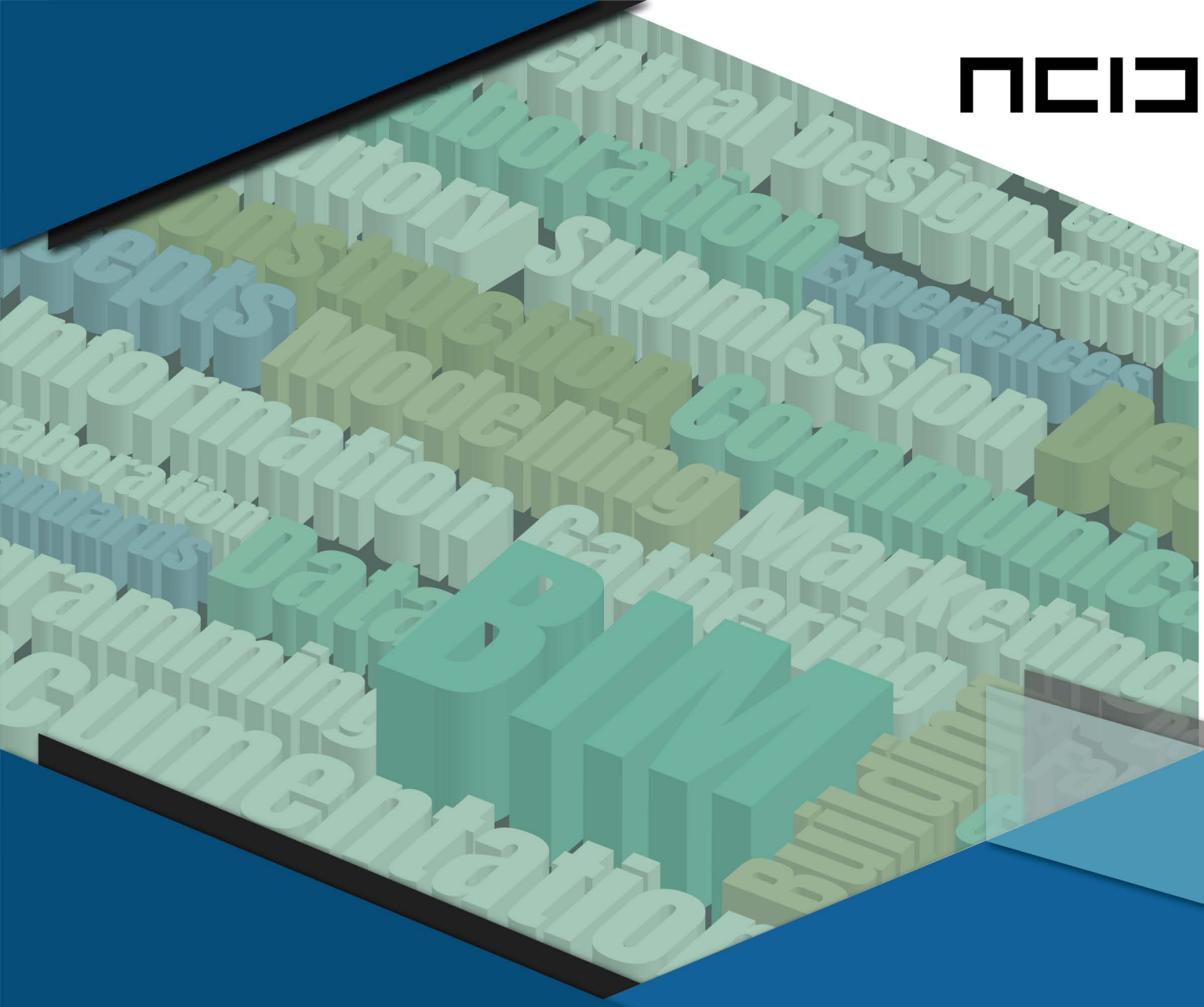


BUILDING INFORMATION MODELLING

Training Materials

Architecture (Revit)

Advanced Construction Information Development Ltd.

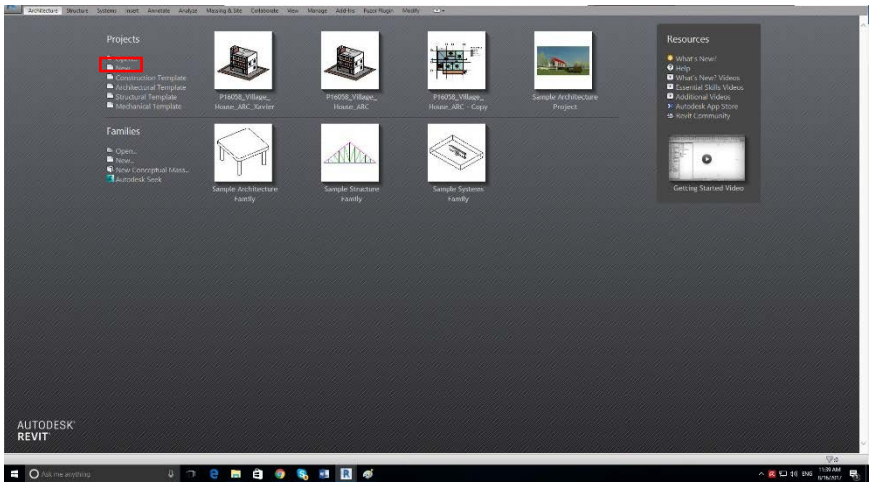
Contents

1. Starting a Project

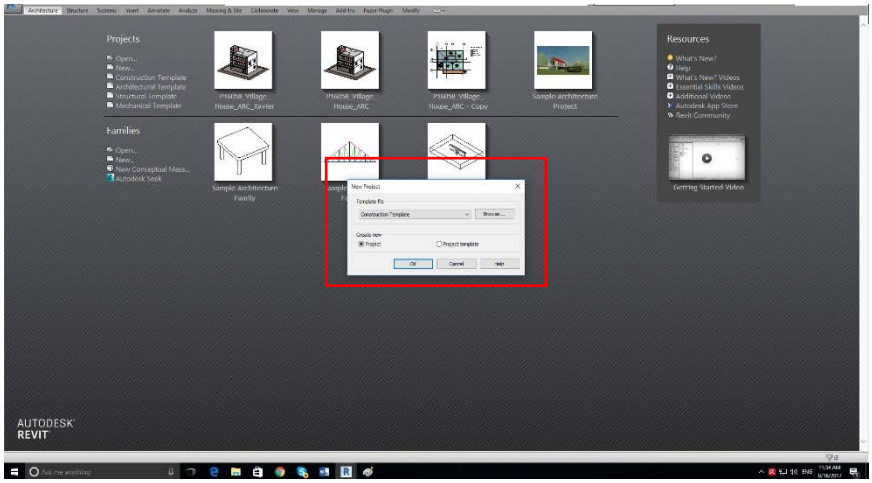
1.1 Creating a new project from a template

1st way to access New Project Dialog:

1. Press **New** on the file window.

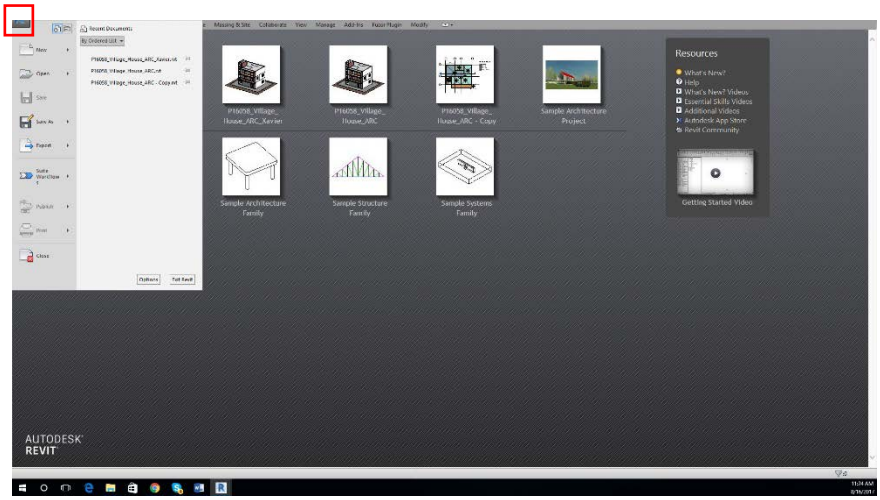


2. The **New Project Dialog** will appear.

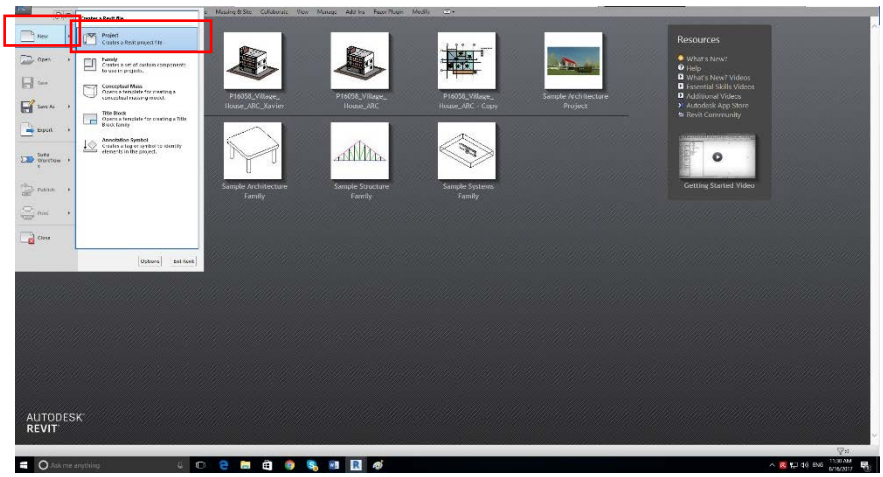


2nd way to access New Project Dialog:

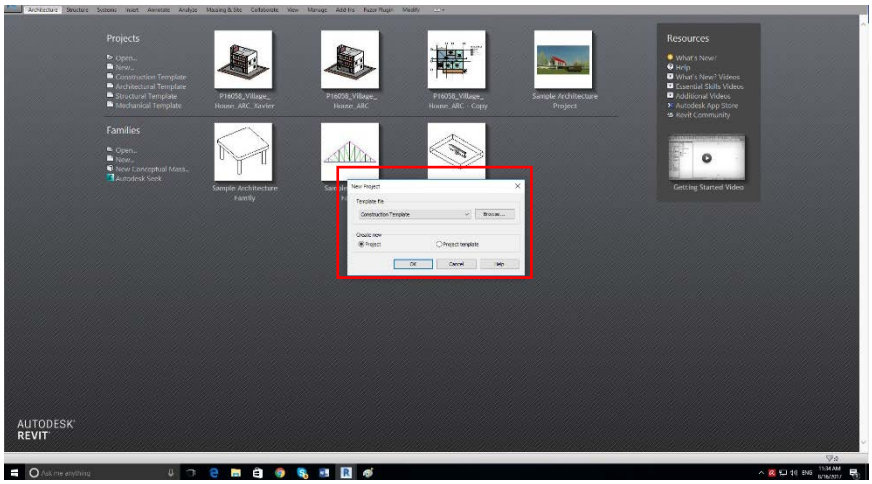
1. Press the application **Menu**.



2. Select **New** command and choose **New Project**.

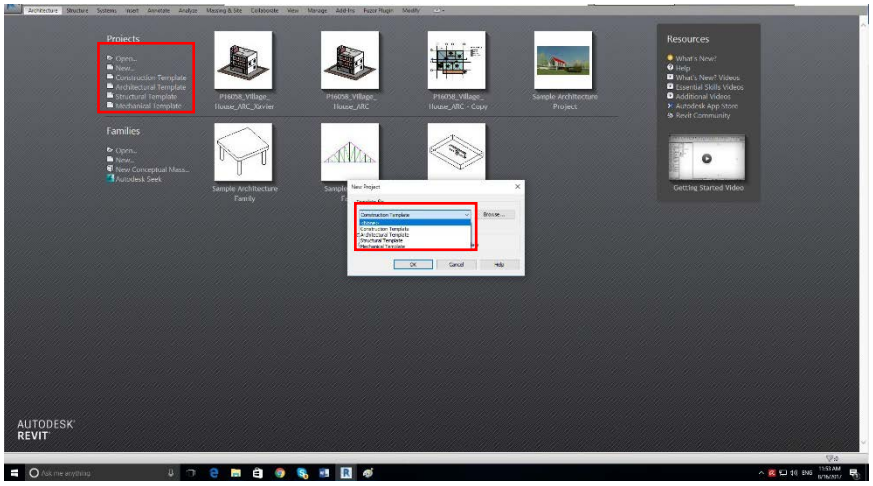


3. The **New Project Dialog** will appear.

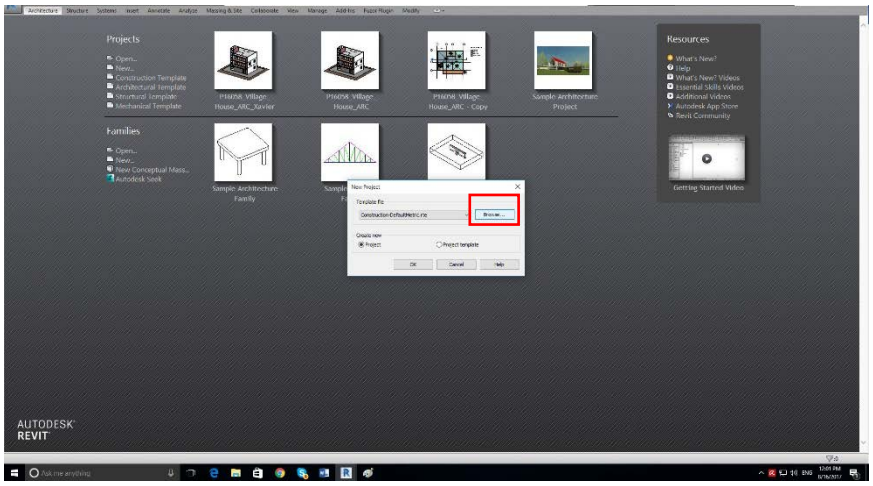


1.1.1 Open DefaultMetric Template:

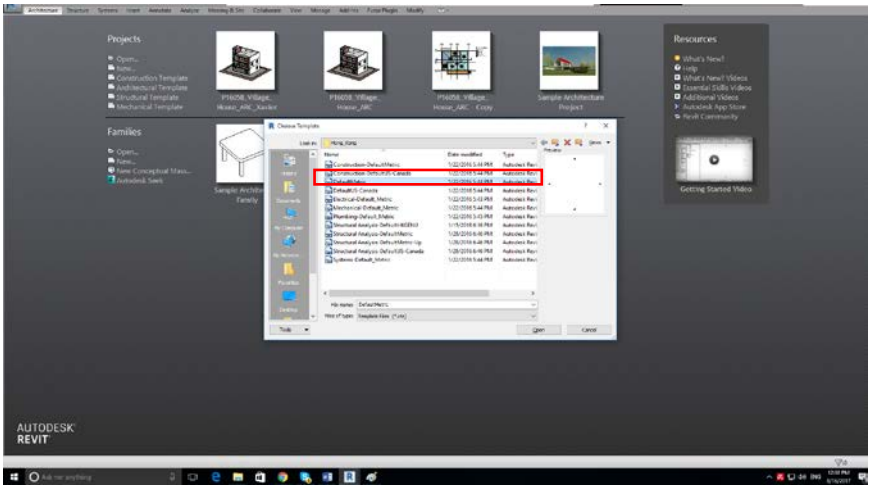
1. The list can be found on the **File Window** and **New File Dialog**.



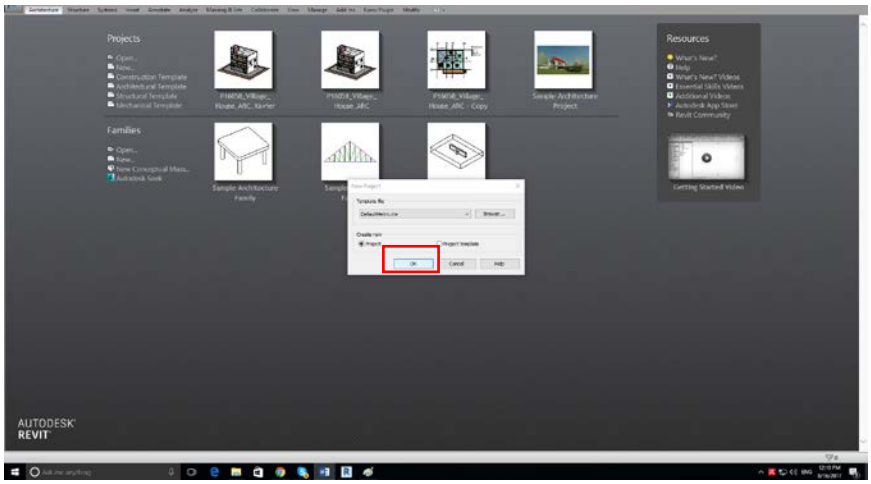
2. Click the **Browse** button.



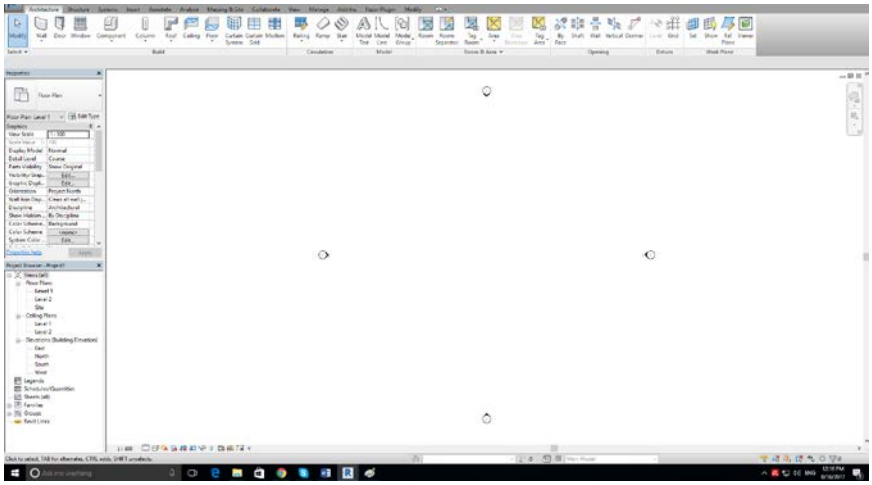
3. Press **DefaultMetric**.



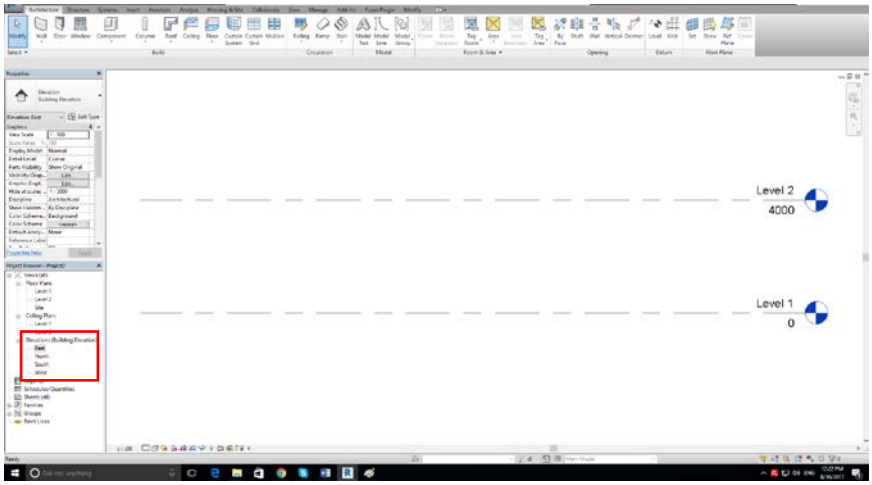
4. Press the **OK** button.



5. A **New Project File** is created.

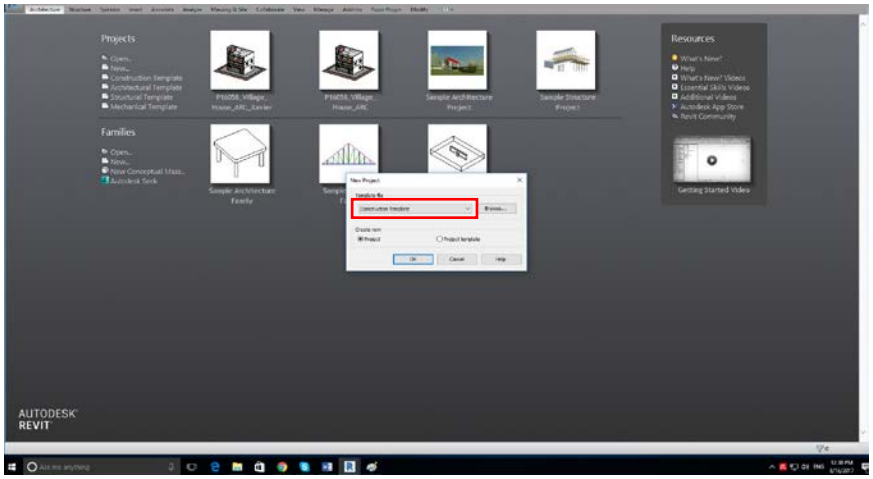


6. Press one of the **Elevations** on the left bottom corner; two levels are shown.

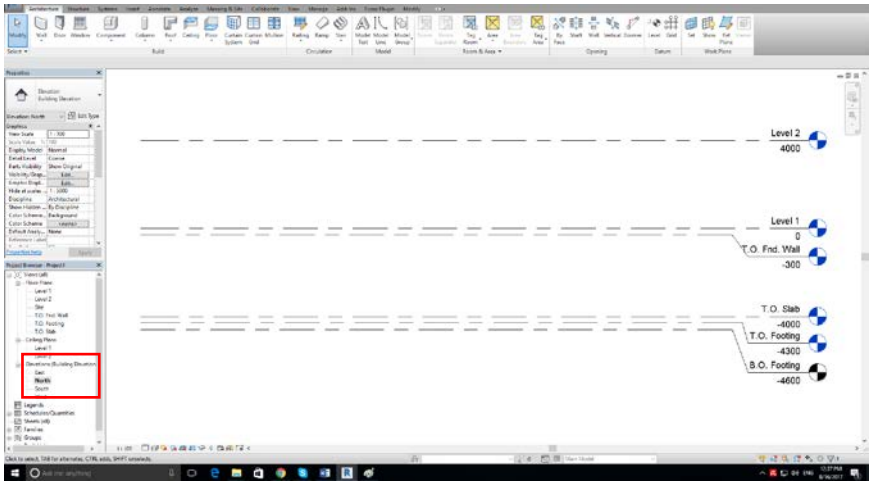


1.1.2 Open Construction Template with preset schedules and groups:

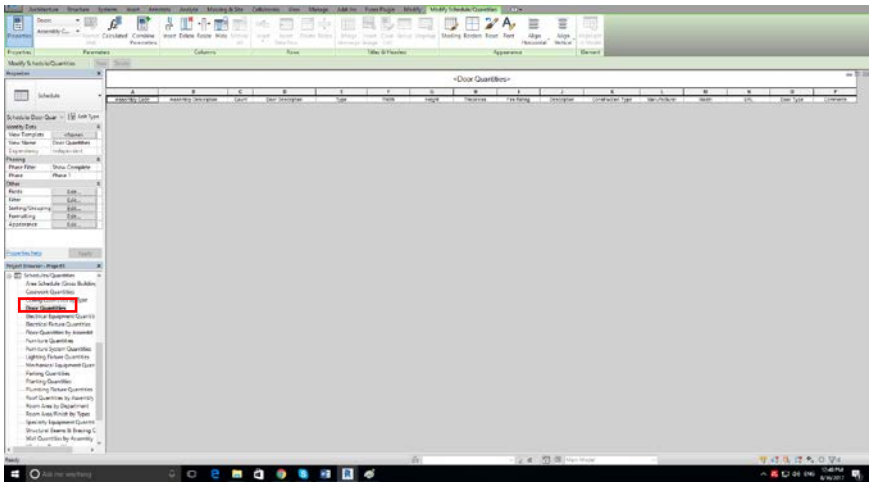
1. Select Construction Template in the new project dialog.



2. Press one of the **Elevations** and 6 level lines will appear.

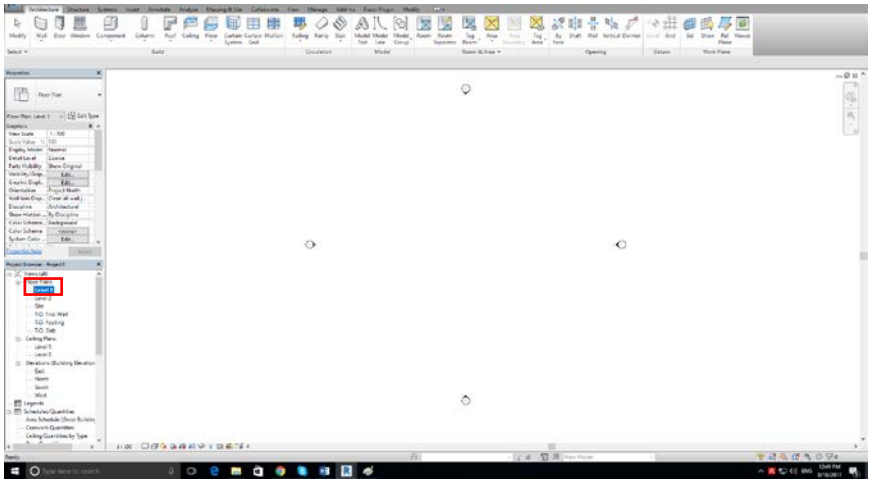


3. Press **Door Quantities** under **Schedules/Quantities** and an empty schedule will appear in the middle.

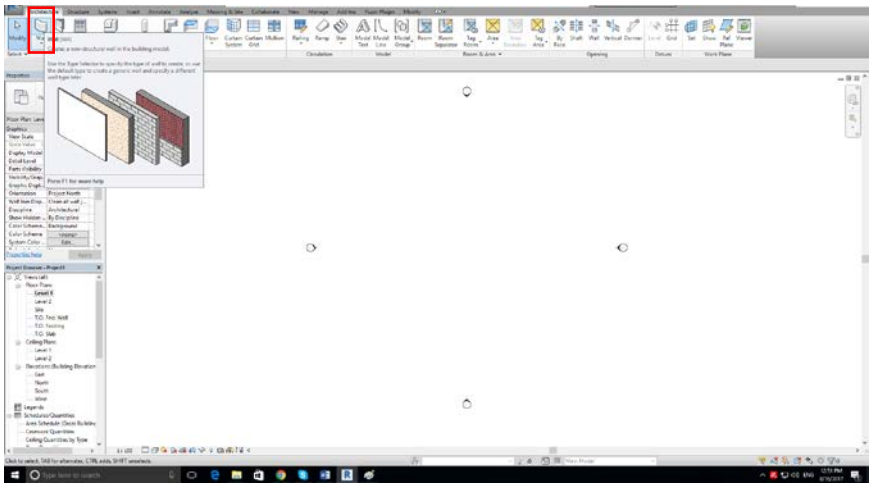


1.1.3 Draw a Door to see how does the door schedule work:

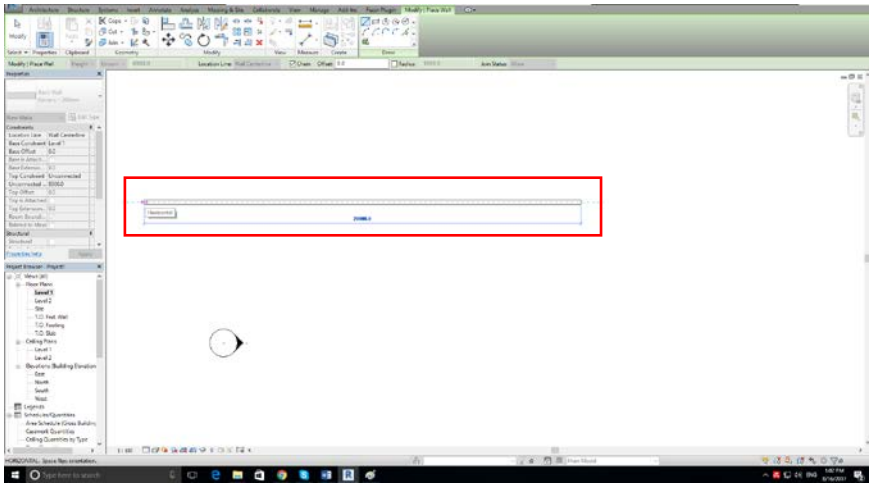
1. Open Up the **level 1 Floor Plan**.



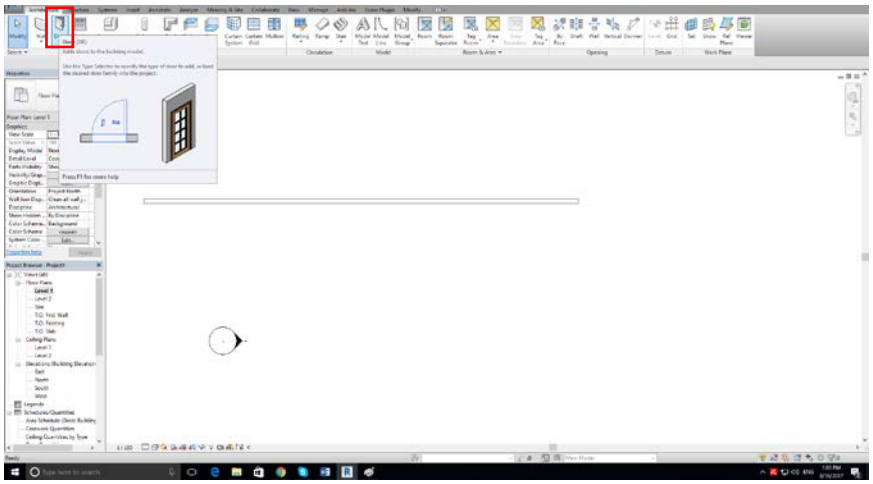
2. Click the **Wall** Command.



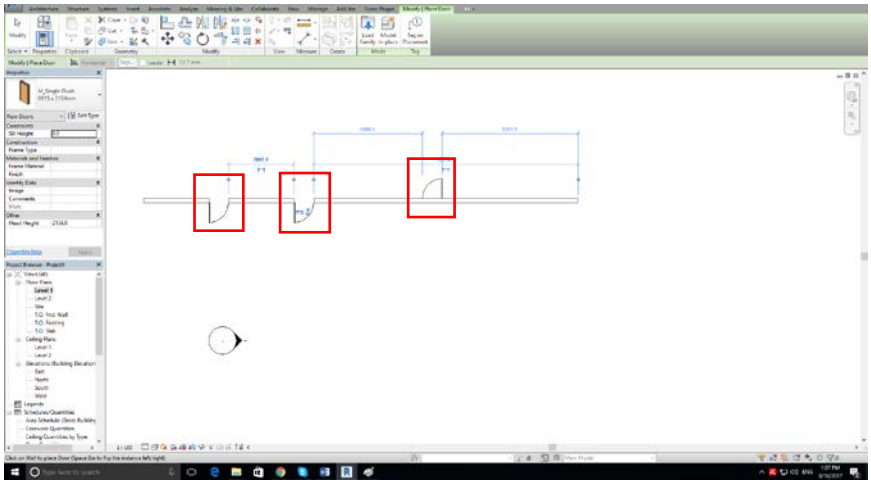
3. Drag the cursor to draw a little segment of **Wall**, the length of the wall is shown.



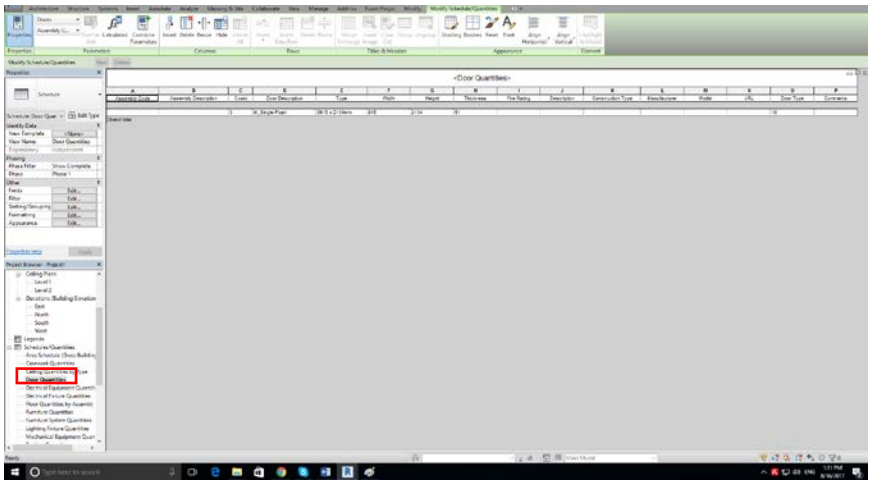
4. Click on the Door command.



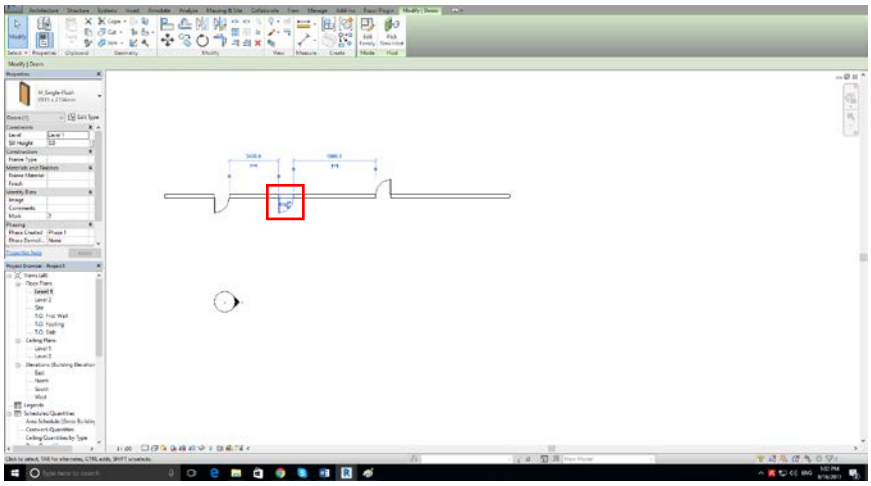
5. Tap on the wall segment to create a Door; the length separation will be shown.



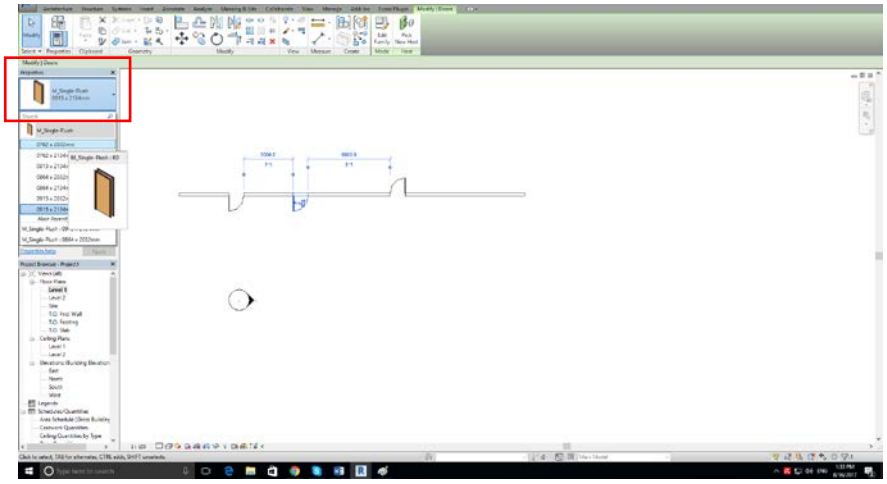
6. Press on **Door Quantities** under Schedules/Quantities, the Schedule with a quantity of three in the **Count** column.



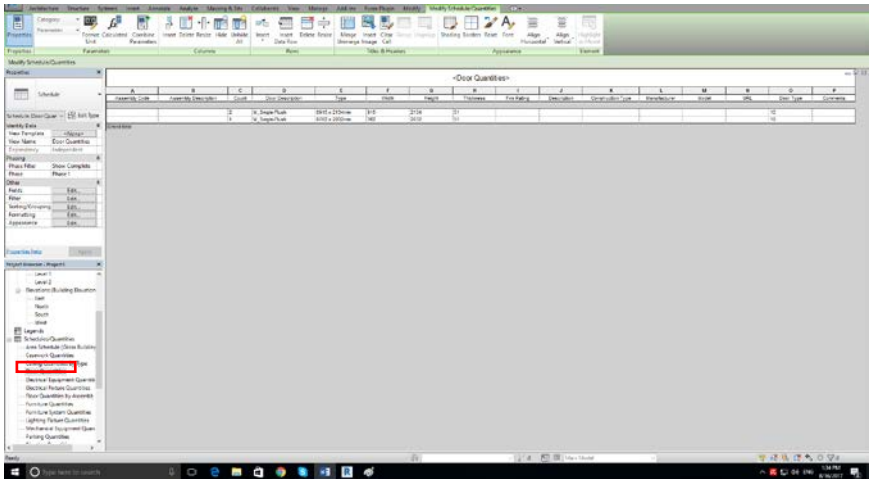
7. Go back to the level 1 floor plan, click on the door and some **Flipping Arrows** are shown.



8. Click on the **Door Properties** button and change it to some other types of door.

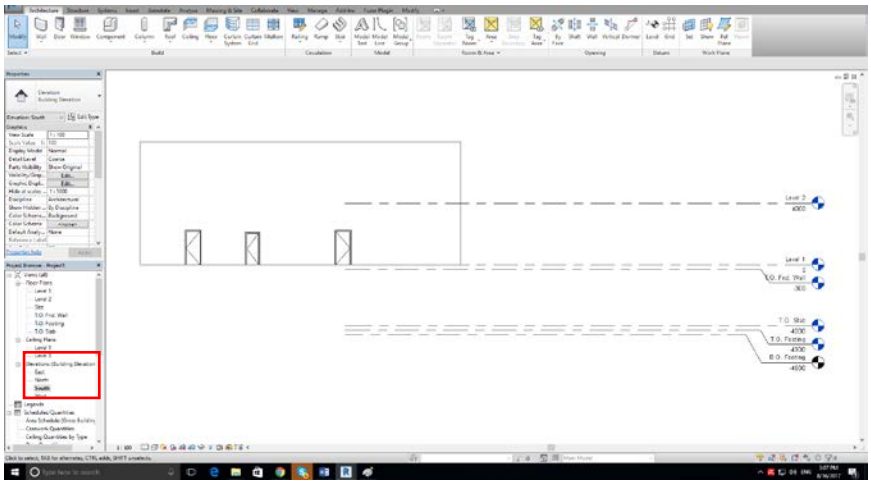


9. Go to the **Door Quantities Schedules**, two types of doors will appear on the schedule.

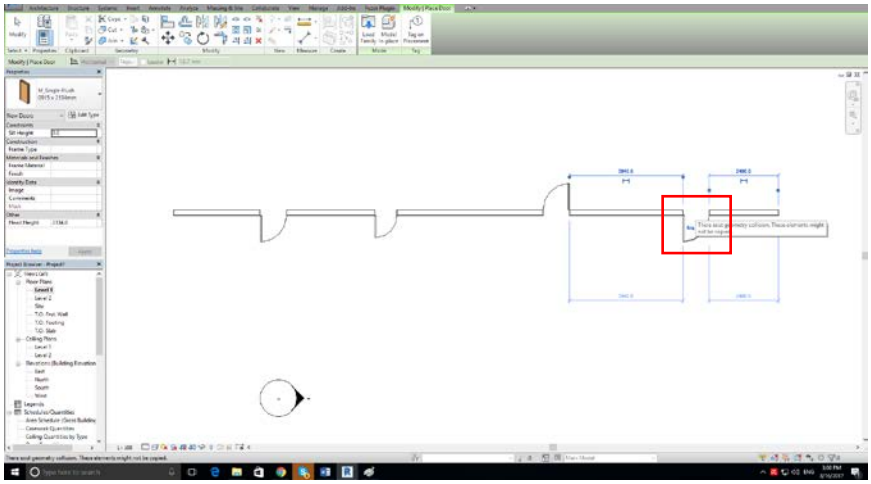


1.1.4 Plans and elevations changes:

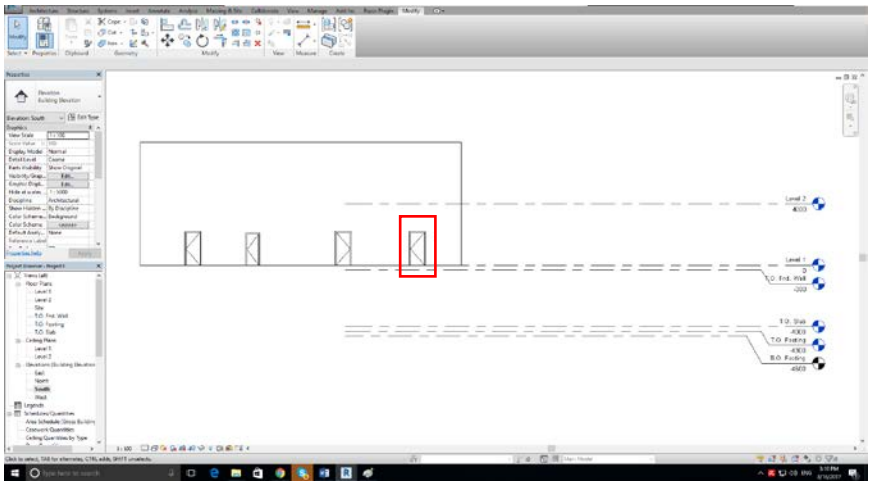
1. Click on one of the **Pre-set Elevation,** and doors from the previous procedures are shown.



2. Click on the level 1 floor plan and add a **Door** to the **Wall**.



3. Go back to the previous elevation, and the door will appear.

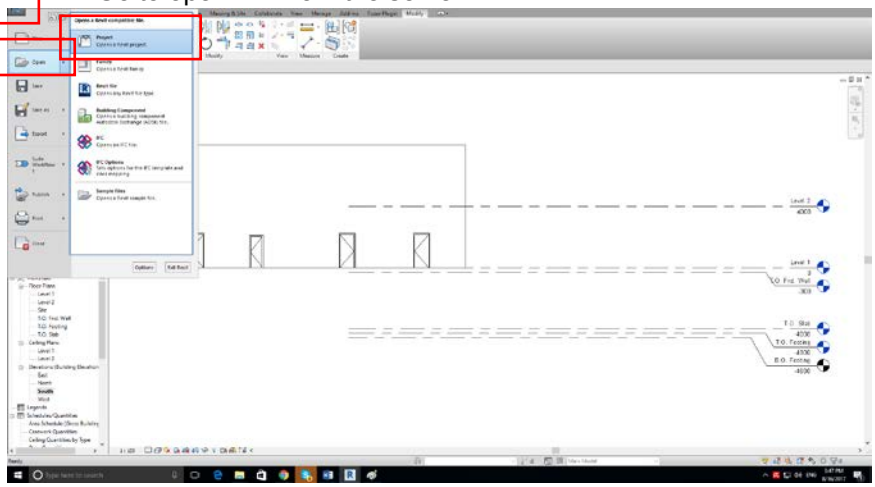


1.2 Accessing a multi-user project using Workshare

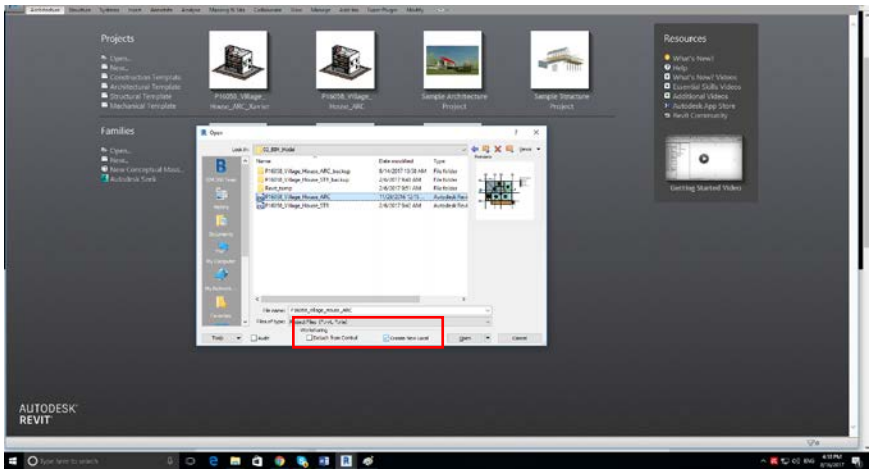
A central file is created by a CAD or BIM manager when people work with multiple users in the same Revit project. Individuals work on local copy and sync with coworkers after finishing his/her part.

1.2.1 Multi-user working method:

1. Go to open link from the server.



2. The Worksharing area is at the bottom of the open window, to create a local copy, tick the box “Create New Local.”



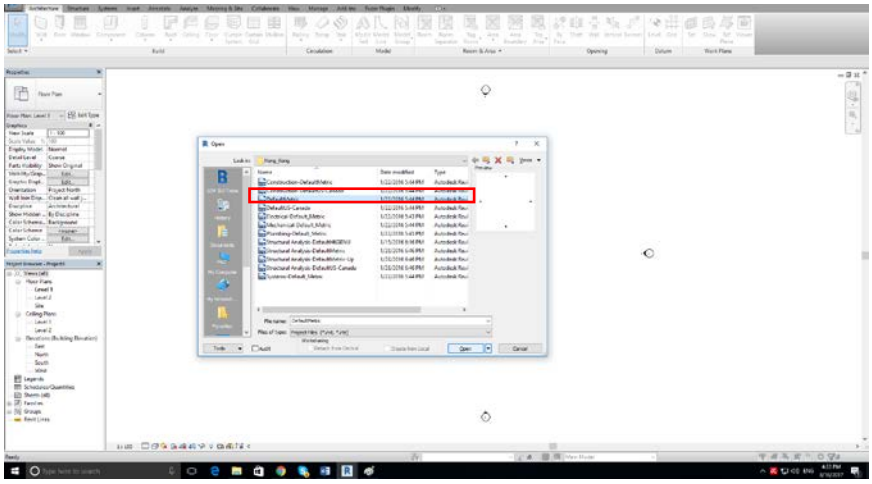
The opened copy is detached from the central file. Changes only appear in the local file until it is synchronized with Central. We the local copy is ready to be synced, press the command “Synchronized with Central.” After the file is synced, changes from other locals can be seen.

1.3 Creating and configuring a new project

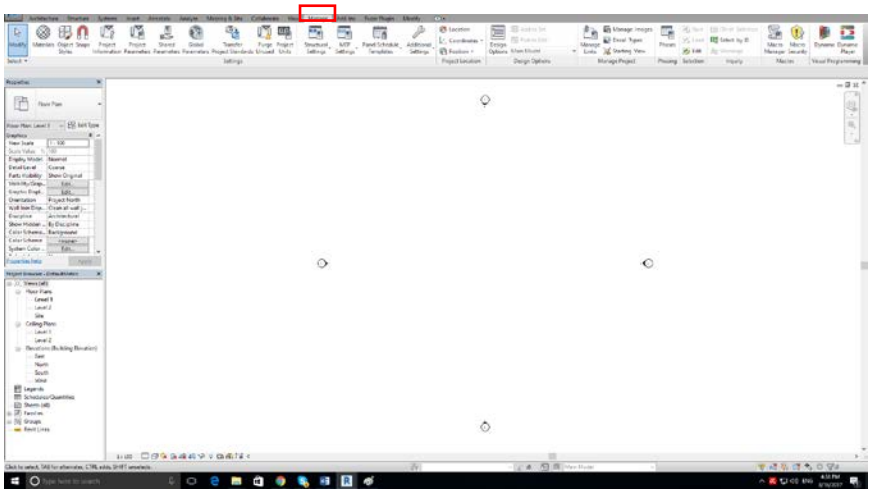
Creating a new project and configuring some of its basic settings is taught in this part. For example, changing the project name.

1.3.1 Project Information:

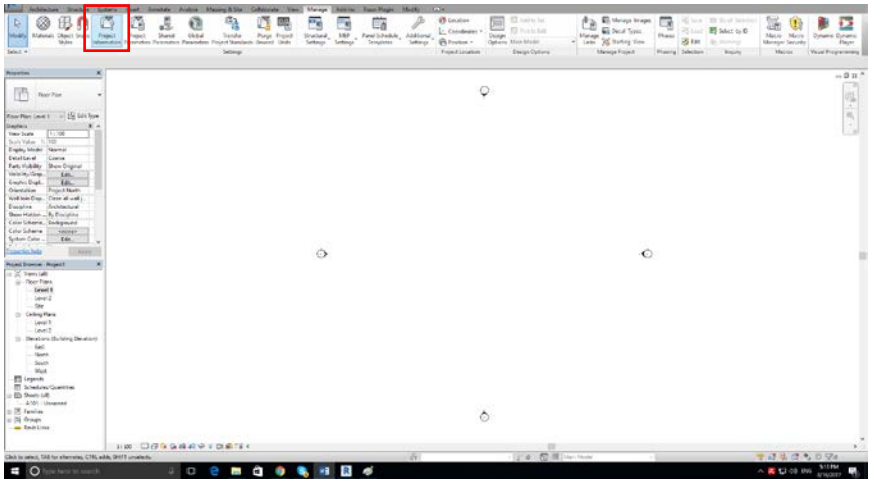
1. Open the DefaultMetric template.



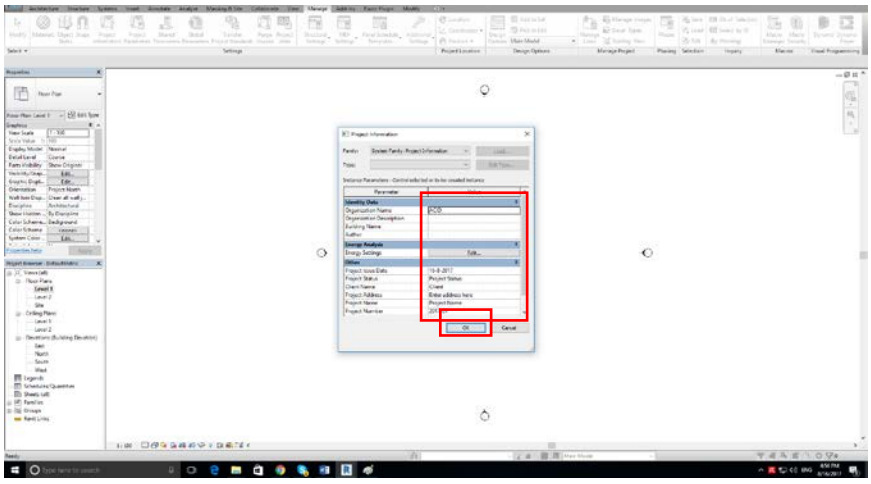
2. Click on the manage tab where many project settings are available here.



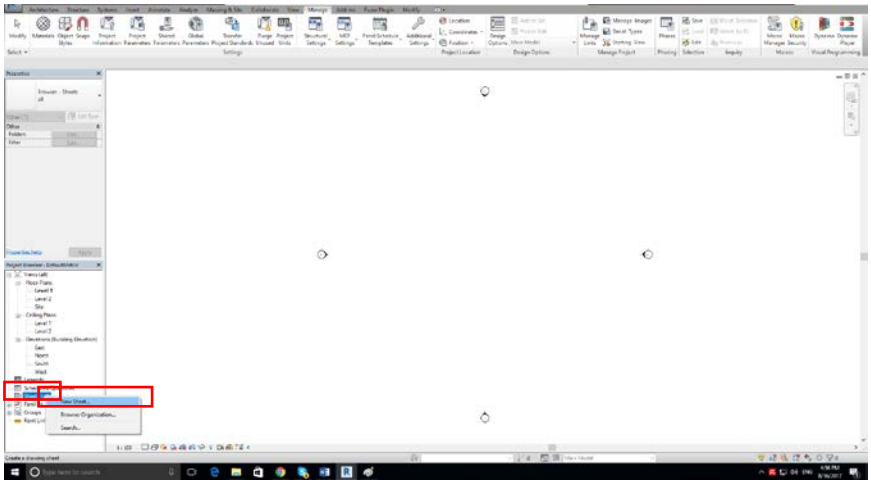
3. Click on Project Information, and a window will pop out. (Your Organization Name, Project Issue Date, Project Status, Client Name, Project Address, Project Name and Project Number).



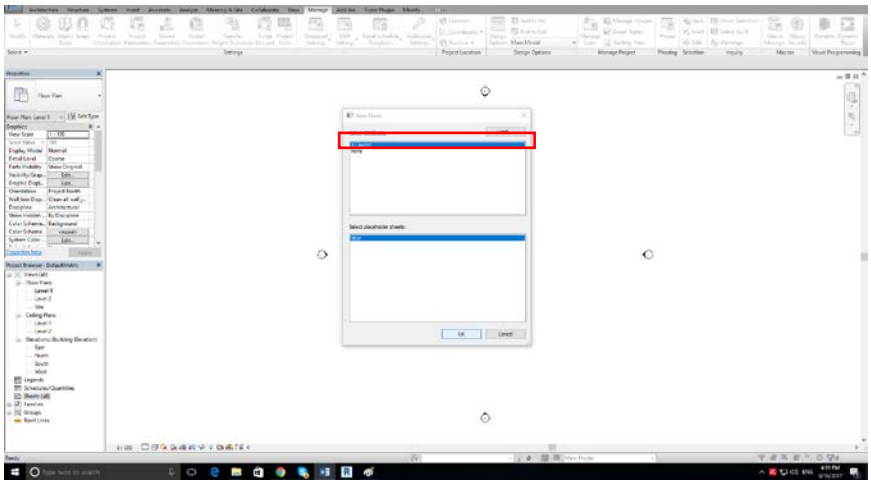
4. Type in the information and press OK.



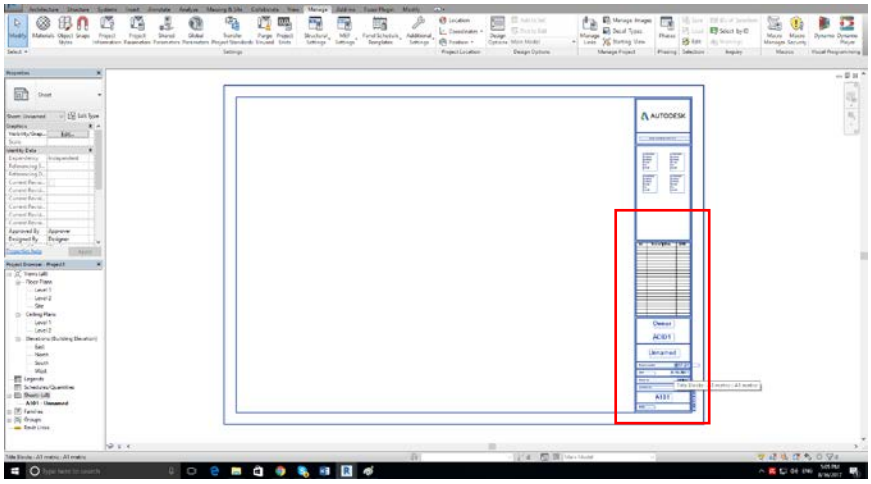
5. Right-click Sheets (all) on the bottom left corner and select **New Sheet**.



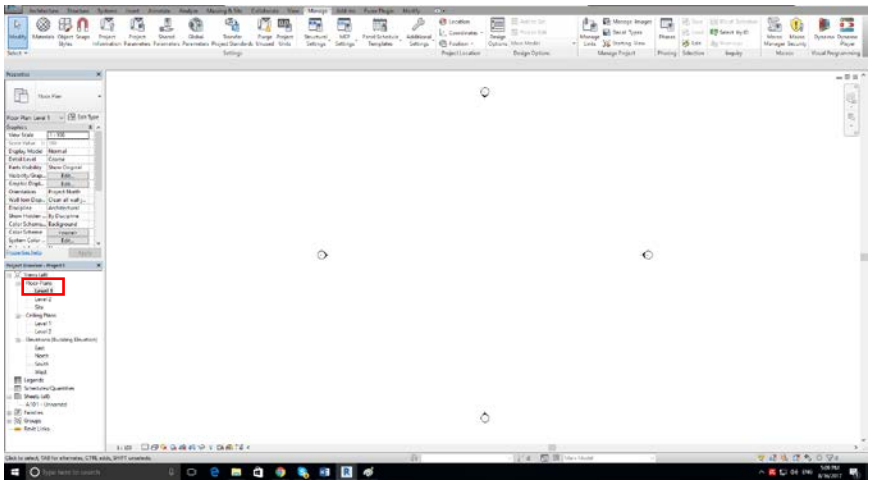
6. Select A1 metric for title blocks and press OK.



7. Open the sheet and the information will be found on the right.

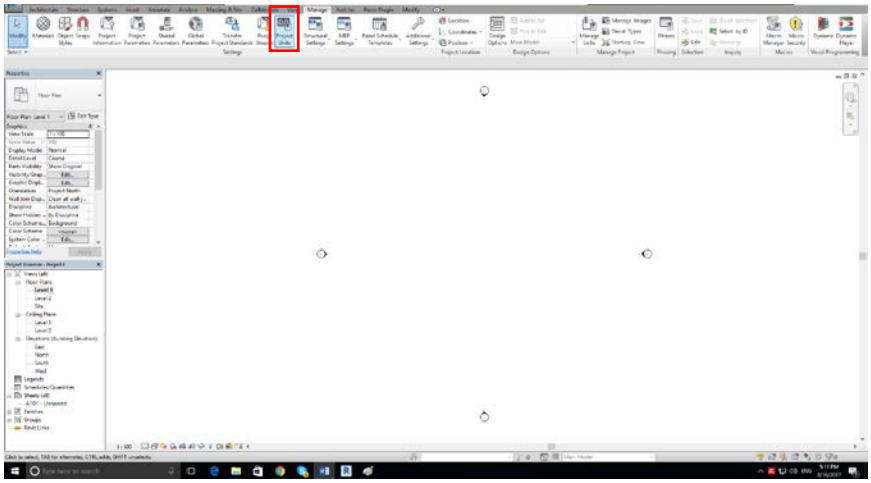


8. Go back to Level 1 Floor Plan.

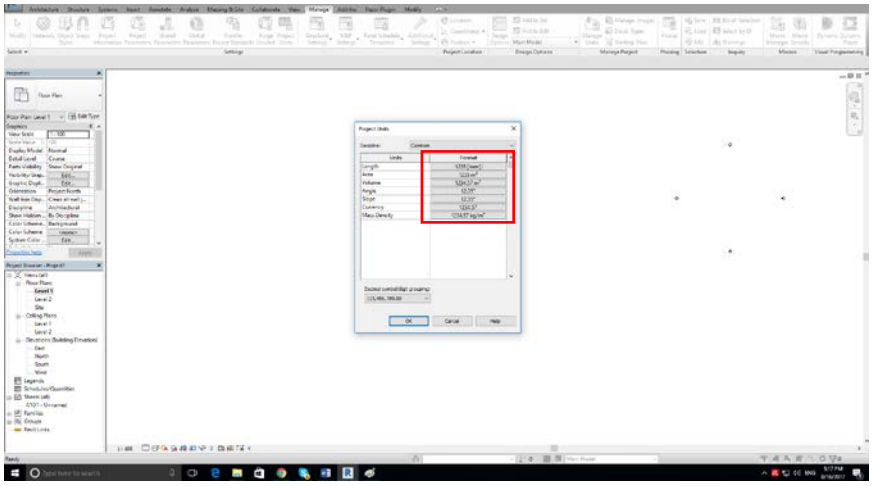


1.3.2 Project Units:

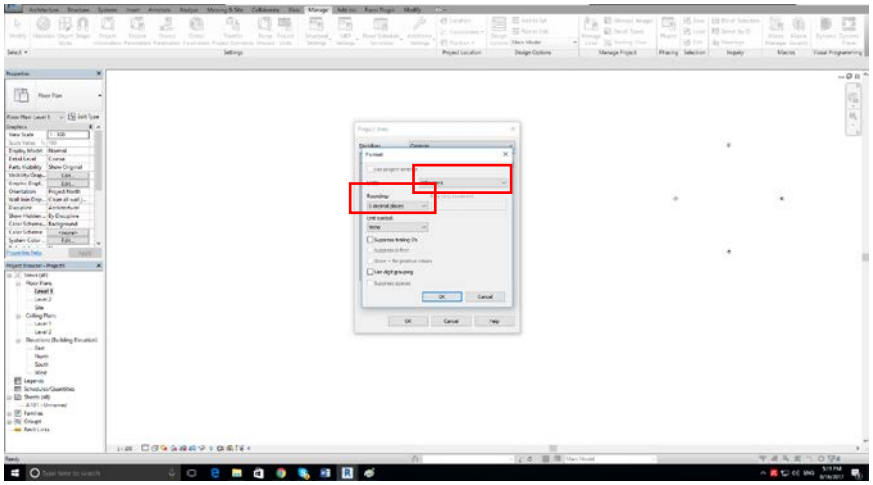
1. Click on Project Units and a window will pop out (Project Units, Rounding Off, Digit Grouping).



2. Click on each item to alter the settings, (press Length).

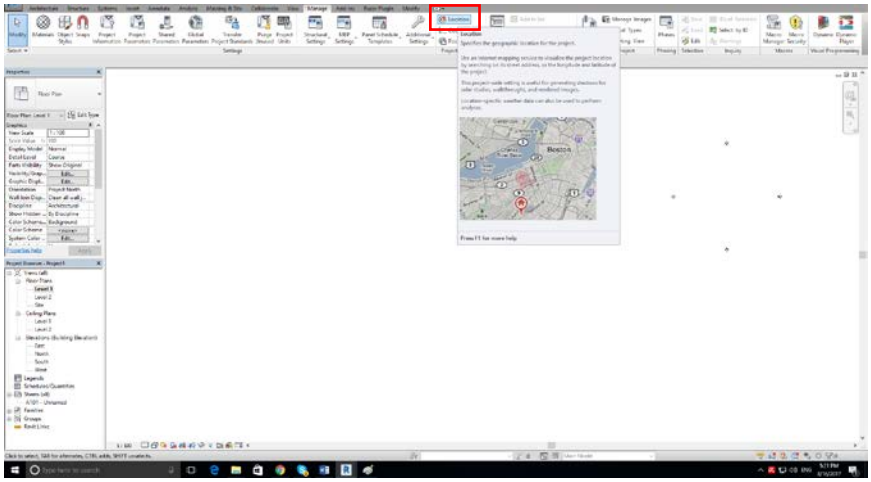


3. Units and decimal place can be changed here.

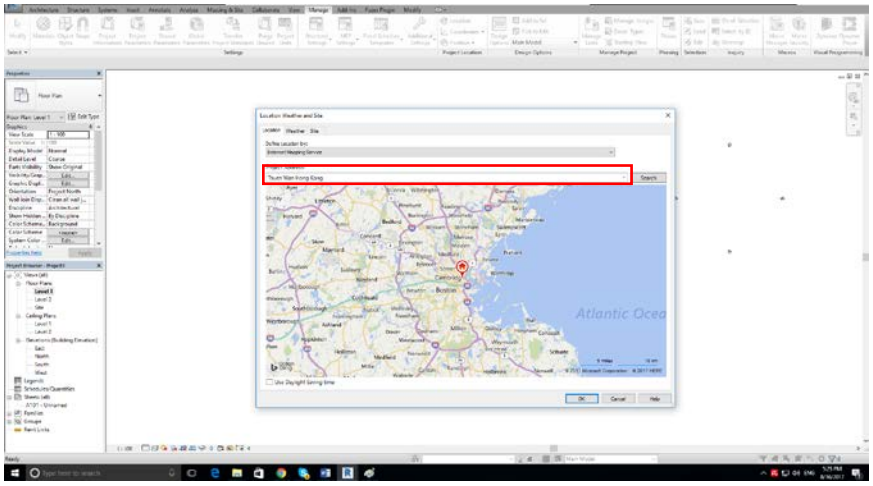


1.3.3 Project Location:

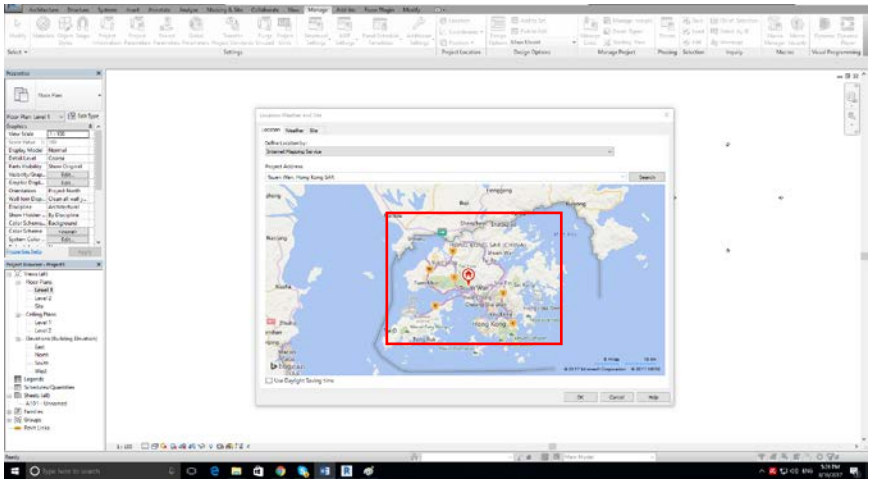
1. Click on Project Location, and a window will pop out (Obtain weather information, shadows, sun path).



2. Default Location is set in Boston, type in a Project Address and press Enter.

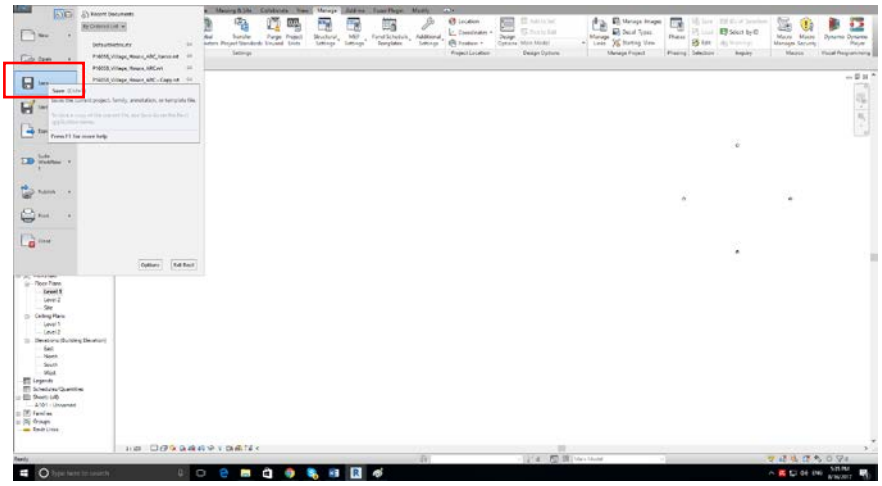


3. The typed address is shown on the map below, drag the icon around or type in the coordinates to give an exact location.

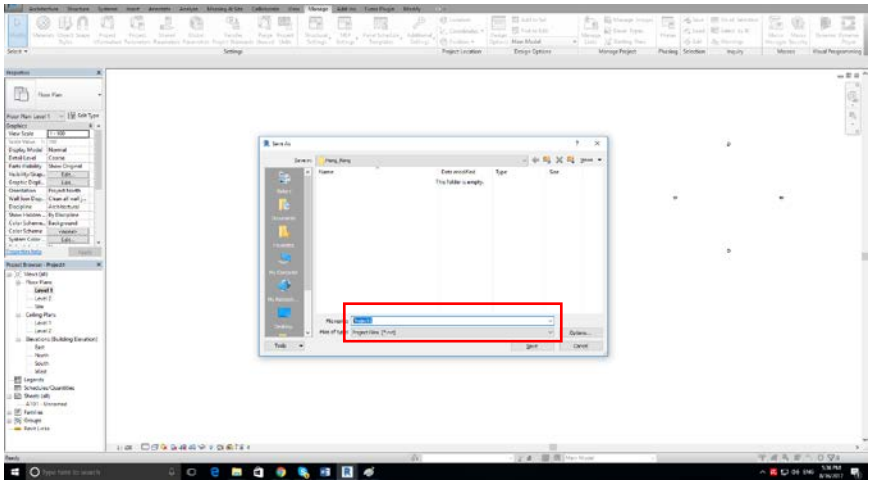


1.3.4 Saving Options:

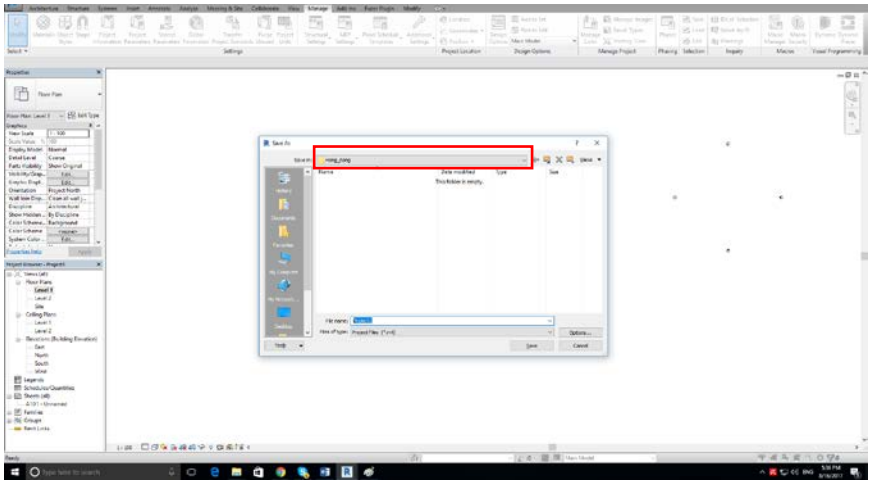
1. Click on Save under the Big R and a window will pop out.



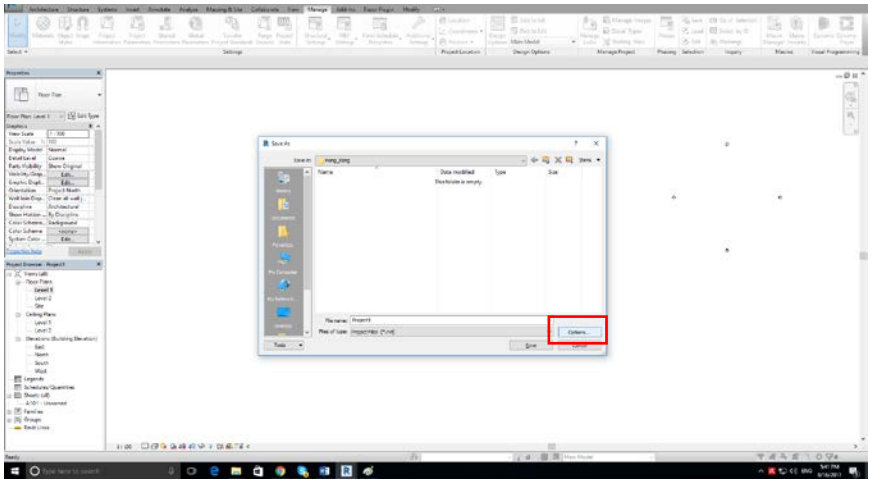
2. Type in the file name and select rvt file as the type of file.



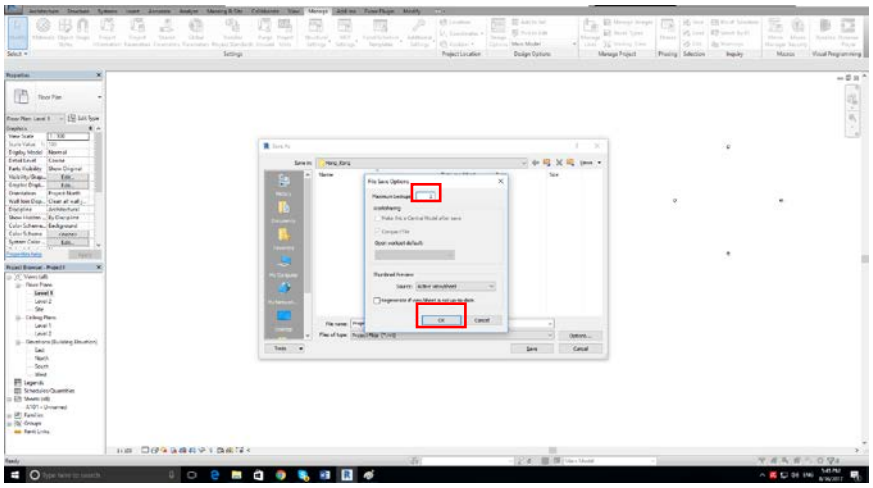
3. Choose the location to save your file.



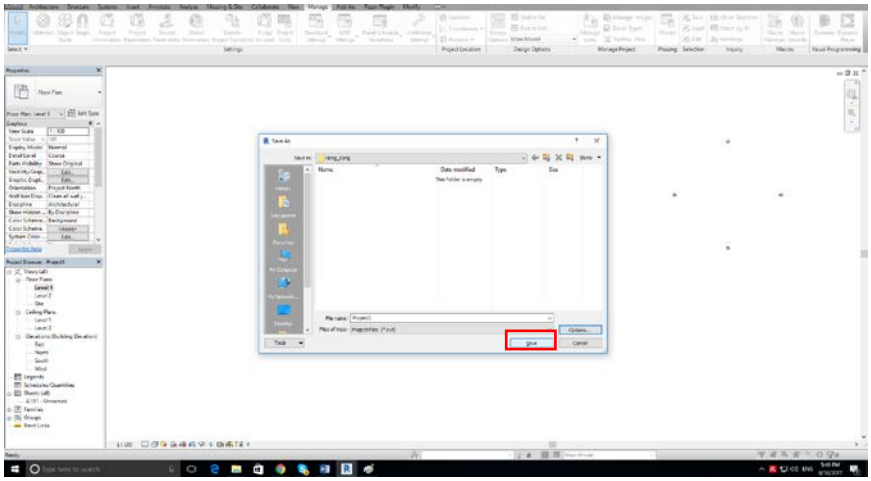
4. Click on Options next to Files of type.



5. Change the maximum backups to 2-4 and press OK.



6. Save the file.

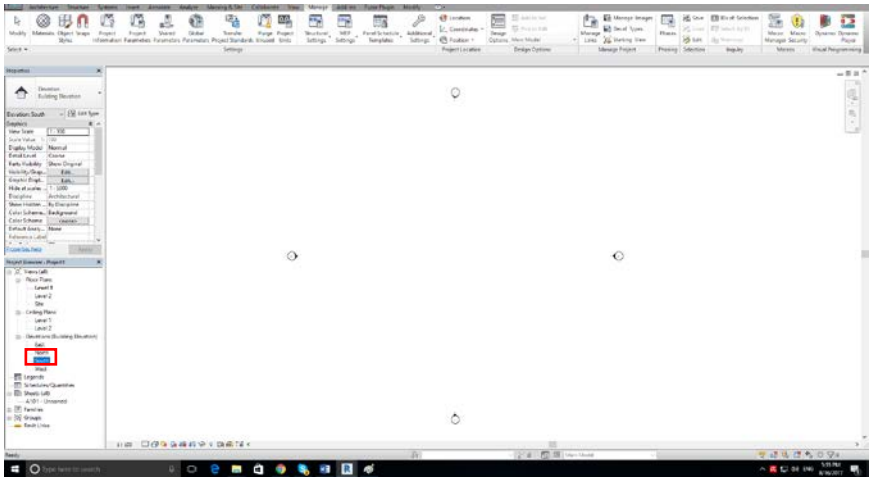


1.4 Adding Levels

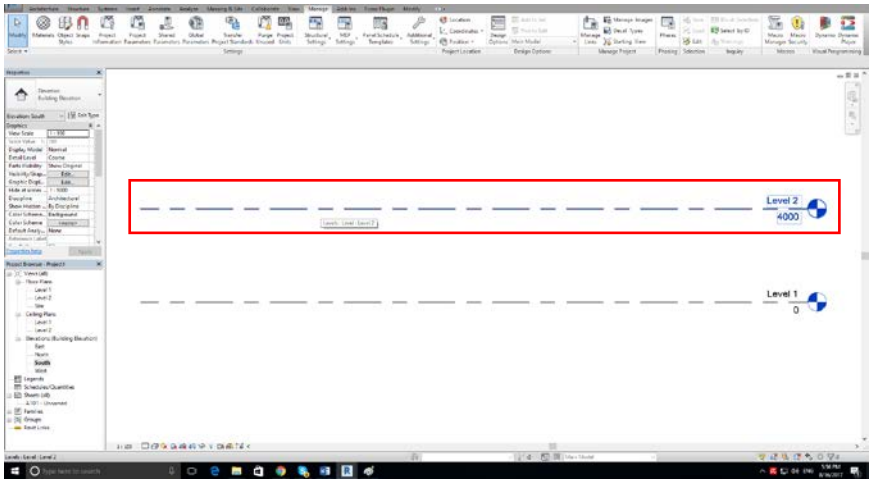
Levels is one of the primary organizational and structural constructs in the Revit projects. They help determine where all the important heights are in the building. They can be in the positive or the negative direction and then determine the important values in that Z direction.

1.4.1 Level Lines:

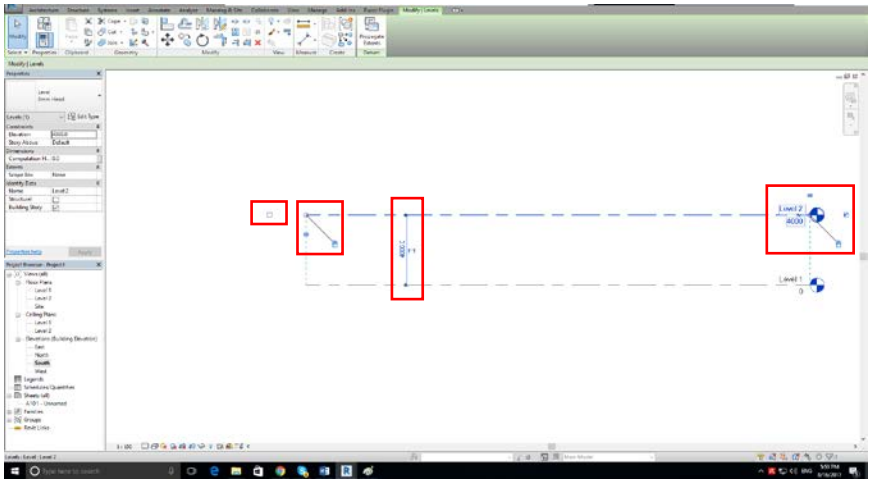
1. Open an Elevation on the left bottom corner.



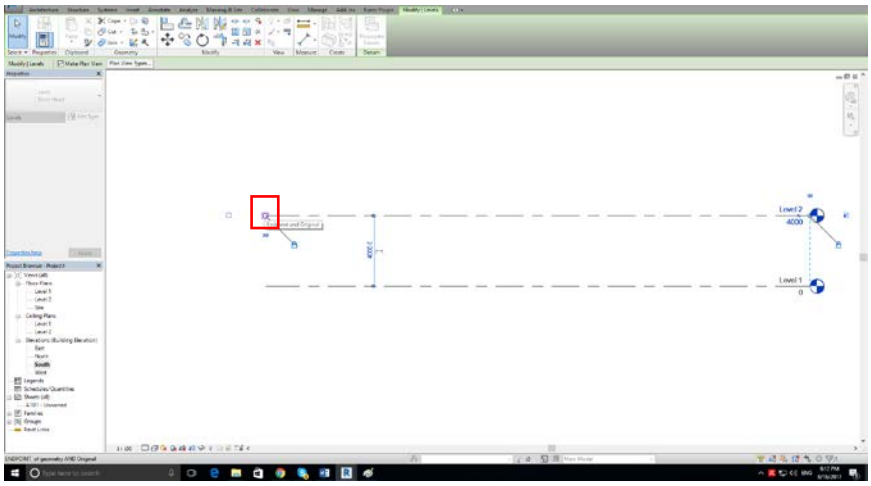
2. Click on the Level Lines.



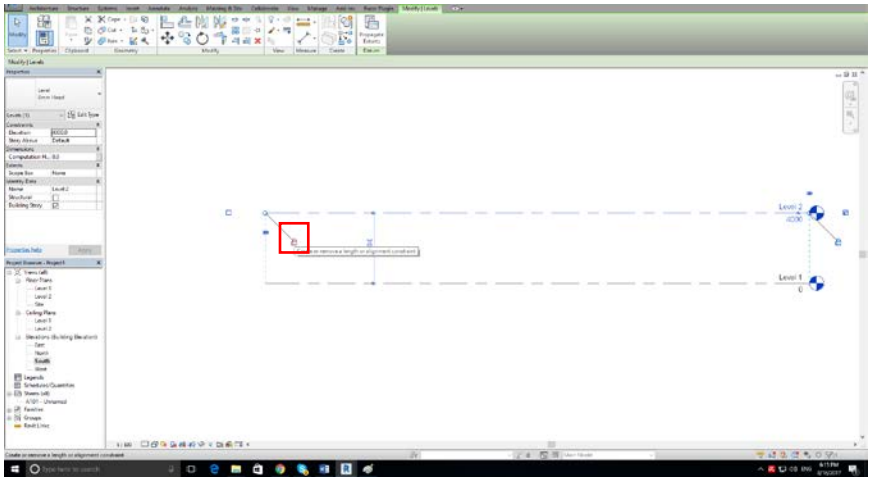
3. When the Level Line is selected, a variety of Small Handles and Controls will appear.



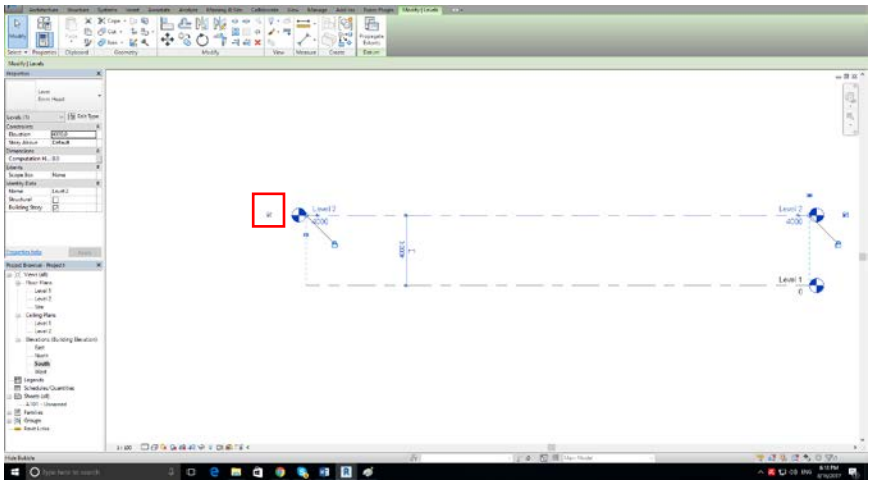
4. The Circle at the end of the level line is used to change the Length of the level line.



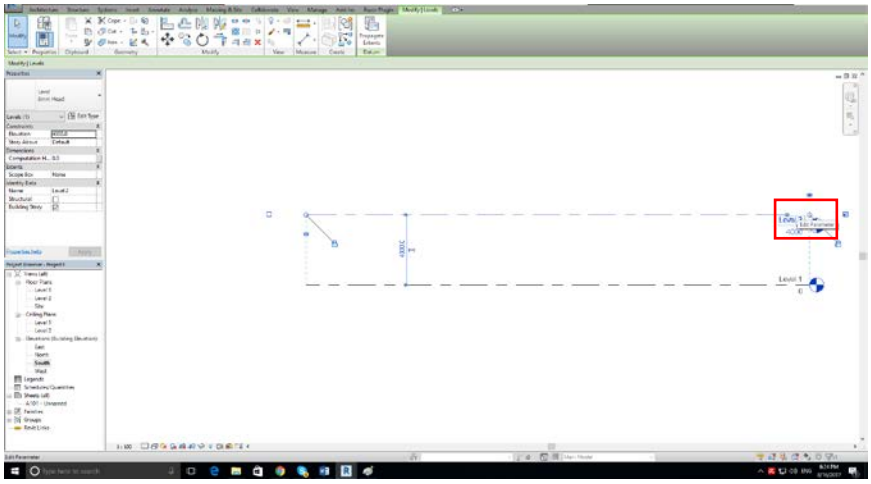
5. The Lock Icon is used to lock several level lines together when one of the lengths is changed, other lines will follow.



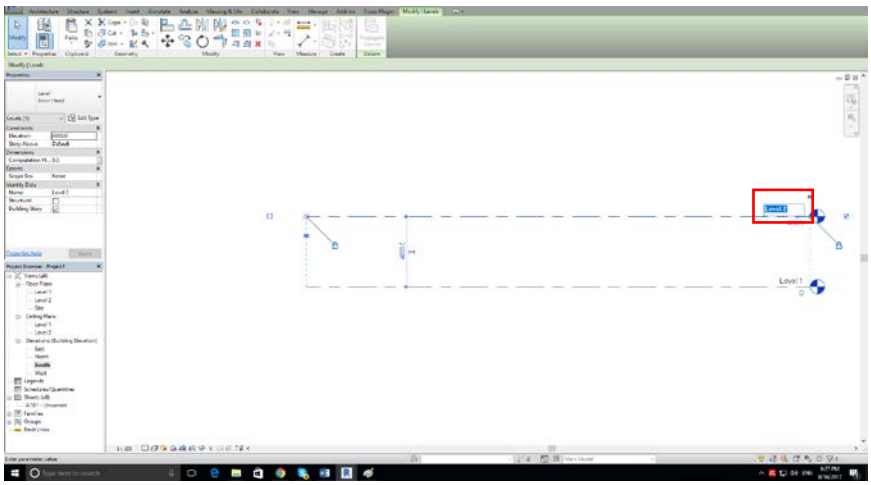
6. The Square on both ends of the level line will hide or show the level annotation.



7. The small little squiggle grip on the right of the level line is used to create an elbow shifting the annotation away.

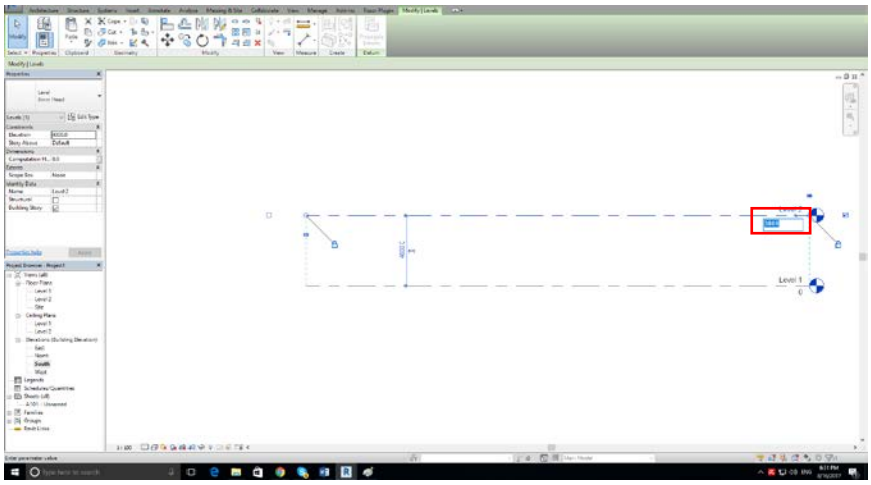


8. The name of the level can be changed by clicking the name and typing in the new level name.

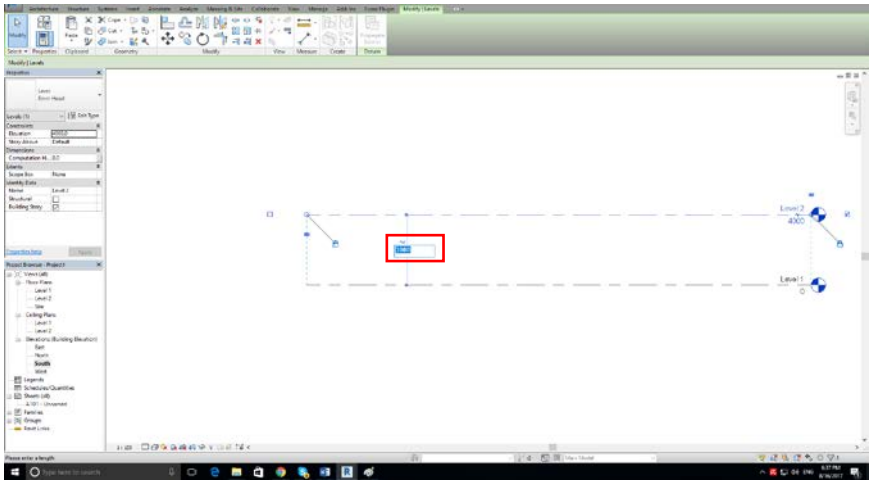


1.4.2 The height of Levels:

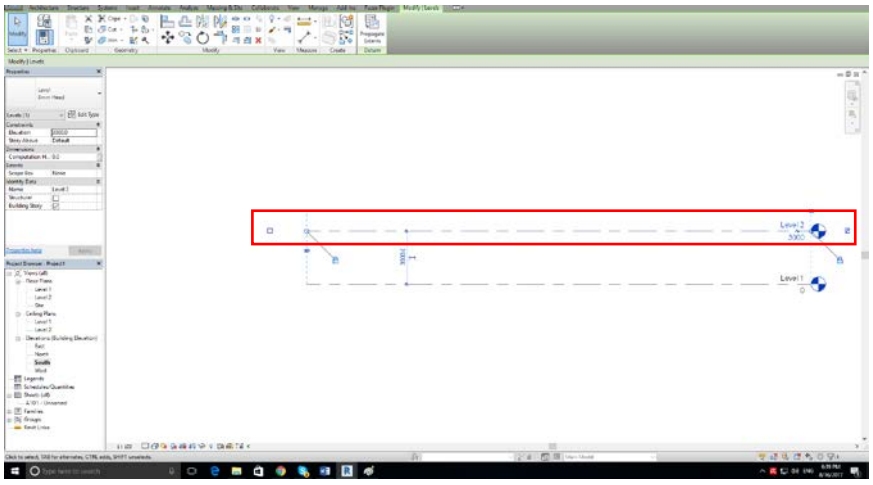
1. The height of the level can be changed by clicking the value and typing in the new level height.



2. The height of the level can also be changed by clicking the dimension between levels and typing in the new level height.

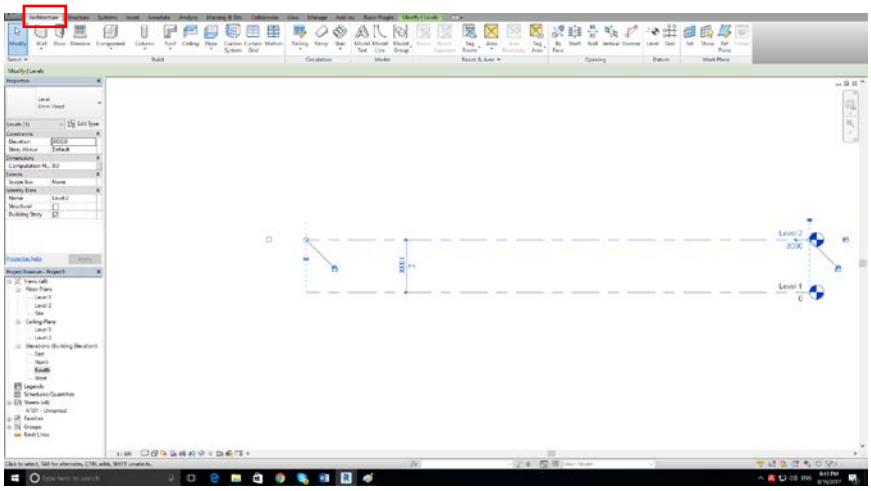


3. The height of the level line is changed.

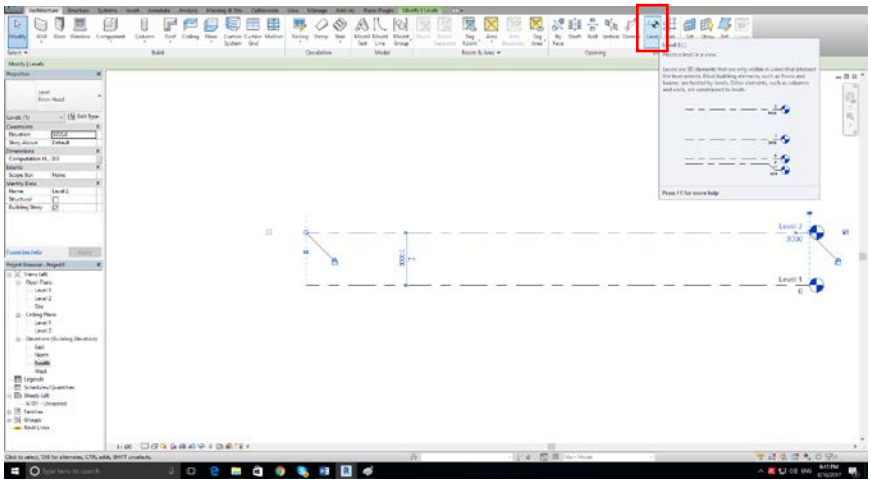


1.4.3 Adding Levels:

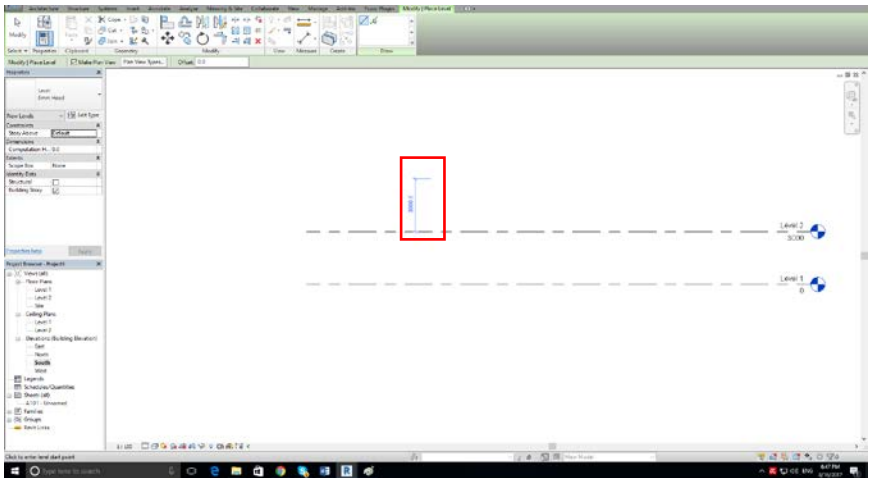
1. Click on the Architecture Tab.



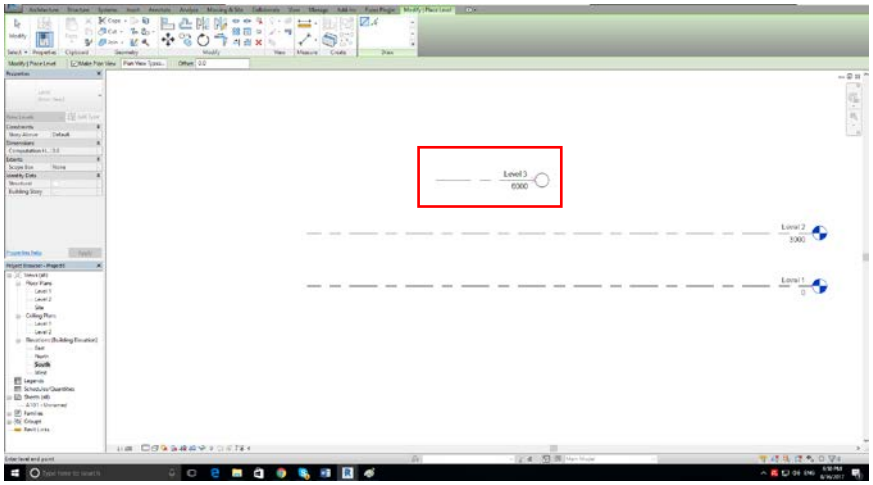
2. The Level button is under the datum panel, click on it.



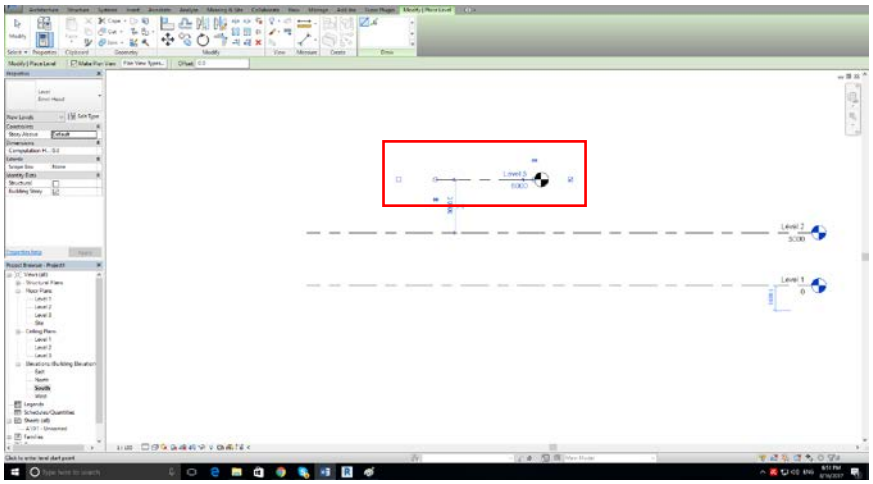
3. A dimension is shown following the cursor, select the new height and click.



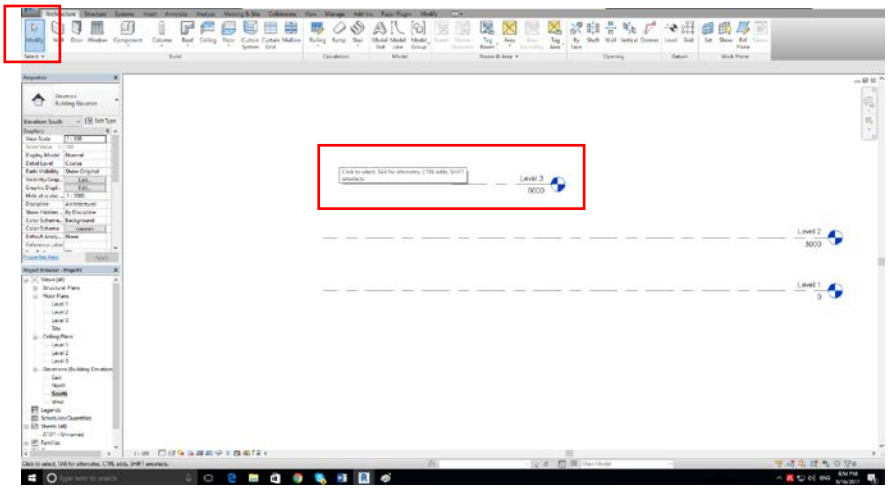
4. The Level Line must be created horizontally, adjust the length with your cursor.



5. A black annotation is created after clicking on the selected length, black color indicates that it is not interactive.

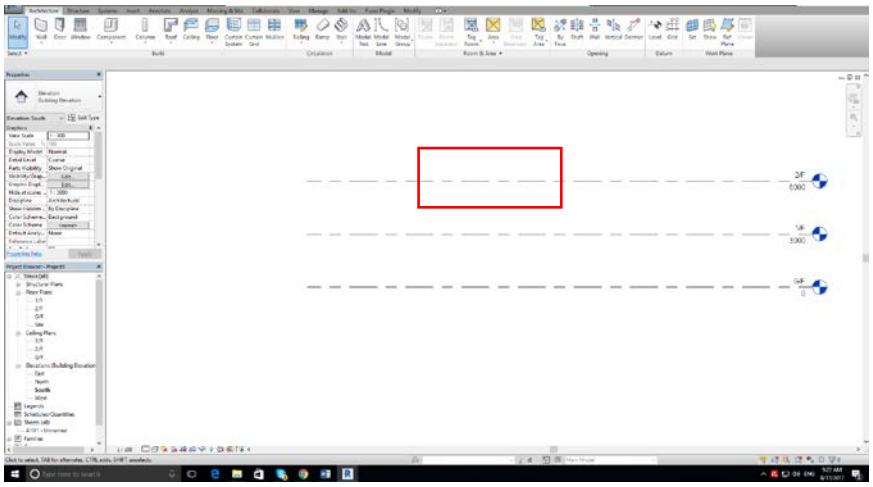


6. The annotation turns blue after selecting modify on the top left.

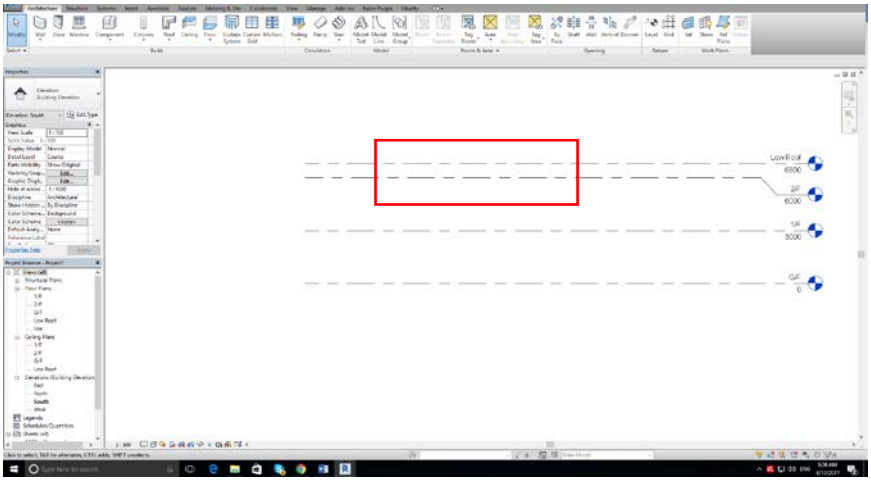


1.4.4 Plan Views:

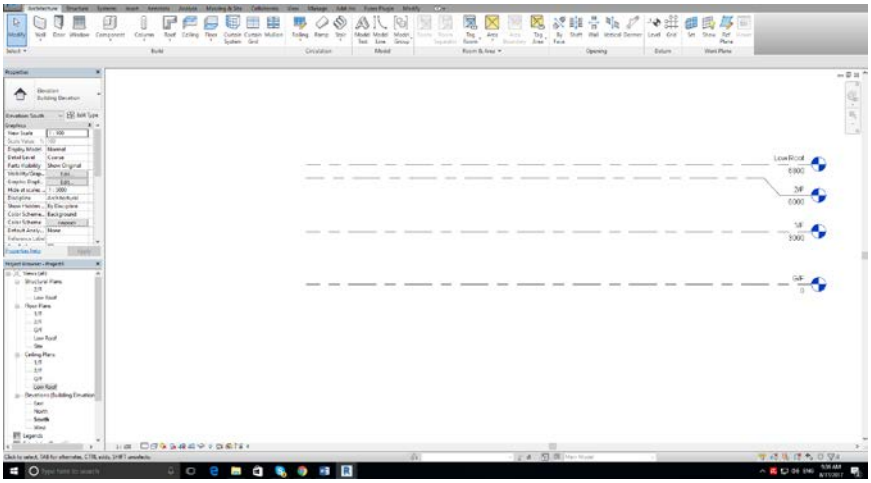
1. Stretch the level lines and lock it with the other lines and rename the three levels.



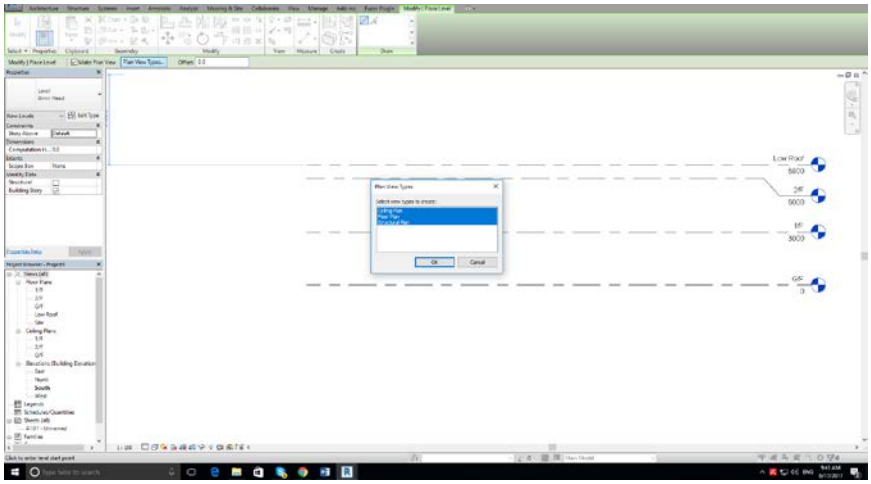
2. Create a new level and name it as Low Roof, adding an elbow to 2/F will make the annotation clear.



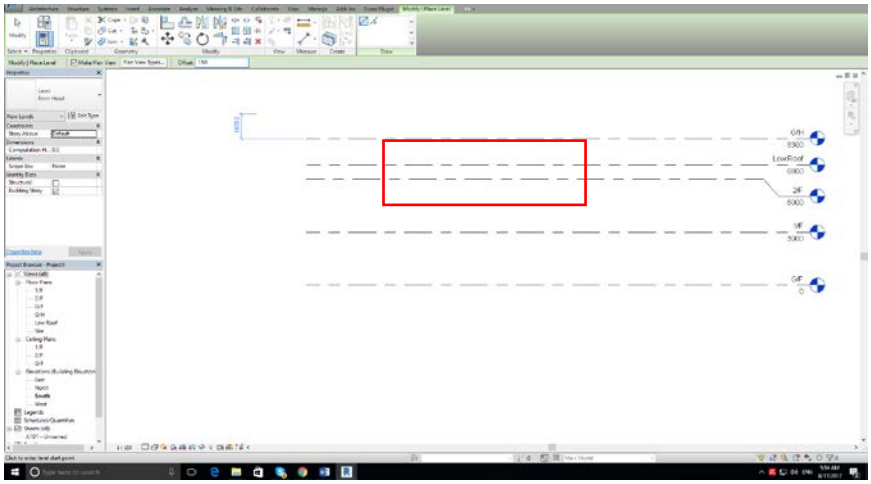
3. The Project Browser, where plan views can be deleted, delete all structural plans and low roof ceiling plans.



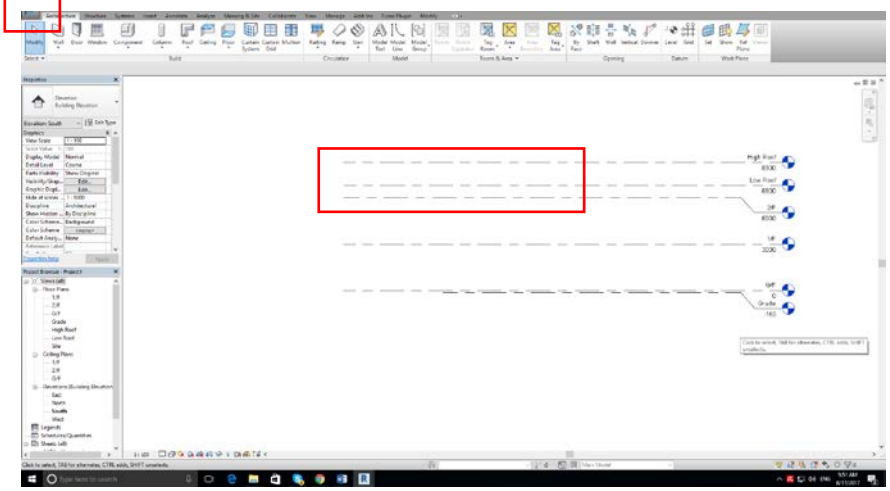
4. Click on the level button, select Plan View Types, select the view types and create another level.



1. Click on the level button, type in an offset value; a level line will be created from an original level.



2. Click on the line, to offset a new line from the original line.

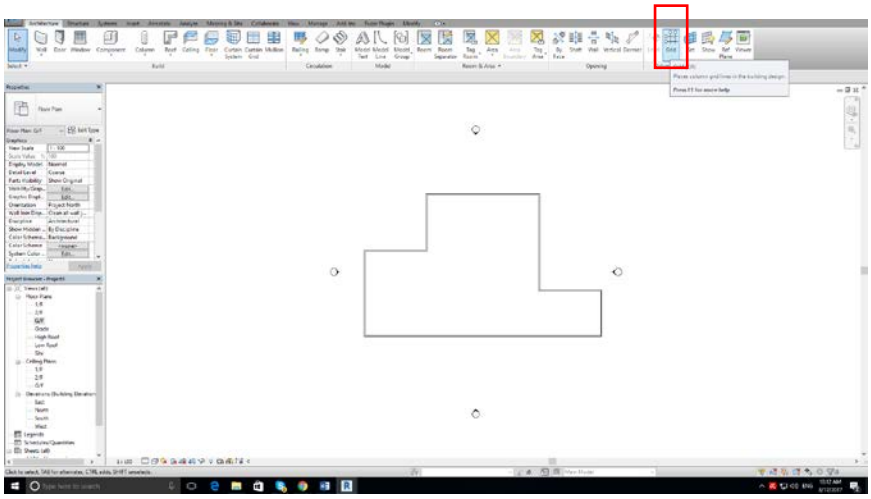


1.5 Adding Grids

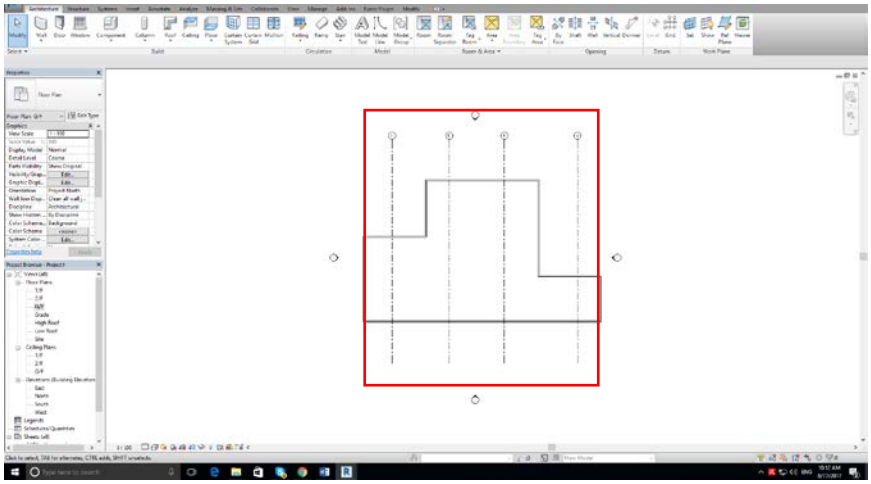
Grids provide organization and structure to the project. Grids serve to locate the structural columns in the project and provide key points of reference, reviews, and sheets.

1.5.1 Creating Grids:

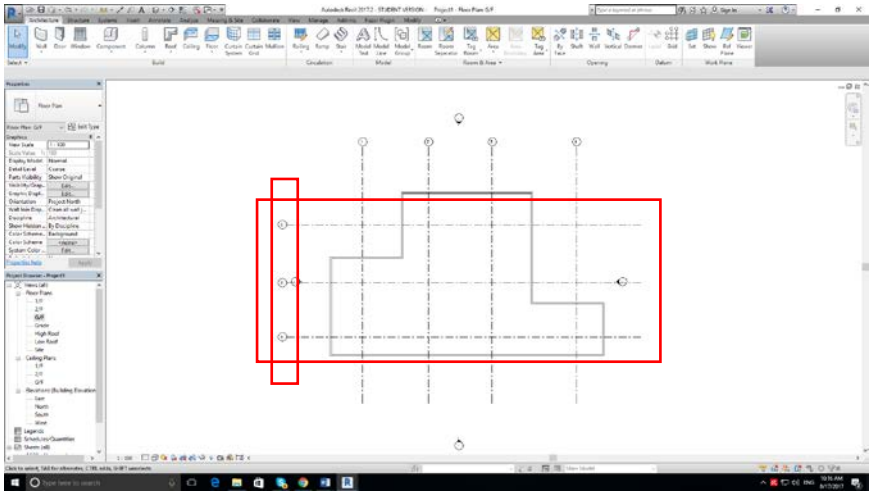
1. Open G/F Plan View, and click on to the Grid Command.



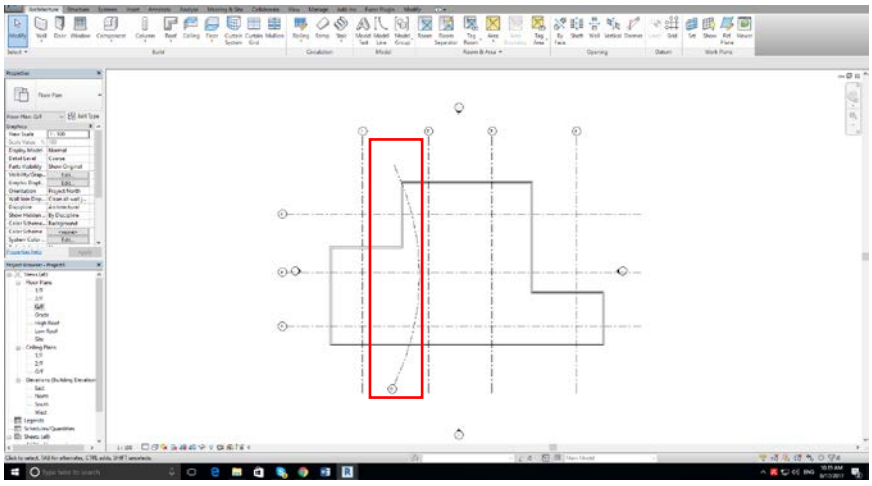
2. Click on a random space on the plan and pull down a Grid Line, they will be named with numbers.



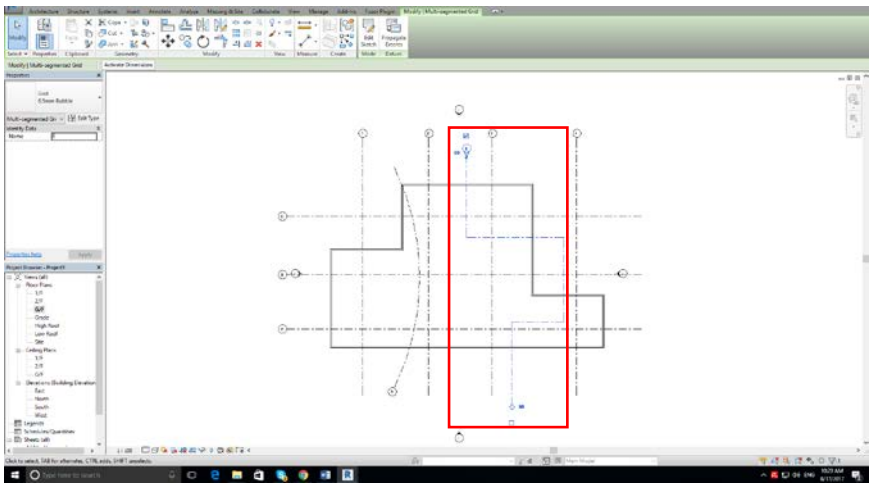
3. Draw a horizontal and change the name to Alphabets, the following grids lines will be named in alphabetical order.



4. Grid Lines can also be drawn with curves, select the Arc Commands and draw a Curve Grid Line.



5. Grid Lines can also be drawn with line segments, select the Multi-Segment Command and draw some line segments.

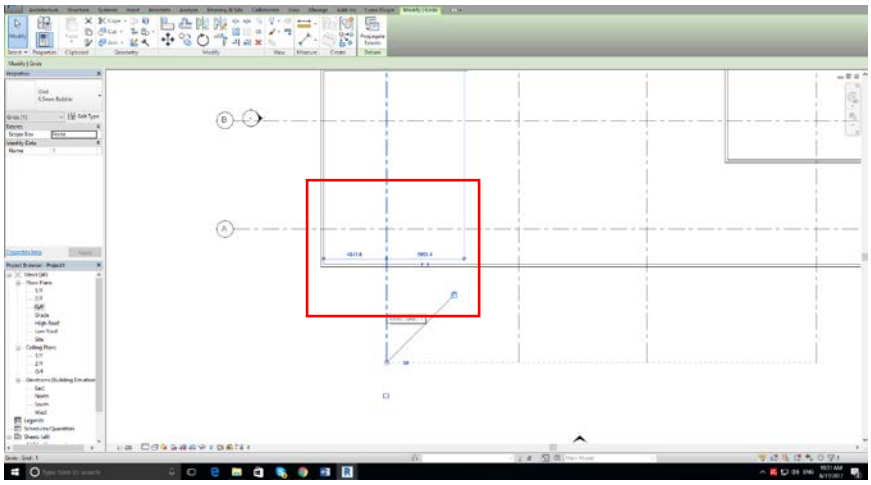


1.6 Refining a Layout with Temporary Dimension

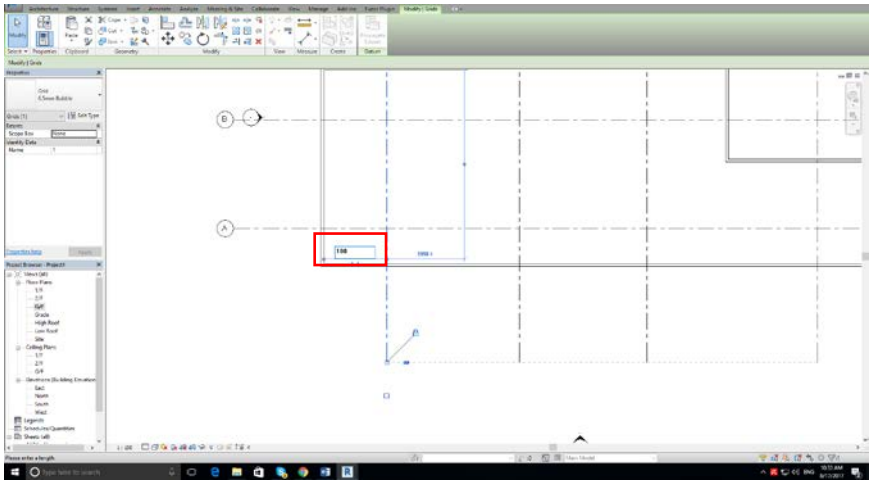
Grids are laid out in a very general location in the previous topic. In this topic, grids are modified to a very precise position.

1.6.1 Precise Grids:

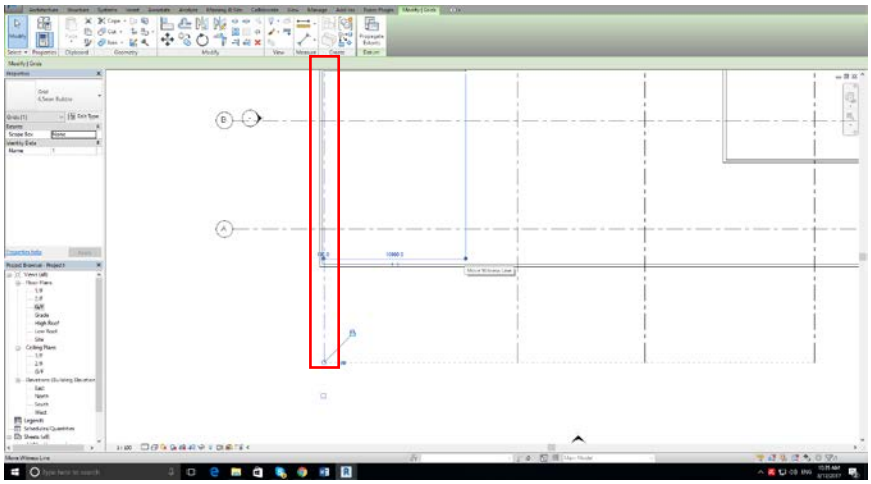
1. Press on a Grid Line; temporary dimensions will appear.



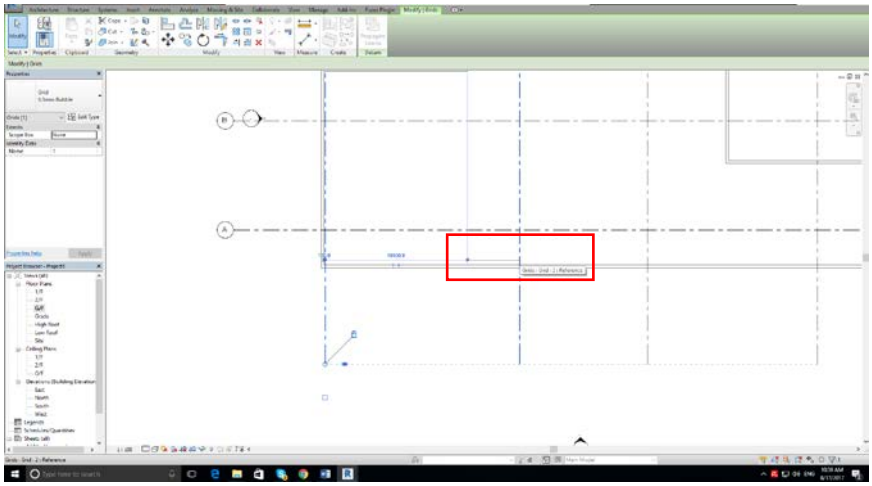
2. Click on the Dimensions and type in a new value.



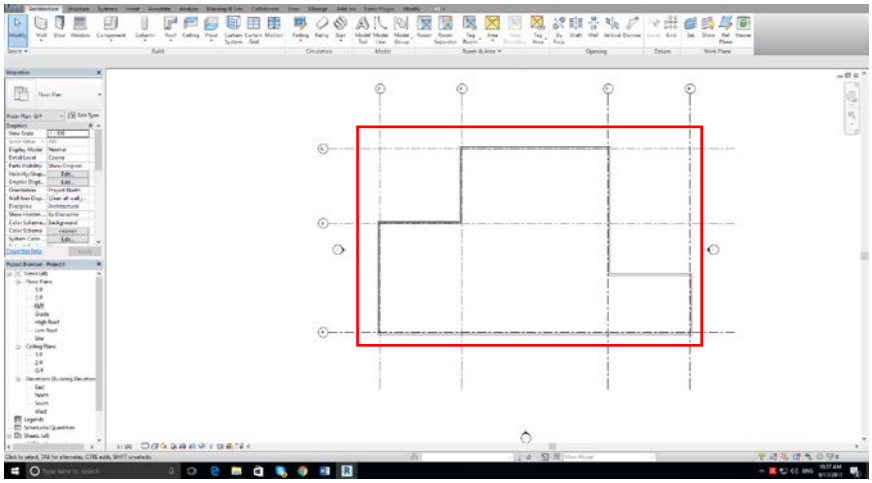
3. Click enter and the Grid Lines will move.



4. Drag the blue circle to the next grid line and type in the distance Between the two grid lines.



5. By adjusting the temporary dimensions of the grid lines, a refined Grid system can be made.

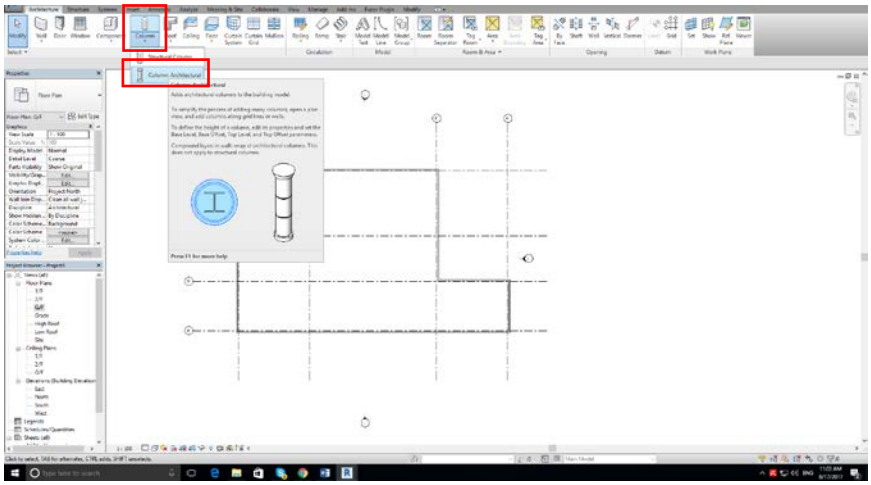


1.7 Adding Columns

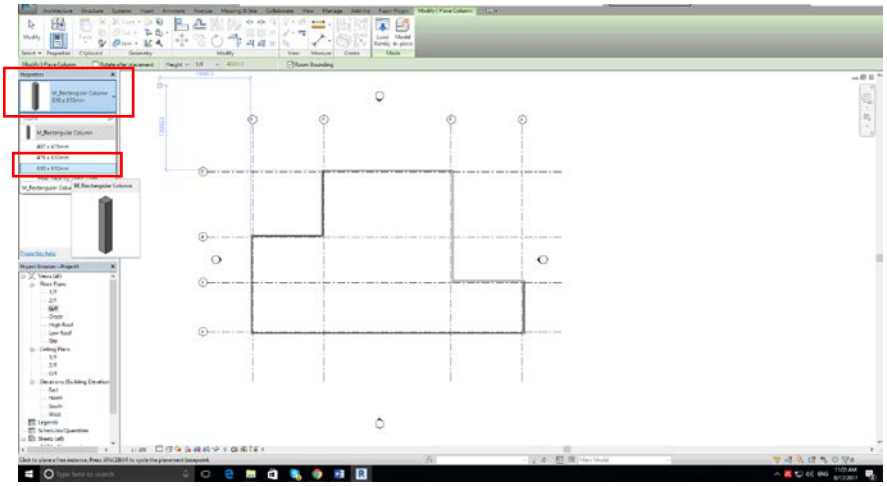
Revit has two different kinds of columns that we can use. There's architectural columns and structural columns. Architectural column is a simple version of a column with finishing, and structural column is the actual structural material.

1.7.1 Architectural Columns:

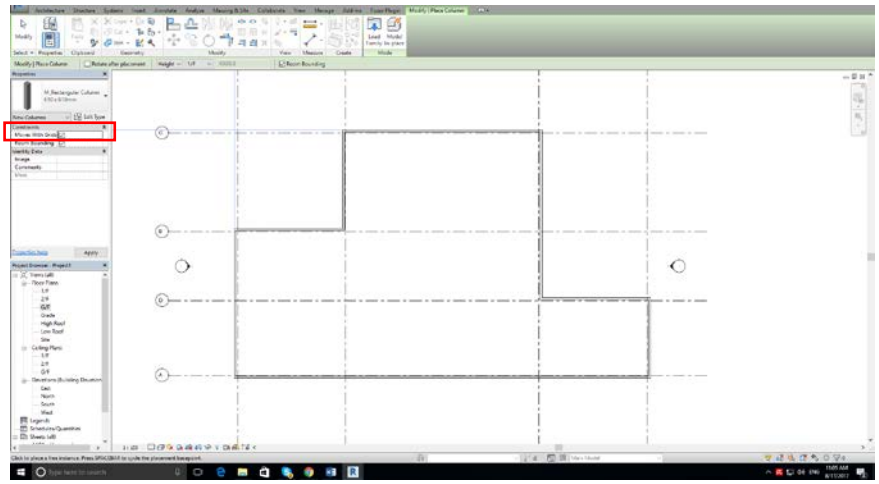
1. Click on the Column command and choose Architectural Column under the command.



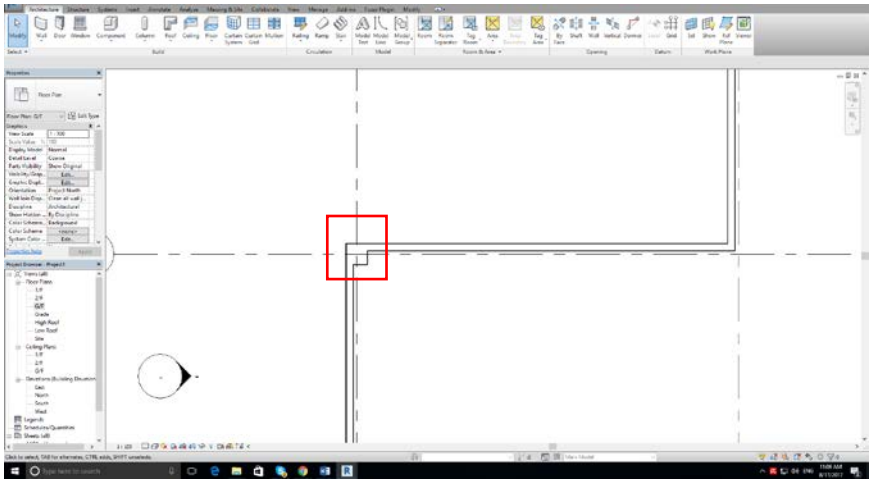
2. Choose the appropriate column type.



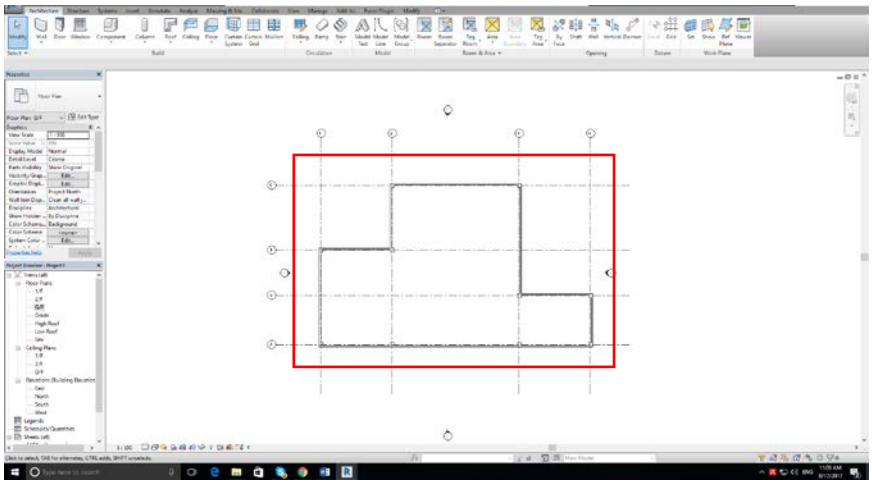
3. Check the Moves with Grids box which make the placed columns follow the grid lines.



4. Click on an intersection of grid lines; columns will be created, the columns will merge with walls.

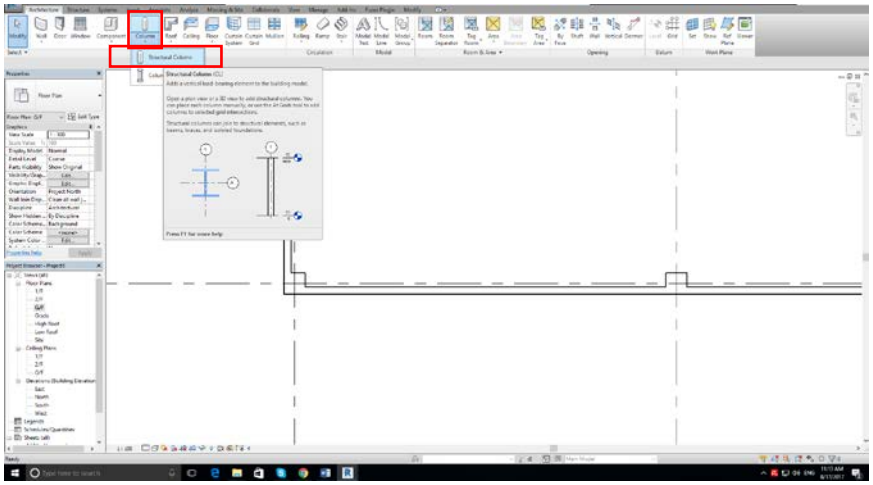


5. Create a system of columns at the intersection of walls.

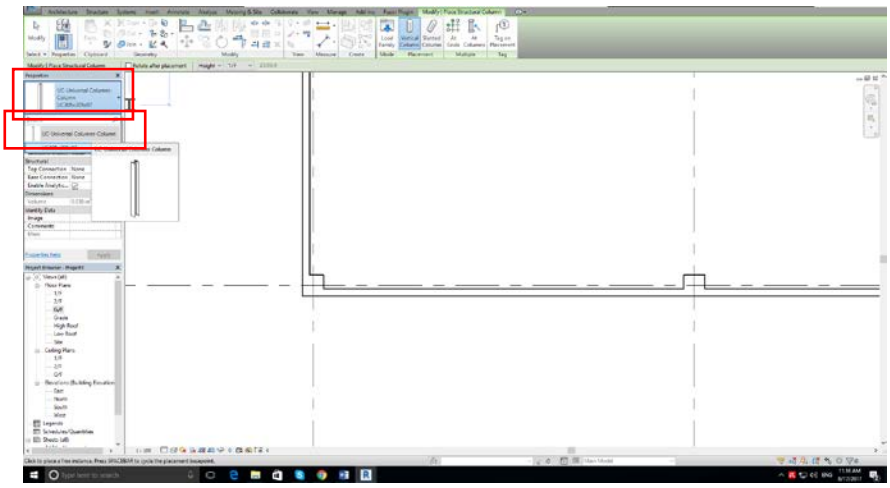


1.7.2 Structural Columns:

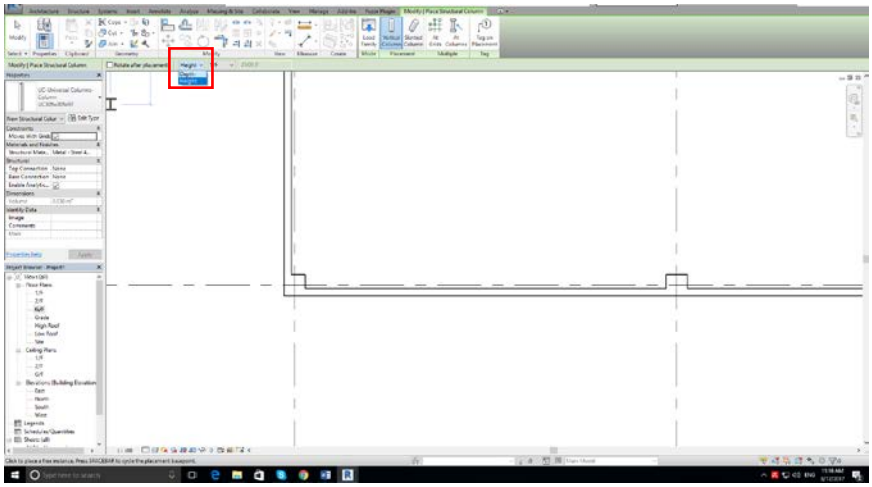
1. Click on the Column command and choose Structural Column under the command.



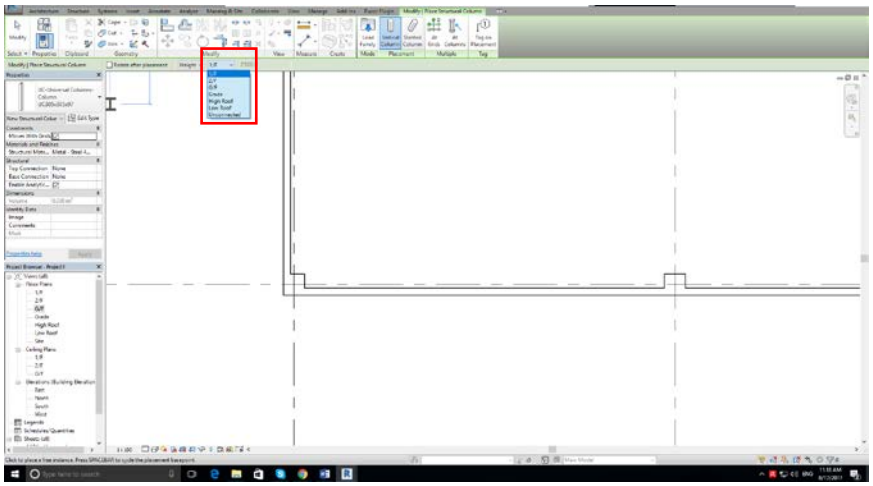
2. Choose a column type.



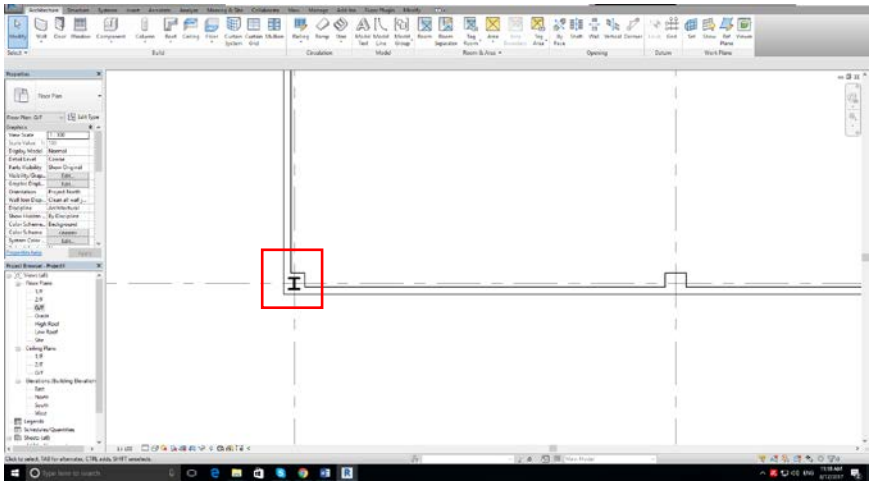
3. Select Height instead of Depth to place a column in a right Position above the selected level.



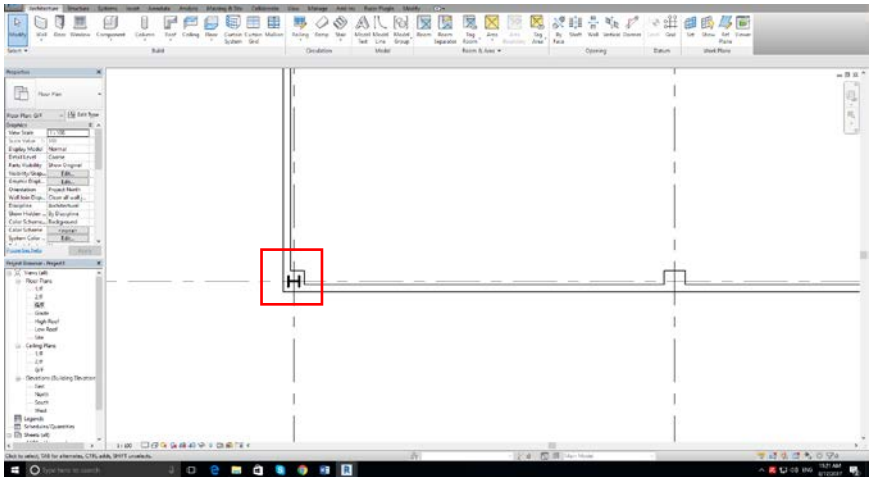
4. Select the level to put your structural column.



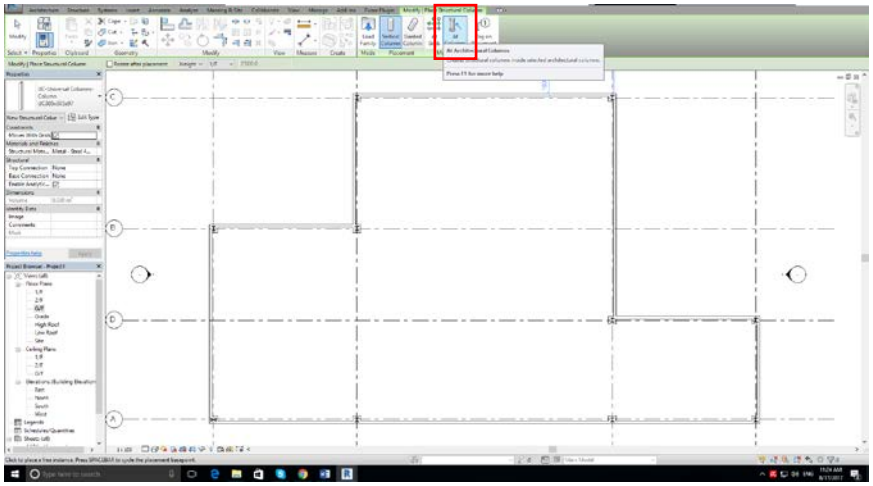
5. Place a structural column within architectural columns; an “H” symbol will appear.



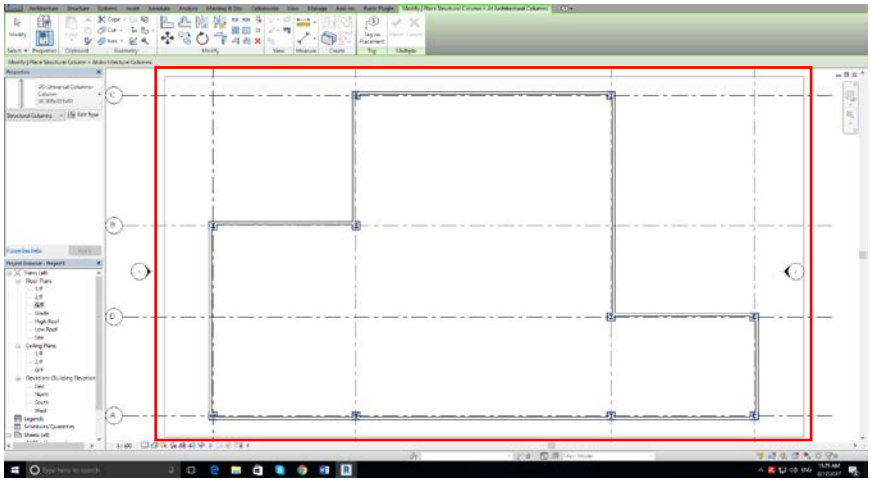
6. Press spacebar and the orientation of the column will change.



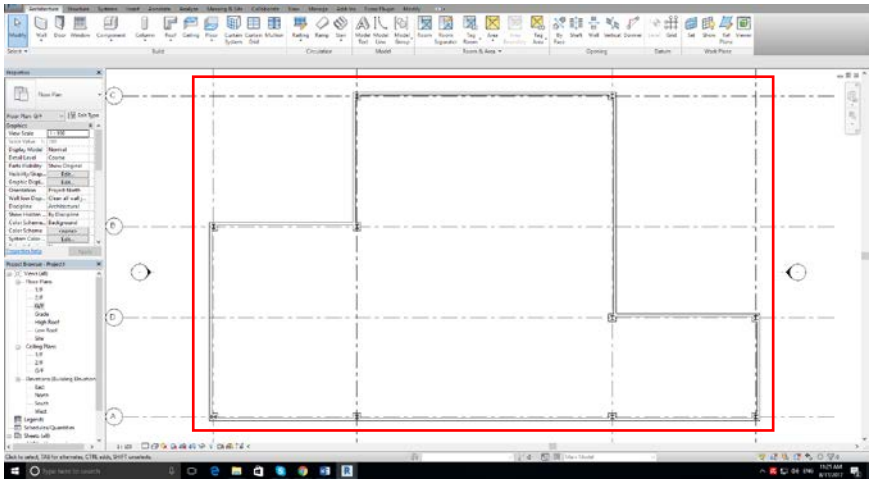
7. Click the “At Architectural Column” command and select all the architectural columns, structural columns will be placed in each.



8. Click on the level button, type in an offset value, a level line will be created from an original level.



9. Click on the line, to offset a new line from the original line.



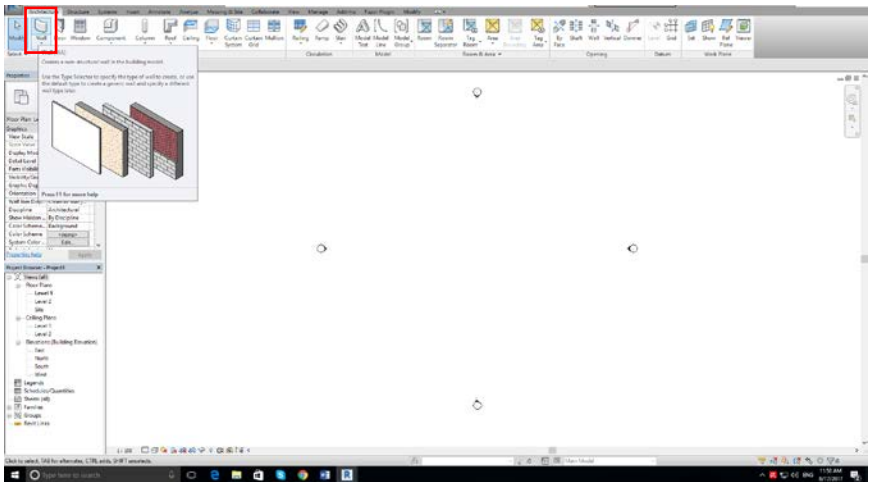
2. Modeling Basics

2.1 Adding Walls

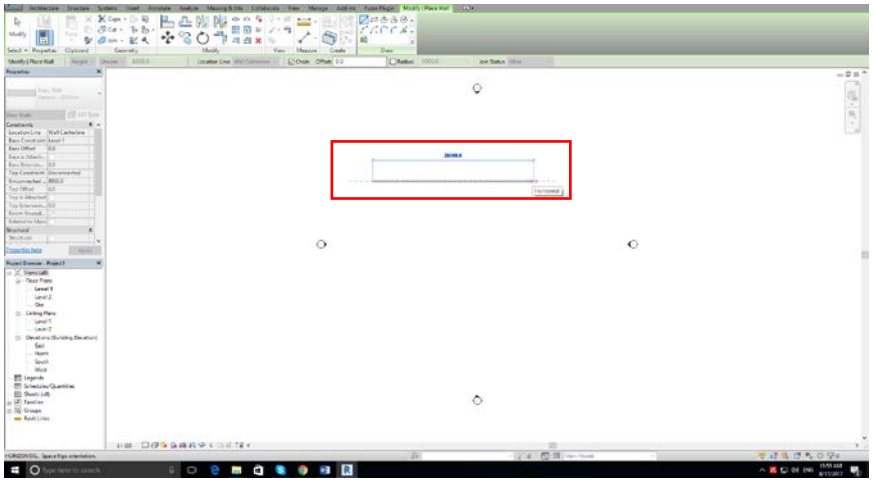
Walls are the most basic building component of the project. Walls have many settings which can be changed after they have been created.

2.1.1 Drawing Walls:

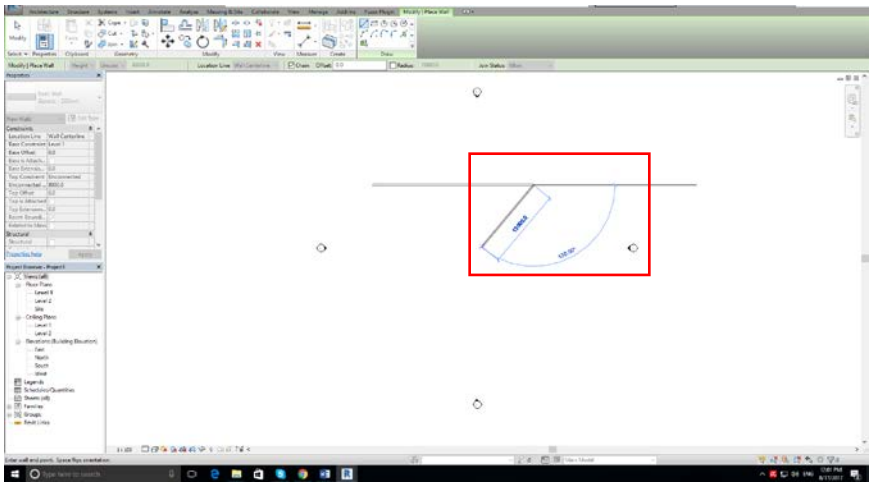
1. Open a plan view and select the Wall Command.



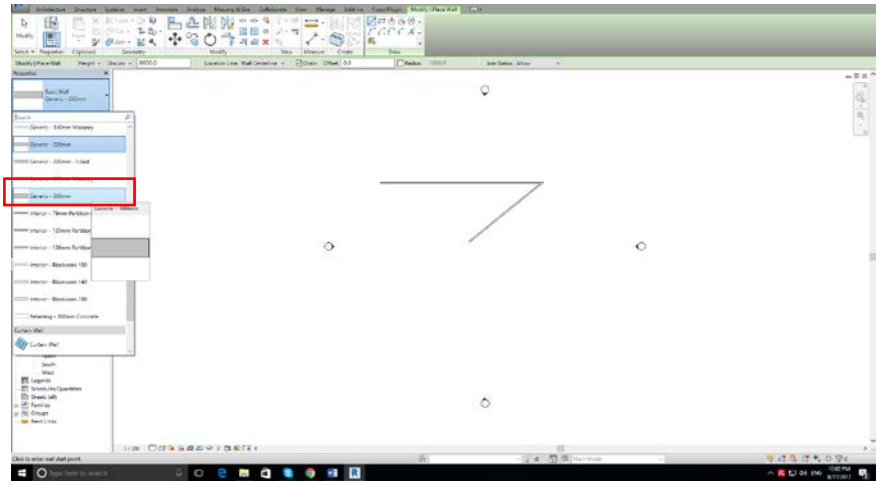
2. Drag Horizontally and create a wall.



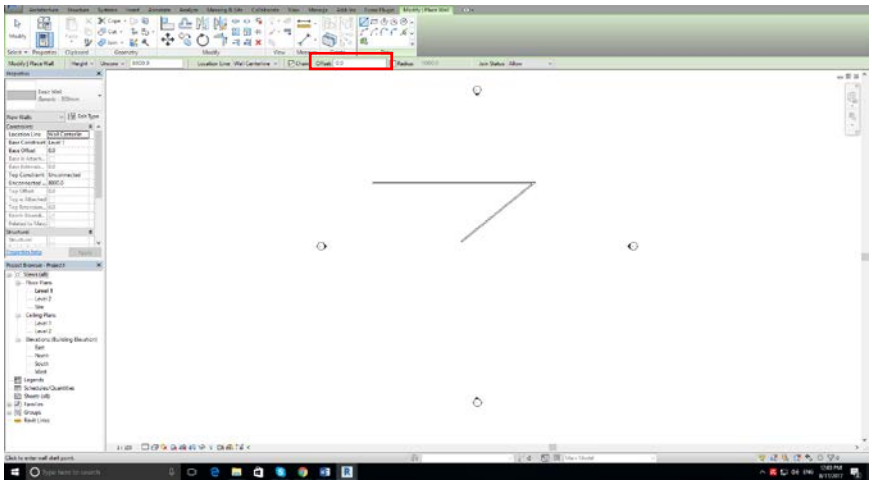
3. Walls can be created at all angles.



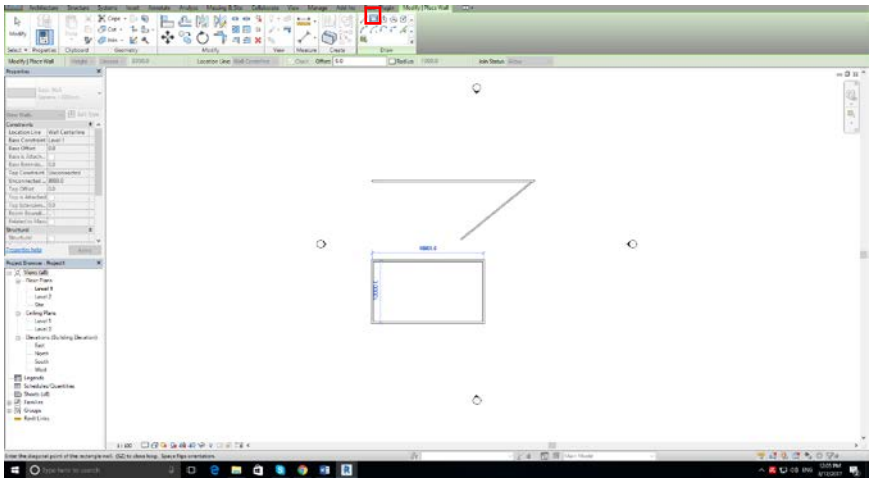
4. Different wall types can be chosen according to the design.



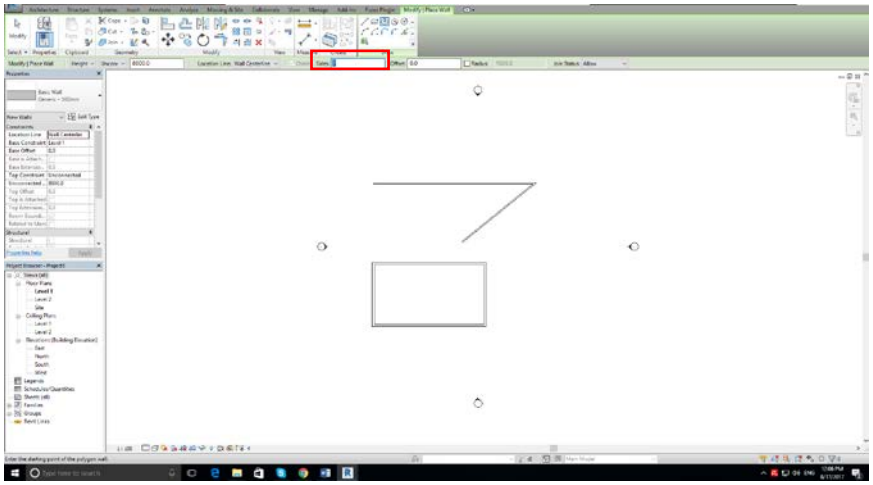
5. Click on the line, to offset a new line from the original line.



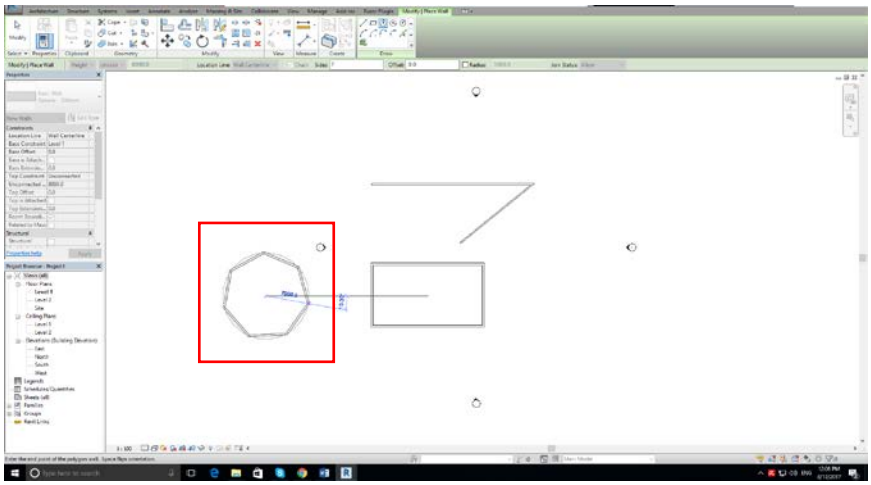
6. Use the Rectangle Tool to create a rectangular wall.



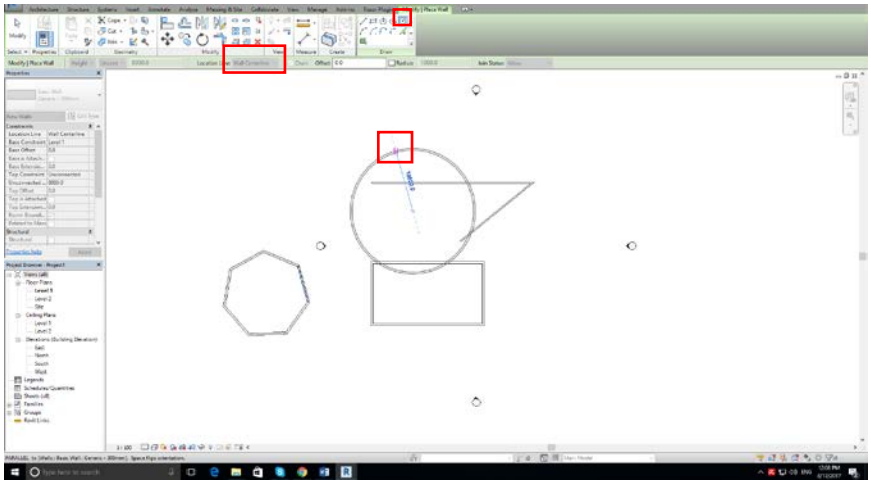
7. There are different tools to create walls of different shapes.



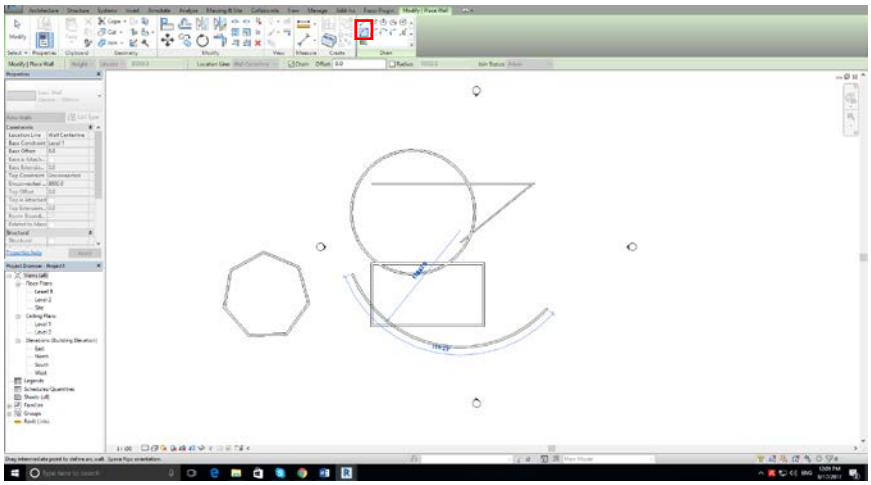
8. Type in the number of sides to create polygons.



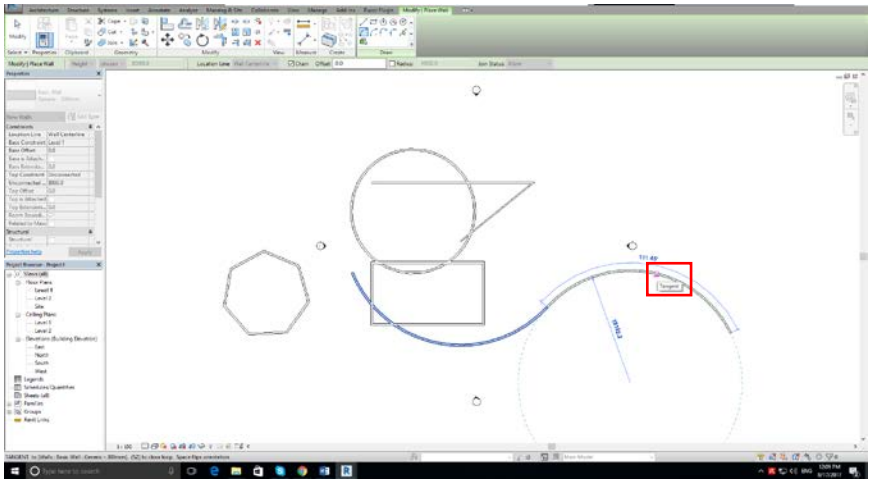
9. Click the Circle Tool where you can select the radius set to the exterior, center, interior of the circle.



10. Click the Arc Tool to create a curve.

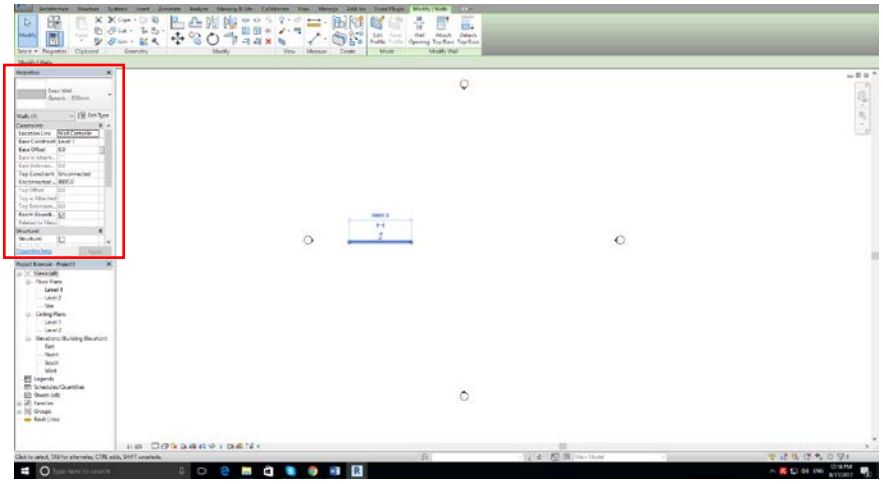


11. Draw another arc, and it will be snap at its tangent.

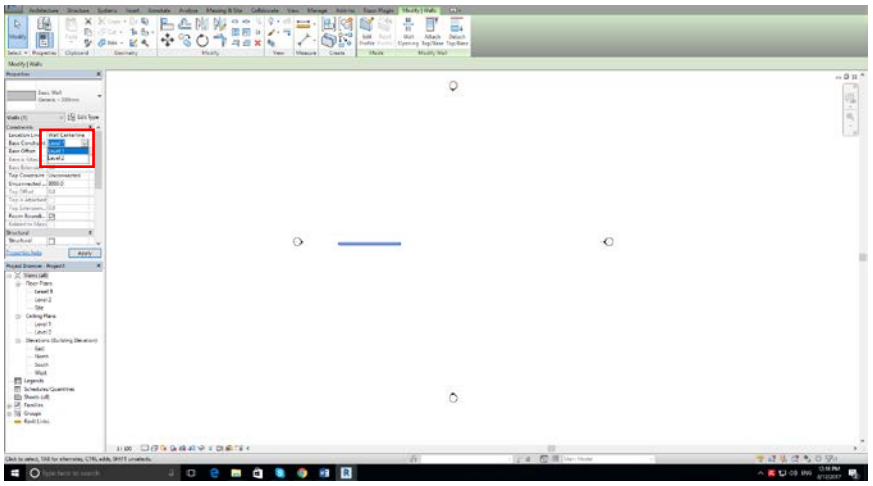


2.1.2 Walls Height:

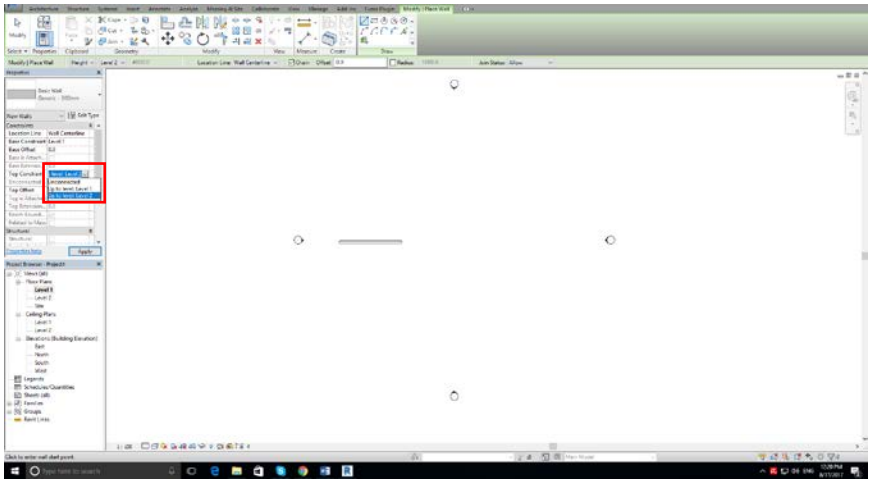
1. Draw a Wall, the properties of it are on the left.



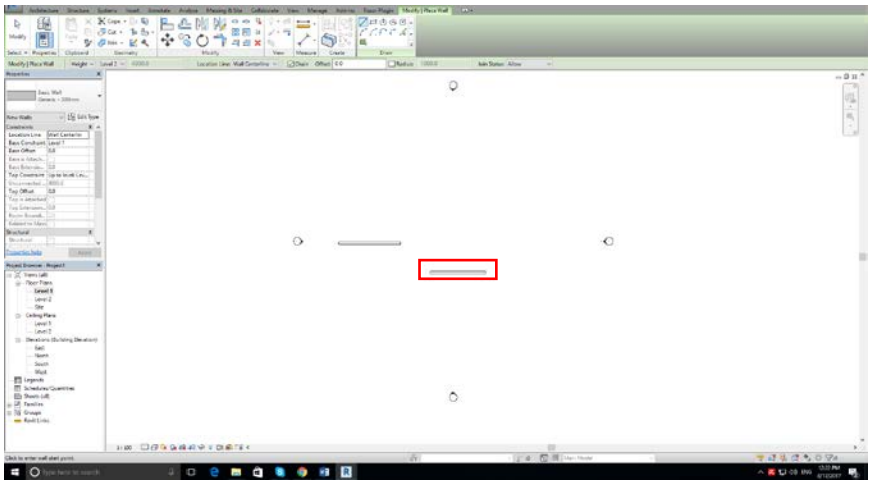
2. The Base Constraint is bottom level of the wall, set it to level 1.



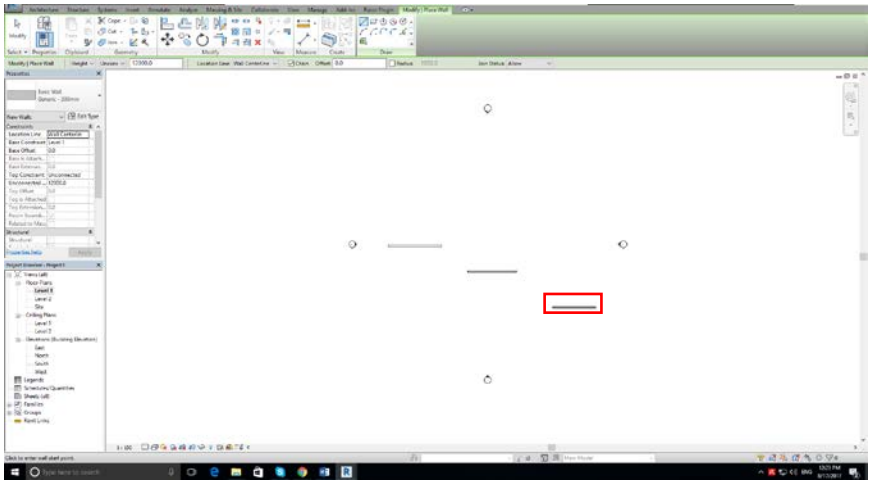
3. Click the Top Constraint can be set to a level or an actual value.



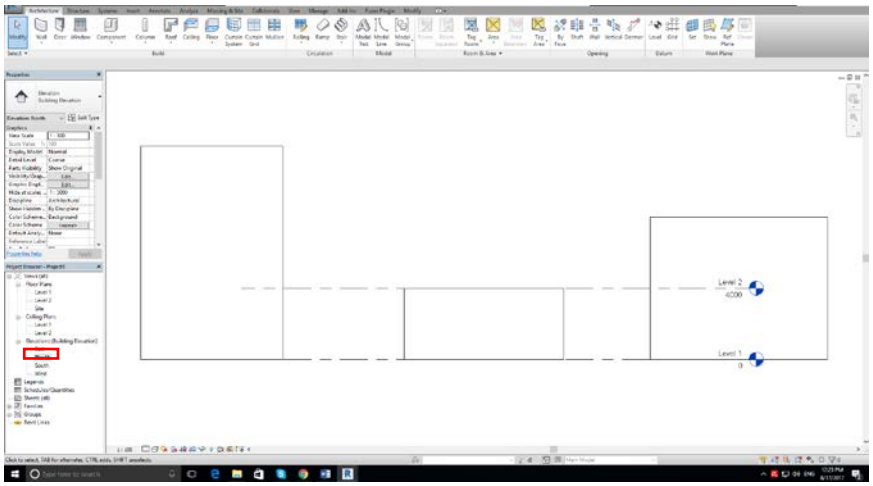
4. Draw another wall, set the top constraint to “up to level 2”.



5. Click Draw the third wall and select unconnected, type in height, it is not possible to see any difference in plan view.



6. Click Change to Elevation View, walls of three different height will be shown.

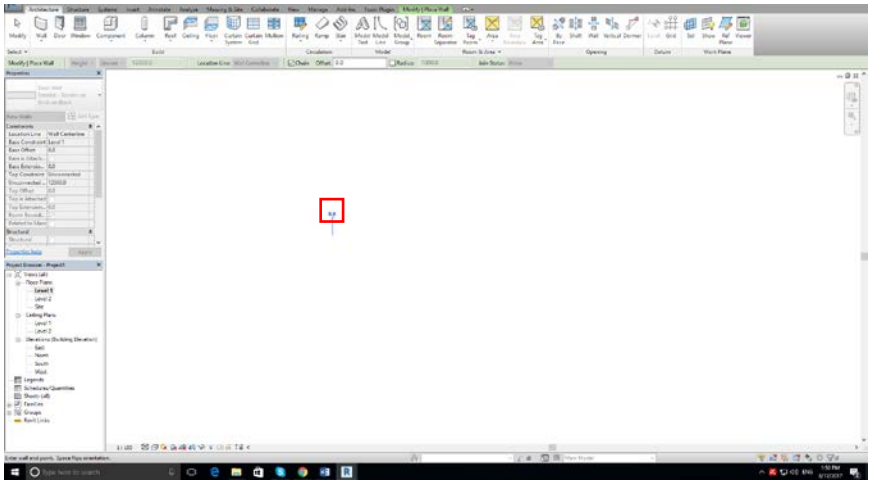


2.2 Using Snap

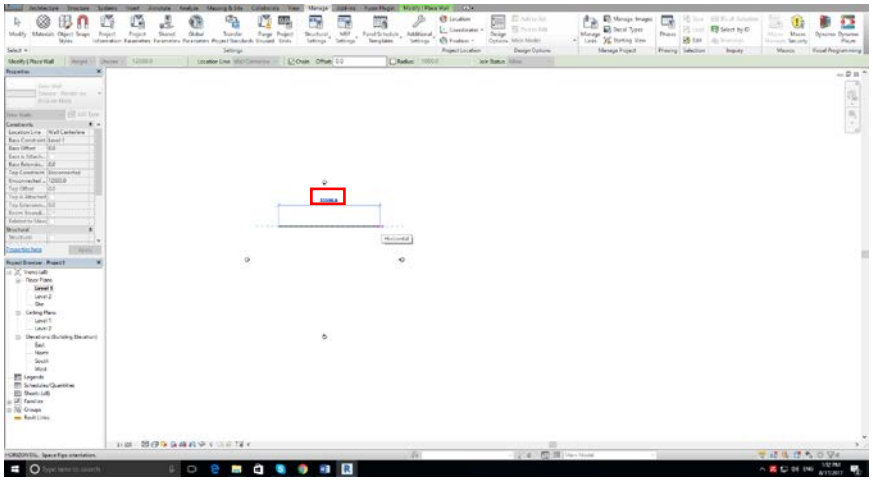
Revit has two basic kinds of snapping behavior, Increment Snapping Behavior and Object Snapping Behaviors.

2.2.1 Wall Layers:

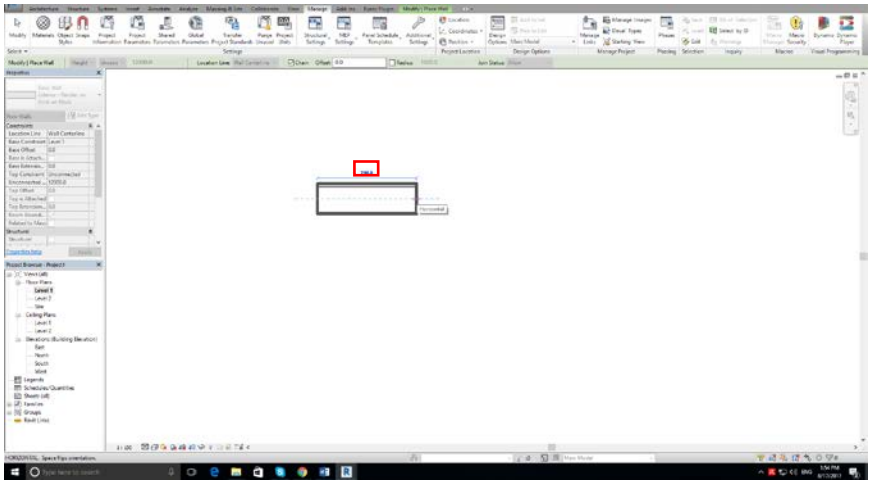
1. Select the Wall Command and click on empty space, it will show a coordinate of (0,0), every snap starts with (0,0).



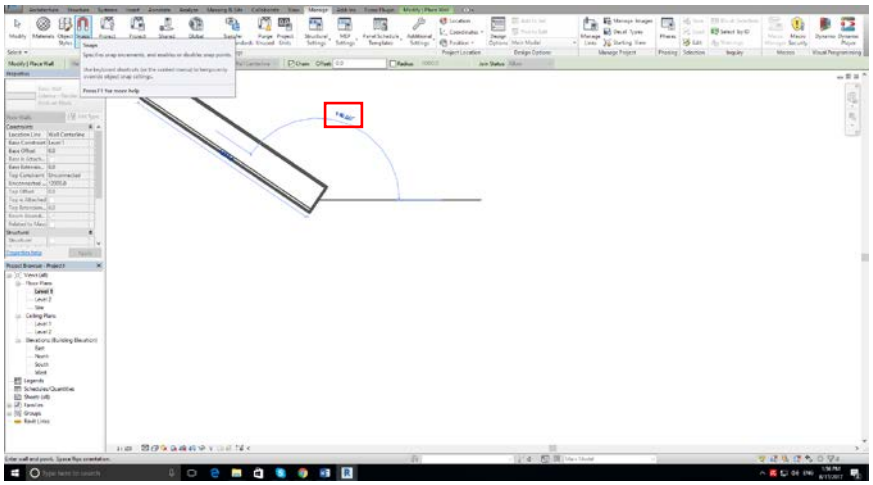
2. The dimension of a wall snaps at every 1000 when it is zoom at this distance.



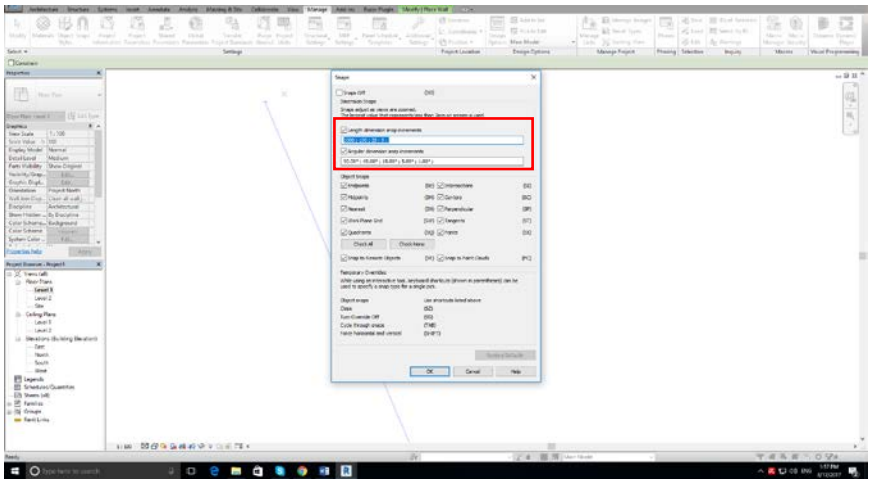
3. Zoom in, and the value of snap changes to every 20, the snap becomes smaller the closer you zoom.



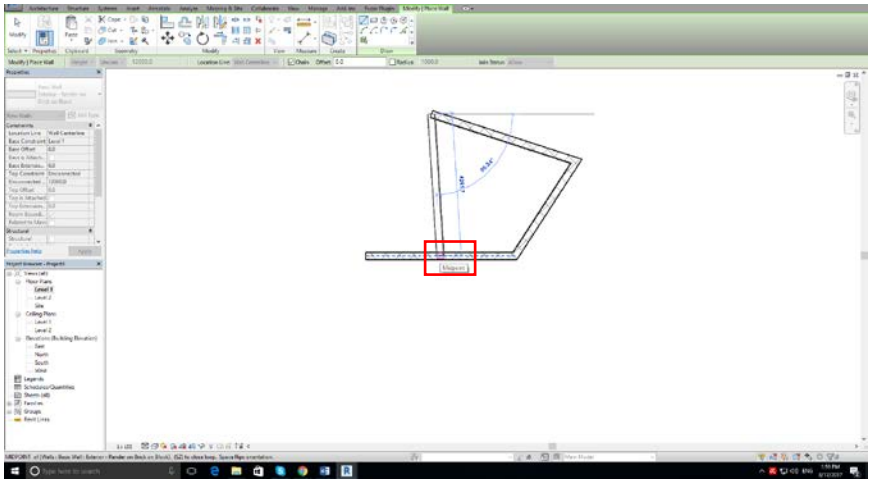
4. Click The angle also snaps in the same way, click the Snap command on the top left corner.



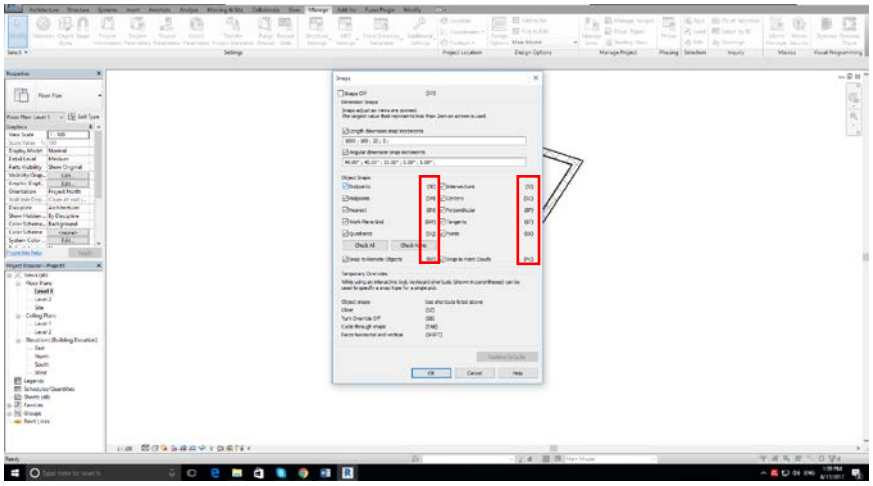
5. The snap properties: Length increments and angular increments can be controlled here, type in your values.



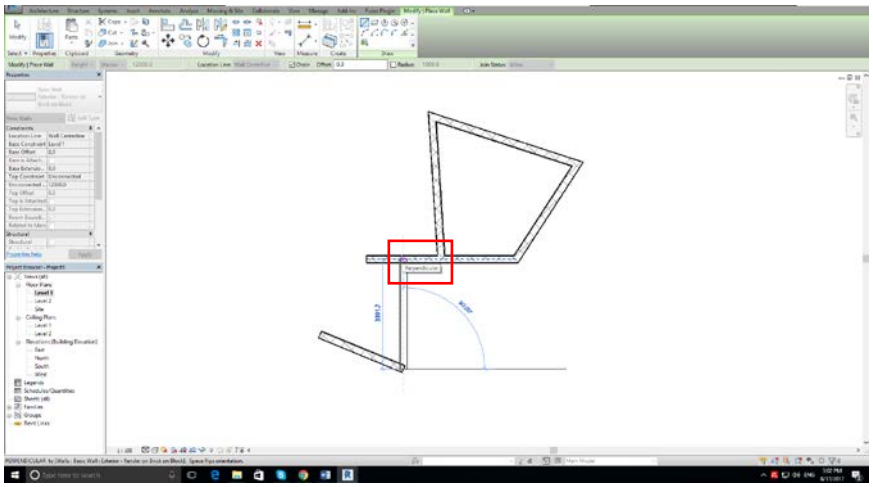
6. Click The object snapping behavior shows different snaps, for example: End, Midpoint, Tangent, Perpendicular, Center.



7. Go to Snap Properties, select the object snap by checking the box, a short form of the snap is written on the side.



8. Draw a wall and type in SP; it will snap Perpendicular, after one click it will snap to any other object snap.

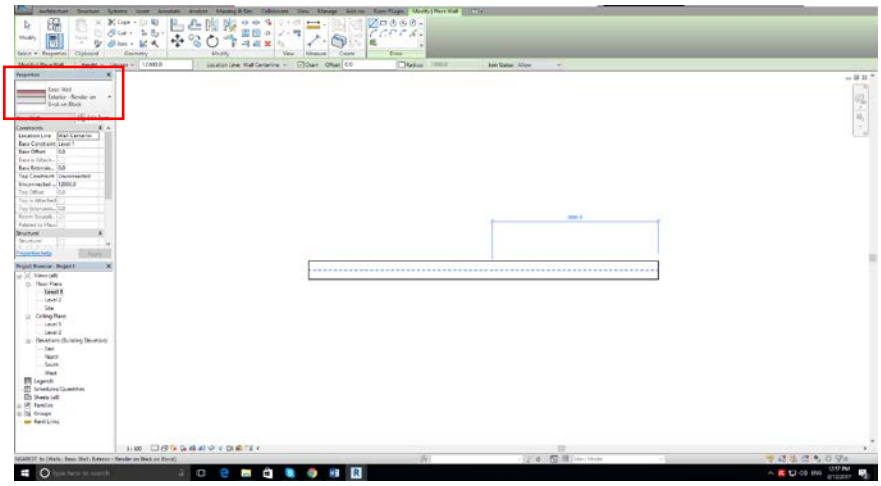


2.3 Wall Properties and Types

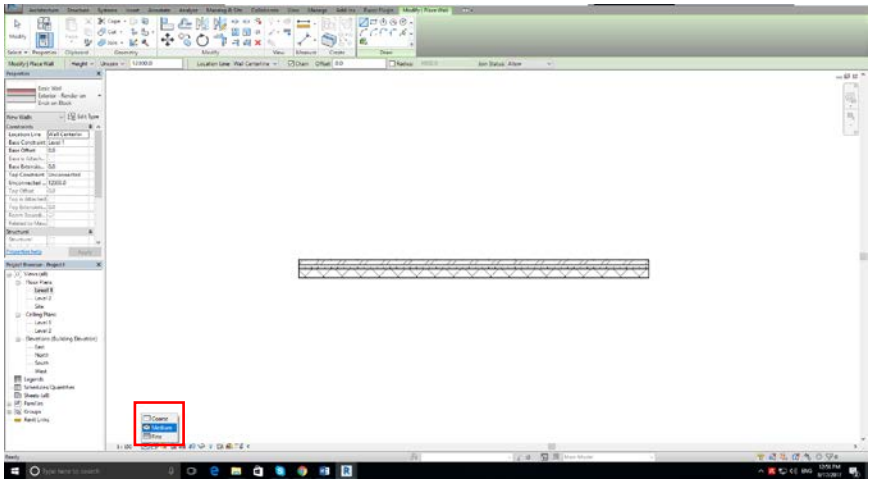
Walls have a lot of different properties, layers within the wall, location line, structure and non-structure can be changed here.

2.3.1 Wall Layers:

1. A wall contain different layers, for example: insulation, structure, drywall, finishing, etc.

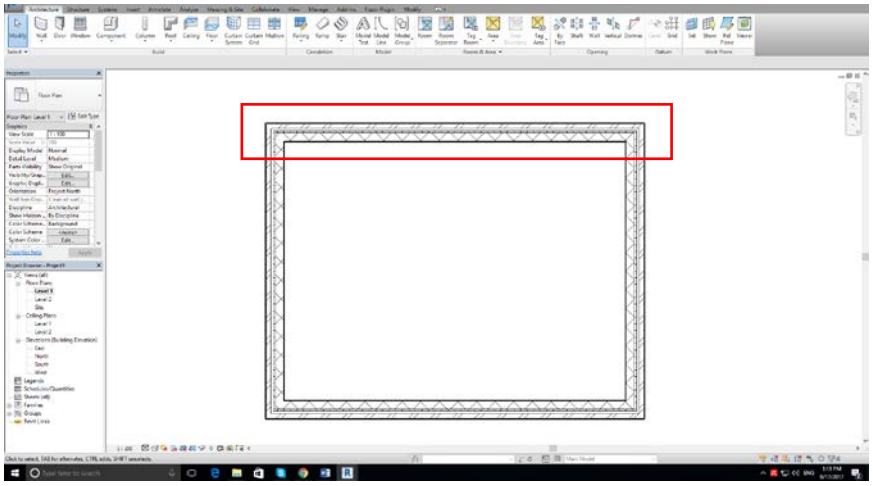


2. Level of details is selected to be Coarse, change it to medium or fine, layers within walls will be shown.

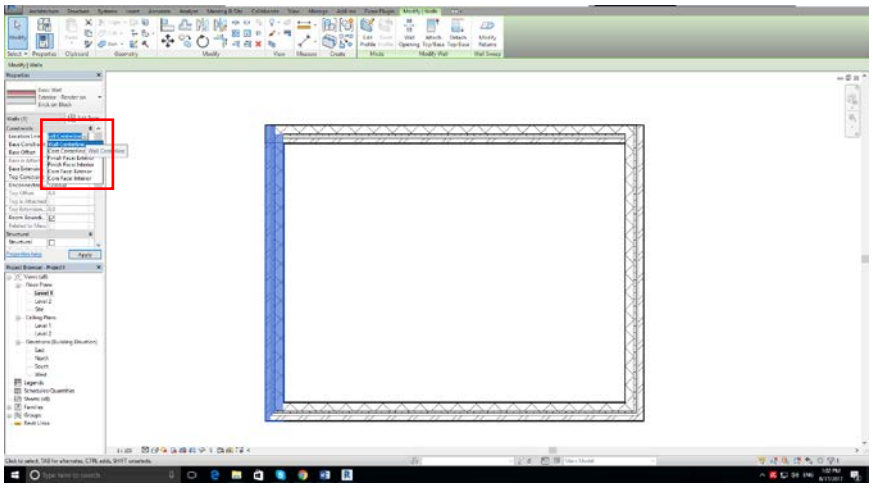


2.3.2 Wall Location Line:

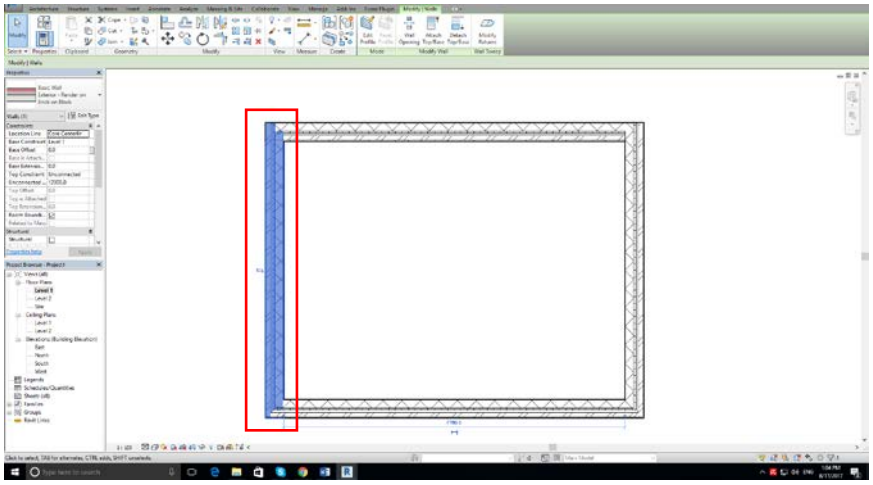
1. Draw a rectangular wall with layered walls; the layers connect to each other at the corners.



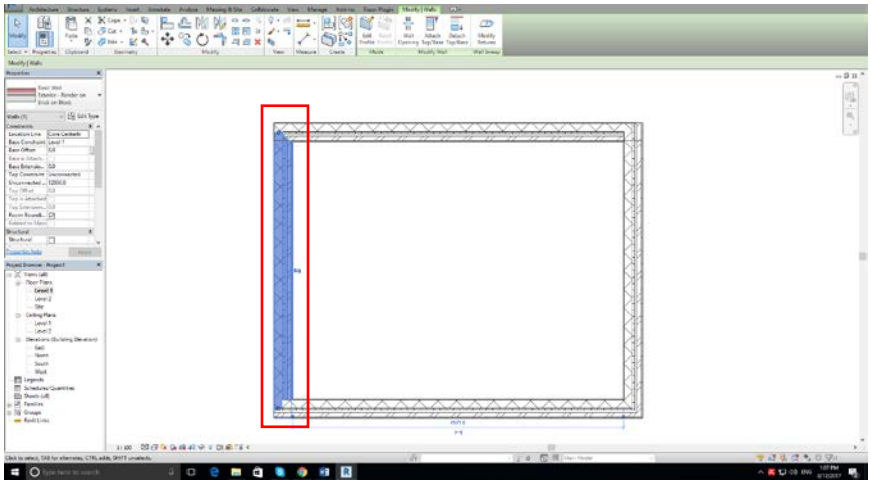
2. Click Location line is where to define the wall, change it under wall properties.



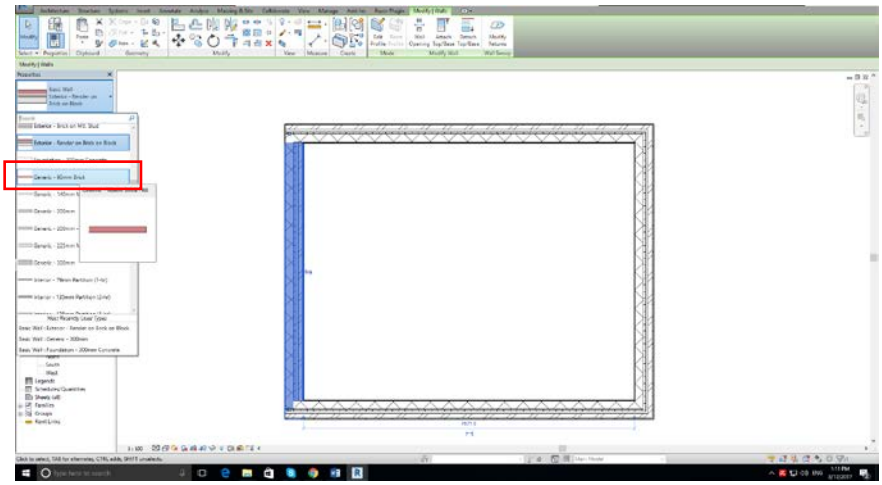
3. Select different type to try it out; Core Centreline is selected here.



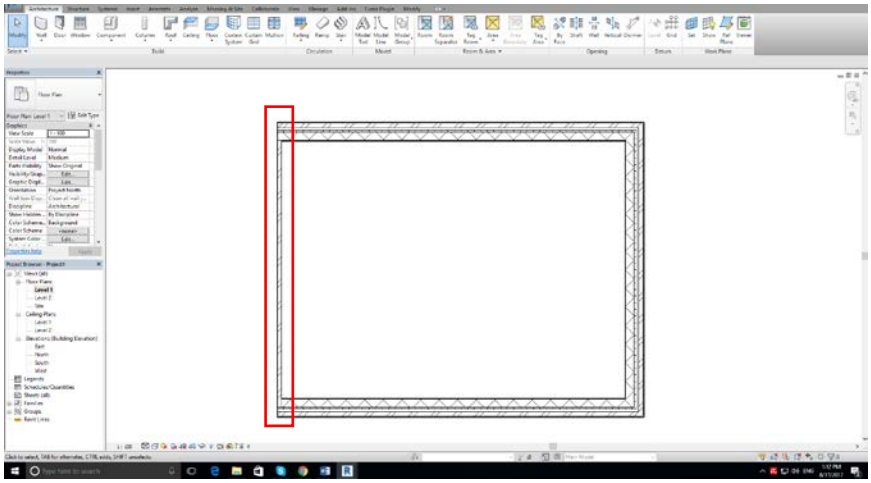
4. Click Press Spacebar to reflect the wall, the location line is used as the axis of symmetry.



5. Choose another type of wall to see the effect of location line.

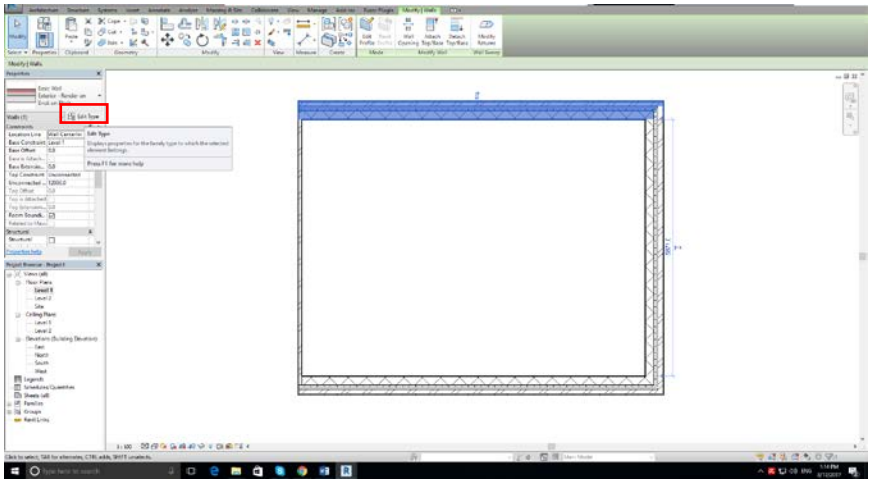


6. The new wall uses the same location line.

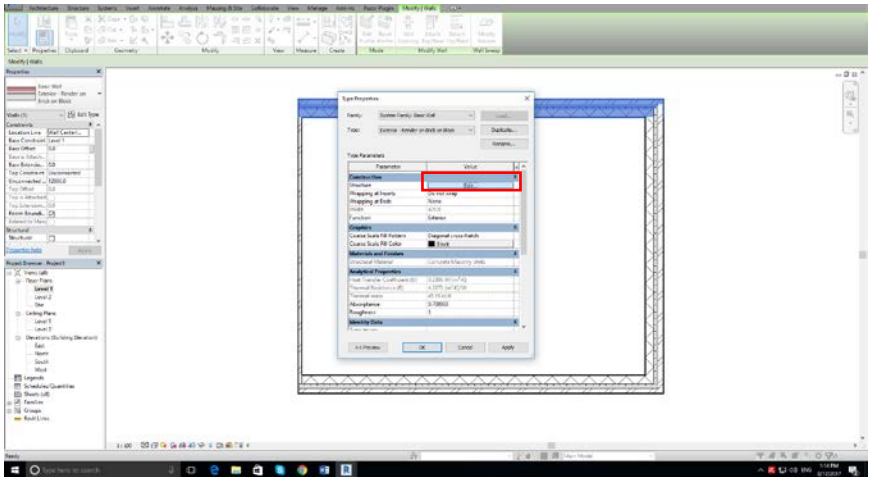


2.3.3 Edit Wall Type:

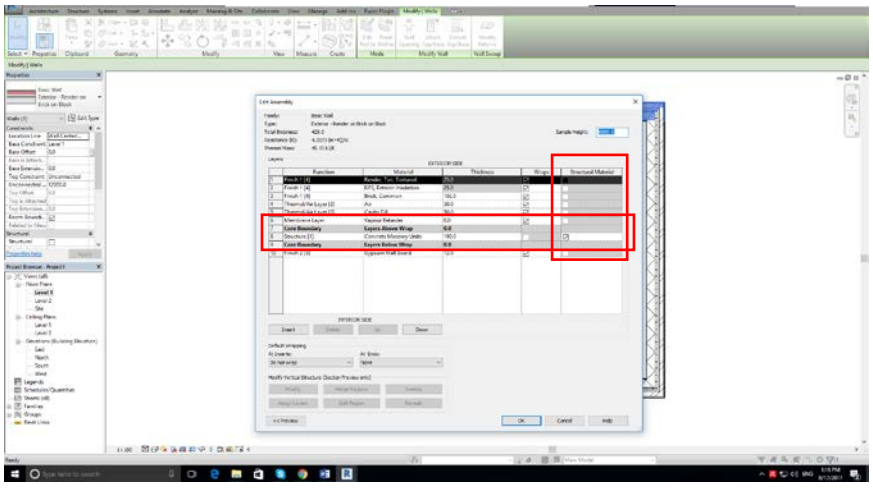
1. Click Edit Type in Wall Properties to change the composition of different layers of the wall.



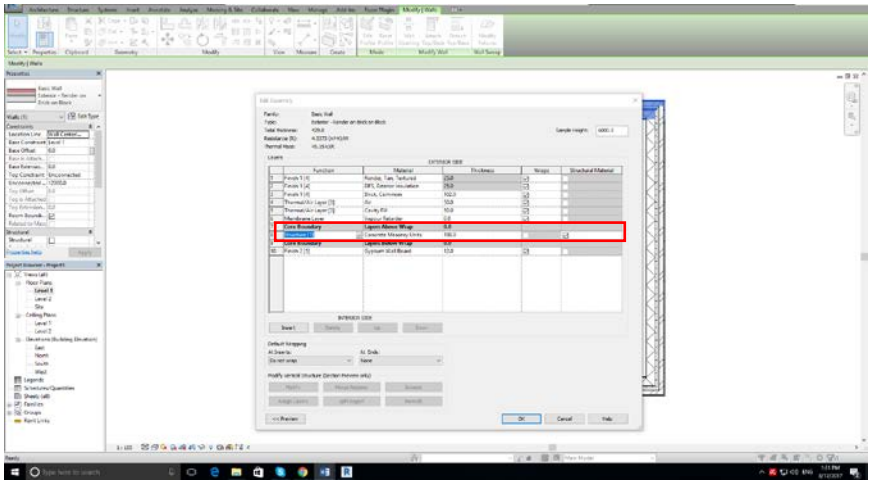
2. In Type Properties, choose Edit Structure.



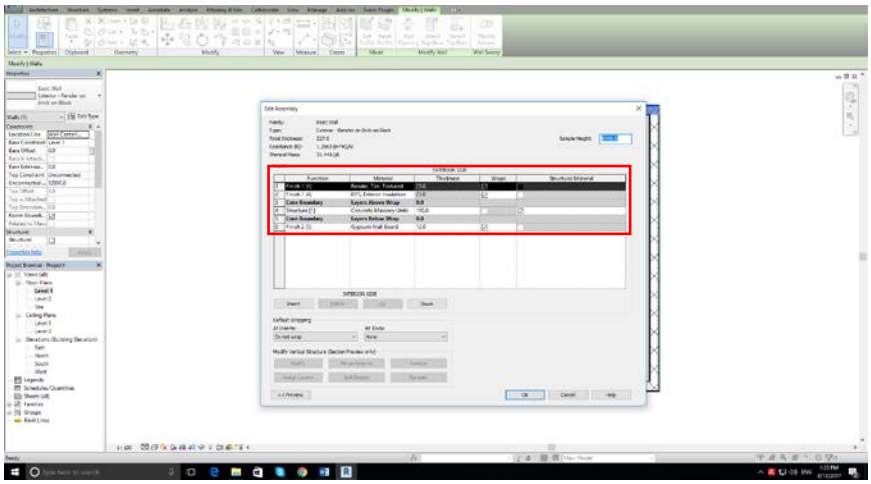
3. Layers of wall is shown, function, material, thickness can be altered, only one layer is selected as a structural material.



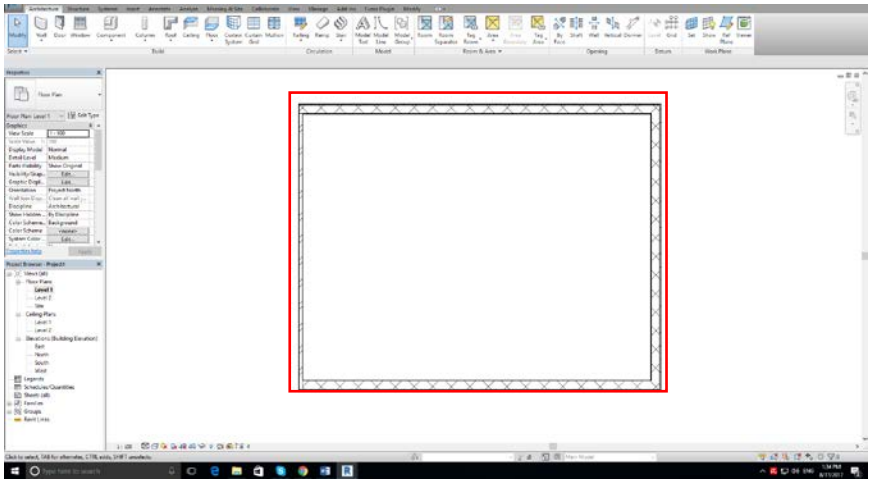
4. Click There must be at least one layer between core boundaries, and core boundaries do not have any thickness.



5. Click Layers outside core boundaries can be deleted while the structural material cannot be deleted.



6. Press OK and the changes will be shown in the plan view.

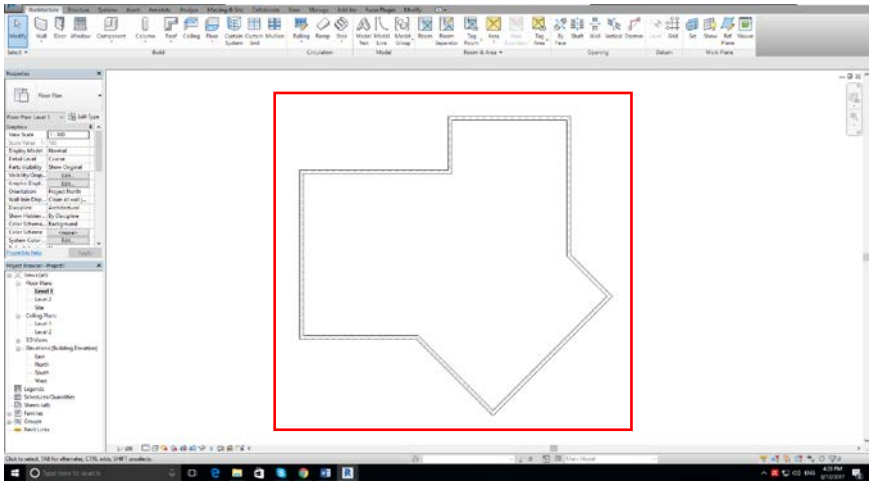


2.4 Locating Walls

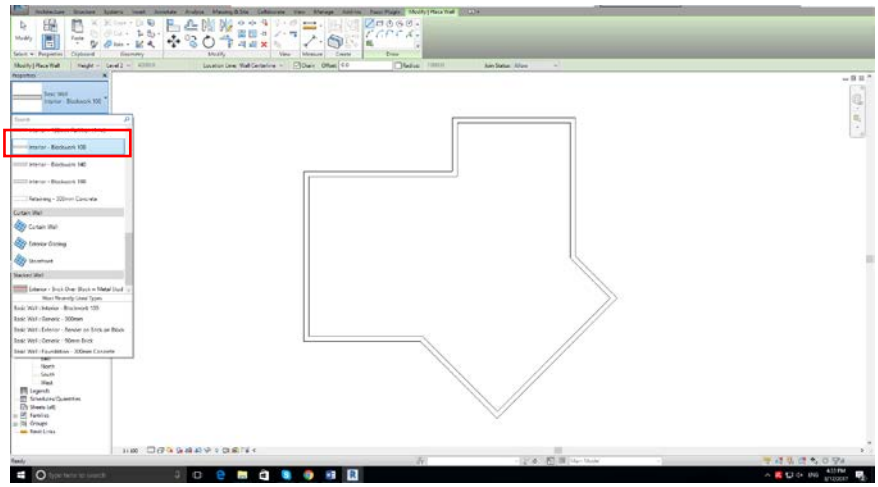
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

2.4.1 Wall Layers:

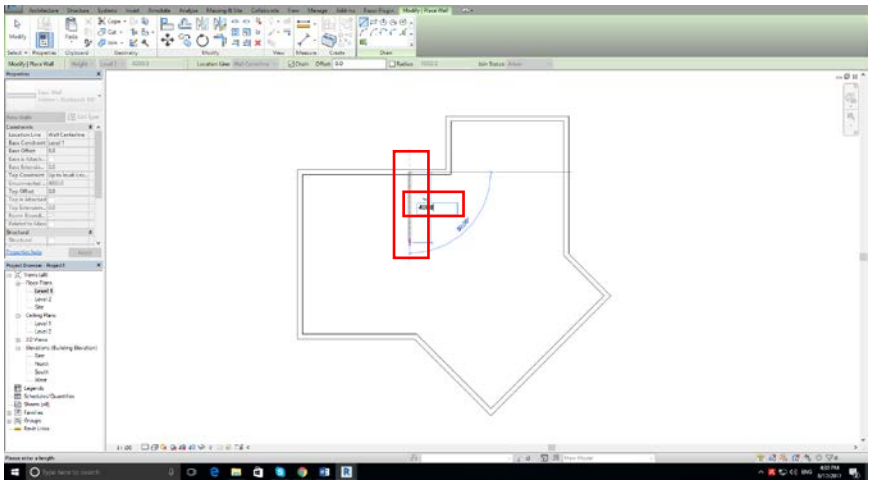
1. Draw a shape will the Wall Command.



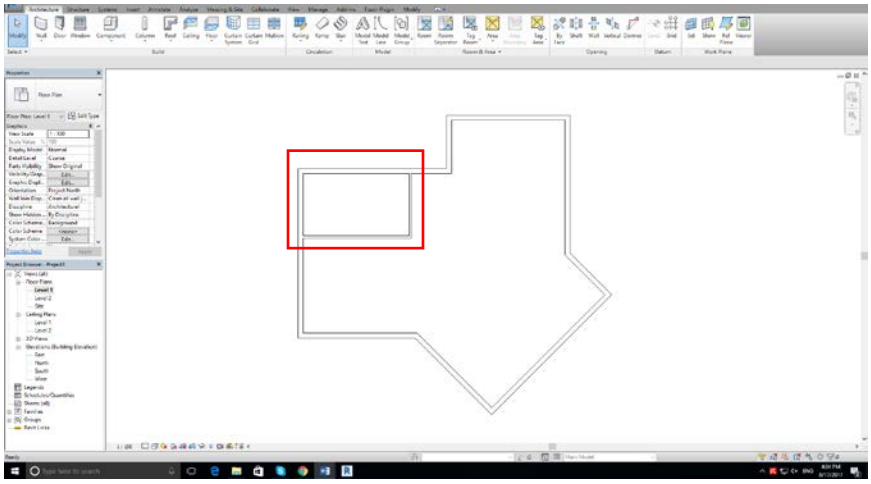
2. Select Interior Wall type to construct interior wall panels.



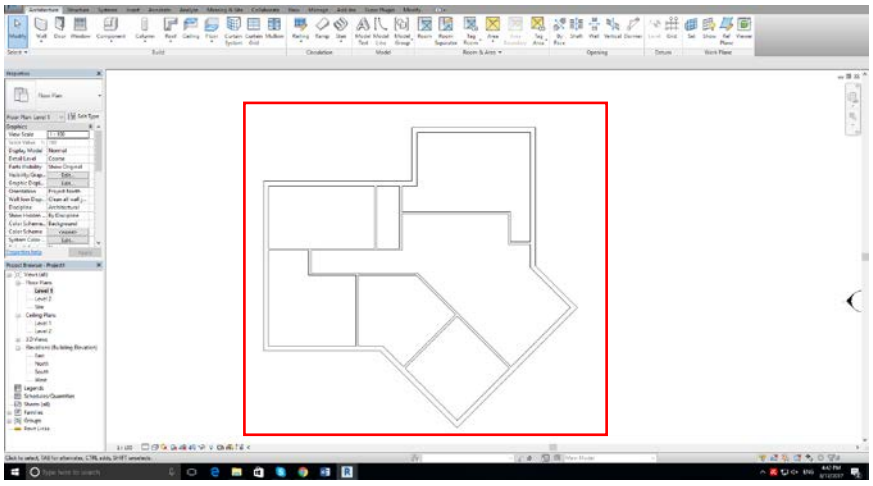
3. Draw the interior Walls in a sketchy position.



4. Create an interior room, connecting them to exterior walls.

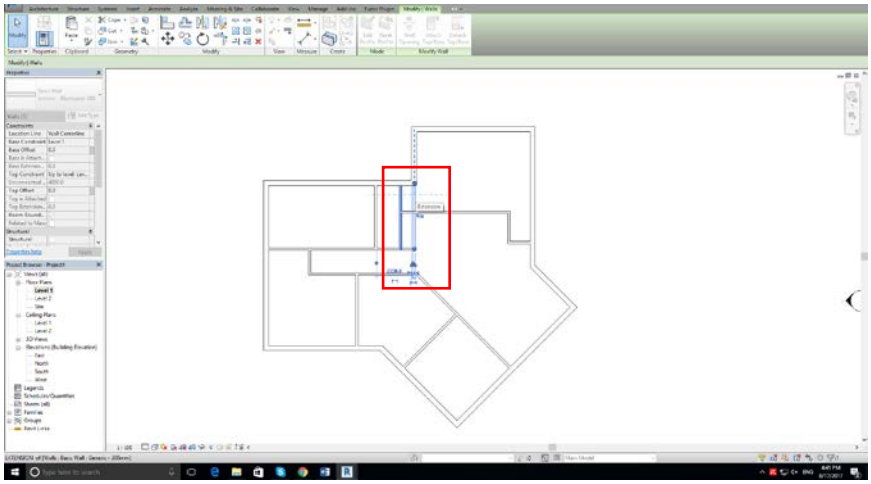


5. Divide the floor plan into different room functions.

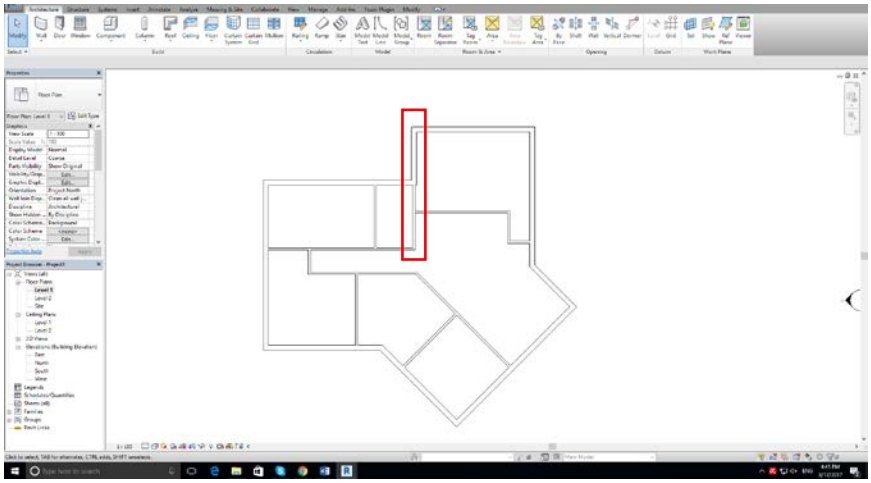


2.4.2 Modify:

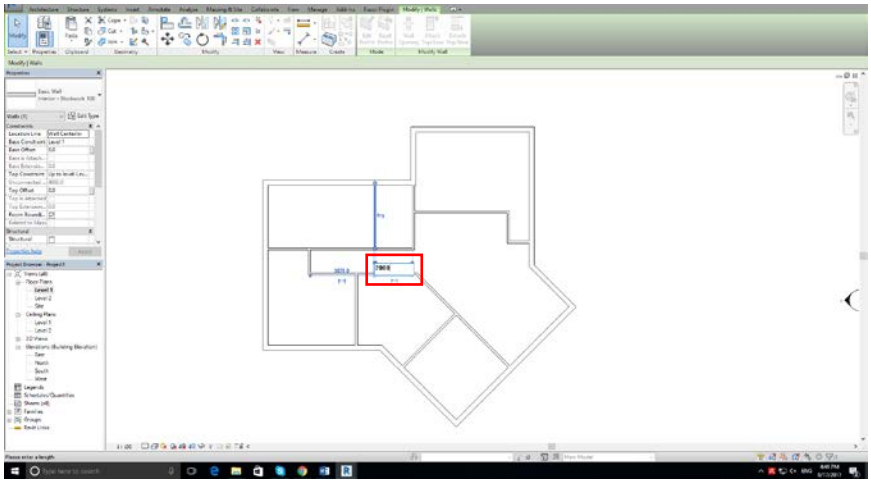
1. Move the walls by directly pulling the wall to align them with the correct position.



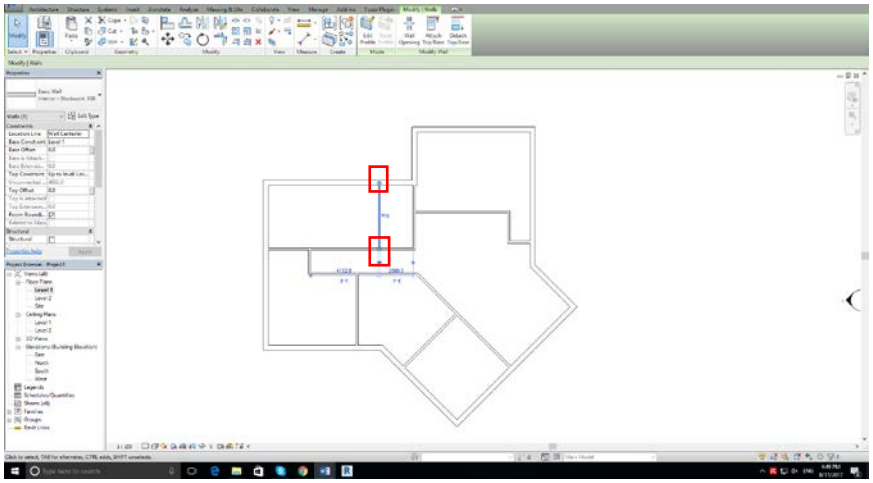
2. The interior wall is moved to align with the exterior wall according to their location line which is centreline in this case.



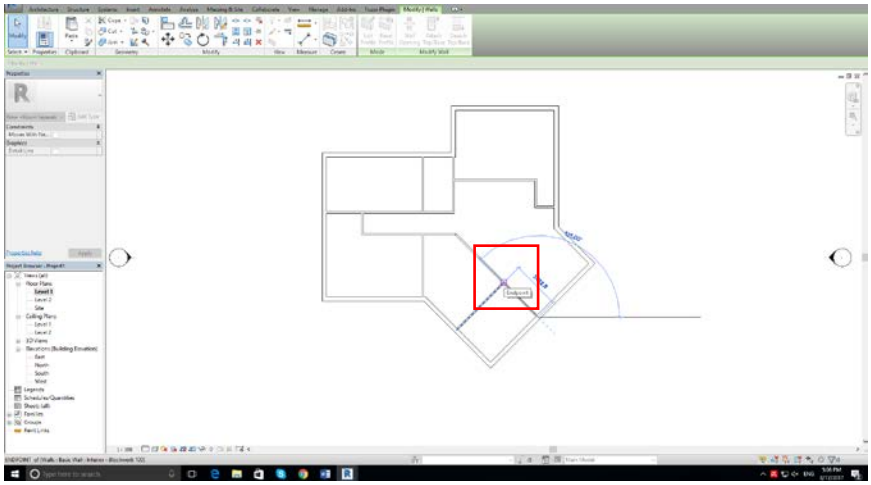
3. Walls can also be moved by typing in a temporary dimension.



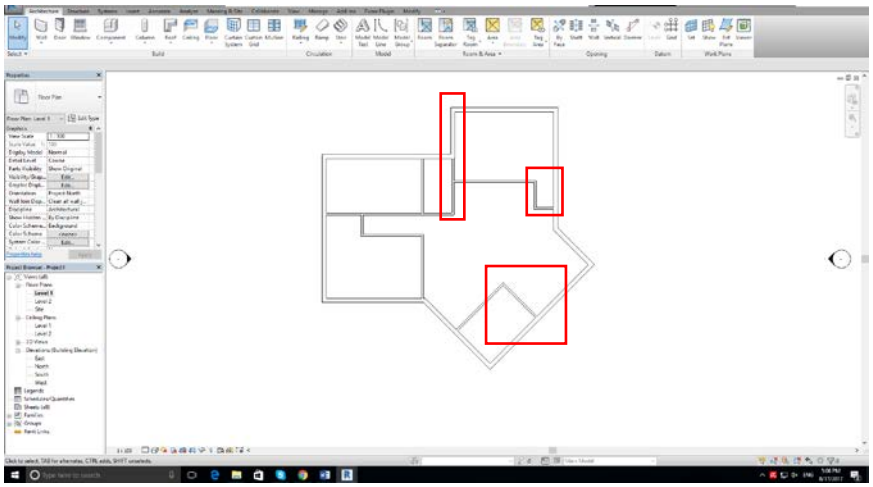
4. Click The length of a wall can be changed by dragging the blue circles on both ends of the wall.



5. Drag the circle and snap it to the end point of another wall.



6. By sketching then modify, a tidy room setting can be made.

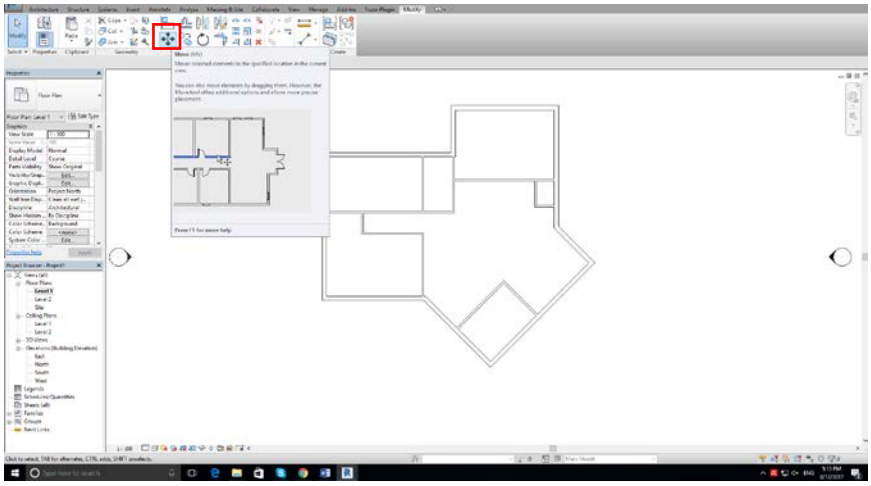


2.5 Using the Modify Tools

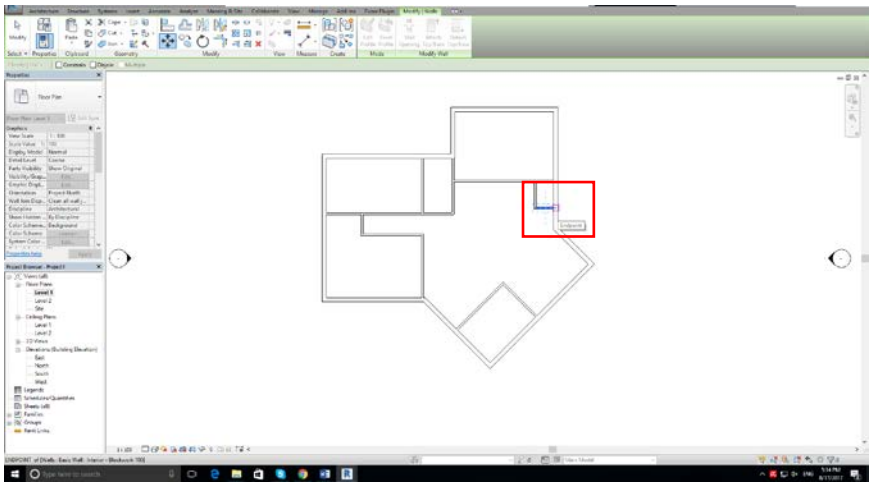
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

2.5.1 Move:

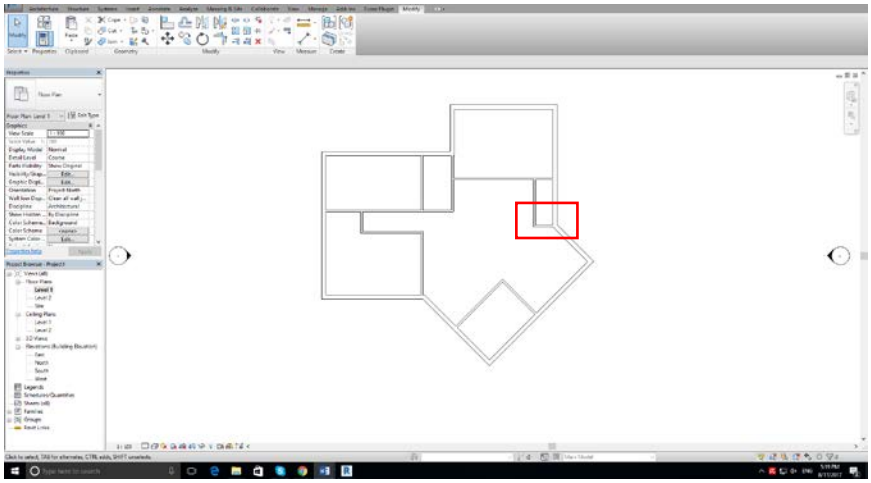
1. Select the Modify panel and click on the Move Tool.



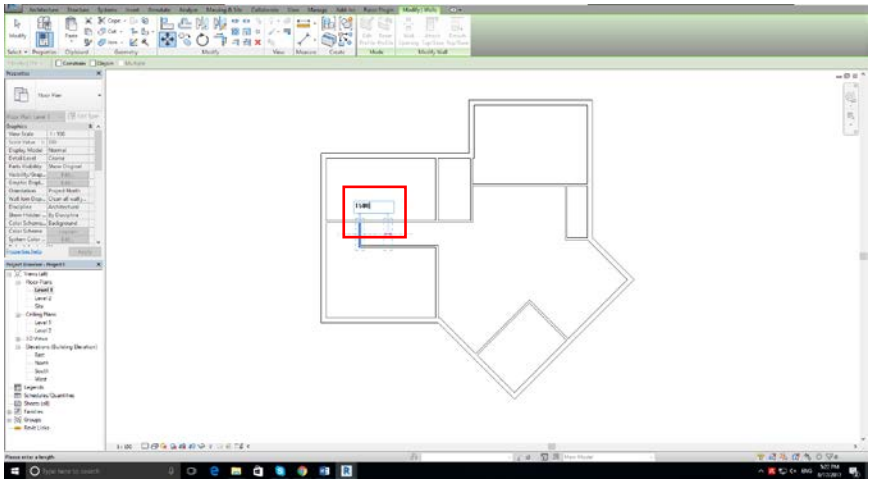
2. Choose the object to be moved and click a starting point.



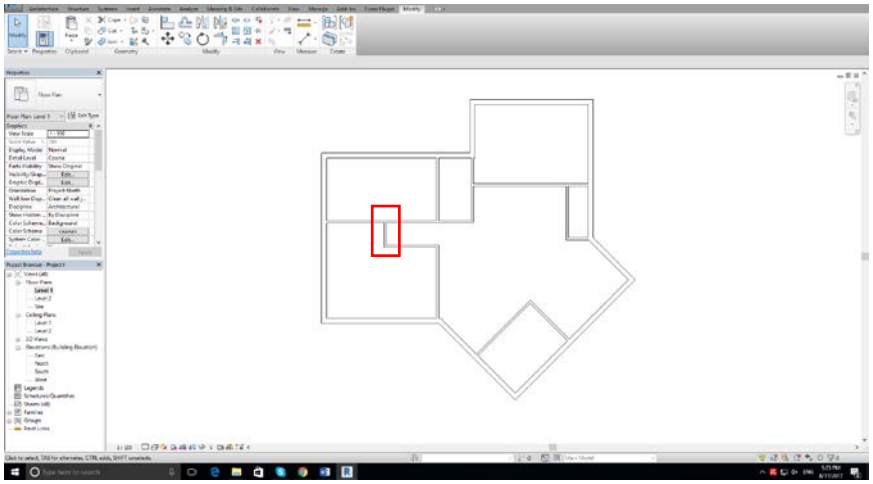
3. Snap the wall the to correct endpoint and click, the wall on the side will follow and extend to merge with the moving wall.



4. Other than snapping, type in the distance and press Enter.

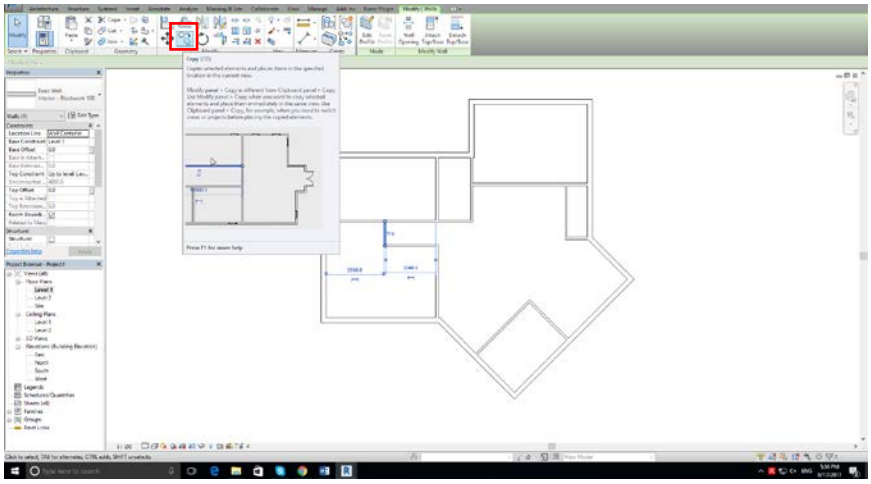


5. The wall moves in the selected direction with the typed distance.

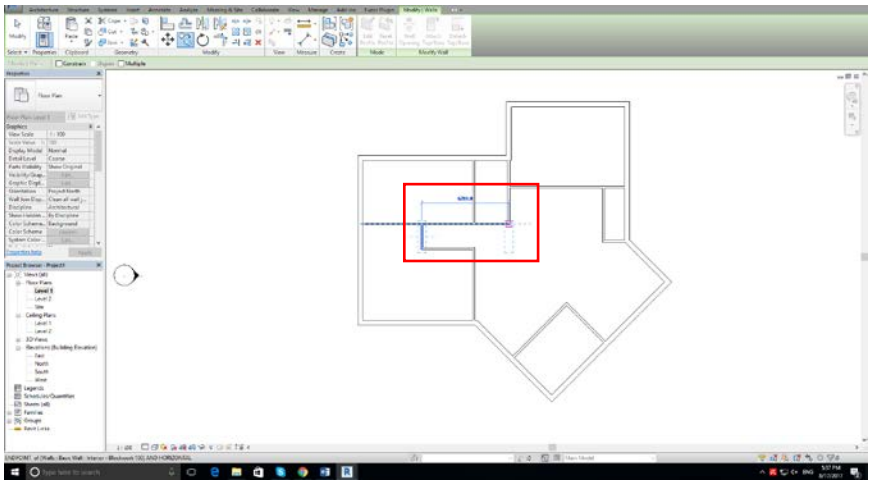


2.5.2 Copy:

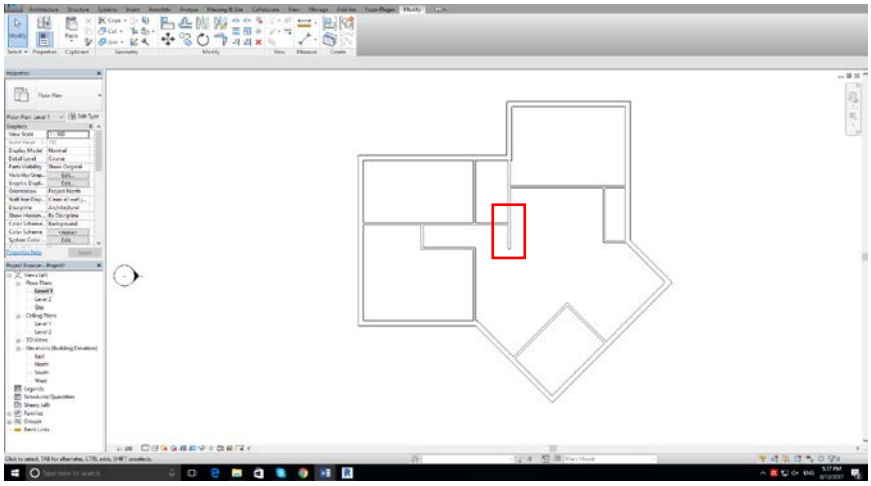
1. Click Select the modify panel and click on the Copy Tool.



2. Snap the wall the to correct endpoint and click, the wall on the side will follow and extend to merge with the moving wall.

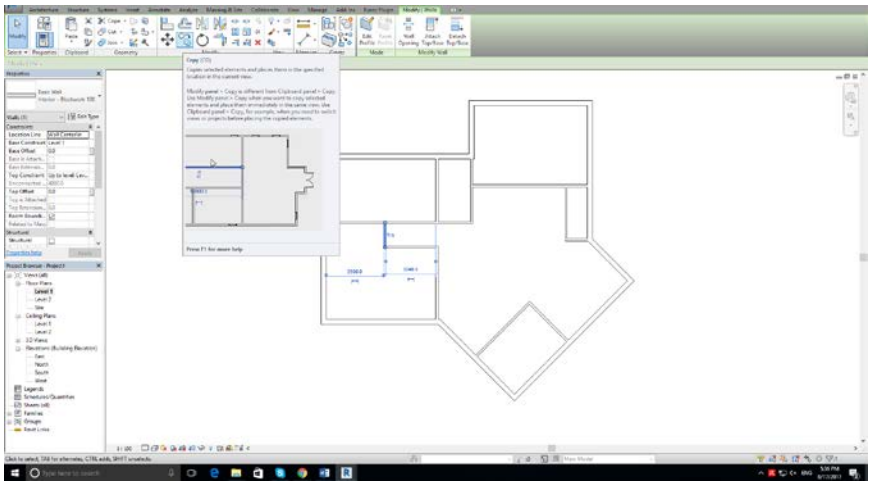


3. Click on the line, to offset a new line from the original line.

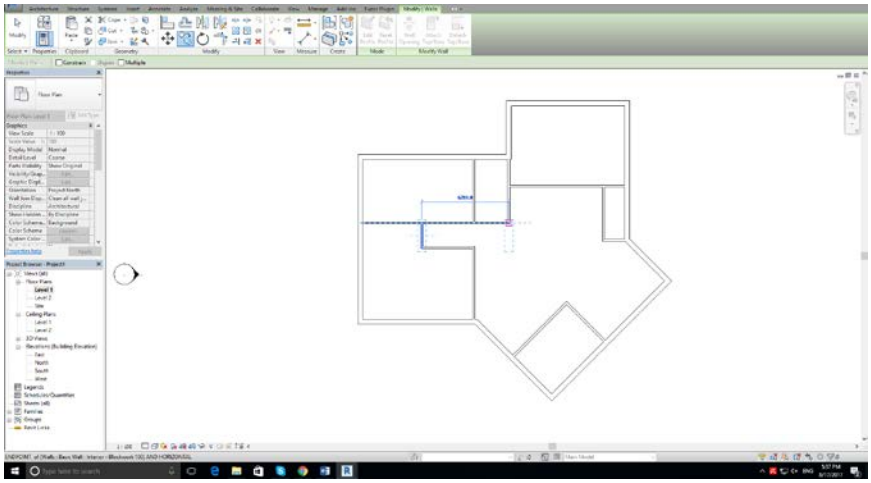


2.5.3 Offset:

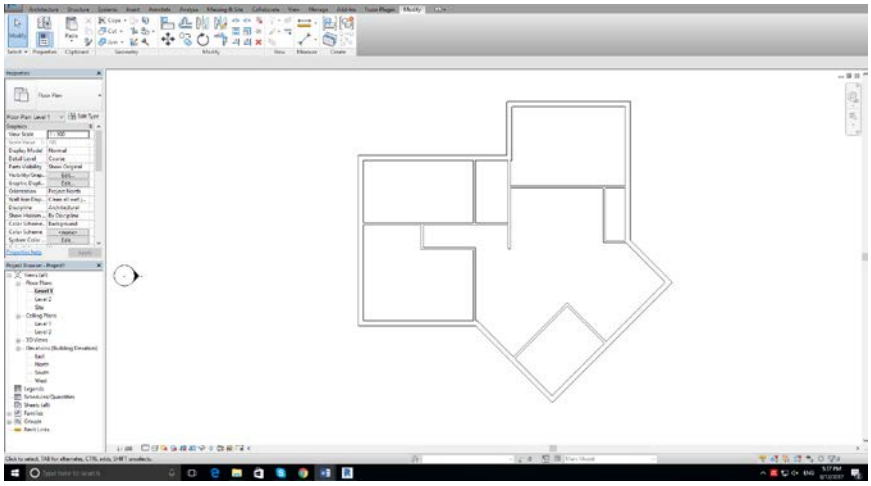
1. Click on the level button, select Plan View Types, select the view types and create another level.



2. Click on the level button, type in an offset value, a level line will be created from an original level.

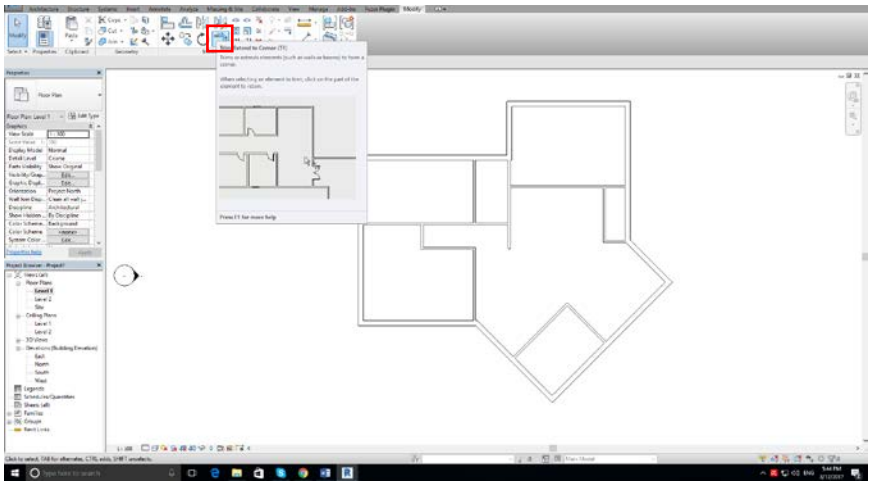


3. Click on the line, to offset a new line from the original line.

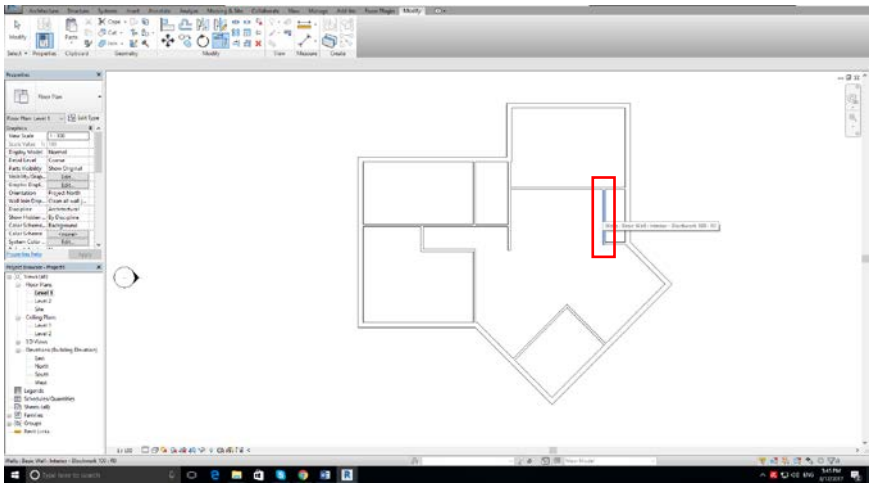


2.5.4 Trim to Corner:

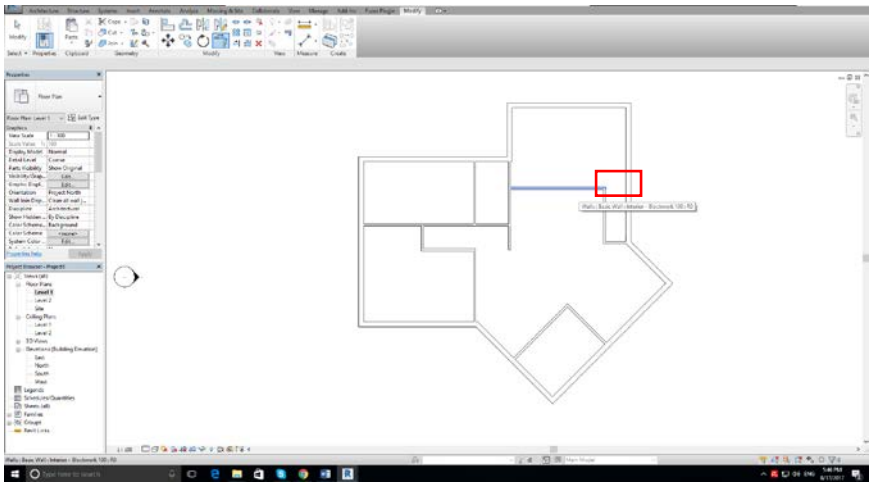
1. Click on the Trim/Extend to Corner Command; it can be used to trim or extend walls and beams.



2. Click on the first wall.

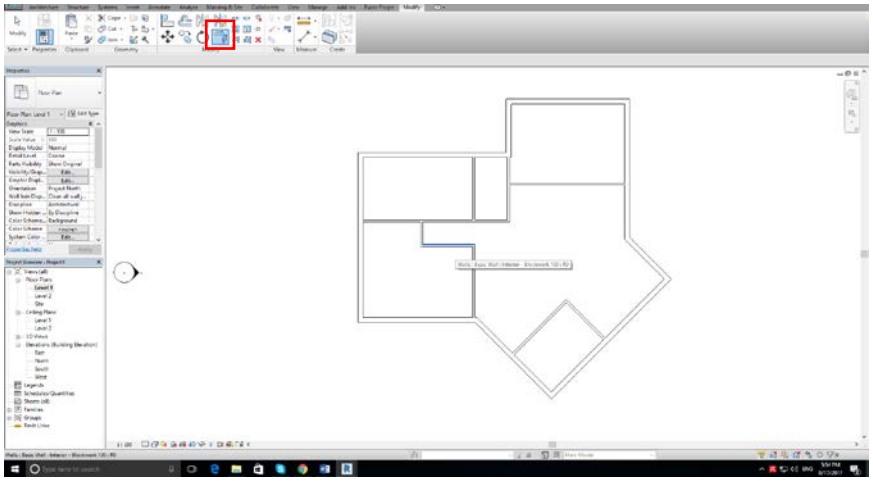


3. Click on the second wall on the side to be kept; the wall will be trimmed, a gap in the wall is created.

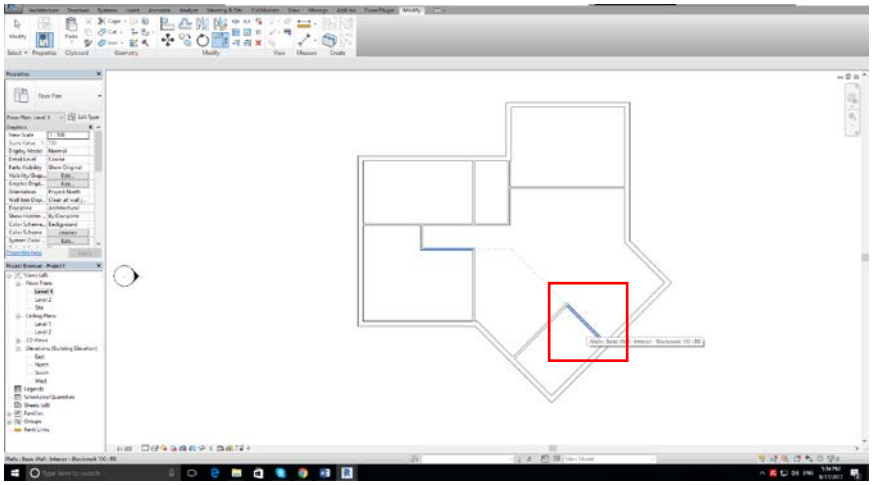


2.5.5 Extend to Corner:

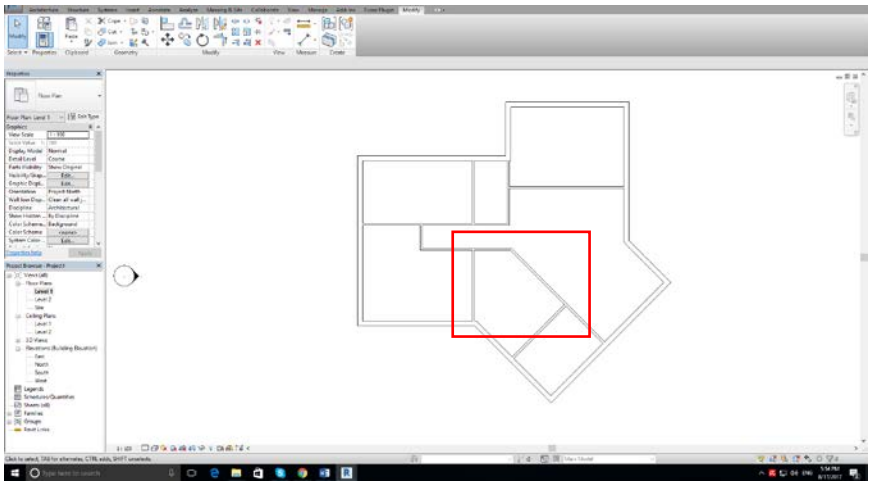
1. Click on the Trim/Extend to Corner Command.



2. Click on the first wall.

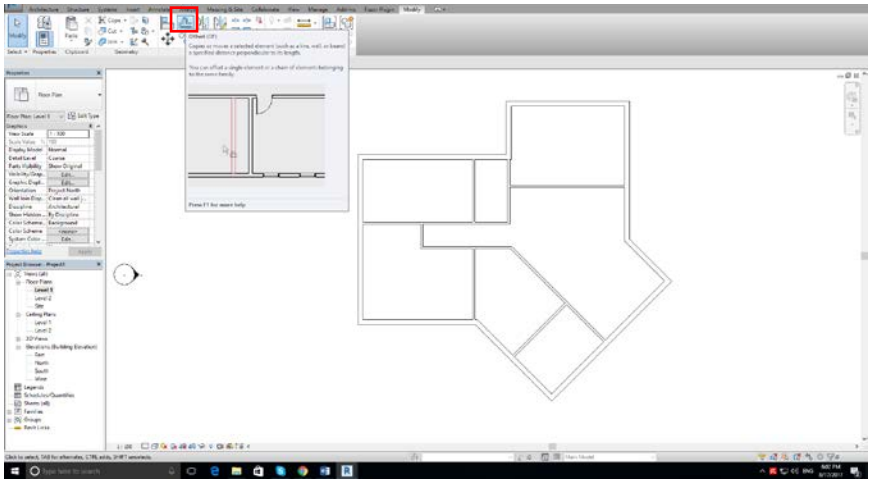


3. Click on the second wall; the two walls will join, creating a room.

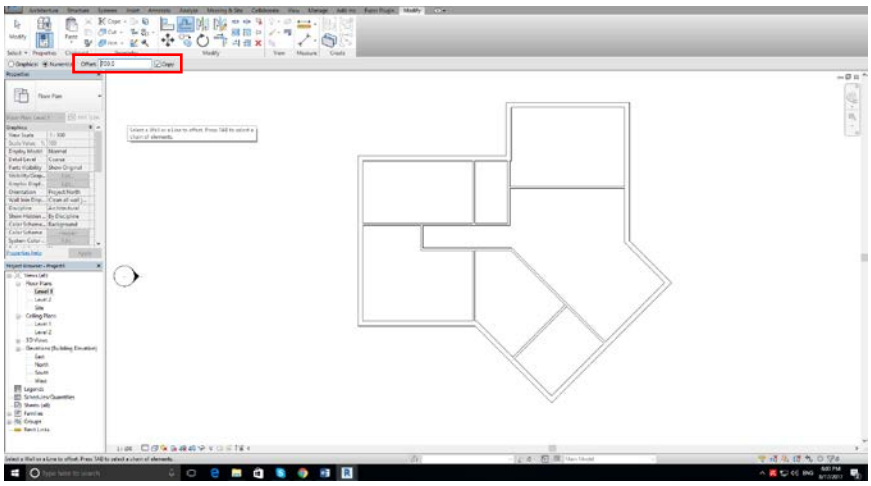


2.5.6 Offset:

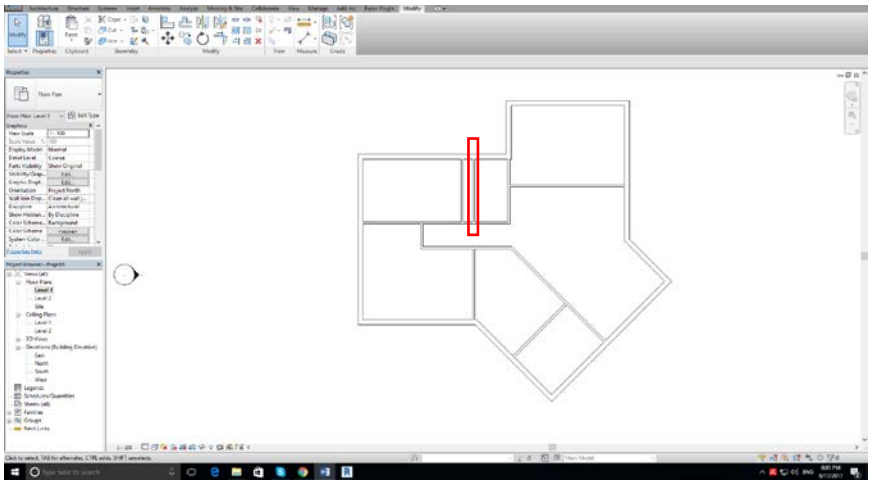
1. Click on the level button, select Plan View Types, select the view types and create another level.



2. Click on the level button, type in an offset value, a level line will be created from an original level.



3. Click on the line, to offset a new line from the original line.

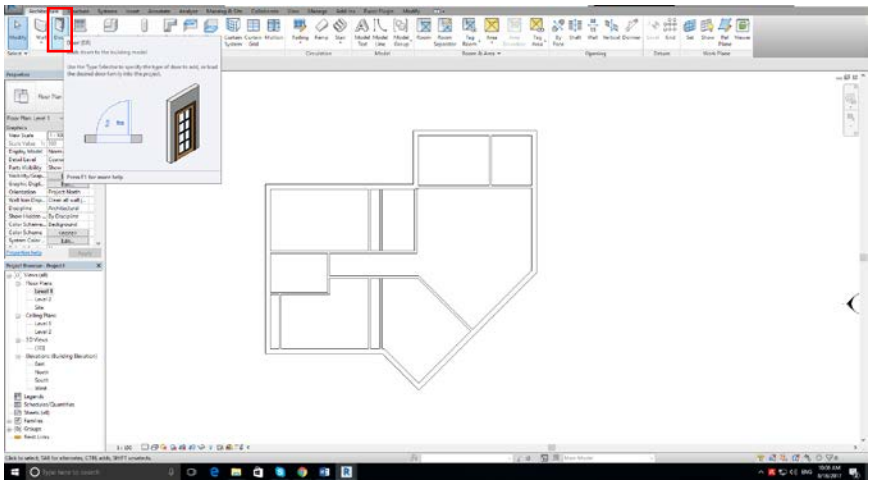


2.6 Adding Doors and Windows

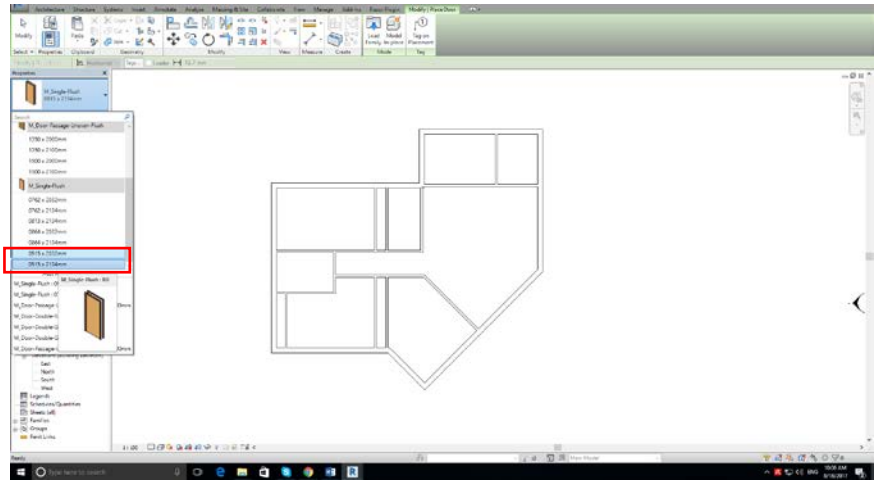
Doors and Windows are hosted families; they must be attached to a wall, doors, and windows cannot be placed in free space. The shortcut for a door is D+R, and the shortcut for a window is W+N

2.6.1 Doors:

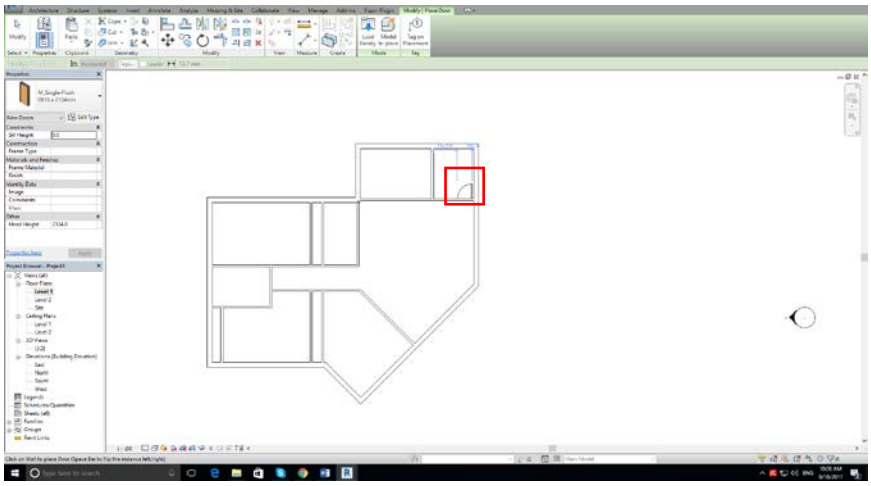
1. Click on the Door Command under the architectural panel.



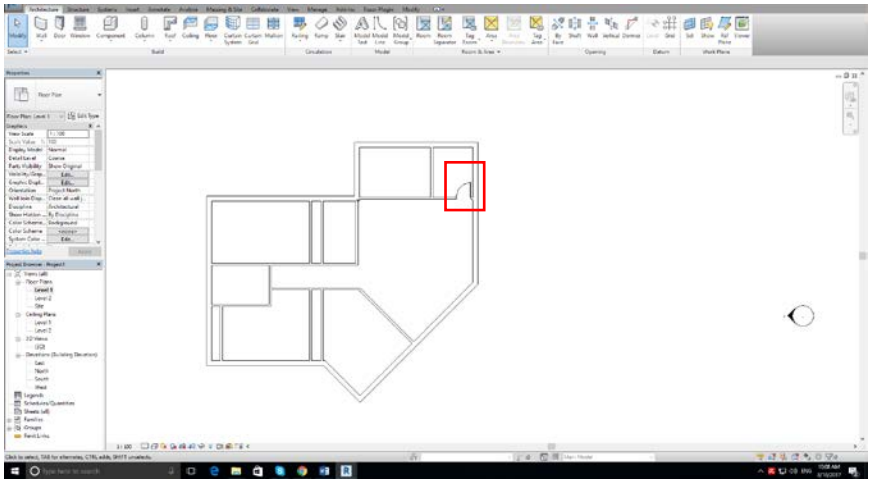
2. There are different families, single-flush, double flush, uneven-flush, sliding doors.



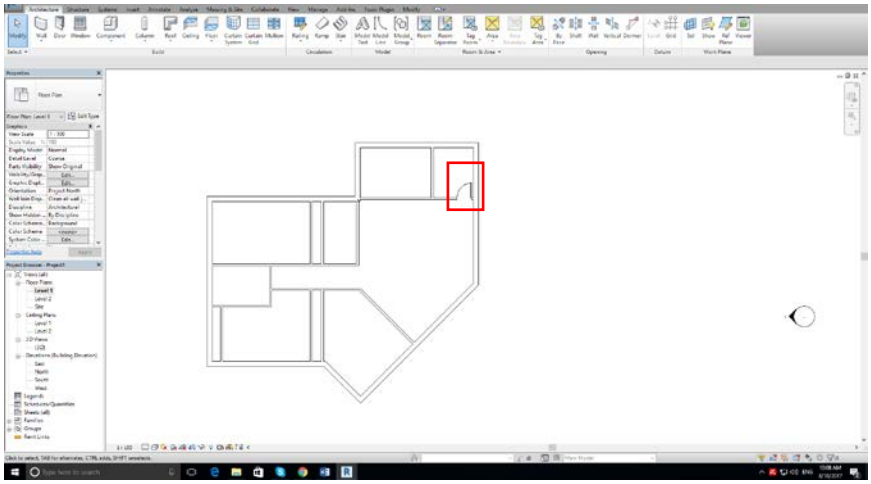
3. When the cursor is moved to a wall, the door will appear.



4. Sketch the door position and modify it later.

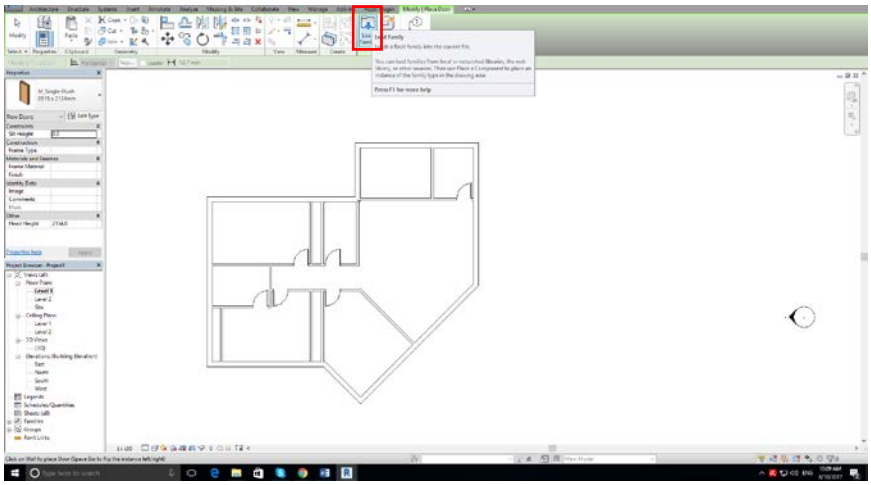


5. Use temporary dimensions to modify the position of the door.

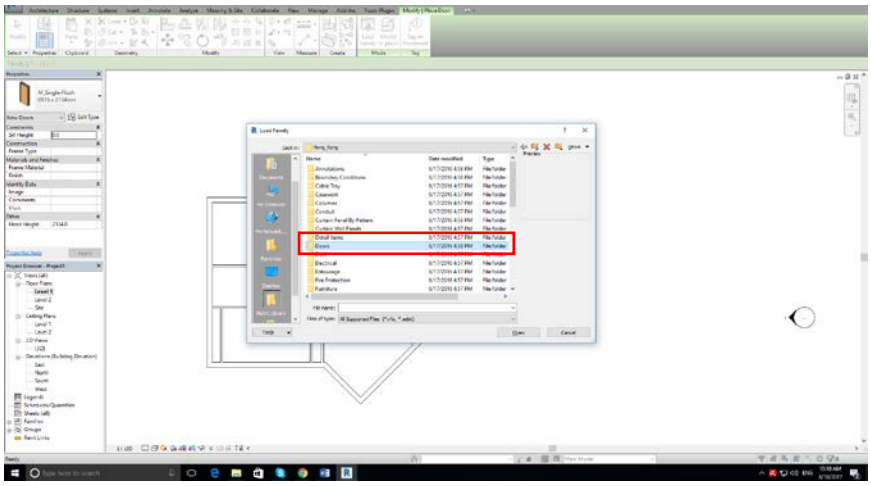


2.6.2 Load Door Families:

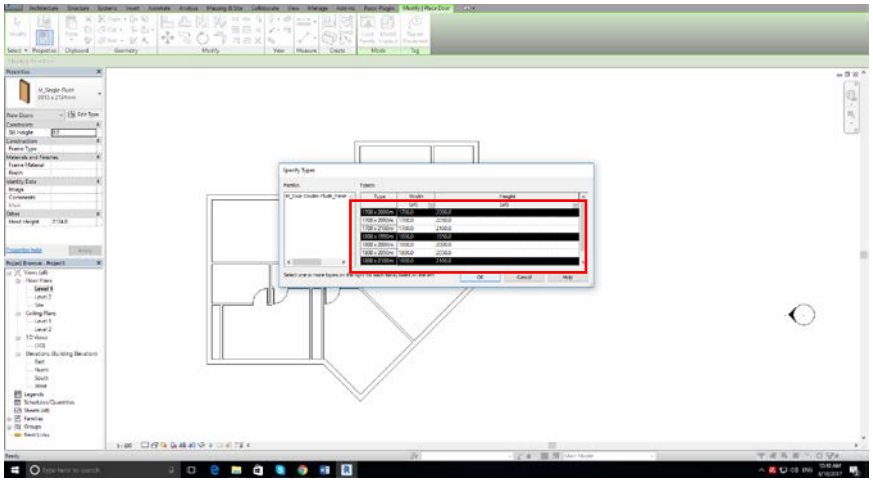
1. There are some door family templates in Revit, click on Load Family to choose from the list of door families.



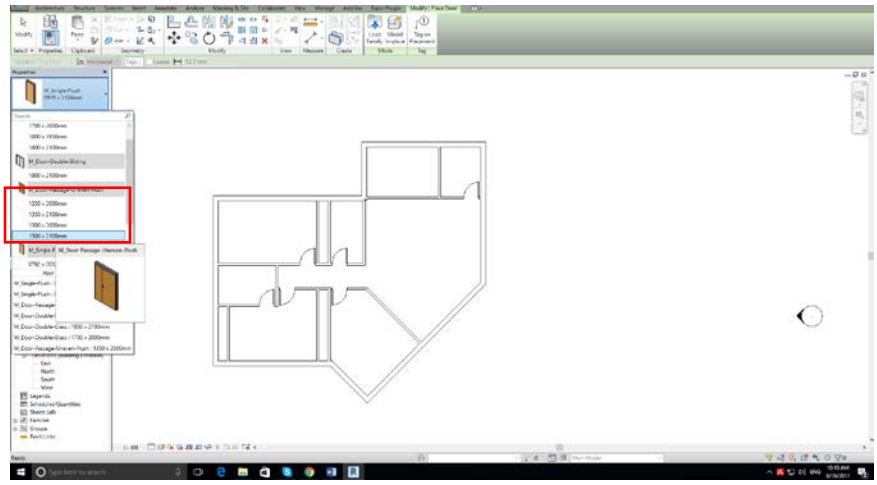
2. Click Open the Door File in the Hong Kong File.



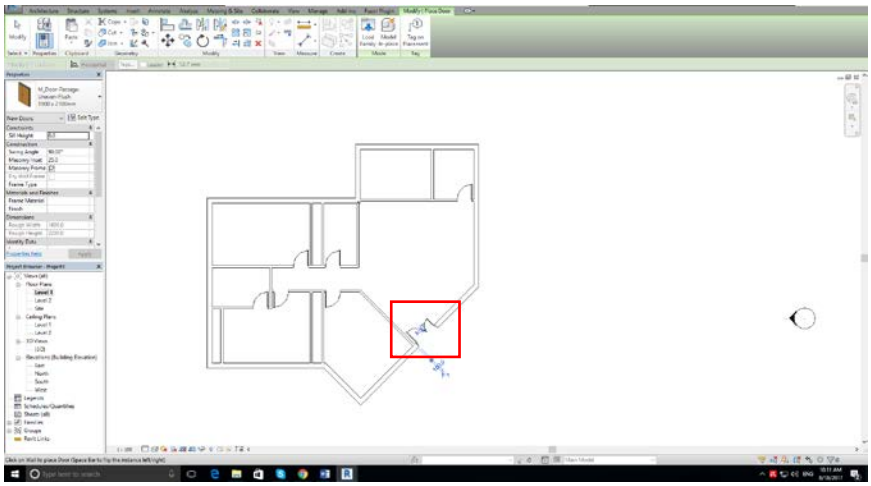
3. A type list will appear, each type has its dimensions, choose the suitable type for the project.



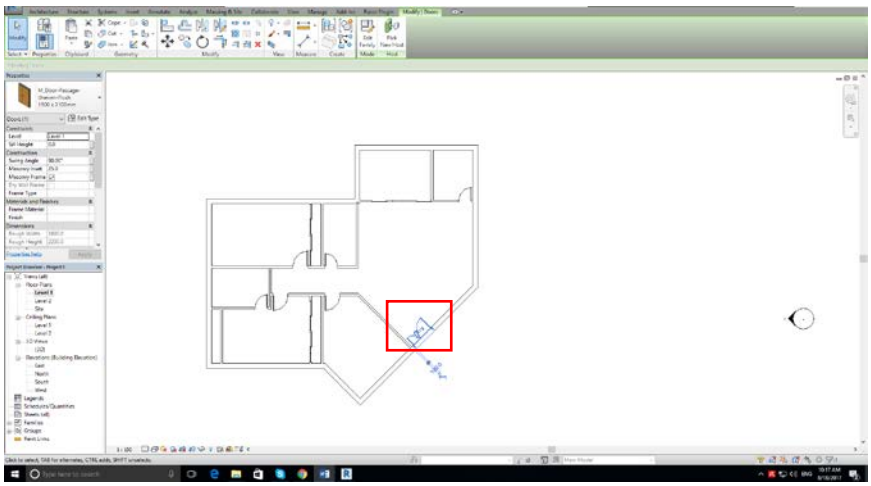
4. The selected type will appear under the family list.



5. The orientation of the door will change according to the orientation of the hosted wall.

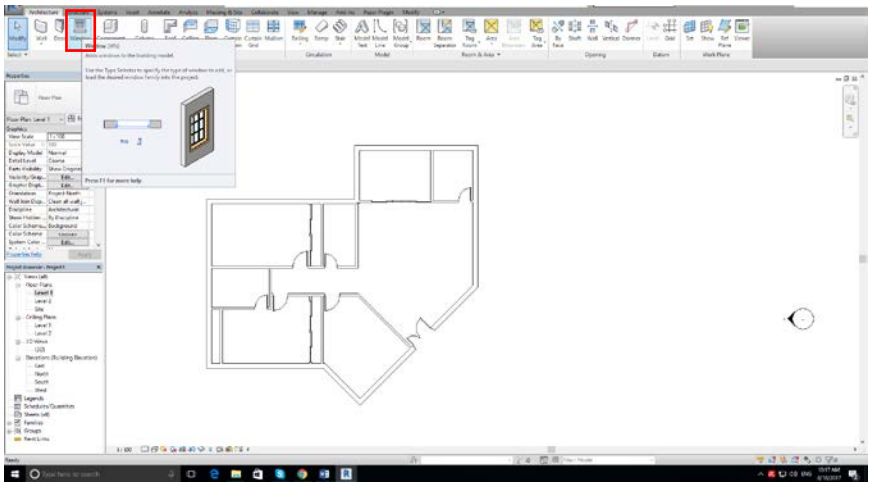


6. By pressing the Spacebar, the door will flip its direction; there are four orientations in total.

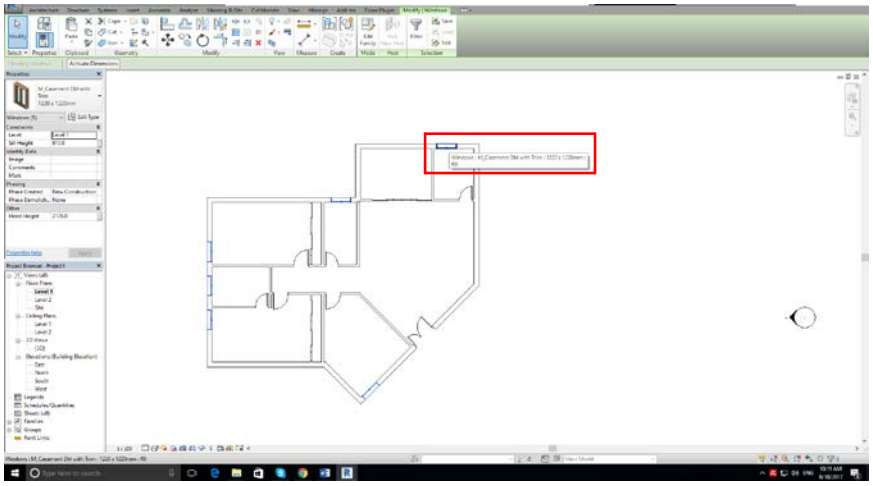


2.6.3 Windows:

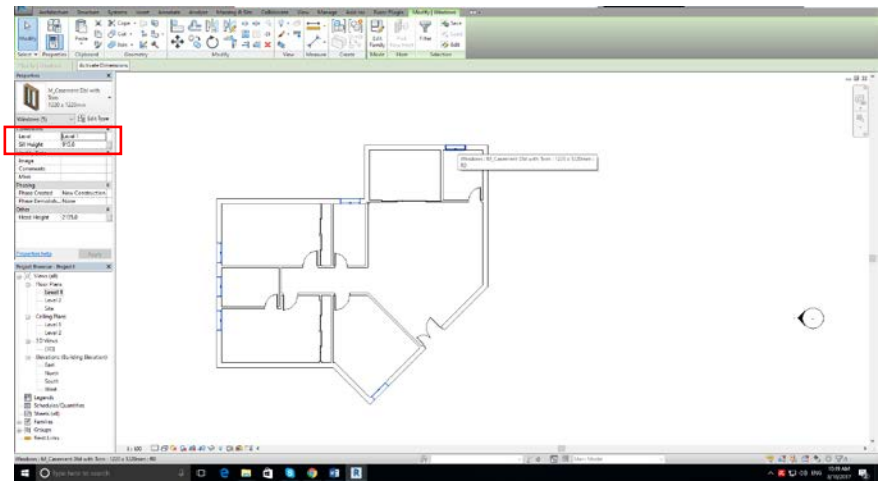
1. Click on the Window Command under the Architectural Panel.



2. Attach the window to a wall, the type of the window is shown with a white box below the cursor.



3. In the Window Properties window, the Sit Height can be changed.

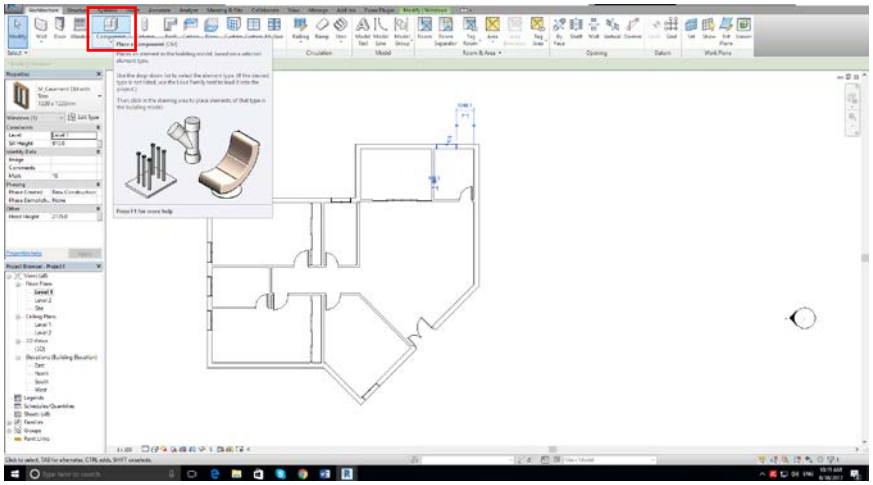


2.7 Adding Plumbing Fixtures and other Components

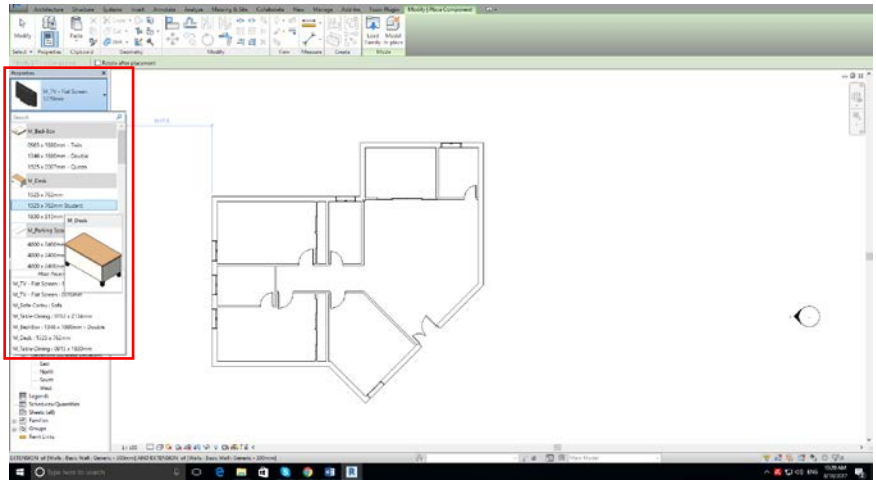
The component includes a lot of different categories, all the categories not shown in the panel is under components, the shortcut for components is C+M.

2.7.1 Adding Components:

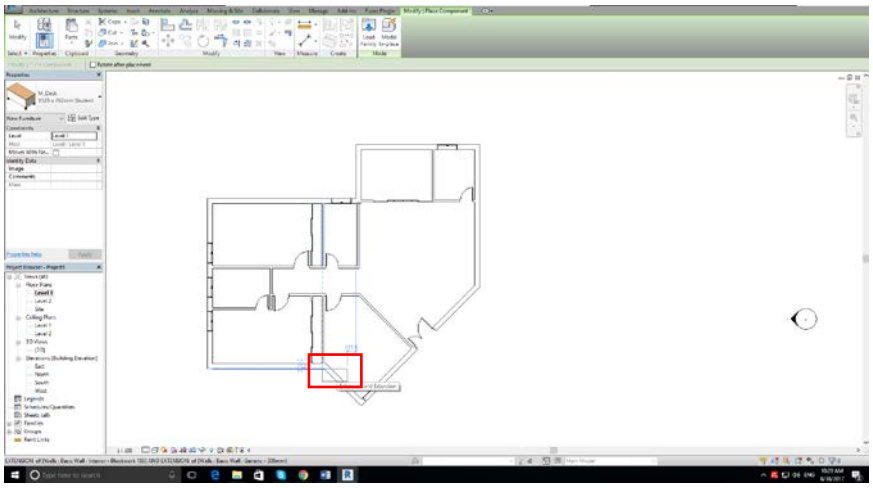
1. Open an Elevation on the left bottom corner.



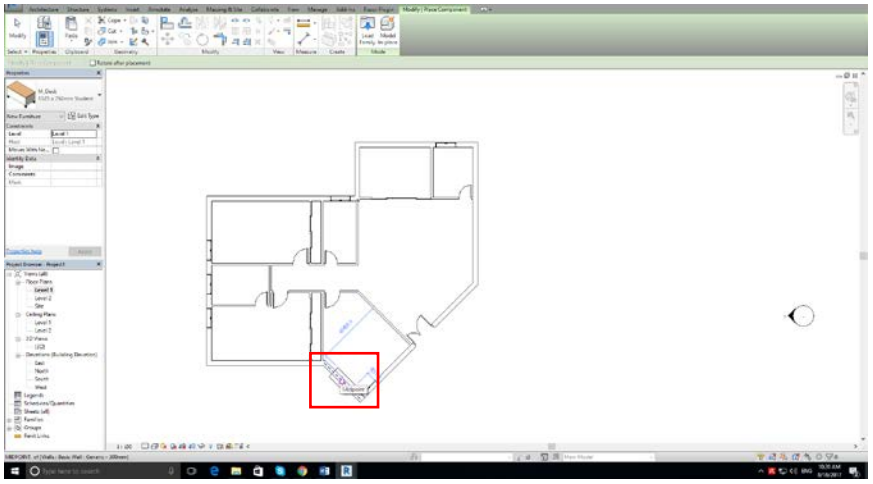
2. Click on the Level Lines.



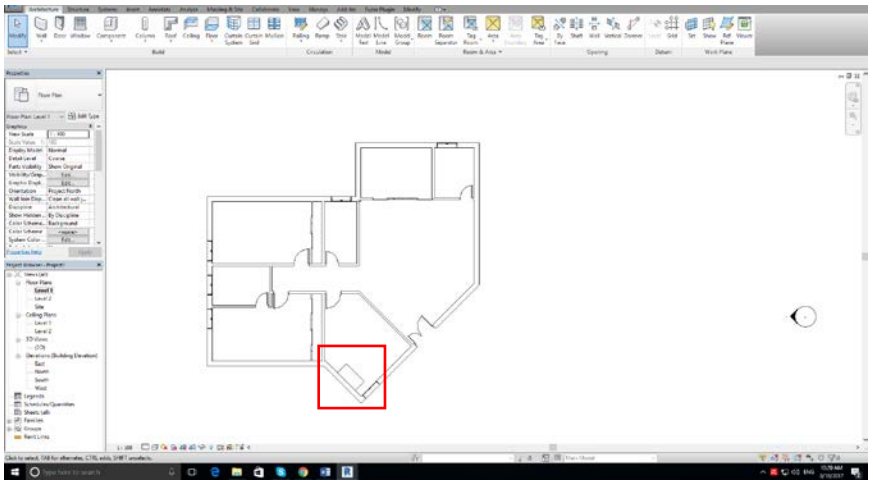
3. Choose a pre-loaded Desk; it is not a hosted family; it can be placed in anywhere.



4. Move the cursor next to a wall which sits at a non-90 degrees angle, press spacebar; the desk can rotate to fit with the wall.

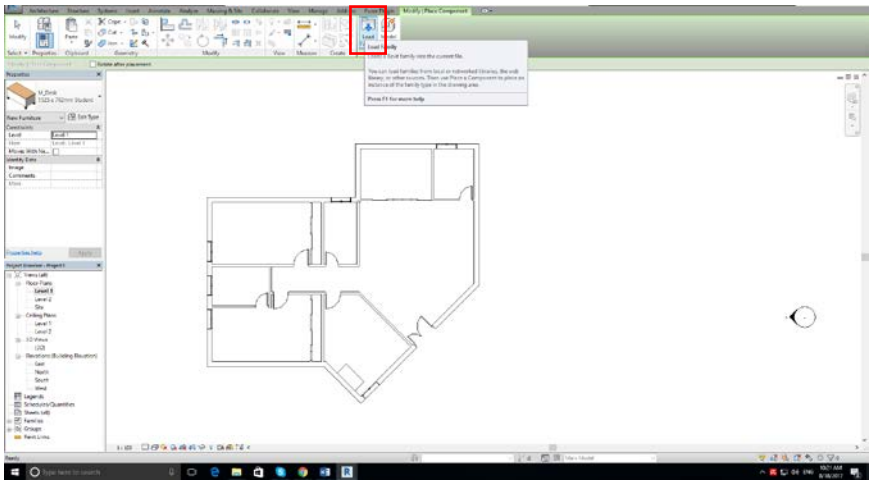


5. The desk will snap to align with the wall, click and place the desk.

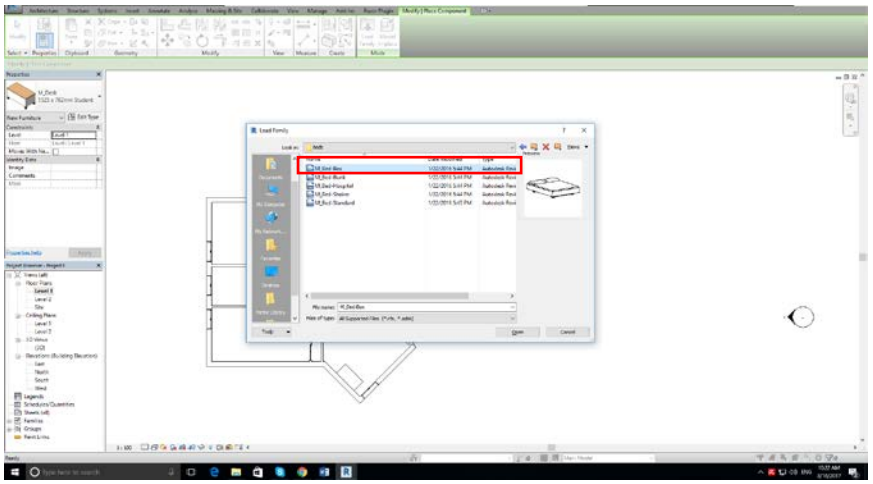


2.7.2 Load Component Families:

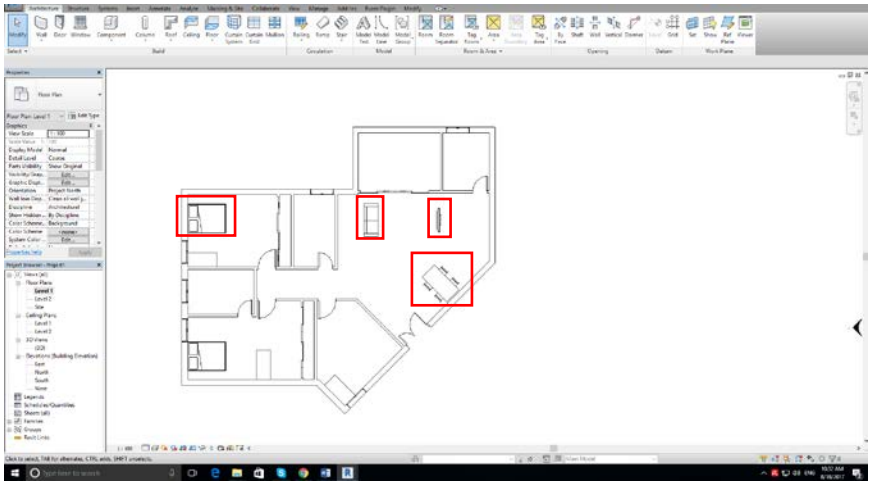
1. There are some component family templates in Revit, click on Load Family to choose from the list of component families.



2. Choose a double bed family, the 3D view of the bed is shown.



3. Place more components into the house.

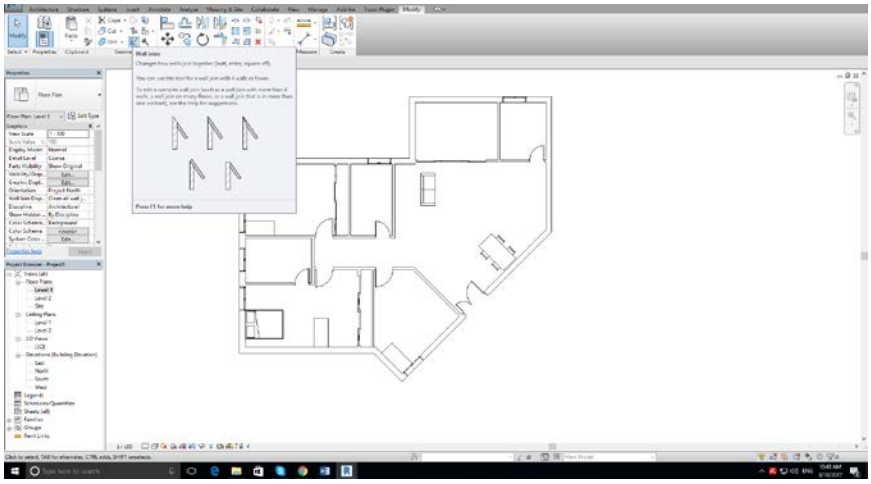


2.8 Using Autodesk Seek

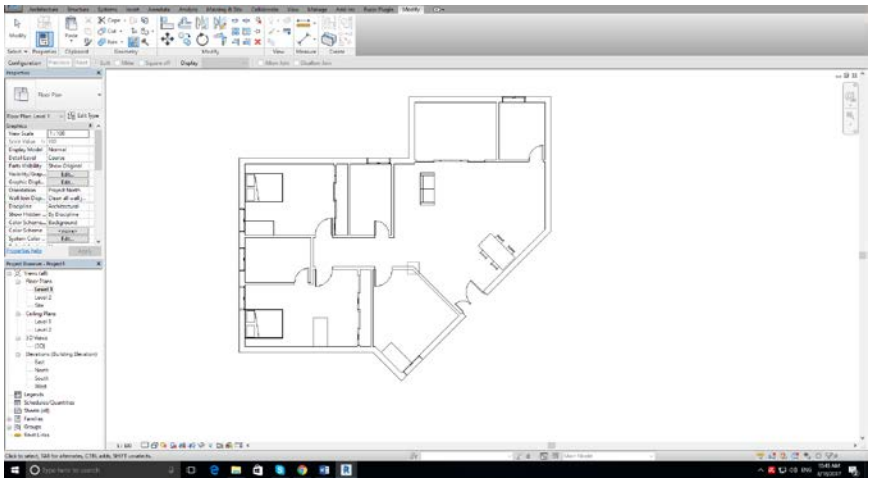
Autodesk seek is an online platform operated by Autodesk; it provides a lot of additional contents provided by Autodesk and Manufacturers.

2.8.1 Autodesk Seek:

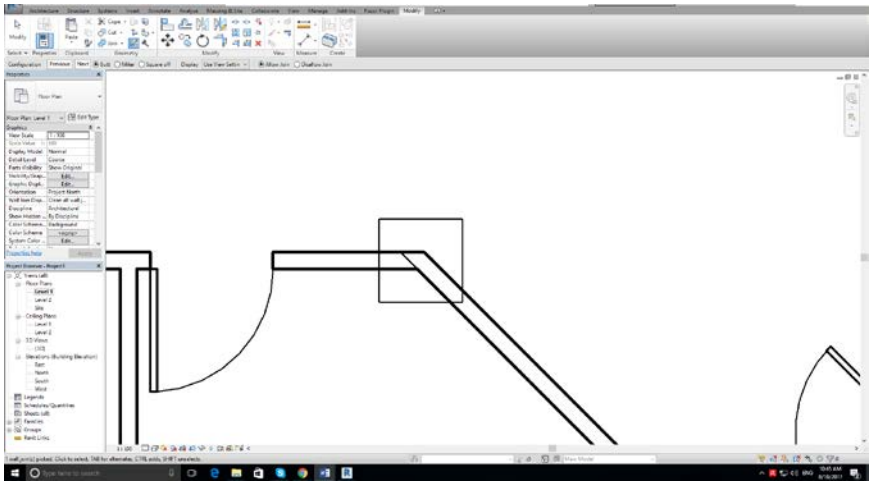
1. Open an Elevation on the left bottom corner.



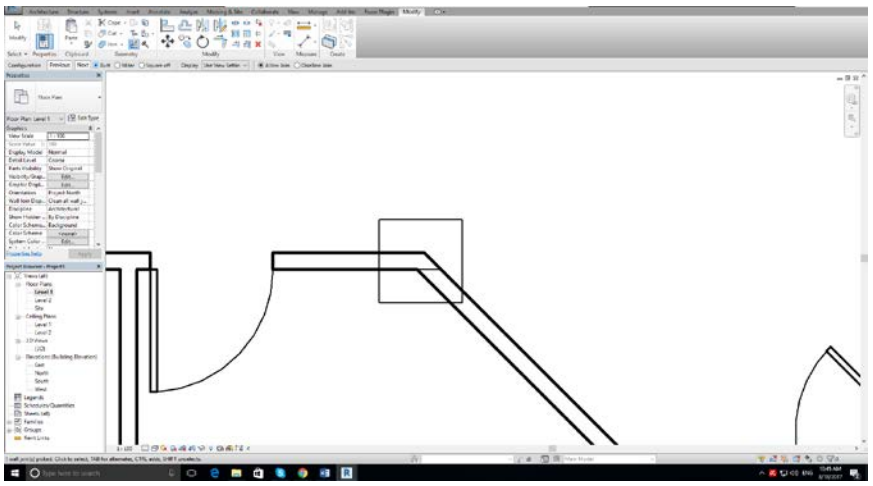
2. Click on the Level Lines.



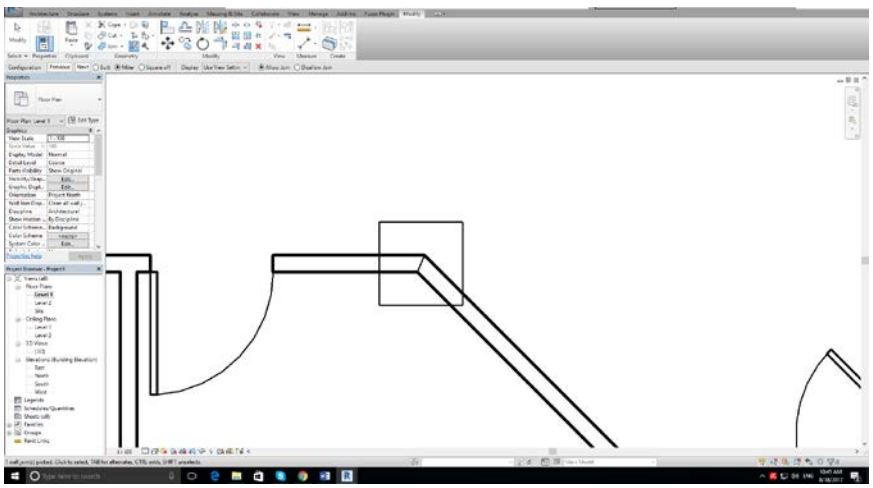
3. Click on the level button, select Plan View Types, select the view types and create another level.



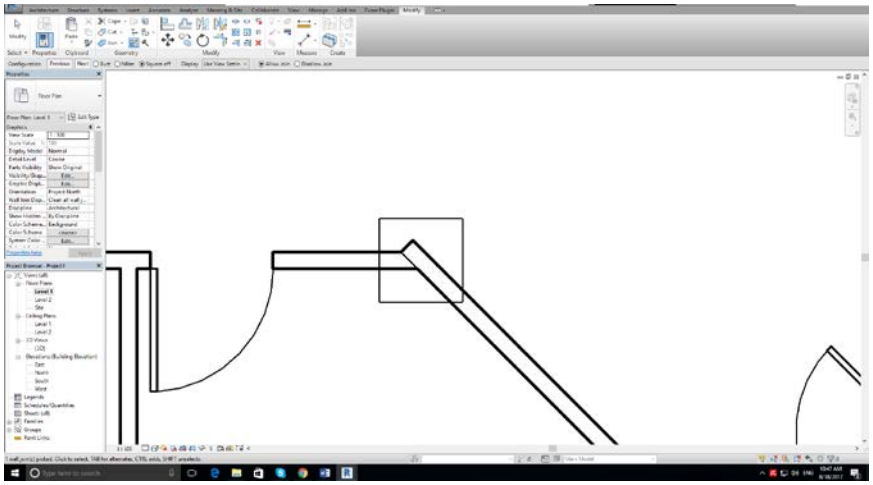
4. Click on the level button, type in an offset value, a level line will be created from an original level.



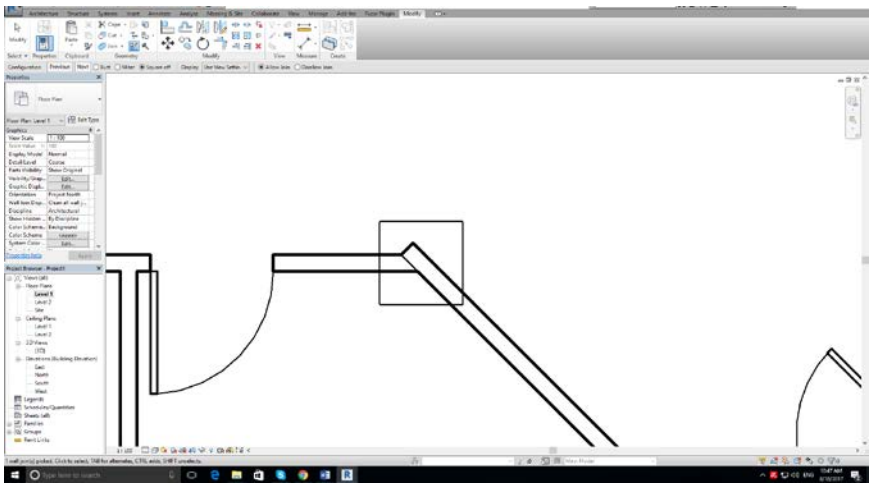
5. Click on the line, to offset a new line from the original line.



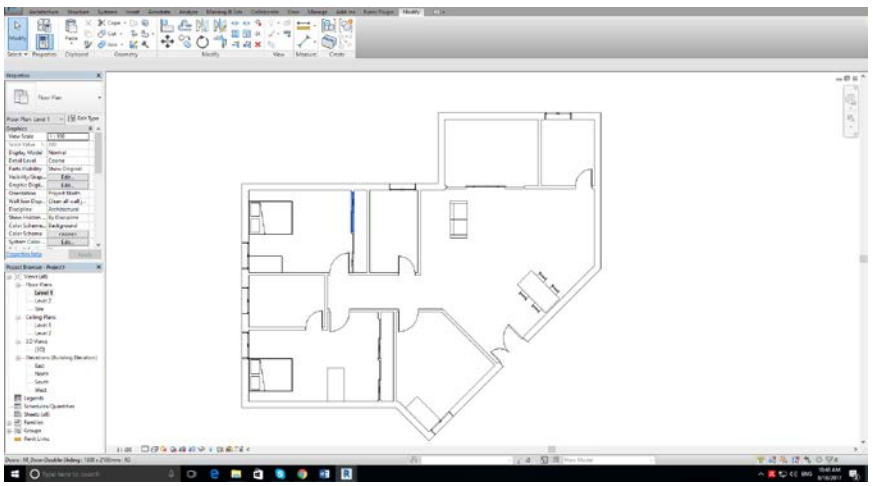
6. Click on the level button, select Plan View Types, select the view types and create another level.



7. Click on the level button, type in an offset value, a level line will be created from an original level.



8. Click on the line, to offset a new line from the original line.



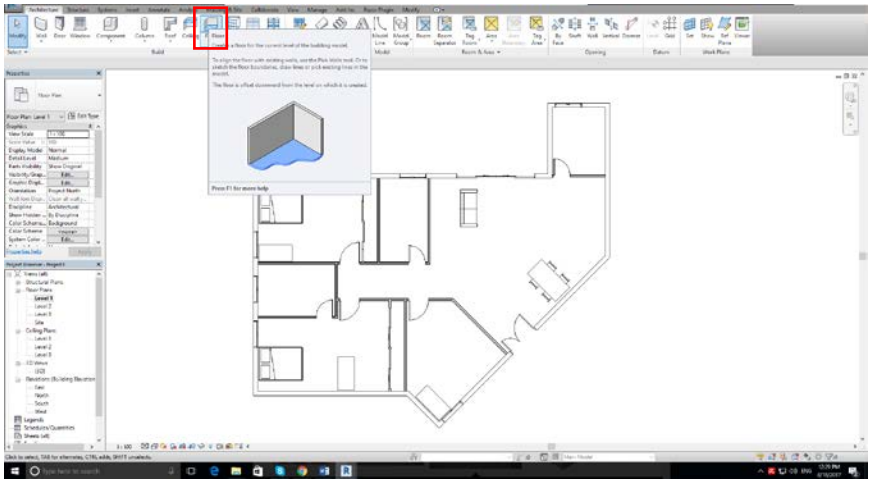
3. Sketch-Based Modeling Components

3.1 Creating Floors

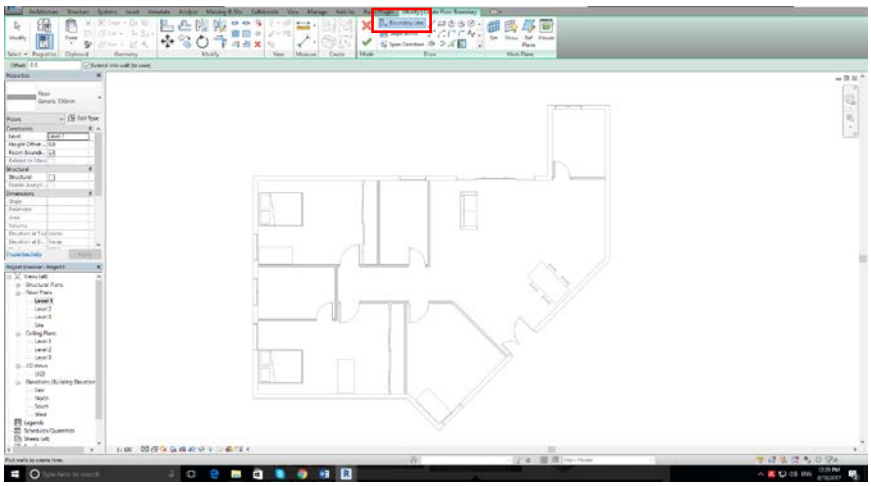
The floor is a kind of Sketch-Based Object. Sketch-Based Object must be created through a two-dimensional sketch to indicate the shape and form of the object. A floor offsets downwards from the created level.

3.1.1 Floor Sketching:

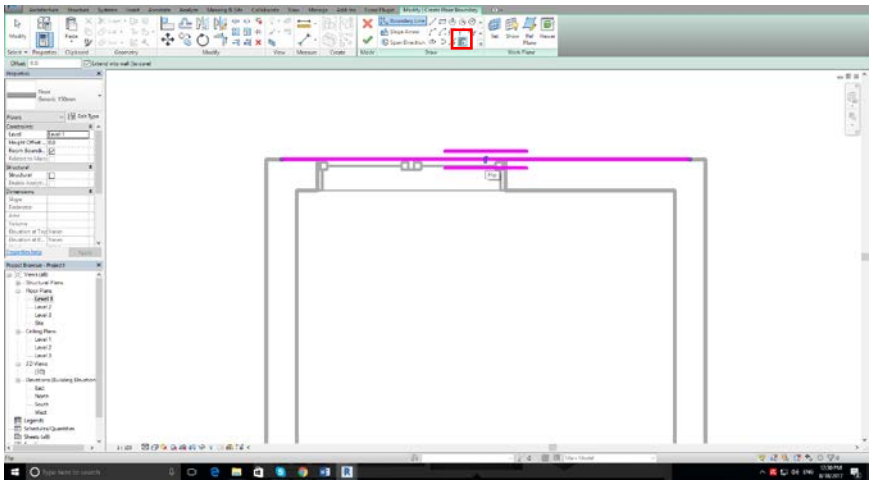
1. Click on the Floor Command under the Architecture Panel.



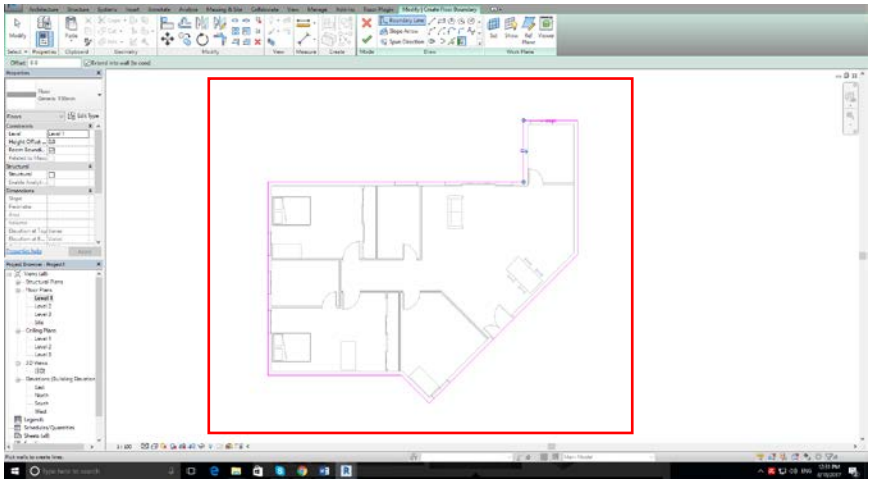
2. The shape of the floor is created by sketching the boundary of the shape; the button boundary line is defaulted to be selected.



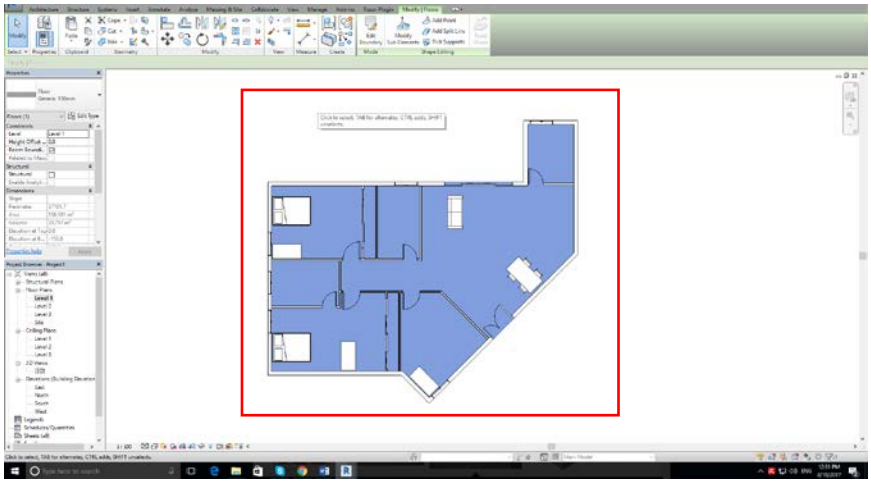
3. Choose the Pick Walls tool.



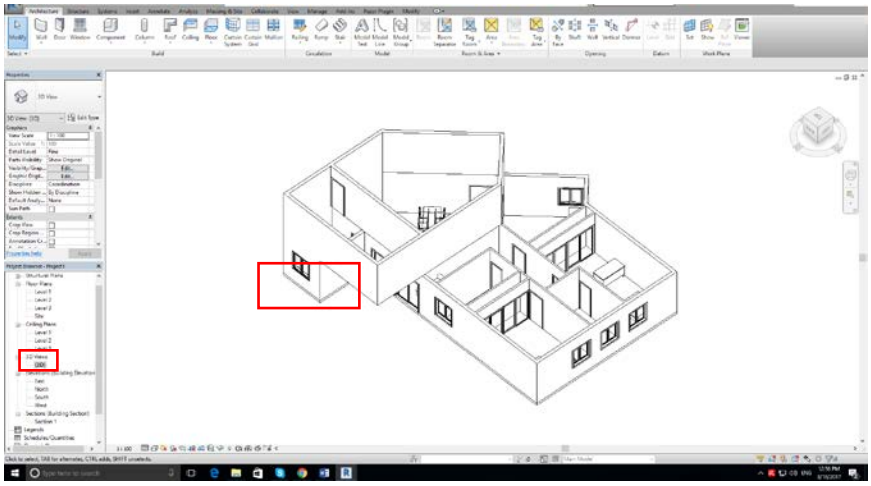
4. Pick walls to create the boundary of the floor; the boundary must be a closed geometry.



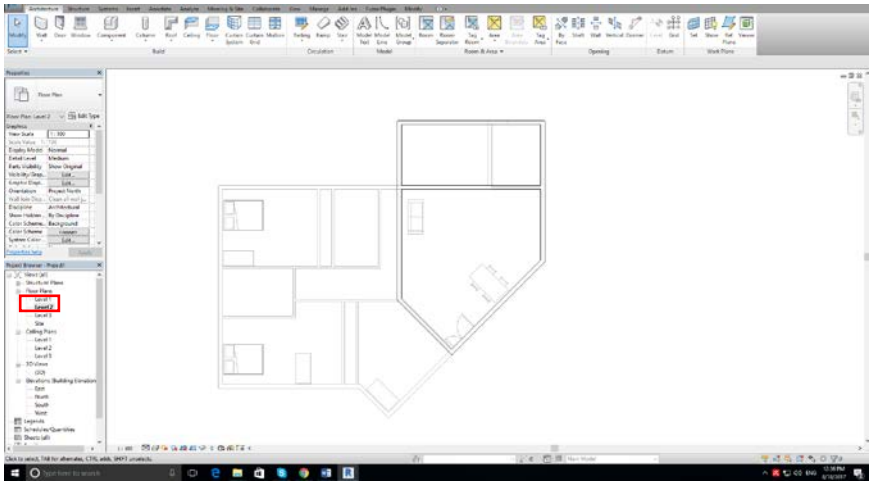
5. Press the click Green Tick; a floor is created, it is shaded in blue.



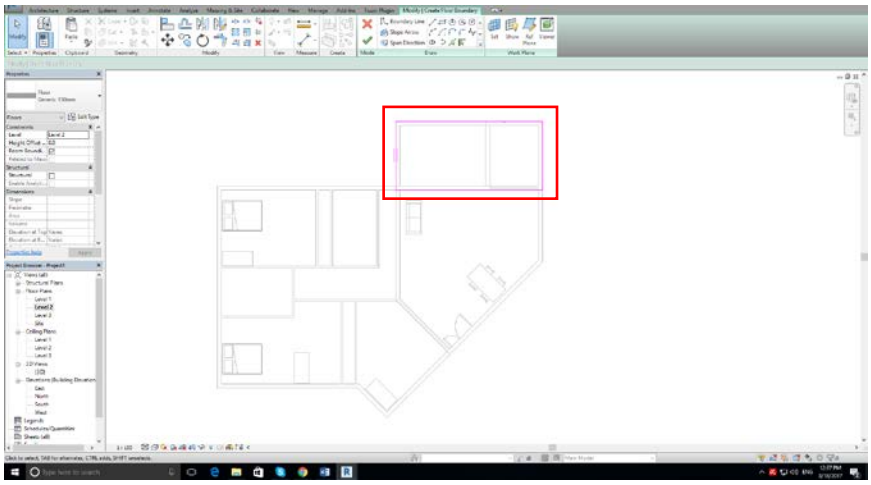
6. Open a 3D view by clicking the house icon on the top of the window; the created floor is shown in the default 3D view.



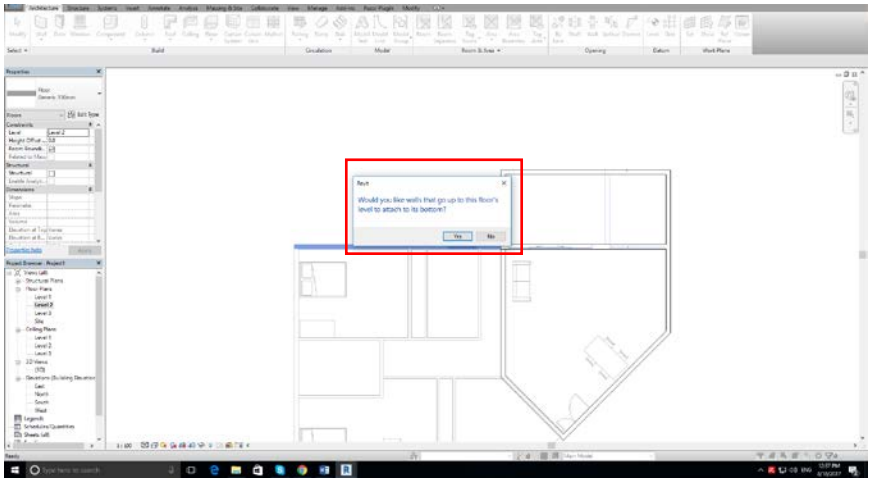
7. Open the Level 2 Plan View and create a floor for the level.



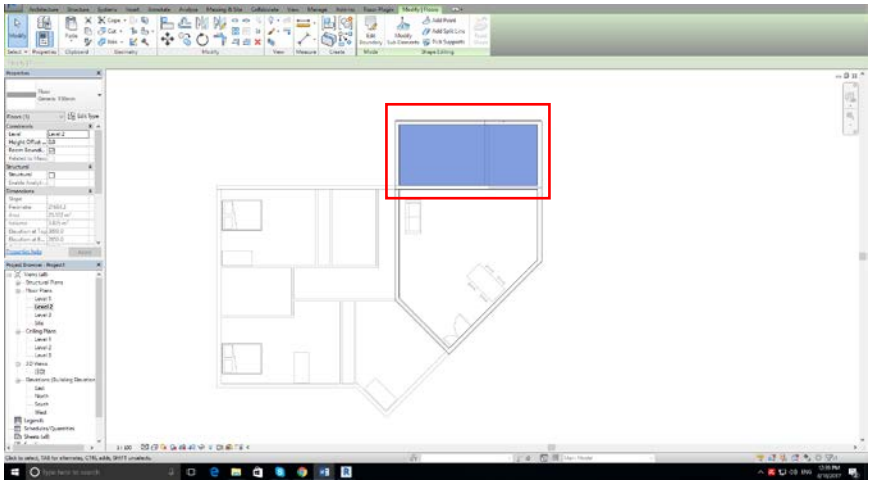
8. Click Use the pick wall tool to create the boundary of the floor.



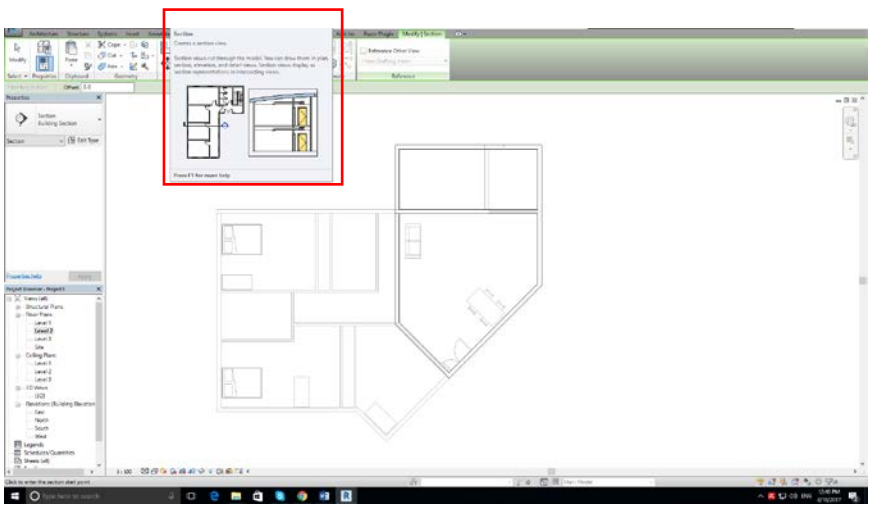
9. Click on the green tick and Revit will ask if the walls must go up to the floor, press yes in the meantime.



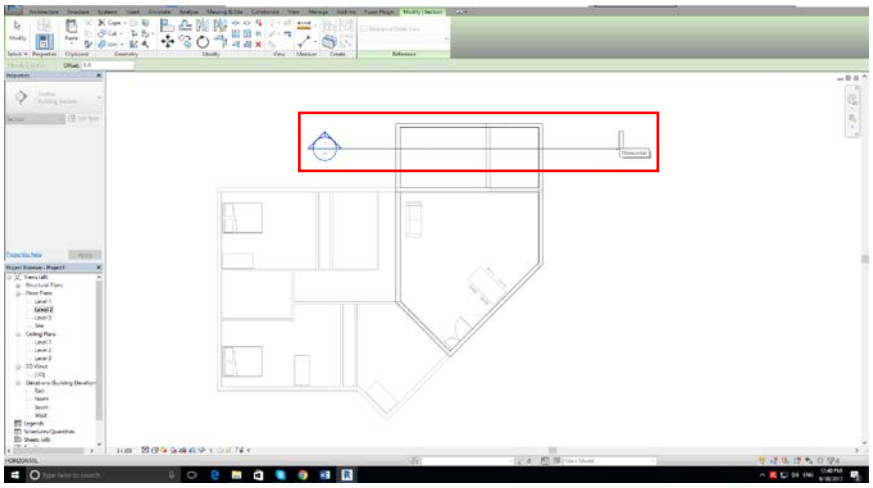
10. The floor is created and attached to the walls below.



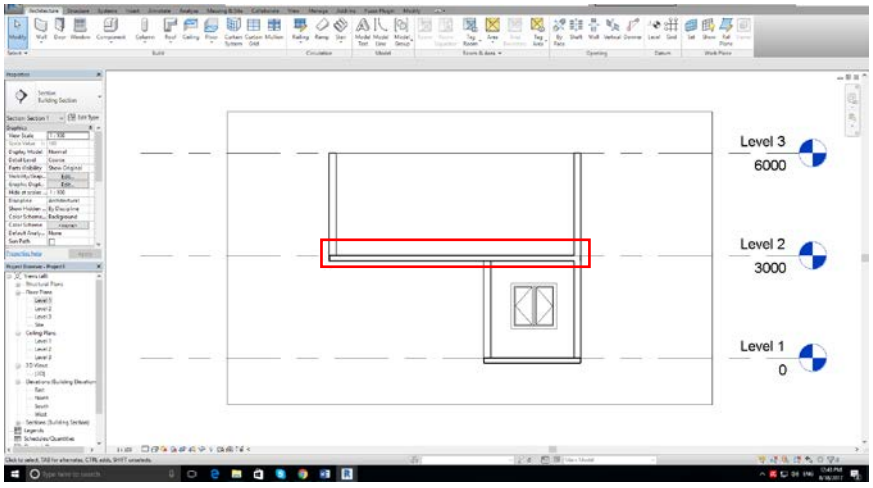
11. Create a section by clicking the black arrow icon on the top.



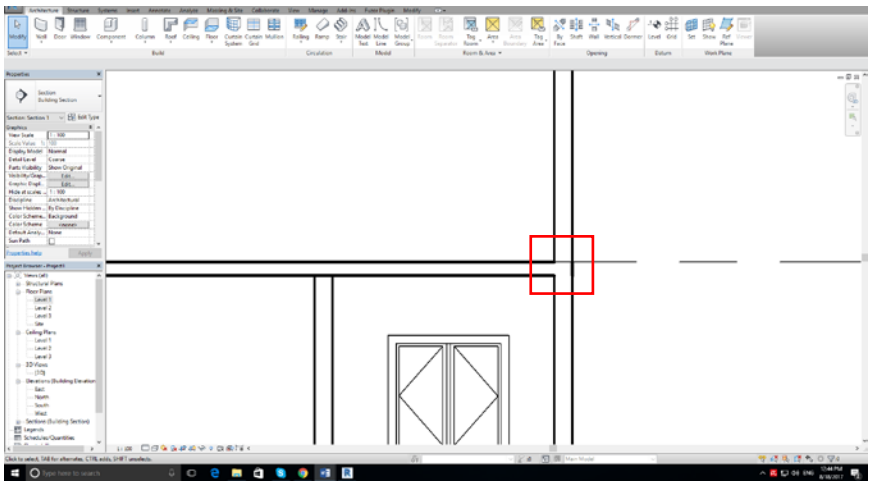
12. Create a section across the floor to see the effect of walls going up to the floor.



13. From the section, there is the floor; it is offset downwards from the created level.

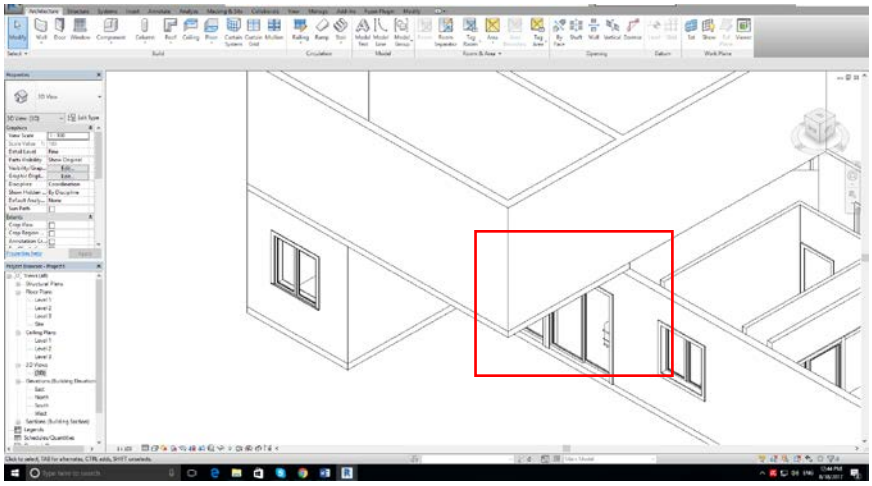


14. The wall and the floor are connected without any separation lines in the middle.

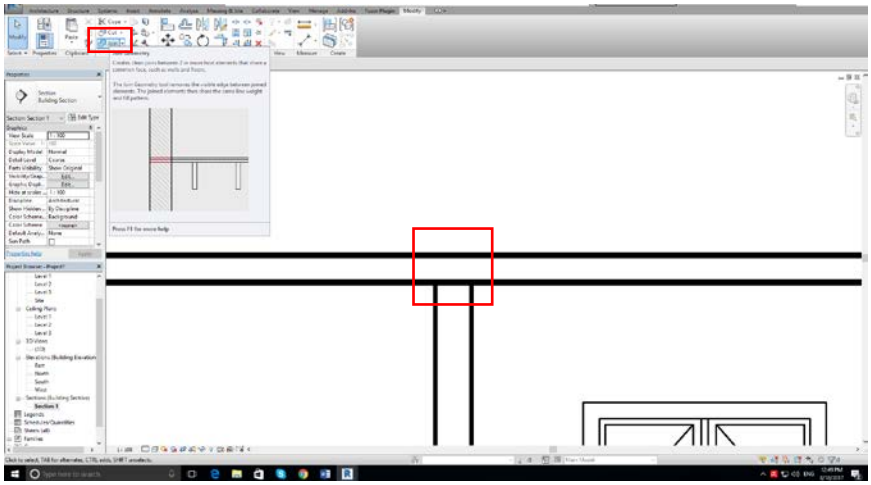


3.1.2 Join Geometry:

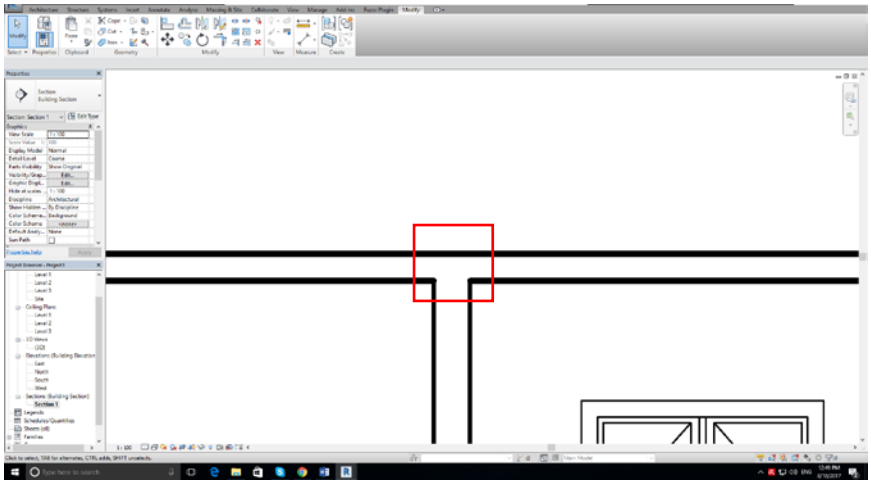
1. The floor is detached from the walls below.



2. Click on the Join Geometry Tool under the Modify Panel.



3. The separation line in between disappeared.

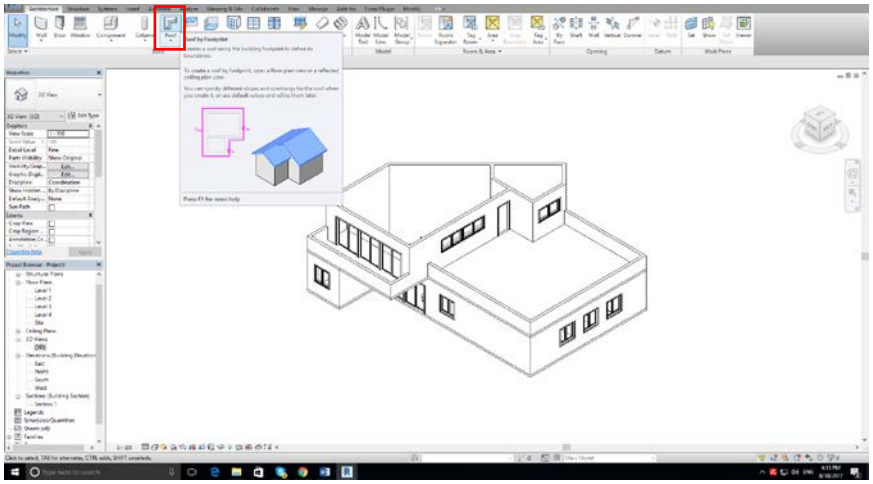


3.2 Creating Footprint Roofs

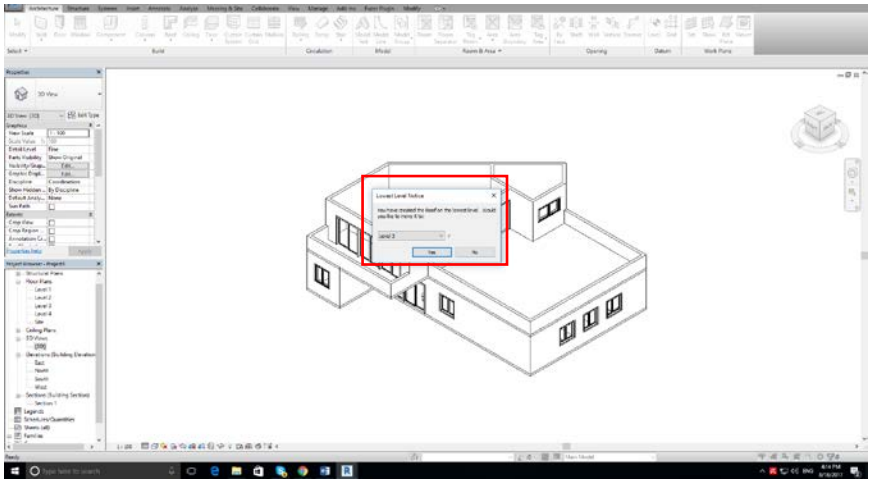
The roof is a kind of Sketch-Based Object. Sketch-Based Object must be created through a two-dimensional sketch to indicate the shape and form of the object. A roof offsets Upwards from the created level

3.2.1 Creating Roofs:

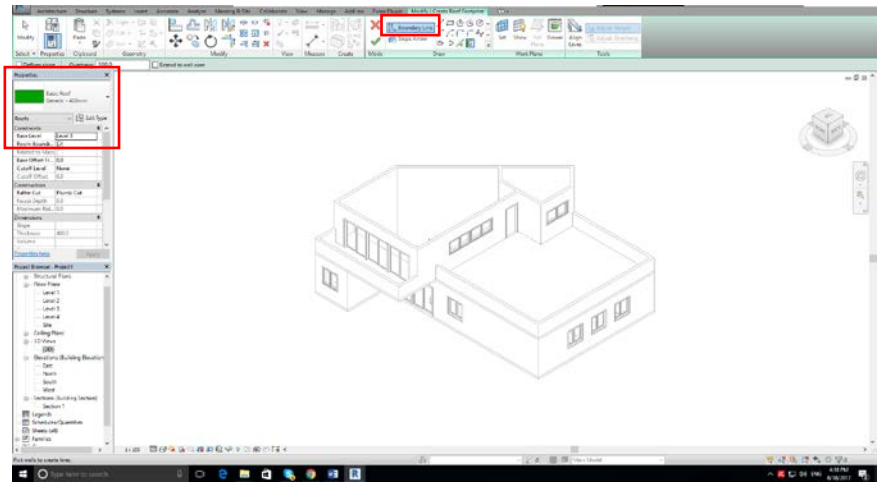
1. Click on the Roof Command under the Architecture Panel.



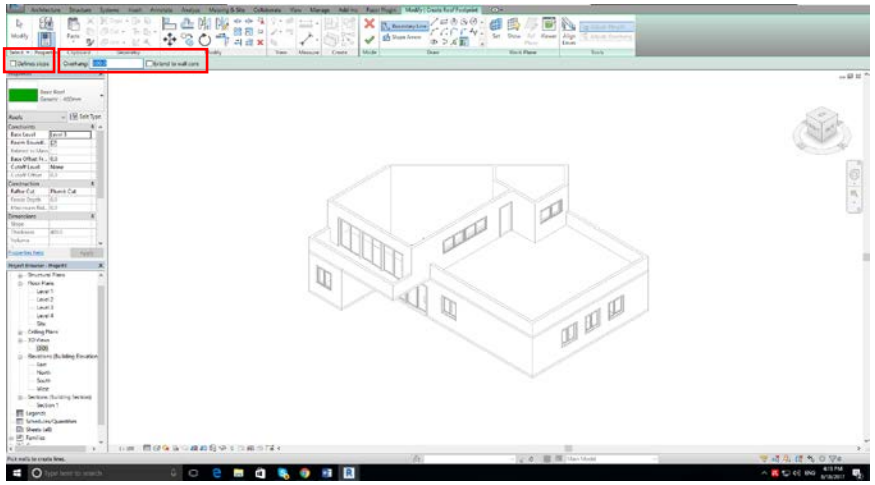
2. Choose the level to create the roof; level 3 is chosen.



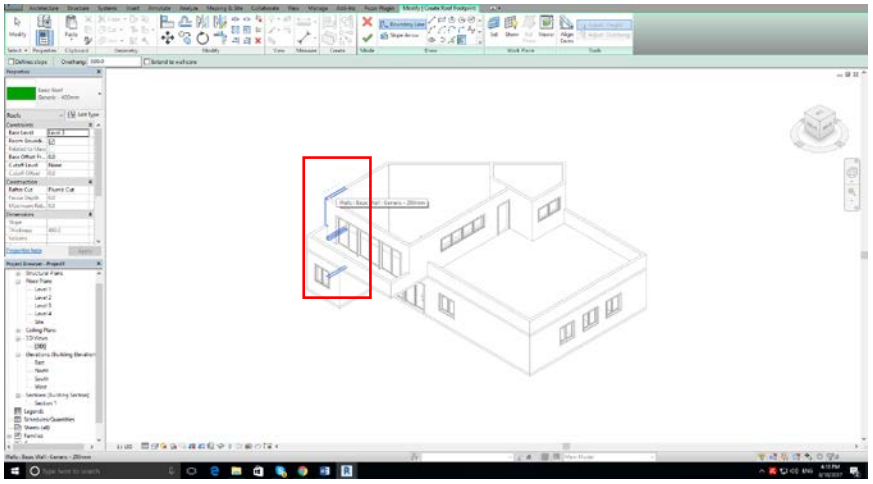
3. Choose a roof type and use the boundary line option.



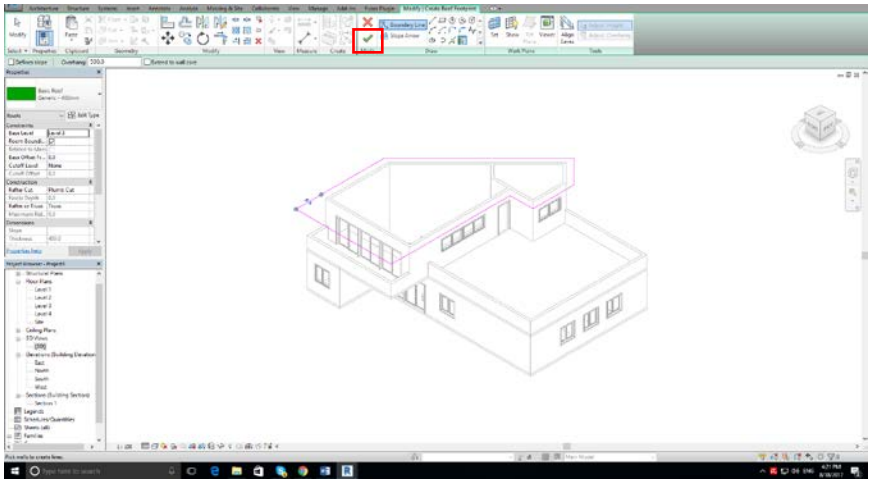
4. Uncheck the define slope box and type in an overhang value.



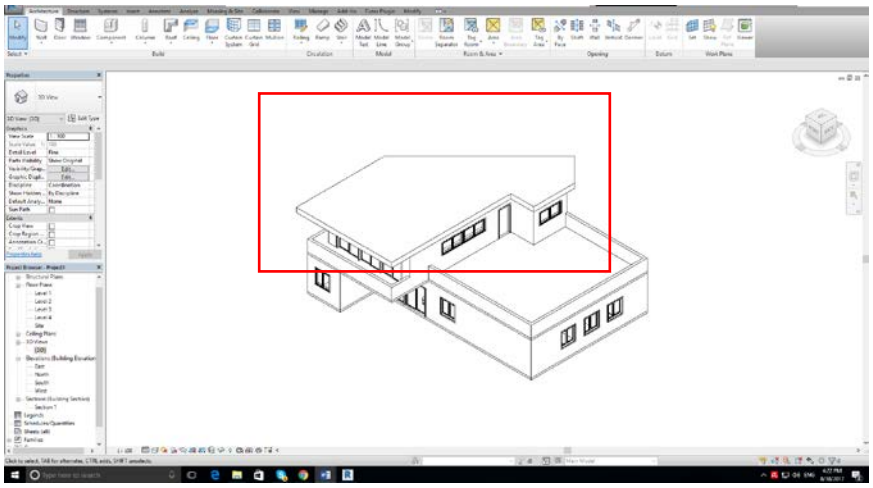
5. Use the pick line tool; the tool can be used in the 3D view.



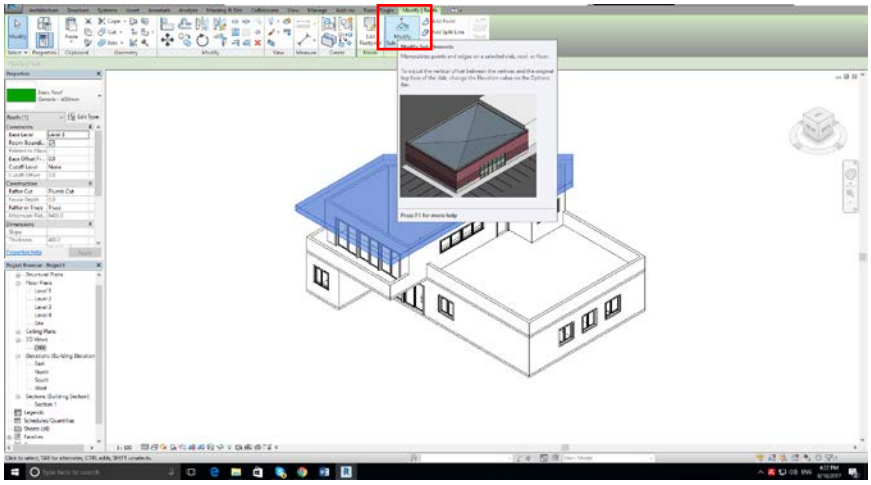
6. Create a closed geometry and press the Green Tick.



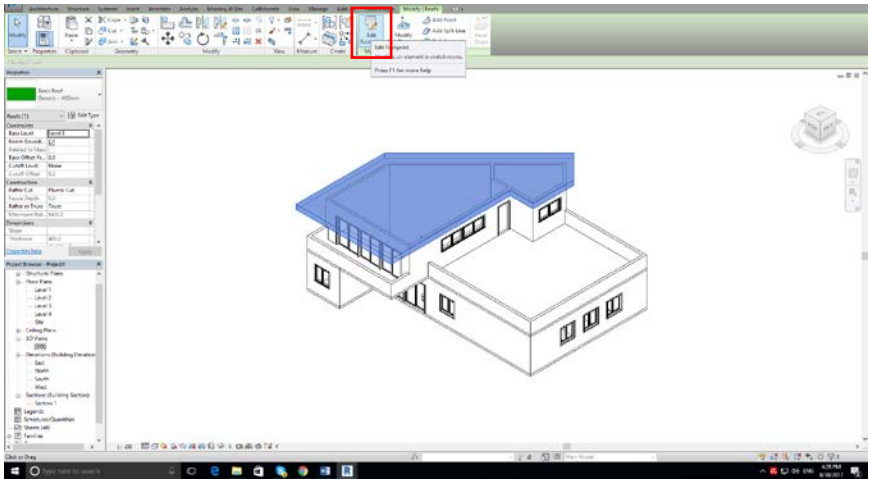
7. A flat roof is created, offsetting upwards from the selected level.



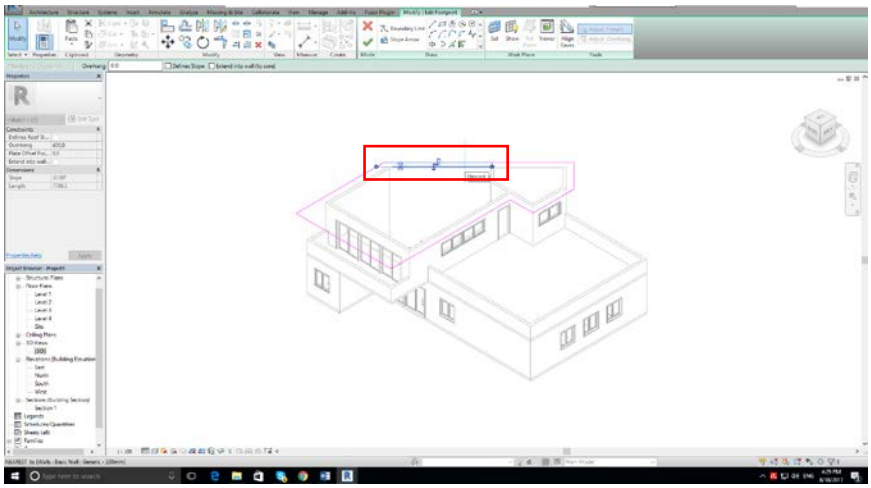
8. To give a slope to the roof, select the roof and click on the Modify Sub Elements Command.



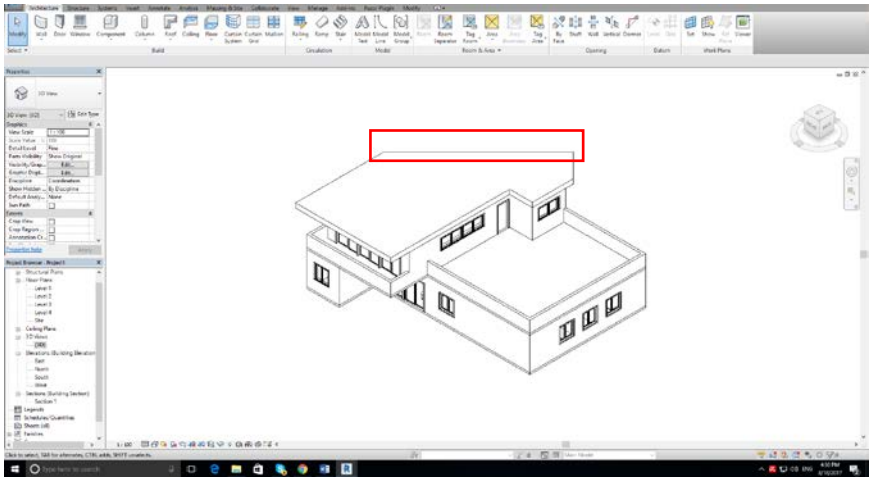
9. To change the boundary of the roof, select the roof and click on the Edit Footprint Command.



10. Select the line and drag it to a new position, the modifying tools can be used as well.



11. The boundary of the roof is changed.

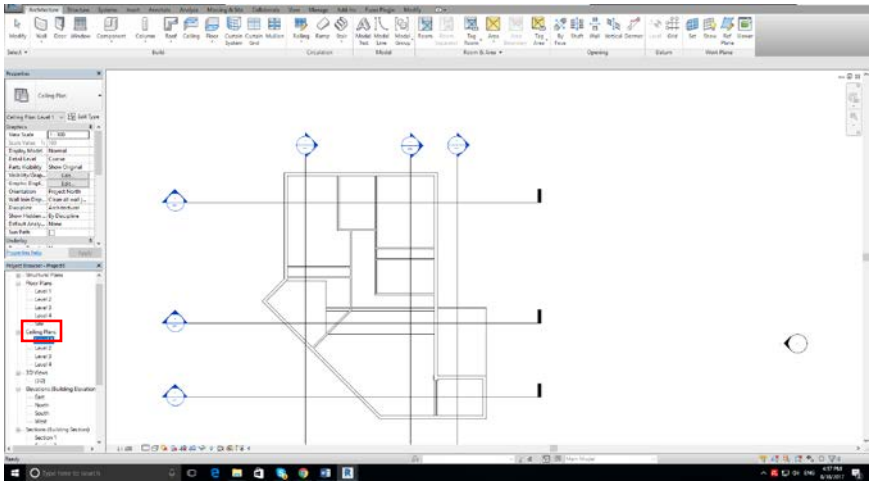


3.3 Working with Ceilings

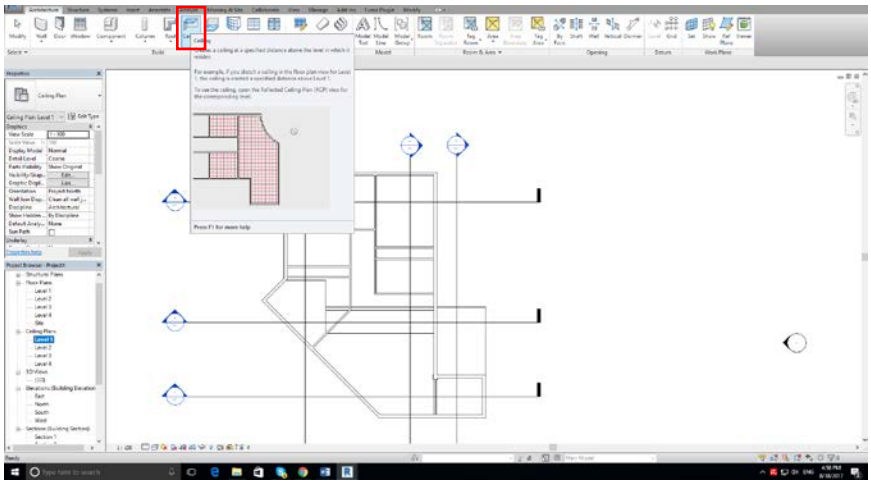
The roof is a kind of Sketch-Based Object. Sketch-Based Object must be created through a two-dimensional sketch to indicate the shape and form of the object.

3.3.1 Creating Ceilings:

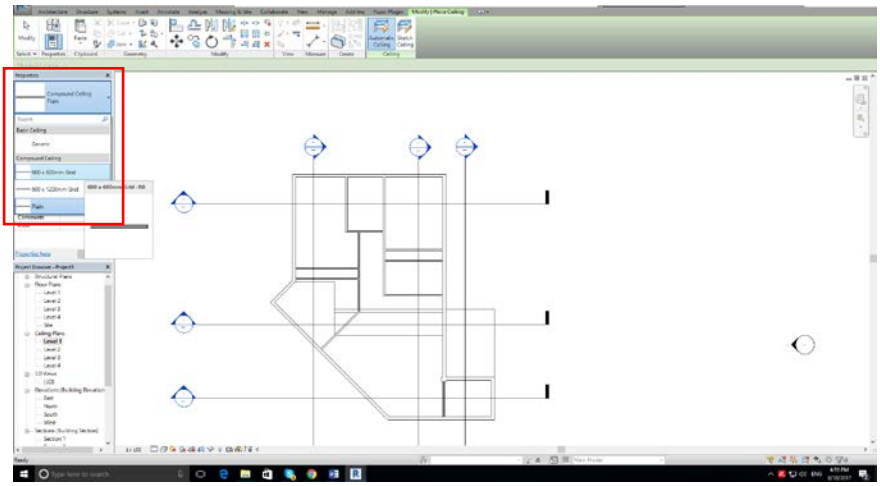
1. Open the ceiling plan for Level 1.



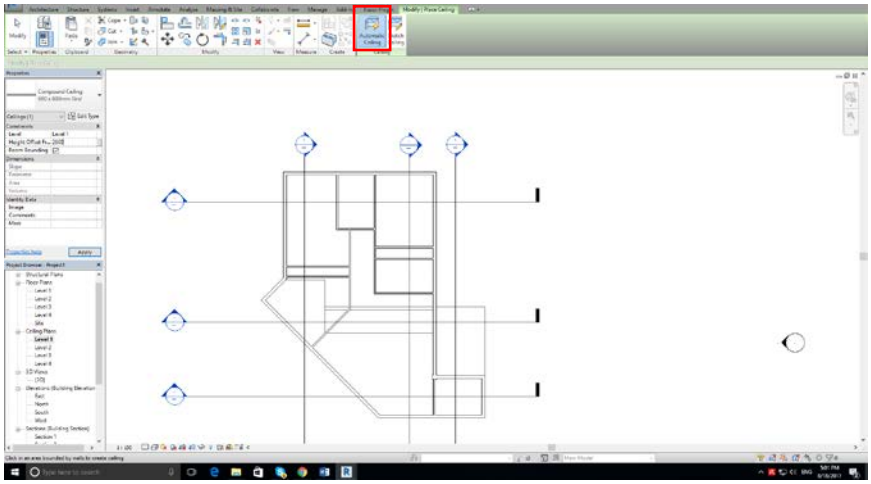
2. Click on the Ceiling Command under the Architecture Panel.



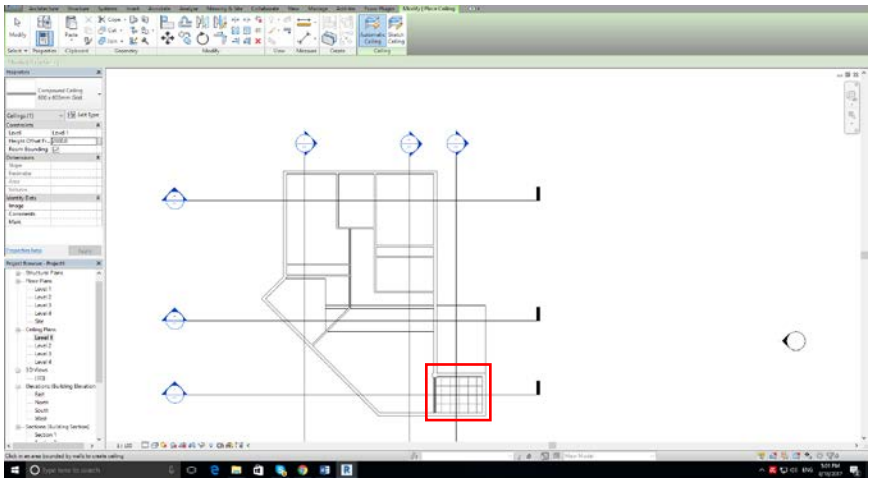
3. Select a type of Ceiling from the pre-loaded list.



4. There are two methods to create ceilings, Automatic and Sketch, choose the automatic option.

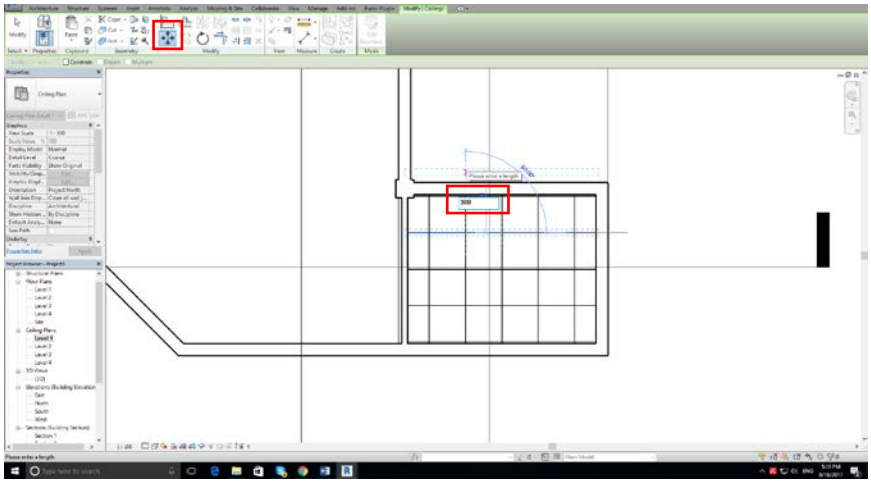


5. Click on an enclosed room, and a ceiling will be created.

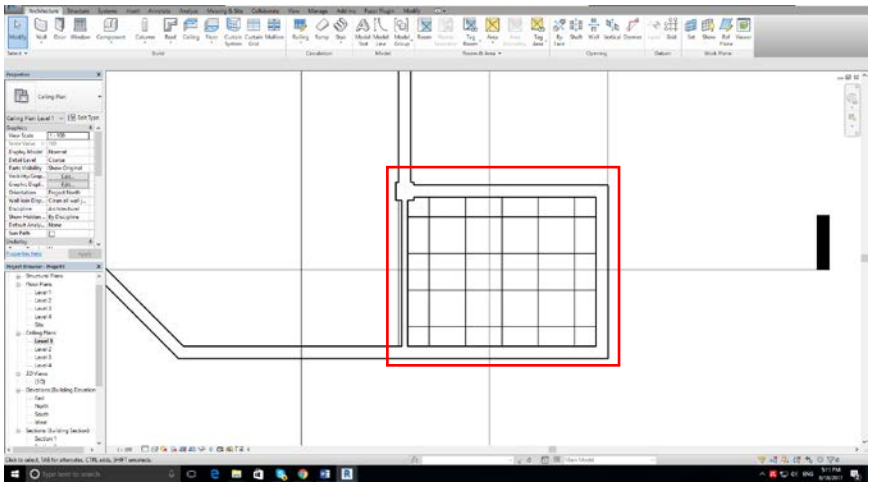


3.3.2 Modifying Ceilings:

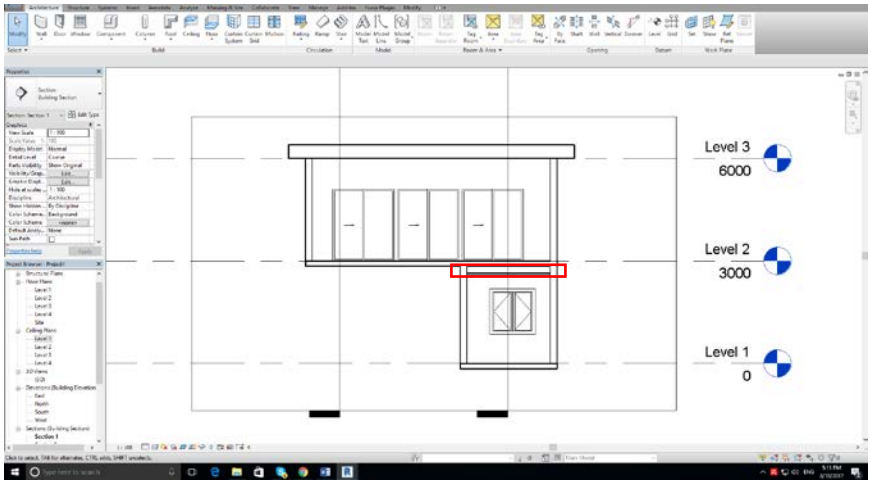
1. Click on one of the ceiling lines and move or rotate it.



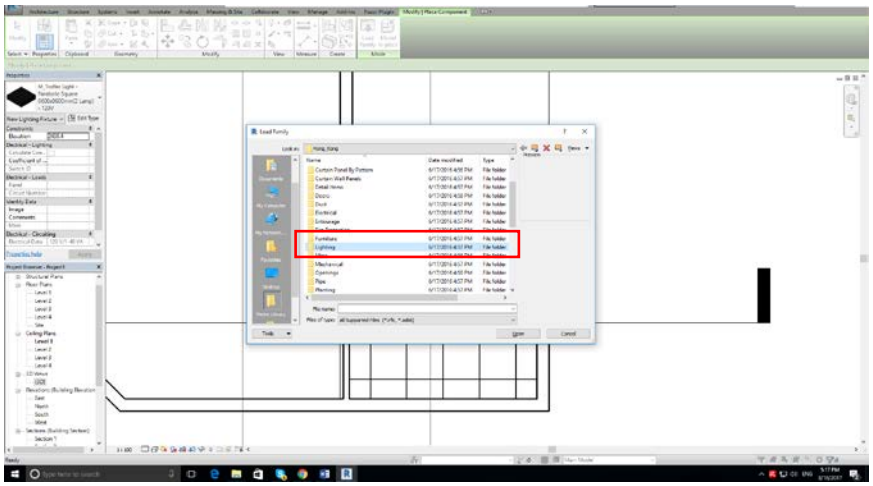
2. Revit will move the whole pattern instead of just moving a single line.



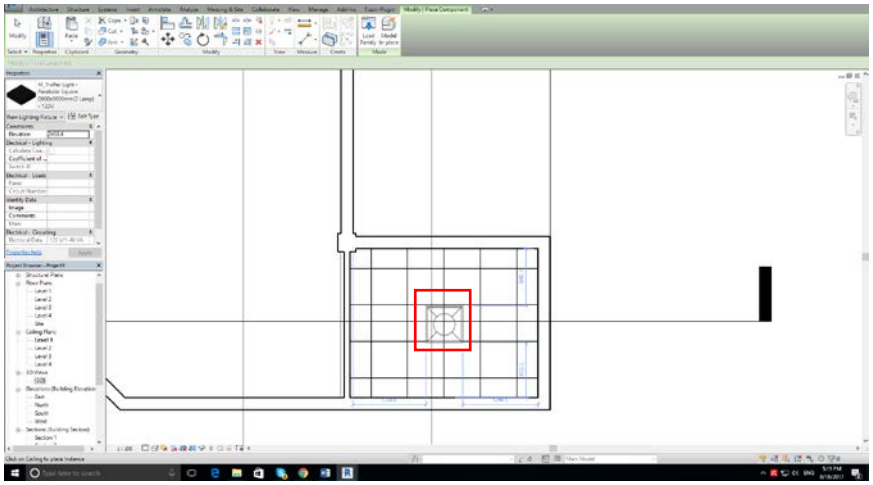
3. Click on the line, to offset a new line from the original line.



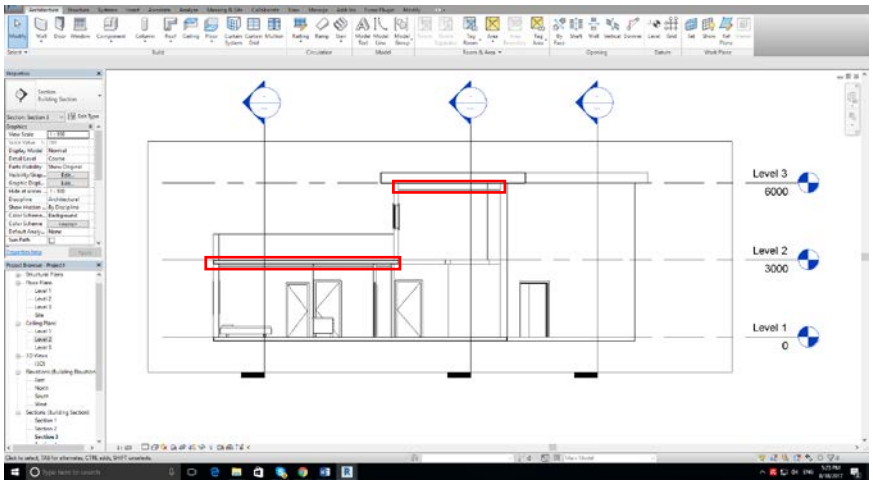
4. Use load family command to add in a lighting family.



5. Place the light on the ceiling plan, and the light will automatically attach to the ceiling.



6. From a section view, the ceilings are just under the roof, the height of the ceiling can be modified in the properties window.

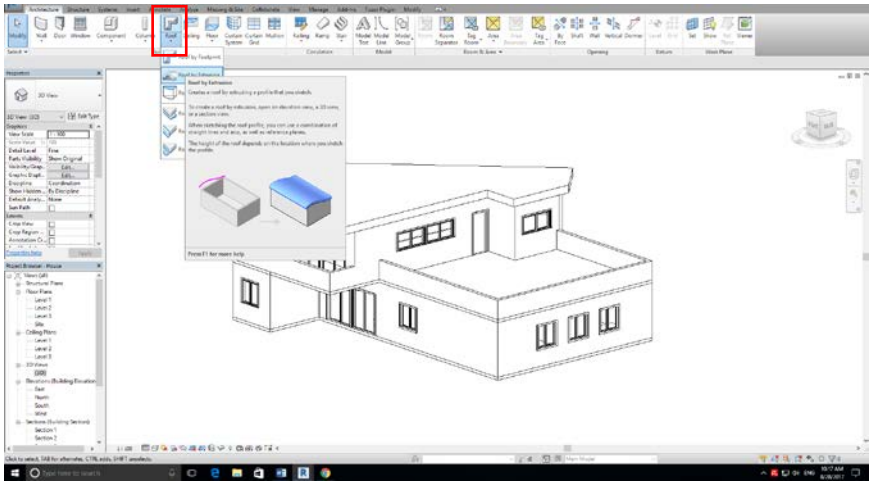


3.4 Creating Extrusion Roofs

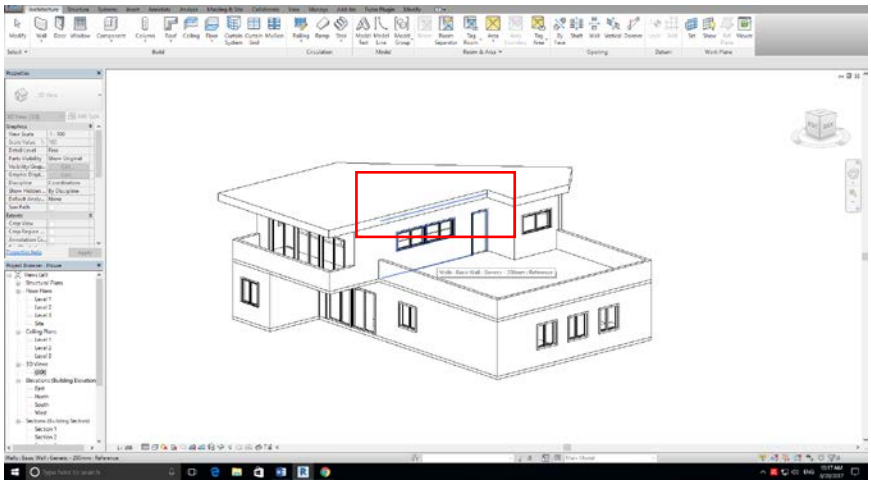
Extrusion Roof is a tool to create curvy free-form roofs; it is also a kind of sketch-based object. Instead of sketching from a floor plan, the working plane can be at any angles.

3.4.1 Extrusion Roofs:

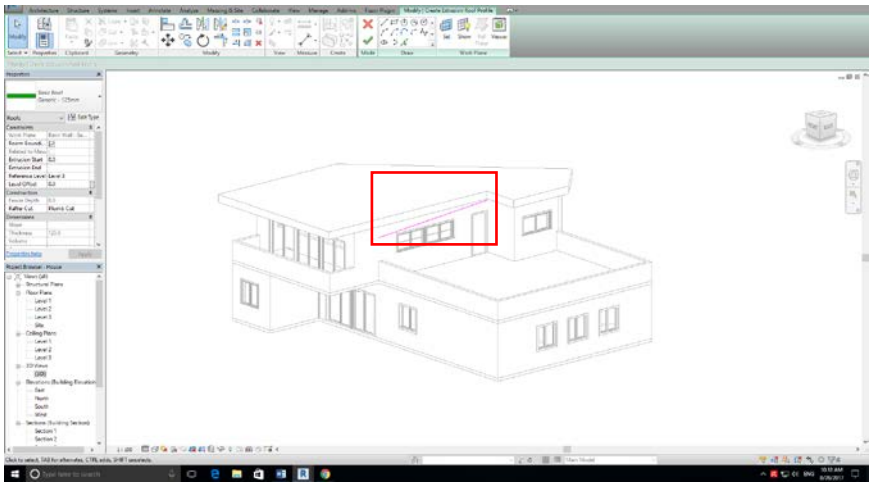
1. Click on Roof by Extrusion under the Roof Command.



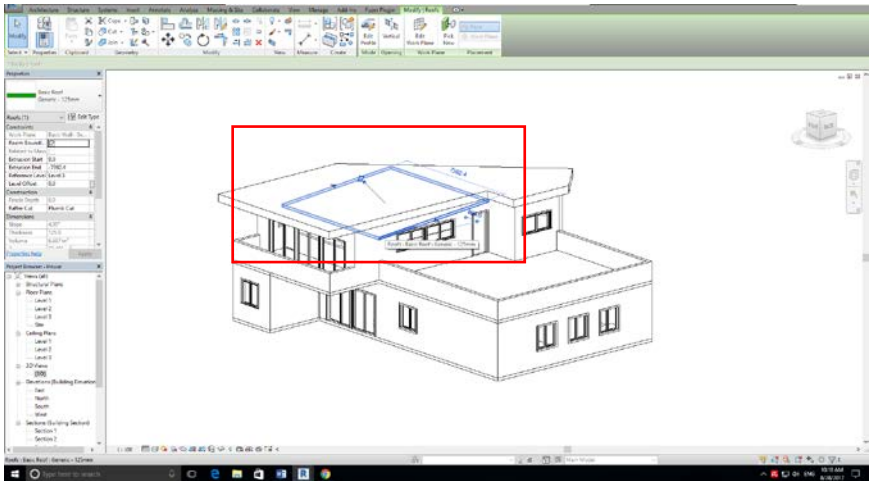
2. Then select a working plane for sketching the shape, the working plane can be a wall.



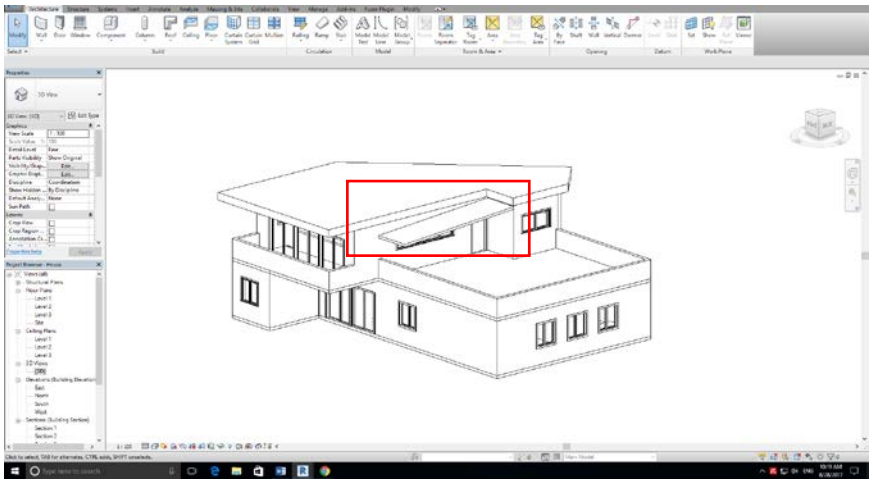
3. The roof can be drawn with any drawing tools like curve, polygons and line segments.



4. Click Press the Green tick, the line will be extruded horizontally, a roof is created but usually in a wrong direction.



5. Drag the blue arrow and fix it to the designated position.

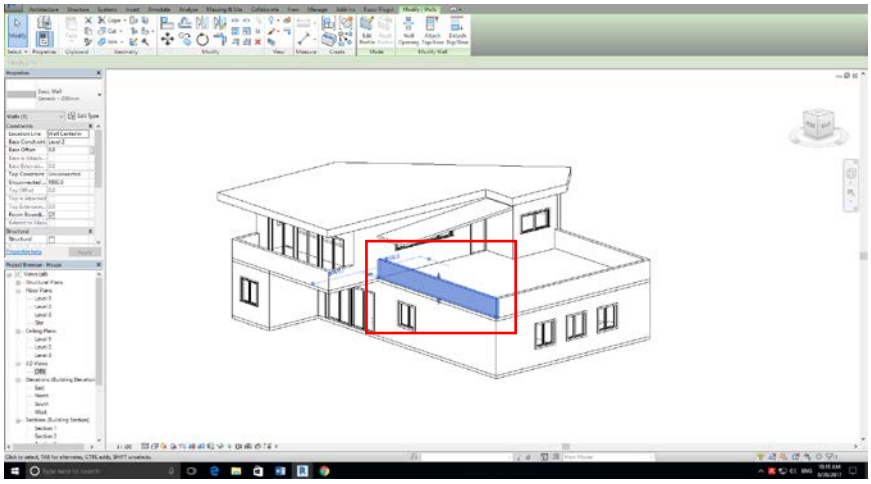


3.5 Attaching Walls to Roofs

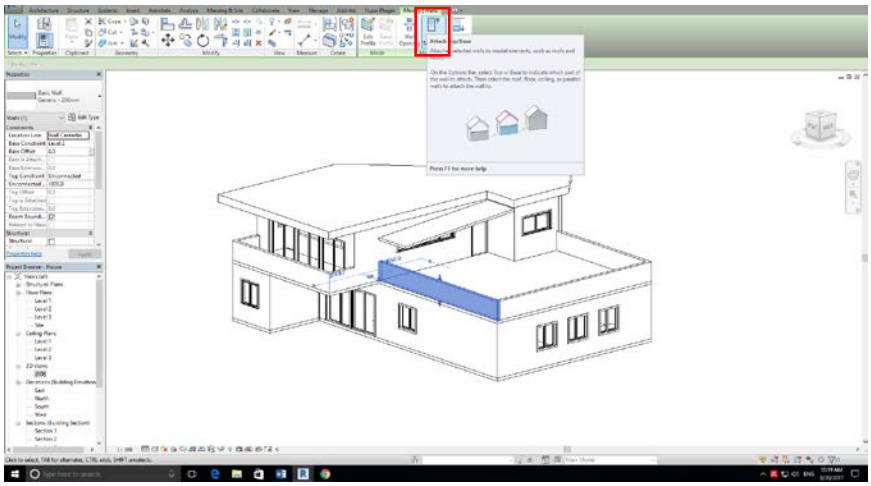
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

3.5.1 Adding Components:

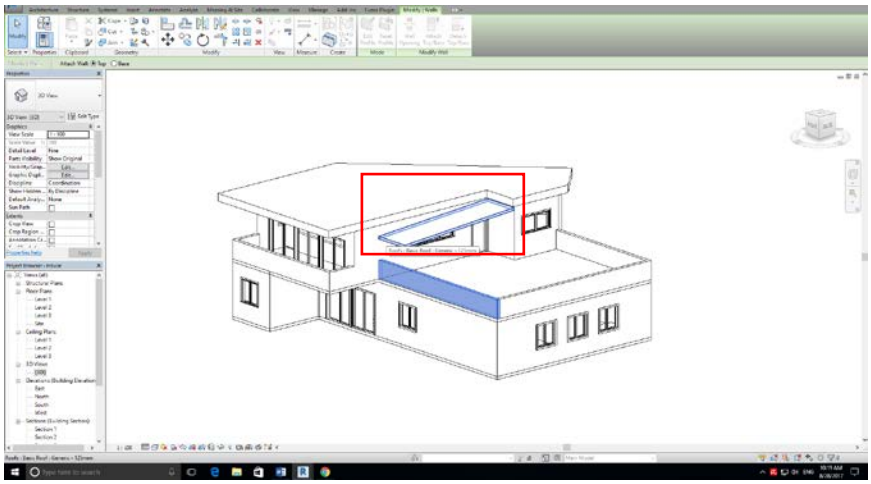
1. Select a wall to be attached to a roof.



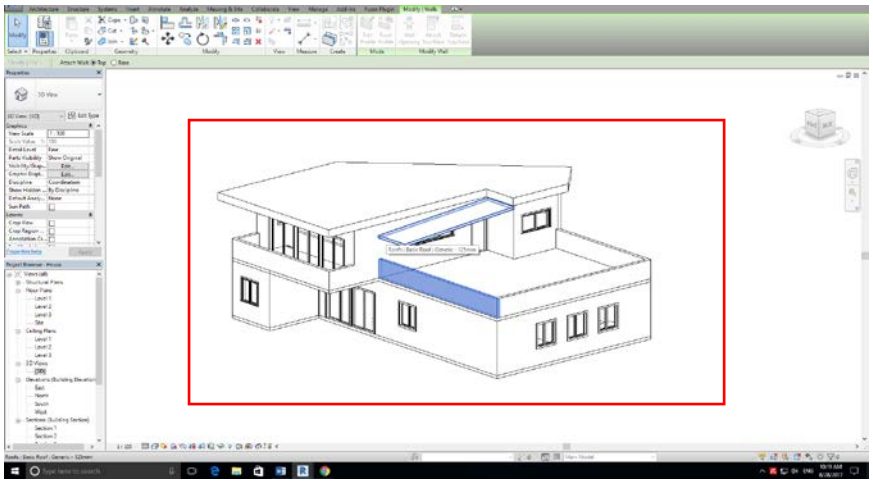
2. Press the Attach Top/Base button under Modify.



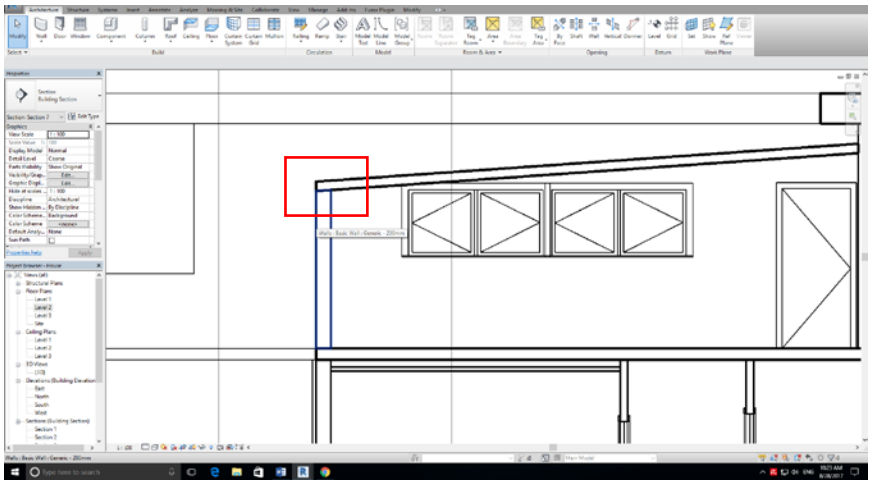
3. Select the roof to be attached to.



4. This command can be used to attach a wall to the base, floor by checking the correct circle in the modify tab.



5. From the section, the wall is attached to the roof, and the intersection point is connected at an angle.

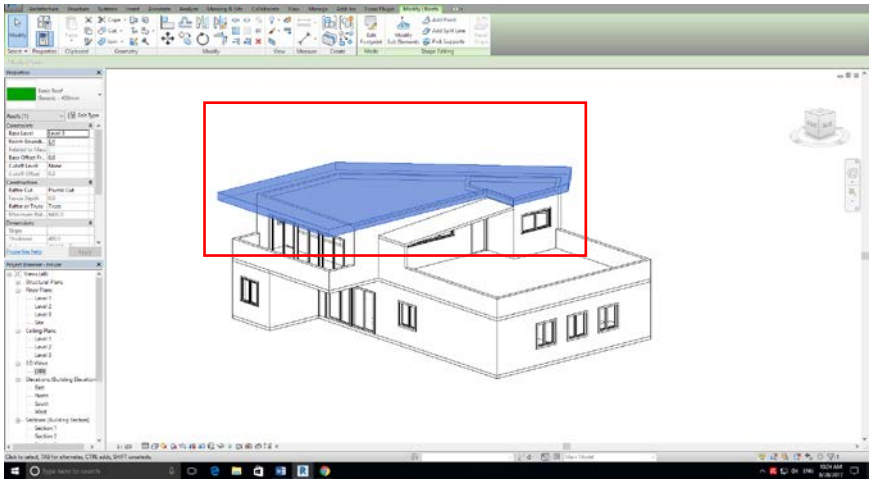


3.6 Using the Shape Editing Tools to Create a Flat Roof

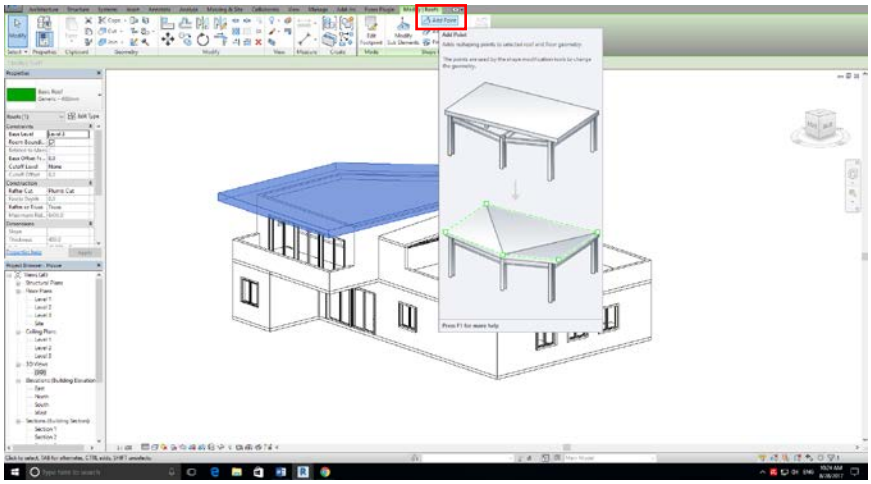
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

3.6.1 Shape Editing:

1. Open the 3D view, select the Roof to be edited.

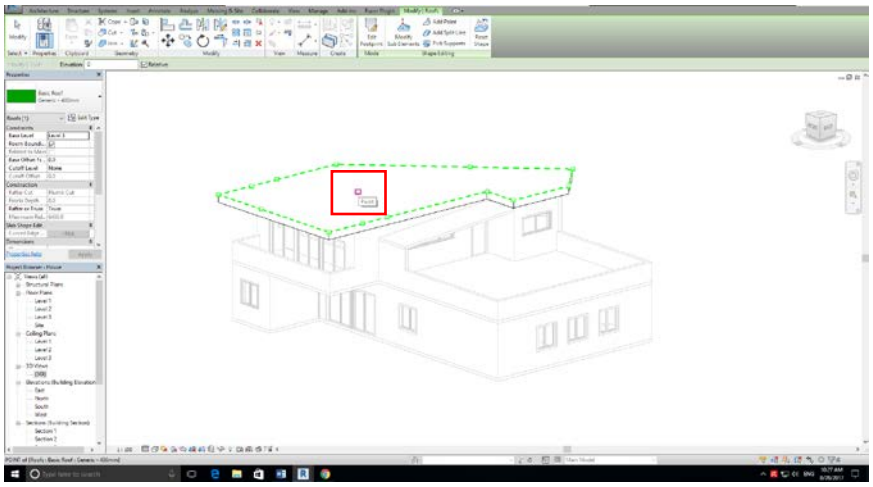


2. The roof can be edited by adding a point, adding a line and picking supports, first start with adding points.

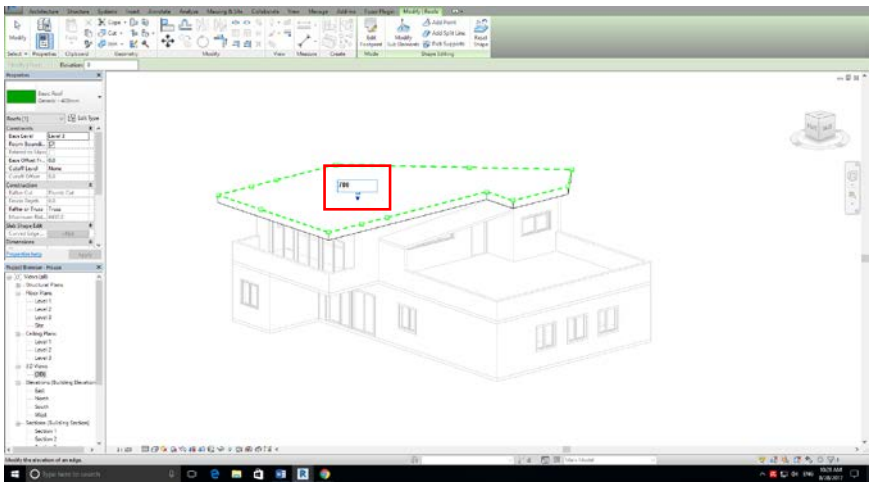


3.6.2 Add Point:

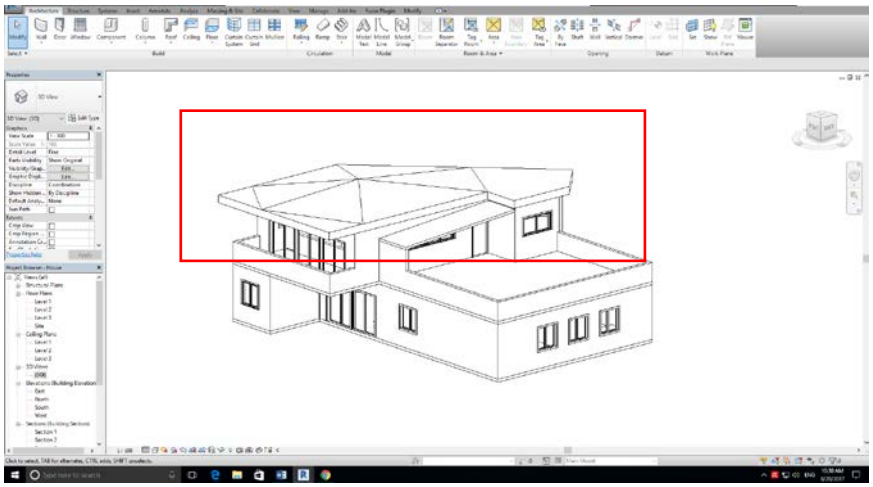
1. Click on Add Point and select a space to place the control point, the point must be within the plane.



2. Click on the point and type in an offset value, positive value moves the point up, negative moves it down.

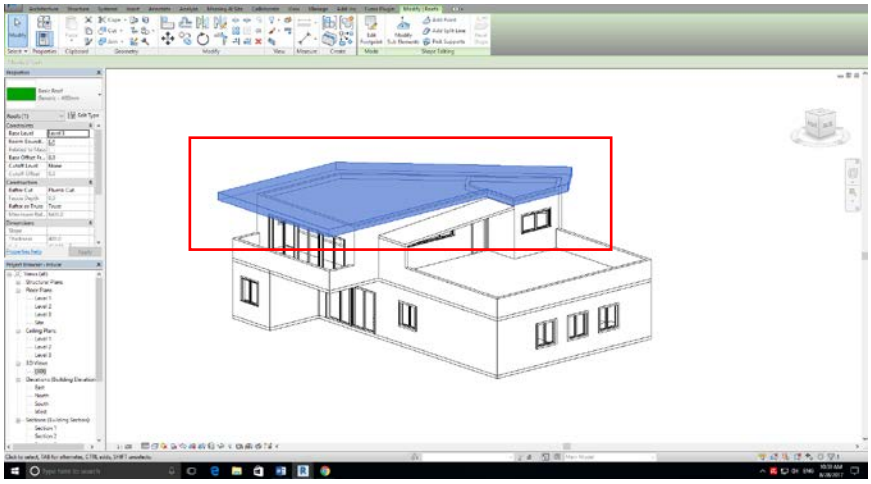


3. Press enter and go back to modify; a pitched roof is created.

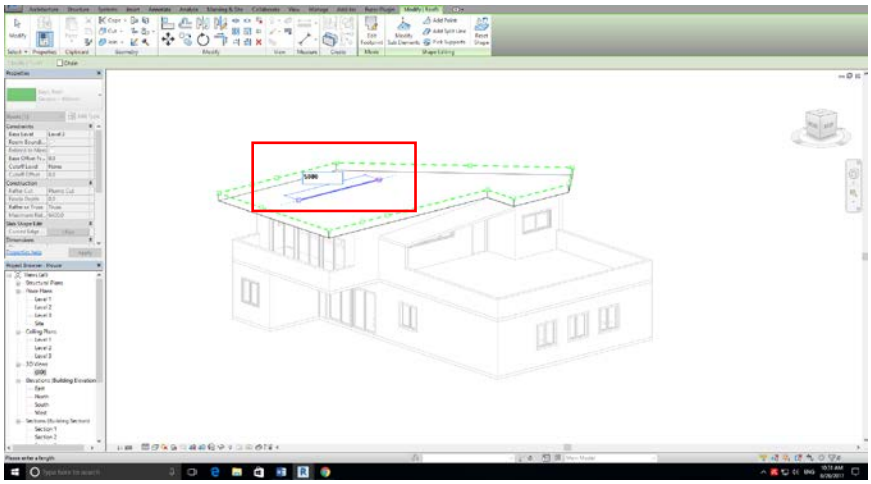


3.6.3 Add Split Line:

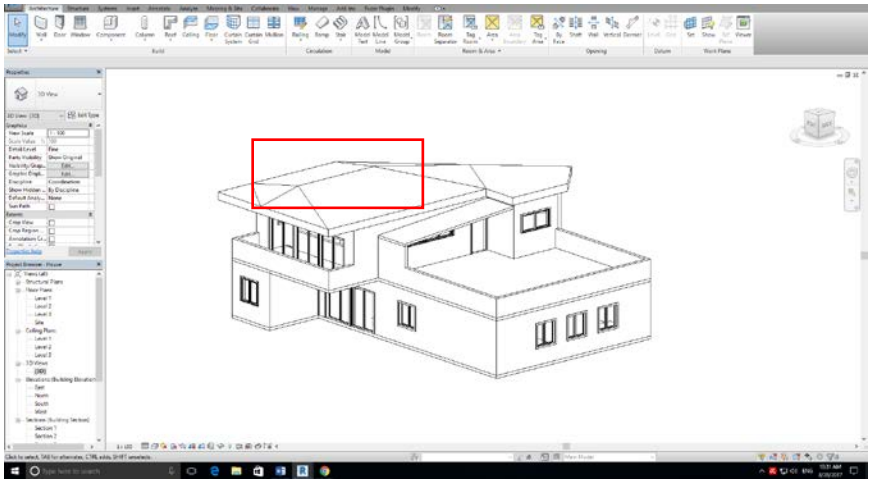
1. Select a roof and click the Add Split Line command.



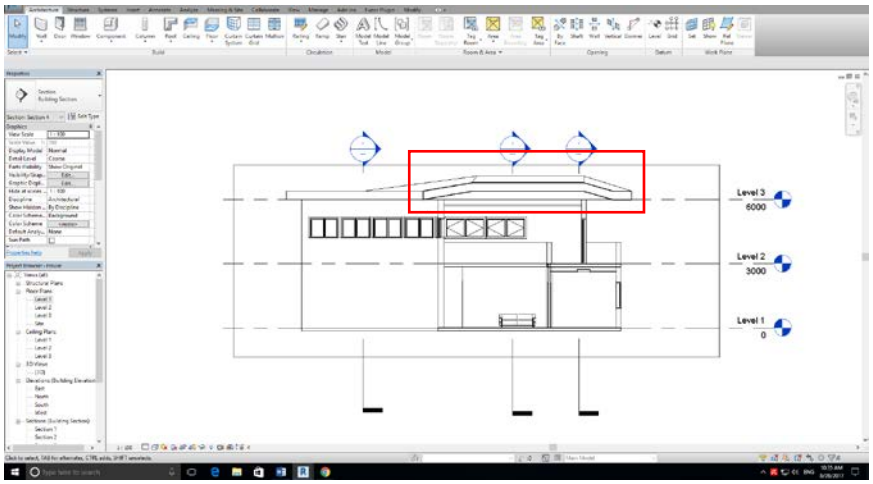
2. Draw a line, drag or type in the length of the line, the starting and ending point must be within the plane.



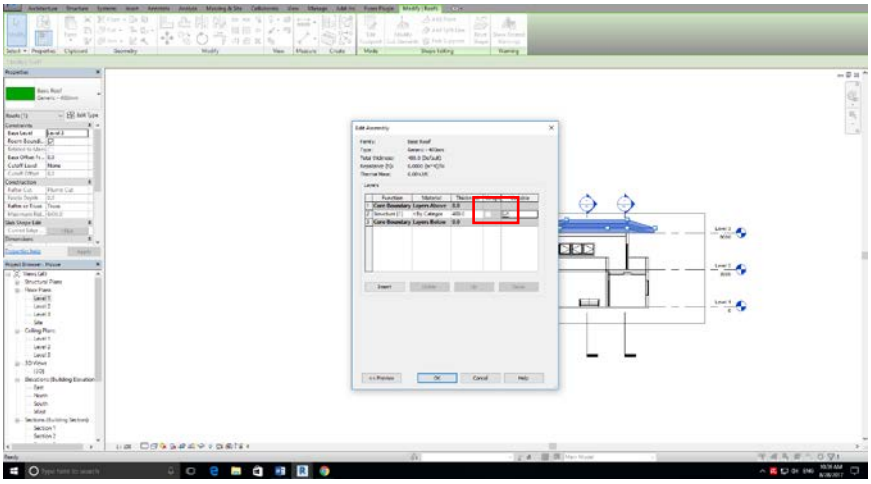
3. A pitched roof with a split line as control is created.



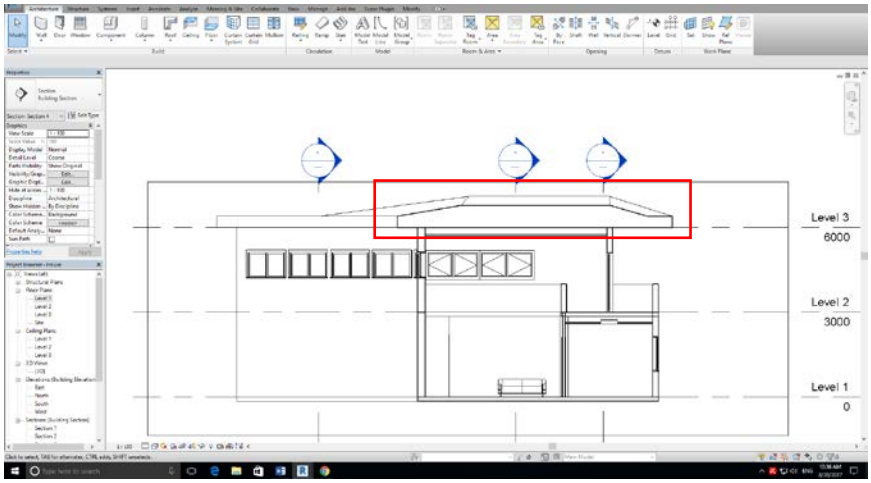
4. Open a section cutting the pitched roof; the slanted roof is shown.



5. Select the slanted roof and click on the Edit Type command, edit structure and check the box under variable.



6. By checking the variable box, the thickness of the roof changes according to the slant, filling up space in the middle.

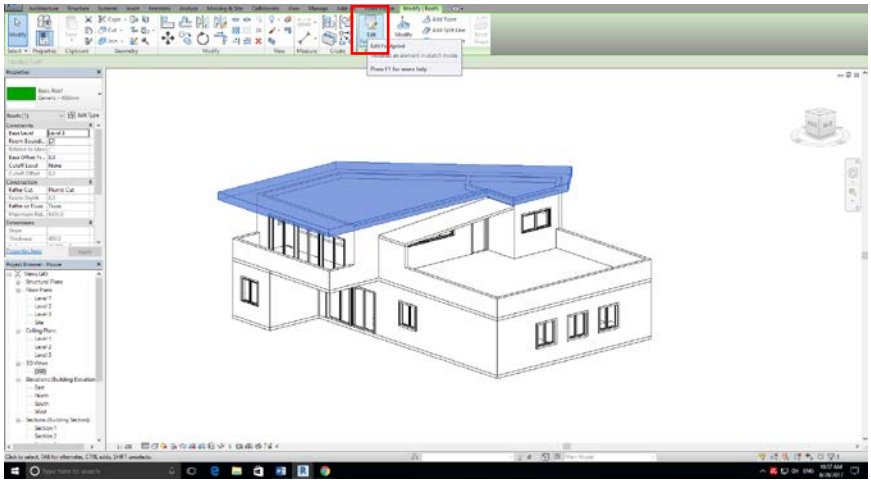


3.7 Working with Slope Arrows

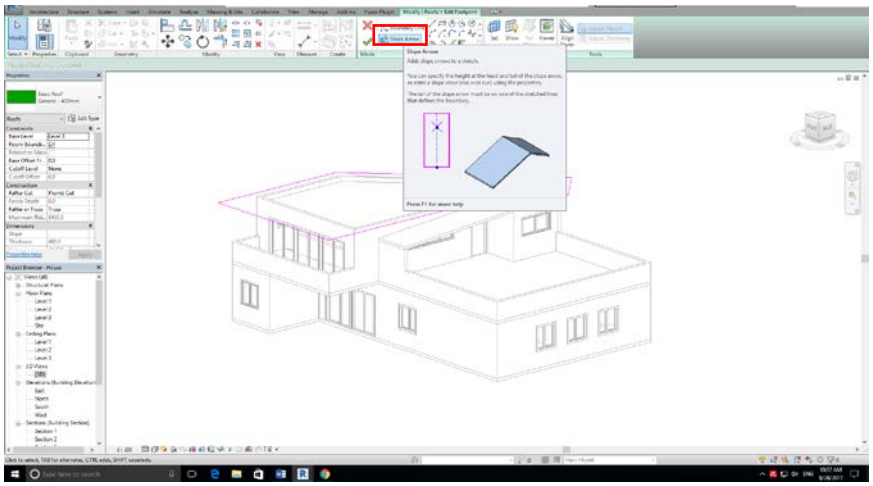
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

3.7.1 Adding Components:

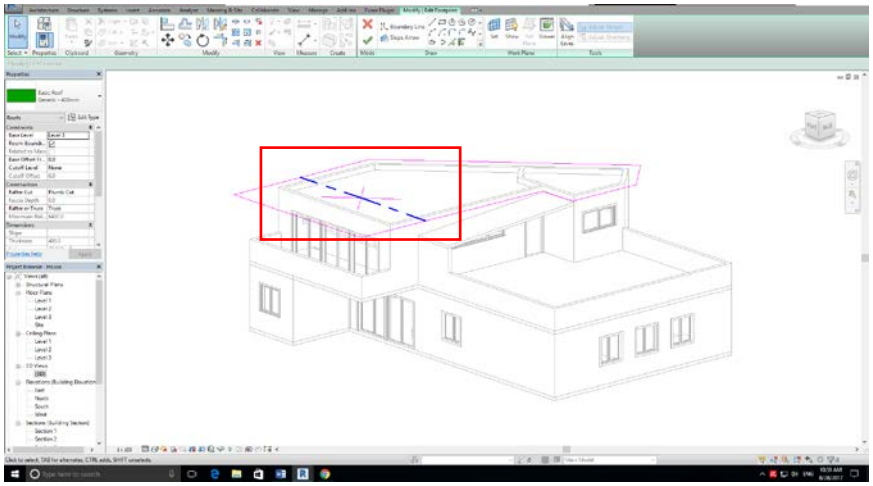
1. Select the roof and click on the Edit Footprint command.



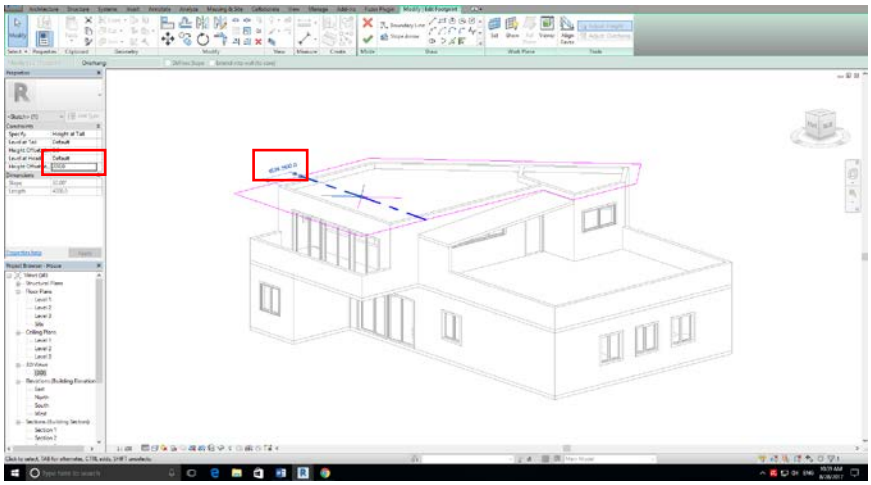
2. It will enter sketching mode, click on the slope arrow command.



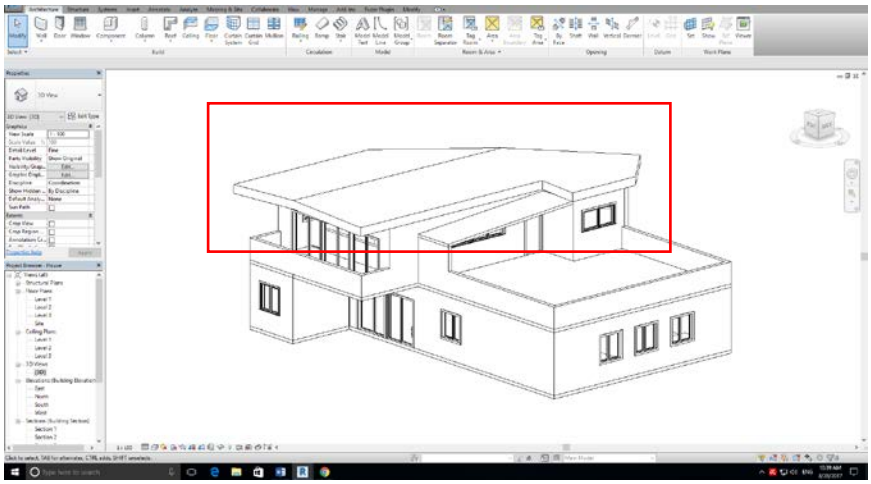
3. Draw one or more slope arrows, the end of the arrow must touch the edge of the roof while the head can be anywhere.



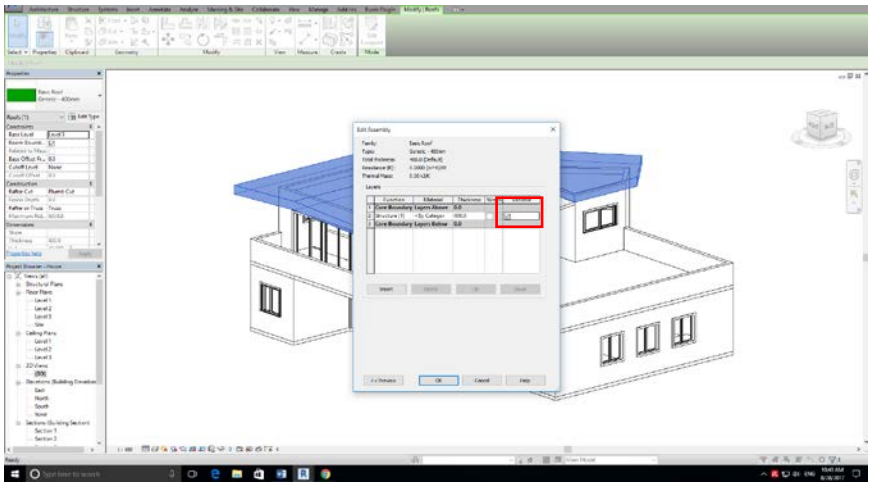
4. Type in a Height offset, it indicated the height of the arrowhead.



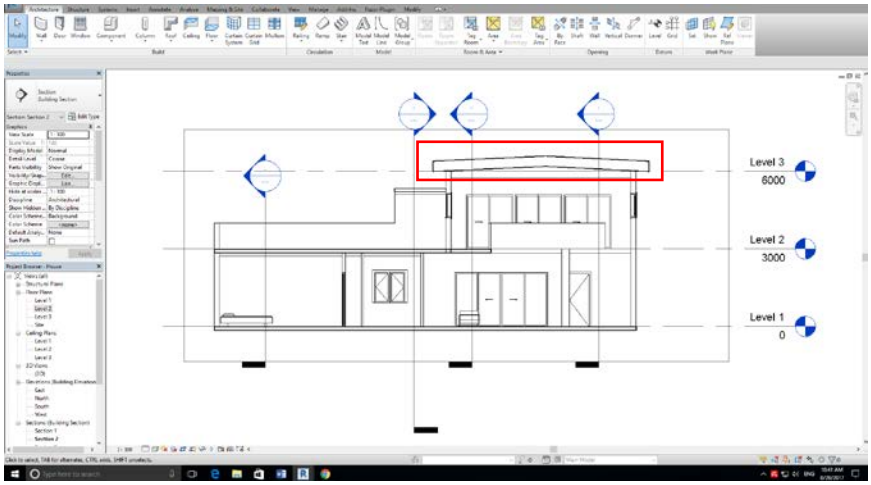
5. The roof will slant according to the slope arrows.



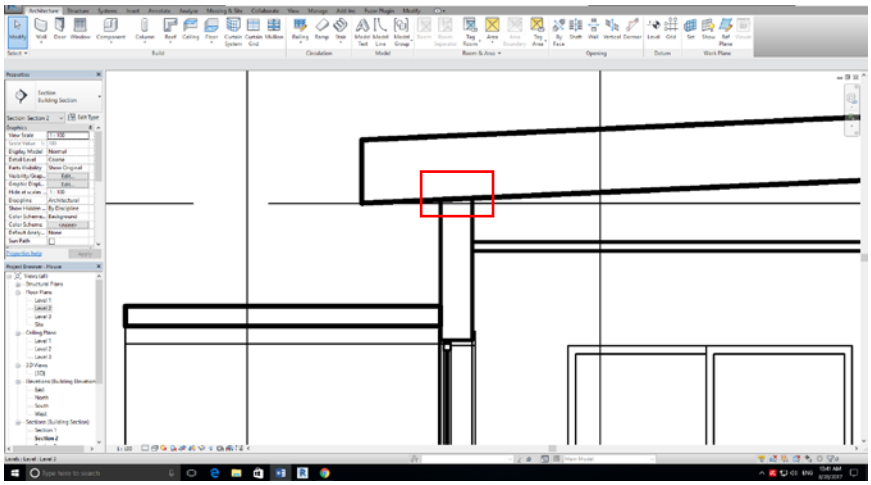
6. Go to Edit Type, make the structure thickness variable.



7. Click Select the walls which are just under the roof, attach all the unconnected walls to the slanted roof.



8. The walls will extend and join the roof.

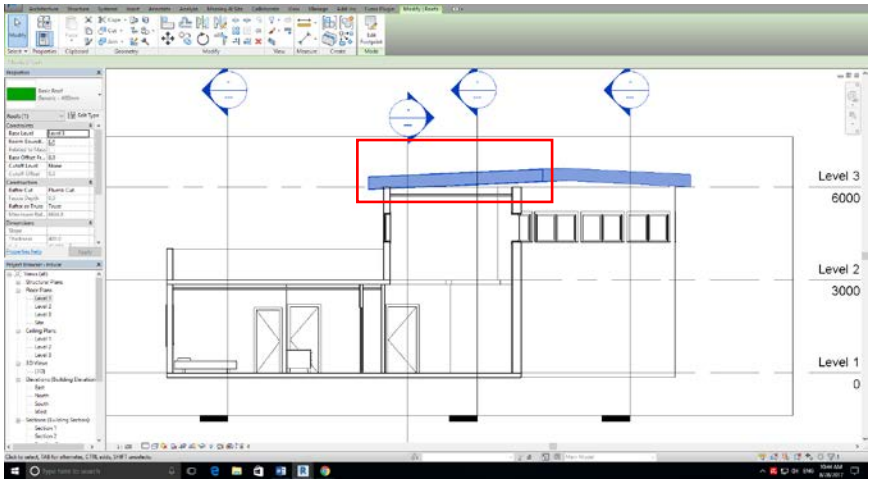


3.8 Adding Openings

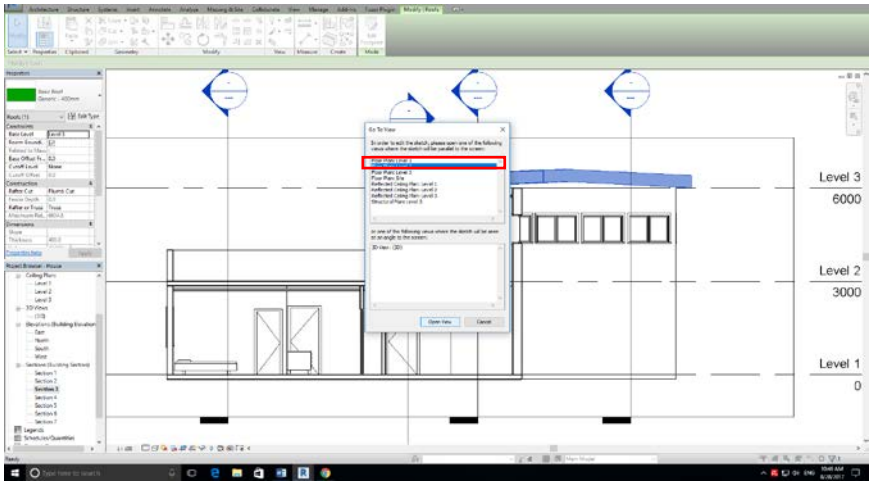
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

3.8.1 Adding Components:

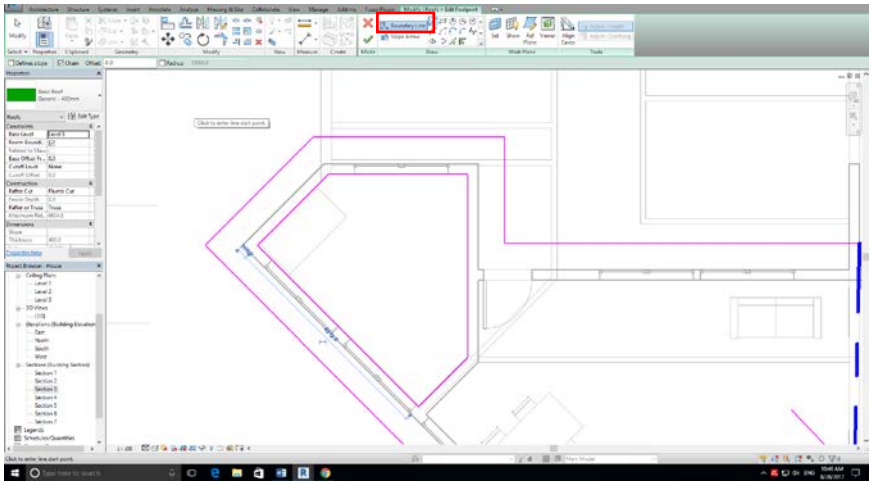
1. To add an opening to an object, first select that object.



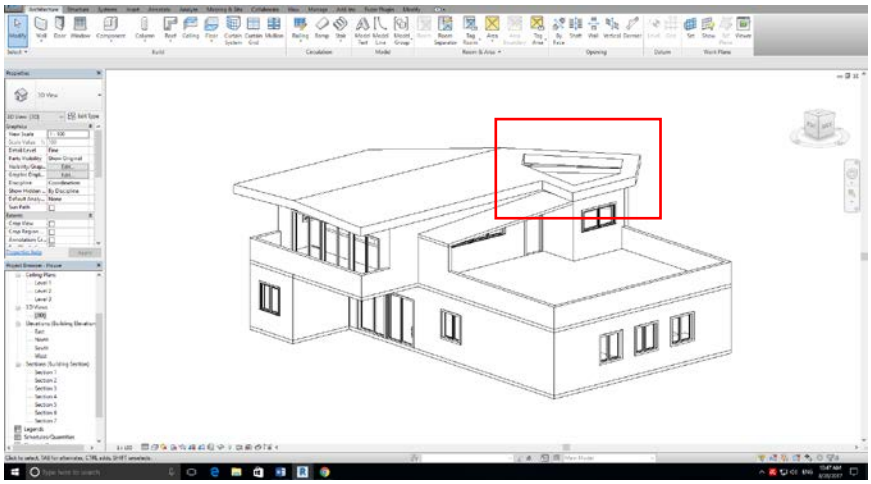
2. Click on Edit Footprint and choose a view to editing the shape boundary, the view has to be perpendicular to the roof.



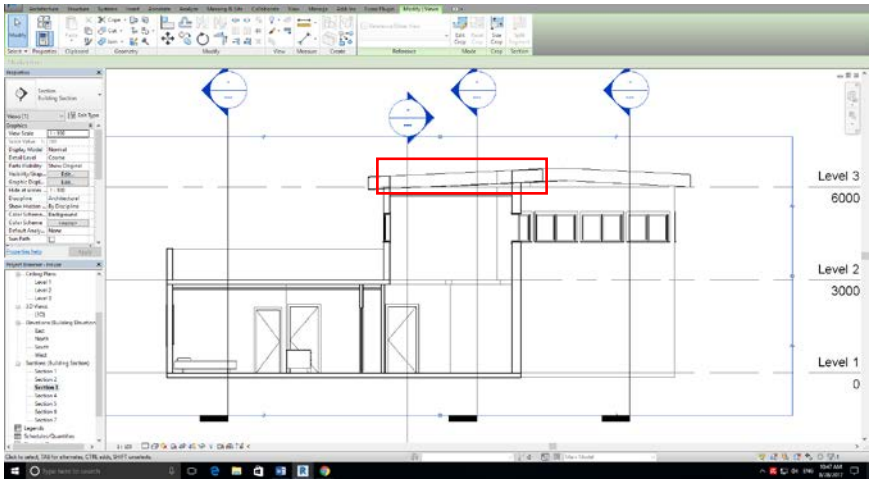
3. Use the drawing tools and draw an opening within the exterior boundary, the two lines should not intersect each other.



4. Switch to the 3D view; the opening will follow the slope of the slanted roof; it is created vertically.



5. Switch to a section view; an opening is shown.



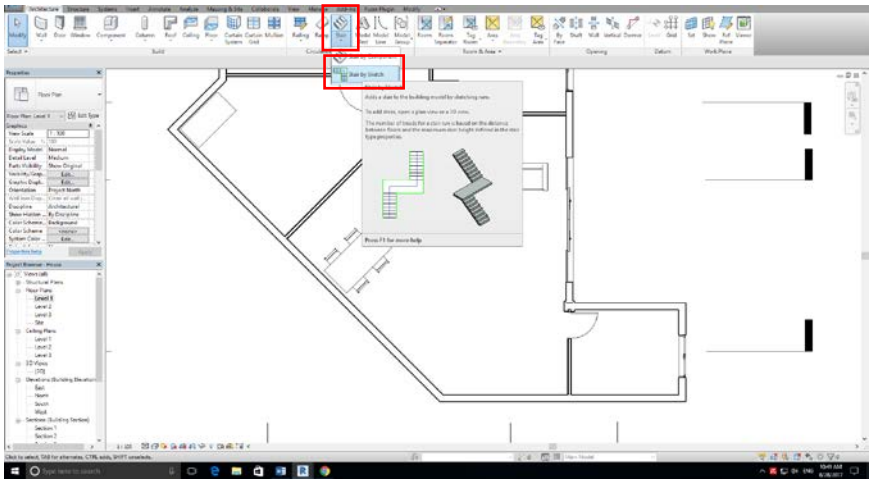
4. Stairs

4.1 Working with Stairs

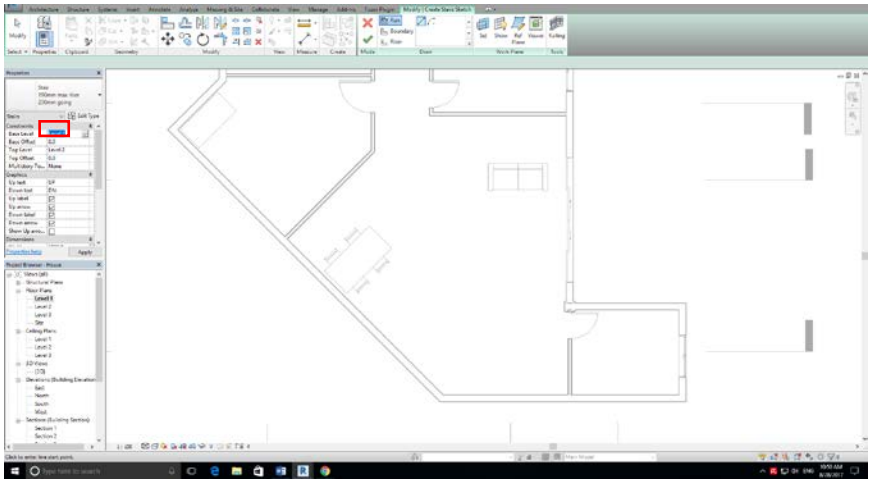
Revit have two kinds of stairs, stair by sketch and stair by component. Stairs contain different components, runs, landings, supports.

4.1.1 Runs and Landings:

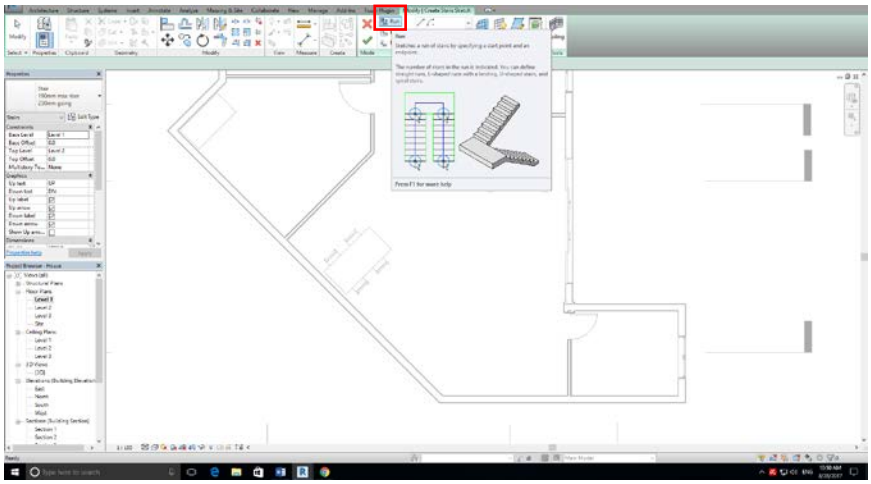
1. Click on Stair by Sketch under the Stair Command.



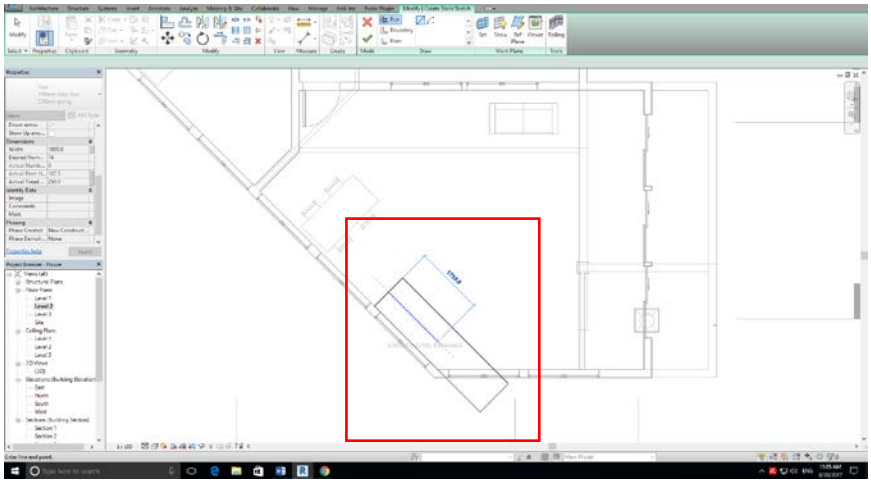
2. On the Properties Panel, choose the base and top level of the stairs, type in base or top offset if necessary.



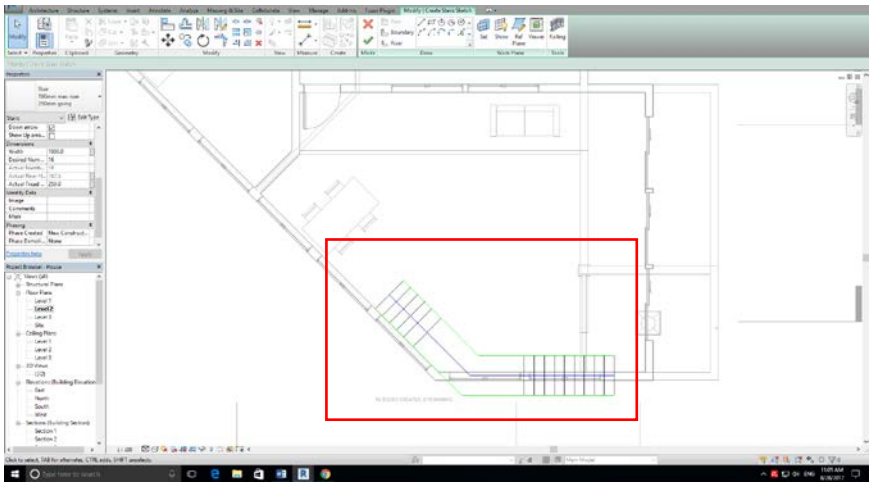
3. There are three ways to sketch the stairs, Run, Boundary, Riser. Select Run in the meantime.



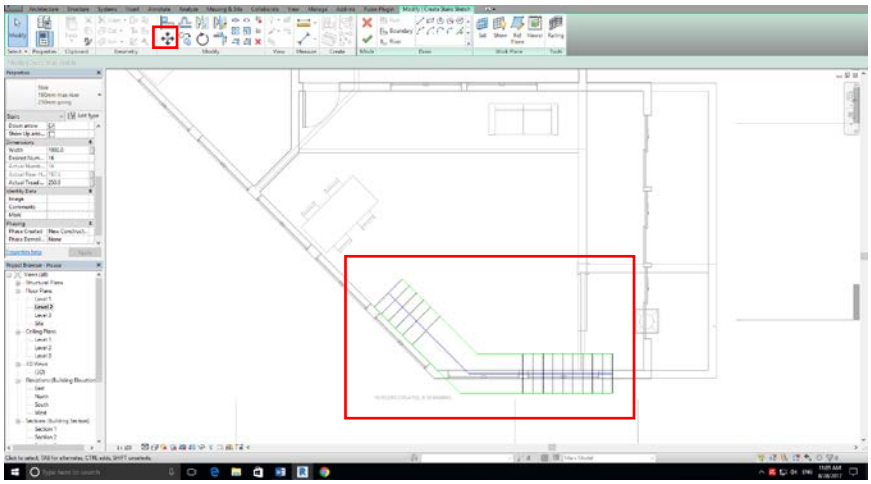
4. Click Sketch the runs of the stairs, Revit will show how many steps are created and how many steps are remaining.



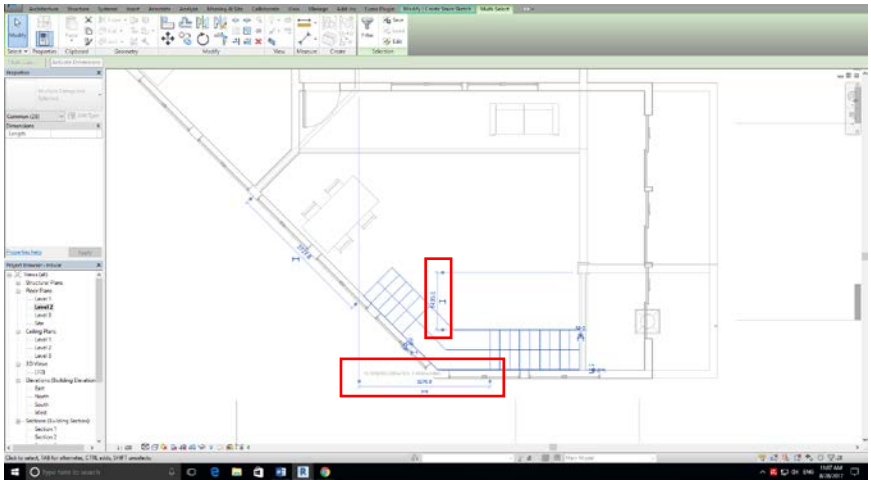
5. Revit will automatically create a landing when two or more runs are created.



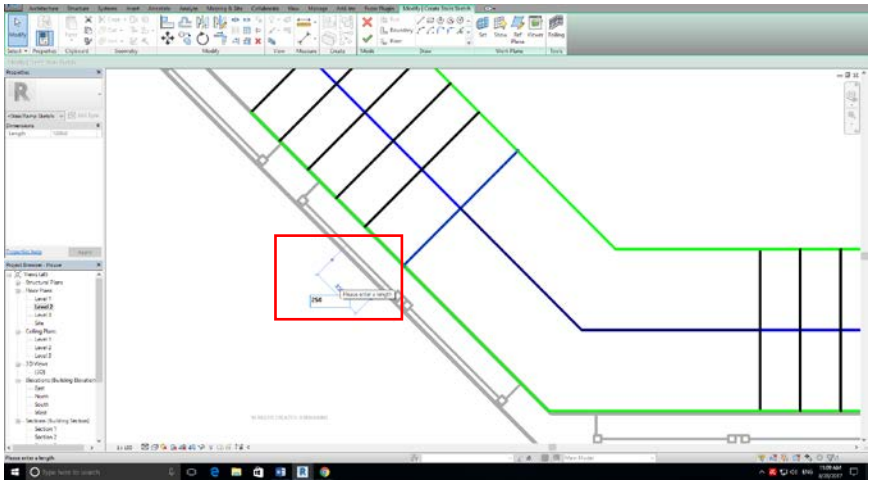
6. Select the whole stairs and use the move tools to put the stairs in the right position.



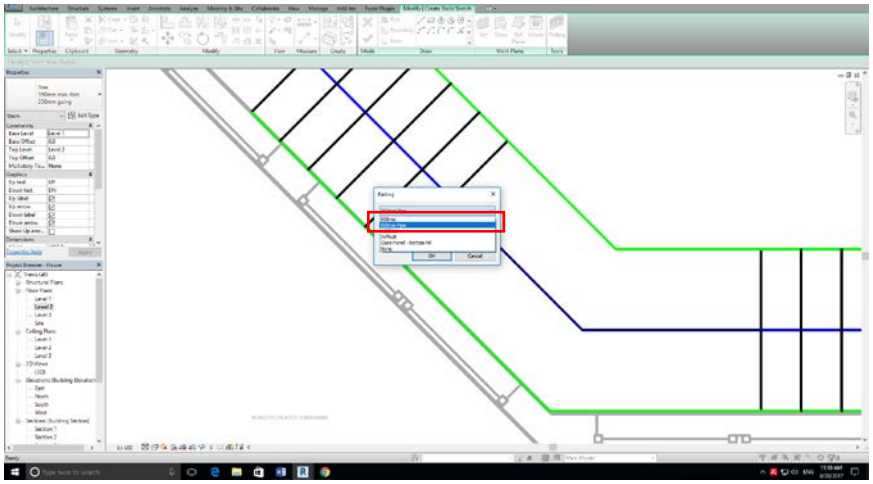
7. Use temporary dimensions to modify the position of the runs.



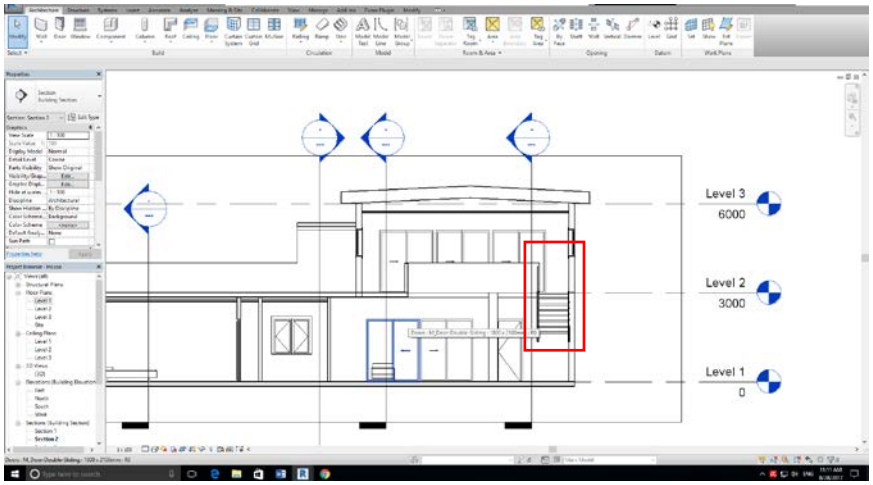
8. Select a single run and adjust the position of the runs.



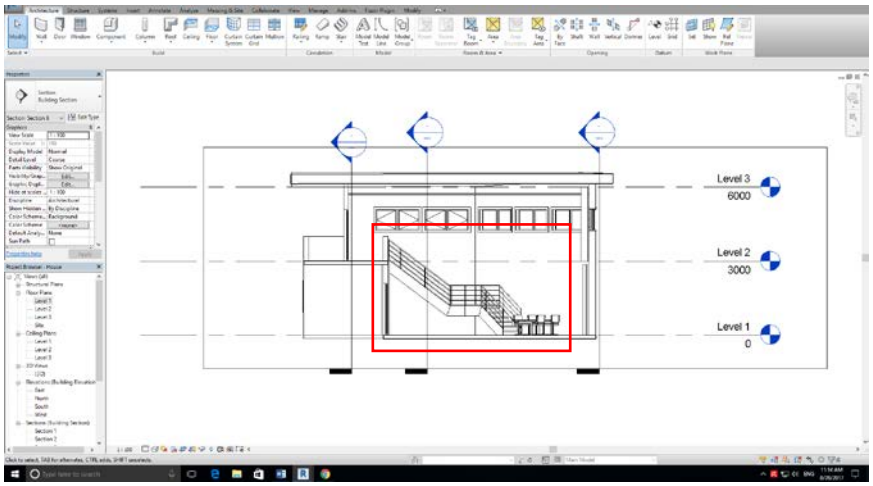
9. Click on the green tick and Revit will ask which kind of railing to be used, choose the 900mm pipe.



10. Click Switch to a section view and the stairs are created.



11. Switch to another section the whole stairs is shown.

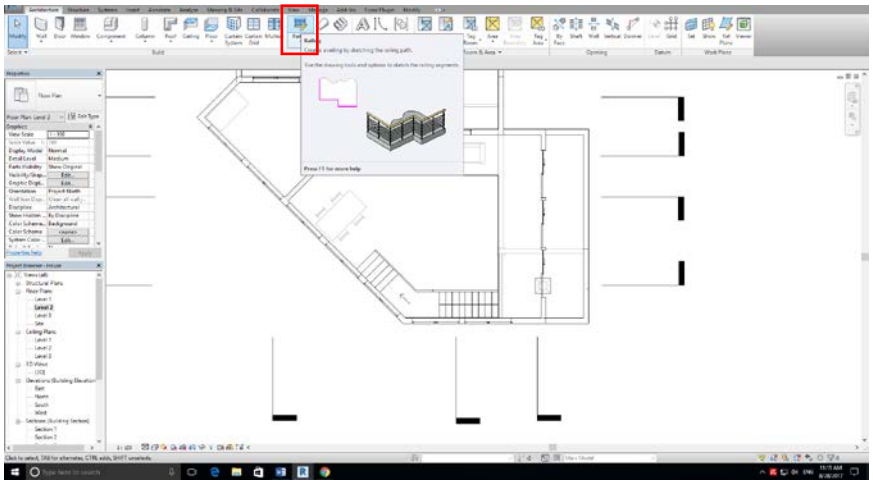


4.2 Adding Railings to Stairs

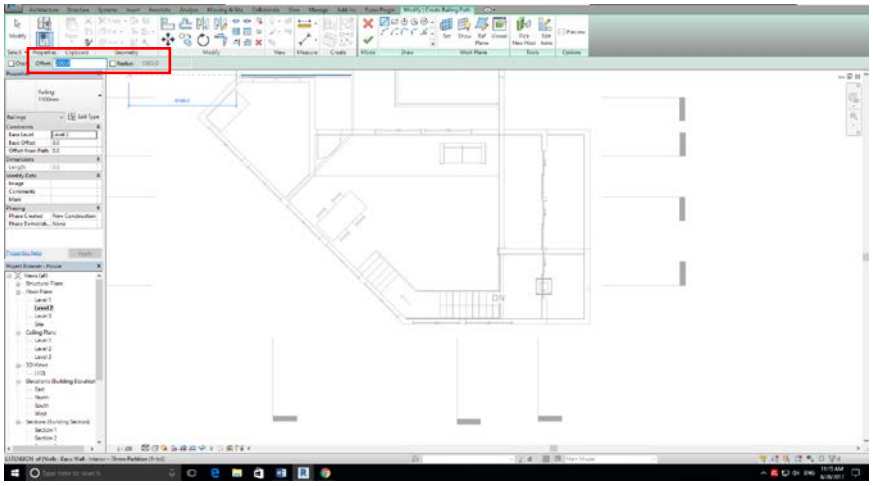
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

4.2.1 Railings:

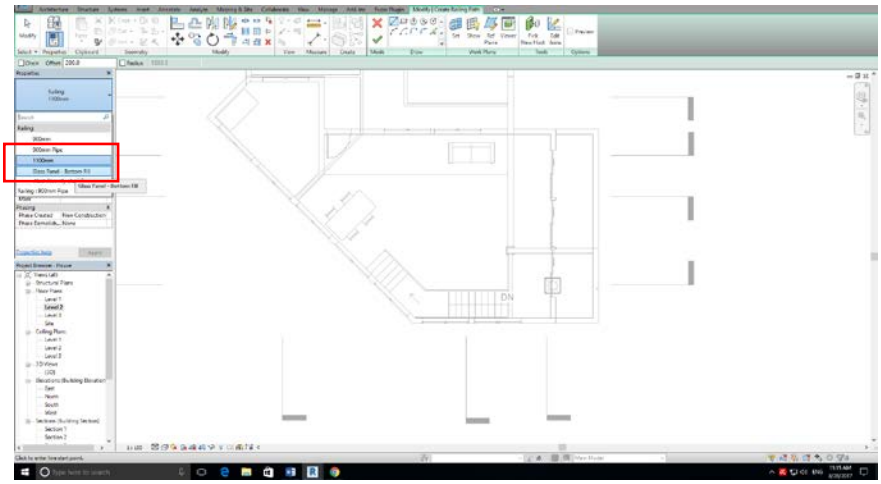
1. Click on the Railing Command under the Architecture Panel.



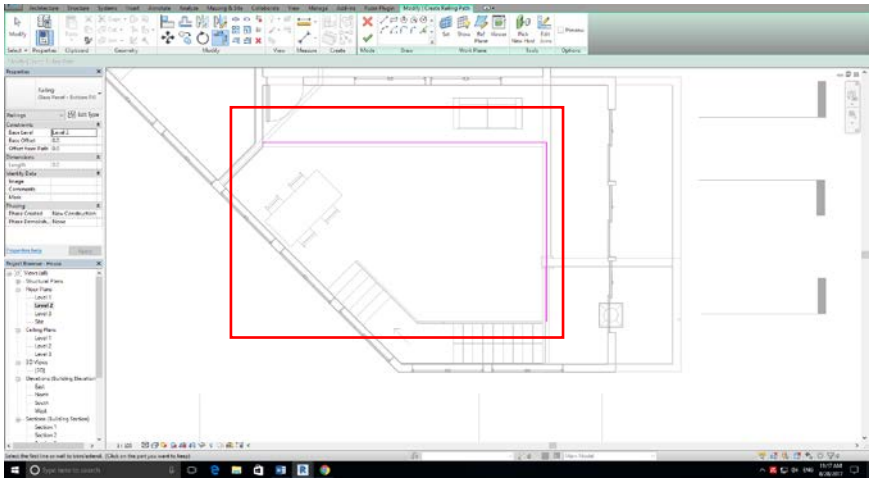
2. There is an offset option, to offset the railing from the edge of the stairs, create a radius at the turns by checking the box.



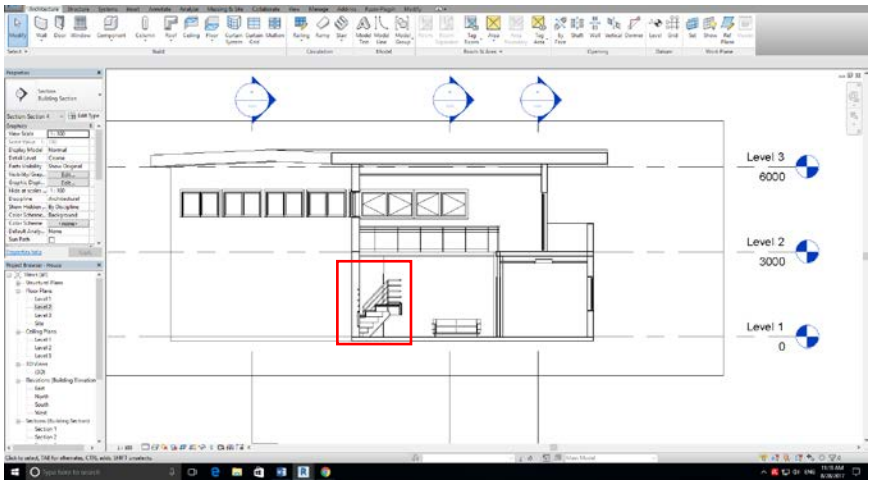
3. Select the type of railing in the properties window.



4. Click Use any drawing tools to sketch the path of the railing.



5. Switch to a section view; the railing is created.

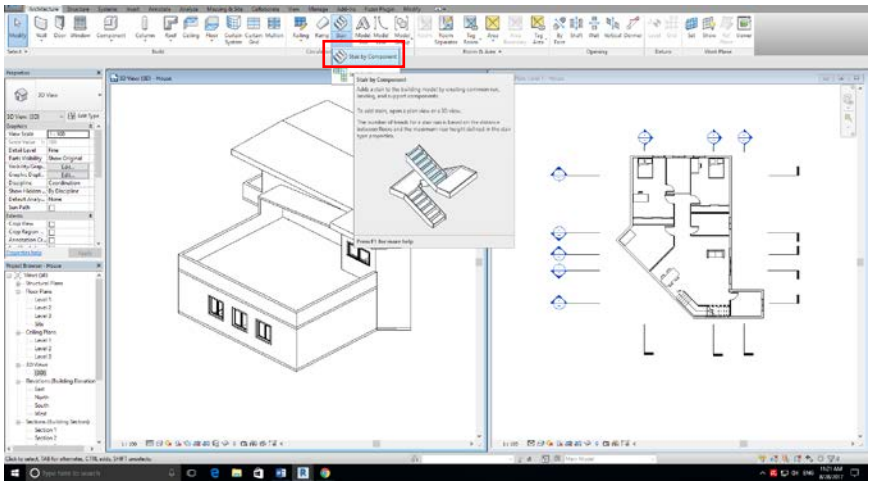


4.3 Working with Component-based Stairs

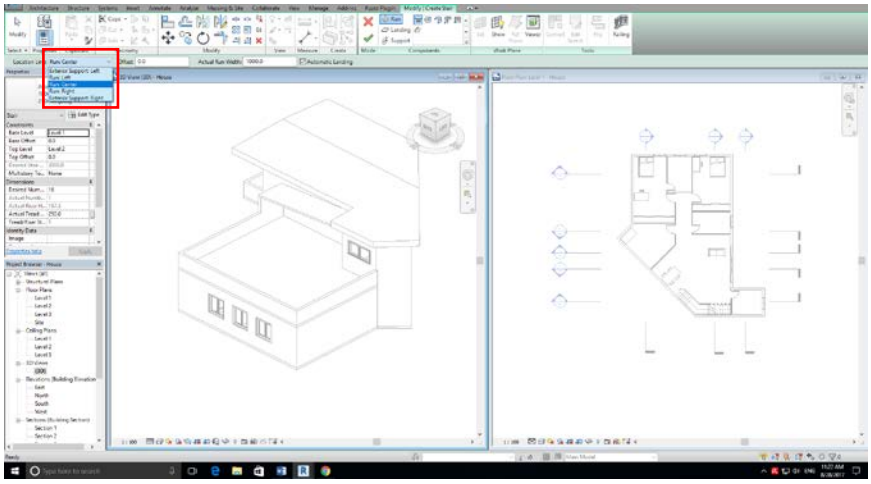
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

4.3.1 Component-based Stairs:

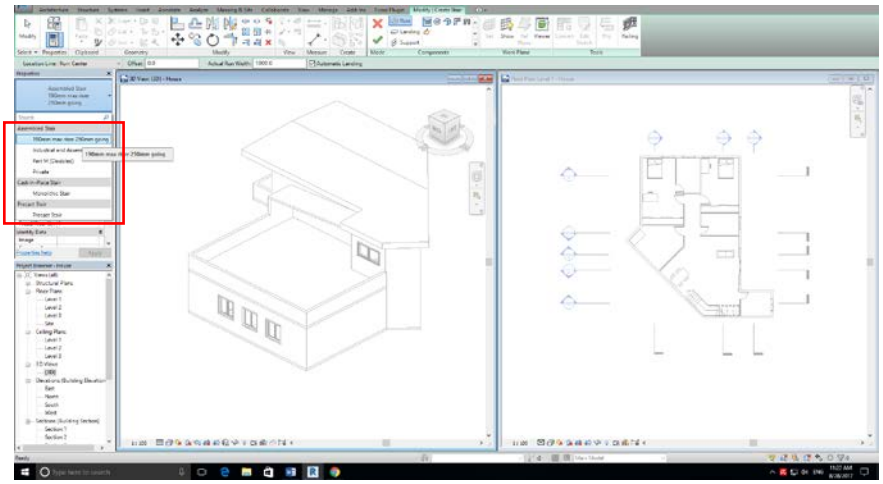
1. Select Stair by Component under the Stair Command.



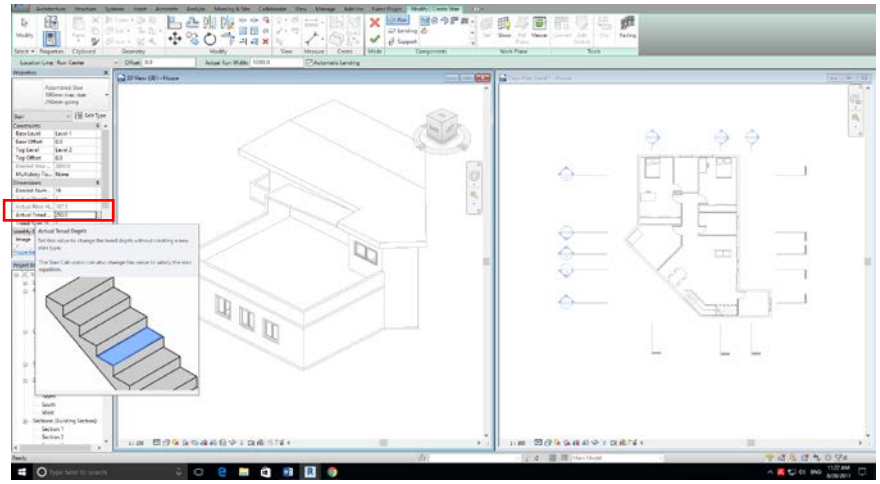
2. Choose Select the location line of the component-based stairs, the offset and width can be changed as well.



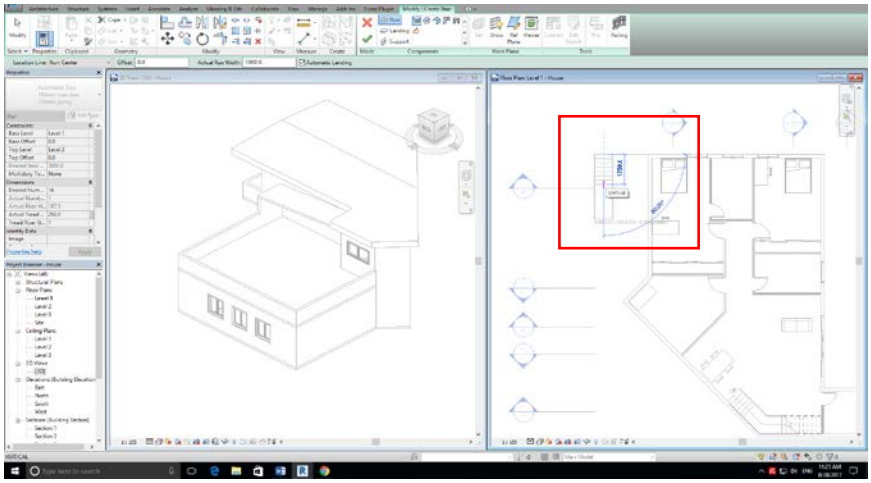
3. Choose the type of stairs; it will be named with the maximum riser and minimum going.



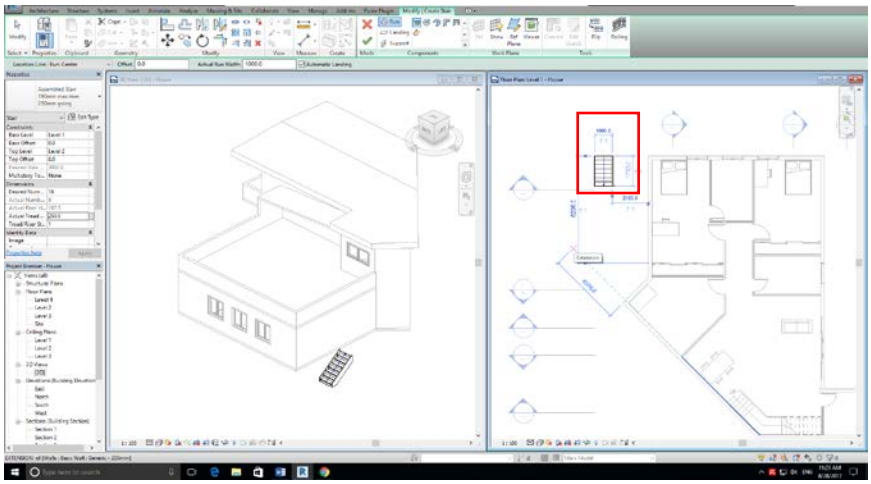
4. Change the number of steps and width of stairs under stairs properties, the restriction of the type still have to be followed.



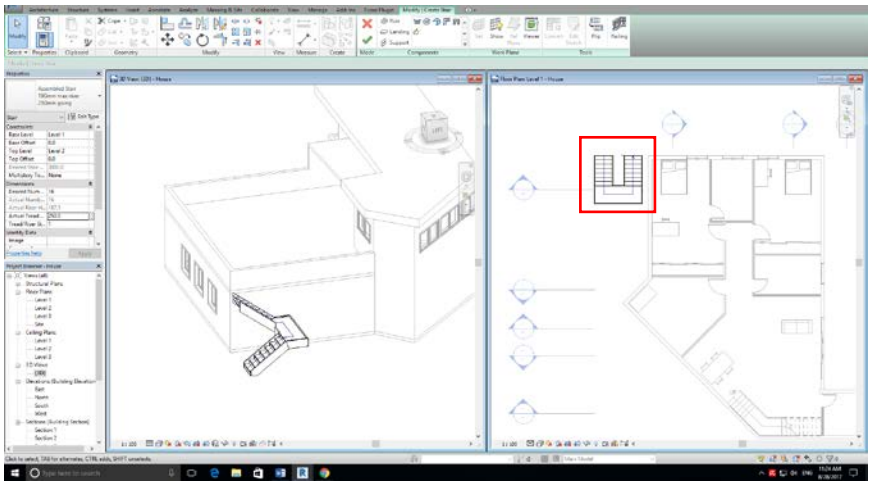
5. Draw the runs and the number of steps created and remaining will be shown with pale text under the drawn stairs.



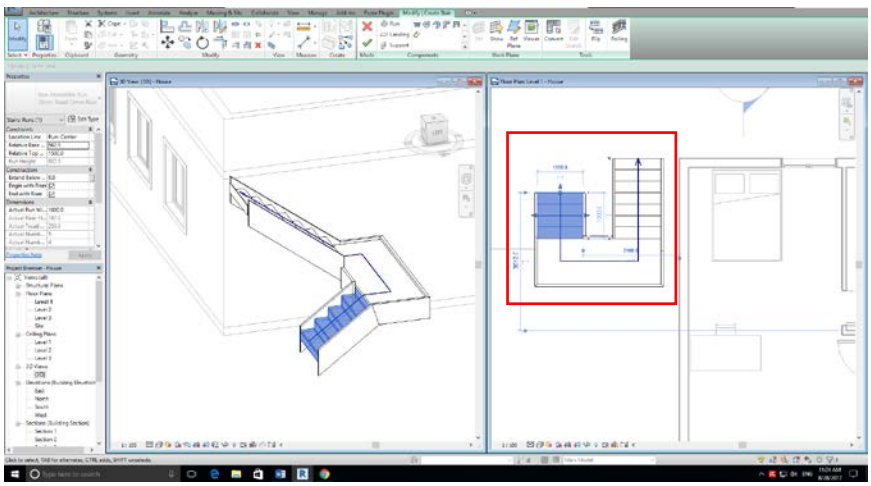
6. When one run is drawn, it is shown in 3D view as well.



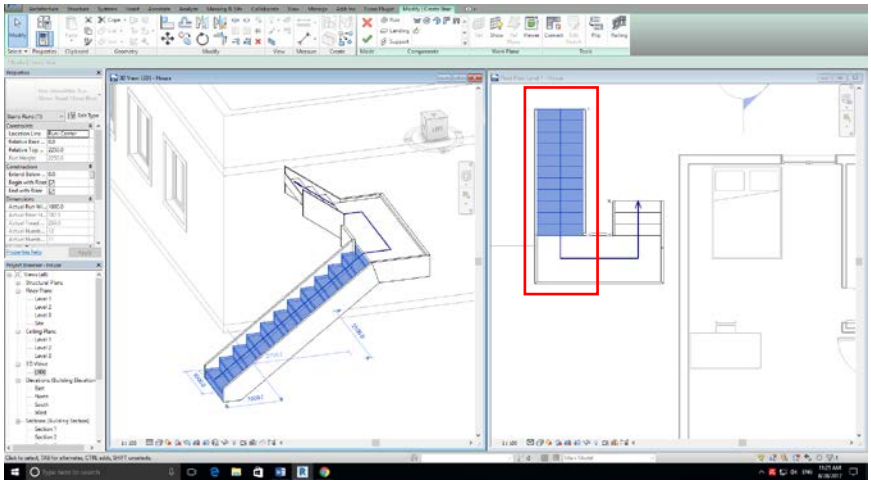
7. Draw another run aligned with the original one, a landing with the same width is created automatically.



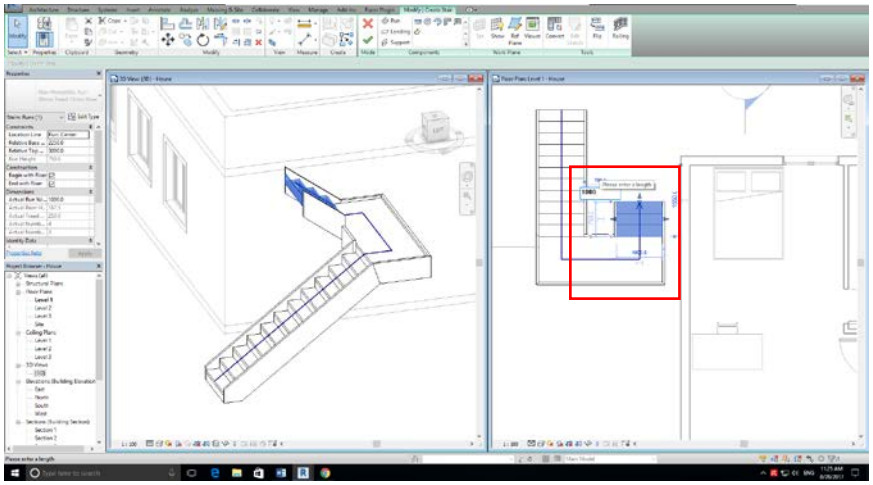
8. Drag circle at the end of the location line, steps will be directly Deleted or added from the run, changing the overall length.



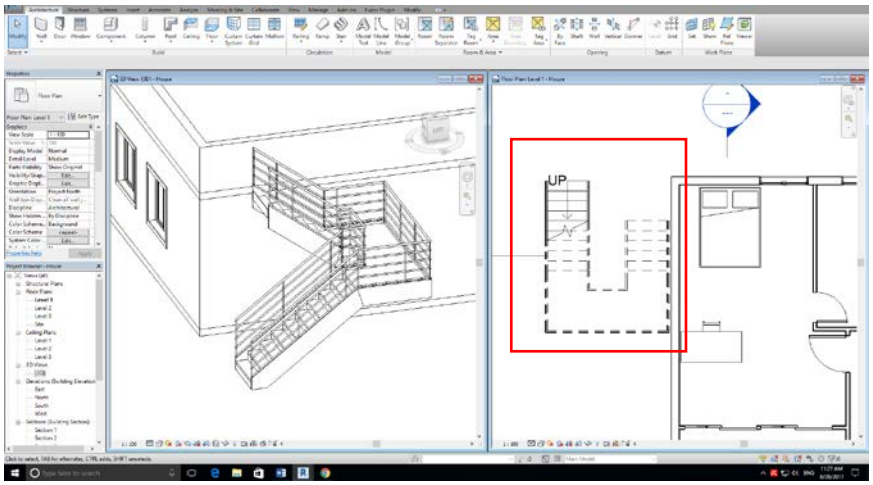
9. Drag the arrow, when the selected run is shortened, another run will be lengthened, the overall rise and length unchanged.



10. Use Temporary Dimensions or the Move tool to change the position of the runs.



11. Click the green tick and railings will be added to the stairs.

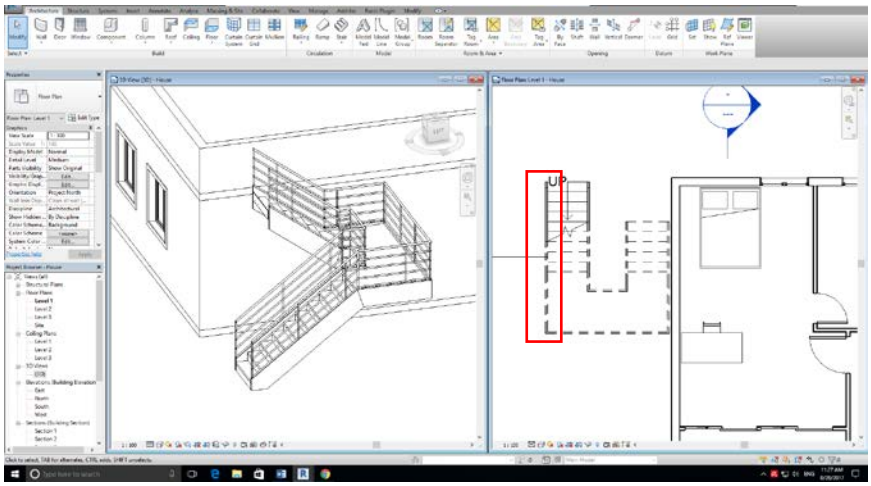


4.4 Adding Extensions to Railings

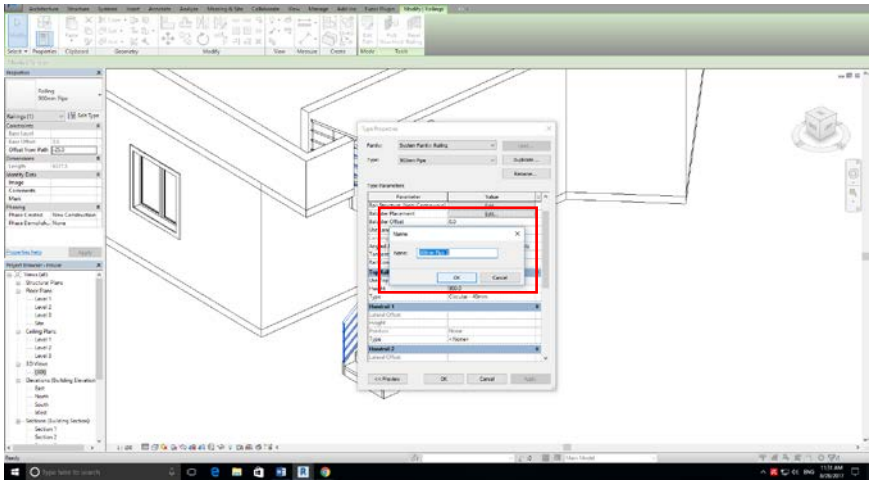
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

4.4.1 Adding Components:

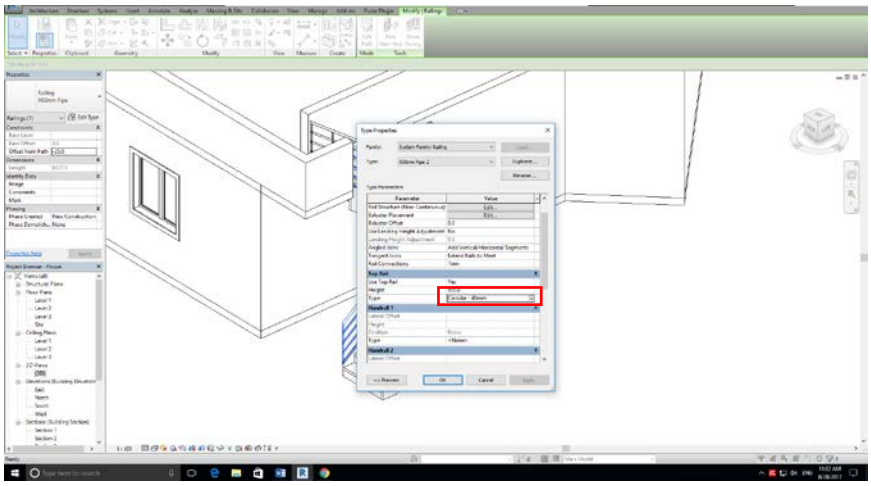
1. Select the railing and click Edit Type.



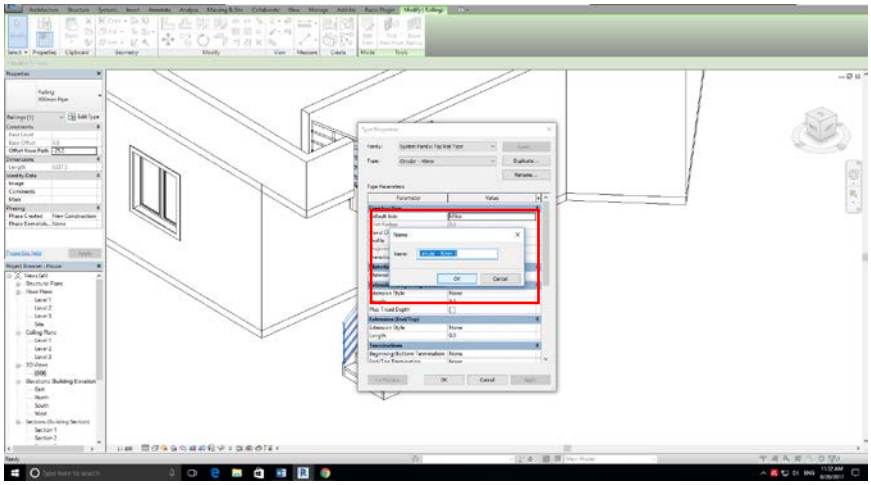
2. Duplicate the type of the 900mm pipe and give it a new name, then select the type of the top rail under 900mm pipe.



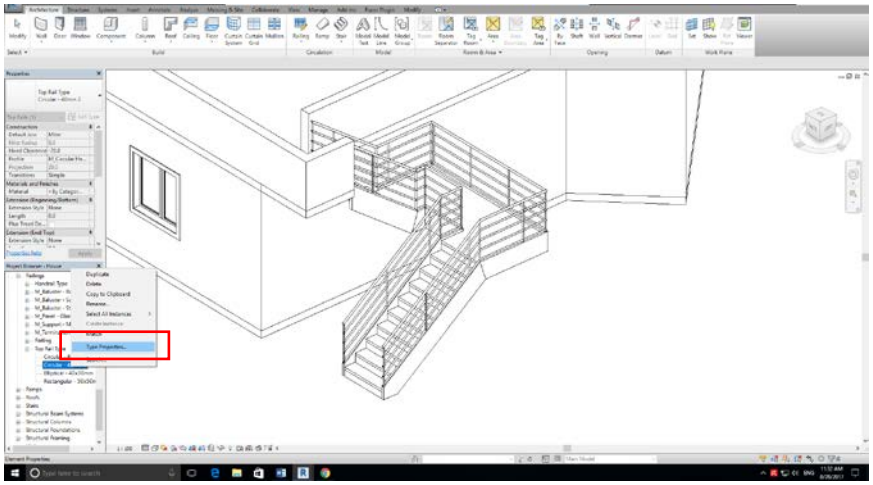
3. Duplicate Circular- 40mm and give it a new name.



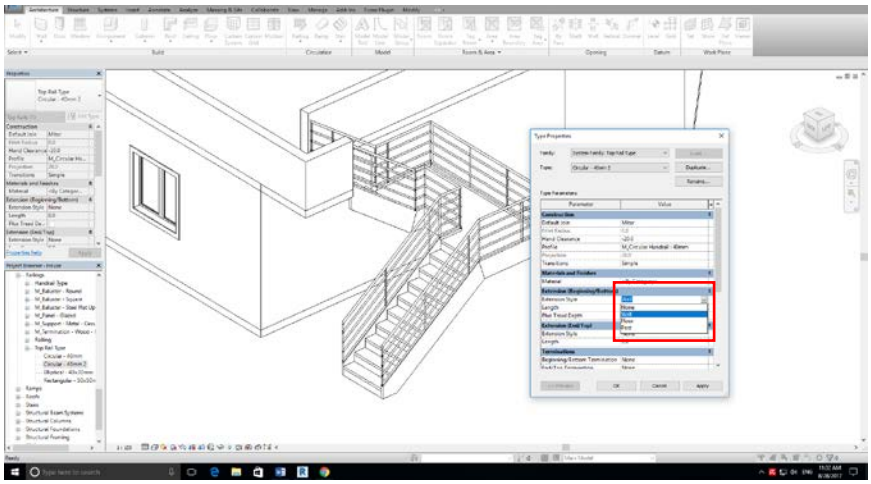
4. Search for the renamed top pipe from the families and right click to open type properties.



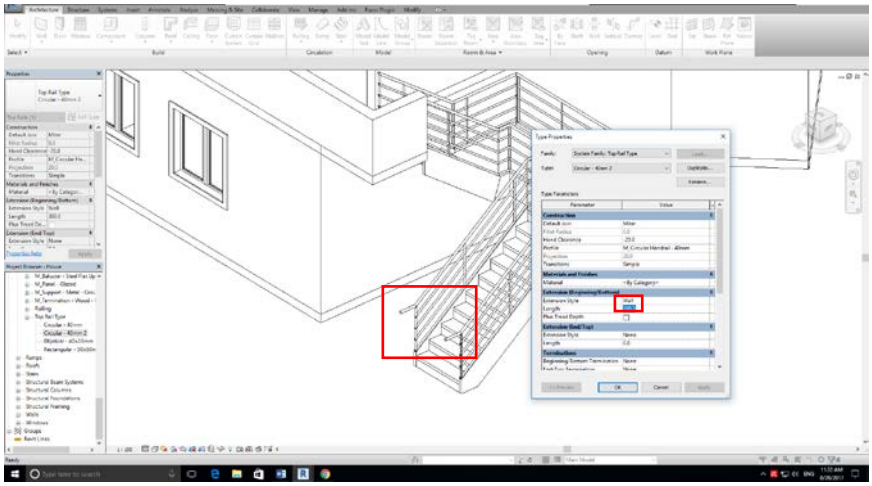
5. Enter a new extension length and select an Extension Style.



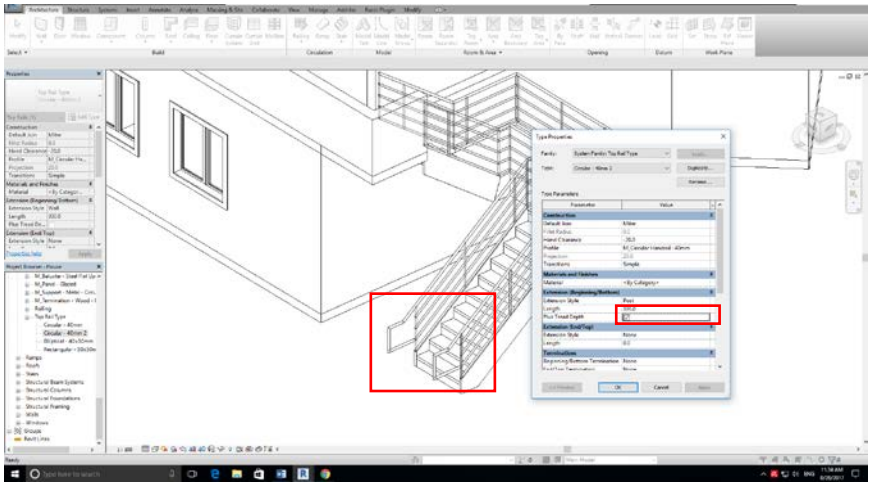
6. Click Post and the extension will bend back to the post.



7. Check Plus Tread Depth will give the railing another style.



8. Click on the line, to offset a new line from the original line.



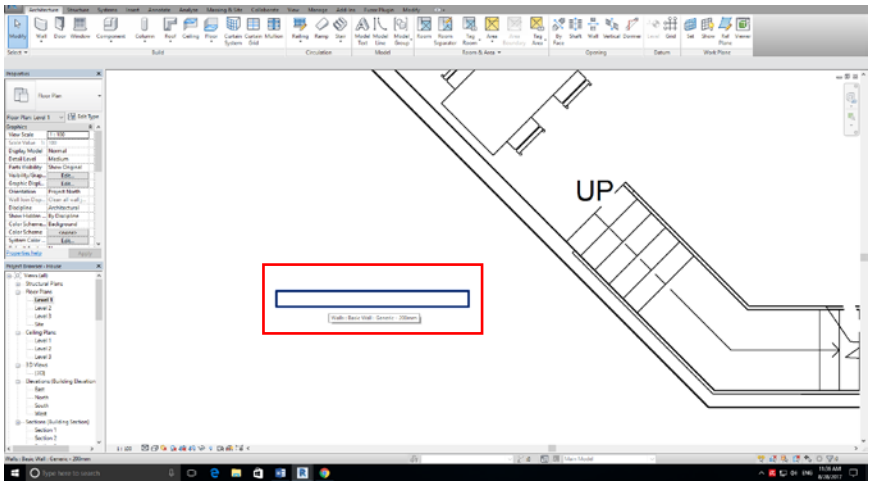
5. Complex Walls

5.1 Creating a Custom Basic Wall Type

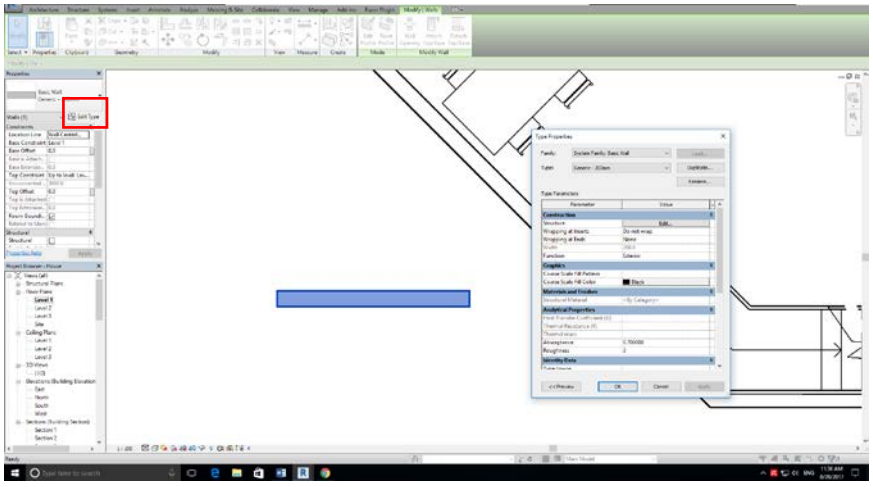
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

5.1.1 Adding Components:

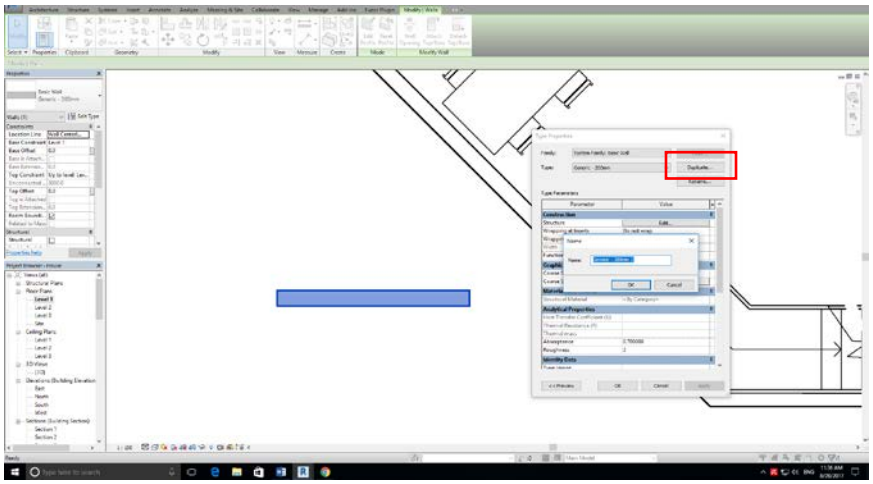
1. Draw a single layer Wall.



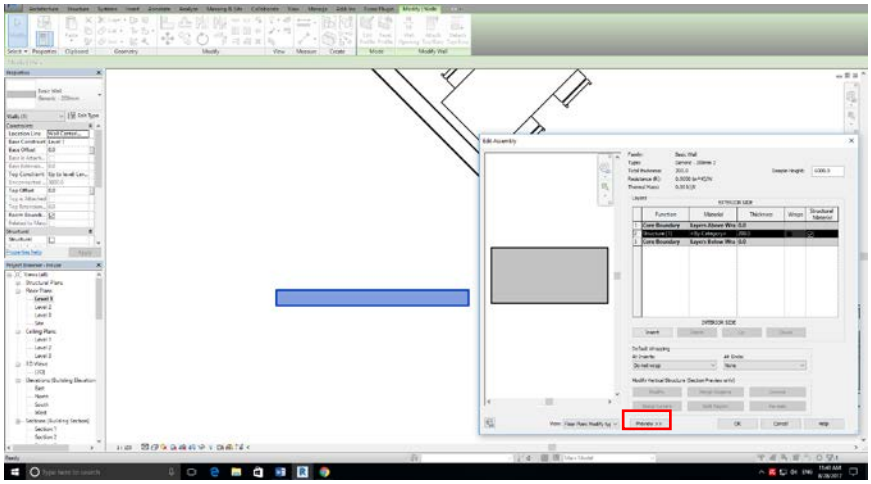
2. Open Type Properties by clicking Edit Type.



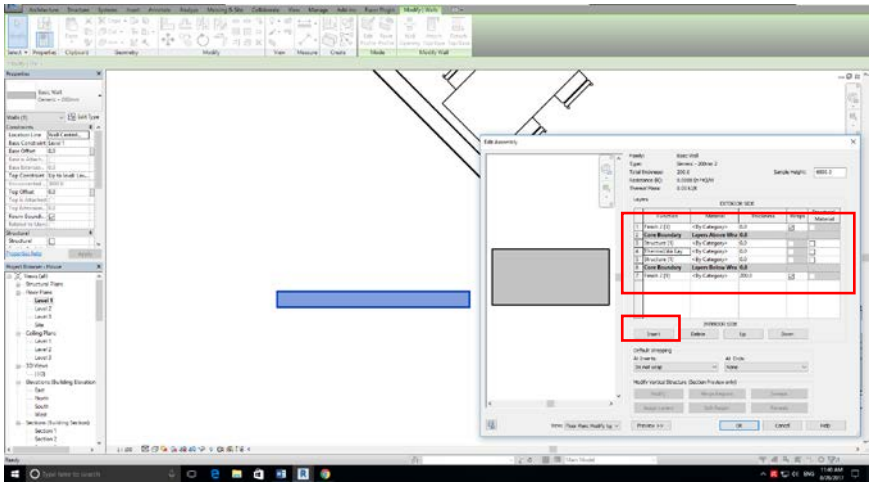
3. Duplicate The wall type and give it a new name.



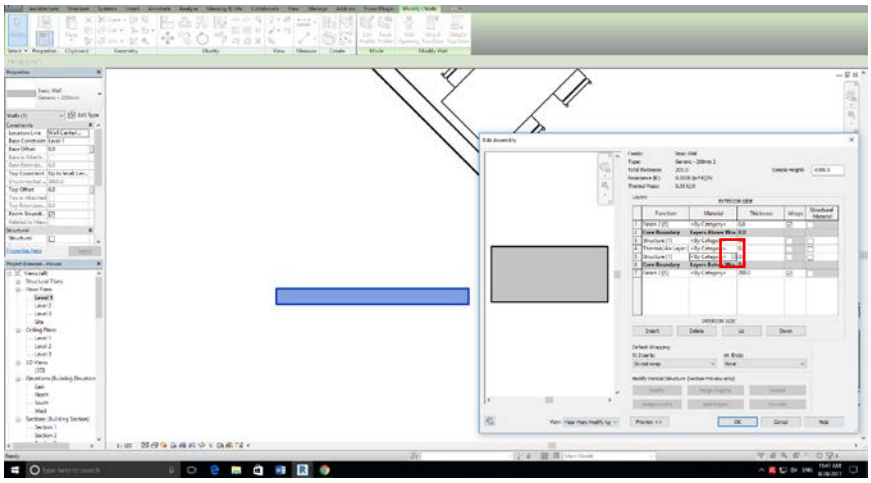
4. Search Click on Edit Structure and simple composition with only one layer is shown.



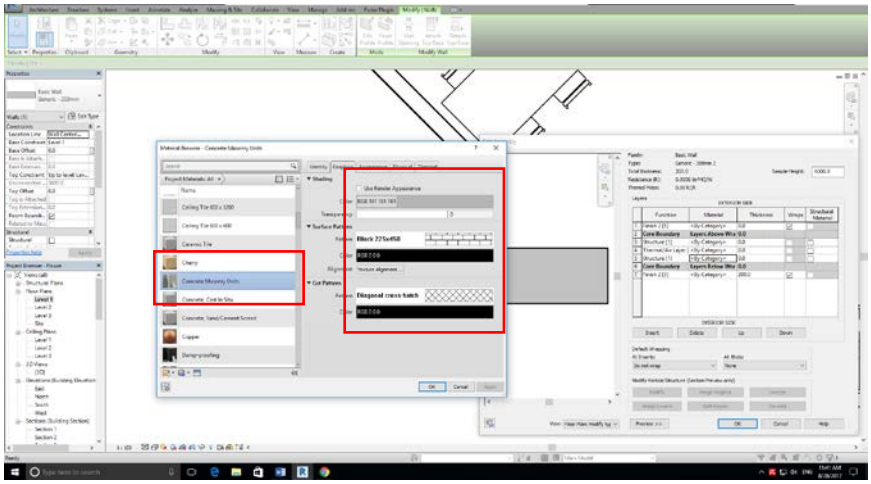
5. Insert layers into the wall and adjust the layering by choosing the Up and Down Option.



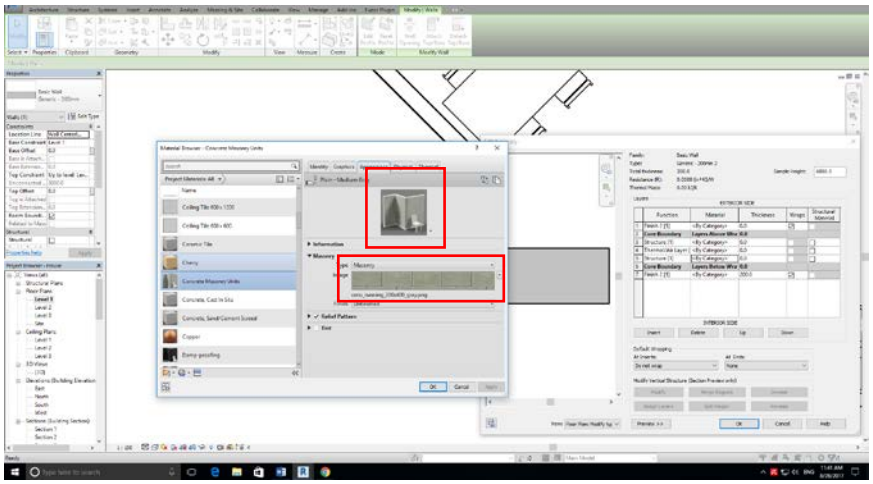
6. Click on the box next to the words under the material column.



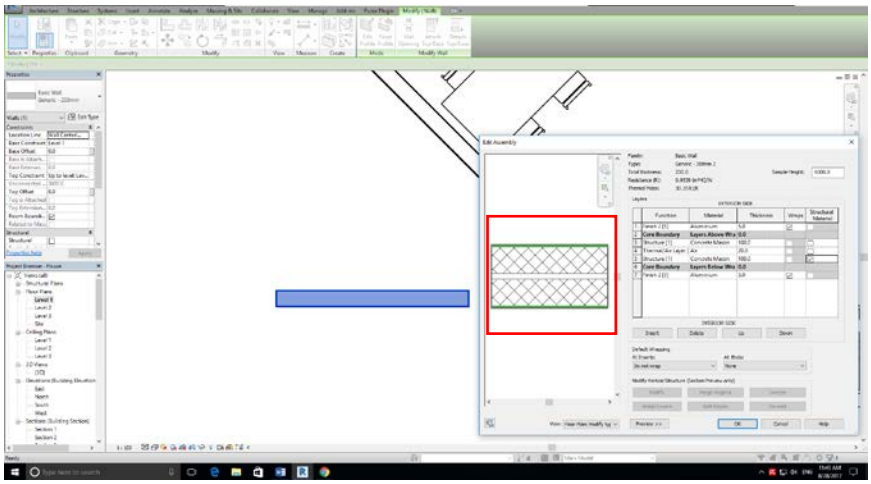
7. A Material Browser is opened, select the Concrete Masonry Units Material, its color, surface pattern, cut pattern is shown.



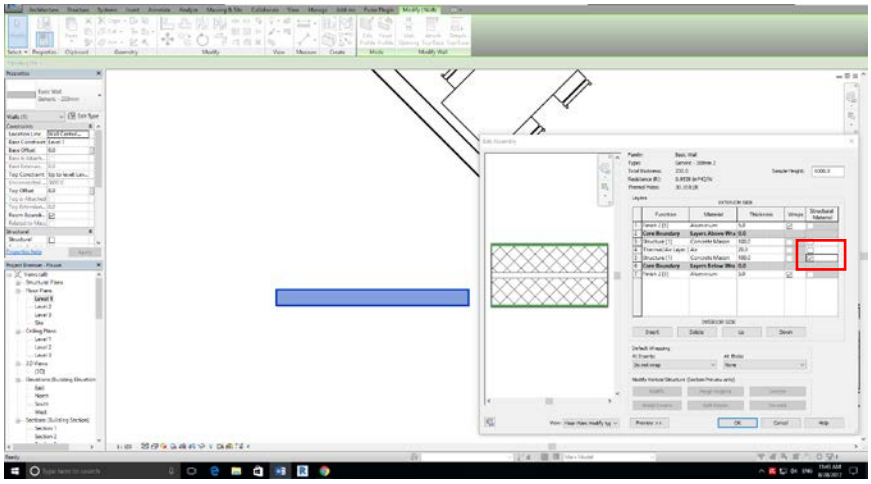
8. Select the Appearance Panel, the rendered view of the material is shown, it can be changed by importing another image.



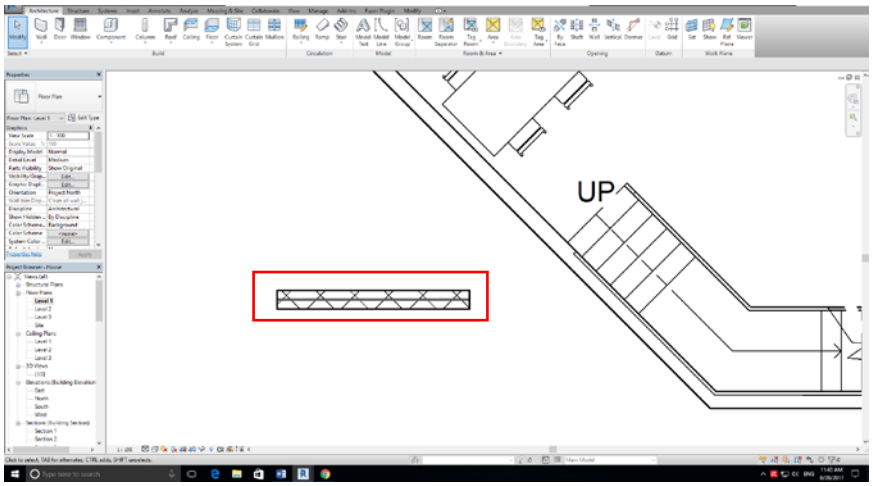
9. Give a material to each layer and the cut plan view is shown on the left in the preview area.



10. The structural material must be between the two core boundaries, and there must only be one structural material.



11. Click OK and wall pattern is shown in the plan view.

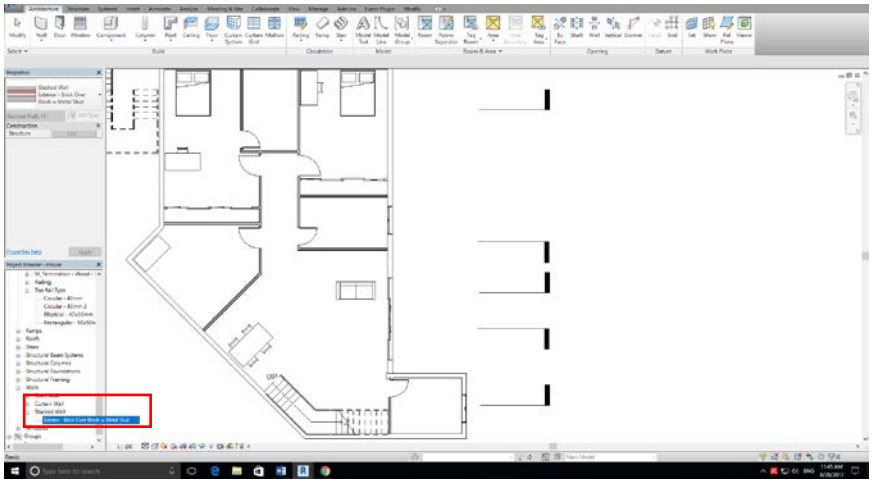


5.2 Understanding Stacked Walls

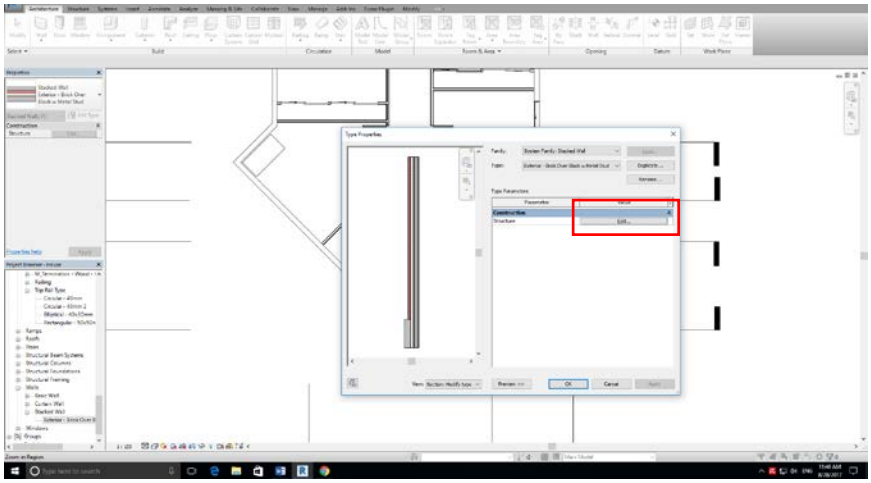
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

5.2.1 Stack Walls:

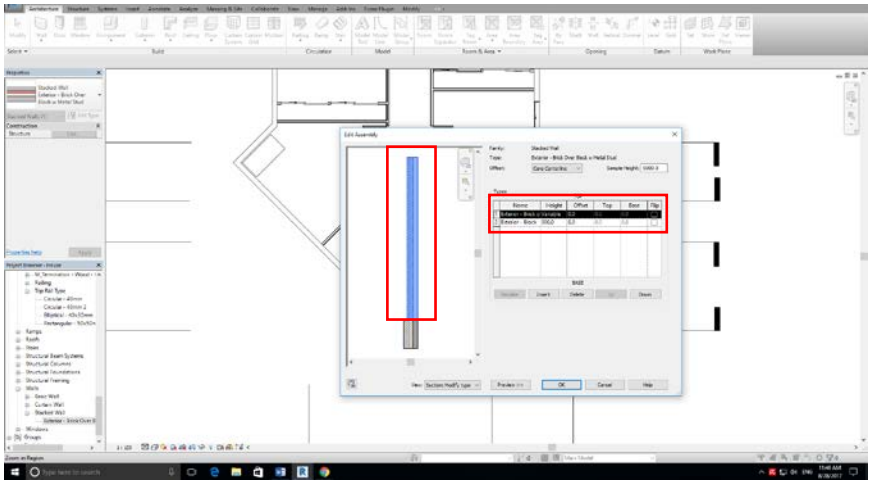
1. Open a Stack Wall Family in the Project Browser.



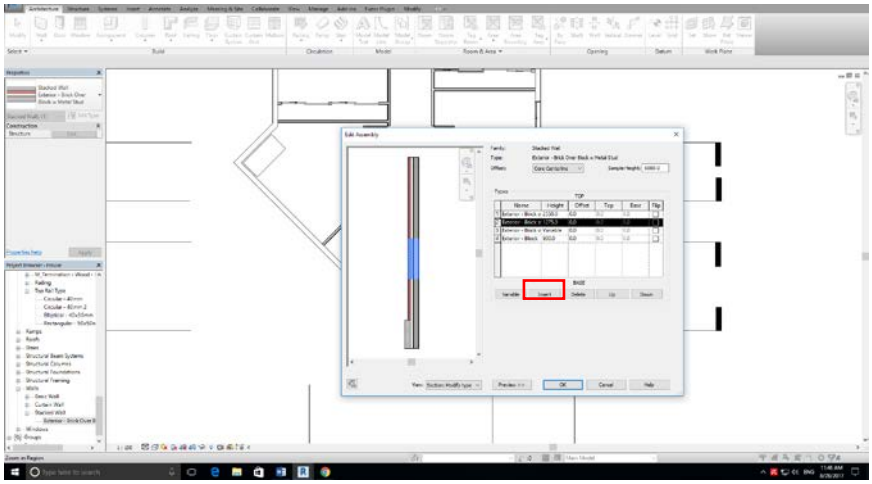
2. The Type Properties window is opened, change the view Section: Modify Type, a stacked wall is shown.



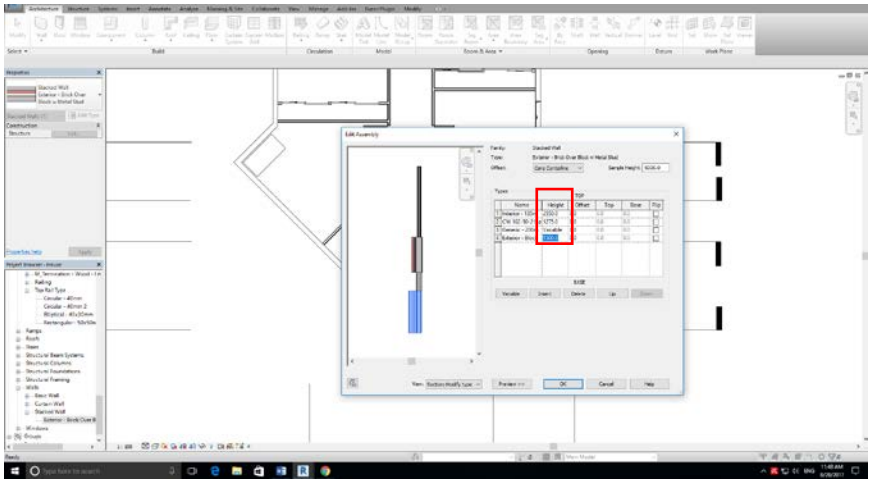
3. Click on Edit Structure and the layer of the stacked wall is shown, select the layer from the table, it will be shaded.



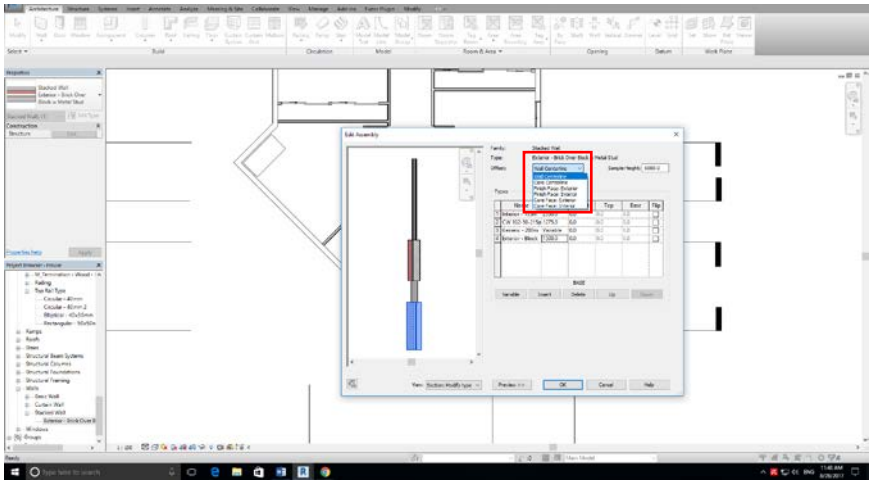
4. Insert several layers to the stacked wall and change the height of each layer.



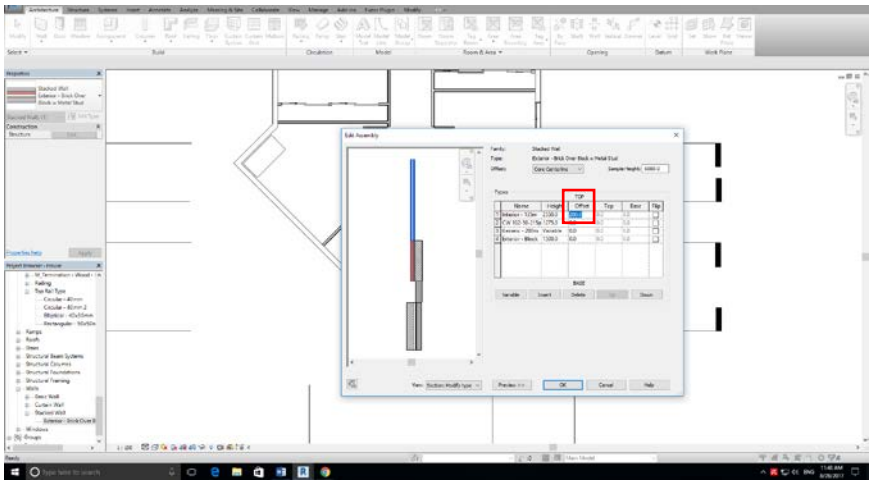
5. Give a new type of wall to each layer; it can be any pre-loaded wall families; it will be shown in the preview panel.



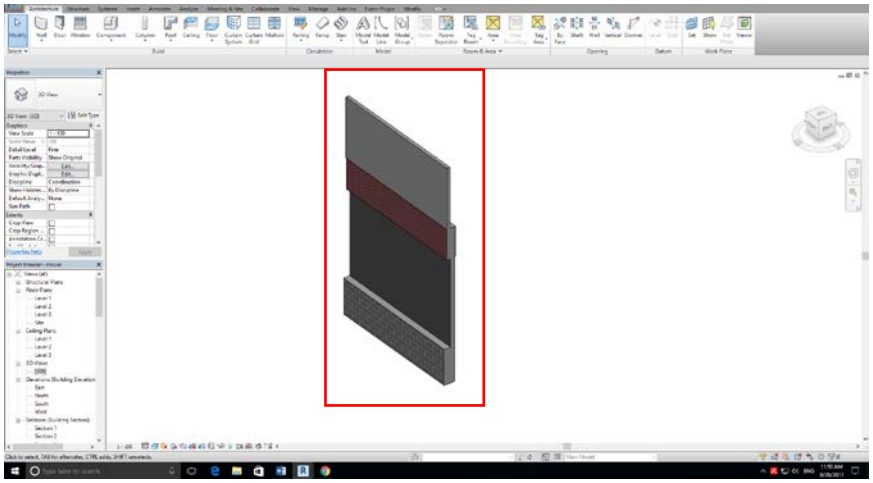
6. By changing the offsetting line, the wall layers will move. Usually, core center line will be the better option as it contains structure.



7. Manually enter an offset value for each layer, the layer will move individually, this can help to suit the design.



8. Switch to a Shade 3D view; a stacked wall is a single object.

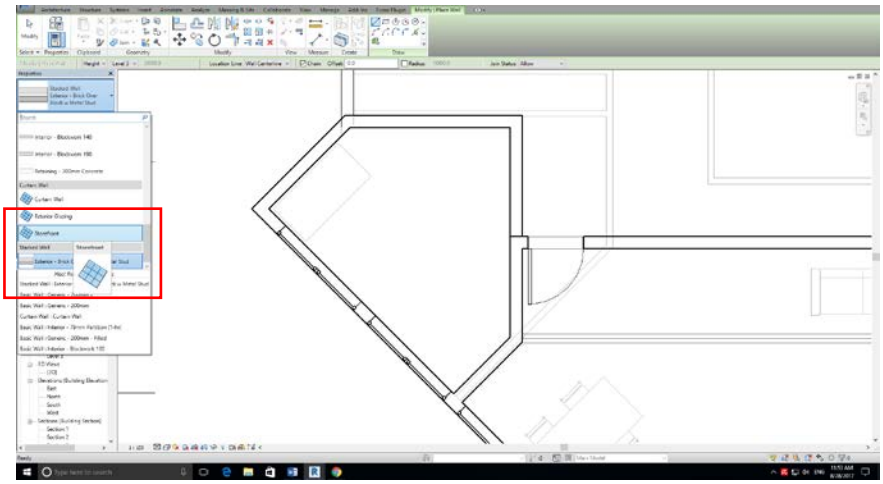


5.3 Adding Curtain Walls

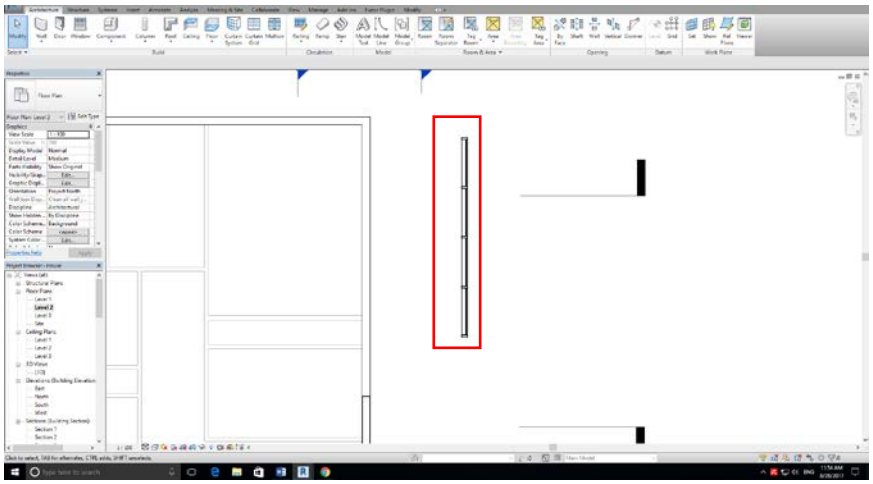
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely.

5.3.1 Storefront Curtain Wall:

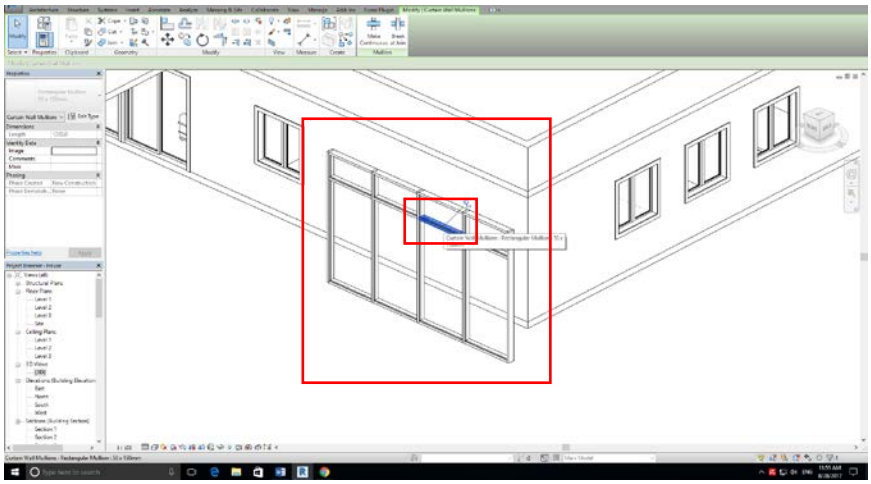
1. Curtain Wall lies under the wall category, click on the Wall Command and select, Storefront under Curtain Wall.



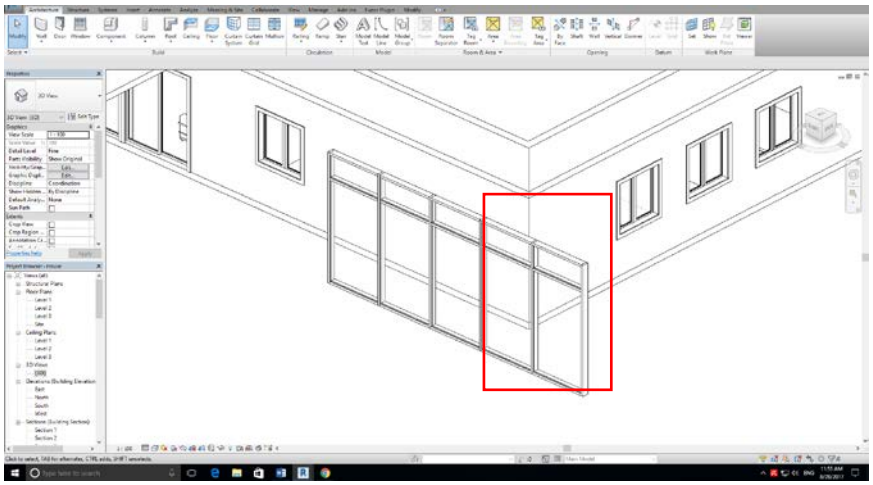
2. The method of creating Curtain Wall is the same as Normal Wall, draw a line on the plan view.



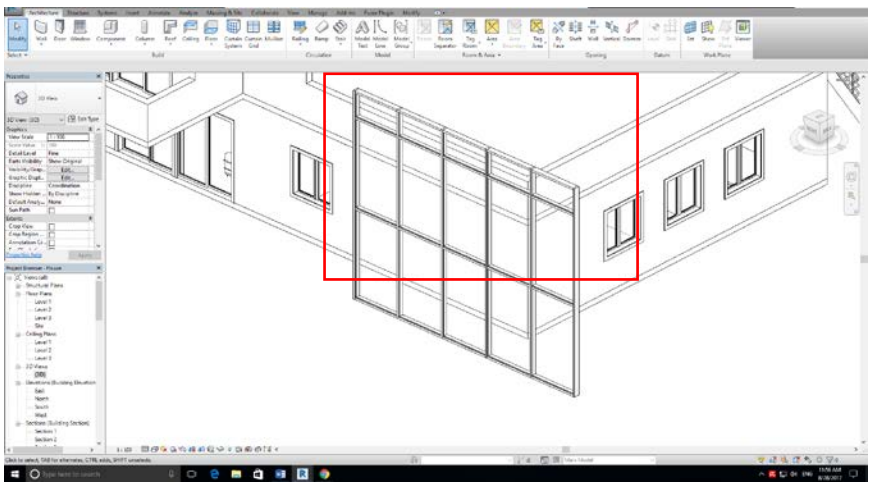
3. The whole Curtain Wall can be selected, while each mullion can also be selected and edited.



4. When dragged horizontally, the width of each grid remains equal, when it exceeds the maximum width, a new bay will be created.

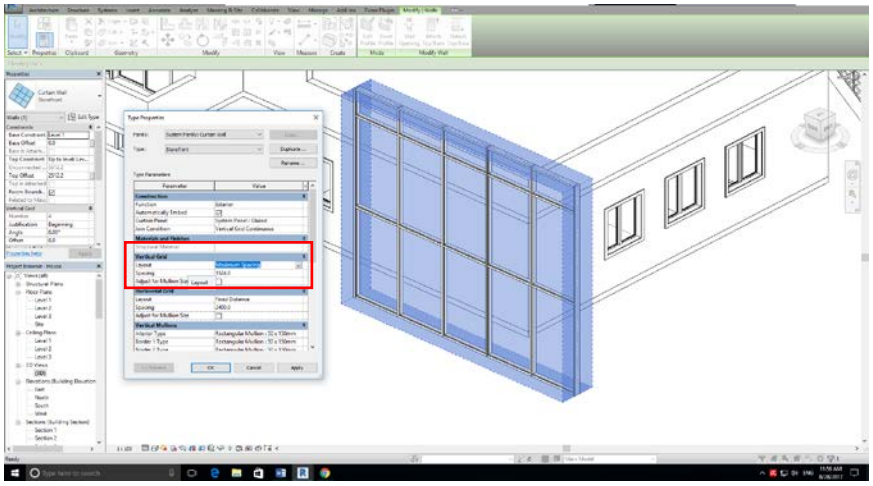


5. When dragged vertically, only the upper row expands, when it exceeds the maximum height, a new row is created.

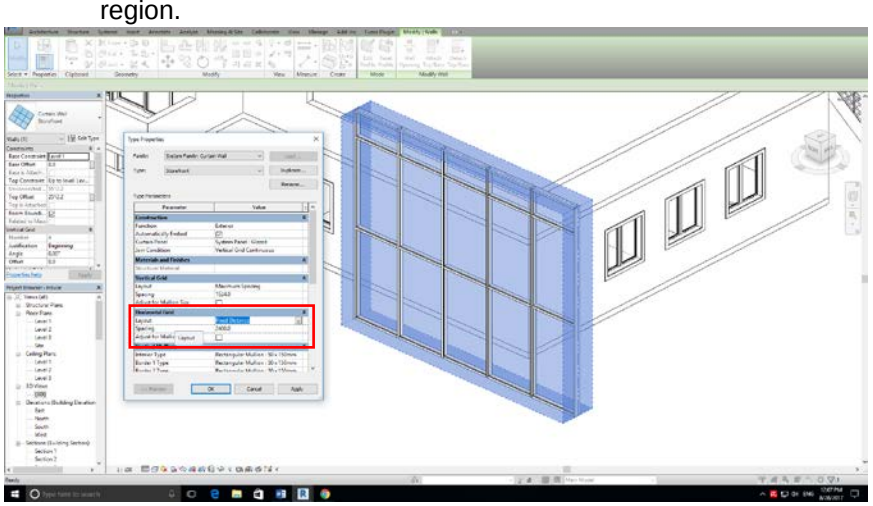


5.3.2 Curtain Wall Properties Editing:

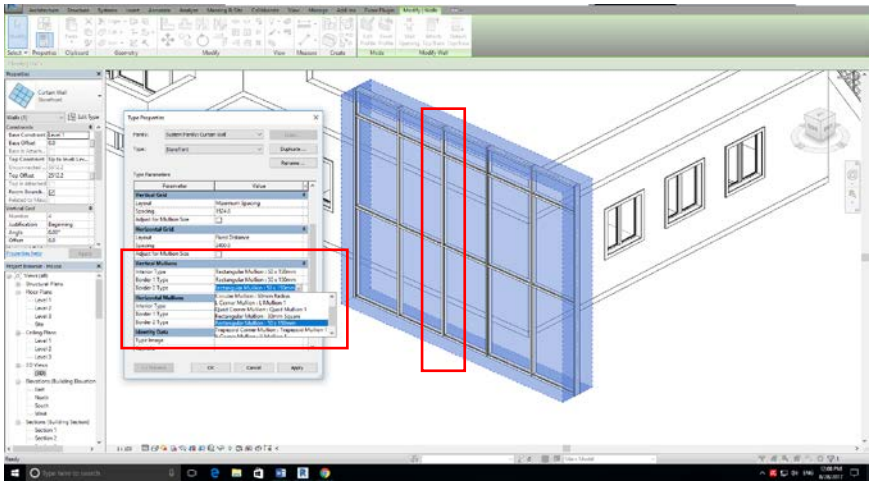
1. The type properties control the way the curtain wall expands; it is defaulted to expand in such way.



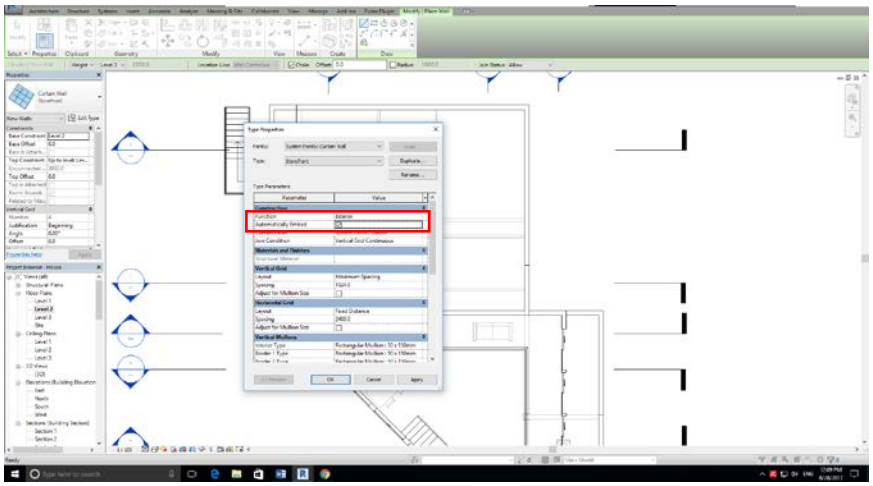
2. Change the setting by adjusting the selection or value in the Vertical Grid and Horizontal Grid region.



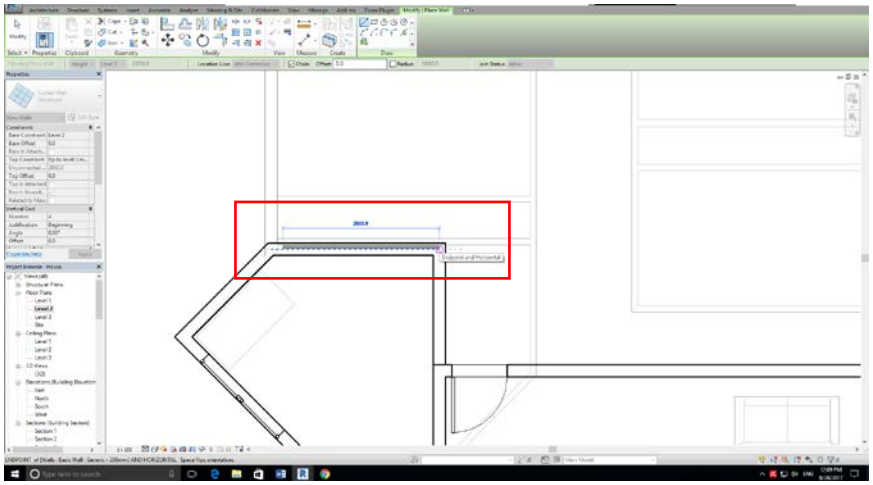
3. Change the type of mullions, vertical and horizontal can be changed individually.



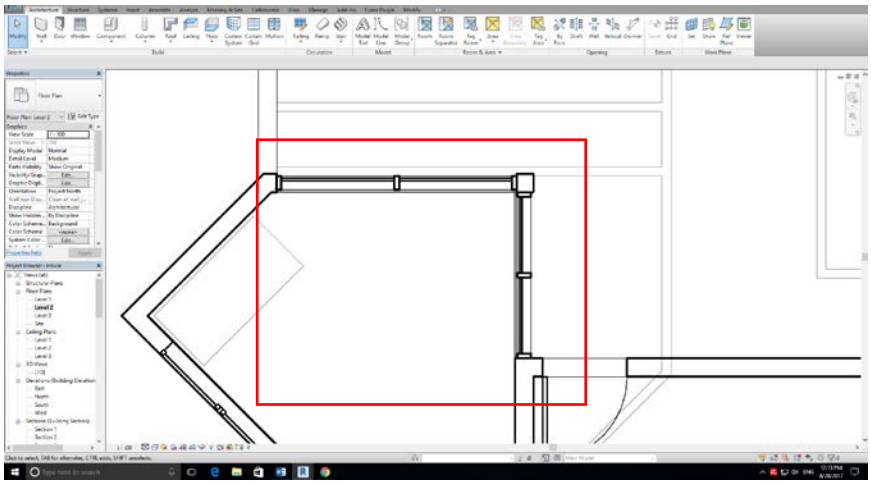
4. Check the Automatically Embed Function.



5. The above function allows the curtain wall to be placed within a wall, draw a line on an existing wall.

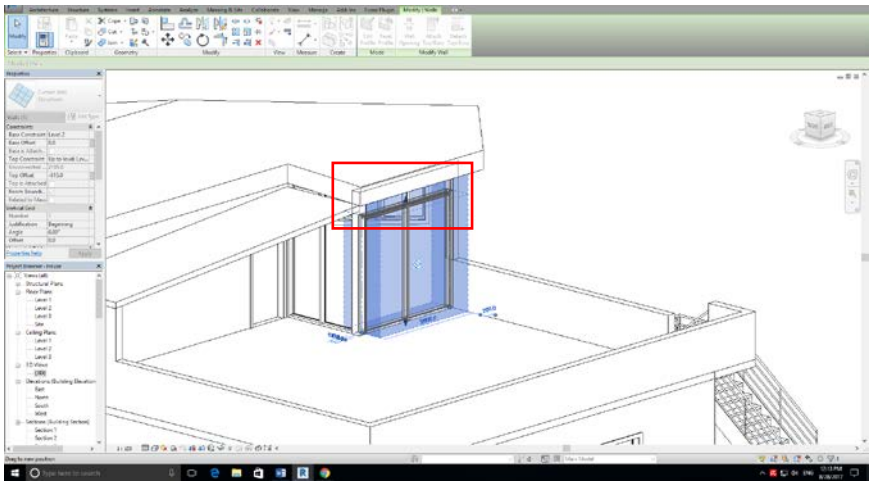


6. Below is an embed curtain wall placed within an existing wall.

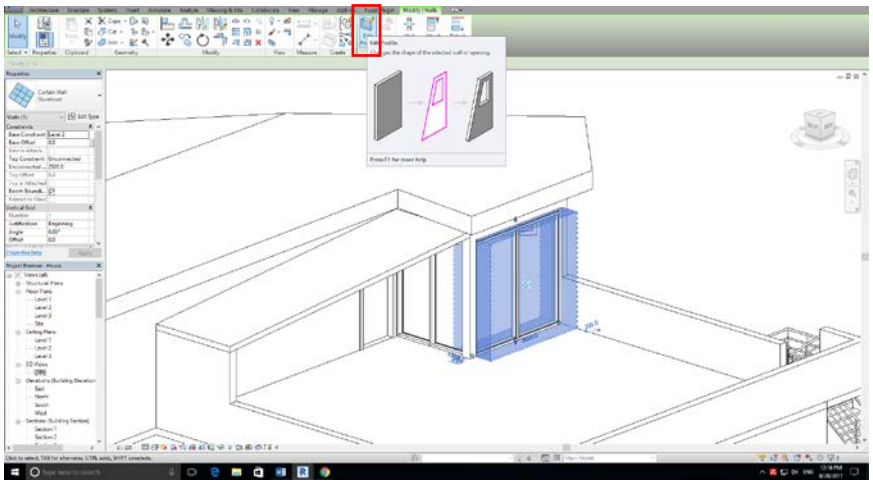


5.3.3 Curtain Wall Height:

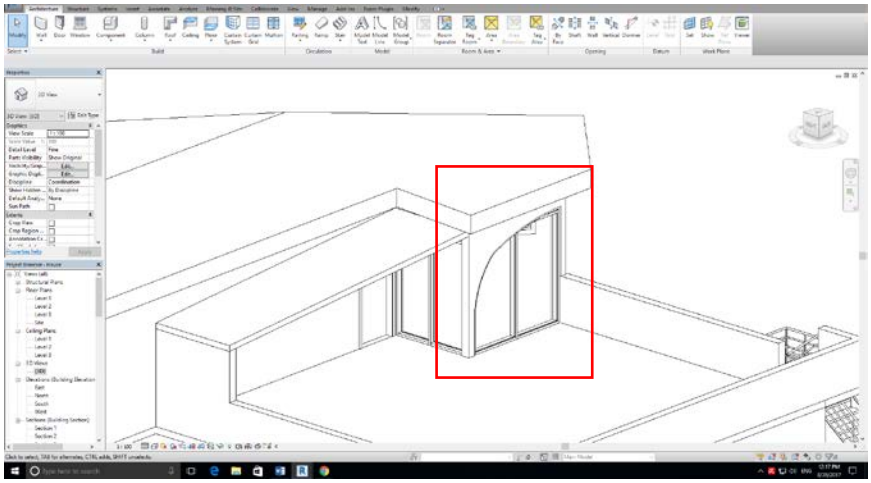
1. Switch to a 3D view, the height of a Curtain wall can be adjusted by pulling the blue arrows or typing in a top offset value.



2. The shape of a flat curtain wall can be changed by clicking on the Edit Profile option.



3. Use drawing tools to shape a new boundary for the curtain wall, the shape of the final shape may be affected by the mullions.

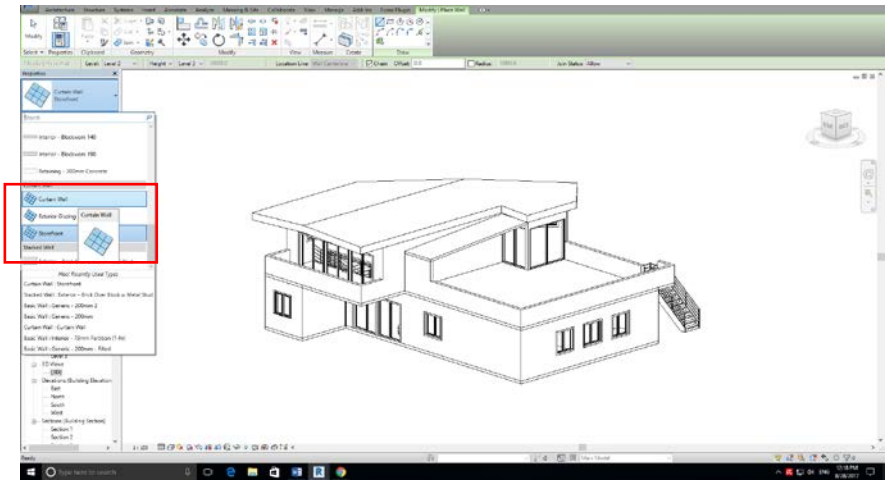


5.4 Adding Curtain Grids, Mullions, and Panels

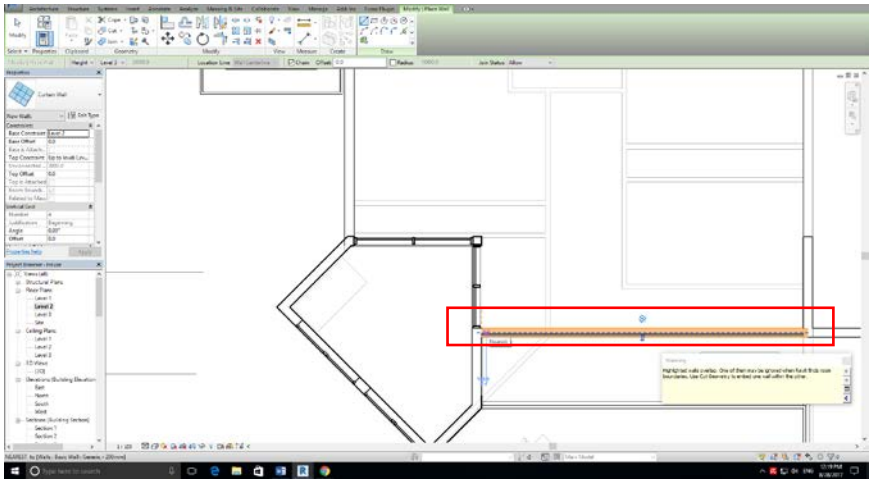
Using the typical curtain wall allows more variation, the grids and mullions are placed manually, it allows customized design.

5.4.1 Typical Curtain Wall:

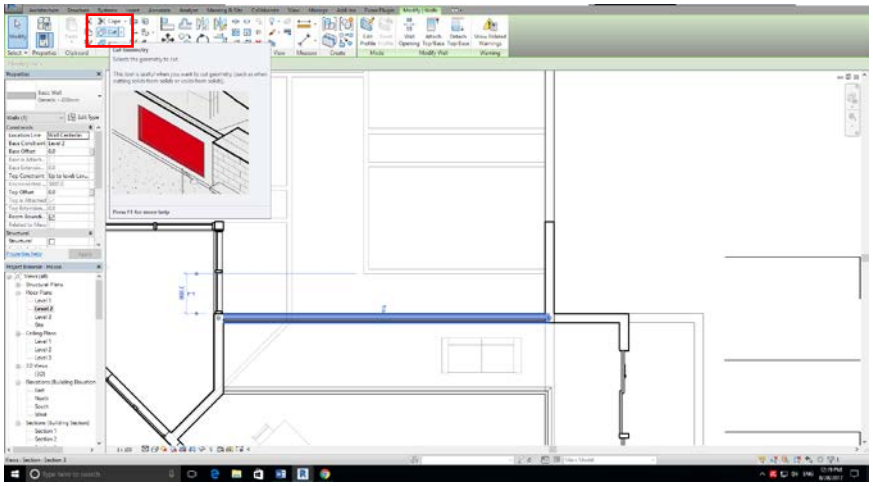
1. Select Curtain Wall Type under Curtain Wall.



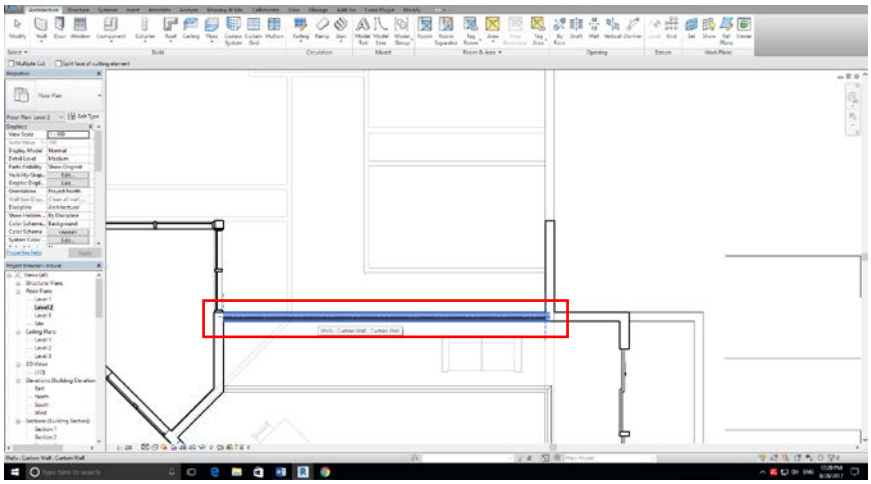
2. Duplicate When the Curtain Wall is placed within an existing wall, Revit will warn that two walls are overlapping each other.



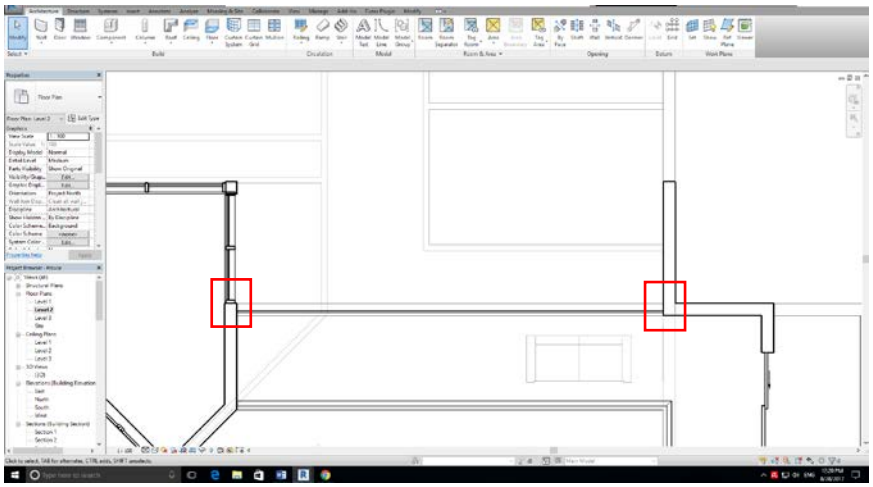
3. Use the Cut Geometry Tools to delete the overlapping part of the original wall, click on the original wall.



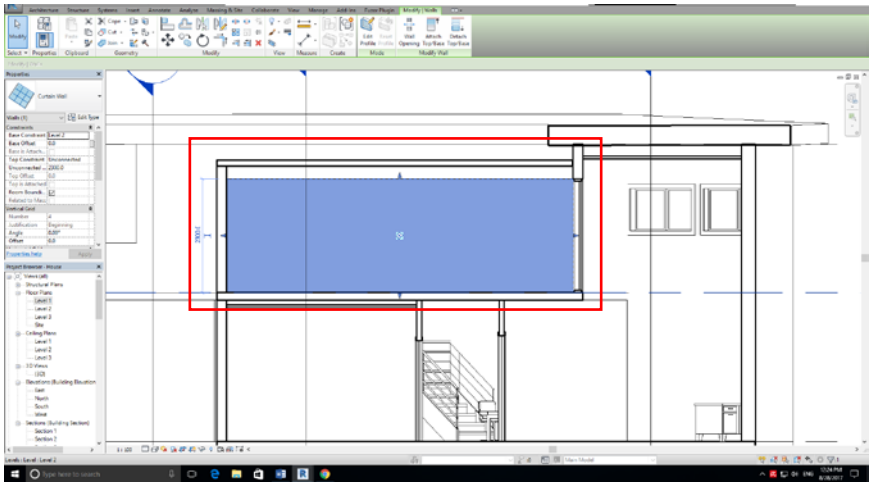
4. Click on the curtain wall, two dotted blue lines are shown on the two sides of the curtain.



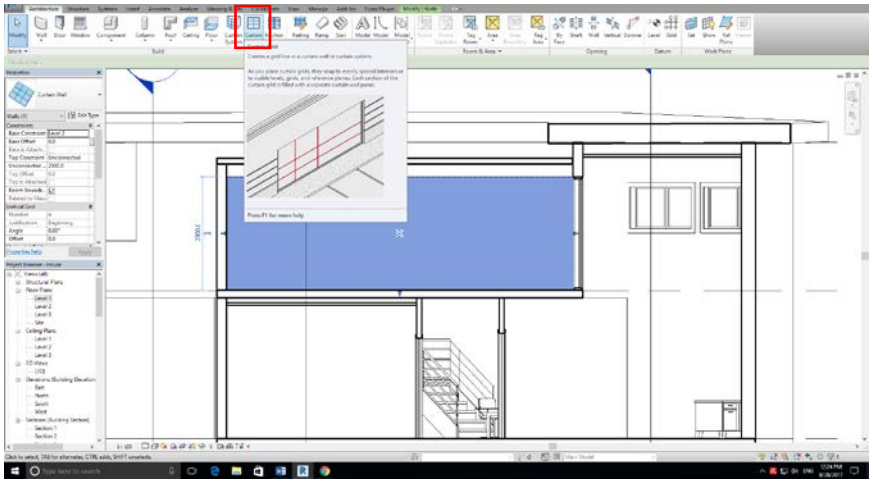
5. The overlapping wall is cut away, a single grid of glass is left.



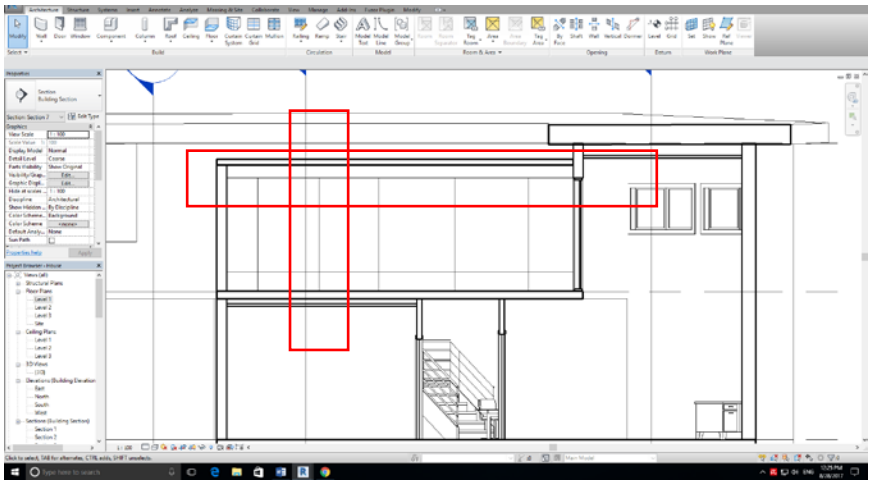
6. Switch to a section or elevation view; it will be a better view to divide the curtain wall into smaller grids.



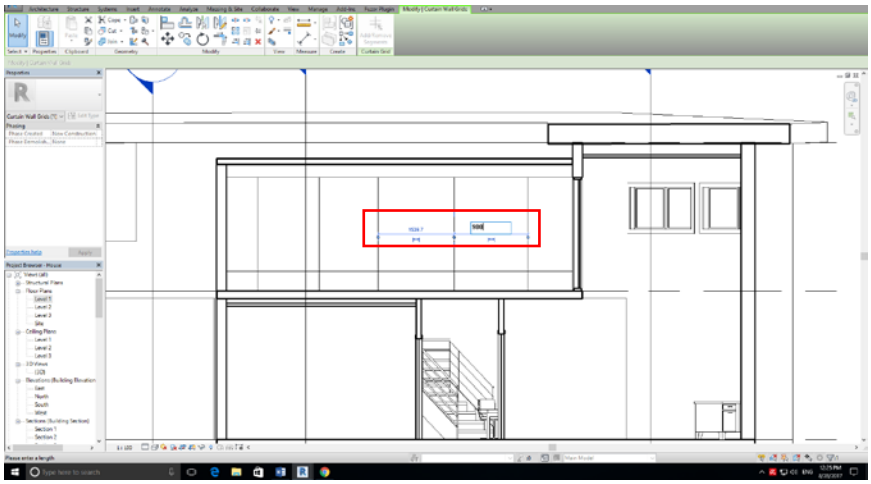
7. Click on Curtain Grid Command under the Architecture Panel.



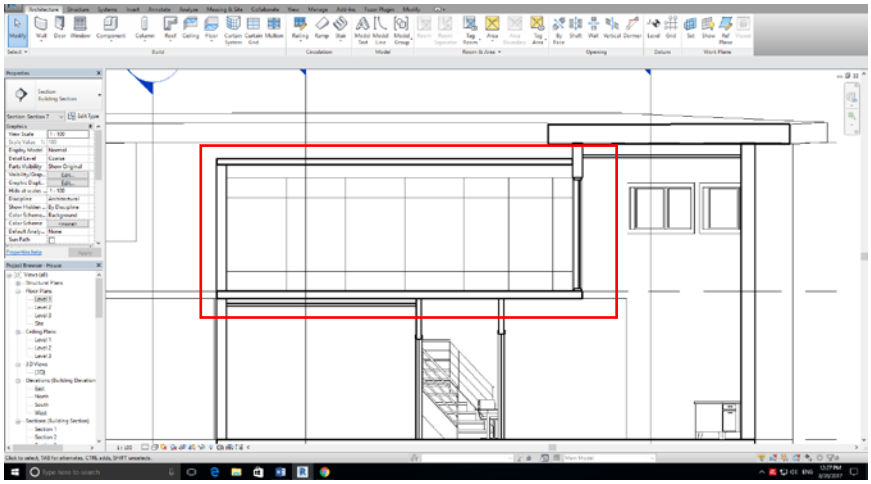
8. Sketch a gridding system on the curtain wall.



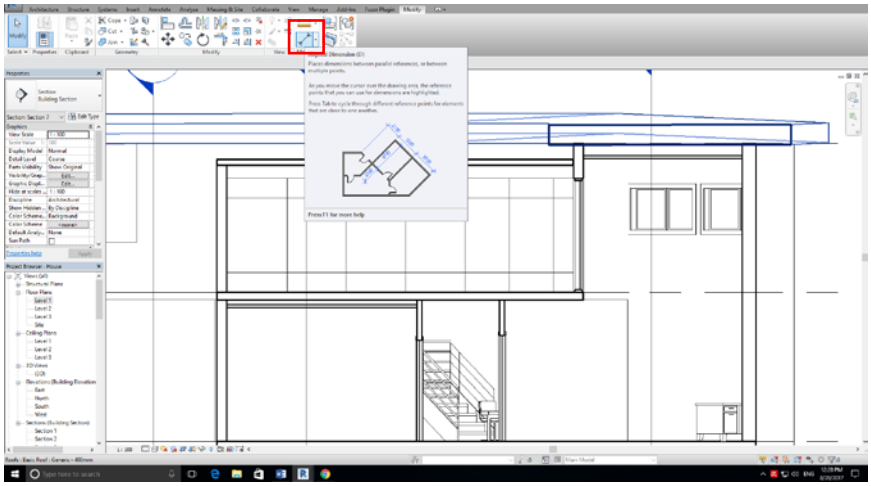
9. Modify the grids by changing the temporary dimensions.



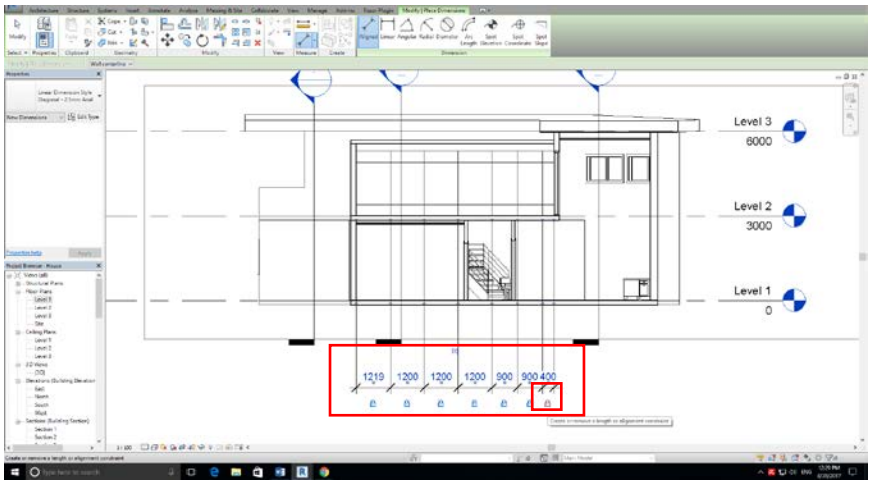
10. The grids can be uneven, unlike the previous storefront family.



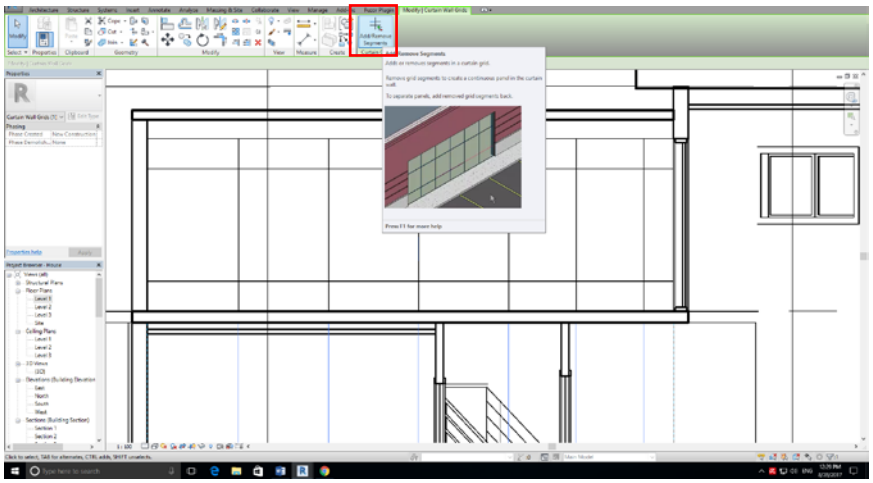
11. Click on the Aligned Dimension Tool under the Modify Panel.



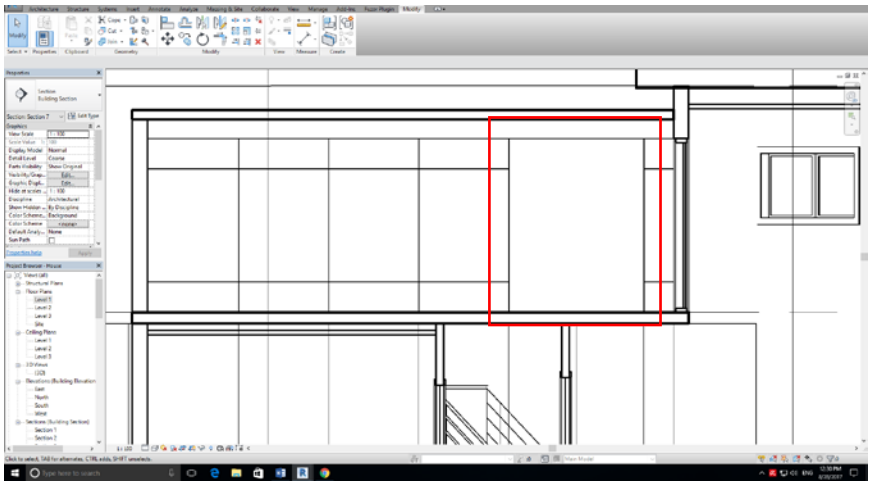
12. Create a permanent dimension of each column and lock them.



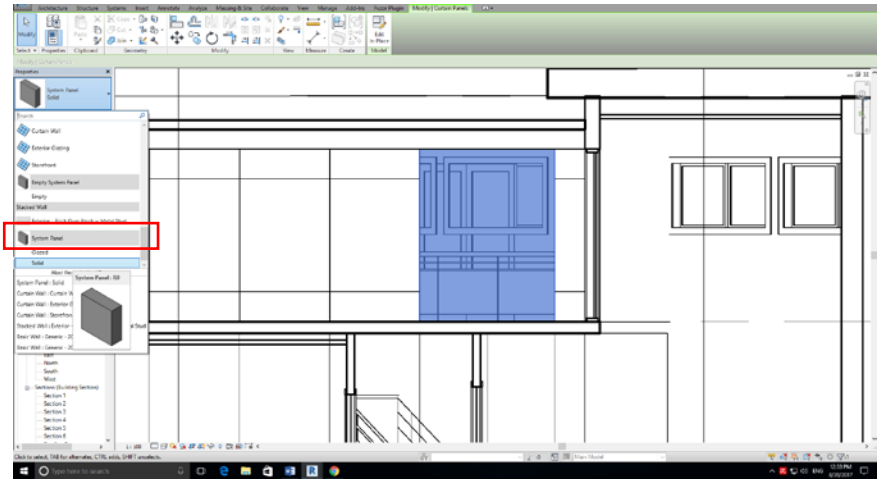
13. Use the Add/Remove Segment Tool to give some patterns to the curtain wall; it can also be used to create openings.



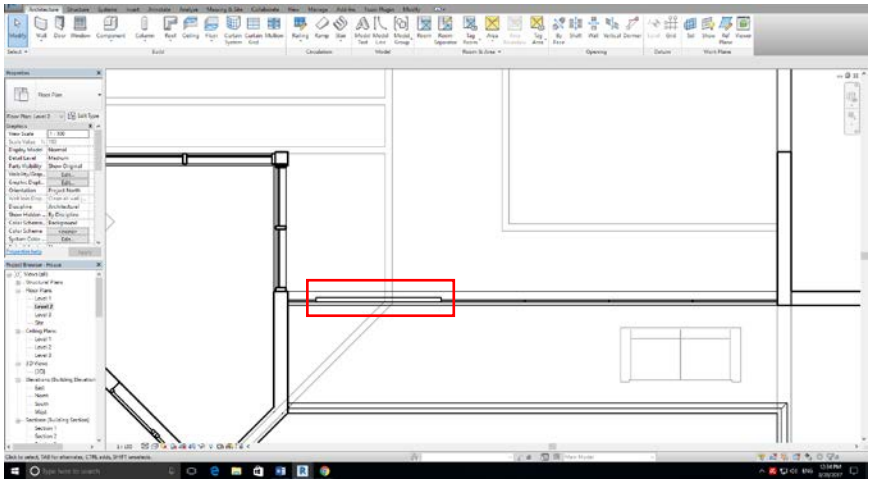
14. Tap on the line segment to delete that line.



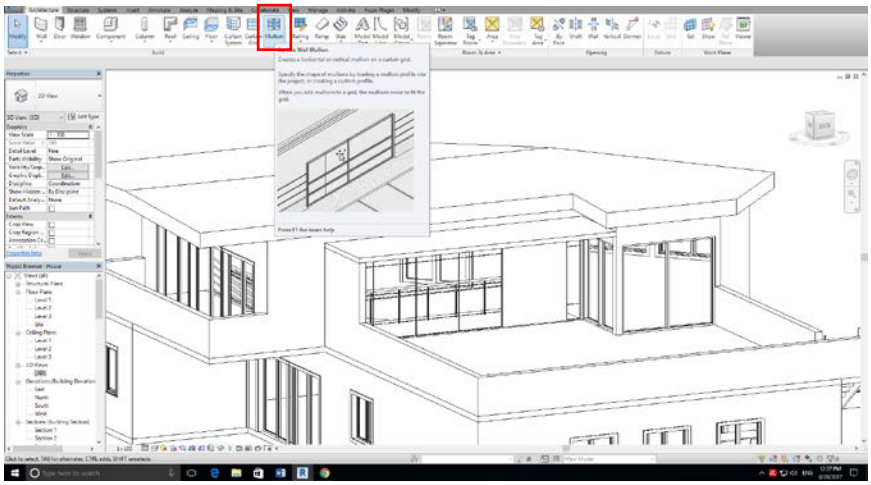
15. A panel is usually hidden under the grid lines, use Tab to select a panel and assign a grid panel to each.



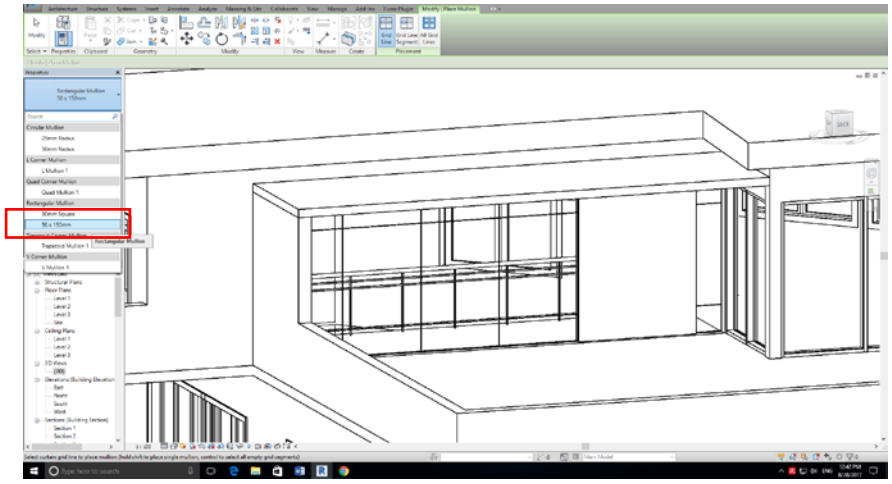
16. Switch to the plan view; a Corbu Door is created.



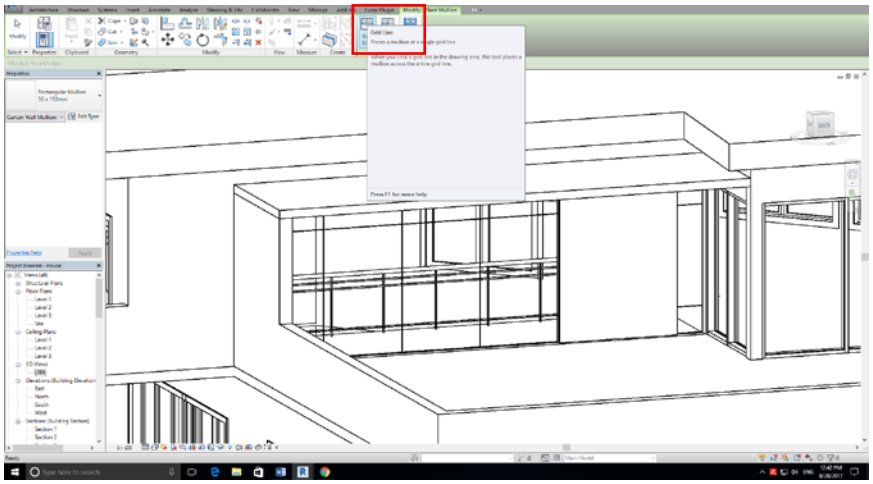
17. Switch to a 3D view; it is a better view to add mullions, Click on the Curtain Wall Mullion command under the Architecture Panel.



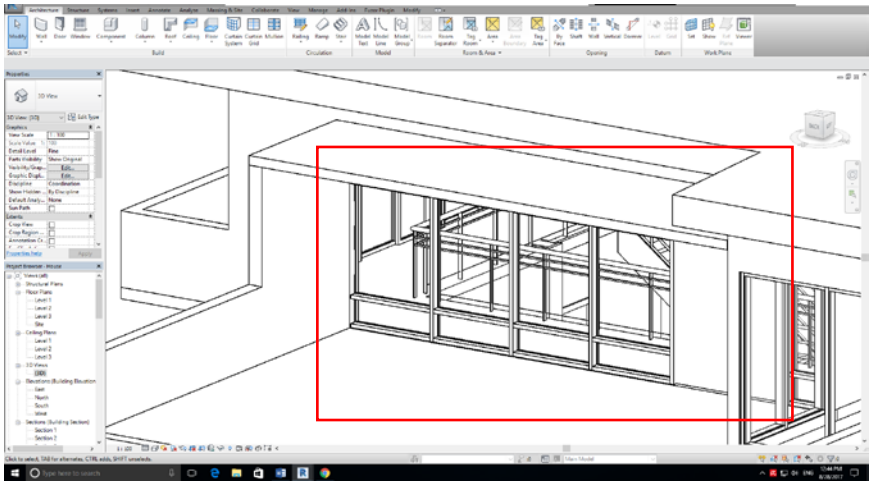
18. Select the type of mullion to be placed.



19. Grid Line is selected as default; it is used to add mullions to a grid line, use the segment option to select a single segment.



20. Switch between line and segment to create patterns.

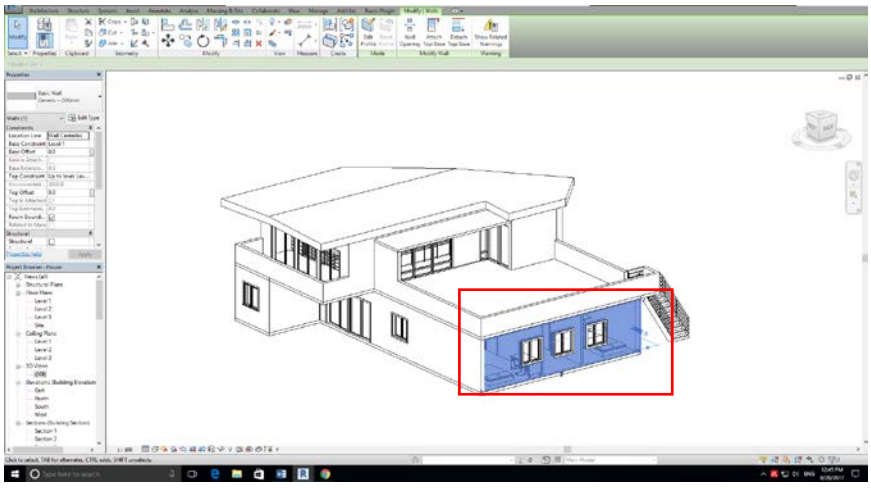


5.5 Creating Wall Sweeps and Reveals

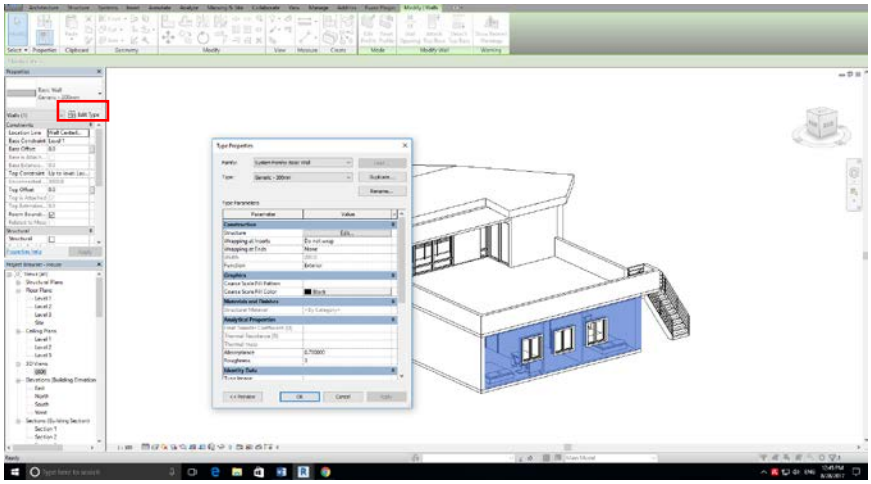
Sweeps and Reveals places 3D geometry and move it along the length or the height of a wall. A sweep will add to the mass of the wall, while a reveal will carve away from it.

5.5.1 Type Sweeps and Reveals:

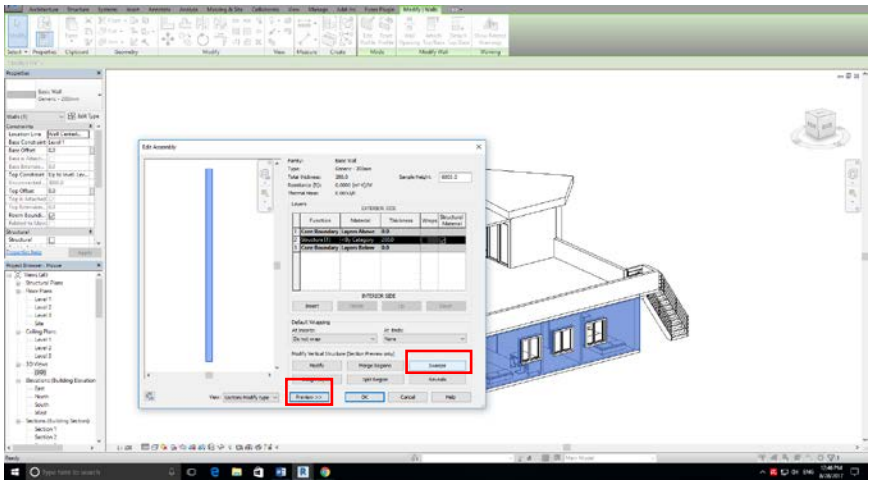
1. Select a wall and click on edit type.



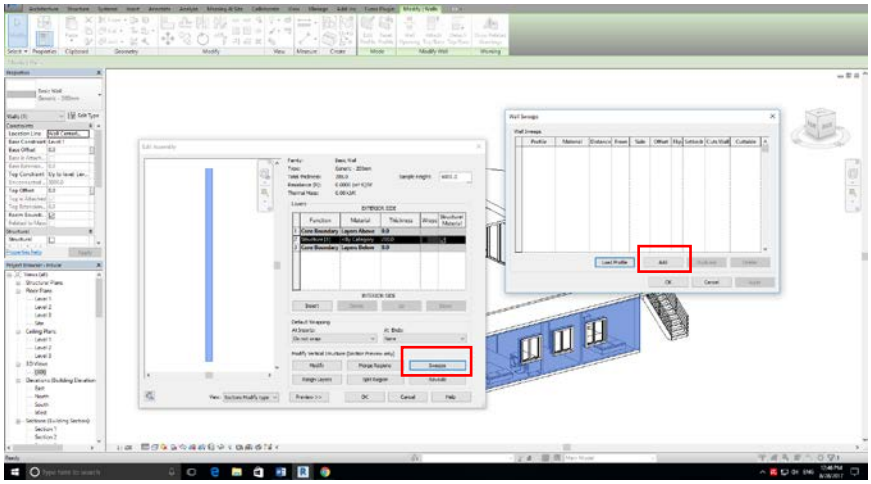
2. The Type Properties window is opened, click on edit structure.



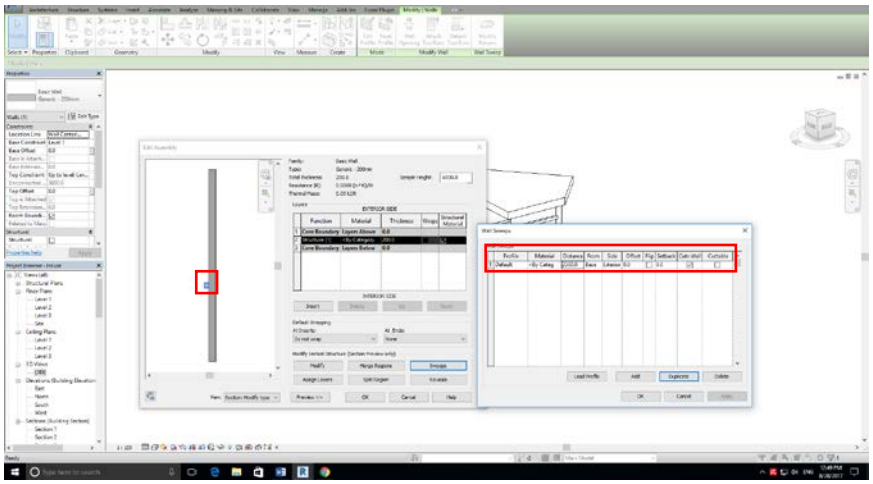
3. Turn on the Preview window and the sweeps and reveals button will lighten up.



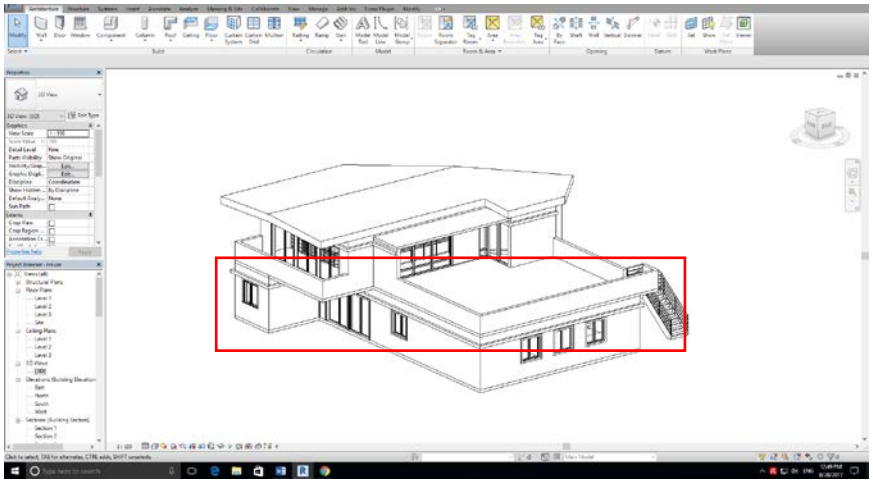
4. Click on the sweeps button, and an empty wall sweeps window appeared.



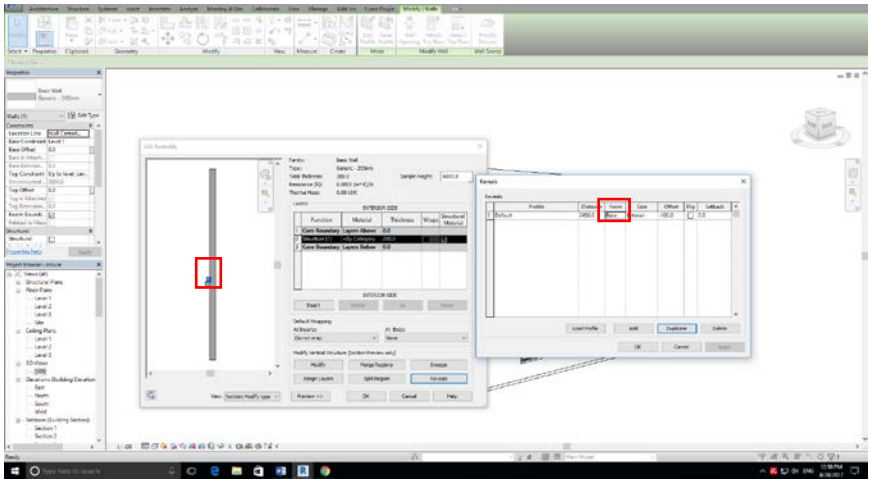
5. Click on the Add button, a default sweep without material is created, a blue box appears on the section preview.



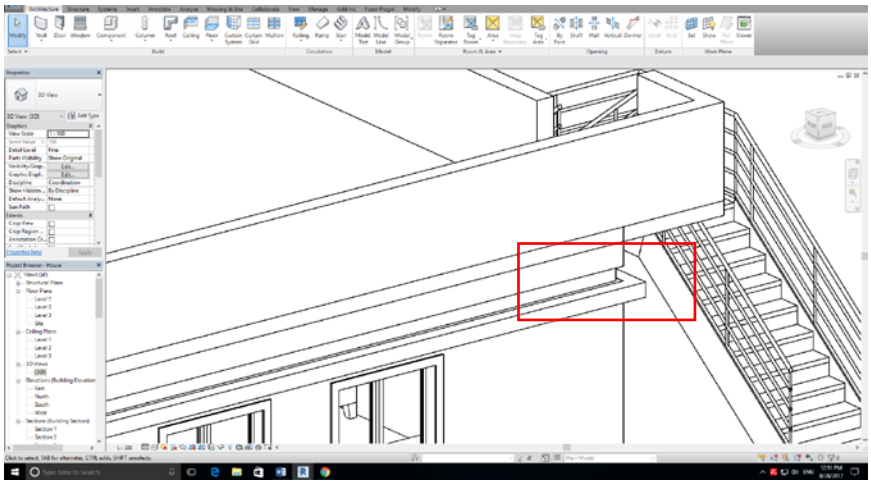
6. Press OK; a sweep is added to all the exterior wall because the type is edited instead of an instance parameter.



7. Add a reveal to the same wall type.

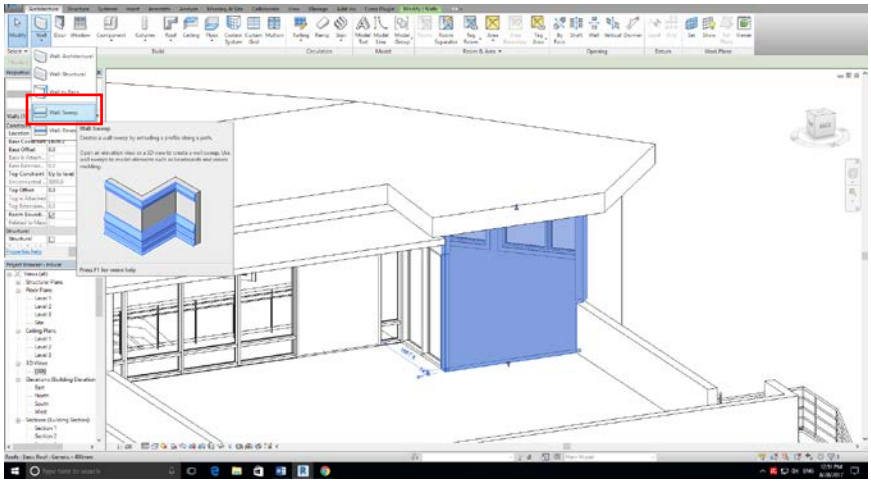


8. A reveal carves a part of the wall away.

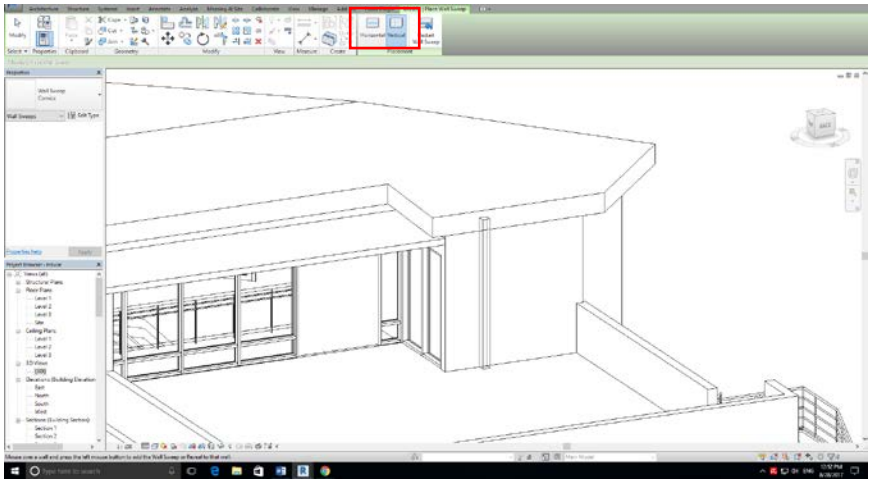


5.5.2 Instance Sweeps and Reveals:

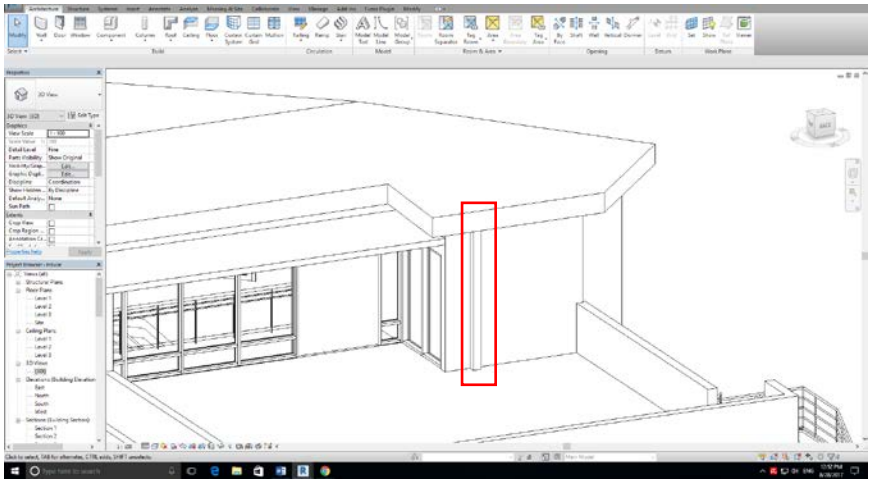
1. Select a Wall and choose Wall to sweep under the Wall Command.



2. Choose between Horizontal and Vertical Sweep.



3. The sweep only appears in this single wall, not affecting the other wall with the same type.

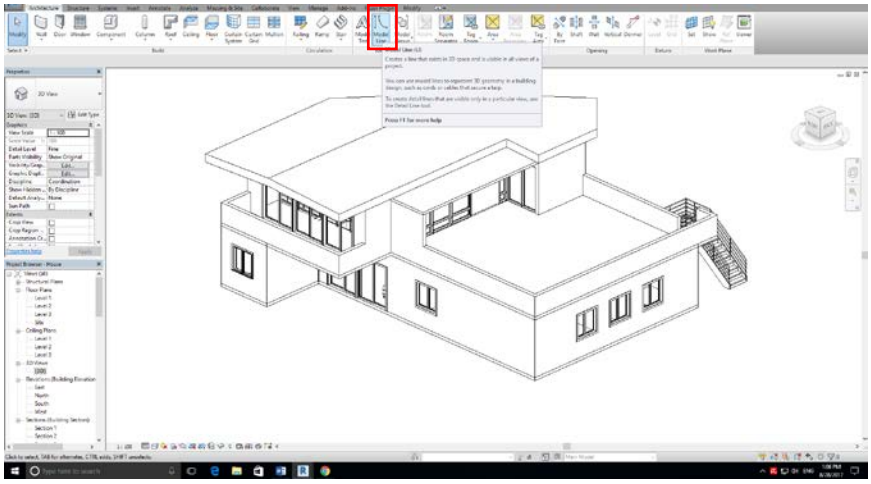


5.6 Model Lines

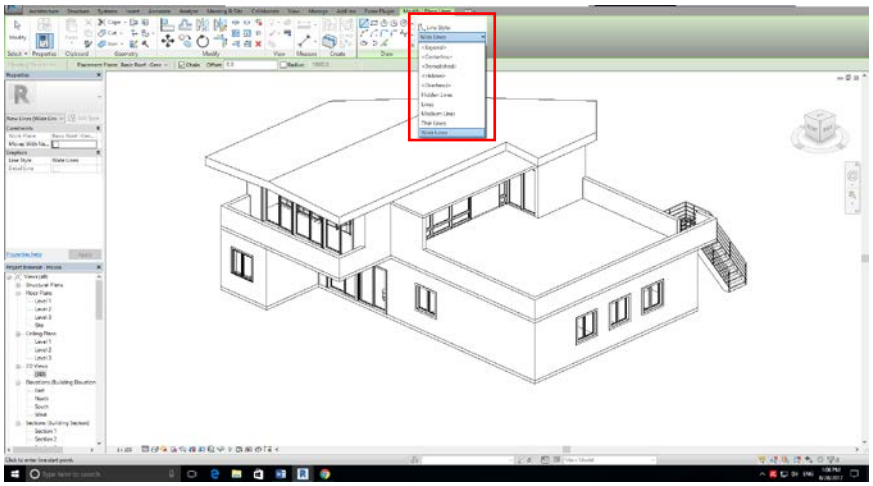
Model lines are actual lines on the model; it is different from detail line which is view specific. A model line is used to representing real things in the model like car parking slot.

5.6.1 Model Lines:

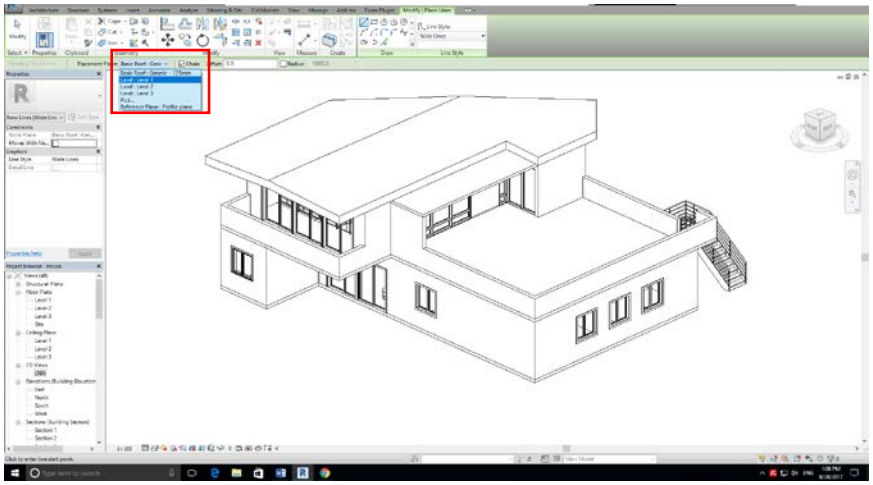
1. Click on the Model Line command under the Architecture Panel.



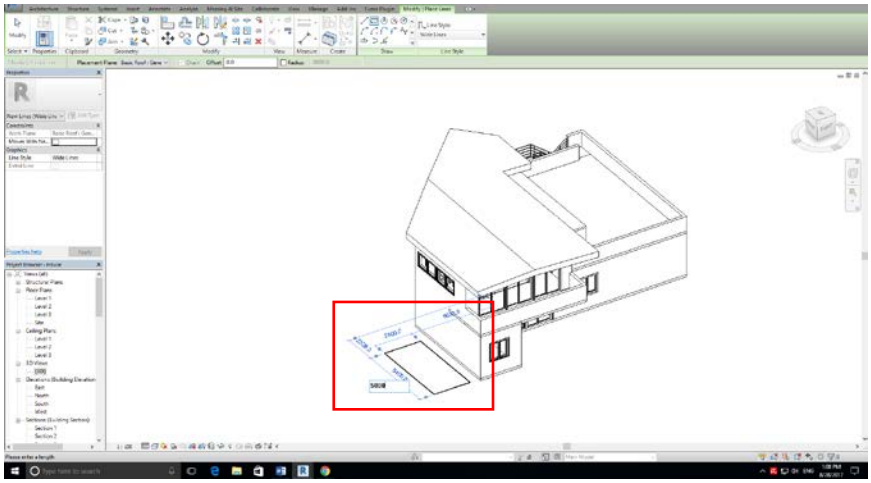
2. Select a line style and width according to the object to be created.



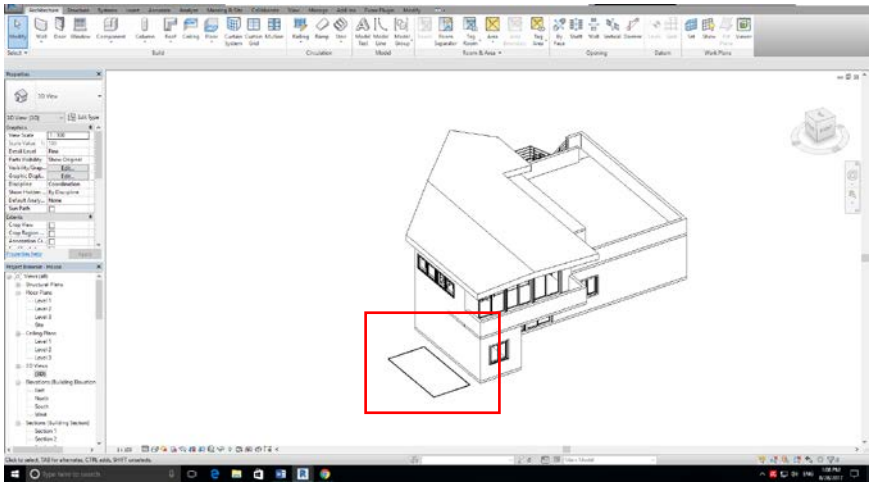
3. Choose a working plane; it can be planes at any angles.



4. Draw a rectangle, use dimensions to modify the proportion.



5. Model lines represent a parking slot.



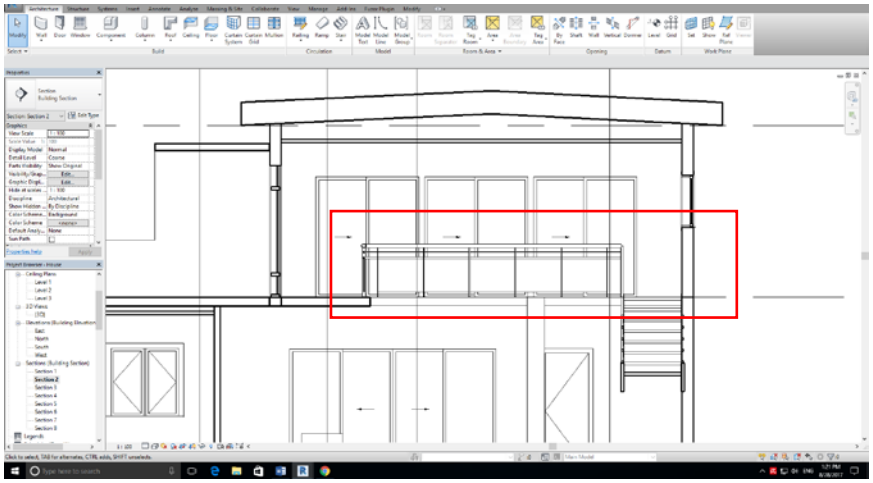
6. Visibility and Graphic Control

6.1 Using Object Styles

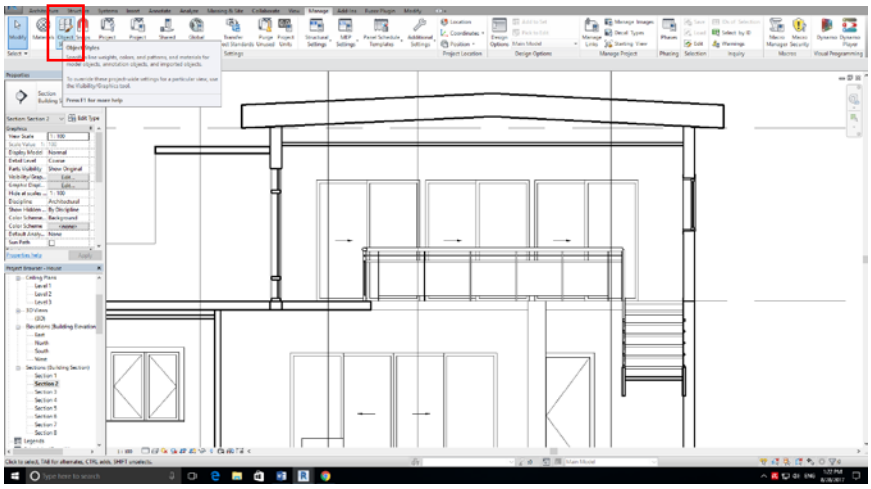
There are various tools in Revit to change the way various items display, some of them changes the display globally, and some of them are more specific and isolated.

6.1.1 Object Styles:

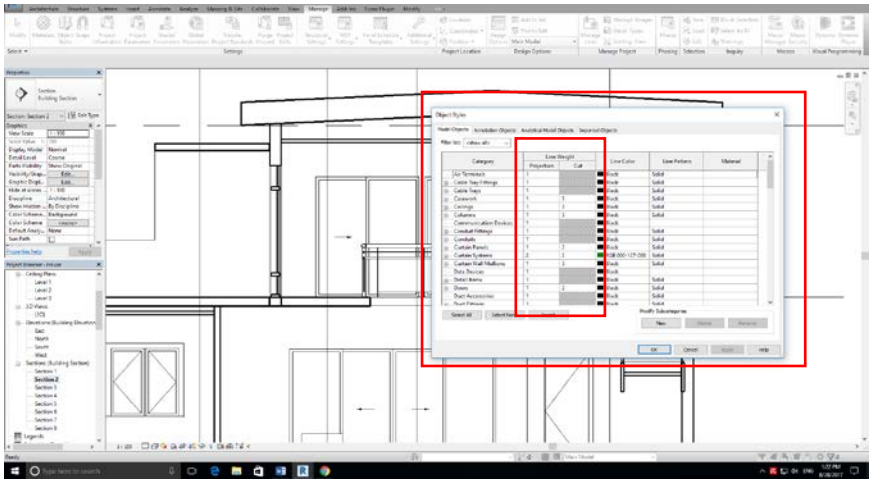
1. Open a section view, the line weight of different components of the house is different; they are set to default.



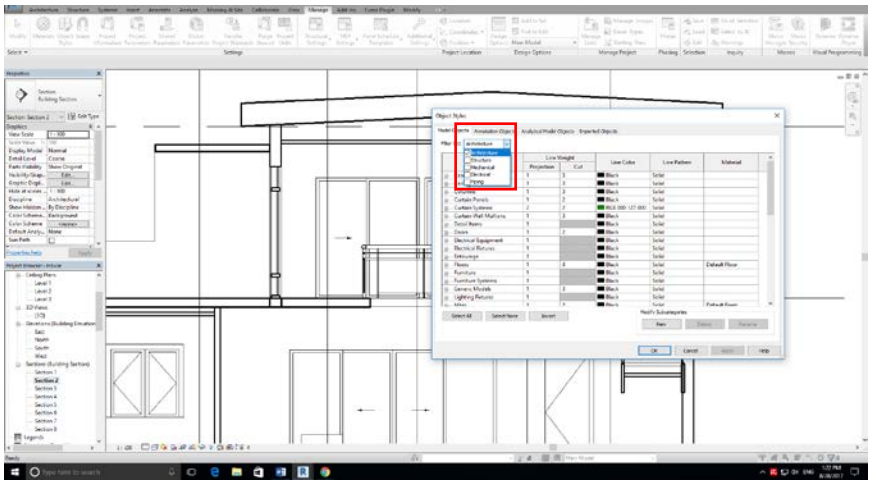
2. Click on Object Styles under the Manage Panel.



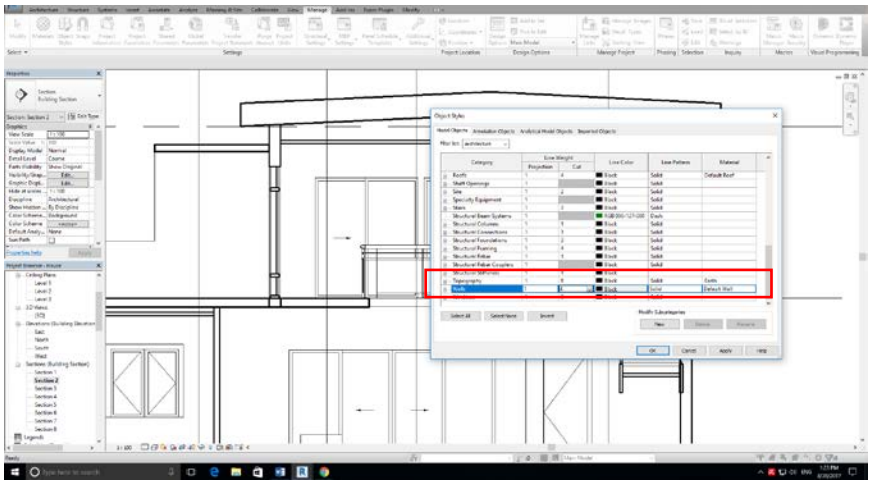
3. Line Weight of a category is divided into projection and cut line weight, the line color and pattern can also be changed.



4. Search for architectural elements by unchecking in the Filter List.



5. Change the line weight of Cut, and it will be shown in the section.

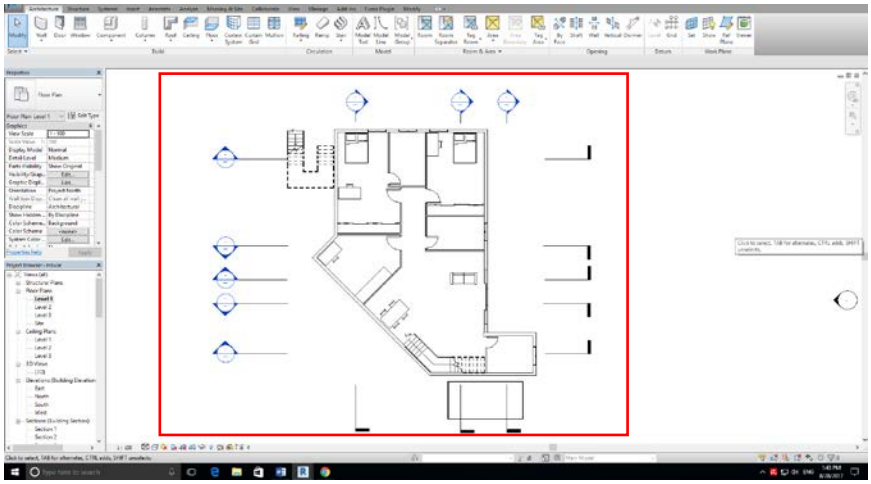


6.2 Working with Visibility and Graphic Overrides

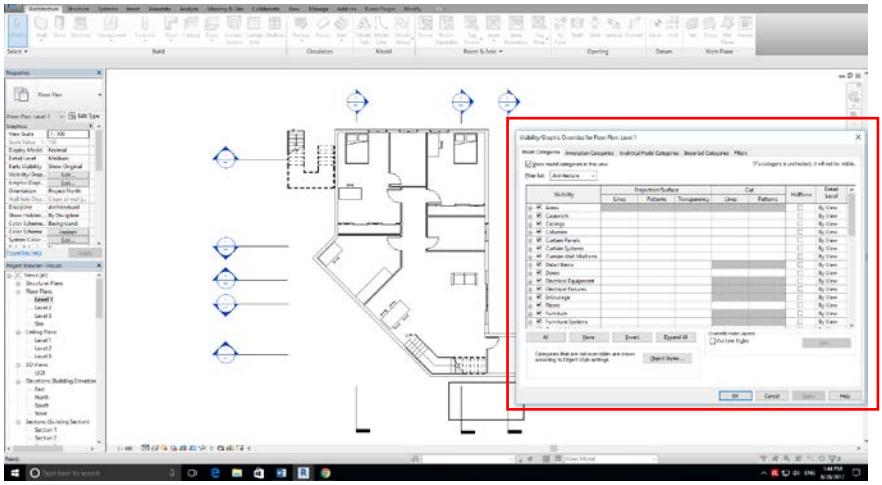
Visibility and Graphics Override Dialog is used very frequently. It gives a lot of control over the objects and how they display variously. It is similar to object styles, but VV is more object specific. The shortcut is V+V.

6.2.1 Visibility and Graphic Overrides:

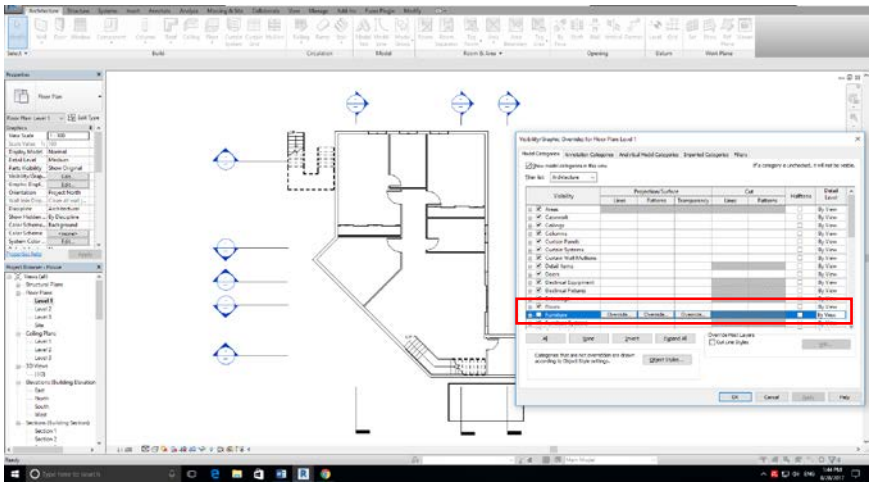
1. Open a plan view and type V+V.



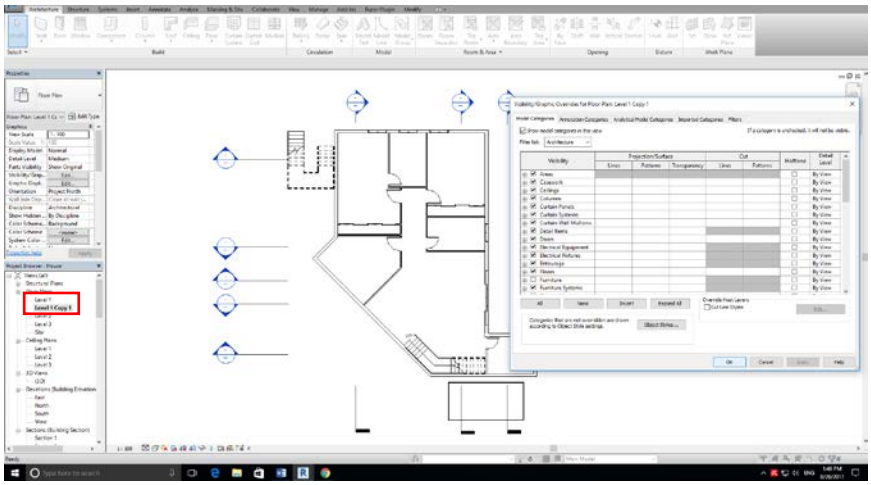
2. The Visibility/Graphic Overrides is view specific.



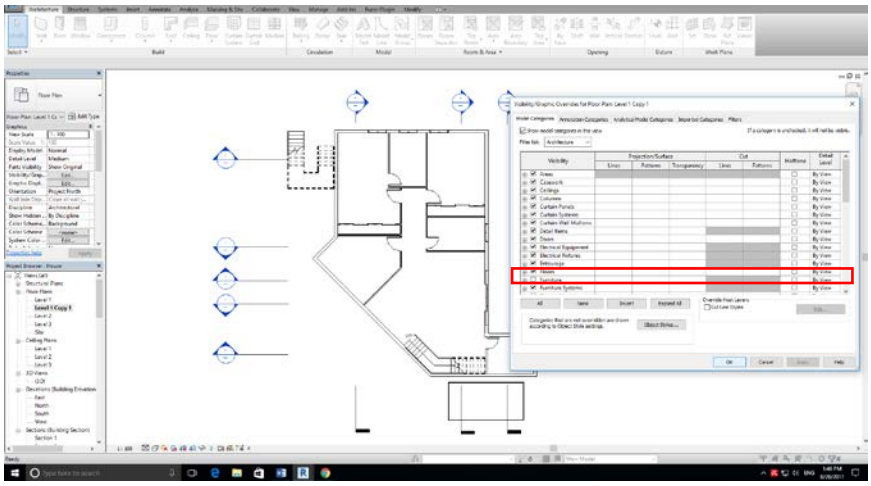
3. By unchecking the box of a category, it will vanish from the plan.



4. Duplicate the level 1 plan by right click in the project browser, select duplicate and duplicate with detailing.

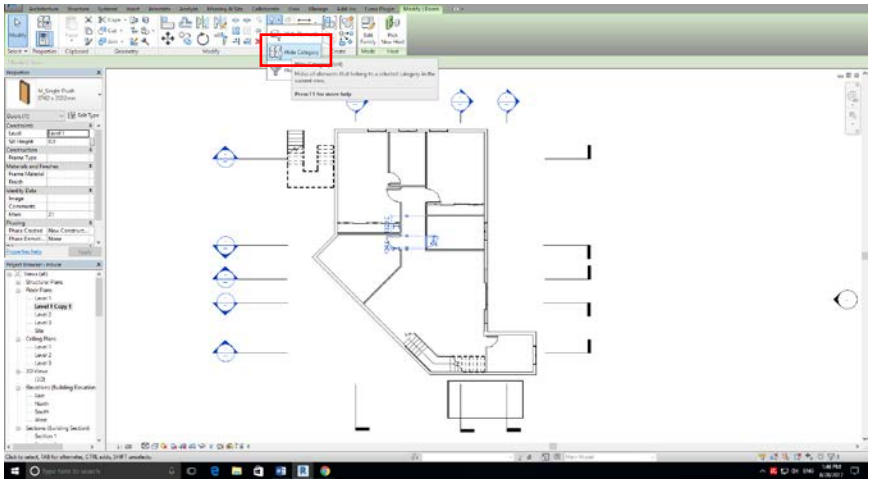


5. Open a VV for the copied view and uncheck the category which is not needed in this view.

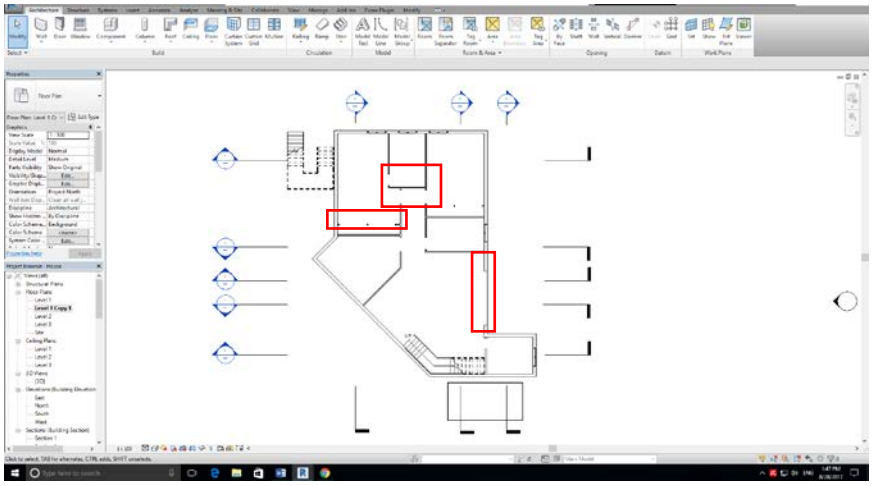


6.2.2 Hiding Elements and Categories:

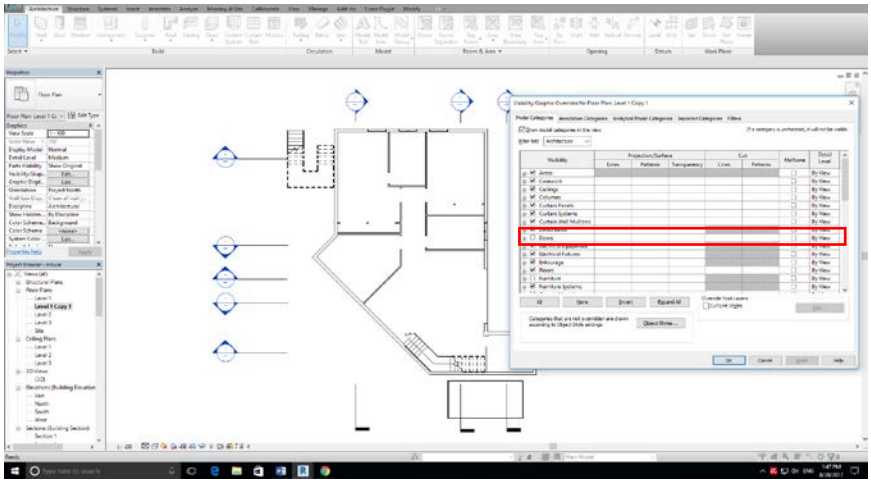
1. Select a door on the plan and select Hide Category under the Modify Panel.



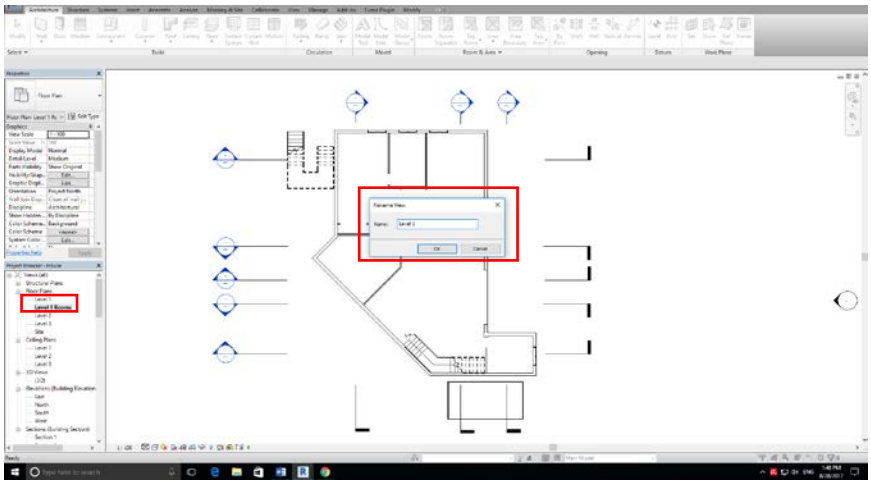
2. All the doors on this view are hidden while hiding elements will only hide a single object.



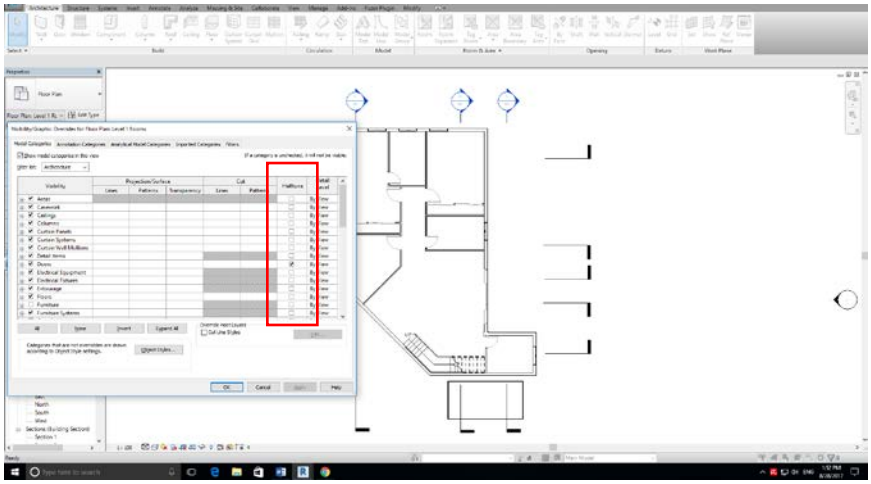
3. Open VV and the box of Doors is unchecked.



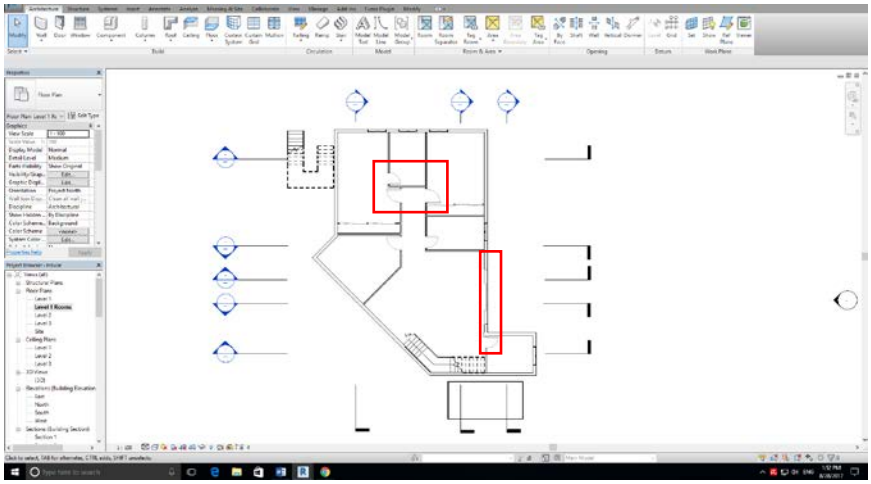
4. Right-click the copied plan in the project browser and rename it.



5. Open VV; there is a Halftone box, the lines, symbols of that category will fade.



6. Halftone can be used to give focus to thing that is more important in this specific view.

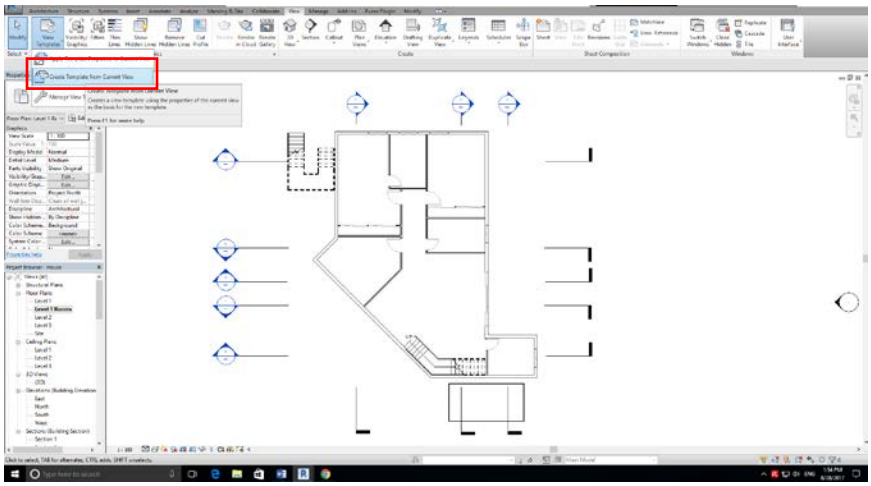


6.3 Using View Templates

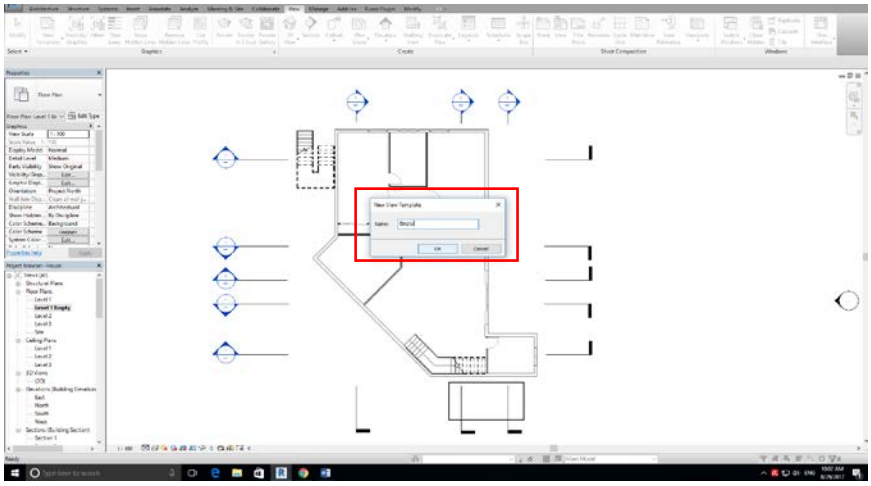
Using VV in every drawing can be time-consuming. View Templates can set up a Visibility Template so that the same setting can be applied to several views.

6.4 View Templates:

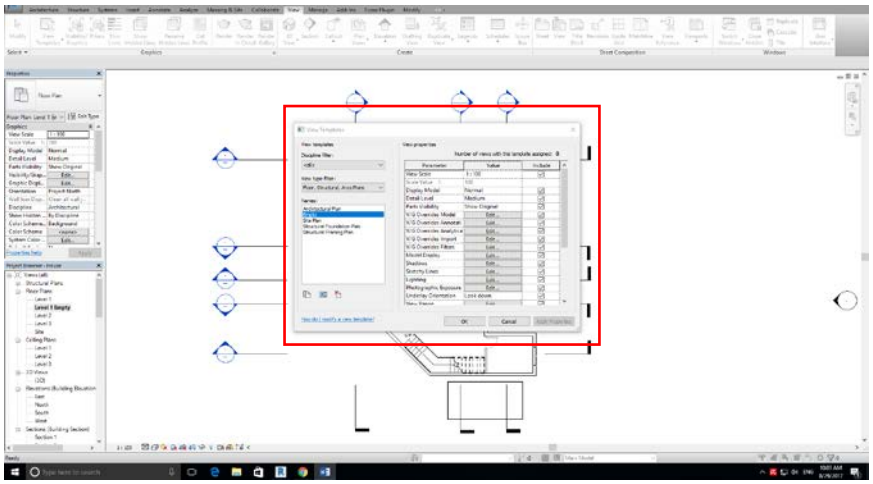
1. Select Create template from Current View under the View Template Command.



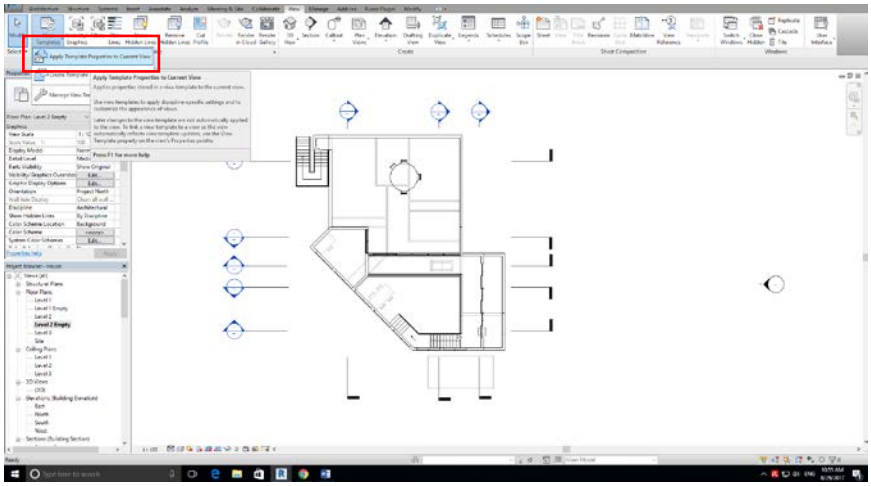
2. Name the template.



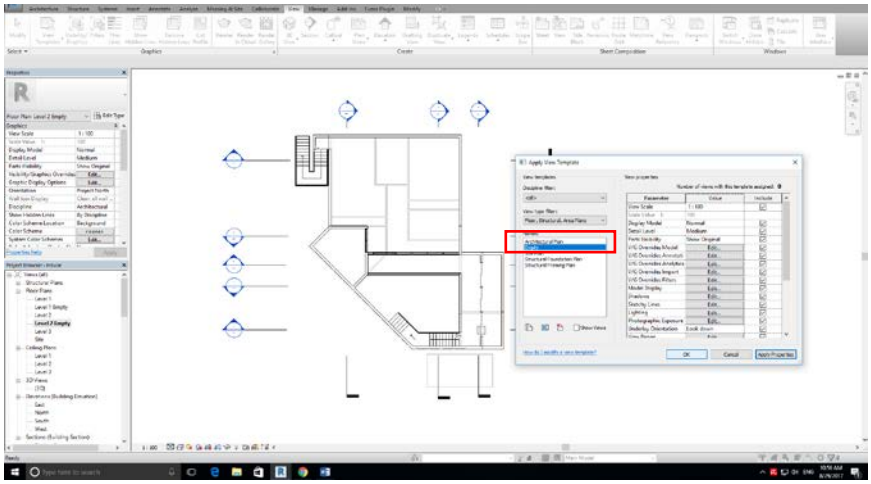
3. Edit the settings of the template; there are some pre-loaded templates in Revit.



4. Switch to the level 2 plan view and Apply Templates Properties to Current View.



5. All the setting from the templates is applied to this view.

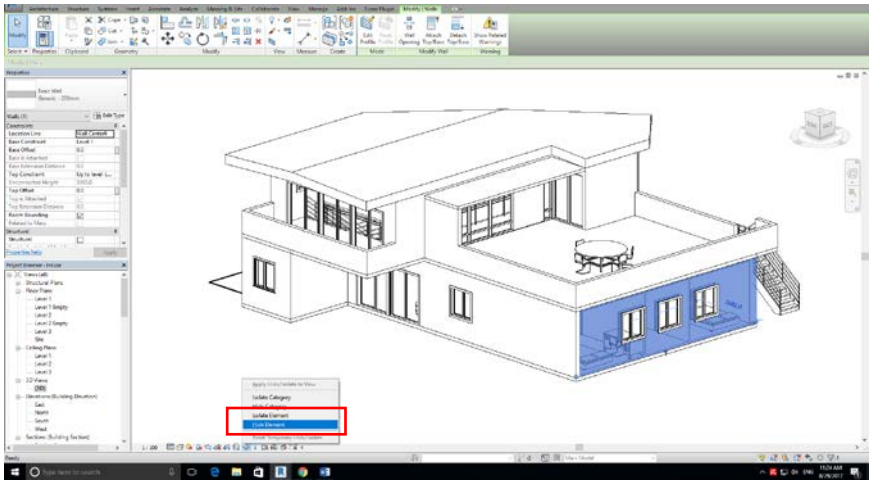


6.5 Hiding and Isolating Objects in a model

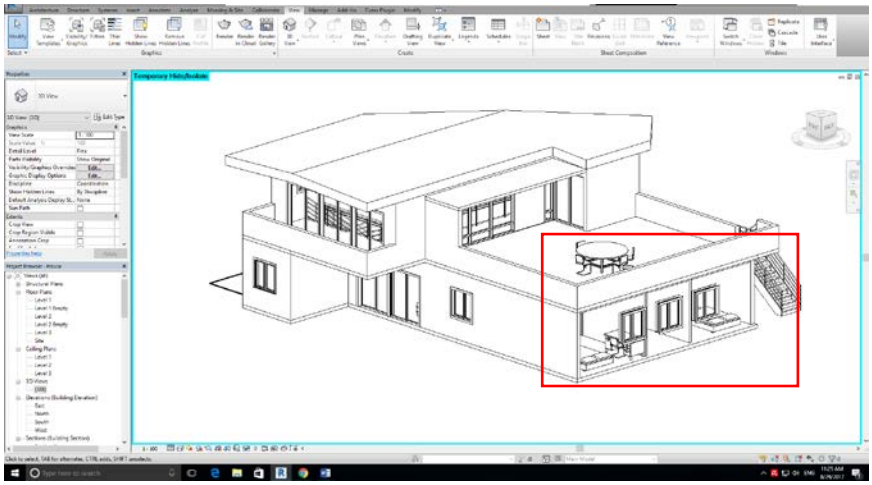
When the model becomes complex, it can be difficult to see and edit objects, by hiding some components, objects from behind can be edited. There are two types of hiding command, temporary hide, and permanent hide.

6.5.1 Temporary Hide:

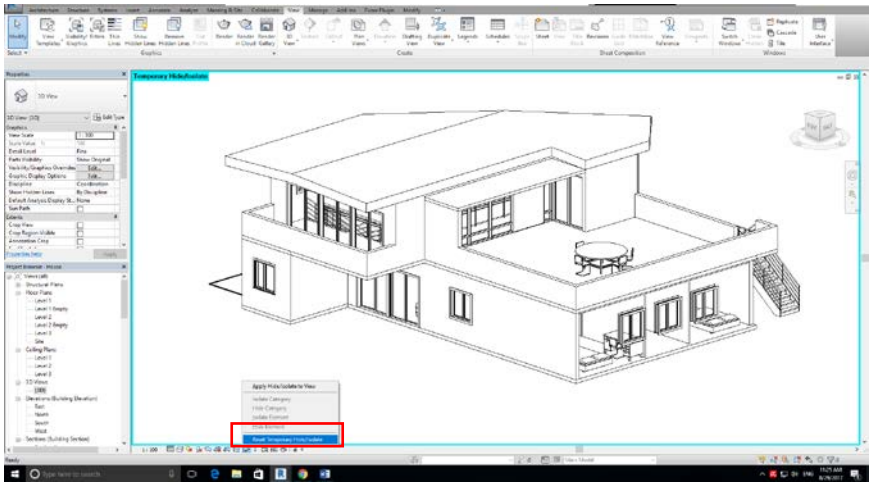
1. Select a wall and click on the glasses icon on the bottom, select the Hide Element Option.



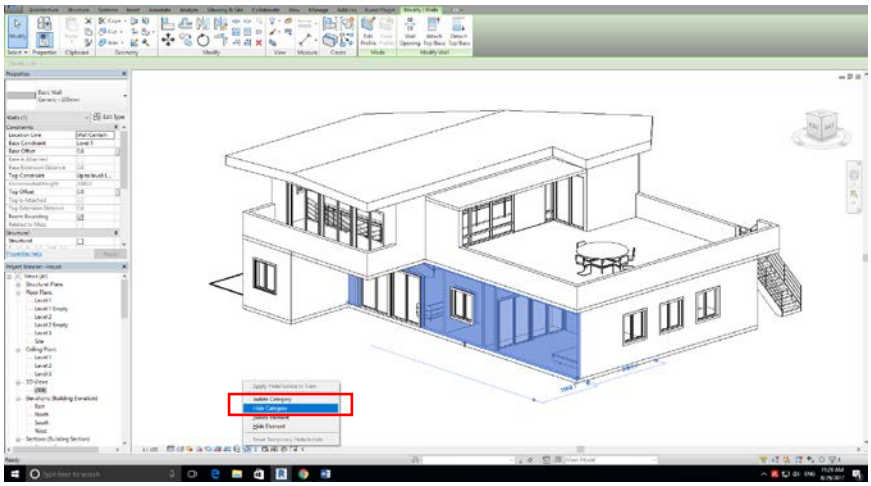
2. A blue edge that reads Temporary Hide/Isolate will appear.



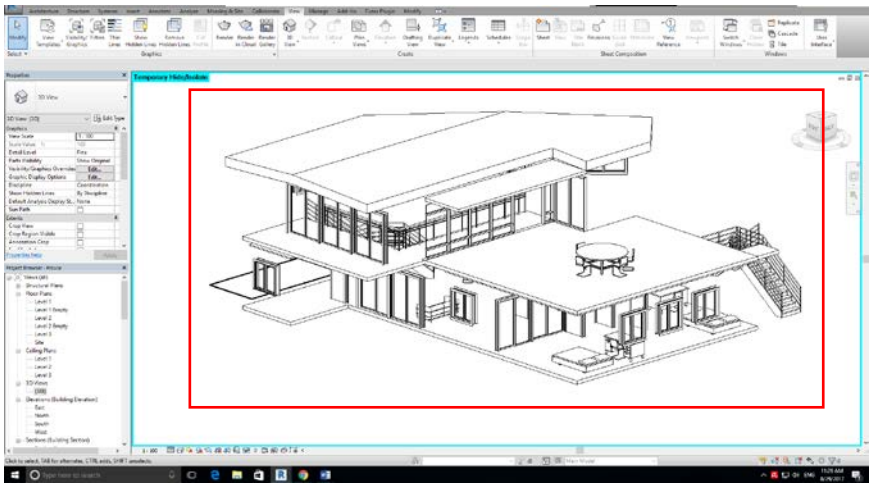
3. To leave the temporary hide window, click on the glasses icon and select Reset Temporary Hide/Isolate.



4. Select a wall and choose Hide Category.

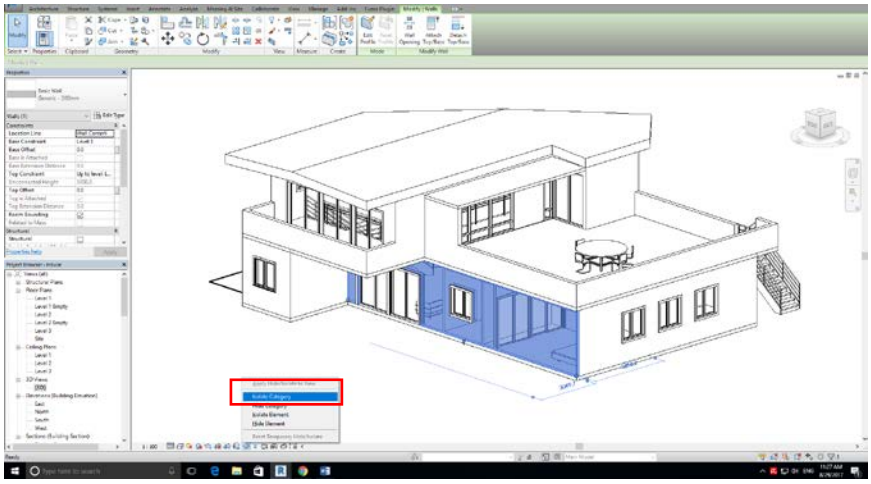


5. All the walls of this house are hidden.

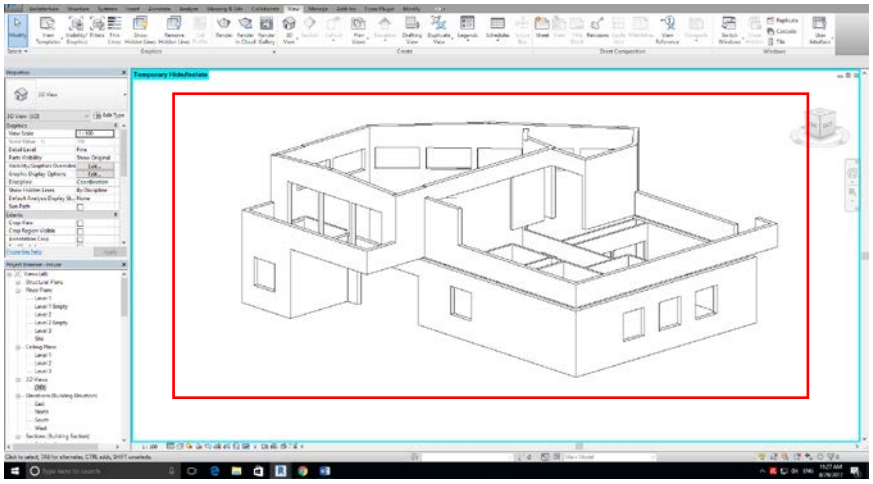


6.5.2 Isolate:

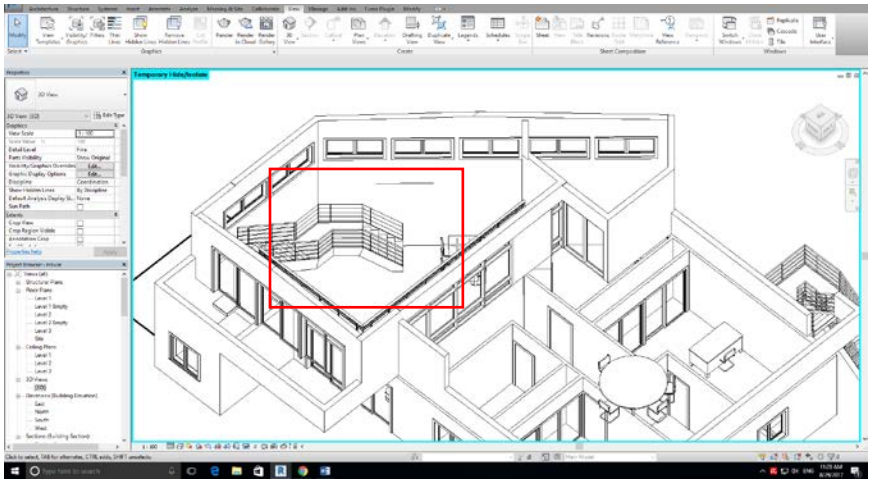
1. Select a wall and choose Isolate Category.



2. Only the walls are shown in the house.

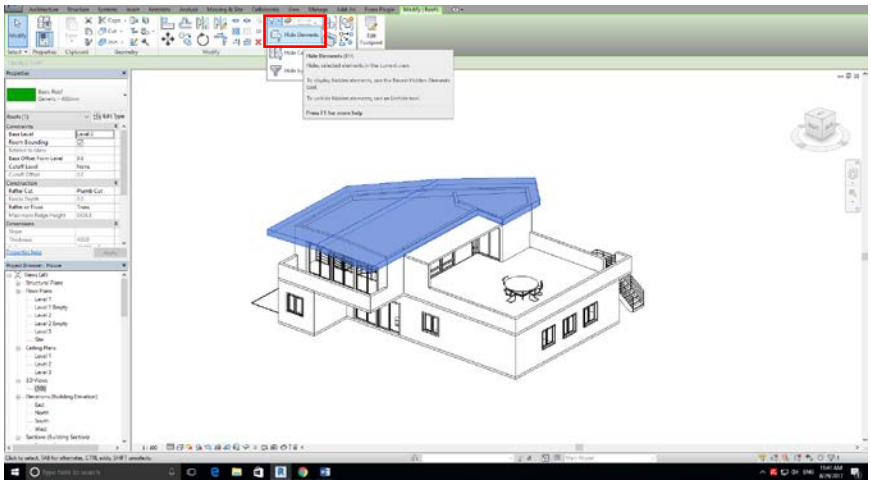


3. Using hide and isolate, it is easier to modify object behind.

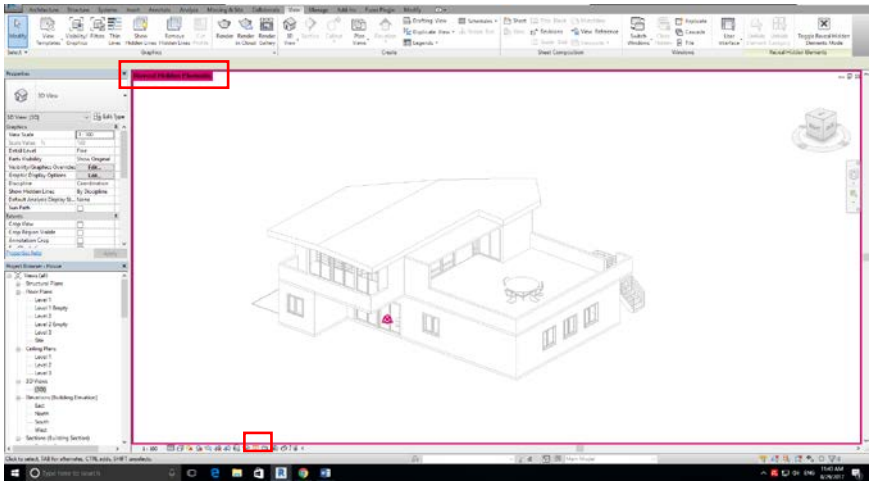


6.5.3 Permanent Hide:

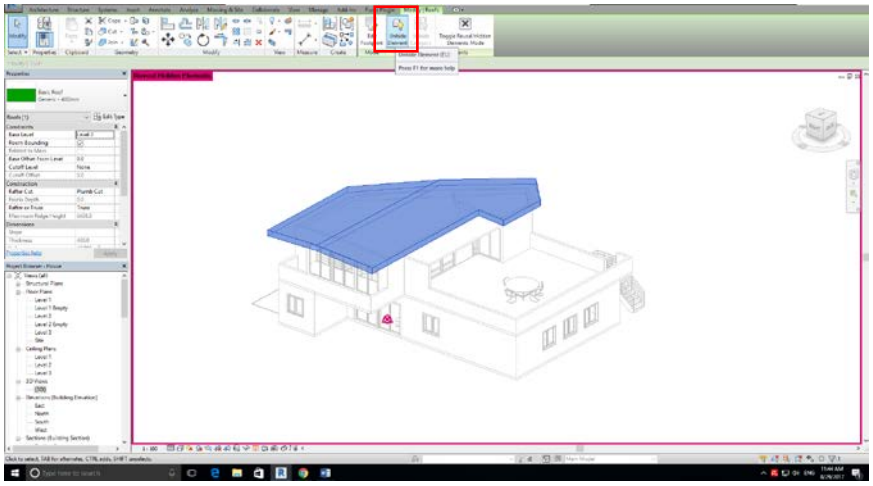
1. Select the roof and click on the lightbulb icon under the Modify Panel, select the Hide Elements option.



2. Search The object will disappear unless the Reveal Hidden Elements Command is turned on.



3. Select the roof and Click on the Unhide Element Command to reveal the roof.

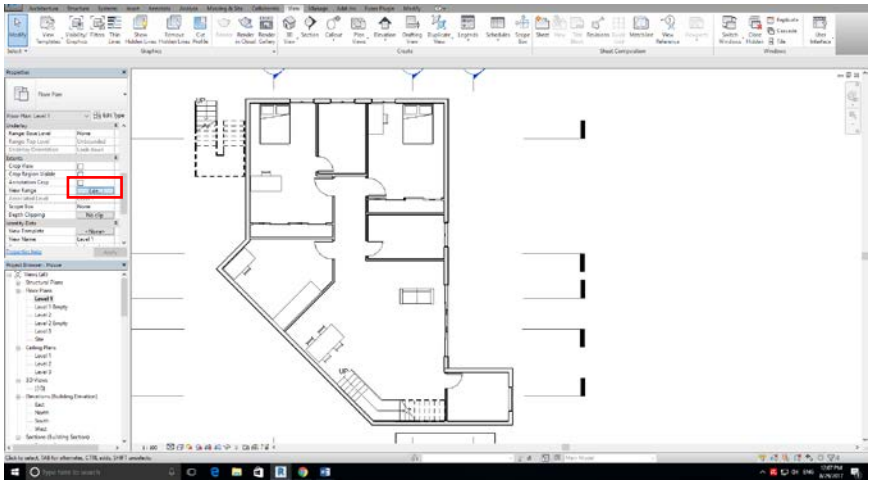


6.6 Understanding View Range

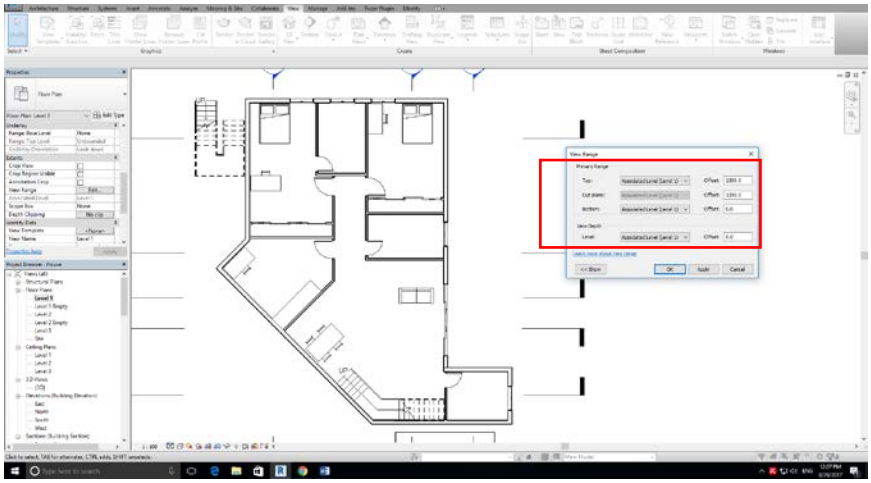
The View Range Feature is a setting that belongs to all floor plans and determines what graphics is shown in the floor plan. View Range feature allows us to determine what height and the depth of the sight.

6.6.1 View Range:

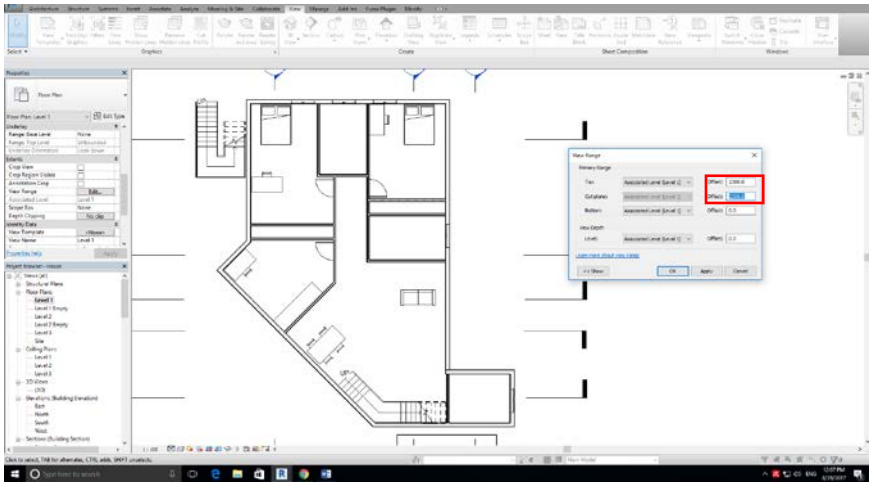
1. On the properties panel of a view, there is a view range option.



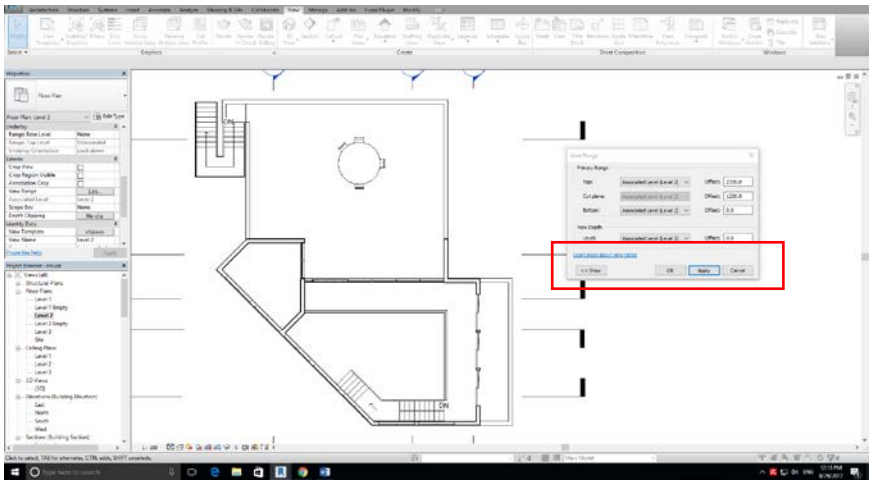
2. Click on Edit view range and the view range window is opened.



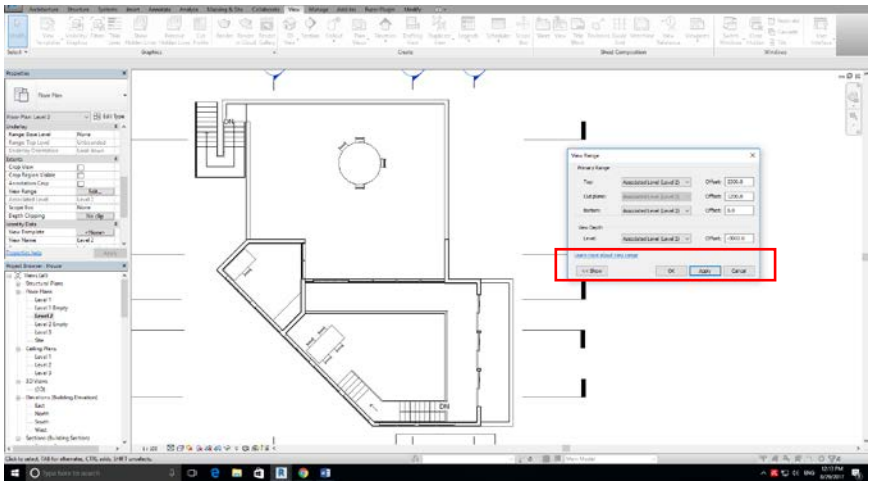
3. Type in a new offset value, the range will change, showing or hiding some objects.



4. By toggling the view range of the view, it can help with presenting the ideas.



5. Press Apply and the effect will be shown on the view.

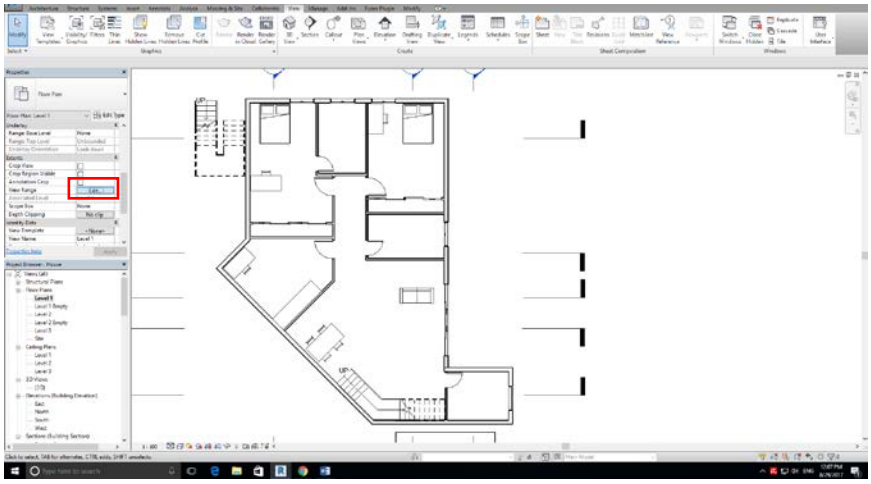


6.7 Displaying Objects Above and Below in Plan Views

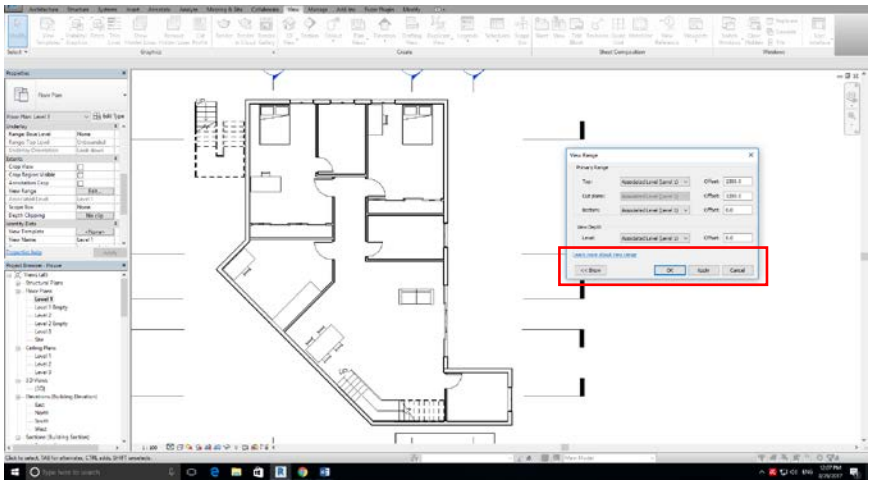
Sometimes it is useful to show objects which are above the cut plane. In a normal plan view, it is impossible to show them, by using plan region, they will appear on the plan.

6.7.1 Plan Region:

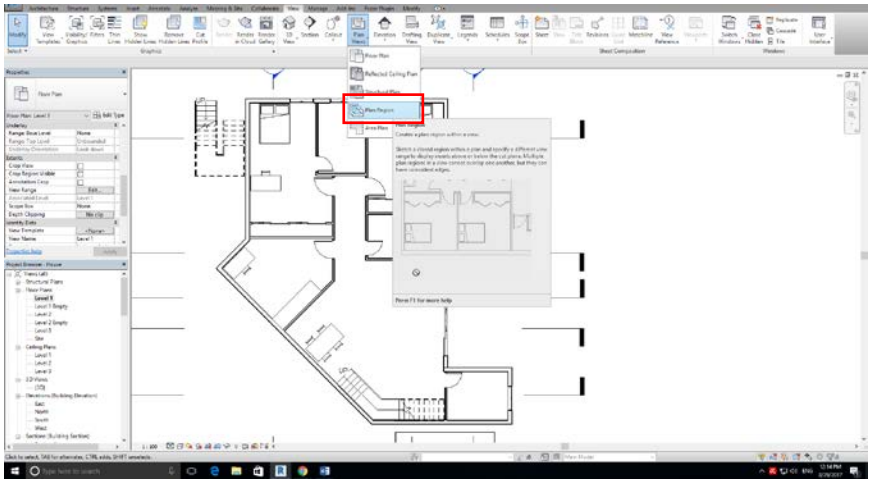
1. On the properties panel of a view, there is a view range option.



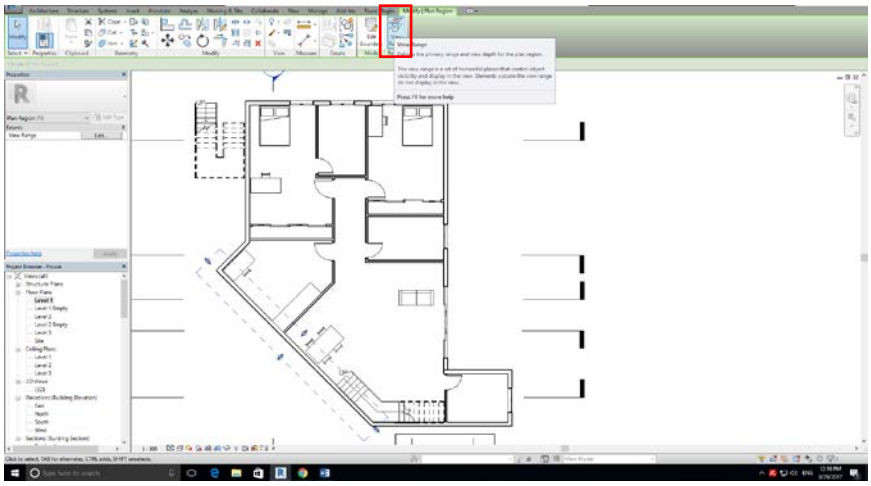
2. Click on Edit view range and the view range window is opened.



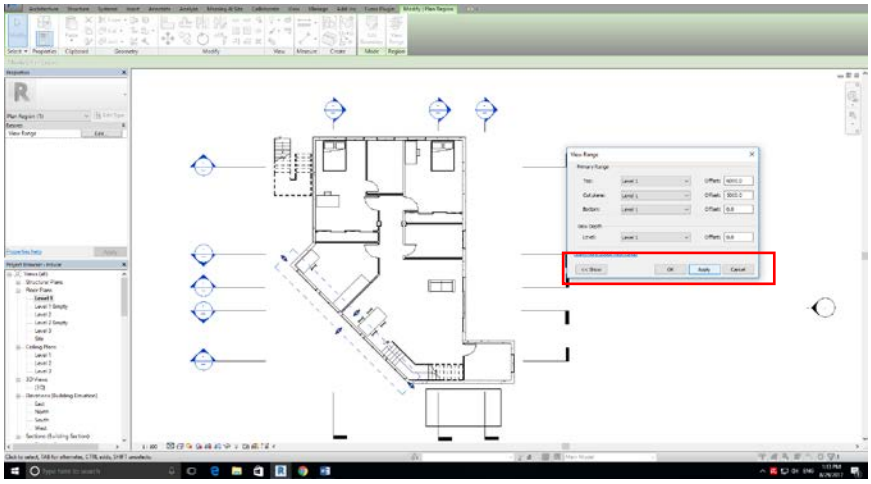
3. Select Plan Region under the Plan Views command.



4. Search Use box to give a boundary to the spaces where things from above should be shown.



5. Select the boundary and click on the View Range command, then the cut plan height can be detached from the normal plan.

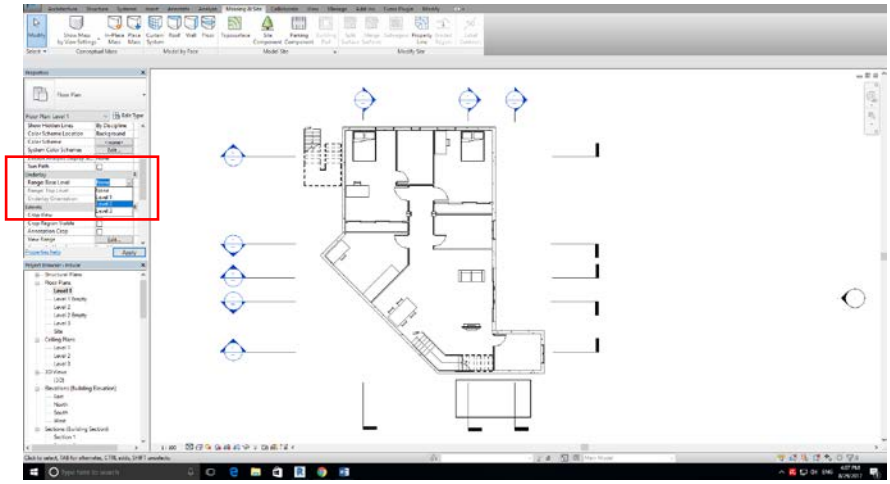


6.8 Using the Linework Tool

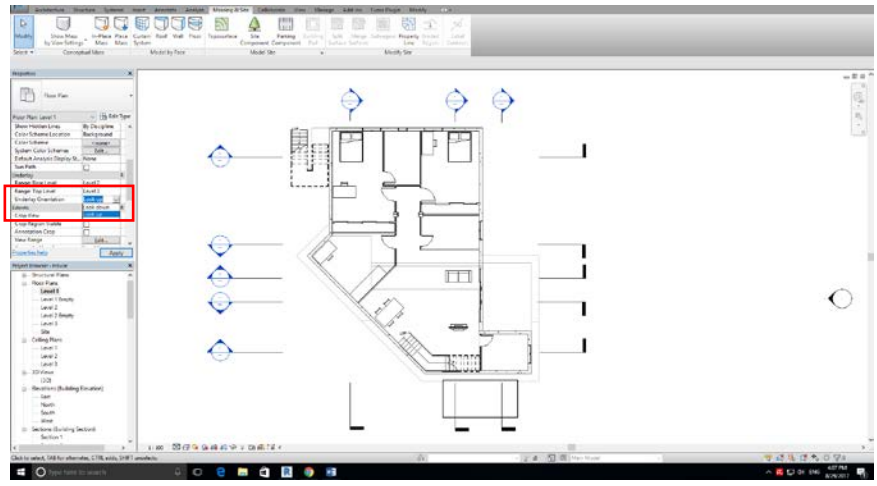
Linework tool is used to modify individual edges that make up element and vary them as required. For example: it can be used to make a wall bolder or change a roof overhang to a dashed line.

6.8.1 Linework Tool:

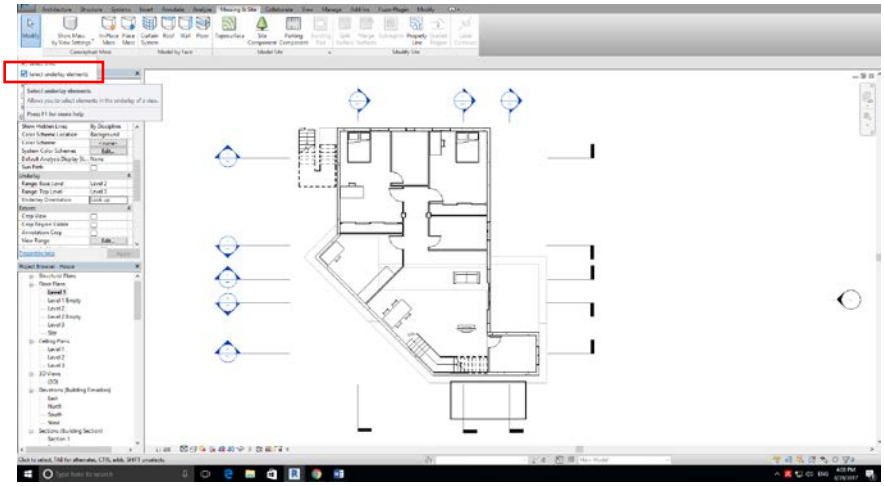
1. In the view properties under the Underlay Region, change the Range: Base Level select a level 2 underlay.



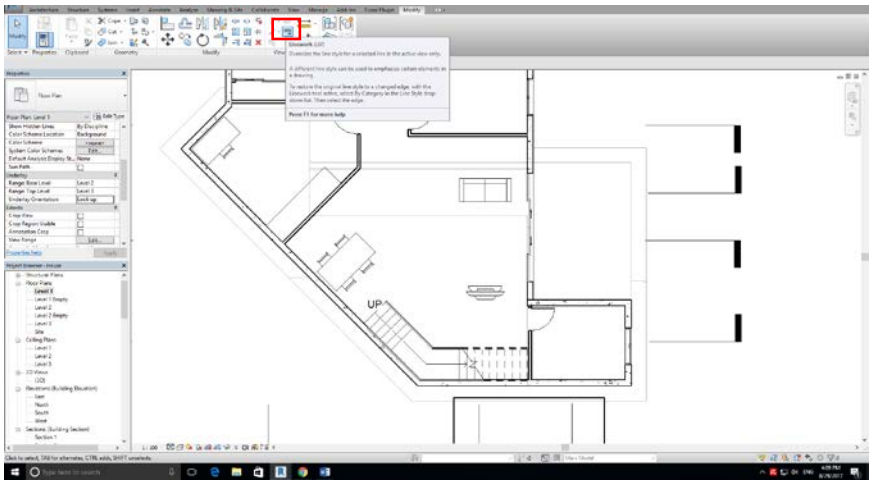
2. Select the Underlay Orientation to Look Up, then the lines from above will be shown on the plan.



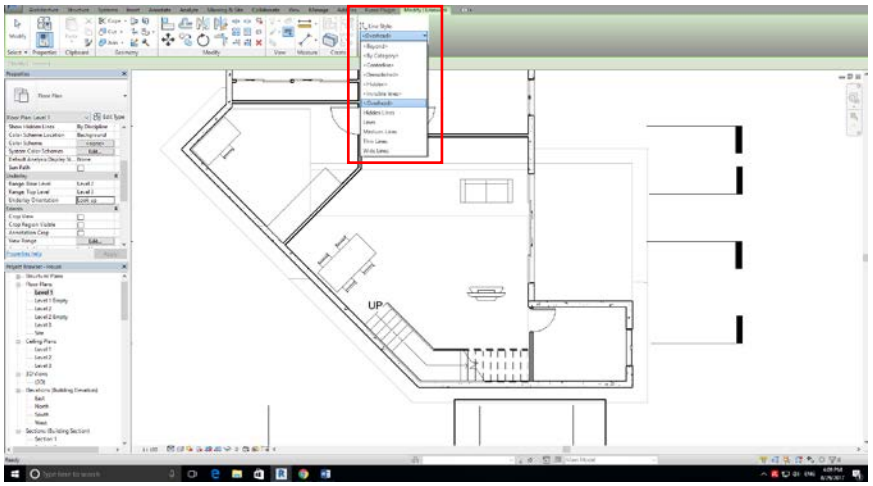
3. To make the underlying lines selectable, open the select panel and check the box, Select Underlay Elements.



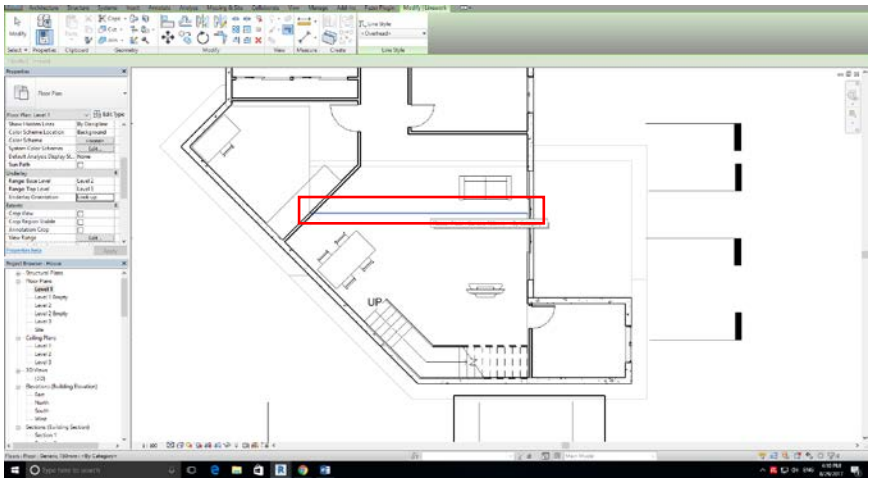
4. Click on the Linework Tool under the Modify Panel.



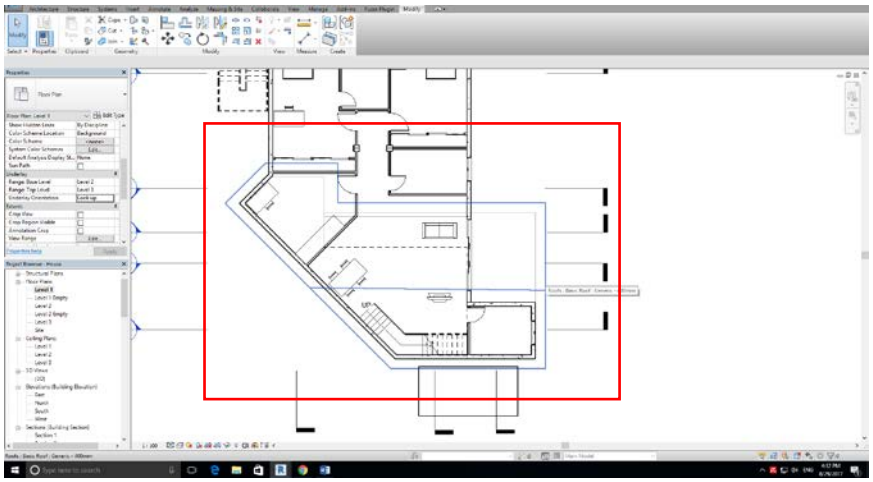
5. Select a line style; overhead is chosen to show the overhang of the pitched roof from above.



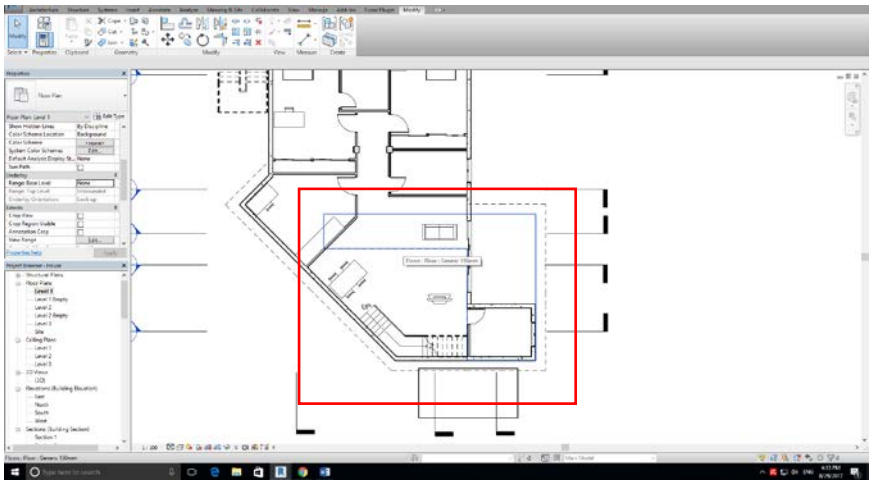
6. Pick the line of the underlying line of the pitched roof.



7. Select the boundary of the roof.



8. Select the boundary of the balcony of the second floor, the balcony, and the roof is shown with a dotted line.

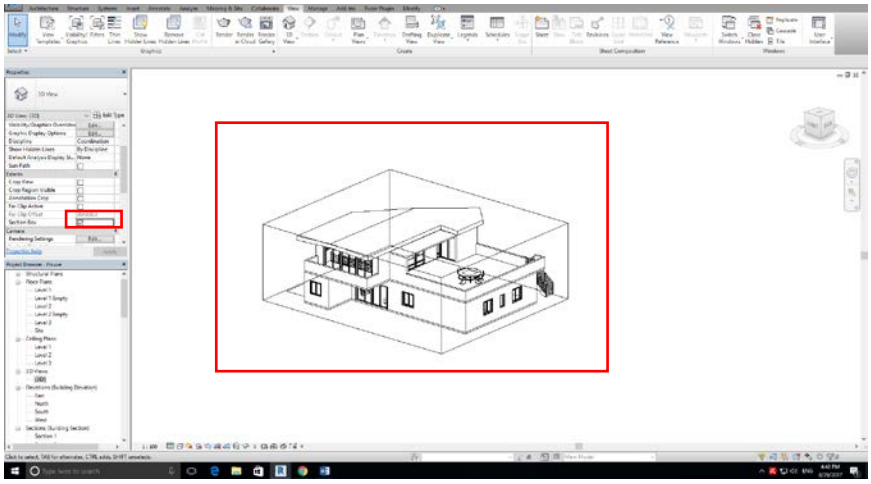


6.9 Using Cutaway Views

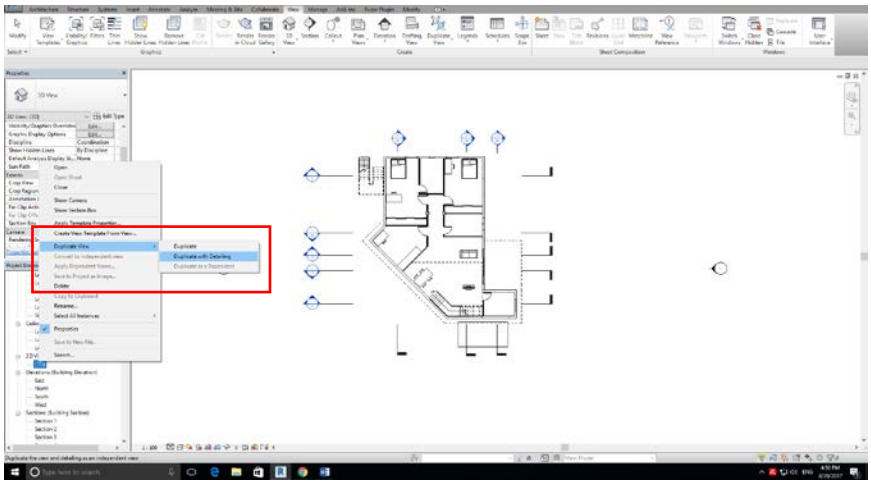
Cutaway Views is used to present an interior space; section box is a very useful tool to cutaway useless objects. It can be used to create sectional perspective and sun path analysis.

6.9.1 Section Box:

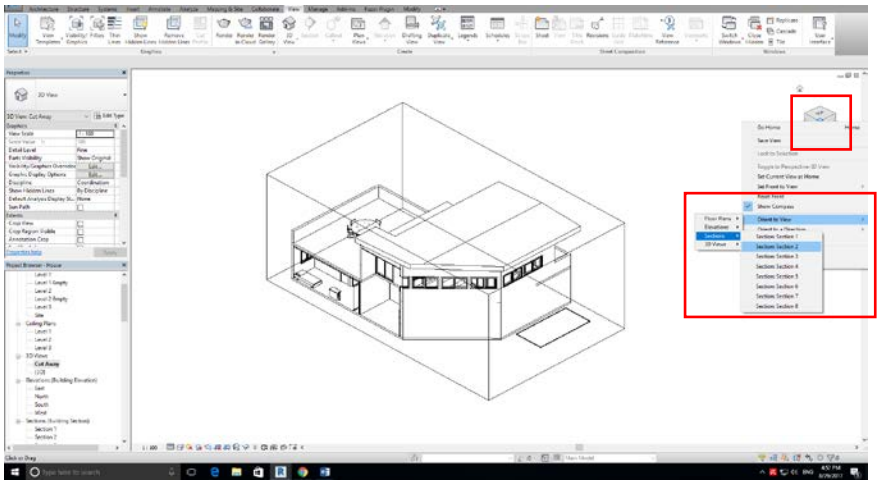
1. Check the box of the Section Box in the view properties window.



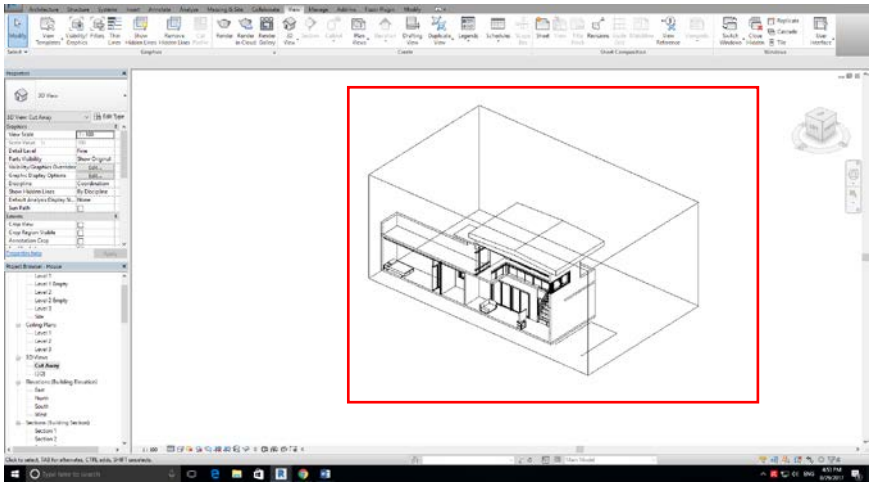
2. Duplicate the 3D view with detailing, name it cutaway.



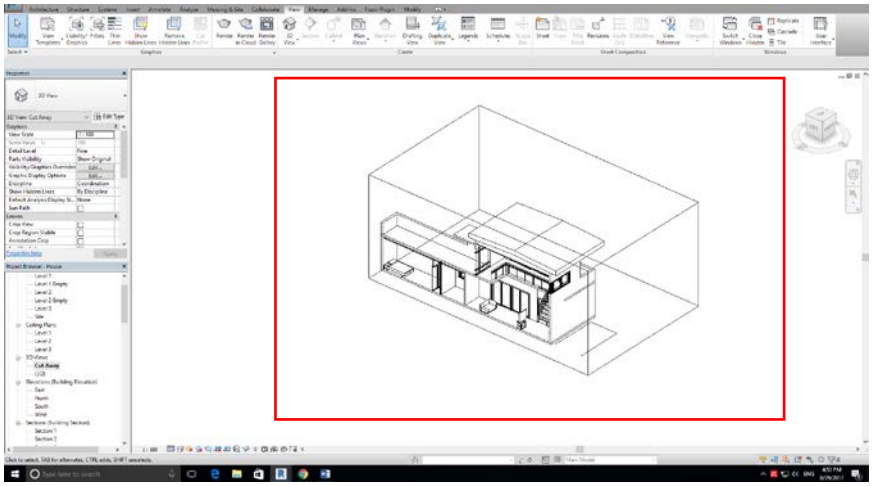
3. Right-click on the view cube and select a section view.



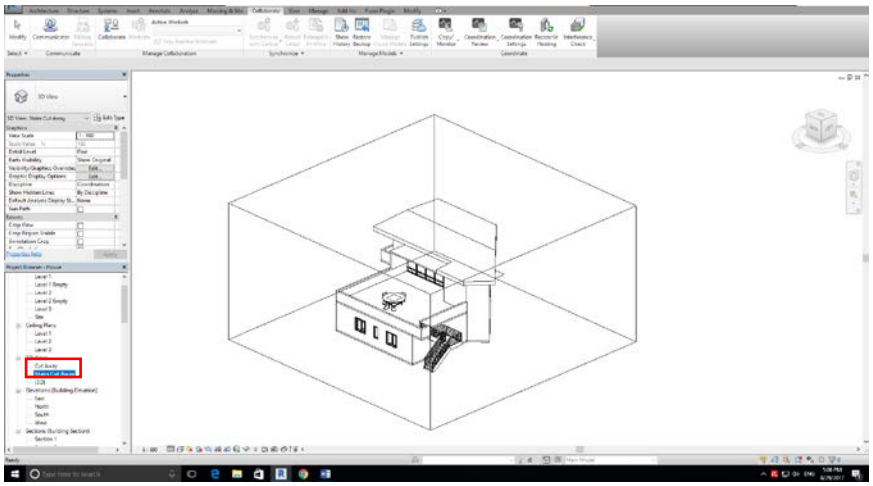
4. The view will be a cutaway 3D view of the selected section.



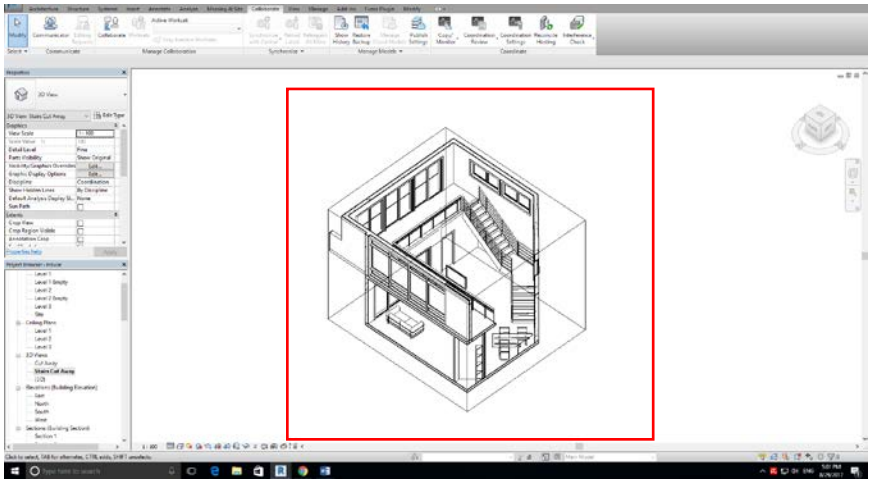
5. Use the blue arrow to drag the section box; it will then cut the house in a different section.



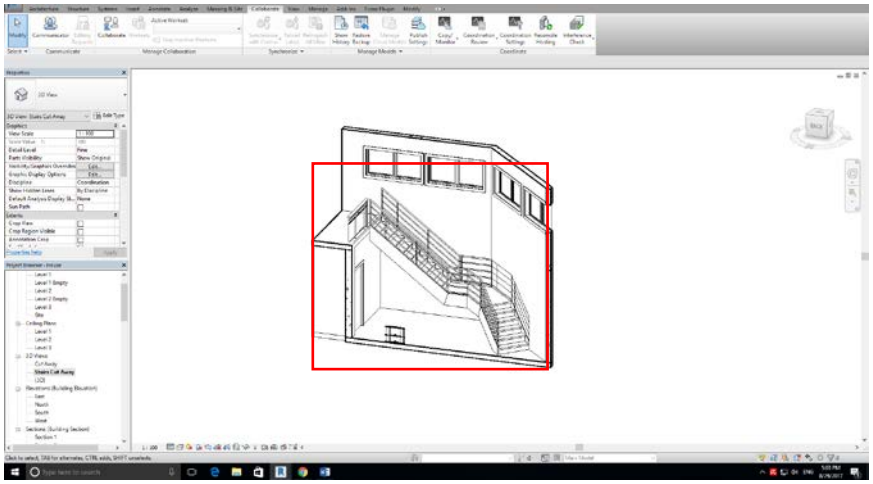
6. Create a view called Stairs Cut Away.



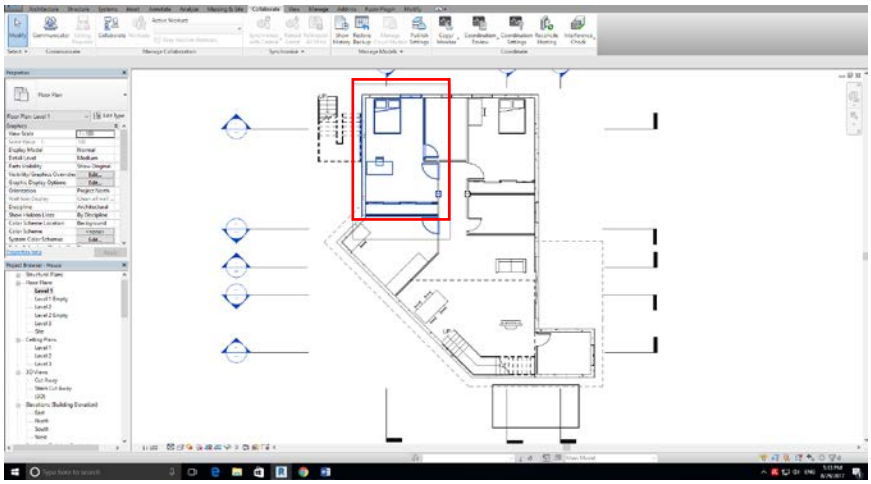
7. Turn on the section Box and slowly drag it to show the stairs.



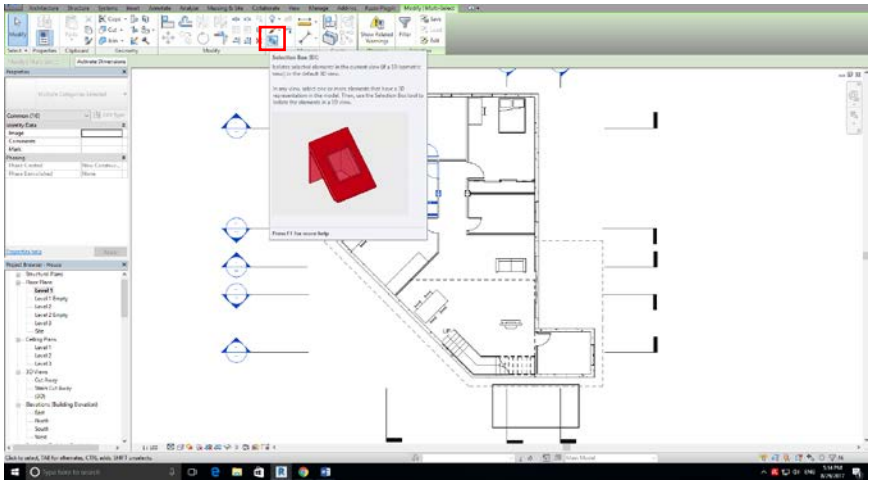
8. It is very useful to illustrate 3D spaces.



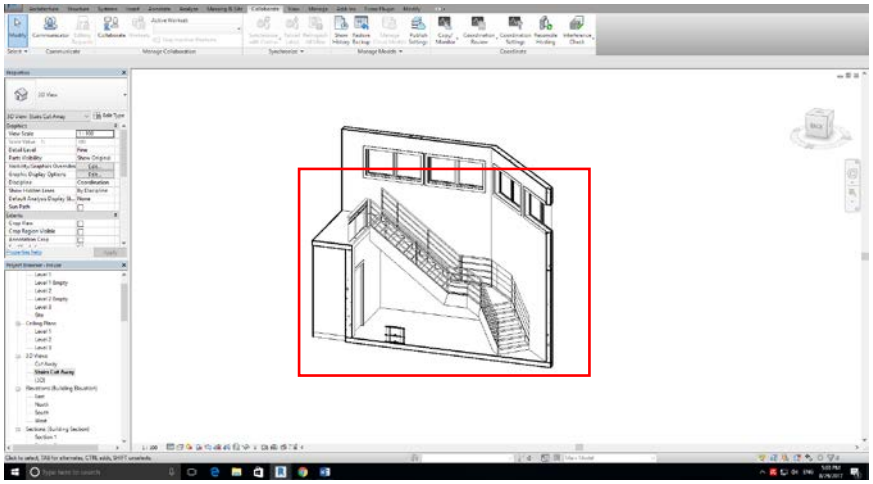
9. Select multiple items in the plan view.



10. Click on the Selection Box Command under the Modify Panel.



11. It will create a Section around an object that is selected.



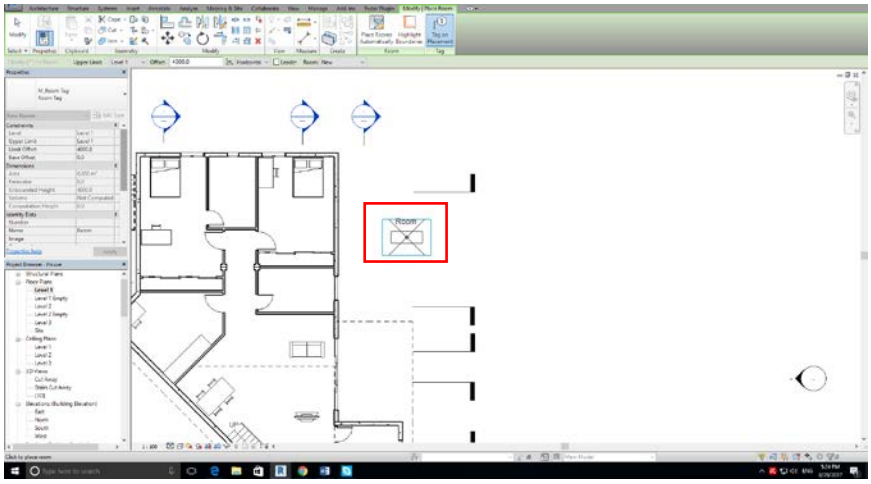
7. Rooms

7.1 Adding Rooms

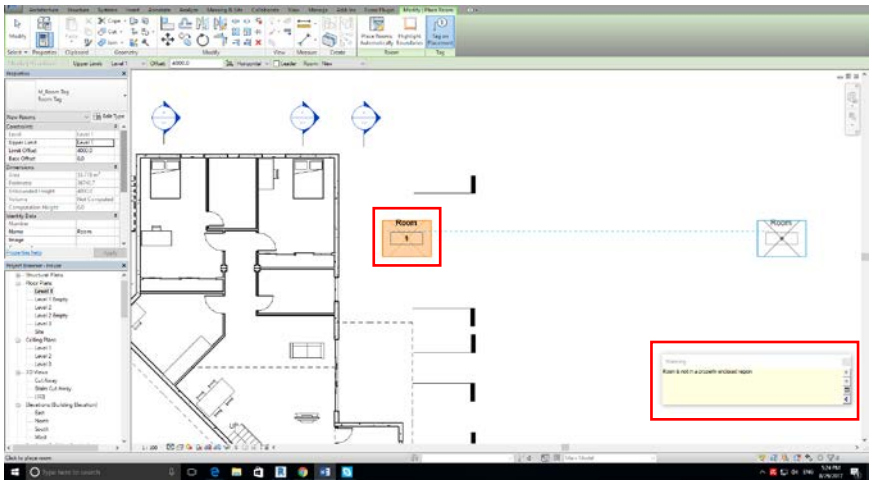
Rooms is a basic element in Revit, by creating room, much information can be obtained from it.

7.1.1 Room:

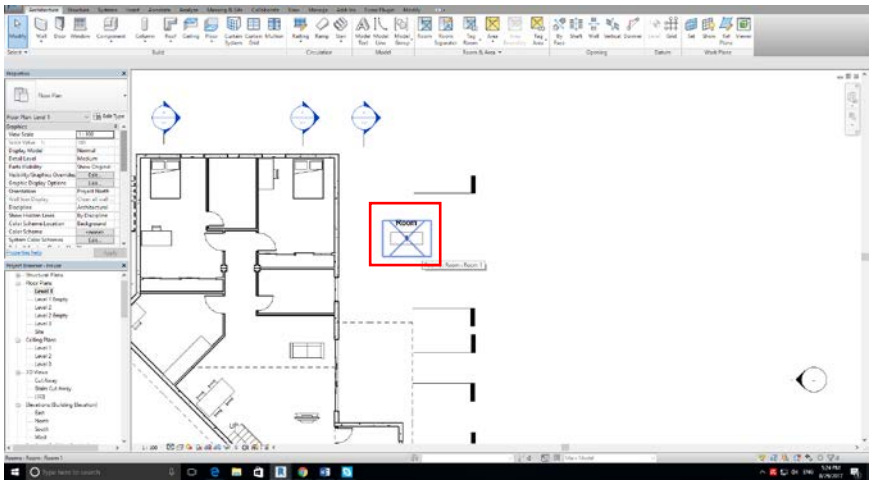
1. Click on the Room command under the Architecture Panel and place a room outside the house.



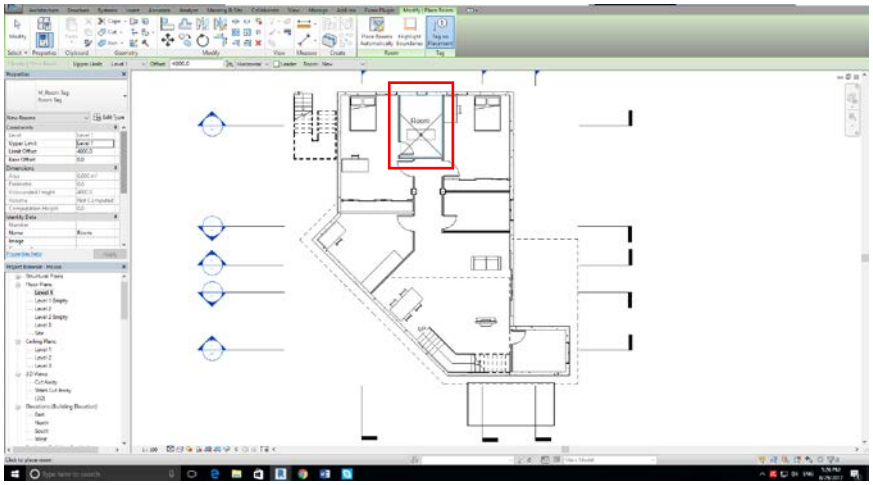
2. Revit will warn you about creating a room out of nowhere.



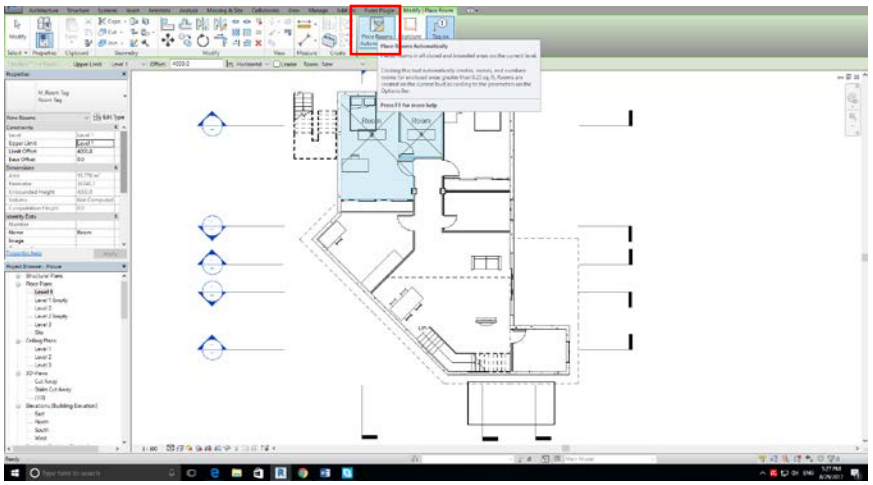
3. It will still allow the room to be placed there.



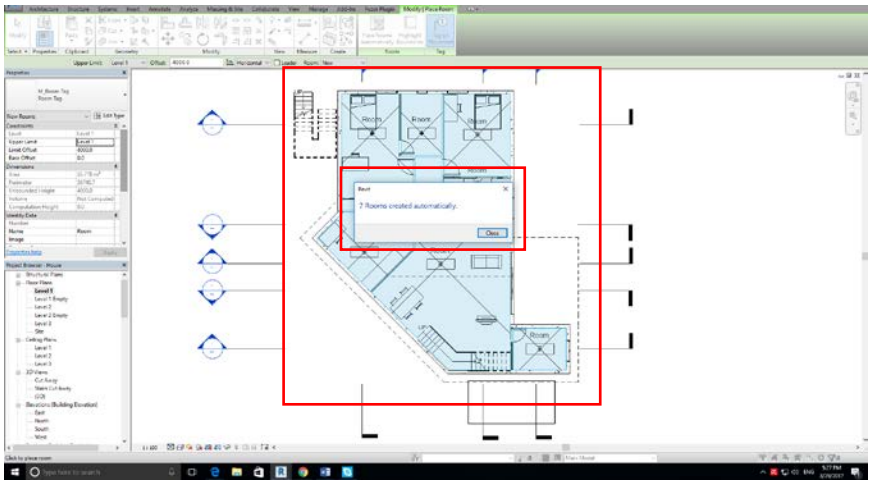
4. Place a room in a bounded space, Revit will automatically find the walls which are bounding the room.



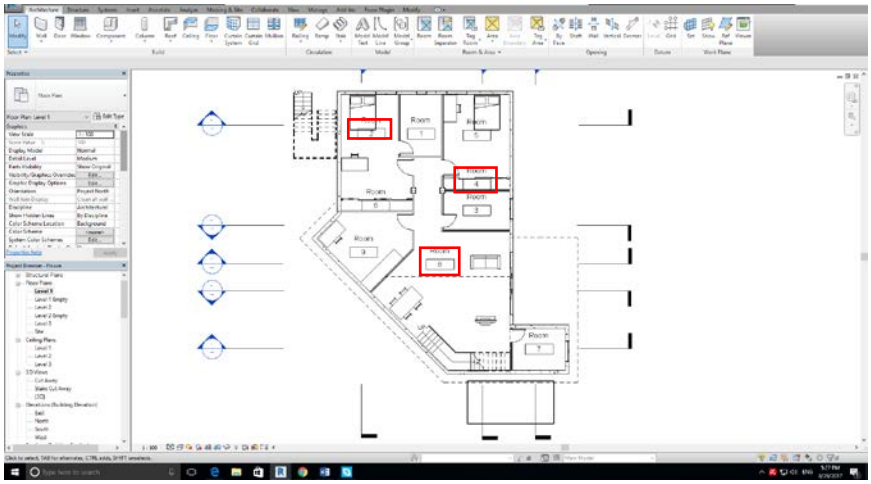
5. Click on Place Room Automatically.



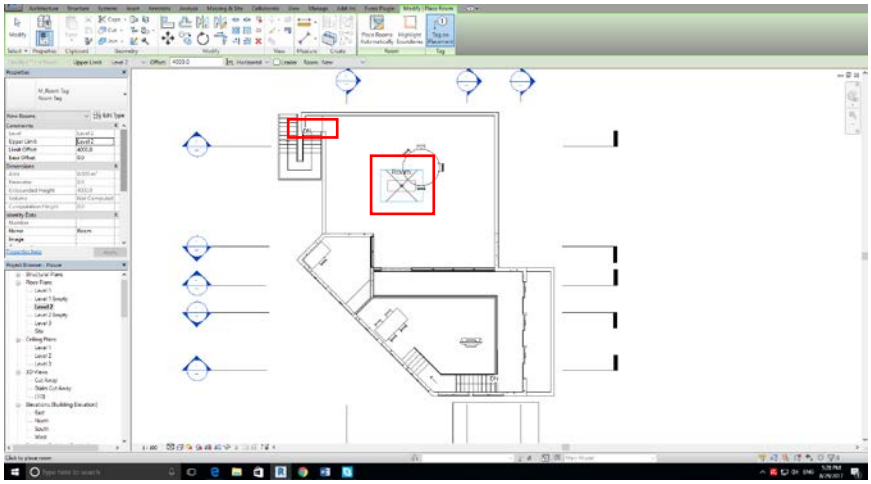
6. Revit will tell that seven rooms are created.



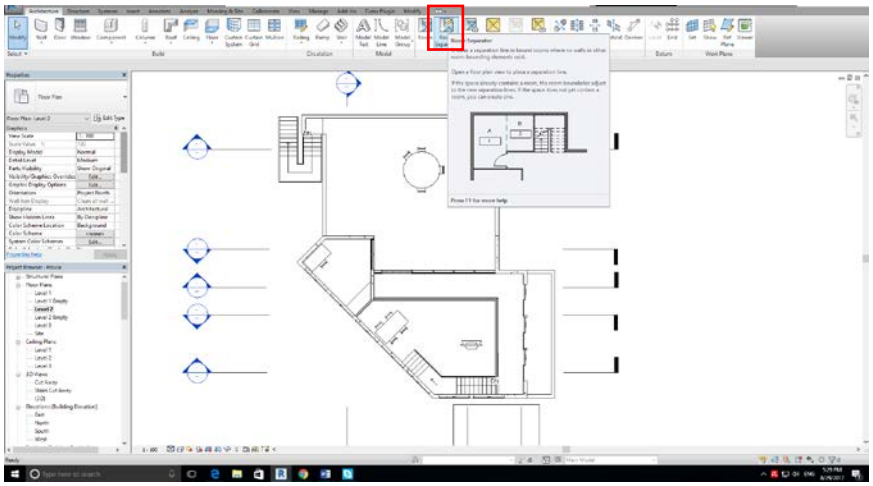
7. There are room numbers for each room; they will never duplicate each other.



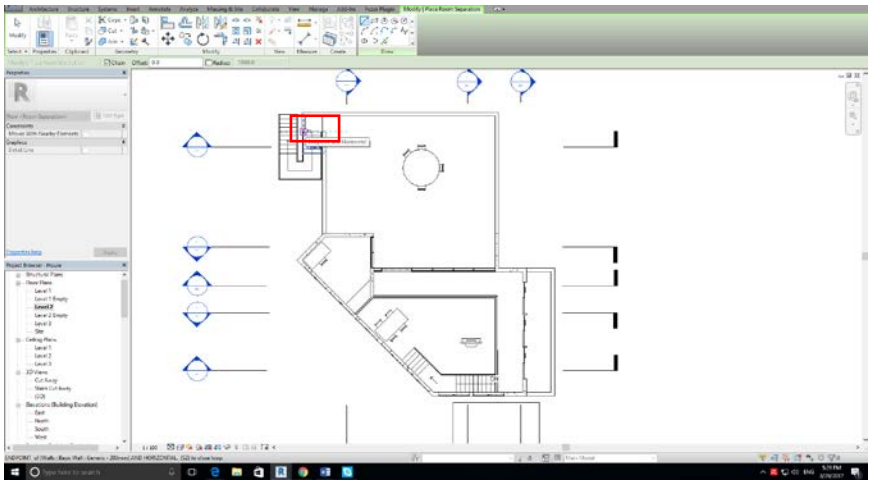
8. Rooms cannot be placed in the roof garden because the walls do not form a closed geometry.



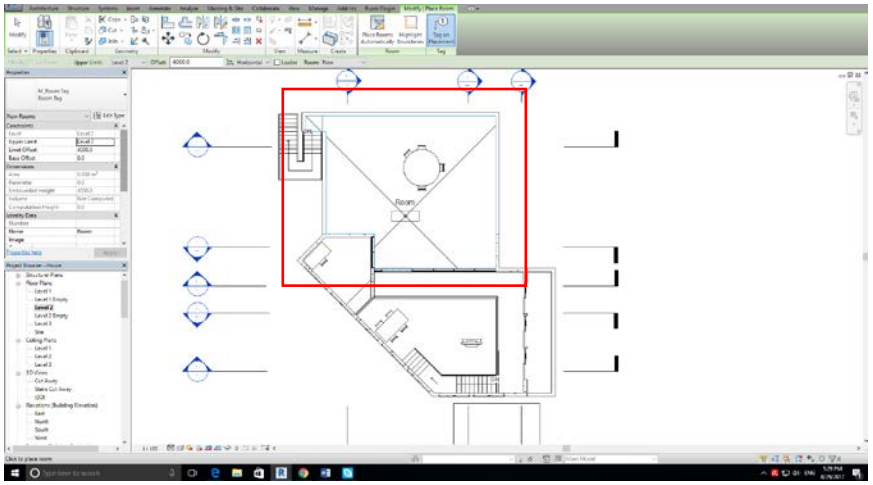
9. Click on the Room Separator Tool under the Architecture Panel.



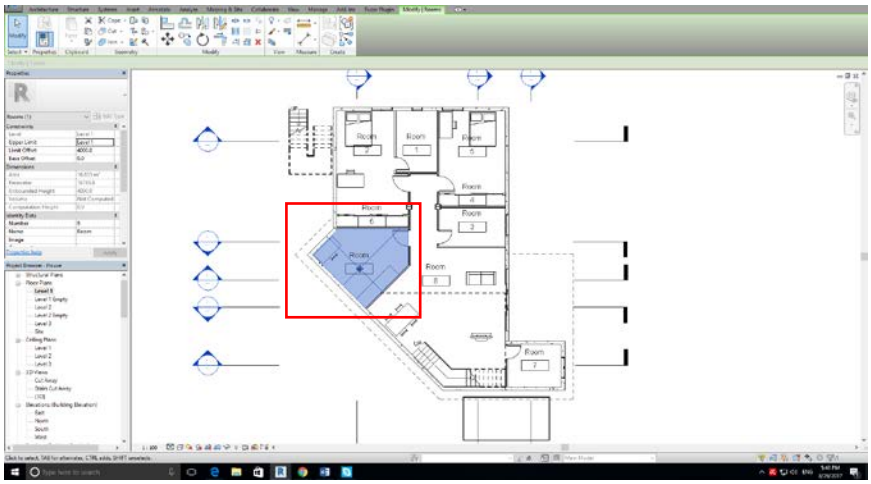
10. Draw a line on the missed part of the closed loop.



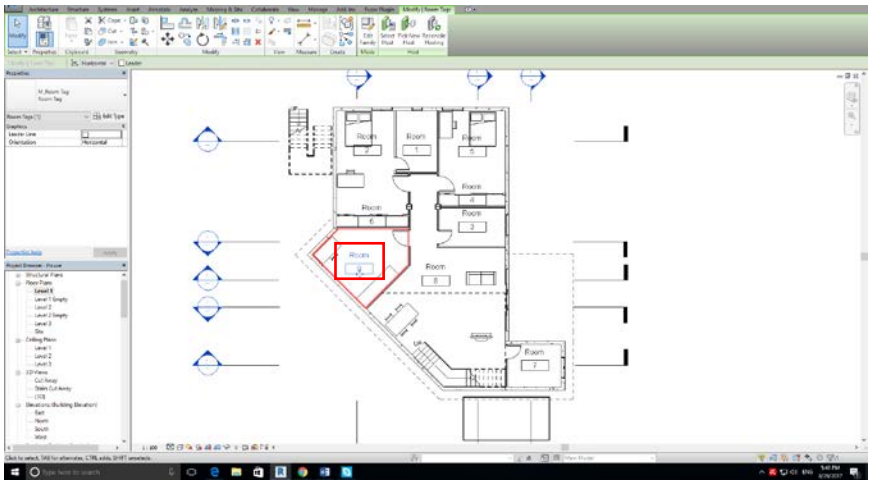
11. Click on the Room command and the room will be created.



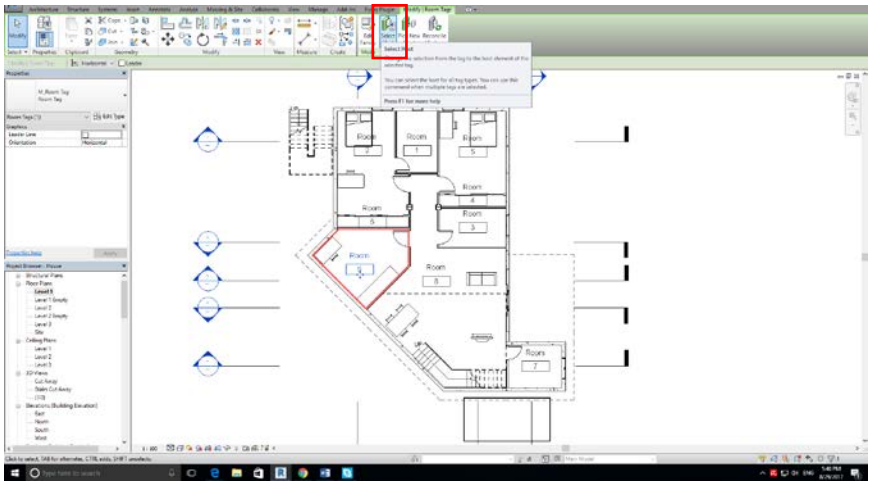
12. The room is different from a room tag.



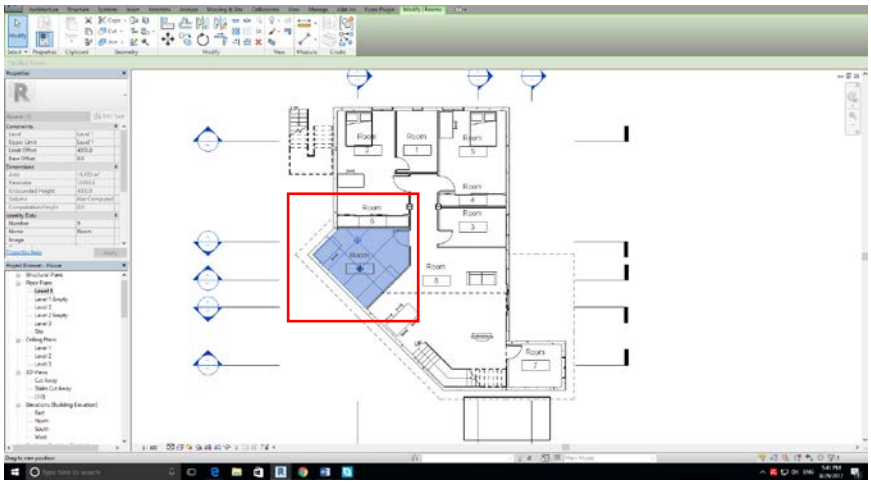
13. A room tag only gets information from the room.



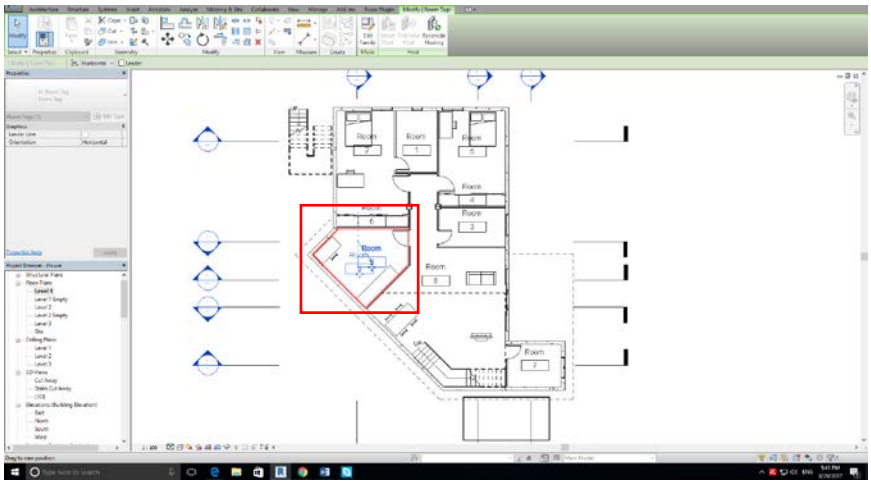
14. Select a room tag and click on Select Host, Revit will show which room the annotation tagging.



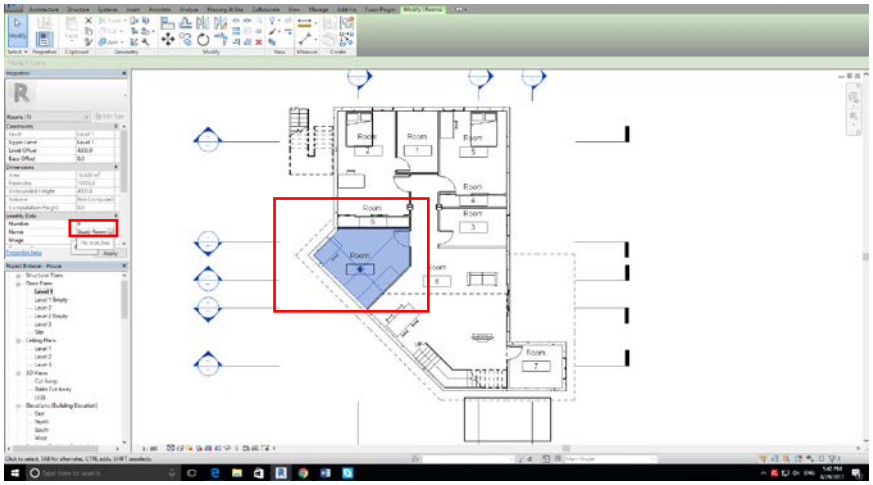
15. The reference to a room is a blue cross; it can be moved by dragging the move icon.



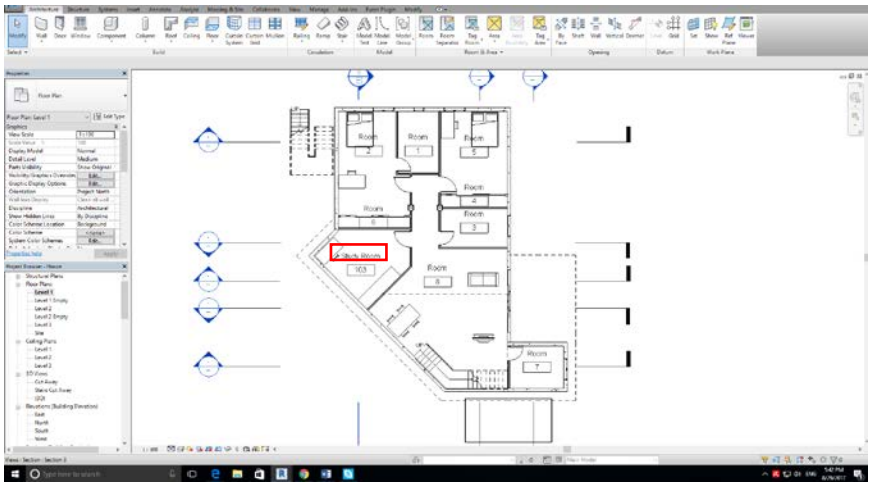
16. The room tag can also be moved to anywhere.



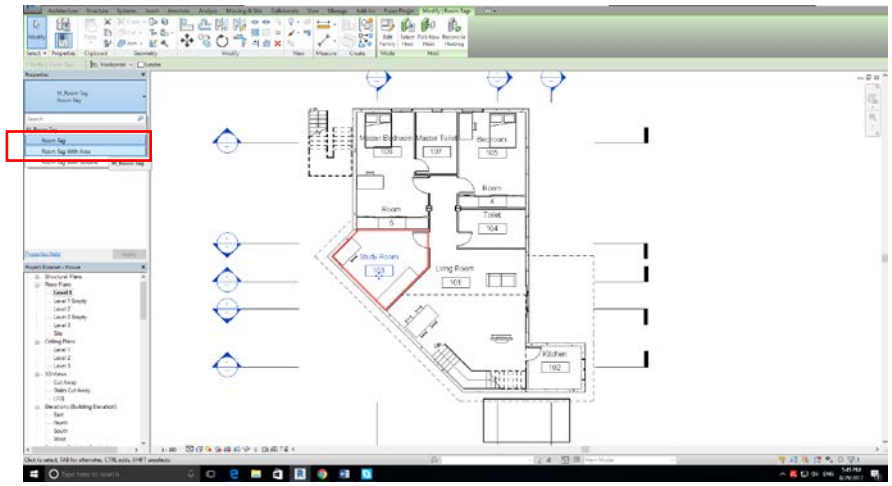
17. Give the room a name in the properties window.



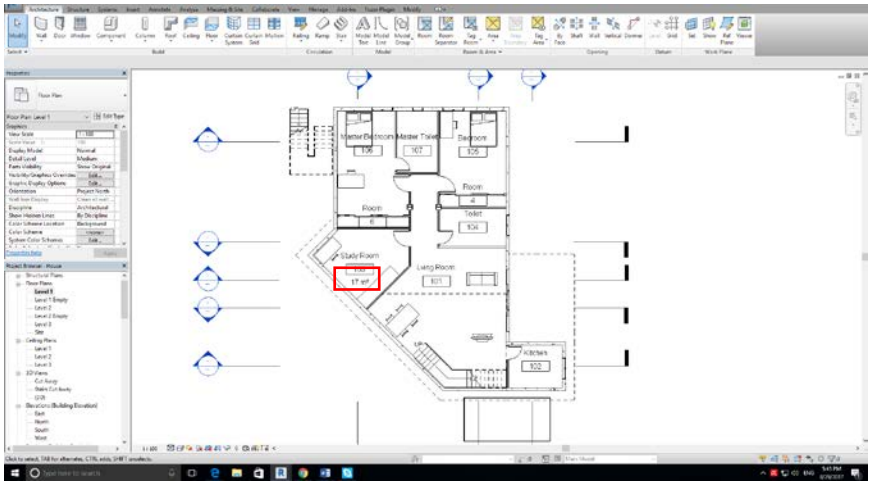
18. The room tag will show the name of the room.



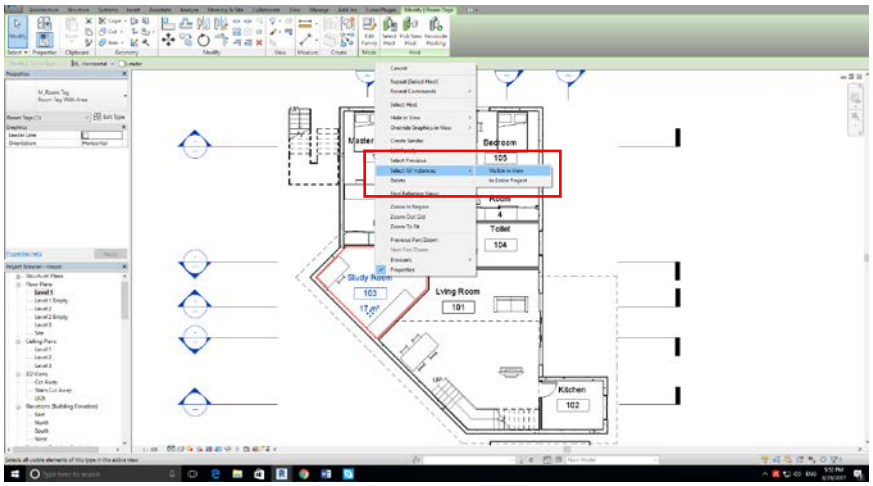
19. There are different types of room tags, select a room tag which shows the room area.



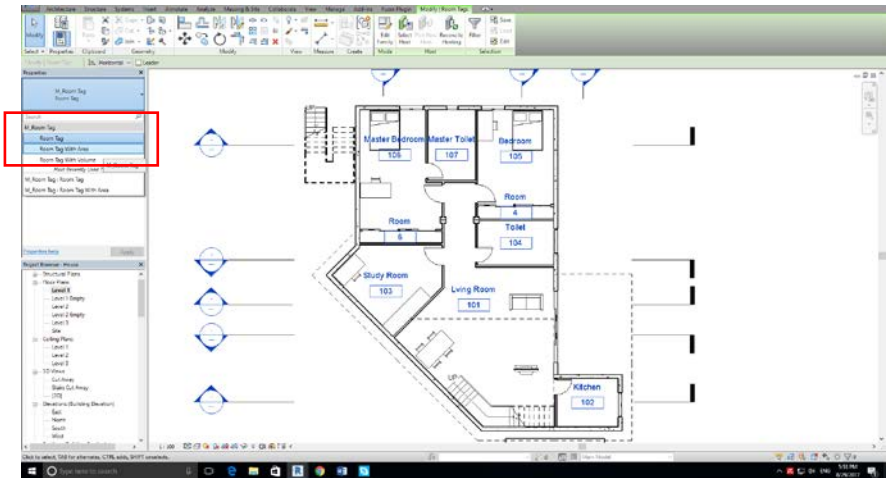
20. The room area is shown under the room number.



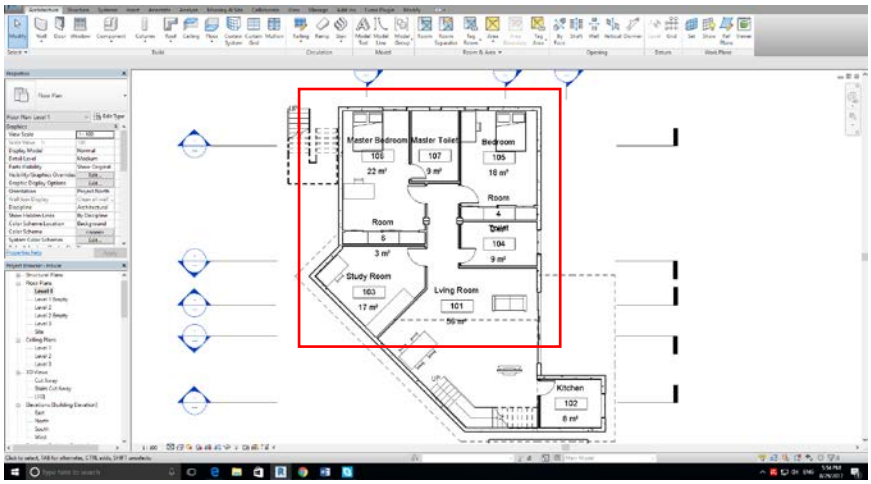
21. Right-click on the Room Tag and select all instances and choose visible in views.



22. All the room tags are selected and change them to tag which contains its room area.



23. All the area is shown, change the round off decimal in the project units under the Manage Panel.

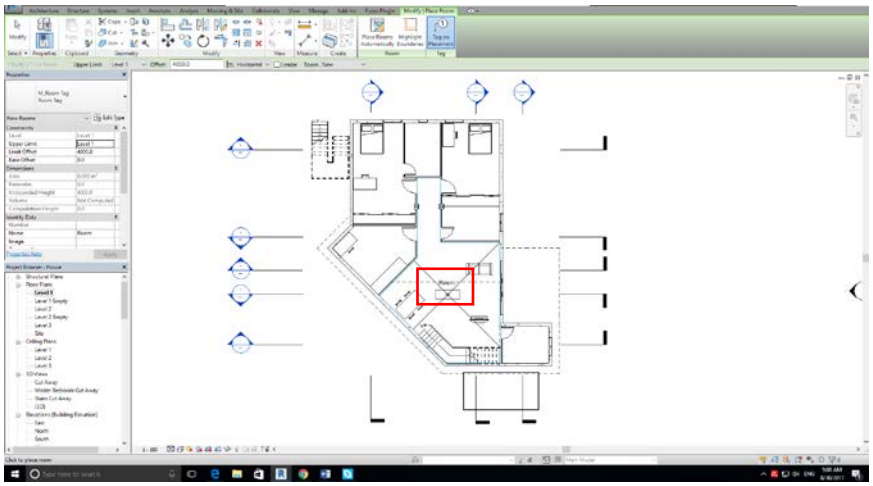


7.2 Controlling Room Numbering

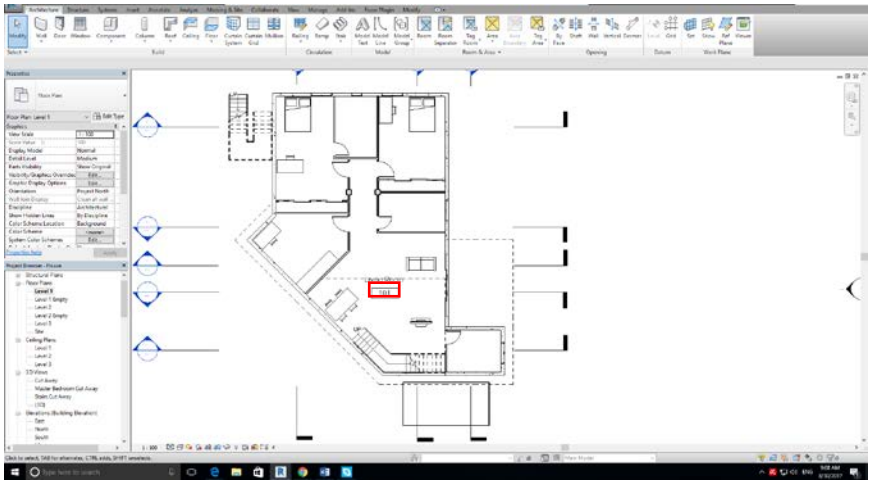
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely VG only one.

7.2.1 Room Numbering:

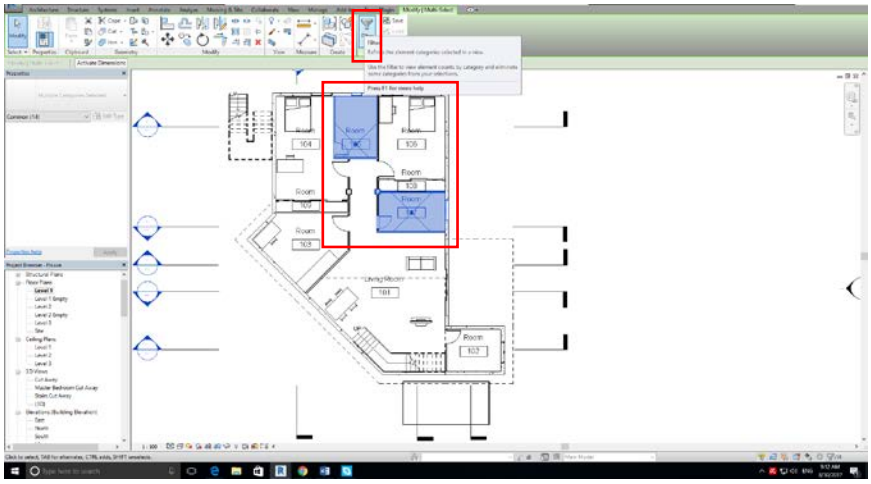
1. Place a room object in the living room space.



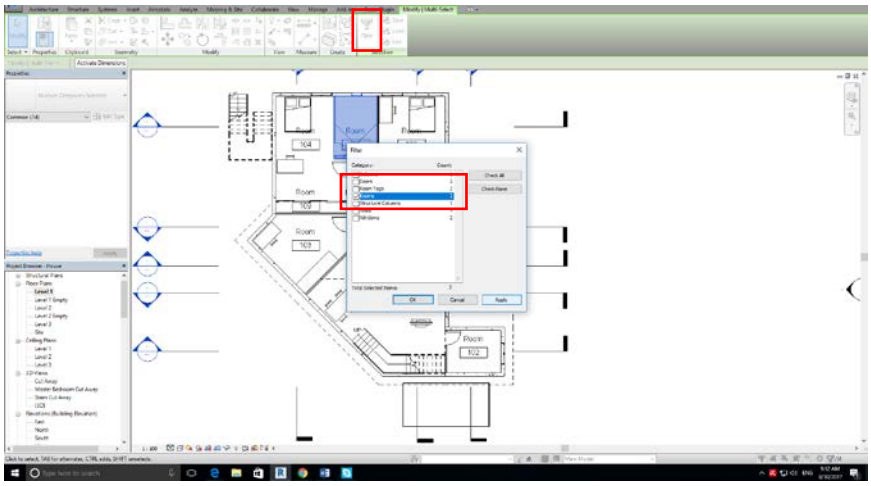
2. Change the room number to 101 and change the room name to living room.



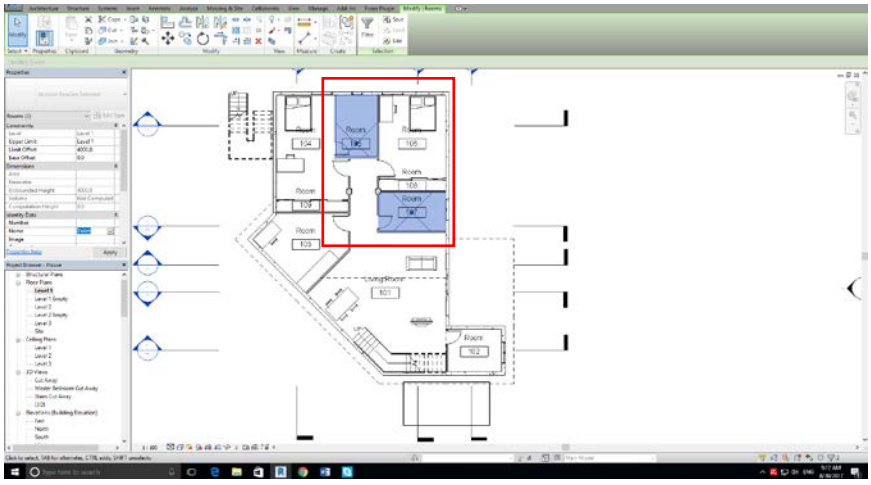
3. Place the rooms in order; the room number will follow the 101 format, highlight two room by dragging selections.



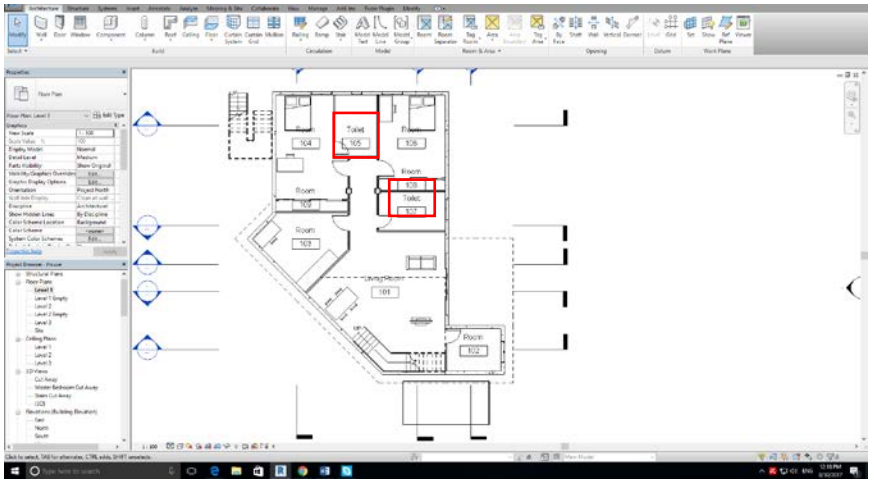
4. Click on the Filter Command under the Modify Panel and only select the room object.



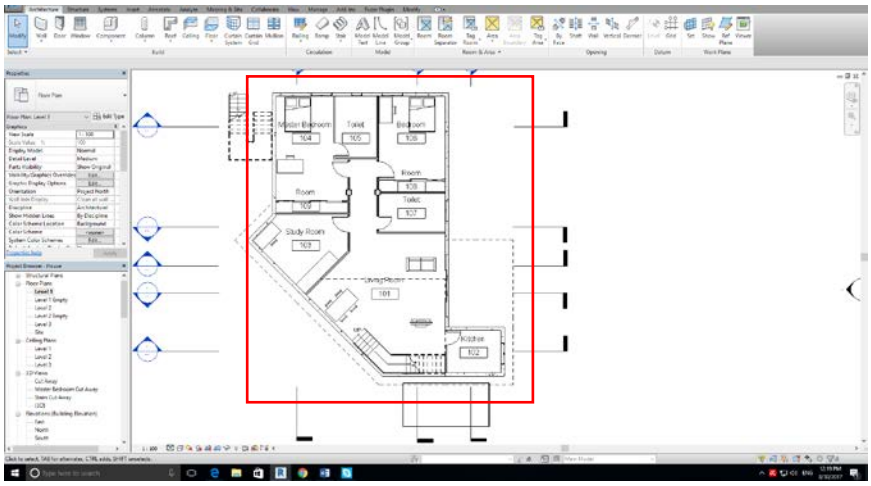
5. Enter the name Toilet in the Properties Panel.



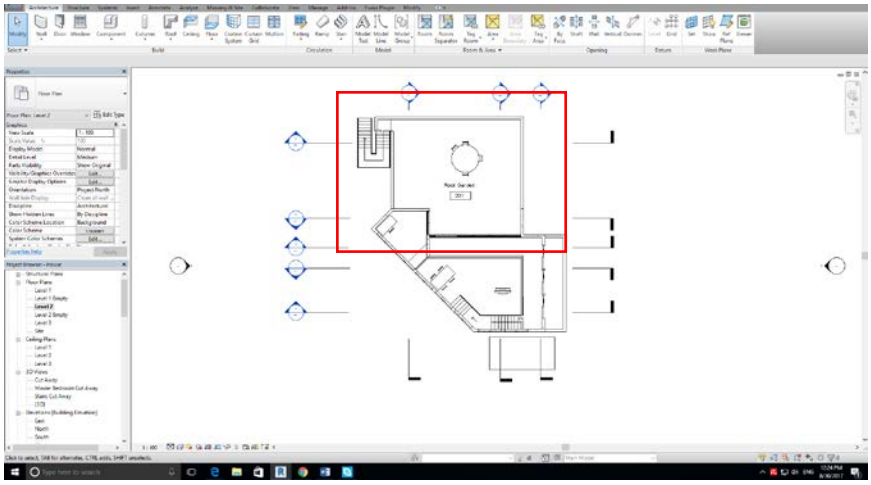
6. Both of the room changed their name to Toilet.



7. Give each room in the house a room name.



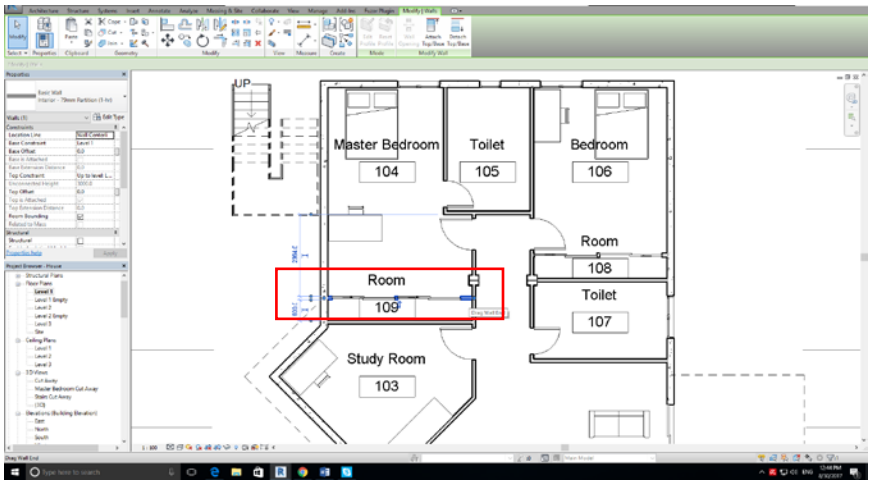
8. Name the room on level 2 as well.



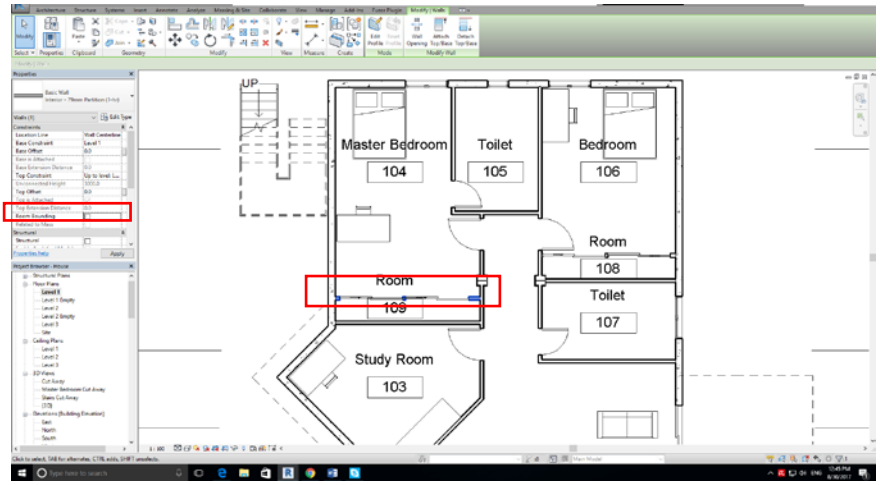
7.3 Understanding Room Numbering

7.3.1 Room Numbering:

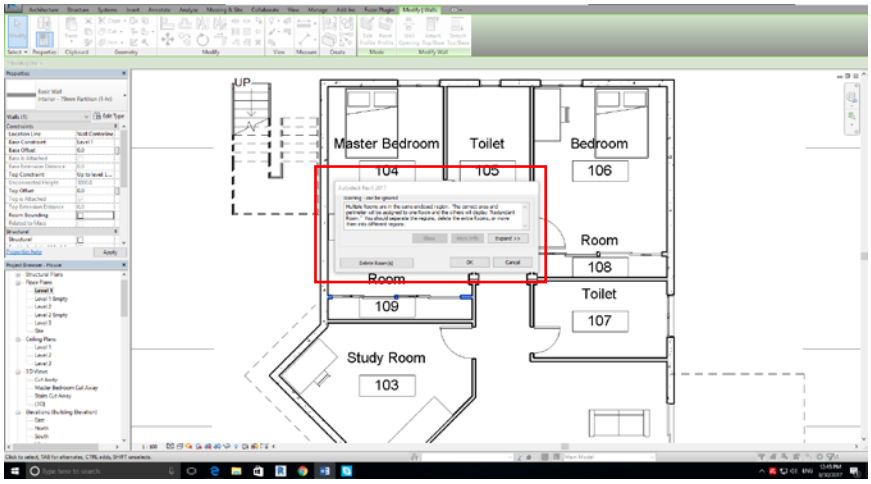
1. Walls bound the closet, but it should not be counted as a room, select a wall to modify its setting.



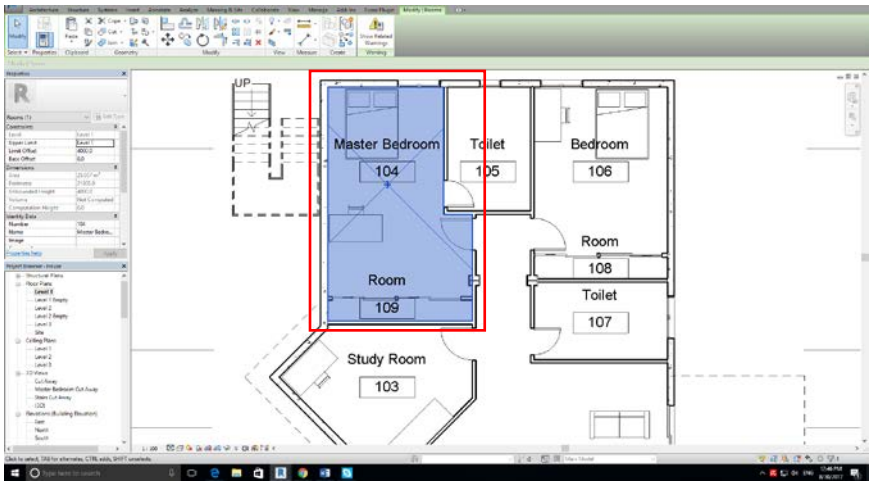
2. Uncheck the box Room Bounding.



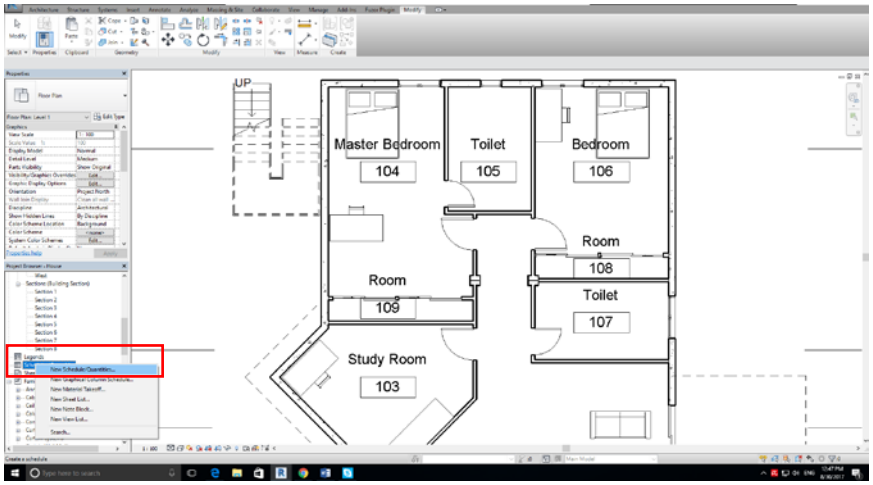
3. Revit will warn that there is two room object in the same space.



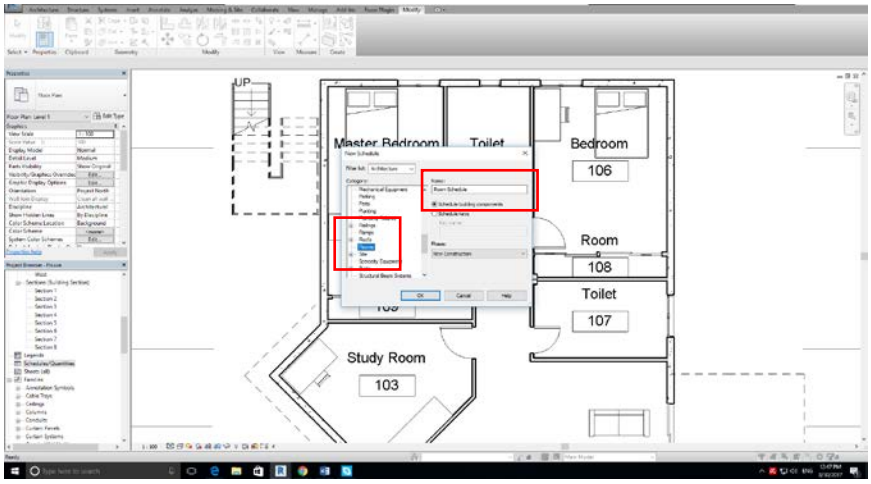
4. Revit will still allow the situation; the two rooms are 104 and 109.



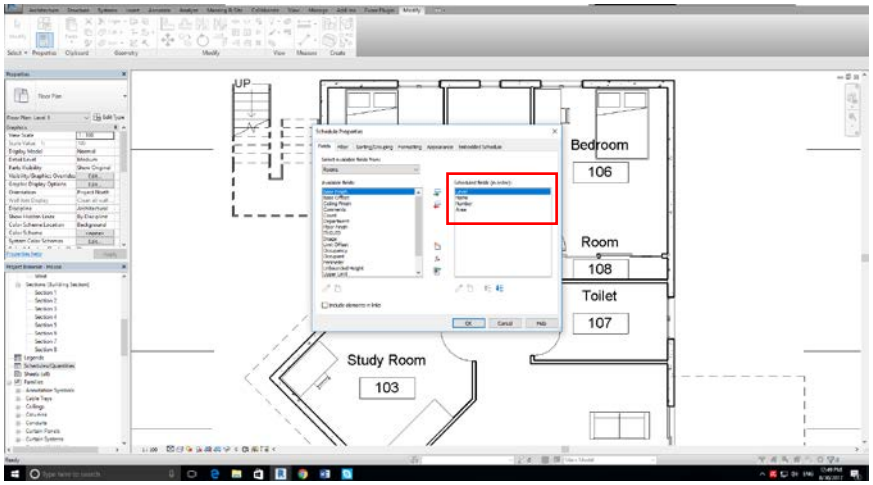
5. A room schedule can solve the problem, create a room schedule by right-clicking the schedule row in the project browser.



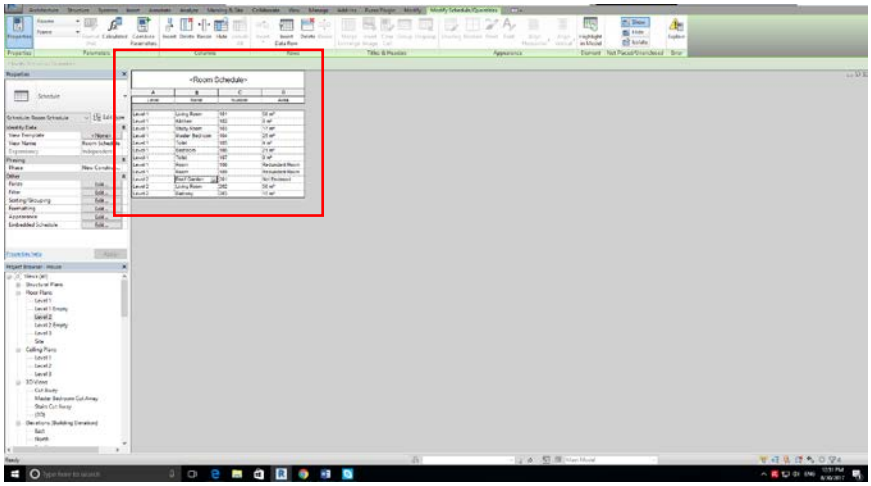
6. Choose the Room category in the new schedule window.



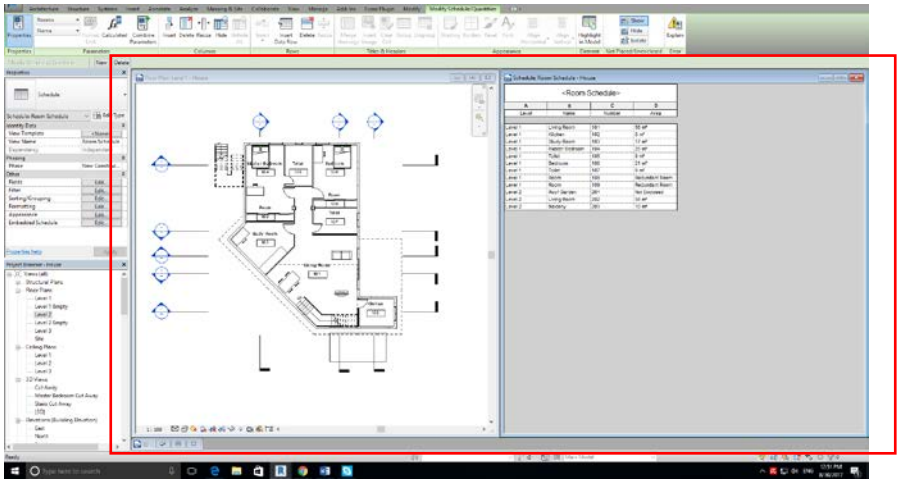
7. Select items to be included in the room schedule, level, name, number, the area is selected, the order of the list matters.



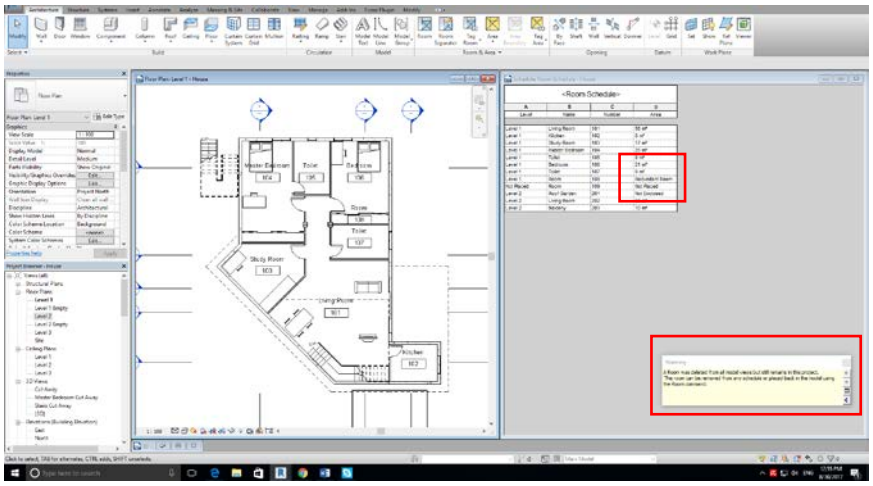
8. A room schedule is created, restore down the schedule and select the floor plan from behind.



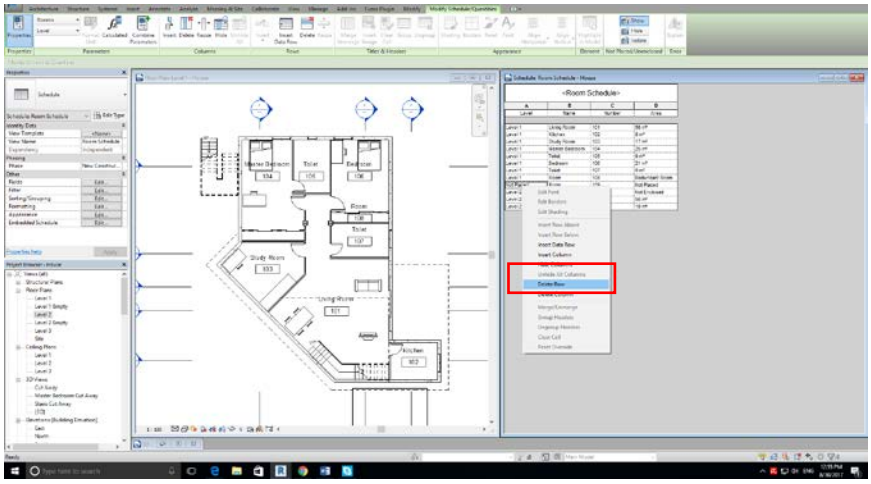
9. Press W+T to form a tile window.



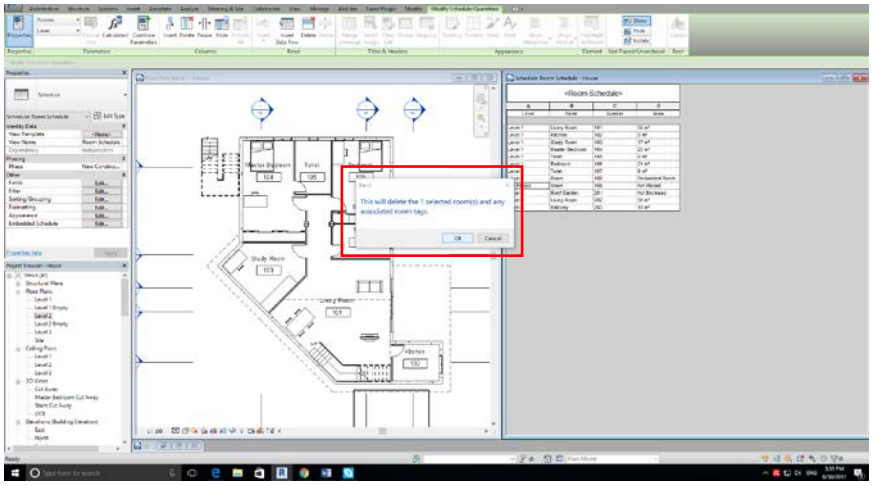
10. Search Delete a room from the floor plan, and Revit will warn you that the room still exists.



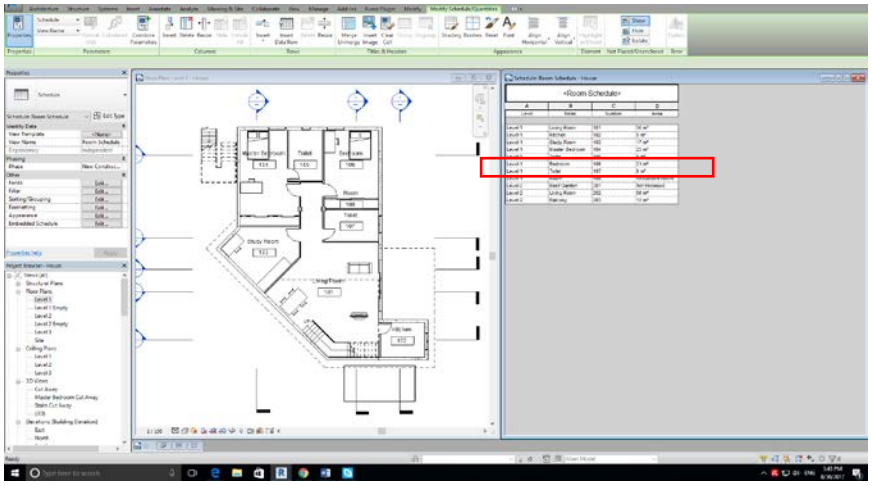
11. To delete a room permanently, it has to be deleted from the room schedule, right click and delete the row.



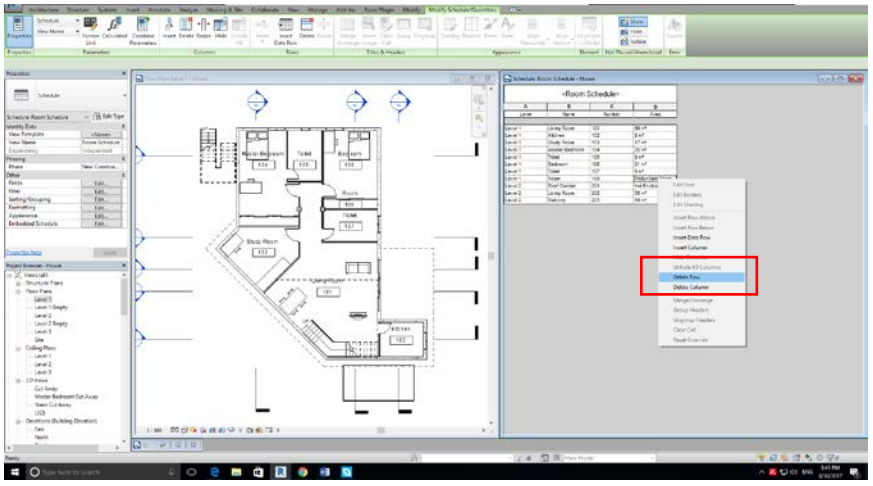
12. Revit will reassure the decision, press ok.



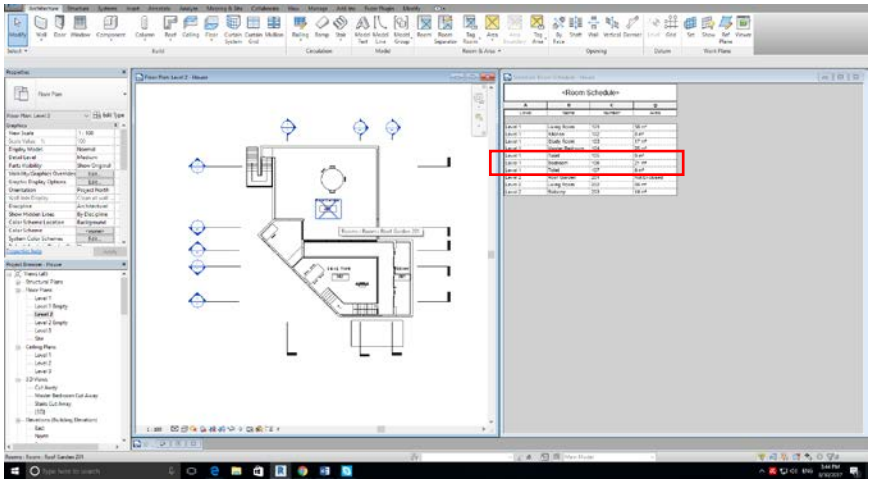
13. The room 109 is deleted permanently.



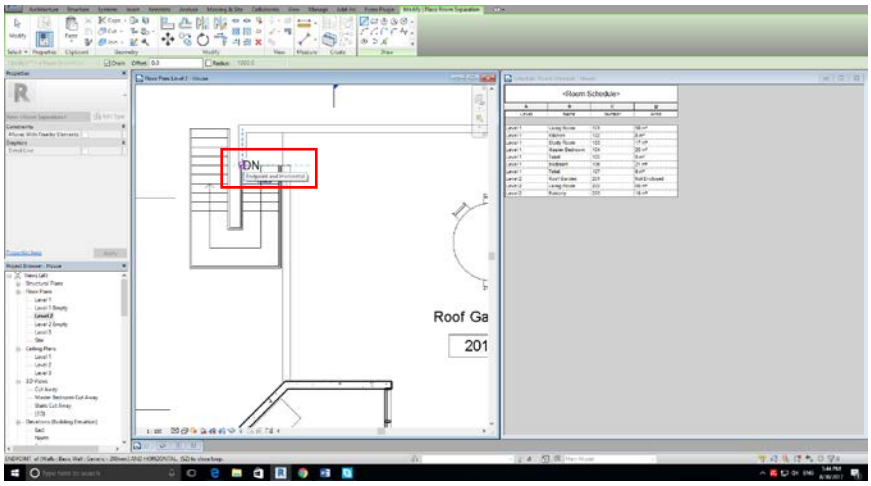
14. Room 108 is classified as the redundant room; it suggests that there is two room object in a single space.



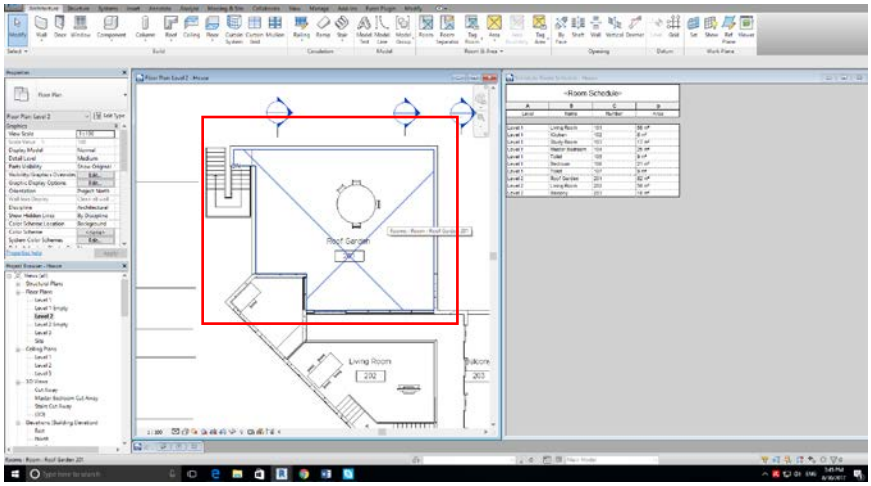
15. Room 201 is classified as Not Enclosed.



16. Add a room separator to enclose the shape.



17. Roof Garden, room 201 is no longer not enclosed.

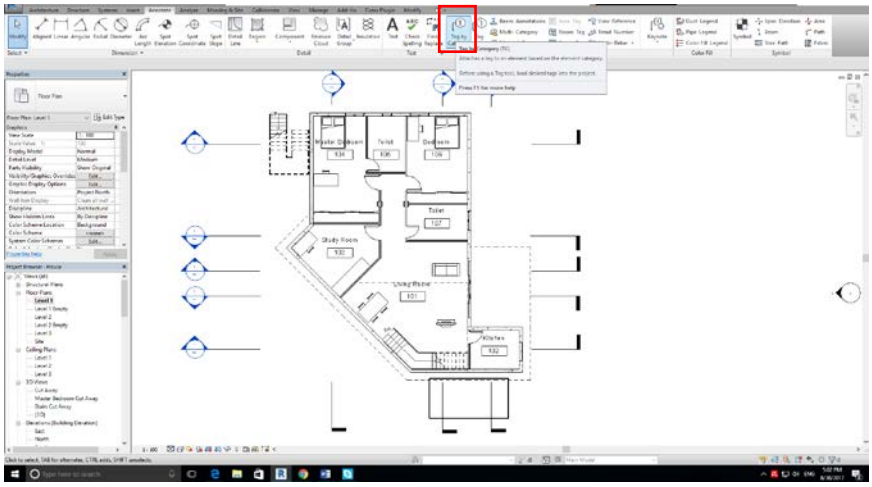


8. Schedules and Tag

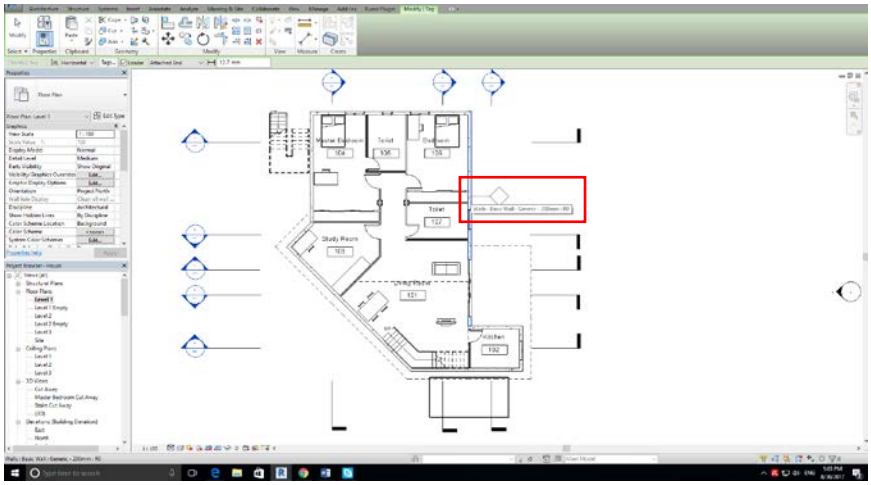
8.1 Understanding Tags

8.1.1 Tags:

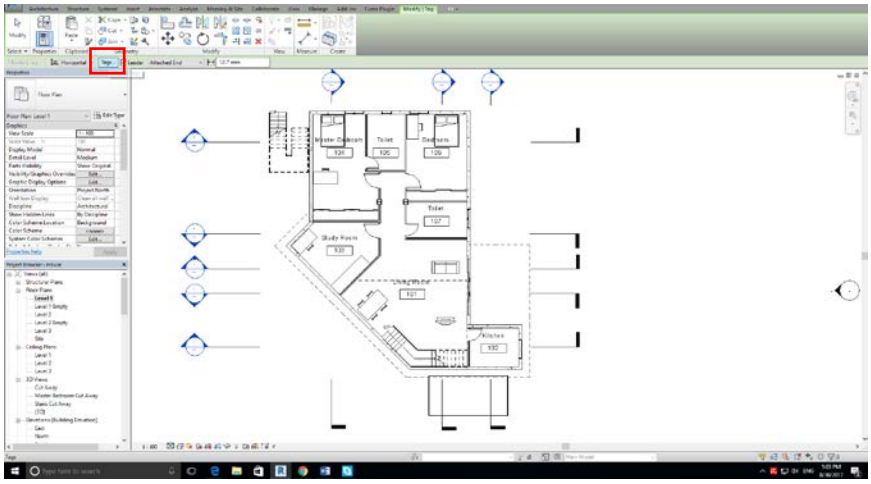
1. Click on Tag by Category under the Annotate Panel.



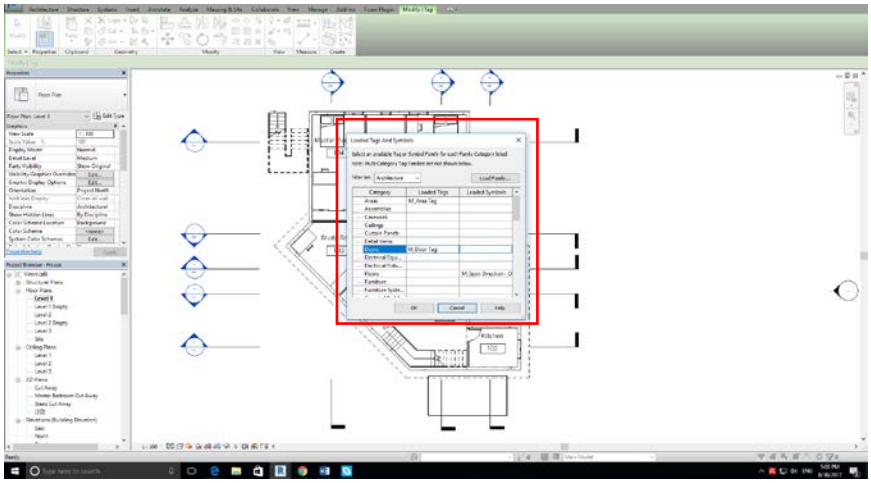
2. When the cursor selects an object, it will give it a tag.



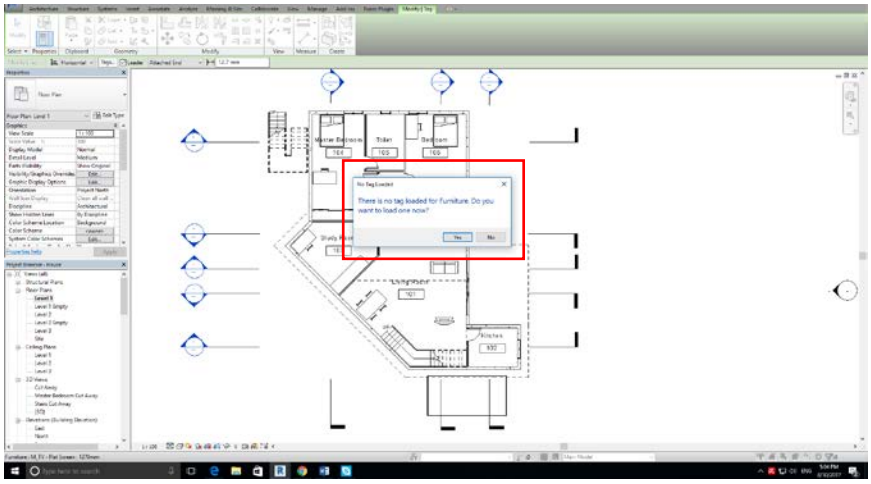
3. Click on the Tags button on the modify tag row.



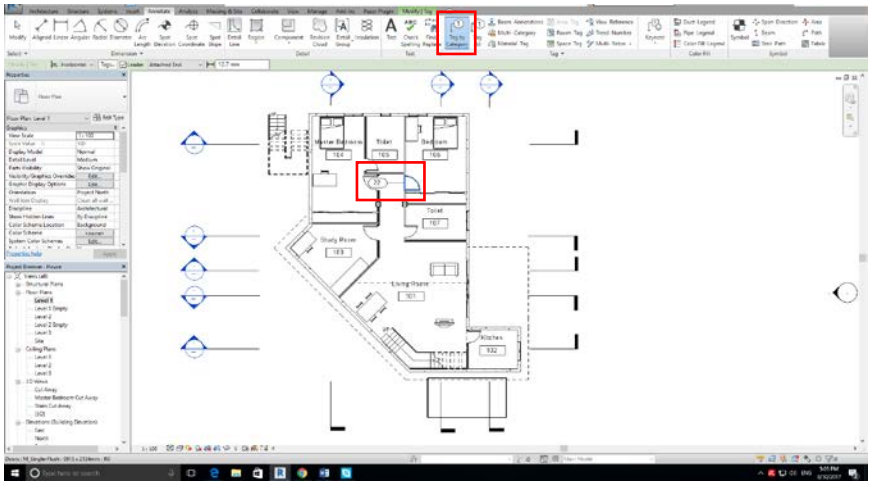
4. The loaded tags and symbols window will be opened, and it shows all the categories that can be tagged.



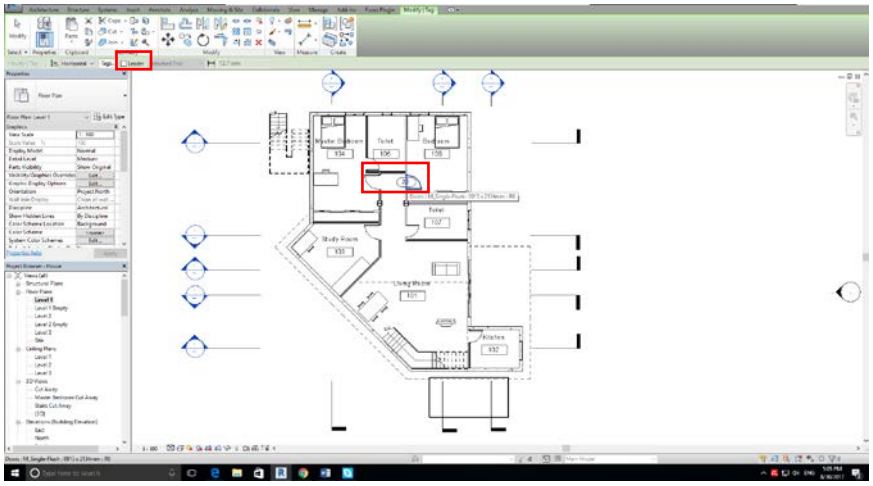
5. Not all category have a pre-loaded tag, furniture does not have a pre-loaded tag, Revit will ask if you want to load a furniture tag.



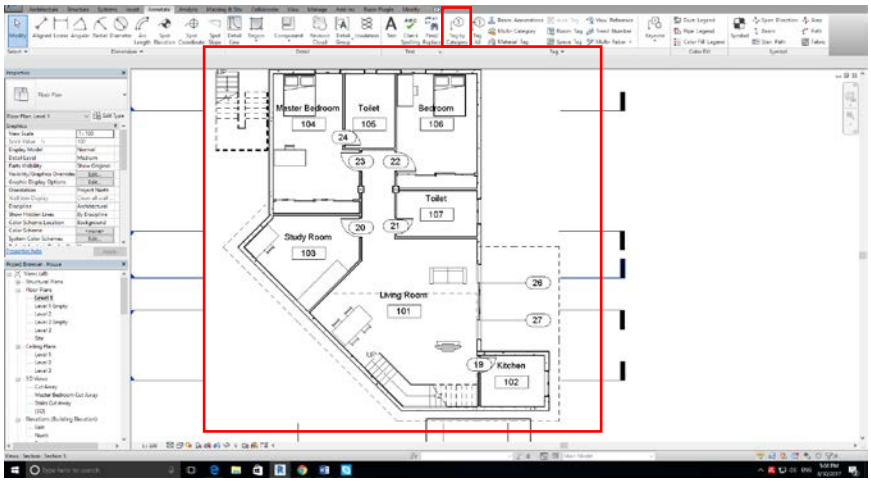
6. Place a door tag.



7. The Leader option is on the Modify Tag row.

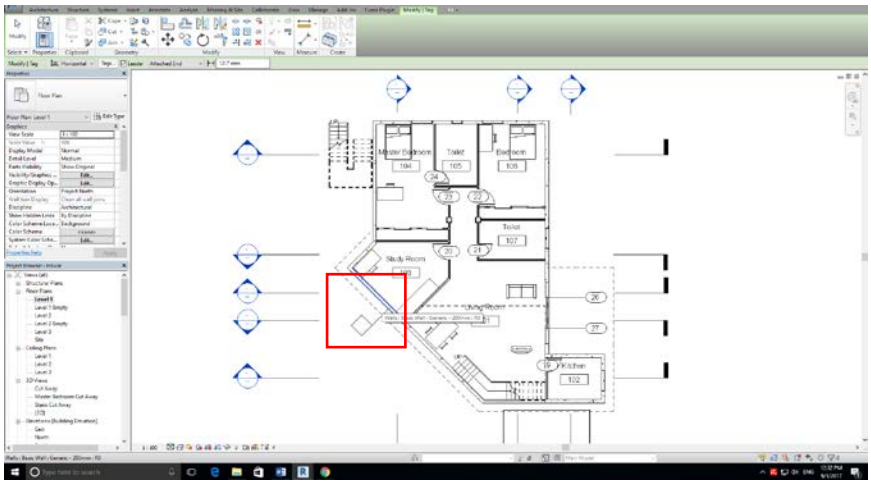


8. Tag all the doors; all doors have their number.

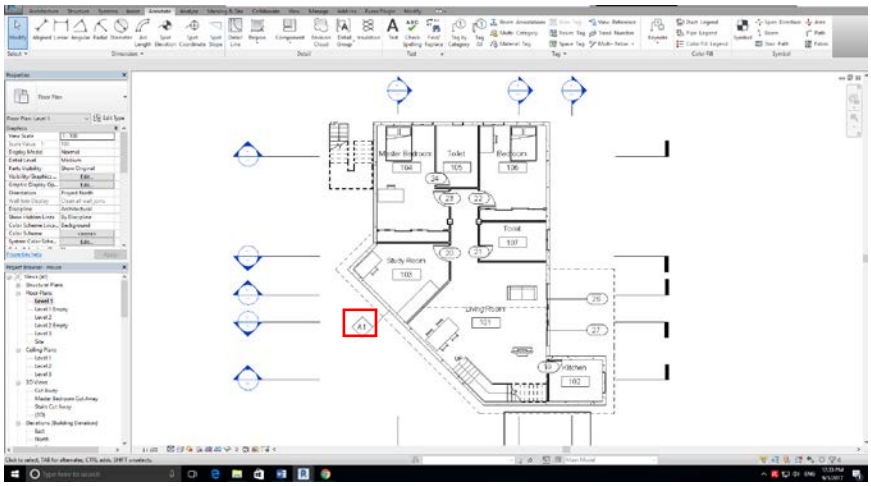


8.1.2 Walls:

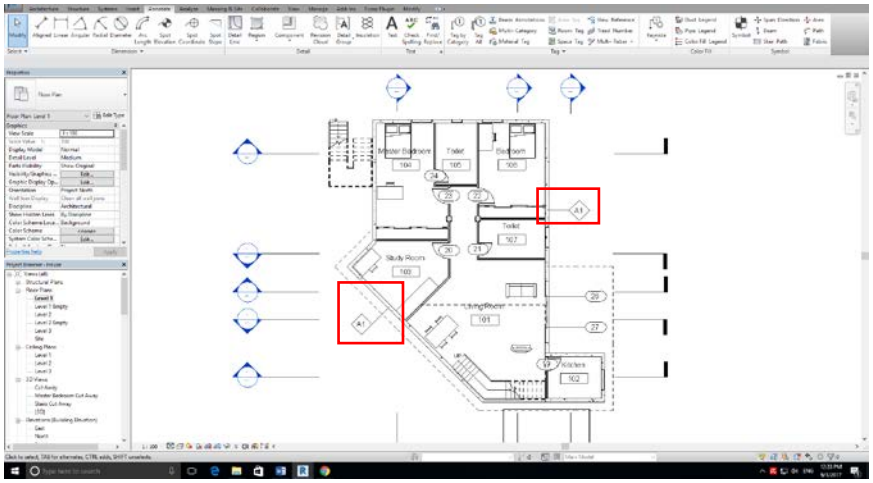
1. Wall tags are different from a door tag because walls do not have a wall number.



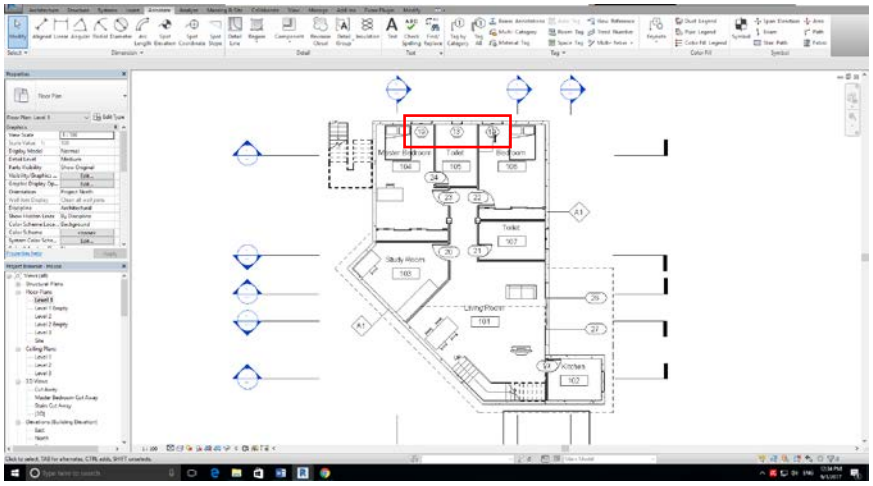
2. Type in a representation or short form for the type of wall, A1 is used as an example.



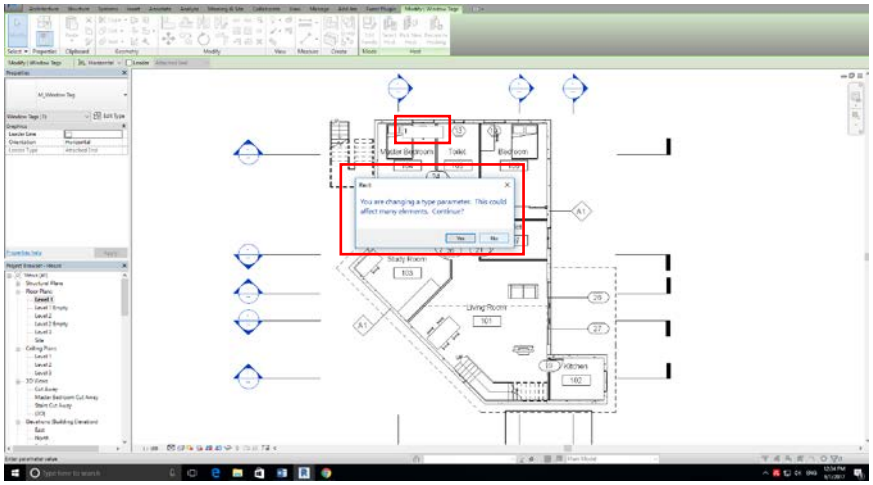
3. Tag the same type of wall; it will give the same tag.



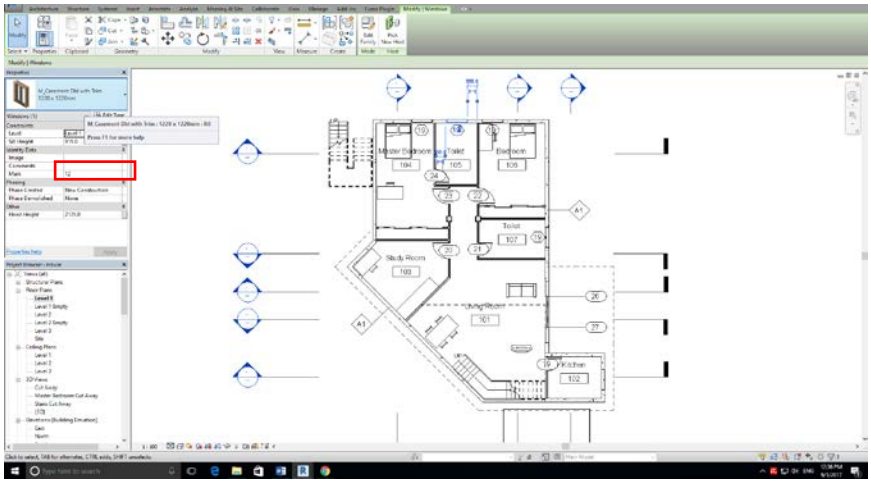
4. Tag the windows.



5. Each type of windows has its window number, the same type of windows will be tagged with the same number.

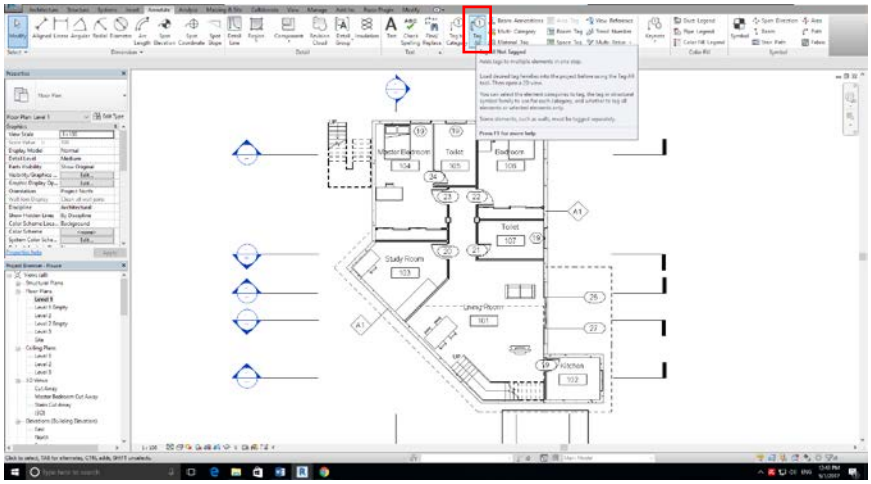


6. Change the number of the window at the Mark row in the window properties panel.

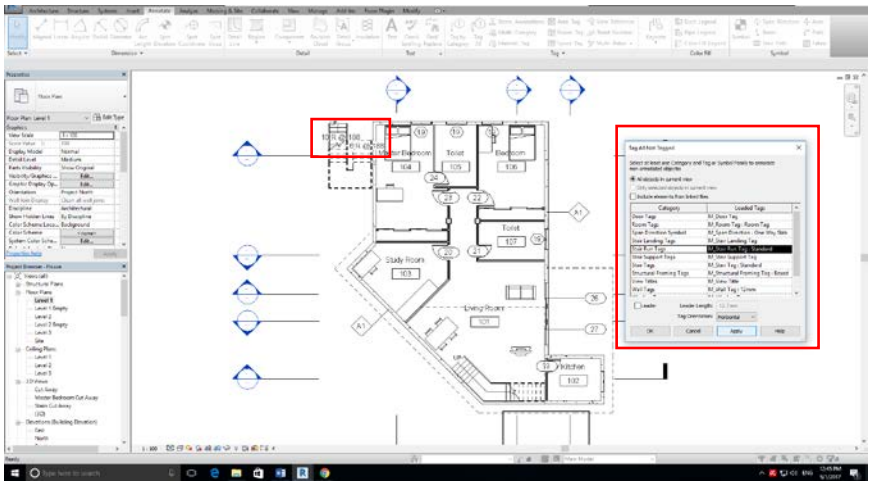


8.1.3 Other Tags:

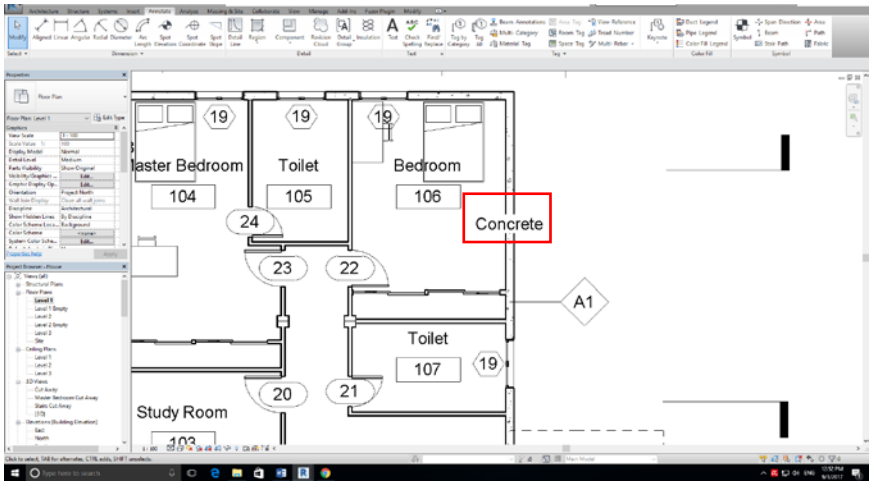
1. There are other tags to be selected, click on the Tag All Not Tagged Command under the Annotate Panel.



2. Select a category and press apply, all the object within that category will be tagged.



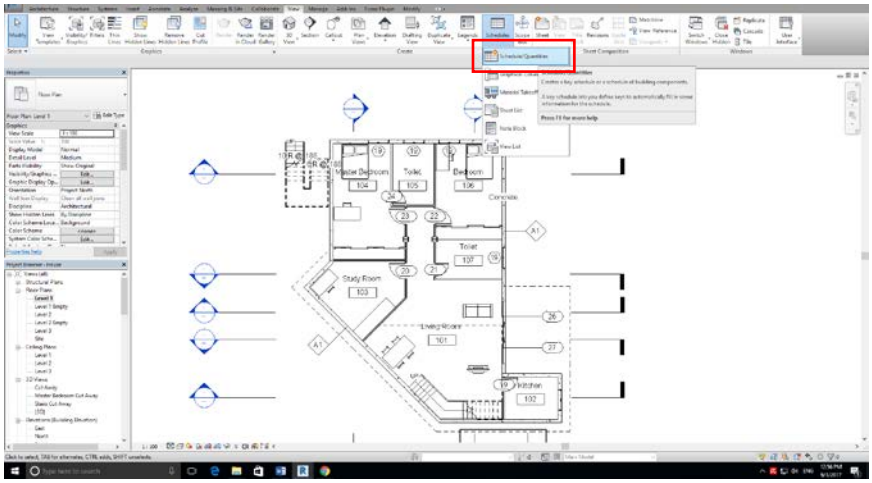
3. The wall is tagged with a material tag; the word concrete is shown in the plan view.



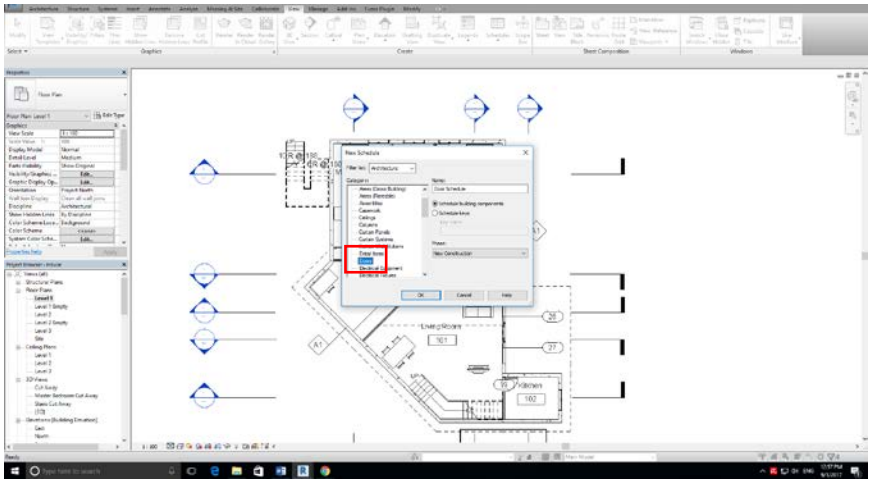
8.2 Adding Schedule Views

8.2.1 Schedule Views:

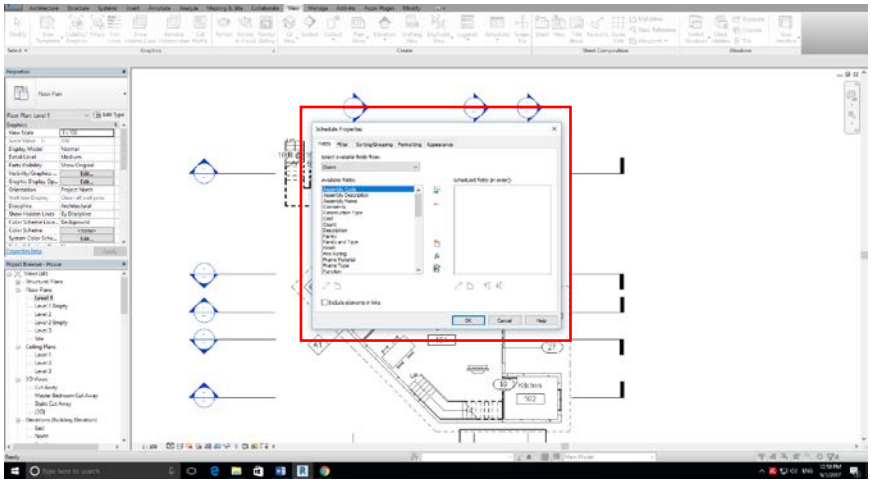
1. Click on Schedule/Quantities under the Schedule command.



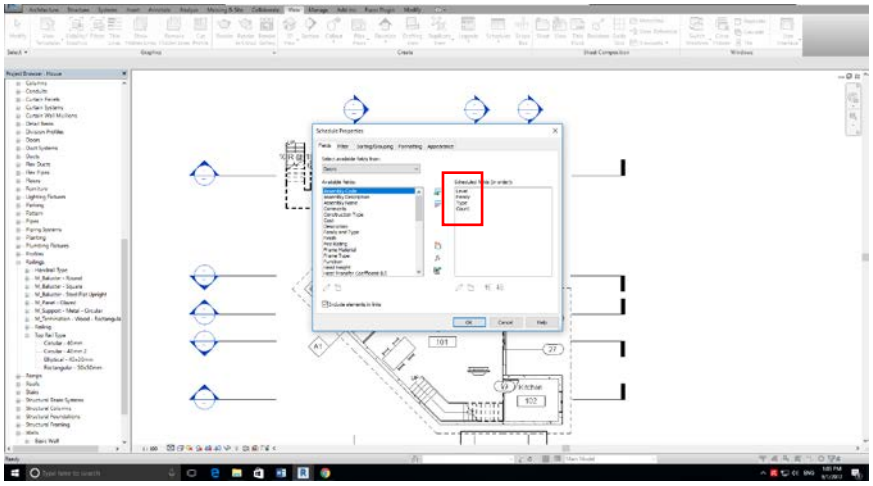
2. Create a door schedule.



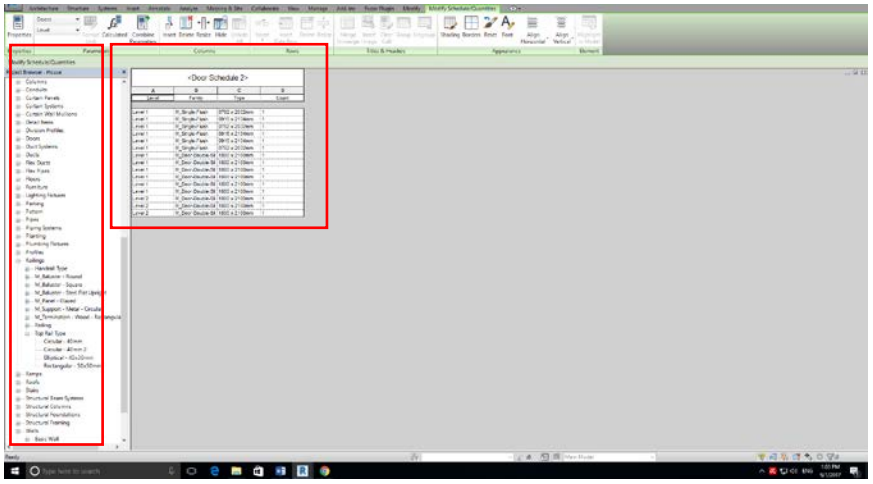
3. Add in items to be shown on the schedule.



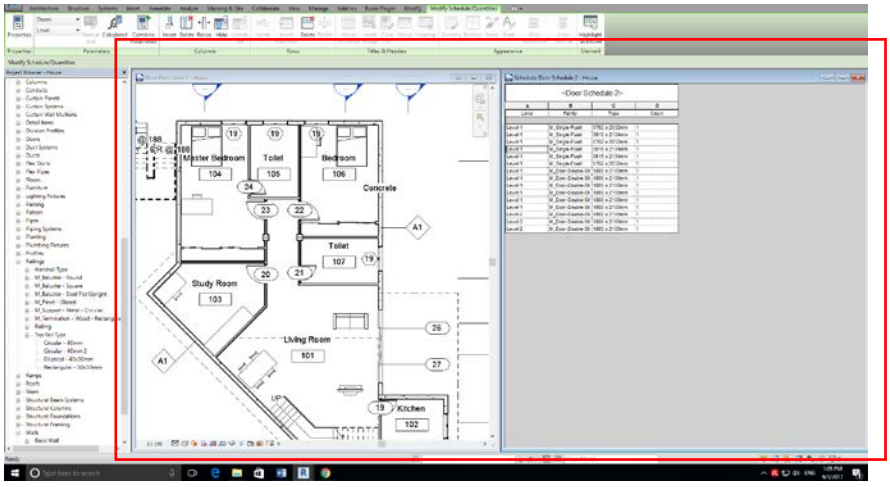
4. Level, family, type, count is selected.



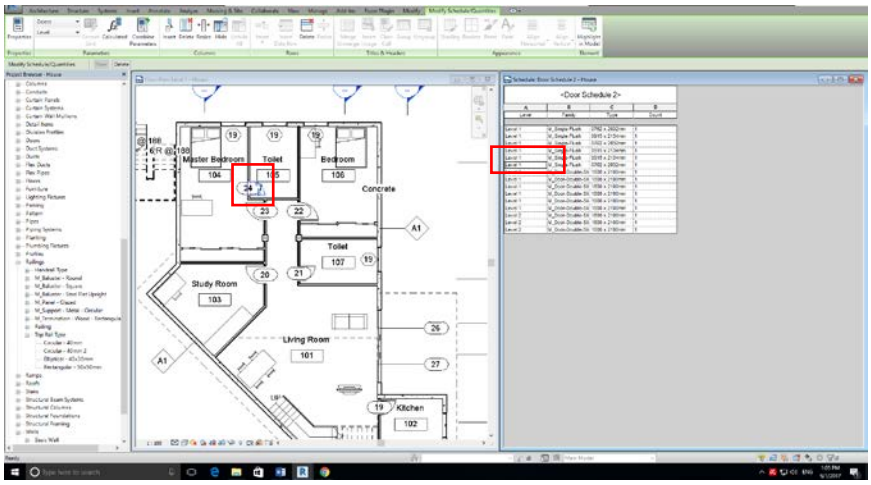
5. A door schedule is created.



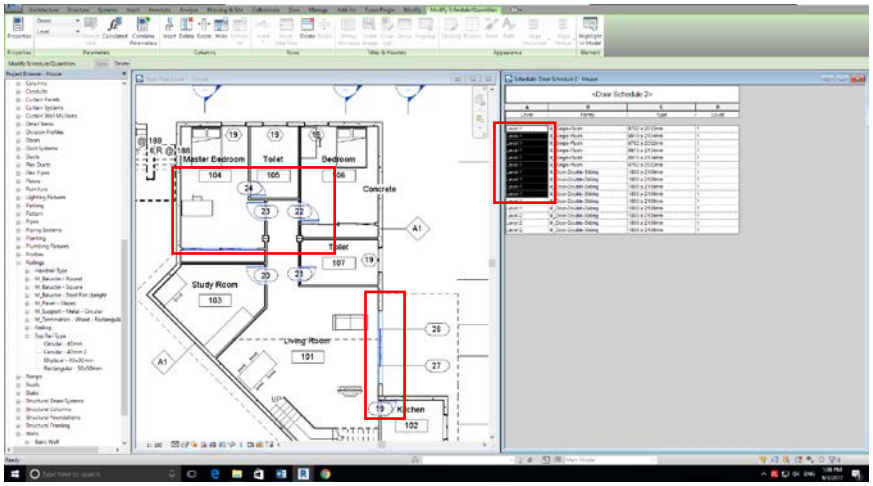
6. Type W+T to create a tile window.



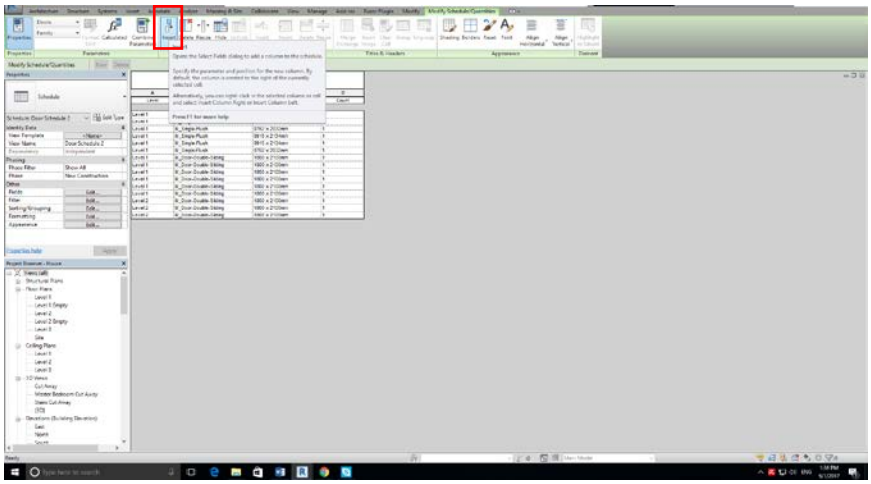
7. Click on any doors on the schedule; the door object will be highlighted in the plan view.



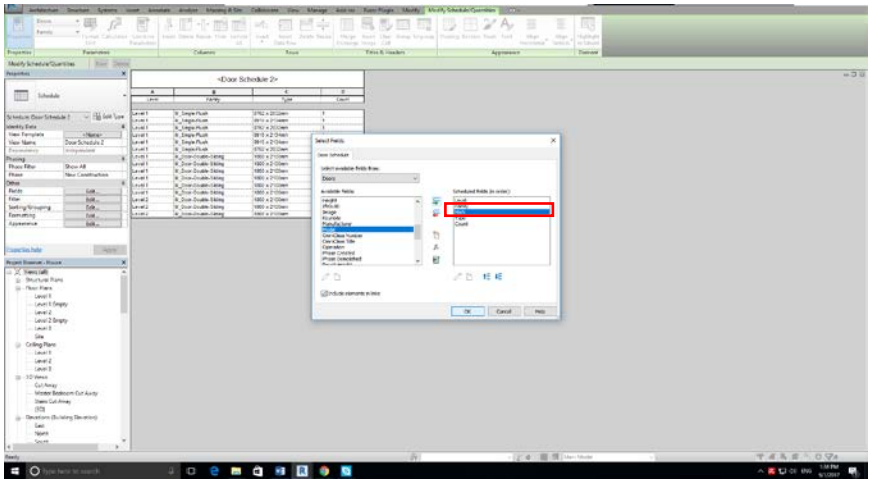
8. Select multiple items by dragging; all the items will be highlighted on the plan view.



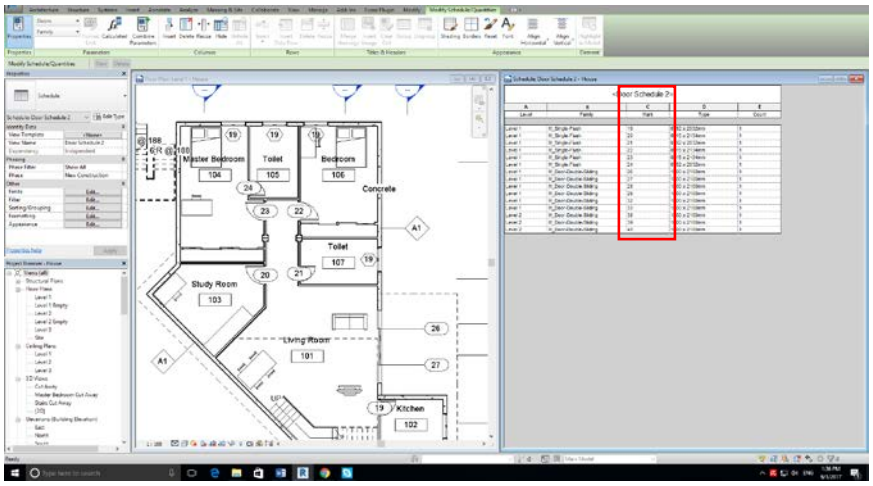
9. Click on the Insert Command under the Modify Panel to add parameters to the schedule.



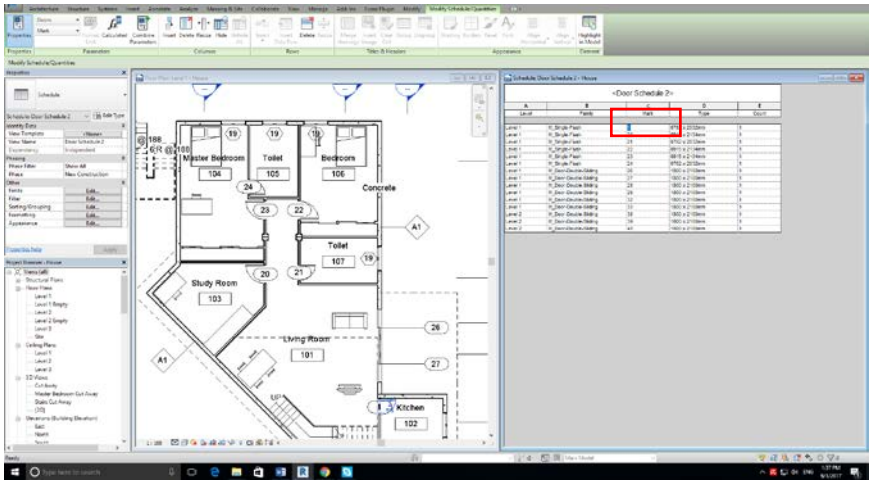
10. Search for the parameters and add it in, the order matters.



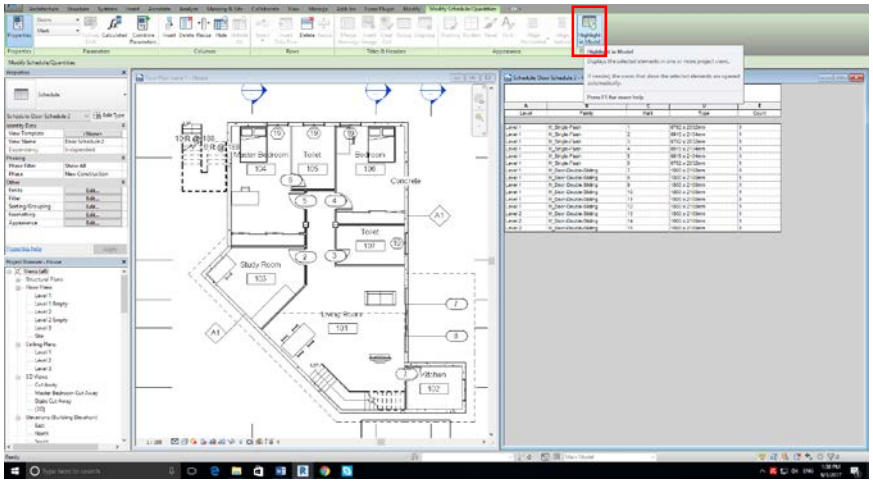
11. The parameter Mark is added to the schedule.



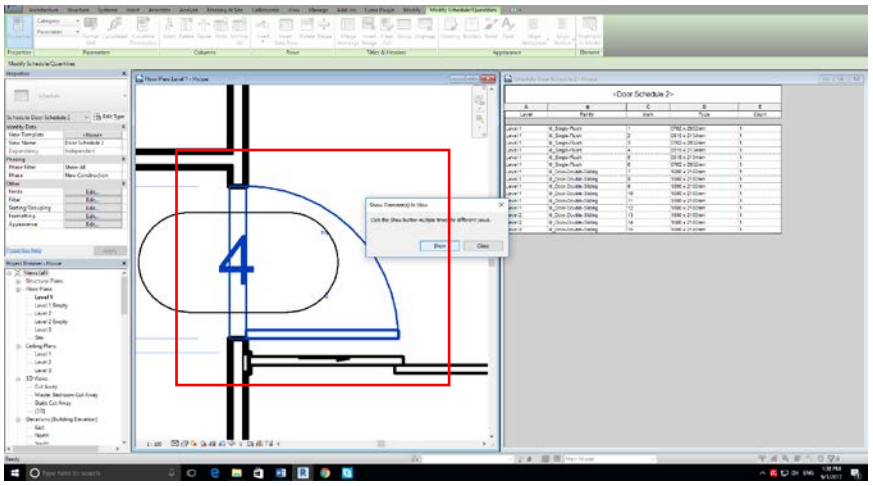
12. Change the mark of the door on the schedule, the number on the tag will change at the same time.



13. Select a door in the schedule and click on Highlight in Model.



14. Revit will automatically search for the object and zoom in.

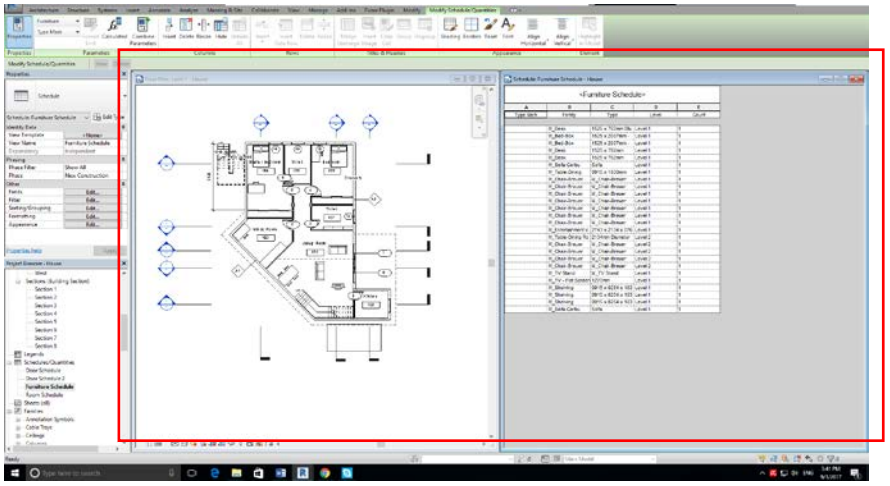


8.3 Modifying Schedule Views

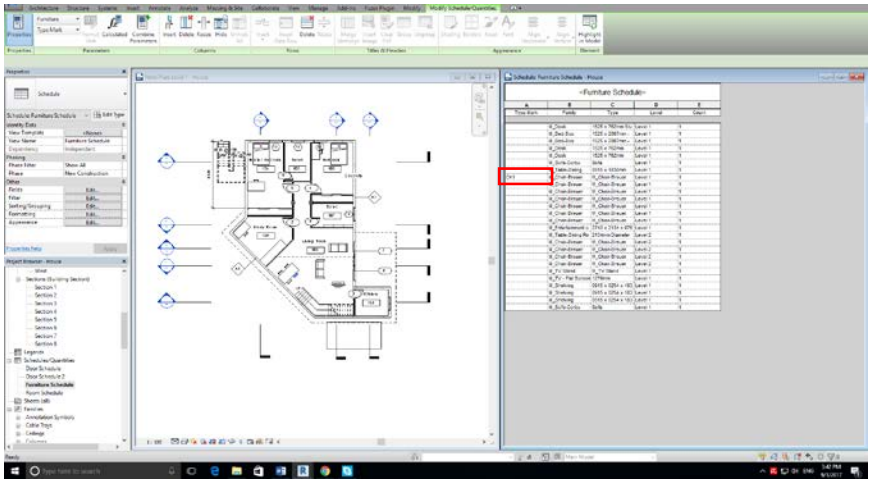
Interior Walls can be laid out with the sketch then modify method. First lay out the geometry in rough locations, then modify them precisely VG only one.

8.3.1 Temporary Hide:

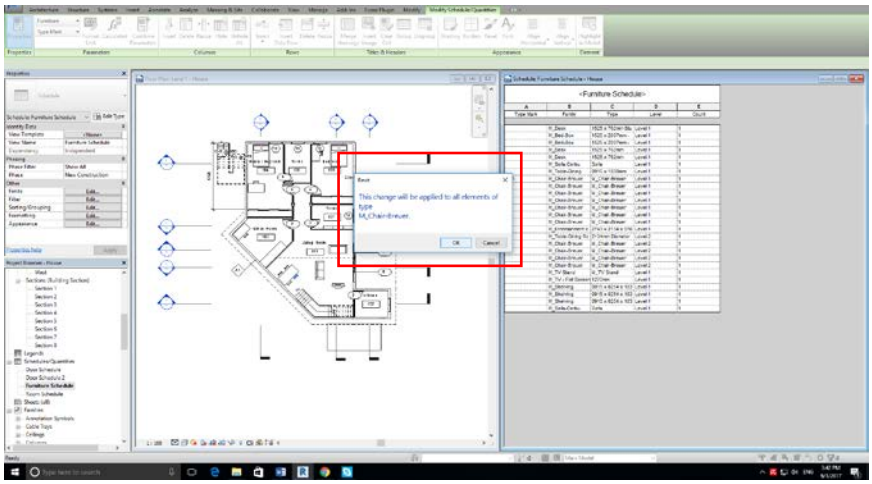
1. Create a furniture schedule.



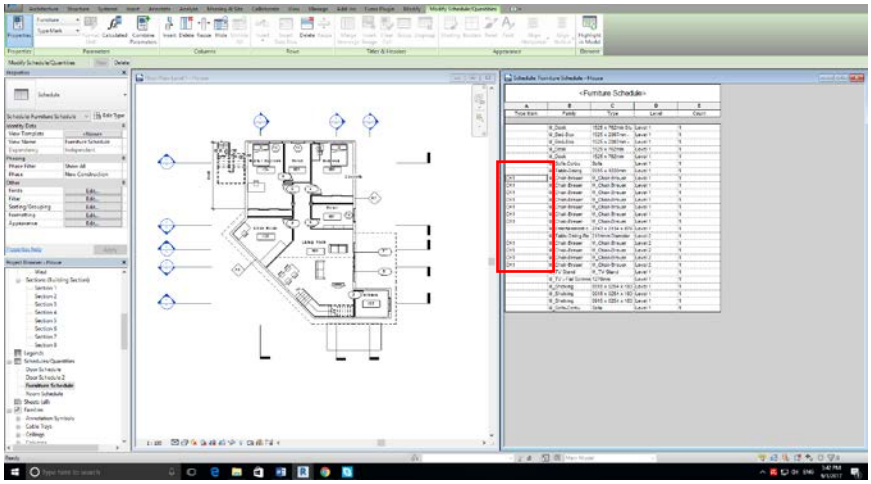
2. Manually type in a type mark to a chair.



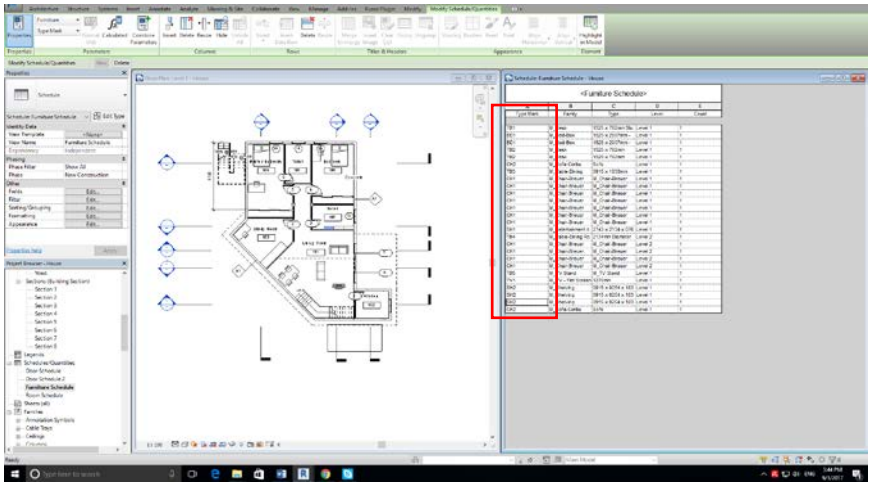
3. This will change the type parameter, click OK.



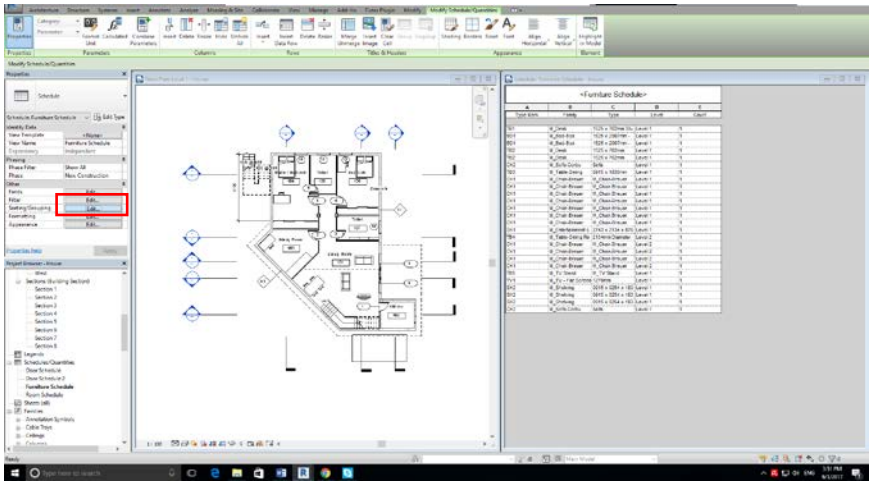
4. All the chairs of the same type will have the same type mark.



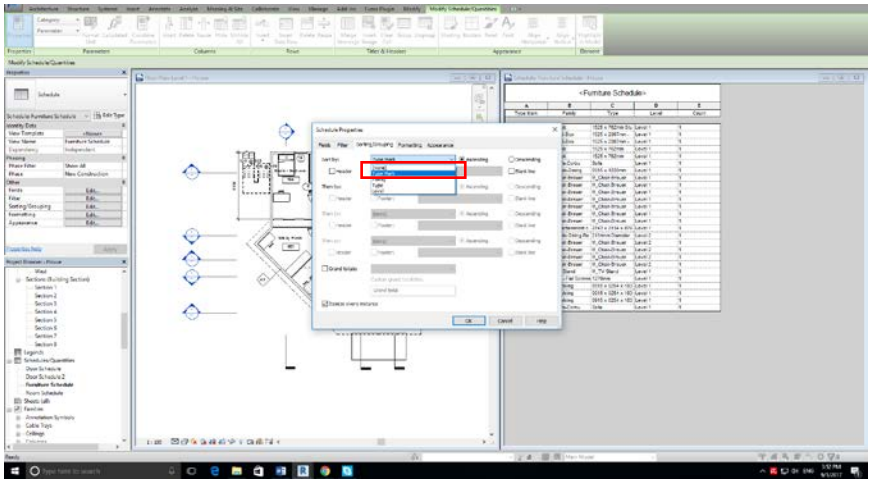
5. Give every furniture a Type Mark.



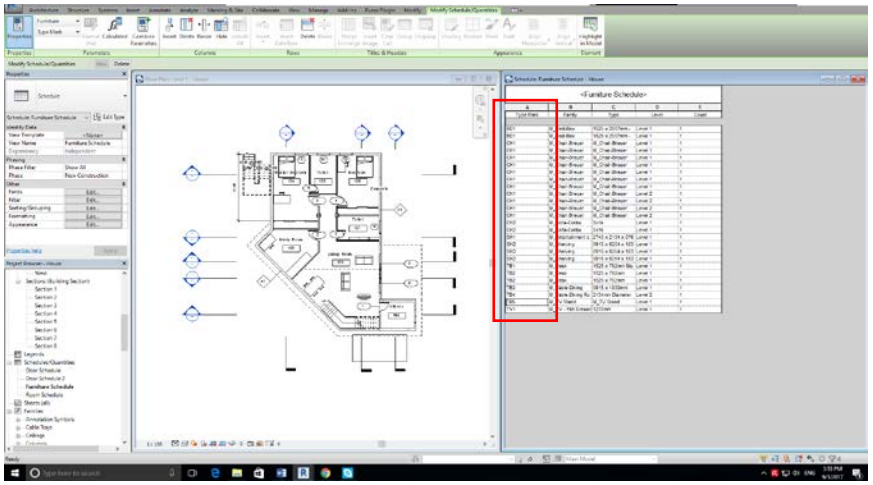
6. Select the schedule and press edit on the Sorting/Grouping row.



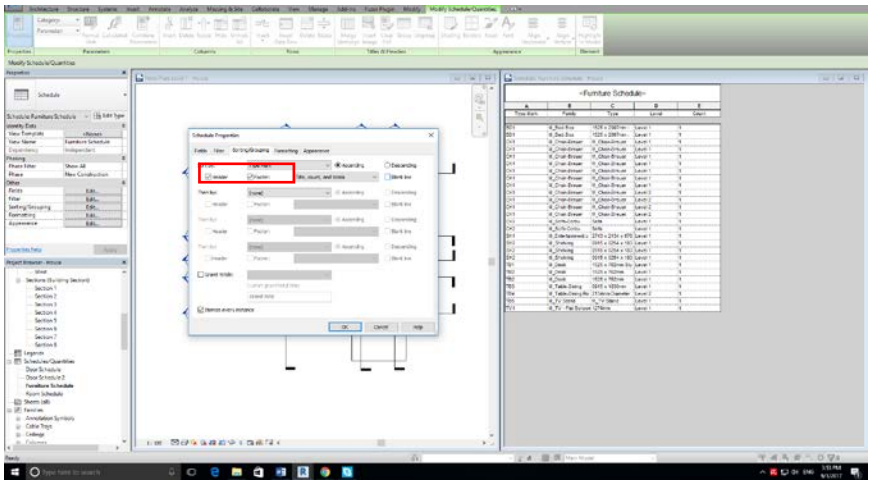
7. Change the sorting order of the schedule to type mark.



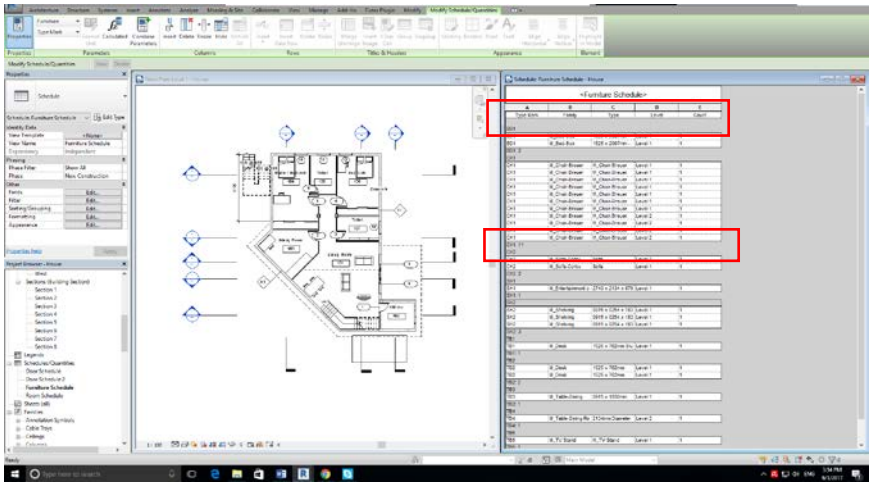
8. All the furniture of the same type will stick together.



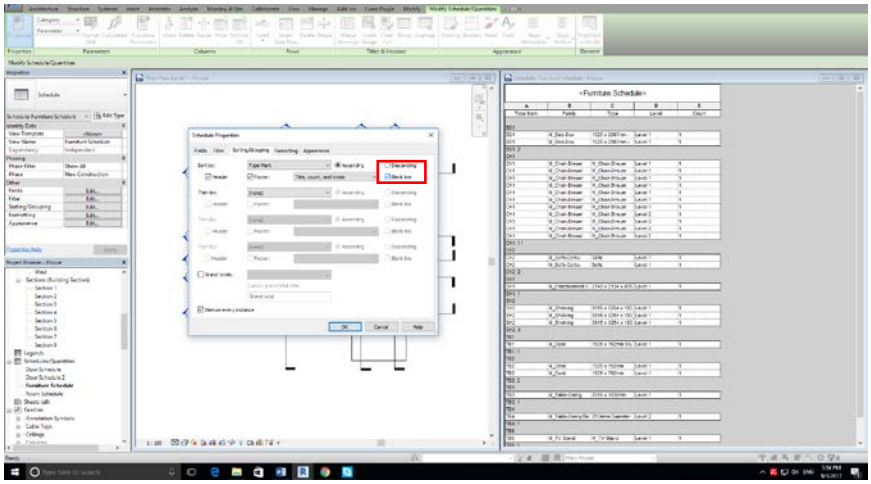
9. Open the sorting window and add a blank line to the schedule.



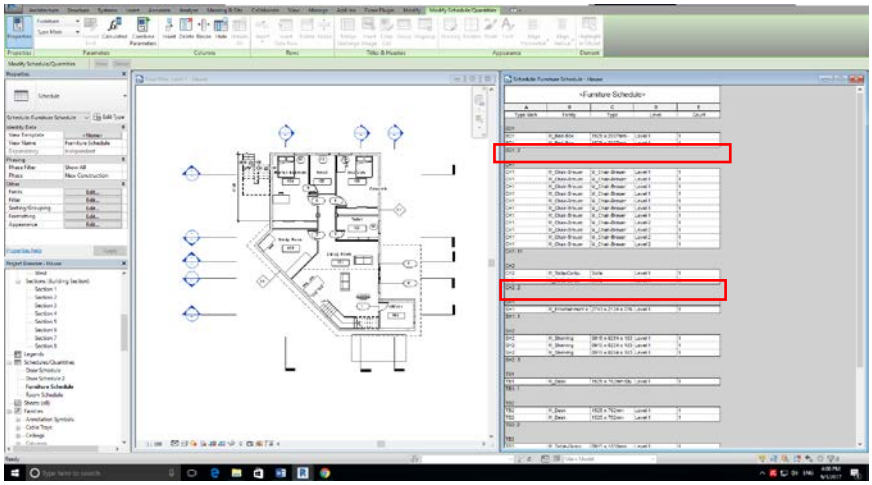
10. It can help separating each type of furniture, making it easier to check.



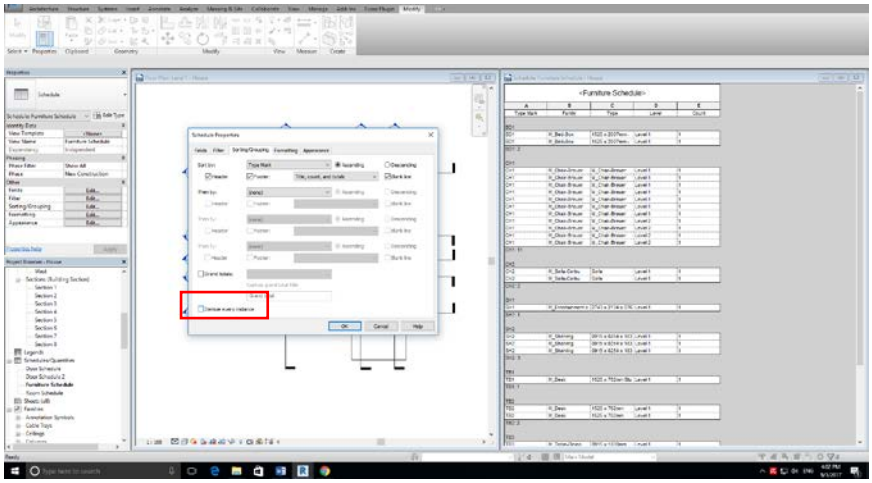
11. Add Header and Footer to the schedule.



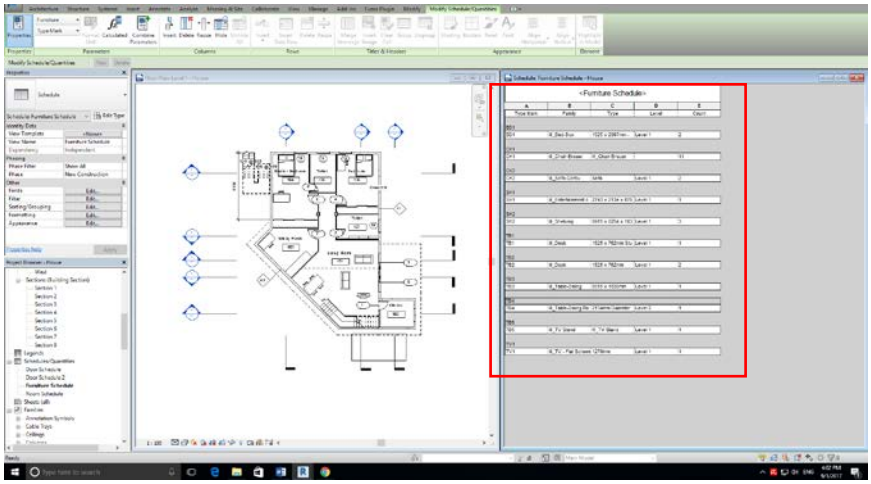
12. It will further separate the types.



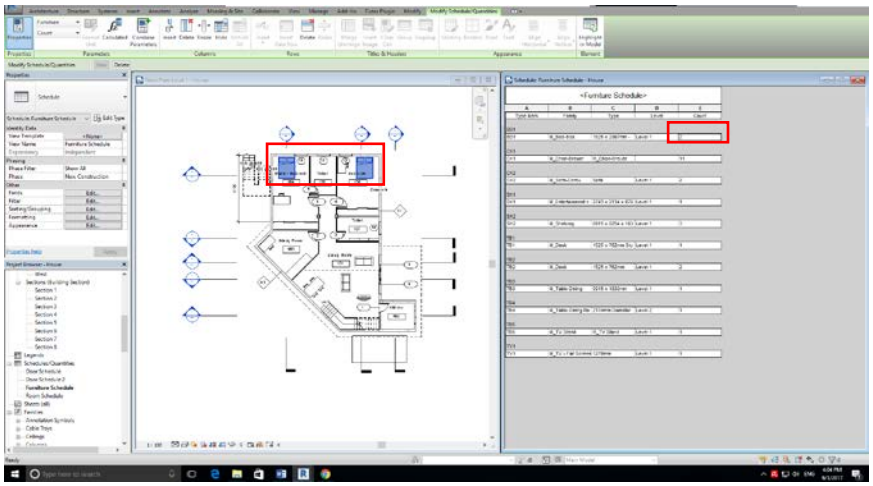
13. Search for the renamed top pipe from the families and right click to open type properties.



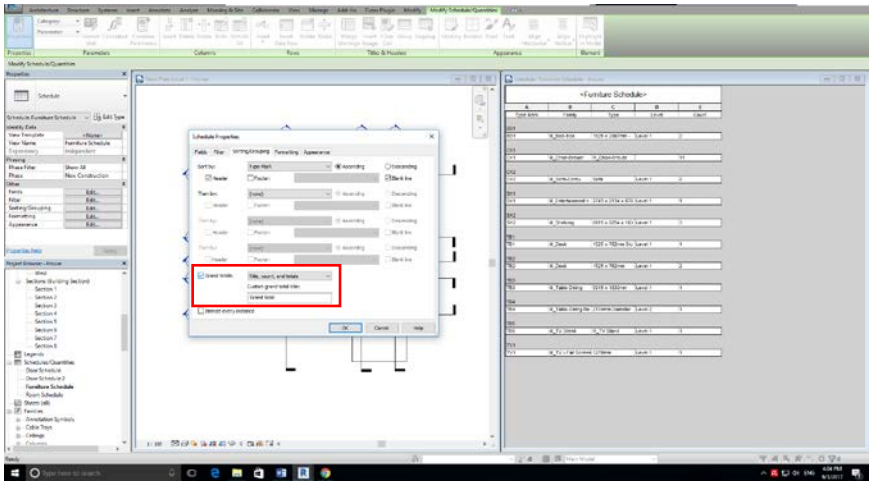
14. Enter a new extension length and select an Extension Style.



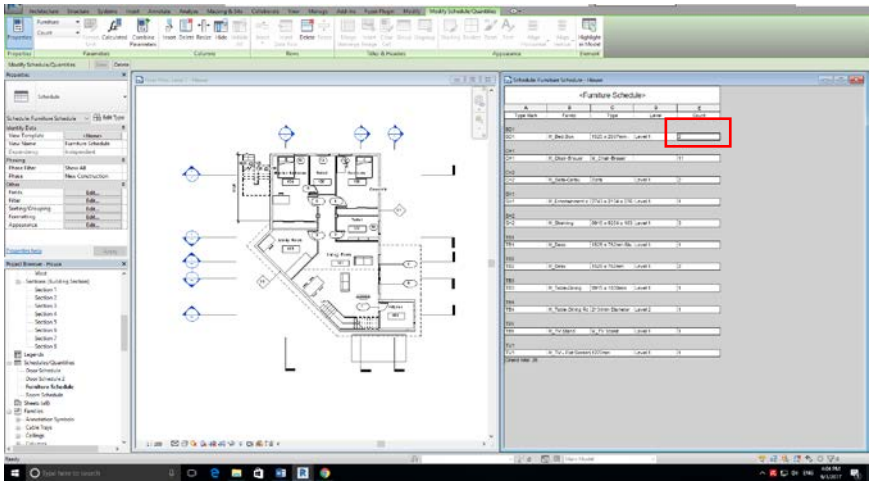
15. Duplicate Circular- 40mm and give it a new name.



16. Search for the renamed top pipe from the families and right click to open type properties.



17. Enter a new extension length and select an Extension Style.



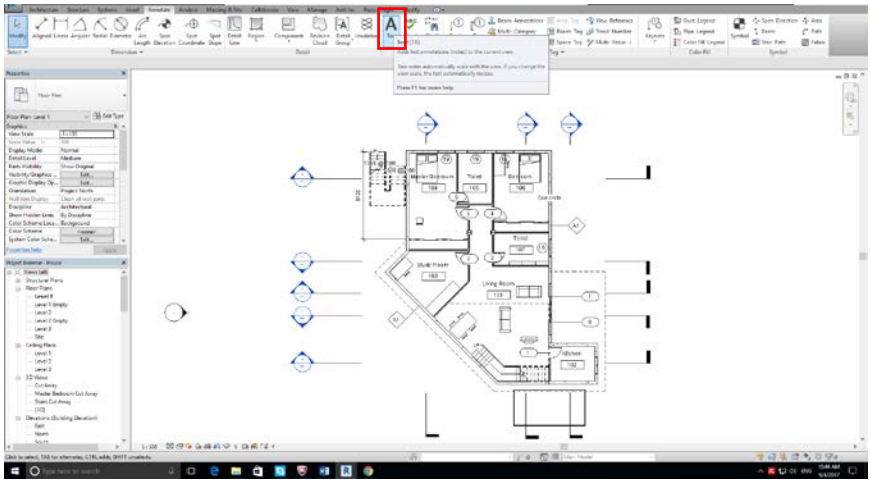
9. Annotation and Details

9.1 Adding Text

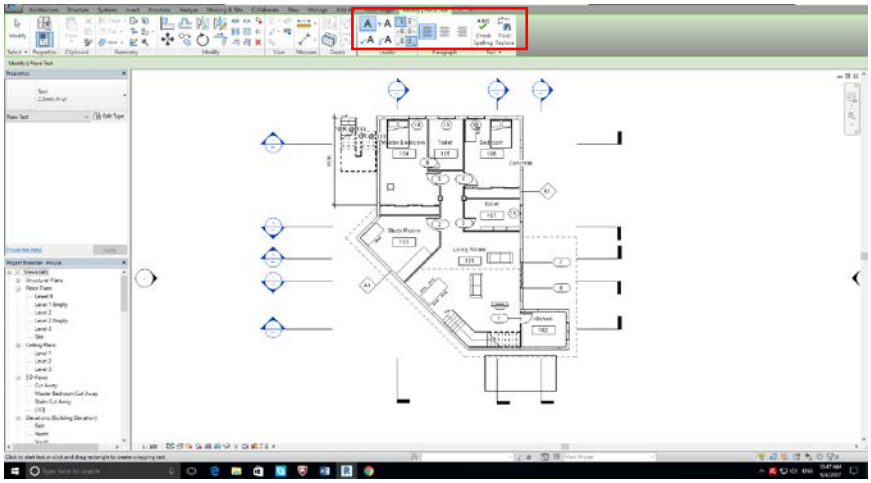
There are flexible and non-flexible families in Revit, non-flexible families are called parametric families. It starts with choosing a right template.

9.1.1 Selecting Template:

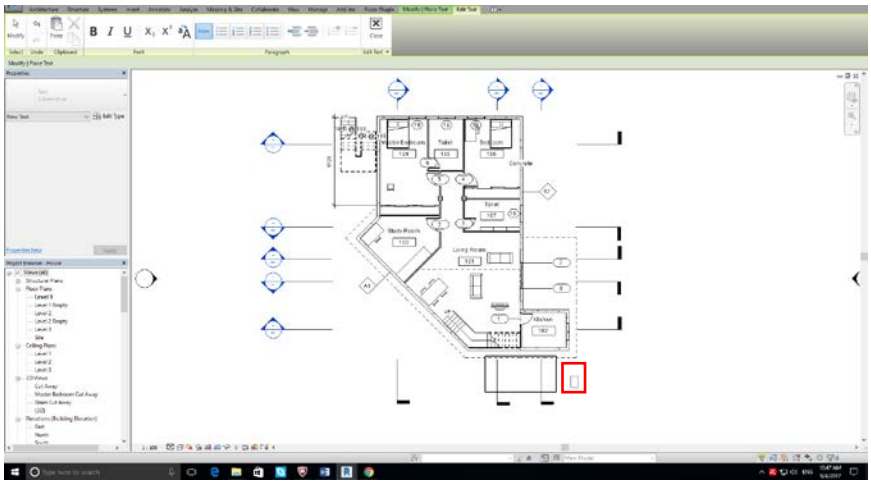
1. Select New Family under the Revit Logo, there are default templates for different usage.



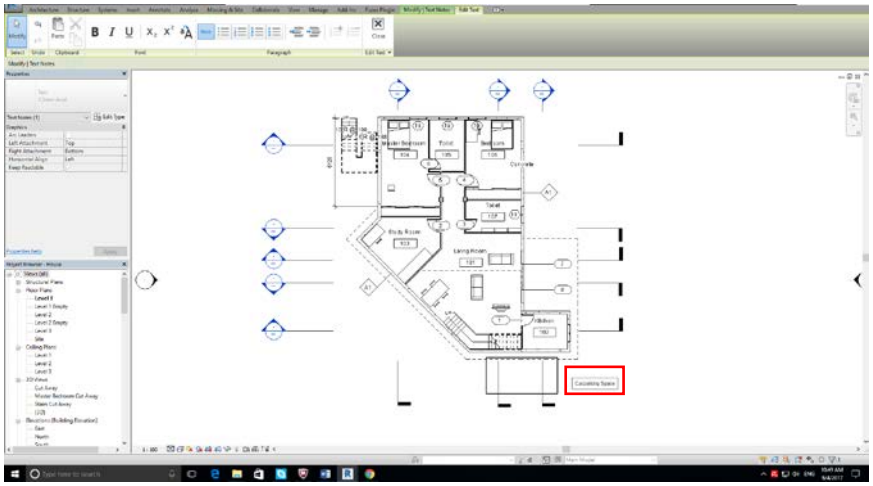
2. Duplicate Some templates are hosted, it must attach to a wall or ceiling; this setting cannot be changed later.



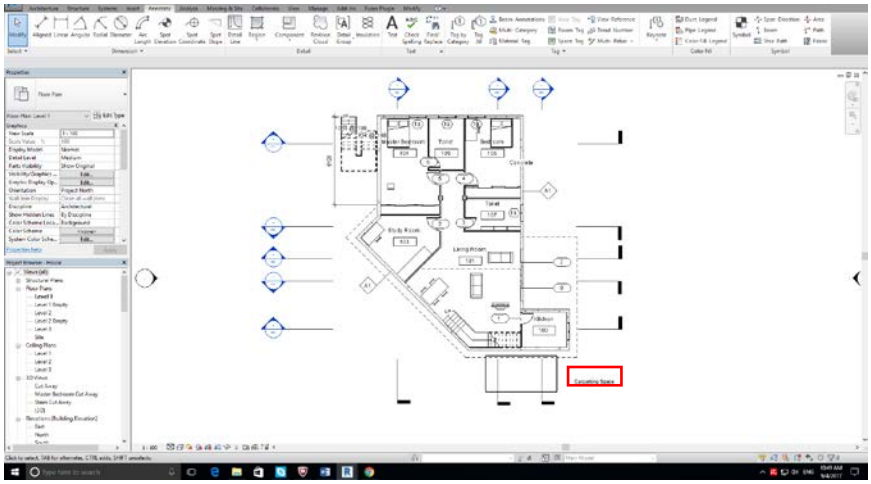
3. Choose the Metric Furniture Template.



4. When the Template is opened, a green cross is shown, they are the center reference plane.

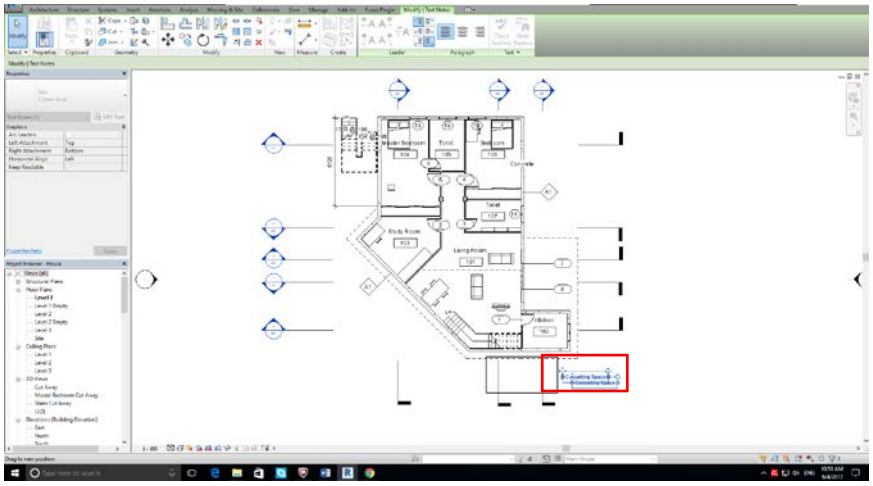


5. Type W+T to create a tile window, then type Z+A to zoom all.

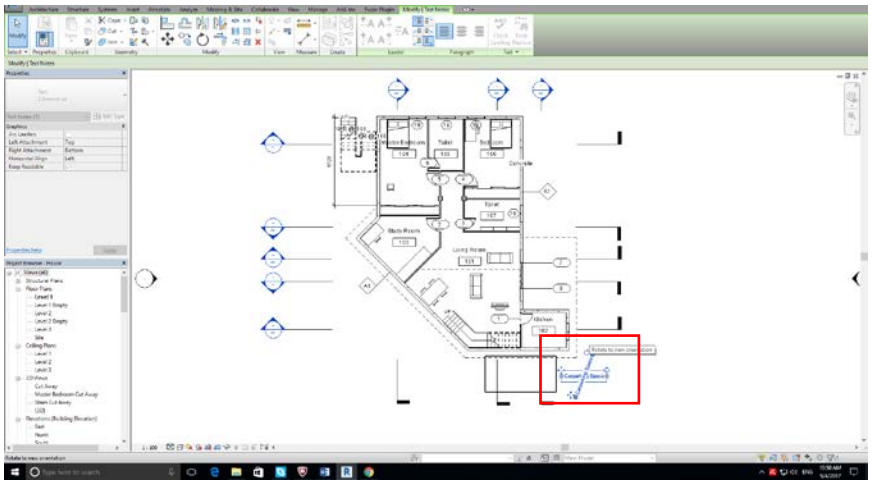


9.1.2 Save:

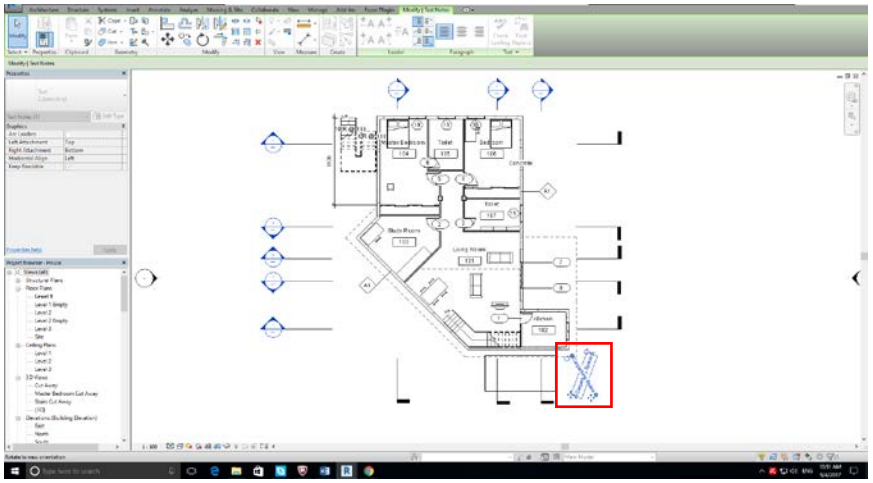
1. Press save under the Revit Logo, the save as window is shown.



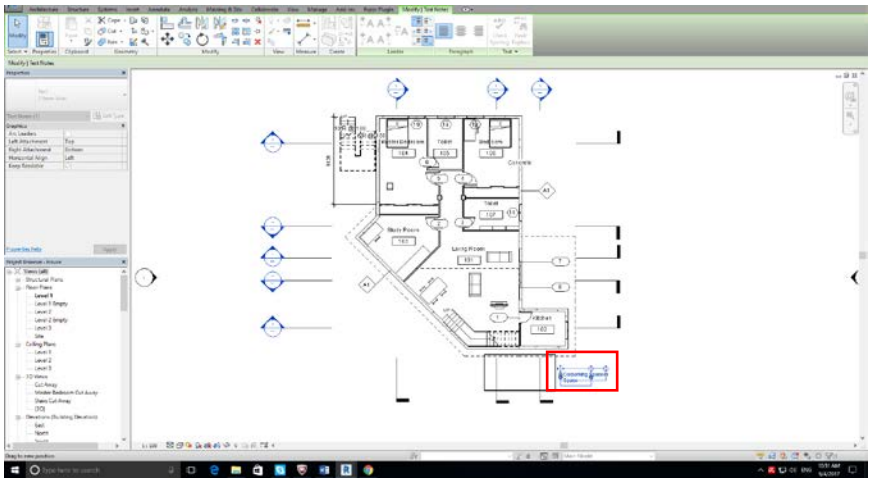
2. Type in a name for the family and click on the option button.



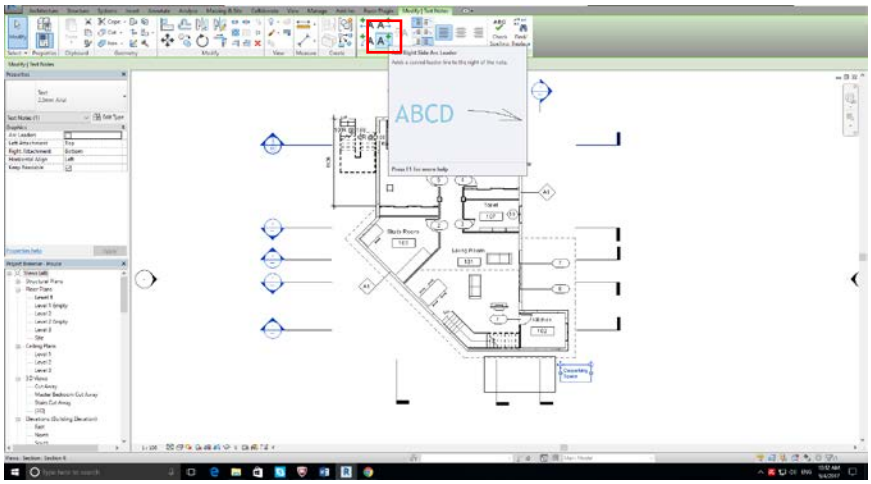
3. In the File Save Option Window, the Maximum Backup and Thumbnail Preview can be changed.



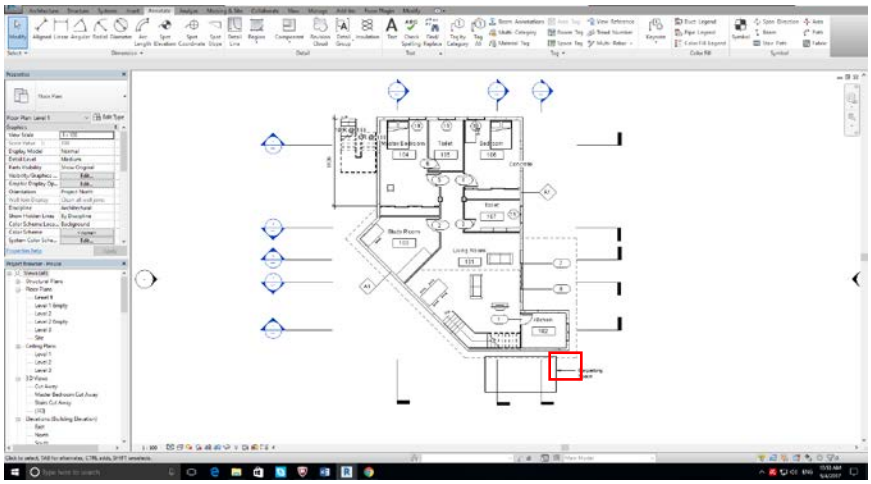
4. Choose the Metric Furniture Template.



5. When the Template is opened, a green cross is shown, they are the center reference plane.

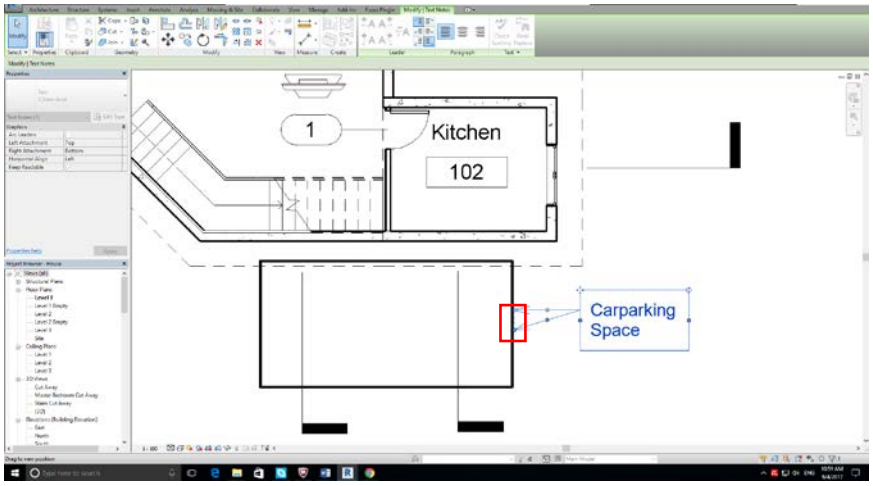


6. Type W+T to create a tile window, then type Z+A to zoom all.

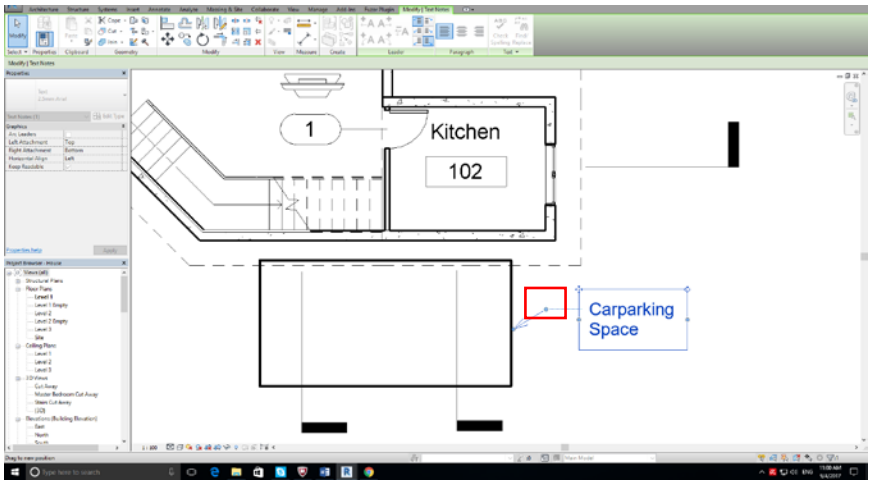


9.1.3 Save:

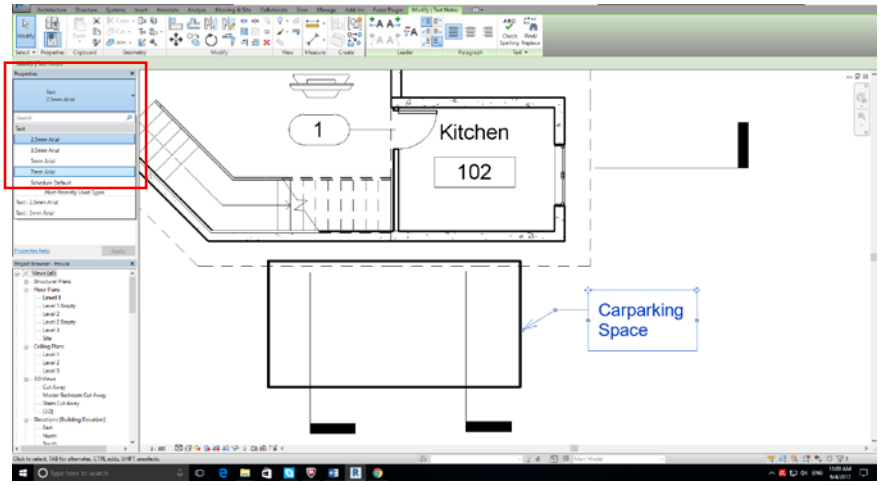
1. Press save under the Revit Logo, the save as window is shown.



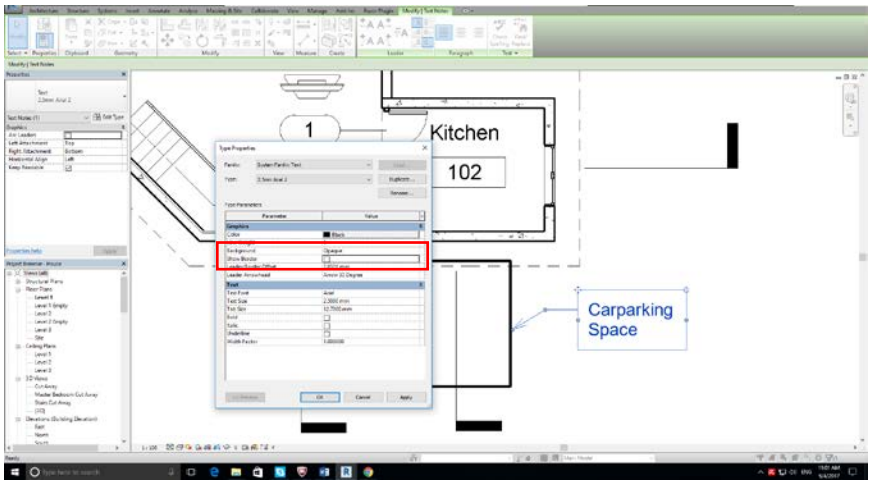
2. Type in a name for the family and click on the option button.



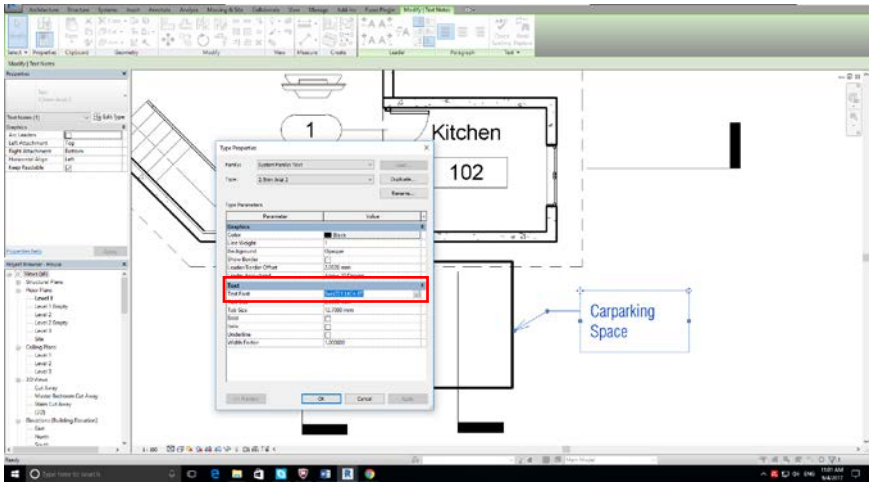
3. In the File Save Option Window, the Maximum Backup and Thumbnail Preview can be changed.



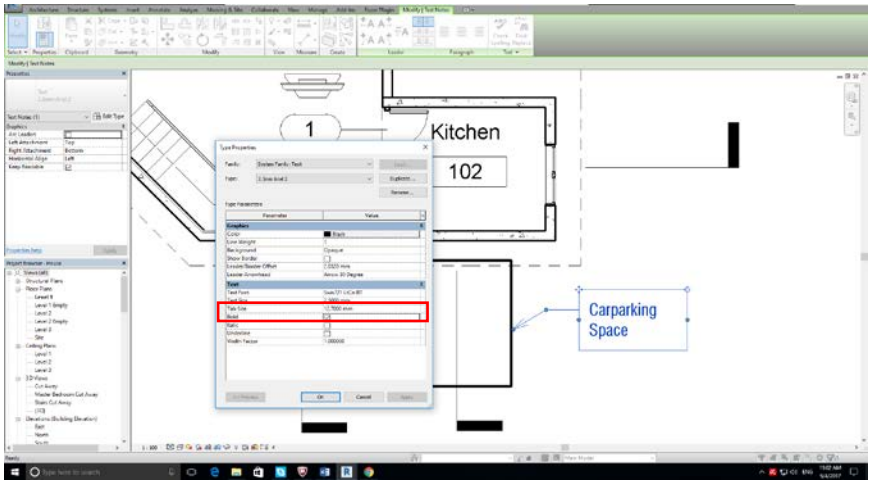
4. Choose the Metric Furniture Template.



5. When the Template is opened, a green cross is shown, they are the center reference plane.



6. Type W+T to create a tile window, then type Z+A to zoom all.

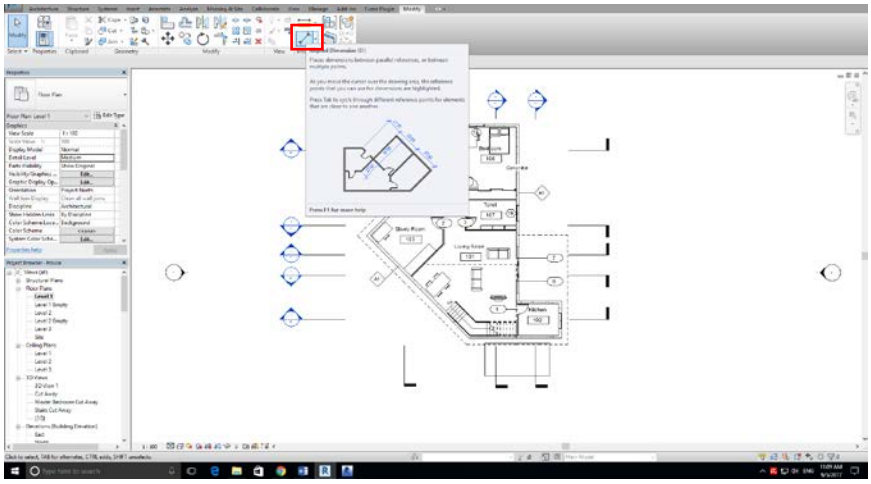


9.2 Adding Dimensions

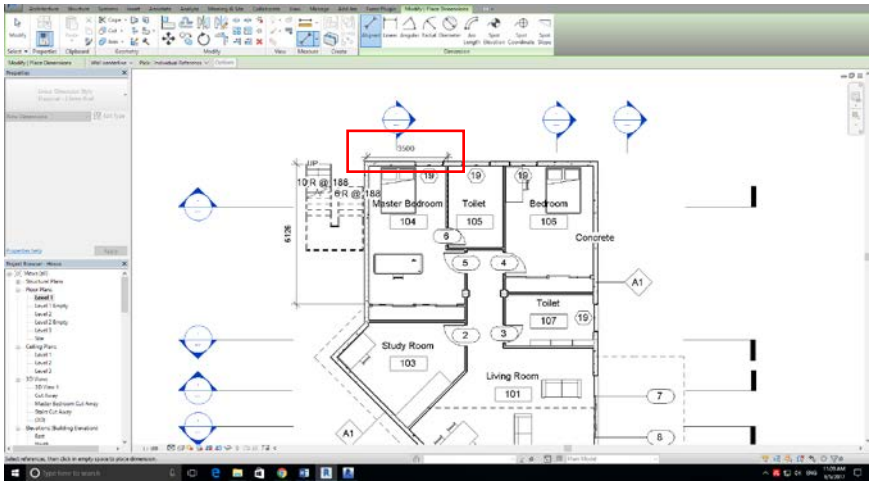
There are flexible and non-flexible families in Revit, non-flexible families are called parametric families. It starts with choosing a right template.

9.2.1 Selecting Template:

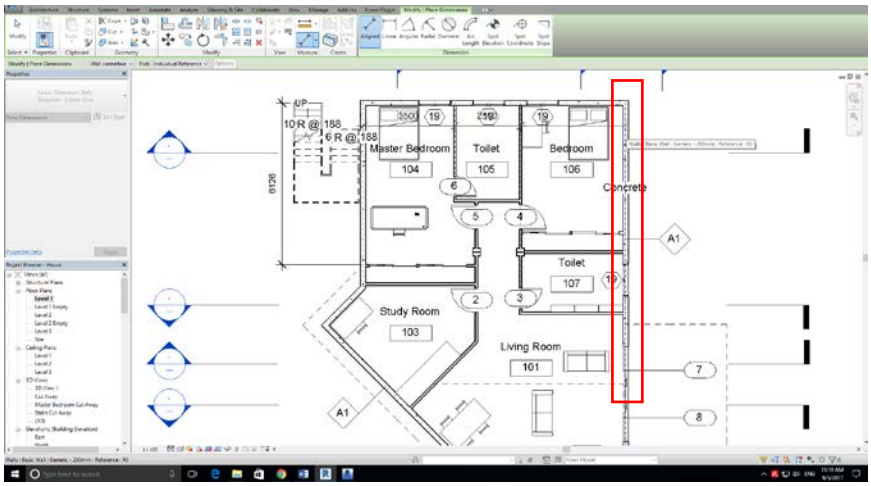
1. Select New Family under the Revit Logo, there are default templates for different usage.



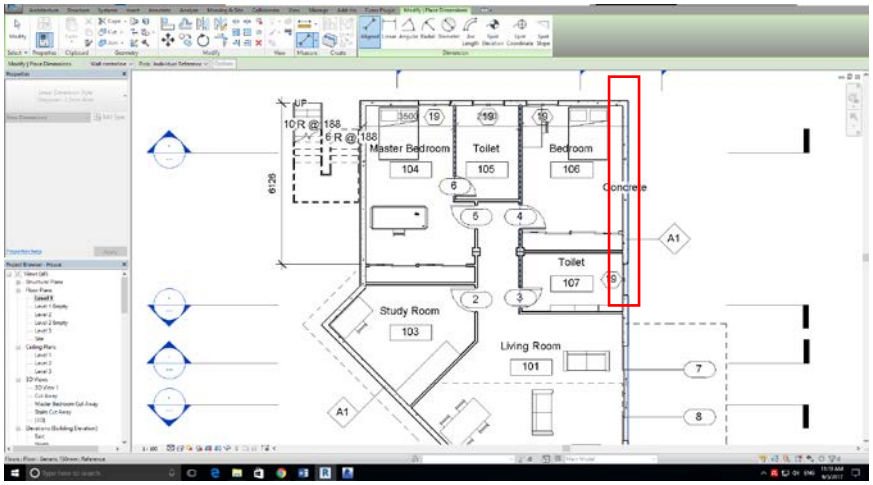
2. Duplicate Some templates are hosted, it must attach to a wall or ceiling; this setting cannot be changed later.



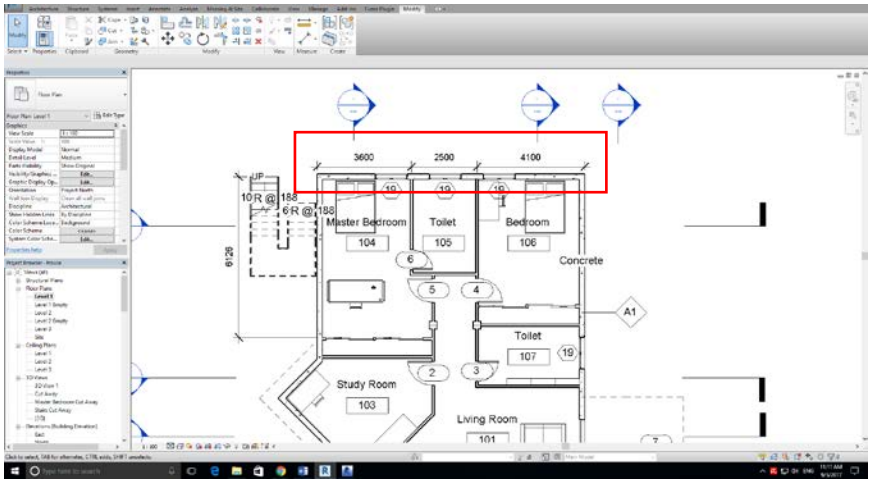
3. Choose the Metric Furniture Template.



4. When the Template is opened, a green cross is shown, they are the center reference plane.

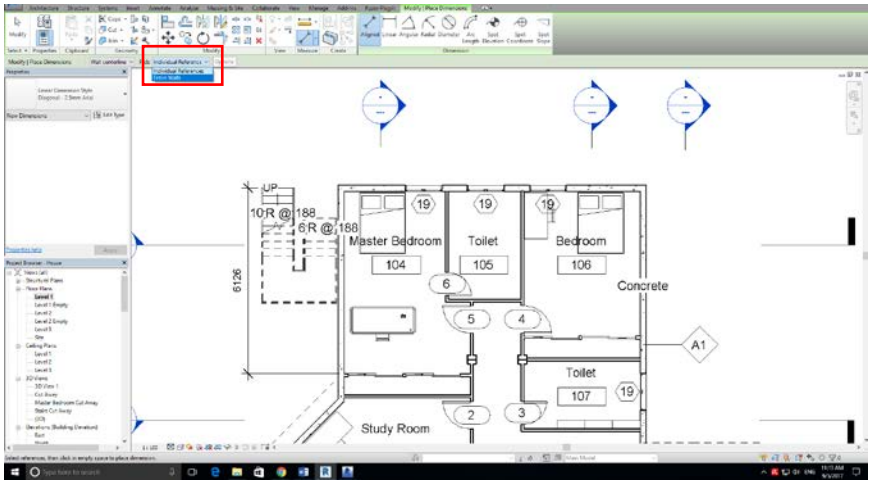


5. Type W+T to create a tile window, then type Z+A to zoom all.

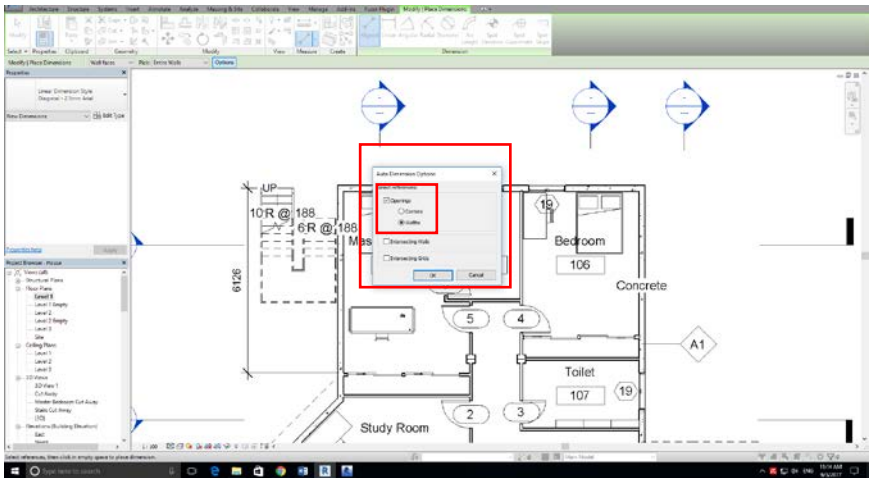


9.2.2 Save:

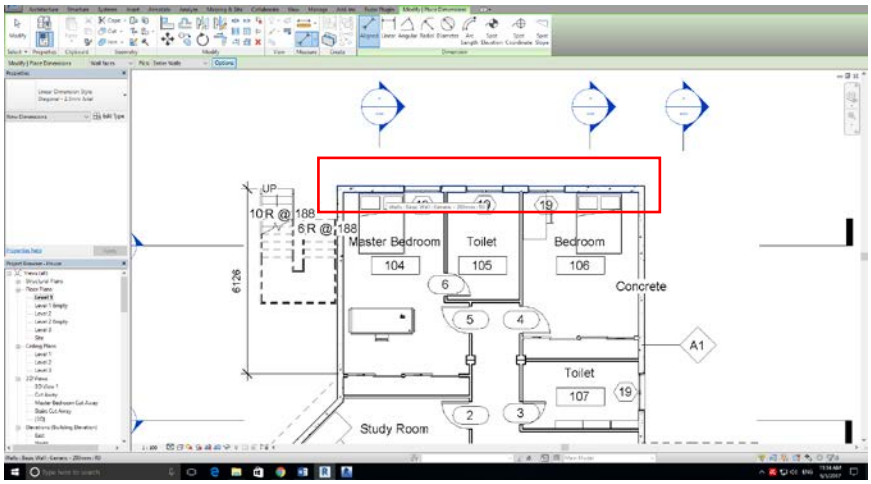
1. Press save under the Revit Logo, the save as window is shown.



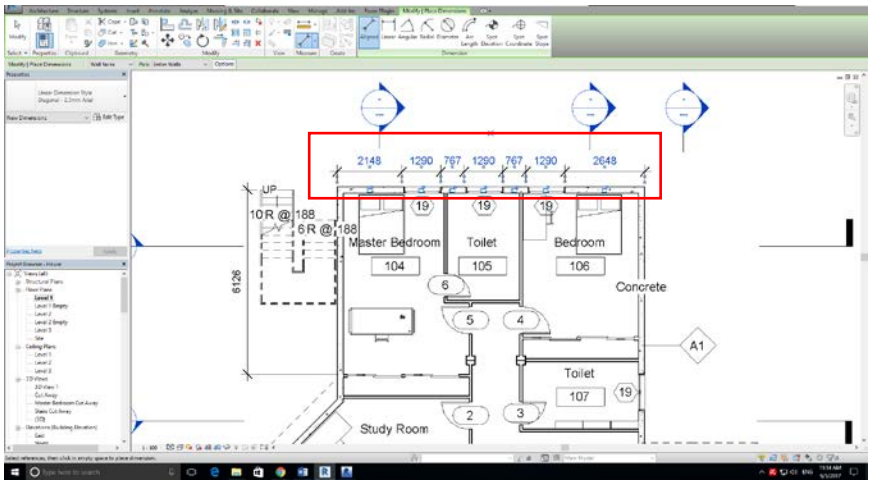
2. Type in a name for the family and click on the option button.



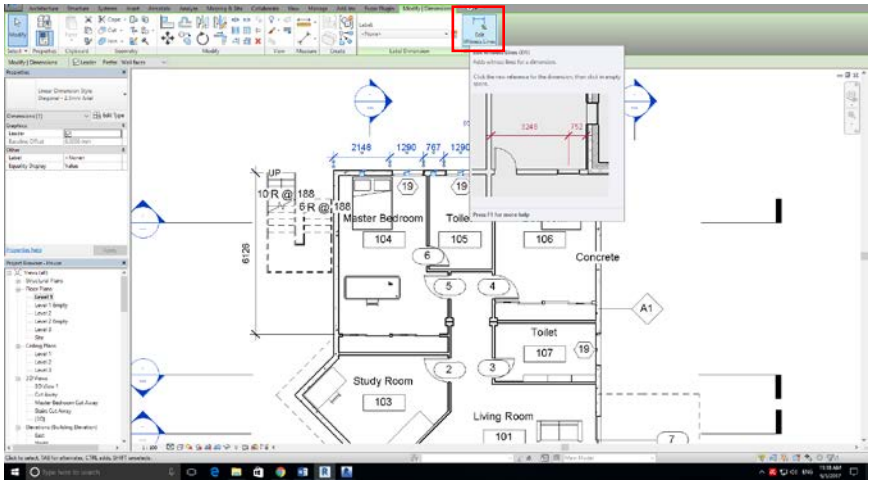
3. In the File Save Option Window, the Maximum Backup and Thumbnail Preview can be changed.



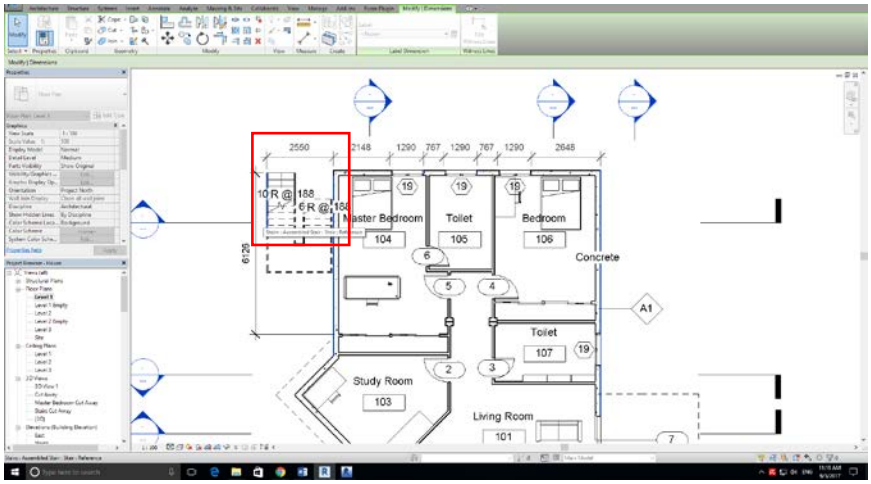
4. Choose the Metric Furniture Template.



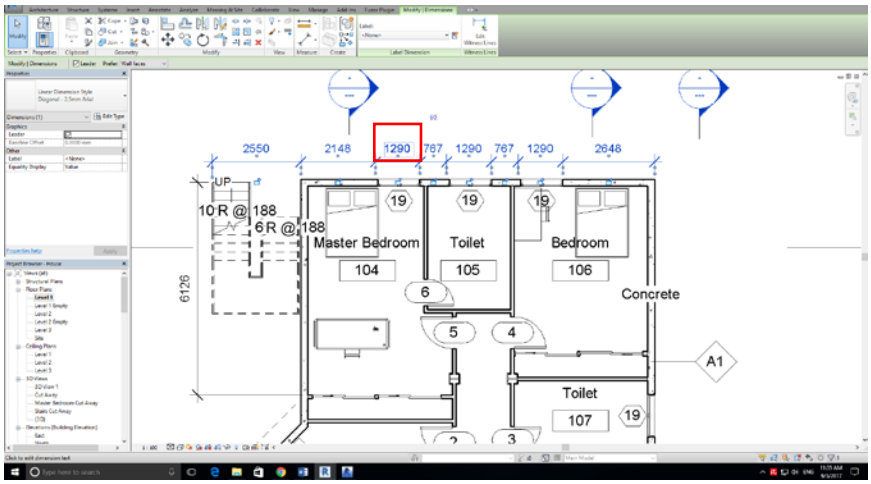
5. When the Template is opened, a green cross is shown, they are the center reference plane.



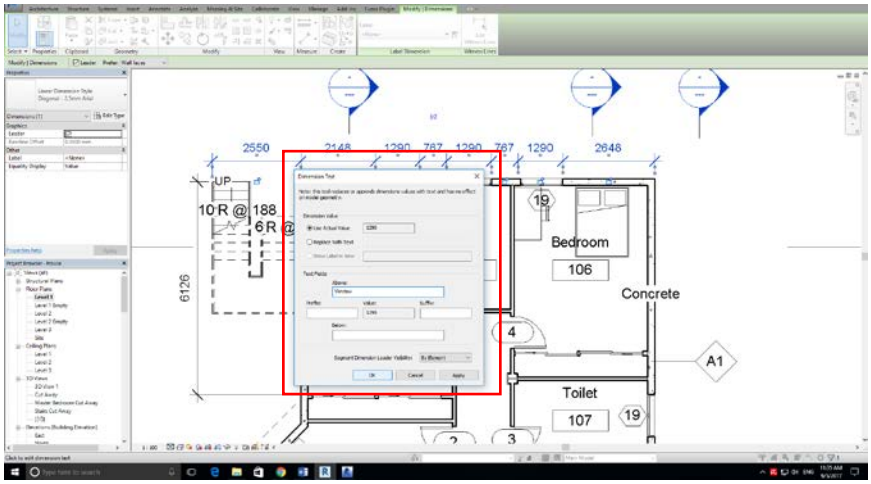
6. Type W+T to create a tile window, then type Z+A to zoom all.



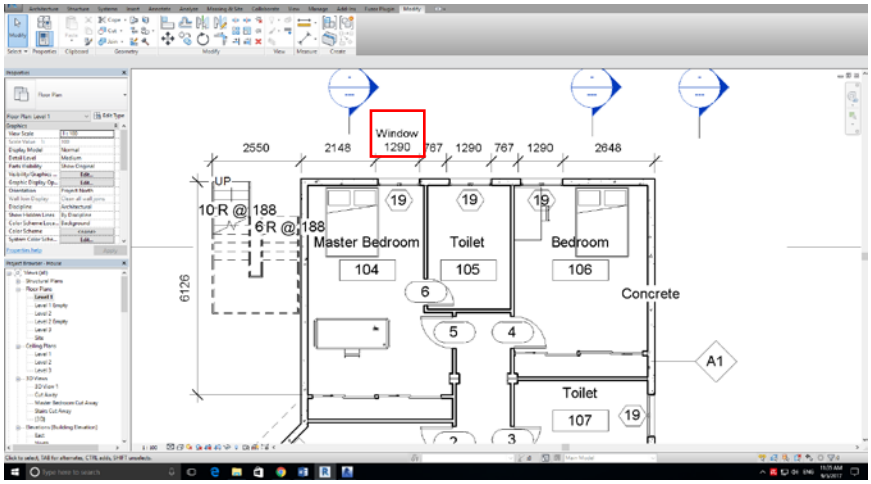
7. Choose the Metric Furniture Template.



8. When the Template is opened, a green cross is shown, they are the center reference plane.



9. Type W+T to create a tile window, then type Z+A to zoom all.

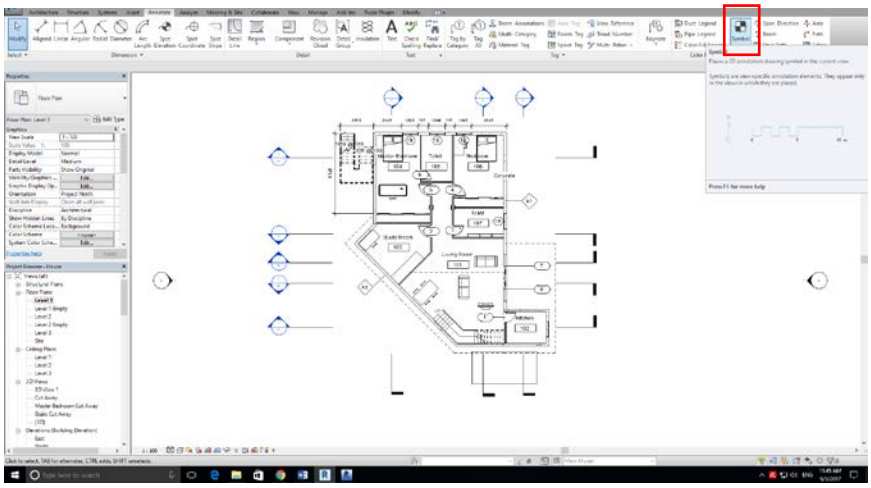


9.3 Adding Symbols

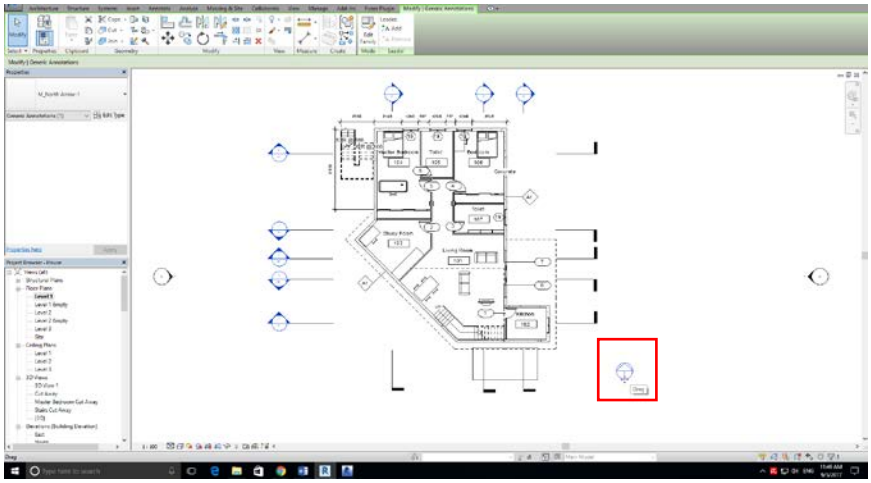
There are flexible and non-flexible families in Revit, non-flexible families are called parametric families. It starts with choosing a right template.

9.3.1 Selecting Template:

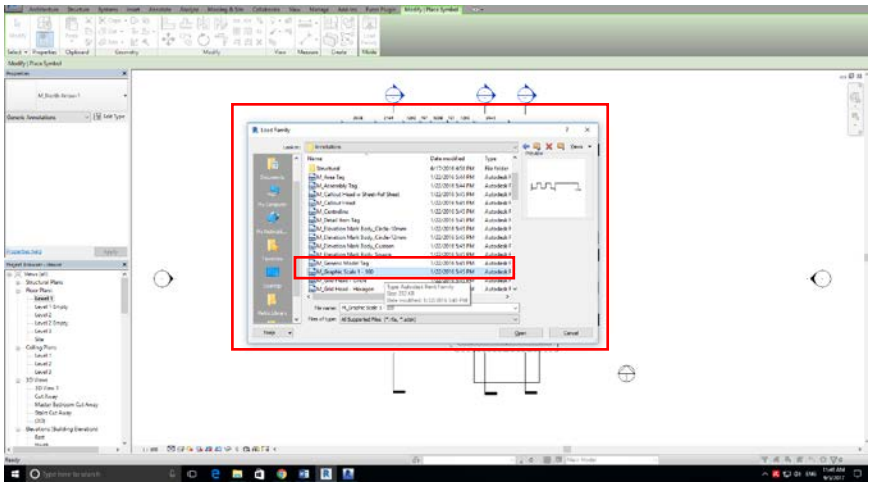
1. Select New Family under the Revit Logo, there are default templates for different usage.



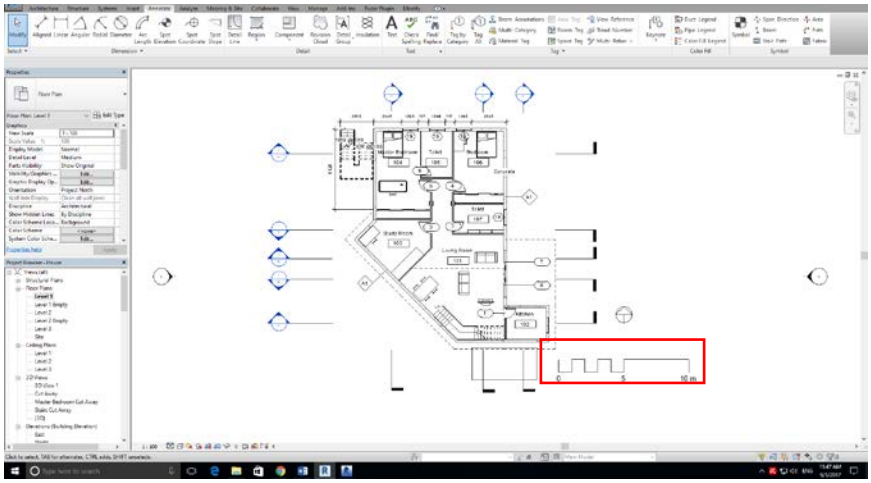
2. Duplicate Some templates are hosted, it must attach to a wall or ceiling; this setting cannot be changed later.



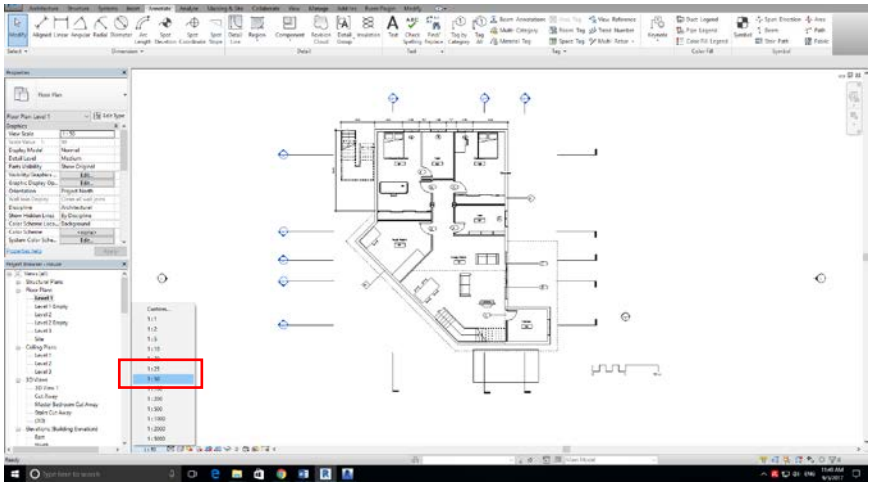
3. Choose the Metric Furniture Template.



4. When the Template is opened, a green cross is shown, they are the center reference plane.



5. Type W+T to create a tile window, then type Z+A to zoom all.

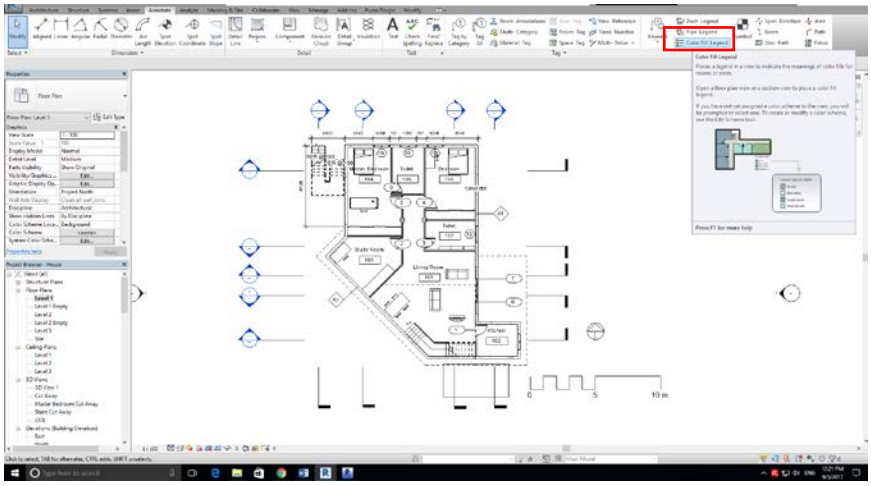


9.4 Adding Legends

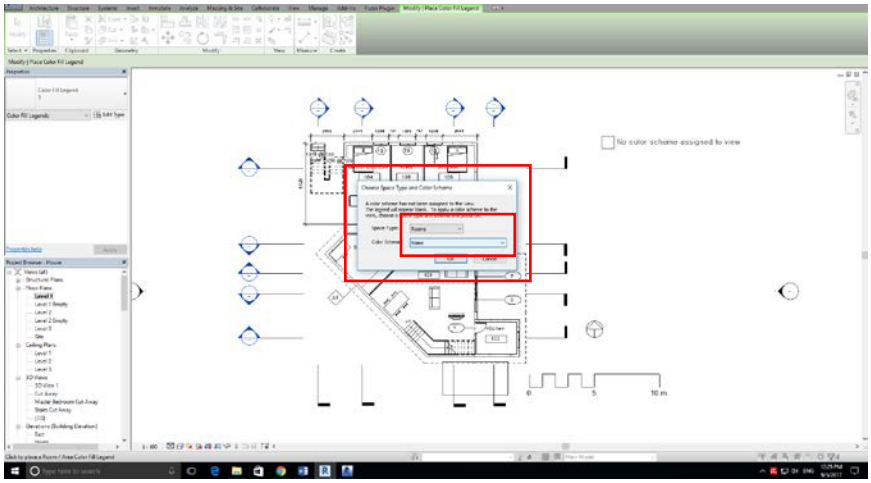
There are flexible and non-flexible families in Revit, non-flexible families are called parametric families. It starts with choosing a right template.

9.4.1 Selecting Template:

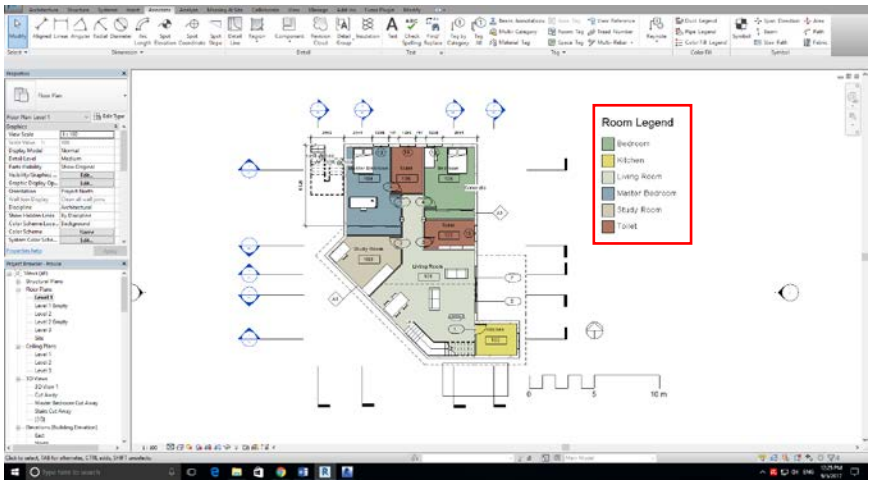
1. Select New Family under the Revit Logo, there are default templates for different usage.



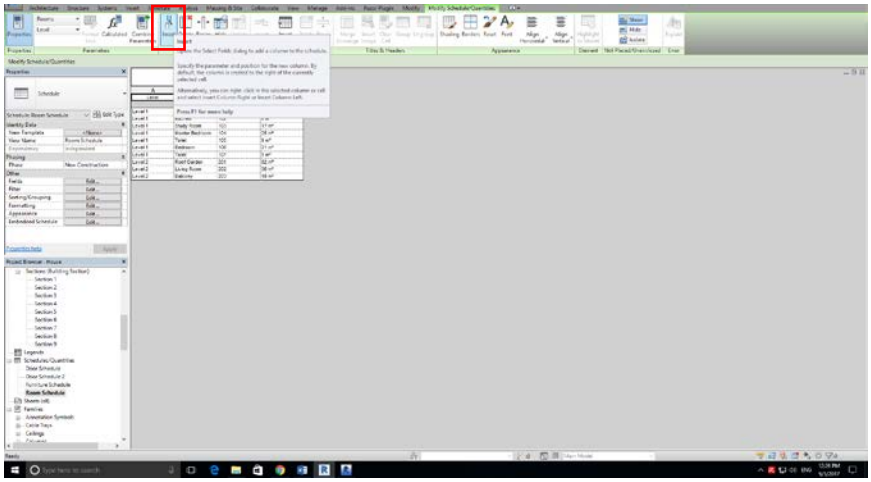
2. Duplicate Some templates are hosted, it must attach to a wall or ceiling; this setting cannot be changed later.



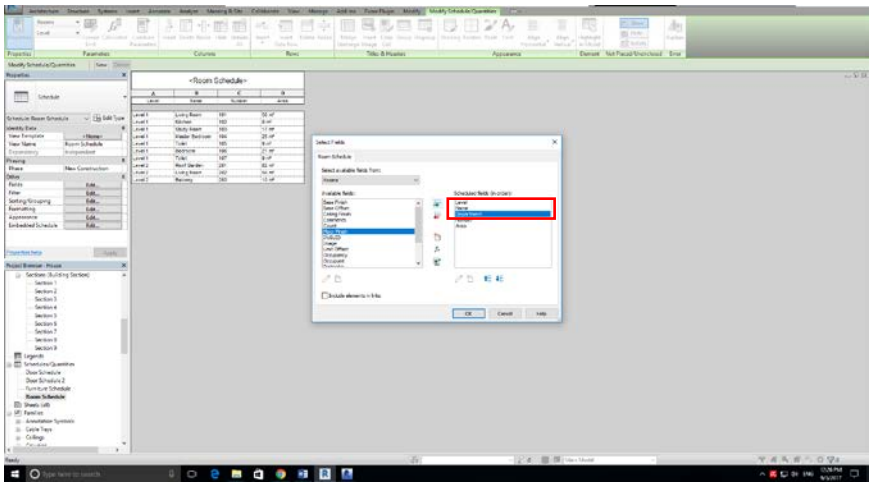
3. Choose the Metric Furniture Template.



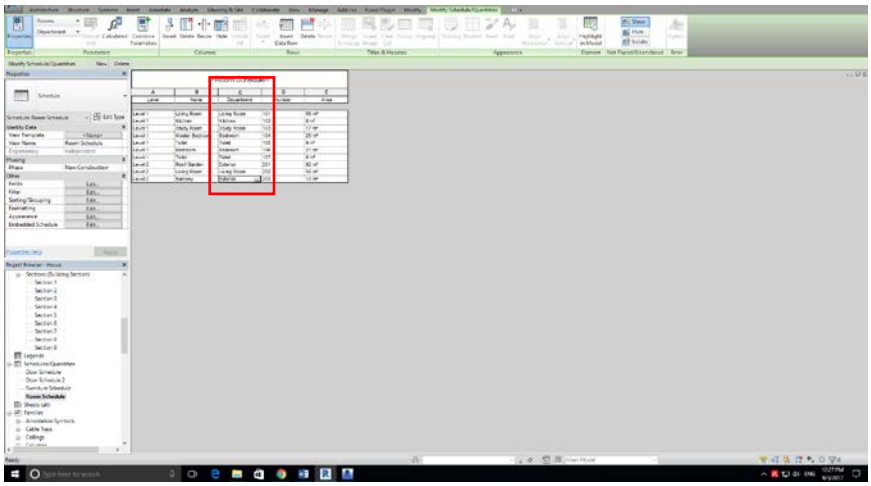
4. When the Template is opened, a green cross is shown, they are the center reference plane.



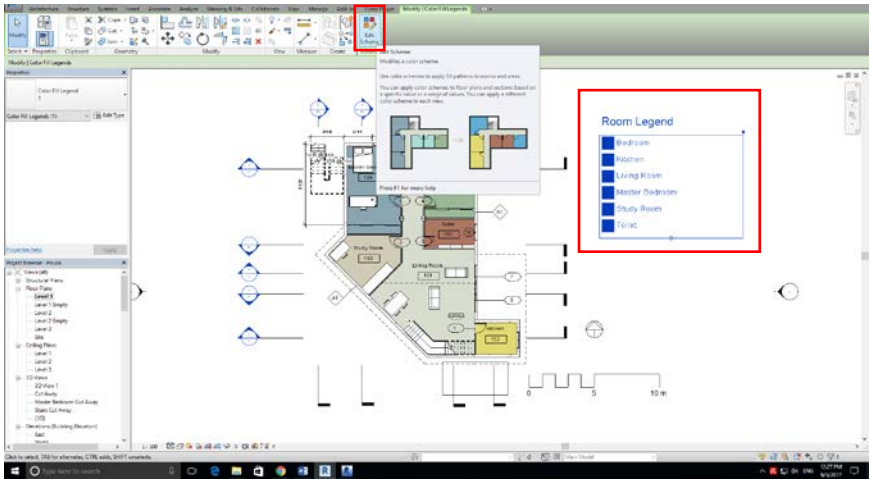
5. Type W+T to create a tile window, then type Z+A to zoom all.



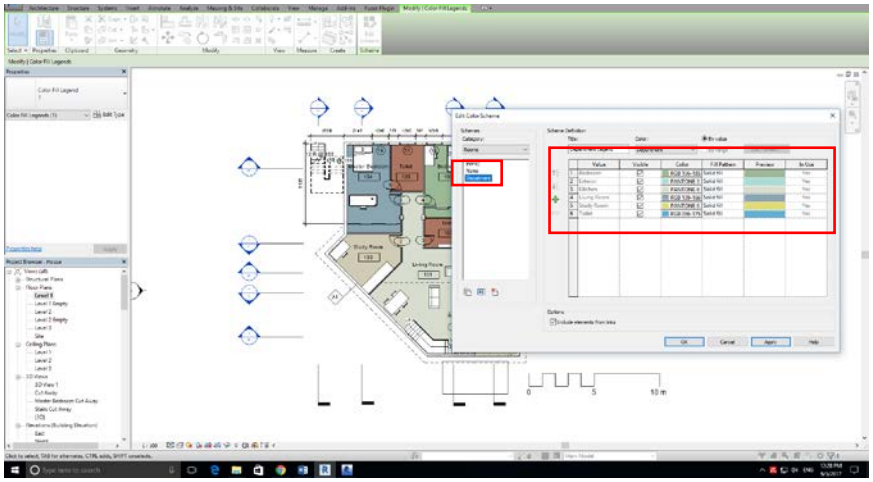
6. Choose the Metric Furniture Template.



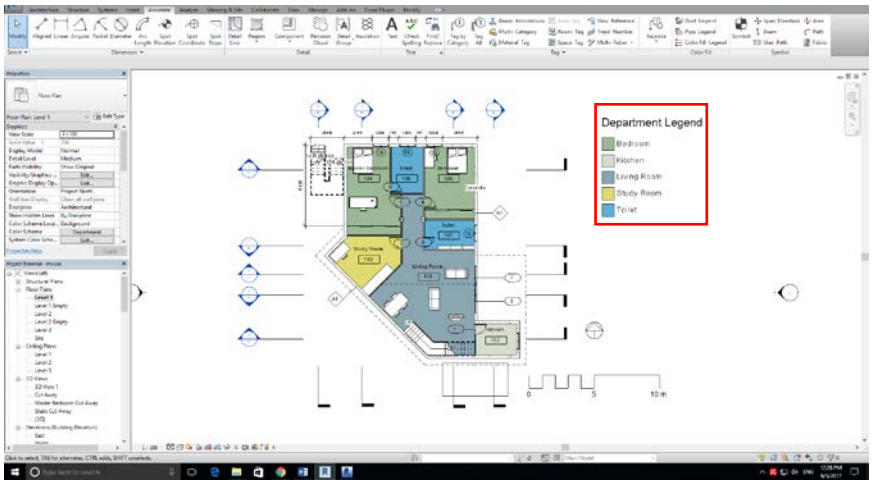
7. When the Template is opened, a green cross is shown, they are the center reference plane.



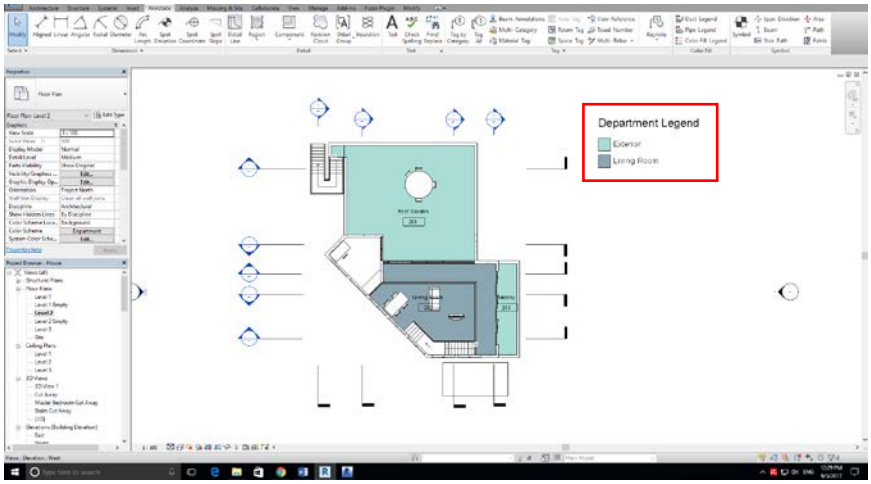
8. Type W+T to create a tile window, then type Z+A to zoom all.



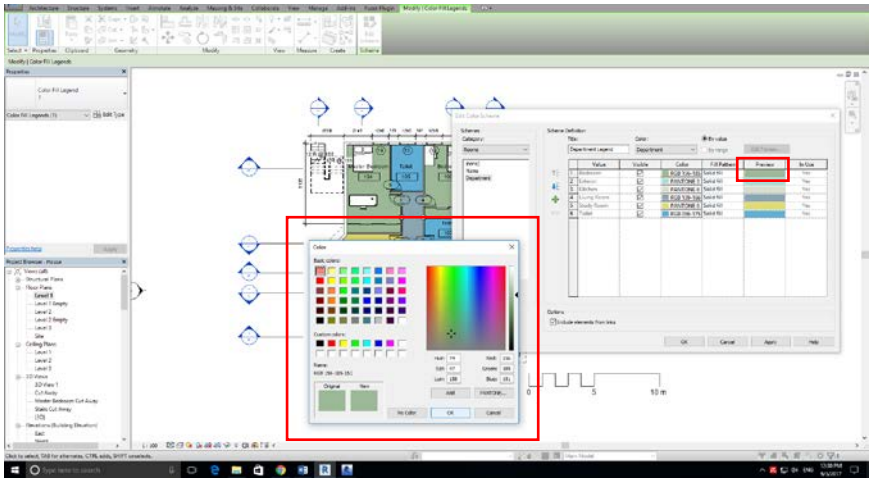
9. Choose the Metric Furniture Template.



10. When the Template is opened, a green cross is shown, they are the center reference plane.



11. Type W+T to create a tile window, then type Z+A to zoom all.

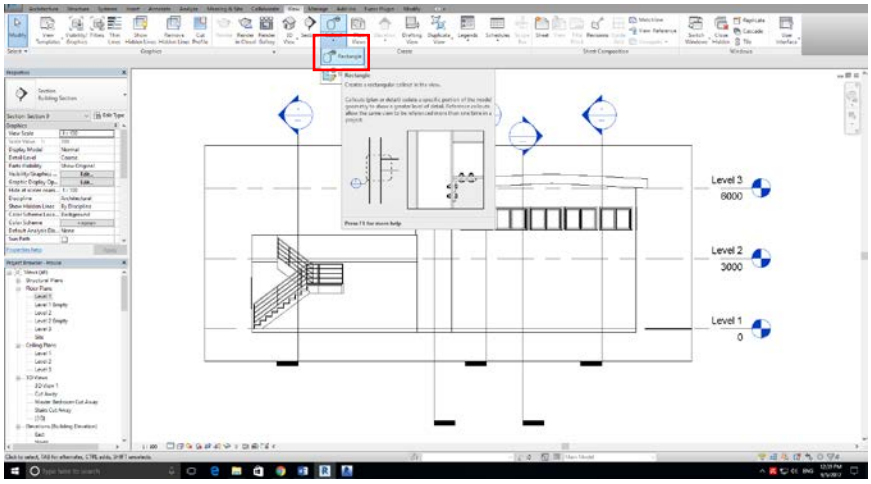


9.5 Creating a Detail Callout

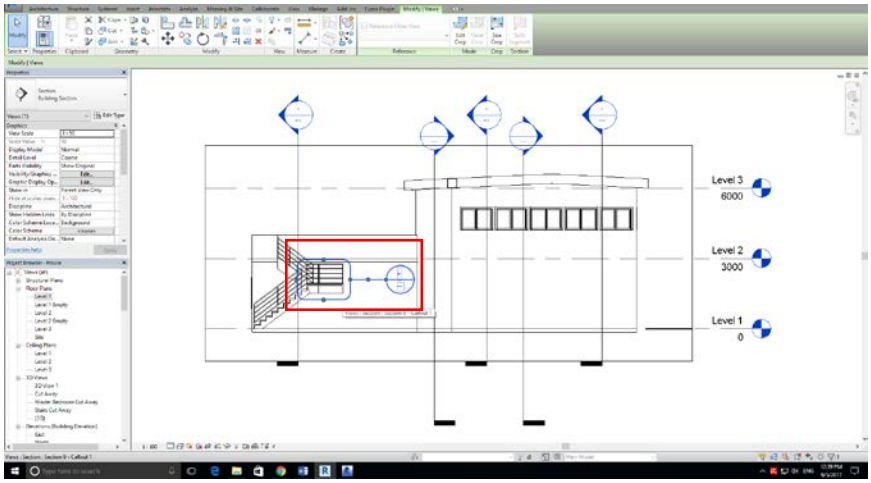
There are flexible and non-flexible families in Revit, non-flexible families are called parametric families. It starts with choosing a right template.

9.5.1 Selecting Template:

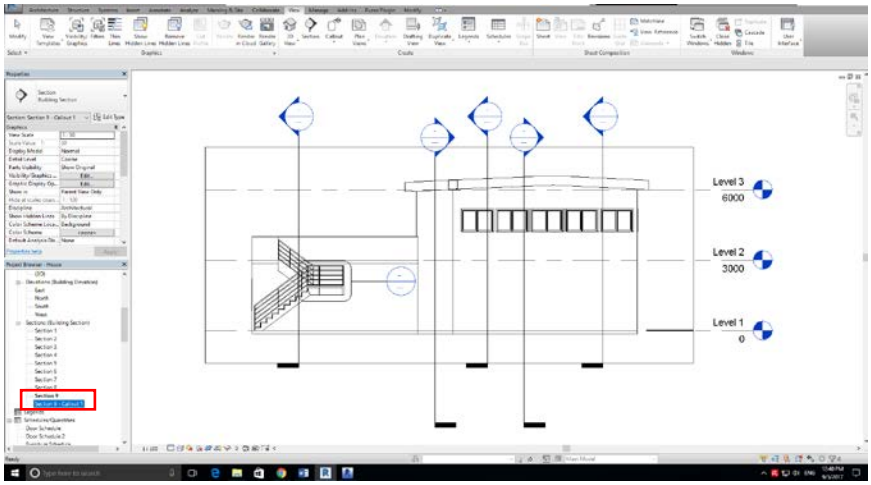
1. Select New Family under the Revit Logo, there are default templates for different usage.



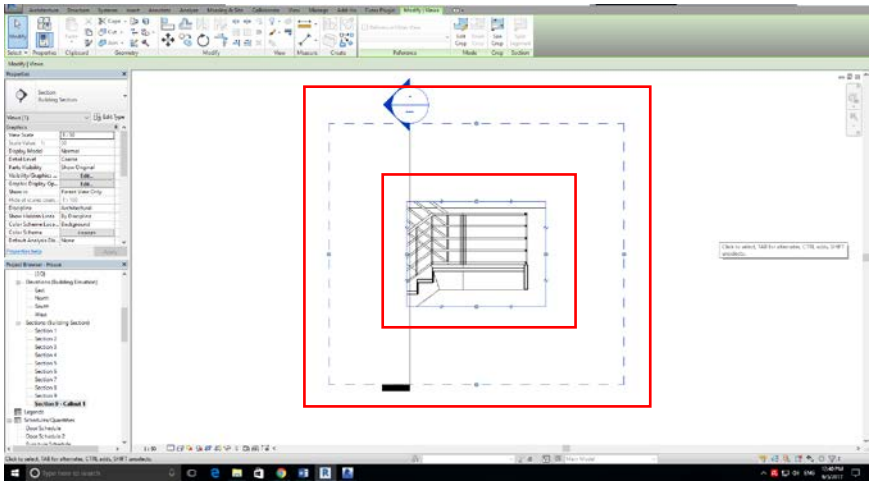
2. Duplicate Some templates are hosted, it must attach to a wall or ceiling; this setting cannot be changed later.



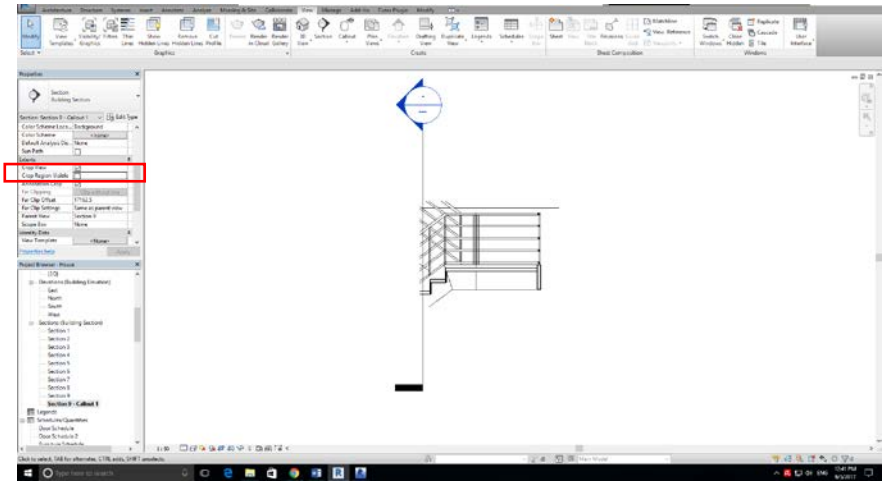
3. Choose the Metric Furniture Template.



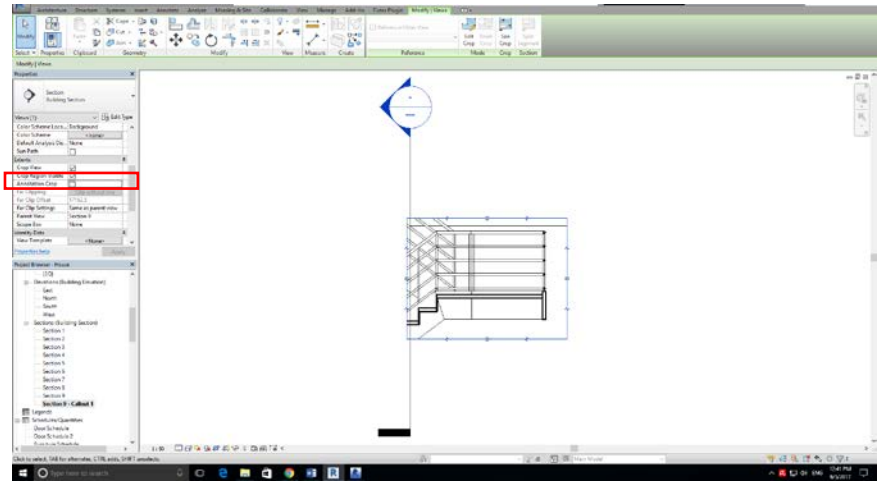
4. When the Template is opened, a green cross is shown, they are the center reference plane.



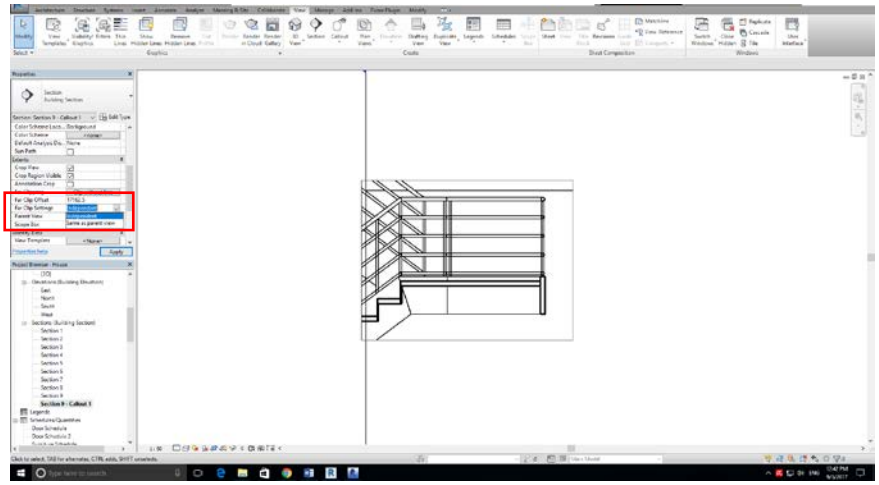
5. Type W+T to create a tile window, then type Z+A to zoom all.



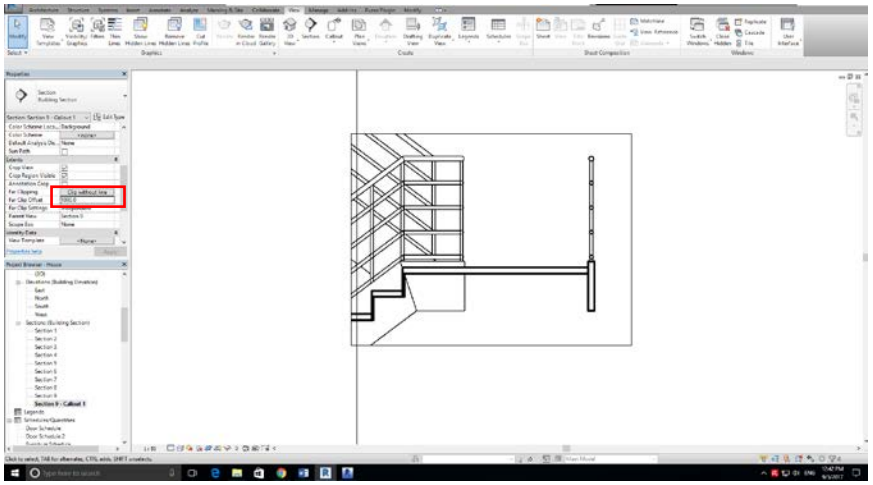
6. Choose the Metric Furniture Template.



7. When the Template is opened, a green cross is shown, they are the center reference plane.



8. Type W+T to create a tile window, then type Z+A to zoom all.

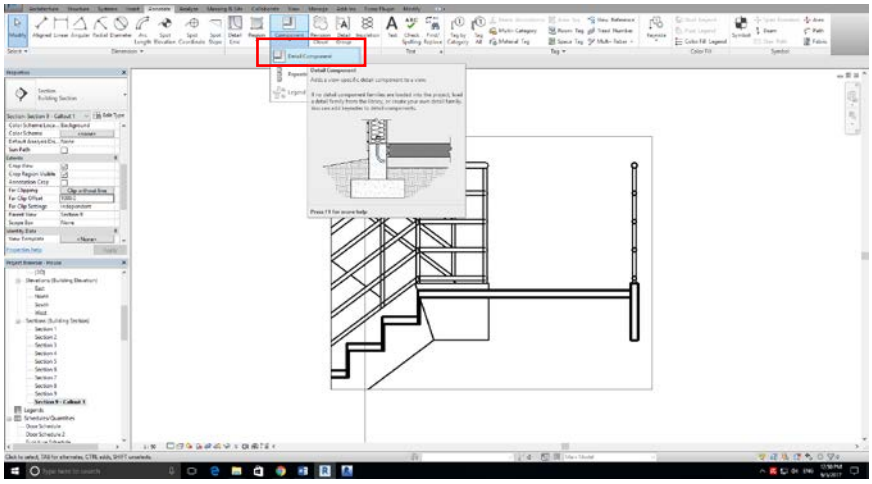


9.6 Adding Detail Components

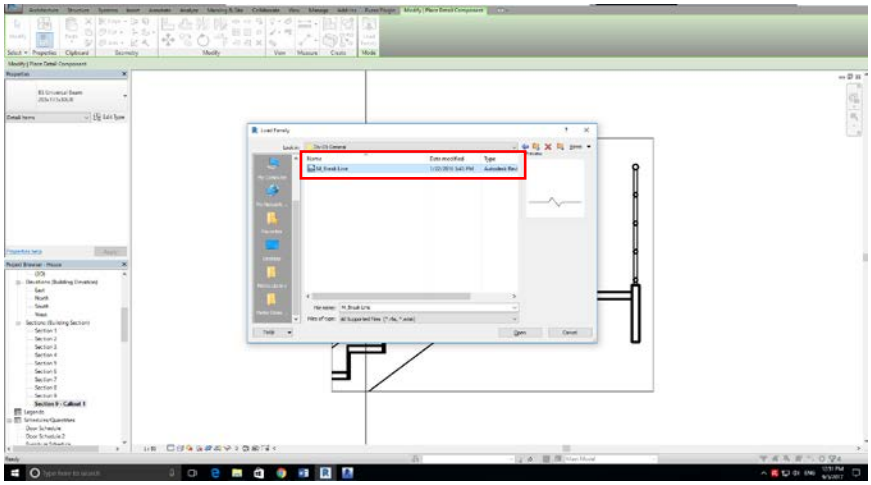
There are flexible and non-flexible families in Revit, non-flexible families are called parametric families. It starts with choosing a right template.

9.6.1 Selecting Template:

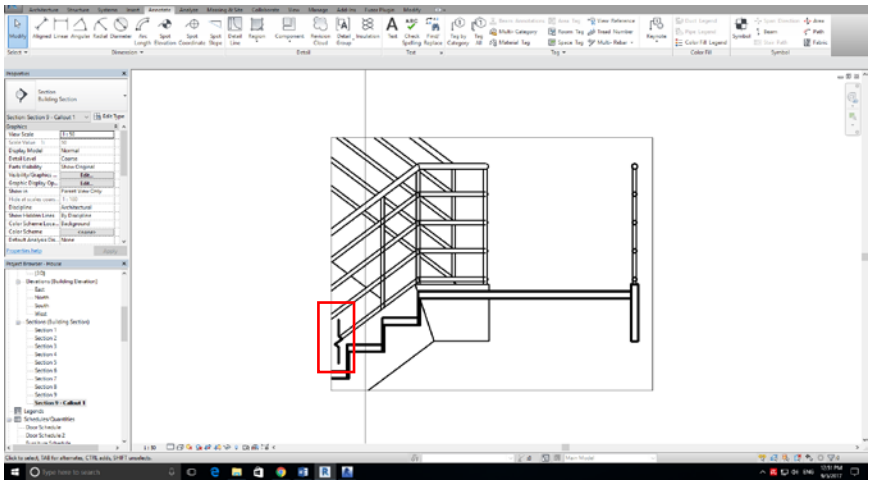
1. Select New Family under the Revit Logo, there are default templates for different usage.



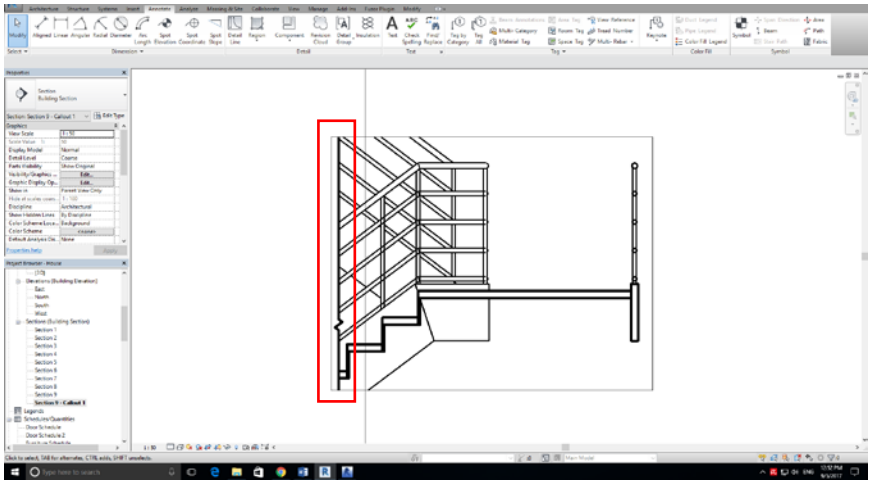
2. Duplicate Some templates are hosted, it must attach to a wall or ceiling; this setting cannot be changed later.



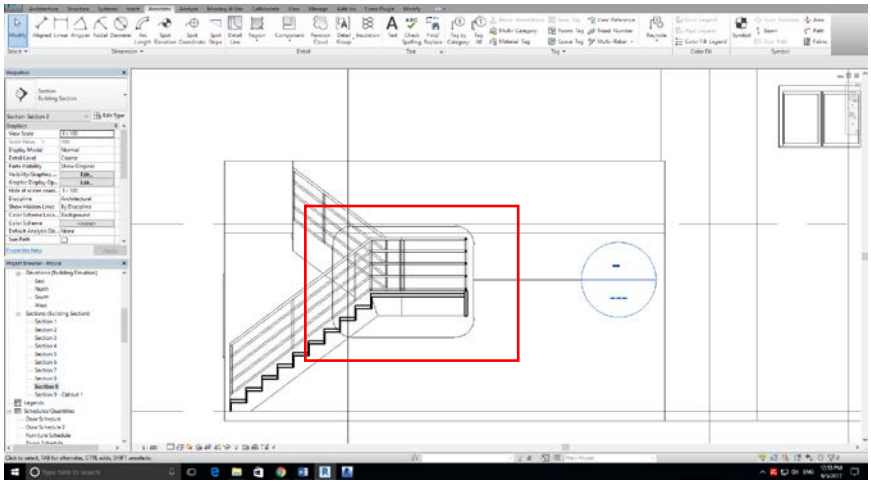
3. Choose the Metric Furniture Template.



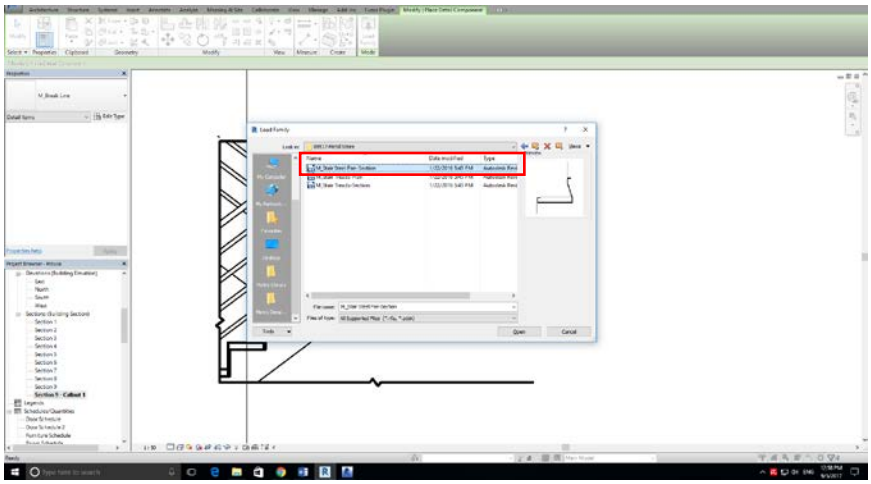
4. When the Template is opened, a green cross is shown, they are the center reference plane.



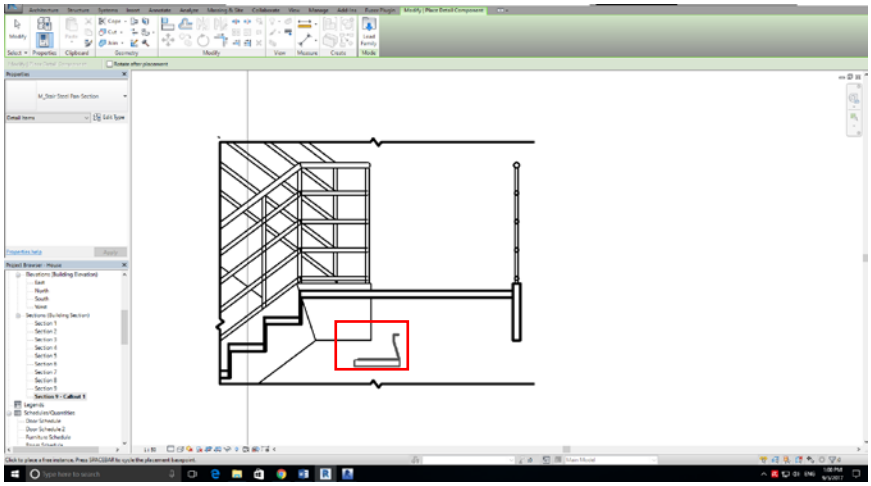
5. Type W+T to create a tile window, then type Z+A to zoom all.



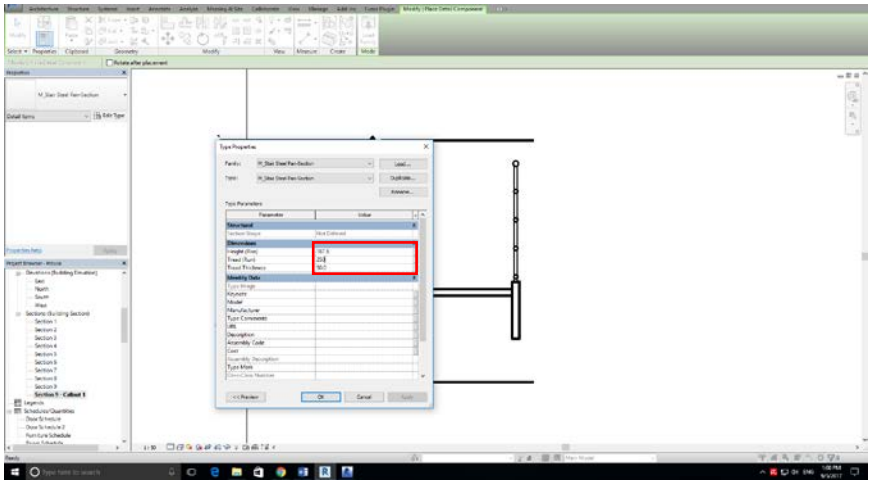
6. Choose the Metric Furniture Template.



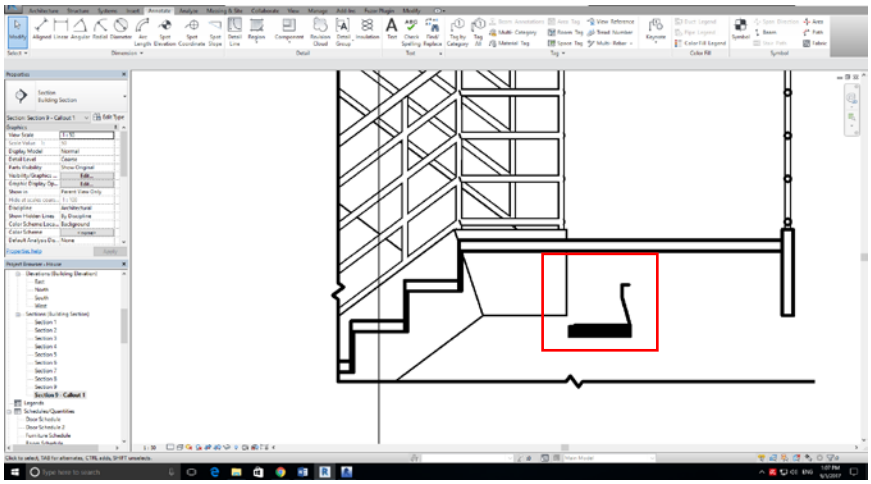
7. When the Template is opened, a green cross is shown, they are the center reference plane.



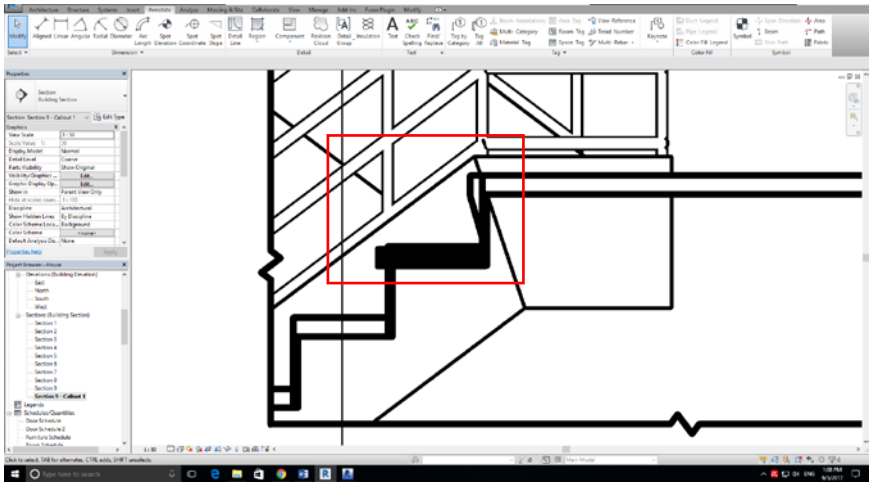
8. Type W+T to create a tile window, then type Z+A to zoom all.



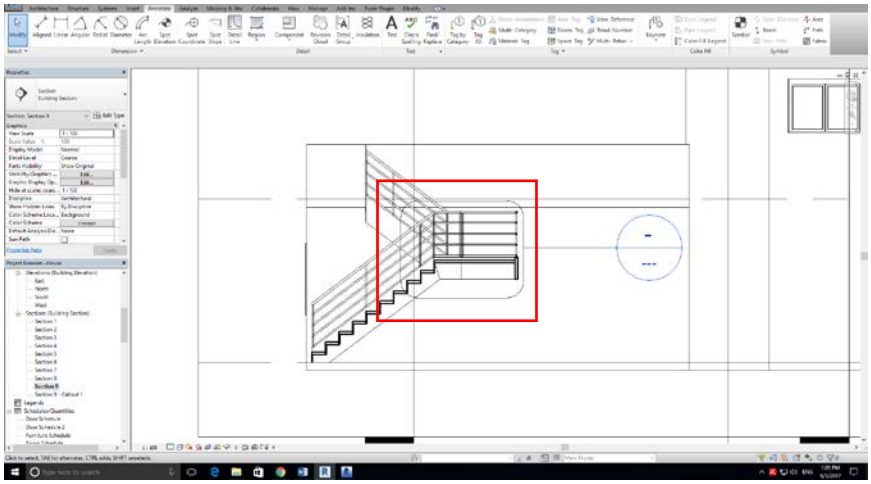
9. Choose the Metric Furniture Template.



10. When the Template is opened, a green cross is shown, they are the center reference plane.



11. Type W+T to create a tile window, then type Z+A to zoom all.

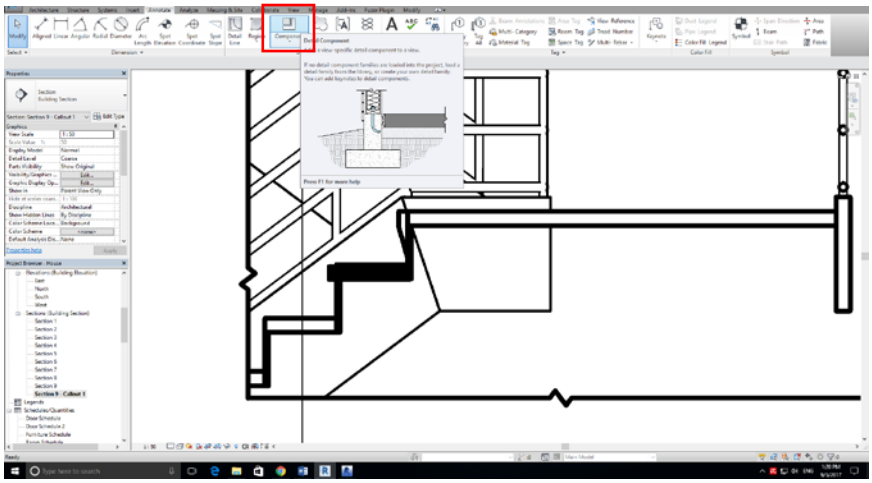


9.7 Using Arrays to Parametrically Duplicate Objects

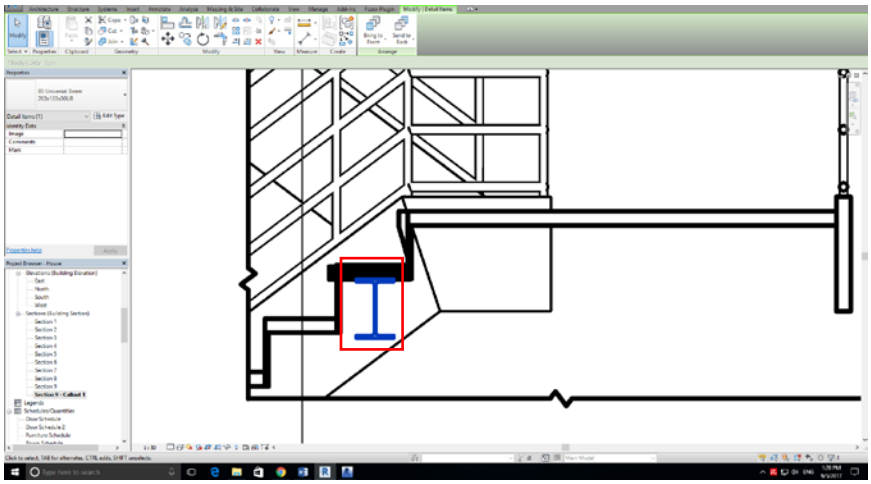
There are flexible and non-flexible families in Revit, non-flexible families are called parametric families. It starts with choosing a right template.

9.7.1 Selecting Template:

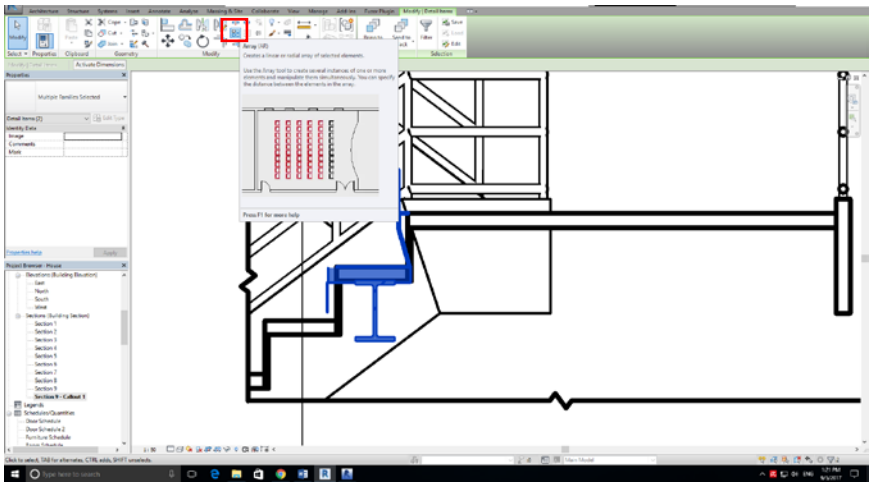
1. Select New Family under the Revit Logo, there are default templates for different usage.



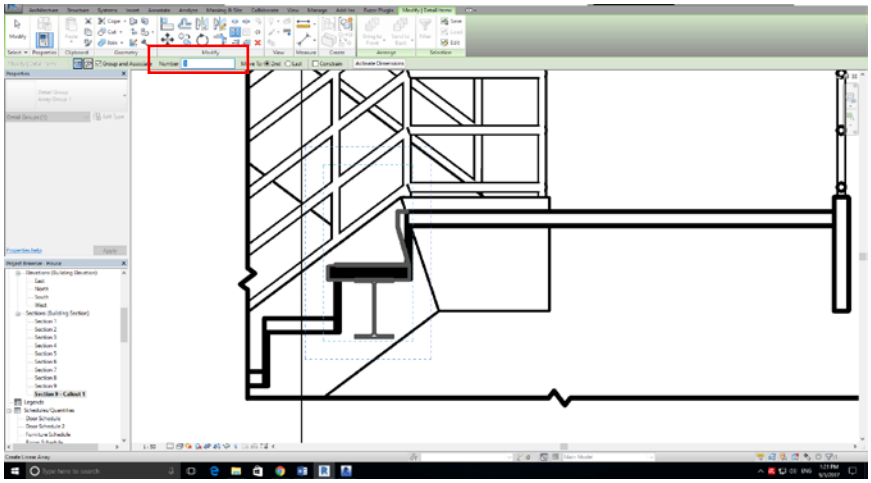
2. Duplicate Some templates are hosted, it must attach to a wall or ceiling; this setting cannot be changed later.



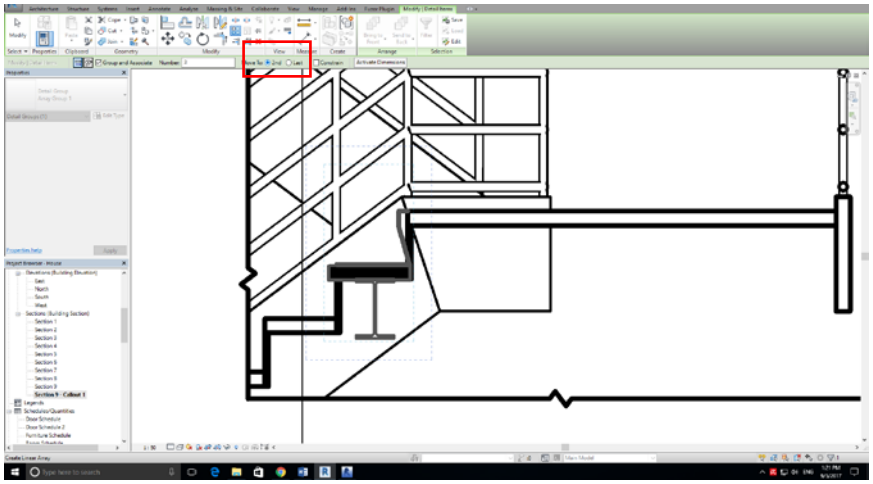
3. Choose the Metric Furniture Template.



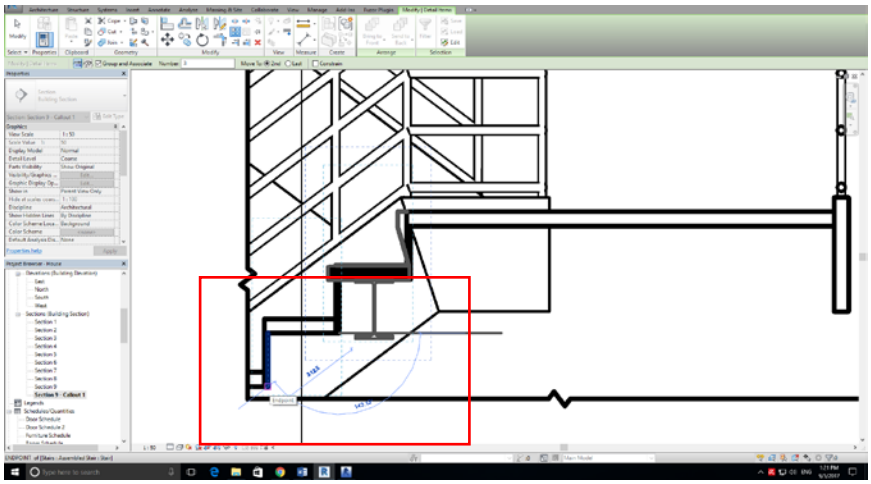
4. When the Template is opened, a green cross is shown, they are the center reference plane.



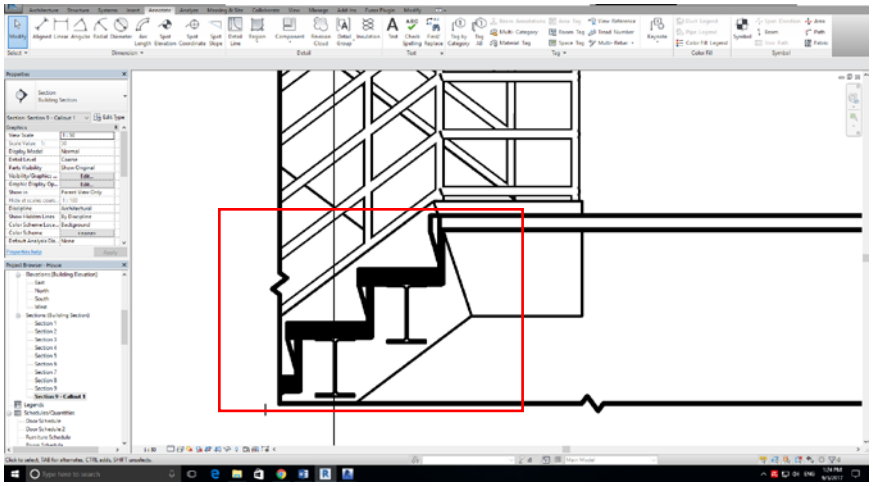
5. Type W+T to create a tile window, then type Z+A to zoom all.



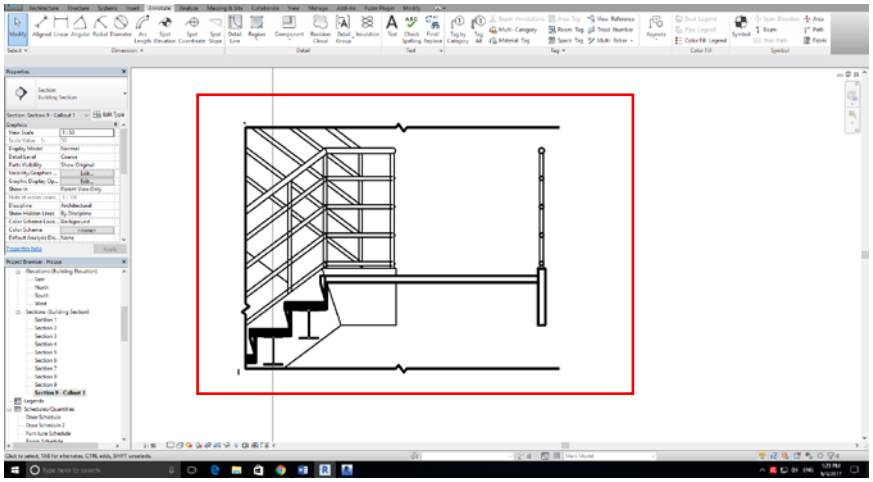
6. Choose the Metric Furniture Template.



7. When the Template is opened, a green cross is shown, they are the center reference plane.



8. Type W+T to create a tile window, then type Z+A to zoom all.



10. The Basics of Families

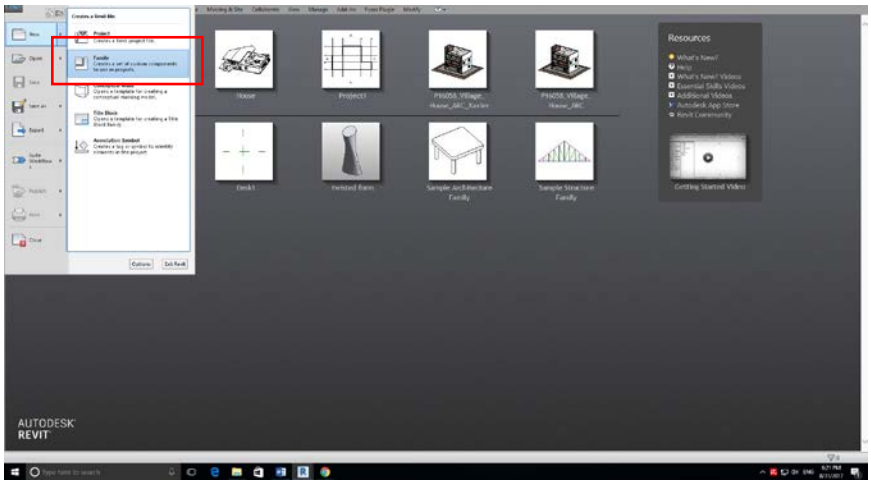
10.1 Understanding Families

10.2 Creating a New family from a Template

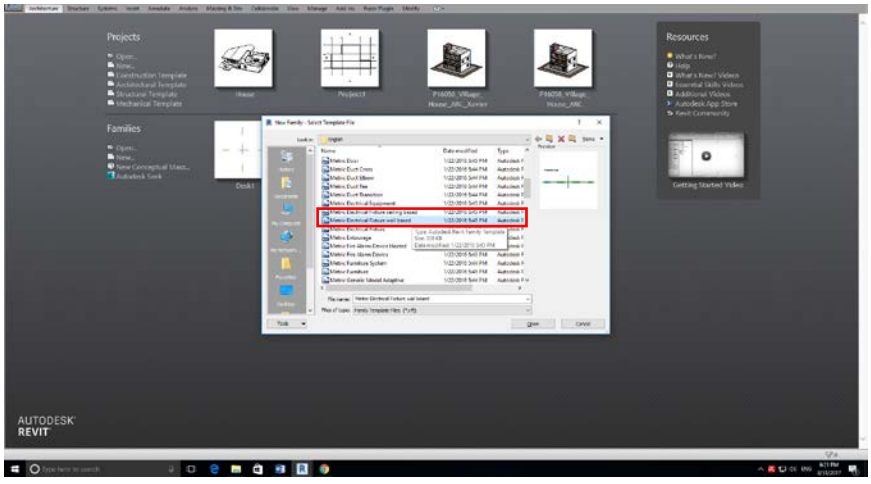
There are flexible and non-flexible families in Revit, non-flexible families are called parametric families. It starts with choosing a right template.

10.2.1 Selecting Template:

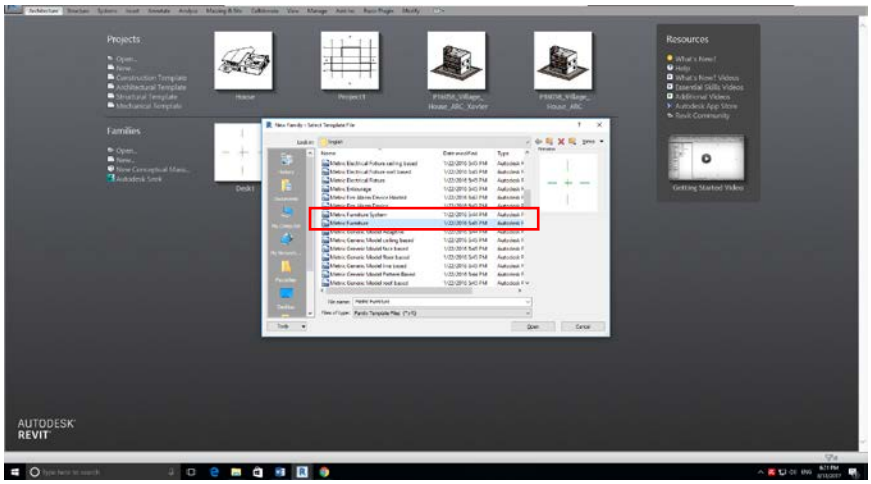
1. Select New Family under the Revit Logo, there are default templates for different usage.



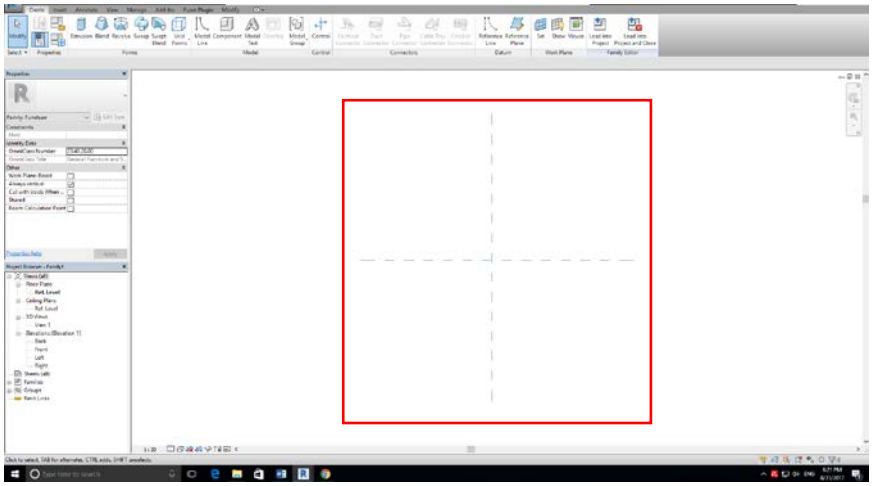
2. Duplicate Some templates are hosted, it must attach to a wall or ceiling; this setting cannot be changed later.



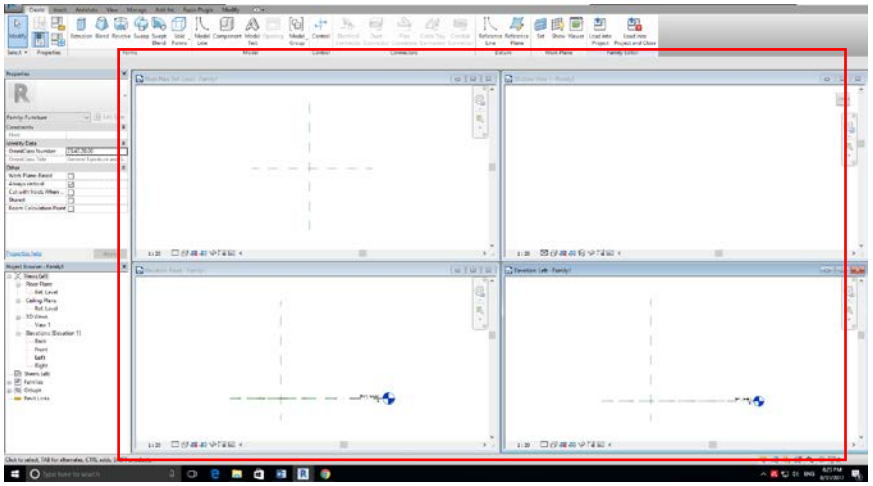
3. Choose the Metric Furniture Template.



4. When the Template is opened, a green cross is shown, they are the center reference plane.

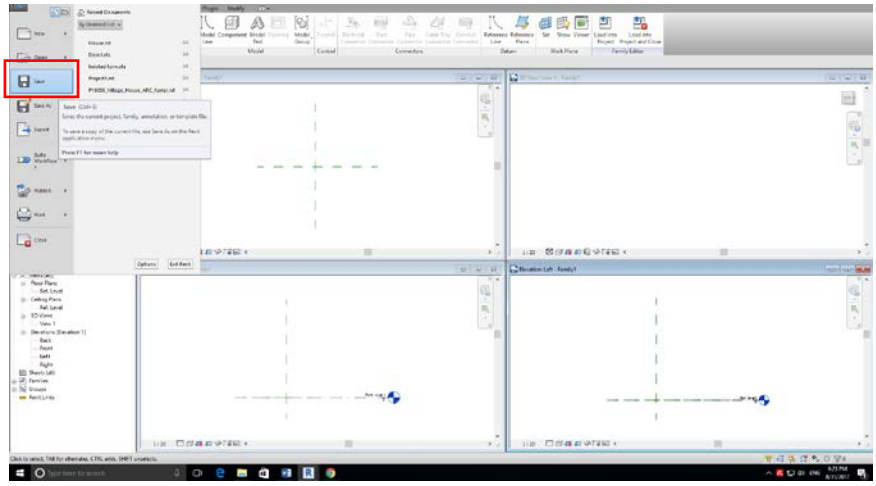


5. Type W+T to create a tile window, then type Z+A to zoom all.

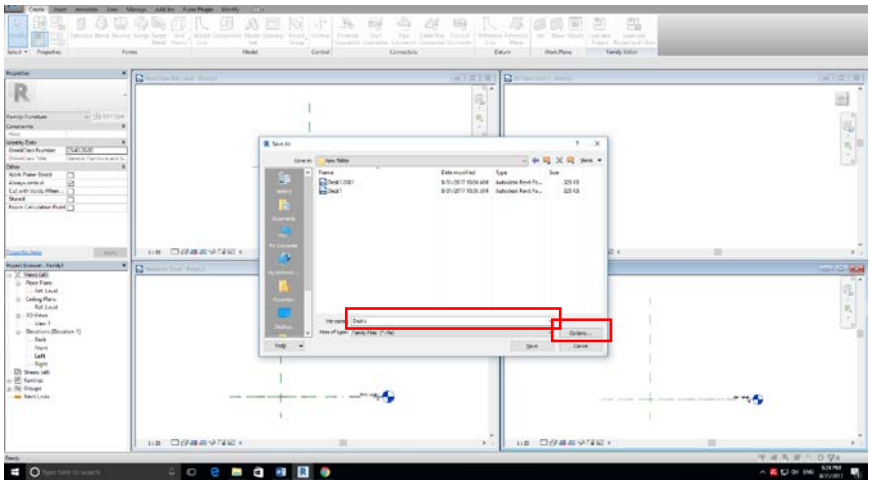


10.2.2 Save:

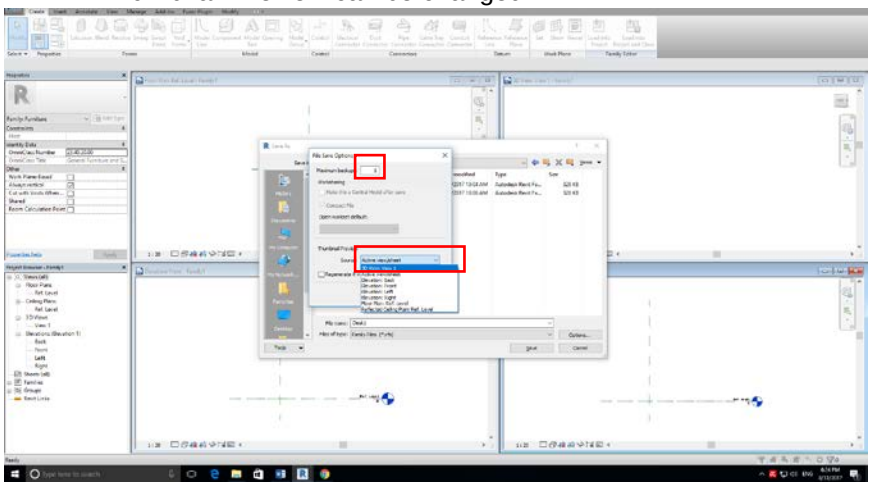
1. Press save under the Revit Logo, the save as window is shown.



2. Type in a name for the family and click on the option button.



3. In the File Save Option Window, the Maximum Backup and Thumbnail Preview can be changed.

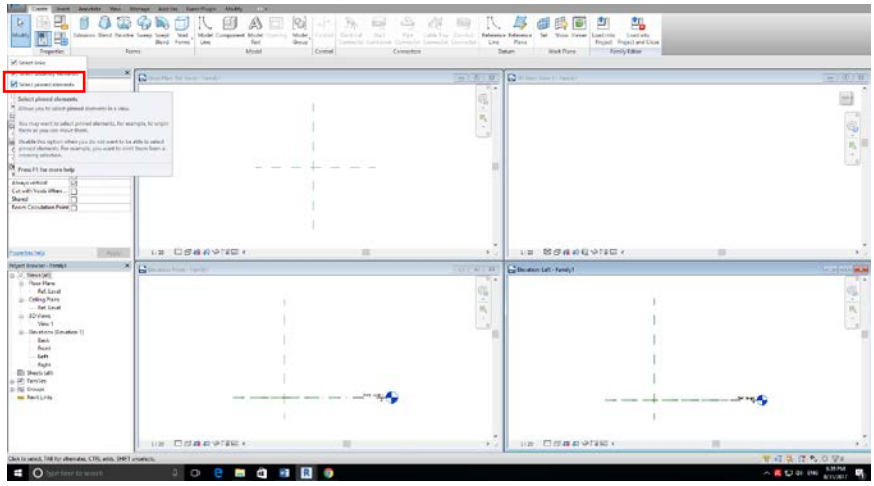


10.3 Using Reference Planes, Parameters and Constraints

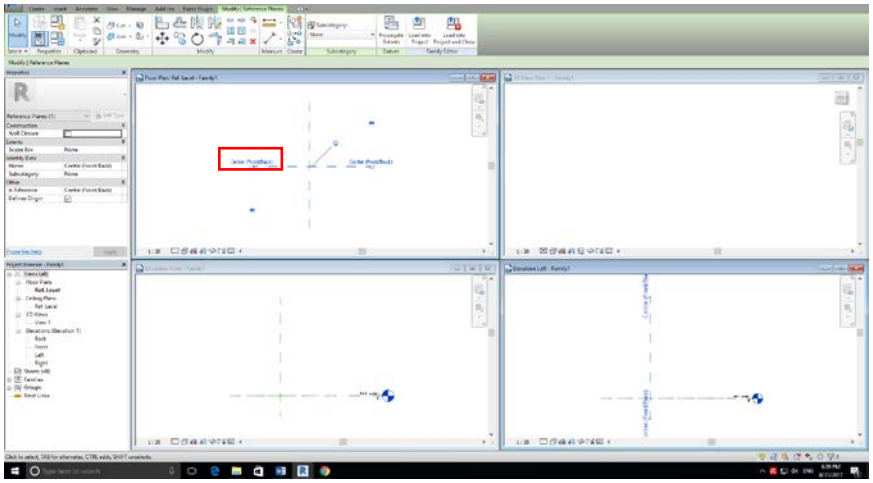
Reference Planes, Parameters and Constraints are the basic components of the parametric design. The further design will be built on these.

10.3.1 Reference Plane:

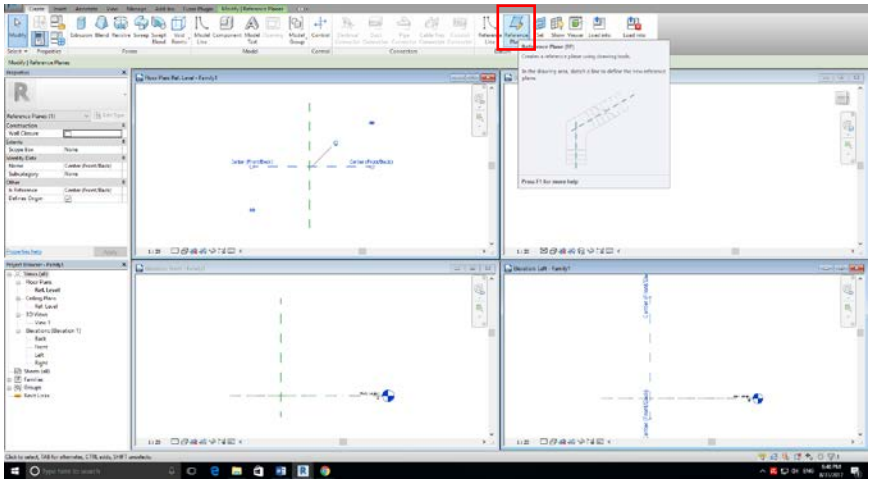
1. Check the box Select Pinned Elements; then the center reference planes can be selected.



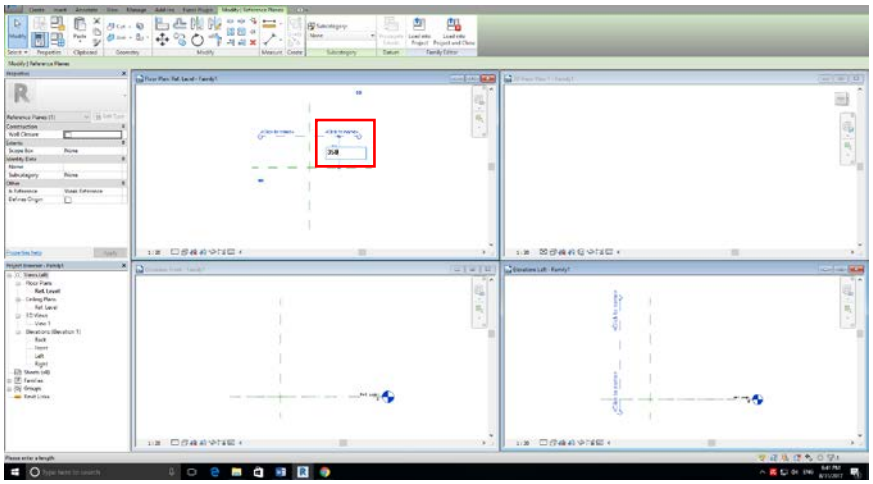
2. Select the center reference plane, the words, Center (Front/Back) appear, indicating the plane's name.



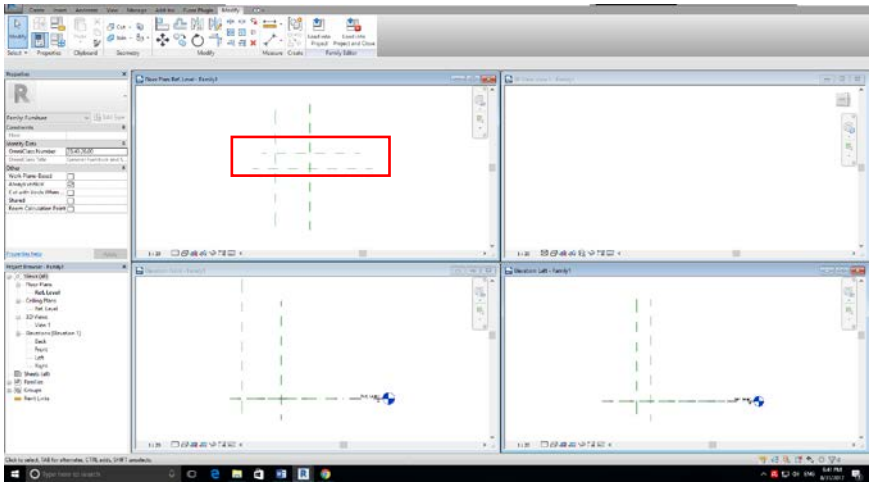
3. Click on the Reference Plane command under the modify panel, create additional reference plane for the design.



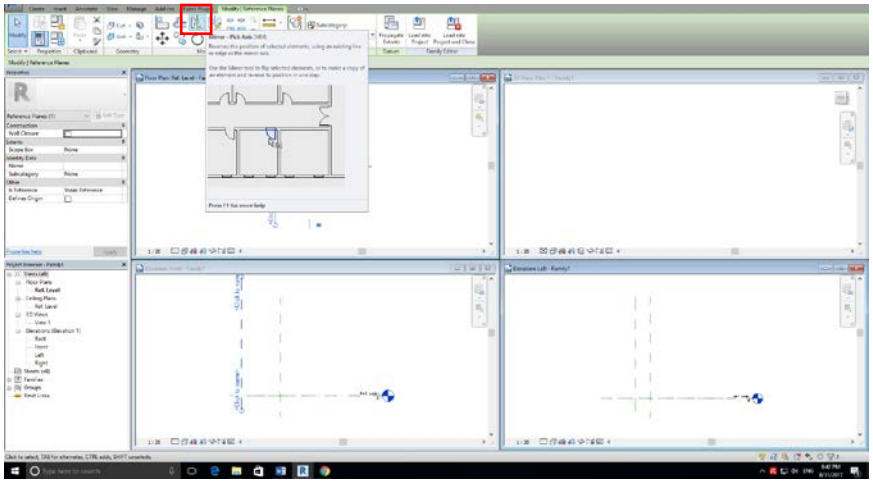
4. Draw a reference plane and use temporary dimensions to adjust the distance from the center reference plane.



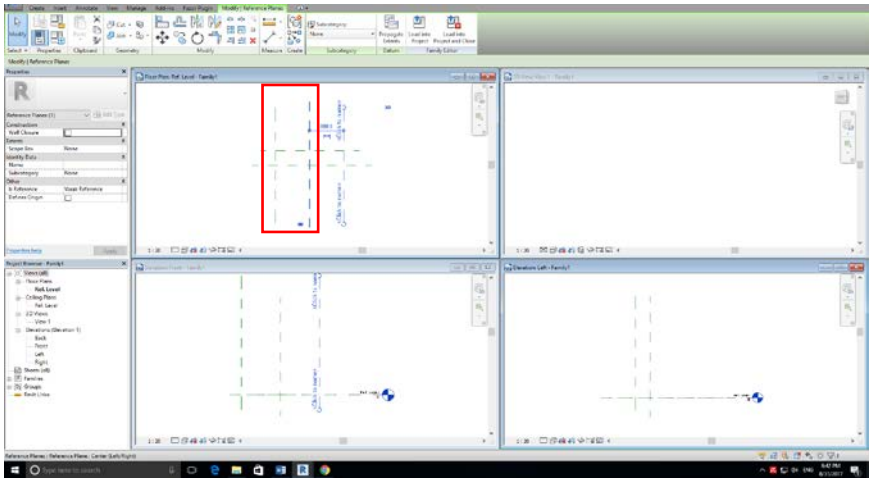
5. Draw another reference plane perpendicular to the previous plane, creating intersection points for future design.



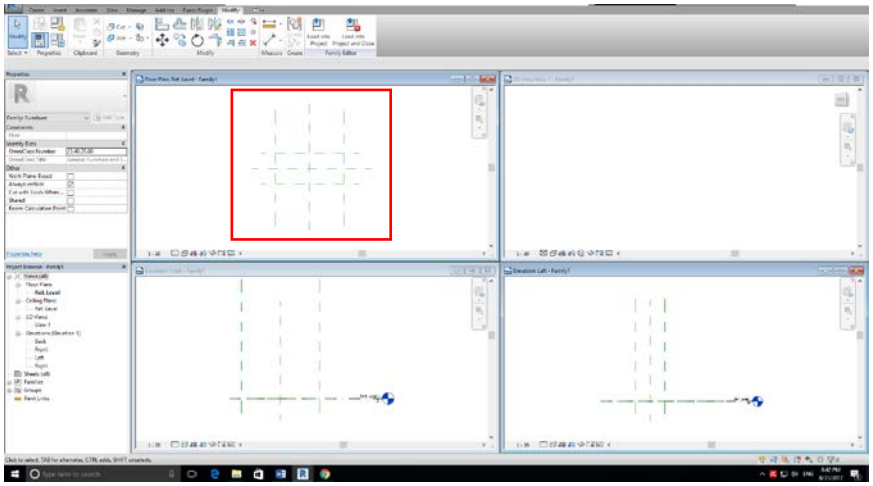
6. Click on the Mirror Tool to reflect the reference planes to the other side of the center reference plane.



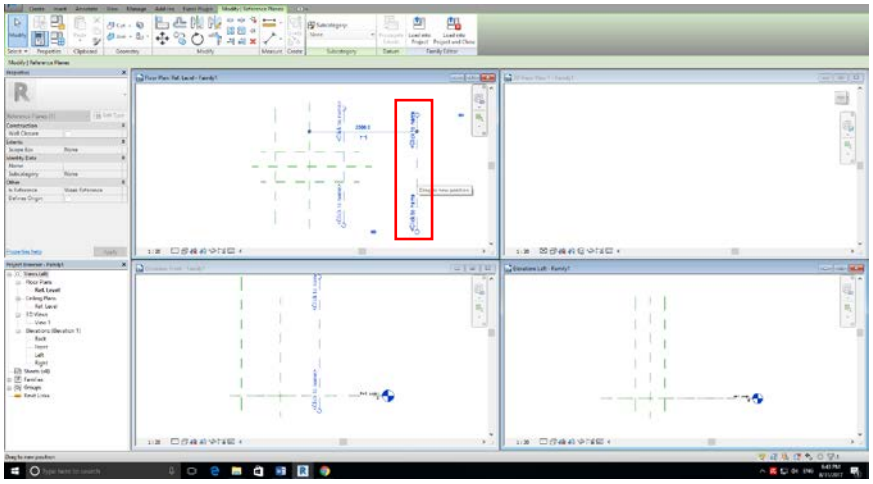
7. Select the object to be mirrored, then select the axis of reflection.



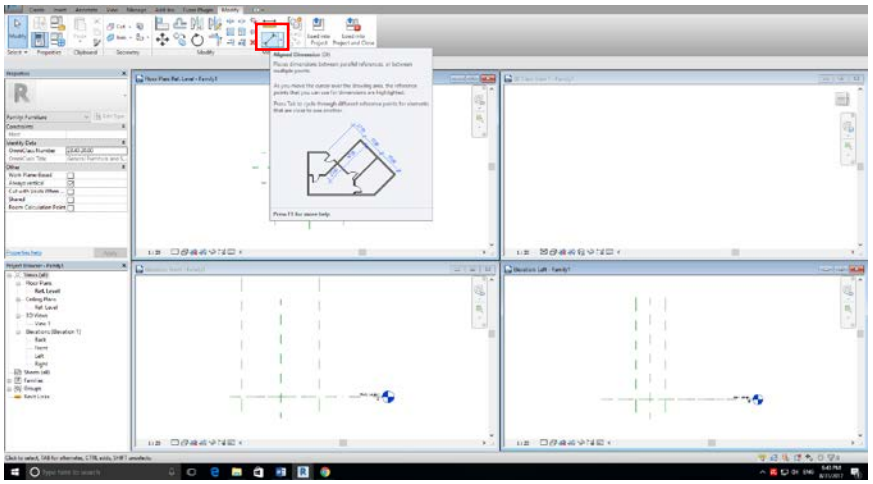
8. Reflect another reference plane; the planes are also shown on the elevations.



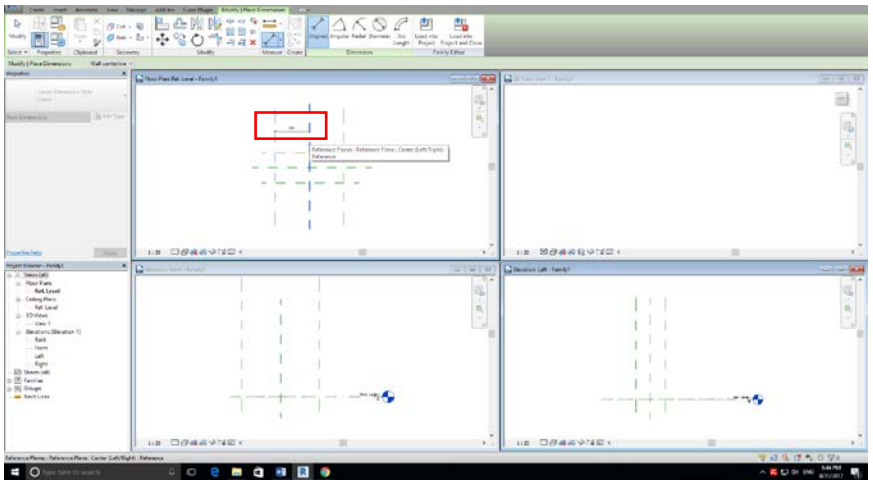
9. The created reference planes can move freely, while the Center reference planes cannot be moved or deleted.



10. Click on the Aligned Dimension Command to create the first set of parameters.

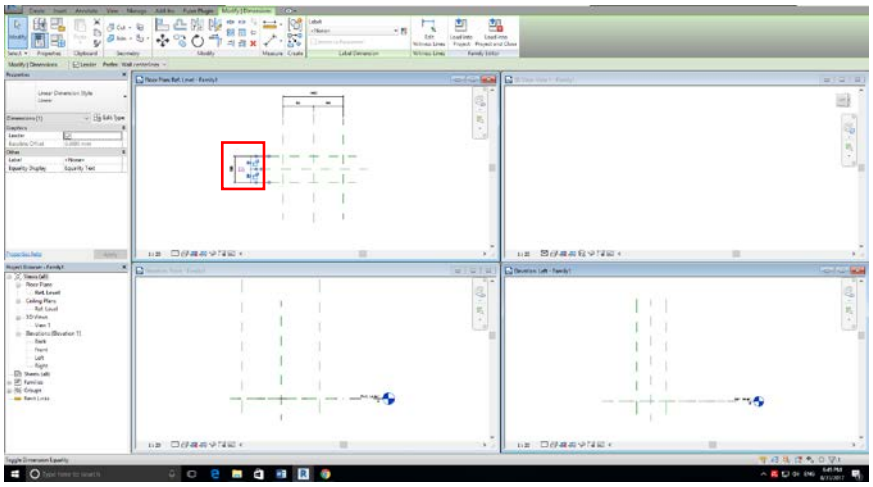


11. Create two set of dimensions, a total distance dimension and divided distance dimensions.

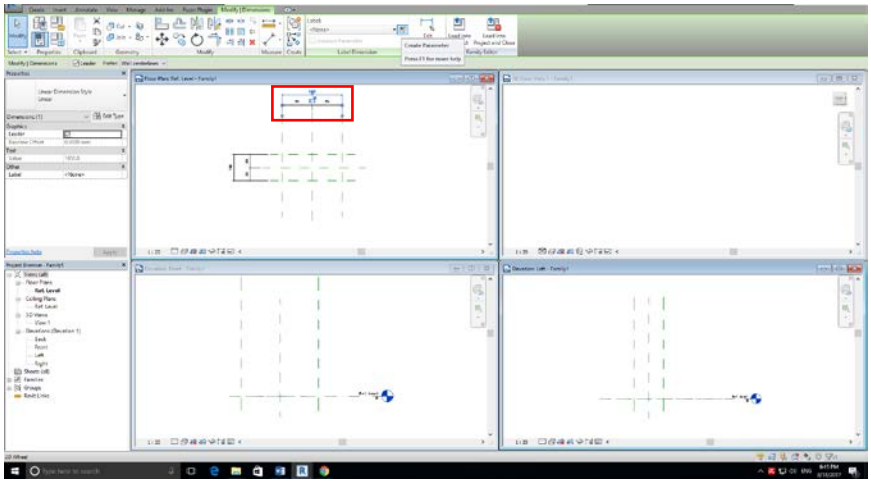


10.3.2 Parameters and Constraints:

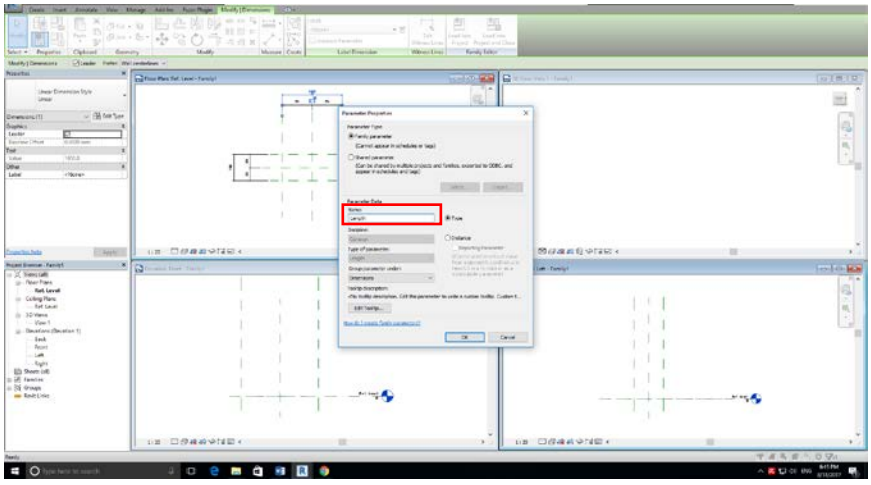
1. There is an EQ button, toggle it to fix the two dimensions equally, no matter how the planes move, their distances will be equal.



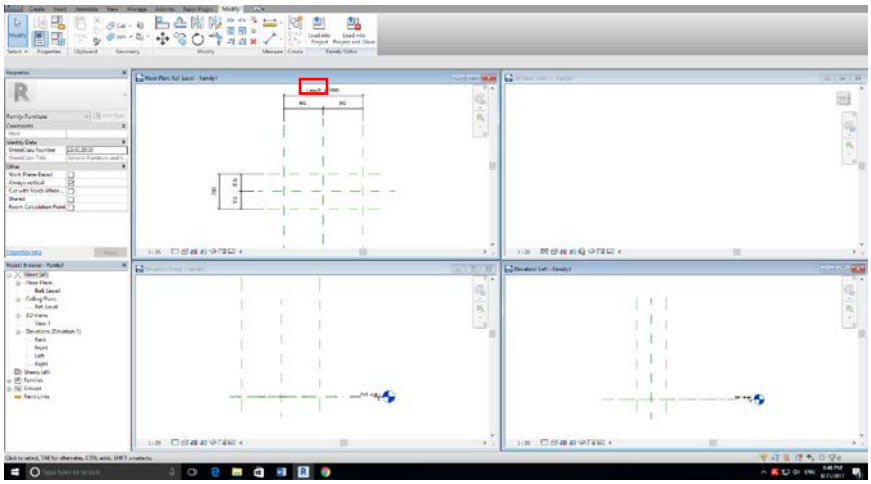
2. Select the upper Dimensions and click on the Create Parameter command under the modify panel.



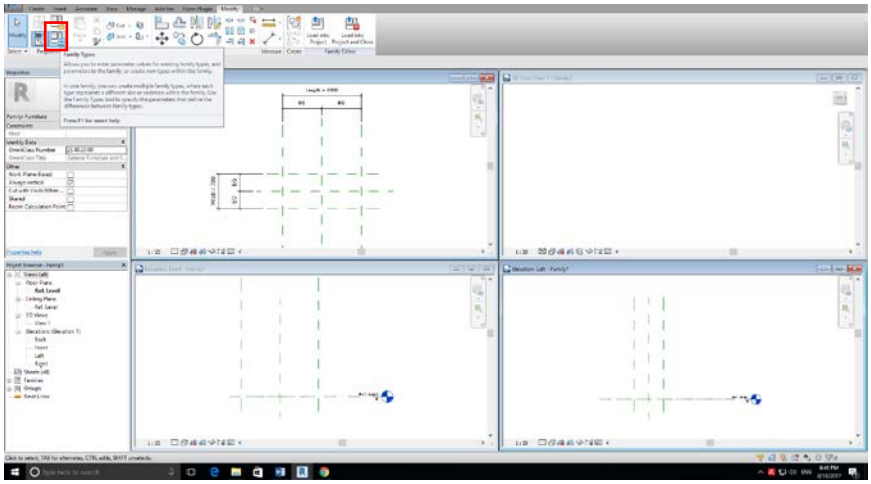
3. Type in a name for the parameter, check type instead of instance the idea of type and instance will be illustrated later.



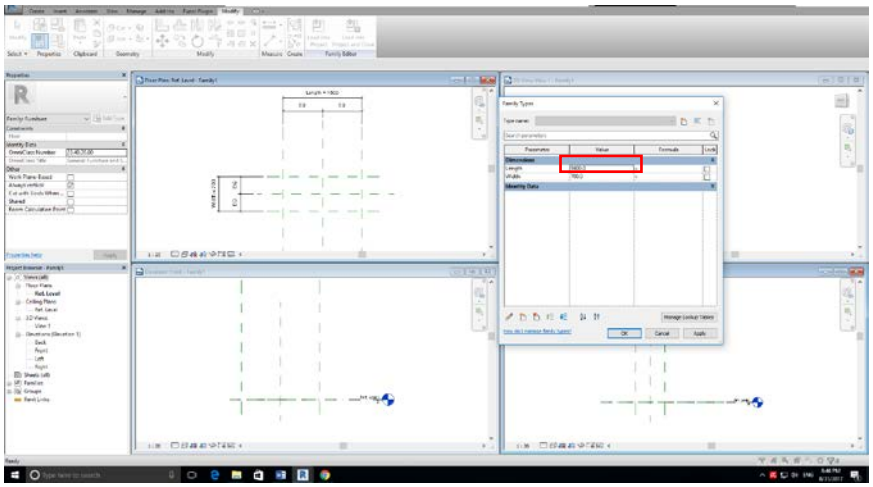
4. The name of the parameter is shown before the value.



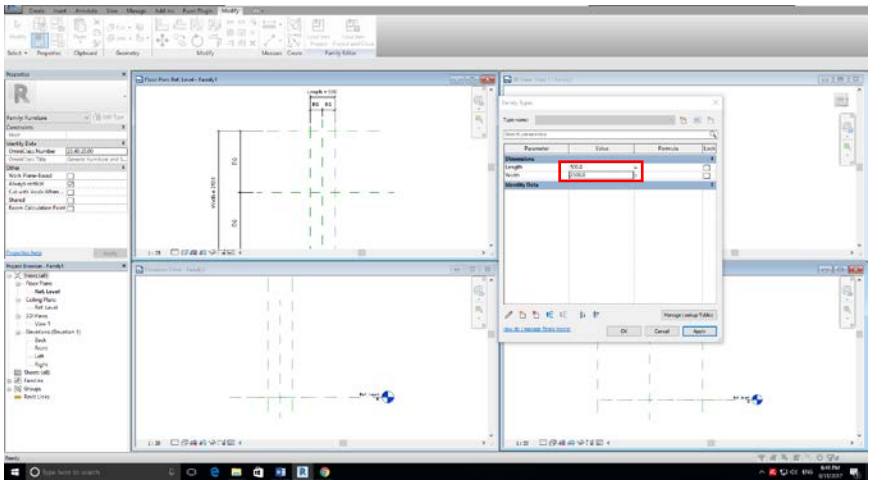
5. Enter the width as the other parameter, and click on Family Types under the modify panel.



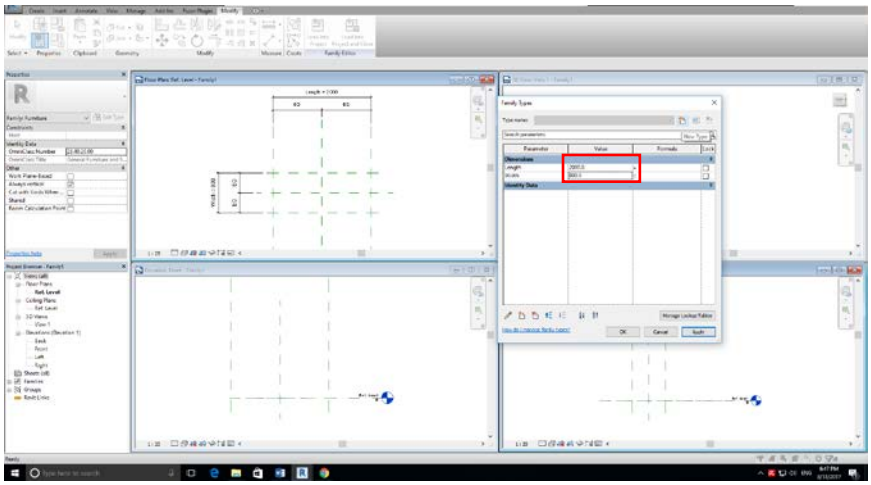
6. Parameters created previously is shown in the Type Window.



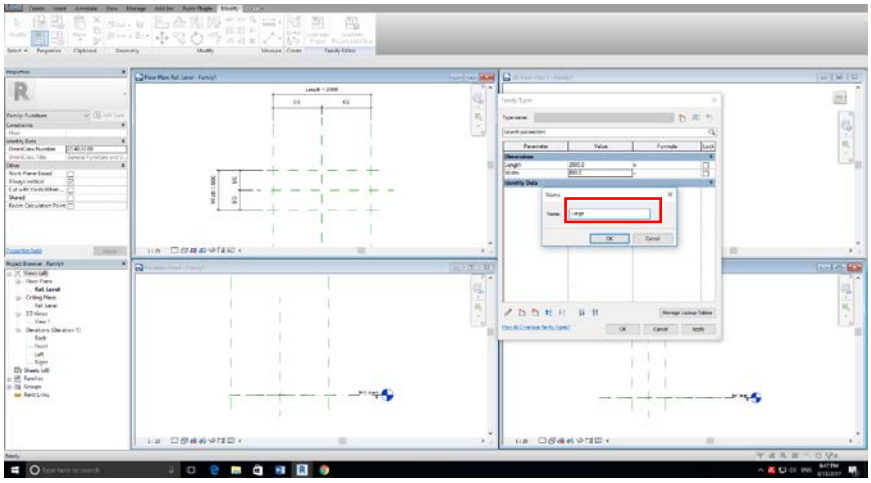
7. Type in a new value to the parameters; changes will be shown in the plan and elevation view.



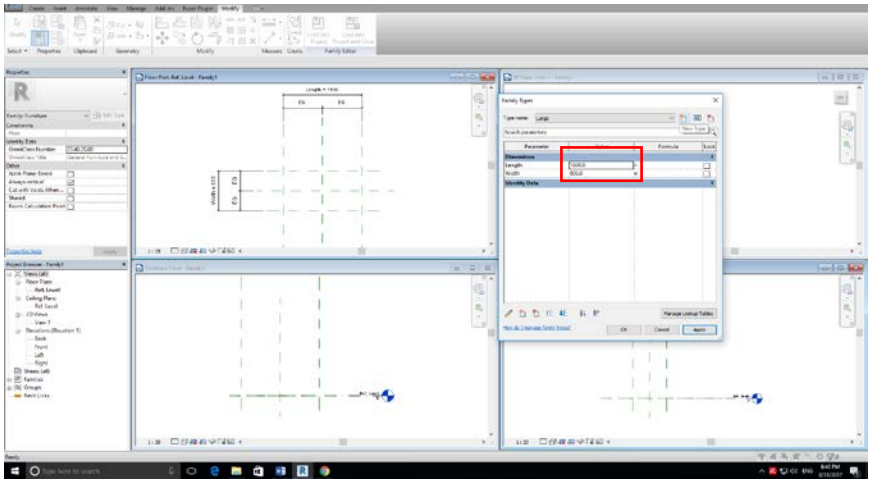
8. Enter a dimension and click on New Type, the type has a set of fixed value and is under family.



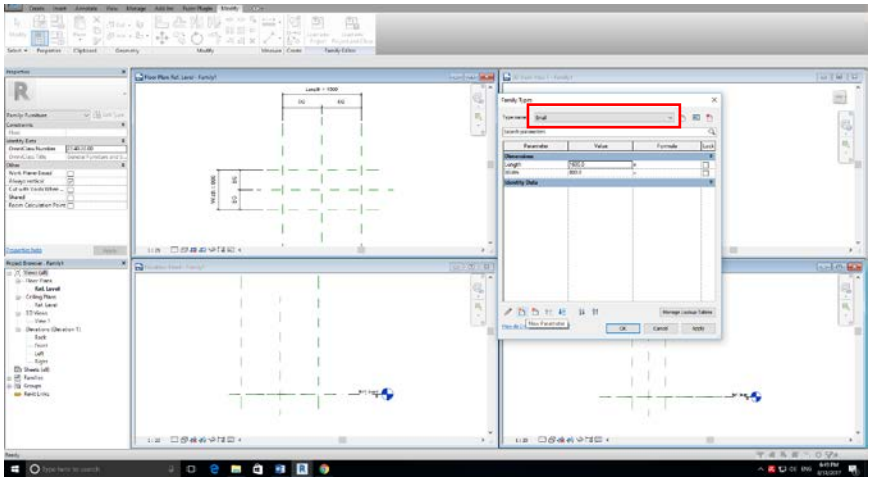
9. Name the New Type.



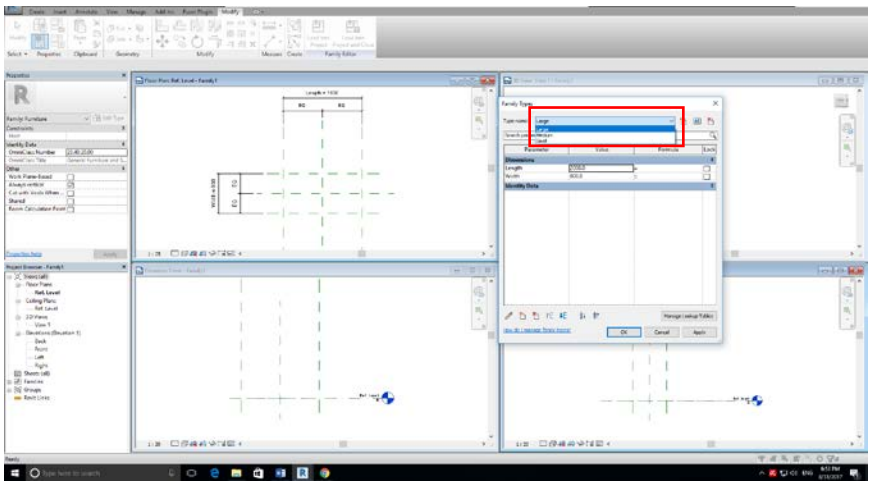
10. Type in another set of dimensions and create a second type.



11. Parameters can be added or deleted using the buttons at the bottom of the type window.



12. Choose among the types to change the dimension of the created object, do not have to type in a value every time.

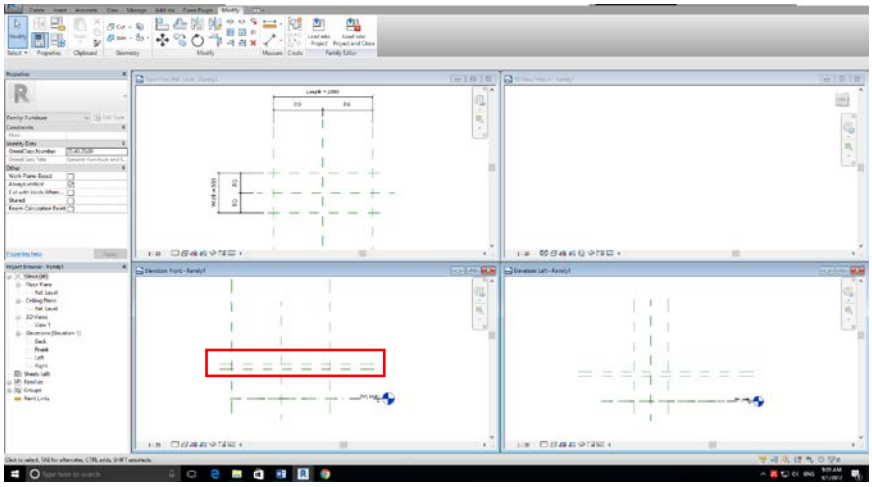


10.4 Adding Solid Form

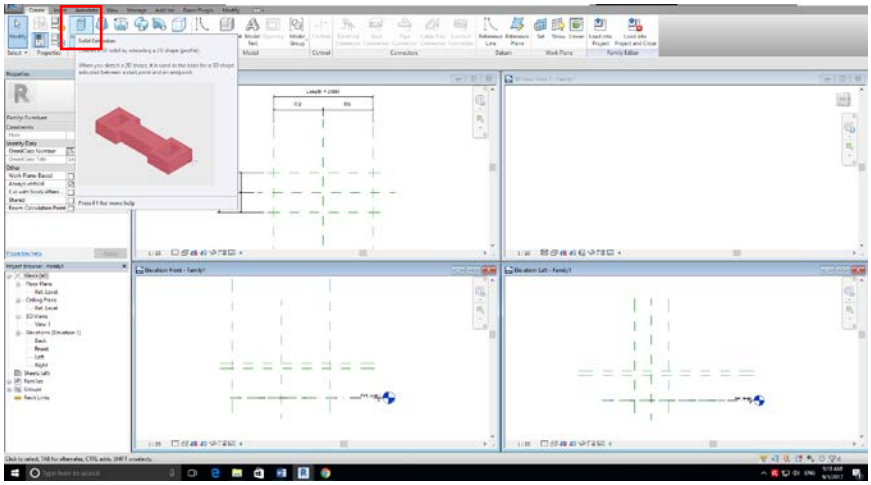
There are several methods to create forms in Revit: Extrusion, Blend, Revolve, Sweep, Sweep Blend. The easiest method is Extrusion, by sketching out the shape, a 3D form is created.

10.4.1 Sketch:

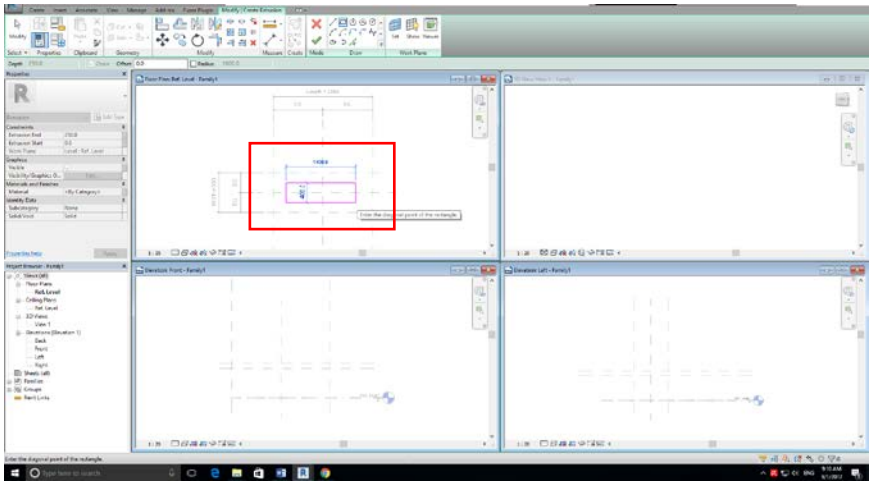
1. Create a pair of reference planes from the elevation view, indicating the height and thickness of the desk.



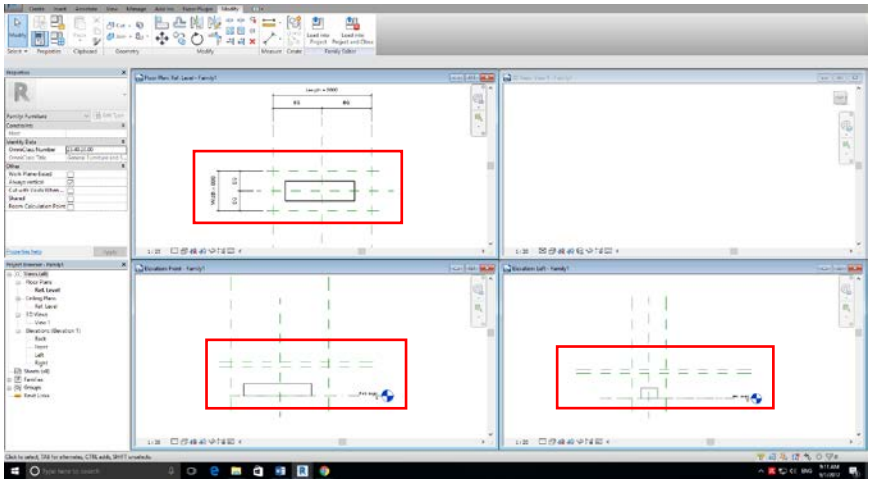
2. Click on the Extrusion Command under the Create Panel.



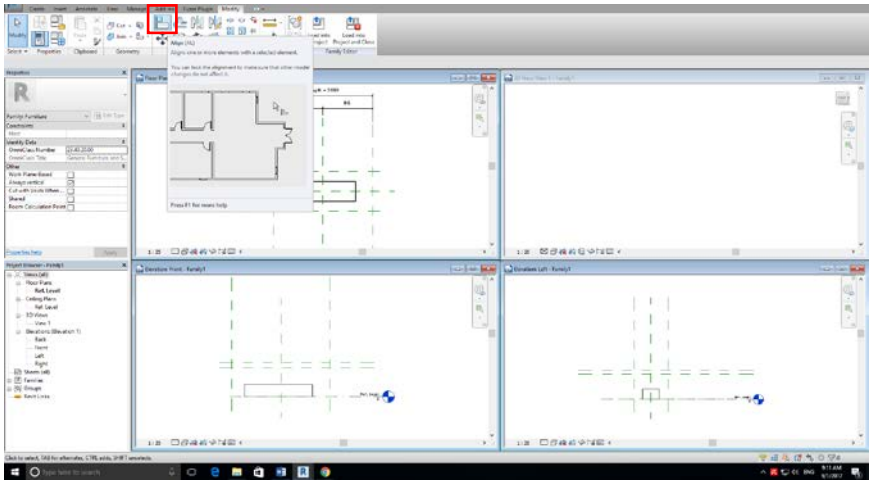
3. Use the rectangle tool to sketch a shape, do not snap it towards the reference planes.



4. Click the green tick; the cuboid is shown on the plan and elevations.

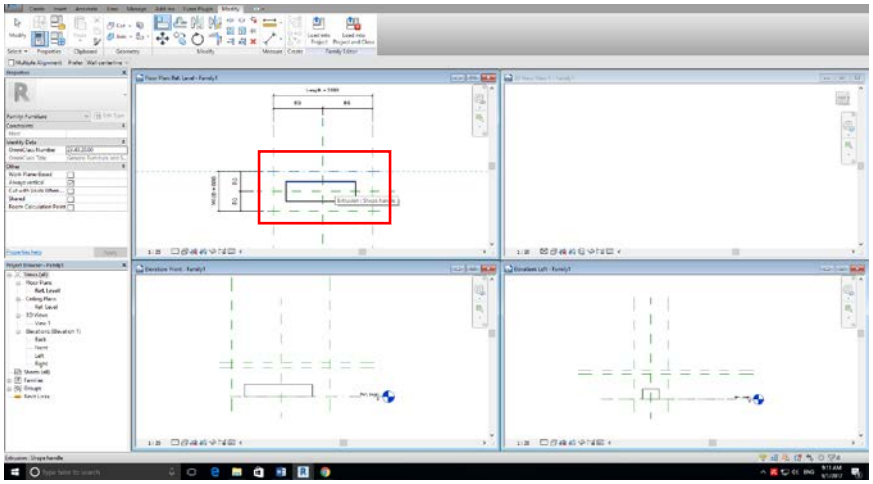


5. Click on the Align tool under the Modify Panel.

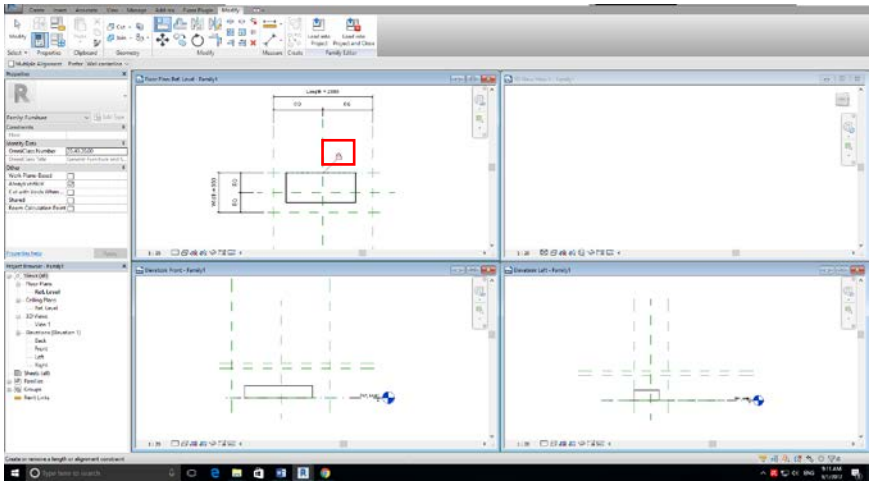


10.4.2 Modify:

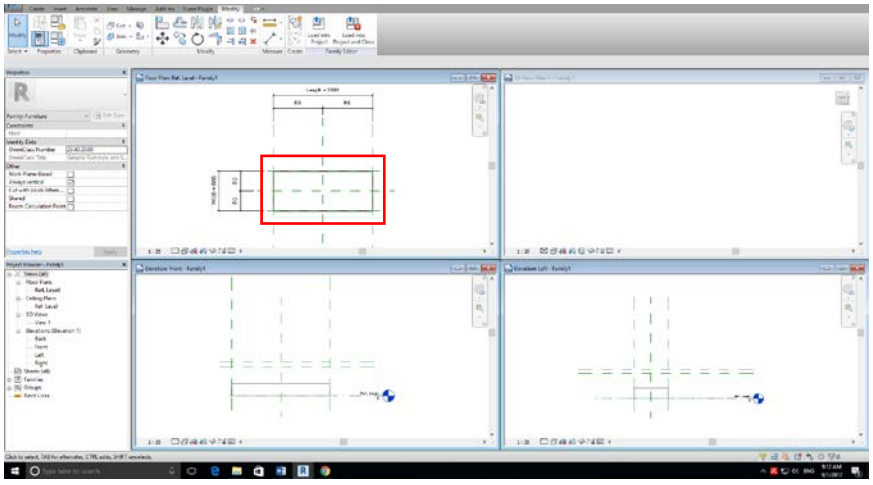
1. Click on a reference plane and select an edge of the form.



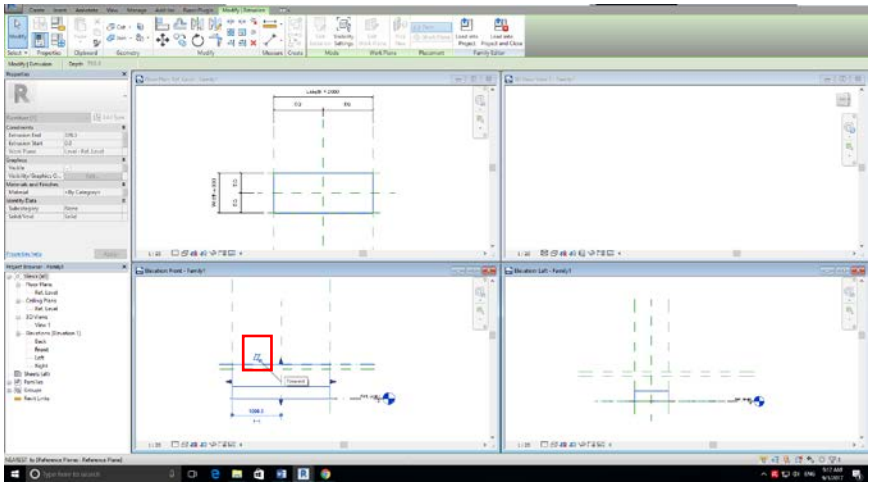
2. After aligning the face to the reference plane, click the padlock icon to lock them together.



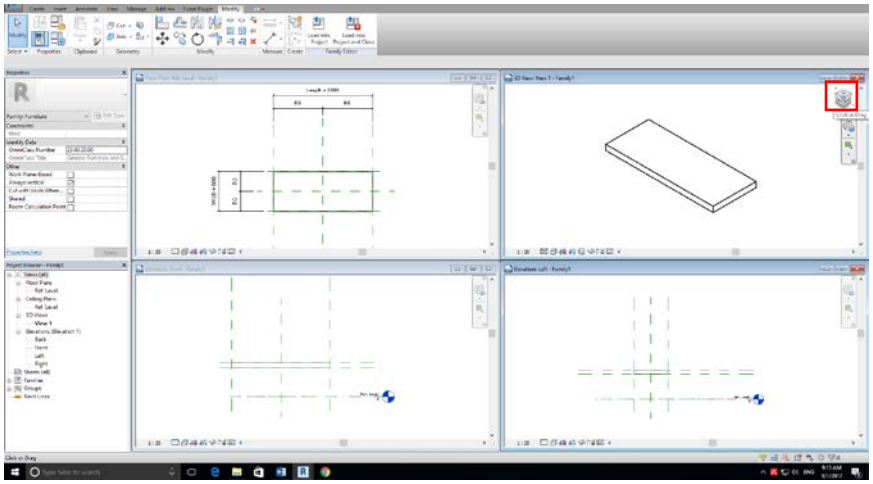
3. Align and lock all four faces to reference planes.



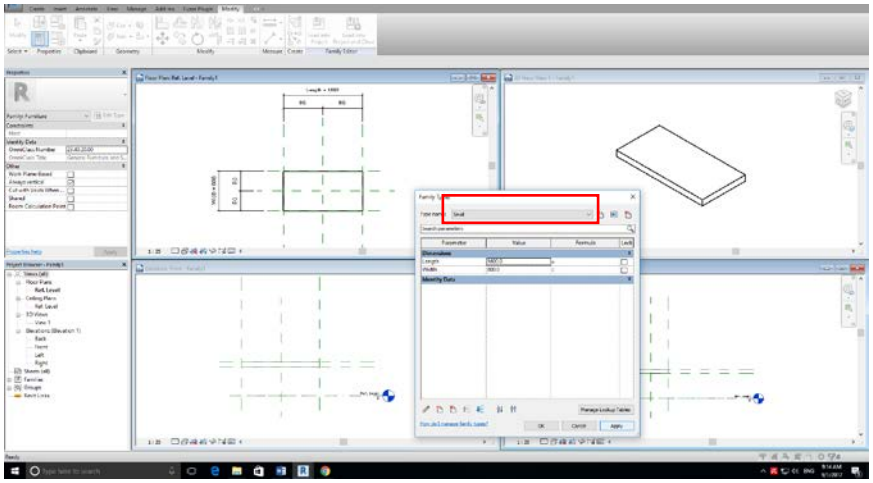
4. Align the top and bottom face to the reference planes on the elevation plane, lock them after aligning.



5. Click on a top corner of the view box.

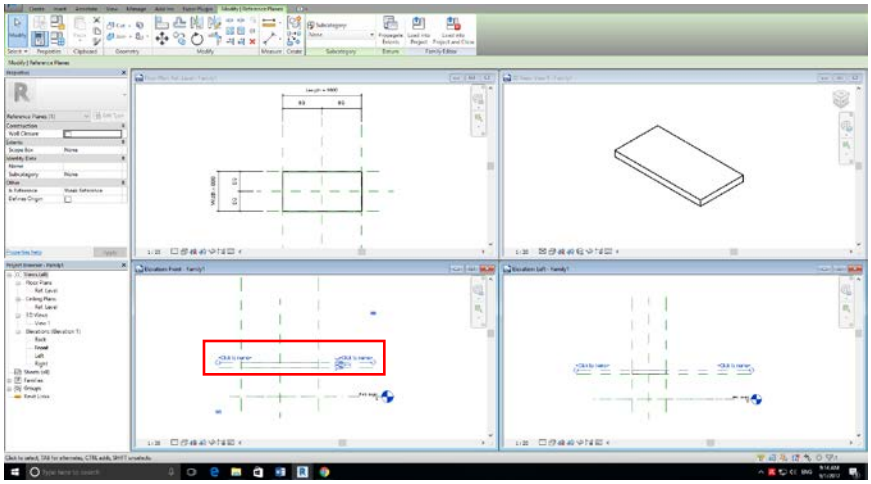


6. Flex the model, select another type and see if the extrusion form follows the changed parameters.

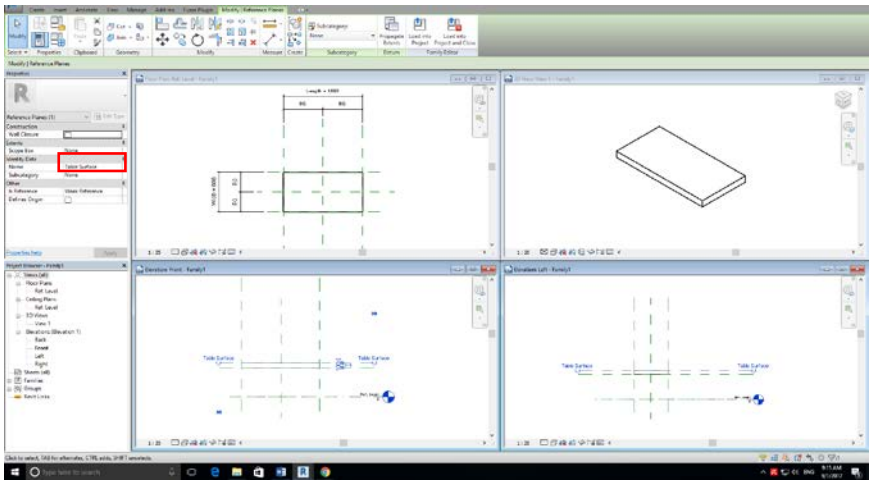


10.4.3 Changing Working Plane:

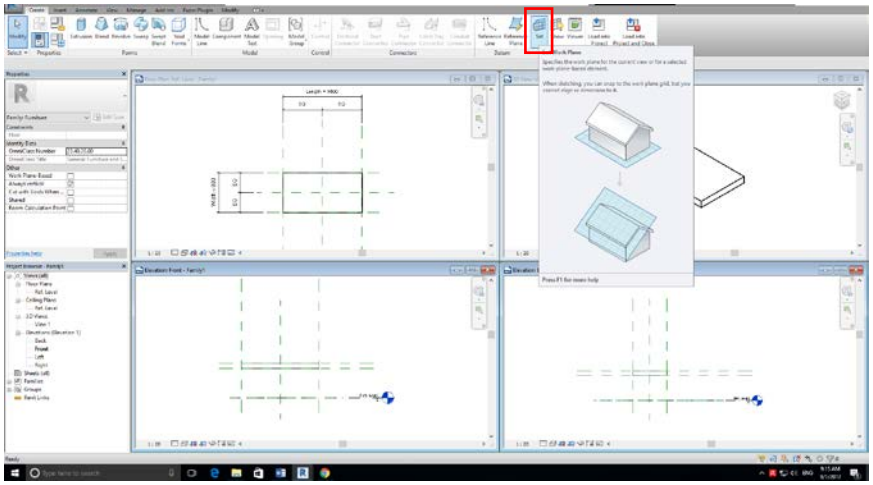
1. Select the top reference plane from the elevation view.



2. Name the plane in the properties window or double tap the end of the reference plane in the elevation view.

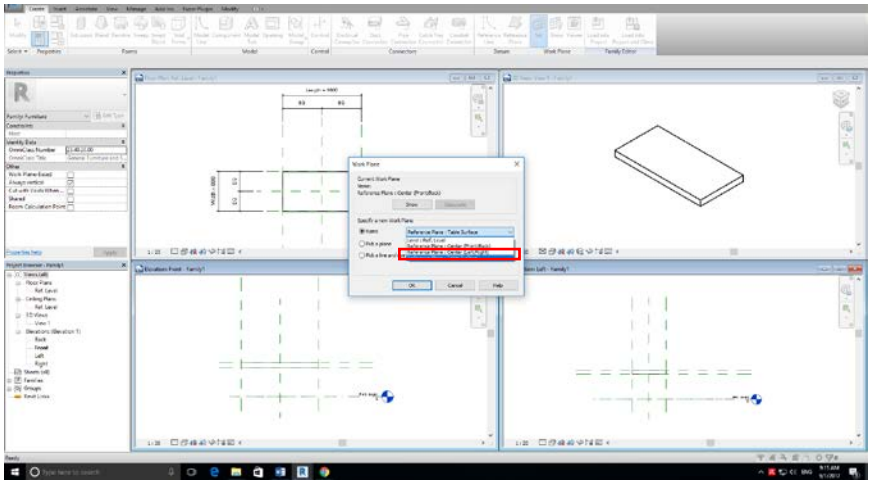


3. Click on the Set Command under the Create Panel.

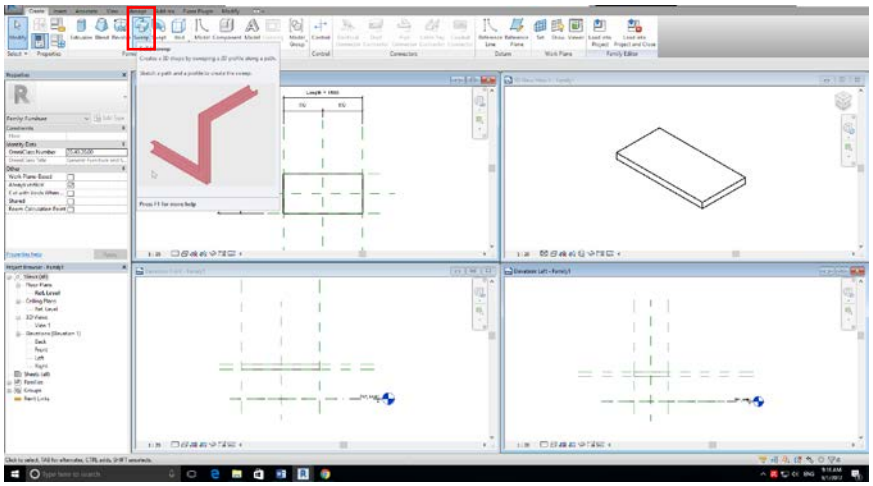


10.4.4 Creating Sweep:

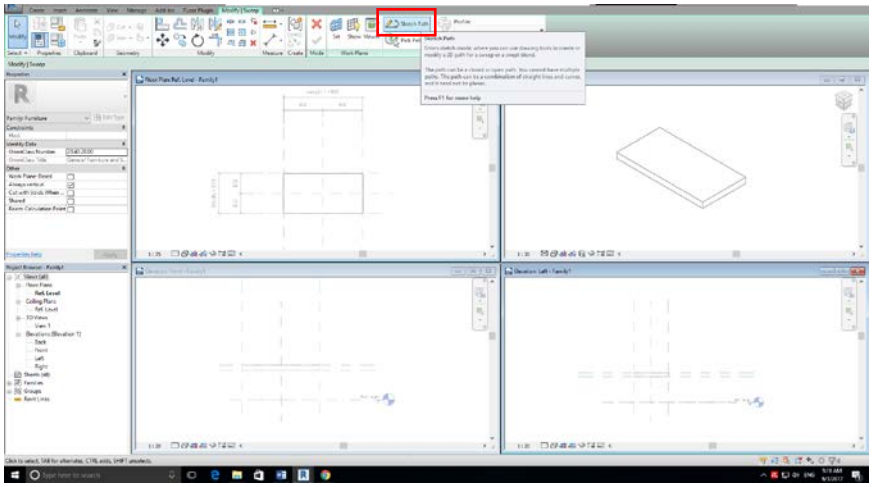
1. The plane is available to be selected, press OK after selecting.



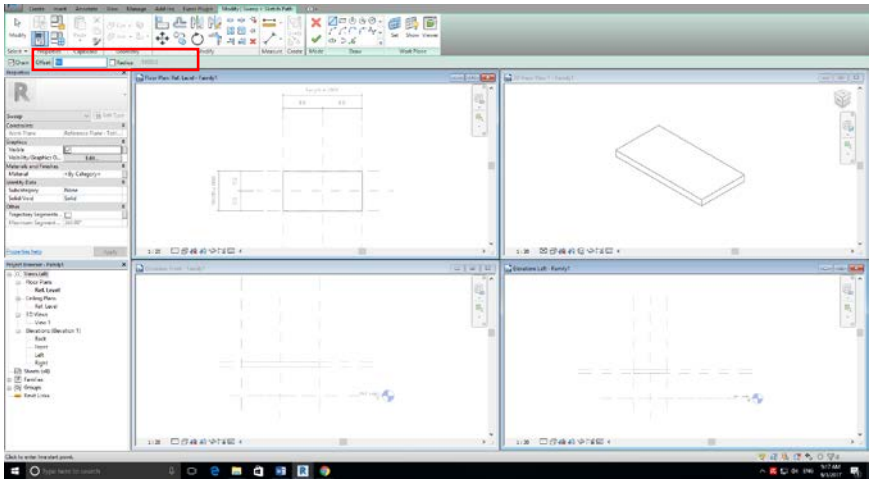
2. Click on the sweep command under the Create Panel.



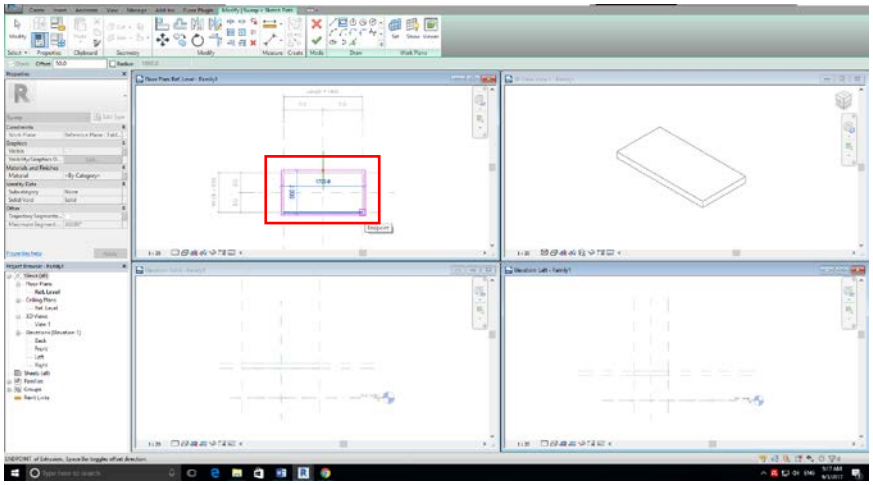
3. There are two ways to create the path of the sweep, Sketch path and Pick path; default selects sketch path.



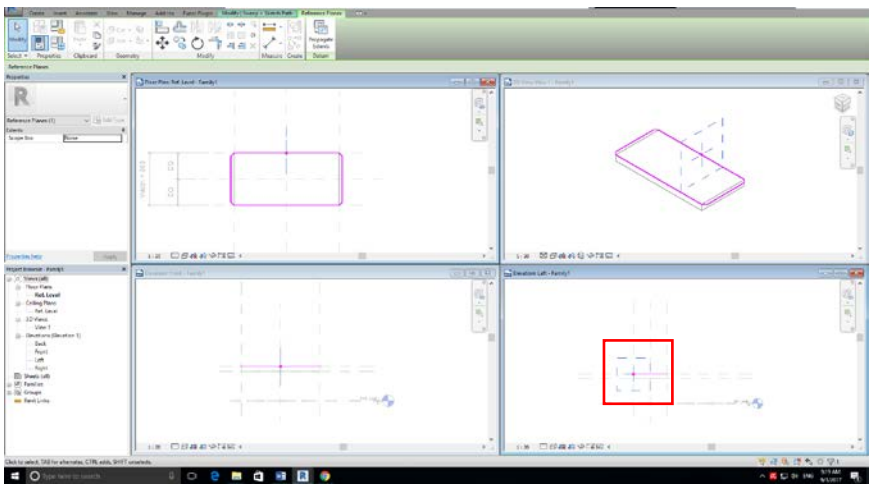
4. There is an offset and radius option; the two cannot be selected at the same time.



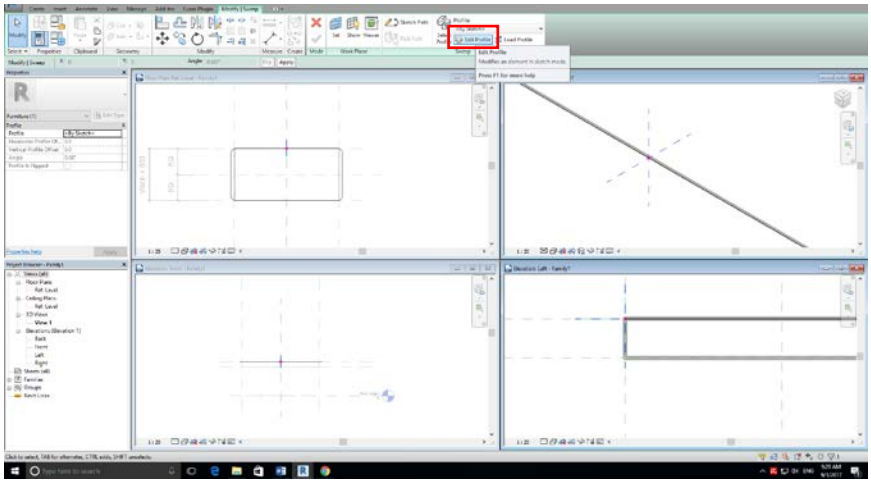
5. Press the spacebar, and the direction of offset can be changed.



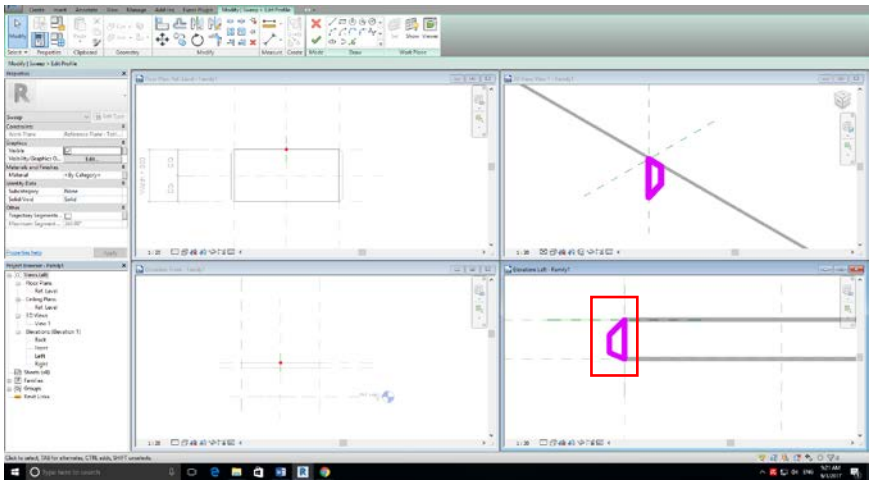
6. The sweep path can be in any shape, after clicking the green tick, a blue cross will appear in all views.



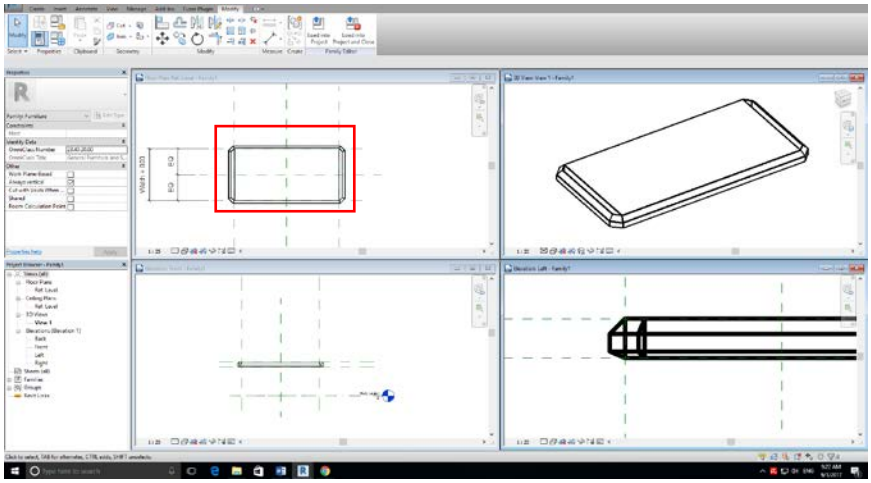
7. The blue cross indicates where to draw the sweeping shape, click on the edit profile option to draw the sweeping shape



8. Choose the best view to draw the sweeping shape; the shape can be drawn with any drawing tools.



9. Click on the green tick, and the sweep is created.

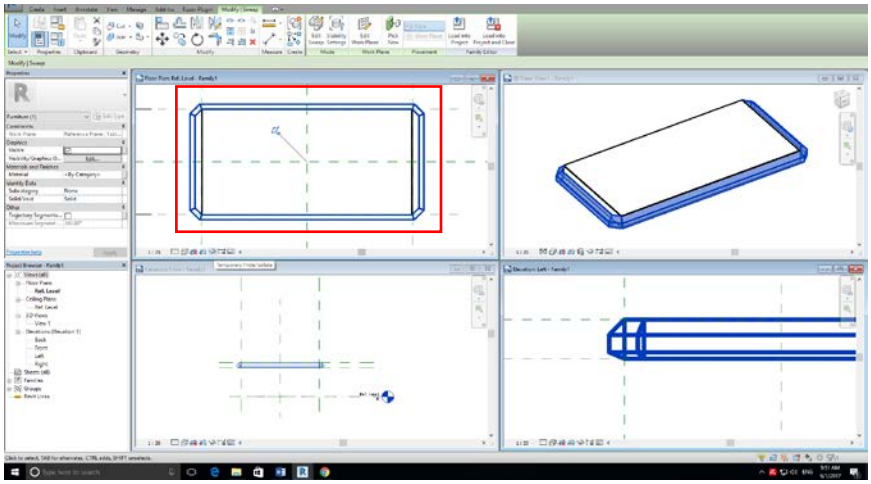


10.5 Cutting Holes Using Void Geometry

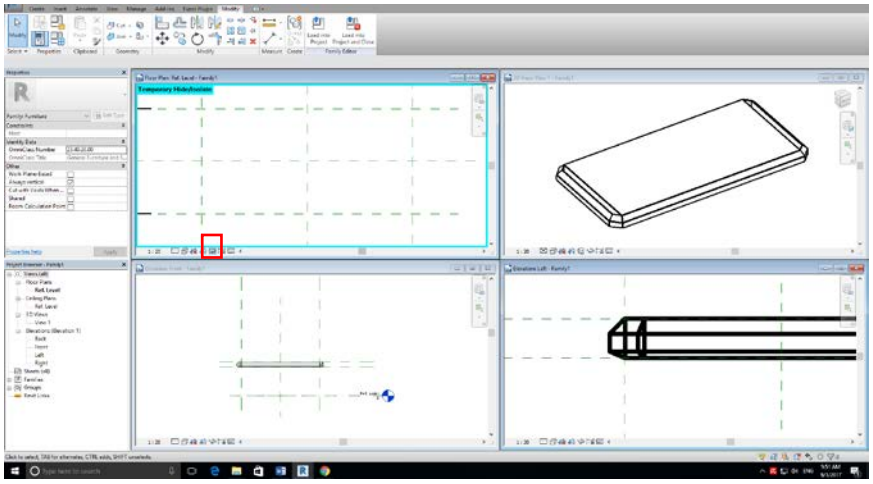
A void is an object, the easiest way to create void is by extrusion. As it is an object, it can be modified later.

10.5.1 Creating Voids:

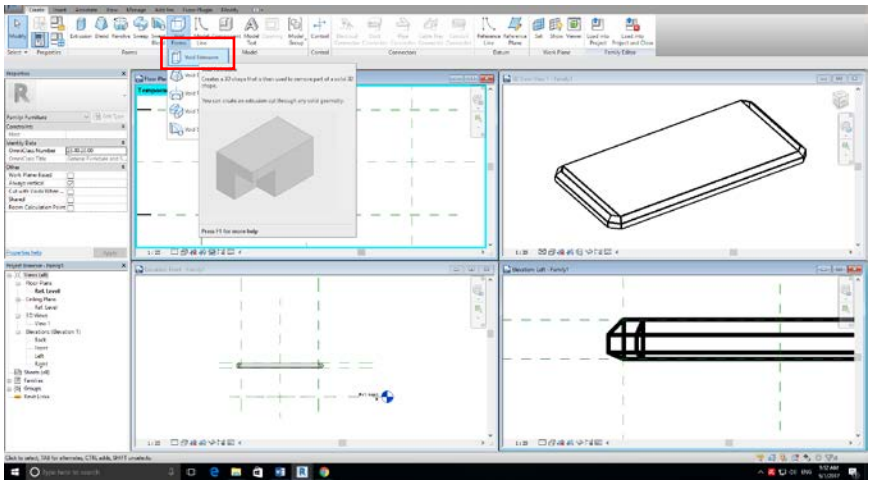
1. Select the extrusion and Void, when objects are overlapping each other, use tab to choose between different object.



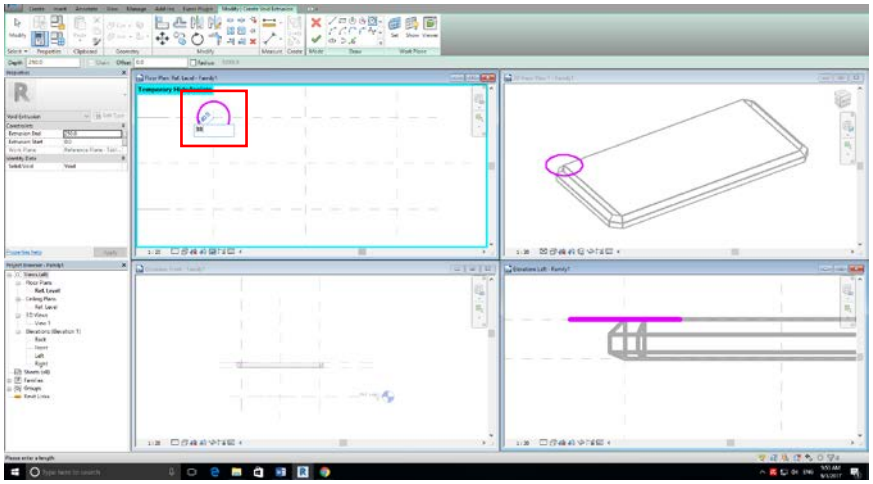
2. Use the glasses icon to hide the two objects temporarily.



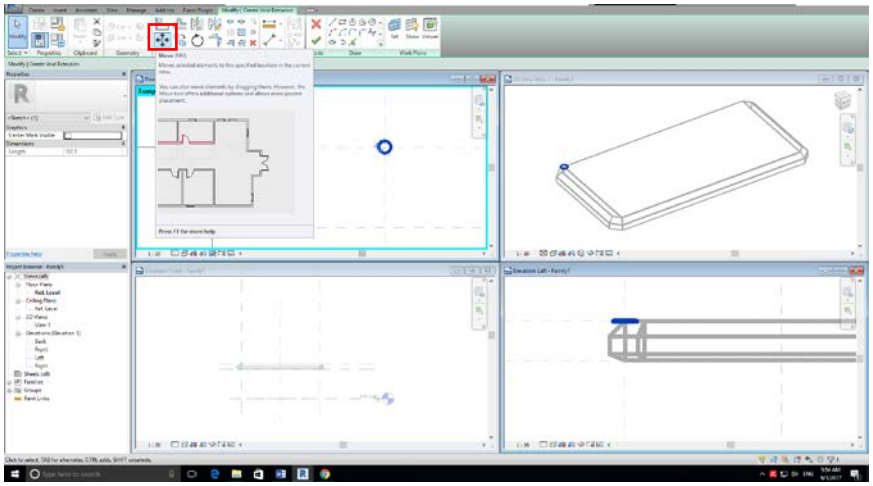
3. Select Void Extrusion under the Void Forms Command.



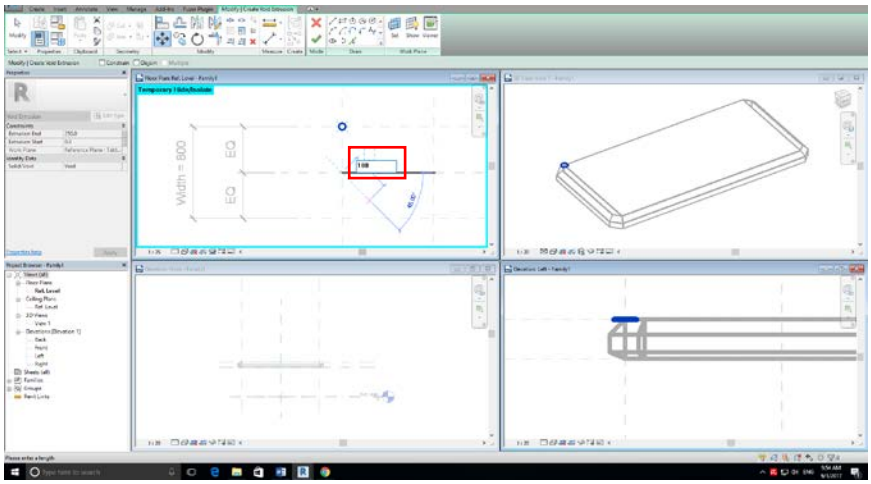
4. Use any drawings tools to create the shape of the extruding void.



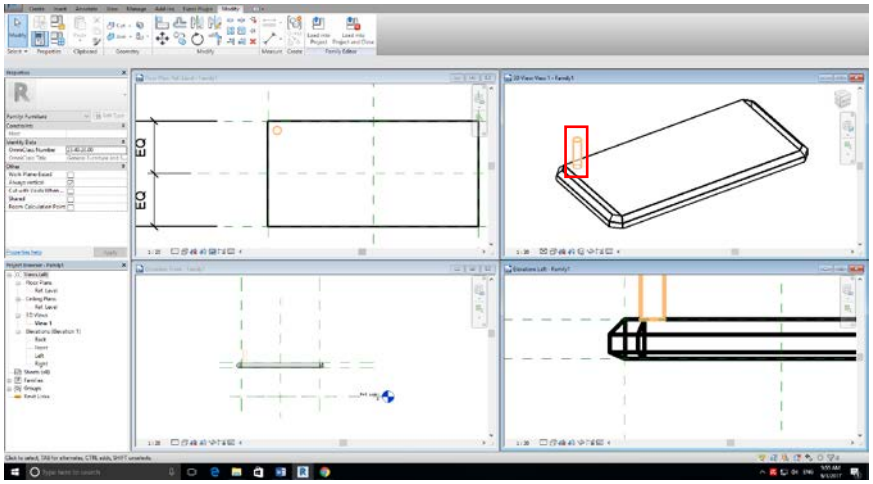
5. Use the move tool to place the void in the right position.



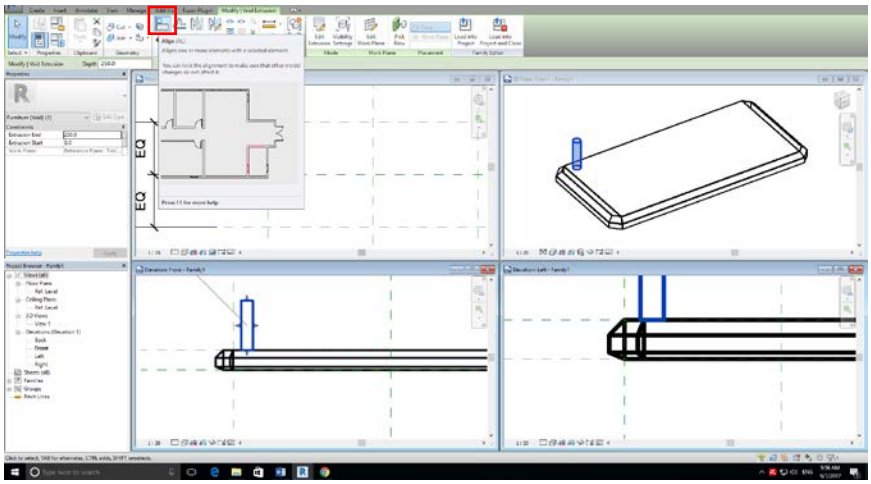
6. Type in the moving distance.



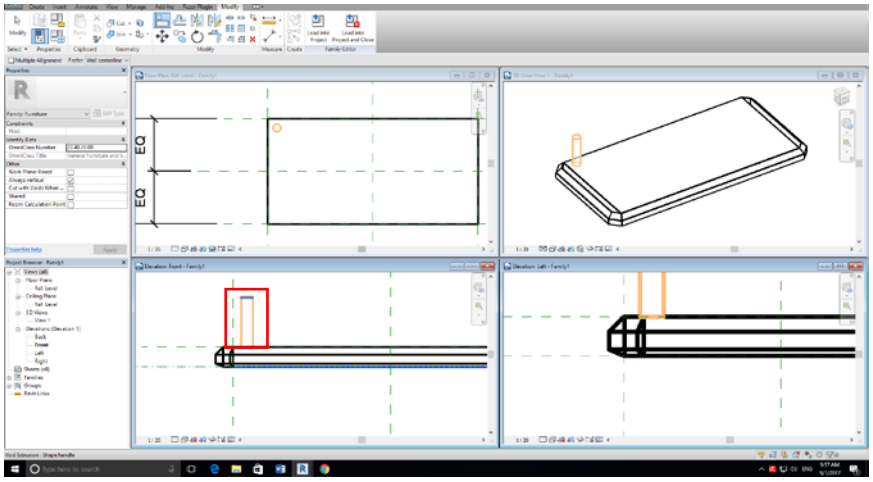
7. Press the green tick, and the void is indicated with orange lines.



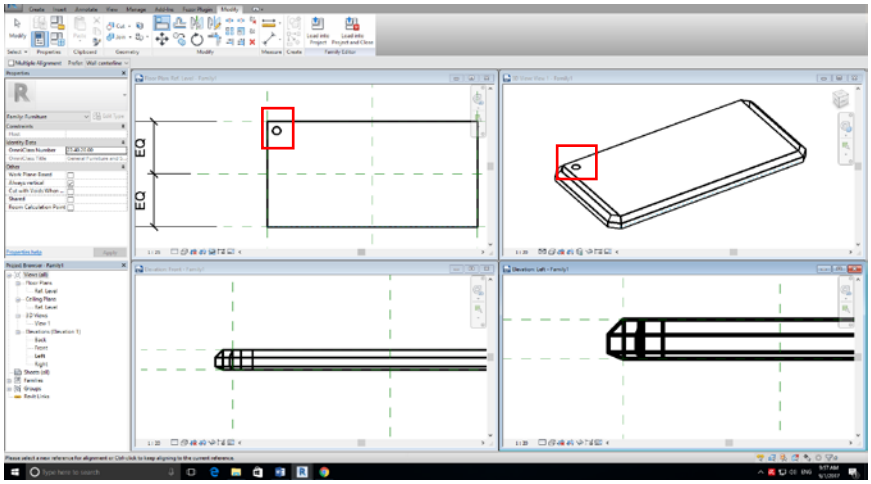
8. Use the blue arrow at the edge to modify its position or use the align tool to relocate the faces.



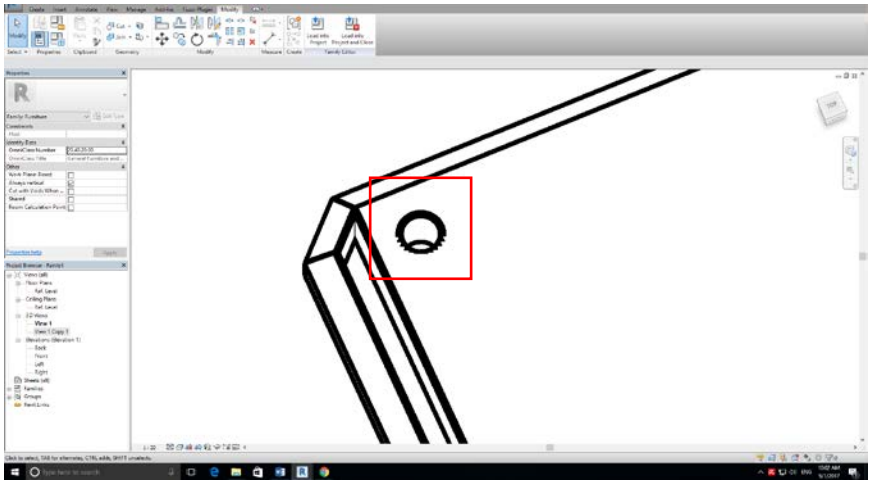
9. Pick the bottom of the desk and select the top of the void to align the two, lock them together afterward.



10. Click the modify icon, and the void is shown in all the views.



11. The void is an object and can be modified later.

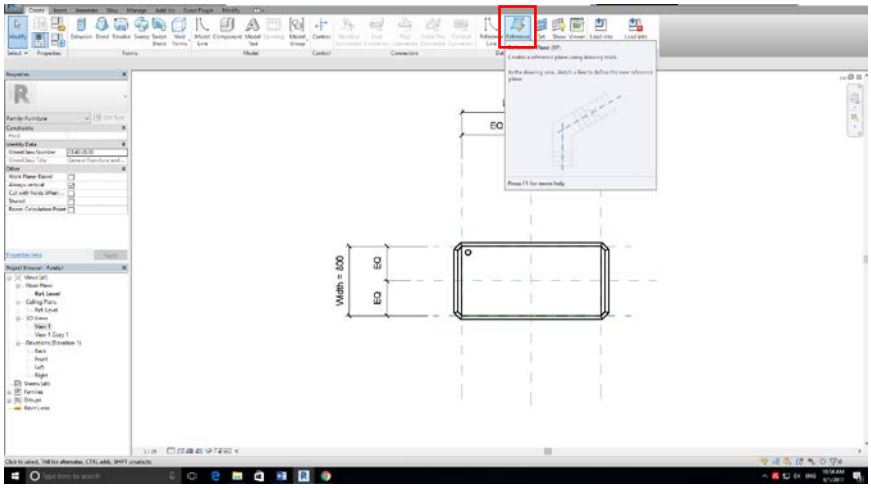


10.6 Adding Blend

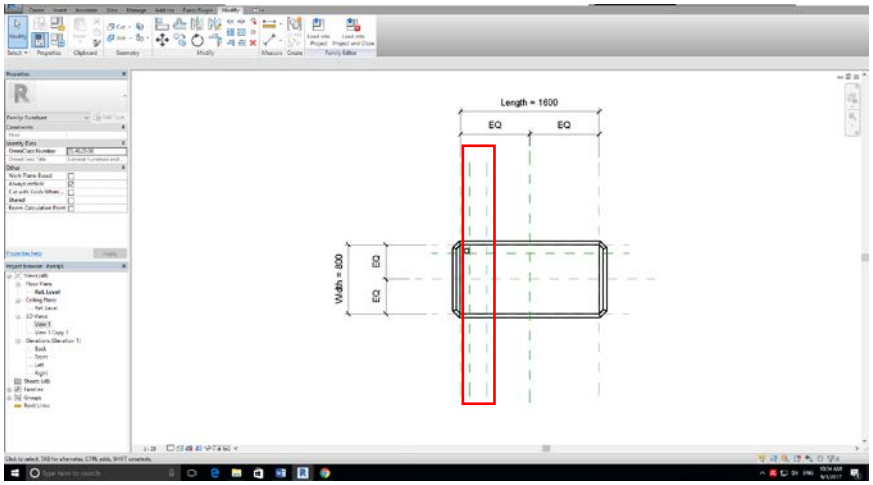
Blend is a tool to create a solid 3D shape that changes along its length, blending from a starting shape to an ending shape.

10.6.1 Blend:

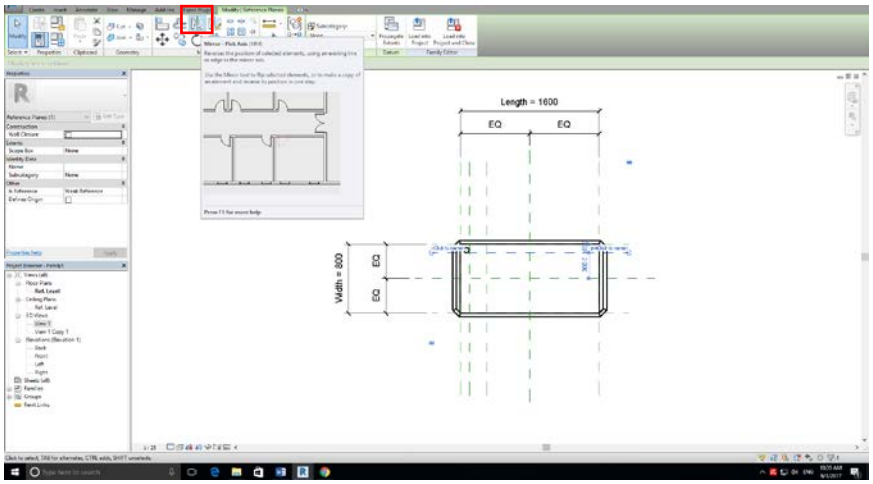
1. Click on the Reference Plane Command and create reference planes for the supporting elements of the table.



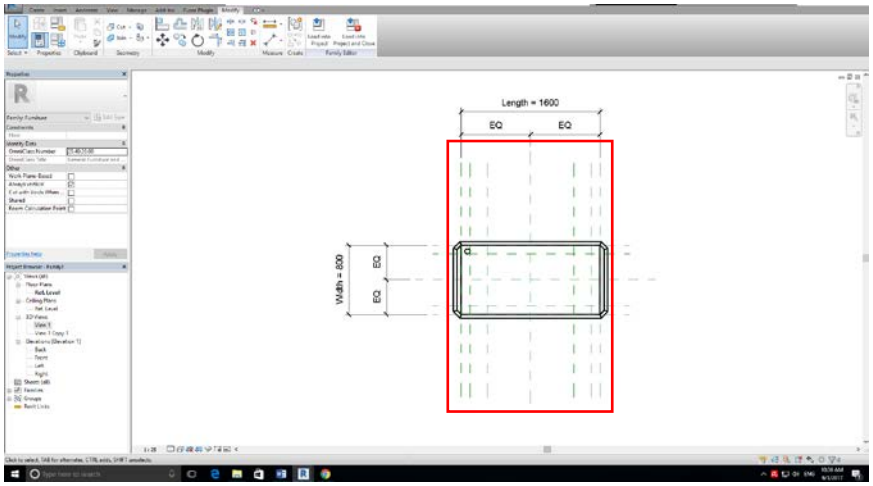
2. Use temporary dimension to adjust the reference planes.



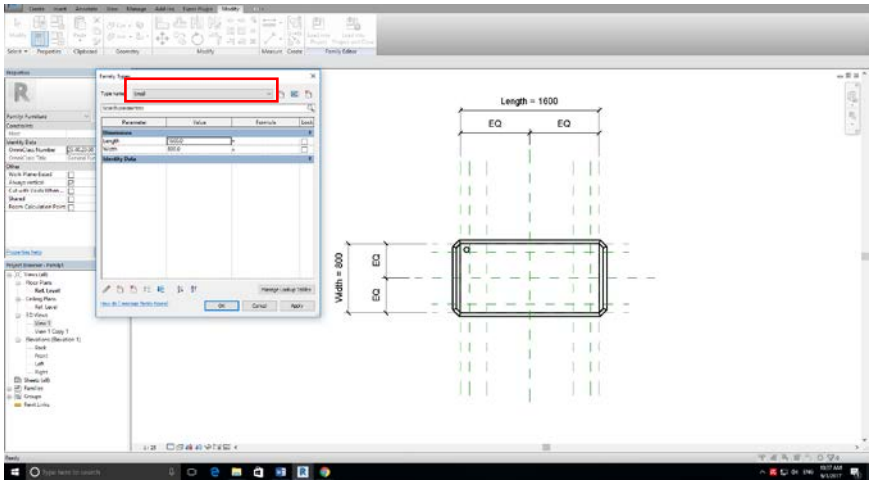
3. Use the mirror tool to create three pairs of reference planes.



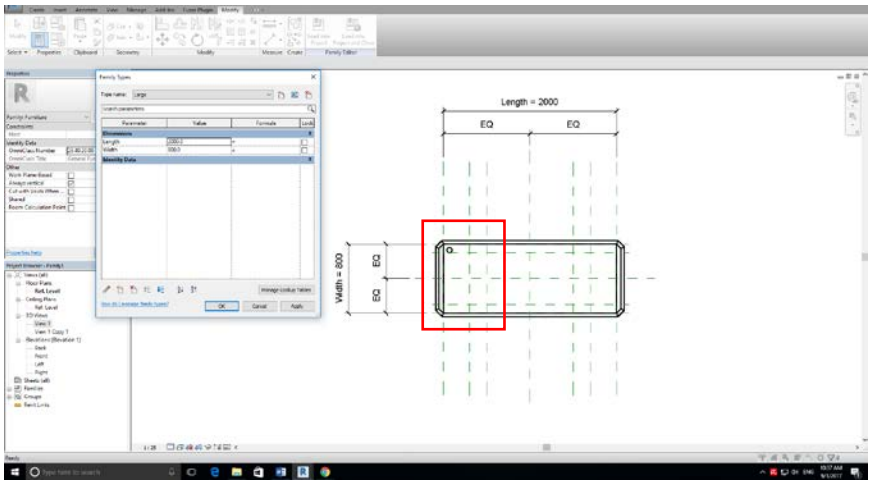
4. Three pairs of reference planes are constructed.



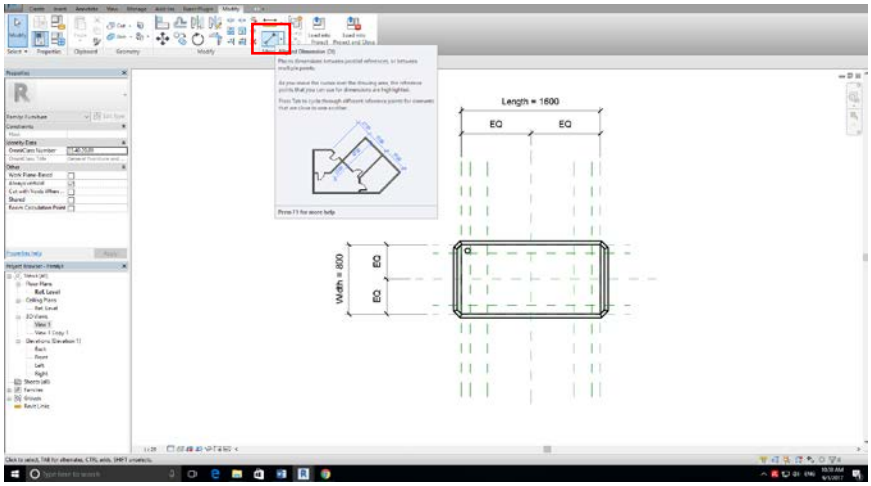
5. Flex the family by changing the type or values of the parameters.



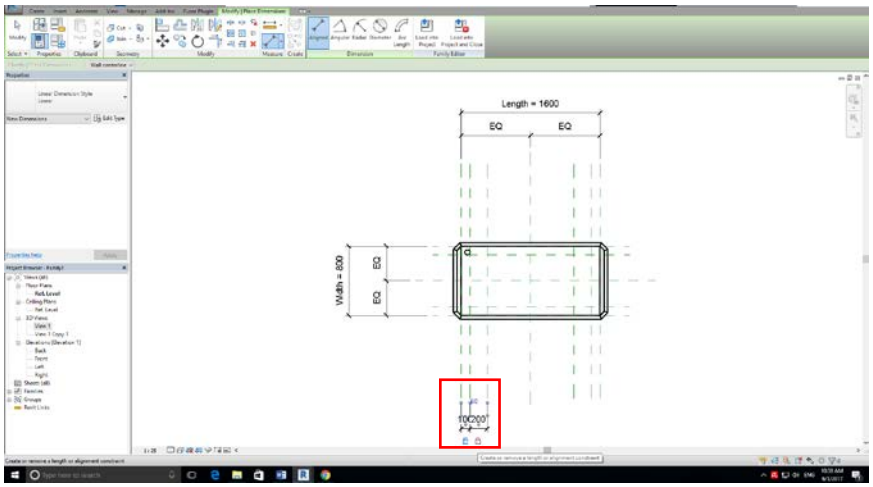
6. The new reference plane will not move according to the change.



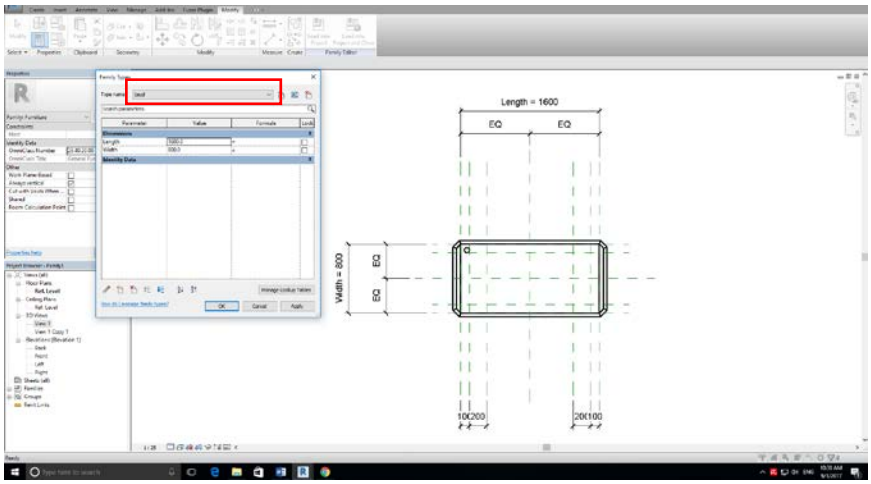
7. Click on the Aligned Dimension command.



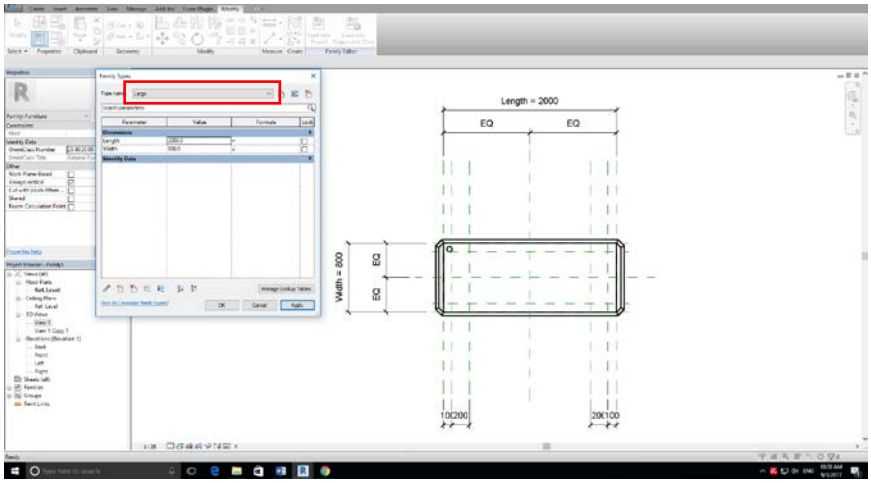
8. Give the distances between reference planes a permanent dimension and lock them.



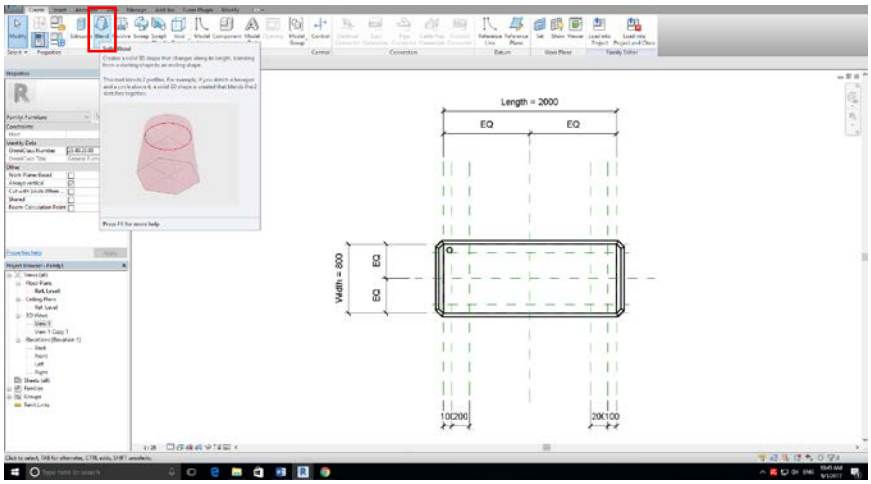
9. Click on the Family Types command under the Create Panel.



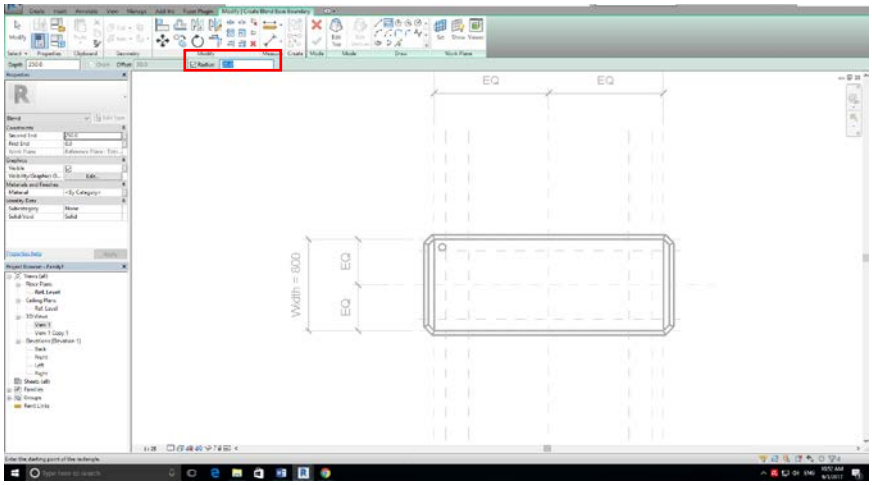
10. Flex the family by changing the type; the new reference planes will follow the dimensions of the table size.



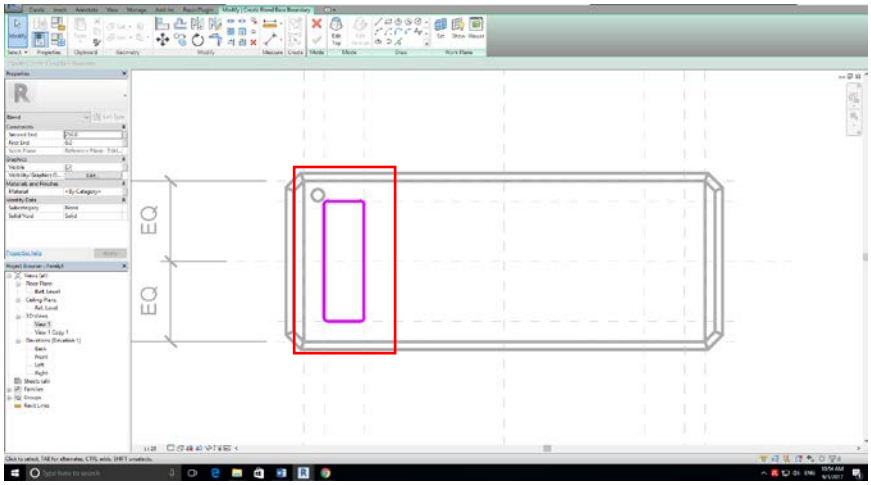
11. Click on the Blend command under the Create Panel.



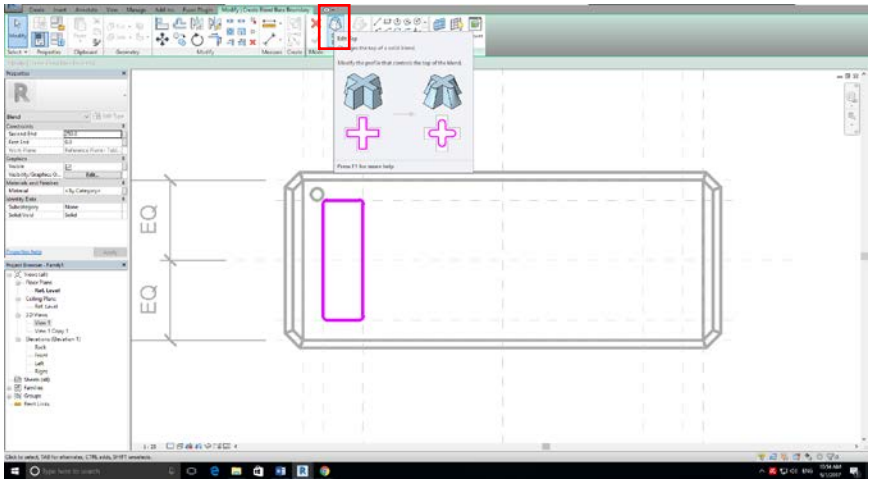
12. Use the Radius option to produce a curved corner.



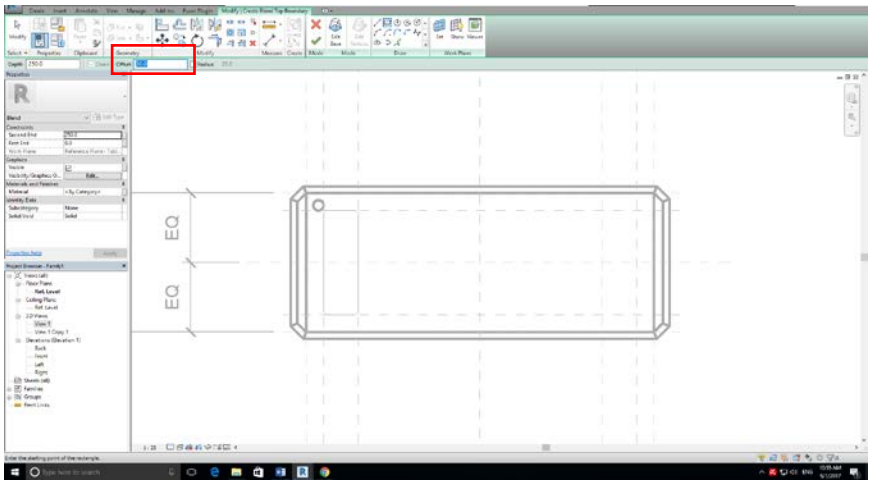
13. Use drawing tools to create the boundary of the base, snap it to the reference planes.



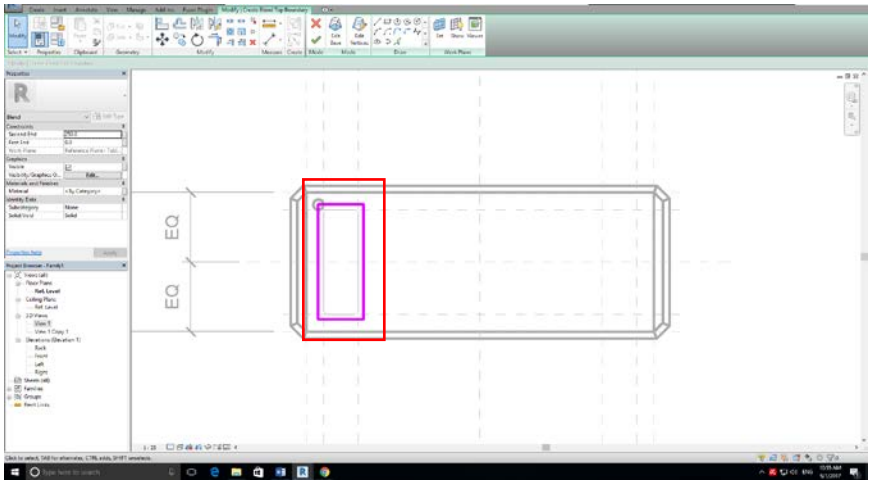
14. Click on the Edit Top option under the Modify Panel.



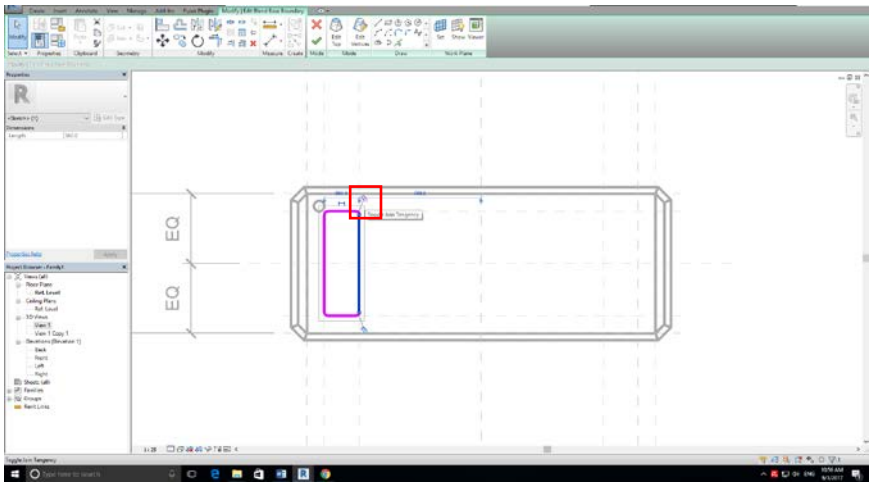
15. Try to use an offset value when constructing the top shape.



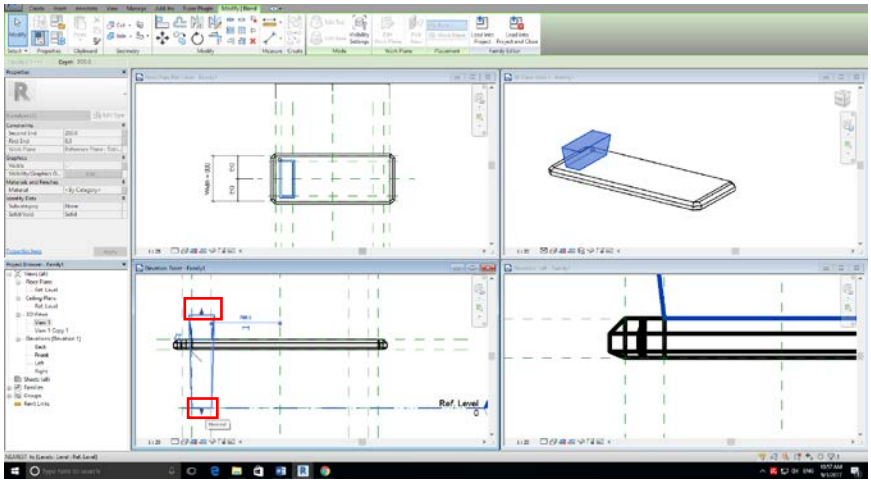
16. Use any drawing tools to create the top shape.



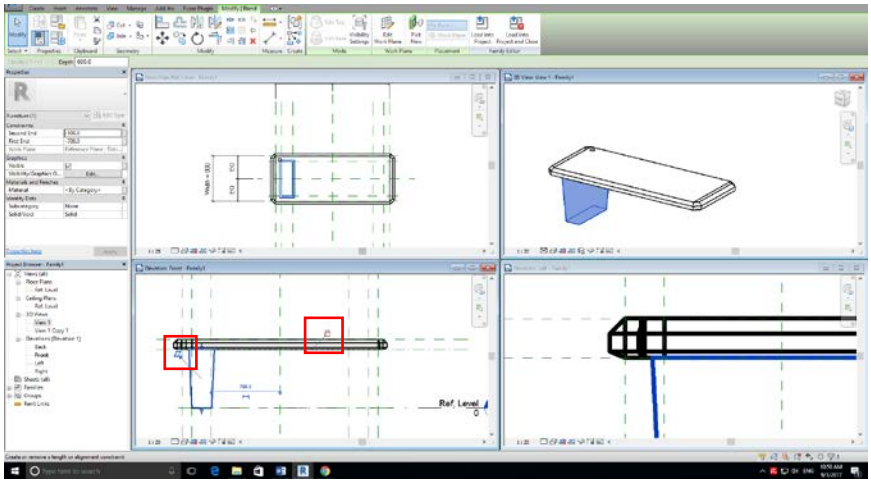
17. Remember to lock the edges to the reference planes, or else they will not move when the type changes.



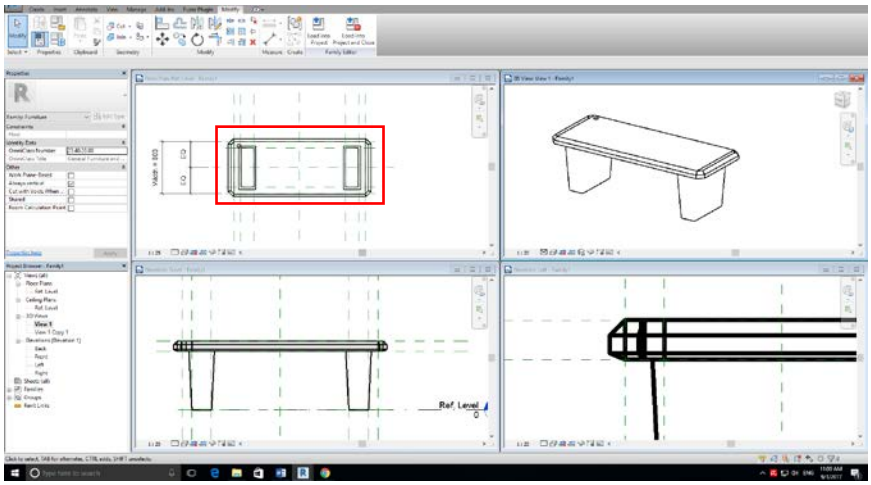
18. Click on the green tick and the blend form is created, it is usually in a wrong position use the blue arrow to move it.



19. Lock the top and the base to the correct reference planes.



20. Flex the family to make sure the support follows the movement of table edges.

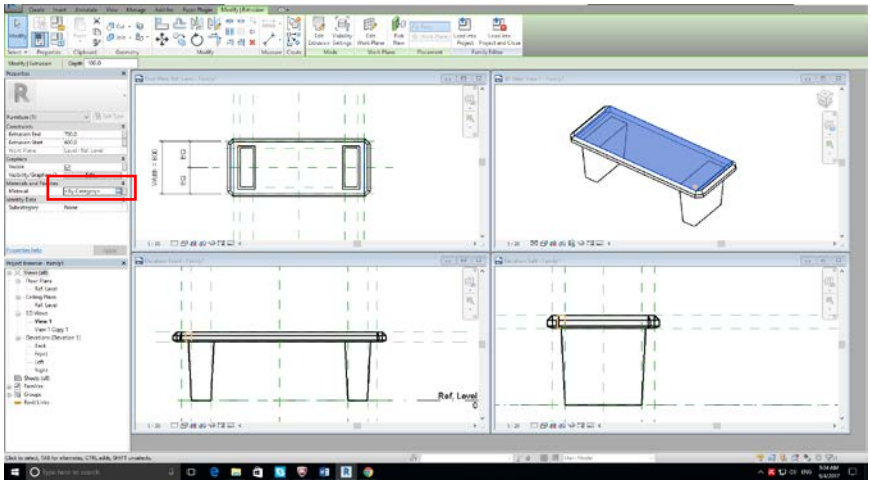


10.7 Completing the Family

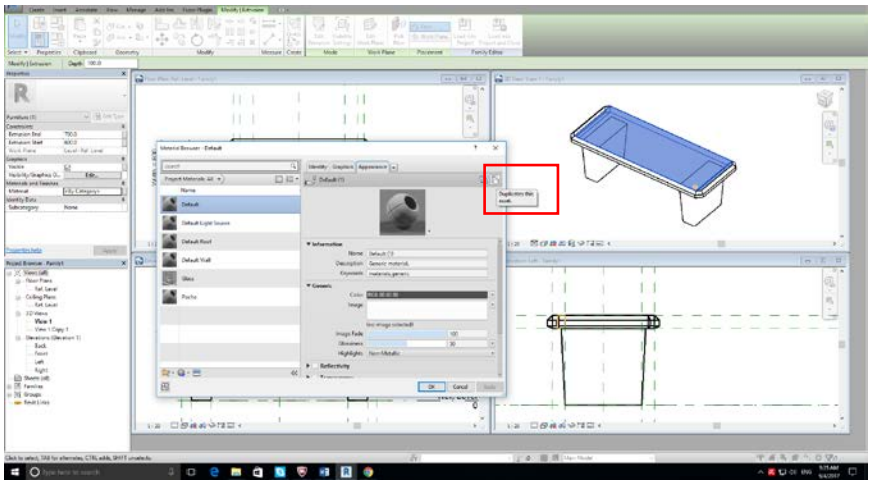
After the parameters and other settings of the families are finalized, it can be loaded into a project. All the information and types of the families will be import into the project.

10.7.1 Materials:

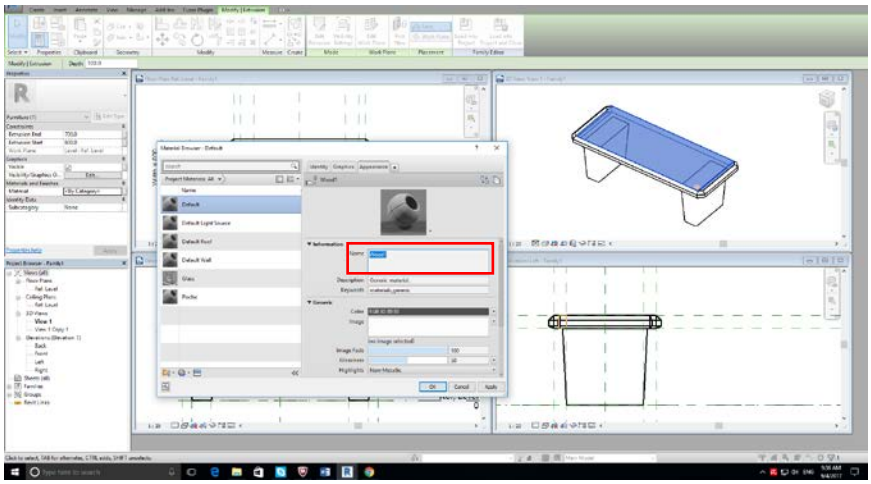
1. Select the table surface and click the box on the material row in the properties window.



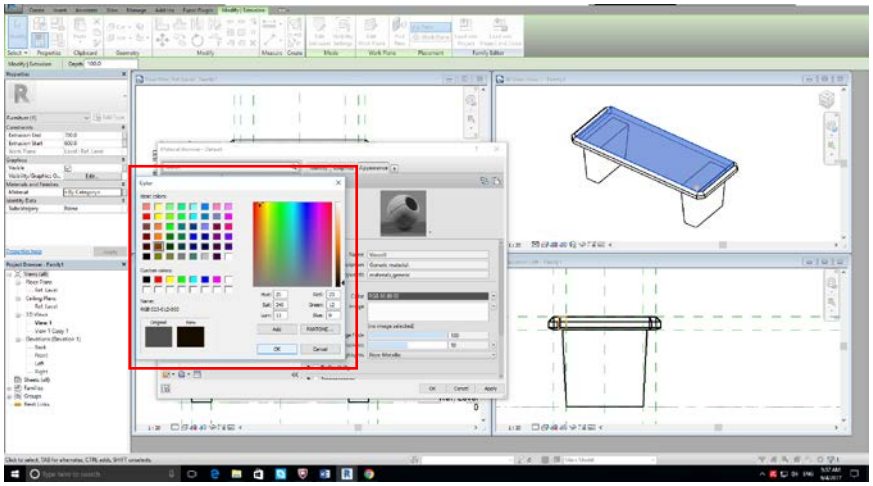
2. In the Material Browser, there are some pre-loaded materials, \ duplicate the default material and create a new one.



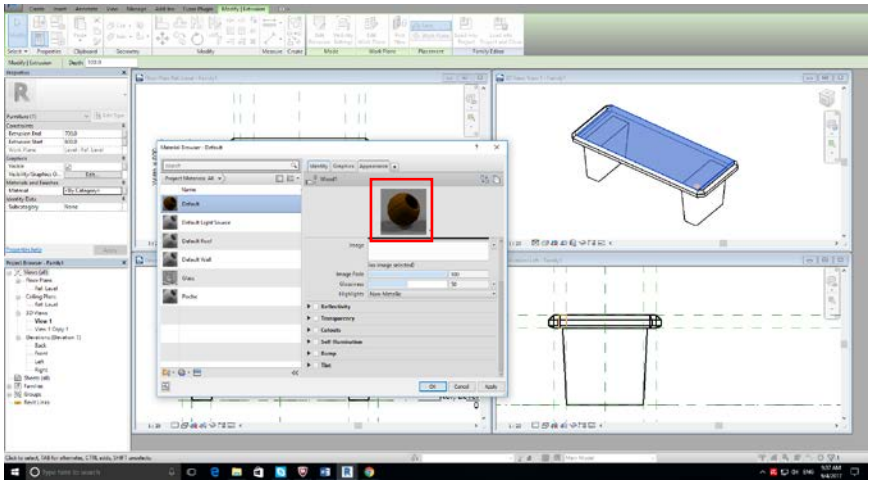
3. Give the new material a name.



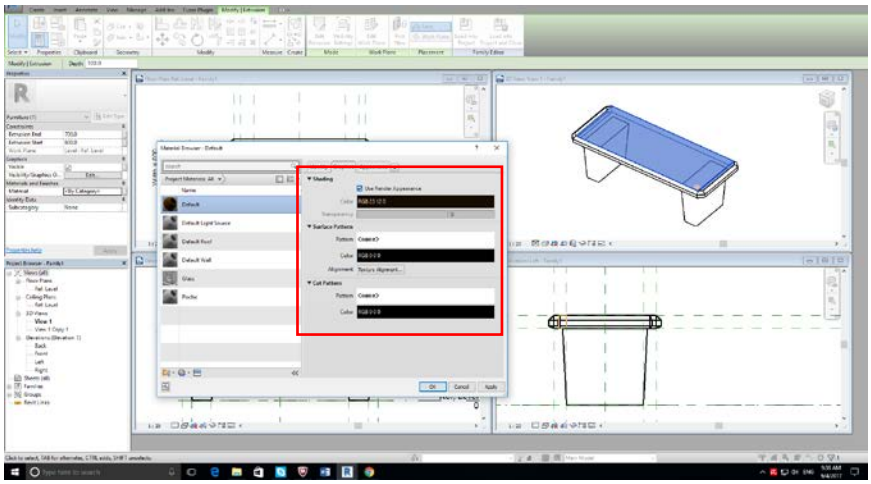
4. Choose a color for the new material or import an image as the appearance of the material.



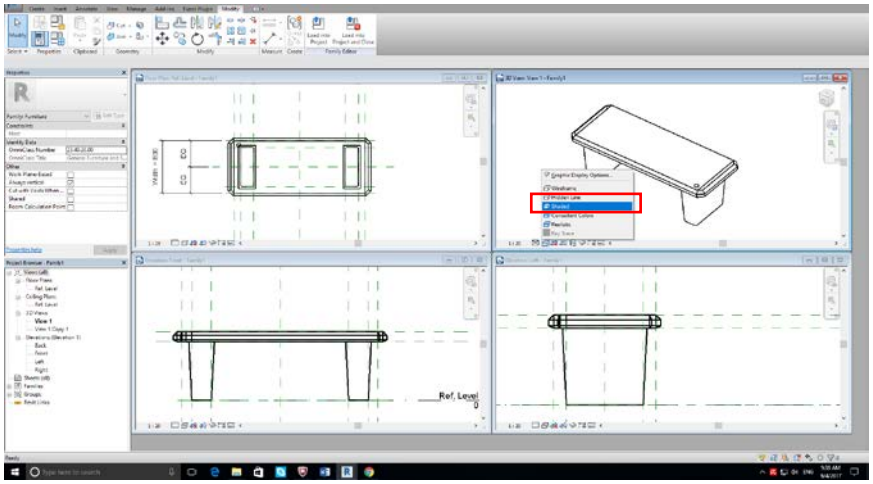
5. Press OK and the appearance of the material is shown above.



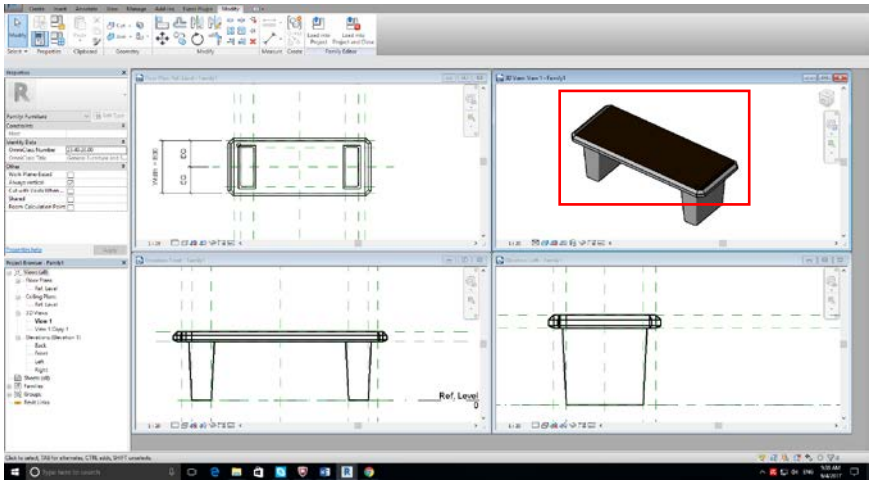
6. The Surface and Cut Patterns can also be changed in the material browser.



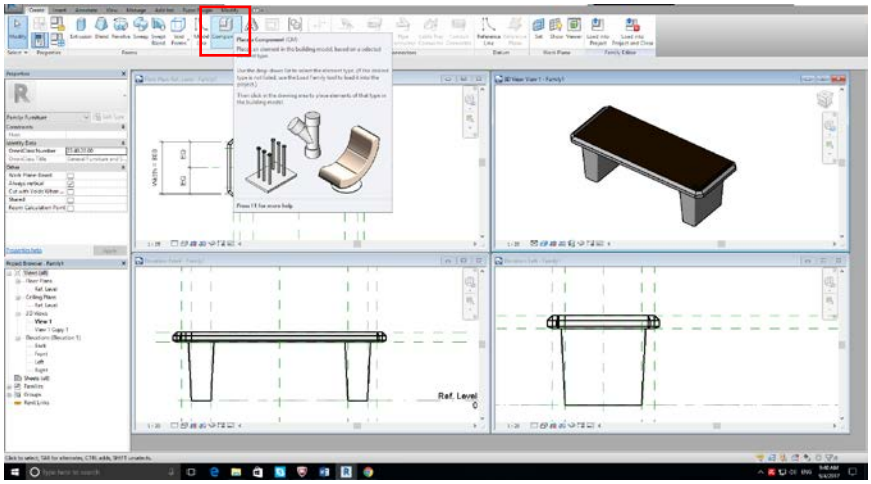
7. Use the Shaded 3D view to look at the appearance.



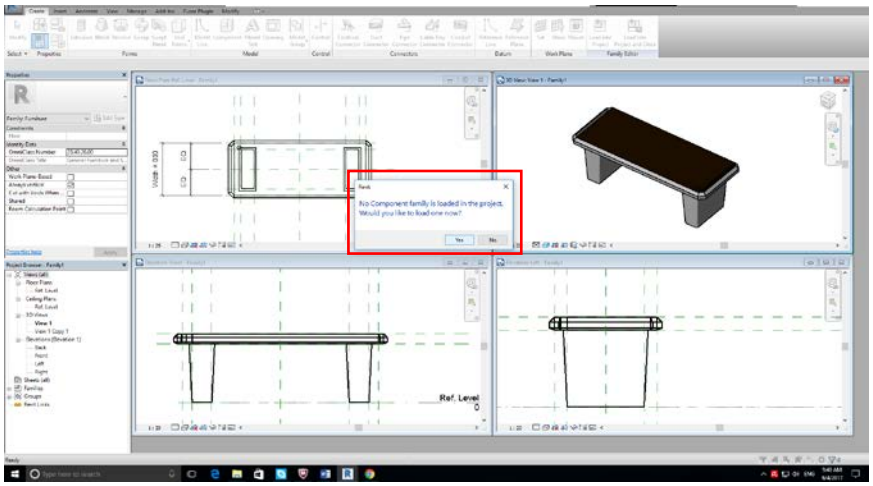
8. The brownish color is shown in the 3D view, choose the realistic view to show a better color.



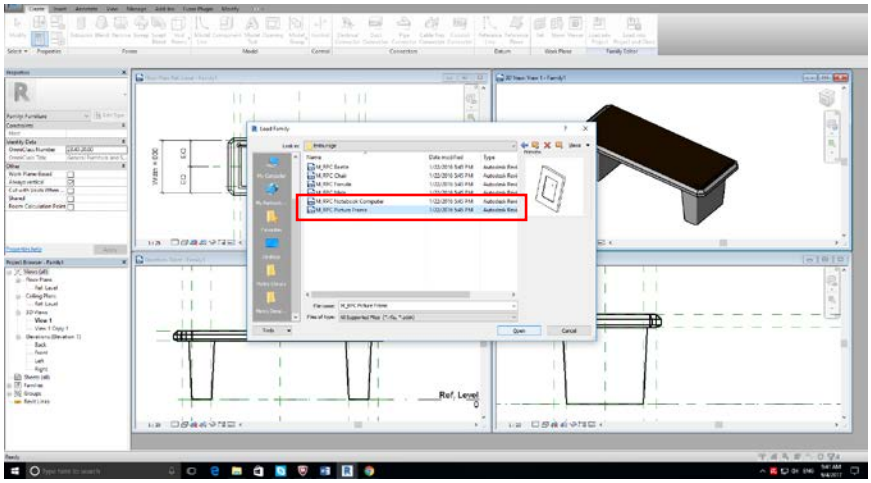
9. A nested family is a family inside a family, click on the component command to place a family into this family.



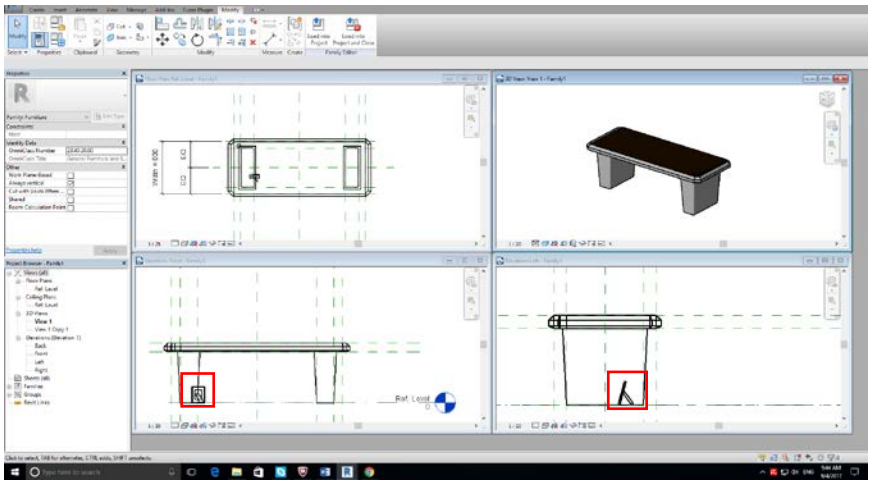
10. Search Revit will warn that no component family is loaded in this project, press OK to load a component.



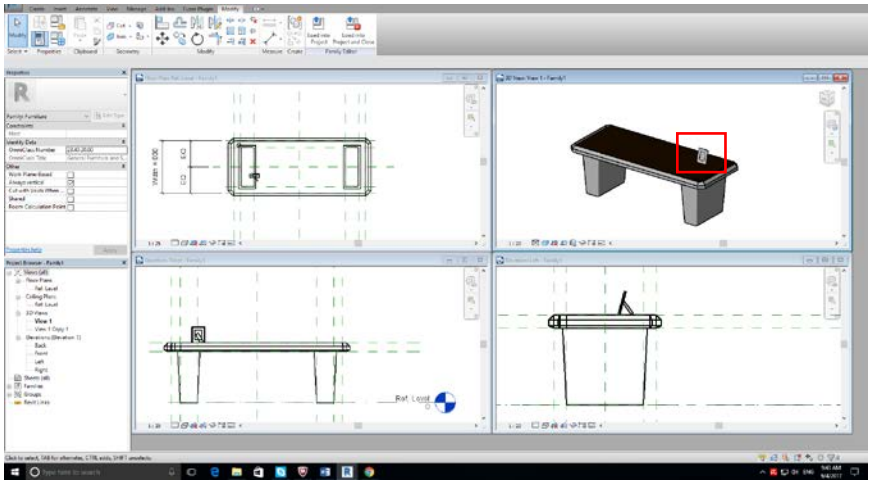
11. Load a Picture Frame into this desk family.



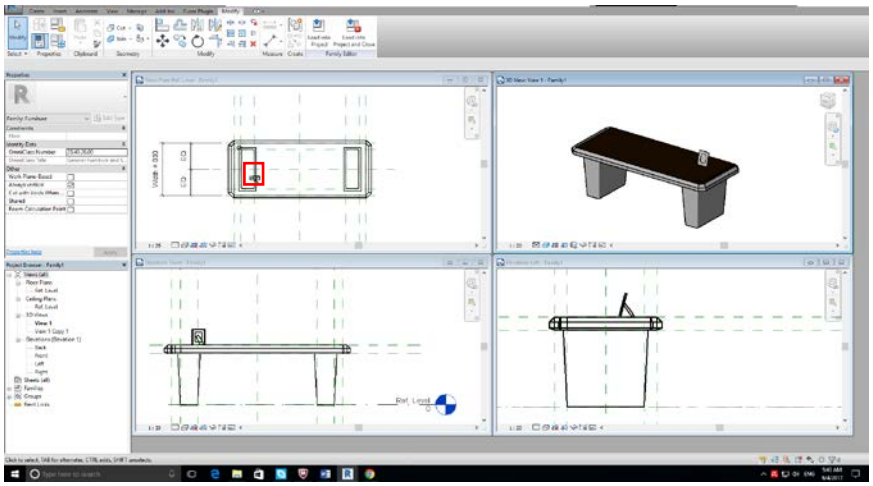
12. The picture frame is placed on the floor because the working plane is ground level.



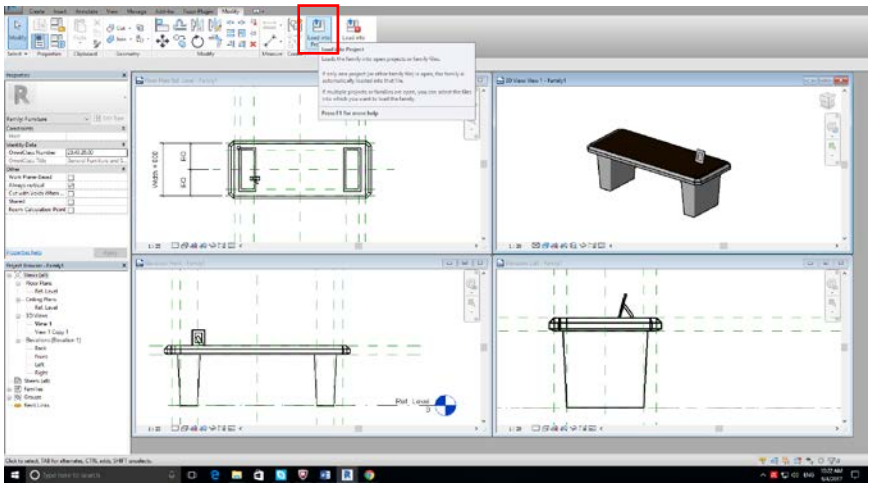
13. Enter an offset value to bring the frame on the table surface.



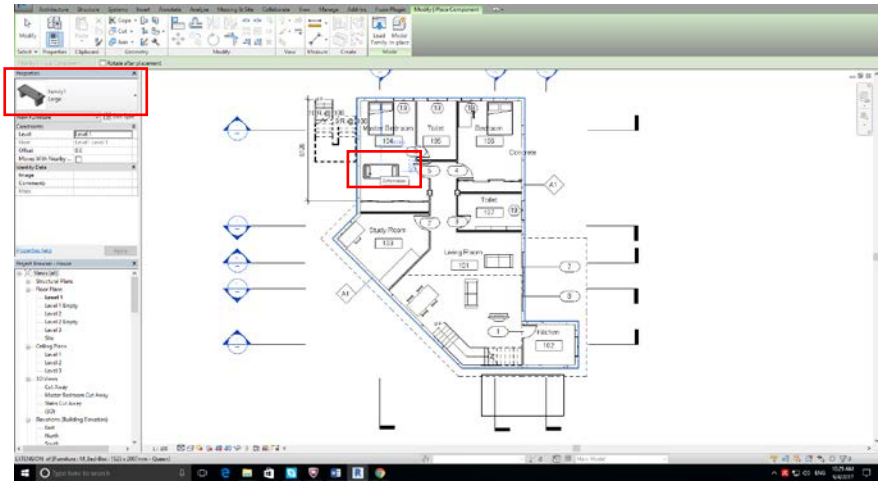
14. As the frame is placed in the middle of the table, it does not have to follow the reference planes.



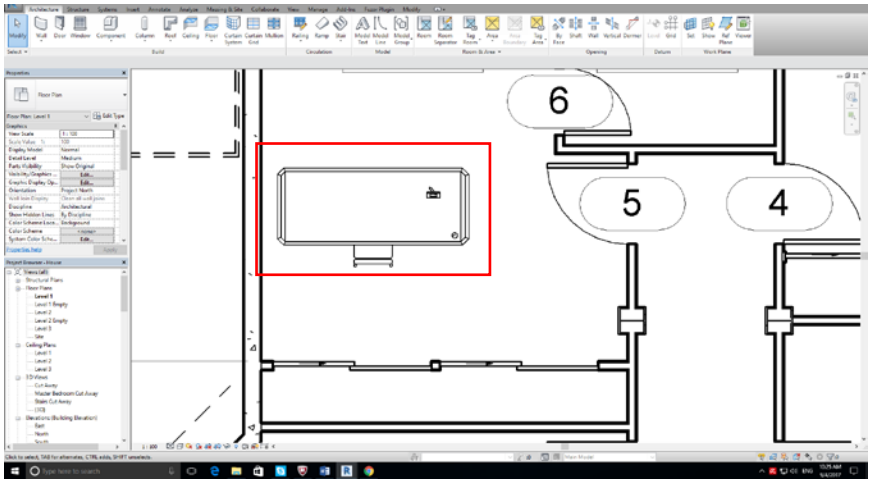
15. Click on Load into Project under the Modify Panel.



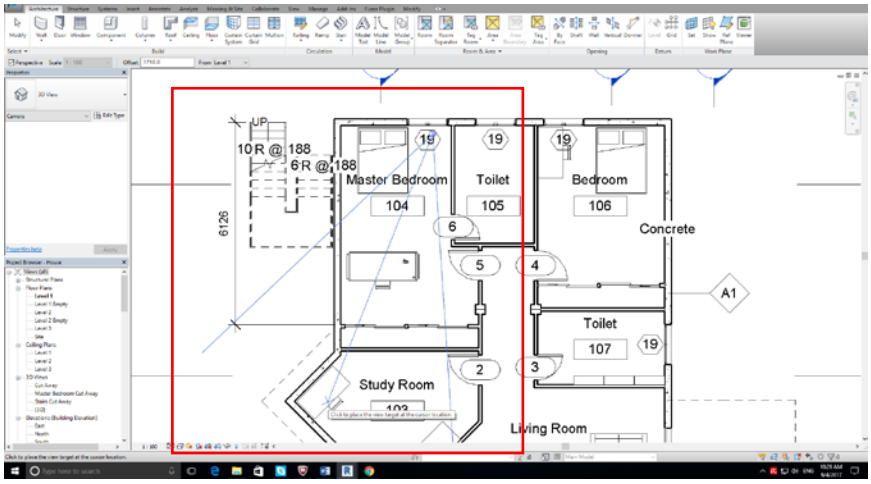
16. Place desk in the master bedroom.



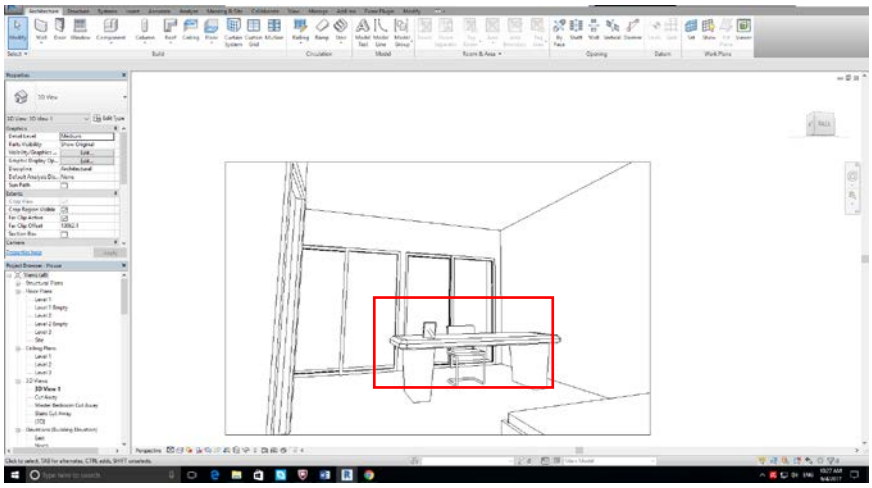
17. The table and nested picture frame are placed together.



18. Use the camera tool to take a look at the interior.



19. The Desk Family is placed in normally.



20. Flex the family to see if it is functioning normally.