

Inside:

SUPPLEMENTAL

FILES ON CD

# Revit Architecture 2011 Basics:

## from the Ground Up



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**SDC**  
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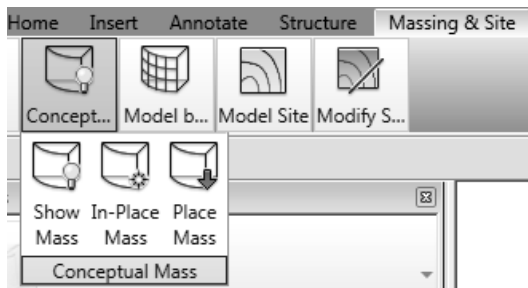
Better Textbooks. Lower Prices.









## Lesson 2

# Mass Elements

Mass Elements are used to give you a conceptual idea of the space and shape of a building without having to take the time to put in a lot of detail. It allows you to create alternative designs quickly and easily and get approval before you put in a lot of effort.

## *Massing Tools*



 In-Place Mass	Creates a solid shape.
 Show Mass	Controls the visibility of mass objects.
 Place Mass	Inserts a mass group into the active project.
 Model b... Model Site  Roof  Wall  Curtain System  Floor Model by Face	Model by Face: Converts a face into a Roof, Curtain Wall System, Wall, or Floor.

## Exercise 2-1 Adding a Level

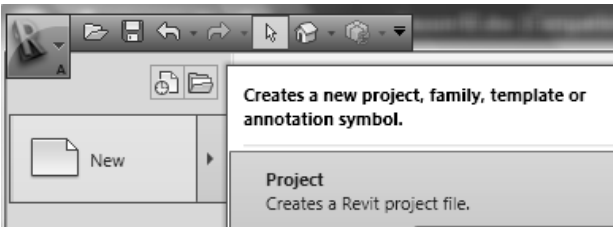
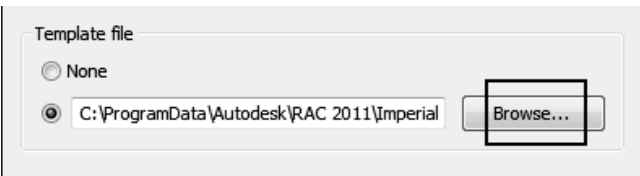

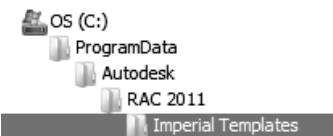
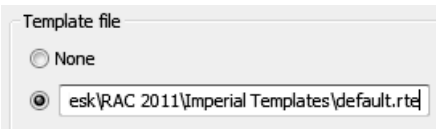
Drawing Name: default.rte [metric default.rte]  
Estimated Time: 5 minutes

This exercise reinforces the following skills:

- ❑ Switching Elevation Views
- ❑ Basics
- ❑ Add a Level

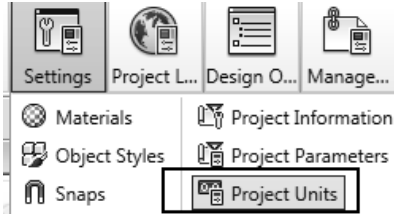
*This tutorial uses metric or Imperial units. Metric units will be designated in brackets.*

Revit uses a level to define another floor or story in a building.

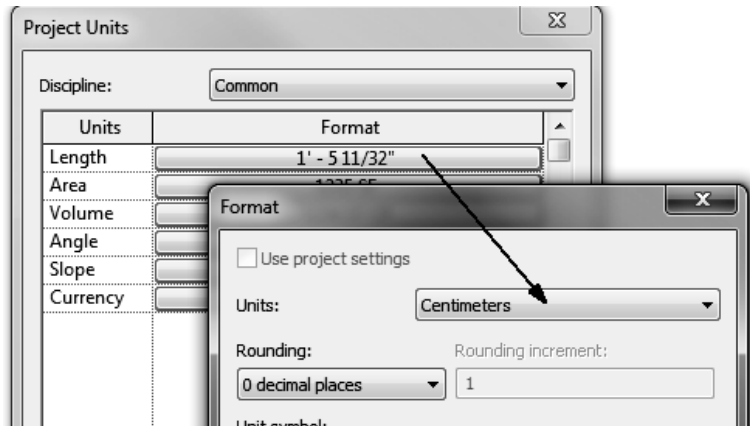
1.  Go to **New→Project**.
2.  Under the Template file: select **Browse**.
3.  Locate the *Metric Templates* folder under *ProgramData/Autodesk/RAC2011*.
3.  Locate the *Imperial Templates* folder under *ProgramData/Autodesk/RAC2011*.
4.  Select the *default.rte* [DefaultMetric.rte] template.  
*Brackets indicate metric is selected as an alternative.*  
Press **OK**.

If you accidentally picked Metric when you wanted Imperial or vice versa, you can change the units at any time. Revit will automatically switch any dimensions over to the active units.

To change Project Units, go to the Manage Ribbon.

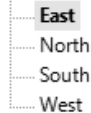


Select **Settings**→**Project Units**.



Left click the Length button, then select the desired units from the drop-down list.

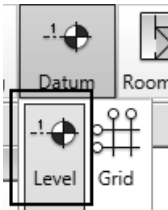
5. Double click **East** under Elevations.



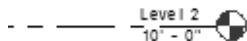
This activates the East view orientation.

6. Select the **Home** ribbon.

7. Select the **Level** tool under Datum. (This adds a floor elevation.)



8. Move your mouse to set an elevation of **12' [3650 mm]**.  
Pick to start the elevation line.



9. **Make Plan View** is checked.

In the Options bar located on the lower left of the screen, enable **Make Plan View**.

This should be enabled if you want Revit to automatically create a floor plan view of this level. If you forget to check this box, you can create the floor plan view later using the **View** Ribbon.



**TIP:** Double click on the blue elevation symbol to automatically switch to the floor plan view for that elevation.

10. Pick to place the end point to position the level indicator above the other indicators.

11. Basically, you place a new level by picking two points at the desired height.

Right click and select **Cancel** twice to exit the Level command.

Revit is always looking for references even among annotations, you will notice that your level tags snap and lock together so when you move one to the right or left, all those in line with it will follow.

The jogged line allows the user to create a jog if desired.

If you need to adjust the position of the tag, just click on the line, 3 blue grips will appear. These can be clicked and dragged as needed. You can also right click on a level tag and select 'Hide annotation in view' and the tag and level line will disappear in that view only.

Hide Annotation in View is only enabled if an object is selected first.


12. Save the file as a project as *ex2-1.rvt*.

**Exercise 2-2****Adding Mass Elements**

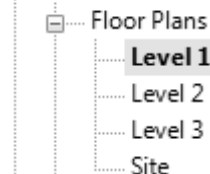
Drawing Name: ex2-1.rvt  
 Estimated Time: 10 minutes

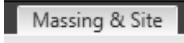
This exercise reinforces the following skills:

- ❑ Switching Elevation Views
- ❑ Add Mass

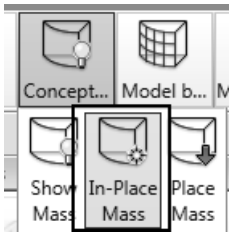
1.  Open or continue working in the file *ex2-1.rvt*.

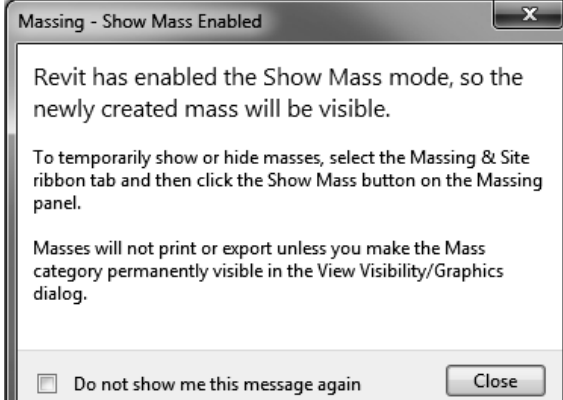
2.  Views (all) Activate the **Level 1** view.



3.  Select the **Site & Massing** ribbon.

4.  Select the **In-Place Mass** tool.



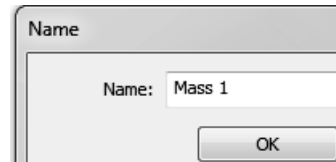
5.  The dialog box titled "Massing - Show Mass Enabled" is shown. It contains the following text: "Revit has enabled the Show Mass mode, so the newly created mass will be visible." "To temporarily show or hide masses, select the Massing & Site ribbon tab and then click the Show Mass button on the Massing panel." "Masses will not print or export unless you make the Mass category permanently visible in the View Visibility/Graphics dialog." At the bottom, there is a checkbox labeled "Do not show me this message again" and a "Close" button.

Masses, by default, are invisible. However, in order to create and edit masses you need to see what you are doing. Revit brings up a dialog to let you know that the software is switching the visibility of masses to ON, so you can work.

Press **Close**.

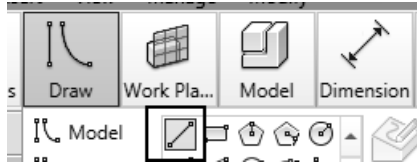
*If you don't want to be bugged by this dialog, enable the **Don't show me this message again** option.*

6.  Enter **Mass 1** in the Name field.



Press **OK**.

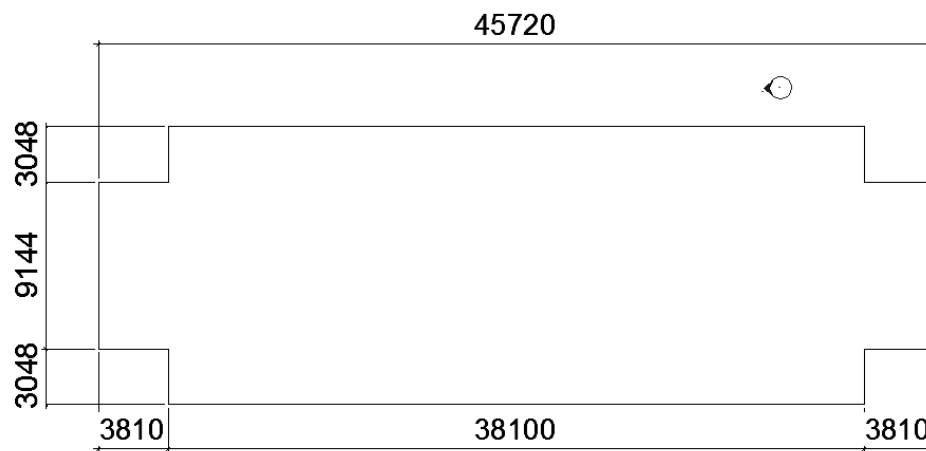
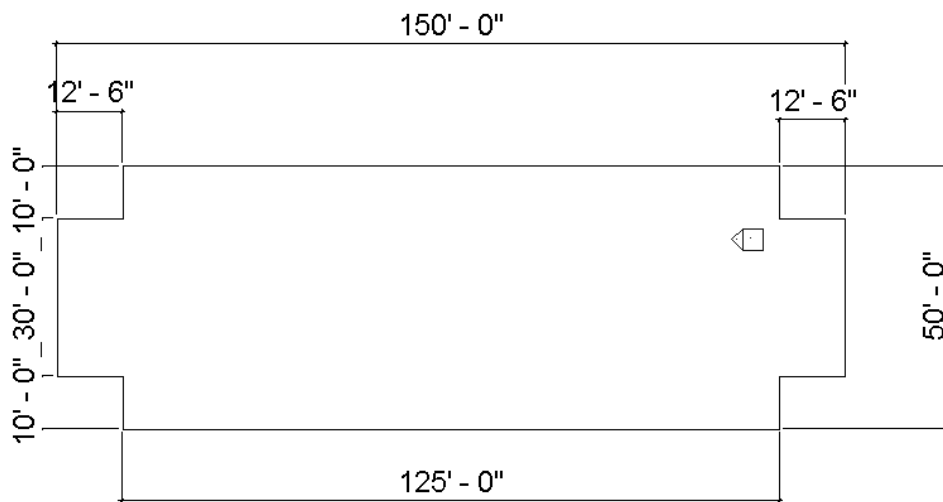
7. Select the **Line** tool located under the Draw panel.



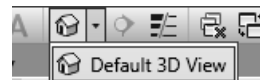
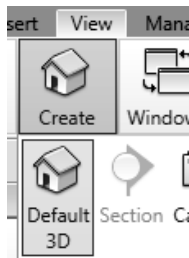
8. ☒ Chain Offset: 0' 0" ☐ Radius: 1' 0"

Enable **Chain** in the Options bar located on the bottom of the screen. This allows you to draw lines without always having to pick the start point.

9. Create the shape shown.  
The top figure shows the units in Imperial units.  
The bottom figure shows the units in millimeters.



10. Switch to a 3D view.

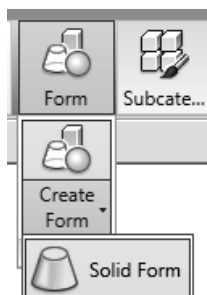


Activate the **View** ribbon and select **3D View**.

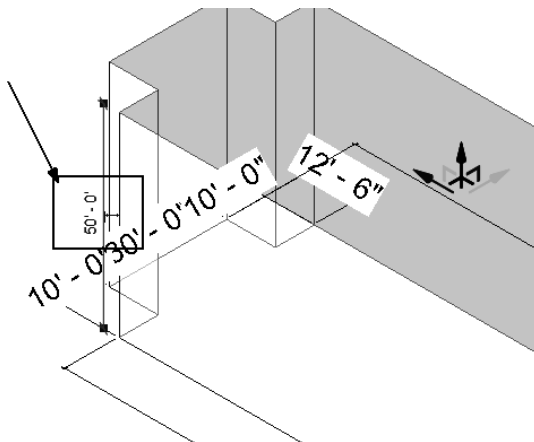
You can also switch to a 3D view from the Quick Access toolbar.

11. Window around the entire figure so it is highlighted.

12. Select **Form**→**Create Form**→**Solid Form**.

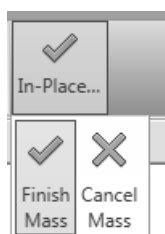


13.

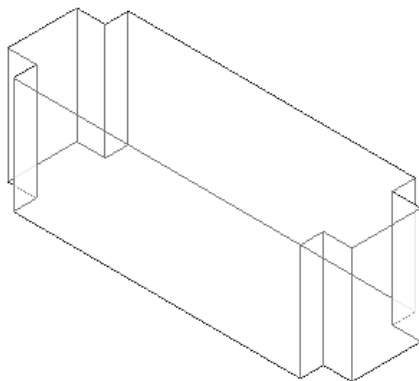


An extrusion distance is displayed.  
This can be edited, if desired.

14. Select the green check box to **Finish Mass**.



The Mass is created.



15. Save the file as *ex2-2.rvt*.



**TIP:** Object tracking will only work if the sketch objects are active and available in the current sketch. You can use **Pick** to copy entities into the current sketch.



**Exercise 2-3****Modifying Mass Elements**

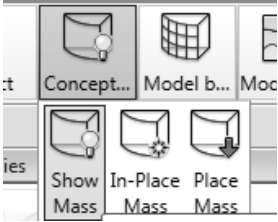
Drawing Name: ex2-2.rvt  
Estimated Time: 30 minutes

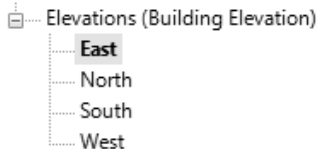
This exercise reinforces the following skills:

- ☐ Show Mass
- ☐ Align
- ☐ Modify Mass
- ☐ Mirror
- ☐ Create Form
- ☐ Save View

A short video of this exercise is available on my website to help users with this exercise. Access at [www.mossdesigns.com/ex3-3-revit.avi](http://www.mossdesigns.com/ex3-3-revit.avi).

1. Open *ex2-2.rvt*.

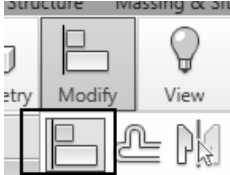
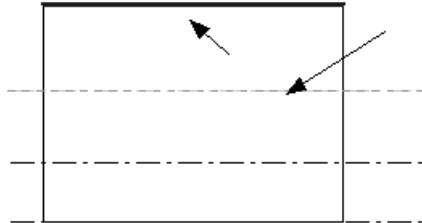
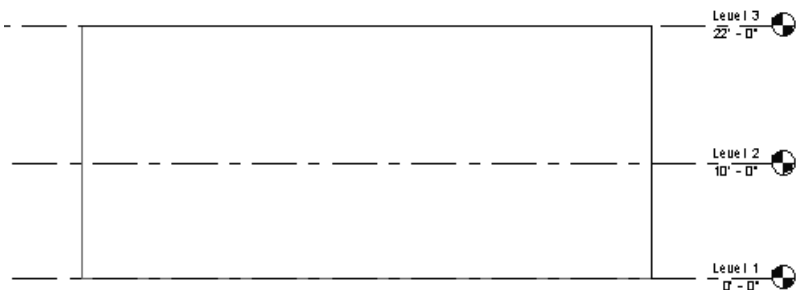
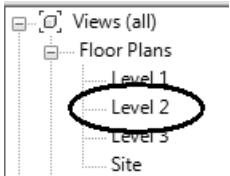
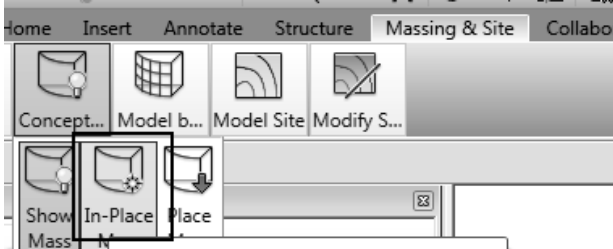
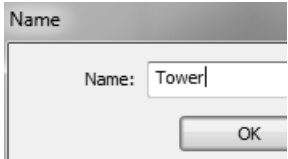
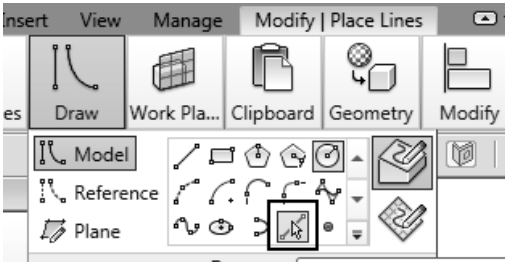
2.  If you don't see the mass, **Show Mass** on the Massing & Site ribbon to turn mass visibility ON.

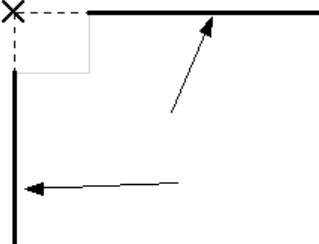
3.  Activate the **East** Elevation.

4.  We see that top of the building does not align with Level 3.

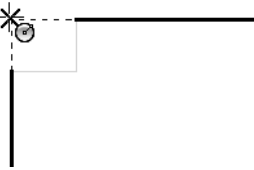
*To adjust the horizontal position of the level lines, simply select the line and use the grip to extend or shorten it.*

5.  Select the **Modify** Ribbon.

6.  Select the **Align** tool.  
*When using Align, the first element selected acts as the source, the second element selected shifts position to align with the first element.*
7.  Select the top level line (Level 3) then select the top of the extrusion.  
Right click and select **Cancel** to exit the Align command.
8.  The top of the extrusion now aligns to level 3.
9.  Activate **Level 2** under Floor Plans.
10.  Select **In-Place Mass**.
11.  Name the new mass **Tower**.  
Press **OK**.
12.  You can use object tracking to locate the intersection between the two corners.  
To activate object tracking, enable the **Pick Lines** tool located under Draw. Then select the two lines you want to align with.

13.  Select the two lines indicated to be used for object tracking to locate the center of the circle.

14.  Select the **Circle** tool under Draw.

15.  When you see the large X and the tooltip says Intersection, you will have located the intersection.

Pick to locate the center of the circle at the intersection.

16.  Enter a radius of **16'-0" [4880]**.

When you used the Pick Line tool, you copied those lines into the current sketch. Once the lines were part of the current sketch, they could be used for object tracking.

17. Select the circle sketch so it is highlighted.

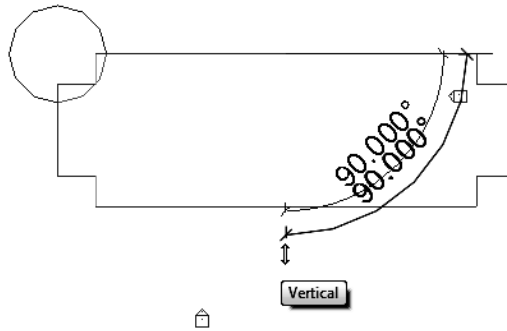
18.  Select the **Draw Mirror Axis** tool under the **Mirror** tool.

19.  Locate the midpoint of the small horizontal line and pick.

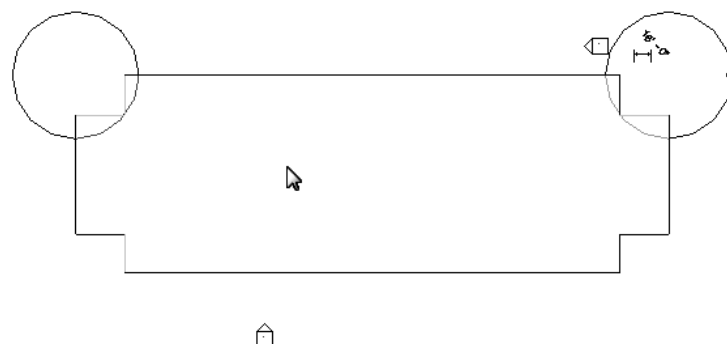
20.



Bring your mouse down in the Vertical direction and pick for the second point of the mirror axis.



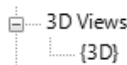
21.



The circle sketch is mirrored.

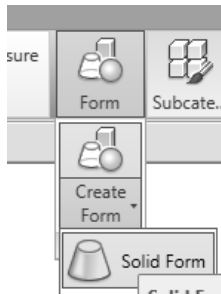
Left click to release the selection.

22.



Switch to a 3D view using the Project Browser.

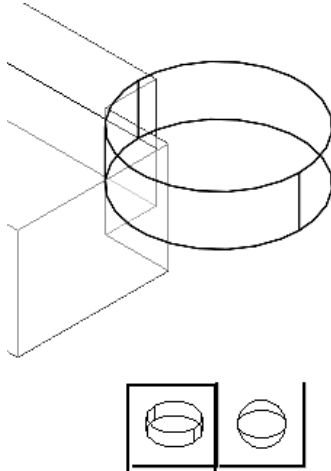
23.



Select one of the circles so it is highlighted.

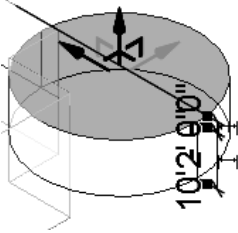
Select **Form**→**Create Form**→**Solid Form**.

24.



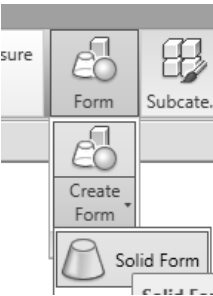
A small toolbar will appear with two options for extruding the circle.

Select the option that looks like a cylinder.

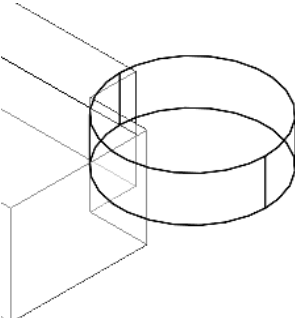
25.  A preview of the extrusion will appear with the temporary dimension. You can edit the temporary dimension to modify the height of the extrusion.

Press ENTER to accept the default height.

26.  The circle is extruded.

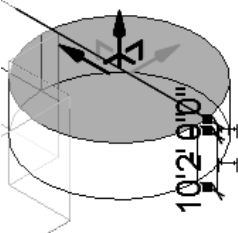
27.  Select the remaining circle so it is highlighted.

Select **Form**→**Create Form**→**Solid Form**.

28.  A small toolbar will appear with two options for extruding the circle.

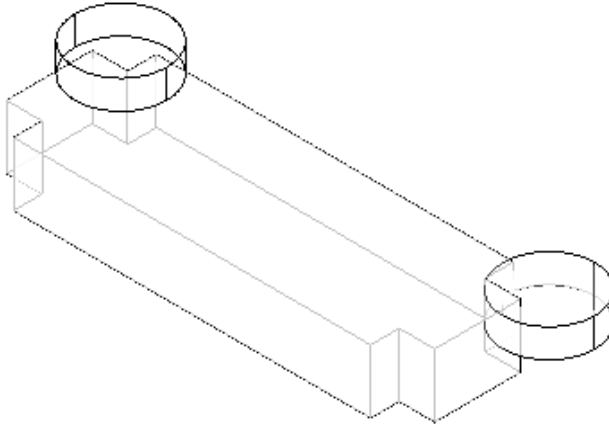
Select the option that looks like a cylinder.



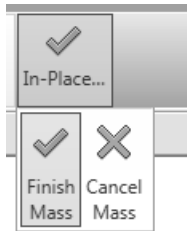
29.  A preview of the extrusion will appear with the temporary dimension. You can edit the temporary dimension to modify the height of the extrusion.

Press ENTER to accept the default height.

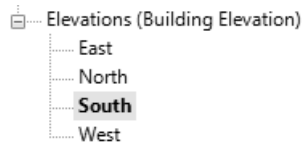
30. Both circles are now extruded.



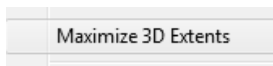
31. Select **Finish Mass**.



32. Activate the **South** Elevation.

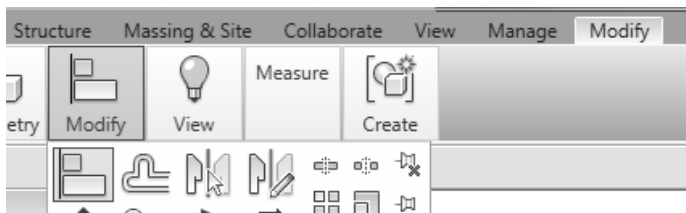


33. Select each level line.



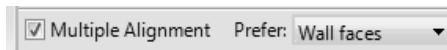
Right click and select **Maximize 3D Extents**.  
This will extend each level line so it covers the entire model.

34. Activate the Modify ribbon.

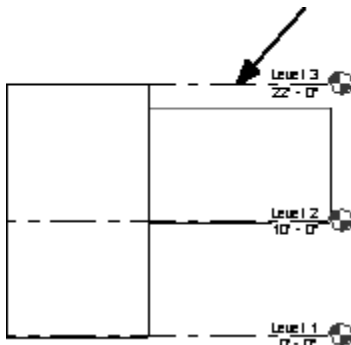


Select the **Align** tool from the Modify Panel.

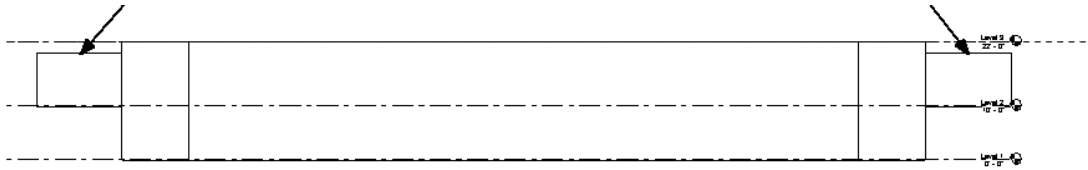
35. On the Options bar, enable **Multiple Alignment**.




36. Select the Level 3 line as the source object.

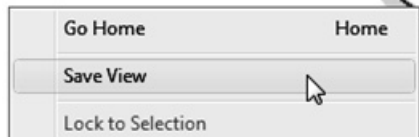


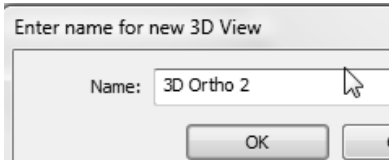
37. Select the top of the two towers as the edges to be shifted.




38.  Use the ViewCube located in the upper right of the screen to orbit the model.

39.  To save the new orientation, right click on the ViewCube and select **Save View**.



40.  Enter **3D Ortho 2** for the name of the view.  
Press **OK**.

41.  The **Saved** view is now listed in the Project browser under 3D Views.

42. Save the file as *ex2-3.rvt*.



- Pick on a mass element to activate the element's grips. You can use the grips to change the element's shape, size, and location.
- You can only use the **View→Orient** menu to activate 3D views when you are already in 3D view mode.

**Exercise 2-4****Creating Wall by Face**


Drawing Name: ex2-3.rvt  
 Estimated Time: 15 minutes

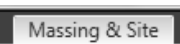
This exercise reinforces the following skills:

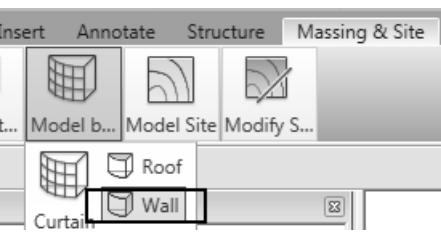
- ☐ Wall by Face
- ☐ Trim
- ☐ Show Mass


You can add doors and windows to your conceptual model to make it easier to visualize.

1. Open *ex2-3.rvt*.

2.  Activate the **SAVED** view under 3D Views.

3.  Activate the **Massing & Site** ribbon.

4.  Select **Model by Face→Wall**.

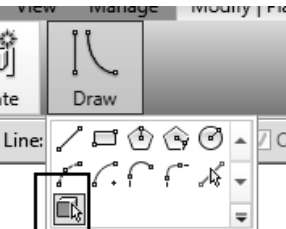
5.  Note the wall type currently enabled in the Properties pane. A different wall type can be selected from the drop-down list available using the small down arrow.

*Imperial:*

Set the Default Wall Type to:  
**Basic Wall: Generic- 8 in.**

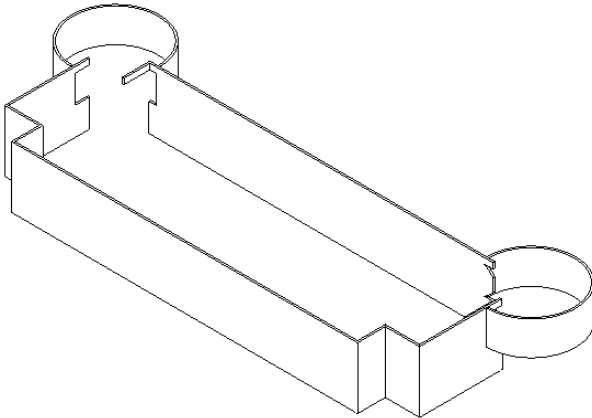
*Metric:*

Set the Default Wall Type to:  
**Basic Wall: Generic- 200 mm.**

6.  Enable **Pick Faces** from the Draw Panel on the ribbon.



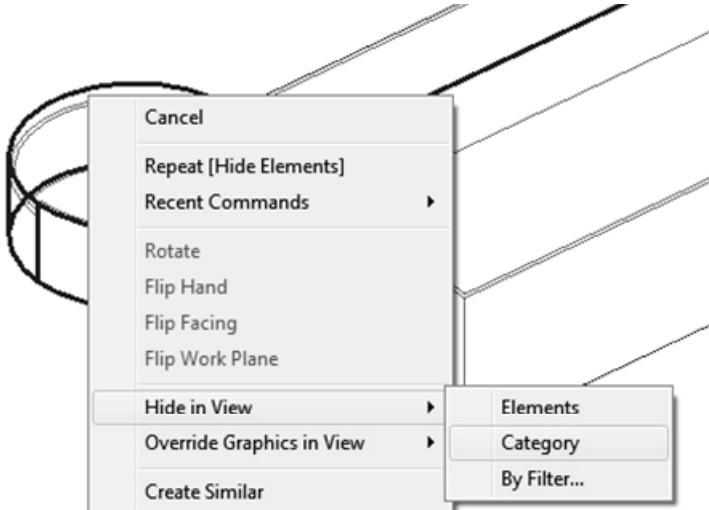
7.



Select each wall and cylinder.  
The cylinder will be halved by the walls, so you will have to select each half.

You will have to do some cleanup work on the corners where the towers are.

8.



Select any visible mass.  
Right click and select  
**Hide in View**→  
**Category**.

*This will turn off the visibility of masses.*

9.



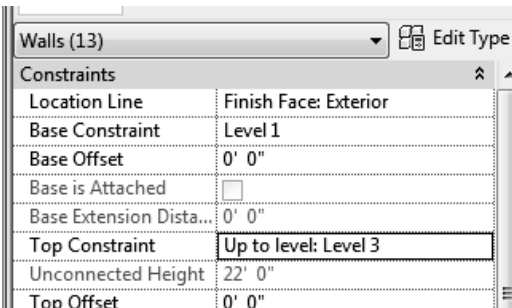
Activate **Level 1** floor plan.

10.



Window around all the walls to select.  
Use Filter to select only walls, if needed.


11.

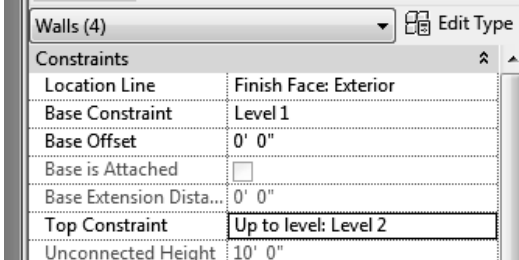


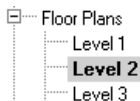
In the Properties pane:

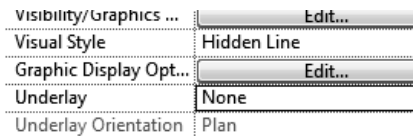
Set the Top Constraint to **up to Level 3**.

Right click and select Cancel to release the selection.

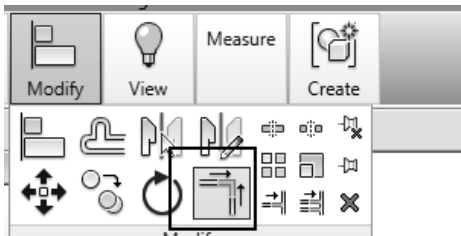
12.  Hold down the Ctrl Key.  
Select the four walls indicated.

13.  In the Properties pane:  
Set the Top Constraint to **up to Level 2**.  
Right click and select Cancel to release the selection.

14.  Activate **Level 2** under Floor Plans.

15.  In the Properties Pane:  
Set the Underlay to **None**.

*This will turn off the visibility of all entities located below Level 2.*

16.  Select the **Trim** tool from the Modify ribbon to clean up where the tower joins with the walls.

17. When you select to trim, be sure to select the section you want to keep.


18.  Select the arc and wall indicated.


19.  Select the arc and wall indicated.

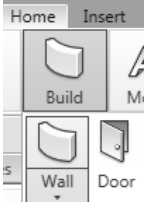
Select the first line or wall to trim/extend. (Click on the part you want to keep)

Note that you have some instructions in the lower left of the screen to assist you.

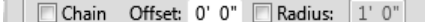
20.  Trim the walls as shown on Level 2.


21.  Activate Level 1.

22.  On Level 1, you should only see the walls with no towers.  
There are some small gaps where the towers overlap.

23.  Activate the Home ribbon.  
Select the **Wall** tool on the Build Pane.

24.  On the Options bar:  
Set the Height to **Level 2**.

25.  Disable **Chain**.

26.  Close the gaps and trim as needed.

27.  Switch to a 3D view and orbit your model.

Check to make sure the walls and towers are adjusted to the correct levels.

28. Save as *ex2-4.rvt*.

**Exercise 2-5****Adding Doors and Windows**


Drawing Name: ex2-4.rvt  
 Estimated Time: 30 minutes


This exercise reinforces the following skills:

- ☐ Basics
- ☐ Door
- ☐ Load from Library
- ☐ Window
- ☐ Array
- ☐ Mirror
- ☐ Shading

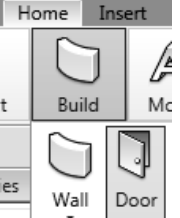
You can add doors and windows to your conceptual model to make it easier to visualize.

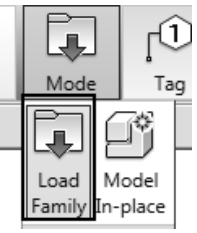
1. Open *ex2-4.rvt*.

2.  Activate **Level 1** under Floor Plans.

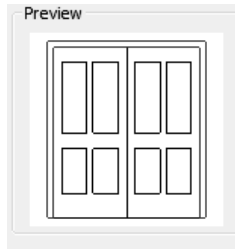
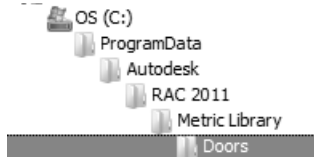
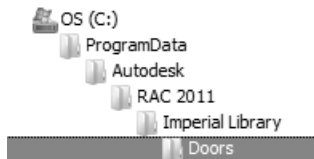
3.  Level 1 should appear like this.

4.  Activate **Home ribbon**.

5.  Select the **Door** tool under the Build panel.

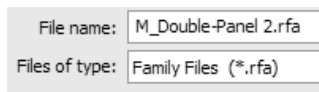
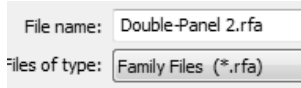
6.  Select **Load Family** under the Mode panel.

7. Browse to the **Doors** folder under the Imperial or Metric library – use Imperial if you are using Imperial units or use Metric if you are using Metric units.



As you highlight each file in the folder, you can see a preview of the family.

8. For Imperial Units:  
Locate the *Double-Panel2.rfa* file.
- For Metric Units:  
Locate the *M\_Double-Panel 2.rfa* file.
- Press **Open**.



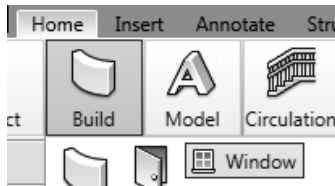
- 9.

Place the door so it is centered on the wall as shown.

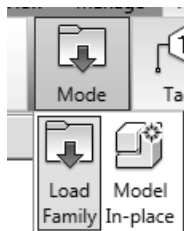
Doors are wall-hosted. So, you will only see a door preview when you place your cursor over a wall.

- 10.
- If you press the space bar before you pick to place, you can control the orientation of the door.
- After you have placed the door, you can flip the door by picking on it then pick on the vertical or horizontal arrows.

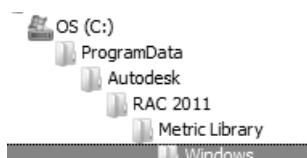
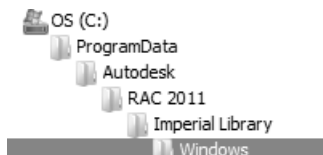
11. Pick the **Window** tool from the Build panel.



12. Select **Load Family** from the Mode panel.



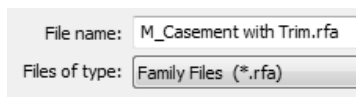
13. Browse to the **Windows** folder under the Imperial or Metric library – use Imperial if you are using Imperial units or use Metric if you are using Metric units.



14. For Imperial Units:  
Located the *Casement with Trim.rfa* file.

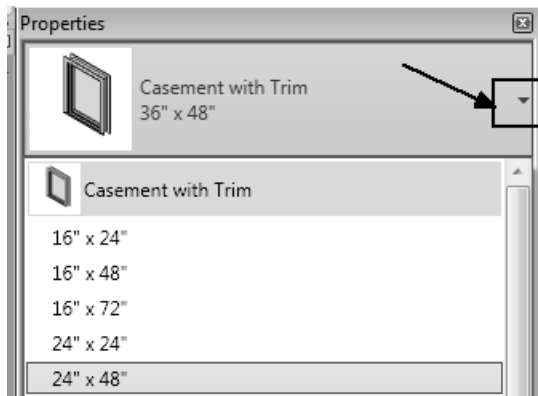


For Metric Units:  
Locate the *M\_Casement with Trim.rfa* file.

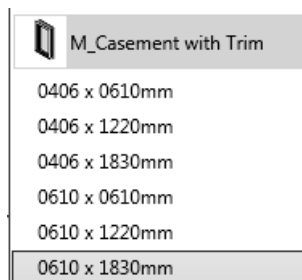


Press **Open**.

15. For Imperial Units:  
From the drop-down list, select the 24" x 48" size for the Casement with Trim window.

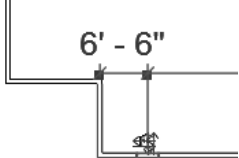


*Access the list of available sizes using the small down arrow indicated.*



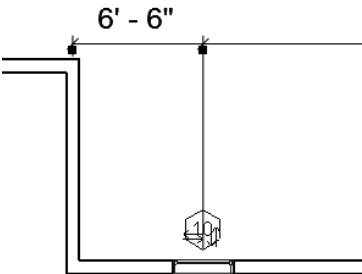
For Metric Units:

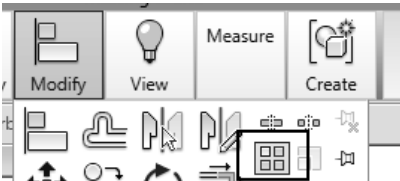
From the drop-down list, select the 0610 x 1830 mm size for the M\_Casement with Trim window.

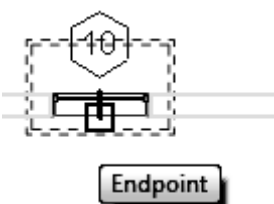
16.  Place the window **6'-6"** [3000 mm] from the inner left wall.  
Right click and select **Cancel** to exit the command.

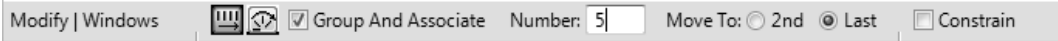
Dimensions in Revit work differently. Revit uses *temporary* dimensions and *permanent* dimensions. Permanent dimensions are the parametric dimensions attached to each object. You can modify these dimensions by clicking on the object. Temporary dimensions are the dimensions you place using the Dimension tool or typing 'DI'. The dimension values of temporary dimensions can only be modified by changing the permanent dimensions.

If you want to define the position of an object using a dimension that doesn't appear when you pick the object, you can apply a temporary dimension using the Dimension tool. This will add a permanent dimension to the object that can then be used to position the object.

17.  Pick the window so it highlights.

18.  Select the **Array** tool under the Modify panel.

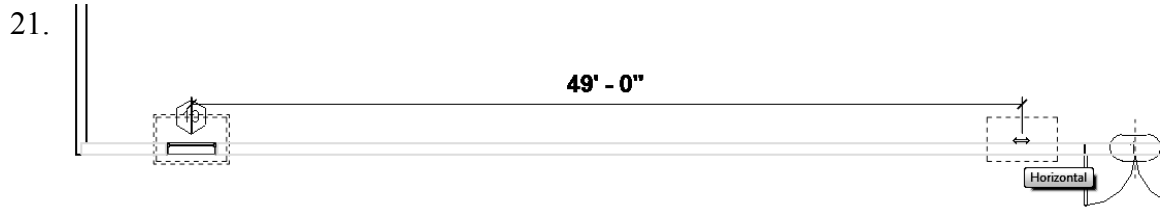
19.  Select the midpoint of the window as the basepoint for the array.

20. 

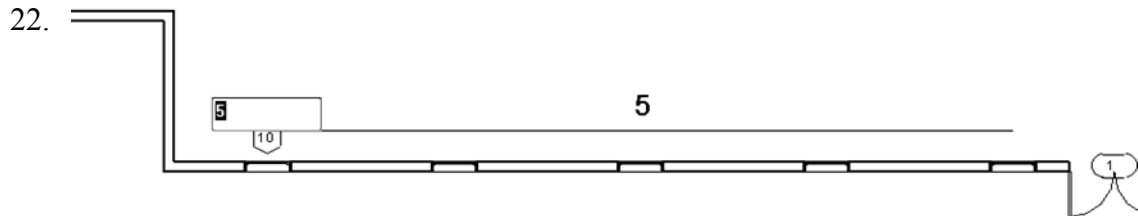
Enable **Group and Associate**. This assigns the windows placed to a group and allows you to edit the array.

Set the array quantity to **5** on the options bar located on the bottom of the screen.  
Enable **Last**.

Array has two options. One option allows you to place elements at a set distance apart. The second option allows you to fill a distance with equally spaced elements. We will fill a specified distance with five elements equally spaced.

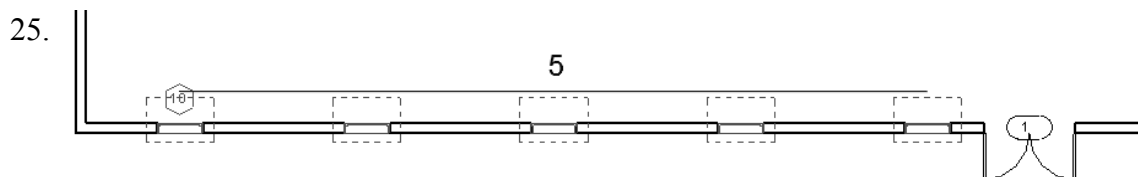
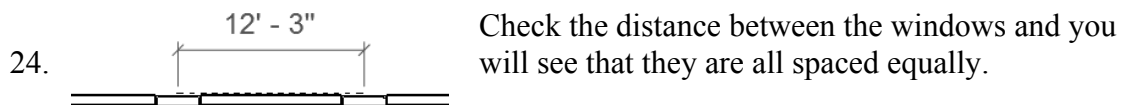
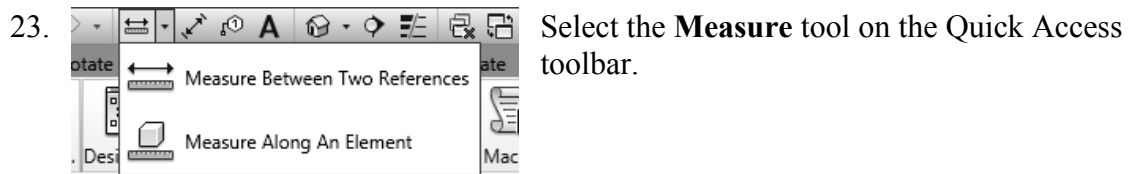


Pick a point 49'-0" [14,935.20] from the first selected point to the right.



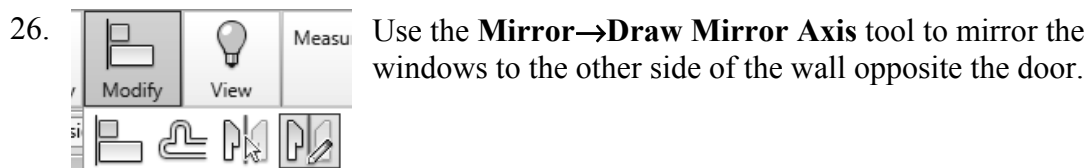
You will see a preview of how the windows will fill the space.

Press **ENTER** to accept.



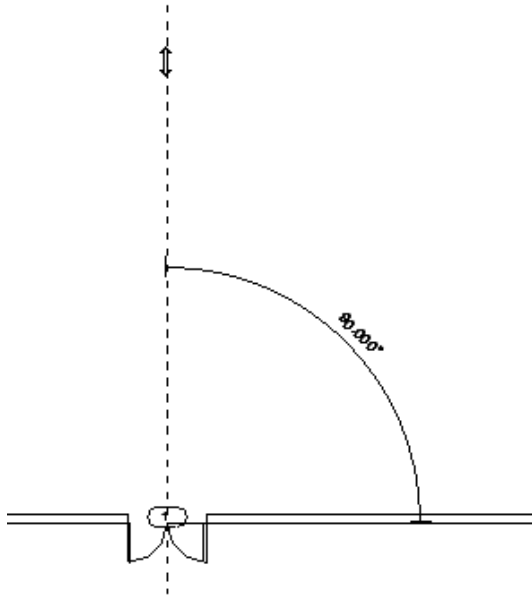
Window around the entire array to select all the windows.

The array count will display.





27.

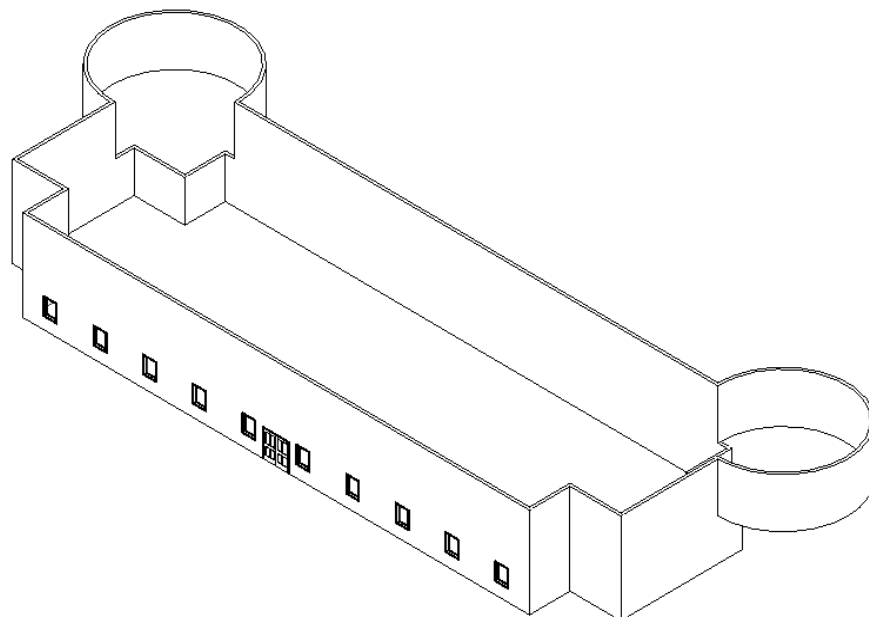
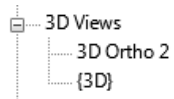


Select the center of the door as the start point of the mirror axis.

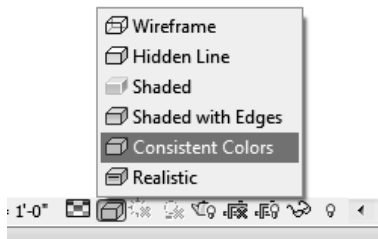
Move the cursor upwards at a 90 degree angle and pick a point above the door.

28. Left pick anywhere in the graphics window to complete the command.

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



30.

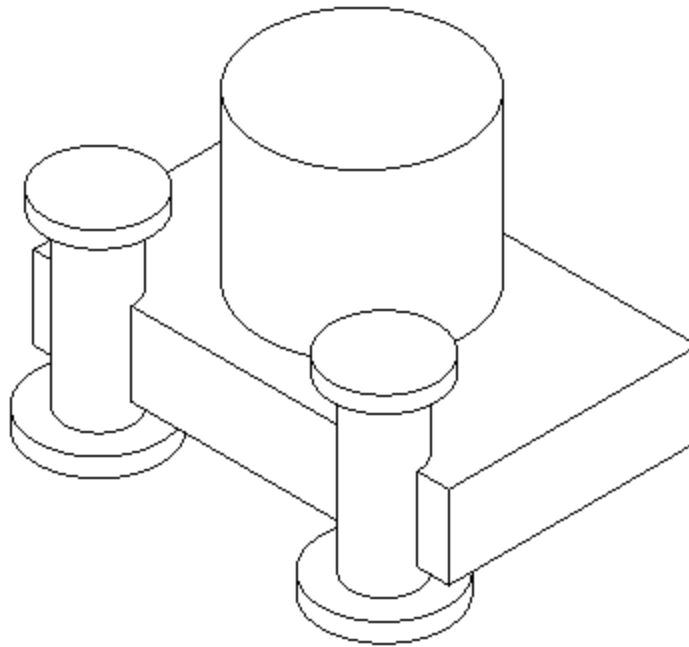


Set the Model Graphics Style to **Consistent Colors**.

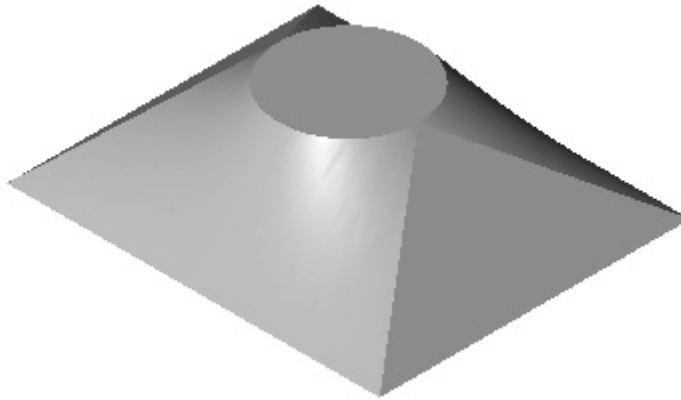
We have created a conceptual model to show a client.

31. Save the file as *ex2-5.rvt*.

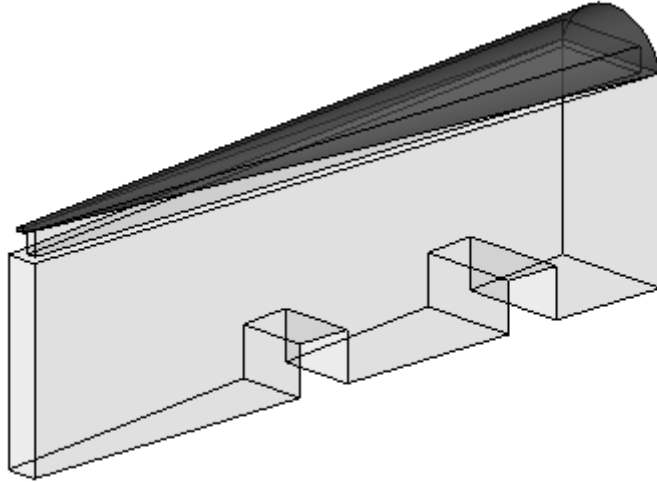
## Additional Projects



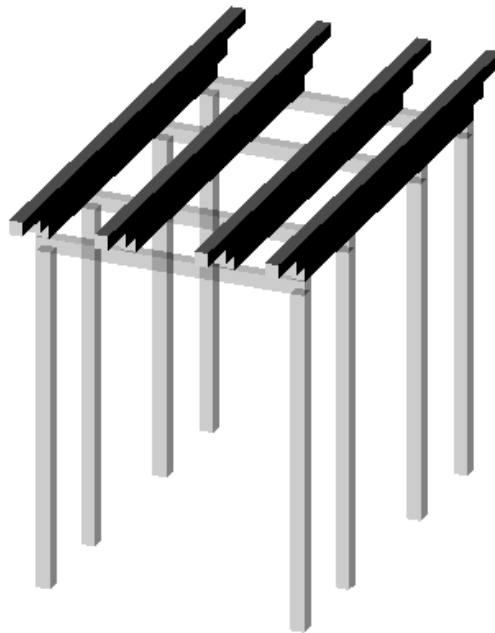
- 1) Create a conceptual model like the one shown using an extruded rectangle, an extruded cylinder and a revolve.



- 2) Make the shape shown using a Blend. The base is a rectangle and the top is a circle located at the center of the rectangle.




- 3) Make a triangle using an extrusion.  
Use Offset to create the upper triangle.  
Use a Blend to create the top piece with two arcs.  
Use Solid Void to create the two openings.



- 4) Design a pergola using 4" x 4" posts and beams.

## Lesson 2 Quiz

### ***True or False***

1. Masses can be created inside Projects or as a Conceptual Mass file.
2. Forms are always created by drawing a sketch, selecting the sketch, and clicking  Create Form.
3. In order to see masses, Show Mass must be enabled.
4. Masses are level-based.

### ***Multiple Choice [Select the Best Answer]***

5. Faces on masses can be converted to the following:
  - A. Walls
  - B. Ceilings
  - C. Floors
  - D. Doors
  - E. A, B, and C, but NOT D
6. You can adjust the distance a mass is extruded by:
  - A. Editing the temporary dimension that appears before a solid form is created
  - B. Use the ALIGN tool.
  - C. Use the 3D drag tool
  - D. Using the Properties pane located on the left of the screen.

### ***ANSWERS:***

- 1) T; 2) T; 3) T; 4) T; 5) E; 6) A, B, and C