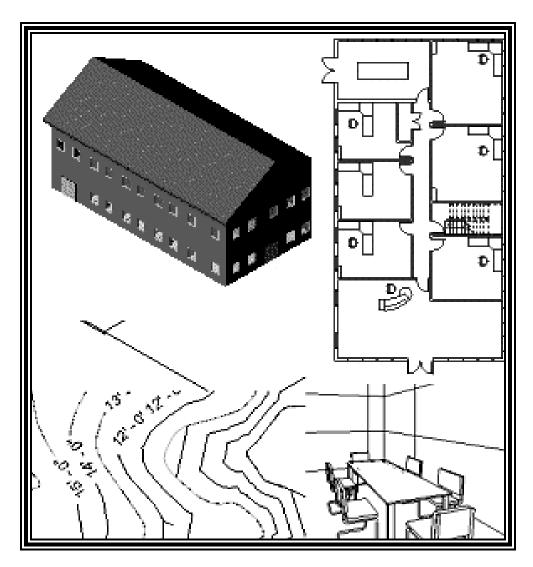


Revit Architecture 2009 Basics:

from the Ground Up



Elise Moss



Schroff Development Corporation www.schroff.com

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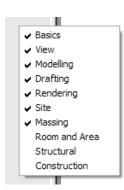
Lesson 3 Mass Elements

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

	Add Mass	Creates a solid shape
Place Mass	Place Mass	Places a mass group
₩all by Face	Wall by Face	Converts a face into a wall
Floor by Face	Floor by Face	Converts a face into a floor
Curtain System by Face	Curtain System by Face	Converts a face into a curtain wall.
Roof by Face	Roof by Face	Converts a face into a roof
⇔ Section	Section	Create a section of the model
Level	Level	Add a level

You may not see a Massing bar on your Design bar.



Just like toolbars, you can control which bars are active/inactive in your Design bar. To activate/deactivate, simply right click on the top of a bar button to see the list of design buttons. Then, check/pick the desired bar. You will need to activate the Massing bar for this lesson.

Exercise 3-1 Adding a Level

Drawing Name: metric default.rte

Estimated Time: 5 minutes

This exercise reinforces the following skills:

- Switching Elevation Views
- Basics
- □ Add a Level

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

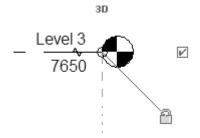
- 1. Start a new project.
- 3. Select the **Massing** button from the Design bar.
- 4. Select the **Level** tool. (This adds a floor elevation.)
- Move your mouse to set an elevation of **3650**.

 Pick to start the elevation line.
- 6. Make Plan View In the Options bar, 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** \rightarrow **New Floor Plan**.

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

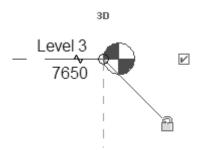
7.



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

8. 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.

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.

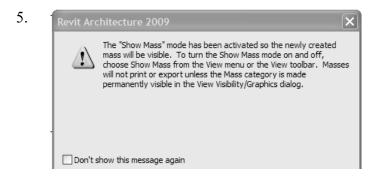
9. Save the file as *ex3-1.rvt*.

Exercise 3-2 Adding Mass Elements

Drawing Name: ex3-1.rvt Estimated Time: 10 minutes

This exercise reinforces the following skills:

- Switching Elevation Views
- Add Mass
- 1. Open or continue working in the file *ex3-1.rvt*.
- 3. Select the **Massing** tool from the Design bar.
- 4. Select the **Create Mass** tool.



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 OK.

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



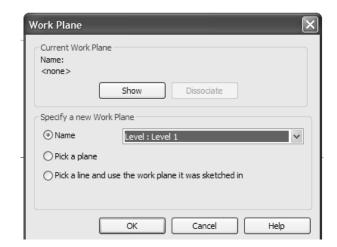
Enter Level 1 in the Name field.

Press OK.



Select Solid Form→Solid Extrusion.

8.



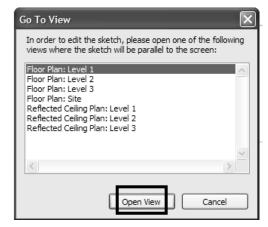
Enable Name.

Select Level 1 from the dropdown list.

Press OK.

This specifies the work plane where the extrusion will be placed.

9.



Highlight Floor Plan: Level 1.

Select Open View.

The display will switch to the plan view of level 1.

We could have just started on the plan view instead of the east elevation view.

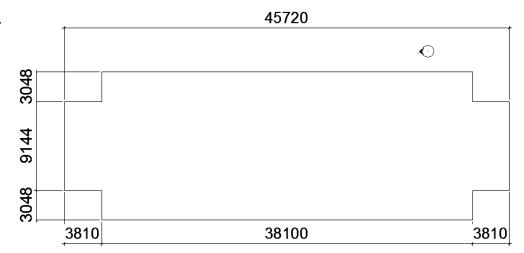
10.



Enable Chain in the Options bar.

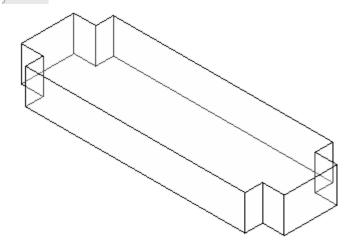
This allows you to draw lines without always having to pick the start point.

11.



Create the shape shown.

- 12. Select Finish Sketch.
- 13. Finish Mass Select Finish Mass.
- 14. Select the **3D** view tool.



15. Save the file as *ex3-2.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 3-3 **Modifying Mass Elements**

Drawing Name: ex3-2.rvt Estimated Time: 30 minutes

This exercise reinforces the following skills:

- Extrude
- □ Add Mass

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.

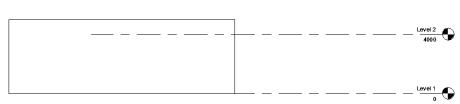
1. Open *ex3-2.rvt*.



If you don't see the mass, go to **View→Show Mass** to turn mass visibility ON.

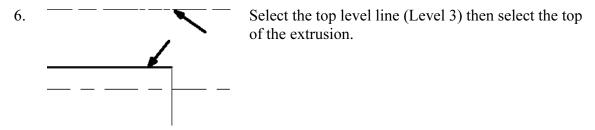


We see that our building isn't really tall enough.



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

- 3. Highlight the mass in red. Select **Edit**.
- 4. Make sure that **Modify** is enabled.
- 5. Select the **Align** tool.



7. Level 3 7700 Level 2 4000

The top of the extrusion extends to the level 3.

8. Floor Plans Activate Level 2 under Floor Plans.

Level 2
Level 3

Verify that you are still editing the mass. If you are not in Edit Mass mode, you will see the following tools on the design bar:



If you are not in Edit Mass mode, select the mass and then select Edit on the option bar.

If you are in Edit Mass mode, you should see the following tools on the design bar:



9. Solid Form » Solid Extrusion

Void Form » Solid Blend

Solid Revolve

Finish Mass Solid Sweep

Select Solid Form→Solid Extrusion.

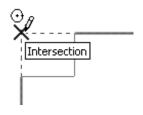
Note we should still be editing the original mass.

- 10. Lines Enable Lines mode.
- 11. You can use object tracking to locate the intersection between the two corners.

 To activate object tracking, enable the **Pick** tool . Then select the two lines you want to align with.

Then enable the **Draw** tool.

Select the **Circle** tool from the Options bar.



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.

13. Depth 3660 On the Options bar: set the Depth to **3660**.

Press **OK**.

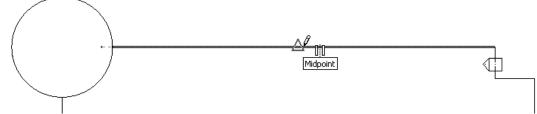
14.

Enter a radius of 4880.

When you selected the two lines, you copied those lines into the current sketch. You need to delete those two lines or you will get a warning error when you try to exit the sketch.

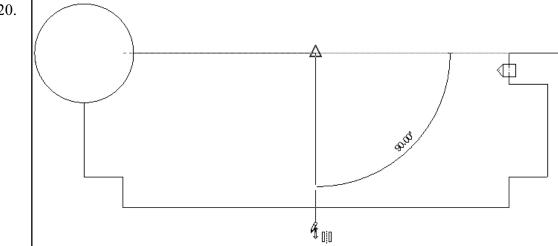
- 15. Select the two copied lines. Right click and select **Delete**.
- 16. Select Finish Sketch.
- 17. Verify that the circle is still highlighted. Select the **Mirror** tool from the Options bar.





Locate the midpoint of the small horizontal line and pick.





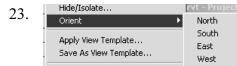
Bring your mouse down in the Vertical direction and pick for the second point of the mirror axis.

21. ●|●Finish Mass Select Finish Mass.

> If the mass object disappears, it simply means you have to re-enable the Show Mass option under View.

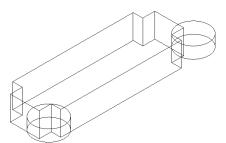
22. Activate the **3D** view.





Deactivate View

Go to View→Orient→Northeast.



Northeast

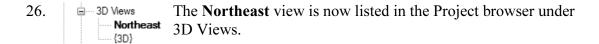
Northwest

The view changes.

24. Save View Go to View→Orient→Save View.

25. Enter name for new 3D View

Name: Northeast | Press OK.



27. Save the file as *ex3-3.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 3-4 Creating Wall by Face

Drawing Name: ex3-3.rvt Estimated Time: 10 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 *ex3-3.rvt*.
- 2. Activate the **Northeast** view under 3D Views.
- 3. Wall by Face Select Wall by Face.
- 4. v 🖆 🛭 🗸 Basic Wall: Generic - 200mm Basic Wall: CW 102-50-100p Basic Wall : CW 102-50-140p Basic Wall : CW 102-50-215p Basic Wall : CW 102-85-100p Basic Wall : CW 102-85-140p Basic Wall : CW 102-85-215p Basic Wall: Exterior - Block on Mtl. Stud Basic Wall : Exterior - Brick on Mtl. Stud Basic Wall : Exterior - Render on Brick on Block Basic Wall : Foundation - 300mm Concrete Basic Wall: Generic - 90mm Brick Basic Wall : Generic - 140mm Masonry Basic Wall : Generic - 200mm Basic Wall : Generic - 200mm - Filled Basic Wall: Generic - 225mm Masonry Basic Wall : Generic - 300mm

In the Options bar, you can set the wall type.

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

- 5. Enable **Pick Faces** in the Option bar.
- 6.

Select each wall and cylinder.

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

7. Activate Level 2 under Floor Plans.

Level 2

Level 3

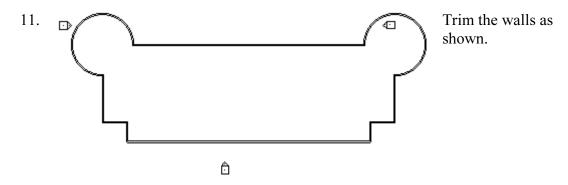
8. Select the **Trim** tool.

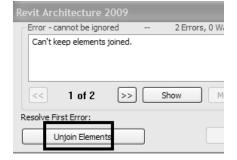
When you select to trim, be sure to select the section you want to keep.

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

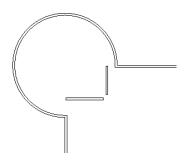
Note that you have some instructions in the lower left of the screen to assist you.

10. Disable **View→Show Mass** so you only see the walls.





If you get an error dialog, select **Unjoin Elements** and continue.



To erase any small sections of walls, simply select and press the Delete key.

12. Save as *ex3-4.rvt*.

Exercise 3-5

Adding Doors and Windows

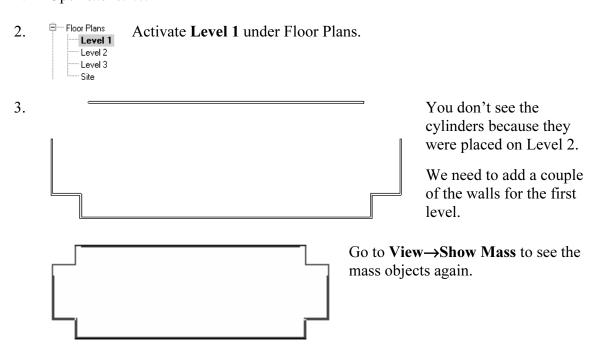
Drawing Name: ex3-4.rvt Estimated Time: 30 minutes

This exercise reinforces the following skills:

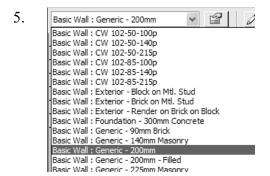
- Basics
- Door
- □ Load from Library
- □ Window
- □ Array
- □ Mirror
- □ Shading

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

1. Open *ex3-4.rvt*.



4. Select Wall by Face.

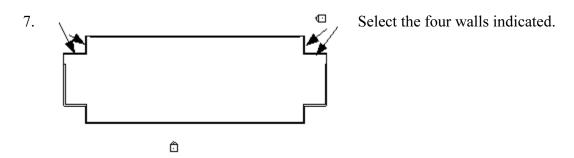


In the Options bar, you can set the wall type.

Set the Default Wall Type to:

Basic Wall: Generic- 200 mm.

6. Enable **Pick Faces** in the Option bar.



- 8. Disable **Show Mass** under View, so you only see the walls.
- 9. Use the **Trim** tool to join the walls.
- Simply select the two walls you want to join and they will automatically extend and join.
- 11. Level 1 should appear like this.
- 12. Basics Activate **Basics** from the Design bar.
- 13. Press the **Door** tool.
- 14. Load... Press **Load** from the Options toolbar.

15. Documents and Settings

All Users

Application Data

Autodesk

RAC 2009

Metric Library

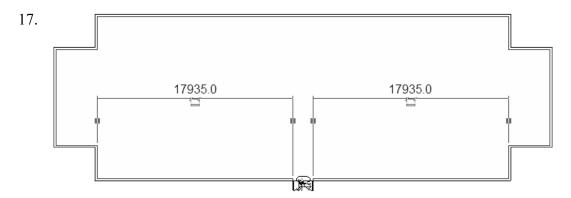
Doors

Browse to the **Doors** folder.

16. File name: M_Double-Panel 2.rfa
Files of type: Family Files (*.rfa)

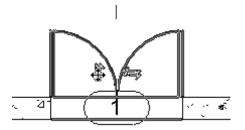
Locate the M Double-Panel 2.rfa file.

Press Open.



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

18.



You can flip the door by picking on it then pick on the vertical arrows.

19. Pick the **Window** tool.

20. M_Fixed: 0406 x 0610mm
M_Fixed: 0406 x 0610mm
M_Fixed: 0406 x 1220mm
M_Fixed: 0406 x 1830mm

M_Fixed: 0610 x 0610mm M_Fixed: 0610 x 1220mm M_Fixed: 0610 x 1830mm Select M_Fixed: 0406 x1830mm from the drop-down list.

21.

Place the window **3000** from the inner left wall.

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.

22.

Pick the window so it highlights in red.

23. Select the **Array** tool.

24. **1300.0** Set the an Set the d

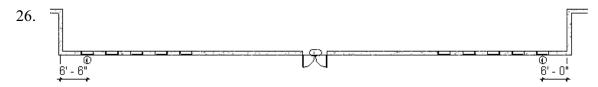
Set the array quantity to 5.

Set the distance for the array to 1300.

25. <u>5</u> 5

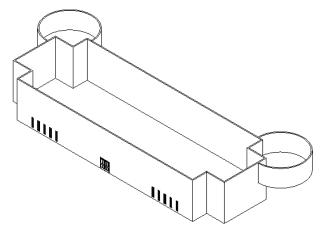
You should see a preview of the array.

Press **ENTER** to accept.



Use the **Mirror** tool to mirror the windows to the other side of the wall opposite the door.

27.



Switch to a **3D** View.

Disable Show Mass under View.

28.



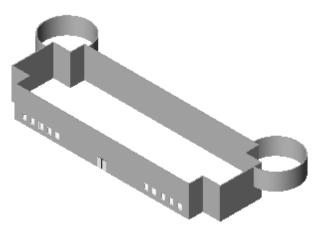
Right click in the graphics window and select **View Properties**.

29.

Scale Value 1:	100	
Detail Level	Medium	
Visibility/Graphics Overrides	Edit	
Model Graphics Style	Shading	V
Advanced Model Graphics	Wireframe	
Discipline	Hidden Line	
Identity Data	Shading Shading w/ Edges	
View Name	Sildaling II/ Edges	

Set the Model Graphics Style to **Shading**.

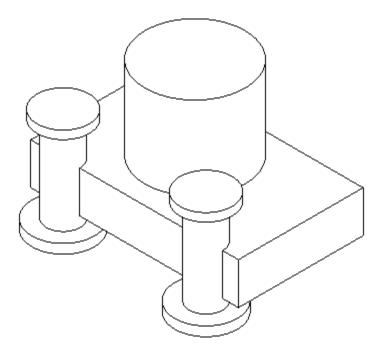
Press **OK**.



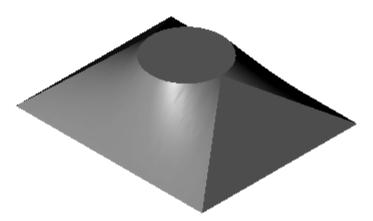
We have created a conceptual model that we can show a client in very little time.

30. Save the file as *ex3-5.rvt*.

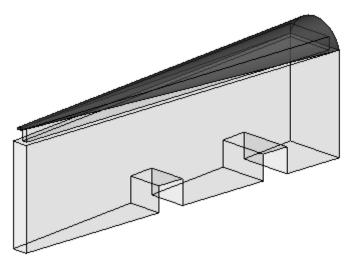
Additional Projects



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.

Quiz 3

True or False

- 1. In order for 'Show Shell' to convert a horizontal face to a floor, it must lie on the top of a level.
- 2. When you create an extrusion, you cannot change the distance of the extrusion.
- 3. The Level tool aligns mass elements.
- 4. Double clicking on the blue elevation symbol activates the elevation's grips.
- 5. You cannot add doors and windows to a mass element.

Multiple Choice

- 6. You can create a mass using all of the following EXCEPT:
 - A. Extrude
 - B. Revolve
 - C. Intersect
 - D. Sweep
- 7. You can use the following edit tools with mass elements EXCEPT:
 - A. ALIGN
 - B. COPY
 - C. MIRROR
 - D. SPLIT
- 8. To change the number of members in an array:
 - A. Use 'Edit Array'.
 - B. Use 'Modify Array'
 - C. Use 'Ungroup'
 - D. Pick on any member of the array, the number will appear, pick on the number and change the value.

ANSWERS: