

# Autodesk® Revit® Architecture 2012 Fundamentals



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# Chapter 2

## Basic Drawing and Editing Tools

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In this chapter you learn how to use the basic drawing and editing tools that apply to almost all types of elements in Revit. These tools also include alignment lines, temporary dimensions, snaps, and the Properties palette. You learn how to select elements for editing. You also learn how to move, copy, rotate, mirror, and array elements.

This chapter introduces:

- ✓ **General Drawing Tools**
- ✓ **Editing Revit Elements**
- ✓ **Basic Modifying Tools**



## 2.1 General Drawing Tools

When you start a drawing command, the contextual Ribbon, Options Bar, and Properties palette enable you to set up features for each element you are placing in the drawing. As you are drawing, several features called *drawing aids* display, as shown in Figure 2–1. They help create designs quickly and accurately.

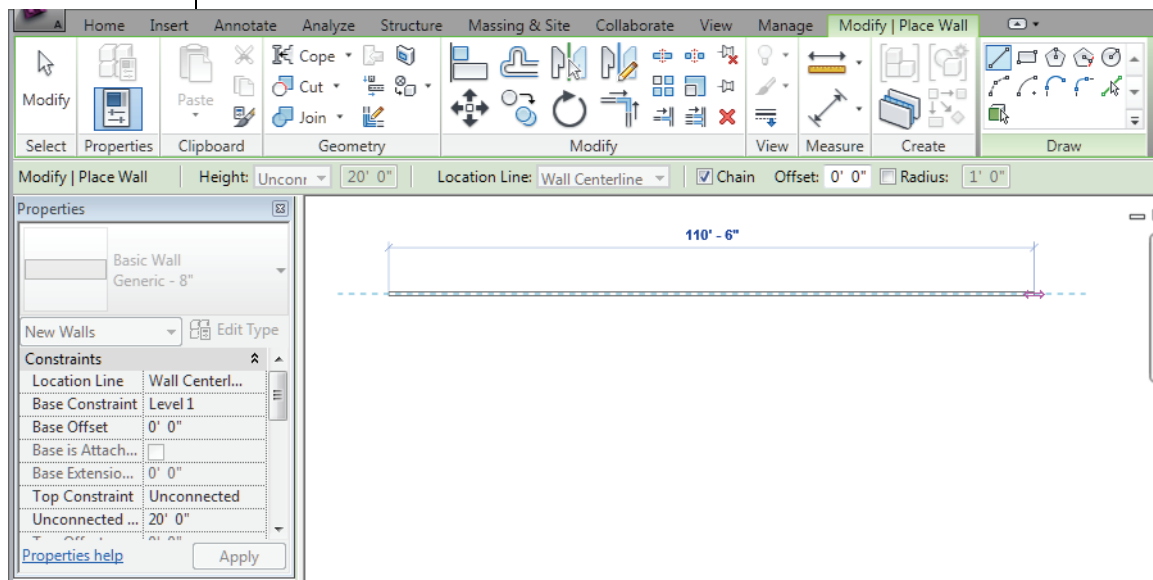


Figure 2–1

### User Interface Tools

#### The Contextual Ribbon

When you select a command, the Ribbon displays the *Modify* tab with the contextual tools. For example, when you click

 (Wall), the *Modify | Place Wall* tab opens, as shown in Figure 2–2.

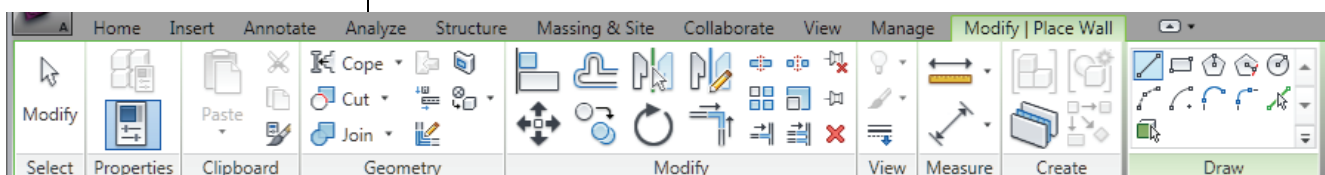



Figure 2–2

- The Modify tools are always displayed to the left of the Ribbon and the contextual tools to the right with a green panel title.
- In the Select panel, click  (Modify) to finish the command and return to the main tab at any time.

## The Options Bar

The Options Bar displays the most used options for an element, as shown in Figure 2–3. These options are also typically found in the Properties palette.

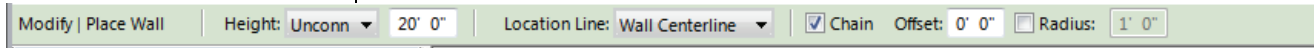


Figure 2–3

## The Properties Palette

The Properties palette displays the current element type in the Type Selector. You can select other types and modify some of the related parameters for the selected object, as shown in Figure 2–4.

*Some of the properties parameters are only available when you are editing an element. They are grayed out when you are creating an element.*

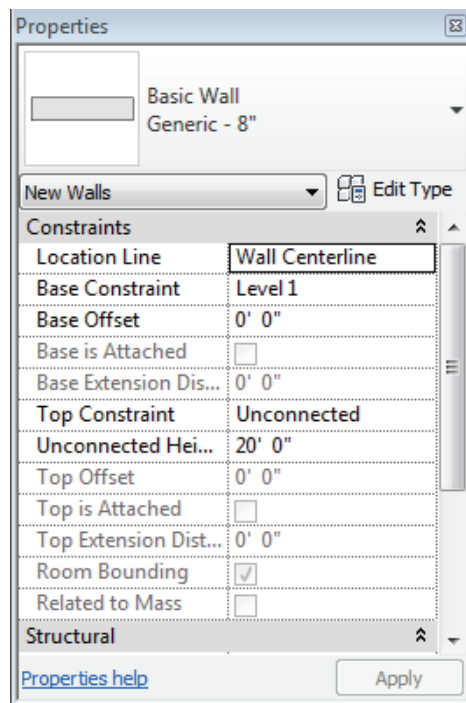



Figure 2–4

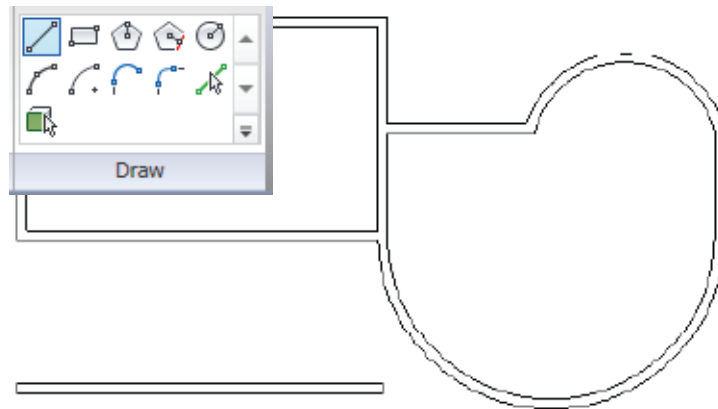
- The Properties palette can be floated and moved around the screen. If it is turned off, starting a command opens it. You can also type **PP** to toggle the Properties palette on or off.
- Changes in the palette do not take effect until you click  or move your cursor onto the screen. If you click in the window, it applies the change but deselects the elements.



## Draw Tools

*Linear elements include walls, lines, detail lines, and sketches for floors, roofs, stairs, and railings.*

Draw tools are used to draw linear elements, such as the walls shown in Figure 2–5. They display in the contextual Ribbon when you start a command to draw any element. The available tools vary according to the element being drawn.





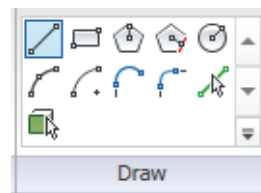
**Figure 2–5**

- Two styles of tools are available: one where you *draw* the element using a geometric form, and another where you *pick* an existing element (such as a line, face, or wall) as the basis for the new element's geometry.


### How to:


#### Draw Linear Elements


1. Start the command you want to use, such as  (Wall).
2. In the contextual tab>Draw panel, select a drawing tool, such as  (Line), as shown in Figure 2–6. Select points to define the walls using other drawing aids, such as temporary dimensions, alignment lines, and snaps.



**Figure 2–6**













You can also select a pick tool, such as  (Pick Lines), and select an element.

The  (Pick Face) option is only available if you are in a 3D view.

3. Click  (Modify) to finish the command.




*You can change from one Draw tool to another in the middle of a command.*

## Draw Tools

	<b>Line</b>	Draws a straight linear element defined by the first and last points. If <b>Chain</b> is enabled, you can continue selecting end points for multiple segments.
	<b>Rectangle</b>	Draws four linear elements defined from two opposing corner points. You can adjust the dimensions after selecting both points.
	<b>Inscribed Polygon</b>	Draws a polygon inscribed in a hypothetical circle with the number of sides specified in the Options Bar.
	<b>Circumscribed Polygon</b>	Draws a polygon circumscribed around a hypothetical circle with the number of sides specified in the Options Bar.
	<b>Circle</b>	Draws a circular linear element defined by a center point and radius.
	<b>Start-End-Radius Arc</b>	Draws a curved linear element defined by a start, end, and radius of the arc. The outside dimension shown is the included angle of the arc. The inside dimension is the radius.
	<b>Center-ends Arc</b>	Draws a curved linear element defined by a center, radius, and included angle. The selected point of the radius also defines the start point of the arc.
	<b>Tangent End Arc</b>	Draws a curved linear element tangent to another element. Select an end point for the first point, but do not select the intersection of two or more elements. Then select a second point based on the included angle of the arc.
	<b>Fillet Arc</b>	Draws a curved linear element defined by two other linear elements and a radius. Because it is difficult to select the correct radius by clicking, this command automatically moves to edit mode. Select the dimension and then modify the radius of the fillet.
	<b>Spline</b>	Draws a curved linear element based on selected points. The curve does not actually touch the points (Model and Detail Lines only).
	<b>Ellipse</b>	Draws an ellipse from a primary and secondary axis (Model and Detail Lines only).
	<b>Partial Ellipse</b>	Draws only one side of the ellipse, like an arc. A partial ellipse also has a primary and secondary axis (Model and Detail Lines only).



## Pick Tools

	<b>Pick Lines</b>	Use this option to select existing linear elements in the project. This is useful when you start the Revit model from an imported 2D drawing.
	<b>Pick Face</b>	Use this option to select the face of a 3D massing element (walls and 3D views only).
	<b>Pick Walls</b>	Use this option to select an existing wall in the project to be the basis for a new sketch line (floors, ceilings, etc.).

## Draw Options

When you are in Drawing mode, several options display in the Options Bar, as shown in Figure 2–7.

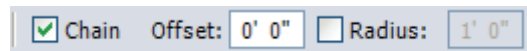


Figure 2–7

*Other options display according to the type of element you are drawing.*

- The **Chain** option controls how many segments are drawn in one process. If it is not selected, the **Line** and **Arc** tools only draw one segment at a time. If it is selected, you can continue drawing segments until you select the command again.
- The *Offset* field enables you to enter values to draw the linear elements at a specified distance from the selected points. For example, set *Offset* to **10'-0"** and select the end points of an existing wall to create a new wall 10'-0" away.
- When using a radial draw tool, you can select the **Radius** option and add a radius in the edit field.
- To draw angled lines, move your cursor to the desired angle shown by the temporary dimensions, and type the distance value. The angle increments shown vary depending on how far in or out the view is zoomed.

## Drawing Aids

As soon as you start drawing in Revit Architecture, three drawing aids display on the screen: *alignment lines*, *temporary dimensions*, and *snaps*. These are available with most drawing and many modification commands.

## Alignment Lines

Dashed *alignment lines* display as soon as you select your first point, as shown in Figure 2–8. They help keep lines horizontal, vertical, or at a specified angle. They also line up with the implied intersections of walls and other elements.

*Angles display at 90, 45, 15, 5, and 1 degree increments. The order of the angle list controls the power level of the snap. For example, the 90 degree angle is most likely to display if you are close to horizontal or vertical.*

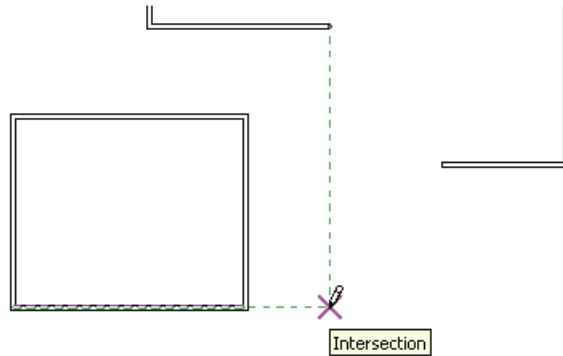


Figure 2–8

- Hold down <Shift> to force the alignments to be orthogonal.

## Temporary Dimensions

Along with alignment lines, *temporary dimensions* display as you draw to help place linear elements (such as walls) at the proper length and location, as shown in Figure 2–9.

*You can move the cursor to the exact dimension, or place it approximately and then modify the dimension as needed. This enables you to sketch the building and then come back and use the parametric engine to update the model with greater precision.*

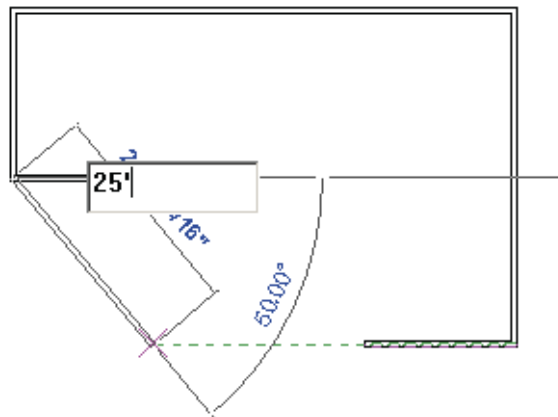
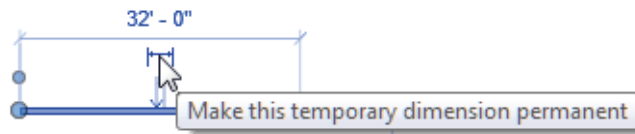


Figure 2–9

- For Imperial measurements (feet and inches), Revit Architecture understands a default of feet. For example, when you type **4**, it assumes 4'-0". To indicate inches, type the inch mark (") after the distance. For a distance such as 4'-6", you can type any of the following: **4'-6"**, **4'6**, **4-6**, or **4 6** (the numbers separated by a space).

*Dimensions are a powerful tool to help create and annotate the model.*

- The increments displayed for dimensions change as you zoom in closer to the elements. These *dimension snap* increments are for both linear and angular dimensions, and can be set in the Snaps dialog box.
- Temporary dimensions disappear as soon as you finish drawing linear elements. If you want to make them permanent, select the control shown in Figure 2–10.

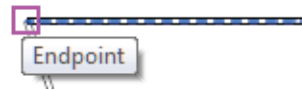


**Figure 2–10**

- The size of the temporary dimensions, in pixels, can be set in the Options dialog box on the *Graphics* tab.


## Snaps

Snaps are key points that help you reference existing elements to exact points when drawing, as shown in Figure 2–11.




**Figure 2–11**

They include *Endpoints*, *Midpoints*, *Nearest*, *Work Plane Grid*, *Quadrants*, *Intersections*, *Centers*, *Perpendicular*, *Tangents*, and *Points*. When you move your cursor over an element, the **Snap** symbol displays. Each snap location type displays with a different symbol.

- To modify the snap settings, in the *Manage* tab>Settings panel, click  (Snaps). This opens the Snaps dialog box, where you can set which snap points are active, as well as the snap distances (for dimension and angular increments). It also shows the keyboard shortcuts for each snap, which you can use to override the automatic snapping.

## 2.2 Editing Revit Elements

Architectural design projects typically involve extensive changes to the positions of walls, doors, and other elements. Revit Architecture was designed to make such changes easy. The

 (Modify) command works with all of the different element types.

- When you select an element during an active command, there are a number of ways to change it, as shown in Figure 2–12:
  - Modify commands and element-specific tools display in the contextual tab in the Ribbon.
  - The Properties palette displays the Type Selector and associated parameters.
  - *Temporary dimensions* enable you to change the element's dimensions.
  - *Controls* enable you to drag, flip, lock, and rotate the element.
- When you hover your cursor over an element, a tooltip displays information about it.

*NEW IN 2012!*

The Type Selector can also be found in the Modify tab of the Ribbon or on the Quick Access Toolbar.

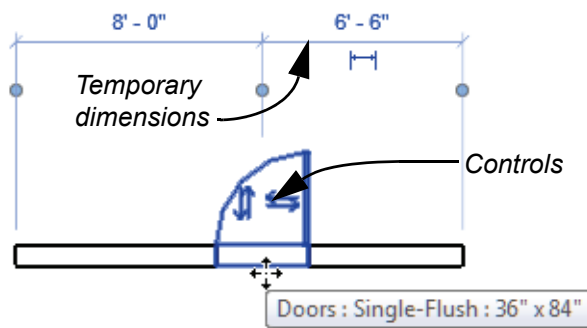



Figure 2–12

- To delete an element, select it and press <Delete> or click  (Delete) in the Modify panel.

- When working with temporary dimensions, the default location of the dimension line might not be where you need it. For example, as shown on the left in Figure 2–13, instead of setting the distance of the selected wall from the center of the left wall, you might want to modify the distance from the grid line. Drag the control (also called the witness line) to the grid line, as shown on the right in Figure 2–13.

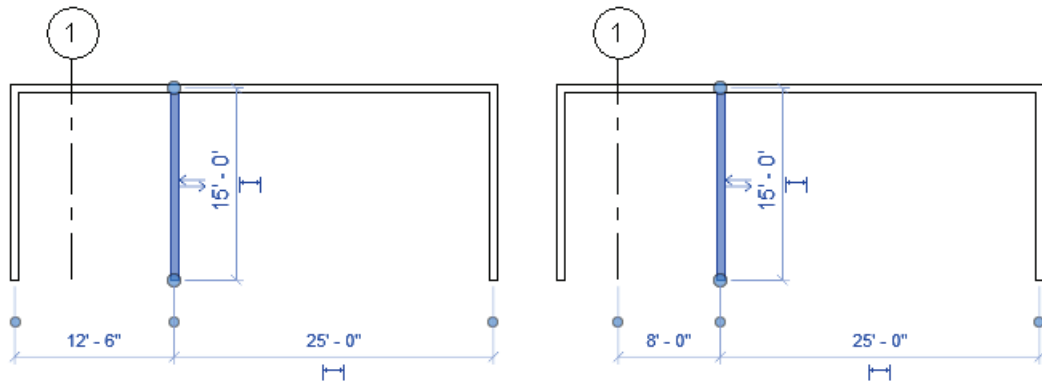


Figure 2–13

- You can click on the square control to move the witness line from one part of the selected wall to another.
- The new location of a temporary dimension is remembered as long as you are in the same session of Revit.

#### Hint: Press & Drag

You can move elements in Revit Architecture by dragging them to a new location. To do this without selecting them first, make sure the **Press & Drag** option is selected in the Status Bar, as shown in Figure 2–14.

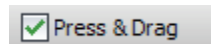


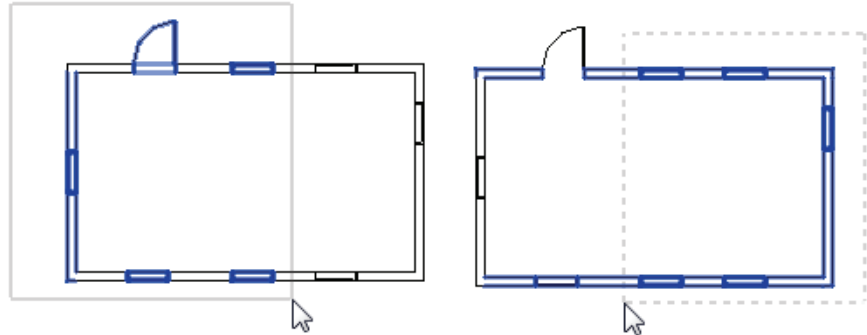
Figure 2–14

## Selecting Elements

You can select elements in several ways:

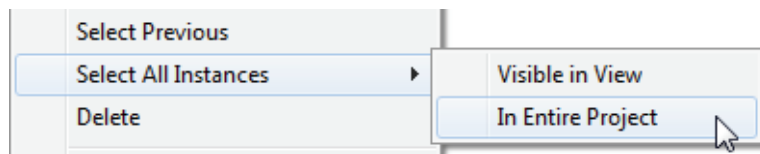
- To select a single element, place your cursor over it and select it.
- To add another element to a selection set, hold down <Ctrl> and select another item.
- To remove an element from a selection set, hold down <Shift> and select the element.

- If you click and drag the cursor to *window* around elements, you have two selection options, as shown in Figure 2–15. If you drag from left to right, you only select the elements completely inside the window. If you drag from right to left, you select elements both inside and crossing the window.



**Figure 2–15**

- If several elements are on or near each other, press <Tab> to cycle through them before you click. If there are elements that might be linked to each other, such as walls that are connected, pressing <Tab> selects the chain of elements.
- Press <Ctrl> + <Left Arrow> to reselect the previous selection set. You can also right-click in the drawing window with nothing selected and select **Select Previous**.
- To select all elements of a specific type, right-click on an element and select **Select All Instances>Visible in View** or **In Entire Project**, as shown in Figure 2–16.



**Figure 2–16**

# Modifying Multiple Elements

When multiple element types are selected, the *Multi-Select* contextual tab opens on the Ribbon, as shown in Figure 2–17. This gives you access to all the Modify tools, as well as the **Filter** command.

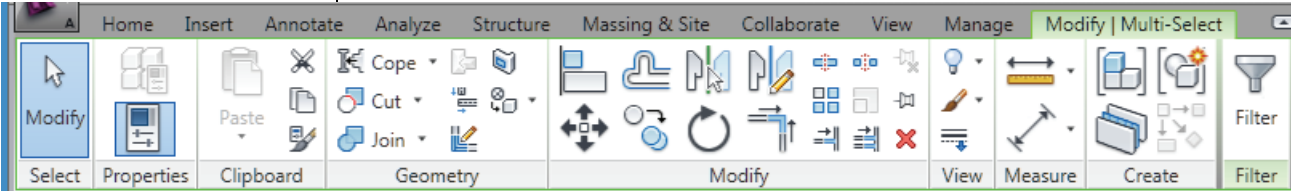


Figure 2–17

- The Properties palette displays tools that are common to all element types if they are available. You can also select just one type and make modifications, as shown in Figure 2–18.

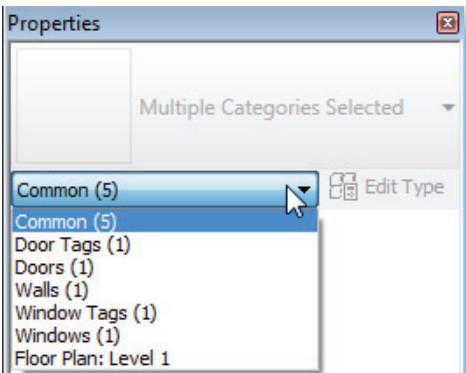


Figure 2–18

## Filtering Selection Sets

The **Filter** command enables you to specify the types of elements to select. For example, you might only want to select doors, as shown in Figure 2–19.

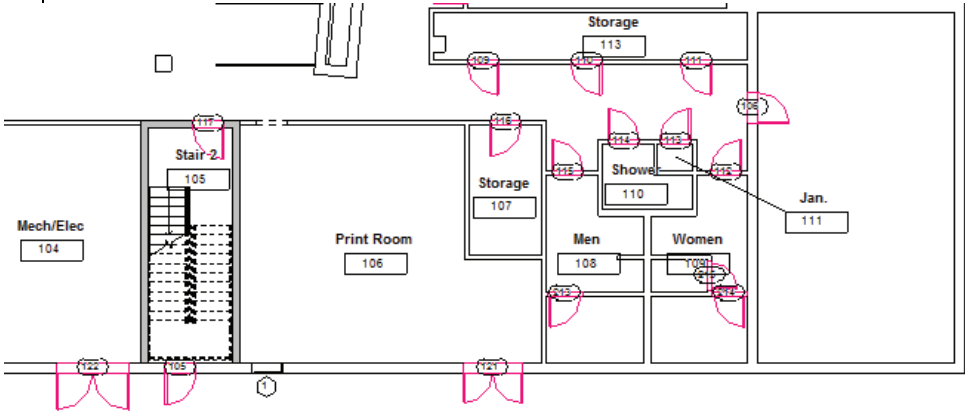



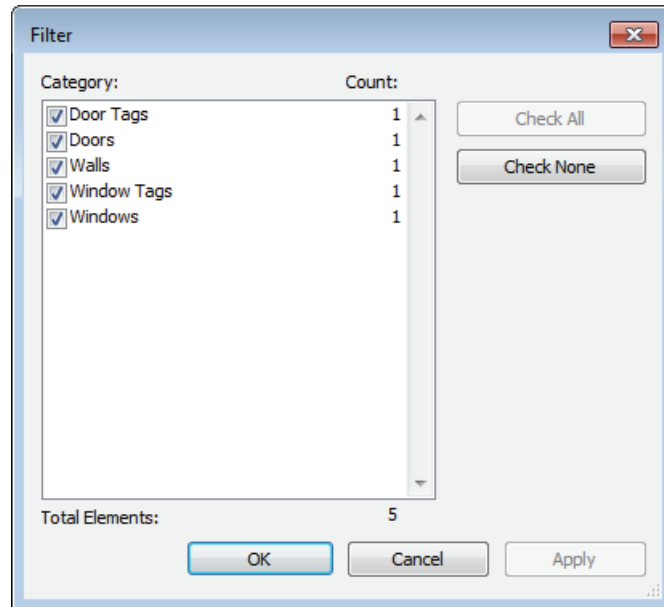
Figure 2–19




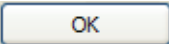

**How to:****Filter a Selection Set**

1. Select everything in the desired area.
2. Click  (Filter) in the *Modify | Multi-Select* tab or in the Status Bar. The Filter dialog box opens, as shown in Figure 2–20.

*The Filter dialog box displays all types of elements in the original selection.*



**Figure 2–20**

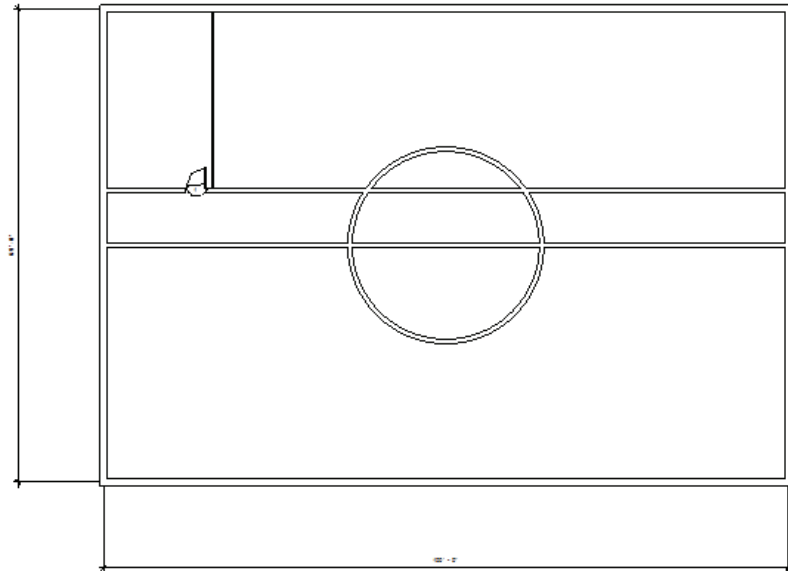
3. Click  to clear all options and then select the element types you want included in the selection.
  4. Click . The selection set is now limited to the elements you specified.
- In the Status Bar,  (Filter) displays how many elements you selected.

## Practice 2a

## General Drawing and Editing



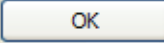



In this practice you will use the **Wall** command along with Draw tools and drawing aids, such as temporary dimensions and snaps. You will use the **Modify** command and modify the walls using grips, temporary dimensions, the Type Selector, and Properties. You will also add a door and modify it using temporary dimensions and controls. The completed drawing is shown in Figure 2–21.

*Estimated time for completion: 10 minutes.*



**Figure 2–21**

### Task 1 - Draw and modify walls.

1. In the Application Menu, select  (New) >  (Project).
2. In the New Project dialog box, accept the defaults and click .
3. In the Quick Access Toolbar, click  (Save). When prompted, name the project **Simple Building.rvt**.
4. In the *Home* tab>Build panel, click  (Wall).
5. In the *Modify | Place Wall* tab>Draw panel, click  (Rectangle) and draw a rectangle approximately **100' x 70'**.

6. When you finish drawing the rectangle, the temporary dimensions are still displayed. Click the dimension controls to make them permanent, as shown in Figure 2–22.

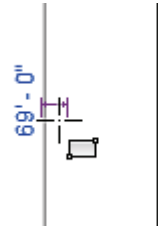



Figure 2–22

7. In the Select panel, click  (Modify).
8. Select one of the vertical lines. The horizontal dimension becomes active. Click the dimension text and type **100'**, as shown in Figure 2–23.

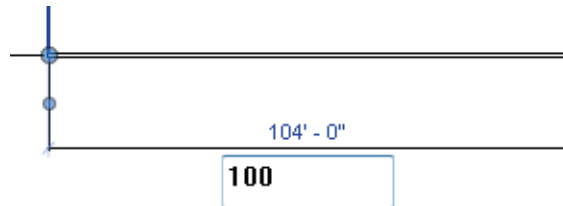


Figure 2–23



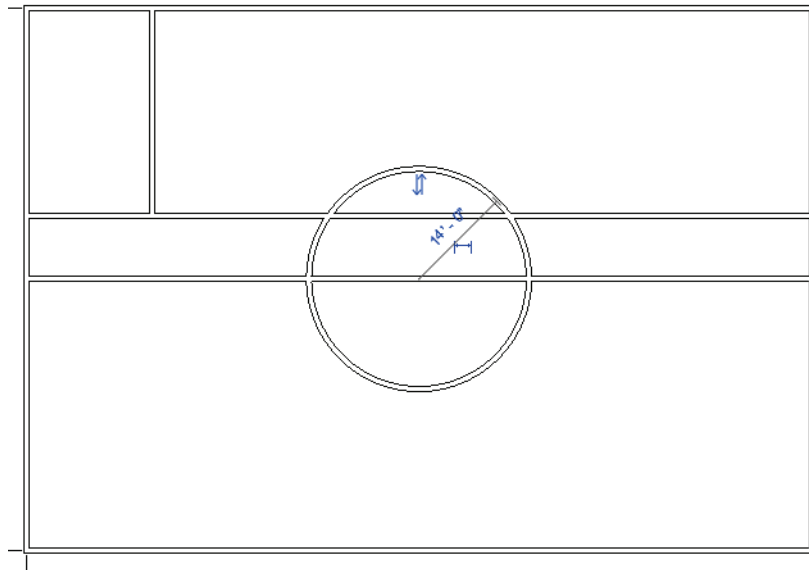
9. Click in an empty space to end the selection. You are still in the **Modify** command.
10. Start the **Wall** command again and click  (Line) in the Draw panel. Draw a wall horizontally from midpoint to midpoint of the vertical walls.
11. Draw another line **8'-0"** above the first one. You can use temporary dimensions or the *Offset* field to do this.
12. Draw a vertical wall exactly **16'-0"** from the left wall, as shown in Figure 2–24.




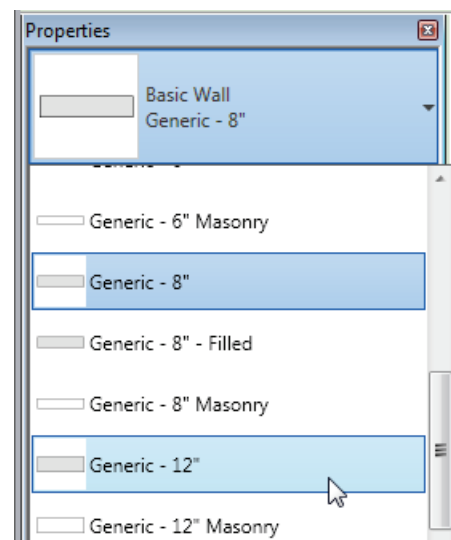
Figure 2–24

13. In the Draw panel, click  (Circle) and draw a **14'-0"** radius circular wall at the midpoint of the lower interior horizontal wall, as shown in Figure 2–25.



**Figure 2–25**

14. Click  (Modify) to finish the command.
15. Hover your cursor over one of the outside walls, press <Tab> to highlight the chain of outside walls, and click to select the walls.
16. In the Type Selector, select **Basic Wall: Generic-12"**, as shown in Figure 2–26. The thickness of the outside walls change.





**Figure 2–26**

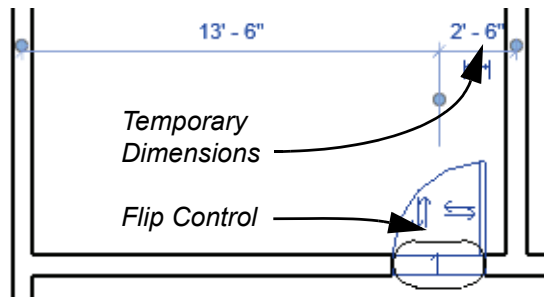
17. Click in an empty space to release the selection.
18. Select the vertical interior wall and change it to one of the small interior partition styles.
19. Click in an empty space to release the selection.

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**Task 2 - Add and modify a door.**

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1. Zoom in on the room in the upper left corner.
2. In the *Home* tab>Build panel, click  (Door).
3. Place a door anywhere along the wall in the horizontal hallway.
4. Click  (Modify) to finish the command.
5. Select the door. Use temporary dimensions to move it so that it is **2'-6"** from one of the walls. Use controls to flip the door so that it swings into the room, as shown in Figure 2–27.



**Figure 2–27**

6. Type **ZE** to zoom out to the full view.
7. Save the project.

## 2.3 Basic Modifying Tools

Revit Architecture contains controls and temporary dimensions that enable you to edit elements. Additional modifying tools can be used with individual elements or any selection of elements. They are found in the *Modify* tab>Modify panel, as shown in Figure 2–28, and in contextual tabs.

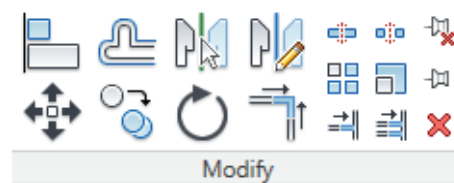


Figure 2–28

- The **Move**, **Copy**, **Rotate**, **Mirror**, and **Array** commands are covered in this topic. Other tools are covered later.

### Moving and Copying Elements

The **Move** and **Copy** commands enable you to select the element(s) and move or copy them from one place to another. You can use alignment lines, temporary dimensions, and snaps to help place the elements, as shown in Figure 2–29.

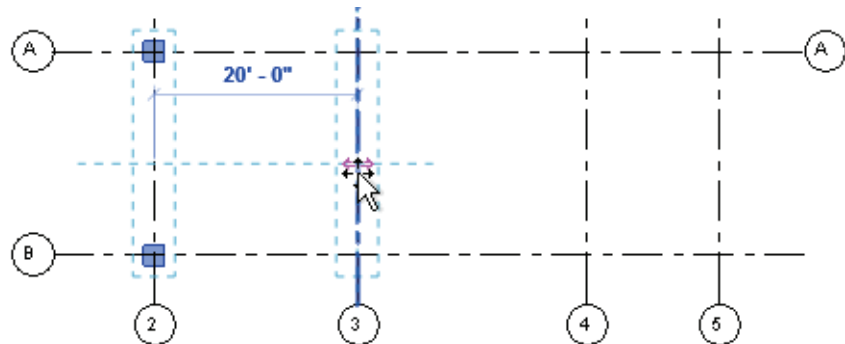





Figure 2–29

#### How to:

#### Move or Copy Elements

If you start the  (Move) command and hold down <Ctrl>, the elements are copied.

1. Select the elements you want to move or copy.
2. In the Modify panel, click  (Move) or  (Copy). A boundary box displays around the selected elements.
3. Select a move start point on or near the element.
4. Select a second point. Use alignment lines and temporary dimensions to help place the elements.
5. The elements remain highlighted, enabling you to start another command, or press <Esc> to finish.

## Move/Copy Elements

The **Move** and **Copy** commands have several options that display in the Options Bar, as shown in Figure 2–30.

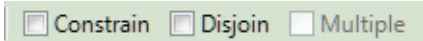





Figure 2–30

<b>Constrain</b>	Restricts the movement of the cursor to horizontal or vertical, or along the axis of an item that is at an angle. This keeps you from selecting a point at an angle by mistake. <b>Constrain</b> is off by default.
<b>Disjoin</b> (Move only)	Breaks any connections between the elements being moved and other elements. If <b>Disjoin</b> is on, the elements move separately. If it is off, the connected elements also move or stretch. <b>Disjoin</b> is off by default.
<b>Multiple</b> (Copy only)	Enables you to make multiple copies of one selection. <b>Multiple</b> is off by default.

- These commands only work within the current view, not between views or projects. To copy between views or projects, use  (Copy to Clipboard) and  (Paste).

### Hint: Pinning Elements

If you do not want elements to be moved, you can  (Pin) them in place, as shown in Figure 2–31. Pinned elements can still be copied.

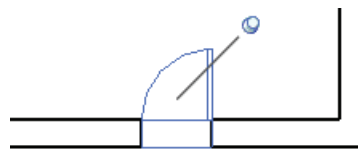



Figure 2–31

Select the element and click  (Unpin) to free it.





## Rotating Elements

### How to:

The **Rotate** command enables you to rotate selected elements around a center point or origin. You can use alignment lines, temporary dimensions, and snaps to help specify the origin and rotation. You can also create copies of the element as it is being rotated.

### Rotate Elements

1. Select the element(s) you want to rotate.
2. In the Modify panel, click  (Rotate) or type RO.
3. The origin is automatically set to the center of the element or group of elements, as shown on the left in Figure 2–32. To change the origin, as shown on the right in Figure 2–32, use the following:
  - Drag the  (Center of Rotation) control to a new point.
  - In the Options Bar beside *Origin*, click  and use snaps to move the origin.
  - Press the <Spacebar> to select the origin.

*NEW IN 2012!*

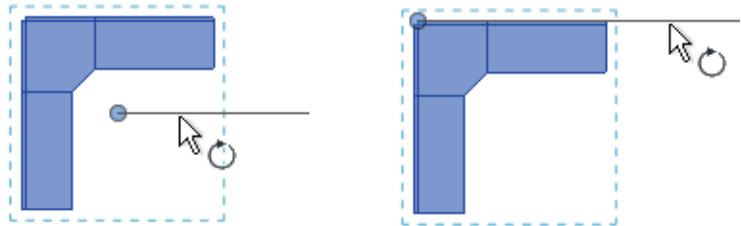


Figure 2–32

- To start the **Rotate** command with an automatic prompt to select the center of rotation, type **R3**.
4. In the Options Bar, specify if you want to make a Copy (select **Copy** option), type an angle in the *Angle* field, as shown in Figure 2–33, and press <Enter>. You can also specify the angle on screen.

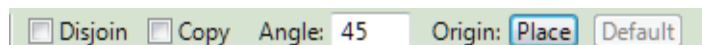


Figure 2–33

5. The rotated element(s) remain highlighted, enabling you to start another command, or press <Esc> to finish.
  - The **Disjoin** option breaks any connections between the elements being rotated and other elements. If **Disjoin** is on (selected), the elements rotate separately. If it is off (cleared), the connected elements also move or stretch. **Disjoin** is off by default.

To specify the angle on screen, select a point for the **rotate start ray**—the reference line for the rotation angle. Then select a second point, using the temporary dimension to help you set the angle.

## Mirroring Elements

The **Mirror** command enables you to mirror elements about an axis defined by a selected element, as shown in Figure 2–34, or by selected points.

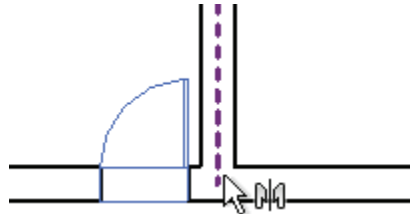





Figure 2–34

### How to:

#### Mirror Elements

1. Select the element(s) to mirror.
2. In the Modify panel, select the method you want to use:
  - Click  (Mirror - Pick Axis) or type **MM**. This prompts you to select an element as the **Axis of Reflection** (mirror line).
  - Click  (Mirror - Draw Axis) or type **DM**. This prompts you to select two points to define the axis about which the elements mirror.
3. The new mirrored element(s) remain highlighted, enabling you to start another command, or press <Esc> to finish.
  - By default, the original elements that were mirrored remain. To delete the original elements, clear the **Copy** option in the Options Bar.

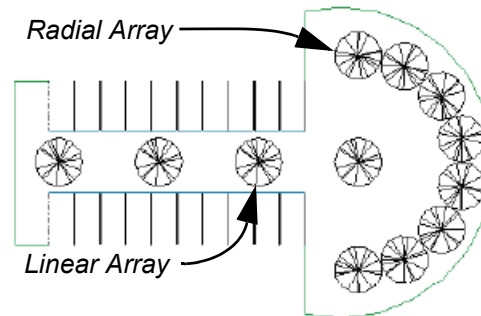
#### Hint: Scale

Revit Architecture is designed with full-size elements; therefore, not much can be scaled. However, you can use  (Scale) in reference planes, images, and imported files from other programs.

## Creating Linear and Radial Arrays

*A linear array creates a straight line pattern of elements, while a radial array creates a circular pattern around a center point.*



The **Array** command creates multiple copies of selected elements in a linear or radial pattern, as shown in Figure 2–35. For example, you can array a row of columns to create a row of evenly spaced columns on a grid, or array a row of parking spaces. The arrayed elements can be grouped or placed as separate elements.

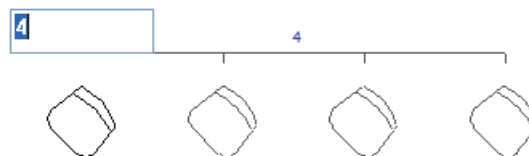


**Figure 2–35**

### How to:

#### Create a Linear Array

1. Select the element(s) to array.
  2. In the Modify panel, click  (Array).
  3. In the Options Bar, click  (Linear).
  4. Specify the other options as needed.
  5. Select a start point and an end point to set the spacing and direction of the array. The array is displayed.
- If you have the **Group and Associate** option toggled on, you are prompted again for the number of items, as shown in Figure 2–36.



**Figure 2–36**

- To make a linear array in two directions, you need to array one direction first, select the arrayed elements, and then array them again in the other direction.

*Type a new number or click on the screen to finish the command.*

## Array Options

In the Options Bar, set up the Array options for **Linear Array** (top) or **Radial Array (bottom)**, as shown in Figure 2–37.

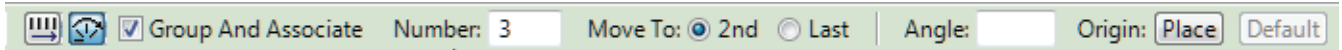
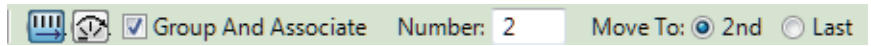





Figure 2–37

<b>Group and Associate</b>	Creates a group element out of all arrayed elements. Groups can be selected by selecting any elements in the group.
<b>Number</b>	Specifies how many instances you want in the array.
<b>Move To:</b>	<b>2nd</b> specifies the distance or angle between the center points of the two elements. <b>Last</b> specifies the overall distance or angle of the entire array.
<b>Constrain</b>	Restricts the direction of the array to only vertical or horizontal (Linear only).
<b>Angle</b>	Specifies the angle (Radial only).
<b>Origin</b>	Specifies a location for the origin of rotation (Radial only).

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### How to:

#### Create a Radial Array

1. Select the element(s) to array.
2. In the Modify panel, click  (Array).
3. In the Options Bar, click  (Radial).
4. Drag the  (Center of Rotation) control or use **Place** to move the origin to the appropriate location, as shown in Figure 2–38.

*Remember to set the **Center of Rotation** control first, because it is easy to forget to move it before specifying the angle.*

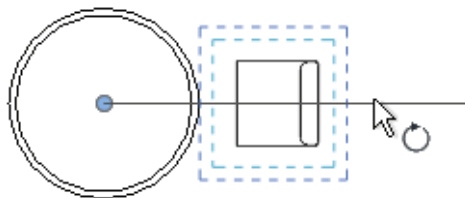
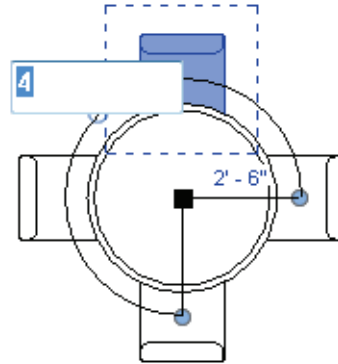


Figure 2–38


5. Specify the other options as needed.
6. In the Options Bar, type an angle and press <Enter>, or specify the rotation angle by selecting points on the screen.

## Modifying Arrays

When you select an element in an array that is created as a group, the associated shape controls and dimensions display, as shown in Figure 2–39. You can modify the number of instances and for radial arrays you can modify the distance to the center.



**Figure 2–39**

- To remove the constraint on the group, select one of the elements in the group and click  (Ungroup) in the Group panel in the contextual tab.

## Practice 2b

*Estimated time for completion: 10 minutes.*

## Modifying Tools

In this practice you will use **Move**, **Copy**, **Mirror**, and **Array** to modify and add elements to a simple building, as shown in Figure 2–40.

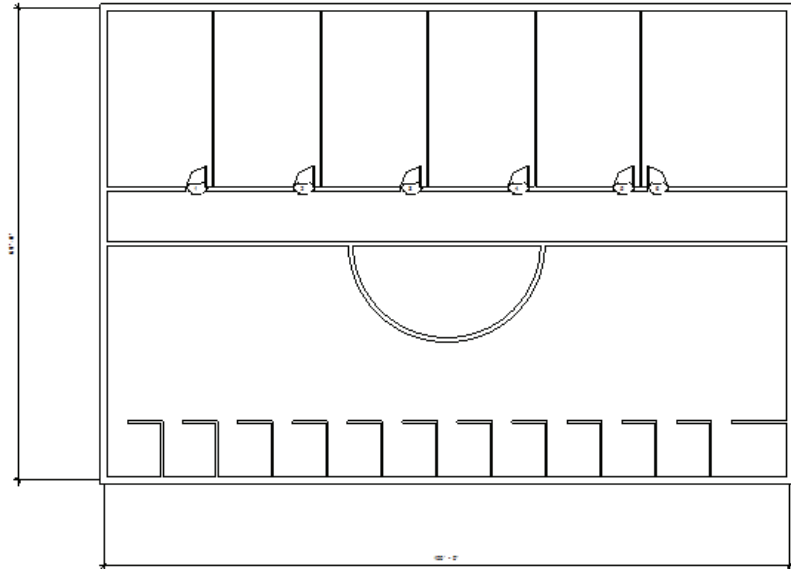


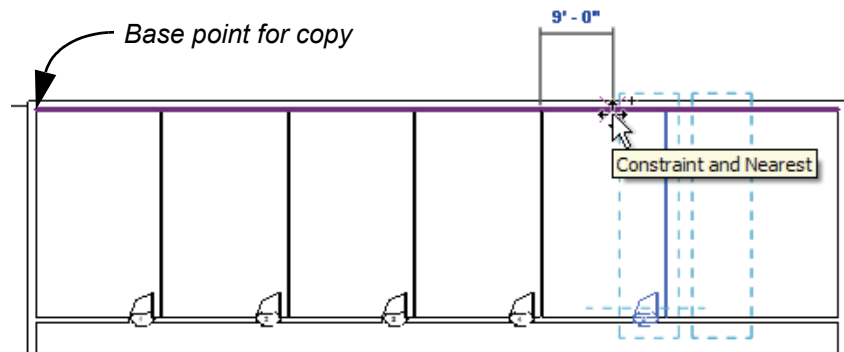


Figure 2–40


### Task 1 - Modify walls and doors.

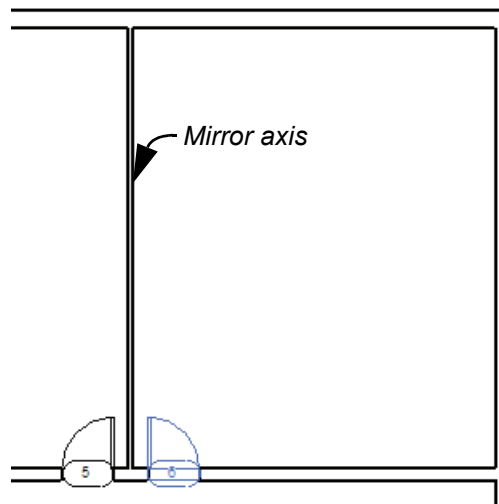
1. Continue working in the **Simple Building** project. If you did not complete the previous practice, open **Simple-Building-1.rvt** from your class folder.
2. Select the top arc of the circular wall.
3. In the Modify panel, click  (Delete). The walls that the circular wall crossed are automatically cleaned up.
4. Select the vertical interior wall, door, and door tag. Hold down the <Ctrl> key to select more than one element.
5. In the Modify panel, click  (Copy).
6. In the Options Bar, select the **Multiple** option.

7. For the base point, select the upper left corner of the room away from the wall, as shown in Figure 2–41.
8. Copy the wall and door along the building, as shown in Figure 2–41.



**Figure 2–41**

9. Press <Esc> twice to finish the command.
10. Zoom in on the room to the far right.
11. Select the door and door tag in the room next to it.
12. In the Modify panel, click  (Mirror - Pick Axis).
13. Select the vertical wall between the rooms as the mirror axis and place the new door, as shown in Figure 2–42.




**Figure 2–42**


14. Click in an empty space to release the selection set.

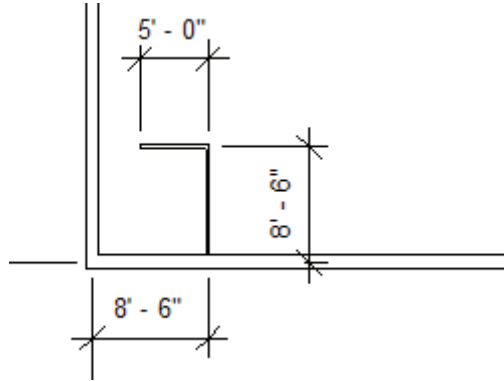


**Task 2 - Draw and array cubicles.**



1. Pan to the lower left corner of the building.
2. In the *Home* tab>Build panel, click  (Wall).
3. In the Type Selector, select **Basic Wall: Interior - 3-1/8" Partition (1 hr)**. Draw the cubicle shown in Figure 2-43 and press <Esc> twice to finish the command.

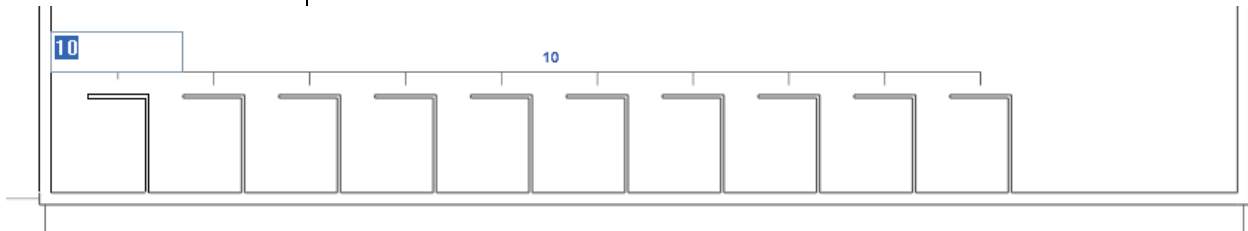
You can also click

 (Modify) in the Selection panel to finish a command.



**Figure 2-43**

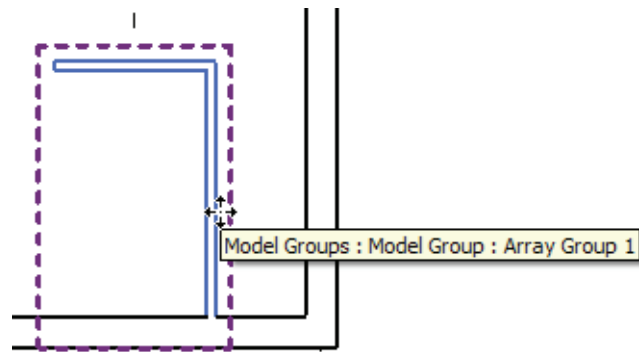
4. Select the two cubicle walls.
5. In the Modify panel, click  (Array).
6. In the Options Bar, click  (Linear) and set the *Number* to **10** and *Move to:* to **2nd**.
7. In the drawing area, select a point on the cubicle wall and another point **8'-0"** to the right of the wall. The array displays as shown in Figure 2-44.



**Figure 2-44**

8. Enough room is available to add more cubicles. Type **12** at the number prompt and press <Enter> to finish the command.

9. Zoom in on the last cubicle and select it. It is part of a group, as shown in Figure 2–45.



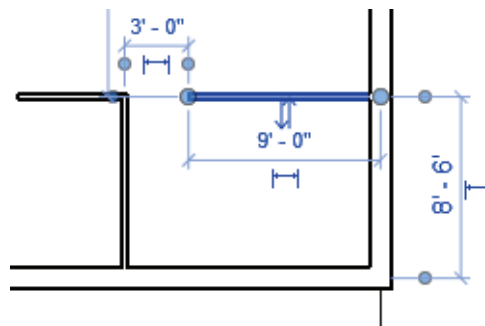
**Figure 2–45**

10. In the *Modify | Model Groups* tab > Group panel, click



(Ungroup). This separates the elements from the rest of the group.

11. Delete the vertical wall and use the end control to drag the horizontal wall to the exterior wall, as shown in Figure 2–46.















**Figure 2–46**

12. Zoom out to see the whole building.  
13. Save the project.

## Chapter Review Questions

1. What is the purpose of an alignment line?
2. How do you edit a temporary dimension when you are drawing?
3. How do you only select Doors in a view?
4. What are the two methods for starting the **Move** or **Copy** command?
5. Where do you change the wall type?

# Command Summary

Button	Command	Location
	<b>Array</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Modify panel&gt;Array</li> <li>■ <b>Shortcut:</b> AR</li> </ul>
	<b>Copy</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Modify panel&gt;Copy</li> <li>■ <b>Shortcut:</b> CO</li> </ul>
	<b>Copy to Clipboard</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Clipboard panel&gt;Copy to Clipboard</li> <li>■ <b>Shortcut:</b> &lt;Ctrl&gt;+C</li> </ul>
	<b>Delete</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Modify panel&gt;Delete</li> <li>■ <b>Shortcut:</b> DE</li> </ul>
	<b>Filter</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify   Multi-Select</i> tab&gt;Filter panel&gt;Filter</li> <li>■ <b>Status Bar</b></li> </ul>
	<b>Mirror - Draw Axis</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Modify panel&gt;Mirror</li> <li>■ <b>Shortcut:</b> DM</li> </ul>
	<b>Mirror - Pick Axis</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Modify panel&gt;Mirror</li> <li>■ <b>Shortcut:</b> MM</li> </ul>
	<b>Move</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Modify panel&gt;Move</li> <li>■ <b>Shortcut:</b> MV</li> </ul>
	<b>Paste</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Clipboard panel&gt;Paste</li> <li>■ <b>Shortcut:</b> &lt;Ctrl&gt;+V</li> </ul>
	<b>Pin</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Modify panel&gt;Pin</li> <li>■ <b>Shortcut:</b> PN</li> </ul>
	<b>Rotate</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Modify panel&gt;Rotate</li> <li>■ <b>Shortcut:</b> RO</li> </ul>
	<b>Scale</b>	<ul style="list-style-type: none"> <li>■ <b>Ribbon:</b> <i>Modify</i> tab&gt;Modify panel&gt;Scale</li> <li>■ <b>Shortcut:</b> RE</li> </ul>