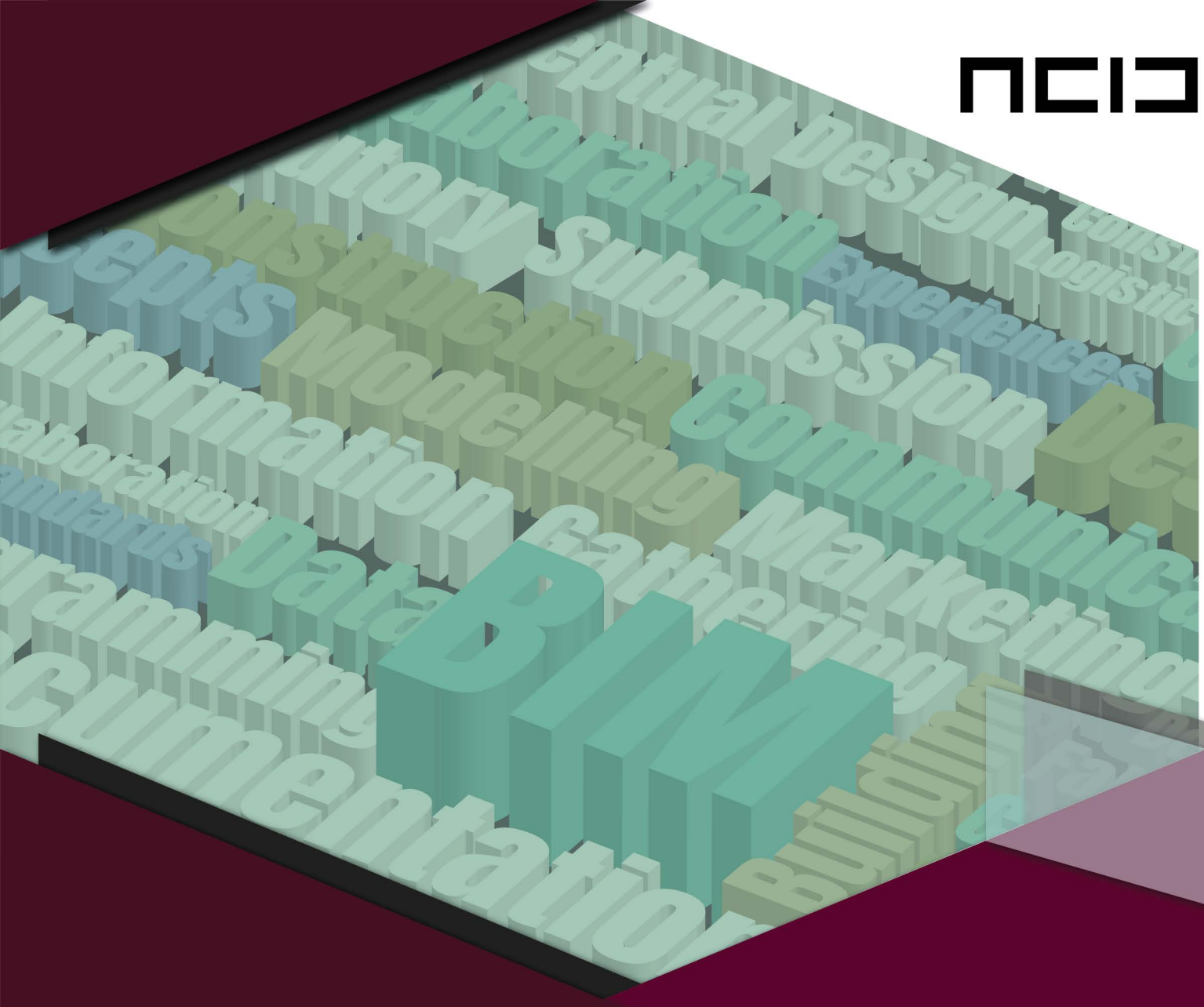


BUILDING INFORMATION MODELLING

Training Materials

Families (Revit)

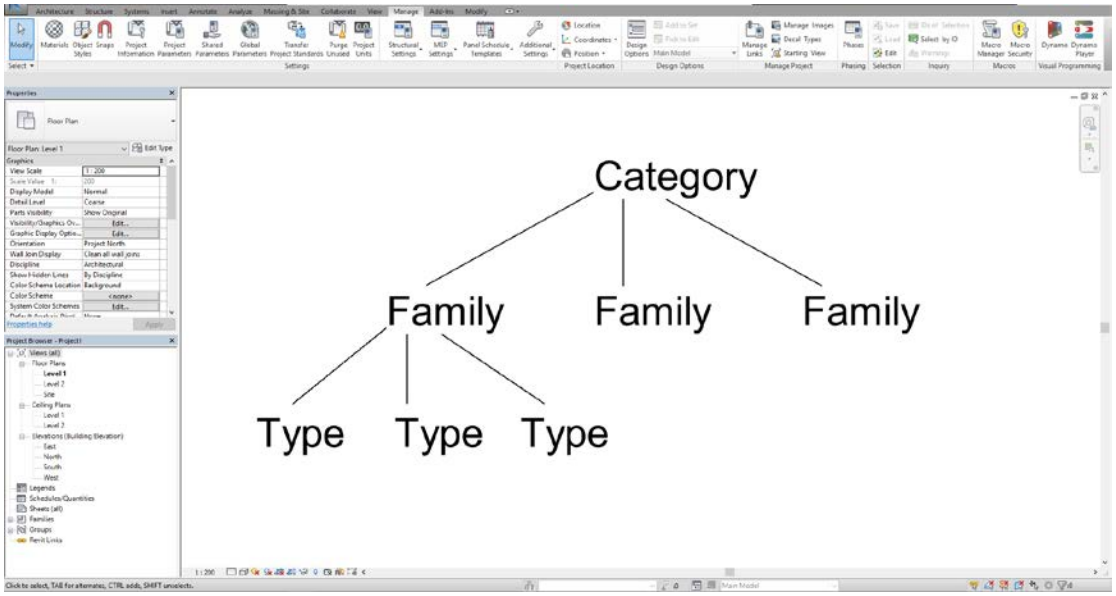
Advanced Construction Information Development Ltd.

Contents

1.Basic families

1.1 Understanding family hierarchy

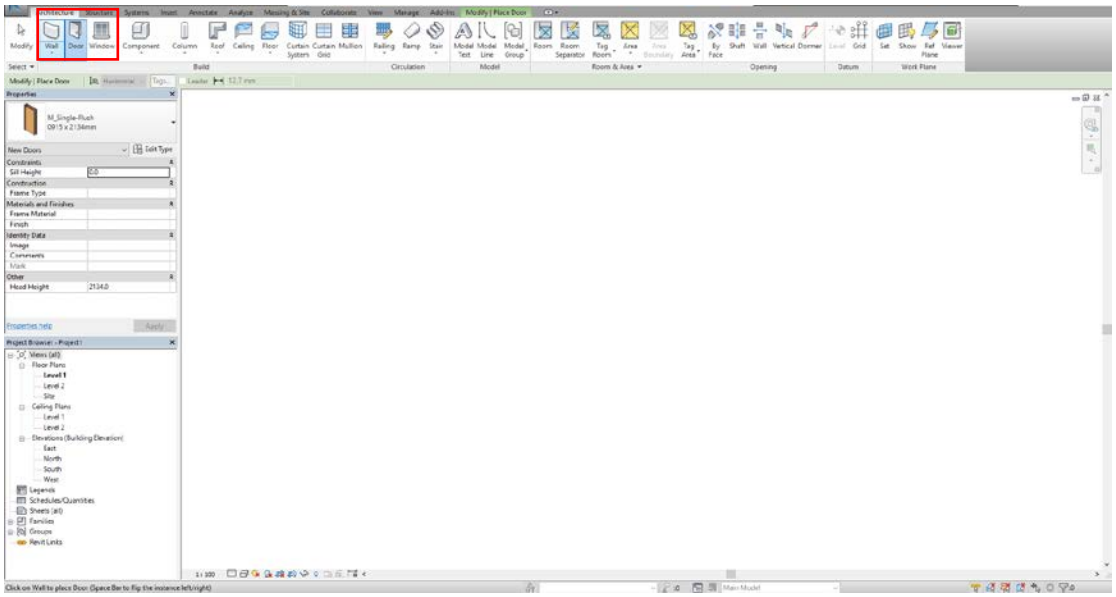
All elements in Revit belong to Family. It's the most fundamental and basic building block of Revit. Almost everything you do in Revit via interacting with Family. Before we dig into it, let's see how related concepts are classified in Revit.



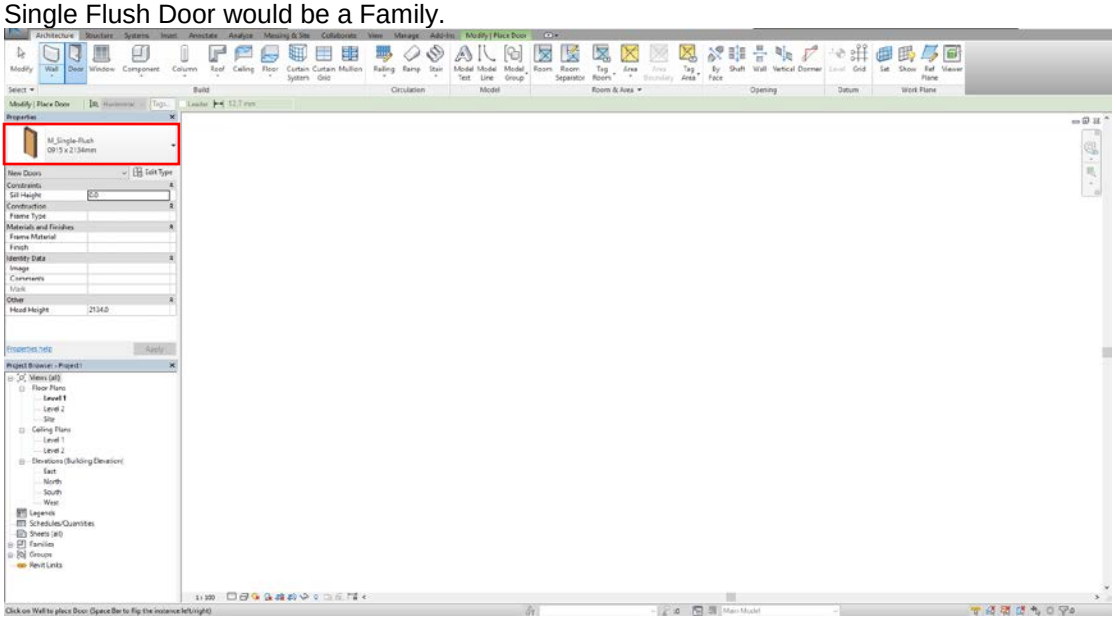
Three important concepts: Category, Family, Type.

For example:

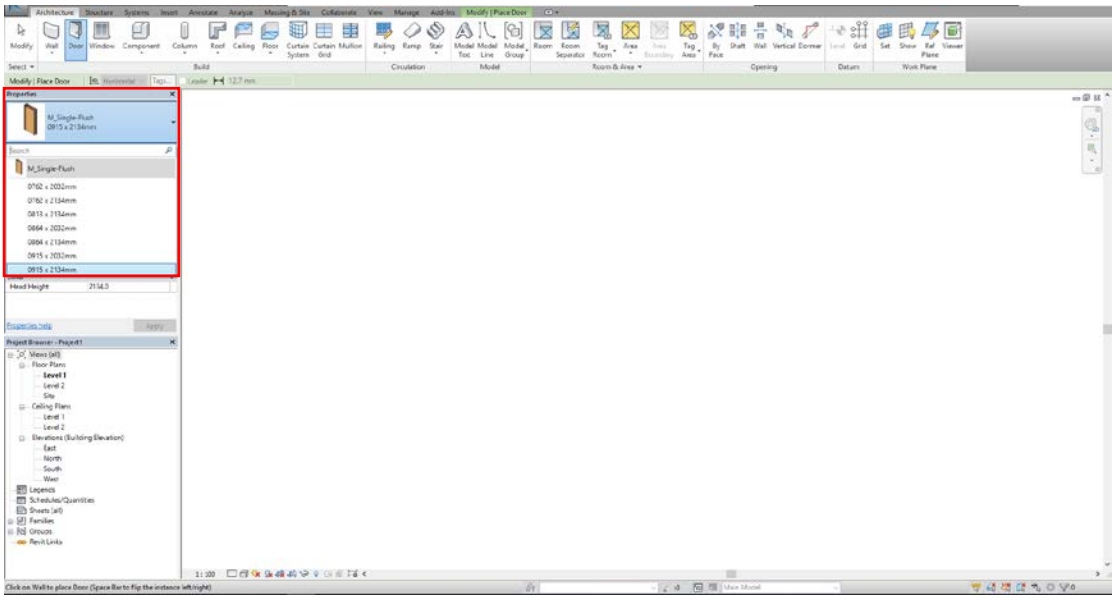
Door, Wall, Window. These are categories built in Revit which we cannot change.

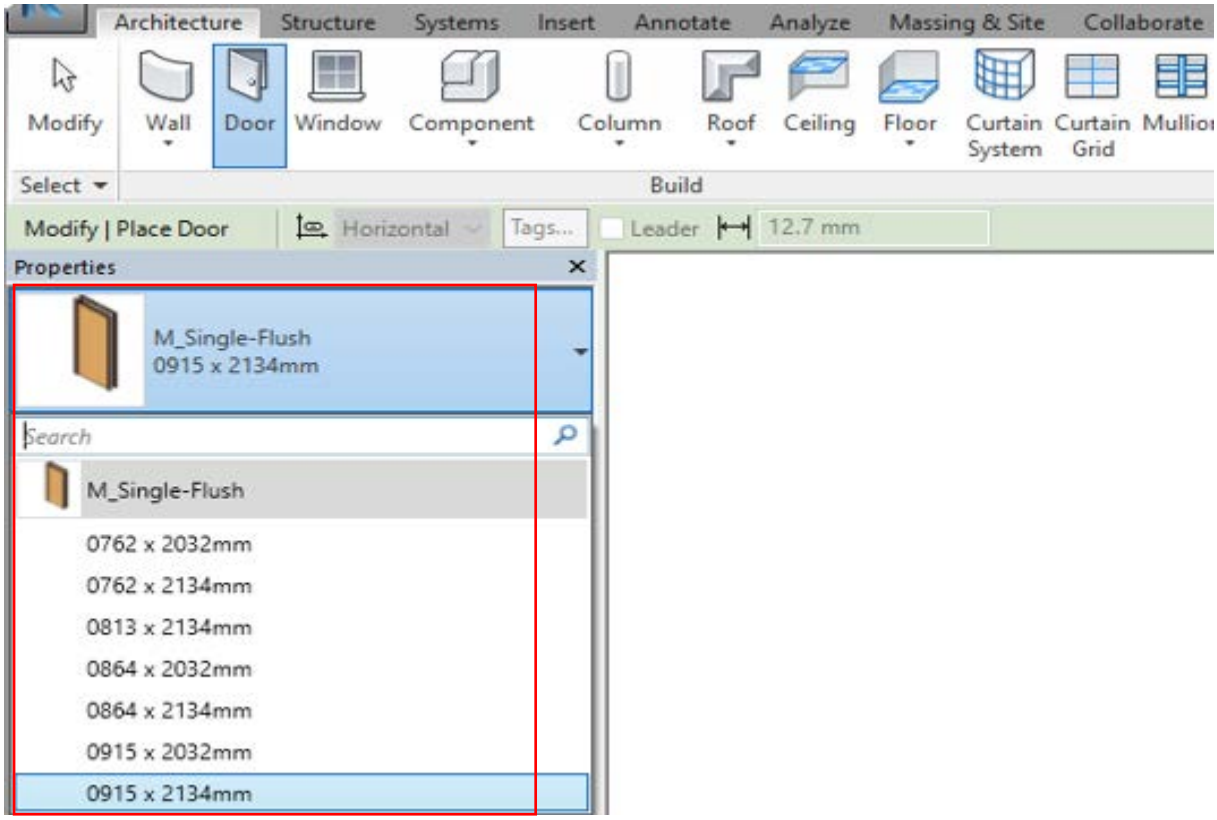


Single Flush Door would be a Family.

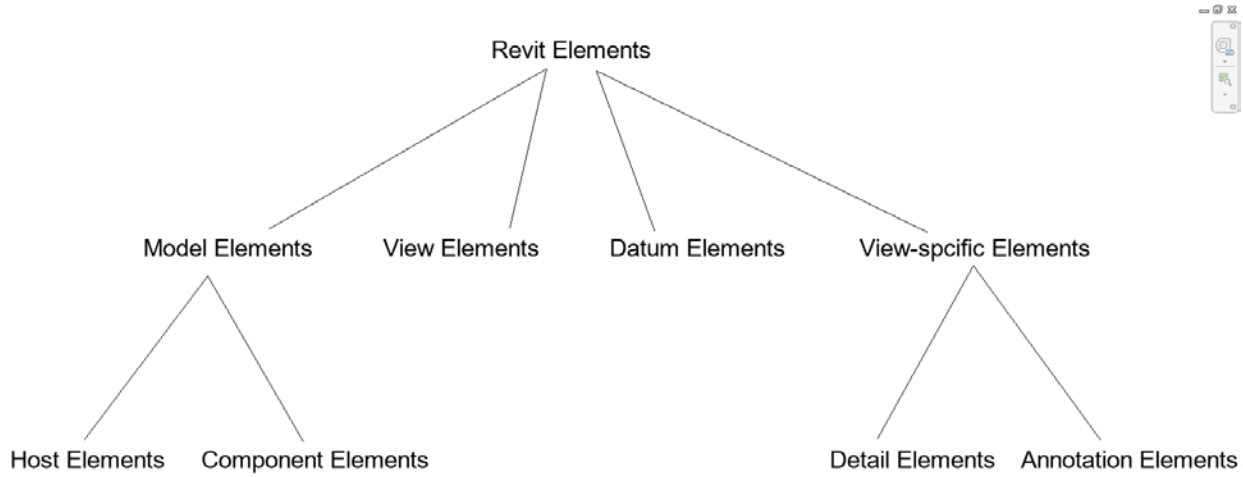


Though Family is a sub class of Category, still, it’s a broad concept since it contains a collection of types.



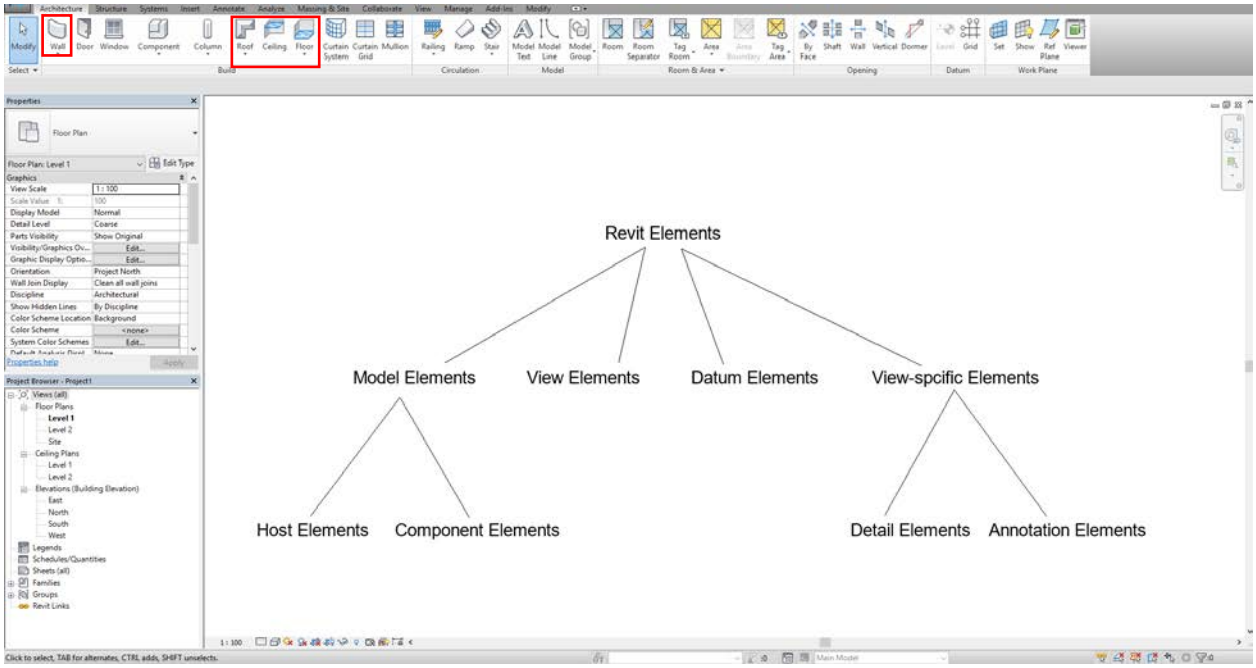


1.2 Using models vs. annotation

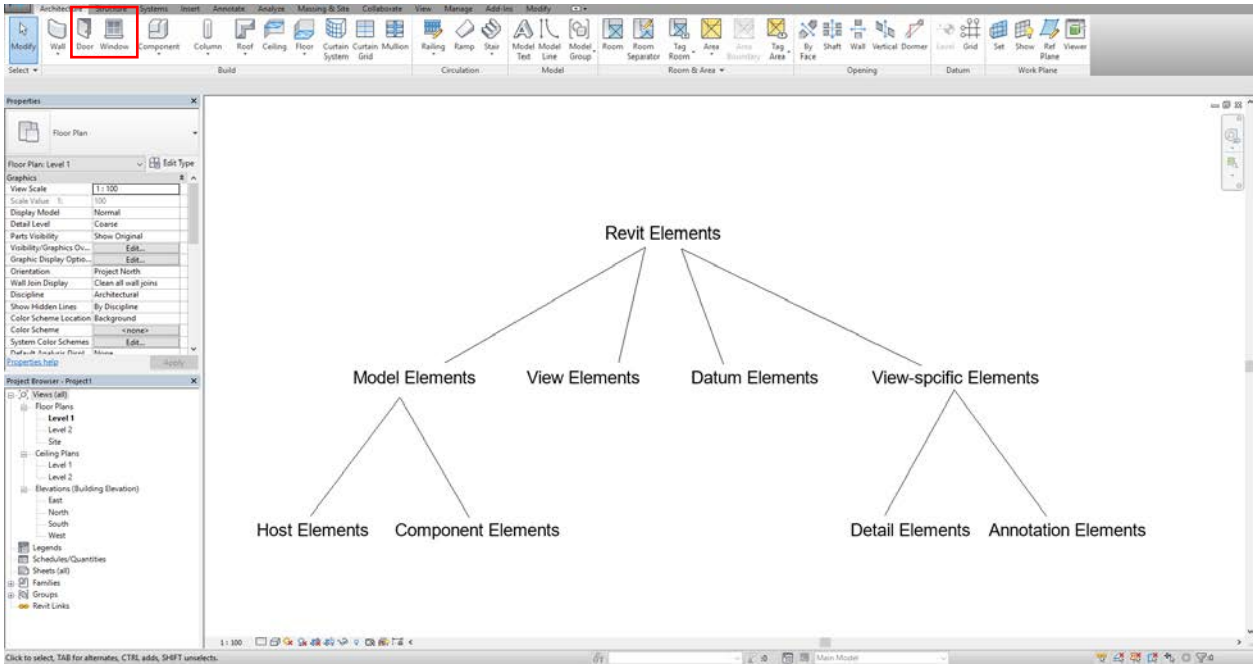


Putting View Elements and Datum Elements aside, Revit Elements can be divided into two groups, Model and Annotation.

Host is just another name for System family, things like Walls, Floors, Roofs, Ceilings, Stairs, Ramps. We'll be able to choose a type from it, change several settings but basically cannot edit them with family editor.

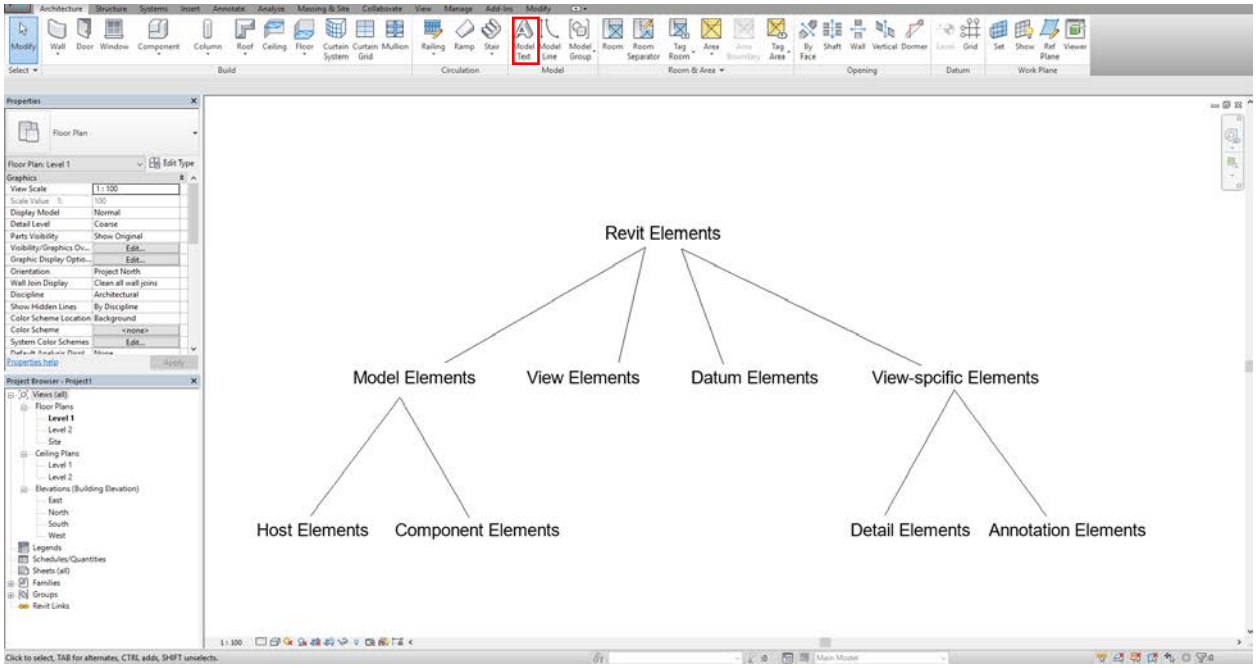


Component Elements offer more flexibilities since we can modify it with family editor, load them into projects as we want. Things like Windows, Doors, Furniture.



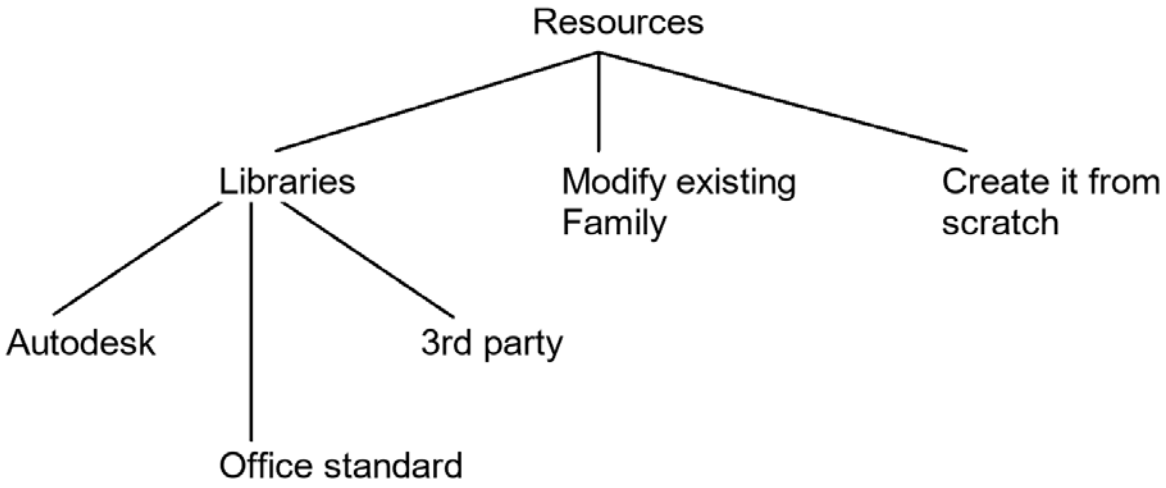
These are actual objects in your project representing real things.

Contrast to that, Annotation or View-specific elements are not for representing real things but helping people read through our files. It describes what the drawing is and show your design intent. Most of them are actually System families that we are not allowed to manipulate in family editor, such as Text and Dimension. But Tags and Symbols are things can be modified in family editor.



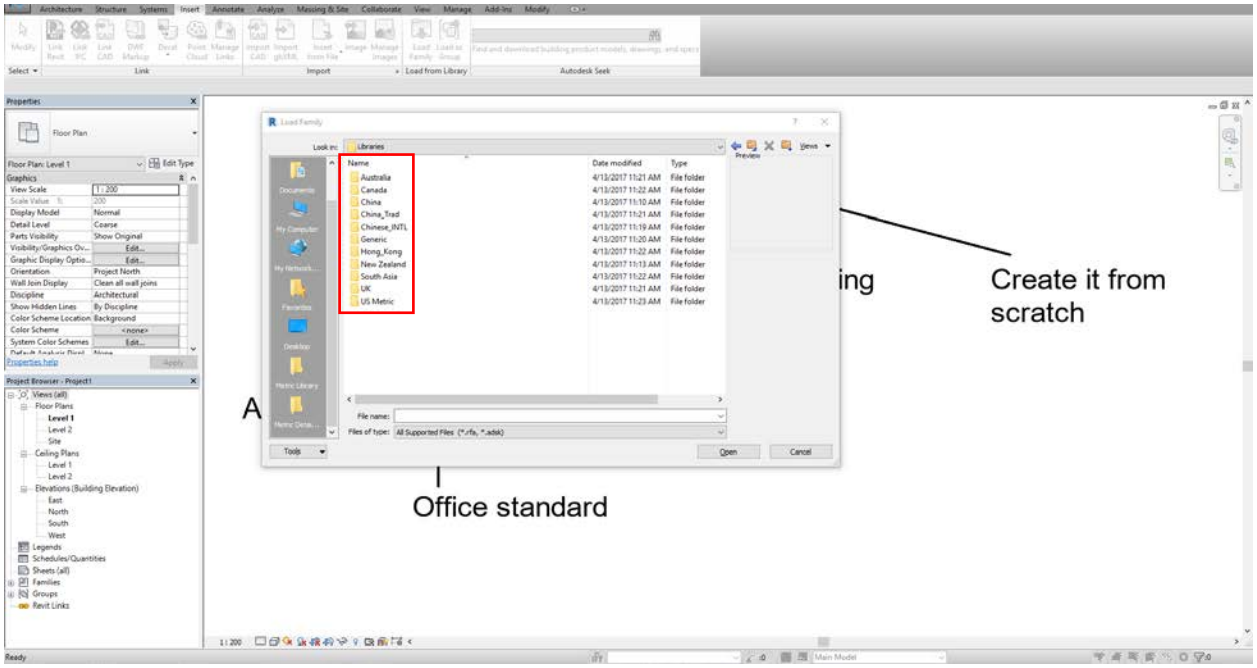
View Elements and Datum Elements cannot be edited with family editor but generally we have no need to modify them since they serve as preset tools to facilitate us working. To name a few, Reference Plane, Views, Schedules fall into this category.

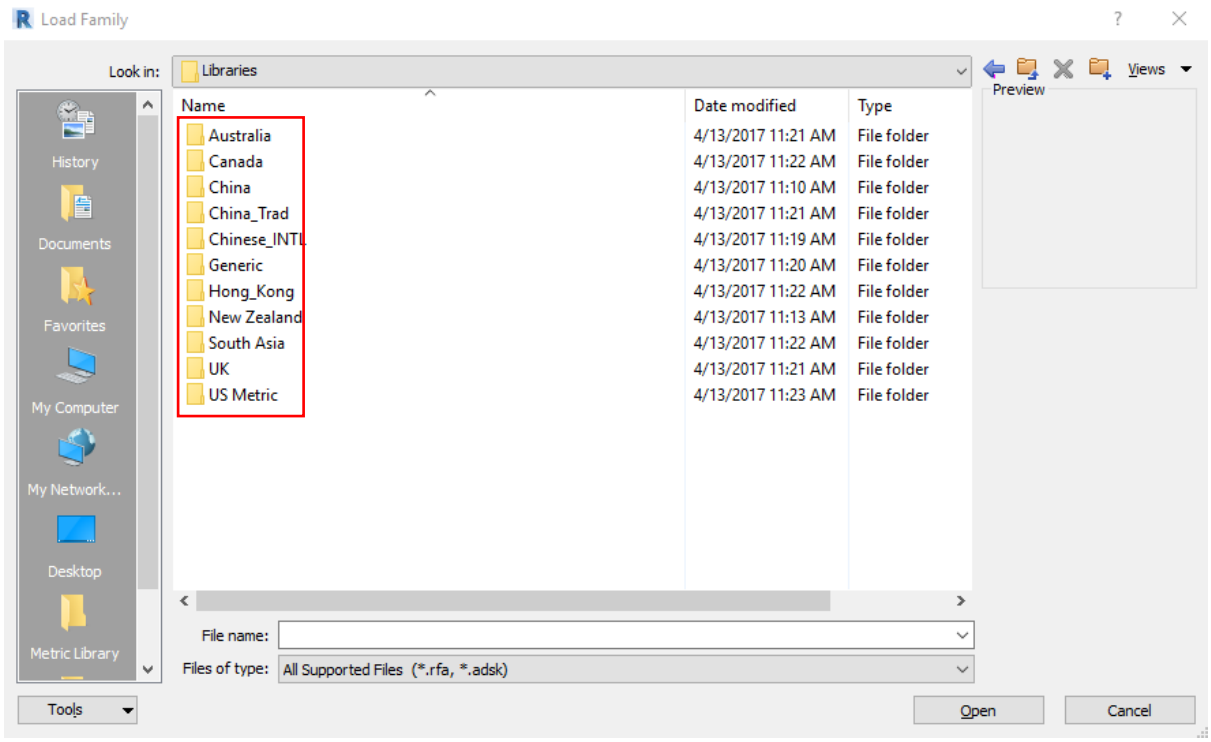
1.3 Exploring libraries and resources



It would be wonderful if your company have your own family library. However, Autodesk default library has already contained many developed family for us. Also, manufacturers and other 3rd parties create families for their products. As a matter of fact, some families made by manufacturers are neat enough. Going through their comprehensive library is a good start before you decide to create a family from scratch.

Depending on which regions you are in, default library may vary accordingly.



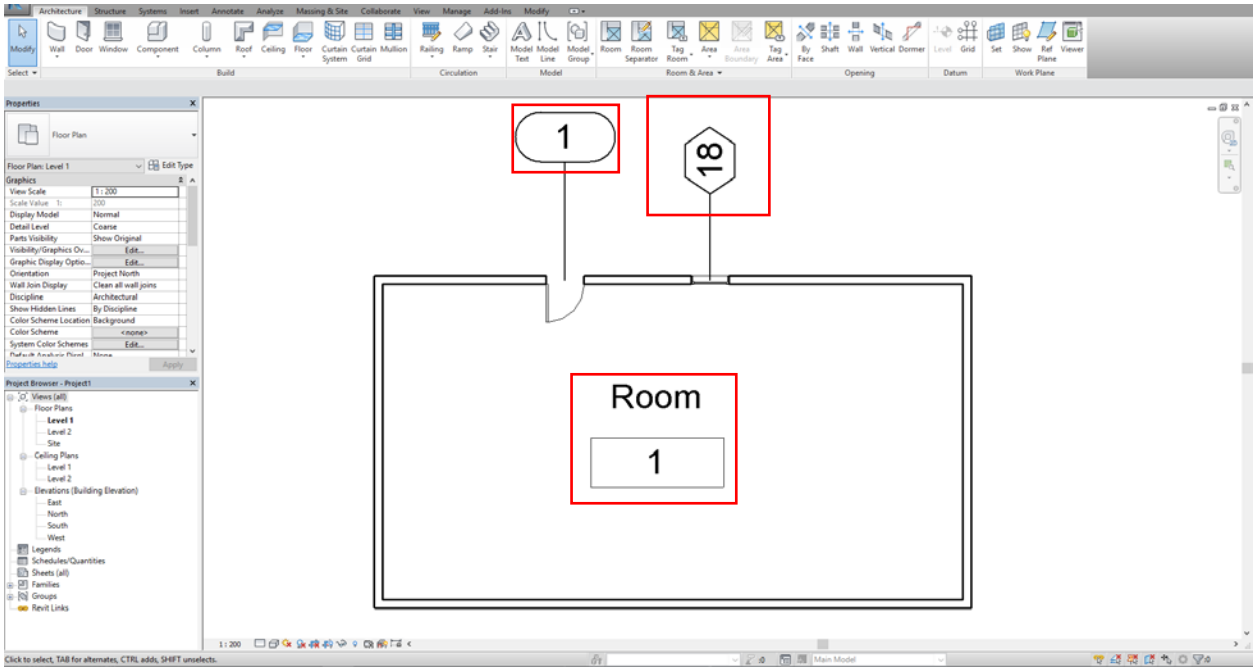


Even though you may not find suitable ones in library, you can always create a new family based on existing ones. Other than that, to build one from scratch is also an option since some families we need are essentially one of kind.

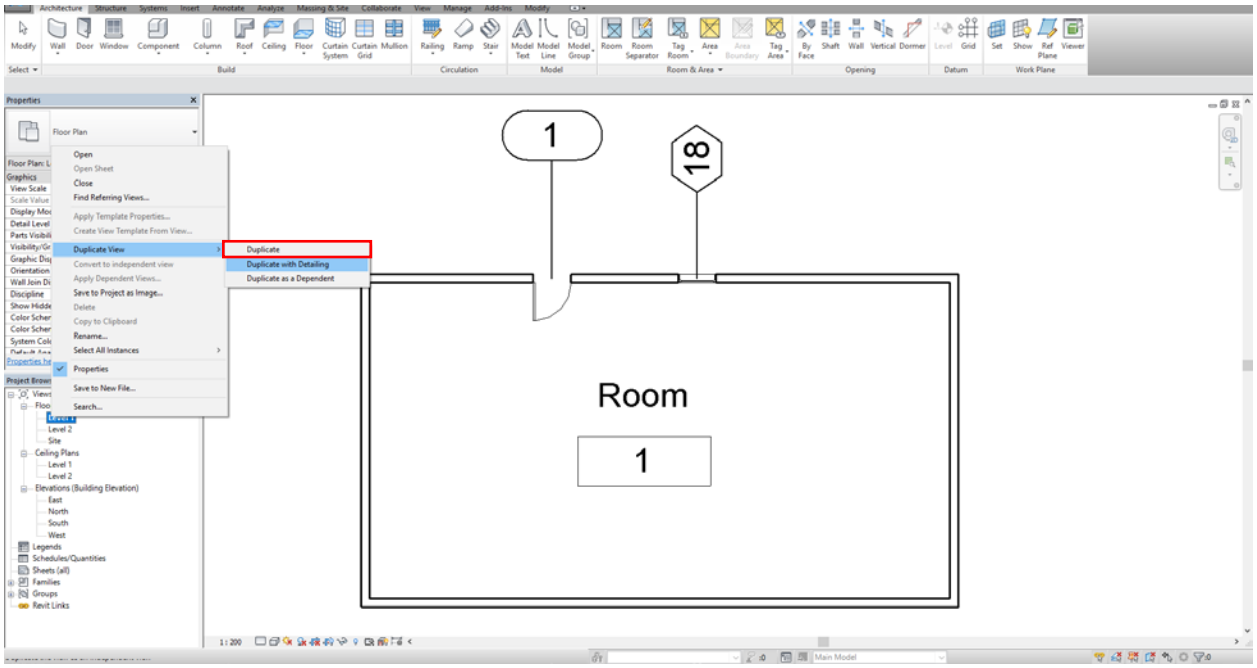
2. Annotation Families

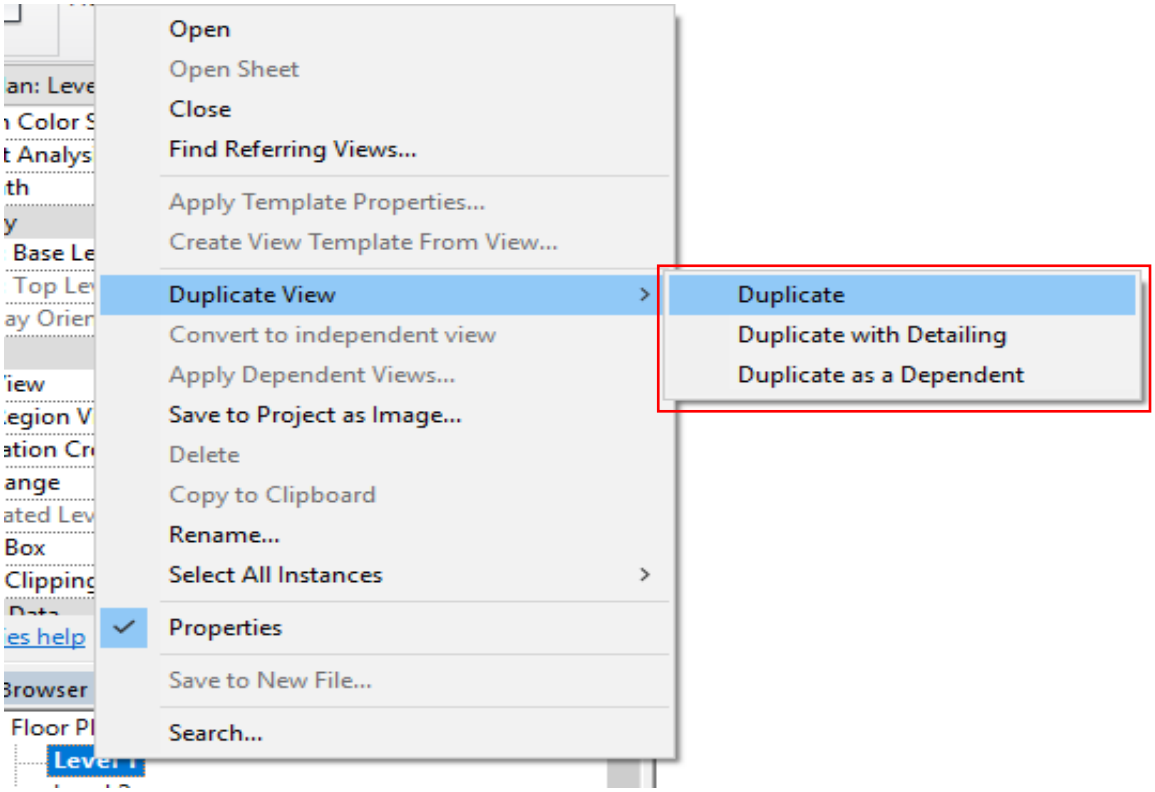
2.1 Kinds of annotation family

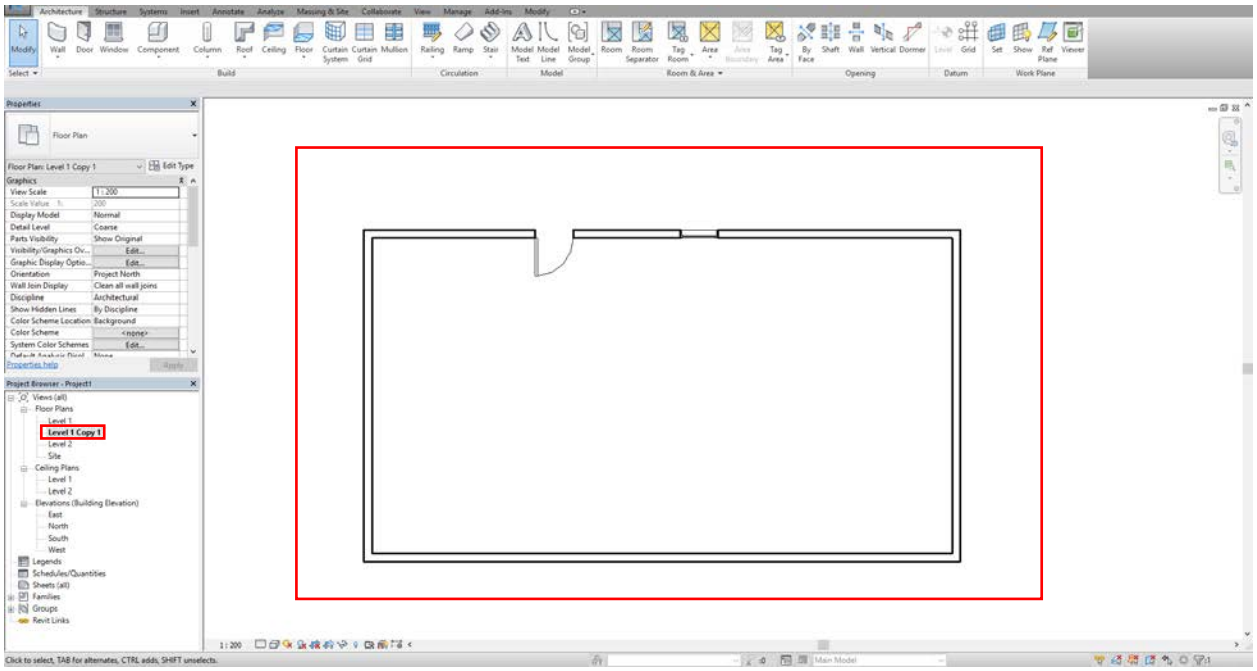
Annotation Families are view-specific. They can be divided into two categories: ones that report information or data of the projects, ones that don't.



One of ways to duplicate our view is Duplicate with Detailing. Detailing refers to Annotations.
If we duplicate our view without detailing, annotations will be left behind.

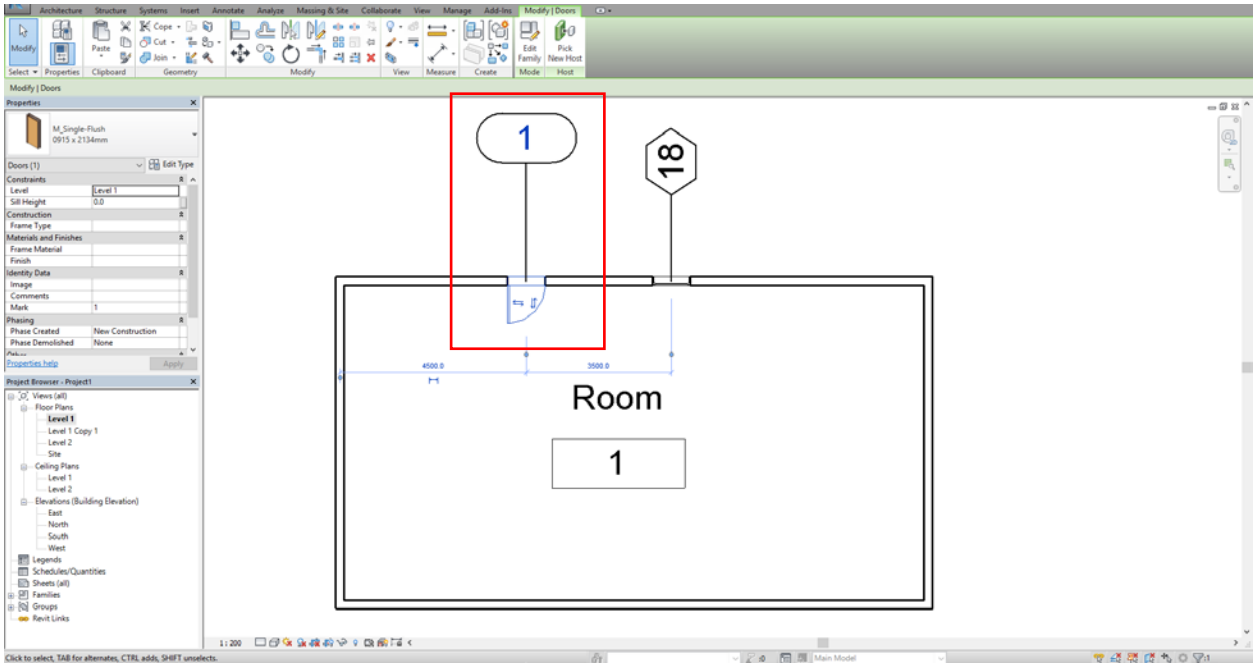




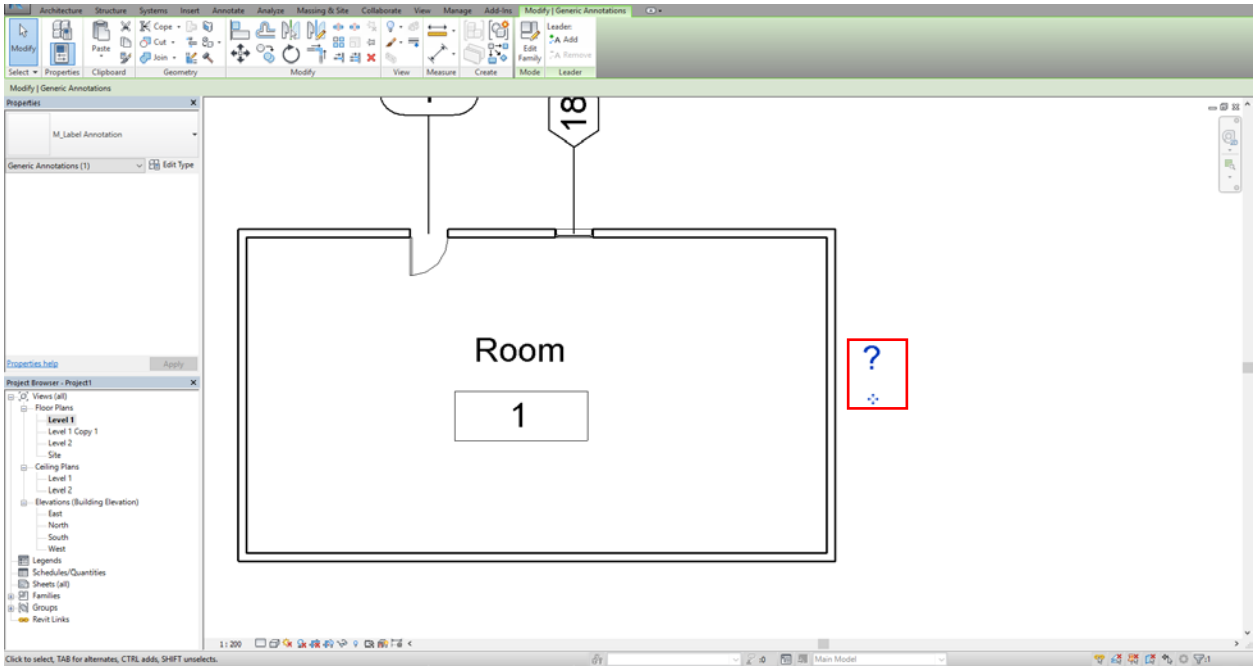


Tag and Generic Annotation are two different kinds of annotations we're going to use frequently in our projects.

Tags are connected to objects systematically while generic are more flexible which are not bounded to certain object. Notice if we select one of the tagged objects, its tag will be highlighted too. Revit treat tag as object's belonging.

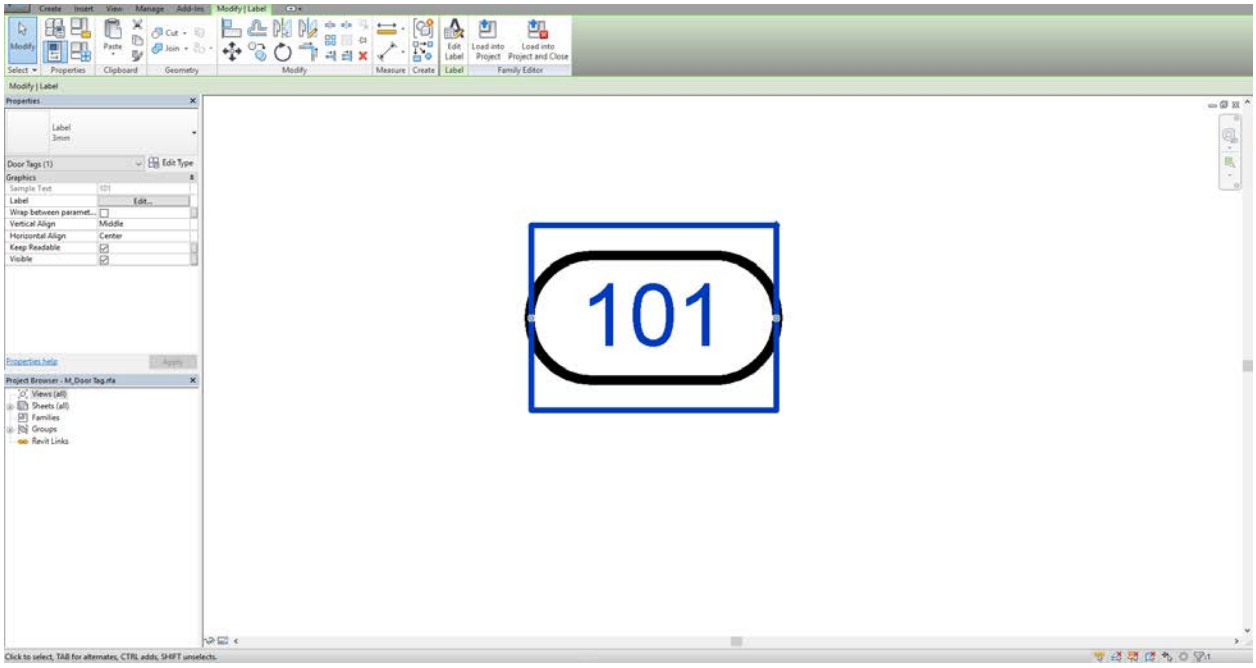


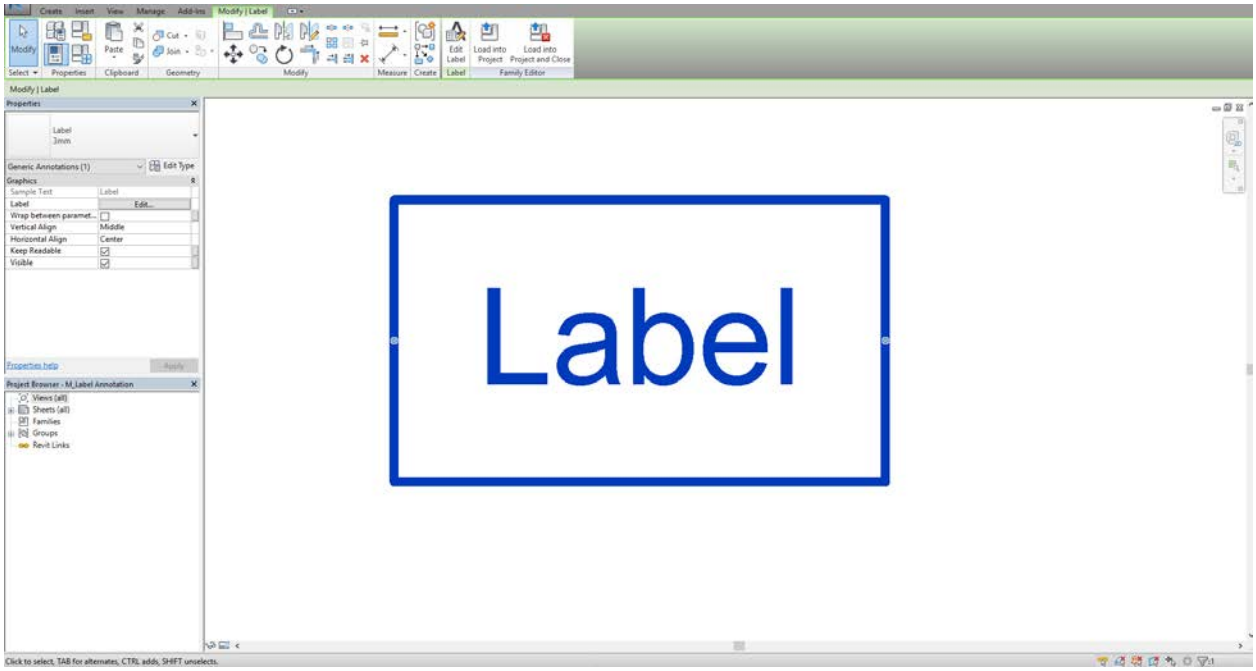
On the other hand, Generic Annotations are flexible since it could be manipulated to wherever you want. Essentially, it's a label which you can modify.



Default text of Generic Annotation is question mark but you're able to modify it as you want.

Notice if we enter family editor, these text boxes are essentially labels, former nested in tags, latter being a single label.

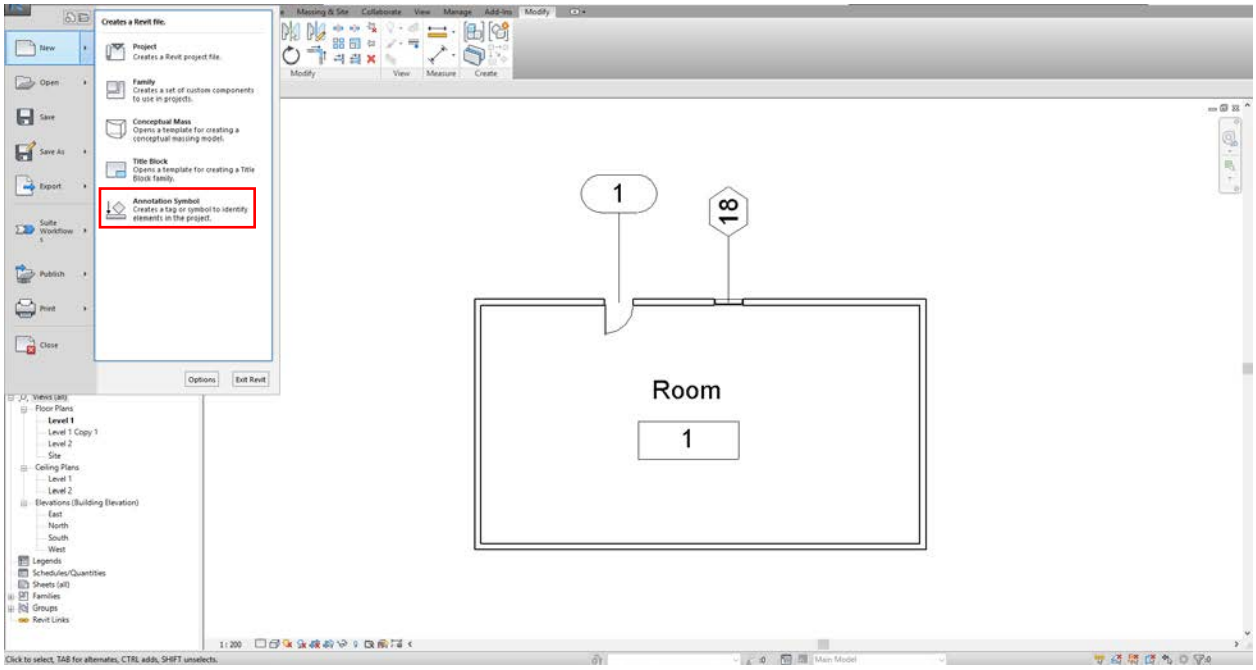


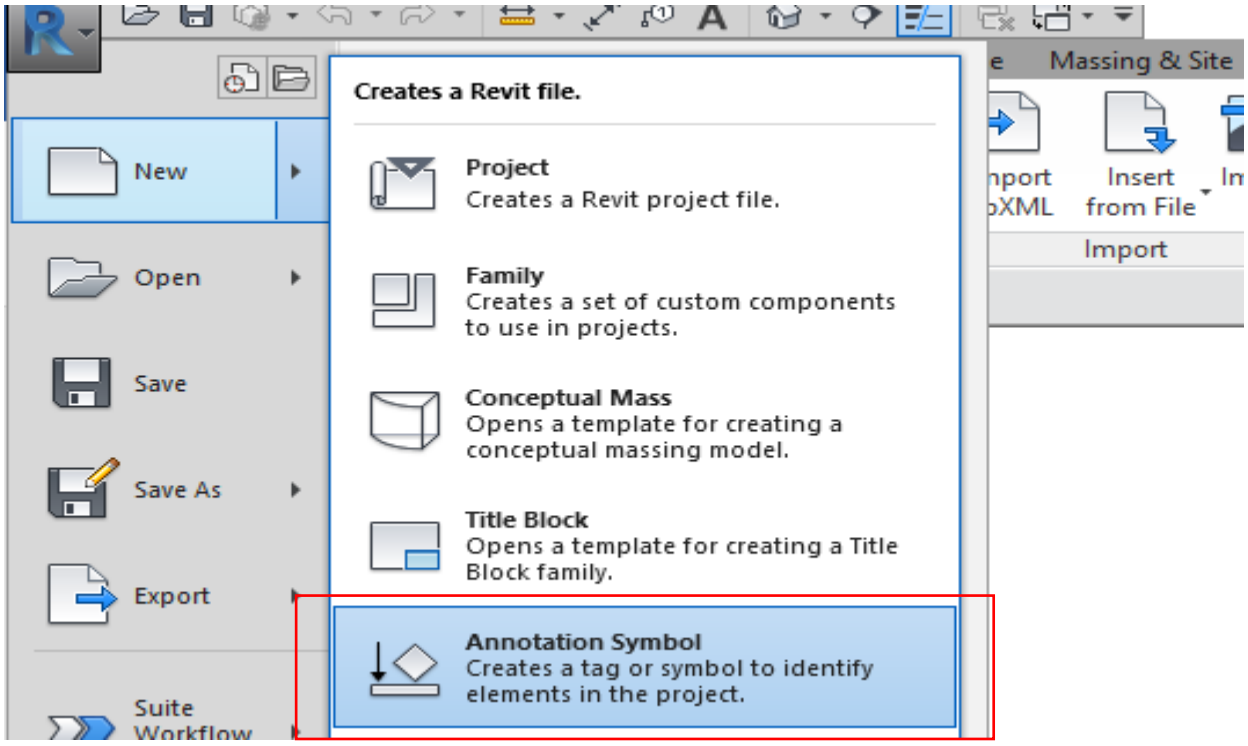


2.2 Creating an annotation family

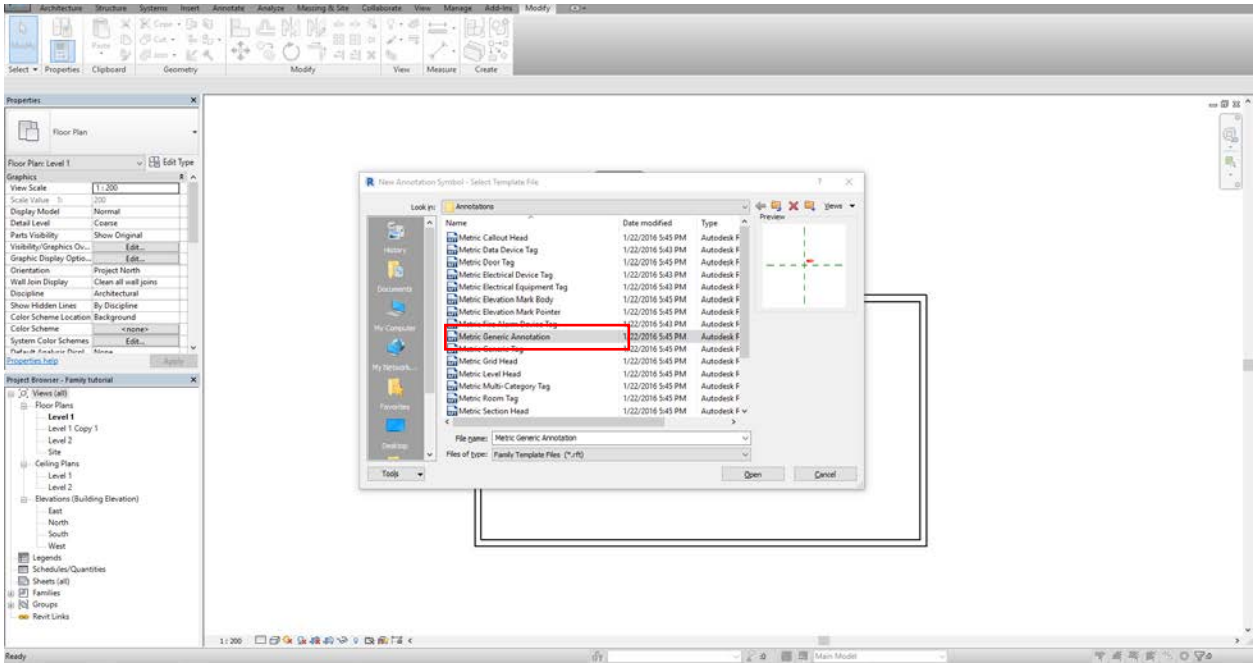
Annotation is family. Family can be created by yourself.

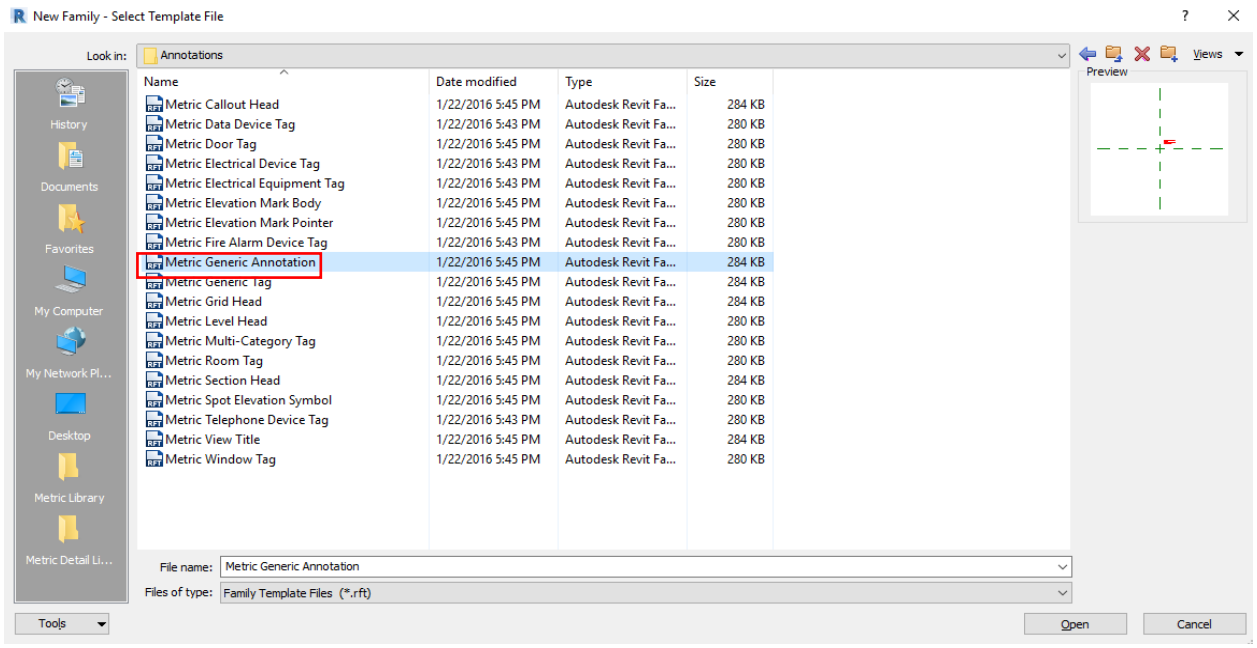
Choosing appropriate template is the first thing you need to do.





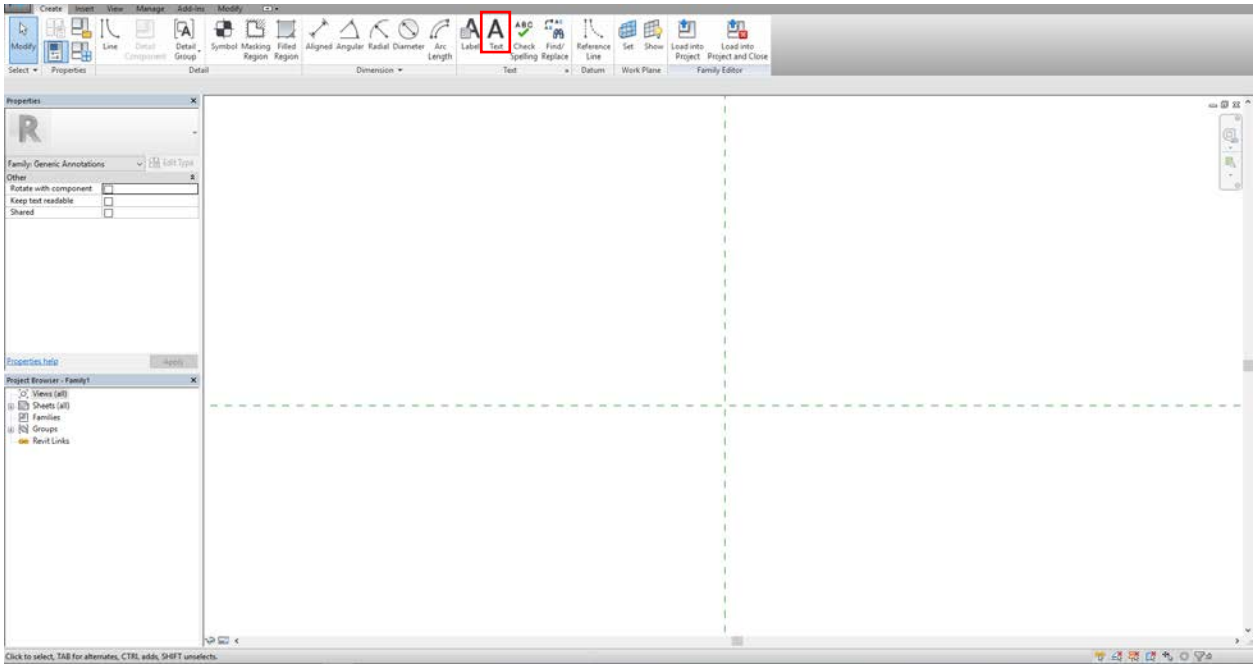
Notice that most of templates are dedicated to Tags. Choose Generic Annotation as our starting template.



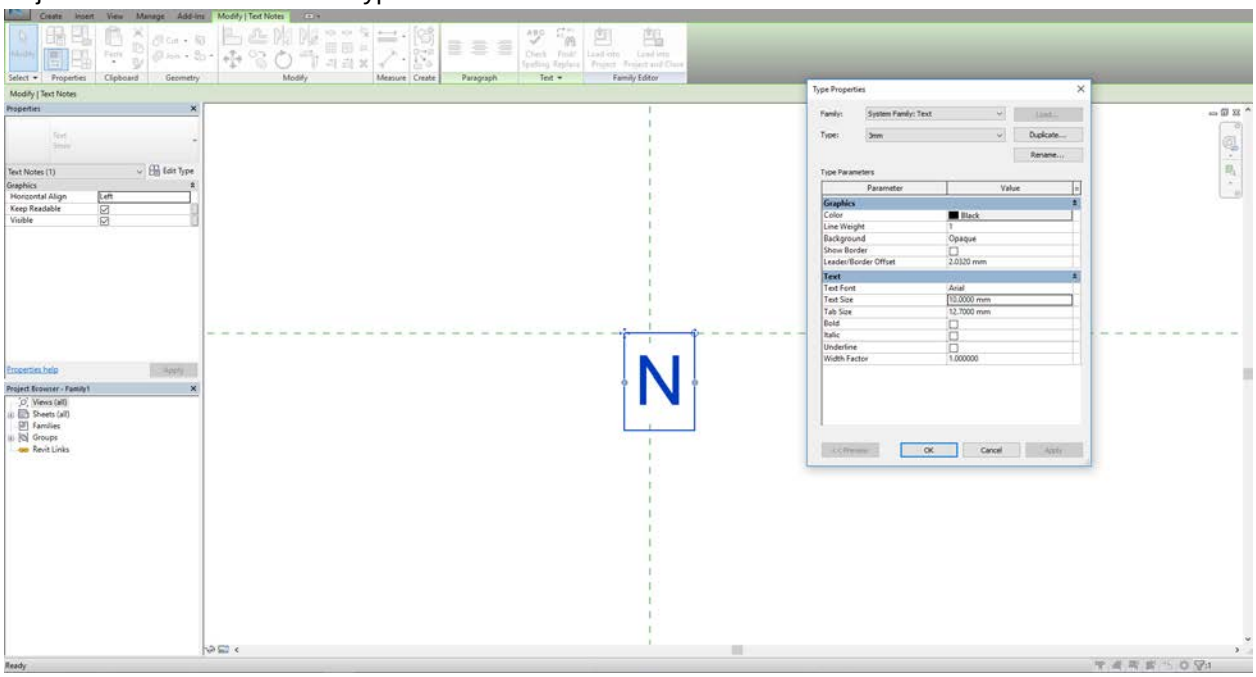


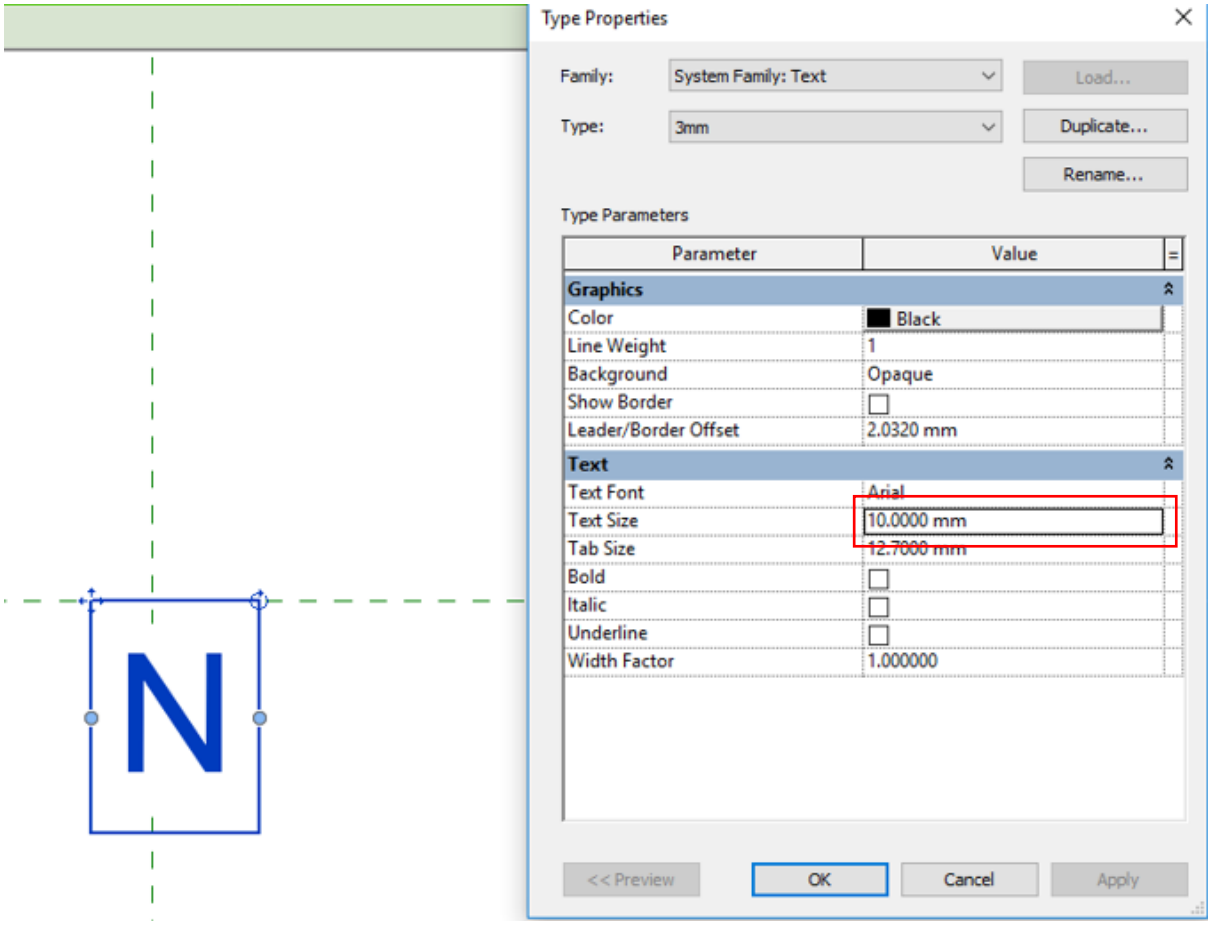
By creating a north arrow, we will gradually familiarize ourselves with the process of creating annotation.

To give yourself a good sense of how large everything is, make sure your ***N***'s magnitude certain is very useful.

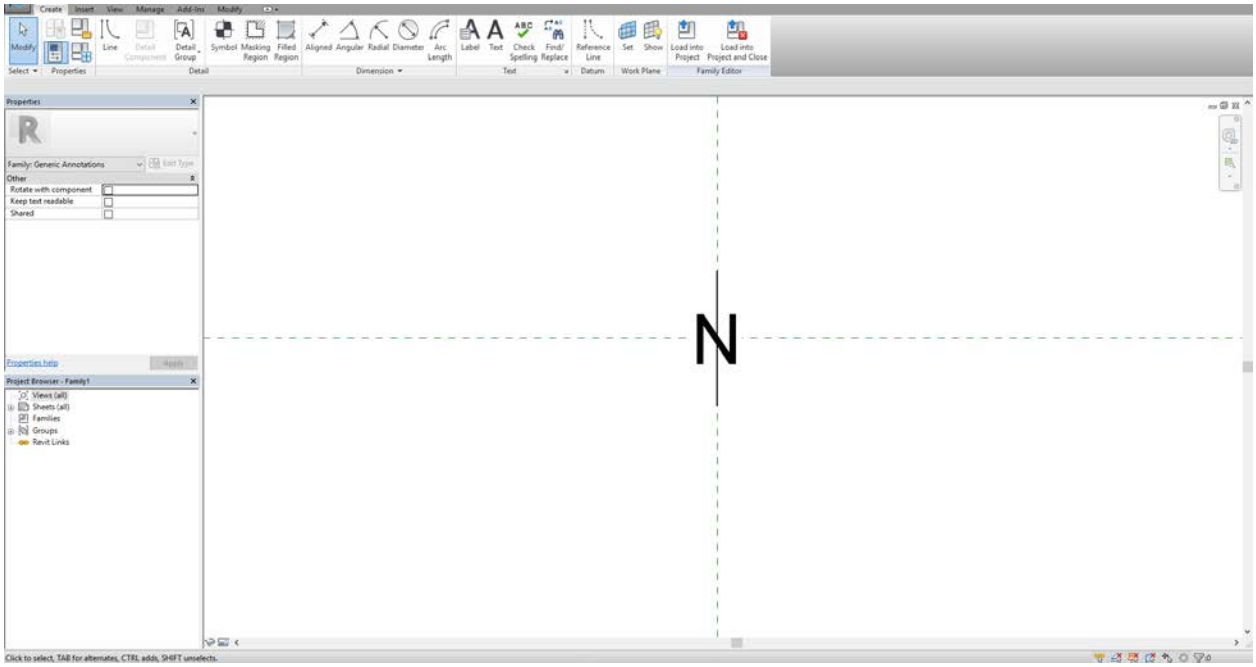


Adjust size of the text in Edit Type.

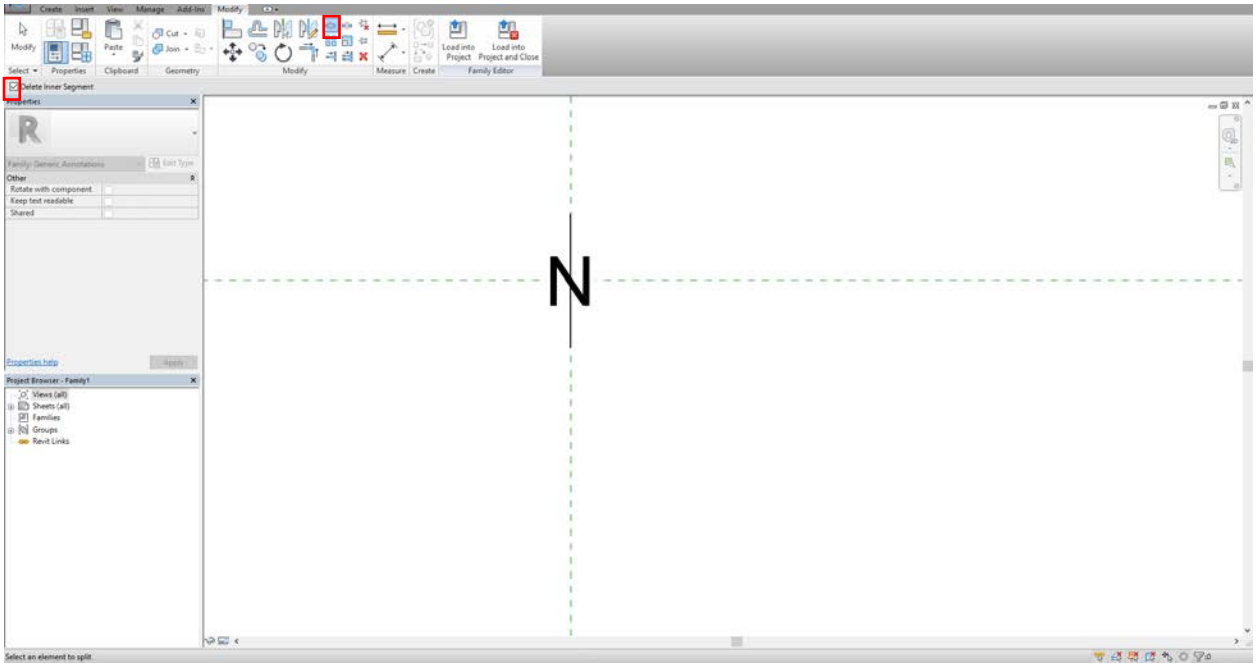


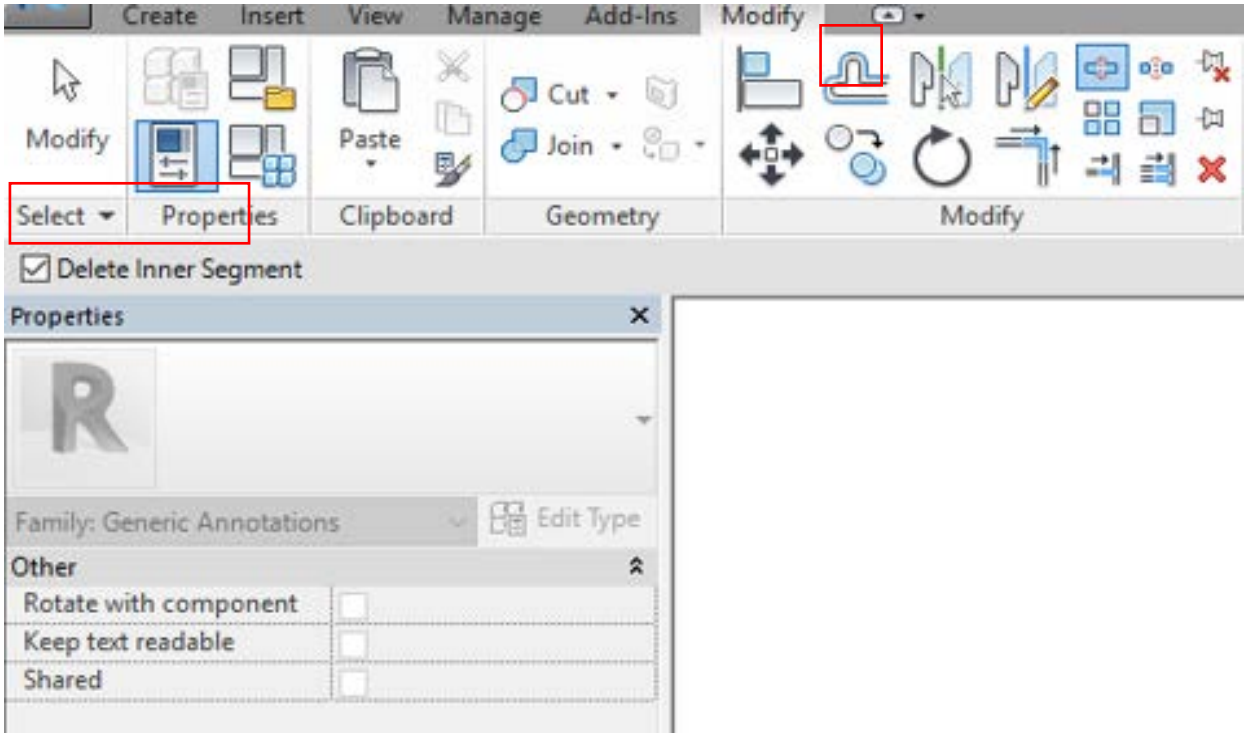


Draw a vertical line going through it.

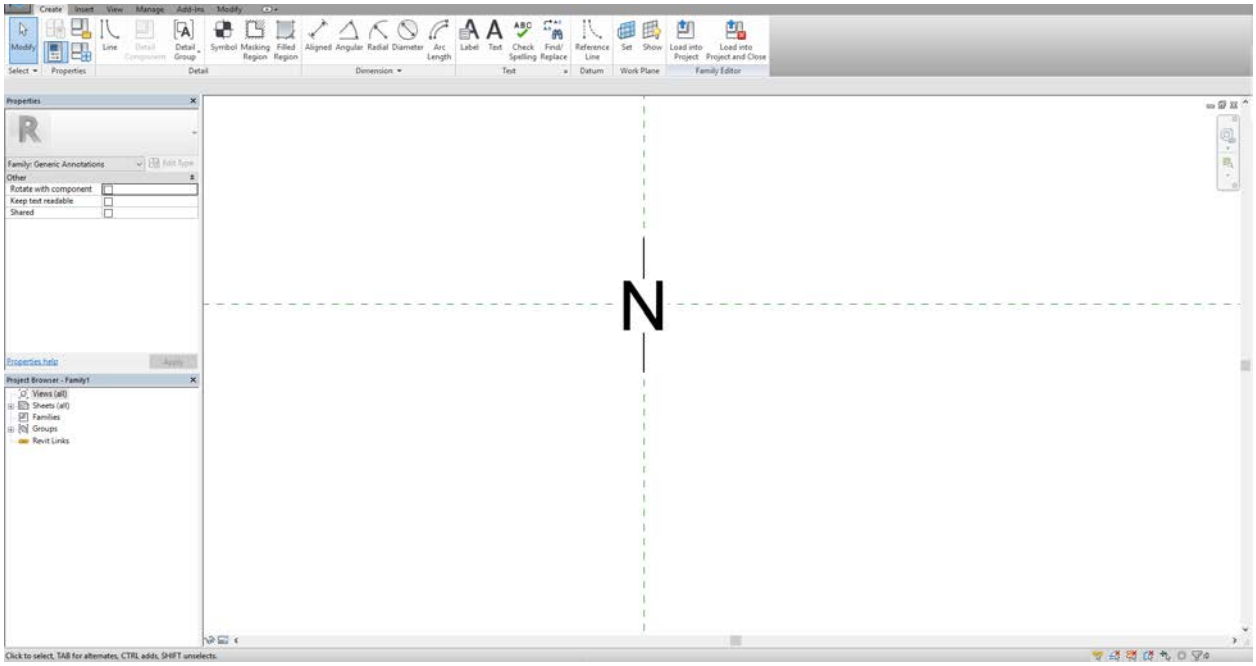


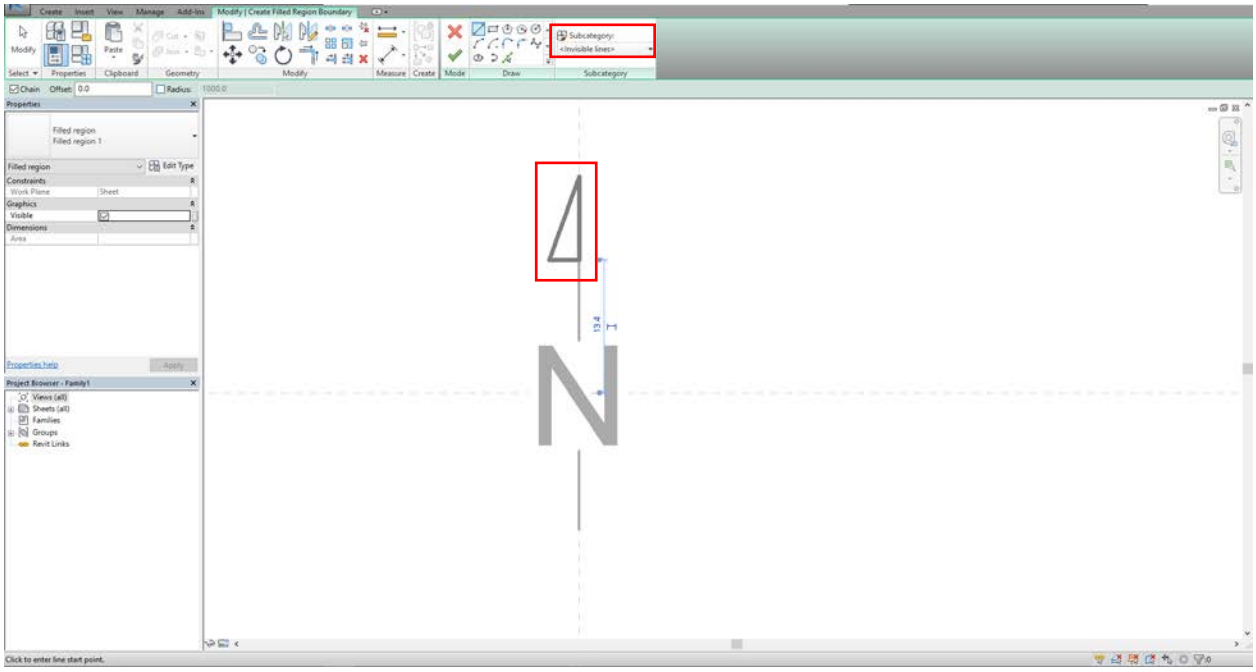
Cut off overlapping part (Split – Delete inner segment).

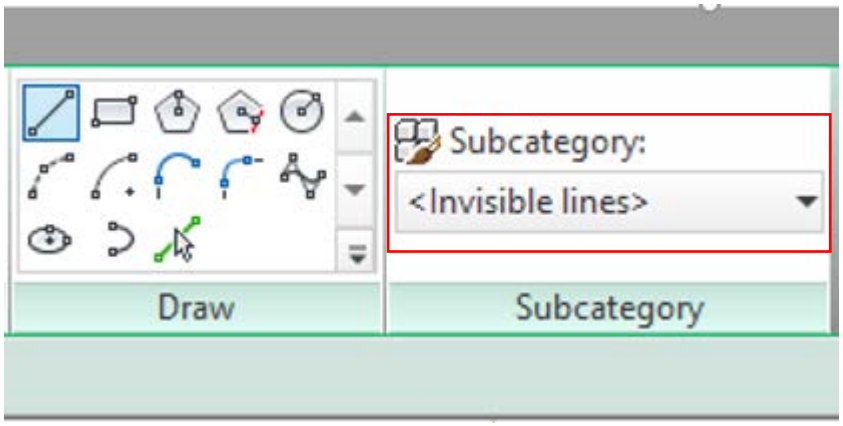




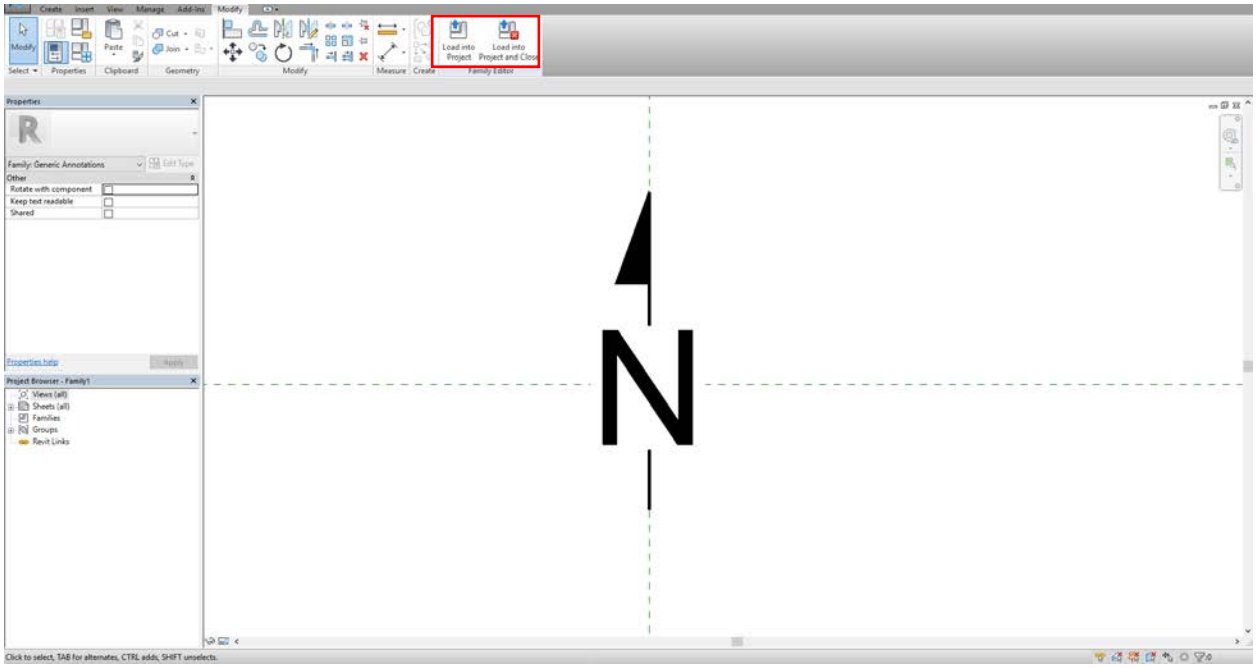
To make it more arrow-like, creating Filled Region. Make sure draw boundary lines with Invisible line.


N


N


Subcategory:
<Invisible lines>
Draw
Subcategory

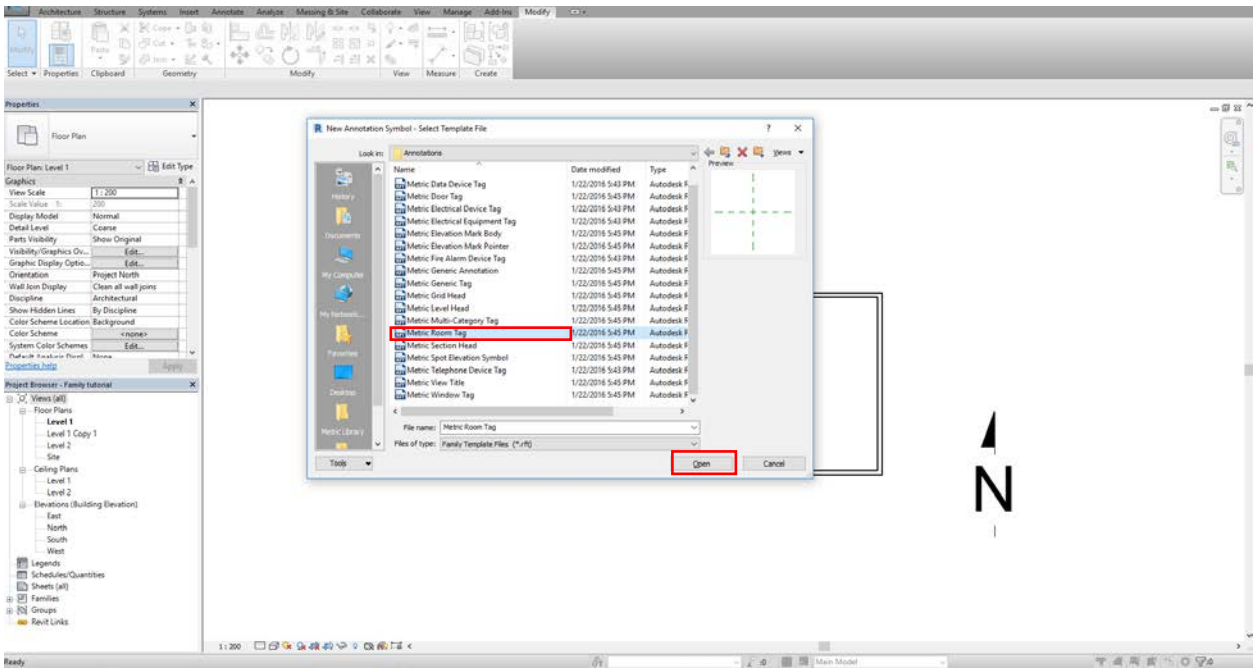
Load it into project to test if it fits.



2.3 Creating a tag family

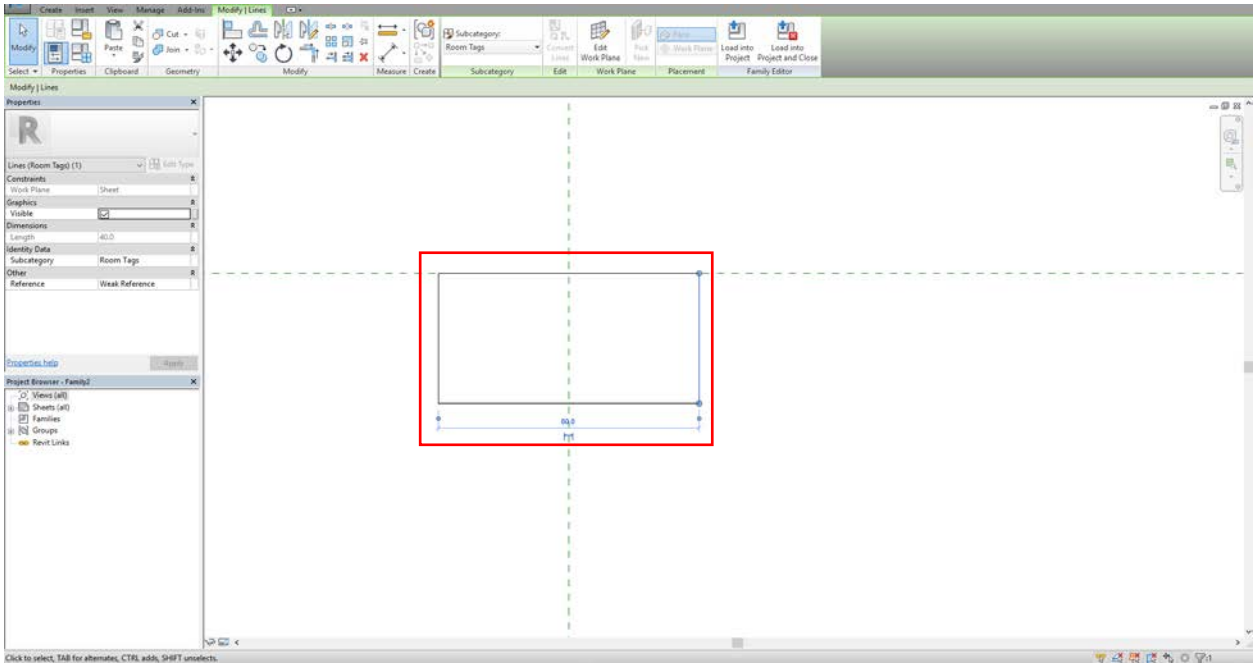
Tag is an Annotation Family that reports data embedded within an object.

To create a Room tag as an example, select Room Tag template.

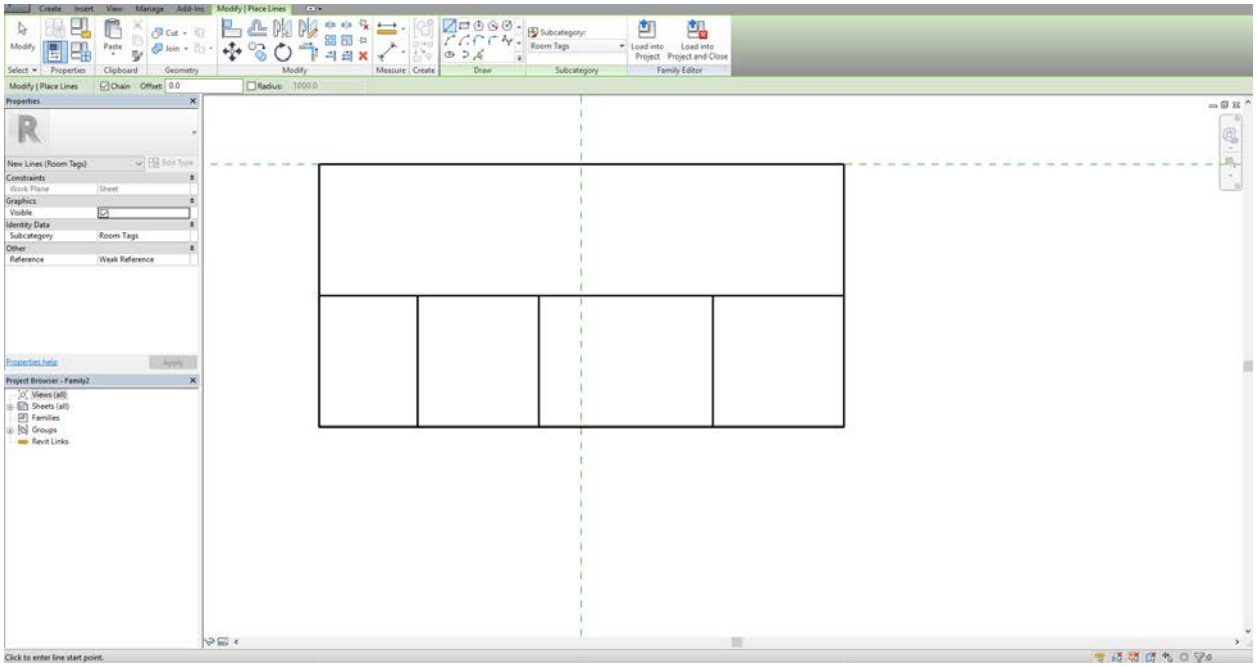


Notice that once appropriate template is selected, our family which is about to be created will fall in the correct category automatically. So, choosing the right template is beneficial.

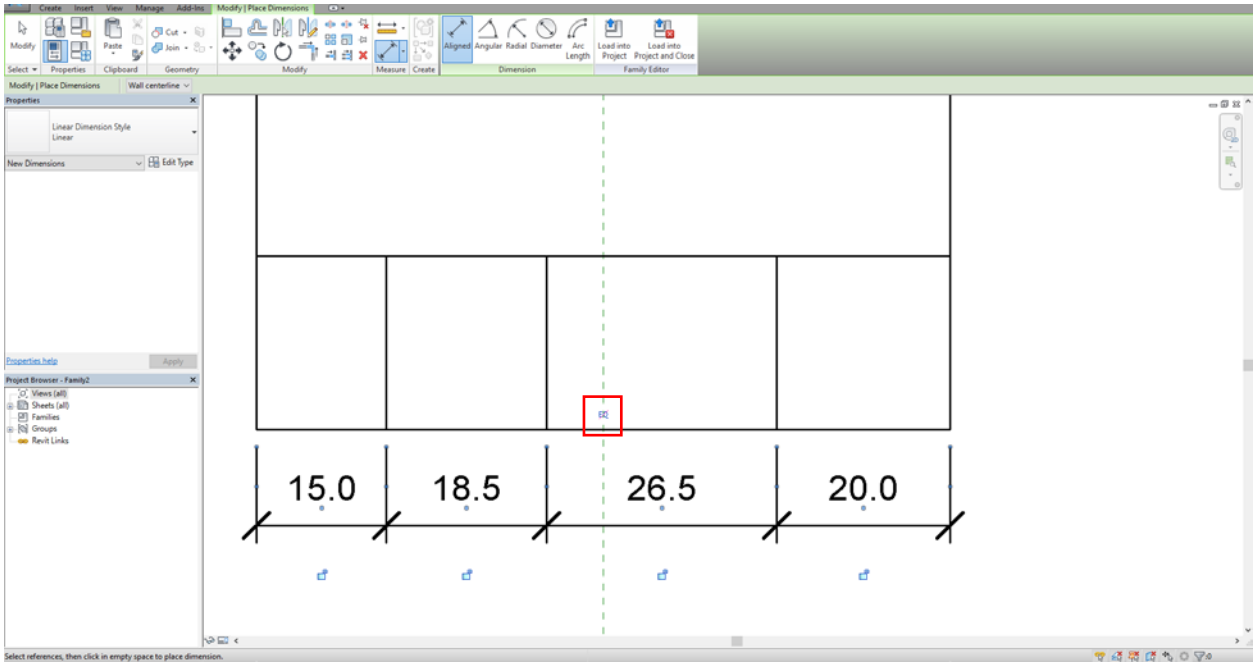
Roughly create a rectangle and change its dimension.



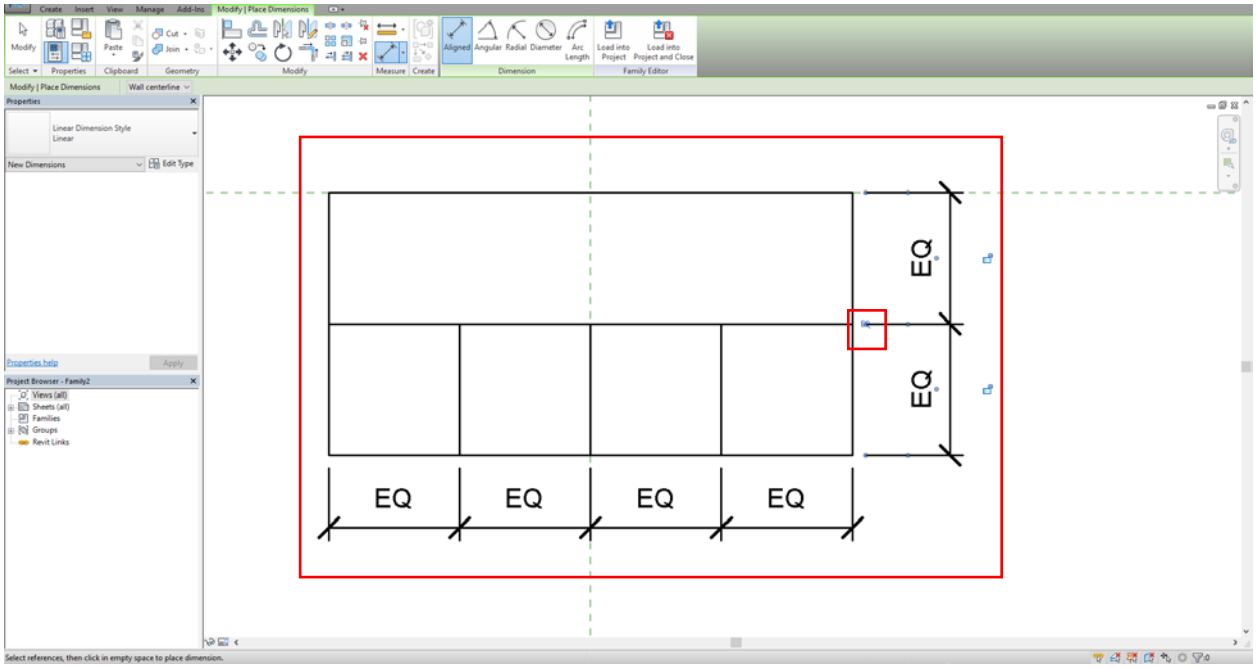
Create more details in our rectangle.



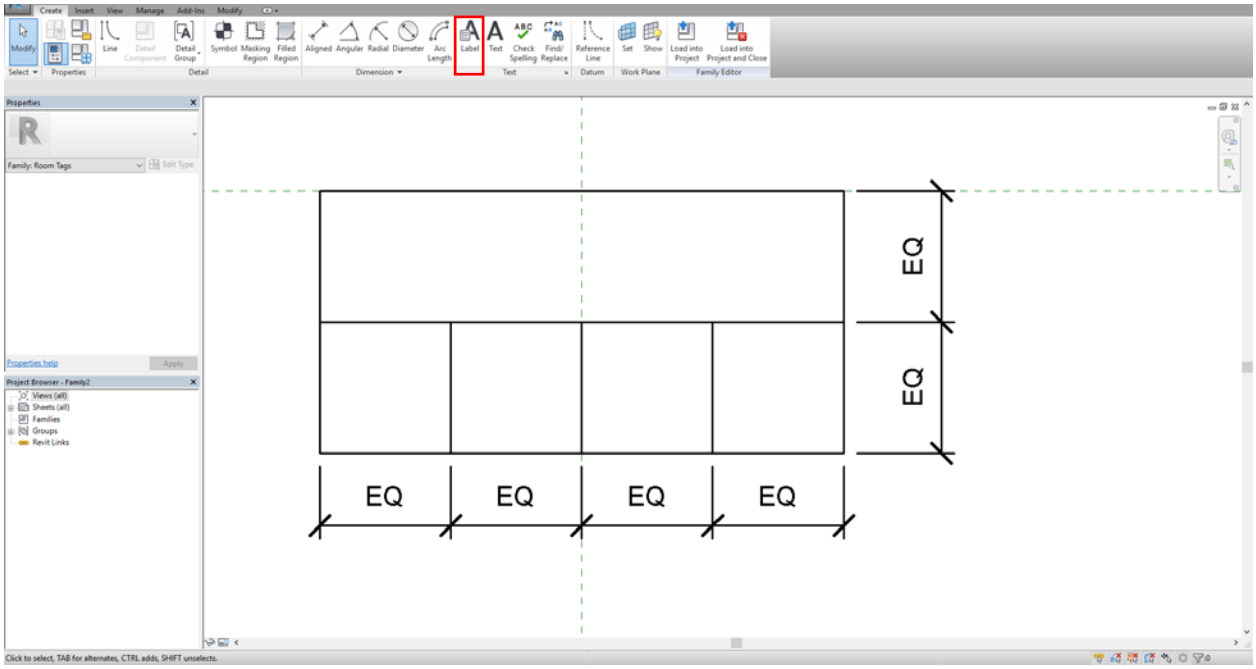
Though these segments have different width, assigning proper dimensions will help us equally distribute small blocks easily.

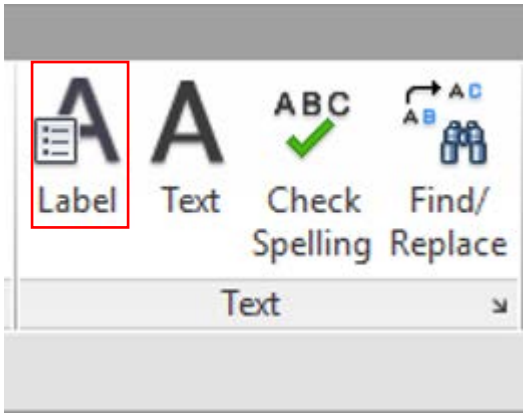


Click on EQ, finish equalizing.

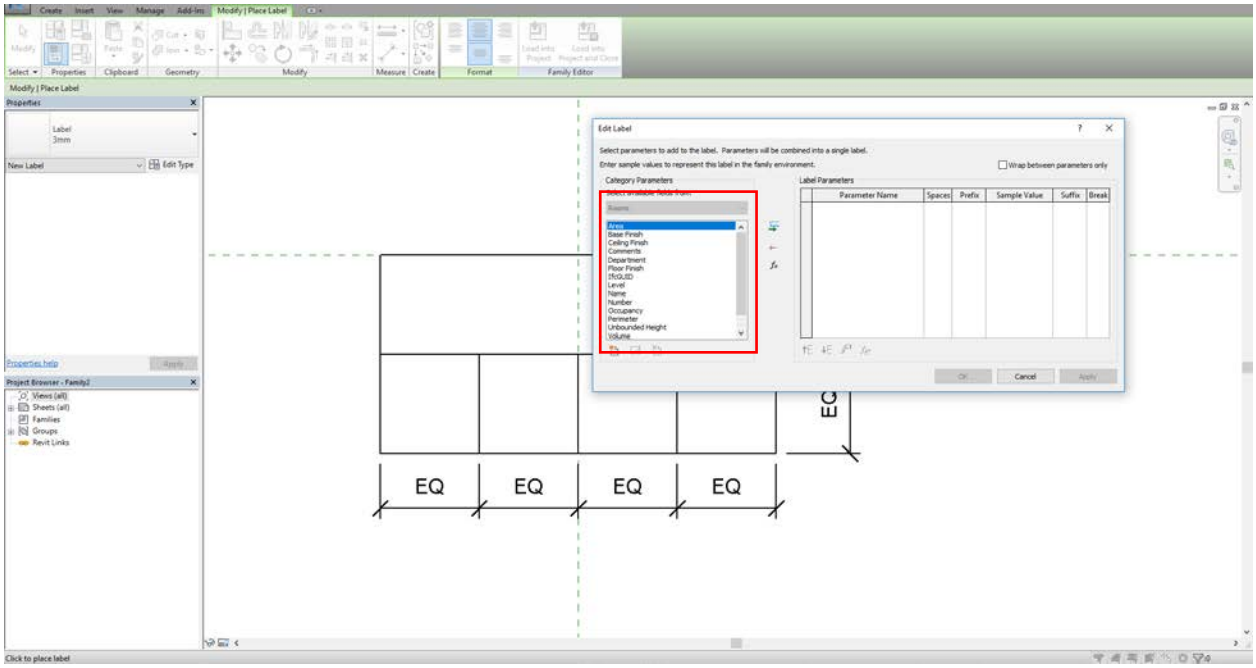


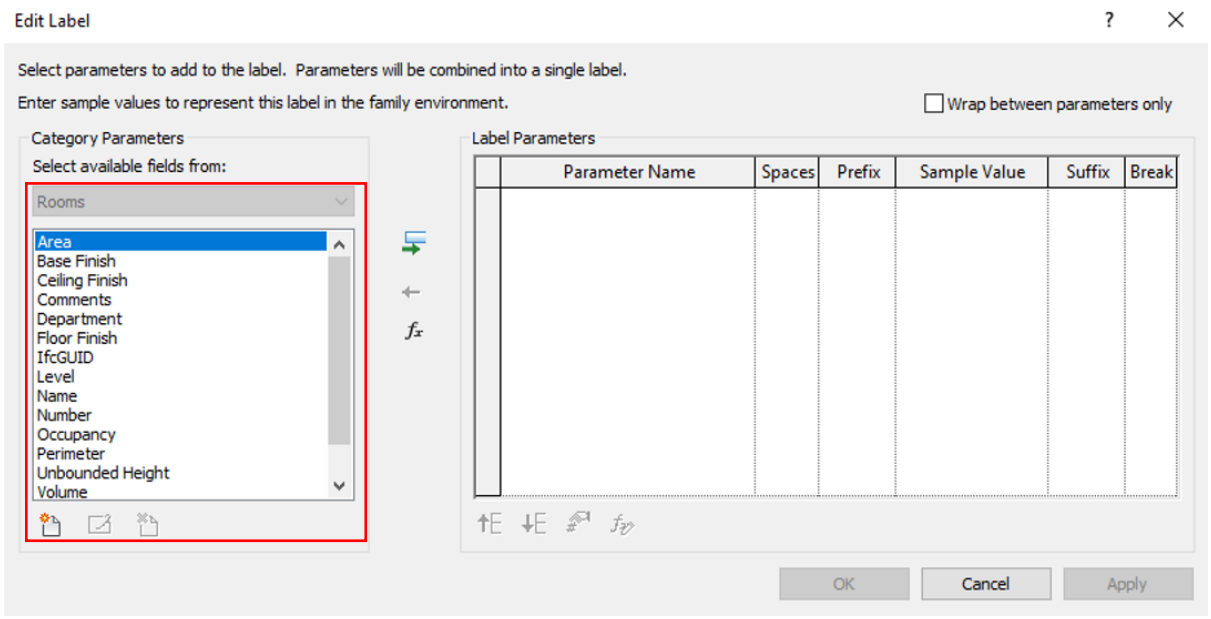
Be aware of the difference between Label of a tag and regular Text. Label in a tag is always linked to properties. Select desirable position, add in your labels.



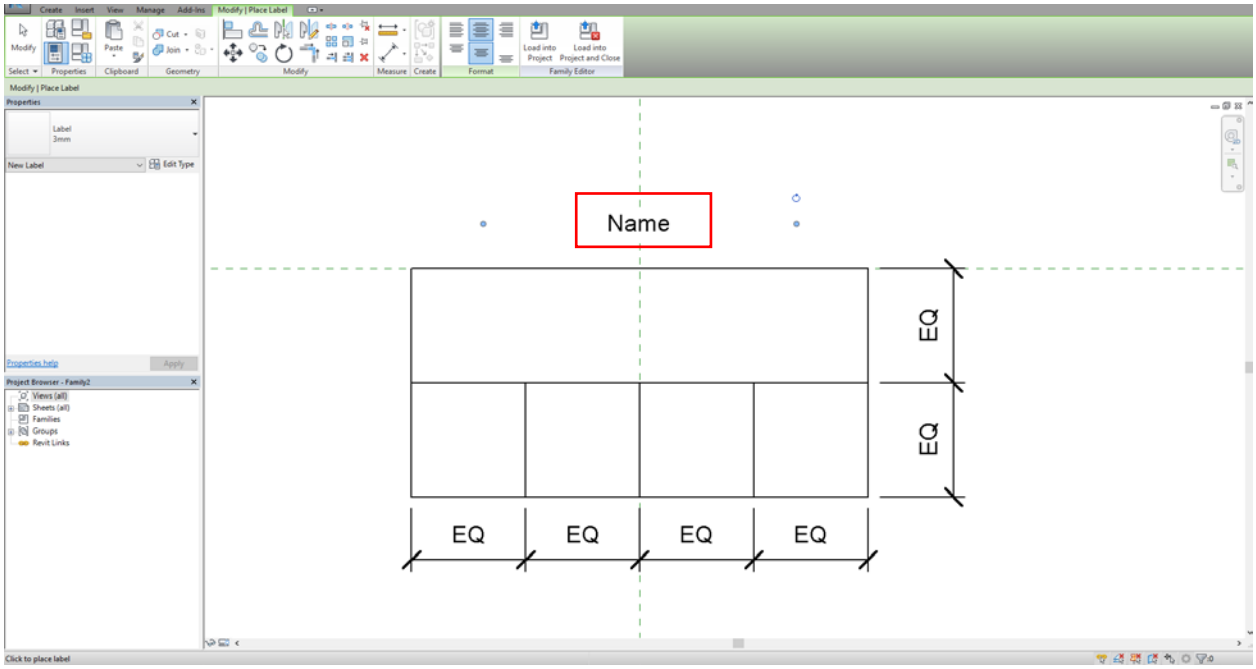


Notice that once we click on the desirable position, a window will pop out. We need to select which kind of property we want our label to link with.

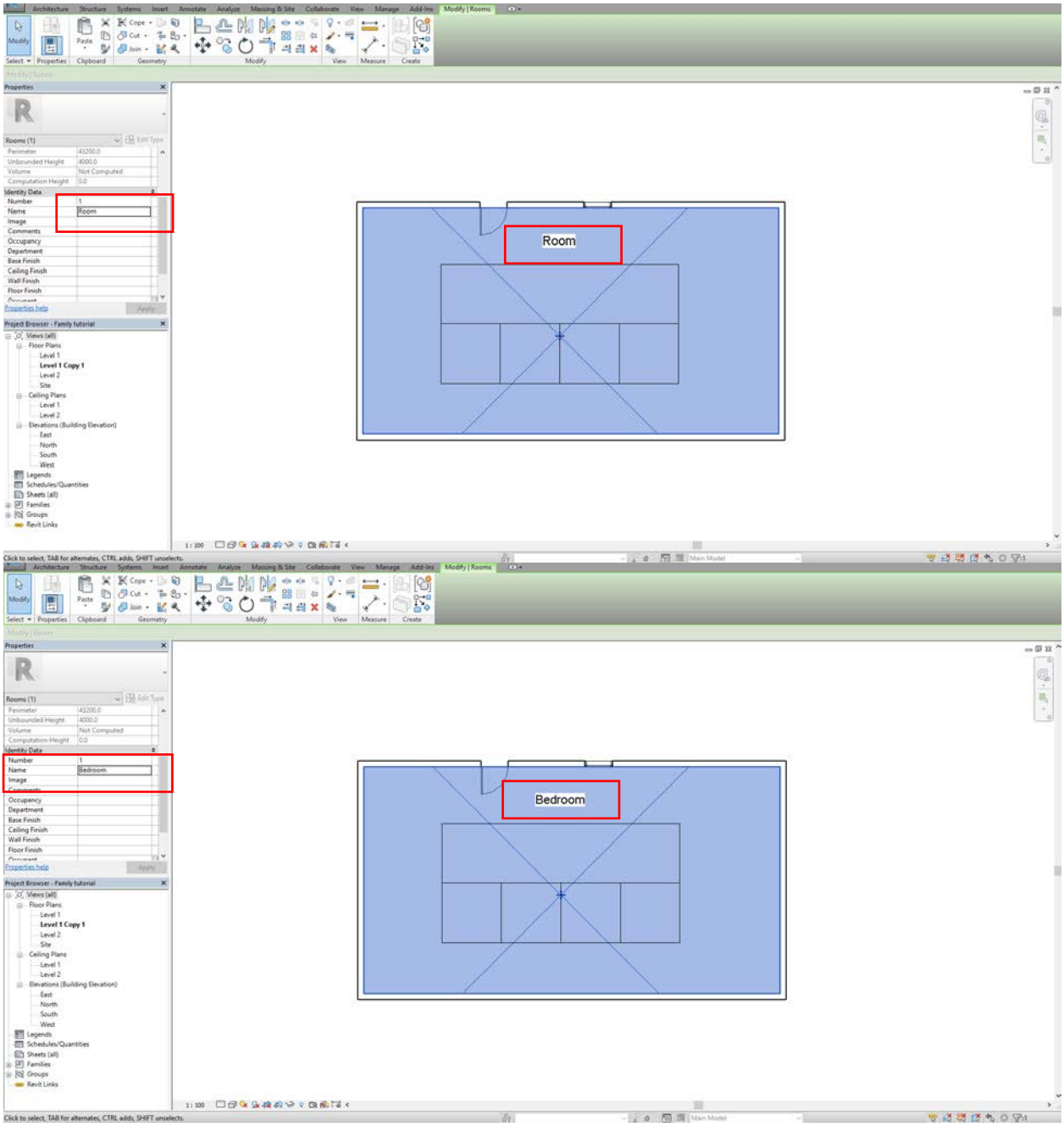


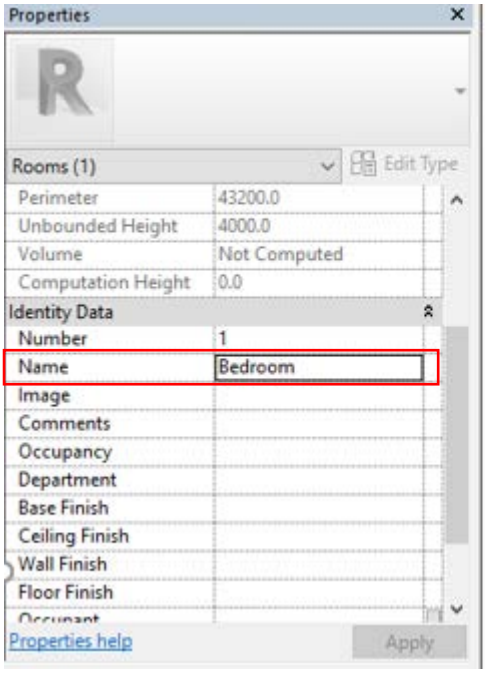


Now we have our Room Name.



Test it in the project, if we change room's property (Name), its tag will be changed accordingly. With our Room selected, change its name.

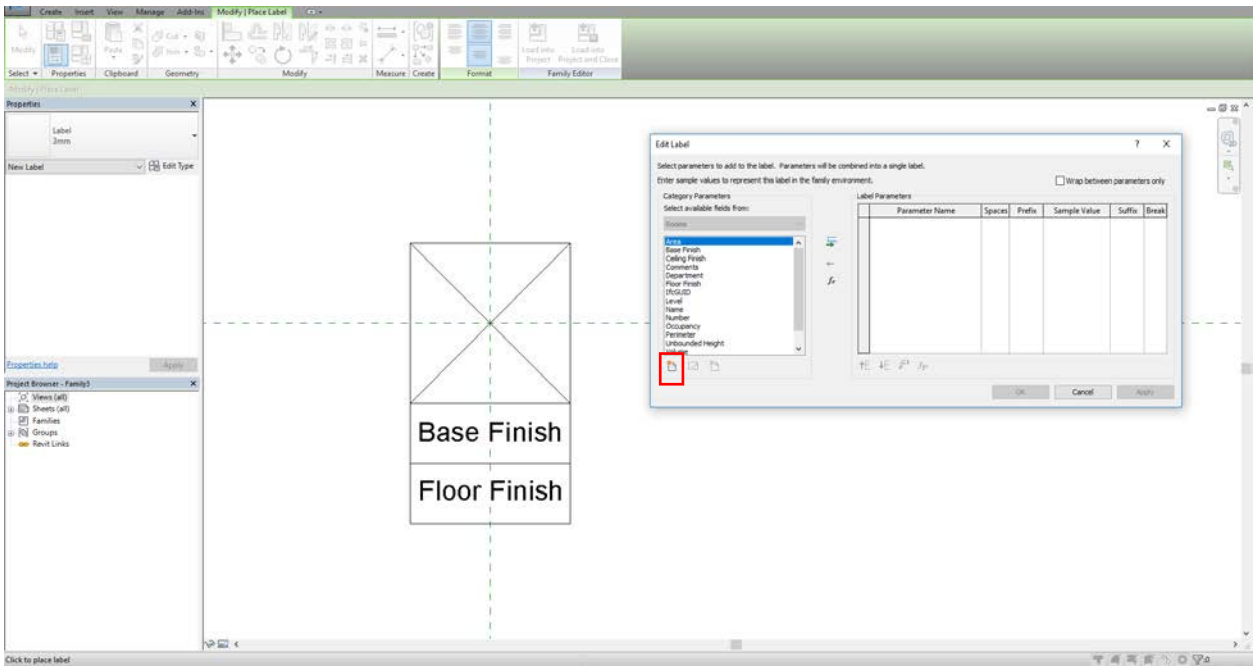

Room
Bedroom

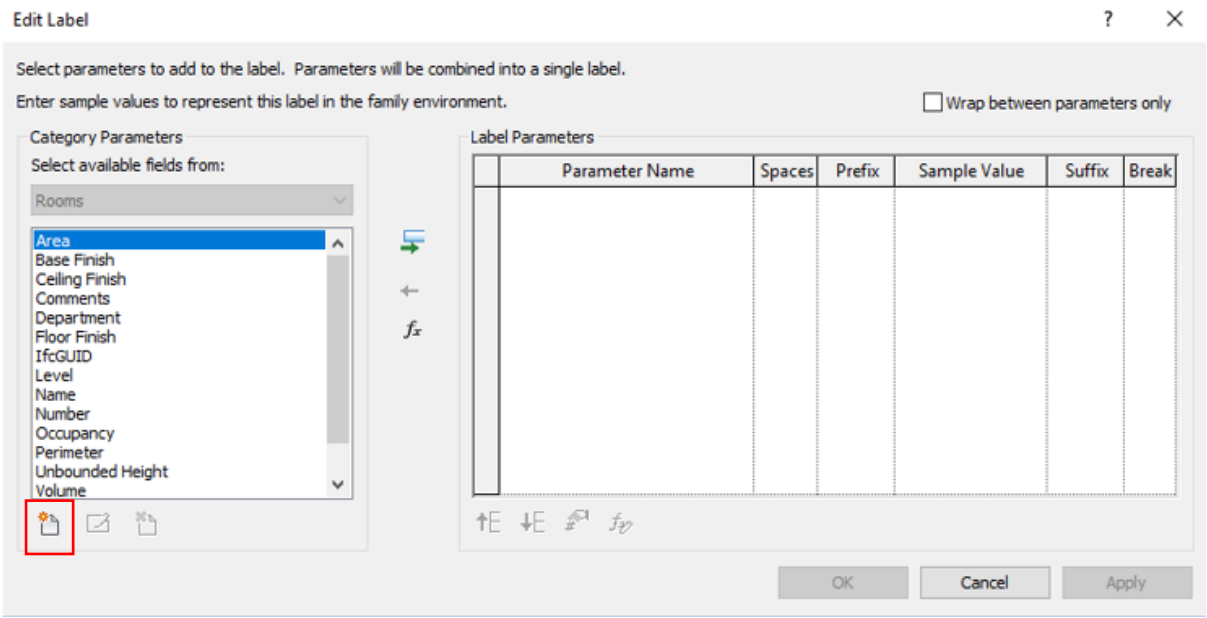


2.4 Shared parameters for tags

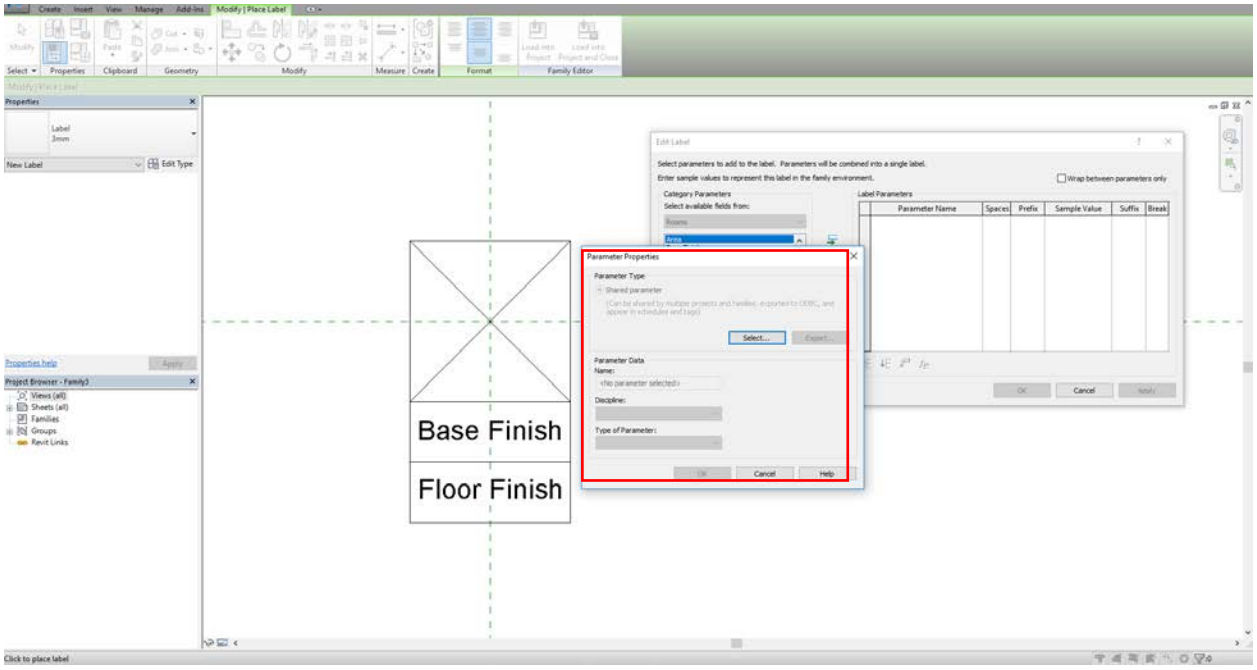
Though Revit provides a comprehensive set of parameters for us, sometimes we still need some custom parameters. If we want extra parameters beyond the scope of pre-built-in set for our tags, these parameters must be defined in a special external file. The parameters are called Shared Parameters.

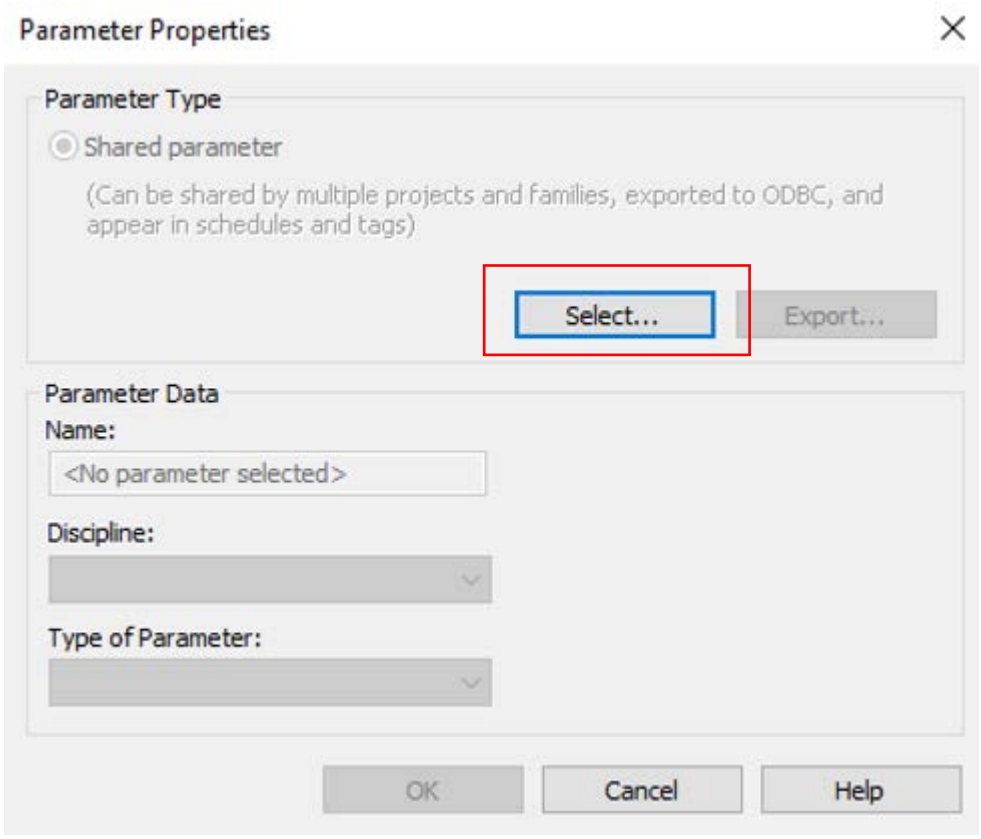
As the parameter we want our label to link to doesn't exist in the preset content. Then create a new one is possible.



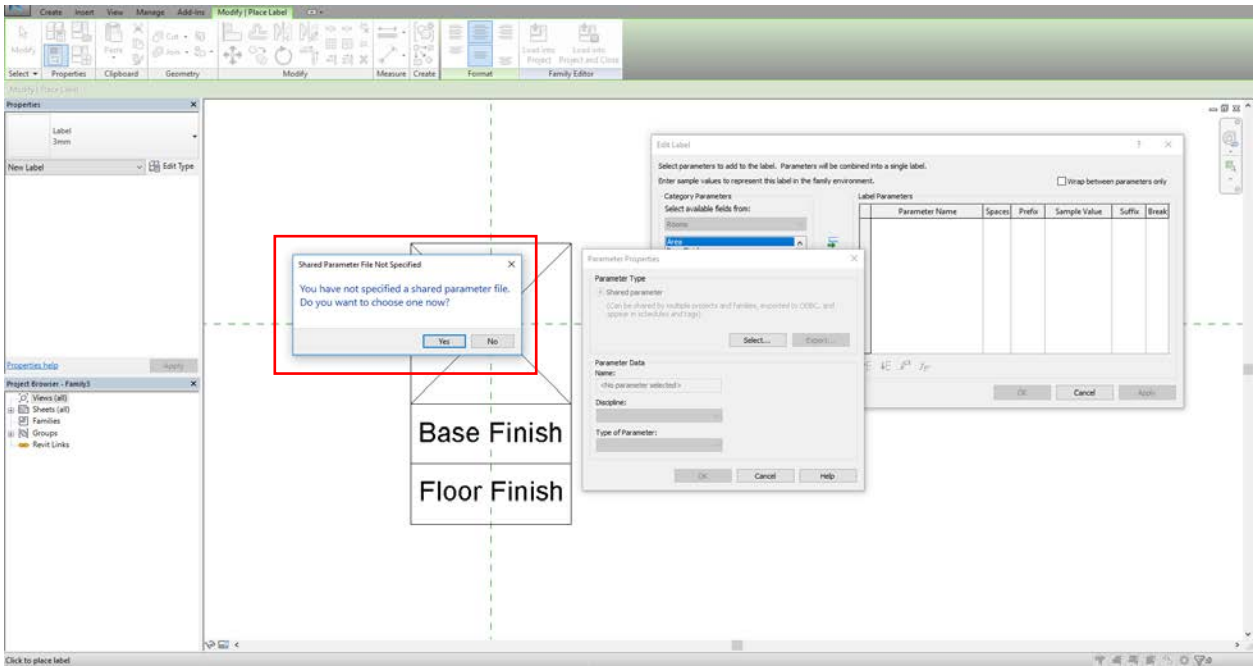


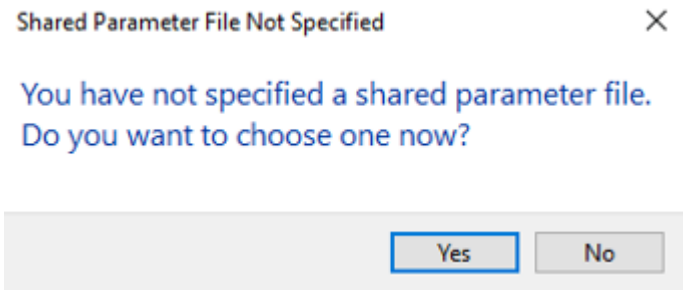
Notice it can only be Shared parameter. It's reasonable because we want everyone who's using these tags in the same way, so it has to be shared among users.



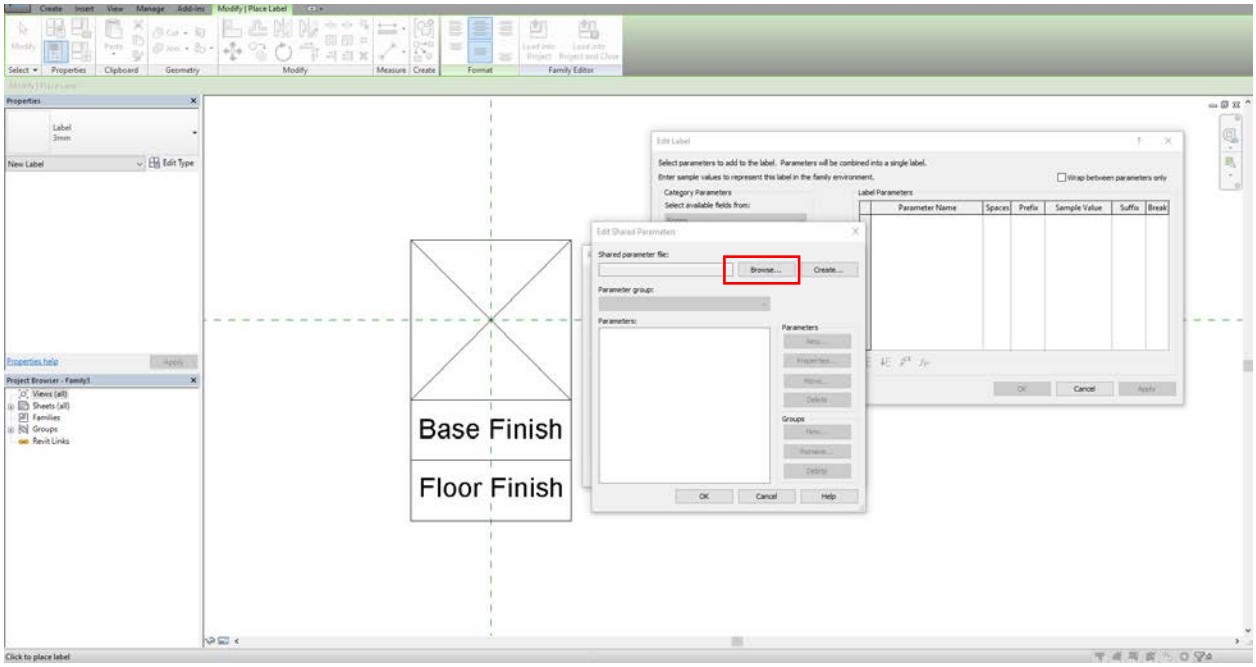


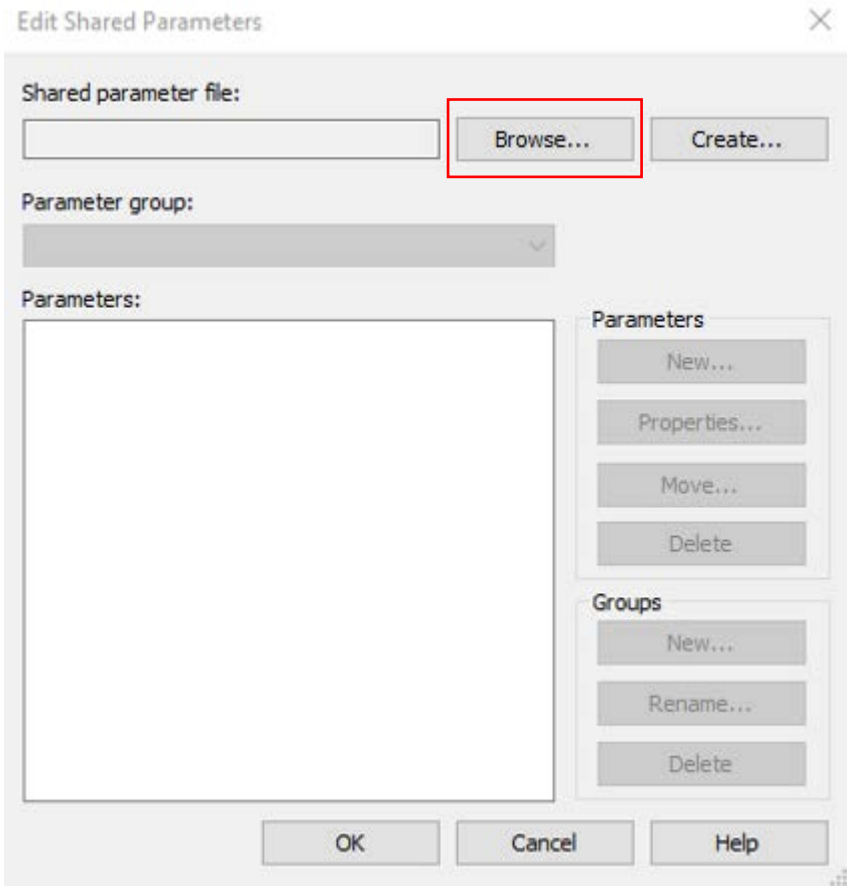
There's good chance that your company has its own set of Shared Parameters. If not, creating new ones is the way to go. Click on Yes.





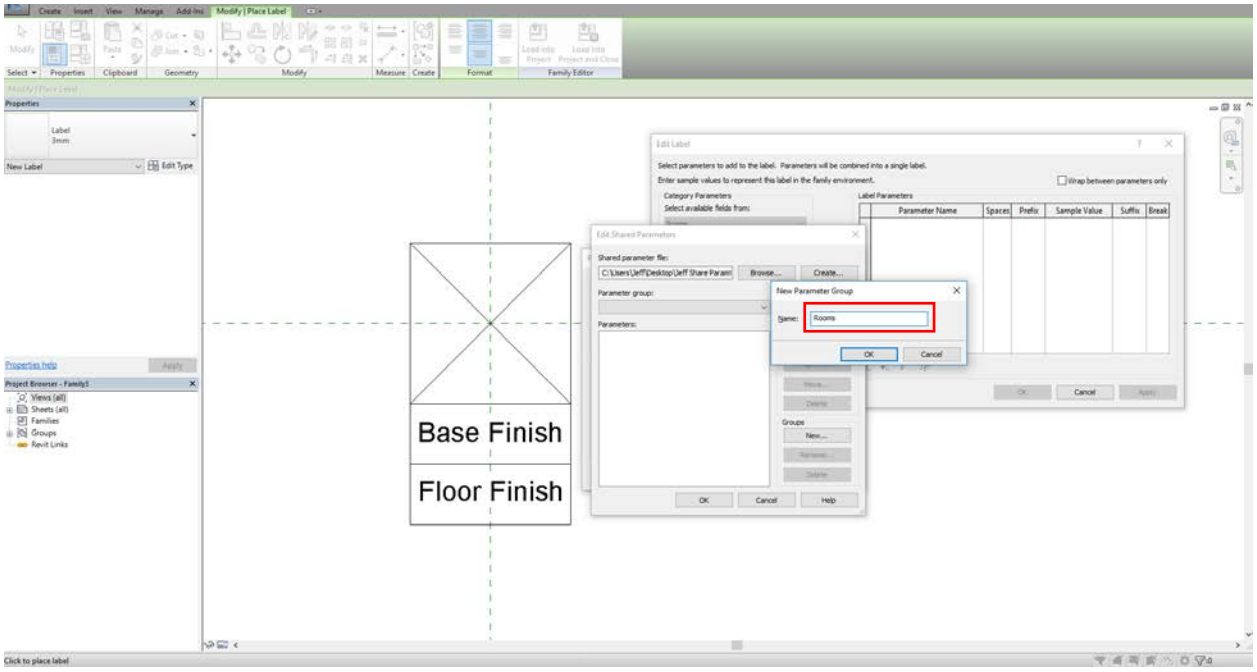
Browse, if you have the file of Shared Parameters ready.

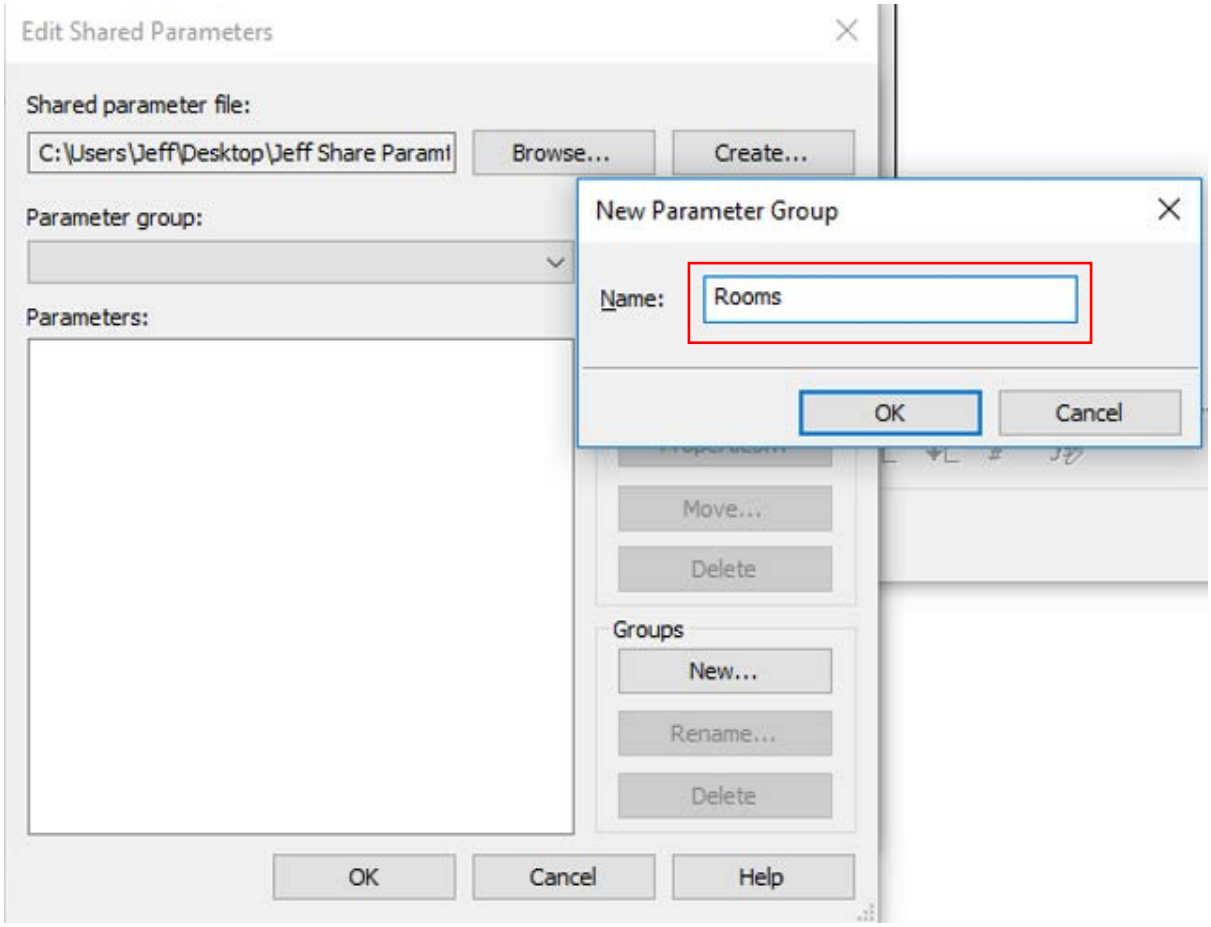




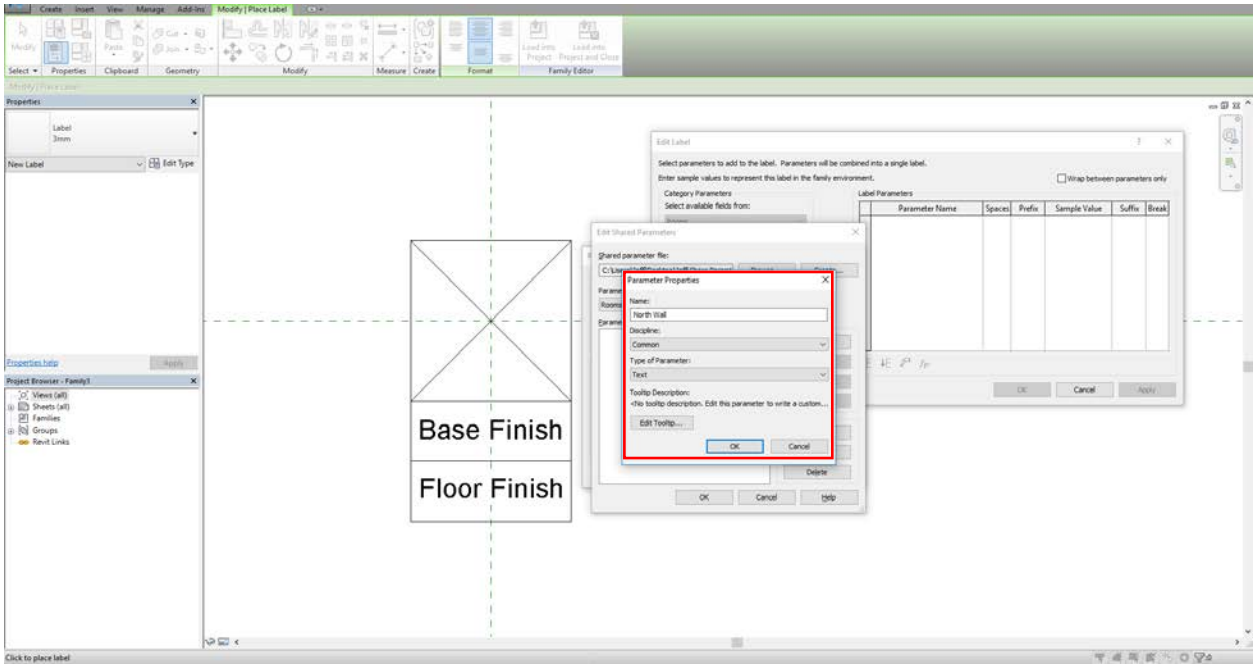
In our case, we want to click on Create. Shared Parameters is a text file with special format. Editing it in Revit interface is always a wise choice.

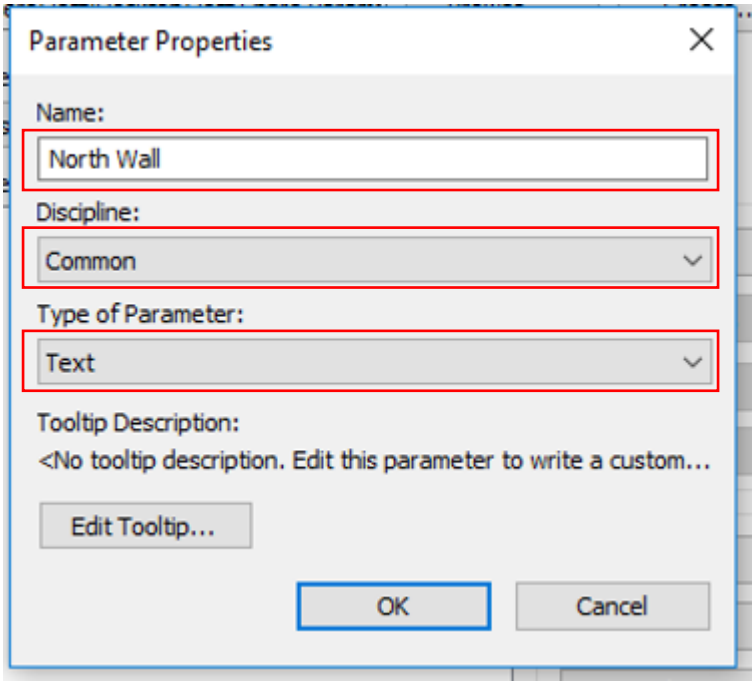
Shared Parameters are organized in groups. Let's simply name our group: Rooms.



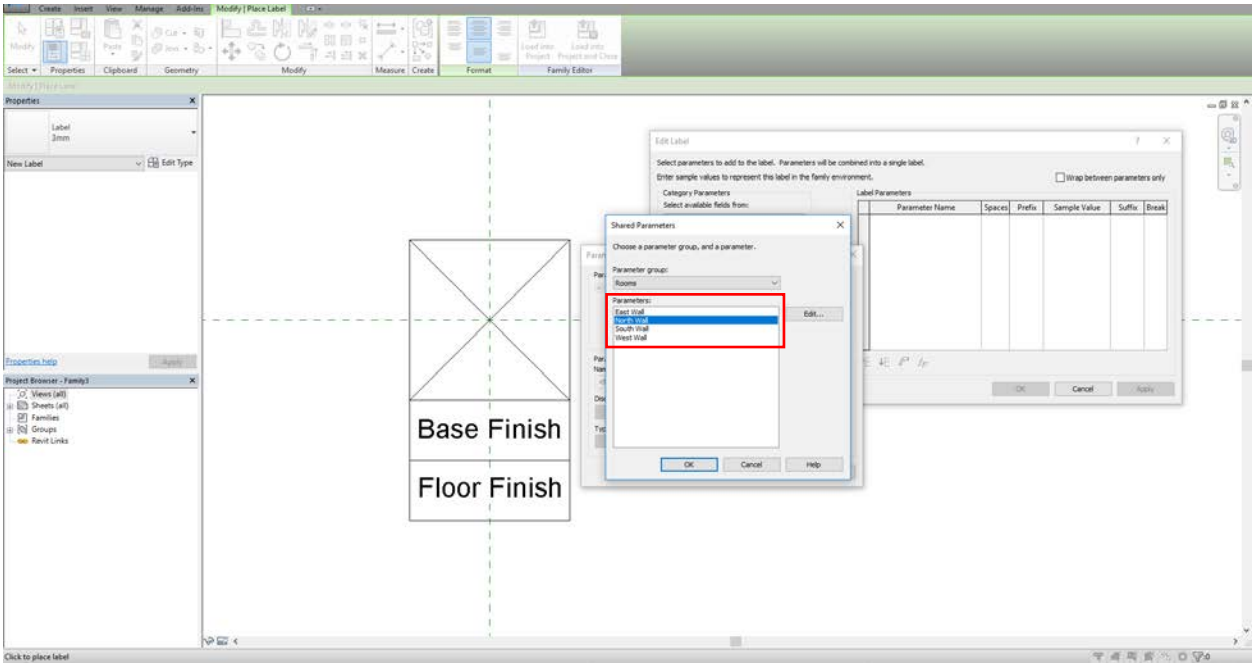


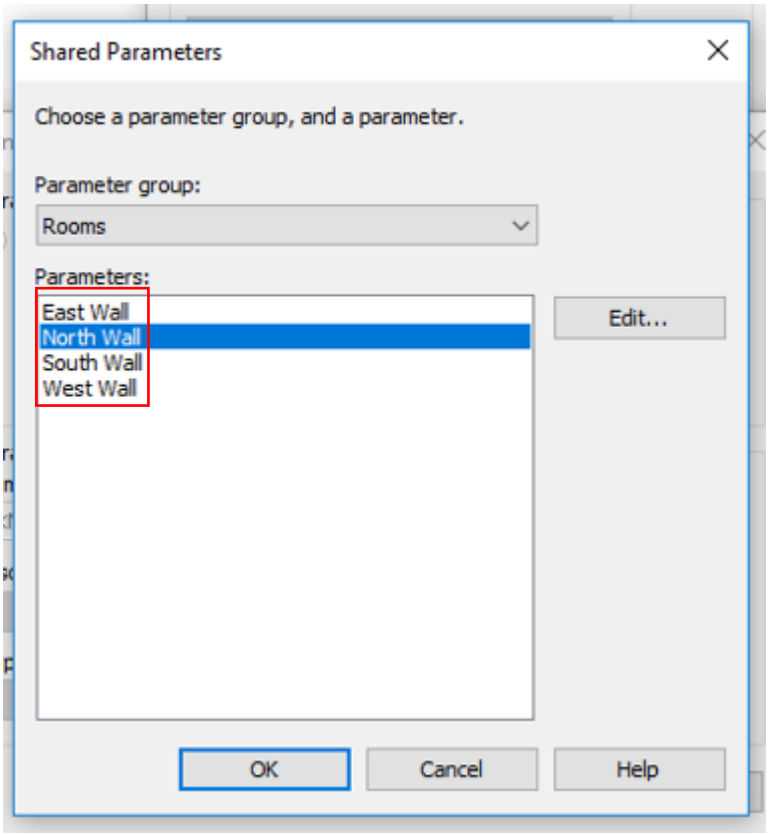
Create parameters in the group.



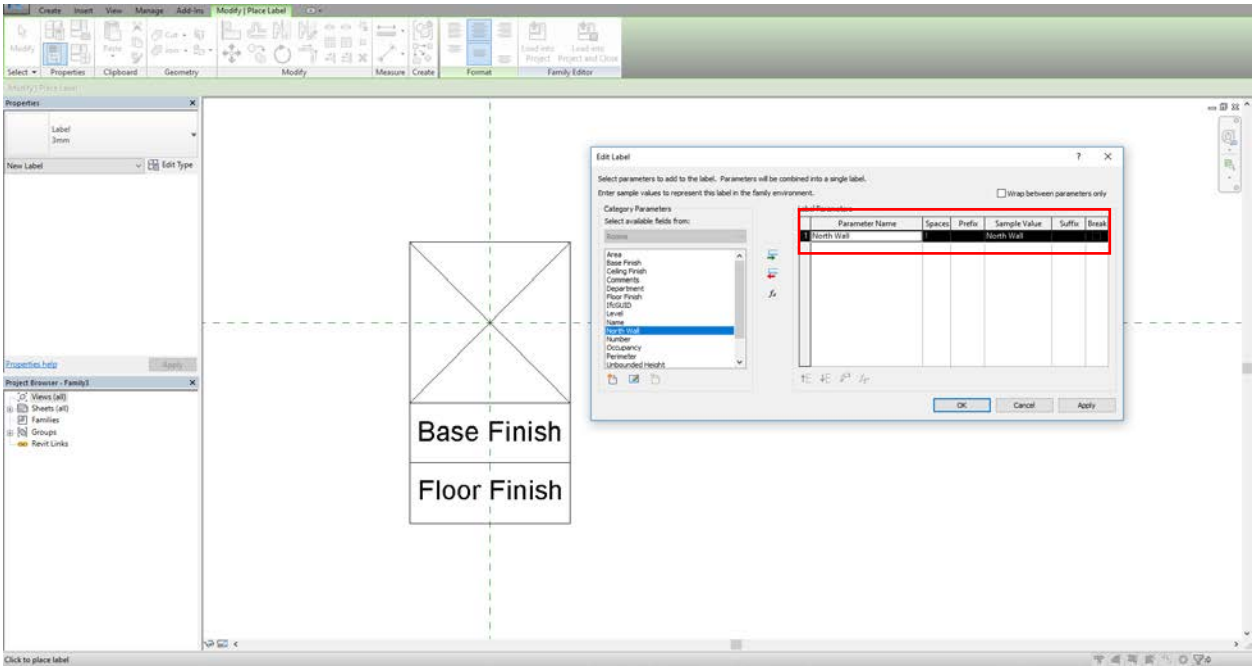


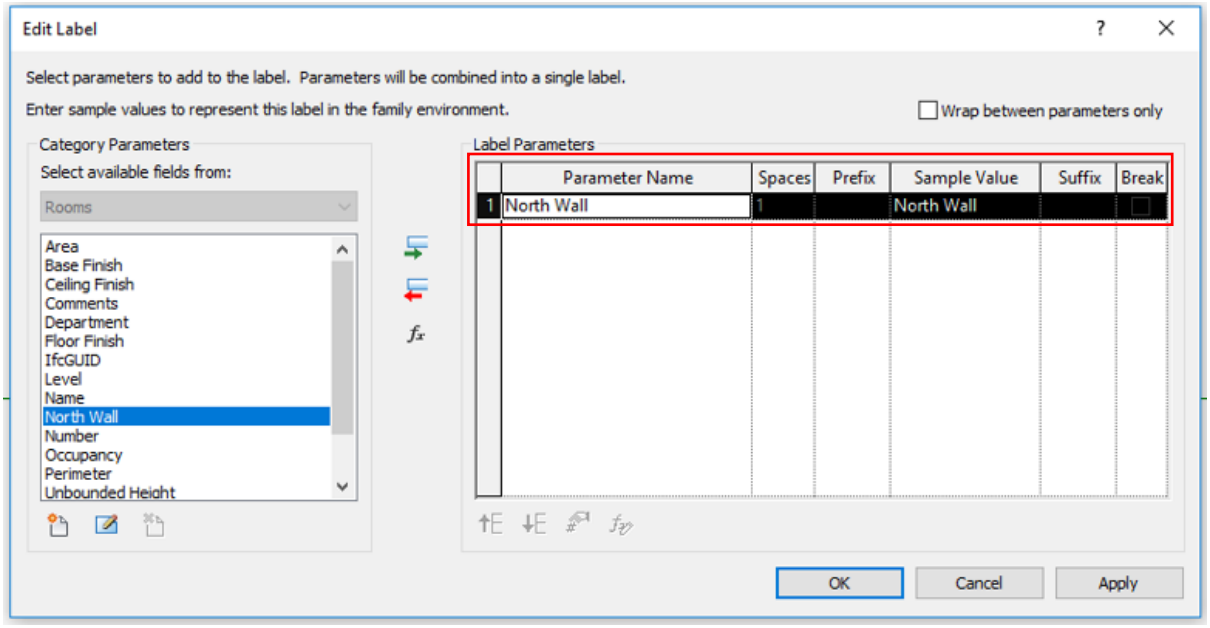
Finish creating parameters then by hitting OK, it will bring us back to the interface where we should choose a parameter for our label to link.



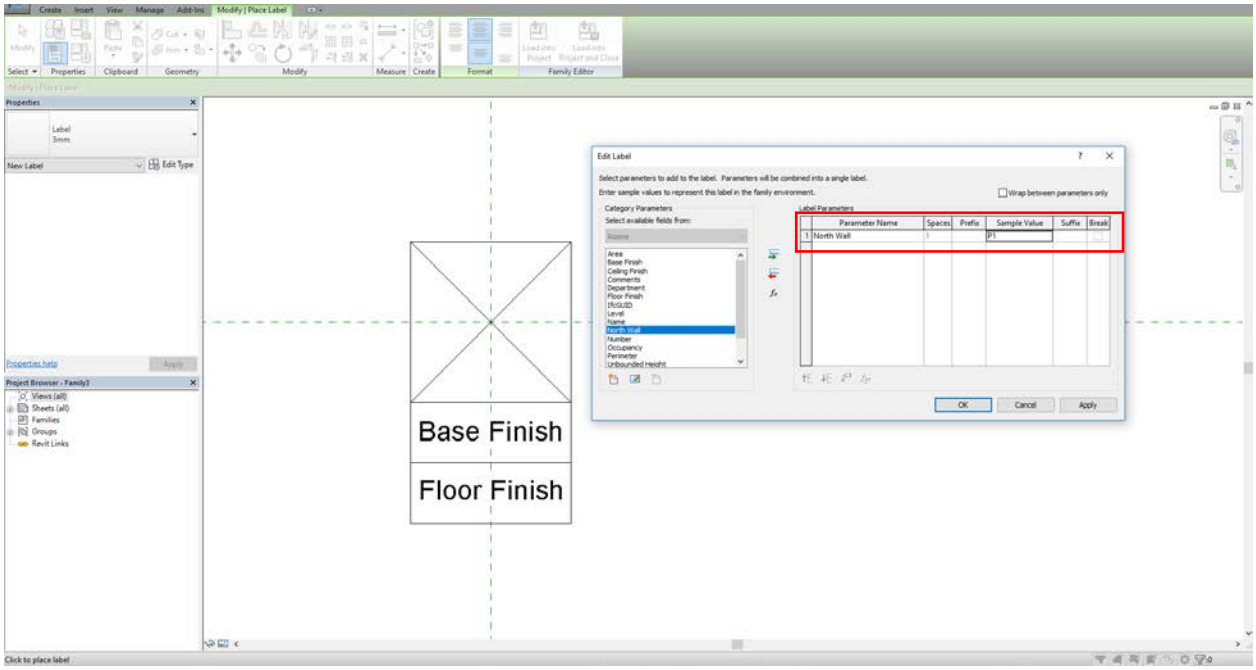


North Wall parameter now is on the list. Simply link it with our label.

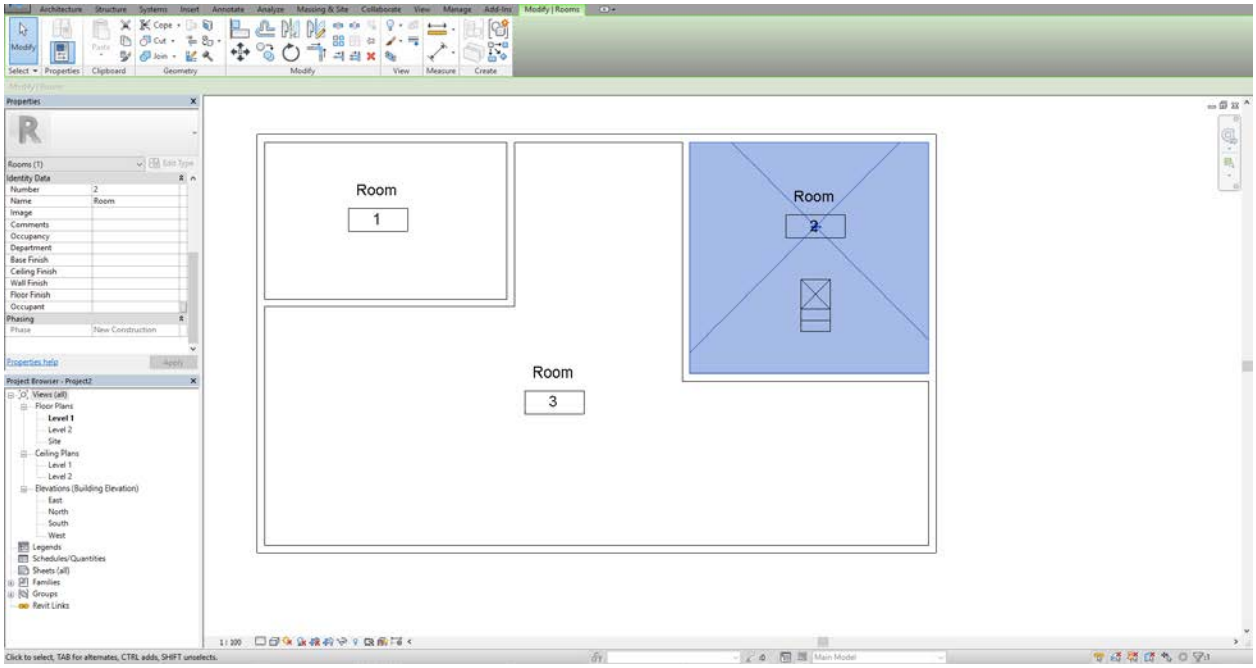




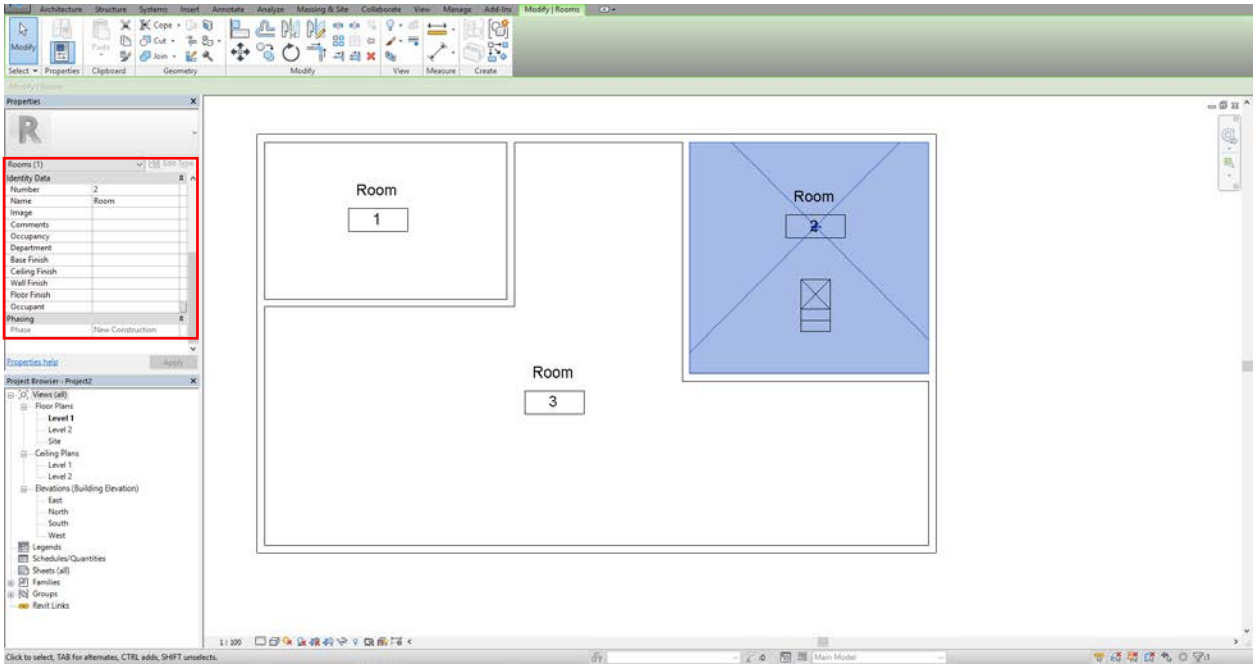
Change its Sample Value to P1. Then click OK.

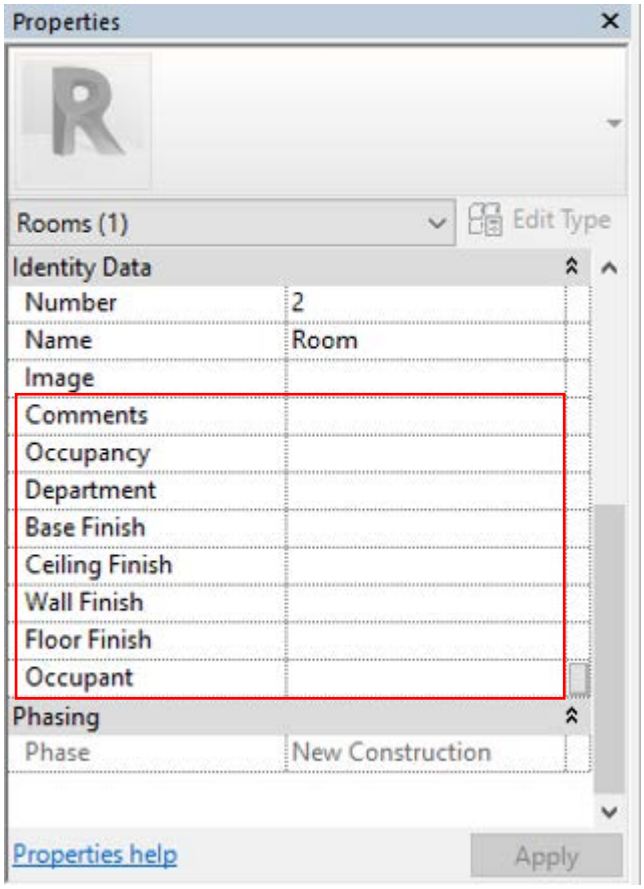


Add in all labels. Test our tag in the project.

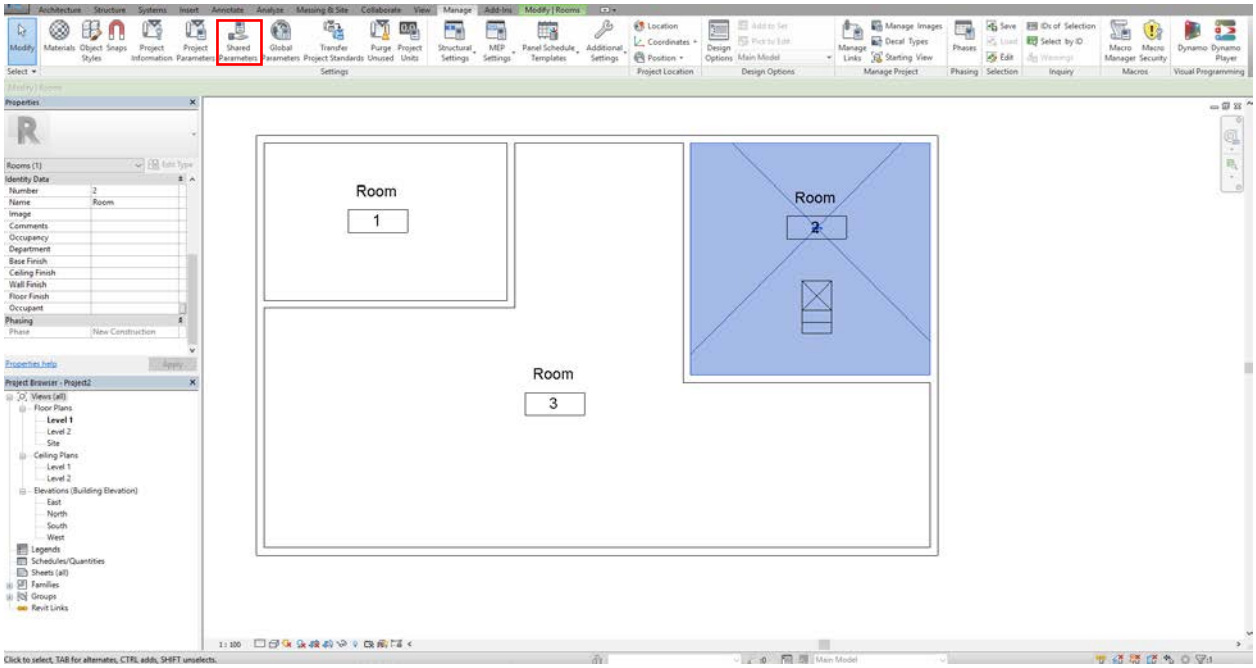


With a Room selected, we notice that our parameters are missing.

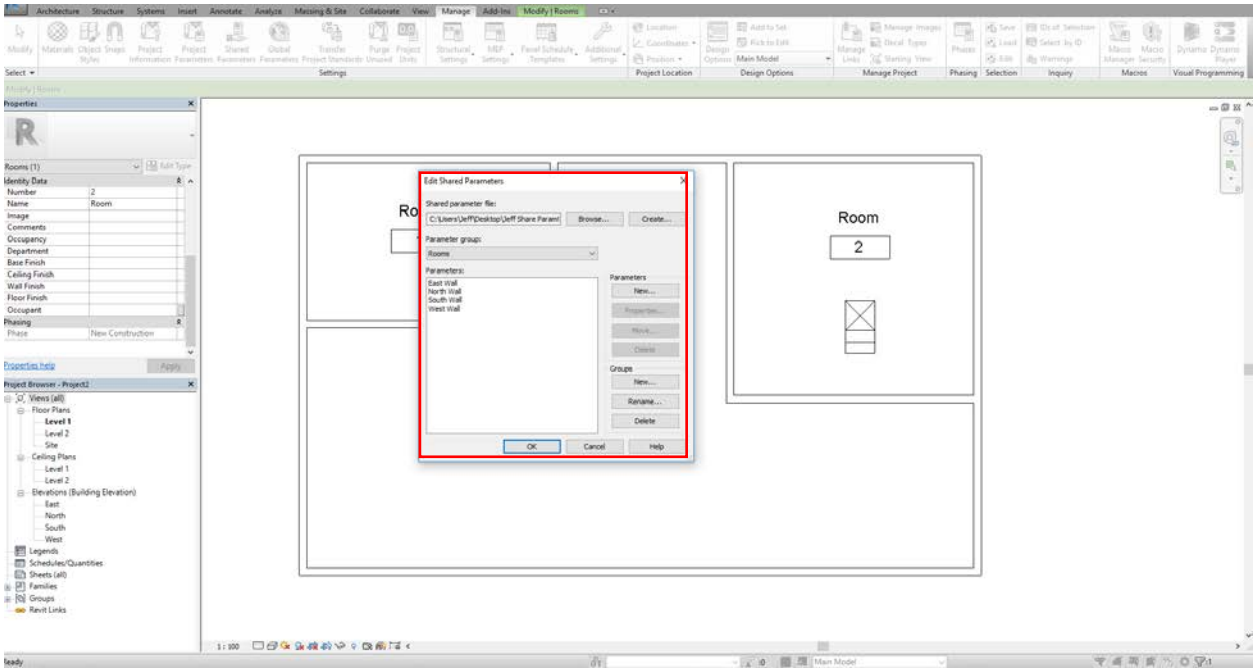




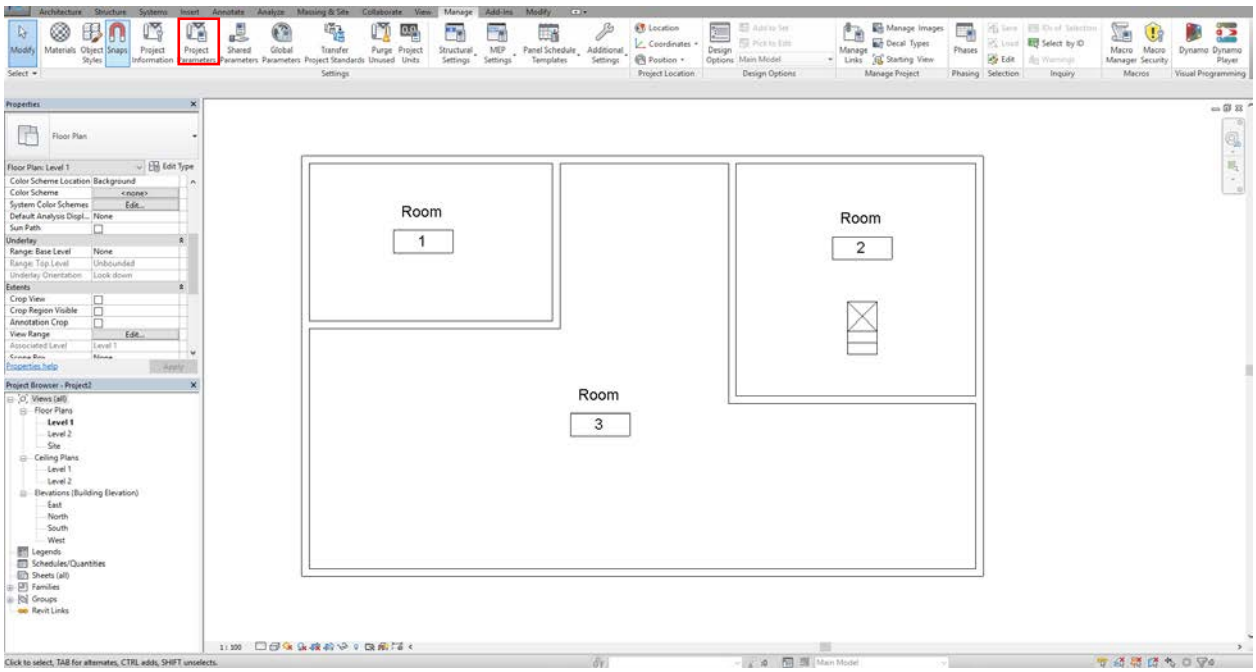
What we have to do is telling the project to access our Shared Parameter file. Go to Manage tab, click on Shared Parameters.

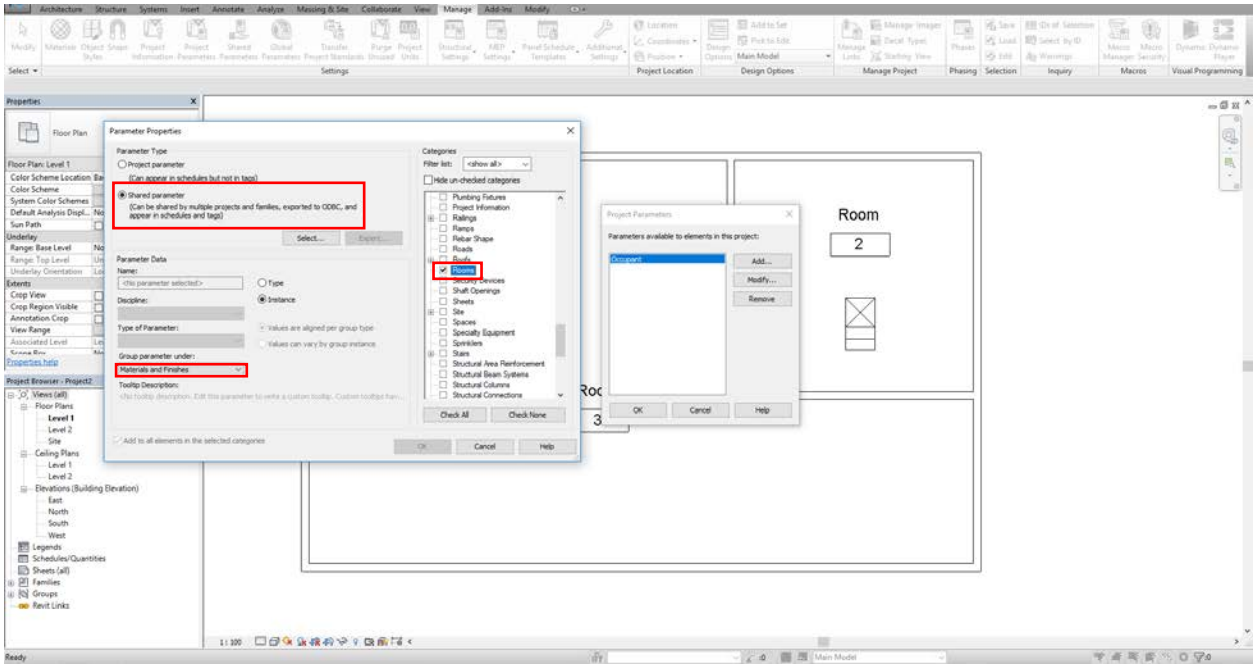


This is the place where our project can access to the Shared Parameters file.

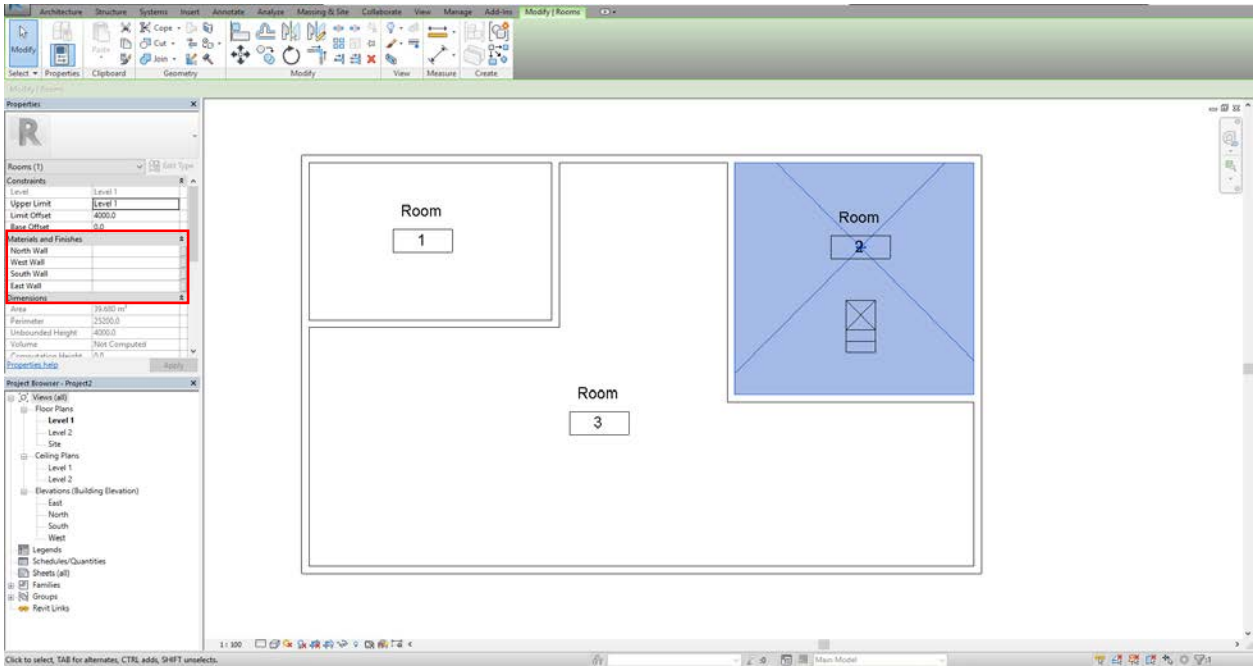


Now with our Shared Parameters loaded. Add them into our project by clicking on Project Parameter.





Now if we click on our room, notice that the parameters we've created show up in Properties panel.

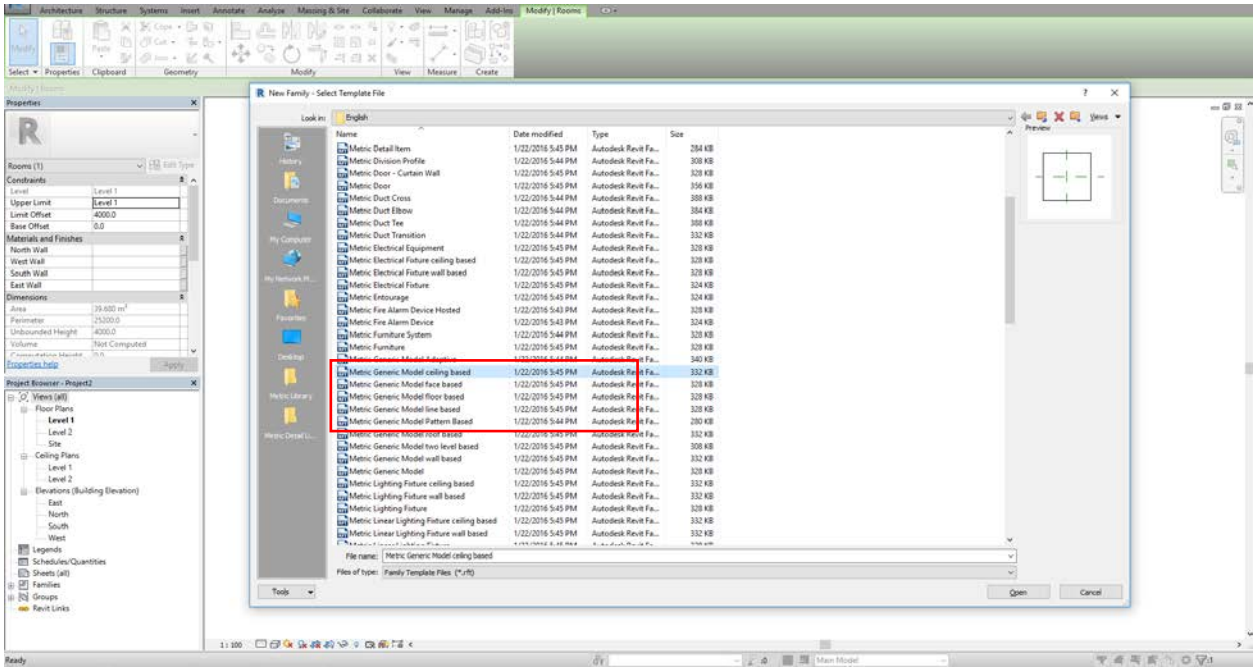

Room
1
Room
2
Room
3

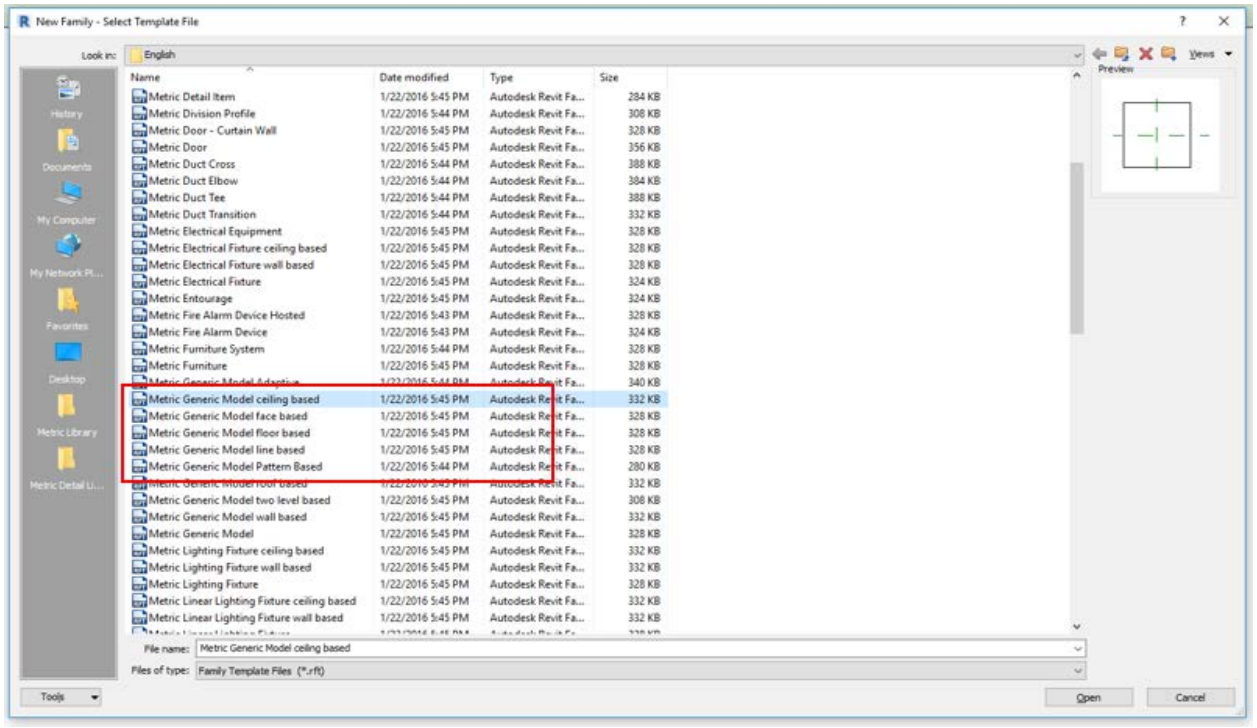
3.Simple Model Families

3.1 The family creation process

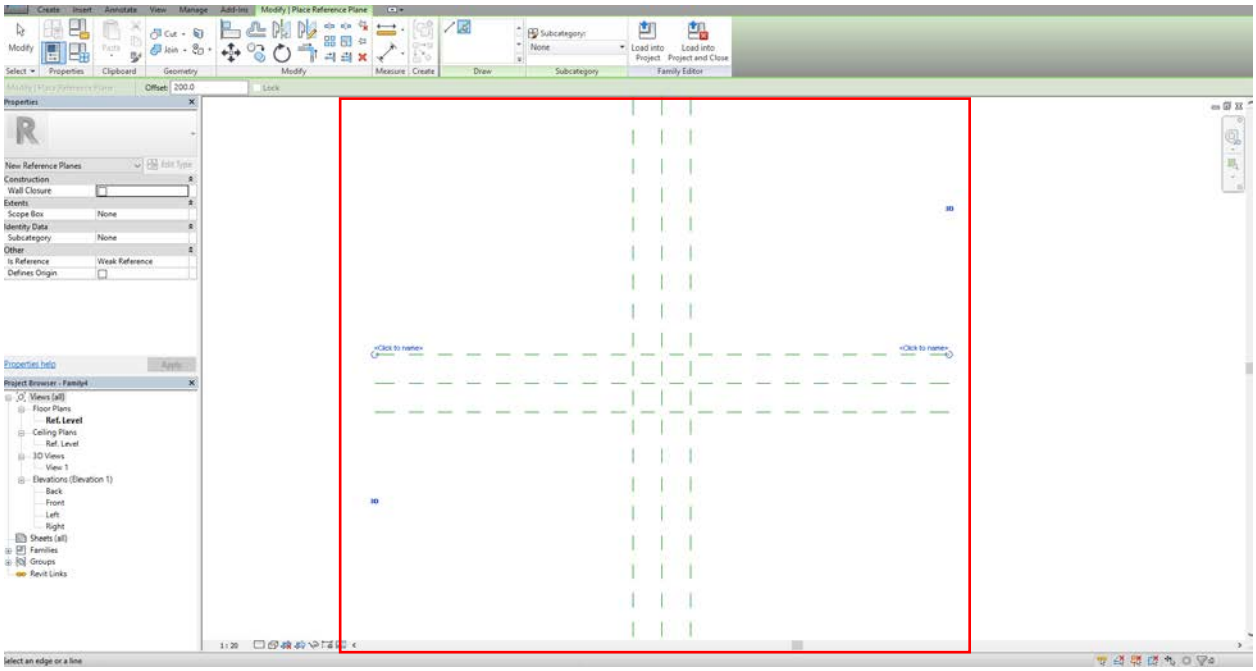
For the most of time, families you're going to create are Model Families. It's one of the major reasons which makes Revit so powerful.

Think about it carefully before you start working. Choose correct template and hosting behavior is crucial to creating a desirable family.





Laying down reference plane would be the first step once you start drafting. Reference planes serve as the skeleton of our family.

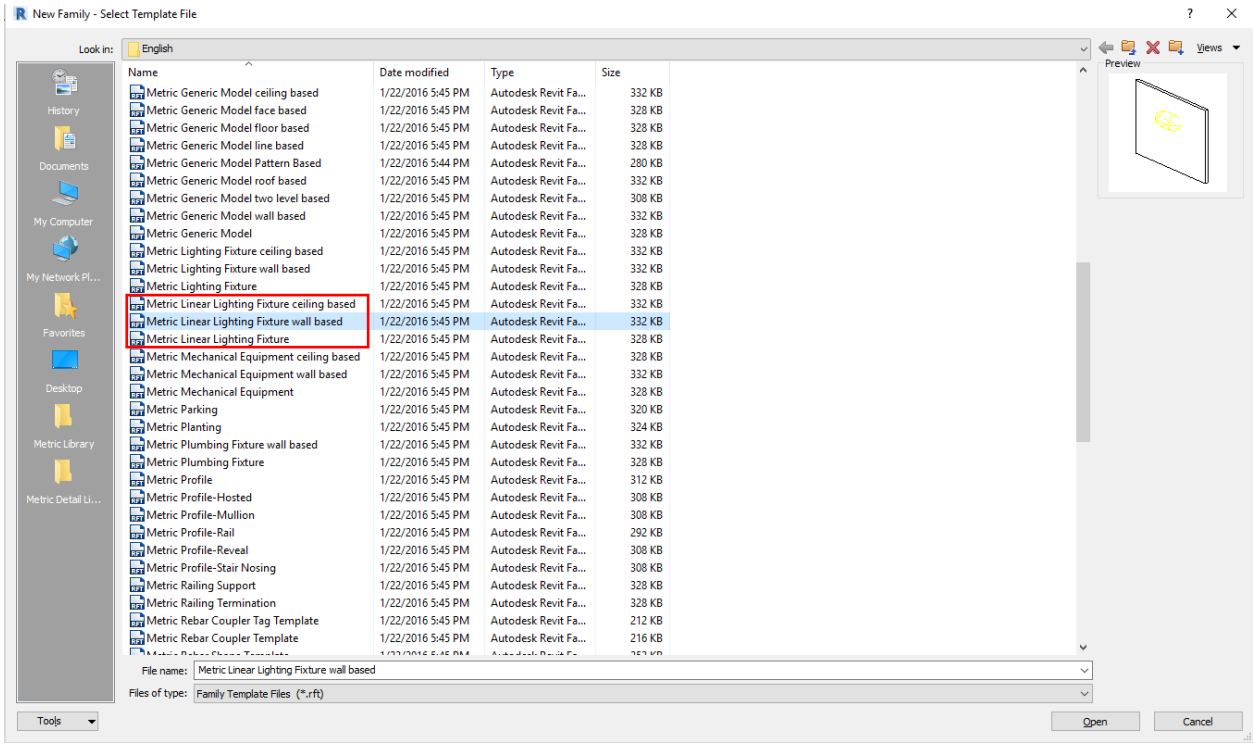


Creating Parameters and Constraints make the family smart. Capabilities like adjust and change shape, move in size and snap to other families are coming from this part of your work.

Everything well prepared, then start to build geometry. Finally, test your family in your project.

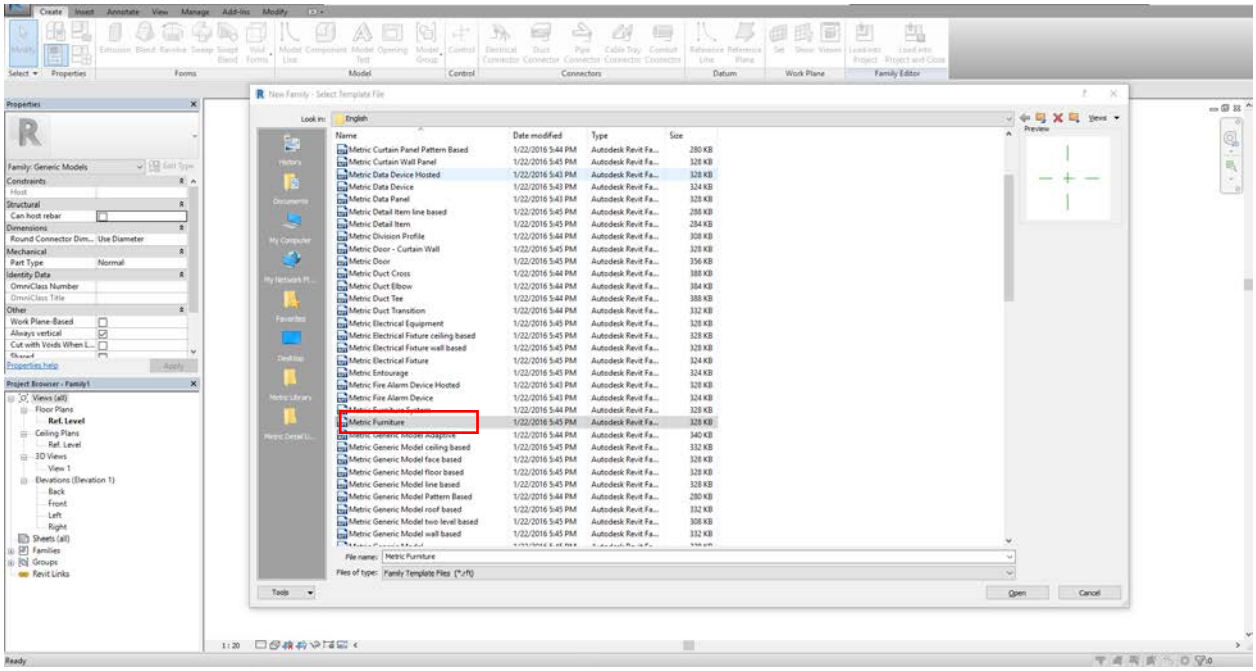
3.2 Creating a new model family

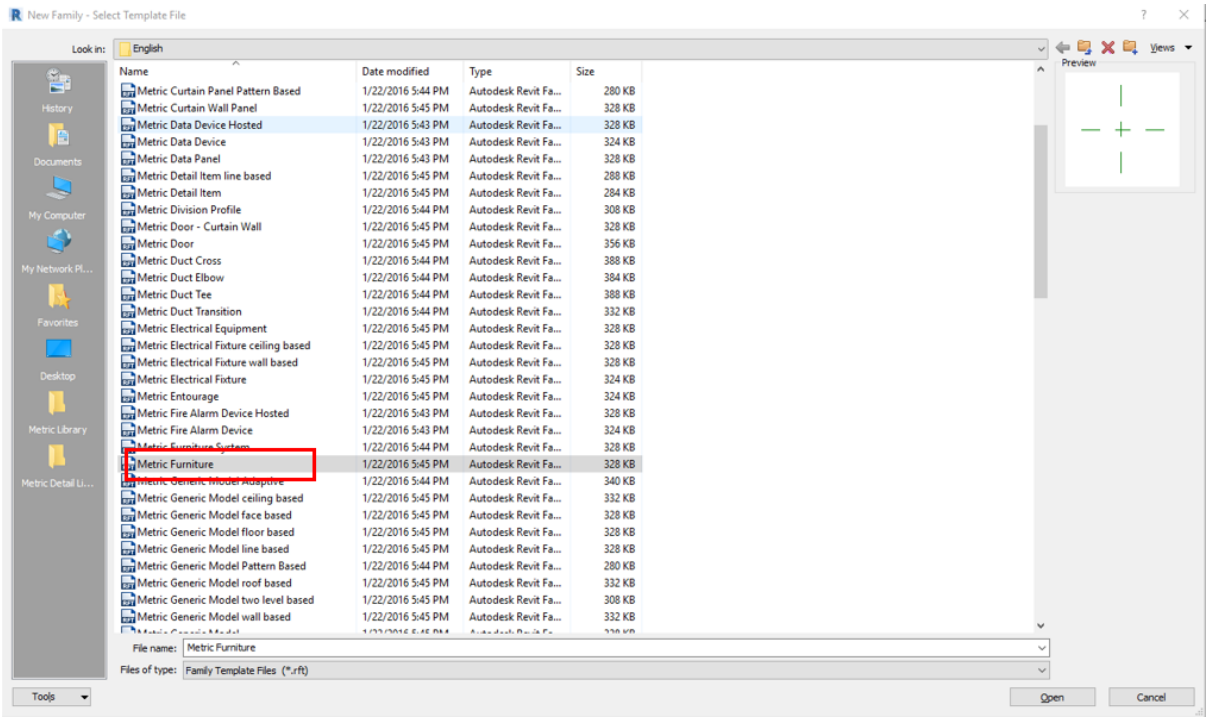
Always choose appropriate template for your family. Pay attention to hosting behavior of your family.



Basically, if you choose a template without hosting behavior but still you can create a family and manually align it to hosting surface. Contrast to that, once you choose a template with hosting behavior, there's no coming back since the behavior will be locked into the family you about to build. Hence, choose template cautiously.

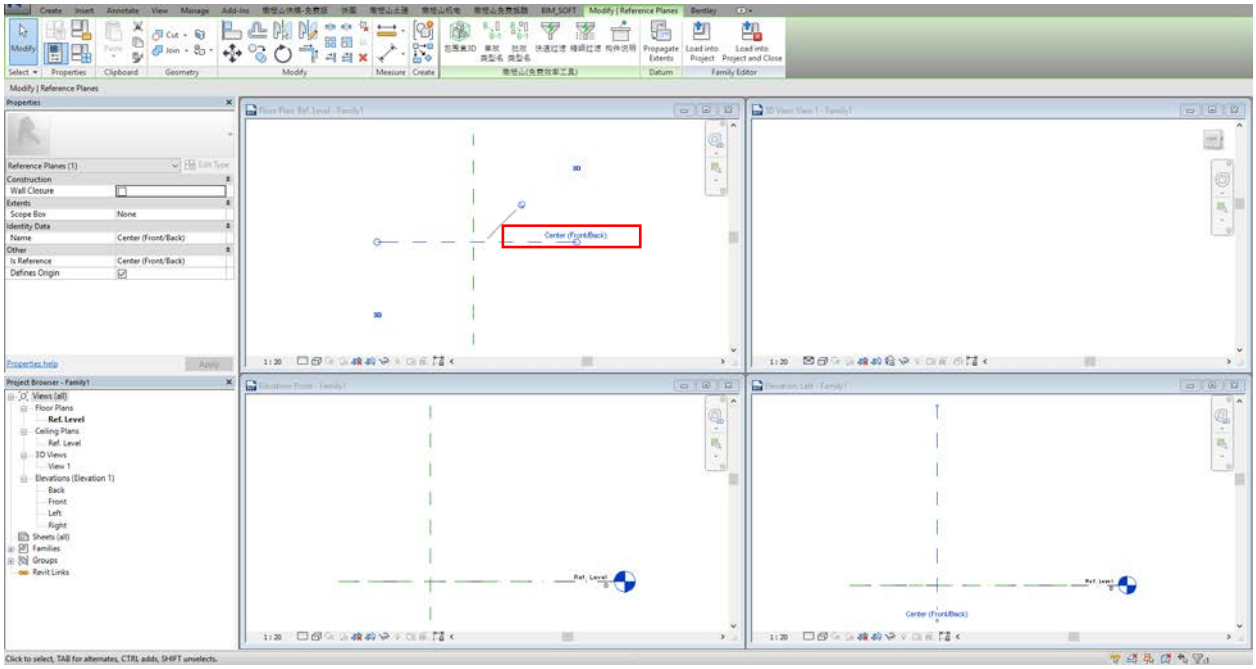
Choose Furniture as our starting point.



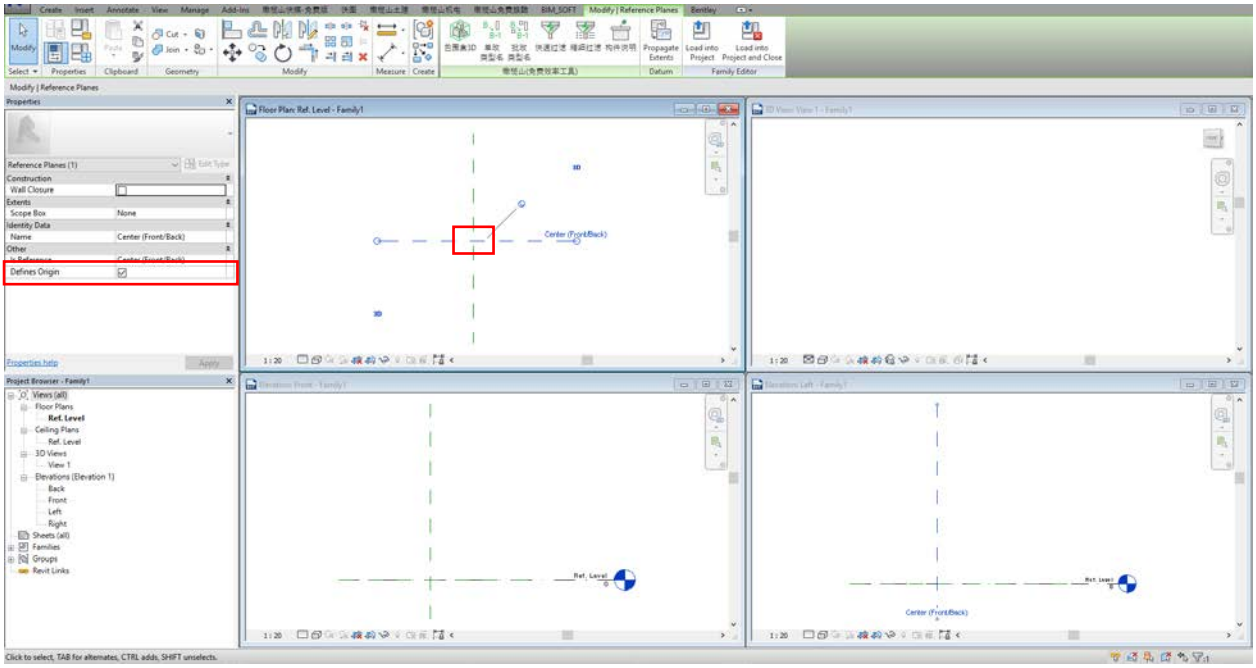


(W+T on your keyboard, tiling our windows helps us build 3D family)

Notice if we click on or hover over any default reference plane, their name will show up which give us a hint about where we are.

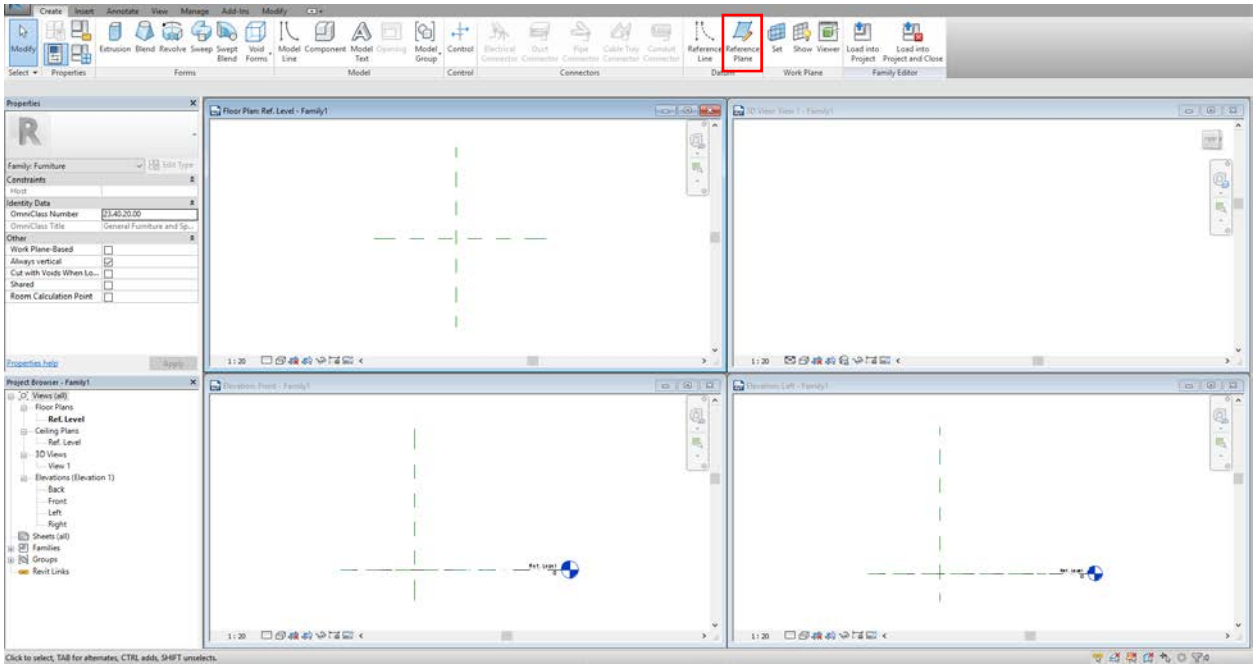


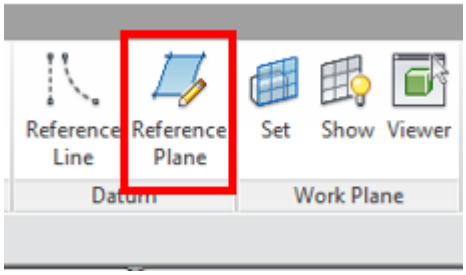
Two default reference planes are pinned which is a good thing because their intersection defines the insertion point of the family.



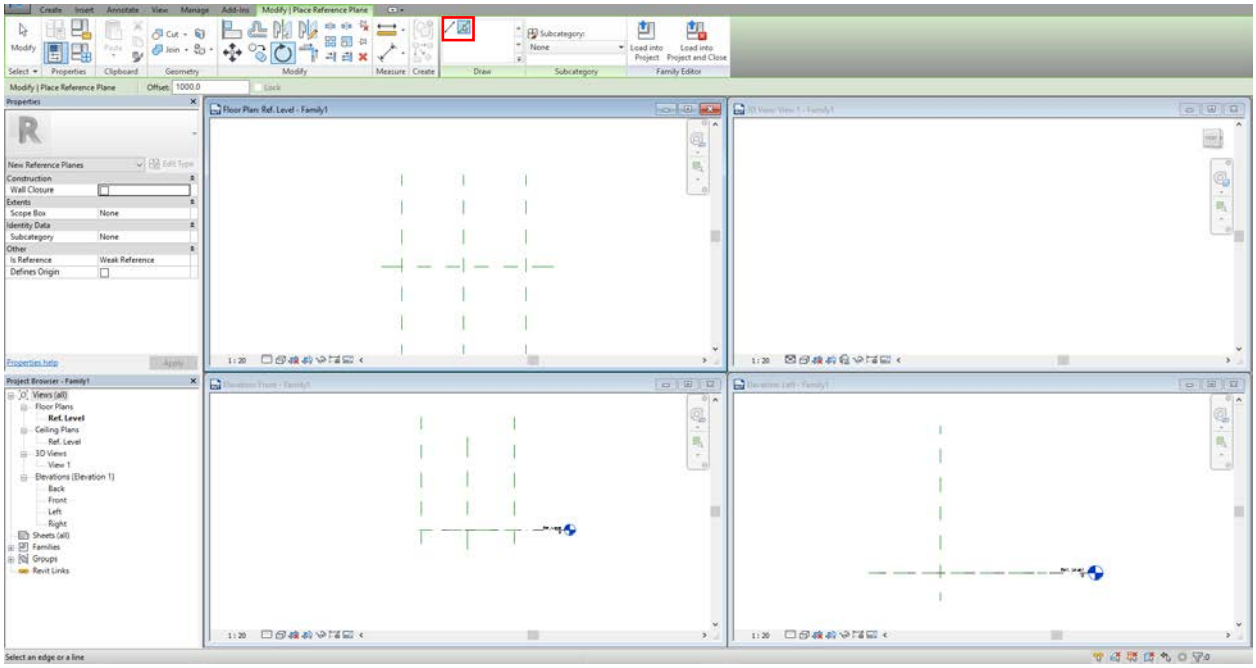
3.3 Adding reference planes

Go to Create tab, Reference Plane

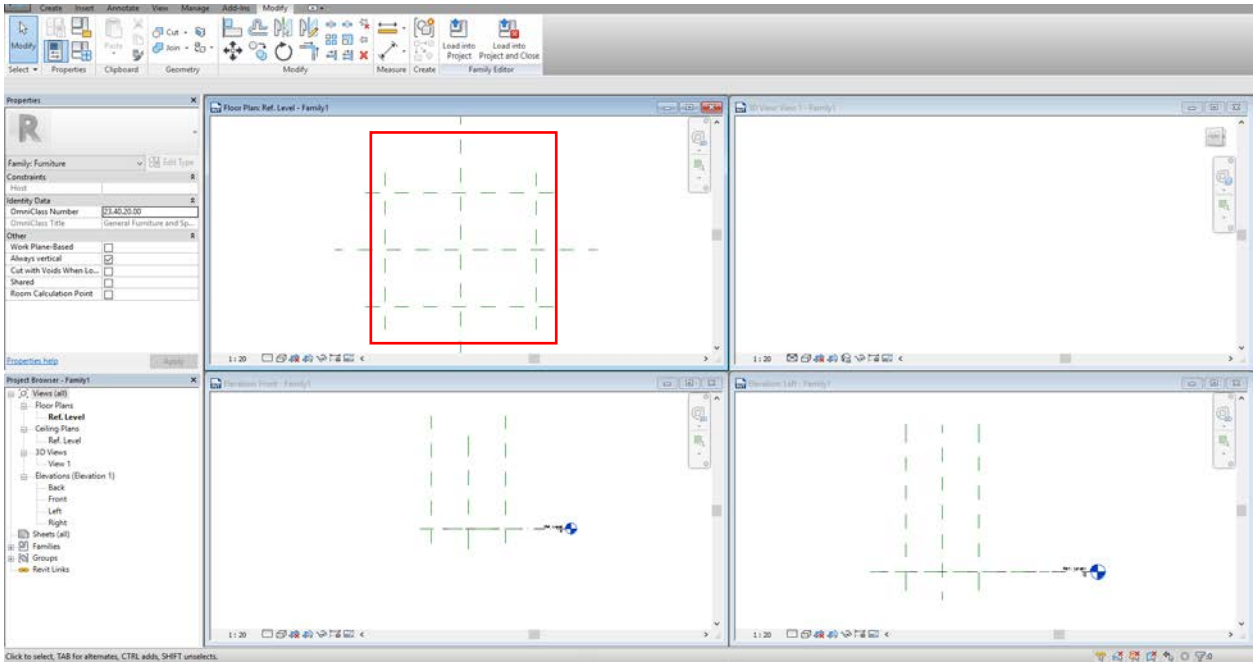




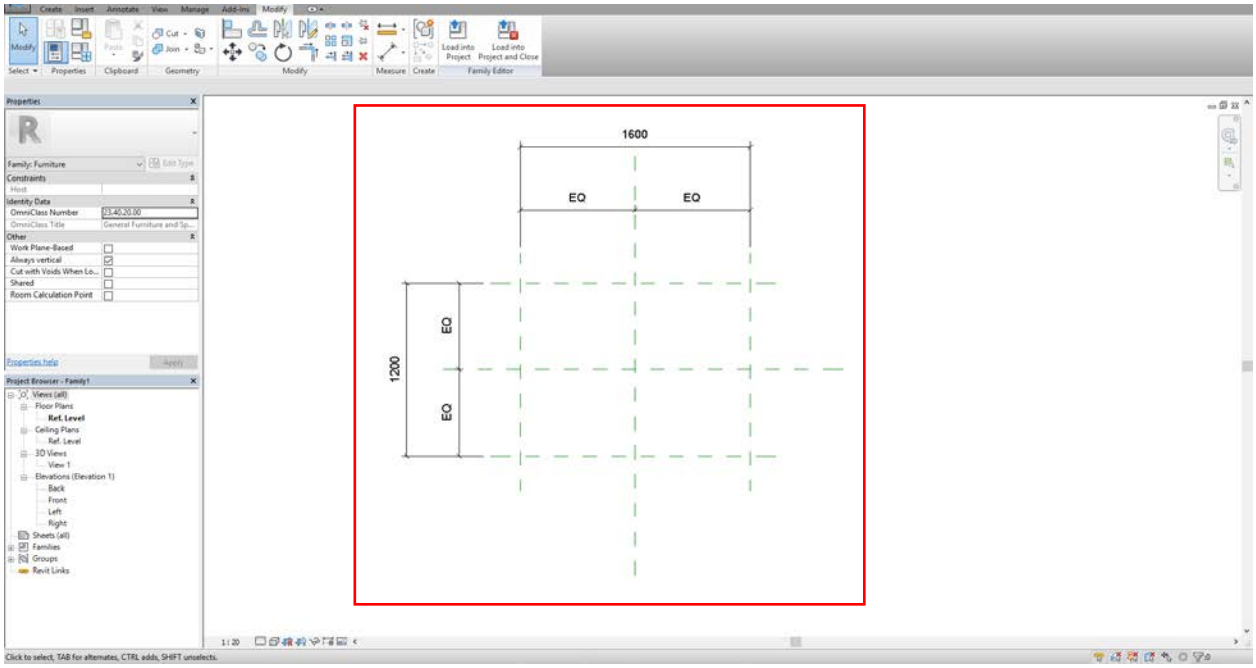
We can simply draw them or offset from existing planes.



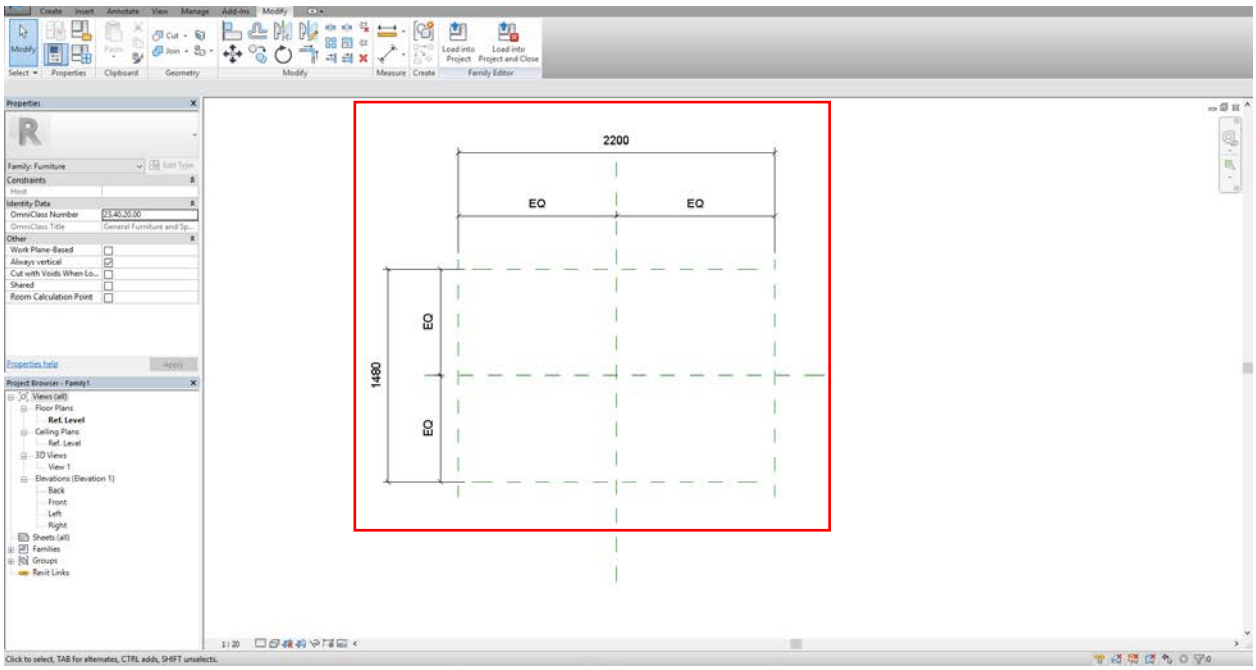
Creating visual hierarchy by making non-refence plane shorter will be beneficial in the long run especially when there’re too many of planes.



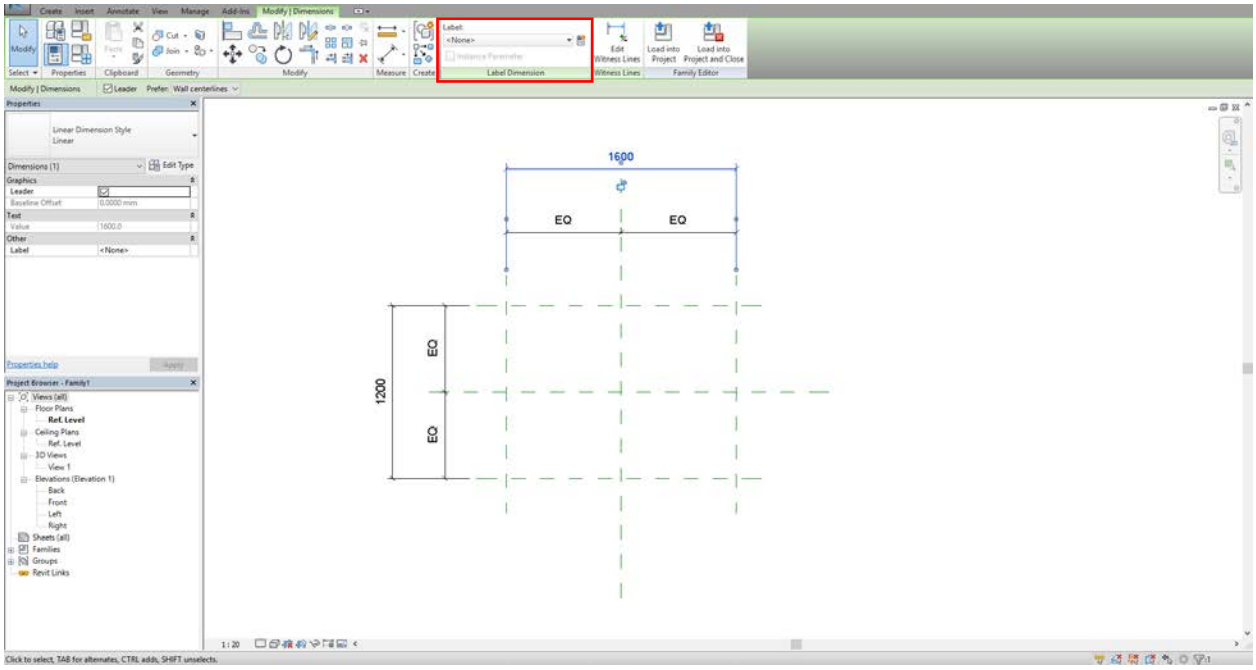
Add some dimensions.



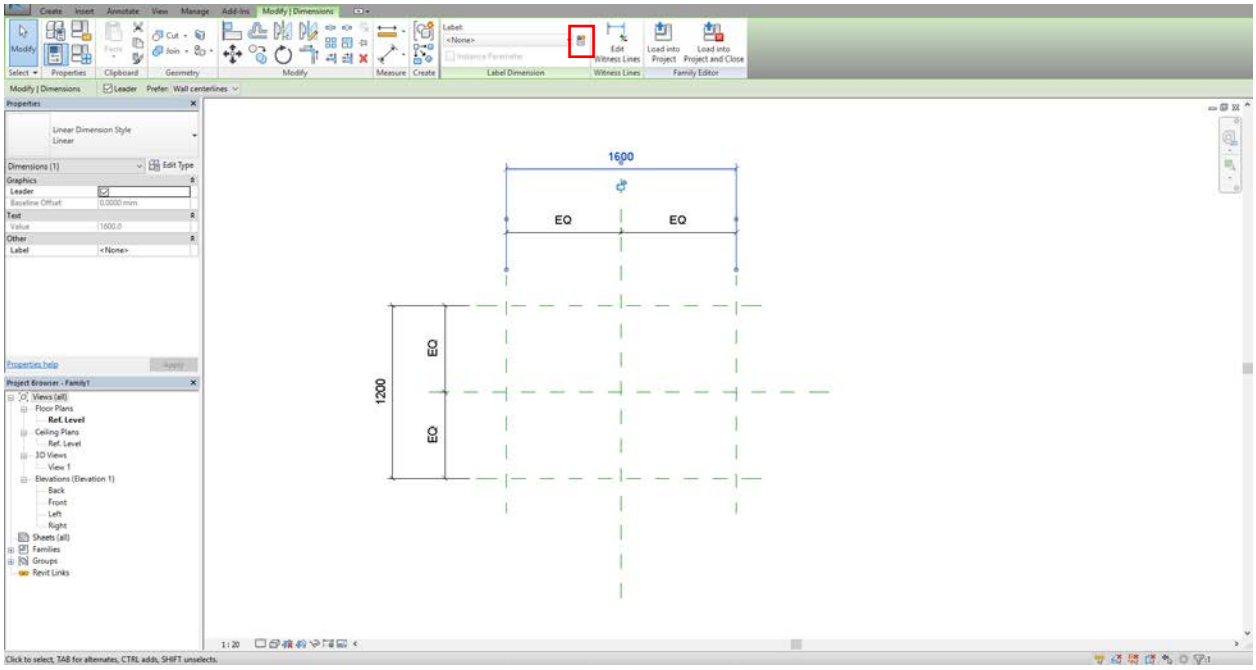
Be aware of the difference between EQ and overall dimension. Now, we haven't assign any parameters to overall dimension so it's just a dimension. But EQ is considered constraint to our model, once you stretch you model, magnitude will be changed while EQ remains unchanged.



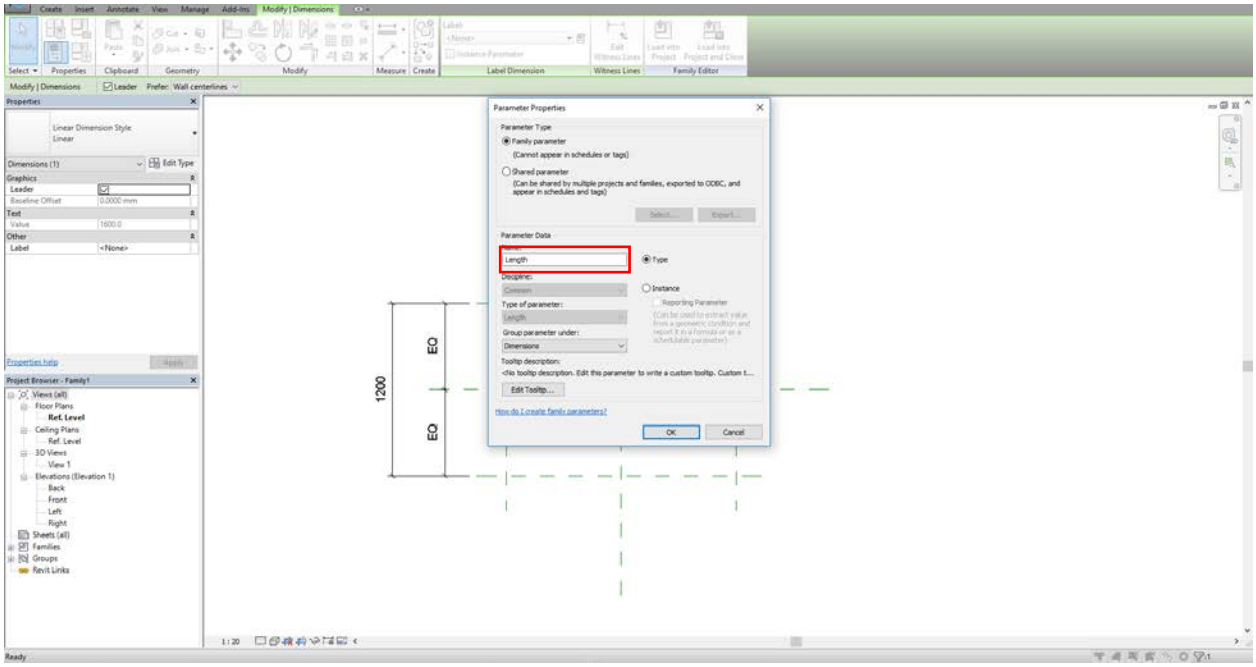
Smarten our overall dimensions with parameter.
Simply click on one of overall dimension.

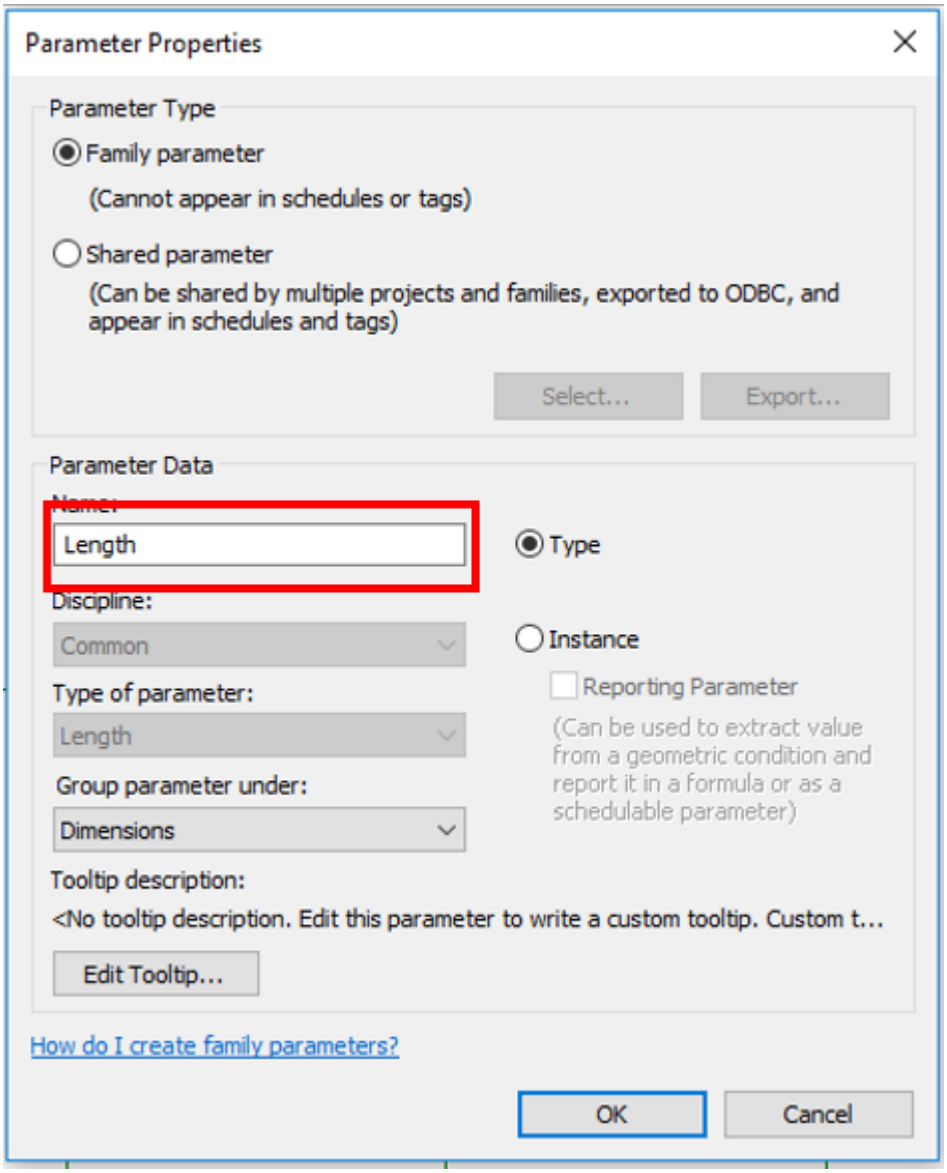


Click on the button on the right.

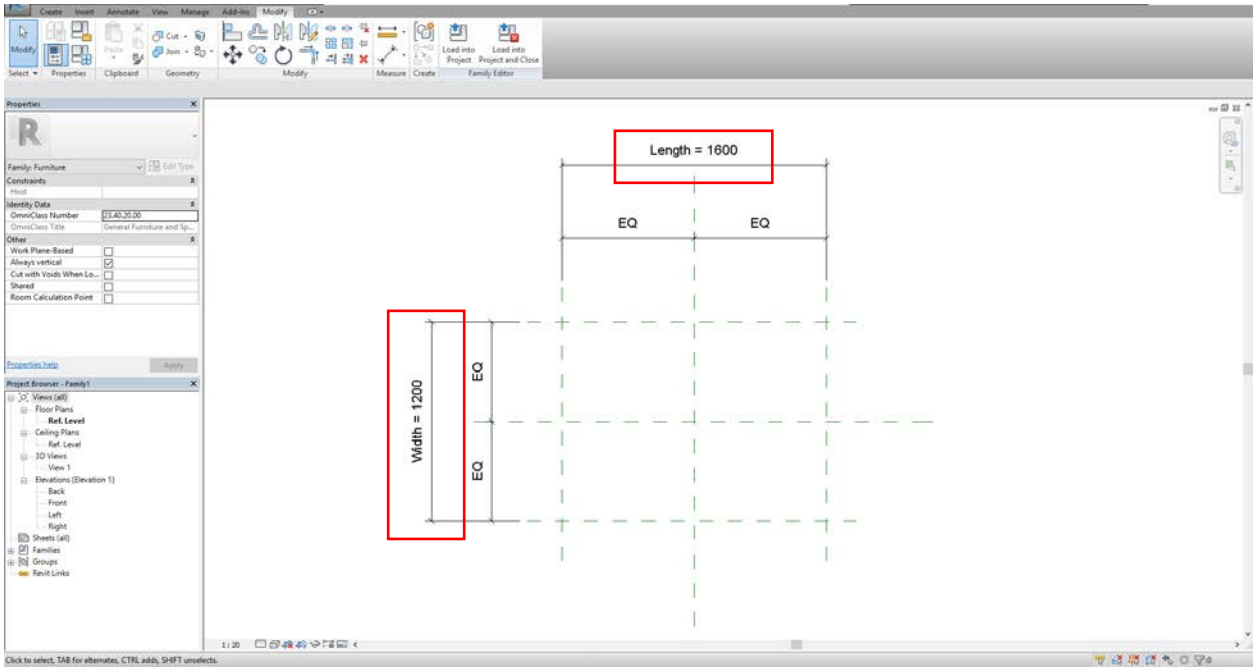


Create a parameter called Length for the dimension.

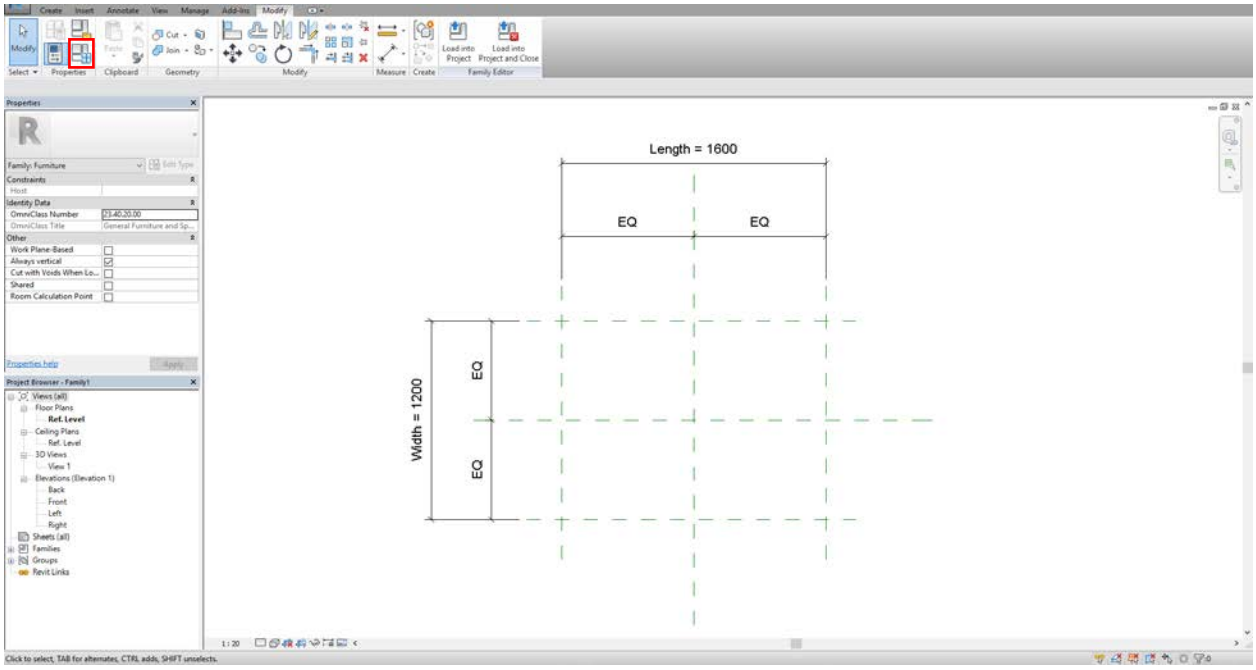

Parameter Properties
Parameter Type
Family parameter
(Cannot appear in schedules or tags)
Shared parameter
(Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)
Parameter Data
Name:
Length
Type
Instance
Discipline:
Common
Type of parameter:
Length
Reporting Parameter
Group parameter under:
Dimensions
Tooltip description:
<No tooltip description. Edit this parameter to write a custom tooltip. Custom t...
Edit Tooltip...
How do I create family parameters?
OK
Cancel
1200
EQ
EQ



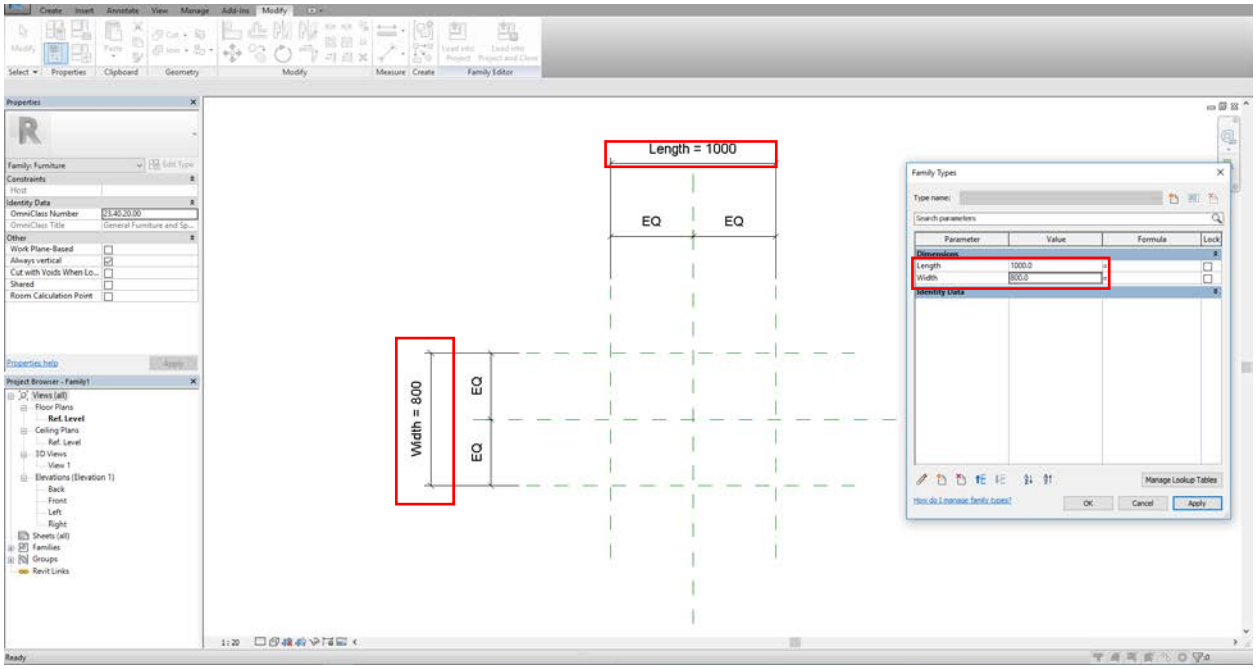
Likewise, create Width.



Test parameters to see if they work properly.

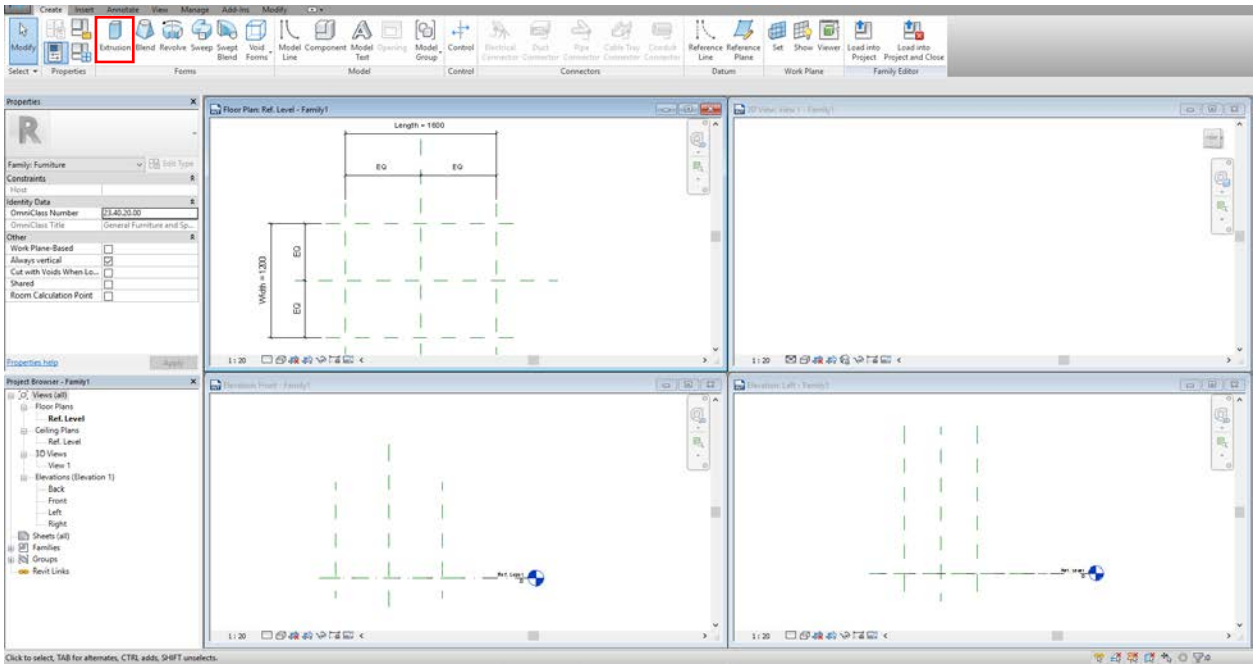


Notice parameters will drive our dimensions if we change parameters' values.

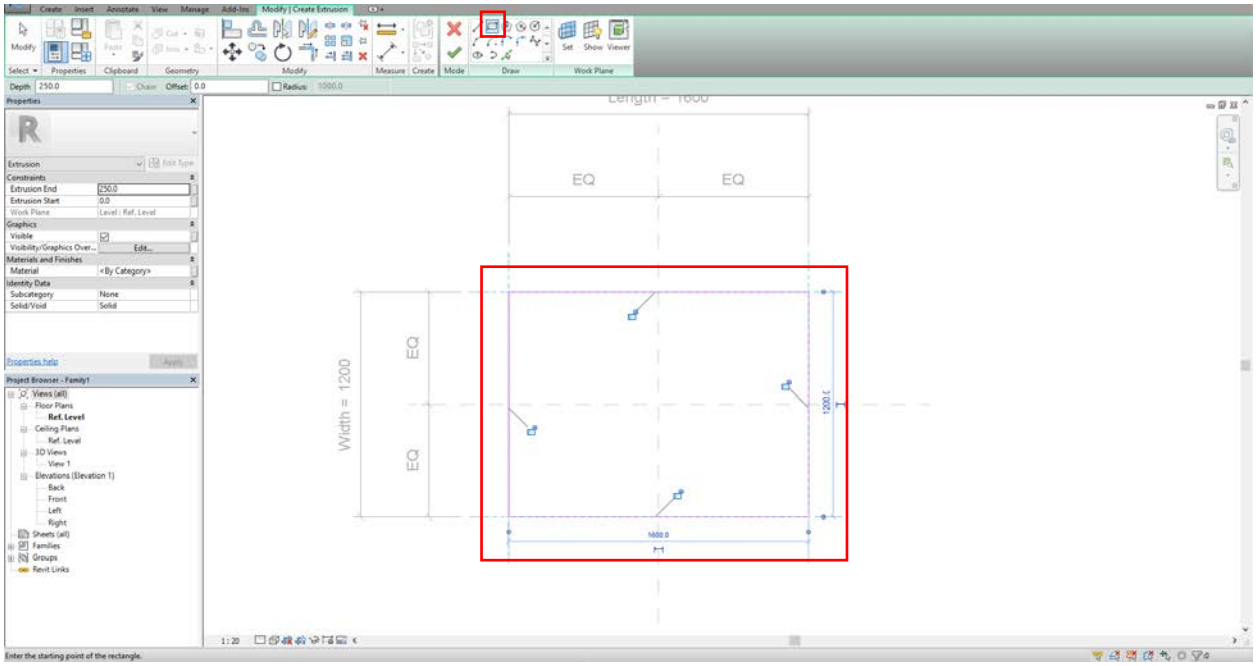


3.4 Adding geometry

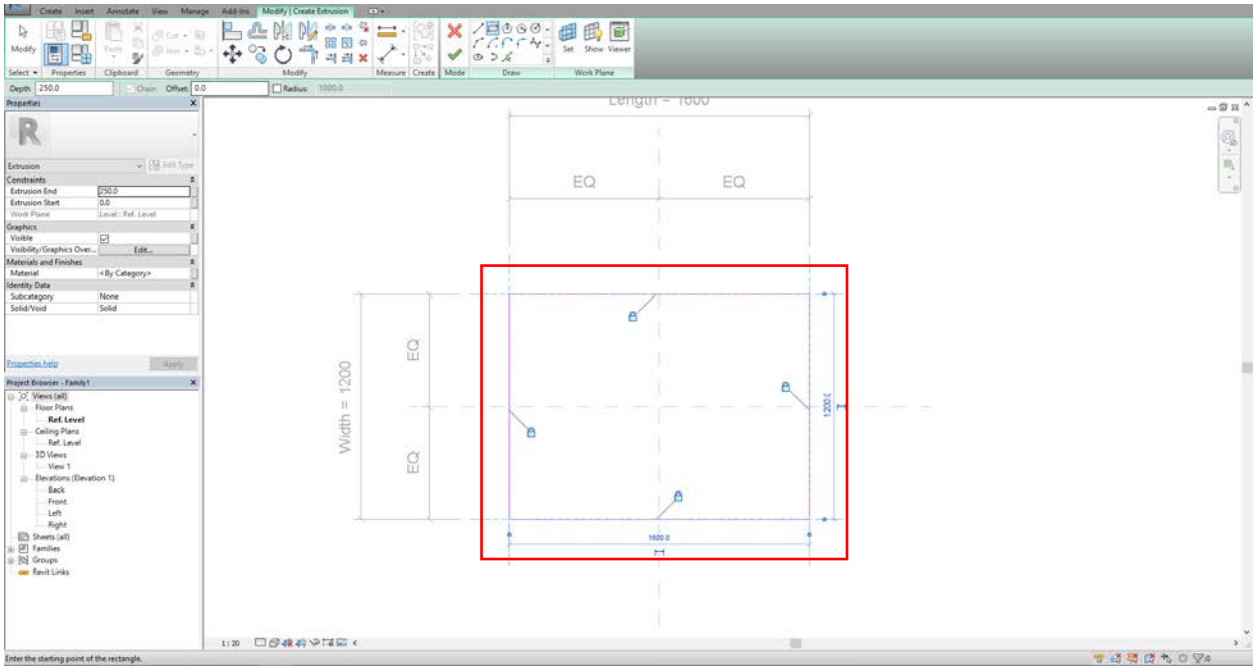
Extrusion is the first one in our tool set. Click on it.



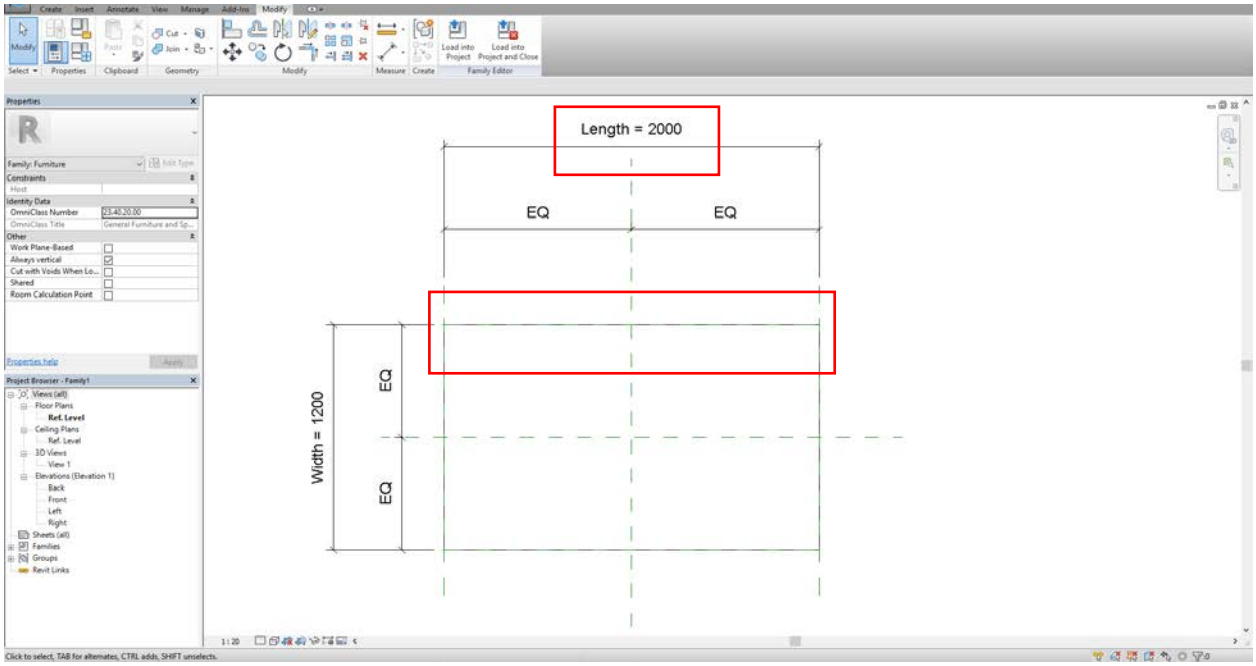
Sketch a rectangle.



Remember to lock each edge to the reference plane.

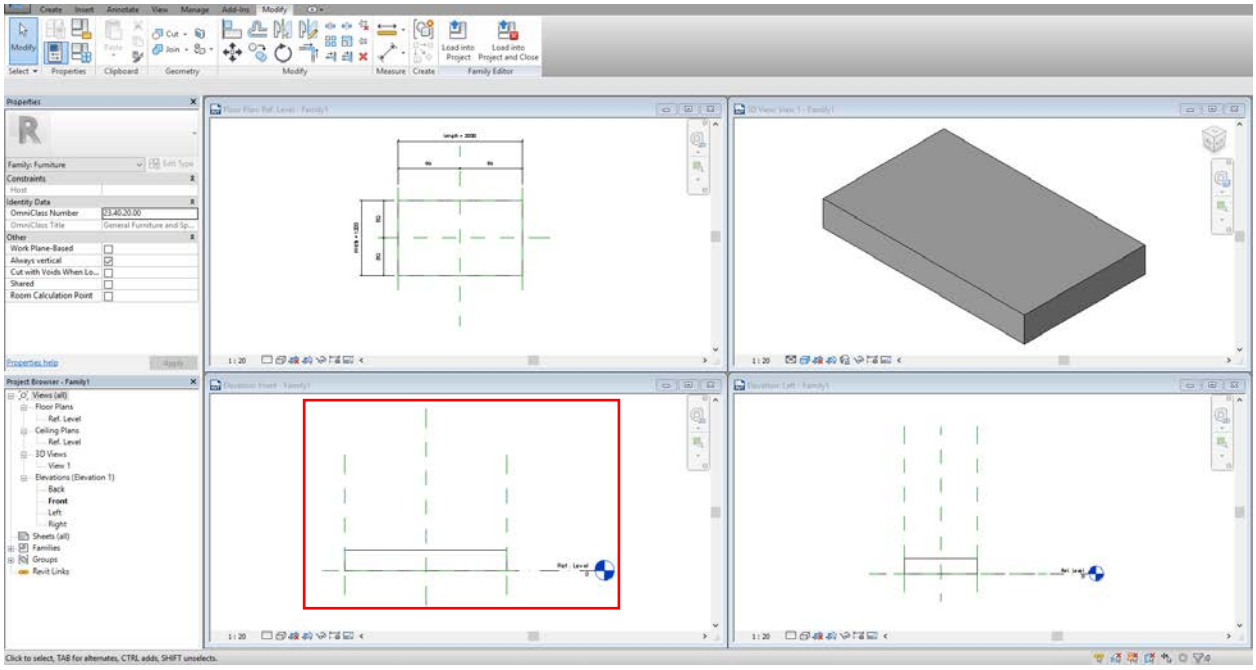


Exit Extrusion mode, we have our geometry. Notice our geometry will adjust itself automatically when we change dimensions. This thanks to that we locked edges to reference planes.

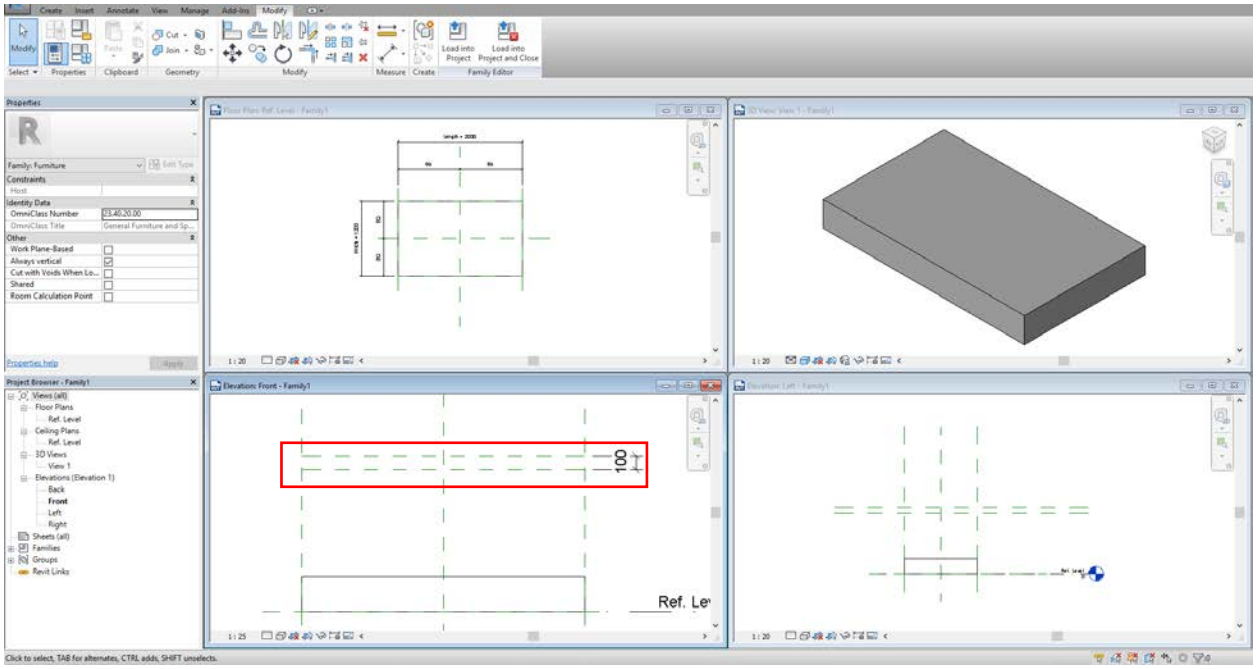


3.5 Using instance parameters

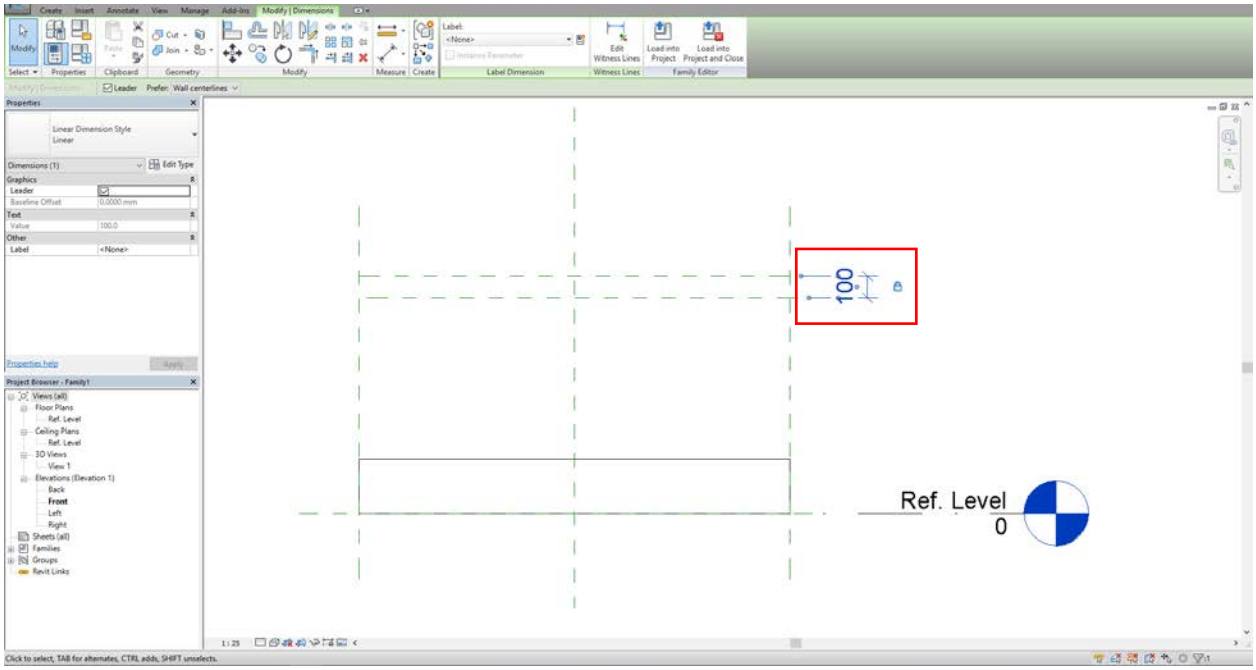
We've created a geometry which is going to serve as our tabletop. But our tabletop is still sitting on the floor. In this section, we'll keep build our family and adjust parts to right height.



Mark appropriate height with reference plane in front view.

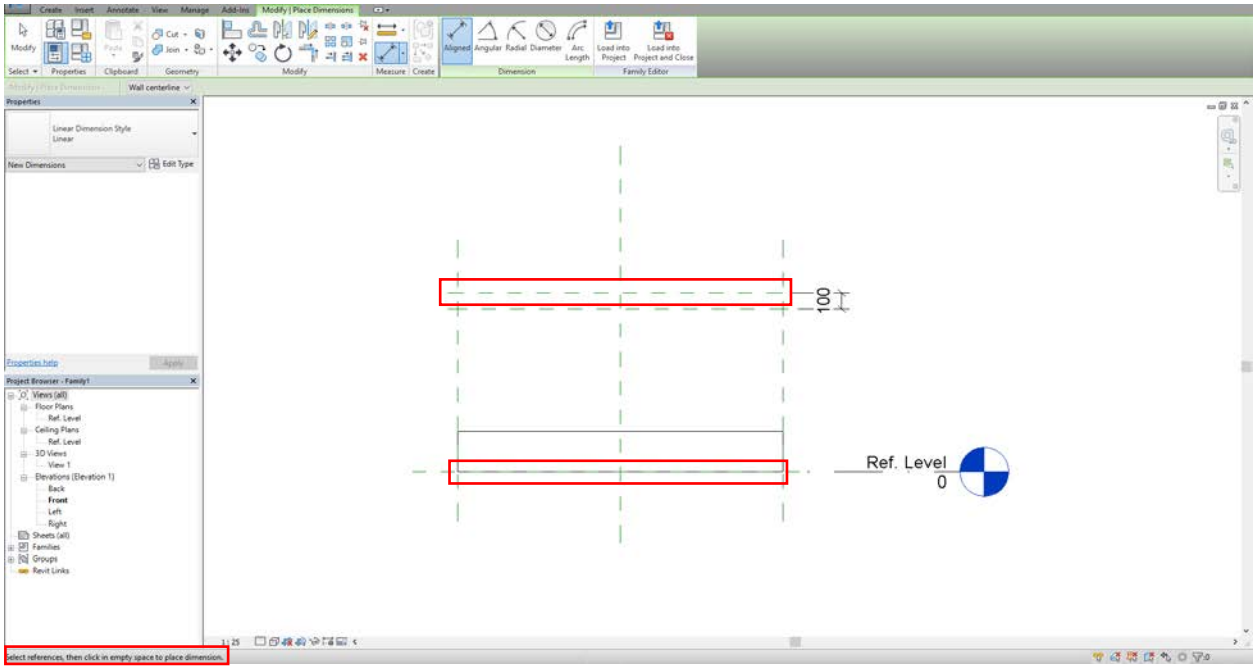


Lock the dimension to make sure end users of the family cannot change it.

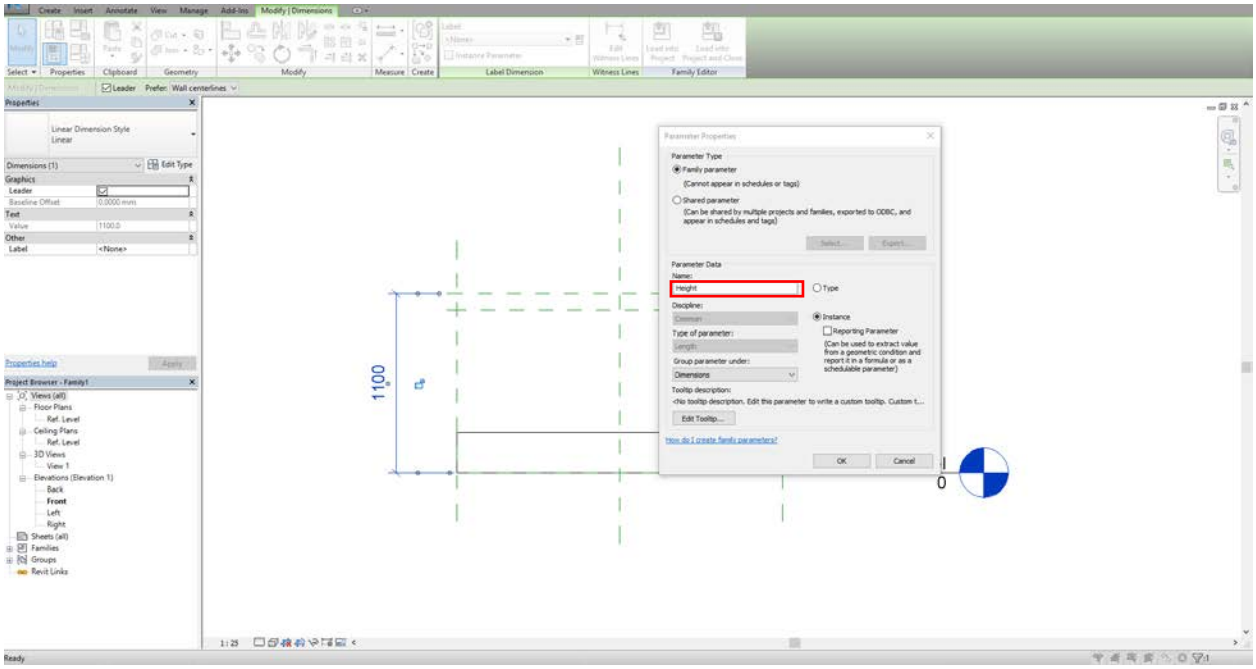


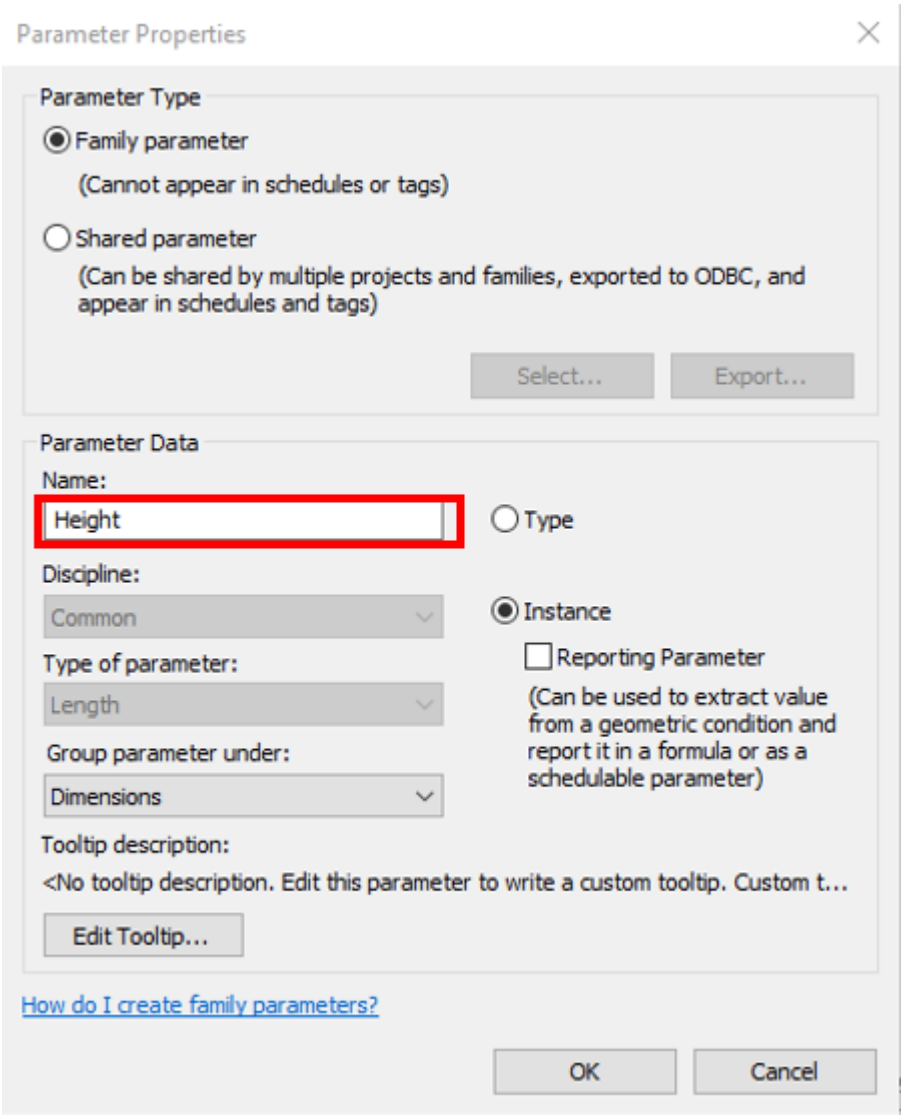
Creating a new dimension from Ref. Level to the top. Make sure it's from Ref. Level, not reference plane or the bottom of geometry. We want correct height calculated from floor level to the top in project.

(Click on Tab we you try to select Ref. Level since it's hard to select when there're multiple objects overlapping with each other.)

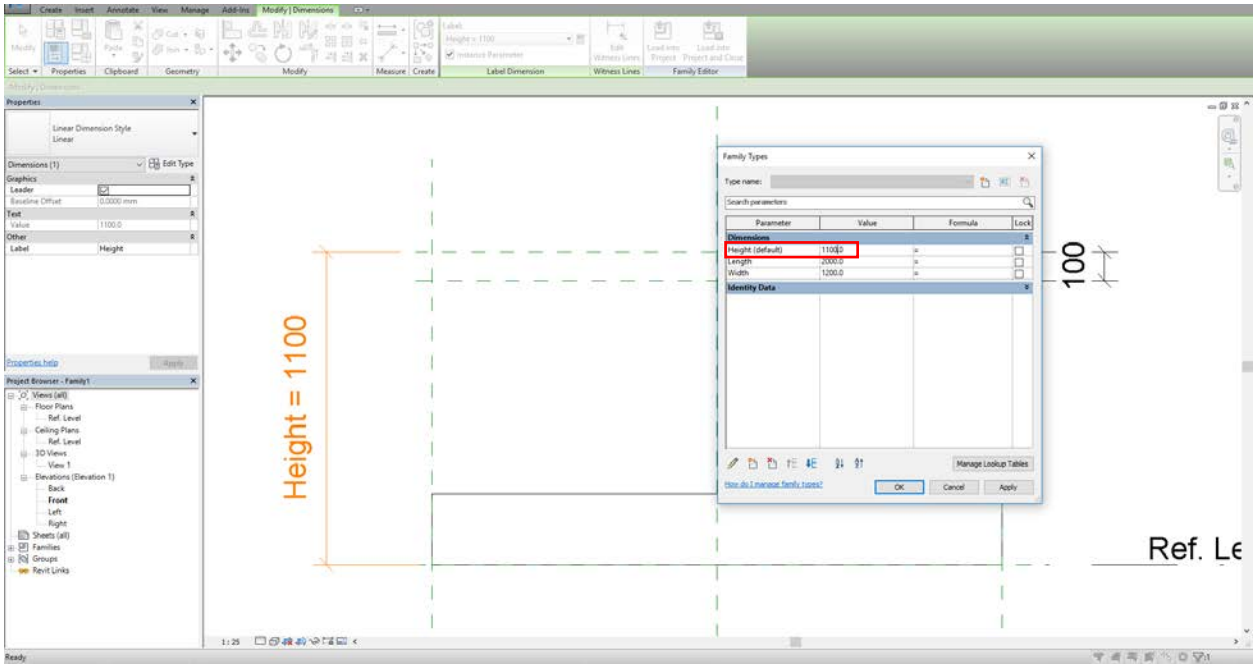


Creating a new parameter in order to smarten the height. Particularly we want our Height to be an Instance Parameter. Basically, it means to all instances will share same width and length while have customized height if applicable.



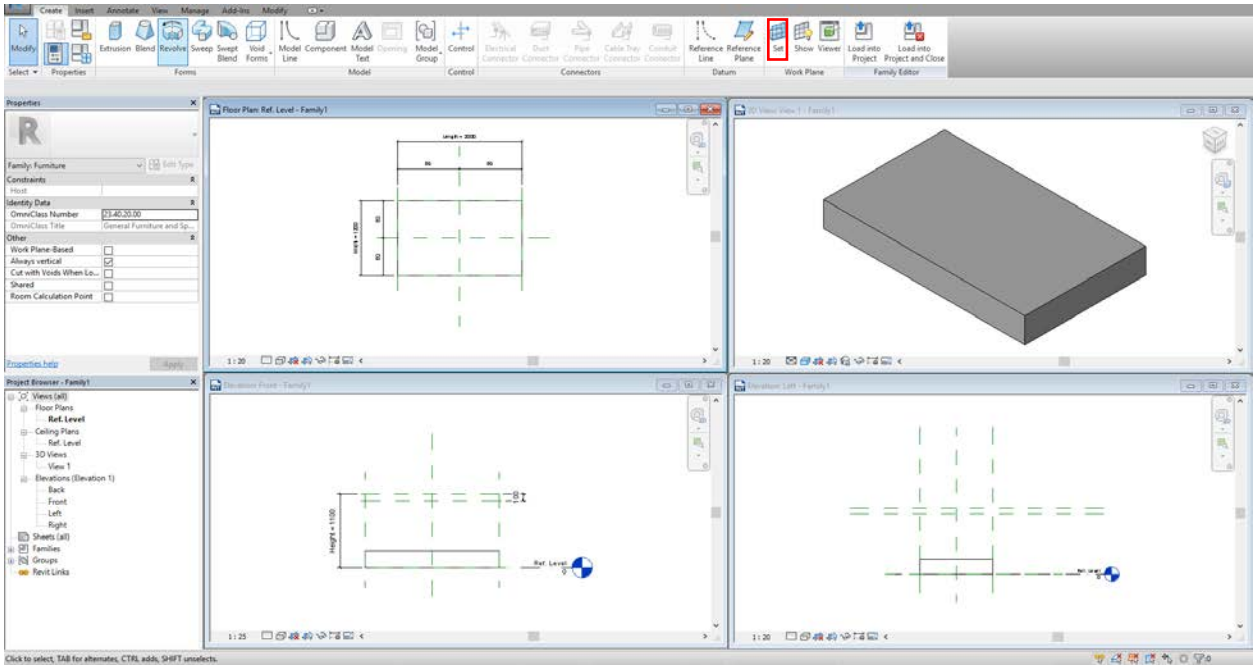


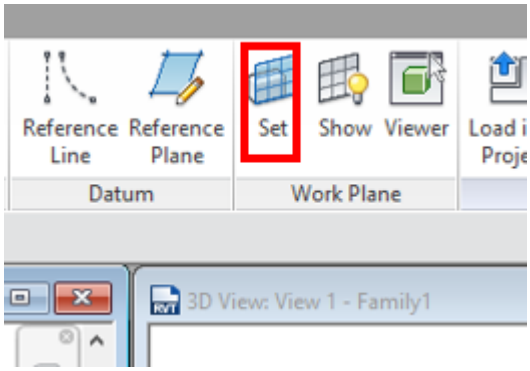
Test Height to see if it works.

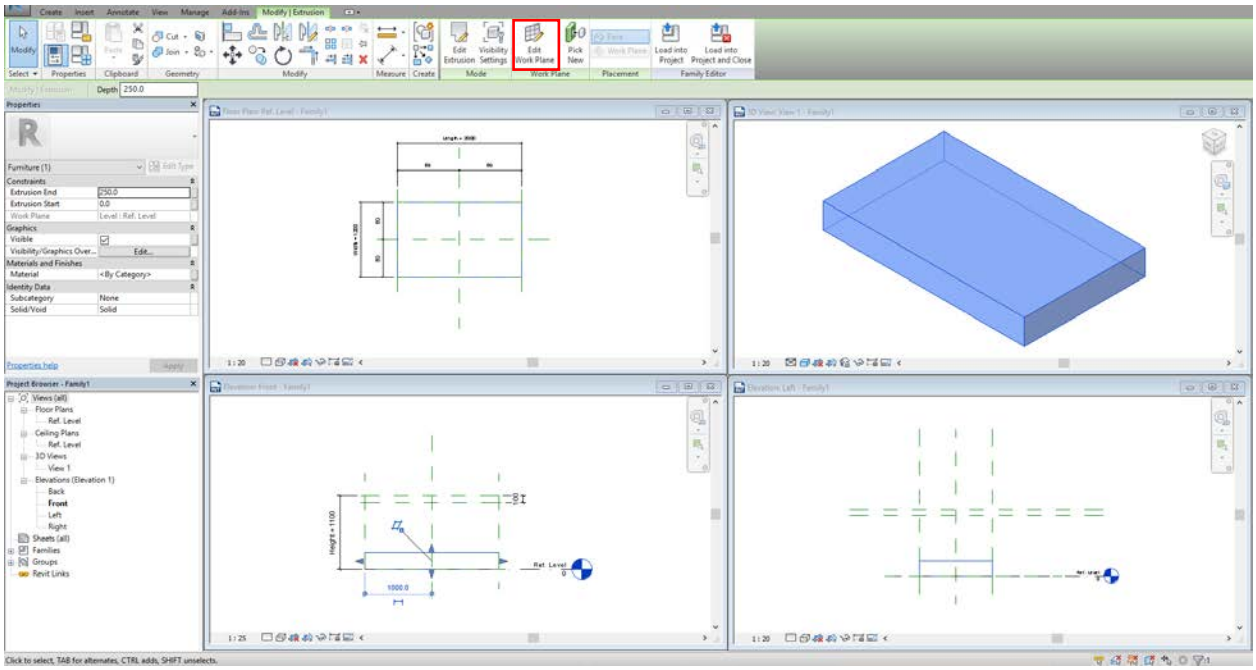


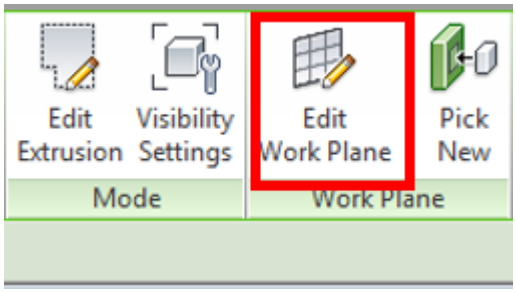
3.6 Understanding work planes

How come our geometry are always created on the ground (default horizontal reference plane)? Go to Create tab, click on Set or with our geometry selected, click on Edit Work Plane.

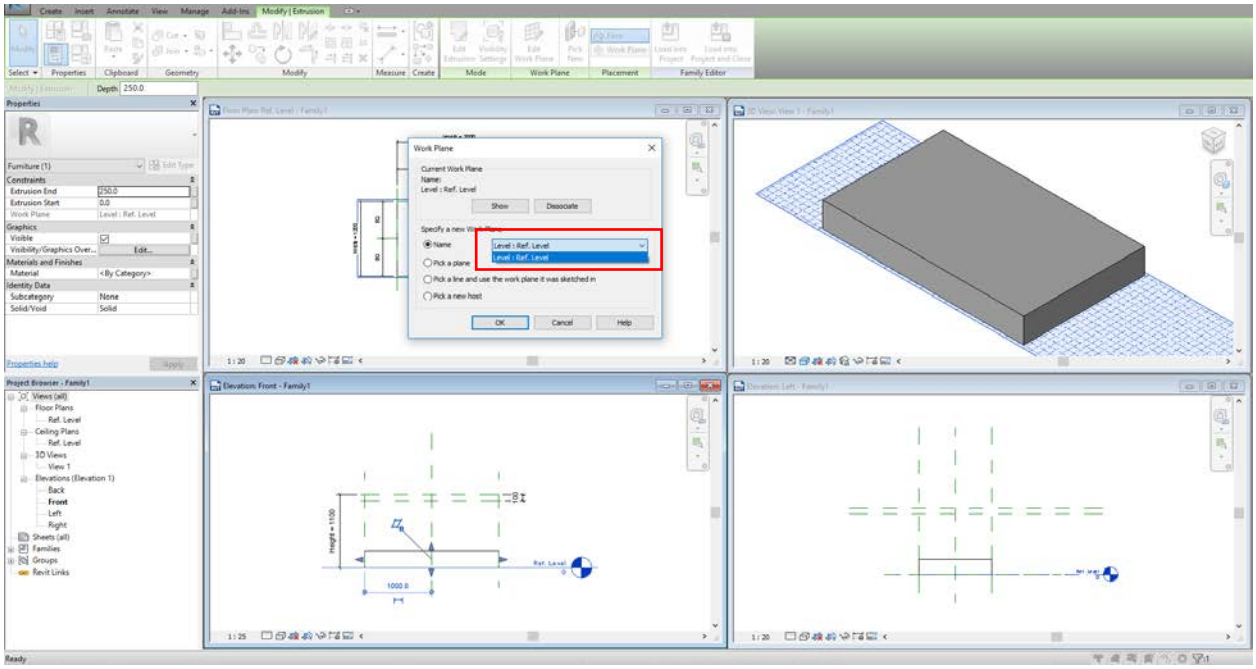


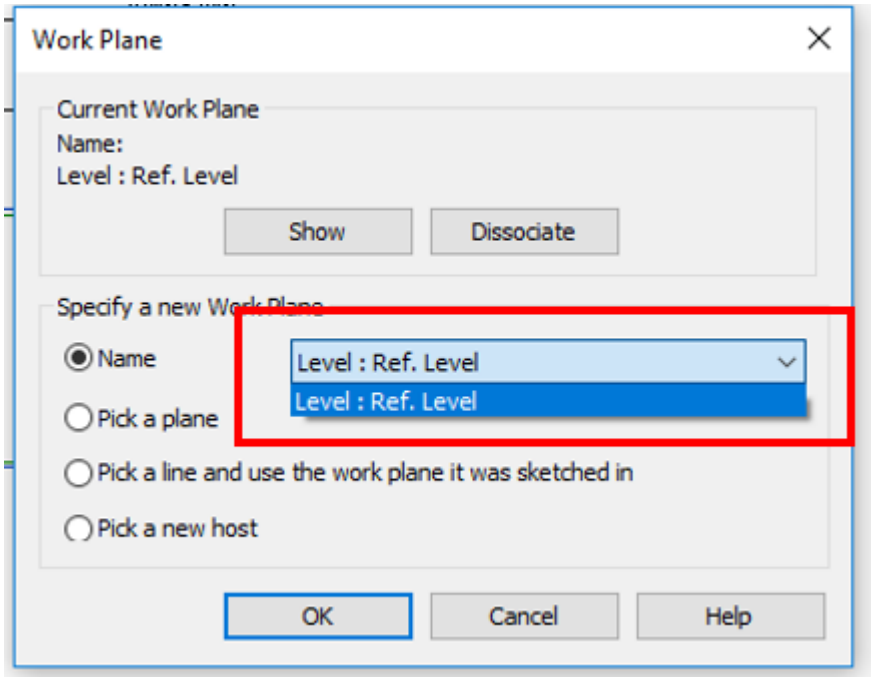




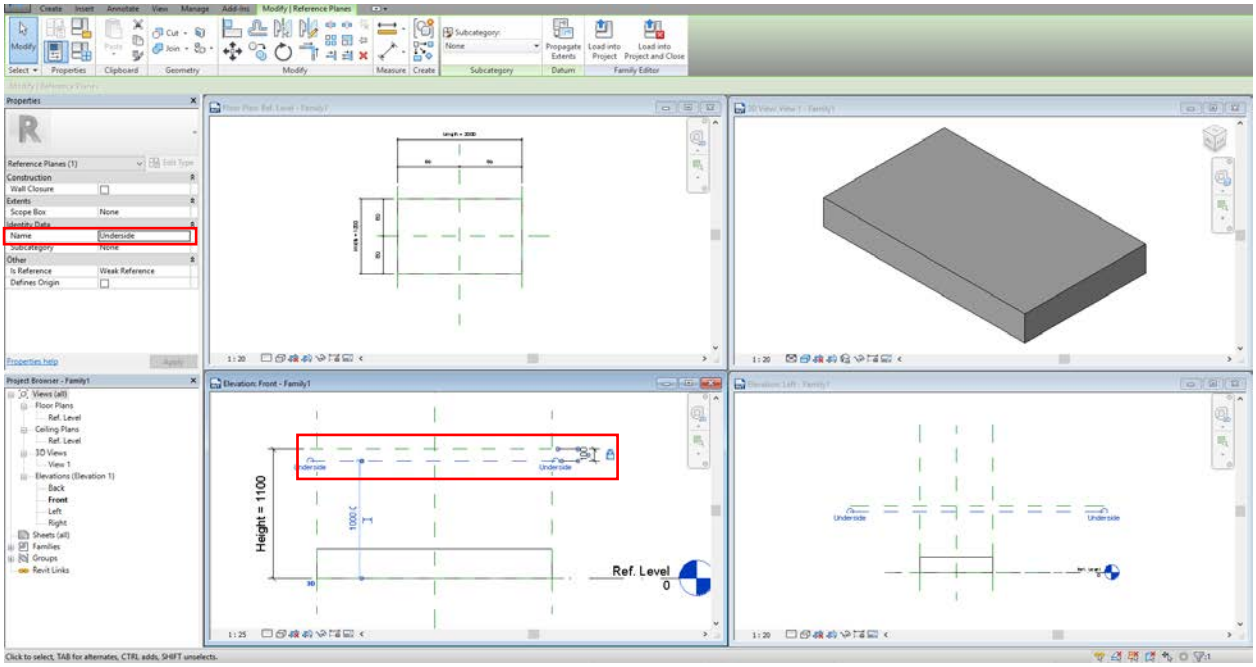


There’s only one choice under work plane drop-down list because currently only default plane has a name.

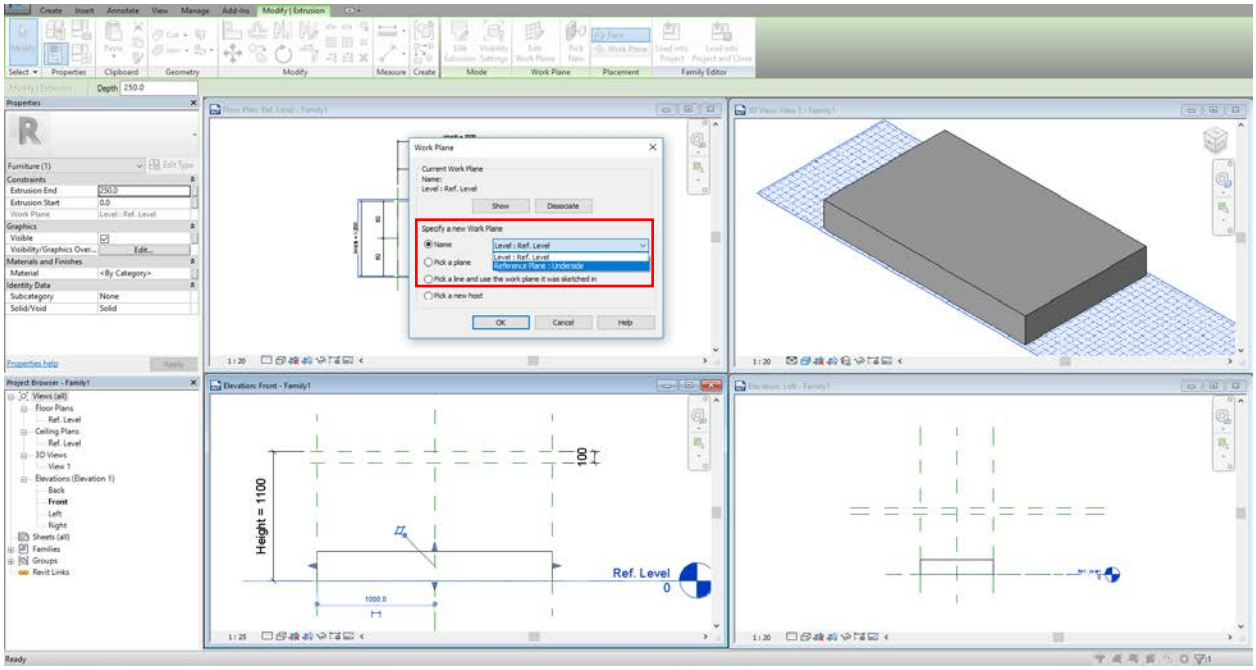


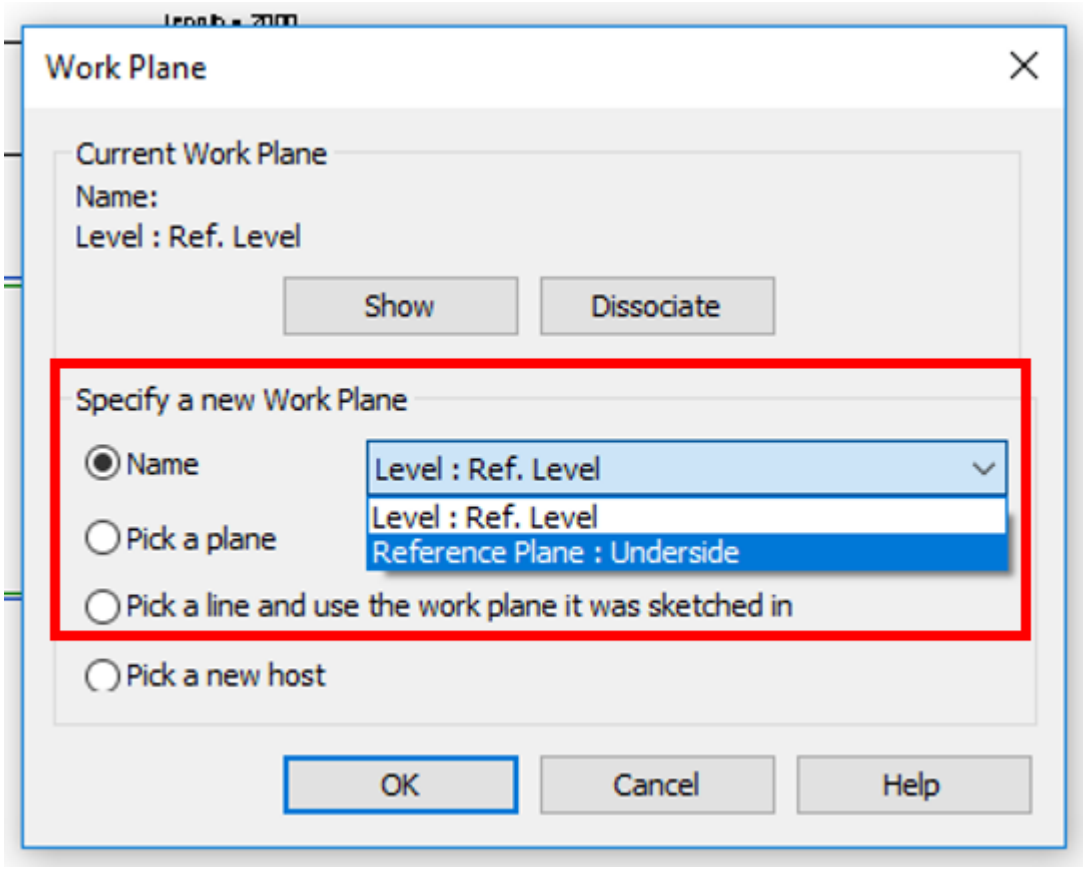


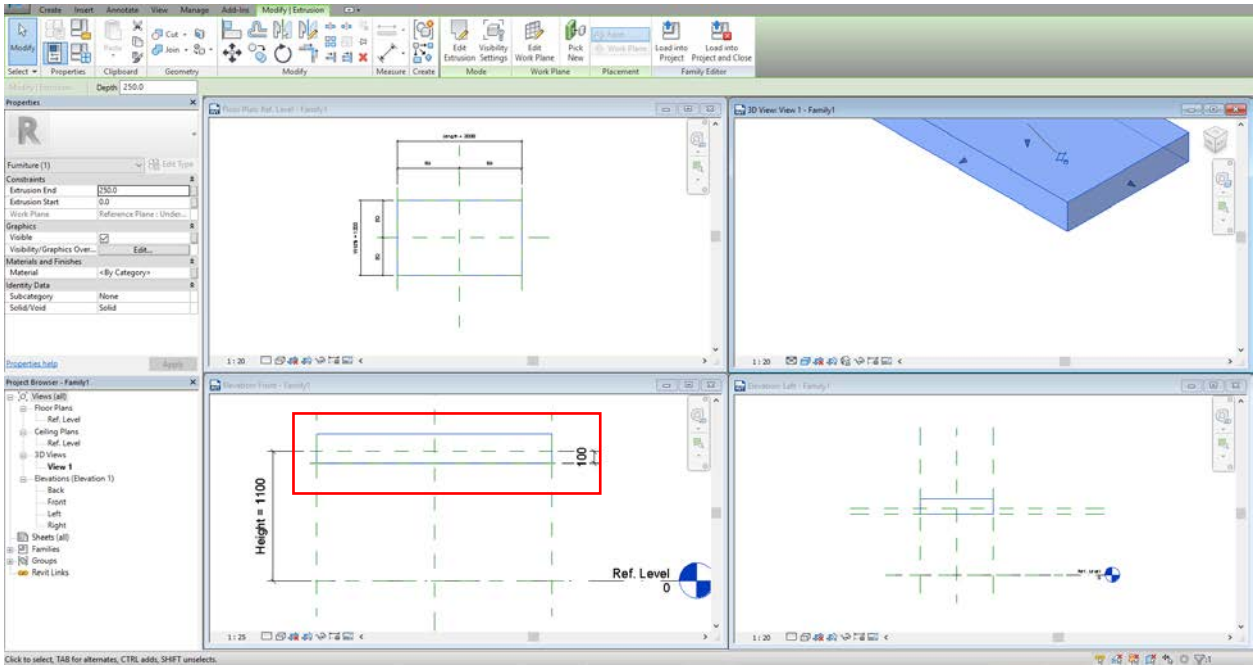
Name the plane that you want it to serve as work plane.



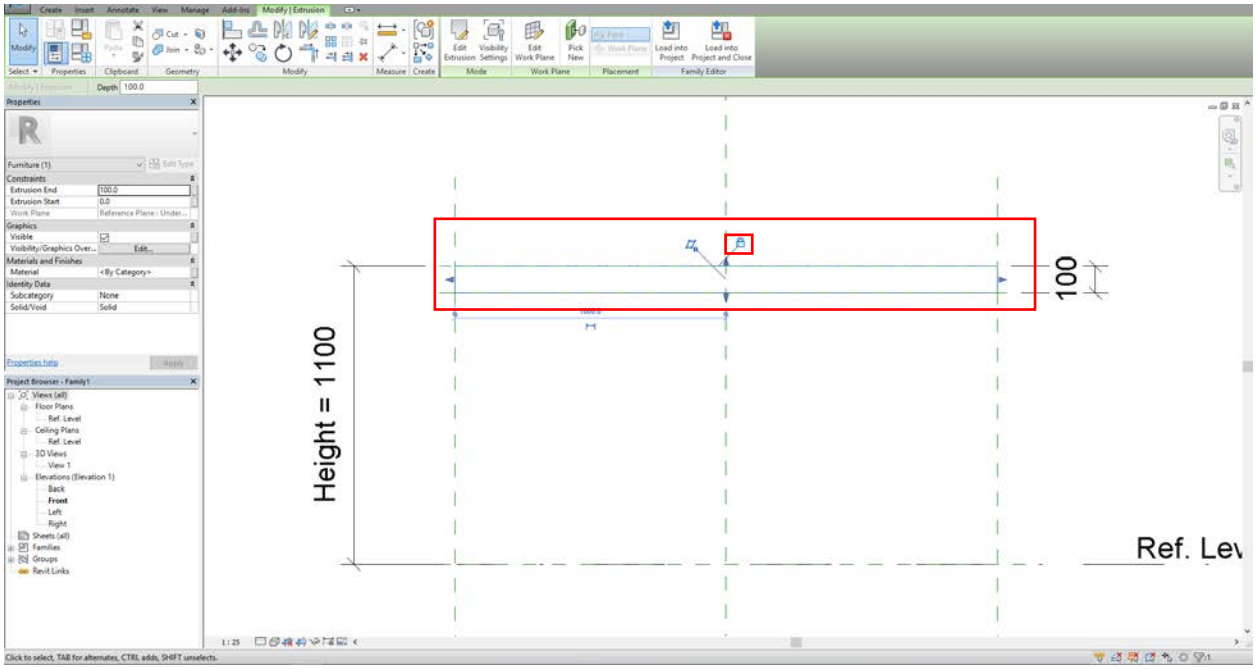
Then, go back to Edit Work Plane or Set. Choose new work plane.





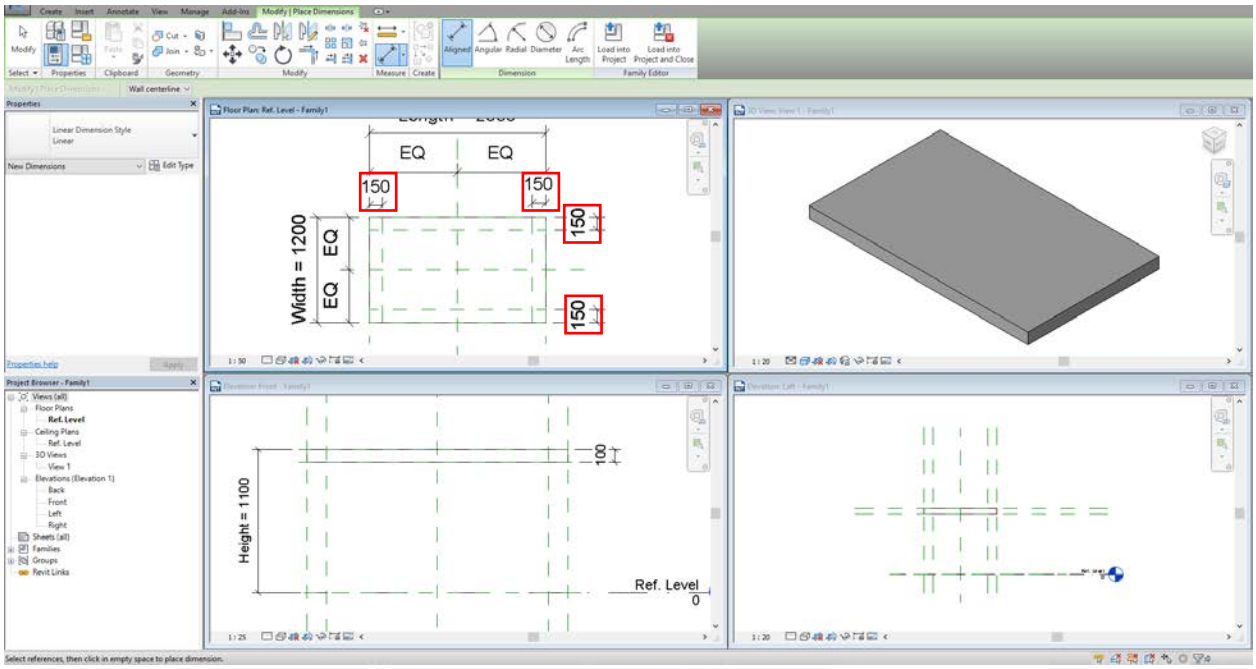


Finally, we want our tabletop to be clamped between two reference planes. Click on the geometry. Adjust it with blue arrows then lock the edge to reference plane.

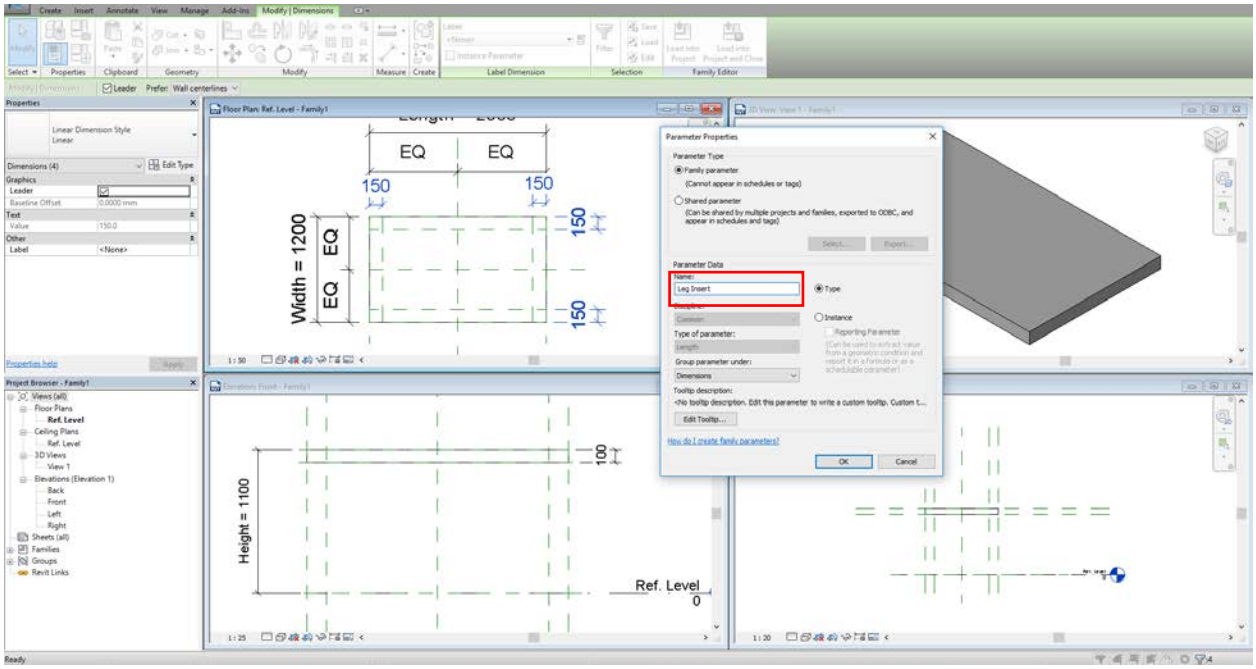


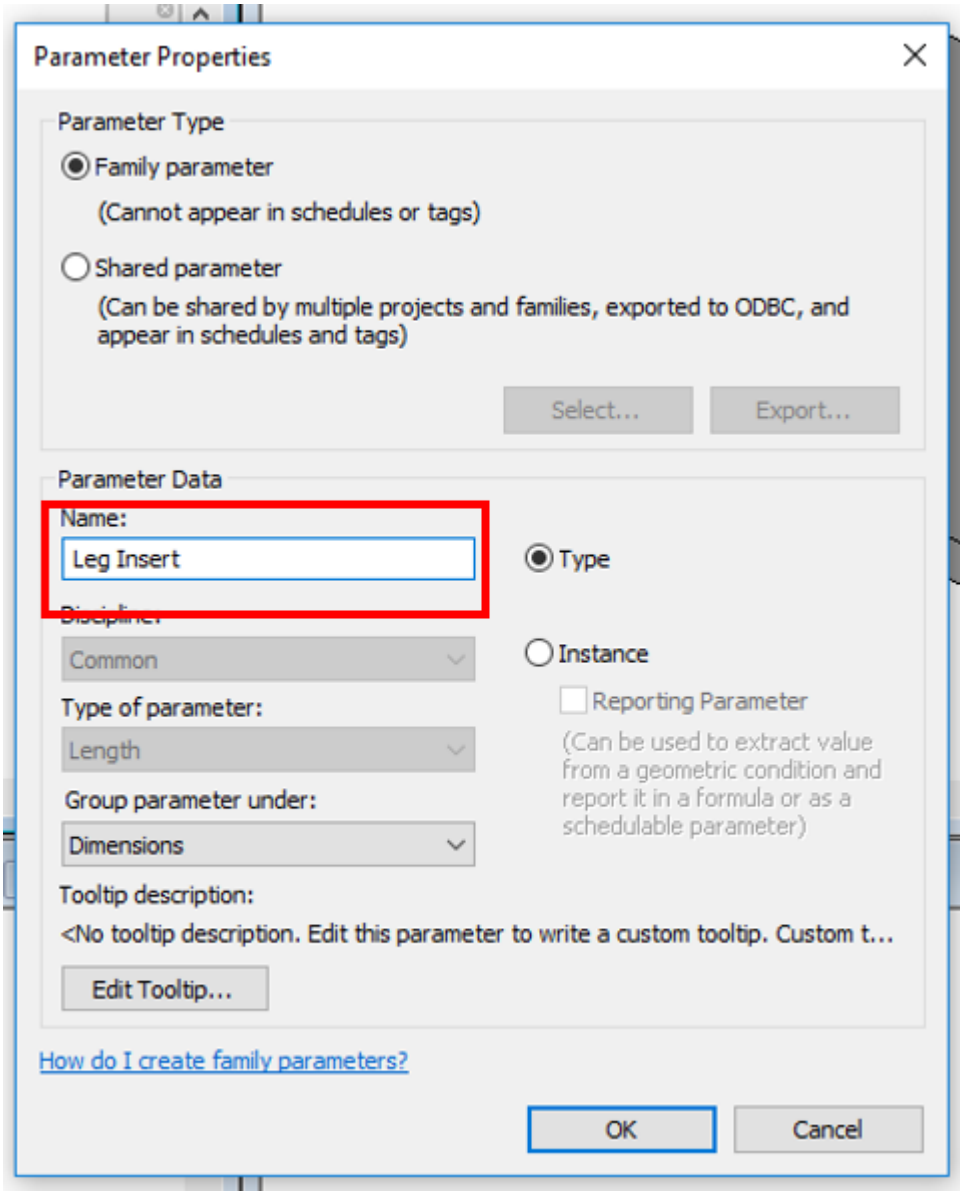
3.7 Adding a revolve

Create several reference planes for table legs. Add and lock dimensions properly but carefully when you select the boundaries for dimensioning, select the reference plane not the geometry.

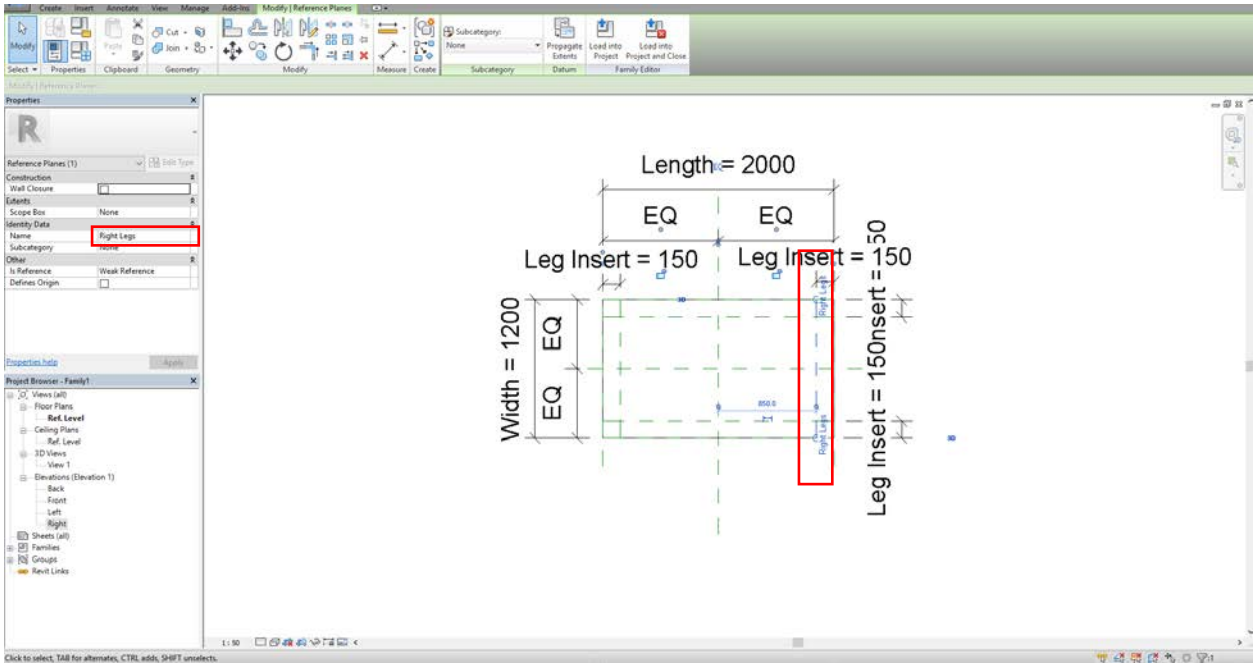


With all of them selected, create a parameter for them.

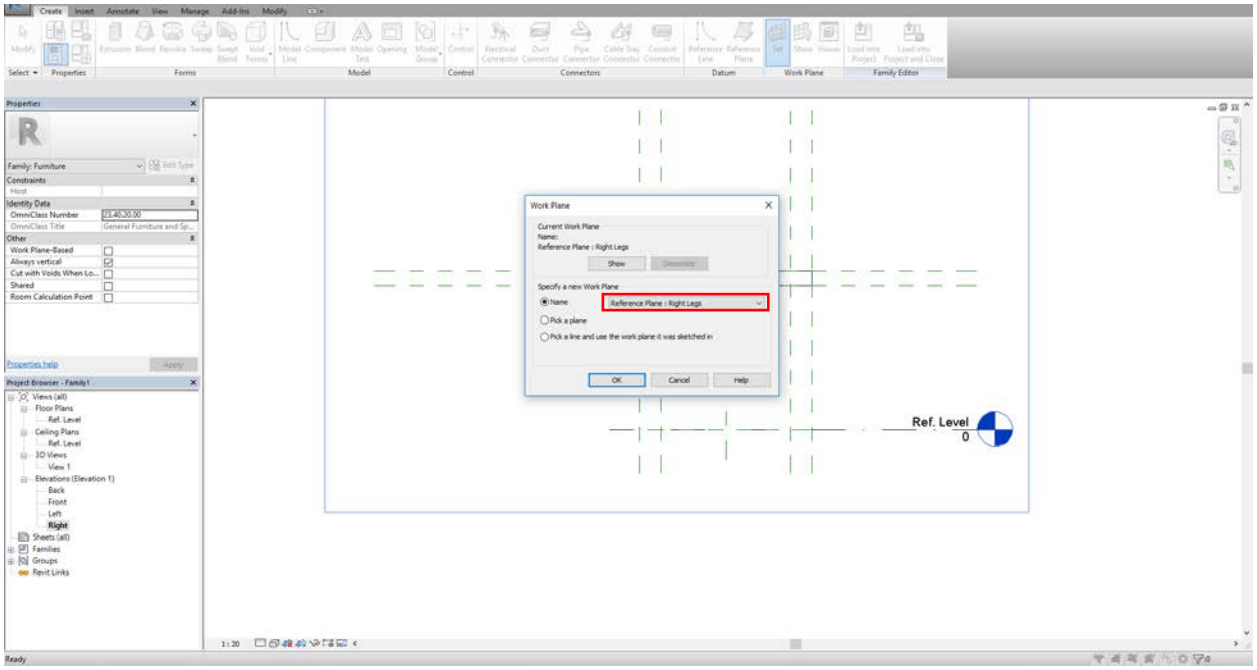

EQ
EQ
150
150
Width = 1200
EQ
EQ
150
150
Parameter Properties
Parameter Type
Family parameter
(Cannot appear in schedules or tags)
Shared parameter
(Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)
Parameter Data
Name:
Leg Insert
Type
Instance
Type of parameter:
Length
Group parameter under:
Dimensions
Tooltip description:
Edit Tooltip...
How do I create family parameters?
OK
Cancel
Height = 1100
100
Ref. Level
0

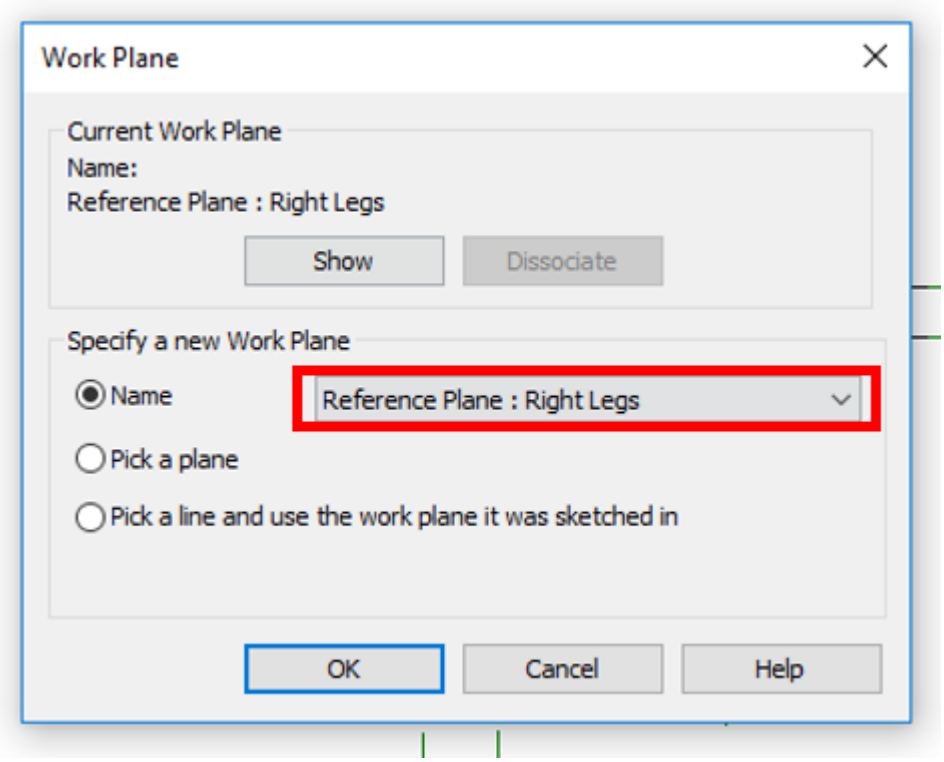


Name the reference plane we're going to use: Right Legs.

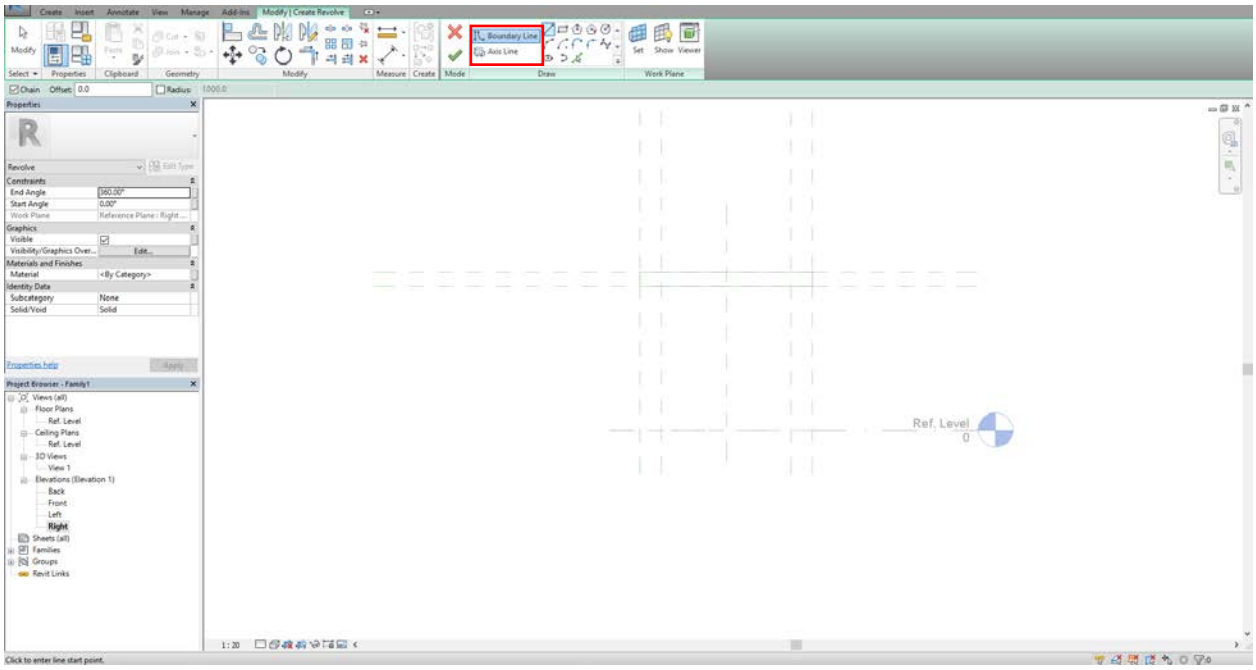


Set our working plane to Right Legs.

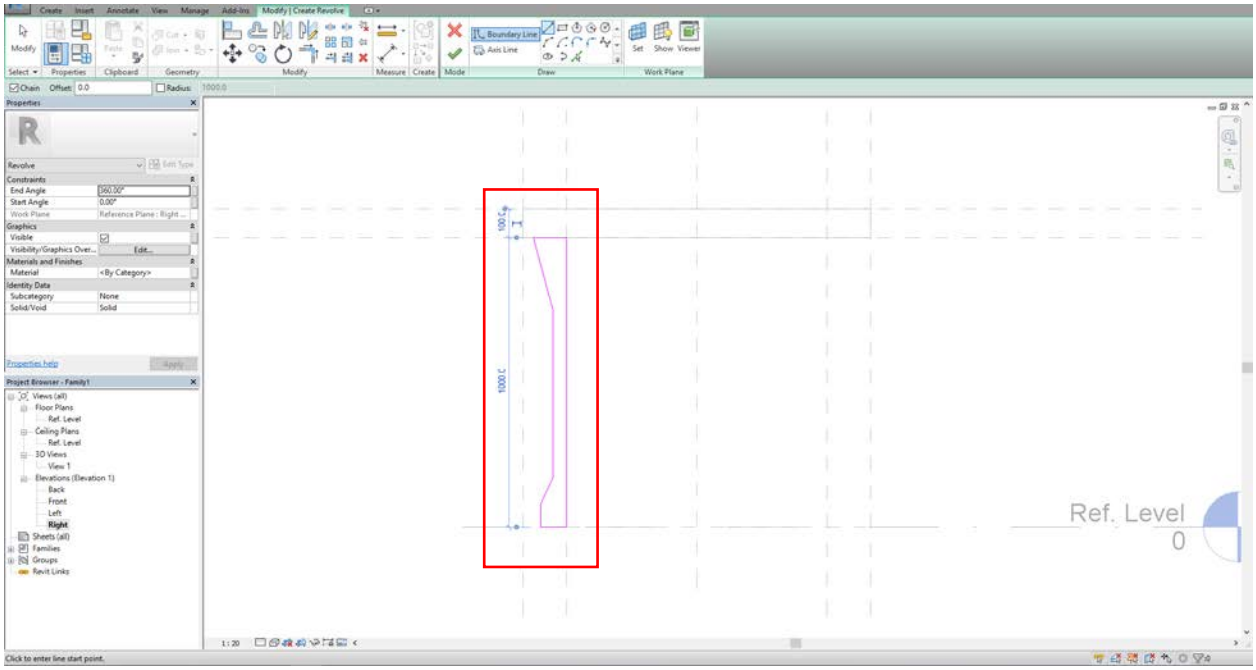




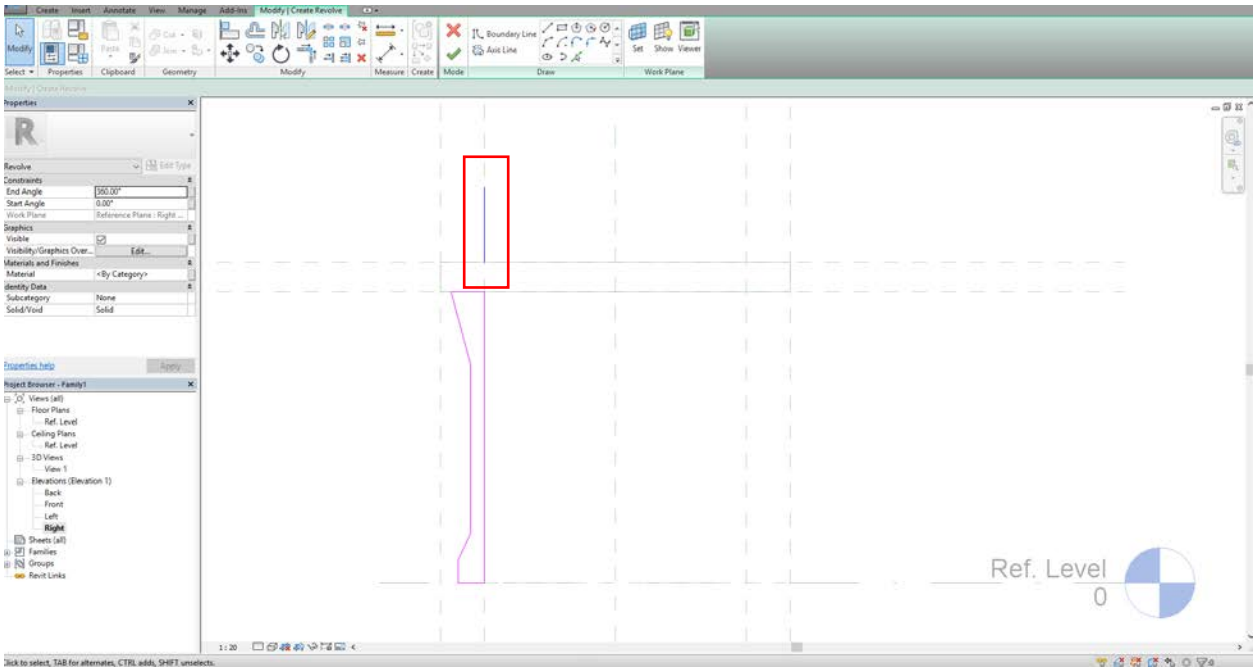
Go to Create tab, hit on Revolve. Notice the command consist of two parts: Boundary Line and Axis Line.
Boundary Line is for creating the profile while Axis Line is the axis that profile will be revolving around.



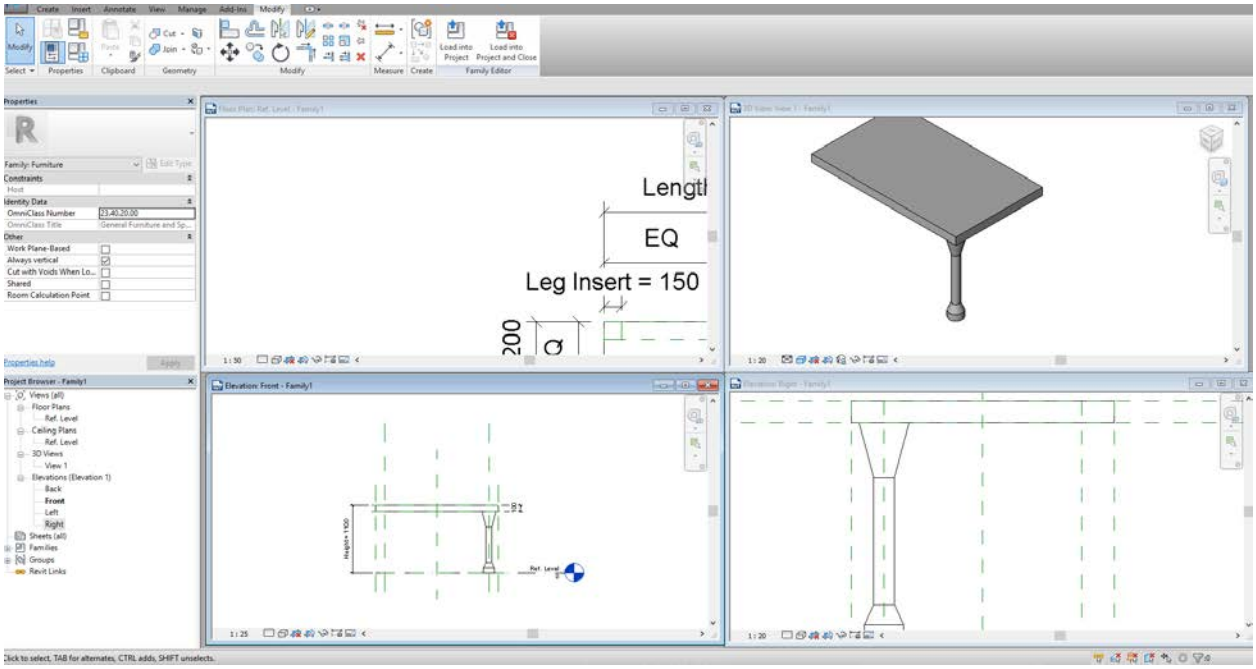
Sketch our leg (half of it).



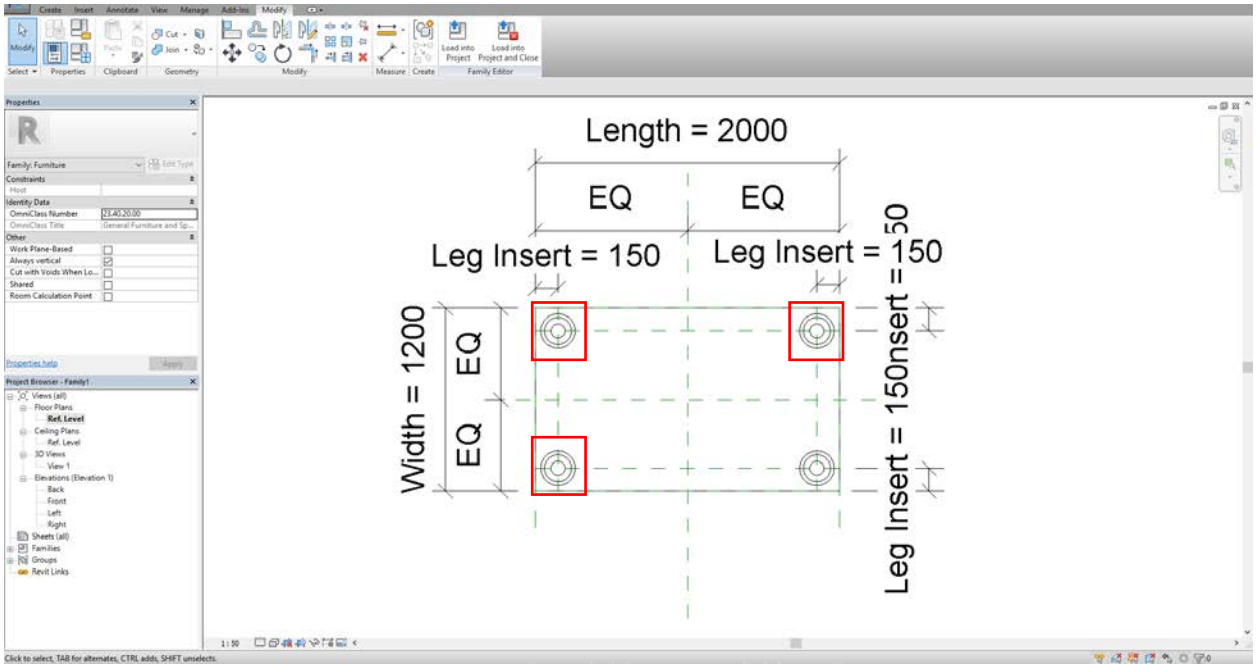
Switch to Axis Line button. Draw a vertical axis.



Click on the green tick mark. Finish revolving.



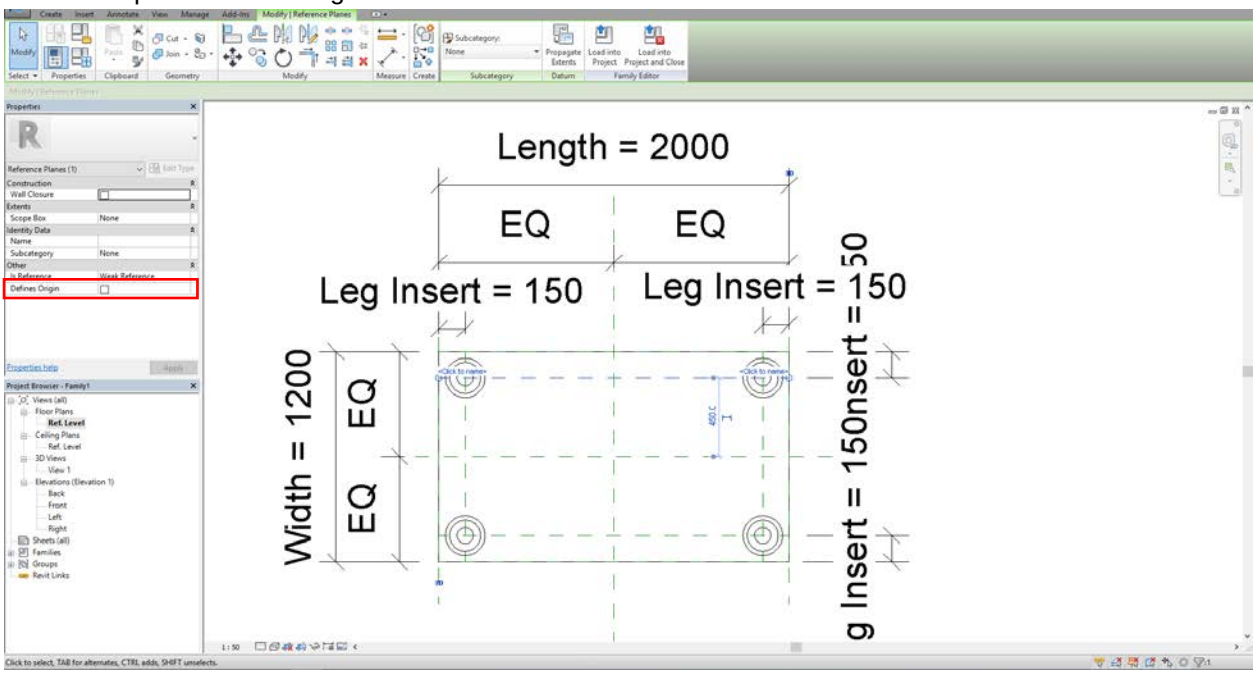
Mirror the other 3 legs.



4. Family Geometry

4.1 Understanding reference planes

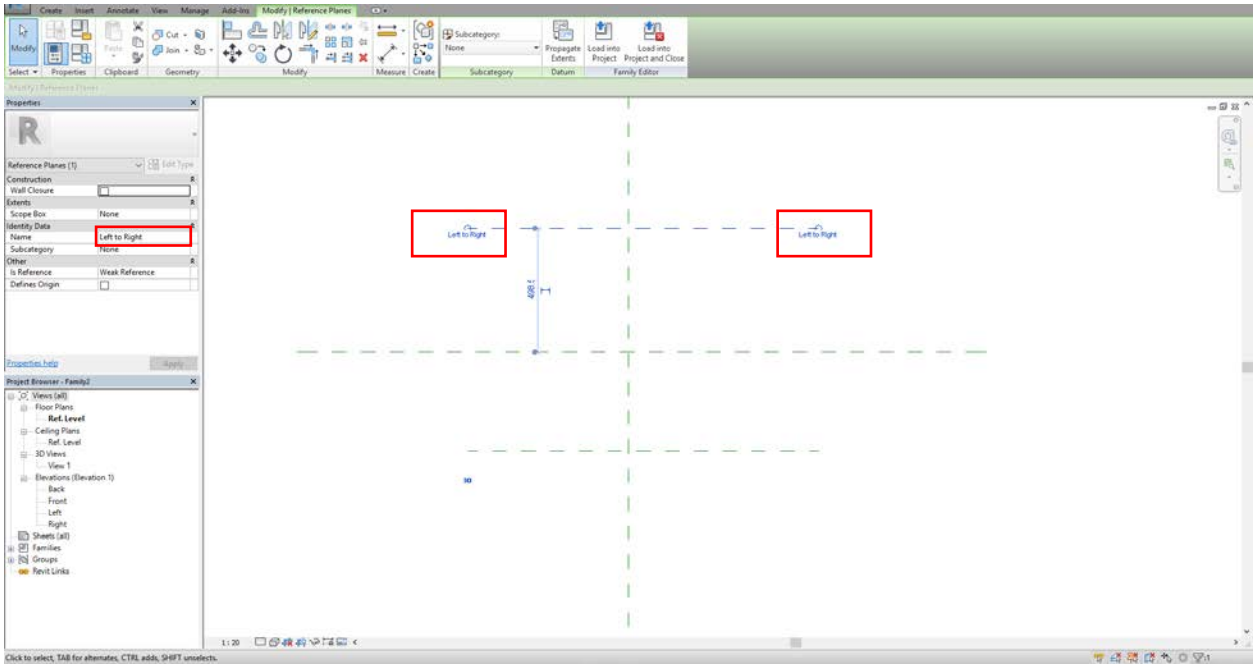
Reference planes define origin.



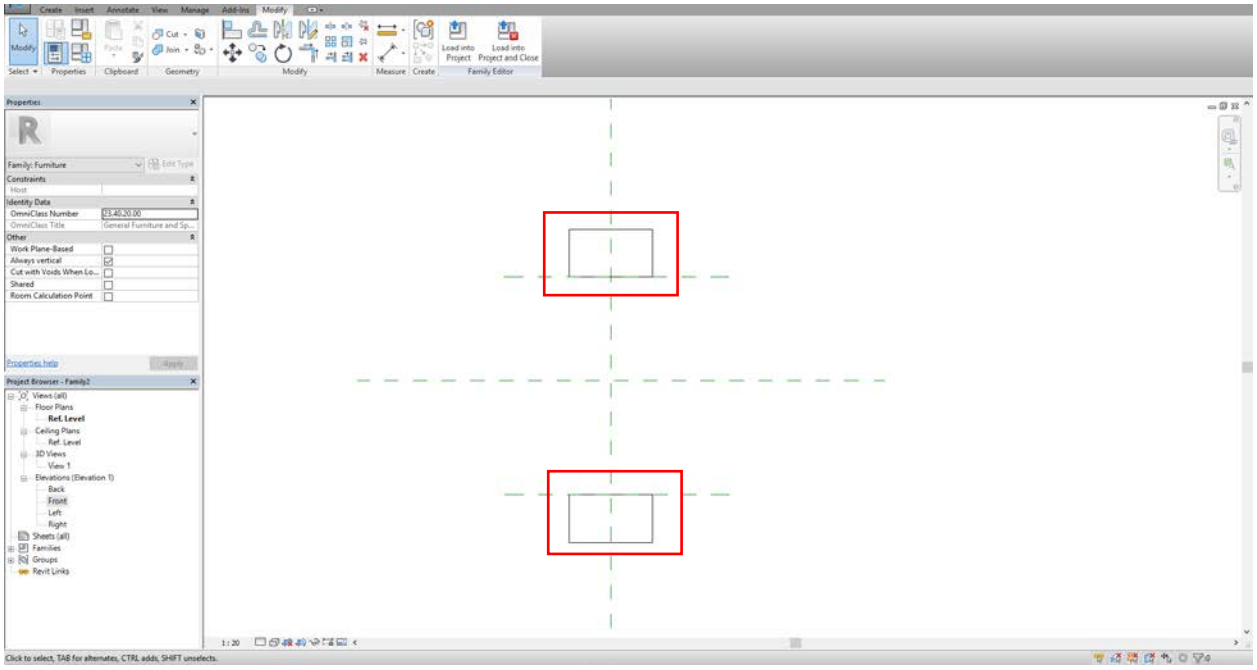
Default origin are defined by default planes. If you wish to change the insertion point, manually select two reference planes (horizontal and vertical) then check two Define Origin checkbox.

Moreover, reference plane has a direction. It's important to especially to Extrusion command. Because we want our shape or profile extrudes in the right direction.

Though there're two reference planes seem to be identical. However, the first one is created by clicking on the left, then to right while the second one is created in reverse order. (Simply name them as Left to Right & Right to Left)

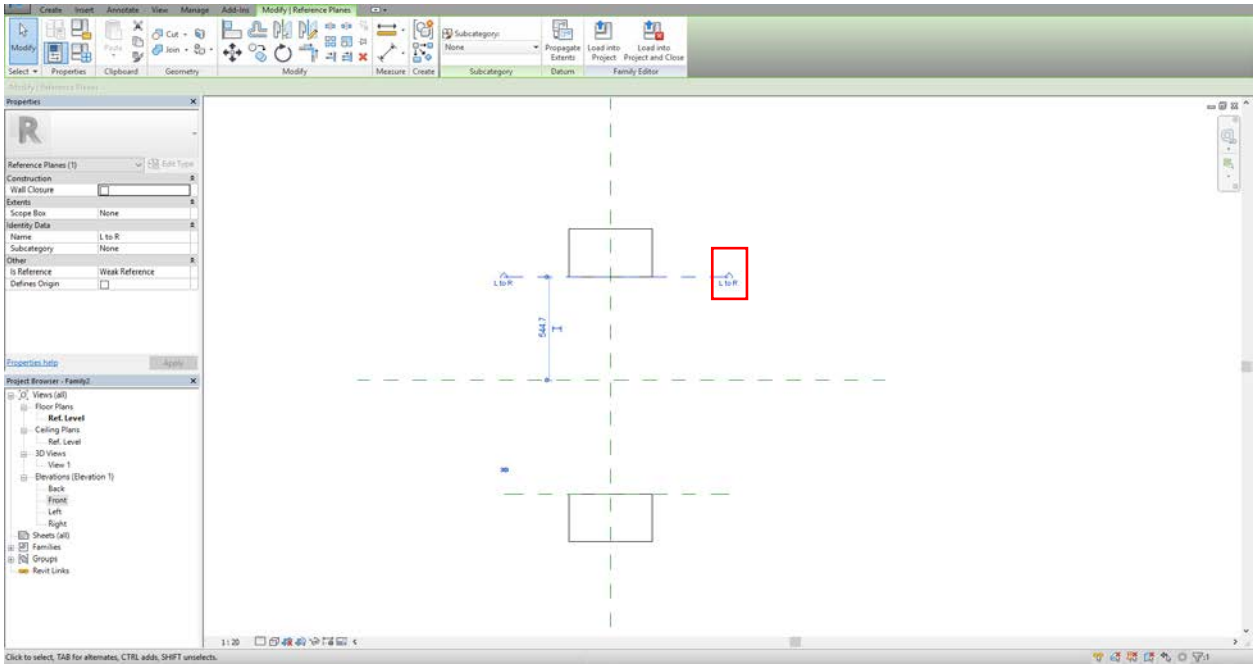


Now go to front view to sketch a profile then Extrude. Notice they extrude in opposite direction because reference plane has a direction itself.

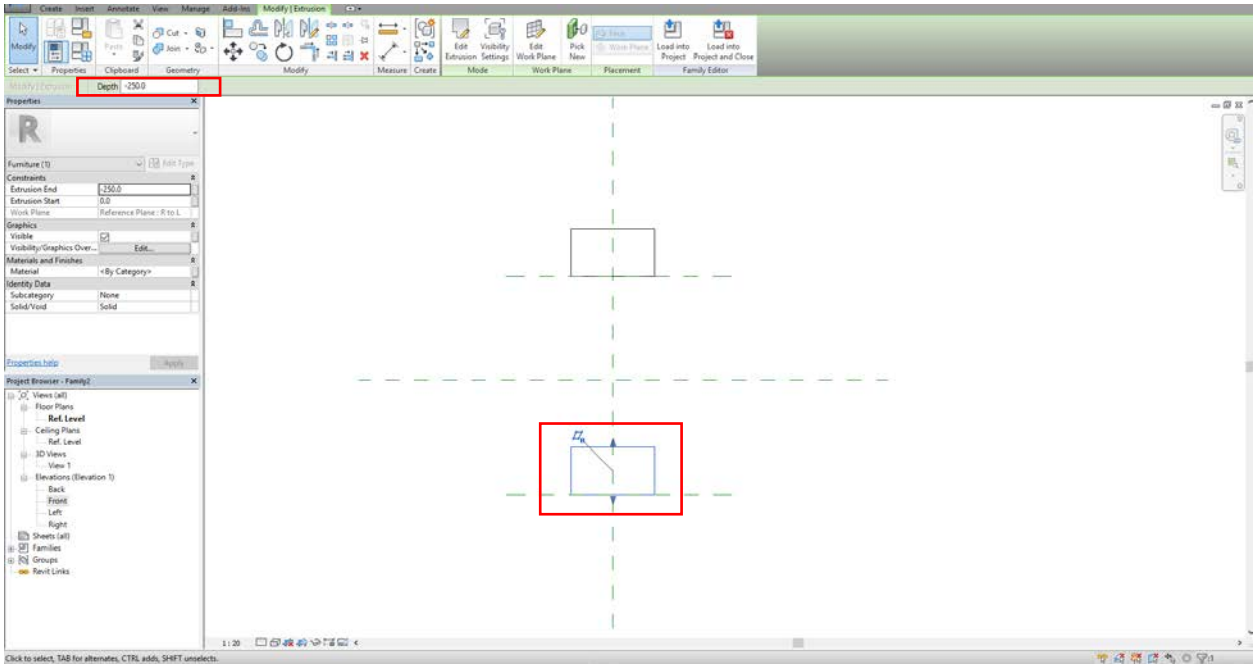


It's hard to memorize all reference plane's direction especially when you are drawing a rather complicated family. Once you find out direction of extrusion is not right. Flip the work plane or change Depth to negative will solve the issue.

Select on the right circle, drag it to the left. (This approach tends to be detrimental to other geometries so if there're many other shapes, try not to use it.)

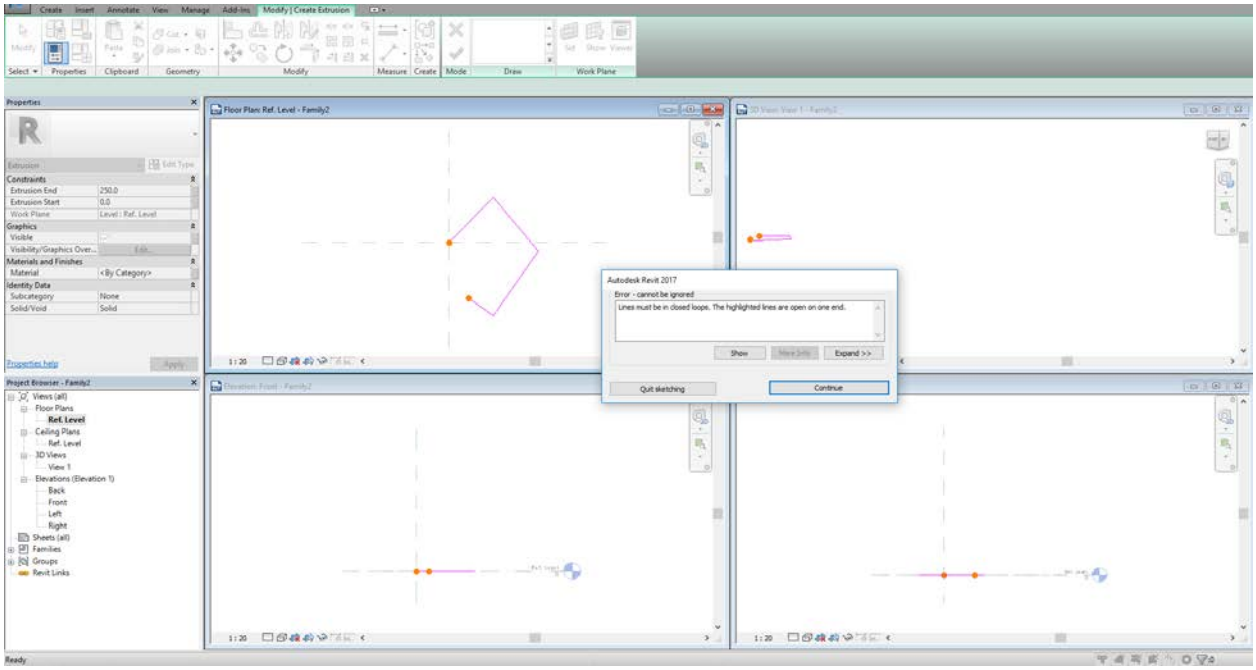


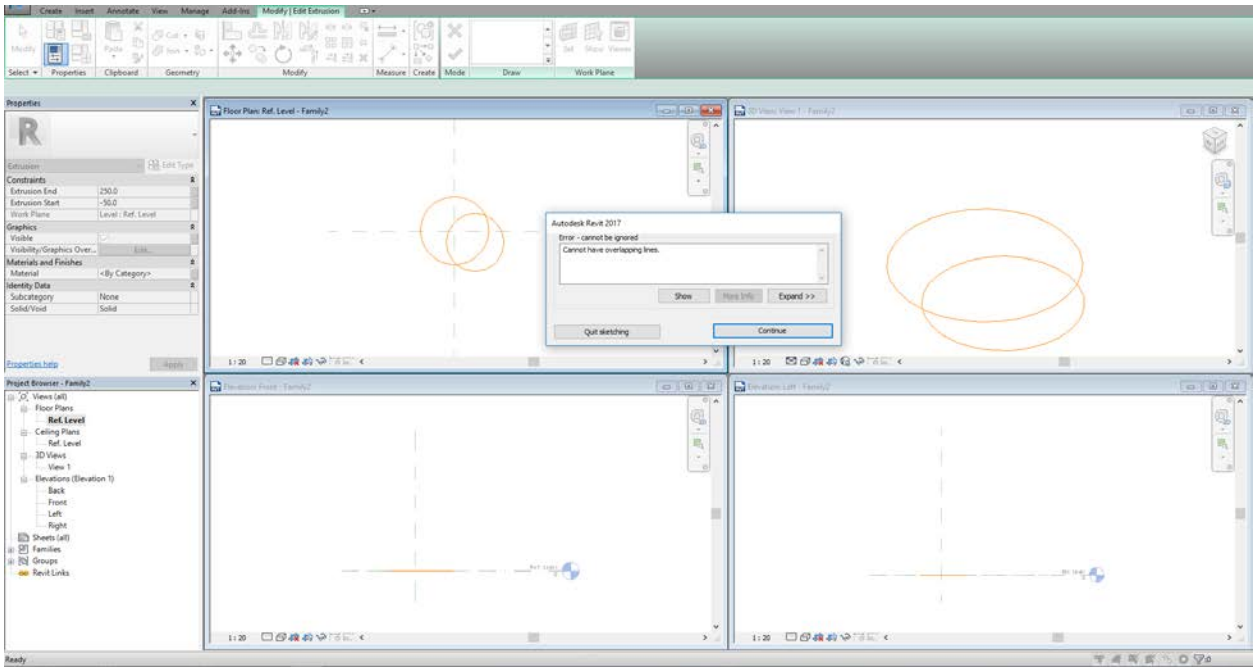
Depth value is on the ribbon. (Safer approach)

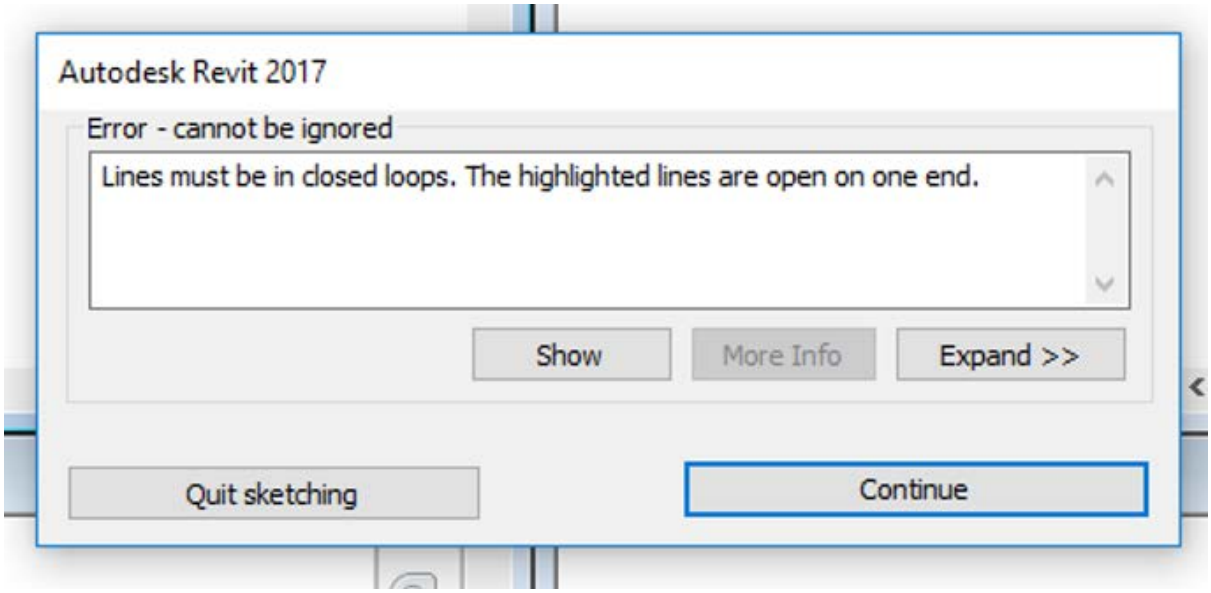


4.2 Creating extrusion

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

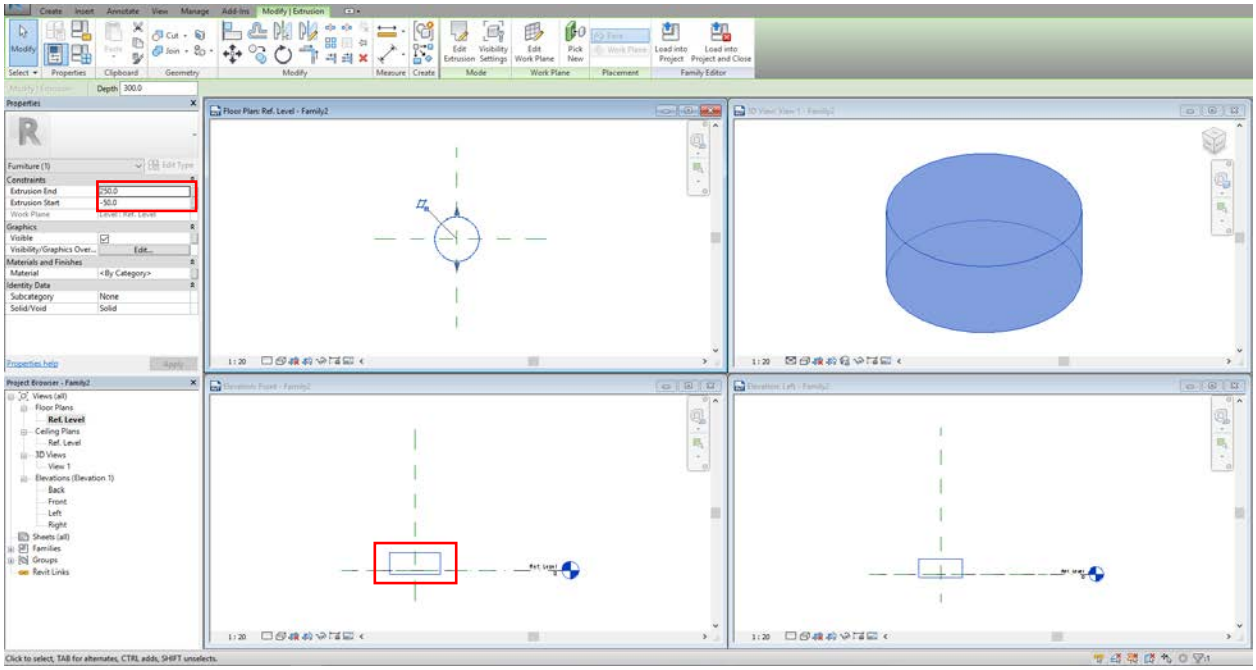

Autodesk Revit 2017
Error - cannot be ignored
Lines must be in closed loops. The highlighted lines are open on one end.
Show
More Info
Expand >>
Quit sketching
Continue


Autodesk Revit 2017
Error - cannot be ignored
Cannot have overlapping lines.
Show
More Info
Expand >>
Quit sketching
Continue



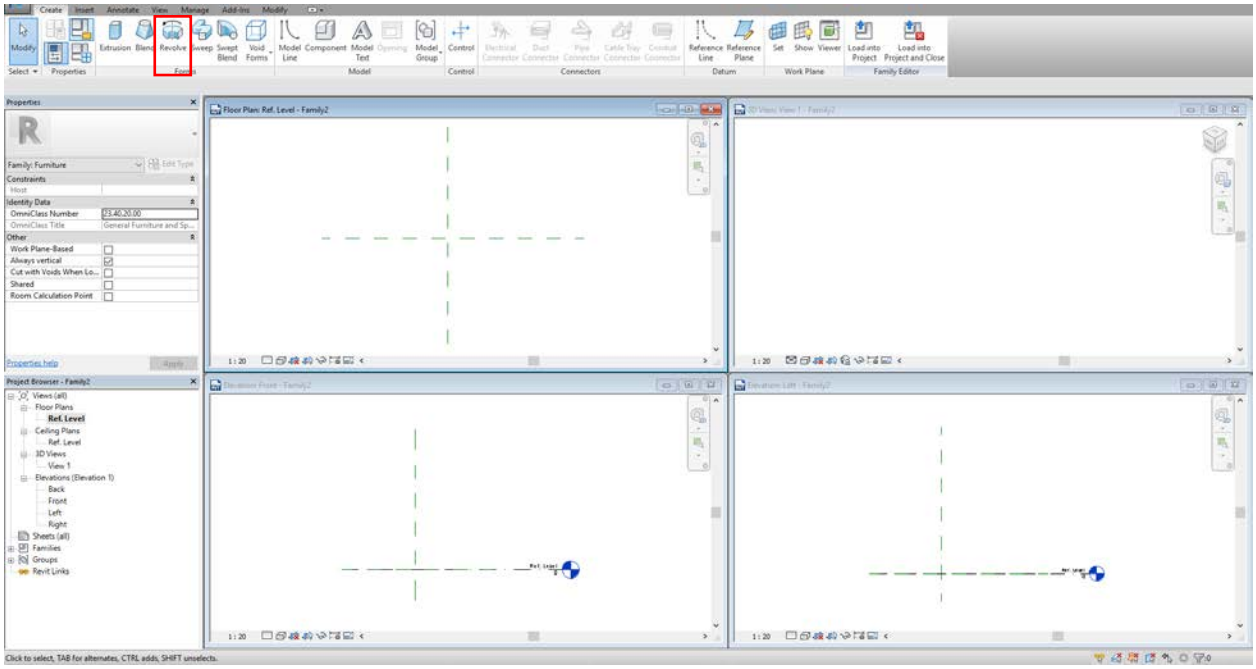
The Extrusions we've made are all starting from their work plane. Revit allow us to expand the ends of Extrusion further.

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

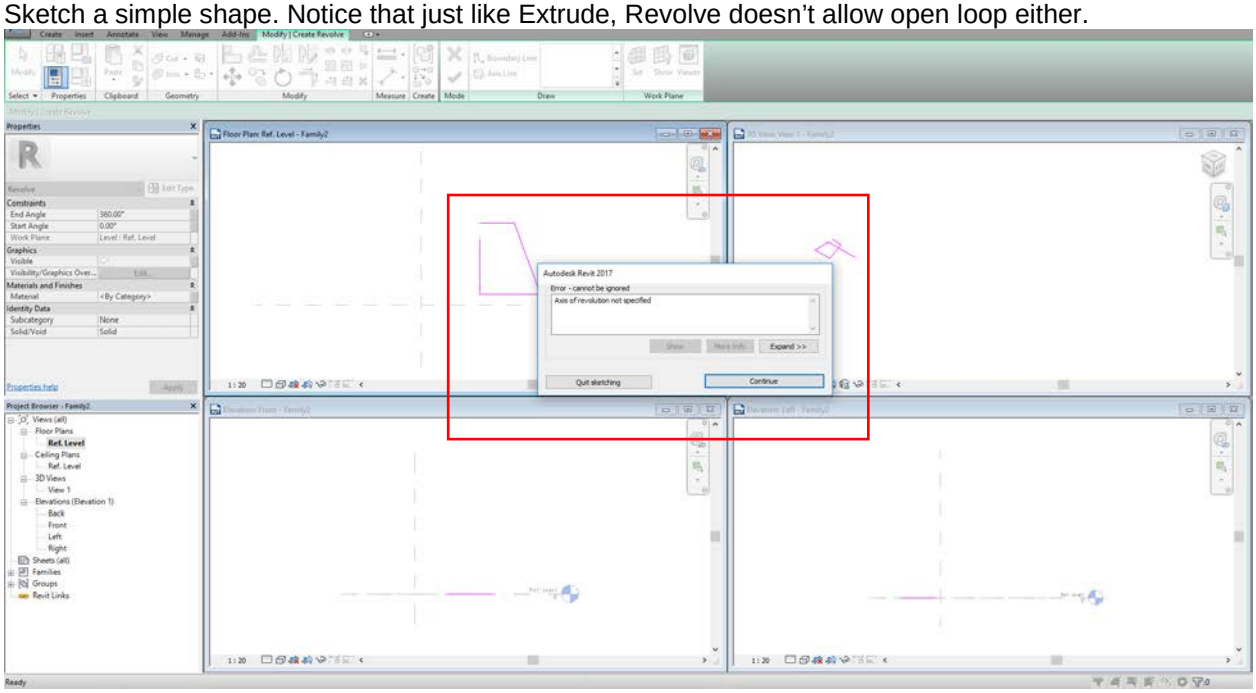


4.3 Creating revolves

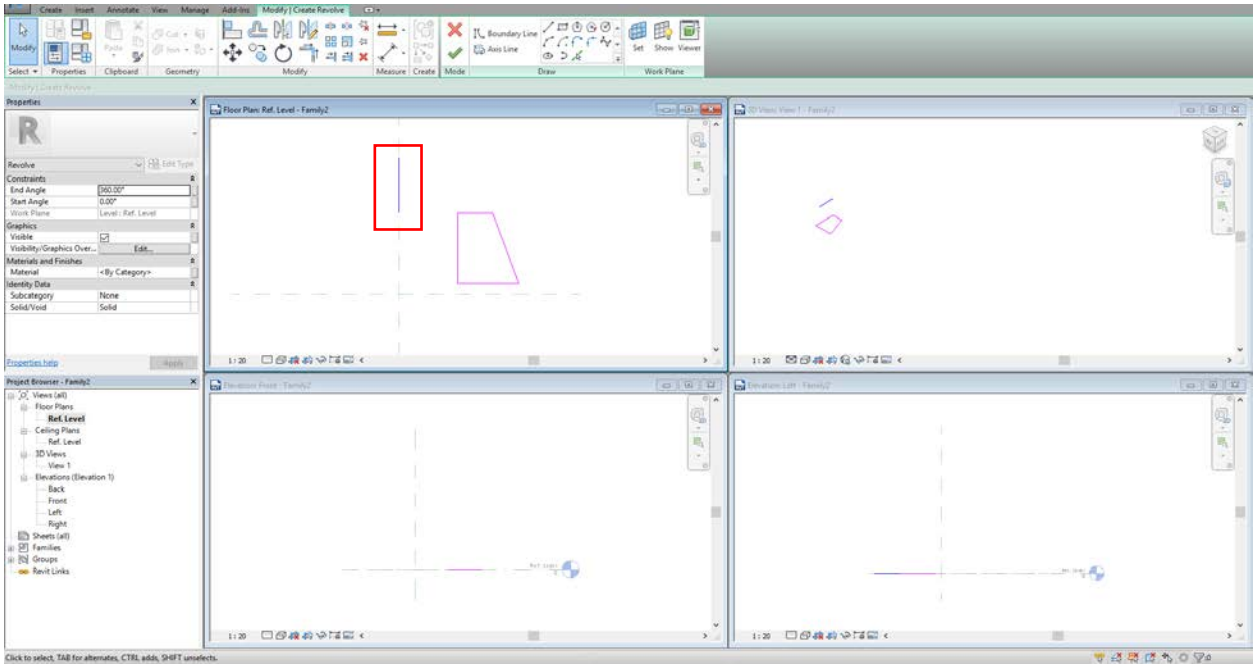
Go to Create tab, click on Revolve.



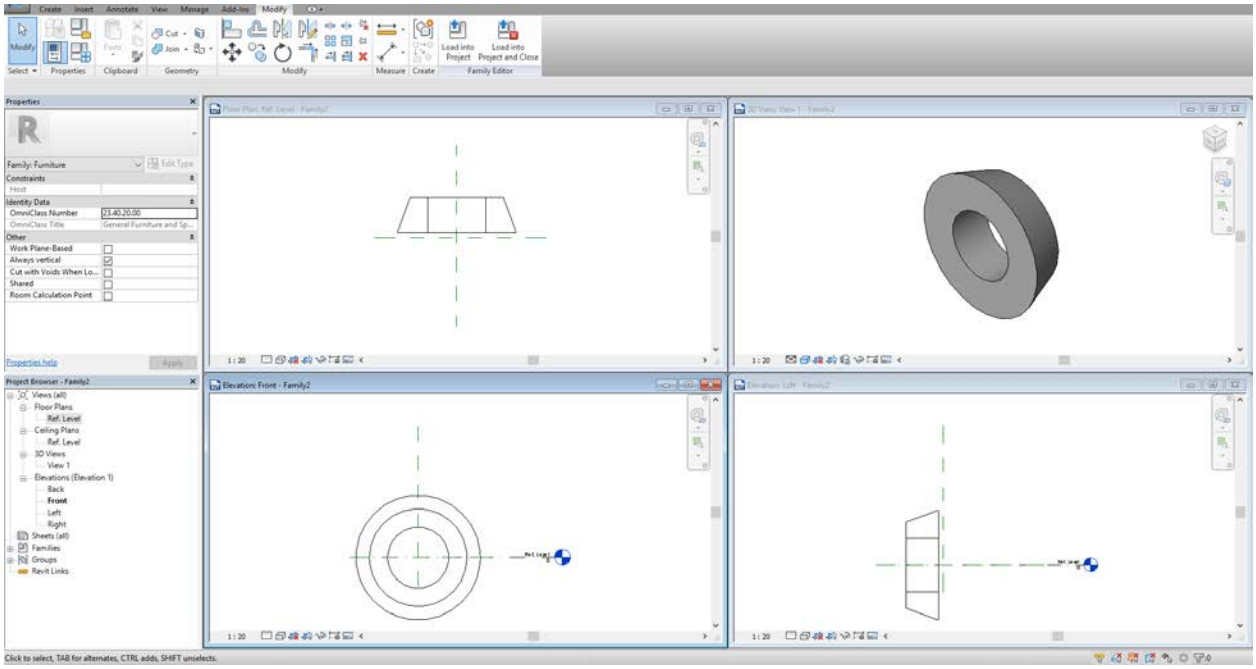
Sketch a simple shape. Notice that just like Extrude, Revolve doesn't allow open loop either.



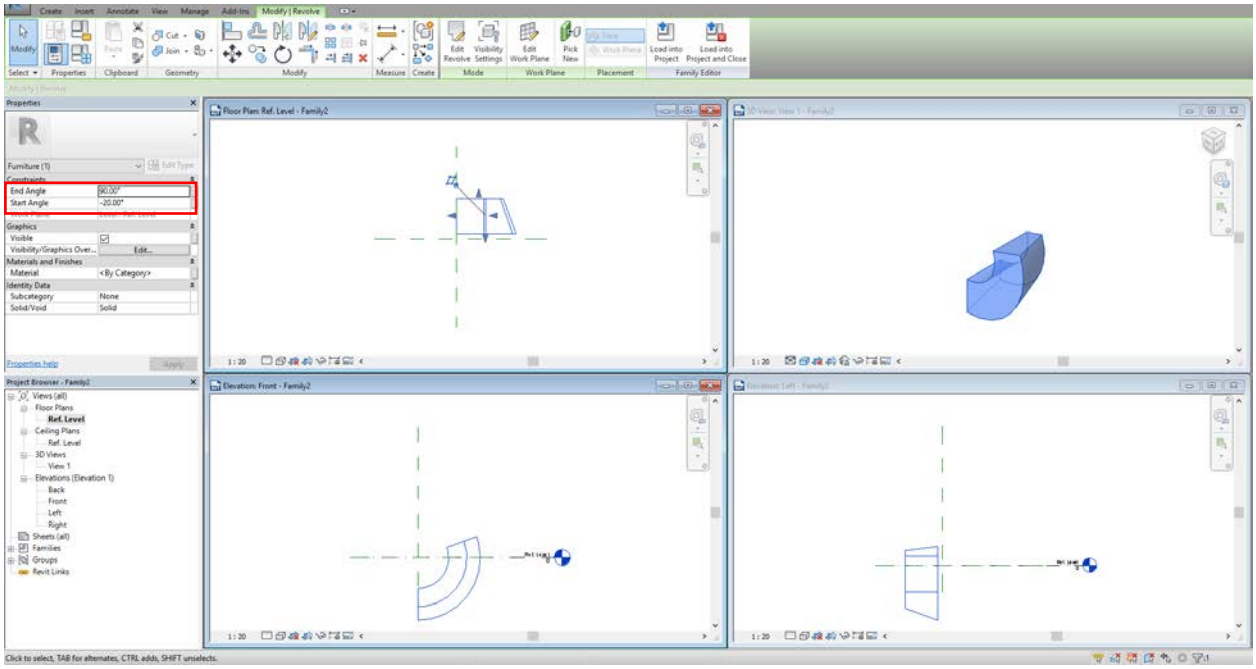
Draw your Axis.



Finish revolving.

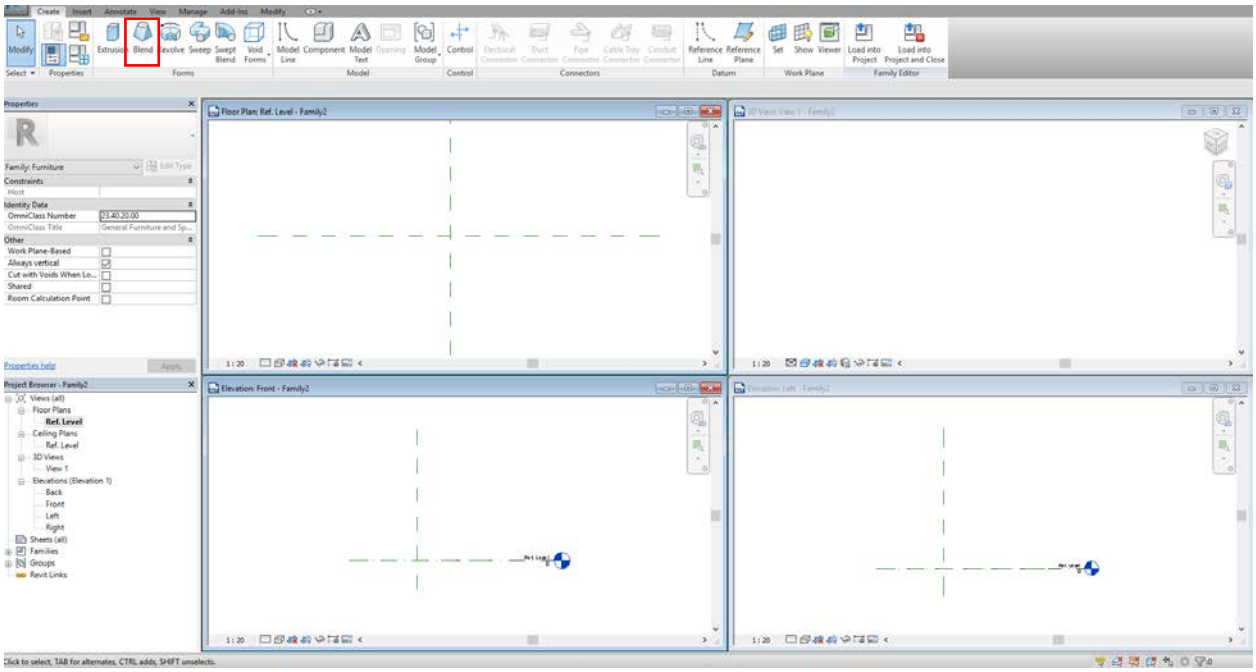


Adjust End or Start Angle if you don’t want the shape to orbit a full circle.

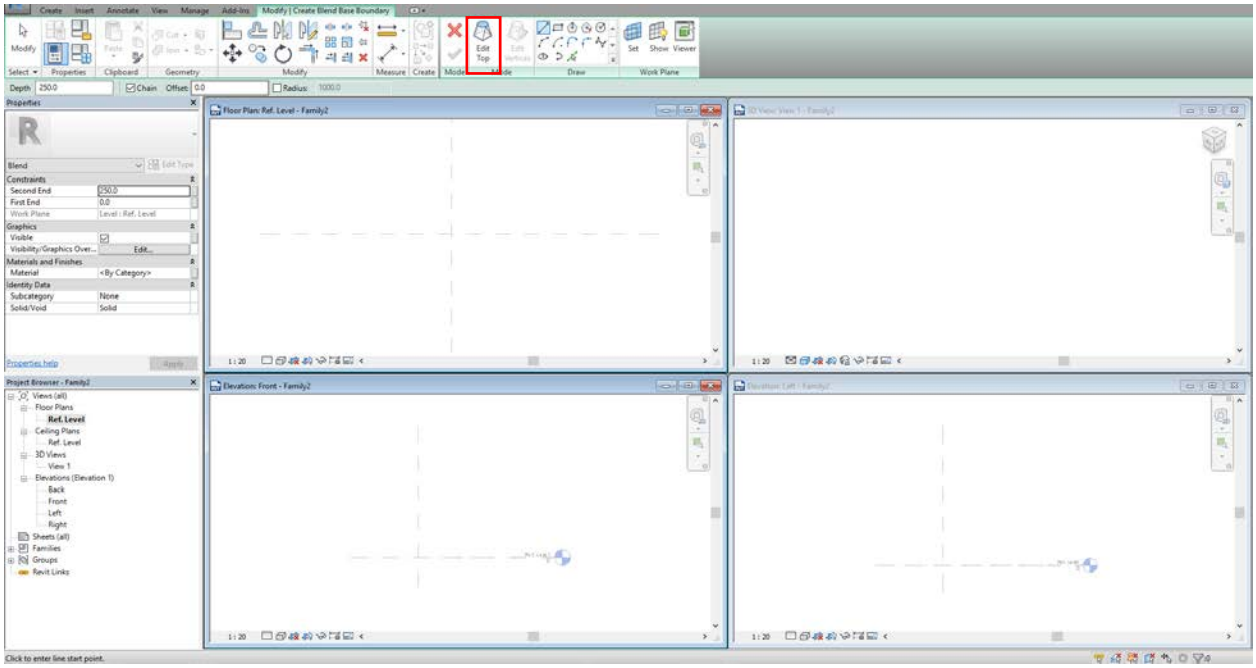


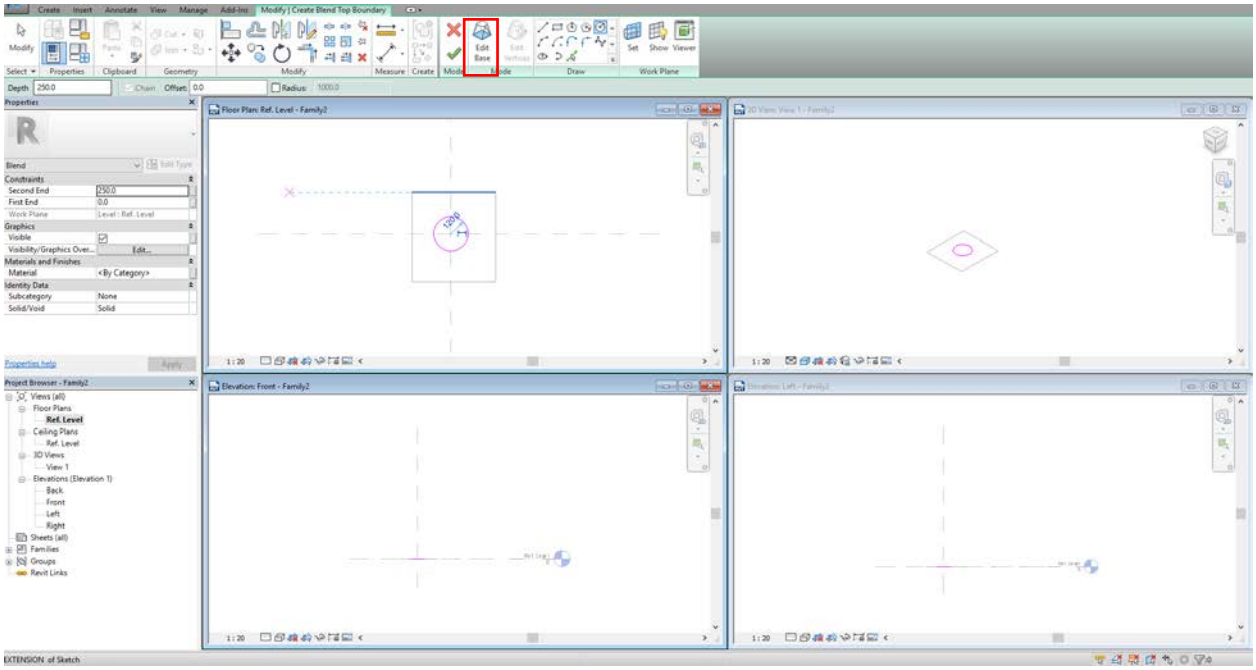
4.4 Creating blends

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



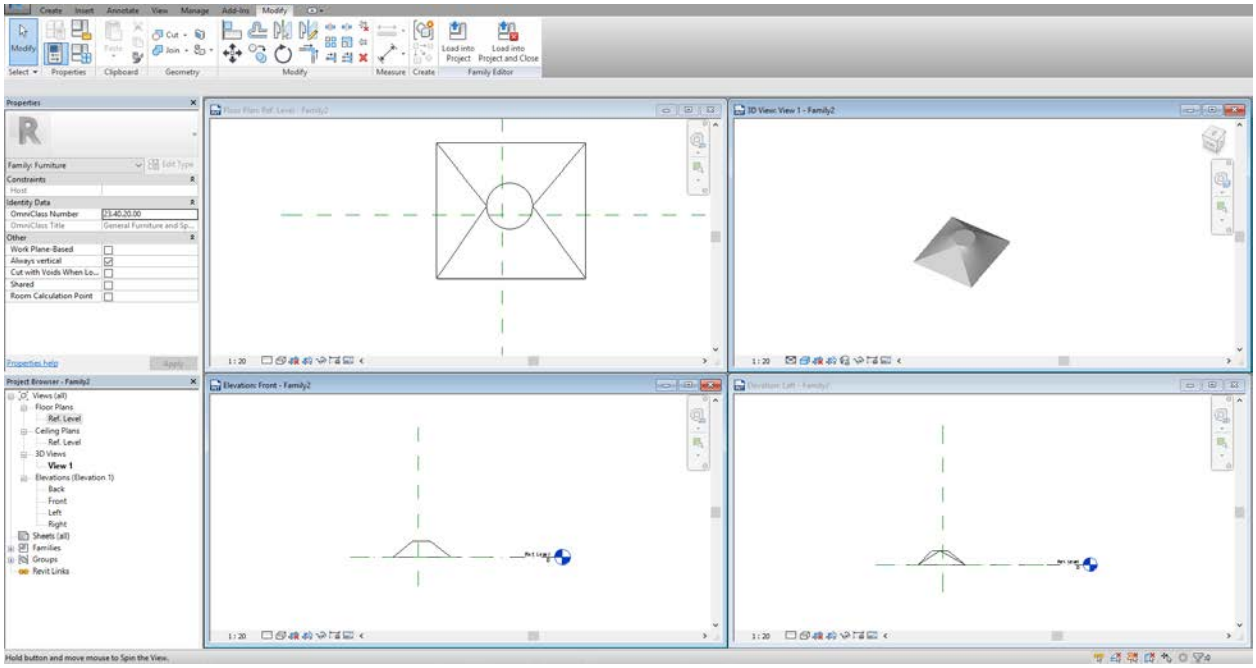
Instead of one shape, we have to sketch the bottom and the top.





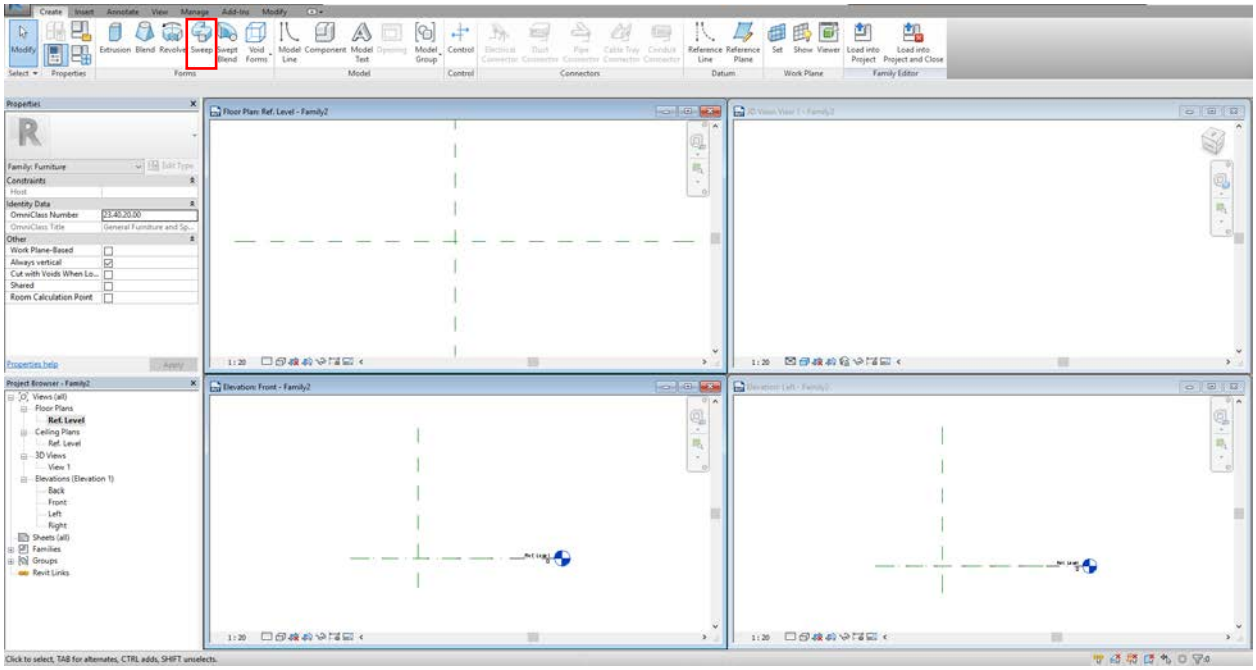
Instinctively though our Top could situate on another work plane, **it's imperative that you draw both shapes on the same work plane**. Otherwise it will raise many issues such as the Depth will be calculated from the Top to somewhere upwards.

Complete Blend by clicking on the green tick mark.

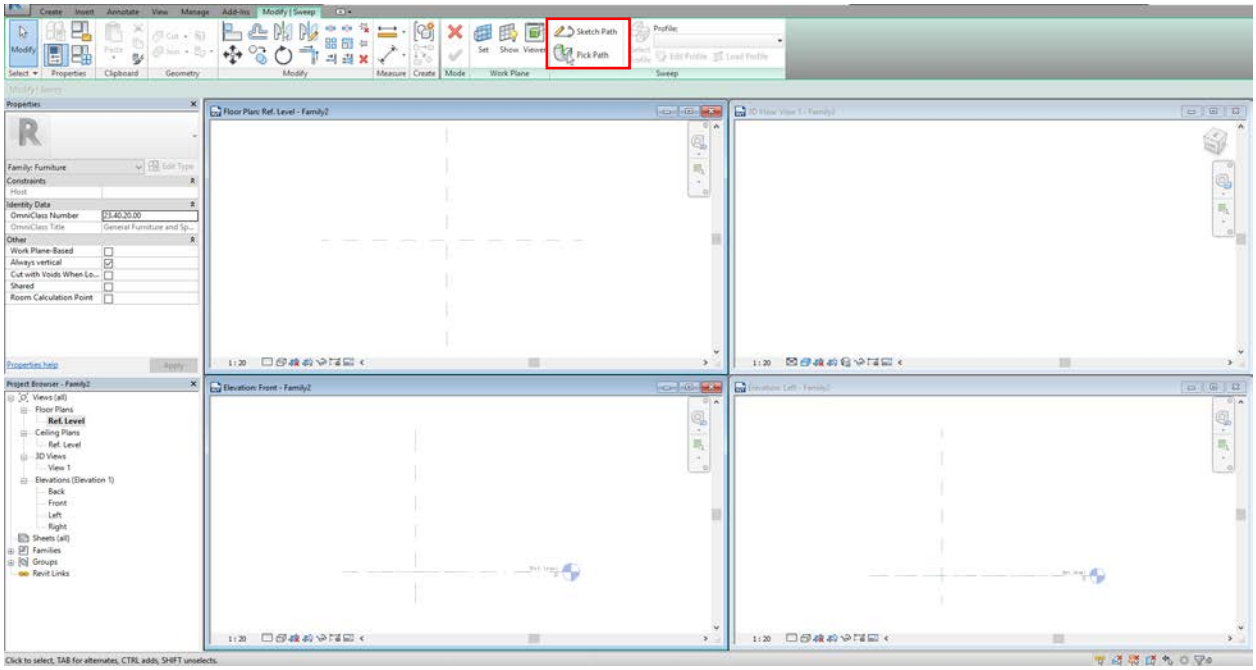


4.5 Creating sweeps

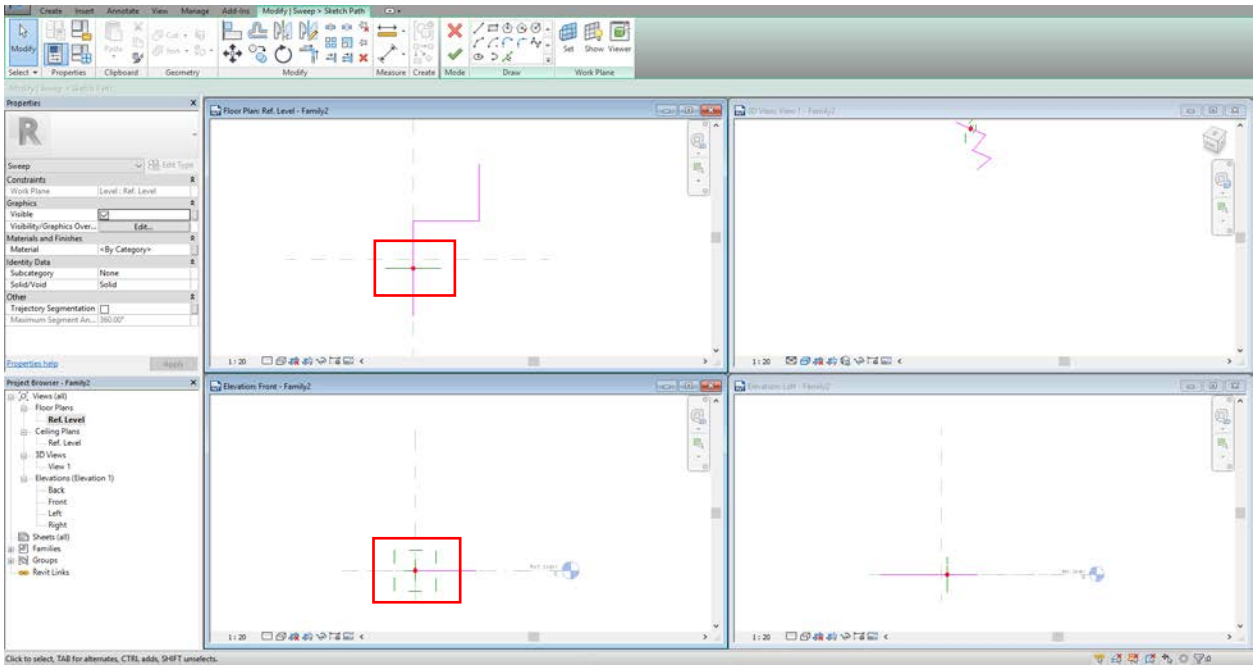
Sweep takes a sketch and moves it along the path. It’s more flexible than Extrusion and Blend.



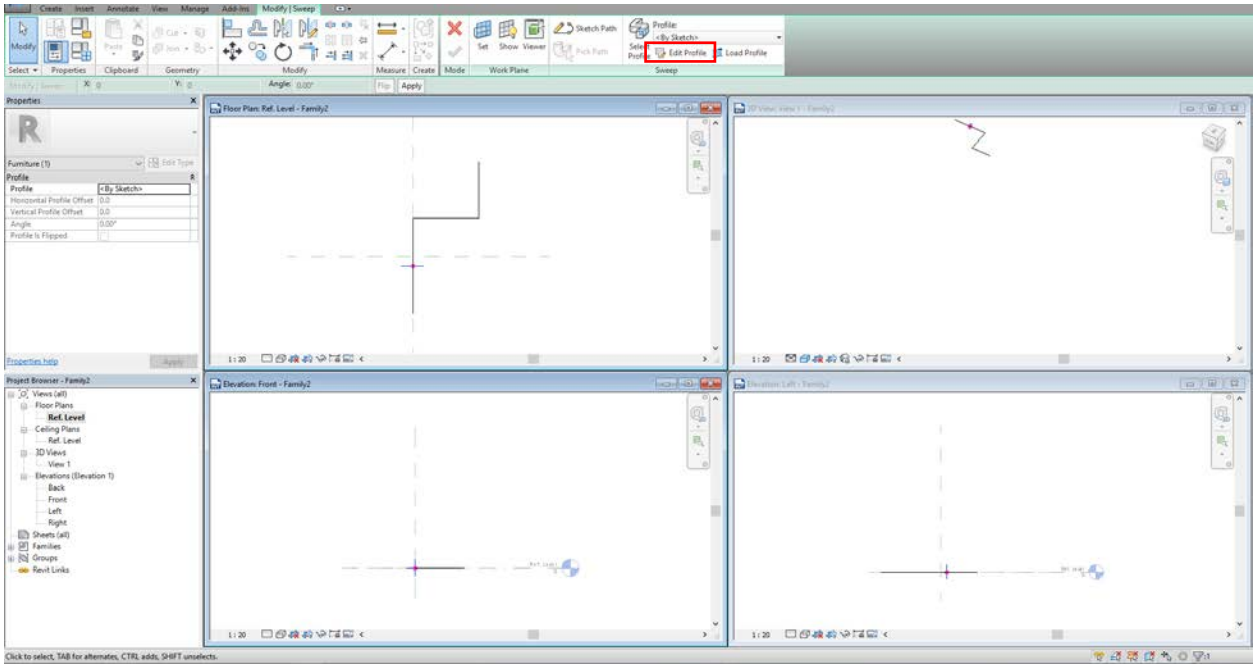
Select an existing path or draw a desirable path.



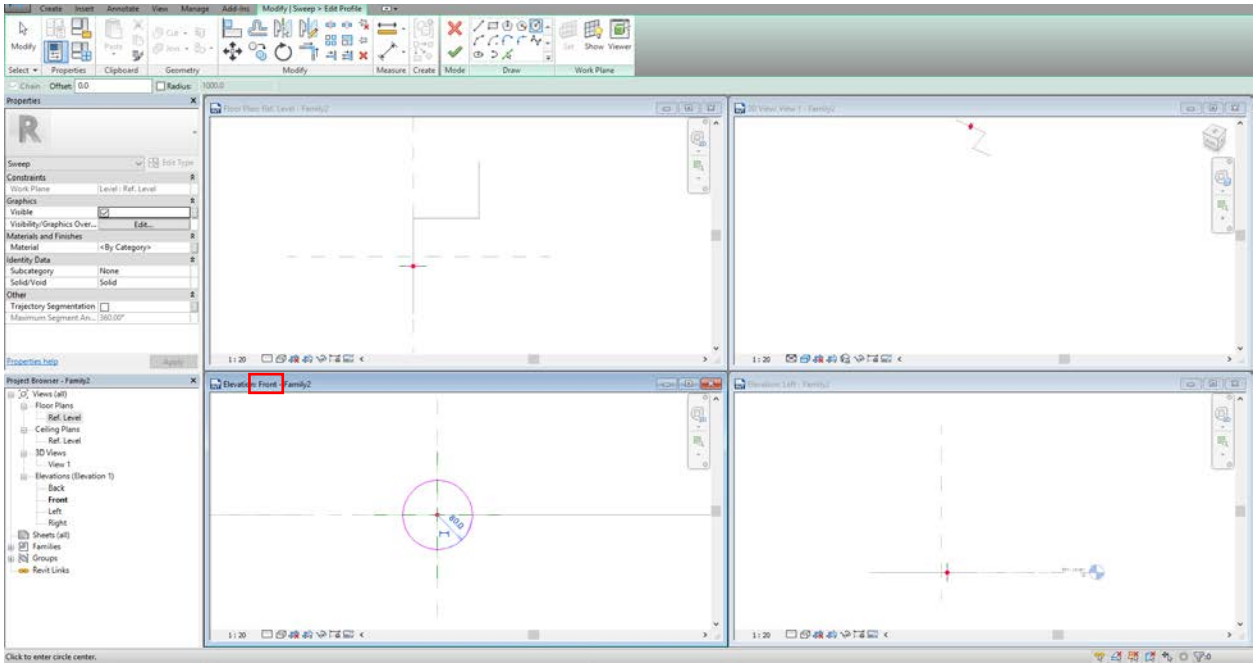
Notice a new plane is created for sketching the shape which is going to move along this path.



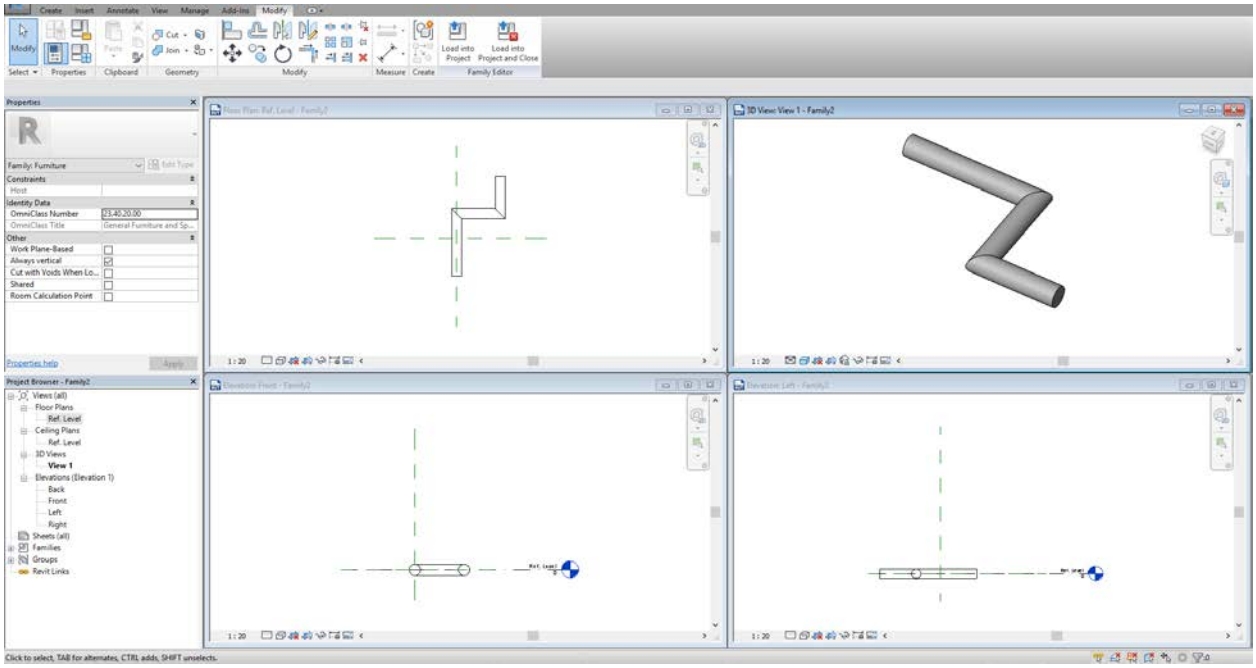
Click on the green tick mark, exit sketch mode of the path.



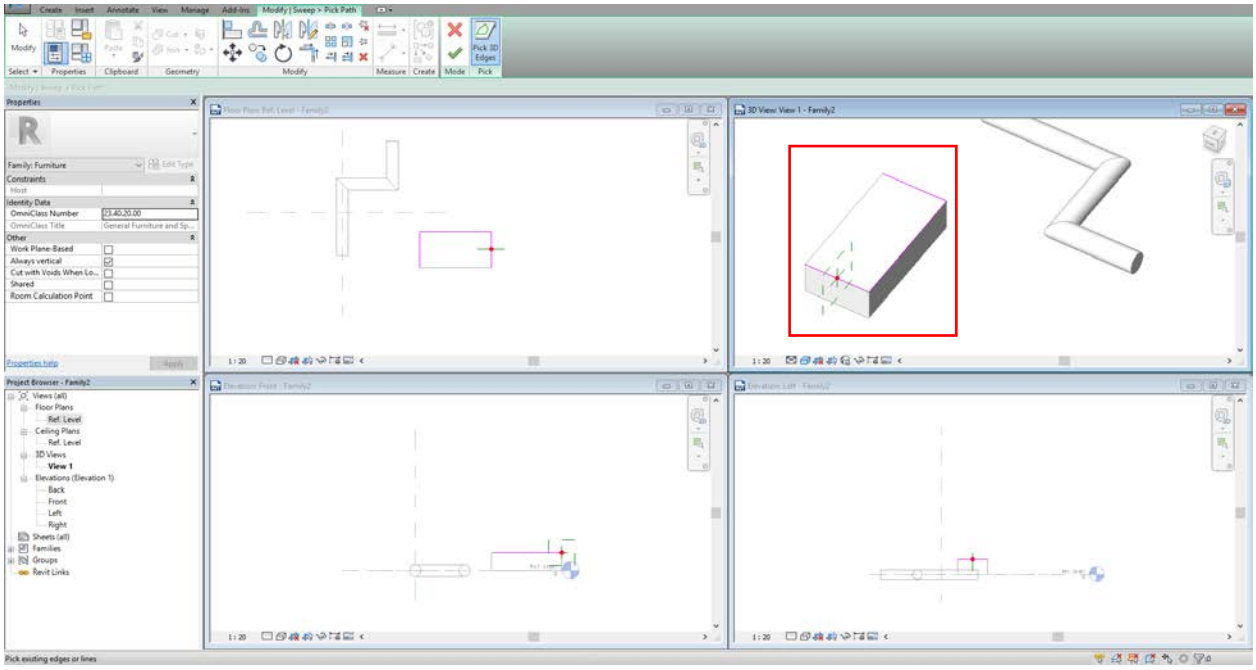
Switch to a view that’s perpendicular to the new plane for sketching the shape. Sketch a shape.

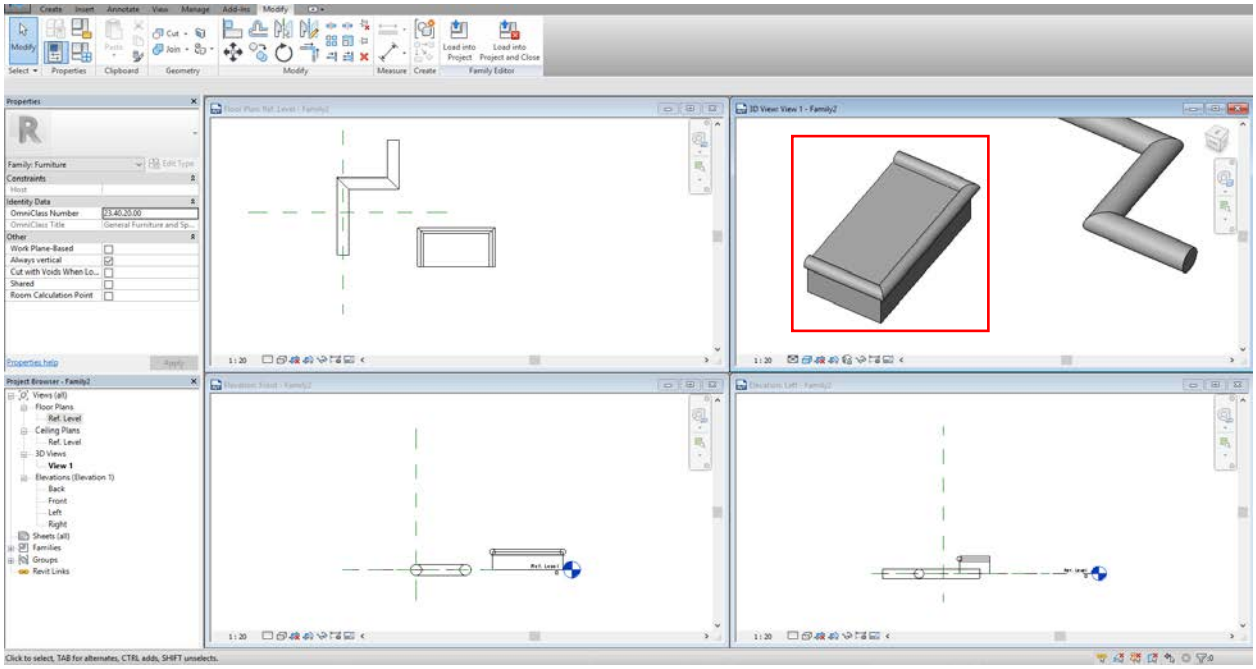


We have our geometry.



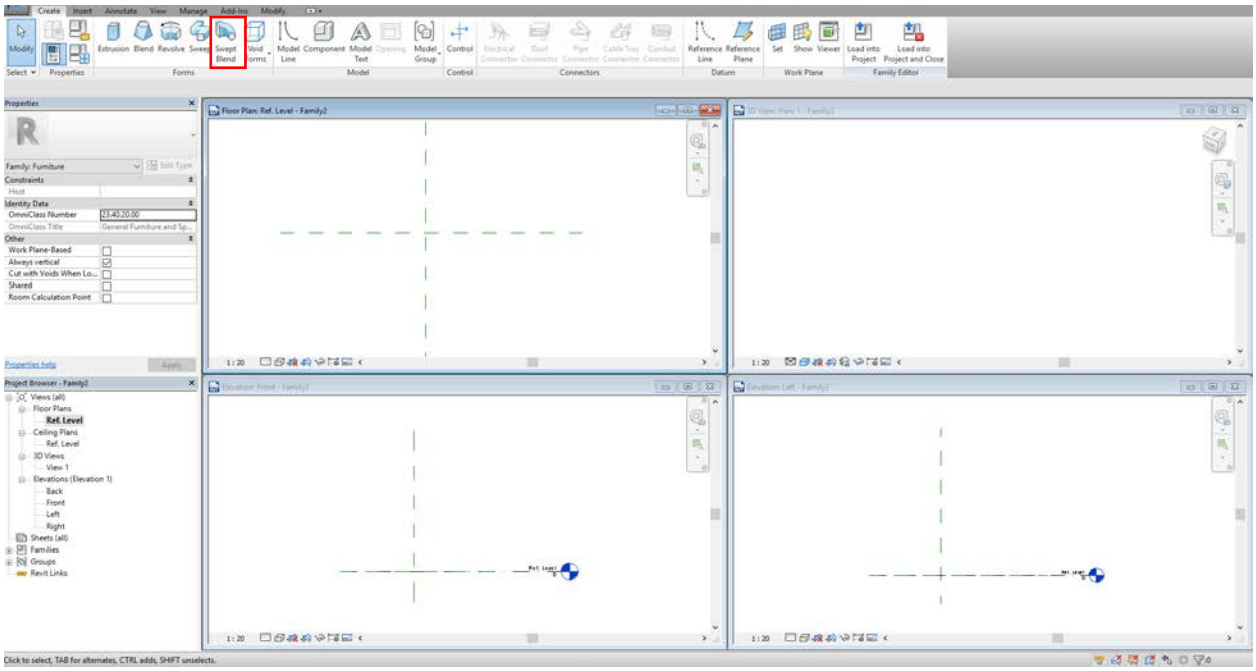
Pick a path is also an option.



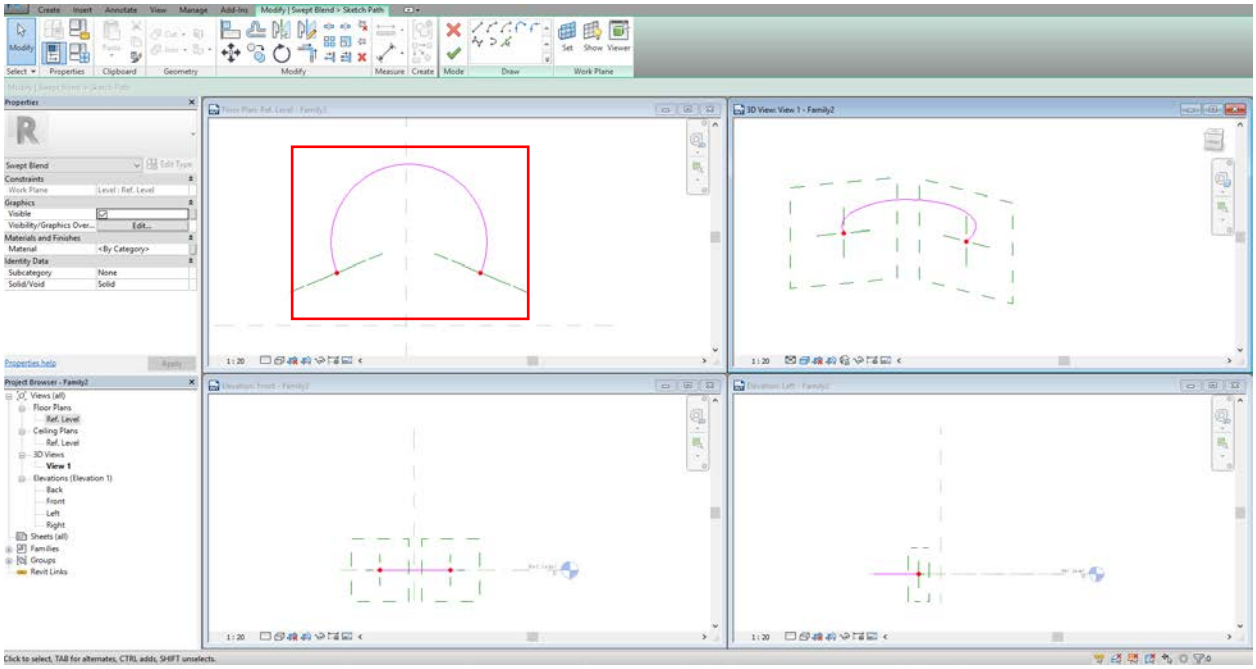


4.6 Creating swept blends

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

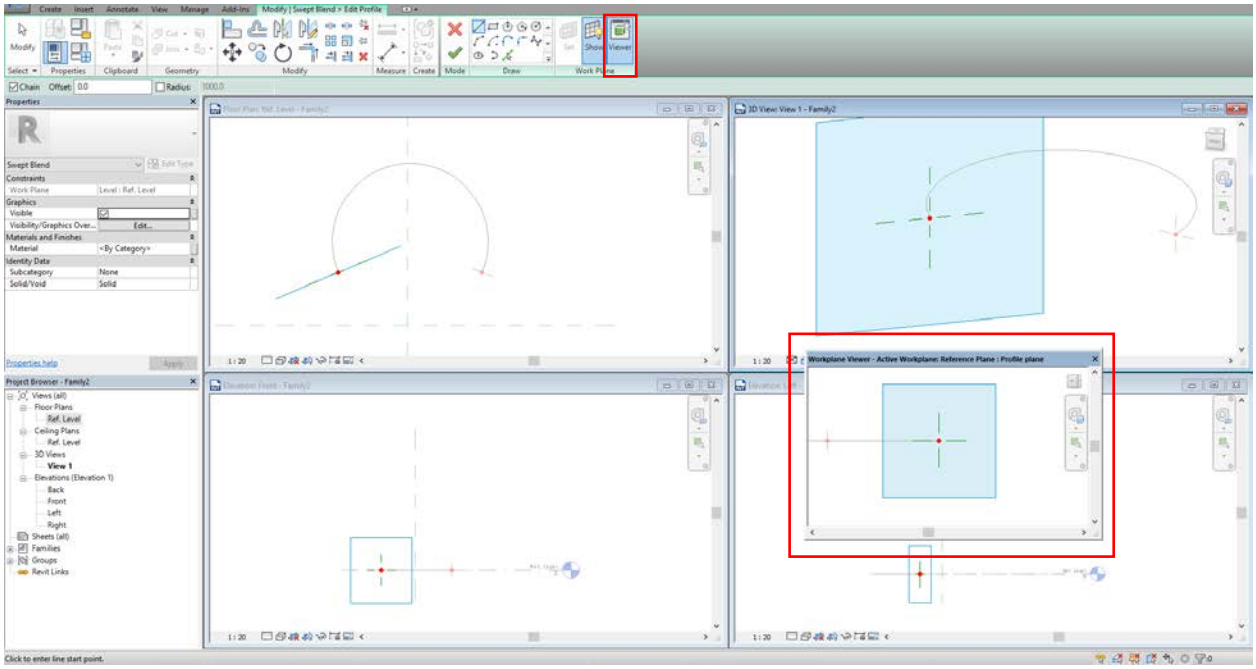


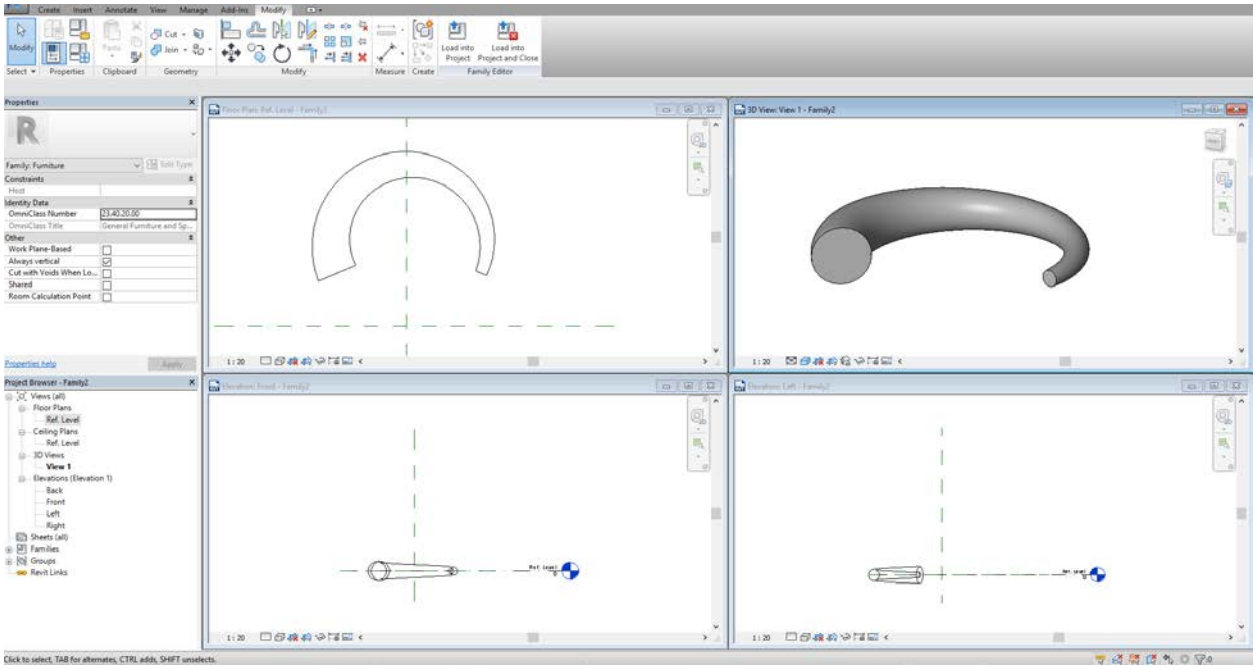
Simply draw an arc as our path.



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.

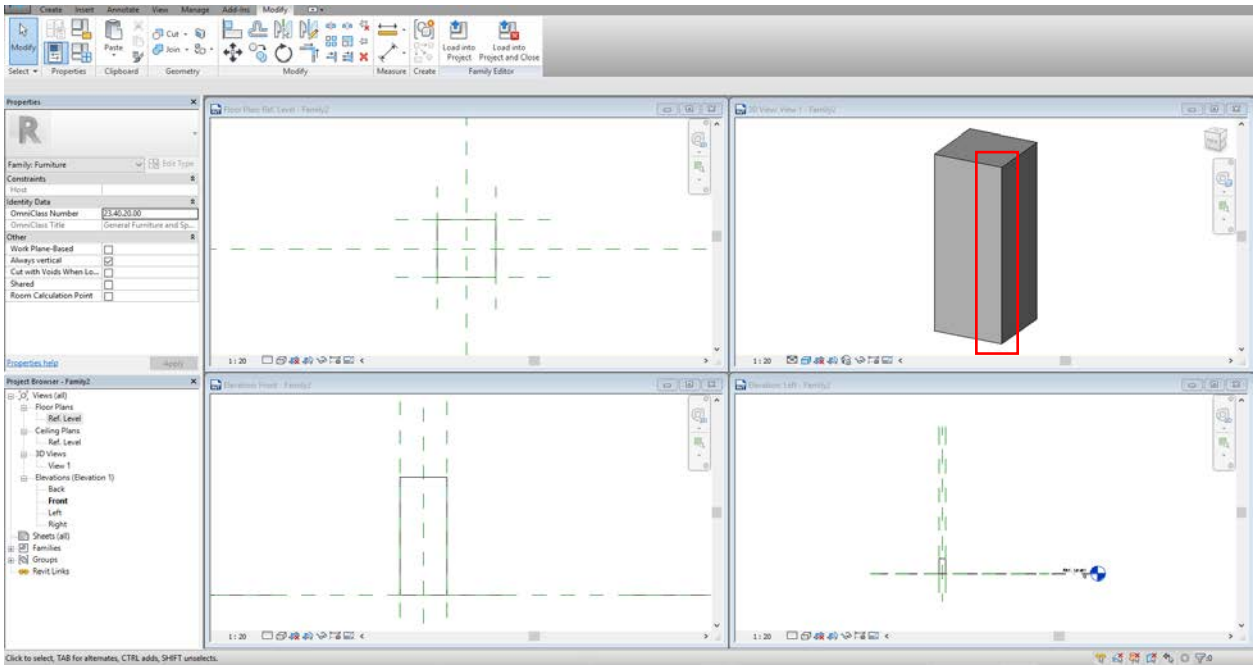




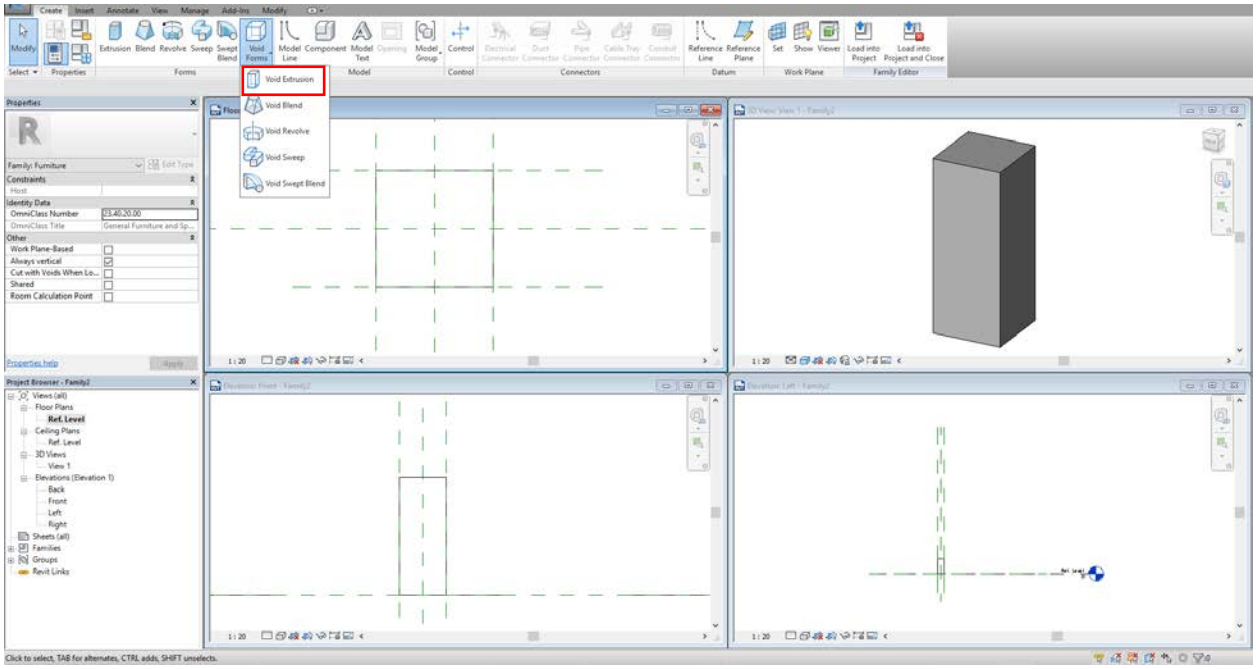
4.7 Using void forms

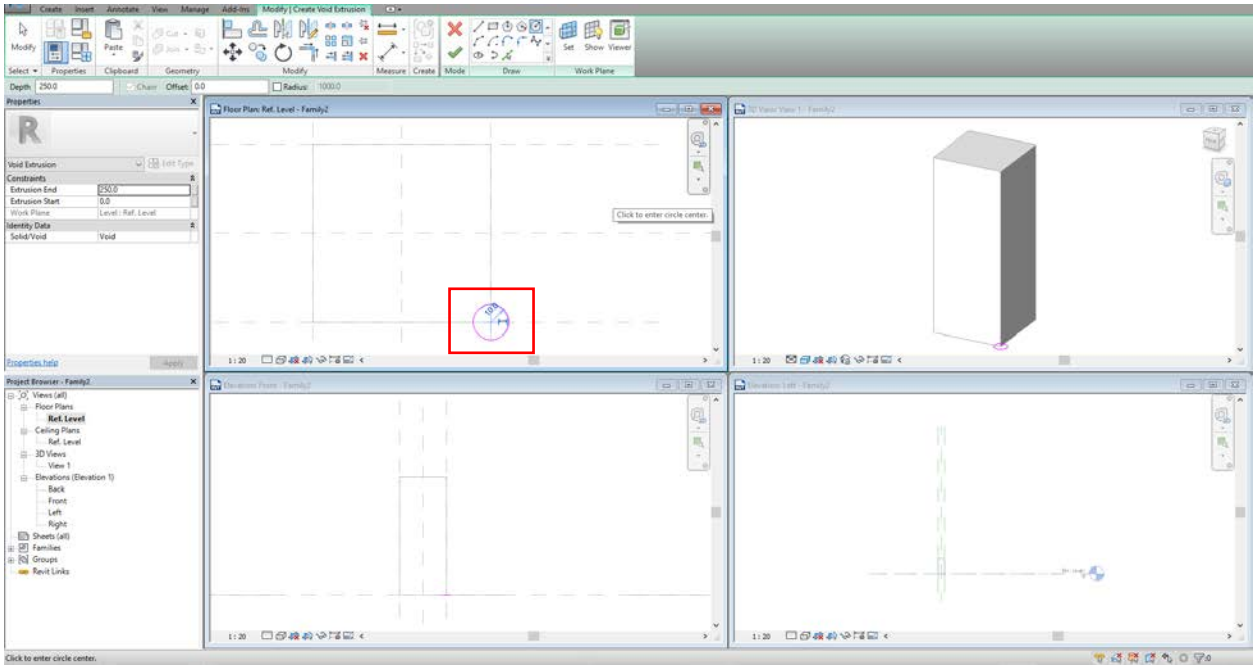
Void forms would be very handy when we want subtle modification.

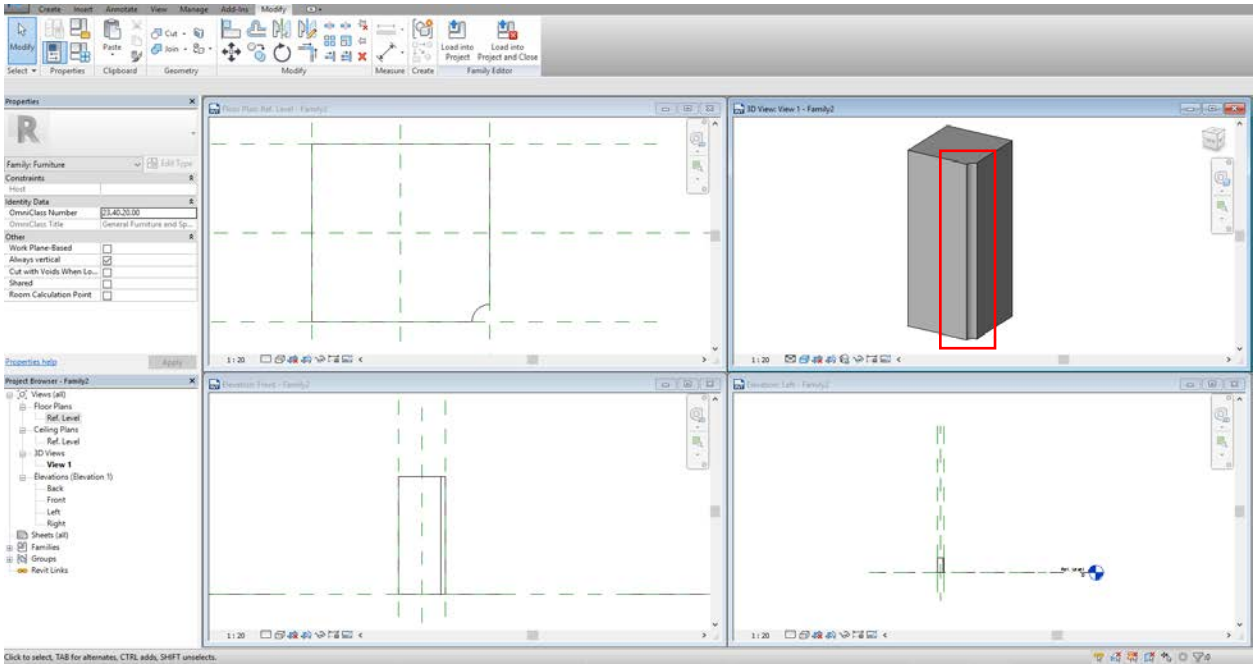
If we want to smooth sharp edges:



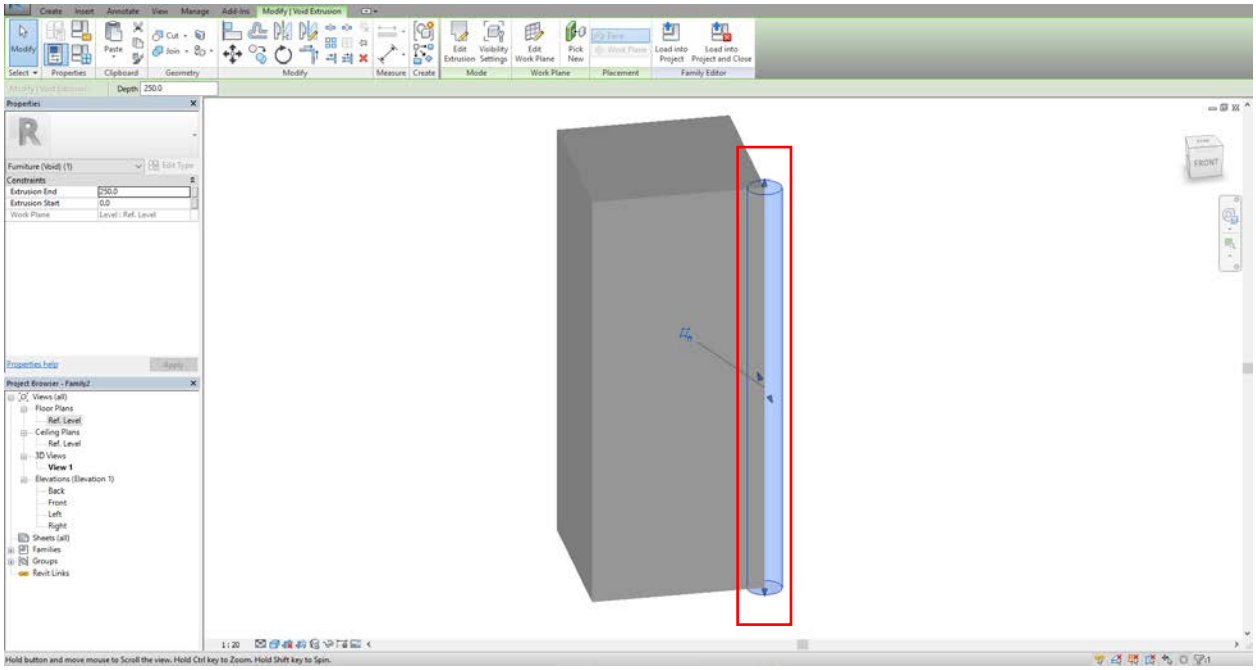
Create a void cylinder.

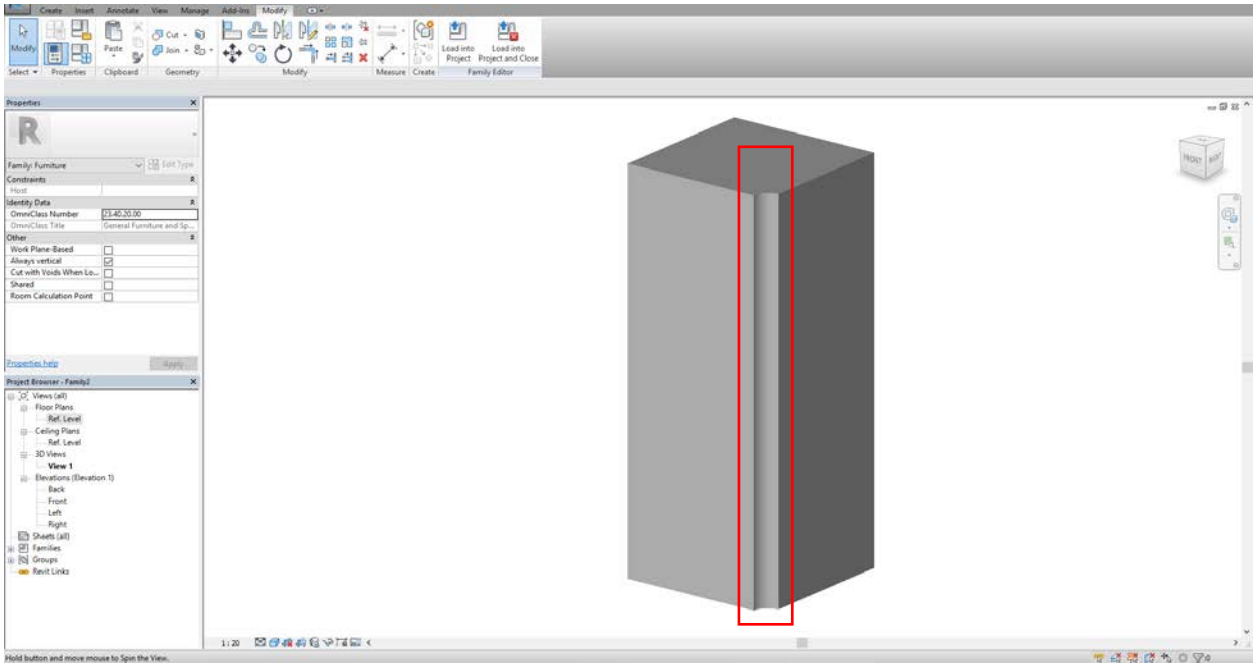

Void Extrusion
Void Blend
Void Revolve
Void Sweep
Void Swept Blend


Click to enter circle center.



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.

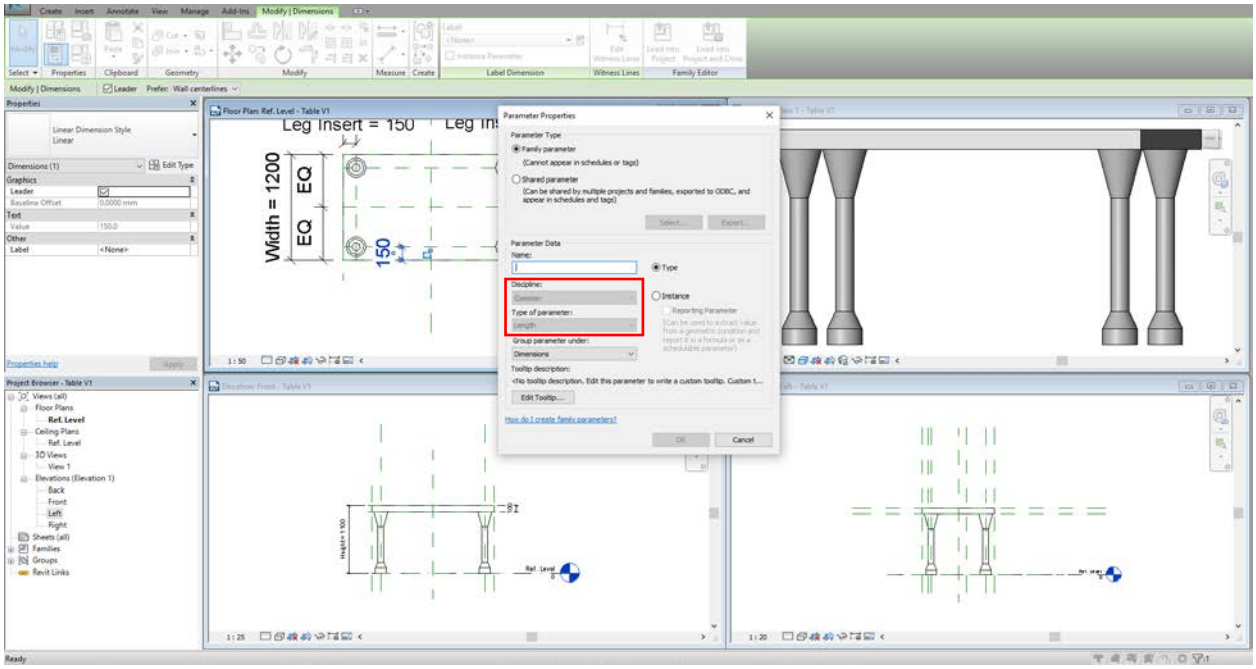


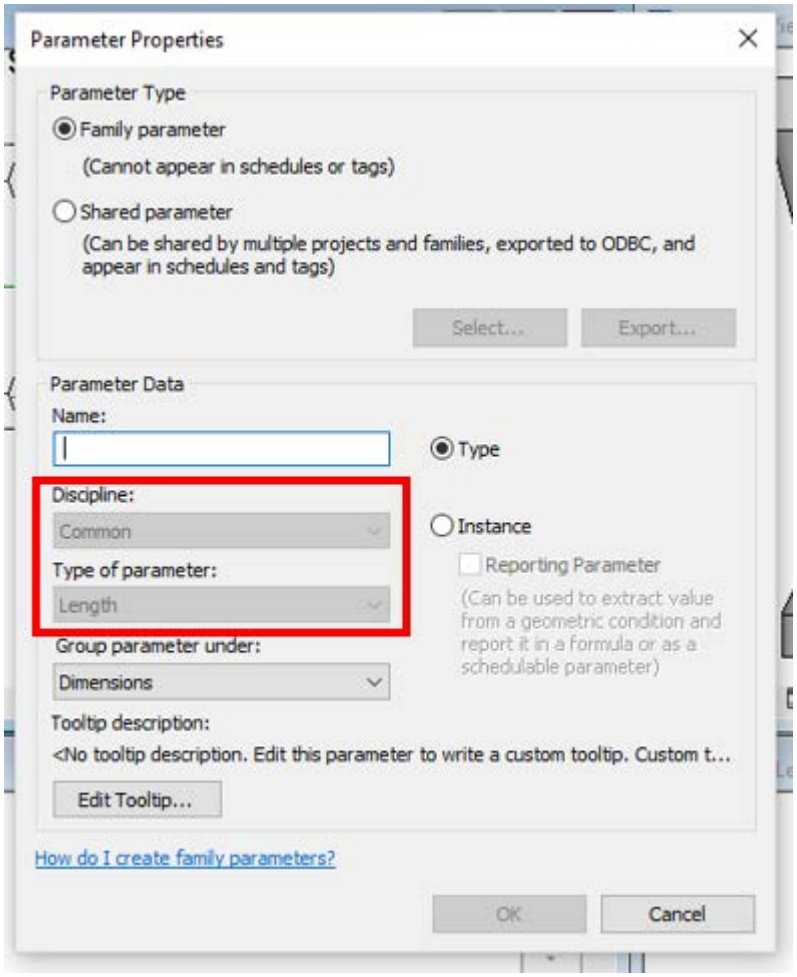

Create
Insert
Annotate
View
Manage
Add-Ins
Modify
Modify
Paste
Cut
Join
Load into Project
Load into Project and Close
Select
Properties
Clipboard
Geometry
Modify
Measure
Create
Family Editor
Properties
Family: Furniture
Edit Type
Constraints
Host
Identity Data
OmniClass Number
23-40.20.00
OmniClass Title
General Furniture and Sp...
Other
Work Plane-Based
Always vertical
Cut with Voids When Lo...
Shared
Room Calculation Point
Properties help
Apply
Project Browser - Family2
Views (all)
Floor Plans
Ref. Level
Ceiling Plans
Ref. Level
3D Views
View 1
Elevations (Elevation 1)
Back
Front
Left
Right
Sheets (all)
Families
Groups
Revit Links
1 : 20
Hold button and move mouse to Spin the View.

5. Beyond Geometry

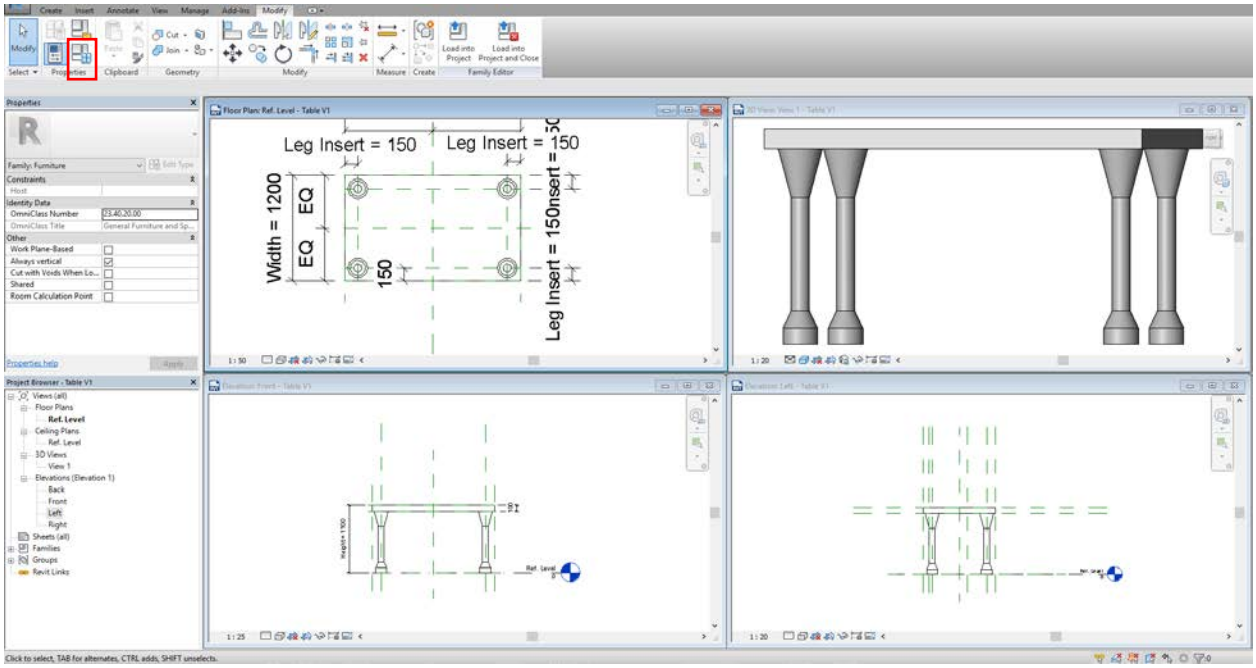
5.1 Working with identity data

If we click on a dimension and assign a parameter to it just like what we did in previous chapter, we'll notice that, Discipline and Type of Parameter are grey out. Since the object we select is a dimension, Revit automatically choose appropriate Discipline and Type for us.

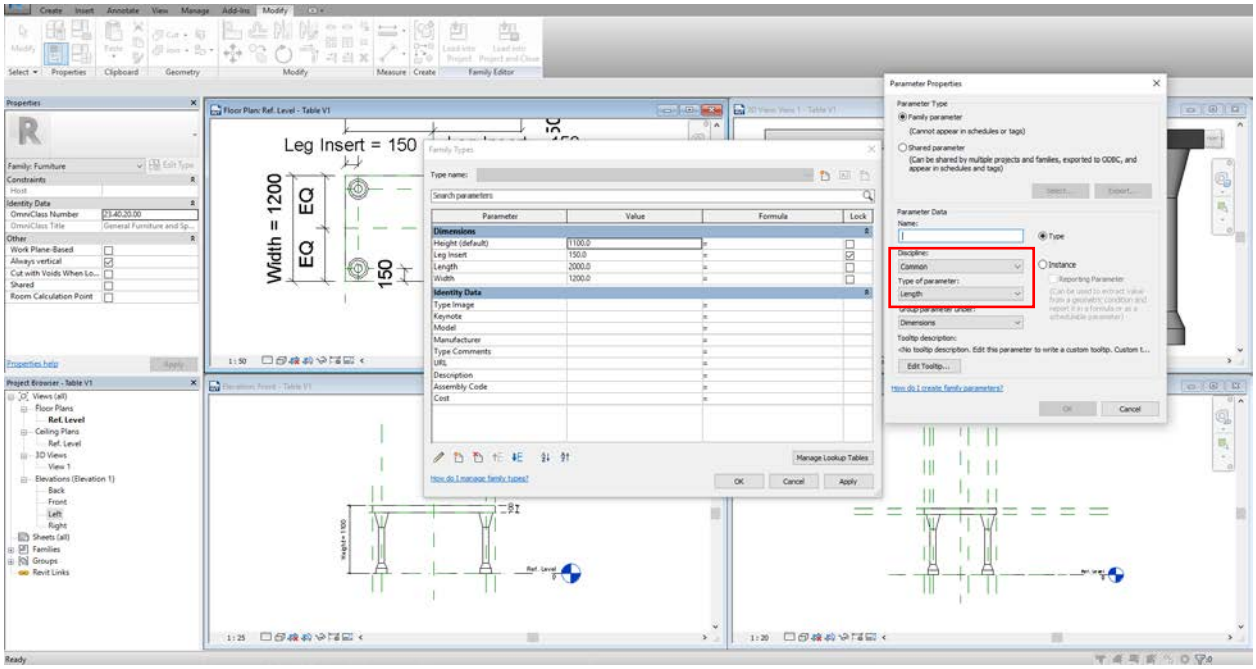


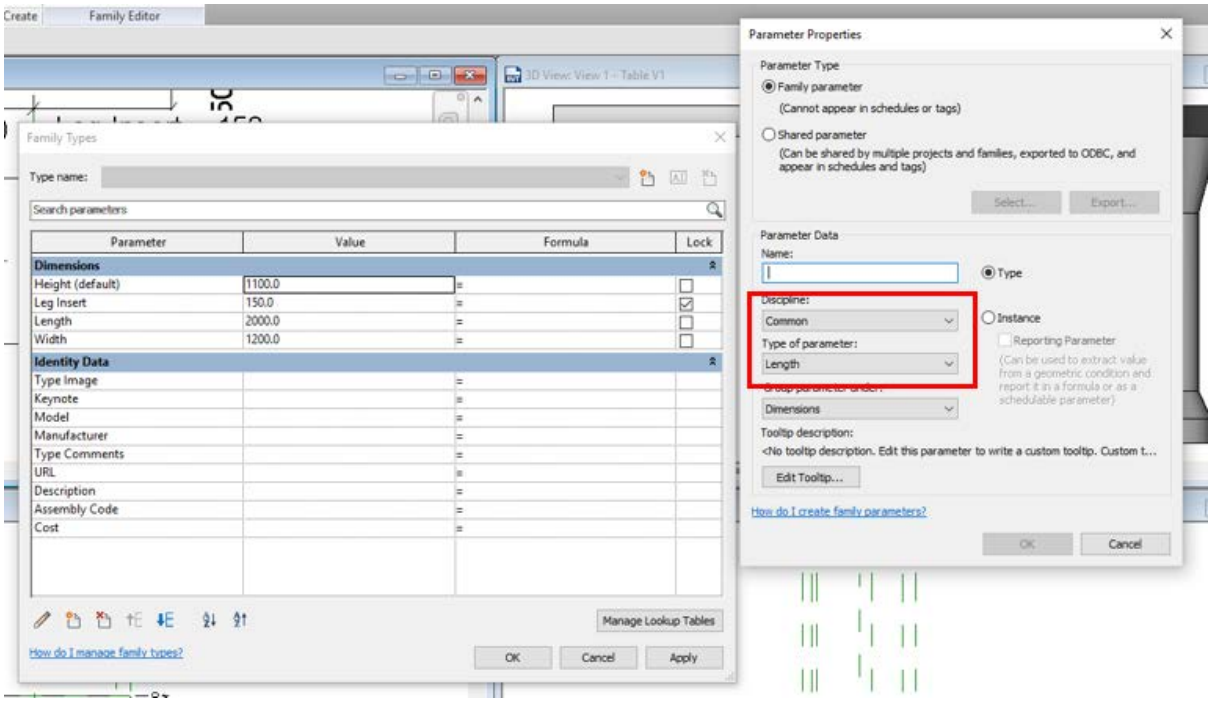


Instead of selecting the object then attach parameters to it, clicking on Family Types allow us to add parameters in another way.

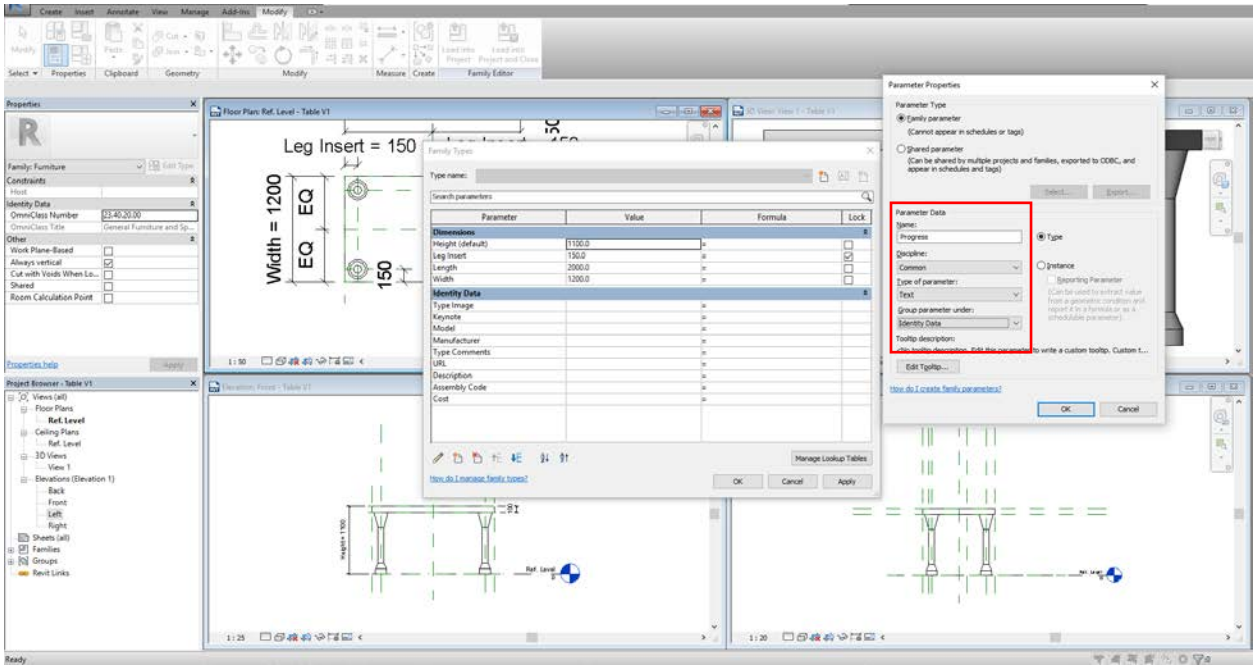


Notice if we click on New parameters, we'll be able to choose Discipline and Type.

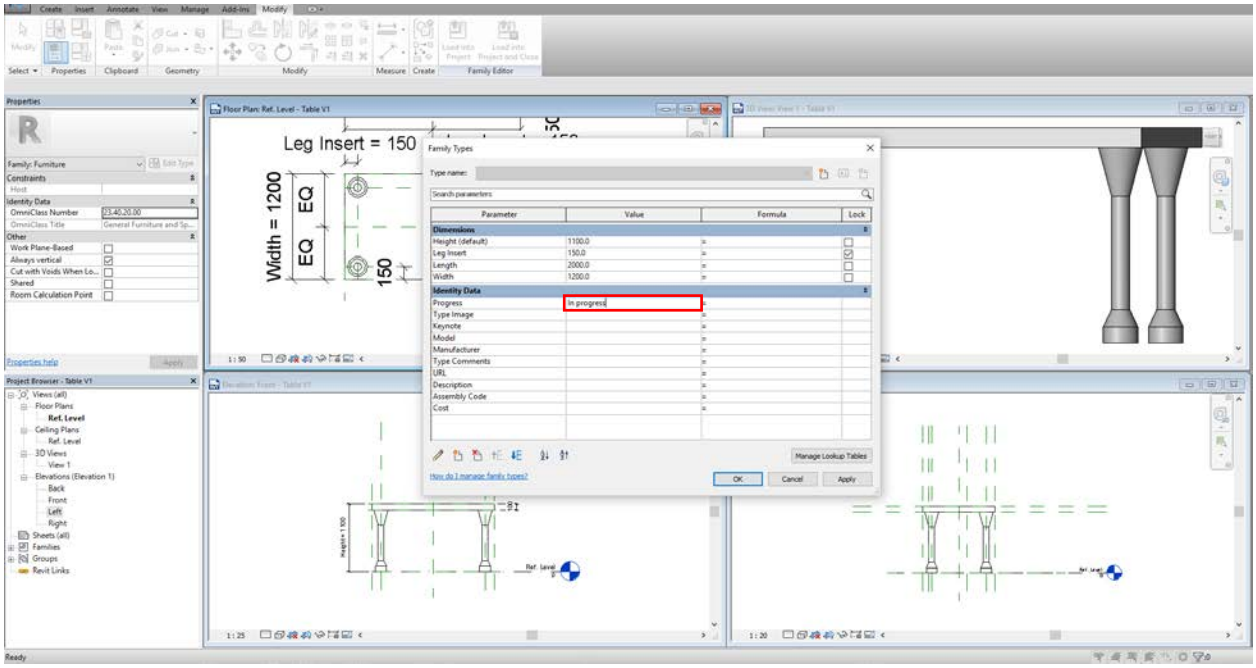


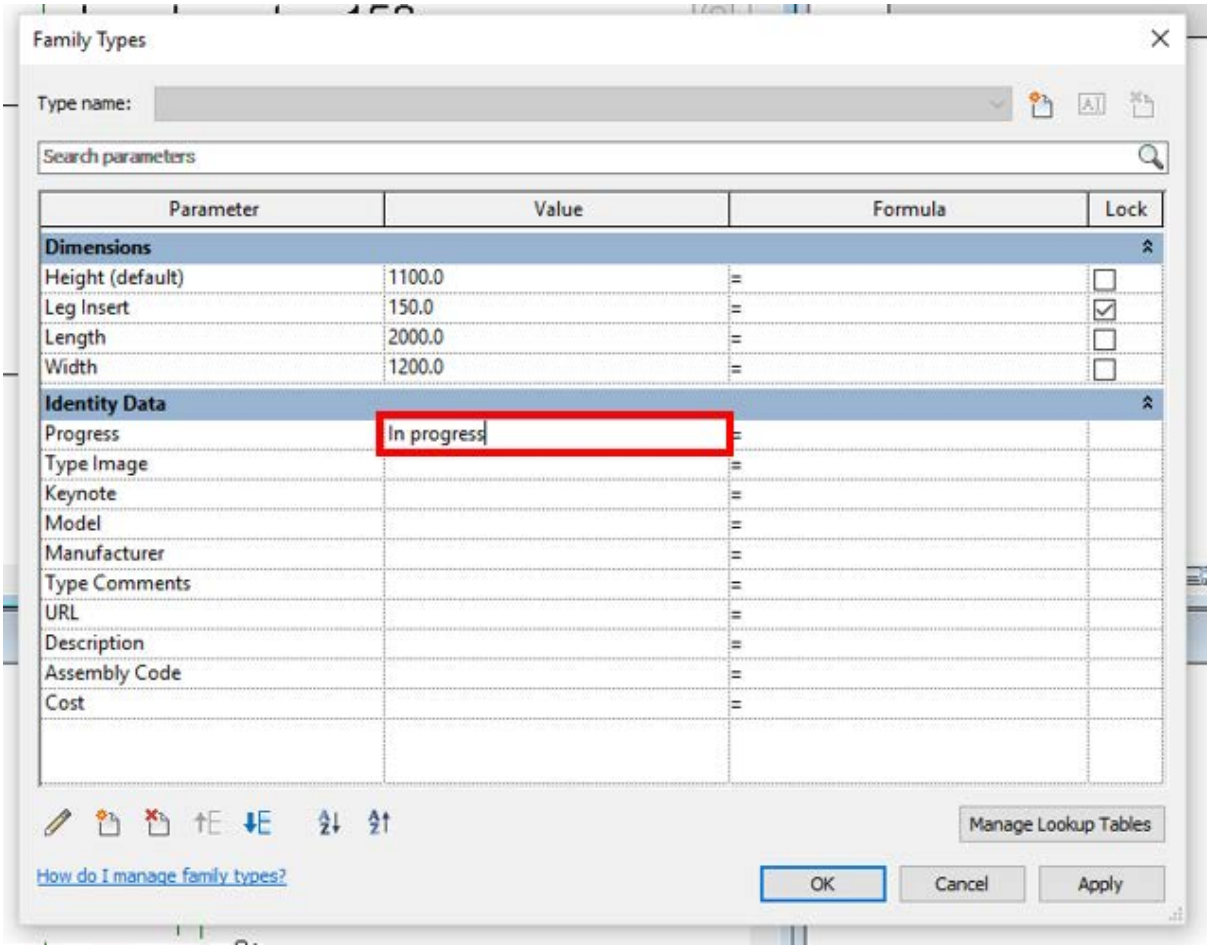


Add an identity parameter, simply name it Progress.

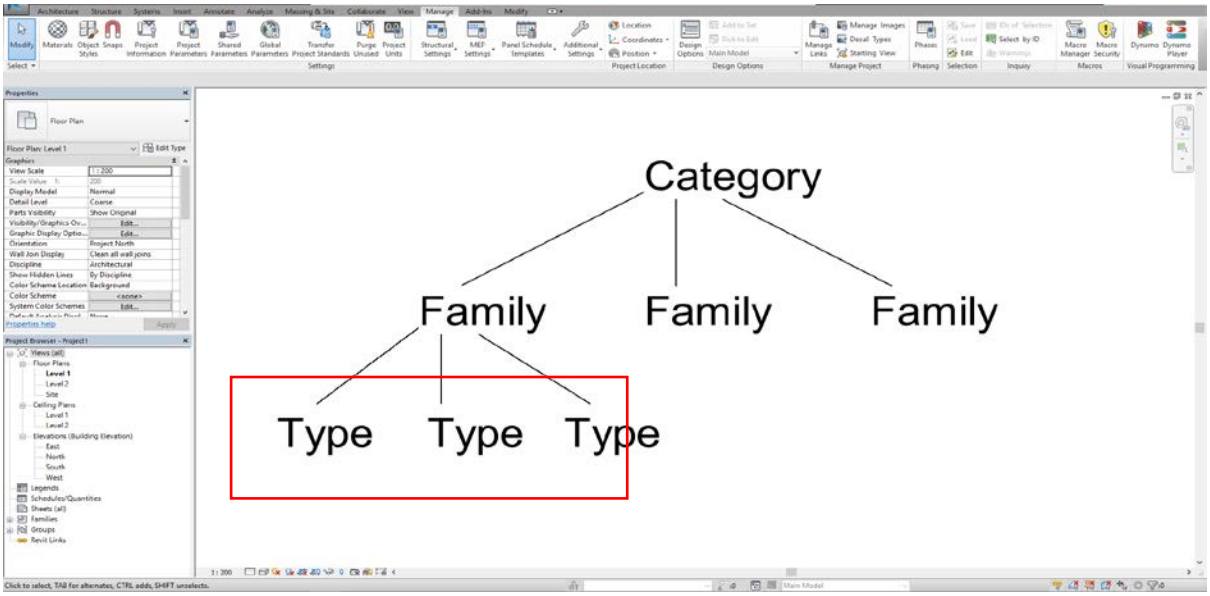


Since it's Text parameter, simply type in "In progress" to remind you the family is not finished.

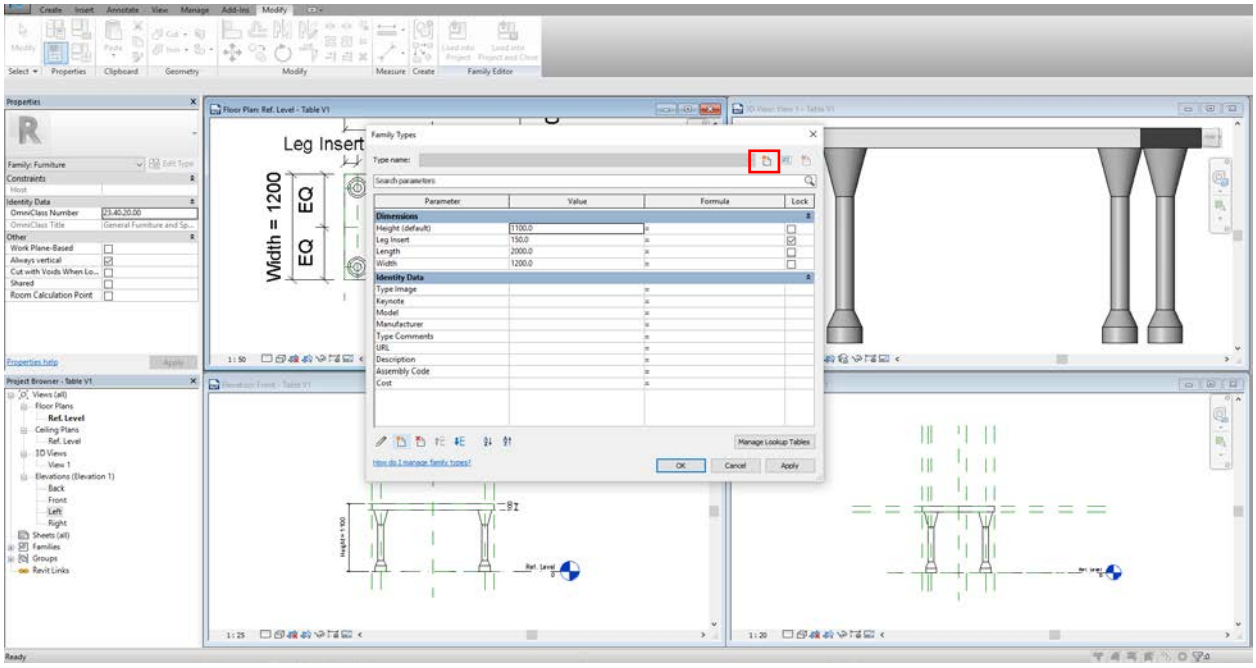




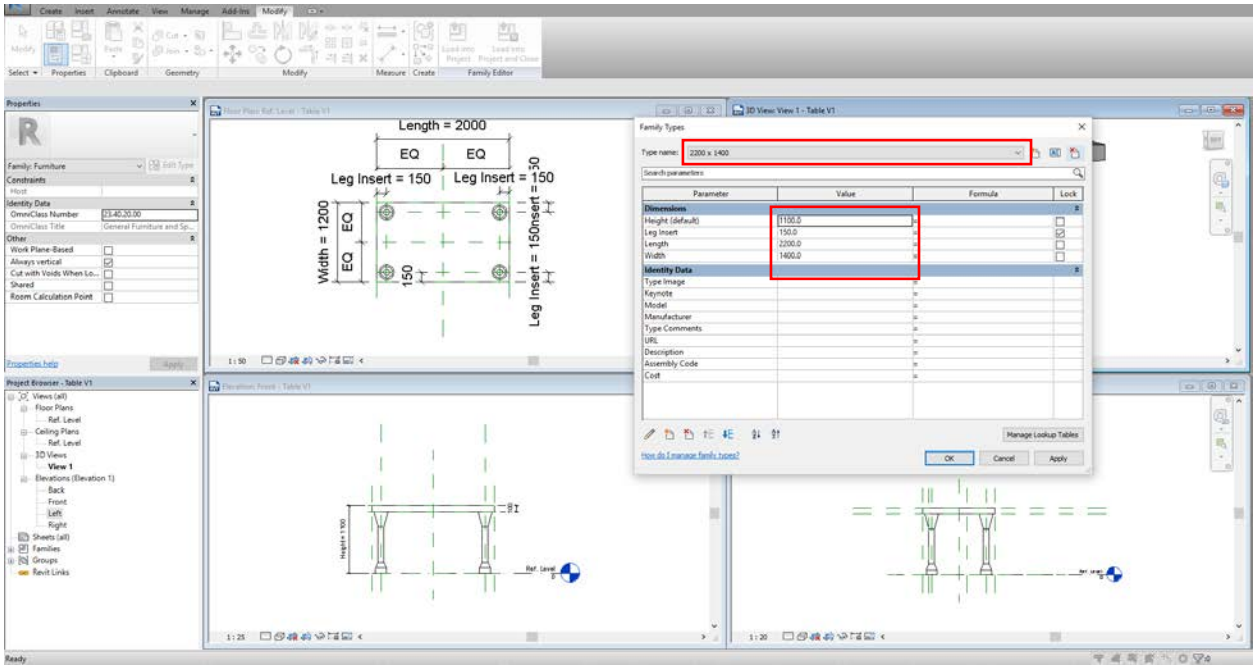
5.2 Adding family types

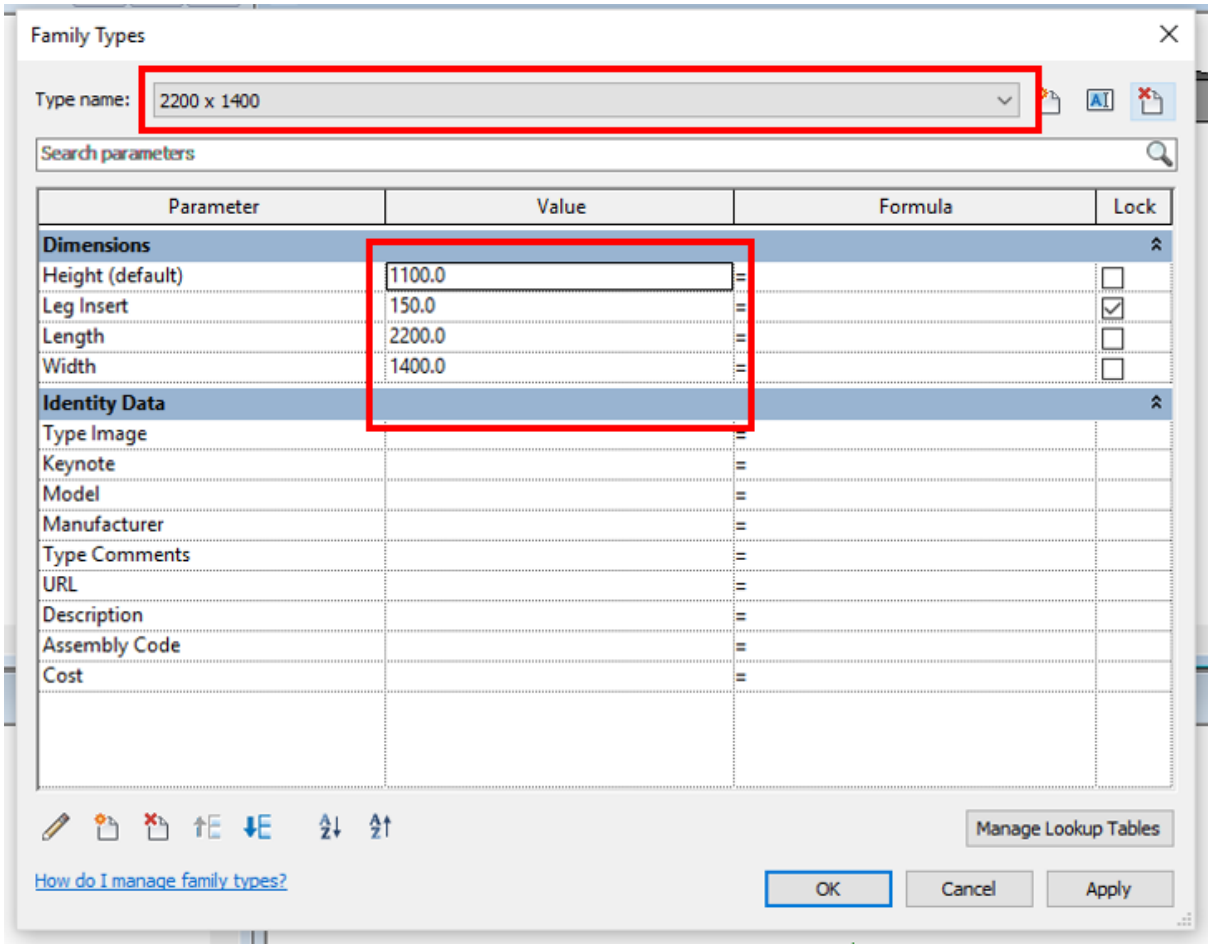


To add types of the family, go to Family Types.



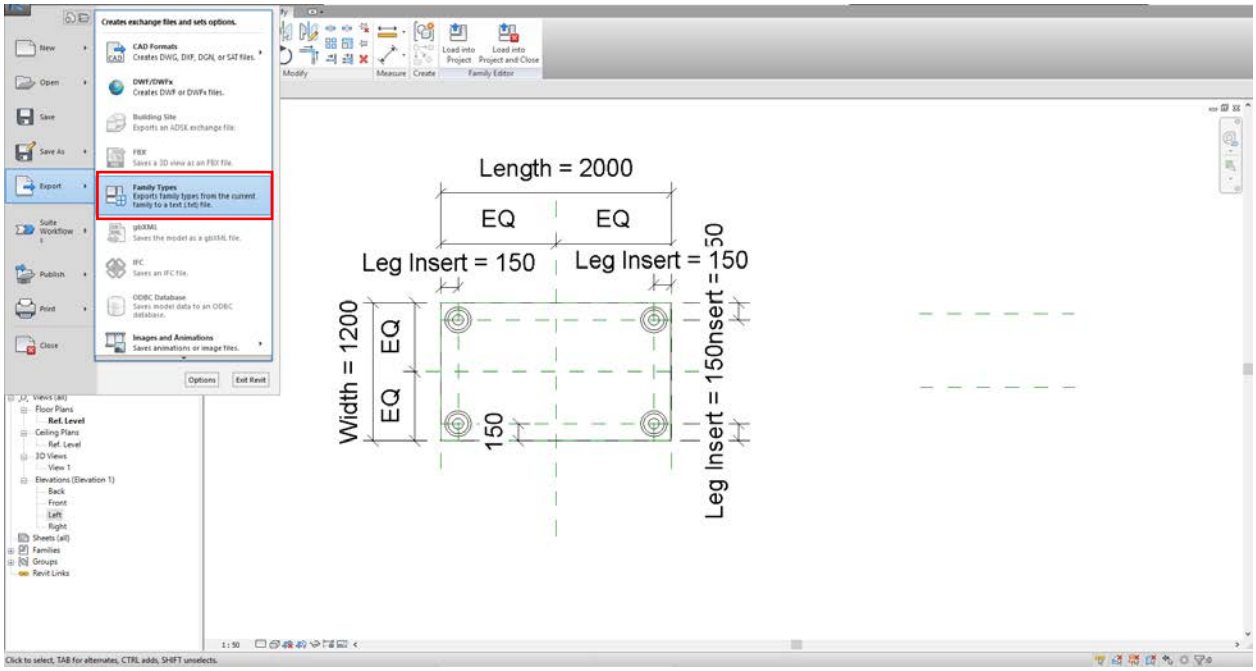
For the type with larger tabletop, name it “2200 x 1400” then change its dimension accordingly. Now we have a new type.





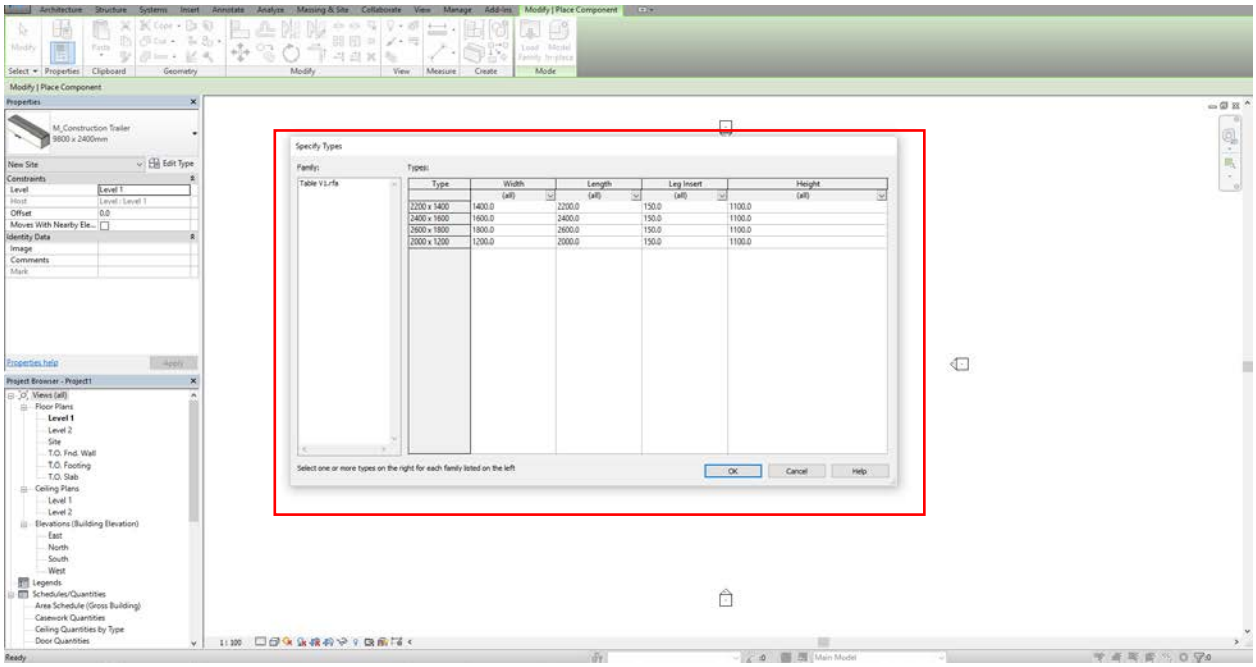
5.3 Creating type catalogs

A family may have many different types. Revit allow us to create a catalog for the types.



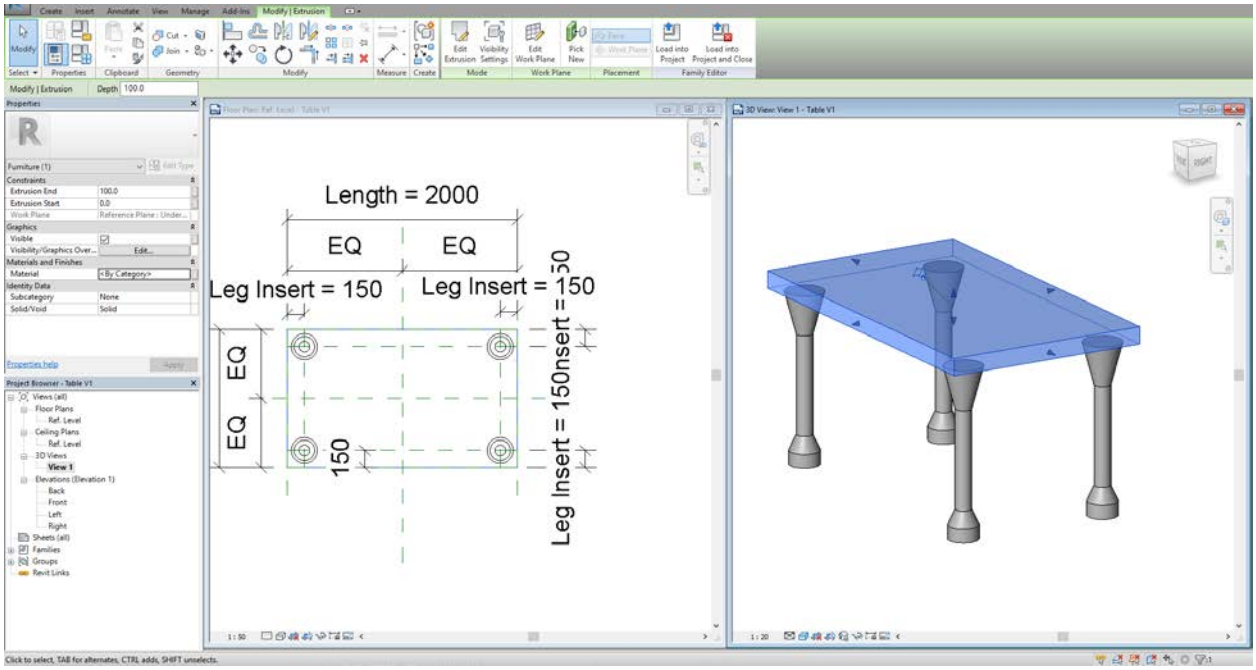
It's recommended that you save the catalog(.txt) in the same directory with your family. The fact that the catalog has the same name with you family is crucial to make sure it works properly.

Now if we import the family into a project we can import part of the catalog instead of loading in the whole collection.

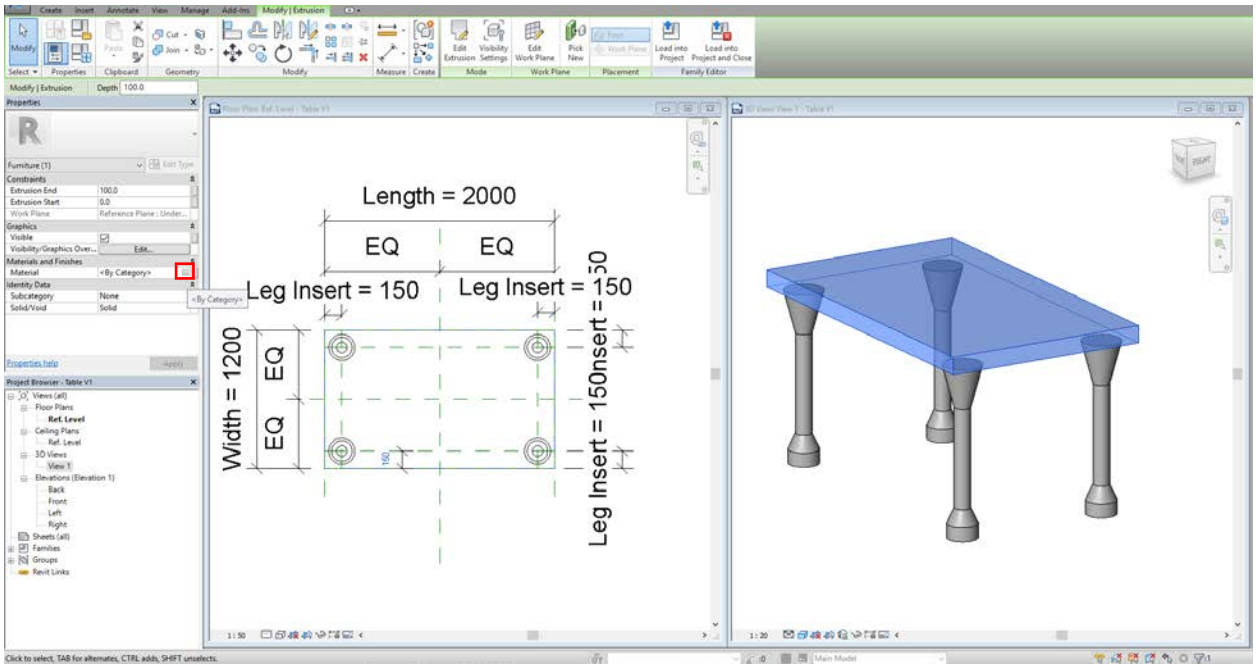


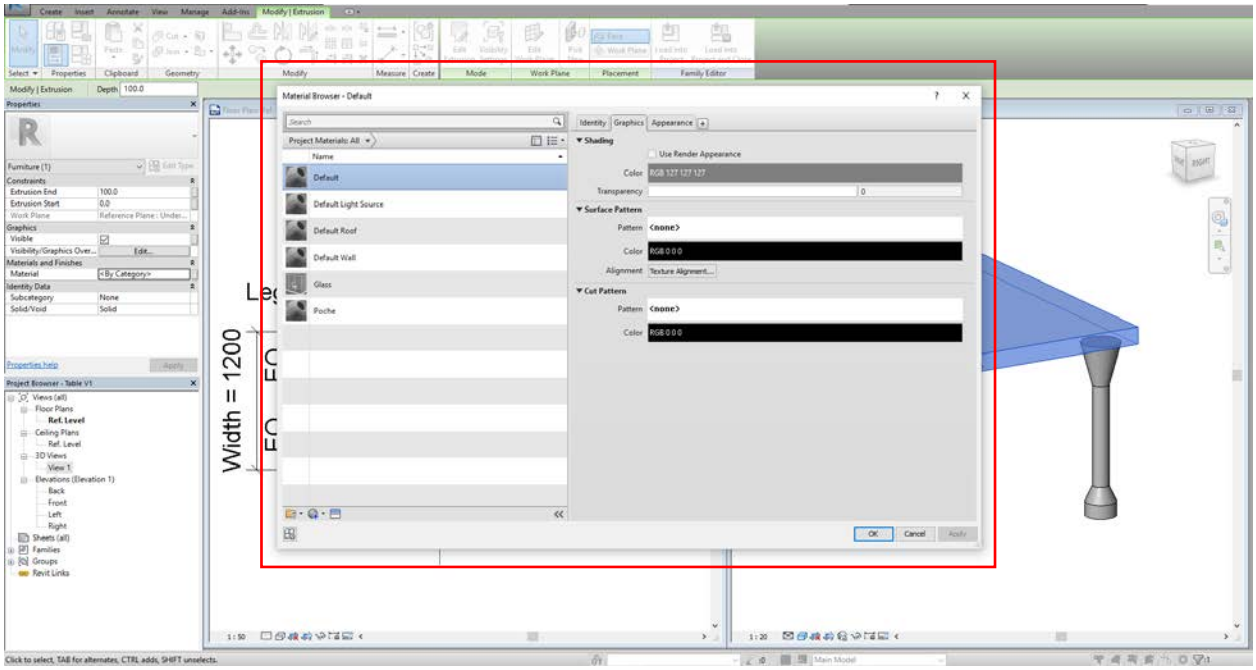
5.4 Using material parameters

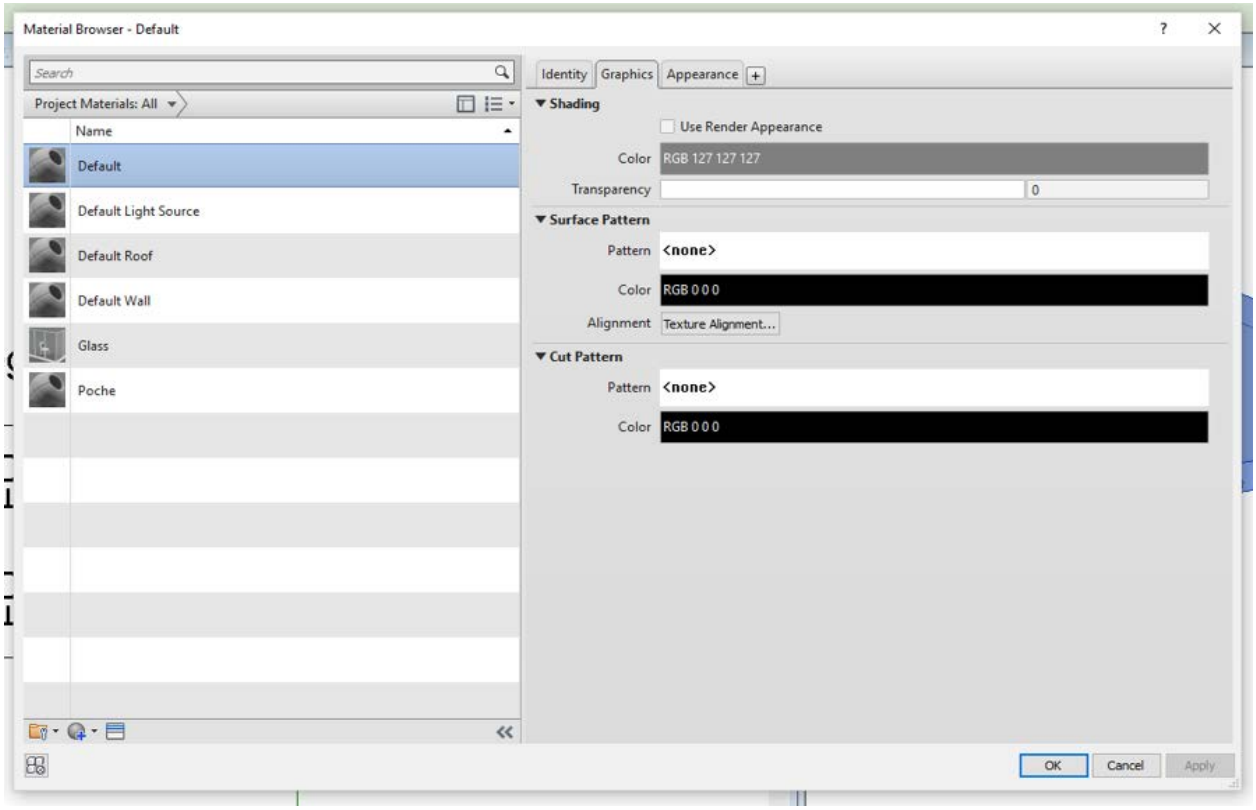
Select our tabletop.



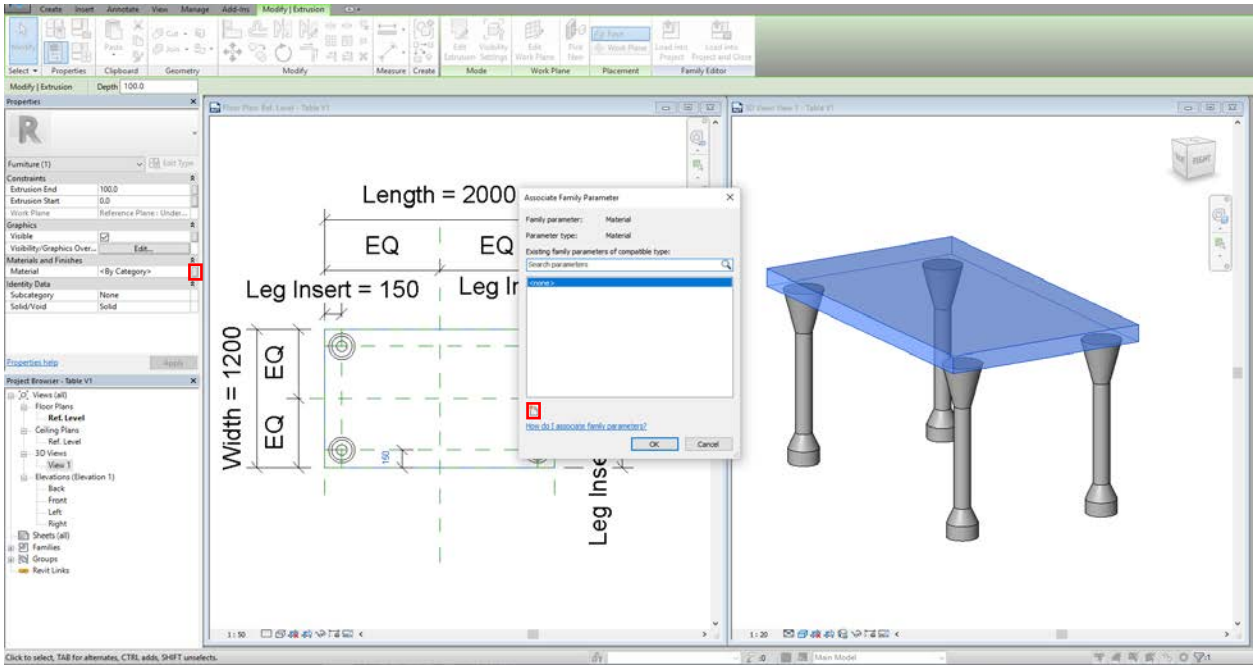
Default setting of Material is By Category. Open Material Browser to change material.

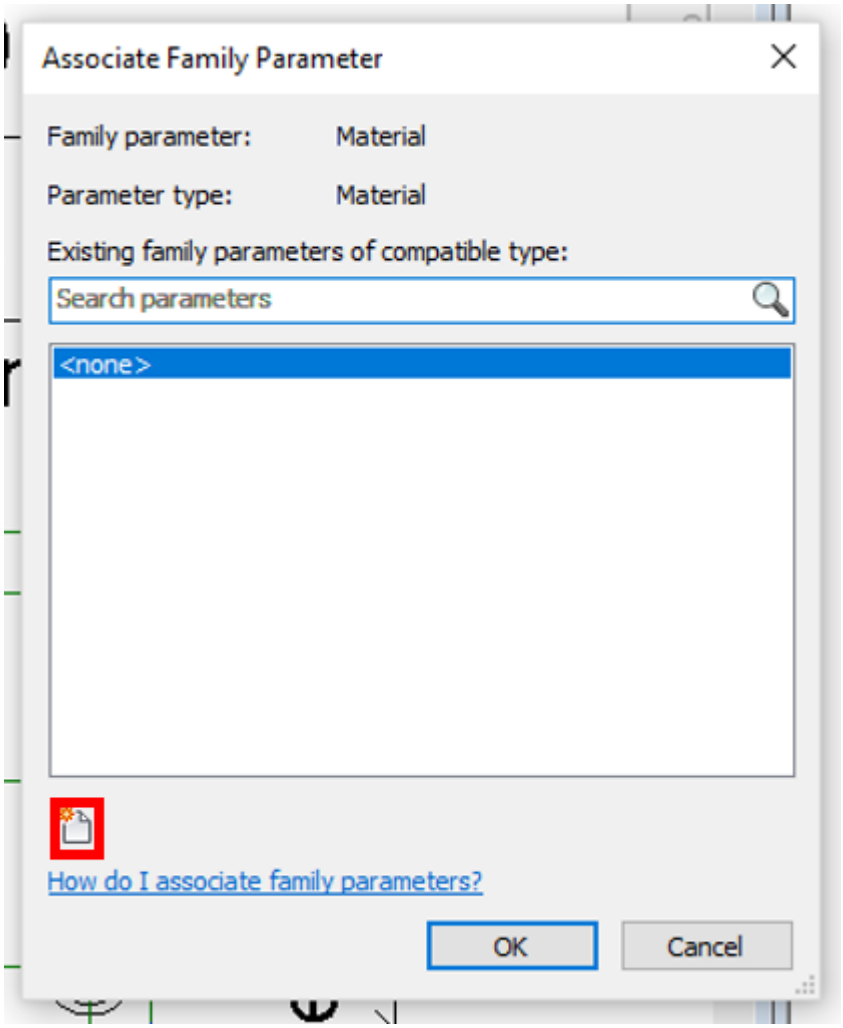


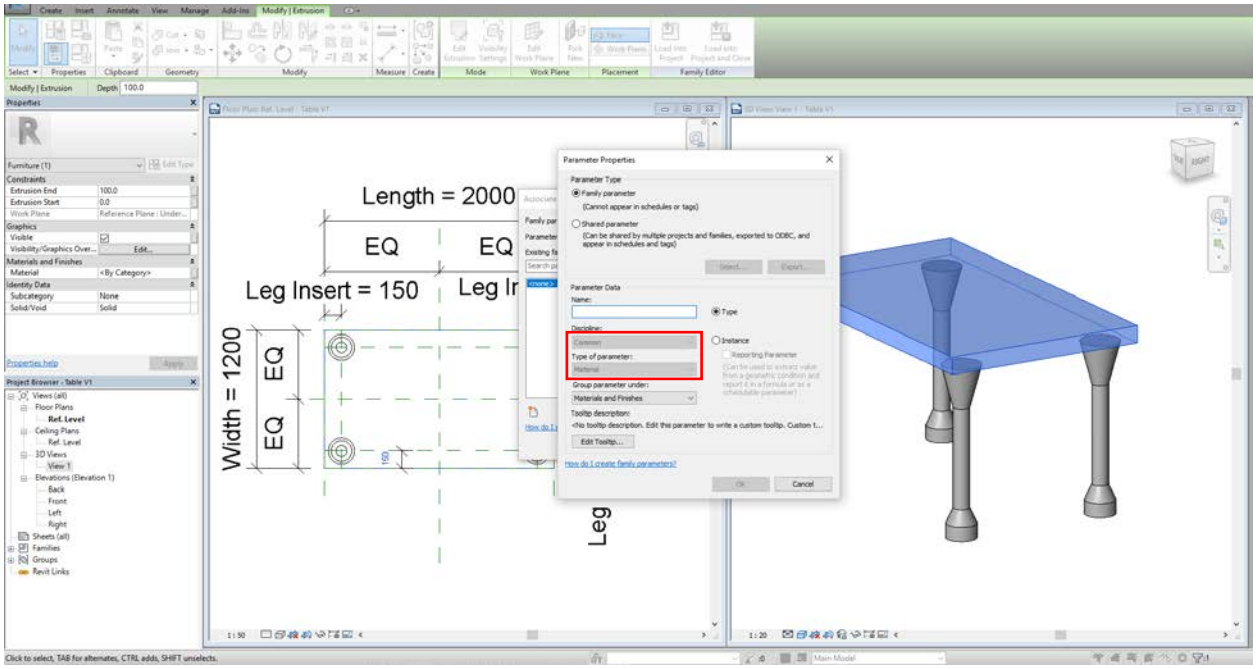




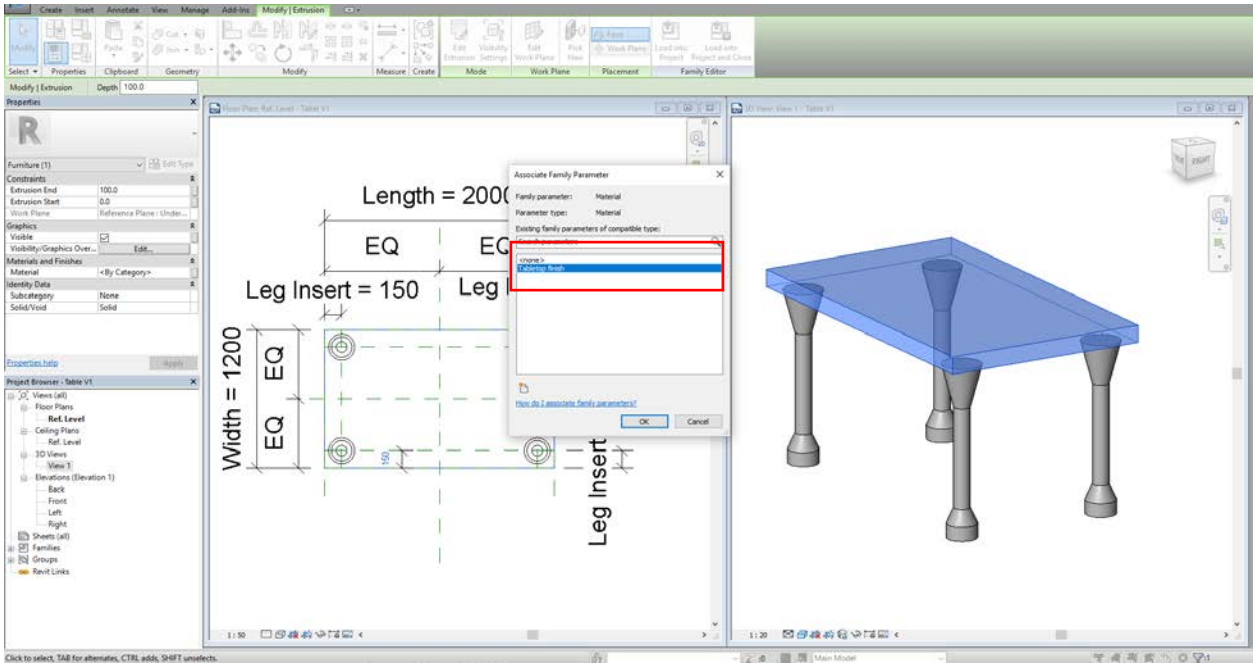
If you are familiar with list of material in Project Editor, you will notice that Revit has purged out most of the materials. Besides, changing material here means change it for good. End users of the family have absolutely no control over the material. To offer end users the option for changing materials in the project, adding a material parameter is the way to go.


Length = 2000
EQ
EQ
Leg Insert = 150
Width = 1200
EQ
EQ
Associate Family Parameter
Family parameter:
Material
Parameter type:
Material
Existing family parameters of compatible type:
Search parameters
<none>
How do I associate family parameters?
OK
Cancel

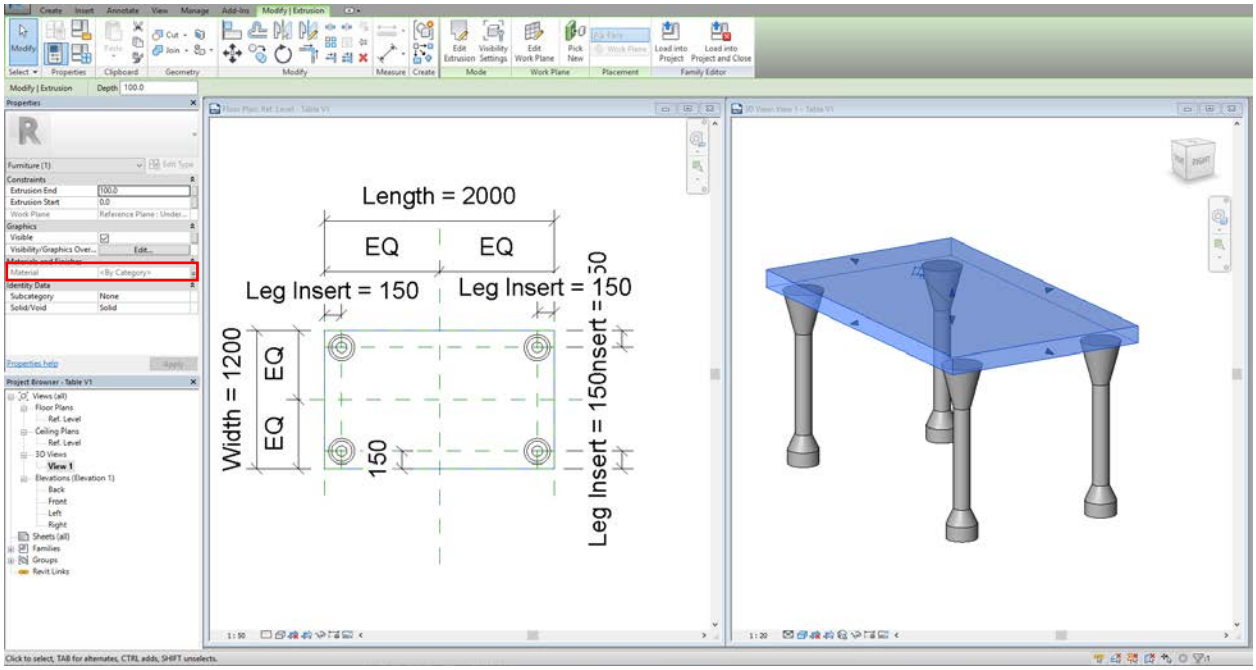

Associate Family Parameter
Family parameter:
Material
Parameter type:
Material
Existing family parameters of compatible type:
Search parameters
<none>
How do I associate family parameters?
OK
Cancel

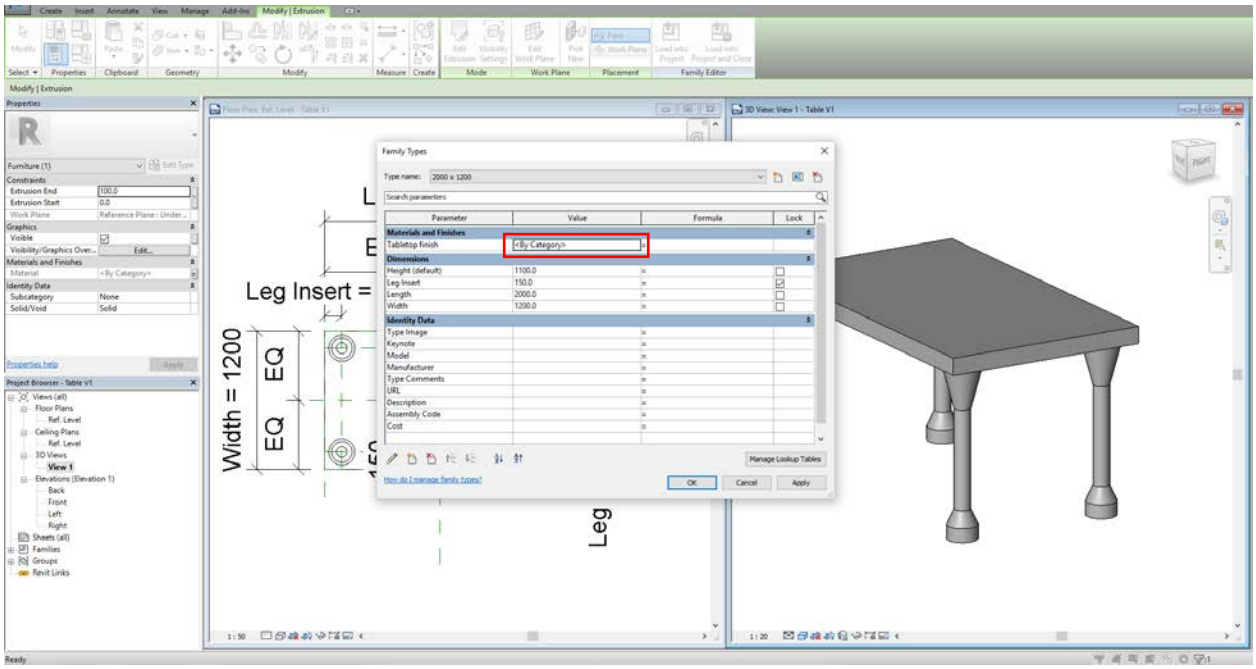


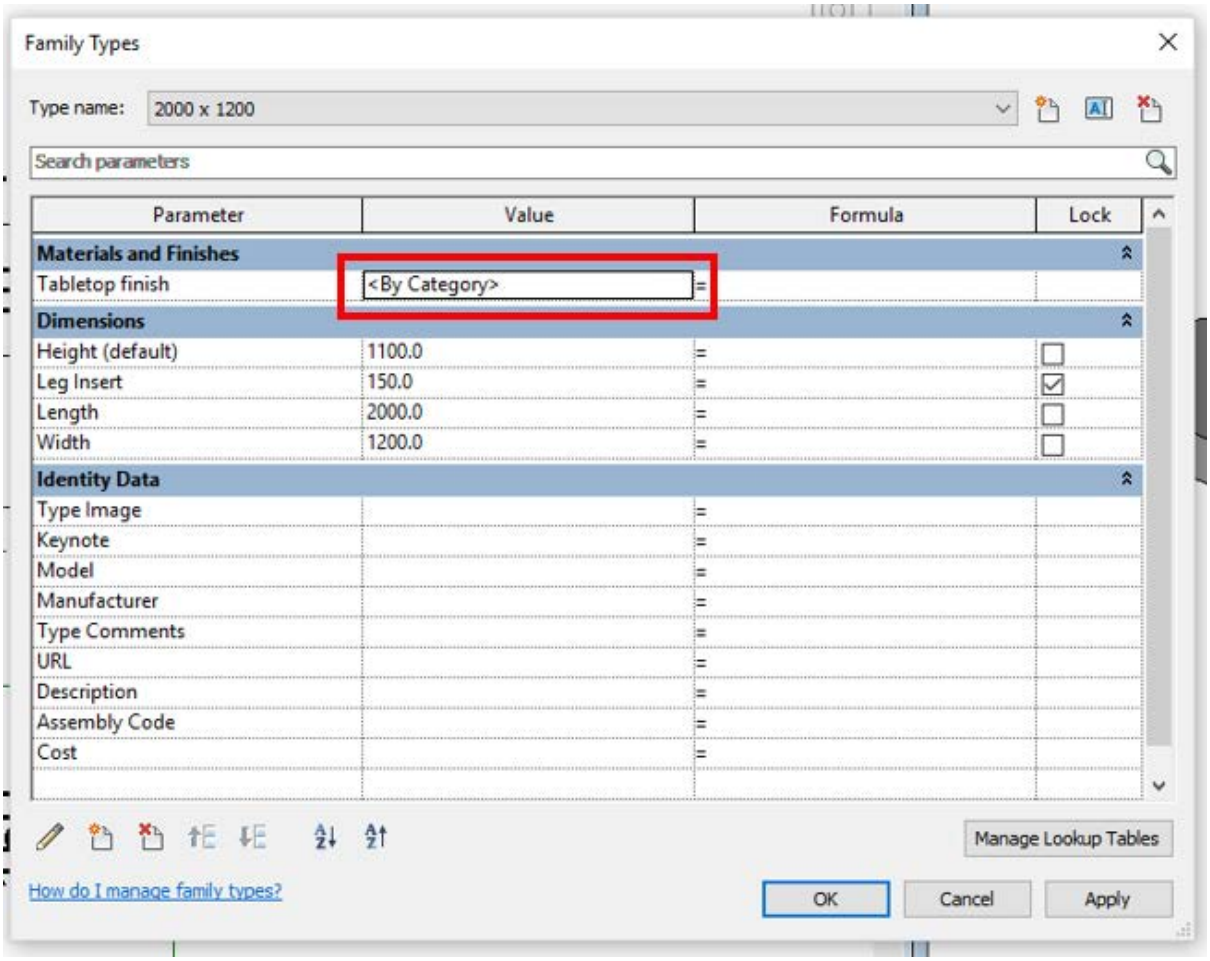
Simply name it Tabletop finish.



Essentially what we have done is creating a material place holder. Because if we click on tabletop, material option will grey out. However, if we go to Family Type or the project in the future, we'll be able to edit its material.


Length = 2000
EQ
EQ
Leg Insert = 150
Leg Insert = 150
Width = 1200
EQ
EQ
150
Leg Insert = 150nsert = 150

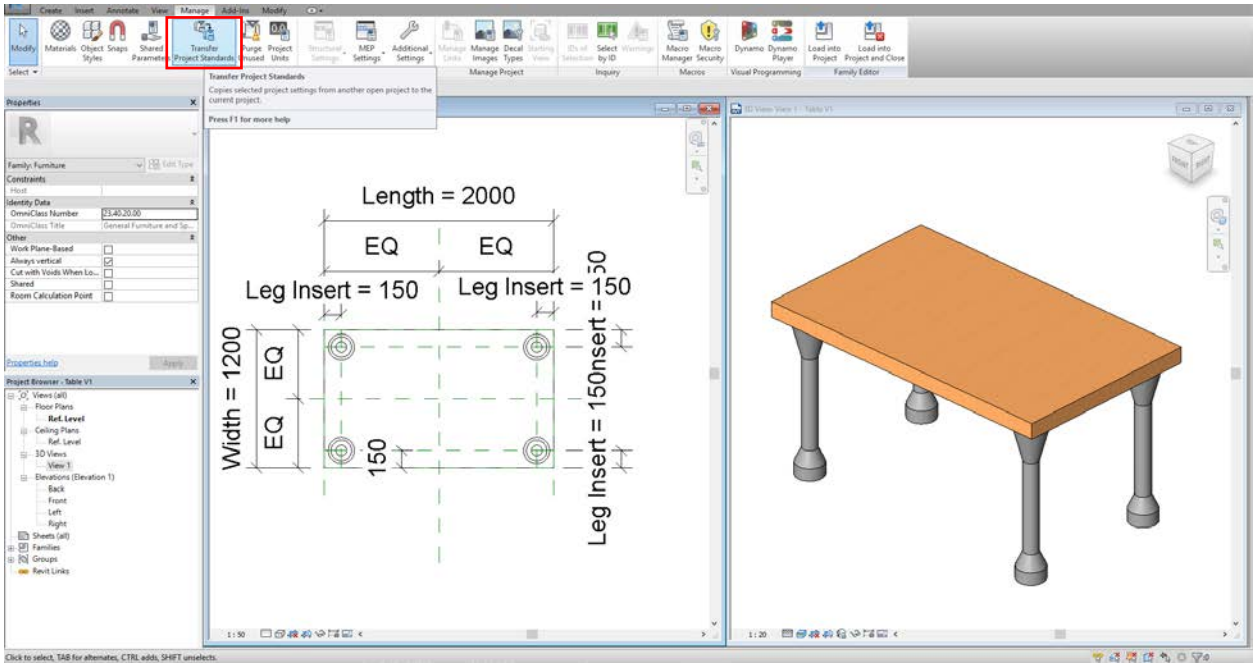

Family Types
Type name:
2000 x 1200
Parameter
Value
Formula
Lock
Materials and Finishes
Tabletop finish
<By Category>
Dimensions
Height (default)
1100.0
Leg Insert
150.0
Length
2000.0
Width
1200.0
Identity Data
Type Image
Keynote
Model
Manufacturer
Type Comments
URL
Description
Assembly Code
Cost
Manage Lookup Tables
How do I manage family types?
OK
Cancel
Apply
Leg Insert =
Width = 1200
EQ
EQ
Leg



5.5 Sharing materials

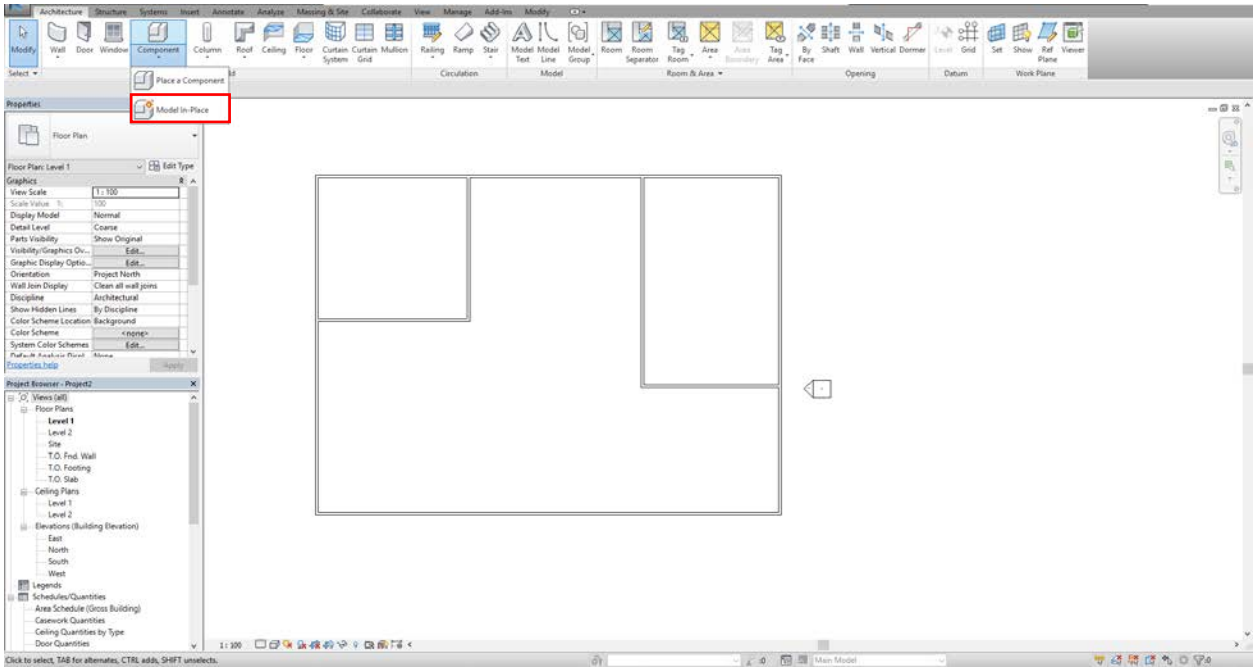
Revit provides us with a very comprehensive material library. Even though there're not many options in Family Editor but we have access to entire library in Project Editor. So, it's wise to search the material you want in the library.

Transfer materials from another project is also an option but you have to transfer either all of them or none of them.

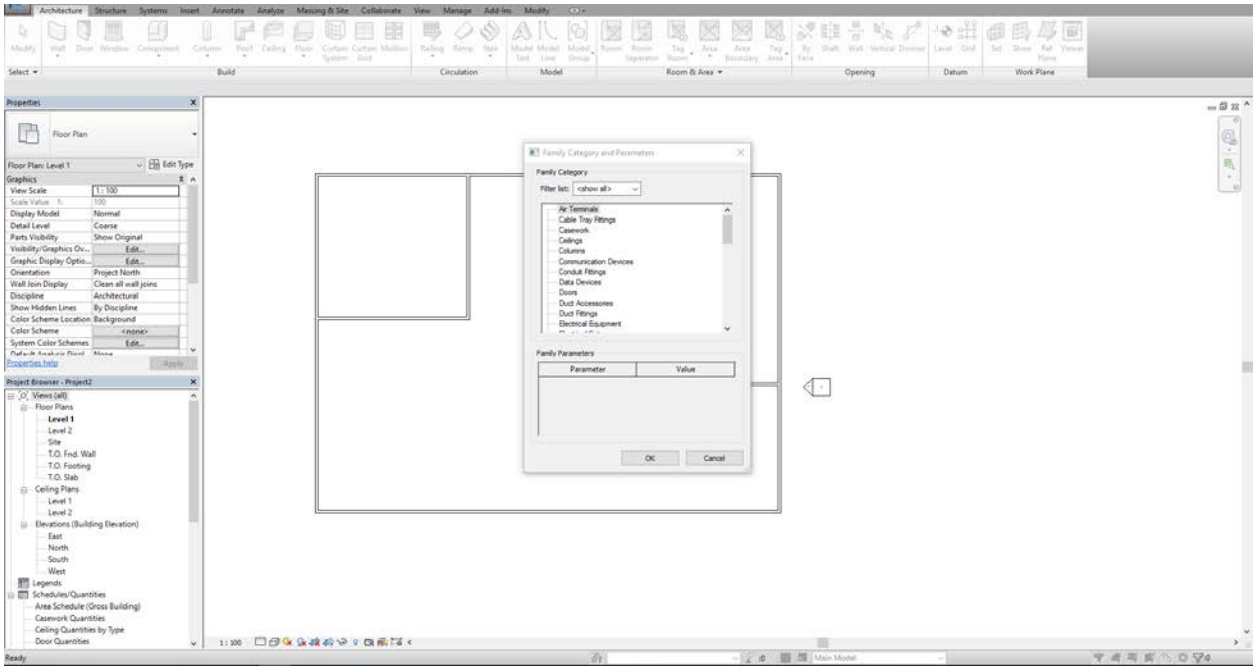


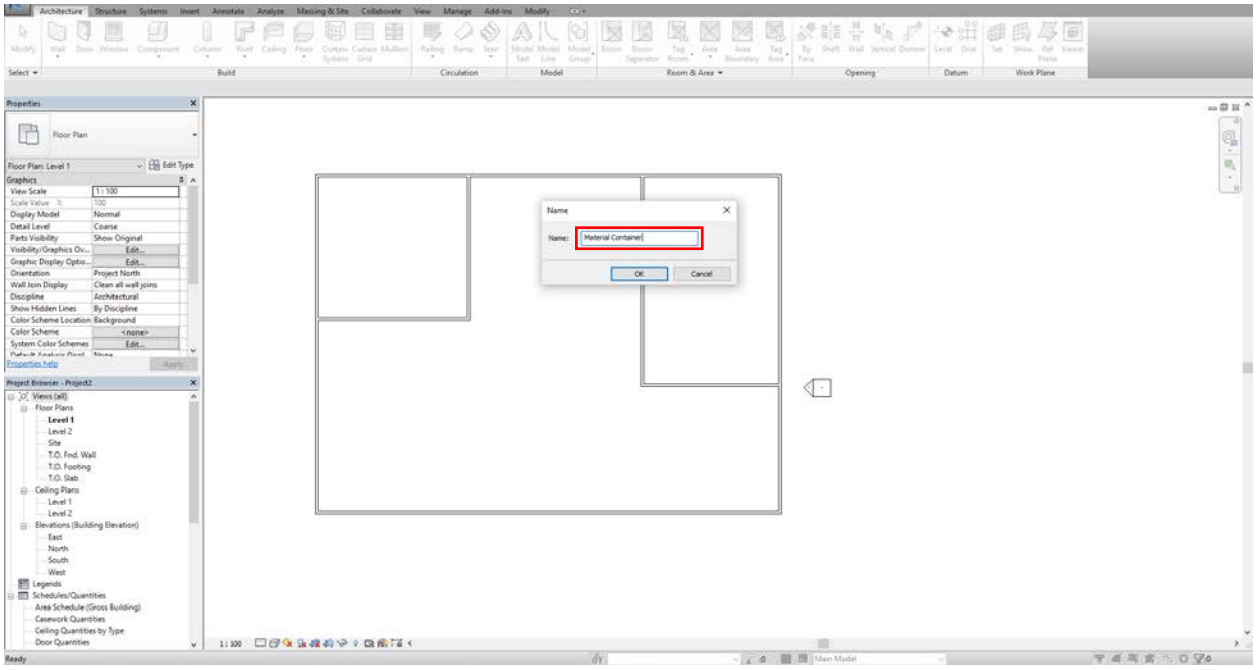
Creating a new material from scratch is achievable but not recommended since many tricky details need to be taken care of. Bringing an existing material from other projects is much more convenient.

First thing we need to do is create an in-place family which will serve as a material container.

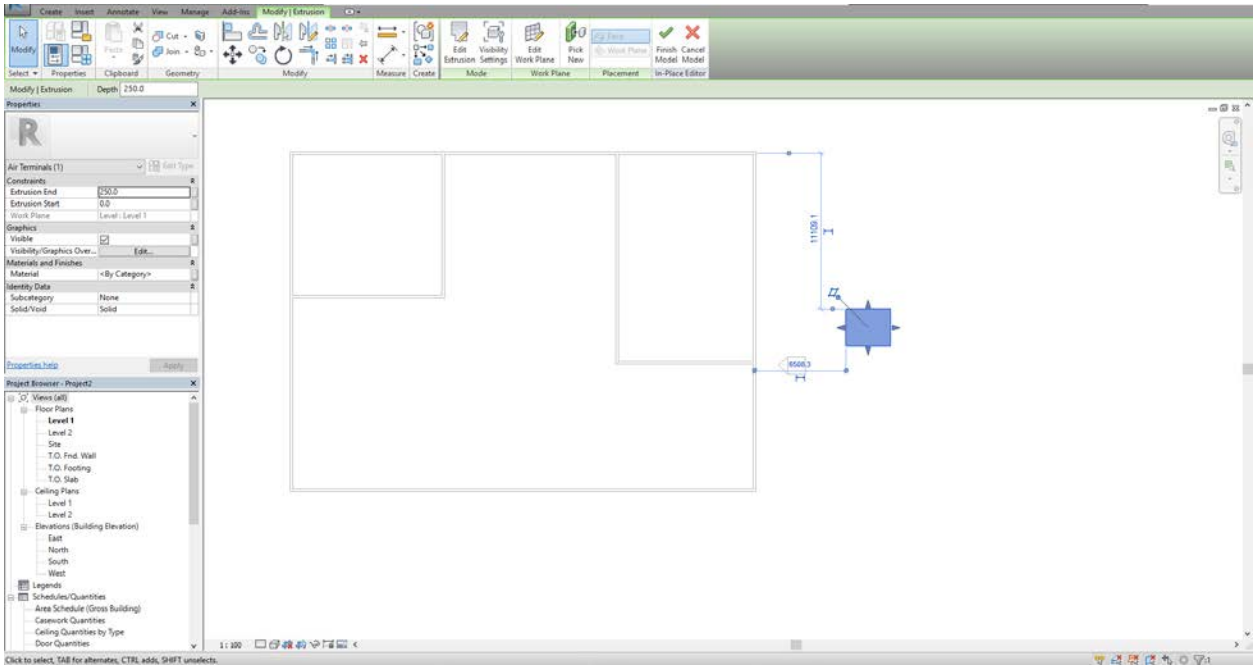


Category and name are not important.

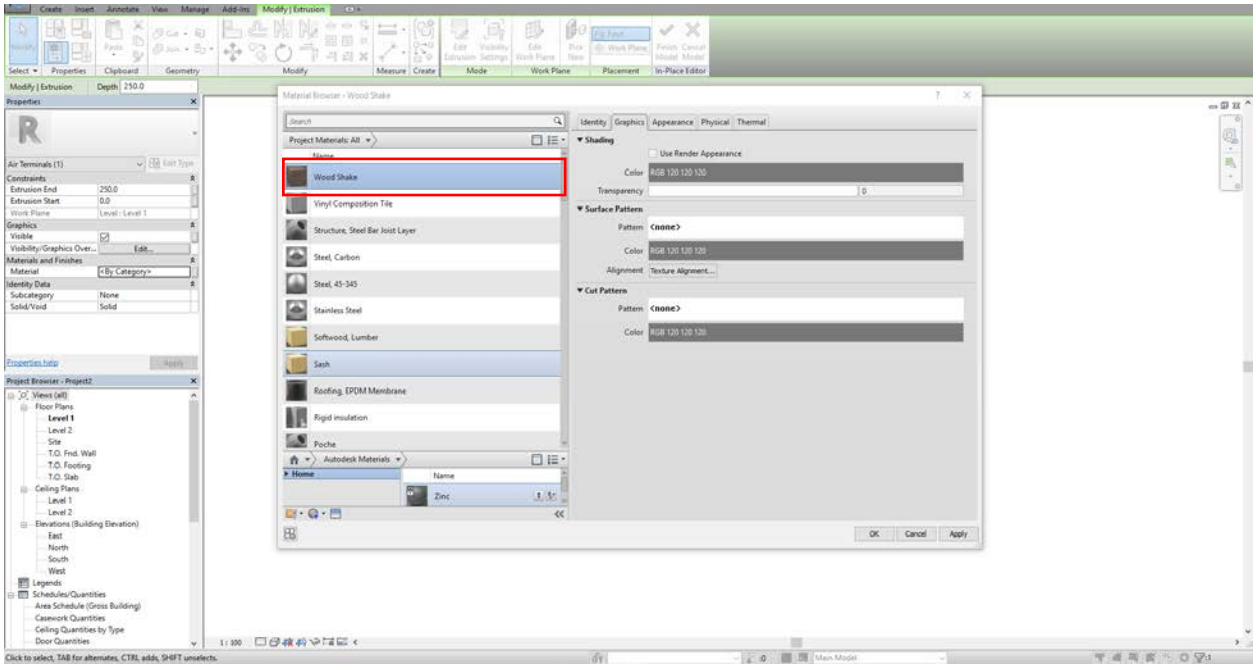




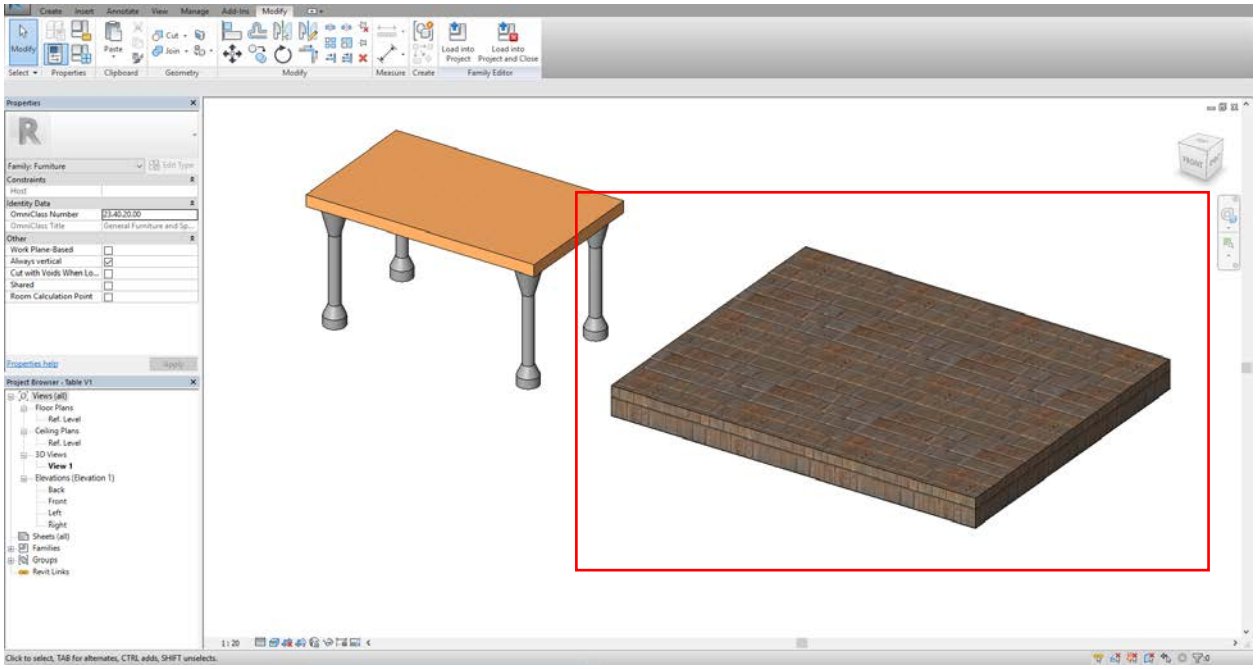
Notice that interface has switched to Family Editor. Simply create a box.



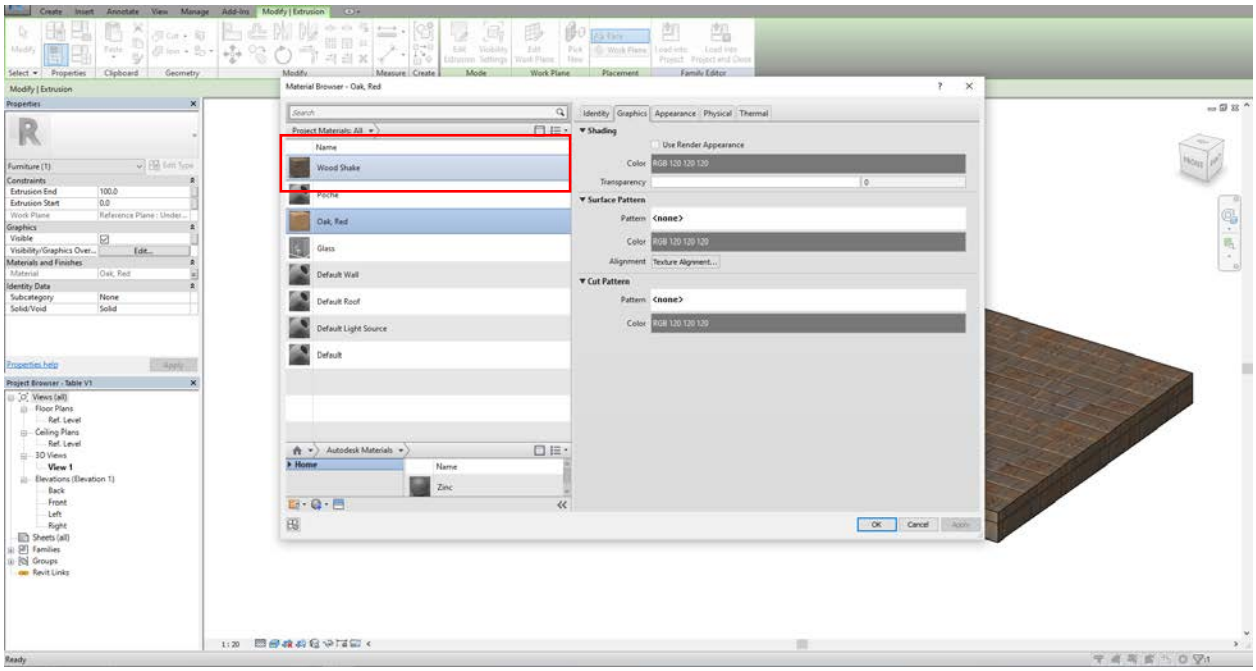
Assume Wood Shake is our target.



Copy and paste it.



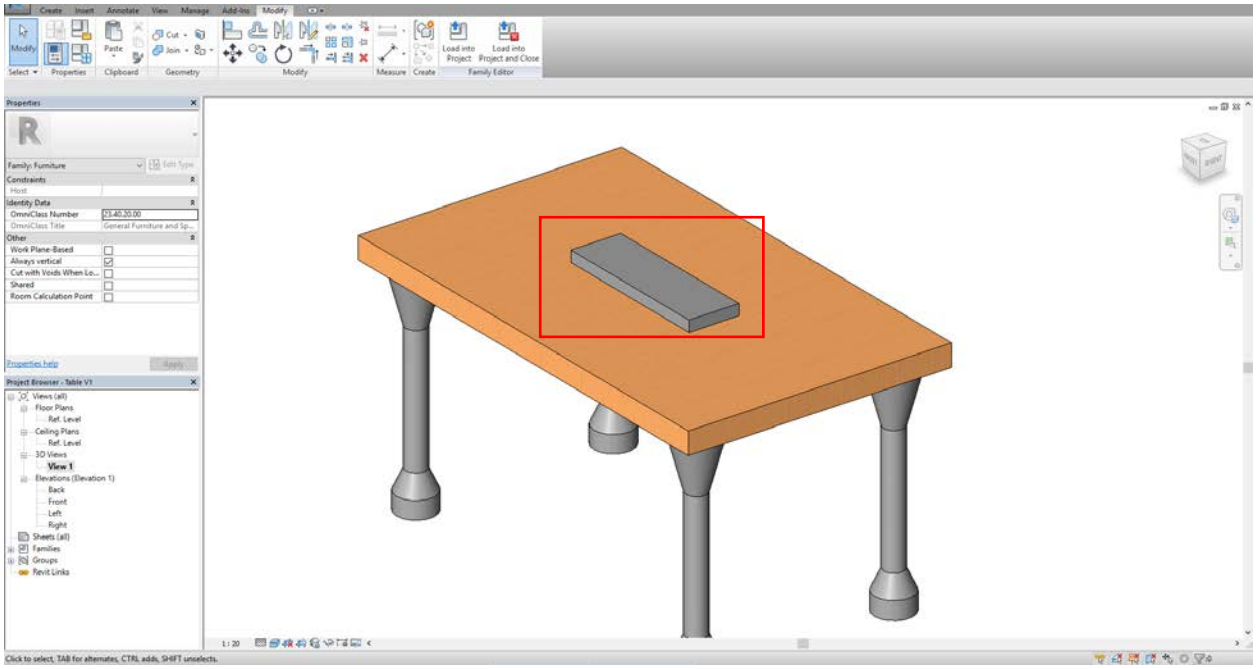
Now, we have introduced Wood Shake to the table.



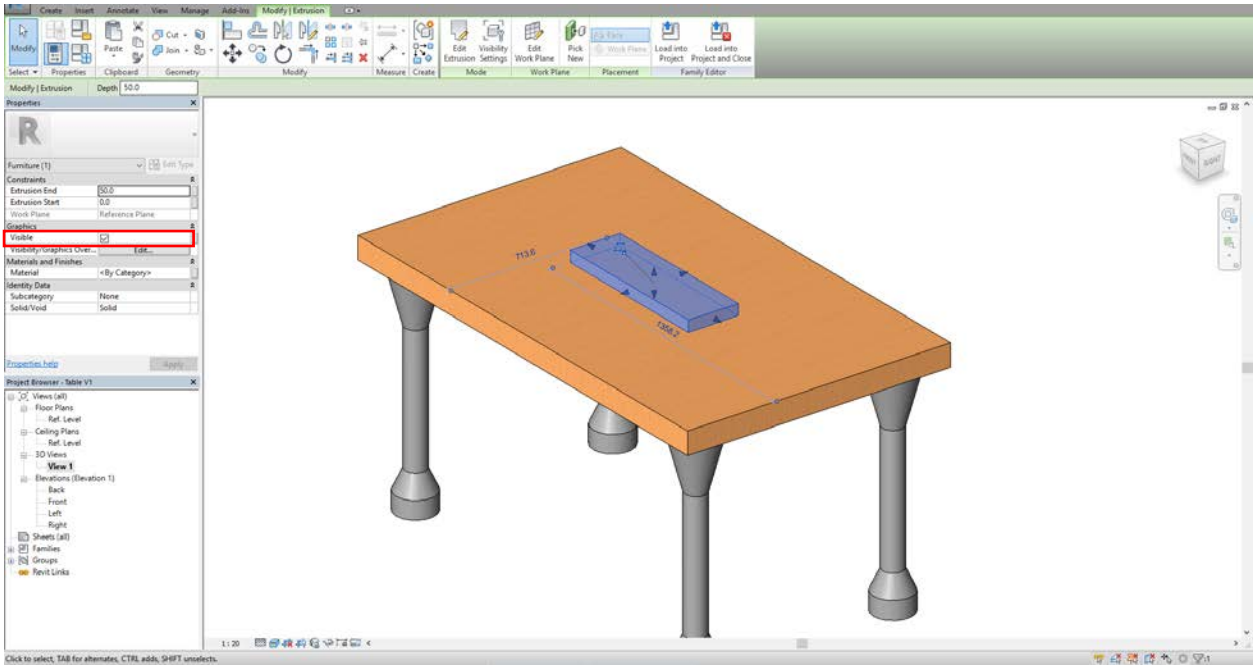
Note: Material container must be an in-place family rather than a wall or some other object.

5.6 Creating visibility parameters

Sometimes you might want to hide part of your family.

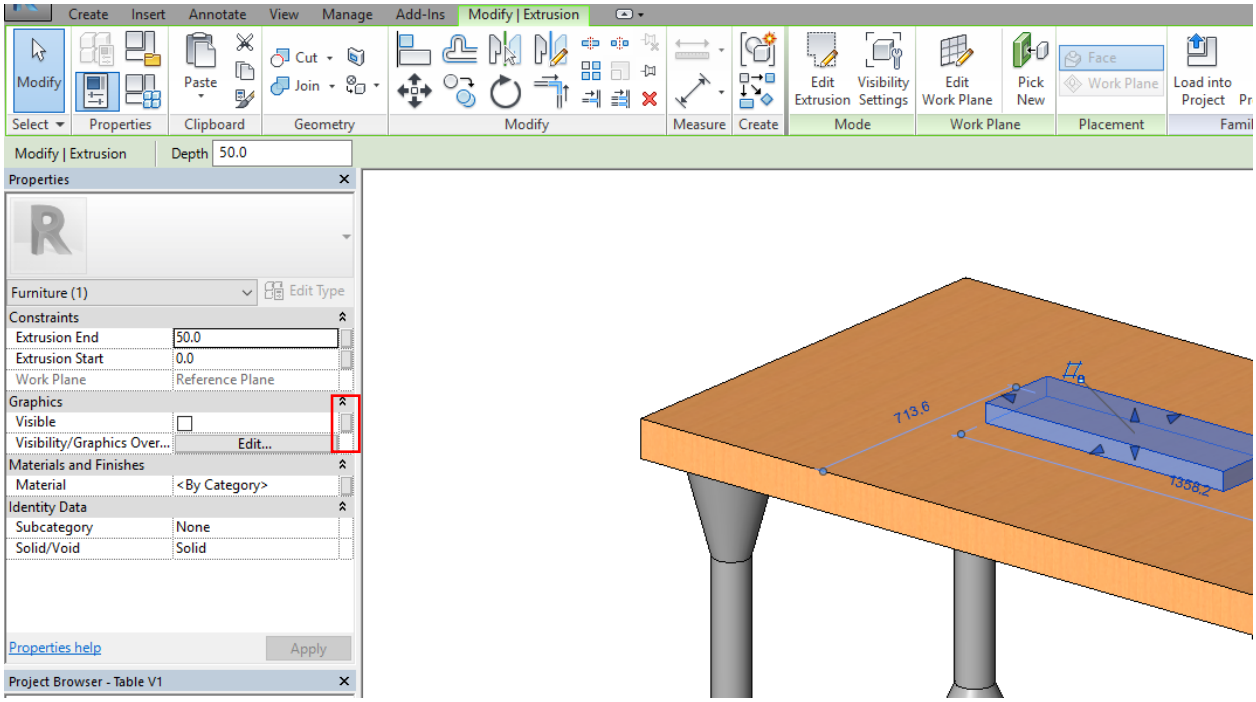


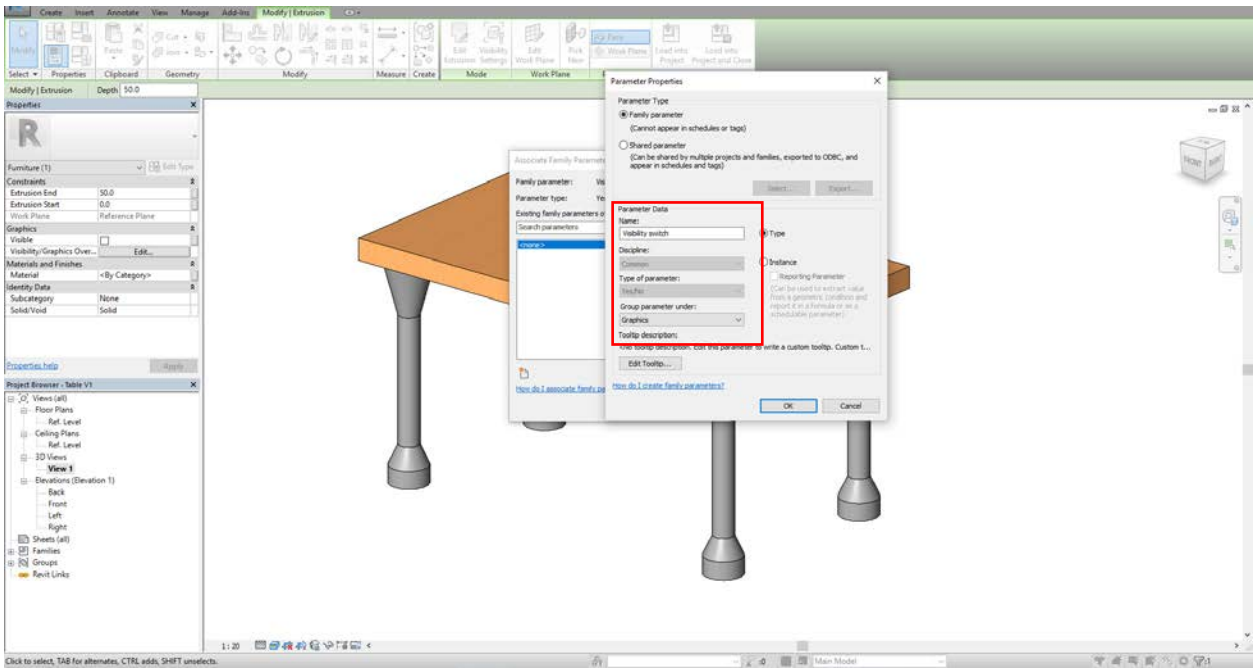
With the object selected, uncheck Visible.



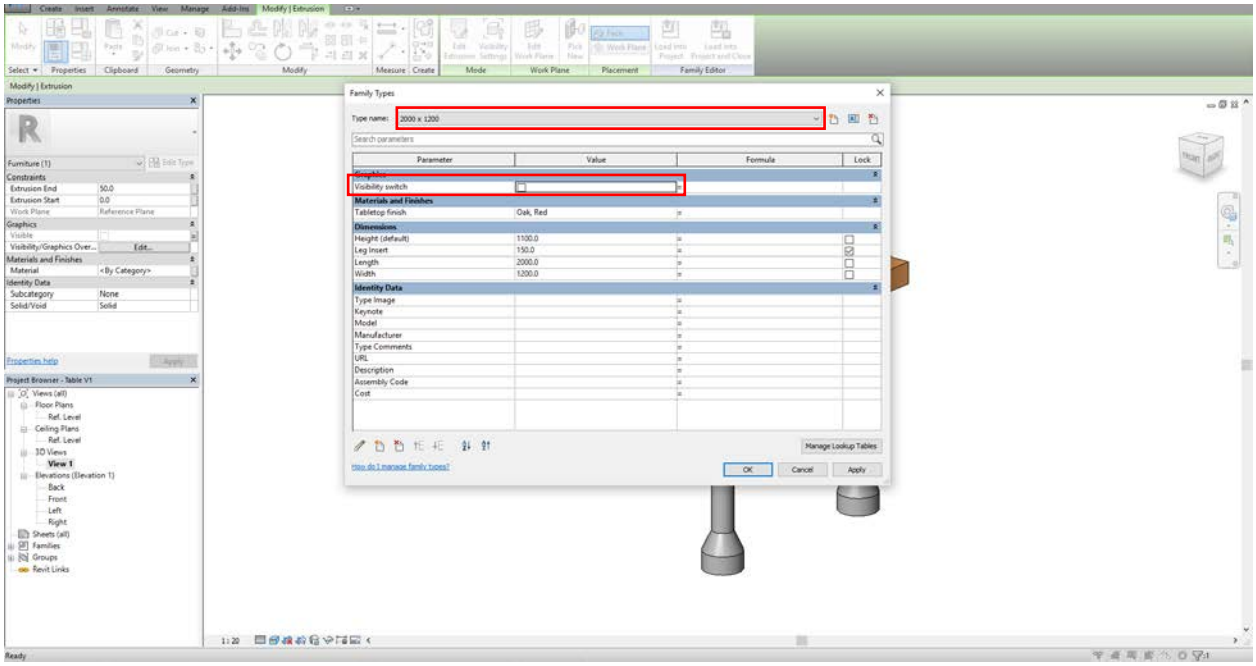
The object won't be totally visible until you load it into the project.

With this approach, changes will apply to all types. If we want to control visible parametrically, create a parameter then.

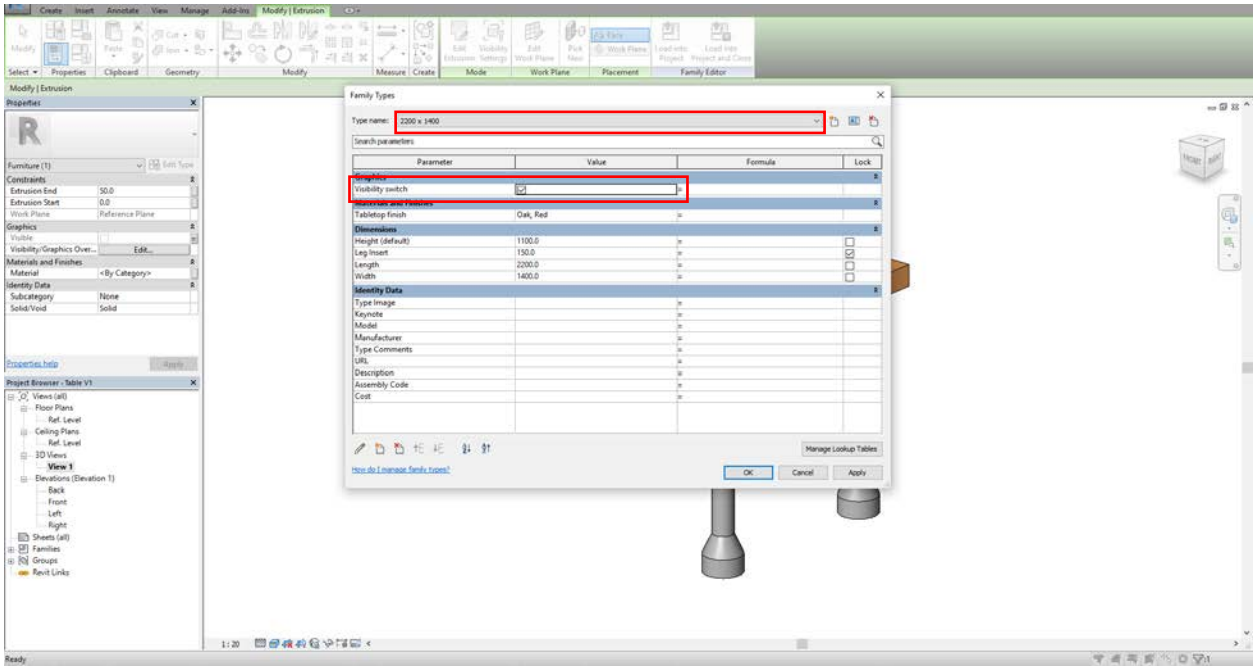


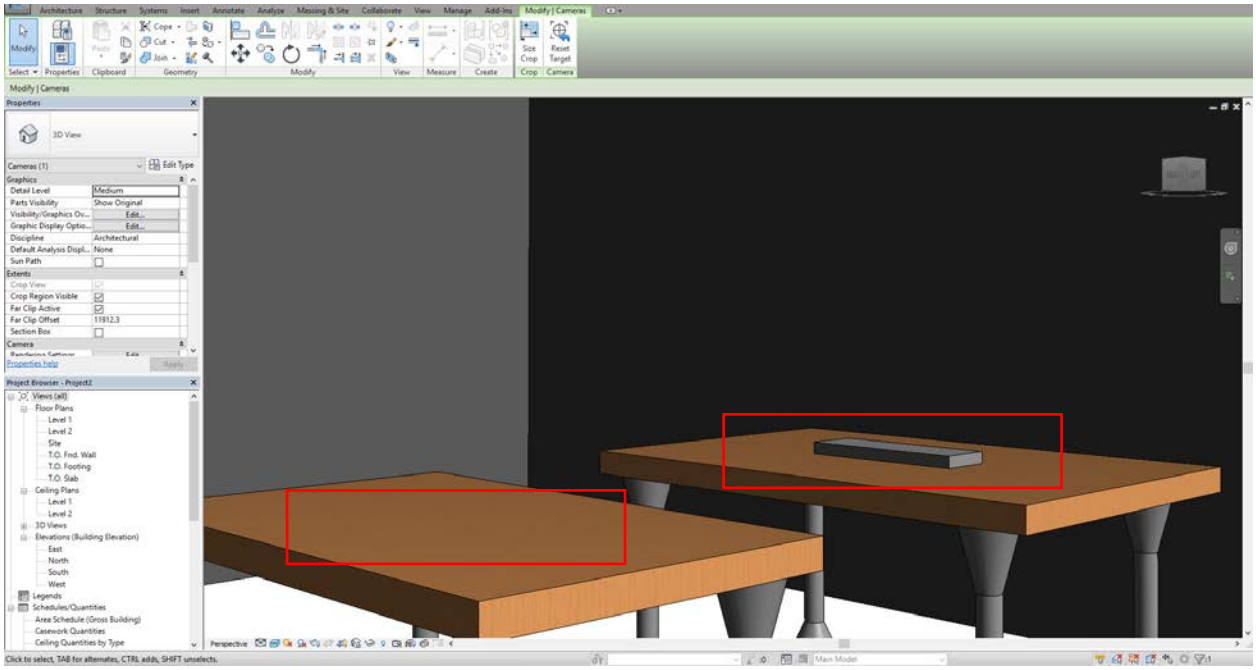


Switch between visible and invisible with the parameter.



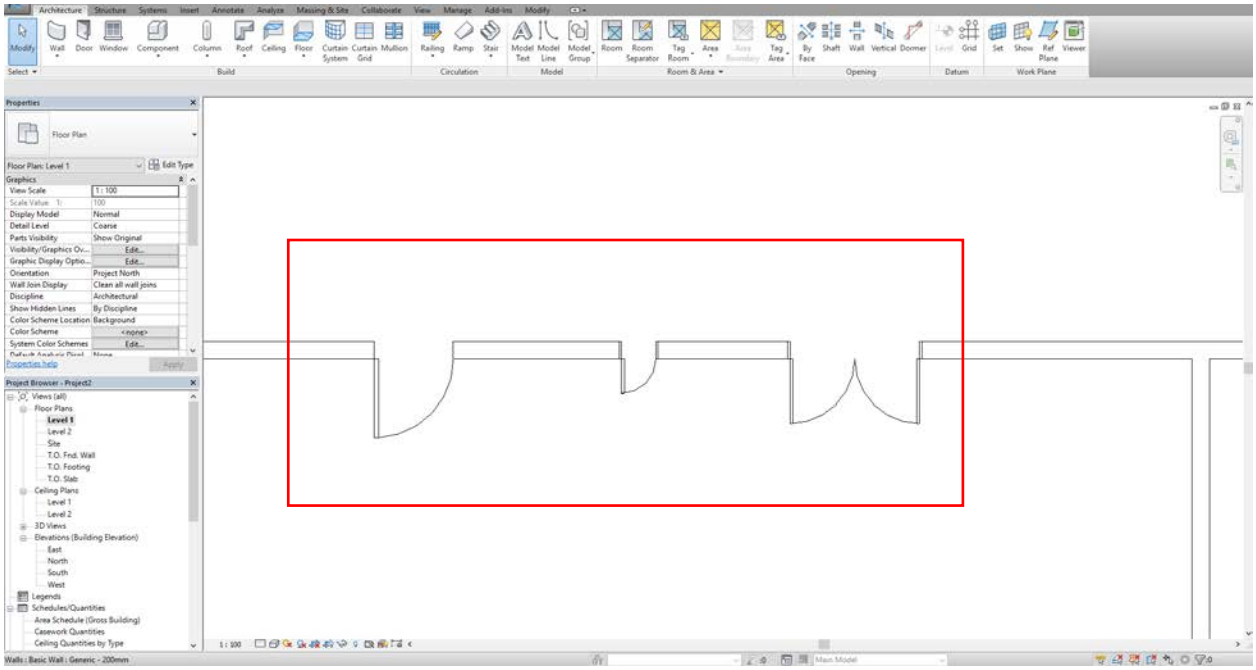
Notice types of the family have different settings of visibility.



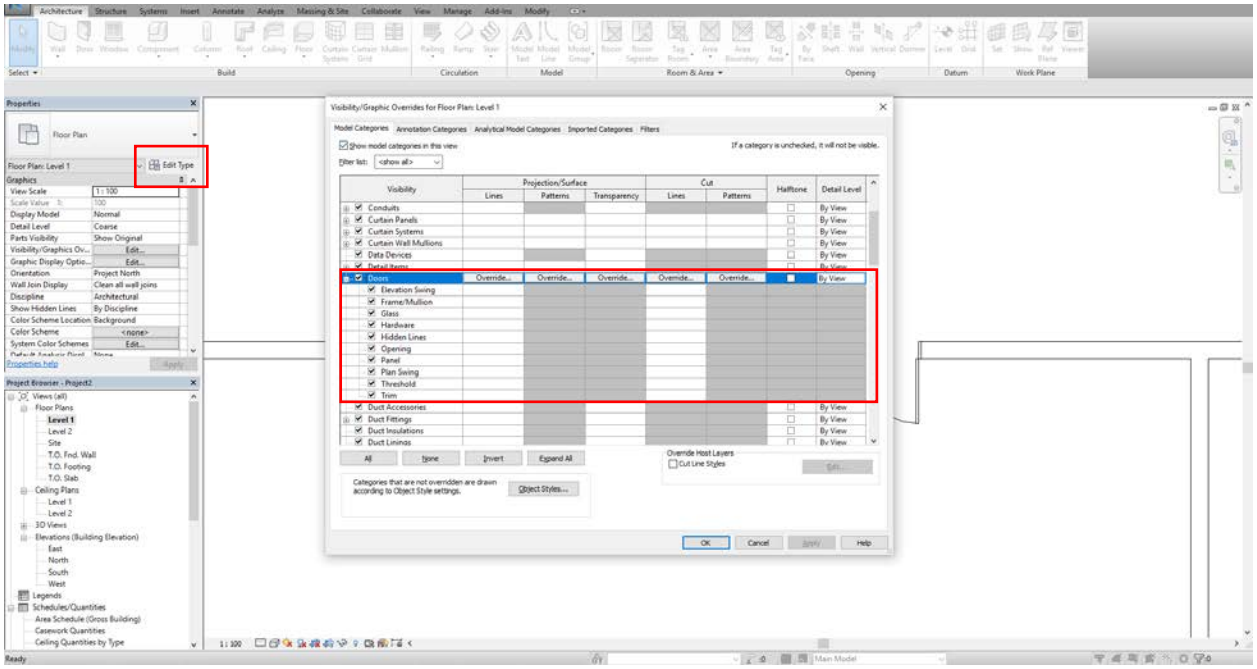


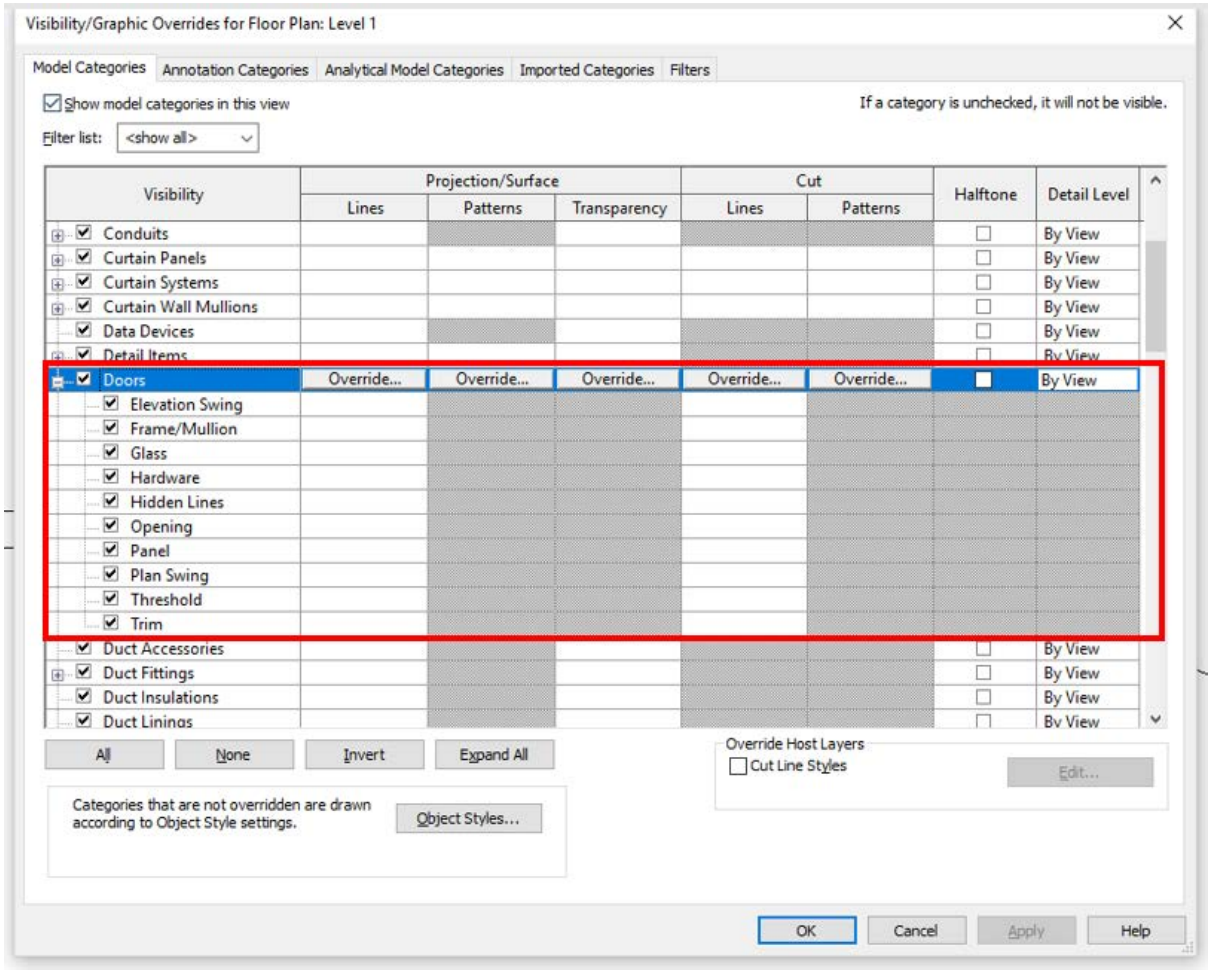
5.5 Understanding subcategories

Subcategory is a feature allowing us control over various settings across different families.

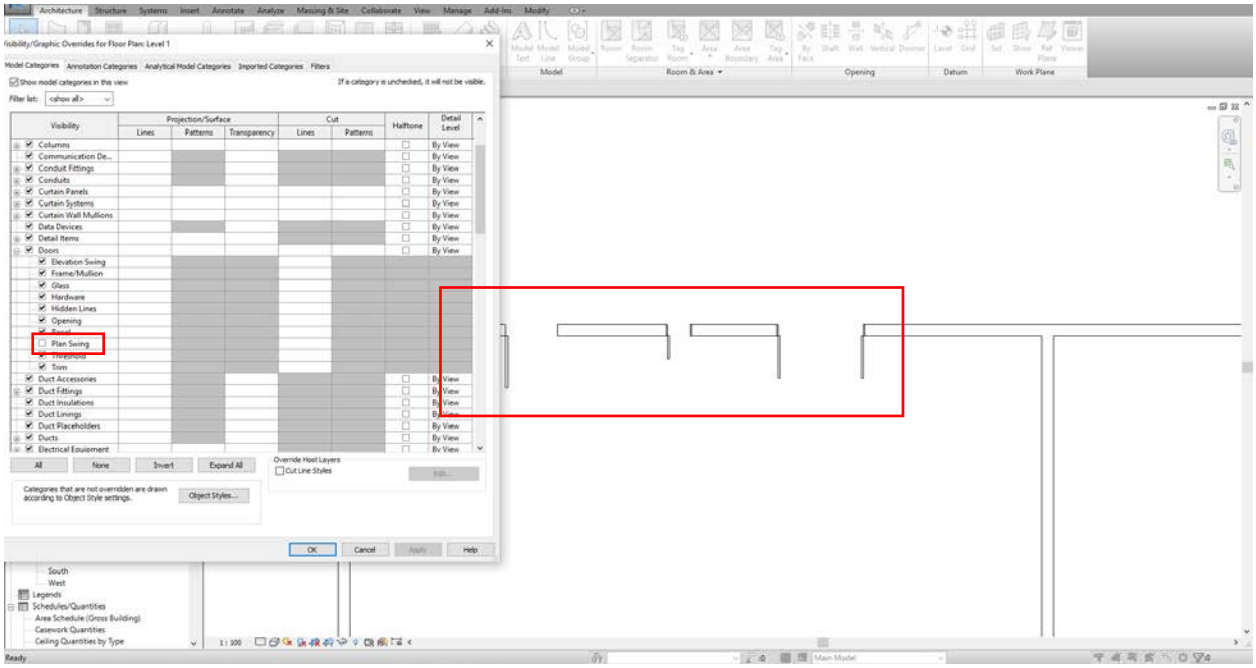


If we go to V/G settings, Doors consist of several subcategories.

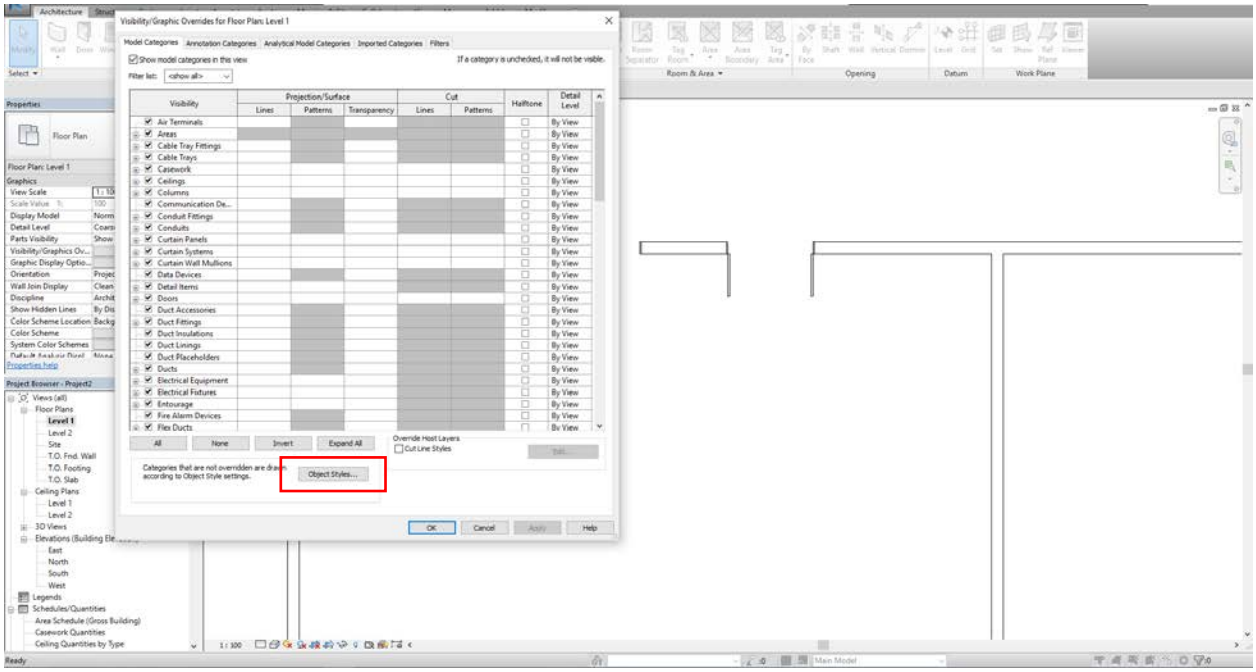


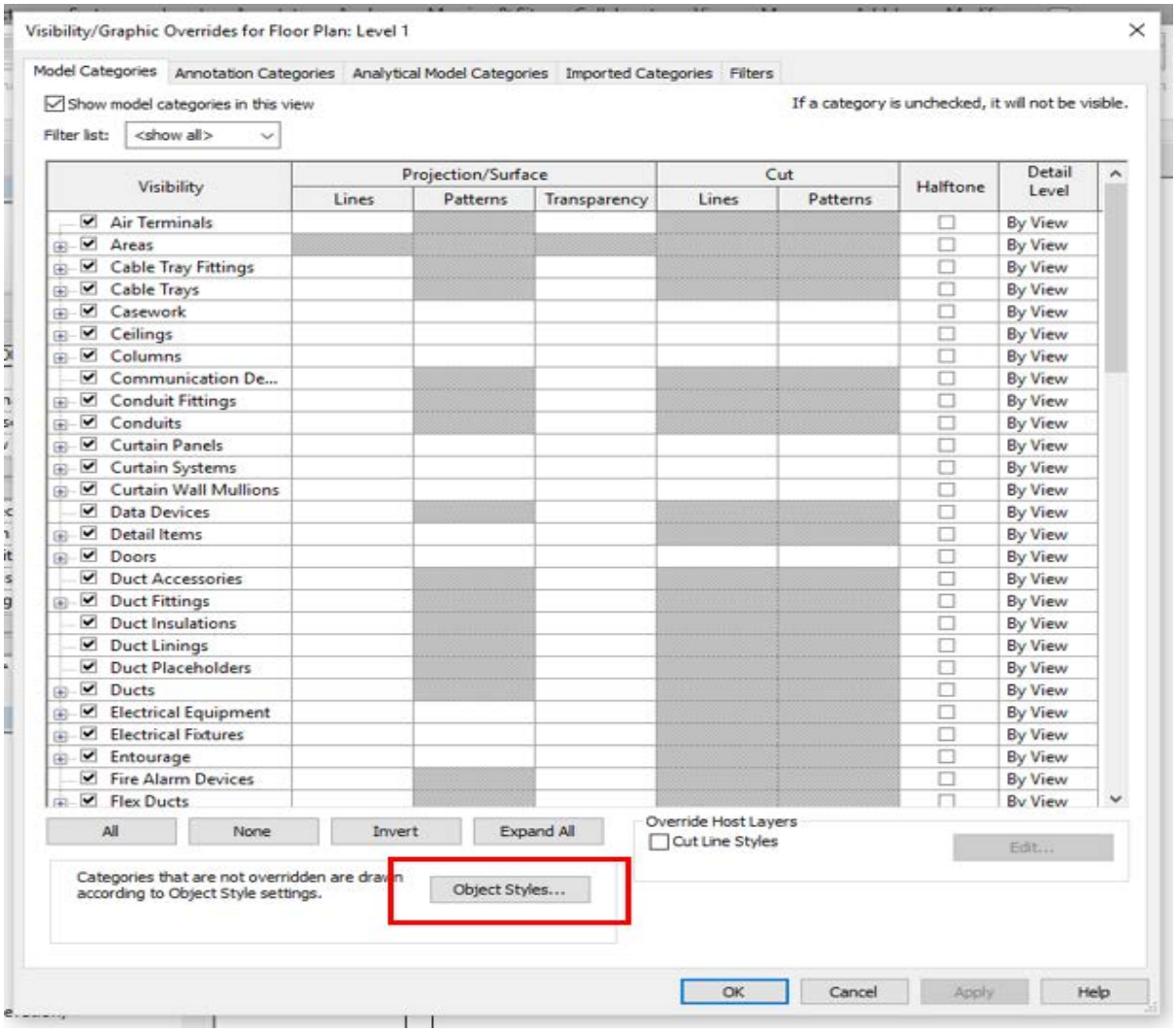


Simply uncheck Plan Swing. Notice Plan Swings of all types are hidden.

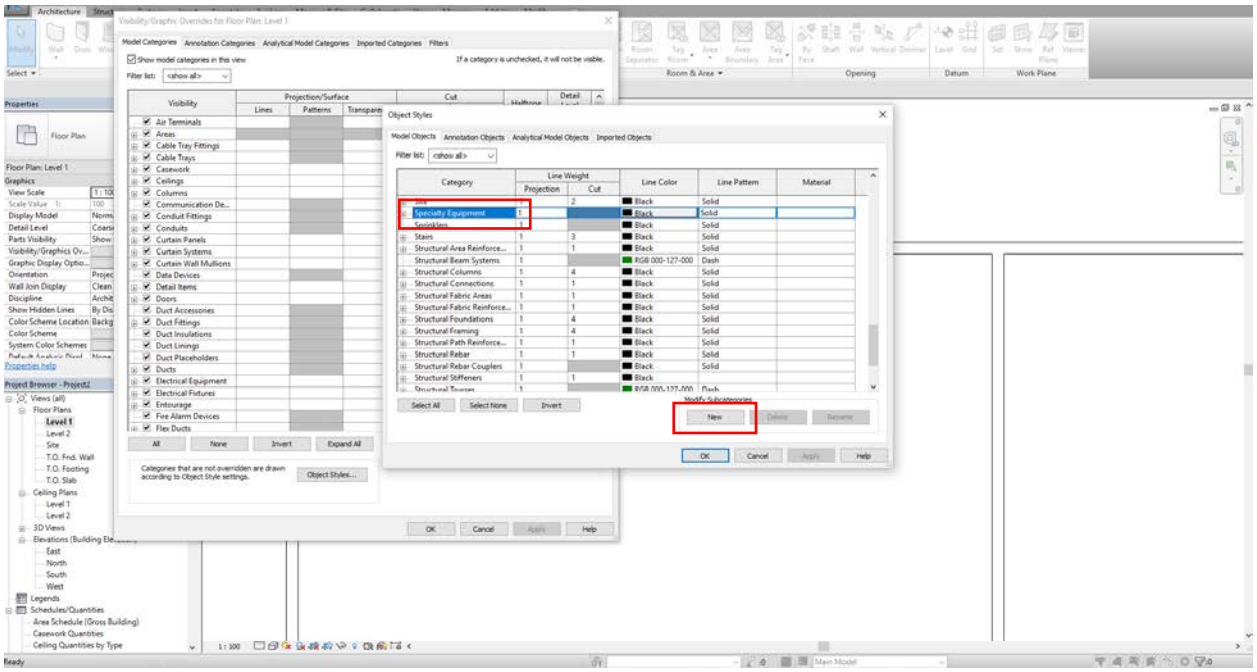


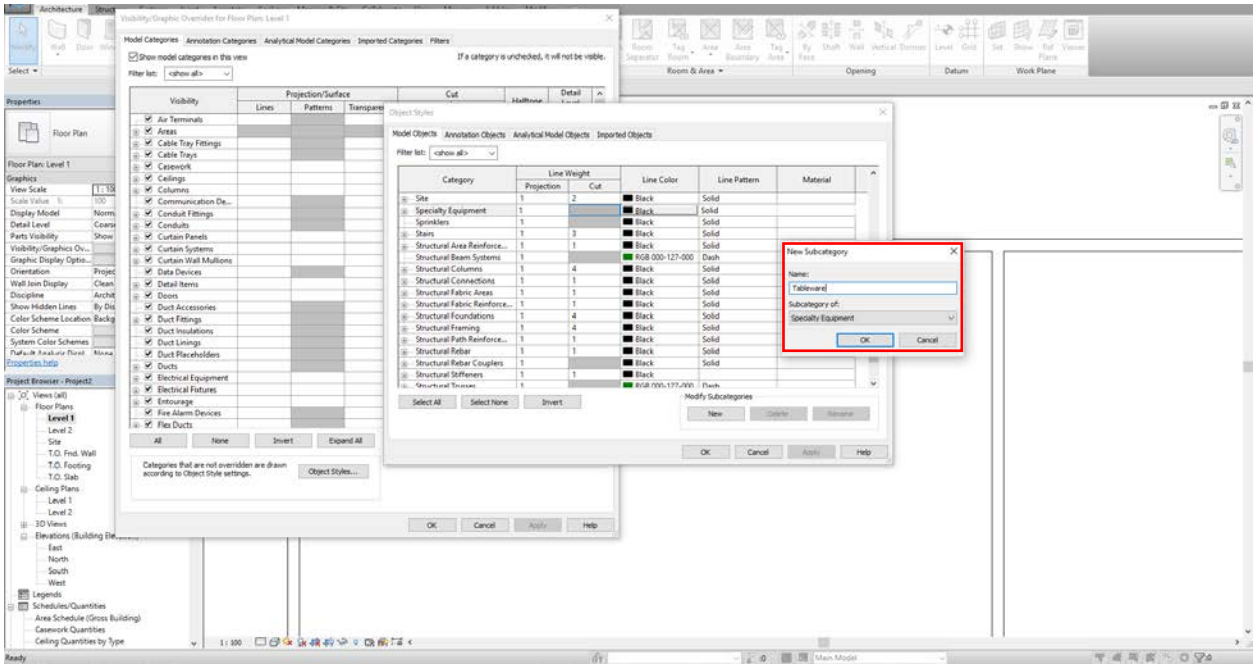
To create a new subcategory, go to Object Styles.





For example, if we'd like to add Tableware to Special Equipment.





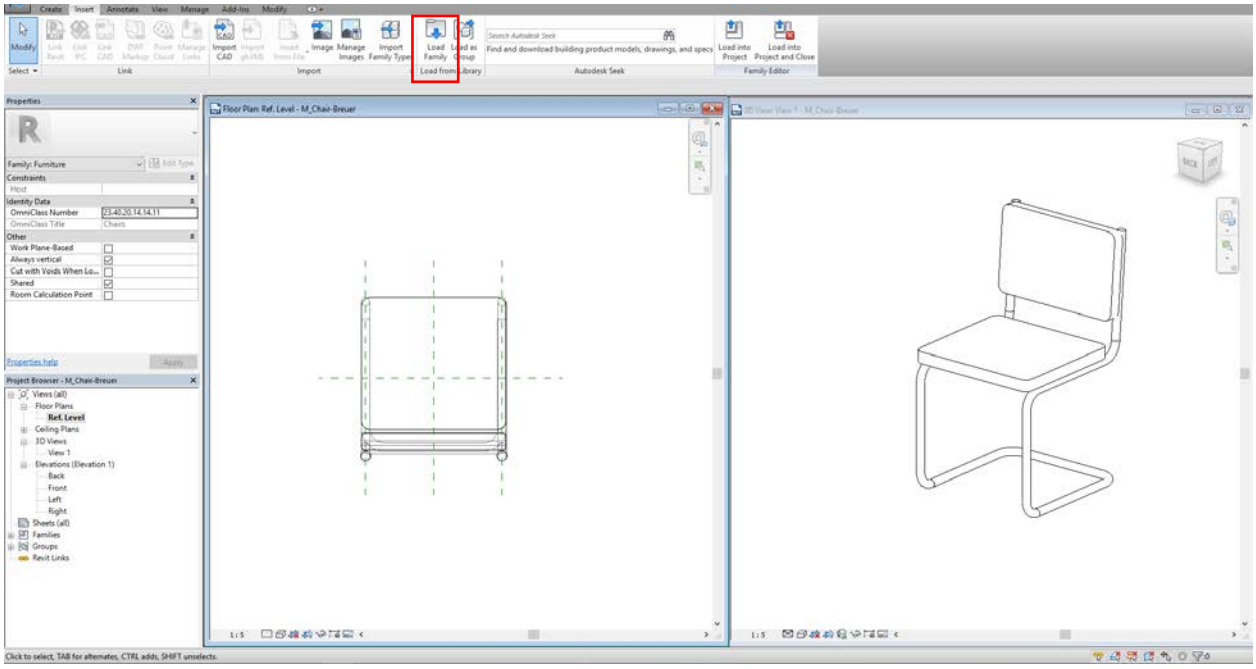
Creating new subcategories with caution. If you fail to categorize elements properly, it would take you very long time to figure out where the problem is.

6. A Family in a Family

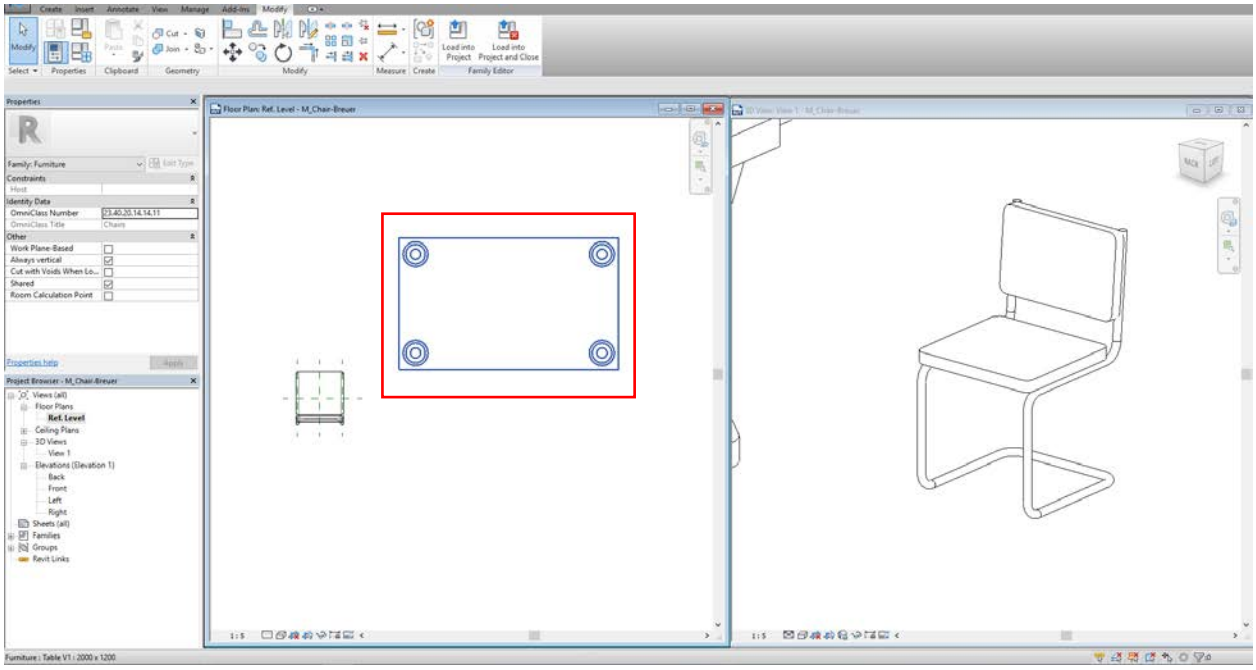
6.1 Understanding nested families

Nested family is simply a Family which is inserted in to another Family. We can nest chairs into table or the other way around or simply create a new family then nest both table and chair into it.

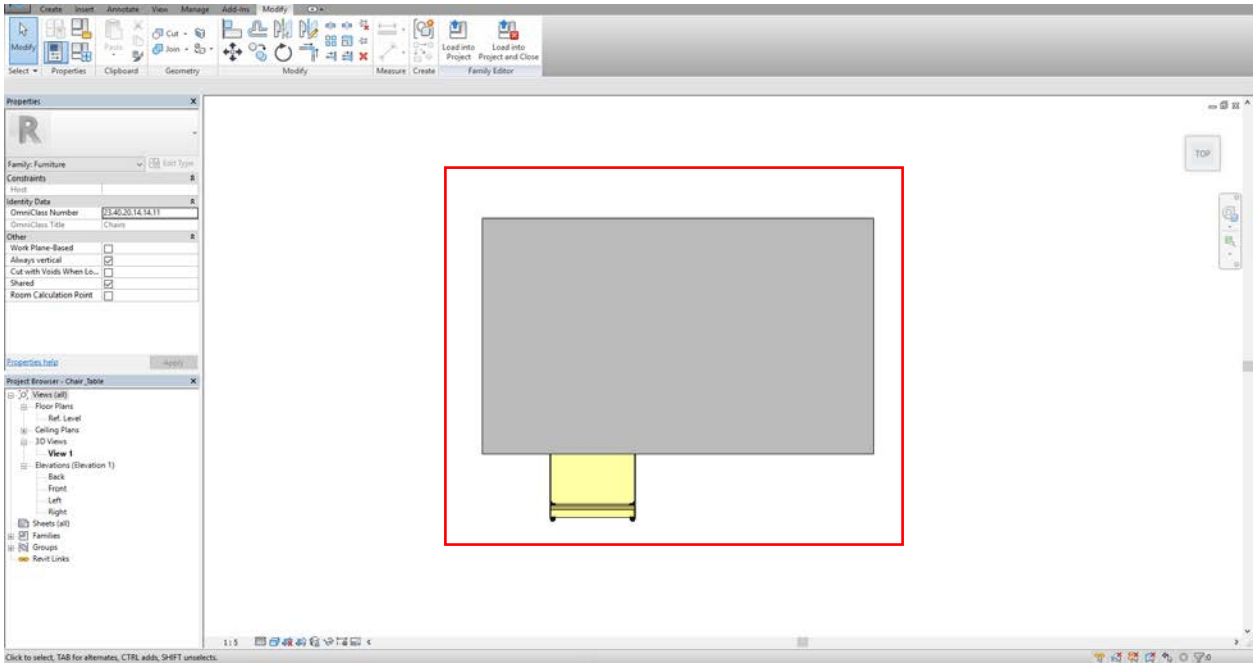
Open any Chair in Default Family Library.



Insert our table.



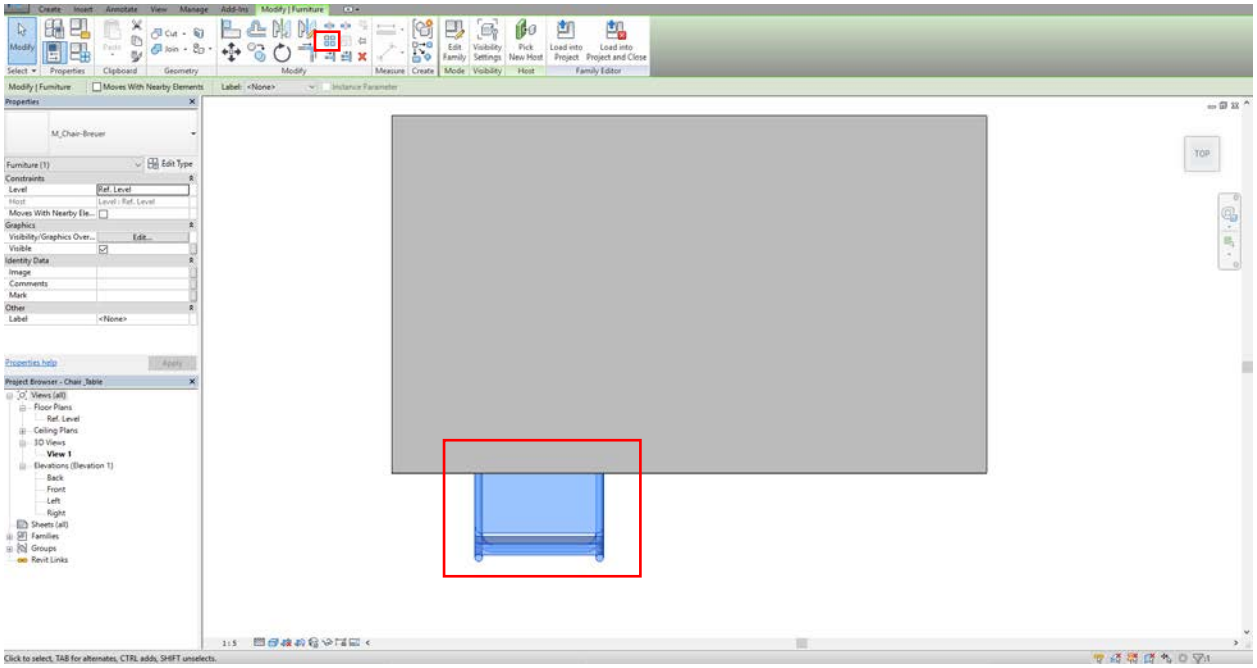
Move your table closer to the chair. You may notice our table moved as a single object.



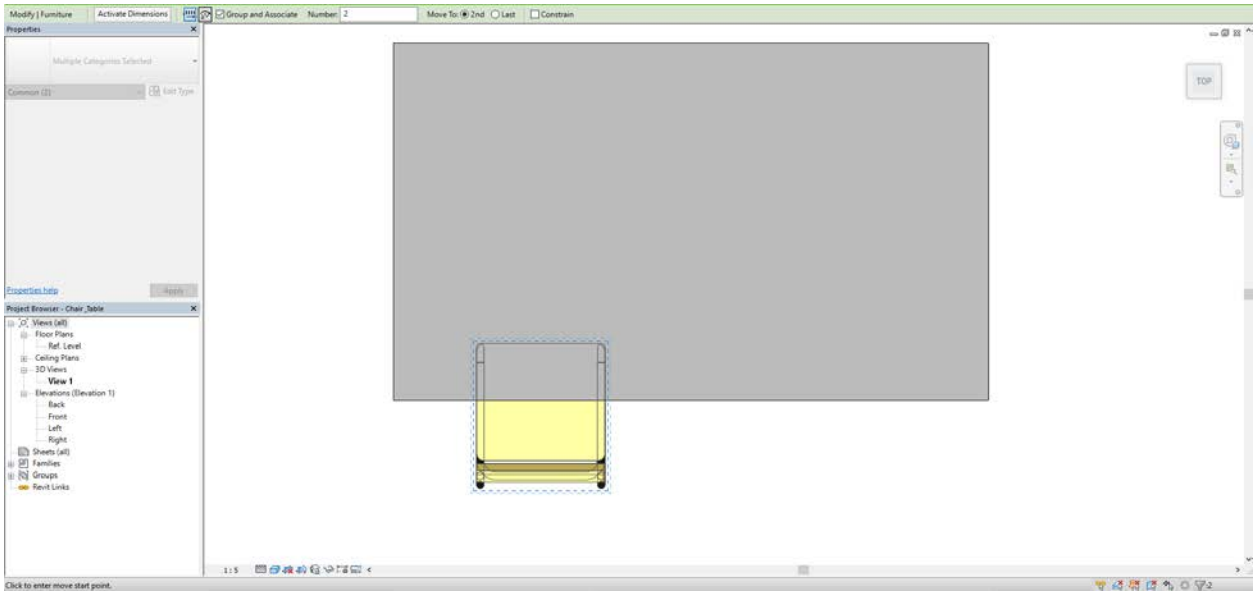
Nesting family is easy, simply load the Family into the host family. When you select or move or assign parameters to them they apply to the entire nested family.

6.2 Building parametric arrays

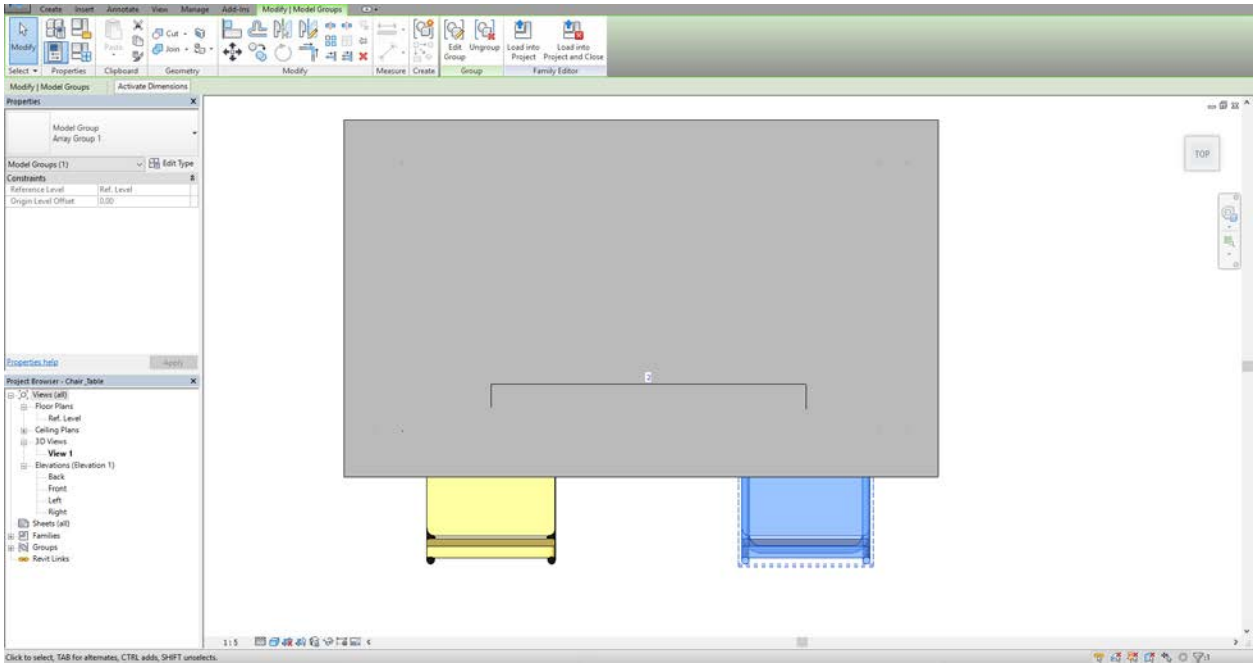
Go to Array.

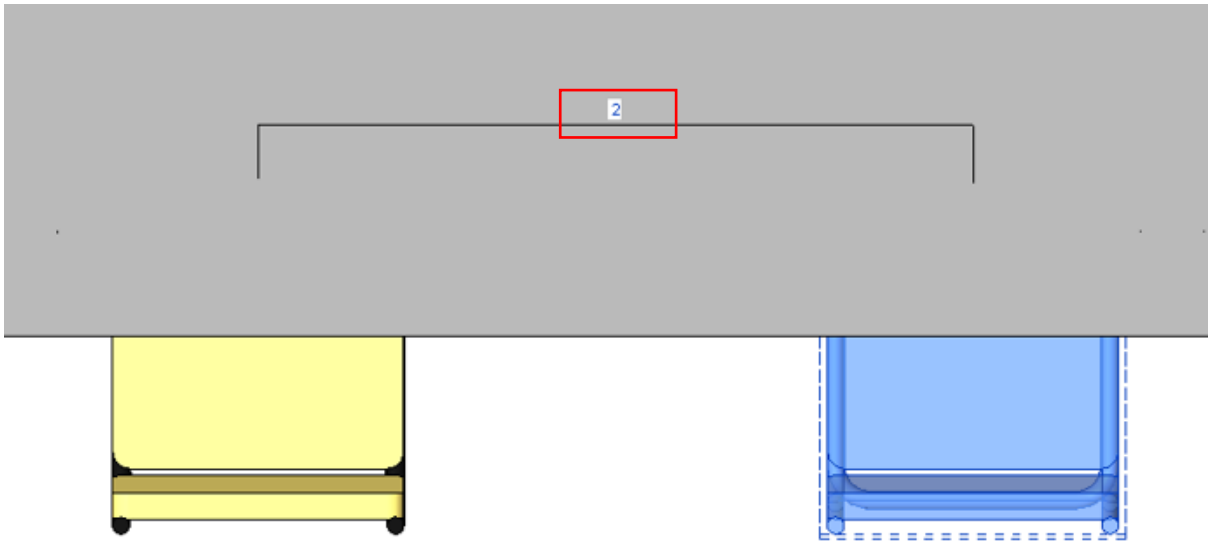


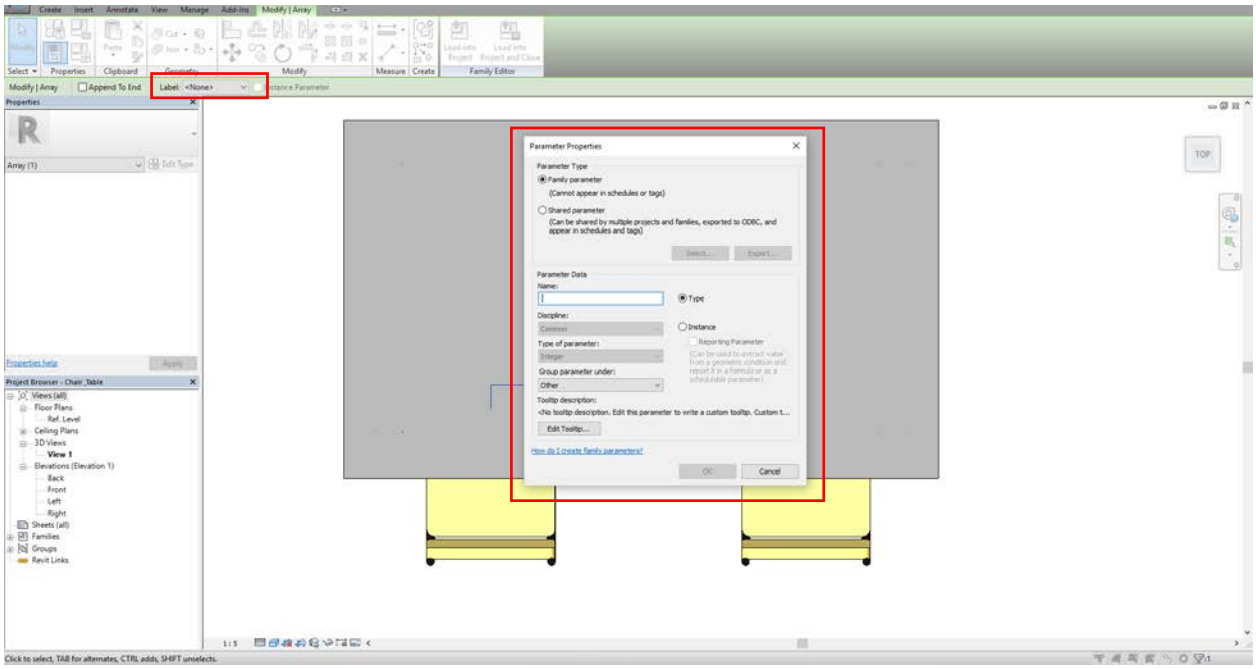
Number set to 2 but we can change it later. **Move to** 2nd or Last depends on your preference.

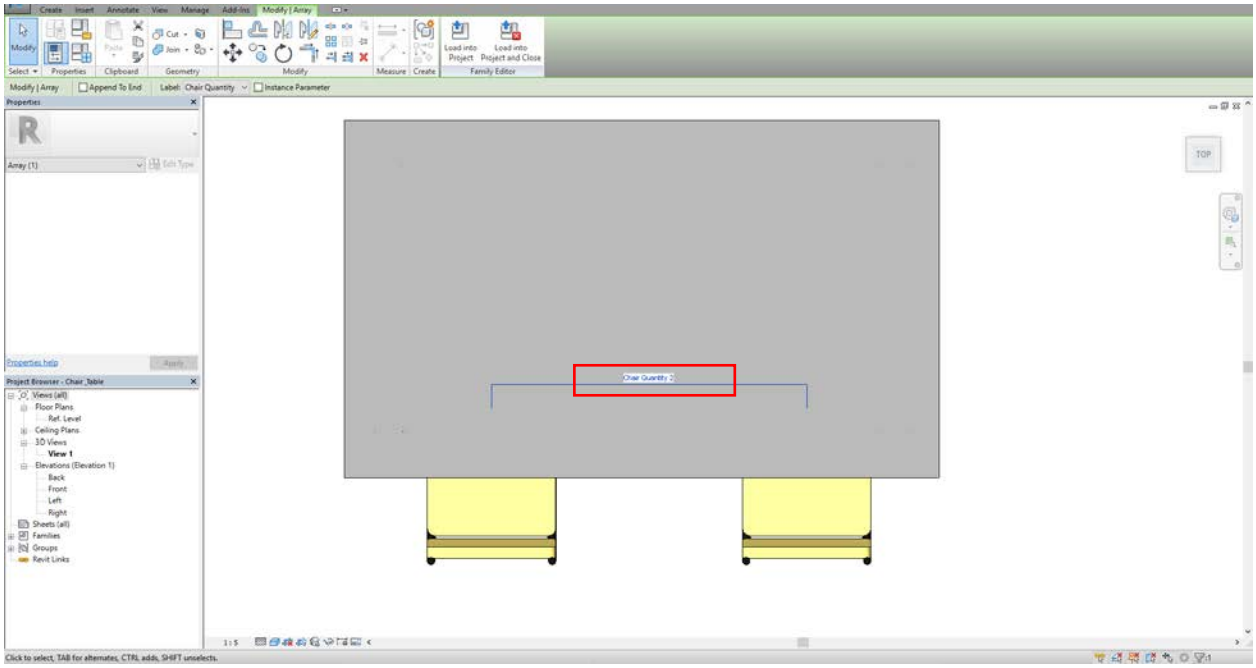


Make it parametric.

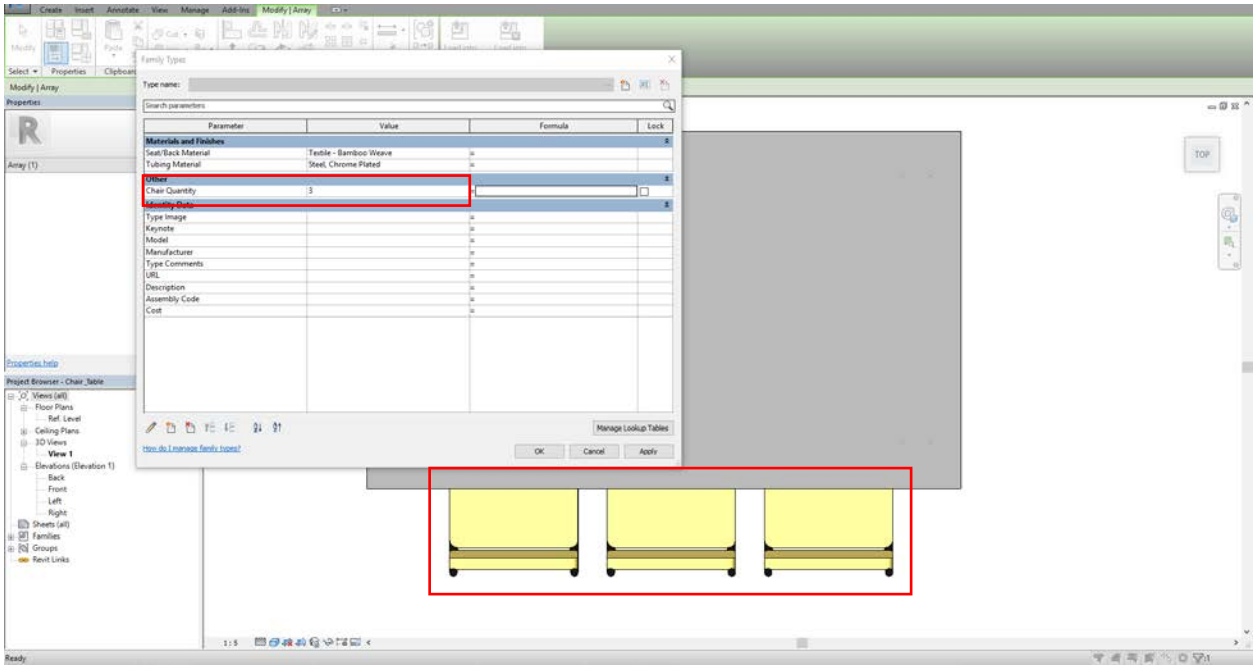


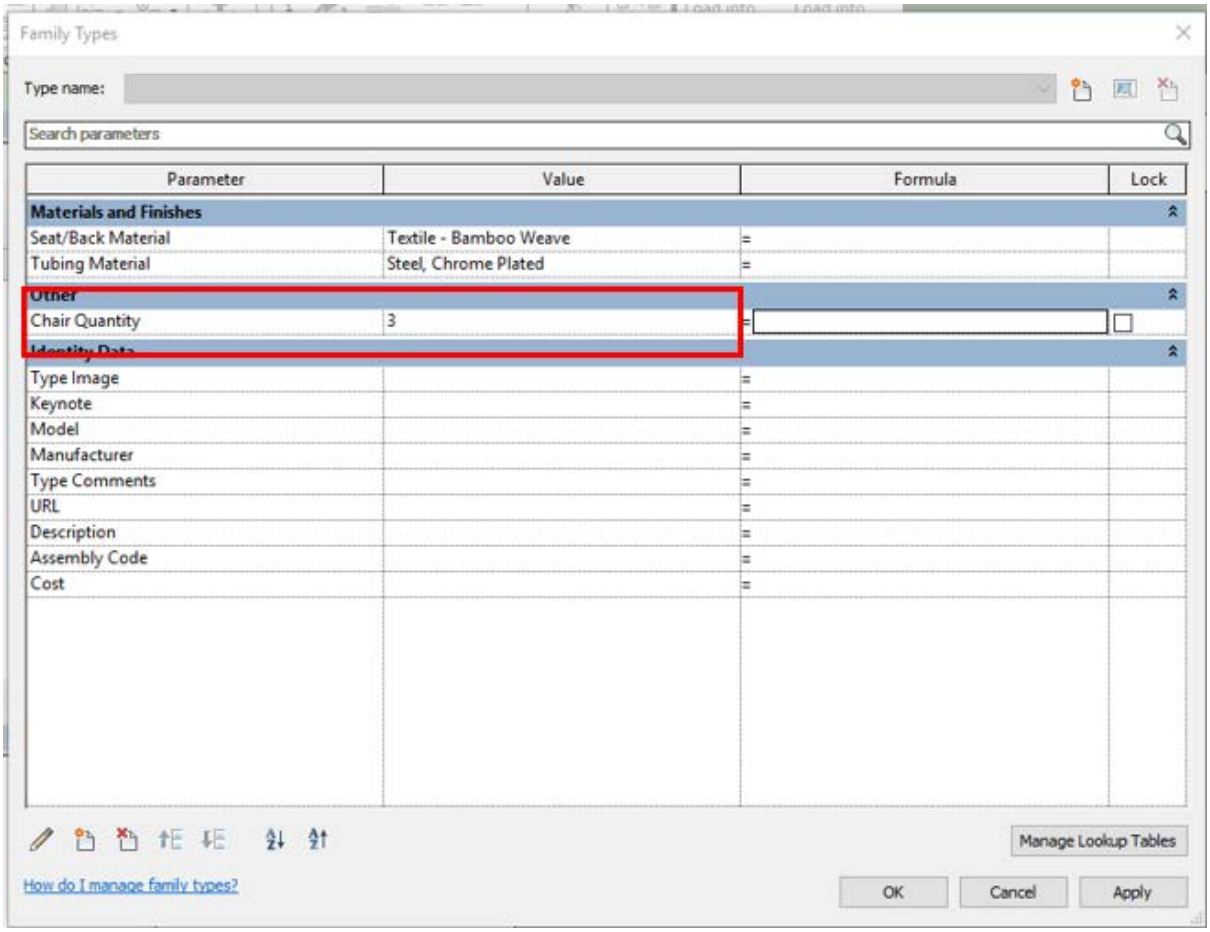

2


Parameter Properties
Parameter Type
Family parameter
(Cannot appear in schedules or tags)
Shared parameter
(Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)
Parameter Data
Name:
Type
Instance
Discipline:
Type of parameter:
Group parameter under:
Other
Tooltip description:
Edit Tooltip...
How do I create family parameters?
OK
Cancel



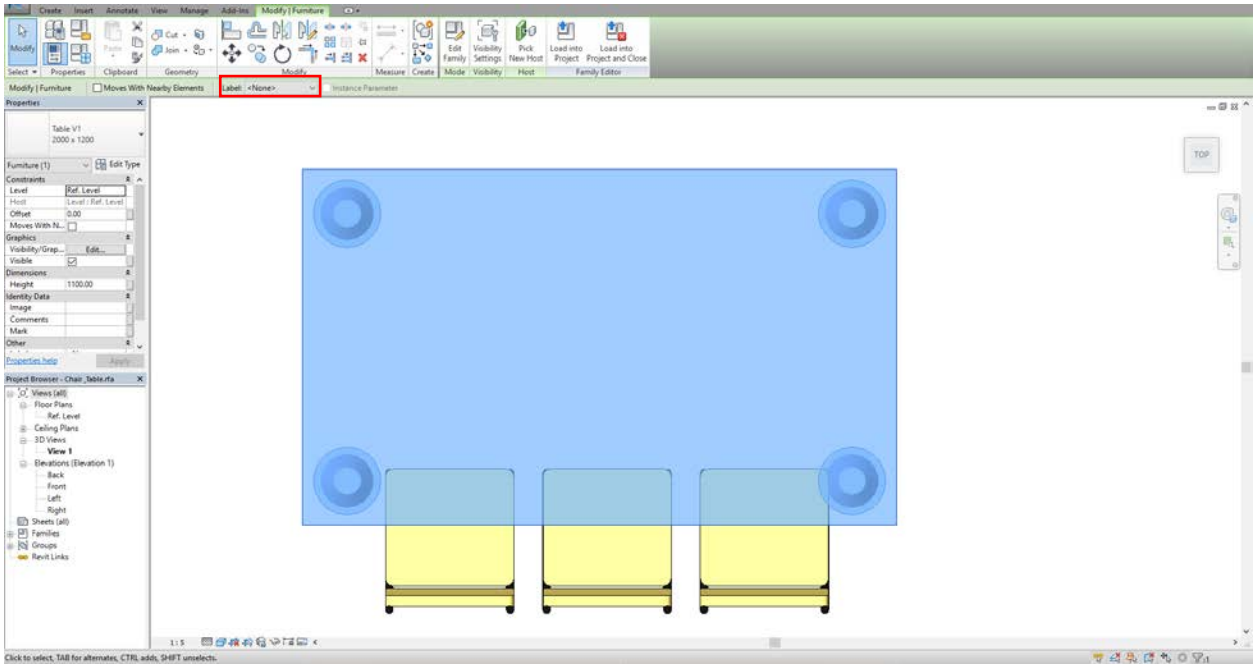
In Family Types, test our parameter.

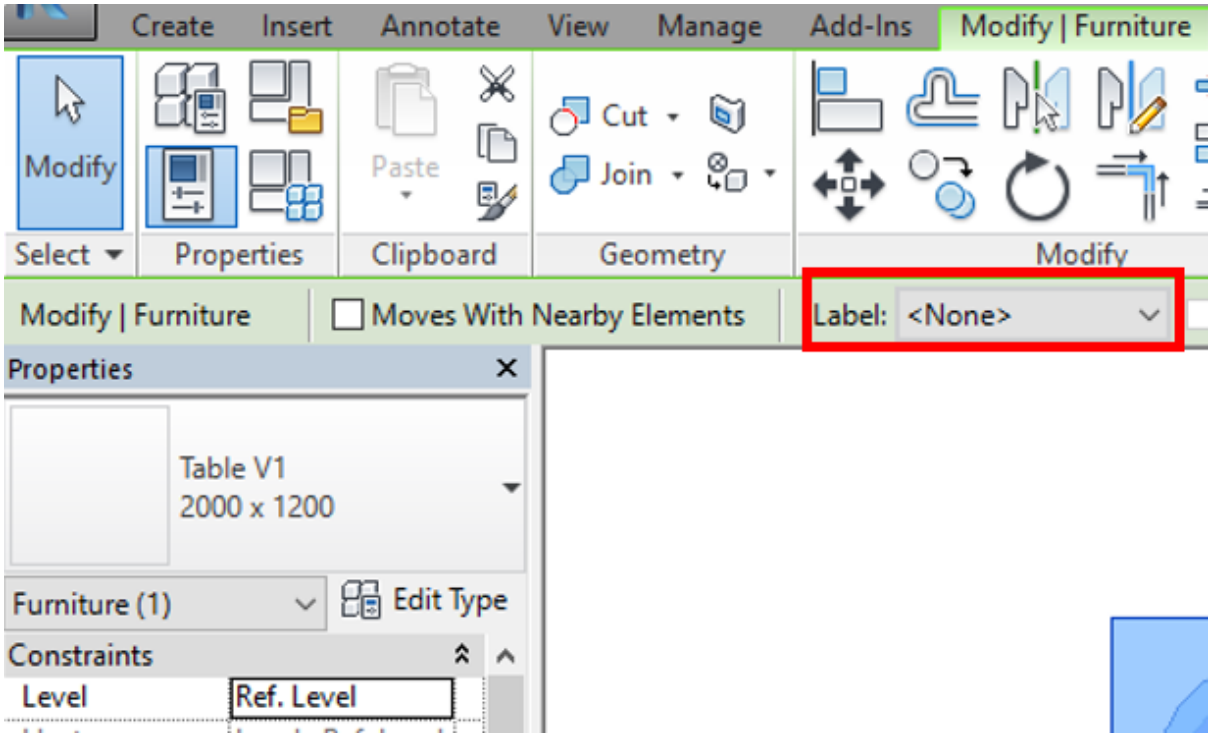




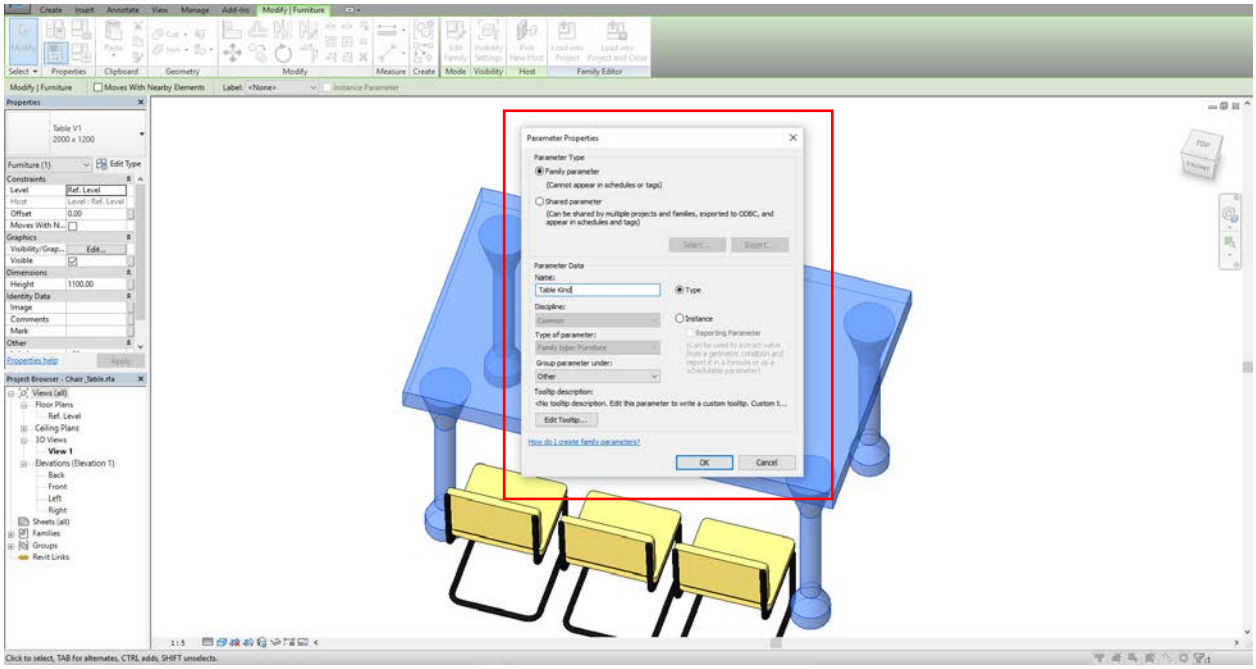
6.3 Creating a family type parameter

Family types can be controlled via parameters too. If we want to change the type of our nested table, assign a parameter to it.

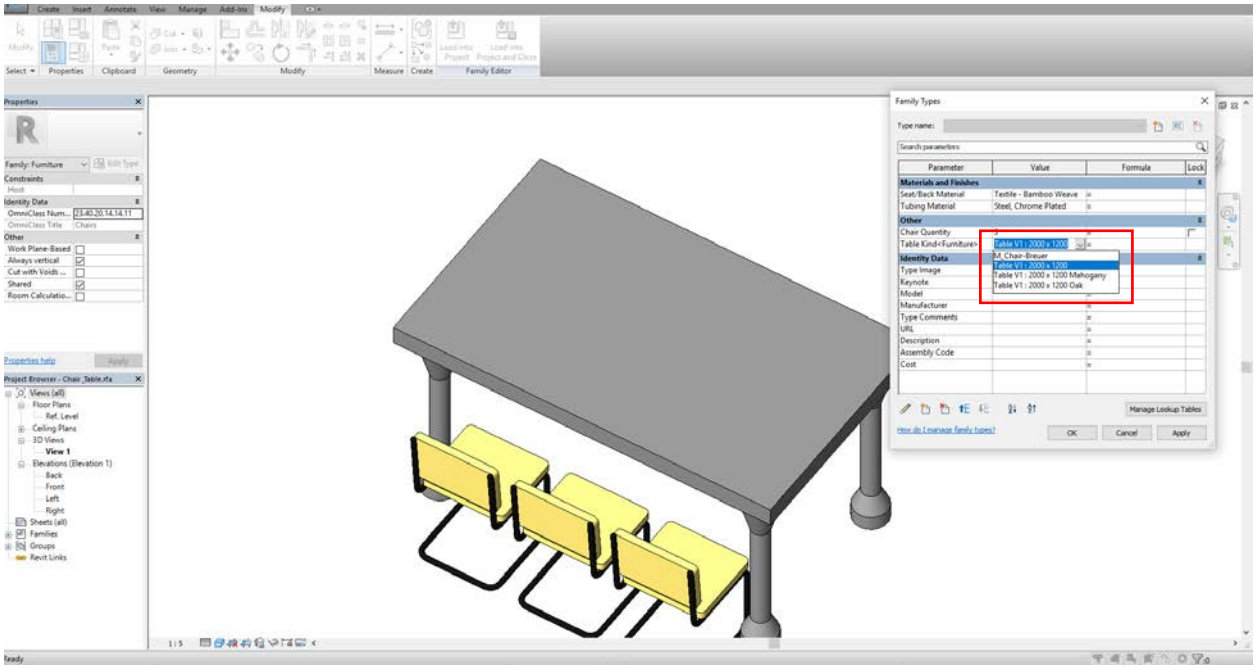


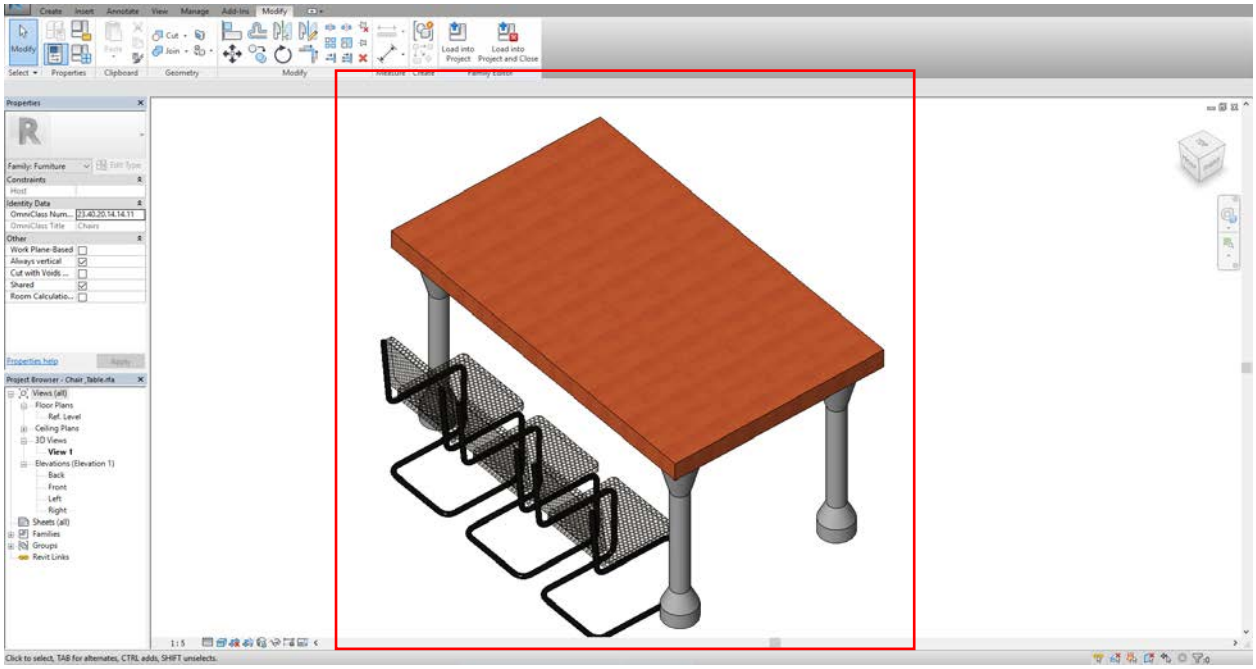


Simply name it Table Kind.



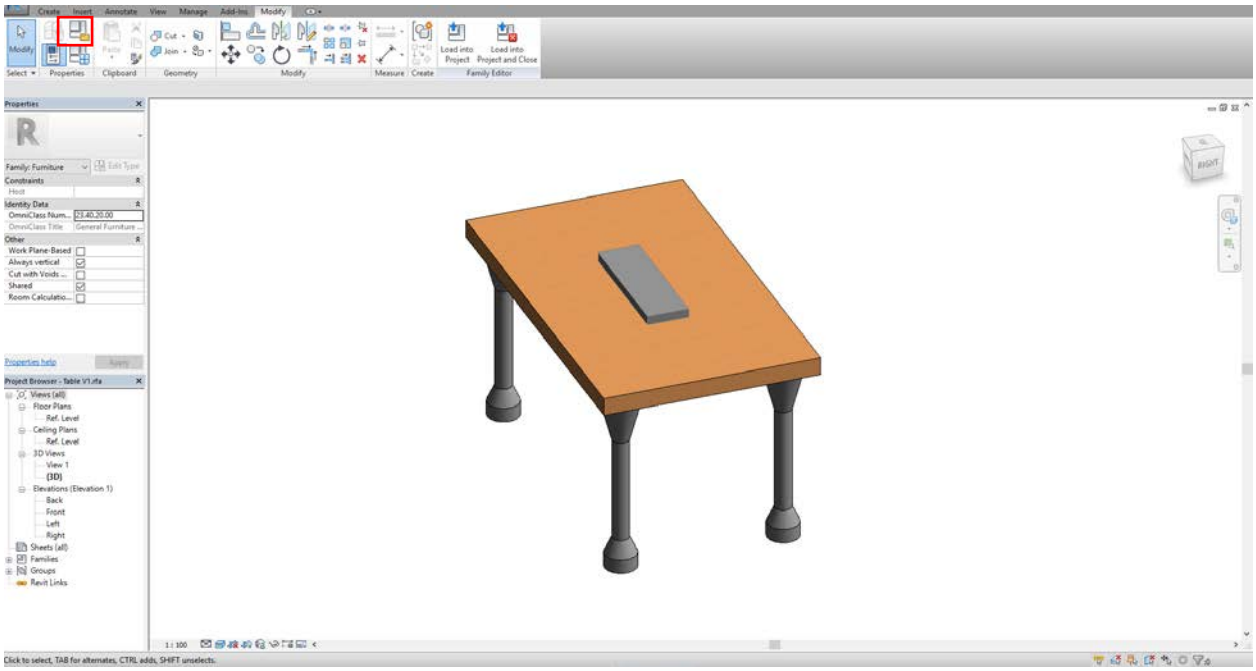
Now it appears as a parameter in Family Types.

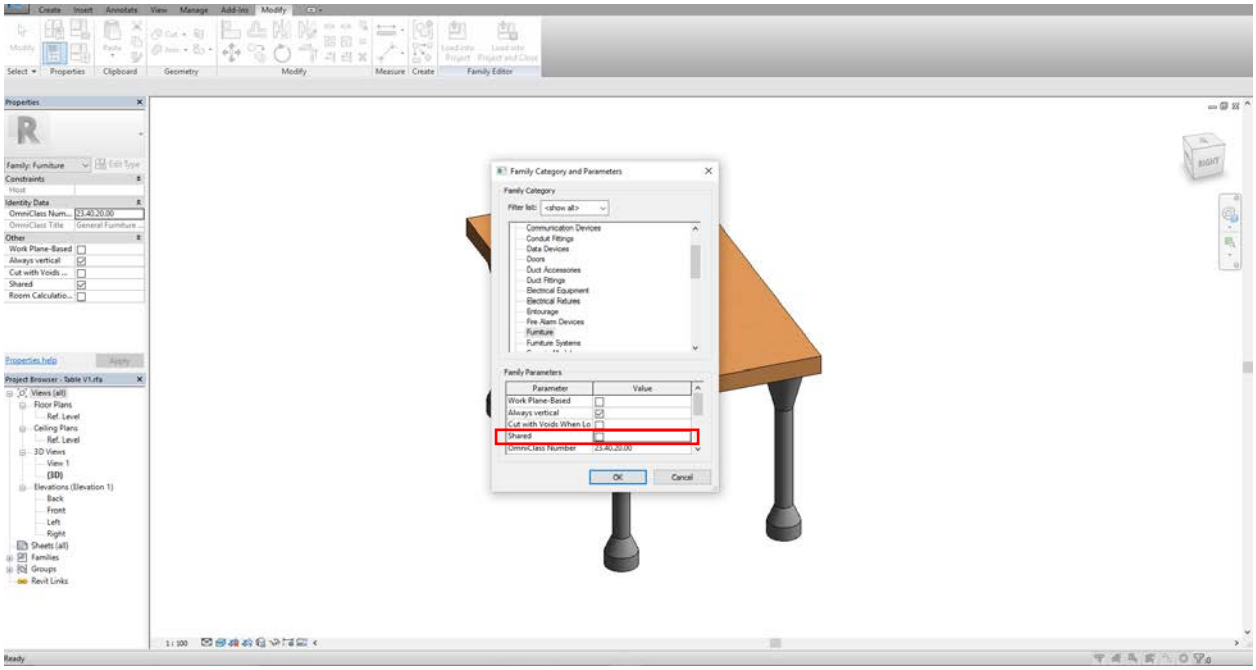


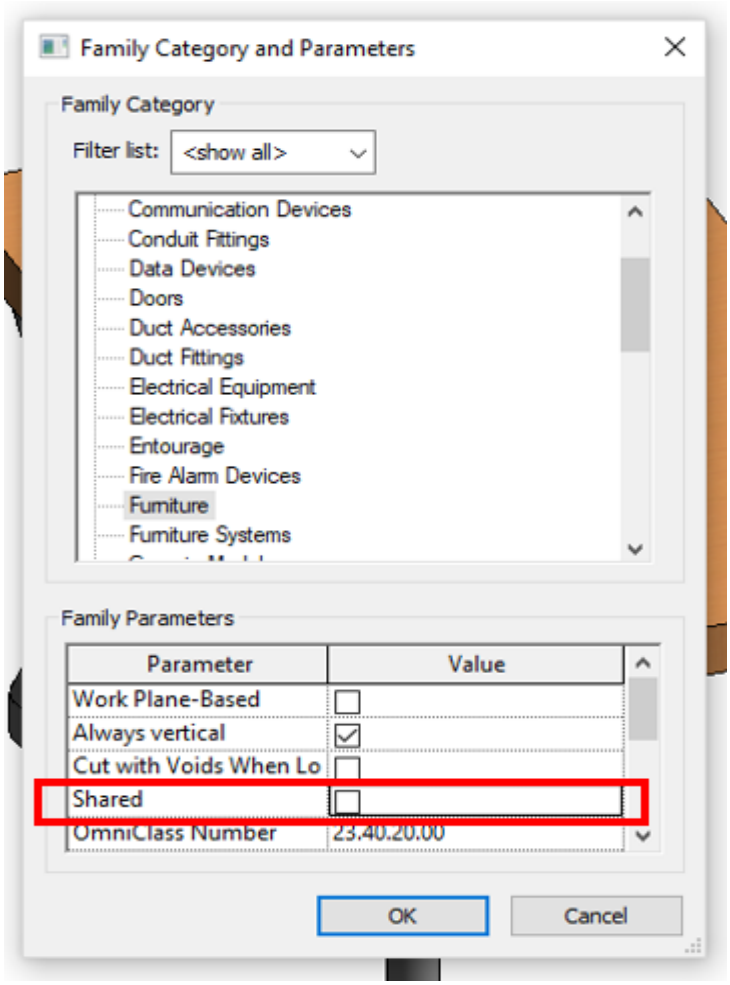


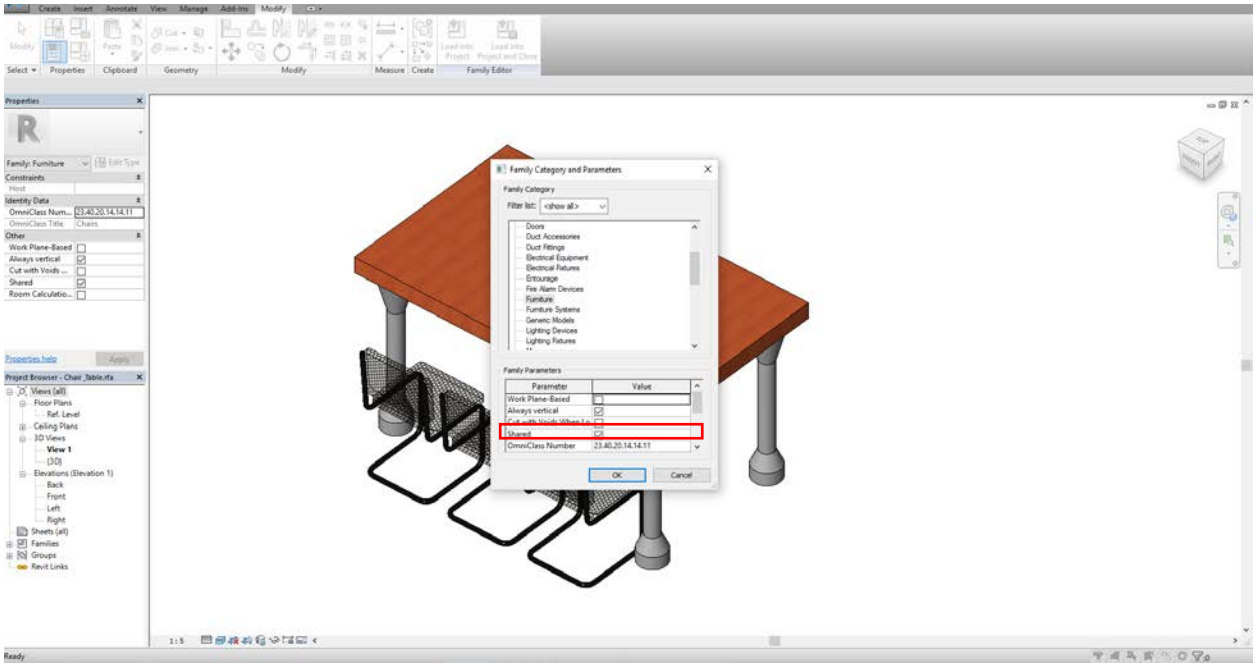
6.4 Understanding shared families

Our chairs were imported from Autodesk library which means by default **Shared** is ticked while our table is not.

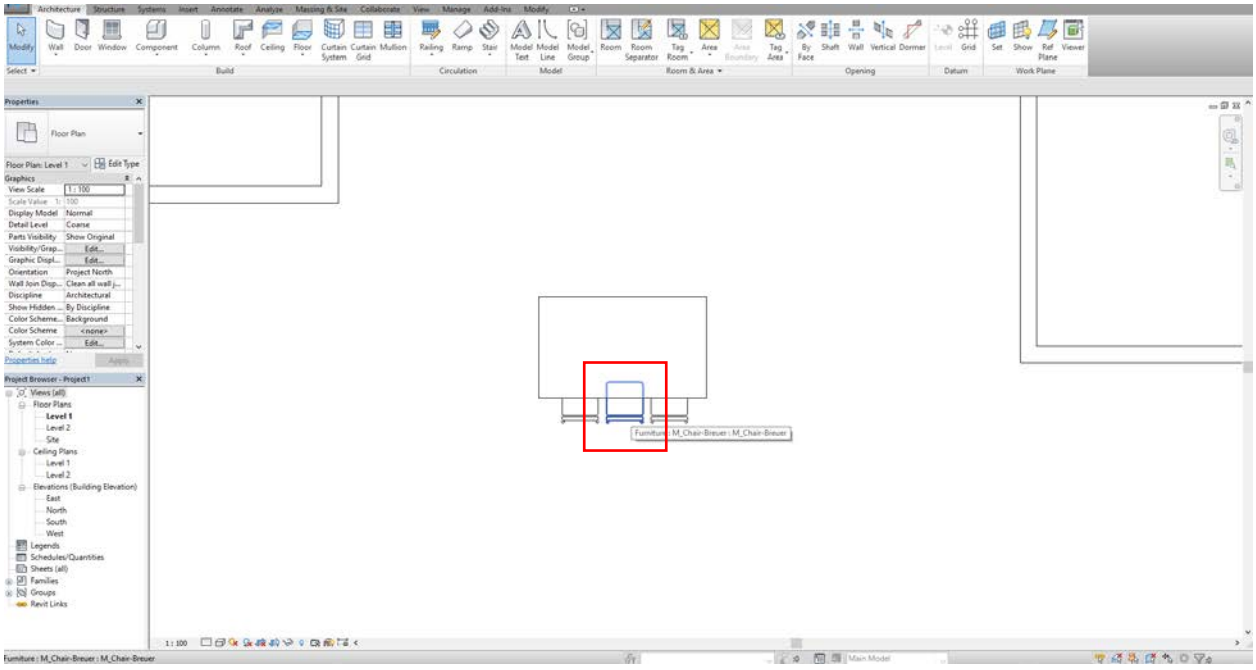





Family Category and Parameters
Family Category
Filter list: <show all>
Communication Devices
Conduit Fittings
Data Devices
Doors
Duct Accessories
Duct Fittings
Electrical Equipment
Electrical Fixtures
Entourage
Fire Alarm Devices
Furniture
Furniture Systems
Family Parameters
Parameter
Value
Work Plane-Based
Always vertical
Cut with Voids When Lo
Shared
OmniClass Number
23.40.20.00
OK
Cancel



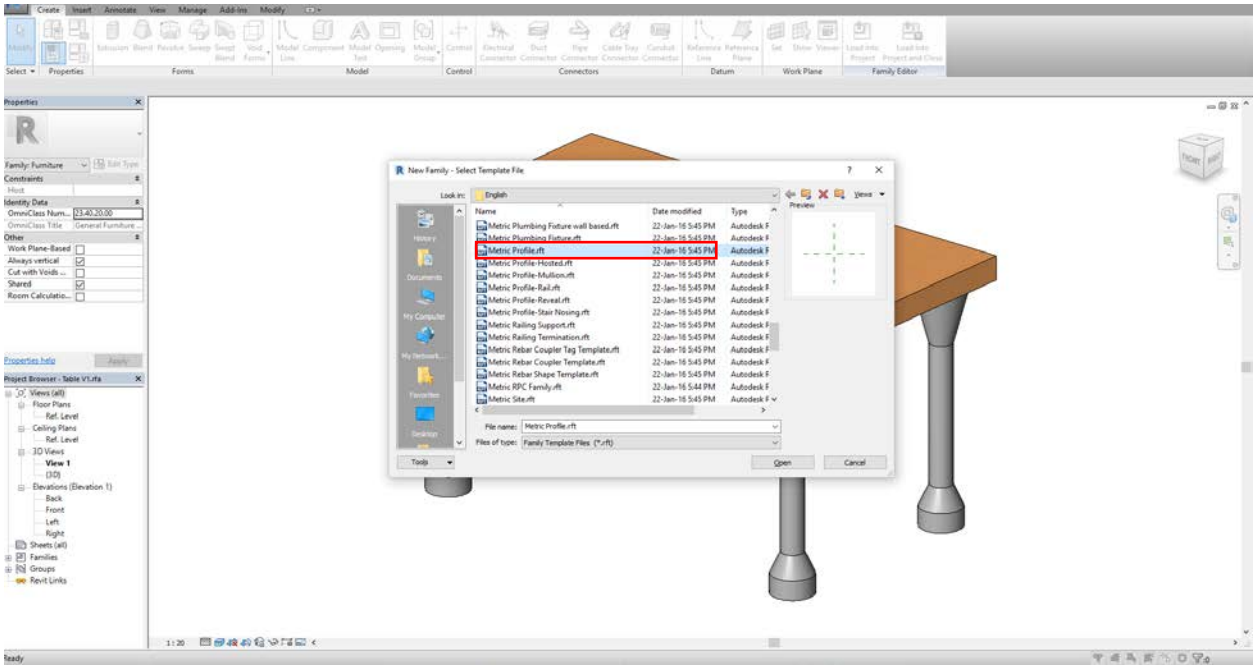
When **Shared** is ticked, we can select our sub-families by pressing Tab. Otherwise, sub-families cannot be selected.



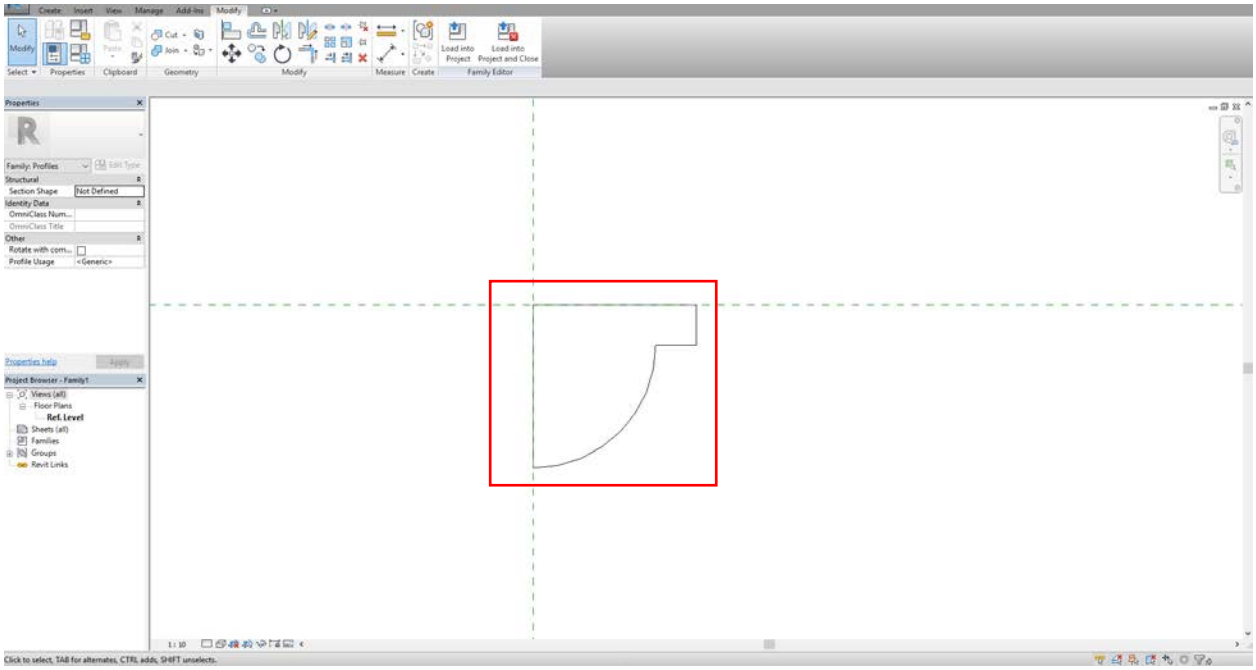
6.5 Creating a profile family

In previous chapters, we sketched our profile for Sweep and Swept Blend. This time, we'll create a nested profile family which can be reused among different forms or families.

Open Generic Profile template. (**Note: Profile we about to create is a Family**.)



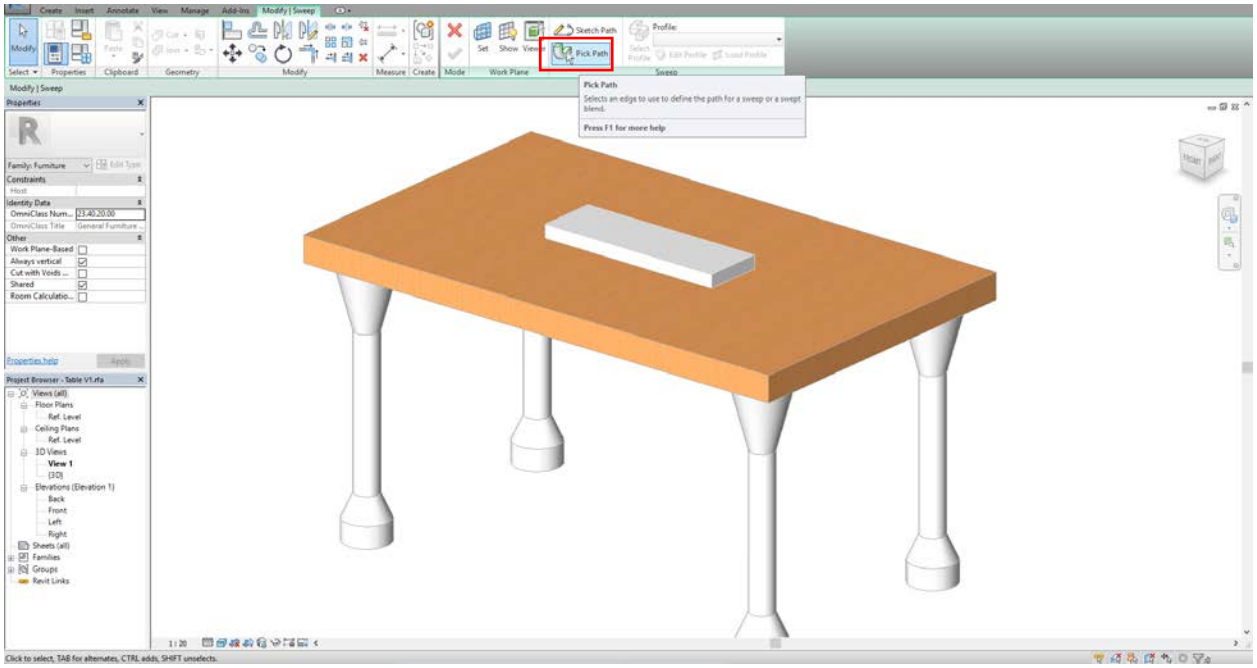
Sketch a profile. Make it parametric if you want it to be a series of profiles and can be controlled in Family Editor of our table.



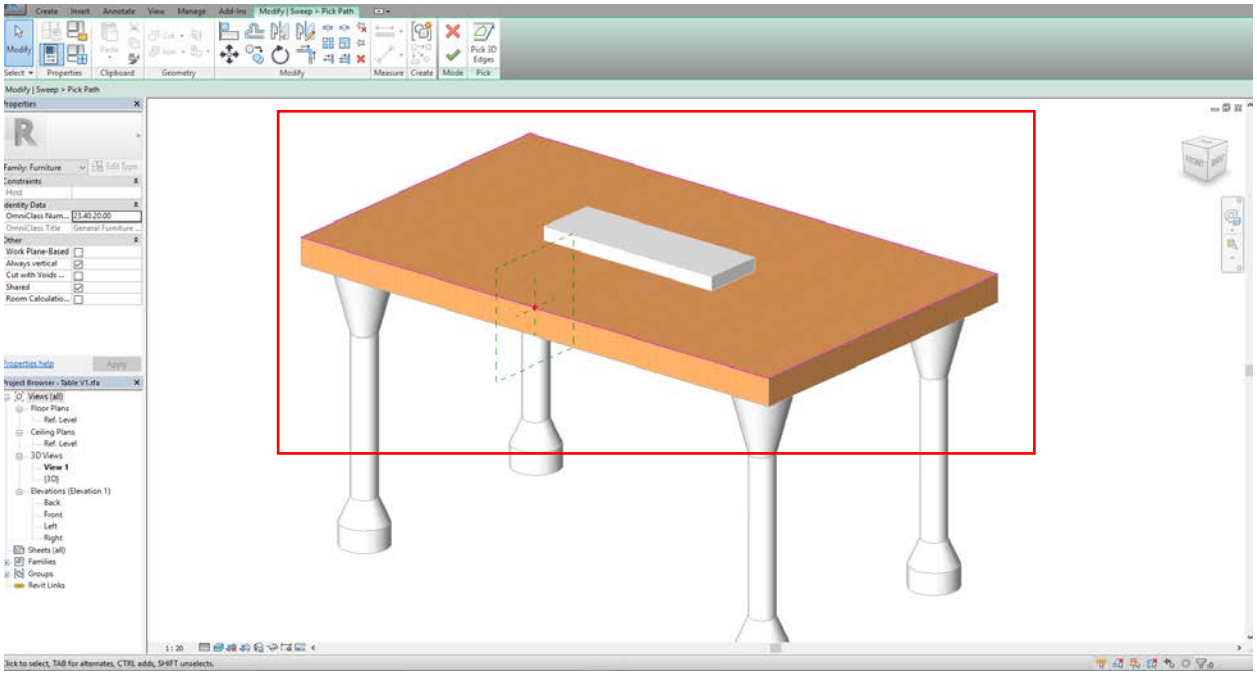
6.6 Creating a parametric table edge

The profile we created can apply to our table in an additive(Sweep) or subtractive (Void sweep) way.

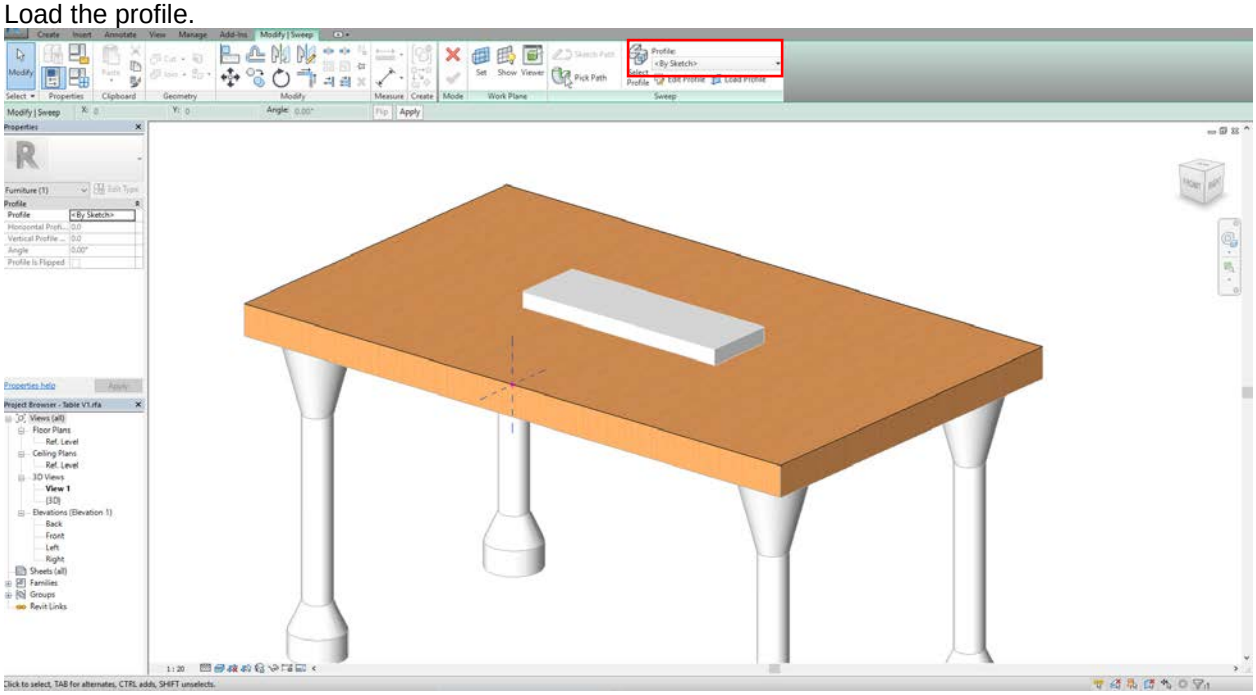
Hit on Sweep, go to Pick Path.



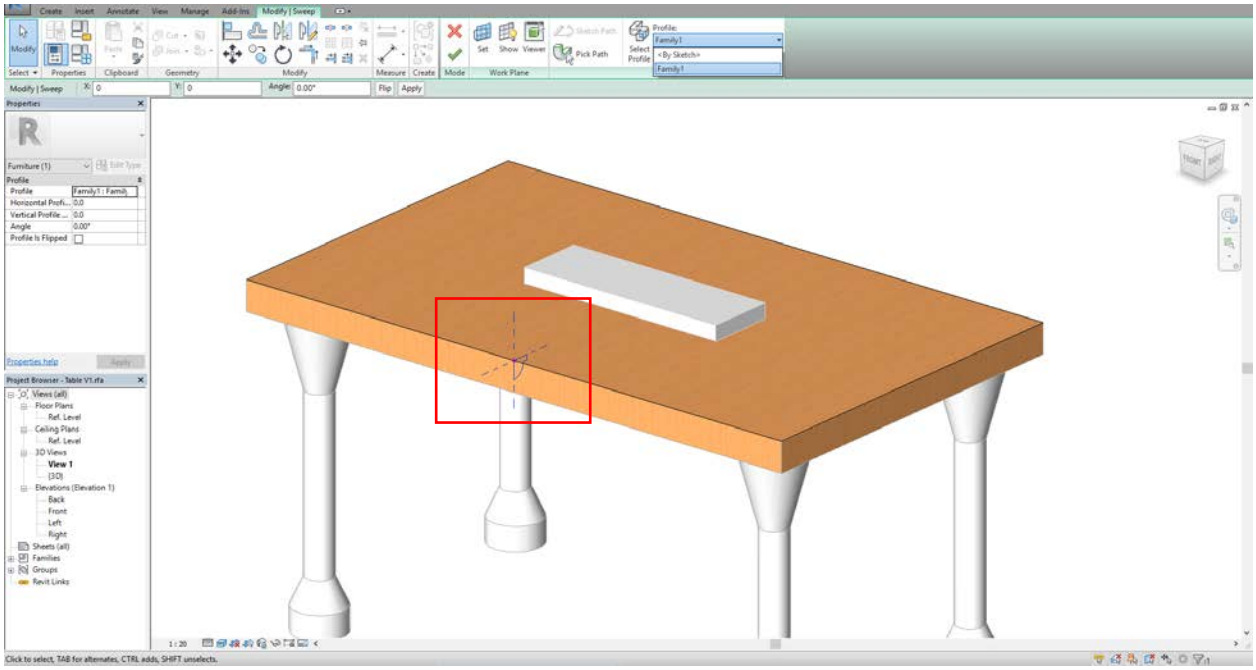
Pick the path.



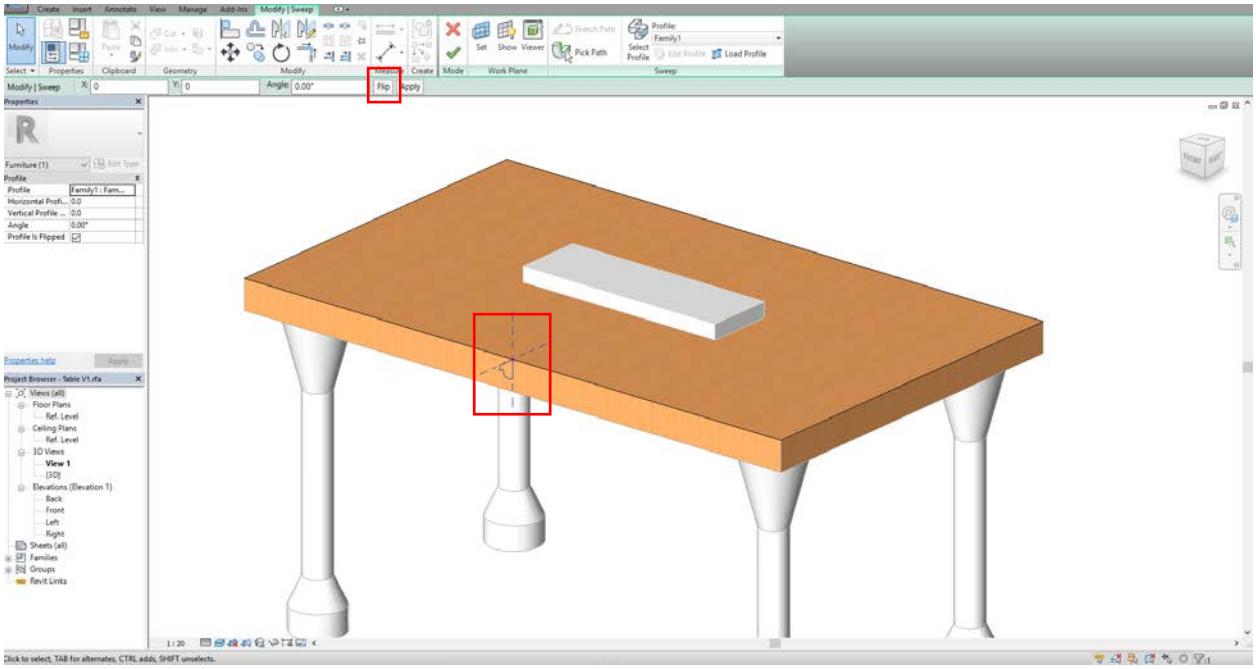
Load the profile.

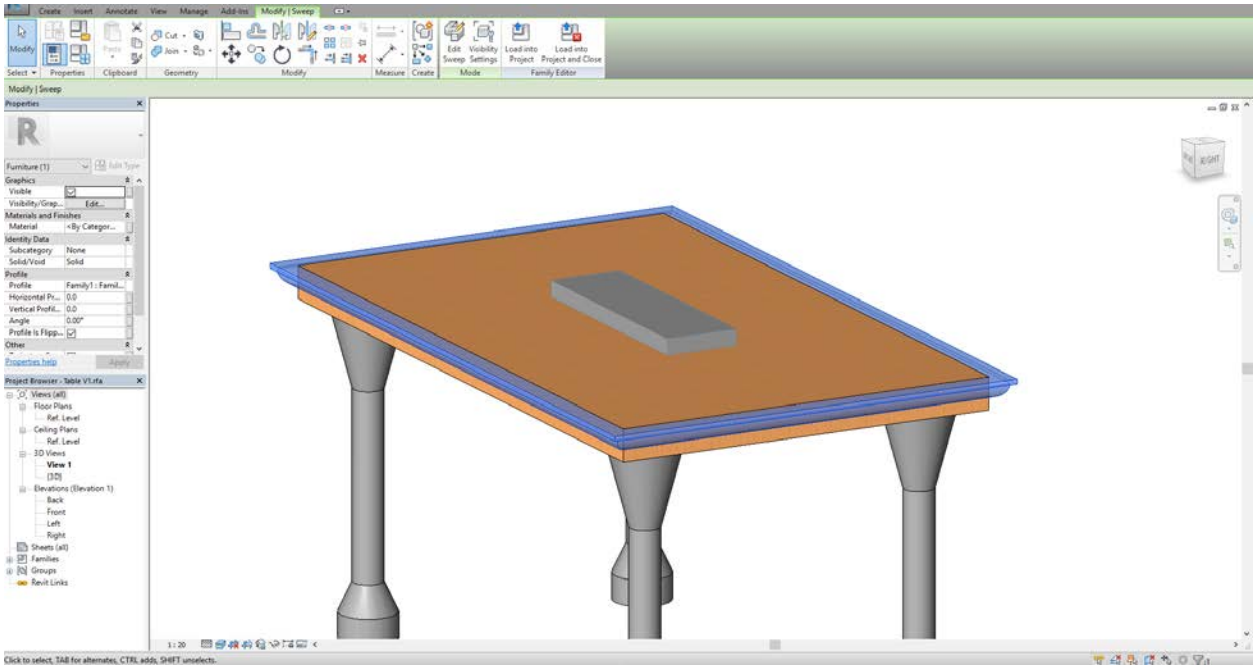


Because we created our profile first and now it has already been loaded into the Family Editor so it should be in the Profile drop-down menu.

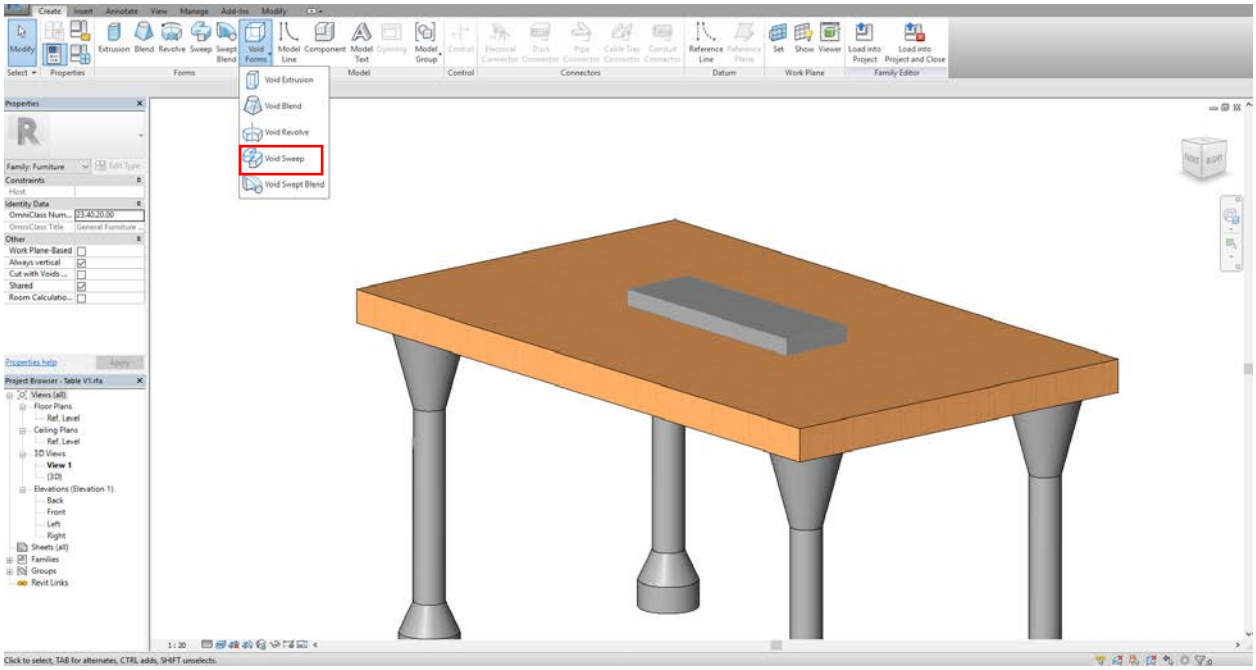


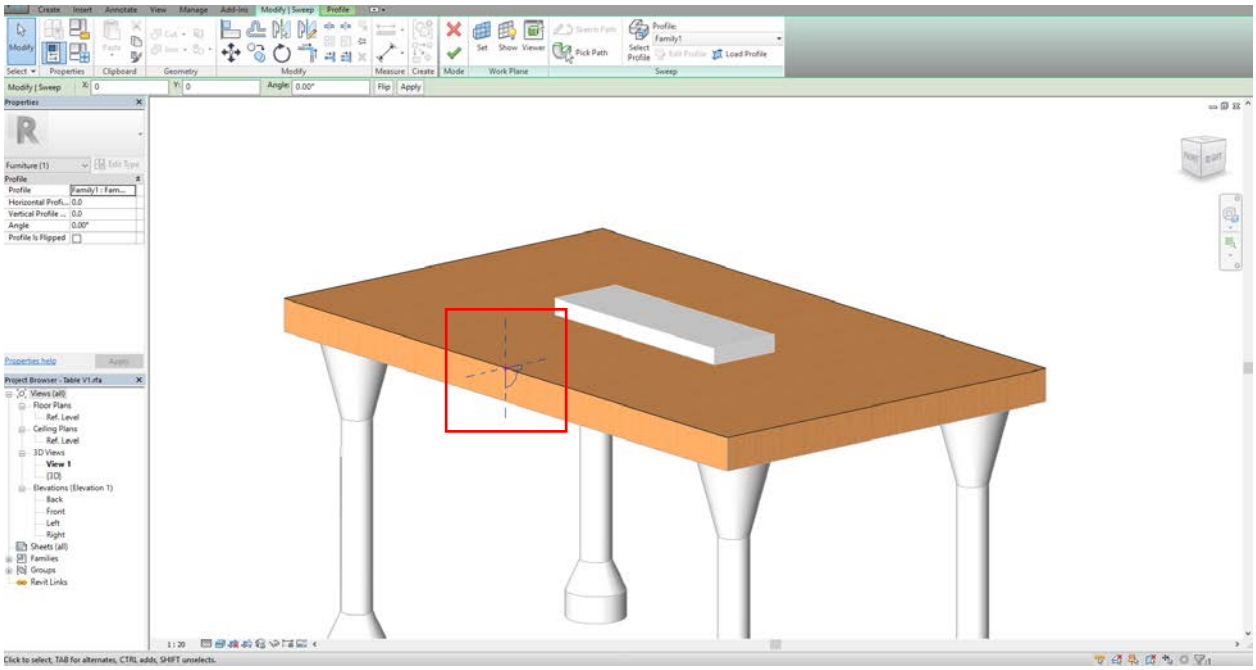
Flip it to make sure it's not oriented within the thickness of table.



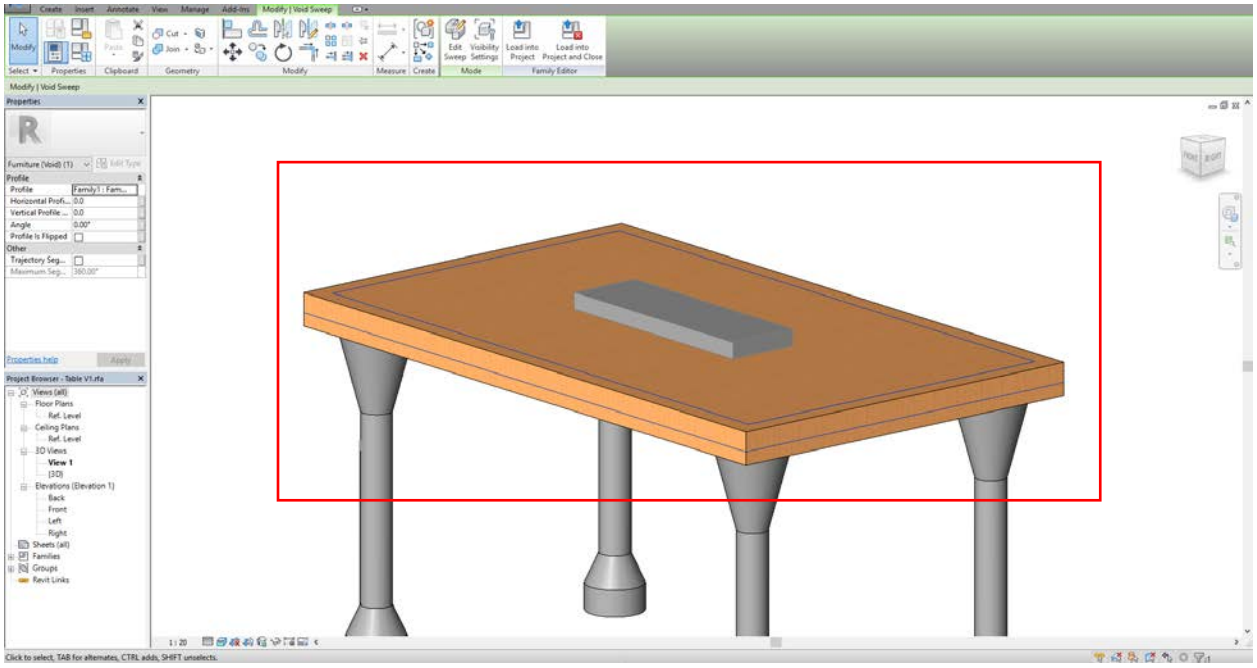


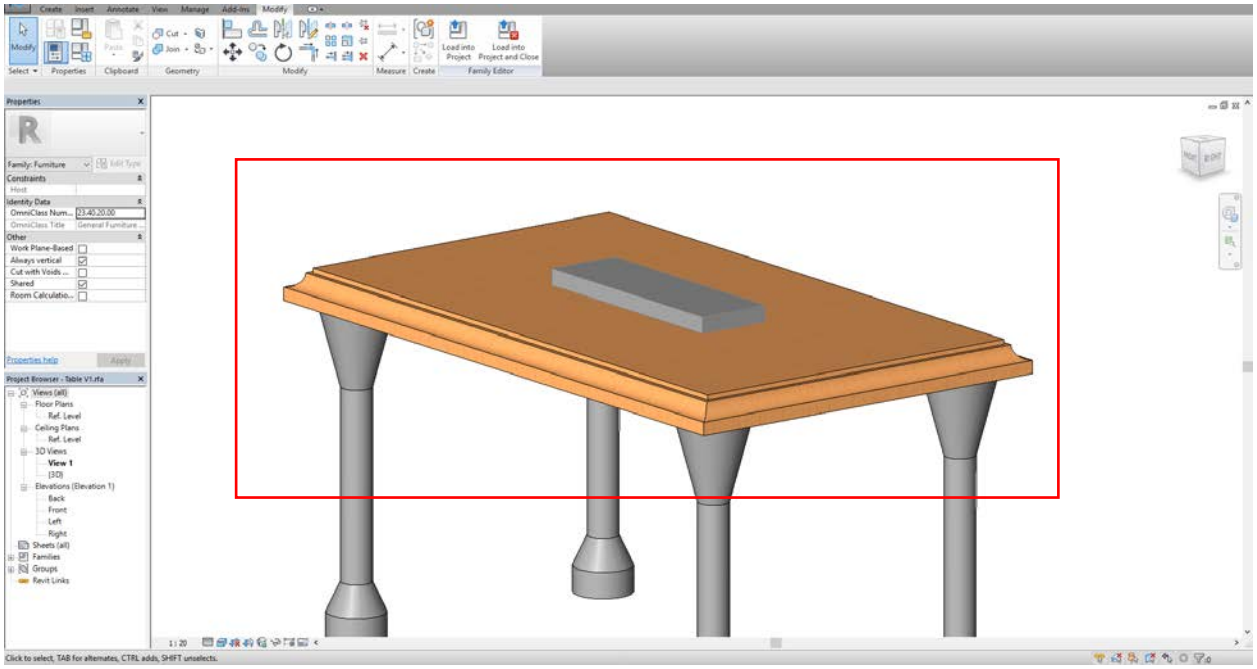
Sweep with void.





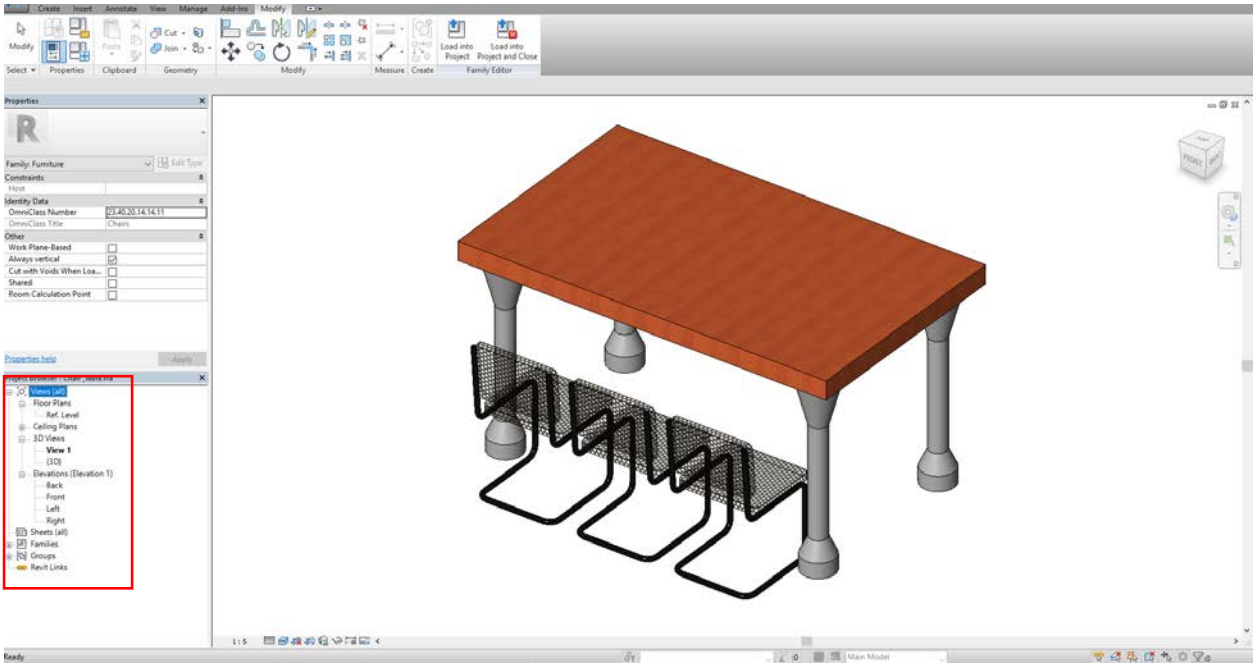
Deselect the void.

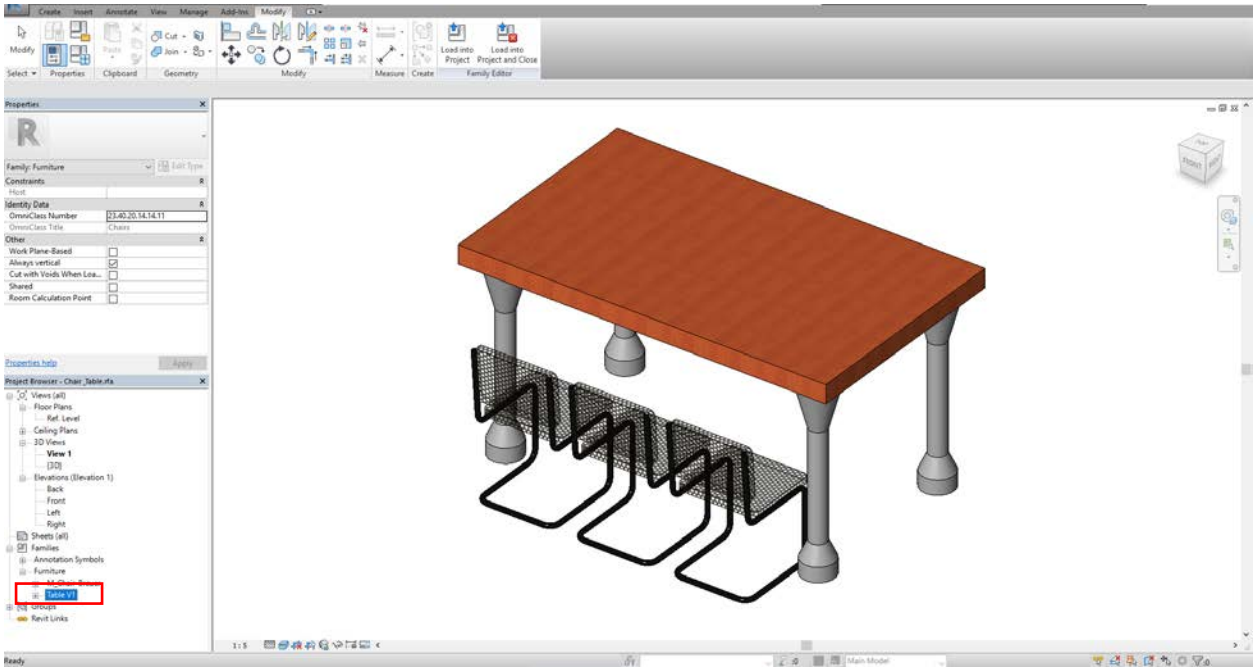




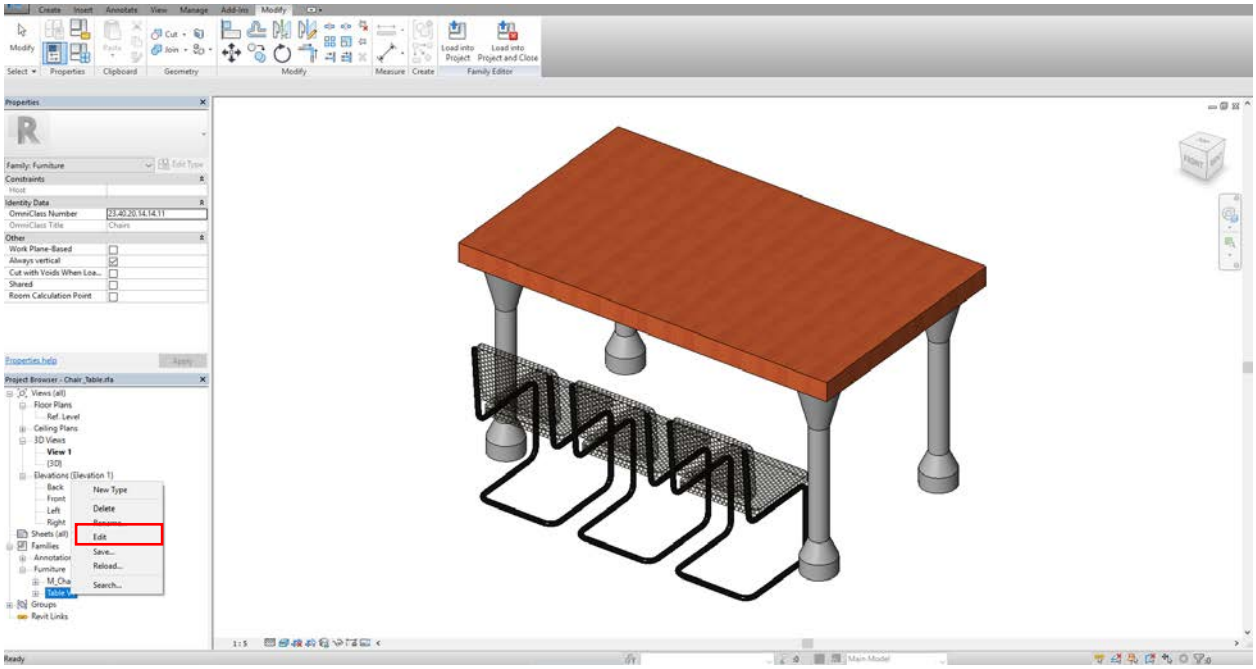
6.7 Modifying a profile

You may find your profile in your local drive then edit it. All projects and families containing the profile will update accordingly. While you can also edit it in the projects or families.

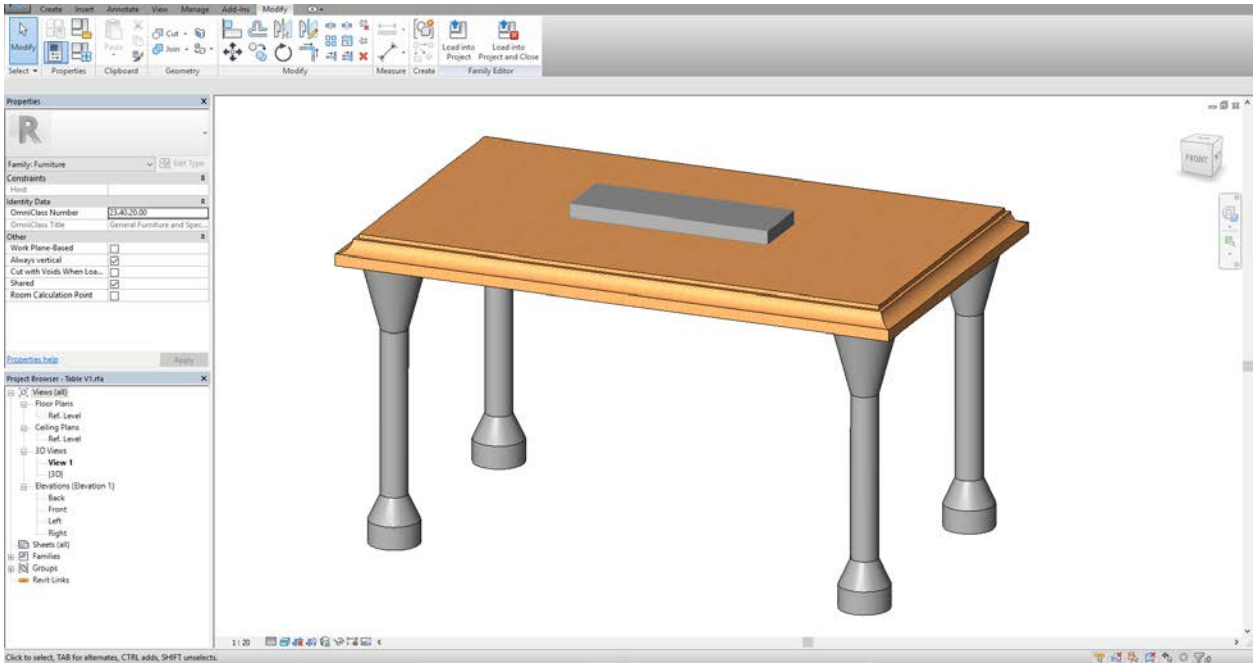




Right click and hit on Edit.



Now we are back to the Family Editor for our table.

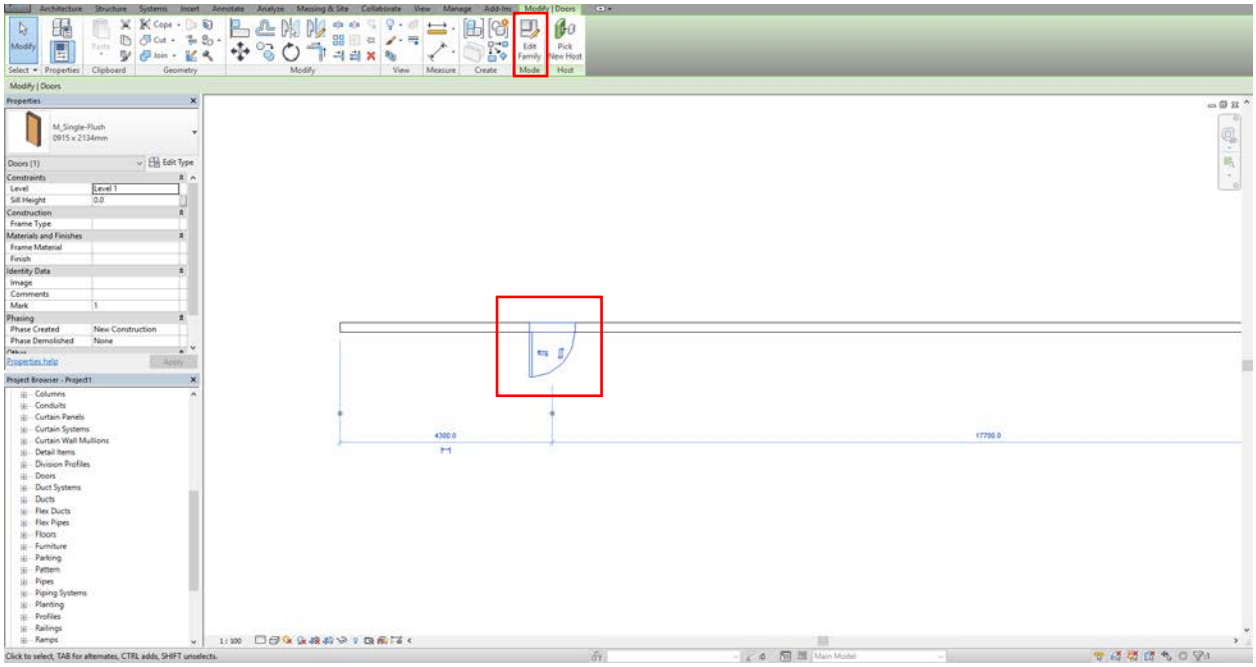


7. Controlling Visibility

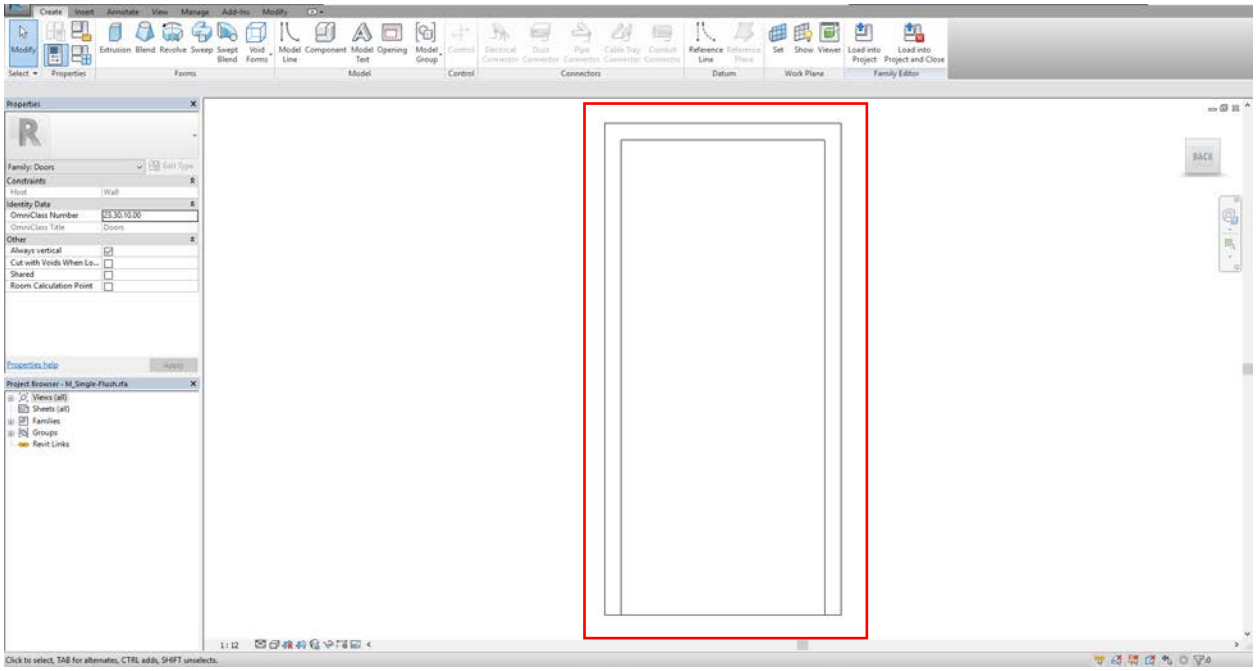
7.1 Understanding symbolic lines

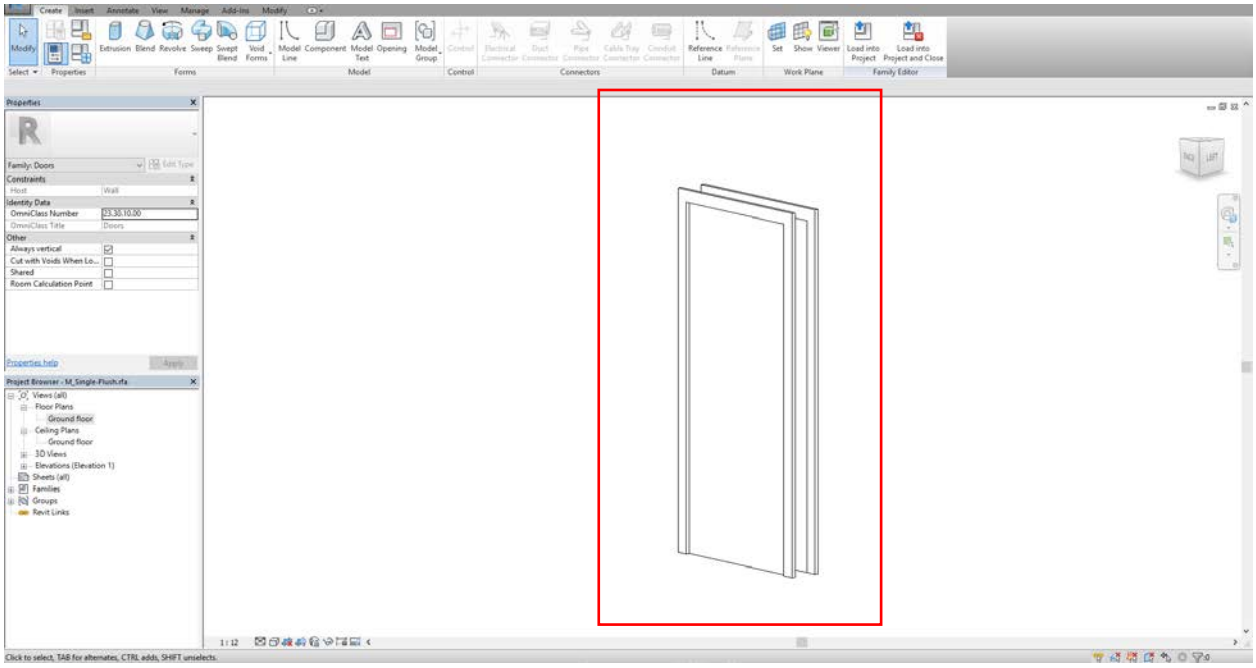
Symbolic lines are two-dimensional drafted lines that display in views parallel to one in which they were created.

Select a door family then Edit Family.

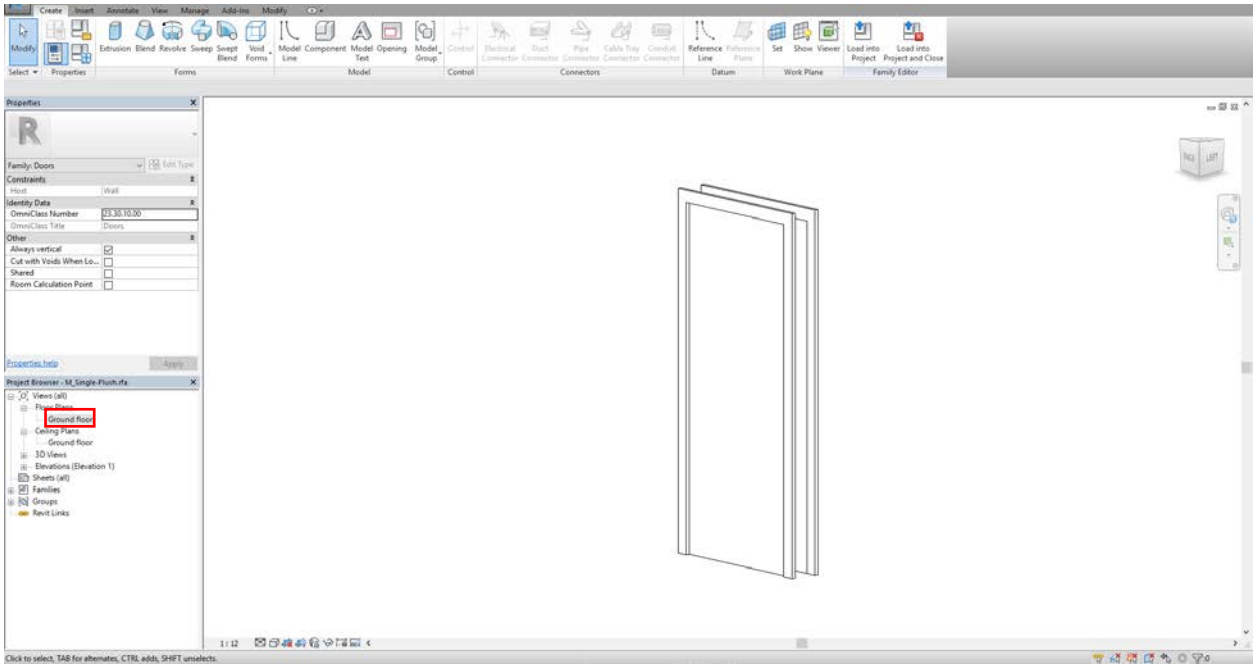


Though it looks like an Elevation View but actually it's the 3D view.

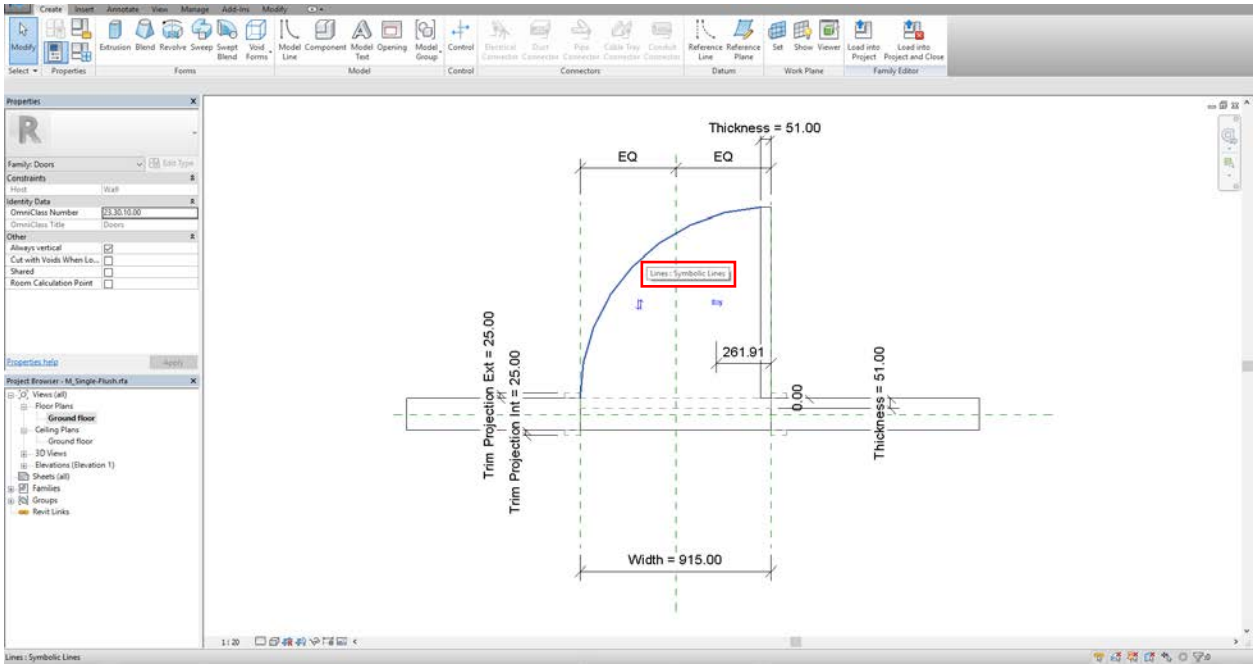




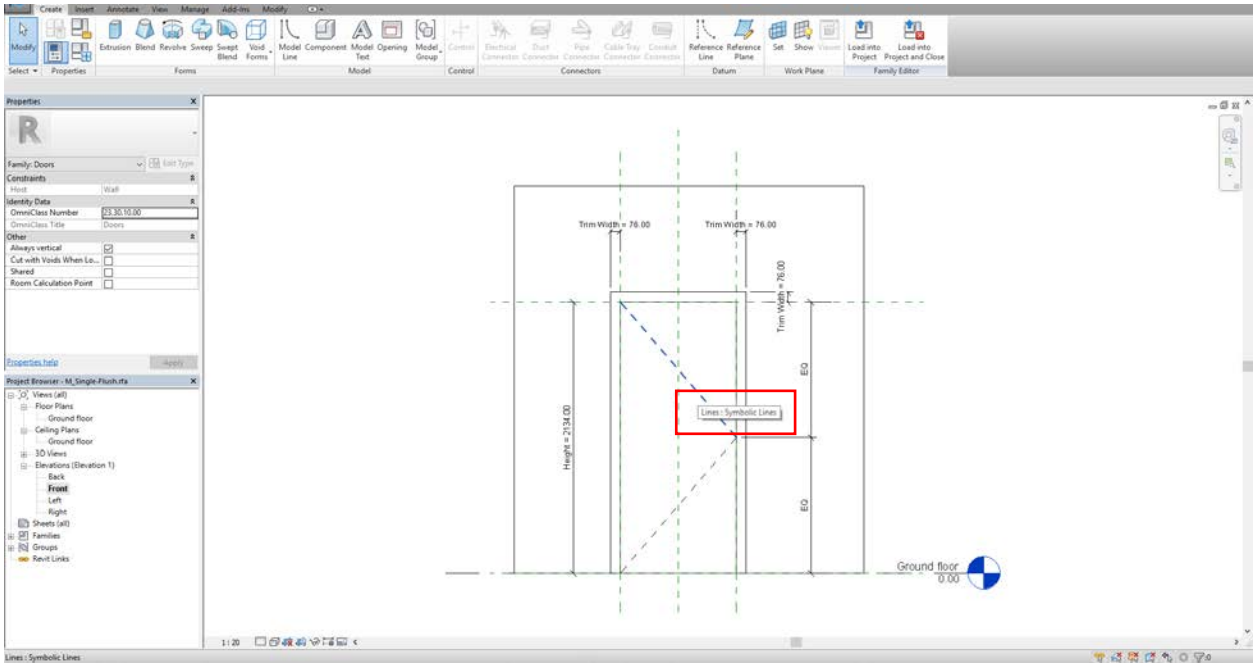
Go to Ground floor plan.



Hover over to the arc, notice it’s a Symbolic Line.

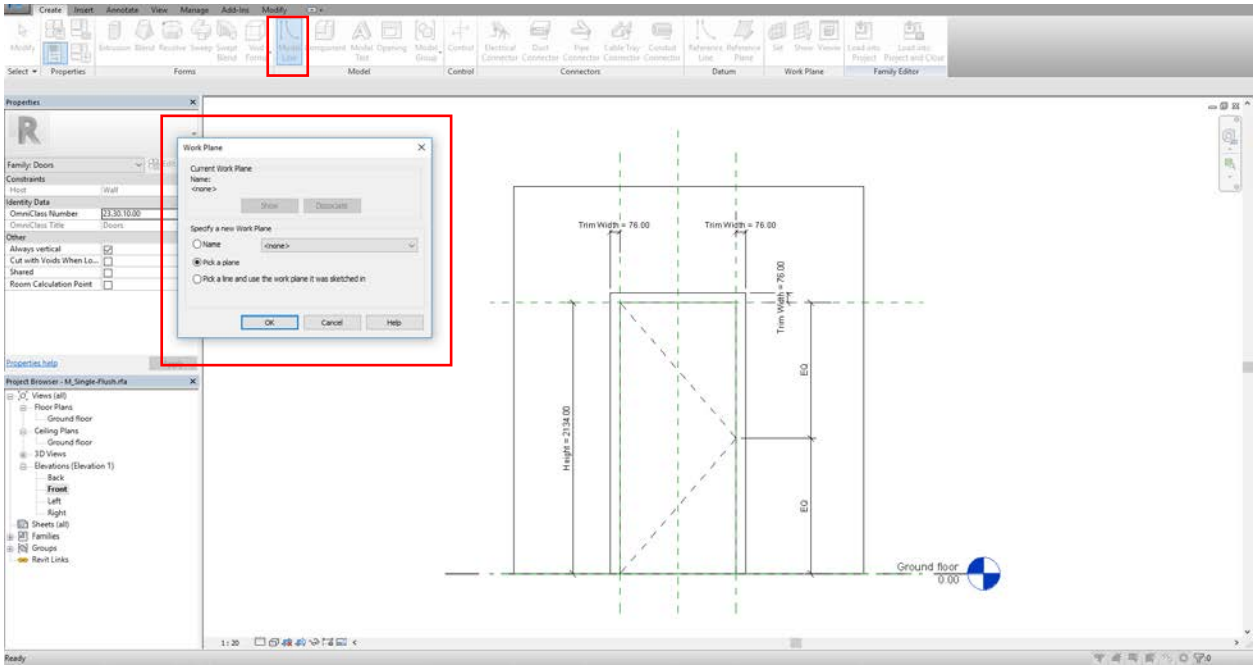


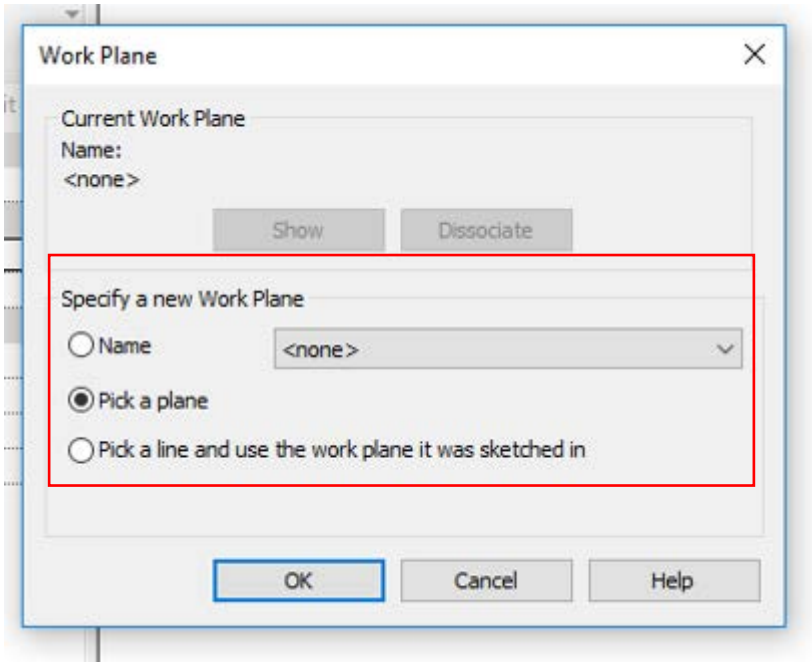
Go to Elevation View, we'll find the same thing.



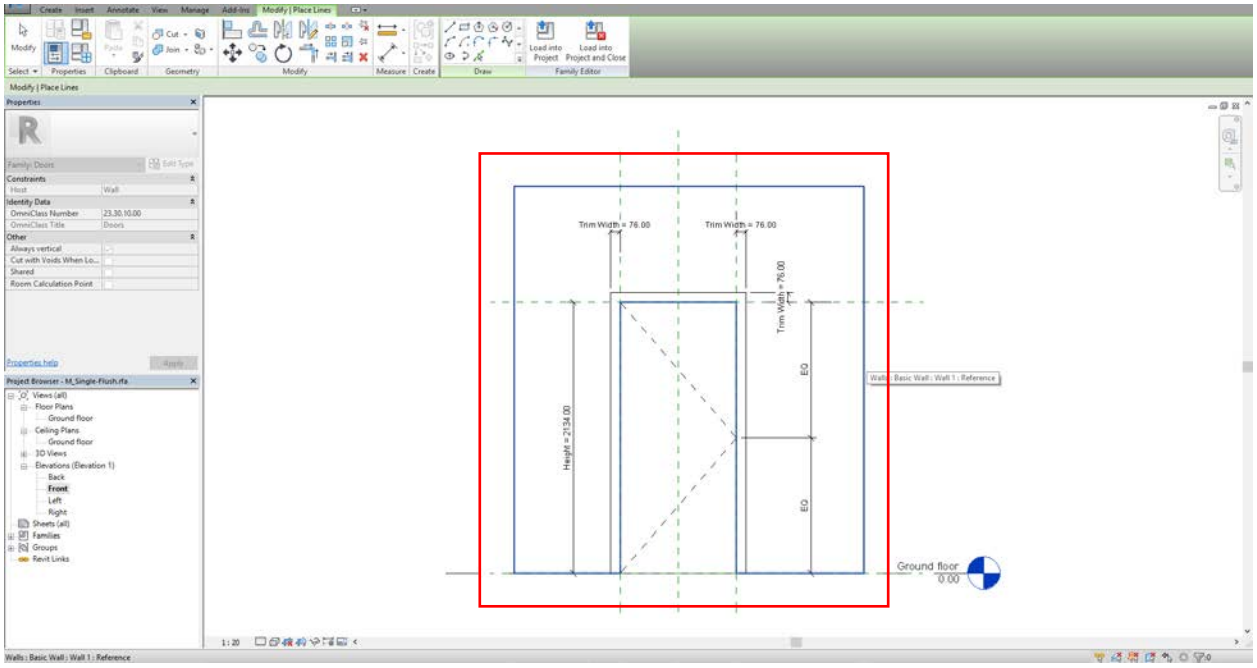
If we need additional details on the door, for example, a louver near the bottom, Symbolic Line will come in handy. We want to see it in Elevation view with full details while simply represent its shape in 3D view, Model Line is an option.

Click on Model Line.

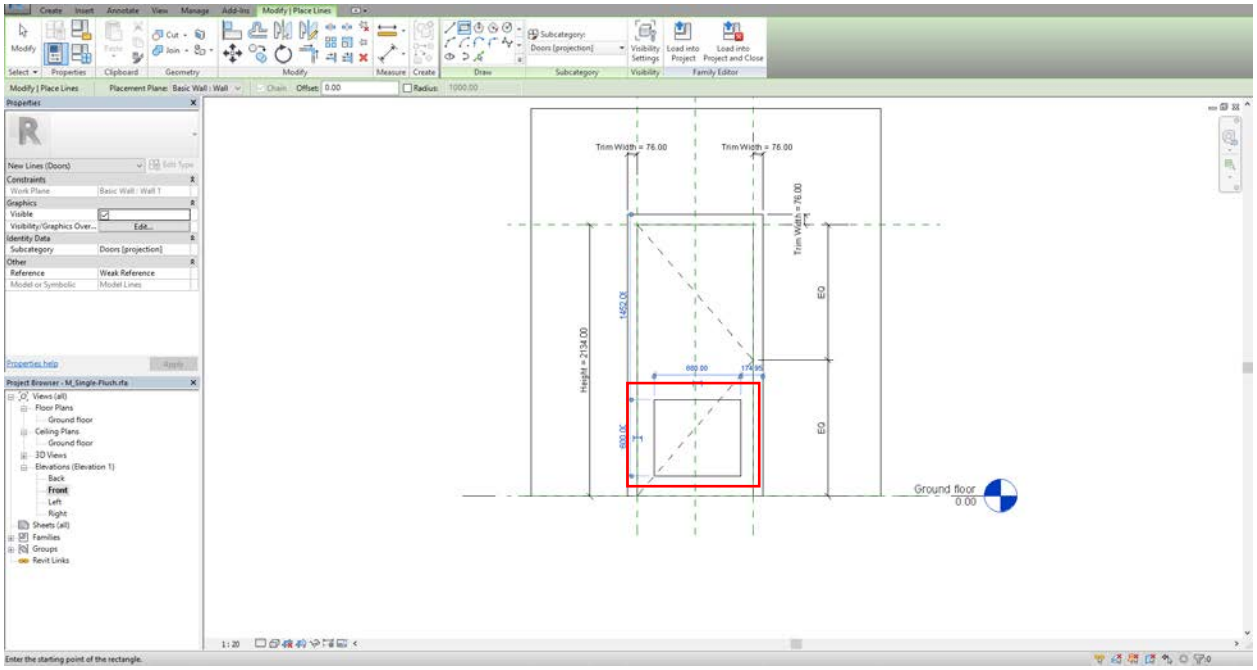




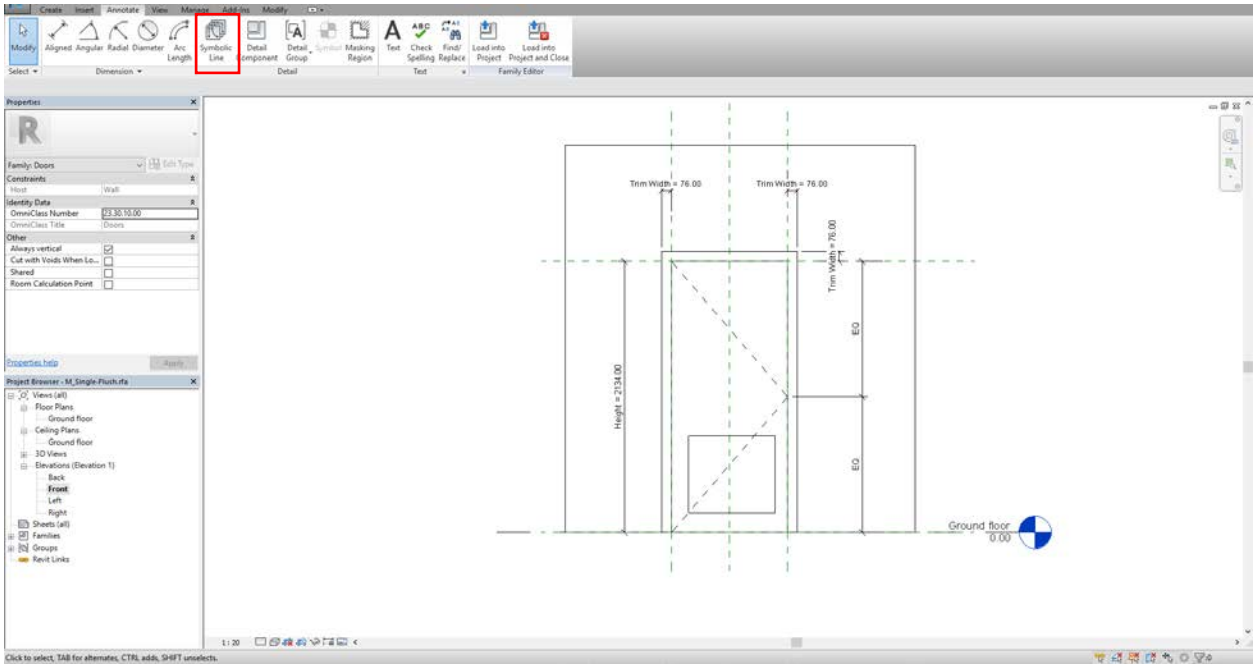
Pick the wall as work plane.

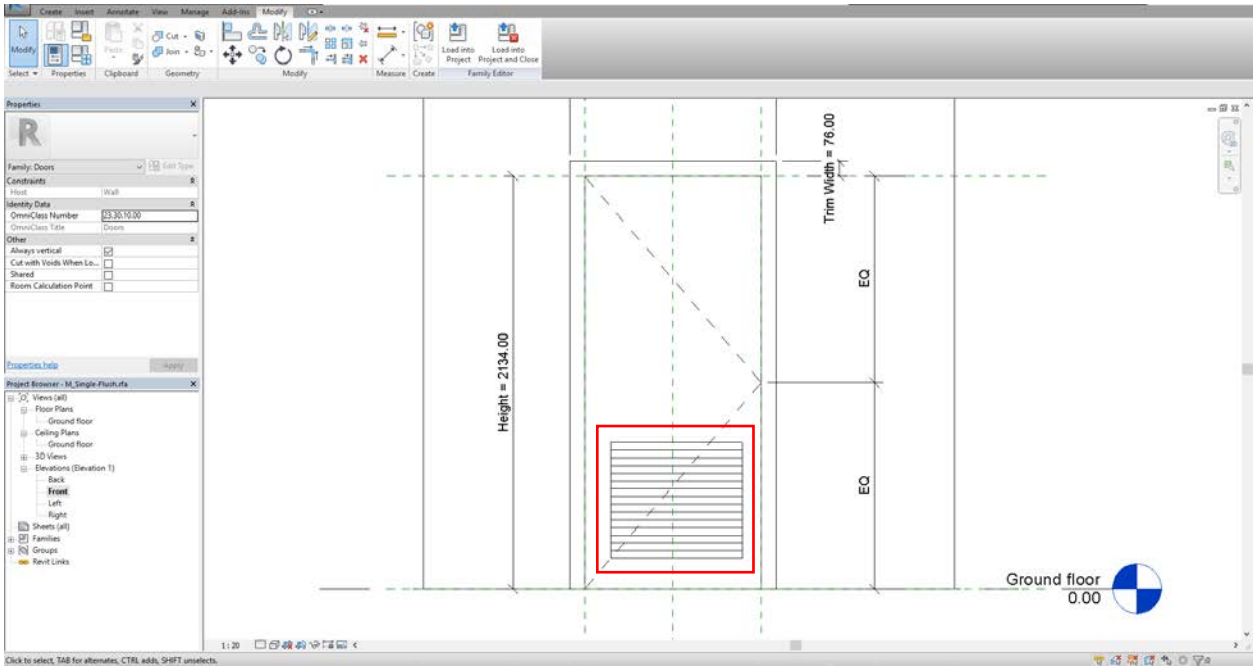


Outline your louver.

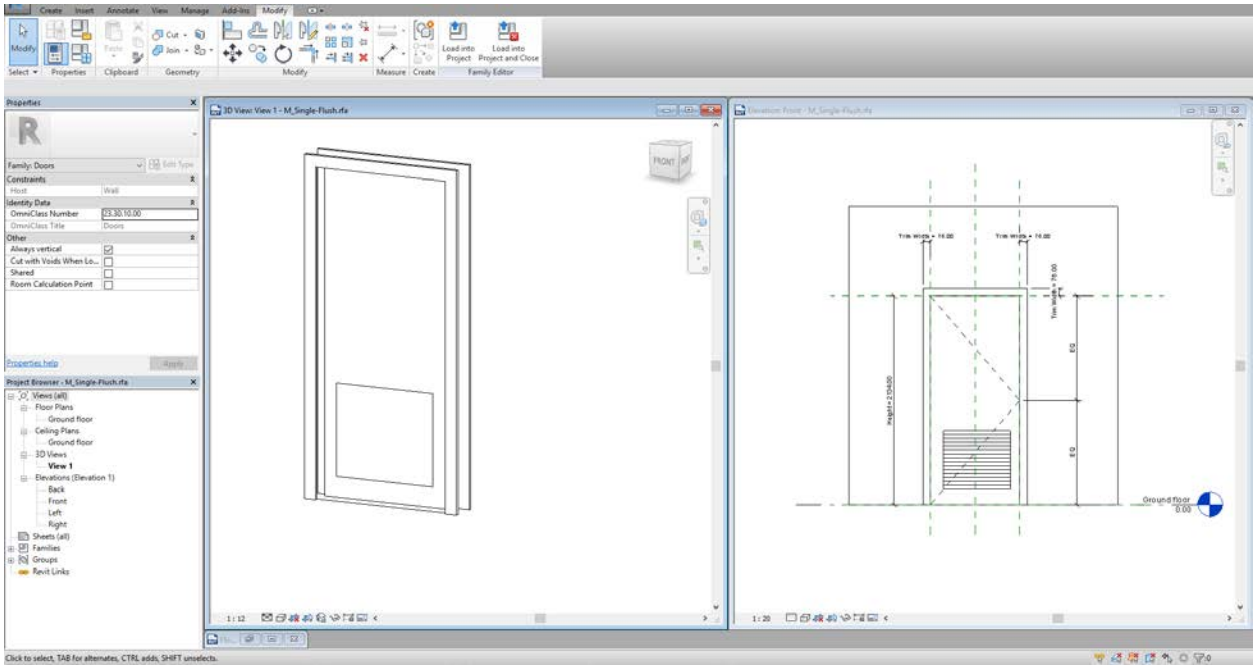


Switch to Annotate tab, hit on Symbolic Line then finish the details.





Now, if we tile our windows, you may notice that there's no Symbolic Line in 3D view.

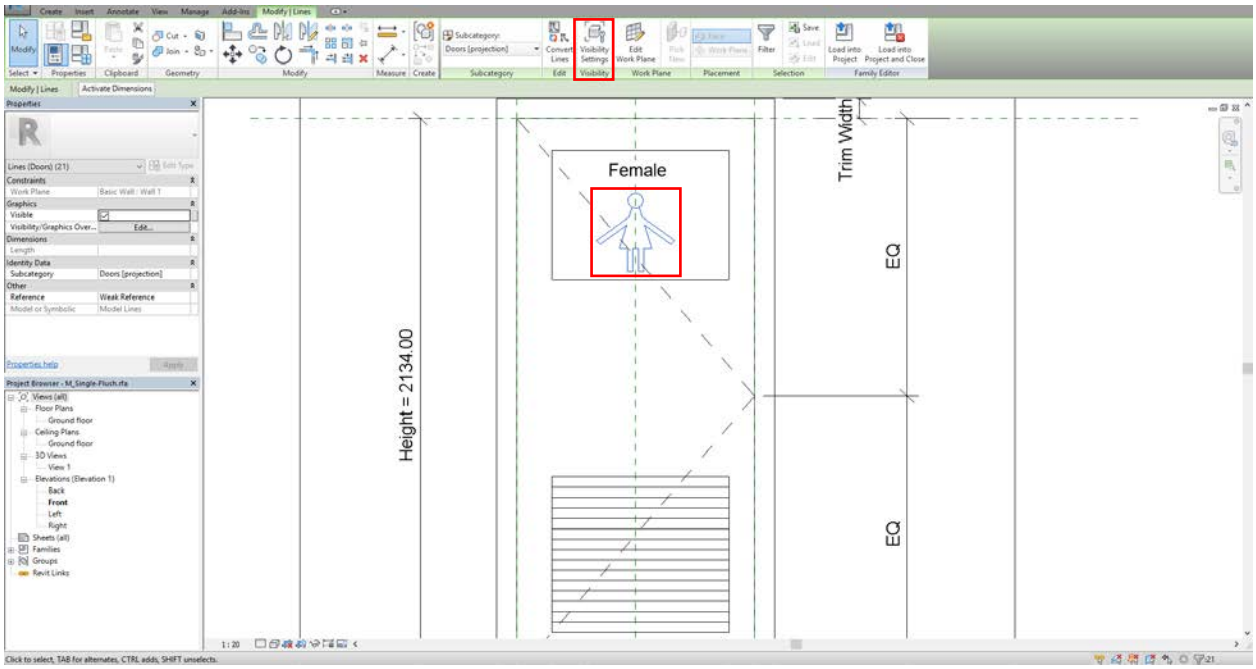


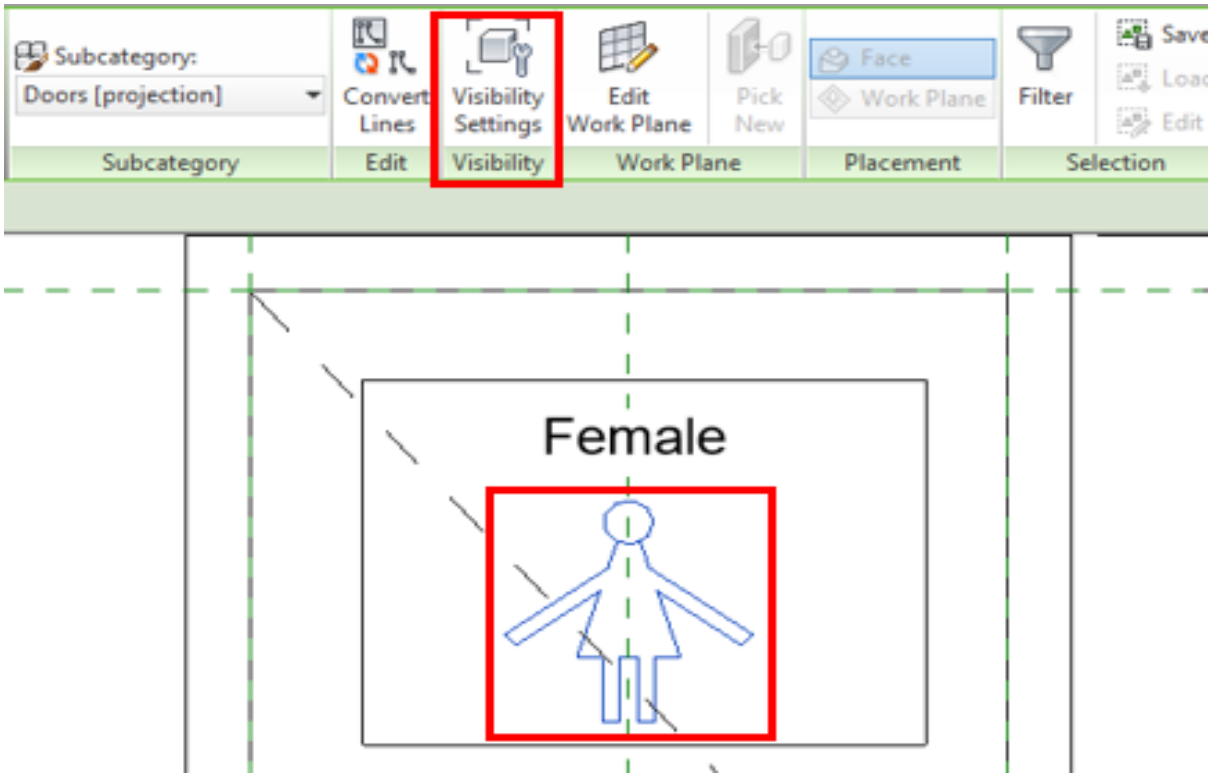
7.2 Editing element visibility

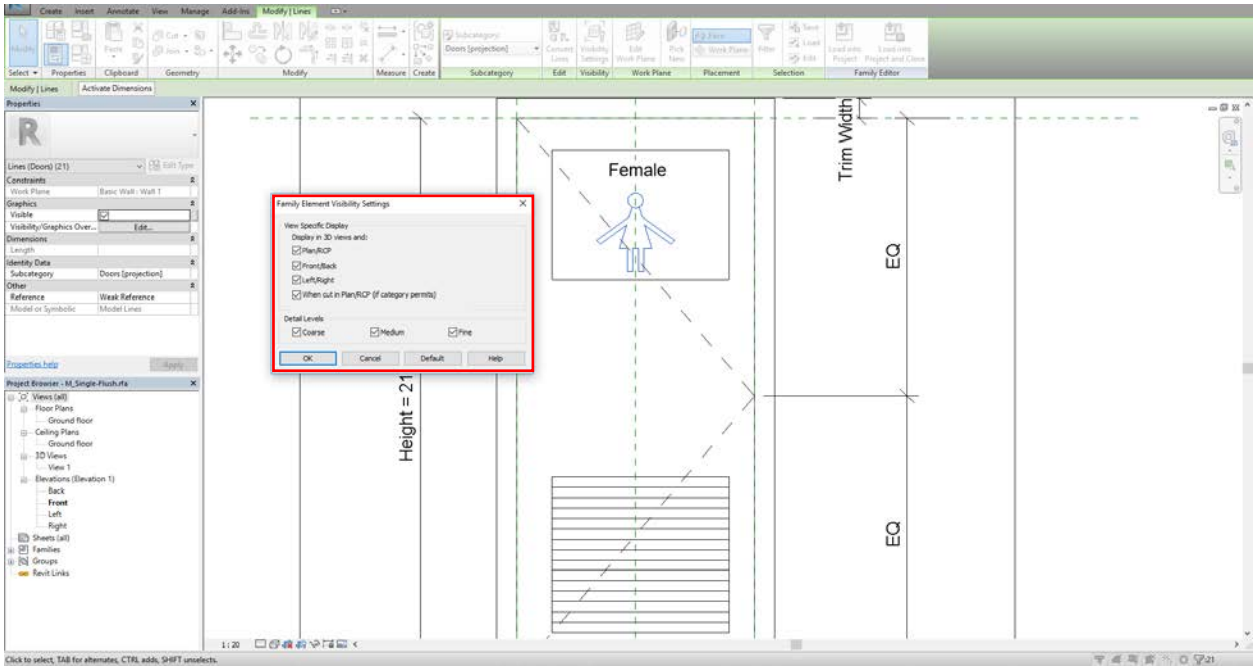
In certain view-specific conditions, we might want to hide some elements.

Usually, 3D geometry will prove too detailed for certain view. Revit allow us to hide and replace them with Symbolic Lines.

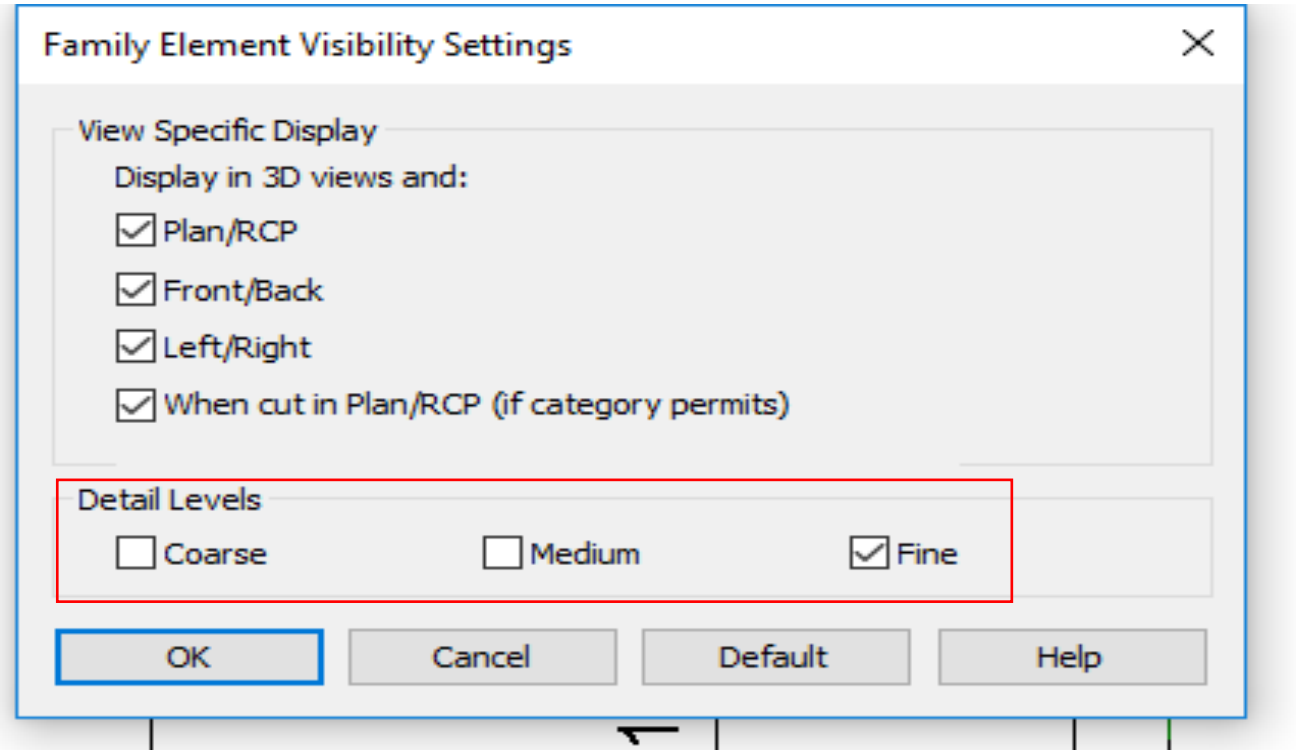
Select the part you want to hide. Go to Visibility Settings.



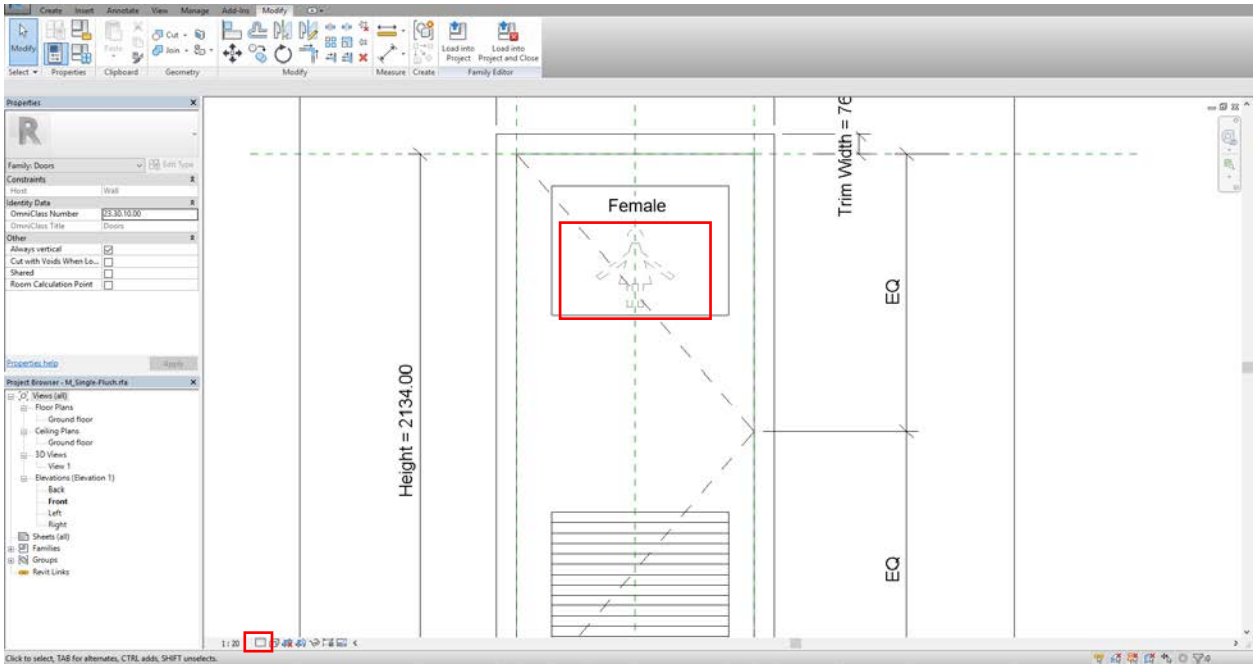




Uncheck any **View Specific Display** or **Detail Levels.**

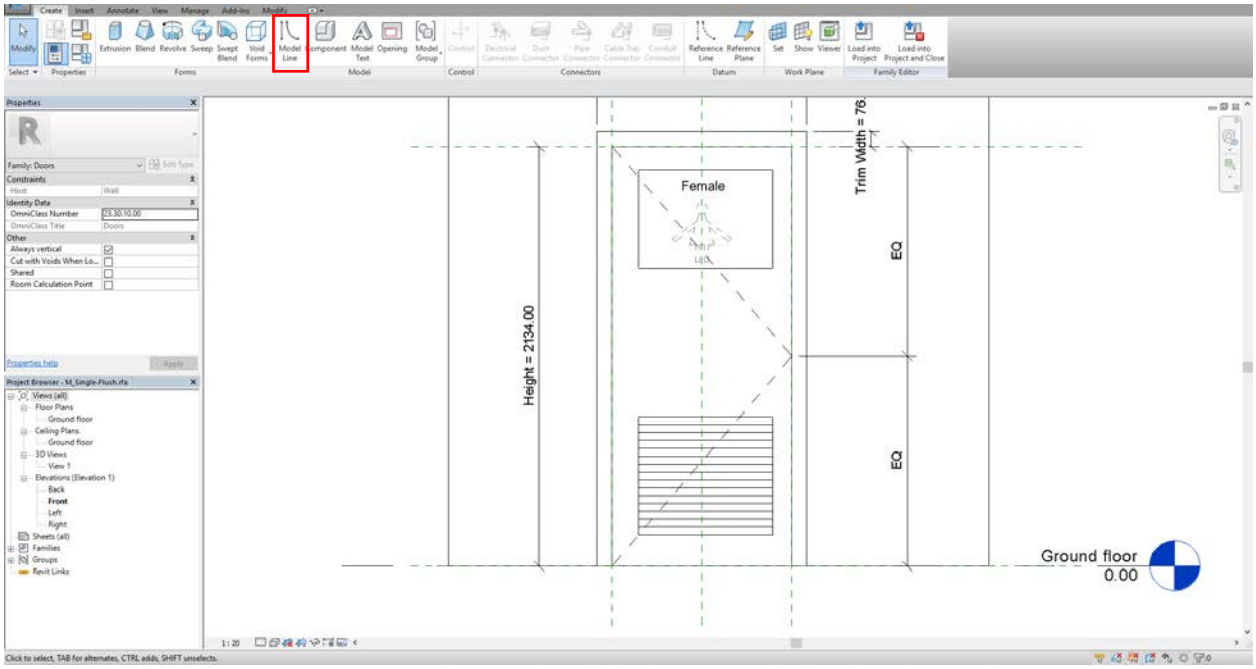


Now it's hidden in Coarse and Medium level.

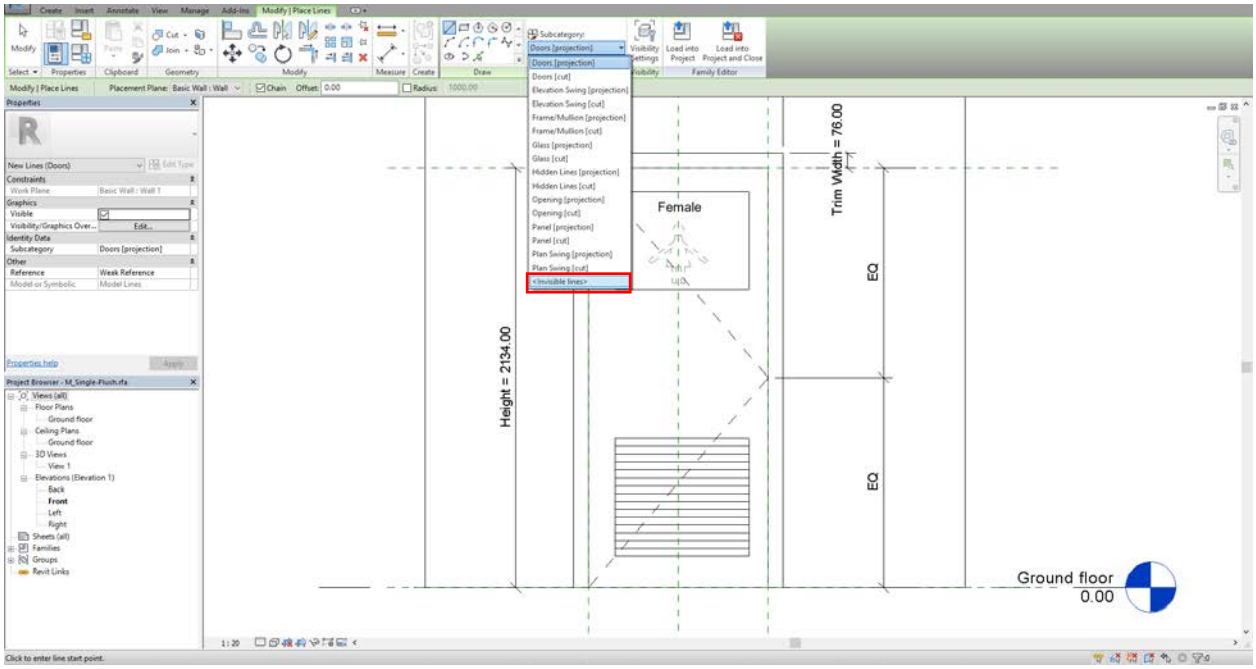


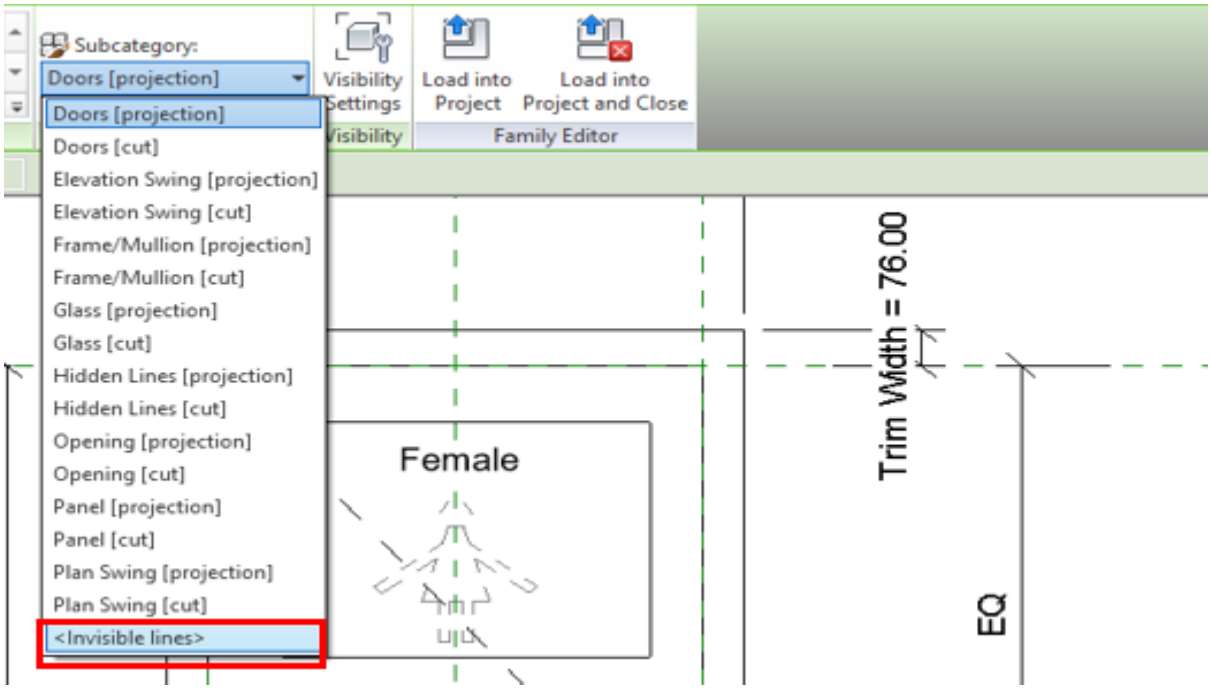
7.3 Ensuring the display of overhead items in a plan

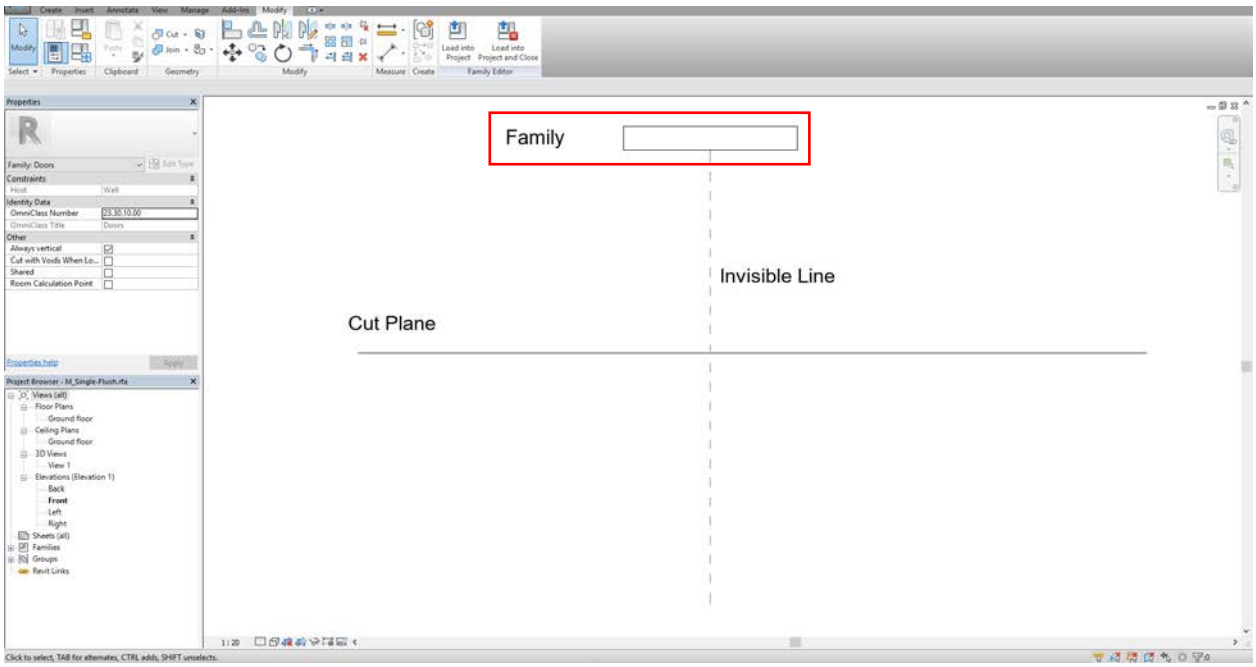
Objects above the cut plane will not show in Plan Views (except Generic models, Casework and Windows). To make sure families will show in this scenario we have to use an Invisible Line.



Draw an Invisible Line which pierce through the cut plane.



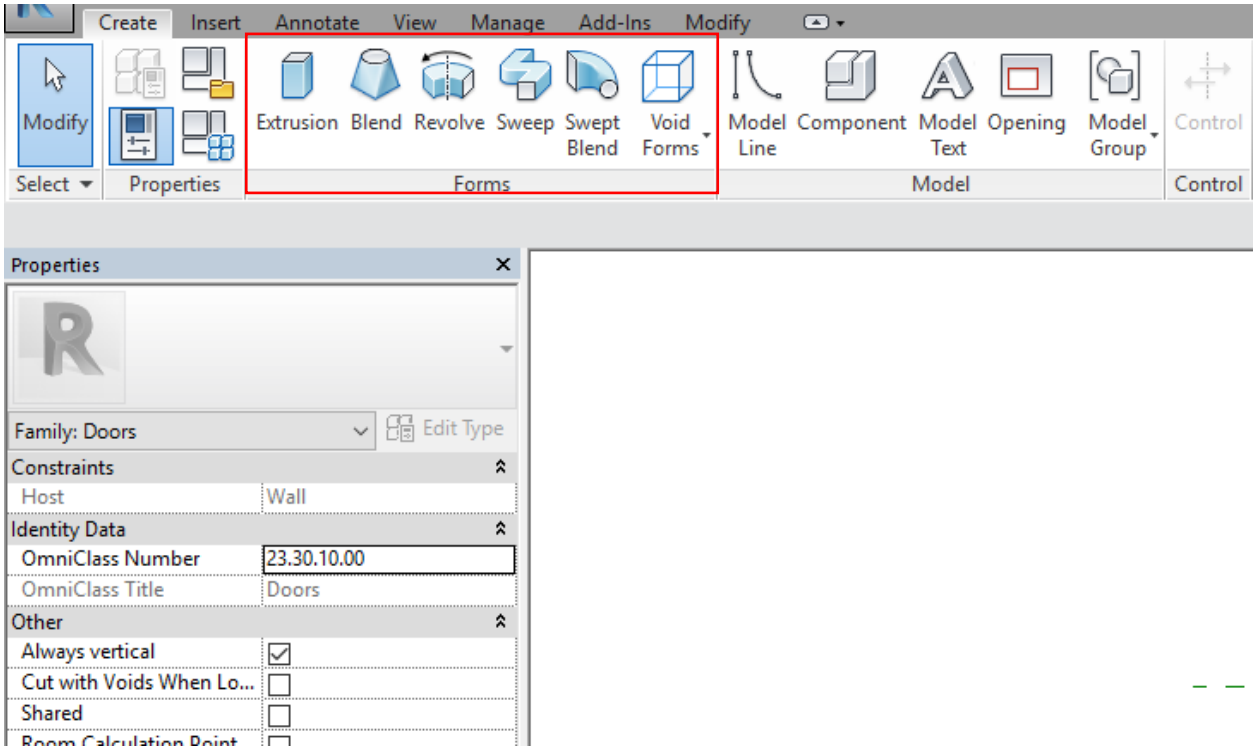

Subcategory:
Doors [projection]
Visibility Settings
Load into Project
Load into Project and Close
Family Editor
Doors [projection]
Doors [cut]
Elevation Swing [projection]
Elevation Swing [cut]
Frame/Mullion [projection]
Frame/Mullion [cut]
Glass [projection]
Glass [cut]
Hidden Lines [projection]
Hidden Lines [cut]
Opening [projection]
Opening [cut]
Panel [projection]
Panel [cut]
Plan Swing [projection]
Plan Swing [cut]
<Invisible lines>
Female
Trim Width = 76.00
EQ


Family
Invisible Line
Cut Plane

8. Building a Complex Parametric Model Family

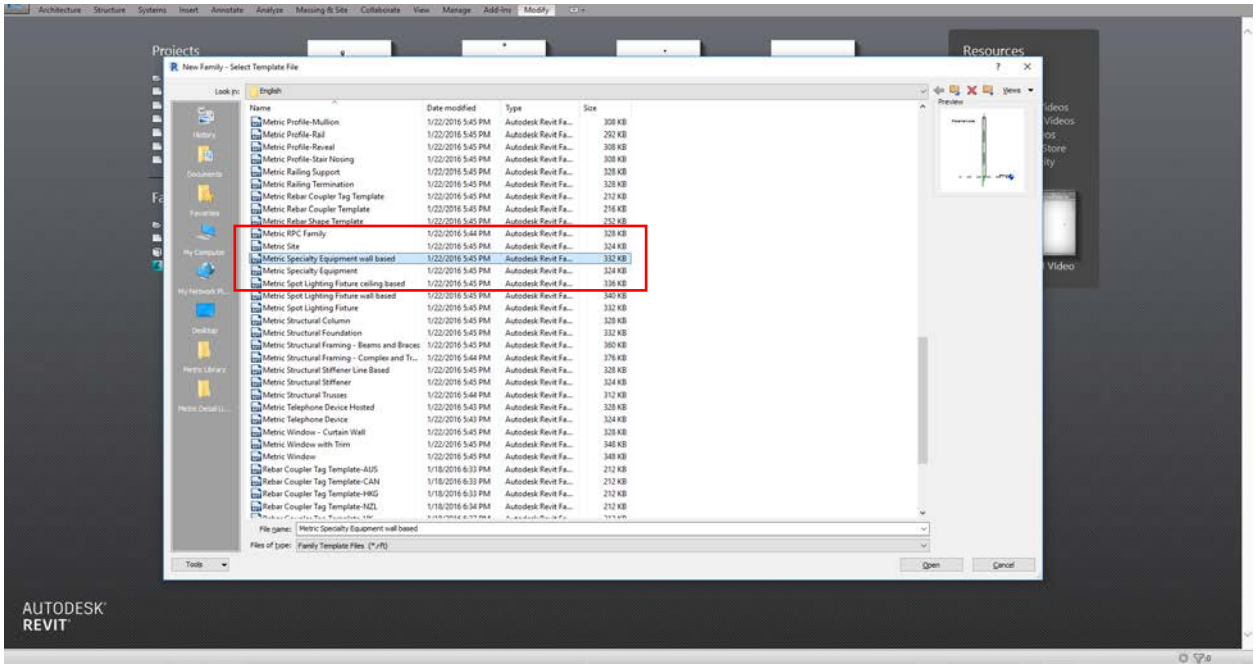
8.1 Introducing complex families

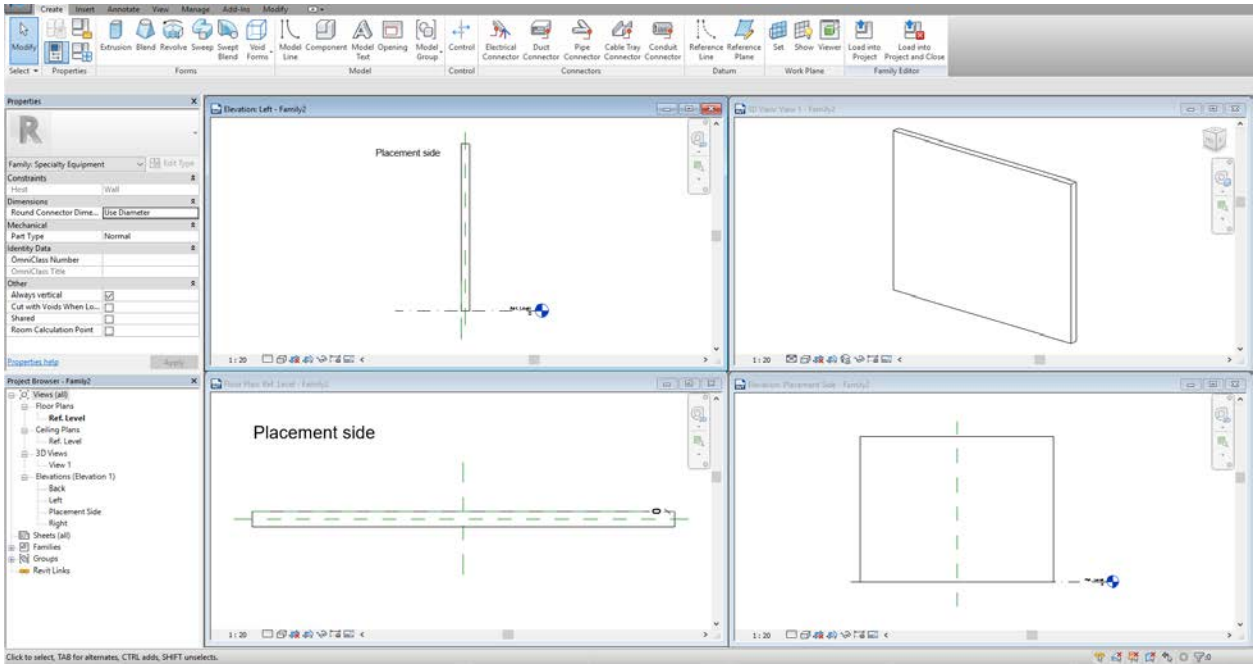
To make a complex family, we need a collection of forms, shapes, formulas, etc. In this chapter we'll go through the process of making a complex family.



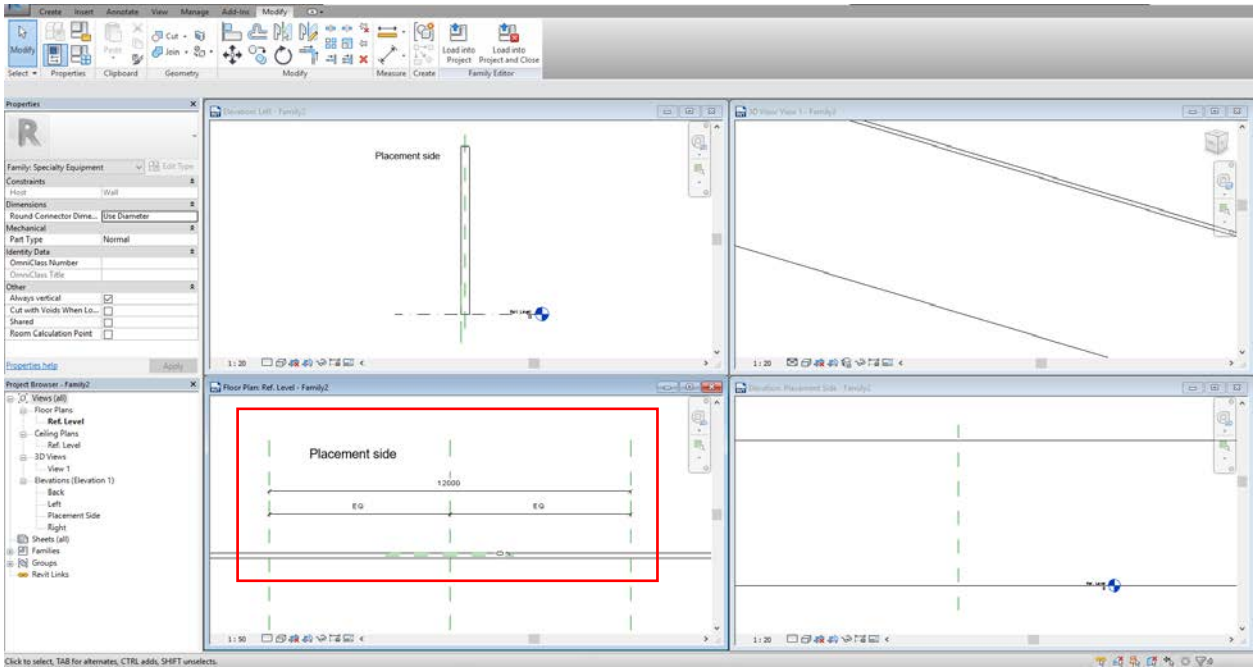
8.2 Adding reference planes and importing nested families

Open a new family project with Special Equipment wall based.

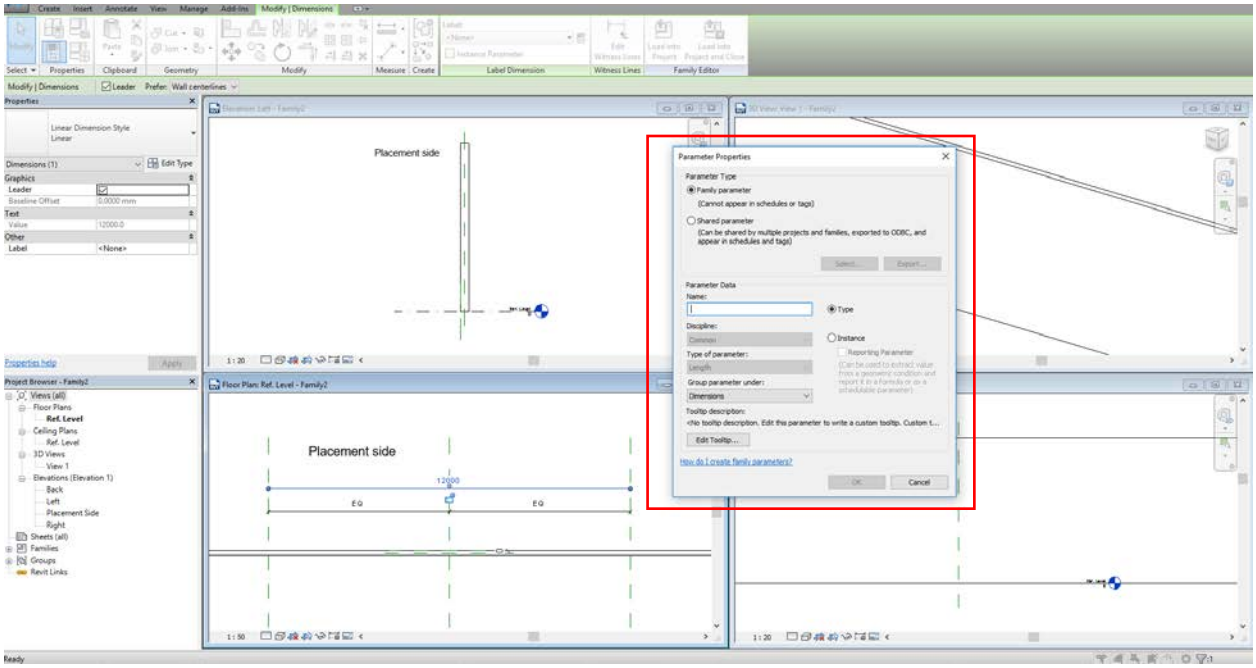




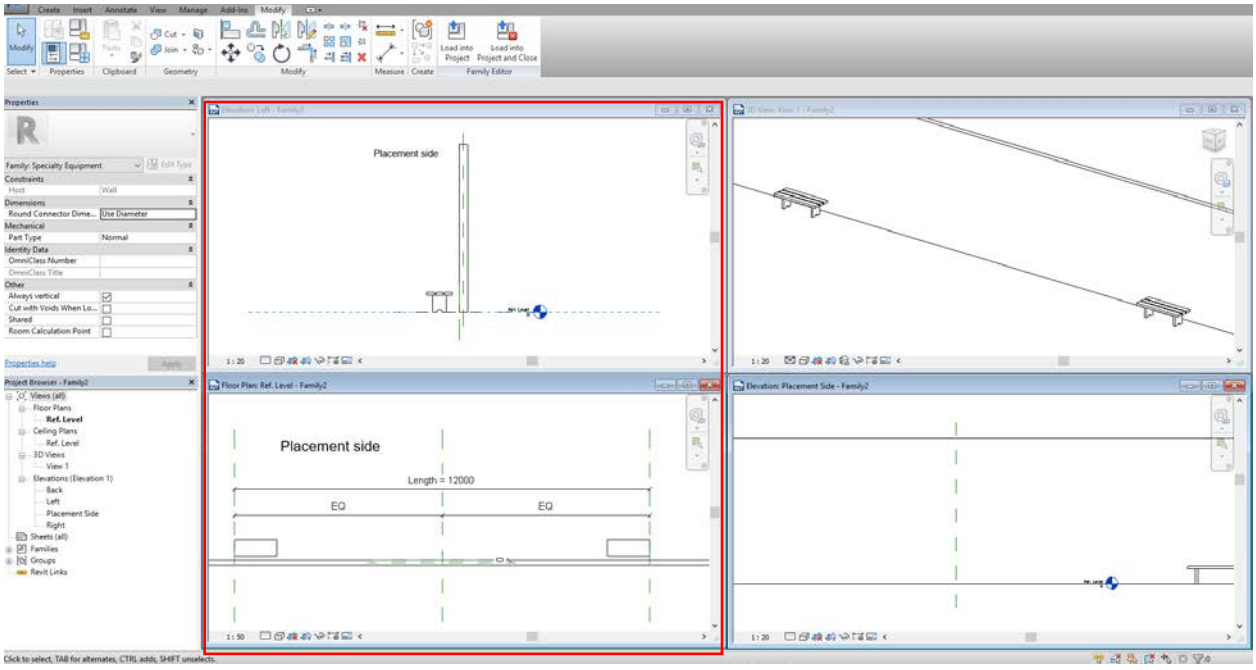
Adding two reference planes then name them properly.



Assign a parameter named Length to the overall dimension.

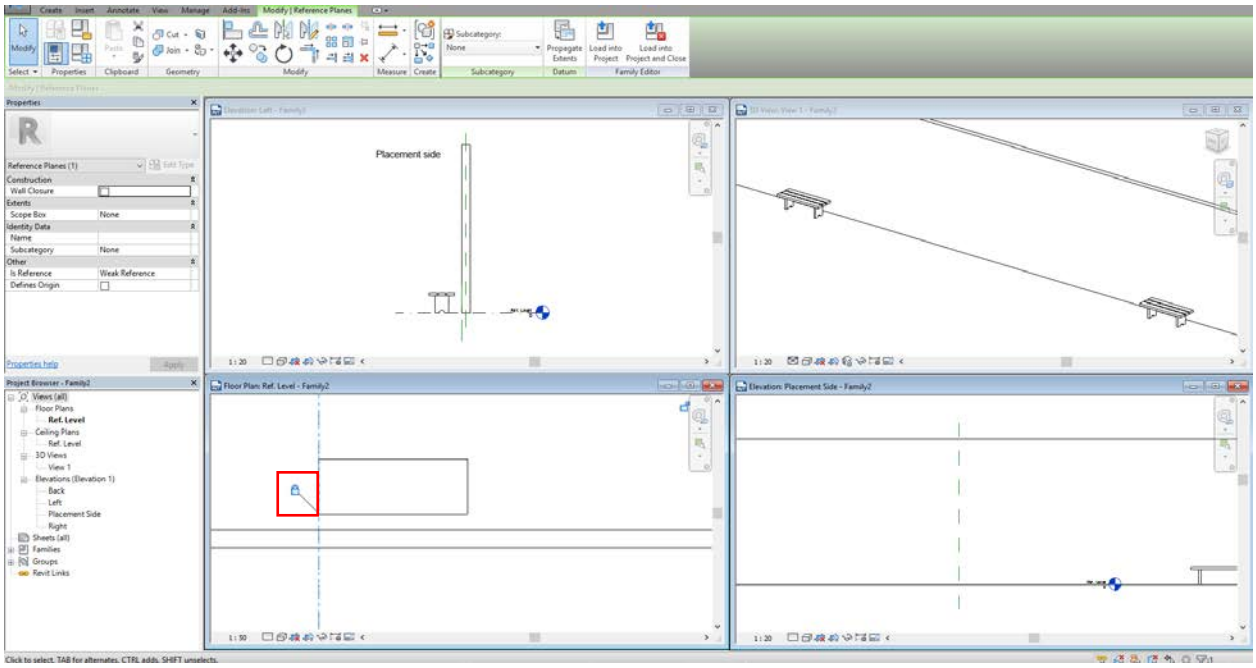


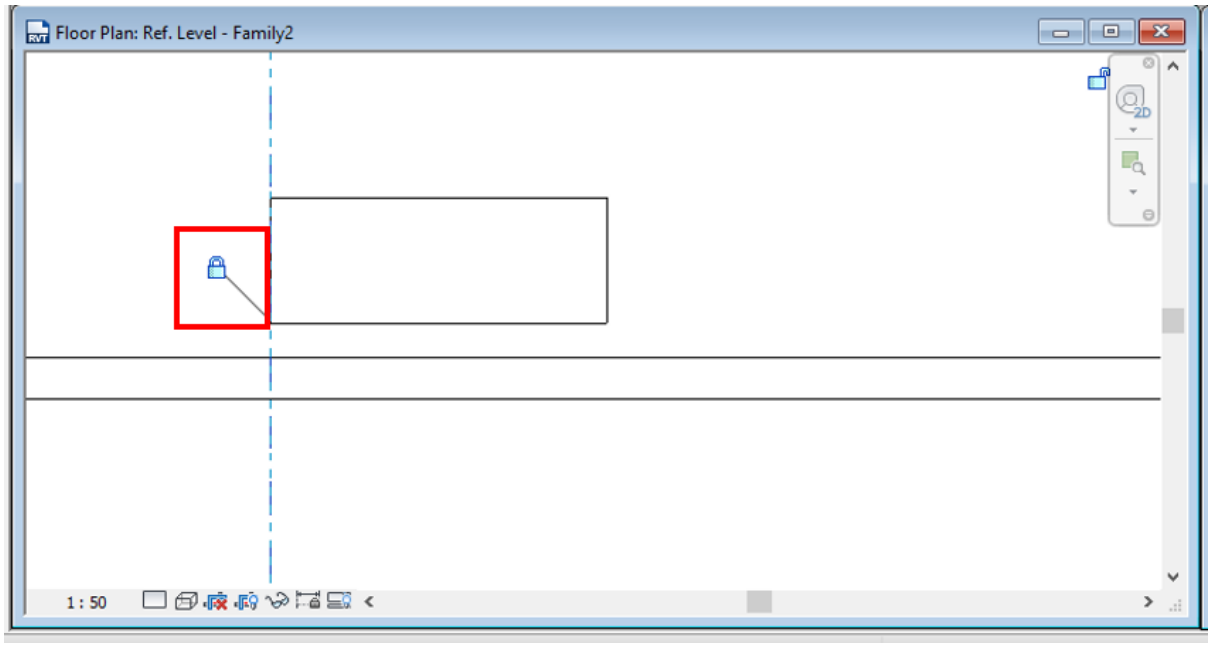
Load in and place your components. Array a series of seats.



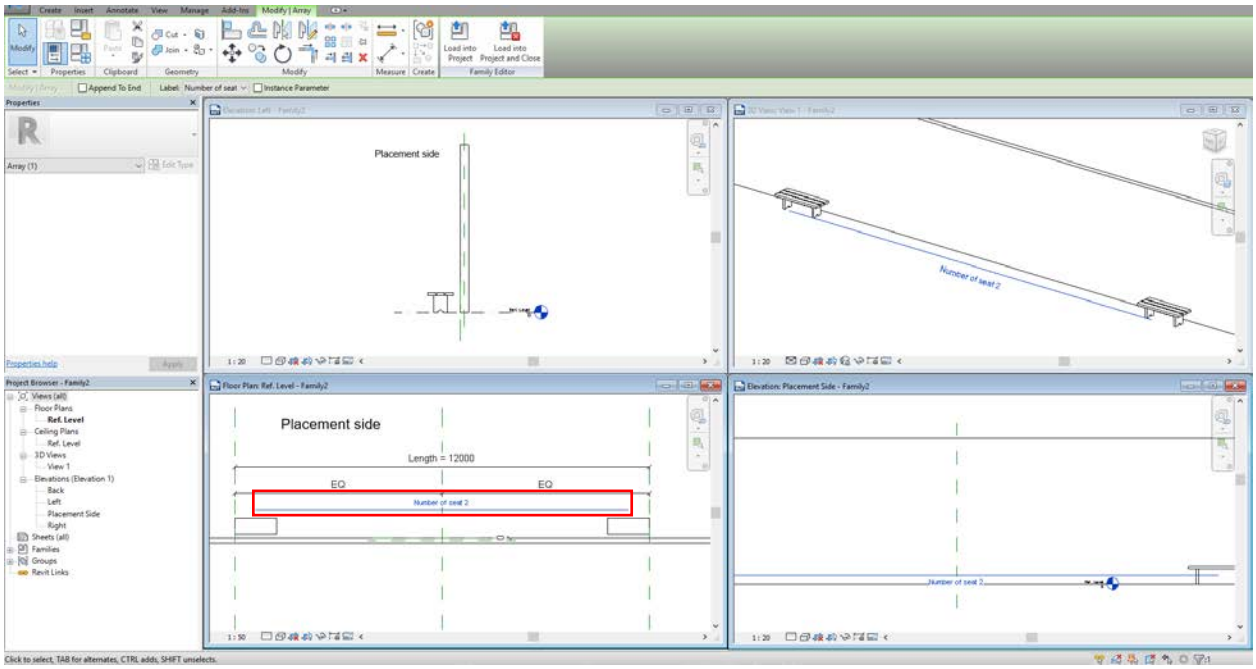
8.3 Building arrays and applying rules

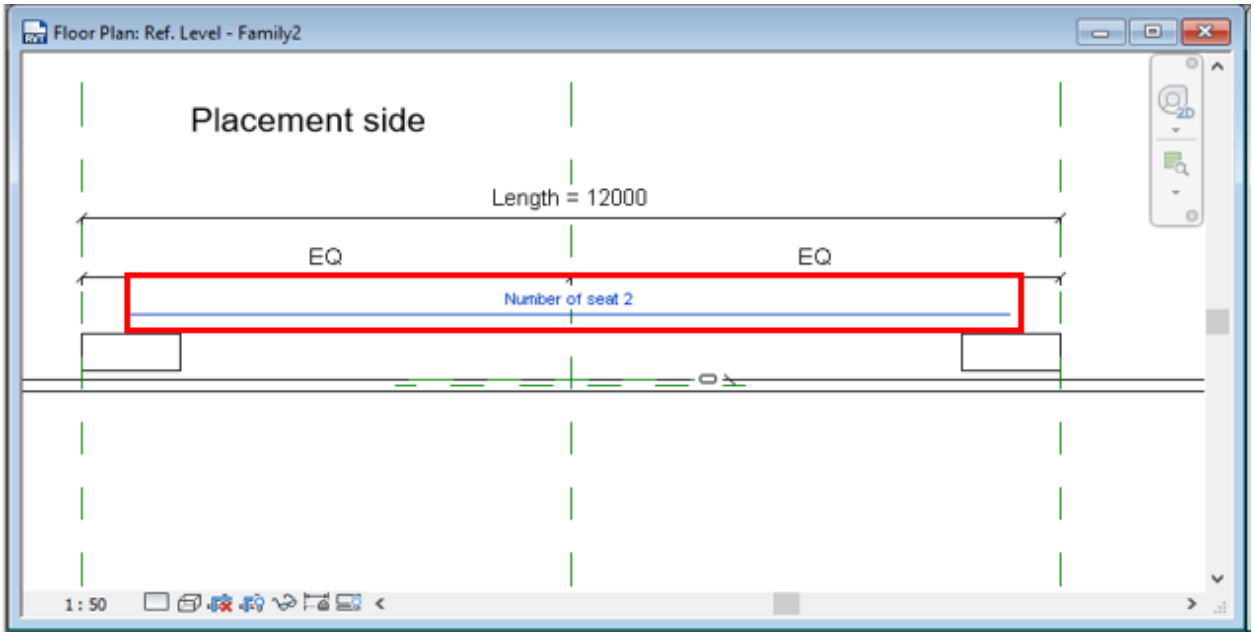
Lock seats to reference planes. (Align first then lock it in place.)

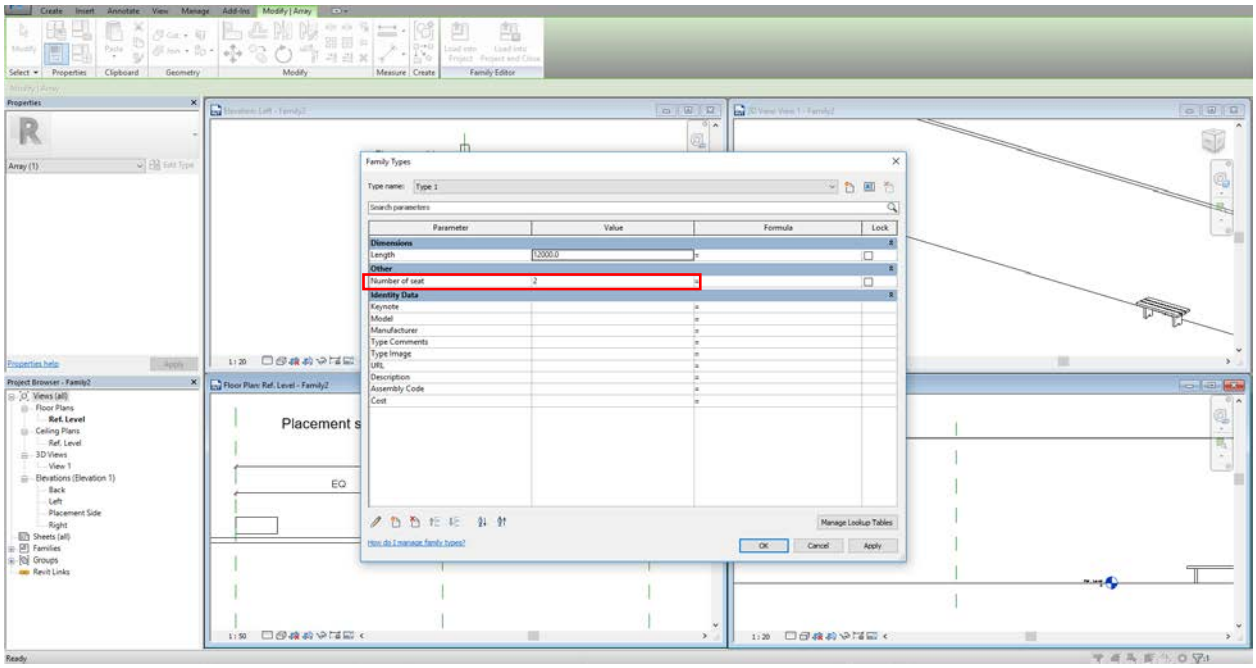


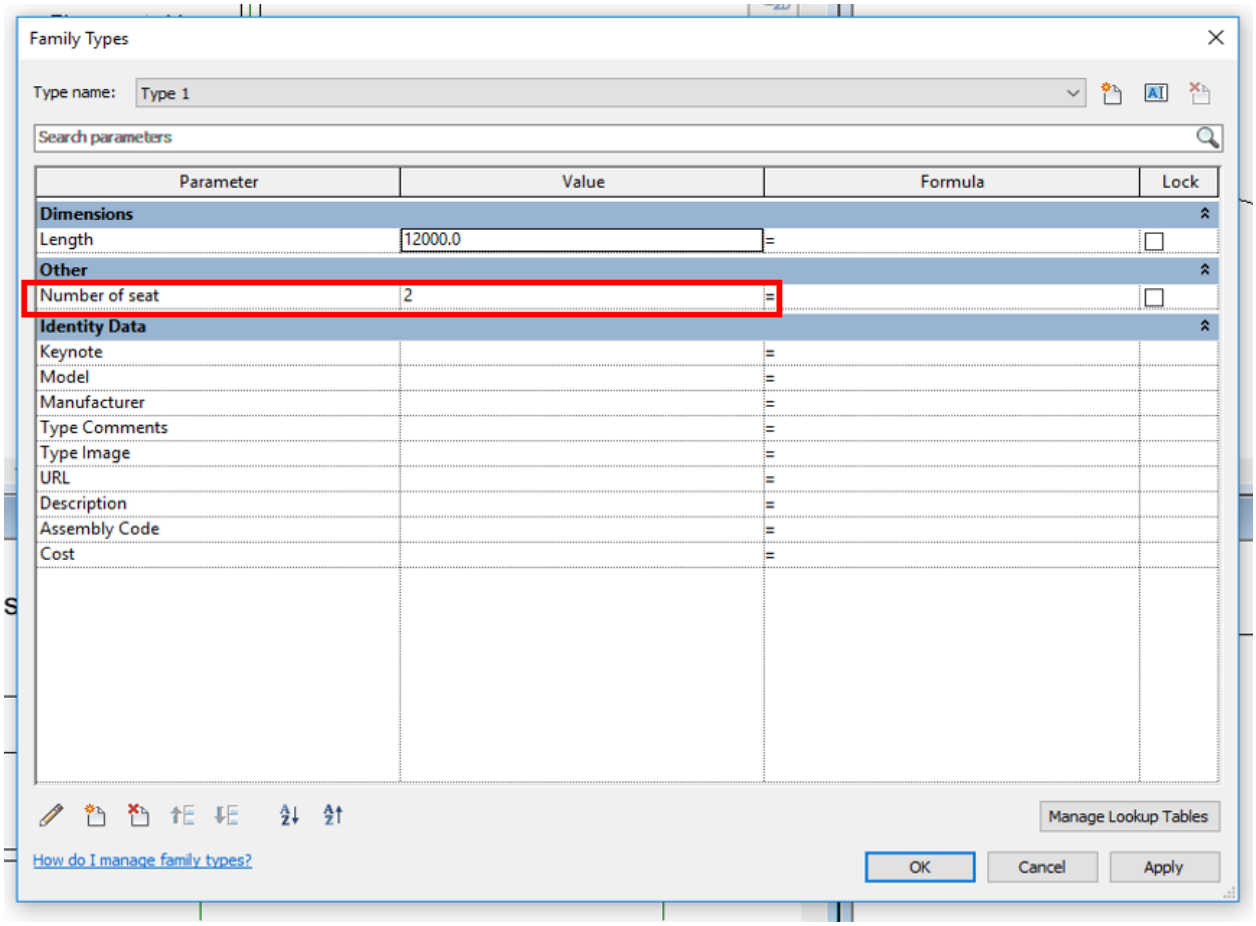


Assign parameter to the array number.

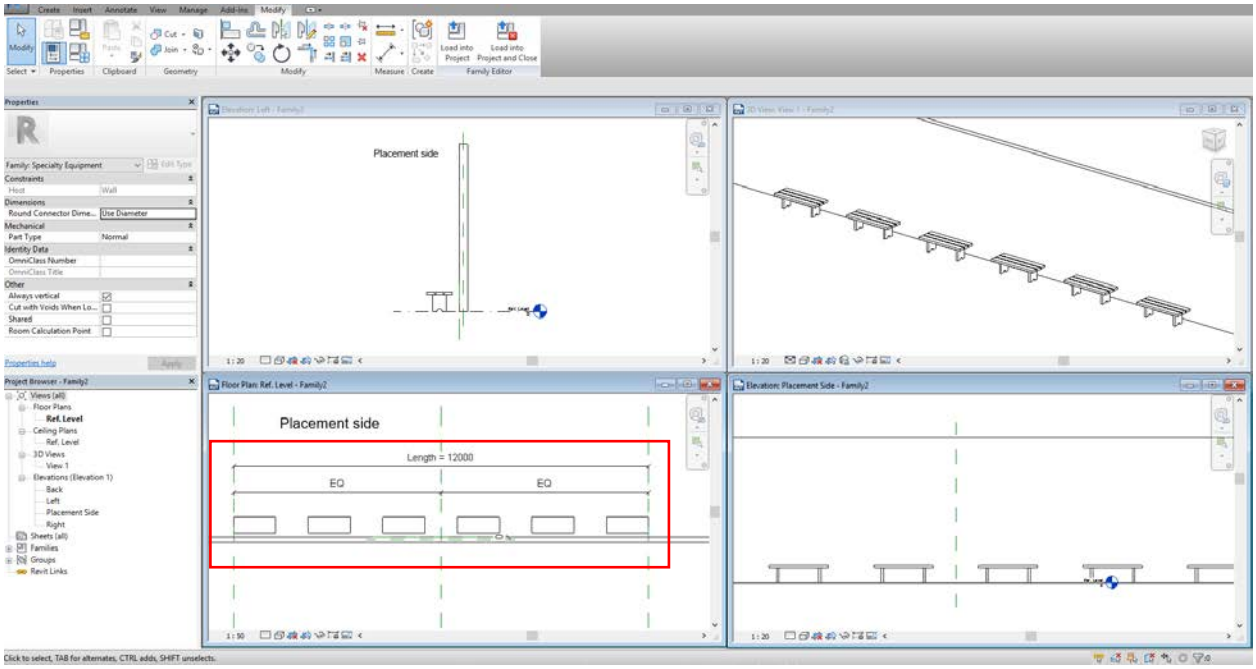

Placement side
Number of seat 2
Floor Plan: Ref. Level - Family2
Placement side
Length = 12000
EQ
EQ
Number of seat 2
Elevation: Placement Side - Family2


Floor Plan: Ref. Level - Family2
Placement side
Length = 12000
EQ
EQ
Number of seat 2
1 : 50





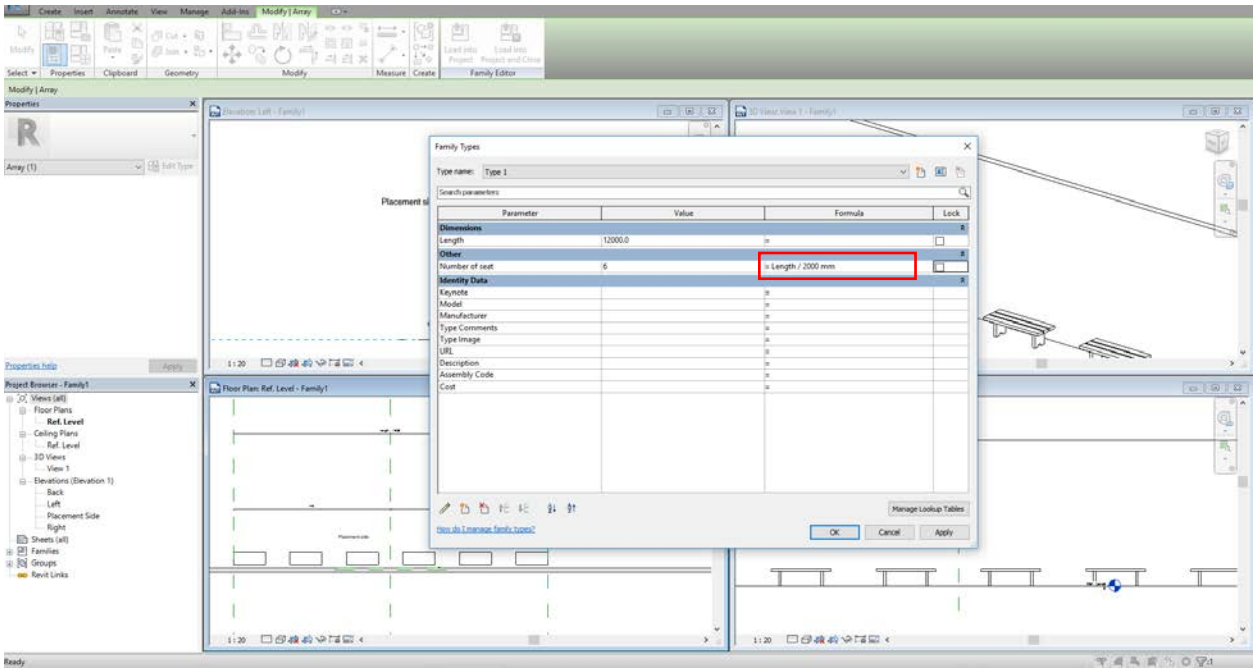
Adjust it to 6 seats.

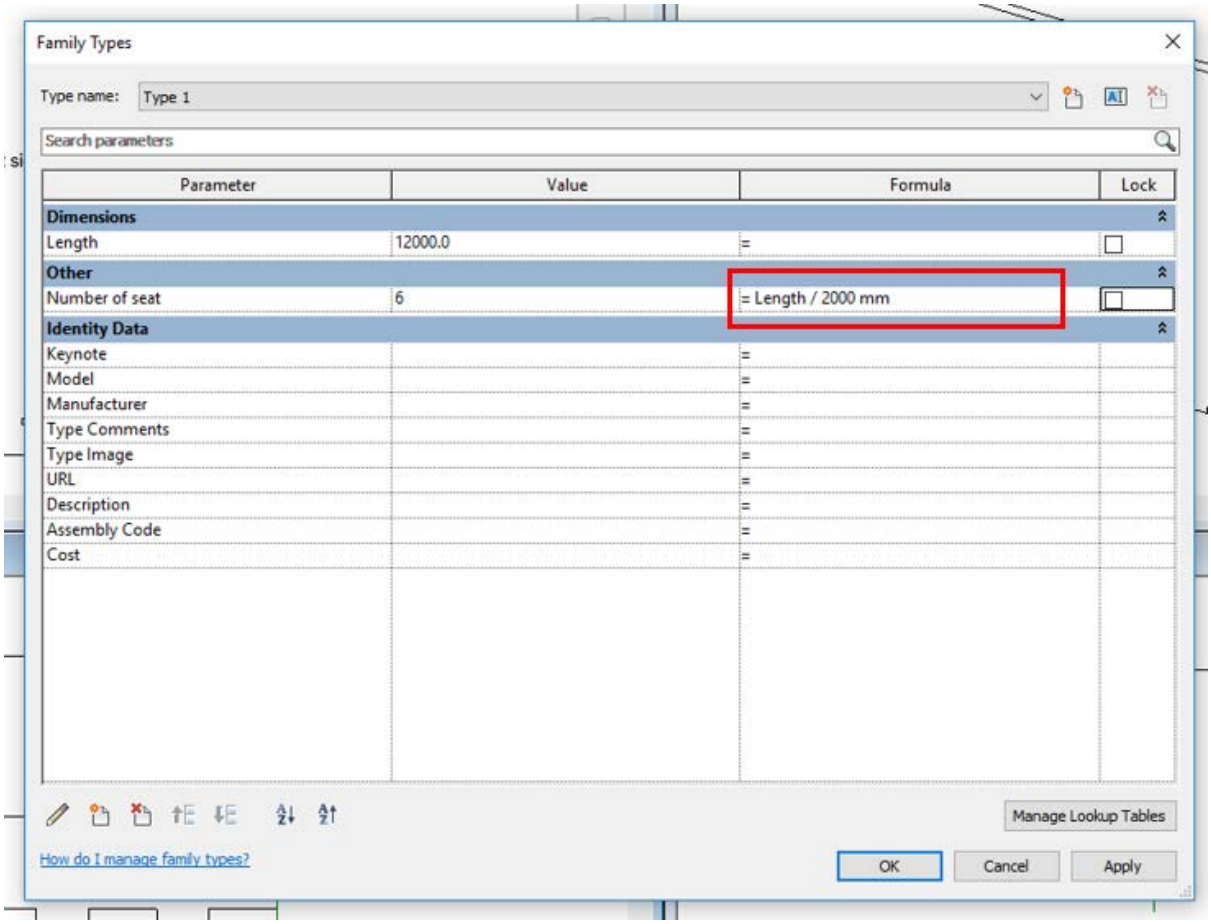


8.4 Adding formulas

By creating formula we'll be able to connect our parameters.

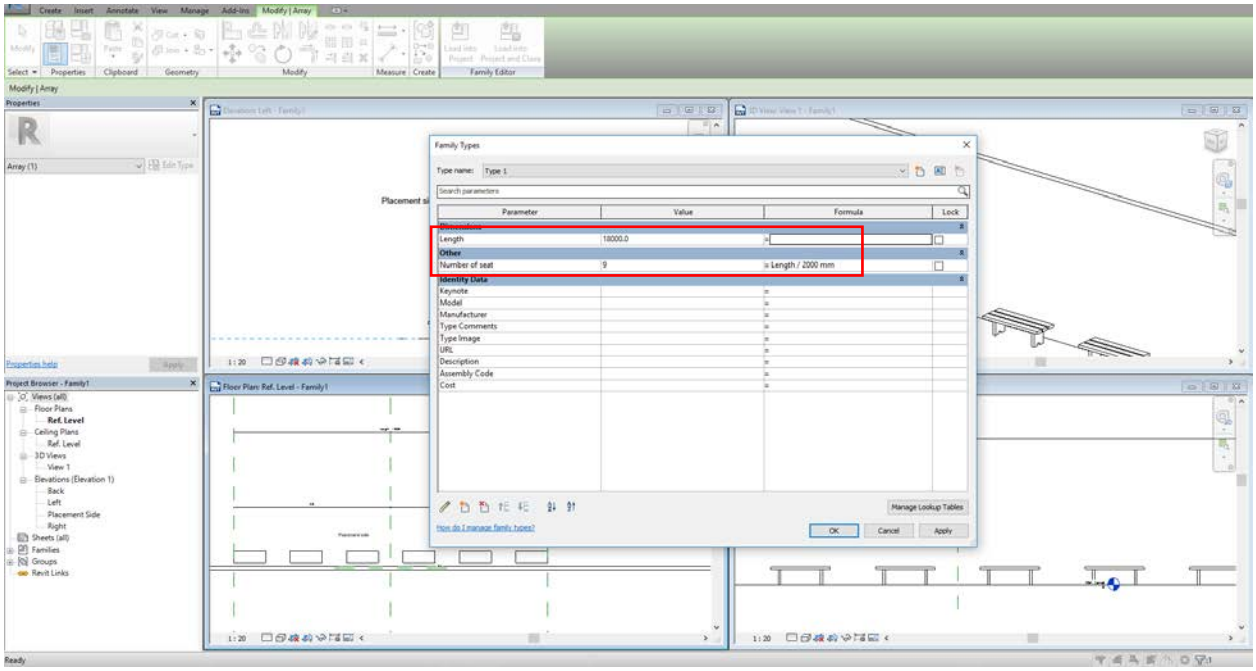
For example, **Number of seat will always be half of Length** (in meters).



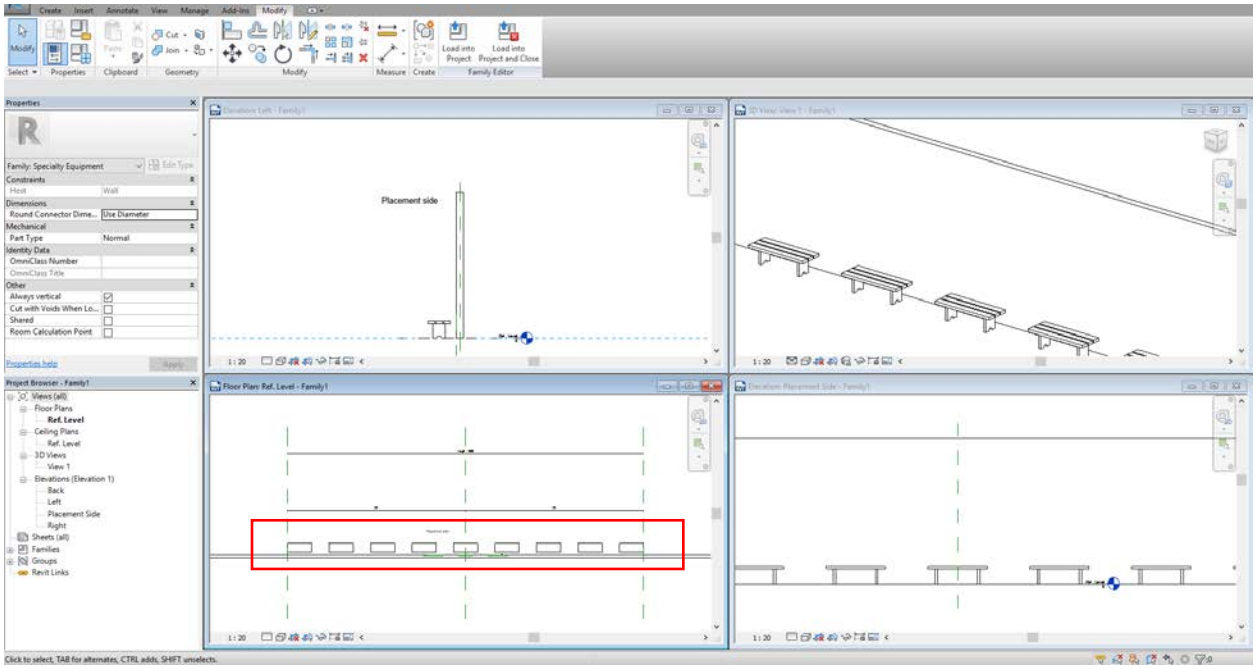


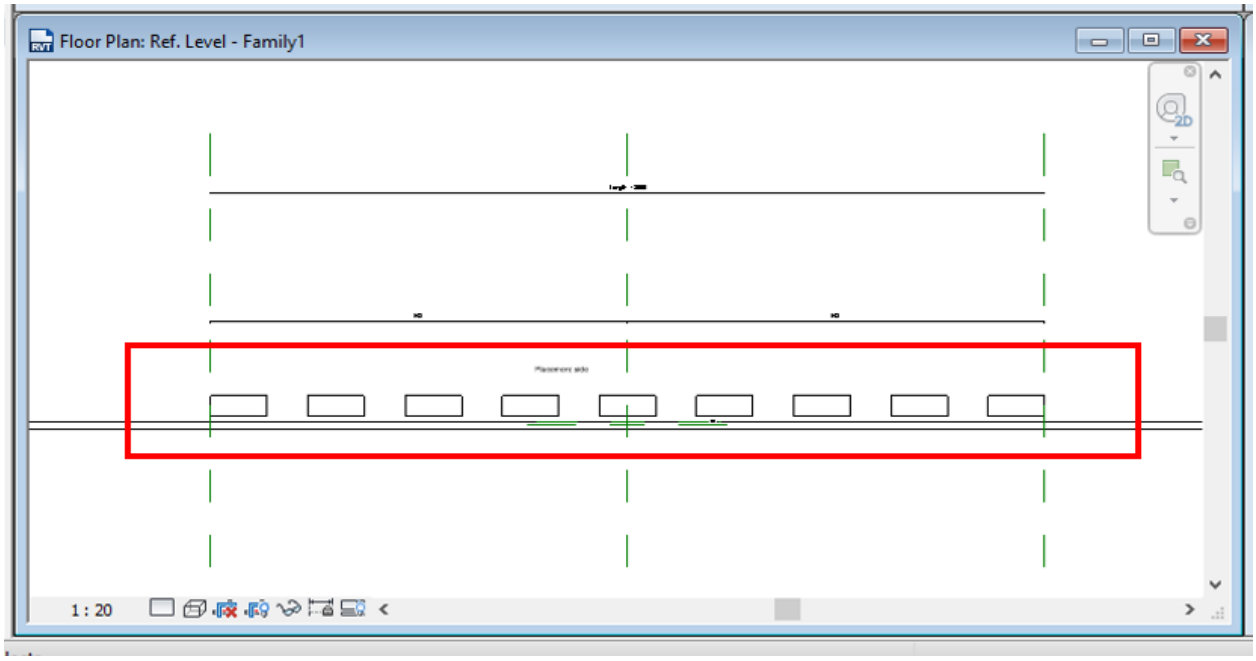
Note: Formulas are case-sensitive.

Notice that once we change Length, Number of seat will be adjusted accordingly.



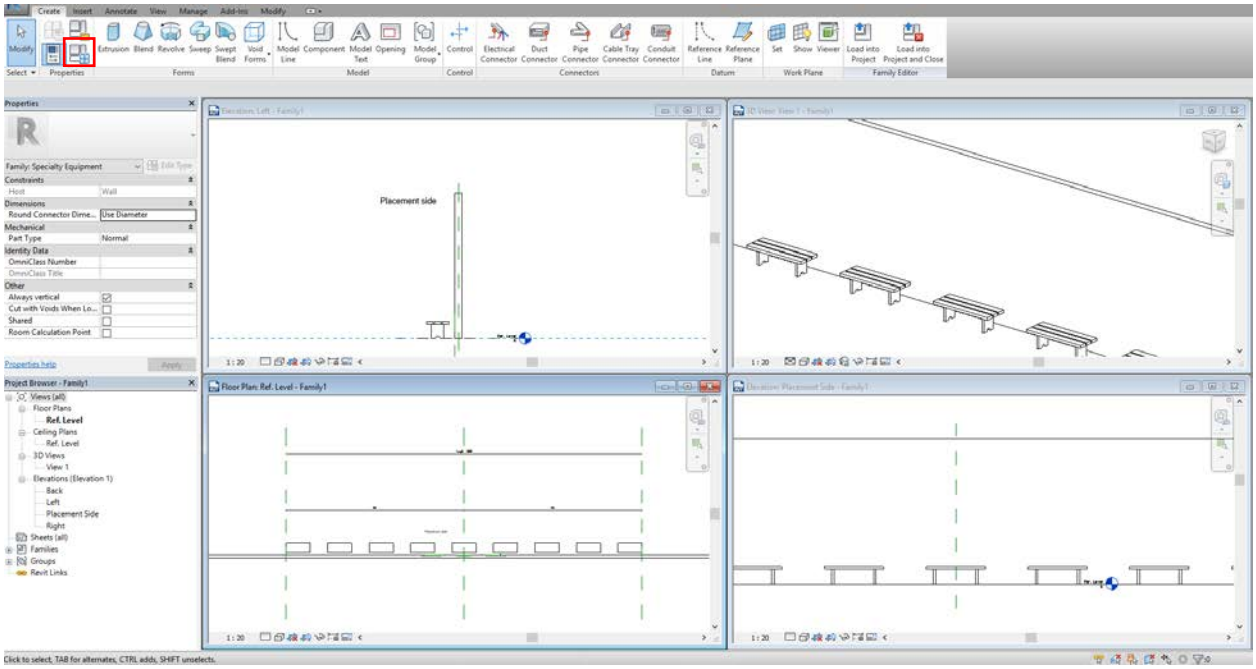
Click OK then.



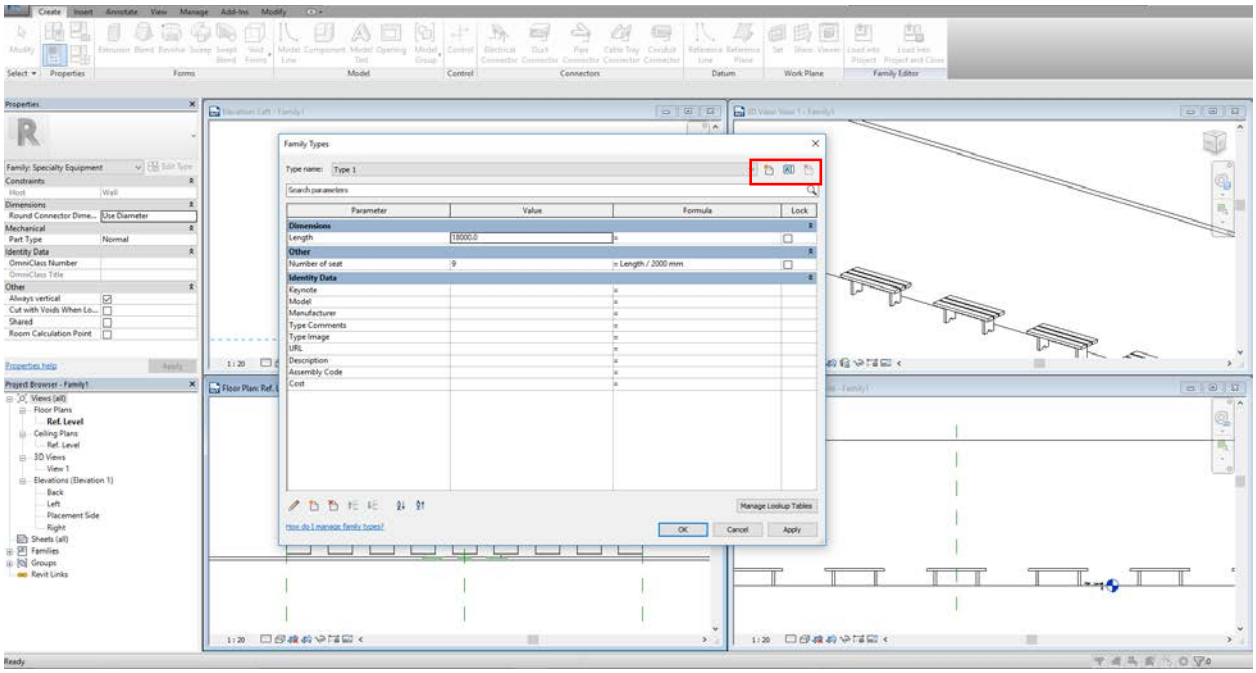


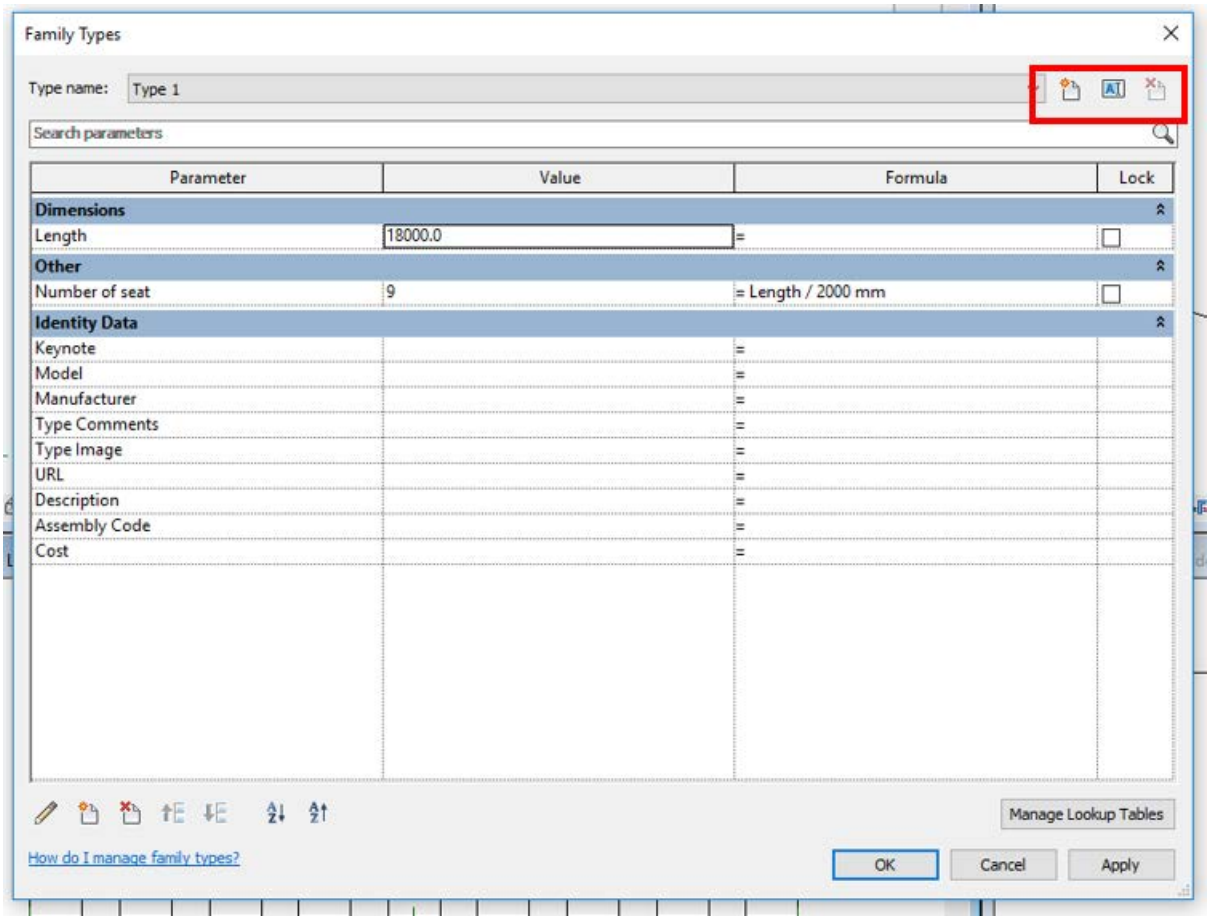
8.5 Working with family type parameters and flip controls

To create new type, go to Family Types.

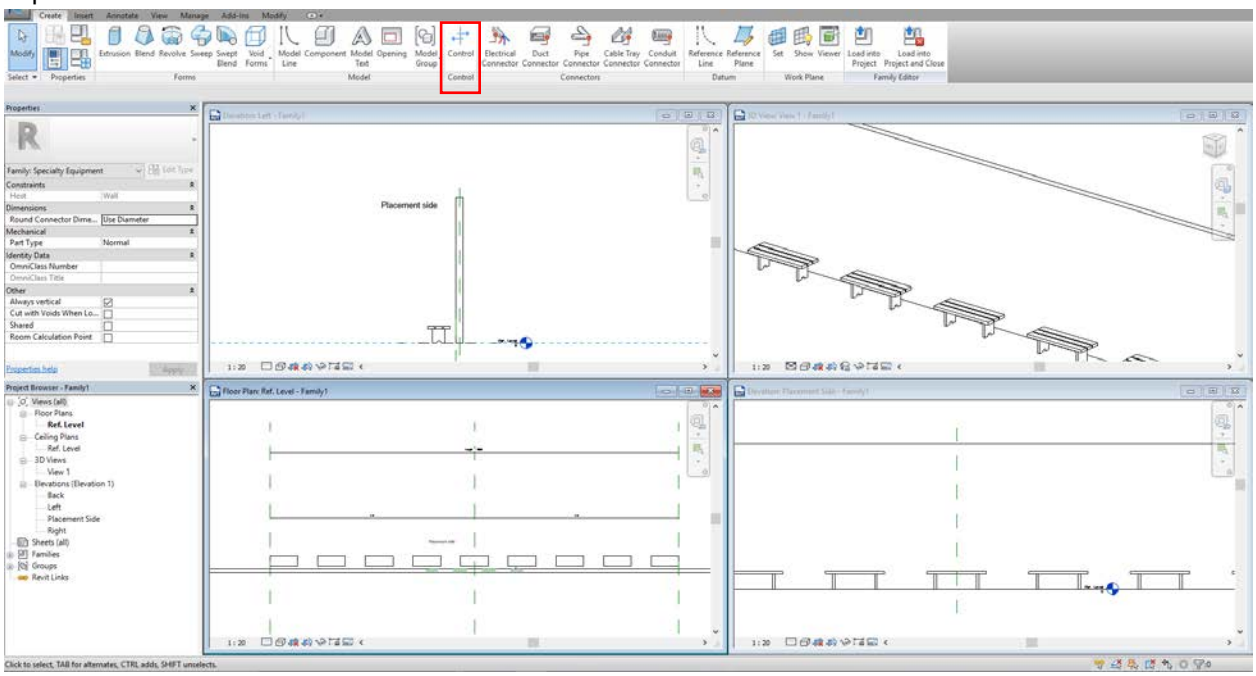


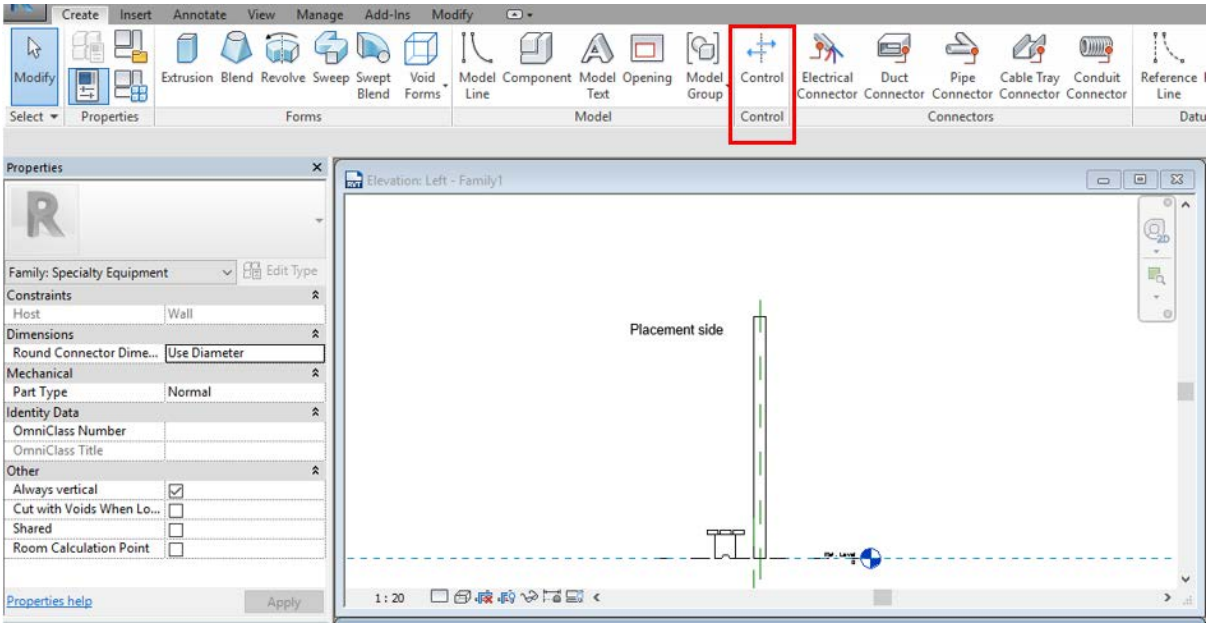
Add in new types, change names of existing type or delete a type. Type parameters need to be changed manually.



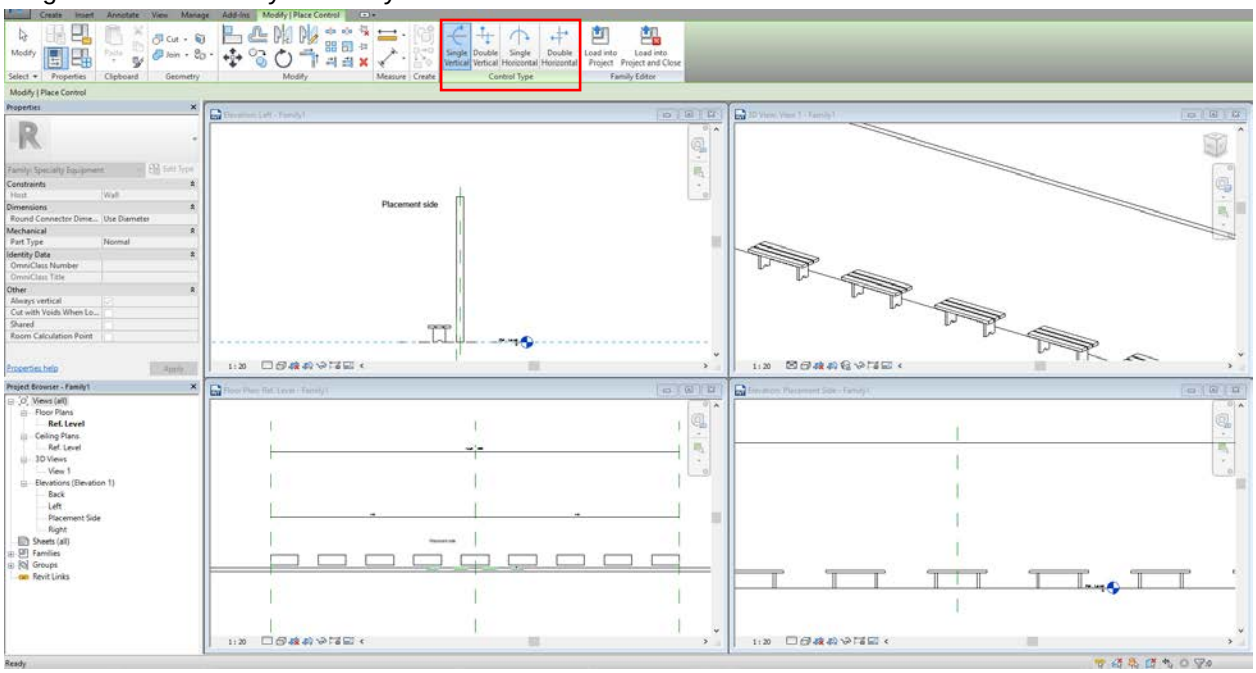


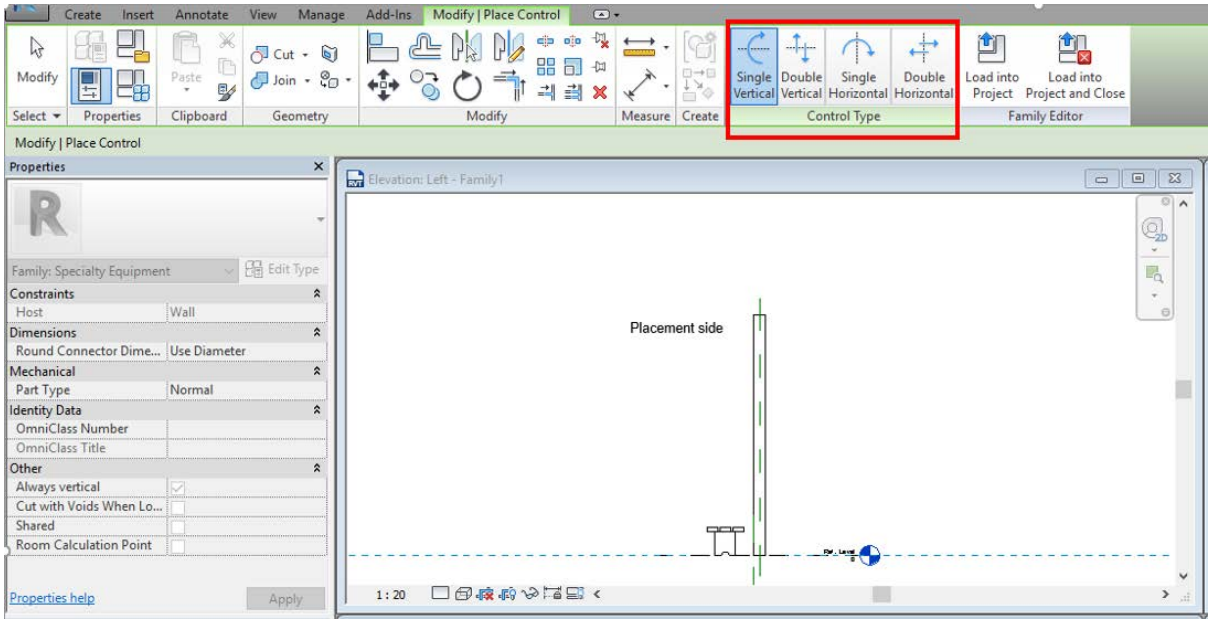
Flip control locate in Create tab.



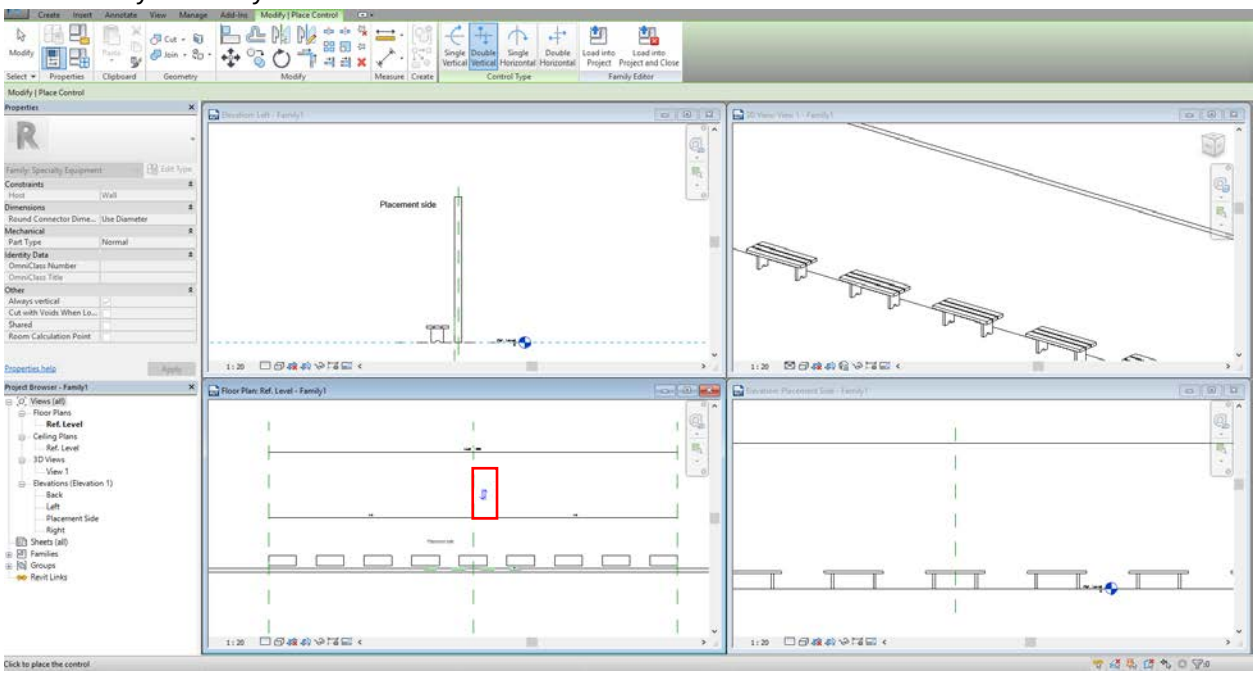


Single Control rotates your family while Double Control mirrors it.



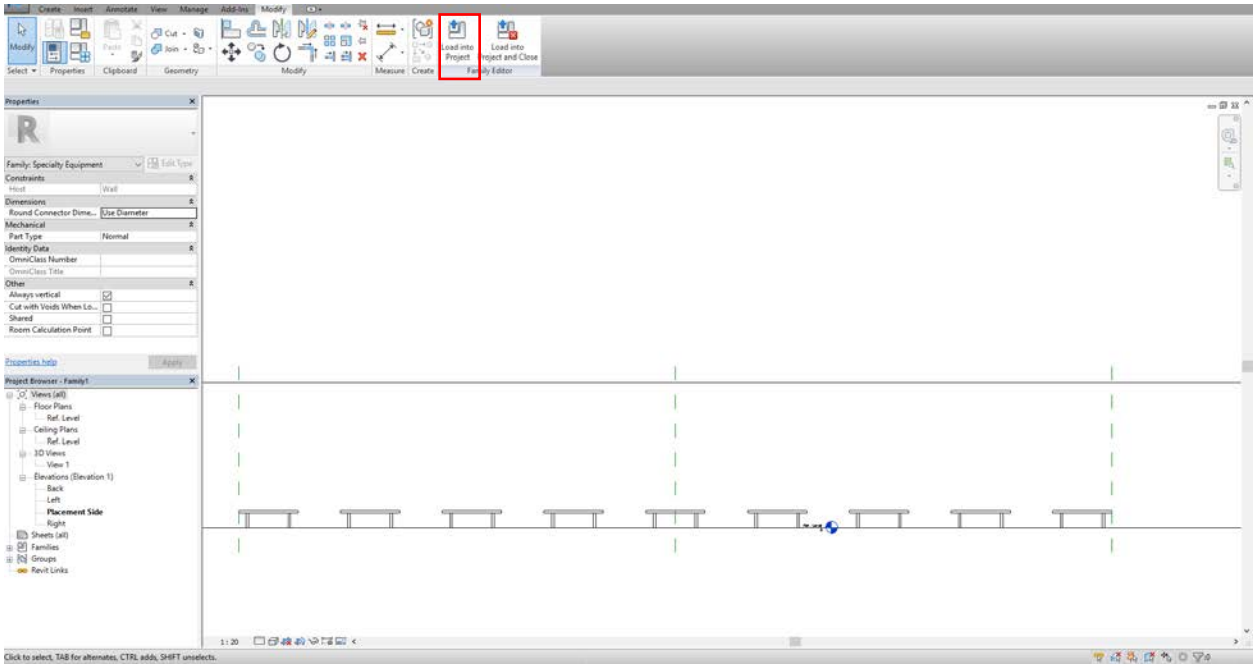


Place it on your family.

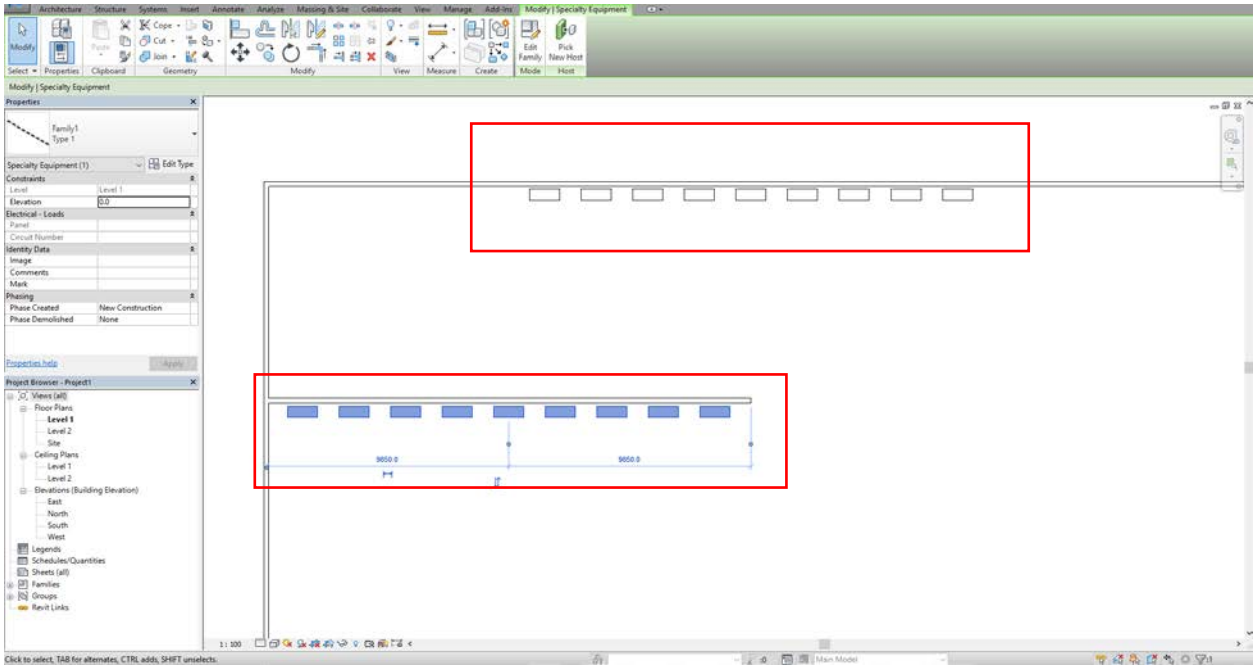


8.6 Loading a model family

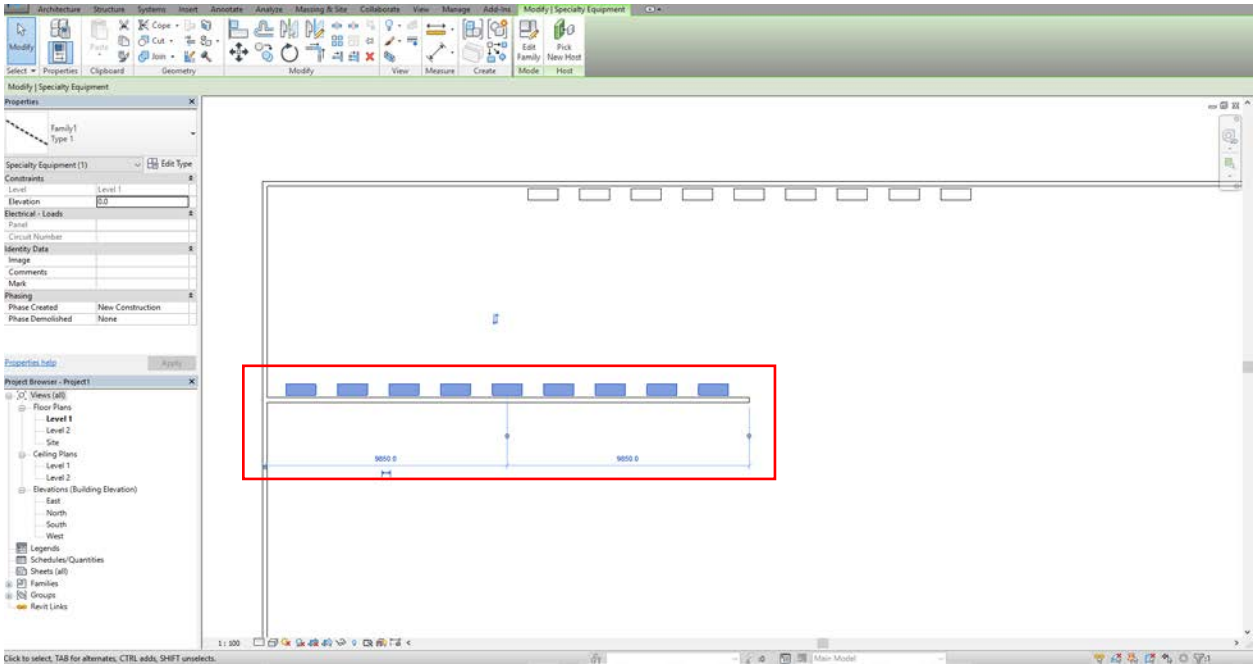
Finally, we need to test our family in project.



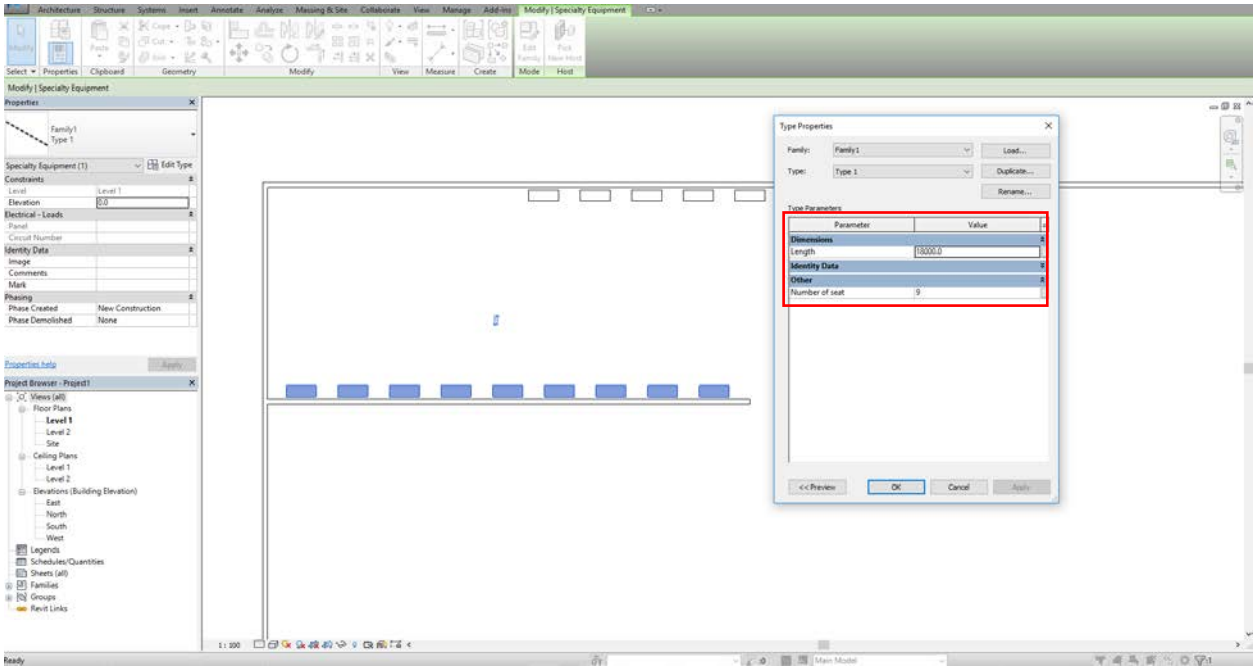
Hover over to a wall since our family is wall-hosted.



Our Flip sign is working.



Parameters are ready for editing.

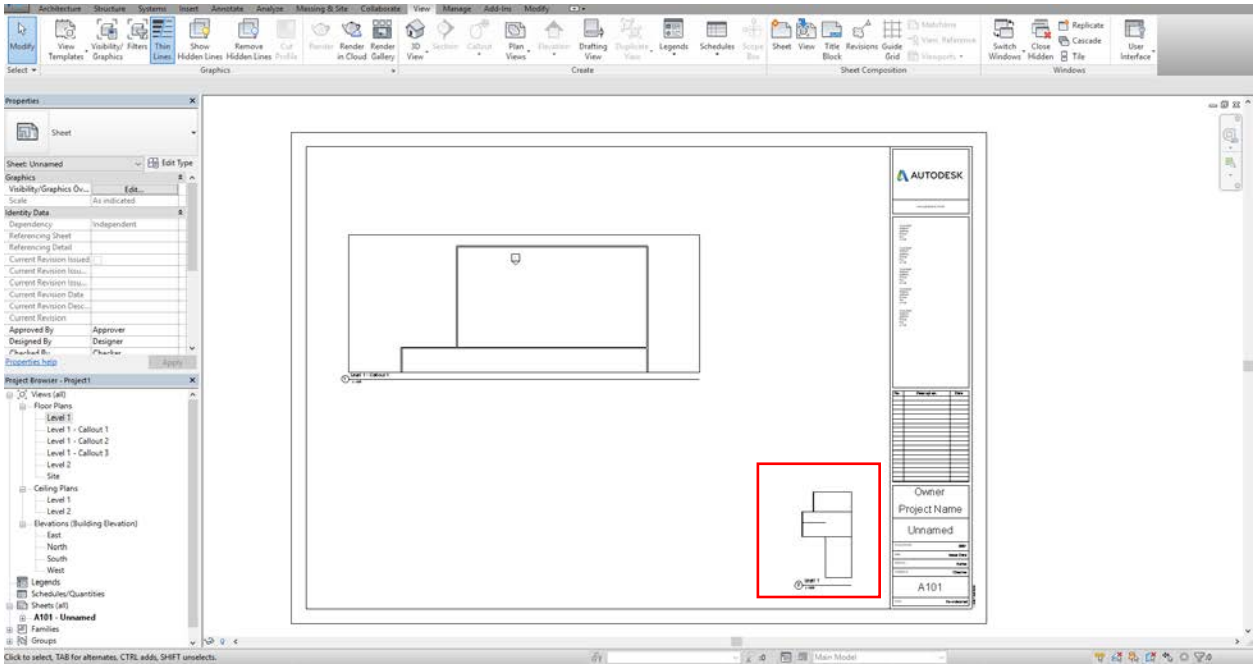


9. Creating a Parametric Key Plan

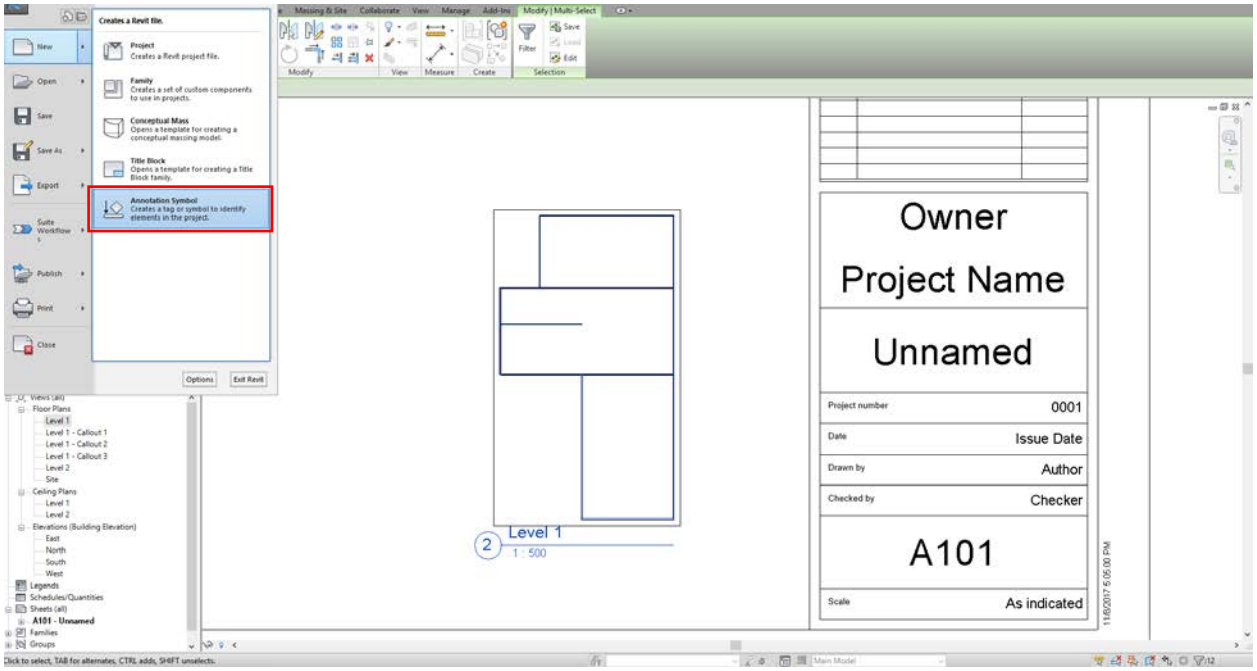
9.1 Tracing a view

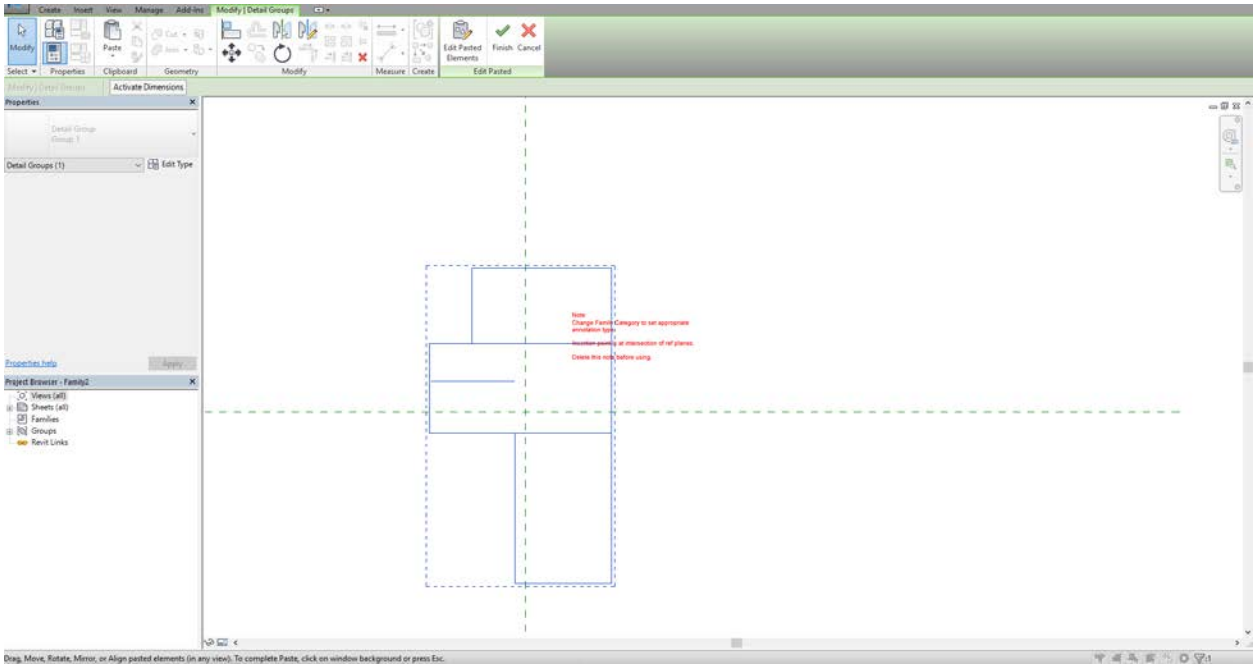
Revit doesn't allow us to drag a geometry directly from project to family editor. So, if we wish to create a family as Key Plan annotation by dragging the model to family editor is not possible.

More appropriate way of creating a Key Plan annotation is drag it to Sheet first then sketch the outline for the Key Plan.



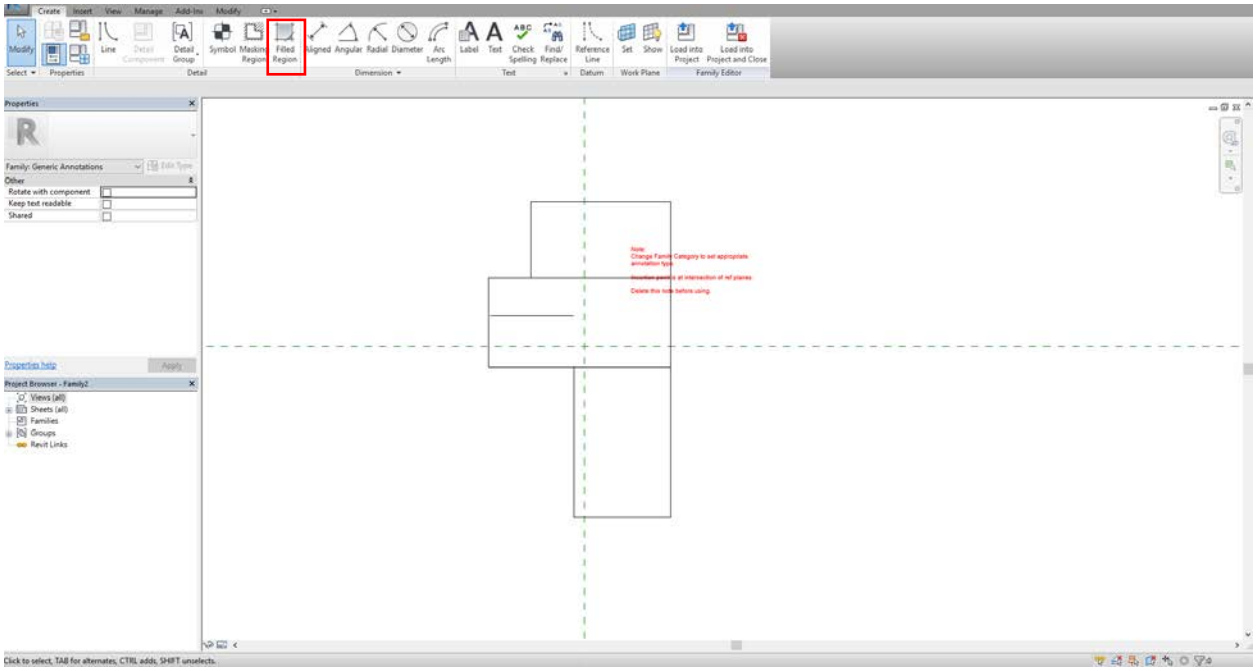
Sketch it with Detail Line (D+L). Then copy it to family editor. (Generic annotation template.)

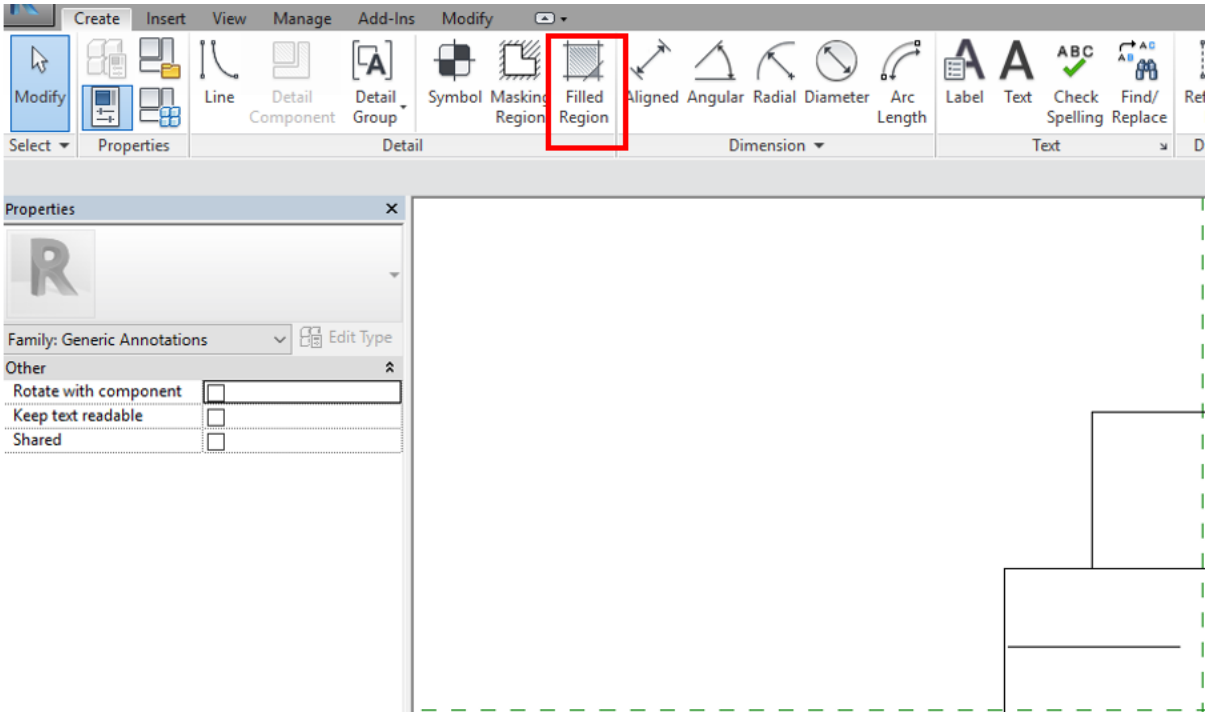




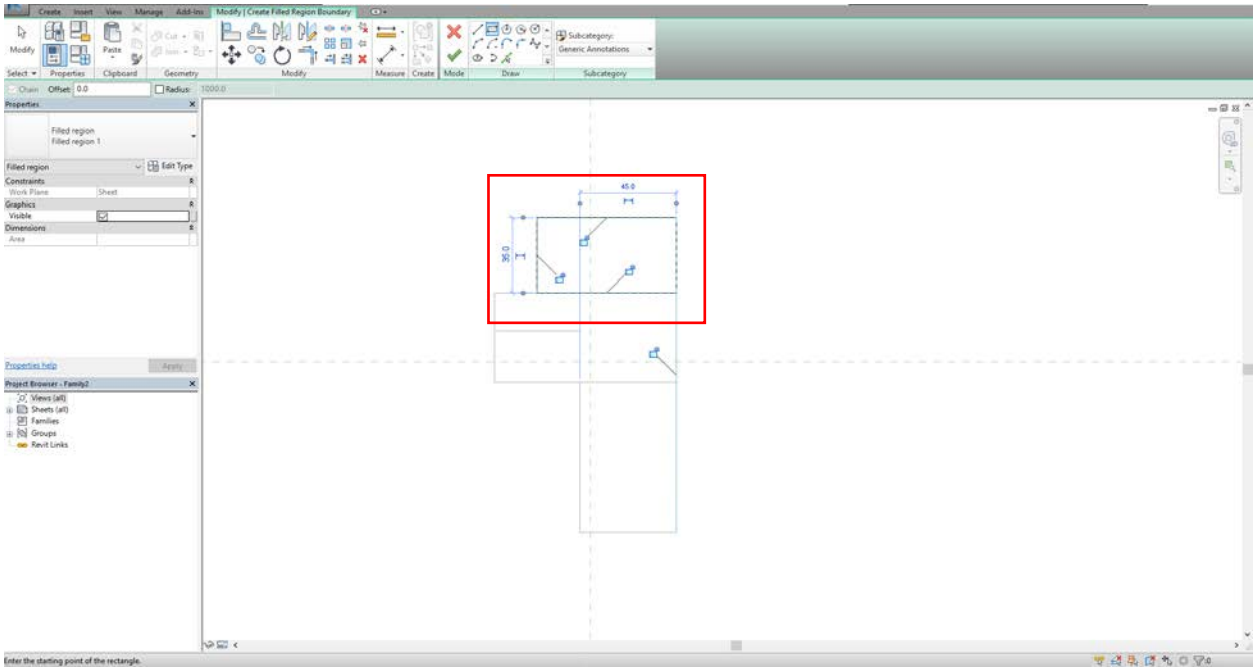
9.2 Adding zones

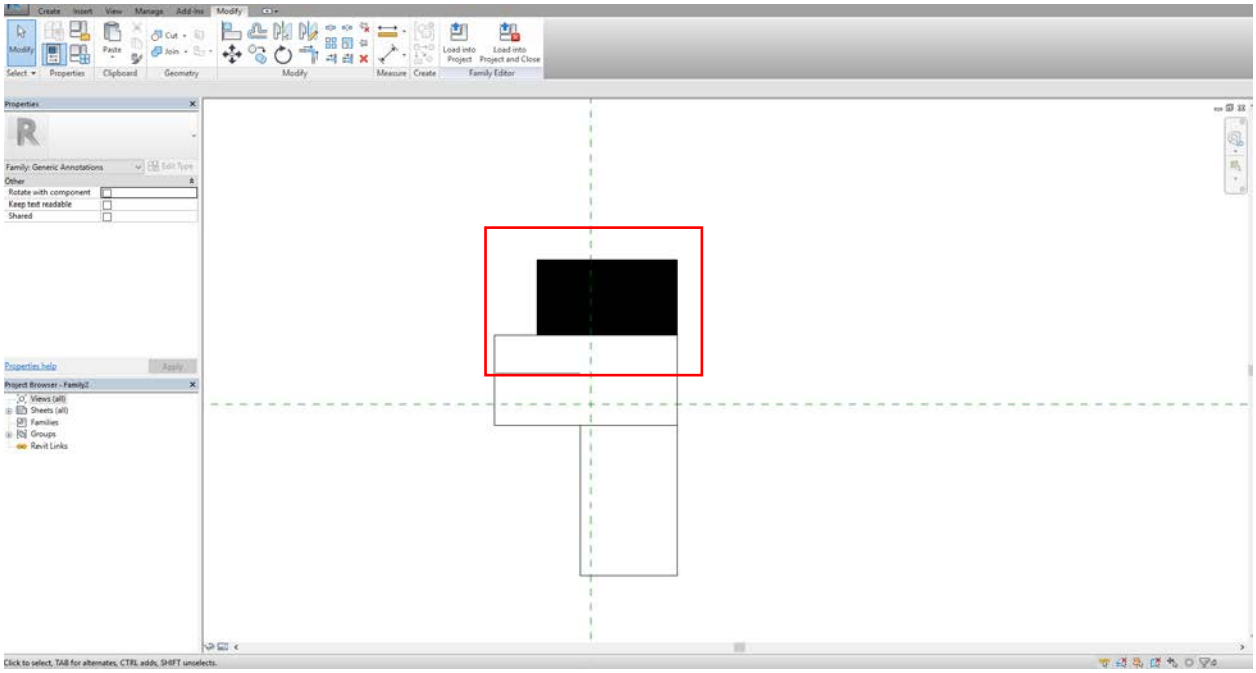
Now we want to create our annotation.
Go to Create tab, Filled Region.



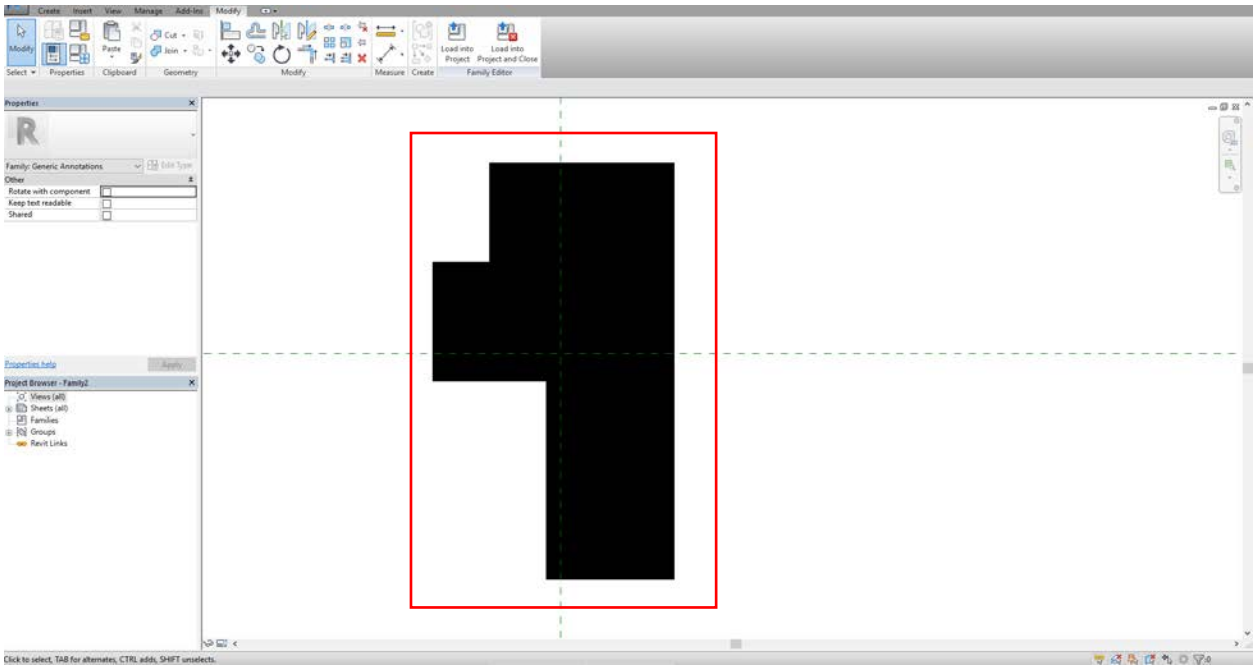


Sketch an area that you wish it to be filled.

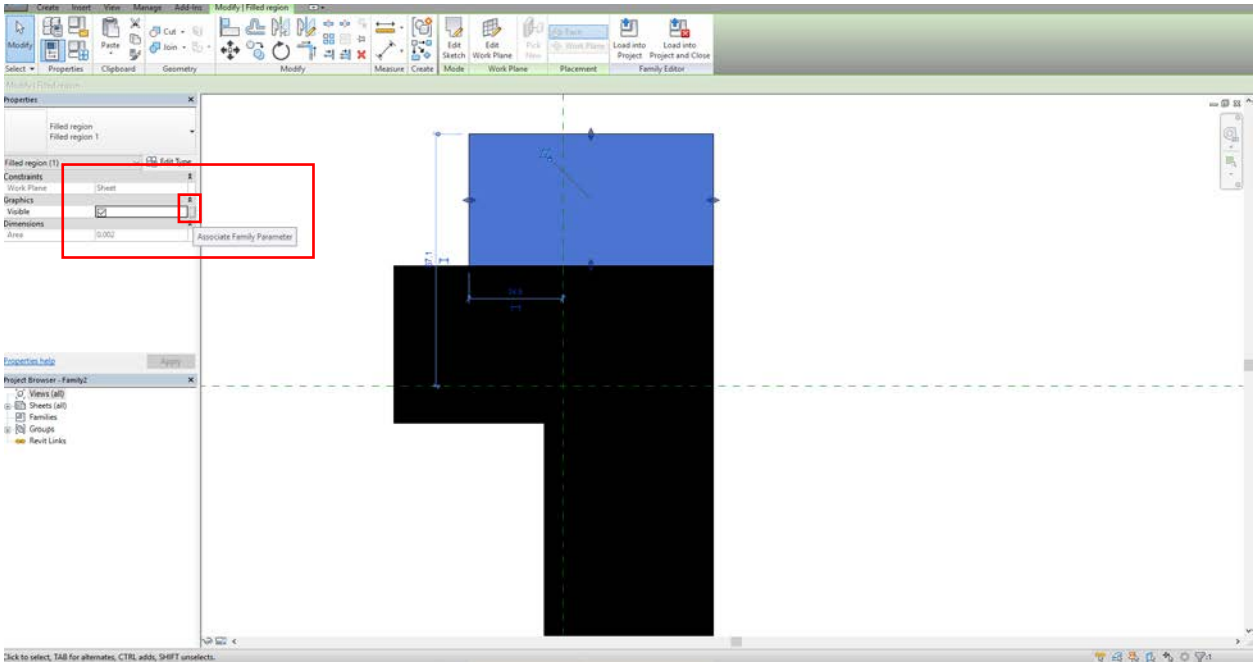


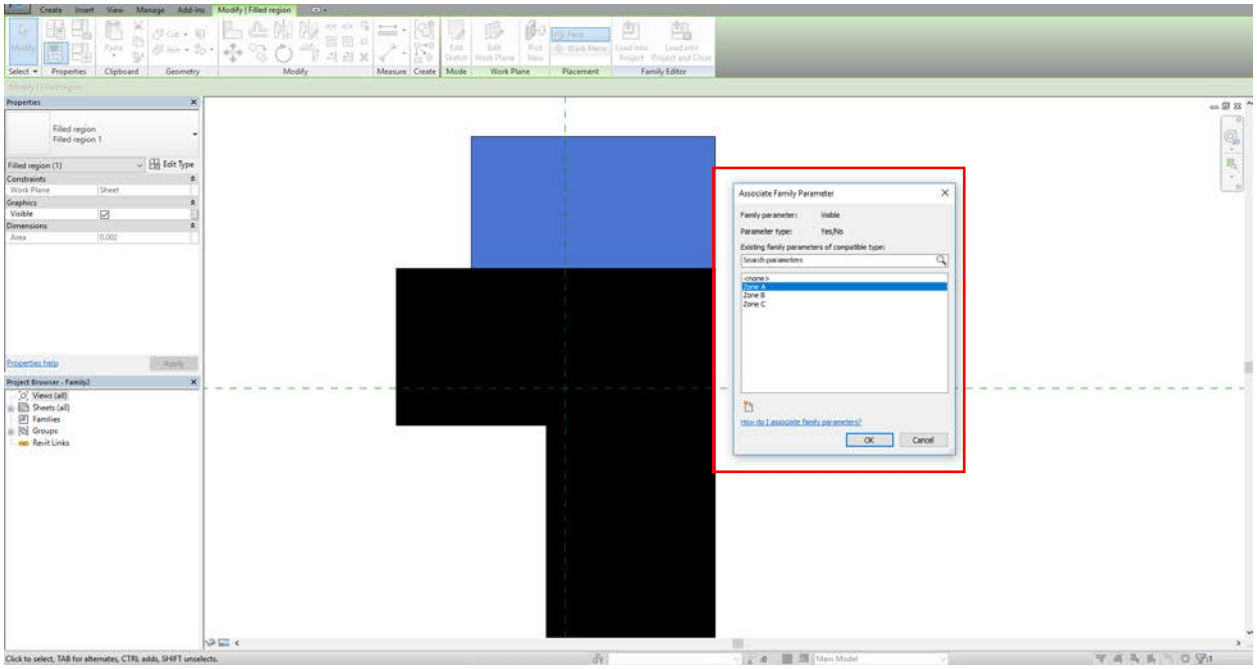


Finish the rest.



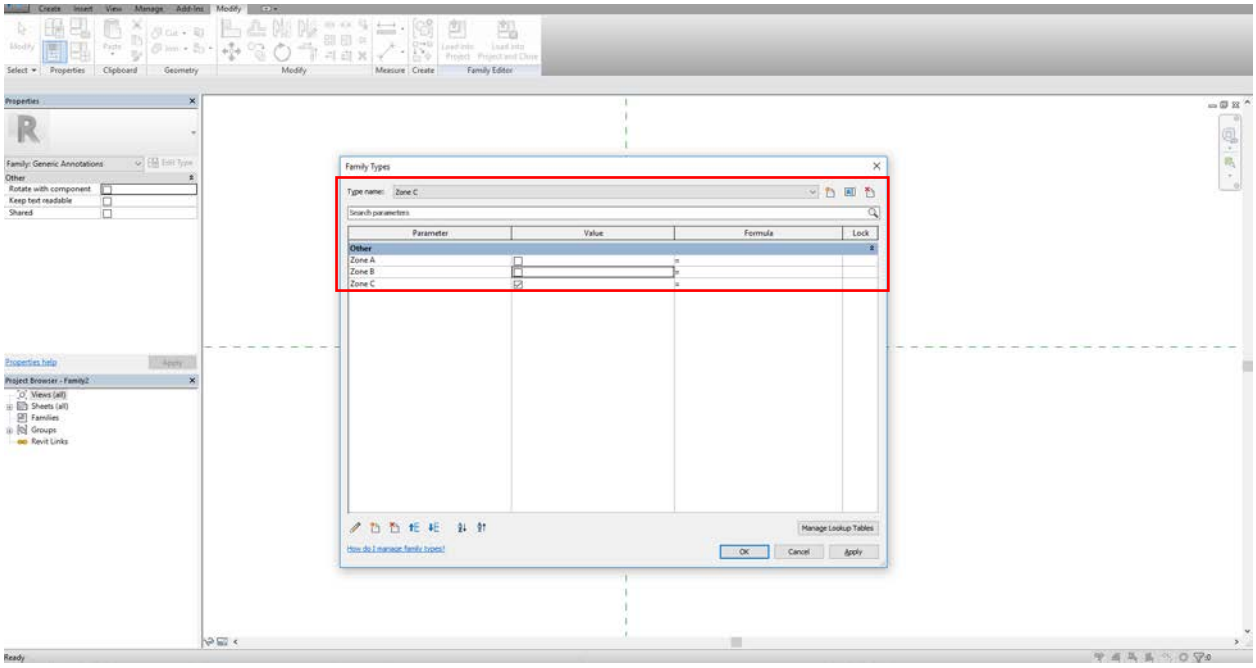
Associate each zone with a Visibility Parameter.



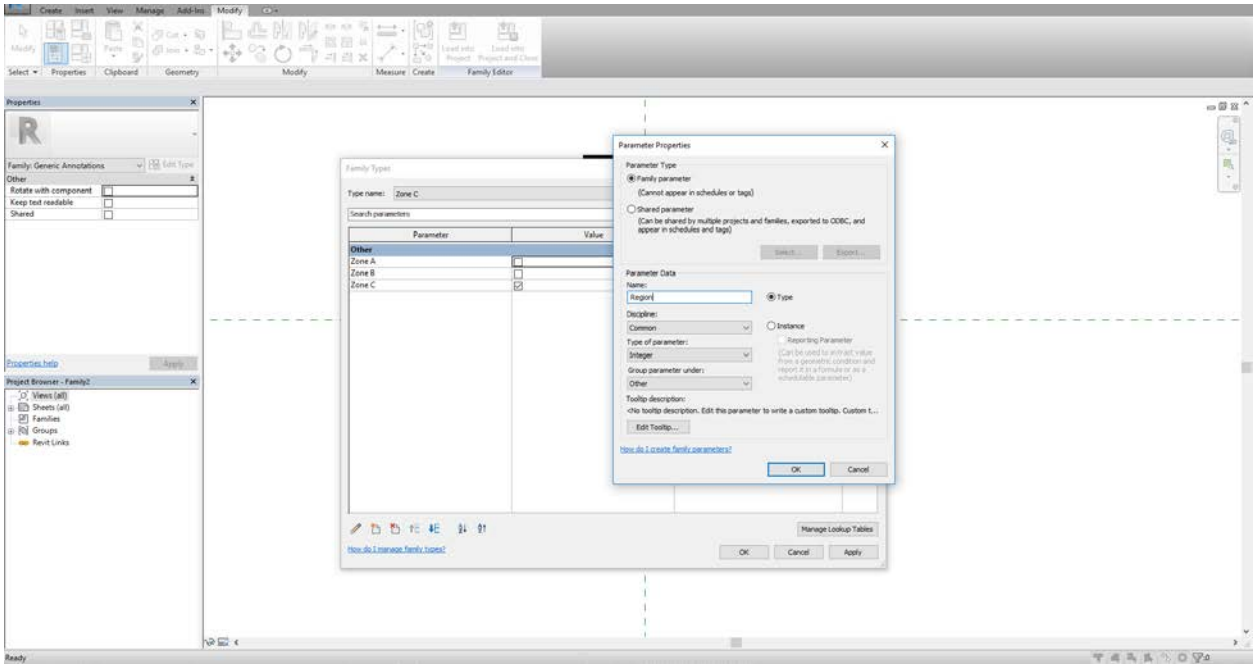


9.3 Adding conditional formulas

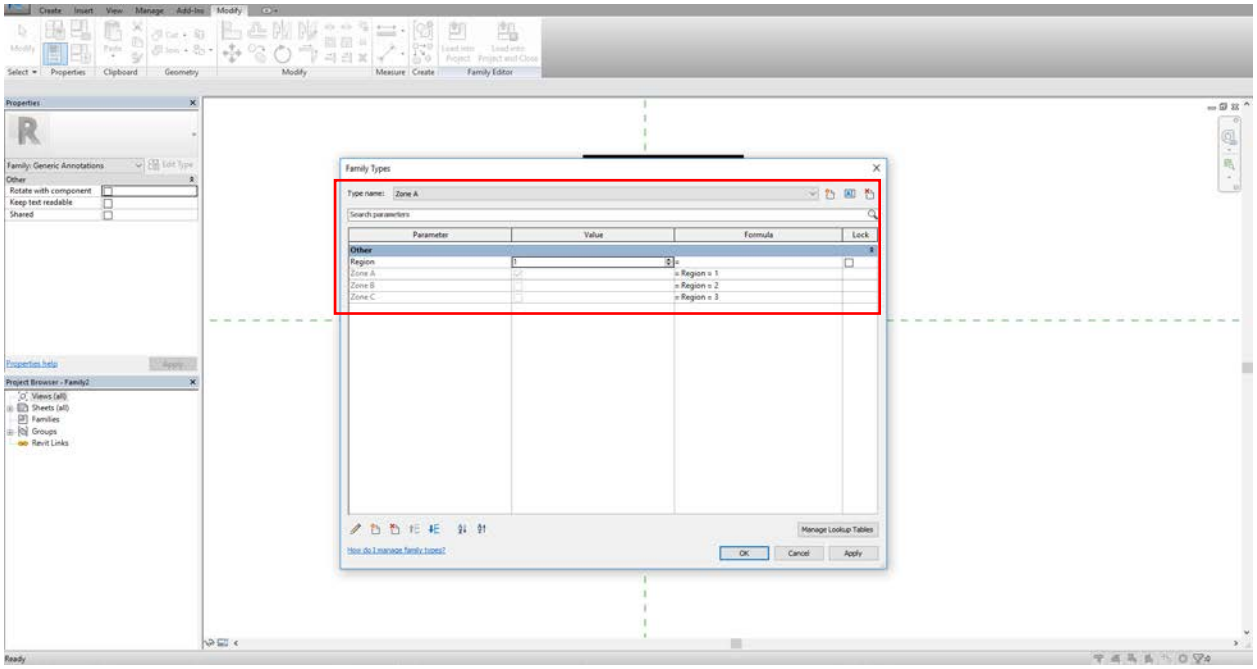
Go to Family Types. Simply create 3 types and tick on related Zone Parameter.

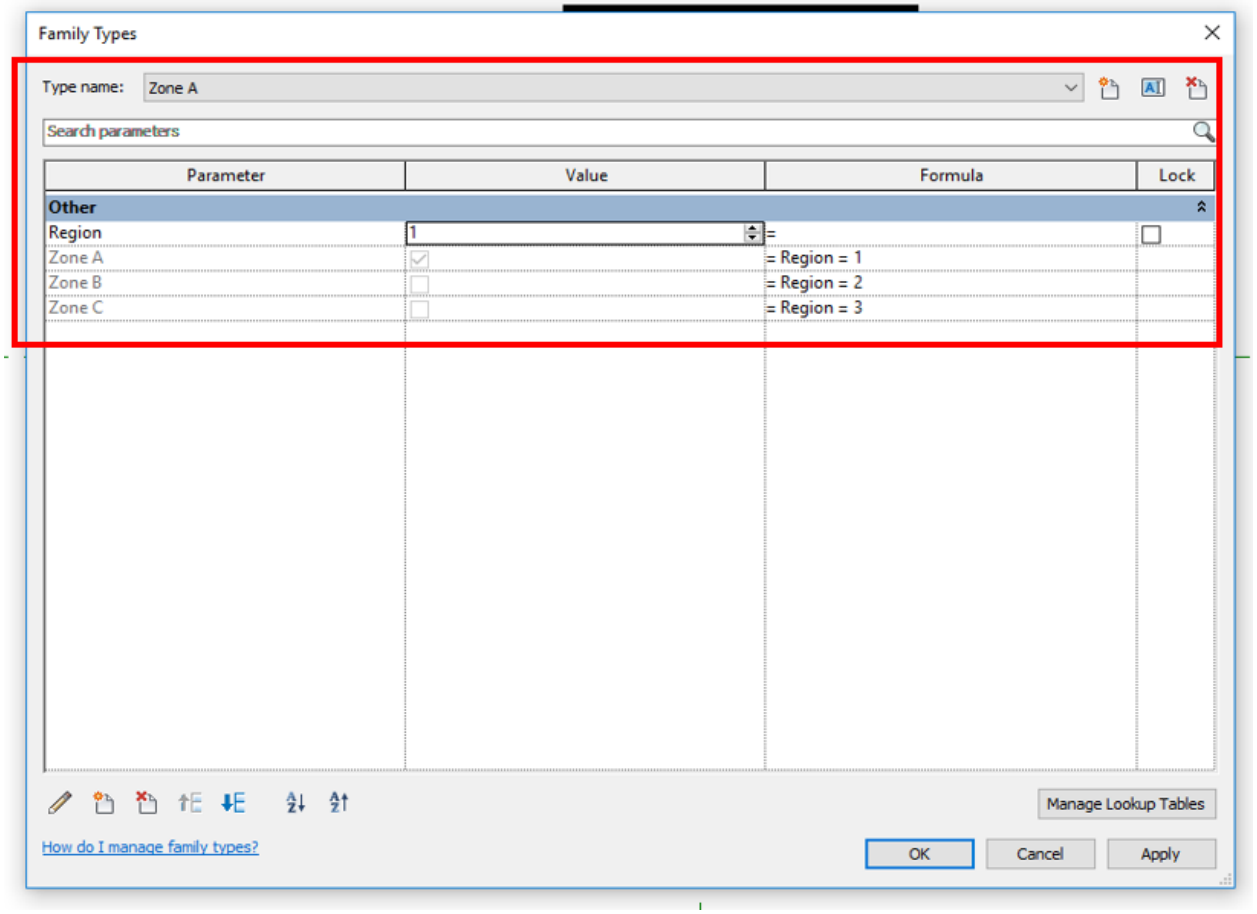


There's a more formulaic way to accomplish the same goal.
Create an extra parameter first. Make sure it's an integer.

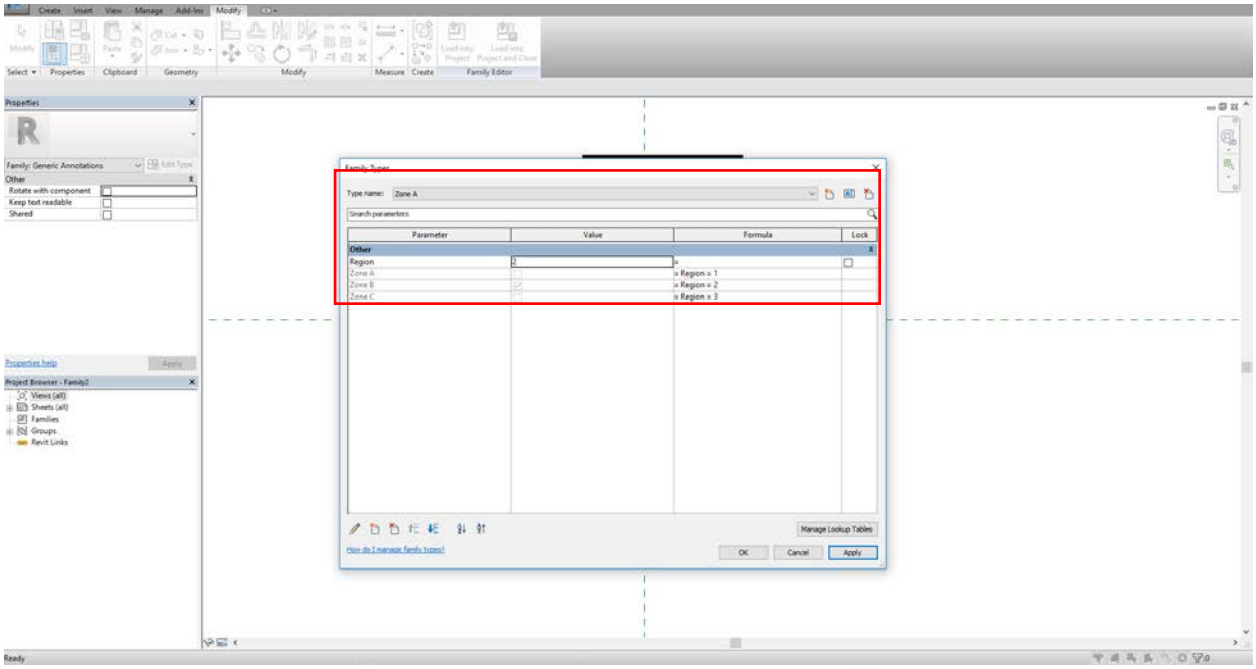


Stating true condition under Formula. In this approach, there's no need to create 3 types.



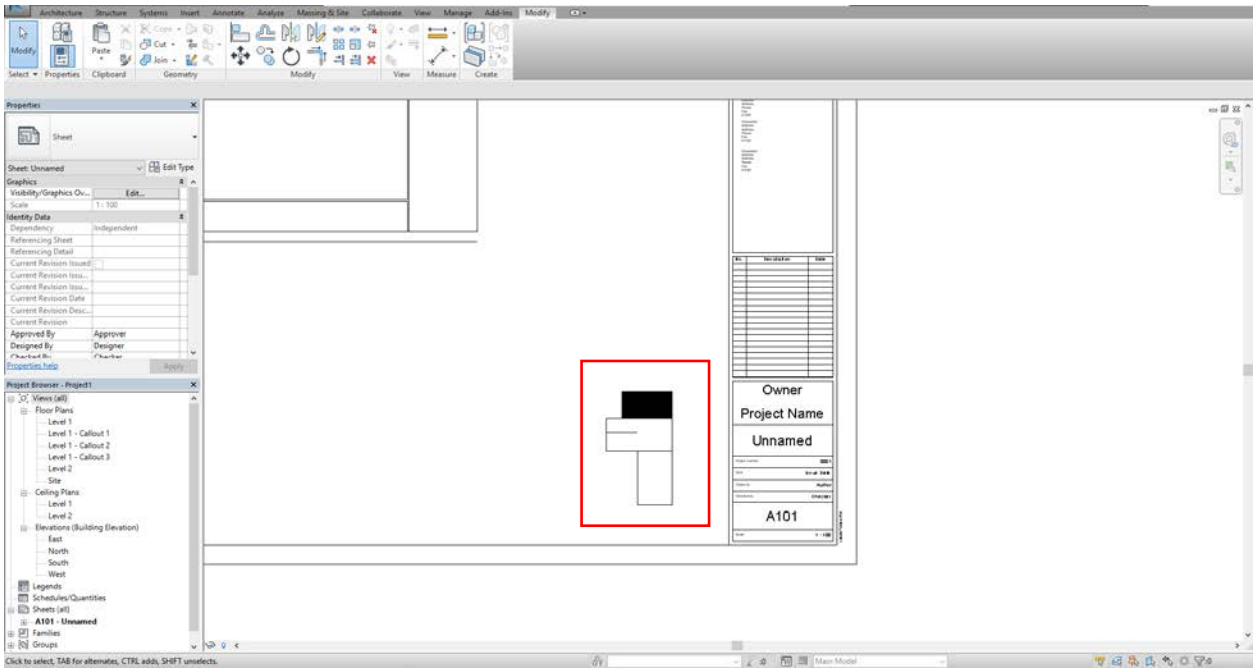


Then we'll be able to control visibility via **Region**. You may notice as we change its value, different region will be ticked.

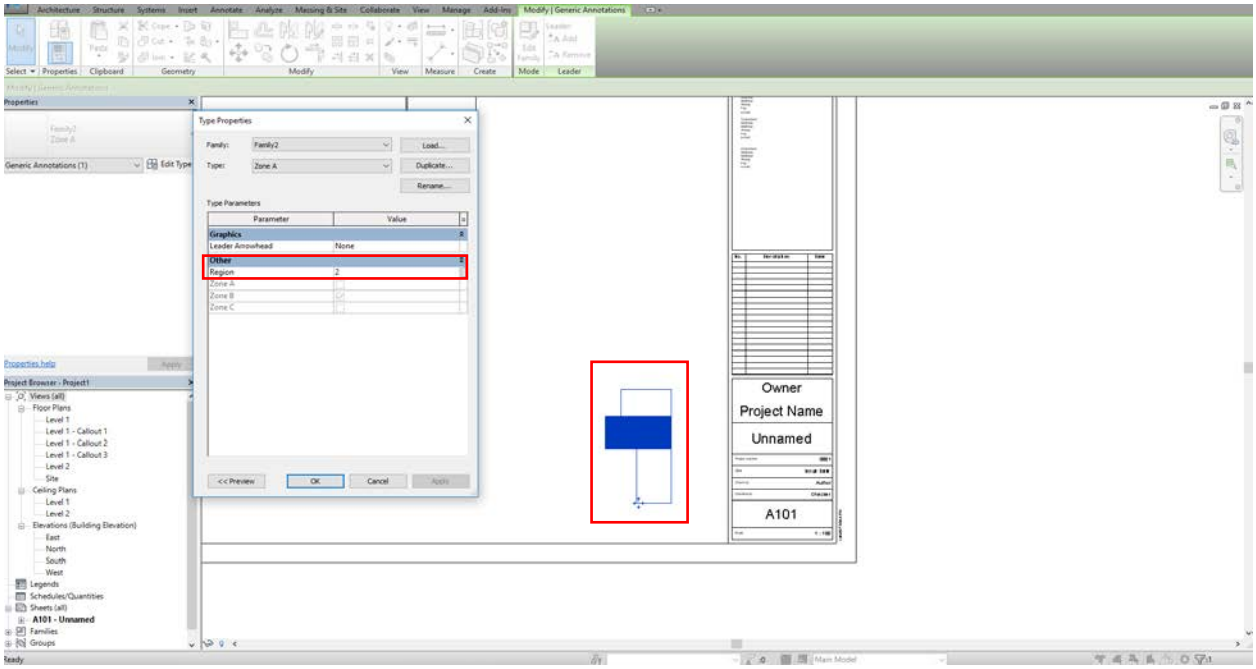


9.4 Flexing the key plan

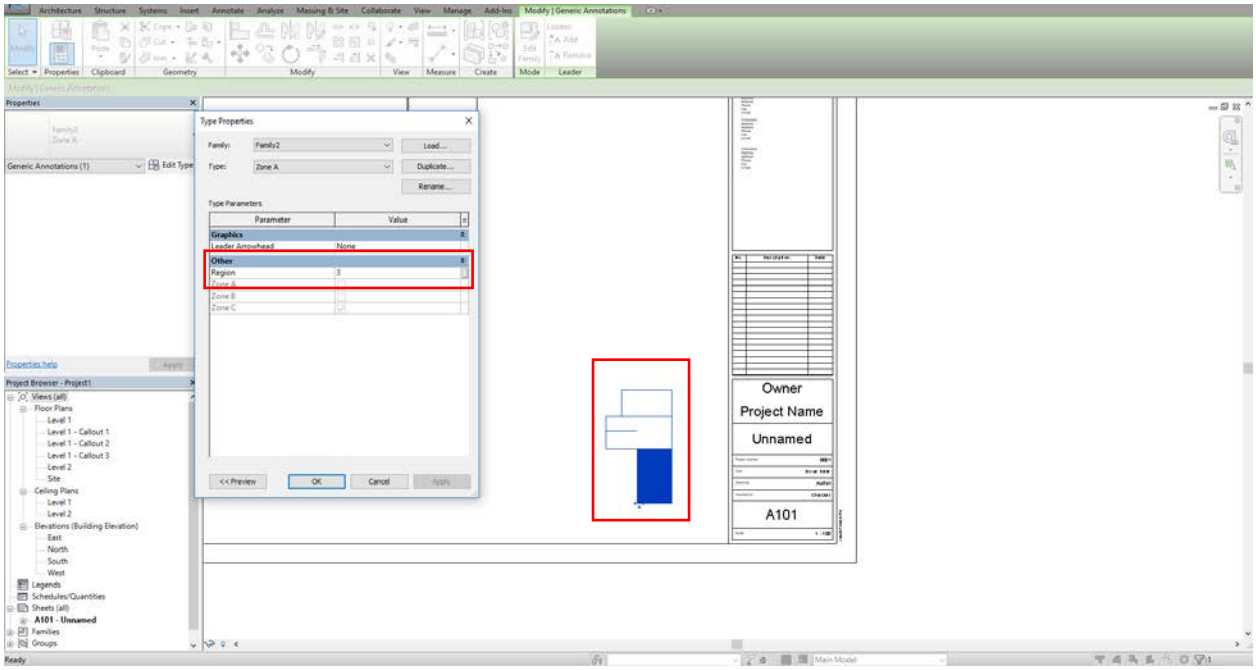
Load in the annotation.



Go to Edit type, change Region to 2 or 3.



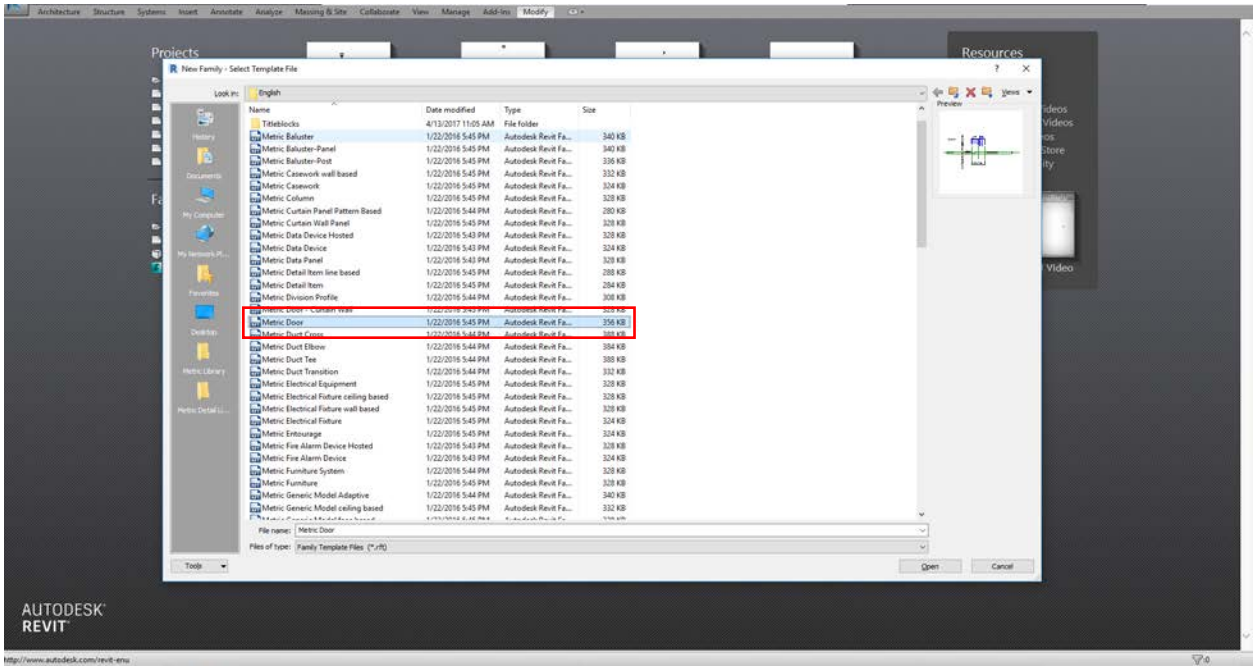
If you used the first way in previous section, you may change it to different types accordingly.



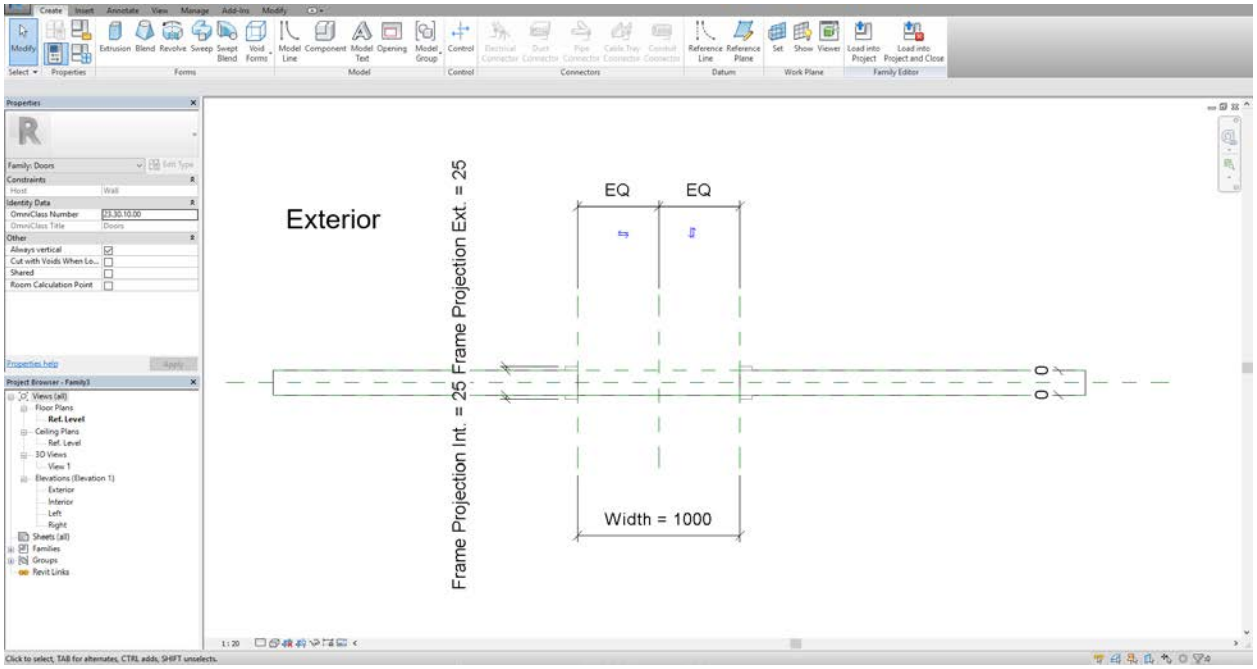
10. Controlling Rotation Work Planes and Shared Parameters

10.1 Understanding rotation in families

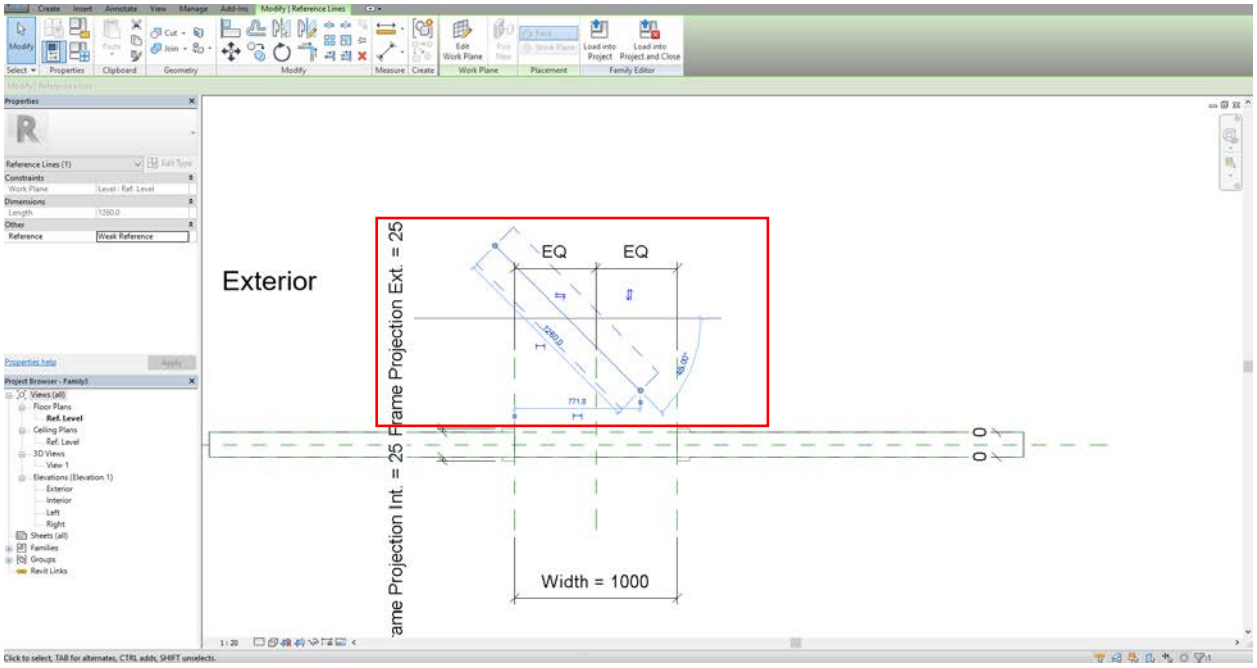
Open Door template.

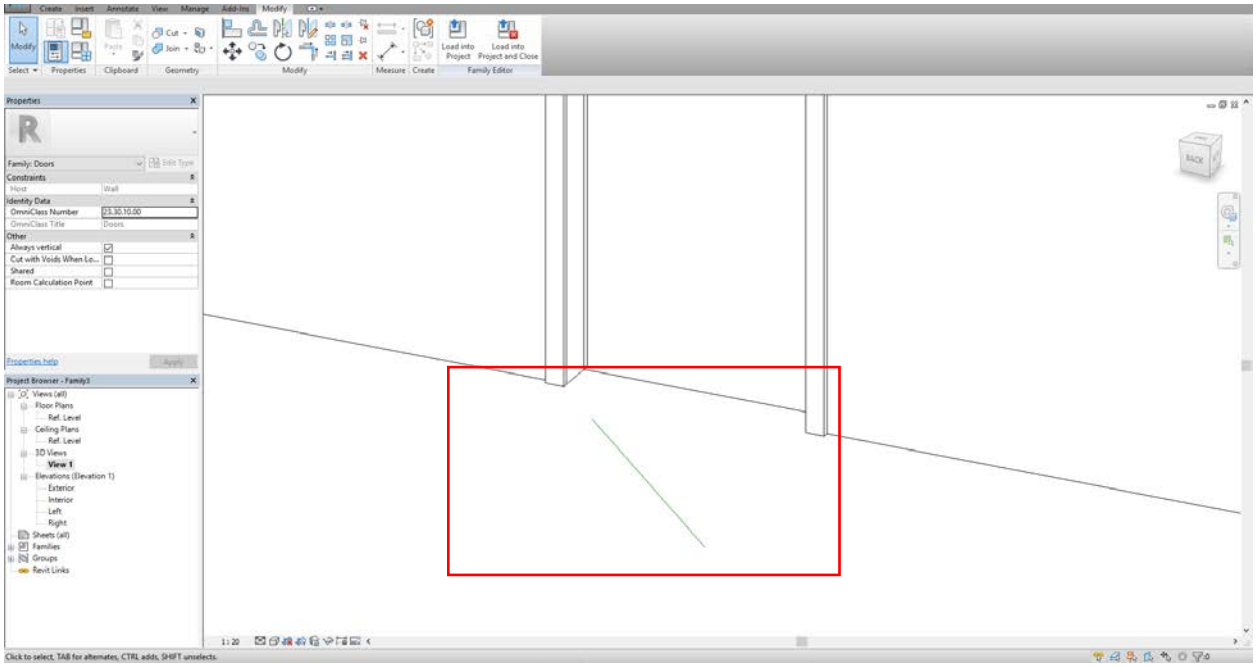


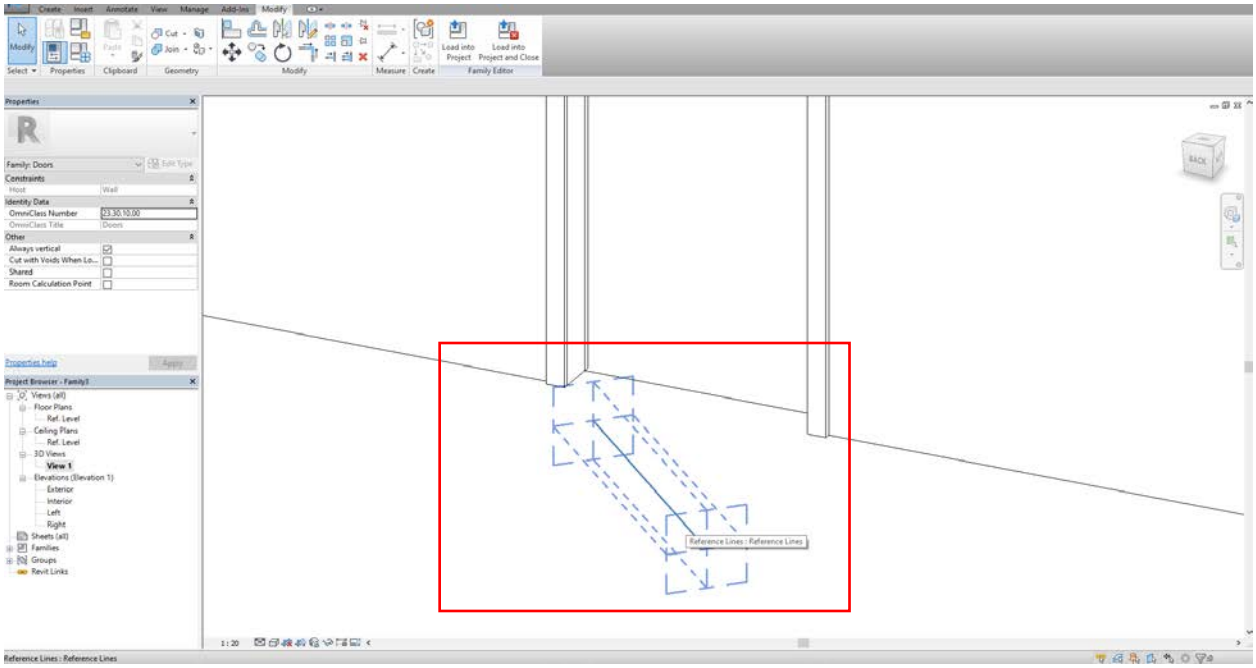
Notice there's a button named Reference Line. It's a line with 4 integral work planes.



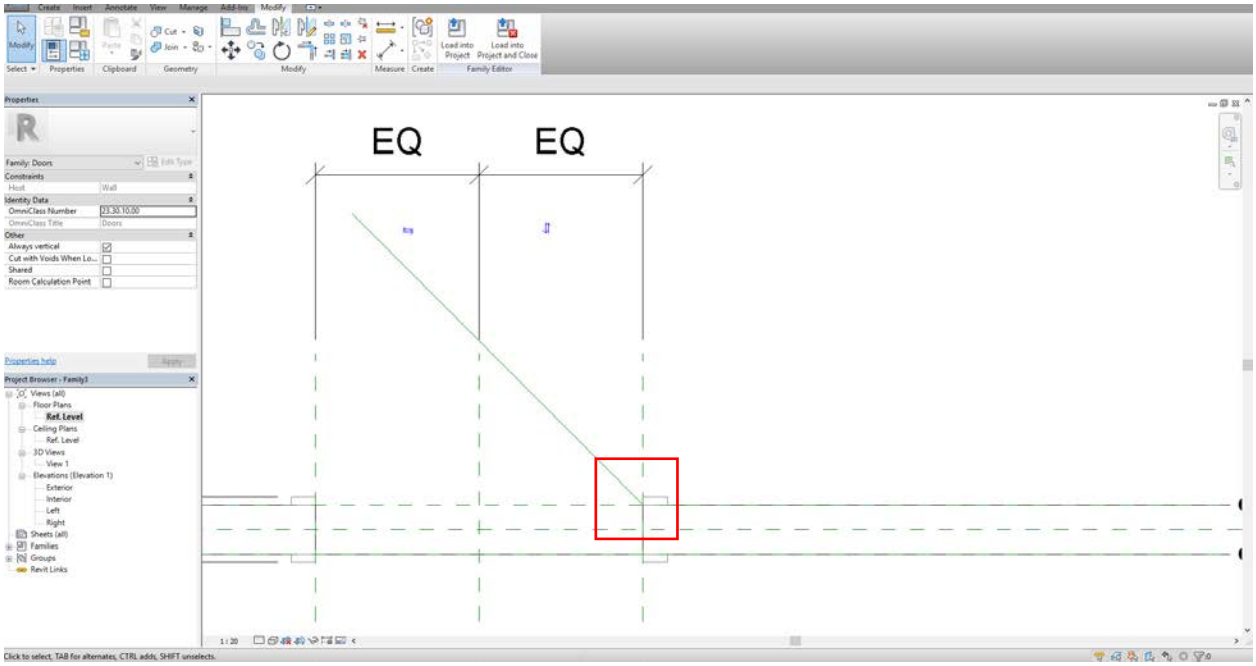
Draw a Reference Line.



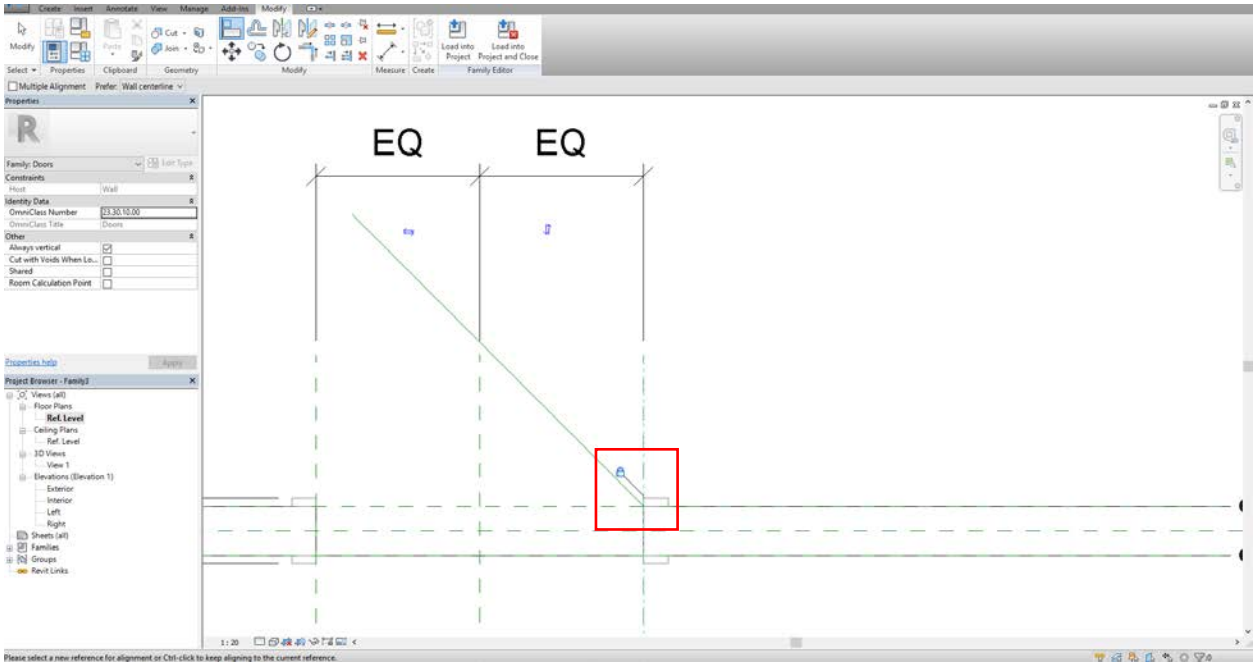


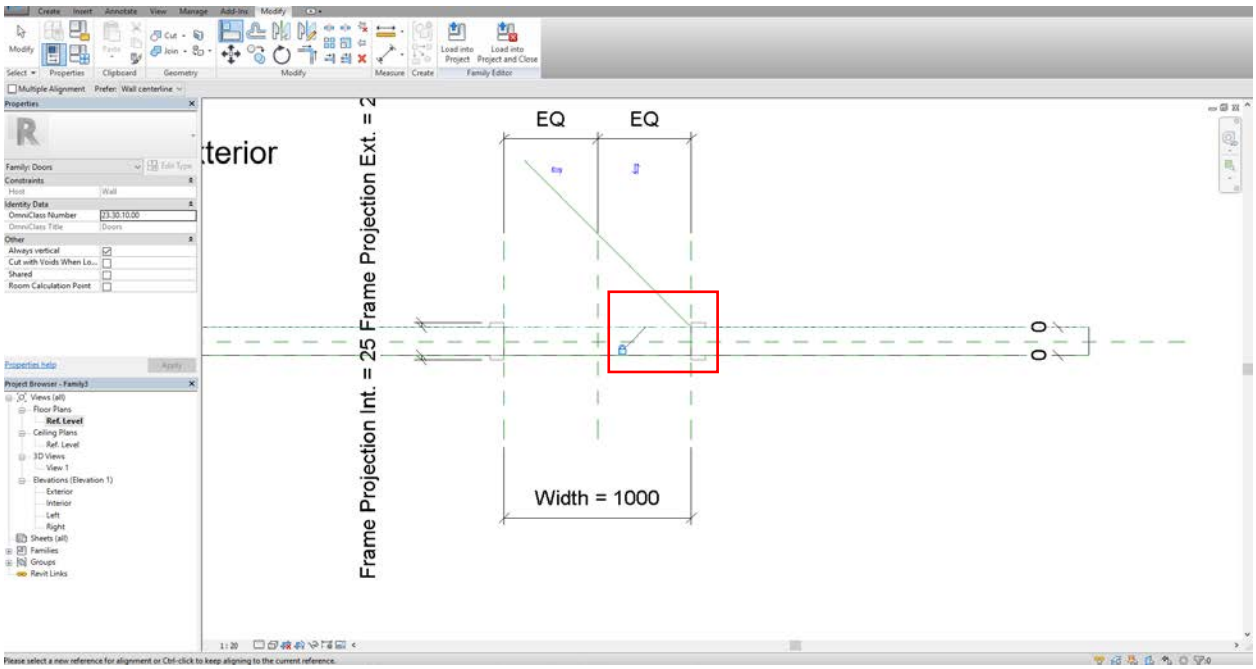


Snap the Reference Line to where the hinge will be.

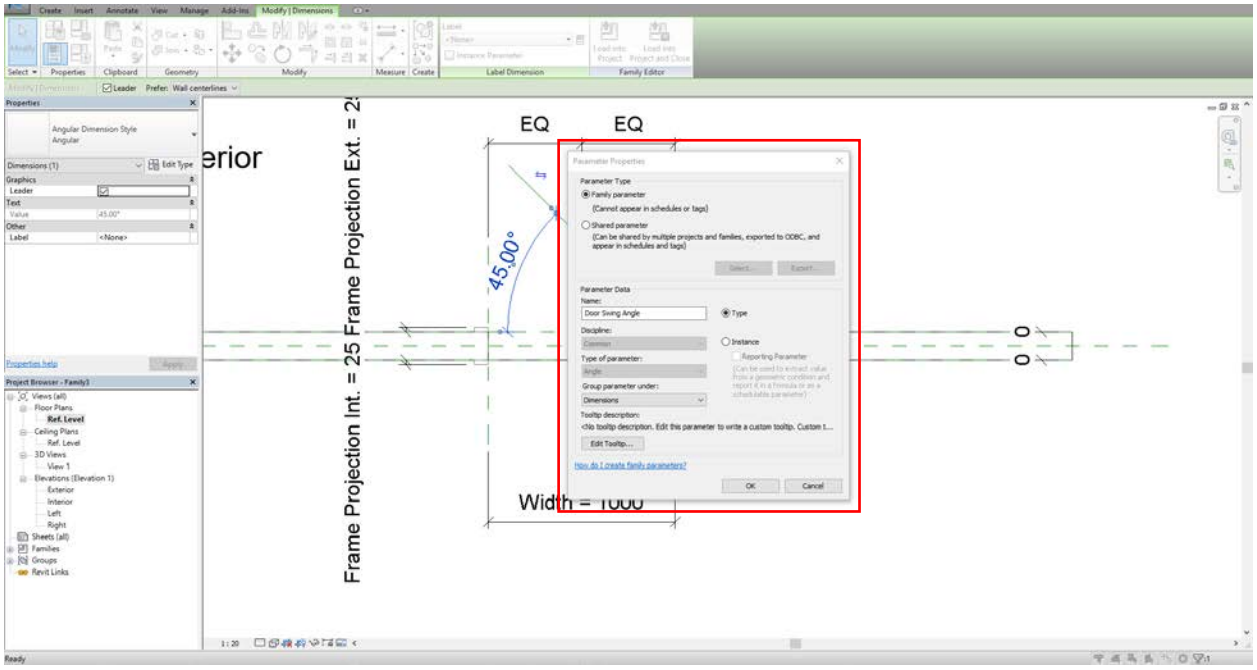


Lock this point to Reference Planes. (Use Tab on your keyboard to select the point.)



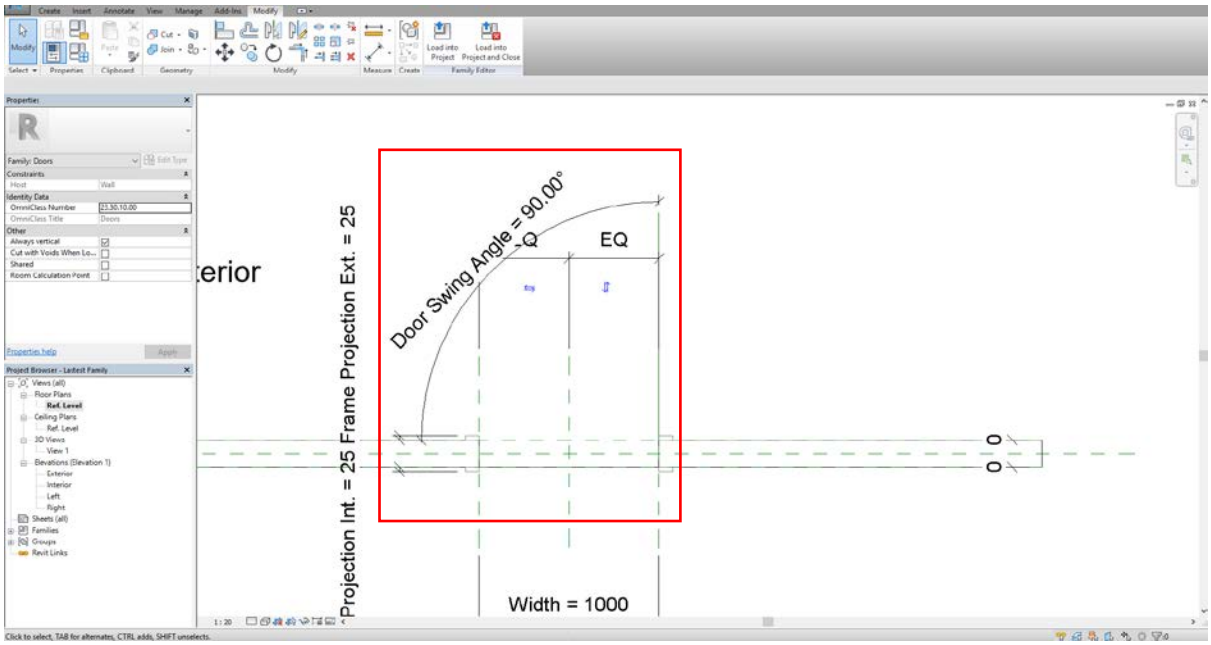


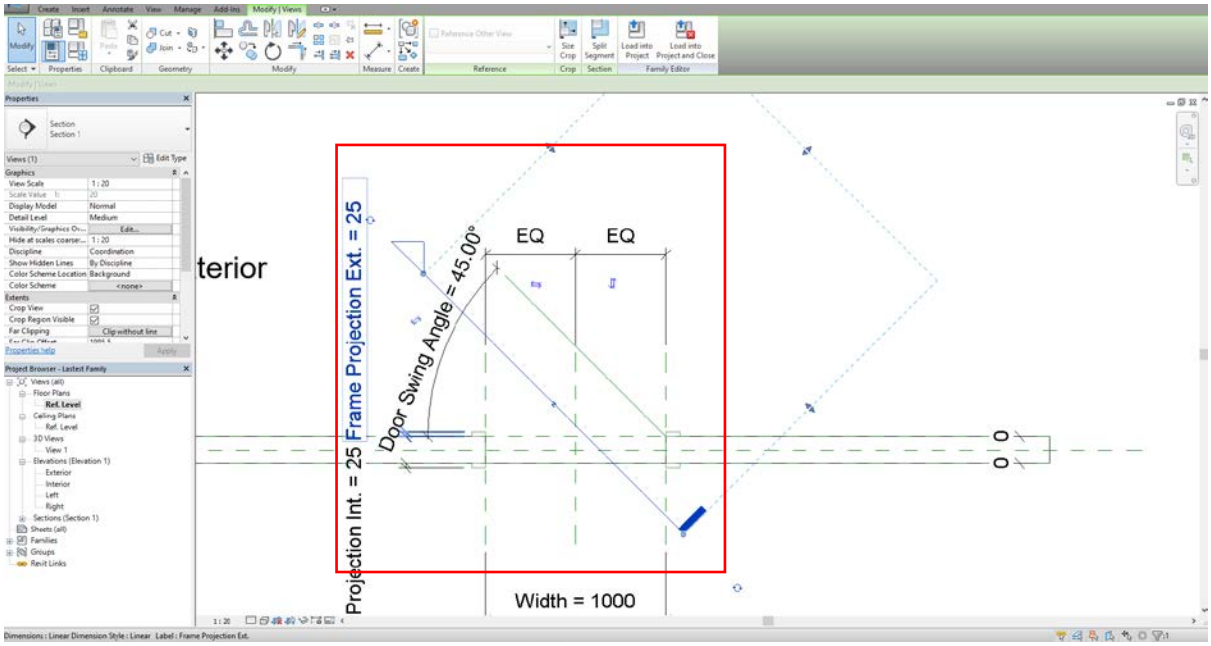
Add dimension to the angle and assign parameter to it.



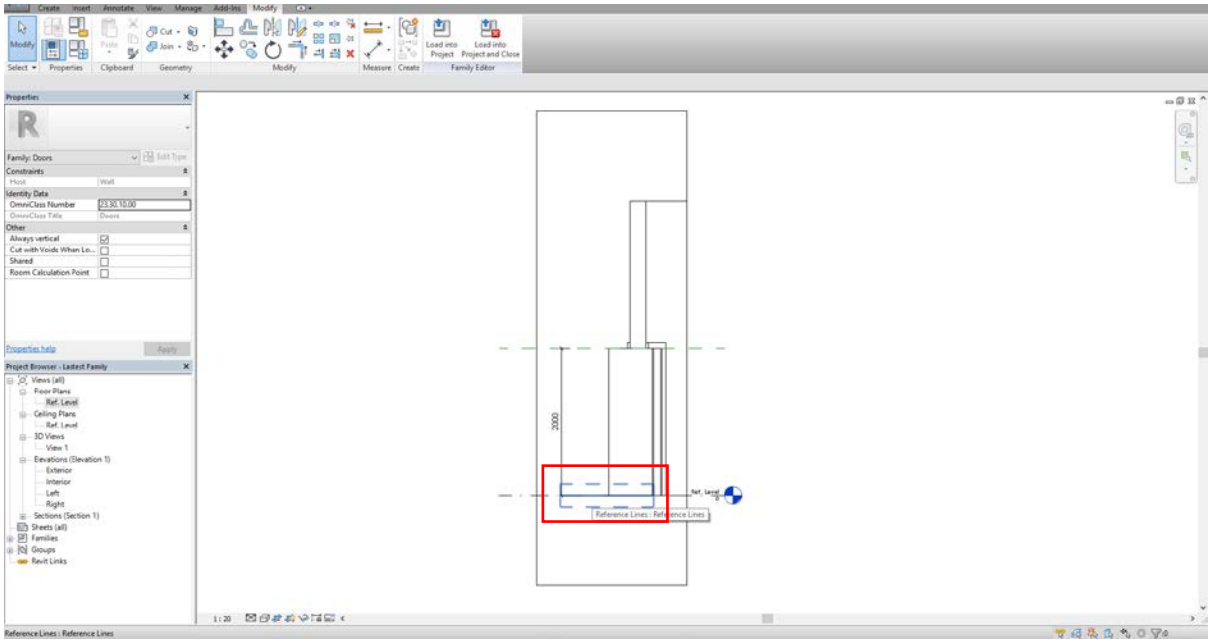
10.2 Building geometry on a reference line

Before we work on the reference line, rotating it to 90 degrees or draw a section is a good option.

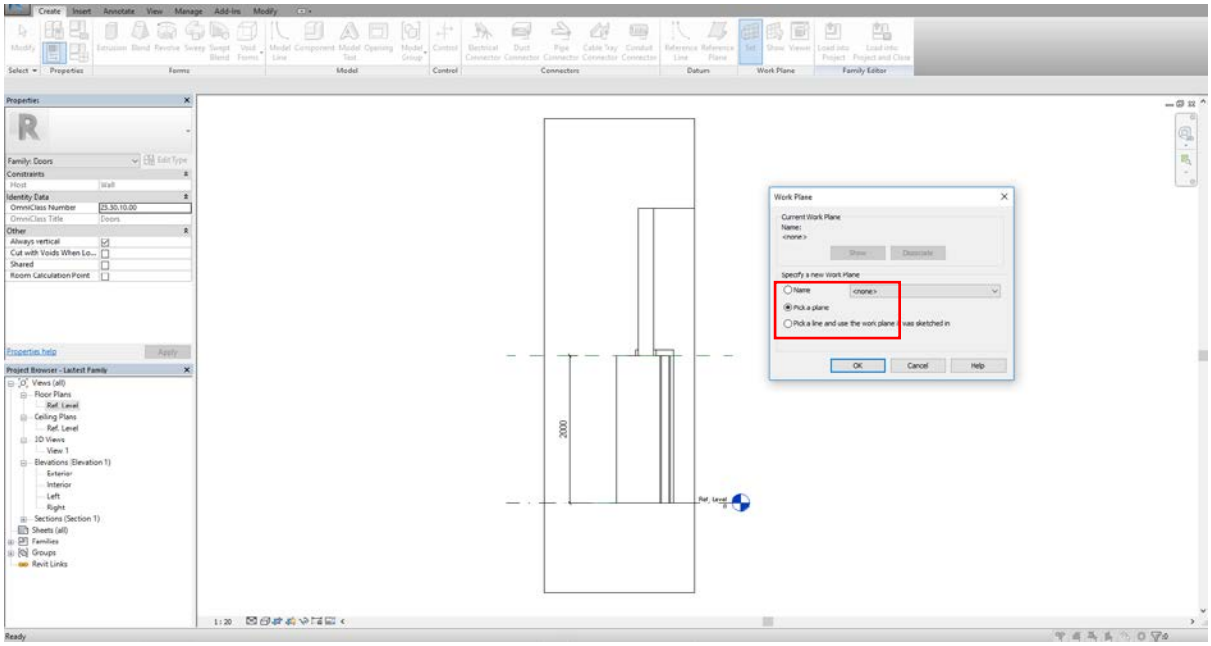


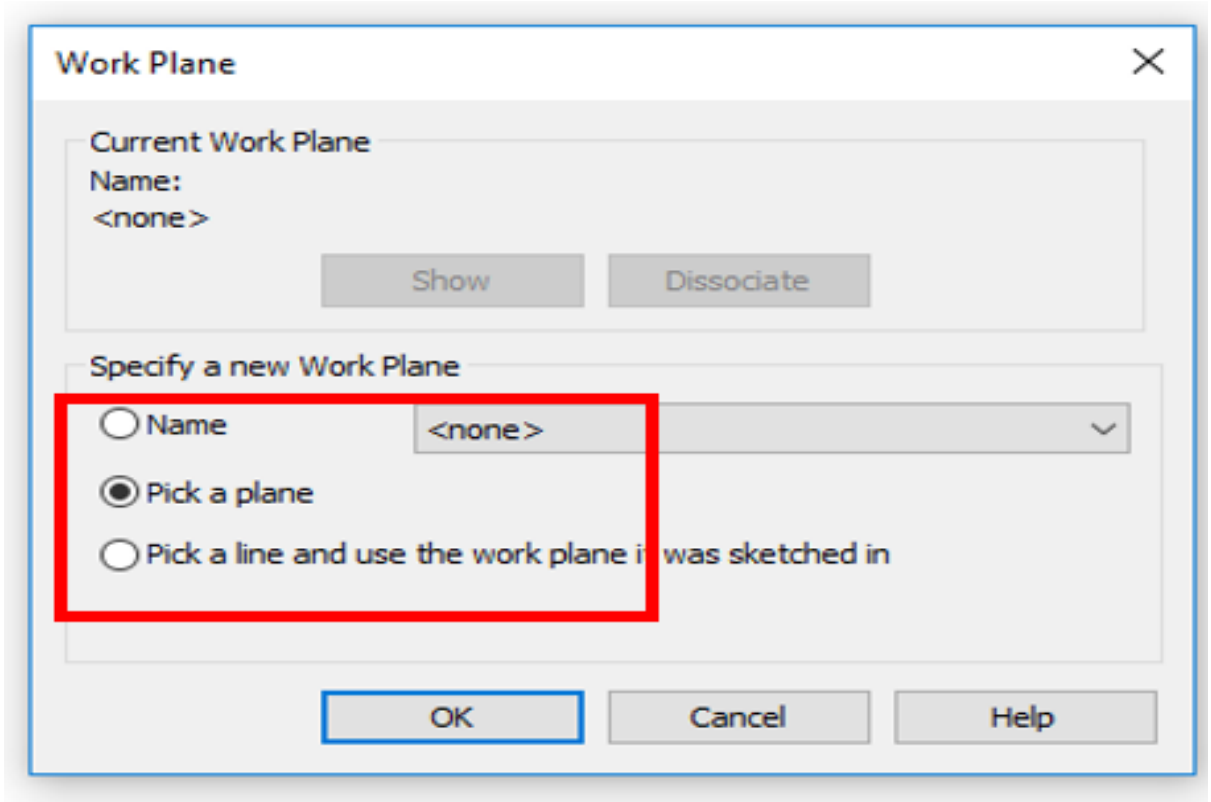


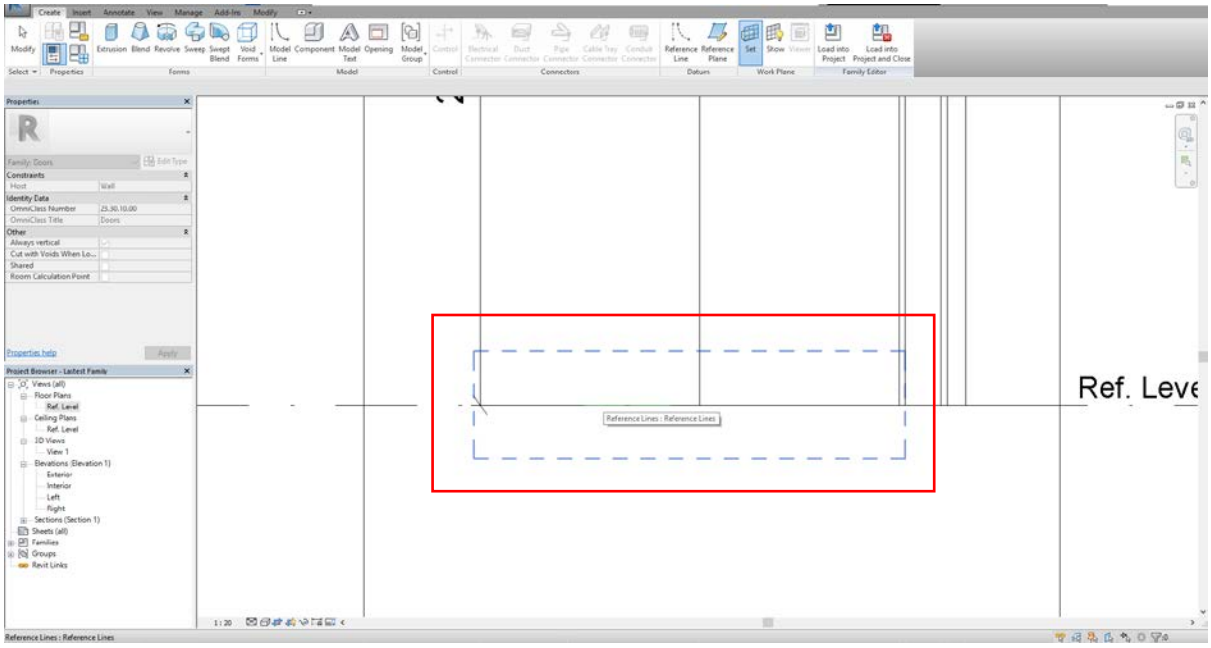
Elements seem to be a little weird since we cut the section at 45 degrees but what we are interested in is the reference line.



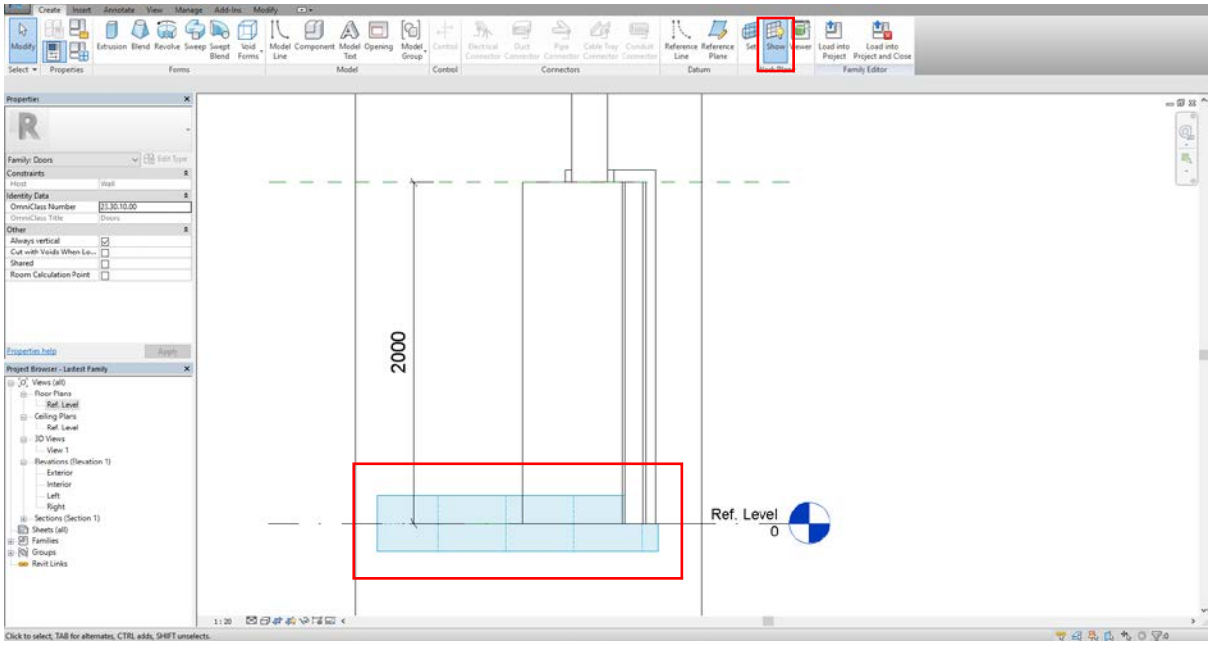
Set the reference line as active work plane. **Pick a plane** which is facing us vertically.



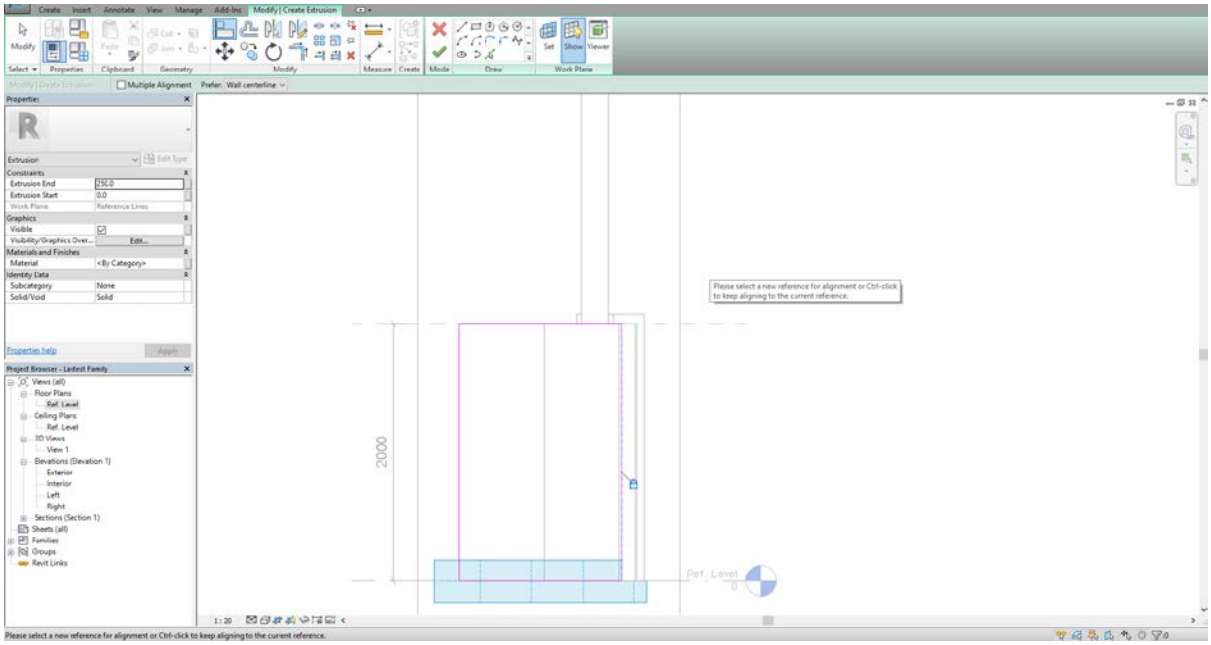

Work Plane
Current Work Plane
Name:
<none>
Show
Dissociate
Specify a new Work Plane
Name
<none>
Pick a plane
Pick a line and use the work plane i was sketched in
OK
Cancel
Help



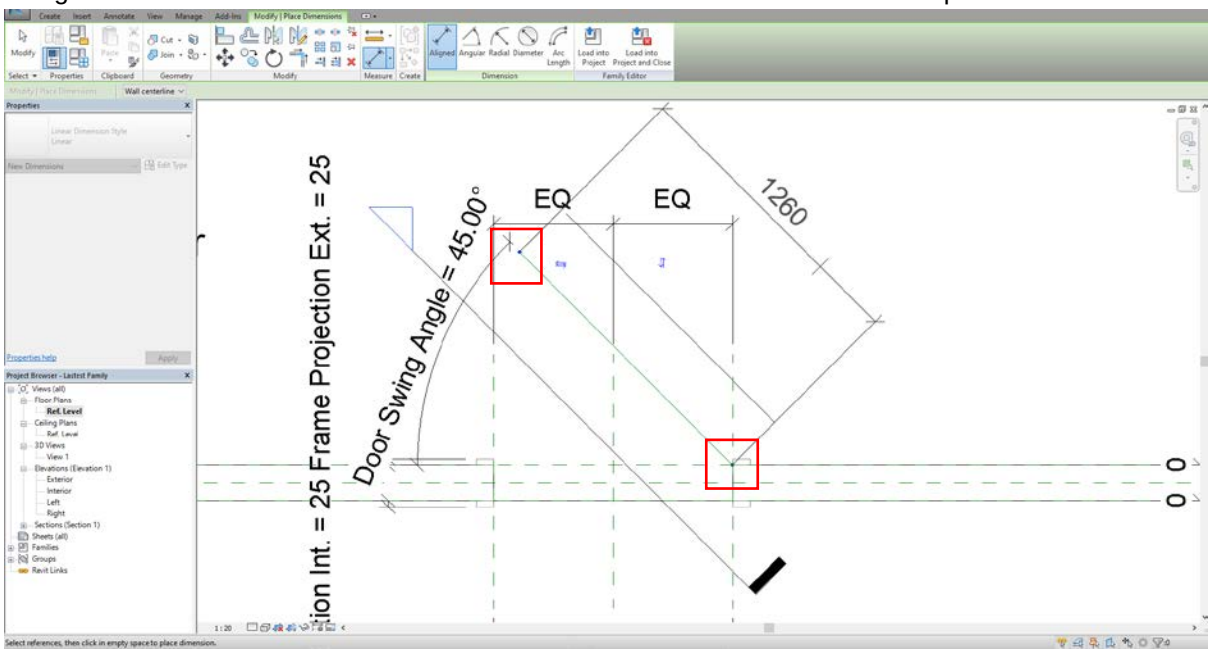
Show work plane button will help us tint the work plane.



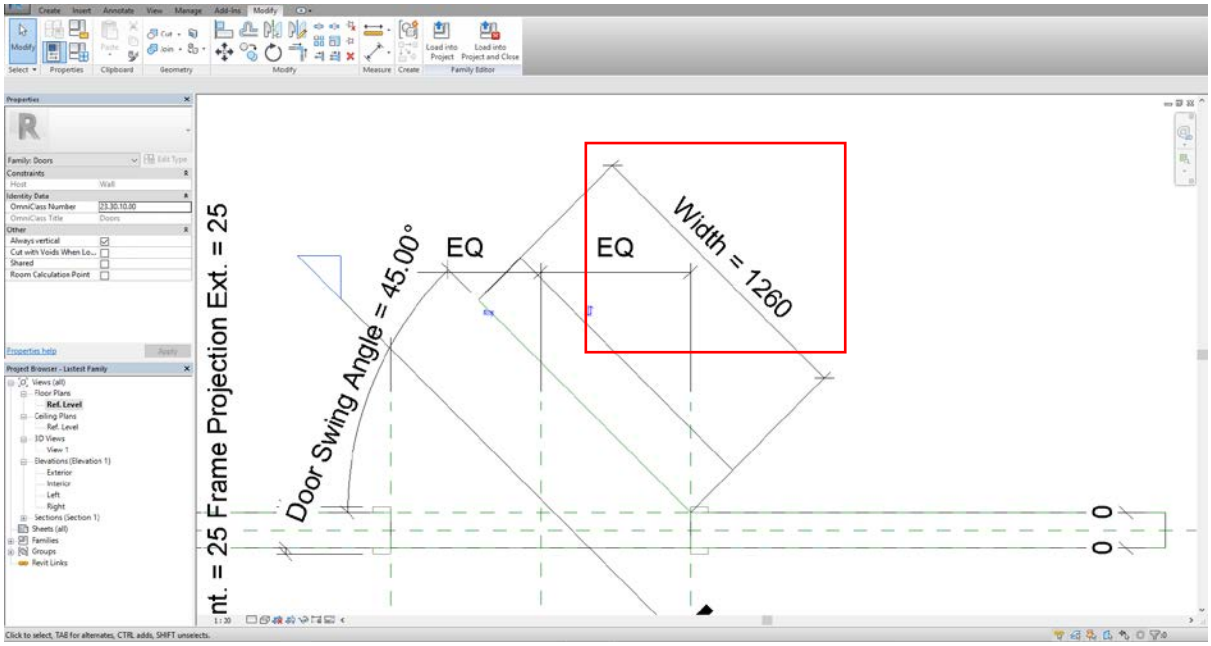
Extrude a box base on reference line.



Assign dimension to the door slab. Remember to click on the ends of reference plane.



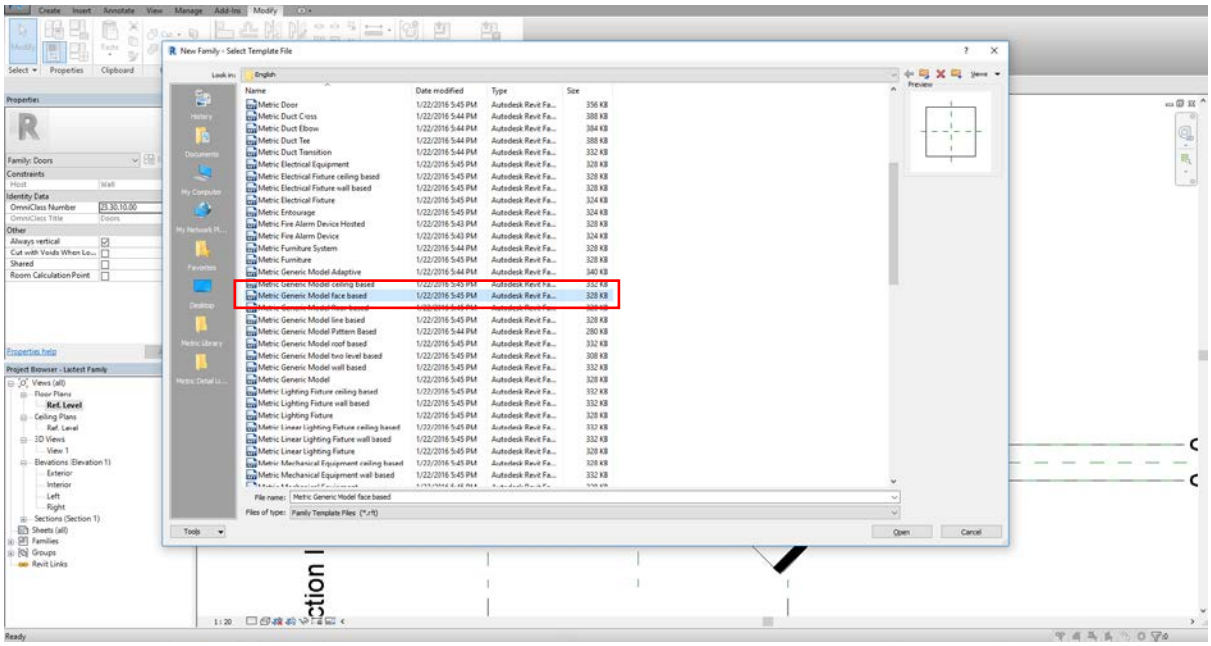
Assign Width parameter to the dimension.



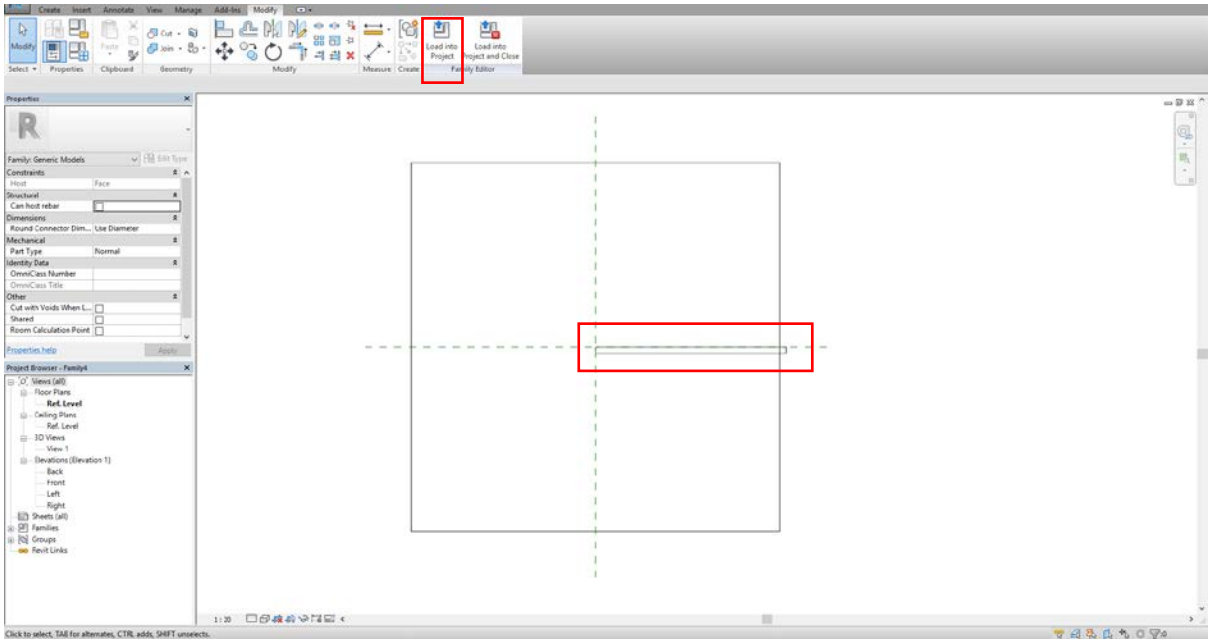
10.3 Hosting a nested family on a reference line

Instead of sketch then extrude, nesting a family on a reference line is another option.

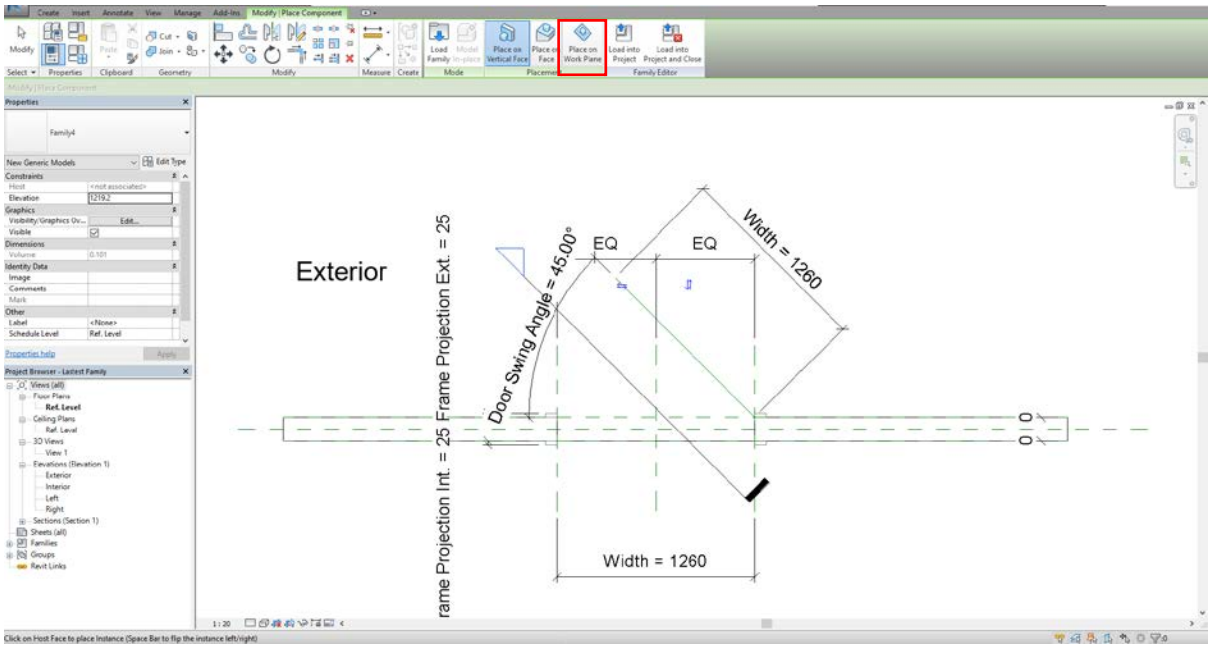
Open Generic Model face based template.

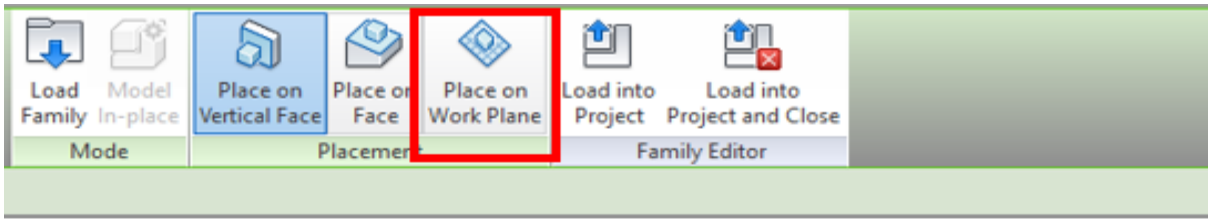


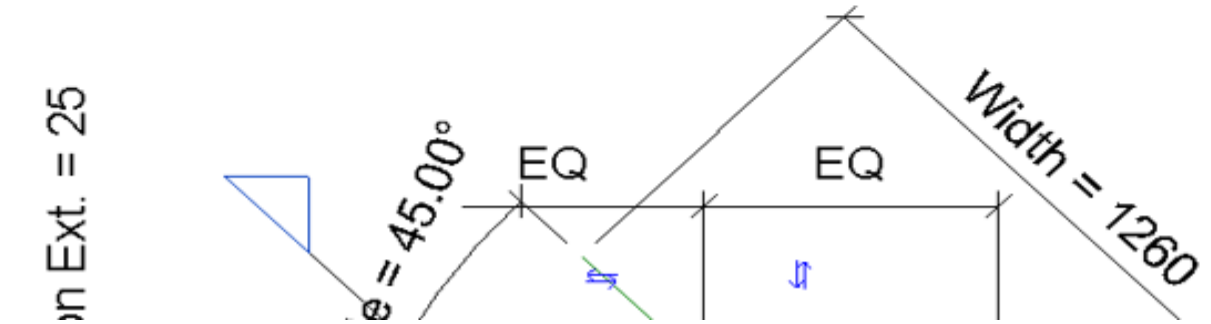
Create a door slab then **Load into project**.



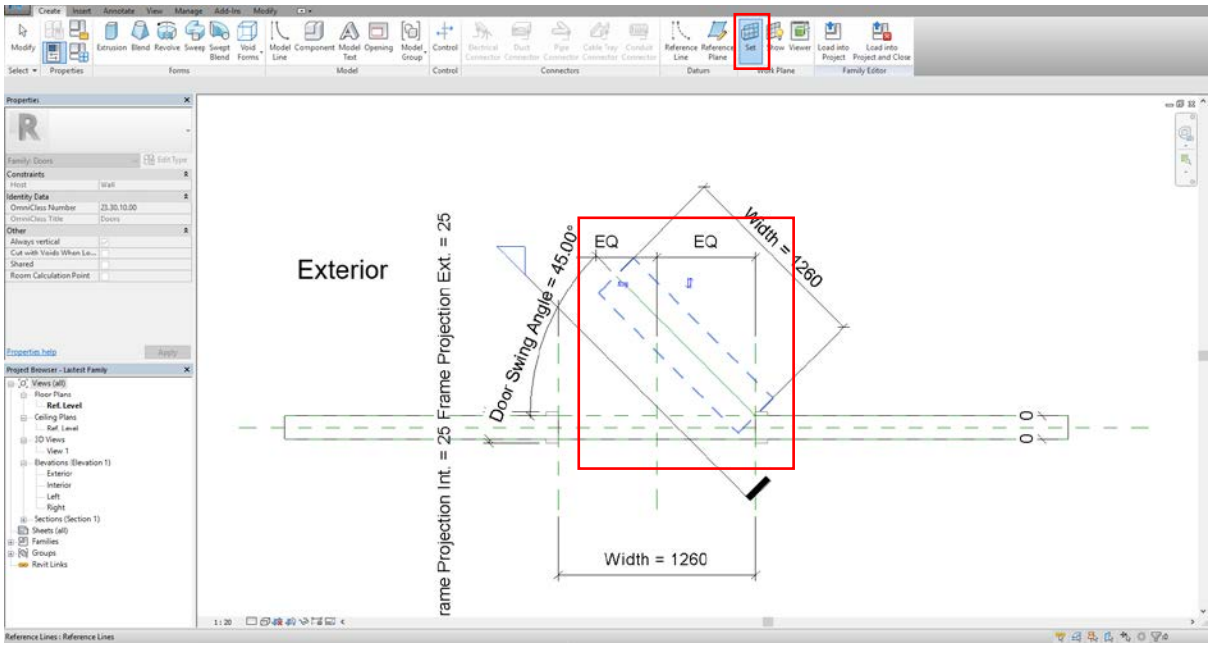
Hit on Place on Work Plane.



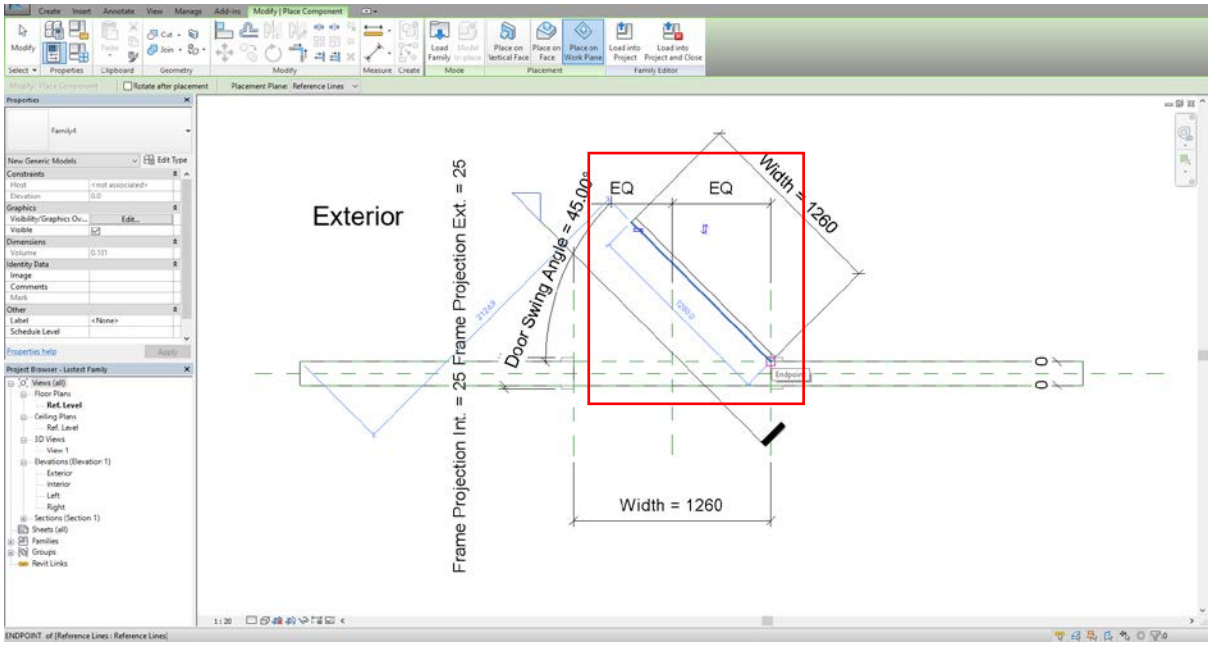




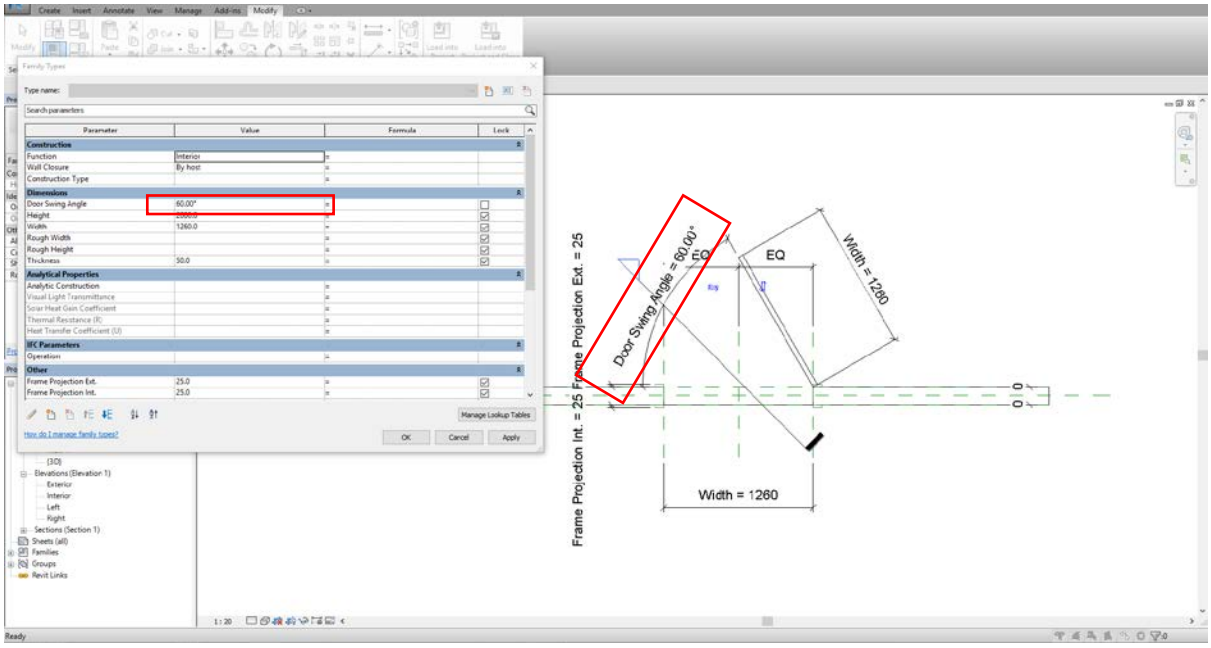
Pick the horizontal surface of refence line.



Place it on current active work plane. Press spacebar to snap the slab to reference line.

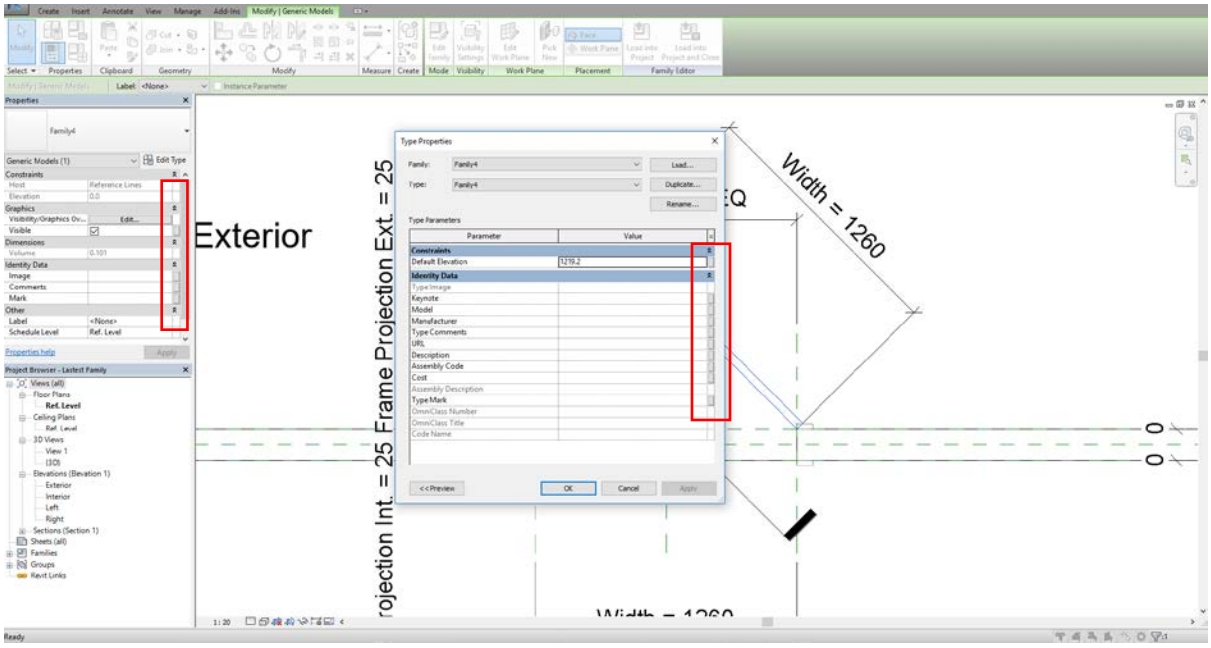


Notice that our nested slab works just fine.



10.4 Driving parameters for nested families

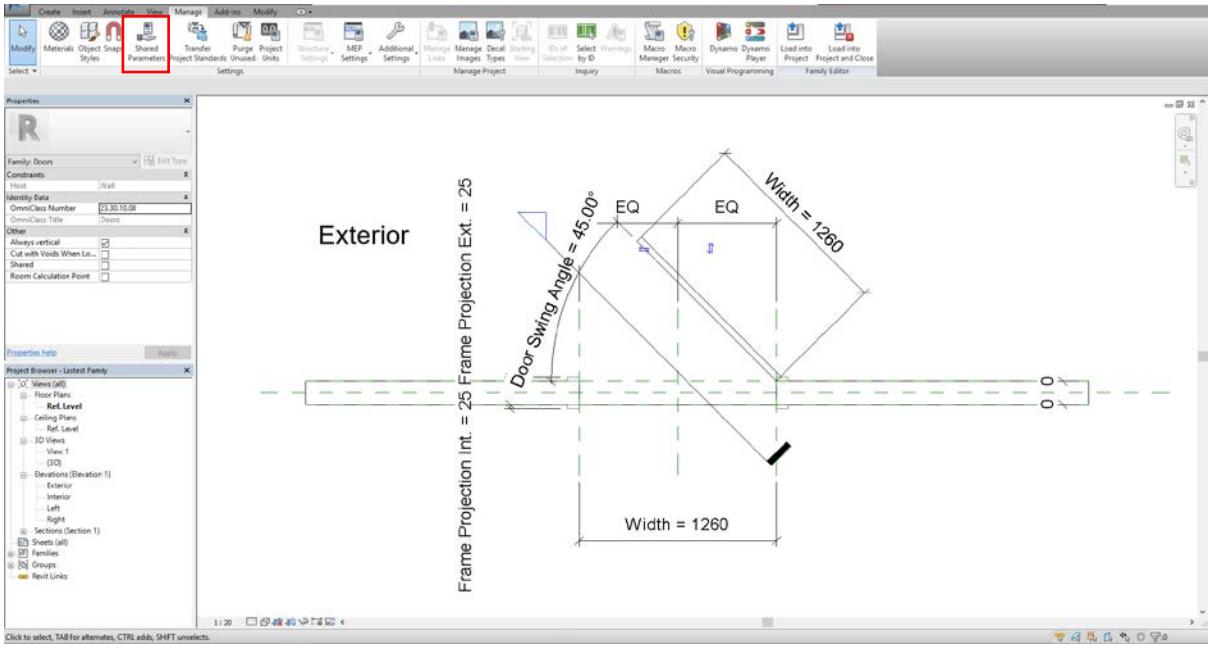
Take a look at Properties panel or simply click on Edit type.



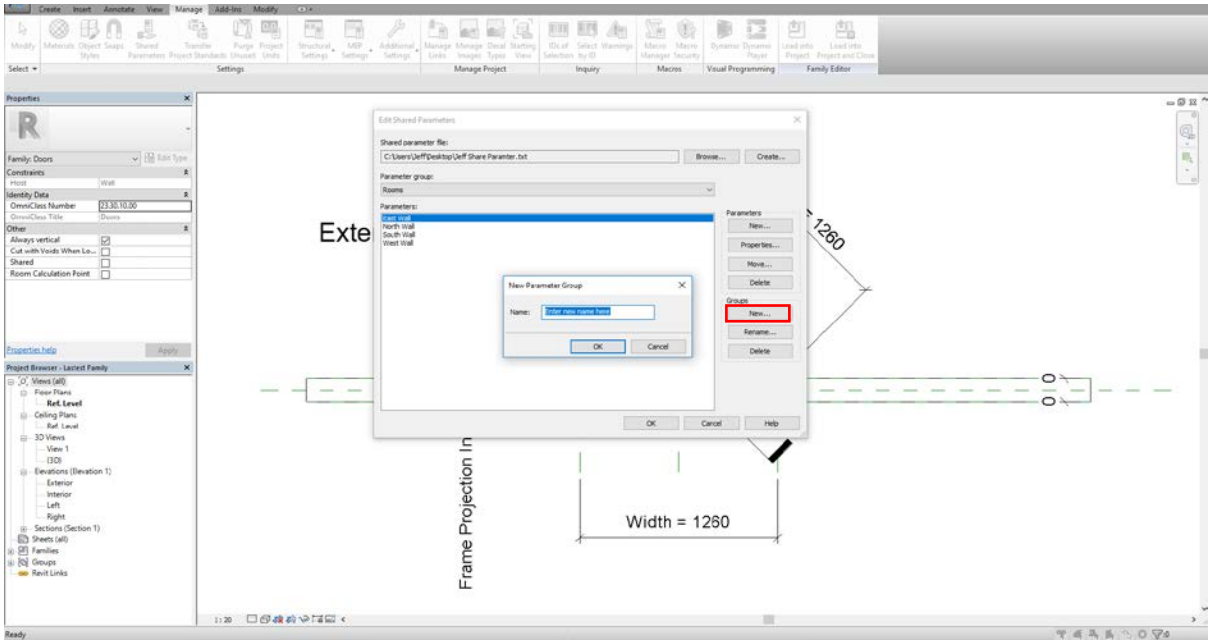
Parameters of nested family appear as properties in host family. If we have nested families in the hierarchy, essentially, Revit allow us to drive parameters with parameters.

10.5 Shared parameters

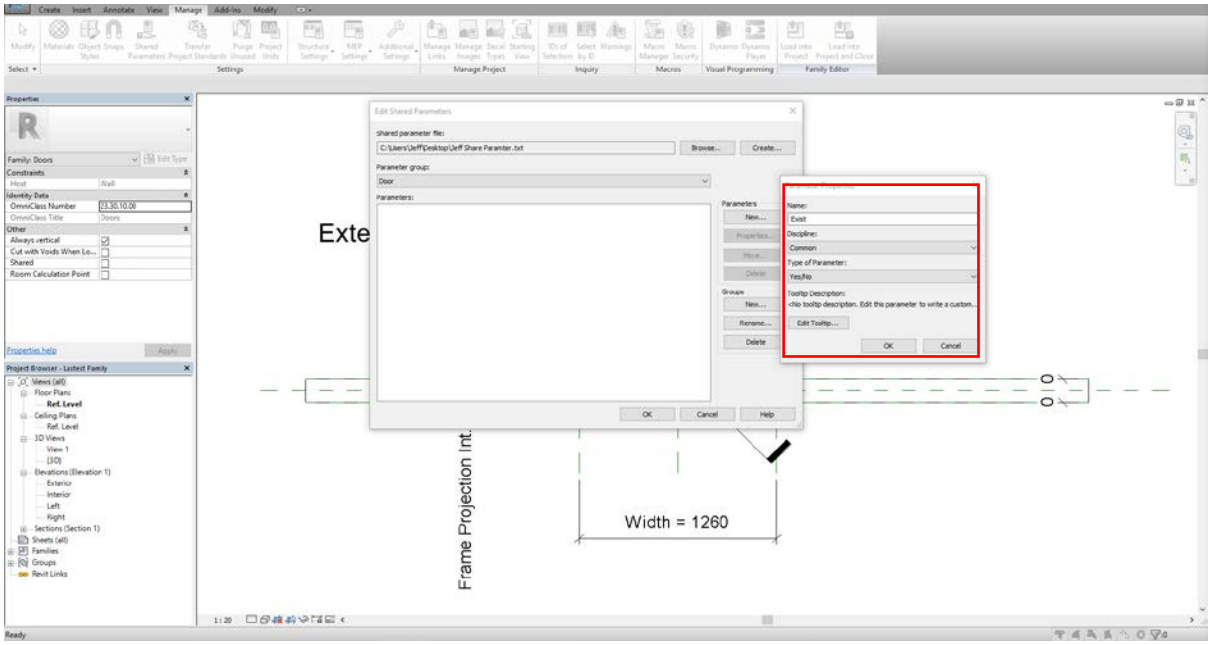
Go to Manage tab, Shared Parameters.

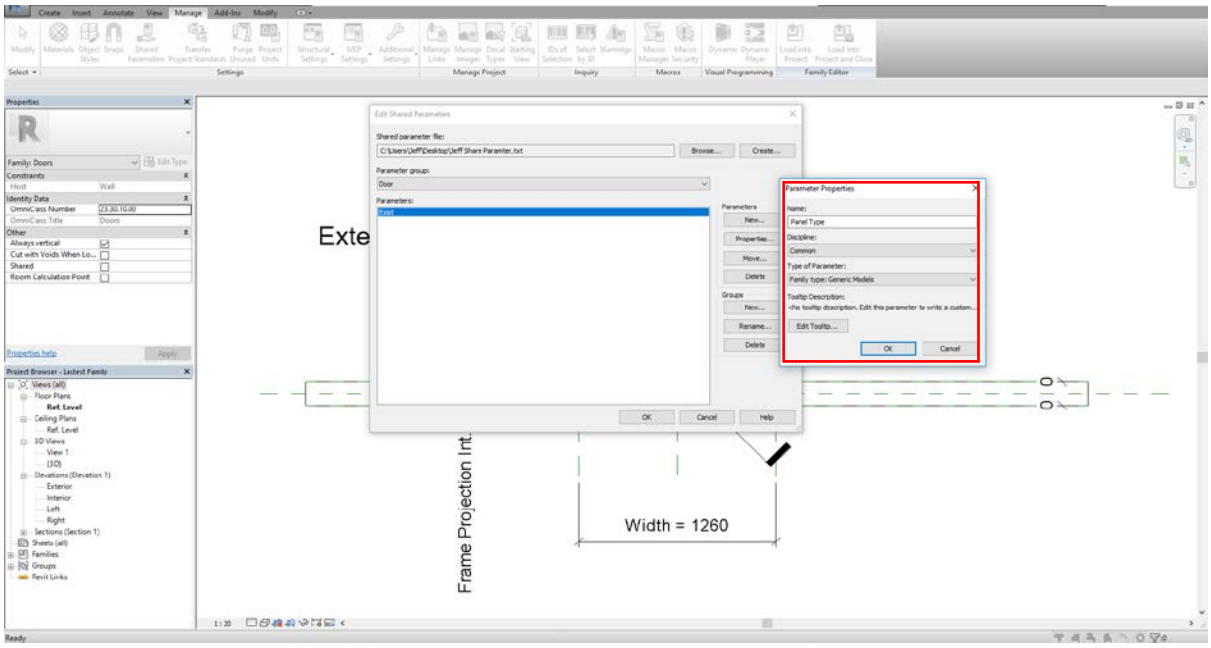


Create a new Group named Door.

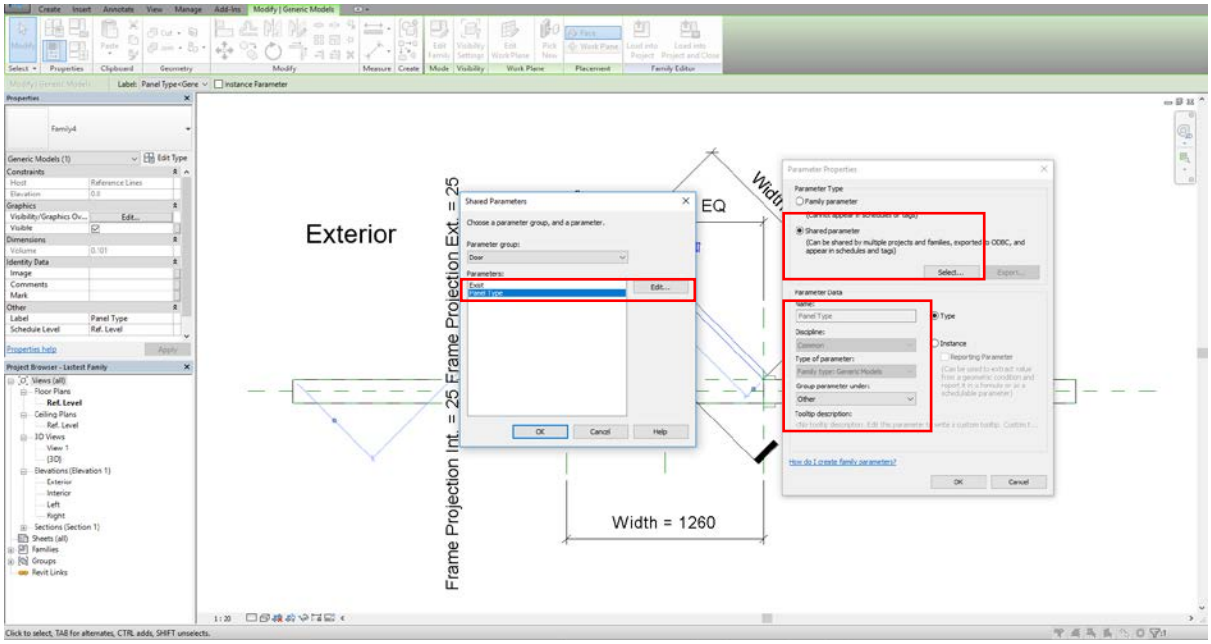


Create new parameters: Exist (Yes/No), Panel Type (Family type: Generic Model).

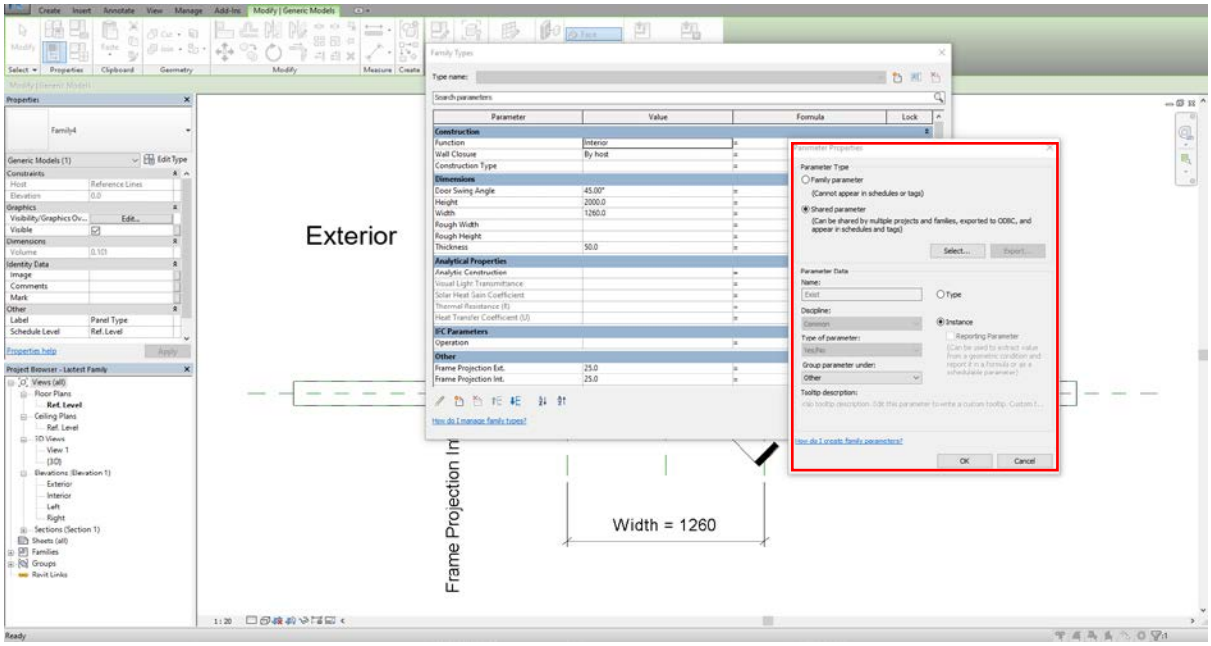




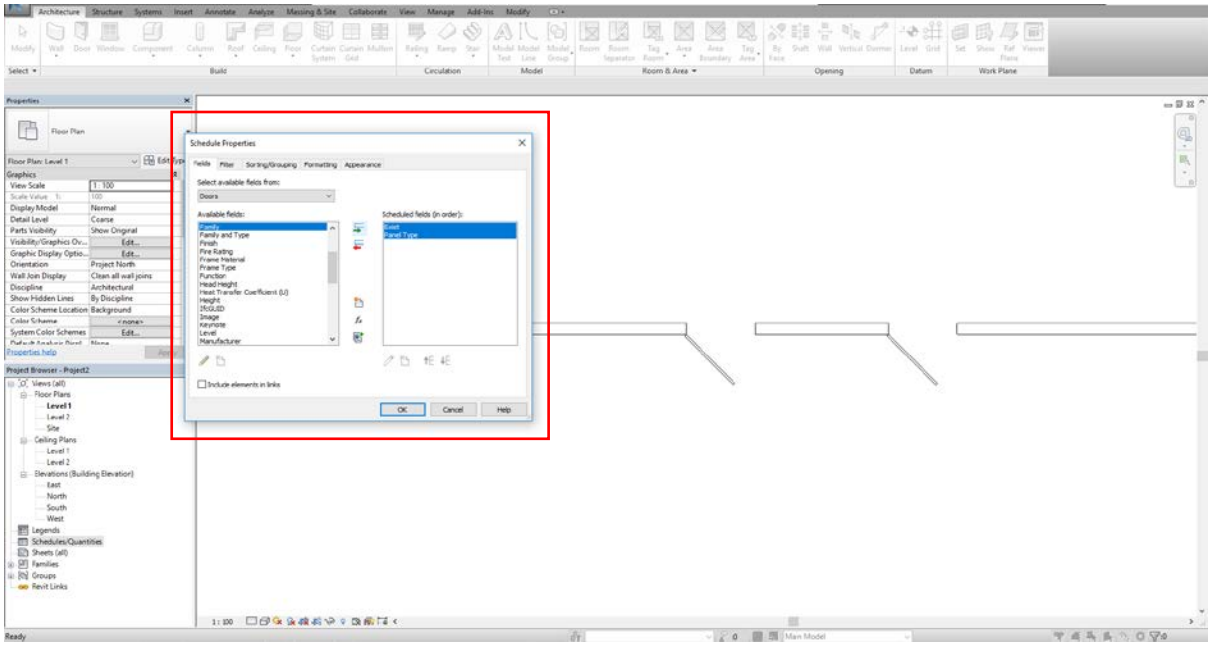
Associate shared parameters to the door.

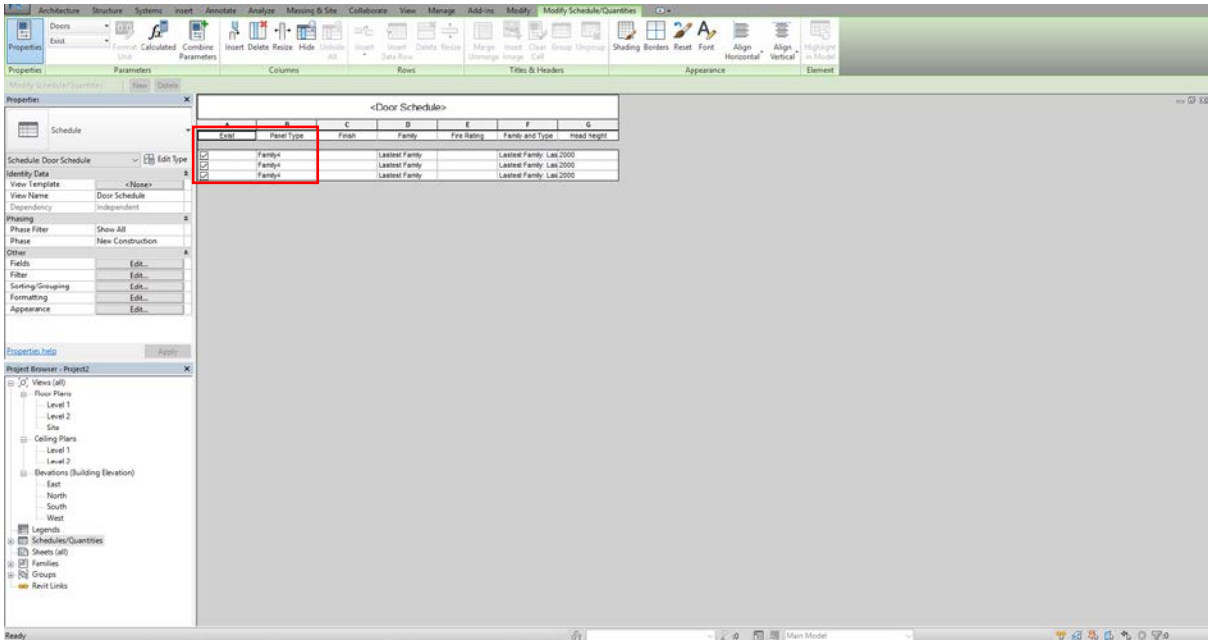


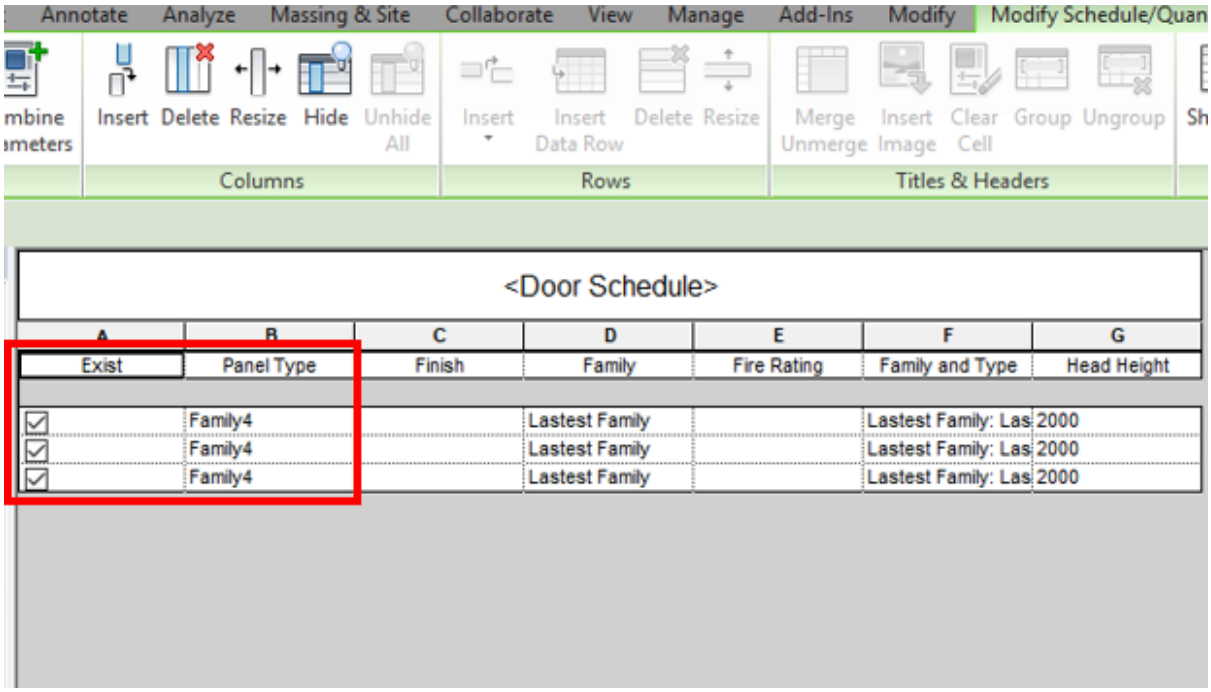
To add Exist parameter, go to Family Types.



If we place it into project, parameters could show in Schedule.



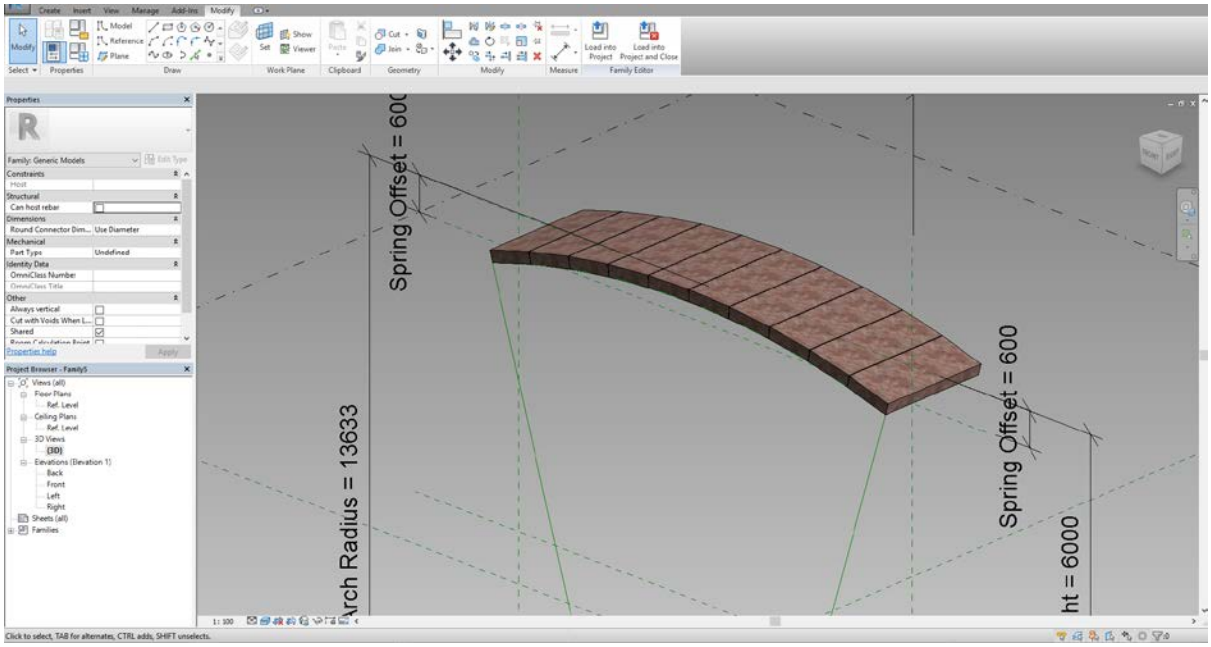



Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
Modify
Modify Schedule/Quan
Insert
Delete
Resize
Hide
Unhide All
Columns
Insert
Insert Data Row
Delete
Resize
Rows
Merge Unmerge
Insert Image
Clear Cell
Group
Ungroup
Titles & Headers
<Door Schedule>
A
B
C
D
E
F
G
Exist
Panel Type
Finish
Family
Fire Rating
Family and Type
Head Height
Family4
Lastest Family
Lastest Family: Las
2000

11. The Tower and the Arch

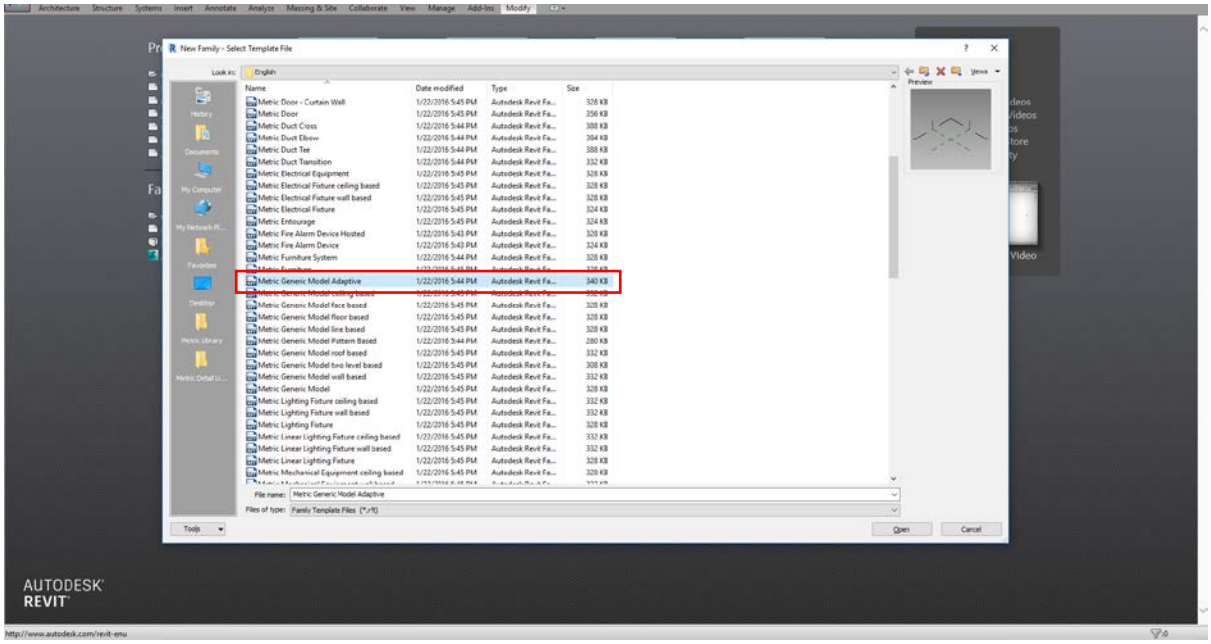
11.1 Introduction to the arch family

Creating a parametric arc is a bit of challenging in Revit. In this chapter we will go through the process of making a parametric arc which involves a few tricks.

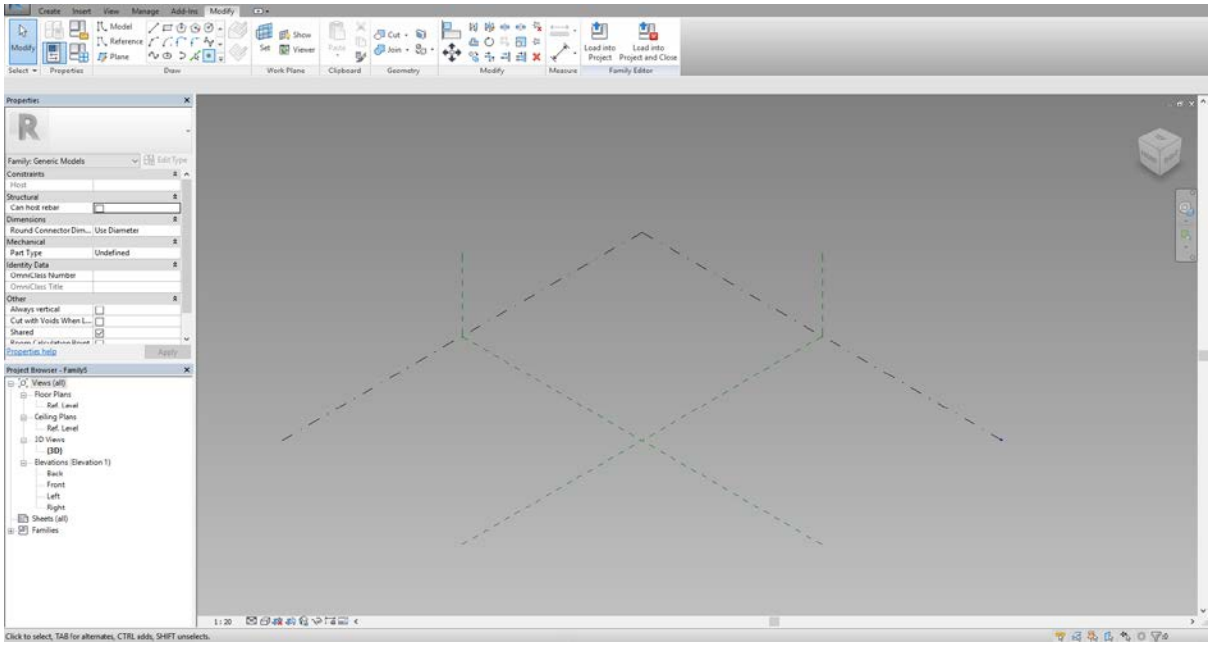


11.2 Setting up reference planes and constraints.

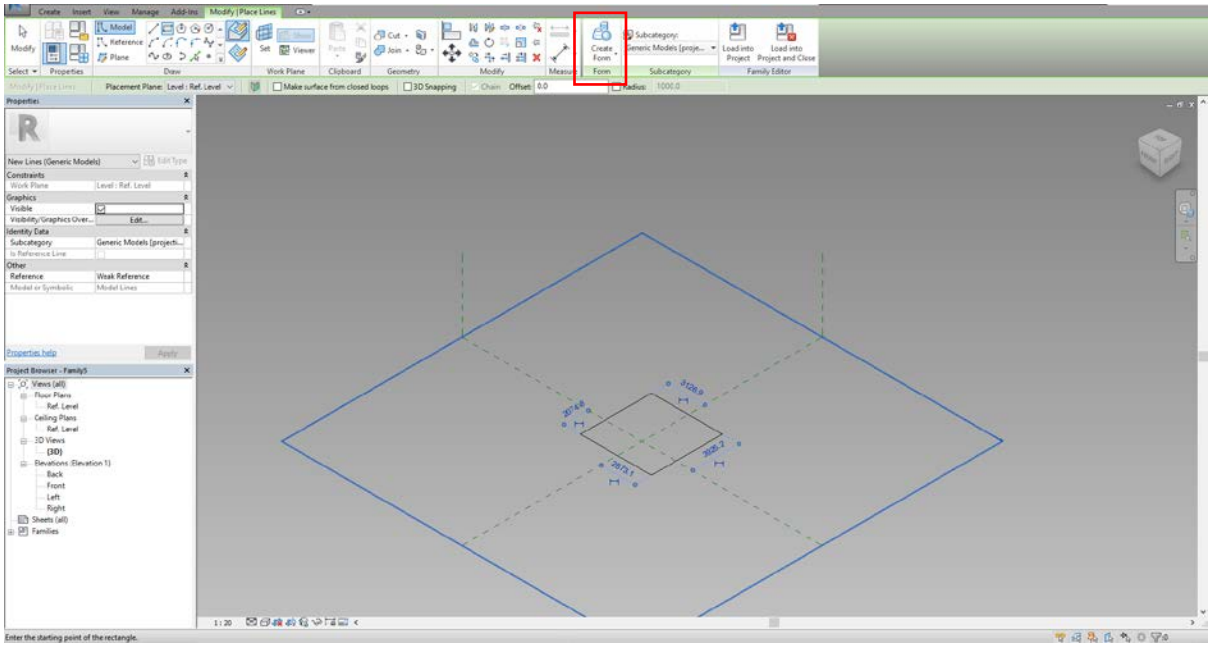
Start our project by opening Generic Model Adaptive.

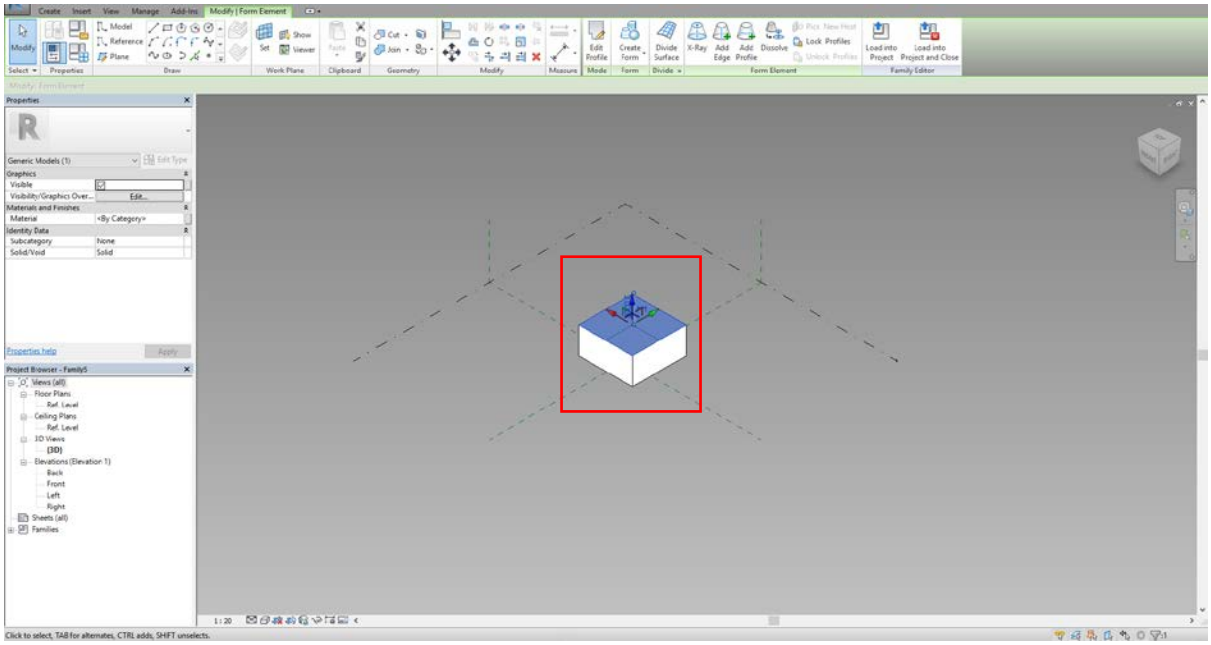


Notice that our interface is slightly different with the regular Family Editor. It's called Massing Family Editor.

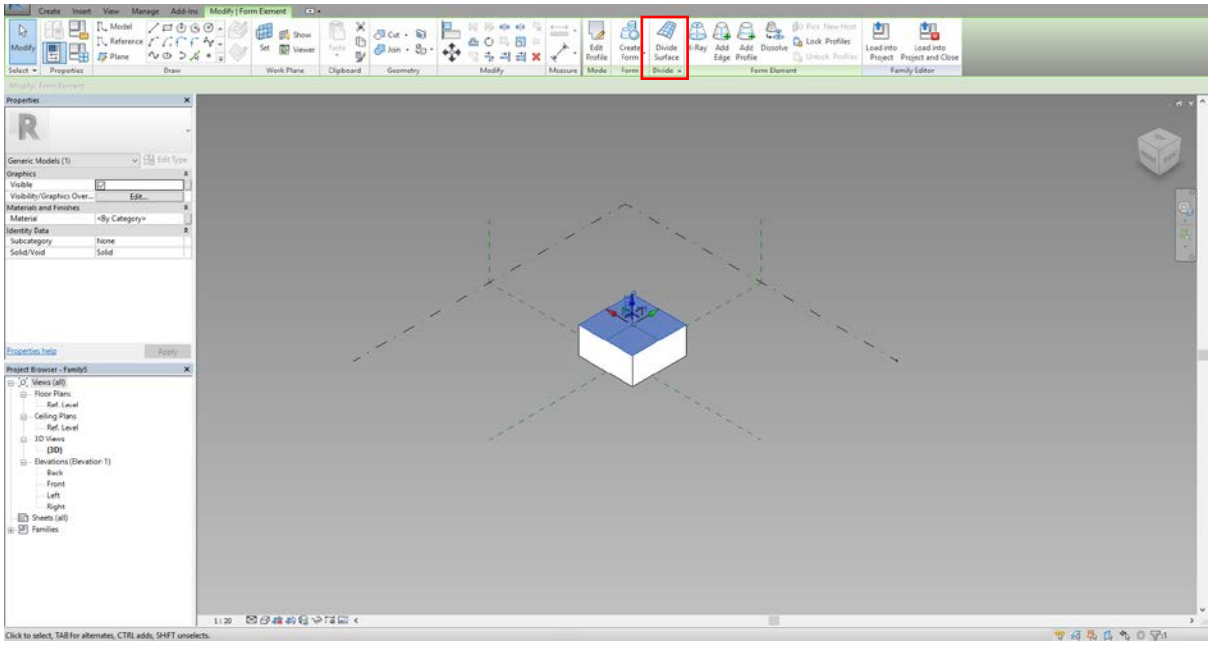


Instead of a series of forms, in Massing Family Editor, those are replaced by Create Form. Click on it to finish Extrusion.

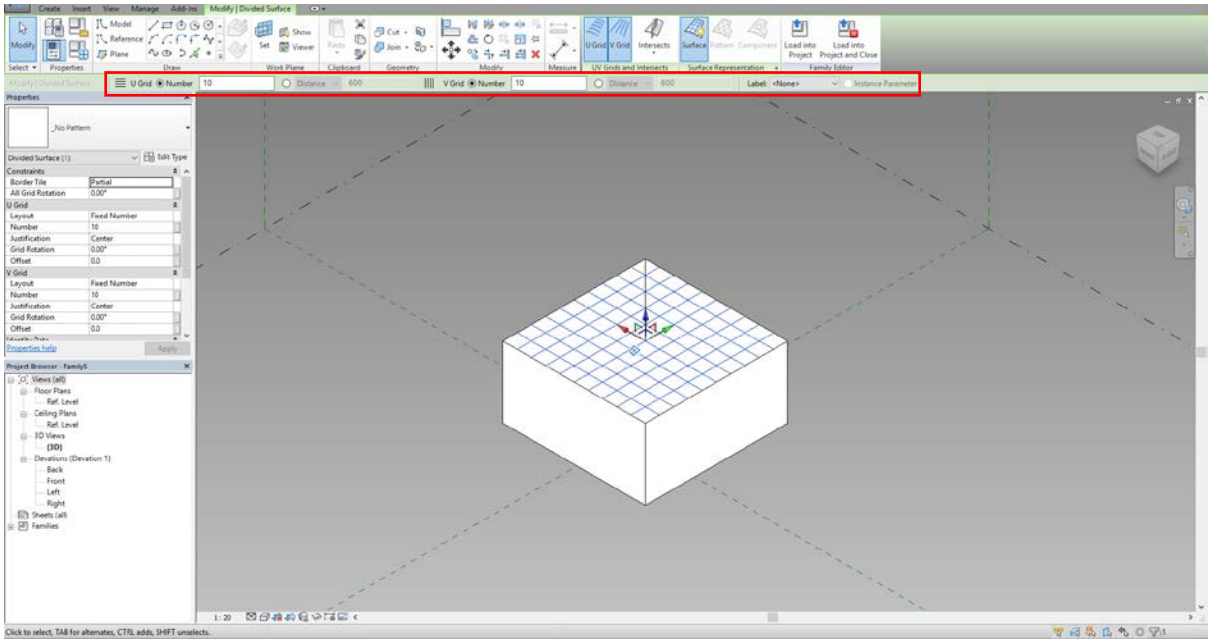




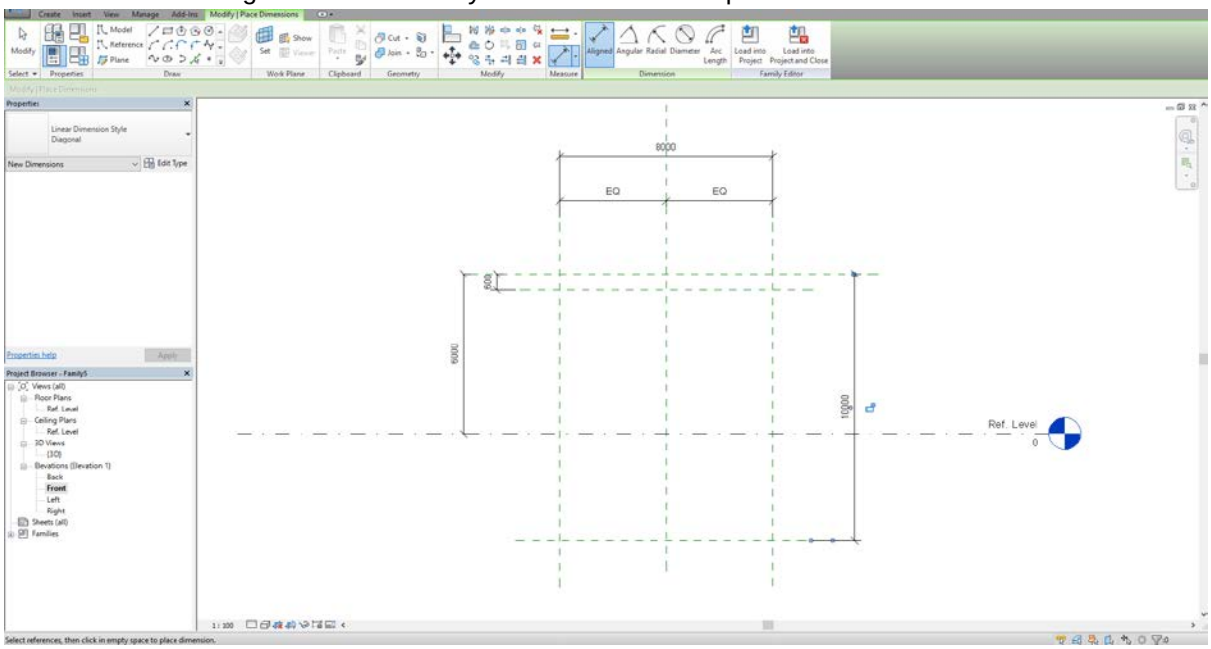
Another commonly used feature is Divide Surface.



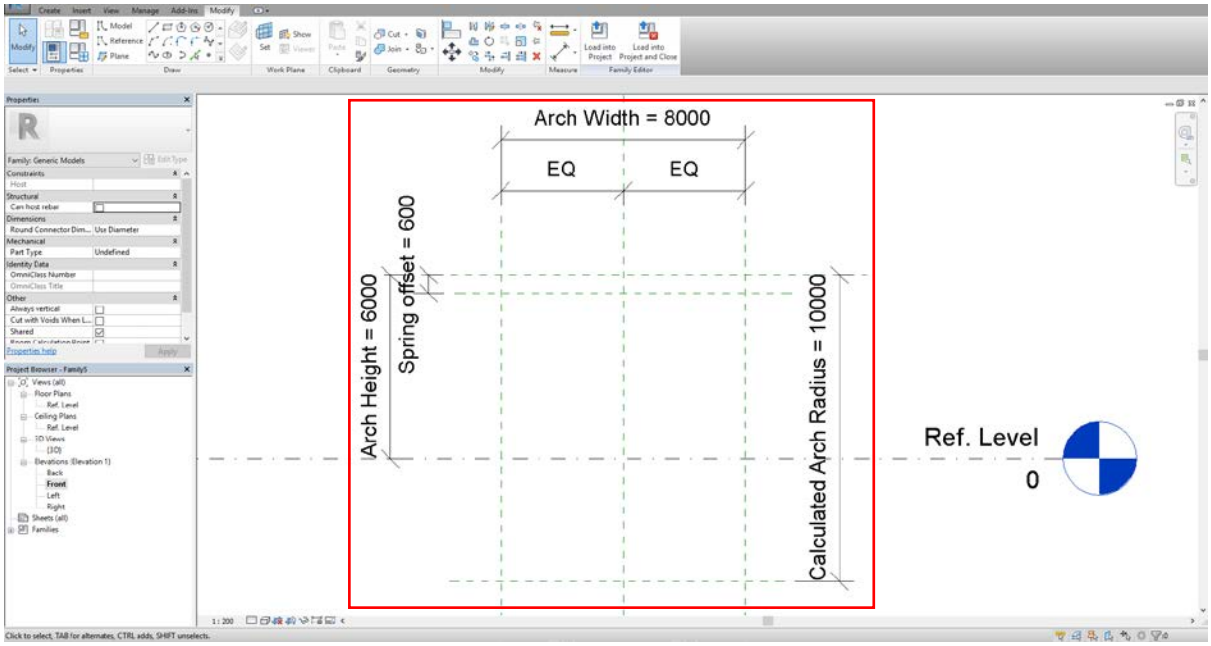
It applies a grid pattern to the selected surface and we’re able to control the pattern parametrically.



Delete the box then go to front view. Lay down our reference planes.

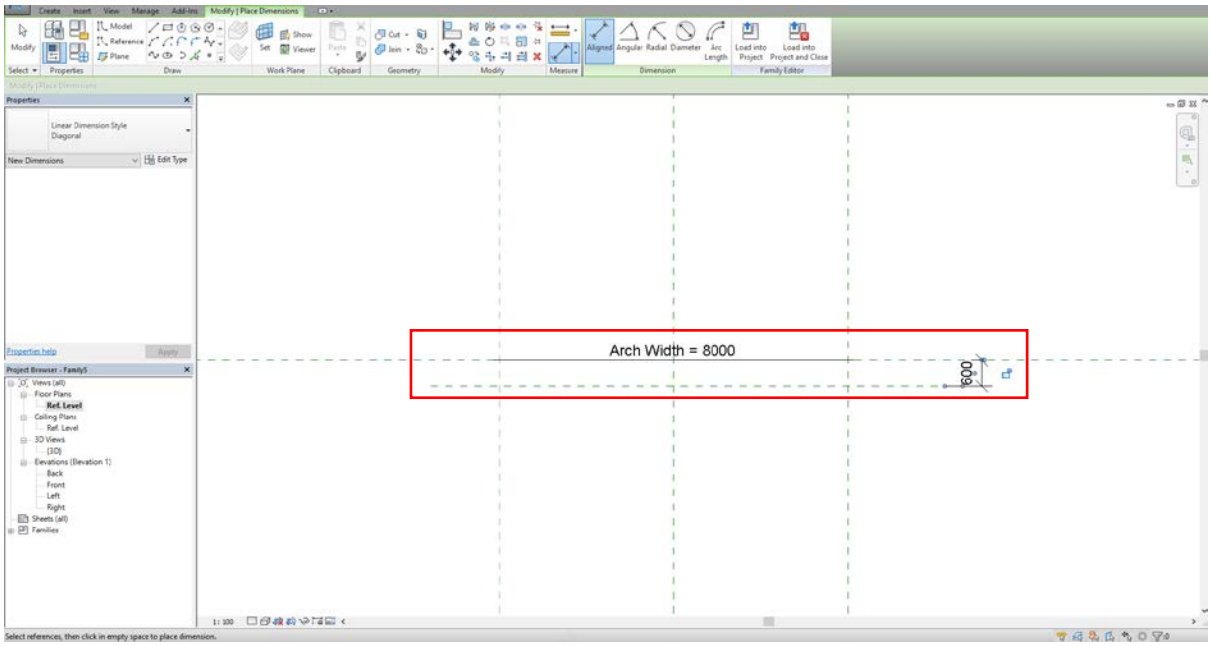


Assign parameter to dimensions.

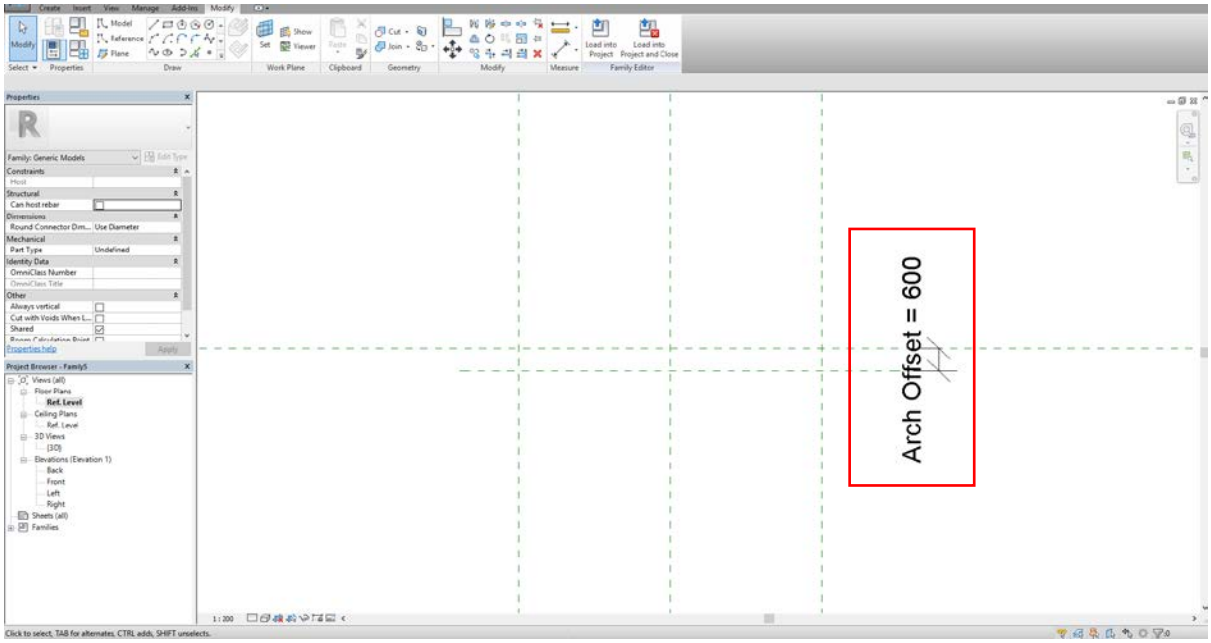


11.3 Locking down a curve

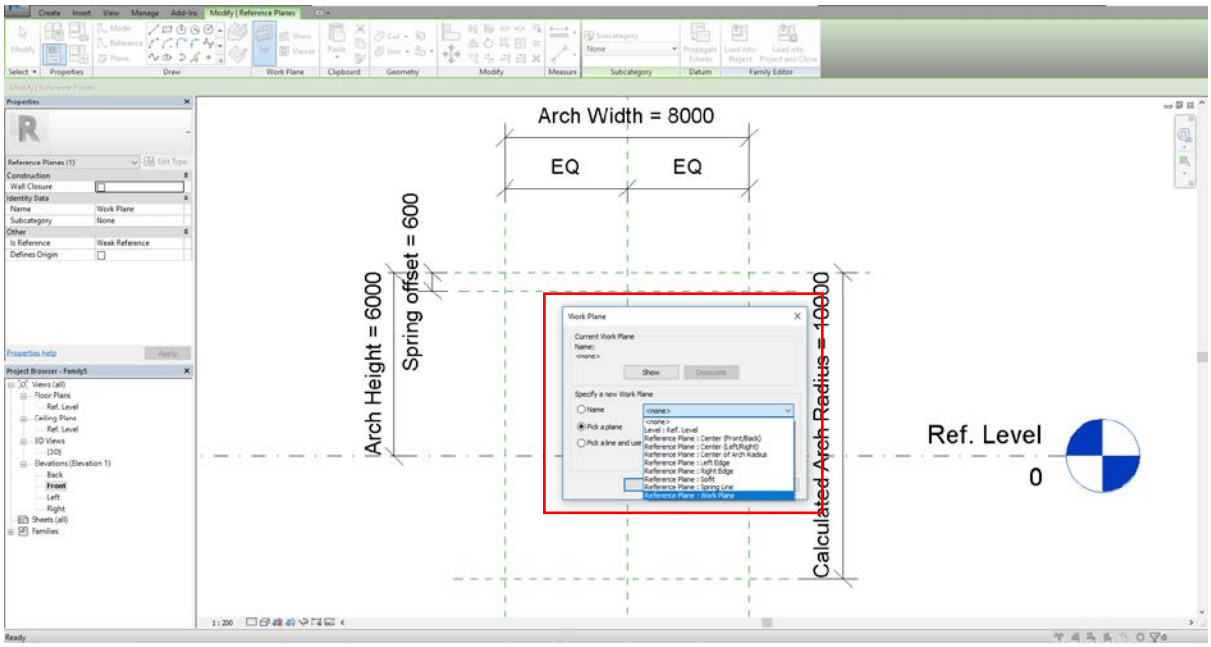
Go to plan view. Create a new reference plan then rename it as Work Plane.

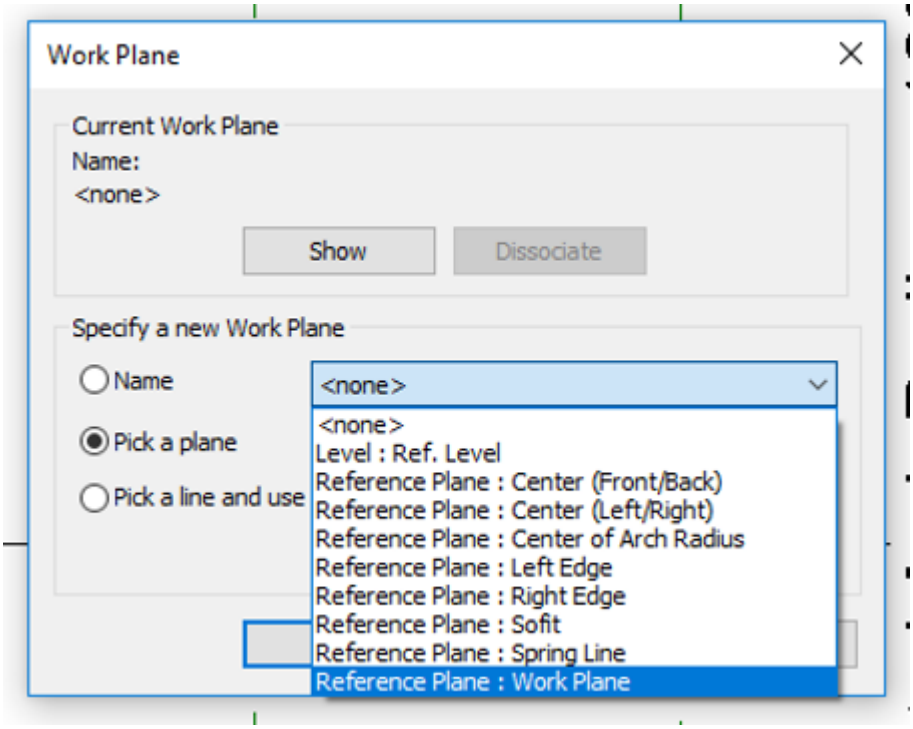


Assign parameter to the dimension.

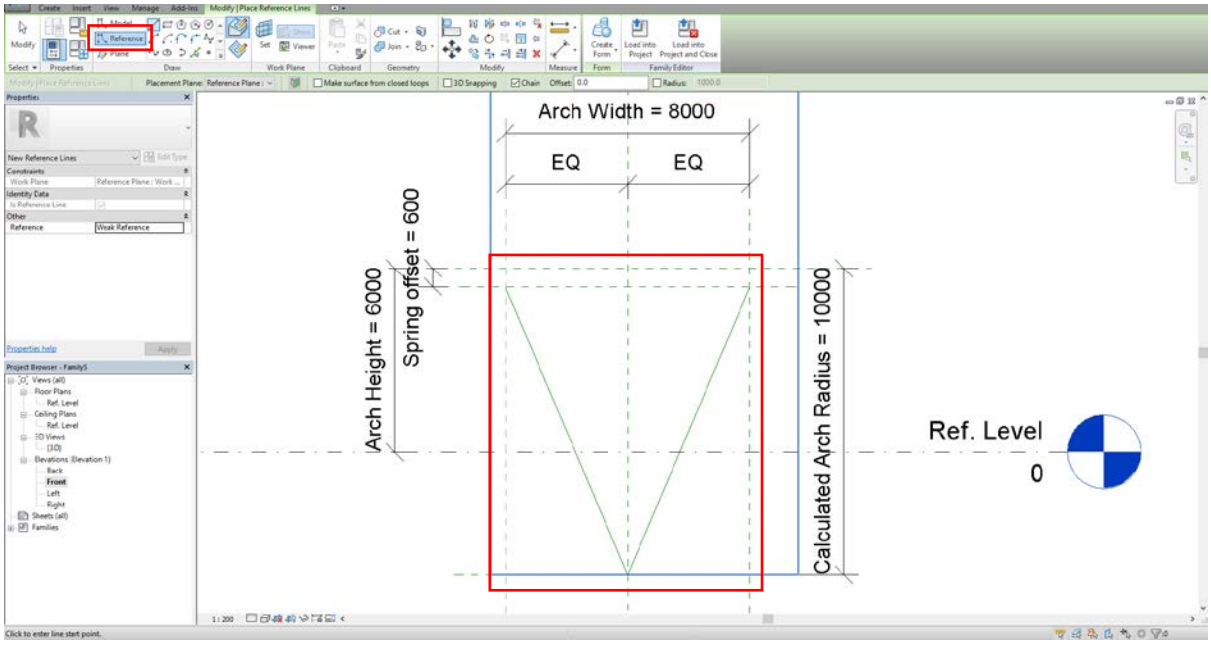


Go back to Front view. Set Work Plane active.

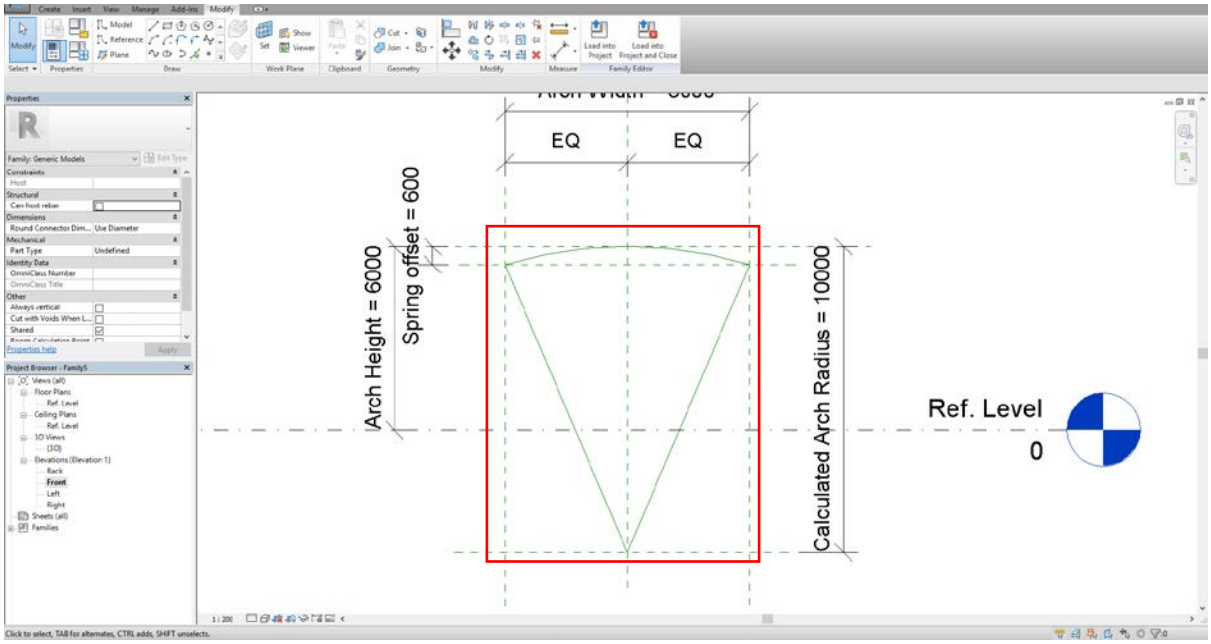




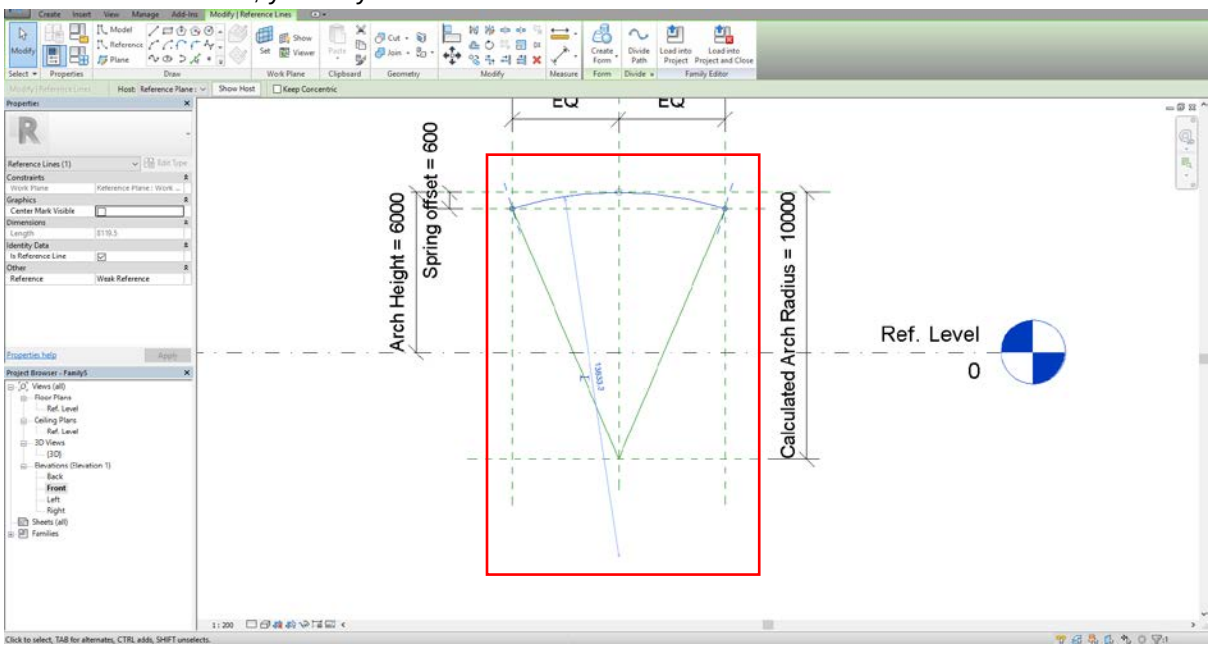
Hit on Reference, draw a **V** first.



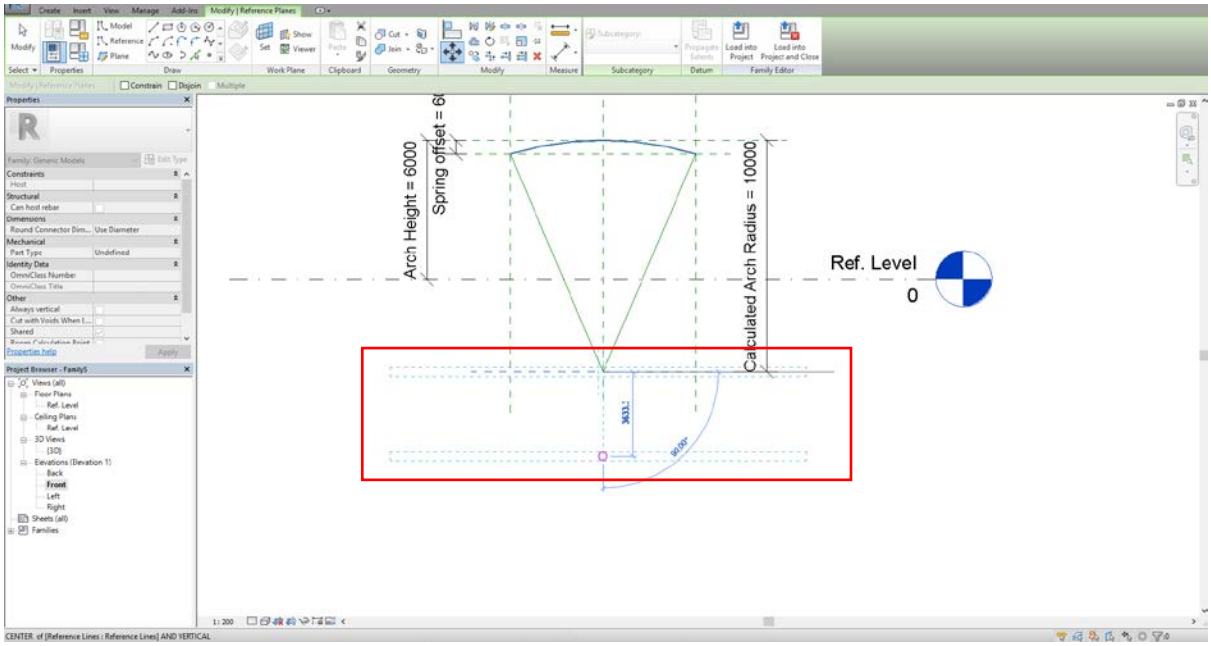
Sketch an arc at the top.



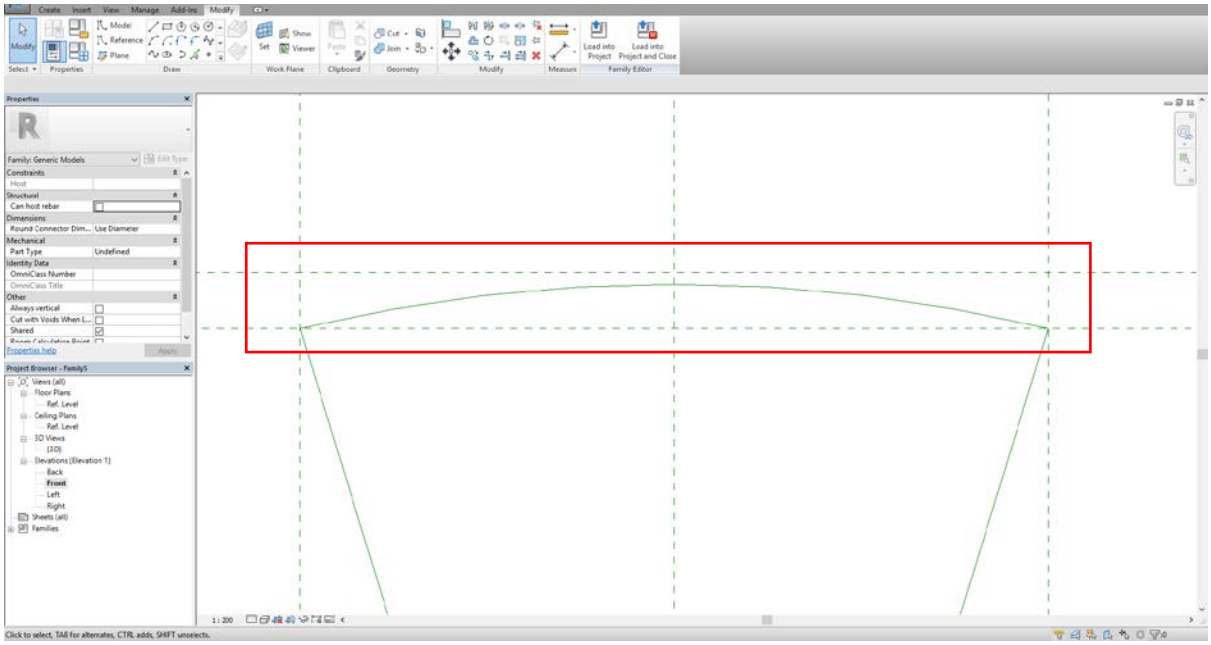
With the arc selected, you may notice the radius is at the bottom.

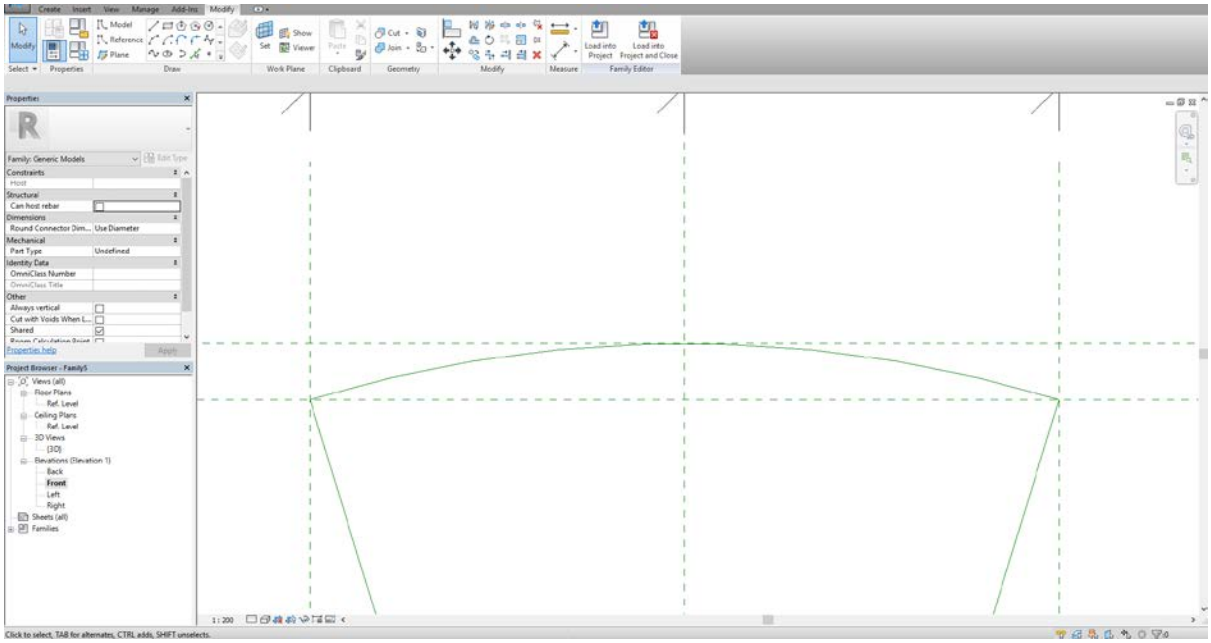


Move down the bottom plane to the center of arc.

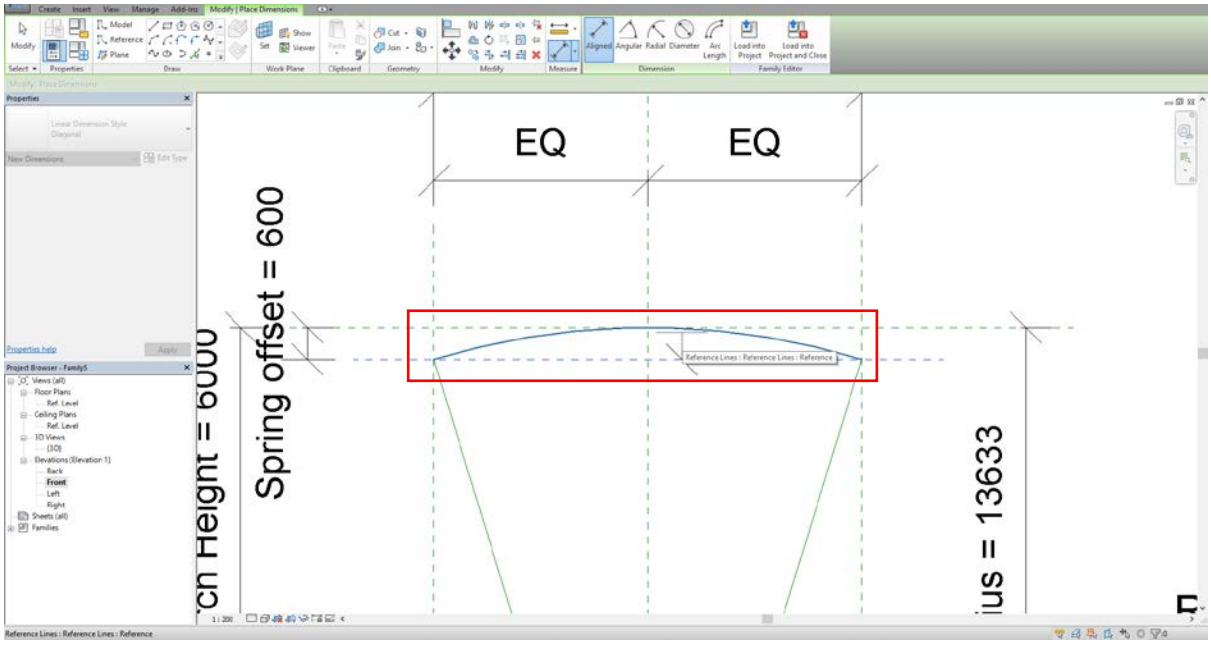


Be aware of subtle changes of the arc. Simple drag it back to correct position.

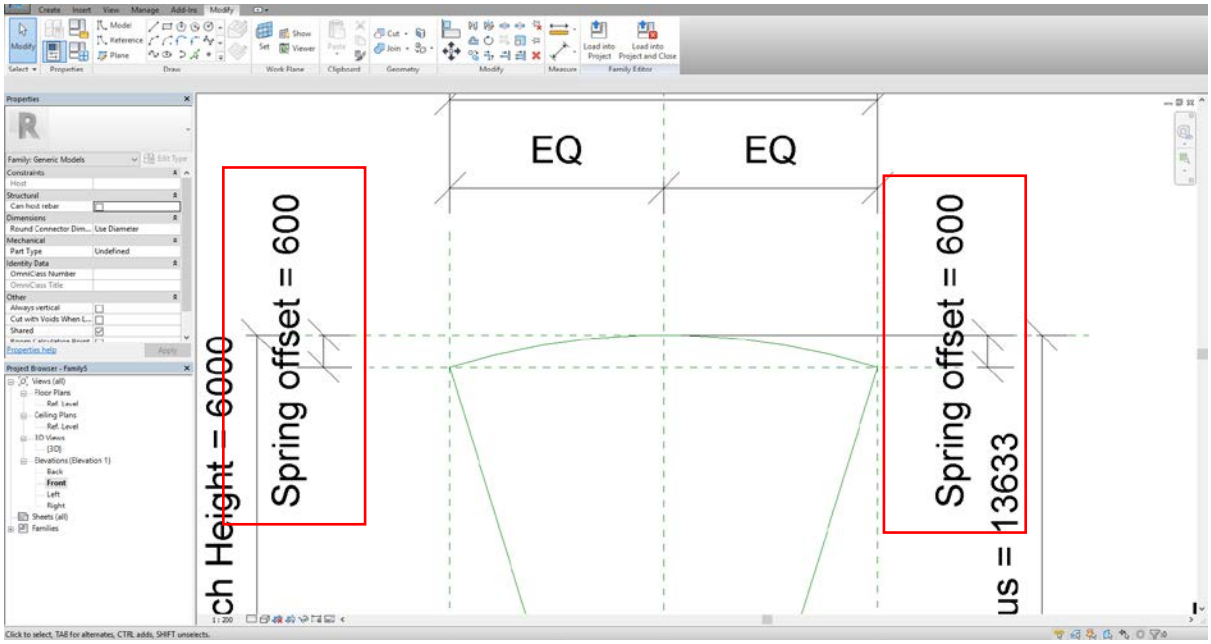




Add dimension between the reference plane and the arc. Assign it with parameter which serves as a constraint.

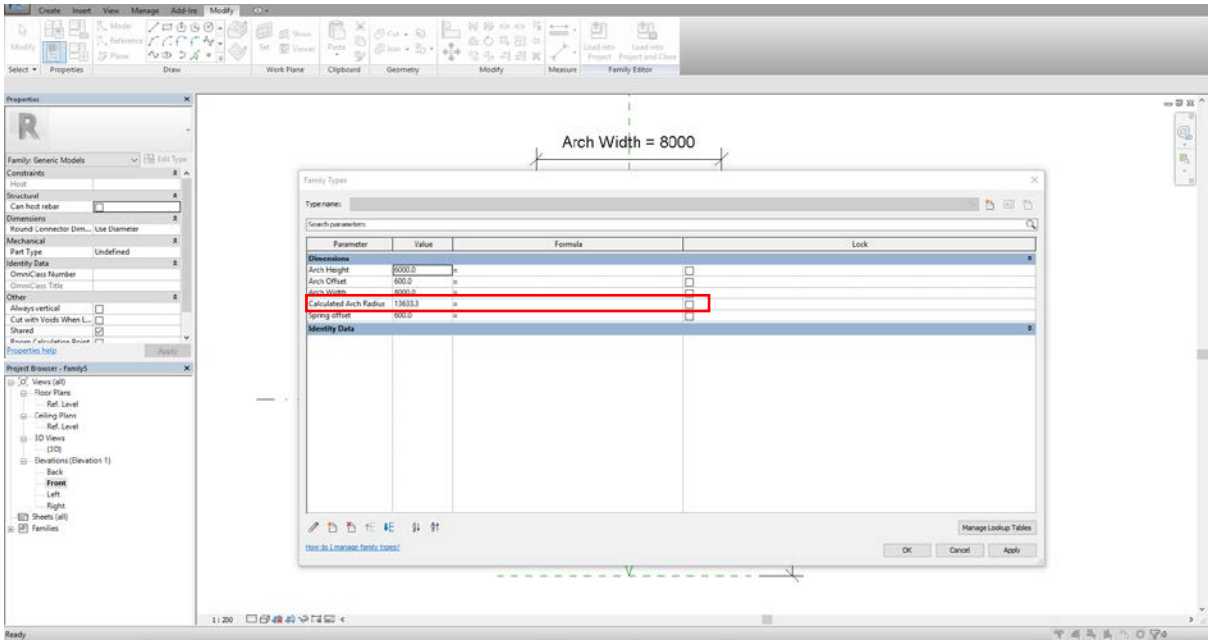


Spring offset on the left constrains the position of reference plan at the top. The one on the right constrains the position of arc.

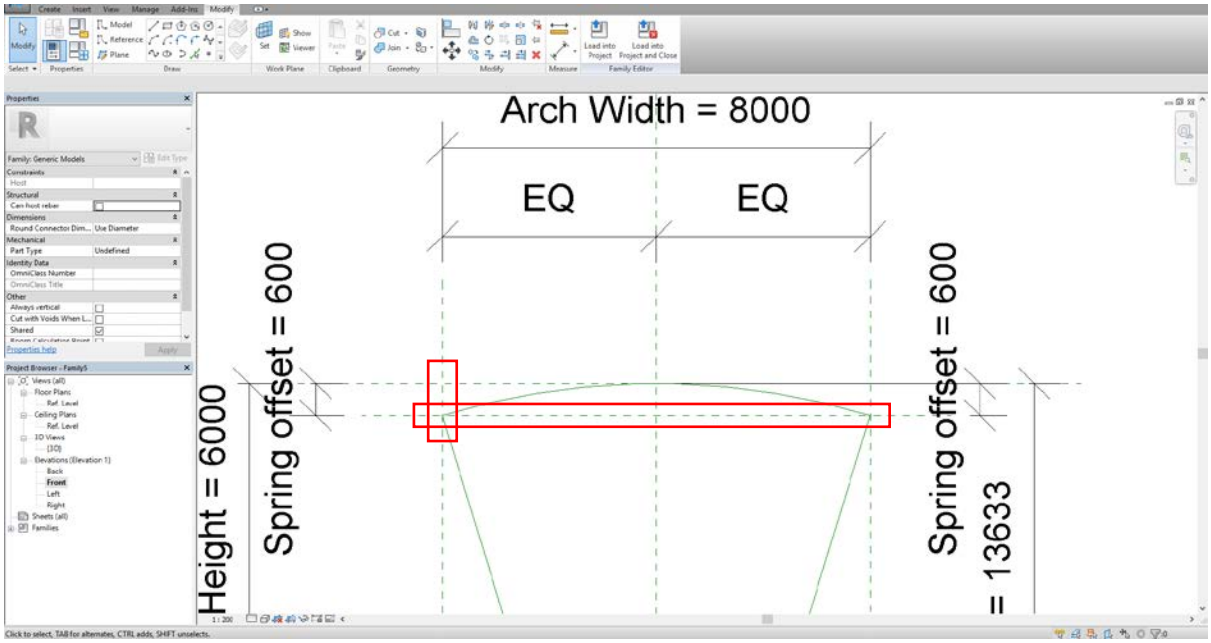


11.4 Working with advanced formulas

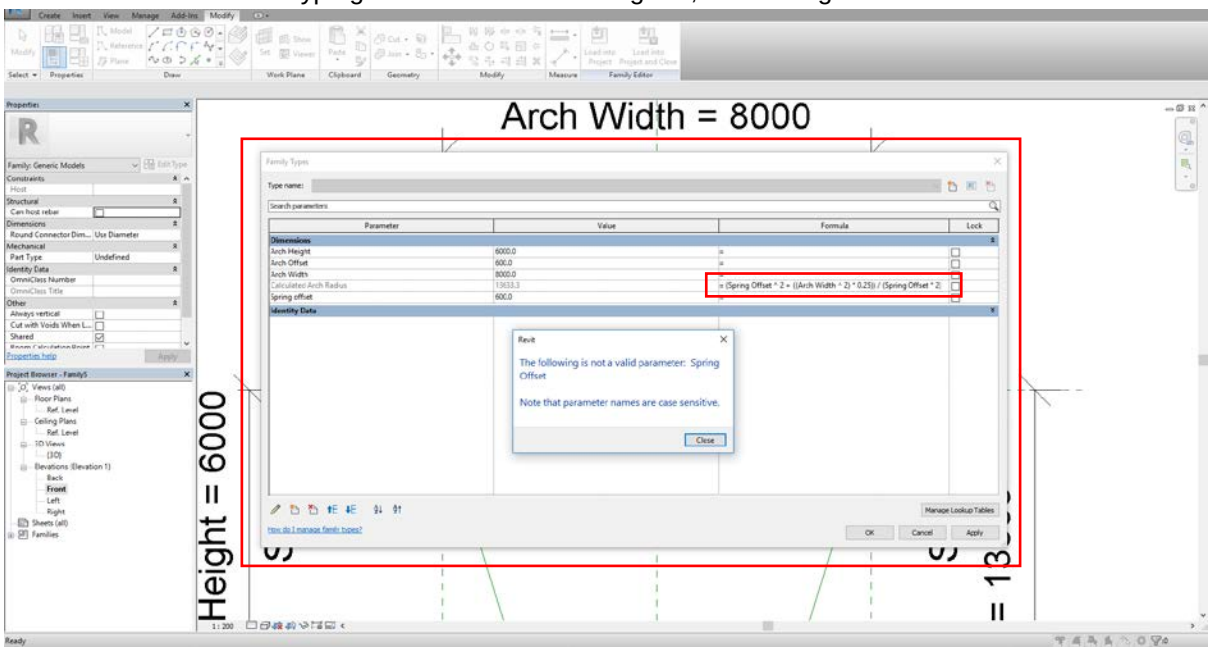
As its name implied, Calculated Arc Radius supposes to be calculated via formula.



Base on Arch Width and Spring Offset, we'll be able to calculate Arc Radius.



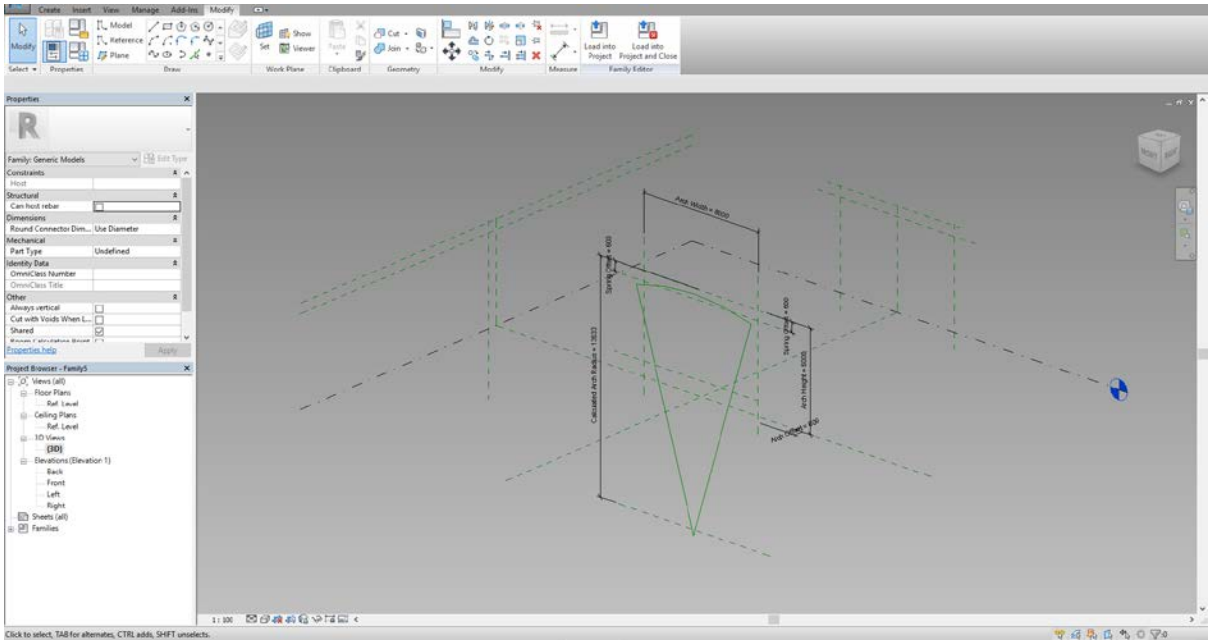
Notice once we finished typing in Formula and clicking OK, Revit will give us an error.



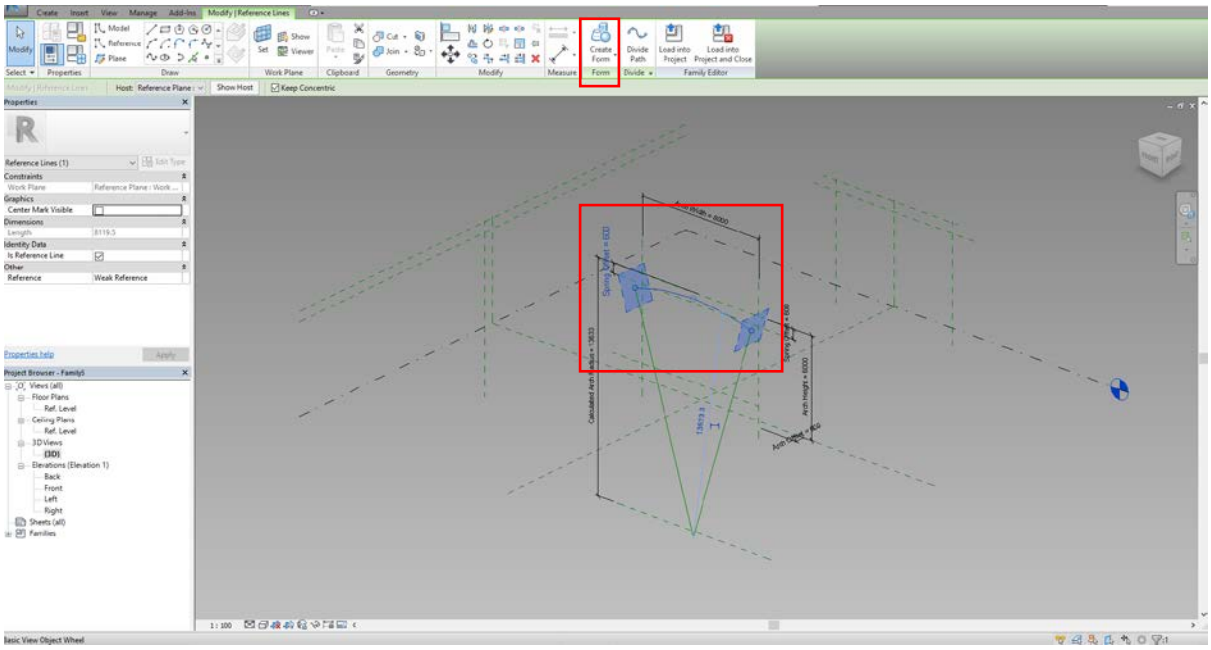
Intentionally, instead of following the same format when naming parameters, Spring **offset** is used rather than Spring **Offset**. So, if you accidentally run into this error means you probably typed Offset in the formula which is strictly case-sensitive. Either change parameter's name or editing your formula will solve the problem. Still, it's very important to remember that **formula is case-sensitive**.

11.5 Creating a divided surface and completing the arch

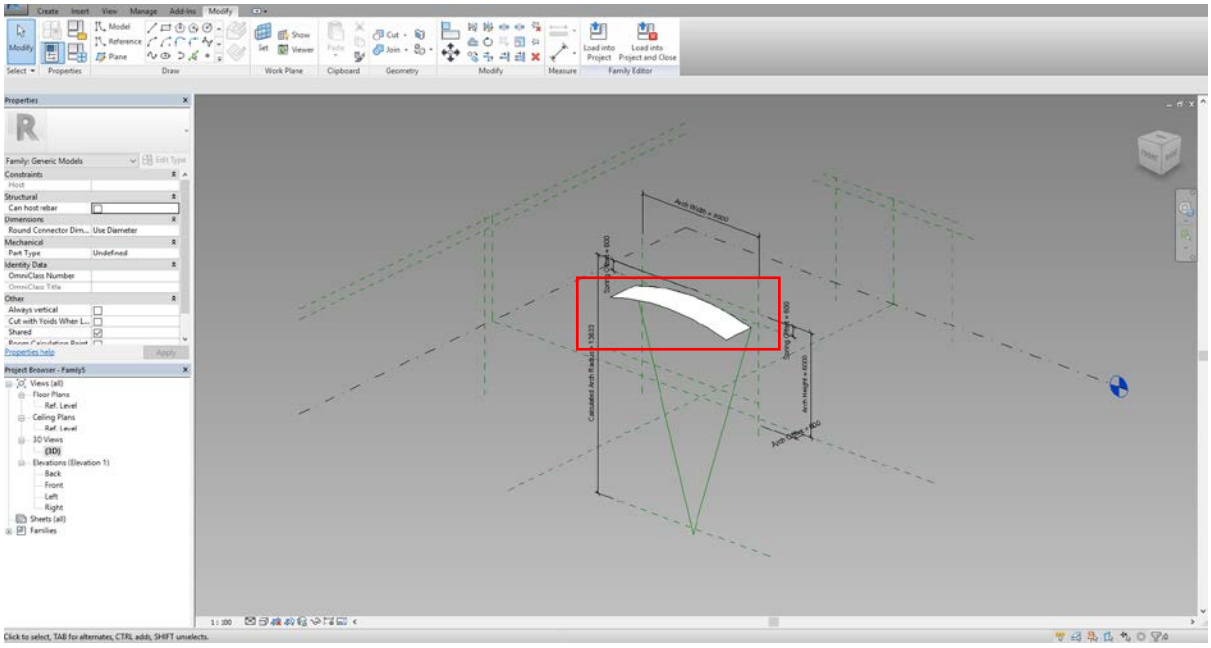
In 3D view, simply clicking on a reference plan will set it active. It's another major difference between Massing environment and that of regular Family editor.



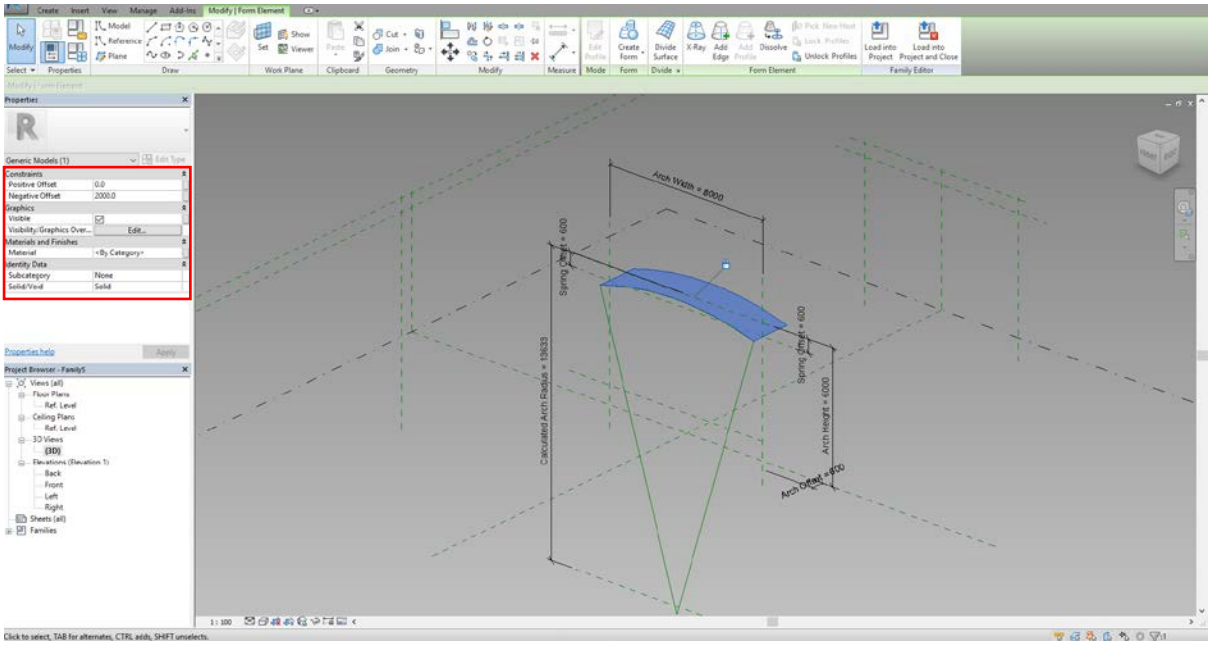
With the curve selected, Create Form.



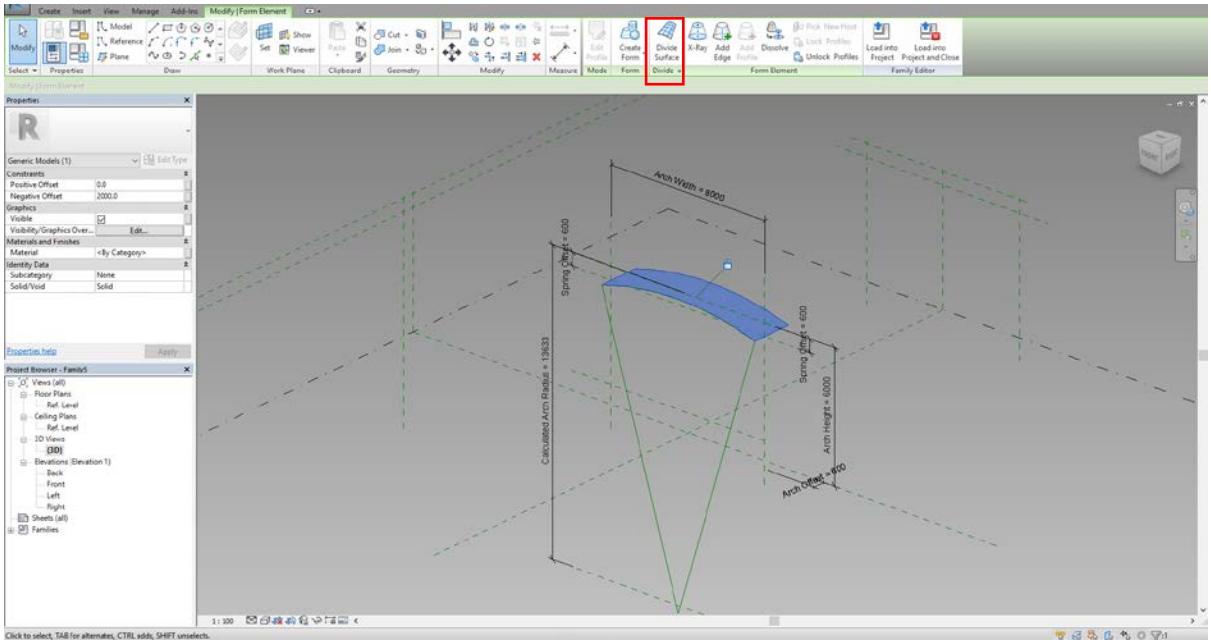
Notice it creates a thin curved plane for us.

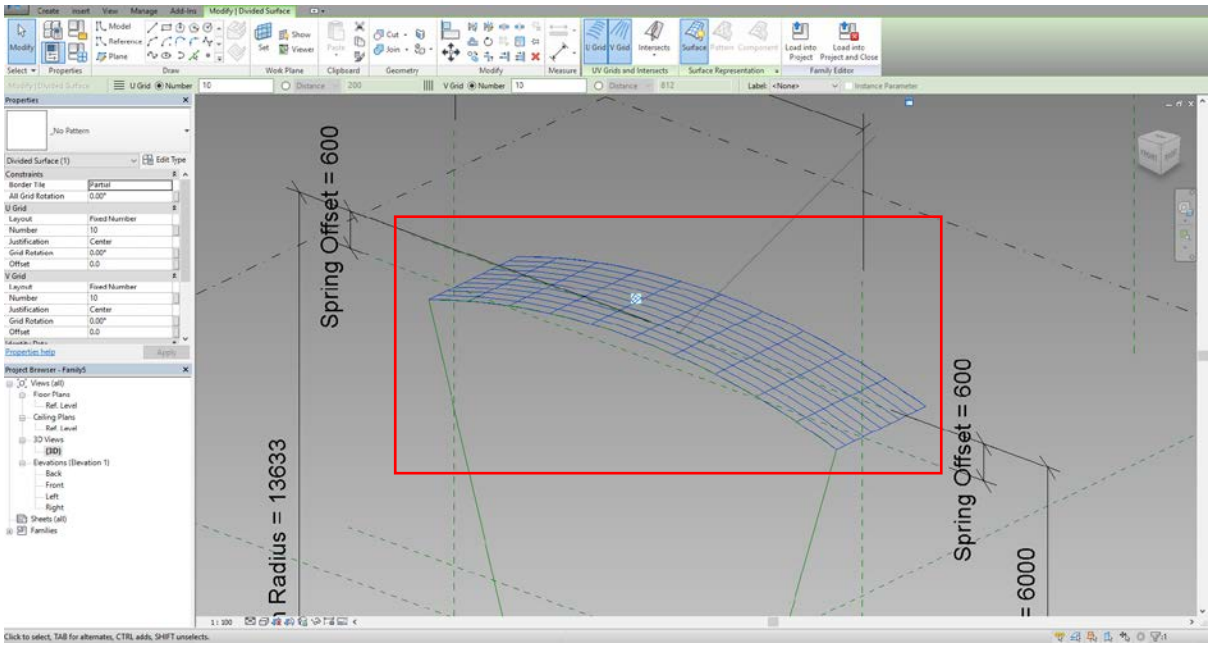


Adjust its properties as you need.

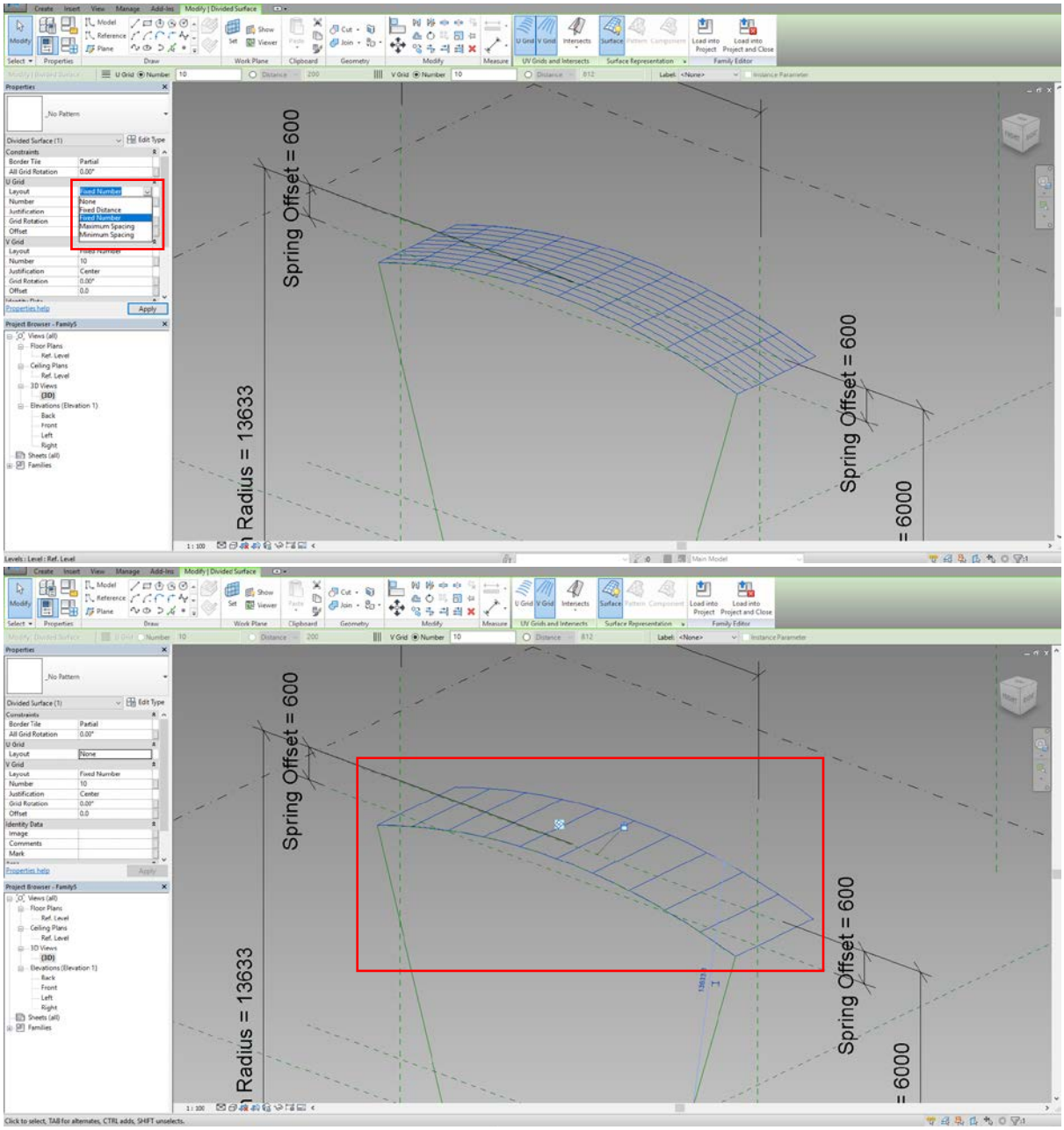


Divide the surface.



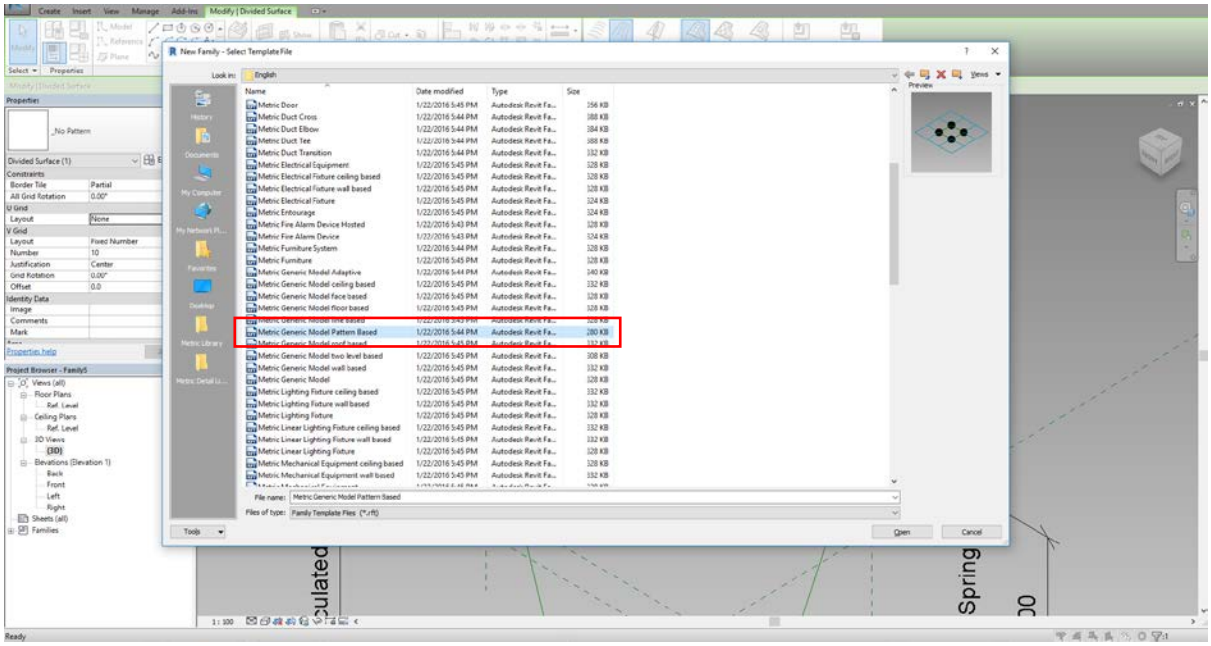


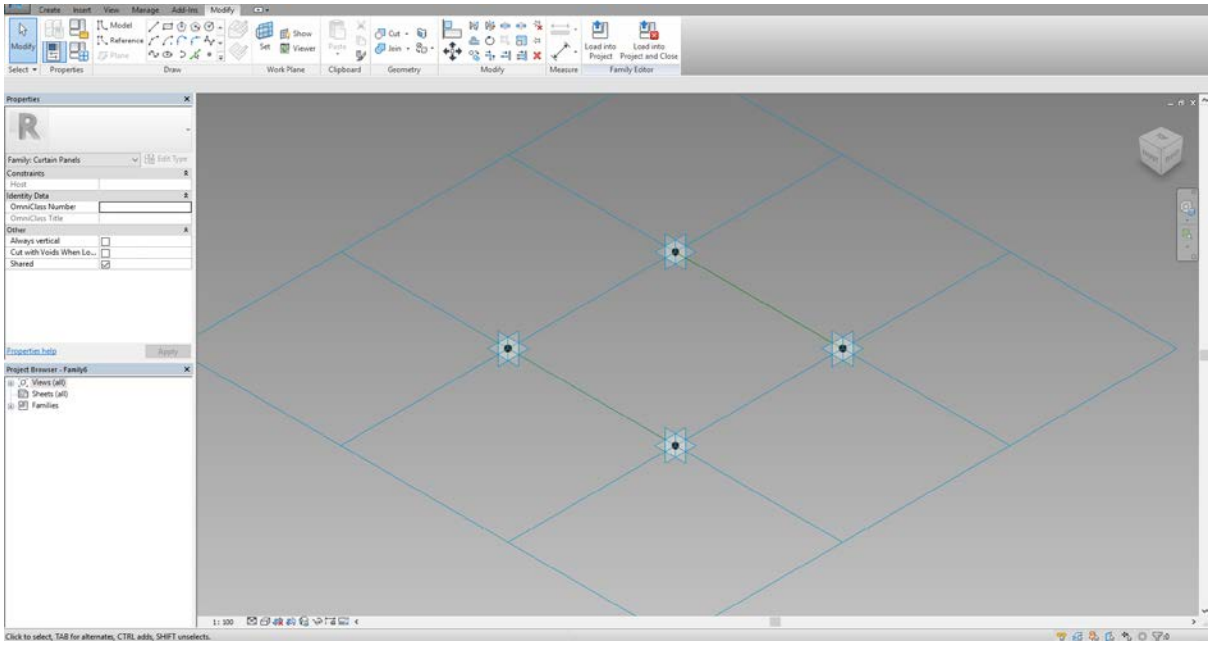
We don’t need dense grids. Reduce its quantity in Properties panel. Click on None.



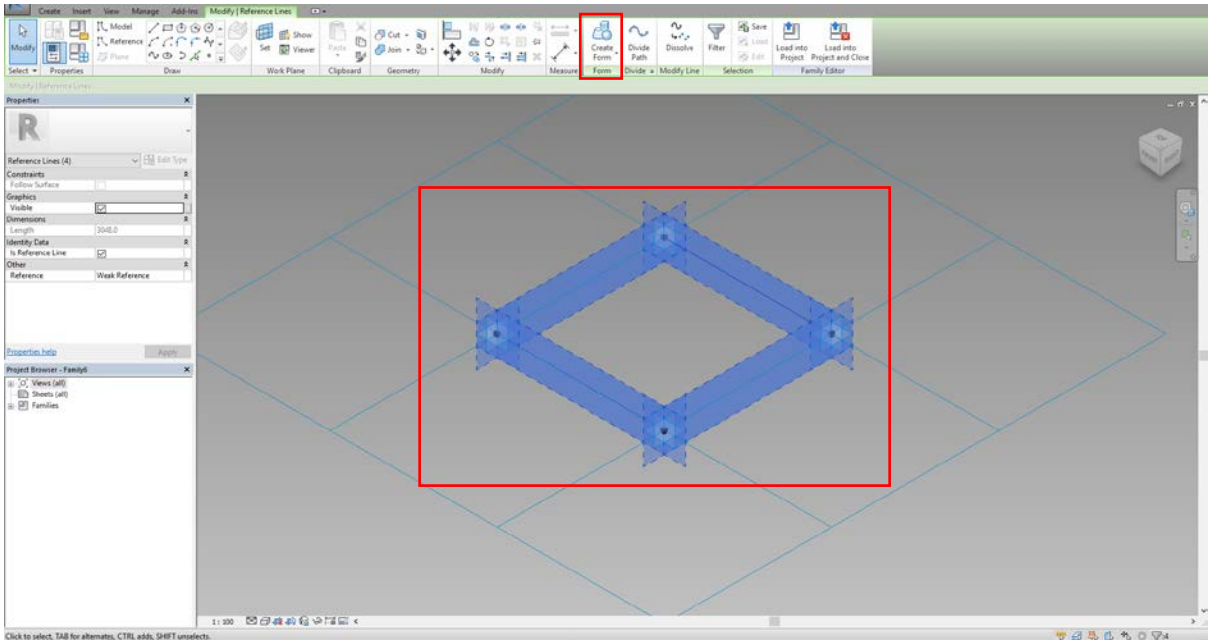
11.6 Finalizing the arc

Create the brick family to fill in curved surface. Open Generic Model Patten Based template.

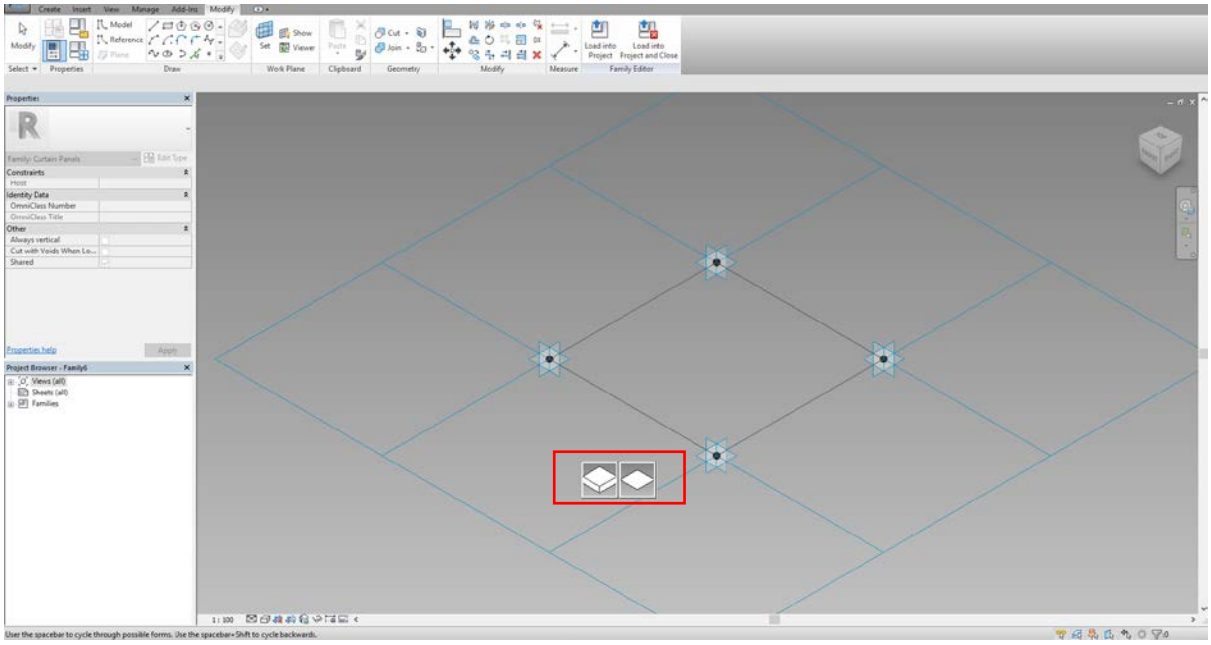




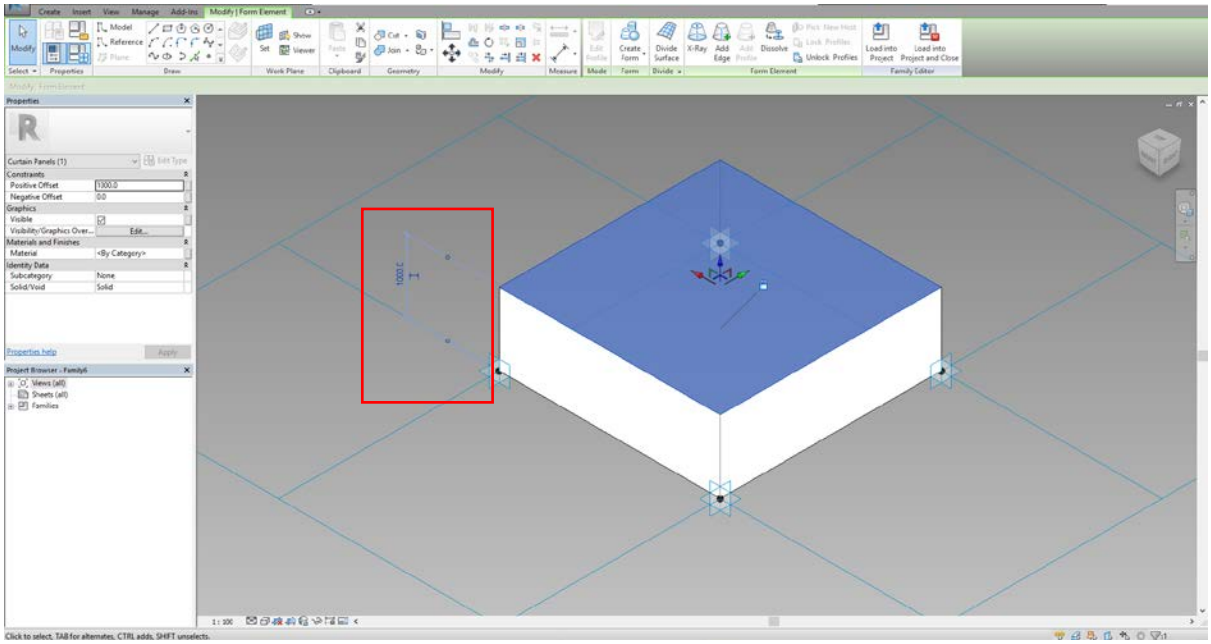
With this chain of reference lines selected, Create Form.



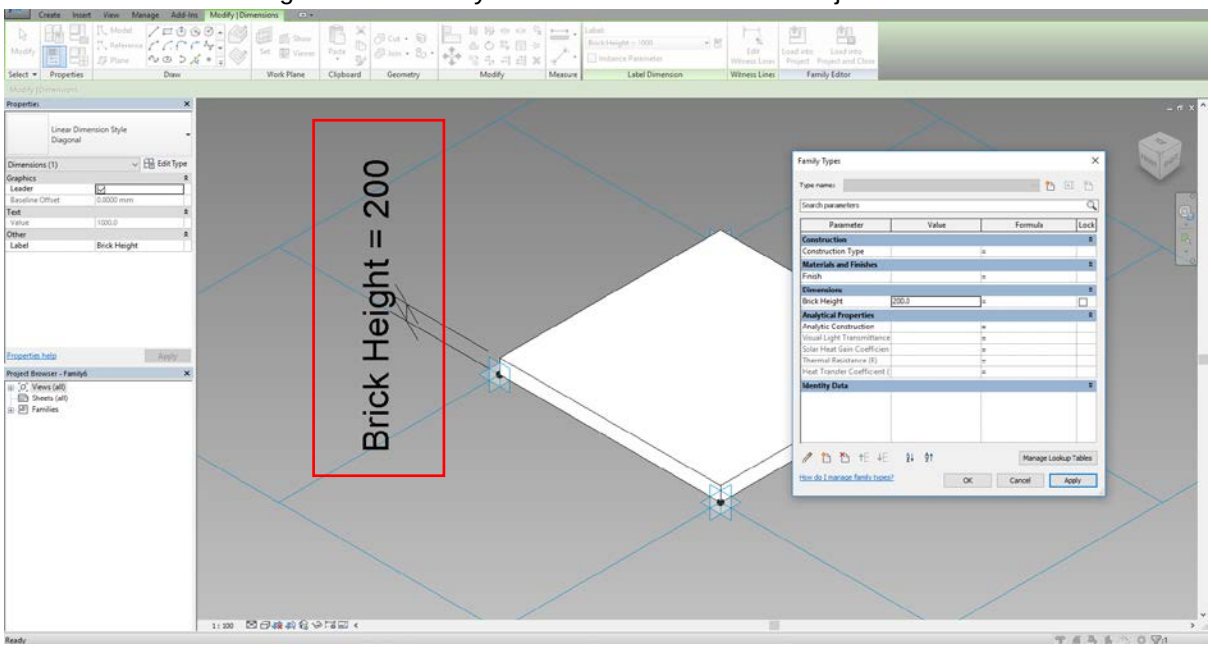
Revit will tell us possible geometry that can be constructed. We need a box rather than a surface. Simply click on the left one.



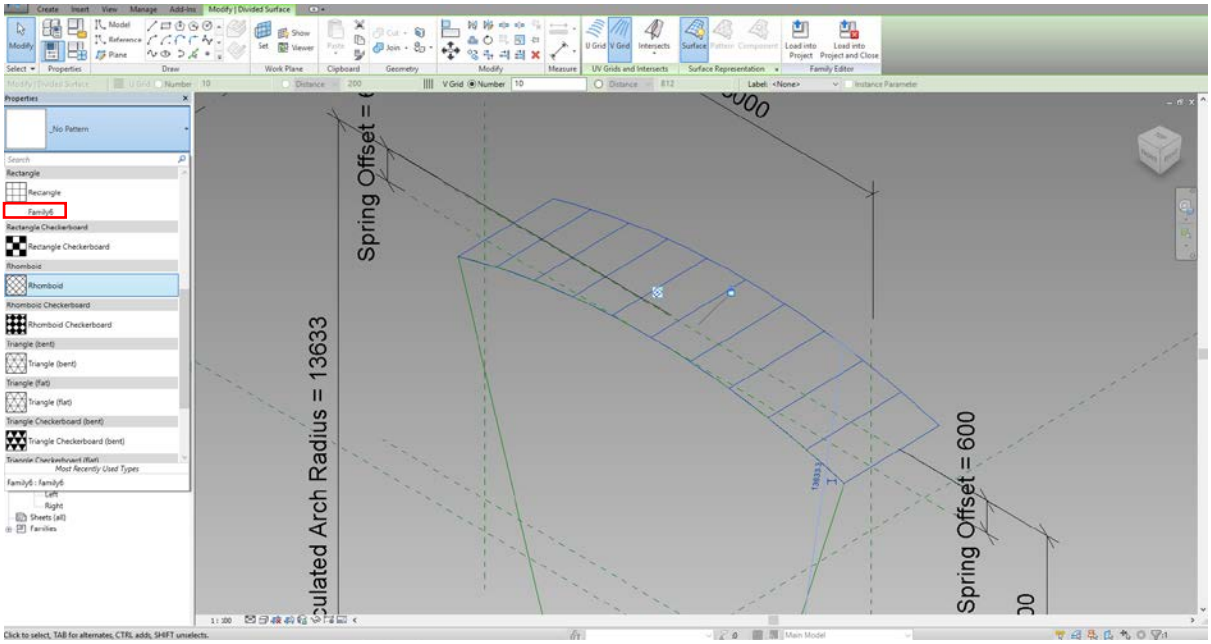
Make the dimension permanent and assign a parameter to it.



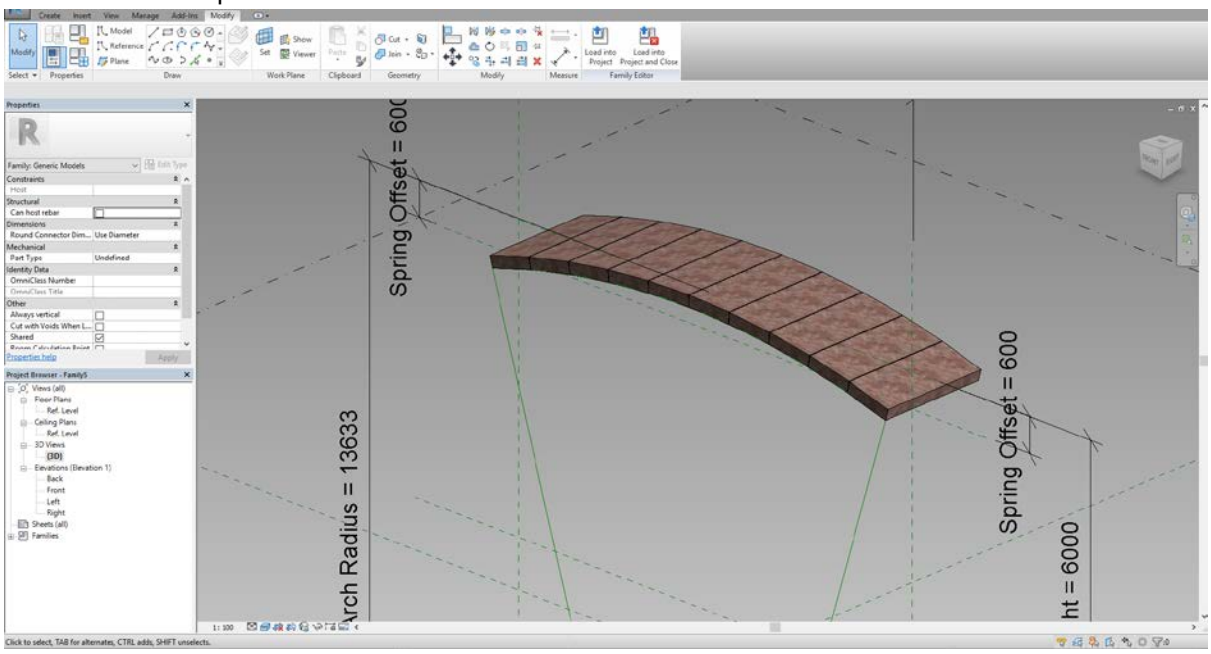
Flex it to 200mm. Change its material if you want to then Load into Project.



With the curved surface selected, find the brick we just created.



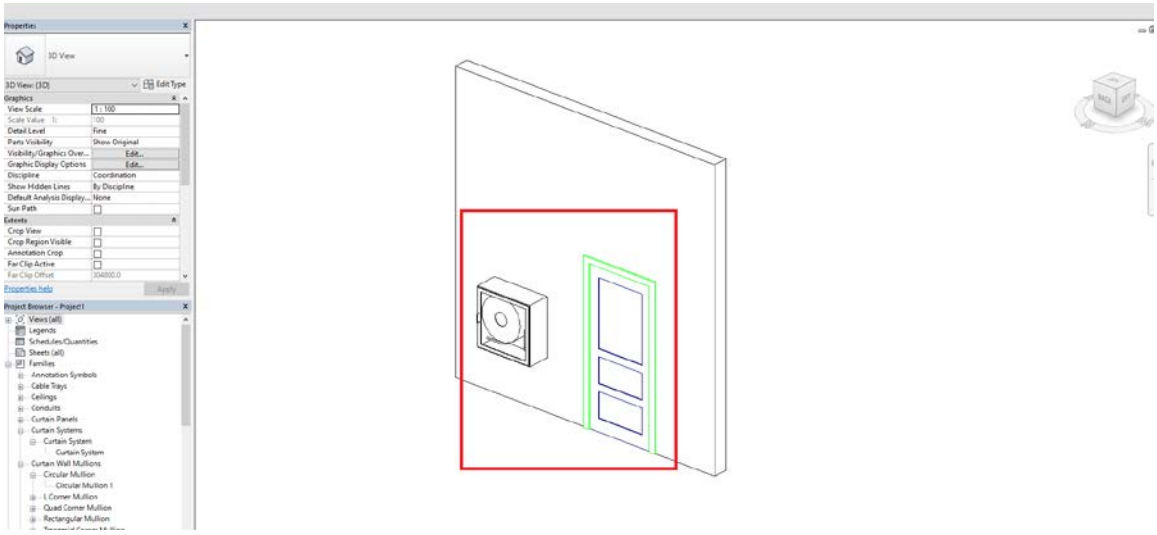
Now we have our parametric arc.



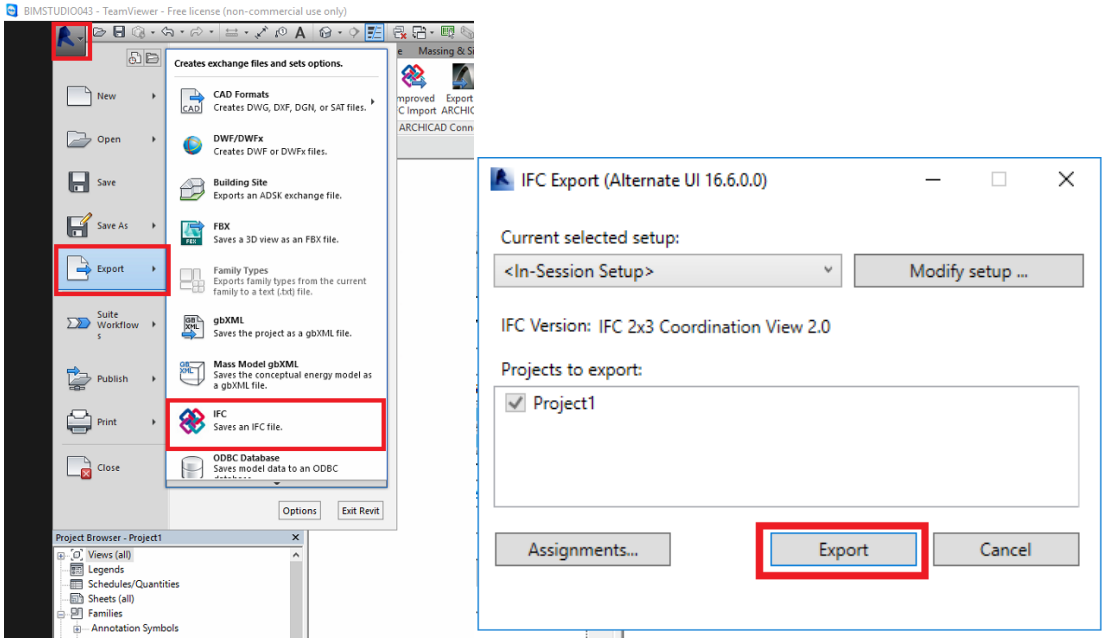
12. BIM Objects Converting from Revit to Other Platforms

12.1 From Autodesk Revit Family to GRAPHISOFT ARCHICAD

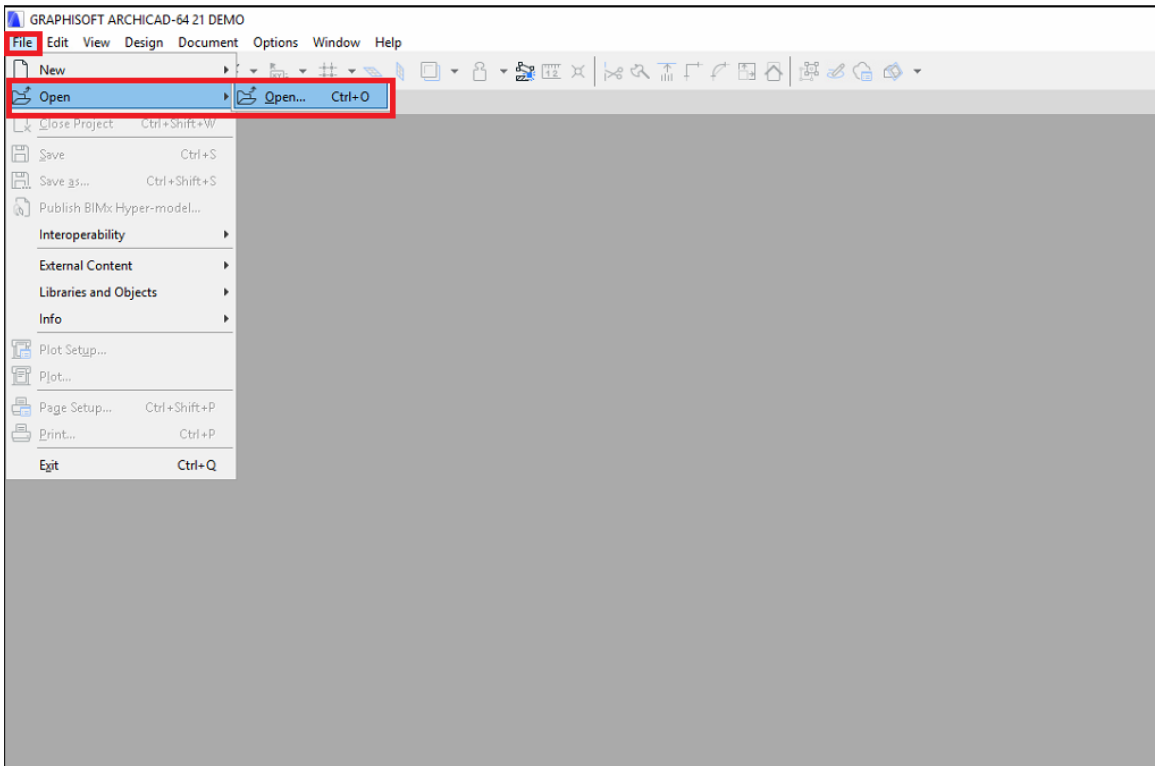
Open a new Revit project and load the family(s) into project.



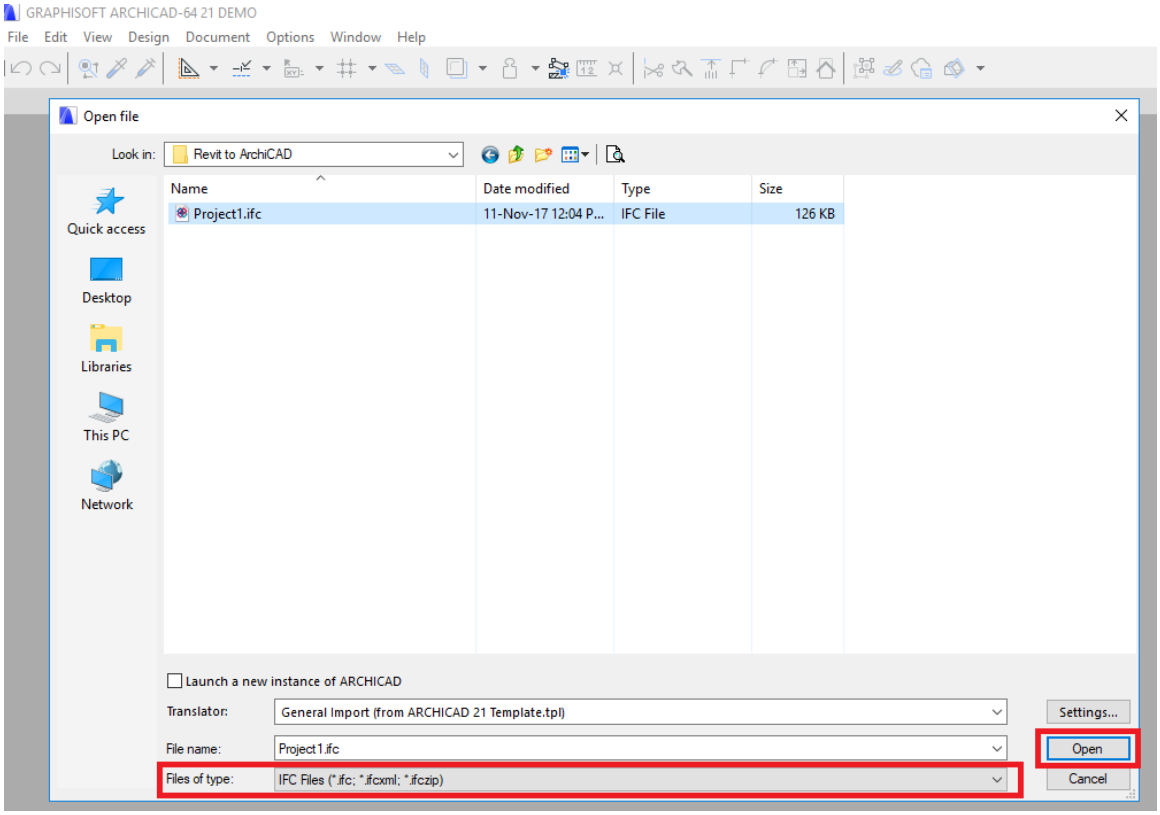
Export Revit project to IFC format.



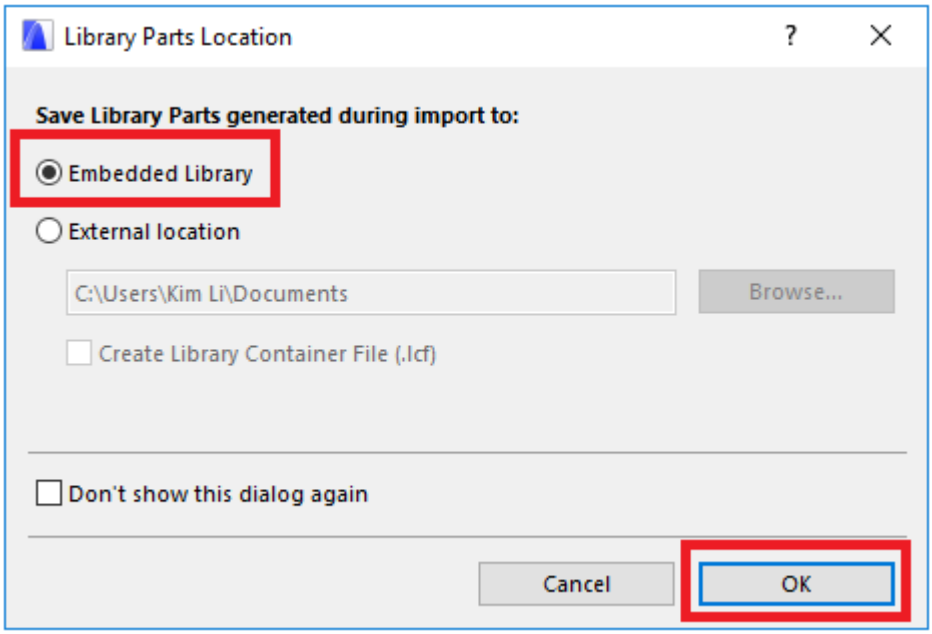
Open ARCHICAD, open a new project.



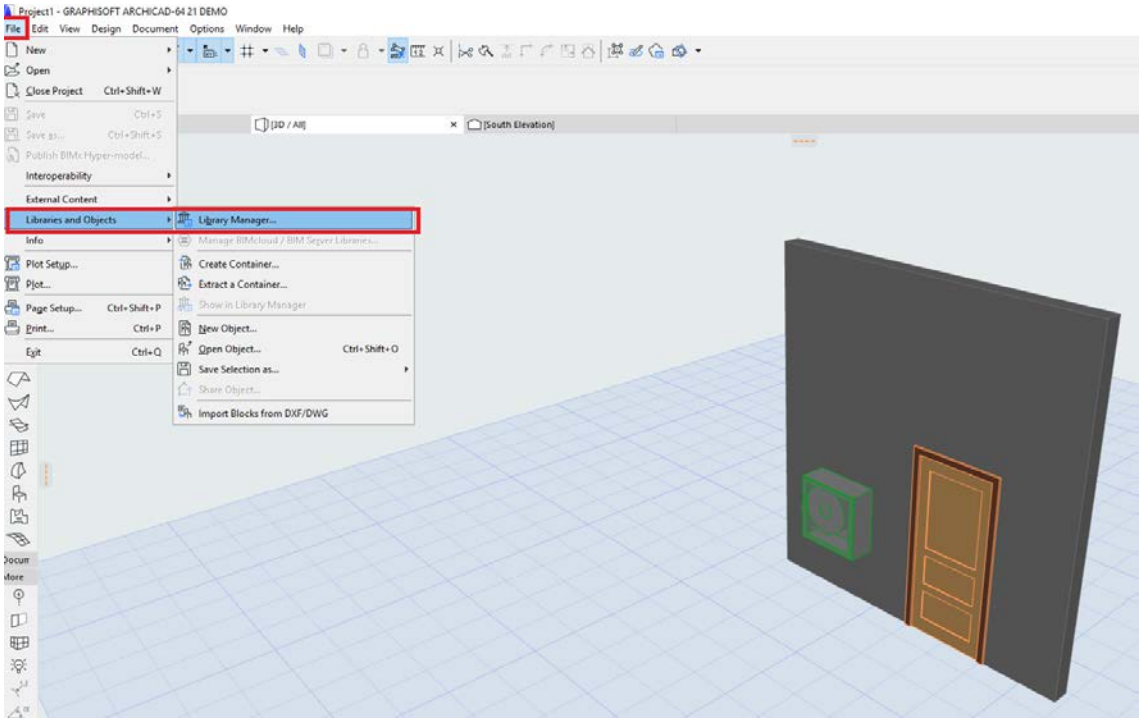
Open the IFC file which export from Revit Project.



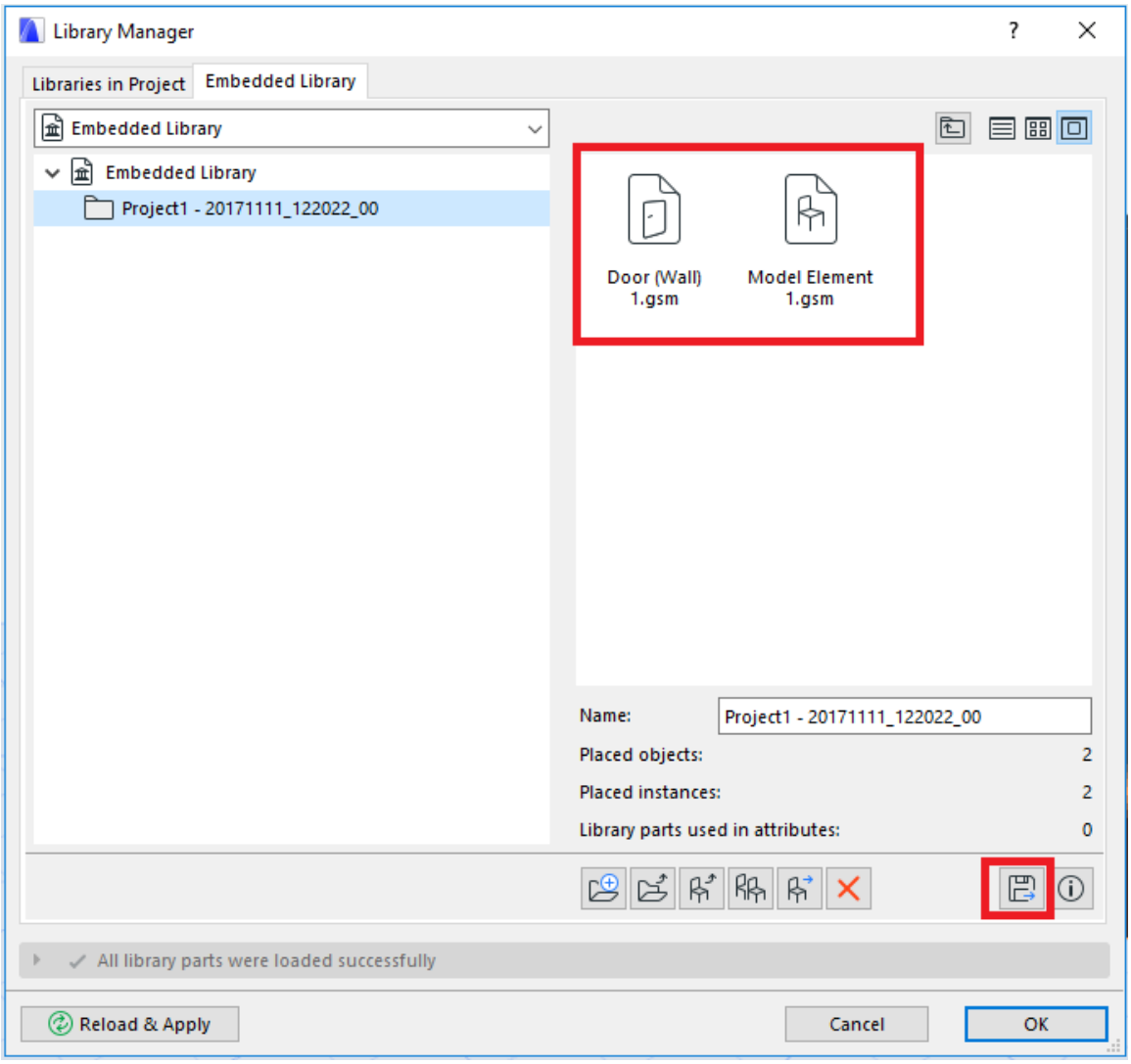
Select Embedded Library.



Open Library Manager.

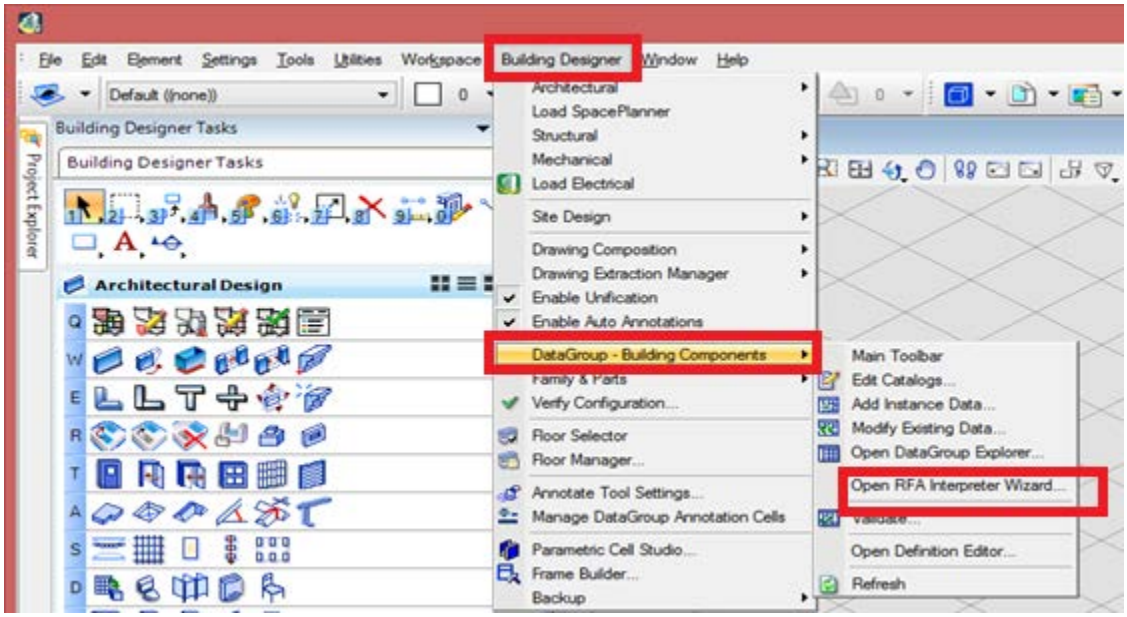


Revit Family(s) is converted into ARCHICAD object. Modify their name, parameter and save as a local library part file or linked library when necessary.

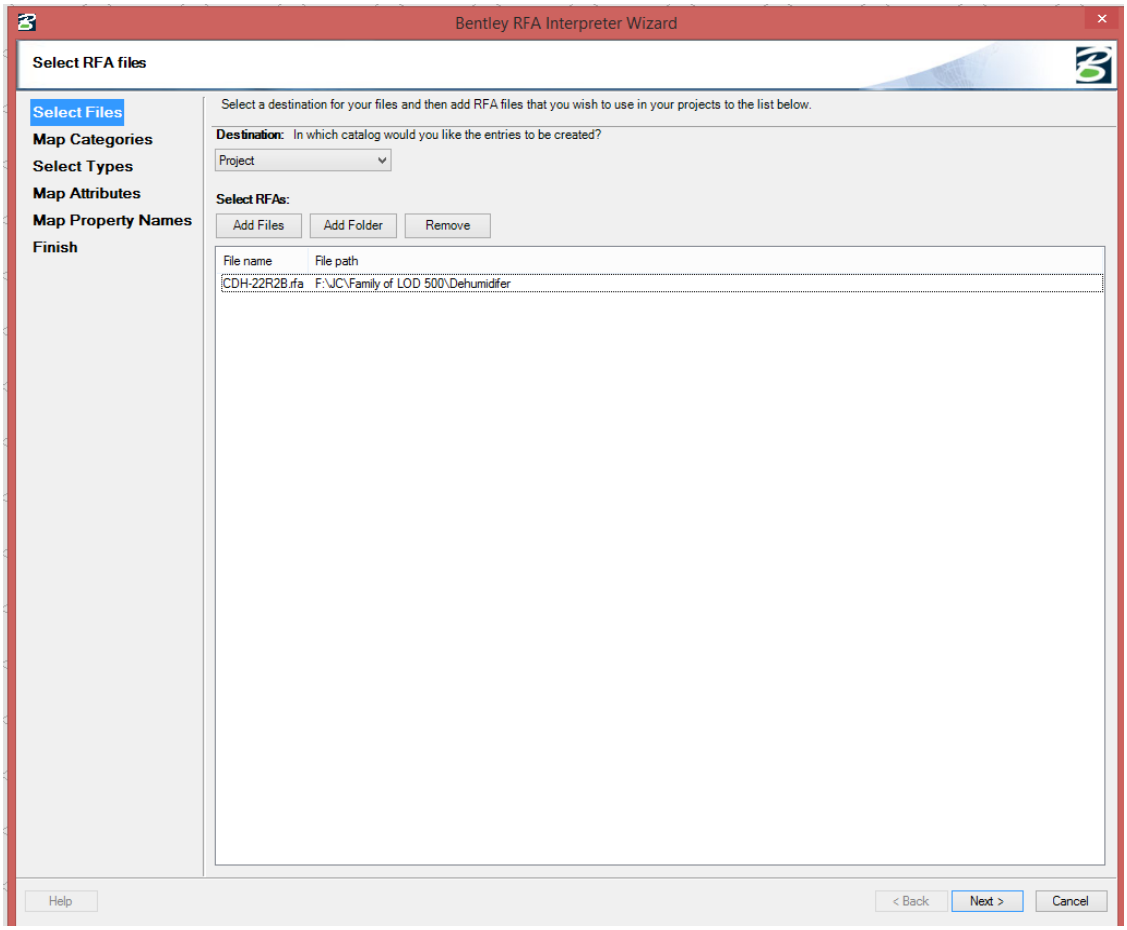


12.2 From Autodesk Revit Family to Bentley AECOsim

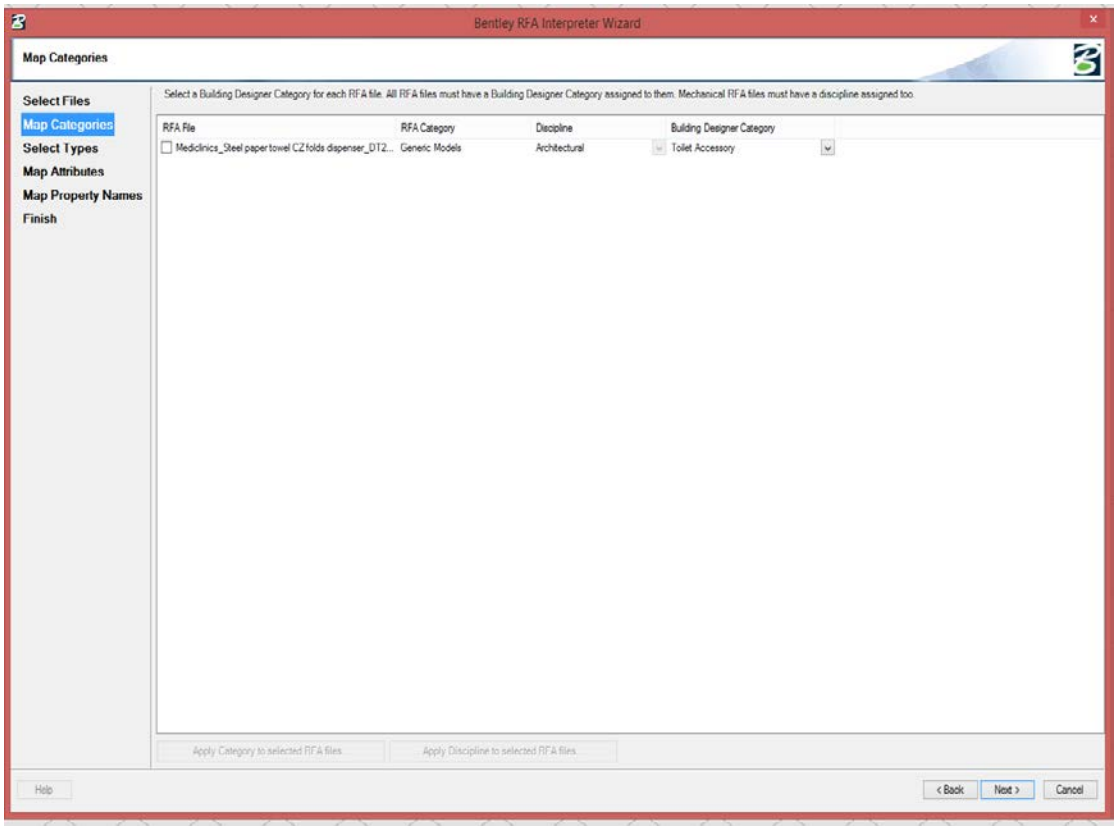
Open AECOsim, open a new project. Open RFA Interpreter Wizard.



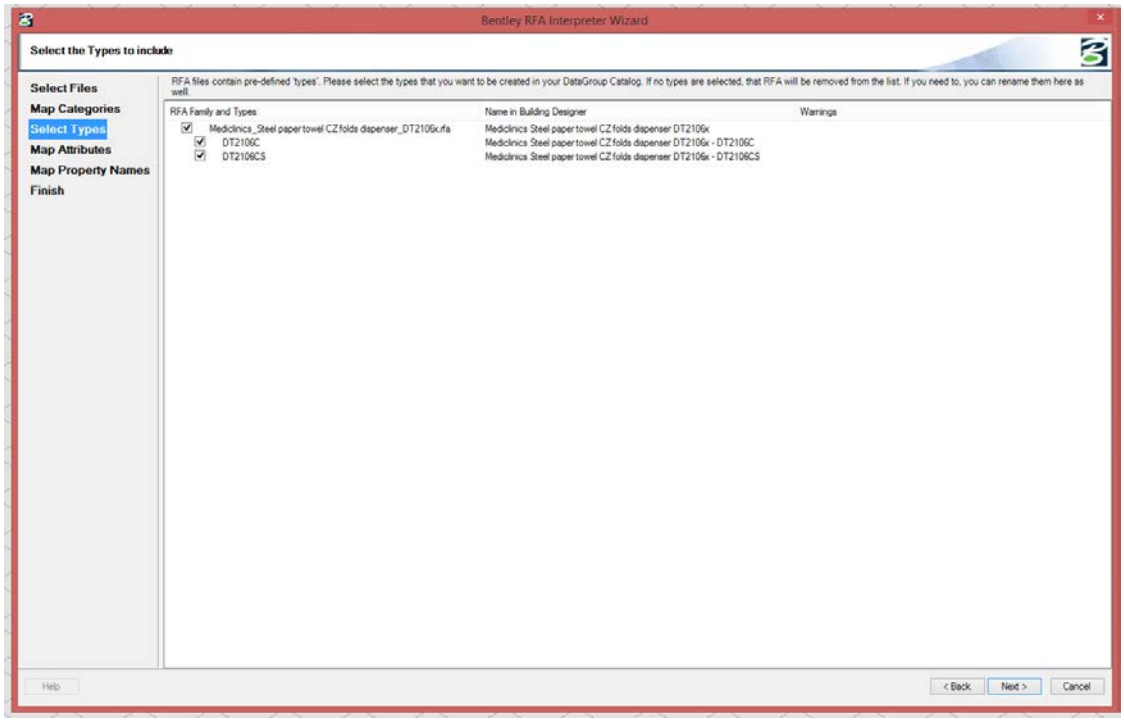
Select Revit Family File(s) (.rfa format).



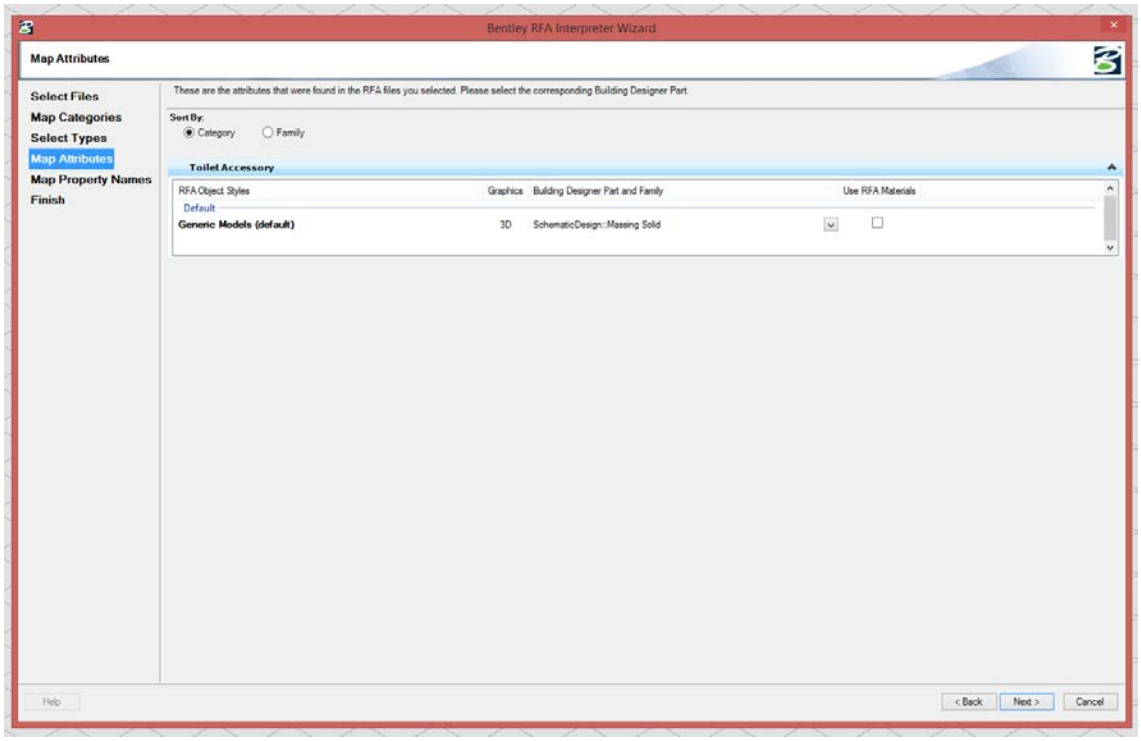
Mapping BIM Object categories, select suitable category for each Revit family.



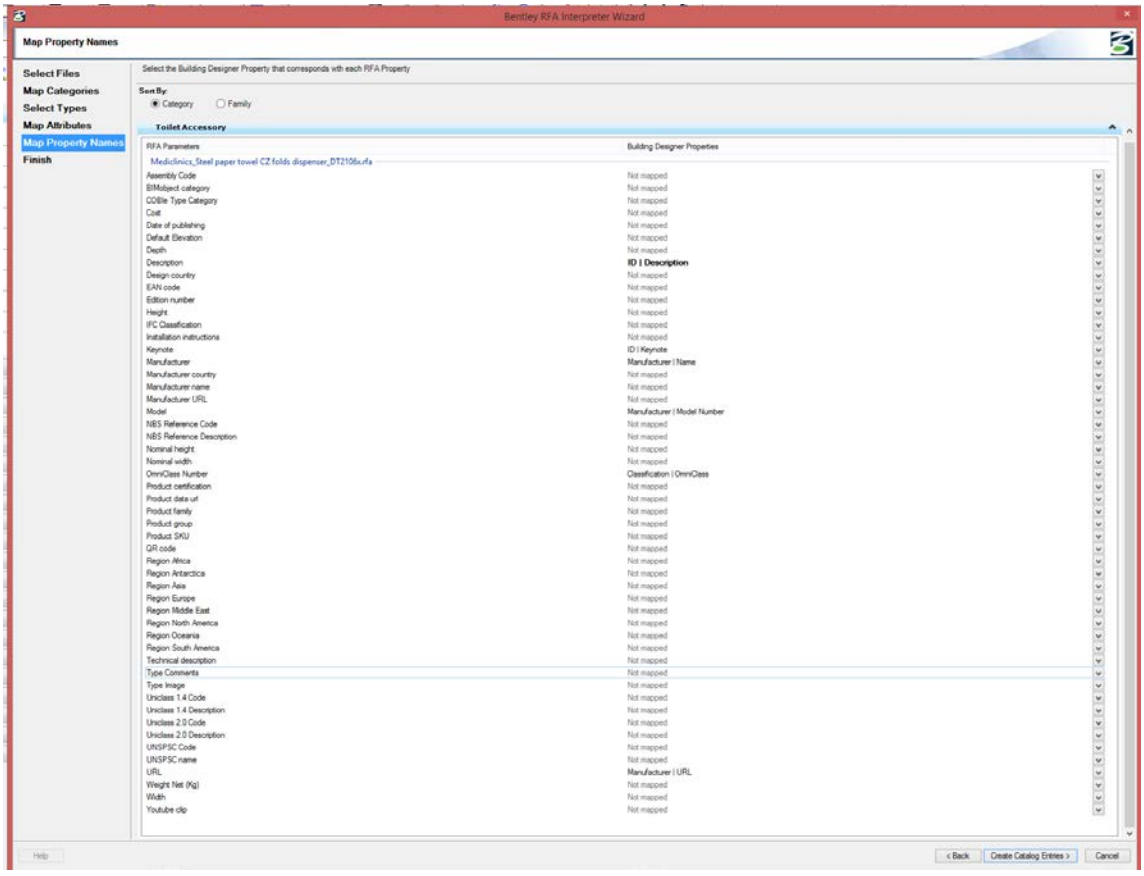
Select require Revit Family type(s). Only selected type(s) will be convers into AECOsim platform.



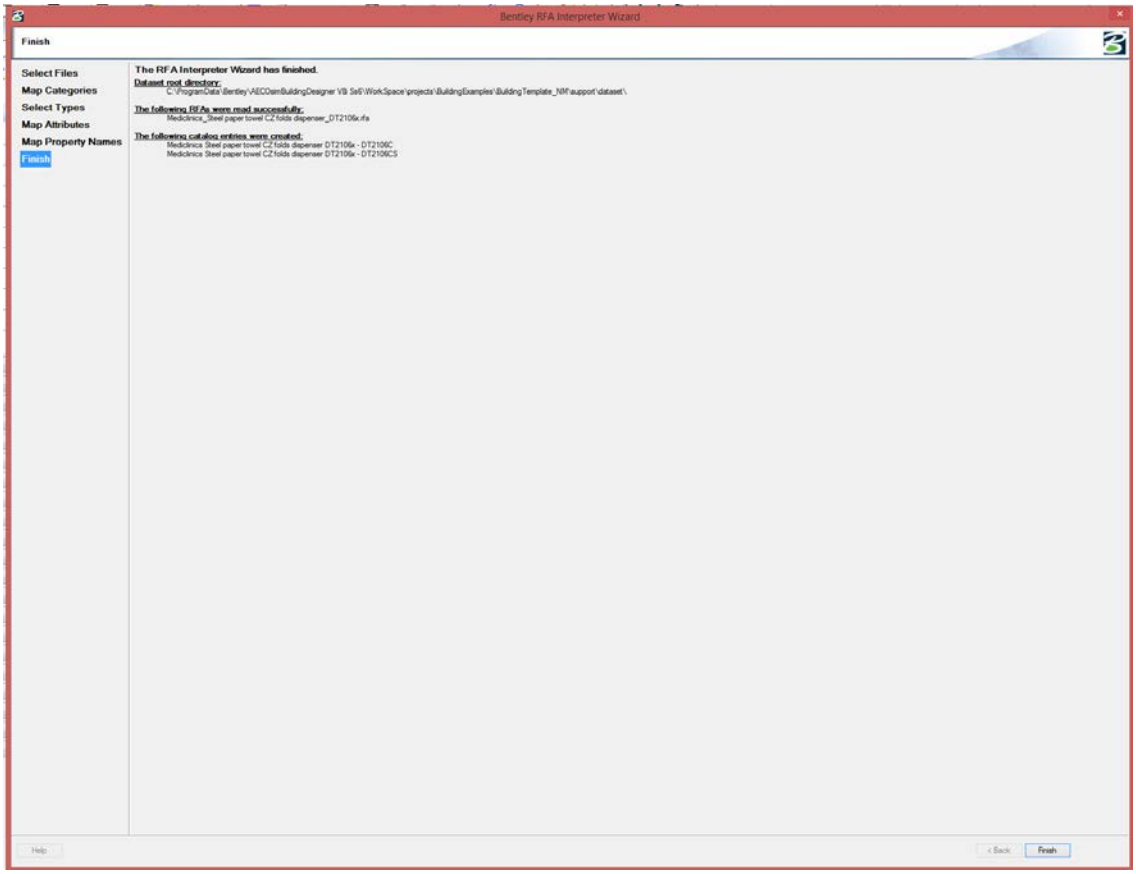
Mapping attributes of Building design part of AECOsim format.



Mapping each property name into AECOsim format.



Conversation Result.


Bentley RFA Interpreter Wizard
Finish
Select Files
Map Categories
Select Types
Map Attributes
Map Property Names
Finish
The RFA Interpreter Wizard has finished.
Dataset root directory:
C:\ProgramData\Bentley\AECOsim Building Designer V8i Se6\WorkSpace\projects\BuildingExamples\BuildingTemplate_NM\support\dataset\
The following RFAs were read successfully:
Medclinics_Steel paper towel CZ folds dispenser_DT2106x.rfa
The following catalog entries were created:
Medclinics Steel paper towel CZ folds dispenser DT2106x - DT2106C
Medclinics Steel paper towel CZ folds dispenser DT2106x - DT2106CS
Help
< Back
Finish