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Autodesk® Revit® 2016

Architecture Fundamentals - Metric

Student Guide (rev. 1.0)

AUTODESK
Official Training Guide

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REVIT Courses

Practice 1a

Open and Review a Project

Practice Objectives

- Navigate the graphic user interface.
- Manipulate 2D and 3D views by zooming and panning.
- Create 3D Isometric and Perspective views.
- Set the Visual Style of a view.

Estimated time for completion: 15 minutes

In this practice you will open a project file and view each of the various areas in the interface. You will investigate elements, commands, and their options. You will also open views through the Project Browser and view the model in 3D, as shown in Figure 1–52.

Figure 1–52

Task 1 - Explore the interface.

1. In the Application Menu, expand (Open) and click (Project).
2. In the Open dialog box, select **Modern-Hotel-Final-M.rvt**. It is found in your practice folder and is a version of the main project you will work on throughout the training guide.

If the Project Browser and Properties palette are docked over each other, use the Project Browser tab at the bottom to display it.

3. Click **Open**. The 3D view of the modern hotel building opens in the drawing window.
4. In the Project Browser, expand the *Floor Plans* node. Double-click on **Floor 1** to open it. This view is referred to as **Floor Plans: Floor 1**.
5. Take time to review the floor plan to get acquainted with it.
6. Review the various parts of the screen.
7. In the drawing window, hover the cursor over one of the doors. A tooltip displays describing the element, as shown in Figure 1–53.

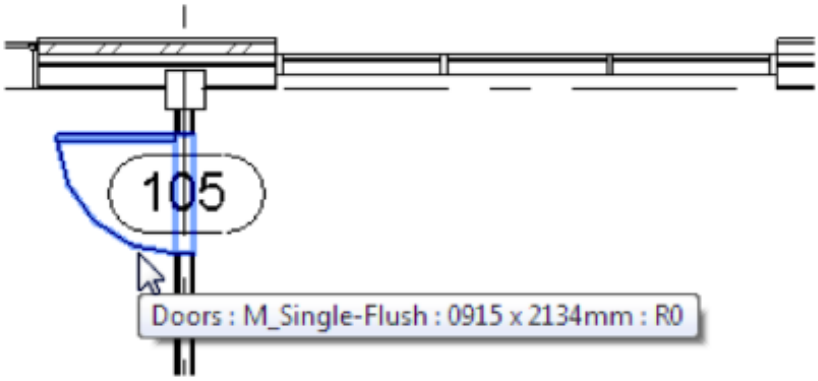


Figure 1–53

8. Hover the cursor over another element to display its description.
9. Select a door. The Ribbon changes to the *Modify | Doors* tab.
10. Click in an empty space to release the selection.
11. Hold down <Ctrl> and select several elements of different types. The Ribbon changes to the *Modify | Multi-Select* tab.
12. Click in an empty space to release the selection set.
13. In the *Architecture* tab>Build panel, click (Wall). The Ribbon changes to the *Modify | Place Wall* tab and at the end of the Ribbon, the Draw panel is displayed. It contains tools that enable you to create walls. The rest of the Ribbon displays the same tools that are found on the *Modify* tab.
14. In the Select panel, click (Modify) to return to the main Ribbon.

15. In the *Architecture* tab>Build panel, click  (Door). The Ribbon changes to the *Modify | Place Door* tab and displays the options and tools you can use to create doors.

16. In the Select panel, click  (Modify) to return to the main Ribbon.

Task 2 - Look at views.

You might need to widen the Project Browser to display the full names of the views.

1. In the Project Browser, verify that the *Floor Plans* node is open. Double-click on the **Floor 1 - Furniture Plan** view.
2. The basic floor plan displays with the furniture, but without the annotations that were displayed in the **Floor 1** view. Open the **1st Floor Life Safety Plan** view by double-clicking on it.
3. The walls and furniture display, but the furniture is grayed out and red lines describing important life safety information display.

*This view is referred to as **Elevations (Building Elevation): East** view.*

4. In the Project Browser, scroll down and expand *Elevations (Building Elevation)*. Double-click on the **East** elevation to open the view.
5. Expand *Sections (Building Section)* and double-click on the **East-West Section** to open it.
6. At the bottom of the drawing window, in the View Control Bar, click  (Visual Style) and select **Shaded**. The elements in the section are now easier to read.
7. In the Project Browser, scroll down to the *Sheets (all)* node and expand the node.

8. View several of the sheets. Some have views already applied, (e.g., **A2.3 - 2nd-8th Floor Plan (Typical)** as shown in Figure 1–54).

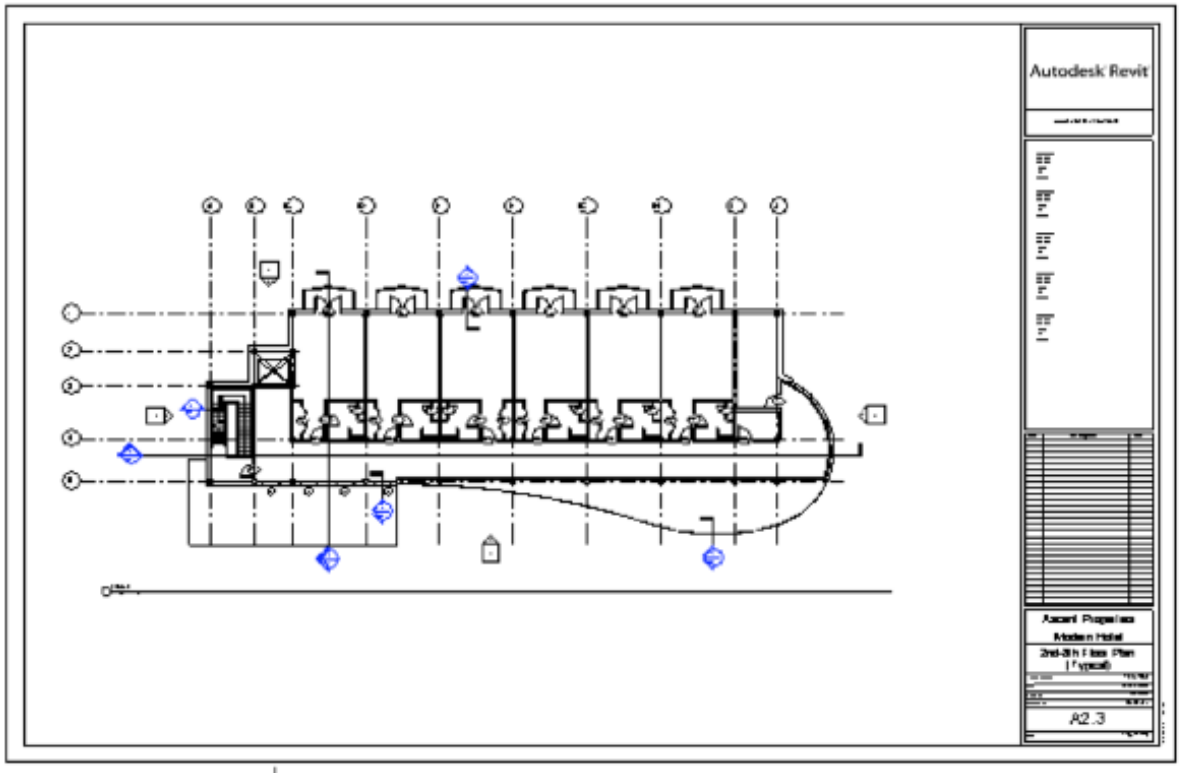


Figure 1–54

9. Which sheet displays the view that you just set to **Shaded**?

Task 3 - Practice viewing tools.

1. Return to the **Floor Plans: Floor 1** view.
2. In the Navigation Bar, click and select **Zoom In Region** or type **ZR**. Zoom in on one of the stairs.
3. Pan to another part of the building by holding and dragging the middle mouse button or wheel. Alternatively, you can use the 2D Wheel in the Navigation Bar.
4. Double-click on the mouse wheel to zoom out to fit the extents of the view.

5. In the Quick Access Toolbar, click (Default 3D View) to open the default 3D view, as shown in Figure 1–55.

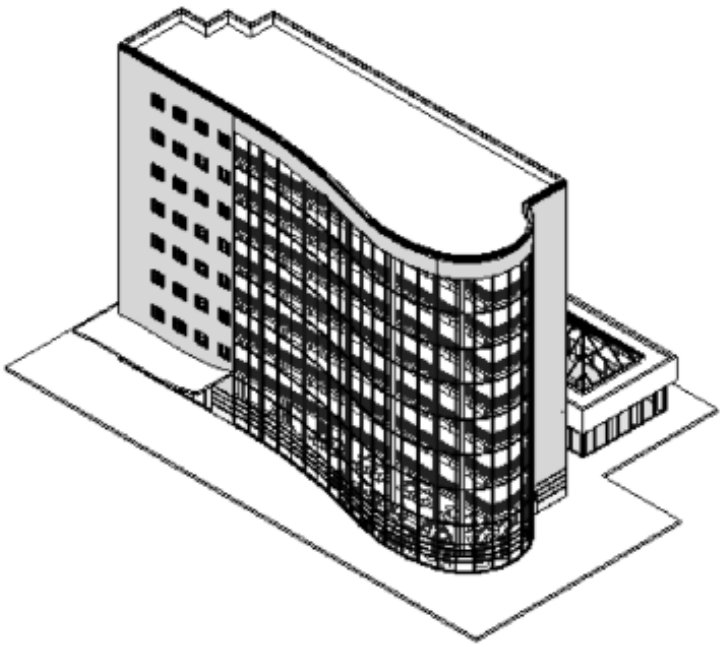


Figure 1–55

6. Hold down <Shift> and use the middle mouse button or wheel to rotate the model in the 3D view.
7. In the View Control Bar, change the *Visual Style* to (Shaded). Then try (Consistent Colors). Which one works best when you view the back of the building?
8. Use the ViewCube to find a view that you want to use.
9. In the Project Browser, expand *3D Views* and right-click on the {3D} view and select **Rename...**. In the Rename View dialog box type in a useful name.
10. Review the other 3D views that have already been created.
11. Press <Ctrl>+<Tab> to cycle through the open views.
12. In the Quick Access Toolbar, expand (Switch Windows) and select the **Modern-Hotel-Final.rvt - Floor Plan: Floor 1** view.
13. In the Quick Access Toolbar, click (Close Hidden Windows). This closes all of the other windows except the one in which you are working.

14. In the Quick Access Toolbar, expand (Default 3D View) and click (Camera).

15. Click the first point near the Lobby room name and click the second point (target) outside the building, as shown in Figure 1–56.

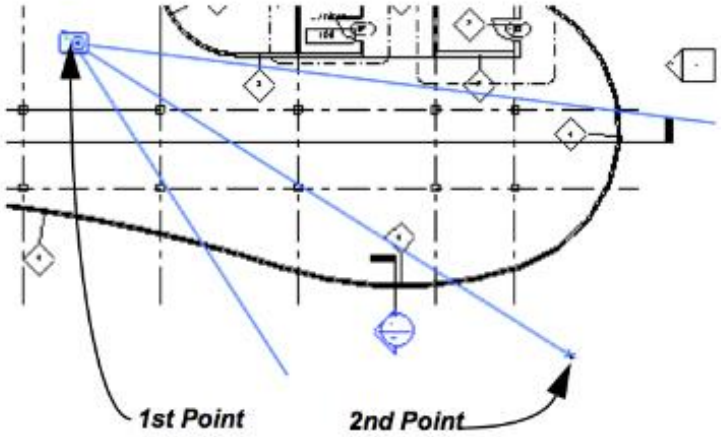


Figure 1–56

16. The furniture and planters display even though they did not display in the floor plan view.

This file is not set up to work with Raytrace.

17. In the View Control Bar, set the *Visual Style* to (Realistic).

18. In the Project Browser, right-click on the new camera view and select **Rename...** In the Rename View dialog box, type **Lobby Seating Area** and click **OK**.

19. In the Quick Access Toolbar, click (Save) to save the project.

20. In the Application Menu, click (Close). This closes the entire project.

Practice 2a

Estimated time for completion: 10 minutes

Draw and Edit Elements

Practice Objective

- Use draw tools and drawing aids.

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 add a door and modify it using temporary dimensions and controls. The completed drawing is shown in Figure 2–18.

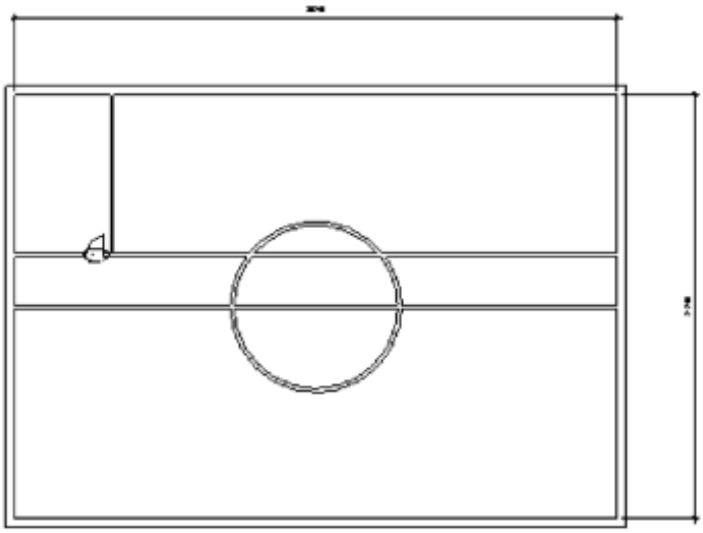


Figure 2–18

Task 1 - Draw and modify walls.

1. In the Application Menu, click (New)> (Project).
2. In the New Project dialog box, select **Architectural Template** in the Template file drop-down list, and click **OK**.
   - This training guide uses the US Metric setup. If you are not using this installation, use the **DefaultMetric.rte** file from your practice folder. In the New Project dialog box, click **Browse...**, navigate to the practice files folder, select **DefaultMetric.rte** and click **Open**. Click **OK** to close the New Project dialog box.

3. In the Quick Access Toolbar, click (Save). When prompted, name the project **Simple Building.rvt**.

4. In the *Architecture* tab>Build panel, click (Wall).

5. In the *Modify | Place Wall* tab>Draw panel, click (Rectangle) and draw a rectangle approximately **30500mm x 21500mm**. You do not have to be precise because you can change the dimensions later.

6. Note that the dimensions are temporary. Select the vertical dimension text and type **21500**, as shown in Figure 2–19. Press <Enter>.

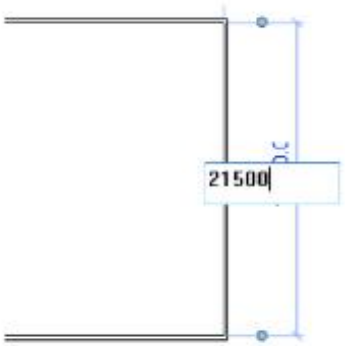


Figure 2–19

7. The dimensions are still displayed as temporary. Click the dimension controls of both the dimensions to make them permanent, as shown in Figure 2–20.

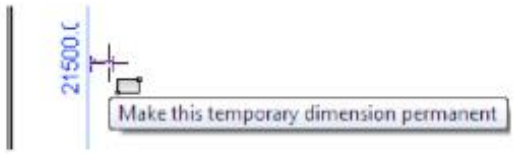


Figure 2–20

- You will change the horizontal wall dimension using the permanent dimension.

8. In the Select panel, click (Modify). You can also use one of the other methods to switch to **Modify:**

   - Type the shortcut **MD**
   - Press <Esc> once or twice
   - Right-click and select **Cancel**

9. Select either vertical wall. The horizontal dimension becomes active (changes to blue). Click the dimension text and type **30500**, as shown in Figure 2–21.

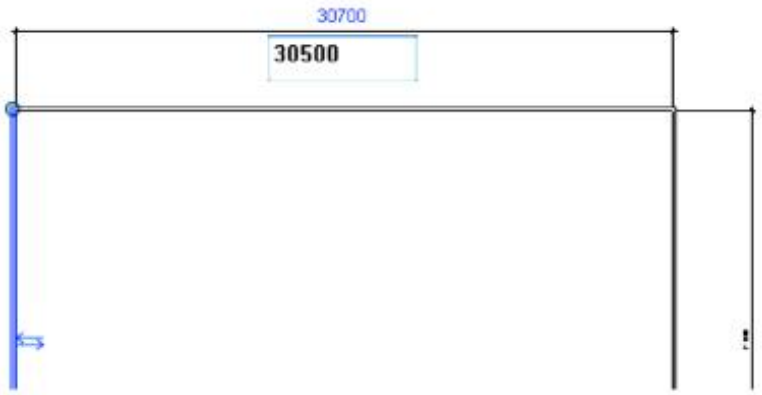


Figure 2–21

10. Click in an empty space to end the selection. You are still in the **Modify** command.

11. In the *Architecture* tab>Build panel, click (Wall). In the Draw panel, verify that (Line) is selected. Draw a wall horizontally from midpoint to midpoint of the vertical walls.

12. Draw another horizontal wall **2500mm** above the middle horizontal wall. You can use temporary dimensions or the *Offset* field to do this.

13. Draw a vertical wall exactly **5000mm** from the left wall, as shown in Figure 2–22.

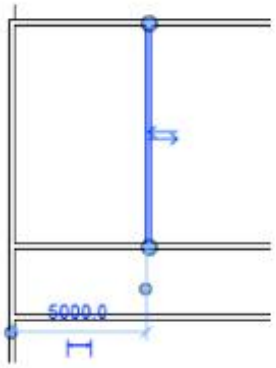


Figure 2–22

14. In the Draw panel, click (Circle) and draw a **4200mm** radius circular wall at the midpoint of the lower interior horizontal wall, as shown in Figure 2–23.

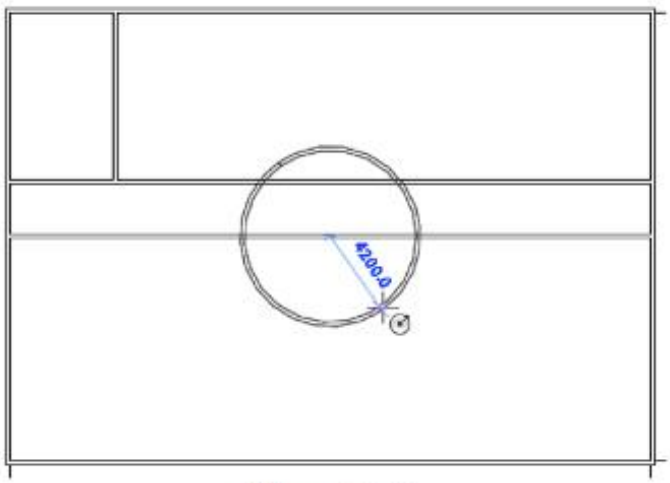


Figure 2–23

15. Click (Modify) to finish the command.

16. Hover the cursor over one of the outside walls, press <Tab> to highlight the chain of outside walls, and click to select the walls.

17. In the Type Selector, select **Basic Wall: Exterior - Block on Mtl. Stud**, as shown in Figure 2–24. The thickness of the outside walls change.

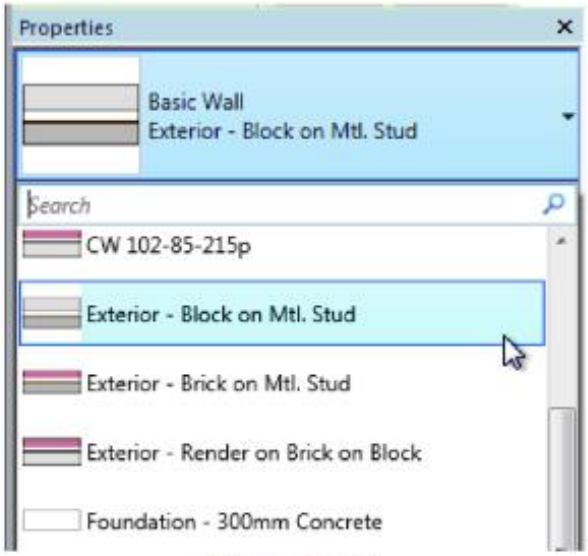


Figure 2–24

18. Click in empty space to release the selection.
19. Select the vertical interior wall. In the Type Selector, change the wall to one of the small interior partition styles.
20. Click in an empty space to release the selection.

Task 2 - Add and modify a door.

1. Zoom in on the room in the upper left corner.
2. In the *Architecture* tab>Build panel, click (Door).
3. In the *Modify | Place Door* tab>Tag panel, click (Tag on Placement) if it is not already selected.
4. Place a door anywhere along the wall in the hallway.
5. Click (Modify) to finish the command.
6. Select the door. Use temporary dimensions to move it so that it is **300mm** from the right interior vertical wall. If required, use controls to flip the door so that it swings into the room, as shown in Figure 2–25.

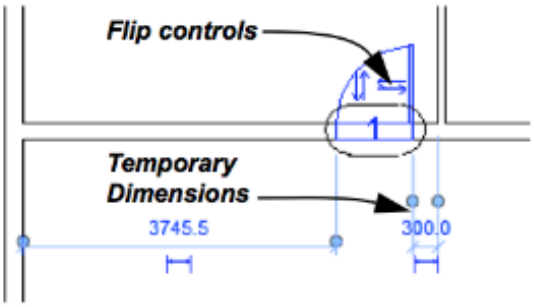


Figure 2–25

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

Practice 2b

Work with Basic Modify Tools

Estimated time for completion: 15 minutes

Practice Objective

- Use basic modify tools, including Move, Copy, Mirror, and Array

In this practice you will create a series of offices using the Copy and Mirror commands. You will then array desks around a circular wall, and add, rotate, and array a pair of columns across the front of a simple building, as shown in Figure 2–41.

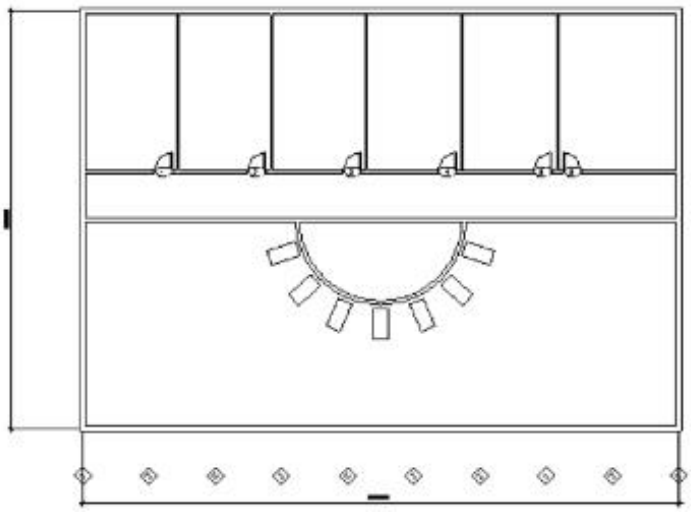


Figure 2–41

Task 1 - Modify walls and doors.

1. Open the project **Simple-Building-1-M.rvt** from your practice folder.
2. Select the top arc of the circular wall.

*Remember that you can also press <Delete>, or right-click and select **Delete**.*

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 <Ctrl> to select more than one element, or use a selection window.
5. In the Modify panel, click (Copy).
6. In the Options Bar, select the **Constrain** and **Multiple** options. The **Constrain** option forces the cursor to move only horizontally or vertically.

7. Select the start point and the end point, as shown in Figure 2–42. The wall, door, and door tag are copied to the right and the door tag displays 2.

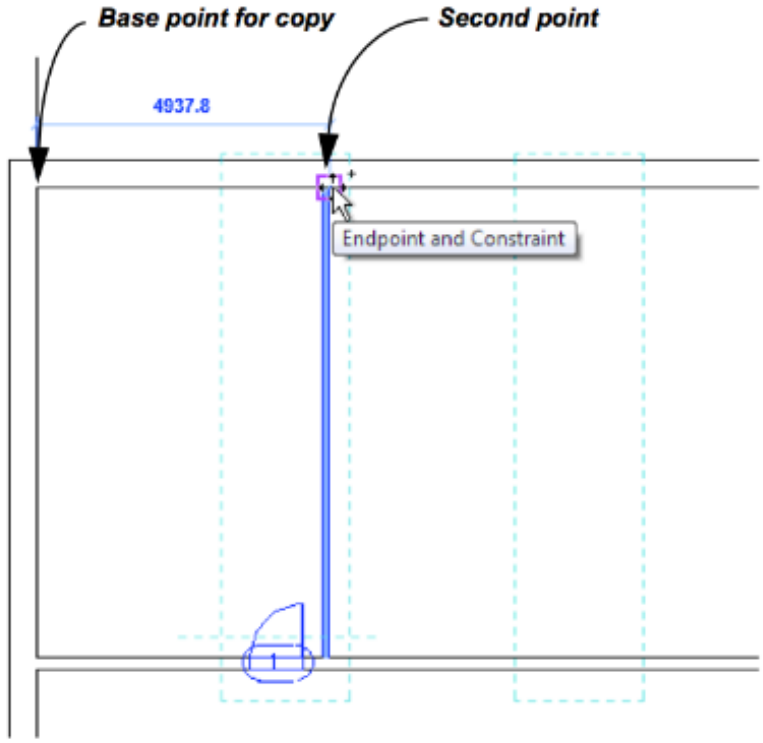


Figure 2–42

8. The new elements are still selected and you can continue to copy them. Use similar start and end points for the additional copies, or type **4800mm** and press <Enter> to set the distance between each copy. The final layout is shown in Figure 2–43.

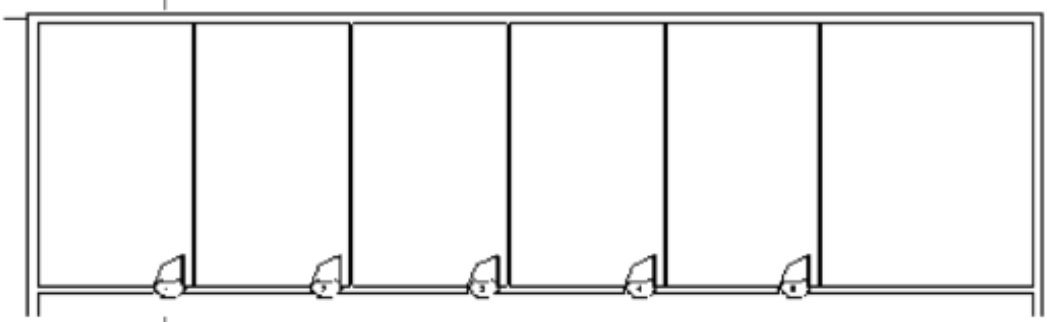


Figure 2–43

9. Click (Modify) to finish the command.
10. Zoom in on the room to the far right.
11. Select door #5 and the associated door tag.

12. In the Modify panel, click (Mirror - Pick Axis). In the Options Bar, ensure that **Copy** is selected.

13. Select the vertical wall between the rooms as the mirror axis. An alignment line displays along the center of the wall. Place the new door, as shown in Figure 2–44.

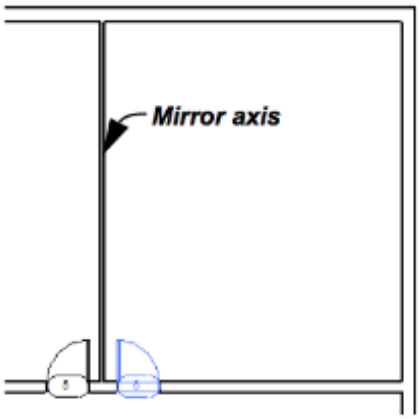


Figure 2–44

14. Click in empty space to release the selection.

Task 2 - Add reference planes and use them to place a component.

1. In the *Architecture* tab>Work plane panel, click (Ref Plane).

2. Draw two reference planes, as shown in Figure 2–45. The vertical one starts at the midpoint of the wall. You can place the horizontal plane anywhere, and then use temporary dimensions to place it more exactly.)

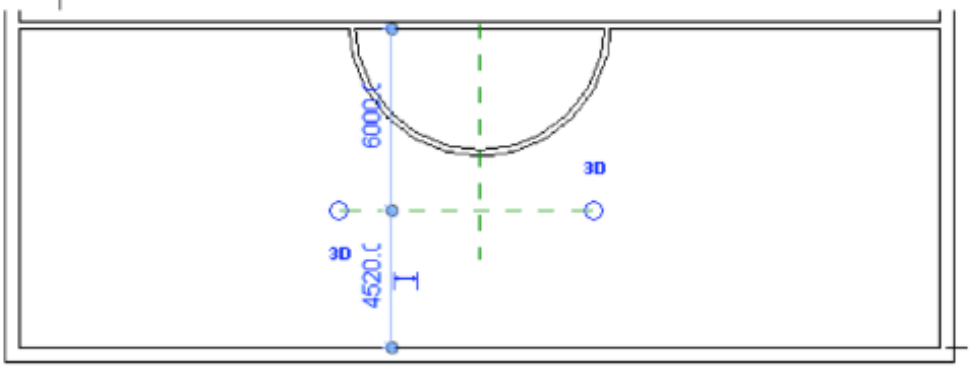


Figure 2–45

3. In the *Architecture* tab>Build panel, click (Component).
4. In the Properties palette, in the Type Selector, verify that **M_Desk: 1525 x 762mm** is selected, as shown in Figure 2–46.

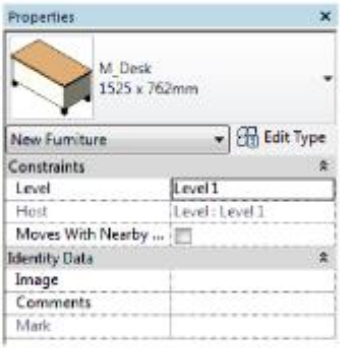


Figure 2–46

5. As you move the cursor you can see that the desk is horizontal. Press <Spacebar> to rotate the desk 90 degrees.
6. Place the desk at the intersection of the two reference planes, as shown in Figure 2–47. Zoom in as required to ensure that you are connected to the reference planes, and not to any other alignment lines.

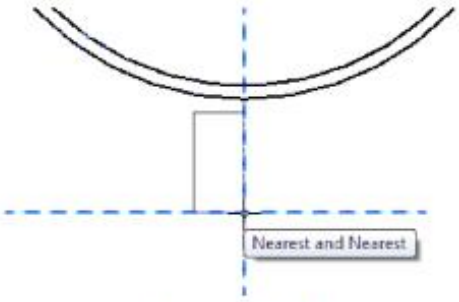


Figure 2–47

7. Click (Modify) and select the desk you just placed.
8. In the Modify panel, click (Move). Select the start point of the move as the vertical alignment line of the desk, and the end point as the vertical reference plane.
9. Save the project.

Task 3 - Create a Radial Array.

1. Select the desk.
2. In the Modify panel, click (Array).
3. In the Options Bar, click (Radial). Clear the **Group and associate** option, set the *Number* field to 15, and set the *Move to:* field to **2nd.**
4. Drag the center of rotation from the center of the desk to the midpoint of the wall, as shown in Figure 2–48.

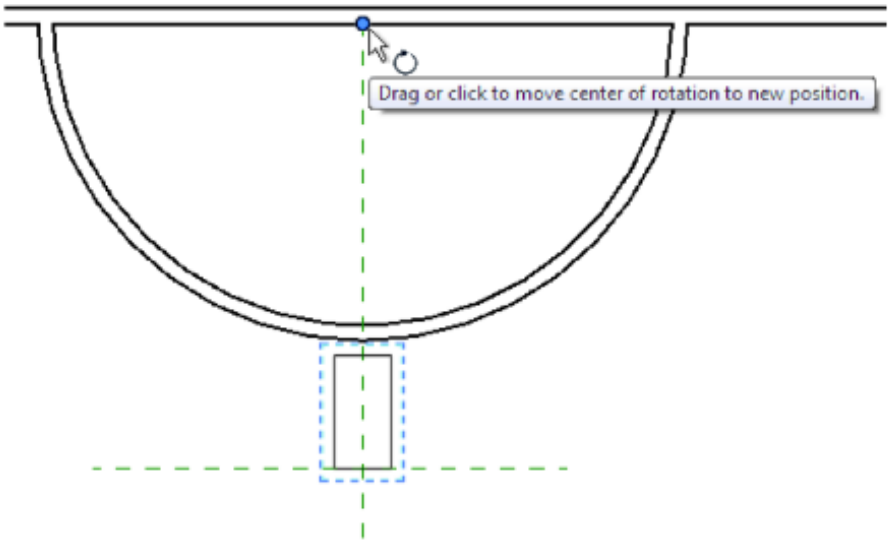


Figure 2–48

5. Return to the Options Bar and set the *Angle* to **360**. Press <Enter>. The array displays as shown in Figure 2–49.

Sometimes it is easier to create more elements then you need, and then delete the ones that are not required, as is done in this example.

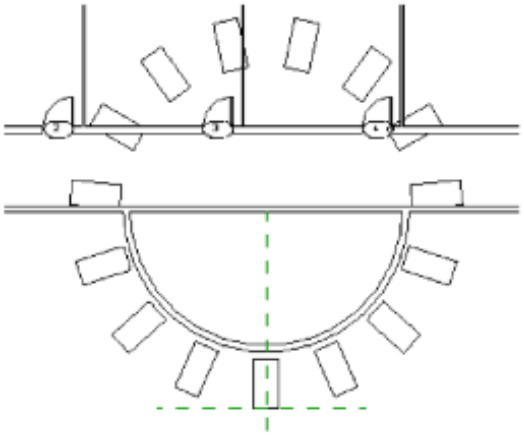


Figure 2–49

6. Delete all of the desks that are outside of the room that has the original desk.
7. Delete the reference planes. These are no longer needed, and deleting them ensures they do not display in other views.
8. Zoom out to display the entire view.

Task 4 - Add columns.

1. In the *Architecture* tab>Build panel, expand (Column), and click (Column: Architectural).
2. In the Type Selector, verify that **M_Rectangular Column: 457 x 457mm** is selected.
3. Using alignment lines and temporary dimensions, place the column on the front left of the building, as shown in Figure 2–50.

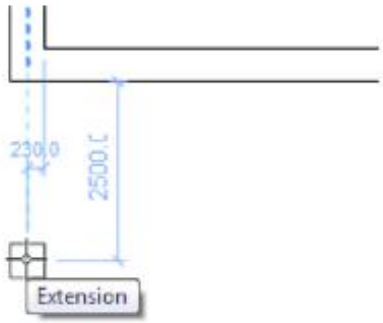


Figure 2–50

4. In the *Architecture* tab>Build panel, expand (Column), and click (Structural Column).
5. In the Type Selector, verify that **UC-Universal Column - Column: 305x305x97UC** is selected.
6. In the Options Bar, set the **Height** to **Level 2**, as shown in Figure 2–51.

Figure 2–51

7. Place the structural column at the center of the architectural column using the **Midpoint and Extension** snaps, as shown in Figure 2–52.

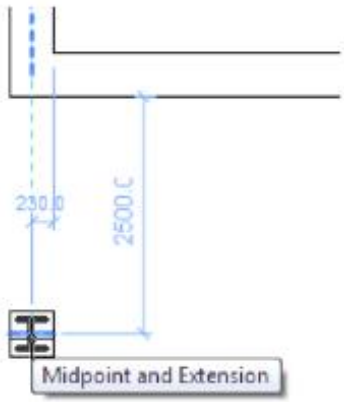


Figure 2–52

8. Save the project.

Task 5 - Rotate and Array the columns.

1. Click (Modify) and select the two columns.
2. In the *Modify | Multi-Select* tab>Modify panel, click (Rotate).
3. For the start ray, click horizontally, as shown on the left in Figure 2–53.
4. Move the ray line until you see the temporary dimension 45.000, as shown on the right in Figure 2–53.

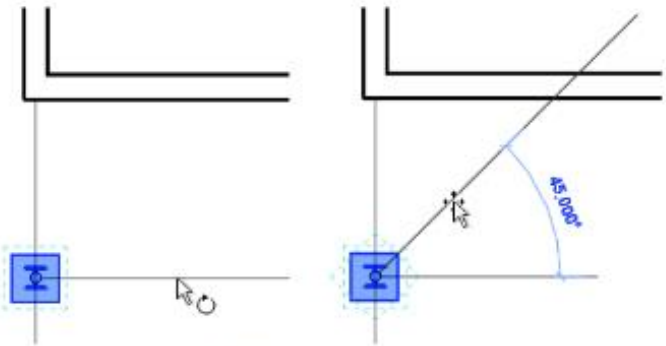


Figure 2–53

5. With the two columns still selected, in the *Modify | Multi-Select* tab>Modify panel, click (Array).

6. In the Options Bar, click (Linear), clear **Group and Associate**, set the *Number* to **10**, and set *Move To:* to **Last**.
7. For the start point, click the midpoint of the columns. For the endpoint of the array, select the **Horizontal and Extension** of the center of the far right wall as shown in Figure 2–54.

Figure 2–54

8. Zoom out to display the entire building.
9. The columns are arrayed evenly across the front of the building as shown in Figure 2–55.

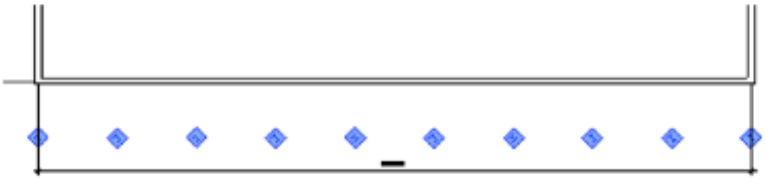


Figure 2–55

10. Save the project.

Practice 2c

Work with Additional Modify Tools

Estimated time for completion: 10 minutes

Practice Objective

- Align, Split, Trim/Extend, and Offset elements.

In this practice you will split a wall into three parts and delete the middle portion. You will offset walls and then trim or extend them to form new rooms. You will then align the new walls to match existing walls.as shown in Figure 2–68.

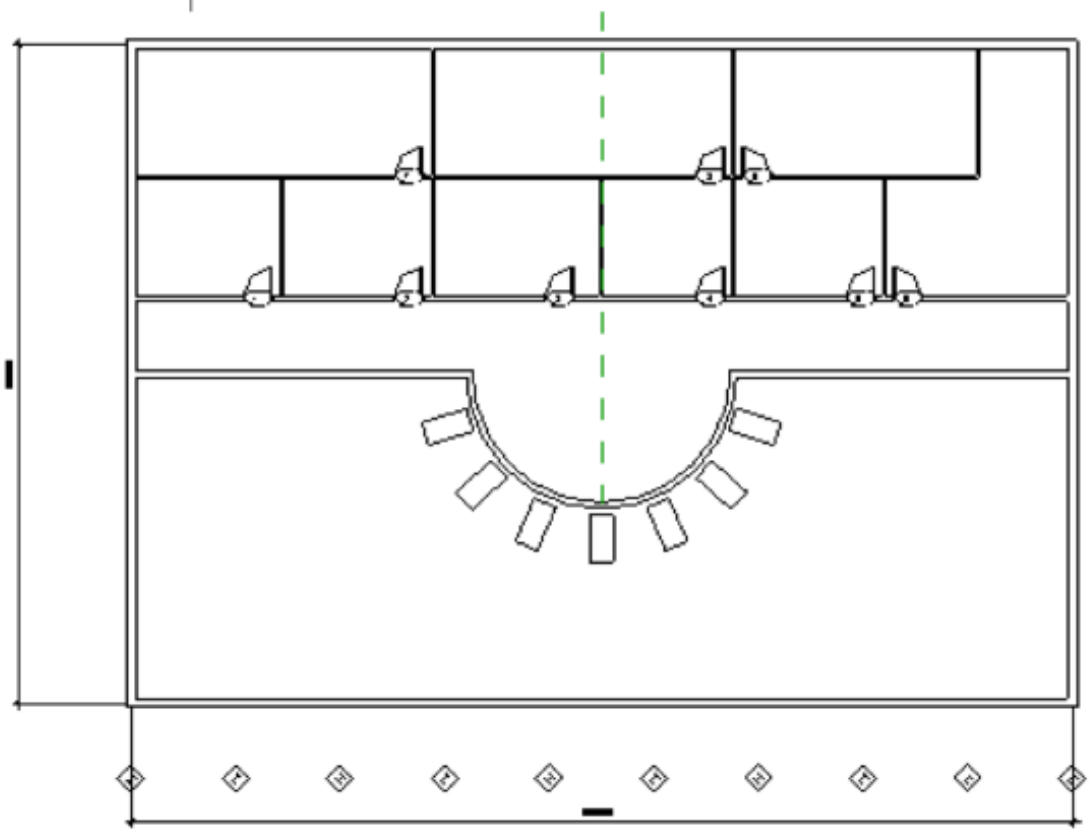


Figure 2–68

Task 1 - Split and Remove Walls

1. Open the project **Simple-Building-2-M.rvt**, found in your practice folder.

2. In the *Modify* tab>Modify panel click (Split Element).

3. In the Options Bar, select **Delete Inner Segment**.

4. Click on the horizontal wall where it intersects with the curved wall at both ends. The wall segment between these points is removed, as shown in Figure 2–69.

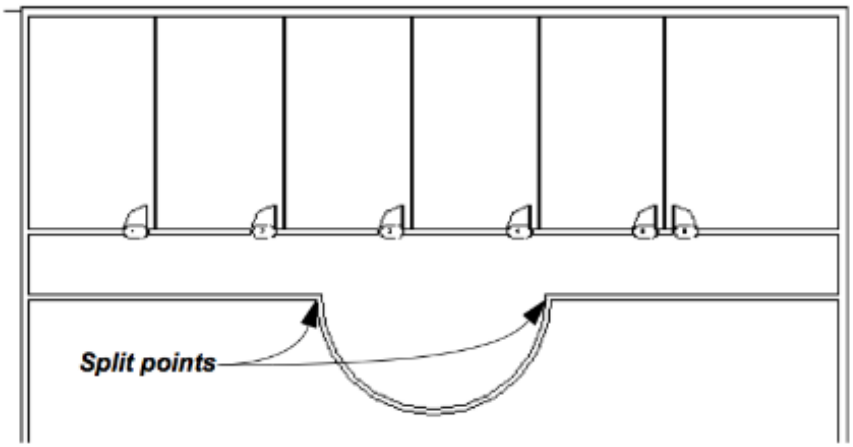


Figure 2–69

5. Click (Modify) to finish.

Task 2 - Offset and Trim Walls

1. In the *Modify* tab> Modify panel click (Offset).
2. In the Options Bar set the *Offset* to **4250mm** and ensure that **Copy** is selected.
3. Select the top horizontal wall while ensuring that the dashed alignment line displays inside the building, as shown in Figure 2–70.

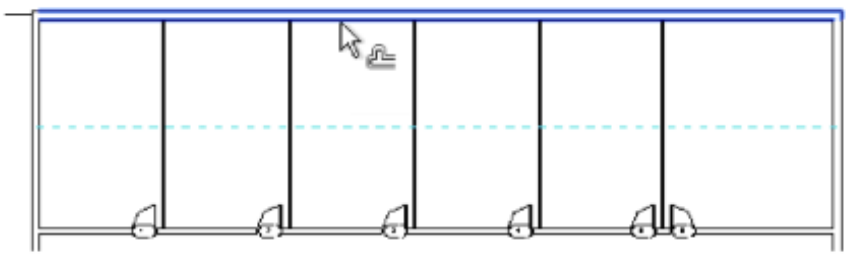


Figure 2–70

4. With **Offset** still active, change the *Offset* to **3000mm** and offset the last vertical interior wall to the right, as shown in Figure 2–71.

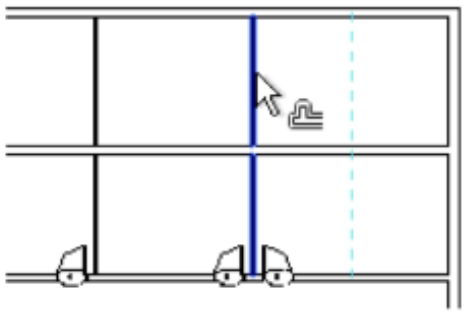


Figure 2–71

5. Click (Modify) and select the new horizontal wall that was created from the exterior wall. Change the wall to **Basic Wall: Interior - 138mm Partition (1-hr).** The layout of the new walls should display as shown in Figure 2–72.

The vertical wall does not need to be changed because it was offset from an interior wall.

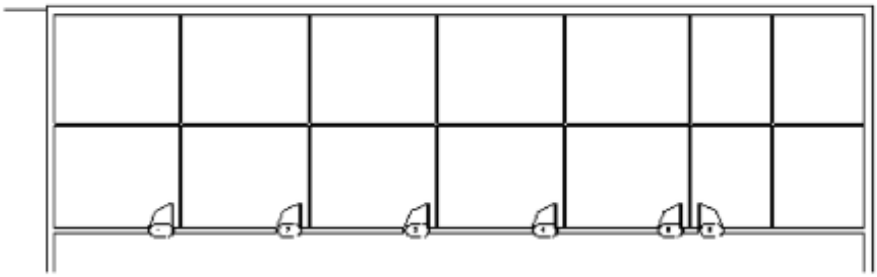


Figure 2–72

6. In the *Modify* tab>Modify panel, click (Trim/Extend Multiple Elements).
7. Select the new horizontal wall as the element to trim against.
8. Select every other wall BELOW the new wall. (Remember, you select the elements that you want to keep.) The walls should display as shown in Figure 2–73.

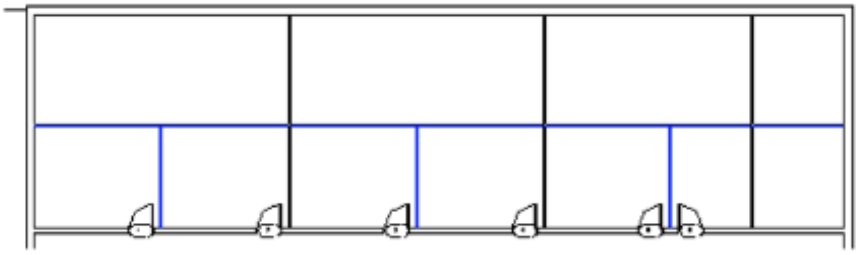


Figure 2–73

9. In the *Modify* tab>Modify panel click (Trim/Extend to corner) and select the two walls to trim as shown in Figure 2–74.

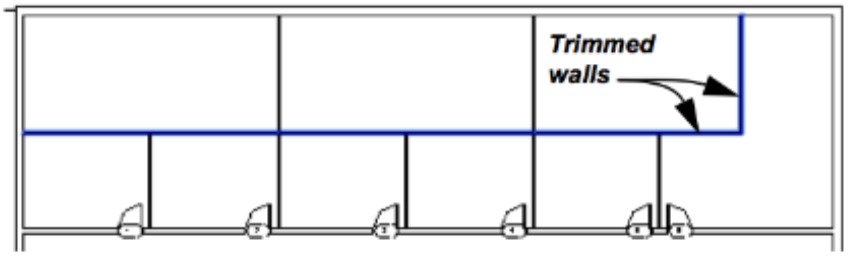


Figure 2–74

10. Add doors into the new rooms.
11. Save the project.

Task 3 - Align Walls.

1. In the *Architecture* tab>Work Plane panel click (Ref Plane).
2. Draw a reference plane vertically up from the midpoint of the curved wall, as shown in Figure 2–75.

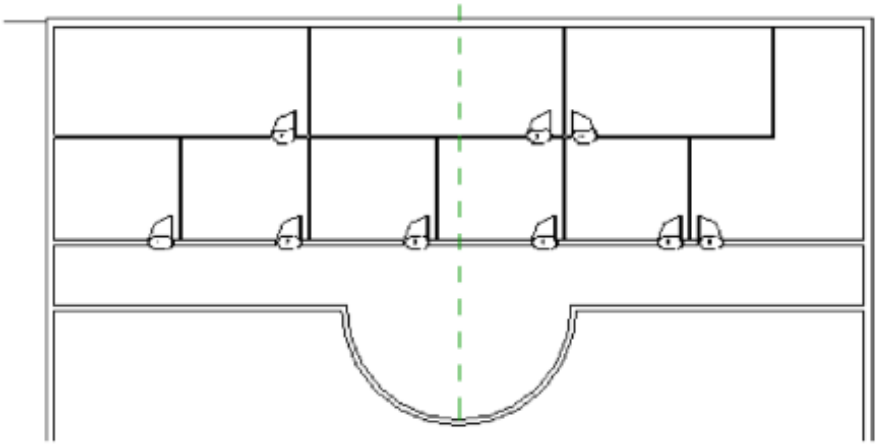


Figure 2–75

3. In the *Modify* tab>Modify panel, click (Align).
4. Select the reference plane, and then the wall to the left. The wall should line up with the reference plane.
5. Save and close the project.

Command Summary

Button	Command	Location
Draw Tools		
	**Center-ends Arc**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
	**Circle**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
	**Circumscribed Polygon**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
	**Ellipse**	• **Ribbon:** *Modify | Place Lines, Place Detail Lines, and various boundary sketches*>Draw panel
	**Ellipse Arc**	• **Ribbon:** *Modify | Place Lines, Place Detail Lines, and various boundary sketches*>Draw panel
	**Fillet Arc**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
	**Inscribed Polygon**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
	**Line**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
	**Pick Faces**	• **Ribbon:** *Modify | Place Wall*> Draw panel
	**Pick Lines**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
	**Pick Walls**	• **Ribbon:** *Modify | (various boundary sketches)*>Draw panel
	**Rectangle**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
	**Spline**	• **Ribbon:** *Modify | Place Lines, Place Detail Lines, and various boundary sketches*>Draw panel
	**Start-End-Radius Arc**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
	**Tangent End Arc**	• **Ribbon:** *Modify | (various linear elements)* tab>Draw panel
Modify Tools		
	**Align**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** AL
	**Array**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** AR
	**Copy**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** CO

	**Copy to Clipboard**	• **Ribbon:** *Modify* tab>Clipboard panel • **Shortcut:** <Ctrl>+<C>
	**Delete**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** DE
	**Mirror - Draw Axis**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** DM
	**Mirror - Pick Axis**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** MM
	**Move**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** MV
	**Offset**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** OF
	**Paste**	• **Ribbon:** *Modify* tab>Clipboard panel • **Shortcut:** <Ctrl>+<V>
	**Pin**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** PN
	**Rotate**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** RO
	**Scale**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** RE
	**Split Element**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** SL
	**Split with Gap**	• **Ribbon:** *Modify* tab>Modify panel
	**Trim/Extend Multiple Elements**	• **Ribbon:** *Modify* tab>Modify panel
	**Trim/Extend Single Element**	• **Ribbon:** *Modify* tab>Modify panel
	**Trim/Extend to Corner**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** TR
	**Unpin**	• **Ribbon:** *Modify* tab>Modify panel • **Shortcut:** UP
Select Tools		
	**Drag elements on selection**	• **Ribbon:** All tabs>Expanded Select panel • **Status Bar**
	**Filter**	• **Ribbon:** *Modify* | *Multi-Select* tab> Filter panel • **Status Bar**
	**Select Elements By Face**	• **Ribbon:** All tabs>Expanded Select panel • **Status Bar**

	**Select Links**	• **Ribbon:** All tabs>Expanded Select panel • **Status Bar**
	**Select Pinned Elements**	• **Ribbon:** All tabs>Expanded Select panel • **Status Bar**
	**Select Underlay Elements**	• **Ribbon:** All tabs>Expanded Select panel • **Status Bar**
	**Selection Sets: Add to Selection**	• **Ribbon:** *Edit Selection Set* tab>Edit Selection panel
	**Selection Sets: Edit**	• **Ribbon:** *Modify* | *Multi-Select* tab> Selection panel or *Manage* tab> Selection panel
	**Selection Sets: Load**	• **Ribbon:** *Modify* | *Multi-Select* tab> Selection panel or *Manage* tab> Selection panel
	**Selection Sets: Remove from Selection**	• **Ribbon:** *Edit Selection Set* tab>Edit Selection panel
	**Selection Sets: Save**	• **Ribbon:** *Modify* | *Multi-Select* tab> Selection panel or *Manage* tab> Selection panel

Practice 3b

Add Structural Grids and Columns

Estimated time for completion: 15 minutes

Practice Objectives

- Link a CAD file.
- Add and modify structural grid lines.
- Add structural columns.

In this practice you will import floor plans from the AutoCAD software and use them as a base layout for the first floor lobby and for a typical guest floor. You will then add grid lines using information in the imported file and add structural columns to the grid, as shown in Figure 3–32.

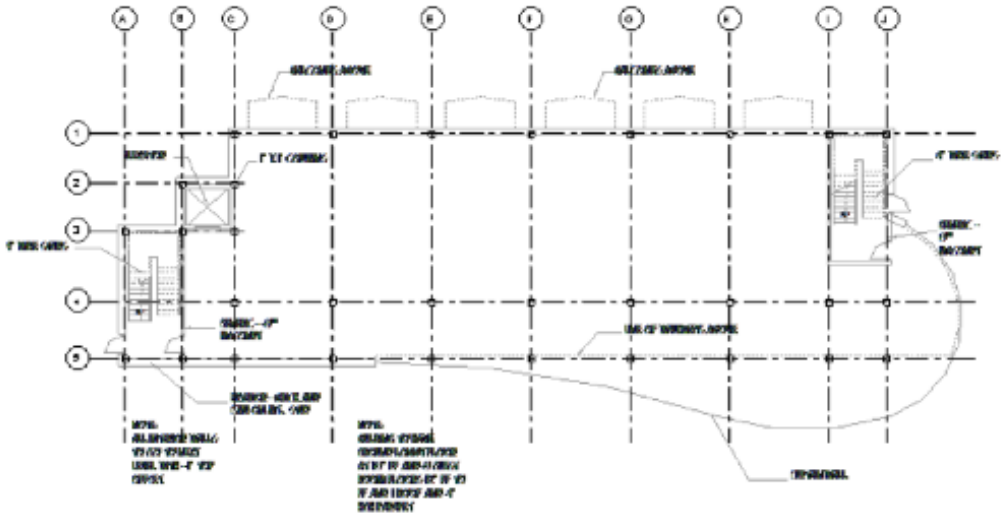


Figure 3–32

Task 1 - Import a CAD file.

1. Open the project **Modern-Hotel-Grids-M.rvt** from your practice folder.
2. Open the **Floor Plans: Floor 1** view.
3. In the *Insert* tab>Link panel, click (Link CAD).
4. In the Link CAD Formats dialog box, select the file **Hotel-Lobby-Floor-Plan-M.dwg**.

5. Set the following options:
   - Current view only: Select this option
   - Colors: **Black and White**
   - Layers: **All**
   - Import Units: **Auto-Detect**
   - Positioning: **Auto-Origin to Origin**
6. Click **Open**. The linked file is placed in the project on the **Floor Plans: Floor 1** view.
7. Select the linked file. It is all in one element and pinned in place because it was imported origin to origin.
8. Right-click and select **Override Graphics in View>By Element...**.
9. In the View-Specific Element Graphics dialog box, select **Halftone**.
10. Click **OK**.
11. Click in empty space to release the selection. The linked file displays in halftone with columns and grids, as shown in Figure 3–33.

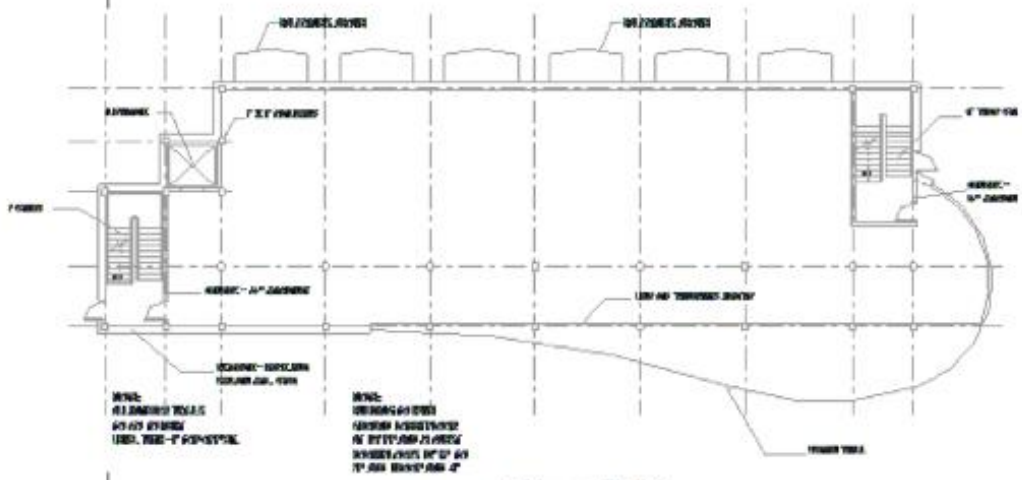


Figure 3–33

12. Open the **Floor Plans: Floor 2** view.
13. Link the CAD file **Hotel-Typical-Guest-Floor-Plan-M.dwg** using the options that were used for **Floor 1**.
14. Override the graphics and set the imported file to halftone.
15. Save the project.

Task 2 - Create structural grids.

1. Open the **Floor Plans: Floor 1** view.
2. In the *Architecture* tab>Datum panel, click (Grid).
3. In the *Modify | Place Grid* tab>Draw panel, click (Pick Lines).
4. Select the first vertical grid line on the left of the linked file. Click inside the bubble, type **A**, and press <Enter>.
5. Continue selecting the vertical grid lines displayed in the imported file. The letters automatically increment.
6. Click the first horizontal grid line and change the letter in the bubble to **1**.
7. Continue selecting the horizontal grid lines. The numbers automatically increment.
8. Click (Modify).
9. Check the lengths of all grid lines. Modify the length by dragging the ends if required. The final drawing is shown in Figure 3–34.

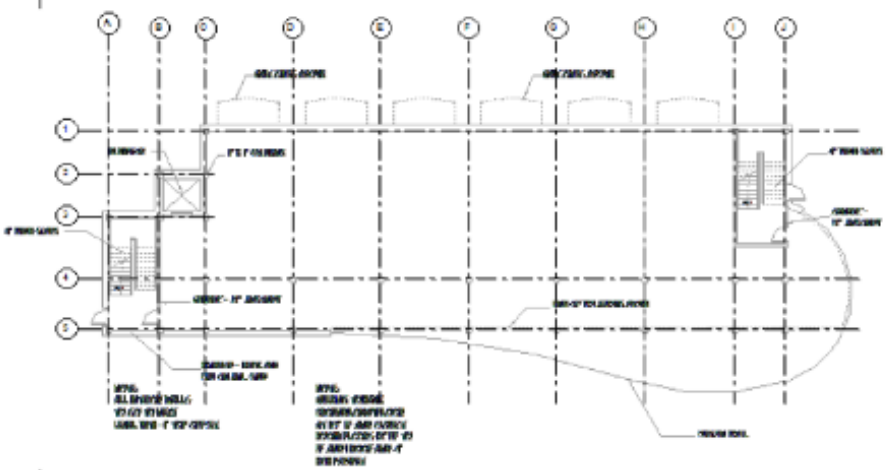


Figure 3–34

10. Save the project.

Task 3 - Add columns.

1. In the *Architecture* tab>Build panel, click (Structural Column).
2. In the Type Selector, select **M_Concrete-Square-Column: 300 x 300mm**.

Verify that Height (not Depth) is selected in the Options Bar.

3. In the Options Bar, set the *Height* to **Floor 2**.
4. In the *Modify | Place Structural Column* tab>Multiple panel, click (At Grids).

You can use a crossing window drawn from right to left to select the grids. All other elements are automatically filtered out.

5. Select all of the horizontal and vertical grid lines in the project.
6. In the *Modify | Place Structural Column>At Grid Intersection* tab>Multiple panel, click (Finish).
7. Return to the **Modify** command.
8. Delete the columns at locations **A1**, **A2**, **A4**, **B1**, and **B4**. The project displays as shown in Figure 3–35.

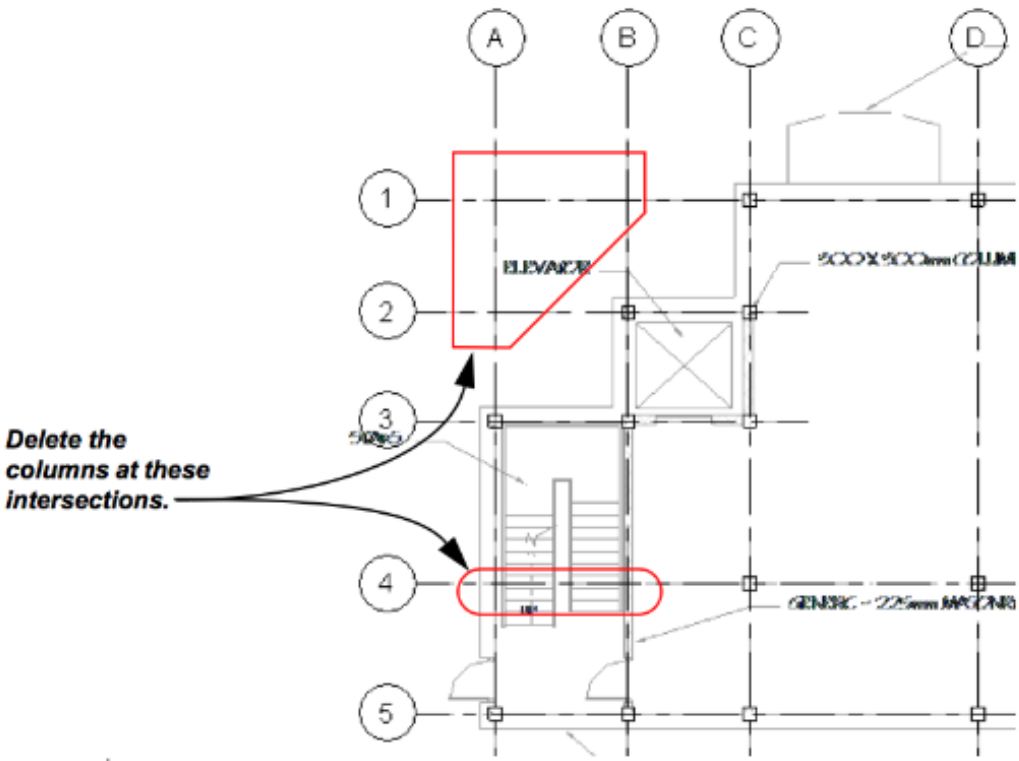


Figure 3–35

9. In the Quick Access Toolbar, click (Default 3D View). The columns are only set to the height of the 2nd floor (Floor 2), as shown in Figure 3–36.

The linked file does not display in the 3D view because it was only linked to the plan view.

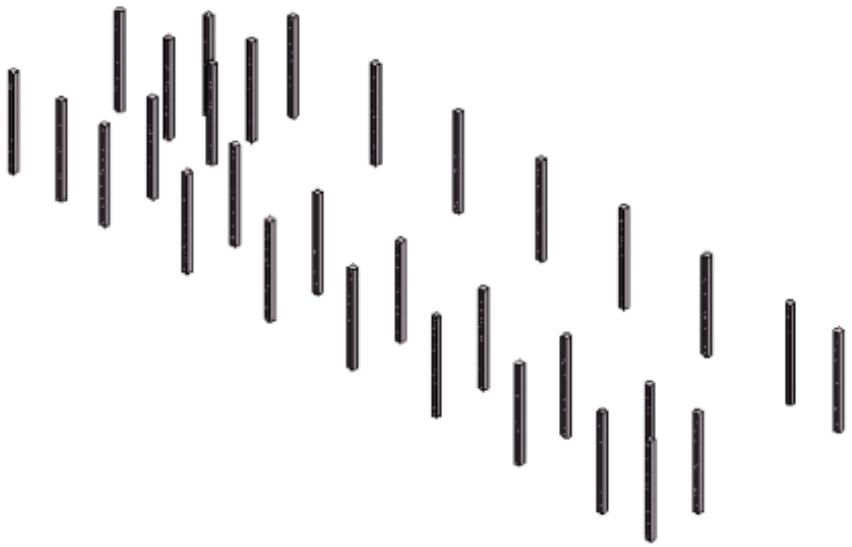


Figure 3–36

10. Select all of the columns. You can select one column, then right-click and select **Select All Instances>Visible in View**.
11. In Properties, in the *Constraints* area, change the *Base Level* to **T.O. Footing** and the *Top Level* to **Roof**. The columns now extend from the top of the footing to the roof.
12. Click in space to release the selection.

*Type **ZA** to zoom out in the view if needed.*

13. View several different floor plan views to verify the columns display.
14. Return to the **Floor Plans: Floor 1** view.
15. Save the project.

Command Summary

Button	Command	Location
	**At Columns**	• **Ribbon:** *Modify | Place Structural Column* tab>Multiple panel
	**At Grids**	• **Ribbon:** *Modify | Place Structural Column* tab>Multiple panel
	**Column**	• **Ribbon:** *Architecture* tab>Build panel
	**Column> Column: Architectural**	• **Ribbon:** *Architecture* tab>Build panel>expand Column
	**Column> Structural Column**	• **Ribbon:** *Architecture* tab>Build panel>expand Column
	**Grid**	• **Ribbon:** *Architecture* tab>Datum panel • Shortcut: GR
	**Import CAD**	• **Ribbon:** *Insert* tab>Import panel
	**Level**	• **Ribbon:** *Architecture* tab>Datum panel • Shortcut: LL
	**Link CAD**	• **Ribbon:** *Insert* tab>Link panel
	**Multi-Segment (Grid)**	• **Ribbon:** *Modify | Place Grid* tab>Draw panel

Practice 4a

Estimated time for completion: 20 minutes

Model the Exterior Shell

Practice Objectives

- Trace over walls in an imported DWG file.
- Add curtain walls.
- Modify wall joins.

In this practice you will add exterior walls, including a curtain wall, to create the exterior shell of the project. You will use an imported file to help establish the location of the walls. You will then add a parapet wall over the curtain wall. The completed model is shown in Figure 4–14.

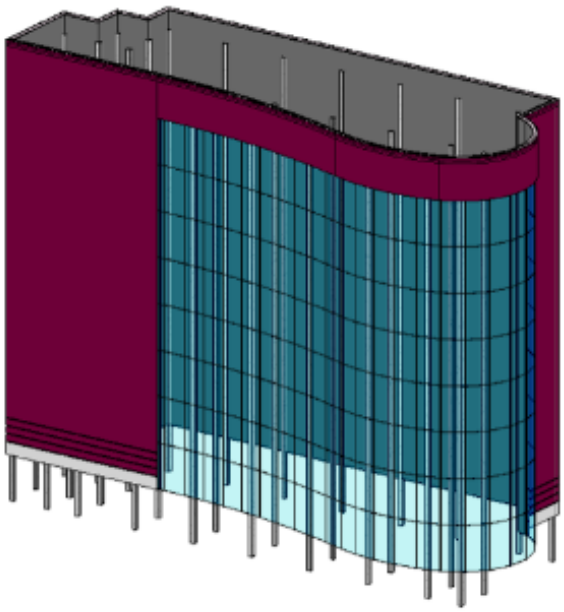


Figure 4–14

Task 1 - Add walls by picking lines.

1. Open the project **Modern-Hotel-Walls-M.rvt** from your practice folder.
2. Verify that you are in the **Floor Plans: Floor 1** view.
3. In the View Control Bar, set the *Detail Level* to (Medium). Doing so enables the multiple layers of the wall that is going to be added to be displayed.
4. In the *Architecture* tab>Build panel, click (Wall).

5. In the Type Selector, select **Basic Wall: Exterior - Brick and CMU on MTL. Stud**.

6. In the Options Bar, set the *Height* to **Parapet** and the *Location Line* to **Finish Face: Exterior**. Verify that the **Chain** option is selected. In Properties, verify that both *Base Offset* and *Top Offset* are set to **0.0**.

7. In the Draw panel, click (Pick Lines).

8. Select one of the exterior walls in the imported file, as shown in Figure 4–15. Ensure the dashed line displays inside the wall. This wall is a compound wall and you want the brick to display on the outside.

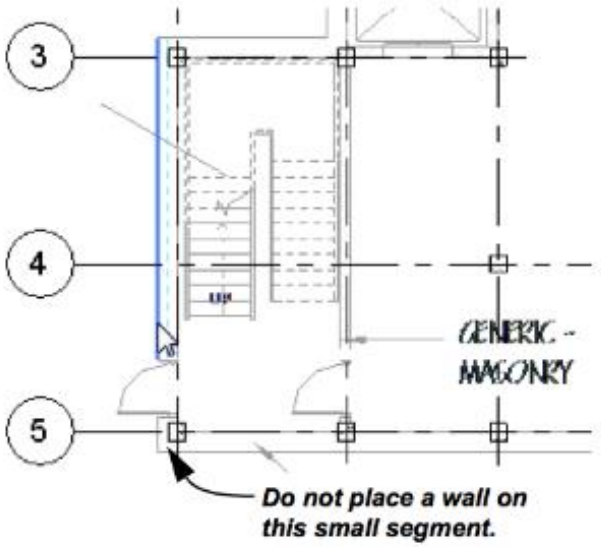


Figure 4–15

9. Continue selecting lines around the exterior of the building. Do not select the curved curtain wall lines.

   - Use (Flip) to change the wall's orientation if the stucco side of the wall is not on the outside.

10. Click (Modify).

11. At the door openings on either end of the building, do not add walls on either side of the door. Instead, use the **Drag Wall End** control, as shown in Figure 4–16, to lengthen the wall across the opening. The intersections should clean up automatically.

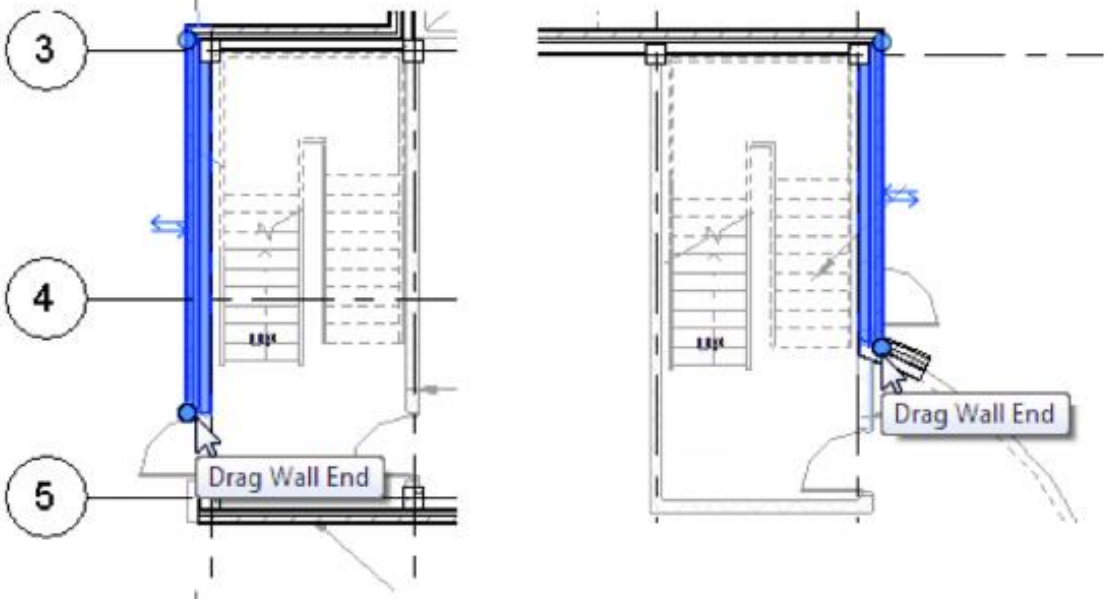


Figure 4–16

12. Save the project.

Task 2 - Add basic curtain walls.

1. Click (Wall).
2. In the Type Selector, select **Curtain Wall: Exterior Glazing** and set the following properties:
   - Base Constraint: **Floor 1**
   - Base Offset: (negative) **0**
   - Top Constraint: **Up to level: Roof**
   - Top Offset: (negative) **-1850**

This places the top of the curtain wall below the roof level.

3. Use (Pick Lines) and select the three curved lines.
4. In the Quick Access Toolbar, click (3D View).

5. In the View Control Bar, set the *Visual Style* to (Consistent Colors). The curtain wall does not extend to the top of the parapet, as shown in Figure 4–17.

The columns are hidden to make this graphic more readable.

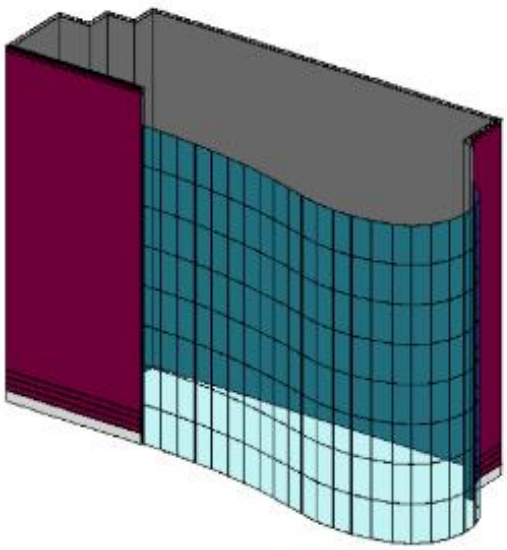


Figure 4–17

Task 3 - Add a parapet.

1. Open the **Floor Plans: Roof** view.
2. In the View Control Bar, set the *Detail Level* to (Medium) to display the layers of the walls.
3. Select the small curved piece of wall at the northeast corner of the building on Column Line J. Right-click on the right end point grip and select **Disallow Join,** as shown in Figure 4–18.

Some walls, when they try to automatically clean up, cause problems. Disallowing a join can resolve the issue.

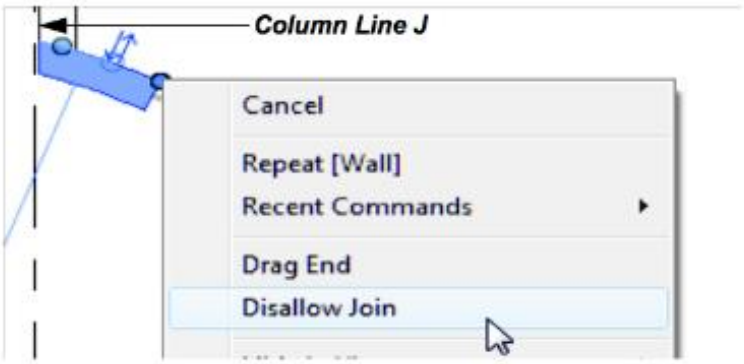


Figure 4–18

4. Repeat the process again on the other wall that connects to the curtain wall near the intersection of Grid D5.
5. Start the **Wall** command.
6. In the Type Selector, select **Basic Wall: Exterior - Brick on MTL. Stud - parapet**. The alert, shown in Figure 4–19, displays because the software remembered the last settings of the properties.

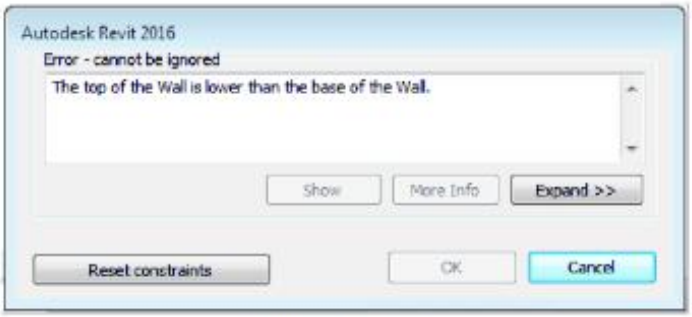


Figure 4–19

7. Click **Reset constraints**. All of the properties are reset.
8. Select the **Basic Wall: Exterior - Brick on MTL. Stud - parapet** again and set the following properties:
   - Base Constraint: **Roof**
   - Base Offset: (negative) **-1850mm**
   - Top Constraint: **Up to level: Parapet**
   - Top Offset: **0.0**
9. In the Draw panel, click (Pick Lines). Move the cursor over the middle curved curtain wall and press <Tab> until the curtain wall reference displays as shown in Figure 4–20 and then click to place the wall.

Ensure that you are selecting the main line of the curtain wall or a grid line and not one of the curtain wall panels.

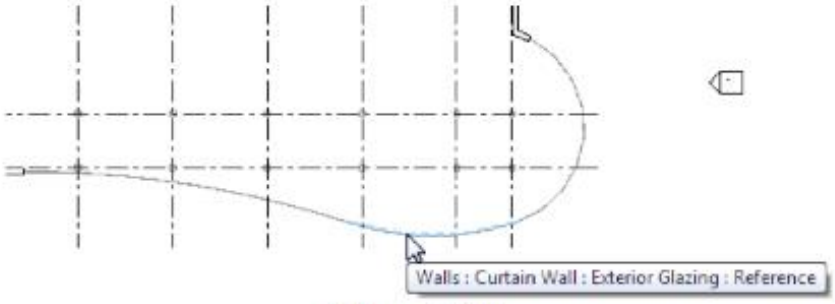


Figure 4–20

10. In the *Modify* | *Place Wall* tab>Draw panel, click (Start-End-Radius Arc).

11. Select the points in the order shown in Figure 4–21. Ensure that you select the endpoints before selecting the tangent point on the arc.

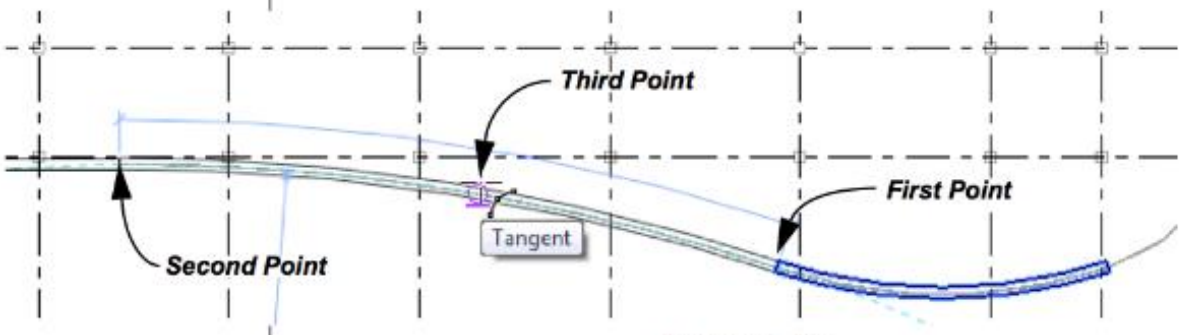


Figure 4–21

- Creating the wall this way solves some issues because the center line of the curtain wall is at a slight offset from the main wall.
- If a warning displays about a wall sweep you can ignore it.

12. Repeat the process in a similar manner for the other part of the arc, starting with the endpoint of the small wall, and then the endpoint of the curved wall, and finally the tangent point.

13. Click (Modify).

14. Type **ZA** to display the full floor plan.

15. Return to the 3D view. The new parapet wall over the curtain wall displays as shown in Figure 4–22.

The columns are hidden to clarify the image.

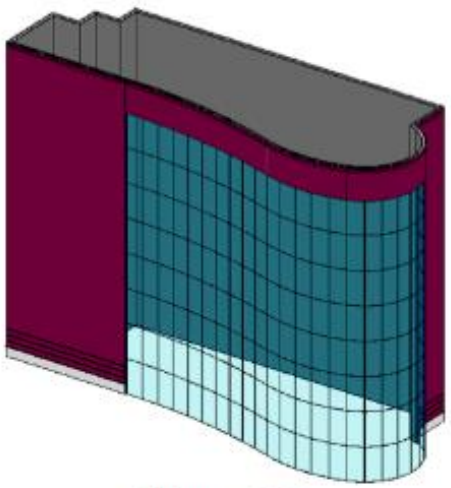


Figure 4–22

16. Save the project.

Practice 4b

Add Interior Walls

Estimated time for completion:
20-30 minutes

Practice Objectives

- Model and modify walls.
- Use modify tools including **Align**, **Offset**, **Trim/Extend**, **Copy**, and **Mirror**.

In this practice you will add interior walls to the first floor plan, as shown in Figure 4–23, and use **Offset**, **Split Element**, **Trim**, and **Align** to help create them. As optional tasks, you can add walls to the second floor, basement, and foundation.

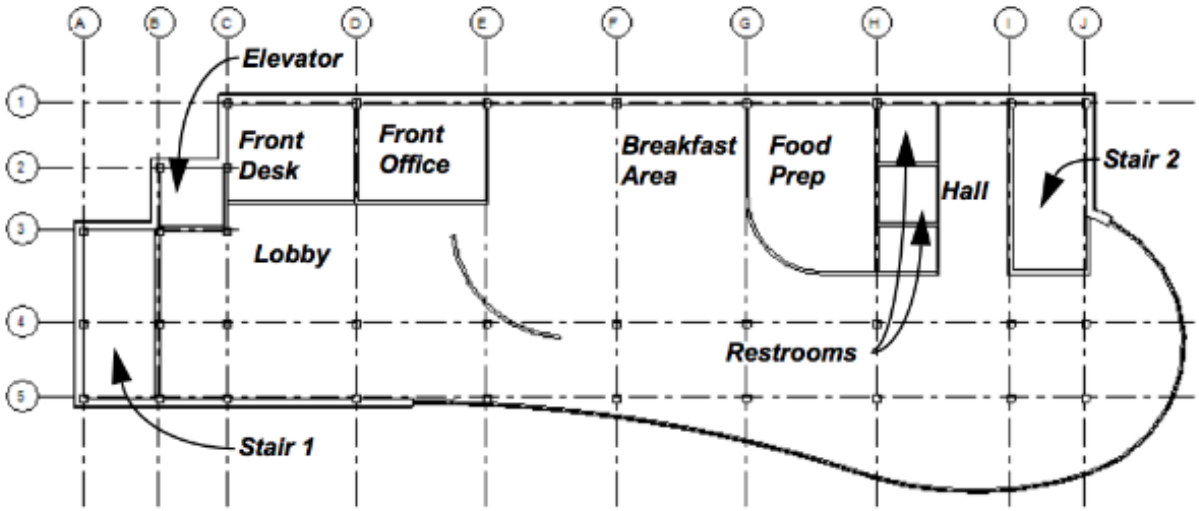


Figure 4–23

Task 1 - Add and align the stair and elevator walls.

1. Open the project **Modern-Hotel-Interior-Walls-M.rvt** from your practice folder.
2. Open the **Floor Plans: Floor 1** view.
3. Zoom in on the stair and elevator area on the left side of the building.
4. Start the **Wall** command.

5. In the Options Bar and Properties, set the following options:
   - Wall Type: **Basic Wall: Generic 225mm Masonry**
   - Height: **Roof**
   - Base Offset: **0.0**
   - Top Offset: **0.0**
6. Draw the stair and elevator walls from column to column, as shown in Figure 4–24.

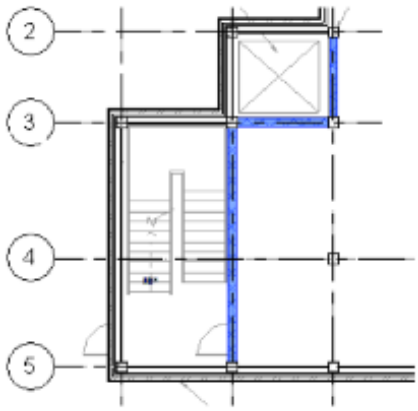


Figure 4–24

7. Click (Modify).
8. Zoom in on the elevator walls and ensure you can also display some of the related grid lines.
9. In the *Modify* tab>Modify panel, click (Align) and select the vertical **Grid C**.
10. Hover the cursor over the vertical elevator wall to display its center line (as shown in Figure 4–25), and then select it. Press <Tab> to display the center line if it is not displayed.

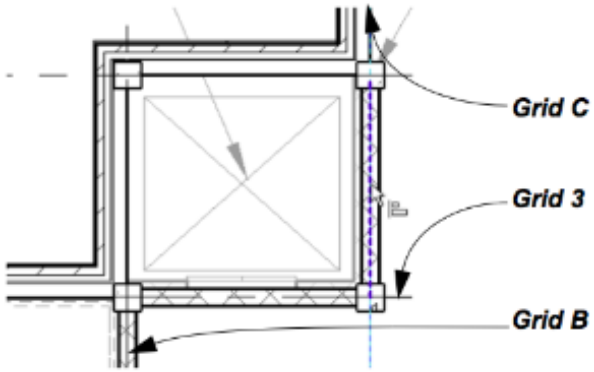


Figure 4–25

11. Align the horizontal elevator wall to Grid 3 and the vertical stairs wall to the Grid B.

12. Click (Modify) and use the drag controls on the ends of the walls to connect any of the places where the walls do not touch other walls.

13. Repeat the process of creating walls on the other stairwell. Align the center line of the left concrete block wall to the grid line and the right concrete wall to the inside face of the exterior wall, as shown in Figure 4–26.

If required, before aligning, disallow the join between the interior and exterior walls. After everything is in place, you can enable the join again.

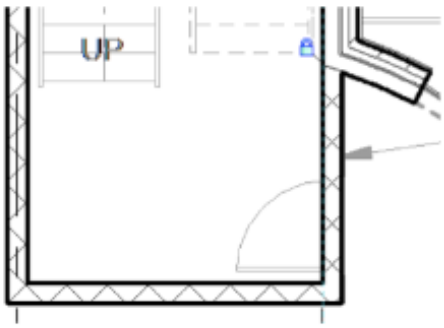


Figure 4–26

14. Zoom out to display the entire building floor plan.

15. Save the project.

Task 2 - Add the front desk and office walls.

1. Select the linked file. Right-click and select **Hide in View>Elements**.

2. Click (Wall) and set the following properties:

   - Wall type: **Basic Wall: Interior - 138mm Partition (1-hr)**
   - Height: **Floor 2**
   - Location Line: **Wall Centerline**
   - Top Offset: (negative) **-300mm**

Setting the Top Offset to a negative number leaves room for the floor above.

3. Draw the walls shown in Figure 4–27.

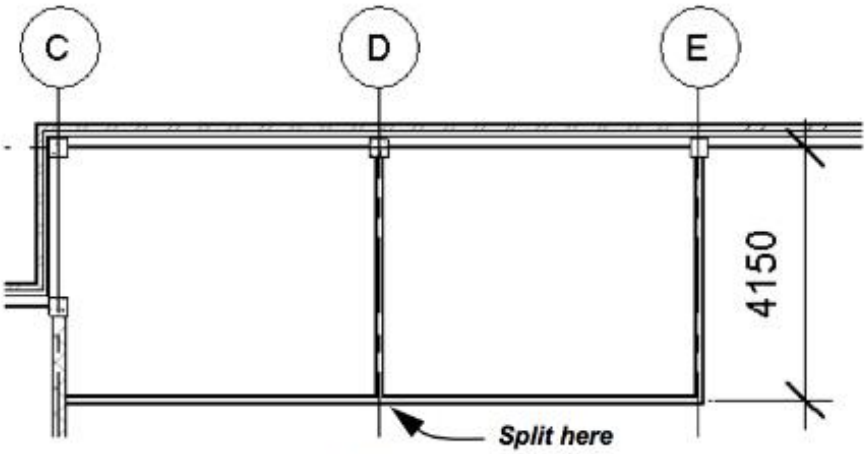


Figure 4–27

4. In the *Modify | Place Wall* tab>Modify panel, click (Split Element).
5. Click the horizontal wall at the point shown in Figure 4–27.
6. Click (Modify) and select the wall on the left. Change the *Top Constraint* to **Unconnected** and the *Unconnected Height* to **1220mm**. This becomes the base for the Front Desk shelf.
7. Modify the lower wall to butt up against the taller walls, as shown in Figure 4–28.

In the Quick Access Toolbar, click (Thin Lines) to make the close-up easier to see.

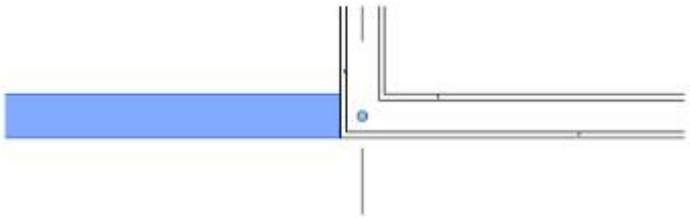


Figure 4–28

Task 3 - Add the support room walls.

1. Pan over to the other stairwell and add the walls shown in Figure 4–29. Use the same wall type and properties as the other main interior walls.

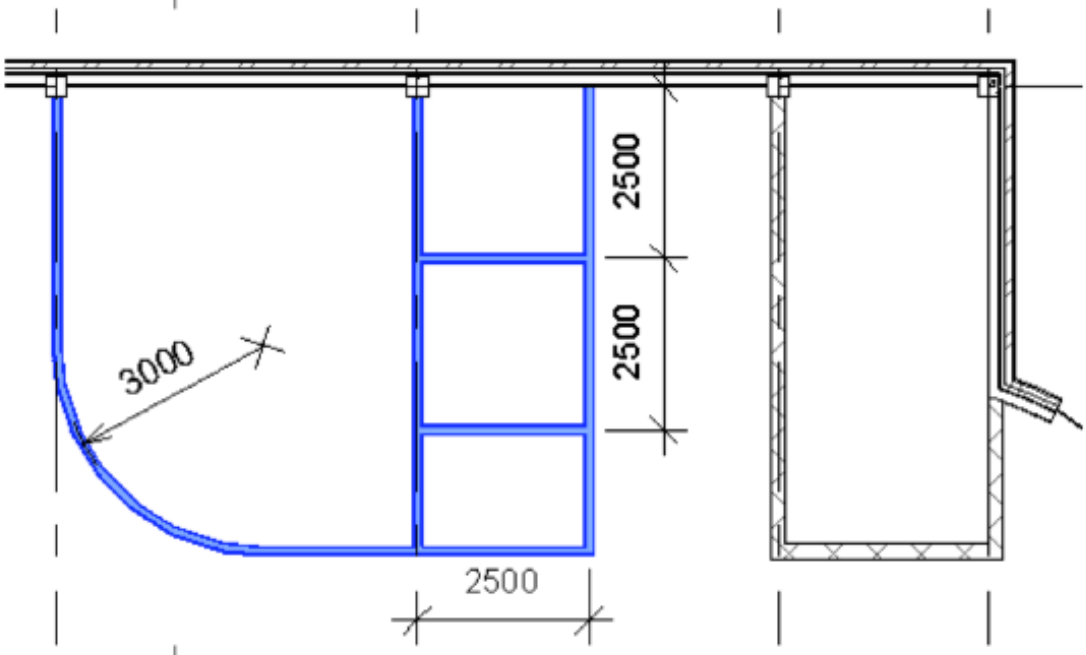


Figure 4–29

- Use (Offset) to locate the 2500mm distance walls after you have drawn some of the others.
- Use (Align) to match up the front face of the lower wall with the front face of the stairwell wall.
- To create the arc wall, add two straight walls first. Click (Fillet Arc), set the *Fillet radius* to **3000mm**, and select the two walls to create the arc at the corner.
- Use (Trim/Extend to Corner), (Trim/Extend Single), and (Trim/Extend Multiple) as required to get the walls in place.

2. Zoom out and add a **2500mm** high curved wall using the same interior wall type to separate the Lobby from the Breakfast area, as shown in Figure 4–30.

The exact size and location does not matter, but ensure there is enough room for people to get by on both sides.

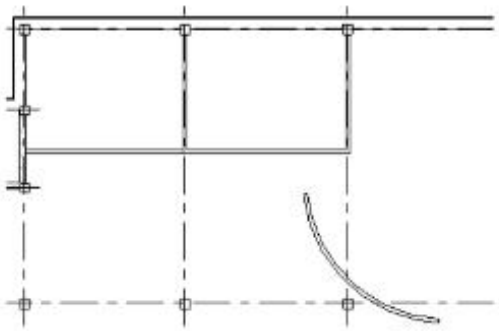


Figure 4–30

3. Zoom out and save the project.

Task 4 - (Optional) Add typical guest floor walls .

1. Open the **Floor Plans: Floor 2** view.

The linked drawing has been hidden in the view for clarity.

2. Add walls for the guest rooms (as shown in Figure 4–31) using the wall type **Interior - 138mm Partition (1-hr)** with a *Height* of **Floor 3** and a *Top Offset* of (negative) **-300mm**.
   - Align the center of the vertical walls to the grids.
   - Ignore all of the door openings.
   - You can use (Copy) and (Mirror) to duplicate the walls once you have drawn one guest room layout.
   - Be aware that the distance between grids C and D is slightly shorter than the distance between the rest of the room grids. This impacts copying the rooms.

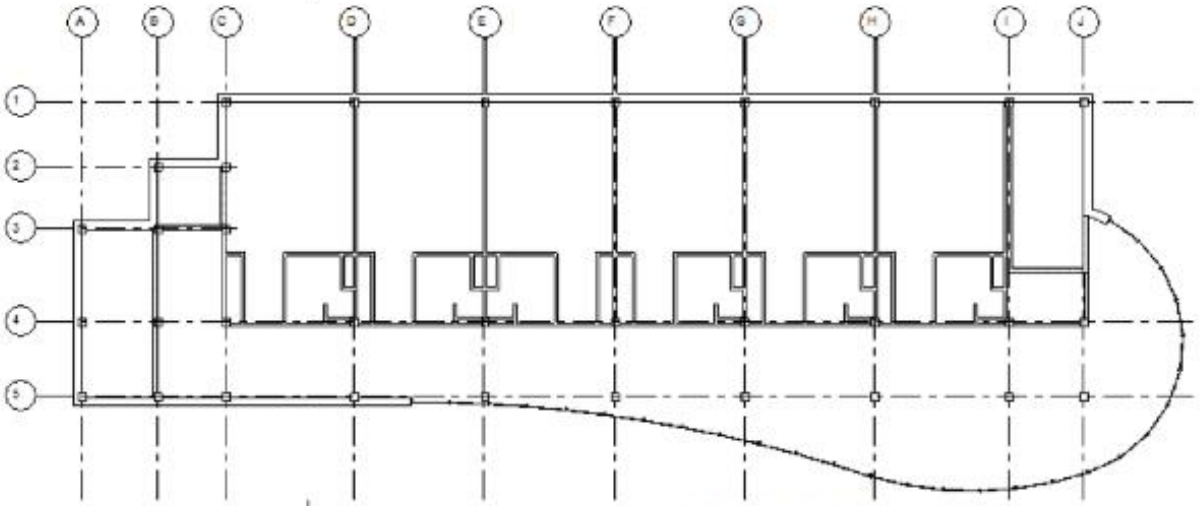


Figure 4–31

3. Return to **Floor Plans: Floor 1** view.

Task 5 - (Optional) Add basement walls.

The following tasks use the standard **Wall** command to draw foundations and wall footings. Additional structural foundation tools are also available.

1. Open the **Floor Plans: T.O. Footing** view.
2. Hide the column grids.
3. In Properties, in the *Graphics* area, set the *Underlay* to **Floor 1** so that the existing walls are displayed.
4. In the *Architecture* tab>Build panel, click (Wall).
5. In Properties set the following options: (Reset the constraints if needed.)
   - Wall type: **Basic Wall: Generic - 225mm Masonry**
   - Location Line: **Core Centerline**
   - Base Constraint: **T.O. Footing**
   - Base Offset: **0.0**
   - Top Constraint: **Up to Level: Floor 1**
   - Top Offset: **0.0**
6. In the *Modify | Place Wall* tab>Draw panel, click (Pick Lines). In the main building underlay, select the core center line of the exterior walls and curtain walls, and around the stairs and elevator to create the walls, as shown in Figure 4–32. (Hint: For the stairwell on the right side, create the inner vertical and horizontal wall and then drag the endpoint of the right exterior wall down so that it intersects with the inner horizontal wall).

Hover the cursor over a wall and then press <Tab> until the center line displays.

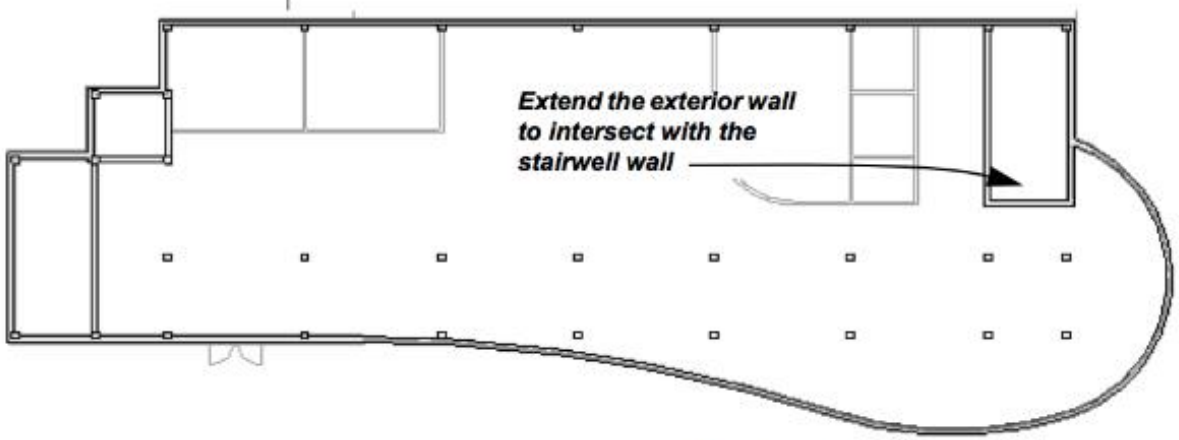


Figure 4–32

7. Click (Modify).
8. In Properties, change the *Underlay* back to **None**.

Task 6 - (Optional) Add footings to the walls.

1. Click (Wall).
2. In Properties or the Options Bar, set the following options:
   - Wall type: **Basic Wall: Generic - 600mm Concrete**
   - Location Line: **Core Centerline**
   - Base Constraint: **T.O. Footing**
   - Base Offset: (negative) **-450mm**
   - Top Constraint: **Up to Level:T.O.Footing**
   - Top Offset: **0.0**
3. Click (Pick Line) and select the core center line of all the foundation walls. The wall footings display as shown in Figure 4–33. You add column footings later.

You might need to zoom in to highlight the core center line.

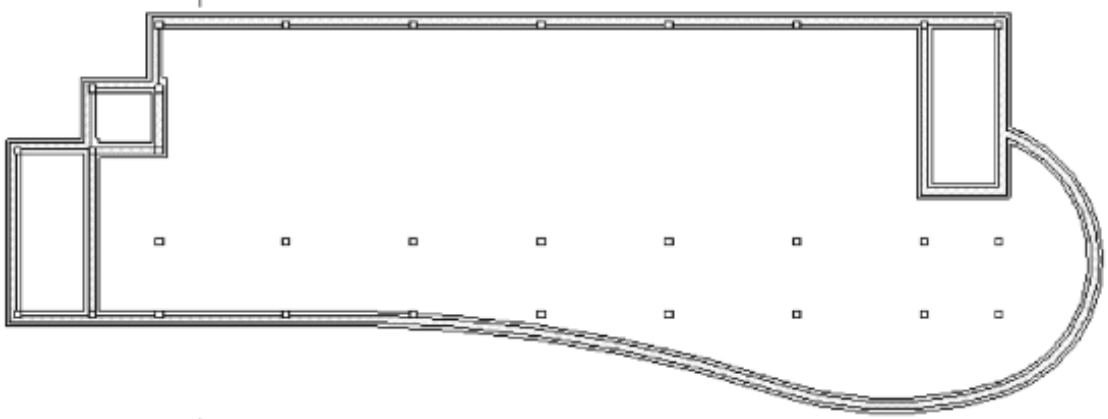


Figure 4–33

4. Save the project.

Command Summary

Button	Command	Location
	**Detail Level: Coarse**	• **View Control Bar**
	**Detail Level: Fine**	• **View Control Bar**
	**Detail Level: Medium**	• **View Control Bar**
	**Edit Type/ Type Properties**	• **Ribbon:** Modify tab>Properties panel • **Properties palette:** Edit Type
	**Match Type**	• **Ribbon:** *Modify* tab>Clipboard panel • **Shortcut:** MA
	**Properties**	• **Ribbon:** *Modify* tab>Properties panel • **Shortcut:** PP
N/A	**Type Selector**	• **Properties palette** • **Ribbon:** *Modify* tab (*optional*) • **Quick Access Toolbar** (*optional*)
	**Wall**	• **Ribbon:** *Architecture* tab>Build panel
	**Wall Opening**	• **Ribbon:** *Architecture* tab>Opening panel

Practice 5a

Insert Doors and Windows

Estimated time for completion: 15 minutes

Practice Objectives

- Add doors and windows.
- Copy elements to multiple levels.

In this practice you will add doors and windows to a model, as shown for Floor 1 in Figure 5–8. You will use controls, temporary dimensions, and dimensions set to Equal to help you place the doors and windows. You will also copy windows to multiple levels.

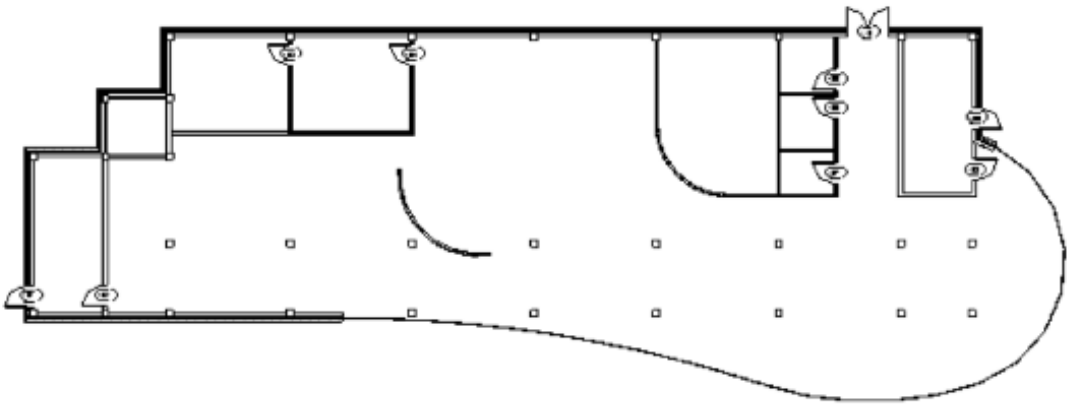


Figure 5–8

Task 1 - Add doors.

1. Open the project **Modern-Hotel-Doors-M.rvt** from your class folder.
2. Working in the **Floor Plans: Floor 1** view, select one of the grid lines. Right-click and select **Hide in view>Category** to turn off all of the grid lines.
3. In the *Architecture* tab>Build panel, click (Door).
4. In the Type Selector, select **M_Single-Flush: 0915 x 2134mm**.
5. In the *Modify | Place Door* tab>Tag panel, verify that (Tag on Placement) is on.

6. Place the door near the lower left corner of the building, as shown in Figure 5–9. Use the flip arrows to make it swing in the right direction and use temporary dimensions to place it to the correct location on the wall. Click on the tag and change the number to **101**.

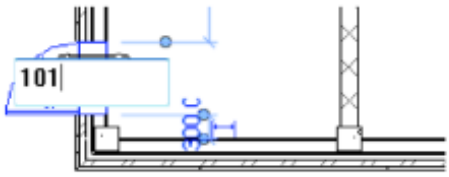


Figure 5–9

7. Continue adding single flush doors in the project, similar to the locations shown in Figure 5–10. Use the same door type. The tag number automatically increments.

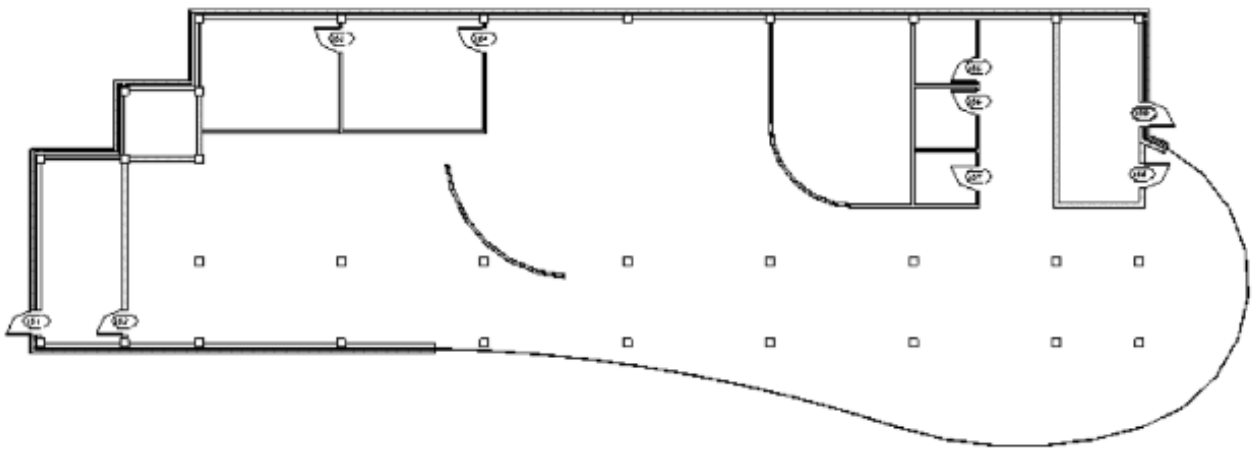


Figure 5–10

8. Click (Modify) and select the two sets of stairwell doors (two doors on the left side and two doors on the right side of the building).
   - If you select multiple categories, use (Filter) to help select only the doors.
9. In the Type Selector, select **M_Single-Flush Vision: 0915 x 2032mm**.
10. Zoom in on the upper right corner of the building, in the area of the stairwell and hallway.
11. Click (Door) and in the Type Selector, select **M_Double-Glass 1: 1830 x 2134mm**.

12. Place the door at the end of the hall. At this point the location does not need to be exact as you are going to modify the placement in the following steps.

13. In the Quick Access Toolbar, click (Aligned Dimension). Note that by starting another command, you automatically end the previous command.)

Press <Tab> to cycle through the reference points.

14. For the dimension locations select the inside of the left wall, the center of the door, and in the inside of the right wall, as shown on the left in Figure 5–11. Click to place the dimension.

15. Click the **EQ** control. The door is centered evenly between the two walls, as shown on the right in Figure 5–11.

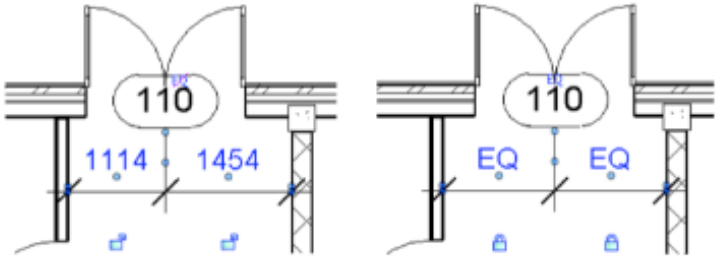


Figure 5–11

16. Delete the dimension. An alert displays, as shown in Figure 5–12. In this case, you want the dimensions constrained to be equal. Click **OK**.

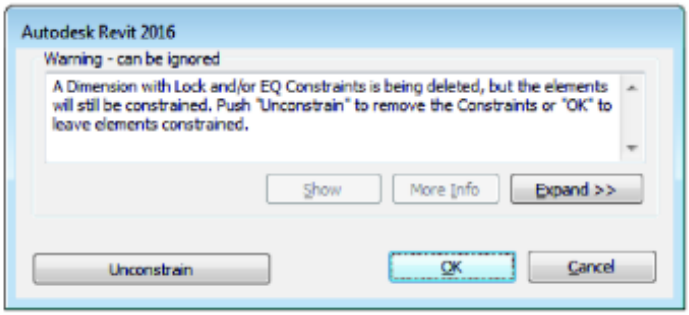


Figure 5–12

17. Zoom out to see the full floor plan.

18. Save the project.

Task 2 - Add windows and space them equally apart.

1. Open the **Floor Plans: Floor 2** view.
2. The linked CAD file is still displayed in this view. Select it and in the Status Bar click (Temporary Hide/Isolate)>**Hide Element**. Leave the grids displayed, as they enable you to place the windows correctly.
3. In the *Architecture* tab>Build panel, click (Window).
4. In the *Modify | Place Window* tab>Tag panel, verify that (Tag on Placement) is turned on.
5. In the Type Selector, select **Casement 3x3 with Trim: 1220 x 1220mm**.
6. Add four windows along the lower exterior wall, as shown in Figure 5–13. The exact location is not important right now.

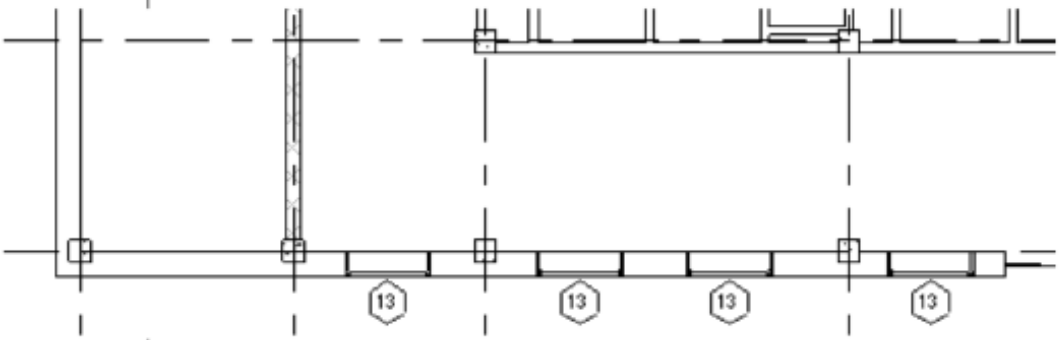


Figure 5–13

7. Click (Modify) and select the window closest to the stair and use temporary dimensions to move it so it is 1400mm from the grid line, as shown in Figure 5–14. You might need to move the witness line so that it references the grid, rather than a wall.

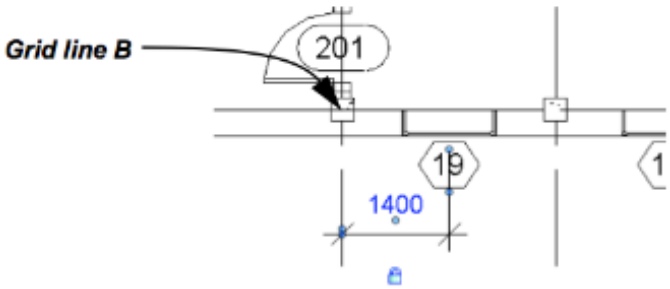


Figure 5–14

8. In the Quick Access Toolbar or in the *Annotate* tab> Dimension panel, click (Aligned Dimension). Dimension from the grid to the center of the window and lock the dimension in place, as shown in Figure 5–15.

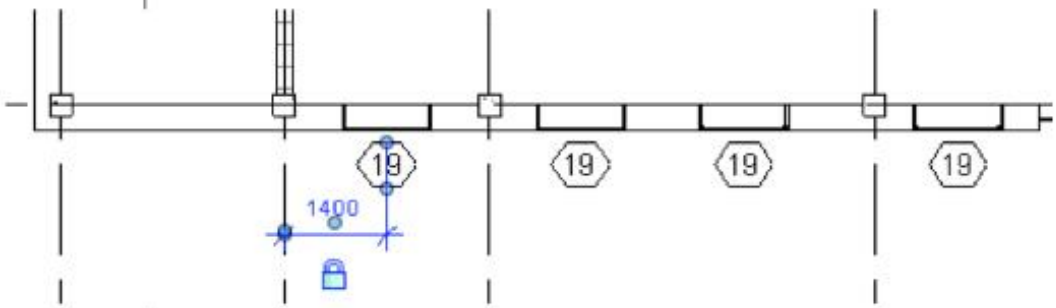


Figure 5–15

9. With the (Aligned Dimension) still active, dimension from center to center of the windows. Click the **EQ** control and lock the padlocks, as shown in Figure 5–16.

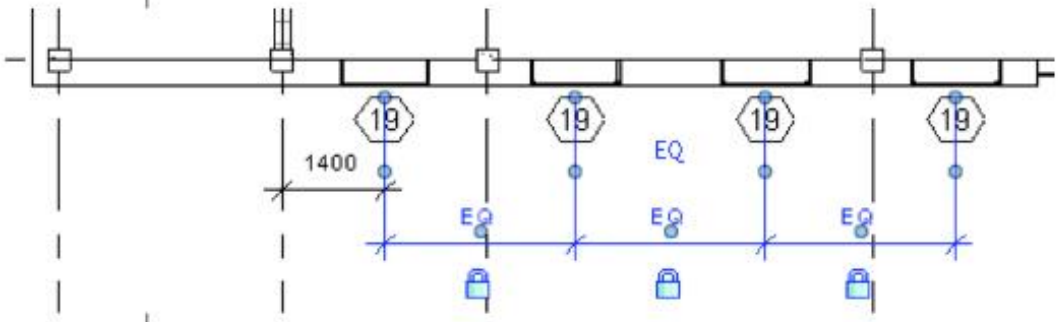


Figure 5–16

10. Delete the dimensions, but keep the constraints.

Task 3 - Copy windows to multiple levels.

1. Open the 3D view and verify that the front of the building where the windows are located is displayed.
2. Select all four windows by holding <Ctrl> and selecting each one.
3. In the *Modify | Windows* tab>Clipboard panel, click (Copy to Clipboard).

4. In the Clipboard panel, expand (Paste) and click (Aligned to Selected Levels).

5. In the Select Levels dialog box, select the floors between and including **Floor 3** and **Floor 8**, as shown in Figure 5–17.

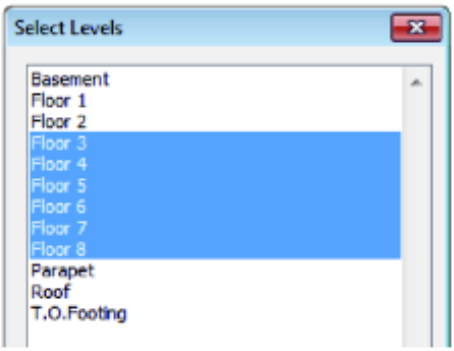


Figure 5–17

6. Click **OK**. The windows are copied up the side of the building, as shown in Figure 5–18.

Additional doors and windows will be placed using storefront curtain walls.

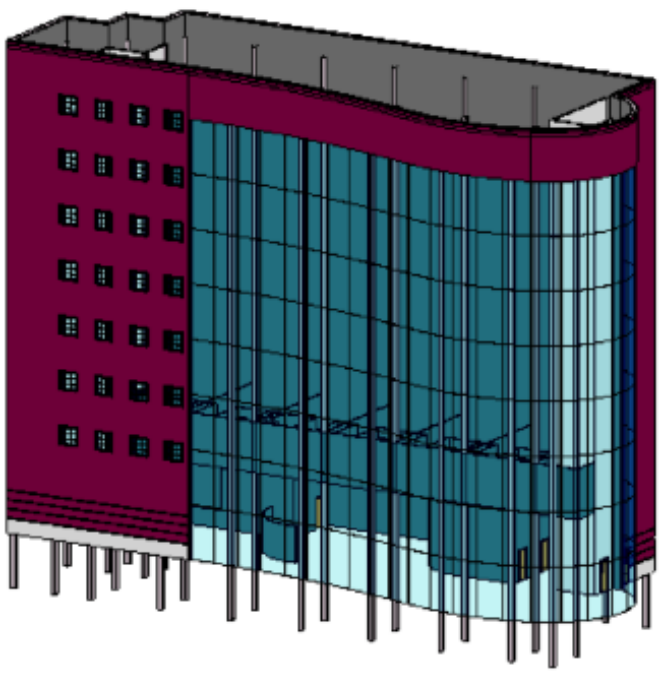


Figure 5–18

7. Save the project.

Practice 5b

Load and Create Door Types

Estimated time for completion: 15 minutes

Practice Objectives

- Load door types.
- Duplicate and modify a door type.

In this practice you will load specialty door types used in the guest rooms, create a new door size, and add doors to the second floor, as shown in Figure 5–25.

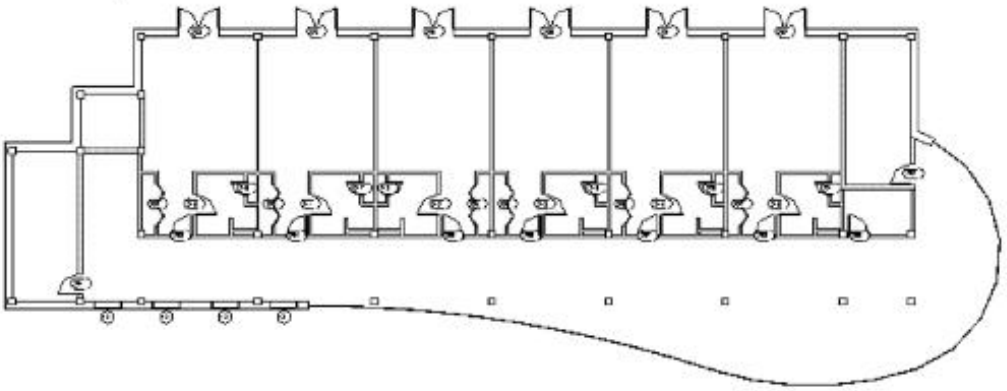


Figure 5–25

Task 1 - Load door types.

1. Open the project **Modern-Hotel-Load-M.rvt** from the class folder.
2. Open the **Floor Plans: Floor 1** view and zoom in on the kitchen area.
3. In the *Architecture* tab>Build panel, click (Door).
4. In the *Modify | Place Door* tab>Mode panel, click (Load Family).
5. In the Load Family dialog box, navigate to the US Metric library>*Doors* folder and select **M_Door-Double-Flush _Panel-Double-Acting.rfa**. Click **Open.**

If you do not have the US Metric library files loaded, navigate to the Practice Library subfolder of your practice folder and select the family for this door and the next.

6. In the Specify Types dialog box, select the *Type* **1800 x 2050mm** (as shown in Figure 5–26) and click **OK**.

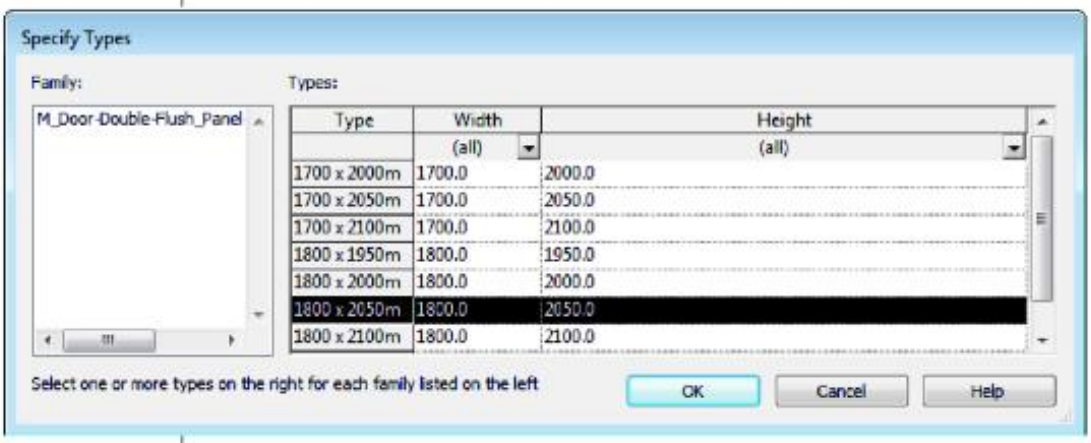


Figure 5–26

7. Start the Load Family command again. (Hint: Press <Enter> to repeat the last command.)

8. In the Load Family dialog box, navigate to the *Residential* folder and select **M_Door-Interior-Single-6_Panel -Wood.rfa.** Click **Open**.

9. In the Specify Types dialog box, scroll down the *Type* list and select **900 x 2000mm** and click **OK**.

10. In the Type Selector, select **M_Door-Double-Flush_Panel-Double-Acting: 1800 x 2050mm**, and place an instance of it in the wall between the kitchen and dining area, as shown in Figure 5–27.

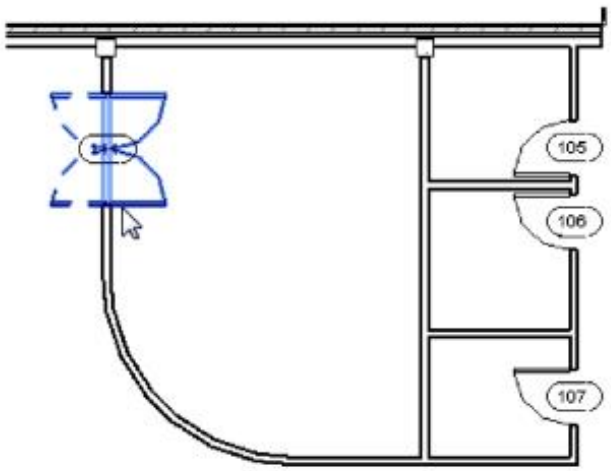


Figure 5–27

11. Zoom to the extents of the view and save the project.

Task 2 - Add doors to Floor 2.

1. Open the **Floor Plans: Floor 2** view.
2. To make the view easier to read, temporarily hide the grids. Leave the linked CAD file displayed to help place the doors.
3. In the *Architecture* tab>Build panel, click  (Door).
4. In the Type Selector, select **M_Single-Flush-Vision: 0915 x 2032mm.**
5. Place the first door in the lower left stairwell as shown in the linked file and change the tag number to **201**.
6. Add another door of the same type to the other stairwell at the opposite end of the building.
7. Change the door type to **M_Door-Interior-Single-6_Panel-Wood. 900 x 2000mm** and place a door at the entrance of each of the rooms, using the CAD file as a guideline.
8. Use the same type to add doors to the bathrooms.

The door to the small closet in the guest bathroom is smaller than the existing door sizes. Therefore, you need to find out what size it is and create a new size.

9. Change the door type to M_**Single Flush: 0762 x 2032mm**.
10. In Properties, click  (Edit Type) or in the *Modify | Place Door* tab>Properties panel, click  (Type Properties).
11. In the Type Properties dialog box, click **Duplicate**.
12. Enter **0600 x 2000mm** for the name and click **OK**.
13. In the Type Properties dialog box, change the **Width** parameter to **600mm**.
14. Click **OK** to close the dialog box. The new door type is available for use. Add it to the small closets.

15. Continue adding other doors using different door styles (i.e., Bifold and Double-Glass). The rooms should look similar to the layout shown in Figure 5–28, though your numbering might be different.

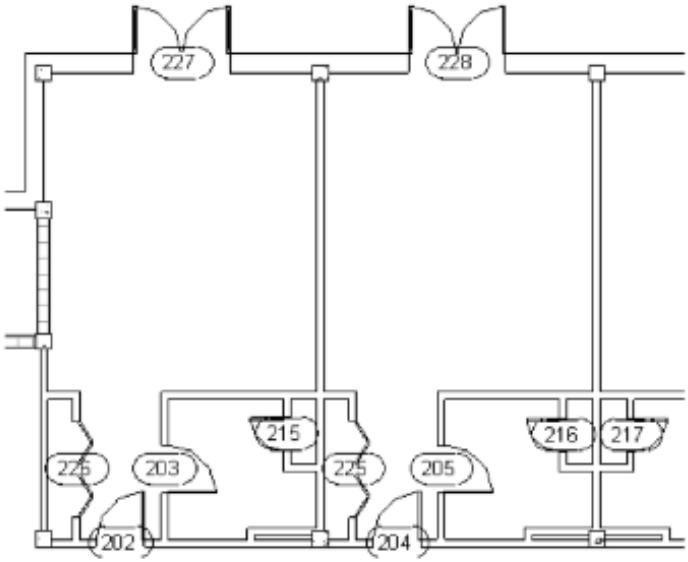


Figure 5–28

16. Select and hide the CAD file.

17. Save the project.

Command Summary

Button	Command	Location
Clipboard		
	**Copy to Clipboard**	• **Ribbon:** *Modify* tab>Clipboard panel • **Shortcut:** <Ctrl>+<C>
	**Cut to the Clipboard**	• **Ribbon:** *Modify* tab>Clipboard panel • **Shortcut:** <Ctrl>+<X>
	**Paste - Aligned to Current View**	• **Ribbon:** *Modify* tab>Clipboard panel> expand Paste
	**Paste - Aligned to Same Place**	• **Ribbon:** *Modify* tab>Clipboard panel> expand Paste
	**Paste - Aligned to Selected Levels**	• **Ribbon:** *Modify* tab>Clipboard panel> expand Paste
	**Paste - Aligned to Selected Views**	• **Ribbon:** *Modify* tab>Clipboard panel> expand Paste
	**Paste - Aligned to Picked Level**	• **Ribbon:** *Modify* tab>Clipboard panel> expand Paste
	**Paste from Clipboard**	• **Ribbon:** *Modify* tab>Clipboard panel • **Shortcut:** <Ctrl>+<V>
Doors and Windows		
	**Door**	• **Ribbon:** *Architecture* tab>Build panel • **Shortcut:** DR
	**Edit Type/ Type Properties**	• **Properties palette:** Edit Type • **Ribbon:** *Modify* tab>Properties panel
	**Measure**	• **Quick Access Toolbar** • **Ribbon:** *Modify* tab>Measure panel
	**Window**	• **Ribbon:** *Architecture* tab>Build panel • **Shortcut:** WN

Practice 6a

Work with Curtain Walls

Estimated time for completion: 10 minutes

Practice Objectives

- Modify curtain wall properties.
- Add curtain wall grid lines.

In this practice you will modify a curtain wall using Properties to ensure that the lines match up with other elements. You will also add grid lines that follow the pattern of a nearby wall. The finished elevation is shown in Figure 6–13.

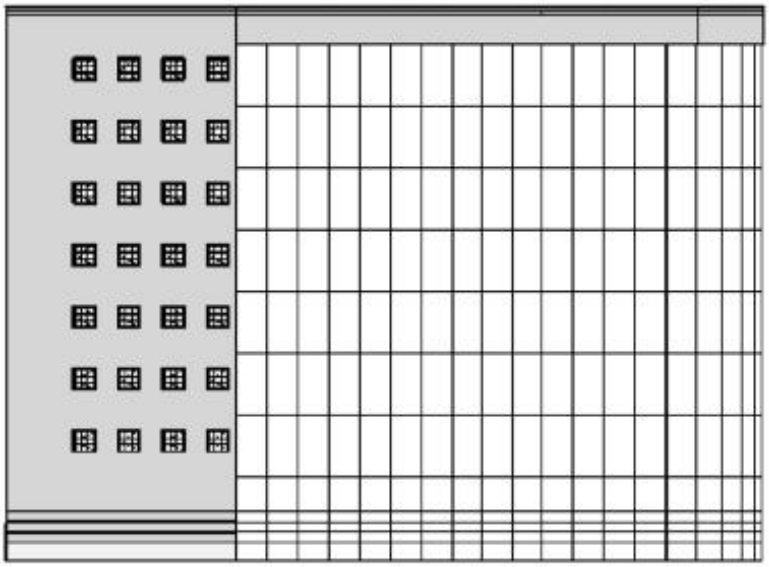


Figure 6–13

Task 1 - Modify the curtain wall.

1. Open the project **Modern-Hotel-Curtain-Walls-M.rvt**.
2. Open the **Elevations (Building Elevation):South** view.
3. To make the view easier to understand, select one grid line, one column, and one level line. (Hold <Ctrl> to select more than one element.) Then, right-click and select **Hide in View>Category**.

The curtain wall grid does not match up with any of the other features, as shown in Figure 6–14.

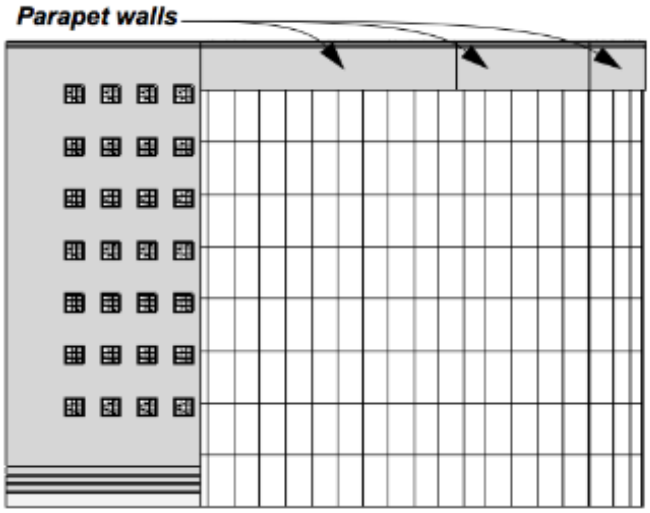


Figure 6–14

4. Select the three parapet walls. In Properties, change the *Base Offset* to (negative) **-610mm** and click **Apply**. This shortens the parapet.

5. Select the three curtain walls. In Properties, change the *Top Offset* to (negative) **-610mm** and click **Apply**. This extends the curtain wall up to the parapet.

6. With the curtain walls still selected, change *the Horizontal Grid Offset* to **1220mm** (*Offset* field in the *Horizontal Grid* area), as shown in Figure 6–15.

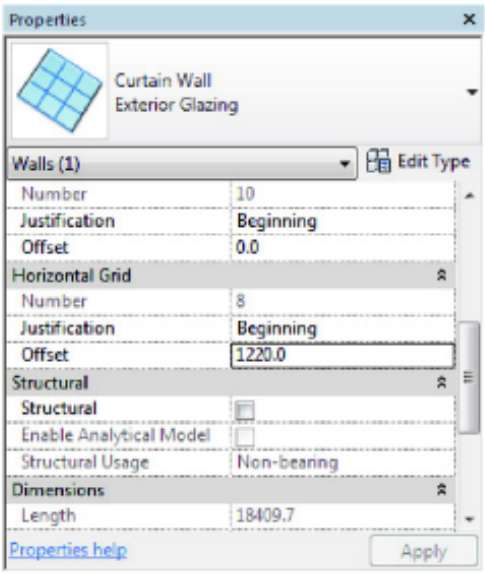


Figure 6–15

The grid now fits better, as shown in Figure 6–16.

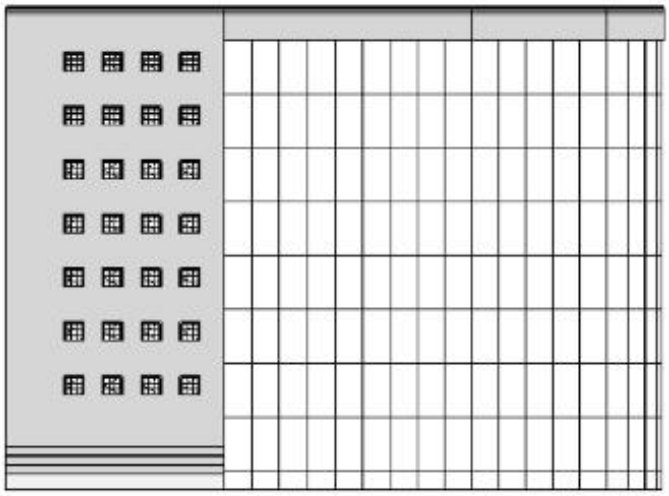


Figure 6–16

Task 2 - Add grid lines.

In this task you will add grid lines to match up with multiple lines at the bottom of the building.

1. Zoom in to the bottom edge of the building and ensure that the brick/CMU and the curtain wall is displayed. Select the grid line and unpin it, as shown in Figure 6–17.

Figure 6–17

2. Use  (Align) to move the curtain grid line so it matches with the top of the CMU sill, as shown in Figure 6–18.

Figure 6–18

3. In the *Architecture* tab>Build panel, click (Curtain Grid).
4. Add three grid lines aligned with the top of the reveals in the brick, as shown in Figure 6–19.

Zoom in until the heavier lines of the brick reveals are displayed.

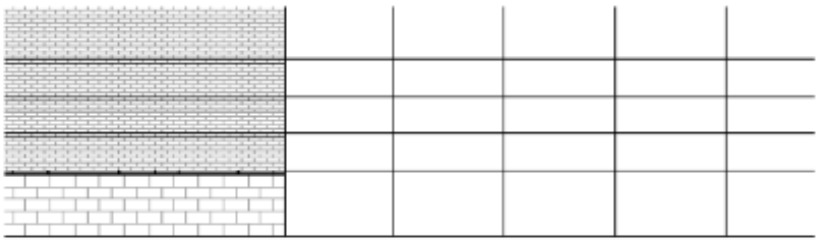


Figure 6–19

5. Select these four curtain grid lines (hold <Ctrl> and select each line individually) and move them down **20mm**. Ensure you drag the cursor down before entering the move value. This places them correctly for the mullions, that are added later.
6. Pan over and align and add curtain grid lines to the other two parts of the curtain wall, as shown in Figure 6–20. Ensure you unpin the existing horizontal curtain grid lines before aligning them.

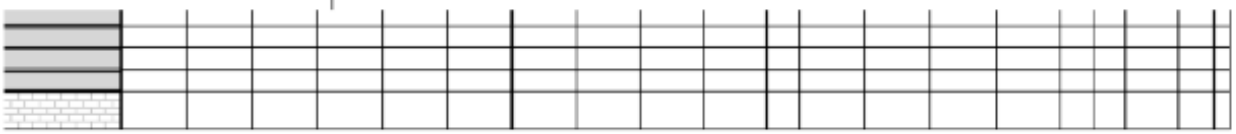


Figure 6–20

7. Zoom out until the entire front of the building is displayed.
8. Save the project.

Practice 6b

Add Mullions and Panels to Curtain Walls

Estimated time for completion: 15 minutes

Practice Objectives

- Add and modify mullions.
- Add a storefront entrance and door panel.

In this practice you will add and modify mullions along the curtain walls. You will also create a storefront that includes a door panel as the front entrance of the building. The finished elevation is shown in Figure 6–32.

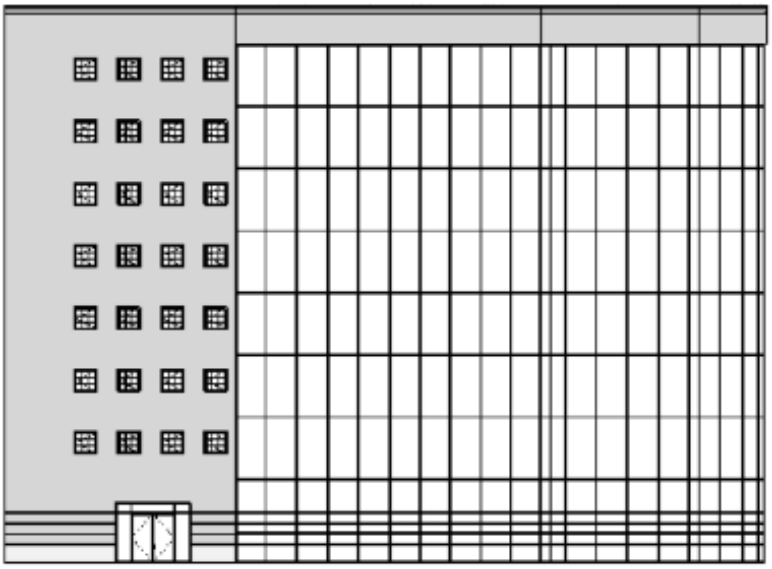


Figure 6–32

Task 1 - Add and modify mullions.

1. Open the project **Modern-Hotel-Mullions-M.rvt**.
2. Open the **Elevations (Building Elevations): South** view, or work in the 3D view.
3. In the *Architecture* tab>Build panel, click (Mullion).
4. In the *Modify | Place Mullion* tab>Placement panel, click (All Grid Lines).
5. Select each of the curtain walls. Mullions are place on all of the grid lines.

6. Click (Modify).
7. At the two lines where the curtain walls meet, extra mullions are added, as shown in Figure 6–33. These are not needed and should be removed.

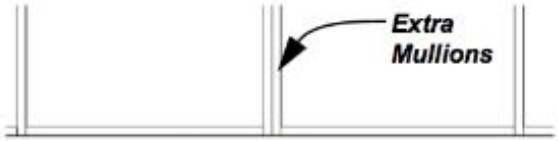


Figure 6–33

8. Select one of the mullions.
9. In the View Control Bar, click (Temporary Hide/Isolate) and select **Isolate Category**. This makes selecting the mullions you want to delete easier.
10. Delete the extra mullions. Select one mullion, right-click and select **Select Mullions>On Gridline**.
11. Zoom out until all of the curtain walls are displayed.
12. Select the entire bottom row of mullions. You can use the Window selection box to select the entire row.
13. In the *Modify | Curtain Wall Mullions* tab>Mullion panel, click (Make Continuous). This changes the mullion direction, as shown in Figure 6–34.

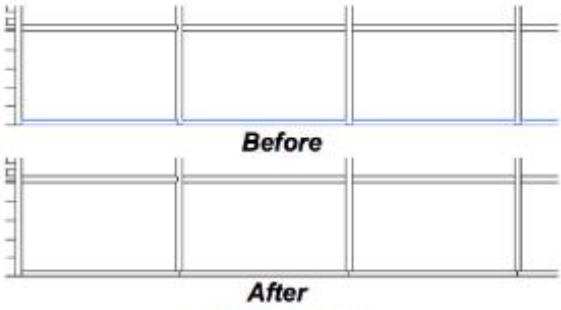


Figure 6–34

14. Repeat with the top row of mullions.
15. In the View Control Bar, click (Temporary Hide/Isolate) and select **Reset Temporary Hide/Isolate**.
16. Save the project.

Task 2 - Add the storefront entrance.

1. Open the **Floor Plans: Floor 1** view.
2. In the *Architecture* tab>Build panel, click (Wall).
3. In the Type Selector, select **Curtain Wall:Storefront**.
4. In Properties, enter the following values:
   - *Base Constraint:* **Floor 1**
   - *Base Offset:* 0.0
   - *Top Constraint:* **Up to level: Floor 2**
   - *Top Offset:* (negative) **-1850mm**
5. Draw the storefront within the existing wall **600mm** off of the right gridline, as shown in Figure 6–35.

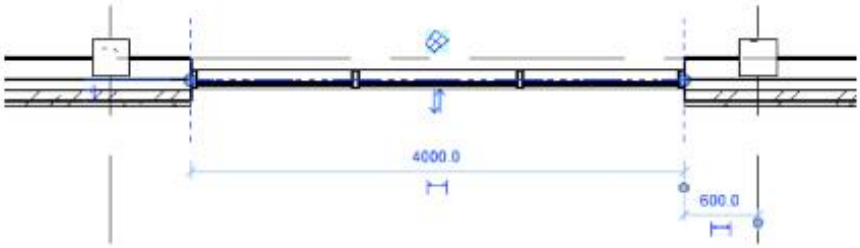


Figure 6–35

   - If you draw from right to left, the exterior of the storefront is placed correctly. If you draw from left to right, you need to flip the storefront.
6. Open the **Elevations (Building Elevation): South** view and zoom in on the storefront.

*Type **UP** to unpin the elements.*

7. Window around to select the storefront. Because it was created with a preset type, all of the grids and panels are pinned, as shown on the left in Figure 6–36.

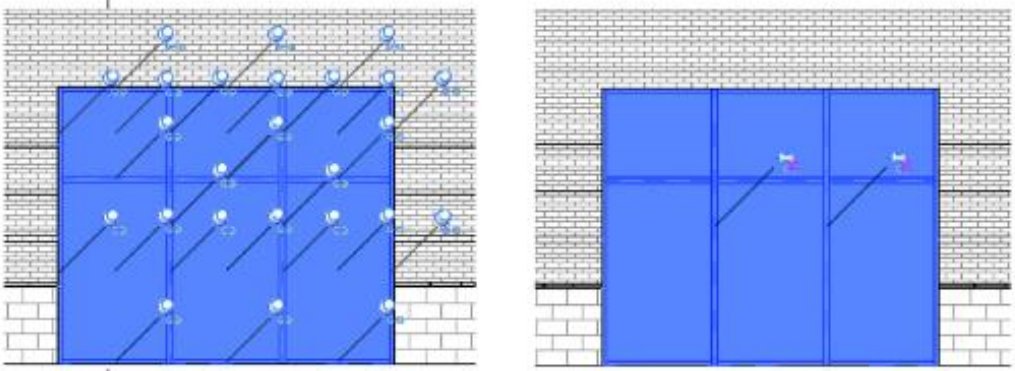


Figure 6–36

Ensure you are selecting curtain grid lines as you work and not the mullions. Use <Tab> to cycle through the elements.

8. Modify the storefront, as shown in Figure 6–37. Align the horizontal line with the curtain grid line in the main curtain wall and use temporary dimensions to locate the vertical grid lines.

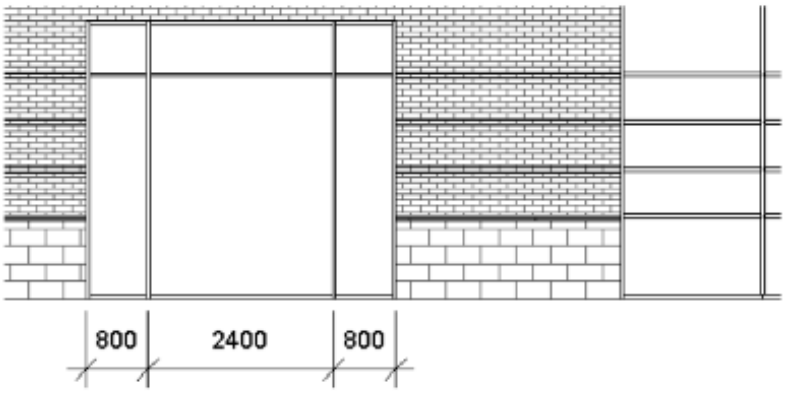


Figure 6–37

9. Select the mullions at the top of the storefront and toggle the mullion joins to the top bar so that it is straight across, as shown in Figure 6–38.

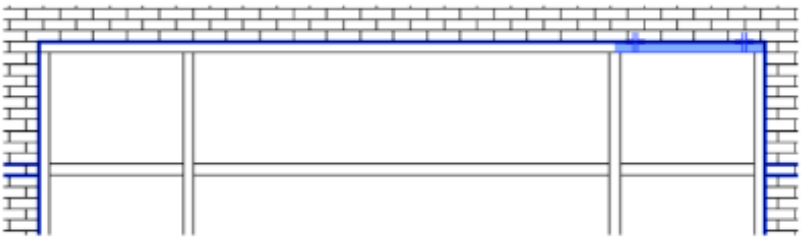


Figure 6–38

10. Save the project.

Task 3 - Add a door in the storefront.

1. In the *Insert* tab>Load from Library panel, click (Load Family). Use this more generic method of loading the curtain wall door family because you cannot use the **Door** command to place doors in curtain walls.

2. In the Load Family dialog box, in the *Doors* folder, select the door **M_Door-Curtain-Wall-Double-Storefront.rfa**, as shown in Figure 6–39. Click **Open**.

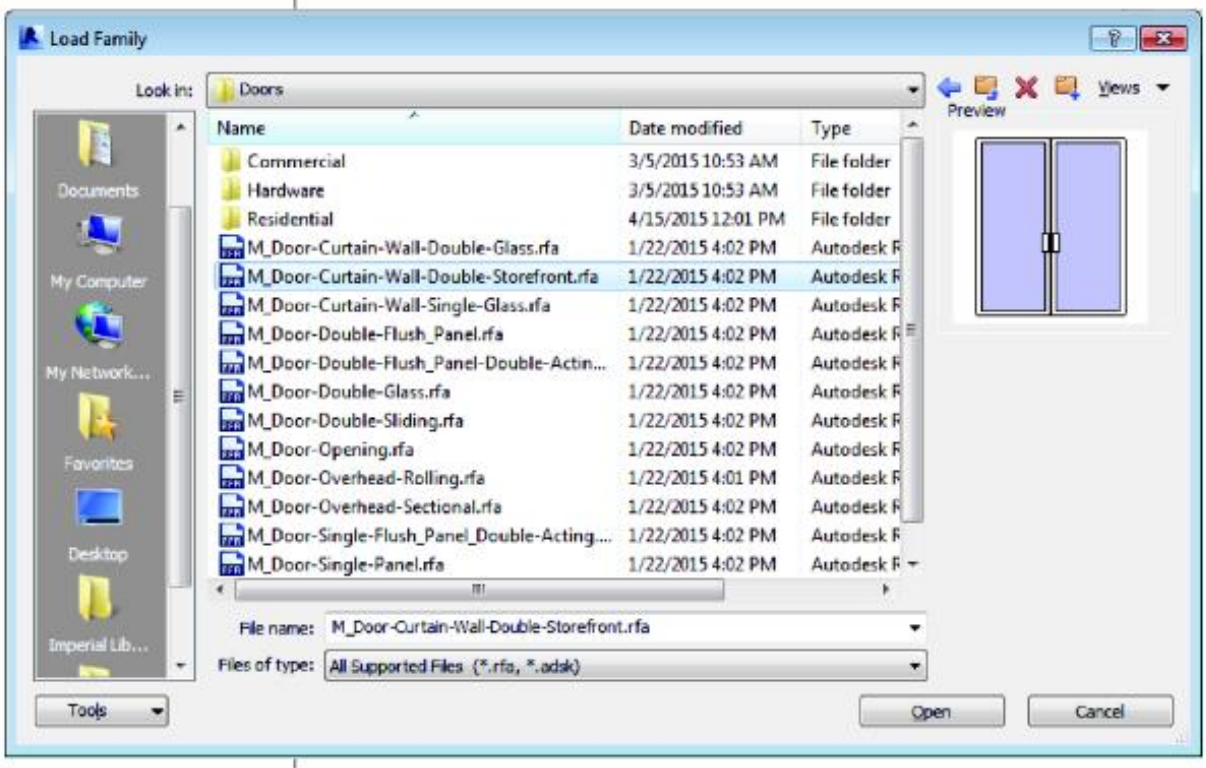


Figure 6–39

3. Select the large panel, as shown in Figure 6–40. Use <Tab> to cycle through the selections and then click to select it.

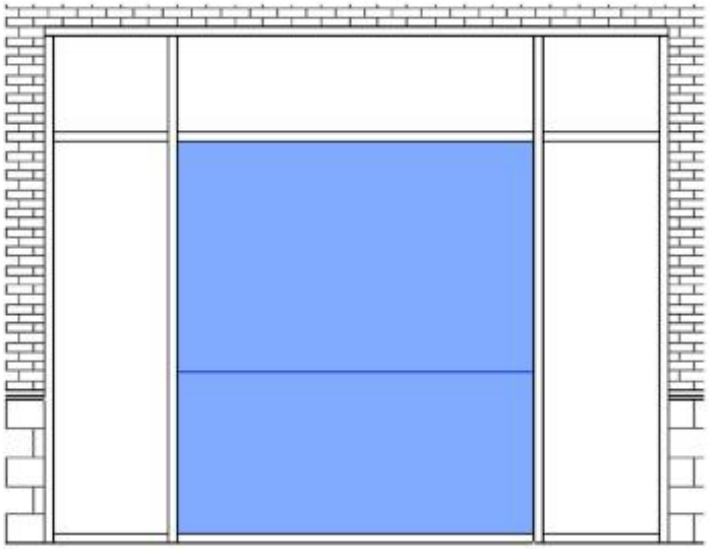


Figure 6–40

4. In the Type Selector, select **Door-Curtain-Wall-Double-Storefront.** The panel changes to the door. Delete the mullion at the bottom of the door, as shown in Figure 6–41.

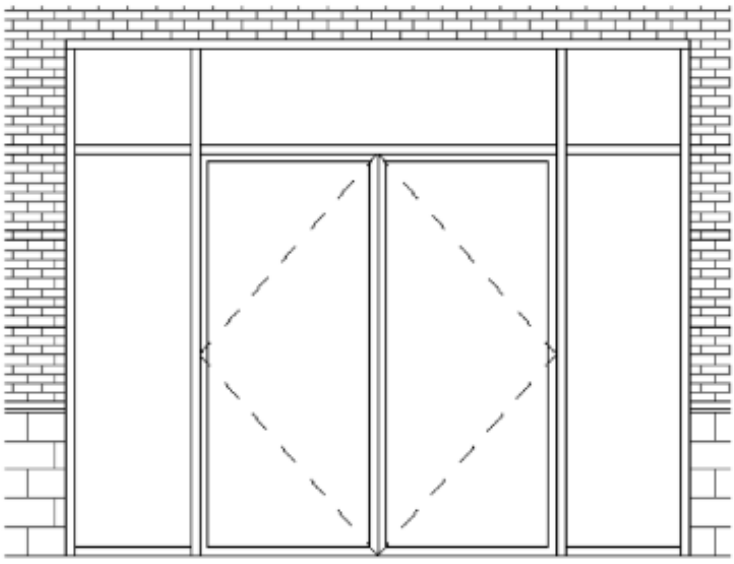


Figure 6–41

5. Zoom out until the entire front elevation is displayed.
6. View the project in 3D.
7. Save the project.

Command Summary

Button	Command	Location
	**Add/Remove Segments**	• **Ribbon:** *Modify* | *Curtain Wall Grids* tab> Curtain Grid panel
	**Curtain Grid**	• **Ribbon:** *Architecture* tab>Build panel
	**Curtain Grid: All Except Picked**	• **Ribbon:** *Modify* | *Place Curtain Grid* tab> Placement panel
	**Curtain Grid: All Segments**	• **Ribbon:** *Modify* | *Place Curtain Grid* tab> Placement panel
	**Curtain Grid: One Segment**	• **Ribbon:** *Modify* | *Place Curtain Grid* tab> Placement panel
	**Mullion**	• **Ribbon:** *Architecture* tab>Build panel
	**Mullion: All Grid Lines**	• **Ribbon:** *Modify* | *Place Mullion* tab> Placement panel
	**Mullion: Break at Join**	• **Ribbon:** *Modify* | *Curtain Wall Mullions* tab>Mullion panel • **Right-click:** (with mullion selected) Join Conditions>Break at Join
	**Mullion: Grid Line**	• **Ribbon:** *Modify* | *Place Mullion* tab> Placement panel
	**Mullion: Grid Line Segment**	• **Ribbon:** *Modify* | *Place Mullion* tab> Placement panel
	**Mullion: Make Continuous**	• **Ribbon:** *Modify* | *Curtain Wall Mullions* tab>Mullion panel • **Right-click:** (with mullion selected) Join Conditions>Make Continuous

Practice 7a

Duplicate Views and Set the View Display

Estimated time for completion: 10 minutes

Practice Objectives

- Duplicate views.
- Modify crop regions.
- Change the visibility and graphic display of elements in views.

In this practice you will duplicate views and then modify them by changing the scale and crop region, hiding some elements, and changing some elements to halftone to prepare them to be used in construction documents. The finished views of the second floor are shown in Figure 7–23, which is a model of the completed building.

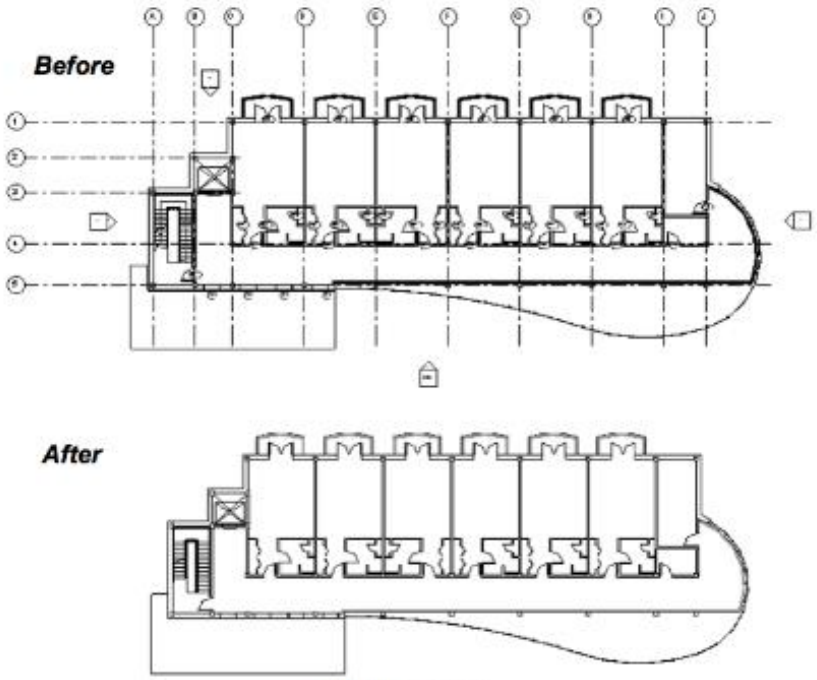


Figure 7–23

Task 1 - Duplicate and modify the first floor plan view.

1. Open the project **Modern-Hotel-Display-M.rvt**.
2. Open the **Floor Plans: Floor 1** view. This view includes a variety of tags.

3. In the Project Browser, right-click on the **Floor Plans: Floor 1** view and select **Duplicate View>Duplicate**. This creates a view without all of the tags, but includes the grids and elevation markers.
4. Right-click on the new view and rename it to **Floor 1 Overall**.
5. In the View Control Bar, change the *Scale* to **1:200**. All of the annotations become larger, as they need to plot correctly at this scale.
6. In the View Control Bar, click (Show Crop Region).
7. Select the crop region and drag the control on the top until the pool house displays, as shown in Figure 7–24.

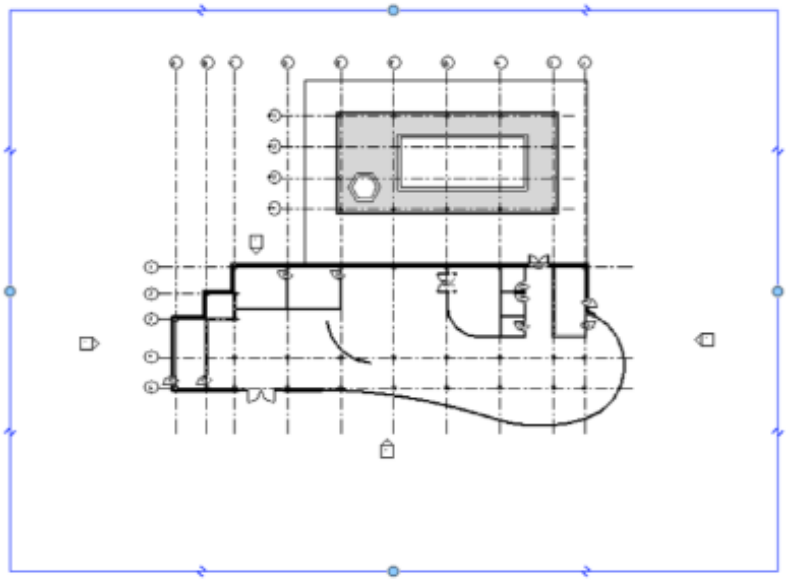


Figure 7–24

8. In the View Control Bar, click (Hide Crop Region)
9. Select the four horizontal pool grid lines (P1-P4).
10. Right-click and select **Hide in View> Elements**. Only the selected grid lines are hidden.
11. Select one of the elevation markers.
12. Right-click and select **Hide in View>Category**. All of the elevation markers are hidden.
13. In the View Control Bar, click (Hide Crop Region).

14. Zoom out to display the entire view. (Hint: Use the shortcuts **ZF** or **ZE**, or double-click the mouse wheel.)

15. Duplicate **Floor 1** again (without Detailing). Rename this view **Floor 1 - Reference**. You will use this later to place callouts and sections.

16. Save the project.

Task 2 - Duplicate and modify a second floor plan view.

1. Open the **Floor Plans: Floor 2** view.

2. In the Project Browser, right-click on the same view and select **Duplicate View>Duplicate**. This creates a new view without any annotation.

3. Rename this view to **Typical Guest Room Floor Plan**.

4. Select one of the grids and type **VH** (Hide in View Category).

5. Turn on the crop region and bring it in close to the building on all sides. If any of the elevation markers still display, hide them.

6. Turn off the crop region.

7. Select one of the railings along the balconies. Right-click and select **Select All Instances>Visible in View**. The railings are selected as shown in Figure 7–25.

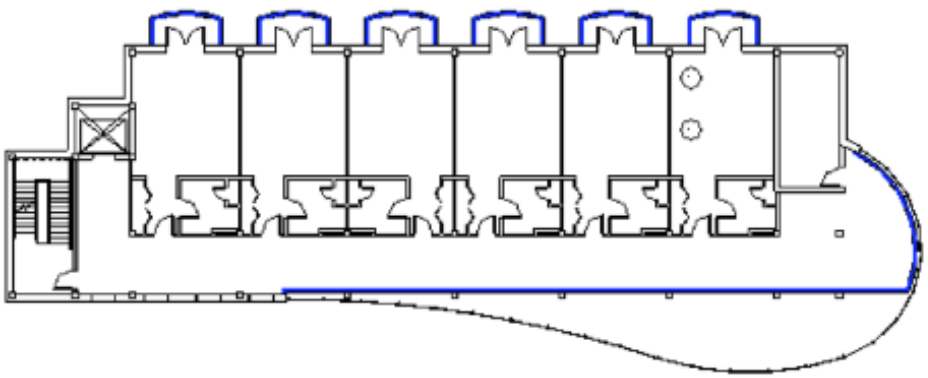


Figure 7–25

8. Right-click again and select **Override Graphics in View > By Element...**

9. In the View-Specific Element Graphics dialog box select **Halftone** and click **OK**.
10. Click in the view to release the selection. The railings are now gray and not as prominent.
11. Close any other projects that may be open.
12. In the Quick Access Toolbar, click (Close Hidden Windows). Only the Typical Guest Room Floor Plan view should be open.
13. Open the **Floor Plans: Floor 2** view again.
14. Type **WT** to tile the two windows and then type **ZA** so the model displays fully in the view so that you can see the differences in the views.
15. Save the project.

Practice 7b

Add Callout Views

Estimated time for completion: 10 minutes

Practice Objective

- Create callouts.
- Override visibility and graphic styles in views.

In this practice you will create callout views of a guest room and make modifications to the visibility graphics so that one displays dimensions and the other displays the furniture plan, as shown in Figure 7–31.

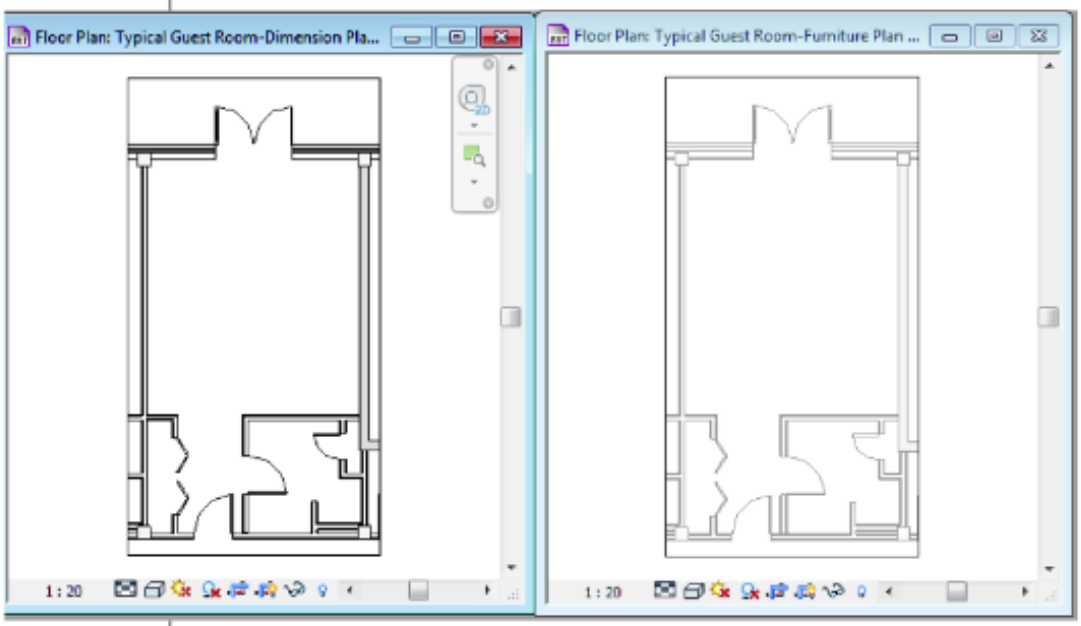


Figure 7–31

Task 1 - Add callout views.

1. Open the project **Modern-Hotel-Callouts-M.rvt**.
2. Open the **Floor Plans: Typical Guest Room Floor Plan** view (if it is not already open).
3. In the *View* tab>Create panel, click (Callout).

4. Place a callout around one of the guest rooms. Using the controls (as shown in Figure 7–32), move the bubble as required. Click in empty space to release the selection.

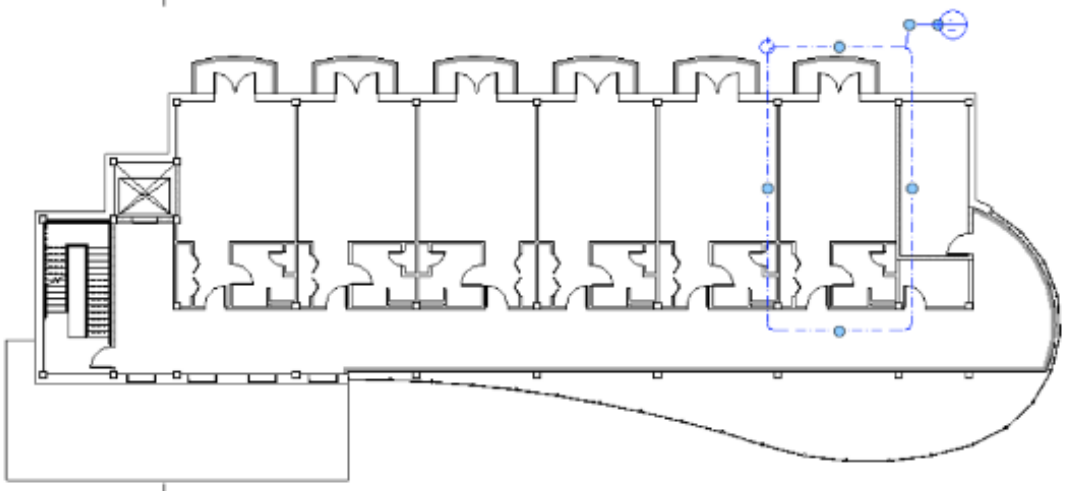


Figure 7–32

5. Double-click on the callout view bubble. It only opens the view that is enclosed within the callout window. Rename the view to **Typical Guest Room - Dimension Plan**.

6. In Properties, change the *Underlay* to **None**.

7. Duplicate the callout view and rename it to **Typical Guest Room - Furniture Plan**. Both views should look similar to Figure 7–33.

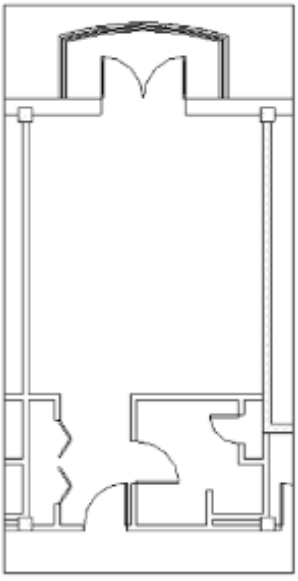


Figure 7–33

8. Save the project.

Task 2 - Override graphics in views.

1. Open the **Floor Plans: Typical Guest Room - Dimension Plan** view.
2. Open the Visibility/Graphic Overrides dialog box by typing **VV**.
3. In the dialog box, set the *Filter list* to **Architecture** (by clearing the check marks for the other options). In the *Visibility* column, clear **Casework**, **Furniture**, **Furniture Systems**, as shown in Figure 7–34 and **Plumbing Fixtures** (not shown).

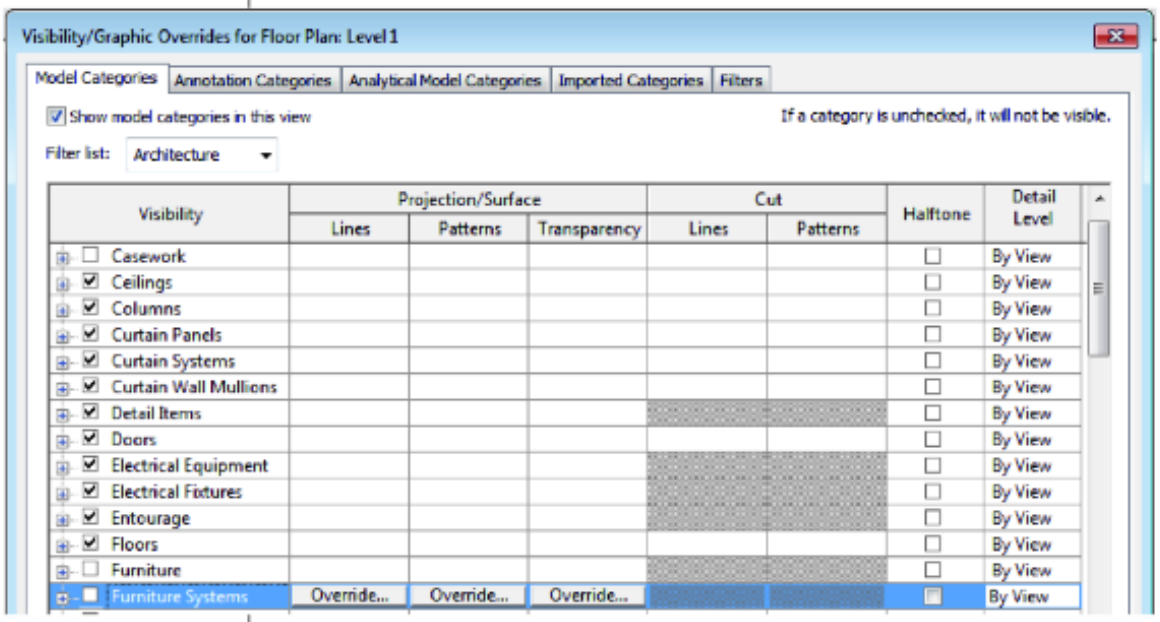


Figure 7–34

4. Click **OK**. While nothing looks different now, when furniture is placed in the model it will not display in this view.
5. Open the **Floor Plans: Typical Guest Room - Furniture Plan** view.
6. Reopen the Visibility/Graphic Overrides dialog box. Below the table, click **All** and place a checkmark in one of the *Halftone* columns. All of the elements are set to halftone.
7. Click **None** to clear all categories.
8. In the *Halftone* column, clear the **Casework**, **Furniture**, **Furniture Systems**, and **Plumbing Fixtures** categories.
9. Click **Apply** to set the changes without exiting the dialog box.

10. In the *Annotation Categories* tab, clear **Show annotation categories in this view**. No annotations elements will display in this view.

11. Click **OK** to close the dialog box. The view should display with all existing elements in halftone, as shown in Figure 7–35.

When furniture, casework, and plumbing fixtures are added, they will display in black against the other halftone elements.

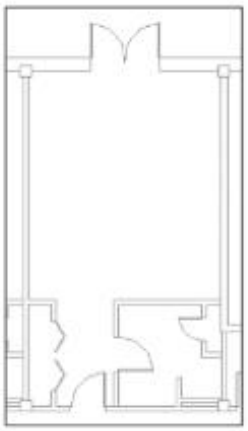


Figure 7–35

12. Save the project.

Task 3 - Additional Callouts

1. Open the **Floor Plans: Floor 1 - Reference** view.

2. In the *View* tab>Create panel, click (Callout) and add callouts to the stairs and restrooms. Name the views as shown in Figure 7–36.

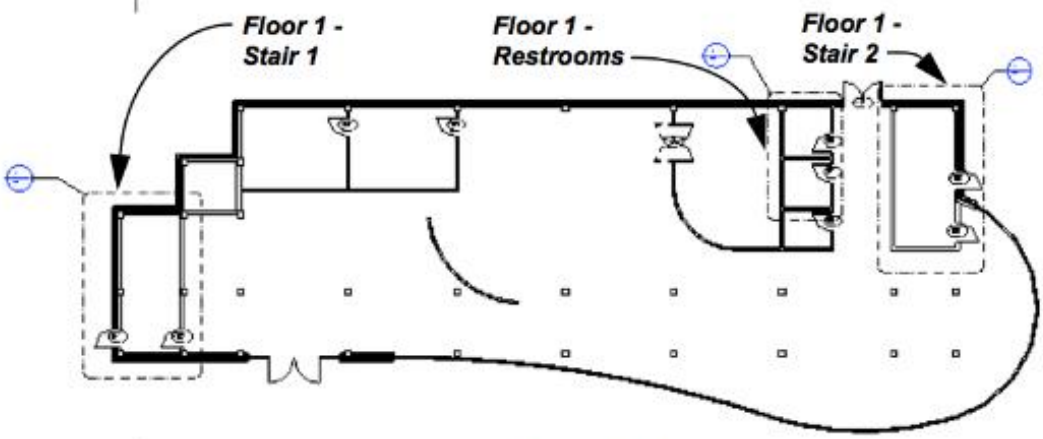


Figure 7–36

3. Save the project.

Practice 7c

Estimated time for completion: 20 minutes

Create Elevations and Sections

Practice Objectives

- Create exterior and interior elevations.
- Add building sections and wall sections.

In this practice you will create exterior elevations of the poolhouse and interior elevations of the restrooms. You will also add building sections, as shown in Figure 7–53, and several wall sections to the project.

Figure 7–53

Task 1 - Add exterior elevations.

1. Open the project **Modern-Hotel-Elevations-M.rvt**.
2. Open the **Floor Plans: Floor 1 - Overall** view.
3. In the View Control Bar click (Reveal Hidden Elements).
4. Select one of the elevation markers. In the Reveal Hidden Element panel click (Unhide Category).
5. In the View Control Bar click (Close Reveal Hidden Elements).

6. In the View Control Bar, click (Show Crop Region).
7. Ensure that there is enough space above the pool house to add an elevation mark at this scale, if not, move the crop region up.
8. In the *View* tab>Create panel, expand (Elevation) and click (Elevation). In the Type Selector, select **Elevation: Building Elevation**.
9. Place an elevation marker outside of the pool building, as shown in Figure 7–54.

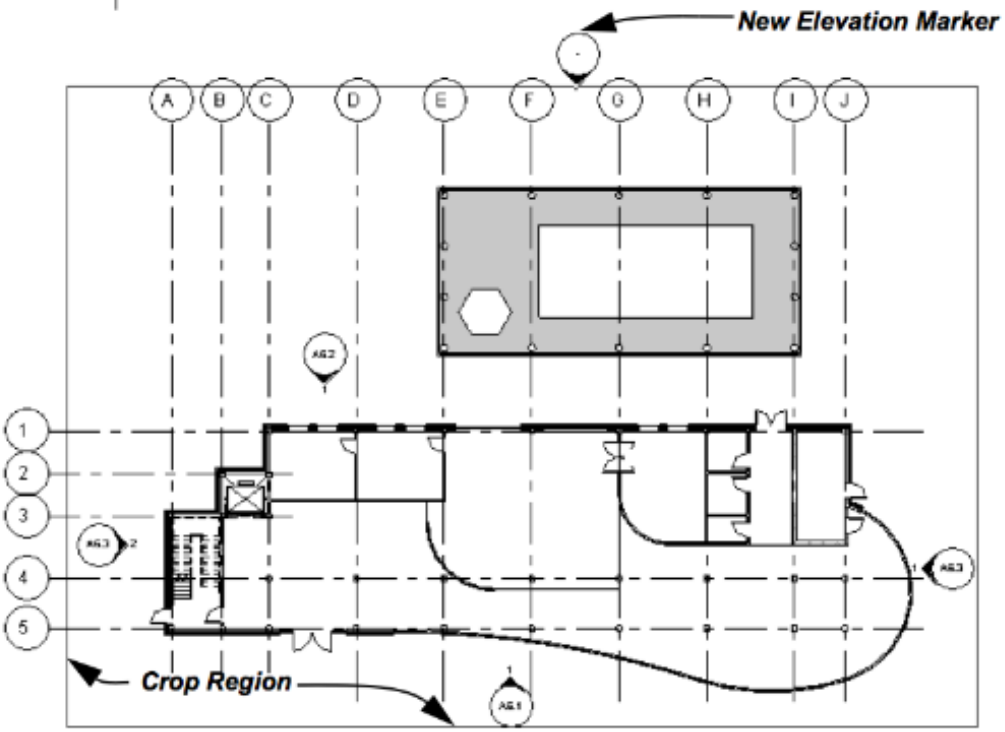


Figure 7–54

10. Hide the crop region.
11. Click (Modify) and select the pointed side of the new elevation marker.

12. Change the length and depth of the elevation boundaries so only the poolhouse is displayed, as shown in Figure 7–55.

Grids are hidden to clarify the view.

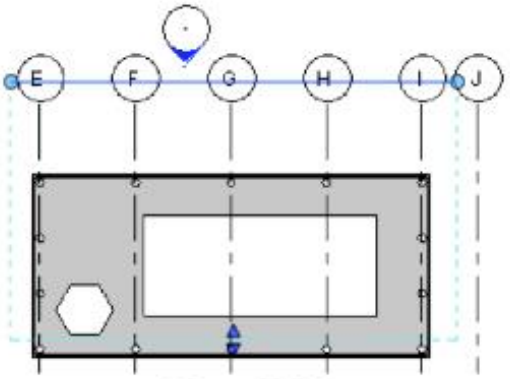


Figure 7–55

13. Double-click on the pointed side of the elevation marker to open the elevation view.

14. Change the crop region so that the height is above the top of the roof and the bottom is just below the floor line. Bring the sides in close to the pool building.

15. Hide the grids and levels so that the elevation is similar to that shown in Figure 7–56.

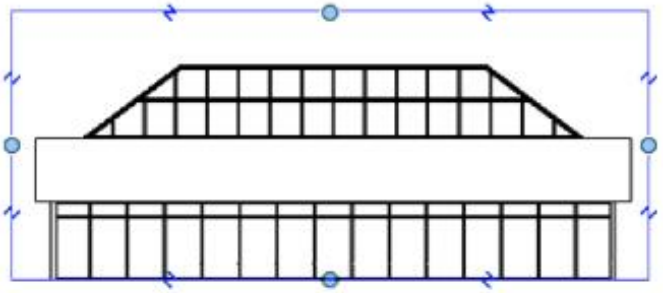


Figure 7–56

16. Hide the crop region.

In this project, North is considered the top of the project.

17. In the Project Browser, rename the elevation (Elevation 1 -a if you selected this direction first) as **Pool-North**.

18. Return to the **Floor Plans: Floor 1 Overall** view.

19. Add elevation markers to the other sides of the poolhouse.

20. Open the new elevations. Resize and rename them as required.

21. Save the project.

Task 2 - Add interior elevations.

1. Open the **Floor Plans: Floor 1 - Restrooms** view.
2. In the *View* tab>Create panel, click (Elevation).
3. In the Type Selector, select **Elevation: Interior Elevation**.
4. Place an elevation in one of the restrooms and then in the other restroom.
5. Click (Modify and select the circle part of one of the elevation markers and check each of the boxes, as shown in Figure 7–57. This places an elevation in each direction.

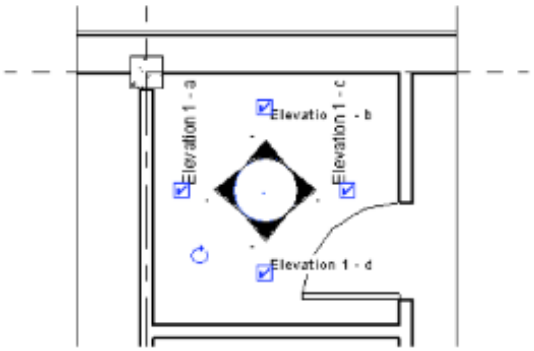


Figure 7–57

6. Repeat for the other restroom.
7. In the Project Browser, under *Elevations (Interior Elevation)*, as shown in Figure 7–58, rename the top restroom elevations as **Men's Restroom-North**, **South**, **East**, **West** and the bottom restroom elevations as **Women's Restroom-North**, **South**, **East**, **West**.

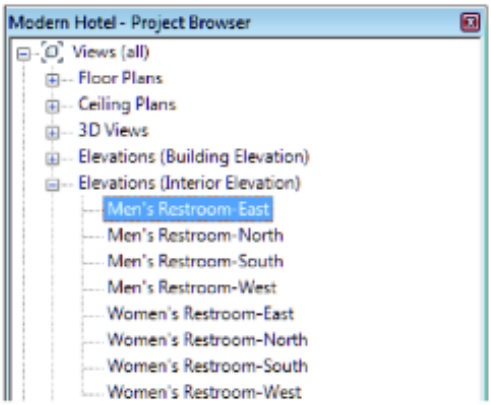


Figure 7–58

8. Open one of the elevations facing the door (**Men's Restroom-East**). The interior elevation automatically stops at the boundaries of the walls and the level above.
9. Move the crop region so that it is tight against the walls, as shown in Figure 7–59.

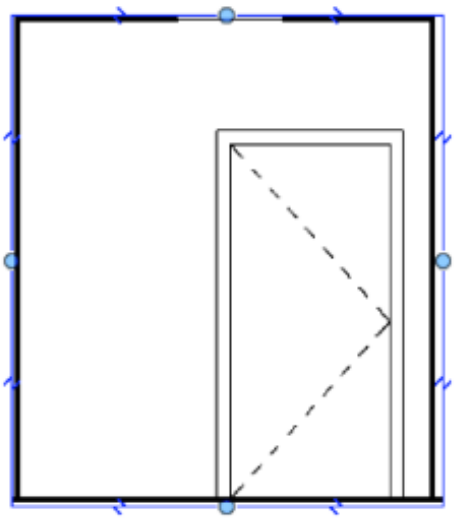


Figure 7–59

10. Save the project.

Task 3 - Clean up a view and add building sections.

1. Open the **Floor Plans: Floor 1- Reference** view.
2. Select all the elements around the restrooms. Use a selection window around the restrooms.
3. In the Status Bar or in the *Modify | Multi-Select* tab>Selection panel, click (Filter).

In this case you do not want to hide the entire category of elevation markers.

4. In the Filter dialog box, clear all of the selections except **Elevations** and **Views** and click **OK**. Only the Interior Elevation markers in the restrooms should be selected.
5. Right-click and select **Hide in View>Elements**.
6. In the View Control Bar, click (Do Not Crop View).
7. Move the elevation markers closer to the building.
8. In the View Control Bar, click (Crop View).

9. In the *View* tab>Create panel, click (Section).
10. In the Type Selector, select **Section: Building Section**.
11. Draw a horizontal section and a vertical section through the building, as shown in Figure 7–60.

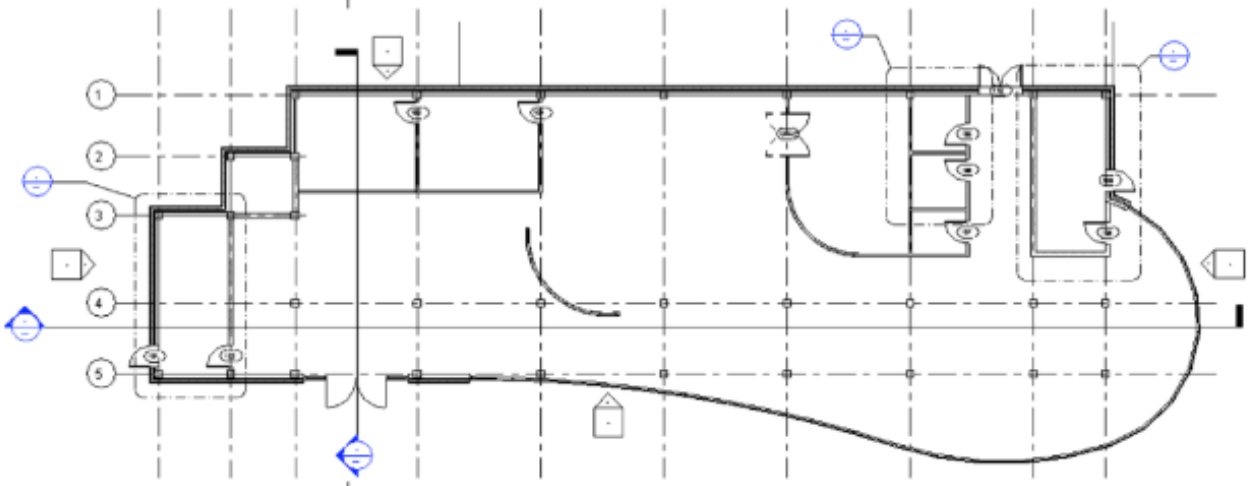


Figure 7–60

12. In the Project Browser, under *Sections*, rename them to **East-West Section** and **North-South Section**.
13. View each of the building sections, modifying the Visual Style as desired.

Task 4 - Add wall sections.

*You are using the **Floor 2** view to place the wall sections, as you want to ensure they go through certain features, such as doors and windows.*

1. Open the **Floor Plans: Floor 2** view.
2. Hide the grids if required and hide by element, any extraneous elevation markers.
3. In the *View* tab>Create panel, click (Section). In the Type Selector, select **Section: Wall Section**.

4. Draw four wall sections, as shown in Figure 7–61. Ensure that the front wall section passes through a window and the back wall section passes through a door.

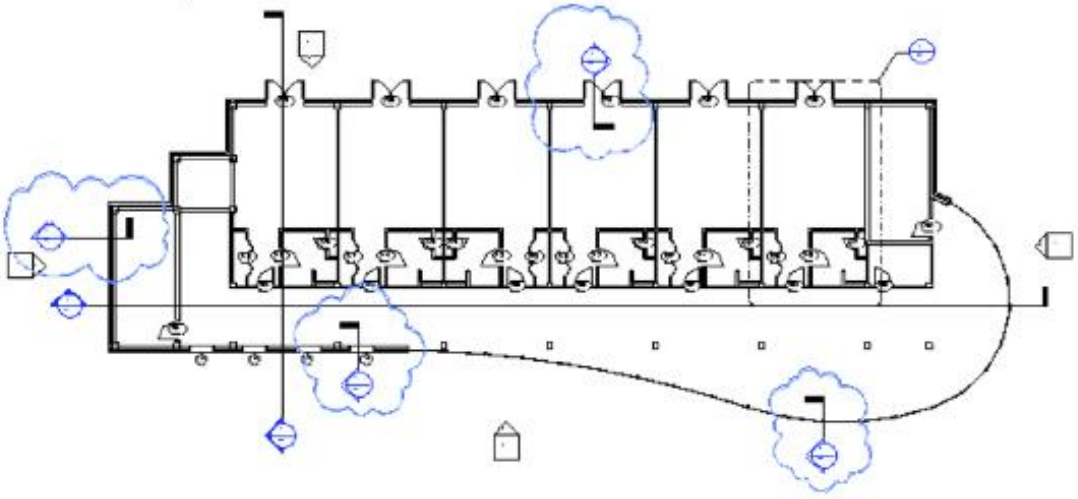


Figure 7–61

5. Move the door and window tag over so they do not interfere with the section cut.
6. View each of the wall sections.
7. Open the **Floor Plans: Floor 1** view.
8. Save the project.

Command Summary

Button	Command	Location
Views		
	**Building Elevation**	• **Ribbon:** *View* tab>Create panel> expand Elevation
	**Callout: Rectangle**	• **Ribbon:** *View* tab>Create panel> expand Callout
	**Callout: Sketch**	• **Ribbon:** *View* tab>Create panel> expand Callout
	**Duplicate**	• **Ribbon:** *View* tab>Create panel> expand Duplicate View • **Right-click:** (*on a view in the Project Browser*) expand Duplicate View
	**Duplicate as Dependent**	• **Ribbon:** *View* tab>Create panel> expand Duplicate View • **Right-click:** (*on a view in the Project Browser*) expand Duplicate View
	**Duplicate with Detailing**	• **Ribbon:** *View* tab>Create panel> expand Duplicate View • **Right-click:** (*on a view in the Project Browser*) Duplicate View
	**Section**	• **Ribbon:** *View* tab>Create panel • **Quick Access Toolbar**
	**Split Segment**	• **Ribbon:** (*when the elevation or section marker is selected*) *Modify | Views* tab>Section panel
Crop Views		
	**Crop View**	• **View Control Bar** • **View Properties:** Crop View (*check*)
	**Do Not Crop View**	• **View Control Bar** • **View Properties:** Crop View (*clear*)
	**Edit Crop**	• **Ribbon:** (*when the crop region of a callout, elevation, or section view is selected*) *Modify | Views* tab>Mode panel
	**Hide Crop Region**	• **View Control Bar** • **View Properties:** Crop Region Visible (*clear*)
	**Reset Crop**	• **Ribbon:** *(when the crop region of a callout, elevation or section view is selected*) *Modify | Views* tab>Mode panel
	**Show Crop Region**	• **View Control Bar** • **View Properties:** Crop Region Visible (*check*)

	**Size Crop**	• **Ribbon:** (*when the crop region of a callout, elevation or section view is selected*) *Modify* | *Views* tab>Mode panel
View Display		
	**Hide in View**	• **Ribbon:** *Modify* tab>View Graphics panel>Hide>Elements *or* By Category • **Right-click:** *(when an element is selected)* Hide in View>Elements *or* Category
	**Override Graphics in View**	• **Ribbon:** *Modify* tab>View Graphics panel>Hide>Elements *or* By Category • **Right-click:** *(when an element is selected)* Override Graphics in View>By Element *or* By Category • **Shortcut:** *(category only)* VV or VG
	**Reveal Hidden Elements**	• **View Control Bar**
	**Temporary Hide/Isolate**	• **View Control Bar**

Practice 8a

Add Components

Estimated time for completion: 20 minutes

Practice Objectives

- Load and add components.
- Load components from Autodesk Seek.

In this practice you will add furniture to the lobby of the hotel, as shown in Figure 8–10. You will load a component from a custom library and use controls to modify the placement. You will also download and use components from Autodesk Seek for the elevator and elevator doors. If you have time, add casework and equipment to the Breakfast and Preparation areas. Finally, you will add footing components to the base of the columns.

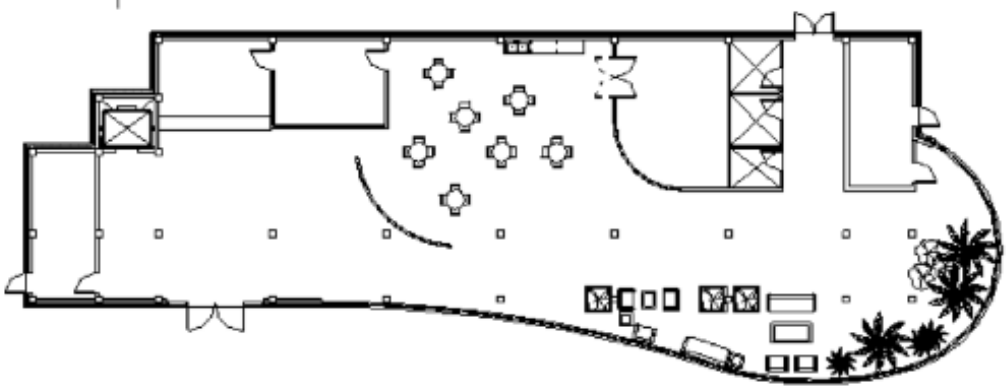


Figure 8–10

Task 1 - Add furniture to the lobby.

1. Open the project **Modern-Hotel-Components-M.rvt**.
2. In the Project Browser, right-click on the **Floor Plans: Floor 1** view and select **Duplicate View>Duplicate**.
3. Rename the new view to **Floor 1 - Furniture Plan**.
4. Hide all annotations and grids, so that only the walls, doors, and columns are displayed.
5. In the *Architecture* tab>Build panel, expand (Component) and click (Place a Component).

6. In the Type Selector, review the various furniture components that are available for the project. Select **Chair-Corbu** and place it in the lobby area near the curved curtain walls.

7. Open the **Floor Plans: Floor 1** view. The chair displays in this view as well.

8. Open the Visibility/Graphic Overrides dialog box and toggle off the *Visibility* of **Casework**, **Furniture**, **Furniture Systems**, **Planting**, and **Site**. Click **OK**. The chair is no longer displayed in the Floor 1 view.

9. Return to the **Floor Plans: Floor 1 Furniture Plan**.

10. Start the **Component** command.

11. Load the following families from the US Metric Library folders (listed below) or the *Practice Library* subfolder of your practice folder.:

    - In the *Furniture>Tables* folder:
      M_Table-Dining Round w Chairs.rfa.
    - In the *Planting* folder:
      M_RPC Plant-Tropical.rfa
      M_RPC Tree-Tropical.rfa.
    - In the *Site>Accessories* folder:
      M_Planter.rfa.

12. Place and arrange the components as required, placing the dining tables in the breakfast area and other elements in the lobby, as shown in Figure 8–11. Place at least one plant in a planter.You can follow the suggested layout or create your own design.

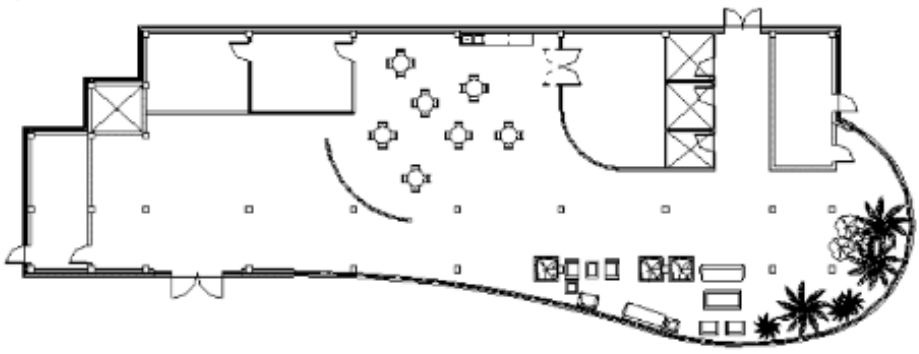


Figure 8–11

Task 2 - Load and place a countertop component.

Countertops are automatically set to 920mm above the level where they are placed. This wall is 1220mm high and the countertop thickness is approximately 40mm .

1. Zoom in on the office area near the elevator where there is a partial height wall.
2. Start the **Component** command and load **M_Countertop-Lobby.rfa** from the *Practice Library* subfolder.
3. In Properties, set the *Offset* to **340mm**.
4. Place the Countertop component over the partial height wall. Modify its length using the controls on each end, as shown in Figure 8–12.

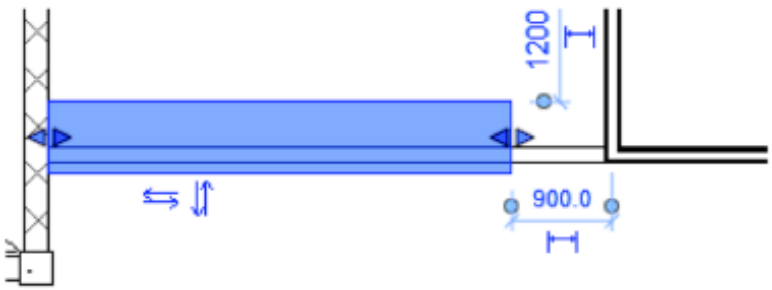


Figure 8–12

Task 3 - Load and add elevator components from Autodesk Seek.

1. Pan over to the elevator.
2. In the *Architecture* tab>Build panel, click (Place a Component).
3. In the *Modify | Place Component* tab>Mode panel, click (Load Family).
4. In the *Practice Library* folder in your practice folder, open **M_Elevator-Door- Center-M.rfa** and **M_Elevator-Electoric.rfa**.
5. In the Type Selector, select **M_Elevator-Electric: 1150kg** and place it in the shaft.

6. In the Type Selector, select **M_Elevator-Door-Center: 1050 x 2100mm** and place it in the door, as shown in Figure 8–13.

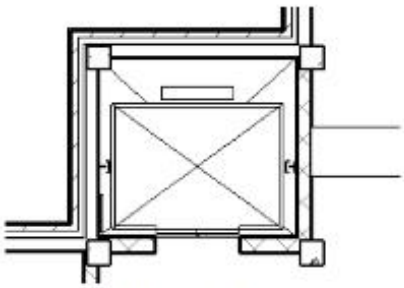


Figure 8–13

7. Select the Elevator Door component.

8. In the *Modify | Floors* tab>Clipboard panel, click (Copy to the Clipboard).

9. In the Clipboard panel, expand (Paste) and click (Aligned to Selected Levels).

10. In the Select Levels dialog box, select **Basement** and **Floor 2** through **Floor 8**, as shown in Figure 8–14. Click **OK**. This copies the door to the rest of the levels.

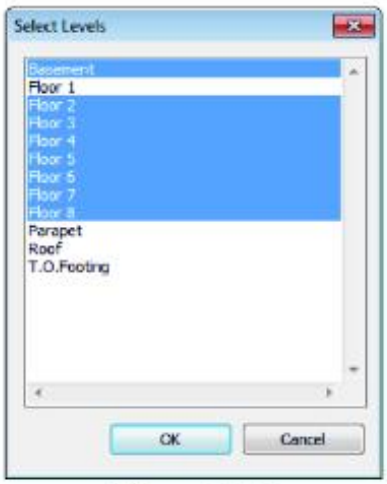


Figure 8–14

11. Save the project.

Task 4 - Add column footings.

1. Open the **Floor Plans: T.O. Footing** view and select everything in the view.
2. In the Status Bar (or in the *Modify | Multi-select* tab>Selection panel), click (Filter).
3. In the Filter dialog box, clear **Structural Columns** and click **OK**.
4. In the Status Bar, expand (Temporary Hide/Isolate) and select **Hide Element.** Everything except the columns should be hidden, as shown in Figure 8–15. It is now easier to identify the locations of the footings.

Figure 8–15

5. In the *Architecture* tab>Build panel, click (Component).
6. In the *Modify | Place Component* tab>Mode panel, click (Load Family).
7. In the *Structural Foundations* folder of the Metric US Library or the *Practice Library* subfolder of your practice folder, select **M_Footing-Rectangular.rfa** and click **Open**.
8. In the Type Selector, select **M-Footing-Rectangular:1800 x 1200 x 450mm**. Set the *Level* to **T.O. Footing**.

9. Place a footing at each column. Once you have placed at least one footing, you can use **Copy** to add the others. Ensure that you are copying from the column midpoint, as shown in Figure 8–16.

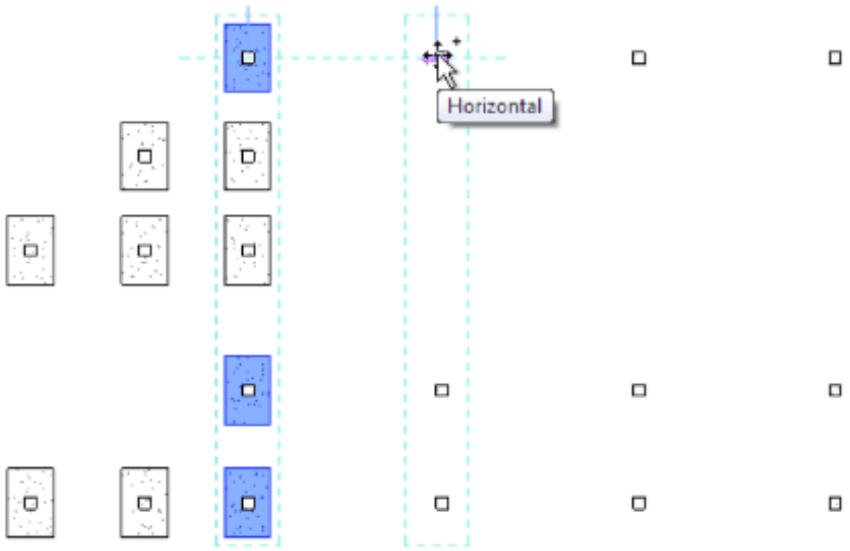


Figure 8–16

10. In the View Control Bar, click (Temporary Hide/Isolate) and select **Reset Temporary Hide/Isolate**.

11. In Properties, edit the View Range so that the *Cut plane Offset* is **300mm**.This hides any elements that should not part of the foundation plan. as shown in Figure 8–17. (Note: the foundations are highlighted for clarity.)

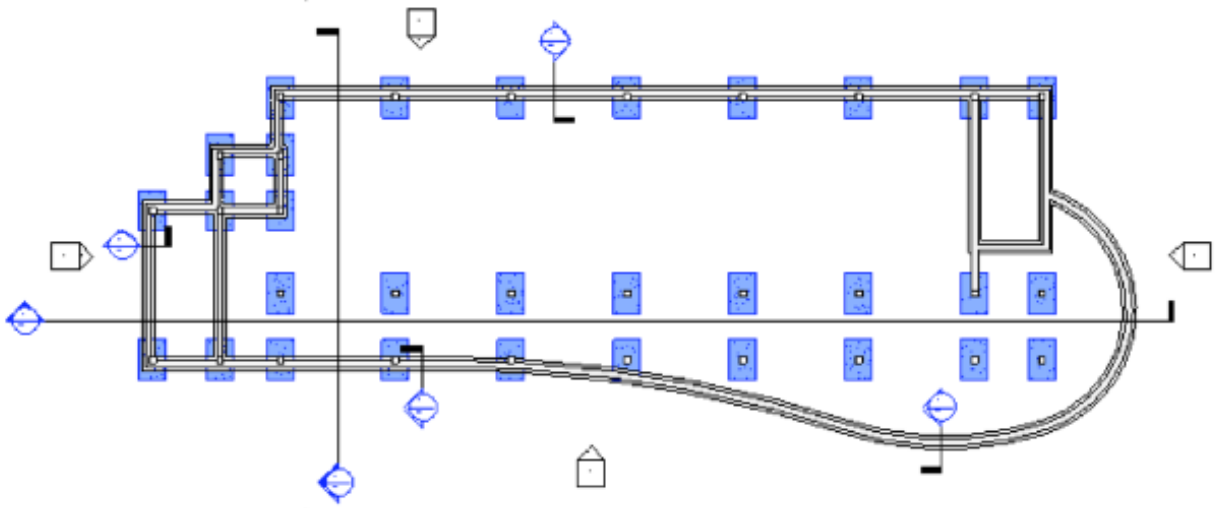


Figure 8–17

12. Save the project.

Command Summary

Button	Command	Location
	**Load Family**	• **Ribbon:** *Modify* | *Place Component* tab>Load panel or *Insert* tab>Load from Library panel
	**Pick New Host**	• **Ribbon:** *Modify* | *Multi-Select* or *component type* contextual tab>Host panel
	**Place Component**	• **Ribbon:** *Architecture* tab>Build panel> expand Component • **Shortcut:** CM
	**Purge Unused**	• **Ribbon:** *Manage* tab>Settings panel
	**Search Seek Online**	• **Ribbon:** *Insert* tab>Autodesk Seek panel

Practice 9a

Estimated time for completion: 30 minutes

Model Floors

Practice Objectives

- Add floors.
- Copy a floor to multiple levels.

In this practice you will create or modify floors in the Basement, first floor, and second floor of a project. You then copy the floor on the second floor to other related levels and clean up connections between the floors and wall. The second floor with balconies is shown in Figure 9–10.

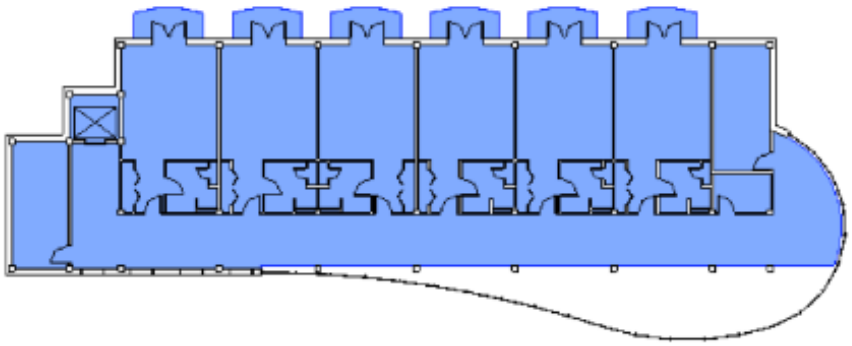


Figure 9–10

Task 1 - Add the basement floor.

1. Open the project **Modern-Hotel-Floors-M.rvt**.
2. Open the **Floor Plans: Basement** view.
3. In the *Architecture* tab>Build panel, click (Floor).
4. In the Type Selector, select **Floor: Insitu Concrete 225mm**.
5. In the *Modify | Create Floor Boundary* tab>Draw panel, click (Pick Walls) and select the inside face of the exterior foundation walls.
6. Click (Finish Edit Mode).
7. If an error dialog box opens, click **Continue**. Use the modify tools to ensure that the boundary is a closed loop. (Hint: On the right side of the building, move the wall end of the stairwell up until it connects with the curved wall.)

8. Click (Finish Edit Mode) again.
9. When the alert box opens, click **Yes**. The floor pattern displays as shown in Figure 9–11.

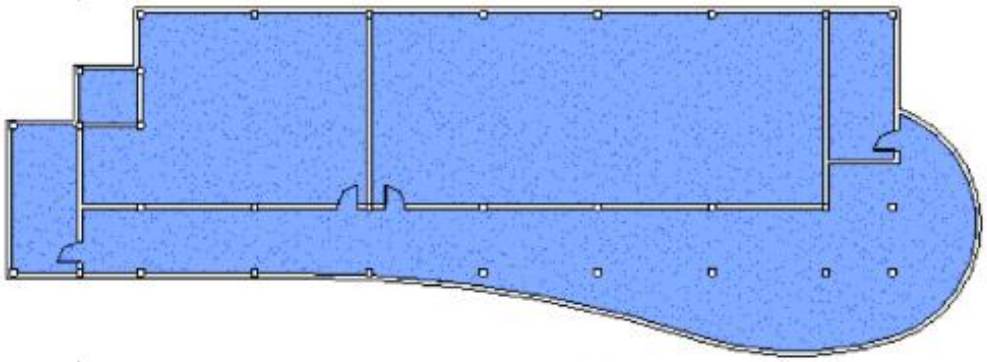


Figure 9–11

10. Click in empty space to release the floor selection.

Press <Enter> to repeat the last command.

11. Start the **Floor** command again.
12. In the Type Selector, select **Floor: Tile**. In Properties, set the *Height Offset from Level* to **6mm** to match the thickness of the tile.
13. Draw the boundary around the stair wells and hall as shown in Figure 9–12.

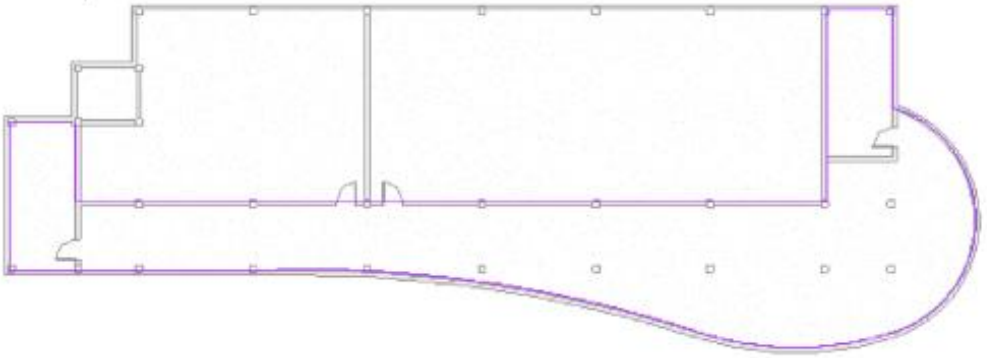


Figure 9–12

14. Click (Finish Edit Mode).
15. When prompted to join overlapping geometry, click **Yes**.

16. Click in empty space to release the selection and zoom in to display the different floor coverings, as shown in Figure 9–13.

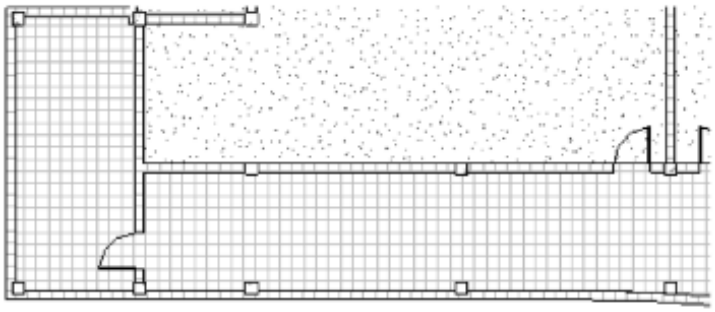


Figure 9–13

17. Save the project.

Task 2 - Modify a floor as a platform for the building.

1. Open the **Floor Plans**: **Floor 1 with Pool** view.
2. Hide the grid lines, tags, and elevation markers.
3. Select the existing floor around the pool building. In the *Modify* | *Floors* tab>Mode panel, click (Edit Boundary).
4. Modify the boundary as shown in Figure 9–14.

Modifying the boundary of this floor creates a platform for the building.

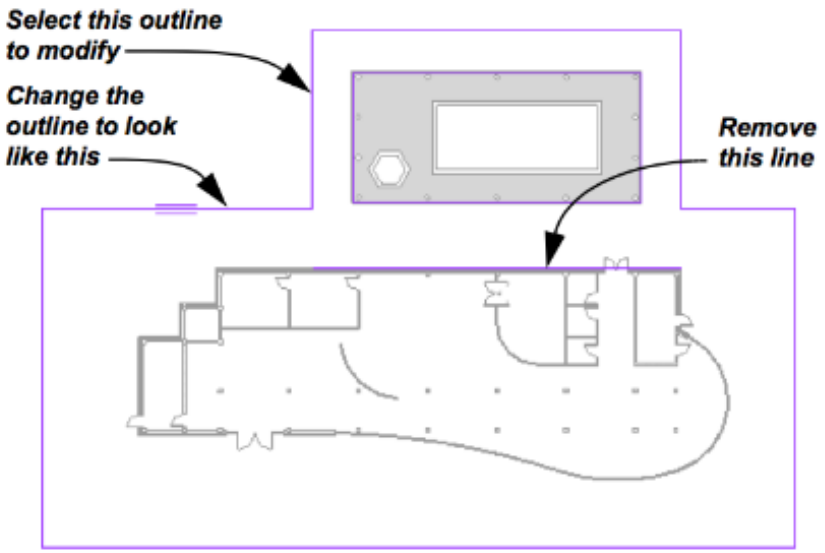


Figure 9–14

5. Click (Finish Edit Mode).

6. When prompted to attach walls to the floor, click **No**. Some of the walls need to be attached, but not all of them.
7. Click in empty space to release the selection.
8. View the building in 3D. It now has a base to rest on.
9. Save the project.

Task 3 - Add the second floor with balconies.

1. Open the **Floor Plans: Floor 2** view.
2. In the View Control Bar, click (Reveal Hidden Elements).

The linked CAD file has been imported to prevent problems with the software finding the correct information for the practice.

3. Select one of the text notes in the imported CAD file. Right-click and select **Unhide in View>Elements**.
4. Click (Close Reveal Hidden Elements).

Using Temporary Hide/Isolate cleans up the view temporarily as you create the floor.

5. Select any element that makes it difficult to display the outline of the floor and balcony. In the View Control Bar, click (Temporary Hide/Isolate) and select **Hide Category**.
6. In the *Architecture* tab>Build panel, click (Floor).
7. In the Type Selector, select **Floor: Generic - 300mm**.
8. In the *Modify | Create Floor Boundary* tab>Draw panel, click (Boundary Line) and (Pick Walls).
9. In the Options Bar, set the *Offset* to **0.0** and select **Extend into wall (to core)**.
10. Select the main outside walls. The sketch line displays at the core of the wall, as shown in Figure 9–15. Do not select the three curved walls.

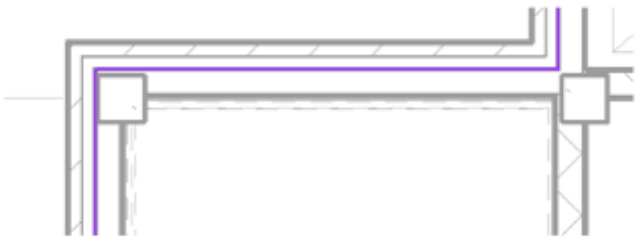


Figure 9–15

11. Change to (Pick Lines) and select the lines of walkways in the linked CAD file. (The text notes displays as **LINE OF WALKWAYS** and points to it).

12. Use draw and modify tools to fix the connections at the wall and walkway, as shown in Figure 9–16.

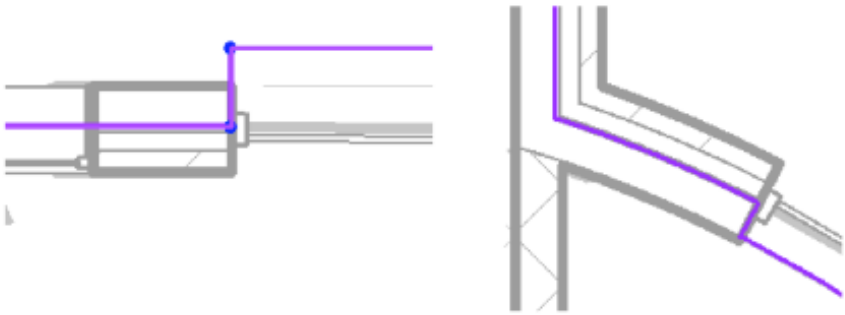


Figure 9–16

13. Pan over to one of the balconies.

14. Use (Pick Lines) to draw the outline of the balcony.

15. Use drag controls to have the balcony lines meet the floor line.

16. Use (Split Element) with **Delete Inner Segment** selected on the Options Bar, and cut the line as shown in Figure 9–17.

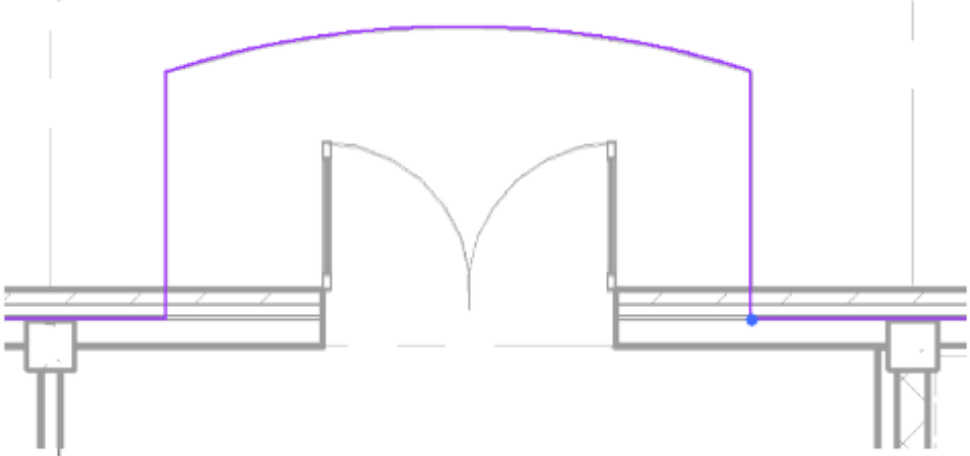


Figure 9–17

17. Click (Modify) and select the balcony elements.

18. Copy the elements to the other balconies and split the lines to create one continuous sketch.

19. Click (Finish Edit Sketch).

20. When the alert box shown in Figure 9–18 displays, click **Yes** to cut overlapping geometry out of the walls.

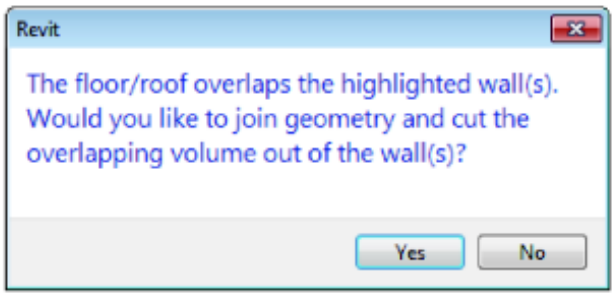


Figure 9–18

21. Click in empty space to release the floor selection.

22. Hide the imported CAD file in the view.

23. In the View Control Bar, click (Temporary/Hide Isolate) and select **Reset Temporary/Hide Isolate**. The elements you hid earlier display.

24. Save the project.

Task 4 - Copy the second floor to other floors and clean up floor connections with the walls.

1. In the **Floor Plans: Floor 2** view, select the new floor.

2. In the *Modify* | *Floors* tab>Clipboard panel, click (Copy to the Clipboard).

3. In the Clipboard panel, expand (Paste) and click (Aligned to Selected Levels).

4. In the Select Levels dialog box, select **Floor 3** through **Floor 8**, as shown in Figure 9–19. Click **OK**.

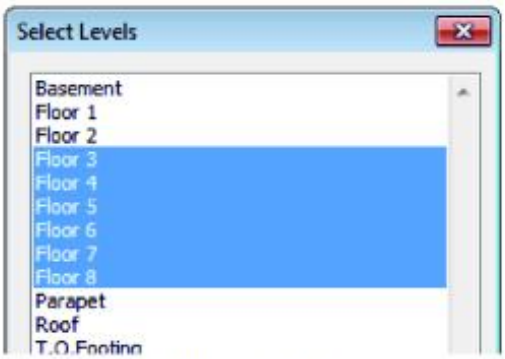


Figure 9–19

5. Open a 3D view and rotate it to display the new floors placed in the building, as shown in Figure 9–20.

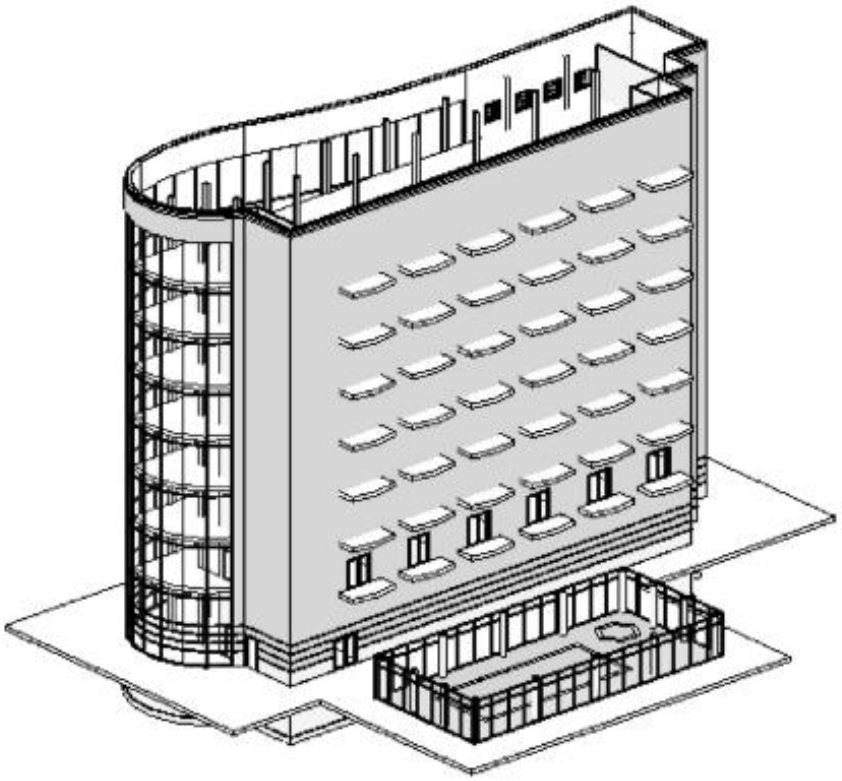


Figure 9–20

6. Return to the **Floor Plans: Floor 2** view again.

7. Select all of the interior walls and interior doors of the guest rooms as well as the exterior doors to the balcony. (Hint: You can open the floor plan of any of the floors between Floor 3 and Floor 8 to display the elements that need to be copied.)
   - Hold down <Shift> to clear the selection of anything you did not want, such as the exterior walls and the interior stairwell and elevator walls.
   - Use (Filter) to filter out items you do not want to copy, such as the columns, door tags, elevations, and views.
8. Copy the selected elements to the clipboard and paste them to the same levels as the floors.
9. Open several of the floor plan views to verify the placement of the guest room walls and doors.
10. Return to the 3D view to display the building with all of the doors and guest rooms, as shown in Figure 9–21.

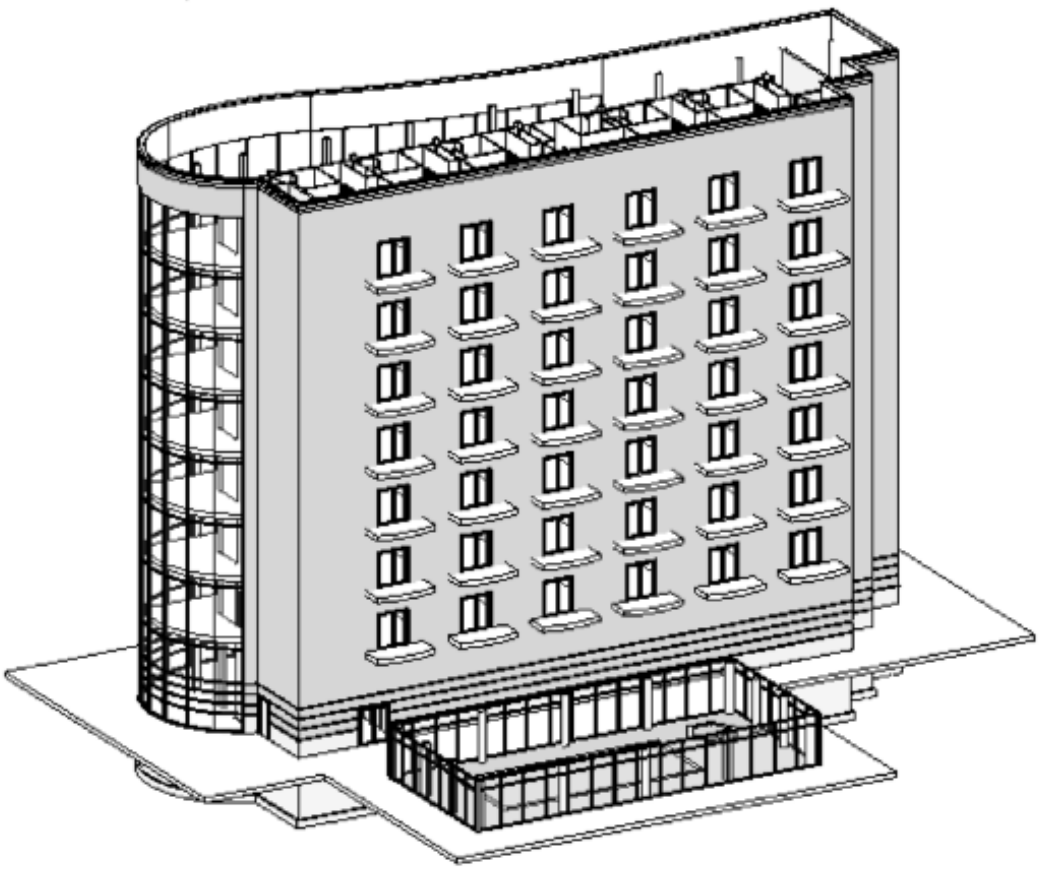


Figure 9–21

11. Zoom in on the back of the building. The floor slabs that extend to the balconies are not joined with the walls and therefore do not display a line across the connection between the wall and balcony, as shown in Figure 9–22. Zoom out to display all of the floors.

Figure 9–22

12. In the *Modify* tab>Geometry panel, expand (Join) and click (Join Geometry). In the Options Bar, select **Multiple Join**.

13. Select the back exterior wall and then select each floor with a balcony to join the wall and floors, as shown in Figure 9–23. Floor 2 is already joined and does not need to be selected.

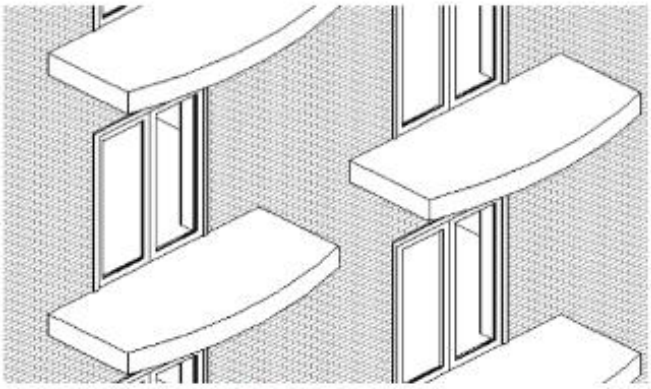


Figure 9–23

14. Zoom out to see the entire building.

15. Save the project.

Practice 9b

Add an Elevator Shaft and Slope Floors to Floor Drains

Estimated time for completion: 15 minutes

Practice Objectives

- Create a shaft opening.
- Slope floors.

In this practice you will add a shaft opening for the elevator, as shown on the left in Figure 9–30. You will also slope floors for drainage in the restrooms and janitors closet using the Shape Editing tools, as shown on the right in Figure 9–30.

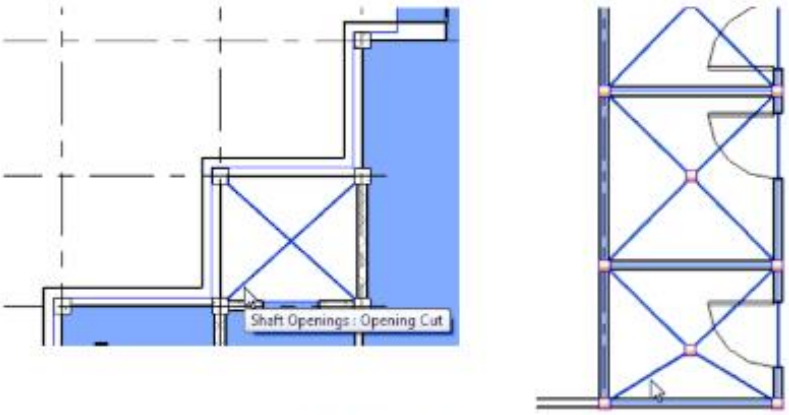


Figure 9–30

Task 1 - Create a shaft opening.

1. Open the project **Modern-Hotel-Shaft-M.rvt**.
2. Open the **Floor Plans: Floor 1** view and zoom in to the elevator area.
3. Temporarily hide the elevator.
4. In the *Architecture* tab>Opening panel, click (Shaft).
5. In the *Modify | Create Shaft Opening Sketch* tab>Draw panel, verify that (Boundary Line) is selected.

6. Use (Pick Walls) to create the boundary. Then use (Trim/Extend to Corner) to ensure that the boundary is closed, as shown in Figure 9–31.

7. In the Draw panel, click (Symbolic Line) and draw two lines crossing the opening, as shown in Figure 9–31.

Shafts do not cut through structural elements.

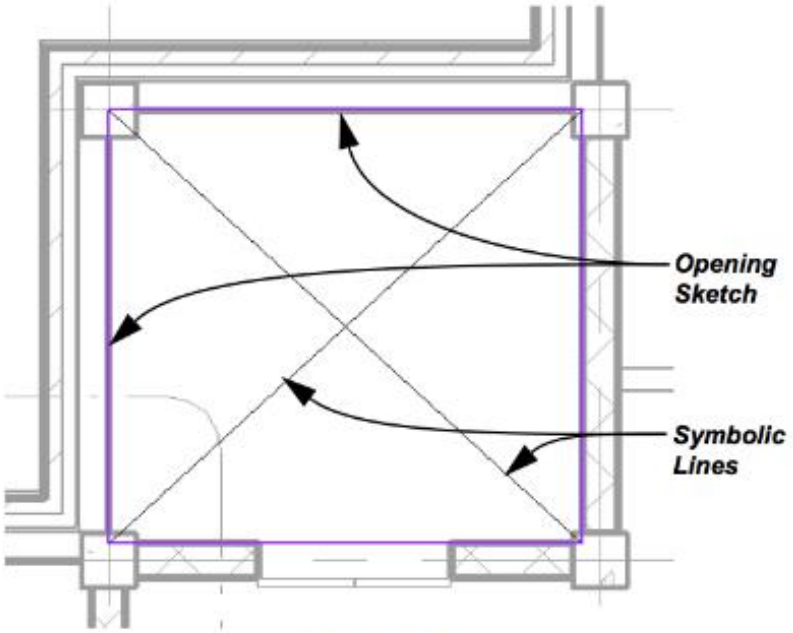


Figure 9–31

8. In Properties, verify that the *Base Constraint* is **Floor 1** and the *Base Offset* is (negative) **-300mm** (the defaults).

9. In Properties, set the *Top Constraint* to **Up to Level:Roof**.

10. Click (Finish Edit Mode).

11. Reset **Temporary Hide/Isolate** and zoom out to fit the view.

12. Open the **Floor Plans: Floor 2** view.

13. In the View Control Bar, change the *Visual Style* to (Consistent Colors) to display the opening.

14. Return the *Visual Style* to (Hidden Line).

15. Open the 3D view and rotate it to display the shaft as it goes through all of the floors, as shown in Figure 9–32.

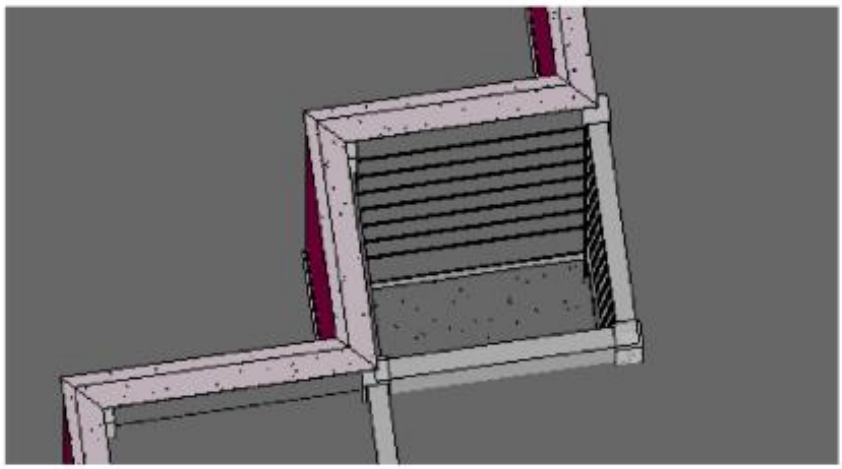


Figure 9–32

16. Open a couple other full floor plan views.The symbolic lines display in all views.
17. Return to the **Floor Plans: Floor 1** view.
18. Zoom out to display the entire view if needed.
19. In the Quick Access Toolbar, click (Close Hidden Windows).
20. Save the project.

Task 2 - Slope floors for drainage.

1. Open the **Floor Plans: Floor 1 Restrooms** view.
2. Expand the size of the crop region so the janitor's closet below is also included in the plan.
3. Select one of the elevation markers and hide the category.
4. The edge of the floor does not display in this view, so you cannot select it using the standard method. In the Status Bar, click (Select Elements by Face), and then click on the face of the floor to select it.

*Use the **Chain** option and draw all of the outside edges first.*

5. In the *Modify | Floors* tab>Shape Editing panel, click (Add Split Line). Draw the lines, as shown in Figure 9–33.

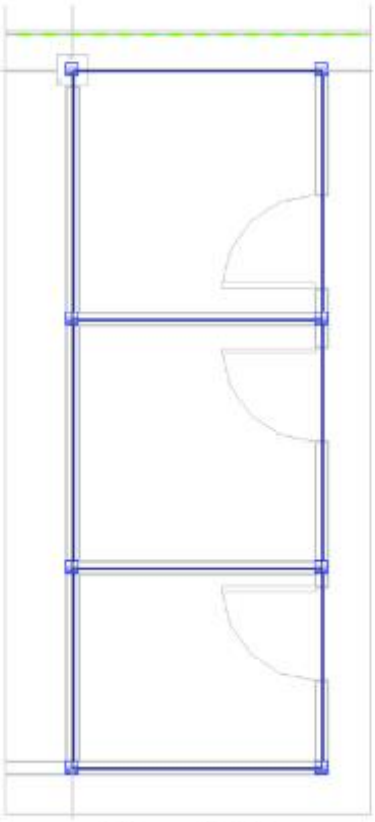


Figure 9–33

6. In the Shape Editing panel, click (Add Point). In the Options Bar, set the *Elevation* to (negative) **-15mm**. Place a point in the center of each room, as shown for one of them in Figure 9–34.

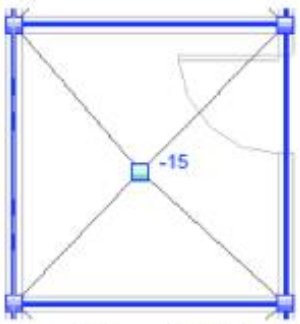


Figure 9–34

7. End the command.
8. Zoom out and save the project.

Command Summary

Button	Command	Location
	**Add Point**	• **Ribbon:** *Modify* | *Floors* tab>Shape Editing panel
	**Add Split Line**	• **Ribbon:** *Modify* | *Floors* tab>Shape Editing panel
	**Floor: Architectural**	• **Ribbon:** *Architecture* tab>Build panel>expand Floor
	**Floor: Structural**	• **Ribbon:** *Architecture* tab>Build panel>expand Floor
	**Modify Sub Elements**	• **Ribbon:** *Modify* | *Floors* tab>Shape Editing panel
	**Pick Supports**	• **Ribbon:** *Modify* | *Floors* tab>Shape Editing panel
	**Reset Shape**	• **Ribbon:** *Modify* | *Floors* tab>Shape Editing panel
	**Shaft**	• **Ribbon:** *Architecture* tab>Opening panel

Practice 10a

Estimated time for completion: 15 minutes

Model Ceilings and Add Ceiling Fixtures

Practice Objectives

- Create automatic ceilings with grids.
- Add ceiling components.

In this practice, while working in a reflected ceiling plan, you will add acoustical tile ceilings to several support spaces. You will then add light fixtures and air terminals, as shown in Figure 10–10.

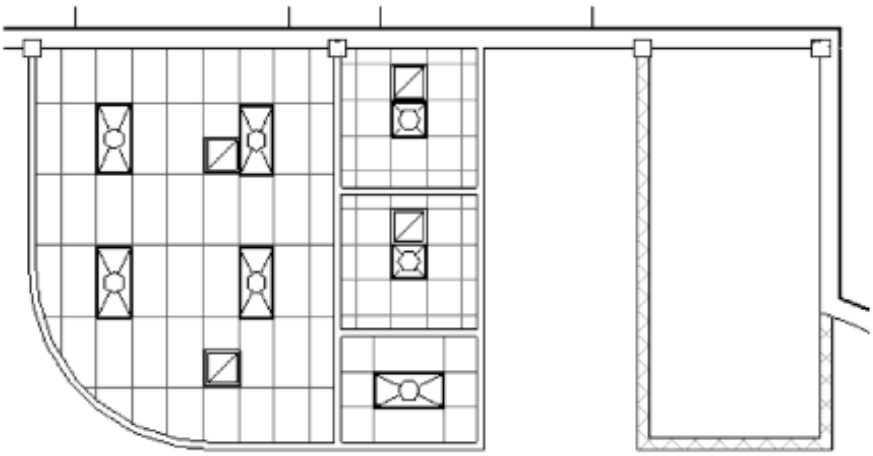


Figure 10–10

Task 1 - Create ceilings with ceiling grids.

1. Open the drawing **Modern-Hotel-Ceilings-M.rvt**.
2. Open the **Ceiling Plans: Floor 1** view.
   - To clarify the drawing, you might want to hide the grids, elevations, and sections categories. A quick way to do this is to select one of each element and then use the **Visibility Hide** shortcut by pressing <V> and then pressing <H>.
3. In the *Architecture* tab>Build panel, click (Ceiling).
4. In the Type Selector, verify that **Compound Ceiling: 600 x 1200mm Grid** is selected.

5. Click inside the four support rooms, as shown in Figure 10–11.

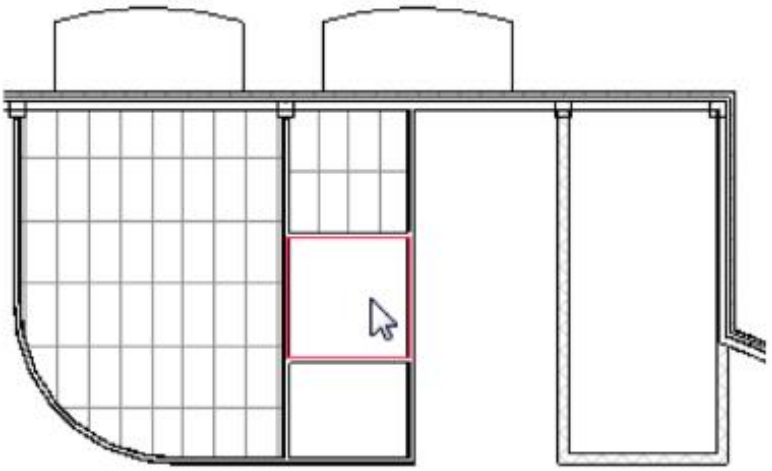


Figure 10–11

Hold <Ctrl> to select more than one element.

6. Start the **Modify** command and select one grid line in each restroom. In the Type Selector, select **Compound Ceiling: 2' x 2' ACT System**. In Properties, set the *Height Offset from Level* to **2800mm**.

Task 2 - Add ceiling components.

1. In the *Architecture* tab>Build panel, click (Component).

2. In the Mode panel, click (Load Family) and load the following components from the associated folders in the US Metric Library or the *Practice Library* subfolder of the practice folder:

   Lighting>Architectural>Internal:

   - **M_Downlight - Recessed Can.rfa**
   - **M_Troffer Light - Parabolic Rectangular.rfa**
   - **M_Troffer Light - Parabolic Square.rfa**

   Mechanical>MEP>Air-Side Components>Air Terminals:

   - **M_Return Register.rfa**
   - **M_Supply Diffuser.rfa**

3. Add the ceiling fixtures, as shown in Figure 10–12.

   - Select a ceiling grid line and use **Move** to modify the grid to suit the location of the fixtures.
   - Select a light fixture and place it on the grid. Press <Esc> and select the light fixture. Press <Spacebar> to rotate the light 90 degrees.
   - Use snaps or **Align** to place it exactly on the grid.
   - Copy it to the other locations.
   - Place return registers in each room. Set the *Offset* from the Level to the height of the ceiling before placing them.

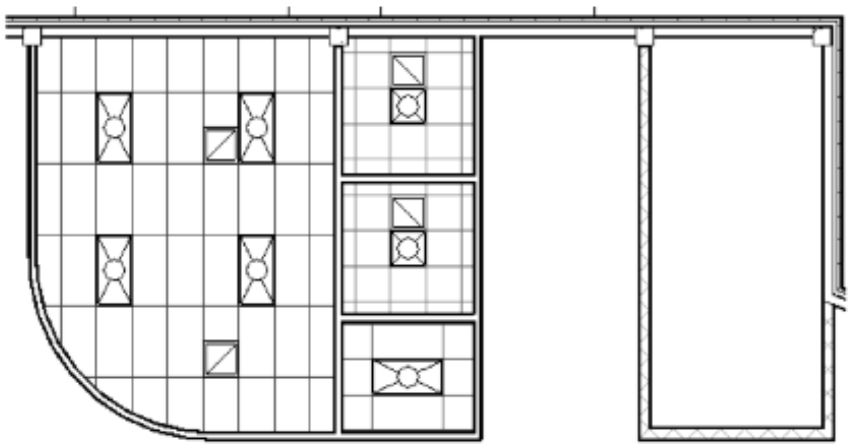


Figure 10–12

4. Save the project.

Practice 10b

Create Ceiling Soffits

Estimated time for completion: 15 minutes

Practice Objective

- Create ceiling soffits.

In this practice you will sketch a ceiling, add fixtures, and create a soffit wall in the hall, as shown in Figure 10–16. Optionally, you will also add a recessed ceiling and soffit to the breakfast area.

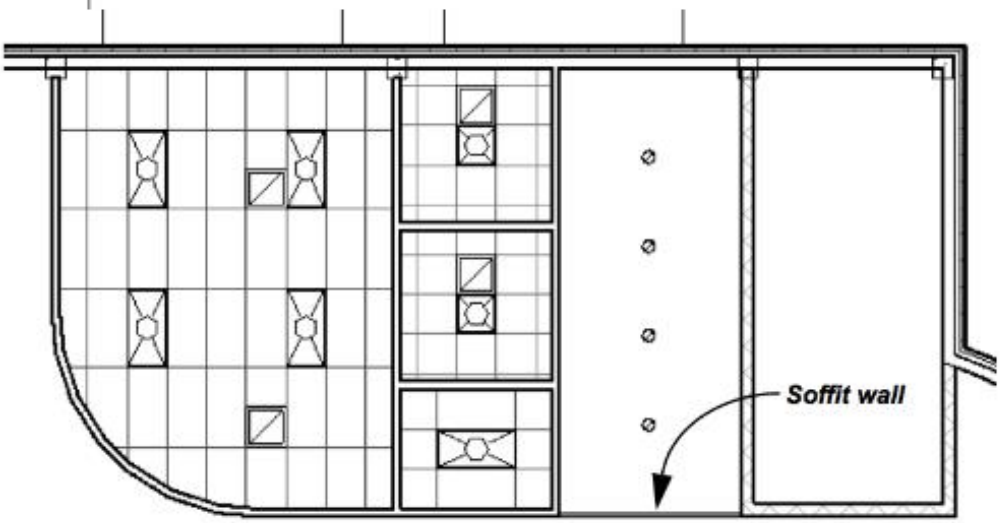


Figure 10–16

Task 1 - Sketch a ceiling.

1. Open the drawing **Modern-Hotel-Soffits-M.rvt**.
2. Open the **Ceiling Plans: Floor 1** view and zoom in on the hallway by the restrooms.
3. In the *Architecture* tab>Build panel, click (Ceiling).
4. In the Type Selector, select **Compound Ceiling: Plain** and in Properties, set the *Height Offset from Level* to **3000mm**.

5. In the *Modify | Place Ceiling* tab>Ceiling panel, click (Sketch Ceiling) and draw sketch lines, as shown in Figure 10–17 in the hallway.

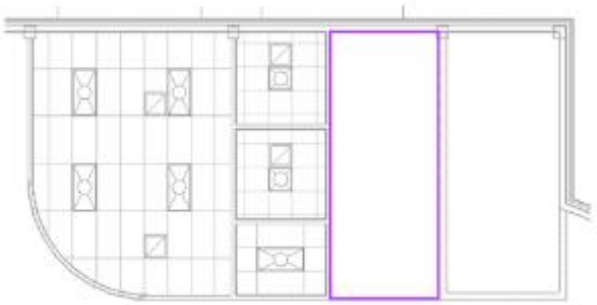


Figure 10–17

6. Click (Finish Edit Mode).
7. Add a line of four **M_Downlight - Recessed Can** components down the hallway, set at an elevation of **3000mm**. Use (Aligned Dimension) with the **EQ** control to space them equally in the hallway.
8. Save the project.

Task 2 - Add a soffit.

1. Open the **Sections (Building Section): East-West Section** view and zoom in on the hallway area shown in Figure 10–18.

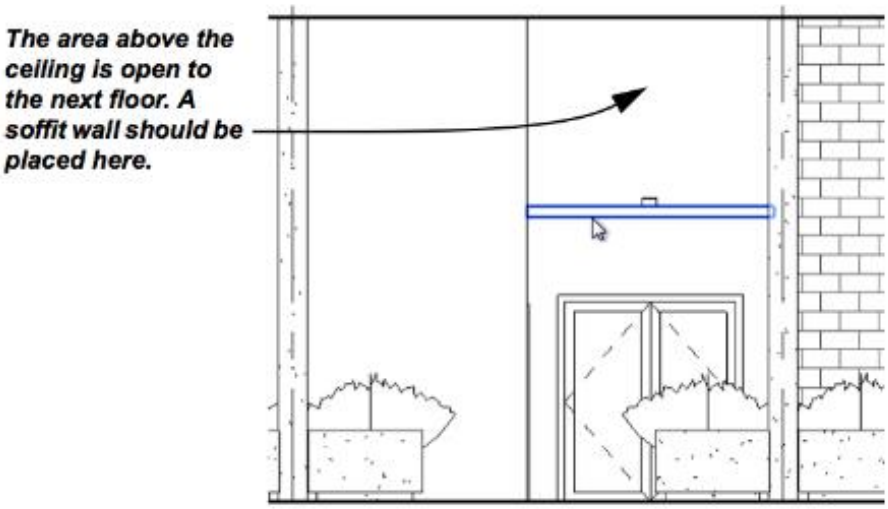


Figure 10–18

5. In the *Modify | Place Ceiling* tab>Ceiling panel, click (Sketch Ceiling) and draw sketch lines, as shown in Figure 10–17 in the hallway.

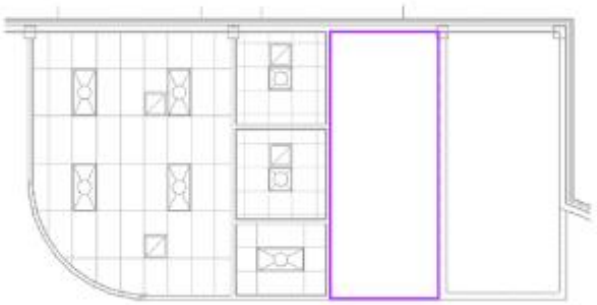


Figure 10–17

6. Click (Finish Edit Mode).
7. Add a line of four **M_Downlight - Recessed Can** components down the hallway, set at an elevation of **3000mm**. Use (Aligned Dimension) with the **EQ** control to space them equally in the hallway.
8. Save the project.

Task 2 - Add a soffit.

1. Open the **Sections (Building Section): East-West Section** view and zoom in on the hallway area shown in Figure 10–18.

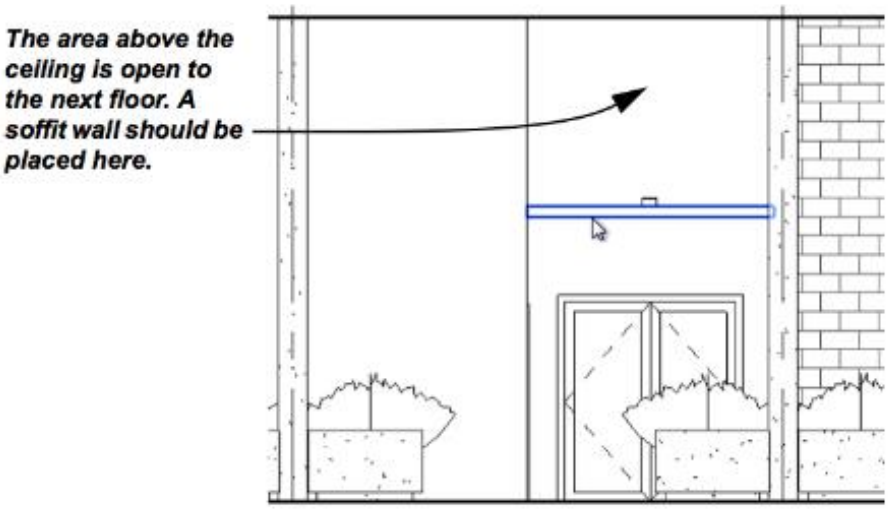


Figure 10–18

2. Return to the **Ceiling Plans: Floor 1** view.

3. Click (Wall). In the Type Selector, select **Basic Wall: Interior - 79mm Partition (1hr)**.

4. In Properties, set the *Location Line* to **Finish Face: Interior**, the *Base Offset* to **3000mm**, and the *Top Constraint* to **Up to level: Floor 2** with a *Top Offset* of (negative) **-300mm**.

5. Draw the wall across the face of the ceiling, as shown in Figure 10–19.

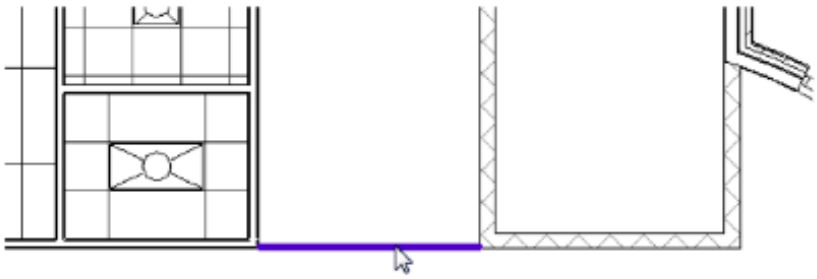


Figure 10–19

6. Open the **Sections (Building Section): East-West Section** view.

7. In the *Modify* tab>Geometry panel, click (Join).

8. Select the soffit wall above the ceiling and then select the ceiling, as shown on the left in Figure 10–20.

9. Select the ceiling again, and then the wall to the left. The elements clean up as shown on the right in Figure 10–20.

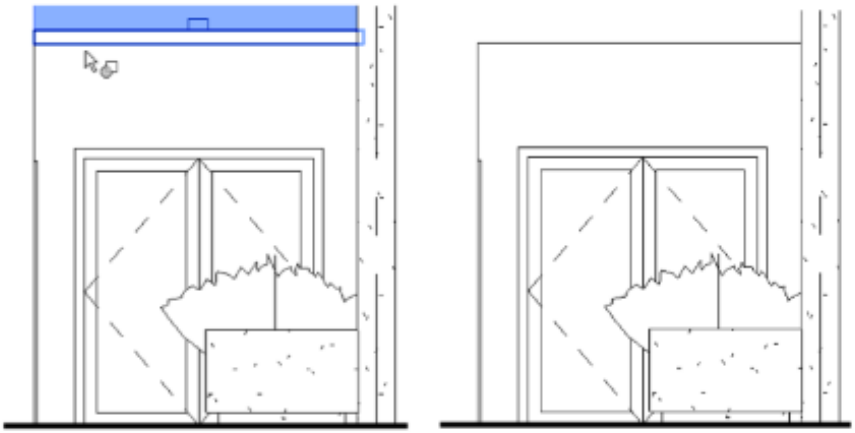


Figure 10–20

10. Open the Default 3D view and save the project.

Task 3 - Add a recessed ceiling (optional).

1. In the **Ceiling Plans: Floor 1** view, pan over to the breakfast area.

2. Click (Ceiling) and click (Sketch Ceiling).

3. Create a ceiling, similar to the one shown in Figure 10–21, that has an opening in the center.

*If you have difficulty selecting the center of the curved wall, type **SC** and then select the curved wall. This snaps to the center point of the arc.*

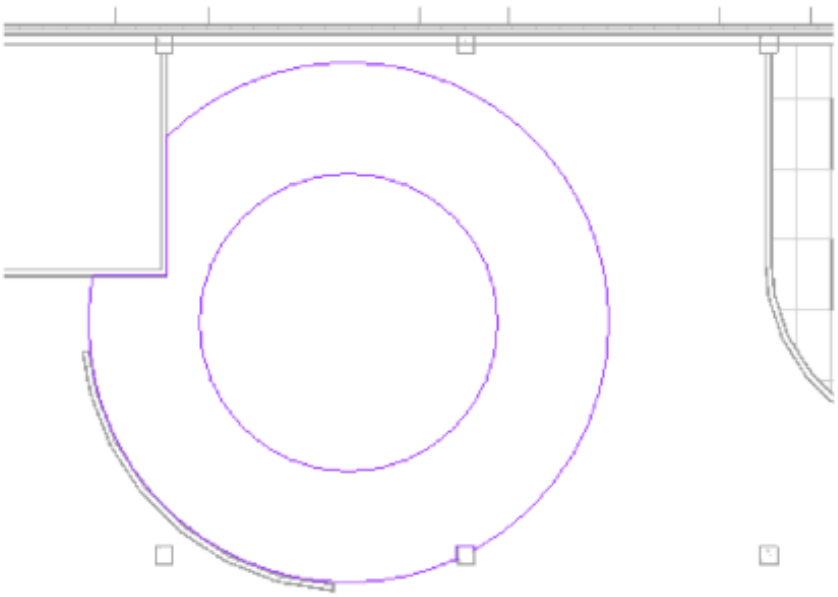


Figure 10–21

4. Click (Finish Edit Mode). The ceiling is still selected.

5. In the Type Selector, select **Compound Ceiling: Plain** and in Properties, set the *Height Offset from Level* to **3000mm**.

6. Click (Wall). In the type Selector, select **Basic Wall: Interior - 79mm Partition (1hr)** with the following parameters:

   - Location Line: **Finish Face: Interior**
   - Base Constraint: **Floor 1**
   - Base Offset: **3000mm**
   - Top Constraint: **Up to level: Floor 1**
   - Top Offset: **3600mm**

7. In the *Modify | Place Wall* tab>Draw panel, click (Pick Lines) and select the inside hole of the ceiling, as shown in Figure 10–22.

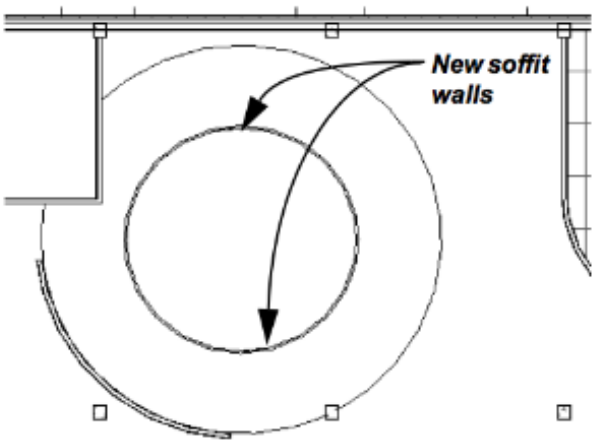


Figure 10–22

8. Click (Ceiling) again and use (Sketch Ceiling) to draw a ceiling inside the open area. Use (Pick Walls) to select the soffit walls.

9. Click (Finish Edit Mode).

10. In the Type Selector, select **Compound Ceiling: Plain** and in Properties, set the *Height Offset from Level* to **3600mm**.

11. Open the **Floor Plans: Floor 1** view and create a camera view looking toward the Breakfast area, as shown in Figure 10–23.

*Use **Hide in View> Elements** to turn off obstructing elements.*

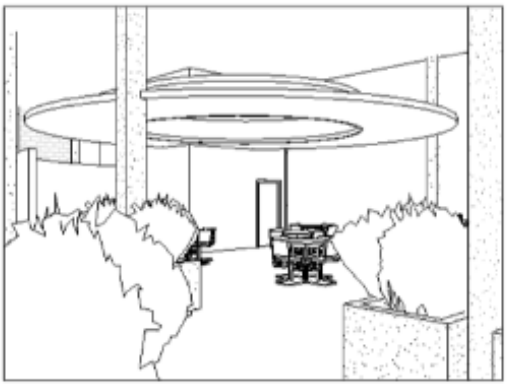


Figure 10–23

12. Save the project.

Command Summary

Button	Command	Location
	**Ceiling**	• **Ribbon:** *Architecture* tab>Build panel
	**Place a Component**	• **Ribbon:** *Architecture* tab>Build panel

Practice 11a

Create Roofs by Footprint

Estimated time for completion: 25 minutes

Practice Objectives

- Create flat and sloped roofs using Roof by Footprint.
- Create a roof plan view.

In this practice you will create a flat roof on the main part of the hotel, and flat and sloped roofs over the poolhouse, as shown in Figure 11–8.

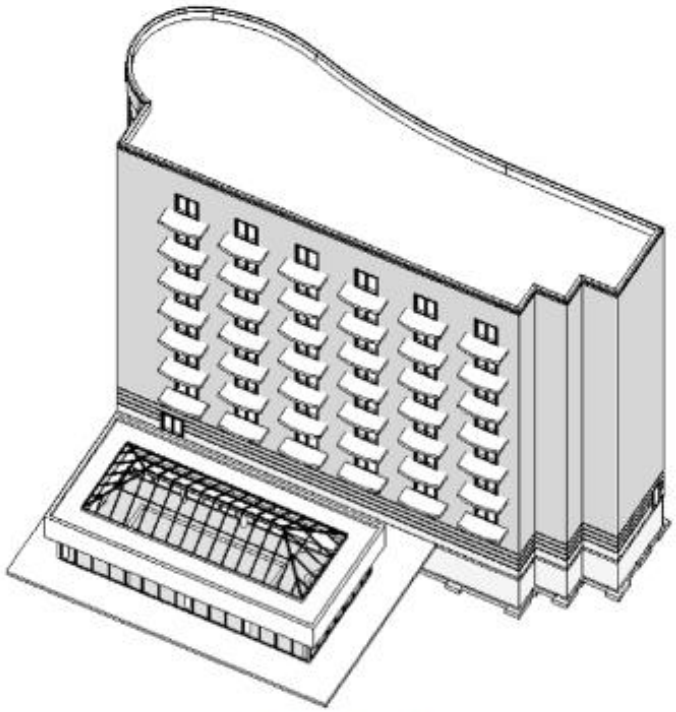


Figure 11–8

Task 1 - Create a flat roof.

1. Open **Modern-Hotel-Roof-Footprint-M.rvt**.
2. Open the **Floor Plans: Roof** view and set the *Underlay* to **None**.
3. Hide the grid lines and section and elevation markers.
4. In the *Architecture* tab>Build panel, expand (Roof) and click (Roof by Footprint).
5. In the Options Bar, clear the **Defines slope** option.

6. In the *Modify | Create Roof Footprint* tab>Draw panel, click (Pick Walls) and select the inside of the walls around the building, as shown in Figure 11–9.

Figure 11–9

7. Click (Finish Edit Mode).
8. In the Type Selector, select **Basic Roof: Steel Bar Joist-Steel Deck - EPDM Membrane**.
9. View the building in 3D to display the roof applied below the parapet wall, as shown in Figure 11–10.

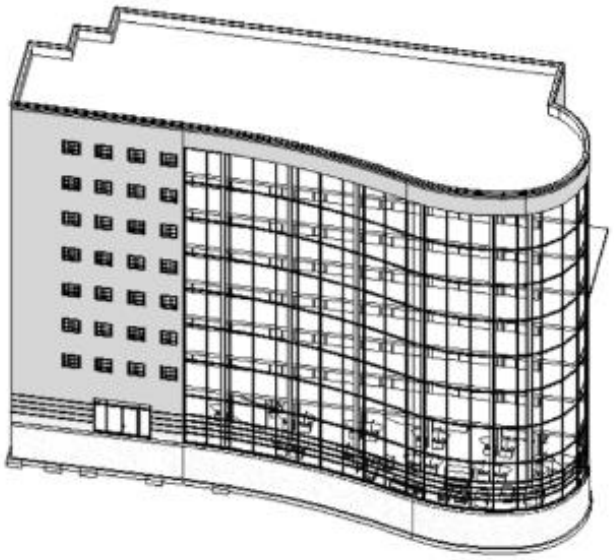


Figure 11–10

10. Save the project.

Task 2 - Create a roof plan.

Hold down <Shift> and the mouse wheel to rotate in 3D view.

1. Rotate the 3D view until the poolhouse at the back of the building displays. It does not yet have a roof, but several features are in place, including the parapet walls and roof soffit, as shown in Figure 11–11.

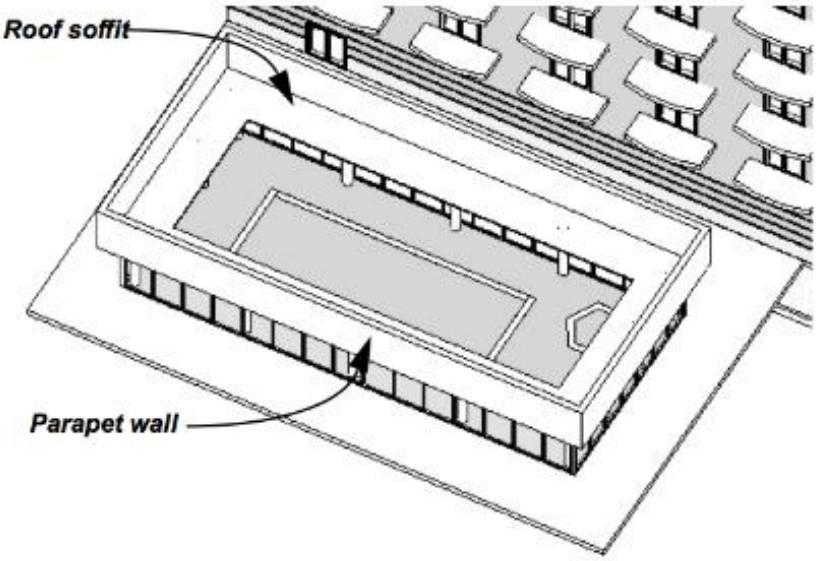


Figure 11–11

2. Duplicate (without detailing) a copy of the **Floor Plans: Floor 2** view and rename it as **Roof - Poolhouse**.
3. Verify that this view is open.
4. In Properties, edit the *View Range* and set it up as shown in Figure 11–12. Then click **OK**.

Figure 11–12

5. Expand the crop region to display the pool area and then modify it so that only the poolhouse displays, as shown in Figure 11–13. Hide any other elements as required.

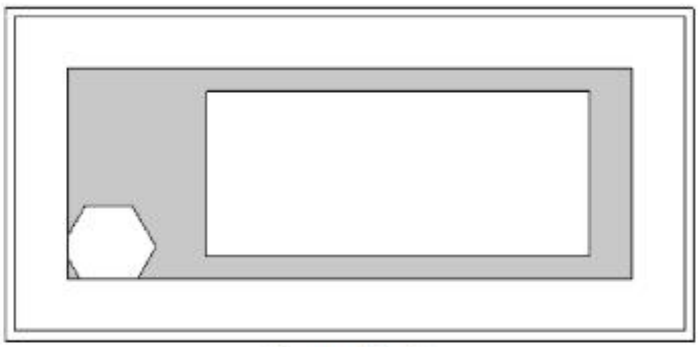


Figure 11–13

6. Hide the crop region.

Task 3 - Create roofs on the poolhouse.

1. In the *Architecture* tab>Build panel, click (Roof). The software remembers the most recently used command of **Roof by Footprint**.
2. In the Options Bar, verify that the **Defines slope** option is cleared and there is no overhang.
3. In the *Modify* | *Create Roof Footprint* tab>Draw panel, click (Pick Walls) and select the inside of the parapet walls.

   Use (Pick Lines) and select the soffit opening, as shown in Figure 11–14. This creates a flat roof with an opening in it.

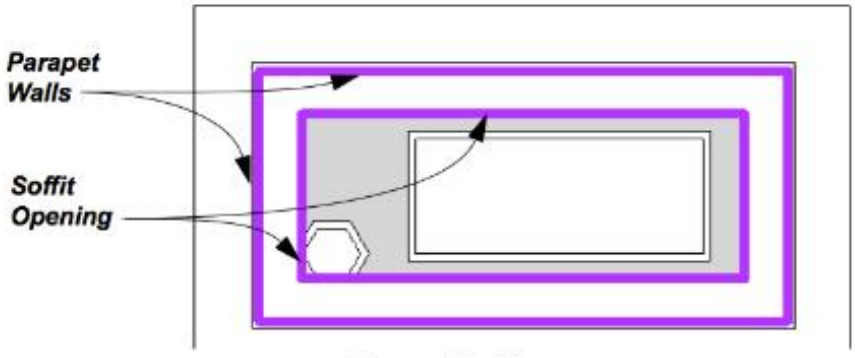


Figure 11–14

4. Click (Finish Edit Mode.)
5. With the roof still selected, set the following:
   - *Type:* **Basic Roof: Generic - 400mm**
   - *Base Level:* **Floor 2**
   - *Base Offset from Level:* (negative) **-600mm**
6. Click in the view to release the roof.
7. Click (Wall).
8. In Properties, set the following parameters:
   - Wall Type: **Basic Wall: Exterior - EIFS on Mtl.Stud**
   - Location Line: **Finish Face: Interior**
   - Base Constraint: **Floor 2**
   - Base Offset: (negative) **-200mm**
   - Top Constraint: **Unconnected**
   - Unconnected Height: **200mm**
9. Draw this short wall around the opening, as shown in Figure 11–15.

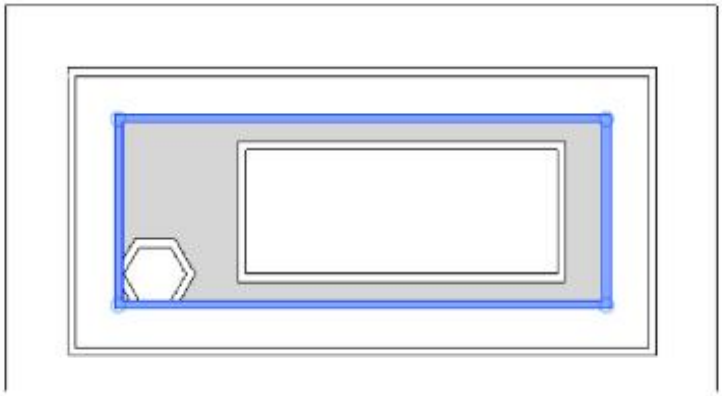


Figure 11–15

10. Click (Roof by Footprint).
11. In the Options Bar, select the **Defines slope** option.

12. Use (Pick Walls) and select the outside of the new walls you just created, as shown in Figure 11–16.

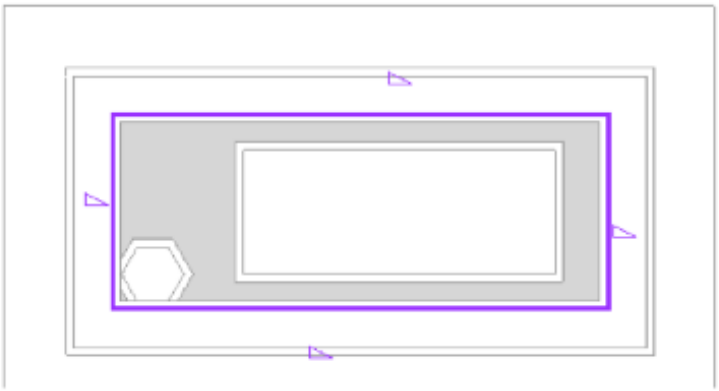


Figure 11–16

13. Click (Finish Edit Mode). In the Message dialog box, click **No** to not attach any walls to the roof.

14. In the Type Selector, select **Sloped Glazing: Pool Roof** and verify that the *Base Level* is **Floor 2**. In the *Grid 1* area, set the *Justification* to **Center**. The new roof displays as shown in Figure 11–17.

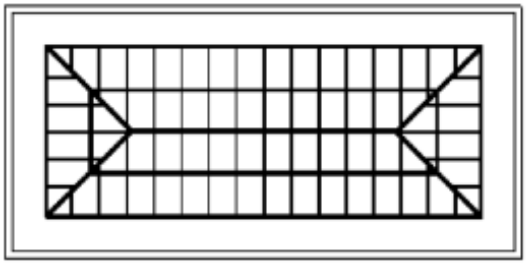


Figure 11–17

15. View the entire model in 3D.

16. Save the project.

Task 4 - Apply slopes to the main flat roof (optional).

If time permits, select the flat roof on the main hotel and use the Shape Editing tools on the *Modify | Floors* tab to add appropriate drainage slopes.

Practice 11b

Estimated time for completion: 20 minutes

Create Roofs by Extrusion

Practice Objectives

- Create an extruded roof.
- Modify the plan profile of a roof.

In this practice you will create a curved extruded roof to cover the main entrance of the building and modify its plan profile to cover the side entrance, as shown in Figure 11–28.

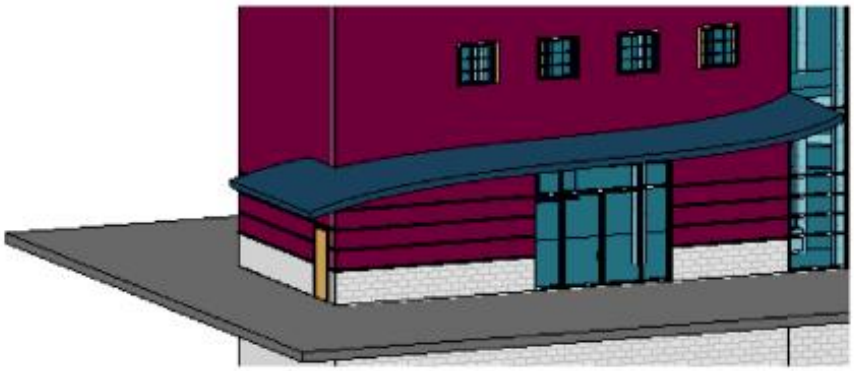


Figure 11–28

Task 1 - Create a roof by extrusion.

1. Open **Modern-Hotel-Roof-Extruded-M.rvt**.
2. Open the **Elevations (Building Elevation): South** view.
3. Zoom in on the area around the front entrance.
4. In the *Architecture* tab>Build panel, expand (Roof) and click (Roof by Extrusion).
5. In the Work Plane dialog box, verify that **Pick a plane** is selected, and click **OK**.
6. Select the front face of the wall.
7. In the Roof Reference Level and Offset dialog box, set the *Level* to **Floor 2** and click **OK**. A reference plane is set at this level and the drawing is grayed out.

The example was created using (Spline).

8. Sketch the profile of a roof similar to the one shown in Figure 11–29. It should extend beyond the building to the left but finish at the end of the brick wall on the right.

Figure 11–29

9. In Properties, set the *Extrusion End* to (negative) **-1850mm**.
10. Click (Finish Edit Mode).
11. In the Type Selector, select **Basic Roof: Generic - 125mm**.
12. View the new roof in 3D. It is mostly inside the building at this point.

Task 2 - Modify the extruded roof.

1. Open the **Floor Plans: Site** view. This view displays the entire building in plan including all of the roofs.
2. Hide the grid lines and elevation markers by category.
3. Select the Entrance roof and using controls, move the roof outward so that the length is **3500mm**, as shown in Figure 11–30.

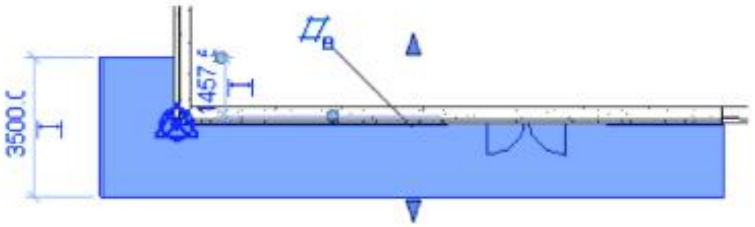


Figure 11–30

4. In the *Modify | Roofs* tab>Opening panel, click (Vertical).

5. Create a rectangular cutout of the roof for the portion that passes through the building, as shown in Figure 11–31.

Figure 11–31

6. Click (Finish Edit Mode).

7. View the modified roof in 3D. It now wraps around the side of the building to cover the side entrance, as shown in Figure 11–32.

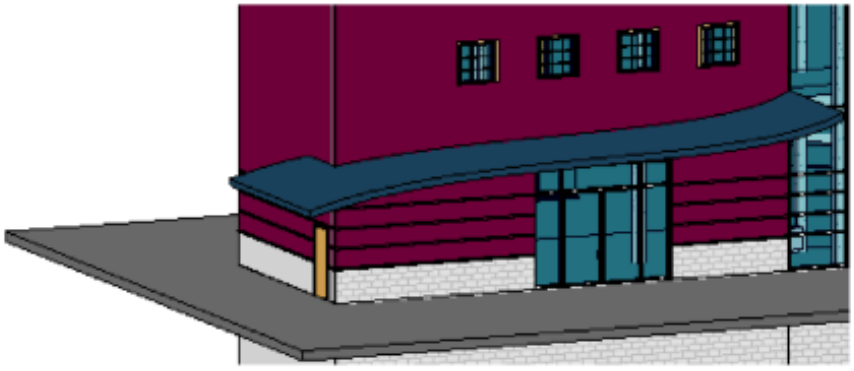


Figure 11–32

8. Save the project.

Command Summary

Button	Command	Location
	**Attach Top/Base**	• **Ribbon:** *Modify* | *Walls* tab>Modify Wall panel
	**Join Geometry**	• **Ribbon:** *Modify* tab>Geometry panel expand Join
	**Join/Unjoin Roof**	• **Ribbon:** *Modify* tab>Geometry panel
	**Ref Plane**	• **Ribbon:** *Architecture* tab>Work Plane panel
	**Roof by Extrusion**	• **Ribbon:** *Architecture* tab>Build panel expand Roof
	**Roof by Footprint**	• **Ribbon:** *Architecture* tab>Build panel expand Roof
	**Set Work Plane**	• **Ribbon:** *Architecture* tab>Work Plane panel
	**Unjoin Geometry**	• **Ribbon:** *Modify* tab>Geometry panel expand Join

Practice 12a

Create Component Stairs

Estimated time for completion: 25 minutes

Practice Objectives

- Create a component stairs.
- Cut out floors where stairs penetrate them.

In this practice you will create u-shaped stairs, including multi-story stairs in the stairwell, as shown in Figure 12–19. You will also modify the floors for stair openings and (if you have time) add a shaft to create an opening for the upper floors.

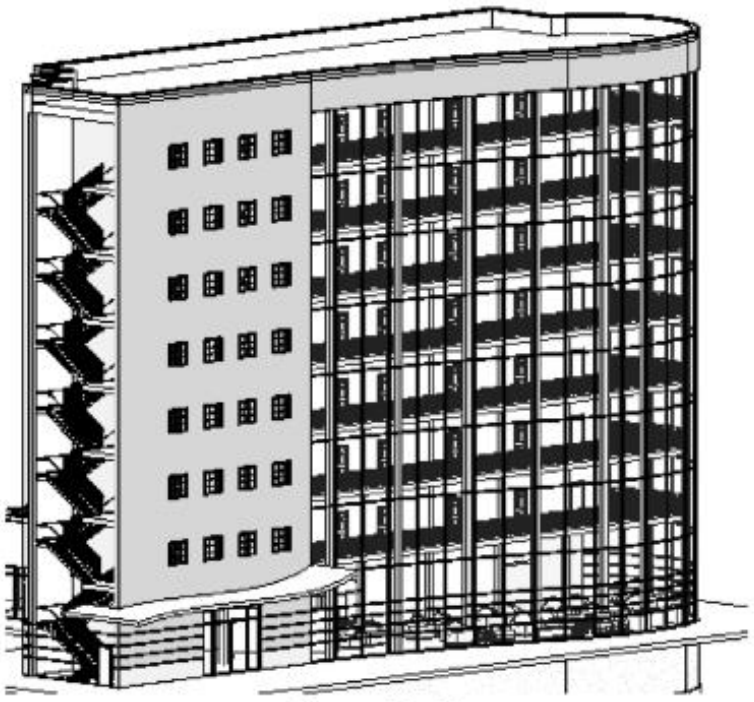


Figure 12–19

Task 1 - Create the stairs on the first floor.

1. Open the project **Modern-Hotel-Stairs-M.rvt**.
2. Open the **Floor Plans**: **Floor 1 - Stair 1** view. This is a callout from the main floor plan.
3. Hide the grid lines, sections, and crop region.
4. In the *Architecture* tab>Circulation panel, click (Stair).

5. In Properties, set or verify the following parameters:
   - Stair Type: **Assembled Stair: Hotel Stairs**
   - Base Level: **Floor 1**
   - Top Level: **Floor 2**
   - Base Offset: **0.0**
   - Top Offset: **0.0**
6. In the *Modify* | *Create Stair* tab>Tools panel, click (Railing). In the Railings dialog box, select **Hotel Stair Guardrail-Floor 1**, as shown in Figure 12–20. Verify that the *Position* is set to **Treads** and click **OK**.

The Guardrails are different for the upper floors. Therefore, there are two different stair guardrail styles.

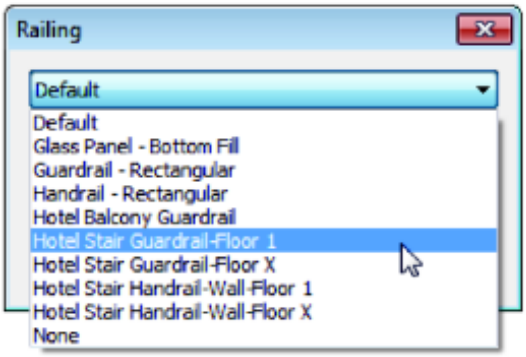


Figure 12–20

7. In the *Modify* | *Create Stair* tab>Work Plane panel, click (Ref Plane). Draw a horizontal reference plane **1200mm** from the inner edge of the top wall of the stairwell, as shown in Figure 12–21. Click (Modify).

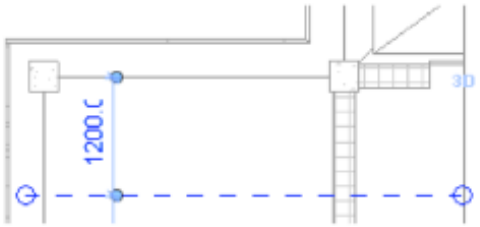


Figure 12–21

8. In the *Modify* | *Create Stair* tab>Components panel, click (Run).
9. In the Options Bar, set the *Location Line* to **Run: Left**, set *Offset* to **0.0**, the *Actual Run Width* to **1200mm**, and select **Automatic Landing**.

10. Pick the start point of the first run on the wall close to the door, as shown in Figure 12–22. The exact location is not important at this point. Pick a second point near the reference plane.

11. Pick the start point for the second run at the intersection of the wall and reference plane as shown in Figure 12–22. Pick the second point past the ghost image of the completed number of stairs.

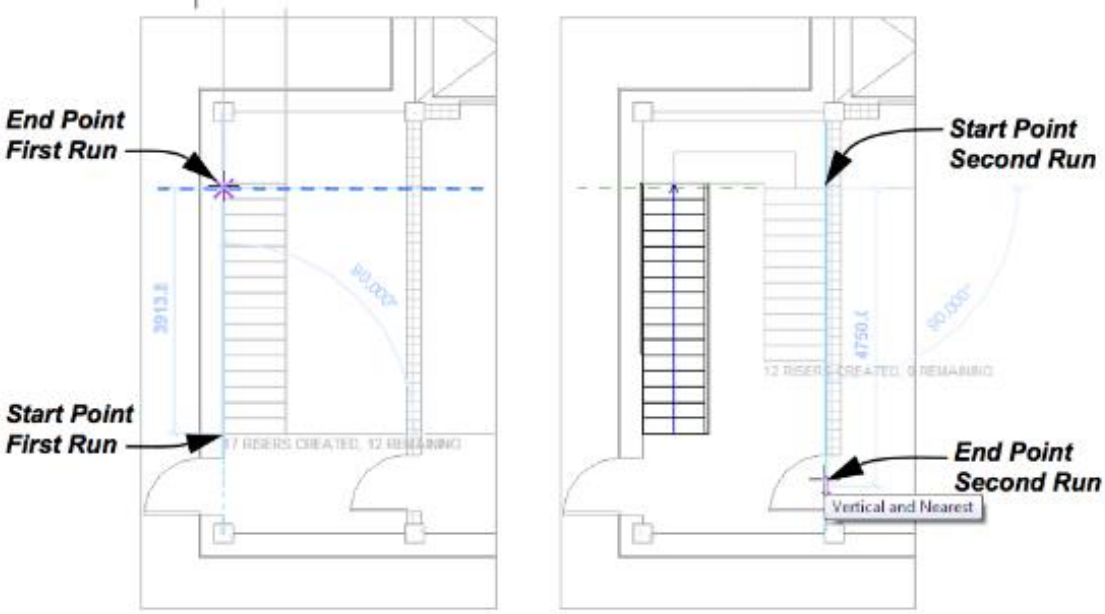


Figure 12–22

12. The run on the left wall might not be in the right place. Select the run and click (Move). Select a point on the top riser and then on the reference plane, as shown in Figure 12–23.

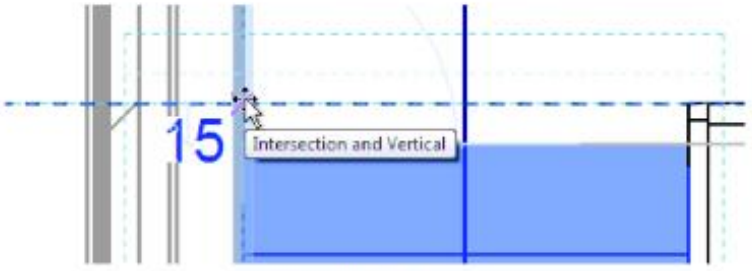


Figure 12–23

13. Depending on how you drew the runs you might also need to modify the run lengths. The left should have steps 1 to 16 and the right should have steps 17 to 31. Select the stairs on the left and use the arrow shape handle at the base of the stairs, to change the number of stairs as required.

14. Click (Finish Edit Mode).

15. Save the project.

Task 2 - Create the Upper Floor stairs.

1. Open the **Floor Plans: Floor 2** view and zoom in on the left stairwell. You should see the **DN** annotation and part of the stairs from the level below.

2. Use **Temporary/Hide** to clean up the view to have it display more clearly.

3. Click (Stair).

All of the floor heights are the same between the 2nd and 8th floors, so you can create a multistory stair.

4. In Properties, verify that the *Base Level* is set to **Floor 2** and the *Top Level* is set to **Floor 3** and set the *Multistory Top Level* to **Floor 8**. Note the *Desired Number of Risers*, as shown in Figure 12–24. This number is much smaller because the height between Floor 2 and Floor 3 is less than the height between Floor 1 and Floor 2.

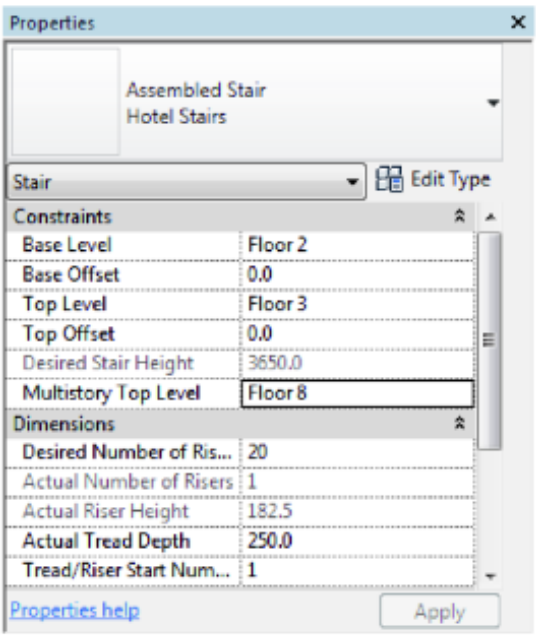


Figure 12–24

5. In the *Modify | Create Stair* tab> Tools panel, click (Railing). In the Railing dialog box, set the *Railing Type* to **Hotel Stair Guardrail-Floor X**. Click **OK**.

6. In the Work Plane panel, click (Reference Plane) and add a horizontal reference plane **1200mm** from the inner side of back wall. Click (Modify).

7. Add the stair runs as in Task 1, modifying the runs as required to display stairs 1 to 11 on the left and 12 to 21 on the right as shown in Figure 12–25.

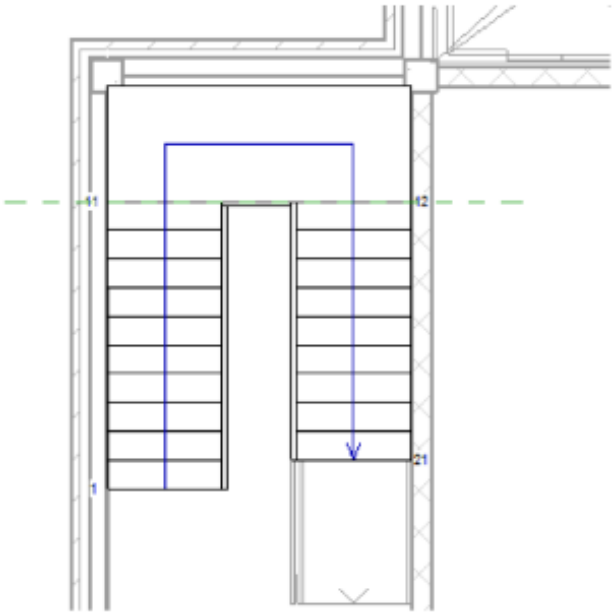


Figure 12–25

8. Click (Finish Edit Mode).

9. To see the stairs on all of the floors, open the **Sections (Building Section): East-West Section** and set the Visual Style to (Consistent Colors), as shown in Figure 12–26.

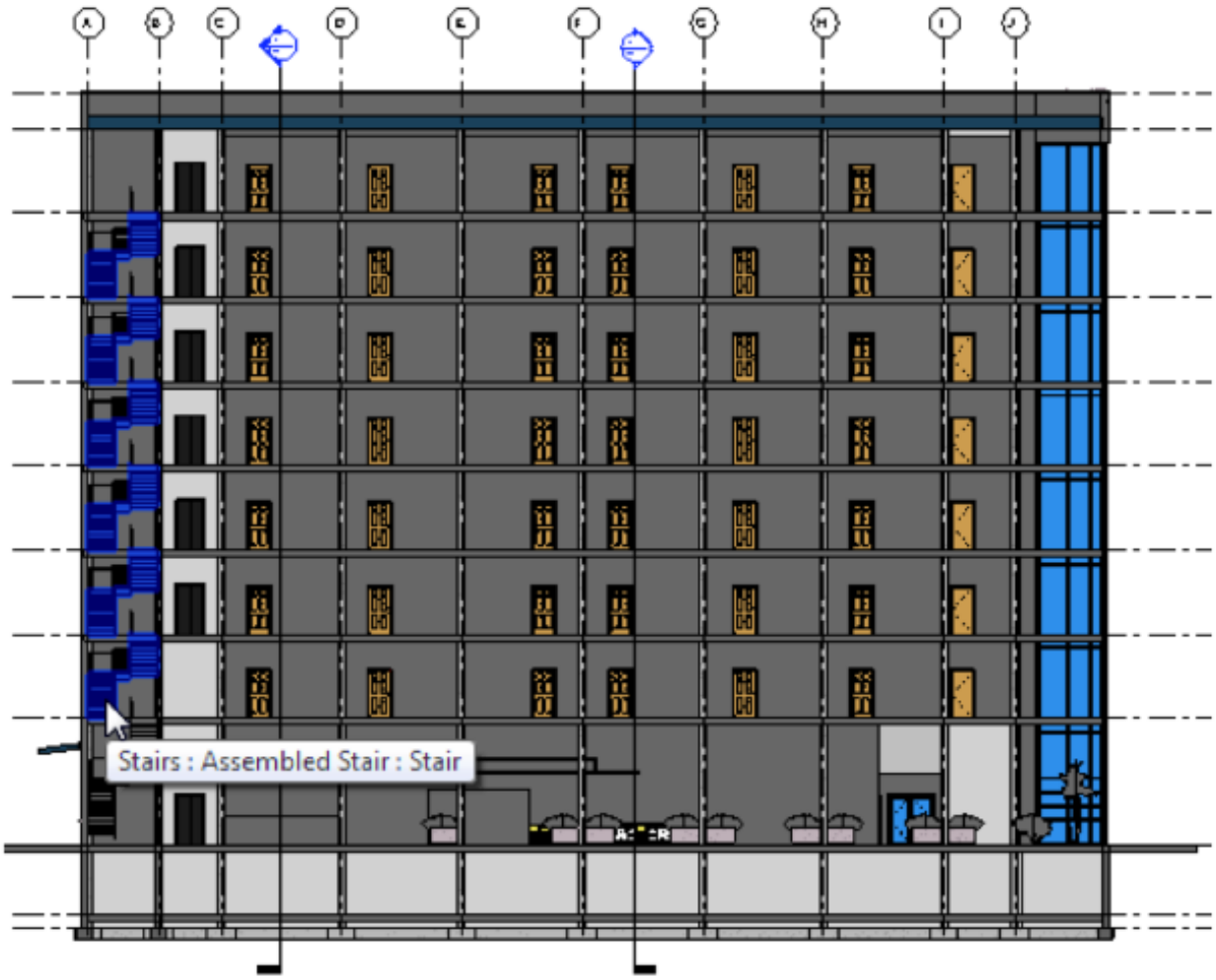


Figure 12–26

10. If you have time at the end of the practice, create stairs from the Basement to Floor 1 and save the project.

Task 3 - Modify the second floor stair openings.

1. Open the **Floor Plans: Floor 2** view.
2. Select the floor. (It is easiest to select one of the balconies.)
3. In the *Modify* | *Floors* tab>Mode panel, click (Edit Boundary).

4. Modify the boundary line so that it creates an opening for the stairs, as shown in Figure 12–27.

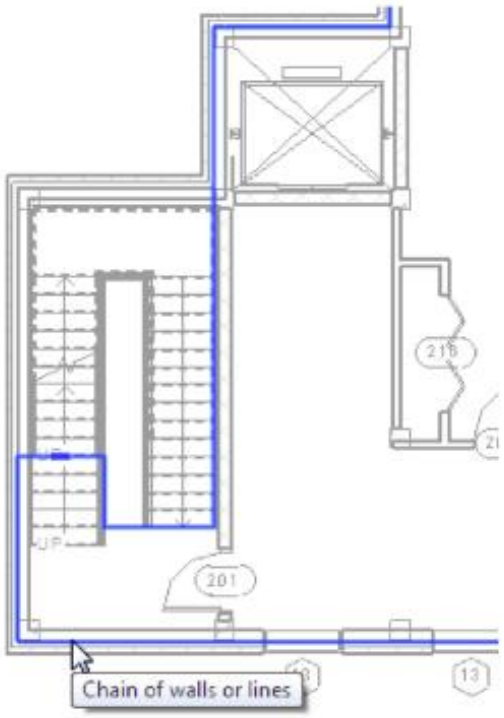


Figure 12–27

5. Click (Finish Edit Mode). Do not attach the walls to the floor.
6. Zoom out to display the entire second floor.
7. Save the project.
8. If you have time at the end of the practice, modify the floor for the Floor 1 stair opening to the Basement. Place a shaft for the Floor 3 through Floor 8. You can use a shaft here because the openings are the same on all of the floors.
9. Save the project.

Practice 12b

Modify and Add Railings

Practice Objectives

- Modify railings and handrails.
- Add stand-alone railings.

Estimated time for completion: 25 minutes

In this practice you will modify the railings in the stairwells by changing the railings against the wall to a new type. You will also modify the extensions and terminations at the end of the railings. You will then add railings to the interior balconies (as shown in Figure 12–37), and to exterior balconies.

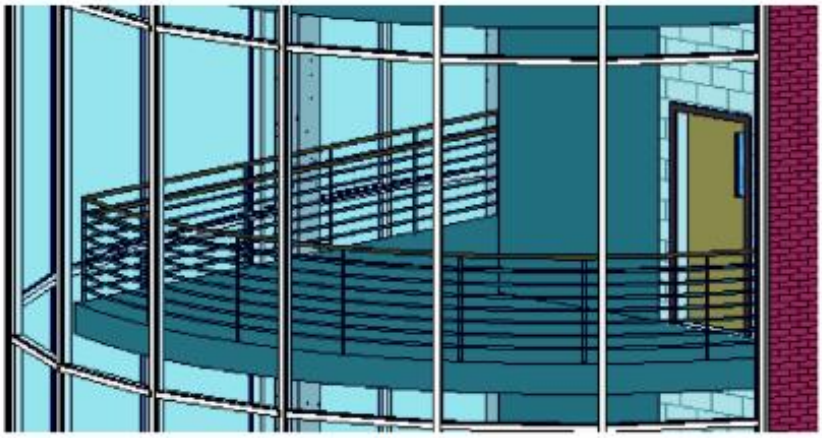


Figure 12–37

Task 1 - Modify the stairwell railings.

1. Open the project **Modern-Hotel-Railings-M.rvt**.
2. Open the **Floor Plans: Floor 1 - Stair 1** view.
3. Create a camera view looking from the door into the stairwell to display the new stairs and railings.
4. In the Project Browser, in *3D Views*, right-click on the new 3D view and rename it as **Stair 1 - Floor 1.**
5. Modify the controls as required to show the first run of the stair. and set the *Visual Style* to (Shaded). The top rail and hand rail of the railings display a different material.
6. Select the railing that is against the wall and in the Type Selector, select **Railing: Hotel Stair Handrail-Wall-Floor 1**. The railing type changes as shown in Figure 12–38.

*Use <Ctrl>+<Tab> to move between the **3D Camera** view and the **Floor Plan** view.*

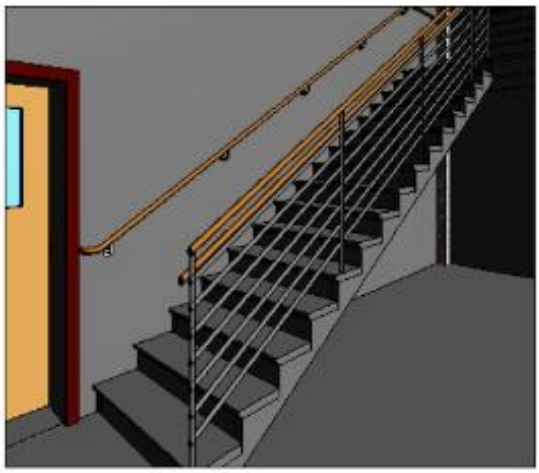


Figure 12–38

7. With the handrail still selected, in Properties set the *Tread/String Offset* to **0**. This prevents the handrail from sitting too far off the wall.

8. Open the **Floor Plans: Floor 2** view.

9. Zoom in on the stairwell and select the outside railing. In the Type Selector, change the type to **Railing: Hotel Stair Handrail-Wall-Floor X** and the *Tread/Stringer Offset* to **0**.

10. Create a camera view to display the stairs and railings of the stair going up as shown in Figure 12–39. Select the railing that is partially displayed and hide it. Shade the view to display the components of the railings more clearly.

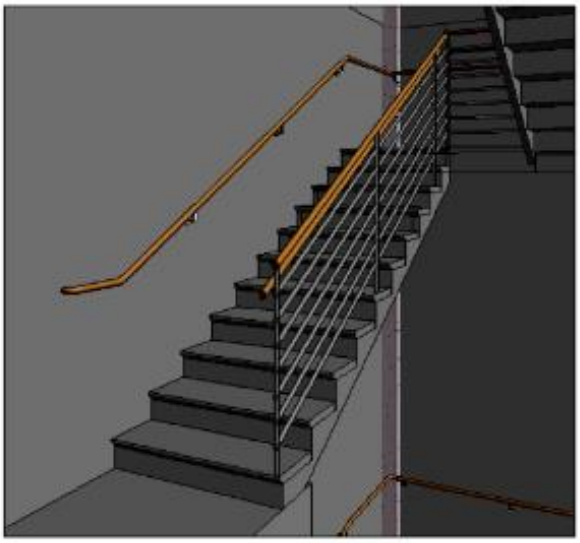


Figure 12–39

11. Rename this view as **Stair 1 - Floor 2**.

12. Click inside the camera view. In the inner guardrail, hover the cursor over the separate handrail (not the top rail). Press <Tab> so that only this handrail is highlighted and click to select it.

13. In Properties, click (Edit Type).

14. In the Type Properties dialog box, in both the *Extension (Beginning/Bottom)* area and the *Extension (End/Top)* area, set the *Extension Style* to **Floor** and the *Length* to **300mm**.

15. In the *Terminations* area, set the *Beginning/Bottom* and *End/Top* to **Termination - Wood - Rectangular**.

16. Click **OK**. The handrail changes as shown in Figure 12–40.

The railing of the other stair is hidden in this view.

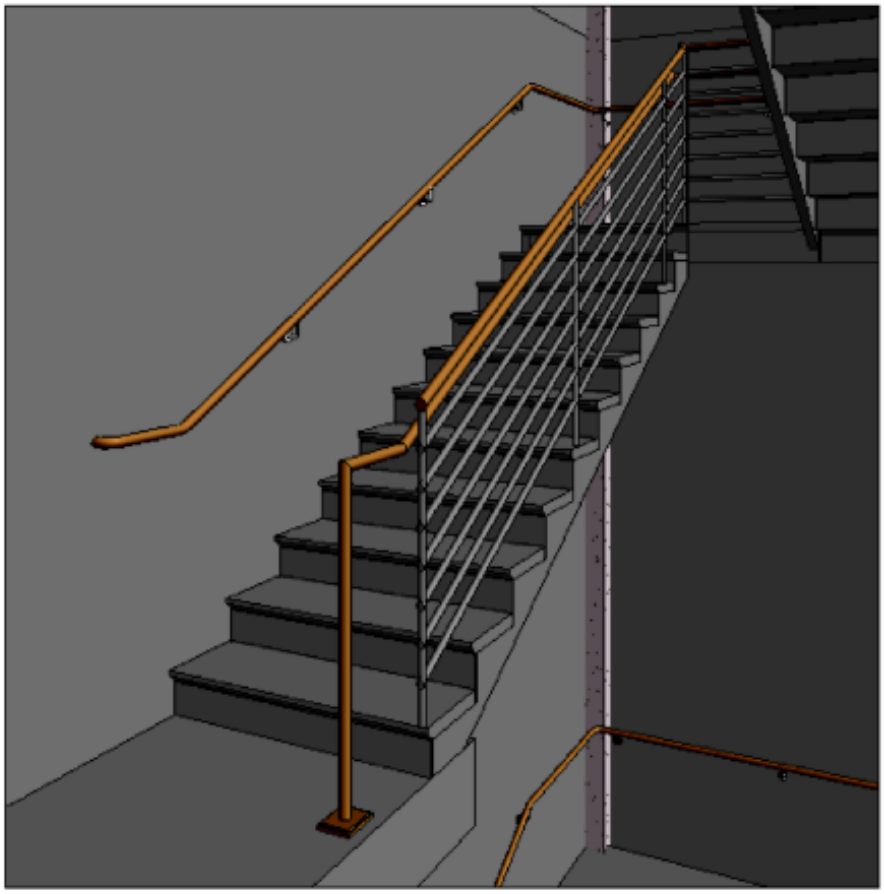


Figure 12–40

17. Open one of the other upper floor plans, as shown for Floor 5 in Figure 12–41. The stairs are in place and the guardrail handrail is modified at both ends.

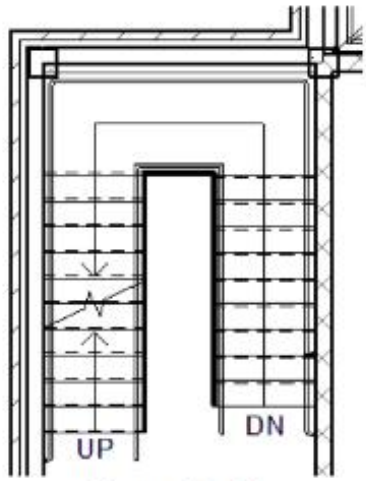


Figure 12–41

18. Open a different upper floor view. The changes to the handrails display because it is part of the multi-story stair system.

19. You can also use the **Railing** command to add a guardrail at the floor openings on the stairs.

20. Save the project.

Task 2 - Add stand-alone railings.

1. Open the **Floor Plans: Floor 2** view and pan and zoom over to the interior balcony (walkway line) as required.

2. In the *Architecture* tab>Circulation panel, expand (Railing) and click (Sketch Path).

3. In the Type Selector, select **Railing: Hotel Balcony Guardrail**.

4. Draw a sketch line that is **75mm** from the edge of the balcony floor over the lobby of the hotel, as shown in Figure 12–42. Ensure that you include the curved portion at the far end.

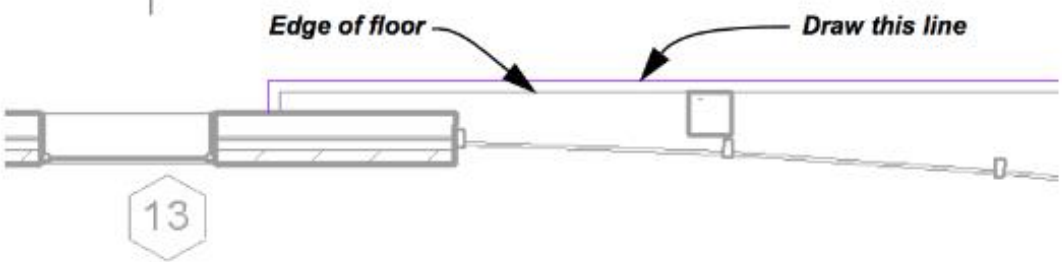


Figure 12–42

5. Click (Finish Edit Mode).
6. Zoom in on one of the outdoor balconies on the back of the building.
7. Add balcony railings, as shown in the sketch in Figure 12–43, using the same parameters as the inside balcony railing.

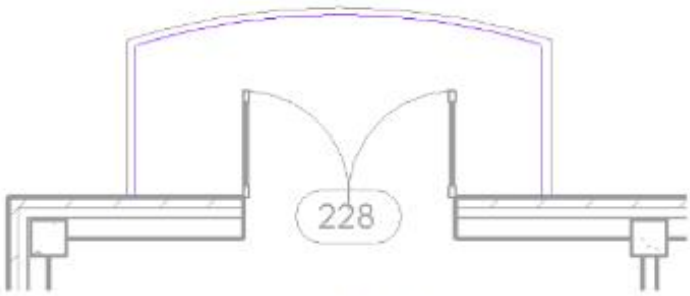


Figure 12–43

8. Click (Finish Edit Mode).
9. Copy the completed railing to the other balconies.
10. Copy all of the railings, inside and out, to the other floors.
11. Open an exterior 3D view and verify the placement of all of the railings.
12. Save the project.

Practice 12c

Sketch Custom Stairs and Ramps

Estimated time for completion: 15 minutes

Practice Objectives

- Create a custom stair using boundaries and risers.
- Add a ramp.

In this practice you will sketch a custom entrance stair and create a sketched ramp with railings, as shown in Figure 12–53.

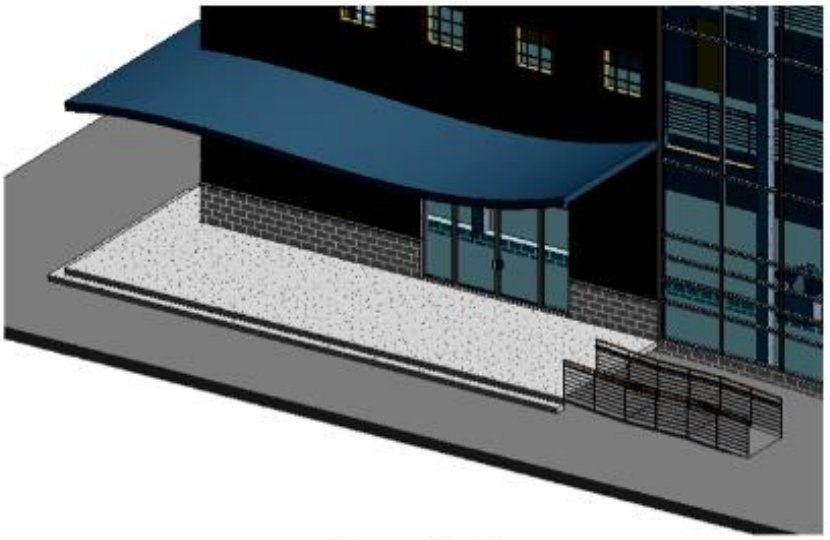


Figure 12–53

Task 1 - Create a custom entrance stair.

1. Open the project **Modern-Hotel-Ramp-M.rvt**.
2. Open the **Floor Plans: Floor 1** view.
3. Hide the gridlines and annotations by selecting one of each and type the shortcut **VH**.
4. Set the *Underlay* to **Floor 2**. This displays the outline of the entrance roof that you will use to create custom stairs.
5. In the *Architecture* tab>Circulation panel, expand (Stair), and click (Stair by Sketch).
6. In the Type Selector, select **Stair: Monolithic Stair - Hotel**.

7. In Properties, set the *Base Level* to **Floor 1,** with a *Base Offset* of (negative) **-300mm,** and set the *Top Level* to **Floor 1**, with a *Top Offset* of **0.0.**

8. In the *Modify | Create Stairs Sketch* tab>Tools panel, click (Railing). In the Railing dialog box, select **None** and click **OK**.

9. In the Draw panel, click (Boundary), and click (Pick Lines). Select the ends of the roof outline, as shown in Figure 12–54.

10. Click (Riser). Use the **Pick Lines** tool to select the other sides of the roof outline, including right up against the building.

11. With (Riser) still selected, use the **Pick Lines** tool and set the offset to **300mm**. Offset another set of risers outside the outline, as shown in Figure 12–54.

The sketch lines have been widened for emphasis.

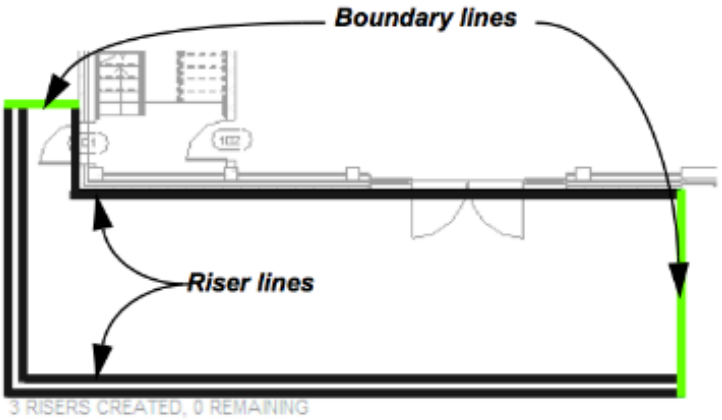


Figure 12–54

12. Use (Trim/Extend to Corner) to clean up the intersections.

13. Click (Finish Edit Mode) to complete the stair.

14. Verify that the stairs are in the right direction. If the arrow is not pointing the same direction as that shown in Figure 12–55, click the **Flip Stairs Up Direction** control, which might be located near the main door.

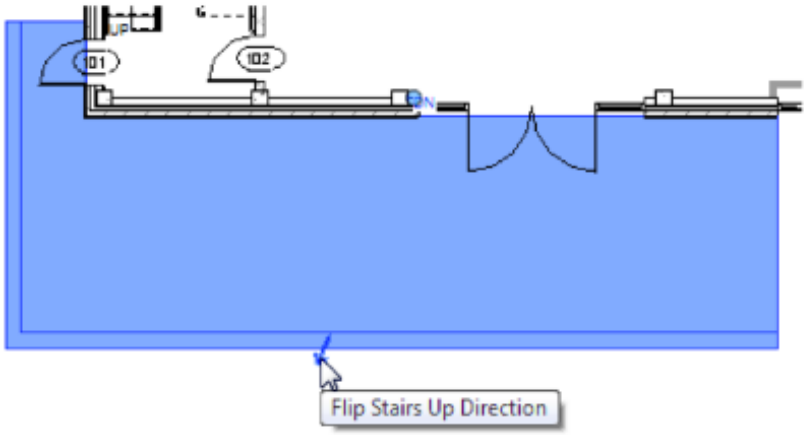


Figure 12–55

15. There is a DN annotation that you do not need. With the stair still selected, in Properties, in the *Graphics* section clear **Down label**.
16. Set the *Underlay* to **None**.
17. View the new stairs in 3D.
18. Save the project.

Task 2 - Adding a Ramp

1. Return to the **Floor Plans: Floor 1** view.
2. In the *Architecture* tab>Circulation panel, click (Ramp).
3. In the Type Selector, select **Ramp: Hotel Ramp**.
4. In Properties, set the *Base Level* to **Floor 1**, with a *Base Offset* of (negative) **-300mm**. Set the *Top Level* to **Floor 1**, with a *Top Offset* of **0.0**. Set the *Width* to **1800mm**.
5. In the *Modify | Create Ramp Sketch* tab>Tools panel, click (Railing), select the Railing type **Hotel Ramp Guardrail**, and click **OK**.

6. In the Work Plane panel, click (Ref Plane).
7. Draw the reference planes shown in Figure 12–56.

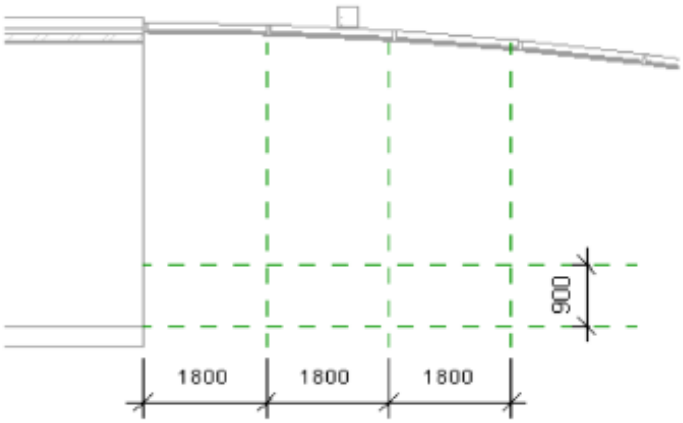


Figure 12–56

8. Click (Modify) to return to the *Modify | Create Ramp Sketch* tab in the ribbon.
9. In the Draw panel, click (Run). Start the run as shown in Figure 12–57. Use the reference plane intersections to end the first run, and then draw the second run.

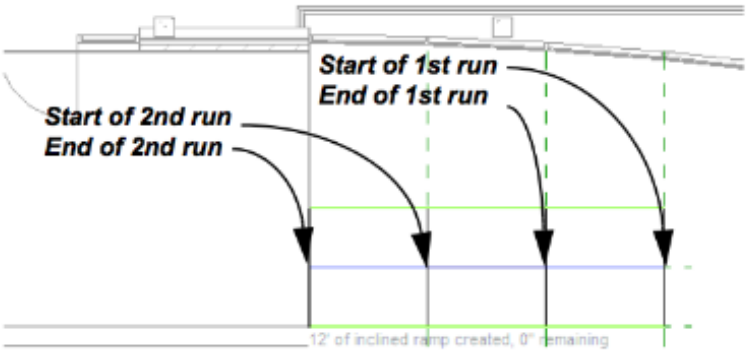


Figure 12–57

10. Click (Finish Edit Mode).
11. The Railings need to be moved so that they are fixed on the ramp. Select both of the railings and in Properties, change the *Tread/Stringer Offset* to (negative) **-50mm**.

12. Open the 3D View and check that the ramp displays as shown in Figure 12–58.

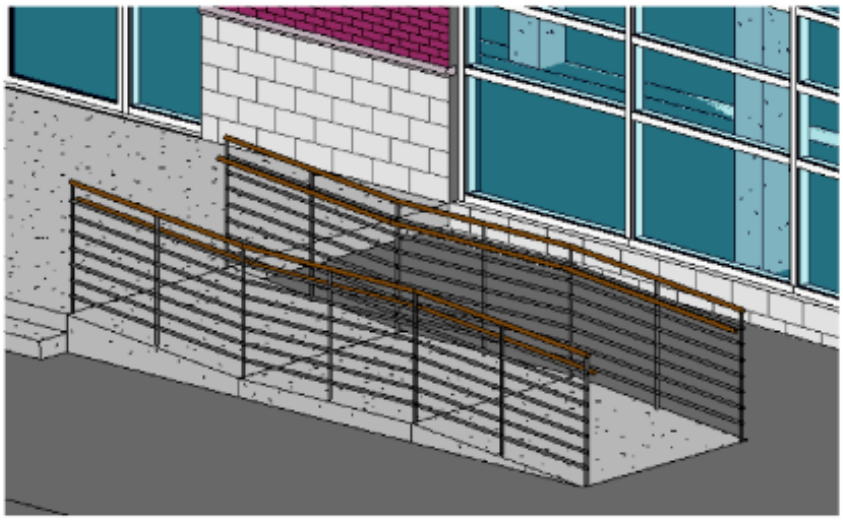


Figure 12–58

13. Zoom out and save the project.

Command Summary

Button	Command	Location
	**Boundary (Stairs by Sketch)**	• **Ribbon:** *Modify | Create Stairs Sketch* tab> Draw panel
	**Convert to sketch-based**	• **Ribbon:** *Modify | Create Stair* tab> Tools panel
	**Edit Path (Railings)**	• **Ribbon:** *Modify | Railings* tab>Mode panel
	**Edit Sketch**	• **Ribbon:** *Modify | Create Stair* tab> Tools panel
	**Edit Stairs**	• **Ribbon:** *Modify | Stairs* tab>Edit panel
	**Flip**	• **Ribbon:** *Modify | Create Stair* tab> Tools panel
	**Landing (Stair by Component)**	• **Ribbon:** *Modify | Create Stair* tab> Components panel
	**Pick New Host**	• **Ribbon:** *Modify | Create Railing Path (Railings)* tab>Tools Panel
	**Railing**	• **Ribbon:** *Modify | Create Stair (Create Stairs Sketch) (Create Ramp)* tab> Tools panel
	**Railing>Place on Host**	• **Ribbon:** *Architecture* tab>Circulation panel>expand Railing
	**Railing>Sketch Path**	• **Ribbon:** *Architecture* tab>Circulation panel>expand Railing
	**Riser (Stairs by Sketch)**	• **Ribbon:** *Modify | Create Stairs Sketch* tab>Draw panel
	**Run (Stair by Component)**	• **Ribbon:** *Modify | Create Stair* tab> Components panel
	**Run (Stairs by Sketch)**	• **Ribbon:** *Modify | Create Stairs Sketch* tab> Draw panel
	**Stair by Component**	• **Ribbon:** *Architecture* tab>Circulation panel>expand Stair
	**Stair by Sketch**	• **Ribbon:** *Architecture* tab>Circulation panel>expand Stair
	**Support (Stair by Component)**	• **Ribbon:** *Modify | Create Stair* tab> Components panel

Practice 13a

Create Construction Documents

Estimated time for completion: 20 minutes

Practice Objectives

- Set up project properties.
- Create sheets individually and use placeholder sheets.
- Modify views to prepare them to be placed on sheets.
- Place views on sheets.

In this practice you will complete the project information, add new sheets and use placeholder sheets to add sheets to the project. You will fill in title block information. You will then add views to sheets, such as the Wall Sections sheet shown in Figure 13–15. Complete as many sheets as you have time for.

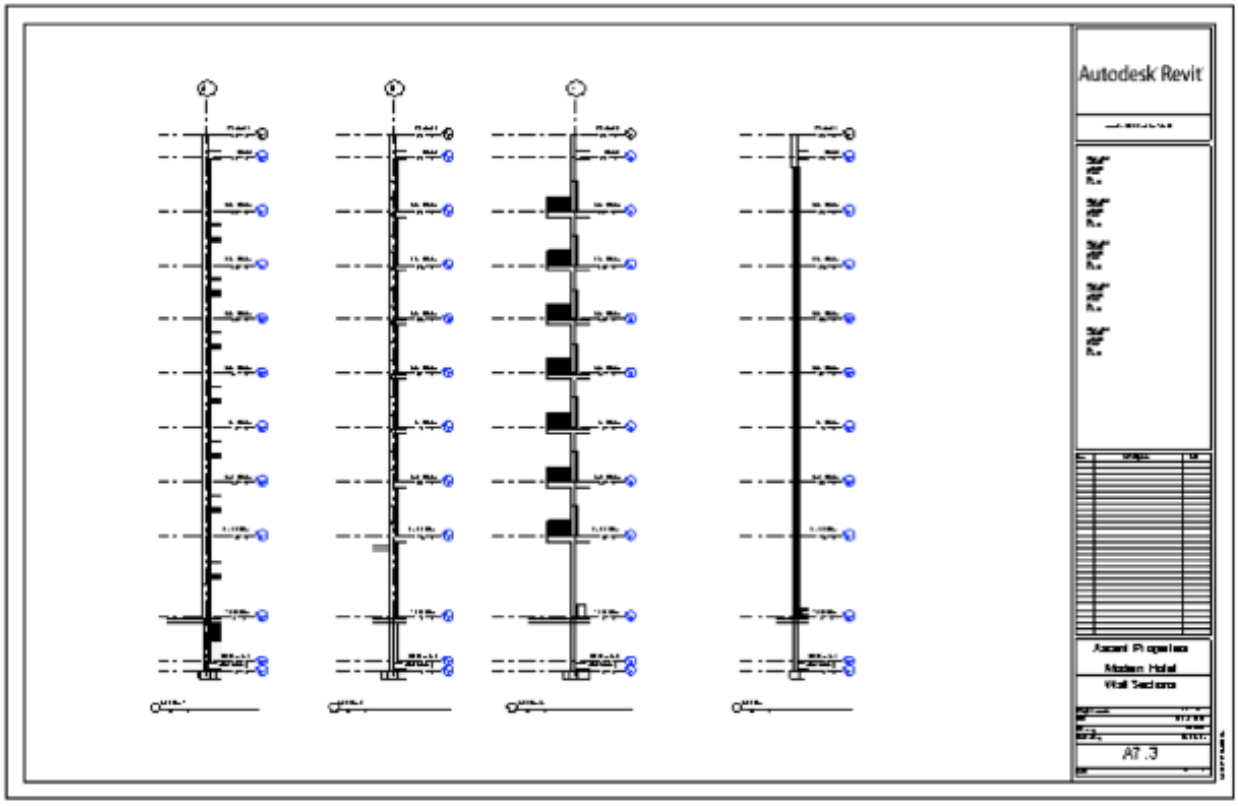


Figure 13–15

Task 1 - Complete the project information.

1. Open the project **Modern-Hotel-Sheets-M.rvt**. This file contains some additional elements that are required for the practice.

2. In the *Manage* tab>Settings panel, click (Project Information).

3. In the Project Properties dialog box, in the *Other* area, set the following parameters:

   These properties are used across the entire sheet set and do not need to be entered on each sheet.

   - Project Issue Date: **Issue Date**
   - Project Status: **Design Development**
   - Client Name: **Ascent Properties**
   - Project Address: Click **Edit...** and enter your address
   - Project Name: **Modern Hotel**
   - Project Number: **1234-567**

4. Click **OK**.

5. Save the project.

Task 2 - Create sheets.

1. In the *View* tab>Sheet Composition panel, click (Sheet).

2. In the New Sheet dialog box click **Load...**.

3. In the Load Family dialog box, navigate to the *Titlesblocks* folder and select **A1 metric**. Click **Open**.

4. In the *Select placeholder sheets:* area, **New** is selected by default. Click **OK**.

5. Zoom in on the lower right corner of the title block. The Project Properties filled out earlier are automatically added to the sheet.

6. Continue filling out the title block, as shown in Figure 13–16. Changing the sheet number and sheet name also changes the name in the Project Browser. Certain labels can be entered on a per sheet basis, such as the *Sheet Name*, *Sheet Number*, *Drawn by*, and *Checked by*. Leave the *Issue Date* as is.

*The Scale is automatically entered when a view is inserted onto a sheet. If a sheet has multiple views with different scales, the scale displays **As Indicated**.*

Figure 13–16

7. In the Sheet Composition panel, click (Sheet). Using the D-sized title block, create the following new sheets:
   - A2.1 - 1st Floor Plan Overall
   - A2.2 - 1st Floor Plan
   - A2.3 - 2nd-8th Floor Plan (Typical)
8. Click (Sheet). This time, in the *Select placeholder sheets:* area, select one of the placeholder sheets and click **OK**.
9. In the Project Browser, expand *Sheets (all)*. Note that the selected placeholder sheet and the other sheets that you created are displayed.
10. Click (Sheet) again. Select all of the other placeholder sheets (use <Ctrl> or <Shift> to select multiple sheets) and click **OK**.

The rest of the sheets are placed in the project, as shown in Figure 13–17.

Having typical placeholder sheets created in the company template is a timesaver. Another option is having the sheets already in the template project.

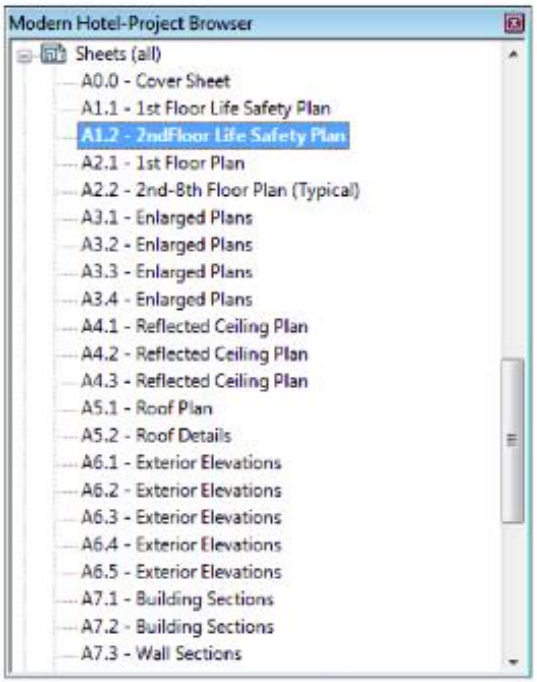


Figure 13–17

Task 3 - Set up and add views to sheets.

1. Duplicate (no detailing) the **Floor Plans: Floor 1** and **Floor 2** views and name them **1st Floor-Life Safety Plan** and **2nd-8th Floor-Life Safety Plan**.
2. Open the new views and do the following:
   - Hide all elements except the actual building elements.
   - Turn on the crop region and ensure it is tight up against the building.
   - Turn the crop region off.

The crop region defines the extent of the view on the sheet.

3. Open the appropriate sheet and drag and drop the corresponding Life Safety Plans onto it.
4. Rename sheet **2nd Floor Life Safety Plan** as **2nd-8th Floor Life Safety Plan**.
5. Repeat the process of adding views to sheets using the views you have available.

- Modify crop regions and hide unnecessary elements in the views, as shown in Figure 13–18. Turn off crop regions after you have modified them.

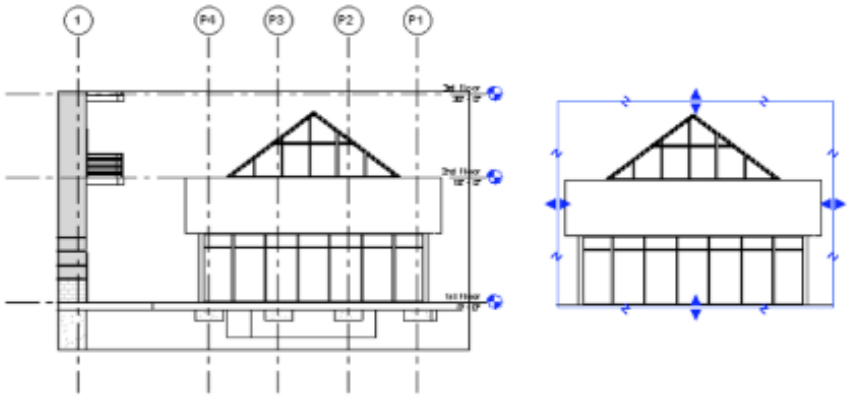


Figure 13–18

- Verify the scale of a view in Properties before placing it on a sheet.
- Use alignment lines to help place multiple views on one sheet, as shown in Figure 13–19.

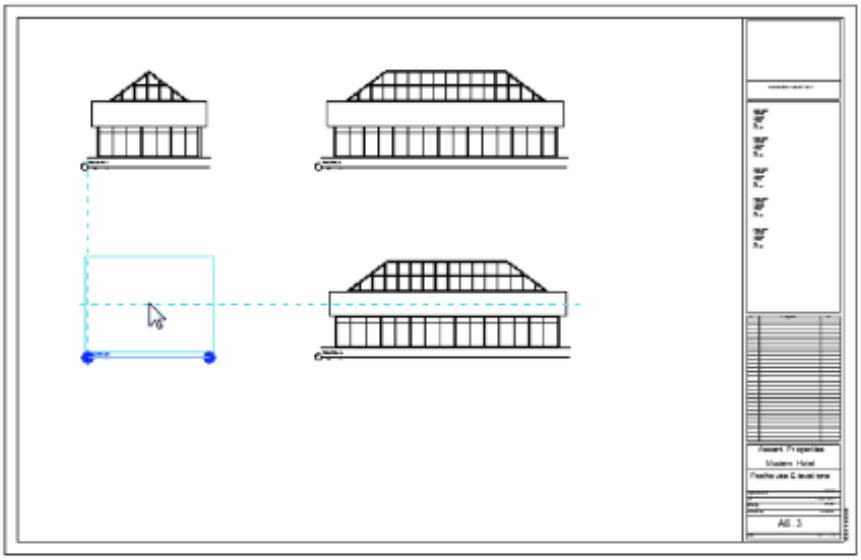


Figure 13–19

- Change the view title, if required, to more accurately describe what is on the sheet.
- To make minor changes to a view once it is on a sheet, double-click inside the viewport to activate the view. To return to the sheet, double-click outside the viewport to deactivate the view.

6. Once you have added callout, section, or elevation views to sheets, switch back to the **Floor Plans: Floor 1** view. Zoom in on one of the markers. Note that it has now been automatically assigned a detail and sheet number, as shown in Figure 13–20.

Your numbers might not exactly match the numbers in the example.

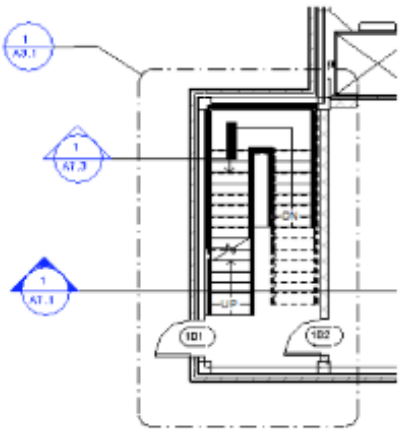


Figure 13–20

7. Save the project.

Command Summary

Button	Command	Location
	**Activate View**	• **Ribbon:** (*select the view*) *Modify | Viewports* tab>Viewport panel • **Double-click:** *(in viewport)* • **Right-click:** (*on view*) Activate View
	**Deactivate View**	• **Ribbon:** *View* tab>Sheet Composition panel>expand Viewports • **Double-click:** *(on sheet)* • **Right-click:** (*on view*) Deactivate View
	**Guide Grid**	• **Ribbon:** *View* tab>Sheet Composition panel • **Properties:** (*when a sheet is selected*)
	**Place View**	• **Ribbon:** *View* tab>Sheet Composition panel
	**Sheet**	• **Ribbon:** *View* tab>Sheet Composition panel

Practice 14a

Add Dimensions

Estimated time for completion: 10 minutes

Practice Objectives

- Add a string of dimensions.
- Dimension using the **Entire Walls** option.
- Edit the witness lines of dimensions.

In this practice you will add dimensions using several different methods to a floor plan view, as shown on the sheet in Figure 14–14. You will also modify the dimensions so that they show what you are expecting. Note that some additional elements including storefront curtain walls and windows have been added at the back of the building.

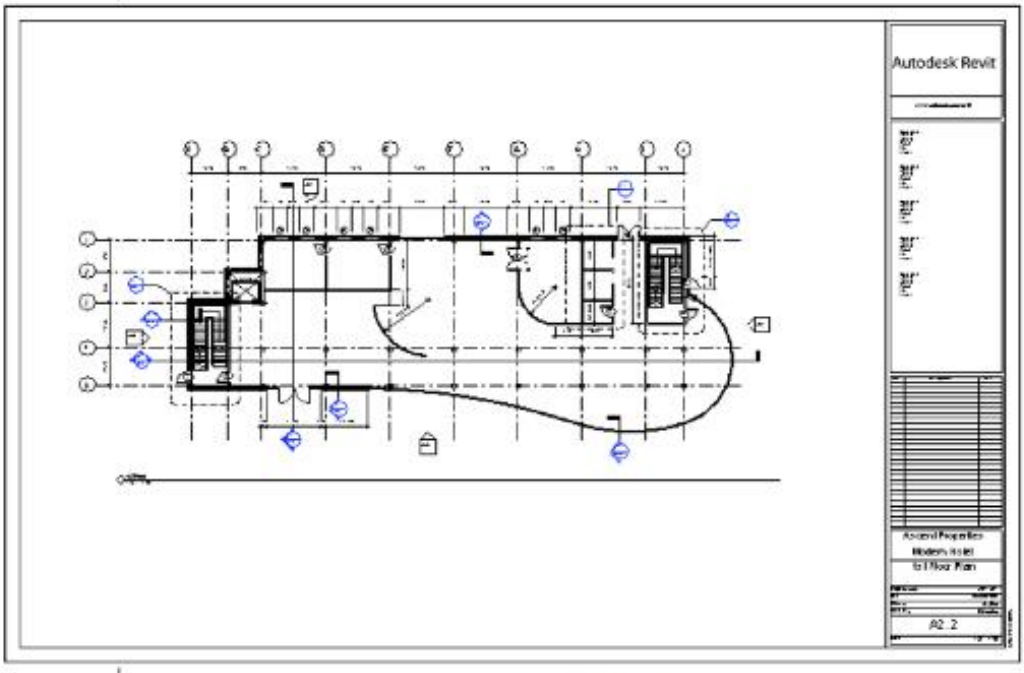


Figure 14–14

Task 1 - Add dimensions to the column grid.

1. Open the project **Modern-Hotel-Dimensions-M.rvt**.
2. In the Project Browser, duplicate the **Floor Plans: Floor 1** view (without detailing so that the door and window tags do not display),
3. Rename the new view to **Floor 1-Dimensioned Plan**.

4. Move the location of the grid bubbles so that there is enough room for dimensioning.

5. In the Quick Access Toolbar, click (Aligned).

6. Dimension the column grid lines in each direction, as shown in Figure 14–15.

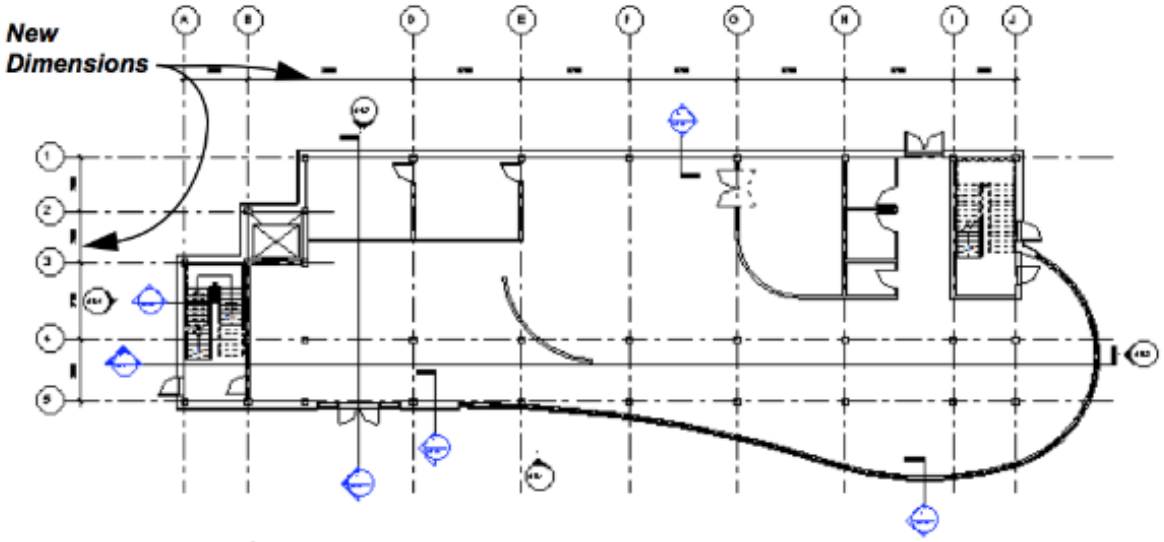


Figure 14–15

Task 2 - Dimension the exterior and interior walls.

1. Click (Aligned).

2. In the Options Bar, select **Wall faces** and set *Pick* to **Entire Walls**.

3. Click **Options** and set the *Openings* to **Widths** (as shown in Figure 14–16). Click **OK**.

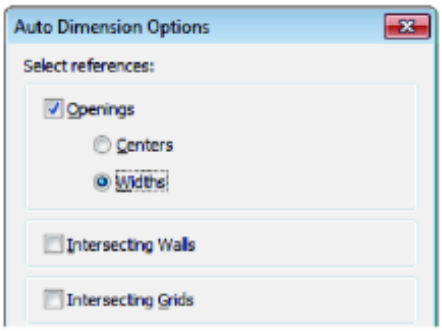


Figure 14–16

4. Select the back wall and place the dimension above it.
5. Zoom in on the upper left corner of the building. Use the **Move Witness Line** control to relocate the line from the end of the wall (as shown in Figure 14–17), to Grid Line C, the closest grid line on the right that passes through the corner column.

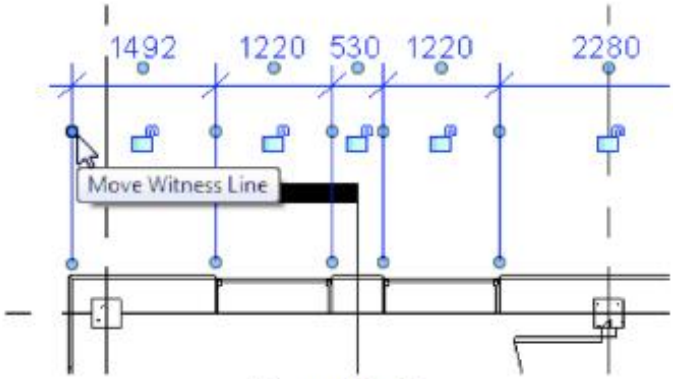


Figure 14–17

6. Click (Modify)
7. In the same wall, pan over to the right between Grid Lines E, F, and G where the storefront openings are displayed. These were not dimensioned automatically.
8. Select the wall dimension line. In the *Modify | Dimensions* tab> Witness Lines panel, click (Edit Witness Lines).
9. Select the outside edges of each side of the storefront openings to add the witness lines and then click in empty space to apply the changes. The modified dimension string displays as shown in Figure 14–18.

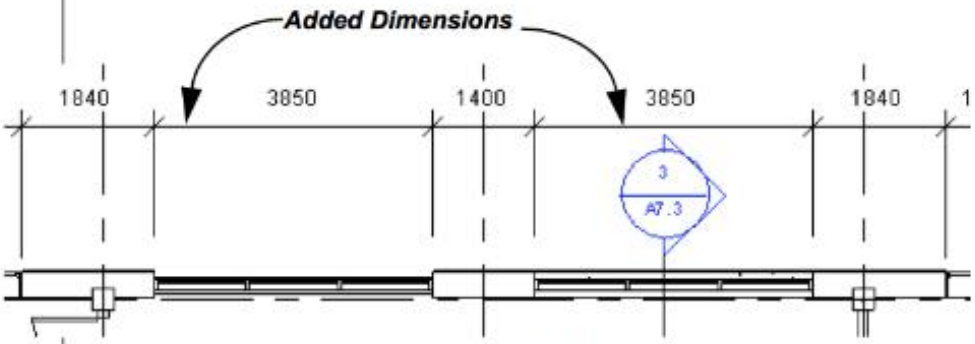


Figure 14–18

10. Move the elevation and section markers as well as the dimension line to keep the dimensions clear. You might also want to move the dimension text away from the grid lines.

11. Use the various dimensioning commands and methods to dimension the interior spaces, as shown in Figure 14–19. (Hint: don't forget to change from **Pick: Entire Walls** to **Pick: Individual References**.) The dimensions might not be exactly as shown.

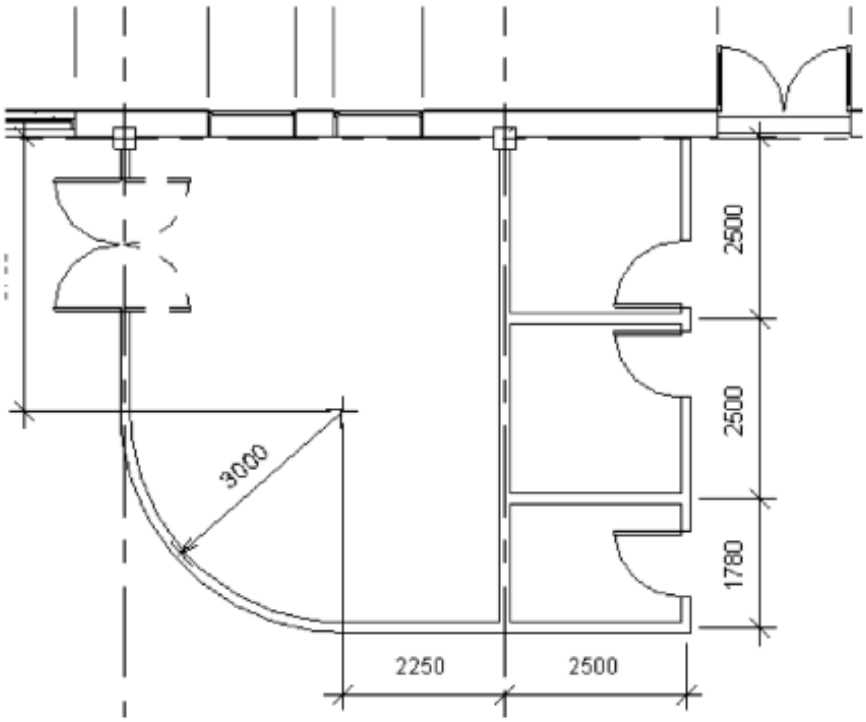


Figure 14–19

12. Save the project.

13. If time permits, dimension the **Floor Plans: Typical Guest Room - Dimension Plan** view. Make adjustments as required to the locations of the walls and doors.

Practice 14b

Annotate Construction Documents

Estimated time for completion: 30 minutes

Practice Objectives

- Add detail lines and symbols.
- Add text.

In this practice you will create a Life Safety Plan. You will use detail lines and symbols to show safety diagonals and travel distances, and add text for labels and notes, as shown in Figure 14–36.

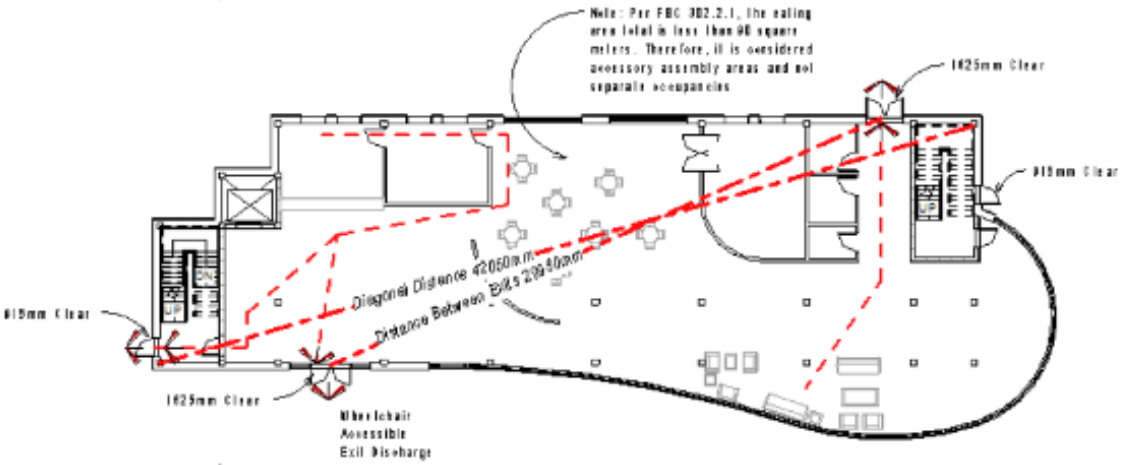


Figure 14–36

Task 1 - Create a Life Safety Plan (lines and symbols).

1. Open the project **Modern-Hotel-Annotations-M.rvt**.
2. Open the **Floor Plans: 1st Floor Life Safety Plan** view.
3. In the View Control Bar or in Properties, change the *View Scale* to **1:200**.
4. Type **VV** (or **VG**) to open the Visibility/Graphic Overrides dialog box.
5. In the *Model Categories* tab, select **Casework**, **Furniture**, and **Furniture Systems** to toggle them on. Select the **Halftone** option for each of these items as well.
6. Click **OK** to close the dialog box.
7. In the *Annotate* tab>Detail panel, click (Detail Line).

8. In the *Modify | Place Detail Lines* tab>Line Style panel, set the *Line Style:* to **Life Safety Diagonal**.
9. In the Options Bar, clear the **Chain** option.
10. Draw a diagonal line from the lower left corner of the building to the upper right corner of the building, and another diagonal line from exit to exit, as shown in Figure 14–37.

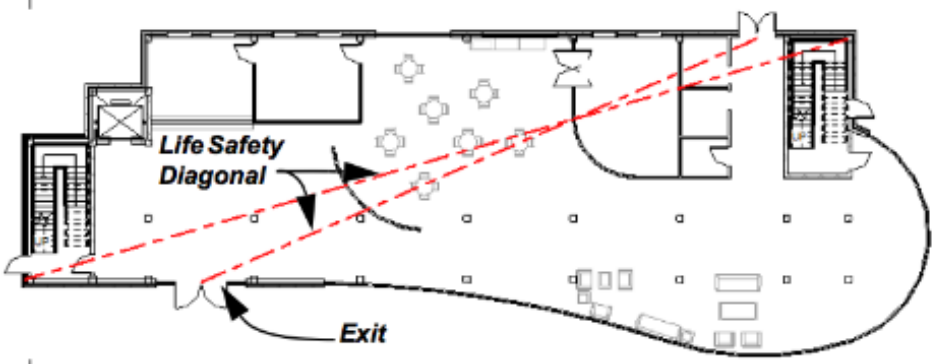


Figure 14–37

11. In the Options Bar, select the **Chain** option.
12. Using the **Life Safety Travel Distance** line type, draw the detail lines shown in Figure 14–38.

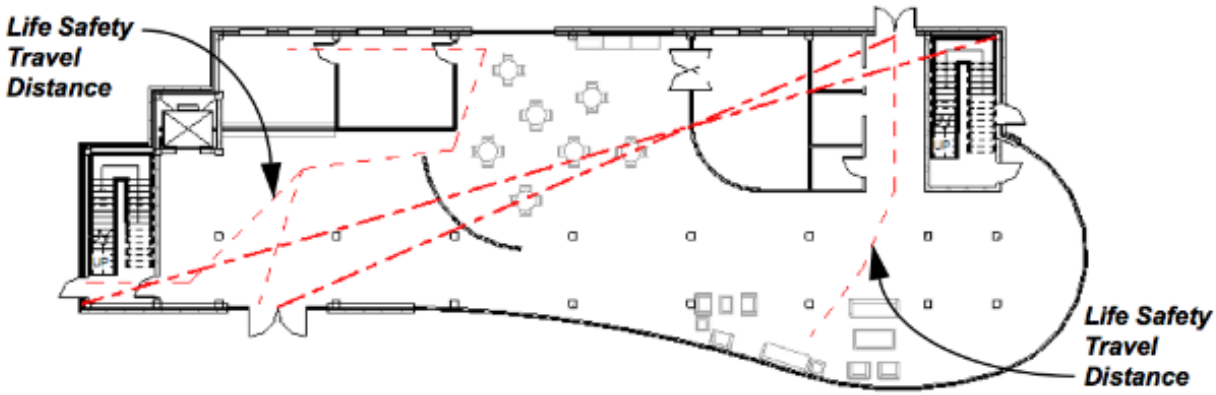


Figure 14–38

13. Zoom in on the front entrance.
14. In the *Annotate* tab>Symbol panel, click (Symbol).
15. In the *Modify | Place Symbol* tab>Mode panel, click (Load Family).
16. In the *Practice Library* folder of your practice folder, select the **Life-Safety-Line-Arrowhead.rfa** symbol and click **Open**.

Press <Spacebar> to rotate the symbol as it is placed. Highlight the end point of the line to rotate to a specific angle.

17. Insert an arrowhead at the end of each travel line and outside the door, as shown in Figure 14–39. Rotate them as required.

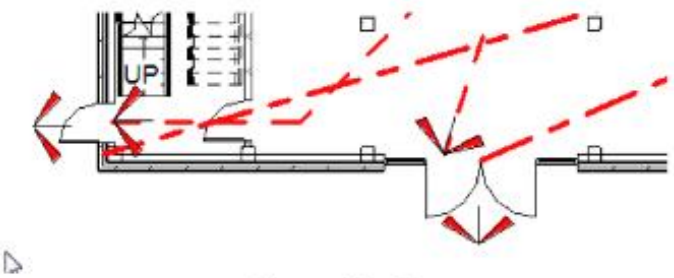


Figure 14–39

18. Add arrows to the ends of the other travel lines, pointing the travel direction toward the doors.

Task 2 - Create a Life Safety Plan (text).

1. In the *Annotate* tab>Text panel, click A (Text).

2. Create two new text types. In Properties, click (Edit Type). In the Type Properties dialog box, click **Duplicate**. For the first new text type, enter **3mm Arial Narrow** as the name and click **OK**.

3. Set the following properties:

   - Text Font: **Arial**
   - Text Size: **3mm**
   - Width Factor: **0.9**

4. Click **OK** to save the settings and close the dialog box.

5. Click (Edit Type) again to open the Type Properties dialog box. Click **Duplicate** and create another text type named **3mm Arial Narrow Italic**.

6. Select the **Italic** option and click **OK**.

7. Zoom in on the front entrance and add text using the **3mm Arial Narrow** text type, as shown in Figure 14–40. Adjust the Annotation Crop Region as necessary to place the text. Add similar notes for the door sizes at the other exits.

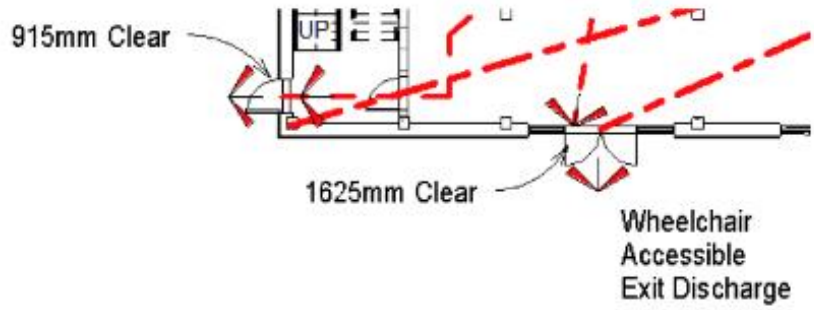


Figure 14–40

8. Add a note to the breakfast room, as shown in Figure 14–41.

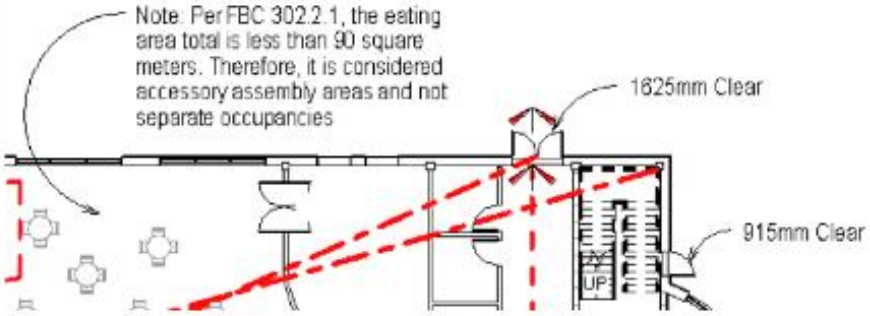


Figure 14–41

9. Using the **3mm Narrow Italic** text type, add text to each diagonal distance line, as shown in Figure 14–42. Enter the text first and then click in empty space to exit the text box.

   - Use the (Move) control at the start of the line of text and the (Rotate) control at the other end of the text line to get the text on top of the appropriate diagonal line. The text automatically masks the line.

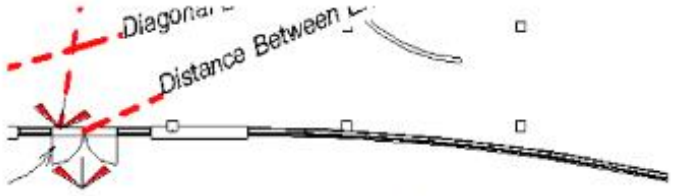


Figure 14–42

10. Save the project.

Practice 14c

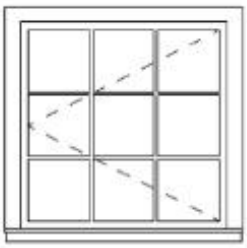
Estimated time for completion: 10 minutes

Create Legends

Practice Objective

- Create legends using legend components and text.

In this practice you will create door and window legends (as shown in Figure 14–47), by creating legend views, adding legend components, and labeling the door and window types with text.



13

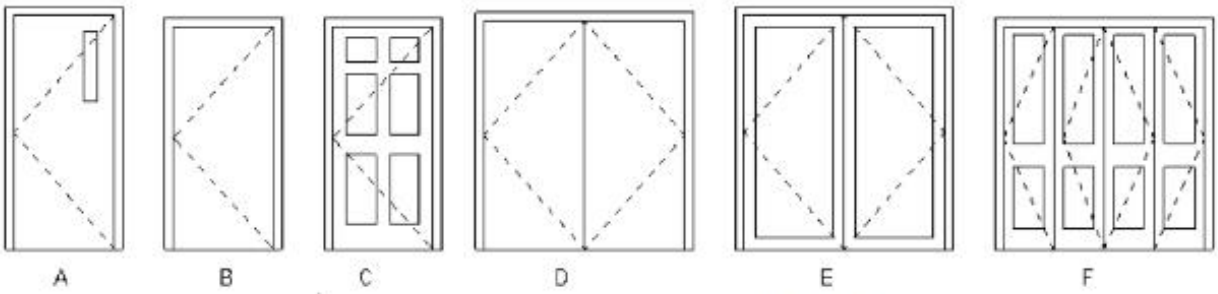


Figure 14–47

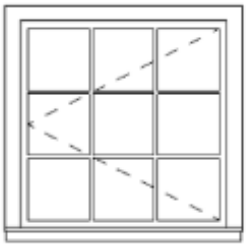
Task 1 - Add window and door legends.

1. Open the project **Modern-Hotel-Legends-M.rvt**.
2. In the *View* tab>Create panel, expand (Legends) and click (Legend) to create a new Legend view.
3. Name it **Window Elevations** and set the *Scale* to **1:50**.
4. In the *Annotate* tab>Detail panel, expand (Component) and click (Legend Component).

5. In the Options Bar, set *Family* to **Windows : Casement 3 x 3 with Trim: 1220x1220mm** and *View* to **Elevation: Front**. Place the component in the view. The window displays, as shown in Figure 14–48.

6. In the *Annotate* tab>Text panel, click A (Text).

7. In the Type Selector, select **Text: 3mm Arial Narrow** and add the window number 13 under the window, as shown in Figure 14–48.



13

Figure 14–48

8. Create another Legend view. Name it **Door Elevations** and set the *Scale* to **1:50**.

9. In the Legend view, click (Legend Component) and add the elevations of the doors used in the project.

10. Label the doors as shown in Figure 14–49.

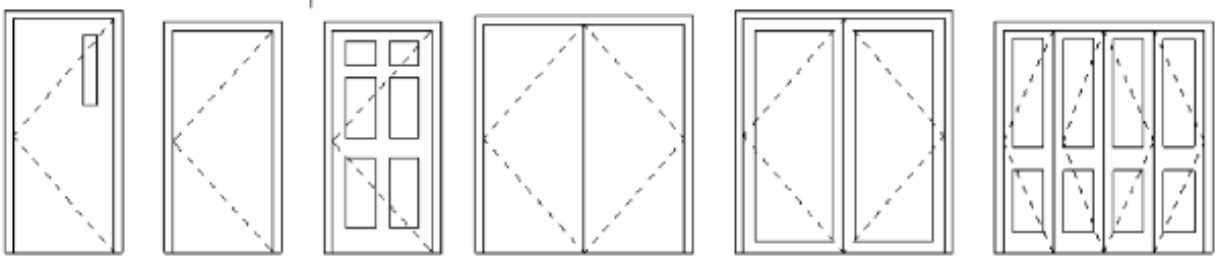


Figure 14–49

11. Save the project.

Command Summary

Button	Command	Location
Dimensions and Text		
	**Aligned (Dimension)**	• **Ribbon:** *Annotate* tab>Dimension panel or *Modify* tab>Measure panel, expanded drop-down list • **Quick Access Toolbar** • **Shortcut:** DI
	**Angular (Dimension)**	• **Ribbon:** *Annotate* tab>Dimension panel or *Modify* tab>Measure panel, expanded drop-down list
	**Arc Length (Dimension)**	• **Ribbon:** *Annotate* tab>Dimension panel or *Modify* tab>Measure panel, expanded drop-down list
	**Diameter (Dimension)**	• **Ribbon:** *Annotate* tab> Dimension panel or *Modify* tab>Measure panel, expanded drop-down list
	**Linear (Dimension)**	• **Ribbon:** *Annotate* tab>Dimension panel or *Modify* tab>Measure panel, expanded drop-down list
	**Radial (Dimension)**	• **Ribbon:** *Annotate* tab>Dimension panel or *Modify* tab>Measure panel, expanded drop-down list
	**Text**	• **Ribbon:** *Annotate* tab>Text panel • **Shortcut:** TX
Detail Lines and Symbols		
	**Beam System Symbol**	• **Ribbon:** *Annotate* tab>Symbol panel
	**Detail Line**	• **Ribbon:** *Annotate* tab>Detail panel • **Shortcut:** DL
	**Span Direction Symbol**	• **Ribbon:** *Annotate* tab>Symbol panel
	**Stair Path**	• **Ribbon:** *Annotate* tab>Symbol panel
	**Symbol**	• **Ribbon:** *Annotate* tab>Symbol panel
Legends		
	**Legend (View)**	• **Ribbon:** *View* tab>Create panel> expand Legends
	**Legend Component**	• **Ribbon:** *Annotate* tab>Detail panel> expand Component

Practice 15a

Add Tags

Estimated time for completion: 10 minutes

Practice Objectives

- Add tags to a model.
- Use the Tag All Not Tagged dialog box.
- Set the Type Mark parameter for tags.

In this practice you will add wall tags in a floor plan and modify the Type Mark numbers for the walls. You will also tag all of the walls using the Tag All Not Tagged dialog box, as shown in Figure 15–14.

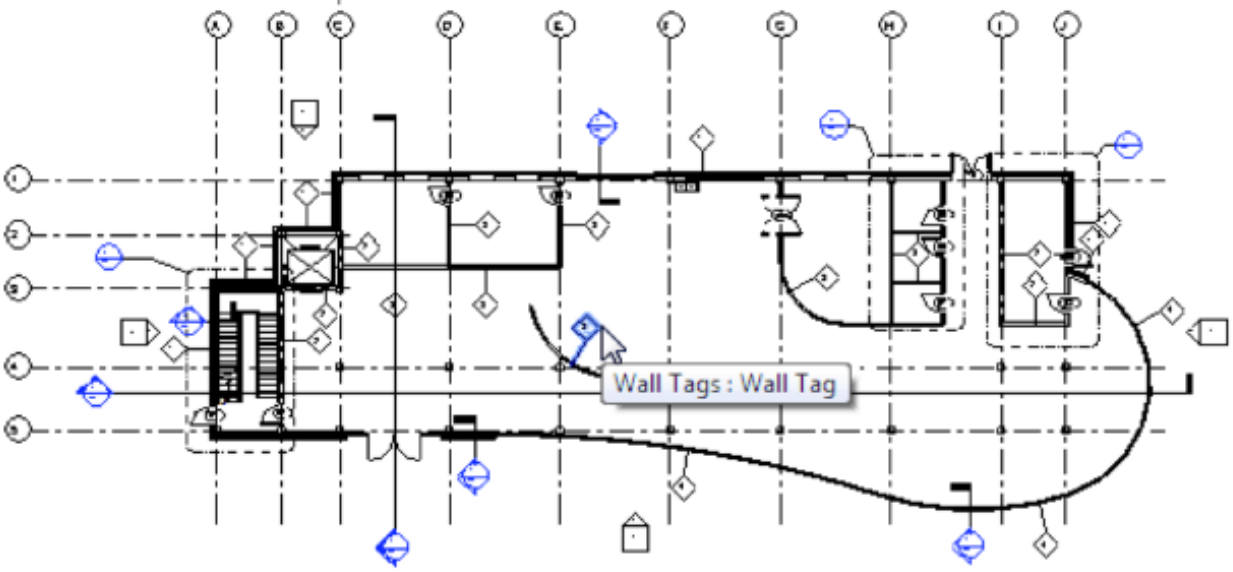


Figure 15–14

Task 1 - Add tags to a floor plan.

1. Open the project **Modern-Hotel-Tags-M.rvt**.
2. In the **Floor Plans: Floor 1** view, zoom into the elevator and stair area near the left side of the building.
3. In the *Annotate* tab>Tag panel, click (Tag by Category). In the Options Bar, select **Leader** and verify that the **Attached End** option is selected.

4. Select the exterior wall, as shown in Figure 15–15.

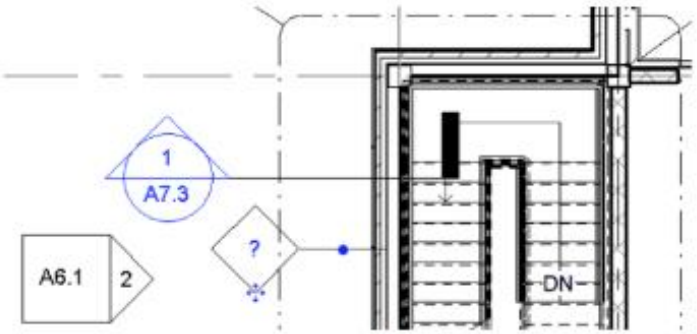


Figure 15–15

5. The tag comes in with a question mark because the wall does not have a *Type Mark* set yet. Click on the **?** in the tag and change the tag number to **1** and press <Enter>.

6. When alerted that you are changing a type parameter, click **Yes** to continue.

7. You are still in the **Tag** command. Add a tag to another exterior wall. This time, the tag number 1 comes in automatically as it is the same wall type as the first one.

8. Click (Modify).

9. Select the masonry wall dividing the stairs from the lobby.

10. In Properties, click (Edit Type).

11. In the Type Properties dialog box, in *Identity Data* area, set *Type Mark* to **2**, as shown in Figure 15–16. Click **OK**.

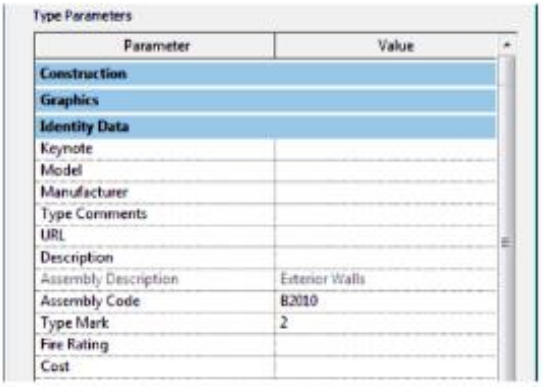


Figure 15–16

12. Select one of the interior partitions and set the *Type Mark* to **3**.

13. Use (Tag By Category) to tag one of each of the wall types. The Type Mark displays as set in the Type Properties.

14. Zoom out to display the entire floor plan.

15. Save the project.

Task 2 - Tag all the rest of the walls and modify tag locations.

1. In the *Annotate* tab>Tag panel, click (Tag All).

2. In the Tag All Not Tagged dialog box, set the *Wall Tags* category to the **12mm** tag type and select **Leader** as shown in Figure 15–17.

Figure 15–17

3. Click **OK** to add wall tags where they have not already been added.

4. Many of the tags overlap other annotation objects. Use the controls to move the tags and/or leaders to a more visible location, as shown in Figure 15–18.

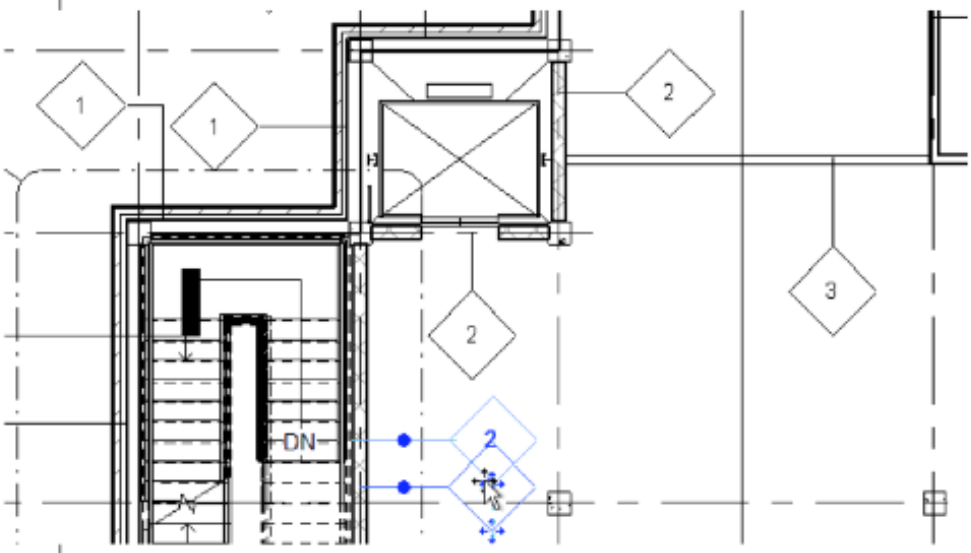


Figure 15–18

5. Update the tag for the main curtain wall to type number **4**.

6. Delete the wall tags that identify the storefront (inset) curtain walls along the back of the building and at the entrance. Delete any other wall tags you do not need to fully annotate the floor plan.

7. Save the project.

Practice 15b

Add Rooms and Room Tags

Estimated time for completion: 10 minutes

Practice Objectives

- Set up a view that displays rooms.
- Add rooms and room separation lines.
- Add room tags.

In this practice you will set up a view that displays rooms and add rooms to the model. You will then change the names and numbers of rooms using tags and Properties and add room separation lines to break up the larger open areas, as shown in Figure 15–25. You will also add room tags to a view where the room elements are not displayed.

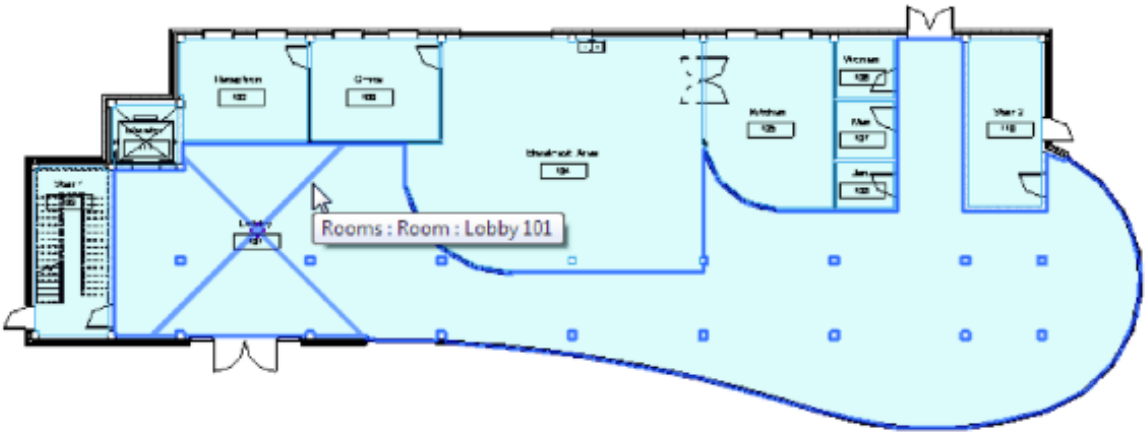


Figure 15–25

Task 1 - Set up a view that displays rooms.

1. Open the project **Modern-Hotel-Rooms-M.rvt**.
2. In the Project Browser, right-click on the **Floor Plans: Floor 1** view and select **Duplicate View>Duplicate**.
3. Rename the new view to **Floor 1 - Rooms**.
4. Hide the gridlines and all elevation and section markers.

5. Open the Visibility/Graphic Overrides dialog box. In the *Model Categories* tab, expand **Rooms,** and select **Interior Fill**, as shown in Figure 15–26.

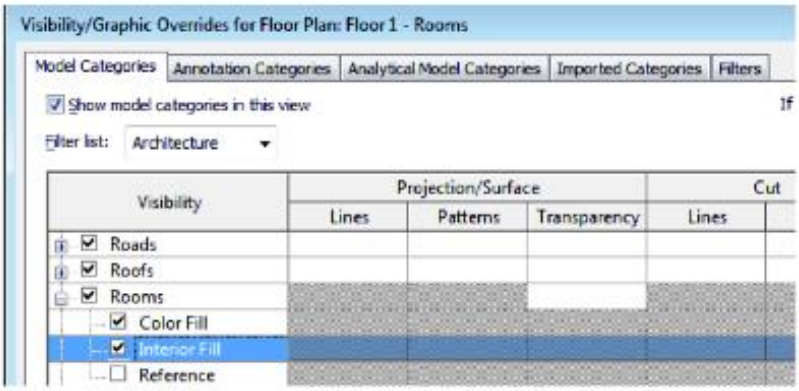


Figure 15–26

6. Nothing displays in the view as there are no rooms in the project.
7. Save the project.

Task 2 - Add rooms and room tags.

1. In the *Architecture* tab>Room & Area panel, click (Tag Room). Click inside the lobby area. You cannot place the room tag because a room element is not assigned to the area.
2. Click (Modify) to end the command.
3. In the *Architecture* tab>Room & Area panel, click (Room).
4. In the *Modify | Place Room* tab>Tag panel, verify that (Tag on Placement) is selected.
5. Place a room element inside the lobby area.

6. Return to the **Modify** command and change the name of the room and the room number, as shown in Figure 15–27. Click in empty space to finish the command.

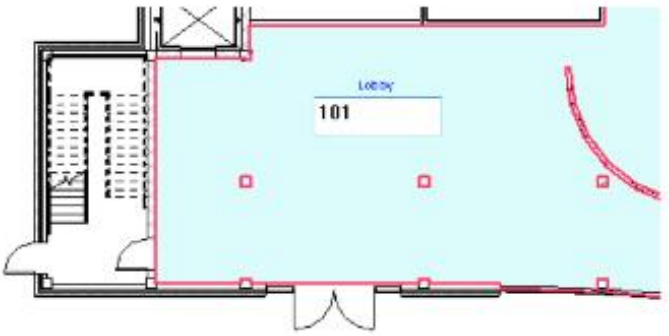


Figure 15–27

7. Click (Room) again. In the *Modify* I *Place Room* tab, toggle off the **Tag on Placement** option. Place the room element in the check in area (the small room next to the elevator) and finish the command. Select the room element.

8. In Properties, in the *Identity Data* area, note that the *Number* is automatically set to **102**. Set the *Name* as **Reception** (as shown in Figure 15–28) and click **Apply**.

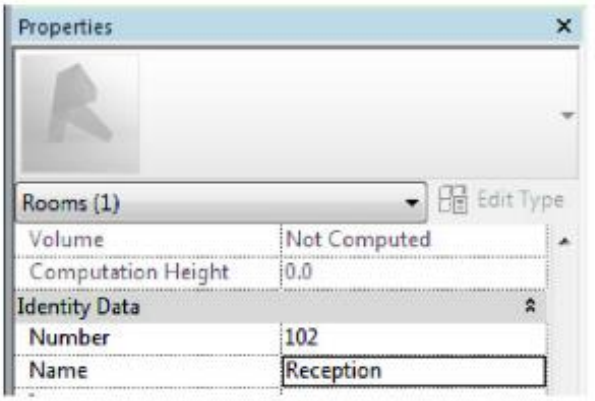


Figure 15–28

9. In the *Architecture* tab>Room & Area panel, click (Tag Room).

10. Tag the new room and press <Esc>. The tag is displayed with the name you specified in Properties, as shown in Figure 15–29.

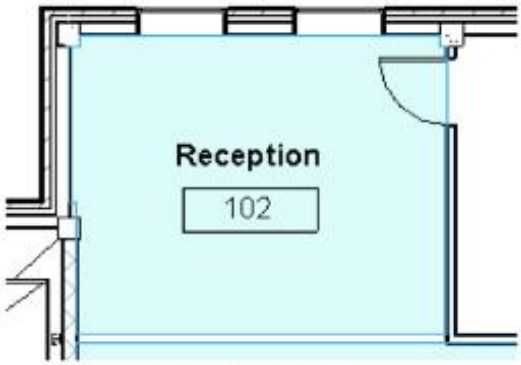


Figure 15–29

11. Add a room and tag in the room to the right of the Reception room and name it **Office**.

12. Save the project.

Task 3 - Add Room Separation Lines and additional rooms.

1. In the *Architecture* tab>Room & Area panel, click (Room Separator).

2. Draw room separation lines to separate the breakfast area from the main lobby as shown in Figure 15–30.

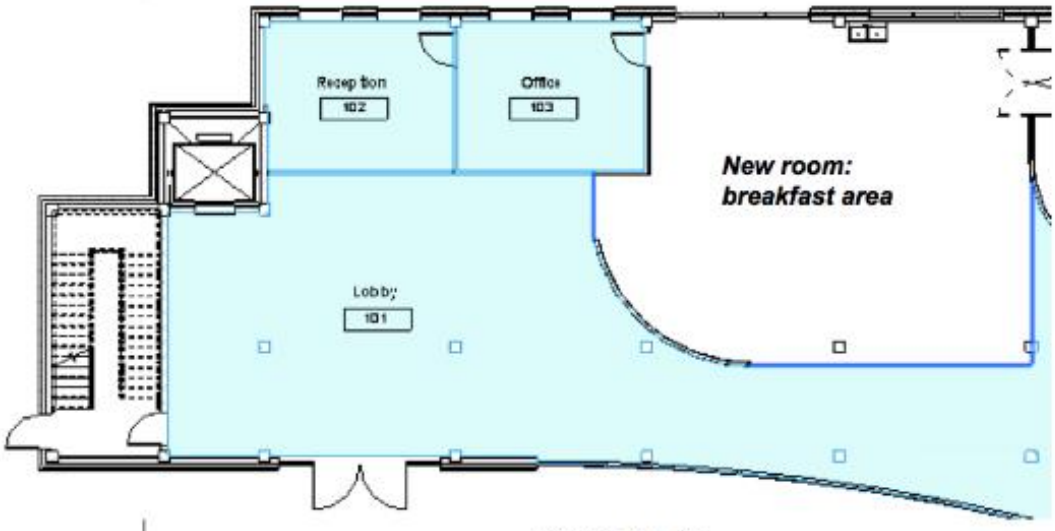


Figure 15–30

3. Start the **Room** command and verify that **Tag on Placement** is on. In Properties, in the *Name* field, type **Breakfast Area, and** then place the room in the location shown in Figure 15–30.

4. Continue to add room elements and room tags to the rest of the rooms on the first floor. Rename the rooms as required.

   - If a room tag is too large for the room, toggle on the **Leader** option and move the tag. If the **Leader** option is not toggled on, the tag is orphaned from the room.

5. Save the project.

Task 4 - Add Room Tags to another view.

1. Open the **Floor Plans: Floor 1** view.

2. Although you do not see the rooms in the view, you can roll the cursor over the rooms in the plan and select the room elements, as shown in Figure 15–31.

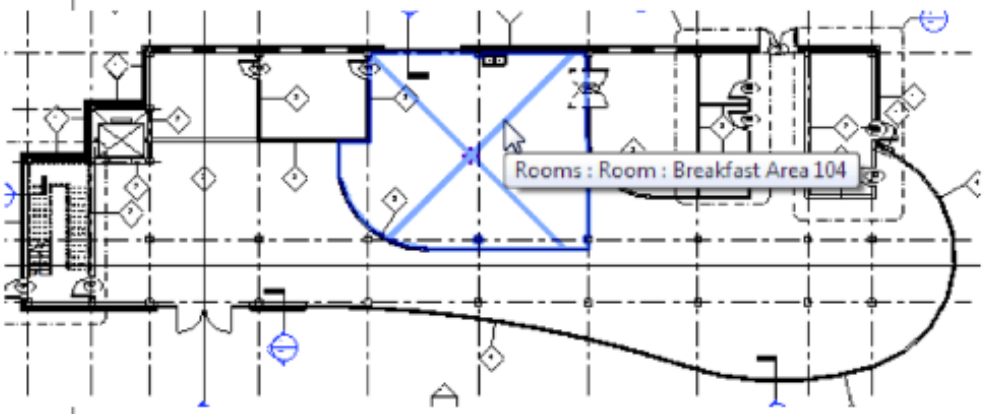


Figure 15–31

3. In the *Annotate* tab>Tag panel click (Tag All).

4. In the Tag All Not Tagged dialog box, select **Room Tags: Room Tag,** and click **OK**. Room tags are added to all of the rooms in the view.

5. Zoom in and clean up the view by moving the various tags so that they do not overlap, as shown in Figure 15–32.

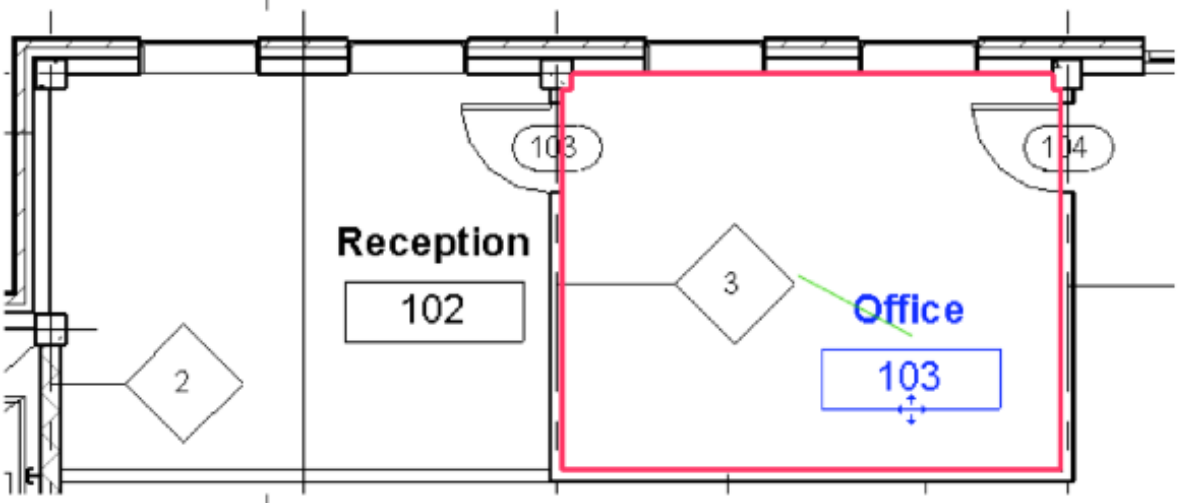


Figure 15–32

6. Save the project.

Practice 15c

Work with Schedules

Estimated time for completion:10 minutes

Practice Objectives

- Update schedule information.
- Add a schedule to a sheet.

In this practice you will add information to a door schedule and to elements that are connected to the schedule. You will then place the schedule on a sheet, as shown in Figure 15–40.

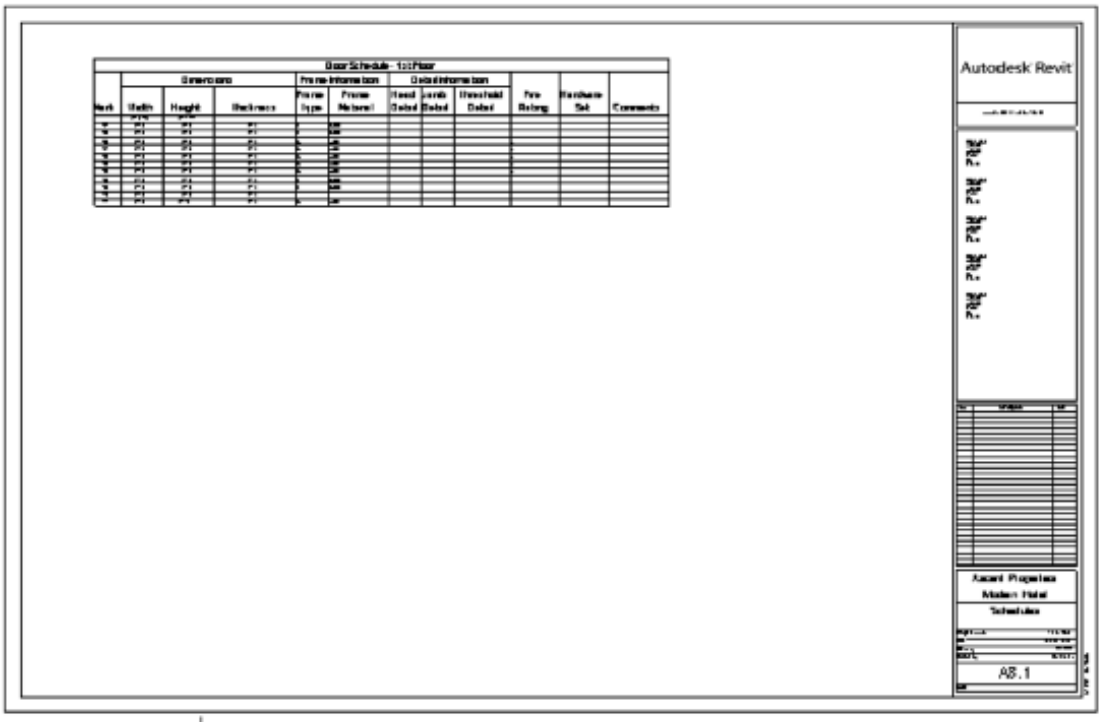


Figure 15–40

Task 1 - Fill in schedules.

1. Open the project **Modern-Hotel-Schedules-M.rvt**.
2. In the Project Browser, expand *Schedules/Quantities*. Four schedules have been added to this project.
3. Double-click on **Door Schedule - 1st Floor** to open it. The existing doors in the project are already populated with some of the basic information included with the door, as shown in Figure 15–41.

<Door Schedule

A	B	C	D	E	F	G
	Dimensions			Frame Information		
Mark	Width	Height	Thickness	Frame Type	Frame Material	Head Detail
	2350	2865				
101	915	2032	51			
102	915	2032	51			
103	915	2032	51			
104	915	2134	51			
105	915	2134	51			
106	915	2134	51			
107	915	2134	51			

Figure 15–41

4. The first door in the list does not have a mark associated with it. Click in the empty *Mark* cell. In the *Modify Schedules/ Quantities* tab>Element panel, click (Highlight in Model). The front door that is part of a curtain wall displays and is highlighted, even though storefront doors are typically not included in Door Schedules. There are no other views to display. Click **Close** in the Show Element(s) in View dialog box.

5. Select one of the single exterior doors other than the front door.

6. In Properties, set a *Frame Type as* **A**, *Frame Material* as **Steel**, and *Finish* as **Coated**.

7. Click (Edit Type).

8. In the Type Properties dialog box, in the *Identity Data* area, set the *Fire Rating* to **A**.

9. Click **OK** to finish.

10. Return to the Door Schedule. (Press <Ctrl>+<Tab> to switch between open windows.)

11. Note that the *Frame Type* and *Frame Material* display for one door and the matching exterior doors also have a fire rating. Use the drop-down list and change the options for the matching doors, as shown in Figure 15–42.

<Door Schedule - 1st Floor>

A	B	C	D	E	F	G	H	I	J
	Dimensions			Frame Information			Detail Information		
Mark	Width	Height	Thickness	Frame Type	Frame Material	Head Detail	Jamb Detail	Threshold Detail	Fire Rating
	2350	2865							
101	915	2032	51	A	Steel				A
102	915	2032	51	A					A
103	915	2032	51		Steel				A
104	915	2134	51						

Figure 15–42

12. In the Door Schedule view, specify the *Fire Rating* for some other doors in the schedule. When you change the fire rating, you are prompted to change all elements of that type. Click **OK**.

13. Open the **Floor Plans: Floor 1** view.

14. Select the door to the office, then right-click and select **Select All Instances>In Entire Project**.

15. Look at the Status Bar beside (Filter) and note that more doors have been selected than are in the current view.

No visual changes to the door display because these are just text properties.

16. In Properties, set the *Frame Type* and *Frame Material* for these doors.

17. Press <Esc> to clear the selection when you are finished.

18. Switch back to the schedule view to see the additions. Not all of the doors are showing because the schedule has been limited to the 1st floor doors.

19. Save the project.

Task 2 - Add schedules to a sheet.

1. In the Project Browser, open the sheet **A8.1 - Schedules**.

2. Drag and drop the **Door Schedule - 1st Floor** view onto the sheet, as shown in Figure 15–43.

Figure 15–43

- Your schedule may look different then the one shown in Figure 15–43.

3. Zoom in and use the arrows at the top to modify the width of the columns so that the titles display correctly.
4. Click in empty space on the sheet to finish placing the schedule.
5. Switch back to the **Floor Plans: Floor 1** view and select the double-swing door at the kitchen.
6. In the Type Selector, change the size. In Properties, add a Frame Type, Frame Material, and Finish.
7. Return to the Door Schedule sheet. The information is automatically populated, as shown in Figure 15–44.

Door Schedule - 1st Floor

	Dimensions			Frame Information		Detail Informat		
Mark	Width	Height	Thickness	Frame Type	Frame Material	Head Detail	Jamb Detail	Thr D
	2350	2365						
101	915	2032	51	A	Steel			
102	915	2032	51	A	Steel			
103	915	2032	51	A	Steel			
104	915	2134	51					
105	915	2134	51					
106	915	2134	51					
107	915	2134	51					
108	915	2134	51					
109	915	2032	51	A	Steel			
110	1830	2134	51					
111	1830	2083	51	B	Glass			

Figure 15–44

8. Return to the 3D view.
9. In the Quick Access Toolbar, click (Close Hidden Windows.
10. Save the project.

Command Summary

Button	Command	Location
	**Material Tag**	**Ribbon:** *Annotate* tab>Tag panel
	**Multi-Category**	**Ribbon:** *Annotate* tab>Tag panel
	**Room**	**Ribbon:** *Architecture* tab>Room & Area panel **Shortcut: RM**
	**Room Separator**	**Ribbon:** *Architecture* tab>Room & Area panel
	**Stair Tread/ Riser Number**	**Ribbon:** *Annotate* tab>Tag panel
	**Tag All Not Tagged**	**Ribbon:** *Annotate* tab>Tag panel
	**Tag by Category**	**Ribbon:** *Annotate* tab>Tag panel **Shortcut: TG**
	**Tag Room**	**Ribbon:** *Architecture* tab>Room & Area panel **Shortcut: RT**

Practice 16a

Create a Detail Based on a Section Callout

Estimated time for completion: 15 minutes

Practice Objectives

- Create a detail based on a section.
- Add filled regions, detail components, and annotations.

In this practice you will create a detail based on a callout of a wall section. You will add repeating detail components, break lines, and detail lines, create filled regions, and add annotation to complete the detail, as shown in Figure 16–27.

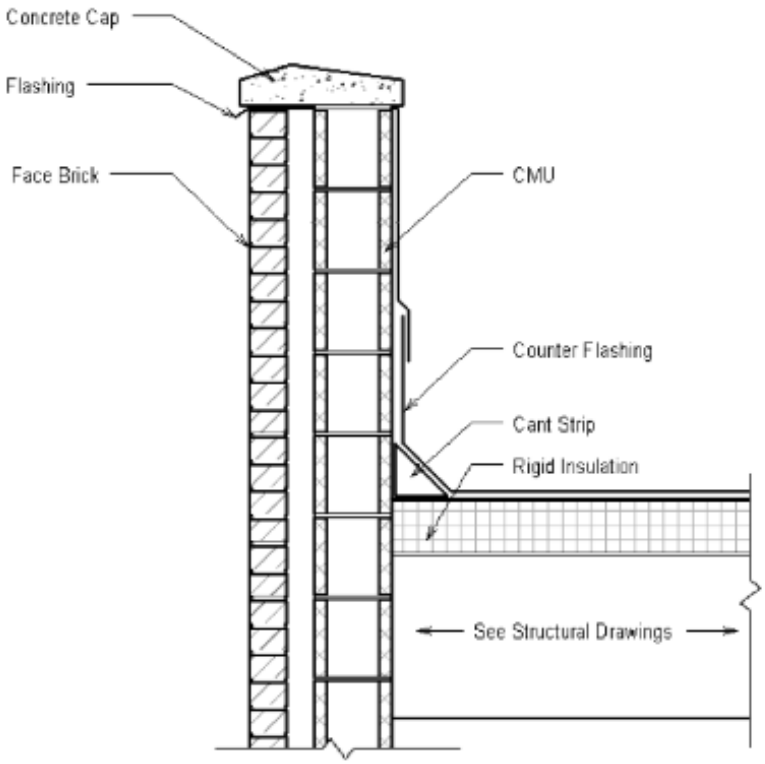


Figure 16–27

Task 1 - Create a callout of a wall section.

1. Open the file **Modern-Hotel-Detailing-M.rvt**.
2. Open the **Floor Plans: Floor 1** view.

3. Double click on the wall section head shown in Figure 16–28. This guarantees that you open the right section.

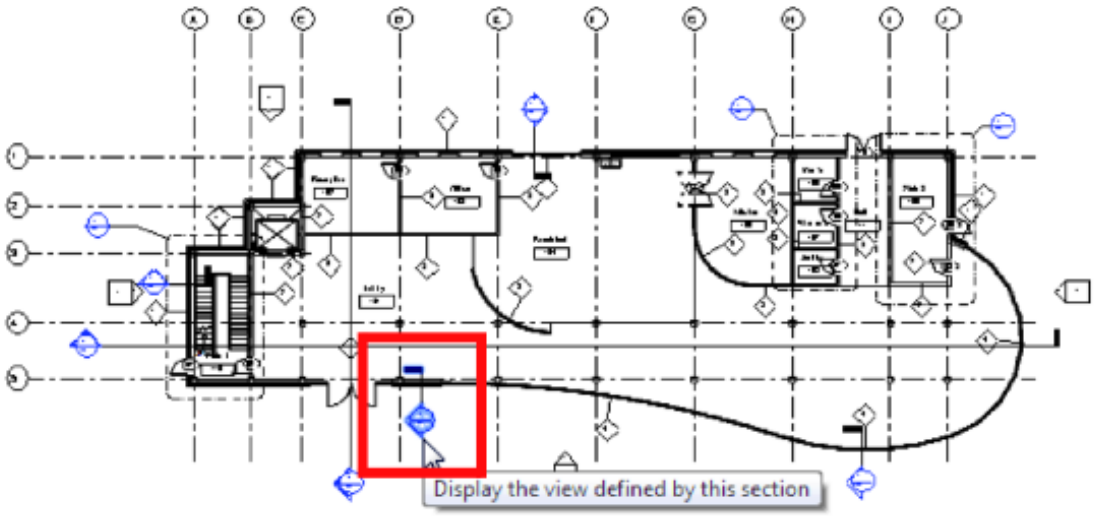


Figure 16–28

4. Zoom in to the top of the wall showing the parapet and the roof.

5. In the *View* tab>Create panel, click (Callout).

6. In the Type Selector, select **Detail View: Detail**.

7. Create a callout as shown in Figure 16–29. Open the callout.

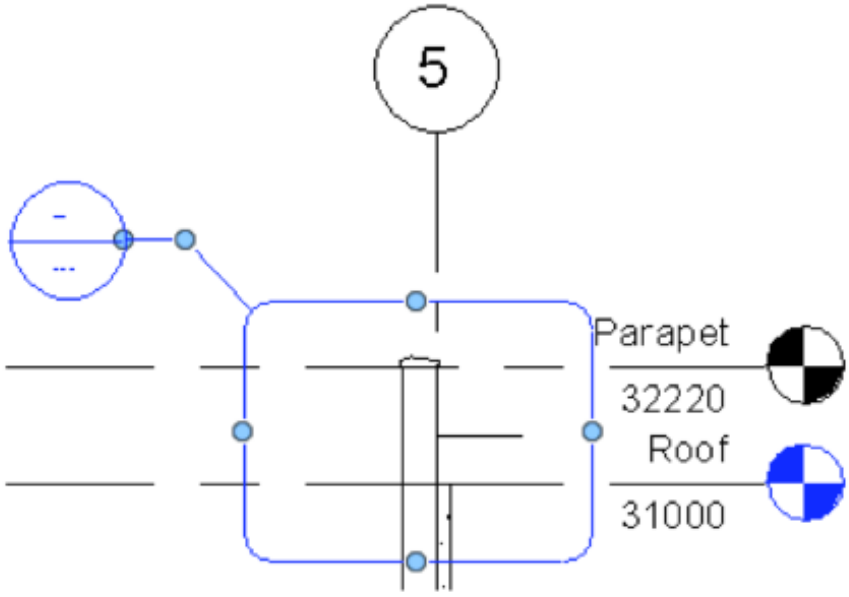


Figure 16–29

8. In the View Control Bar, set the following parameters:
   - *Scale*: **1:10**
   - *Detail Level*: (Fine)
9. Hide the levels, grids, and section markers (if displayed).
10. Turn off the Crop Region.
11. In the Project Browser, in the *Detail Views (Detail)* node, rename the view to **Parapet Detail**.
12. Save the project.

Task 2 - Add repeating detail components and break lines.

1. In the *Annotate* tab>Detail panel, expand (Component) and then click (Repeating Detail Component).
2. In the Type Selector, verify that the type is set to **Repeating Detail: Brick**.
3. Draw the brick line from the top of the parapet cap down, as shown in Figure 16–30.

Drawing from the top down insures that "mortar" is between the cap and the brick. This is how the detail elements were created.

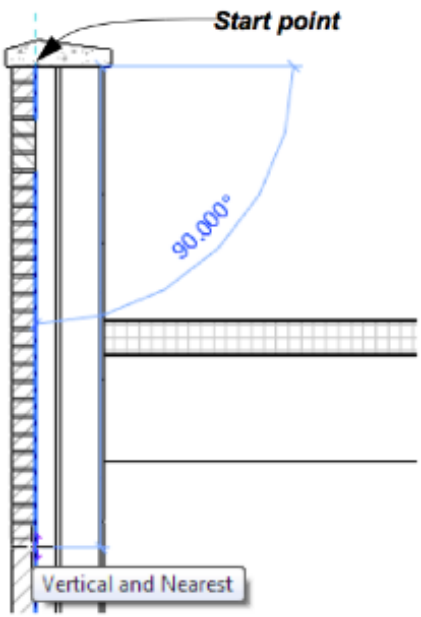


Figure 16–30

4. In the Type Selector, select **Repeating Detail: CMU**. Draw over the other side of the wall.

The Autodesk Revit software lists the last tool you used at the top of the drop-down list.

5. In the *Annotate* tab>Detail panel, expand (Repeating Detail Component) and click (Detail Component).
6. In the *Modify | Place Detail Component* tab>Mode panel, click (Load Family).
7. In the Load Family dialog box, navigate to the US Metric Library and in the *Detail Items>Div 01-General* folder or in your practice files folder, *Practice Library* folder, select **M_Break Line.rfa**, and then click **Open**.
8. Add break lines to the bottom and right side of the detail. Press <Spacebar> to rotate the Break Line as required and use the controls to modify the size and depth, as shown in Figure 16–31.

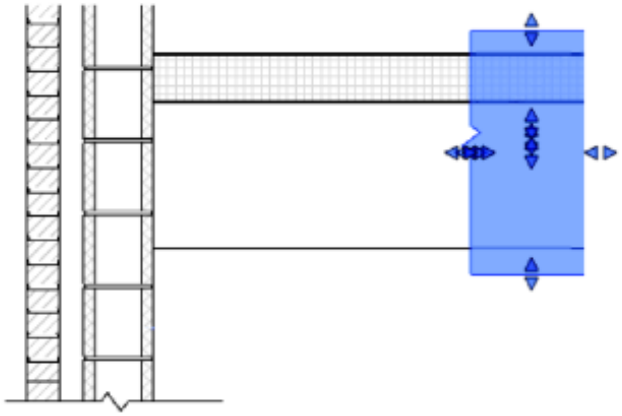


Figure 16–31

9. Save the project.

Task 3 - Add a filled region for the concrete cap.

1. In the Quick Access Toolbar, ensure that (Thin Lines) is off and that you can see the various line weights in the detail.
2. Zoom in to the concrete cap.
3. In the *Annotate* tab>Detail panel, expand (Region) and then select (Filled Region).
4. In the *Modify | Create Filled Region Boundary* tab>Line Style panel, select **Wide Lines**

5. In the Draw panel, click (Pick Lines).
6. In the Options Bar, select **Lock**.
7. Select the edges of the cap, as shown in Figure 16–32.

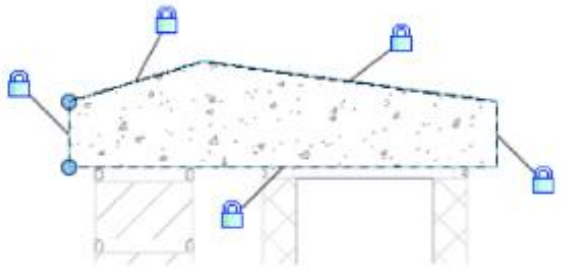


Figure 16–32

8. In the Type Selector, select **Filled Region Concrete**.
9. Click (Finish Edit Mode).
10. Save the project.

Task 4 - Draw flashing using detail lines.

1. In the *Annotate* tab>Detail panel, click (Detail Line).
2. In the *Modify | Place Detail Lines* tab>Line Style panel, verify that **Wide Lines** is still selected.
3. Draw flashing similar to that shown in Figure 16–33.

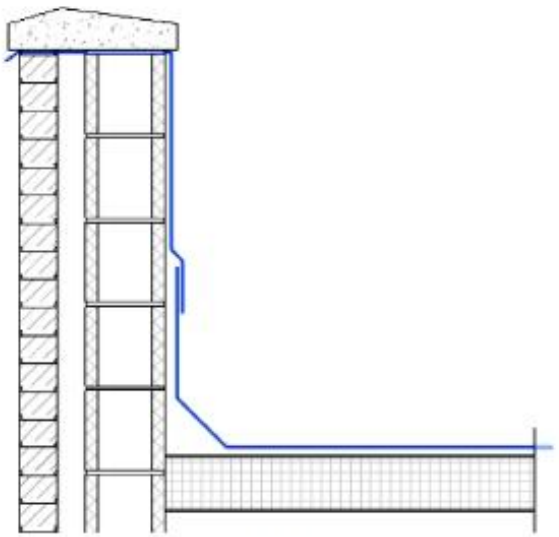


Figure 16–33

4. Using Detail Lines, add a cant strip under the flashing.
5. Save the project

Task 5 - Annotate the detail.

1. In the Quick Access Toolbar or on the *Annotate* tab>Text panel, click A (Text).
2. In the *Modify | Place Text* tab>Format panel, select A (Two-Segments).
3. Add the text and leaders shown in Figure 16–34. Use Alignments to place the leader points and text.

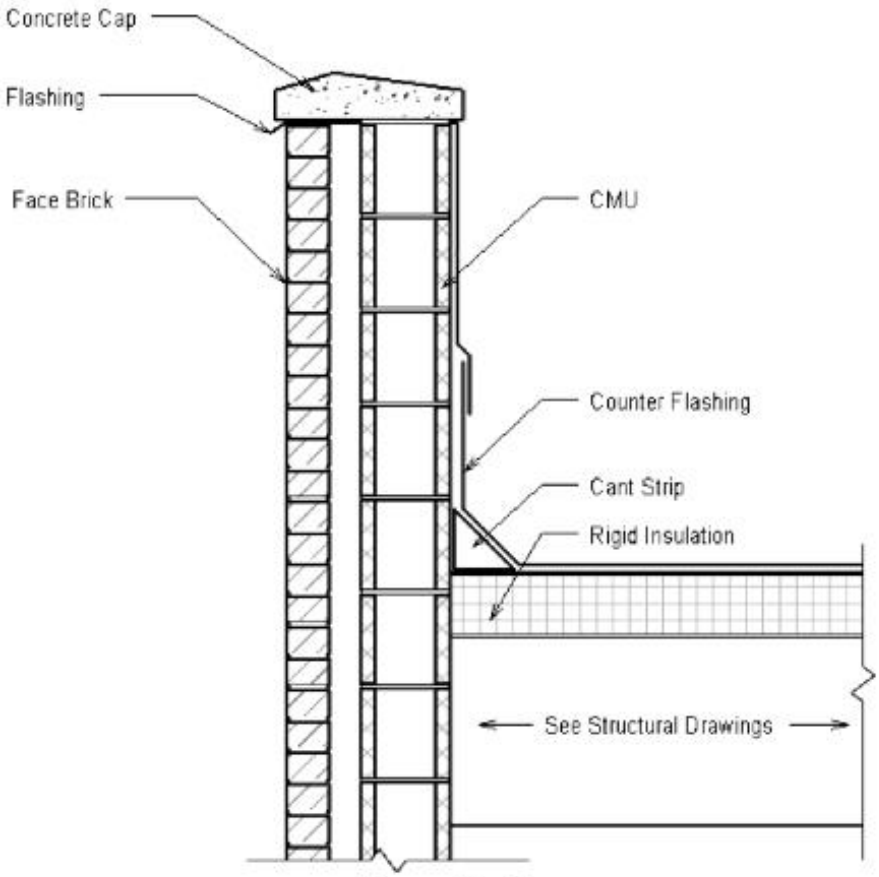


Figure 16–34

4. Save the project.

At this point you have a hybrid between detail items and model items. You can continue to add detail items to replace the roofing. You can also add structural elements if you have time.

Practice 16b

Create Additional Details

Practice Objective

- Create and annotate details.

In this practice you will create a window sill detail and a structural detail, and then annotate them. The following tasks are designed to be completed without detailed steps. Refer to the earlier topics and practice for assistance, as required. You can also use keynotes instead of text notes if required.

Estimated time of completion: 30 minutes

- Use the **Modern-Hotel-Detailing-M.rvt** project as the base file for these tasks.

Task 1 - Create a window sill detail.

In this task you will create a window sill detail, as shown in Figure 16–44.

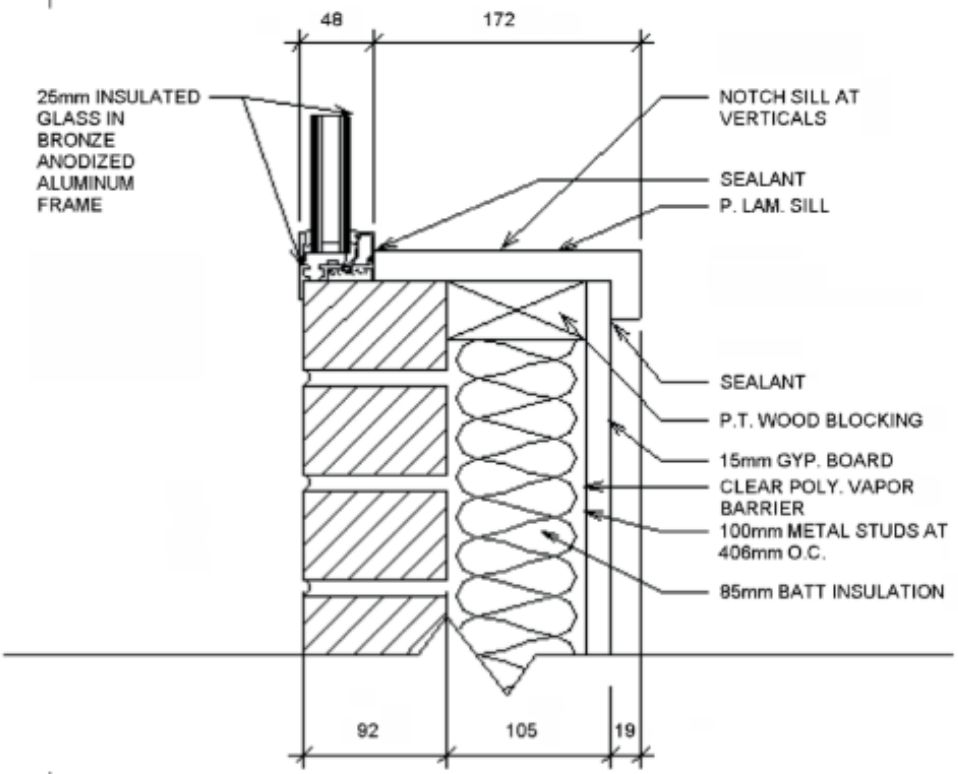


Figure 16–44

- Use detail components from the Library, detail lines, patterning, text, and dimensions to create the window sill.

Task 2 - Add structural detail.

In this task you will create a structural detail, as shown in Figure 16–45.

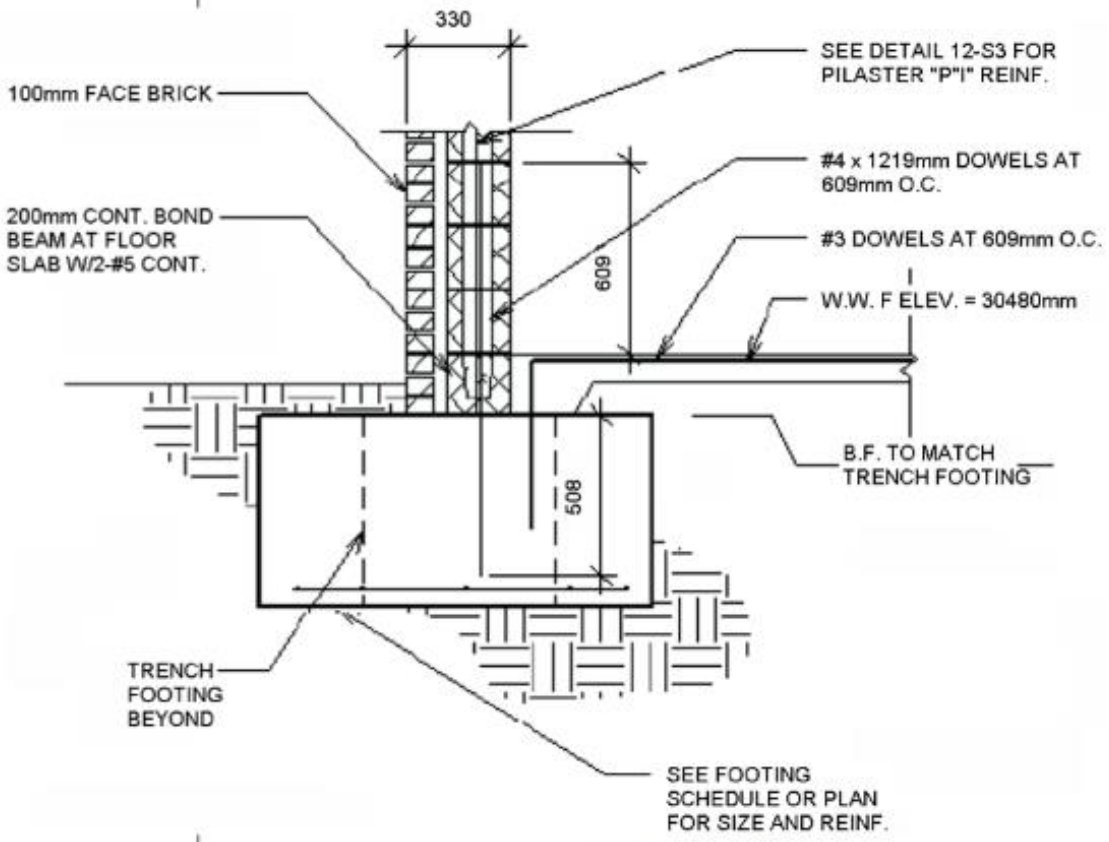


Figure 16–45

- Create a new drafting view and draw the structural detail using the various sketching tools and structural detail components.
- Use the **Invisible lines** line type when you draw the lines for the fill boundary. The curved lines are made with splines.
- Create the Earth pattern type by duplicating an existing type and assigning a new drafting pattern to it.

Practice 16c

Create a Detail Based on a CAD File

Practice Objectives

- Import a CAD file.
- Explode the CAD file and change all of the elements to Autodesk Revit specific elements.
- Save the new detail view and import it into a project.

Estimated time for completion: 10 minutes

In this practice you will create a detail in a drafting view based on an existing detail created in the AutoCAD software, as shown in Figure 16–46. You will explode the imported file and change the text types and line styles of the elements to Autodesk Revit types. You will then create leaders for text and add patterning using filled regions. Finally, you will save the detail and import it into a project to create a clean Autodesk Revit detail without any CAD-based elements.

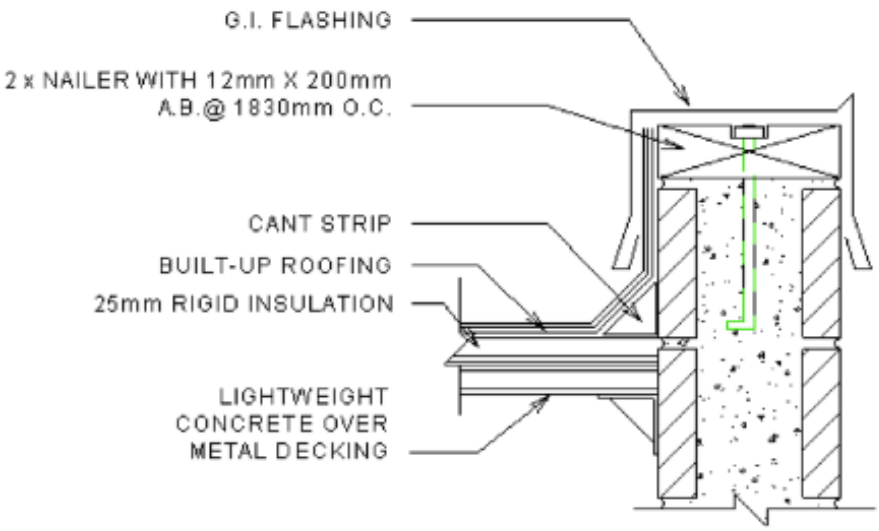


Figure 16–46

Task 1 - Create a detail based on an AutoCAD drawing.

1. Start a new project based on the default architectural template.

2. In the *View* tab>Create panel, click (Drafting View).

3. In the New Drafting View dialog box, set the name and scale to the following:
   - Name: **Parapet Detail**
   - Scale: **1:10**
4. In the *Insert* tab>Import panel, click (Import CAD).
5. In the Import CAD Formats dialog box, select the AutoCAD drawing **Roof-Detail-M.dwg** from your practice folder. Change the *Colors* to **Black and White** and keep the other default options, as shown in Figure 16–47.

Figure 16–47

6. Click **Open** to place the detail.
7. Zoom in and select the detail. It is all one element, as shown in Figure 16–48.

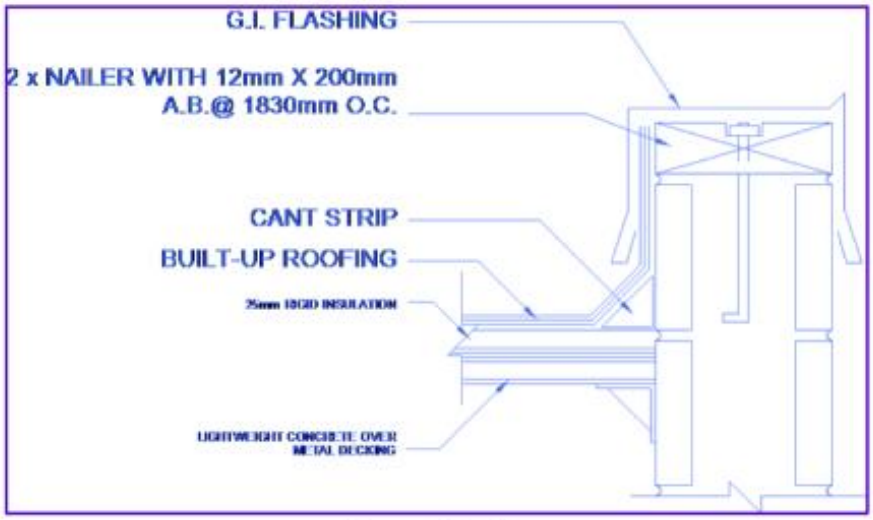


Figure 16–48

8. In the *Modify | Roof-Detail-M.dwg* tab>Import Instance panel, expand (Explode) and click (Full Explode). You are now able to edit individual sections of the imported detail.

9. Select all of the text, as shown in Figure 16–49.

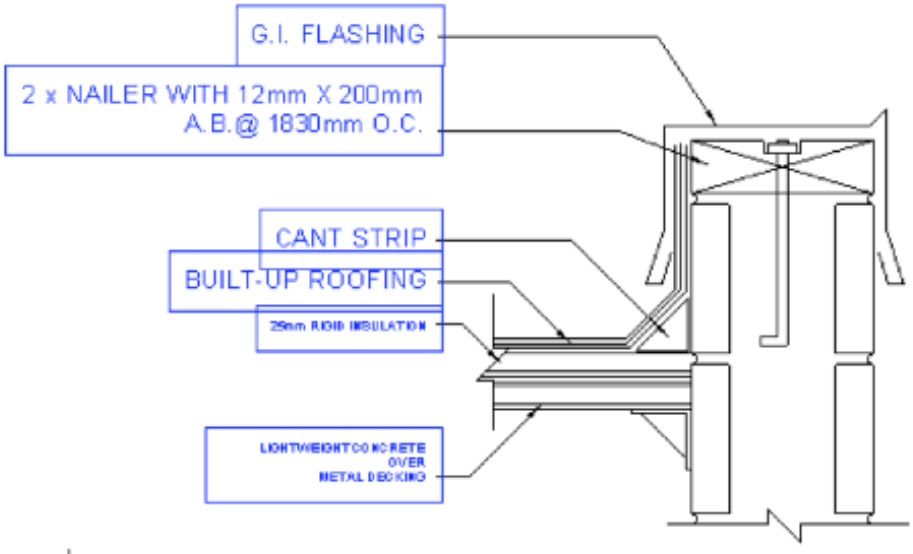


Figure 16–49

10. In the Type Selector, select **Text: 2.5mm Arial**.

11. Click (Modify) and select all of the individual elements. (Hint: use a crossing window.)

12. In the *Modify | Multi-Select* tab>Selection panel, click (Filter).

These lines are referenced to AutoCAD layers names rather than Autodesk Revit Line Type names.

13. In the Filter dialog box, click **Check None** and then select **Lines (Heavy)** as shown in Figure 16–50. Click **OK.**

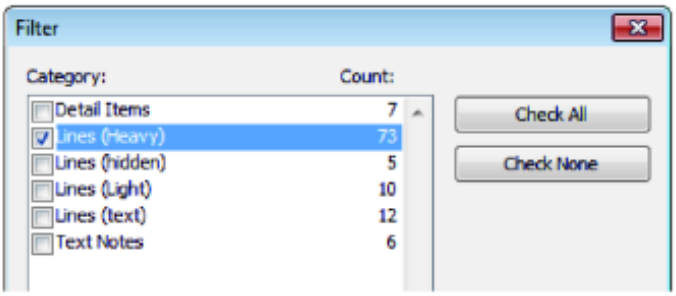


Figure 16–50

14. In the *Modify | Lines* tab>Line Style panel, change the *Line Style* to **Medium Lines**.

15. Return to the **Modify** command to finish.

16. Repeat the process with the other line types changing *Lines (hidden)* to **Hidden Lines** and *Lines (Light)* to **Thin Lines**.

Task 2 - Modify text and leaders.

1. Select everything again and use the **Filter** command to select **Lines (text)**. Delete these lines as they are not used.
2. Select one of the arrowheads that remain in the drawing. Right-click and select **Select All Instances>Visible in View**. Delete the elements.
3. Select a text element. In the *Modify* | *Text Notes* tab>Format panel, click (Add Right Side Straight Leader). Modify the leader to point to the correct element, as shown in the example in Figure 16–51.

Figure 16–51

4. Repeat the process of adding leaders to the text, pointing to the appropriate parts of the detail, as shown in Figure 16–52.

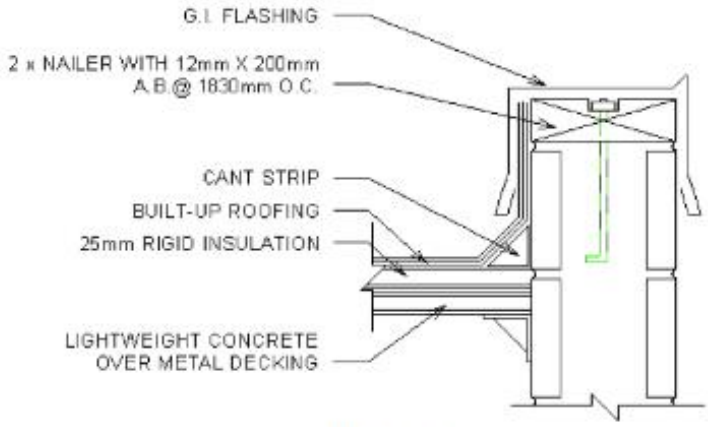


Figure 16–52

Task 3 - Add filled regions.

1. In the *Annotate* tab>Detail panel, click (Region).

Use the <Invisible lines> type because the boundary does not need to display.

2. In the *Modify | Create Filled Region Boundary* tab>Line Style panel, set the line style to **<Invisible lines>**.

3. In the Draw panel, click (Rectangle) and add a box around each of the four rectangular brick sections, as shown in Figure 16–53. You can do all four areas in one sketch.

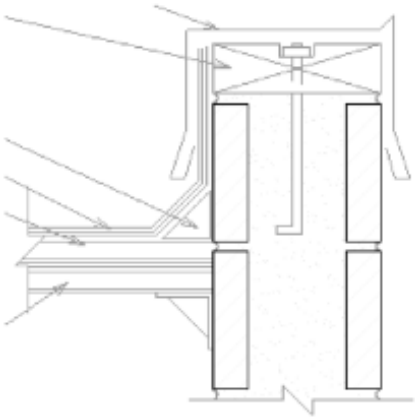


Figure 16–53

4. In the Type Selector, set the *pattern type* to **Diagonal Up** and click in empty space to clear the selection.

5. Click (Finish Edit Mode).

This area was hatched in the AutoCAD drawing. The hatching was automatically converted to a filled region when the drawing was imported into the project, but was not assigned an Autodesk Revit based pattern.

6. Select the large region between the areas that you just hatched, as shown in Figure 16–54.

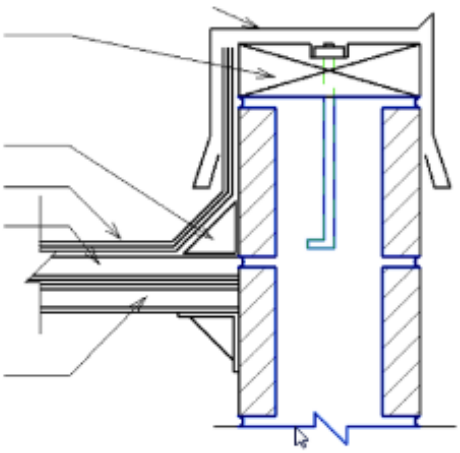


Figure 16–54

7. In Properties, click (Edit Type).
8. In the Type Properties dialog box, click **Duplicate** and name the new pattern **Concrete**.
9. In the *Value* field for the *Fill Pattern* parameter, click (Browse).
10. In the Fill Patterns dialog box, in *Pattern Type* area, select **Drafting** and then select the pattern **Concrete**.
11. Click **OK** twice to create the Filled Region type and apply it to the selected boundary.
12. The detail view now consists of only Autodesk Revit elements and is safe to use in another project.

Task 4 - Create a View and Import it in to a Project.

1. In the Application Menu, expand (Save As), expand (Library), and select **View**.
2. In the Save Views dialog box, verify that **Drafting View: Parapet Detail** is selected, as shown in Figure 16–55 and click **OK**.

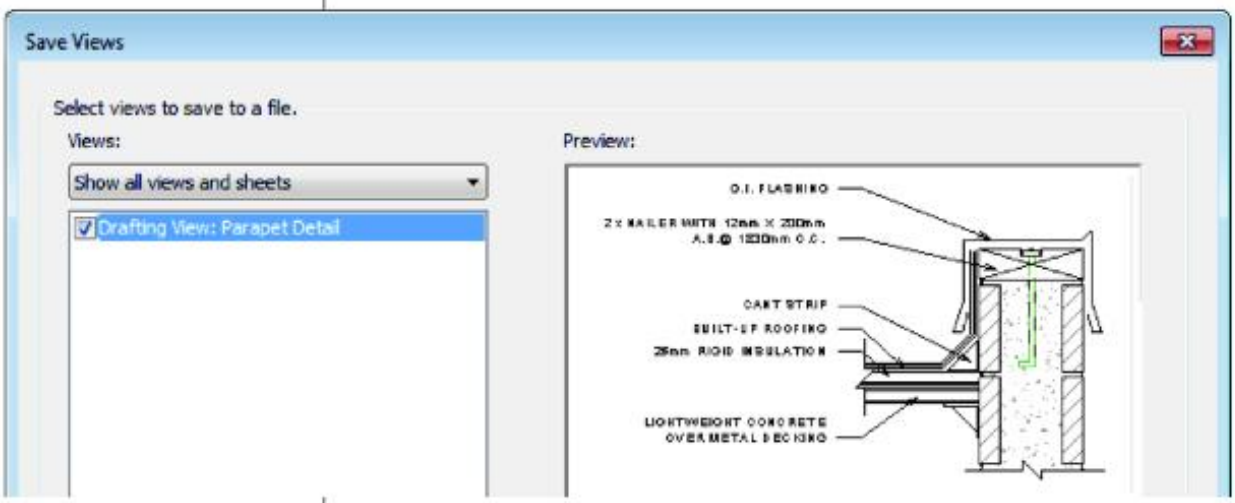


Figure 16–55

3. In the Save As dialog box, navigate to your practice folder and click **Save**.
4. Close the project and do not save it.
5. Open **Modern-Hotel-Detailing-M.rvt**.
6. In the *Insert* tab>Import panel, expand (Insert from File) and click (Insert Views from File).
7. In the Open dialog box, navigate to your practice folder and open **Parapet-Detail.rvt**.
8. In the Insert Views dialog box only this view is available. Click **OK**.
9. Accept any warnings that might display about duplicate types. They do not impact the project.
10. Save the project.

Command Summary

Button	Command	Location
CAD Import Tools		
	**Delete Layers**	• **Ribbon:** *Modify | <imported filename>* tab>Import Instance panel
	**Full Explode**	• **Ribbon:** *Modify | <imported filename>* tab>Import Instance panel> expand Explode
	**Import CAD**	• **Ribbon:** *Insert* tab>Import panel
	**Partial Explode**	• **Ribbon:** *Modify | <imported filename>* tab>Import Instance panel> expand Explode
Detail Tools		
	**Detail Component**	• **Ribbon:** *Annotate* tab>Detail panel> expand Component
	**Detail Line**	• **Ribbon:** *Annotate* tab>Detail panel
	**Insulation**	• **Ribbon:** *Annotate* tab>Detail panel
	**Region**	• **Ribbon:** *Annotate* tab>Detail panel
	**Repeating Detail Component**	• **Ribbon:** *Annotate* tab>Detail panel> expand Component
View Tools		
	**Bring Forward**	• **Ribbon:** *Modify | Detail Items* tab> Arrange panel
	**Bring to Front**	• **Ribbon:** *Modify | Detail Items* tab> Arrange panel
	**Drafting View**	• **Ribbon:** *View* tab>Create panel
	**Insert from File: Insert Views from File**	• **Ribbon:** *Insert* tab>Import panel> expand Insert from File
	**Send Backward**	• **Ribbon:** *Modify | Detail Items* tab> Arrange panel
	**Send to Back**	• **Ribbon:** *Modify | Detail Items* tab> Arrange panel