in the other angle or choose "Use any angle" use in the layout.
Wiring	Show Tick Marks: Always
Rise/ Drop 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:

Electrical Settings



DM-E 01

Cable Tray Fittings

Discipline	Electrical		
Family	Loadable Family		
Category	Generic Model → Cable Tray Fittings		
Workset			
Naming Convention	CTF-(Functional_Type)-HAB-Type		

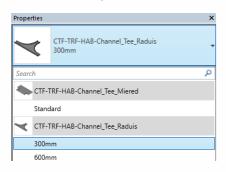
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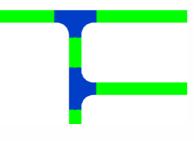
Modelling

Place Cable Tray Fitting



- Typical fitting types should 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.

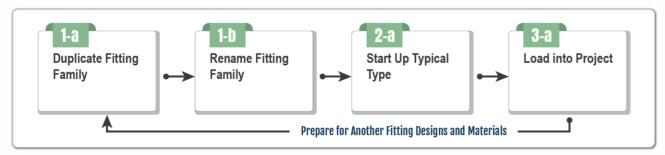




It is NOT

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

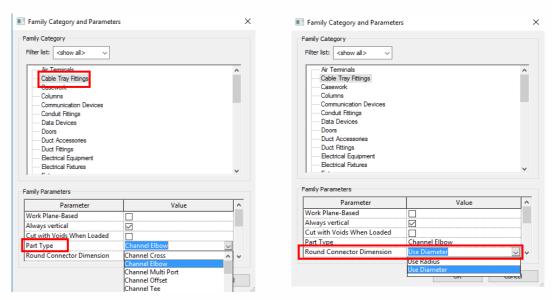
Cable Tray Fitting Type Naming Convention

- There are type parameters "Radius Multiplier" and "Cable Tray Length" for different types.
- Type name of Loadable Family should be able to present the dimension or characteristic of the type.

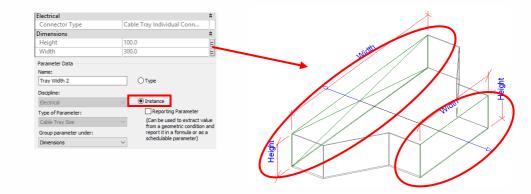
· CTF-CHN-HAB-Horizontal_Tee-Raduis

3D model family

- Extracting the material properties of the Cable Tray fittings from their family name for 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.



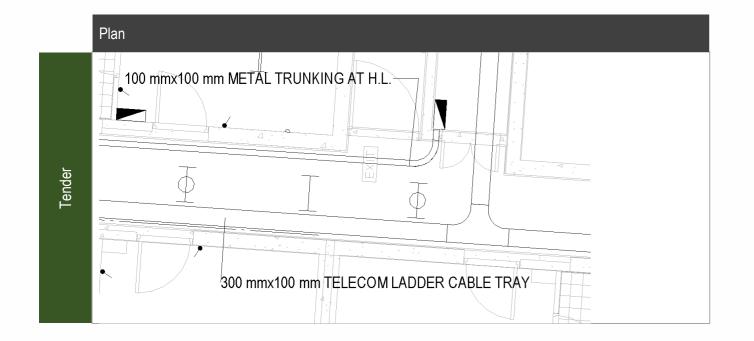
- · Cable Tray connectors should be modelled in family.
- The diameters of the cable tray fitting outlets and corresponding connectors should be controlled by formulated instance parameters.



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	-		Υ
Туре	-		Υ
Service Type	Instance		Υ
	-		

B Drawing Production



Schedule -

		Cable Tray Fit	ting Schedule		
Service Type	Family	Туре	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

GUIDE 1-Q1

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Level 2 - Q2

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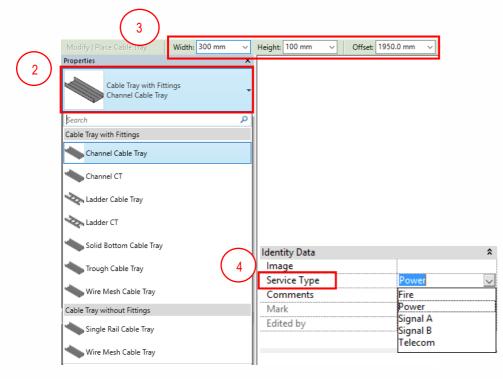
DM-E 02 Cable Tray

Discipline	Electrical
Family	System Family
Category	Cable Trays
Workset	
Naming Convention	(Functional_Type)-HAB-1st_Descriptor



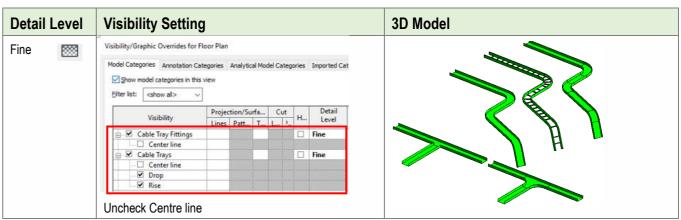
Modelling

- 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 should be drawn in elevation view. The angle of the fitting should refer to the Electrical Setting, otherwise specify the special fitting angle in Remarks as reference for Quantity Take-Off or drawing production.

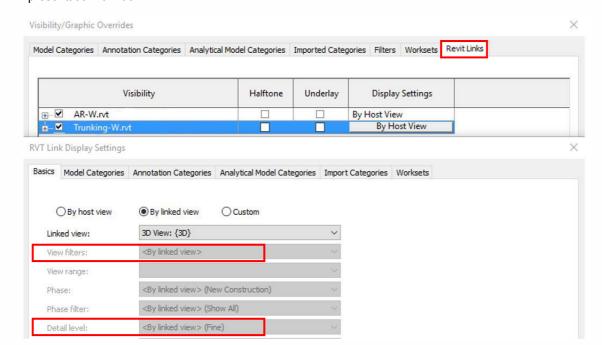


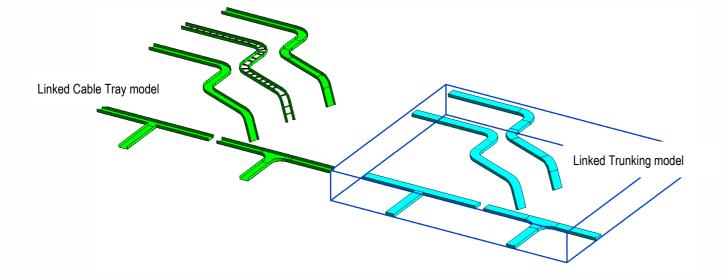
- After all Cable Tray have been modelled in detailed design stage, information of the slab/ wall opening shall be
 passed to Architects/ Structure Engineers accordingly. Trade, opening shape, dimension, offset and material
 should be included.
 - Manage Builder's Work Legend
 - The setting on Builder's Work Legend for Cable Tray is similar to the setting for Duct. Refer to Section 5.8.3, Model Duct under Section 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.





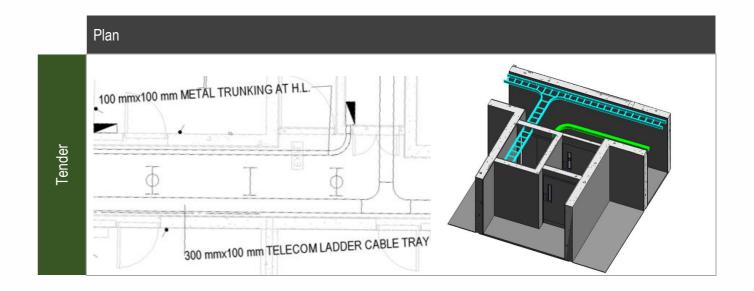


Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family and Type	Instance		Υ
Width	Instance		Υ
Height	Instance		Y
Length	Instance		Υ
Service Type	Instance		Υ
Type Mark	Туре		
Other information	Instance	Description for cable tray	Υ
Builder's Work Parameters		Builder's Work Legend	Υ

B

Drawing Production



STANDARD APPROACH OF MODELLING (SAM)

Annotation/ Presentation

Setup standard filter for Cable Tray on plan view and 3D view.

Electrical Components	Preferred colour	RGB Colour System
Cable Tray and Cable Tray Fittings	GREEN	000, 255, 000

- 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 Bend Radius Multiplier Bottom Elevation Service Type Туре Power Power 300 mmx100 mm Cable Tray with Fittings Channel Cable Tray Cable Tray with Fittings Channel Cable Tray 300 mmx100 mm Cable Tray with Fittings Power Channel Cable Tray 300 mmx100 mm 2800 2700 Power 2494 Channel Cable Tray 1930 Cable Tray with Fittings 300 mmx100 mm Cable Tray without Fittings Single Rail Cable Tray 4000 300 mmx100 mm 1900 Cable Tray without Fittings Single Rail Cable Tray 1900 Cable Tray without Fittings Single Rail Cable Tray 5100 Power Power 300 mm×100 mm 1900 2000 1900 300 mmx100 mm Cable Tray with Fittings Ladder Cable Tray 5100 300 mmx100 mm 2000 1900 Cable Tray with Fittings Channel Cable Tray 300 mmx100 mm 300 mmx100 mm Cable Tray with Fittings Channel Cable Tray

Dimension, type and Service Type of Cable Tray can be retrieved from the 3D model directly.

DM-E 03 Trunking Fittings

Discipline	Electrical-Trunking
Family	Loadable Family
Category	Generic Model → Cable Tray Fittings
Workset	
Naming Convention	CTF-(Functional_Type)-HAB-Type

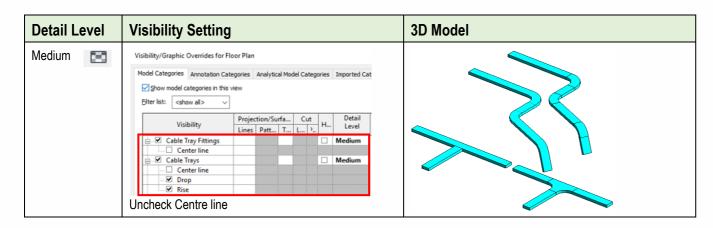
Refer to 6.9 DM-E 01 Cable Tray Fitting

DM-E 04 Trunking

Discipline	Electrical-Trunking
Family	System Family
Category	Cable Trays
Workset	
Naming Convention	(Functional_Type)-HAB-1st_Descriptor

Modelling

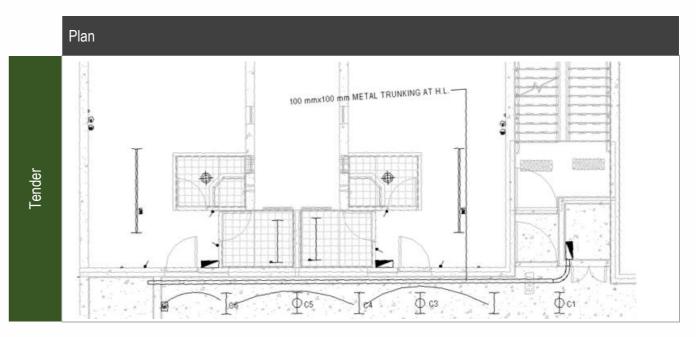
- There is no direct tool for drawing Trunking in Revit. To perform electrical properties, Trunking should be modelled by using Cable Tray tool in a separate file.
- Refer to Section 6.9 DM-E 02, Model Cable Tray under Section Electrical SAM



Essential Parameter

• Refer to Section 6.9 DM-E 02, Model Cable Tray under Section Electrical SAM

B Drawing Production



Annotation/ Presentation

• Setup standard filter for Trunking on plan view and 3D view.

Electrical Components	Preferred colour	RGB Colour System
Cable Tray and Cable Tray Fittings	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 -

METAL TRUNKING TELECOM Cable Tray with Fittings Channel Cable Tray 2475 300 mm×100 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.

DM-E 05 Conduits Fittings

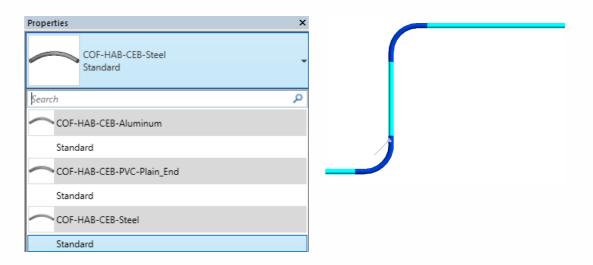
Discipline	Electrical	
Family	Loadable Family	
Category	Generic Model → Conduit Fittings	
Workset		
Naming Convention	CDF-(Functional_Type)-HAB-Type-Material	

	Short form	Description
Functional Type (Fitting	CCP	Conduit Cap
Type)	CCR	Conduit Cross
	СЕВ	Conduit Elbow
	CEM	Conduit Junction Box Elbow
	CER	Conduit Elbow_Radius
	CEC	Conduit Endcap
	CTE	Conduit Tee
	CTR	Conduit Transition
	CUN	Conduit Union
1st_Descriptor (Shape)	RECT	Rectangular
	OVL	Oval
	RND	Round
(1st_Descriptor for Multi- shape Transition)	RECT to OVL	Rectangular to Oval
2 nd _Descriptor (Material)	SSD	Sheet Metal
Refer to Duct Type (Material) Table.		



Modelling

- Typical fitting types should 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.

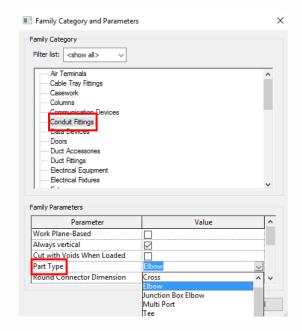


- It is **NOT suggested to create a fitting family** unless there is insufficient fitting design in Revit family library.
- Please follow the below procedure to modify the fittings provided from Revit Library for Hong Kong Practices for Design Stage only.
- Prepare Typical Type

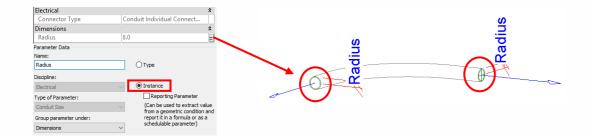
For conduit coupling, elbow, union, junction box for tee and cross etc., set up appropriate size lookup table.

(i) 3D model family

- Extracted the material properties of the Conduit fittings from their family name for Quantity Take-Off is proposed.
- Define suitable Conduit Fittings for family category and Part Type for family creation.



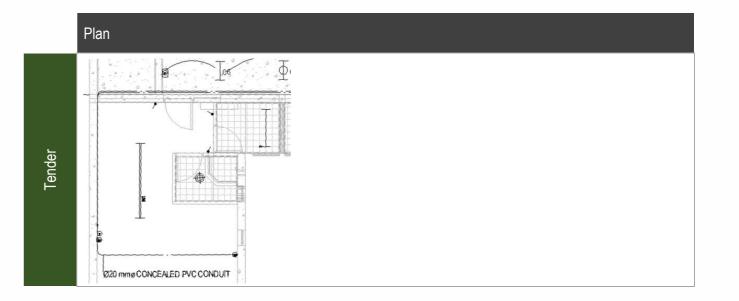
- Conduit connectors should be modelled in family.
- Only Radius is adopted for connector dimension in Revit. Please be aware of dimension parameter control.
- The diameters of the conduit fitting outlets and corresponding connectors should be controlled by formulated instance parameters.



Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	-		Υ
Туре	-		Υ
Service Type	Instance		Υ

B Drawing Production



Schedule -

			Bend	
Family	Туре	Size	Radius	Count
OF HAD OFF OF T	0111	50	200	T4
OF-HAB-CEB-Steel	Standard	53 mmø-53 mmø	292 mm	1

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PPENDIXES

DM-E 06 Conduits

Discipline	Electrical
Family	System Family
Category	Conduits
Workset	
Naming Convention	Material-HAB

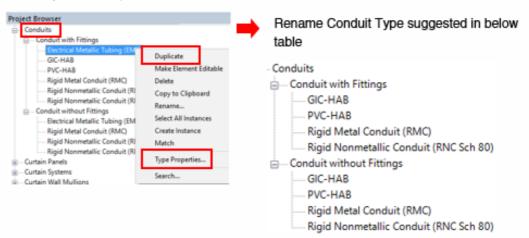
	Short form	Description
Material	GIC	Concealed G.I. surface/ Concealed Conduit
	PVC	Concealed PVC Conduit





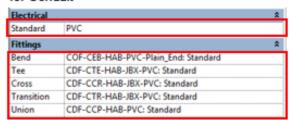
Modelling

- Unless there is requirement on conduit drawing production, conduits should not be modelled.
- Before conduit modelling, Conduit Type and Conduit Fitting should be well established.
 - Manage Conduit Type



- 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



Establish your own abbreviations for Conduit by Type Mark for Drawing Production

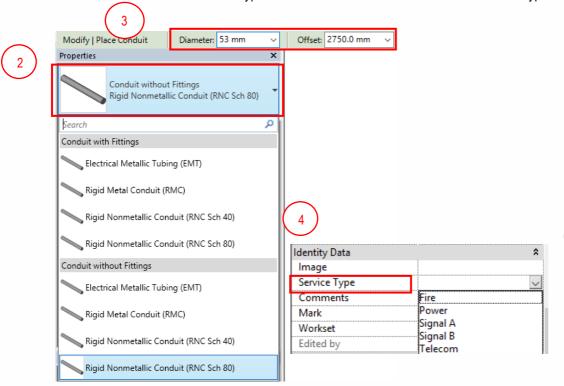
Type Mark CONCEALED G.I. SURFACE/ CONCEALED CONDUIT



All Conduits should be modelled as a closed/ complete system.

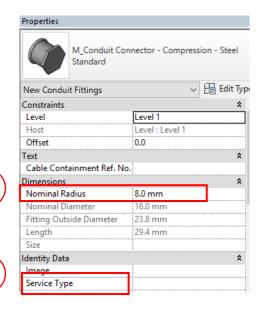
Model Conduit with fixtures/ equipment within Electrical project file

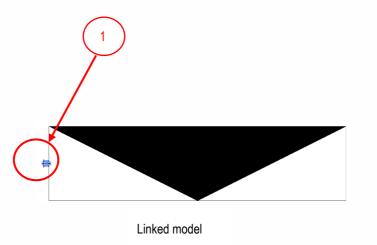
• Select Conduit ➤ Set suitable Conduit type ➤ Set dimensions and offset ➤ Define Service Type



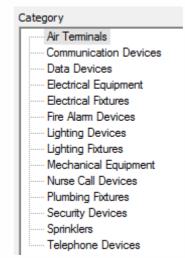


- To retrieve the actual elevation according to mPD level, select "Datum" as Reference Level.
- Model Conduit with fixtures/ equipment in Linked Revit model
 - Add appropriate connector to the fixtures/ equipment in linked model >> Set dimensions for the connect (directly/ By Edit Type) >> Input the electrical information of the fixture/ equipment to the connector >> Model duct referring to the procedure stated above.





 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 should be drawn in elevation view. The angle of the fitting should refer to the Electrical Setting, otherwise specify the special fitting angle in Remarks as reference for Quantity Take-Off or drawing production.

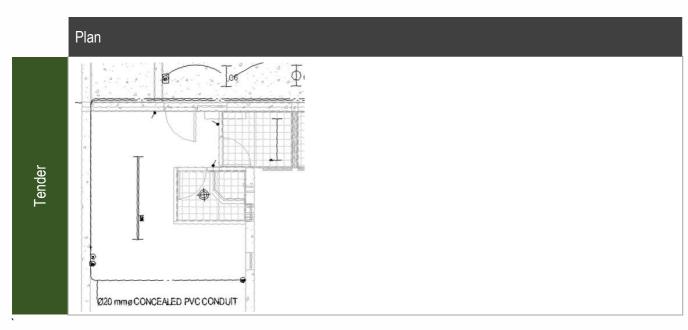


Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family and Type	Туре		Υ
Type Mark	Туре		Υ
Diameter	Instance		Υ
Length	Instance		Υ
Offset	Instance		Υ
Service Type	Instance		Υ
Other information	Instance	Description for Conduit	Υ

Q3

Drawing Production



(i) 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 Type Mark Family CONCEALED G.I. SURFACE/ CONCEALED CONDUIT Conduit with Fittings GIC-HAB CONCEALED G.I. SURFACE/ CONCEALED CONDUIT CONCEALED G.I. SURFACE/ CONCEALED CONDUIT Conduit with Fittings 2760 GIC-HAB 20 mm

• Dimension, type and Service Type of Conduit can be retrieved from the 3D model directly.

DM-E 07 Electrical components

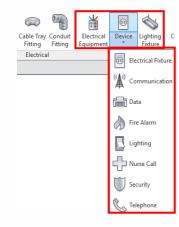
Discipline	Electrical
Family	Loadable Family
Category	According to Electrical components (Sub-Category) Table
Workset	
Naming Convention	Category-(Functional_Type)-HAB-1st_Descriptor-2nd_Descriptor

Electrical components (Sub-Category) Table

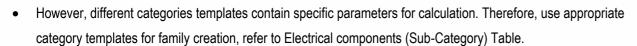
Category	Sub- Category	Examples
Electrical Equipment		Switchboards, Panelboards,
Device	Electrical Fixture	Power Socket, Junction Box, Electrical Cable Pit, Switch
	Communication device	Microphone, Speaker
	Data device	Junction Box, Data Outlet
	Fire alarm device	Smoke Detector, Fire Alarm Horn
	Lighting device	Dimmer, Occupancy Sensor
	Nurse Call device	Staff Station, Toilet Station
	Security device	Electric Lock, Security Alarm
	Telephone device	Telephone Outlet, Junction Box
Lighting Fixture		Wall, Ceiling and Recessed lights

Modelling

Place Electrical components







- The modelling requirements of electrical components are similar to that of Plumbing Fixture. Refer to Section DM-P 04, Plumbing Fixture under Section 6.7 Plumbing and Water Services SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to Section 6.8 DM-M 06 Mechanical Equipment.
- The lighting analysis can be done by Insight 360, involving Cloud Service, in Revit. However, models can be exported in STF or gbXML format for analysis in DiaLux or other software.

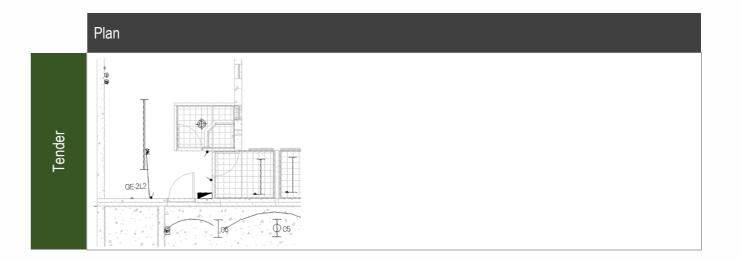


Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	Туре		Υ
Туре	Instance		Υ
Type Mark	Туре		Υ
Other information	Instance	Description of fixture and equipment for tagging	Y

• All required specifications of electrical components in equipment schedule should be built in the family as Essential Parameters accordingly.

B Drawing Production



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

- All specifications should 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.

DM-E 08

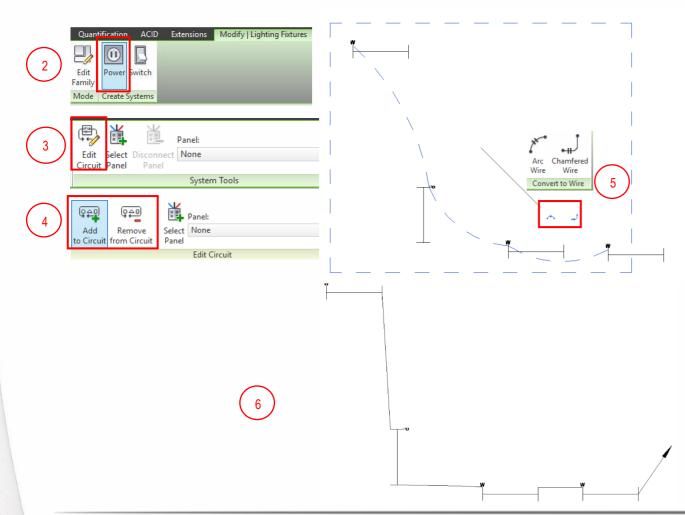
Circuit (Layout)

Discipline	Electrical
Family	System Family
Category	Circuit
Workset	
Naming Convention	

M

Modelling

- Before creating a circuit system for layout plan, all electrical components should be placed.
- Electrical components should 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



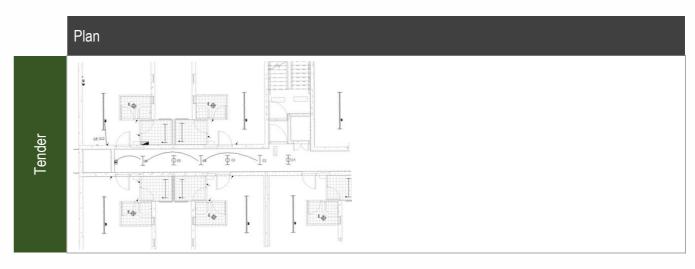
- · Use Wire tool in Electrical Panel to draw wiring directly.
- Wiring with arrow should be modelled after the whole circuit system is built.
- Name the circuit in a shared parameter "Schedule Circuit Notes".

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family and Type	Instance		Υ
Apparent Load	Туре		Υ
Circuitry No.	Instance		Υ
Other information	Instance	Description for Wiring	Υ

B

Drawing Production



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.

Schedule -SCHEDULE 5B - CIRCUITRY FOR (F1 - F39) PUBLIC LIGHTING LIGHTING FITTING CIRCUITRY NO. LOCATION (F6 - F12) (F13 - F18) (F19 - F25) (F26 - F32) (F33 - F39) T1 * SF11A MEP-3L2 MEP-4L2 HEP-3L2 HEP-4L2 TELECOM ROOM LEP-3L2 LEP-4L2 T2(F3 ONLY) + SF33A LEP-3L2(F3 ONLY) CABLE DUCT RR1 * SFM35A LE-11L1 RS&MMR RR2 * SFM35A LE-14L1 ME-13L1 LH-15L1 MH-15L1 PASSAGE TO RS&MMR RR4 * SFM50 LE-6L1 ME-6L1 HH-12L1 WATER METER CUPBOARD (1 WM1 * SF8 LH-12L1 LH-13L1 MH-12L1 MH-13L1 HH-13L1 WATER METER CUPBOARD (2) WM2 * SF8 LH-13L2 MH-12L2 MH-13L2 HH-12L2 HH-13L2 WM3 * SF8 LH-12L3 HH-13L3 WATER METER CUPBOARD (3) LH-13L3 MH-12L3 MH-13L3 HH-12L3 LEP-1L2 MEP-2L2 HEP-1L2 HEP-2L2 ELECT. METER ROOM (1) MR1 * SF11A LEP-2L2 MEP-1L2 CD1 * SF11A LEP-1L2 WORKING PLAFORM MR1 * SF11A ELECT. METER CUPBOARD LEP-1L2 ELECT. METER ROOM (2) MR2 * SF11A LEP-2L3 MEP-1L3 MEP-2L3 HEP-1L3 HEP-2L3 ELECT. METER ROOM (3) MR3 * SF11A MEP-2L1 WORKING PLAFORM CD3 + SF11A LEP-1L1 HEP-4L3 ELECT. METER ROOM (4) MR4 * SF11A LEP-4L3 MEP-3L3 MEP-4L3 HEP-3L3 CABLE DUCT CD4 • SF11A LEP-3L3 FOR SCHEMATIC WIRING DIAGRAM, SEE DRAWING. NO. KEO8/1/BLK1/B/EL-07, EL-08 & EL-09 • LICHTING FITTING WITH ELECTRONIC BALLAST

Above schedule format cannot be applied in Revit. Therefore, this schedule can only be prepared by traditional method.

Category	Examples
Specialty Equipment	Lift, Escalator, Fire Shutter etc.

DM-E 09 Specialty Equipment

Discipline	Architecture
	Electrical
	Fire Services and Pump
	Utility Services
	Depend on the function of the equipment
Family	Loadable Family
Category	Generic Model → Specialty Equipment
Workset	
Naming Convention	Category-(Functional_Type)-HAB-1st_Descriptor-2nd_Descriptor

Specialty Equipment Table



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 04, Plumbing Fixture under Section 6.7 Plumbing and Water Services SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to Section 6.8 DM-M 06 Mechanical Equipment.

Lift

- Lift and escalator are designed and located by Architects.
- For lift, engineers should place their Lift Car 3D family into the lift shaft to facilitate their drawing production.
- An instant parameter should 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.

Essential Parameter

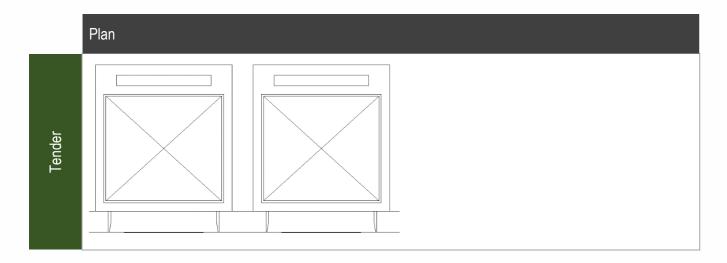
Parameter	Type / Instance	Description	Schedule
Family	Туре		Υ
Туре	Instance		Υ
Other information	Instance	Description of fixture and equipment for tagging	Υ
Type Mark	Туре		Υ

• All required specifications of electrical components in equipment schedule should be built in the family as Essential Parameters accordingly.

B

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Drawing Production



Schedule -

	Lift Schedule														
RVT Lir		LIFT				No.of Passengers	No. OF STOPS	TOTAL TRAVEL	Туре	RATED				DIMENSION	
Nai	ime	No.	Family	Type	FEATURE	Nos.	ABOVE G/F	DISTANCE	Mark	SPEED(m/s)	CONTROL	W (mm)	D (mm)	W (mm)	D (mm)
HAB-	-MRL	1	SPQ-LFT-HAB	Lift Door TYPICA R1L	PASSEN GER	12	10	111035	Lift		DUPLEX DOWN COLLECTIVE	2065	2065	2265	2365
HAB-	-MRL	2	SPQ-LFT-HAB	Lift Door TYPICA R1L	PASSEN GER	12	15	46235	Lift		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.
- All specifications should 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.

6.10 **Fire Services and Pump SAM**

The objective of this section is to assist project team in preparing Revit models for tender submission. It describes the standard approach to modelling in Fire Services and Pump 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 should be well prepared before modelling. This guide will cover pipework and relative appliances modelling. Refer Section 7 Presentation Style for preparing drawing production.

DM-F 01

Pipework



The setting and modelling on pipe system in FS discipline is similar to Plumbing discipline. Refer to Section 5.7.3, Model Pipe under Section Plumbing and 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

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		

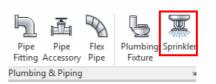
DM-F 02 Fire Services Equipment

Discipline	Fire Services
Family	Loadable Family
Category	According to Fire Services Protection components (Sub-Category) Table
Workset	
Naming Convention	Category-(Functional_Type)-HAB-1st_Descriptor-2nd_Descriptor

Modelling

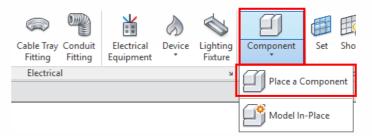
- Fire Services Equipment is divided into three main categories in Revit, i.e. Sprinkler, Specialty Equipment and Fire Alarm Device under Electrical Equipment.
- Fire Protection equipment, such as fire extinguisher, fire hose cabinet etc., is under Specialty Equipment; Fire Alarm Device refers to Section 6.9 DM-E 07, Add Electrical components under Section Electrical SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to Section 6.9 DM-E 07 Mechanical Equipment.

Place Sprinkler

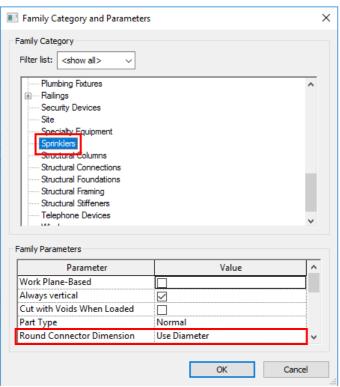


• Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.

Place Specialty Equipment



- Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.
- Most of the sprinklers hosted on ceiling should be placed in ceiling model file shared with Architects.
- Other sprinkler layouts and Fire Protection equipment should be drawn on floor plan under Fire Services discipline with suitable setting on View range.



- Fire Protection equipment is suggested to use a Face-based or Generic family template under Specialty Equipment.
- The modelling requirements of Fire Service Equipment are similar to that of Plumbing Fixture. Refer to Section DM-P 04, Plumbing Fixture under Section 6.7 Plumbing and Water Services SAM.



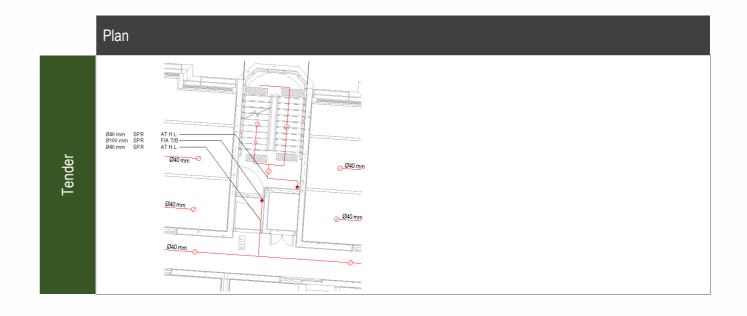
Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	Туре		Υ
Туре	Instance		Υ
Type Mark	Туре		Υ
Other information	Instance	Description of fixture and equipment for tagging	Y

 All required specifications of electrical components in equipment schedule should be built in the family as Essential Parameters accordingly.

B

Drawing Production



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

Schedu	ule -								
	Sprinkler Schedule								
Level	Space: Name	Space: Number	Family	Туре	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			

All specifications should 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.

6.11 Utility Services SAM

The objective of this section is to assist project team in preparing Revit models for tender submission. It describes the standard approach to modelling in Utility Services 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 should be well prepared before modelling. This guide will cover pipework and relative appliances modelling. Refer Section 7 Presentation Style for preparing drawing production.

DM-U 01

Pipework – CLP Cable, TBE Cable, Electrical Cable, Towngas Pipe

The setting and modelling on pipe system in Utility Services discipline is similar to Plumbing discipline. Refer to Section 5.7.3, Model Pipe under Section Plumbing and 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 Section 5.9.3, Model Cable Tray and Section 5.9.4, Model Trunking under Section Electrical SAM.

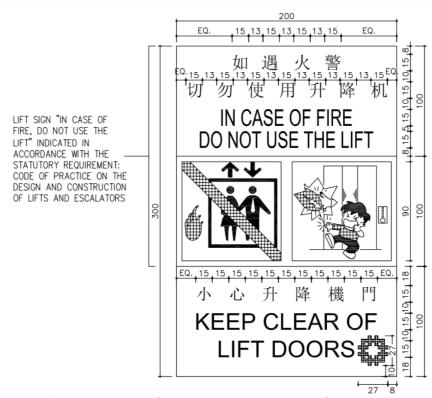
DM-U 02

Utility Equipment

M

Modelling

- 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.
- All signage details such as below figure should **not** be modelled in family or project model.
- Signage details should 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 7.4 Model and Drawing Detail.



- The modelling requirements of equipment are similar to that of Plumbing Fixture. Refer to Section DM-P 04,
 Plumbing Fixture under Section 6.7 Plumbing and Water Services SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to Section 7.7 MD-P 05 Mechanical Equipment.

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APPENDIXE

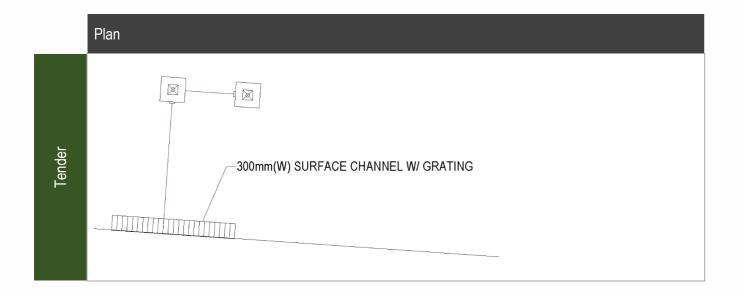
Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	Туре		Υ
Туре	Instance		Υ
Cover Level	Instance		Υ
Invert Level	Instance		Υ
Depth	Туре		Υ
Length	Туре		Υ
Width	Туре		Υ
Type Mark	Туре		Υ
Other information	Instance	Description of fixture and equipment for tagging	Y

 All required specifications of electrical components in equipment schedule should be built in the family as Essential Parameters accordingly.

B

Drawing Production



Schedule -

Gully Schedule									
Fan	nily	Туре	Type Mark	Outlet Pipe	Length	Width	Depth	Invert Level	Cover Size
STE-STU-I	HAB-Gully	OTG 200x200	OTG	100	200	200	200	330	225x225
STE-STU-I	HAB-Gully	OTG 300x300	OTG	150	300	300	300	380	300x300
0.20.0		01000000	10.0	100	1000		1000	1000	Joseph

6.12 **Drainage and Sewage SAM**

The objective of this section is to assist project team 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 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 should be well prepared before modelling. This guide will cover pipework and relative appliances modelling. Refer Section 7 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 Section 5.7.3, Model Pipe under Section Plumbing and 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

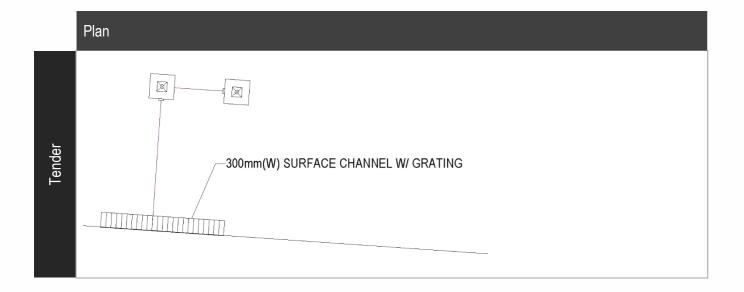


- Drainage plan including pipeworks, fixture and equipment should be created under Drainage and Sewage
- Some of the equipment is built as site component in the family, such as Manhole. Then, you may add it through the Structure view or create a new family under a suitable category.
- The modelling requirements of equipment are similar to that of Plumbing Fixture. Refer to Section DM-P 04, Plumbing Fixture under Section 6.7 Plumbing and Water Services SAM.
- The modelling requirements for service/ maintenance space are similar to that of Mechanical Equipment. Refer to Section 7.7 MD-P 05 Mechanical Equipment.

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Family	Туре		Υ
Туре	Instance		Υ
Cover Level	Instance		Υ
Invert Level	Instance		Υ
Depth	Туре		Υ
Length	Туре		Υ
Width	Туре		Υ
Other information	Instance	Description of fixture and equipment for tagging	Y

All required specifications of electrical components in equipment schedule should be built in the family as Essential Parameters accordingly.



Schedule -

			Gully Sched	lule				
Family	Туре	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

6.13 Quantity Take-Off Enabled Scheduling SAM

The following principles shall be noted for Quantity Take-off (QTO) purpose from the information models -

- Modelling methodology for serving drawing production purposes shall take precedent; If schedule is prepared also for Quantity Take-off (QTO) purpose, the modelling methodology may need some adjustments to fulfil both purposes;
- Such adjustments should not be exhaustive nor induce notable extra effort by the model design authors. Otherwise it defeats the
 primary objective for BIM adding workload to the team rather than facilitating the design process;
- Quantity Surveyor shall extract required information input by the originator, i.e., the design authors, out of the models;
- Raw data manipulated by the software, e.g. object quantity counts, can be extracted to facilitate the QTO process;
- Quantity Surveyor shall input some calculation process out of the information readily available in the model, to achieve their
 professional deliverables. Example for calculating the cost of paints for concrete is illustrated in below section.
- To facilitate the process of the QTO, two vacant parameters are added to family object's essential parameter, which can be customised by Quantity Surveyor.

Essential Parameter

Parameter	Type / Instance	Description	Schedule
Base Constraint	Instance	Base Level	Υ
Top Constraint	Instance	Top Level	Υ
Unconnected Height	Instance	Wall Height	N
Length	Instance		N
Thickness	Туре		Υ
Material	Туре	Material	Υ
Туре	Туре	Type Name	Υ
Area	Instance	Wall Area	Υ

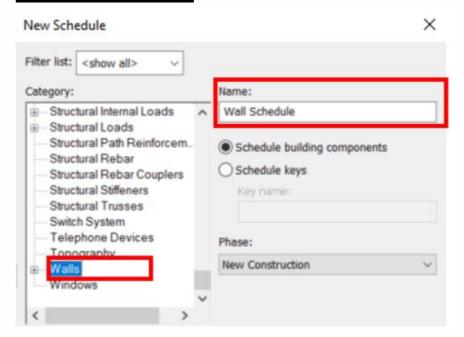
- Extract the parameters from a category of elements from Revit is simple yet powerful. It helps to filter or sort informant in an organized fashion
- · Quantities can be extracted to enable Cost Estimation
- Correct Category of objects must be selected.

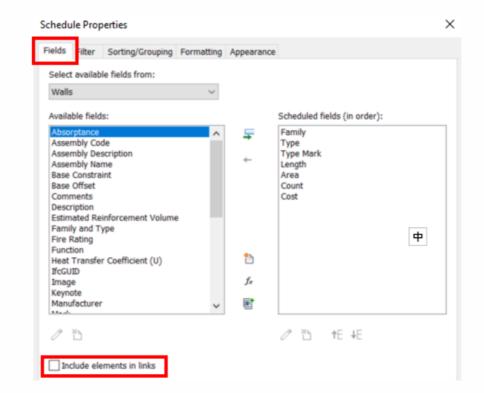
DQ-01

Concrete

- · All concrete item will not be given a concrete grade in the material, Concrete grade to be added under Type Comments field;
- Precast / cast in-situ will be distinguished by material;
- Formwork area of slab, beam, column and wall could be scheduled from the size of the element itself, no additional modelling is
 required, but may need adjustments to the raw data extracted to suit the Hong Kong Standard Method of Measurement of Building
 Works (SMM) requirements.
- QS is required to pay attention to the material of different formwork as the schedule that BIM provided could only show the area of formwork.
- The method below describes the way to extract quantities in Volume, the same methodology also applies to other quantities in length or area.

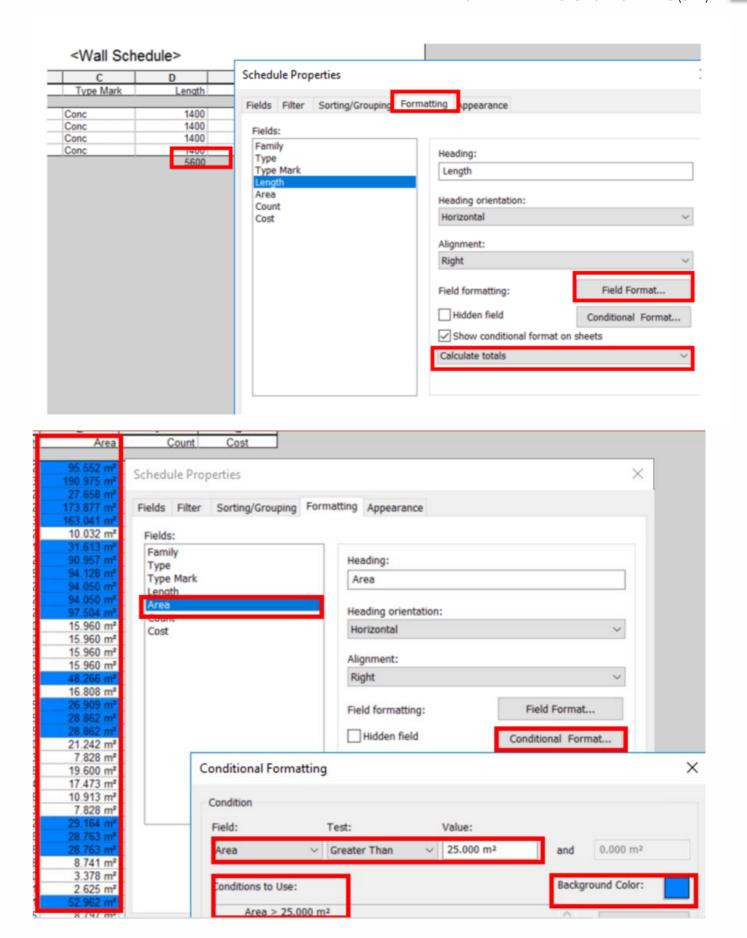
Create Concrete Wall QTO





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В			D	E		F		G			
Type	Type	Mark		ength	Area		Count	Cost			
Exterior - Insulation on Masonry											
Exterior - Insulation on Masonry		Schedu	le Prop	perties							>
Exterior - Insulation on Masonry											
Exterior - Insulation on Masonry		Fields	Filter	Sorting/Grouping	Forma	ttina	Appearan	ice			
Exterior - Insulation on Masonry		110.00		Der tillige di dalpini,	,	9	тфрозгол				
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Generic - 200mm		And:		(non€ 中		~				_	~
Generic - 200mm				Ψ							
Generic - 200mm						-					
Generic - 200mm		And:		(none)							~
Generic - 225mm Concrete	Conc										
Generic - 225mm Concrete	Conc	And:		(none)					~		
Generic - 225mm Concrete	Conc	PUTO.		(none)							
Generic - 225mm Concrete	Conc					_					
Interior - 138mm Partition (1-hr)	A1	And:		(none)							~
Interior - 138mm Partition (1-hr)	A1										
Interior - 138mm Partition (1-hr)	A1					-					
Interior - 138mm Partition (1-hr)	A1	And:		(none)		~			~		
Interior - 138mm Partition (1-hr)	A1										

Sort by:	Length	∨	ending	Opescending
Header	Footer:	_		Blank line
Then by:	Туре	∨	ending	Oescending
Header	Footer:			Blank line
Then by:	(none)	∨ ⊚ Asc	ending	O Descending
Header	Footer:			Blank line
Then by:	(none)	⇒ @ Asc	ending	Oescending
Header	Footer:			Blank line
Grand totals:	Title, count, and totals	~		
	Custom grand total			



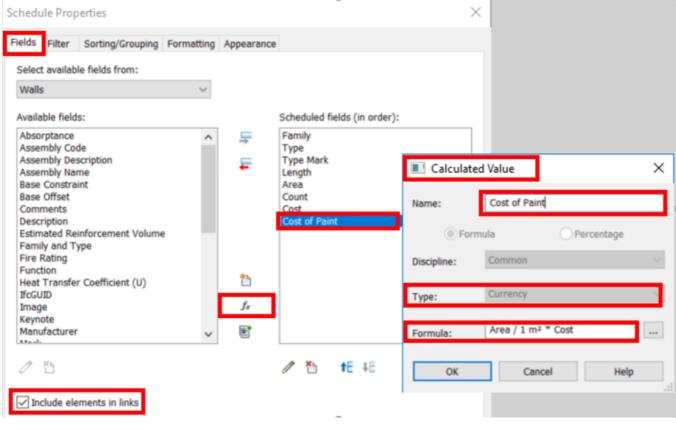
To Calculate the cost by adding additional Cost field:

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Q1

Q2



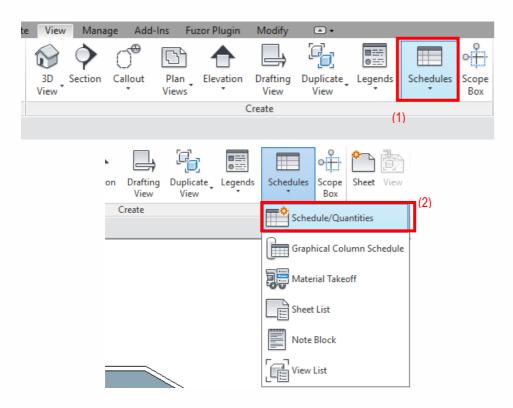
C	D	E	F	G	Н
pe Mark	Length	Area	Count	Cost	Cost of Paint
	8402	95.552 m²	1	HK\$12.00	HK\$1146.62
	20713	190.975 m²	1	HK\$12.00	HK\$2291.70
	8332	27.658 m²	1	HK\$12.00	HK\$331.90
	20002	173.877 m²	1	HK\$12.00	HK\$2086.53
	14133	163.041 m²	1	HK\$12.00	HK\$1956.49
1	2892	10.032 m²	1	HK\$12.00	HK\$120.38
	8471	31.613 m²	1	HK\$12.00	HK\$379.36
	8302	90.957 m²	1	HK\$12.00	HK\$1091.49
	8385	94.128 m²	1	HK\$15.00	HK\$1411.92
	8402	94.050 m²	1	HK\$15.00	HK\$1410.75
	8332	94.050 m²	1	HK\$15.00	HK\$1410.75
	8332	97.504 m²	1	HK\$15.00	HK\$1462.56
	1400	15.960 m ²	1	HK\$21.00	HK\$335.16
	1400	15.960 m²	1	HK\$21.00	HK\$335.16
	1400	15.960 m²	1	HK\$21.00	HK\$335.16
	1400	15.960 m²	1	HK\$21.00	HK\$335.16
	16246	48.266 m²	1	HK\$17.00	HK\$820.52
	5890	16.808 m²	1	HK\$17.00	HK\$285.74
	8385	26.909 m²	1	HK\$17.00	HK\$457.45
1	8385	28.862 m²	1	HK\$17.00	HK\$490.65
	8385	28.862 m²	1	HK\$17.00	HK\$490.65

DQ-02 Door/ Window

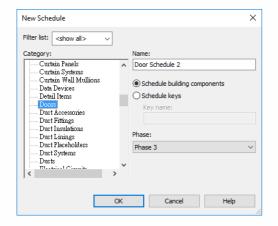
- Door/ Window is required to be built up to LOD 350 in project model file;
- Typical door/ window is required to be built up to LOD 350 in modular flat model for QTO purposes;
- Door lock (ironmongery) is not an essential item as it could be represented as an instant parameter of the door itself; unless it is required to be shown for presentation purpose;
- Over modelling in Revit is not recommended.

Door/ Window Schedule

View Tab \rightarrow Click "Schedule" (1) \rightarrow Click "Schedule /Quantities" (2)

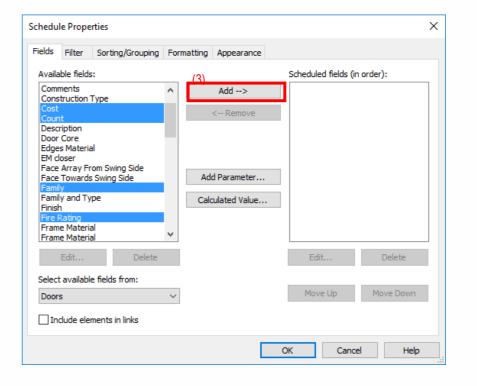


Click "Door" → Click "OK" (apply similar for "Window")



Fields

Add the door fields from Available fields to Scheduled fields: (apply similar for "Window") Select parameter in Available fields box → Click "Add" (3)

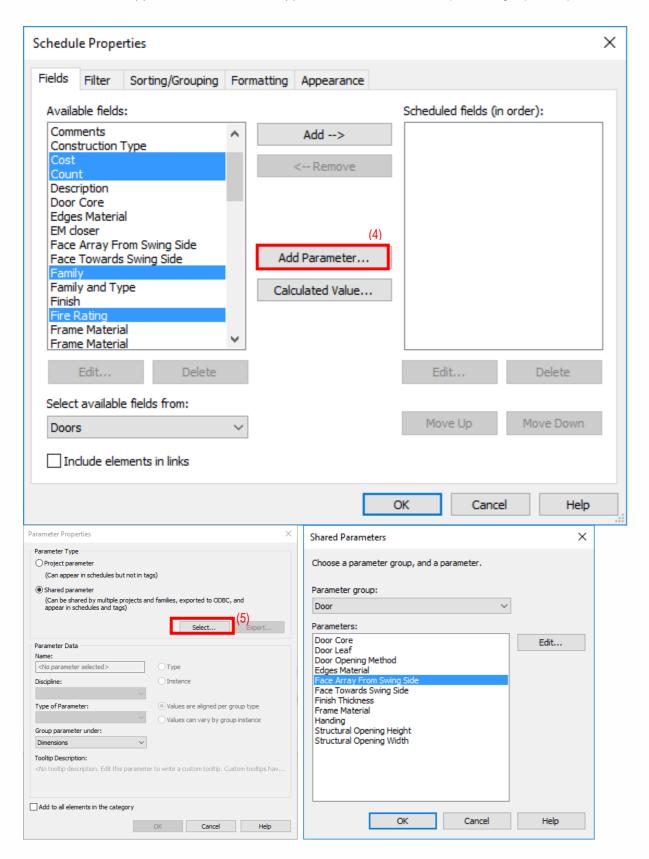


SMM4 to Schedule	Parameter	Type of Parameter
Door mark	mark	System Parameter
Structural opening width	Structural Opening Width	Length
Width to outside of door frame	Width	Length
Structural opening height	Structural Opening Height	Length
Height to outside of door frame	Height	Length
Door thickness	Thickness	Length
Door set type	Type Comment	System Parameter
Teak veneered one side	Face Array From Swing Side	Material
Teak veneered one side Teak veneered both sides	Face Array From Swing Side Face Towards Swing Side	Material Material
Teak veneered both sides	Face Towards Swing Side	Material
Teak veneered both sides Door opening method	Face Towards Swing Side Opening Method	Material (Family Naming)
Teak veneered both sides Door opening method Framed	Face Towards Swing Side Opening Method Frame Material	Material (Family Naming) Material

STANDARD APPROACH OF MODELLING (SAM)

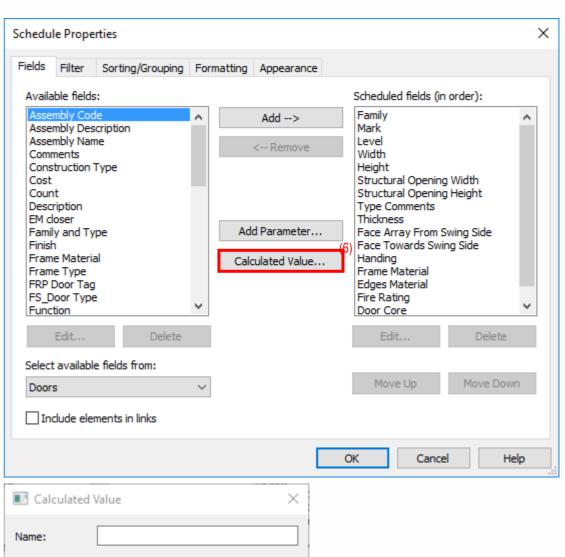
Add the parameters in door schedule: (apply similar for "Window")

Click "Add Parameter" (4) → Pick "Share Parameter" (5) → Click "Select" → Choose a parameter group, and a parameter → Click OK



Calculated Value in door / window schedule:

Click "Calculated Value" (6)→ Add Name and Choose Type → Use Parameter to create Formula → Click OK



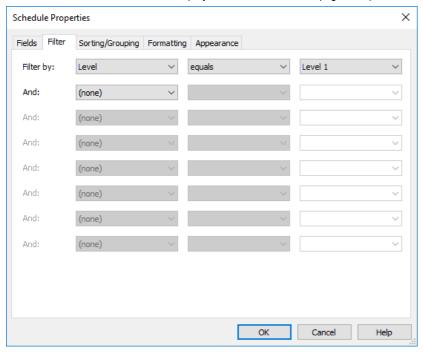
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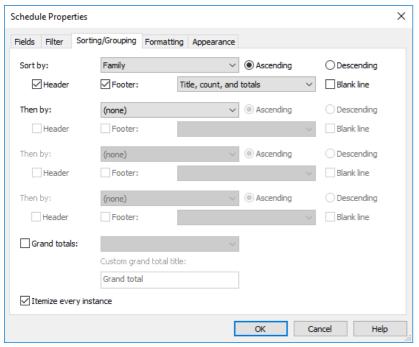
Filter

You can create filters that limit the display of data in a schedule. (e.g. Level)



Sorting/Grouping

See examples of sorting and grouping for schedules, including itemizing instances, sorting, and totals.



Formatting

Width > 1000

Specify various formatting options, such as column orientation and alignment, grid lines, borders, and font styles. Click "Conditional Format" (7) \rightarrow Add rule \rightarrow Set Background Colour

School of Department (1) 7 Year tale 7 Co	X
Schedule Properties	^
Fields Filter Sorting/Grouping Formatt	ing Appearance
Fields:	
Family Mark	Heading:
Level Width	DOOR
Height Structural Opening Width	Heading orientation:
Structural Opening Height	Horizontal
Type Comments Thickness	Alignment:
Face Array From Swing Side Face Towards Swing Side	Left ~
Handing Frame Material	Field formatting: Field Format
Edges Material Fire Rating	Hidden field Conditional Format (7)
Door Core	✓ Show conditional format on sheets
	Calculate totals
	OK Cancel Help
Conditional Formatting	×
Condition	
Field: Test:	Value:
Mark V None	value.
, and	
Conditions to Use:	Background Color:

Clear All

Cancel

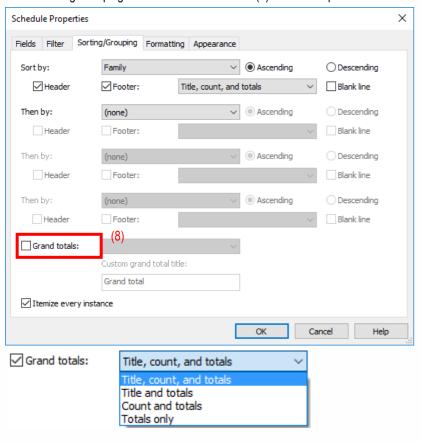
OK

STANDARD APPROACH OF MODELLING (SAM)

D	E
	DOOR
WIDTH	HEIGHT
1660	2100
1660	2100
900	2100
900	2100
850	2100
850	2100
900	2100

Grand totals

On the Sorting/Grouping tab \rightarrow Click "Grand Total" (8) \rightarrow Select option



A	В	С
DOOR	DOOR MARK	LEVEL
DOR-DBL-AEC-Wood-w_VP		
DOD DDI AEC Wood w VD	D07	Level 1
-	DUT	Level I
-	D07	Level 1
DOR-DBL-AEC-Wood-w_VP		
DOR-DBL-AEC-Wood-w_VP DOR-SGL-AEC-Wood-SC_VP		Level 1
DOR-DBL-AEC-Wood-w_VP DOR-DBL-AEC-Wood-w_VP DOR-SGL-AEC-Wood-SC_VP DOR-SGL-AEC-Wood-SC_VP DOR-SGL-AEC-Wood-SC_VP	D08	Level 1
DOR-DBL-AEC-Wood-W_VP DOR-SGL-AEC-Wood-SC_VP DOR-SGL-AEC-Wood-SC_VP	D08	Level 1 Level 1 Level 1 Level 1
DOR-DBL-AEC-Wood-W_VP DOR-SGL-AEC-Wood-SC_VP DOR-SGL-AEC-Wood-SC_VP DOR-SGL-AEC-Wood-SC_VP	D08 D01 D02	Level 1 Level 1 Level 1

400

DQ-03

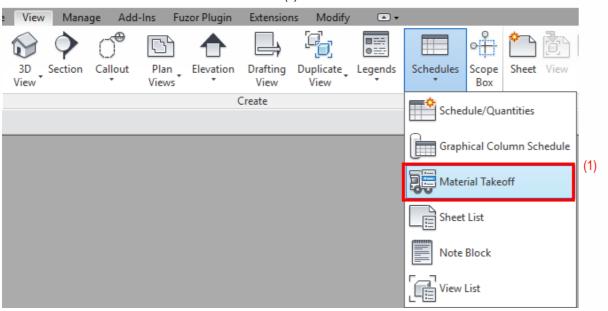
Finishes (typical floor)

- Wall and floor finishes to be built in the typical floor non-modular flat area such as corridor, lift lobbies etc. for QTO purposes.
- Wall finishes are to be built under separate workset so that they can be hidden used for the purpose of statutory submission (no wall finishes to be shown);
- Wall finishes will only build up to 100mm above ceiling:
- Floor finishes to be built room by room;
- Finishes are measured as separate walls and finishes objects;

Material Takeoff

Create a list of the sub-components or materials of any Revit family category.

View Tab → Click "Schedule" → Click "Material Takeoff" (1)



Scheduled fields (in order):

Material: Area
Material: As Paint
Material: Comments
Material: Cost
Material: Description
Material: IfcGUID
Material: Image
Material: Manufacturer
Material: Manufacturer
Material: Model
Material: Name
Material: URL
Material: Volume

DQ-04

MEP Elements

- For MEP elements, extraction of QTO is to be the same as Door/ Window.
- For the schedule methodology, please refer to DQ-02 Door/ Window.
- All elements and systems shall be named according to FLIP Naming System.
- System family (Pipes, Ducts, Trunking etc.) can be sort according to its system name.
- Equipment should be sort according to (appropriate) "Type Mark".
- Fitting or accessories should be sort according to its family name and system name.
- Fields of MEP elements should be based on family objects' essential parameters. Only apply the important parameters (two
 vacant parameters) for SMM4 scheduling.
- The modelling hierarchy of MEP services, however, shall be prioritized as follows:
 - 1. MVAC Ducts
 - 2. Drainage Pipe
 - 3. Electrical
 - Plumbing

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6.14 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.

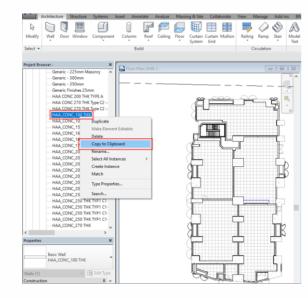
Follow this workflow to determine whether the existing system family types can be adopted.

- 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.

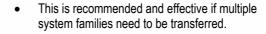
To load system family types:

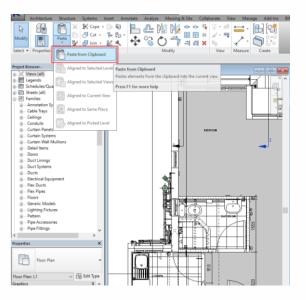
 Copy one or more selected types from one project

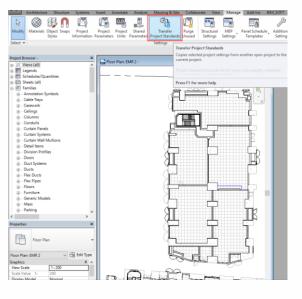


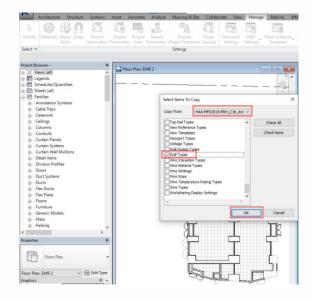
Paste to another project

 Transfer all system family types of a selected system family from one project to another









FL-02

Loadable Family

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

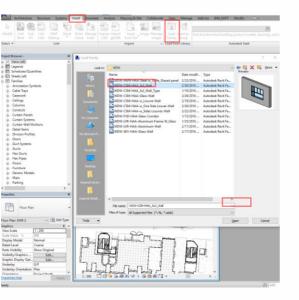
Follow this workflow to determine whether the existing families can be adopted. Loadable families are the most extensive and customizable families in Revit. Families can be customized for projects while a number of families are ready for use in the Revit family library.

- 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 adde single project file and cannot be shared	ed to multiple categories of elements in a pro with other projects.	oject. Project parameter is specific to a	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		

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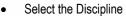
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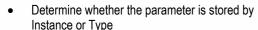
Project Parameter:

To add custom information to a system family, project parameters are needed since system families are not loaded into the project.

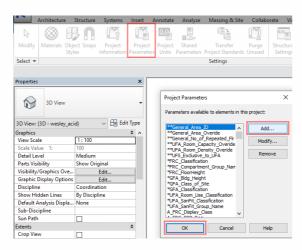
- Add the new Project Parameters in the Project Parameters dialog
- Name the new Project Parameter

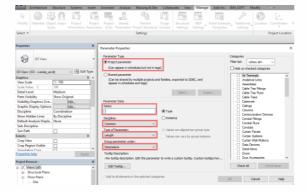


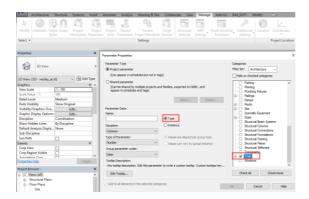
- Select the Parameter Type
- Under Group Parameter, select the heading under which the parameter should display on the Properties palette or in the Type Properties dialog



• Select the element Categories to which this parameter should be applied





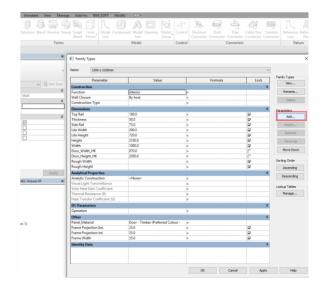


Family Parameter:

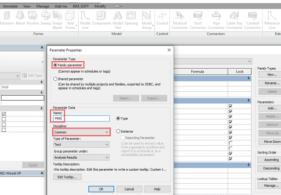
New instance parameters or type parameters for any family type can be created.

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.

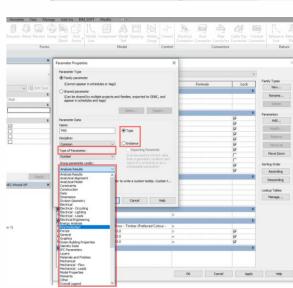
- Click Create tab in the Family Editor > Properties panel > Family Types
- Click Add under Parameters



- 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



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APPENDIX

Shared parameters are parameter definitions that can be used in multiple families or projects. Shared parameter definitions are stored in a file independent of any family file or Revit project; so that access to the file is possible from different families or projects.

Shared parameters are saved in a text file that can be placed in a shared area on the office network or server to allow common access. One Revit project can reference only one shared parameter file at a time. Thus, at an organization level, there should be one common shared parameter file, like a template, that is applicable as standard for all projects. The editing authorization for this file has to be limited to the BIM Manager of the office.

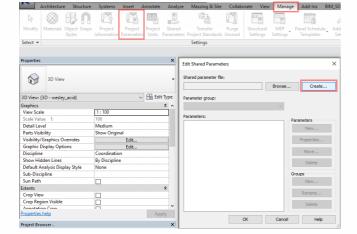
To start a new project, the standard shared parameter text file should be relocated to the project-specific location for access by the project team's BIM Manager. When customized shared parameters solution (from a different file) is required for a specific project, BIM Manager should export the parameters to the active file and supersede the old one at the project-specific location.

For a parameter to be used in a tag, it must be a shared parameter. Shared parameters are also essential when creating a schedule that displays various family categories. With a shared parameter added to the desired family categories, these categories can be included in a multi-category schedule.

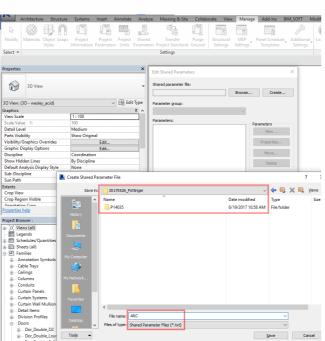
Please refer to D.MET-2-2 Naming conventions for Shared Parameter and Parameter Naming

The shared parameter file stores the definitions of the shared parameters. To create a shared parameter file:

- Click Manage tab > Settings panel > Shared Parameters
- Click Create in the Edit Shared Parameters dialog

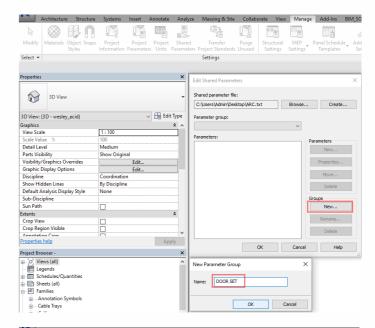


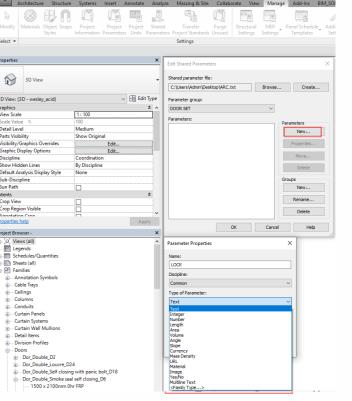
- Save the file to the desired location (within the project folder is recommended)
- This should be protected from change
- The file is to be accessed, edited and managed by the BIM Manager of the project



Add and name the Parameter Group

- Select a 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





NEXES APPEN

Design Guidelines

4

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). (https://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: 300 KB

MEP Family:

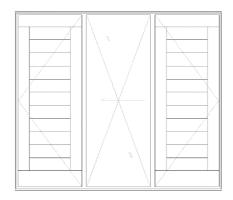
Simple Level: 200 – 400 KB Complex Level: 800 – 1000 KB

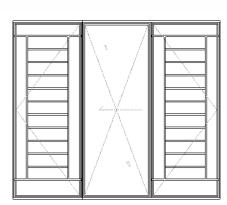
IMPORTANT: To help reduce the file size, in Revit, click File—Purge Unused to delete items that are not in use, click File menu—Save As, and verify that the Compact File option is selected when saving the file.

Level of Detail

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 should 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 predefined reference planes and the insertion point is the cross point of these reference planes. Also, these reference planes have default setting of "Defines Origin" property. Please follow the guide below to determine the family insertion point.

- Normally, the default insertion point from template should not be modified in order to avoid unexpected error. Create or modify 3D geometry based on default insertion point.
- Consider the insertion point of user convenience, that is, family should be easy to place in the project without manual adjust.
- On plan view (known as XY plane), the insertion point should 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 should 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 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 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 should 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 should be considered while planning the Family.

Will the Family need to accommodate multiple sizes?

For a window that is available in several preset sizes, or a bookshelf that can be built in any length, create a standard component Family.

How should the Family display in different views?

The way the object should 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 should 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 should be used to create the Family.

How much detail should 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.

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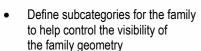
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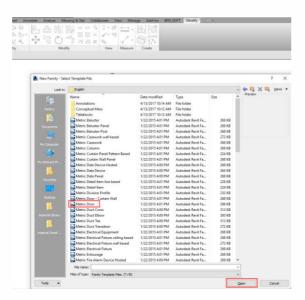
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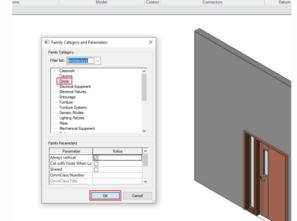
To ensure that the content is created in the most efficient and least error–prone manner, review and use the best practice workflow below before creating a model family.

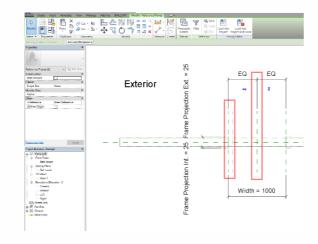
• Create a new family file (*.rfa) with the appropriate family template



- Create the family framework:
 - Define the origin (the insertion point) of the family
 - Layout reference planes to snap to when sketching component geometry



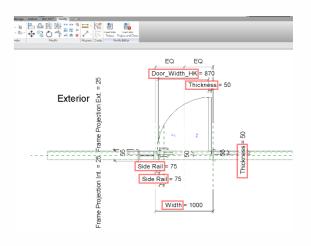


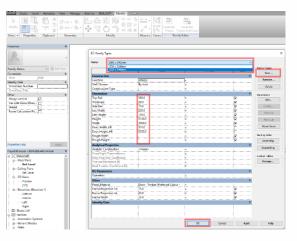


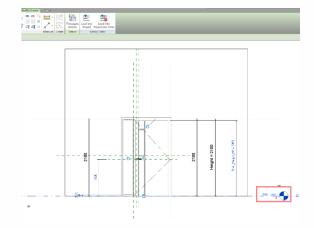
- Add dimensions to specify parametric relationships
- Label dimensions to create type of instance parameter or 2D representation

· 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 should 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	

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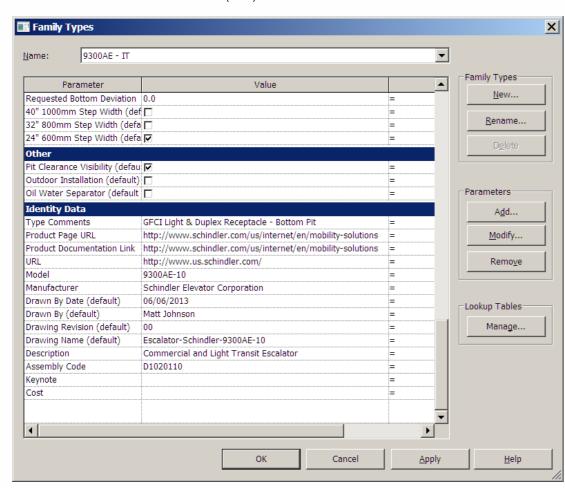
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Identity data parameters for an Escalator that include values for manufacturer data.

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 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 catalogs:

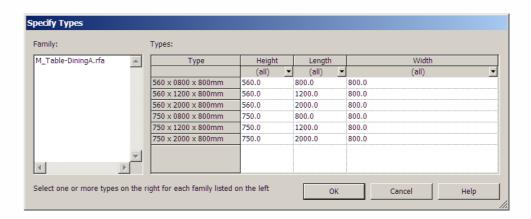
- Use any text editor to create type catalogs.
- Create type catalogs for families that contain six or more types.
- Name a type catalog file (.txt) with the same name as the family file (.rfa) that it supports.
- Ensure that parameters in type catalogs are test loaded by the family for which you create 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 annotation family. Apply the following modelling methods to create an intelligent annotation family for drawing production.

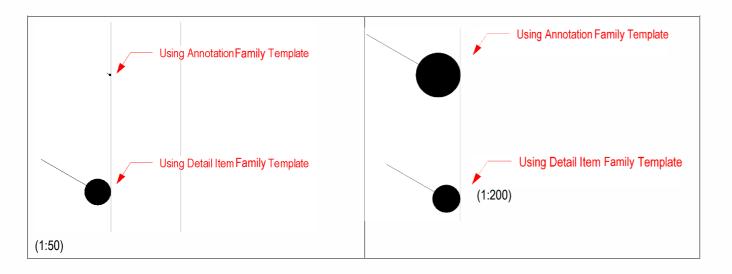
Scale-dependent Symbol

- Detail Item family template and Annotation family template both can be used to create 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

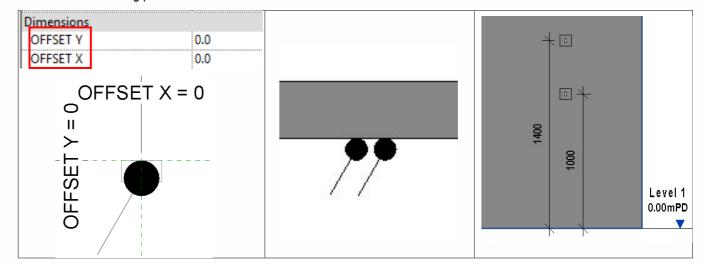
A light switch 2D symbol draw by Detail Item family template and Annotation family template.

	Node Diameter sketch in family editor (mm)	In Project Environment				
Node Diameter		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



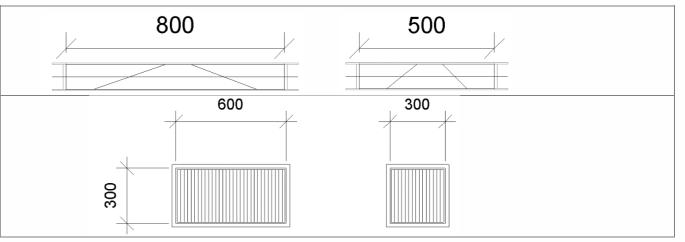
2D Symbol Offset

• Apply offset parameters to control the location of the annotation family in order to avoid the overlapping of 2D symbols in MEP drawing production.

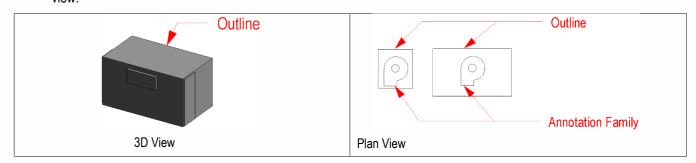


Size-dependent Symbols

• For those families and corresponding symbols which are able to vary their dimensions, the symbols should be drawn within the family by using Symbolic Line and locked with 3D model.

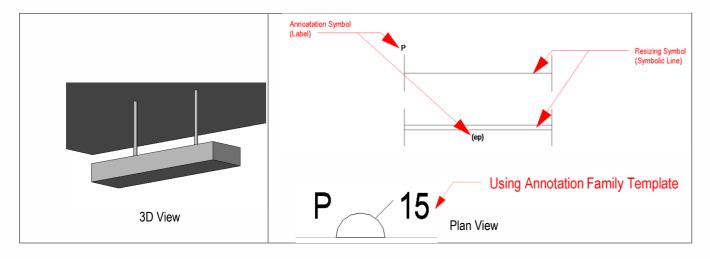


• Make use of the outline of the family as a placeholder for the symbol. Turn off the visibility for useless 3D solids for plan view.



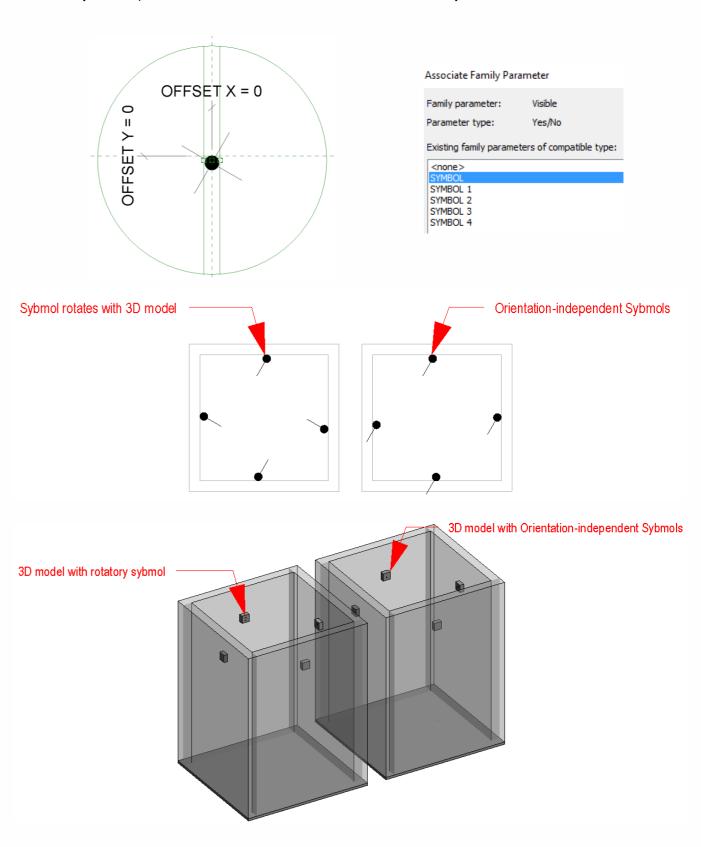
2D Symbol Text

- Annotation family template should 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 should 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 of 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.

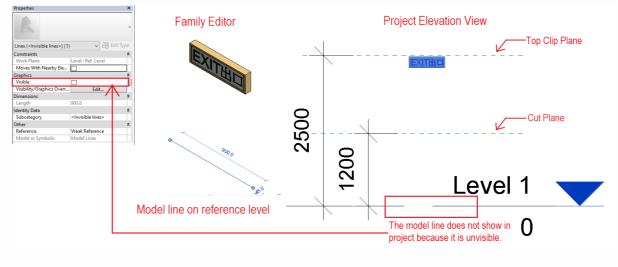
- The maintenance space should be created as a sperate family and nested into equipment family.
- The maintenance space should use generic model and be set as a "Shared" family and a sub-category such as "Maintenance Space". This method allows user to control all maintenance space visibility by sub-category under 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 should be created by parametric modelling to allow user to change its size in equipment family.
- The maintenance space should be transparent in the 3D view, normally set as 80% in material.
- The maintenance space should 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

- 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:



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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		













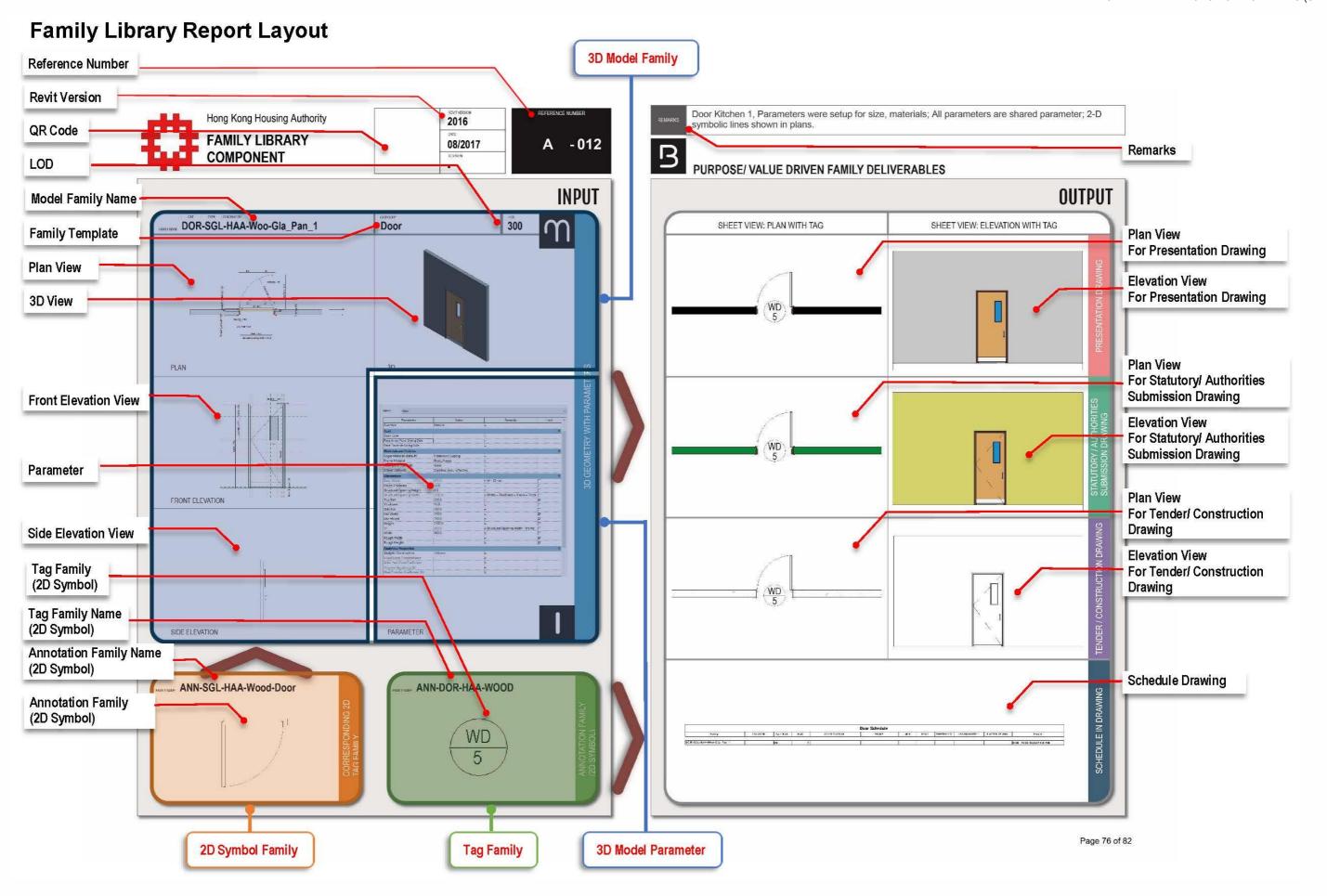












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