

Lesson 6

ROOF:

This lesson will look at some of the powerful options and tools for designing a roof for your building. You will also add skylights.



Exercise 5-6:

Hip Roof

The first step is to create a floor plan view at the roof level, at the top of your exterior masonry wall. This will create a working plane, called a level datum, for the *Roof* tool.

Add Level Datum:

1. Open ex5-7.rvt and **Save As ex6-1.rvt**.
2. Open the **South** elevation view.
3. Select **Architecture** → **Datum** → **Level** tool from the *Ribbon*.
4. Draw a *Level* datum at the top of the exterior wall, at elevation 36'-0"; see the wall properties. Draw the datum "line" so both ends align with the other datum "lines" below it.



Level

Next, you will rename the level datum. By default Revit will name the level based on the previous level created, plus 1. Thus, the new level should be named "Level 4." You will change this name so you (and others working on the same project) know it is the top of the masonry view and not another floor in the building.

5. Press **Esc** or select **Modify** from the *Ribbon*.
6. Now select the level datum you just drew (click on the line).
7. With the level datum selected, click on the [level name] text to rename the level label.
8. Change the label to **T.O. Masonry** (Figure 6-1.1).

FYI: T.O. means "Top Of."

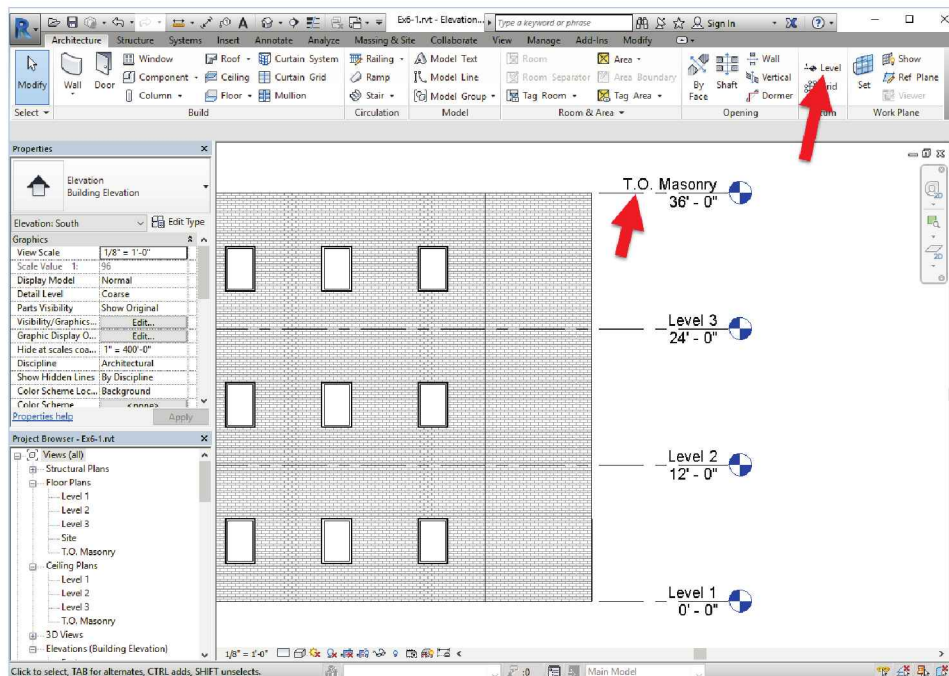


FIGURE 6-1.1 Renamed level datum

9. Click **Yes** when prompted to rename corresponding views (Figure 6-1.2).

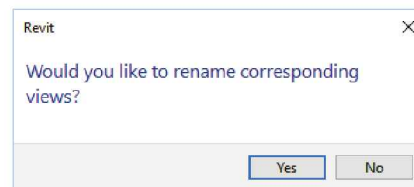


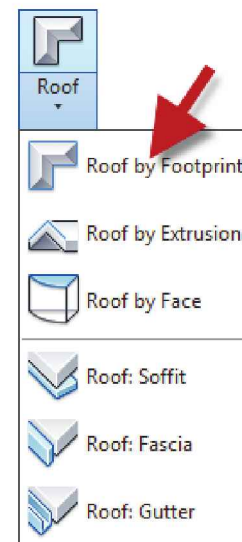
FIGURE 6-1.2 Rename prompt

These steps are the same you used to add the third floor. Notice the “T.O. Masonry” label is now listed in the *Floor Plans* section of the *Project Browser*. You can delete the T.O. Masonry ceiling plan if you’d like as it will not be needed; simply right-click and select delete from the pop-up menu.

Add a Hip Roof:

10. Open the newly created **T. O. Masonry** Floor Plan view.
11. In Properties, while nothing is selected, set the (Underlay) **Range: Base Level** to **Level 3**.
12. Select **Architecture** → **Build** → **Roof** (down-arrow).
13. Select **Roof by Footprint** from the drop-down list.

Before you start the roof you will change the slope (pitch) of the roof.



14. Click the **Properties Filter** drop down and select New <Sketch> as pointed out in Figure 6-1.3.

15. Make sure **Defines Slope** is checked and then change the **Slope** to **6"/12"**. Click **Apply**.

This will make the roof pitch 6/12, which means for every 12" horizontally the roof will *rise* 6" vertically.

16. You are now prompted to select exterior walls to define the footprint. Select **ONLY** the wall segments that define the 120'-0" x 60'-0" portion of the building (Figure 6-1.4). Pick the exterior side of the walls.

You will notice in Figure 6-1.4 that there are three sections along the perimeter of the rectangle that are open because no wall is available to pick. You will need to draw three lines to close the "footprint."

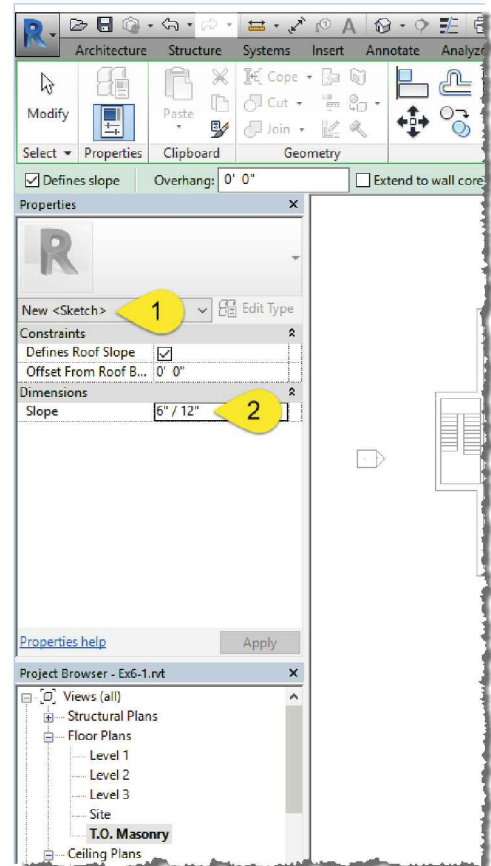


FIGURE 6-1.3 Properties Palette

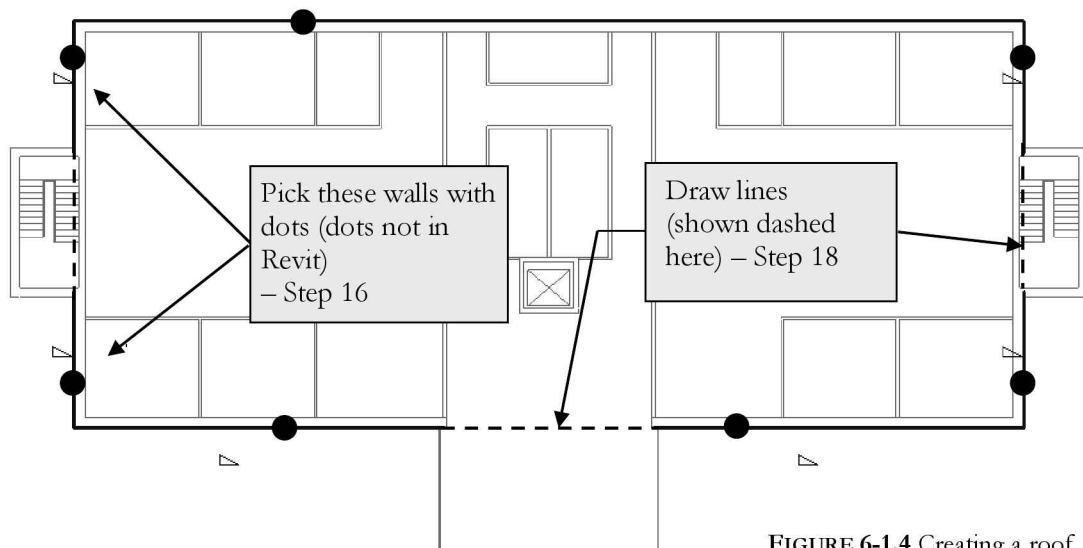


FIGURE 6-1.4 Creating a roof

17. Select the **Line** tool from the **Ribbon** (Figure 6-1.5).

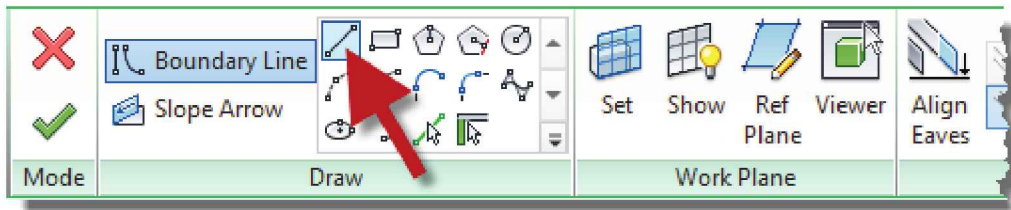


FIGURE 6-1.5 Ribbon: Roof tool active

18. Draw three lines to create a complete rectangle, making sure you use the snaps to accurately snap to the endpoint of the lines already present; one line across the atrium and the other two at the stair shafts (Figure 6-1.4).
19. Now click the **green check mark** from the *Ribbon*.

20. Click **NO** when prompted to attach the highlighted walls to the roof (Figure 6-1.6).

You will now see a portion of the roof in your plan view. The cutting plane is 4'-0" above the "floor" level, so you are seeing the roof thickness in section at 4'-0" above the T.O. Masonry level.

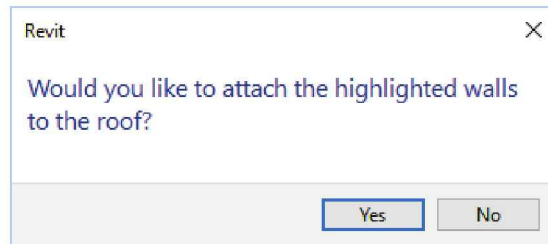


FIGURE 6-1.6 Prompt

- Switch to an elevation view to see the roof, South elevation, shown in Figure 6-1.7.
- You can also switch to the default 3D view to see the roof in isometric view via the *Quick Access Toolbar*.

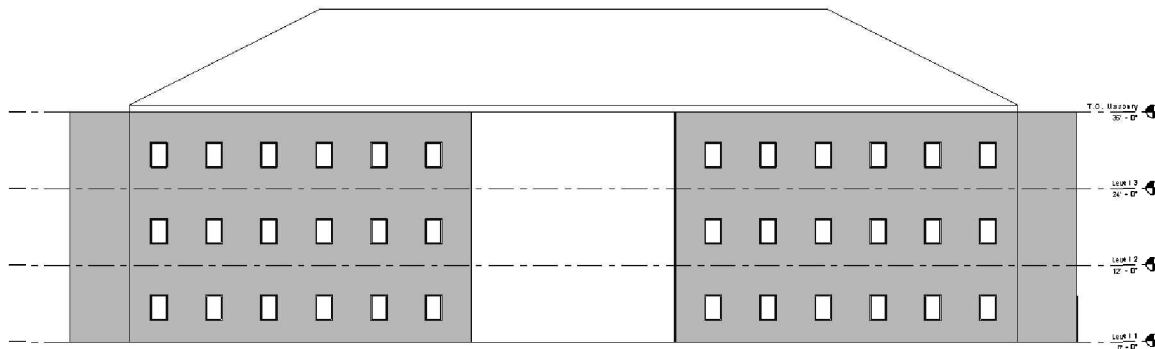


FIGURE 6-1.7 South elevation

After looking at the roof you have created, switch back to the plan view: **T.O. Masonry**. You will now add a roof over the East stair shaft.

21. **Zoom in** on the East stair shaft.
22. Select the **Roof** tool and click “*Roof by Footprint*.”
23. With **Defines slope** checked in the *Options Bar* (Figure 6-1.5), pick the three exterior walls at the stair shaft.
24. Uncheck **Defines Slope**, and then select the **Line** tool and draw a line as shown in Figure 6-1.8 to close the footprint. Be sure to use snaps to accurately draw the enclosed area.
25. Pick the **Modify** button and then select the line you just drew.

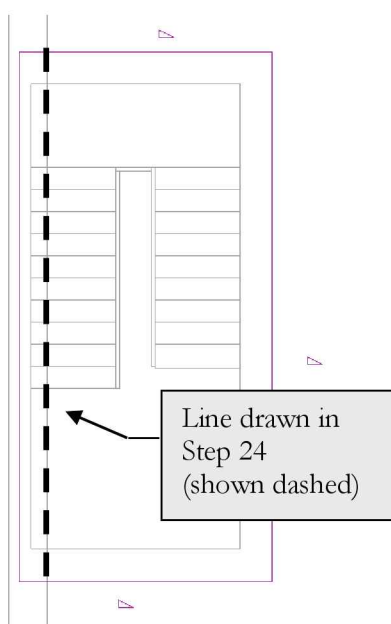


FIGURE 6-1.8 Roof footprint; East stair

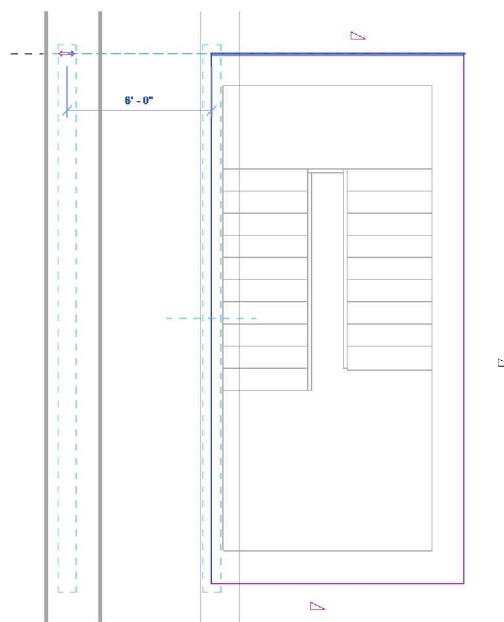


FIGURE 6-1.9 Modified roof footprint; East stair

26. Use the **Move** command to move the line **6'-0"** to the West (Figure 6-1.9).
27. Select the **green check mark** from the *Ribbon* to finish the roof.
28. Click **NO** when prompted to attach the highlighted walls to the roof (Figure 6-1.6).

29. Switch to the **South** elevation view (Figure 6-1.10).

30. Switch back to the **T.O. Masonry** view.

31. Select the roof element over the East stair shaft.

32. Switch to the *Default 3D View* and adjust your view to look similar to Figure 6-1.11.

Notice in the South elevation that the ridge of the stair roof does not extend into the main roof. You will adjust this next.

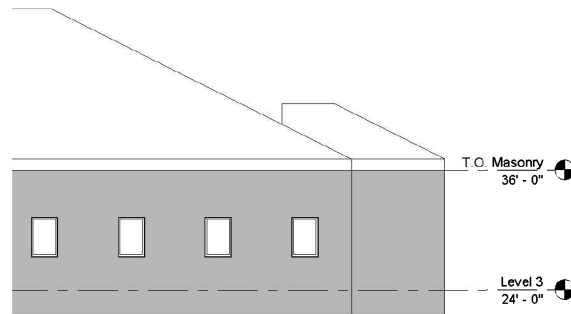
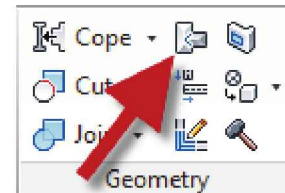


FIGURE 6-1.10 South elevation; East stair

TIP: Drag on the ViewCube.

33. Select **Modify** → **Geometry** → **Join/Unjoin Roof**.



You will now select the two edges of the roofs that you want to come together.

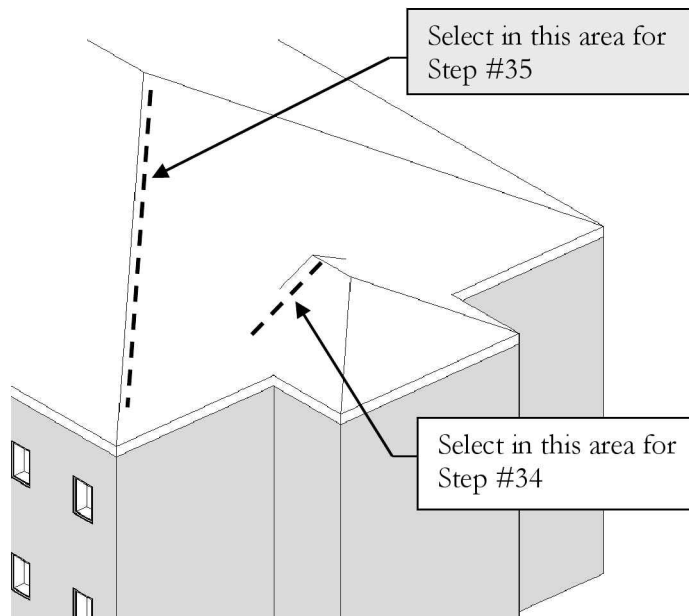


FIGURE 6-1.11 Default 3D View

34. Select the edge of the smaller roof; see Figure 6-1.11.

35. Select the edge of the larger roof; see Figure 6-1.11.

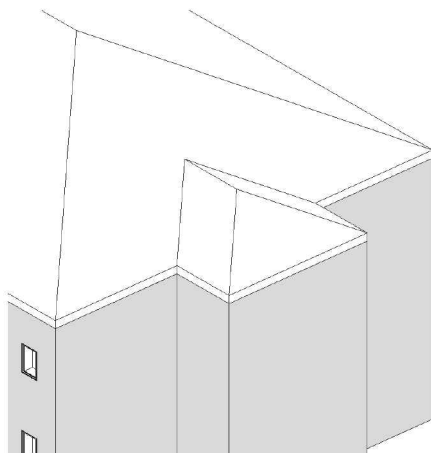


FIGURE 6-1.12 Joined roof

Your roof should now look similar to Figure 6-1.12. Take another look at the South elevation to see the revision.

36. Repeat the previous steps to create a roof over the West stair shaft.

TIP: You can also try mirroring about your Reference Plane.

Atrium Roof:

Next you will create a roof over the atrium area. We want a 4'-0" high aluminum panel above the curtain wall, thus pushing the atrium roof up higher. You will need to create a new wall type for the aluminum panels.

37. Switch to the **T.O. Masonry** view listed under *Floor Plans*.
38. Select the **Wall** tool and then select the Basic Wall: Generic – 5" type.
39. Click *Type Edit* on the *Properties Palette*, and then **Duplicate**.
40. Enter **exterior wall – aluminum** for the name.
41. Click **Edit** next to the *Structure* parameter. Add a new *Layer* using the *Insert* button. Set the exterior finish with the material set to **Aluminum** and then edit the thickness to be **5/8"** (Figure 6-1.13).
42. Draw three walls, so their exterior faces align with the exterior face of the curtain wall below. Be sure to use *Snaps* and set the wall height to **4'-0"** (Figure 6-1.14).

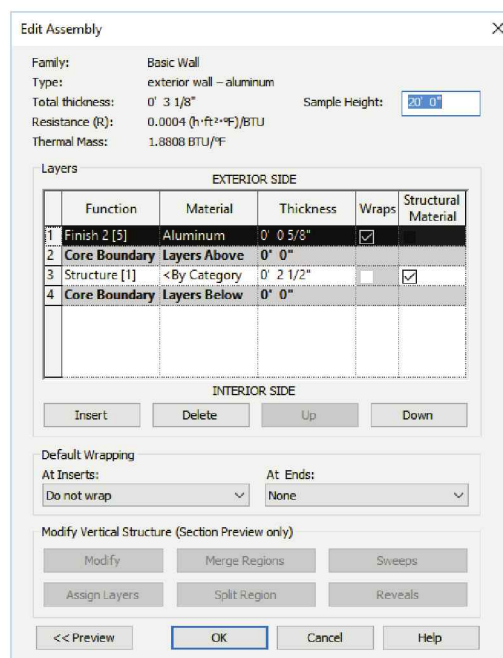


FIGURE 6-1.13 New wall structure

The walls running north-south need to extend far enough back into the main roof to avoid any holes.

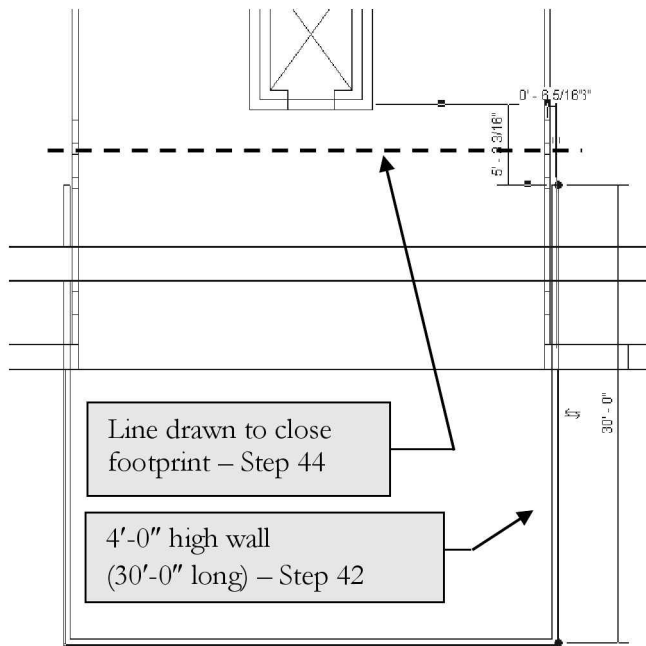


FIGURE 6-1.14 4'-0" high wall above curtain wall in atrium

43. Use the **Roof** tool and select the three walls just drawn using the footprint option; "Defines slope" checked.

44. Use the **Line** tool to draw a line to close the open side (Figure 6-1.14). This will create a closed rectangle to complete the roof; "Defines slope" unchecked.

45. Before finishing the roof, set the **Base offset from level** to 4'-0" in the *Properties Palette*. This will place the roof on top of the 4'-0" high wall you just drew.

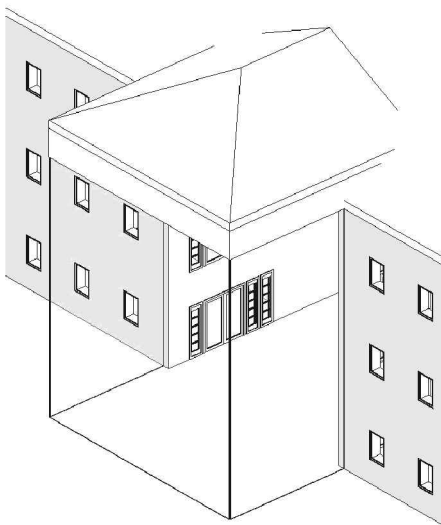


FIGURE 6-1.15 3D view

46. Select the **green check mark**.

Your 3D view should look similar to **Figure 6-1.15**. Like the stair roof, the atrium roof needs to be joined to the main roof.

47. Click **NO** when prompted to attach the highlighted walls to the roof (Figure 6-1.6).

48. Use the **Join/Unjoin Roof** tool to join the atrium roof to the main roof (similar to steps 32-34 in this section).

Look at the side elevations. If the roof does not extend all the way to the main roof, select the roof and pick *Edit Footprint* (on the *Ribbon*) to move the line further into the building. When finished it should look like Figure 6-1.16.

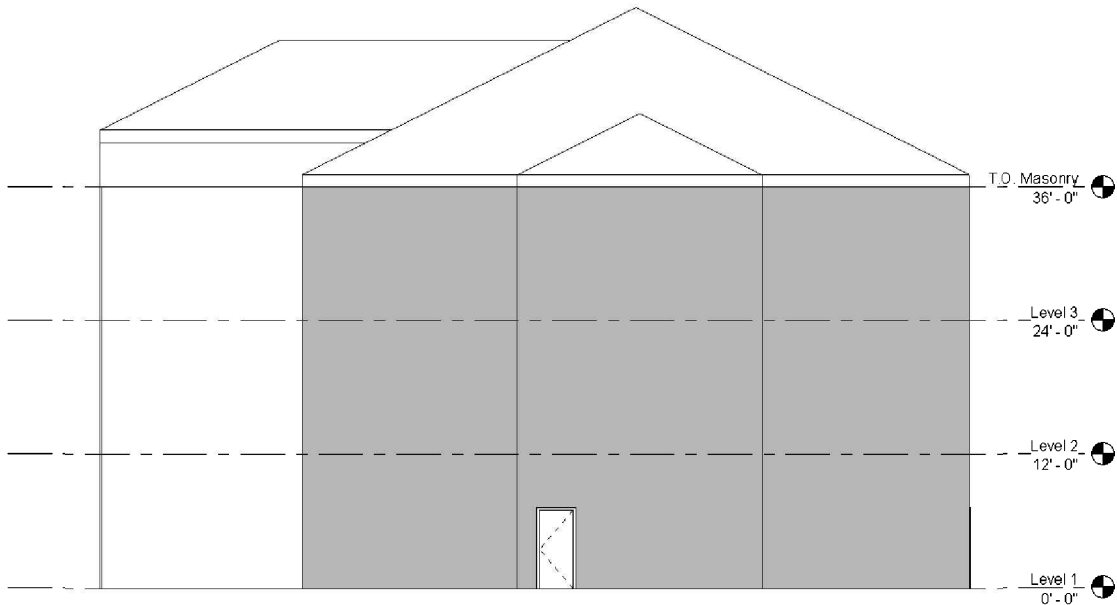


FIGURE 6-1.16 Atrium roof

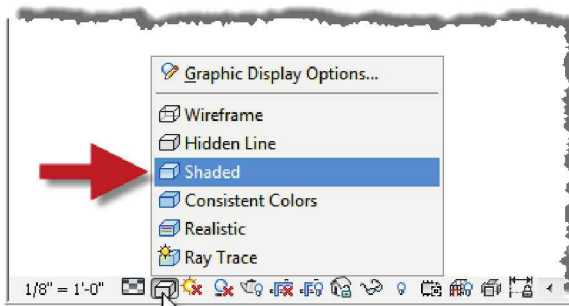


FIGURE 6-1.17 Setting visual style

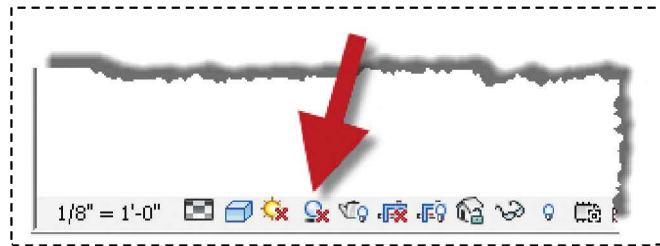
Next you will take a quick look at the project, thus far, in an isometric view.

49. Click the *3D View* icon on the *Quick Access Toolbar*.

The 3D view can be improved by shading the surfaces.

50. Set the *Visual Style* to **Shaded** via the *View Control Bar* (Figure 6-1.17).

TIP: You can also turn on shadows from the View Control Bar (see image to right). This can make viewing and printing on larger, complex models much slower so use it sparingly.



The 3D Model should now be shaded (Figure 6-1.18).

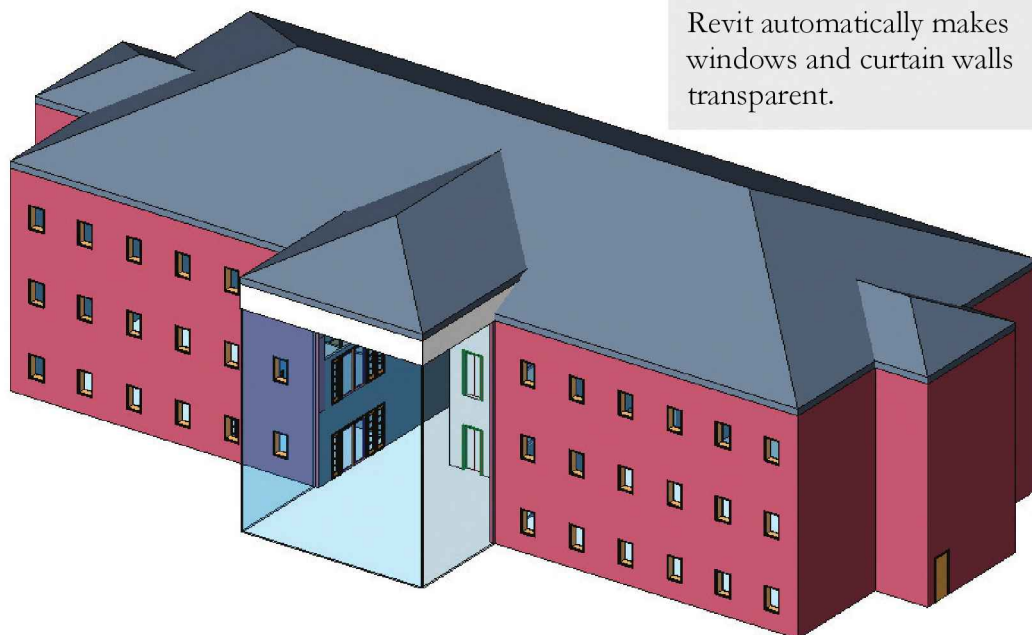
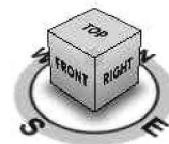


FIGURE 6-1.18 Shaded model

Before moving on you will adjust the top constraint of the Level 3 interior walls to be tied to the new level.

51. Switch to the Level 3 Floor Plan view and select all the interior walls. Adjust their *Top Constraint* to the new level: *T.O. Masonry*.
52. **Save** your project.

Try adjusting the view; click and drag on the *ViewCube*.



Exercise 6-2:

Skylights

This short exercise covers inserting skylights in your roof. The process is much like inserting windows. In fact, Revit lists the skylight types with the window types, so you use the *Window* tool to insert skylights into your project. Technically, a skylight is a roof hosted window.

Inserting Skylights:

You will place the skylights in an elevation view.

1. Load project file **ex6-1.rvt**.
2. Switch to the **South** elevation view.
3. Select the **Window** tool and load the *skylight* family (skylight.rfa) into the project (via the *Load family* button on the *Ribbon*).
4. Select *Skylight: 24" x 27"* from the *Type Selector*.



You are now ready to place skylights on the roof. Revit will only look for roof elements when placing skylights, so you don't have to worry about a skylight ending up in a wall.

5. Roughly place four skylights as shown in Figure 6-2.1 on the roof.

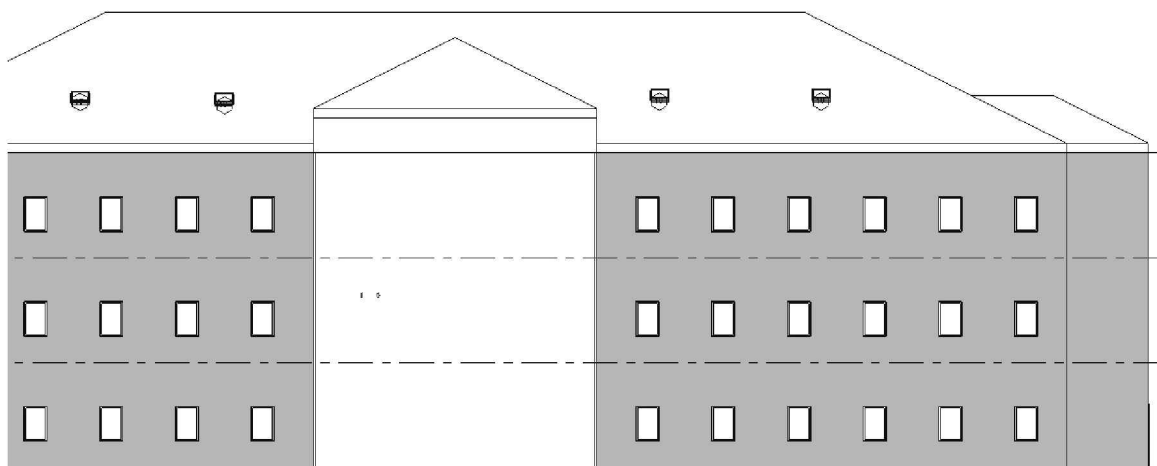


FIGURE 6-2.1 South elevation, skylights added

6. Press **Esc** or click the **Modify** tool to cancel the *Window* tool.

Next, you will want to align the skylights with each other.

7. Switch to the **West** elevation view.
8. Select one of the visible skylights.

You should now have the skylight selected and see the temporary dimensions that allow you to adjust the exact location of the element. Occasionally, the dimension does not go to the point on the model that you are interested in referencing from. Revit allows you to adjust where those temporary dimensions point to.

9. Click and drag the grip shown in Figure 6-2.2 (wait until it snaps) to the ridge of the main roof (Figure 6-2.3).

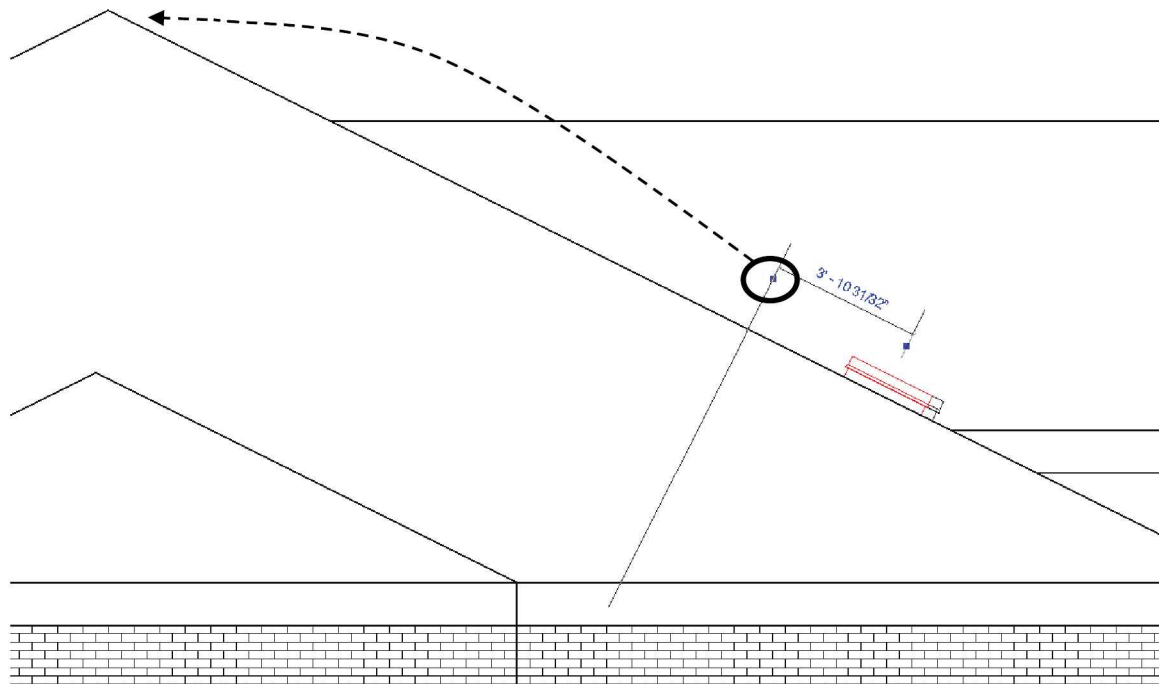


FIGURE 6-2.2 West elevation: default dimension shown when selecting skylight.

Click on the dimension text and change the text to **22'-8"**.

NOTE: This will adjust the position of the skylight relative to the roof.

10. Select the other skylight on the west elevation and adjust it to match the one you just revised.
11. Switch to the East elevation and repeat the above steps to adjust.

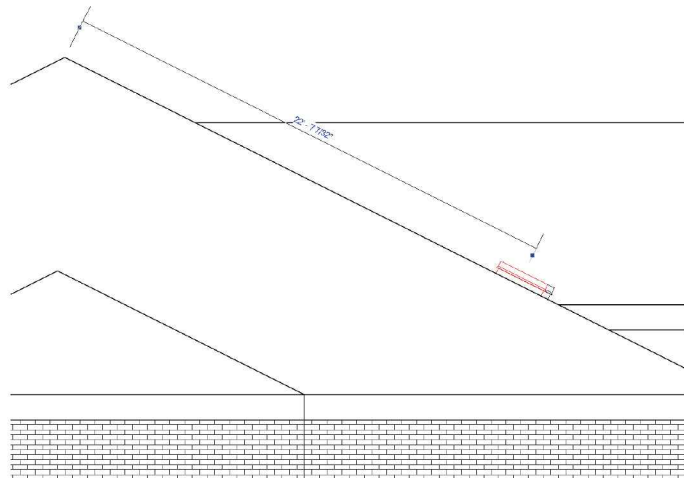


FIGURE 6-2.3 West elevation: default dimension shown when selecting skylight.

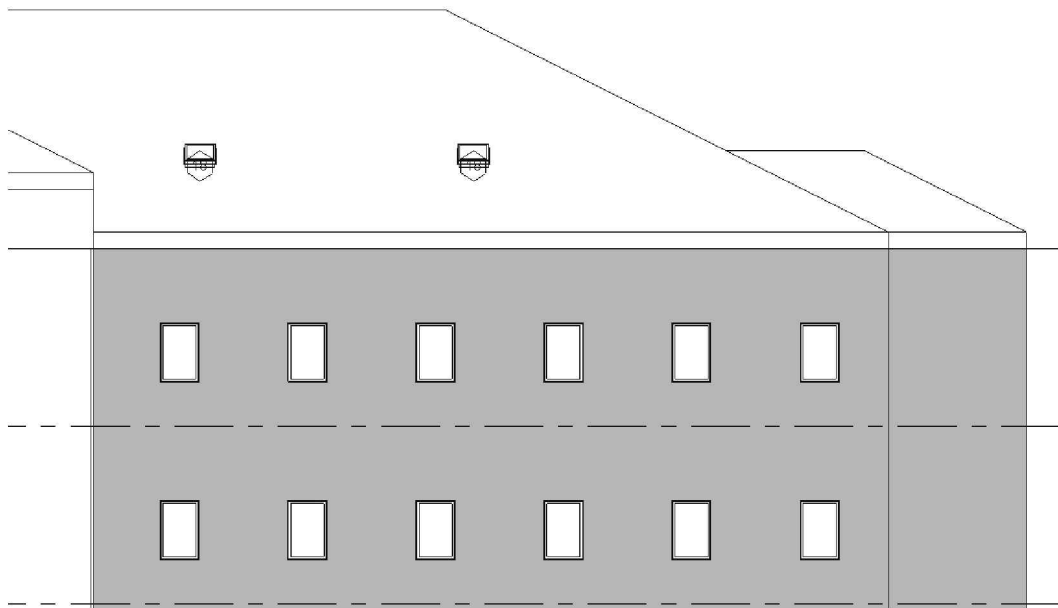


FIGURE 6-2.4 South elevation: with skylights added

Your drawing should look similar to the one above. Notice that the skylight tag is right on top of the skylight. You will adjust that next.

12. **Zoom in** on one of the skylights and **click** on the skylight tag (South view).
13. You should see a symbol appear near the bottom of the tag; drag on this symbol to move the tag down (Figure 6-2.5).
14. Position the skylight tag so the tag does not overlap the skylight (Figure 6-2.6).
15. Adjust the other skylight tags; as you reposition these tags you may see a reference line appear indicating the symbol will automatically align with an adjacent symbol.

Take a minute to look at your shaded 3D view and try changing the view so you can see through the skylight glass into the spaces below (Figure 6-2.7).

16. **Save** as **ex6-2.rvt**.

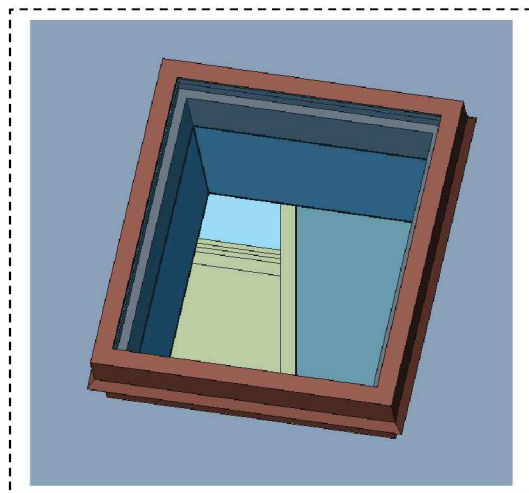


FIGURE 6-2.7 Shaded skylight view

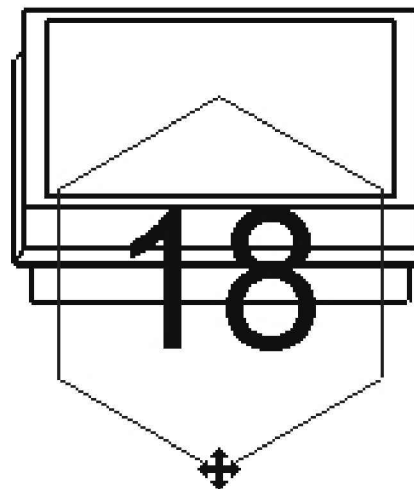


Figure 6-2.5 Enlarged skylight detail

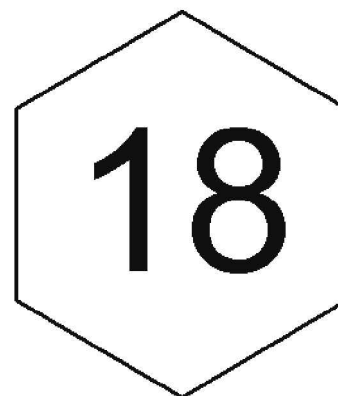
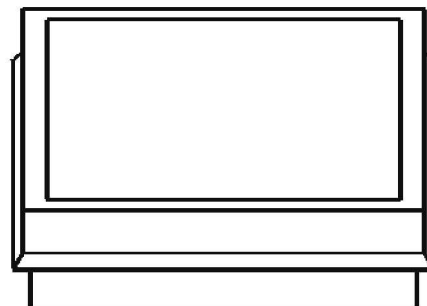


FIGURE 6-2.6 Enlarged skylight detail – revised

Exercise 6-2:

Roof Design Options (Style, Pitch and Overhang)

In this lesson you will look at the various ways to use the *Roof* tool to draw the more common roof forms used in architecture today.

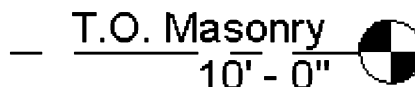
Start a New Revit Project:

You will start a new project for this lesson so you can quickly compare the results of using the *Roof* tool.

1. Start a new project using the **default.rte** template.
2. Switch to the **North** elevation view and rename the level named *Level 2* to **T.O. Masonry**. This will be the reference point for your roof. Click **Yes** to rename corresponding views automatically.

TIP: Just select the Level datum and click on the level datum's text to rename.

3. Switch to the *Level 1 Floor Plan* view.



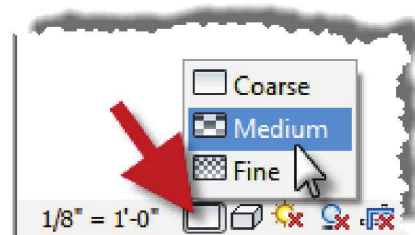
Drawing the Buildings:

4. Set the Level 1 “Detail Level” to **medium**, so the material hatching is visible within the walls.

TIP: Use the View Control Bar at the bottom.

5. Using the *Wall* tool with the wall *Type* set to “**Exterior - Brick on Mtl. Stud**,” and draw a **40'-0" x 20'-0"** building (Figure 6-3.1).

FYT: The default Wall height is OK; it should be 20'-0".



Be sure to draw the building within the elevation tags.

TIP: You can draw the building in one step if you use the Rectangle option on the Ribbon, while using the Wall tool.

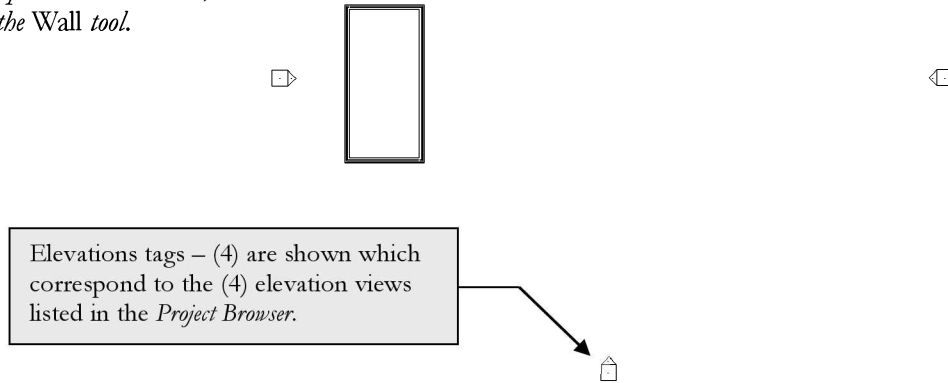


FIGURE 6-3.1 Bldg. and Elev. tags

You will copy the building so that you have a total of four buildings. You will draw a different type of roof on each one.

6. Drag a window around the walls to select them. Then use the **Array** command to set up four buildings **35'-0" O.C.** (Figure 6-3.2). See the *Array Tip* below.

TIP: Zoom in and make sure the brick is on the exterior side of the wall. If not, you can select each wall and click its flip icon.

ARRAY TIP: Select the first building, select Array, and then, just like the Copy command, define a copy 35' to the right, then enter the number of copies.

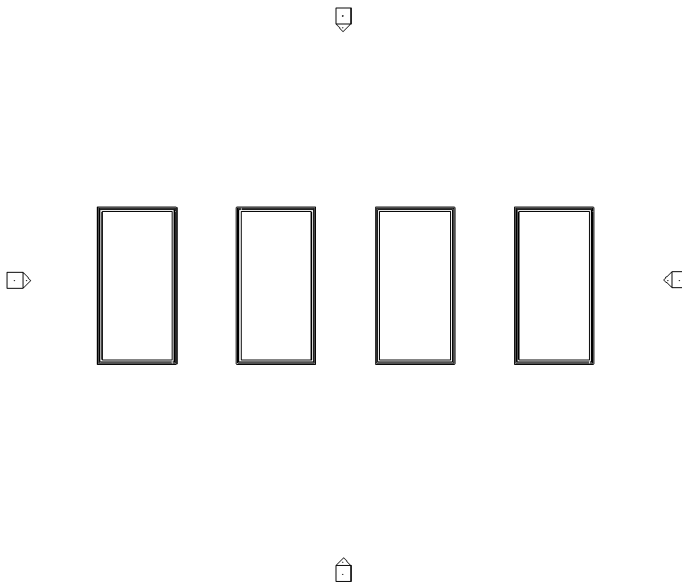


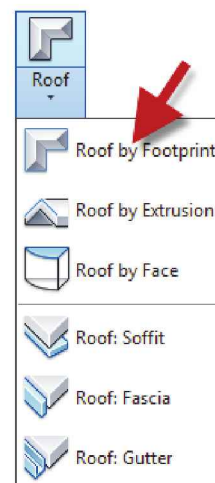
FIGURE 6-3.2 Four buildings

7. Select all of the buildings and click **Ungroup** from the *Ribbon*.

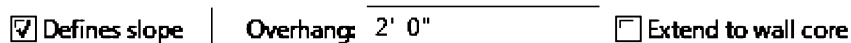


Hip Roof:

The various roof forms are largely defined by the “*Defines slope*” setting. This is displayed in the *Options Bar* while the *Roof* tool is active. When a wall is selected and the “*Defines slope*” option is selected, the roof above that portion of wall slopes. You will see this more clearly in the examples below.



8. Switch to the **T.O. Masonry Floor Plan** view.
9. Select the **Architecture → Build → Roof (down-arrow) → Roof by Footprint** tool.
10. Set the overhang to **2'-0"** and make sure **Defines slope** is selected (checked) on the *Options Bar*.



11. Select the four walls of the West building, clicking each wall one at a time.

TIP: Make sure you select towards the exterior side of the wall; notice the review line before clicking.

12. Click **Finish Edit Mode** (i.e., the green check mark) on the *Ribbon* to finish the *Roof* tool.

13. Click **Yes** to attach the roof to the walls.

14. Switch to the **South** elevation (Figure 6-3.3).

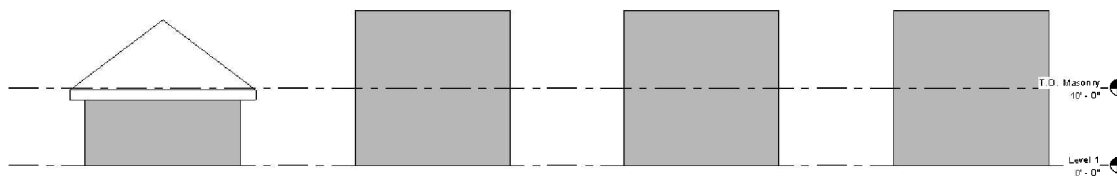
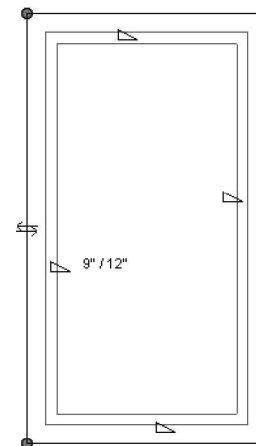


FIGURE 6-3.3 South elevation – Hip roof

You will notice that the default wall height is much higher than what we ultimately want. However, when the roof is drawn at the correct elevation and you attach the walls to the roof, the walls automatically adjust to stop under the roof object. Additionally, if the roof is raised or lowered later, the walls will follow; you can try this in the South elevation view by simply using the *Move* tool. **REMEMBER:** *You can make revisions in any view.*

15. Switch to the **3D** view using the icon on the *QAT* (Figure 6-3.4).

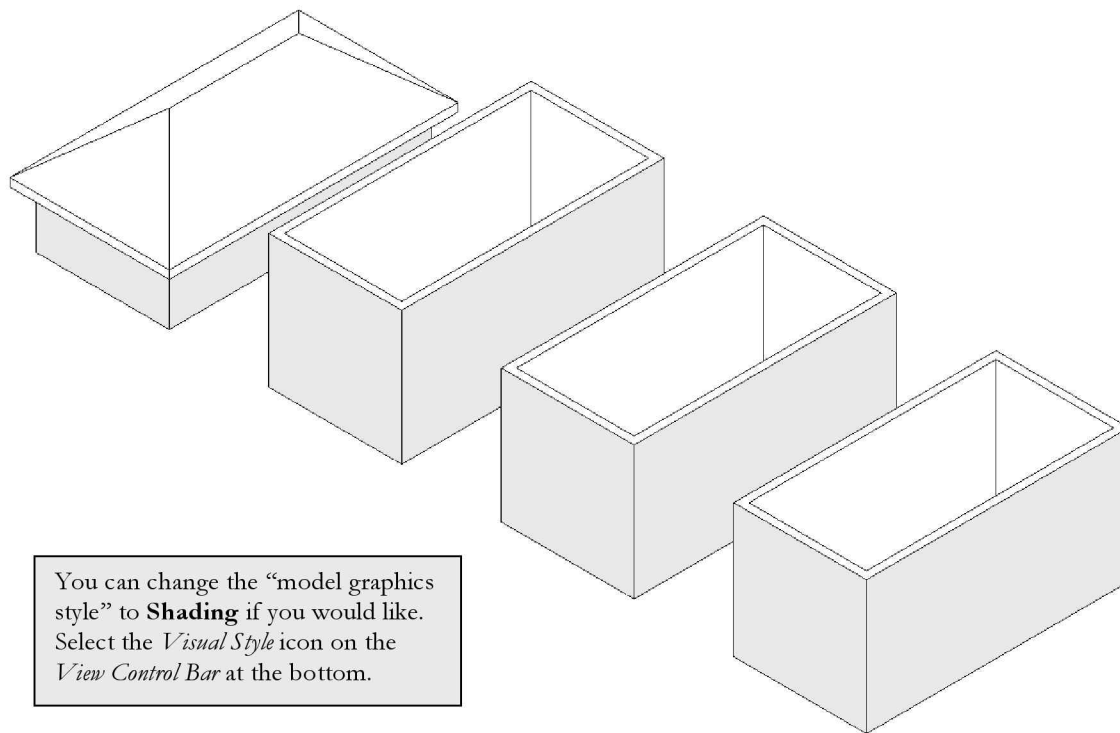


FIGURE 6-3.4 3D view – hip roof

Gable Roof:

16. Switch back to the **T.O. Masonry** view (not the ceiling plan for this level).
17. Select the **Roof** tool and then **Roof by Footprint**.
18. Set the overhang to **2'-0"** and make sure **Defines slope** is selected (checked) on the *Options Bar*.
19. Only select the two long (40'-0") walls.
20. **Uncheck** the **Defines slope** option.
21. Select the remaining two walls (Figure 6-3.5).
22. Pick the **green check mark** on the *Ribbon* to finish the roof.
23. Select **Yes** to attach the walls to the roof.
24. Switch to the **South** elevation view (Figure 6-3.6).



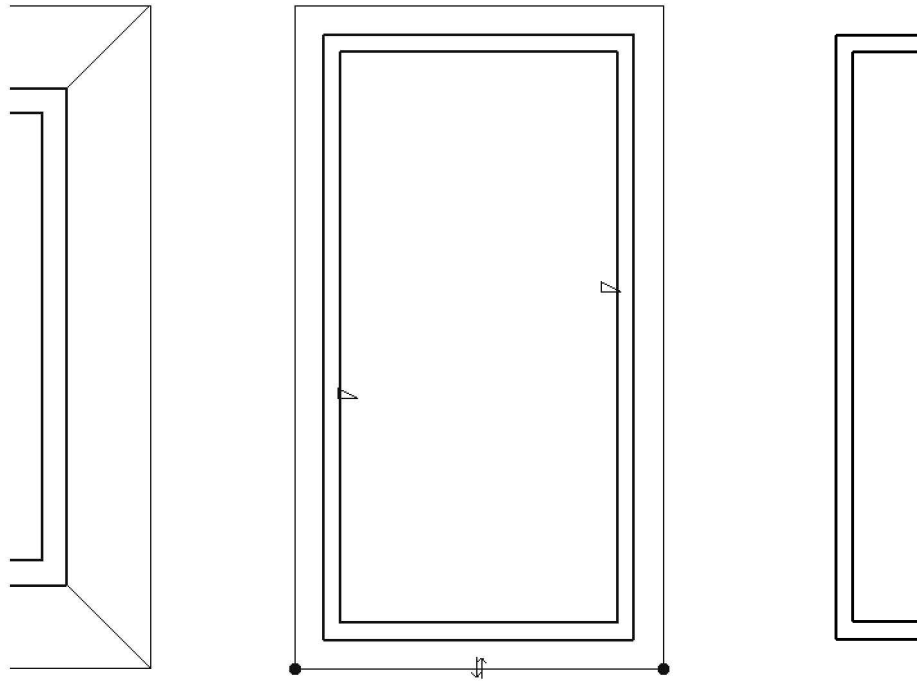


FIGURE 6-3.5 Gable – plan view

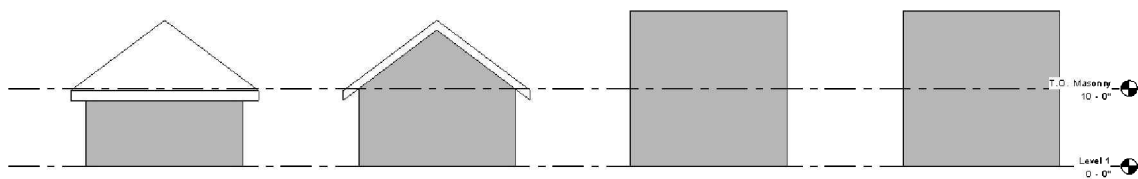


FIGURE 6-3.6 South elevation – gable roof

25. Switch to the **3D** view (Figure 6-3.7).

Notice the wall extends up to conform to the underside of the roof on the gable ends.

FYT: You may be wondering why the roofs look odd in the floor plan view. If you remember, each view has its own cut plane. The cut plane happens to be lower than the highest part of the roof – thus, the roof is shown cut at the cut plane. If you go to Properties Palette → View Range (while nothing is selected) and then adjust the cut plane to be higher than the highest point of the roof, then you will see the ridge line.

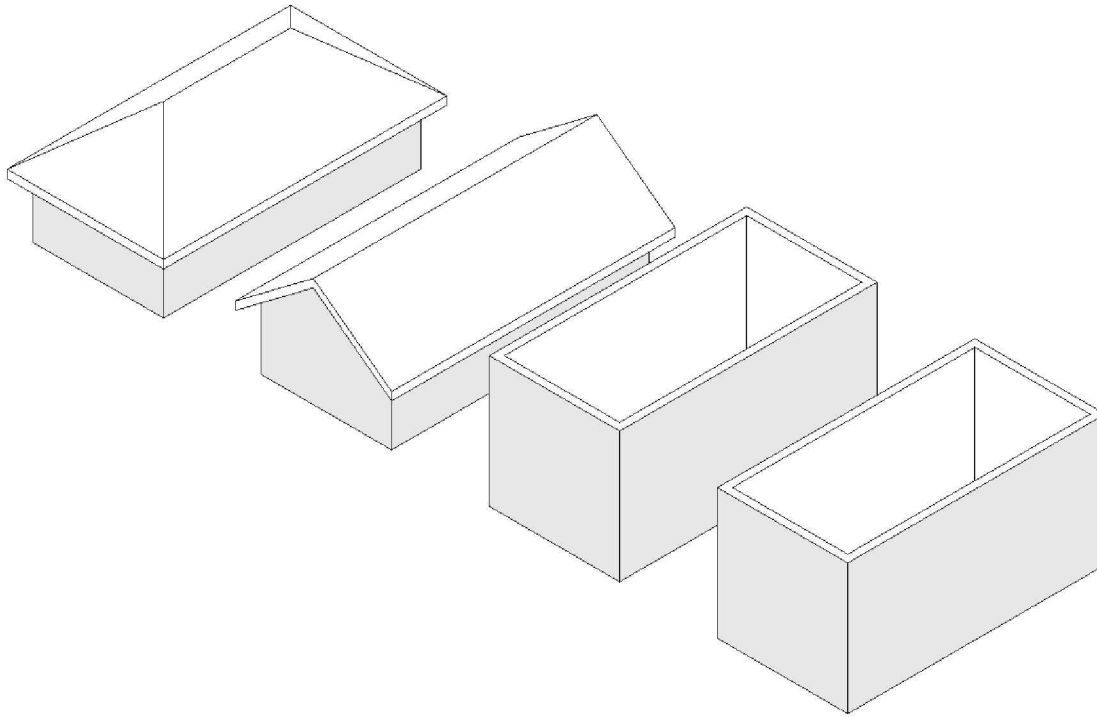


FIGURE 6-3.7 3D view – gable roof

Shed Roof:

26. Switch back to the **T.O. Masonry** view.
27. Select the **Roof** tool, and then **Roof by Footprint**.
28. Check **Defines slope** on the *Options Bar*.
29. Set the overhang to **2'-0"** on the *Options Bar*.
30. Select the East wall (40'-0" wall, right-hand side).
31. Uncheck **Defines slope** in the *Options Bar*.
32. Select the remaining three walls (Figure 6-3.8).

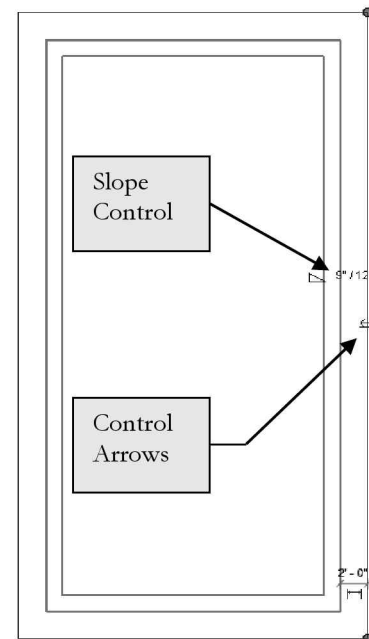


FIGURE 6-3.8 Selected walls

33. Set the **Slope**, or roof pitch, to 3/12 (Figure 6-3.9) on the *Properties Palette*.
34. Click **Apply** on the *Properties Palette*.
35. Pick the **green check mark** on the *Ribbon* to finish the roof.
36. Select **Yes** to attach the walls to the roof.

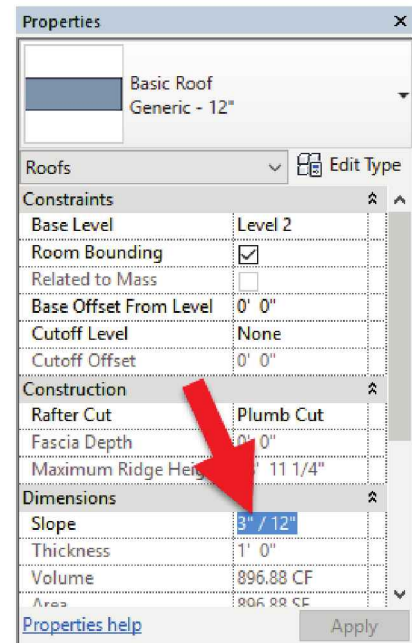
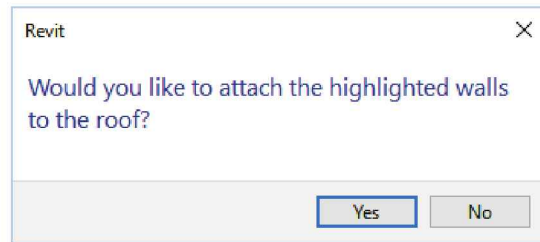


FIGURE 6-3.9
Properties for Roof tool

FYI: You can also change the slope of the roof by changing the Slope Control text (see Figure 6-3.8); just select the text and type a new number.

TIP: You can use the Control Arrows, while the roof line is still selected, to flip the orientation of the roof overhang if you accidentally selected the wrong side of the wall and the overhang is on the inside of the building.

37. Switch to the **South** elevation view (Figure 6-3.10).

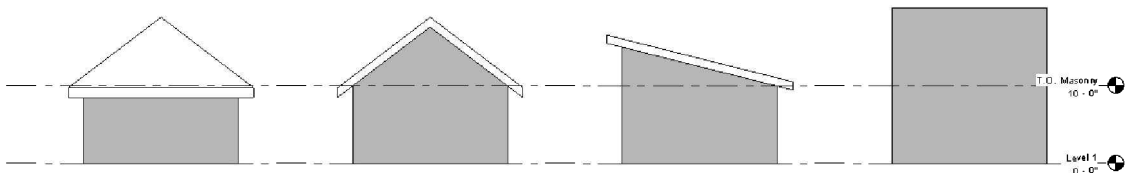


FIGURE 6-3.10 South elevation – shed roof

38. Switch to the *Default 3D* view (Figure 6-3.11).

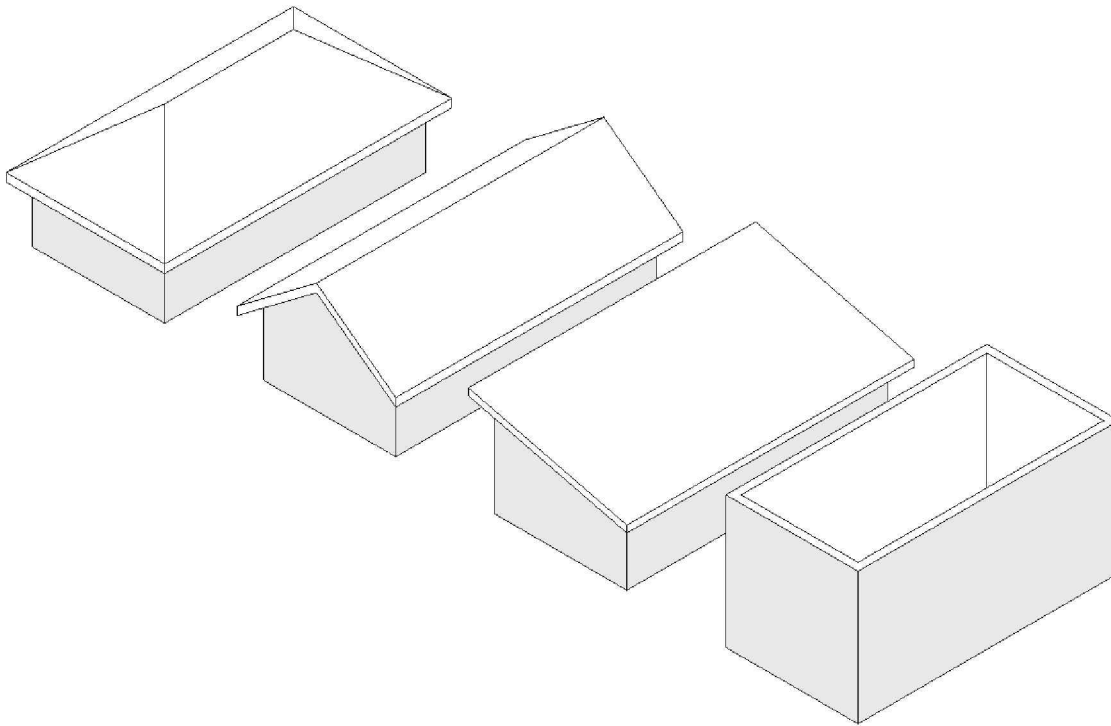


FIGURE 6-3.11 Default 3D view – shed roof

Once the roof is drawn, you can easily change the roof's overhang. You will try this on the shed roof. You will also make the roof slope in the opposite direction.

39. In **T.O. Masonry** view, Select **Modify** from the *Ribbon*, and then select the shed roof.

40. Click **Edit Footprint** from the *Ribbon*.



41. Click on the East roof sketch-line to select it.

42. Uncheck **Defines slope** from the *Options Bar*.

43. Now select the West roofline and check **Defines slope**.

If you were to select the green check mark now, the shed roof would be sloping in the opposite direction. But, before you do that, you will adjust the roof overhang at the high side.

44. Click on the East roofline again to select it.

45. Change the overhang to **6'-0"** in the *Options Bar*.

Changing the overhang only affects the selected roofline.

46. Select the **green check mark**.

47. Switch to the South view to see the change (Figure 6-3.12).

Thus you can see it is easier to edit an object than to delete it and start over. Just remember you have to be in sketch mode (i.e., *Edit Sketch*) to make changes to the roof. Also, when a sketch line is selected, its properties are displayed in the *Properties Palette*. That concludes the shed roof example.

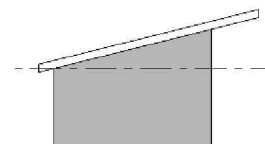


FIGURE 6-3.12 South elevation – shed roof (revised)

Flat Roof:

48. Switch back to the **T.O. Masonry** *Floor Plan* view.
49. Select **Architecture → Roof → Roof by Footprint**.
50. Set the overhang to **2'-0"** and make sure **Defines slope** is not selected (i.e., unchecked) in the *Options Bar*.
51. Select all four walls.
52. Pick the **green check mark**.
53. Select **Yes** to attach the walls to the roof.

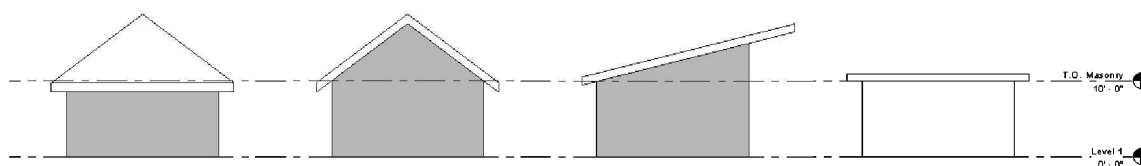


FIGURE 6-3.13 South elevation – flat roof

54. Switch to the South elevation view (Figure 6-3.13).

55. Also, take a look at the **Default 3D view** (Figure 6-3.14).

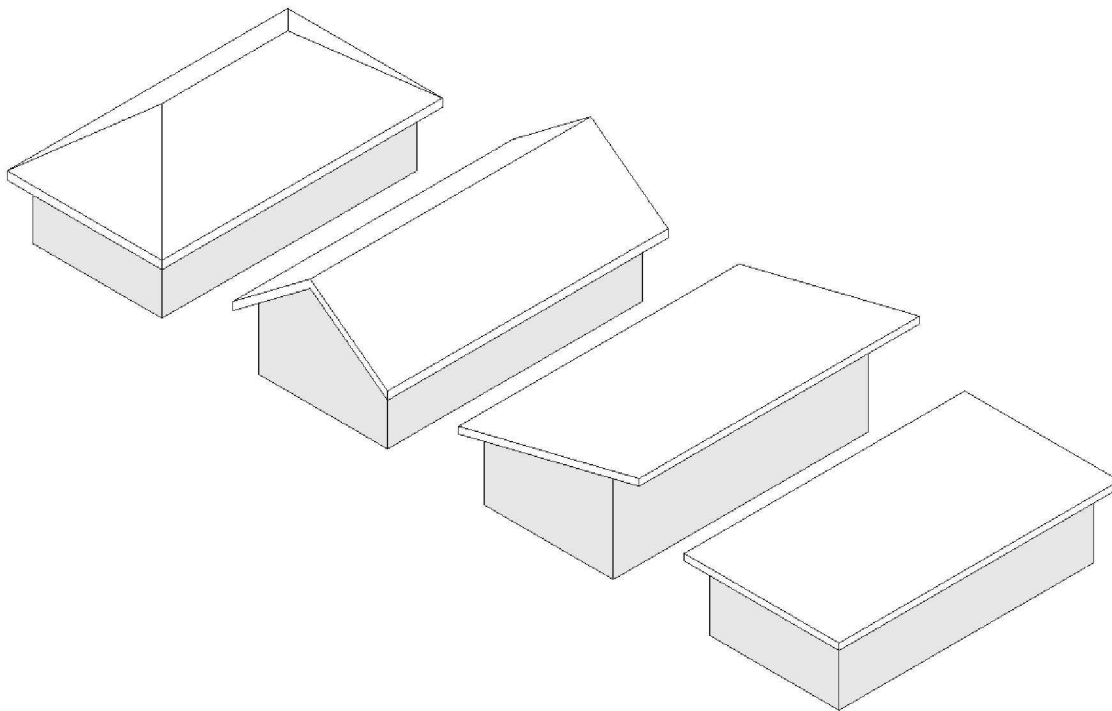


FIGURE 6-3.14 Default 3D view – flat roof

56. Save your project as **ex6-3.rvt**.

Want More?

Revit has additional tools and techniques available for creating more complex roof forms. However, that is beyond the scope of this book. If you want to learn more about roofs, or anything else, take a look at one of the following resources:

- Revit **Web Site** (www.autodesk.com)
- Revit **Newsgroup** (potential answers to specific questions)
www.augi.com; www.revitcity.com; www.autodesk.com; www.revitforum.org
- Revit **Blogs** information from individuals (some work for Autodesk and some don't)
www.revitoped.com, revitclinic.typepad.com, do-u-revit.blogspot.com

Reference material: Roof position relative to wall

The remaining pages in this chapter are for reference only and do not need to be done to your model. You are encouraged to study this information so you become more familiar with how the *Roof* tool works.

The following examples use a brick and concrete wall example. The image below shows the *Structure* properties for said wall type. Notice the only item within the *Core Boundary* section is the *Masonry – Concrete Block* (i.e., CMU) which is 7⁵/₈" thick (nominally 8"). Keep this in mind as you read through the remaining material.

Edit Assembly ×

Family: Basic Wall
 Type: Exterior - Brick on CMU
 Total thickness: 1' 7 1/2" Sample Height: 20' 0"
 Resistance (R): 31.6278 (h·ft²·°F)/BTU
 Thermal Mass: 28.6462 BTU/°F

Layers

	Function	Material	Thickness	Wraps	Structural Material
1	Finish 1 [4]	Brick, Com	0' 3 5/8"	☒	
2	Thermal/Air L	Air	0' 3"	☒	
3	Thermal/Air L	Rigid insula	0' 3"	☒	
4	Membrane La	Damp-proo	0' 0"	☒	
5	Core Boundar Layers Above 0' 0"				
6	Structure [1]	Concrete M	0' 7 5/8"		☒
7	Core Boundar Layers Below 0' 0"				
8	Substrate [2]	Metal Furri	0' 1 5/8"	☒	

EXTERIOR SIDE

INTERIOR SIDE

Insert Delete Up Down

Default Wrapping

At Inserts: Do not wrap At Ends: None

Modify Vertical Structure (Section Preview only)

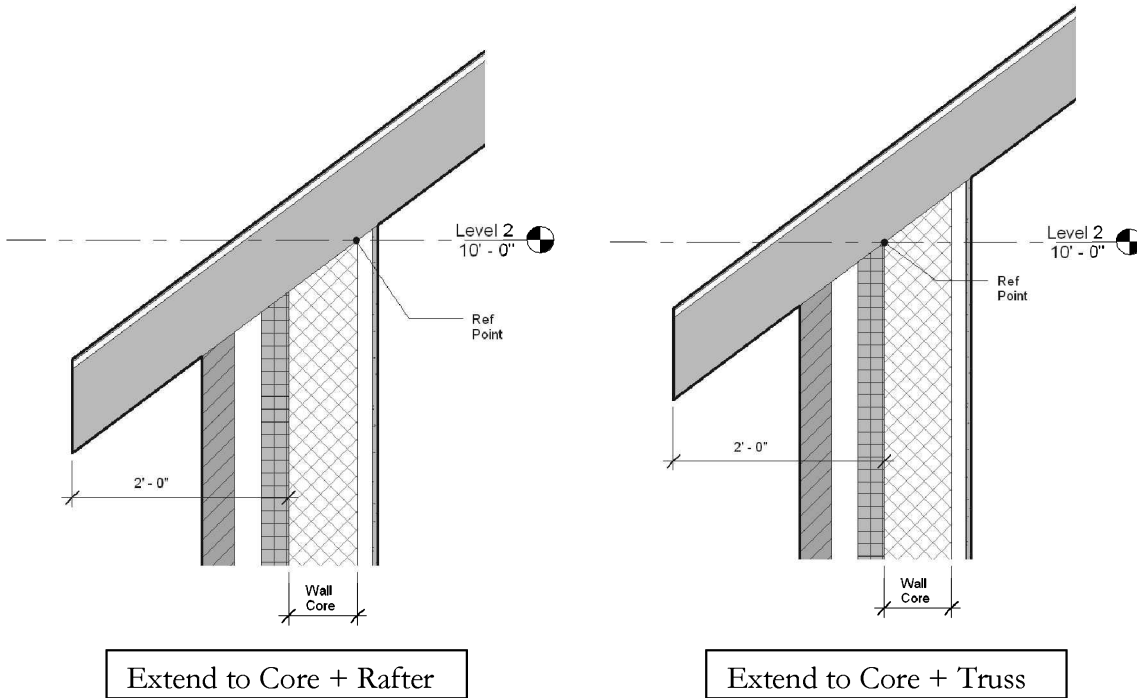
Modify Merge Regions Sweeps

Assign Layers Split Region Reveals

<< Preview OK Cancel Help

The following examples will show you how to control the position of the roof system relative to the wall below, both vertically and horizontally. The roof properties that dictate its position basically involve relationships between three things: the **Level Datum**, the exterior **Wall System** and the bottom edge of the **Roof System**. There are several other properties (e.g., pitch, construction, fascia, etc.) related to the roof that will not be mentioned at the moment so the reader may focus on a few basic principles.

The examples on this page show a sloped roof sketched with *Extend into wall (to core)* enabled and the *Overhang* set to 2'-0". Because *Extend into wall (to core)* was selected, the bottom edge of the roof is positioned relative to the *Core Boundary* of the exterior wall rather than the finished face of the wall. See the discussion about the wall's *Core Boundary* on the previous page.



Revit Roof Properties under Consideration:

Extend Into Wall: (To Core) This option was *checked* on the *Options Bar* while sketching the roof.

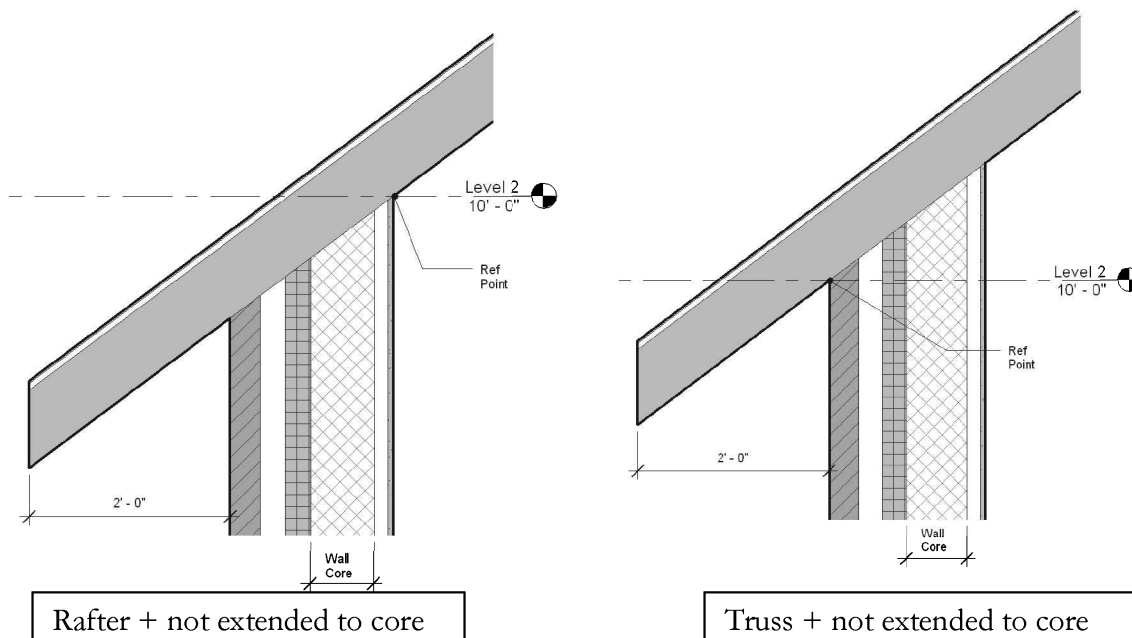
Rafter Or Truss: This option is an *Instance Parameter* of the roof object; the example on the above left is set to *Rafter* and the other is set to *Truss*.

NOTE: The Extend into Wall (to core) option affects the relative relationship between the wall and the roof, as you will see by comparing this example with the one on the next page.

Base Level: Set to *Level 2*: By associating various objects to a level, it is possible to adjust the floor elevation (i.e., *Level Datum*) and have doors, windows, floors, furniture, roofs, etc., all move vertically with that level.

Base Offset: From Level Set to 0'-0": This can be a positive or negative number which will be maintained even if the level moves.

The examples on this page show a sloped roof sketched with *Extend into wall (to core)* NOT enabled and the *Overhang* set to 2'-0". Notice that the roof overhang is derived from the exterior face of the wall (compared to the *Core Boundary* face on the previous example when *Extend into wall* was enabled).



Revit Roof Properties under Consideration:

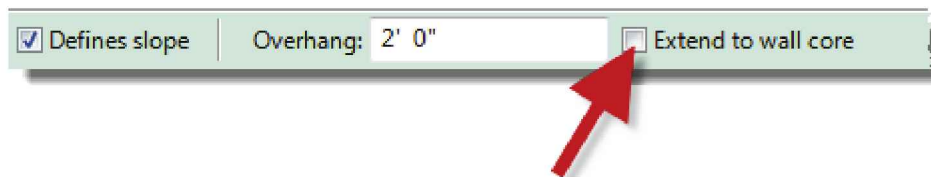
Extend Into Wall: (To Core) This option was *NOT checked* on the *Options Bar* while sketching the roof.

Rafter Or Truss: This option is an *Instance Parameter* of the roof object; the example on the above left is set to *Rafter* and the other is set to *Truss*.

NOTE: The Extend into wall (to core) option affects the relative relationship between the wall and the roof, as you will see by comparing this example with the one on the previous page.

Base Level: Set to *Level 2*. By associating various objects to a level, it is possible to adjust the floor elevation (i.e., *Level Datum*) and have doors, windows, floors, furniture, roofs, etc., all move vertically with that level.

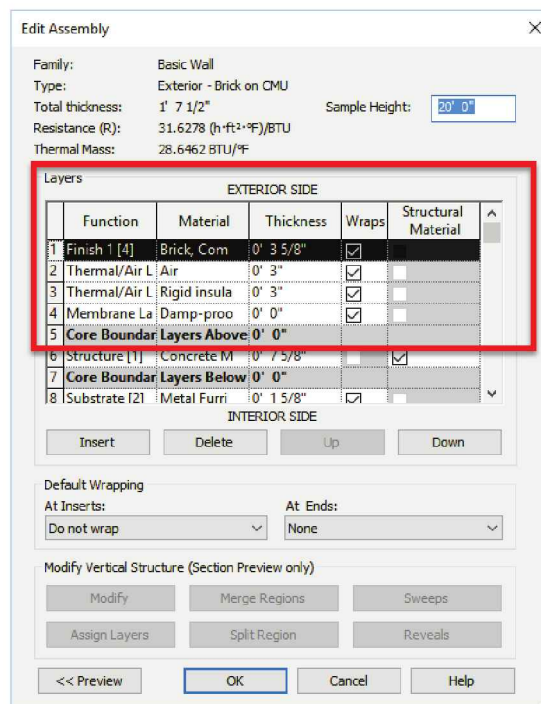
Base Offset: From Level Set to 0'-0". This can be a positive or negative number which will be maintained even if the level moves.



As you can see from the previous examples, you would most often want to have *Extend to wall (to core)* selected while sketching a roof because it would not typically make sense to position the roof based on the outside face of brick or the inside face of gypsum board for commercial construction.

Even though you may prefer to have *Extend to wall (to core)* selected, you might like to have a 2'-0" overhang relative to the face of the brick rather than the exterior face of concrete block. This can be accomplished in one of two ways:

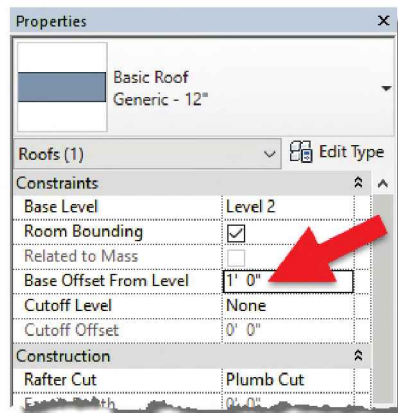
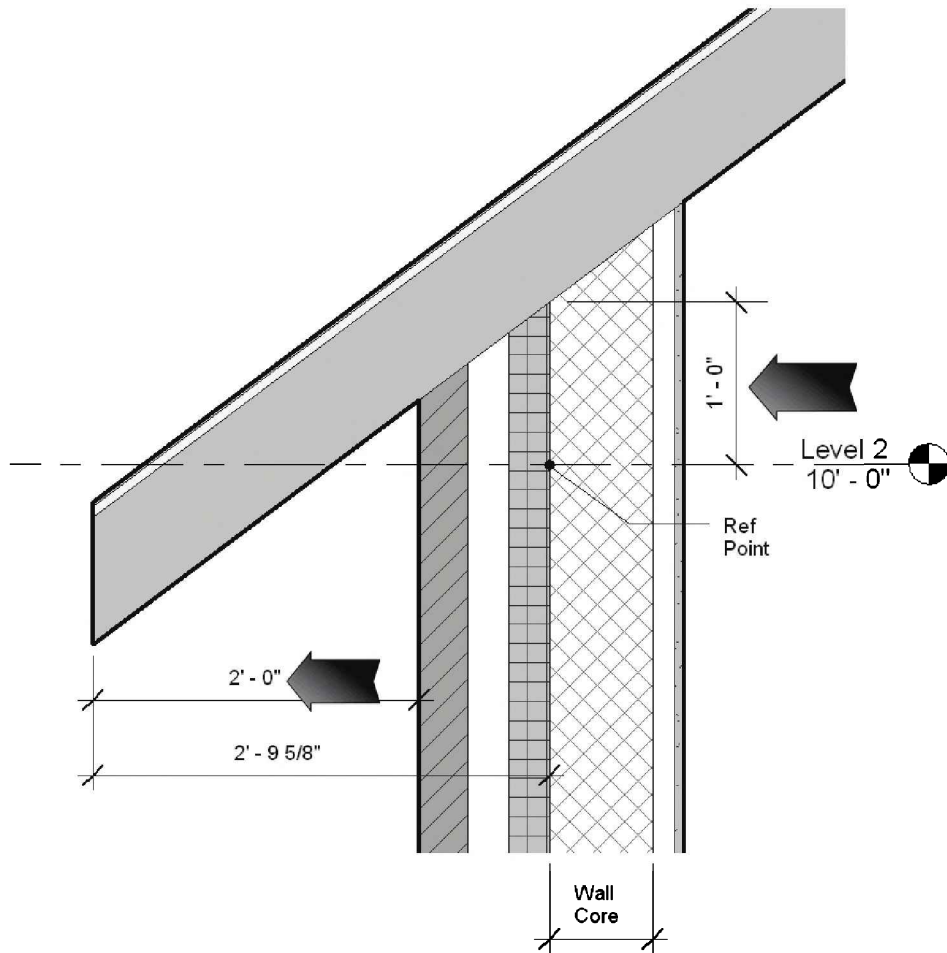
- (A) You can modify the overhang, while sketching the roof, to include the wall thickness that occurs between the face of wall and face of core:
 $2'-0" + 9\frac{5}{8}" = 2'-9\frac{5}{8}"$. See the image to the right.
- (B) The second option is to manually edit the sketch lines. You can add dimensions while in *Sketch* mode, select the sketch line to move, and then edit the dimension. The dimension can also be *Locked* to maintain the roof edge position relative to the wall. When you finish the sketch the dimensions are hidden.



Energy Truss:

In addition to controlling the roof overhang, you might also want to control the roof properties to accommodate an energy truss with what is called an *energy heal*, which allows for more insulation to occur directly above the exterior wall.

To do this you would use the *Extend into wall (to core) + Truss* option described above and then set the *Base Offset from Level* to 1'-0" (for a 1'-0" energy heal). See the image and the *Properties Palette* shown on the next page.



Many other properties and techniques exist which one can use to develop the roof for a project, things like the *Rafter Cut* and *Fascia Depth* which control the fascia design. Also, you can apply a sweep to a roof edge to add a 1x fascia board around the building. These are intermediate to advanced concepts and will not be covered here.

This concludes the study of the *Roof* tool!

Self-Exam:

The following questions can be used as a way to check your knowledge of this lesson. The answers can be found at the bottom of this page.

1. You don't have to click *Finish Roof* when you are done defining a roof. (T/F)
2. The wall below the roof automatically conforms to the underside of the roof when you join the walls to the roof. (T/F)
3. The roof overhang setting is available from the *Options Bar*. (T/F)
4. To create a gable roof on a building with 4 walls, two of the walls should not have the _____ option checked.
5. Is it possible to change the reference point for a temporary dimension that is displayed while an object is selected? (Y/N)

Review Questions:

The following questions may be assigned by your instructor as a way to assess your knowledge of this section. Your instructor has the answers to the review questions.

1. When creating a roof using the "*roof by footprint*" option, you need to create a closed perimeter. (T/F)
2. Can the "*Defines Slope*" setting be changed after the roof is "finished"? (Y/N)
3. Skylights need to be rotated to align with the plane (pitch) of the roof. (T/F)
4. Skylights automatically make the glass transparent in shaded views. (T/F)
5. While using the **Roof** tool, you can use the _____ tool from the *Ribbon* to fill in the missing segments to close the perimeter.
6. You use the _____ parameter to adjust the vertical position of the roof relative to the current working plane (view).
7. While using the **Roof** tool, you need to select the _____ tool from the *QAT* before you can select a roofline for modification.
8. You need to use the _____ to flip the roofline when you pick the wrong side of the wall and the overhang is shown on the inside.

SELF-EXAM ANSWERS:

1 - F, 2 - T, 3 - T, 4 - defines slope, 5 - Y

Lesson 7

FLOOR SYSTEMS and REFLECTED CEILING PLANS:

In this lesson you will learn to create floor structures and reflected ceiling plans.

Even though you currently have floor levels defined, you do not have an object that represents the mass of the floor systems. You will add floor systems with holes for stairs, elevators, and the atrium.

Ceiling systems allow you to specify the ceiling material by room and the height above the floor. Once the ceiling has been added it will show up in section views (sections are created later in this book).

Exercise 7-1:

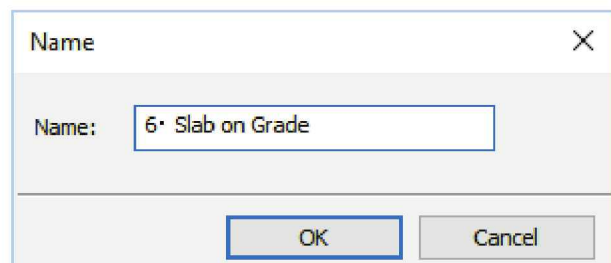
Floor Systems

Similar to other Revit elements, you can select from a few pre-defined system families. You can also create new types.

Level 1, Slab on Grade:

Sketching floors is a lot like sketching roofs (Lesson 5); you can select walls to define the perimeter and draw lines to fill in the blanks and add holes (cut-outs) in the floor element.

1. Open ex6-2.rvt and **Save As ex7-1.rvt**.
2. Switch to the **Level 1** floor plan view.
3. Select **Architecture** → **Build** → **Floor** (*down-arrow*) → **Floor: Architectural**.
4. Click **Edit Type** on the *Properties Palette*.
5. Select type **Generic – 12"** from the *Type* drop-down list at the top.
6. Click **Duplicate** to start a new floor type.
7. Type **6" Slab on Grade**, then **OK**.
8. Click the **Edit** button next to the *Structure* Parameter.



9. Change the material for the structure layer shown to **Concrete: cast-in-place concrete grey**, and change the thickness to **6"**.
10. Next you will add carpet on top of the slab. Click **Insert** and use the **Up/Down** buttons to position the *Layer* correctly (Figure 7-6.1).
11. Add another layer:
 - a. *Function*: **Finish 1 [4]**
 - b. *Material*: **Carpet (1)**
 - c. *Thickness*: **1/4"**
(Figure 7-1.1)
12. Click **OK** to close the open dialog boxes.
13. Select all the exterior walls on **Level 1**; this should include the curtain wall at the atrium and the stair shafts (Figure 7-1.3).

TIP: Select the interior side of the wall; you can use the control arrows if needed.

14. Click the **green check mark**.

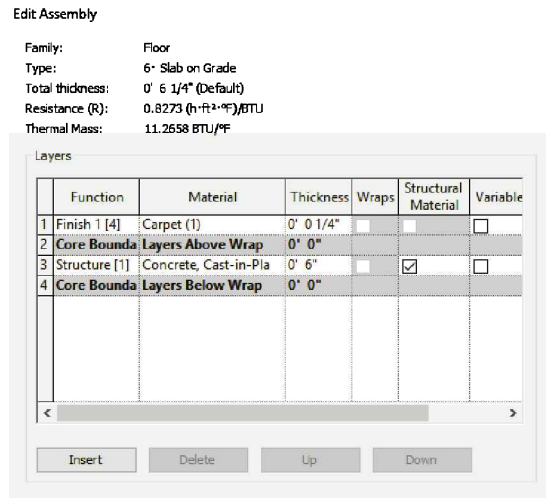


FIGURE 7-1.1 New Floor System

You will most likely get an error message. This is because the main exterior walls extend into the atrium (past the curtain wall). Because this is not a perfect corner (and it does not need to be), you can trim the “edge of slab” lines while in sketch mode to create a true corner, i.e., a closed line for the floor (Figure 7-1.2).

15. (If you did not get an error, skip ahead to Step 18.) Click **Continue**.

16. Use the **Trim** tool; select the two lines leading to the corner that needs to be trimmed. Do this for both sides of the atrium (Figure 7-1.3).

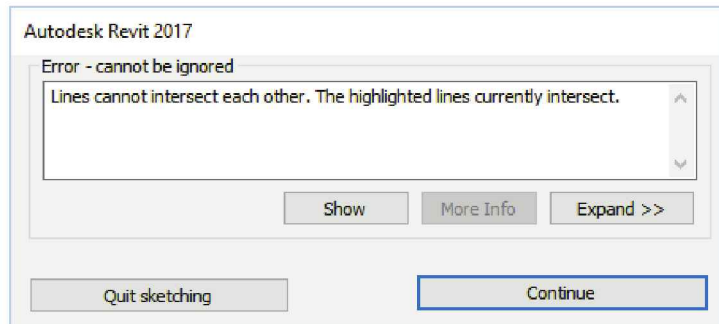


FIGURE 7-1.2 Floor error message

17. Click the **green check mark**.

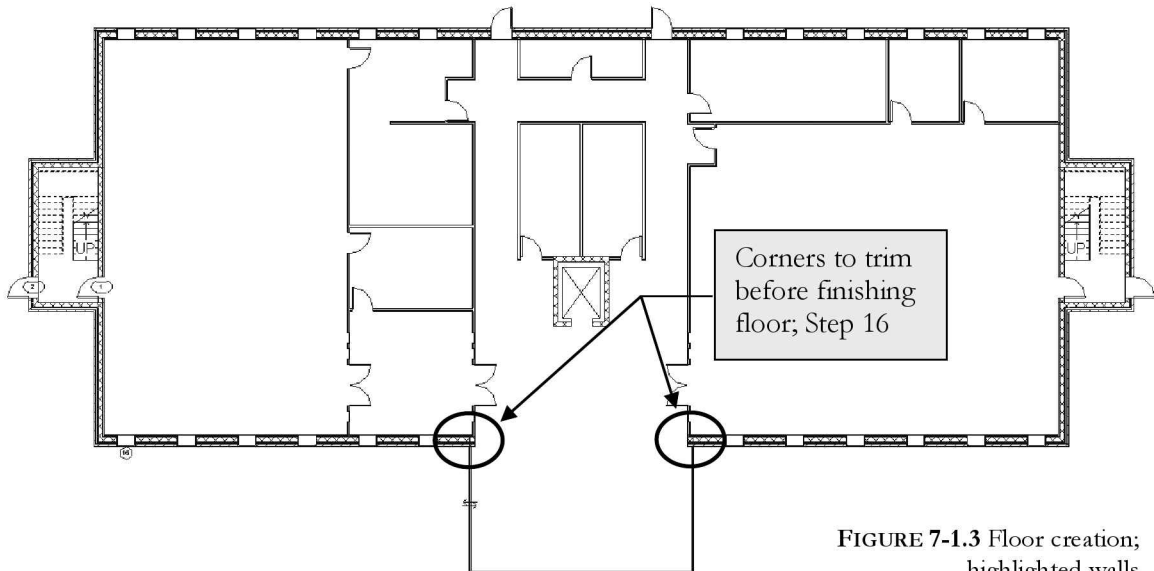


FIGURE 7-1.3 Floor creation; highlighted walls

You now have a floor at the first level. You should see a stipple pattern representing the floor area. You would most likely want to turn that pattern off for a floor plan. You will do that next.

18. Click **Modify** on the *Ribbon* to unselect the new floor.
19. Select **Edit**, next to the *Visibility/Graphic Overrides* parameter in the *Properties Palette* (Figure 7-1.4).

TIP: Type VV to skip Steps 19 and 20!

20. In the *Visibility/Graphic Overrides* dialog, click the “cell” at the intersection of *Floors* (row) and *Surface / Patterns* (column); select **Override** (Figure 7-1.5).

FYI: The word “Override” does not appear until you click within the “cell.”

21. Uncheck **Visible**.
22. Click **OK** to close the dialogs.

The stipple pattern is no longer visible.

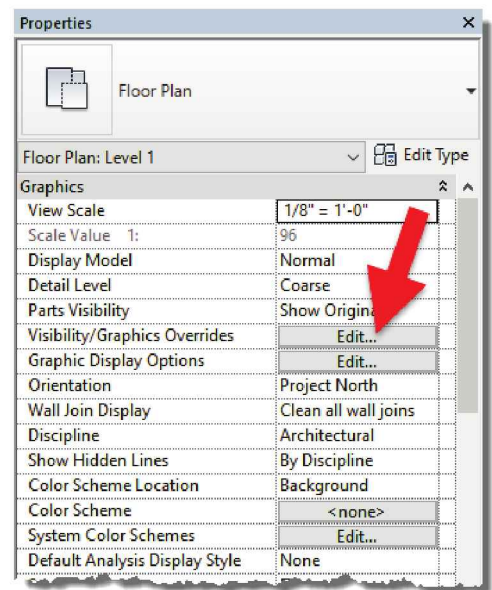


FIGURE 7-1.4 Level 1 view properties

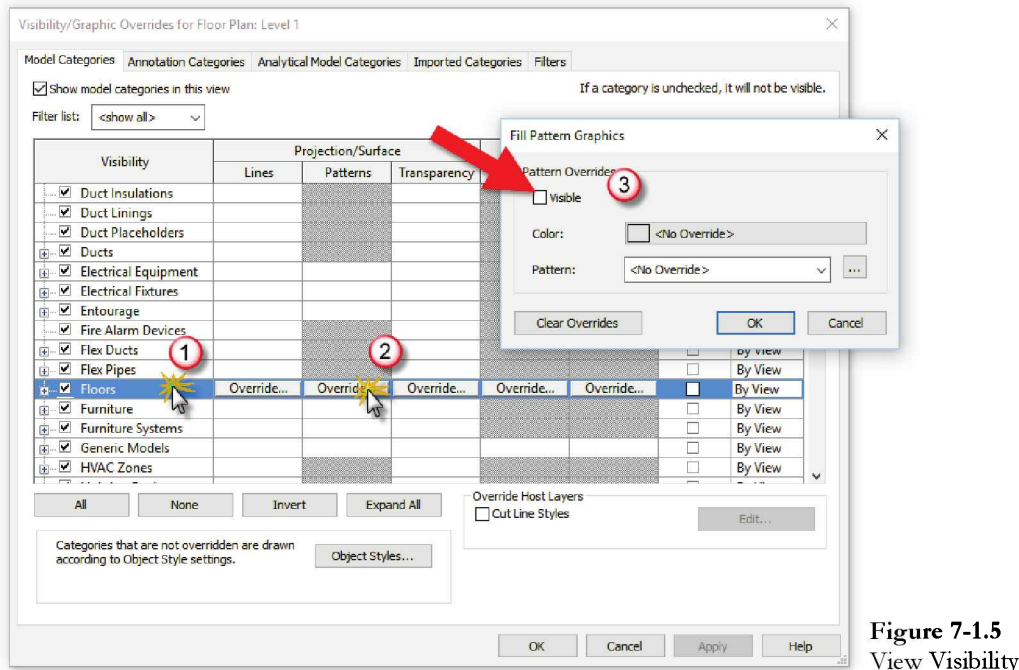


Figure 7-1.5
View Visibility

Levels 2 and 3, Conc. + Metal Deck + Bar Joists:

23. Switch to **Level 2** view.

Next you need to load a profile to properly define the upper floors.

24. Use the **Load Family** tool to load the following:
Profiles\Metal Deck\ **Form Deck_Non-Composite**. If prompted, select overwrite.

25. Activate the **Floor** tool and create a new floor type named **Steel Bar Joist 14" – Carpet on Concrete**.

TIP: Use a similar floor type as a starting point (duplicate) when creating new floor types.

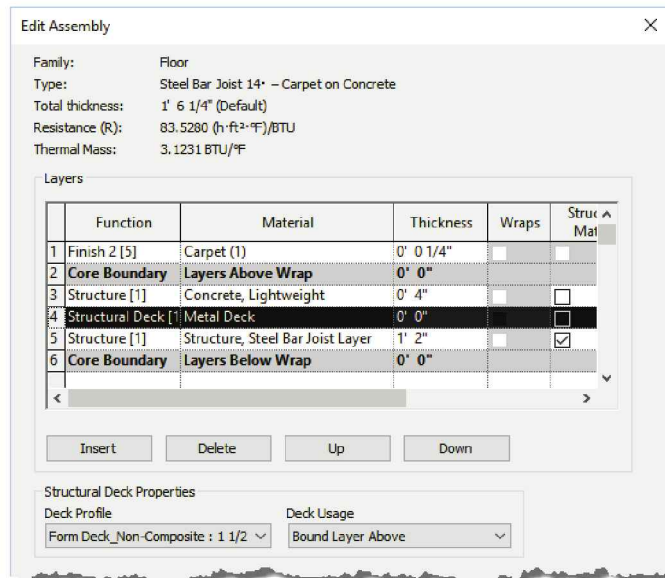


FIGURE 7-1.6 Floor system – edit structure

26. Adjust/add the layers shown in **Figure 7-1.6**.

- Be sure to set the *Structural Deck Properties* correctly near the bottom of the *Edit Assembly* dialog. Select the 1 1/2" deck; this will appear in sections.

NOTE: In an actual project you might not want to include the finishes, such as VCT and Carpet. These can be added separately to better control their locations.

Creating the second and third floors will be a little more involved than was the first floor. This is because the upper floors require several openings. For example, you need to define the openings for the elevator, the stair shafts and the atrium space. Revit makes the process very simple however.

You should still be in the *Floor* tool.

27. On the *Options Bar*, check “**Extend into wall (to core).**”

FYT: The “**Extend into wall (to core)**” option will extend the slab to your CMU (CMU is the core in our example), and go under the furring. Depending on the design, the floor may extend to the exterior face of the CMU, allowing the CMU to bear on the floor slab at each level. In this exercise you will select the interior side.

28. Select the exterior walls indicated in Figure 7-1.7.

REMEMBER: To select the interior side of the wall, use the control arrows if needed.

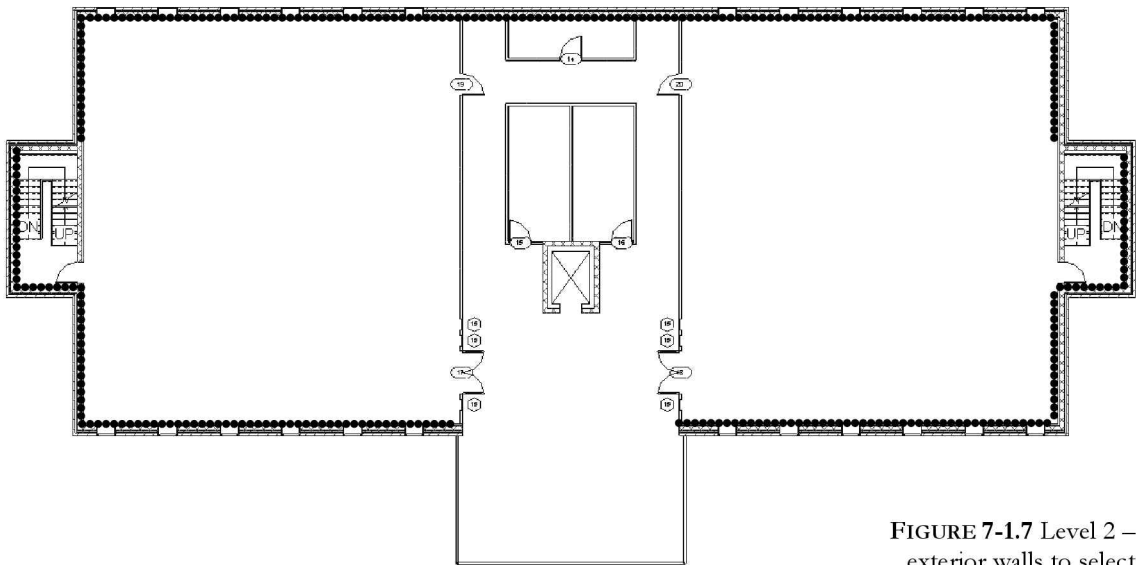
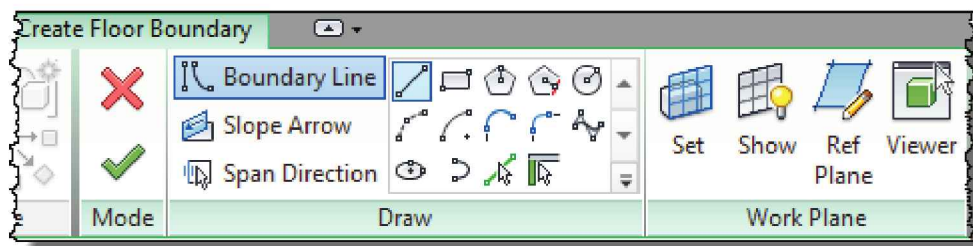


FIGURE 7-1.7 Level 2 – exterior walls to select

Next you will define the portion of floor that extends into the stair shaft to be the landing at this level. You will need to use the *Line* tool and the *Trim* tools to define this area.

29. Click on the **Line** tool from the *Draw* panel on the *Ribbon*.



30. **Zoom In** to the West stair shaft.

31. Draw a horizontal line defining the edge of the landing; use Revit's snaps to accurately pick the top riser as shown in **Figure 7-1.8**.

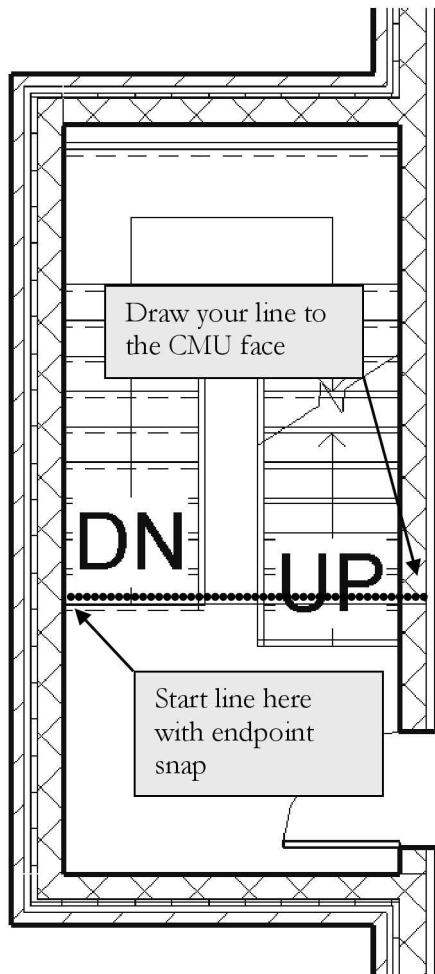


FIGURE 7-1.8 Level 2 – West stair

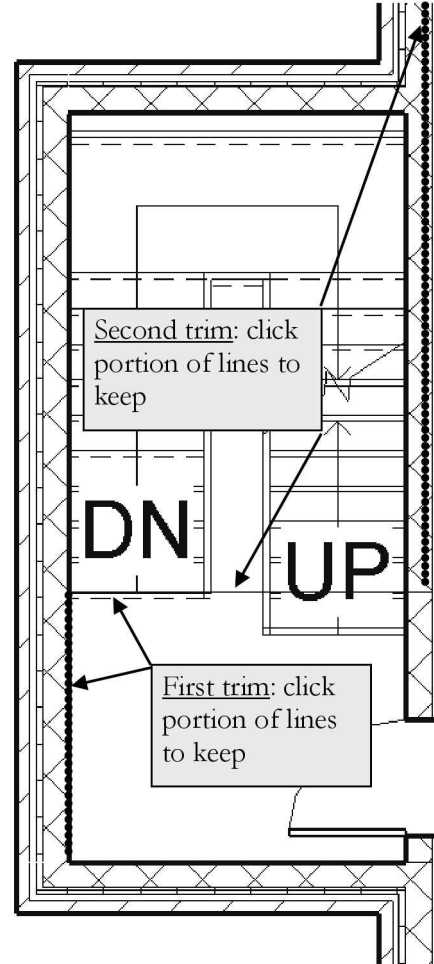


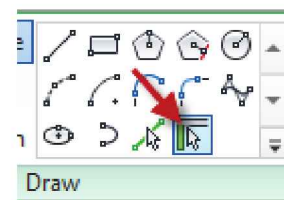
FIGURE 7-1.9 Level 2 – West stair trim lines

32. Select the **Trim** tool and trim the three lines referenced in **Figure 7-1.9**.



33. Repeat these steps for the East stair shaft.

34. Next you will pick the four walls at the elevator shaft, selecting the shaft side of the wall; be sure to use the **Pick Walls** feature from the *Draw* panel on the *Ribbon*.



You are now ready to define the edge of the slab at the atrium.

35. Use the **Line** tool (from the *Draw* panel) to draw the edge of slab in the atrium (5 lines) as shown in **Figure 7-1.10**.

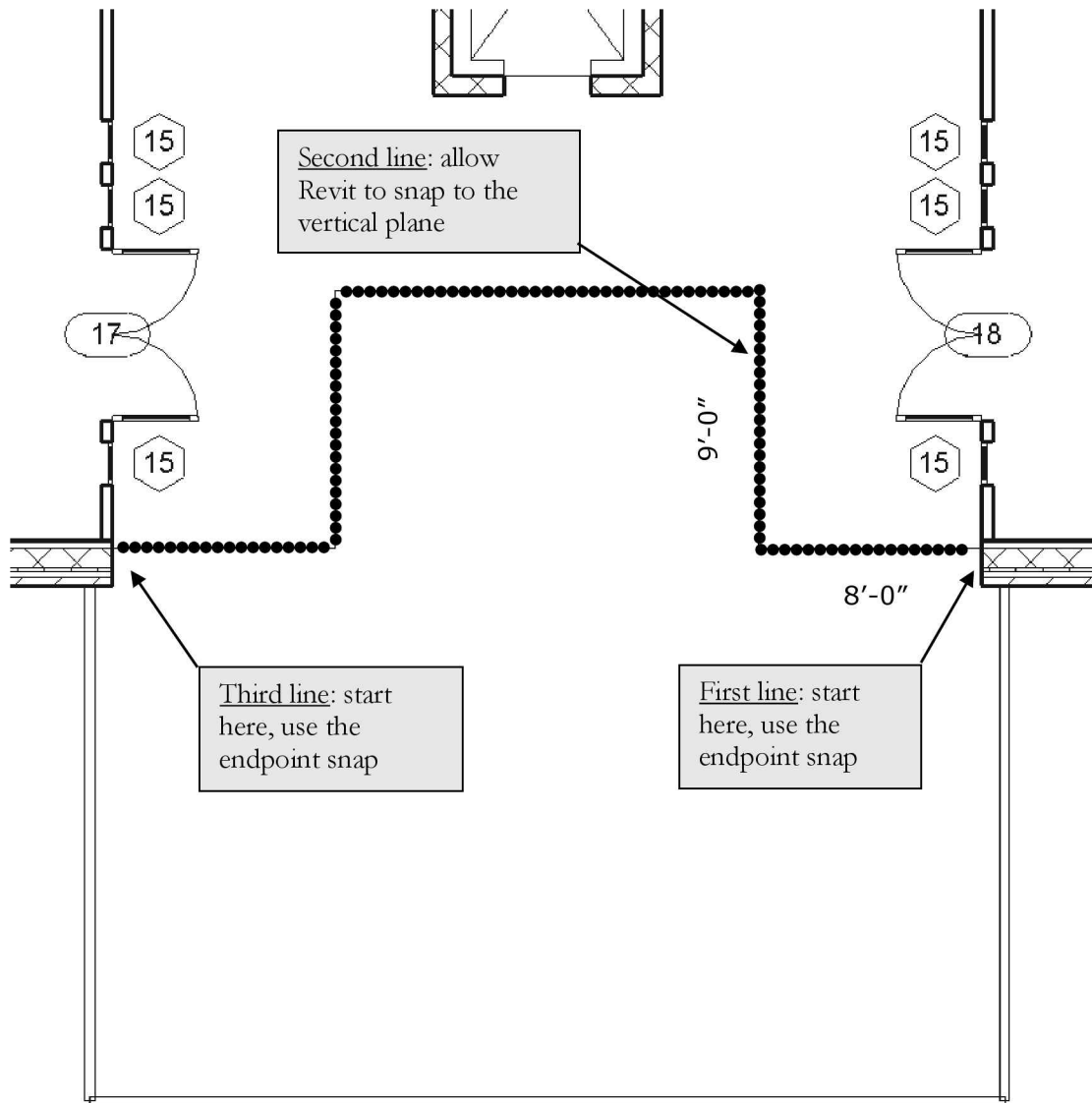


FIGURE 7-1.10 Atrium slab definition

36. Click the **green check mark** to finish the floor.
37. Click **Yes** to the prompt “*Would you like the walls that go up to this floor’s level to attach to its bottom?*”
38. Click **Yes** for the prompt to join the walls that overlap the floor system (Figure 7-1.11).

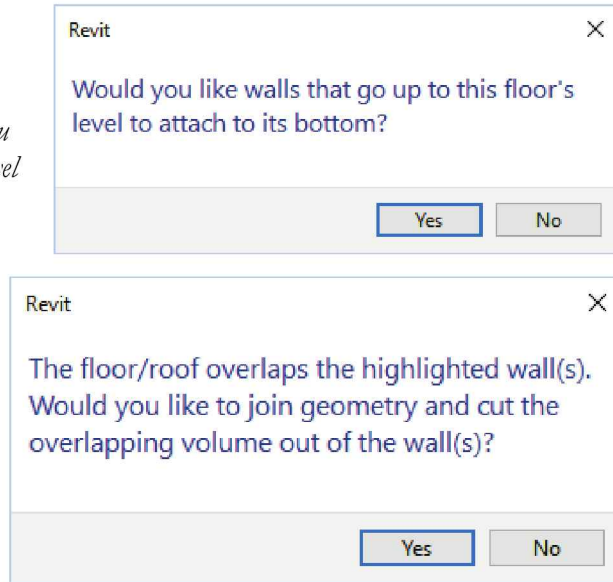


FIGURE 7-1.11 Finish floor prompts

39. Change Level 2’s *Visibility* to turn off the floor pattern.

That completes the Level 2 floor system. Next you will copy the floor you just created to Level 3. You could switch to Level 3 and manually draw a floor following the same steps as for Level 2; however, because the two floors are identical, it would be faster to copy it.

40. Select the Level 2 floor element you just created and select **Modify Floors** → **Clipboard** → **Copy** from the *Ribbon*.

TIP: Selecting elements that overlap, like the exterior walls and the edge of slab (floor system), may require the use of the TAB key. The only way to select a floor element is by picking its edge. Revit temporarily highlights elements when you move your cursor over them. But, because the floor edge may not have an “exposed” edge to select (e.g., like we have in the atrium area), you will have to toggle through your selection options for your current cursor location. With the cursor positioned over the edge of the floor (probably with an exterior wall highlighted), press the TAB key to toggle through the available options. A tooltip will display the elements; when you see floor:floor-name, click the mouse to select it.

41. Switch to **Level 3**.
42. Select *Modify* → *Clipboard* → *Paste (down arrow)* → **Aligned to Current View**.
43. Change Level 3’s *Visibility* to turn off the floor pattern.

Explore your work by looking at the model in 3D (Figure 7-1.12).

Notice again how Revit automatically applies colors and patterns to surfaces to help you (and your client) better visualize your design with minimal effort. These colors and materials relate to the materials applied to each element. You will learn more about this in the rendering chapter.

44. Save your project as **ex7-1.rvt**.



FIGURE 7-1.12 3D view with floors

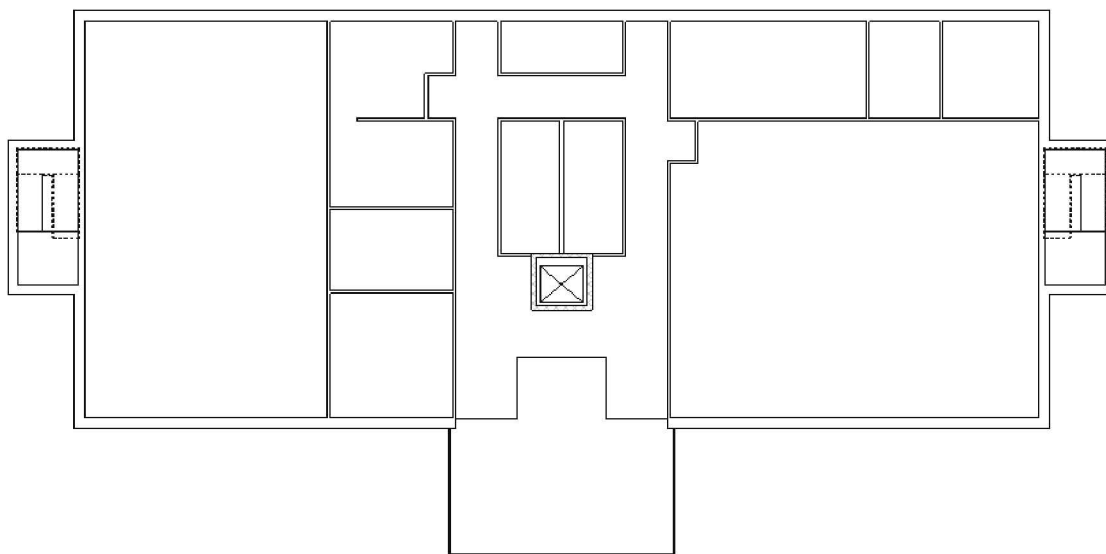
Exercise 7-2:

Ceiling Systems (Susp. ACT and Gypsum Board)

This lesson will explore Revit's tools for drawing reflected ceiling plans. This will include drawing different types of ceiling systems.

Suspended Acoustical Ceiling Tile System:

1. Open ex7-1.rvt and Save As **ex7-2.rvt**.
2. Switch to the **Level 1 ceiling plan** view from the *Project Browser*.



Notice the doors and windows are not visible in the ceiling plan views. The ceiling plan views have a cutting plane similar to floor plans. You can see this setting by selecting *Edit*, next to **View Range** in the *Properties Palette*.

The default value is 7'-6". You might increase this if, for example, you had 10'-0" ceilings and 8'-0" high doors. Otherwise, the doors would show because the 7'-6" cutting plane is below the door height (Figure 7-2.1).

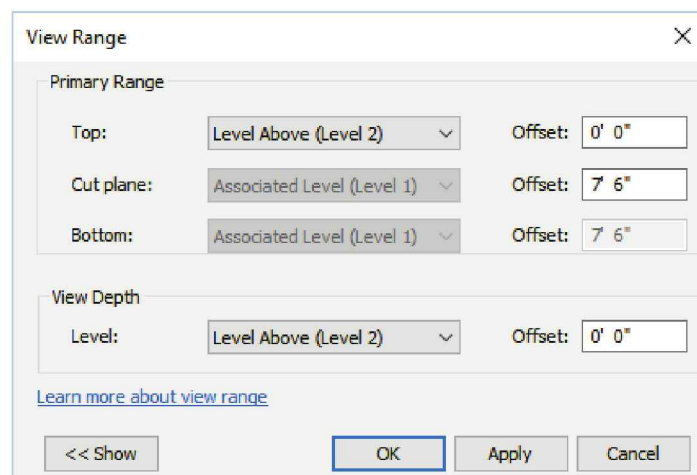


FIGURE 7-2.1 Properties: View Range settings

Click **<<Show** for more information...

3. Select **Architecture → Build → Ceiling**.



Ceiling

You have 4 ceiling types (by default) to select from (Figure 7-2.2).

4. Select Compound Ceiling: 2'x4' ACT System from the *Type Selector*.

Next you will change the ceiling height. The default setting is 8'-0" above the current level. You will change the ceiling height to 9'-0" to make the large open office areas feel more spacious. This setting can be changed on a room by room basis.

5. Set the *Height Offset From Level* setting to **9'-0"** in the *Properties Palette* (Figure 7-2.3).

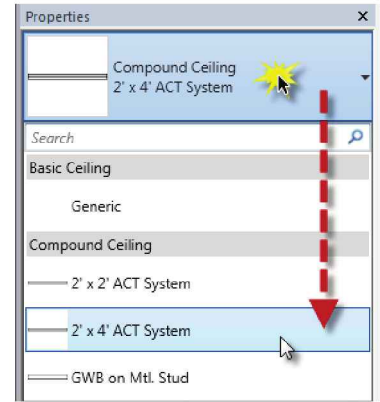


FIGURE 7-2.2 Type Selector

You are now ready to place ceiling grids. This process cannot get much easier, especially compared to traditional CAD programs.

6. Move your cursor anywhere within the large open office area in the West side of the building. You should see the perimeter of the room highlighted.
7. Pick within the large room; Revit places a grid in the room (Figure 7-2.4).

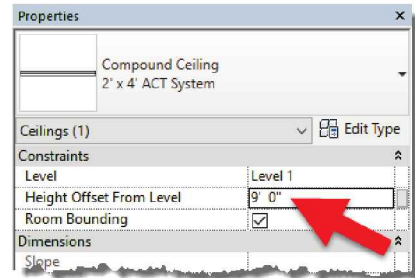


FIGURE 7-2.3 Properties Palette

You now have a 2x4 ceiling grid at 9'-0" above the floor (Level 1 in this case).

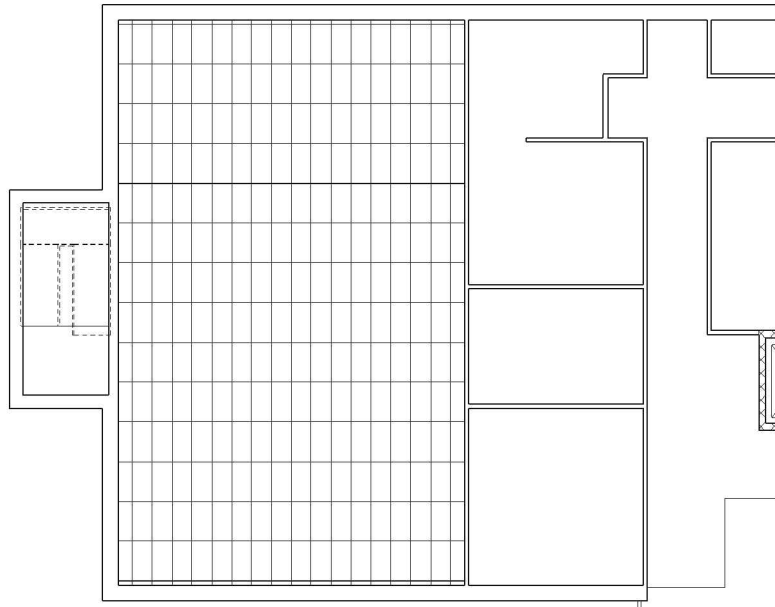


FIGURE 7-2.4 Level 1: Ceiling

When you place a ceiling grid, Revit centers the grid in the room. The general rule-of-thumb is you should try to avoid reducing the tile size by more than half at its perimeter. You can see in Figure 7-2.4 that the East and West sides look okay. However, the North and South sides are small slivers. You will adjust this next.

8. Select **Modify** from the *Ribbon*.
9. **Select** the ceiling grid (only one line in the ceiling grid will be highlighted).
10. Use the **Move** tool to move the grid 24" to the North (Figure 7-2.5).
11. Place ceiling grids as shown in Figure 7-2.5.
 - a. *Be sure to adjust the ceiling heights shown.*
 - b. *Adjust the grids to avoid small tiles at the perimeter.*



FIGURE 7-2.5 Level 1: Ceiling Grids

Modifying the Suspended Acoustical Ceiling Tile System:

Making modifications to the grid is relatively easy. Next, you will adjust the ceiling height and rotate the grid.

12. Zoom in to the room in the upper right corner on *Level 1*.
13. Change the height to **8'-6"** in the *Properties Palette*, and then click **Apply**.
14. With the grid still selected, pick Compound Ceiling: 2'x2' ACT System from the *Type Selector* on the *Properties Palette*.

15. Again, with the grid still selected, use the *Rotate* tool to rotate the grid 45 degrees.

TIP: When using the Rotate tool  you need to pick two points. The first point is your reference line. The second point is the number of degrees off that reference line. In this example, try picking your first point to the right as a horizontal line. Then move the cursor counter-clockwise until 45 degrees is displayed. You can also type the angle instead of picking a second point.

16. Your drawing should look similar to **Figure 7-2.6**.

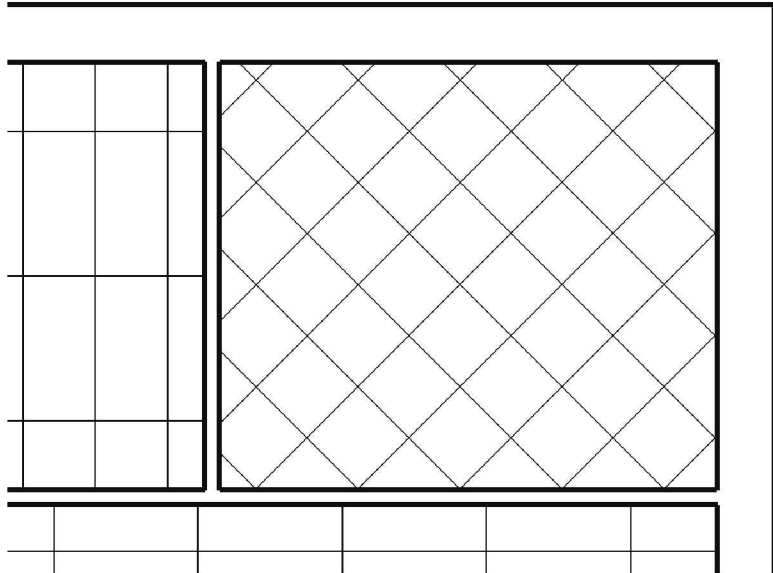
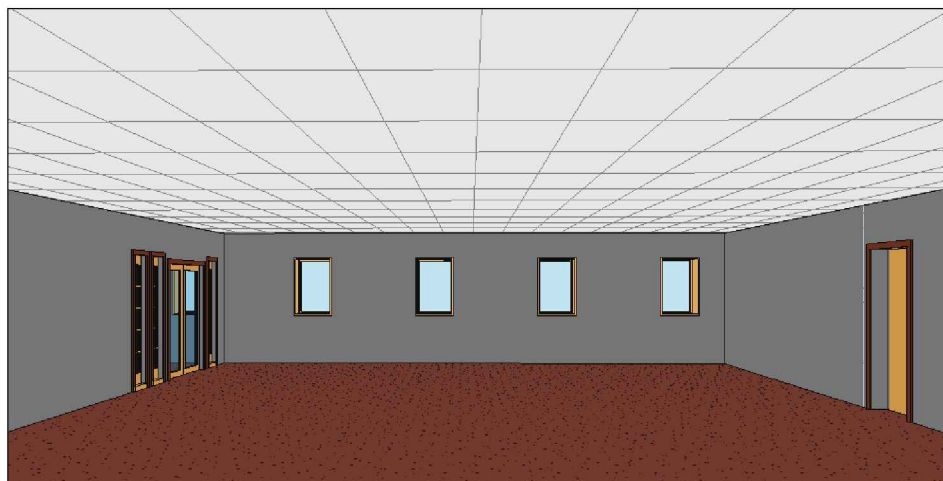


FIGURE 7-2.6 Level 1: Modified Ceiling

The image below shows a camera view, looking South, of the large open office area, showing the ceiling. You will learn how to create camera views later in the text.



Next, you will look at drawing gypsum board (or drywall) ceiling systems. The process is identical to placing the grid system. Additionally, you will create a new ceiling type.

Gypsum Board Ceiling System:

You will create a new ceiling type for a gypsum board ceiling. To better identify the areas that have a gypsum board ceiling, you will set the ceiling type to have a stipple pattern. This will provide a nice graphical representation for the gypsum board ceiling areas. First we will create a new material to define the stipple pattern which can be applied to our gypsum board ceiling type.

17. From the *Manage* tab, select **Materials**.

This is the list of materials you select from when assigning a material to each layer in a wall system, etc.

18. Select *Gypsum Wall Board*, **right-click** on it and select **Duplicate** and then enter the name **Gypsum Ceiling Board**.

19. In the *Surface Pattern* area, pick the down-arrow and select **Gypsum-Plaster** from the list, and then click **OK** (Figure 7-2.7).

FYI: The appearance asset should also be duplicated but will not be done now; see chapter 11.

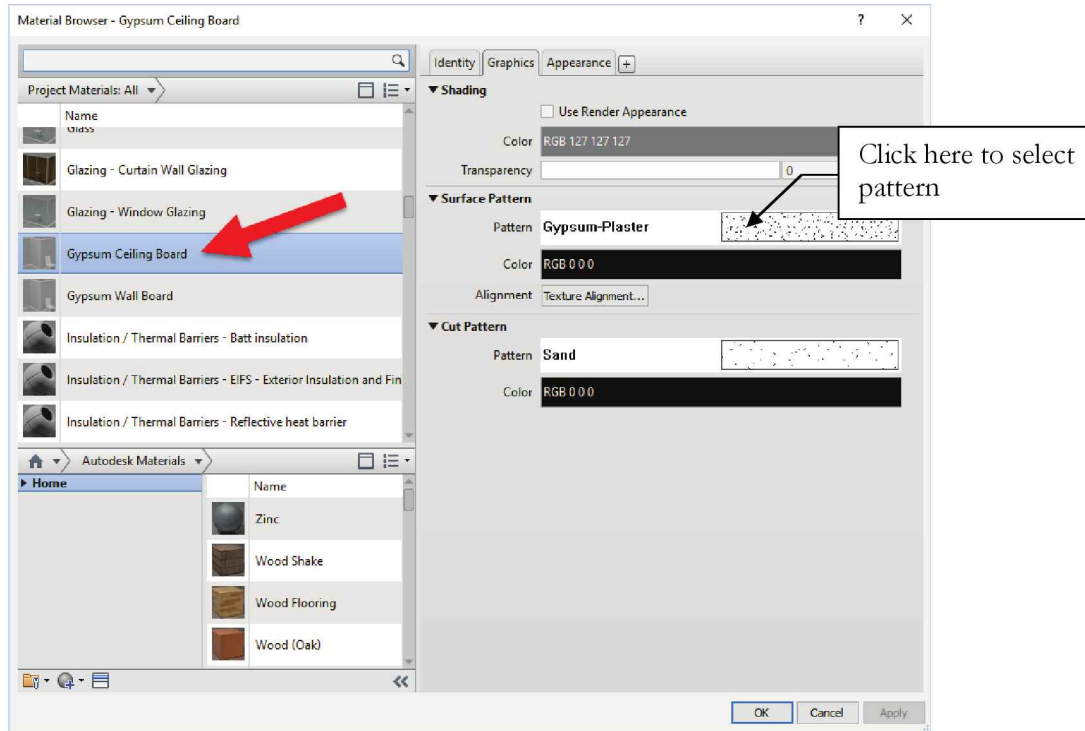


FIGURE 7-2.7 Materials dialog

The *Surface Pattern* setting is what will add the stipple pattern to the gypsum board ceiling areas. With this set to *none*, the ceiling has no pattern (like the basic ceiling type).

Thus, if you wanted Carpet 1 finish to never have the stipple hatch pattern, you could change the surface pattern to none via the *Materials* dialog and not have to change each view's visibility override.

20. Select **Architecture** → **Build** → **Ceiling**.

21. Click **Edit Type** on the *Properties Palette*.

22. Set the *Type* drop-down to **GWB on Mtl. Stud**.

FYT: You are selecting this because it is similar to the ceiling you will be creating.

23. Click *Duplicate* and type **Gypsum Ceiling Board** for the name.

24. Select **Edit** next to the *Structure* parameter.

25. Set the values as follows (Figure 7-2.8):

- a. **1½" Mtl. Stud**
- b. **¾" Mtl. Stud**
- c. **Gypsum Ceiling Board**
(*This is the material you created in Step 18.*)

26. Click **OK** two times.

FYT: The ceiling assembly you just created represents a typical suspended gypsum board ceiling system. The Metal Studs are perpendicular to each other and suspended by wires, similar to an ACT (acoustical ceiling tile) system. You are now ready to draw a gypsum board ceiling.

27. Make sure **Gypsum Ceiling Board** is selected in the *Type Selector* on the *Properties Palette*.

28. Set the ceiling height to **8'-0"**.

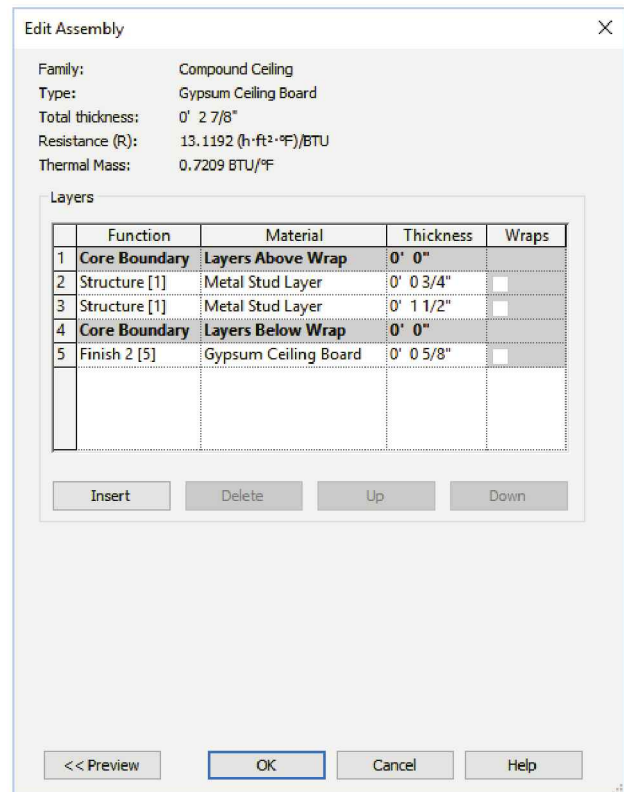


FIGURE 7-2.8 New ceiling – Edit assembly

29. Pick the two bathrooms on Level 1, which are the two rooms North of the elevator (Figure 7-2.9).

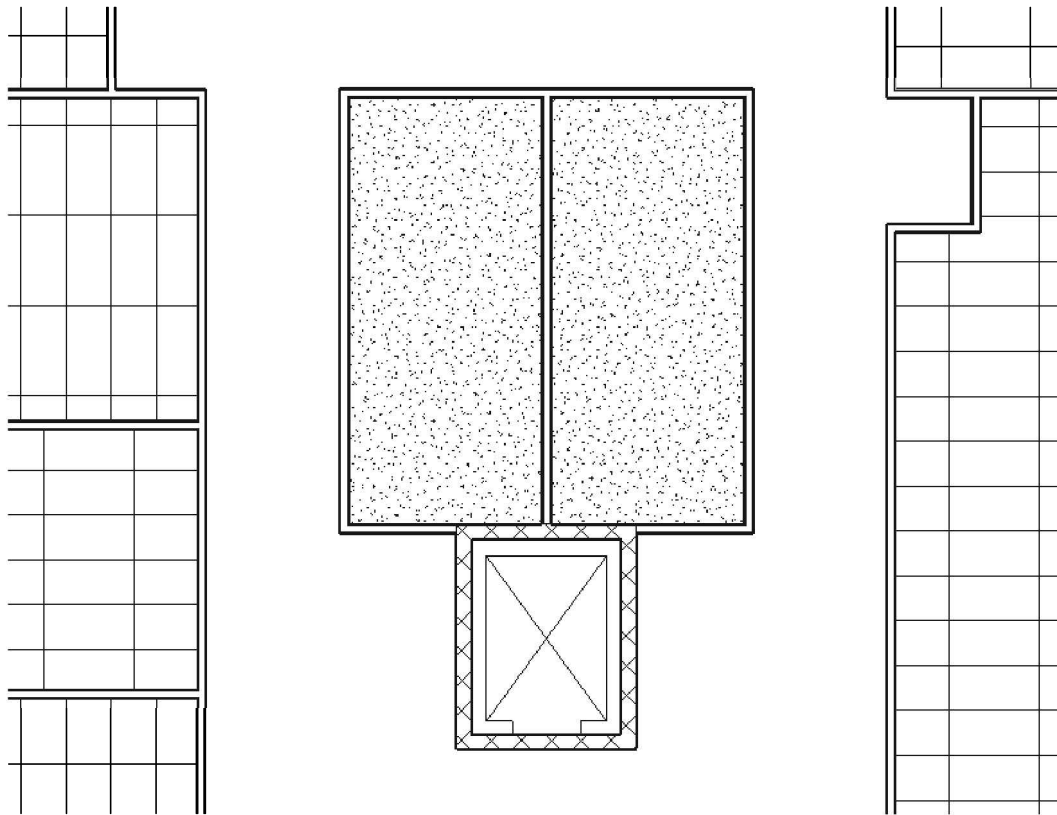


Figure 7-2.9 Gyp. Bd. Ceiling

You now have a gypsum board ceiling at 8'-0" above the finished floor in the toilet rooms.

Sketching a Ceiling:

Next, you will draw a ceiling in the atrium area. However, you cannot simply pick the room to place the ceiling because of the opening in the floor. You will need to sketch the ceiling just like you sketched the floor system in the previous exercise. First, you will need to draw a bulkhead at the edge of the second floor slab. A bulkhead is a portion of wall that hangs from the floor above and creates a closed perimeter for a ceiling system to tie into.

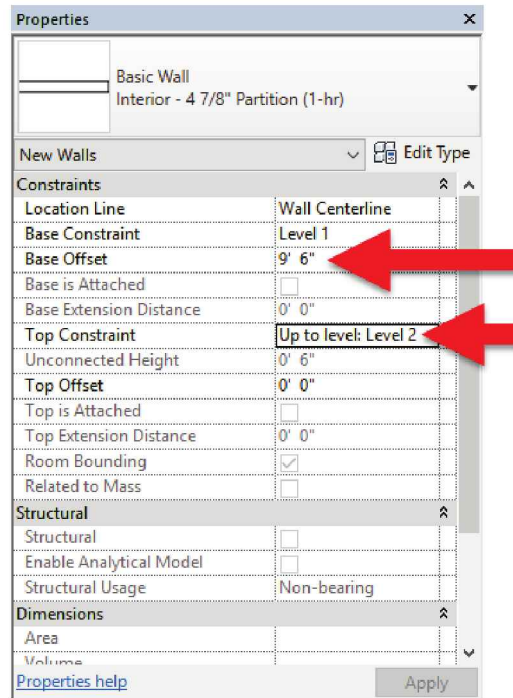
30. While still in the Level 1 Reflected Ceiling Plan view, select the **Wall** tool.

31. Set the wall properties to **Interior - 4 7/8" Partition (1-hr)** and the *Base Offset* to **9'-6"**. (This will put the bottom of the wall to 9'-6" above the current floor level, *Level 1* in this case.) (Figure 7-2.10)

32. Set the *Top Constraint* to **Up to level: Level 2** (Figure 7-2.10).

TIP: The next time you draw a wall you will have to change the Base Offset back to 0'-0" or your wall will be 9'-6" off the floor.

33. **Draw the bulkhead;** make sure you snap to the edge of the slab. Also, make sure the wall is under the floor system, not out in the opening. Do this by drawing the wall either from right to left or left to right depending on how you have the *Location Line* set (Figure 7-2.11).



Properties	
Basic Wall	
Interior - 4 7/8" Partition (1-hr)	
New Walls	Edit Type
Constraints	
Location Line	Wall Centerline
Base Constraint	Level 1
Base Offset	9' 6"
Base is Attached	☐
Base Extension Distance	0' 0"
Top Constraint	Up to level: Level 2
Unconnected Height	0' 6"
Top Offset	0' 0"
Top is Attached	☐
Top Extension Distance	0' 0"
Room Bounding	☒
Related to Mass	☐
Structural	
Structural	☐
Enable Analytical Model	☐
Structural Usage	Non-bearing
Dimensions	
Area	
Volume	
Properties help	
Apply	

FIGURE 7-2.10 Bulkhead (wall) properties

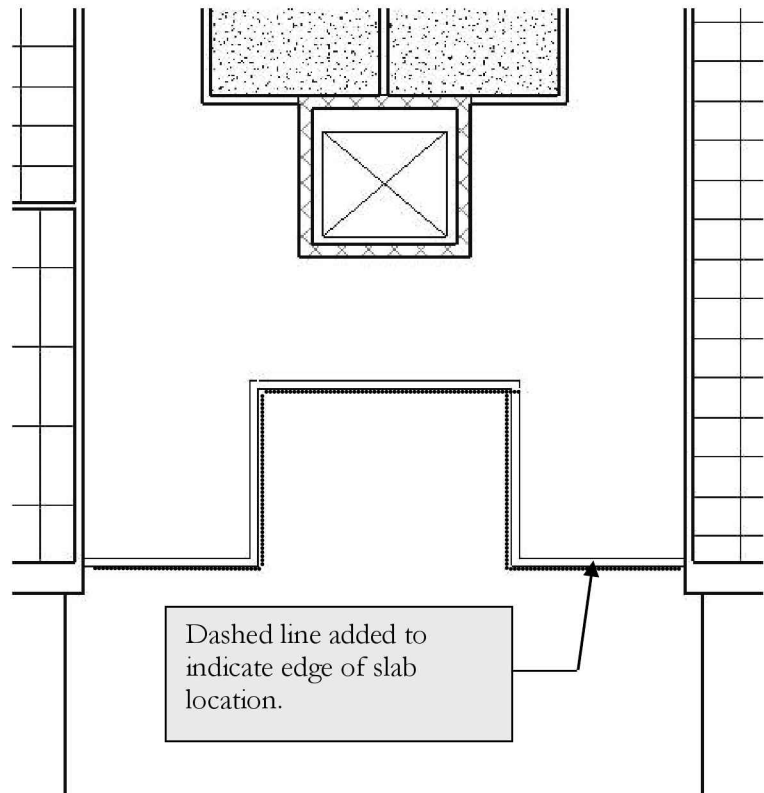


FIGURE 7-2.11 Bulkhead drawn

34. Select the **Ceiling** tool and then click **Sketch Ceiling** from the *Ribbon*.



35. Use the **Pick Walls**, **Line**, and **Trim** tools to sketch a line at the perimeter of the ceiling area as shown in **Figure 7-2.12**. You will also need to sketch a line around the toilet/elevator area to define the area within the larger area that will not receive the ceiling pattern: **2'x2' ACT ceiling, with the ceiling height set to 9'-6"**.
36. Click the **green check mark** and save project as **ex7-2.rvt**.

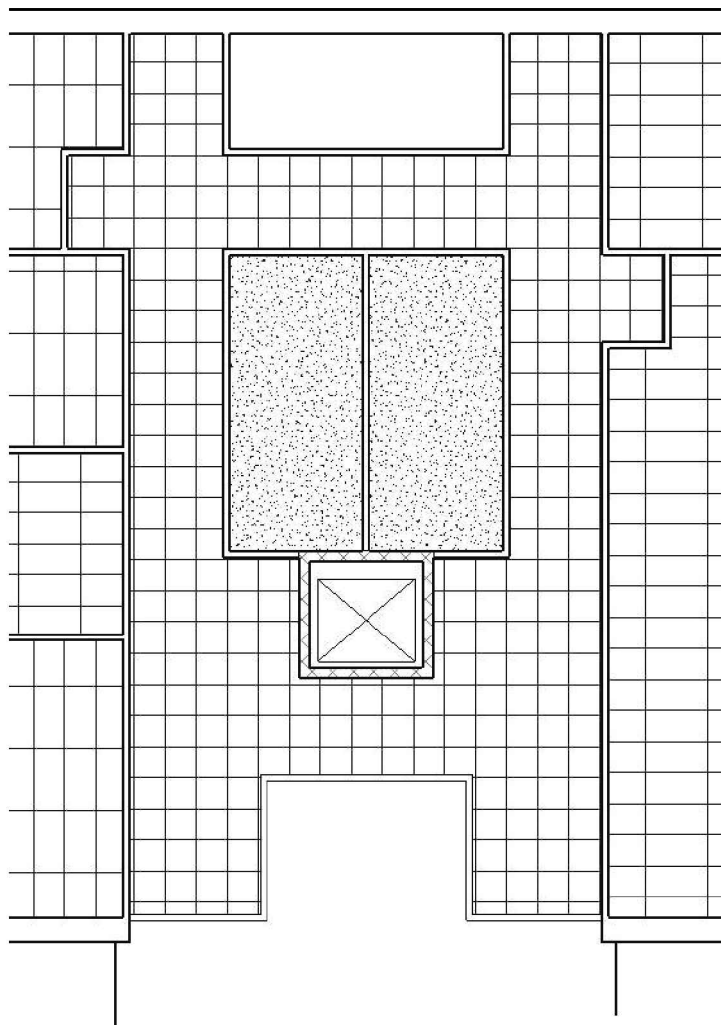


FIGURE 7-2.12 Atrium Ceiling

Exercise 7-3:

Placing Fixtures (Lights and Diffusers)

In this exercise, you will learn to load and place light and mechanical fixtures in your reflected ceiling plans.

Loading Families:

Before placing fixtures, you need to load them into your project.

1. Select **Architecture** → **Build** → **Component** from the *Ribbon*.
2. Select **Load Family** on the *Ribbon* (Figure 7-3.1).

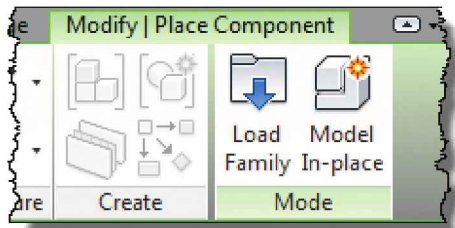


FIGURE 7-3.1 Component tool active; Ribbon

3. Double-click the *Lighting\Architectural\Internal* folder, and then double-click **Troffer Light- 2x4 Parabolic.rfa** (Figure 7-3.2).

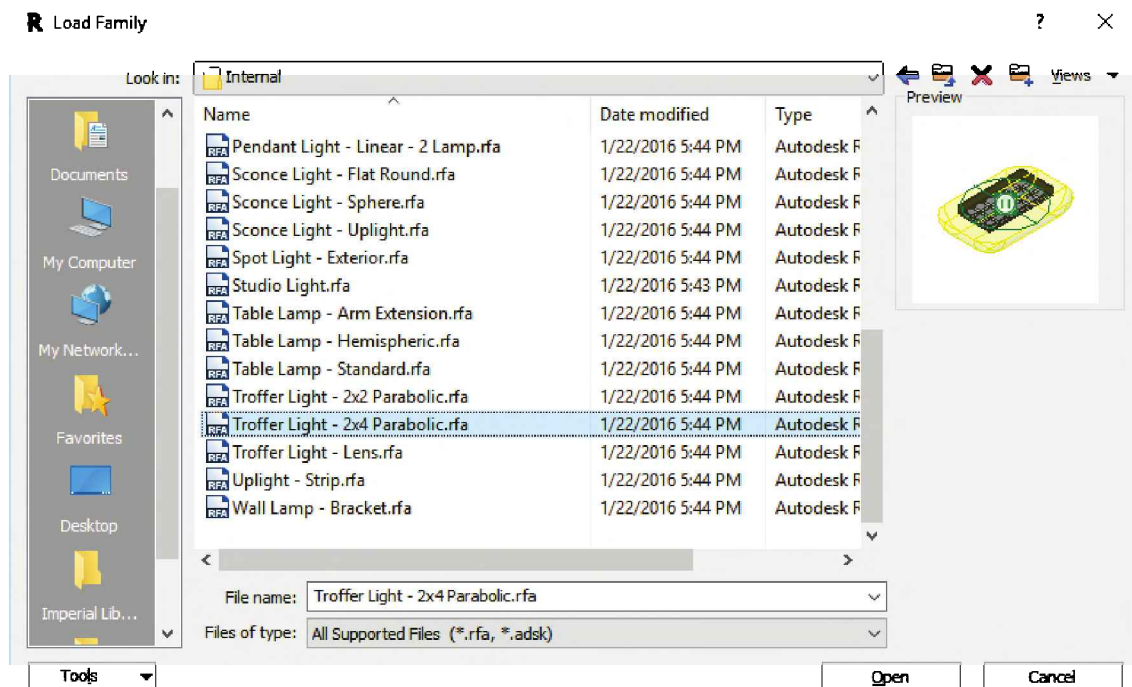


FIGURE 7-3.2 Load family

Before placing the light fixture you will load the other families first.

4. Select **Load Family** again, browse to the *Mechanical\Architectural\Air-Side Components\Air Terminals* folder.
5. Select **Square Supply Diffuser** and **Square Return Register** (you can select both while holding the Ctrl key) and then **Open**.

TIP: You can hold the Ctrl key to select and load multiple components from the same folder at once.

Placing Families:

You are now ready to place the elements in your ceiling plans.

6. With **Component** still selected from the *Ribbon*, pick *Troffer Light – 2'x 4' Parabolic: 2'x4' (2 Lamp) – 277V* from the *Type Selector*.
7. On **Level 1 RCP**, place fixtures as shown in **Figure 7-3.3**.

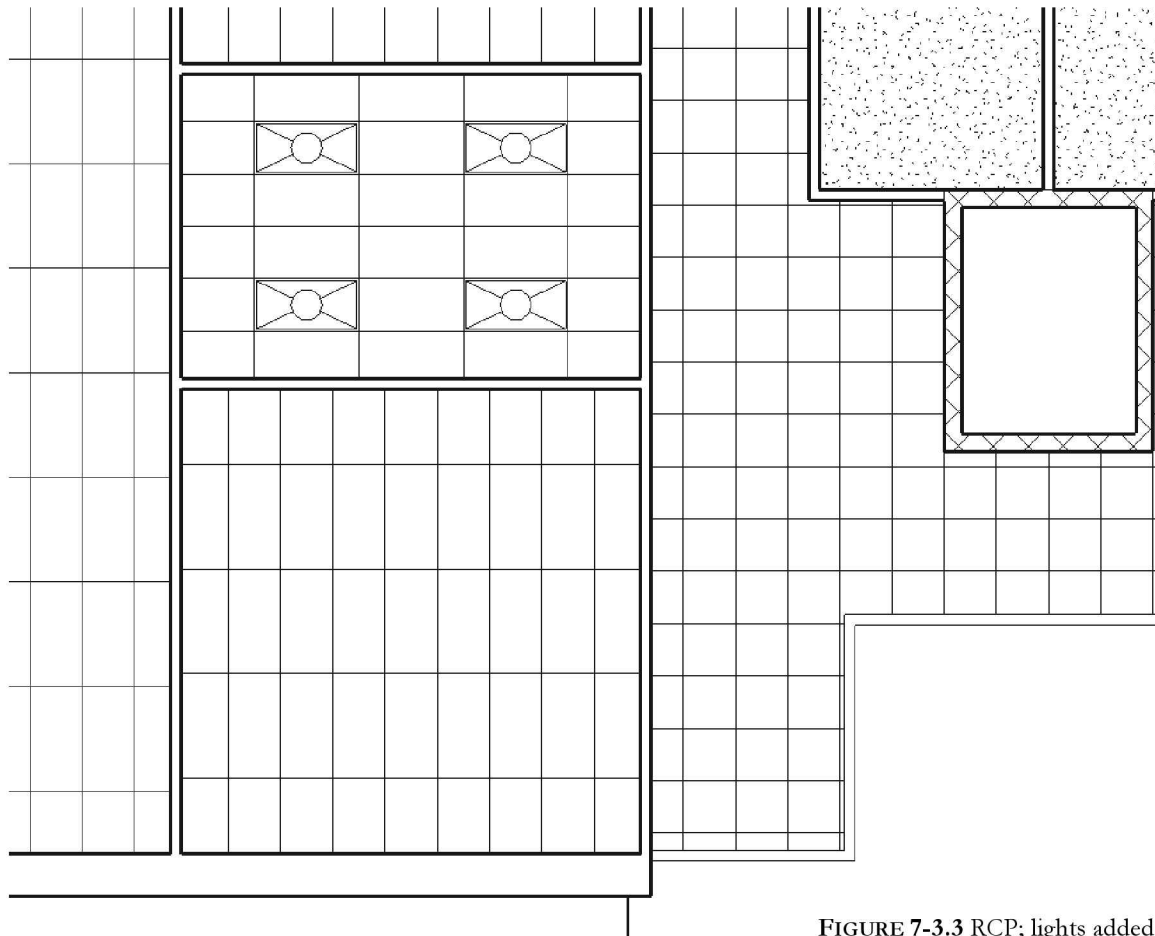


FIGURE 7-3.3 RCP; lights added

TIP: You can use array to quickly place several lights.

You may have to use the *Move* command (or better, the *Align* tool) to move the fixture so it fits perfectly in the ACT grid.

8. Now place another **2x4 light fixture** as shown in **Figure 7-3.4**.

Notice the fixture does not automatically orientate itself with the ceiling grid. There may be an occasion when you want this.

Also, notice the light fixture hides a portion of the ceiling grid. This is nice because the grid does not extend through a light fixture.

TIP: You may press the Space bar while placing the light fixture to rotate it.

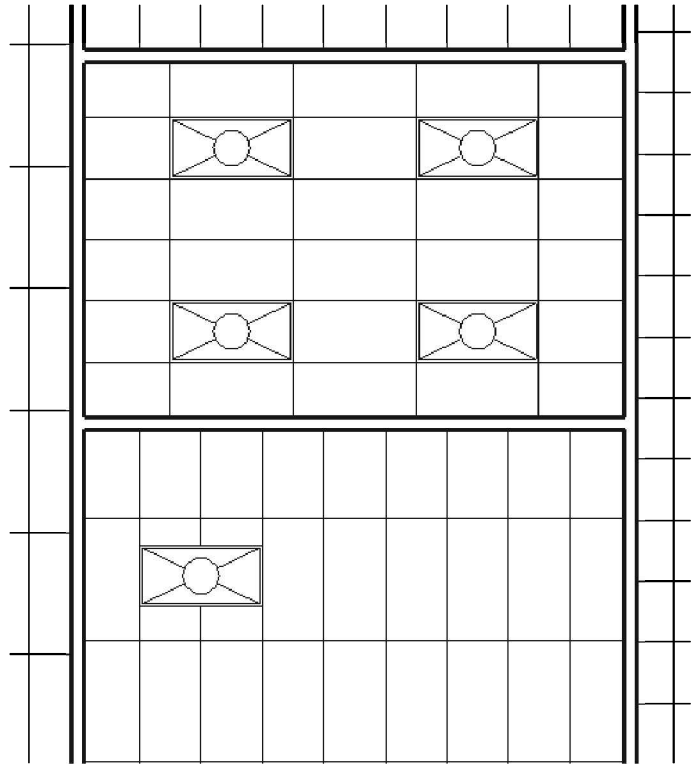


FIGURE 7-3.4 RCP; lights added

9. Use **Rotate** and **Move** to rotate the fixture to align with the grid (Figure 7-3.5).
10. Once you have one fixture rotated, it is easier to use the *Copy* tool and the snaps to add rotated light fixtures. **Copy** the light fixture to match the layout in **Figure 7-3.5**.

TIP: You can check “multiple” on the Options Bar to quickly copy several lights at once.

11. Select Square Supply Diffuser: 24" x 24" from the *Type Selector*.
12. Place the diffusers as shown in Figure 7-3.6.
13. Select Square Return Register: 24" x 24" from the *Type Selector*.
14. Place the registers as shown in Figure 7-3.6.
15. Save your project as **ex7-3.rvt**.

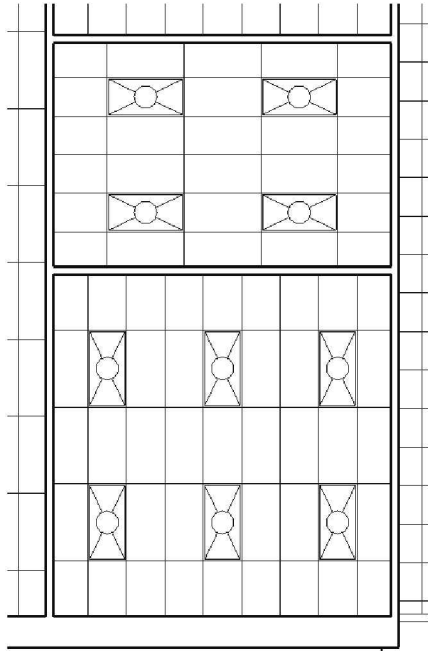


FIGURE 7-3.5 RCP; rotated lights

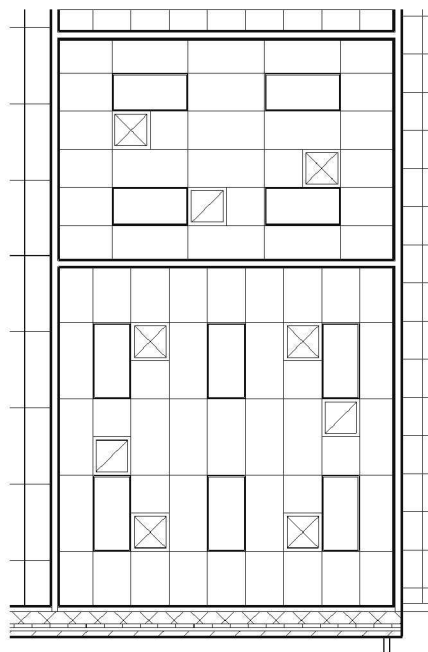


FIGURE 7-3.6 RCP; mechanical

Reflected Ceiling Plan Symbols:

Revit provides many of the industry standard symbols necessary in drawing reflected ceiling plans (RCP). As shown in Figure 7-3.5, supply air is represented with an X and return air has a diagonal line. It is typical to have a RCP symbol legend showing each symbol and material pattern and list what each one represents.

Component Properties

If you want to adjust the properties of a component, such as a light fixture, you can browse to it in the *Project Browser* and right click on it (*notice the right click menu also has the option to select all instances of the item in the drawing*) and select *Properties*. You will see the dialog below for the 2x4 (2 Lamps).

You can also click duplicate and add more sizes (e.g., 4'x4' light fixture).

Type Properties

Family: **Troffer Light - 2x4 Parabolic** Load...

Type: **2x4 (2 Lamp) - 277V** Duplicate... Rename...

Type Parameters

Parameter	Value
Cost	
Assembly Description	Lighting - Fluorescent
Type Mark	
OmniClass Number	23.80.70.11.14.11
OmniClass Title	Downlights
Code Name	
Photometrics	
Tilt Angle	-90.00°
Photometric Web File	2x42T12.ies
Light Loss Factor	0.88
Initial Intensity	80.00 W @ 78.75 lm/W
Initial Color	4230 K
Emit from Rectangle Width	1' 10"
Emit from Rectangle Length	3' 10"
Emit Shape Visible in Rendering	☐ None
Dimming Lamp Color Temperature	<None>
Color Filter	White
Light Source Definition (family)	Rectangle+Photometric Web

<< Preview OK Cancel Apply

You can also select an inserted component and review the *Properties Palette* for additional properties for that particular instance.

It should be pointed out that, in professional practice, the mechanical and electrical design is often created in a separate model and then linked into the architectural model.

Exercise 7-3:

Annotations

This short section will look at adding notes to your RCP. A later chapter will cover annotations in much more detail.

Adding Annotations:

1. Select **Annotate** → **Text** → **Text** from the *Ribbon*.
2. Pick **3/32" Arial** from the *Type Selector*.
3. Select the **Leader** option pointed out in **Figure 7-4.1**.

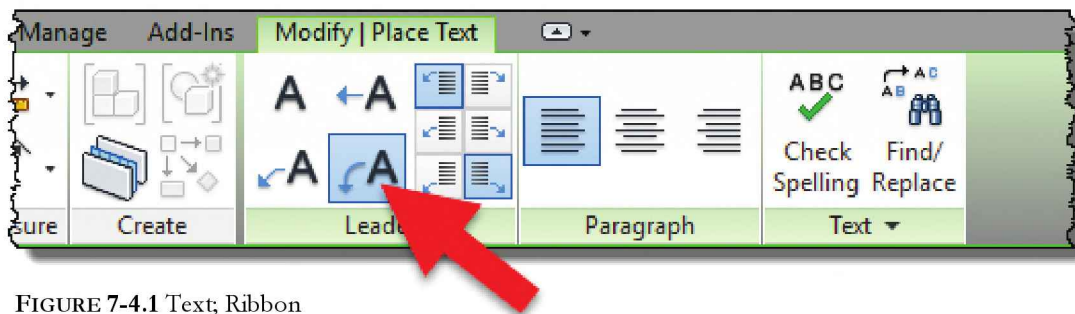
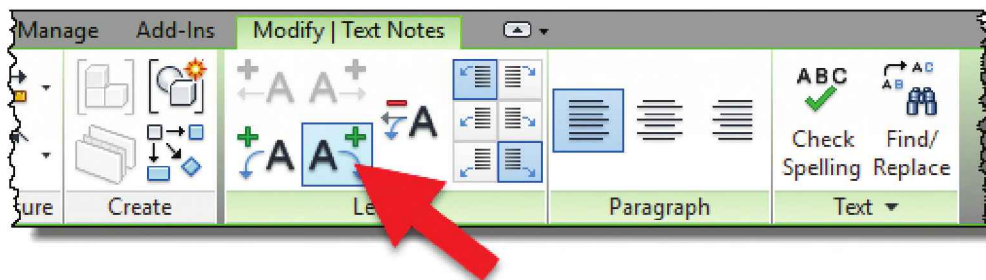


FIGURE 7-4.1 Text; Ribbon

Next, you will add a note indicating that the atrium area is open to the floor above (i.e., no floor or ceiling here). First you will draw a leader, and then Revit will allow you to type the text.

4. Add one of the leaders (i.e., arrows) shown in Figure 7-4.2.
5. Add the note “**OPEN TO ABOVE**” shown in **Figure 7-4.2**.
 - a. Do the following to add the right-hand arrow:
 - i. Click **Modify**;
 - ii. Click the text to select it;
 - iii. Click the right-hand arrow icon on the *Ribbon*.



Notice in the image of the *Ribbon* above, with the text selected, the ability to remove leaders is available (i.e., *Remove Last*). The arrows are removed in the order they were added.

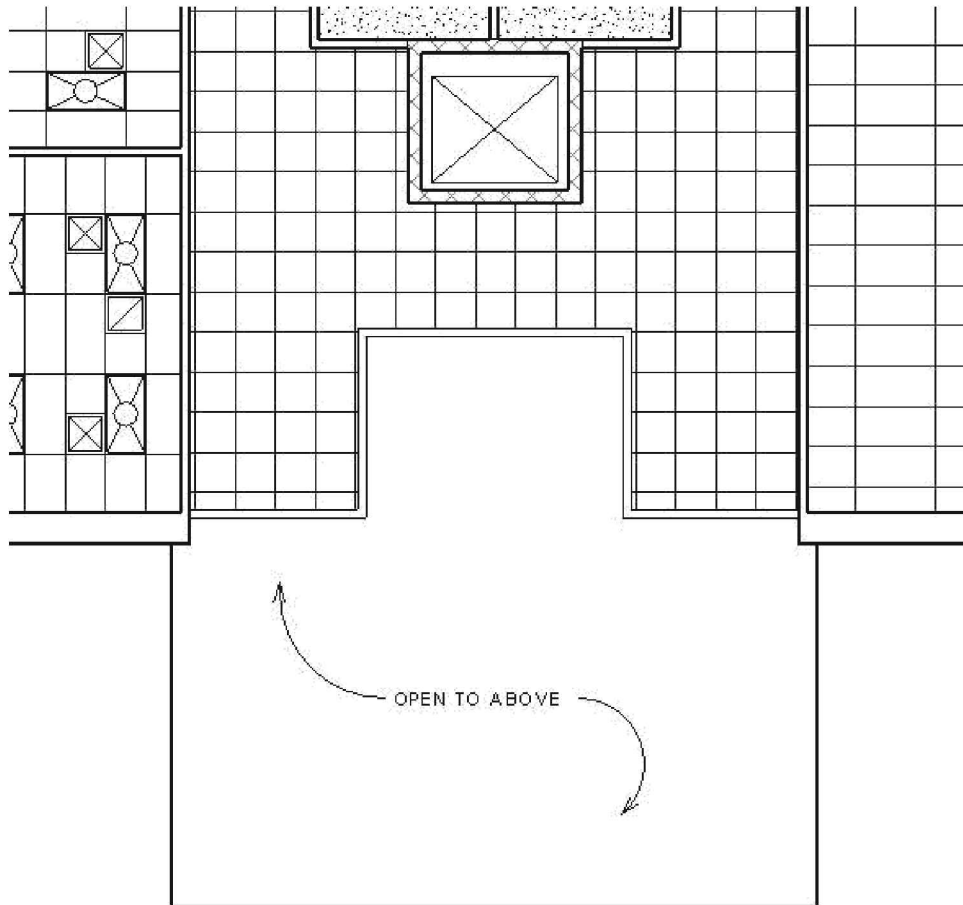


FIGURE 7-4.2 Text with leaders

Adding Text Styles to Your Project:

You can add additional text styles to your project. Some firms prefer a font that has a hand lettering look and others prefer something like the Arial font. These preferences can be saved in the firm's template file so they are consistent and always available. You will add a new text style next.

6. Click on the **Text** tool.
7. Select **Edit Type** on the *Properties Palette*.

8. Select **Duplicate** and enter **1/4" Outline Text** (Figure 7-4.3).
9. Next, make the following adjustments to the *Type Properties* (Figure 7-4.4):
 - a. *Text Font*: **Swis721 BdOul BT**
 - b. *Text Size*: **1/4"**

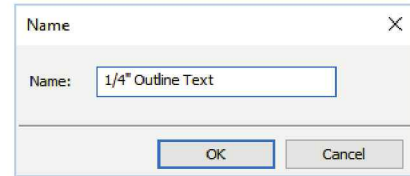


FIGURE 7-4.3 New text name

NOTE: You can use any Windows True-Type font. If you do not have this font, select another that best matches (see Figure 7-4.5 below).

The text size you entered in step 9 is the size of the text when printed. If you change the scale of the drawing, the text size will automatically change, so the text is always the correct size when printing. It is best to set the drawing to the correct scale first, as changing the drawing scale can create a lot of work: repositioning resized text that may be overlapping something or too big for a room.

10. Select **OK** to close the open dialog boxes.

You should now have the new text style available in the *Type Selector* on the *Properties Palette*.

11. Use the new text style to create the text shown below (Figure 7-4.5).
12. Erase the sample text (unless your instructor tells you otherwise).
13. Save as **ex7-4.rvt**.

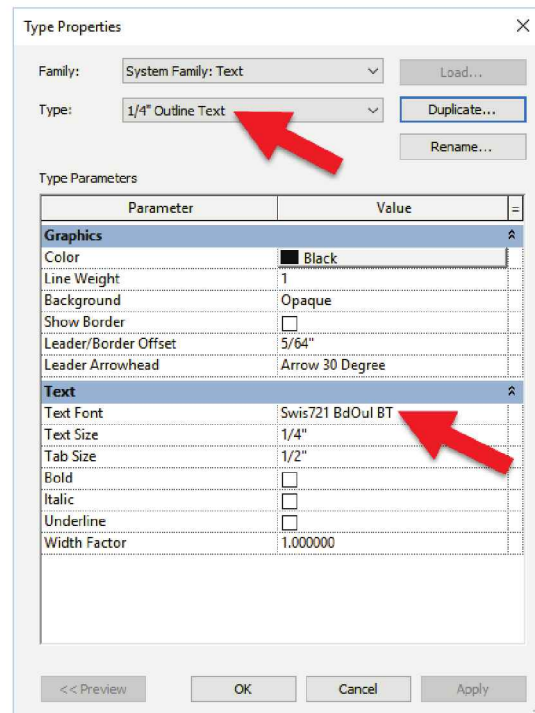


FIGURE 7-4.4 New text properties

TEST TEXT IN REVIT

FIGURE 7-4.5 New text style sample

Self-Exam:

The following questions can be used as a way to check your knowledge of this lesson. The answers can be found at the bottom of this page.

1. You must pick Walls to define floor areas. (T/F)
2. Use the Ctrl key to cycle through the selection options. (T/F)
3. When you add a floor object in the plan view, the floor does not show up right away in the other views, i.e., 3D, Sections, etc. (T/F)
4. You use the _____ tool if you need to add a new product, like exterior plaster, so you can add it to wall types and other systems.
5. You have _____ different types of leader options with the *Text* tool.

Review Questions:

The following questions may be assigned by your instructor as a way to assess your knowledge of this section. Your instructor has the answers to the review questions.

1. It is not possible to create new text styles. (T/F)
2. You can add additional diffuser sizes to the Family as required. (T/F)
3. The light fixtures automatically turn to align with the ceiling grid. (T/F)
4. You can adjust the ceiling height room by room. (T/F)
5. Use the _____ button to add additional elements, for insertion, into the current project (e.g., ceiling: linear box family).
6. Leaders can only be removed in the order in which they were originally drawn. (T/F)
7. Use the _____ tool if the ceiling grid needs to be at an angle.
8. Use the _____ tool to adjust the ceiling grid location if a ceiling tile is less than half its normal size.
9. Use the _____ tool to adjust whether an object's surface pattern is displayed (i.e., the stipple for the gypsum board ceiling).
10. What is the current size of your project (after completing Exercise 7-4)?
_____ MB.

SELF-EXAM ANSWERS:

1 – F, 2 – F, 3 – F, 4 – Material, 5 – 4