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Revit® 2025 Structure Fundamentals

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Chapter

7

Foundations

Structural foundations are created using concrete walls, columns, and footings. Revit® includes standard tools for creating walls and columns in several different materials, as well as specific tools for adding footings.

Learning Objectives

- Create walls that can be used in foundations.
- Add bearing and retaining wall footings under the walls.
- Create column types to be used as piers and pilasters.
- Place isolated footings under the columns.

7.1 Modeling Walls

Walls in Revit are more than just two lines on a plan. They are full 3D elements that store detailed information, including height, thickness, and materials. This means they are useful in 2D and 3D views. Structural walls (as shown in Figure 7–1) are bearing walls that can act as exterior, foundation, retaining, and shaft walls.

- Walls also impact material takeoff schedules.
- Walls are a system family that is predefined in the Revit template file and cannot be loaded in from an external location or saved out to a external location.
- Walls can be customized to suit your company needs, if necessary.

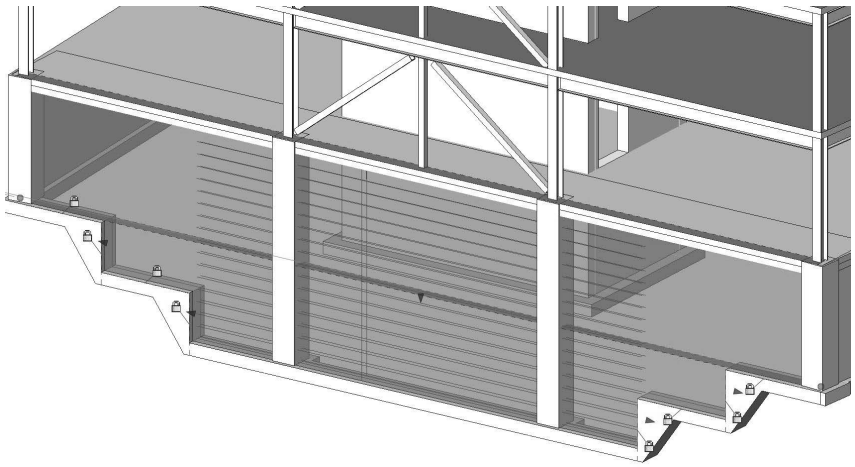


Figure 7–1

There are three broad categories of walls:

- **Basic walls:** Compound walls that contain one or more layers (e.g., blocks, air space, bricks, etc.).
- **Curtain walls:** Walls that are divided horizontally and vertically into a grid system.
- **Stacked walls:** Consist of two or more basic walls stacked vertically, such as a brick wall over a concrete wall.

- When placing a wall as a finish wall, you have the option to **Auto Join** with an adjacent wall or **Auto Join & Lock** so that when the join wall moves, the locked finish wall moves with it.
  - If you try to move a wall that has a finish wall joined to it, you will get a warning that the highlighted elements are joined but do not intersect. You have the option to **Unjoin Elements**.

Wall Cross-Section

The *Cross-Section* for the basic wall category can be modified to be **Vertical**, **Slanted**, or **Tapered**, as shown in Figure 7–2.

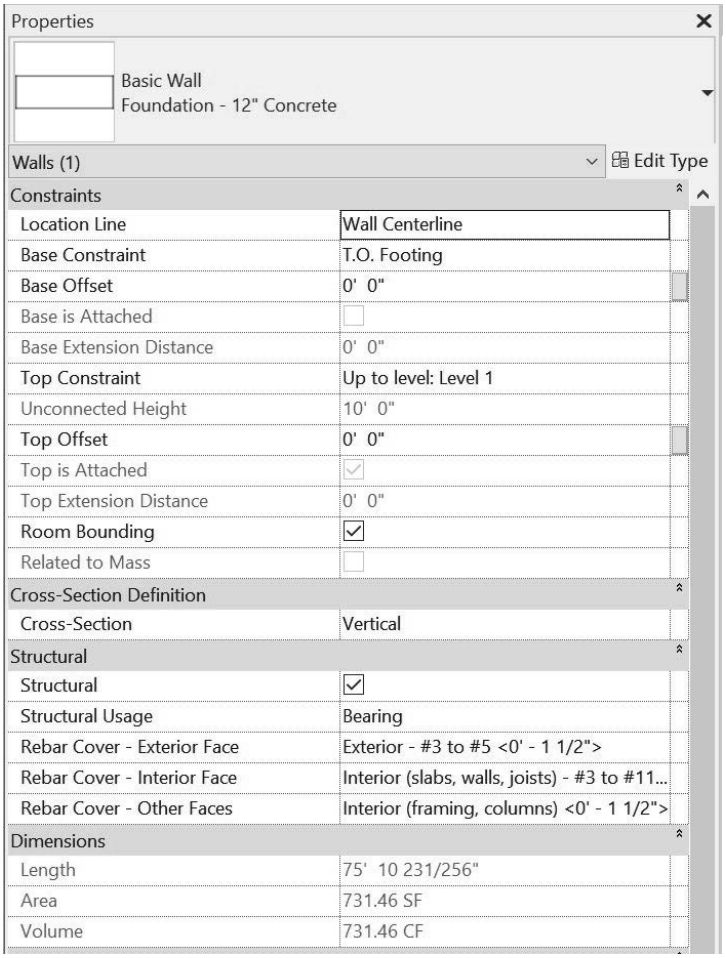


Figure 7–2

Vertical Wall

All walls are drawn by default as a vertical wall and are at a 0° vertical when comparing it to a slanted wall type.

> ***Note:*** *If you change a wall's cross-section to* ***Tapered*** *and adjust the settings for the tapered wall, then you will see only the Tapered wall types displayed in the Type Selector. If you need to draw a vertical or slanted wall after the tapered wall is drawn, you will need to set the cross-section back to* ***Vertical*** *or* ***Slanted*** *so that you can see all the wall types in the Type Selector.*

Slanted Wall

You can draw a slanted wall type and specify the **Angle From Vertical** degree value in Properties. The slant degree needs to be within -90° to 90°. You can also change a vertically drawn wall to a slanted wall type. If there are any doors, door openings or window added to the wall, you will need to select those objects and, in Properties, specify their *Orientation*. The direction to which the wall has been drawn (right to left or left to right) will determine the direction the angle will go. Figure 7–3 shows that when drawing from left to right the wall slant will go in the negative direction, and drawing from right to left the slant wall goes in the positive direction.

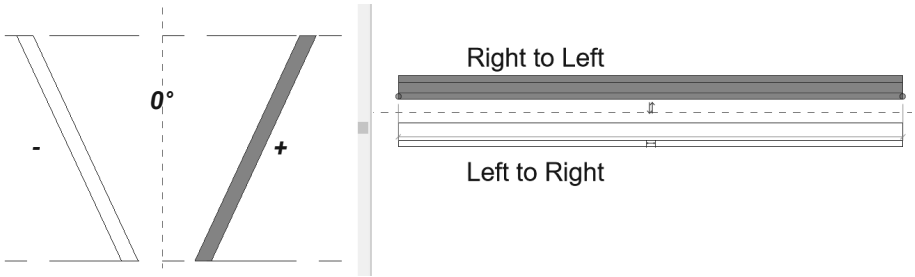


Figure 7–3

- Slanted walls can be modified in a plan, 3D, section, and perspective views.
- You can create a slanted wall with curved, circle, arc, polygon, or elliptical paths.
- If the angle is not going in the correct direction, + or -, you can add a (negative) - symbol in front of the degree value in Properties.

Tapered Wall

You can create a tapered wall from any wall type except walls with sweeps and reveals. You must first edit the structure of the wall to set the variable thickness for the available wall layers. If not, you are prompted to set this before drawing the wall, as shown in Figure 7–4.

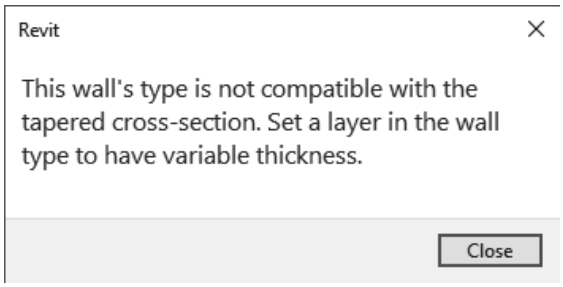


Figure 7–4

- To set the default angles of the tapered wall, you can set the *Default Exterior* and *Interior Angle* in the *Type Properties* dialog box.

- If you have multiple instances of the same tapered wall type, you can select a tapered wall, and in Properties, override the angles by selecting the **Override Type Properties** option and also setting the *Exterior Angle* and *Interior Angle*, as shown in Figure 7–5.

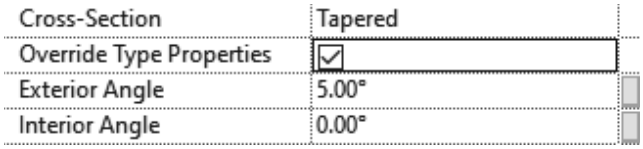


Figure 7–5

- Curtain walls and stacked wall types cannot be tapered.
- If doors, door openings, or windows are placed in a tapered wall, you can specify the orientation of the door and wall.

Wall Display per View

You can alter the way a wall is displayed in the active view by setting the *Detail Level*, as shown in Figure 7–6. You can also override the visibility settings of all walls in a view by opening the *Visibility/Graphic Overrides* dialog box and modifying the **Wall** category. To change the way selected walls display in the active view, you would override the setting for graphics in view by element.

- To display the hatching in all walls in the active view where a wall is being cut through, in the View Control Bar, set the *Detail Level* to **Medium** or **Fine**, as shown in Figure 7–6.

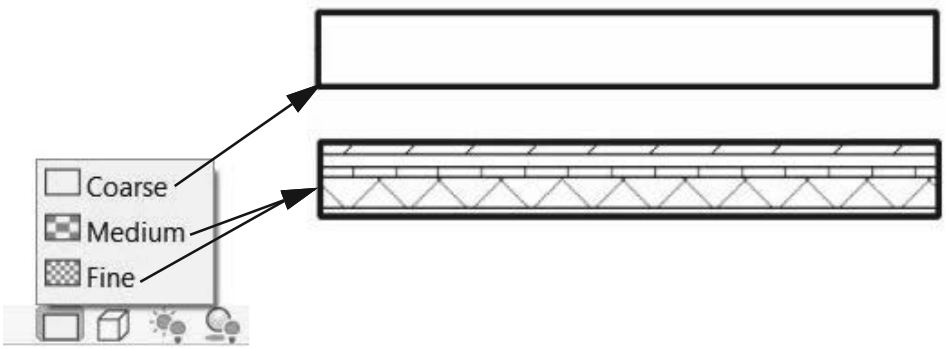


Figure 7–6

- To access the *Visibility/Graphic Overrides* dialog box to change all walls in a view, go to the *View* tab>*Graphics* panel and click (Visibility/Graphics), or type **VG** or **VV**. You can uncheck **Non-Core Layers** (as shown in Figure 7–7) to only view the core layer in the view. This overrides all walls in the view.

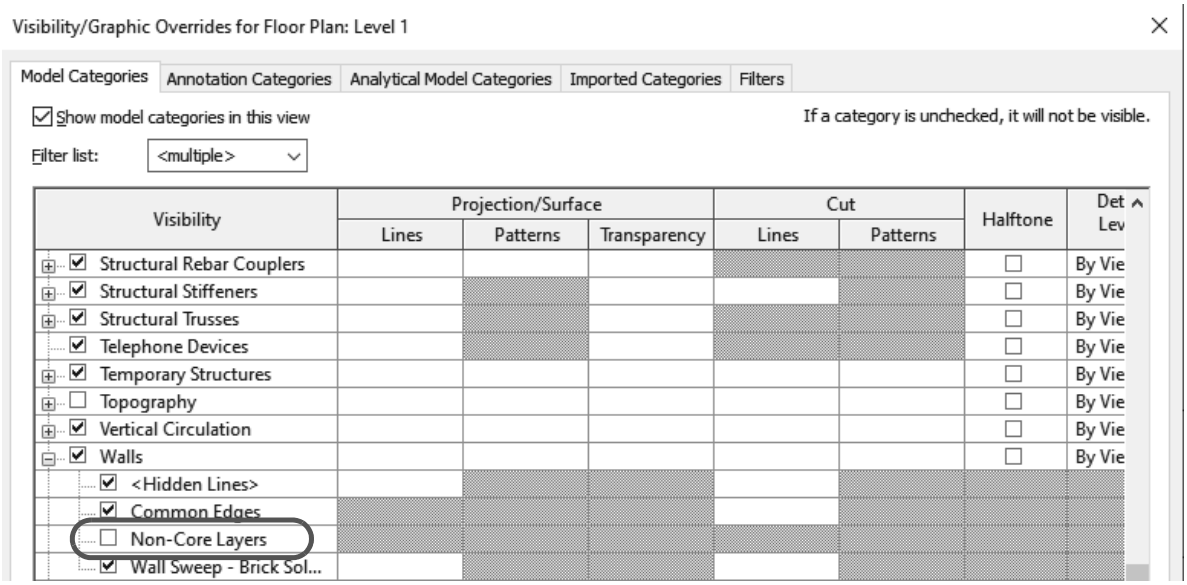


Figure 7–7

- To modify a single or a select few walls in the view, select the walls, right-click, and select **Override Graphics in View>By Element**, as shown in Figure 7–8.

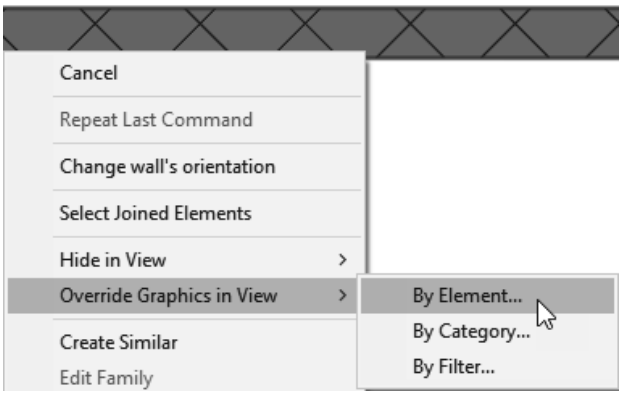


Figure 7–8

How To: Model a Wall

1. In the *Structure* tab>*Structure* panel, click (Wall: Structural), or type **WA**.
   - Architectural walls (which are created with the **Wall: Architectural** command) are typically non-bearing walls, such as curtain walls and partitions. They do not display when the view *Discipline* is set to **Structural**.

2. In the Type Selector, select a wall type, as shown in Figure 7–9. You can use the search box to quickly find specific types of walls.

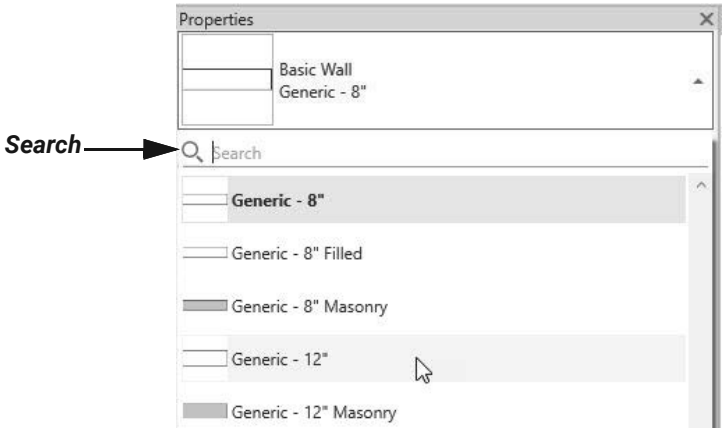


Figure 7–9

3. In Properties, set the *Cross-Section* to **Vertical**, **Slanted**, or **Tapered**, depending on the wall you need to create, as shown in Figure 7–10. Specify the properties and type properties as needed. If this is not set at the beginning of drawing a wall, the last cross-section used will be the default.
   - If you set the *Cross-Section* to **Slanted**, you are able to set the *Angle From Vertical* degree, as shown in Figure 7–10.

Figure 7–10

- If you set the *Cross-Section* to **Tapered**, you will get a warning about the wall type. You must first edit the structure of the wall before setting the *Cross-Section* to **Tapered**.
  - **a.** With the wall type selected, click **Edit Type** in Properties.
  - **b.** Click **Edit...** next to *Structure*.
  - **c.** In the *Edit Assembly* dialog box, select the option in the *Variable* column (as shown in Figure 7–11) for the layer that you want tapered.

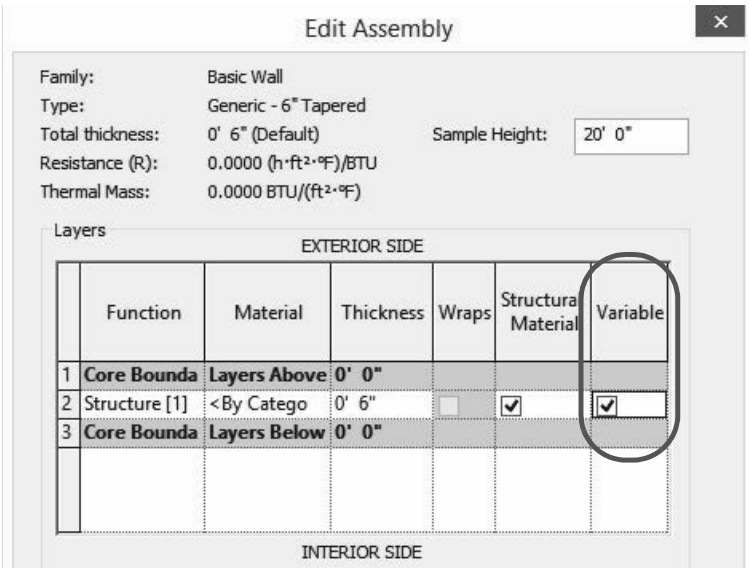


Figure 7–11

  - **d.** Click **OK**.
  - **e.** In the *Type Properties* dialog box, you will now have the ability to set the *Cross Section Properties*, as shown in Figure 7–12.

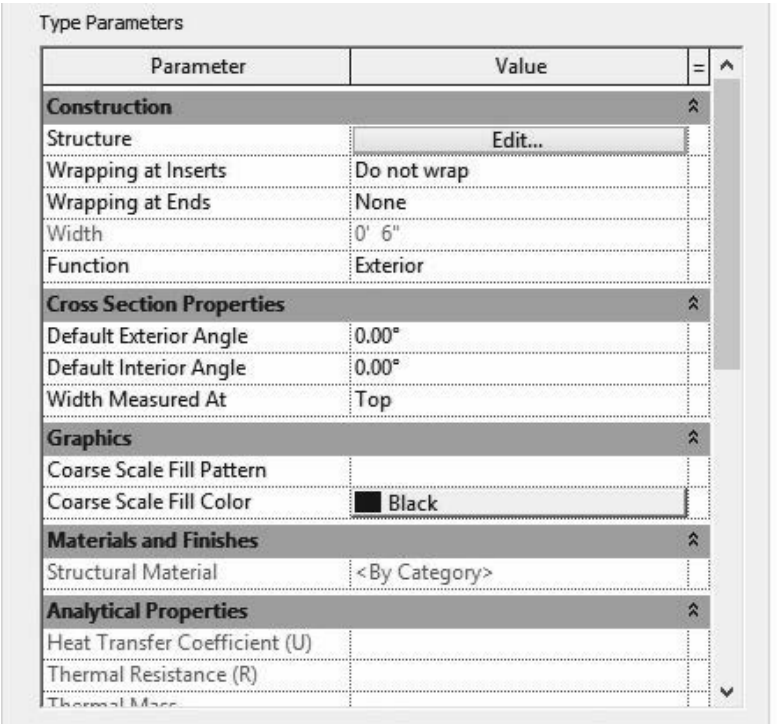


Figure 7–12

4. In the Options Bar (shown in Figure 7–13), specify the following information about the wall before you start modeling:

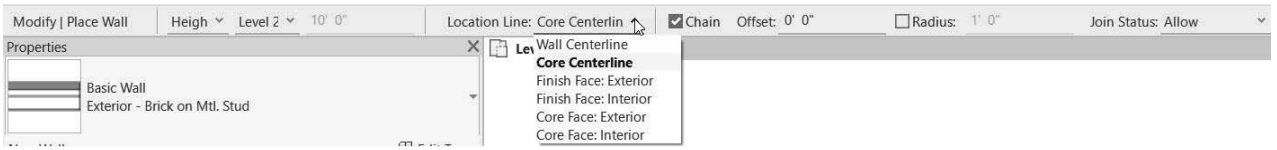


Figure 7–13

- *Height:* Set the height of a wall to either **Unconnected** (with a specified height) or to a level.
- *Location Line:* Set the justification of the wall using the options shown above in Figure 7–13.
- *Chain:* Enables you to model multiple connected walls.
- *Offset:* Enables you to enter the distance at which a new wall is created from an existing element.
- *Radius:* Adds a curve of a specified radius to connected walls as you model.
- *Join Status:* **Allow** or **Disallow** automatic wall joins.

5. In the *Modify | Place Wall* tab>*Draw* panel (shown in Figure 7–14), select one of the options to create the wall.

Figure 7–14

- Use alignment lines, temporary dimensions, and snaps to place the walls.
- As you are sketching, you can press <Spacebar> to flip the orientation of compound walls.
- When using the *Chain* option, press <Esc> once to finish the string of walls and remain in the **Wall** command or press <Esc> twice to get out of the Wall command completely. Hint: <Esc> works similarly on other commands.

How To: Place a Finish Wall

1. In the *Structure* tab>*Structure* panel, click (Wall: Structural), or type **WA**.
2. In the *Modify | Place Wall* tab>*Placement* panel, select (Auto Join) or (Auto Join & Lock).
3. Draw the wall along an existing wall, as shown in Figure 7–15.

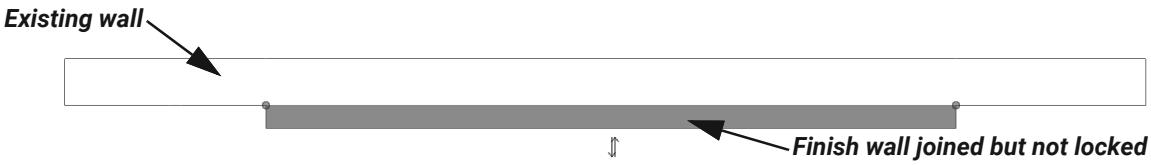
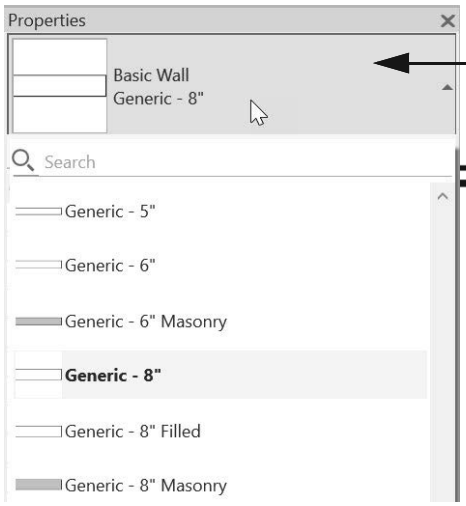


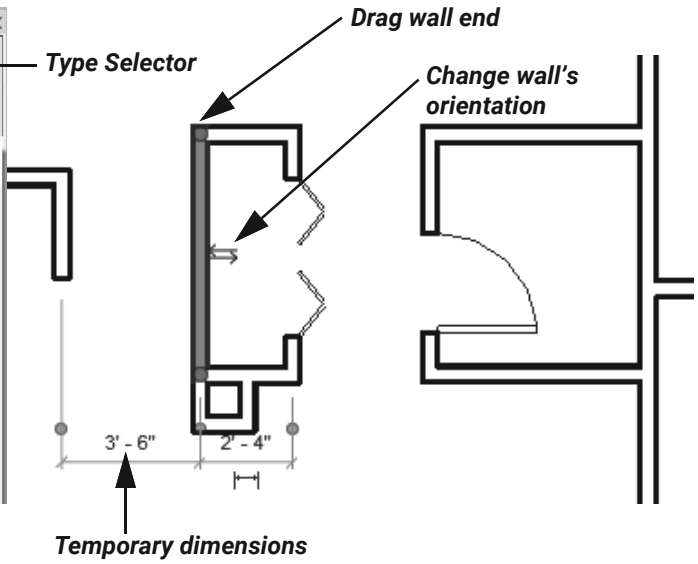
Figure 7–15

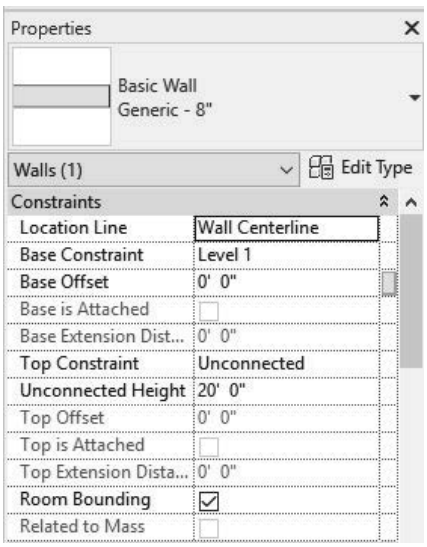
7.2 Modifying Walls

There are several methods of modifying walls. You can change the type of wall using the Type Selector, modify the Properties, use controls and shape handles to modify the length and wall orientation, and use temporary and permanent dimensions to change the location or length of a wall in 2D and 3D views, as shown in Figure 7–16. Additional tools enable you to modify wall joins, edit the profile of a wall, and add wall openings.



Type Selector





Properties

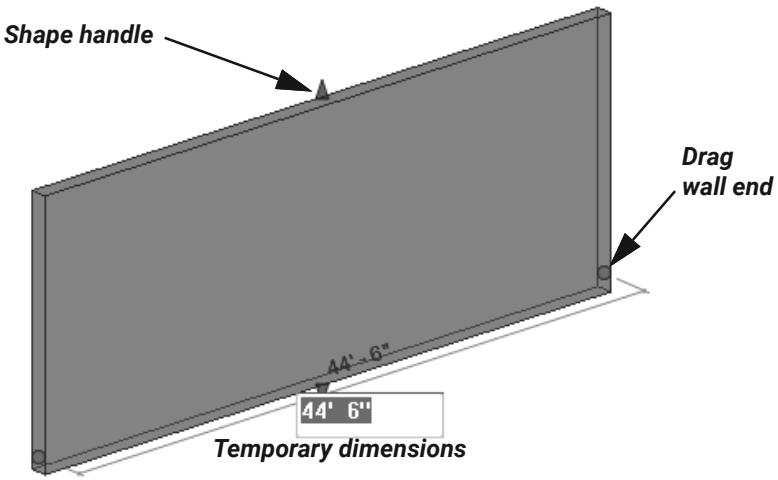


Figure 7–16

Modifying Slanted and Tapered Walls

Modifying a slanted or tapered wall is similar to modifying a vertical wall type with the exception of modifying the angle.

- When modifying a slanted wall type, you have the ability to modify the Drag Wall Slant grip or modify the temporary dimension in a 3D, section, elevation, or isometric view, as shown in Figure 7–17.

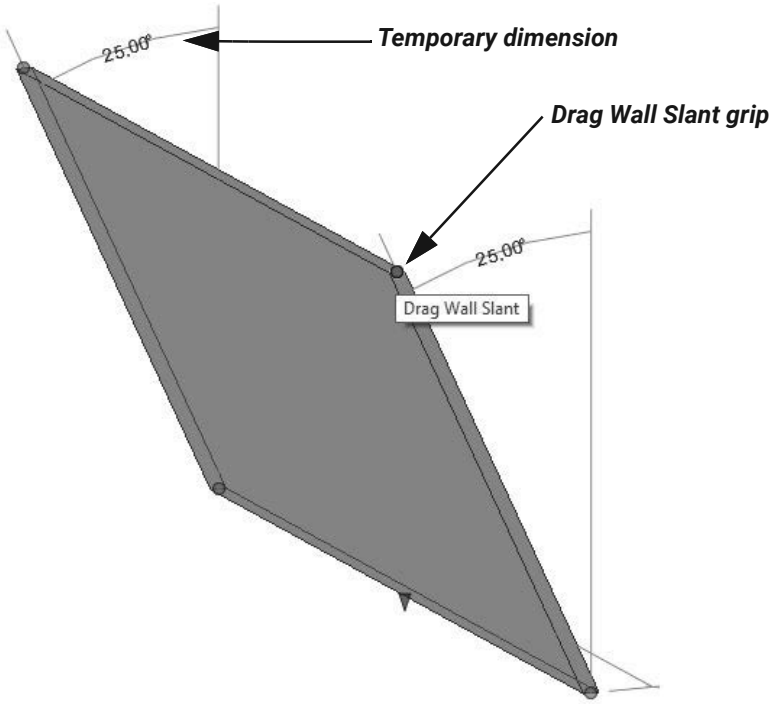


Figure 7–17

- When modifying a tapered wall, you have the ability to modify the Drag Wall Exterior Face Slant and Drag Wall Interior Face Slant grips or modify the temporary dimension in a 3D, section, elevation, or isometric view, as shown in Figure 7–18.

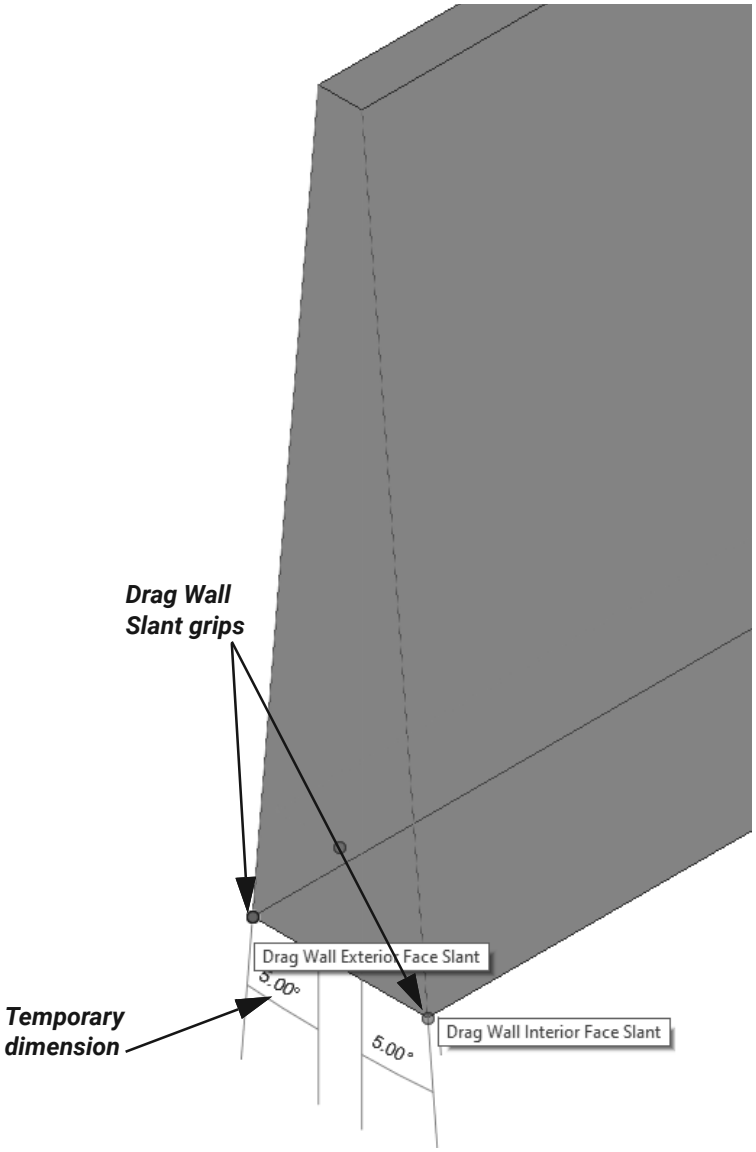


Figure 7–18

- You can set the wall's structural properties as **Non-bearing**, **Bearing**, **Shear**, or **Structural combined**, as shown in Figure 7–19.

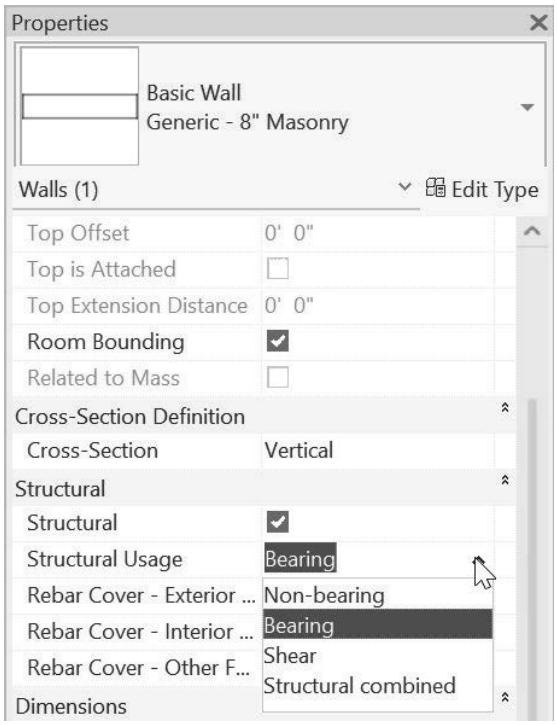


Figure 7–19

Wall Joins

The software automatically joins walls with common materials when they come together at an intersection, as shown on the left in Figure 7–20. However, there are times when you do not want the walls to clean up, such as when one fire-rated wall butts into another, or when a wall touches a column surround, as shown on the right in Figure 7–20.

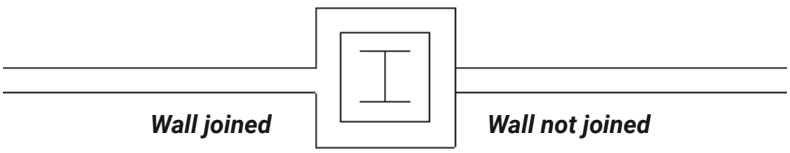


Figure 7–20

- While you are creating walls, change the *Join Status* to **Disallow** in the Options Bar.

- If a wall is already placed, select the wall and right-click on the Drag Wall End control at the end of the wall and select **Disallow Join**, as shown on the left in Figure 7–21. Once the end is not joined, you can drag it to the appropriate location, as shown on the right in Figure 7–21.

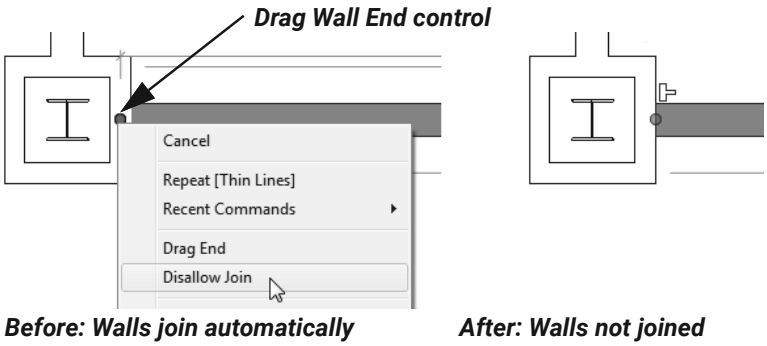


Figure 7–21

- To rejoin the walls, click (Allow Join) or right-click on the end control and select **Allow Join**. Manually drag the wall back to where you want it to touch the target wall.

Editing Wall Joins

Use **Wall Joins** to modify the configuration of the intersections, as shown in Figure 7–22. Do not use this command if you have complex wall joins; instead, modify the length of the wall in relation to the adjoining walls.

Figure 7–22

How To: Modify the Configuration of a Wall Join

1. In the *Modify* tab>*Geometry* panel, click (Wall Joins).
2. Click on the wall join that you want to edit. There is a square box around the join. Hold <Ctrl> to select multiple joins.
3. In the Options Bar, the configuration options display, as shown in Figure 7–23. Select the required options.

Figure 7–23

- Select from three configurations: **Butt**, **Miter**, and **Square off**, as shown in Figure 7–24.

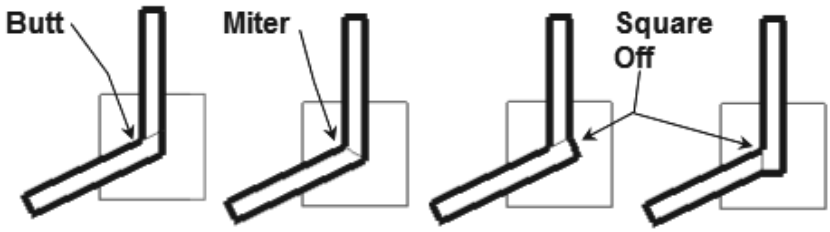


Figure 7–24

- Click **Previous** and **Next** to toggle the butt or squared-off corner configurations through the various intersection options.
- **Allow Join** automatically cleans up the join while **Disallow Join** breaks the connection.

4. The **Wall Joins** command remains active until you select another command.

How To: Modify Display Options of Wall Joins

1. In the *Modify* tab>*Geometry* panel, click (Wall Joins).
2. Click on the wall join that you want to edit.
   - To modify multiple joins at the same time, draw a window around several wall intersections (as shown in Figure 7–25), or hold <Ctrl> and pick additional intersections. A square box displays around each join.

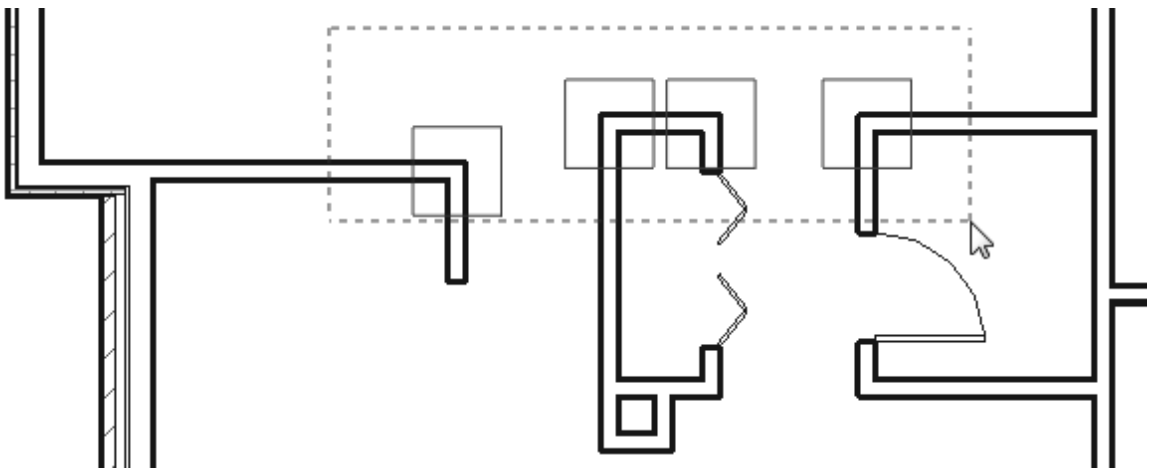


Figure 7–25

- The *Display* controls whether or not wall joins are displayed. The options are **Use View Settings** (set up in View Properties), **Clean Join**, and **Don't Clean Join**, as shown in Figure 7–26.

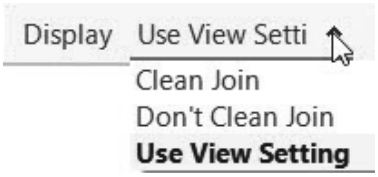


Figure 7–26

3. If you select the end of a wall that is not joined to another wall, you can change the option to **Allow Join** in the Options Bar, as shown in Figure 7–27. Reselect the wall join to make the configurations available.

Figure 7–27

Editing Wall Profiles

Walls often follow the contours of a site or an angle, such as following a line of stairs, as shown in Figure 7–28. If needed, you can edit the profile of a wall.

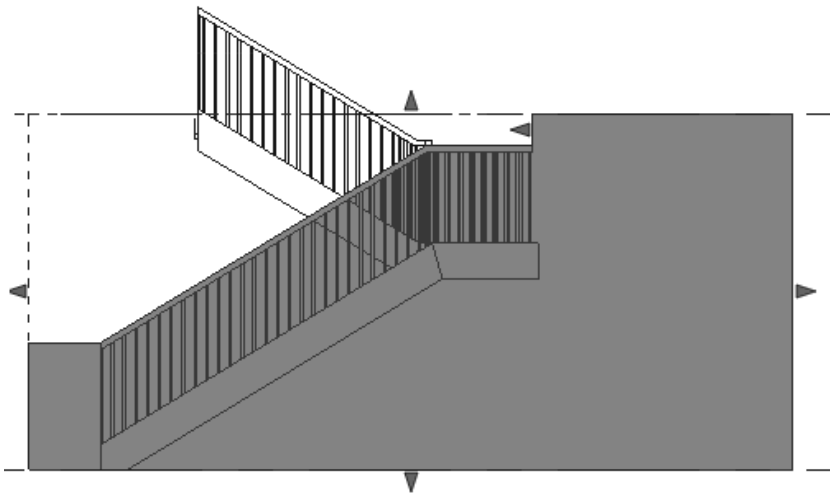


Figure 7–28

How To: Edit the Profile of a Wall

1. Open an elevation or section view in which you can see the face of the wall that you want to edit.
2. Select the wall (by highlighting the wall boundary). You can also double-click on a wall to edit the profile.
   - You cannot edit the profile of a tapered wall.
3. In the *Modify | Walls* tab>*Model* panel, click (Edit Profile). The wall is outlined in magenta, indicating the profile of the wall.
4. In the *Modify | Walls>Edit Profile* tab>*Draw* panel, use the tools to modify the profile sketch of the wall, as shown on the top in Figure 7–29.

   Note: *The sketch must form a continuous loop. Verify that the lines are clean without any gaps or overlaps. Use any of the tools in the Modify panel to clean up the sketch.*

5. Once the profile is complete, click (Finish Edit Mode). The wall now follows the new profile, as shown on the bottom in Figure 7–29.

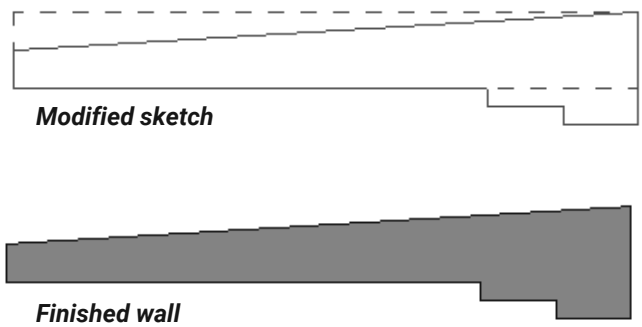


Figure 7–29

- After you adjust the sketch, you can add isolated footings to create the appropriate shape.

Wall Openings

You can add openings in walls that are not windows or doors by using the **Wall Opening** tool. This creates rectangular openings for both straight and curved walls, as shown in Figure 7–30.

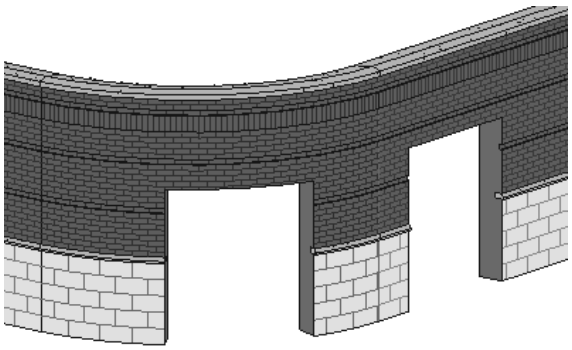


Figure 7–30

How To: Add Wall Openings

1. Open a plan, elevation, section, or 3D view.
2. In the *Architecture* tab>*Openings* panel, click (Wall Opening).
3. Select the wall.
4. Pick two points on the diagonal to determine the opening size, if in elevation, section, or 3D view. If you are in plan, you need to pick the start and stop points for the wall opening.

- You can use temporary dimensions to size the opening while in the command and both temporary dimensions and shape handles to modify the opening when it is selected, as shown in Figure 7–31.

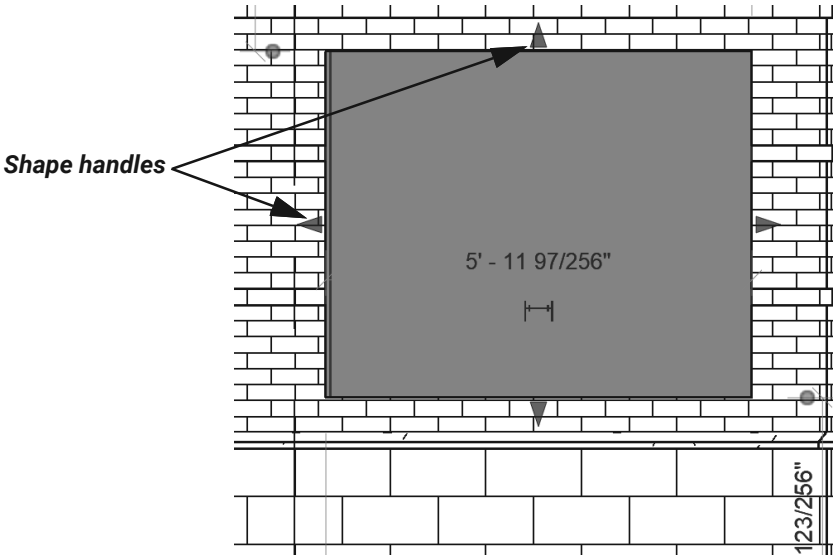


Figure 7–31

Hint: Matching Properties

You can select an existing wall and use it to assign the wall type and instance properties to other walls by using the **Match Type** command. This command also works with all elements that have types.

1. In the *Modify* tab>*Clipboard* panel, click (Match Type), or type **MA**. The cursor changes to an arrow with a clean paintbrush.
2. Select the source element that you want all of the others to match. The paintbrush changes to look as if it has been dipped in black paint, as shown in Figure 7–32.

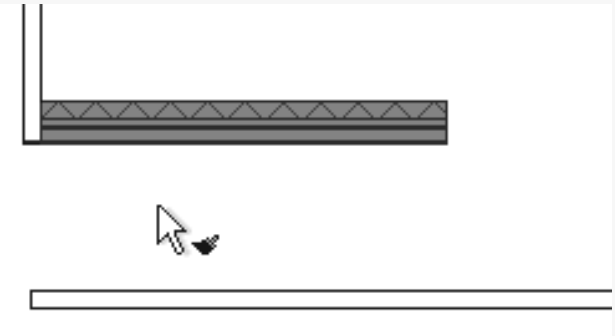


Figure 7–32

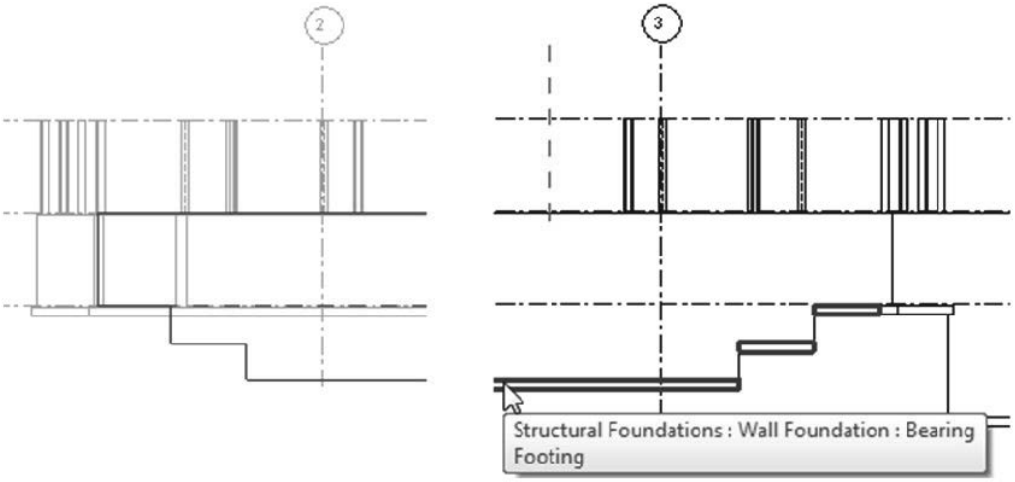
3. To select more than one element, in the *Modify | Match Type* tab>*Multiple* panel, click (Select Multiple). You can then use windows, crossings, <Ctrl>, and <Shift> to create a selection set of elements to change.
4. Click (Finish) to apply the type to the selection.

- Click in an empty space in the view to empty the brush so that you can repeat the command with a different element.
- Elements to be matched must be of the same type (e.g., all walls, all doors, etc.).

5. Click (Modify) to end the command.

7.3 Adding Wall Footings

Footings are appended to the bottom of a wall, which means that any change to the base of the host wall influences the footing. This occurs for lateral movement and horizontal movement. For the example shown in Figure 7–33, when the wall profile changes based on a sloped site (as shown on the left), the footing breaks and follows the modified profile (as shown on the right). This is accomplished by editing the profile of the foundation wall.



Wall profile in process *Completed wall with footing*

Figure 7–33

- Once a footing is in place, you can add reinforcement in a section view, as shown in Figure 7–34. With the advantages of having a true foundation in place, you can accurately tag and schedule the footings.

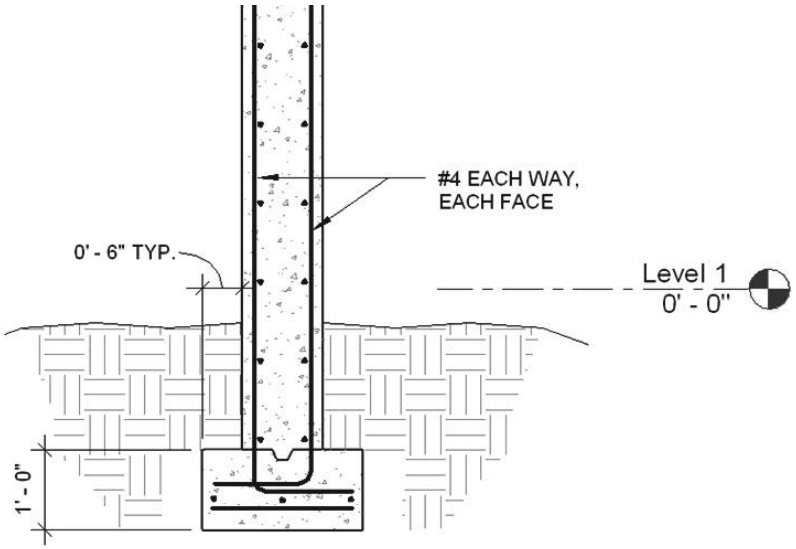
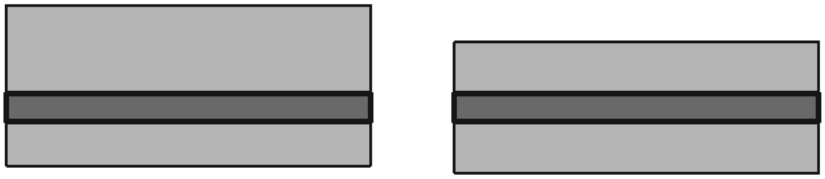


Figure 7–34

- You can edit a footing's profile the same way you would edit a wall profile.
- You can apply two types of continuous footing systems, as shown in Figure 7–35. You must have walls in your model to add a footing system.
  - **Retaining footings:** A footing with one side offset to accommodate additional lateral loads and reinforcement.
  - **Bearing footings:** A footing with an equal distance on either side of the bearing wall.



Retaining footing ***Bearing footing***

Figure 7–35

How To: Place a Bearing or Retaining Footing

1. Create or use existing walls in a 3D, section, or elevation view.
   - A wall must be in place to add a bearing or retaining footing.
2. Open a foundation plan and set it up so that the walls are displayed and you can select them.
3. In the *Structure* tab>*Foundation* panel, click (Structural Foundation: Wall) to start the **Structural Foundations: Wall** command, or type **FT**.
4. In the Type Selector, select a type, as shown in Figure 7–36.

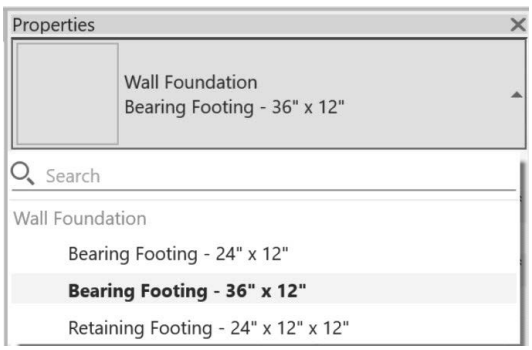


Figure 7–36

5. Select a wall. The footing is placed beneath the wall, as shown in Figure 7–37.

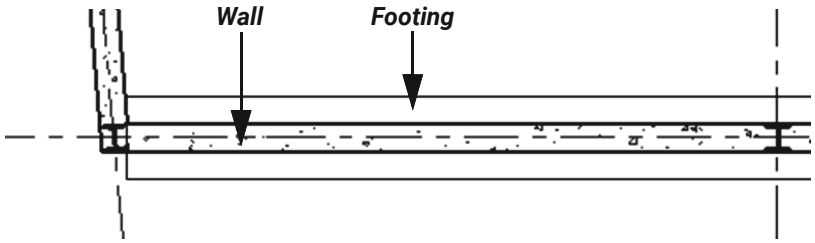


Figure 7–37

- To select multiple walls, hover over one wall and then press <Tab> to select all connected walls. Alternatively, in the *Modify | Place Wall Foundation* tab>*Multiple* panel, click (Select Multiple). Select the walls using any selection method and click (Finish) to place the footings.

- You can flip retaining footings using the Flip control, as shown in Figure 7–38.

Figure 7–38

Hint: Materials

When you are creating some types, such a wall footings, one option is to set the *Structural Material*. In the *Type Properties* dialog box, in the *Materials and Finishes* section, click in the *Value* column and then click (Browse), as shown in Figure 7–39.

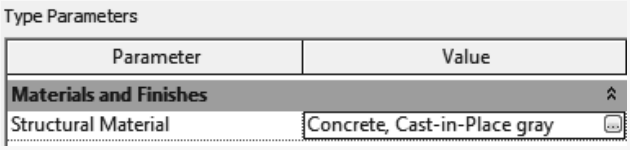


Figure 7–39

In the Material Browser (shown in Figure 7–40), specify the material you want to use and click **OK.**

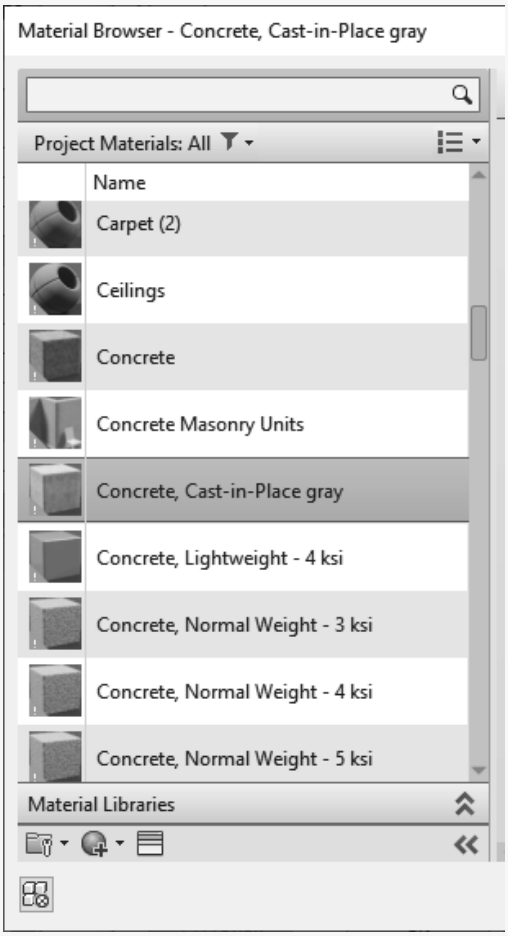


Figure 7–40

Practice 7a
Model Walls and Wall Footings

Practice Objectives

- Place structural walls.
- Create and apply wall footings.

In this practice, you will model the perimeter foundation walls, as shown in Figure 7–41. (Grids have been turned off in the image for clarity.)

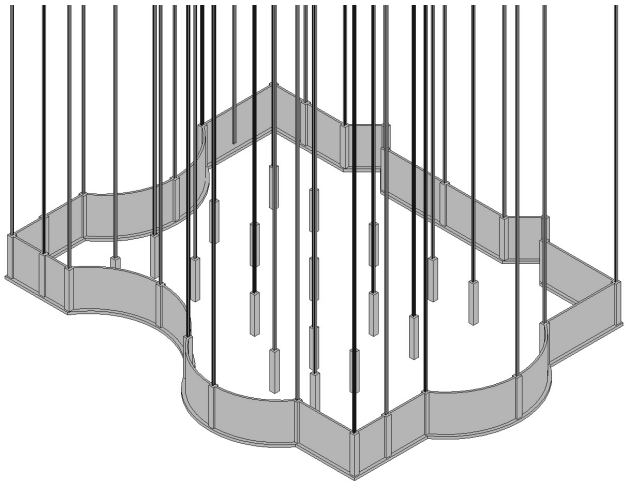


Figure 7–41

Task 1: Add walls.

1. Open **Structural-Walls.rvt** from the practice files folder.
2. Open the **Structural Plan: 00 GROUND FLOOR** view. (The green lines are the outline of the building.)
3. In the *Structure* tab>*Structure* panel, click (Wall: Structural).
4. In the Type Selector, select **Basic Wall: Exterior - 8" Concrete**.
5. In the Options Bar, set the *Depth* to **00 T.O. FOOTING** and ensure that the *Location Line* is set to **Wall Centerline** and that **Chain** is selected.
6. In the *Modify | Place Structural Wall* tab>*Draw* panel, click (Line).

7. Select the start point by snapping to the **G1** grid intersection, as shown in Figure 7–42.

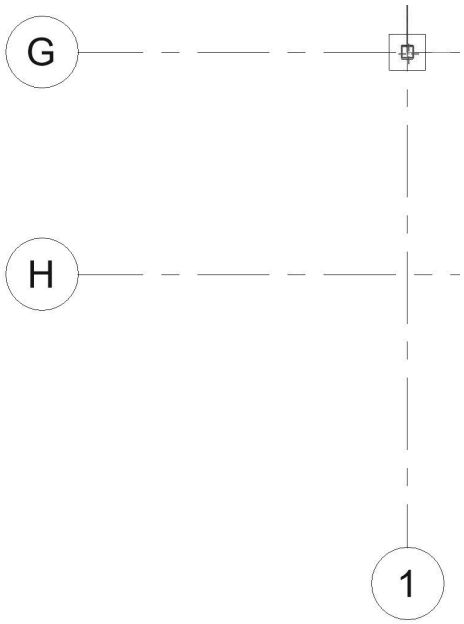


Figure 7–42

8. Draw the wall up to the **E1** grid intersection.

9. In the *Draw* panel, click (Start-End-Radius Arc). Select the second point at the **C1** grid intersection and then the third point anywhere along the green arc to specify the radius of the arc, as shown in Figure 7–43.

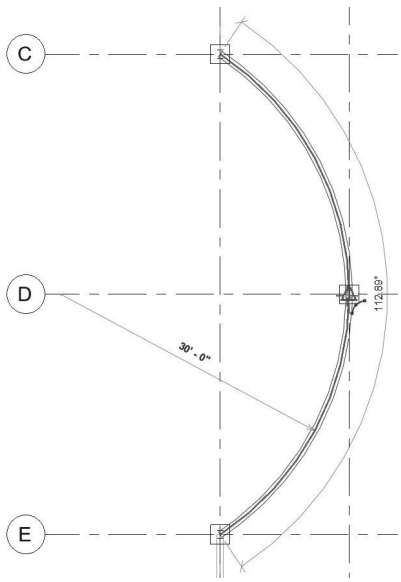


Figure 7–43

10. Click (Line) again and select the **B1** grid intersection.
11. Following the green outline, continue drawing walls all the way around the perimeter, as shown in Figure 7–44.

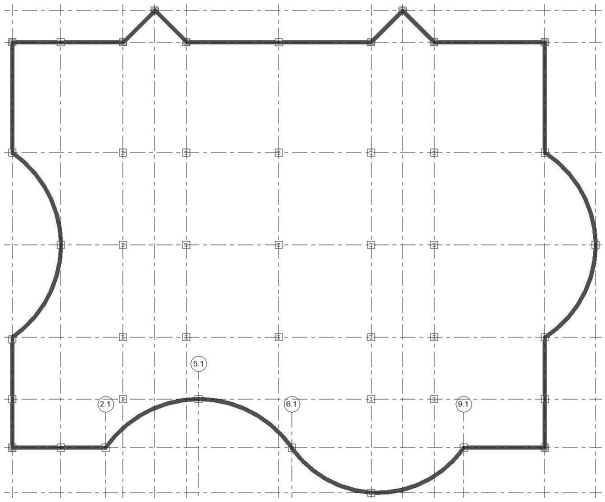


Figure 7–44

12. Click (Modify).
13. Save the project.

Task 2: Apply wall footings.

1. Open the **Structural Plans: 000 FOUNDATION PLAN** view.
2. In the *Structure* tab>*Foundation* panel, click (Structural Foundation: Wall), or type **FT**.

3. In the Type Selector, select the **Wall Foundation: Bearing Footing - 24" x 12"**, as shown in Figure 7–45.

Figure 7–45

4. Hover the cursor over one of the existing walls and press <Tab> to highlight the entire wall system. Click to select the walls. The footing is placed under the entire structure.
5. If you do not see the new wall foundation elements, you might be in an area of the view where they are not visible. Open the **Structural Plans: 000 FOUNDATION PLAN** view.
6. Click (Modify).
7. In the Quick Access Toolbar, click (Default 3D View) to go to a 3D view. Verify that the footing is placed correctly, as shown in part in Figure 7–46. Change the visual style as needed.

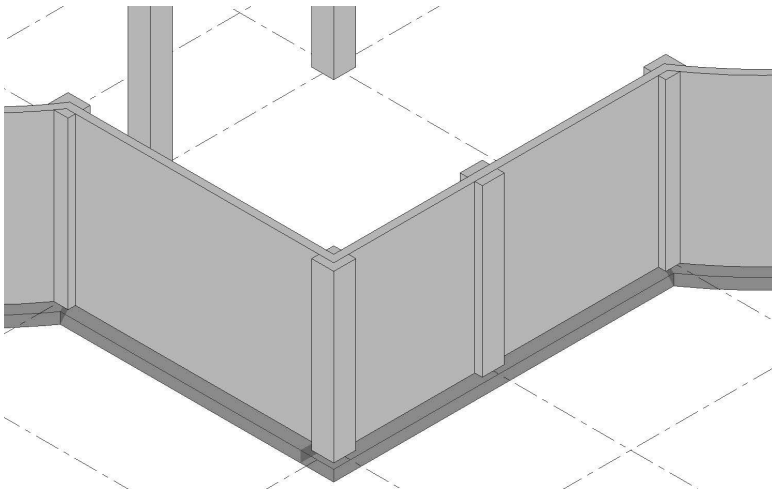


Figure 7–46

8. Save and close the project.

End of practice

7.4 Adding Isolated Footings

Footings for columns (shown in Figure 7–47) are placed using the **Structural Foundation: Isolated** command. When you select a column, the footing automatically attaches to the bottom of the column. This is true even when the bottom of the column is on a lower level than the view you are working in.

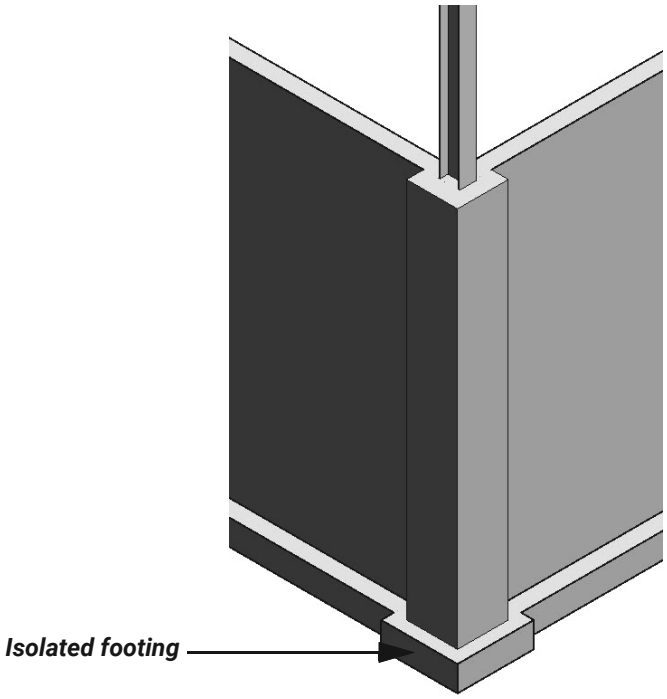


Figure 7–47

How To: Place an Isolated Footing

1. Open a plan view, such as a top of footing structural floor plan.
2. In the *Structure* tab>*Foundation* panel, click (Isolated) to start the **Structural Foundation: Isolated** command.
3. In the Type Selector, select a footing type.

4. In the view, click to place the individual footing, as shown in Figure 7–48.
   - If needed, press <Spacebar> to rotate the isolated footings after they are placed.

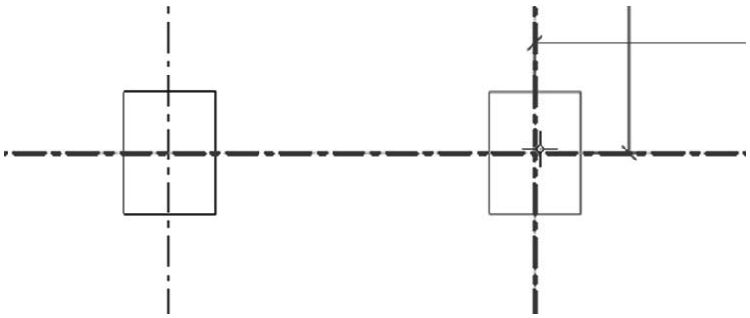


Figure 7–48

- To add more than one footing at a time, in the *Modify | Place Isolated Foundation* tab>*Multiple* panel, select (At Grids) or (At Columns) and select the grids or columns.
  - If needed, press <Spacebar> to rotate the isolated footings after they are placed.
- If the material of the wall footing and the material of the isolated footing are the same, they automatically join, as shown in Figure 7–49.

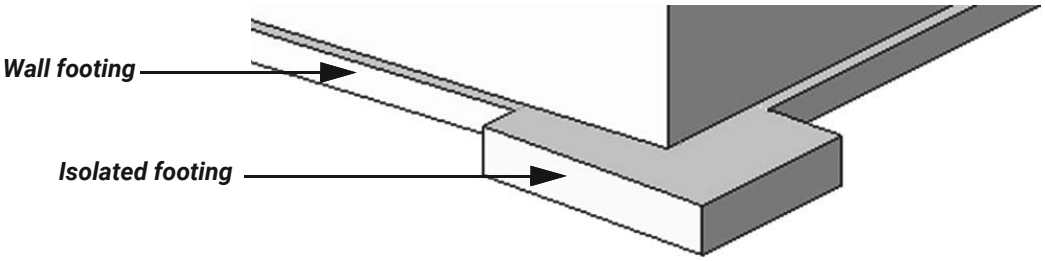


Figure 7–49

Hint: Foundation Element Properties

Some of the element properties are automatically generated from the location and size of the element in the model and are grayed out, for example *Host*, *Elevation at Top*, and *Elevation at Bottom* as shown in Figure 7–50. These can be used in tags and schedules.

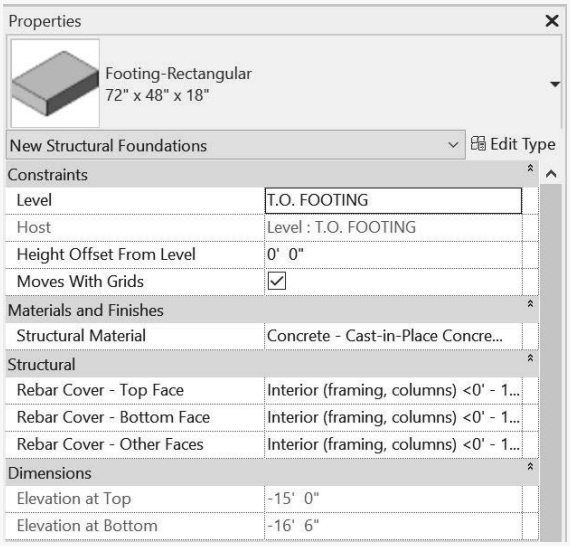


Figure 7–50

Working with Custom Families

Sometimes you need to work with a custom family that has parameters that you can manipulate to fit a specific situation. For example, to add the step footings shown in Figure 7–51, you need to insert an angled isolated footing and modify it to fit the exact size and location.

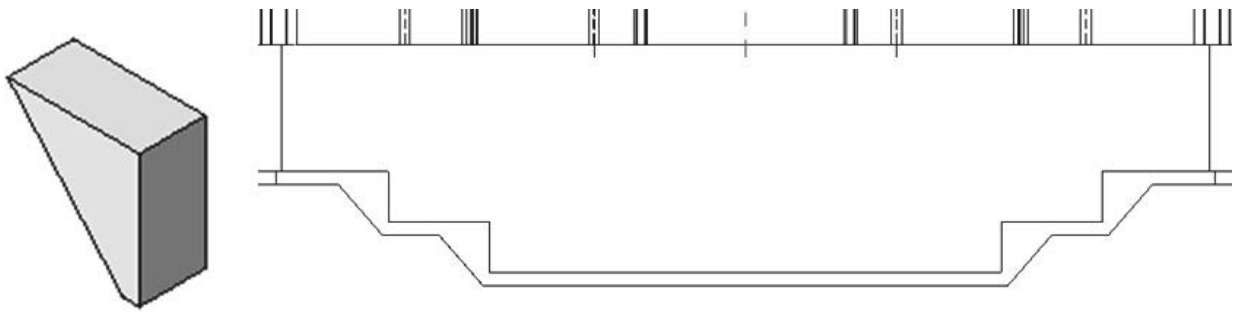


Figure 7–51

How To: Load, Insert, and Modify a Custom Footing

1. Open a plan view.
2. In the *Structure* tab>*Foundation* panel, click (Isolated).
3. In the *Modify | Place Isolated Foundation* tab>*Mode* panel, click (Load Family).
4. In the *Load Family* dialog box, find the structural foundation family that you want to use and click **Open**.
5. Place the footing in the plan view. It might not be in the right place, but you can modify it in a section or elevation view.
6. Open an elevation or section view.
7. Move the footing to the correct location. As long as it is in line with another footing, it automatically cleans up, as shown in Figure 7–52.

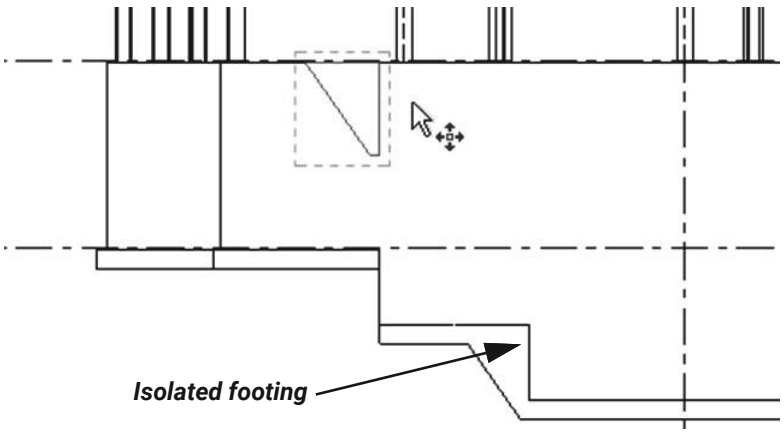


Figure 7–52

- Use (Align) to align the isolated footing with the footing already in the model. When it is aligned, select the lock, as shown in Figure 7–53. This ensures that if the elevation of the footing wall changes, the step footing will also adjust appropriately.

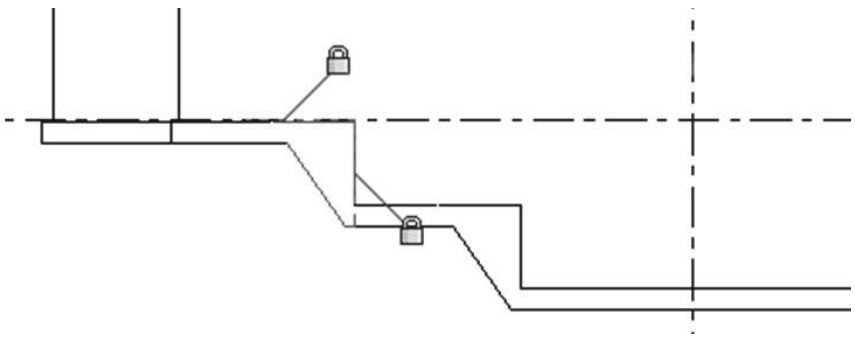
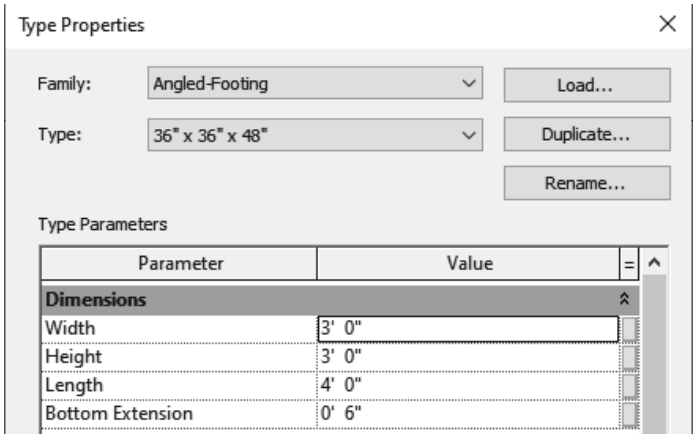


Figure 7–53

- Some custom families have sizing options in either Properties (per instance) or in the *Type Properties* dialog box (as shown in Figure 7–54) so that you can create additional types in various sizes as needed in the project.



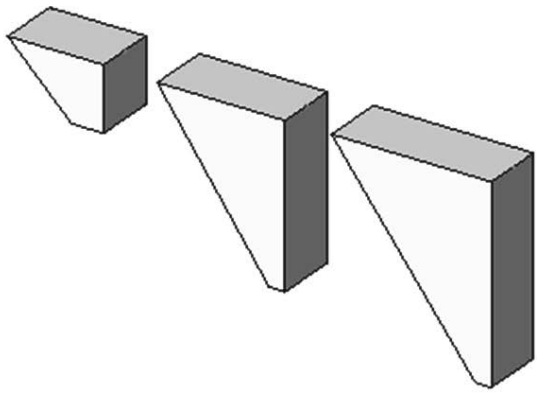


Figure 7–54

Practice 7b
Add Isolated Footings

Practice Objectives

- Place isolated footings.
- Modify a wall profile and add stepped footings.

In this practice, you will place isolated footings, as shown in Figure 7–55. You will also create a series of stepped footings by modifying a wall profile and adding custom footings.

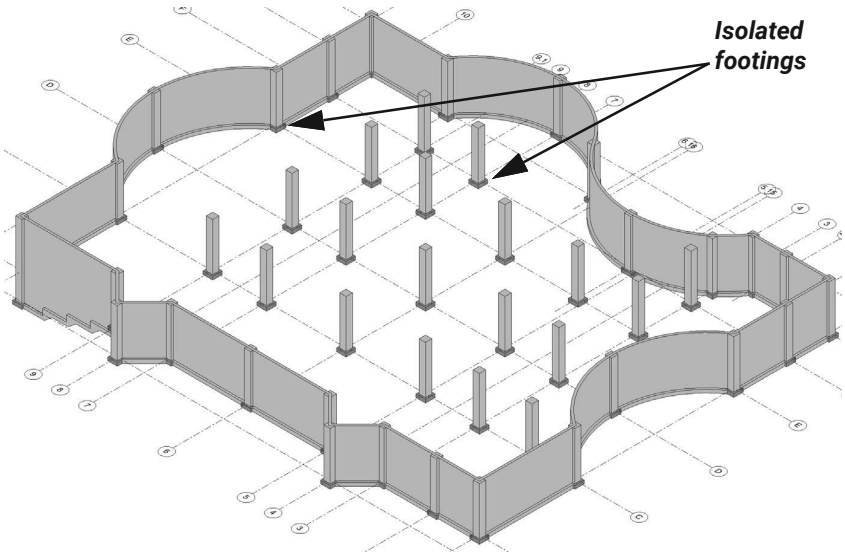


Figure 7–55

Task 1: Place isolated footings.

1. Open **Structural-Footings.rvt** from the practice files folder.
2. Open the **Structural Plans: 00 T.O. FOOTING** view.
3. In the *Structure* tab>*Foundation* panel, click (Isolated).
4. In Properties, select one of the **Footing Rectangular Foundations** and click (Edit Type).
5. In the *Type Properties* dialog box, click **Duplicate...** and name it **36"x36"x12"**.

6. Set the following values for each of the parameters below, as shown in Figure 7–56:
   - *Foundation Thickness:* **1'-0"**
   - *Width:* **3'-0"**
   - *Length:* **3'-0"**

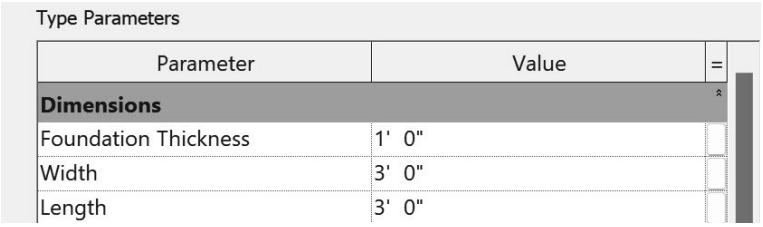


Figure 7–56

7. Click **OK**.
8. Zoom in to the column at the **B1** grid intersection and place the isolated footing. The isolated footing and wall footing automatically join together, as shown in Figure 7–57.

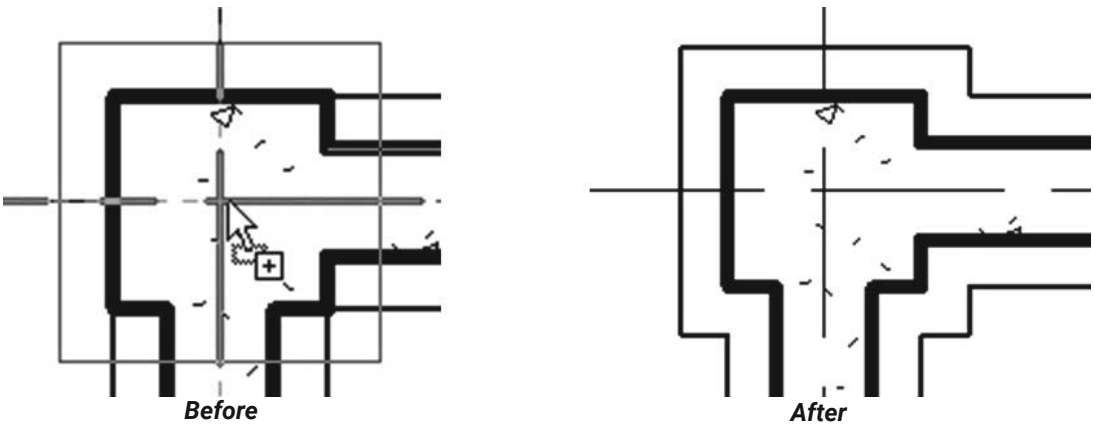


Figure 7–57

9. In the *Modify | Place Isolated Foundation* tab>*Multiple* panel, click (At Columns). Use a pick window to select all of the columns and click (Finish).
10. Reopen the default 3D view.

11. There should be an isolated footing under each pier and pilaster, as shown in Figure 7–58.

Note: *The steel columns were hidden in this figure for clarity.*

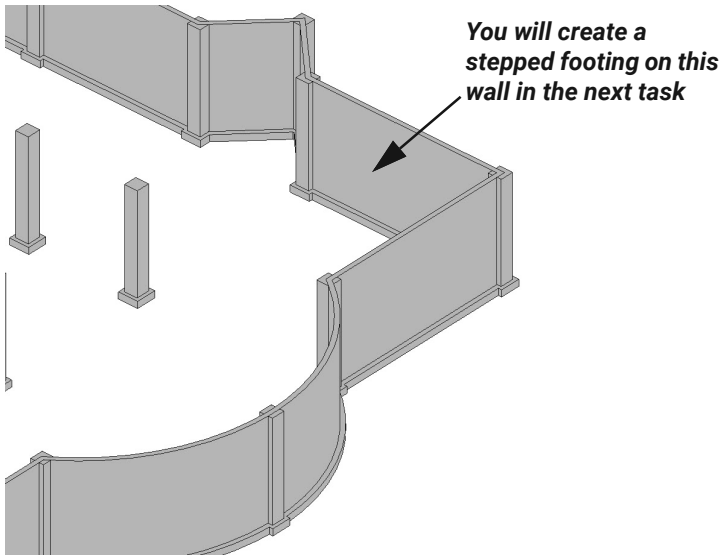


Figure 7–58

12. Save the project.

Task 2: Modify the profile of a wall and add stepped footings.

1. Open the **Elevations (Building Elevation): North** view.

2. Zoom in on the left end of the foundation wall and select the wall located between grid lines **10** and **9**, as shown in Figure 7–59.

Hint: You can turn on (Crop View) and (Show Crop Region) to show less in this view and make it easier to see the grid lines.

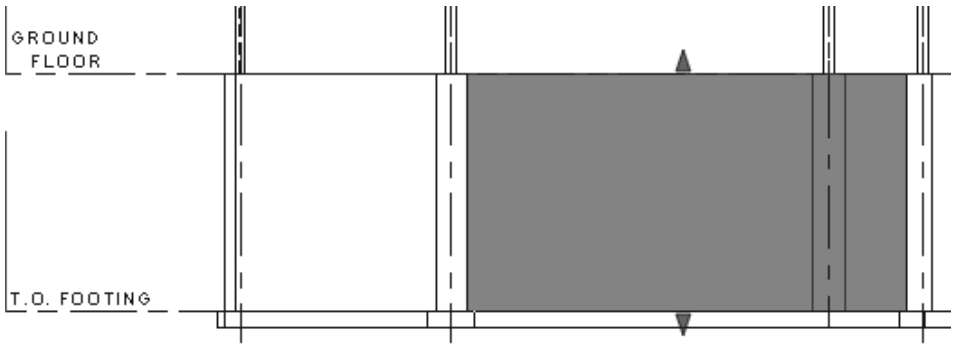


Figure 7–59

3. In the *Modify | Walls* tab>*Mode* panel, click (Edit Profile).

4. Select the wall. Click on the lock at the bottom of the wall.
5. Using the dimensions shown in Figure 7–61, use the Draw and Modify tools to add the stepped profile shown in Figure 7–61. The dimensions are for information only.

   Make sure to remove the bottom of the wall's constraint by clicking on the lock or by moving the line and clicking **Remove Constraints** in the *Error - cannot be ignored* dialog box that displays as shown in Figure 7–60.

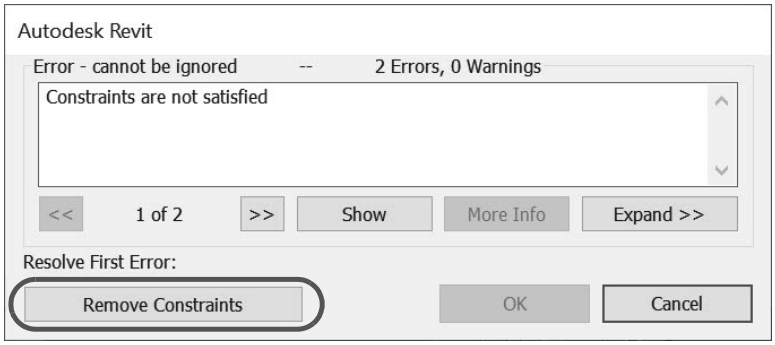


Figure 7–60

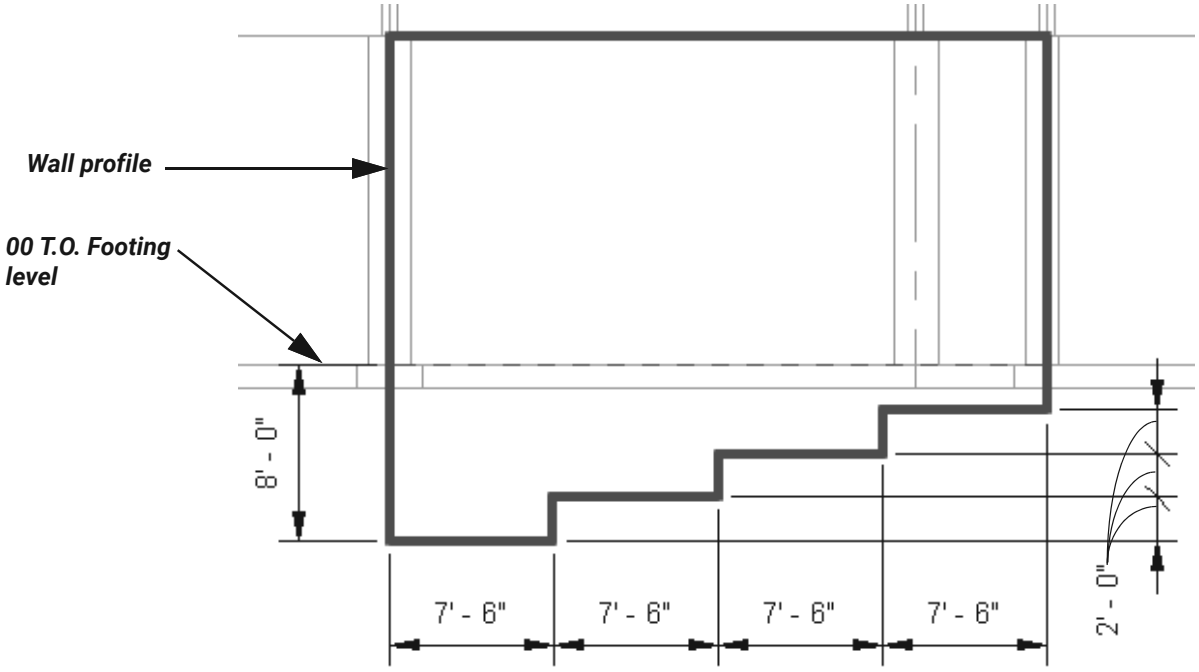


Figure 7–61

6. Click (Finish Edit Mode). The wall profile is modified along with the footings, as shown in Figure 7–62.

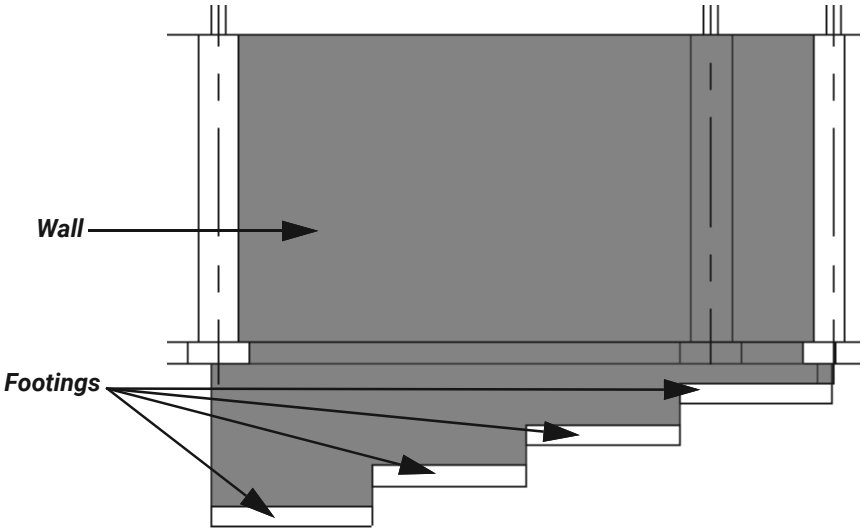


Figure 7–62

7. Open the **Structural Plans: 00 T.O. Footing** view and zoom in on the upper right corner of the **B10** grid intersection. You should be able to see lines that show the steps of the footing below.
8. In the *Structure* tab>*Model* panel, click (Place a Component), or type **CM**.
9. In the Type Selector, select **Angled-Footing: 24" x 24" x 36"**.
10. Place three footings along the wall, similar to those shown in Figure 7–63.

Note: *The exact location does not matter at this time.*

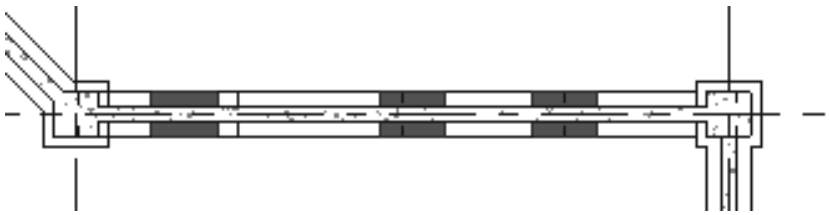


Figure 7–63

11. Return to the **North** elevation view. The three footings are still on the level where they were placed, as shown in Figure 7–64.

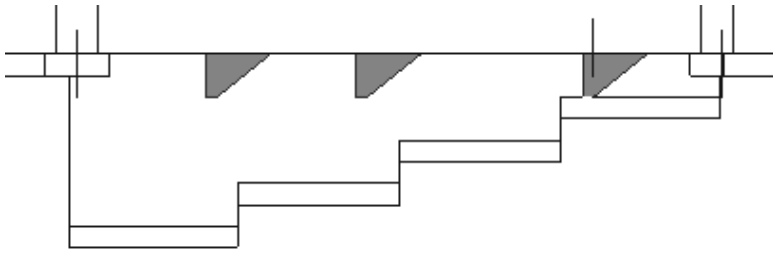


Figure 7–64

12. In the *Modify* tab>*Modify* panel, click (Align), or type **AL**.

13. Align each angled footing to the wall footings, as shown in Figure 7–65.

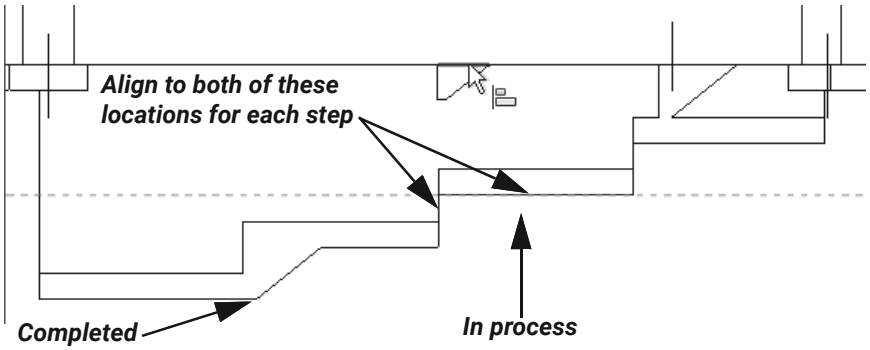


Figure 7–65

14. View the new footings in 3D, as shown in Figure 7–66.

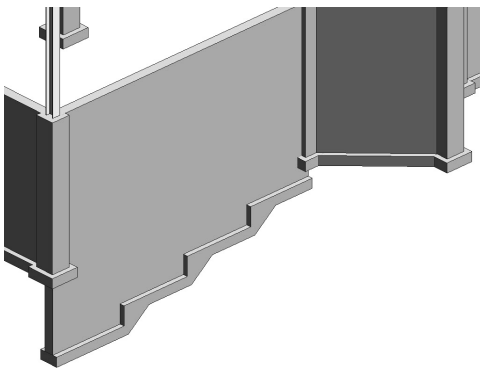


Figure 7–66

15. (Optional) Modify the nearby wall, columns, and footings to match up with the new stepped footings.

16. Save and close the project.

End of practice

Chapter Review Questions

1. Which of the following are ways that you can create walls in a project? (Select all that apply.)
   a. Draw Lines
   b. Pick Lines
   c. Insert Lines
   d. Pick Face

2. Which command do you use to insert a pier or a pilaster such as those shown in Figure 7–67?

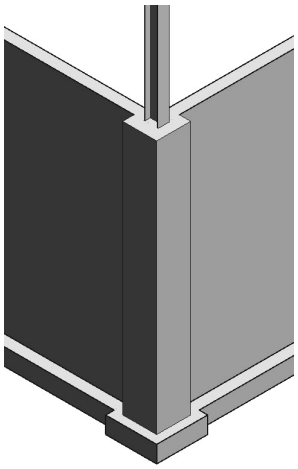


Figure 7–67

   a. Structural Foundation
   b. Isolated Foundation
   c. Structural Column
   d. Isolated Column

3. The (Structural Foundation: Wall) command requires a host wall to already be in place.
   a. True
   b. False

4. Some walls are made from multiple layers of materials, such as brick, block, and drywall, as shown on the bottom in Figure 7–68. If the hatching for these materials is not displayed (as shown at the top in Figure 7–68), how do you change this?

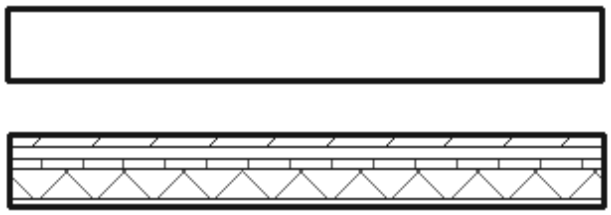


Figure 7–68

a. Set the *Visual Style* to **Realistic**.

b. Set the *Detail Level* to **Medium**.

c. Set the *View Scale* to be higher.

d. Set the *Phase* to **New**.

5. Which command do you use to add a custom footing type under a wall such as the ones shown in Figure 7–69?

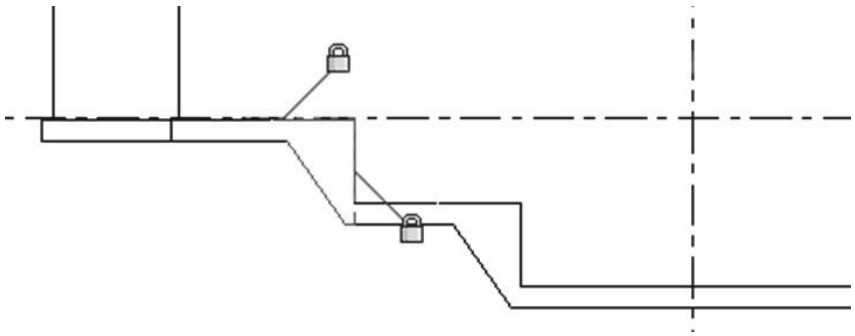


Figure 7–69

a. Component

b. Structural Foundation: Isolated

c. Structural Foundation: Wall

d. Component: Structural Foundation

6. Which command do you use to add a custom footing type under a wall such as the ones shown in Figure 7–70?

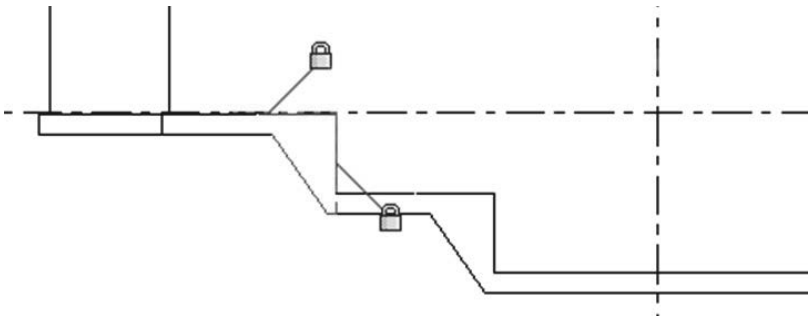


Figure 7–70

a. Component

b. Structural Foundation: Isolated

c. Structural Foundation: Wall

d. Component: Structural Foundation

7. Which of the following are potential differences between the column surround wall and the associated walls, as shown in Figure 7–71? (Select all that apply.)

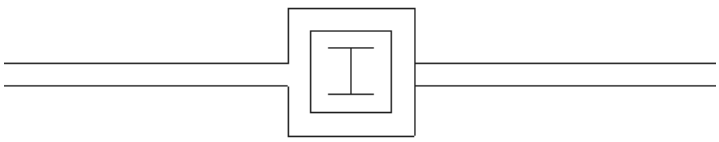


Figure 7–71

a. The column surround and wall on the left are made with the same wall type, while the wall type on the right is a different wall type.

b. The wall on the left has been joined together with the column surround, while the wall on the right was set to **Disallow Join**.

c. The wall on the left was trimmed against the column surround.

d. The wall on the right was extended to the column surround.

8. Which of the following would be true if you changed the top constraint of one wall from an unconnected height to a level?

a. All walls of that type would also change height.

b. Only that wall would change height.

c. You cannot change just one walls height.

Command Summary

Button	Command	Location
	**Detail Level: Coarse**	• **View Control Bar**
	**Detail Level: Fine**	• **View Control Bar**
	**Detail Level: Medium**	• **View Control Bar**
	**Edit Profile**	• **Ribbon:** (when a wall is selected) *Modify* | *Walls* tab> *Mode* panel
	**Isolated**	• **Ribbon:** *Structure* tab>*Foundation* panel
	**Match Type**	• **Ribbon:** *Modify* tab>*Clipboard* panel • **Shortcut:** MA
	**Properties**	• **Ribbon:** *Modify* tab>*Properties* panel • **Shortcut:** PP
	**Structural Foundation: Wall**	• **Ribbon:** *Structure* tab>*Foundation* panel
N/A	**Type Selector**	• **Properties** • **Ribbon:** *Modify* tab (*Optional*) • **Quick Access Toolbar** (*Optional*)
	**Wall**	• **Ribbon:** *Architecture* tab>*Build* panel
	**Wall Opening**	• **Ribbon:** *Architecture* tab>*Opening* panel
	**Wall: Structural**	• **Ribbon:** *Structure* tab>*Structure* panel