

Chapter 6

Using Basic Building Components-II

Learning Objectives

After completing this chapter, you will be able to:

- Understand the concept of floor.
- Create floors using the Floor tool.
- Create roofs using the Roof tool.
- Create ceilings using the Ceiling tool.
- Join walls with the other walls and roof.
- Create openings in the floor, roof, and ceiling.

In earlier chapters, you learnt to use levels, grids, and datums in a project. This chapter describes the concept of using the floor, roof, and ceiling.

You have learnt that elements, such as, walls, doors, windows, and so on, can be added from the library of built-in elements provided in Autodesk Revit Building. Floor, roof and ceiling are examples of sketched elements, whose sketches need to be drawn before their creation.

CREATING FLOORS

Menu Bar: Modelling > Floor
Design Bar: Basic > Floor; Modelling > Floor



You can add a floor to the building model using the **Floor** tool, which can be invoked by choosing **Modelling > Floor** from the menu bar. Alternatively, you can choose the **Floor** tool from the **Basic** or **Modelling** tab of the **Design Bar**. When you invoke this tool, the **Design Bar** shows only the **Sketch** tab, as shown in Figure 6-1.

The **Sketch** tab consists of various tools that are used to draw the floor sketch, which defines the boundary of the floor. You can either pick the existing walls or sketch the boundary in the plan view by using lines. It can also be sketched in the 3D view, provided that the work plane is set to the plan view.

Similar to the other model components, the floor too has associated type and instance properties. You can choose the **Floor Properties** option in the sketch tab to display the **Element Properties** dialog box. The **Type** drop-down list shows the floors available in Autodesk Revit Building's library, as shown in Figure 6-2. This dialog box can be used to modify the instance properties of the floor, such as the level in which the floor is to be created, the height offset of the floor from the specified level, and so on.

To modify the type properties of a floor, choose the **Edit/New** button in the **Element Properties** dialog box. The **Type Properties** dialog box is displayed, as shown in Figure 6-3. You can set the type parameters for the floor in it. You can create a new floor type by using the **Duplicate** button. Choose the **Edit** button in the **Value** column for **Structure** type parameter to display the **Edit Assembly** dialog box, which displays the structure of the floor type with its various layers. The **Insert** or **Delete** button can be used to customize the new floor type, based on the specific project requirement.

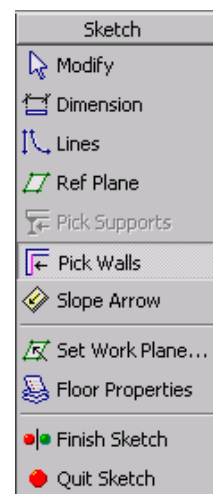


Figure 6-1 The **Sketch** tab in the **Design Bar**



Note

The type and instance properties vary depending on the floor type selected. Autodesk Revit Building Help provides a detailed explanation for all the properties associated with the floor types.

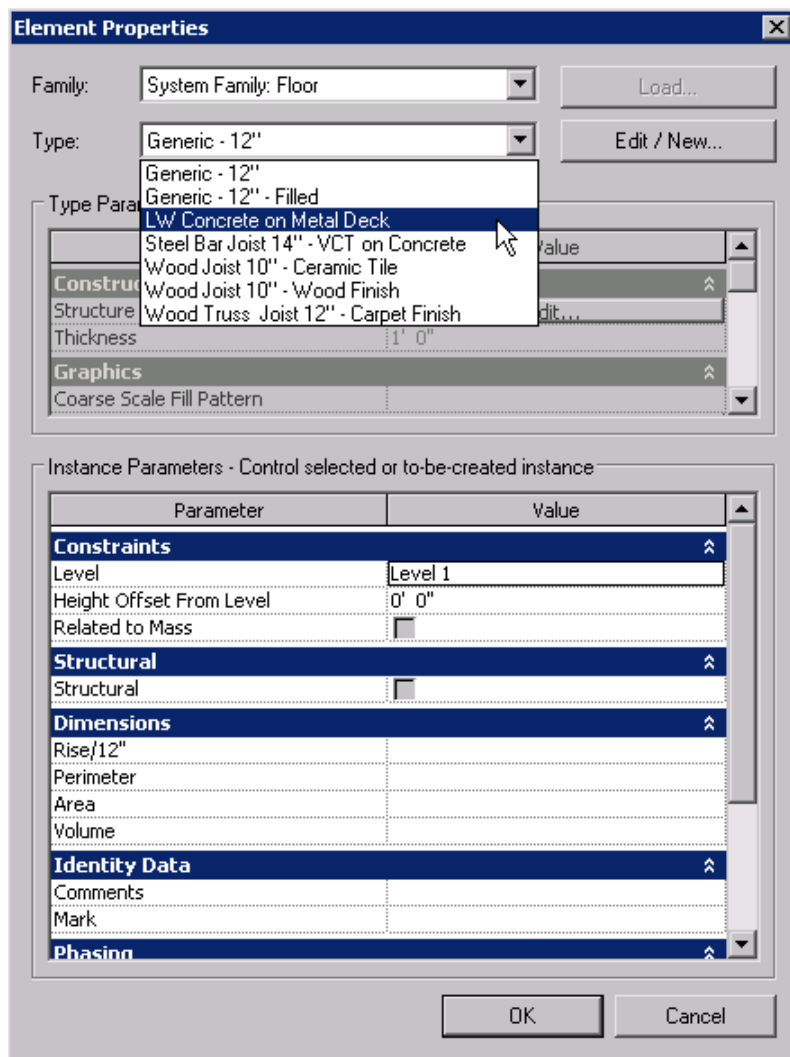
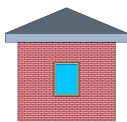


Figure 6-2 The *Element Properties* dialog box showing the floor types



Tip: The *Preview* button in the *Type Properties* dialog box can be used to display a graphical image of the floor type, which changes when you add or remove a layer in the floor structure.

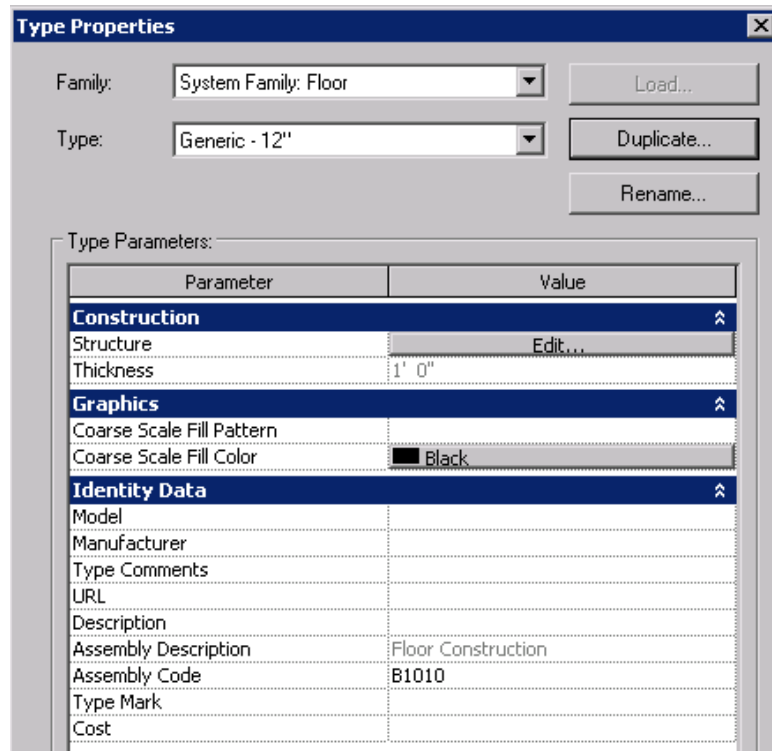


Figure 6-3 The partial view of the *Type Properties* dialog box for the floor

Sketching the Floor Boundary

To create a floor, you need to sketch its boundary by using any one of the two methods. The first method is to pick the already created walls as the defining floor boundary, using the **Pick Walls** tool. The other is to draw the floor profile using the **Lines** tool from the **Design Bar**.

The **Pick Walls** tool can be used to sketch the floor for spaces bound by the connected walls. The **Option Bar** displays the **Offset** edit box, which can be used to specify the offset distance of the floor sketch line from an existing wall. The **Extend into wall (to core)** check box, used to extend the floor to the wall core, assists in creating a joint between the floor and the wall core. After selecting the **Pick Walls** tool (default), move the cursor near the wall. You will notice that a dashed line appears along its inner or outer face, as the cursor is brought near the respective wall face. You can choose either face of the wall to sketch the floor. Click when the dashed line appears at the appropriate location. A purple line, with flip and drag controls, is displayed on the wall, as shown in Figure 6-4. The flip control can be used to flip the line between the two faces of the wall.

Similarly, you can select other walls to define the floor boundary. The sketched boundary must form a closed profile, with all the edges connected to each other.

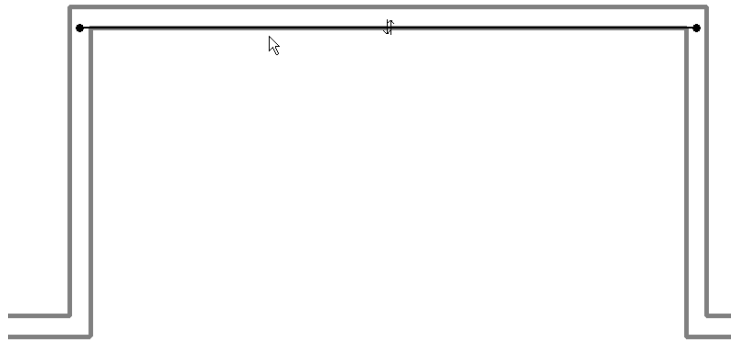
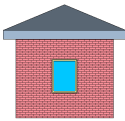


Figure 6-4 Sketching the floor boundary



Tip: You can also use the **TAB** key to select a chain of walls segments to create the floor boundary.

After completing the boundary sketch, choose the **Modify** tool from the **Design Bar** to edit it. For example, you can extend the floor boundary by dragging the appropriate sketched line to the new location, as shown in Figure 6-5.

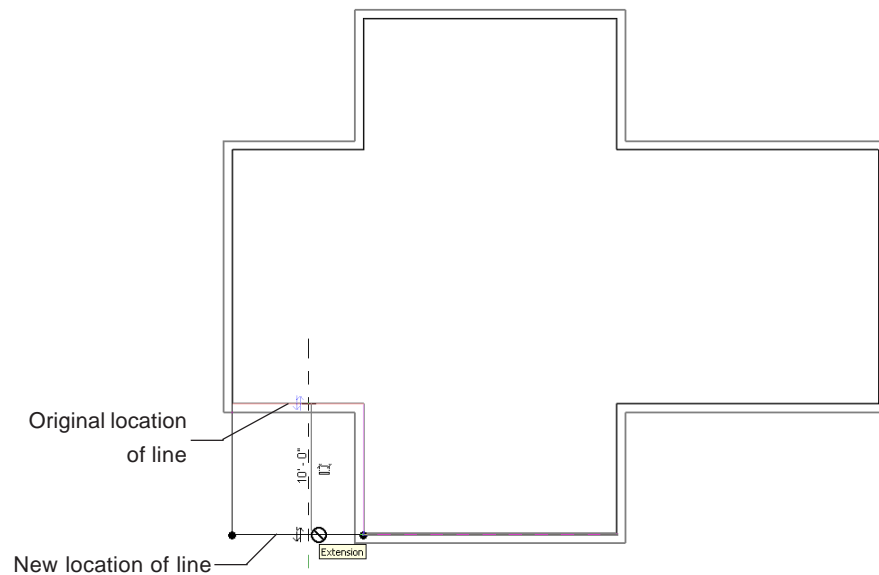
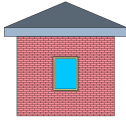


Figure 6-5 Dragging the sketched floor boundary

The connected sketched lines are also extended. You can also use the drag controls to ensure that all the corners of the sketched profile are completed. After the floor profile is sketched, select the **Finish Sketch** option from the **Design Bar** to create the floor. The floor is created and

the sketch tab is closed. Because the created floor is not visible in the plan view, you can use the **3D** tool to view it.



Tip: In case the sketched profile does not form a closed loop, Autodesk Revit displays an error message highlighting the lines that are not connected. It prompts you to quit sketching or continue editing the sketch. To correct the error, you can choose to continue, make the correction, and then create the floor.

The **Quit Sketch** tool in the **Design Bar** is used to quit sketching and exit the **Sketch** tab without saving the sketched profile.



Note

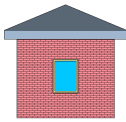
When you invoke the tools for the sketched elements, such as floor, roof and ceiling, only the **Sketch** tab is available in the **Design Bar**. You must complete or quit the sketching process in order to access the other tabs. This can be done by choosing either the **Finish Sketch** or the **Quit Sketch** option. It closes the **Sketch** tab and displays the original **Design Bar**.

The other option to sketch the floor profile is to draw it using the **Lines** tool from the **Sketch** tab. When you choose **Lines**, the **Options Bar** displays the toolbar with the sketching tools. You can choose the appropriate sketching tool to sketch the floor boundary based on its shape. The functionality of the sketching tools is the same as that for creating a wall. You can use the **Chain** option to sketch lines that are connected end to end. The **Offset** edit box can be used to sketch lines at a specified offset distance from a point on an existing element. Using the **Modify** tool in the **Sketch** tab, you can use the editing tools to edit the sketched profile. After completing the profile, choose the **Finish Sketch** option to create the floor and return to the original tabs of the **Design Bar**.

The **Dimension** tool is used to dimension the floor profile. You can use the **Ref Plane** and **Set Work Plane** tools to create a reference plane or set a work plane for sketching the floor boundary.

The **Slope Arrow** tool is used to create a sloped floor by sketching a slope arrow. After creating, you can select the slope arrow and choose the **Properties** button to modify its associated properties and attain the desired slope in the floor.

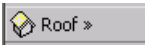
You can also change the floor type, after it has been created by selecting the floor and then selecting the new floor type from the **Type Selector Bar**. The floor properties are modified to the new floor type.



Tip: You can also access various floor properties and other related tools, by highlighting the floor, right-clicking and selecting the **Properties** option from the shortcut menu. This displays the **Element Properties** dialog box, through which you can modify various instance and type parameters of the selected floor.

CREATING ROOFS

Menu Bar: Modelling > Roof
Design Bar: Basics > Roof; Modelling > Roof



The roof is another important element in a building project. Autodesk Revit Building provides various tools to sketch and create a variety of roof shapes. Like the floor, the roof is also a sketched element.

You can add a roof to the building model by using the **Roof** tool, which can be invoked by choosing **Modelling > Roof** from the menu bar or by choosing the **Roof** tool from the **Basic** or **Modelling** tab of the **Design Bar**. When you invoke this tool, four options are displayed in the cascading menu, as shown in Figure 6-6.

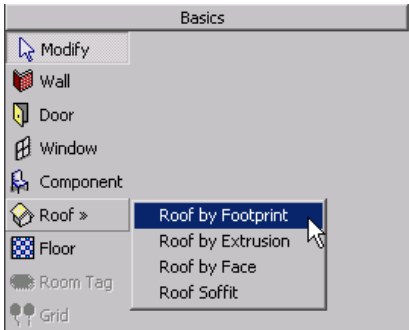


Figure 6-6 Invoking the Roof tool from the Design Bar

In Autodesk Revit Building, you can create roofs using two different methods, footprint or extrusion, depending on the roof you wish to create.

Creating the Roof by Footprint

To use the **Roof by Footprint** tool, you first need to sketch the profile or footprint of the roof in the plan view. You can choose **Modelling > Roof > Roof by Footprint** from the menu bar to invoke this tool. By default, Autodesk Revit Building sketches the footprint in Level 2. You can, however, specify the level in the **Lowest Level Notice** dialog box, as shown in Figure 6-7. You can select the appropriate level and choose the **Yes** button to close the dialog box.

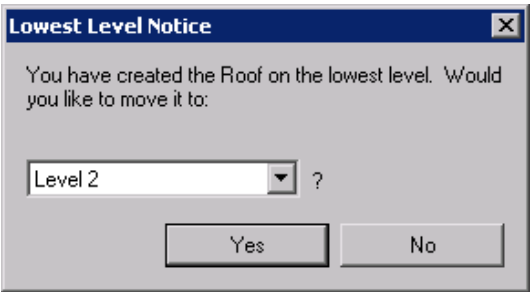


Figure 6-7 Specifying the level to sketch the roof footprint

The **Design Bar** now shows only the **Sketch** tab. Using the tools in this tab, you can sketch the boundary defining the roof extents or its footprint. To define the roof footprint, you can either pick the existing walls or sketch the boundary using lines.

The method of sketching the roof footprint is similar to the method described for sketching the floor earlier in this chapter. You can use the **Pick Walls** tool to sketch the footprint by selecting the walls. Alternatively, the **Lines** option enables you to draw the footprint using the sketching tools. The boundary can be easily sketched in the plan view or the 3D view, provided the work

plane is set to the plan view. You can use the **Overhang** edit box in the **Options Bar** to specify the distance of the roof overhang from the wall. The **Defines Slope** check box is used to apply a sloping character to the lines in the roof footprint. The **Extend to wall core** check box can be selected to extend the roof to the wall core.

On completing the sketch of the footprint, choose the **Modify** tool from the **Design Bar** to edit the sketched profile. Select the footprint and specify the parameters to define the slopes in the roof. If you select the **Define Slope** option, the completed sketch will have sloped sides. This generates the hip roof. Figure 6-8 shows the completed roof footprint for a rectangular wall profile with a specified offset distance and a defined slope. Autodesk Revit Building Release 8 provides the slope edit control that enables you to specify the slope of the roof. Choose **Finish Roof** to complete the sketching procedure. Autodesk Revit Building prompts you to choose whether you want to attach the highlighted walls to the roof. Choose the **Yes** button to attach them. The roof is created and you can choose the **3D** option from the **Project Browser** to view it, as shown in Figure 6-9.

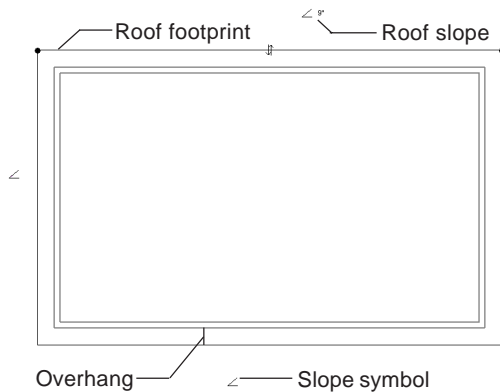


Figure 6-8 Sketching the roof footprint

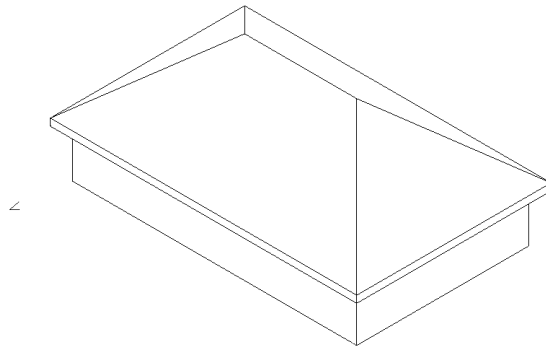


Figure 6-9 Created hip roof

To create a gable roof, set the two parallel lines of the roof footprint as sloping. Select each footprint line and clear the **Define Slope** check box to remove the slope parameter. Alternatively, after selecting the line, choose the **Properties** button and select or clear the **Define Roof Slope** parameter check box in the value column of the **Instance Parameters** table in the **Element Properties** dialog box. For example, for a given rectangular profile, you can select the longer edges of the roof footprint as sloping, as shown in Figure 6-10. Choose **Finish Roof** from the **Sketch** tab to complete the sketch. Choose the **Yes** button in the confirmation box that is displayed to attach the highlighted walls to the roof. The resulting roof shape resembles the illustration shown in Figure 6-11.

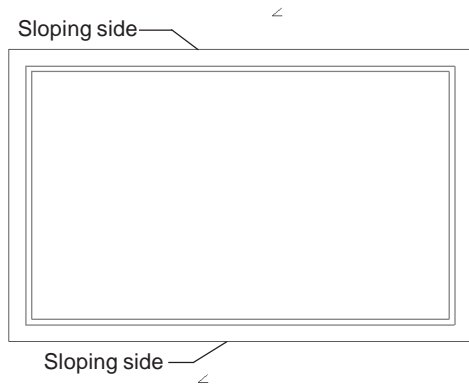


Figure 6-10 Sketching the roof footprint

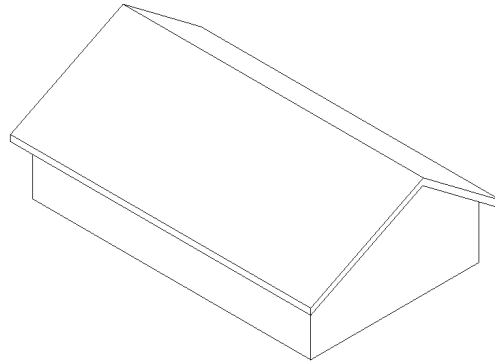


Figure 6-11 Resulting gable roof

A shed roof can be created by selecting only one edge of the roof footprint as the sloping side. Figure 6-12 shows the selected sloping side for the rectangular wall profile. The resulting roof is shown in Figure 6-13.

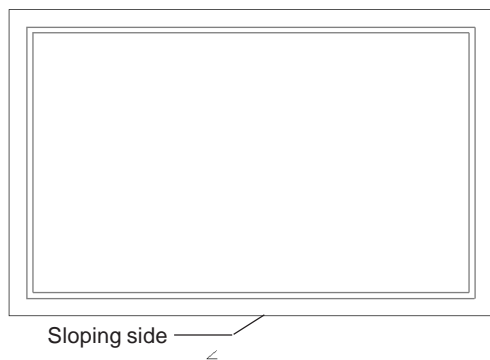


Figure 6-12 Specifying the sloping side

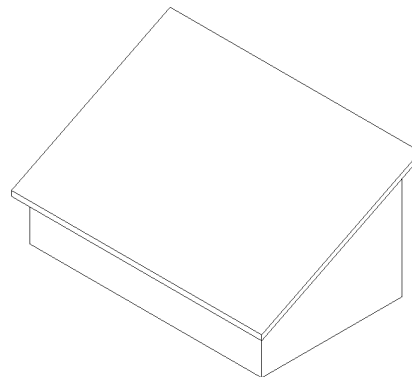


Figure 6-13 Resulting shed roof

A flat roof results if no line is assigned a sloping parameter. To create a flat roof, clear the **Define Slope** check box before sketching the roof footprint. Alternatively, you can enter the value of **0** for the roof slope control, while sketching the roof profile.



Note

To select the roof, open the view in which it has been created, because it might not be visible in the lowest plane. The sloping roof may appear to be cut off in a level because of the intersection of the roof and the work plane of the level. Double-click on **Site** in the **Floor Plans** head of the **Project Browser** to view the entire roof profile.

Creating the Roofs by Extrusion

The second method of creating a roof is by using the **Roof by Extrusion** tool. Using this tool, you can sketch the roof profile and then extrude it to create the roof. The profile can be created in the elevation view using a specific work plane. Also, it must be a series of connected lines that do not form a closed boundary.

On invoking the **Roof by Extrusion** tool, you are prompted to select the work plane to sketch the roof profile through the **Work Plane** dialog box, as shown in Figure 6-14.

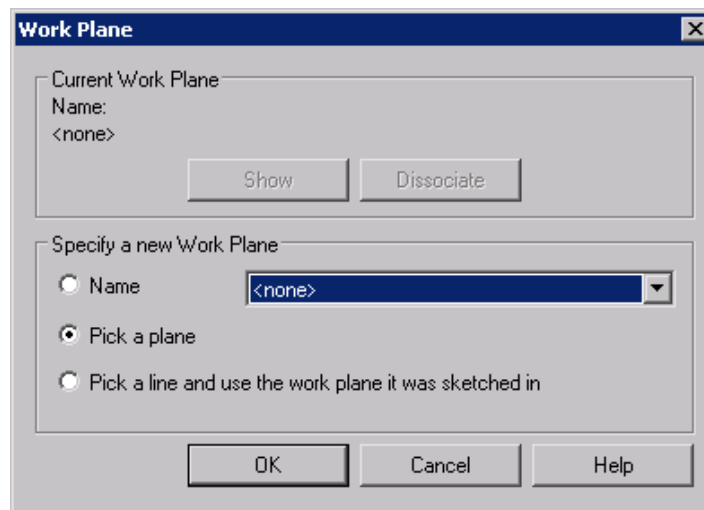


Figure 6-14 Specifying the work plane for sketching the roof profile

You can choose an existing work plane by selecting the **Name** radio button and then selecting its name from the drop-down list. The second method is to select an existing plane using the **Pick a Plane** option. When you select this option, which is also the default option, Autodesk Revit Building prompts you to select a work plane or an element defining a plane, to sketch the roof profile. The **Pick a Line and use the Work Plane it was sketched in** radio button can be used to select a line and use the work plane, in which it was sketched, for sketching the roof profile.

When you select a work plane, Autodesk Revit Building displays the **Roof Reference Level and Offset** dialog box, as shown in Figure 6-15. You can specify the base level of the roof from the

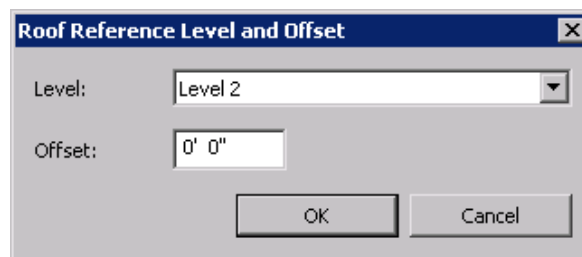


Figure 6-15 Setting the roof reference level and offset

Level drop-down list. The default level in the drop-down list is the highest level in the project. The **Offset** edit box can be used to specify the offset distance of the roof from the base level. A positive value creates the roof above the specified base level whereas a negative value creates the roof below it.

The **Ref Plane** tool is used to sketch reference lines to assist you in sketching the roof profile. A reference plane is automatically generated at the offset distance from the specified level. For example, Figure 6-16 shows the reference planes created to provide the reference points for sketching the roof profile.

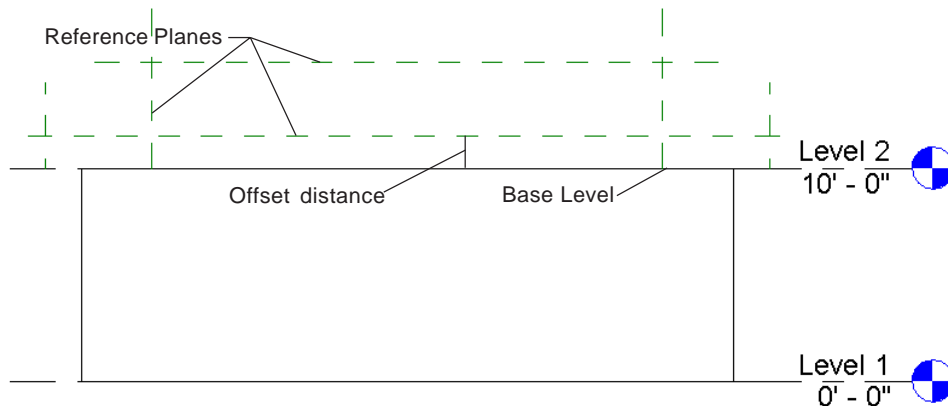


Figure 6-16 Sketching reference planes to sketch the roof profile

After sketching the reference planes, use the **Lines** tool in the **Design Bar** to sketch the roof profile. You can use the object snaps and the **Chain** option to sketch the roof profile. Other sketching tools are also available in the **Options Bar** of creating the roof profile. An example of the sketch for the roof profile is shown in Figure 6-17.

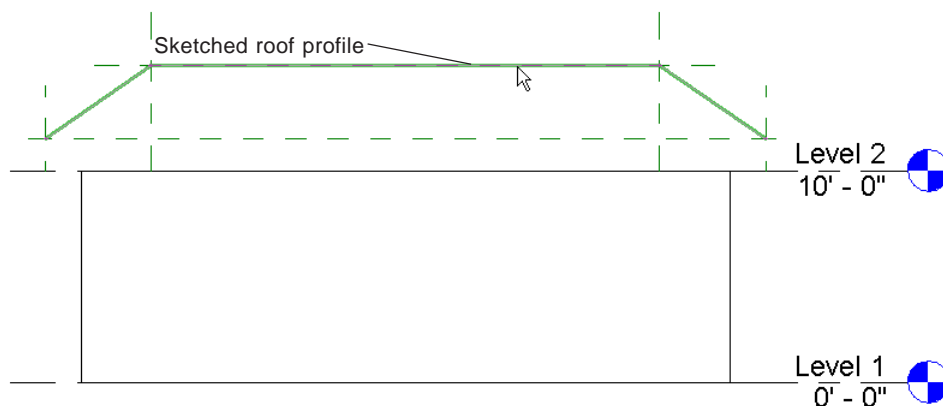


Figure 6-17 Sketching the roof profile using the reference planes

**Note**

For the sketch to be valid, the sketched profile should have lines and/or curves that are connected end to end. Also, it should not form a closed loop, if it is to be extruded.

On completing the roof profile, choose **Finish Sketch** from the **Sketch** tab. Autodesk Revit Building generates the roof from the sketched profile. The generated roof, as shown in Figure 6-18, acquires the properties of the roof type selected in the **Type Selector Bar**. You can also specify the properties of the roof before creating it, by choosing the **Properties** button from the sketch tab. You will notice that the walls do not go up to the roof soffit. Now, select the walls that need to be connected to the roof. The **Options Bar** shows the **Attach** and **Detach** buttons for the **Top/Base** parameter. Choose the **Attach** button and select the created roof. The selected walls are extended and attached to the roof soffit, as shown in Figure 6-19.

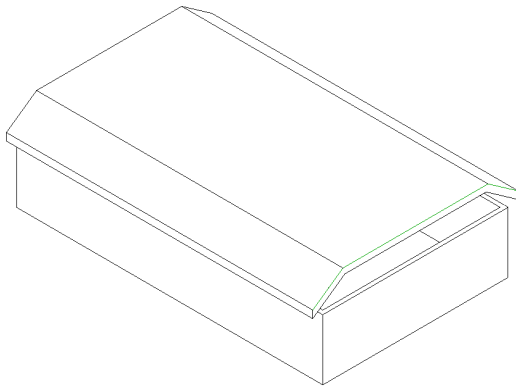


Figure 6-18 Roof created using the **Roof by Extrusion** tool

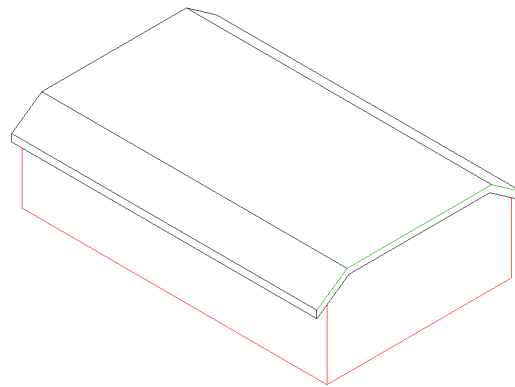
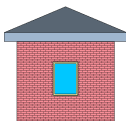


Figure 6-19 Extending the walls to the roof soffit

The **Roof Soffit** tool can be invoked by choosing **Modelling > Roof > Roof Soffit** from the menu bar. This tool is used to sketch and create roof soffits based on the specific requirements of the project.

**Note**

The examples given in this chapter are elementary in nature and their purpose is to explain the basic methods of creating roofs. Using the described techniques, you can experiment with roof shapes and forms to create roofs that are suitable for your project. Autodesk Revit Building empowers you to create a variety of dynamic roof forms using a combination of these tools.



Tip: You can create a combination of different roof shapes and join or unjoin them by choosing **Tools > Join/Unjoin Roof** tool from the menu bar.

Modifying the Roof Shape and Properties

As described earlier, you can either specify the roof properties before or after sketching the roof profile. The current roof type is displayed in the **Type Selector Bar**. To change it, select the new roof type from the drop-down list of the **Type Selector Bar**, as shown in Figure 6-20.

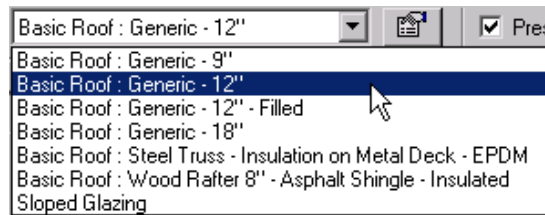


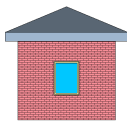
Figure 6-20 Modifying the roof type using the **Type Selector Bar**

You can use various editing tools such as, **Copy**, **Rotate**, **Move**, **Mirror**, and so on, to edit or copy the created roof.

The properties of a roof may be classified into the following three categories.

- Roof Boundary Line Properties**- properties of the lines used in sketching the roof footprint, such as length, slope angle, offset from the base, and so on.
- Roof Instance Properties**- instance properties of the selected roof, such as, maximum ridge height, base offset from level, and so on.
- Roof Type Properties**- properties of the roof, composition and cost, such as, structure, thickness, material, and so on.

To modify the roof boundary line properties, select the roof and choose the **Edit** button from the **Options Bar**. The sketch mode is activated and you can modify the sketch profile using the drag controls and other editing tools. For a roof generated using the **Roof by Footprint** tool, each line segment of the sketched footprint can be assigned a slope parameter individually to achieve sides with the desired slope. You can also specify the pitch for each a sloping side of the roof. Select the line and choose the **Properties** button to display the **Element Properties** dialog box. Enter the value of the instance parameters, such as overhang, rise, and so on. You can enter the value of the rise per 12" of the horizontal length in the value column of the **Rise/12"** parameter.



Tip: You can also access the properties of a line by right-clicking over the highlighted line and choosing **Properties** from the shortcut menu.

The roof instance properties can be viewed by selecting the created roof and choosing the **Properties** button. The **Element Properties** dialog box displays the instance parameters, such as the maximum ridge height, base offset from level, cutoff level, and so on, as shown in Figure 6-21. The maximum ridge height is automatically calculated, based on the slopes of different sides of the roof. The **Cutoff Offset** parameter can be used to enter the value of the offset distance of a cut off plane from the base level of the roof. The sloping roof is cut at the specified offset distance.

Element Properties

Family: System Family: Basic Roof Load...

Type: Generic - 12" Edit / New...

Type Parameters: Control all elements of this type

Parameter	Value
Construction	
Structure	Edit...
Thickness	1' 0"
Graphics	
Coarse Scale Fill Pattern	

Instance Parameters - Control selected or to-be-created instance

Parameter	Value
Constraints	
Base Level	Level 2
Related to Mass	<input type="checkbox"/>
Base Offset From Level	0' 0"
Cutoff Level	None
Cutoff Offset	0' 0"
Construction	
Rafter Cut	Plumb Cut
Fascia Depth	0' 0"
Rafter or Truss	Truss
Maximum Ridge Height	22' 9"
Dimensions	
Rise/12"	9"
Volume	2368.89 CF
Area	2368.89 SF

OK Cancel

Figure 6-21 The **Element Properties** dialog box for **Generic 12"** roof



Note The instance parameters displayed in the **Instance Parameters** table depends upon the roof type selected. You can experiment with these parameters to modify the roof to the desired shape.

The type properties of the roof can be viewed and modified by choosing the **Edit/New** button in the **Element Properties** dialog box, which displays the **Type Properties** dialog box, as shown in Figure 6-22. You can now modify various type parameters, such as the layer composition, material, thickness, and so on. Similar to the other elements, choose the **Edit** button in the value column of the **Structure** type parameter to display the **Edit Assembly** dialog box. Use the **Insert** and **Delete** buttons to add or remove layers to the existing assembly. The total thickness of the roof is calculated by adding the individual thickness of all the layers.

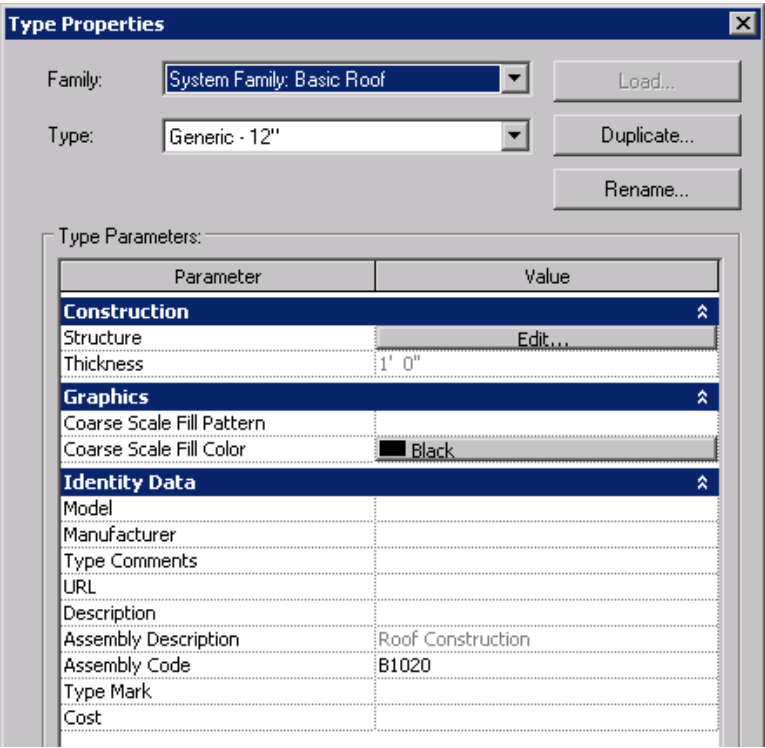
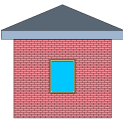


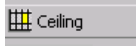
Figure 6-22 The partial view of the **Type Properties** dialog box for the roof



Tip: Autodesk Revit generates roofs based on the sketch profile and values of the instance and type parameters. In case the roof profile is not continuous or the inputs given are invalid, an error message is displayed. Based on the error description, you can do the necessary corrections.

CREATING CEILINGS

Menu Bar: Modelling > Ceiling
Design Bar: Modelling > Ceiling



You can add a ceiling to the building model using the **Ceiling** tool, which can be invoked by choosing **Modelling > Ceiling** from the menu bar. Alternatively, you can choose the **Ceiling** tool from the **Modelling** tab of the **Design Bar**. On invoking the tool, the **Options Bar** shows the **Sketch** button. Ceilings are not visible in the floor plan, hence they are created in the ceiling plan. You can add a ceiling to a project using two different methods, automatic ceiling and sketched ceiling.

Creating an Automatic Ceiling

The first method is to create an automatic ceiling. After choosing the **Ceiling** tool, select the ceiling type from the drop-down list of the **Type Selector Bar**. Autodesk Revit Building provides different built-in ceiling types that can be used. To add the ceiling to an entire room, open the ceiling plan, move the cursor inside the room, and click when the ceiling boundary is displayed. Autodesk Revit Building automatically creates the ceiling from the center of the room.

For example, to create an automatic ceiling, when you move the cursor inside the room, its boundary is highlighted in red, as shown in Figure 6-23. Click to create the ceiling automatically. If you have created the ceiling in a floor plan, Autodesk Revit Building displays a warning indicating that the created ceiling will not be visible in it. You can then open the ceiling plan of the corresponding level to view the created ceiling, as shown in Figure 6-24. You can also open the section view through the room to view the cross-section of the created ceiling.

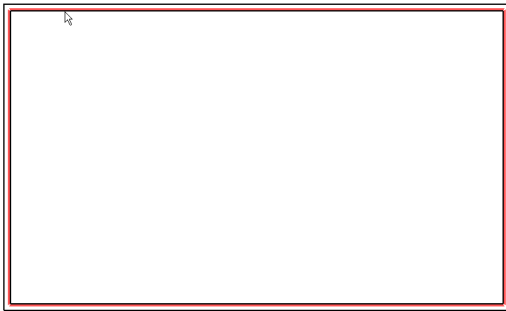


Figure 6-23 Selecting the room to create an automatic ceiling

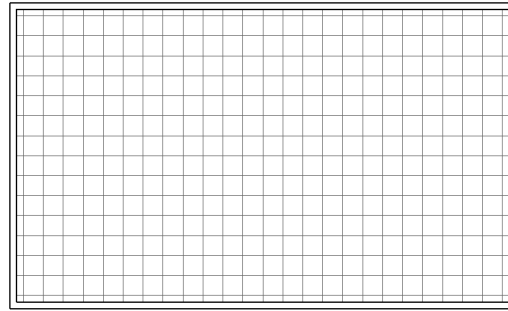
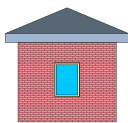


Figure 6-24 The created automatic ceiling



Tip: Using the automatic ceiling method, you can add a ceiling to each room with a single click. This method is useful when you need to add a ceiling to the entire room. If the room profile is not closed, Autodesk Revit does not display the ceiling boundary, and so, the ceiling can not be created.

Sketching the Ceiling

The second method of creating a ceiling is to sketch its boundary. For doing so, choose the **Sketch** button in the **Options Bar**. This activates the sketch mode. Use the **Ref Plane** tool to draw the reference planes, as shown in Figure 6-25. The ceiling can now be sketched using the **Lines** tool and the object snap options, as shown in Figure 6-26. After completing the sketch, choose the **Finish Sketch** button in the **Design Bar** to create the ceiling.

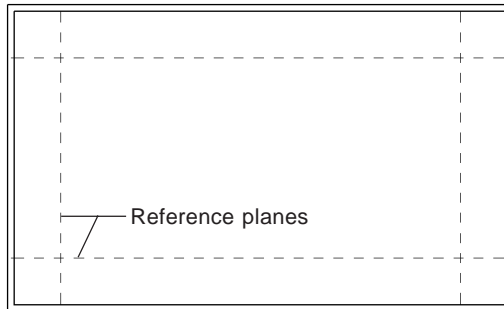


Figure 6-25 Drawing reference planes for sketching the ceiling boundary

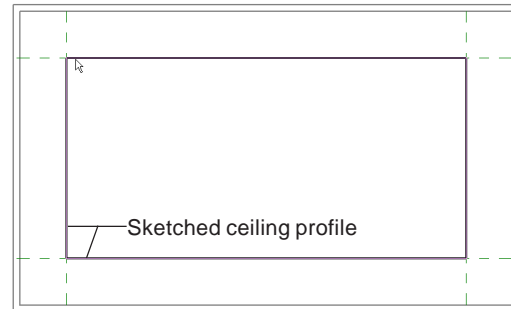


Figure 6-26 Sketching the ceiling boundary

The ceiling is created within the sketched profile, as shown in Figure 6-27. Display the section view to view the ceiling in it. The ceiling appears at a certain height from the floor level, as shown in Figure 6-28.

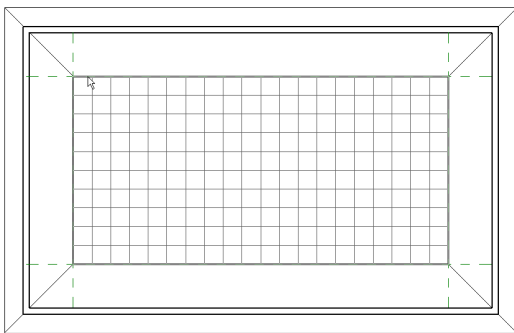


Figure 6-27 Resulting ceiling within the sketched boundary

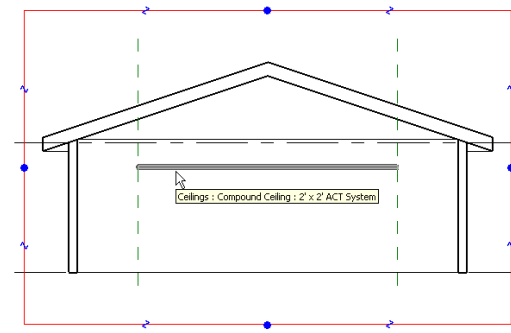
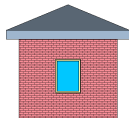


Figure 6-28 Resulting ceiling in the section view



Tip: You can also create a sloping ceiling. While sketching the ceiling profile, assign the sloping parameter to the appropriate lines using the **Define Slope** check box in the **Options Bar**. The procedure for creating a sloping ceiling is similar to the procedure for creating a sloping roof.

Modifying the Ceiling

You can either modify the ceiling before or after it has been created. The current ceiling type is displayed in the **Type Selector Bar**, which you can change by selecting the ceiling and then selecting the new ceiling type from the drop-down list of the **Type Selector Bar**. You can also use editing tools such as, **Copy**, **Rotate**, **Move**, **Mirror**, and so on, to edit or copy the created ceiling.

To modify the ceiling properties based on its sketch, select the ceiling and choose the **Edit** button from the **Options Bar**. The sketch mode is activated and you can modify the sketch profile using the drag controls and other editing tools. Select the line and choose the **Properties** button to display the **Element Properties** dialog box and enter the value of various instance parameters. The **Offset from Base** parameter is activated only when you assign the sloping parameter to a ceiling boundary line.

The ceiling instance properties can be viewed by selecting the created ceiling and choosing the **Properties** button. The **Element Properties** dialog box displays the instance parameters of the selected ceiling, such as the height offset from level, as shown in Figure 6-29.

Element Properties

Family: System Family: Compound Ceiling Load...

Type: 2' x 2' ACT System Edit / New...

Type Parameters: Control all elements of this type

Parameter	Value
Construction	
Structure	Edit...
Thickness	0' 2 1/4"
Graphics	
Coarse Scale Fill Pattern	

Instance Parameters - Control selected or to-be-created instance

Parameter	Value
Constraints	
Level	Level 1
Height Offset From Level	8' 0"
Dimensions	
Rise/12"	
Perimeter	120' 0"
Area	800.00 SF
Volume	150.00 CF
Identity Data	
Comments	
Mark	
Phasing	
Phase Created	New Construction
Phase Demolished	None

Figure 6-29 The partial view of the **Element Properties** dialog box for the ceiling

Being a level-based element, ceilings are created at a specified distance from the base level. This distance is specified in the **Height Offset From Level** instance parameter in the **Element Properties** dialog box. For example, to create a ceiling at 10' height from Level 2, you can select it as the value for the **Level** instance parameter and enter the value 10' for the **Height Offset From Level** instance parameter.

Choose the **Edit/New** button to view the **Type Properties** dialog box for the selected ceiling type, as shown in Figure 6-30. The **Duplicate** button is used to create a new ceiling type. Choose the **Edit** button in the **Value** column for the **Structure** type parameter to display the **Edit Assembly** dialog box, which displays the structure of the ceiling type with its various layers. The **Insert** or **Delete** button can be used to customize the new ceiling type, based on the specific project requirement.

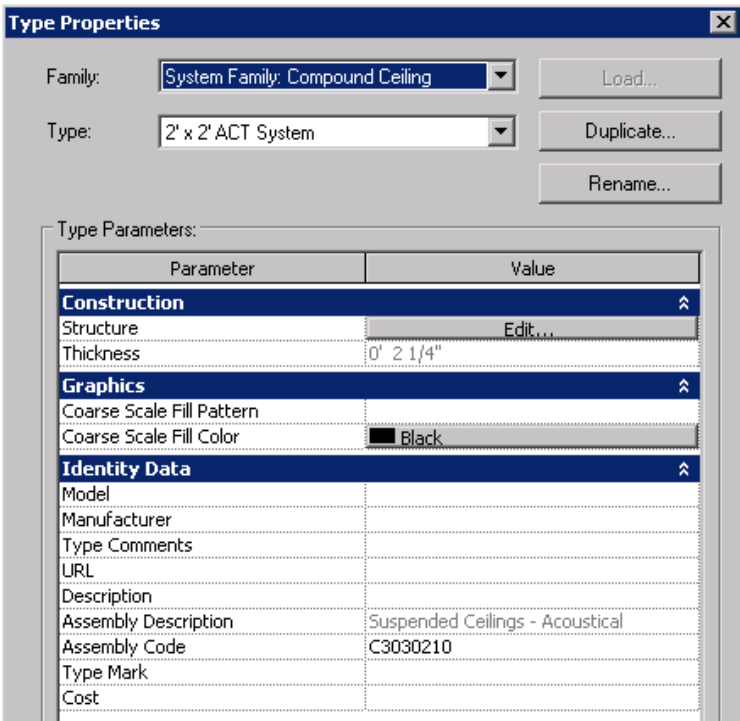
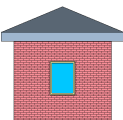


Figure 6-30 The partial view of the **Type Properties** dialog box for the ceiling



Tip: To access the element properties, you can also right-click over the ceiling and choose **Properties** from the shortcut menu.

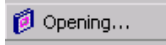


Note

When you select the created ceiling in the section view and choose **Edit**, Autodesk Revit Building displays the **Go To View** dialog box. You can select the view that you want to open for editing the ceiling boundary sketch.

CUTTING OPENINGS IN THE WALL, FLOOR, ROOF, AND CEILING

Menu Bar: Modelling > Opening
Design Bar: Modelling > Opening



You can create an opening in a wall, floor, roof, or ceiling using the **Opening** tool, which can be invoked by choosing **Modelling > Opening** from the menu bar. Alternatively, you can choose the **Opening** from the **Modelling** tab of the **Design Bar**. On invoking this tool, Autodesk Revit Building displays the **Opening Placement Option** dialog box, as shown in Figure 6-31. You can choose from the three options provided, to create the desired type of opening.

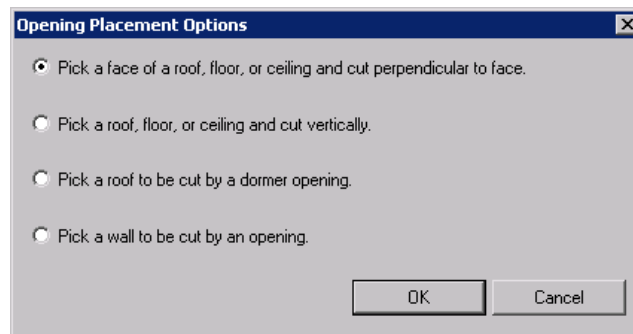


Figure 6-31 The *Opening Placement Options* dialog box

To make a perpendicular cut, you need to select the face of the floor, roof, or ceiling that is to be cut, as shown in Figure 6-32. To make a vertical cut, select the entire roof. When you make the selection, Autodesk Revit Building enters the sketch mode. You can open the desired view to sketch the opening and use the reference planes to sketch it, as shown in Figure 6-33. Choose **Finish Sketch** from the **Design Bar** to create the opening. An opening, which is perpendicular to the face is created, as shown in Figure 6-34.

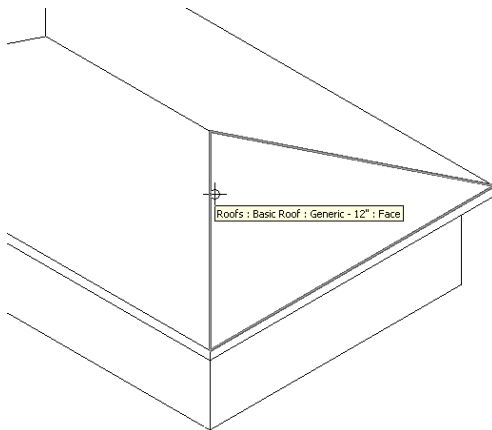


Figure 6-32 Selecting the face of the roof to be cut

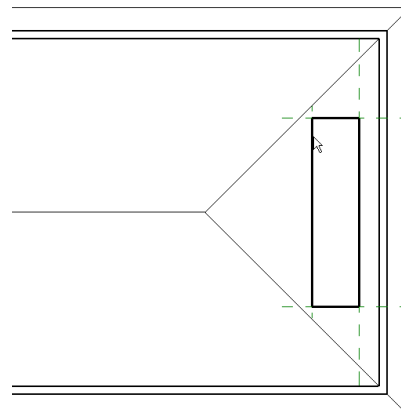


Figure 6-33 Sketching the opening in the ceiling plan using the reference planes

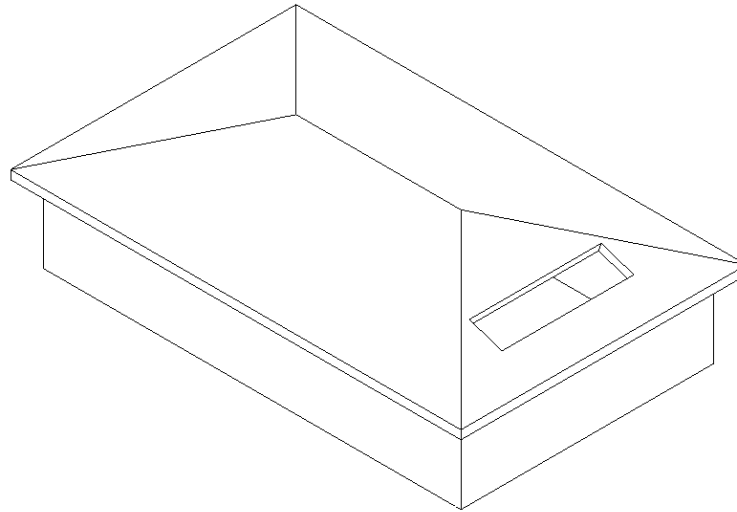


Figure 6-34 Resulting opening perpendicular to the selected face

Similarly, to make a vertical cut, sketch the opening in the appropriate view and choose **Finish Sketch**. A vertical opening is created in the selected element. For example, to cut a vertical opening in a roof, select the **Pick a roof, floor or ceiling and cut vertically** option from the **Opening Placement Options** dialog box. Select the roof as the level to sketch the opening. Use the sketching tools to draw the sketch of the appropriate size, as shown in Figure 6-35. Choose **Finish Sketch** from the **Design Bar** to create the opening. The opening can also be viewed in the 3D view, as shown in Figure 6-36.

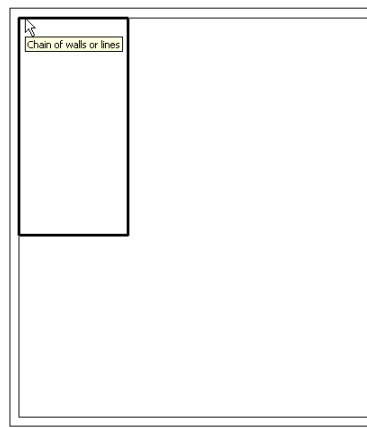


Figure 6-35 Sketching the roof opening in the ceiling plan view

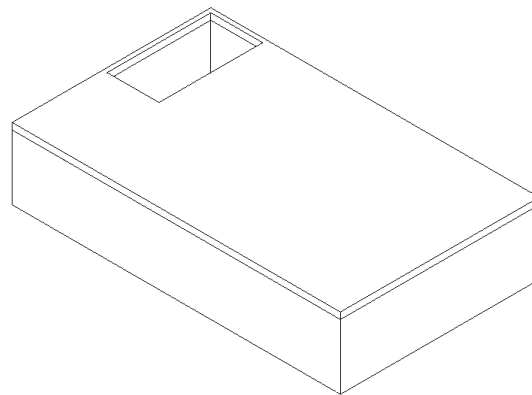


Figure 6-36 Resulting roof opening in 3D view



Note

You can also create openings in the walls using the **Opening** tool.

JOINING THE WALLS WITH THE OTHER ELEMENTS

In Autodesk Revit Building, walls are not attached to the floor and roof automatically. If need be, these can be attached using the **Attach/Detach** tool. For example, using this tool, you can attach the structural layer of a wall to the floor without attaching its finish layer.

Using the Attach/Detach tool

To attach walls to other elements, first select the walls to be attached. The **Options Bar** displays the **Attach** and **Detach** button. Choose the **Attach** button. The **Options Bar** now prompts you to choose whether you want to attach the element to the top or the bottom of the wall. To attach the floor to the wall, choose the **Base** radio button, whereas to attach a roof or ceiling, choose the **Top** radio button. After choosing the appropriate radio button, select the element(s) to be attached to the wall(s). They are attached to the top/base of the selected wall(s). The **Options Bar** returns to the previous options and you can attach or detach more elements to the already selected walls.

The wall attachment status can be checked from its instance properties. After selecting the walls, choose the **Properties** button to display the **Element Properties** dialog box. In the **Instance Parameters** table, the value column for the **Top is Attached** and the **Base is Attached** parameters show the status of the attachments to the selected walls, as shown in Figure 6-37.

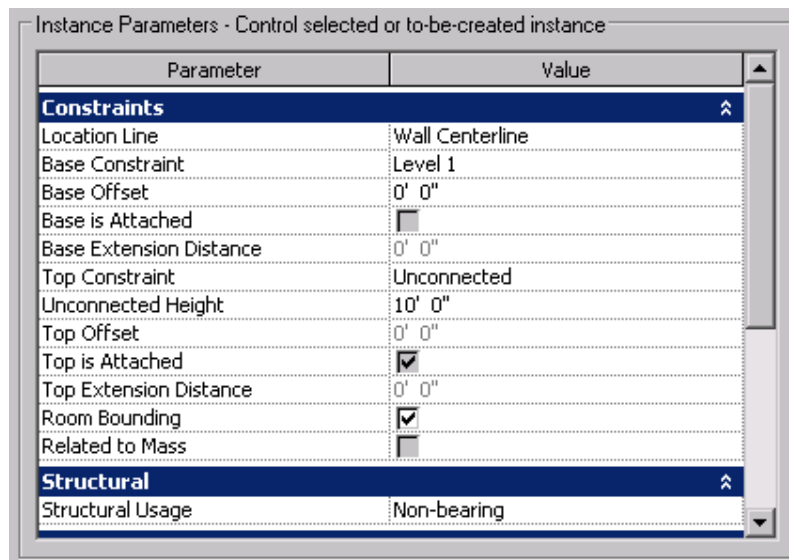


Figure 6-37 Checking the status of attachments for walls in the **Element Properties** dialog box

TUTORIALS

Tutorial 1

Apartment 1

Add a floor and ceiling to the *Apartment 1.rvt* project created in Tutorial 1 of Chapter 5. Attach the walls to the floor. Use the following project parameters. **(Expected time: 30 min)**

1. Floor type - **Floor : LW Concrete on Metal Deck**, Extents- to wall core.
2. Ceiling type- **Compound Ceiling : GWB on Mtl Stud**, Level- 8'6" from the floor level.

The following steps are required to complete this tutorial:

- a. Open the *Apartment 1.rvt* file created in Chapter 5.
- b. Hide the annotation tags, such as the section line, grids, and the elevation tag.
- c. Create the floor using the **Floor** tool, refer to Figures 6-38 through 6-40.
- d. Create the ceiling using the **Ceiling** tool, refer to Figures 6-41 and 6-42.

Opening the Project File and Hiding the Annotation Tags

First, open the specified project file. Because you do not need the annotation symbols, such as the section line, grids and the elevation tags, you can hide them in the plan view using the **Visibility/Graphics** tool.

1. Choose **File > Open** from the menu bar and open the *Apartment 1.rvt* file, created in Tutorial 1 of Chapter 5.
2. Choose **View > Visibility/Graphics** from the menu bar. The **Visibility/Graphics Overrides for Floor Plan: First Floor** dialog box is displayed.
3. Choose the **Annotation Categories** tab and clear the boxes of the **Visibility** parameter for **Elevation, Grids, and Sections**.
4. Choose the **Apply** button to apply the settings to the plan view.
5. Choose the **OK** button to close the dialog box and return to the drawing window.

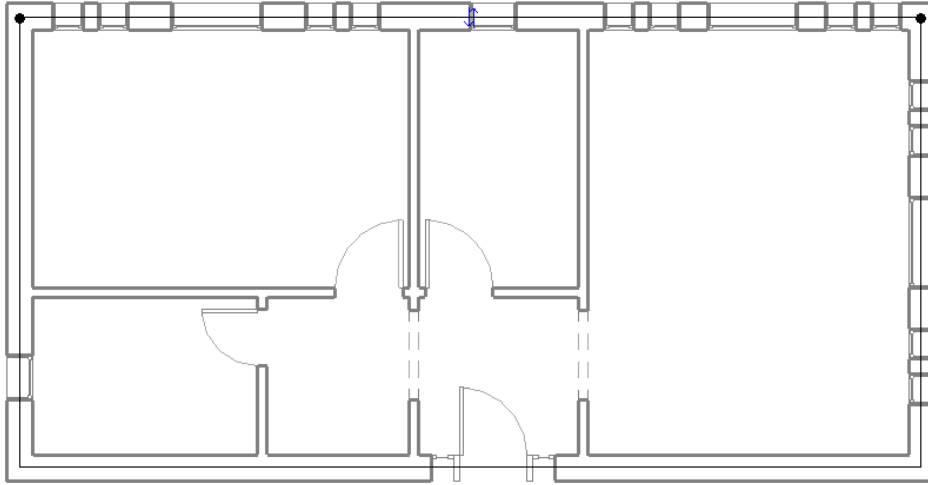
Creating the Floor

You can now add the floor to the apartment plan using the **Floor** tool.

1. Choose **Modelling > Floor** from the menu bar to invoke the **Floor** tool. The sketch mode is activated with **Pick Walls** as the selected (default) tool.
2. Ensure that the **Extend into wall (to core)** check box is selected.
3. Move the cursor near the north wall of the apartment plan, and press the TAB key when the wall is highlighted. All the exterior walls are highlighted and a dashed line, indicating the extents of the floor, appears.

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4. When the chain of walls is highlighted, click to sketch the floor boundary. The boundary is sketched and it appears as a purple rectangle, as shown in Figure 6-38.



*Figure 6-38 The sketched floor boundary using the **Pick Walls** tool*

5. Choose the **Floor Properties** button in the **Sketch** tab of the **Design Bar**.
6. In the **Element Properties** dialog box, click on the drop-down list for the **Type** parameter and select **LW Concrete on Metal Deck** as the floor type, as shown in Figure 6-39.

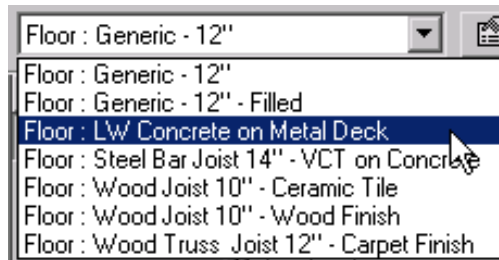


Figure 6-39 Selecting the floor type

7. Choose the **OK** button to close the **Element Properties** dialog box.
8. Choose **Finish Sketch** from the **Sketch** tab of the **Design Bar** to complete the floor. The floor of the selected type is created, as shown in Figure 6-40.

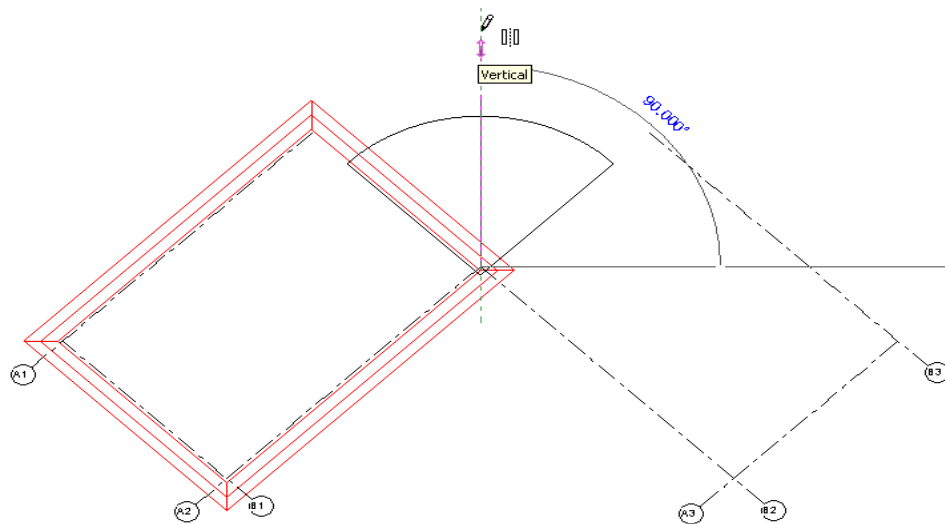


Figure 6-40 Created floor type LW Concrete on Metal Deck

Creating the Ceiling

The ceiling can be created using the **Ceiling** tool. You must create it in the ceiling plan to view it.

1. Double-click on **First Floor** from the **Ceiling Plans** head of the **Project Browser** to display the first floor ceiling plan in the drawing window.

You will notice that the annotation tags appear in this view. Repeat steps 2, 3, 4, and 5, given in the **Opening the Project File and Hiding Annotation Tags** section in this tutorial to hide various grids, elevation, and section tags from the first floor ceiling plan view.

2. Choose **Modelling > Ceiling** from the menu bar to invoke the **Ceiling** tool.
3. Click on the **Type Selector Bar** to display the drop-down list of the available ceiling types and select the **Compound Ceiling : GWB on Mtl Stud** type from it.
4. Choose the **Properties** button to display the **Element Properties** dialog box.
5. In the **Instance Parameter** table, replace the current value by entering **8'6"** as the value for the **Height Offset From Level** instance parameter to set the ceiling height.
6. Choose the **OK** button to close the **Element Properties** dialog box.

As you move the cursor over the plan, the boundaries of the rooms are highlighted. You will click inside each room to define the ceiling boundary.

7. Move the cursor inside the bedroom. The room boundary is highlighted.

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8. Click when the bedroom boundary is highlighted. The ceiling is created inside the room.

The created ceiling is not distinctly visible in the ceiling plan, because the ceiling type selected has a plain GWB board finish.

9. Repeat steps 6 and 7 to create the ceiling individually for each room.

You can now view the created ceiling in the 3D view of the project.

10. Click on the + symbol for the **3D Views** head in the **Project Browser** and double-click {3D}. The 3D view of the apartment project, with the created ceiling, is displayed. You can move the cursor over the ceiling of the bedroom to highlight it and display the ceiling type, as shown in Figure 6-41.

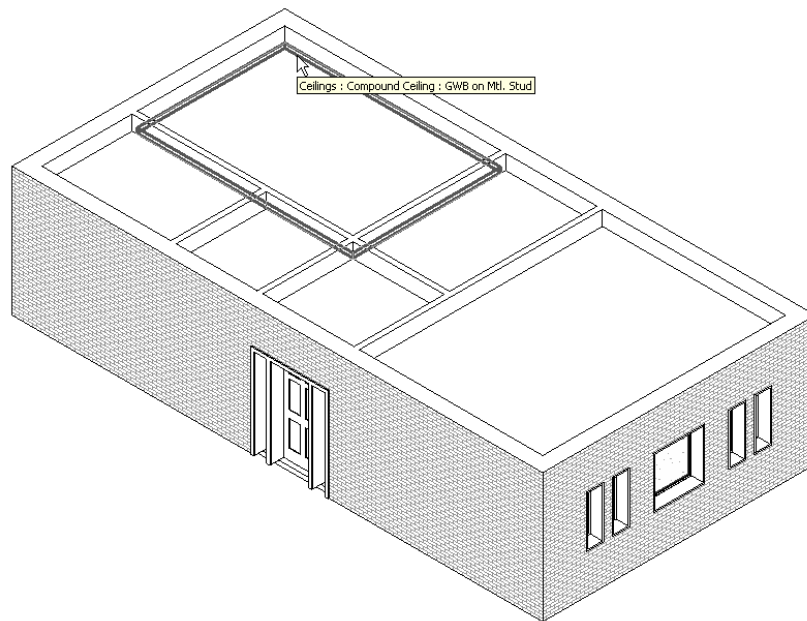


Figure 6-41 Highlighting and displaying the ceiling type for the bedroom

Attaching Walls to the Floor

Next, use the **Attach** tool to attach the wall to the floor. You will use the section view to attach the floor and ceiling.

1. Double-click on the **Section X** in the **Project Browser**.
2. Move the cursor near the external wall that is cut in the section and when it is highlighted, press TAB to highlight all the exterior walls..
3. Click to select the chain of exterior walls in the section view.

4. Choose **Attach** from the **Top/Base** parameter in the **Options Bar**.
5. Click to select the **Base** radio button.
6. Move the cursor near the floor and when it is highlighted, as shown in Figure 6-42, click to attach it to the walls. This attaches the walls to the floor.

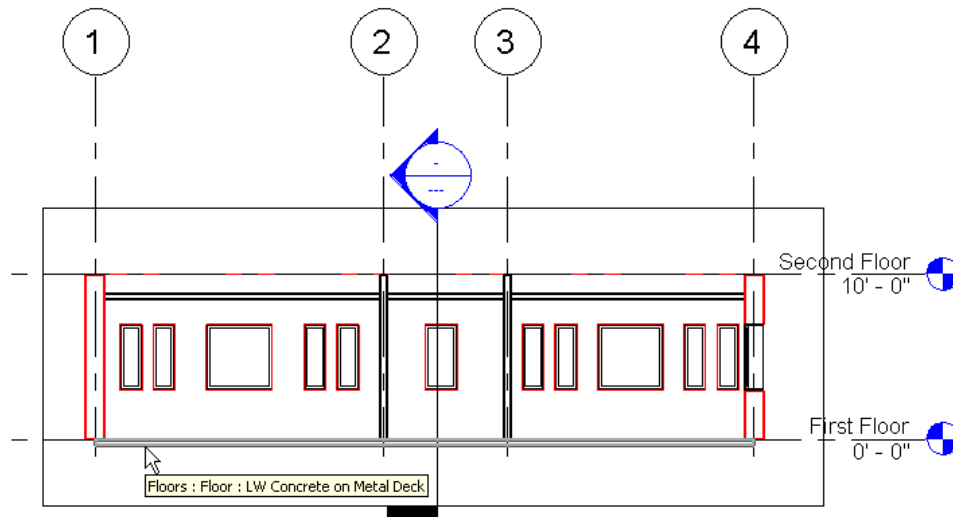


Figure 6-42 Selecting the floor to attach the exterior walls

This completes the tutorial for adding the floor and ceiling to the Apartment 1 project.

7. Double-click on **First Floor** in the **Floor Plans** head in the **Project Browser** to display the corresponding floor plan in the drawing window.
8. Choose **File > Save** from the menu bar to save the project file.
9. Choose **File > Close** from the menu bar to close the file.

Tutorial 2**Club**

Create a floor, ceiling, and roof to the *Club.rvt* project created in Tutorial 2 of Chapter 5. Attach the walls to the floor and ceiling. The roof to be created is shown in Figure 6-43. Use the following project parameters. (Expected time: 30 min)

1. Floor type - **4" Concrete slab w VCT**
2. Ceiling type- **Compound Ceiling : 2' X 2' ACT System**
Level- 11'0" from floor level
3. Roof type for Hall 1 and Hall 2- Hip roof- **Basic Roof: Insulation on Metal Deck EPDM**
Roof shape for Hall 1 and Hall 2- Hip roof with Rise/12" as 4"
Roof level for Hall 1 and Hall 2- Roof
Roof type for Lounge- **Basic Roof : Generic 9"**
Roof shape for Lounge- Flat
Roof level for Lounge- **Roof**; Base Offset from level -1'4"
Overhang for all roofs- 4'0" from the outer face of the exterior walls

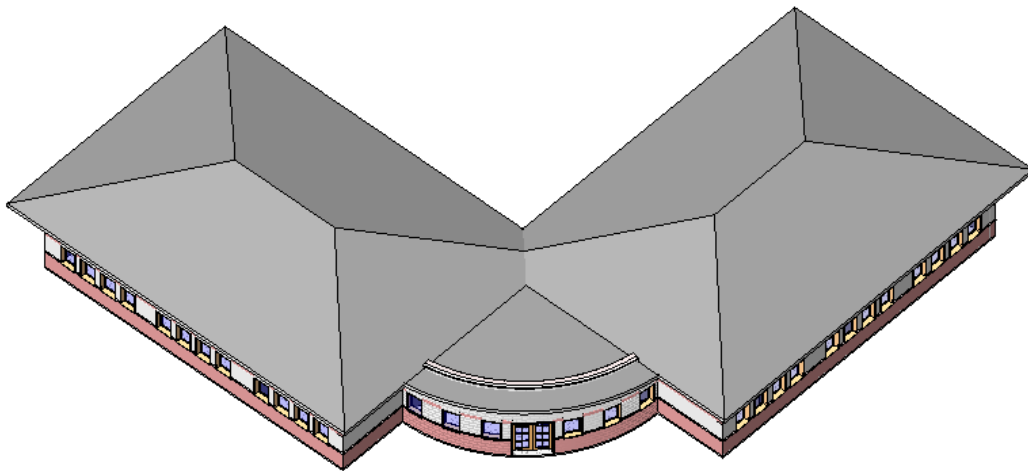


Figure 6-43 Sketch view for adding roof to the Club project

The following steps are required to complete this tutorial:

- a. Open the *Club.rvt* project file created in Chapter 5.
- b. Hide the annotation tags, such as the section line, grids and the elevation tag.
- c. Create the floor using the **Floor** tool, refer to Figure 6-44.
- d. Create the ceiling using the **Ceiling** tool.
- e. Create the roof using the **Roof by Footprint** tool, refer to Figures 6-45 through 6-51.
- f. Attach all the walls to the floor and roof.

Opening the Project File and Hiding the Annotation Tags

Open the *Club* project and make sure that the **First Floor** plan is the current view. You can hide the annotation tags using the **Visibility/Graphics** tool.

1. Choose **File > Open** from the menu bar and open the *Club.rvt* file, created in Tutorial 1 of Chapter 5.
2. Choose **View > Visibility/Graphics** from the menu bar. The **Visibility/Graphics Overrides for Floor Plan : First Floor** dialog box is displayed.
3. Select the **Annotation Categories** tab to open the list of annotation categories.
4. Clear the check boxes of the **Visibility** parameter for **Elevation**, **Grids**, and **Sections** in the dialog box.
5. Choose the **Apply** button to apply the settings to the plan view.
6. Choose the **OK** button to close the dialog box and return to the drawing window.

Repeat the steps 2, 3, 4, 5 and 6 for all the project views that are opened in this tutorial.

Creating the Floor

You will now add the floor to the club plan. This will be done using the **Floor** tool.

1. Choose **Modelling > Floor** from the menu bar to invoke the **Floor** tool. The sketch mode is activated with **Pick Walls** as the selected (default) tool in the **Design Bar**.
2. Clear the **Extend into wall (to core)** check box in the **Options Bar**.
3. Move the cursor near any exterior wall of the club building plan.
4. When the exterior wall is highlighted, press the TAB key. All the exterior walls are highlighted and dashed lines appear on them, indicating the extents of the floor.
5. When the chain of walls is highlighted, click to sketch the floor boundary. Ensure that the floor boundary line is sketched on the outer face of the exterior wall, as shown in Figure 6-44. If required, use the flip control to move the floor profile to the outer face.
6. Choose the **Floor Properties** button in the sketch tab of the **Design Bar**.
7. In the **Element Properties** dialog box, click on the drop-down list for the **Type** parameter and select **4" Concrete slab w VCT** as the floor type.
8. Choose the **OK** button to close the **Element Properties** dialog box.
9. Choose **Finish Sketch** from the sketch tab of the **Design Bar**. The selected floor type is created.

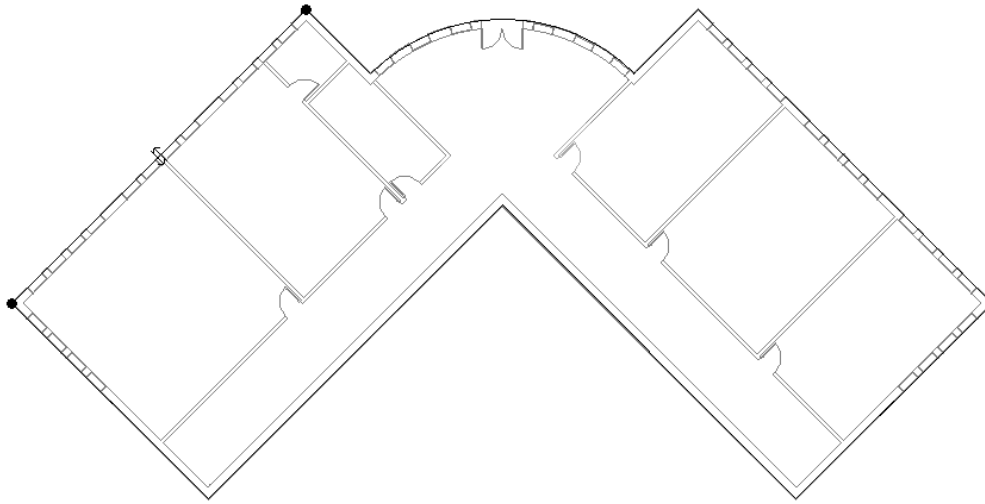


Figure 6-44 The sketched floor boundary

Creating the Ceiling

The ceiling can be created using the **Ceiling** tool. You must create it in the ceiling plan in order to view it.

1. Double-click on **First Floor** from the **Ceiling Plans** head of the **Project Browser** to display the first floor ceiling plan in the drawing window.
2. Choose **Modelling > Ceiling** from the menu bar to invoke the **Ceiling** tool.
3. Click on the **Type Selector Bar** to display the drop-down list of the available ceiling types.
4. Select the ceiling type **Compound Ceiling: 2' X 2' ACT System** from the drop-down list.
5. Choose the **Properties** button to display the **Element Properties** dialog box.
6. In the **Instance Parameter** table, replace the current value by entering **11'0"** as the value for the **Height Offset From Level** instance parameter to set the ceiling height.
7. Choose the **OK** button to close the **Element Properties** dialog box.
8. Move the cursor inside the building profile. As you move the cursor over the plan, each space boundary is highlighted.
9. Click inside each room to create the ceiling for it at the specified height. It appears as a square grid in the first floor ceiling plan.

Creating the Roof

The roof will be created using the **Roof** tool. You will create it in the **First Floor** plan and set its level as roof. First, you will create the hip roof for Hall 1. The hip roof shown in the sketch plan can be easily created using the **Roof by Footprint** tool.

1. Double-click **First Floor** from the **Floor Plans** head of the **Project Browser** to display the first floor plan in the drawing window.
2. Choose **Modelling > Roof > Roof by Footprint** from the menu bar to invoke the **Roof by Footprint** tool.
3. Select the **Define Slope** check box in the **Options Bar**.
4. In the **Overhang** edit box, enter the value **4'0"** as the overhang distance specified as the project parameter.
5. Ensure the **Pick Walls** option is selected in the sketch tab of the **Design Bar**.
6. Move the cursor near the northwest facing the exterior wall of Hall 1 and click when the dashed line appears on the outer side, as shown in Figure 6-45. The roof boundary line is sketched.
7. Similarly, create the boundary lines using the other three exterior walls of Hall 1, at the same offset distance. The boundary lines are sketched, as shown in Figure 6-46.

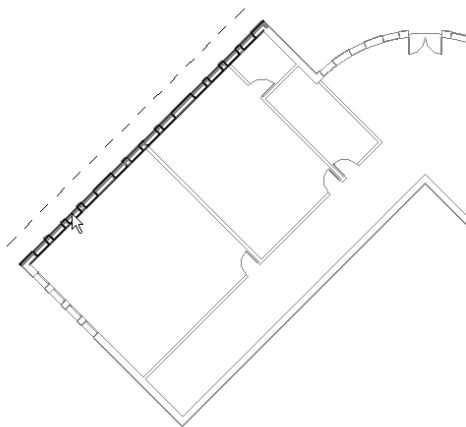


Figure 6-45 Sketching the roof profile

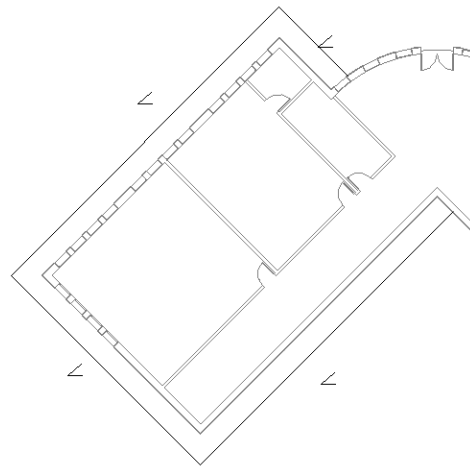


Figure 6-46 Completing the roof profile of Hall 1

8. Choose **Tools > Trim/Extend** from the menu bar and select the two lines near the lounge to complete the closed rectangular profile of the roof of Hall 1. After completing the profile, press the ESC key twice to exit the **Trim/Extend** tool.

9. Choose **Roof Properties** from the **Design Bar** to display the **Element Properties** dialog box.
10. From the **Type** drop-down list, select the roof type **Insulation on Metal Deck EPDM**.
11. Click on the value column for the **Base Level** instance parameter and select **Roof** as the base level.
12. Choose the **OK** button to close the **Element Properties** dialog box.

To set the appropriate slope for the hip roof, you must select the sketch boundary and then set its slope properties.

13. Select all the four boundary lines using the TAB key.
14. Choose the **Properties** button to display the **Element Properties** dialog box for the boundary lines.
15. Replace the current value present in the **Value** column of the **Rise/12"** instance parameter by entering **4"** as the new value of pitch, as specified in the project parameters.
16. Choose the **OK** button to close the **Element Properties** dialog box.
17. Choose **Finish Roof** from the **Design Bar** to create the roof.
18. Choose the **Yes** button to attach the selected walls to the roof in the dialog box.

The roof is created, but is not visible in the first floor plan.

19. Double-click on **North** from the **Elevation (Building Elevation)** head in the **Project Browser** to view the roof, as shown in Figure 6-47. Make sure that the **Shading with Edges** option is selected in the **View** menu.



Figure 6-47 North elevation of the club project with the created roof

The next step is to create the flat roof of the Lounge area of the Club building.

20. Double-click on **Roof** in the **Floor Plans** head of the **Project Browser**.

21. Choose **Modelling > Roof > Roof by Footprint** from the menu bar.
22. Clear the **Define Slope** check box in the **Options Bar**.
23. Ensure that the **Overhang** edit box shows 4'0" as the overhang value.
24. Move the cursor near the curved wall of the Lounge area. When the dashed line appears on the outer face of the wall, as shown in Figure 6-48, click to sketch the roof boundary curve.

To sketch the other two lines for the Lounge roof, you will use the **Lines** tool from the **Design Bar**.

25. Choose **Lines** from the **Design Bar**.
26. Select the **Chain** option from the **Options Bar**.
27. Move the cursor near the left end point of the roof boundary and click when the end point object snap appears.
28. Ensure that the **Define Slope** check box in the **Options Bar** is clear and sketch the two lines to complete the boundary of the Lounge roof, as shown in Figure 6-49.

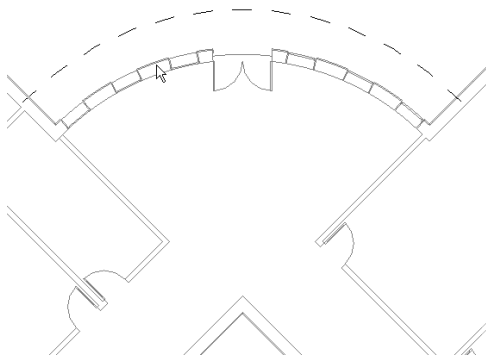


Figure 6-48 Sketching the curved roof profile

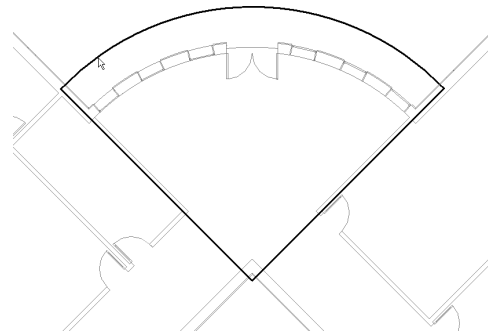


Figure 6-49 The completed Lounge roof profile

29. Choose **Roof Properties** from the **Design Bar**. The **Element Properties** dialog box is displayed.
30. Select the roof type **Generic 18"** from the **Type** drop-down list.
31. Click on the **Value** column for the **Base Level** instance parameter and ensure that the **Roof** option is selected.
32. Enter the value **-1'4"** in the **Value** column for the **Base Offset From Level** parameter, as specified in the project parameter.

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33. Choose the **OK** button to close the dialog box and return to the drawing window.

34. Choose **Finish Roof** from the **Design Bar** to create the roof.

35. Choose **Yes** to attach the walls to the roof. The flat roof is created.

Since the roof of Hall 2 is identical to the roof of Hall 1, you can mirror the roof of Hall 1 to create the roof of Hall 2, using the **Mirror** tool.

36. Double-click on **Roof Framing** from the **Floor Plans** head in the **Project Browser** to display the roof framing plan of the club building.

37. Select the roof of Hall 1.

38. Choose **Edit > Mirror** from the menu bar to invoke the **Mirror** tool.

39. Choose the **Draw** option from the **Options Bar**.

40. Mirror the selected roof using the vertical axis originating from the intersection of the grid lines, as shown in Figure 6-50. (You can use the **Visibility/Graphics** tool to make the grids visible for this step, if they are not visible).

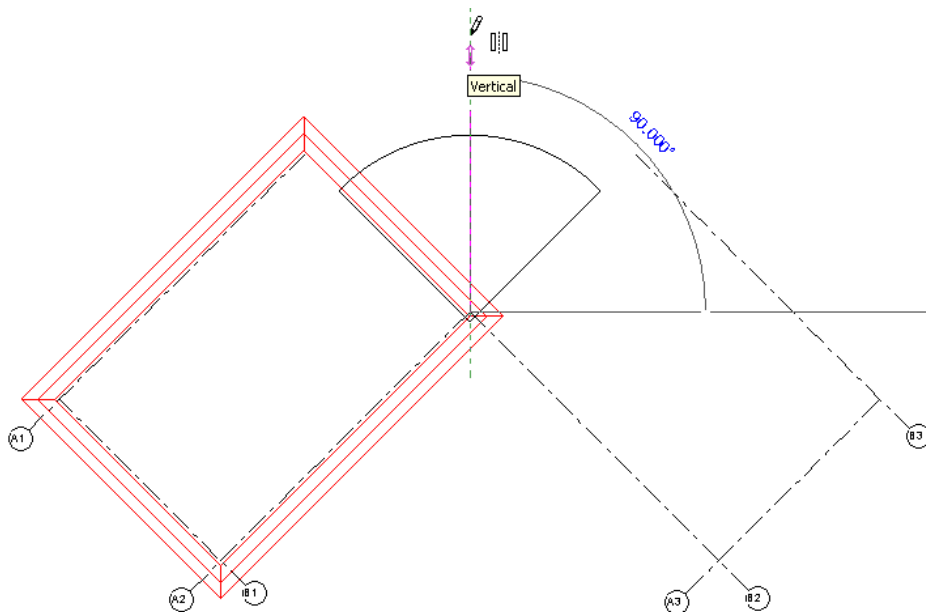


Figure 6-50 *Mirroring the roof of Hall 1*

41. Double-click on **North** in the **Elevations** tab in the **Project Browser** to view the north elevation of the club building, as shown in Figure 6-51.

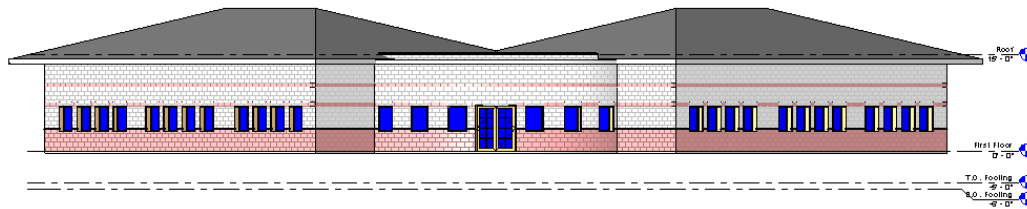


Figure 6-51 North elevation of the club project with the completed roof profile

Attaching Walls to the Floor

While creating the roof, you have already attached the walls to its bottom. Attach the walls to the floor using the **Attach** tool. Use the plan view to attach the floor.

1. Double-click on the **Section X** in the **Project Browser** to display the corresponding section view in the drawing window.
2. Move the cursor near the exterior wall and when it is highlighted, press the TAB key. All the exterior walls are highlighted.
3. Click to select the chain of exterior walls in the section view. All the exterior walls are selected.
4. Choose the **Attach** button from the **Top/Base** parameter in the **Options Bar**.
5. Select the **Base** radio button in the **Options Bar**.
6. Move the cursor near the floor and click when it is highlighted. The walls are now attached to the floor.

This completes the tutorial of creating the floor, ceiling, and roof for the Club project.

7. Double-click on **First Floor** in the **Floor Plans** head of the **Project Browser** to display the first floor plan in the drawing window.
8. Choose **File > Save** from the menu bar to save the project file.
9. Choose **File > Close** from the menu bar to close the file.

Self-Evaluation Test

Answer the following questions and then compare your answers with those given at the end of the chapter.

1. Floors, once created, cannot be modified. (T/F)
2. You can sketch the floor in the section view. (T/F)
3. When you choose the **Quit Sketch** tool, the sketched profile is saved. (T/F)
4. You can use the **Chain** tool to sketch the roof footprint. (T/F)
5. The floor is created, even if the sketched profile is not closed. (T/F)
6. Using the _____ drop-down list, you can select the ceiling type to be created.
7. The slope of a boundary line can be specified in the value column of the _____ instance parameter.
8. You can use the _____ tool to create a roof profile by sketching its boundaries in a closed loop.
9. To create an opening in the roof, you can use the _____ tool.
10. The _____ tool can be used to attach the wall to the floor.

Review Questions

Answer the following questions.

1. A reference plane can be used to provide guides for sketching the roof profile. (T/F)
2. You can modify the slope of a roof after it has been created. (T/F)
3. An automatic ceiling is generated with the center as the center of the room. (T/F)
4. You can create an opening in the ceiling using the **Cut** tool. (T/F)
5. You can select only the sloping side to create an opening perpendicular to its face. (T/F)
6. Walls can be attached to the floors using the **Join/Unjoin** tool. (T/F)
7. You cannot copy a floor, roof, or ceiling from one project to another. (T/F)

8. Which of the following options can be used to modify a sloping roof to a flat roof?
- a) **Opening**
 - b) **Rise/12"**
 - c) **Join/Unjoin**
 - d) **Define Slope**
9. You can create a roof overhang, using which of the following options?
- a) **Define Slope**
 - b) **Offset**
 - c) **Overhang**
 - d) **Extend to wall core**
10. Which of the following tools can be used to limit the visibility a of datum in a view?
- a) **Visibility/Graphics**
 - b) **Hidden lines**
 - c) **Scope Box**
 - d) **Dynamic View**

Exercises

Exercise 1

Apartment 2

Create a floor and a ceiling on the First Floor level of the *Apartment 2.rvt* project created in Exercise 1 of Chapter 5. Attach the walls to the floor. Use the following project parameters.

(Expected time: 30 min)

1. Floor type - **Floor : LW Concrete on Metal Deck**, Extents- to wall core.
2. Ceiling type- **Compound Ceiling : GWB on Mtl Stud**, Level- 8'6" from the First Floor level.

Exercise 2

Elevator and Stair Lobby

Create a floor and ceiling on the First Floor level of the *Elevator and Stair Lobby.rvt* project created in Exercise 2 of Chapter 5. Attach the walls to the floor. Also, create openings in the floor and ceiling, based on the Figure 6-52. Use the following project parameters. Do not create the floor and ceiling in the elevator shafts.

(Expected time: 30 min)

1. Floor type - **LW Concrete on Metal Deck**, Extents- to wall core
2. Ceiling type- **GWB on Mtl Stud**, Level- 8'6" from the floor level.

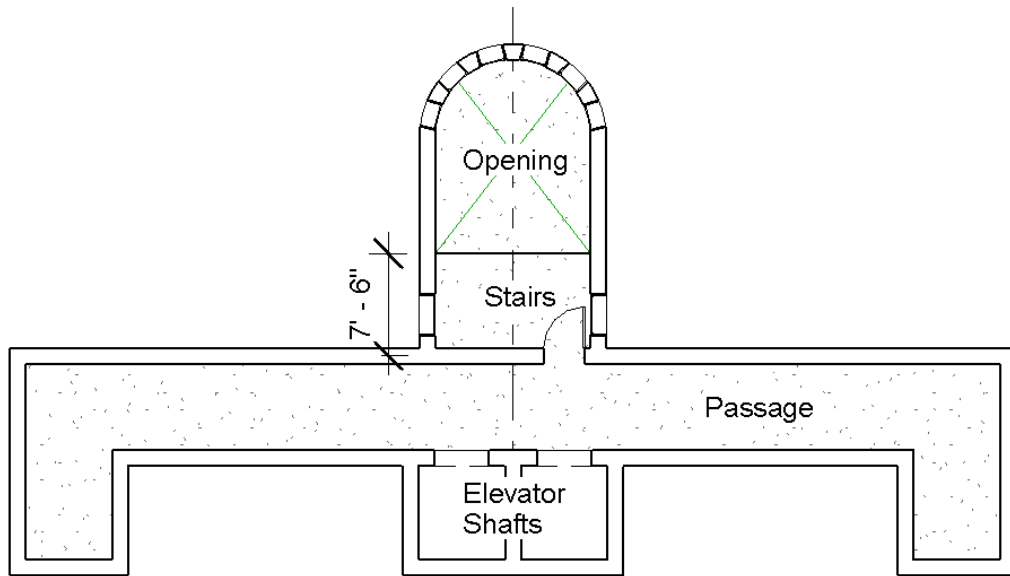


Figure 6-52 Sketch plan for creating an opening for the Elevator and Stair Lobby project

Answers to Self-Evaluation Test

1. F, 2. F, 3. F, 4. T, 5. F, 6. Type Selector Bar, 7. Rise/12", 8. Roof by Extrusion, 9. Opening, 10. Attach