

ELISE MOSS  
Autodesk Certified Instructor

Autodesk®

# Revit® 2024 Architecture Certified Professional Exam Study Guide

Text and Practice Exam



Better Textbooks. Lower Prices.  
[www.SDCpublications.com](http://www.SDCpublications.com)



ACCESS CODE  
UNIQUE CODE INSIDE

Visit the following websites to learn more about this book:



[amazon.com](https://www.amazon.com)

[Google books](https://books.google.com)

[BARNES & NOBLE](https://www.barnesandnoble.com)

# Modeling and Materials

This lesson addresses the following certification exam questions:

- Create and Modify Architectural Components  
This includes walls, curtain walls, roofs, floor, ceilings, stairs, railings, and columns
- Create, Configure and Apply Materials  
Understand how to create a custom material, how to apply a material to a family and how to use the Split Face and Paint tools
- Configure Rooms  
Modify room parameters and understand how to assign room boundaries
- 3D Parametric Families  
Understand how to select the correct template when creating a family, how reference lines and planes are used to control geometry, how to manage visibility/graphic overrides, how nested families operate, how to define and leverage parameters
- Topography  
Revit 2024 has updated how topography is created and modified. However, the exam may still use older terminology and methods. You need to be familiar with toposurfaces and toposolids. You also need to know how to create topography from a linked file.
- Model Groups  
Demonstrate how to create and modify model groups

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.

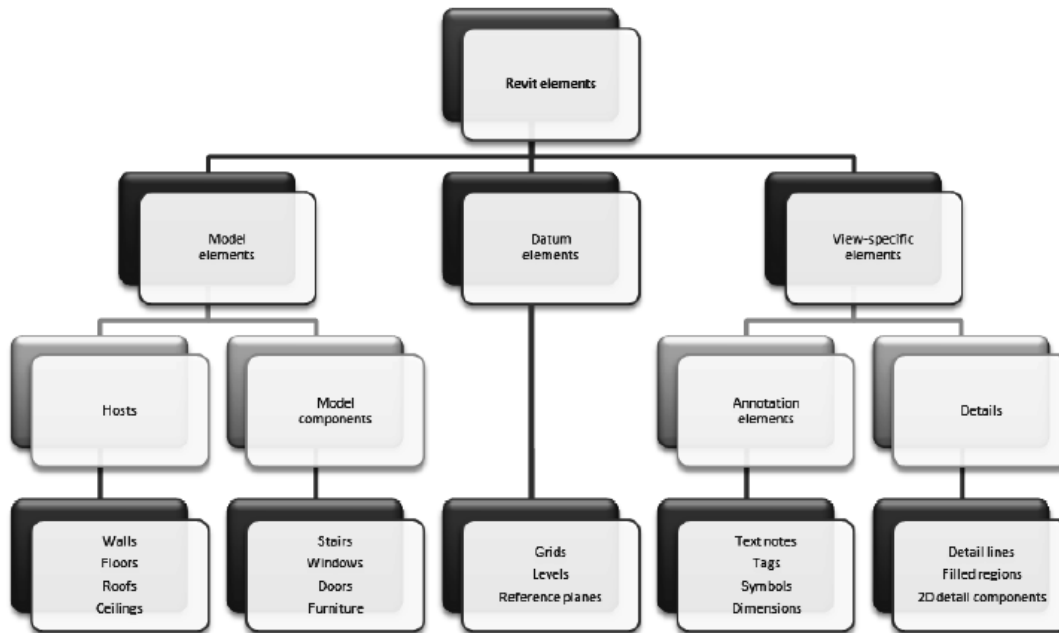
There are three kinds of families in Revit Architecture:

- 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. You can copy system families from one project to another using the Transfer Project Standards tool.

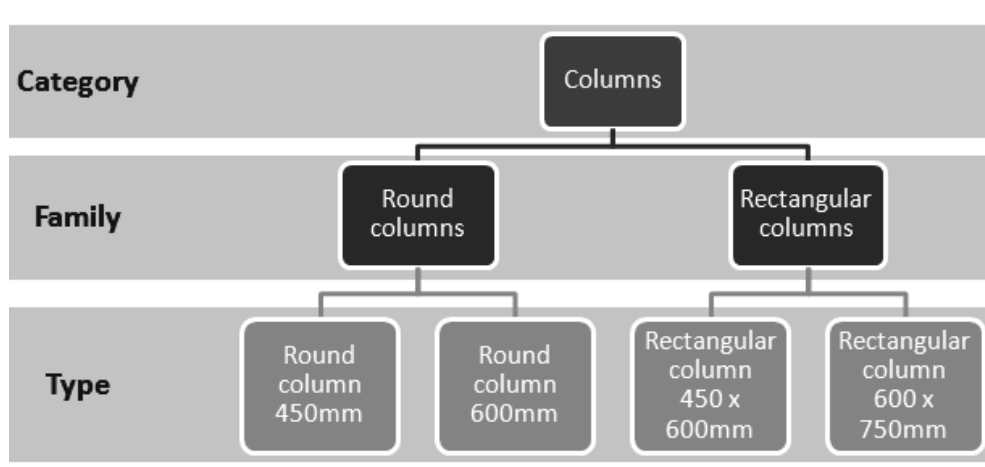
**Loadable families** are external files. These include doors, windows, furniture, and plants.

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

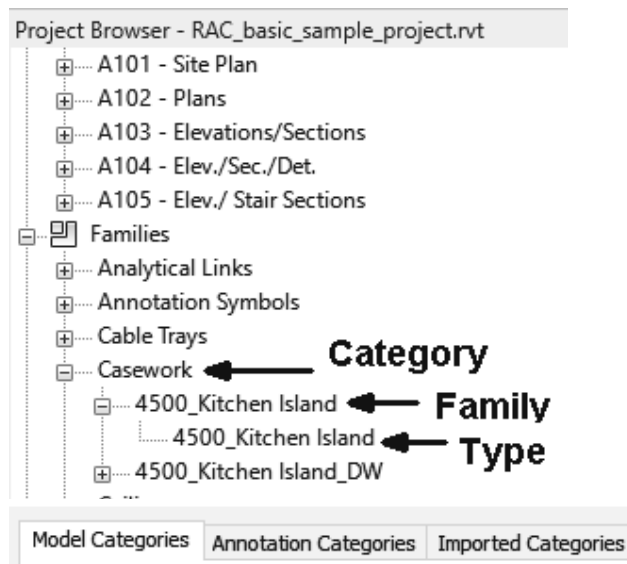


Revit elements are separated into three different types of elements: Model, Datum and View-specific. Users are expected to know if an element is model, datum or view specific.

Model elements are broken down into categories. A category might be a wall, window, door, or floor. If you look in the Project Browser, you will see a category called Families. If you expand the category, you will see the families for each category in the current project. Each family may contain multiple types.



Every Revit file is considered a Project. A Revit project consists of the Project Environment, components, and views. The Project Environment is managed in the Project Browser.



There may be one question on the exam asking you to describe the hierarchy of elements in a Revit project.

Elements are organized by Category, then Family, then Type, then Instance. This is easier to visualize if you look in the Project Browser.

If you look in the Visibility/Graphics Overrides dialog, elements are divided into Model Categories and Annotation Categories.

You should be able to identify whether an object is a model element or an annotation element.

One way to think of it is that model elements are actual physical items. If you walk through a building, you can see a door or column or floor. These are all model elements. If you walk through a building, you don't see door tags, grids, or level lines. These are annotation elements.

## *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. Expect one question on Basic walls, one question on Stacked walls, and one question on Curtain walls.

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 1-1

## Wall Options

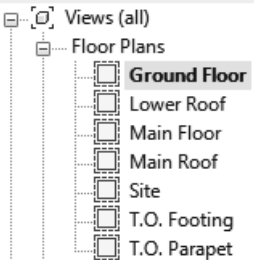
Drawing Name: **i\_firestation\_basic\_plan.rvt**

Estimated Time to Completion: 10 Minutes

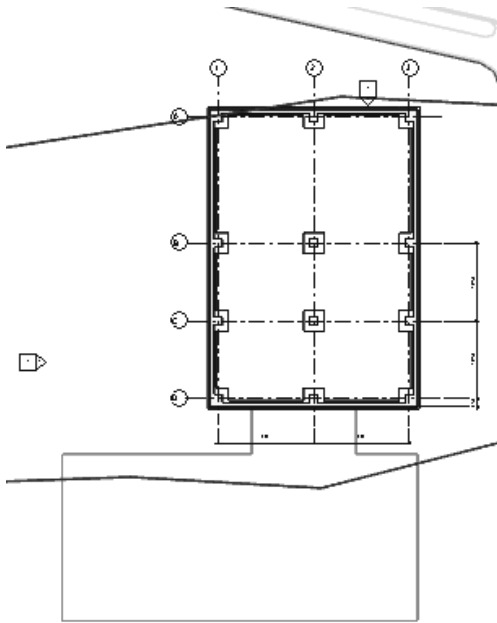
### Scope

Exploring the different wall options

### Solution

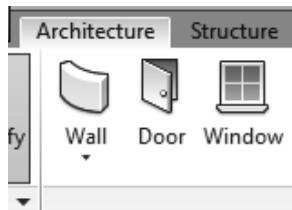
1.  Activate the **Ground Floor** floor plan.

2.



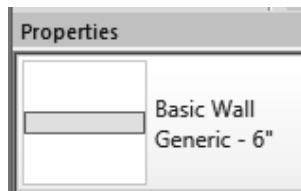
Zoom into the area where the green polygon is.

3.



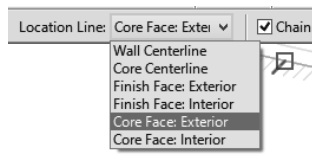
Select **Wall** from the Architecture ribbon.

4.



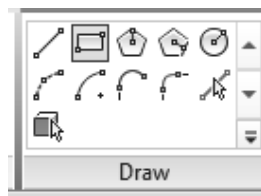
Set the Wall Type to **Generic – 6"** in the Properties pane.

5.



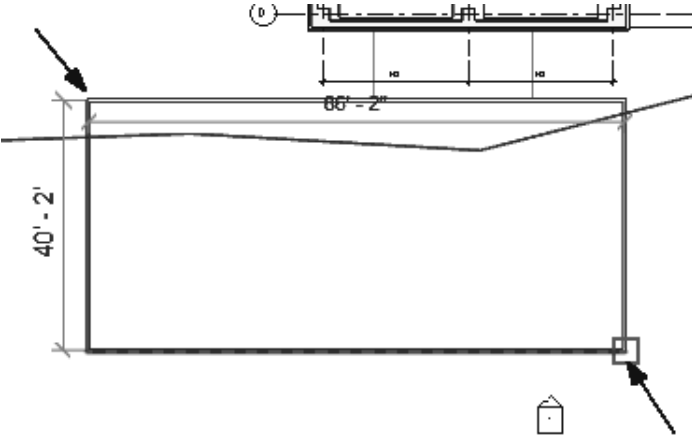
Set the Location Line to **Core Face: Exterior**.

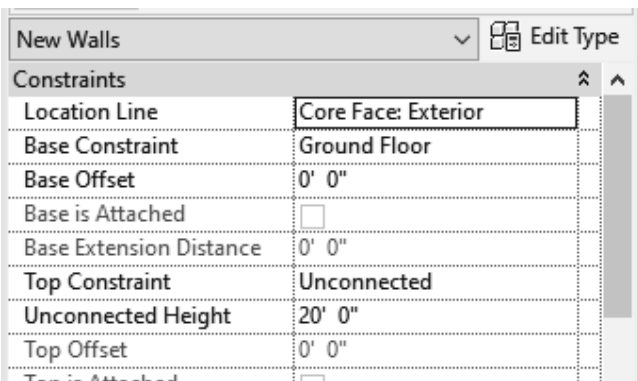
6.



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



7.  Select the two points indicated to place the rectangle.

8.  Notice that if the Top Constraint is set to Unconnected, you can define the Unconnected Height.
9. 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 1-2

## Attaching Walls

---

Drawing Name: **i\_Attach.rvt**

Estimated Time to Completion: 10 Minutes

### Scope

Create a wall section view.

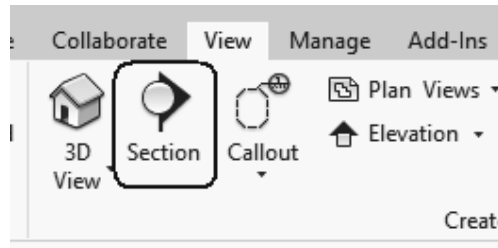
Attach a wall to a roof or floor.

### Solution

1.  Open *i\_Attach.rvt*.

2.  Activate Level 2 Floor Plan.

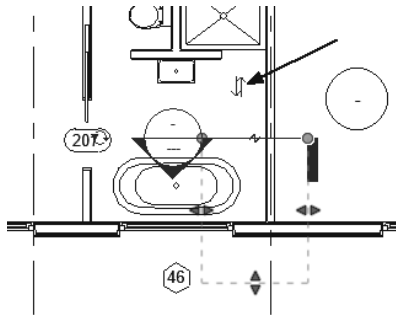
3.  Place a wall section as shown.



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

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

5.

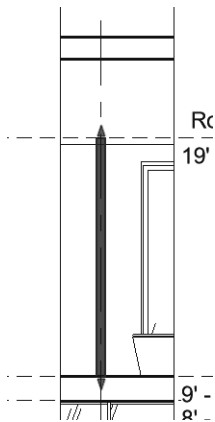


The first point selected will place the section head.  
The second point selected will place the section tail.

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

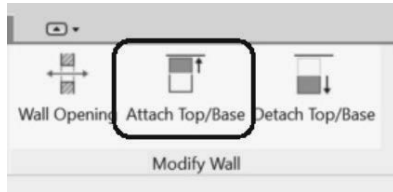
Double left click on the section head to open the section view.

6.



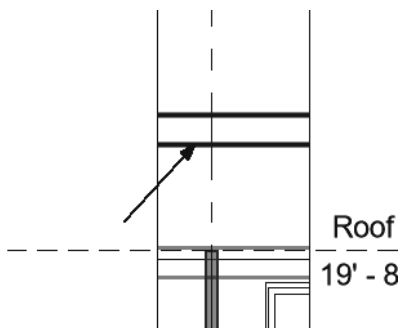
Select the wall on Level 2.

7.



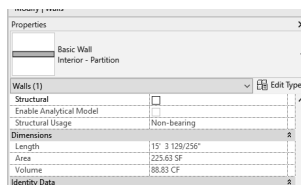
Select **Attach Top/Base** from the ribbon.

8.



Select the roof.

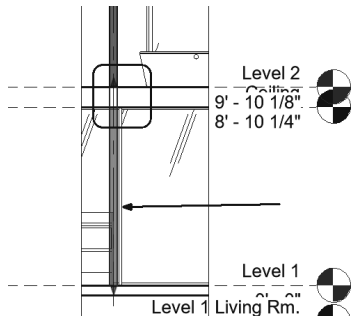
9.



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.

10.



Select the wall on Level 1.

Note that the wall goes through the floor on Level 2.

Walls (1)		Edit Type
Constraints		
Location Line	Wall Centerline	
Base Constraint	Level 1	
Base Offset	0' 0"	
Base is Attached	<input type="checkbox"/>	
Base Extension Distance	0' 0"	
Top Constraint	Up to level: Level 2	
Unconnected Height	9' 10 7/64"	
Top Offset	0' 0"	

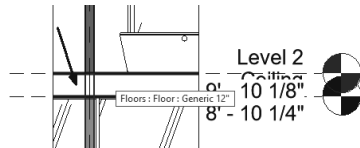
Check the Properties palette and note that the Top Constraint is set to Level 2 and the Unconnected Height is grayed out.

11.



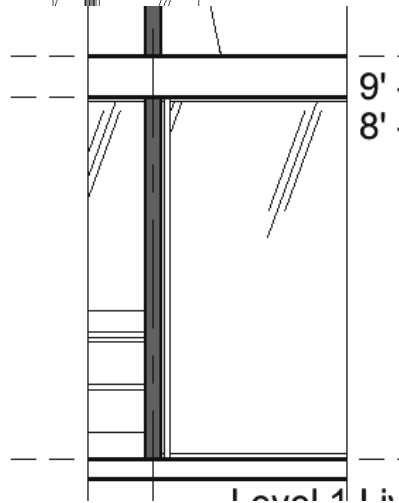
Select **Attach Top/Base** on the ribbon.

12.



Select the Level 2 floor.

13.



The wall adjusts.

Walls (1)	
Constraints	
Location Line	Wall Centerline
Base Constraint	Level 1
Base Offset	0' 0"
Base is Attached	<input type="checkbox"/>
Base Extension Distance	0' 0"
Top Constraint	Up to level: Level 2
Unconnected Height	9' 10 7/64"
Top Offset	0' 0"

Note that the Top Constraint and Unconnected Height values did not change.

# Exercise 1-3

## Stacked Walls

Drawing Name: **i\_Footing.rvt**

Estimated Time to Completion: 10 Minutes

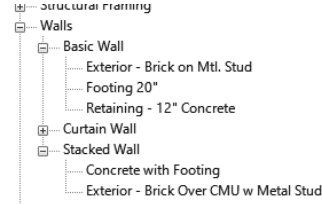
### Scope

Defining a stacked wall.

A stacked wall uses more than one wall type. Stacked walls may have varying widths.

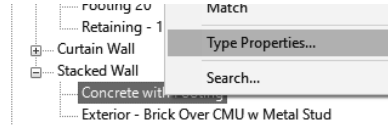
### Solution

1.  Open *i\_Footing.rvt*.

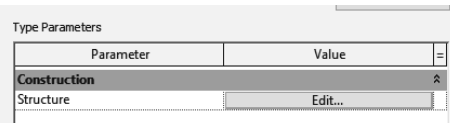
2. 
  - Walls
    - Basic Wall
      - Exterior - Brick on Mtl. Stud
      - Footing 20"
      - Retaining - 12" Concrete
    - Curtain Wall
    - Stacked Wall
      - Concrete with Footing
      - Exterior - Brick Over CMU w Metal Stud

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

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

3. 
  - Match
  - Type Properties...
  - Search...

Right click and select **Type Properties**.

4. 

Parameter	Value
<b>Construction</b>	
Structure	Edit...

Select **Edit** next to Structure.

5.  Select the **Insert** button.

6.

Types						
	Name	Height	Offset	Top	Base	Flip
1	Footing 20"	0' 9"	0' 0"	0' 0"	0' 0"	<input type="checkbox"/>
2	Retaining - 12"	Variable	0' 0"	0' 0"	0' 0"	<input type="checkbox"/>

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

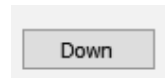
Note the Retaining – 12” Concrete wall is set to a Variable Height.

7.

Types						
	Name	Height	Offset	Top	Base	Flip
1	Retaining - 12"	Variable	0' 0"	0' 0"	0' 0"	<input type="checkbox"/>
2	Footing 20"	0' 9"	0' 0"	0' 0"	0' 0"	<input checked="" type="checkbox"/>

Highlight Layer 1.

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

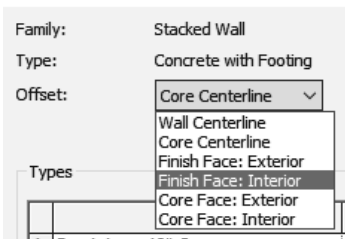


8.



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

9.



Set the Offset to **Finish Face: Interior**.

10.



*Notice how the wall adjusts in the preview so that the interior faces of the walls are now flush.*

Click **OK** to close the dialog.

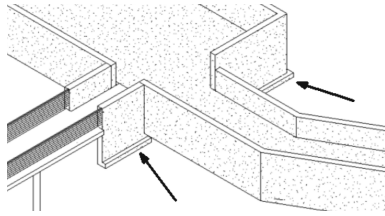
11.



Click **Unjoin Elements**.

Click **OK**.

12.



Notice how the stacked walls updated in the model.

## Exercise 1-4

### Placing a Cut in a Wall

Drawing Name: **walls.rvt**

Estimated Time to Completion: 20 Minutes

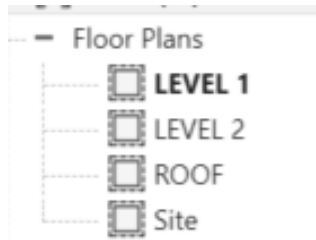
#### Scope

Placing a horizontal or vertical cut in a wall using Reveal.

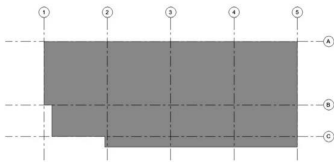
Creating a cut in a wall using Edit Profile.

#### Solution

1.

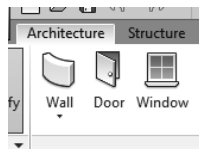


Activate **Level 1** Floor Plan.



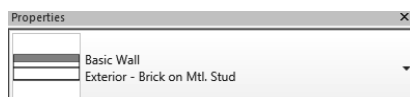
A floor, some model lines and some grid lines are already placed in the drawing.

2.

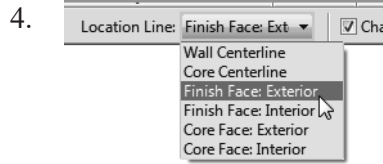


Select the **Wall** tool from the Architecture ribbon.

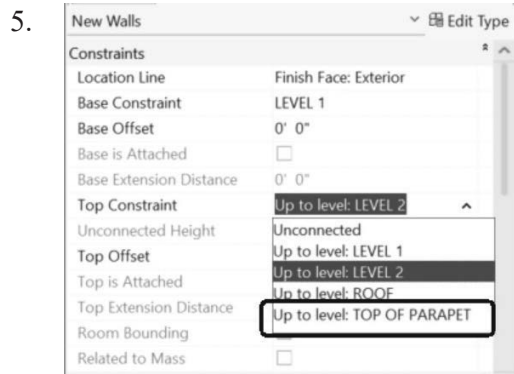
3.



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

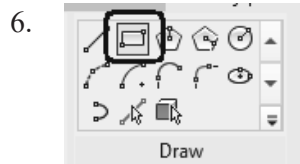


Set the Location Line to **Finish Face: Exterior**.

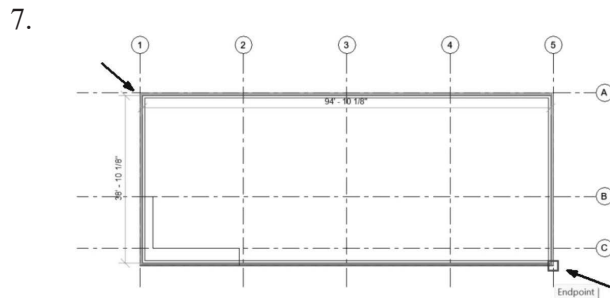


Set the Top Constraint to **TOP OF PARAPET**.

Set the Top Offset to **0"**.

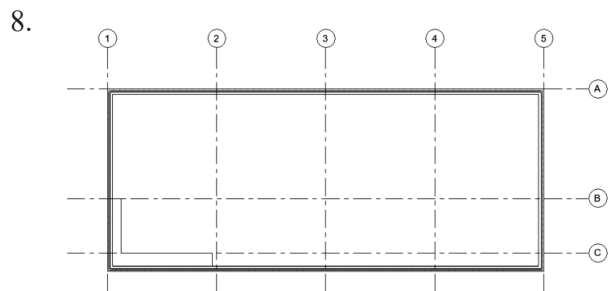


Select the **Rectangle** tool from the Draw panel.



Select the upper left corner as the first point of the green rectangle and the lower right corner as the second point of the green rectangle.

Exit out of the Wall command.



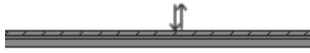
The lines should be aligned to the exterior side of the walls.



Set the Detail Level to **Medium**.

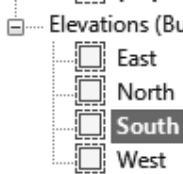


9. Select a wall.

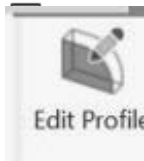


Note if the exterior side of the wall is oriented correctly. If it needs to be re-oriented, use the Flip Arrows to position it correctly.

10. Switch to a South elevation.

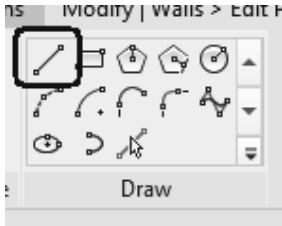


11. Select the South wall.



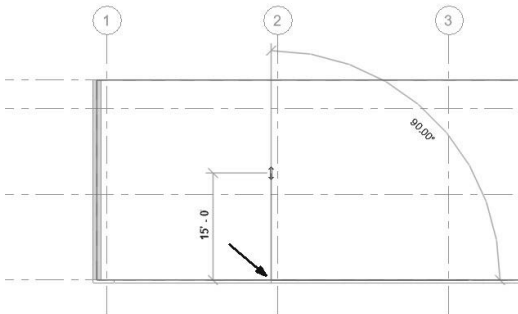
Click **Edit Profile** on the ribbon.

12. Select the **Line** tool from the Draw Panel.



- 13.

Start the line using the endpoint located to the left of Grid 2.

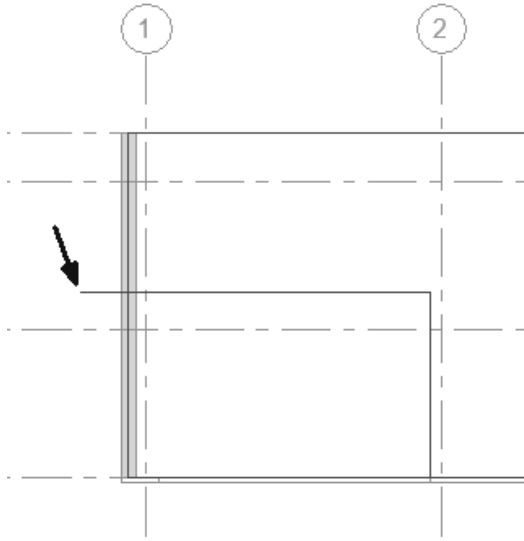


Draw the line vertically and select an endpoint above Level 2.

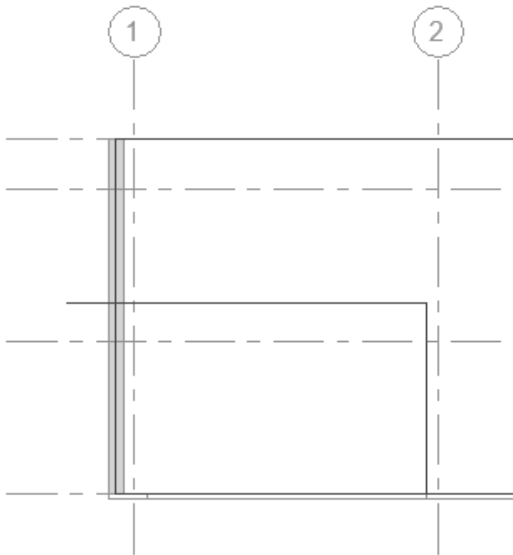
14.

Drag the mouse to the left to place a horizontal line and click outside the building to select the endpoint for the horizontal line.

Exit the line command.

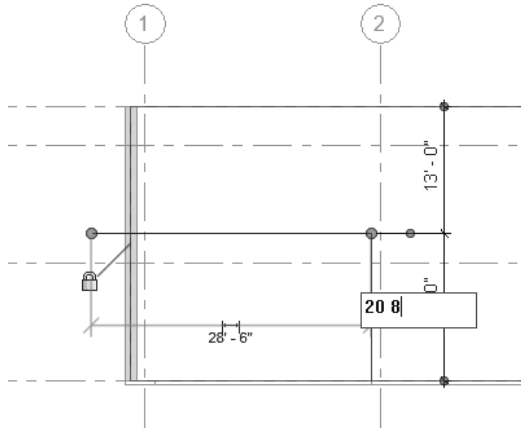


Your profile should look like this.



15.

Select the horizontal line.



Modify the temporary dimension to **20' 8"**.

*Note that you don't need to use the feet or inches symbols, just place a space between the units.*

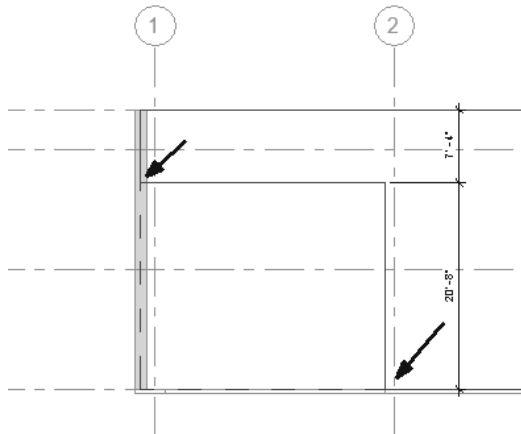
16.



Select the **TRIM** tool from the ribbon.

17.

Trim the two corners to create a single continuous wall boundary.



18.



Select the **Green Check** to exit the edit profile mode.

19.



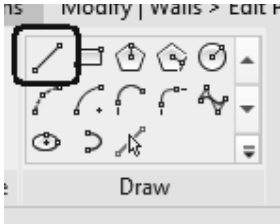
Switch to a **West** elevation.

20. Select the West wall.

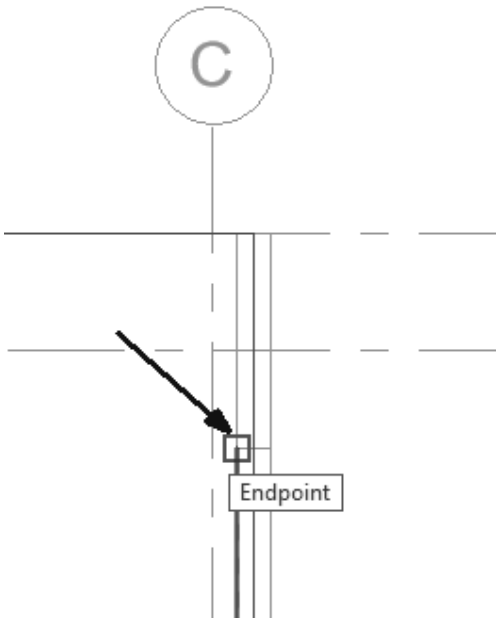


Click **Edit Profile** on the ribbon.

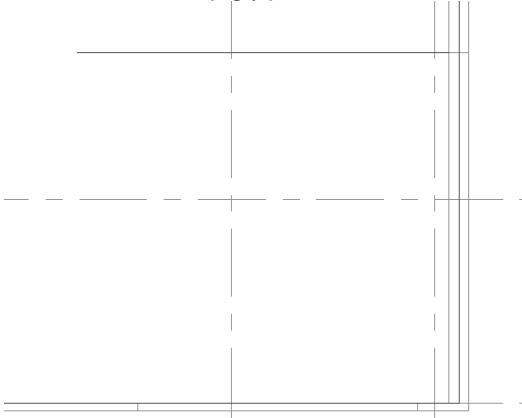
21. Select the **Line** tool from the Draw Panel.



22. Start the line using the end point located below the Roof level near Grid C.

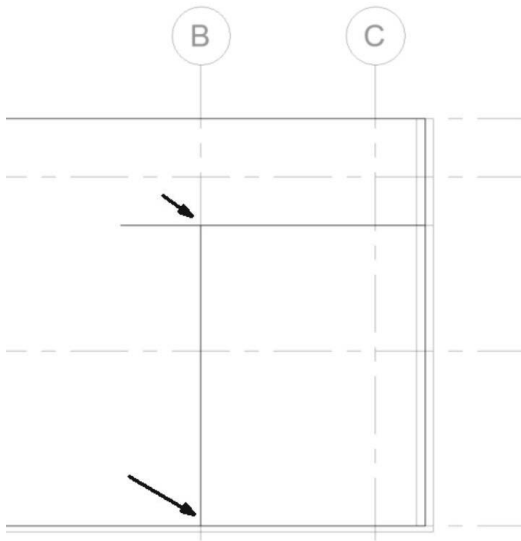


23. Draw a horizontal line across Grid B.



24.

Select the endpoint at Level 1 and Grid B and draw a vertical line up to intersect with the horizontal line.



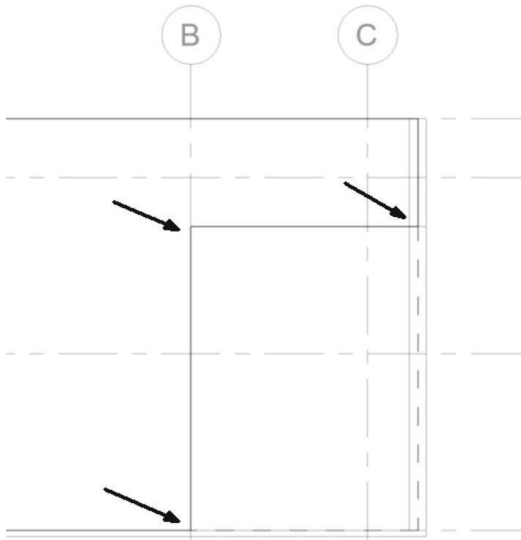
25.



Select the **TRIM** tool from the ribbon.

26.

Trim the three corners to create a single continuous wall boundary.

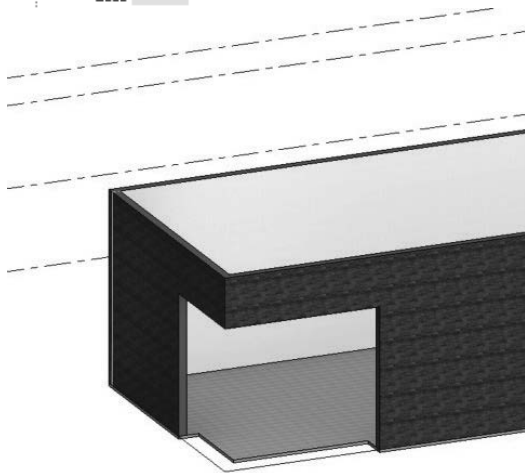


27.



Select the **Green Check** to exit the edit profile mode.

28. Switch to the **3D** view.

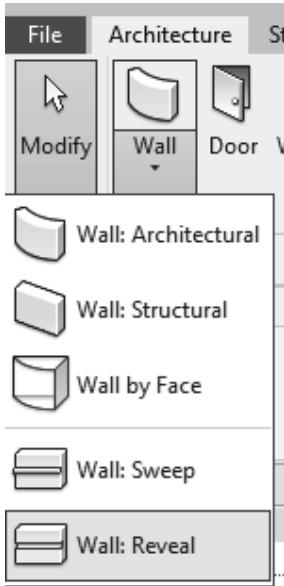


*You can see the opening in the wall that was created.*

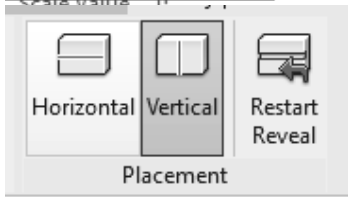
29. Activate the **South** elevation.



30. Under Wall, select **Wall: Reveal**.



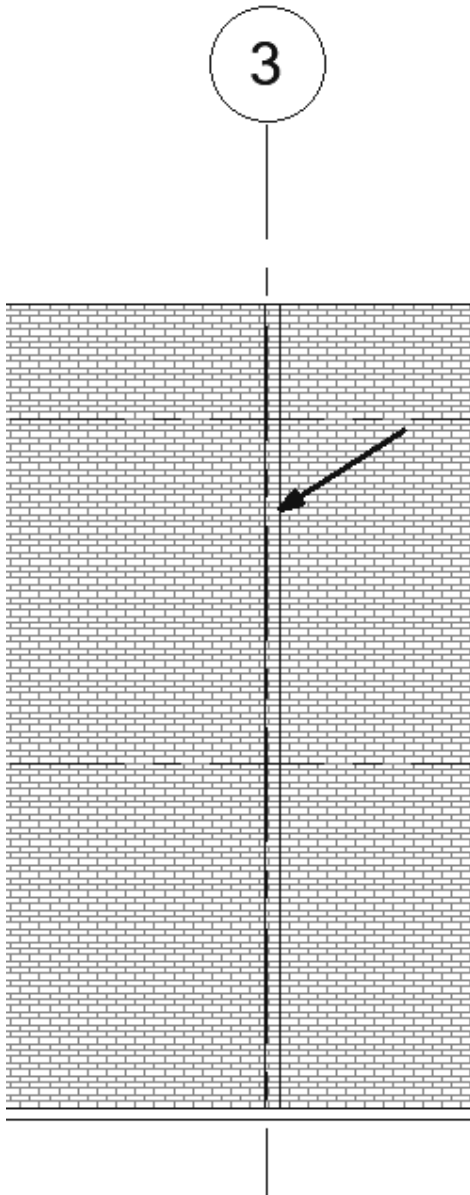
31. Enable **Vertical** on the ribbon.



32.

Click on Grid 3 to place the reveal.

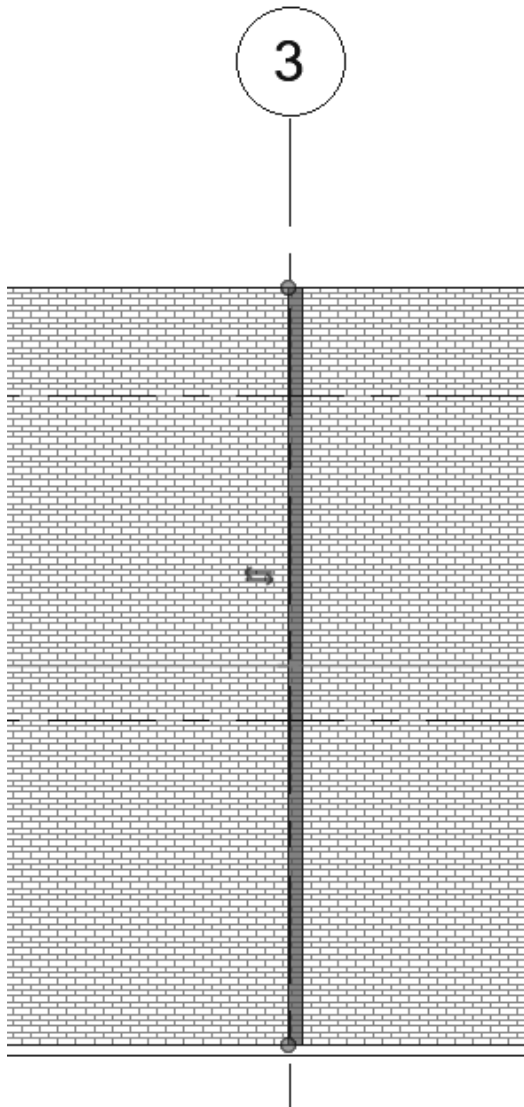
Exit the command.



33.

Select the reveal so it is highlighted.

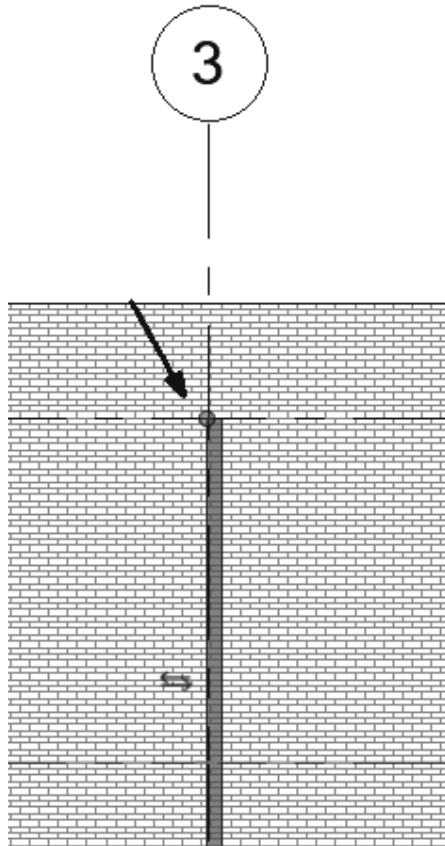
Notice there is a grip located on each end of the reveal.





34.

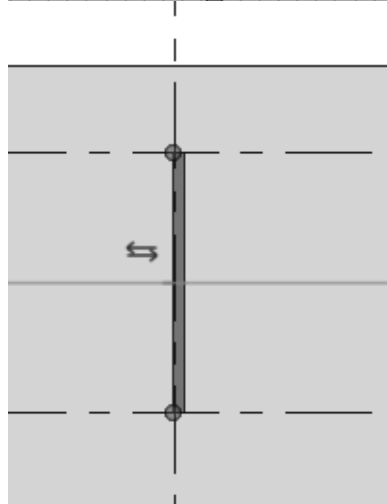
Drag the top end of the reveal to the intersection of Grid 3 and Roof Level.



35.

Drag the bottom end of the reveal to the intersection of Grid 3 and Level 2.

Close the drawing file.



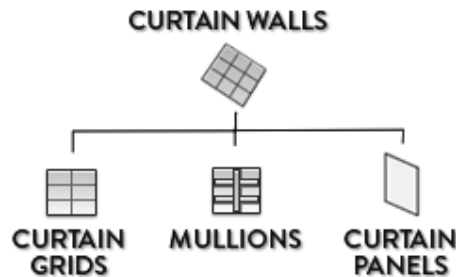
# *Curtain Walls*

A curtain wall is any exterior wall that is attached to the building structure and which does not carry the floor or roof loads of the building. Like walls, curtain walls are system families.

In common usage, curtain walls are often defined as thin, usually aluminum-framed walls containing in-fills of glass, metal panels, or thin stone. When you draw the curtain wall, a single panel is extended the length of the wall. If you create a curtain wall that has automatic curtain grids, the wall is subdivided into several panels.

In a curtain wall, grid lines define where the mullions are placed. Mullions are the structural elements that divide adjacent window units. You can modify a curtain wall by selecting the wall and right-clicking to access a context menu. The context menu provides several choices for manipulating the curtain wall, such as selecting panels and mullions.

Curtain Walls contains most properties of a basic wall. They have bottom and top constraints and their profile can be modified.



## **CURTAIN GRIDS**

Curtain grids are divisions created on the walls. These divisions can be horizontal or vertical. Curtain grids can be placed in floor plan, elevations, and 3D views.

## **MULLIONS**

Mullions are elements that can be created on each curtain grid segment, as well as on each curtain wall extremity.

## **CURTAIN PANELS**

Curtain panels are rectangular elements located between each curtain grid.

# Exercise 1-5

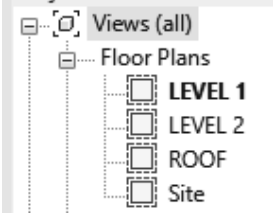
## Curtain Walls

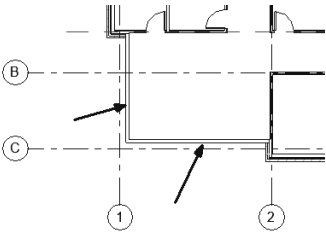
Drawing Name: **linear\_curtain\_wall.rvt**  
 Estimated Time to Completion: 30 Minutes

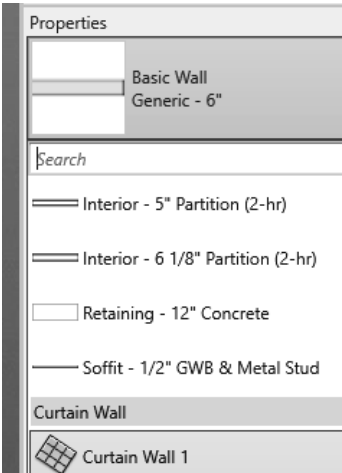
### Scope

Placing a Curtain Walls  
 Adding and removing Curtain Wall Grids  
 Adding a Curtain Wall Door  
 Adding and removing mullions

### Solution

- 

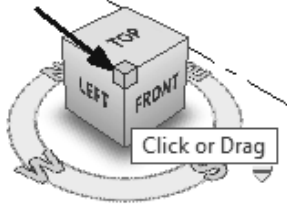
Activate **Level 1** Floor Plan.
- 

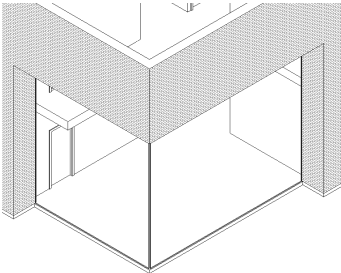
Select the two walls located between Grids 1 and 2 and Grids B and C.  
*Hint: Hold down the CTL key to select more than one element.*
- 

Use the Type Selector to assign **Curtain Wall 1** to the selected walls.

4.  Switch to a **3D** View.

5. Use the Viewcube to orient the view to a SW perspective view.

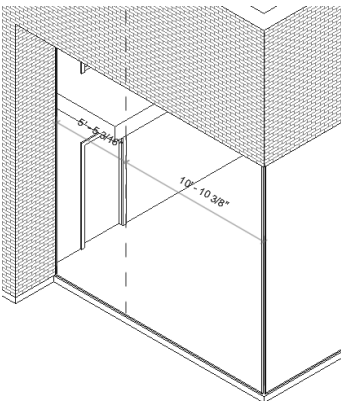


6.  Zoom into the Southwest corner of the building model.

7.  Select **Curtain Grid** from the ribbon.

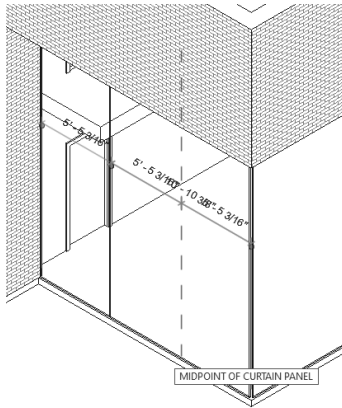
8.  Enable **All Segments** on the ribbon.

*All segments applies a curtain grid to the entire glass panel.*

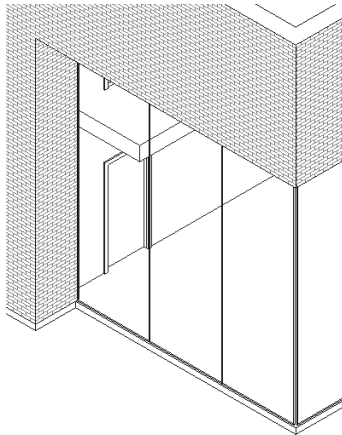
9.  If you hover the mouse along the bottom of the glass panel on the west side of the building, the mouse will snap to different points. These preset points divide the panel into equal sections.

Click when the value **5' 5 3/16"** is displayed.

10.

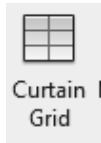


Click a second time to place a curtain grid at the midpoint of the curtain panel.



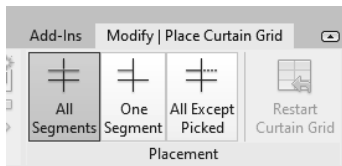
If you cancel out of the command, you see the glass panel has been divided into three equal panes.

11.



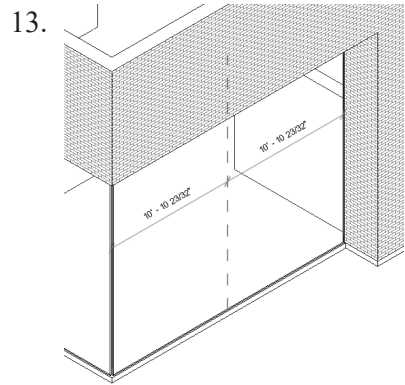
Select **Curtain Grid** from the ribbon.

12.

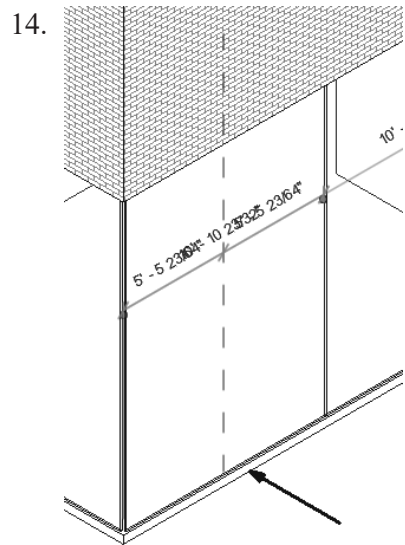


Enable **All Segments** on the ribbon.

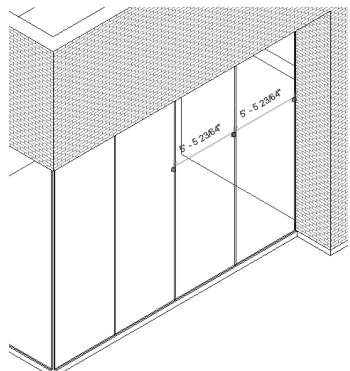
*All segments applies a curtain grid to the entire glass panel.*



Locate the midpoint of the south curtain wall and select to place a curtain grid.

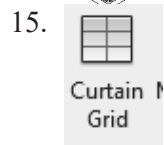


Locate the midpoint of each section of the divided curtain wall to place another curtain grid.



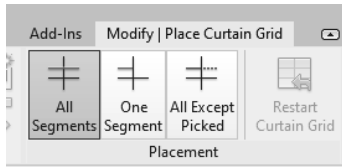
Cancel out of the command so you can inspect your curtain wall.

The south curtain wall should have four vertical glass panels of equal width of 5' 5-23/64\"/>



Select **Curtain Grid** from the ribbon.

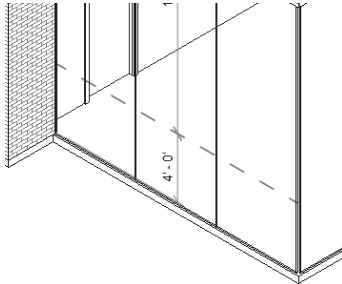
16.



Enable **All Segments** on the ribbon.

*All segments applies a curtain grid to the entire glass panel.*

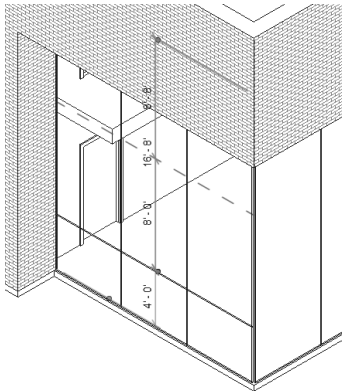
17.



Place a horizontal curtain grid by hovering over the vertical edge of the curtain wall.

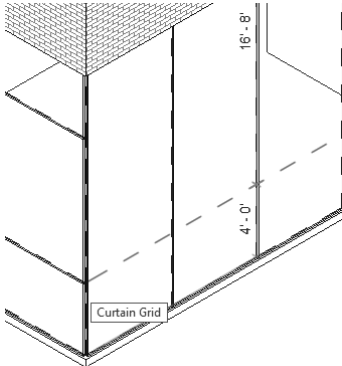
Locate the bottom grid 4' above Level 1.

18.



Place a second horizontal grid 8' above first horizontal grid.

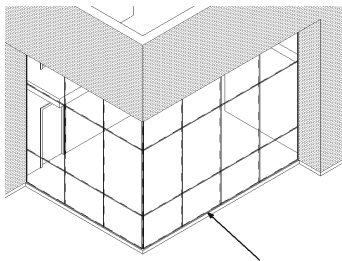
19.



Move over to the west curtain wall.

The curtain grid tool should automatically snap to the horizontal grids placed on the west wall.

Add two horizontal grids at the same distances on the south curtain wall.



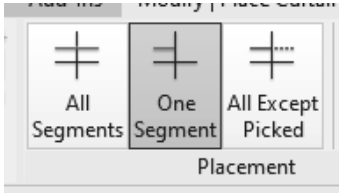
The curtain wall should look as shown.

We will add a door in the area indicated by the arrow, but first we need to define a panel the correct size.

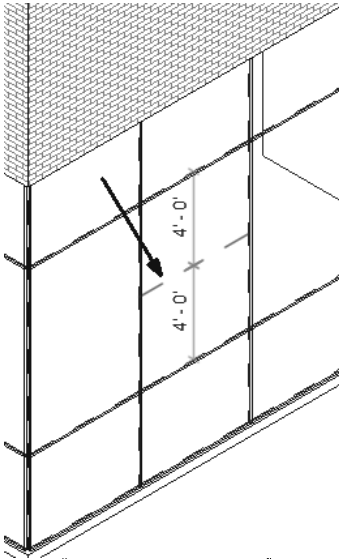
20. Select the **Curtain Grid** tool from the ribbon.



21. Set the Placement to **One Segment**.

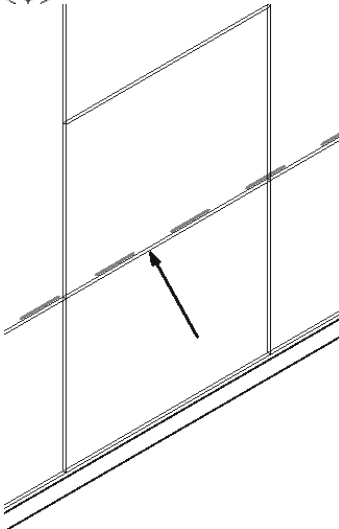


22. Place the segment at the midpoint of the middle glass panel.



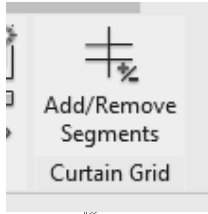
ESC out of the command.

23. Select the lower curtain grid line.

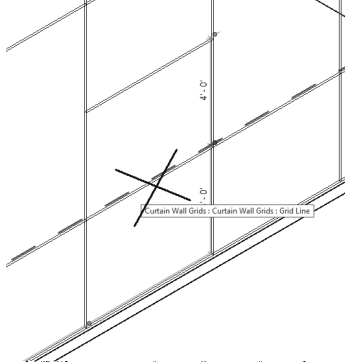




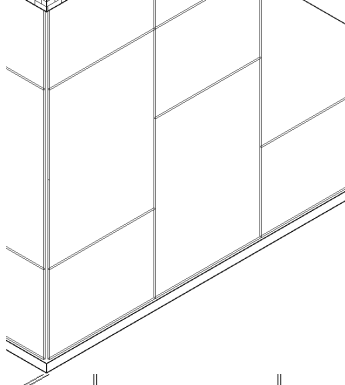
24. Enable **Add/Remove Segments** from the ribbon.



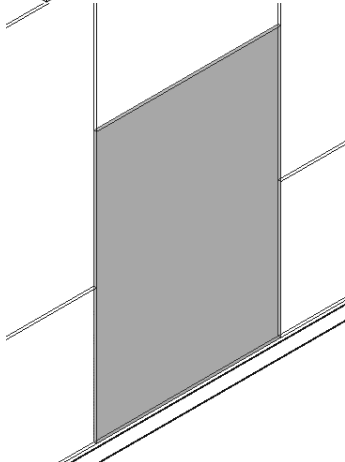
25. Select the segment indicated then click outside the building.



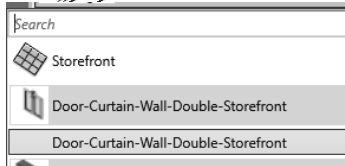
The panel should appear as shown.



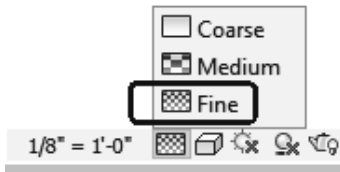
26. Select the panel.



27. Use the Type Selector to change the panel to **Door-Curtain-Wall-Double-Storefront**.



28. Change the Detail Level to **Fine** so you can see the door hardware.

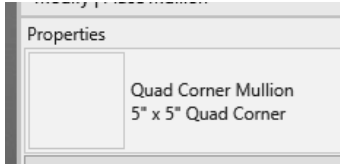


29. Select the Mullion tool from the ribbon.

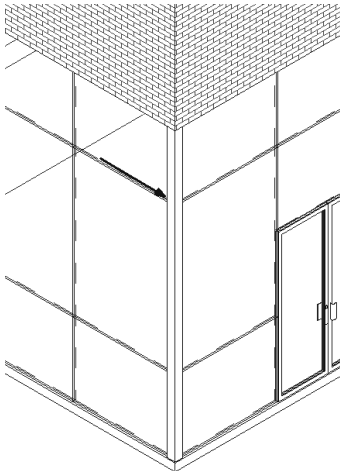


*The placement of mullions is determined by curtain grids. You cannot place a mullion without a curtain grid.*

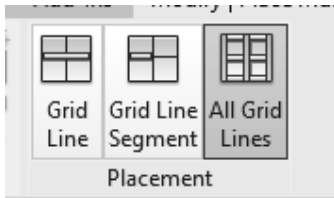
30. Set the Type Selector to **Quad Corner Mullion: 5" x 5" Quad Corner**.



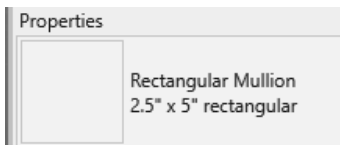
31. Place at the southwest corner where the two curtain walls intersect.



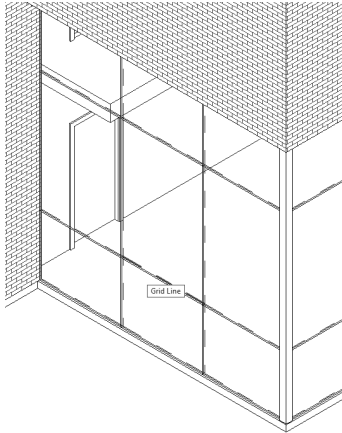
32. Enable **All Grid Lines** on the ribbon.



33. Set the Type Selector to **Rectangular Mullion: 2.5" x 5" Rectangular**.

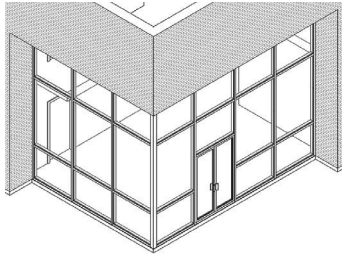


34.



Select the Grid Line on the west curtain wall.

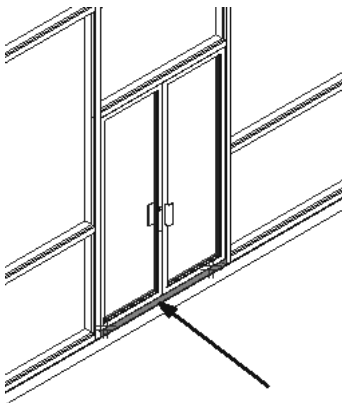
35.



Select the grid lines on the south curtain wall.

ESC out of the command.

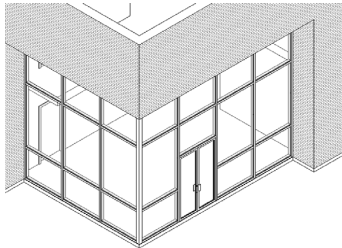
36.



Use the TAB key to cycle through selections until the mullion below the door is selected.

Delete the mullion by clicking the DELETE key on the keyboard or using the Delete tool on the ribbon.

37.



The curtain wall should appear as shown.

Save as *ex1-5.rvt*.

# Exercise 1-6

## Embedded Curtain Walls

---

Drawing Name: **embedded curtain wall.rvt**

Estimated Time to Completion: 20 Minutes

### Scope

Placing a Curtain Wall inside an existing wall

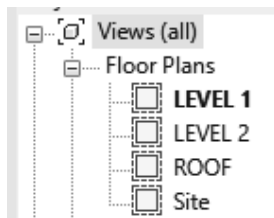
Adding and removing Curtain Wall Grids

Adding a Curtain Wall Door

Adding and removing mullions

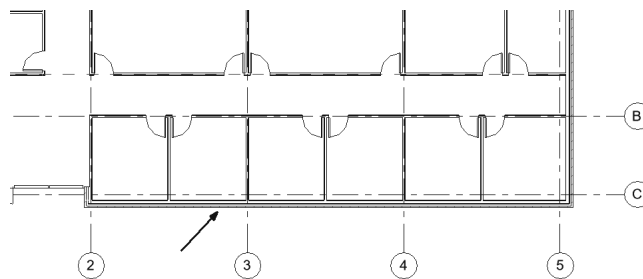
### Solution

1.



Activate **Level 1 Floor Plan**.

We are going to embed a curtain wall in the indicated south wall.

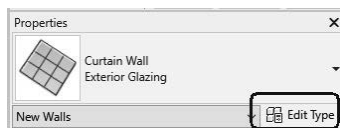


2.



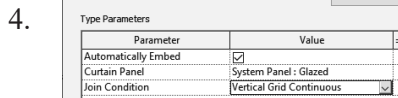
Select the **Wall** tool from the Architecture ribbon.

3.



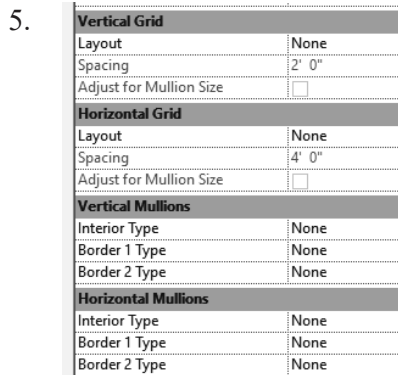
Select the **Curtain Wall: Exterior Glazing** from the Type Selector.

Click **Edit Type**.



Enable **Automatically Embed**.

Set the Curtain Panel to **System Panel: Glazed**.  
Set the Join Condition to **Vertical Grid Continuous**.

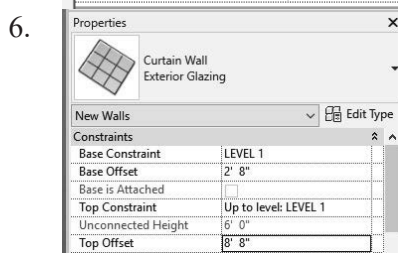


Under Vertical Grid:  
Set the Layout to **None**.

Under Horizontal Grid:  
Set the Layout to **None**.

Set the Vertical and Horizontal Mullions to **None**.

Click **OK**.



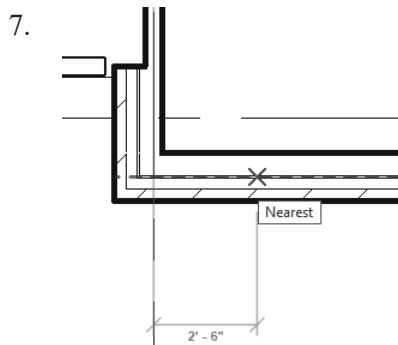
In the Properties palette:

Set the Base Constraint to **LEVEL 1**.

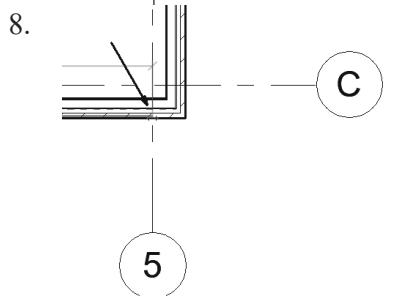
Set the Base Offset to **2' 8"**.

Set the Top Constraint to **LEVEL 1**.

Set the Top Offset to **8' 8"**.

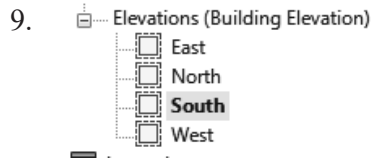


Set the start point at **2' 6"** to the right of Grid 2.



Set the end point at Grid 5.

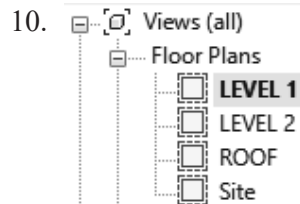
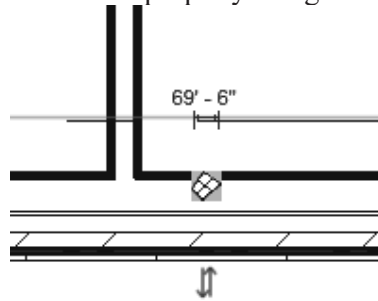
ESC to exit the command.



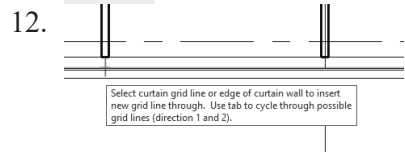
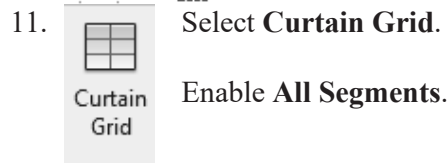
Switch to a South Elevation.



If the curtain wall doesn't appear properly, return to the Level 1 floor plan and check that the curtain wall is oriented properly using the flip arrows.

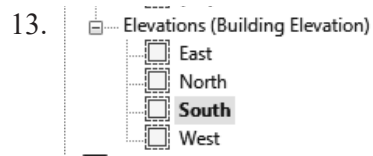


Switch to the **LEVEL 1** Floor Plan view.

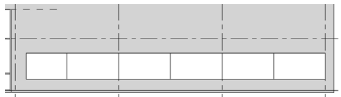


Place a curtain grid at the midpoint of each of the interior walls.



*Curtain Grids can be placed in elevations or floor plans.*

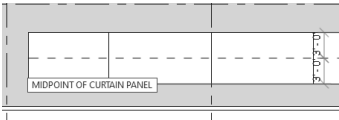


Switch back to the South elevation.

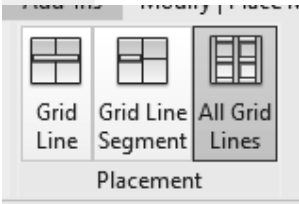


You should see vertical curtain grids have been placed.

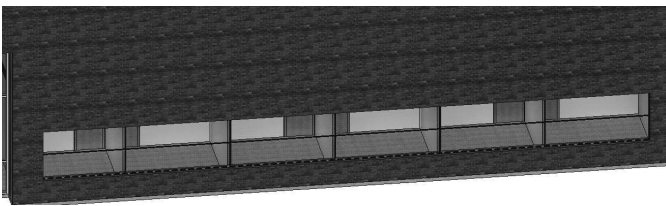
14.  Select **Curtain Grid**.  
 Enable **All Segments**.

15.  Place the curtain grid at the horizontal midpoint of the curtain wall.  
 ESC out of the command.

16.  Select the **Mullion** tool from the ribbon.  
 Mullion

17.  Enable **All Grid Lines**.

18.  Select the **Rectangular Mullion: 1" Square** from the Type Selector.

19.  Click on one of the curtain grids to place the mullions.  
 Switch to a 3D view to inspect your embedded curtain wall.

20. If the embedded curtain wall does not create an opening in the south wall, select the south wall, click Edit Profile and then place a rectangle at the location of the curtain wall.

Save as *ex1-6.rvt*.

# *Roofs*

Roofs are system families. Roofs can be created from a building footprint, using an extrusion, and from a mass instance (converting a face to a roof).

## Roof by footprint

- 2D closed-loop sketch of the roof perimeter
- Created when you select walls or draw lines in plan view
- Created at level of view in which it was sketched
- Height is controlled by Base Height Offset property
- Openings are defined by additional closed loops
- Slopes are defined when you apply a slope parameter to sketch lines

## Roof by extrusion

- Open-loop sketch of the roof profile
- Created when you use lines and arcs to sketch the profile in an elevation view
- Height is controlled by the location of the sketch in elevation view
- Depth is calculated by Revit based on size of sketch, unless you specify start and end points.

Roofs are defined by material layers, similar to walls.



# Exercise 1-7

## Creating a Roof by Footprint

Drawing Name: **i\_roofs.rvt**

Estimated Time to Completion: 10 Minutes

### Scope

Create a roof.

### Solution

1.  Views (all)  
Floor Plans  
Ground Floor  
Lower Roof  
Main Floor  
Main Roof  
Site  
T. O. Footing  
**T. O. Parapet**

Activate the **T.O. Parapet** floor plan.

2.  Roof Ceiling Floor  
**Roof by Footprint**

Select **Roof by Footprint** from the tab.

3.  Properties  
Basic Roof  
Wood Rafter 8" - Asphalt Shingle - Insulated  
Basic Roof  
Generic - 9"  
Generic - 12"  
Generic - 12" - Filled  
Generic - 18"  
**Steel Truss - Insulation on Metal Deck - EPDM**

Select **Steel Truss - Insulation on Metal Deck - EPDM** using the Type Selector on the Properties panel.

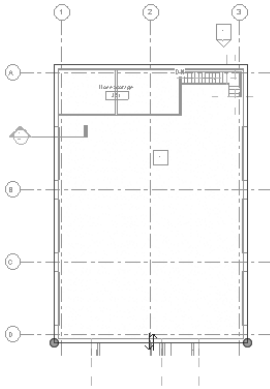
4. Select **Pick Walls** mode.



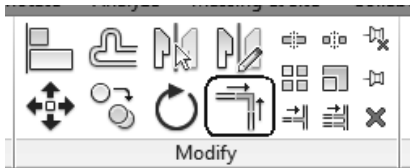
5.  Defines slope    Overhang: 0' 0"     Extend to wall core

On the Options bar, uncheck **Defines slope**.  
Set the Overhang to **0'-0"**.  
Uncheck **Extend to Wall Core**.

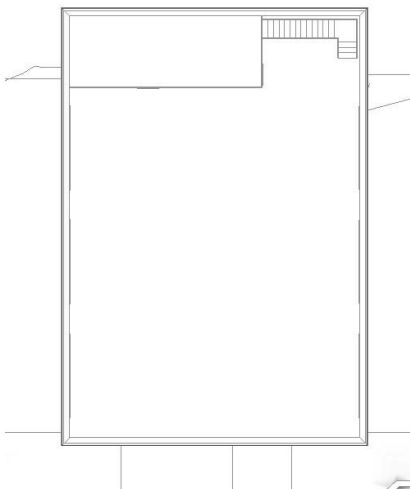
6. Select all the exterior walls.



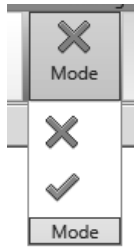
7. Use the **Trim** tool from the Modify panel to create a closed boundary, if necessary.



8. Align the boundary lines with the exterior face of each wall.



9. Select the **Green Check** on the Model panel to **Finish Roof**.



10. Close without saving.

## Exercise 1-8

# Creating a Roof by Extrusion

Drawing Name: **i\_roofs\_extrusion.rvt**  
 Estimated Time to Completion: 30 Minutes

### Scope

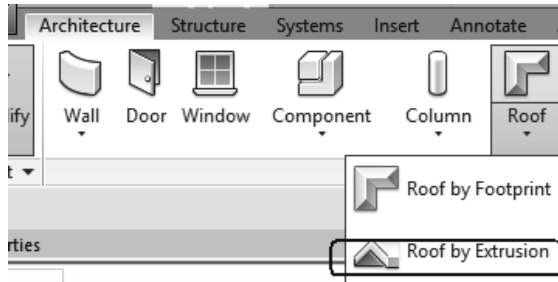
Create a roof by extrusion.  
 Modify a roof.

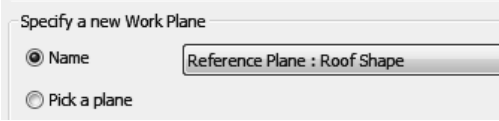
### Solution

1.  **3D Views**      Activate the **3D view**.

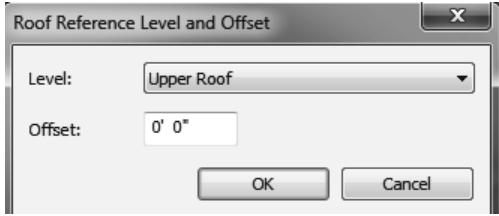


2.  **Architecture**    **Structure**    **Systems**    **Insert**    **Annotate**    **A**    Activate the Architecture tab.  
 Select **Roof by Extrusion** under the Build panel.

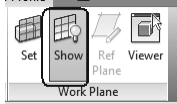


3.     Enable **Name**.  
 Select **Roof Shape** from the list of reference planes.  
 Click **OK**.

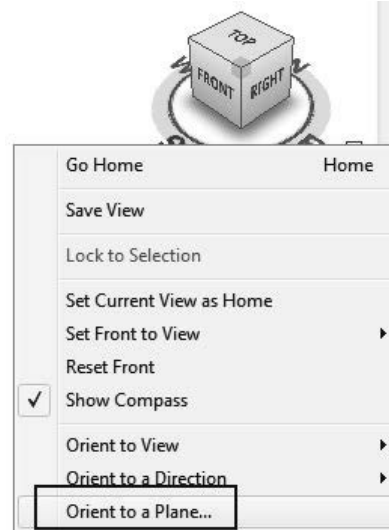
4. Select **Upper Roof** from the list.  
Click **OK**.



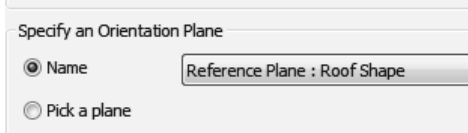
5. Select the **Show** tool from the Work Plane panel.  
This will display the active work plane.



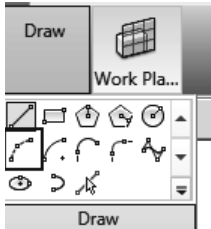
6. Right click on the ViewCube's ring.  
Select **Orient to a Plane**.



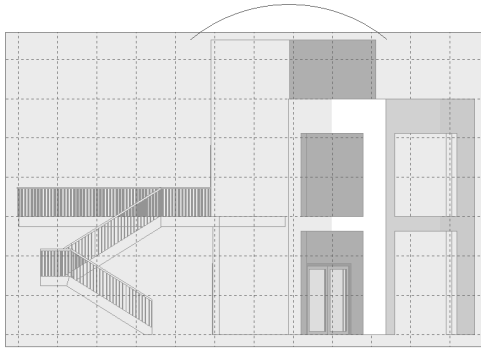
7. Enable **Name**.  
Select **Roof Shape** from the list of reference planes.  
Click **OK**.



8. Select the **Start-End-Radius Arc** tool from the Draw panel.

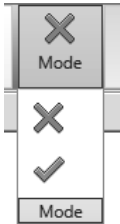


9.



Draw an arc over the building as shown.

10.



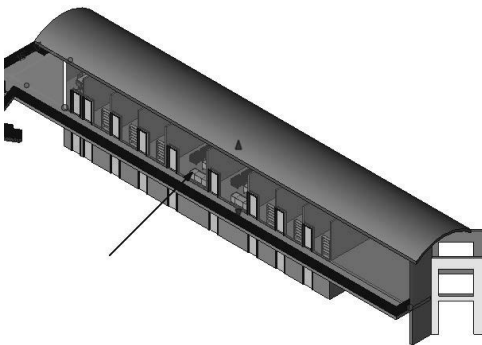
Select the **Green Check** under the Mode panel to finish the roof.

11.



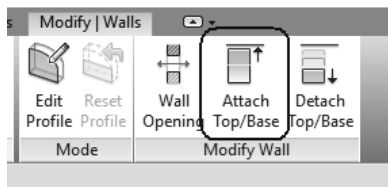
Switch to an isometric 3D view.

12.



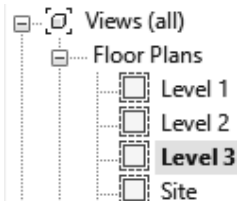
Hover over the wall below the roof.  
Click **TAB**.  
*All connected walls will be selected.*

13.



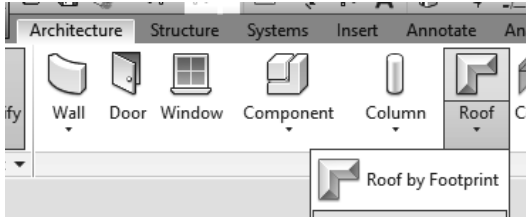
Select **Attach Top/Base** from the Modify Wall panel.  
Then select the roof.  
The walls will adjust to meet the roof.  
Orbit the model to inspect the walls.

14.

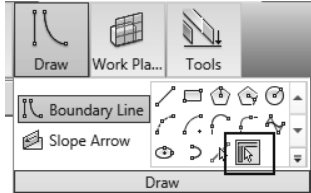


Activate the **Level 3** floor plan.

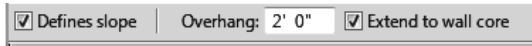
15. Activate the Architecture tab.  
Select the **Roof By Footprint** tool from the Build panel.



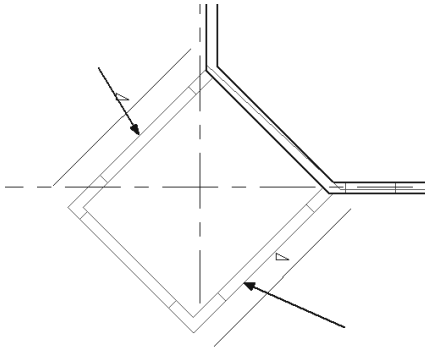
16. Select the **Pick Walls** tool from the Draw panel.



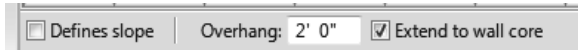
17. On the Options bar:  
Enable **Defines slope**.  
Set the Overhang to **2' 0"**.  
Enable **Extend to wall core**.



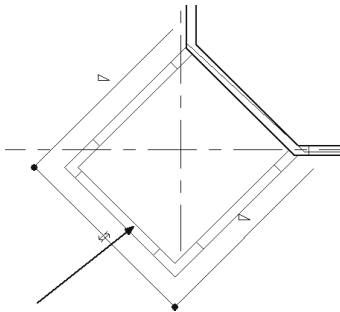
18. Select the outside edge of the two walls indicated.



19. Disable **Defines slope**.



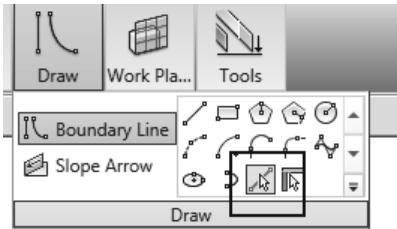
20. Select the outside edge of the wall indicated.



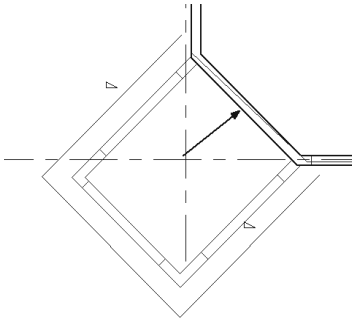
21. Disable **Defines slope**.  
Set the Overhang to **0' 0"**.



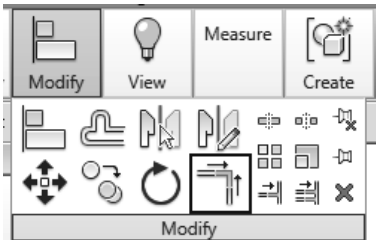
22. Select the **Pick Line** tool from the Draw panel.



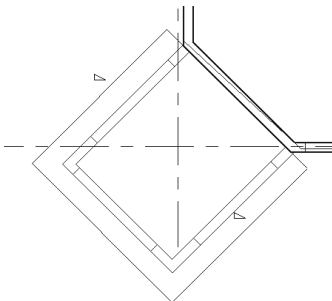
23. Pick the exterior side of the wall indicated.



24. Select the **Trim** tool from the Modify panel.



25. Trim the roof boundaries so they form a closed polygon.



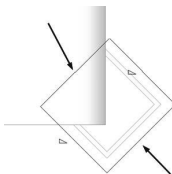
26. Set the Type to **Generic- 9"**. Click **OK**.



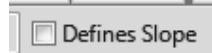
27. Set the Slope to **6"/12"**.



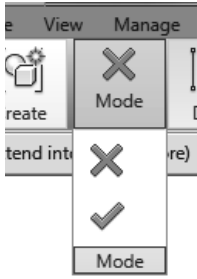
28. Verify that both the back and front boundary lines have no slope assigned.



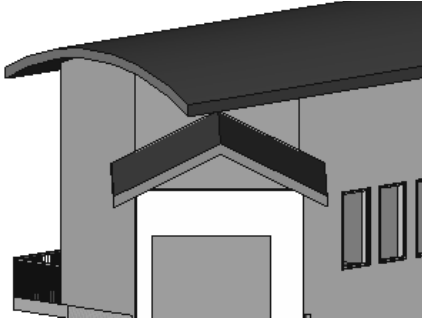
If they have a slope symbol, select the back and front boundary and lines and uncheck **Defines Slope** on the Options bar.



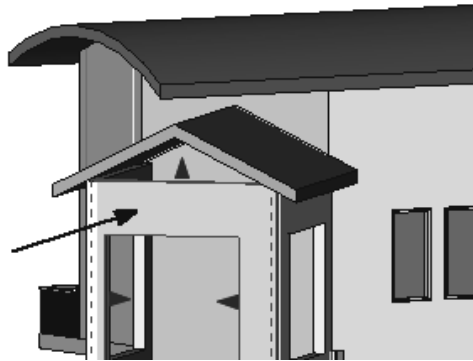
29. Once the sketch is closed and trimmed properly, select the **Green Check** on the Mode panel.



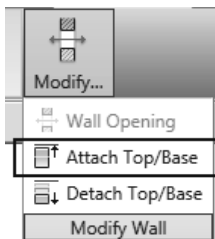
30. Return to a 3D view.



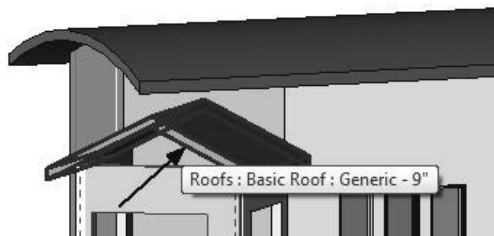
31. Hover over the front wall.  
Click TAB to select all connected walls.  
Left click to select the walls.



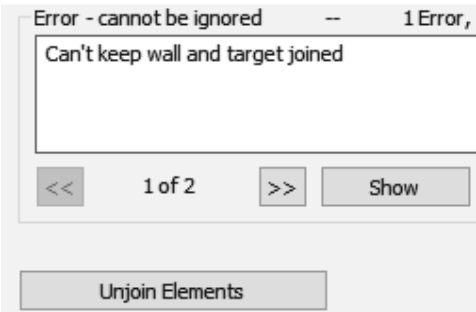
32. Select Attach Top/Base from the Modify Wall panel.



33. Select the roof to attach the wall.





34.  Click **Unjoin Elements**.  
Left click in the window to release the selection.  
Orbit around the model to inspect the roofs.
35. Close without saving.

## Exercise 1-9

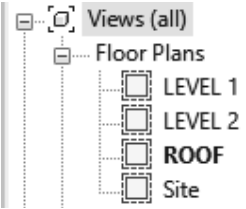
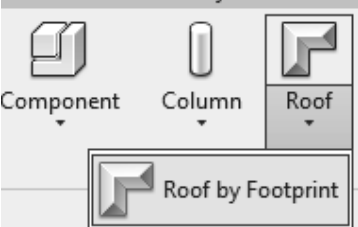
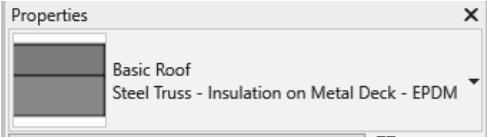
# Add Split Lines to a Roof

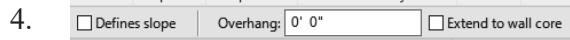
Drawing Name: **Split Lines Roof.rvt**  
Estimated Time to Completion: 20 Minutes

### Scope

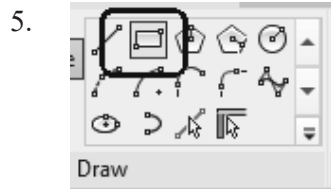
Create a roof by footprint.  
Modify a roof using split lines.

### Solution

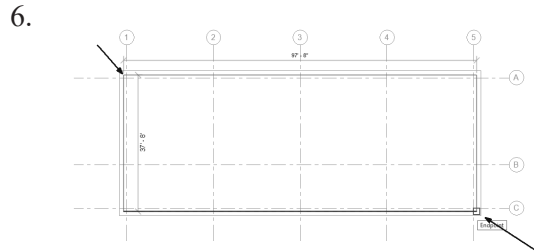
-  Activate the **ROOF** floor plan.
-  Select the **Roof by Footprint** tool from the ribbon.
-  Verify that the Type is set to Steel Truss – Insulation on Metal Deck – EPDM.



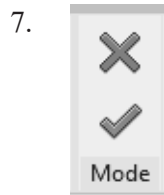
Disable **Defines slope**.  
Set the Overhang to **0' 0"**.  
Disable **Extend to wall core**.



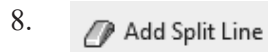
Select the **Rectangle** tool from the Draw panel.



Select the two inside corners of the parapet walls to define the rectangle.

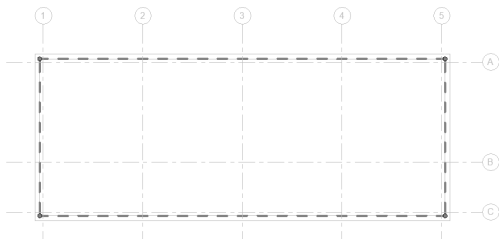


Select **Green Check** to complete the roof.

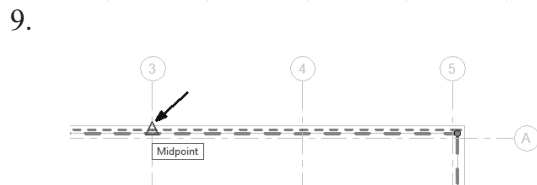


*The roof should still be highlighted.  
If you accidentally clicked ESC or deselected the roof, click on the roof to select it.*

Select the **Add Split Line** tool from the ribbon.



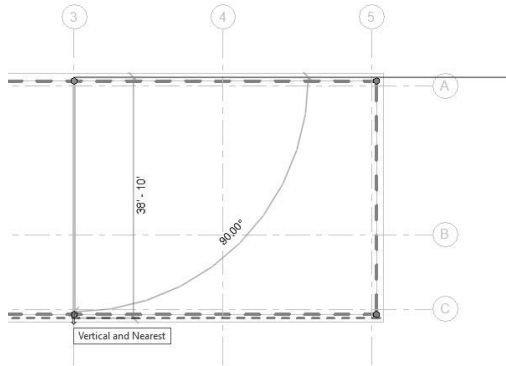
The display changes and shows the roof boundary with green dashed lines.



Start the split line at Grid 3 and Grid A.

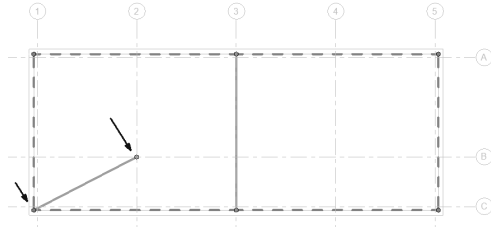
10.

End the split line at Grid 3 and Grid C.



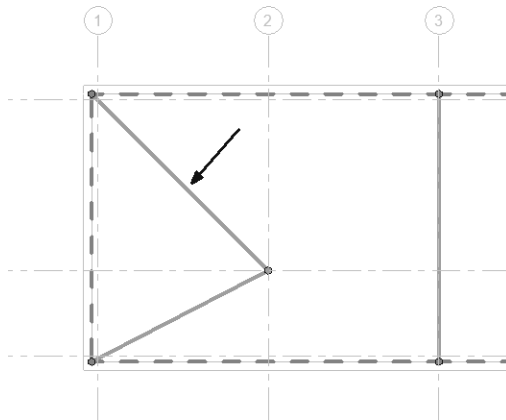
11.

Draw a split line from C1 to B2.



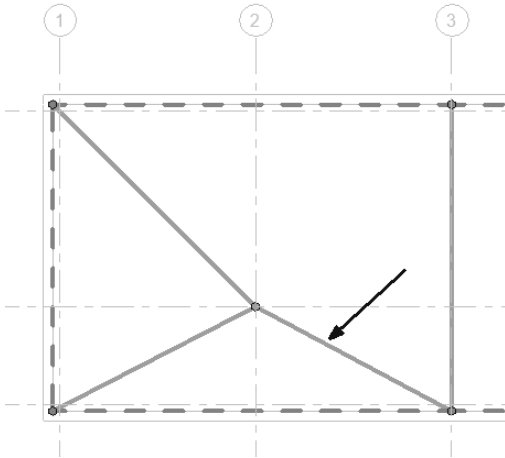
12.

Draw a split line from A1 to B2.



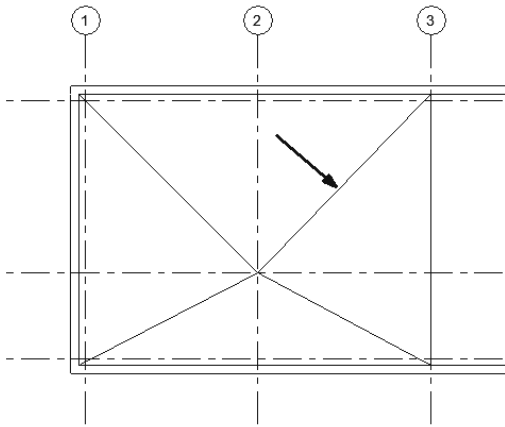
13.

Draw a split line from C3 to B2.



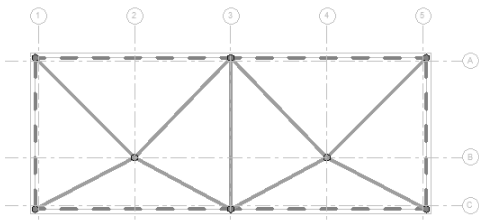
14.

Draw a split line from A3 to B2.



15.

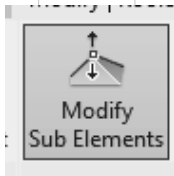
Add split lines that mirror the left side of the roof as shown.



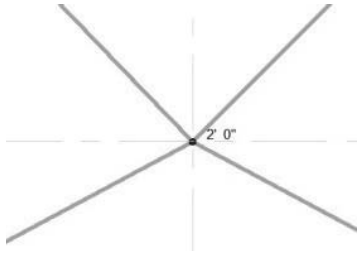
Notice you can't use the MIRROR or COPY tools. You must place each split line individually.

16.

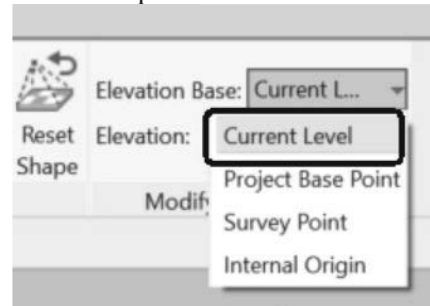
Enable **Modify Sub Elements**.



17.



Select the point at B2.

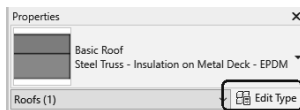


On the ribbon: set the Elevation Base to **Current Level**.

Set the Elevation to **2'-0"**.

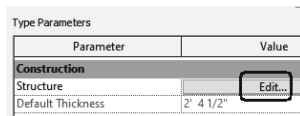
Repeat for the point at B4.

18.



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

19.



Click **Edit** next to Structure.

20.

	Function	Material	Thickness	Wraps	Variable
1	Finish 1 [4]	Roofing, EPD	0' 0 1/4"	<input type="checkbox"/>	<input type="checkbox"/>
2	Thermal/Air Layer [3]	Rigid insulatio	1' 0"	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	<b>Core Boundary</b>	<b>Layers Above</b>	<b>0' 0"</b>	<input type="checkbox"/>	<input type="checkbox"/>
4	Structure [1]	Metal Deck	0' 0 1/4"	<input type="checkbox"/>	<input type="checkbox"/>
5	Structure [1]	Structure, Ste	1' 4"	<input type="checkbox"/>	<input type="checkbox"/>
6	<b>Core Boundary</b>	<b>Layers Below W</b>	<b>0' 0"</b>	<input type="checkbox"/>	<input type="checkbox"/>

Note that Layer 2 has Variable enabled.

This is because we added a slope with split lines.

Click **OK** twice to close the dialog boxes.

21.



Click **Modify** on the ribbon to exit the roof editing mode.