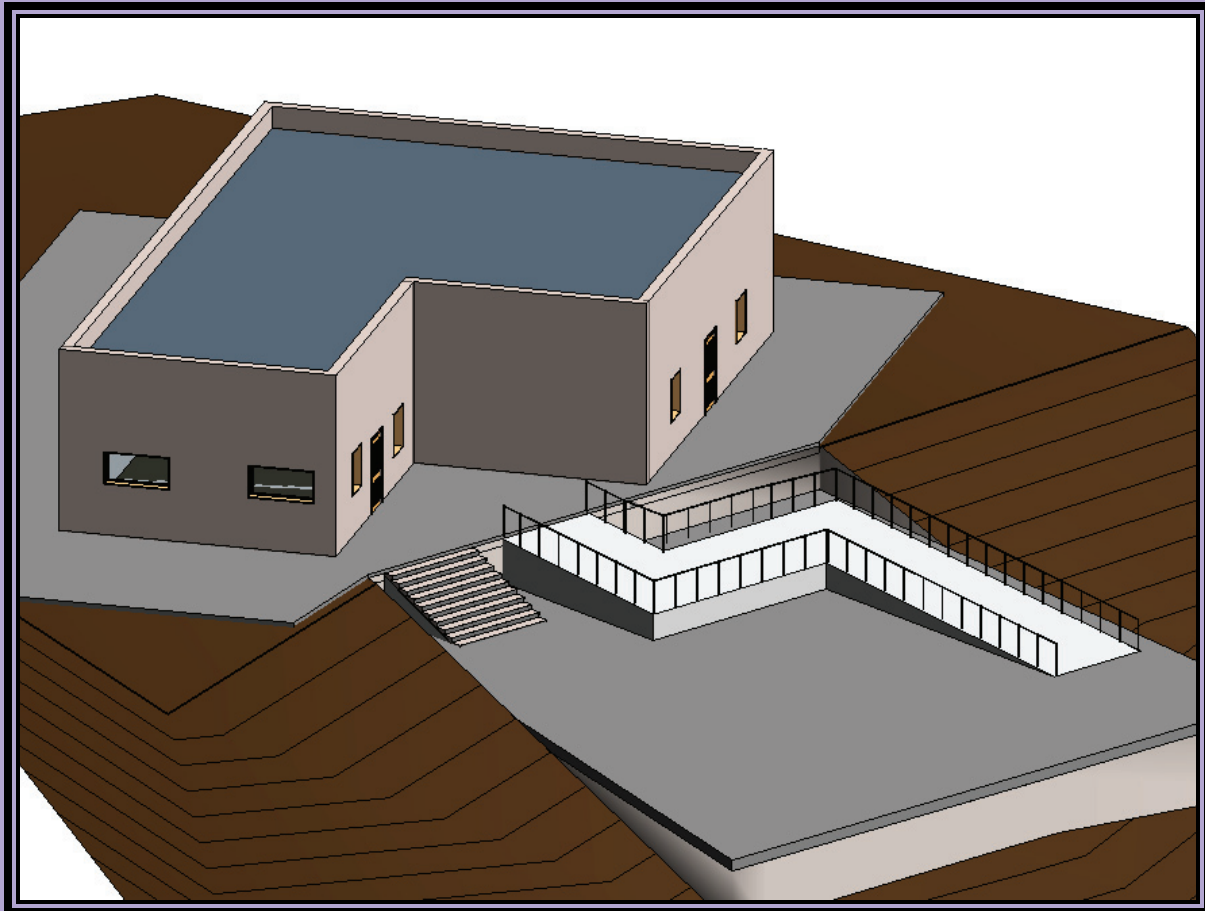


Inside:



Revit Structure 2012 Basics:

Framing and Documentation



Elise Moss

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Lesson One

Structural Columns and Walls

After completing this lesson, you will be able to:

- Load structural columns
- Create structural column types
- Create openings in structural columns
- Use AutoCAD profiles to create a structural column family
- Add and modify structural columns
- Edit a wall profile
- Add an opening in a wall



-
- Pin columns in position to prevent columns from moving.
-

Command Exercise

Exercise 1-1 – Load a Structural Column

Drawing Name: **i_columns.rvt**

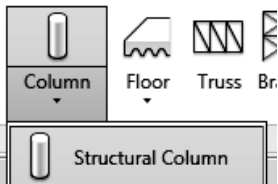
Estimated Time to Completion: 10 Minutes

Scope

Load a structural column

Solution

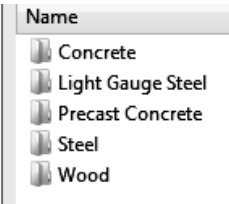
1.  Activate the **FIRST FLR Structural Plan** in the Project Browser.

2.  Activate the **Home** ribbon.
Select **Column**→**Structural Column**.

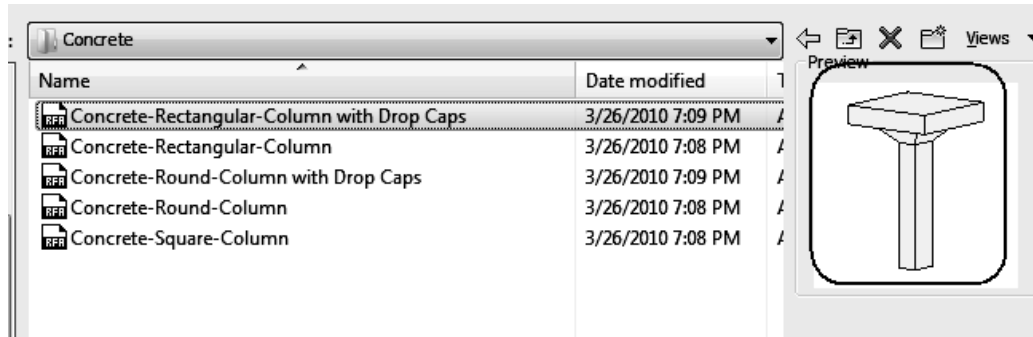
3.  In the Type Selector, note that there are several Wide Flange-Columns available.

4.  Select **Load Family** on the Mode panel.

5.  Browse to the *Columns* folder.

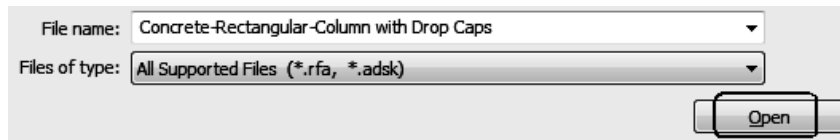
6.  Note the columns are sorted by material type in alphabetical order.
Select the *Concrete* folder.


- Highlight the *Concrete-Rectangular-Column with Drop Caps*.



Note that you see a preview of the family in the Preview window.

- Press Open to load the *Concrete-Rectangular-Column with Drop Caps* family.



- | | |
|---|--|
|  | Concrete-Rectangular-Column with Drop Caps |
| | 12 x 18 |
| | 18 x 24 |
| | 24 x 30 |

On the Properties Pane:
Select the Type Selector to see the different sizes available for that family.
- Close without saving.

Command Exercise

Exercise 1-2 – Modify a Structural Column Family

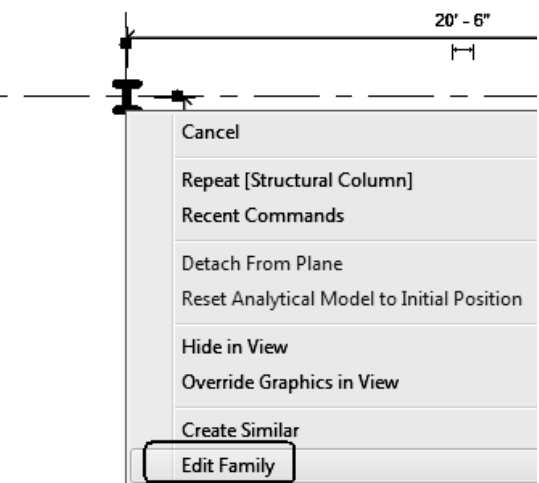
Drawing Name: **modify_columns.rvt**
Estimated Time to Completion: 10 Minutes

Scope

Modify a Wall Profile

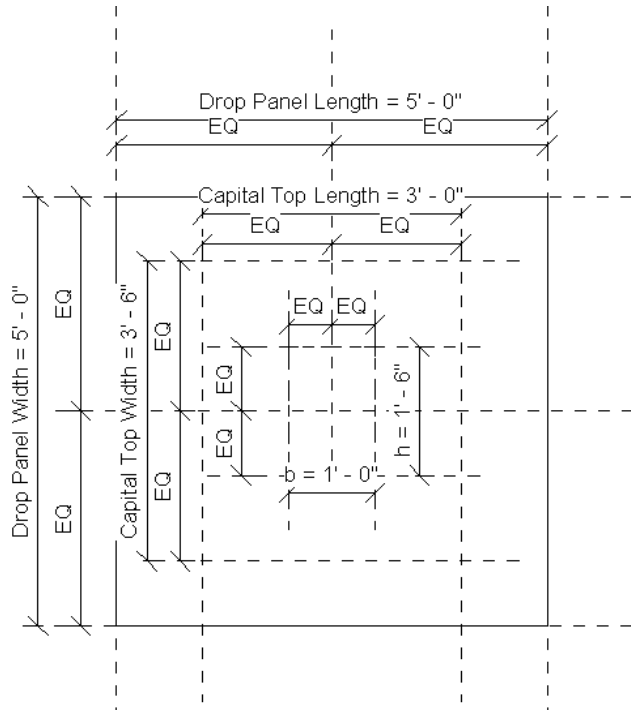
Solution

1.  Activate the **FIRST FLR Structural Plan** in the Project Browser.

2.  Select the column located at **A1**.
Right click and select **Edit Family**.

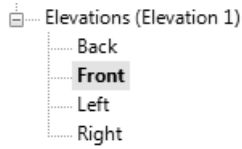
3.  Activate the **Lower Ref. Level** in the Project Browser.

4.



Study the parameters assigned to the different dimensions.

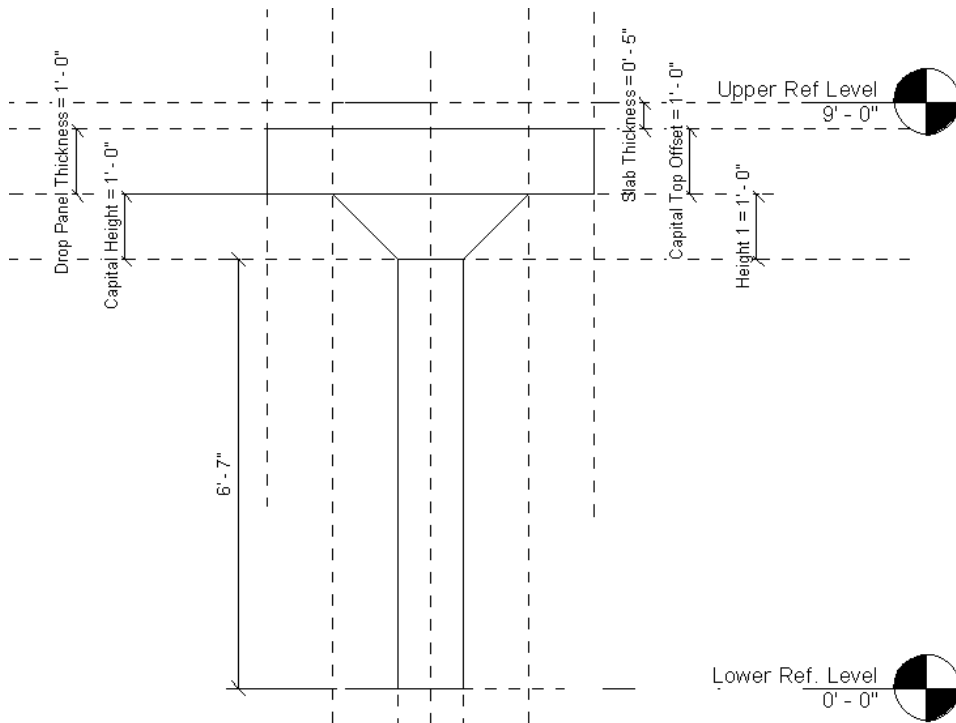
5.




Activate the **Front Elevation** in the Project Browser.


6.

Note how the levels control the height of the column.

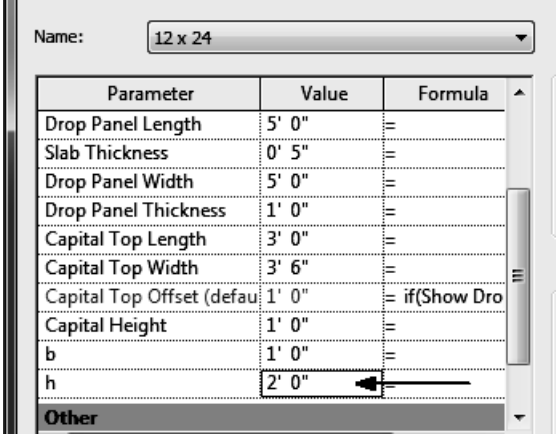


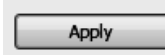
7.  Activate the **Lower Ref. Level** in the Project Browser.

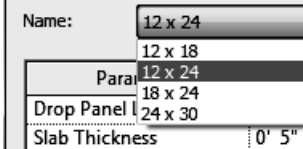
8.  Select **Family Types** on the Properties panel.

9.  Select **New** under Family Types.

10.  Type **12 x 24** for the Name.
Press **OK**.

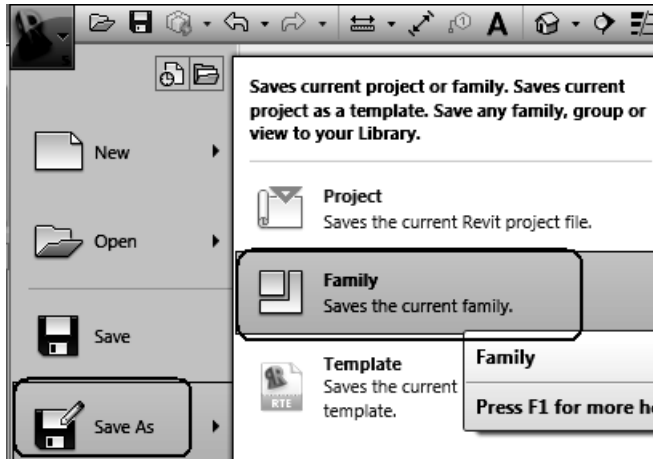
11.  Change the value of h to **2' 0"**.
- | Parameter | Value | Formula |
|------------------------------|-------|---------------|
| Drop Panel Length | 5' 0" | = |
| Slab Thickness | 0' 5" | = |
| Drop Panel Width | 5' 0" | = |
| Drop Panel Thickness | 1' 0" | = |
| Capital Top Length | 3' 0" | = |
| Capital Top Width | 3' 6" | = |
| Capital Top Offset (default) | 1' 0" | = if(Show Dro |
| Capital Height | 1' 0" | = |
| b | 1' 0" | = |
| h | 2' 0" | = |
| Other | | |

12.  Press the **Apply** button.
Observe how the column changes.

13.  Select each size in the type drop-down list.
Press the **Apply** button.
Observe how the column changes.

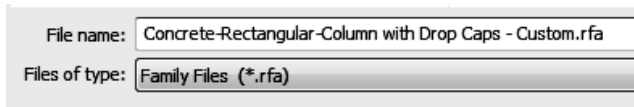
14. Press **OK**.

15.



Go to the Applications Menu.
Select **Save As** → **Family**.

16.



Browse to your exercise folder.
Save the family as a Custom family.

17. Close without saving.

Command Exercise

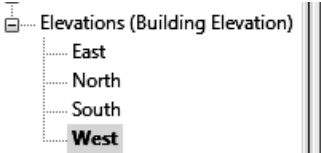
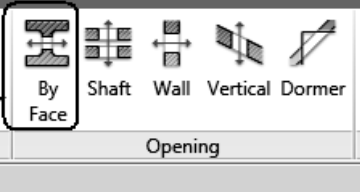
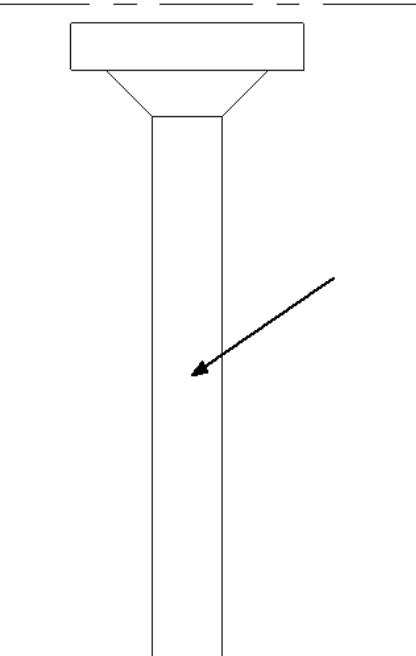
Exercise 1-3 – Create an Opening in a Structural Column

Drawing Name: **modify_columns.rvt**
Estimated Time to Completion: 10 Minutes

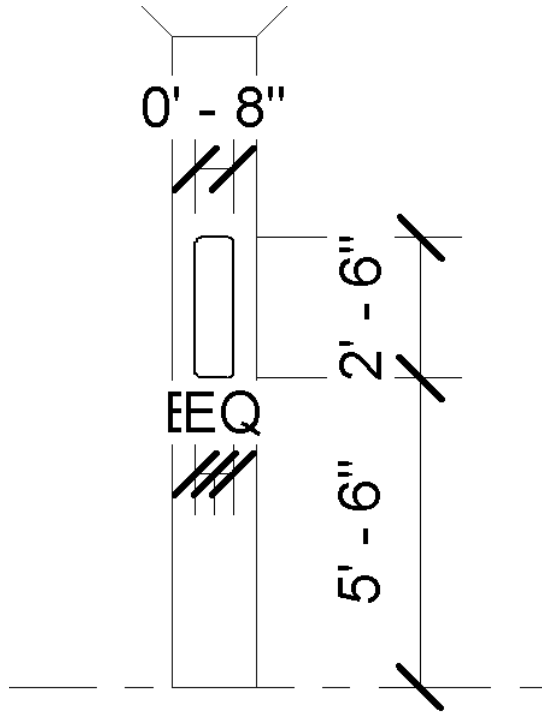
Scope

Modify a Wall Profile

Solution

-  1. **Activate the West Elevation.**
-  2. **Activate the Home ribbon. Select the By Face tool on the Opening panel.**
-  3. **Left click to select the face of the column.**

4.



Create the sketch shown.



Draw a rectangle.

The rectangle is 2' 6" x 8".

Center the rectangle on the column by applying an EQ dimension between the reference plane and two horizontal dimensions.

Position the sketch so it is 5' 6" from the Basement Level.



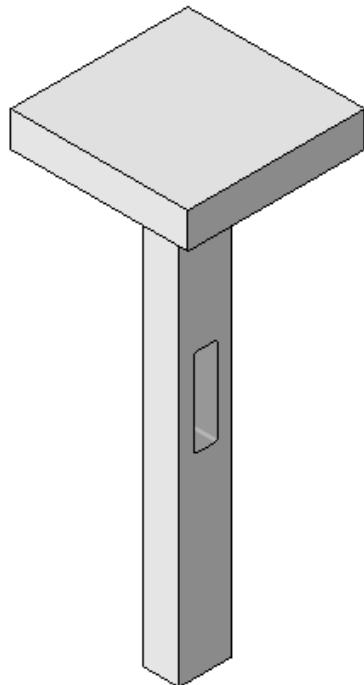
Add a 1" fillet to each corner using the Fillet Arc tool.

5.



Select the green check on the Mode panel to finish the opening.

6.



Switch to a 3D view so you can inspect the new opening.

7. Close without saving.

Command Exercise

Exercise 1-4 – Use AutoCAD Profile to Create a Structural Column Family

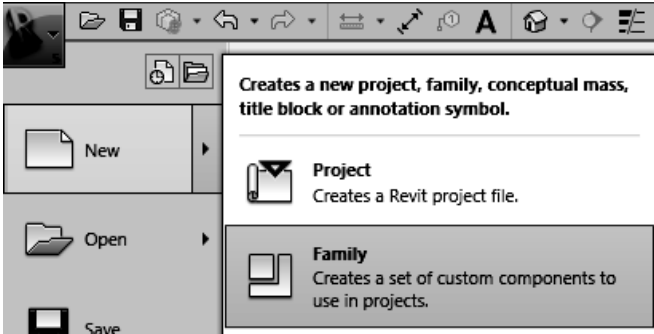
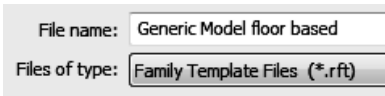
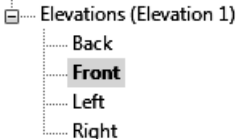


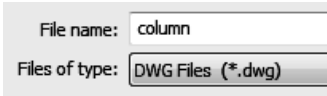
Drawing Name: **column.dwg**

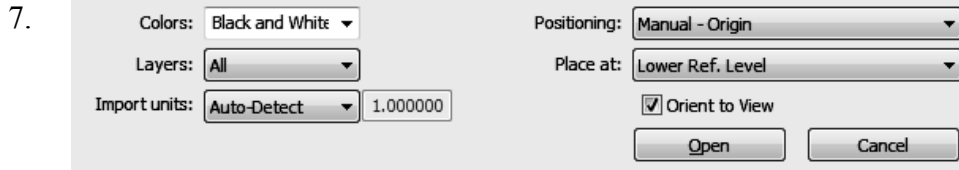
Estimated Time to Completion: 60 Minutes

Scope

Create a custom column family

Solution

-  On the Application Menu:
Go to **New** → **Family**.
-  Locate the *Generic Model floor based* template under the *Imperial Templates* folder.
Press **Open**.
-  Activate the **Front** elevation.
-  Activate the **Home** ribbon.
Select **Revolve** from the Forms panel.
-  Activate the **Insert** ribbon.
Select the **Import CAD** tool.
-  Locate the **column.dwg** file in the exercise folder.



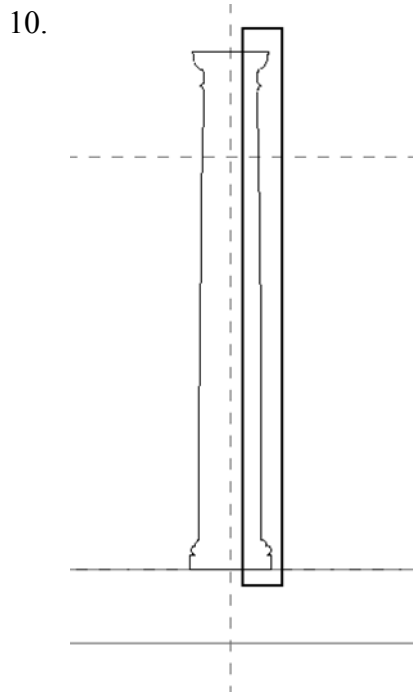
Set Colors to **Black and White**.
 Set Layers to **All**.
 Set Import Units to **Auto-Detect**.
 Set Positioning to **Manual - Origin**.
 Press **Open**.



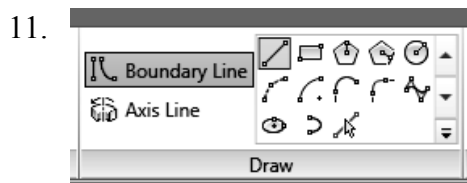
Press **Yes**.

The imported file was automatically exploded.

9. Right click and select Zoom to Fit.

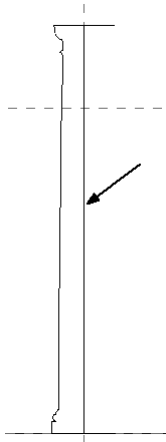



Window around the right side of the column.
 Delete the right side by pressing the Delete key on the keyboard or right click and select **Delete**.



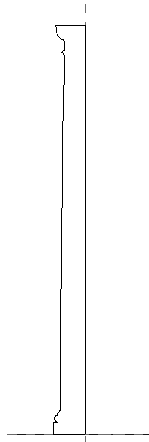
Highlight Boundary Line.
 Select the **Line** tool on the Draw panel.

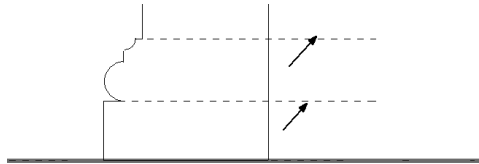
12. Draw a vertical line to close the profile.




13.  Select the **Trim** tool from the Modify panel.

14. Use the Trim tool to clean up the profile.

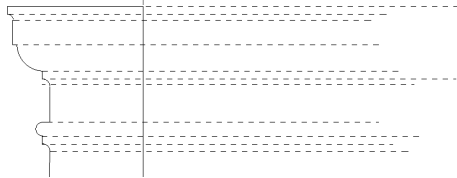


15.  Zoom into the base of the column sketch. Activate the Home ribbon. Add two reference planes aligned to the two horizontal lines.

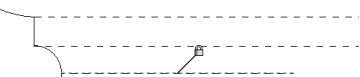
16.  Use the ALIGN tool to lock each horizontal sketch line to the reference plane.

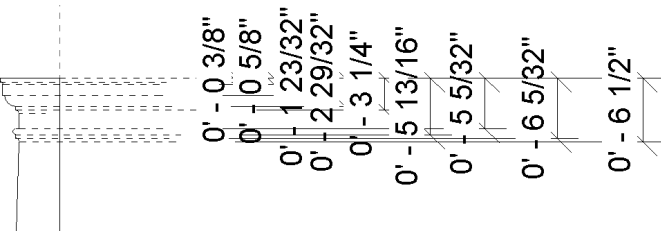
17.  Add an aligned dimension between each new reference plane and the Ref. Level.

Be sure to select the Ref. Level and the reference plane – not the column sketch or floor!

18.  Zoom into the top of the column sketch. Activate the Home ribbon. Add eleven reference planes aligned to each horizontal point that defines the profile.

Reference planes are used to control the geometry.

19.  Use the ALIGN tool to lock each horizontal sketch point/line to the reference plane.

20.  Add an aligned dimension between each new reference plane and the top reference plane.

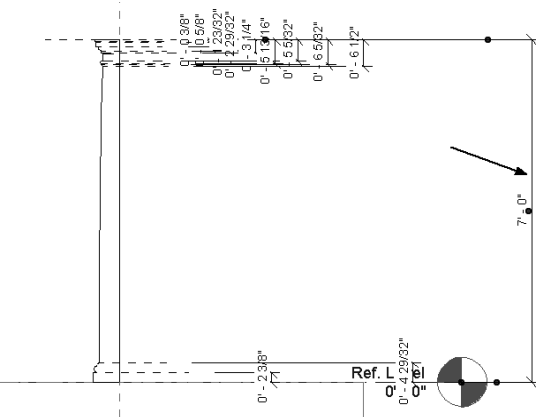
Be sure to select the reference planes – not the column sketch!

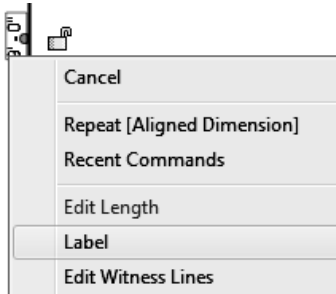
21. Select the top reference plane so it is highlighted.



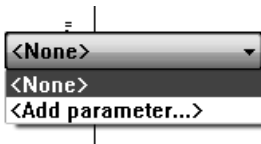
In the Properties pane, enter **Column Top** as the name for the reference plane.

Hint: By naming reference planes, they can be selected as work planes and used in formulas.

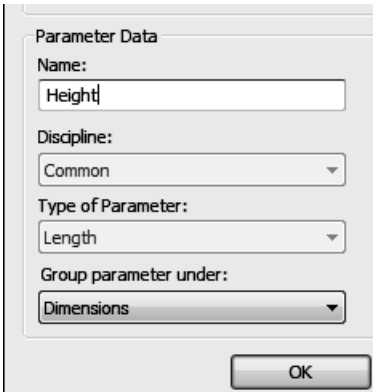
22.  Select the **Aligned Dimension** tool. Add a dimension between the top reference plane and the Ref. Level at the bottom.

23.  Select the dimension. Right click and select **Label**.

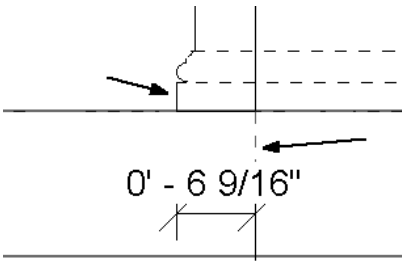
24. Select the **Add parameter** option from the Label drop-down list.



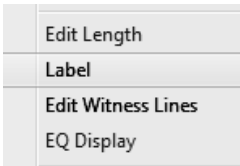
25. Set the Name to **Height**.
Enable **Type**.
Press **OK**.



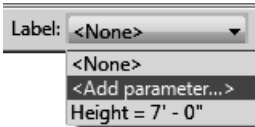
26. Add an aligned dimension between the base vertical line and the center reference plane.



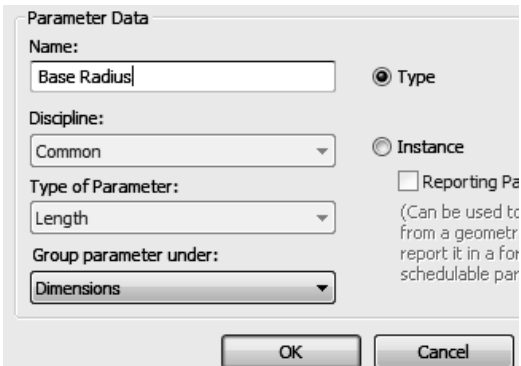
27. Select the dimension.
Right click and select **Label**.



28. Select the **Add parameter** option from the Label drop-down list.

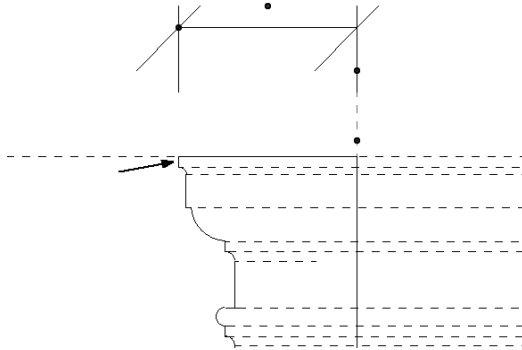


29. Set the Name to **Base Radius**.
Enable **Type**.
Press **OK**.



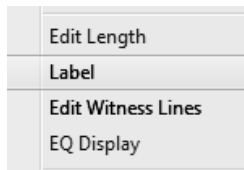
30.

0' - 6 5/32"



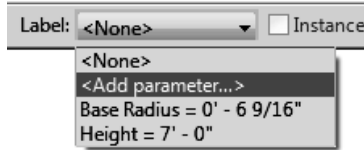
Add an aligned dimension between the top vertical line and the center reference plane.

31.



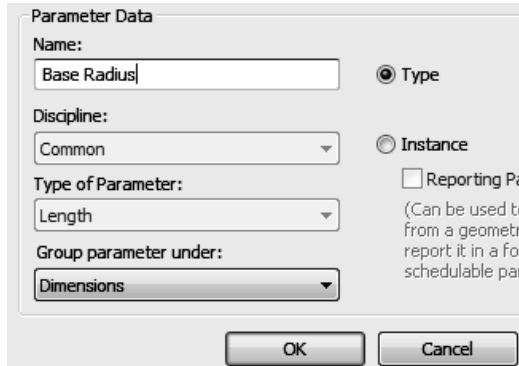
Select the dimension.
Right click and select **Label**.

32.



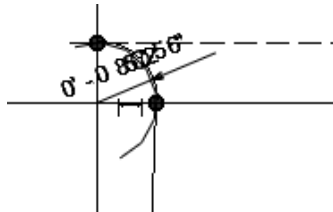
Select the **Add parameter** option from the Label dropdown list.

33.



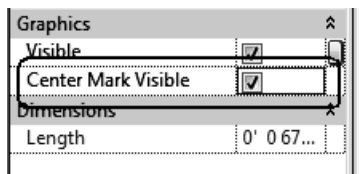
Set the Name to **Base Radius**.
Enable **Type**.
Press **OK**.

34.



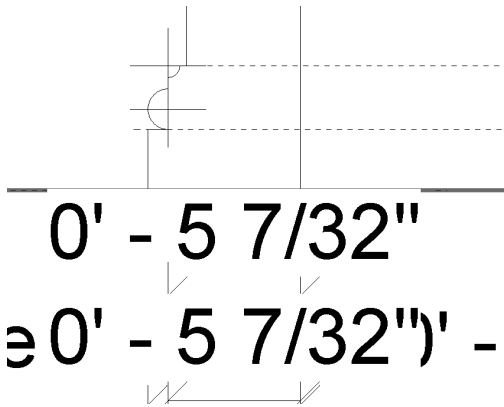
Select each arc in the sketch.

35.



In the Properties pane:
Enable **Center Mark Visible**.
Repeat for each arc.

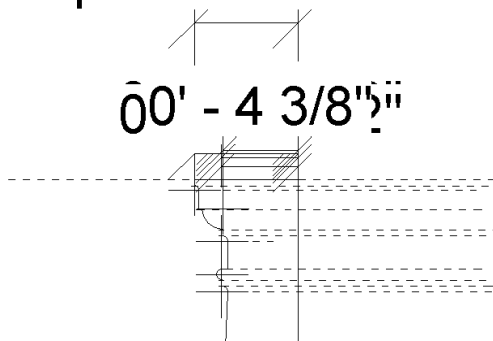
36.



Add an aligned dimension between the center mark for each arc and the center reference plane.

37. The values of the aligned dimensions don't matter and shouldn't be locked. These dimensions just ensure that the geometry stays in a proper location.

Top Radius = 0' - 6"

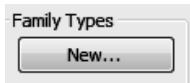


38.



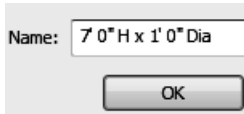
Select the **Types** tool on the Ribbon.

39.



Press **New** under Family Types.

40.



Type **7' 0" H x 1' 0" Dia**.
Press **OK**.

41.

Parameter	Value	Fc
Dimensions		
Top Radius	0' 6"	=
Height	7' 0"	=
Base Radius	0' 6"	=
Identity Data		

Verify the Height is set to **7' 0"**.
Change the Top and Bottom Radius to **6"**.
Press **Apply** and verify that the sketch updates.
Press **OK**.

42.

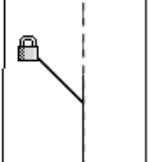
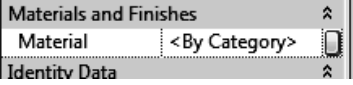



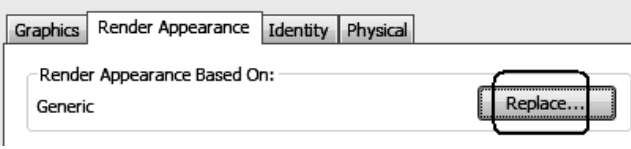





Axis Line Highlight the Axis Line tool.

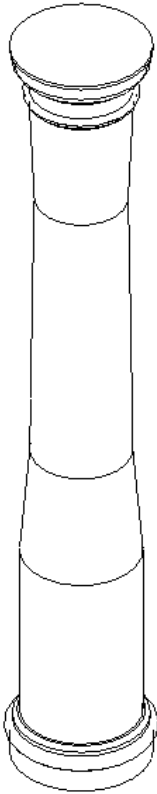
43.




Select the **Pick Tool** from the Draw panel.
Select the center vertical plane.

44.  Lock the axis into position.
45.  In the Properties pane:
Select the Material column.
46.  Highlight the **Default** material.
Select **Duplicate** at the bottom left of the dialog box.
47.  Name: Concrete Type **Concrete**.
Press **OK**.
48.  On the Graphics tab:
Enable **Use Render Appearance for Shading**.
49.  On the Render Appearance tab:
Select **Replace**.
50.  Type concrete in the search field located in the upper right of the dialog.
- All the concrete material definitions will be displayed.
51.  Select the **Smooth Precast Structural** material.
Press **OK**.
52. Switch to a 3D view.
53.  Select the **Green Check** to Finish the Revolve.

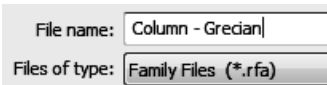
54. Your column should be formed.



55.  Activate the **Home** ribbon.
Select the **Family Categories** tool.

56.  Select **Structural Columns**.
Press **OK**.

This adds the properties for Structural Columns to the family.

57.  Save the column in your exercise folder.
Name the file *Column - Grecian*.

Command Exercise

Exercise 1-5 – Add and Modify Structural Columns

Drawing Name: **i_columns.rvt**

Estimated Time to Completion: 30 Minutes

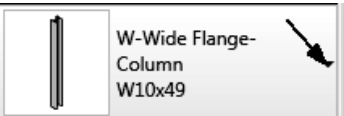
Scope

Add Structural Columns
Modify Structural Columns

Solution

1.  Activate the **First Flr.** under Structural Plans in the Project Browser.

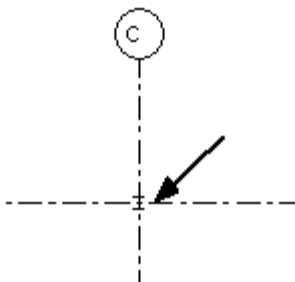
2.  Activate the **Home** ribbon.
Select **Structural Column**.

3.  Use the Type Selector to select **W-Wide Flange-Column W10x49**.

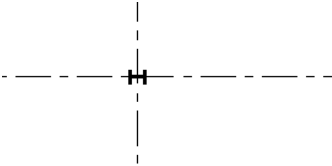
4.  On the Options bar:
Set the Height to **ROOF**.

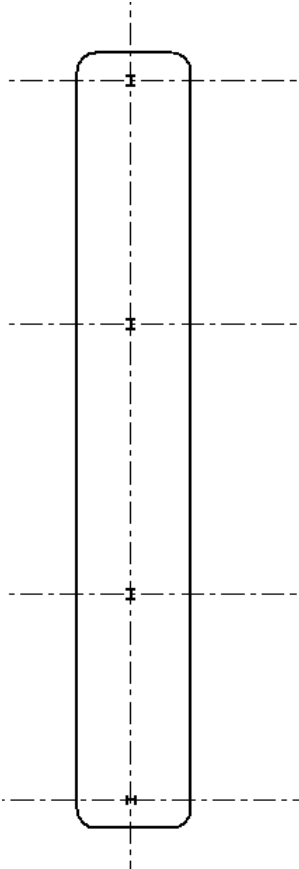
5.  On the ribbon:
Select **At Grids**.


To place columns at grid intersections, select the vertical and horizontal grid.

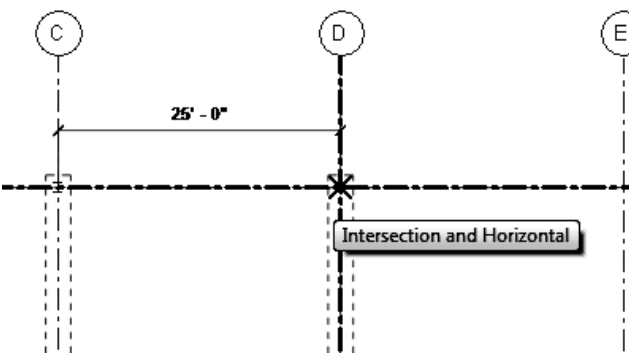
6.  Select the C grid and the 1 grid to place the first column.
Press **Enter** to confirm the placement.
Repeat to place columns at C2, C3, and C4 by performing the following steps:
 1. Select **At Grids**.
 2. Select a horizontal and vertical grid to identify the intersection.
 3. Press **ENTER**.

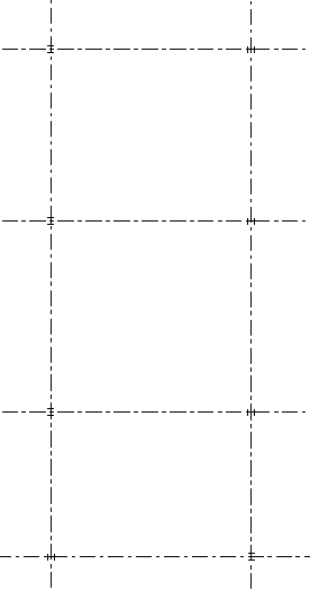
7. Right click and select **Cancel** to finish placing columns.

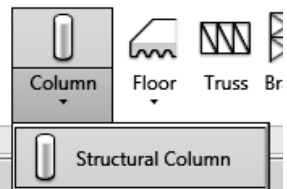
8.  Select the column at the **C4** intersection.
Press the **SPACEBAR**.
Note that the column rotates.

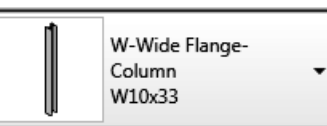
9.  Window around the four columns that have been placed.
You should see the column type in the Properties pane.

10.  Select the **Copy** tool from the Modify panel.

11.  Select the C1 intersection as the base point and the D1 intersection as the target point.
Note all the copied columns are highlighted.
Press the **SPACEBAR**.

12.  Note that the columns on the D grid have rotated 90 degrees.

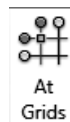
13.  Activate the **Home** ribbon.
Select **Structural Column**.

14.  Use the Type Selector to select **W-Wide Flange-Column W10x33**.


15. 

On the Options bar:
Enable **Rotate after placement**.
Set the Height to **ROOF**.

16. Select the **At Grids** mode.
Select the **B** grid.
Select the **1** grid.
This sets the intersection to B1.



17. Press the **SPACEBAR**.
Note that the column rotates.

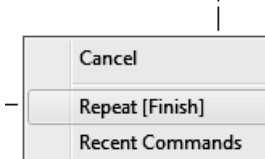
18.  Select **Finish** from the ribbon to complete the column placement.

Note: If you press ENTER, you will re-initialize the grid selection and the column is not placed. This is a bug which may be resolved in a later release.

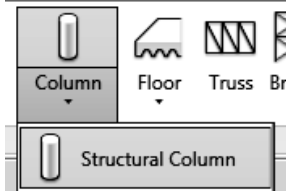
19. Repeat to add columns at E1, F1, B4, E4, and F4.
Set the columns horizontal at each grid intersection.

Hint: You can also right click to select Finish once you have placed the column.

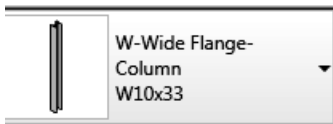
20. Right click and select **Cancel** to exit placing columns.



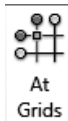
21. Activate the **Home** ribbon.
Select **Structural Column**.




22. Use the Type Selector to select **W-Wide Flange-Column W10x33**.



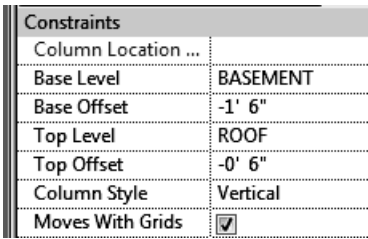
23. Select the **At Grids** mode.



24. Hold down the **CTRL** key and select A1, A2, G1, and G4 intersections.

25.  Select **Finish** from the ribbon.
Columns are placed at each intersection.


26. Window around the columns so they are all selected.

27.  In the Properties pane:
Set the Base Level to **BASEMENT**.
Set the Base Offset to **-1' 6"**.
This places the column's bottom face 1' 6" below the BASEMENT level.

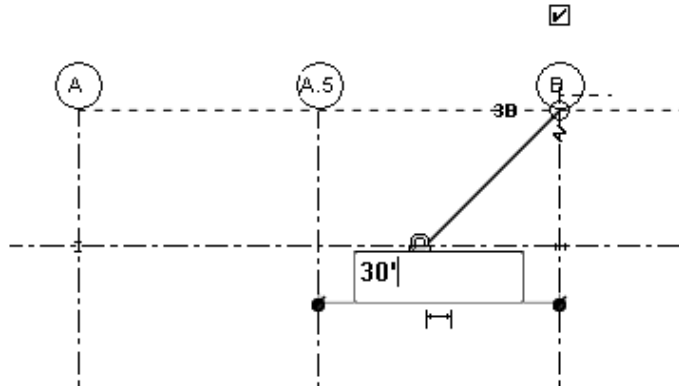
Set the Top Level to **ROOF**.

Set the Top Offset to **-6"**.

This places the column's top face 6" below the ROOF level.

28.  Press the **Apply** button at the bottom of the Properties pane.

29.



Select the B grid.
Change the dimension
between A.5 and B to **30' 0"**.

Note that the columns remain aligned to the grid.

30.  3D Views
 {3D}

Activate the 3D view.

31. Close without saving.

Command Exercise

Exercise 1-6 – Edit a Wall Profile

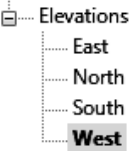
Drawing Name: **wall profile.rvt**

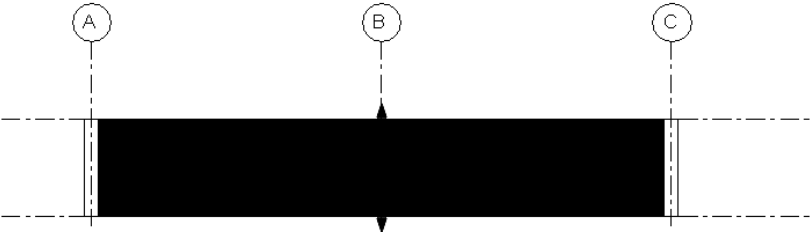
Estimated Time to Completion: 10 Minutes

Scope


Modify a Wall Profile

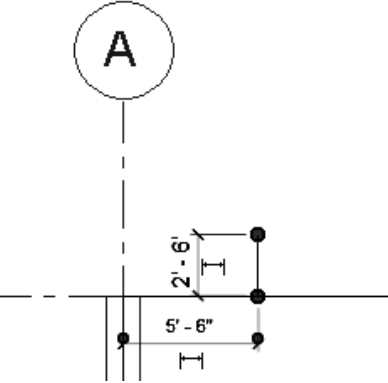
Solution

1.  Elevations (Building Elevation) Activate the **West Elevation** in the Project Browser.

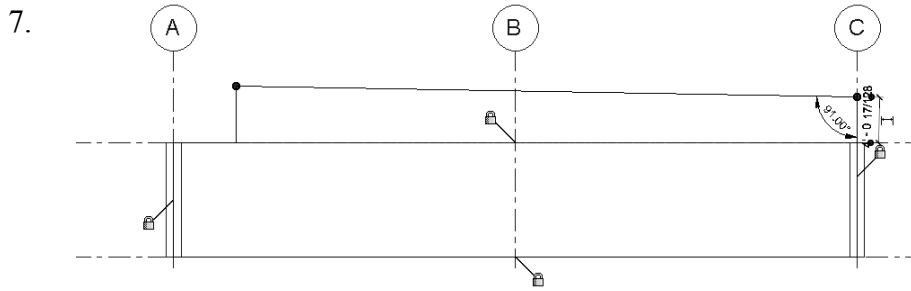
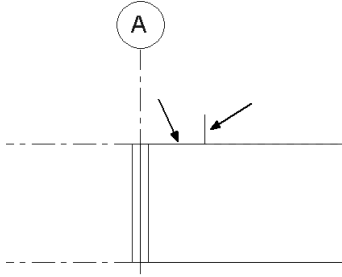
2.  Select the wall.

3.  Select **Edit Profile** on the Mode panel.

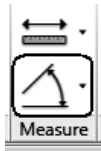
4.  Select the **Line** tool from the Draw panel.

5.  Draw a vertical line 5' 6" to the right of the A grid and 2' 6" high.

6. Use the TRIM tool to delete the top line for the wall to the right of the short vertical line. Arrows indicate the selections for the TRIM tool.



Extend the right vertical line up.
 Draw a new slanted line to close the profile.
 Set the angle to 91° .



To set the angle: add a temporary angle dimension using the Angle tool in the Measure panel.

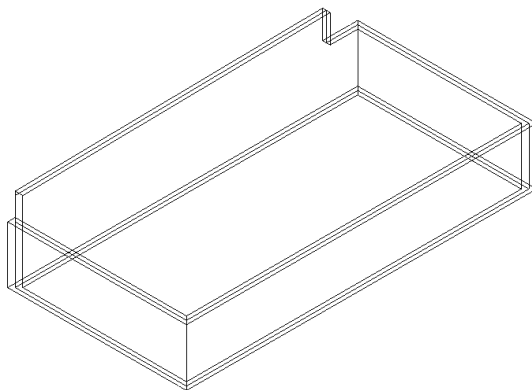
8. Select the **Green Check** on the Mode panel.



9. Switch to a 3D view.



10. The wall profile has been modified.



11. Close without saving.

Command Exercise

Exercise 1-7 – Add an Opening in a Wall


Drawing Name: **add_opening.rvt**

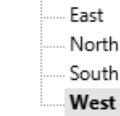
Estimated Time to Completion: 10 Minutes



Scope

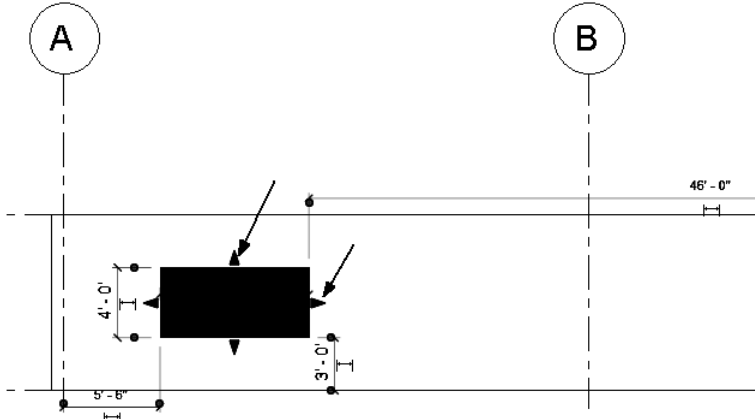
Add an opening to a wall.

Solution


1.  Elevations (Building Elevation) Activate the **West Elevation** in the Project Browser.



2.  Activate the Home ribbon.
 Select the **Wall** opening tool on the Opening panel.

3.  Select the wall.
Draw a rectangle.
Adjust the size and position of the rectangle using the grips and temporary dimensions.
Set the size of the rectangle to 4' 0" high x 8' 6" wide.

4. Position the rectangle 5' 6" to the right of the A grid and 3' 0" above Level 1.

5.  Switch to a 3D view.

6.  An opening to the wall has been added.

Close without saving.