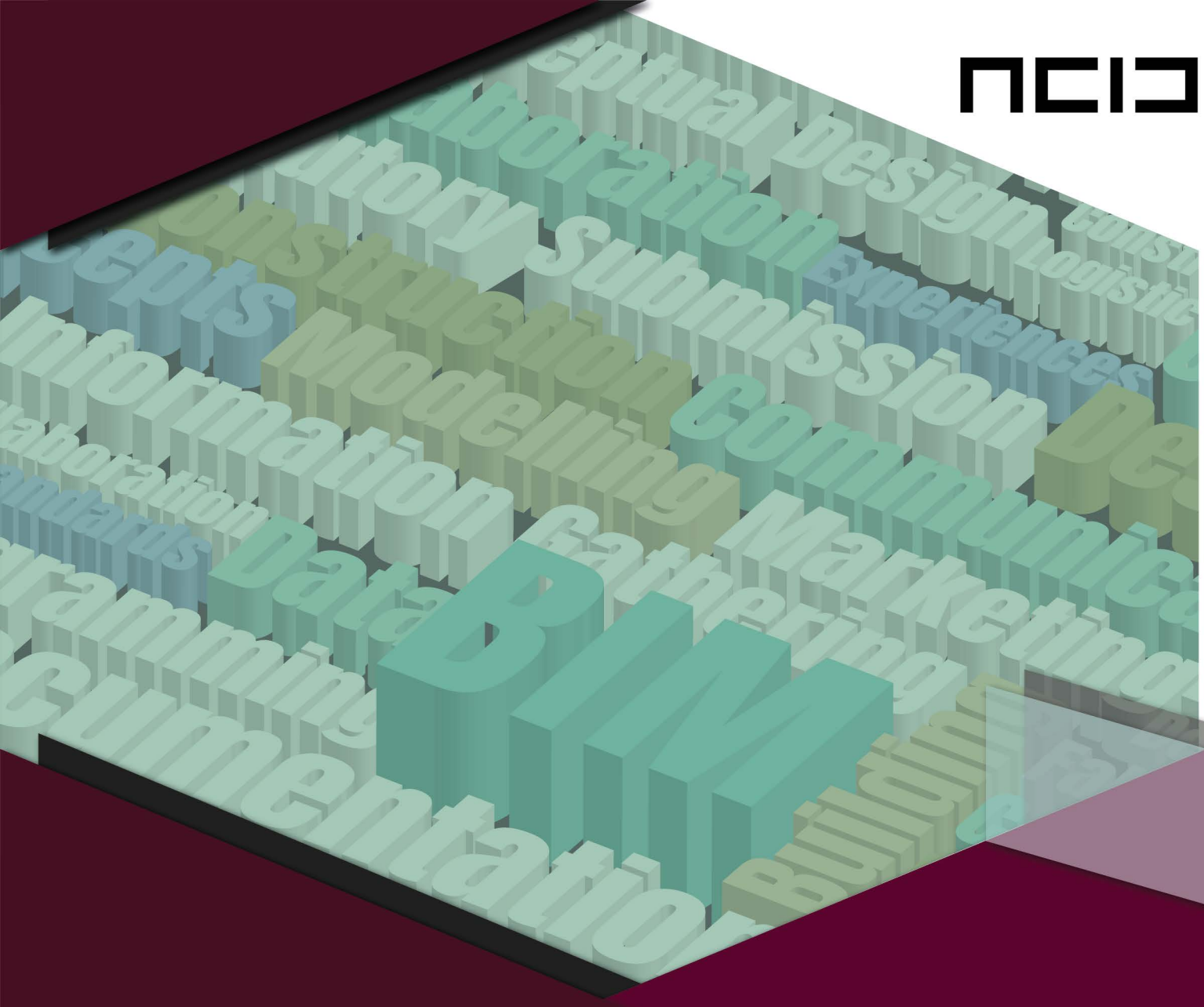

BUILDING INFORMATION MODELLING

Training Materials

Families (Revit)

Advanced Construction Information Development Ltd.

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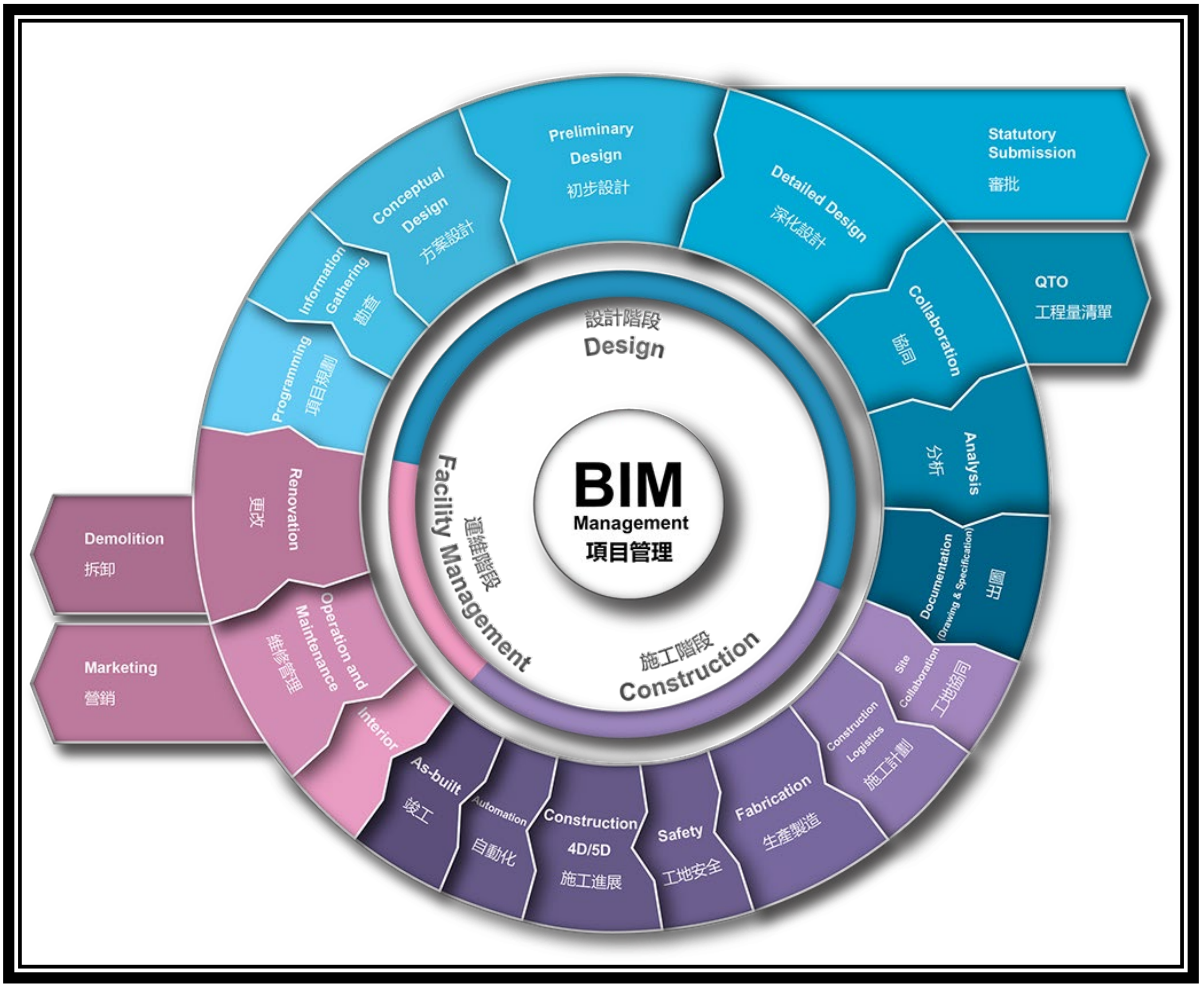
1. Basic Concepts

1.1 Background

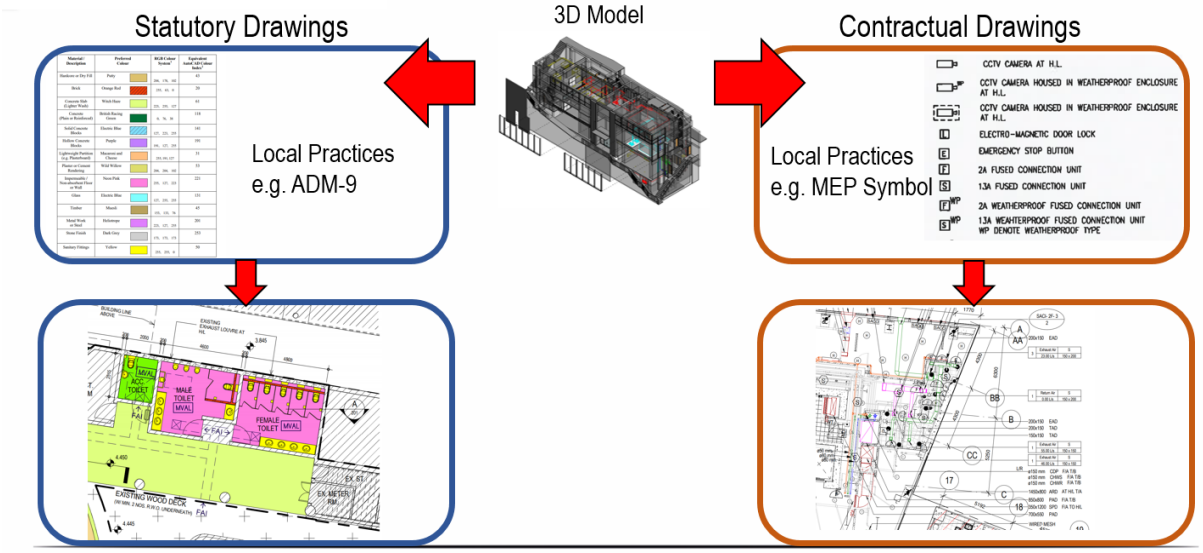
Building Information Modelling (BIM) is not just a three-dimensional drawing tool but a new tool to holistically manage information relating to construction projects from planning stage, to design, construction and operational stages. It is a new way of working using new technology to facilitate project management and execution, better construction process control, cross-disciplinary collaboration, internal coordination, external communication, problem solving, decision making support, productivity management, and risk management.

A BIM project is made up of **a lot of BIM objects** such as walls, floors, columns, window, door, furniture or even a picture on the wall. A BIM object should be contained geometry and non-geometry information to achieve various requirement in whole life cycle of building.



1.2 Purpose Driven

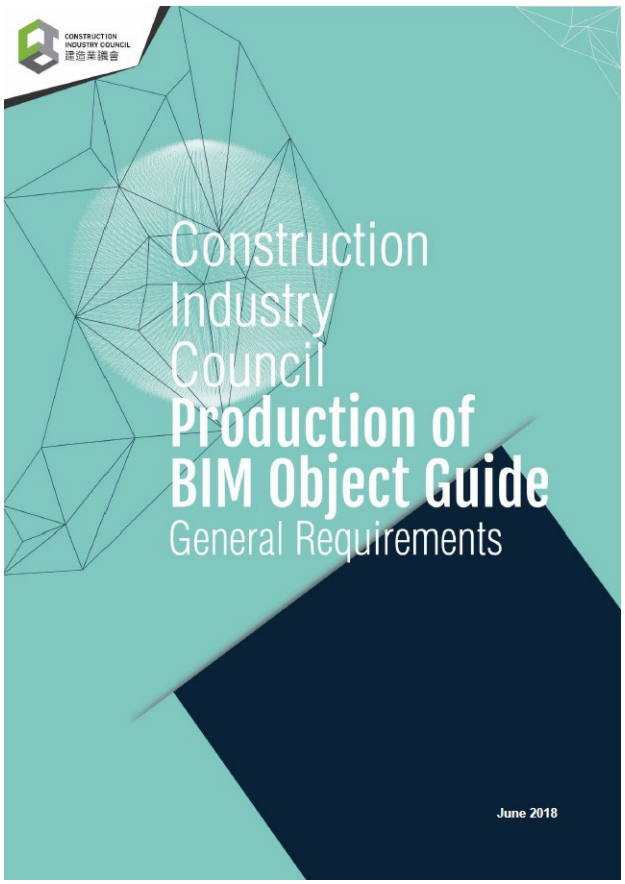
Drawing production is the most important and concerned deliverable of industry, both statutorily and contractually due to drawing is the only accepted tool of submission and communication in local practice nowadays. **A value driven BIM should be able to generate drawing production** set for presentation, statutory and tender purpose.



To achieve drawing production purpose, the BIM object needs to be of the purpose and value driven. A right quality BIM object should satisfy requirements which including suitable geometry, non-geometry information, functional in BIM project and able to generate drawing production.

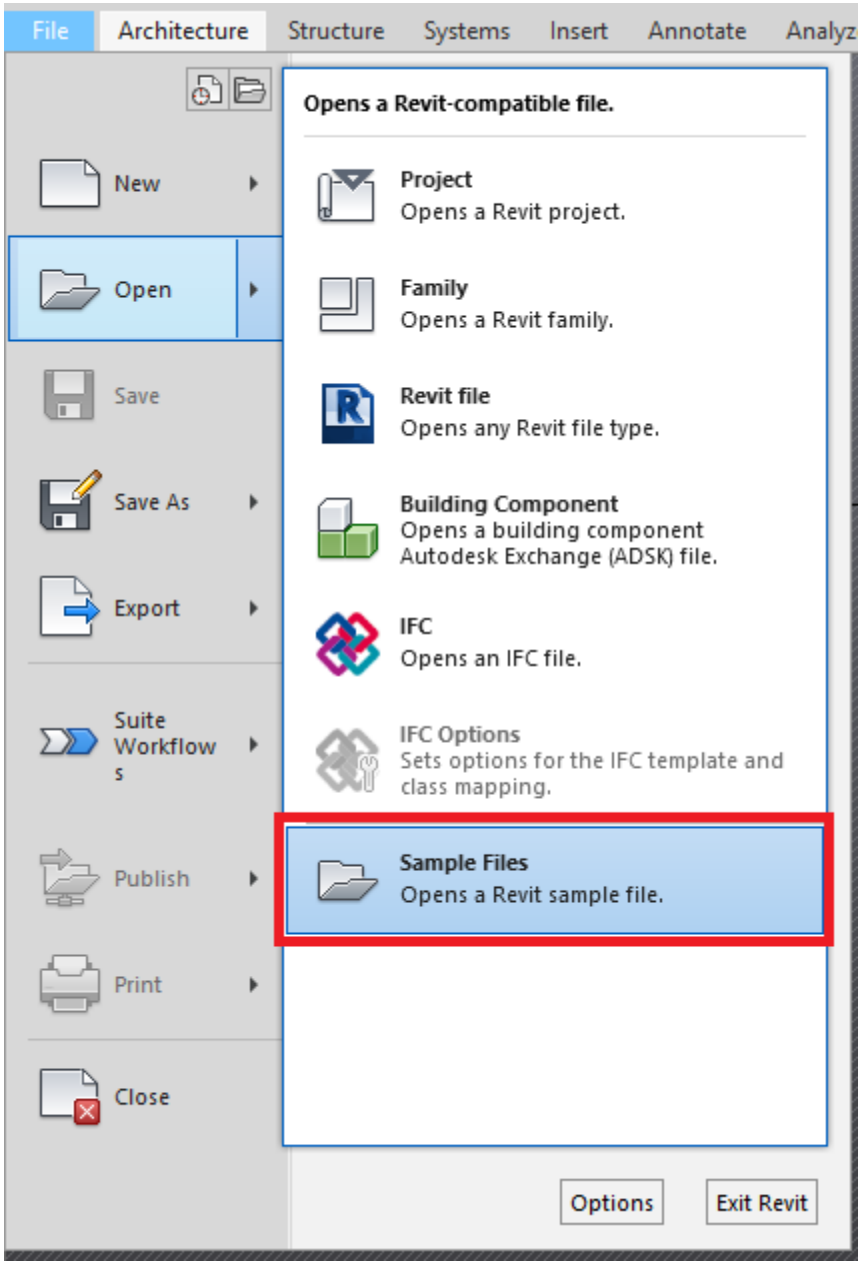
The BIM object shall be designed and modelled to enable to generate drawing production without extra handling or modifying. The value of BIM object is created on its proper information including geometry and non-geometry component. Hence, the BIM object can coordination in BIM model and generate schedule production.

The minimum requirement of the BIM object shall refer to *"CIC Production of BIM Object Guide - General Requirements"* published by Construction Industry Council. This guide is standardizing all BIM object in Hong Kong industry.



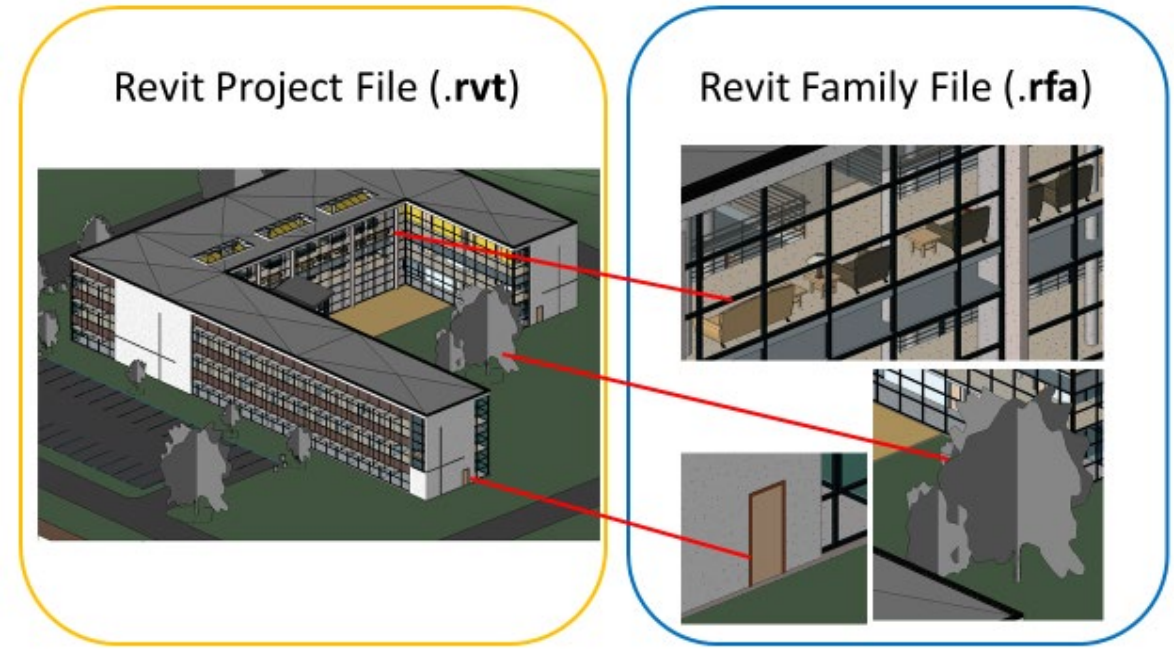
1.3 Revit Sample Project

Revit has provided a set of Sample Revit Project of default installation including Architecture, Structure and MEP models. These sample projects are good start to learn Revit. Each discipline provided one basic sample and one advanced sample Revit project. You can open these sample project from “File” -> “Open” drop down list -> “Sample Files” button.



1.4 Revit Environment

In simple word, Revit models can separate to two kinds of file type, Revit Project File (.rvt) and Revit Family File (.rfa). You can imagine that the Revit Project File is containing the building while the Revit Family File is containing BIM Object.



One Revit Project File is containing many Revit Family Files. Each Revit Family File is containing one BIM Object and able to apply into many Revit Project Files. In other word, relationship between Revit Project File and Revit Family File is similar of LEGO, Revit Family File as like as little LEGO element and used to consist a large LEGO model (Revit Project File).

1.5 BIM Object in Revit

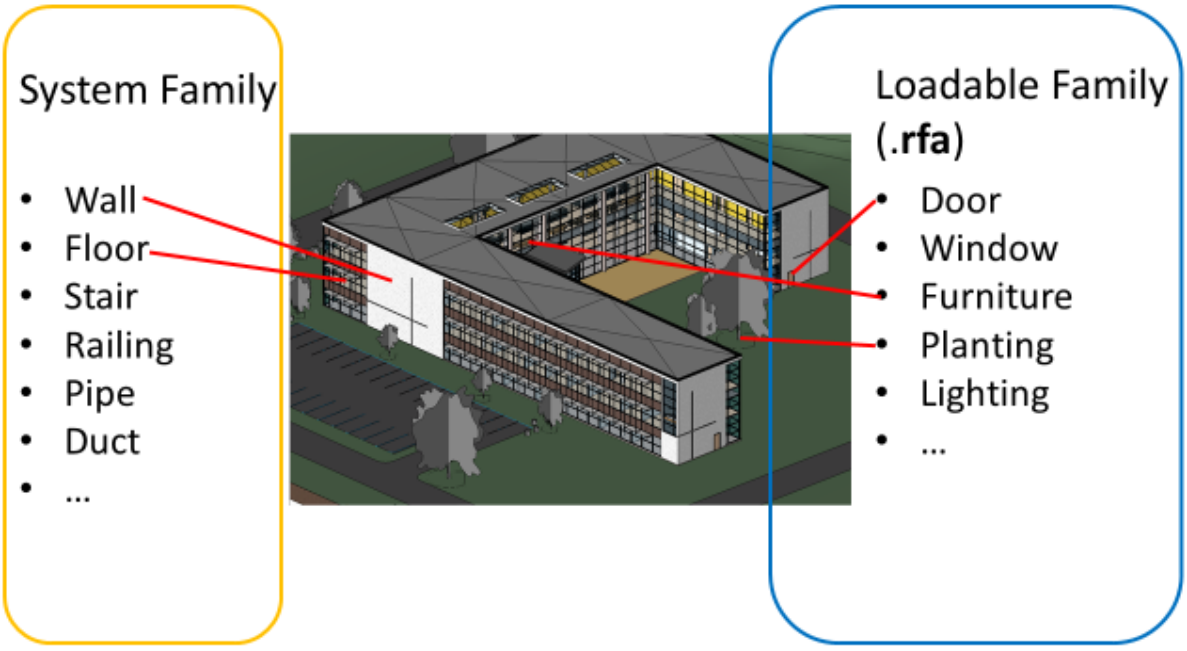
BIM Object is called "**Family**" in Revit. A family is a group of elements with related graphical representation and a common set of properties, called parameters.

There are 3 kinds of families in Revit: **System Families, Loadable Families, and In-place Families**.

Most commonly used in 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 in project environment and unable to be loaded into another project.

System families contain family types for basic building elements such as walls, floors, ceilings, and stairs in the building model. It also includes types for elements such as levels, grids, sheets, viewports and project & system settings which affect the project environment. System families are predefined and saved in templates and projects, not loaded from external files. They can be duplicated and modified customized to become system family types.

Unlike system families, loadable families are created in external RFA files and imported into projects. Most of building components, services components and 2D annotation BIM objects are loadable families in Revit such as window, door, equipment and fixture, are loadable families. Loadable families are the most extensive and customizable families in Revit. Families can be customized for projects while a number of families are ready to use in the Revit family library.

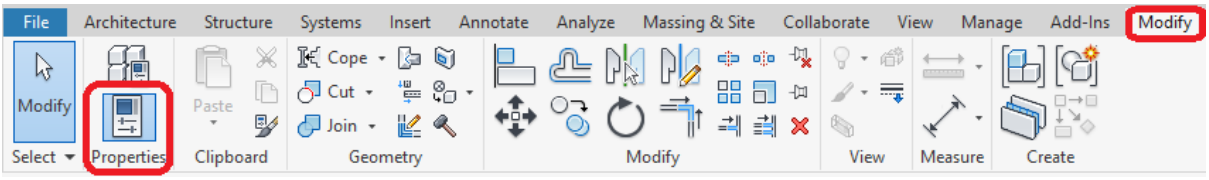


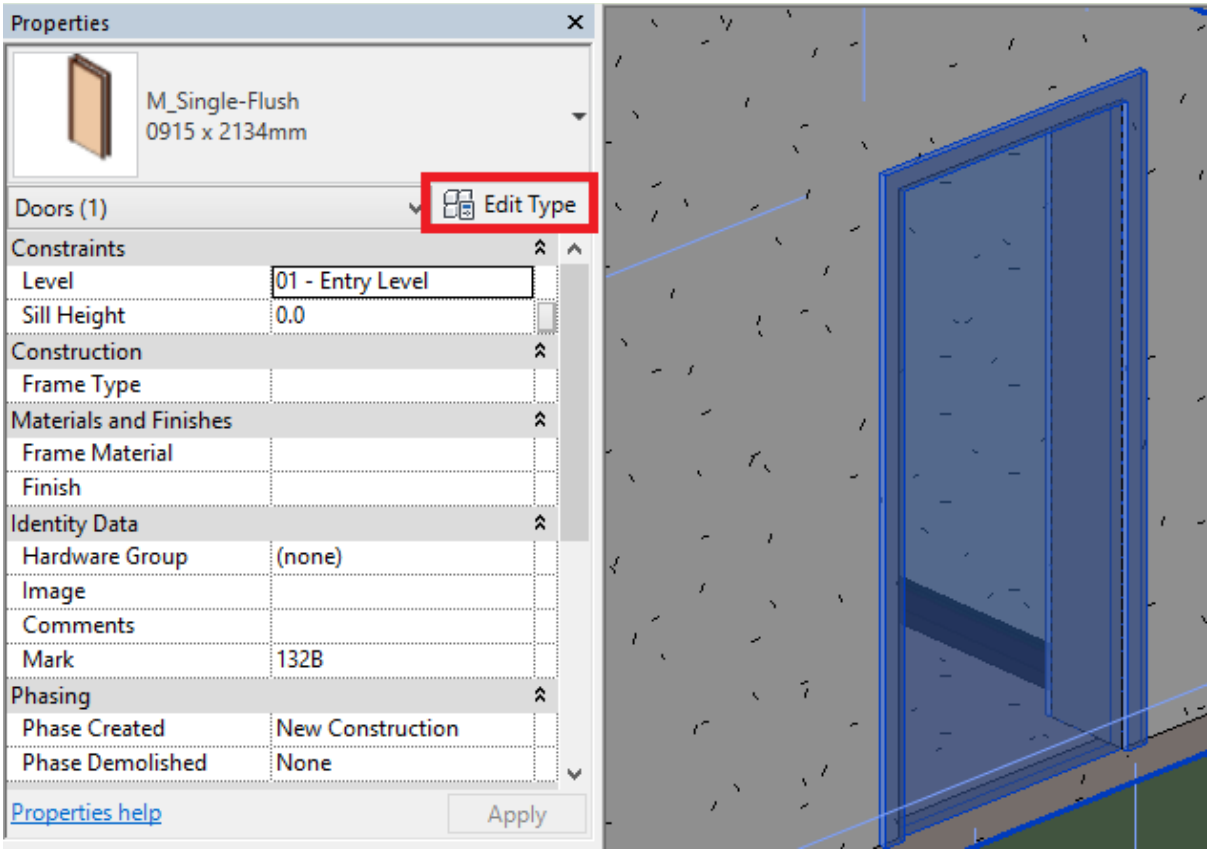
1.6 Introduction of Revit Project UI

Revit Project UI and Revit Family Editor UI is similar with little difference. This section only highlighted several important part which relative of Revit Family Application and drawing production.

- Properties Window

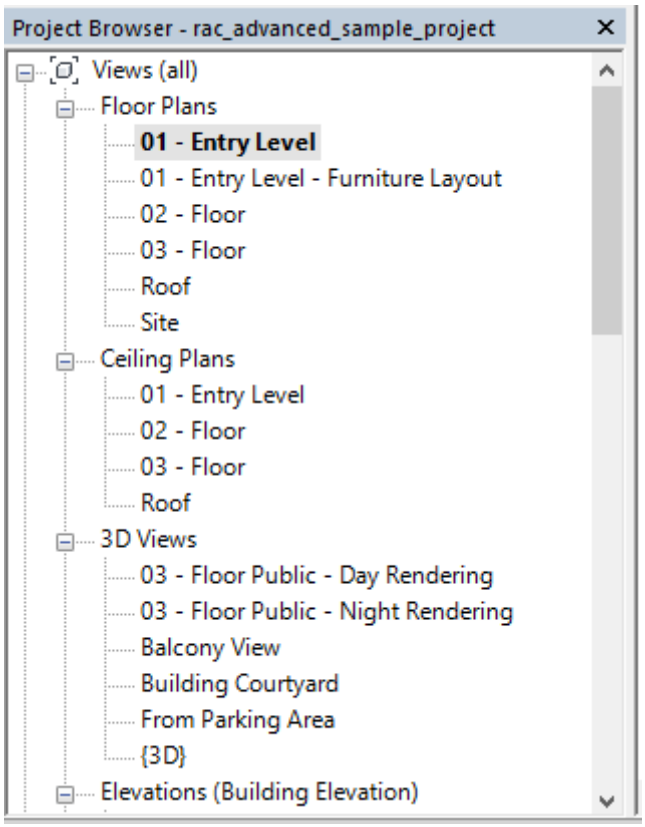
When you select an element in Project, its Instance Parameter Information will show on this properties window. Click the “Edit Type” button will show up a dialog which contain its family type information (Type Parameter).





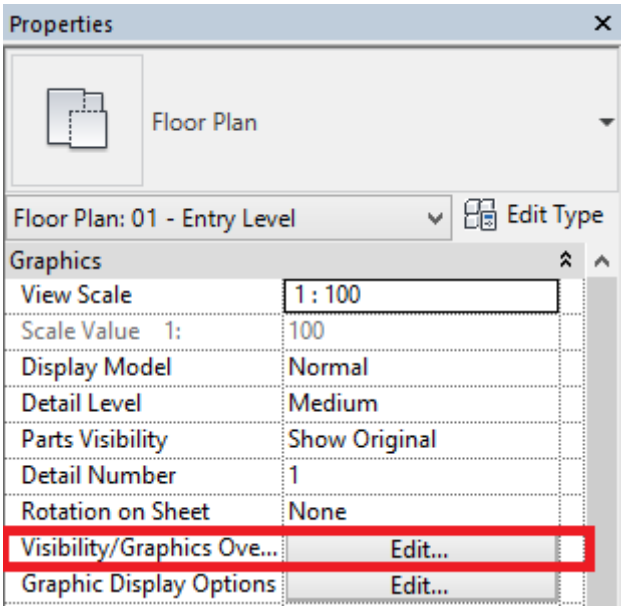
- Project Browser

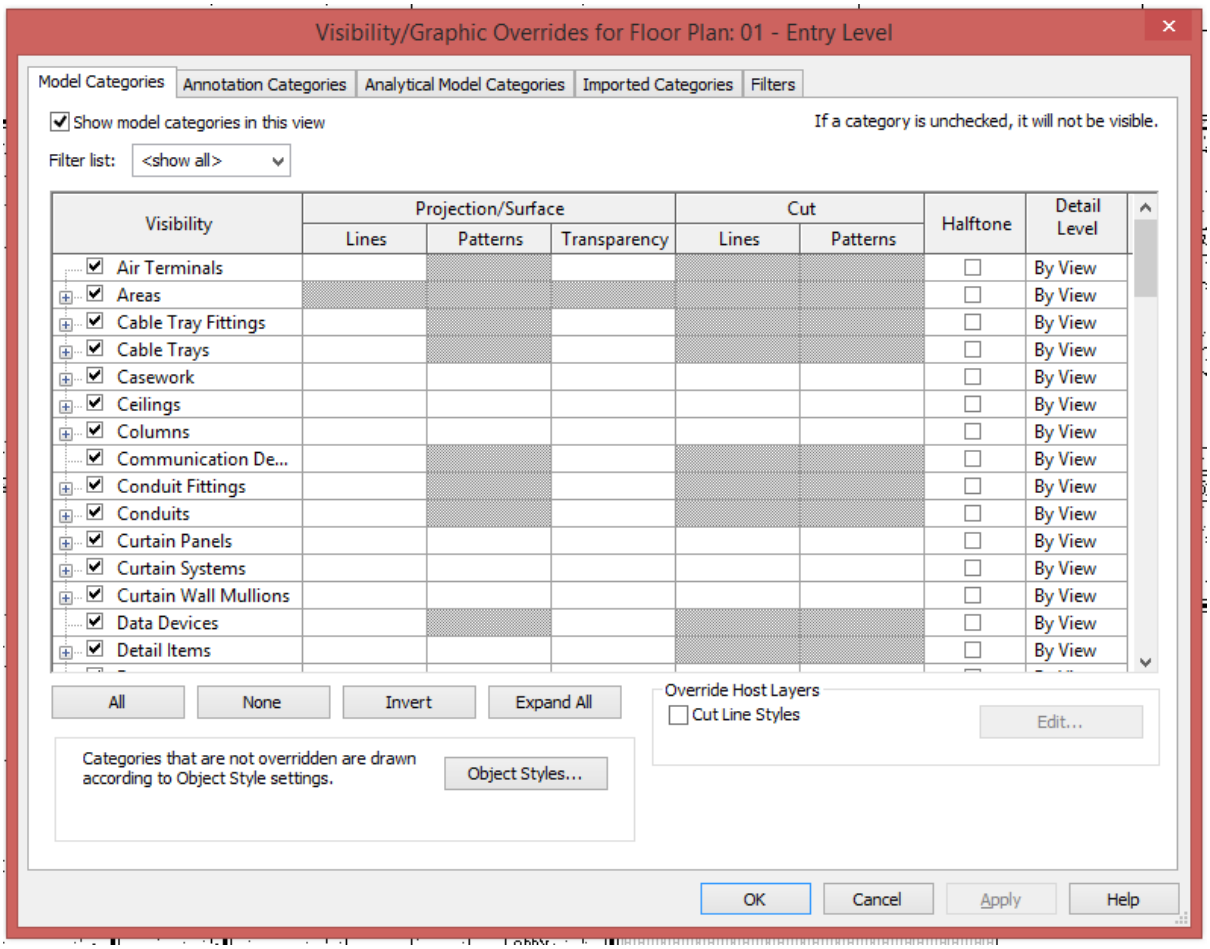
Shows a logical hierarchy for all views, schedules, sheets, groups, and other parts of the current project / family.



- Visibility/Graphics Overrides

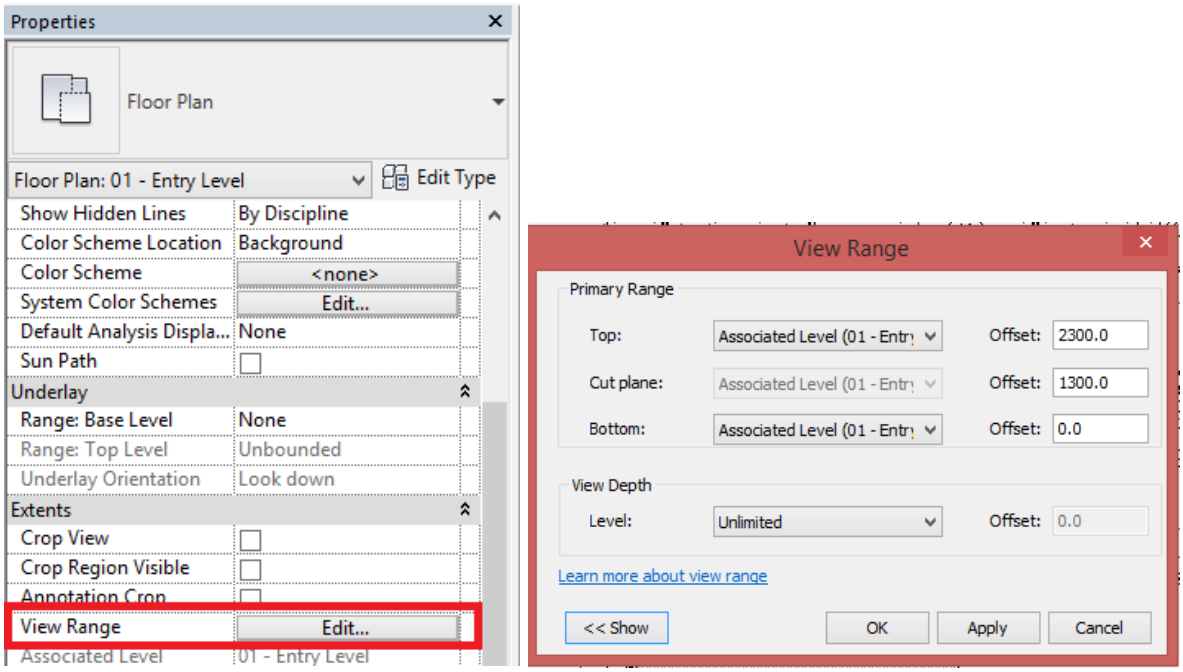
Used to control display which category, set display color / line weight / pattern override and also allowed to set up filter by conditional. Notice that these setting only applied on current view. If you want to re-use current setting, use “View Template”.

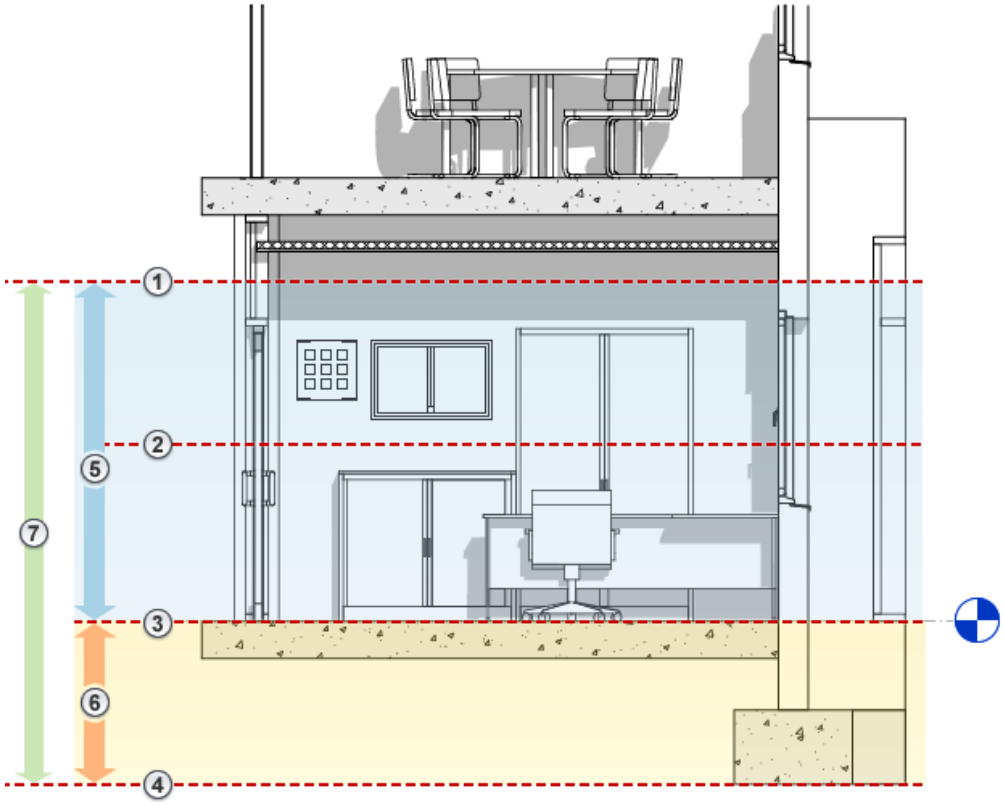




- View Range

When you state on a plan view, a property name “View Range” will show the property window. This property is affecting what is the range showing on the plan.





1.7 Family Library and Resource

- Autodesk Revit Product Library

Autodesk has provided a lot of family libraries can optional install when installing Revit.

- The default library is "**US Imperial**" where all families are created under imperial unit and not suitable to use in Hong Kong industry.
- Optional library "**US Metric**" is used metric unit, thus, suggested to install and set to default.
- If do not change the installing setting, the default path of library is:

C:\ProgramData\Autodesk\RVT xxxx\Libraries\ (where xxxx is installed Revit version)

- RevitCity (https://www.revitcity.com)

Open Source Revit content and online Revit community forum.

- bimobject (http://bimobject.com)

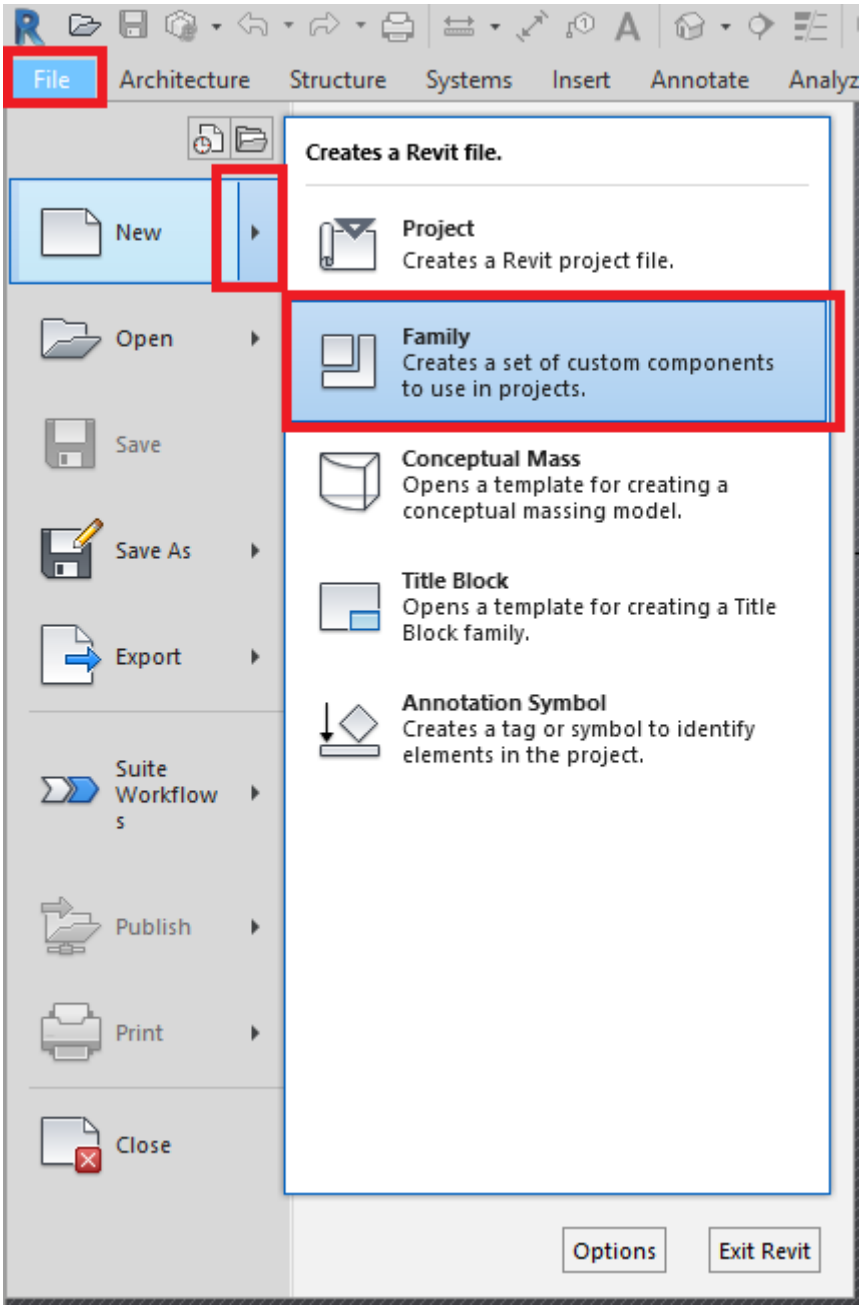
International BIM content platform. Over 20 million products provided from manufacturer

2. Fundamental Family Modelling

2.1 Create New Family

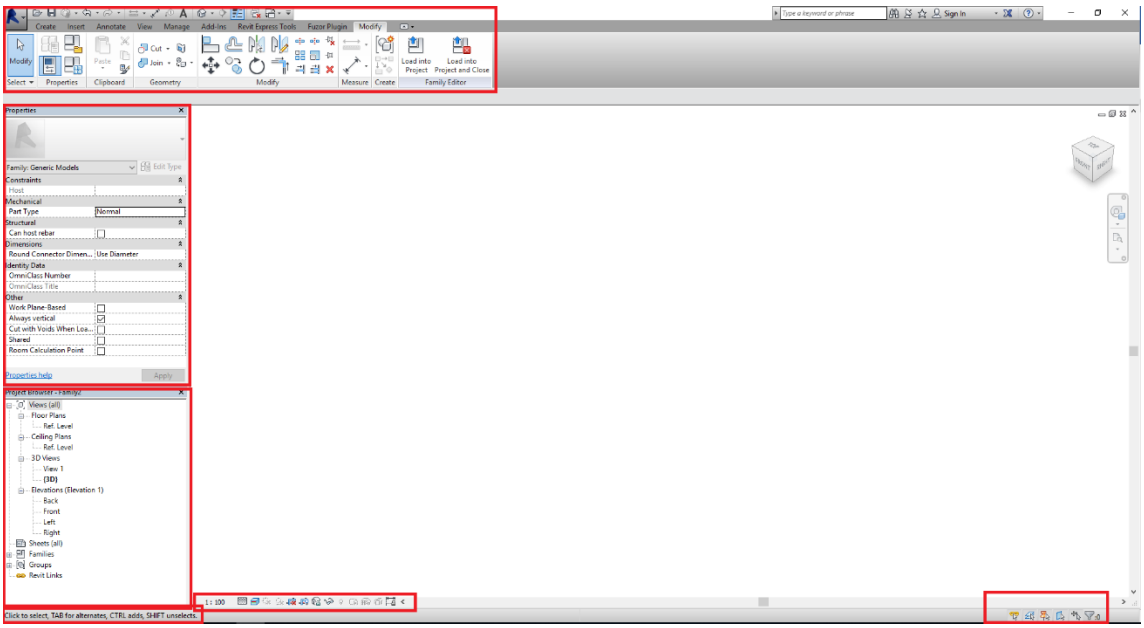
Create new family from “File” -> “New” -> Extended List –> “Family”

- Must open the extended list of “New” tab and click “Family” button to create new family, otherwise the browser will show dialog of create new Revit project.

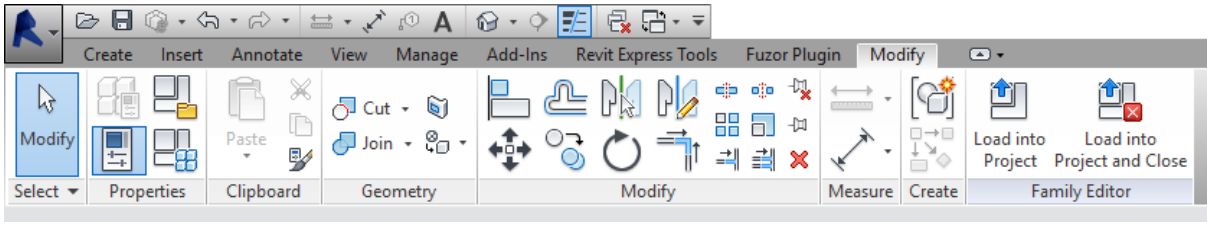


2.2 Introduction of Family Editor UI

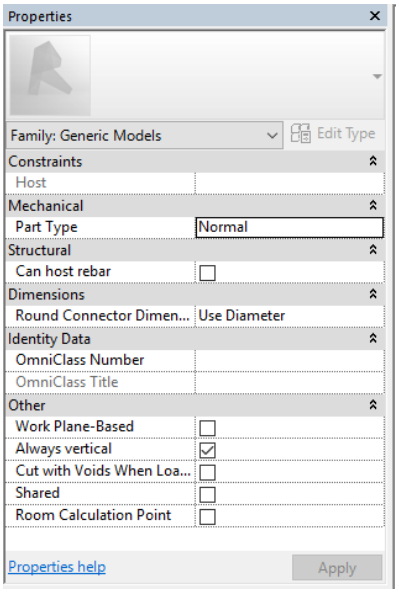
Revit Family Editor UI is similar with Revit Project UI. This section will only briefly introduce the default UI on family editor. Useful commands and shortcuts please refer to attachments.



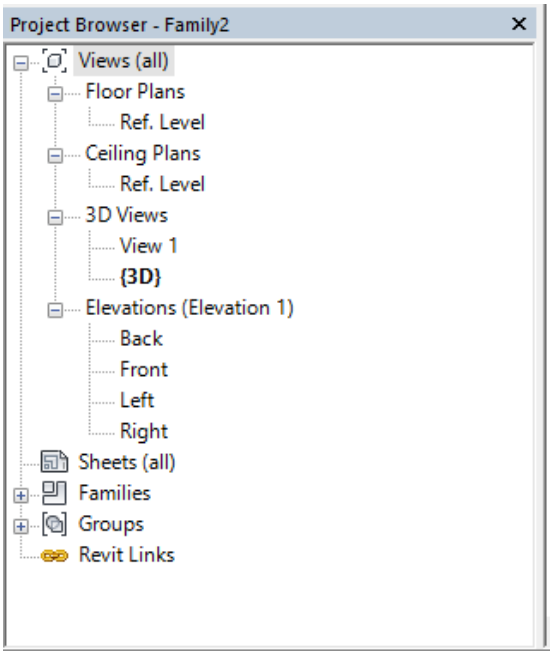
- Quick Access Toolbar: The top bar, can customize by user;
- Ribbon: Provides all tools necessary to create a project or family.



- Properties Palette: Modeless dialog where you can view and modify the parameters that define the properties of elements.

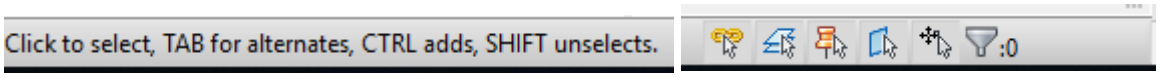


- Project Browser: Shows a logical hierarchy for all views, schedules, sheets, groups, and other parts of the current project / family.



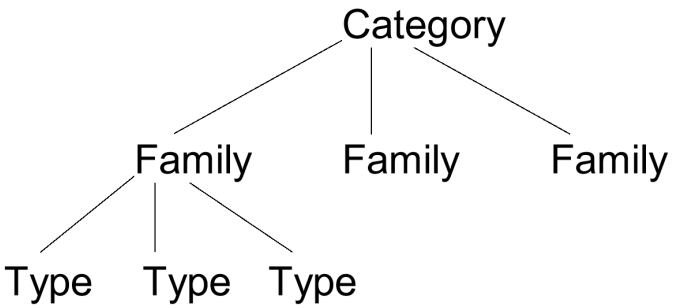
- View Control Browser: Provides quick access to functions that **affect the current view**

- Status Bar: Provides tips or hints on what to do. Other controls appear on the right side.



2.3 Family Category

All families can be classifying and grouping by "**Category**" such as Door and Window. Every Family should be containing at least one "**Type**" or more. "Type" is used when building components using similar geometry but little different on dimensions or non-geometry information such as door sizes and model number.



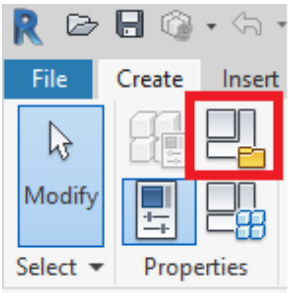
Category is the first definition to control the geometry how to display in the Revit Project of 3D and 2D view. To display different line weights, line colors, line patterns, and material assignments for different geometric components of the family (for example, the frame, sash, mullions, and glass that comprise a window), the components can be assigned to subcategories within the family category.

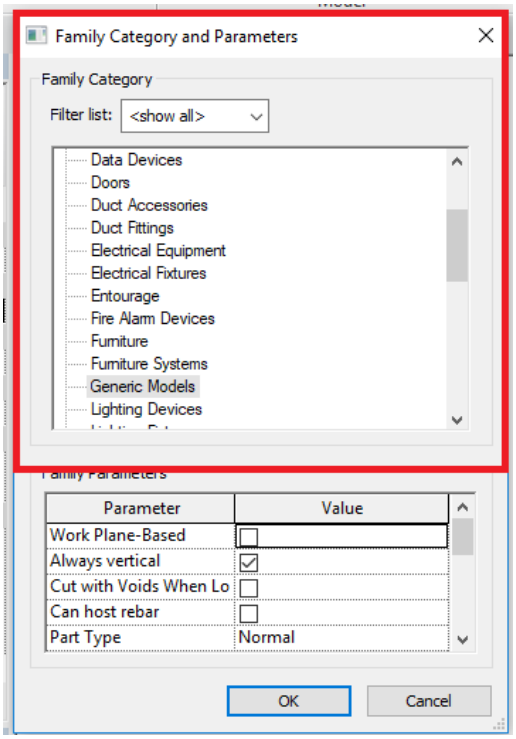
Categories are predefined in Revit software and cannot be created or changed by the user. Subcategories are predefined in some families, but other subcategories can be created in families as needed.

Basically, you should decide the family category before you create anything and select the corresponding family template. However, if desired category family template has not been provided or the category still not decided, you might want to change the category later. Noticed that change category is seriously NOT suggested after many parameter and geometry has created.

Open "Family Category and Parameters" window under "Create" tab to change family category.

- Category is NOT allowed to change to some categories by system restriction. e.g. A family created from 3D family template is not allowed to change to 2D family category.





2.4 Family Naming Conventions

A systematic naming convention is necessary of create, manage and apply a family library. Refer to *"CIC Production of BIM Object Guide - General Requirements",* Revit family has suggested to apply Family Library Interchange Program (F.L.I.P.) naming conventions.

The abbreviation can make reference to F.L.I.P. Master Type List (http://www.aiab.org/index.php/flip-guideline).

Format

<Category> - <Sub-Type> - <Originator> - <Descriptor 1> - <Descriptor 2>.<File Format Extension>

Limitation on Number of Characters

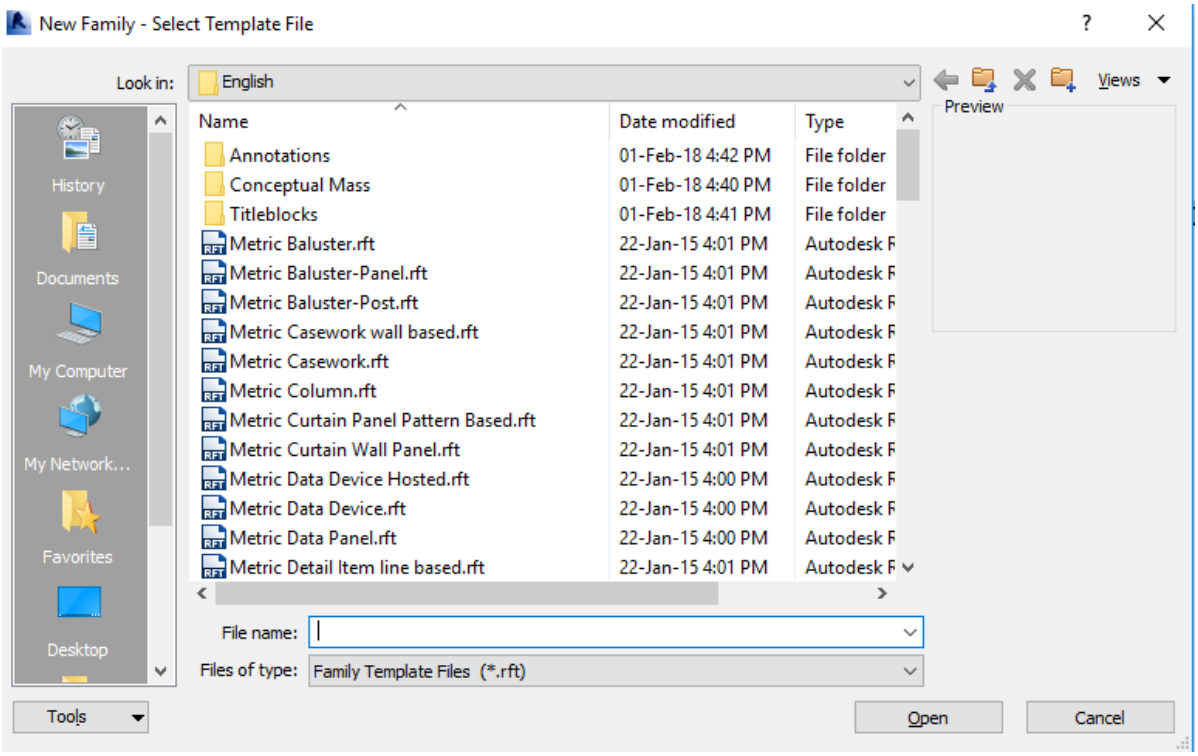
- 3 characters for Category, Sub-Type and Originator field
- 25 characters for entire name including hyphen mark

Example

Field	**DOR-SGL-AEC-Wood-w_Louver.xxx**	**Description**
Category	**DOR**-SGL-AEC-Wood-w_Louver.xxx	A Door, DOR is the short form of the **category / classification / catalog** "**door**".
Sub-Type	DOR-**SGL**-AEC-Wood-w_Louver.xxx	A Single Door, SGL is the short form of the sub-type "**single**".
Originator	DOR-SGL-**AEC**-Wood-w_Louver.xxx	AEC is the short form of the **Architecture, Engineering and Construction**. It is to represent a common standard of the industry. This can be replaced by the name of the creator in short form.
Descriptor 1	DOR-SGL-AEC-**Wood**-w_Louver.xxx	A door is made of **Wood** (Material). An optional descriptive text.
Descriptor 2	DOR-SGL-AEC-Wood-**w_Louver**.xxx	A door is built **with Louver**. This text further describes the BIM object.
File Extension	DOR-SGL-AEC-Wood-w_Louver.**xxx**	File Format Extension

2.5 Family Template

Autodesk Revit has provided basic family templates for the base of family creation. These templates are classifying by category and several templates have provided build-in parameter.



Careful which template folder you are looking in, Revit default installation setting will be looking to "**English_I**" folder and all templates are using imperial unit. Normally, Hong Kong industry is using metric unit and metric templates are located as "**English**" folder.

- "Default path for family template files" browse location can modify as "Options" -> "File Locations"
- The path of family template folder is:

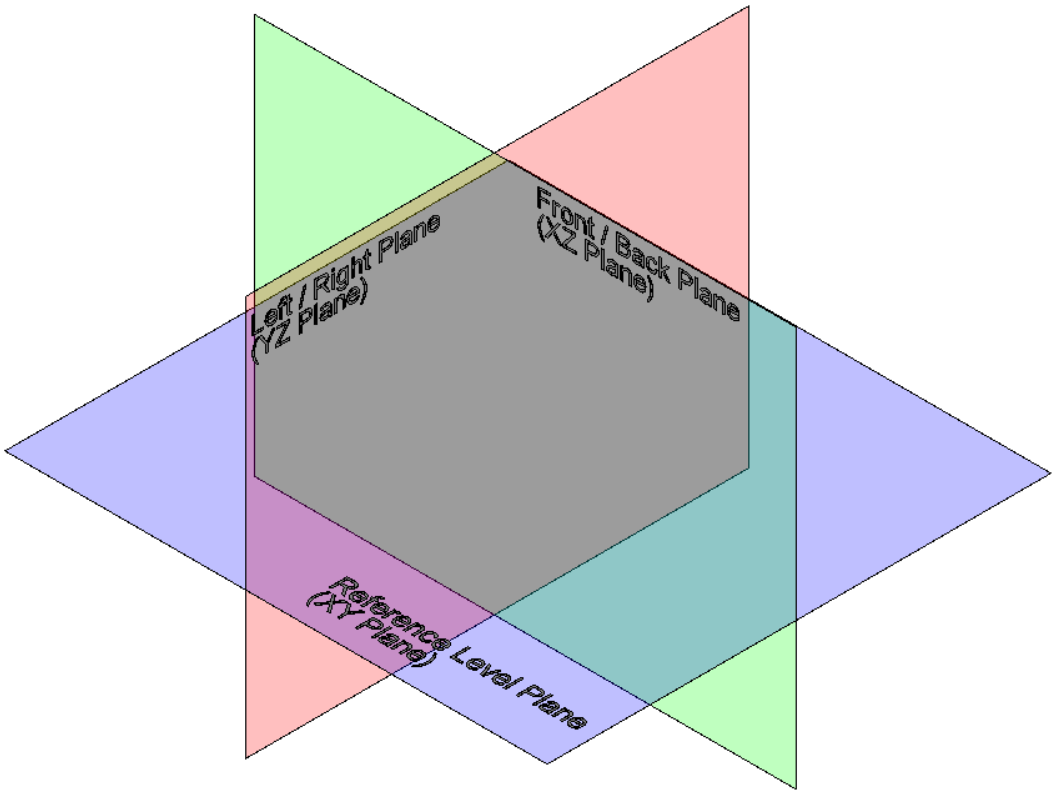
C:\ProgramData\Autodesk\RVT xxxx\Family Templates (where xxxx is installed Revit version)

2.6 Reference Plane and Work Plane

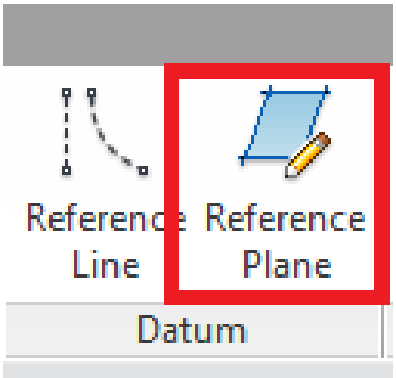
Unlike traditional drawing works on 2D software, lines and lines drawing over each other, Revit is a 3D based software and must indicate “which face” you are drawing.

Reference plane is a basic component of all family creation. Several reference planes must be provided by family template and you can draw additional reference plane if needed. The work plane is indicating which reference plane using so only one reference plane can assign to work plane in same time.

- In Revit Family Editor, each view has its own work plane setting.
- Everything drew on the reference plane will moving together if the reference plane has movement.

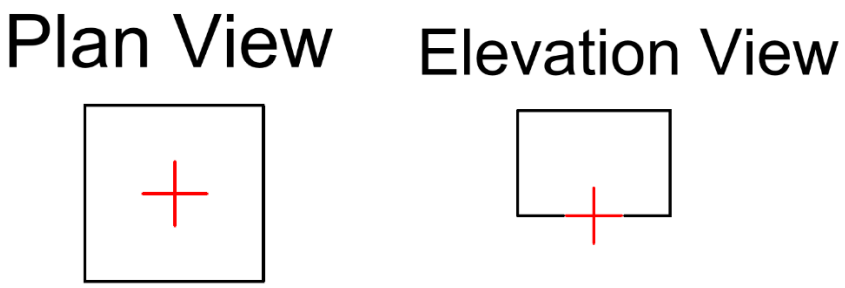


Create reference plane by “Reference Plane” tool under “Create” tab.



2.7 Insertion Point

The insertion/origin point is the point at which you want to place the Family in a project. Normally, the insertion point shall be located at center of the geometry on plan view (as known as XY plane on three-dimension coordinate system) and bottom of the geometry on elevation view (XZ plane or YZ plane). Following figure is indicated insertion point of simple curb geometry by red lines.



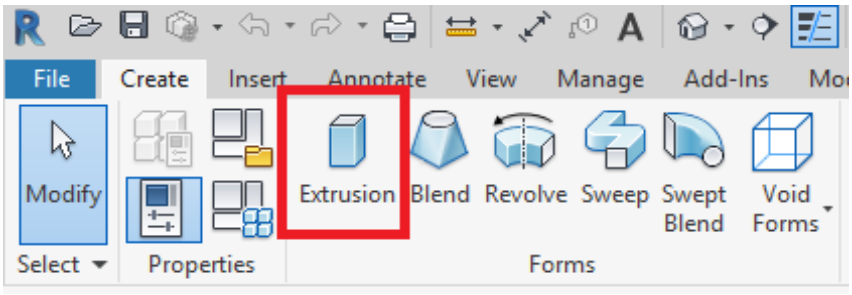
The insertion point can be located at other point if reasonable, e.g. lighting switch always aligned on wall surface, the insertion point on plan view (XY plane) should be located at the back side of the switch surface.

Each family template has created several reference planes and the intersection point of these reference planes is the default insertion point of the family. Modify reference plane property “Defines Origin” can modify the insertion point to additional reference plane.

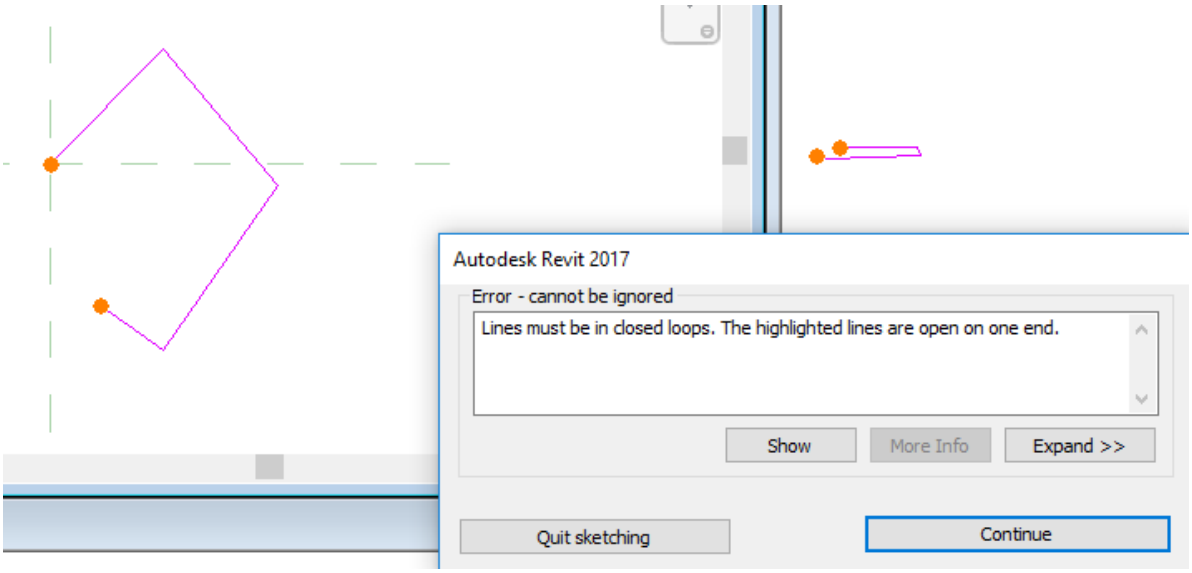
2.8 Create Solid and Void Geometry

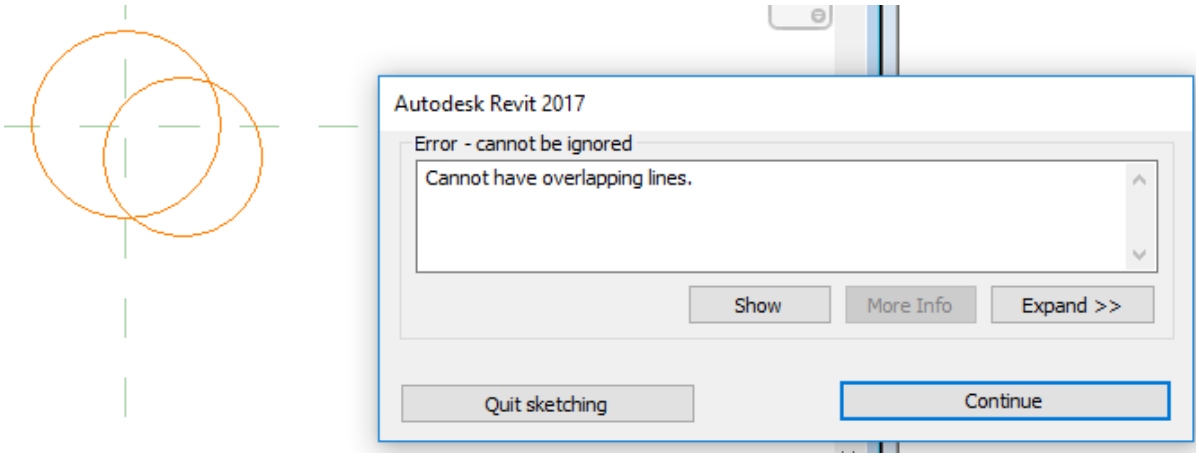
Geometry is the basic component of 3D BIM object. Revit is able to create multiple solid and void geometry to consist complex 3D shape. Both solid and void are using 5 forms: Extrusion, Blend, Revolve, Sweep and Swept Blend. These commands are under “Create” tab.

2.8.1 Creating Extrusion



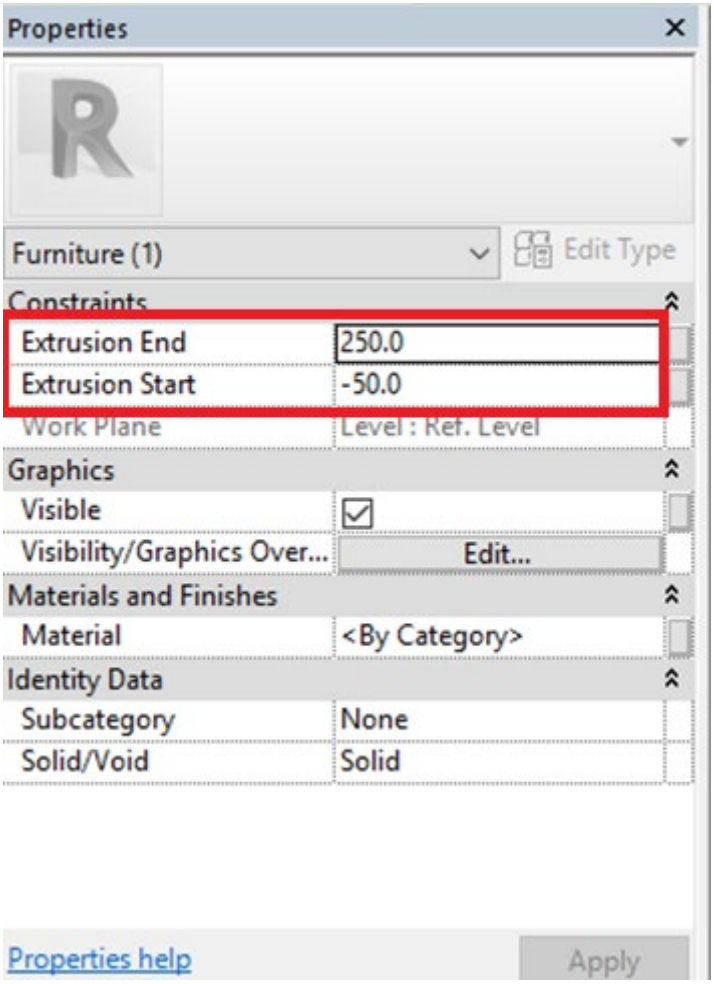
Shape for extrusion must be a closed loop without overlapping, otherwise Revit won’t allow us to use Extrusion.





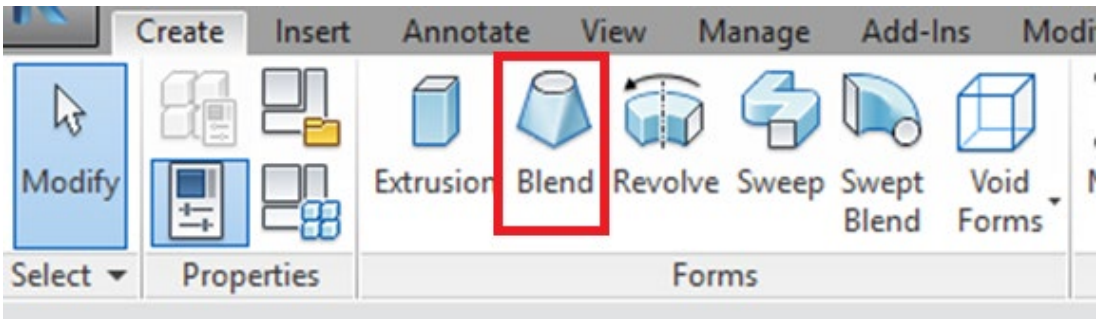
The Extrusions we've made are all starting from their work plane. Revit allow us to expand the ends of Extrusion further.

With extruded geometry selected, adjust Extrusion End or Start. Notice Depth will be calculated automatically.

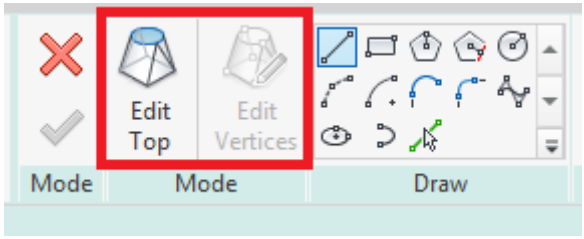


2.8.2 Creating Blend

Blend is essentially an Extrusion with two shapes. Go to Create tab, hit on Blend.

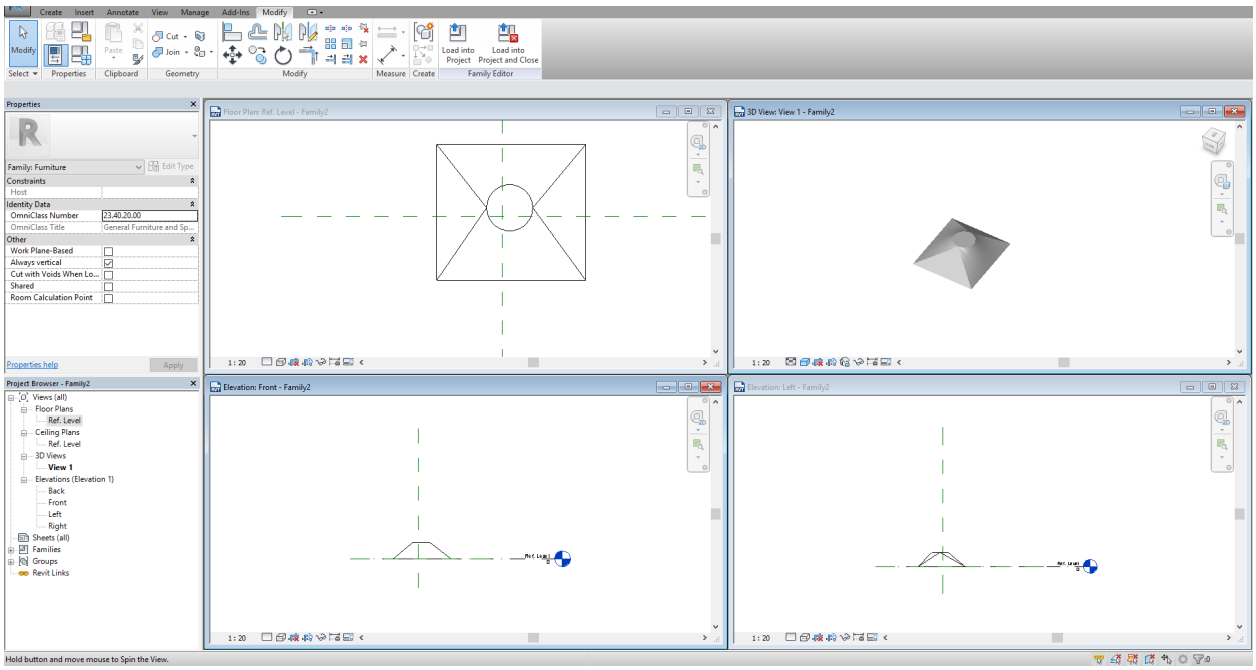


Instead of one shape, we have to sketch the bottom and the top.



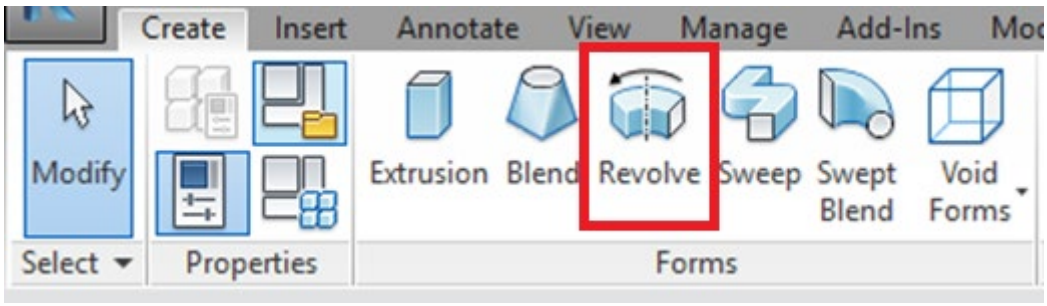
Instinctively though our Top could situate on another work plane, **it's imperative that you draw both shapes on the same work plane**. Otherwise it will raise many issues such as the Depth will be calculated from the Top to somewhere upwards.

Complete Blend by clicking on the green tick mark.

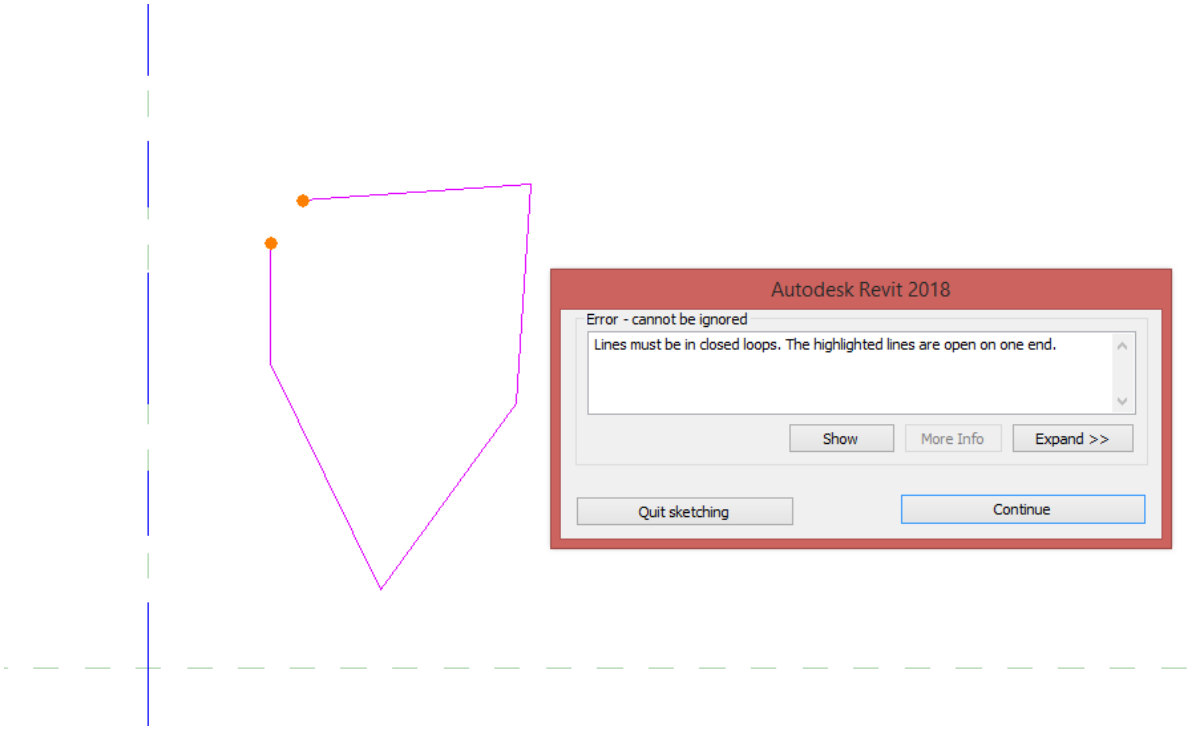


2.8.3 Creating Revolve

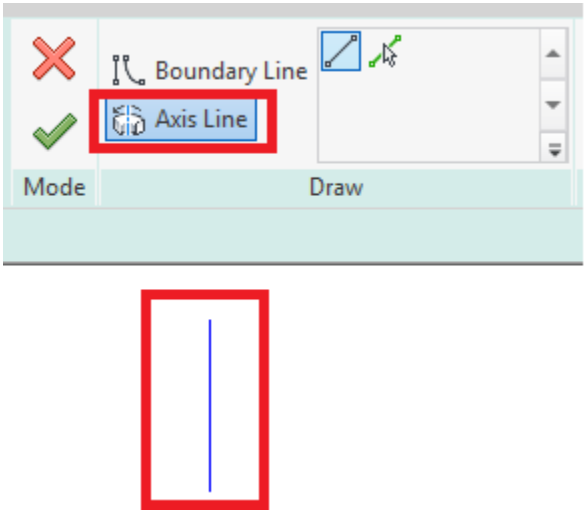
Go to Create tab, click on Revolve.



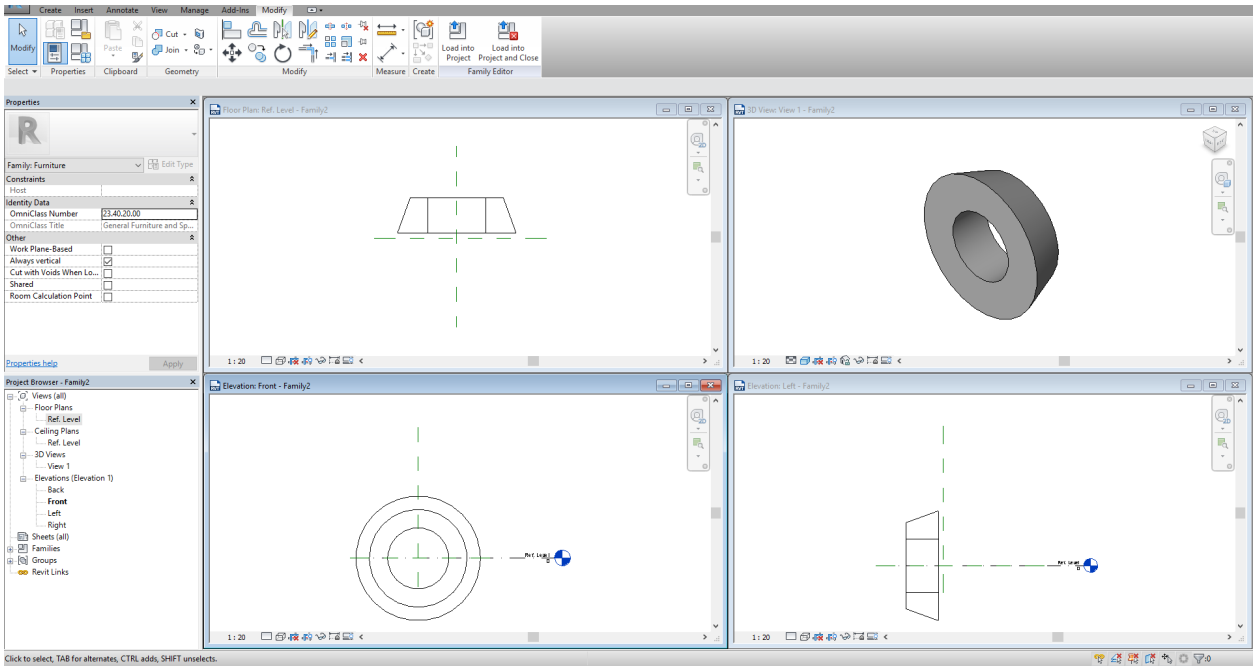
Sketch a simple shape. Notice that just like Extrusion, Revolve doesn't allow open loop either.



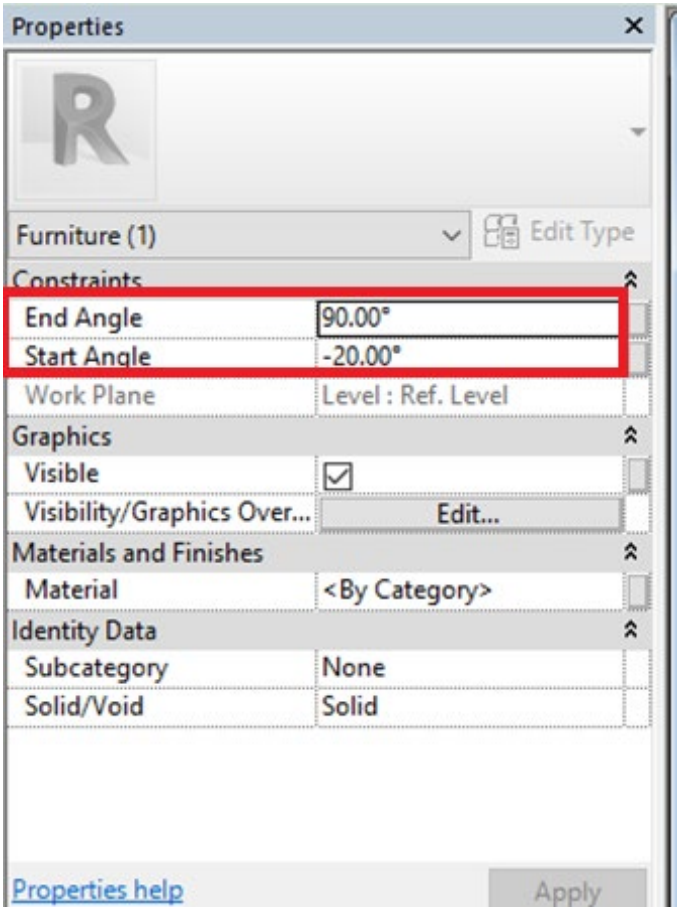
Draw Axis.



Finish revolving.

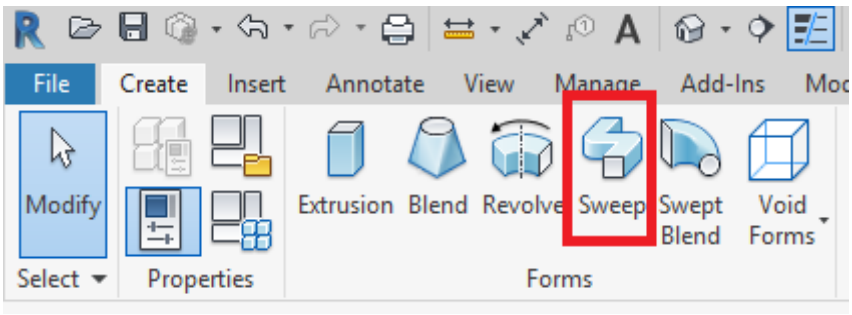


Adjust End or Start Angle if you don’t want the shape to orbit a full circle.

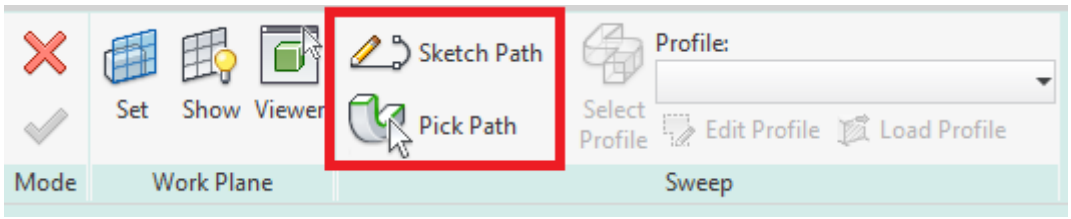


2.8.4 Creating Sweep

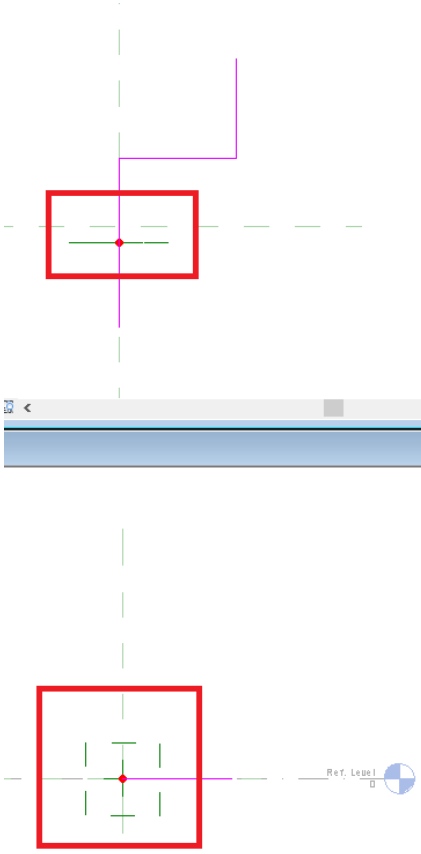
Sweep takes a sketch and moves it along the path. It's more flexible than Extrusion and Blend.



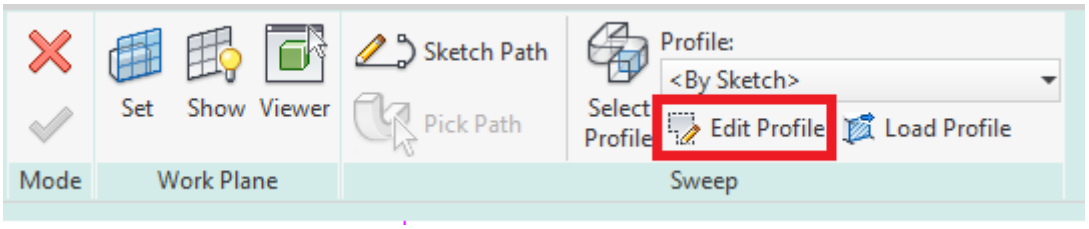
Select an existing path or draw a desirable path.



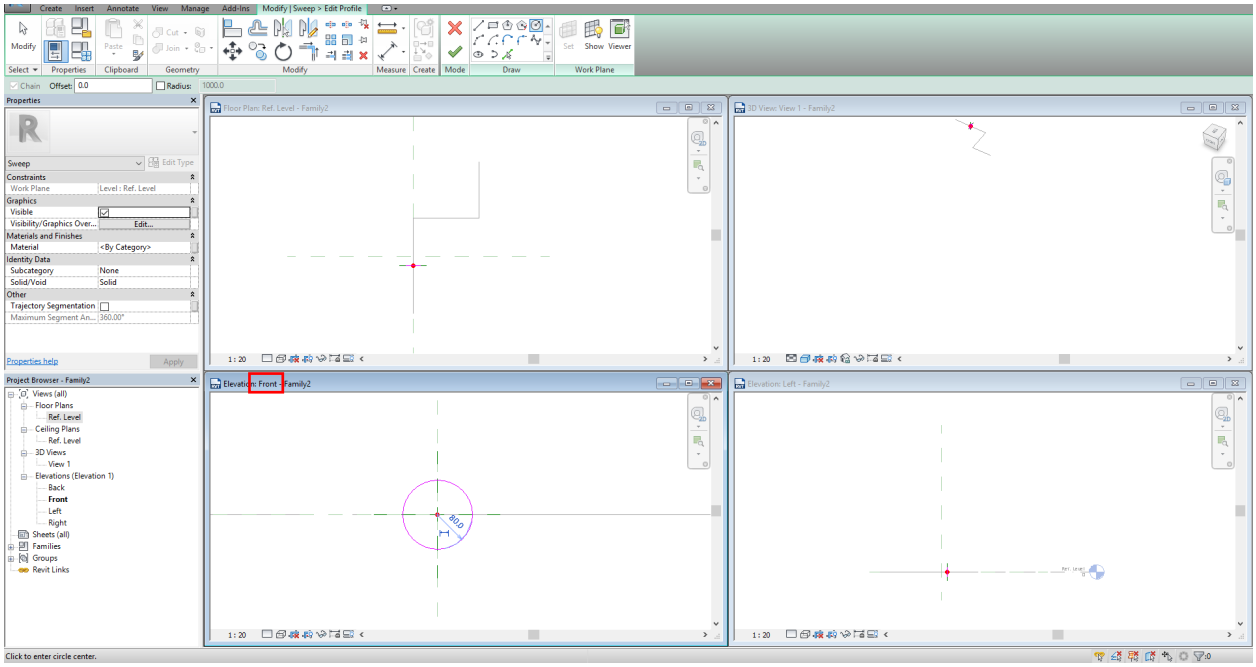
Notice a new plane is created for sketching the shape which is going to move along this path.



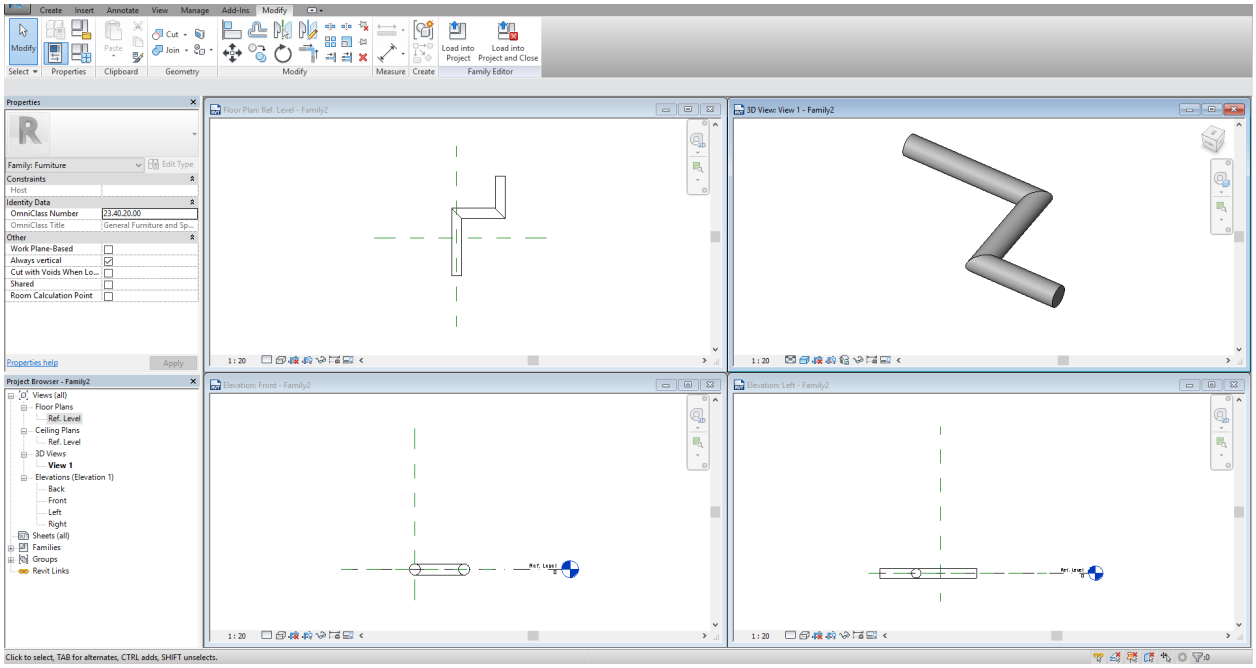
Click on the green tick mark, exit sketch mode of the path. Click Edit Profile to sketch profile of geometry.



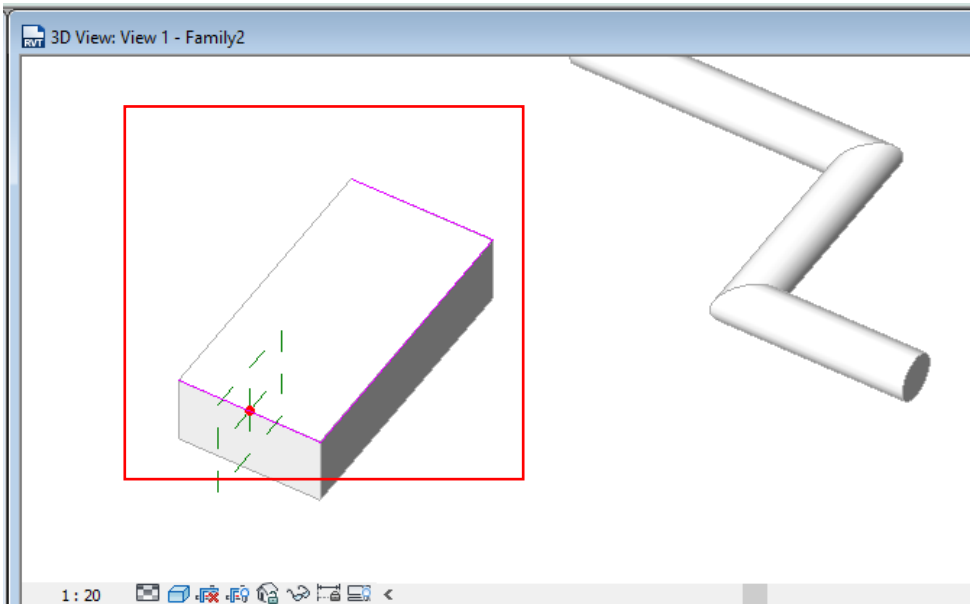
Switch to a view that's perpendicular to the new plane for sketching the shape. Sketch a shape.

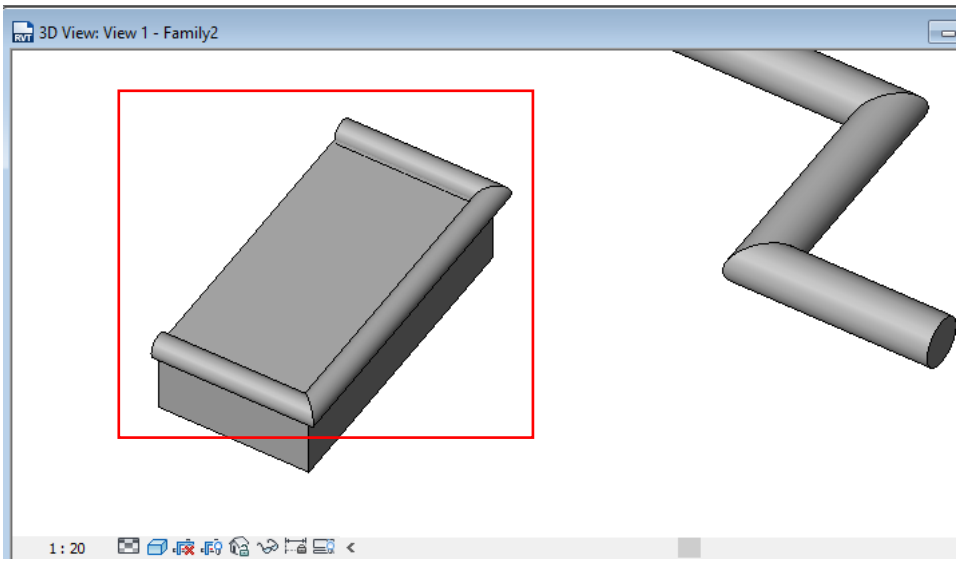


Click on the green tick mark, exit sketch mode of the profile. Click on the green tick mark again to finish the sweep editing.



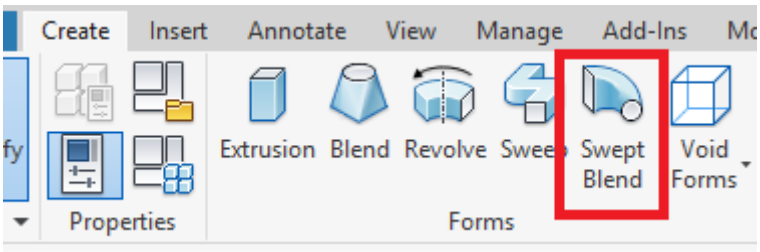
Pick a path is also an option.



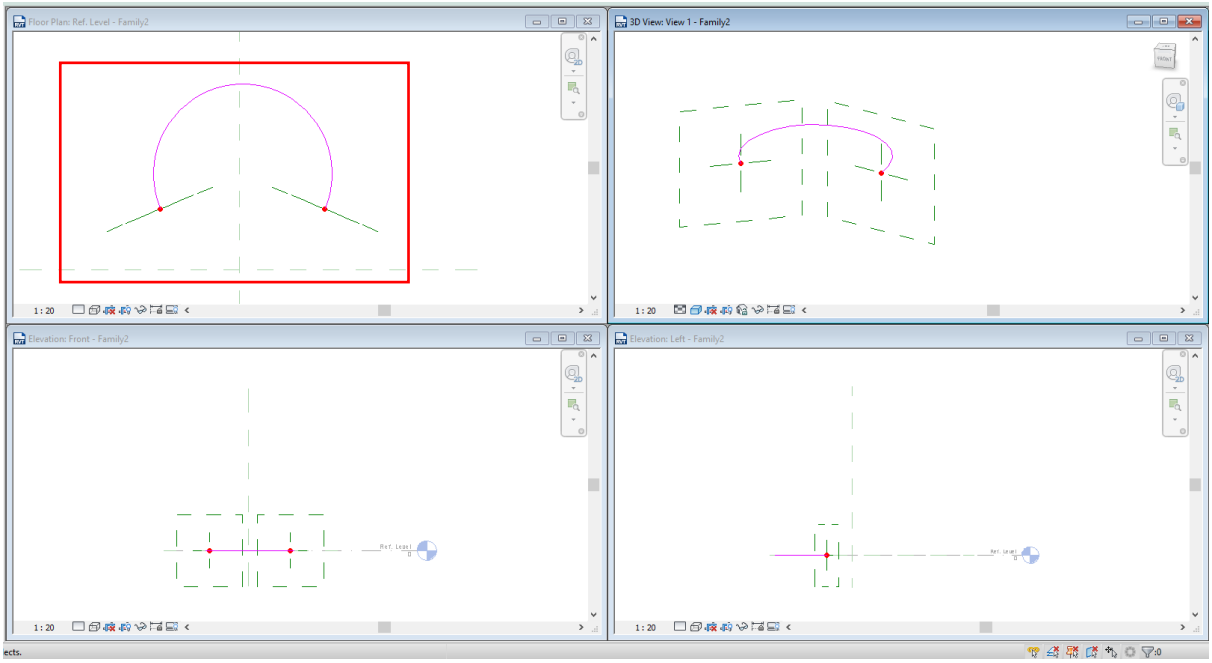


2.8.5 Creating Swept Blend

Swept Blend is the combination of Sweep and Blend. We're allowed to draw a path, starting profile and ending profile.

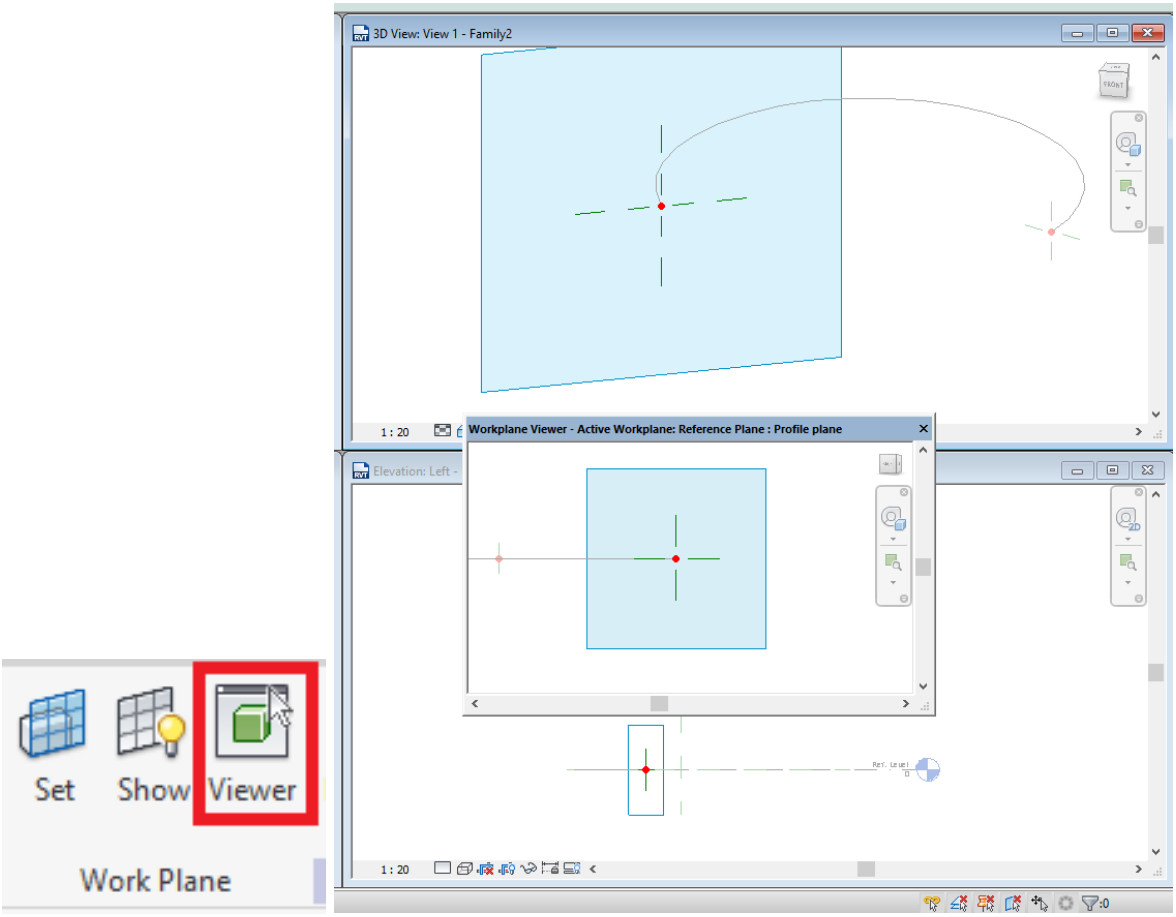


Simply draw an arc as our path.

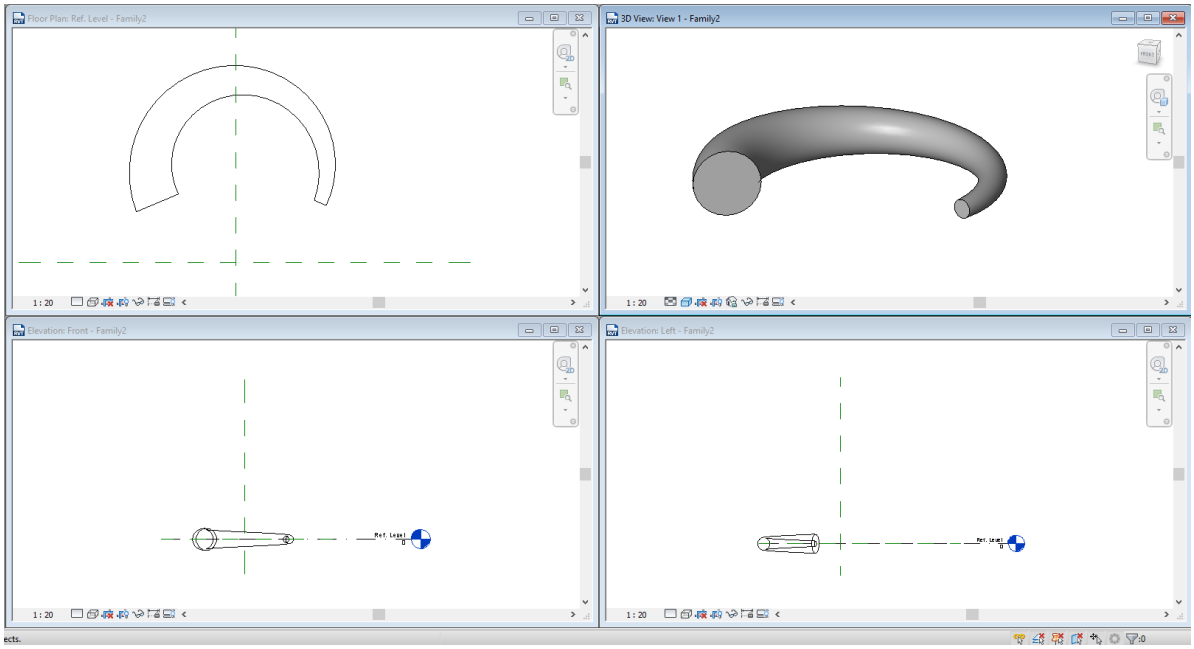


Sometimes, the planes on which you want to draw your shapes are not assigned with a perpendicular view.

Viewer will help us in these cases.

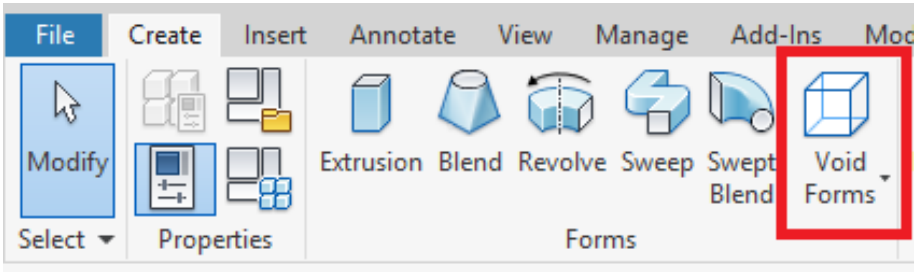


After draw the two profiles on corresponding plane, click the green tick to finish the swept blend.

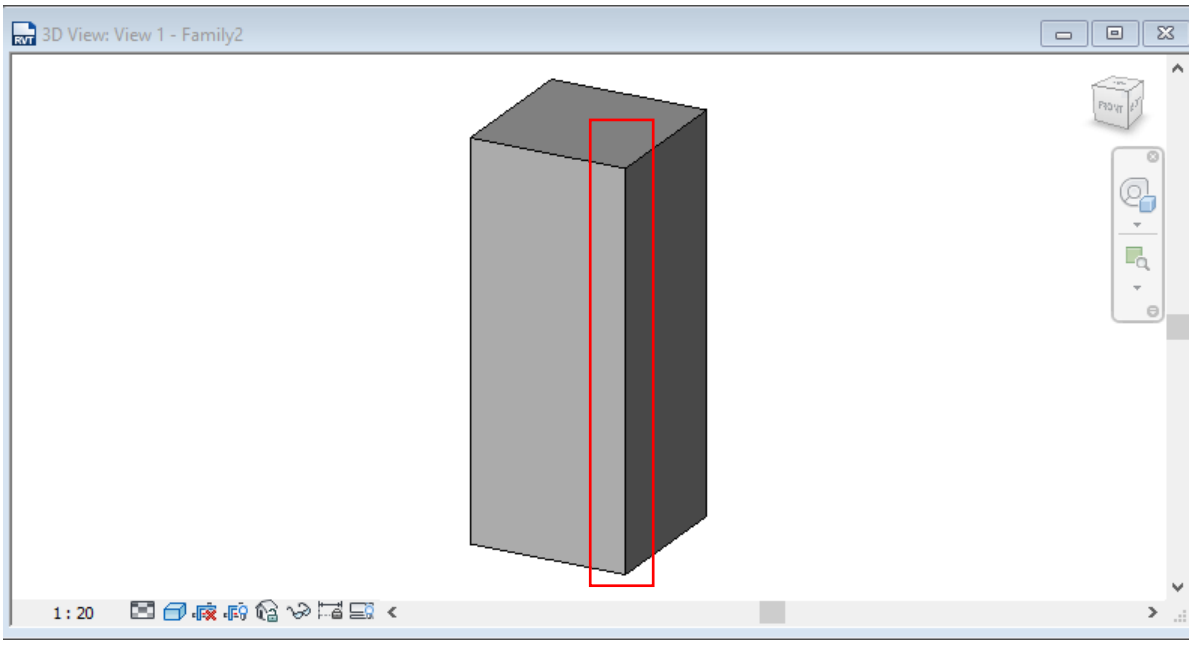


2.8.6 Using Void Forms

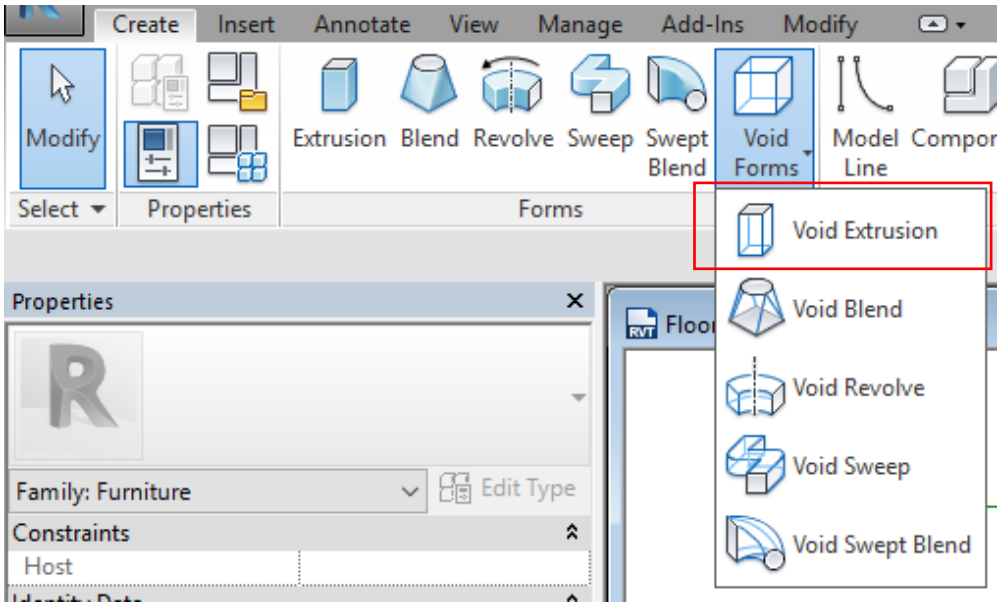
Void forms would be very handy when we want subtle modification. Revit has five void shapes allowed to model which exactly same of the five solid forms command.

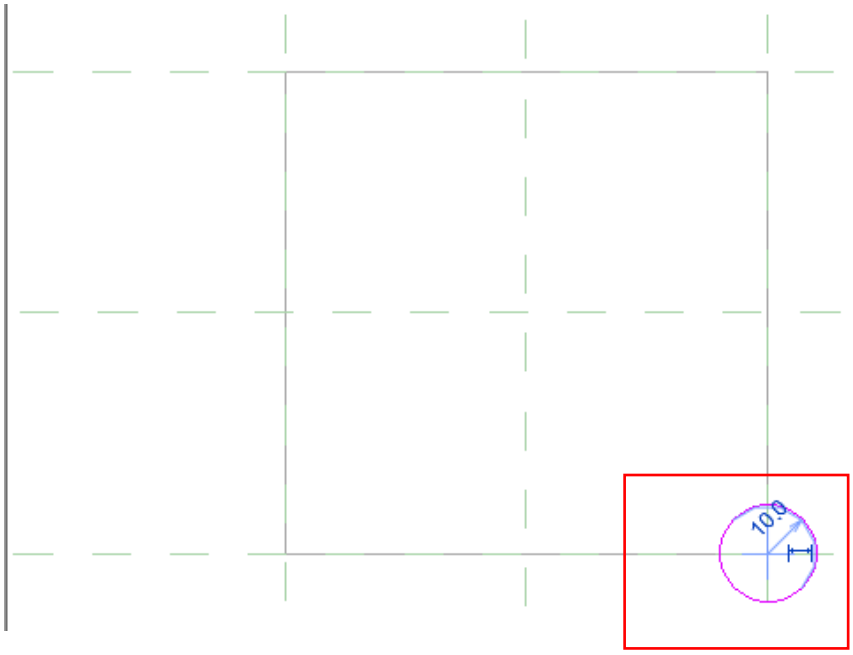


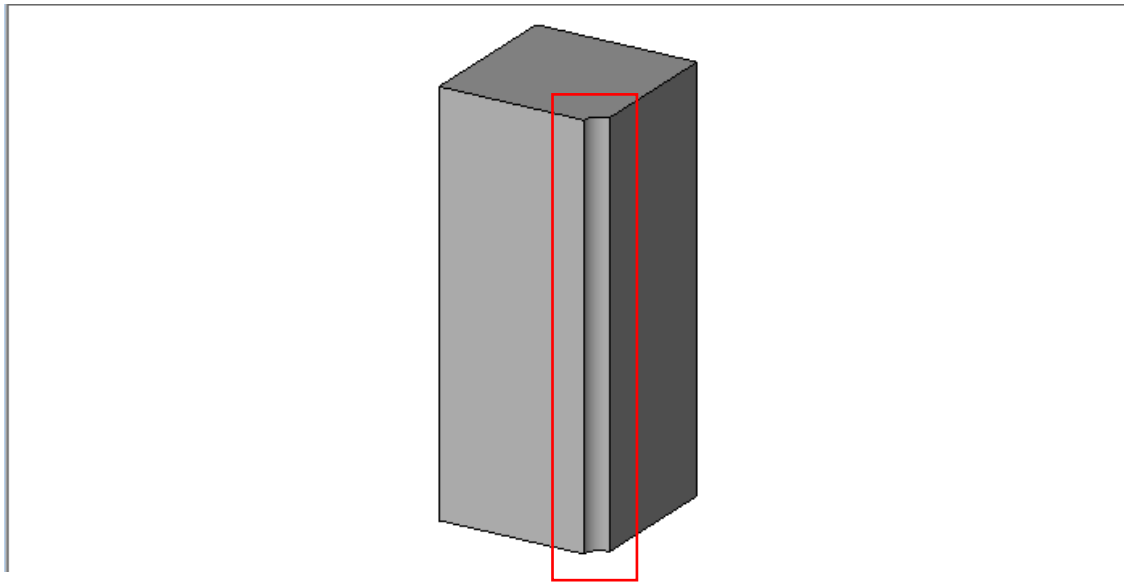
If we want to smooth sharp edges:



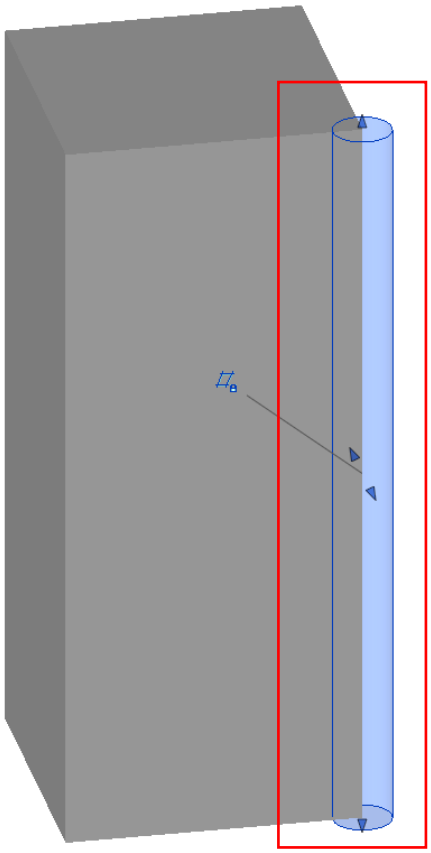
Create a void cylinder.







Notice that if not selected, the void will disappear. But what we want is the fact that its existence will cut off our solid geometry.

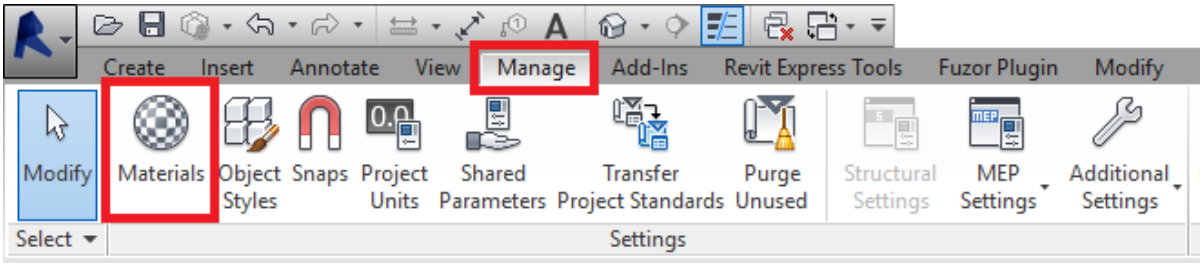


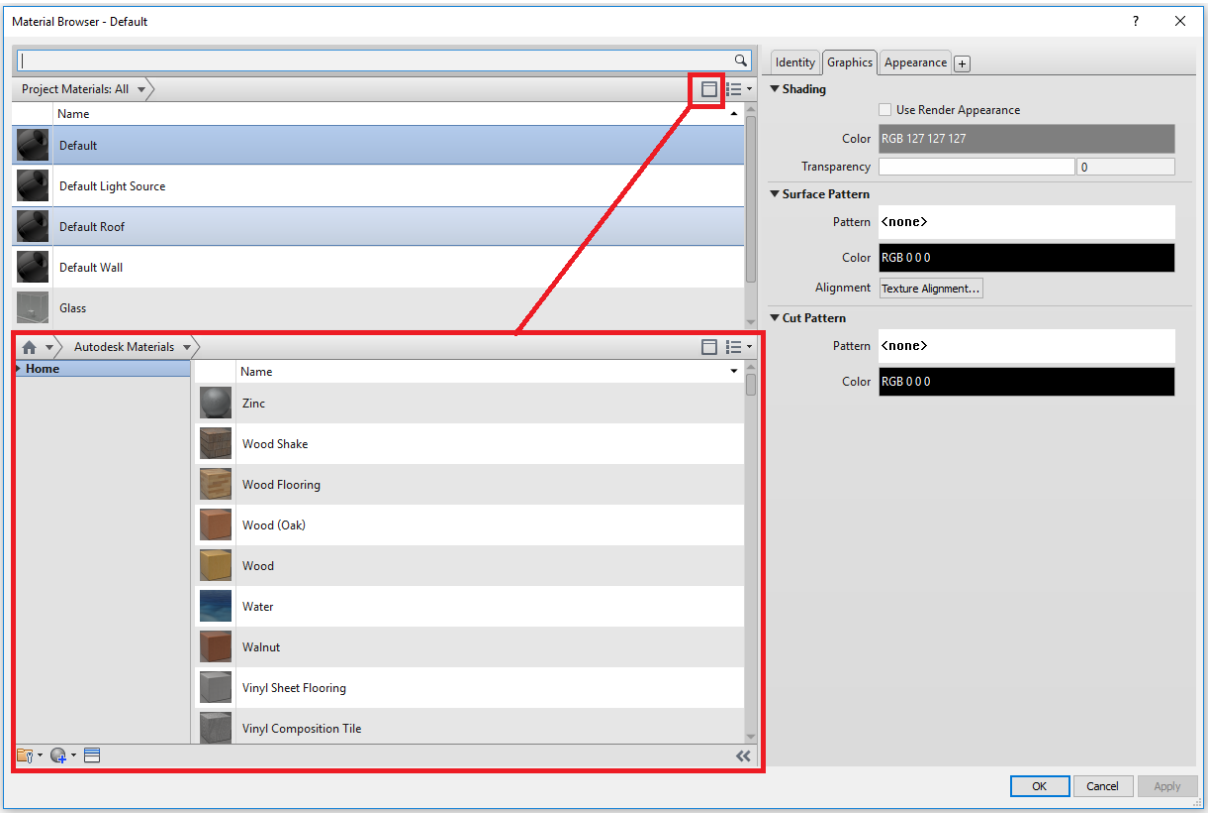
2.9 Concept of Material

In Revit, materials are used to control how elements display in views and rendered images. Materials are allowed you to specify graphical, appearance, thermal, physical. Materials storage independent in each project and family, called “Project Material”, until load into project / family. Notice that materials are name sensitive and family material will be overwritten by project material which have same name.

- You can create your own material library for future use.
- “Graphics” tab define the material shading color and pattern on 2D view.
- “Appearance” tab define the material rendering texture.

Open Material Browser to manage Project Material.

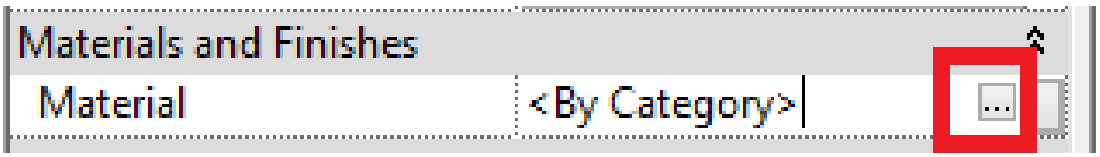


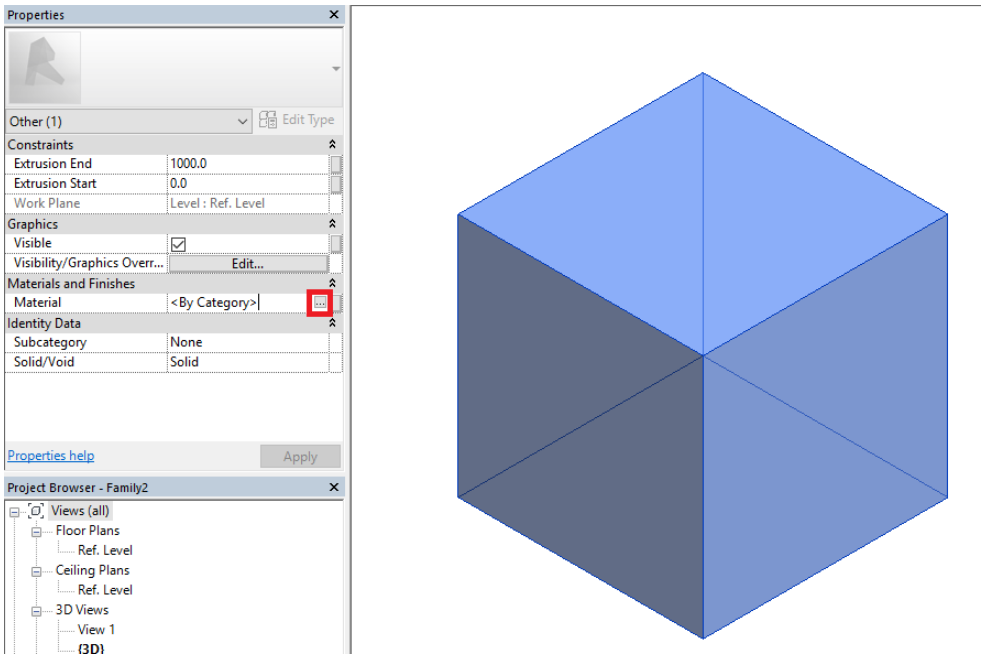


Revit has provided a comprehensive material library. Open library panel by button shown on above image.

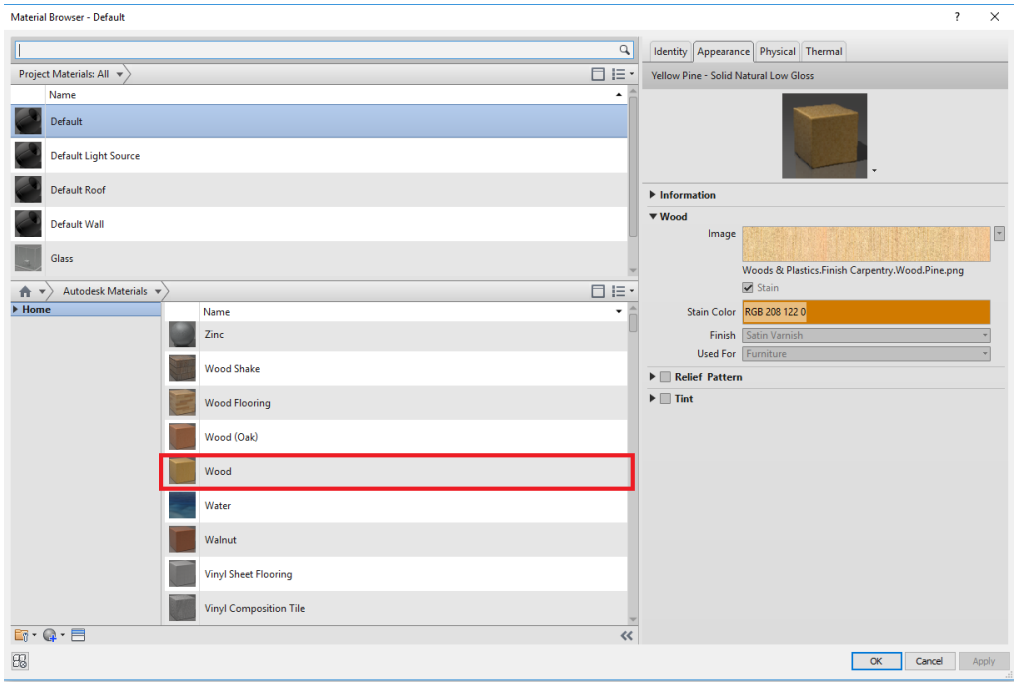
2.10 Assign Material

Select element and click the field named “Material”, a little button will appear on the field.

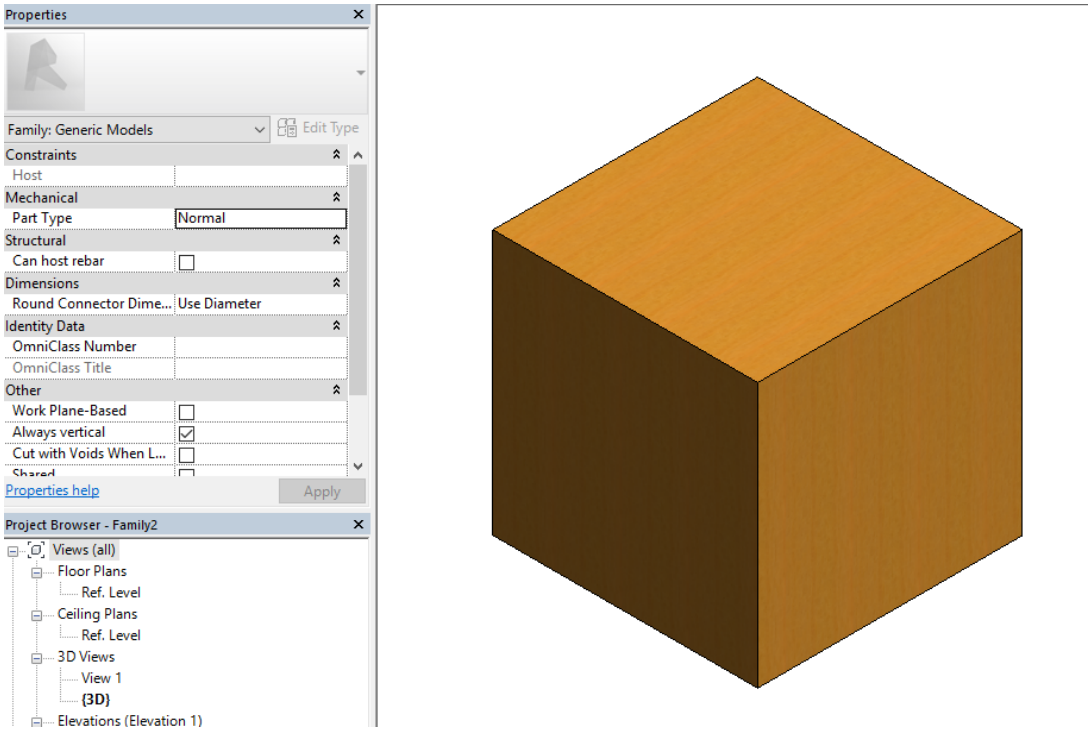




Select desired material from Project Material or Material Library on pop up Material Browser.



Click OK to assign material.

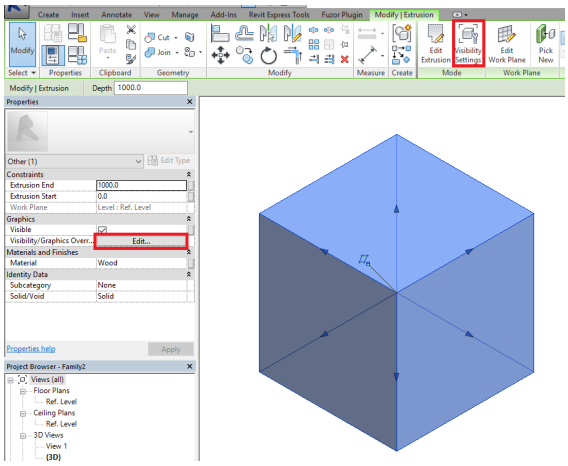


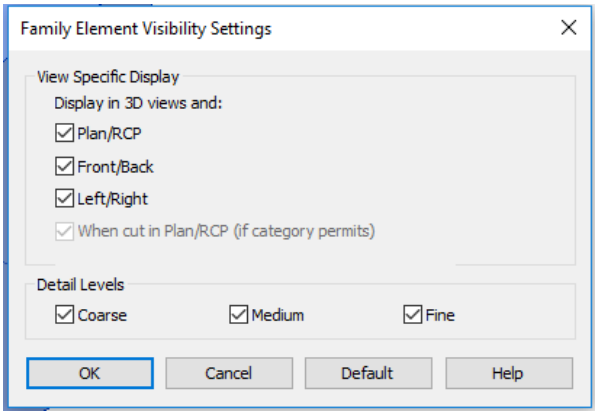
- Apply advanced material control by parameter.

2.11 Concept of Visibility Control

To achieve drawing production purpose, presentation requirement and reduce calculation loading, we should control 2D and 3D element visibility.

Select element and click “Edit…” button on “Visibility/Graphics Overrides” property.





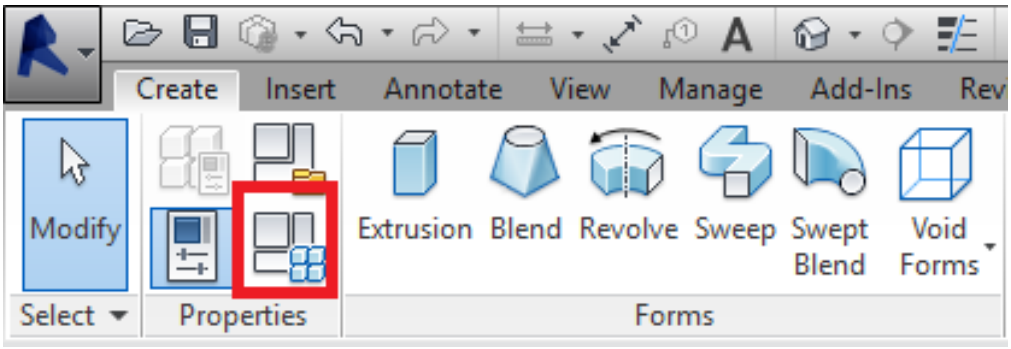
“View Specific Display” is controlling element visibility on 2D views. “Detail Levels” is controlling element visibility on detail levels. Checked item represent the element will be shown on that view setting.

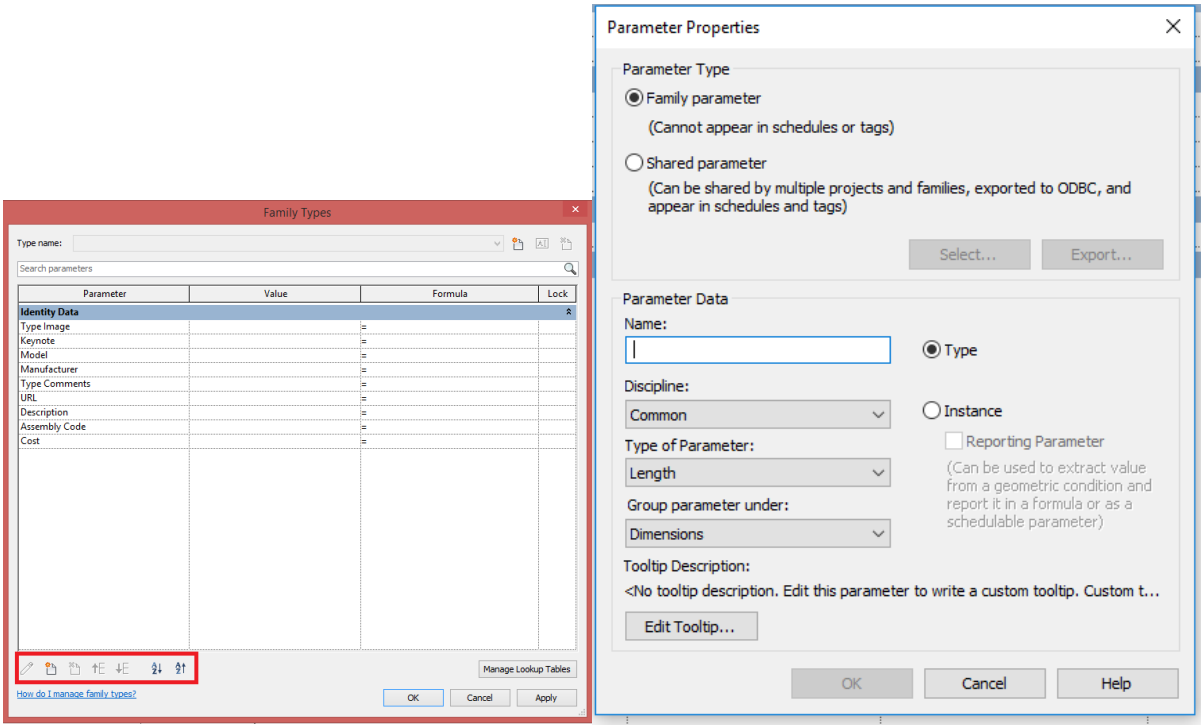
- If you want to control 3D geometry visibility in 3D views, need to control “Visible” property. However, if check out that, the element will disappear in the project environment.
- Apply advanced visible control by parameter.

2.12 Creation of Parameter

Parameters store and communicate information of all elements in a project. Parameters can be customized for a project, and for any element or component category in the project. Parameter is a big concept in entire Revit environment, thus, we focus parameter usage in family first.

In family editor, all parameter of family is storage in “Family Types”.





All family parameters belong either “Family Parameter” or “Shared Parameter”. Both are used to descript information or control variable values of the family. The difference is Family Parameter only “appear” inside of the family and cannot extract its information in Revit project.

Both Family Parameter and Shared Parameter can classify into two group, “Type Parameter” and “Instance Parameter”. In Revit project, all element belong this family type will be affected by Type Parameter. Instance Parameter can be customized of each element without affect other.

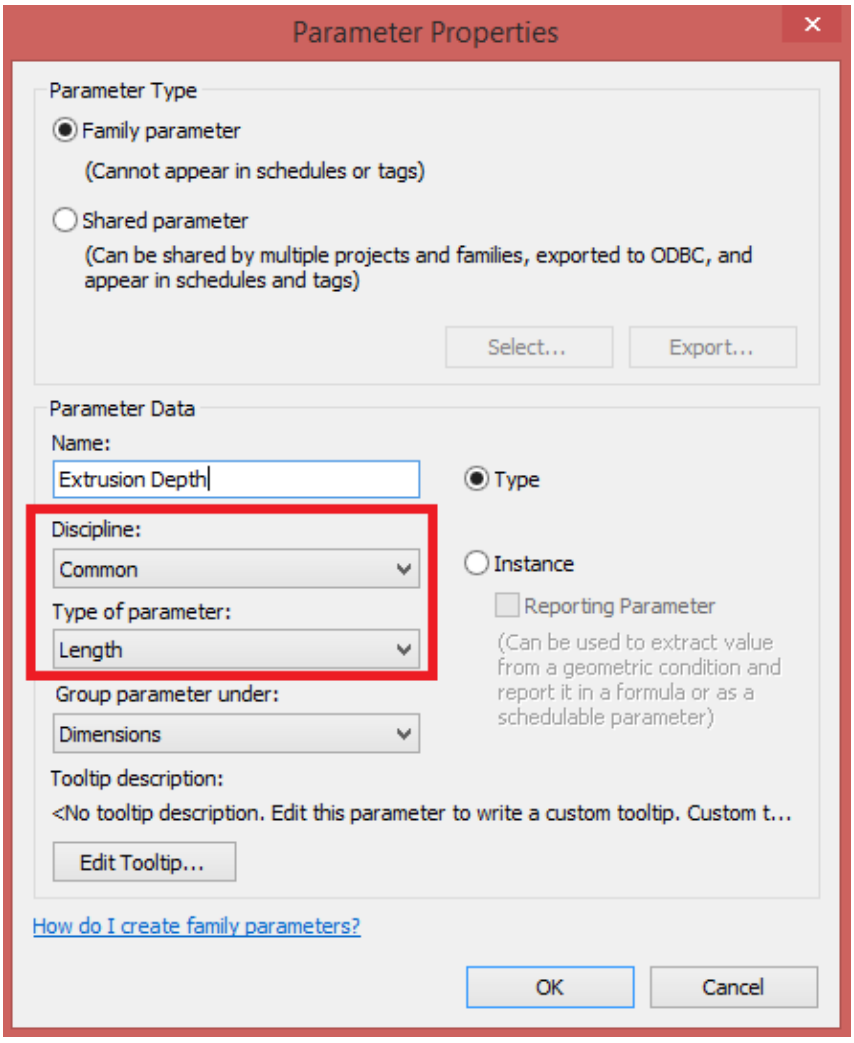
Item of Parameter Data	Description
Name	Parameter name, must be unique. Case sensitive.
Discipline	Revit default internal classification of parameter.
Type of Parameter	Indicate type of parameter such as Length, Material.
Group Parameter under:	Indicate the parameter will be grouping under which group. Revit has a lot of pre-defined group name and not allowed to custom. This grouping function is suggested to use to primary management of the parameter in the family.
Tooltip Description	Additional description of parameter, will appear when cursor stay on that parameter. Can use to explain the parameter usage.

2.13 Associate Parameter

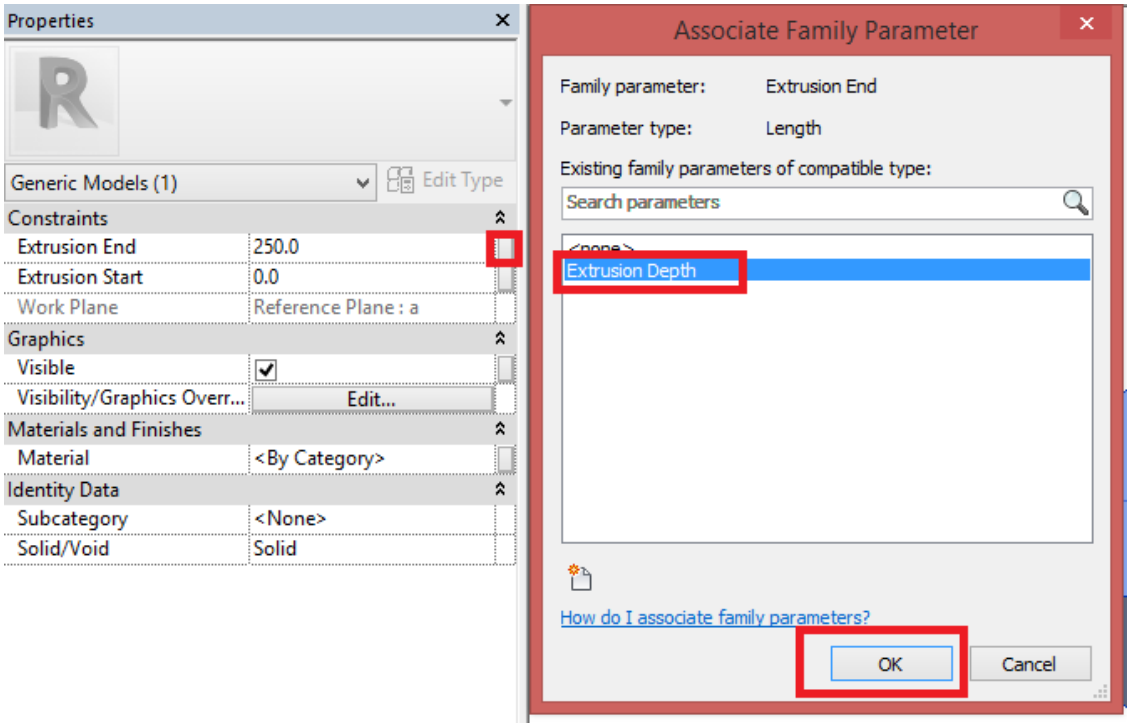
Parameter is allowed user change family in the project without additional modify the family file. These parameter called “Associate Parameter”. It also allows many elements share same parameter, thus, one parameter can control many elements behaviors. For example, use associate parameter to control family geometry, material or visibility.

- Assign Associate Parameter to Family Geometry

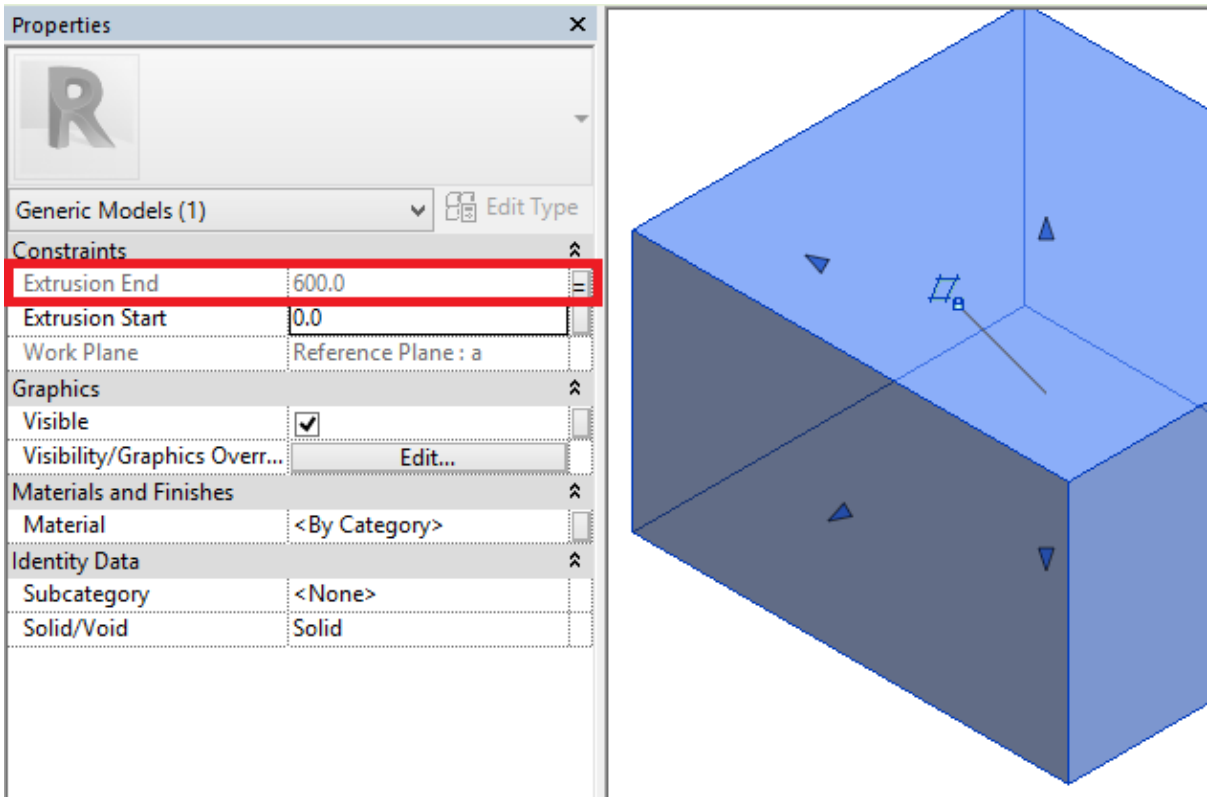
Create length parameter and input desired length.



Assign the associate parameter to the element property by the gray button.



- After assigned the associate parameter, the element property will become gray and disable to manual modify. Also an equal mark will appear on the button.



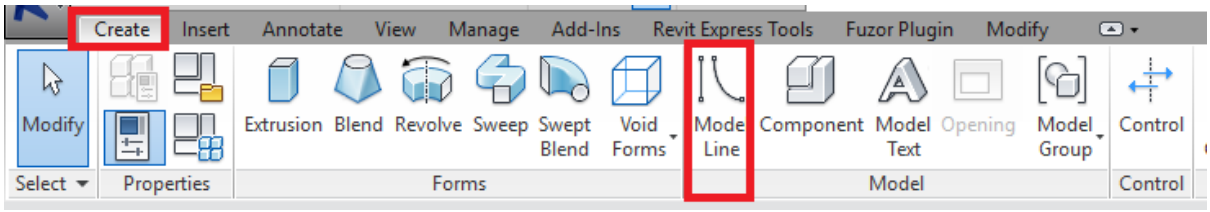
2.14 Model Line and Symbolic Line

To achieve drawing production purpose, many family shall be displaying symbol on 2D view. Several ways can use to create symbol and the simplest way is just drawing lines on the family.

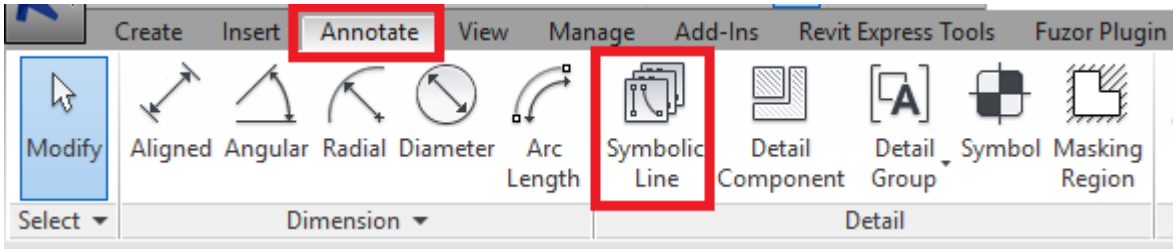
Family editor has two types of line, model line and symbolic line, creating by different command.

- Model Line is a 3D element. Thus, it will be displaying on all 3D and 2D views.
- Symbolic Line is a 2D element. Thus, it will be only displaying on the 2D views which parallel with the symbolic line.

Model Line under “Create” tab.



Symbolic Line under “Annotate” tab.



3. Advanced Family Modelling

3.1 Introduction of Parametric Modelling

Applying parametric modelling into creation of BIM object allow the family to vary its size and shape without creating new family. A well designed parametric family is able to apply in various project and different purpose, however, parametric modelling would increase risk of unexpected error, difficulty of modification and decrease speed of computer calculation.

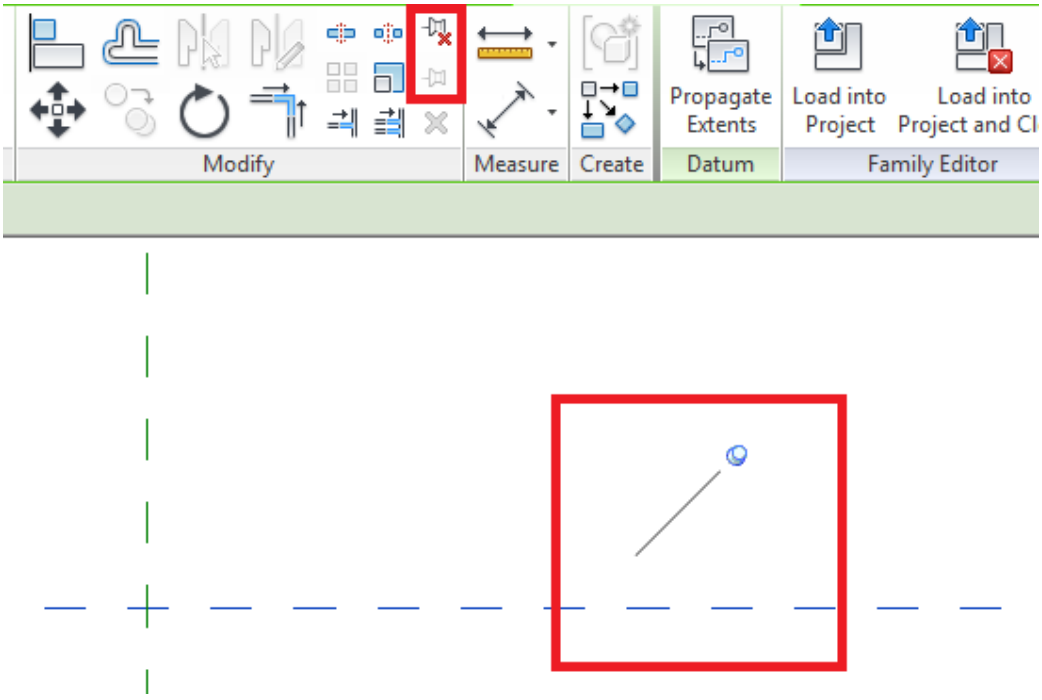
Parametric modelling is not only including various dimension but also including constrain relationship between elements.

3.1.1 Parametric Relationship on Reference Planes

Many methods allowed to create parametric modeling. However, a not well designed parametric relationship will very easy to appear unexpected error and difficulty of modification. Basically, use reference planes as all parametric relationship base is better. Use “Align”, “Dimension” tools to create relationship from geometries to reference planes.

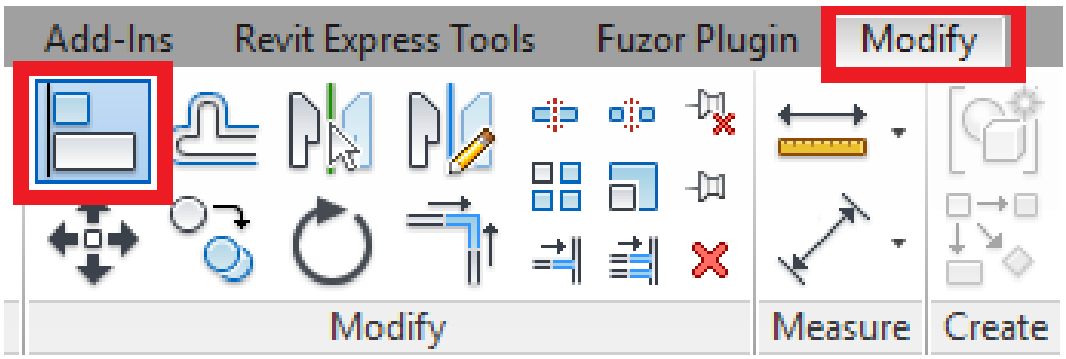
3.1.2 Pin

Use “Pin” command to pin the element, usually reference planes, to make the element unmodifiable and unmovable.

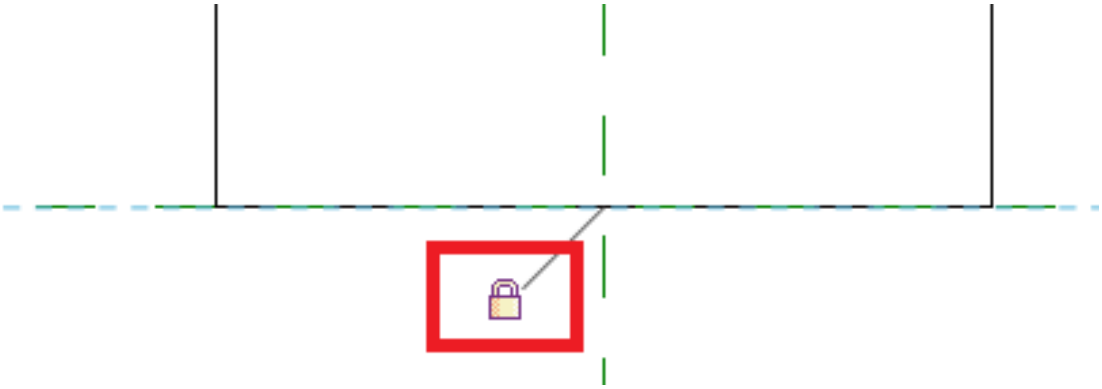


3.1.3 Align

Use “Align” command to align two elements.

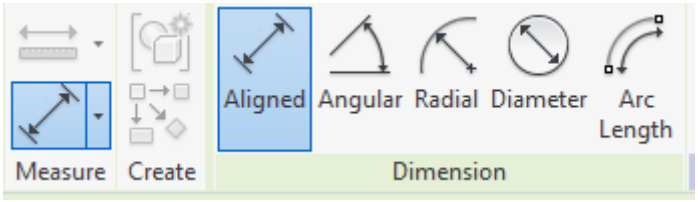


- Click the reference element. The reference element will be highlighted.
- Click the element which want to move.
- A “lock icon” will appear after aligned. Trigger the lock will create constrain relationship to force that element align forever.

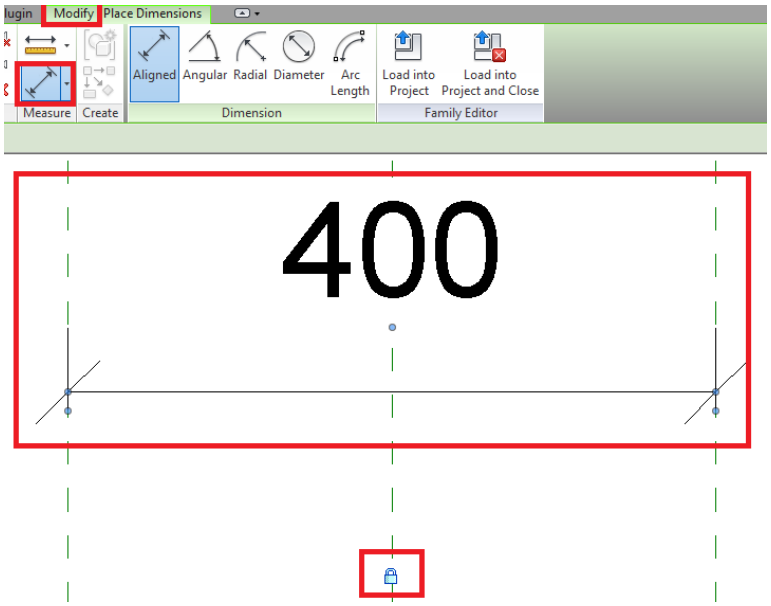


3.1.4 Locked Dimension

The basic application of “Dimension” tool is measurement. Revit provides five dimension tools to measure different type geometry. All dimension tools allowed to assign parametric relationship but “Aligned” (distance of two parallel elements), “Angular” (angle between two elements) and “Diameter” (diameter of circular element) are always used.

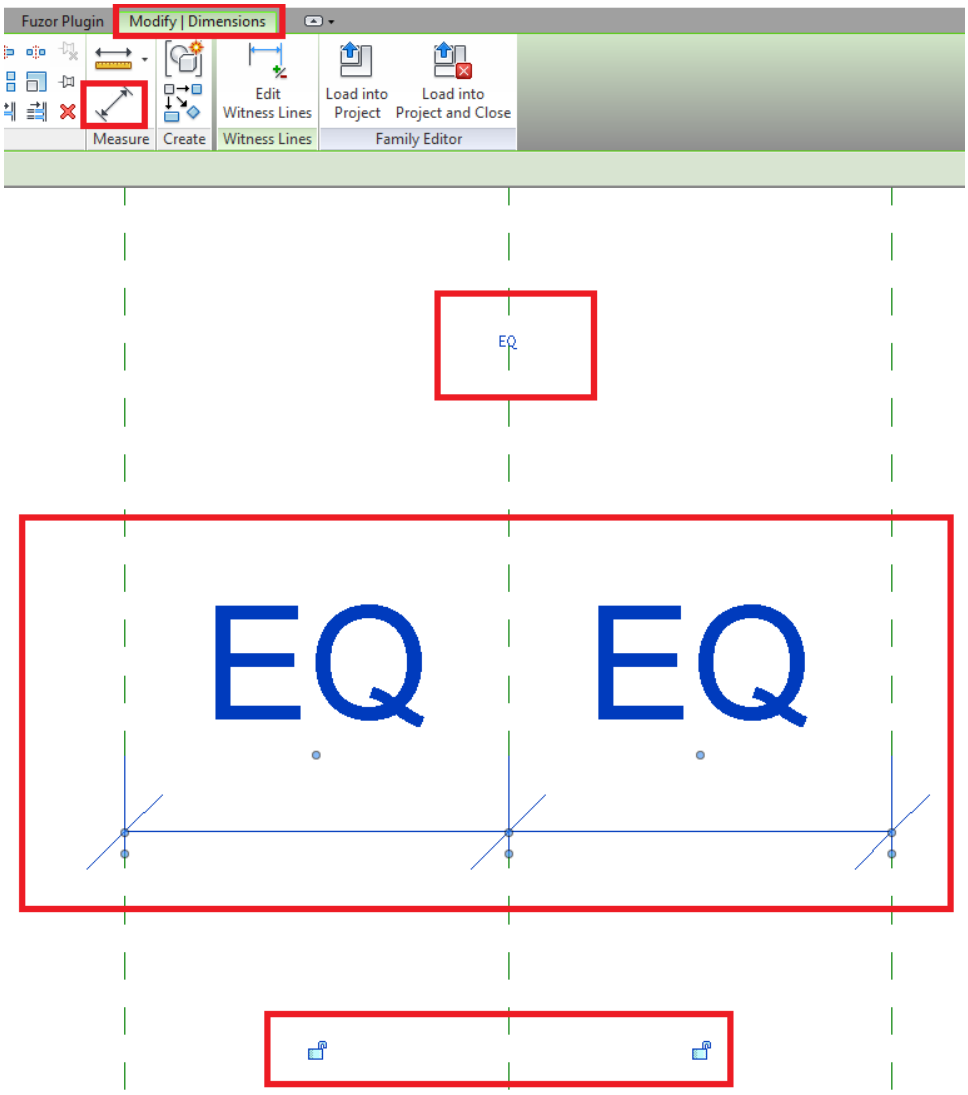


Only a measurement dimension is not a parametric relationship. Trigger the lock icon of the dimension to create parametric relationship to force the value of dimension become unmodifiable.



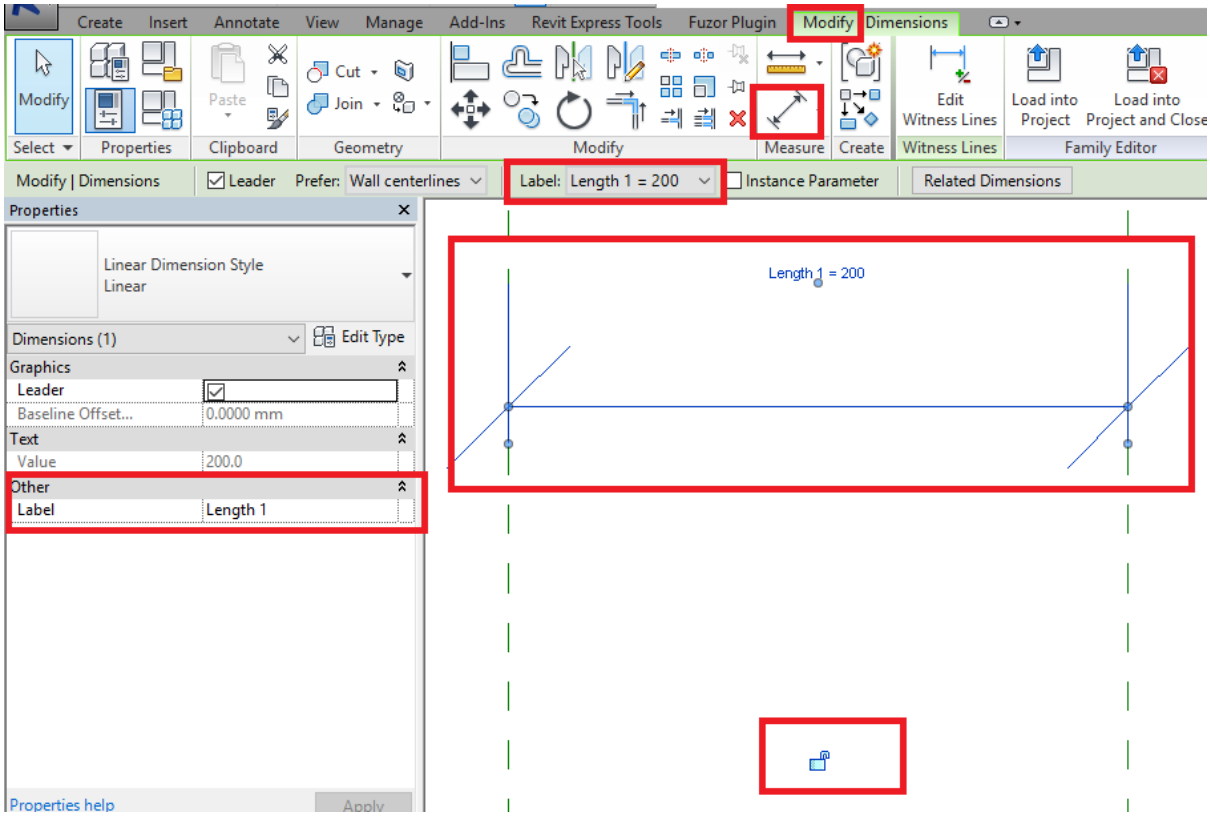
3.1.5 Equality Dimension

The “Dimension” is allowed to create a series of dimension between several elements. Trigger the “EQ” icon appear of multiple dimension will create equality relationship to force those elements equality with each other. Notice that equality dimension is already a type of constrain, if trigger the lock icon will force the value of dimension unmodifiable.



3.1.6 Label Dimension

Dimension can be assigned and controlled by one parameter. User can control the family geometry in project by this parameter. Notice that only assign parameter to dimension is a parametric relationship but not a type of constrain, that mean if the element has been modify, the parameter will been change. Trigger lock icon to force the dimension unmodifiable.

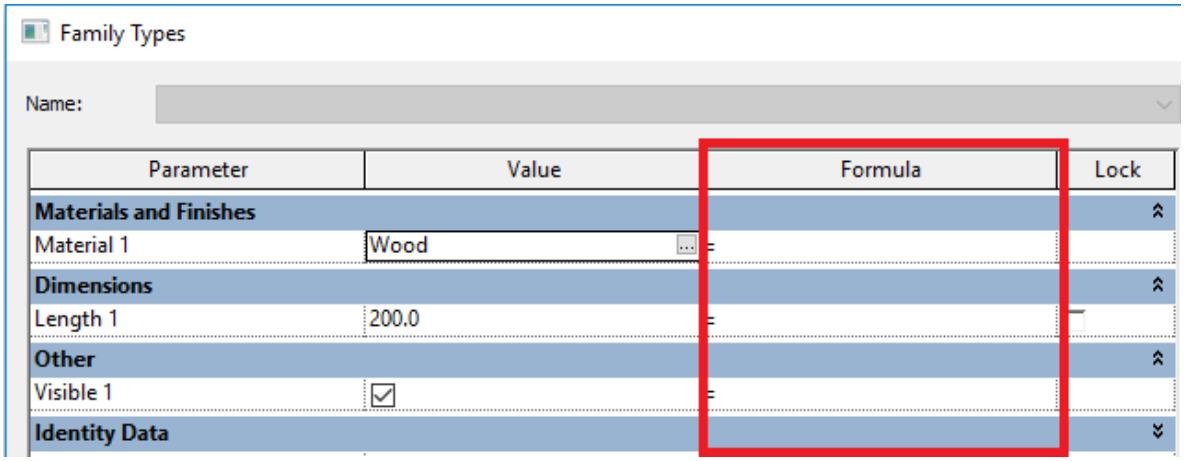


3.2 Introduction of Formula

Revit allows user apply formula to control and calculation of parameters. Use conditional statements in formulas to incorporate information from parameters.

- Parameter names in formulas are case sensitive.

Input formula on “Family Types” window.



3.2.1 Formula Syntax

Formula is must be following the syntax:

Arithmetic / Conditional	= x Operators y	x,y: Constant Number or Parameter Operators: + Addition - Subtraction * Multiplication / Division
Mathematical Function	= Function (x)	Function (): Revit build-in mathematical function
Strings	= “Text”	Text should be enclosed by “ ”.

3.2.2 Useful Formula

Mathematical Function:

- Circle: π = pi()
- Square Root = sqrt(x)
- Exponentiation = x ^ y

Round Function:

- Round to nearest whole number = round(x)
- Round to smaller number = rounddown(x)
- Round to larger number = roundup(x)

Notice that round function in Revit only able to handle no unit value, thus, if you want to round off a unit value must modify the formula to:

Result = round(x / 1) * 1

Conditional Statements:

Parameter type (Yes/No) and result of conditional statements must be a Boolean data type – a binary number. Binary Number only have two possible value: 0 and 1 (as known as FALSE and TRUE in logic).

- If formula return FALSE, the (Yes/No) parameter become No (unchecked);
- If formula return TRUE, the (Yes/No) parameter become Yes (checked).

Revit Supported Conditional Operators:

- Less than (return TRUE if x less than y): x < y
- Greater than (return TRUE if x greater than y): x > y
- Equal (return TRUE if x equal y): x = y
- Negation (return TRUE if x is FALSE, return FALSE if x is TRUE): NOT (x)
- Conjunction (return TRUE when all statements are TRUE): AND (x, y, z …)
- Disjunction (return TRUE when anyone statements are TRUE): OR (x, y, z …)

"IF" Conditional Syntax:

- IF (<condition>, <result-if-true>, <result-if-false>)

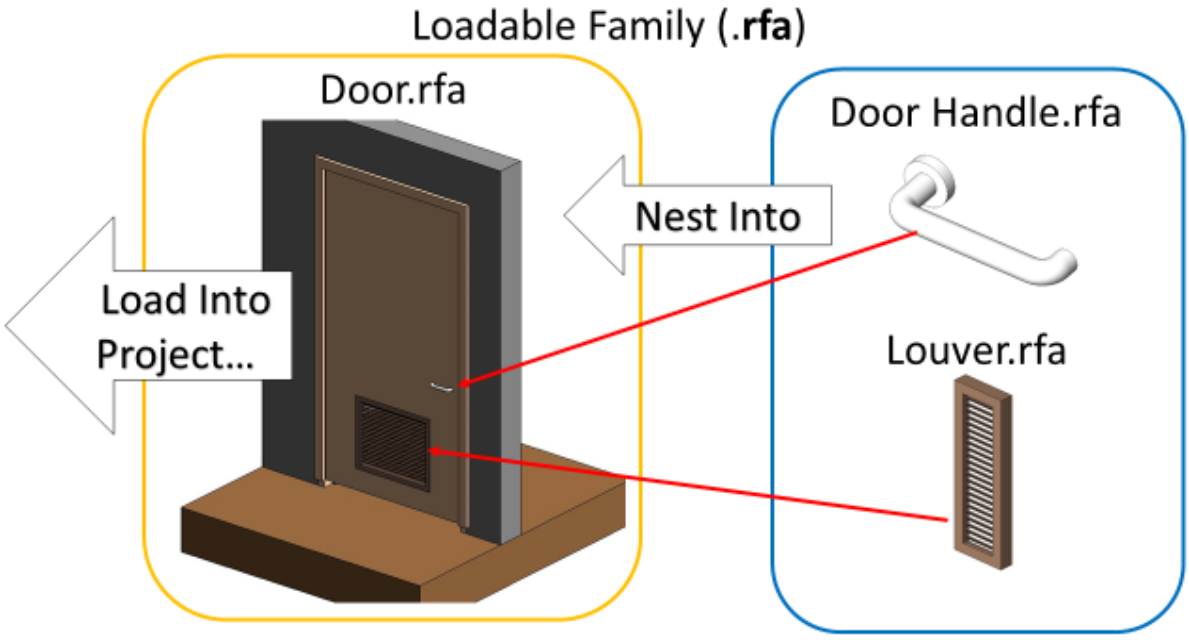
e.g.

Parameter	Value	Formula
Dimensions		
Length	300.0	= if(Width > 500 mm, 300 mm, 900 mm)
Width	600.0	=

3.3 Nested Family

A building component might be large and complex and possible to separate to several parts. In other words, a small component might be a part of many building components. For example, a company produces many types of door but they only support one types of door handle. We can just create one family of the door handle and “Nest” into door families.

- Revit does not have restricted the nested number but suggested do not nest over 2 levels.
- This method is suggested to insert 2D symbol to 3D family.
- The nested family will become a part of the host family and cannot select / schedule / tag independently in project if the “Shared” property of nested family is unchecked.
- The nested family can select / schedule / tag in project if the “Shared” property of nested family is checked.

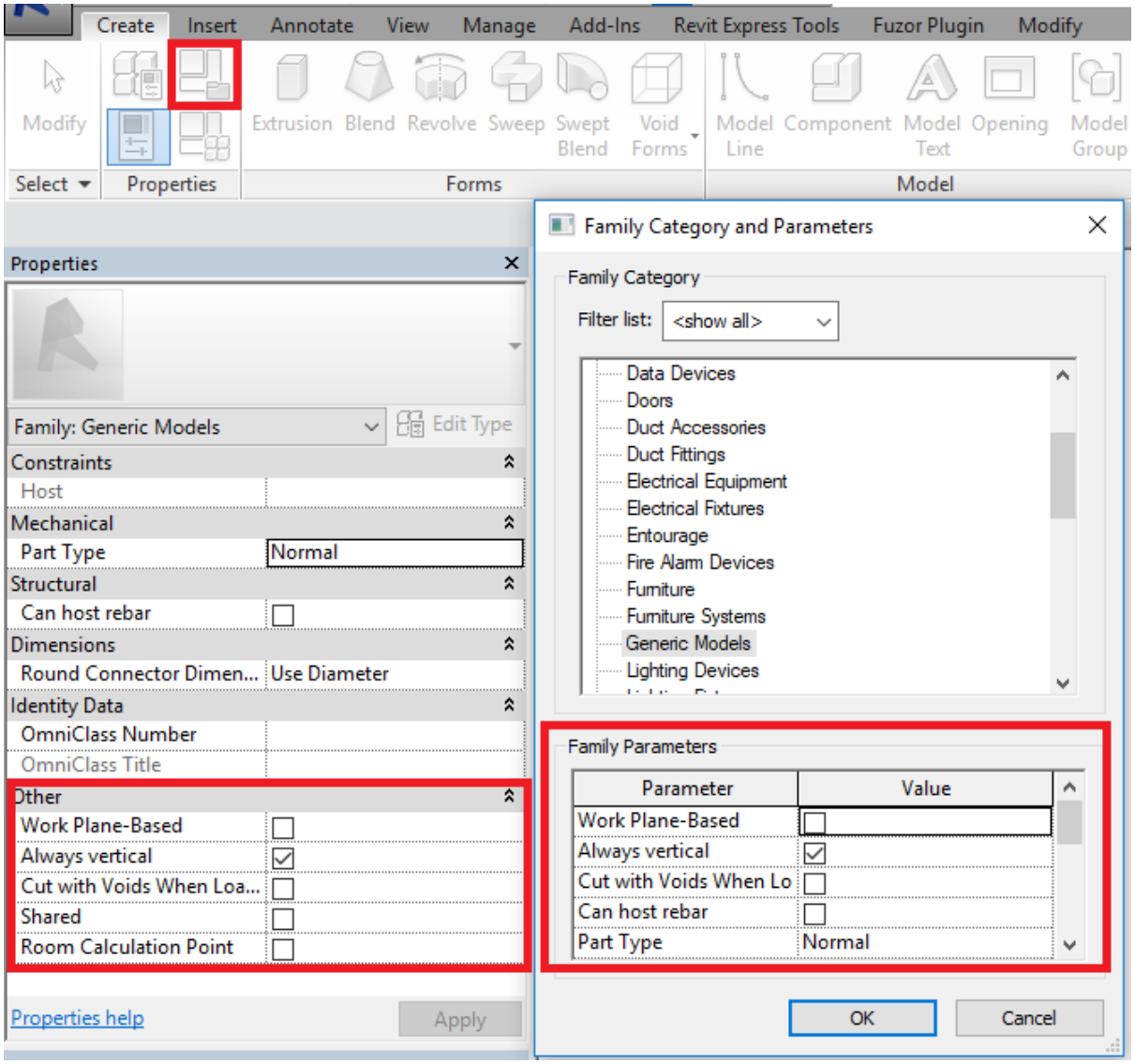


3.4 Family Behavior Parameter

Revit has several build-in parameters which depend on family category to control that category behavior in project. There are some behavior parameters appear in most categories.

- Work Plane-Based: If checked, allow family place on a reference plane whatever the reference plane is horizontal, vertical or even slope plane. Otherwise the family will only allowed to place on “Level”.
- Always Vertical: If checked, the family has forced to vertical in project.
- Shared: It will not have any effect if the family directly inserted into project. Only effect when the family **nest** into another family.

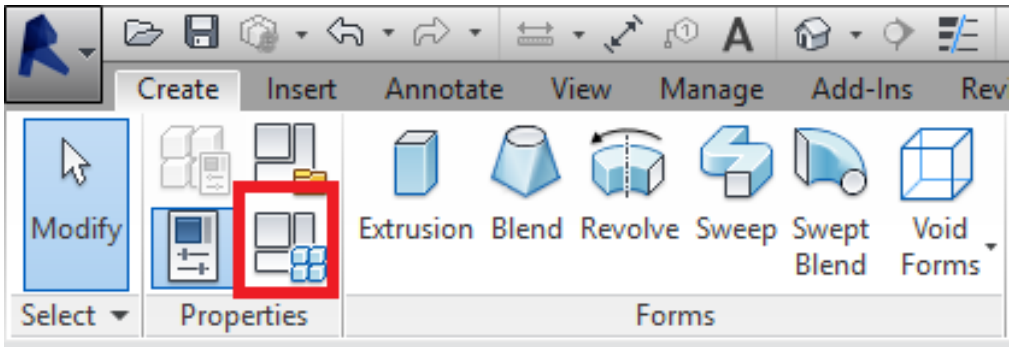
Control family behavior parameter on properties palette when not selected any element or open “Family Category and Parameters” window under “Create” tab.

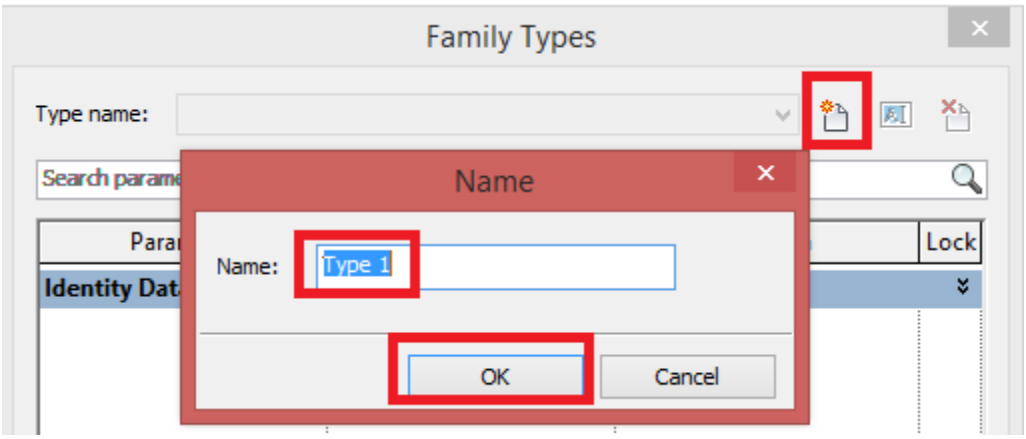


3.5 Create Family Type

Use family type to create variable types including geometry or non-geometry information. Only parameter value is changeable between each family type. Family behavior parameter, formula and geometry constrain (i.e. locked align, pin etc.) cannot change in family type.

Manage family types in “Family Types” window under “Create” tab.





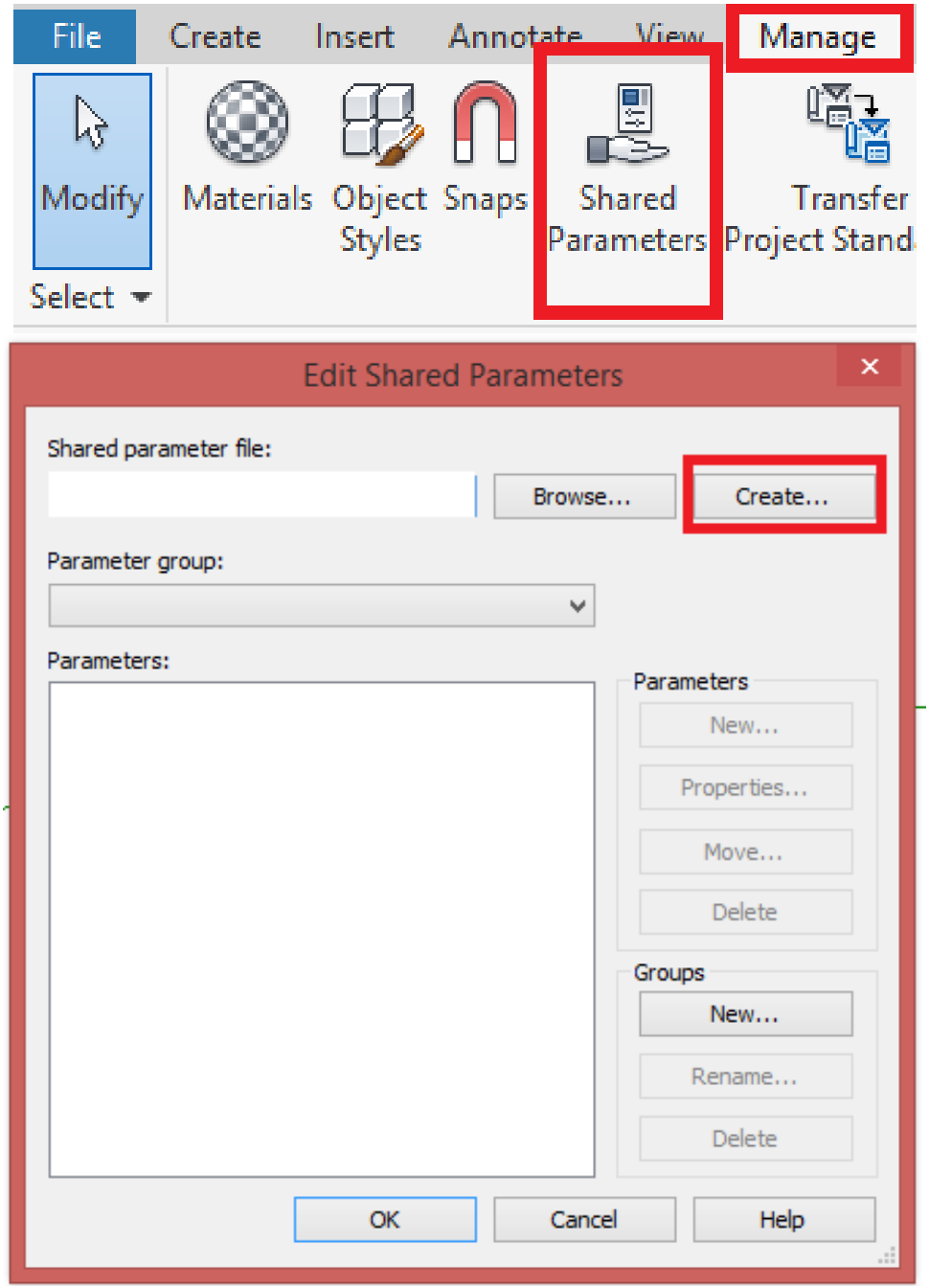
3.6 Introduction of Shared Parameter

Shared parameters are parameter definitions that can be used in multiple families or projects. Definitions are stored in a text file which is independent of any family file or Revit project, thus, access to the text file is possible from different families or projects.

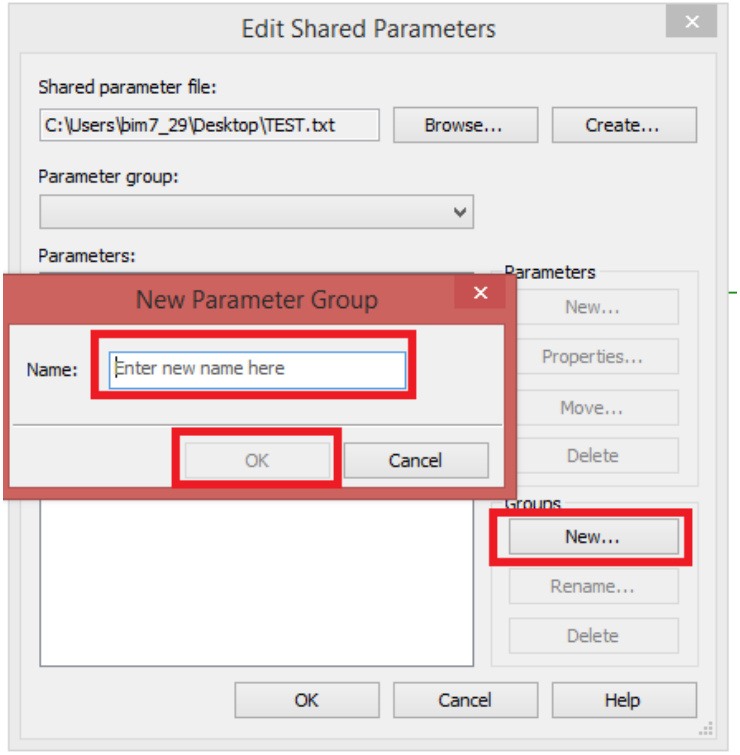
Shared parameters are saved in a text file that can be placed in a shared area on the office network or server to allow common access. One Revit project can refer to only one shared parameter file at a time. Notice that the shared parameter text file must be modifying in Revit and NOT allowed modifying by manual.

- Manage Shared Parameter

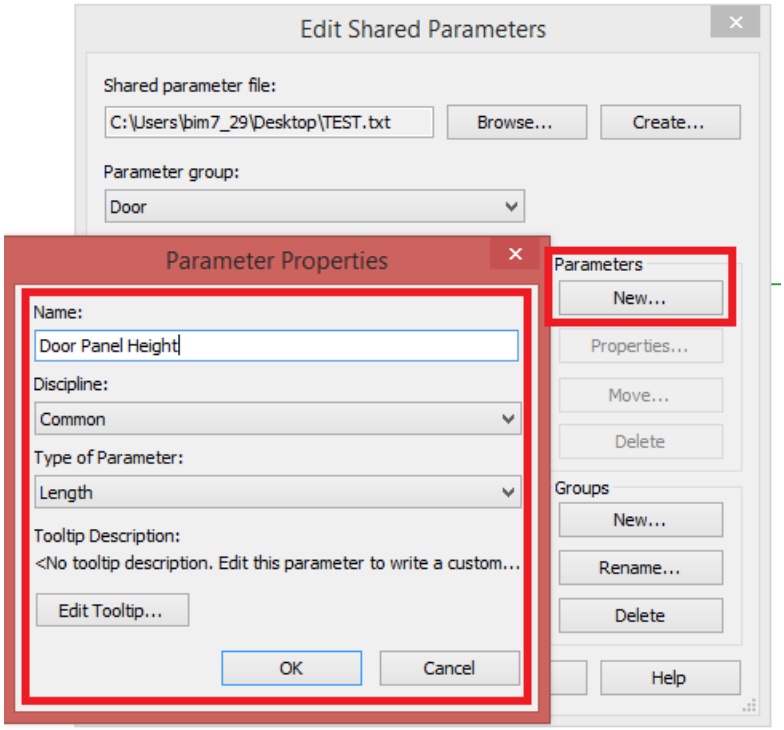
Open “Edit Shared Parameters” under “Manage” tab. Create new Shared Parameter File.



Create new groups.

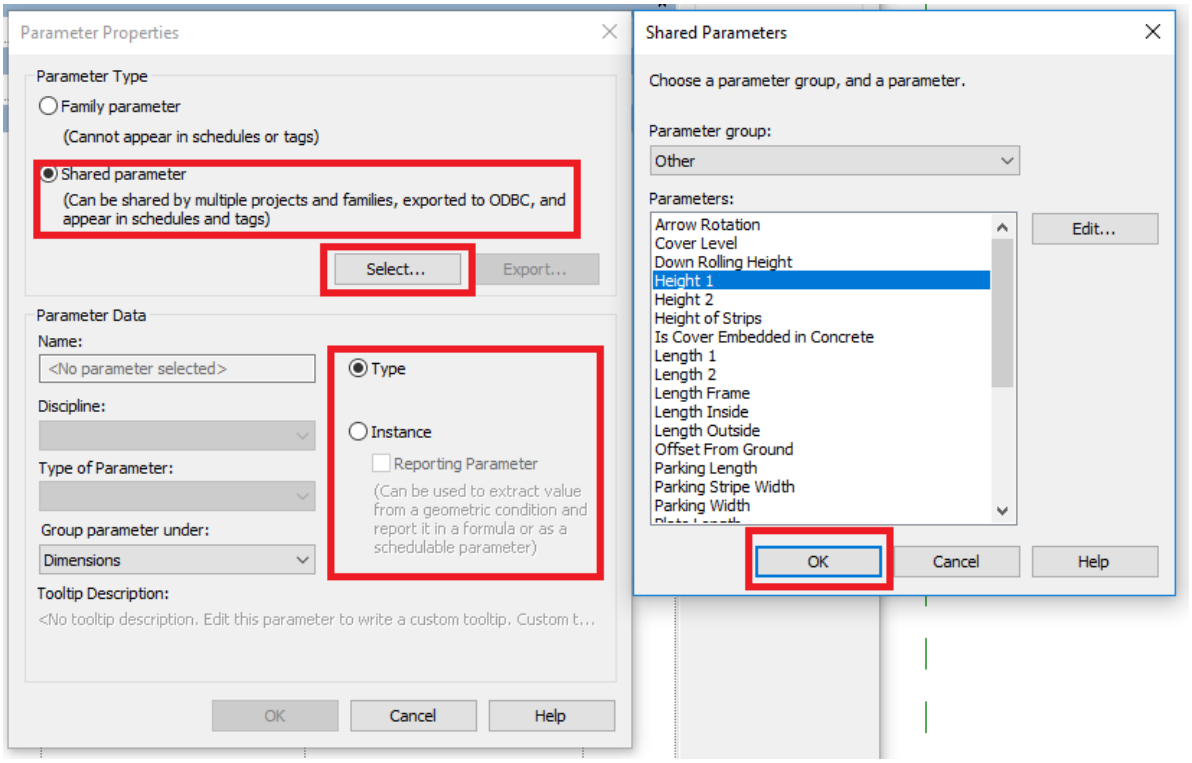


Create new share parameter. The parameter data is same with the family parameter. Notice that shared parameter is NOT allowed to modify after creation.



- Assign Shared Parameter to Family File

Create new parameter from “Family Types” window and select to apply Shared Parameter. Select desired Shared Parameter from your Shared Parameter List. Shared Parameter already defined parameter data so those field will be grayed and not allowed to manual modify.



3.7 Annotation Family

2D annotation family is very important to achieve drawing production purpose. 2D symbol used to represent the 3D geometry to industry acceptable drawing. 2D tag used to extract information from family and shown on the drawing.

3.7.1 2D symbol

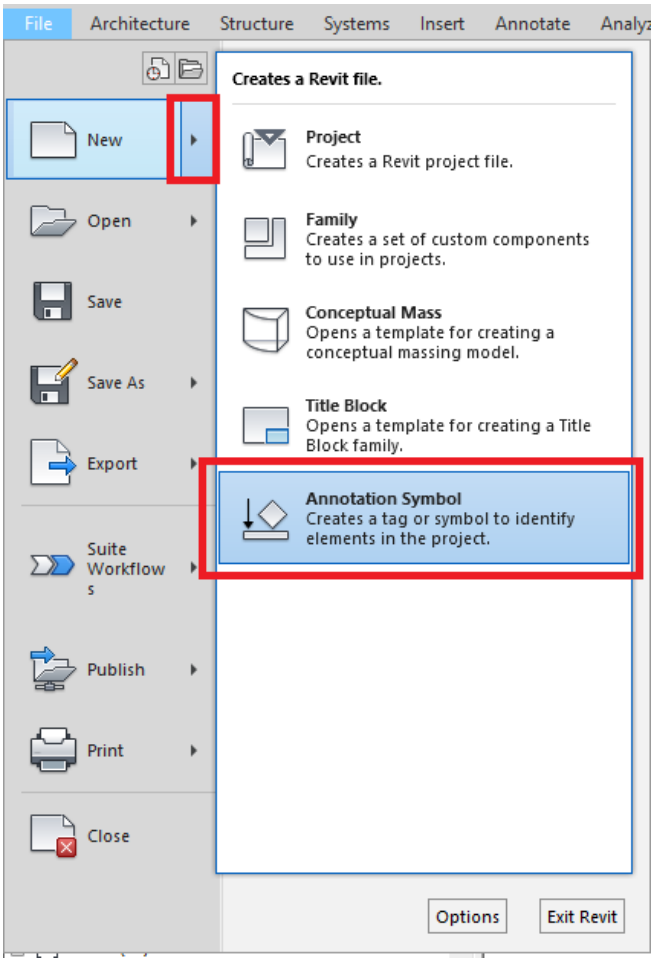
Beside of symbolic line, draw an independent 2D symbol family and nest into 3D family is more suggested because 2D symbol usually use in many building components.

Two family templates can create 2D symbol family:

- Detail Item family template and Annotation family template both can create symbol. However, symbols using Annotation family template are varied according to the view annotation scale in Revit but cannot be assigned individually. Detail Item family is used 1:1 scale and will not change by view annotation scale.
- Detail Item family will be a good starting point. However, text note cannot be appeared in Detail Item family when loading into the project

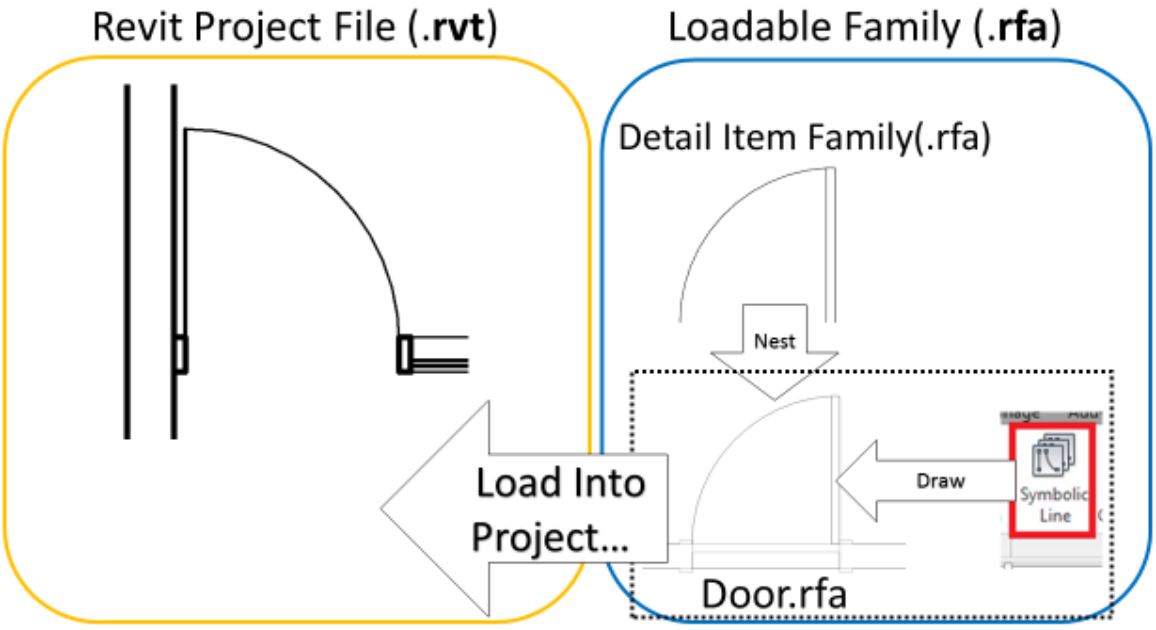
The Detail Item family template is under same folder of family template library.

The Annotation Family Template is under “Annotation” Folder in the family template library. A shortcut on the bottom of “New” drop down list can directly browse the annotation family template folder.



When you creating a symbol for a family, the symbol must choose from 3 methods. The simplest way is draw directly on the family by symbolic line. Another one is nest one annotation family. The last one is nest one detail item family.

Whatever which method you used, the symbol must state inside the family. **NO symbol will draw / place individually in the Revit Project.**



3.7.2 Symbol Requirement

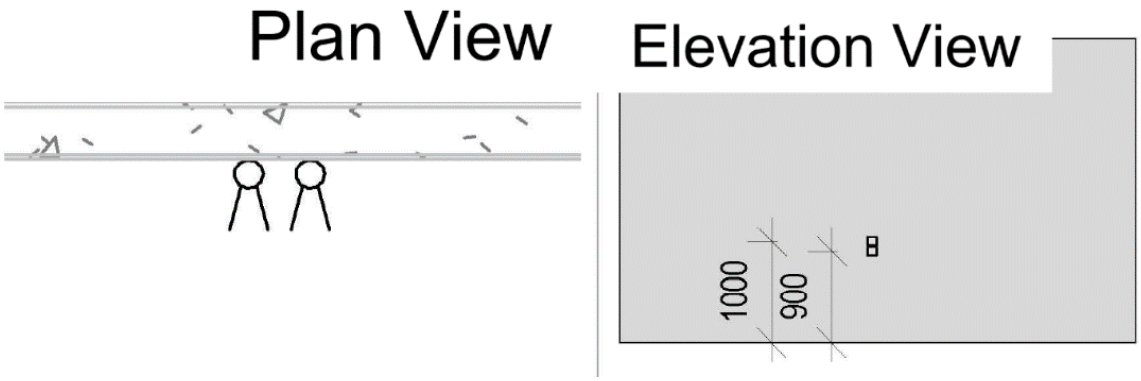
Based on *"CIC Production of BIM Object Guide - General Requirements",* several requirement has been indicated to satisfy drawing production.

- "The BIM object symbol shall be followed with the geometry" & "Symbol is orthogonal to the BIM object geometry"

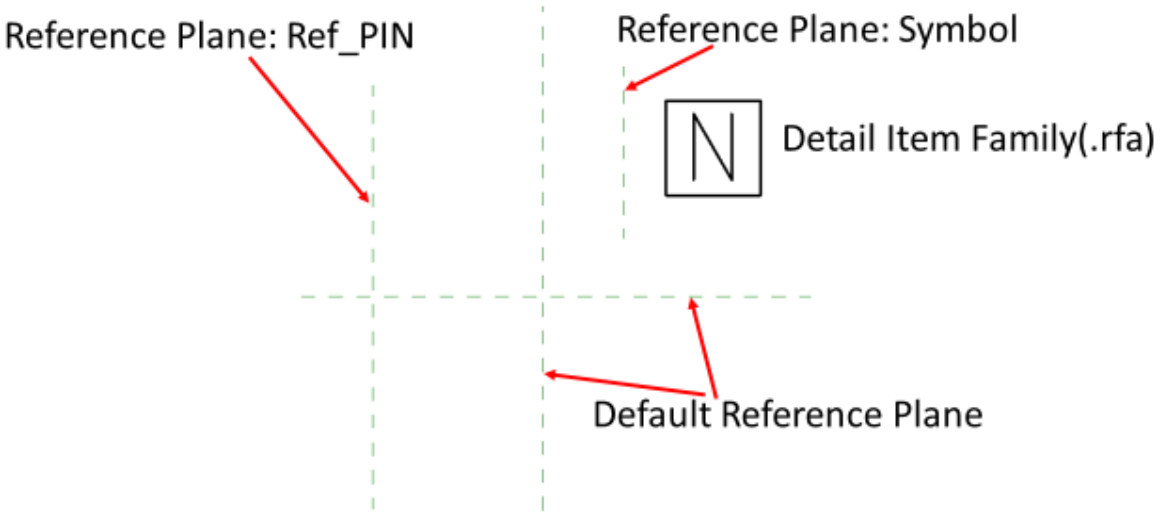
If the symbol is stated inside the family, it must fulfil this requirement.

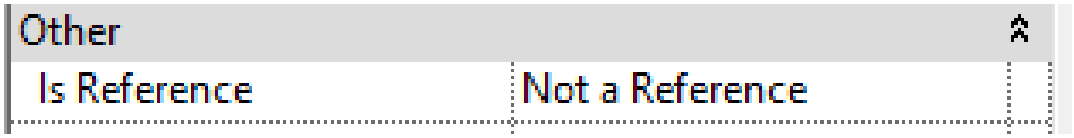
- "Controllable offset(s) for overlapping object in the BIM model"

In reality, some type of building component might overlapping each other on plan and their symbol still need to show as individually. For example, lighting switch and socket might be occur this issue.

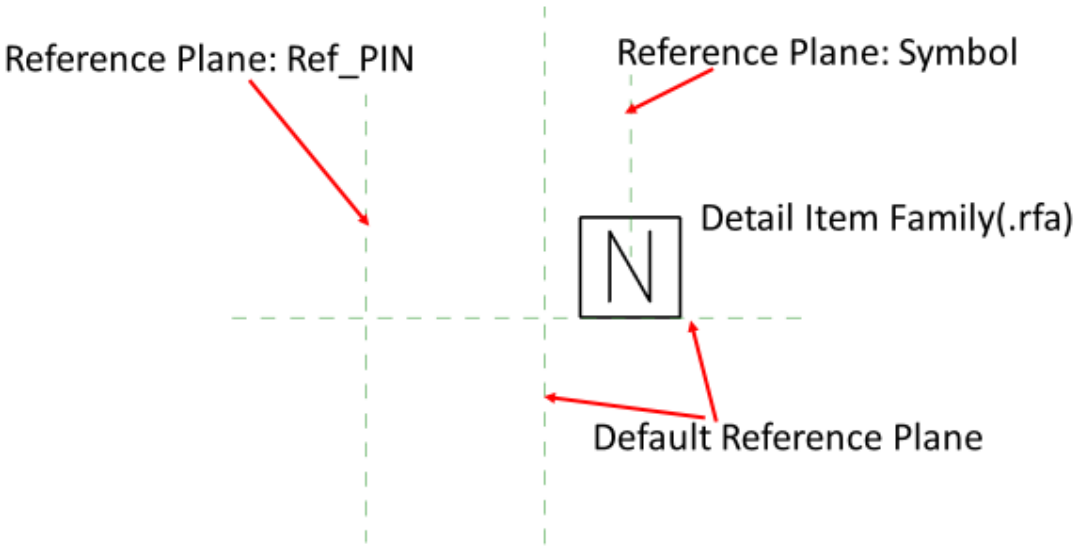


To solve this isse, the family symbol must have controllable offset. There is a sample to achieve this function by using a detail item family. The geometry is drew on the inserction point but does not shon on this sample. Prepare two reference plane and named as image shown. **Pin the Ref_PIN reference plane and set the "Is reference" propertry to "Not a reference".**

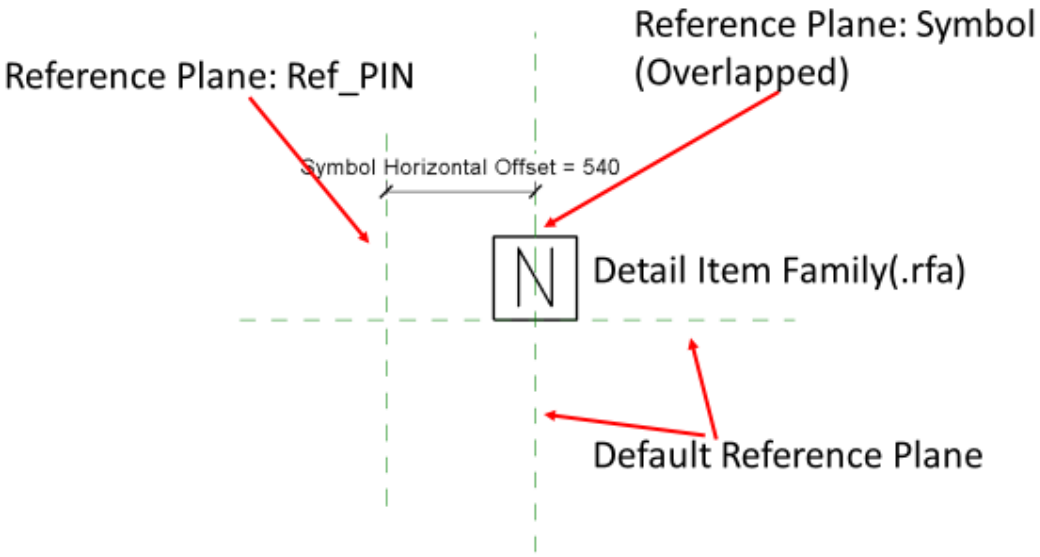




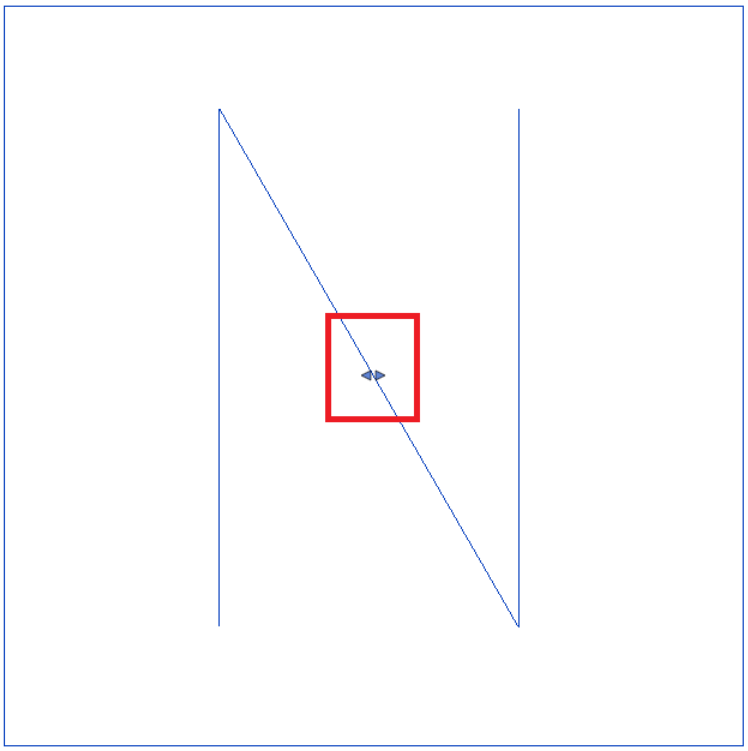
Use "Align" tool to lock the symbol to the suitable reference plane. In this sample, vertical is aligned to Symbol reference plane and horizontal is aligned to default reference plane.



Make dimension between Ref_PIN and Symbol reference planes. Assign Instance Parameter named Symbol Horizontal Offset to the dimension. Remember that the symbol place into suitable place before using.

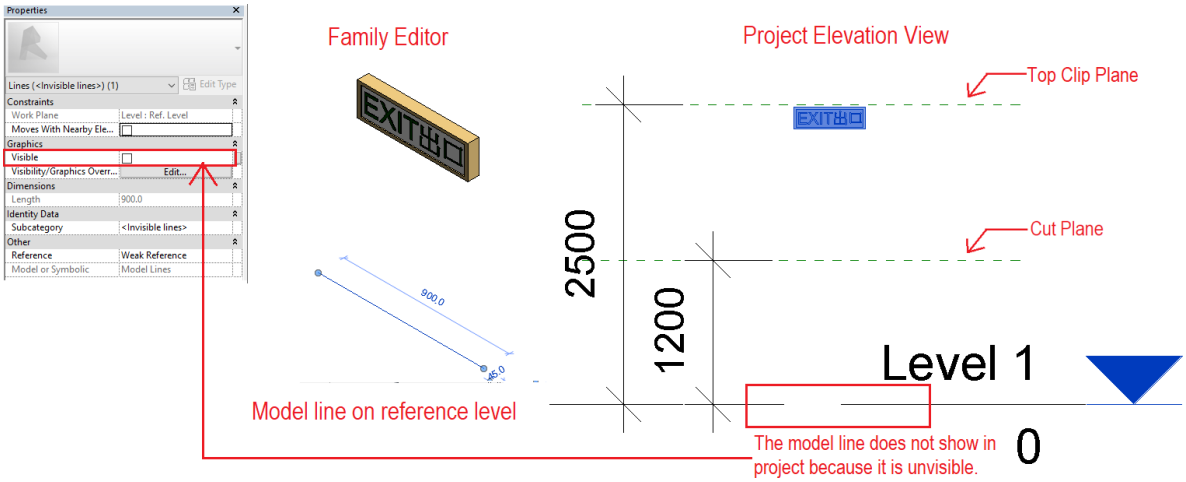


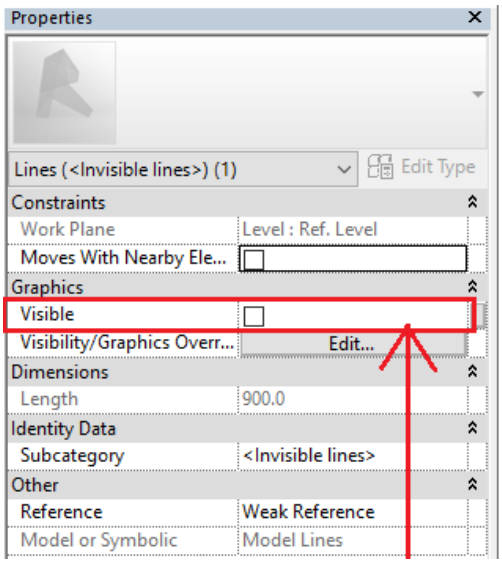
Follow this method you should able to see a Shape Handle on the family after loaded into Revit Project. That allow user easy to apply symbol offset if needed.

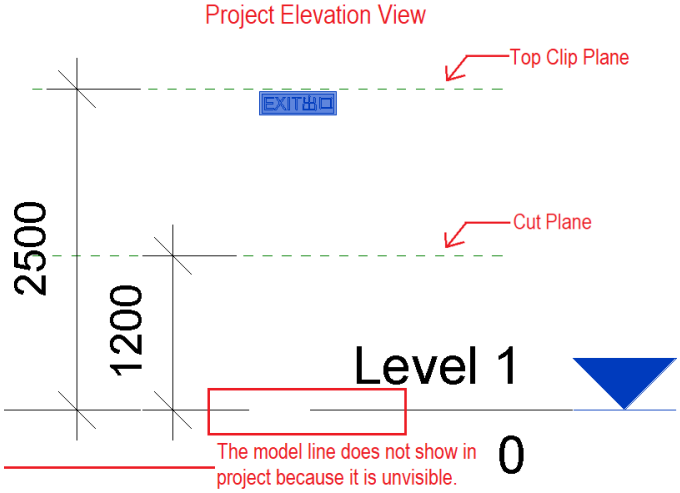


- Family Place Higher Than Cut Plane

If the family need to show on the floor plan but it geometry placed higher than cut plane of view range setting will make it does not shown on the plan. For example, an Exit Sign is place on high level but it need to show on submission drawings.







- “The BIM object symbol shall be modelled, where appropriate, size-dependent with 3D geometry”

Whatever the symbol is drew by Symbolic Line or Annotation / Detail Family, it still can apply parametric modelling. Use “Align” tools, label dimension and associate parameter skill to achieve this requirement.

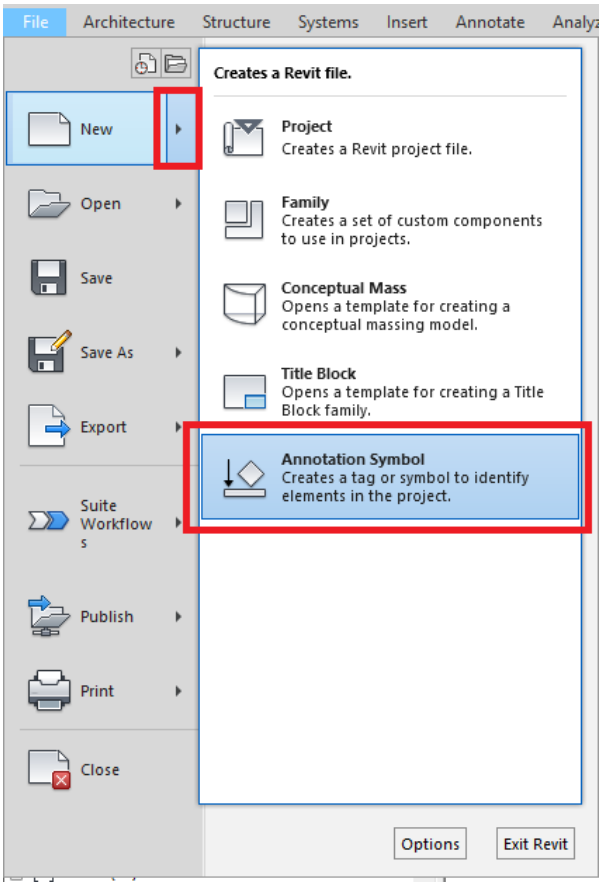
3.7.3 2D Tag

2D Tag is a separate BIM object (loadable family) in Revit environment. Similar with 3D family, 2D Tag family has many templates classified by category. 2D Tag family has following characteristics:

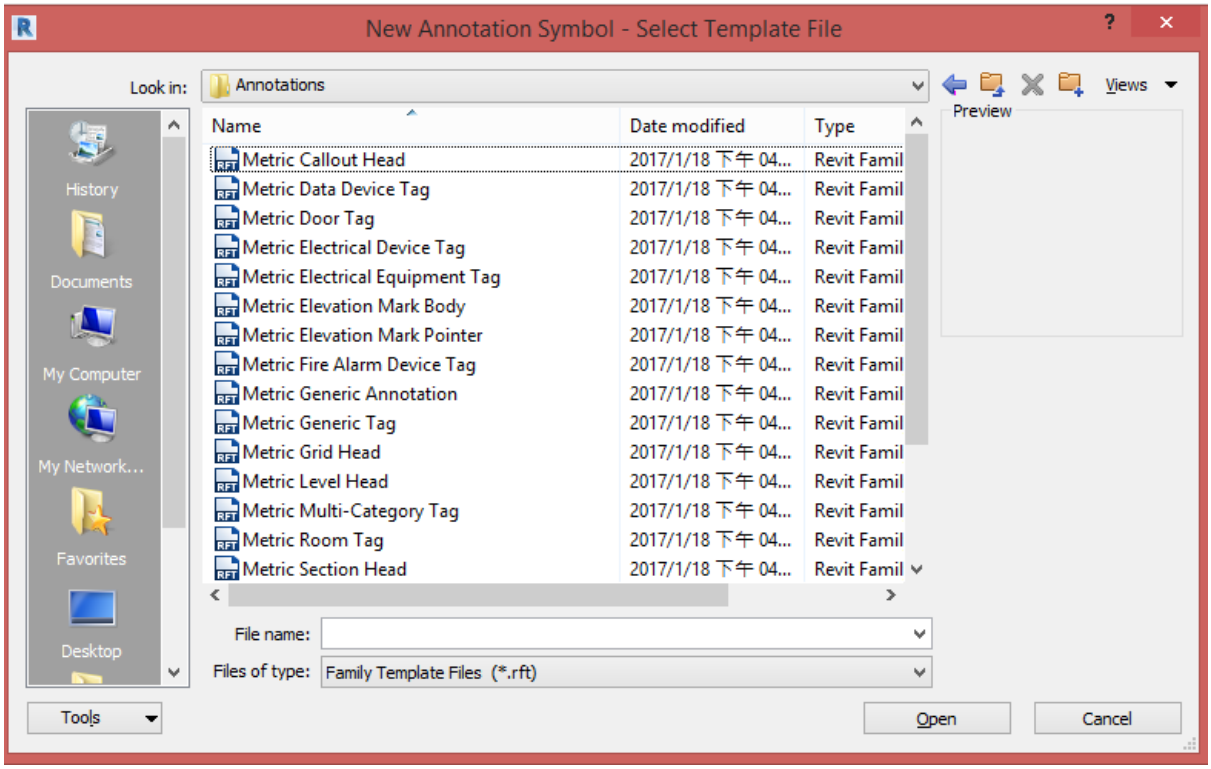
- 2D Tag family templates are under annotation templates so 2D tag will be affected by scale in Revit.
- The 2D tag family category should be match with the target category, e.g. if tagging a door, the 2D tag family should be under “Door Tags” category.
- All information (parameters) of 2D Tag family should extract from target in Revit project. These parameters should be Shared Parameter.

3.7.4 Tag Creation

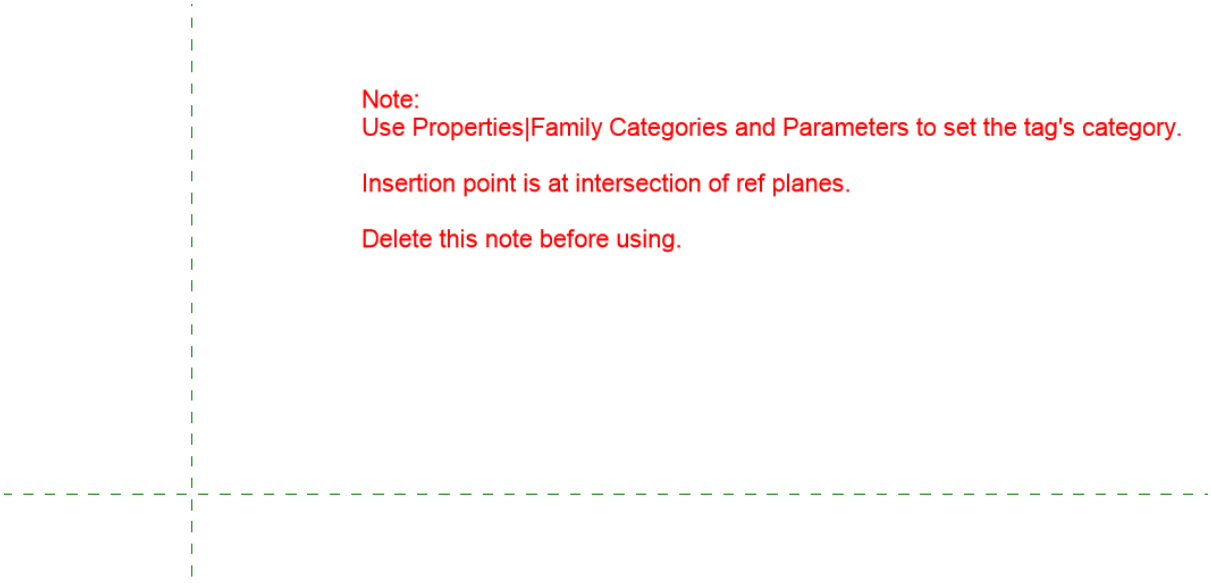
Tag family template is under “Annotation” Folder in the family template library. A shortcut on the bottom of “New” drop down list can directly browse the annotation family template folder.



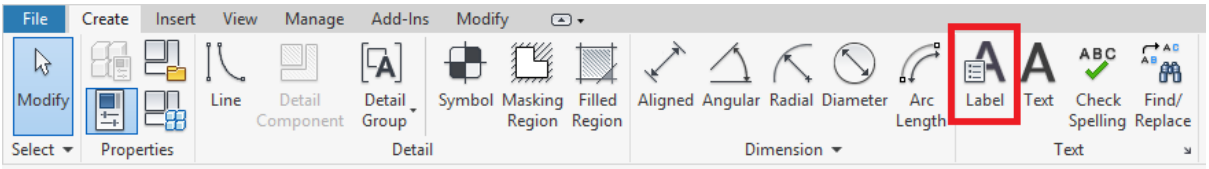
As like as normal creation procedure, you should take suitable family template.



A note will be shown on Generic Tag Family Template to remind you change the category if necessary. Remember delete that note before using.

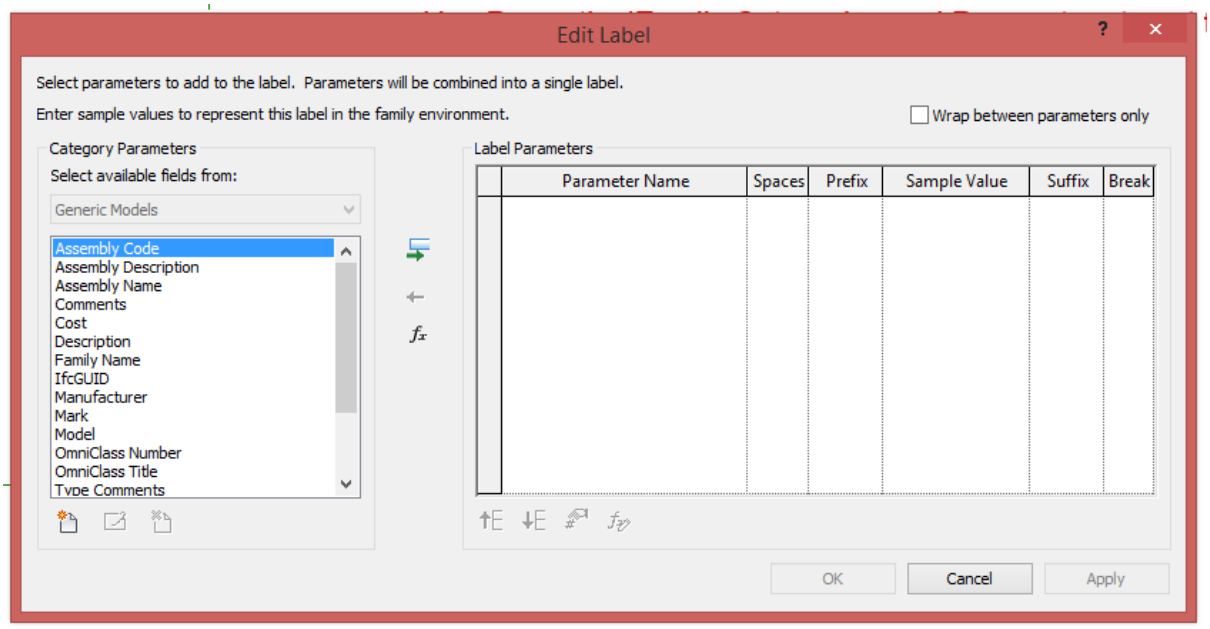


The creation tool is similar of “Annotation” tool in 3D family editor. The important tool of create tag family is “Label” tool.

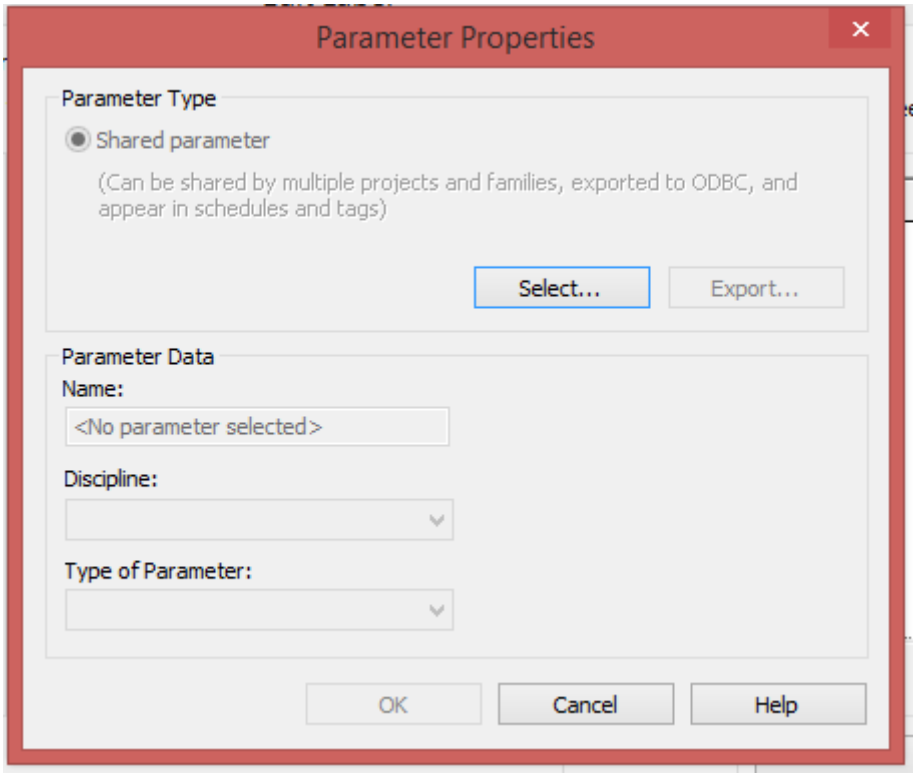


The label is used to extract parameter information from other family so the content will various by family information variation. If you only used “Text” tool, the content will be a fixed text.

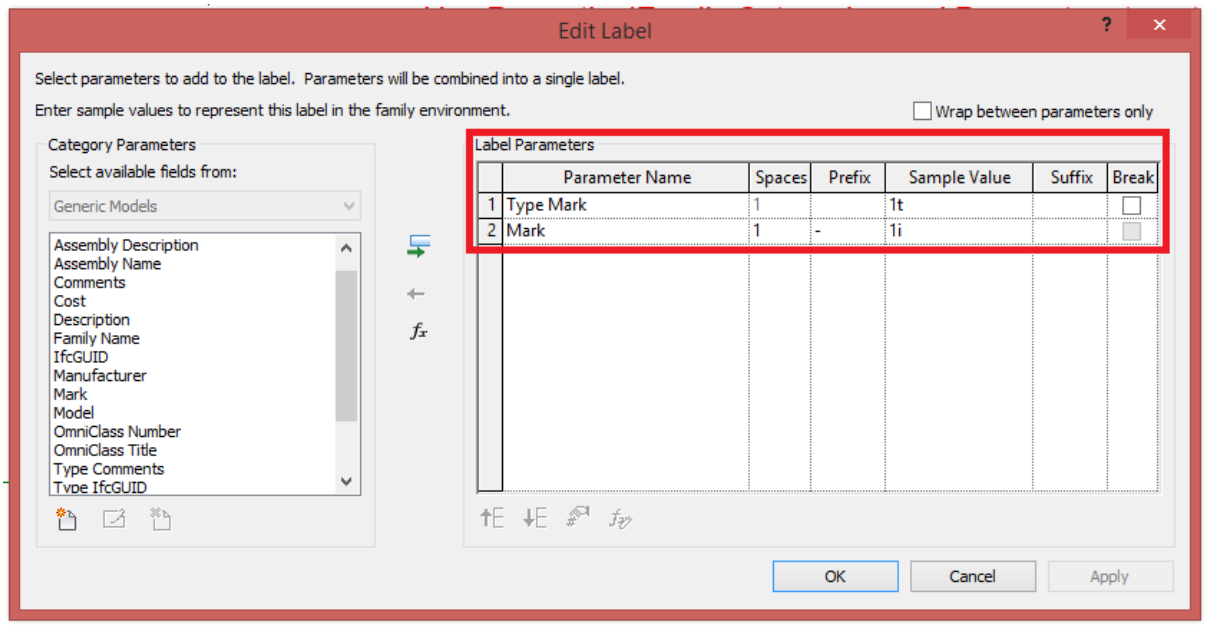
When you creating or editing a label element, you will see “Edit Label” dialog. The list of left hand side is listed all build-in parameter under the category so you can easily to extract information such as mark and type mark from the list. If you want to extract your own created parameter, you must use Shared Parameter. Select the “Add Parameter” icon bottom of the list.



When adding parameter, you will see the dialog is different of other, Revit only allowed use Shared Parameter to label.



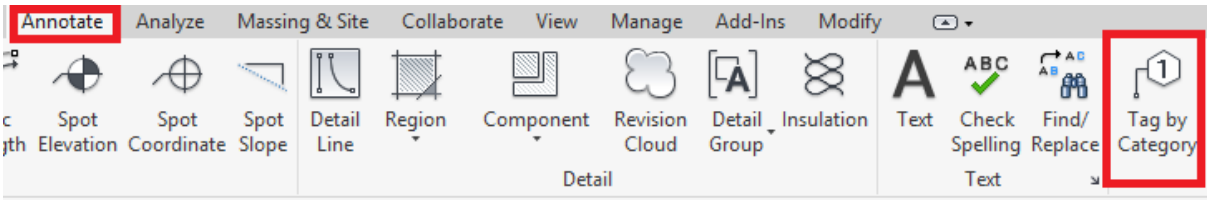
You can select more than one parameter into one label element. Use Prefix and Suffix to build suitable text structure. If checked Break parameter will shift following parameter into next line. The Sample Value is only shown on the family editor and suitable value make modification easier.



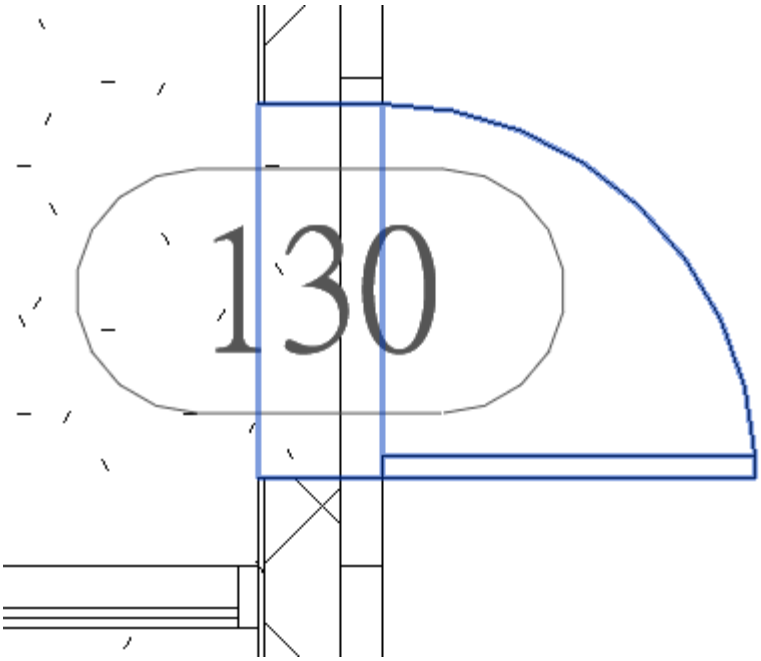
3.7.5 Tag Command in Revit Project

After the tag family has loaded into Project, it cannot place individually on the model and must be host with one element.

Use “Tag by Category” command under “Annotate” tab in Revit Project.



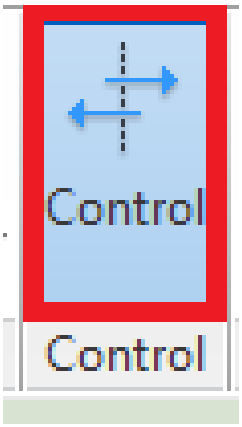
Move the cursor to the family which want to tag, a preview of the tag will appear on the view.

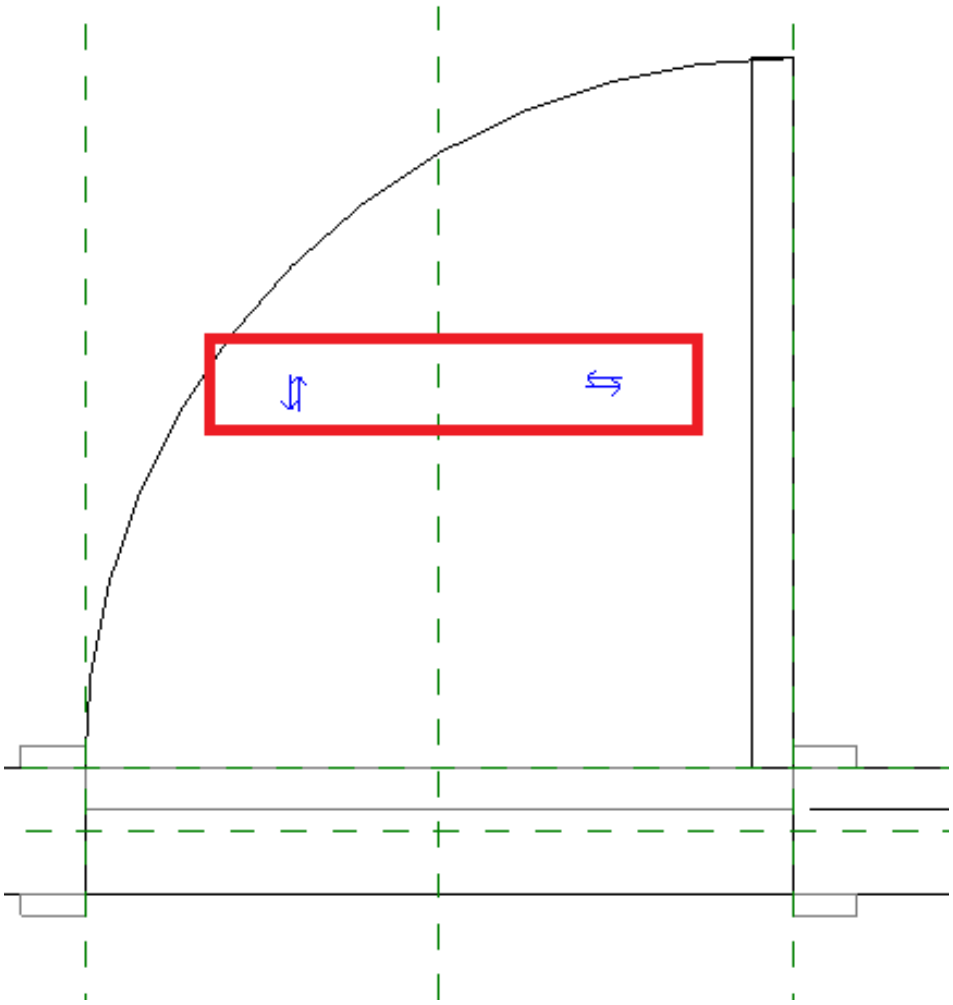


3.8 Flip Control

When the family is placed in a project, the flip arrow allows you to change the vertical or horizontal orientation of the family.

Create Flip Control under “Create” tab.



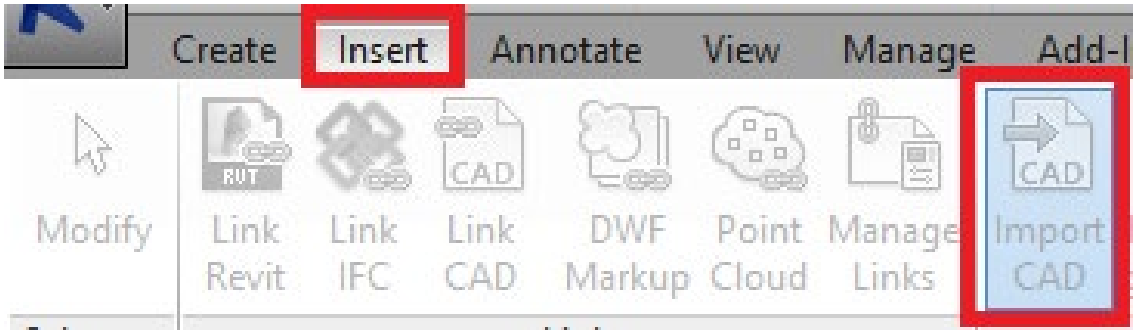


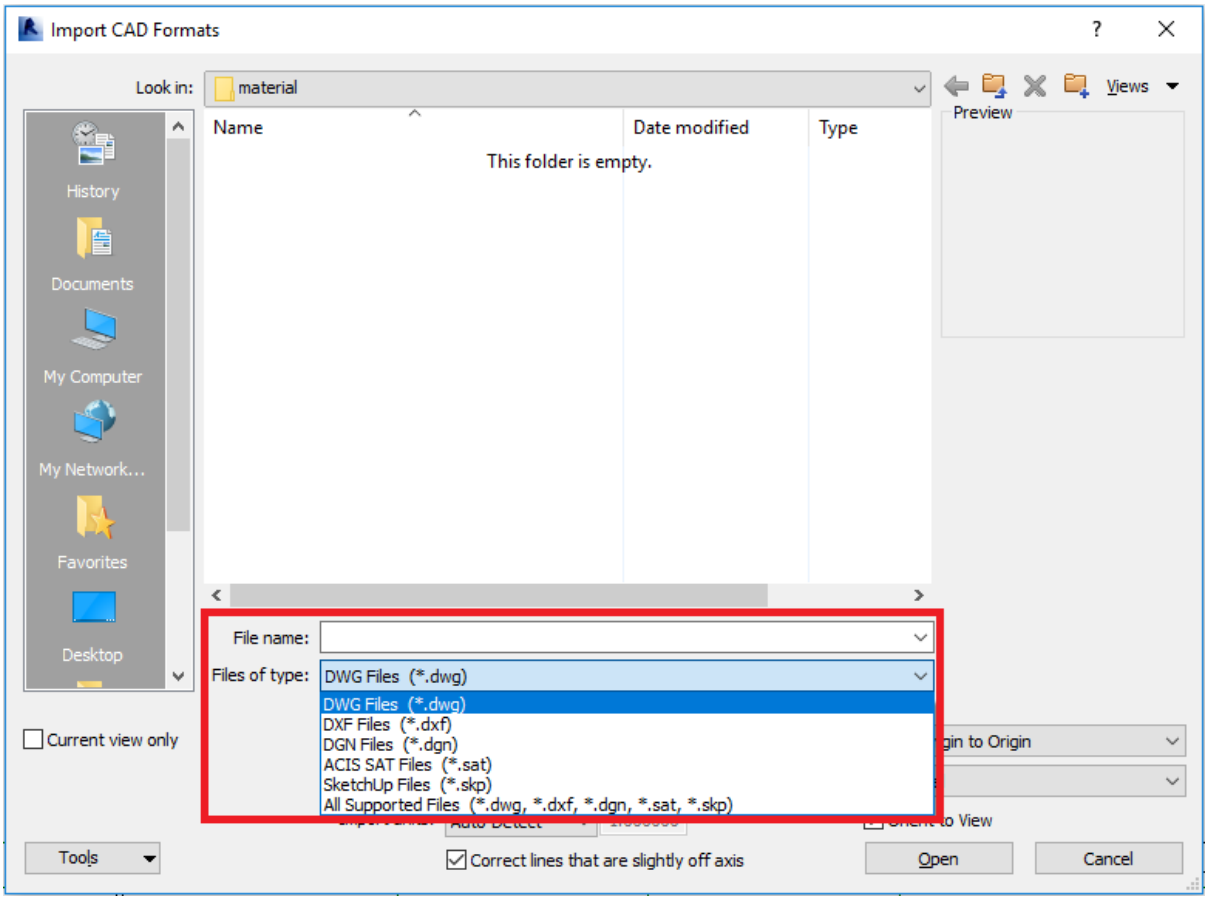
4. Workshop

4.1 Introduction of Import Geometry from Other Programs

Family editor allow import geometry from another 3D software. Supported external file types are DWG, DXF, DGN, ACIS SAT and SketchUP files. Notice that only geometry will be imported into Revit and need to add non-geometry information and parametric relationship by manual if needed.

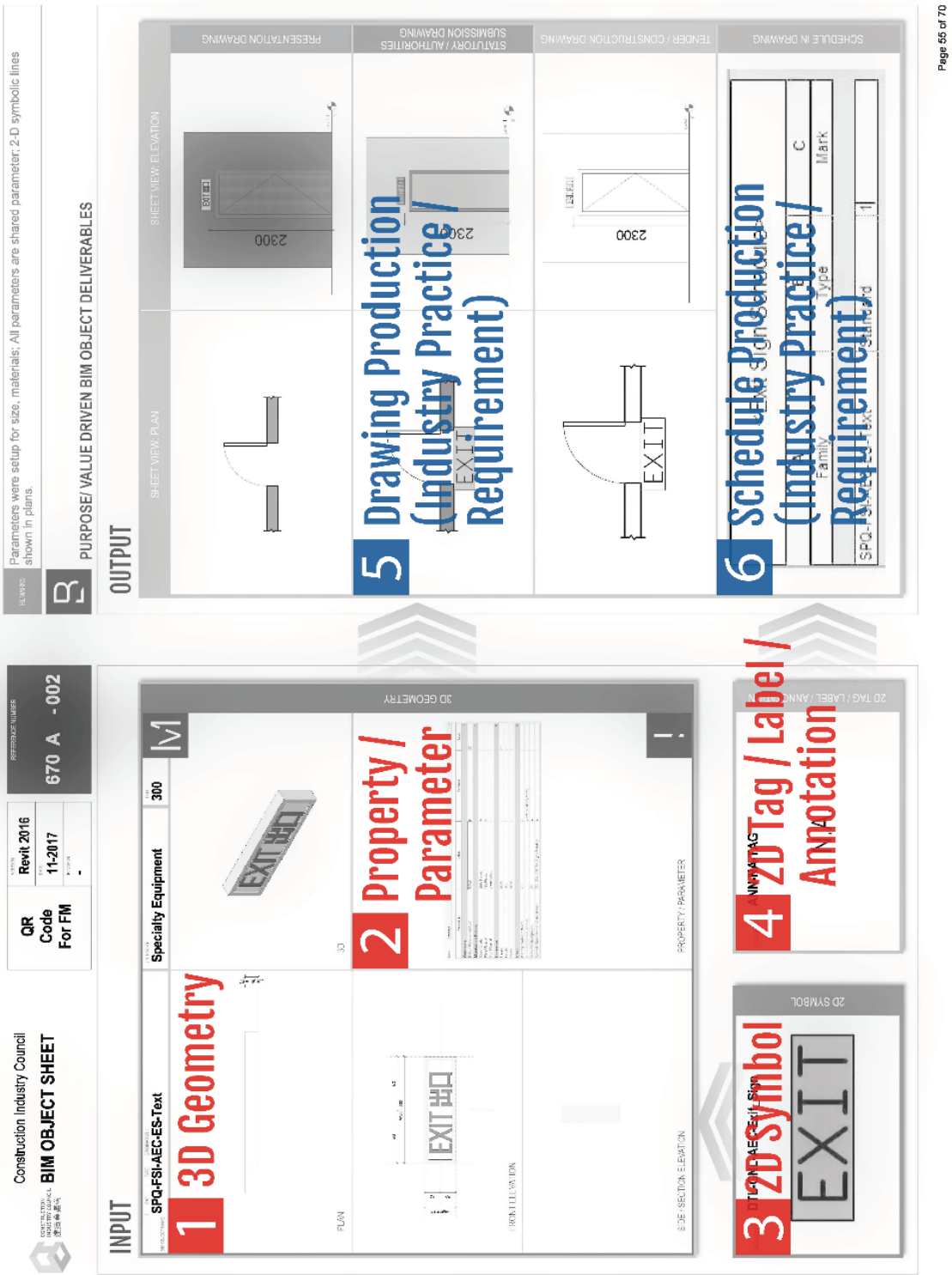
Open import function by “Import CAD” tool under “Insert” tab.





4.2 BIM Object Sheet

Refer to "*CIC Production of BIM Object Guide - General Requirements",* a standardized BIM object should provide BIM object sheet. CIC will provide BIM object sheet template.

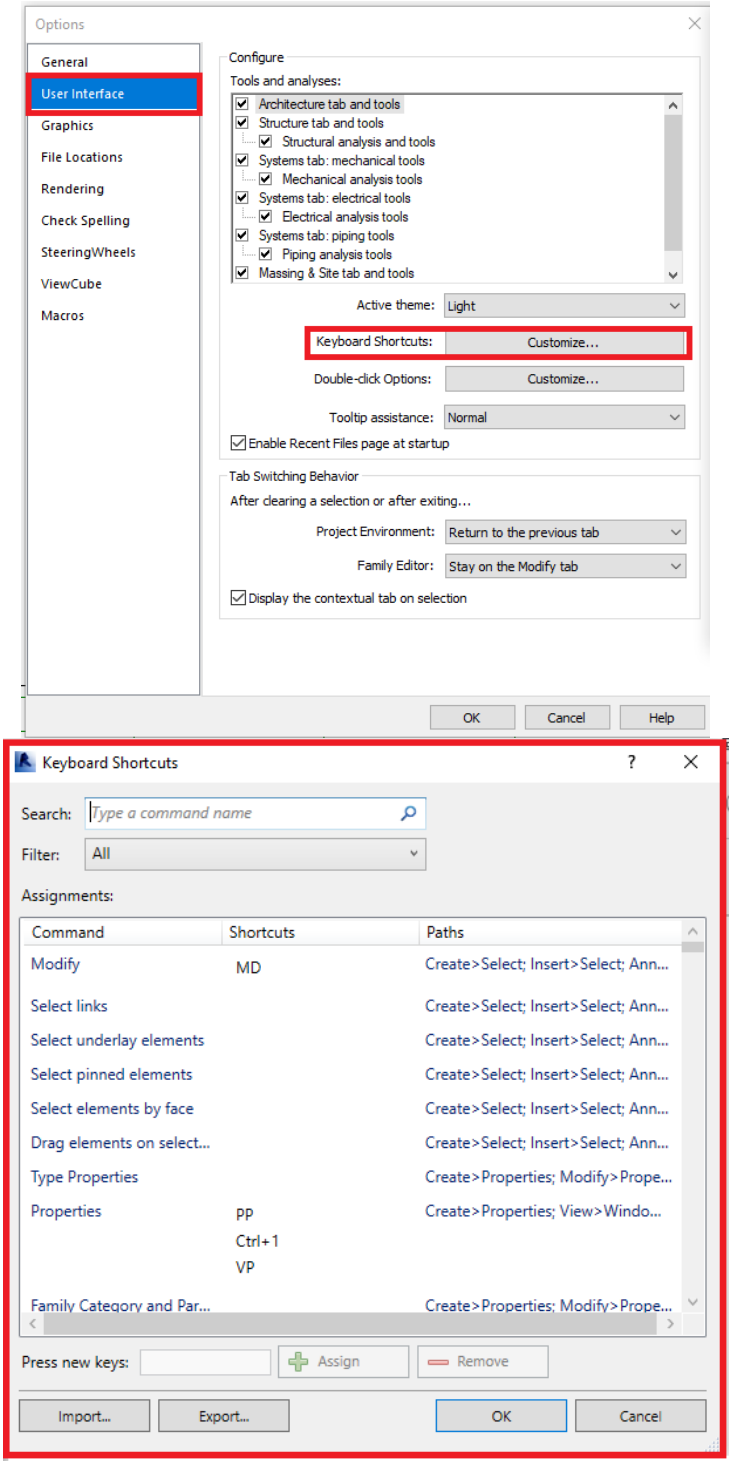


5. Attachment

5.1 Customize Shortcuts

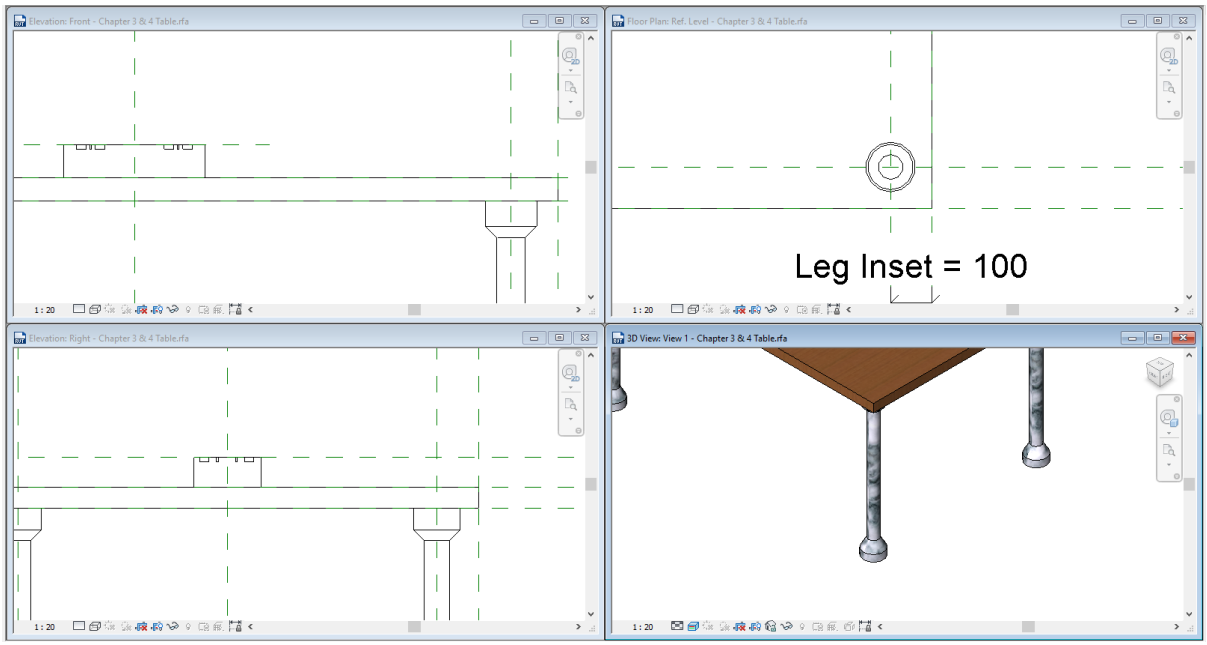
Revit has created several default shortcuts and allow user to customize. Revit also support the customized shortcuts export to an external file and import back to another pc or new version Revit.

Customize shortcuts by “Keyboard Shortcuts” window under “User Interface” option panel.

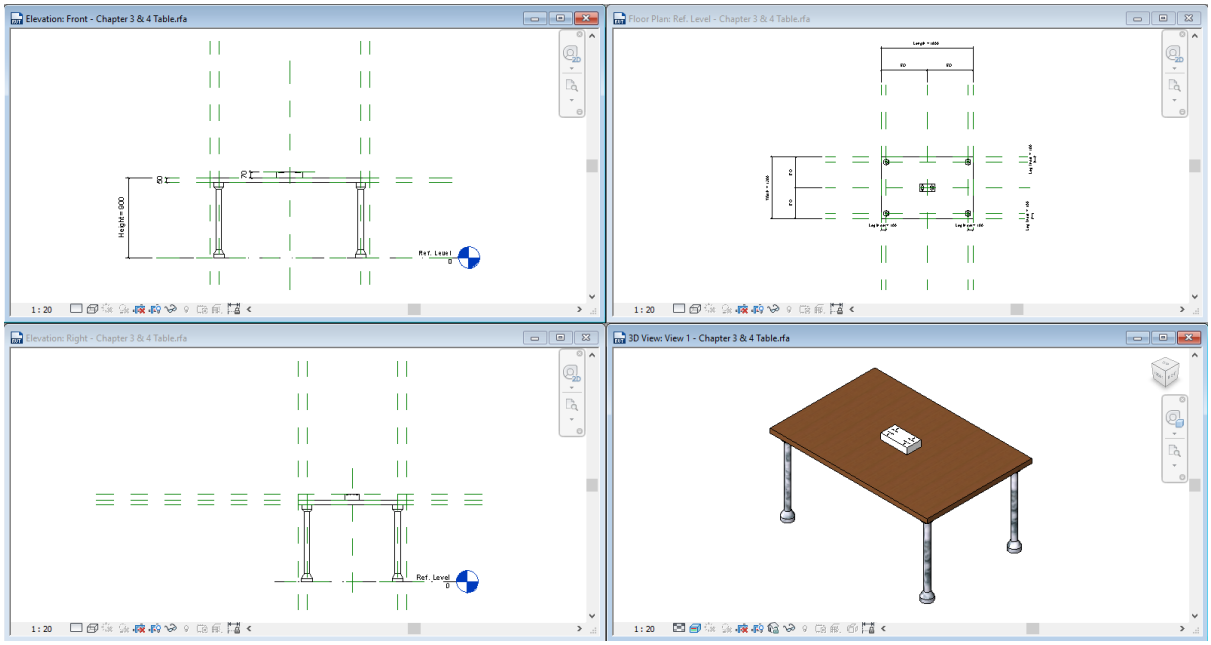


5.2 Useful Default Shortcuts

Tile Window (WT)



Zoom All (ZA)



Command	Default Shortcut
Align	AL
Dimension	DI
Move	MV
Copy	CO
Rotate	RO
Trim/Extend to Corner	TR
Reference Plane	RP
Visibility/Graphics Overrides	VV
Tag by Category	TG
Thin Lines	TL
Wireframe	WF
Shaded	SD