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Revit® 2021 Architecture Certification Exam Study Guide

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Lesson
01

Creating and Modifying Components

This lesson addresses the following certification exam questions:

- Create and Modify Grids
- Create and Modify Levels
- Create and Modify Walls
- Create compound walls
- Create a stacked wall

Users should be able to understand the difference between a hosted and non-hosted component. A hosted component is a component that must be placed or constrained to another element. For example, a door or window is hosted by a wall. You should be able to identify what components can be hosted by which elements. Walls are non-hosted. Whether or not a component is hosted is defined by the template used for creating the component. A wall, floor, ceiling or face can be a host.

Some components are level-based, such as furniture, site components, plumbing fixtures, casework, roofs and walls. When you insert a level-based component, it is constrained to that level and can only be moved within that infinite plane.

Components must be loaded into a project before they can be placed. Users can pre-load components into a template, so that they are available in every project.

Users should be familiar with how to use Element and Type Properties of components in order to locate and modify information.

There are three kinds of families in Revit Architecture:

- system families
- loadable families
- in-place families

System families are walls, ceilings, stairs, floors, etc. These are families that can only be created by using an existing family, duplicating, and redefining. These families are loaded into a project using a project template.

Loadable families are external files. These include doors, windows, furniture, and plants.

In-place families are components that are created inside of a project and are unique to that project.

Create and Modify Grids

Grids are system families. Grid lines are finite planes. Grids can be straight lines, arcs, or multi-segmented. In the User exam, you can expect at least one question about grids. It will probably be True/False.

Revit automatically numbers each grid. To change the grid number, click the number, enter the new value, and Click ENTER. You can use letters for grid line values. If you change the first grid number to a letter, all subsequent grid lines update appropriately. Each grid ID must be unique. If you have already assigned an ID, it cannot be used on another grid.

As you draw grid lines, the heads and tails of the lines can align to one another. If grid lines are aligned and you select a line, a lock appears to indicate the alignment. If you move the grid extents, all aligned grid lines move with it.

Grids are Annotation elements. But, unlike most annotation elements, they DO appear across different views. For example, you can draw a grid on your ground floor plan and it would then appear on the subsequent floors (levels) of your model. You can control the display of grids on different levels using a scope box. Grids are datum elements.

A grid line consists of two main parts. The grid line itself and the Grid Header (i.e. the bubble at the end of the grid line). The default setting is for the grid line to have a grid header at one end only.

On the Professional exam, expect a grid question relating to how to control the view display of grids using 2D extents, 3D extents and/or scope boxes.

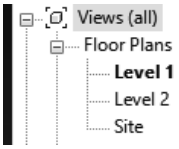
Exercise 1-1

Create and Modify Grids

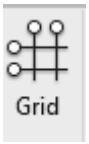
Drawing Name: **grids.rvt**
Estimated Time to Completion: 20 Minutes

Scope
Create and Modify Grids

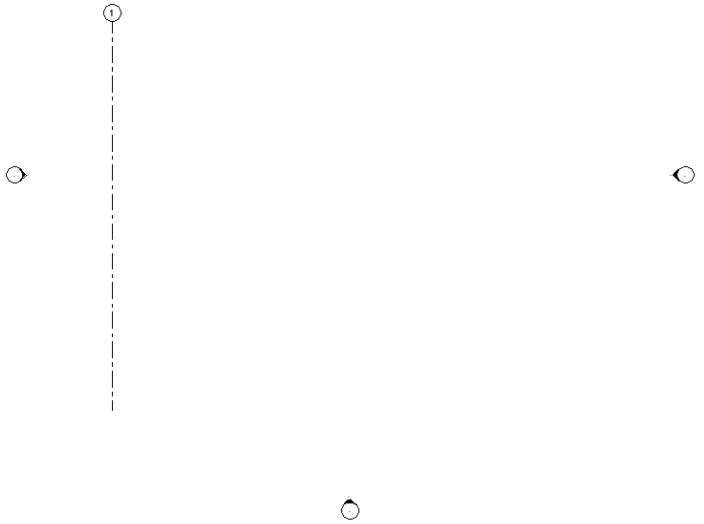
Solution

1. 

Activate the **Level 1** floor plan.

2. 

Select the **Grid** tool from the Architecture tab on the ribbon.

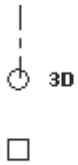
3. 
Draw a grid on the left side of the display.

Left pick on the bottom of the screen to start the grid line.

Move the mouse up.

Left pick to place the end point of the grid line.

Notice that by default the grid line only displays a bubble on one end.

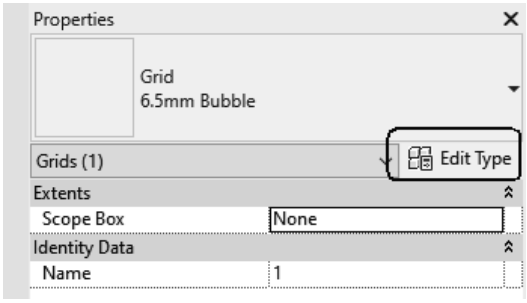
4. 

Select the grid that was just placed.

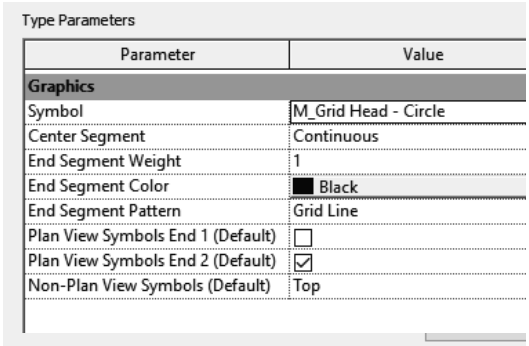
A small box appears at the end of the grid line.

Left click inside the box.

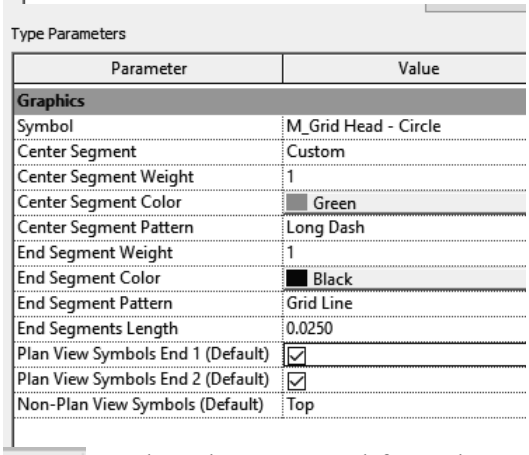
This enables the visibility of the grid bubble.

5. 

Select the grid line.
On the Properties panel, select **Edit Type**.

6. 

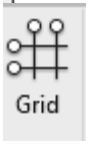
Study the properties that are controlled by the grid type.

7. 

Change the Center Segment to **Custom**.
Set the Center Segment Color to **Green**.
Set the Venter Segment Pattern to **Long Dash.**
Enable Plane View Symbols End 1.
Enable Plane View Symbols End 2.

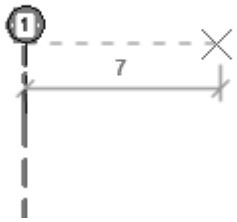
Click **OK**.

Notice how the appearance of the grid line changes.

8. 

Select the **Grid** tool from the Architecture tab on the ribbon.

9.



Start a second grid line 7 m to the right of the first grid line.

Use Object Tracking and the Temporary dimension to help you locate the grid line.

Notice that the second grid line has two bubbles visible.

This is because you changed the type properties of the grid.

Select the second grid line.

10.  Select the **Copy** tool from the Modify tab on the ribbon.

11. 

On the Options bar:

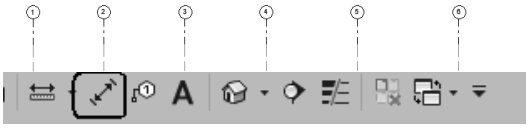
Enable **Constrain.**
Enable **Multiple**.

Constrain is similar to using ORTHO mode in AutoCAD. It constrains movement in the horizontal/vertical direction.

Multiple allows you to place more than one copy.

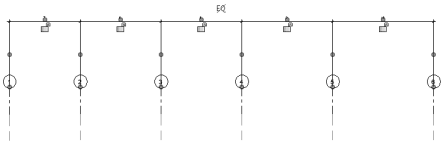
12. Select the endpoint below the top bubble on the second grid line.

13. Place four more grids to the right of the existing grids. Don't worry about the dimensions yet.



14. Select the **Aligned Dimension** tool from the Quick Access toolbar located at the top of the window.

15. Select each grid, starting with grid 1.



Then left click above the grids to place the dimension.

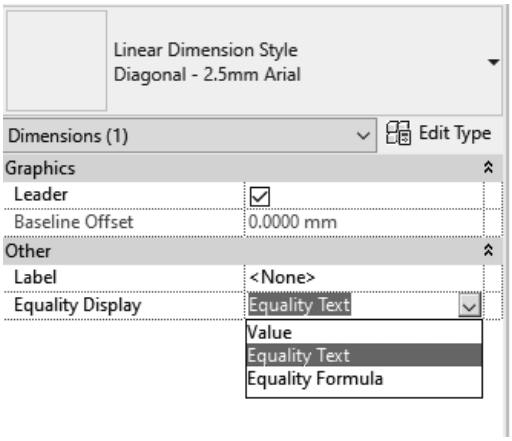
This creates a multi-segmented dimension, also known as a dimension string.

16. Left click on the EQ symbol displayed above the dimension.

This toggles the dimension string to set the distance between the grids as equal. This is considered a constraint in Revit.

Click ESC to exit the dimension command or right click and select CANCEL.

17. Select the multi-segmented dimension.

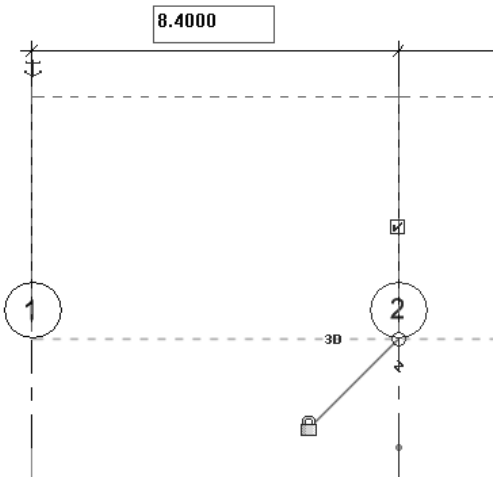


On the Properties palette, you can set the Equality Display to Value, Equality Text, or Equality Formula.

Select **Value** from the drop-down.

The dimension now displays a numerical value.

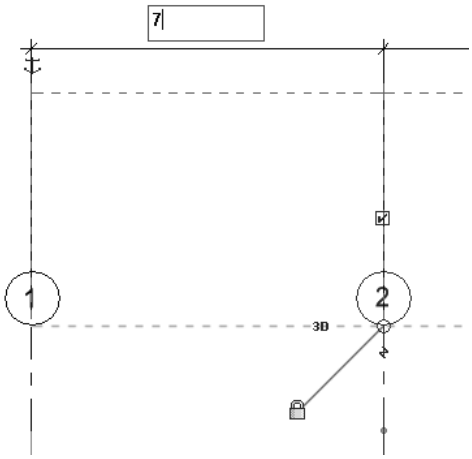
18. Select Grid 2.



Select the dimension value located between grid 1 and grid 2.

Your value may be different from mine depending on how you placed your grids.

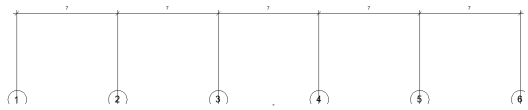
19.



Change the value to **7.**

Left click anywhere in the display to release the selection.

20.

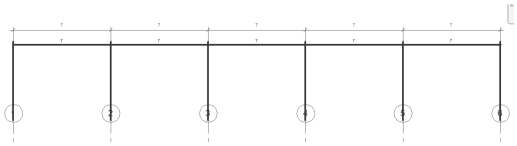


Notice that all the dimensions update as they have been set equal.

21.

Click on the **Reveal Constraints** tool located on the display bar at the bottom of the window.

22.



The dimensions are displayed as red and bold.

This is because they were defined using an EQ (equal) constraint and are set to always be equal.

23.

Click on the Reveal Constraints tool located on the display bar at the bottom of the window to toggle the display off.

24. Save as *ex1-1.rvt*.

Levels

Levels are finite horizontal planes that act as a reference for level-hosted elements, such as roofs, floors, and ceilings. You can resize their extents so that they do not display in certain views.

You can modify level type properties, such as Elevation Base and Line Weight, in the Type Properties dialog.

If the elevation base is set as the project base point, the level elevation will be displayed to the Origin 0,0. If it is set as the survey point, the level will be displayed according to the defined relative coordinates. (This is a possible question on the Professional exam)

Modify instance properties to specify the level's elevation, computation height, name, and more.

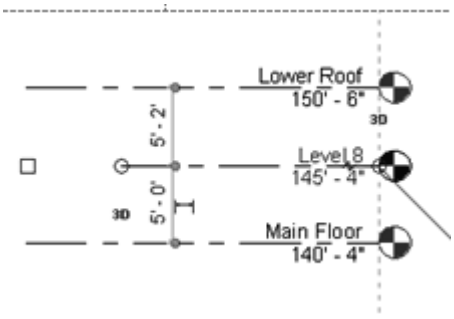
On the certification exam, you may need to identify which Level properties are instance properties and which level properties and type properties.

Levels are finite horizontal planes that act as a reference for level-hosted elements, such as roofs, floors, and ceilings.

Create a level for each known story or other needed reference of the building (for example: first floor, top of wall, or bottom of foundation).

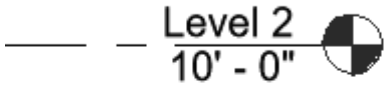
To add levels, you must be in a section or elevation view. When you add levels, you can create an associated plan view.

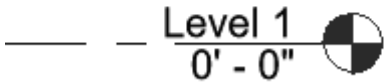
You can resize the extents of a level so that they do not display in certain views.



Levels which are blue are story levels. They have floor and ceiling plan views associated to the levels. Levels displayed in black are reference levels and have no associated views.

You should be able to identify the different level components and properties. There will be one question regarding levels in the User exam and in the Professional exam.





You also should be able to identify the components of a level element.

For example, the elevation dimension shown is a permanent dimension when the level is not selected because it is always displayed as long as the level is displayed. If the level is selected, the dimension displayed is a temporary dimension and can be modified.

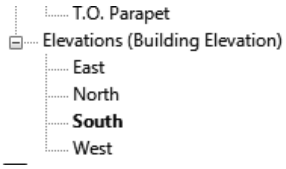
Exercise 1-2

Create and Modify Levels

Drawing Name: **i_levels.rvt**
Estimated Time to Completion: 5 Minutes

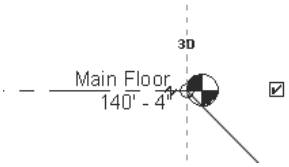
Scope
Placing a level.

Solution

1. 

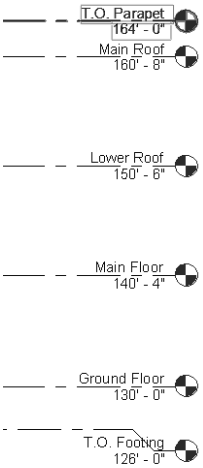
Activate the **South Elevation**.

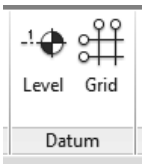
The level names have been turned off.

2. 

Select each level and place a check in the square that appears. This will turn on visibility of the level name.

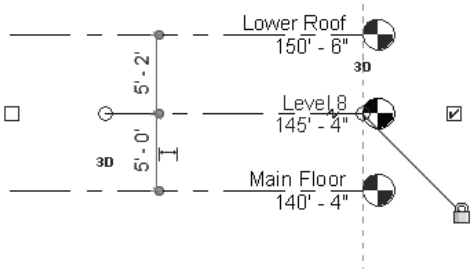
3. You should be able to identify the names for each level.



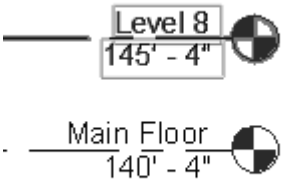
4. 

Select the **Level** tool from the Architecture ribbon.

5. Place a level **5′-0″** above the Main Floor.



6. Note the elevation value for the new level.



7. Close without saving.

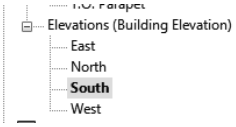
Exercise 1-3

Story vs. Non-Story Levels

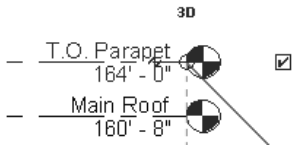
Drawing Name: **story_levels.rvt**
Estimated Time to Completion: 15 Minutes

Scope
Understanding the difference between story and non-story levels
Converting a non-story level to a story level

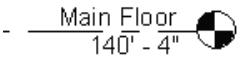
Solution

1. 

Activate the **South Elevation**.

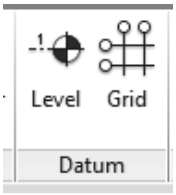
2. 

Select each level and place a check in the square that appears. This will turn on visibility of the level name.

3. 

Study the Main Floor level. Notice that it is the color black while all the other levels are blue.

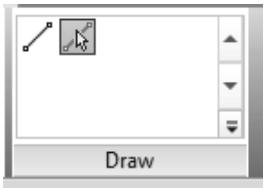
The Main Floor level is a non-story or reference level. It does not have a view associated with it.

4. 

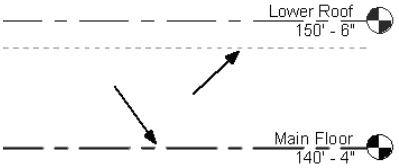
Activate the Architecture ribbon.
Select the **Level** tool on the Datum panel.

5. 

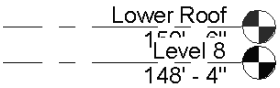
On the Options bar: Uncheck **Make Plan View**. Set the Offset to **8' 0"**.

6. 

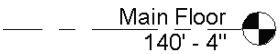
Select the **Pick** tool on the Draw panel.

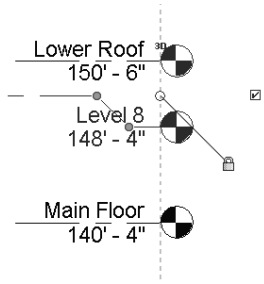
7. 

Select the Main Floor level.
Verify that the preview shows the level will be placed 8' 0" ABOVE the Main Floor level.

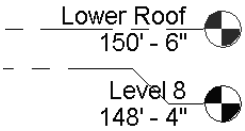
8. 

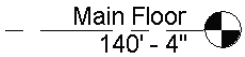
The level is placed above the Main Floor.
Right click and select Cancel twice to exit the Level command.



9. 

Select the Elbow control on the new level to add a jog.

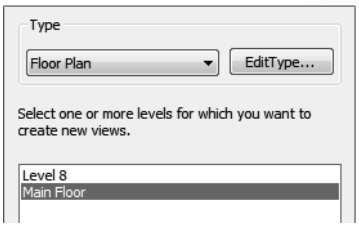
10. 



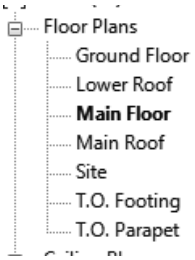
Note that the new level is also a non-story or reference level.
Check in the Project Browser and you will see that no views were created with the new level.

11. 

Activate the View ribbon.
Select the **Plan Views→Floor Plan** tool on the Create panel.

12. 

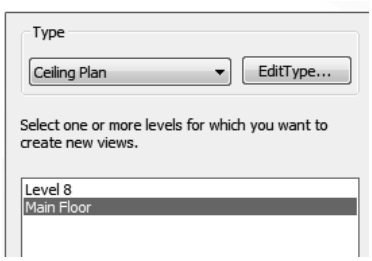
The reference levels are listed.
Select the **Main Floor** level and press **OK**.

13. 

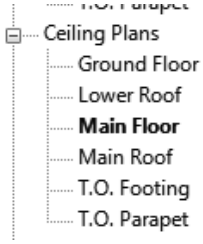
The Main Floor floor plan view will open.
Note that the Main Floor floor plan is now listed in the Project Browser; however, there is no ceiling plan for the Main Floor.

14. 

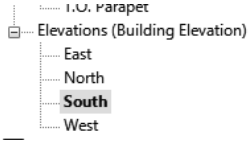
Activate the View ribbon.
Select the **Plan Views→Reflected Ceiling Plan** tool on the Create panel.

15. 

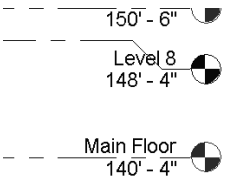
The reference levels are listed.
Select the **Main Floor** level and press **OK**.

16. 

The Main Floor ceiling plan view will open.

17. 

Activate the **South Elevation**.

18. 

The Main Floor level is now the color Blue to indicate it has story views.

19. Close the file without saving.

Level and Grid Extents

All levels and grids (also known as datums) have 3D and 2D extents. Datums are Revit elements used as references while modeling. They are finite representations of infinite planes (vertical – grids, horizontal – levels) that are displayed as lines. They are not model elements. They are considered a special category, listed under annotation elements. Unlike other annotation elements, they are not view-specific.

If the 3D extents of the grids don't cross the entire elevation/section/3D view, they will not be displayed.

There are three functions or commands which allow you to control the extents of levels or grids:

- Maximize 3D Extents
- Reset 3D Extents
- Propagate Extents

You need to be familiar with all three of these commands when taking the Professional exam. All three functions are available on the right click menu after selecting the grid/level/section line.

The Maximize 3D Extents function expands the extents of the grid/level/section to the full boundaries of your model.

You cannot reset to 3D extents for a level if crop view is enabled and the level endpoints are not inside the crop area. To use the Reset function, toggle crop view off, use the Reset to 3D Extents and then enable crop view.

The Propagate Extents tool pushes any modifications you apply to a datum object from one view to other parallel views of your choosing. This tool does not work well on levels because the parallel views are essentially mirrored views of each other. For example, the orientation of the South elevation is the opposite of the North elevation; therefore, if you make a change to the extents at the right end of a level in the South elevation, those changes would be propagated to the left end in the North elevation.

The best way to apply the Propagate Extents tool is with the 2D extents of grids. Why only the 2D extents? Because changing the 3D extents affects the datum object throughout the project, independent of any specific view. The 2D extents controls the display of the datum line while 3D extents controls whether the line will appear in other referring views. When you need to adjust the level line in a specific view, but not in the entire model, the level should be set to 2D extents.

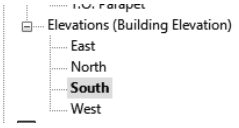
Exercise 1-4

Level and Grid Extents

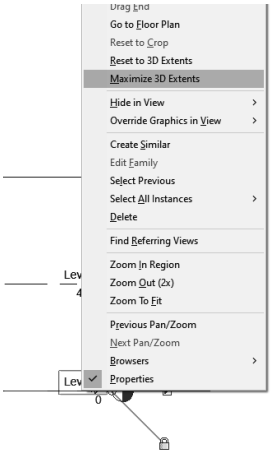
Drawing Name: **datum_extents.rvt**
Estimated Time to Completion: 30 Minutes

Scope
Use Maximize 3D Extents
Use 2D Extents
Use Propagate Extents

Solution

1. 

Activate the **South Elevation**.

2. 

Select Level 1.

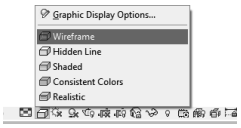
Right click and select **Maximize 3D Extents**.

3. 

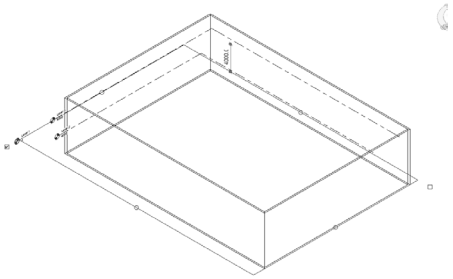
Notice how the level extends past the building.

Notice how the bubble at the end of Level 1 is unfilled and it indicates 3D.

4.  Switch to a 3D view.

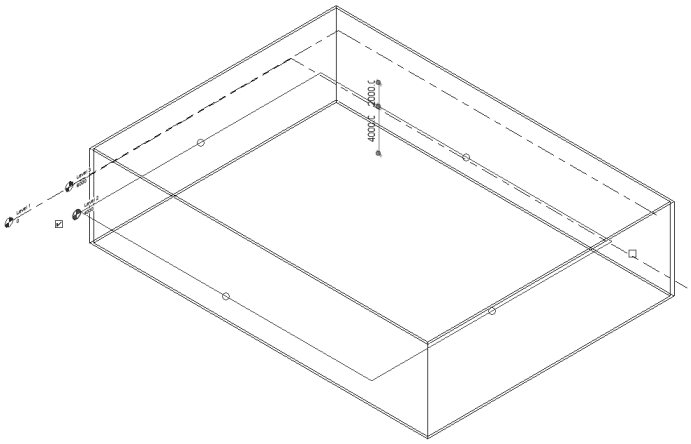
5. 

Change the display to Wireframe.

6. 

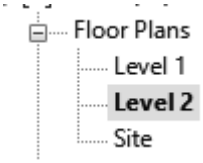
Select **Level 1** so it highlights.

Notice how it extends through the entire building model.

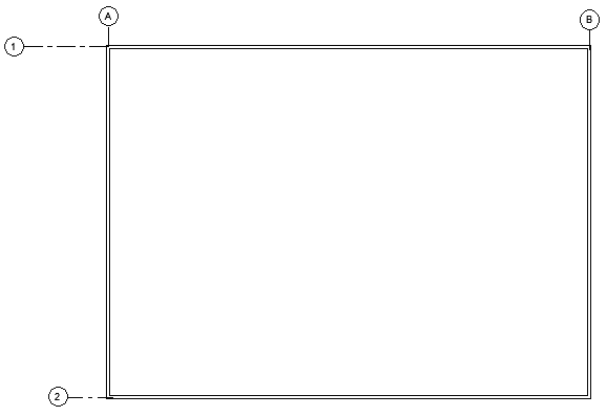
7. 

Select **Level 2**.

Notice how it doesn't extend through the entire building model.

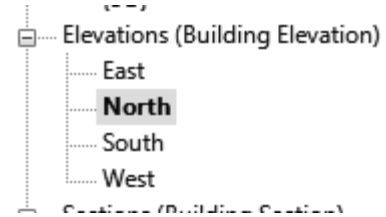
8. 

Switch to the Level 2 floor plan view.

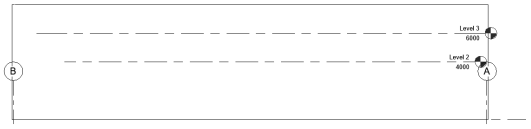
9. 

You see all four walls for the level.

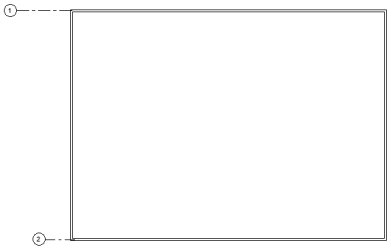
Floor plan views or parallel views display the entire level as long as they are not cropped regardless of how far the level line extends.

10. 

Switch to the North elevation.

11. 

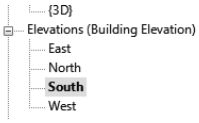
Move the grids below Level 2.

12. 

Activate Level 2.

Notice that you no longer see the grids.

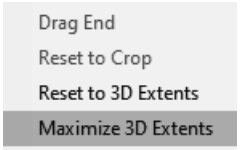
This is because the grids do not extend past Level 2.

13. 

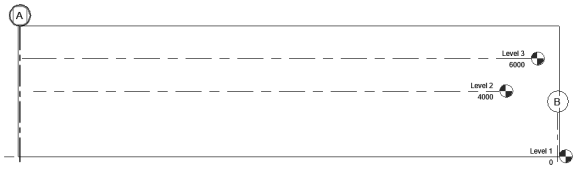
Activate the South elevation.

14. 

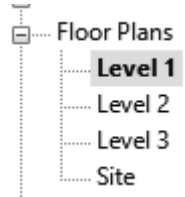
Notice that you moved the grids in the North elevation, but they are below Level 2 in the South elevation.

15. 

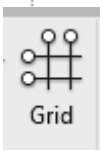
Select Grid A.
Right click and select **Maximize 3D Extents**.

16. 

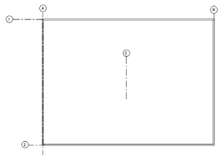
Notice that Grid A extended up, but Grid B is still below Level 2.

17. 

Activate **Level 1**.

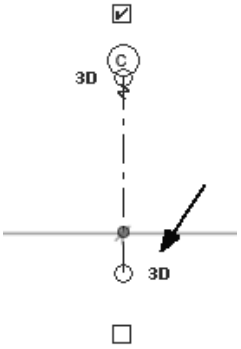
18. 

Select the **Grid** tool on the ribbon.

19. 

Draw a grid line inside the room.

Do not extend beyond the walls.

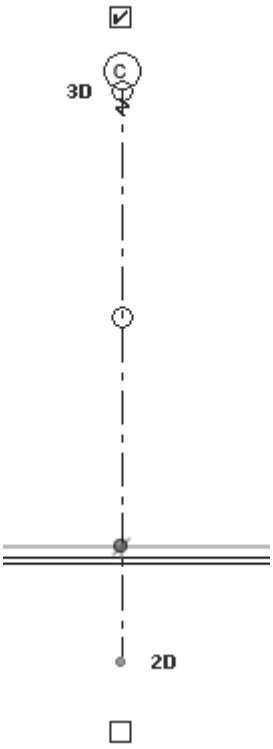
20. 

Select the grid that you just placed.

Click the text displayed as 3D to toggle the grid to use 2D extents.

21.

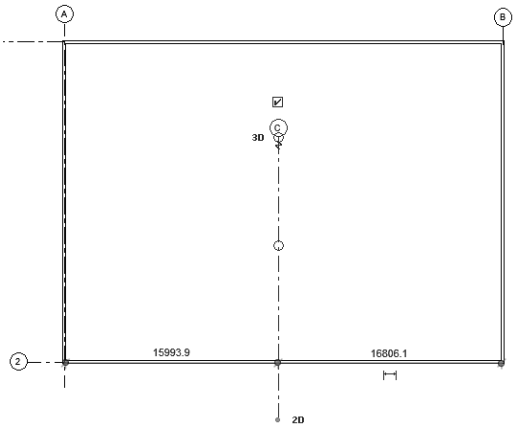
Extend the grid below the south wall in the Level 1 floor plan.



22. 

Switch to Level 3.

Notice the grid line retains the appearance it had when it was originally placed. 2D Extents only apply to the active view. 3D extents are applied to all views where the grid is visible.

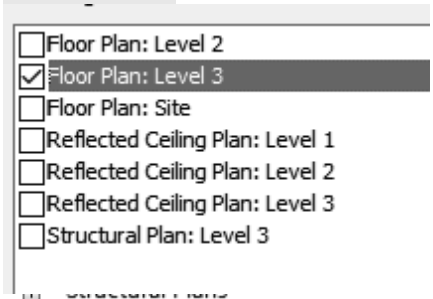
23. 

Switch to Level 1.
Select the centered grid.

Verify that 2D is enabled.

24. 

Select **Propagate Extents** on the ribbon.

25. 

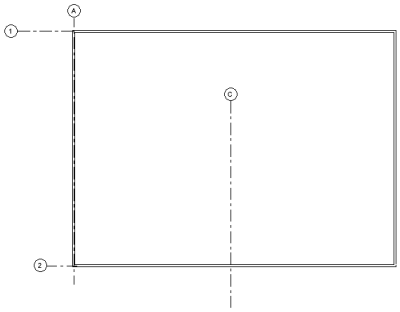
Select **Level 3.**

Click **OK.**

Release the selection.

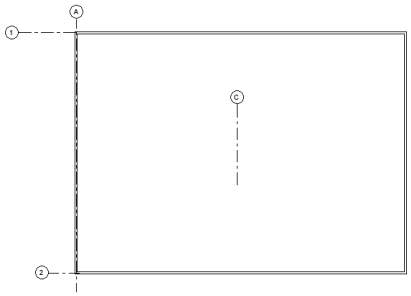
26. 

Activate Level 3.

27. 

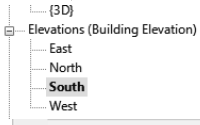
Grid C now looks like the grid on Level 1.

You don't see Grid B because it is below Level 2.

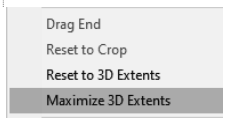
28. 

Switch to Level 2.

Notice that the grid line wasn't changed.

29. 

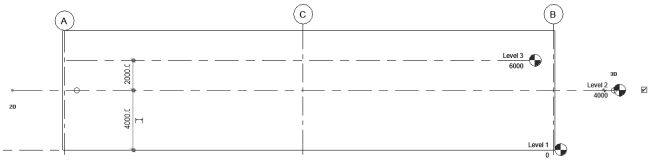
Activate the South elevation.

30. 

Select Grid B.

Right click and select **Maximize 3D Extents**.

31.



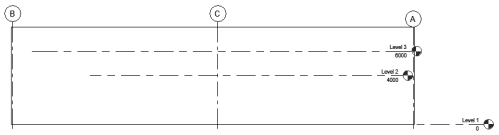
Select **Level 2**.

Click on the 3D text near the endpoint.

Notice that it now displays 2D extents.

Adjust Level 2 so each end extends outside the building model.

32.



Switch to the North elevation.

Notice that Level 2 looks the same as it did before you extended it using 2D extents in the South elevation.

33. Save the file as *ex1-4rvt*.

Walls

Users will need to be familiar with the different parameters in walls. The user should also know which options are applied to walls and when those options are available.

Walls are system families. They are project-specific. This means the wall definition is only available in the active project. You can use Transfer Project Standards or Copy and Paste to copy a wall definition from one project to another.

On the Professional exam, you may be shown an image of a wall and asked to identify different wall properties.

Just as roofs, floors, and ceilings can consist of multiple horizontal layers, walls can consist of more than one vertical layer or region.

You can modify a wall type to define the structure of vertically compound walls using layers or regions.

Revit has several different wall types: Basic, Compound, Stacked, and Curtain

A Basic Wall is just what it sounds like, the standard “out of the box” wall style. This wall type may have several layers. For example, a brick exterior wall with a brick exterior layer, an air gap layer, a stud layer, an insulation layer, and a gypsum board layer.

A Compound wall is similar to a Basic wall. It also has layers, but one or more layers is divided into one or more regions, with each region being assigned a different material—for example, a wall that has an exterior layer that has concrete at the bottom and brick at the top.

A Stacked wall is two or more basic and/or compound walls that are stacked on top of each other. While Basic and Compound walls have a uniform thickness or width defined by the layers, a Stacked wall can have a variable thickness or width.

A Curtain wall is defined by a curtain grid. Mullions can be placed at the grid lines. Panels are placed in the spaces between the grid lines.

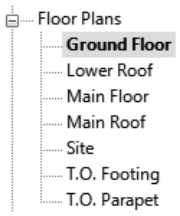
Exercise 1-5

Wall Options

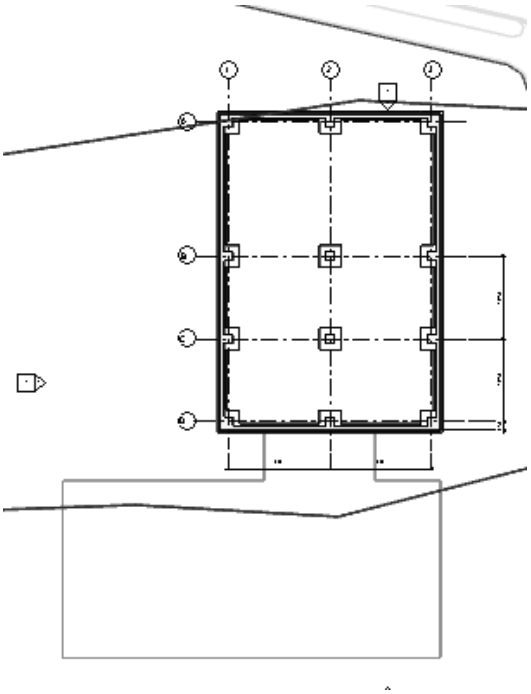
Drawing Name: **i_firestation_basic_plan.rvt**
Estimated Time to Completion: 10 Minutes

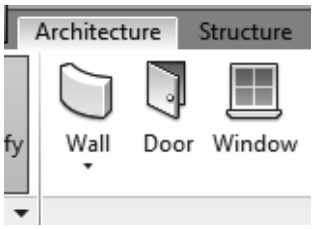
Scope
Exploring the different wall options

Solution

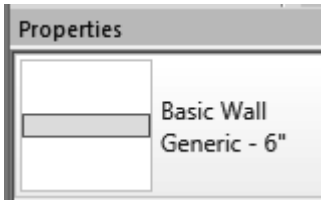
1. 

Activate the **Ground Floor** floor plan.

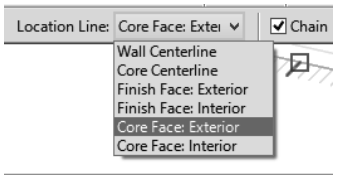
2. 
Zoom into the area where the green polygon is.

3. 

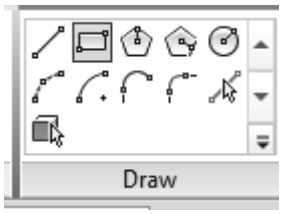
Select **Wall** from the Architecture ribbon.

4. 

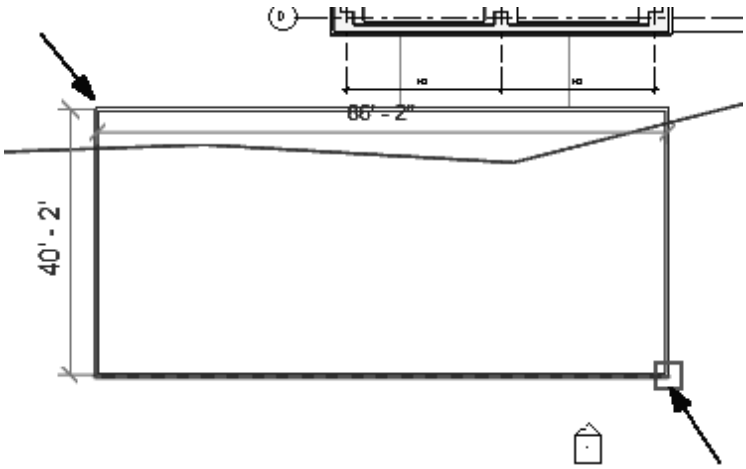
Set the Wall Type to **Generic – 6″** in the Properties pane.

5. 

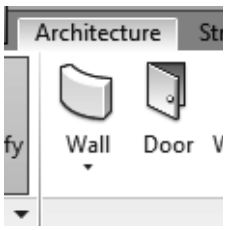
Set the Location Line to **Core Face:Exterior**.

6. 

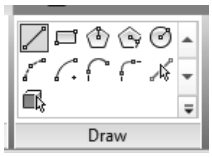
Select the **Rectangle** tool on the Draw panel.

7. 

Select the two points indicated to place the rectangle.

8. 

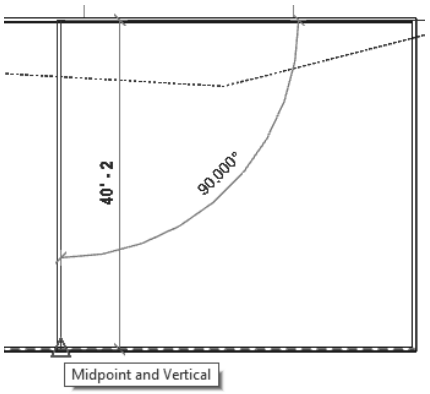
Select **Wall** from the Architecture ribbon.

9. 

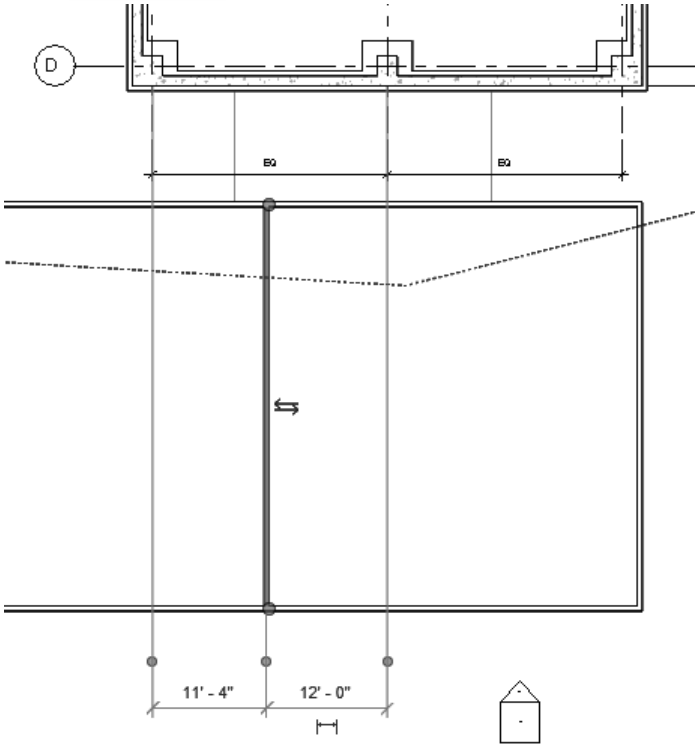
Select the **Line** tool from the Draw panel.

10. 

Start the line at the midpoint of the lower horizontal wall.

11. 

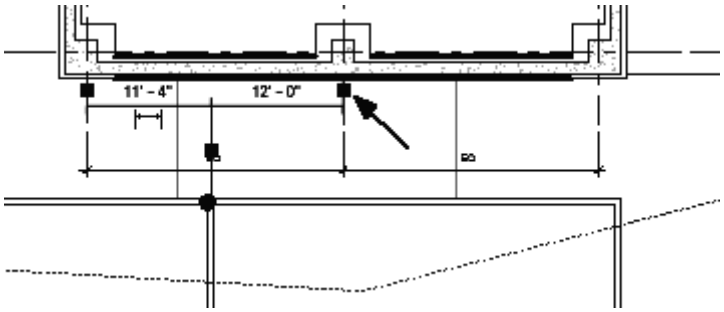
Bring the line end up to the midpoint of the upper horizontal wall.
Left click to finish placing the wall.
Exit the wall tool.

12. 

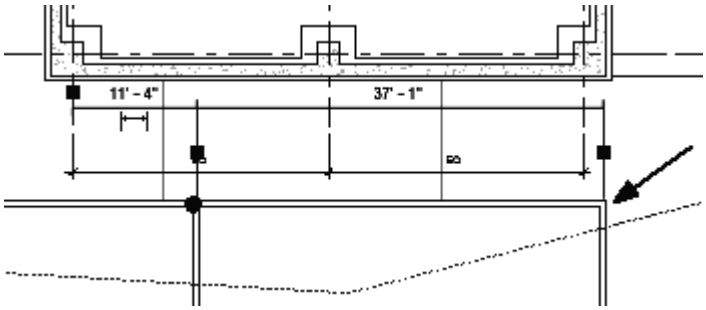
Select the vertical wall that you just placed.

Two temporary (listening) dimensions will appear.

Change the right dimension to **12′ [3600 mm**].

13. 

Select the witness grip point indicated.

14. 

Move the witness line to the right vertical wall.

Note that the dimension updates.

The dimension should display 37' 1".

15. Close the file without saving.

Attaching Walls

After placing a wall, you can override its initial top and base constraints by attaching its top or base to another element in the same vertical plane. By attaching a wall to another element, you avoid the need to manually edit the wall profile when the design changes.

The other element can be a floor, a roof, a ceiling, a reference plane, or another wall that is directly above or below. The height of the wall then increases or decreases as necessary to conform to the boundary represented by the attached element.

You can detach walls from elements as well. If you want to detach selected walls from all other elements at once, click Detach All on the Options Bar.

Exercise 1-6

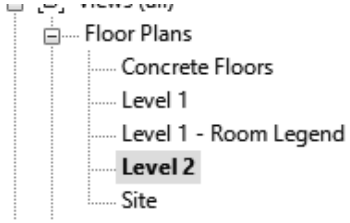
Attaching Walls

Drawing Name: **i_Attach.rvt**
Estimated Time to Completion: 10 Minutes

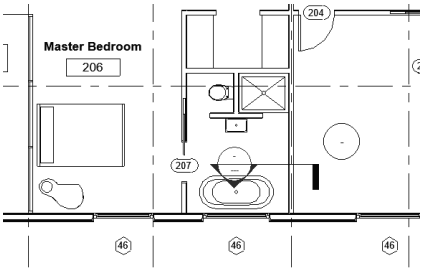
Scope
Create a wall section view.
Attach a wall to a roof or floor.

Solution

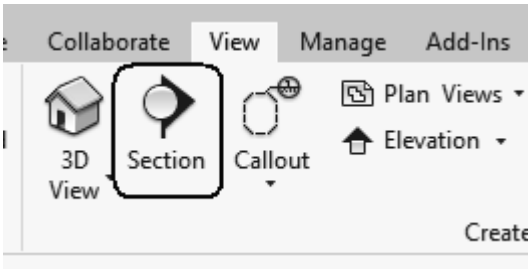
1. Open *i_Attach.rvt*.

2. 

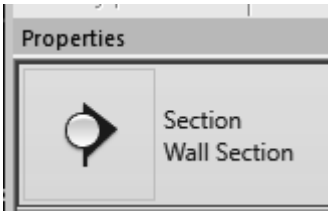
Activate Level 2 Floor Plan.

3. 

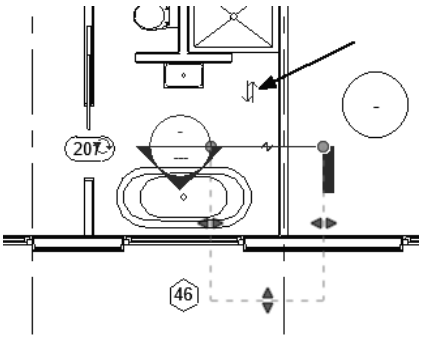
Place a wall section as shown.



Go to the **View** ribbon.
Select the **Section** tool.

4. 

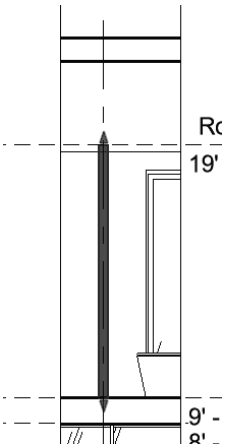
Set the view type to **Wall Section**.

5. 

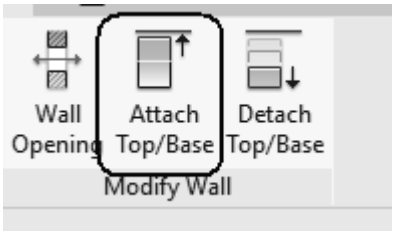
The first point selected will place the section head.
The second point selected will place the section tail.

Use the Flip controls if needed to orient the section head to face down/south.

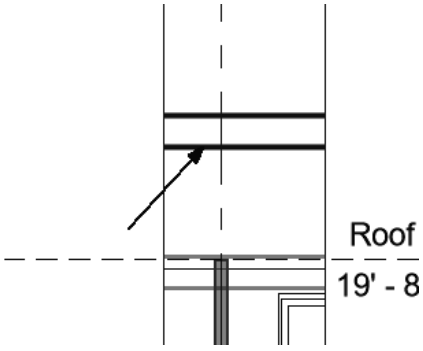
Double left click on the section head to open the section view.

6. 

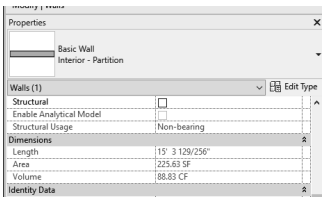
Select the wall on Level 2.

7. 

Select **Attach Top/Base** from the ribbon.

8. 

Select the roof.

9. 

What is the volume of the wall after it is attached to the roof?

Select the wall and then go to the Properties panel to determine the correct volume.
It should be 88.83 CF.

Exercise 1-7

Compound Walls

Drawing Name: **compound_walls.rvt**
Estimated Time to Completion: 60 Minutes

Scope
Defining a compound wall structure

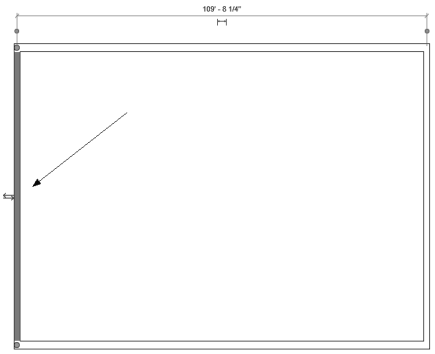
A compound wall has multiple vertical layers and/or regions. A layer is assigned to each row with a constant thickness and extends the height of the wall. A region is any shape in the wall that is situated in one or more layers. The region may have a constant or variable thickness.

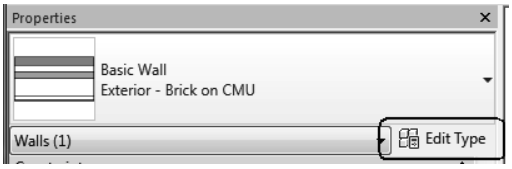
Solution

1.  Open *compound_walls.rvt*.

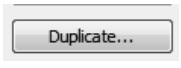
2. 

Activate **Level 1**.

3. 
Select the left vertical wall.

4. 

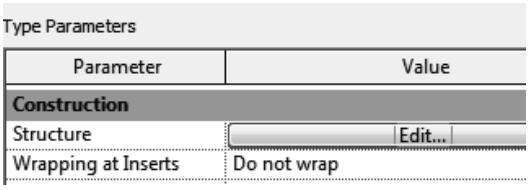
Select **Edit Type** on the Properties pane.

5. 

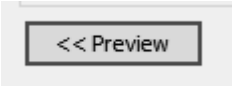
Select **Duplicate**.

6. 

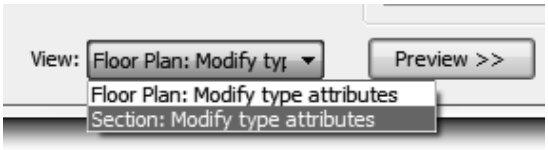
Type **Exterior - Concrete Foundation**. Click **OK**.

7. 

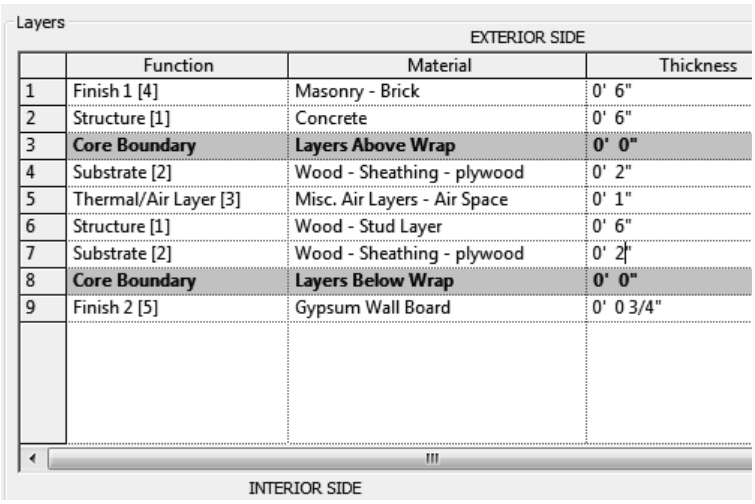
Select **Edit Structure**.

8. 

Expand the dialog by Clicking the **Preview** button.

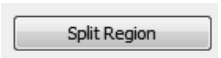
9. 

Switch the view to **Section: Modify Type attributes**.

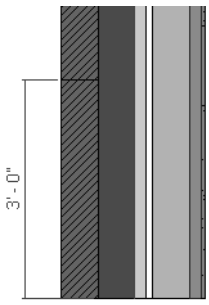
10. 

	Function	Material	Thickness
1	Finish 1 [4]	Masonry - Brick	0' 6"
2	Structure [1]	Concrete	0' 6"
3	**Core Boundary**	**Layers Above Wrap**	**0' 0"**
4	Substrate [2]	Wood - Sheathing - plywood	0' 2"
5	Thermal/Air Layer [3]	Misc. Air Layers - Air Space	0' 1"
6	Structure [1]	Wood - Stud Layer	0' 6"
7	Substrate [2]	Wood - Sheathing - plywood	0' 2"
8	**Core Boundary**	**Layers Below Wrap**	**0' 0"**
9	Finish 2 [5]	Gypsum Wall Board	0' 0 3/4"

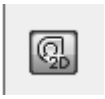
Add Layers as follows:
Layer 1: Finish 1 [4] Masonry - Brick 6″
Layer 2: Structure [1] Concrete 6″
Layer 3: Core Boundary
Layer 4: Substrate [2] Wood – Sheathing - plywood 2″
Layer 5: Thermal Air/Layer – Misc. Air Layers - Air Space 1″
Layer 6: Structure [1] Wood – Stud Layer 6″
Layer 7: Substrate [2] Wood – Sheathing - plywood 2″
Layer 8: Core Boundary
Layer 9: Finish 2 [5] Gypsum Wall Board 3/4″

11. 

Select **Split Region**.

12. 

Cut the Layer 1: brick layer 3′-0″ from the base.



Toggle the 2D button to see the hatch patterns on the layers.

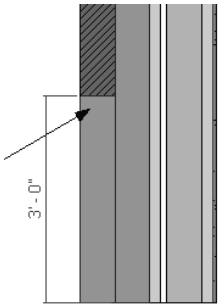
13. 

	Function	Material
1	Finish 1 [4]	Masonry - Brick
2	Structure [1]	Concrete

Highlight the **Layer 2: Concrete** Layer.

14. 

Pick on the **Assign Layers** button.

15. 

Select the lower region of the brick layer that was just split.

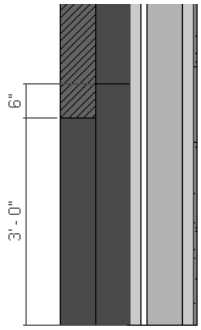
Left pick just below the cut line.

The upper region will now be brick and the lower region will be concrete.

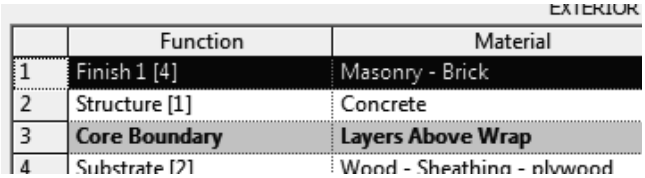
It may take some practice before you are able to do this.

16. 

Select **Split Region**.

17. 

Cut the Layer 2: concrete 3′-6″ from the base.

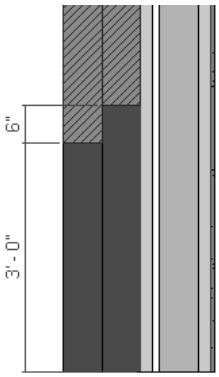
18. 

	Function	Material
1	Finish 1 [4]	Masonry - Brick
2	Structure [1]	Concrete
3	**Core Boundary**	**Layers Above Wrap**
4	Substrate [2]	Wood - Sheathing - plywood

Highlight the **Layer 1: Masonry Brick** Layer.

19. 

Pick on the **Assign Layers** button.

20. 

Highlight the Masonry brick layer.
Select the upper region of layer 2.

Left pick slightly above the cut line.

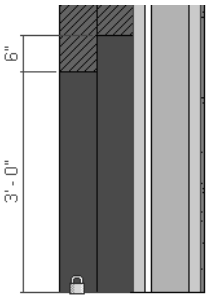
The upper region will now be brick and the lower region will be concrete.

It may take some practice before you are able to do this.

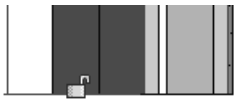
21. 

Select **Modify**.

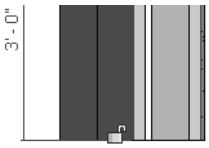
You can also use the Modify mode to correct the dimensions of the splits if needed.

22. 

Select the base of the concrete Layer 1 component.

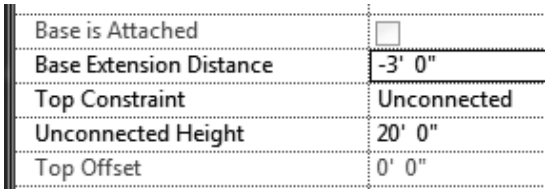
23. 

A small lock will appear.
Click on the lock to unlock it.

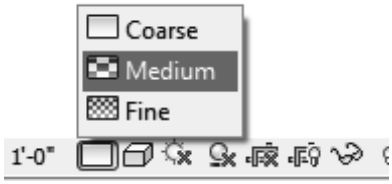
24. 

Select the base of Layer 2: Concrete.
Click on the lock to unlock it.

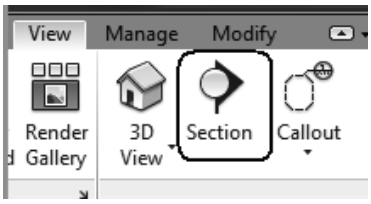
25. Click **OK** to close the dialogs.

26. 

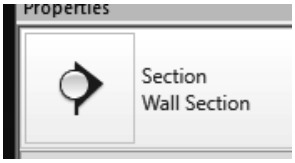
Select the wall with the Exterior - Concrete Foundation wall type.
In the Properties pane:
Set the Base Extension Distance to **-3′ 0″**.
Left Click in the display window to release the selection.

27. 

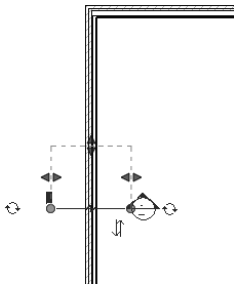
Set the display to Medium or Fine to see the wall layers.

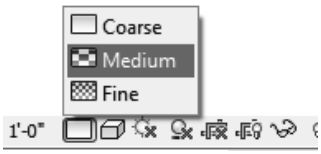
28. 

Activate the **View** ribbon.
Select the **Section** Tool from the Create panel.

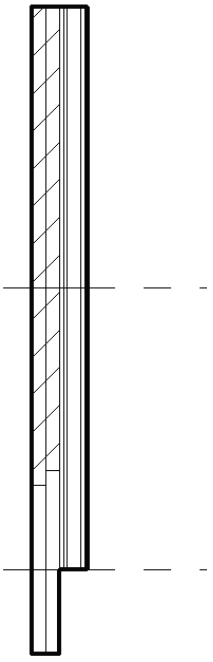
29. 

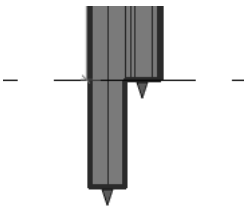
Set the section type to be a **Wall Section**.

30. 
Place a small section on the wall you just defined.
Activate the section view.

31. 

Set the display to Medium or Fine to see the wall layers.

32. 
Note the concrete section is below the base level.
Select the wall.

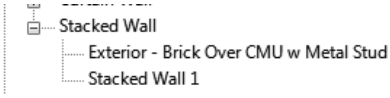
33. 

You can use the grips to adjust the base depth of the concrete section.

This type of wall is called a compound wall because you have split wall layers and modified the layers using regions.

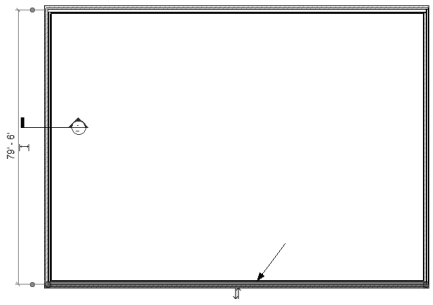
34. 

Activate **Level 1**.

35. 

In the Project Browser, locate the two Stacked Wall types.

These are the stacked walls available in the current project.

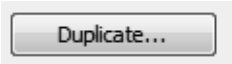
36. 

Select the south wall.

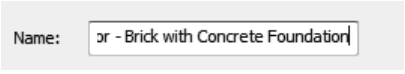
37. 

Switch the wall to **Stacked Wall 1** using the Type Selector on the Properties panel.

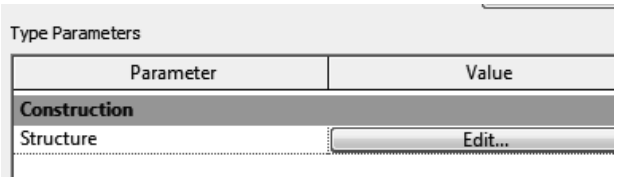
Select **Edit Type**.

38. 

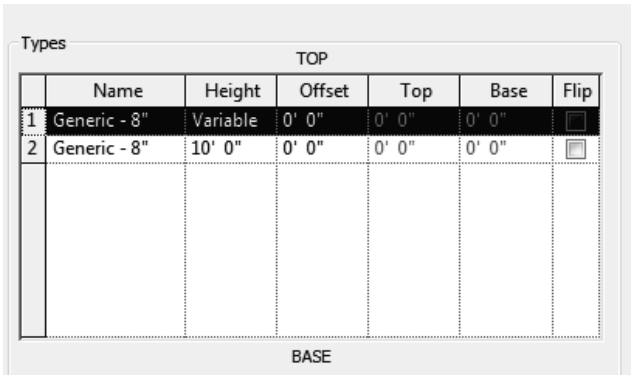
Select **Duplicate**.

39. 

Rename **Exterior - Brick with Concrete Foundation**.
Click **OK**.

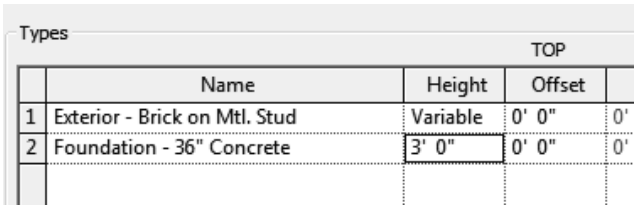
40. 

Select **Edit** Structure.

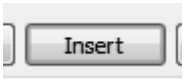
41. 

Note the stacked wall uses different layers going from Top to Base instead of Exterior to Interior.

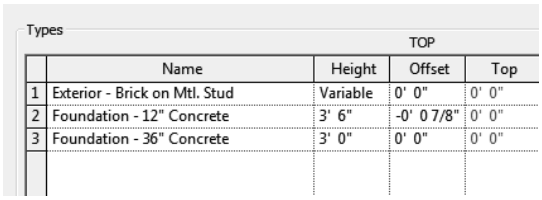
Each layer is a wall type instead of a component material. These wall types are called subwalls.

42. 

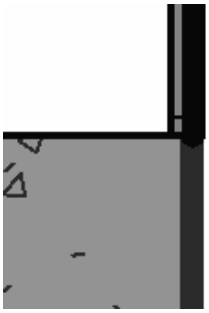
Change Layer 1 to **Exterior Brick on Mtl. Stud**.
Change Layer 2 to **Foundation - 36″ Concrete**.
Set the Height of Layer 2 to **3'-0"**.

43. 

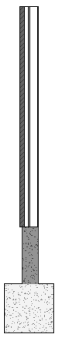
Select **Insert**. Position the new layer between the existing layers.

44. 

Set the new layer to:
Foundation- 12″ Concrete.
Set the Height to **3′ 6″**.
Set the Offset to **-7/8″**.

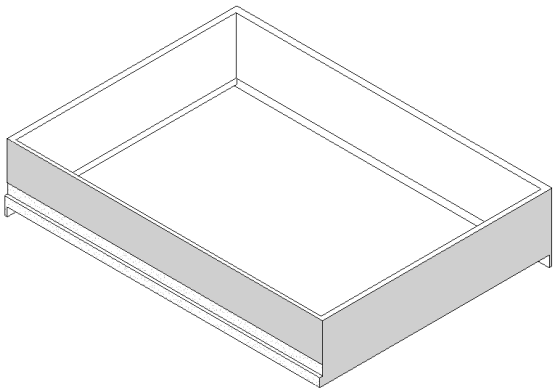
45. 

You can zoom into the preview window to check the offset value.

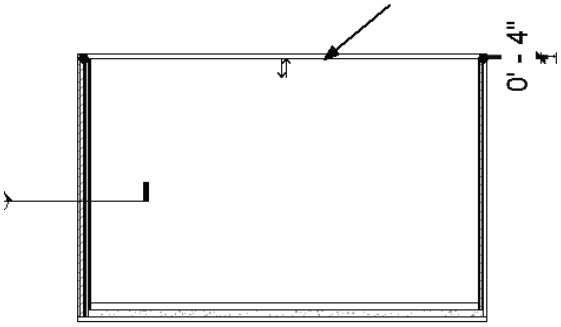
46. 

The height of the Top Layer is set to Variable so the user can set the wall height.
Click **OK** twice to exit the dialog.

Subwalls can be moved up or down the height of a stacked wall.

47. 

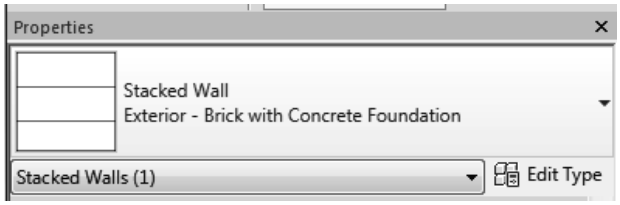
Switch to a 3D view so you can inspect the two wall types.
Note that when you hover the mouse over the first wall you defined, it displays as a Basic Wall.
The other wall displays as a Stacked Wall.

48. 

Activate the Level 1 view.
Select the North wall.

49. 

Use the Type Selector drop-down to set the Type to **Exterior - Siding with Wood Stud**.

50. 

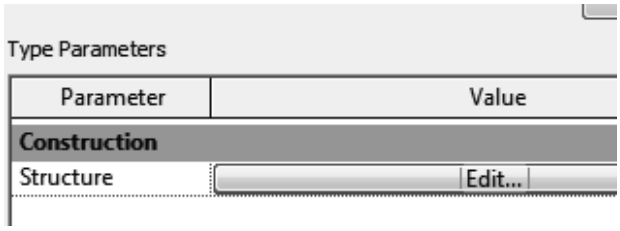
Select the South Wall (the stacked wall).
Select **Edit Type**.

51. 

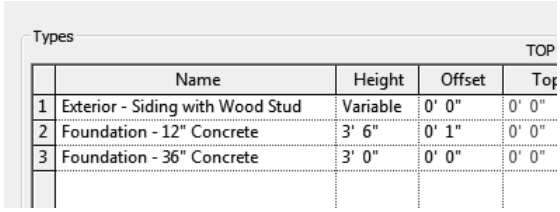
Select **Duplicate**.

52. 

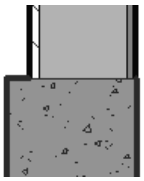
Rename **Exterior - Siding with Concrete Foundation**. Click **OK**.

53. 

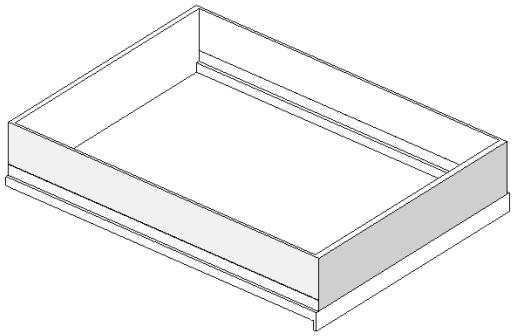
Select **Edit** Structure.

54. 

Set Layer 1 to the new wall type: **Exterior - Siding with Wood Stud. Adjust the Offset for** Layer 2: Foundation -12" Concrete to **1"**.

55. 

You can zoom into the preview window to check the offset. Click OK twice to close the dialogs.

56. 

Switch to a 3D view.

How many stacked walls are there in the model?

How many basic walls?

What is the difference between a compound wall and a stacked wall?

Is a compound wall a basic wall or a stacked wall?

57. Close without saving.

Exercise 1-8

Stacked Walls

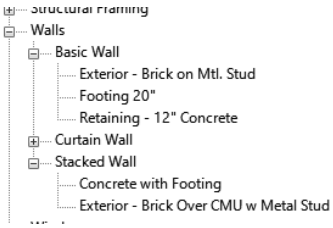
Drawing Name: **i_Footing.rvt**
Estimated Time to Completion: 10 Minutes

Scope
Defining a stacked wall.

A stacked wall uses more than one wall type.

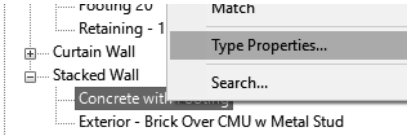
Solution

1. Open *i_Footing.rvt*.

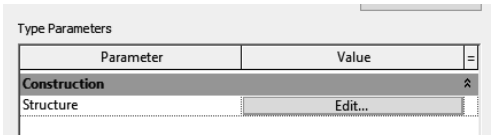
2. 

   In the Project Browser, locate the Walls family category.
   Expand the Stacked wall section.

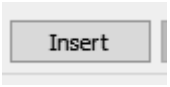
   Select the **Concrete with Footing** wall type.

3. 

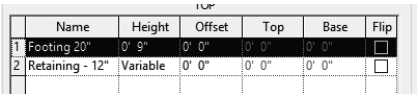
   Right click and select **Type Properties**.

4. 

   Select **Edit** next to Structure.

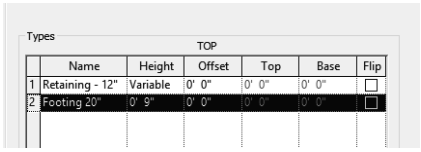
5. 

   Select the **Insert** button.

6. 

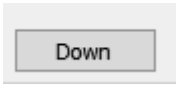
   Set the type to **Footing 20'** for Layer 1.
   Set the Height to **9".**

   Note the Retaining – 12" Concrete wall is set to a Variable Height.

7. 

Highlight Layer 1.

Use the Down button to move the Footing 20' below the Retaining – 12" Concrete.



8. 

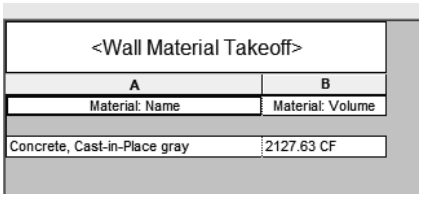
Select the Preview button to expand the dialog and see what the wall looks like.

Click OK twice to close the dialog.

9. 

Locate the **Wall Material Takeoff** schedule in the Project Browser.

Right click and select Open or double left click to activate.

10. 

What is the material volume in cubic feet of the Concrete, Cast-in-Place, gray material?

Did you get 2127.63 CF?

Exercise 1-9

Placing a Wall Sweep

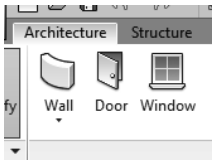
Drawing Name: **walls.rvt**
Estimated Time to Completion: 20 Minutes

Scope
Placing a wall sweep

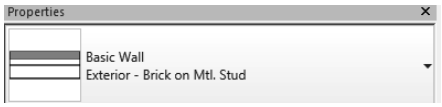
Solution

1. 

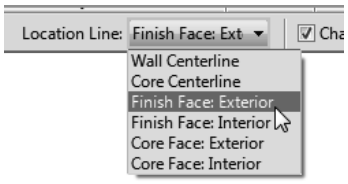
Activate **Level 1** Floor Plan.

2. 

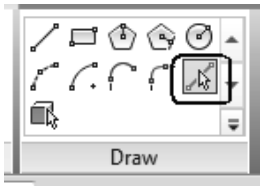
Select the **Wall** tool from the Architecture ribbon on the Build panel.

3. 

Set the wall type to **Exterior - Brick on Mtl. Stud** using the Type Selector on the Properties pane.

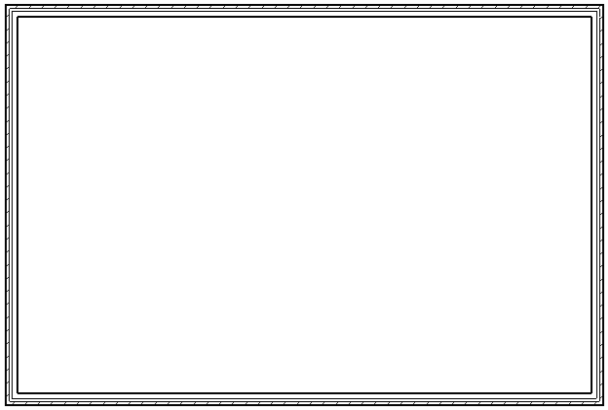
4. 

Set the Location Line to **Finish Face: Exterior**.

5. 

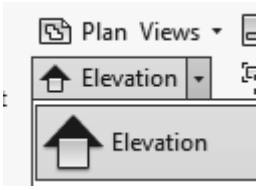
Select the **Pick Line** mode from the Draw panel.
Select the four green lines.

Note that when you pick the lines, the side of the line you use determines which side of the line is used for the exterior side of the wall.

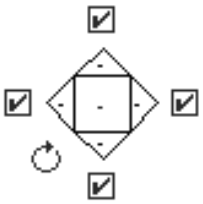
6. 

The lines should be aligned to the exterior side of the walls.

Set the Detail Level to **Medium**.

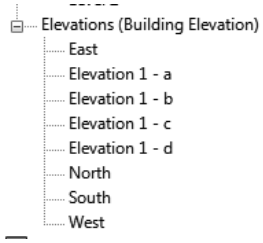
7. 

Activate the **View** ribbon.
Select the **Elevation** tool on the Create panel.

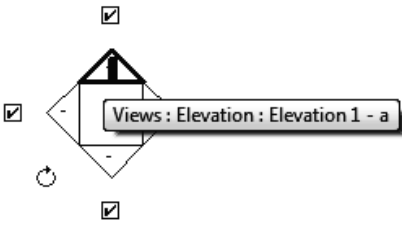
8. 

Place an elevation in the center of the room.
Right click and select **Cancel** to exit the command.

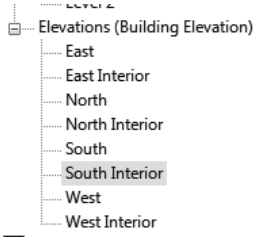
Place a check mark on each box to create an elevation for each interior wall.

9. 

In the Project Browser, you will see that four elevation views have been created.

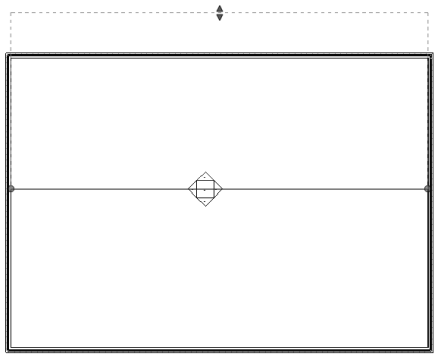
10. 

If you hover your mouse over a triangle, a tooltip will appear with the name of the linked view.

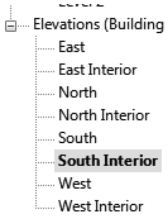
11. 

Rename the elevation views to East Interior, North Interior, South Interior and West Interior.

*Clicking **F2** is a shortcut for Rename.*

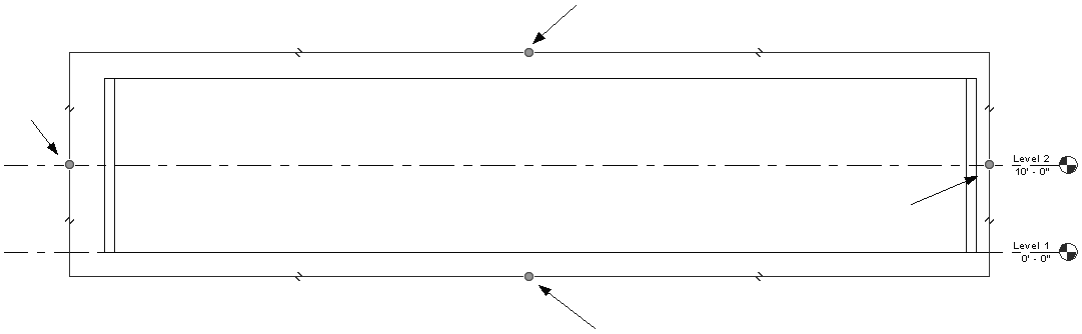
12. 

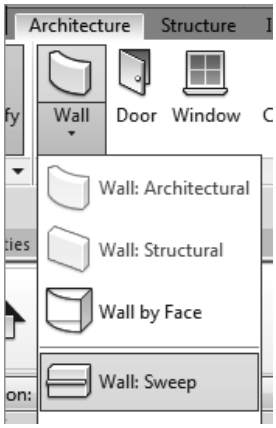
If you pick on the triangle part of the elevation, you will see the view depth (Far Clip Offset) of that elevation view.

13. 

Activate the **South Interior** View.

14. Use the grips to extend the elevation view beyond the walls.

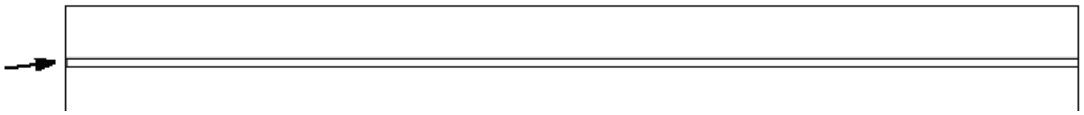


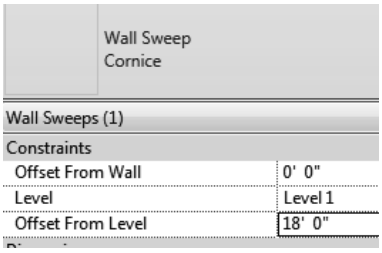
15. 

Activate the **Architecture** tab on the ribbon.
Select the **Wall Sweep** tool.

The Wall Sweep tool is only available in elevation, 3D or section views.

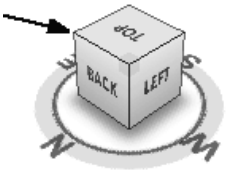
16. Left click to place the sweep so it is toward the top of the wall.
Click ESC to exit the command.



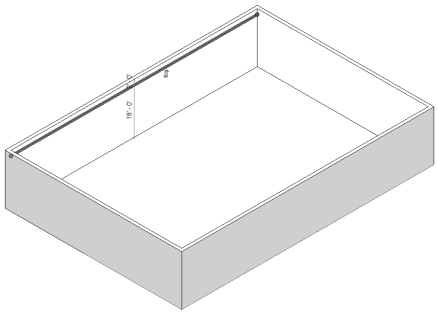
17. 

Select the wall sweep.
In the Properties pane, adjust the Offset from Level to **18′ 0″**.

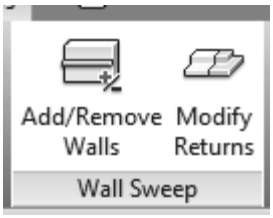
18.  Switch to a 3D view.

19. 

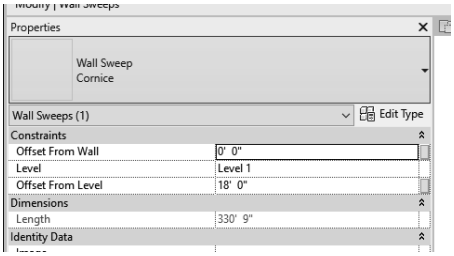
Select the top corners of the view cube to orient the view so you can see the wall sweep.

20. 

Select the wall sweep that was placed.
It will highlight when selected.

21. 

Select **Add/Remove Walls** from the ribbon.
Select the other walls.
Orbit around to inspect.

22. 

Select the wall sweep that was placed.
Look in the Properties panel.

What is the length of the wall sweep?

You should see a value of 330' 9".

23. Save as *ex1-10.rvt*.

Certified User Practice Exam

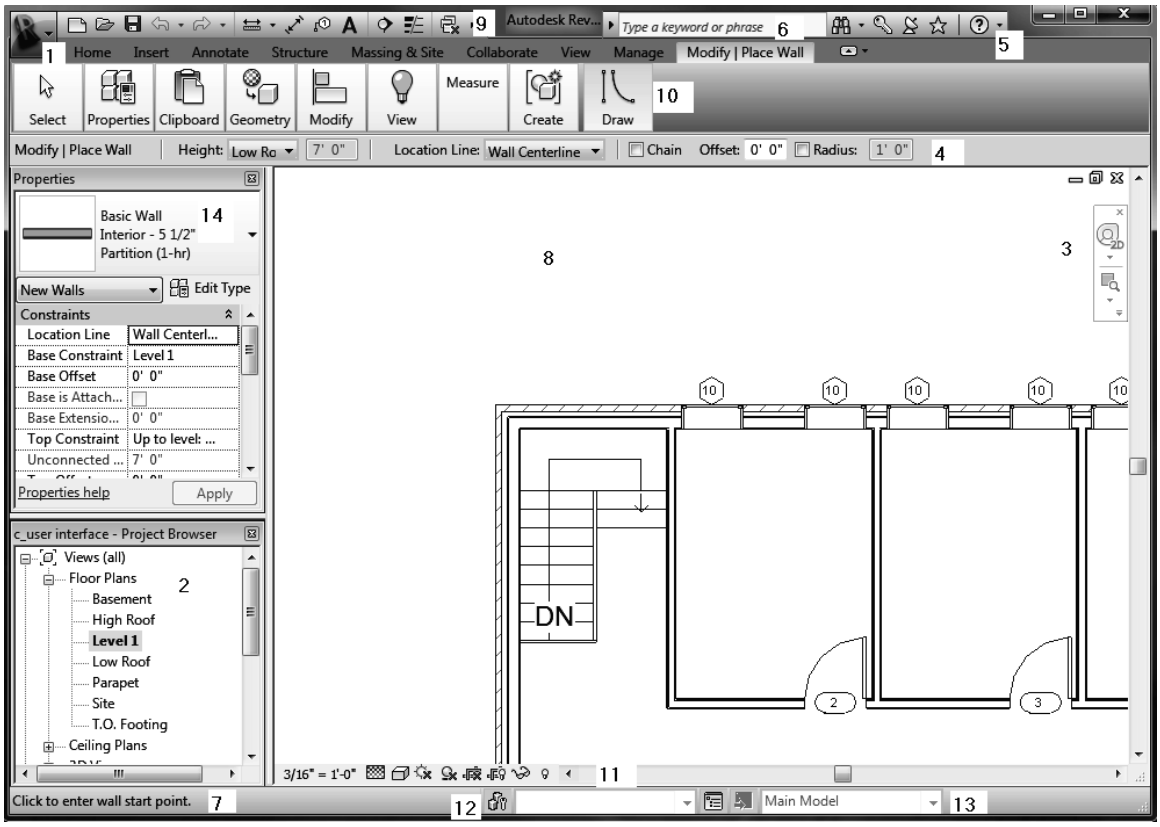
1. Select the answer which is NOT an example of bidirectional associativity:
    A. Flip a section line and all views update.
    B. Draw a wall in plan view and it appears in all other views.
    C. Change an element type in a schedule and the change is displayed in the floor plan view as well.
    D. Flip a door orientation so the door swing is on the exterior of the building.

2. Select the answer which is NOT an example of a parametric relationship:
    A. A floor is attached to enclosing walls. When a wall moves, the floor updates so it remains connected to the walls.
    B. A series of windows are placed along a wall using an EQ dimension. The length of the wall is modified, and the windows remain equally spaced.
    C. A door is placed in a wall. The wall is moved, and the door remains constrained in the wall.
    D. A shared parameter file is loaded to the server.

3. Which tab does NOT appear on Revit's ribbon?
    A. Architecture
    B. Basics
    C. Insert
    D. View

4. Which item does NOT appear in the Project Browser?
    A. Families
    B. Groups
    C. Callouts
    D. Notes

5. Which is the most recently saved backup file?
    A. office.0001
    B. office.0002
    C. office.0003
    D. office.0004



6. Match the numbers with their names.

View Control Bar	InfoCenter
Project Browser	Status Bar
Navigation Bar	Properties Pane
Options Bar	Application Menu
Design Options	Drawing Area
Help	Quick Access Toolbar
Ribbon	Worksets

Answers:

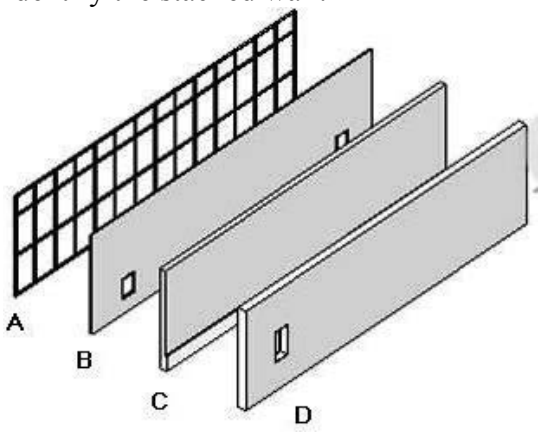
1) D; 2) D; 3) B; 4) D; 5) D; 6) 1- Application Menu, 2- Project Browser, 3- Navigation Bar, 4- Options Bar, 5- Help, 6- InfoCenter, 7- Status Bar, 8- Drawing Area, 9- Quick Access Toolbar, 10- Ribbon, 11- View Control Bar,12- Worksets, 13- Design Options

Certified Professional Practice Exam

1. Which of the following can NOT be defined prior to placing a wall?

    A. Unconnected Height
    B. Base Constraint
    C. Location Line
    D. Profile
    E. Top Offset

2. Identify the stacked wall.



3. Walls are system families. Which name is NOT a wall family?

    A. BASIC
    B. STACKED
    C. CURTAIN
    D. COMPLICATED

4. Select the TWO that are wall type properties:

    A. COARSE FILL PATTERN
    B. LOCATION LINE
    C. TOP CONSTRAINT
    D. FUNCTION
    E. BASE CONSTRAINT

5. Select ONE item that is used when defining a compound wall:

    A. MATERIAL
    B. SWEEPS
    C. GRIDS
    D. LAYERS
    E. FILL PATTERN

6. Use this key to cycle through selections:

    A. TAB
    B. CTRL
    C. SHIFT
    D. ALT

7. The construction of a stacked wall is defined by different wall _____.

    A. Types
    B. Layers
    C. Regions
    D. Instances

8. To change the structure of a basic wall you must modify its:

    A. Type Parameters
    B. Instance Parameters
    C. Structural Usage
    D. Function

9. If a stacked wall is based on Level 1 but one of its subwalls is on Level 7, the base level for the subwall is Level _____.

    A. 7
    B. 1
    C. Unconnected
    D. Variable

Answers:

1) D; 2) C; 3) D; 4) A & D; 5) D; 6) A; 7) A; 8) A; 9) B