

# Chapter 3

---

## Working with Architecture Workspace

### **Learning Objectives**

**After completing this chapter, you will be able to:**

- *Add columns and grids*
- *Add walls*
- *Add windows and doors*
- *Add stairs, railings, and stair tower*
- *Add roofs and slabs*
- *Create layouts*



## INTRODUCTION

In AutoCAD MEP, before designing an MEP project, its architectural model is required. An architectural model consists of the following elements: Walls, Doors, Windows, Floors, Stairs, Roofs, Beams, and Columns. It also consists of standard views, sheets, and units. You can add these elements in the project using the Architecture workspace. In this chapter, you will learn to use various tools and options to add and create architectural elements using the Architecture workspace.

## ARCHITECTURE WORKSPACE

To work with the architectural plans, you need to invoke the **Architecture** workspace. To do so, choose the **Architecture** option from the flyout displayed on choosing the **Workspace Switching** button available in the **Application Status Bar**; the tools required for performing architectural operations will be displayed in the **Ribbon**, refer to Figure 3-1.

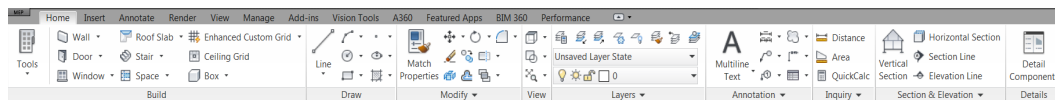


Figure 3-1 The **Ribbon** displayed on invoking the **Architecture** workspace

The procedure of creating various components of an architectural structure such as wall, door, window, grid, and so on are discussed next.

## CREATING WALLS

Walls are the building blocks of a structure. The tools to create a wall are available in the **Wall** drop-down of the **Build** panel in the **Home** tab of the **Ribbon**, refer to Figure 3-2. There are three tools for creating walls: **Wall**, **Curtain Wall**, and **Curtain Wall Unit**. These tools are discussed next.

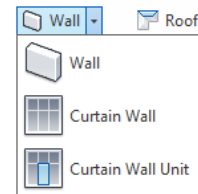


Figure 3-2 The **Wall** drop-down

### Wall

This tool is used to create the straight and curved walls. To create a wall, choose the **Wall** tool from the **Wall** drop-down available in the **Build** panel of the **Home** tab in the **Ribbon**; you will be prompted to specify the start point of the wall. Also, the **PROPERTIES** palette will be displayed. The prompt sequence for creating a wall by choosing the **Wall** tool is given next.

Start point or [STyle/Group/Width/Height/Offset/Flip/Justify/Match/Arc]: *Specify the start point of the wall segment.*

End point or [STyle/Group/Width/Height/Offset/Flip/Justify/Match/Arc]: *Specify the end point of the current wall segment and starting point of the next wall segment.*

End point or [STyle/Group/Width/Height/Offset/Flip/Justify/Match/Arc/Undo]: *Specify the end point of the current wall segment and starting point of the next wall segment.*

End point or

[STyle/Group/Width/Height/Offset/Flip/Justify/Match/Arc/Undo/Close/ORtho close]: *Specify the end point of the current wall segment and starting point of the next wall segment.*

End point or  
[STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc/Undo/Close/ORtho  
close]: 



### Note

*You can also invoke the tools given in the **Ribbon** by entering the corresponding command at the command prompt.*

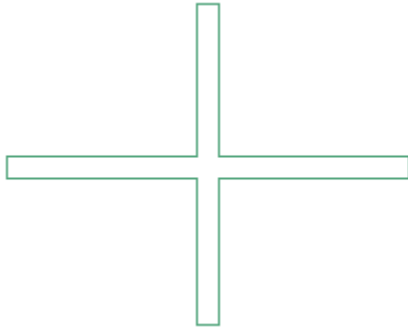
There are various options available in the command prompt to change the properties of the wall. Alternatively, you can select these options from the shortcut menu displayed on right-clicking in the drawing area. These options are discussed next.

## Style

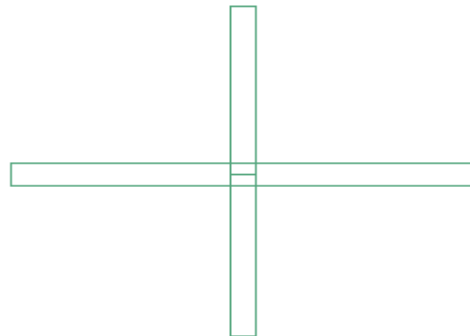
This option is used to change the style of the wall to be created. You can create a wall style by using the **Style Manager** which will be discussed later in this chapter. You can also choose a wall style from the **STYLES BROWSER** palette. By default, the **Standard** style is chosen as the wall style.

## Group

This option is used to specify the cleanup group for the wall. These cleanup groups are created by using **Style Manager** which is discussed later. When two walls of the same group intersect each other, they get automatically cleaned up at the intersection point, refer to Figure 3-3. Figure 3-4 shows the intersecting walls of two different groups.



**Figure 3-3** The intersecting walls of same cleanup group



**Figure 3-4** The intersecting walls of two different groups

## Width

This option is used to specify the width of a wall. The width specified using this option will be applicable for all the walls that are created after specifying this value. The prompt sequence for changing the width of a wall is given next.

Start point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc]: **WI**

Width <240>: *Specify the desired width.*

Start point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc]: 

## Height

This option is used to specify the height of the wall. The height specified using this option will be used for all the walls to be created afterwards. To view the height of wall, you need to switch to the isometric view. The prompt sequence for changing the height of wall is given next.

Start point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc]: **H**

Height <3000>: *Specify the desired height.*

Start point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc]:

## Offset

This option is used to set the distance of centerline of the wall from the wall edge. By default the value is set to zero. Figure 3-5 shows a wall being created using the **Offset** option.

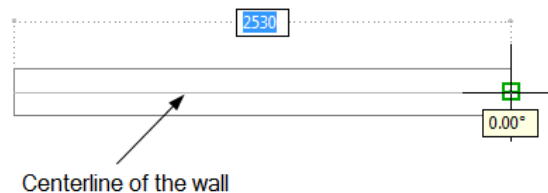


Figure 3-5 The wall being created with centerline at its default position

## Flip

This option is used to flip the direction of wall creation to either side of the cursor. You can also press the CTRL key once to change the direction of the wall.



### Note

The **Flip** Command works only if the **Justification** option selected from the **PROPERTIES** palette is either **Left** or **Right**.

## Justify

This option is used to switch the cursor position to the right, center, and left points of the wall. When you choose this option, four options will be available at the command prompt to justify the wall. You can also switch between the justification option by pressing the SHIFT key. The command prompt for justifying the wall after choosing the **Wall** tool is given next.

Start point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc]: **J**

Justification [Left/Center/Right/Baseline] <Baseline>: *Enter the justification option.*

Start point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc]:

The justification options available at the prompt are discussed next.

### Left

The **Left** option is used to justify the wall on the left of the cursor.

### Center

The **Center** option is used to justify the wall on the center of the cursor.

**Right**

The **Right** option is used to justify the wall on the right of the cursor.

**Baseline**

The **Baseline** option is used to justify the wall on the center of the baseline.

**Match**

This option is used to match the properties of the wall to be created with an existing wall. On choosing this option, you will be prompted to select a wall with which the properties will be matched. At the next prompt, enter the property names to be matched. The options available at this prompt are Style, Group, Width, Height, Justify, and All. After specifying the options, you will be prompted to specify the start point of the wall. Specify the start point and the end point of the wall to create a wall having properties similar to the one selected for matching.

**Arc**

This option is used to create a wall in the shape of an arc. The command prompt for creating an arc shaped wall is given next.

Command: **WALLADD** 

Start point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc]: **A** 

Start point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Line]: *Specify the Start point of the wall segment.*

Mid point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Line]: *Specify the Mid point of the wall segment.*

End point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Line]: *Specify the End point of the wall segment.*

Mid point or

[STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Line/Undo/Close]: *Specify the Mid point of the next wall segment or enter **Close** to close the wall segment.*

End point or

[STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Line/Undo/Close]: *Specify the Mid point of the next wall segment or enter **Close** to close the wall segment.*

**Line**

This option is used to create straight walls. This option will be available at the command prompt only when the **Arc** option is active. The command prompt for creating an arc shaped wall is already discussed.

**Undo**

This option is used to invert the changes made by the previous command. Using the **Undo** option, you can invert the changes made by the wall command in the current session.

**Close**

This option is used to create a wall that makes a closed boundary by joining the other walls. When you choose this option, a wall connecting the first and last walls is created.

## ORtho close

This option is used to join two wall segments to make a closed boundary of walls. The command prompt for creating a wall using this option is given next.

Command: **WALLADD**

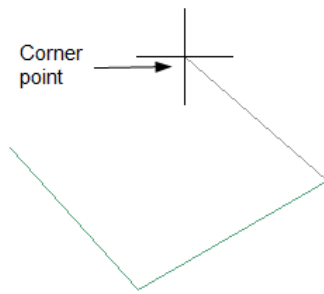
Start point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc]: *Specify the Start point of the wall segment.*

End point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc]: *Specify the End point of the wall segment.*

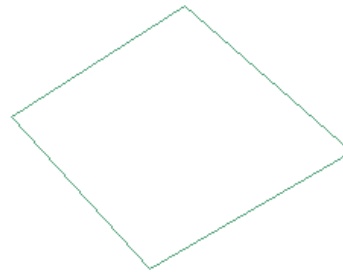
End point or [STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc/Undo]: *Specify the End point of the wall segment.*

End point or  
[STyle/Group/Width/Height/OFFset/Flip/Justify/Match/Arc/Undo/Close/ORtho  
close]: **ORtho** 

Point on wall in direction of close: *Click on the direction in which you want the two perpendicular connecting walls to meet; the joining walls will be created, refer to Figure 3-6 and Figure 3-7.*



**Figure 3-6** The corner point to be selected for the perpendicular walls



**Figure 3-7** The wall created after selecting the corner point using the **ORtho close** option

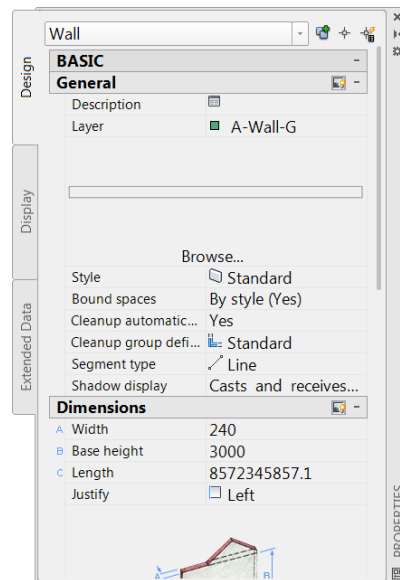
You can also change the properties of a wall by using the **PROPERTIES** palette. Select the wall and then enter the **PR** command at the command prompt; the **PROPERTIES** palette will be displayed, as shown in Figure 3-8. Various rollouts available in this palette are discussed next.

## BASIC Rollout

The options available in this rollout are used for basic settings. There are three options available in this rollout and they are discussed next.

### General

The options in this rollout are used for specifying general settings such as the layer, description, style of the wall, and the segment type. When you click on the Style Preview area of this rollout, the **STYLES BROWSER** palette will be opened. Now you can change the wall style type directly by double-clicking on the required style in gallery of the **STYLES BROWSER** palette. The selected style will be added to the **Style** drop-down list and its preview will be displayed in the Style Preview area of the **PROPERTIES** palette. You can also change the cleanup properties for the intersecting walls by using the options in this rollout.



**Figure 3-8** The **PROPERTIES** palette displayed on selecting a wall



#### Note

Like changing the style of the walls, you can change the style of **Curtain Wall**, **Curtain Wall Unit**, and other objects by using the **PROPERTIES** palette. These objects will be discussed later in this chapter.

#### Dimensions

The options in this rollout are used to specify the height, width, and length of the wall. You can also justify the wall by using the **Justify** option available in the rollout.

#### Location

The options available in this rollout are used to change the rotation angle and elevation of the wall. You can also change the insertion point and the orientation of wall by using the **Location** dialog box which is displayed on choosing the **Additional information** option available in this rollout.

### ADVANCED Rollout

The options available in this rollout are used for changing the advanced settings such as cleanups, styles, overrides and worksheets. These options are discussed next.

#### Cleanups

The options in this rollout are used for changing the cleanup radius for intersecting walls. You can also apply overrides for the start and end cleanup radii by using the options available in this rollout.

### Style Overrides

The options in this rollout are used to override the starting and ending endcap styles. You can also set the priority of a wall with respect to an intersecting wall by using the **Priority overrides** option available in this rollout.

### Worksheets

The options in this rollout are used to modify the cross-section of the wall. You can also specify the start point and the end point of the modifiers by using the options in this rollout.

## Curtain Wall



This tool is used to create a curtain wall. A curtain wall is a non-structural wall which is used to avoid the effect of weather on the building. This wall does not support any load in the building. The curtain walls created by using the **Curtain Wall** tool can be straight or curved.

The command prompt for creating a curtain wall is given next.

Command: CURTAINWALLADD

Start point or [STyle/Height/Match/Arc]: *Specify the start point of the wall segment.*

End point or [STyle/Height/Match/Arc]: *Specify the end point of the current wall segment and start point of the next wall segment.*

End point or [STyle/Height/Match/Arc/Undo]: *Specify the end point of the current wall segment and start point of the next wall segment.*

End point or [STyle/Height/Match/Arc/Undo/Close/ORtho close]: *Specify the end point of the current wall segment and start point of the next wall segment or enter **Close** to create a closing wall.*

The options available in the command prompt have already been discussed. You can also use the **PROPERTIES** palette to change properties of the created wall. The options available in the **PROPERTIES** palette for a curtain wall are discussed next.

### BASIC Rollout

The options available in this rollout are used for basic settings. Most of the options available in this rollout are same as discussed earlier. Rest of the options are discussed next.

#### Dimensions

The options in this rollout are used to change the base height, length, start miter, and end miter.

### ADVANCED Rollout

The options available in this rollout are used to change the advanced settings. The options available in this rollout are already discussed.

## Curtain Wall Unit



This tool is used to create a unit of curtain walls. On choosing this tool, you will be prompted to specify the start point of the wall. Specify the start point of the wall; you will be prompted to specify the end point of the wall. Specify the end point of the wall; you will be prompted to specify the height of the wall. On specifying the height, the **Curtain Wall Unit Styles** dialog box will be displayed, as shown in Figure 3-9.



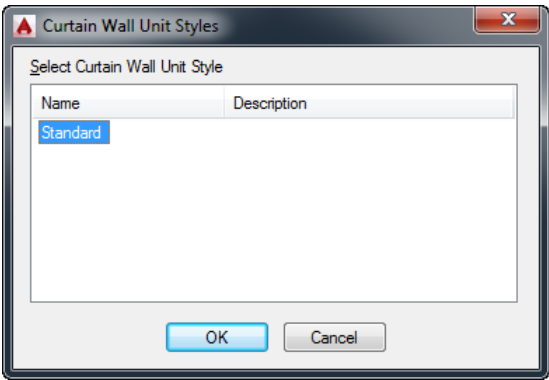


Figure 3-9 The Curtain Wall Unit Styles dialog box

Select a curtain wall unit style from the dialog box and choose the **OK** button; the wall unit with the defined specifications will be created in the drawing area. Using the **PROPERTIES** palette, you can change the properties of a curtain wall unit. The options available for a curtain wall unit are the same as discussed earlier.

## CREATING DOORS

Doors are movable structures used to close the entrance of a room or building. The tools to create a door are available in the **Door** drop-down of the **Build** panel in the **Home** tab of the **Ribbon**, refer to Figure 3-10. There are three tools available in the **Door** drop-down: **Door**, **Opening**, and **Door/Window Assembly**. These tools are discussed next.

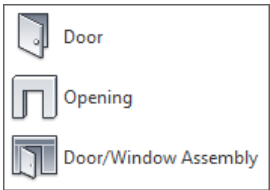



Figure 3-10 The Door drop-down list

### Door

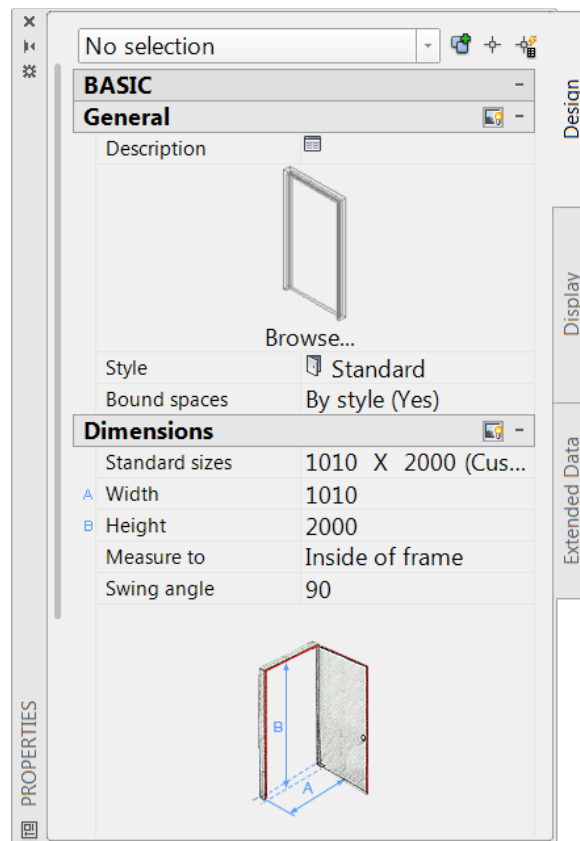
 This tool is used to create doors of a specified profile. To create a door, choose the **Door** tool from the **Door** drop-down; the **PROPERTIES** palette will be displayed, refer to Figure 3-11 and you will be prompted to select a wall or a grid assembly. You can press ENTER to create a door as an individual entity or you can attach the door with a wall. To attach a door to the wall, select an existing wall; you will be prompted to select an insertion point. Select the desired point on the wall; the door will be created with the parameters specified in the **PROPERTIES** palette. The options available in the **Dimensions** rollout of the palette are discussed next.

### Standard sizes

This drop-down list displays various standard sizes created by using the **Style Manager**. You can choose any of the standard sizes for the door or you can specify a custom size by using the options available in the **PROPERTIES** palette.



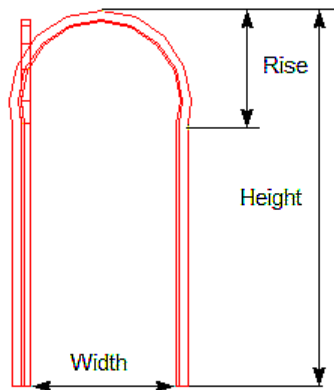
**Tip.** To add an arched door, choose the **Style Manager** tool from the **Style & Display** panel in the **Manage** tab; the **Style Manager** will be displayed. In the **Style Manager**, create a new door style with arch shape. The **Style Manager** will be discussed in the later chapters.



**Figure 3-11** The **PROPERTIES** palette displayed on choosing the **Door** tool

### Width

This option is used to specify the width of the door, refer to Figure 3-12. This option is used to customize a standard door. By default, the width specified by Door style is displayed in this field. You can change the value in this field as per your requirement.



**Figure 3-12** Specifications of an arched door

## Height

This option is used to specify the height of the door, refer to Figure 3-12. This option is used to customize a standard door. By default, the height specified in the Door style is displayed in this field. You can change the value in this field as per your requirement.

## Measure to

The options available in this drop-down list are used to specify whether the width and height of the door is measured from the inner edge of the frame or the outer edge of the frame.

## Swing angle

This option is used to specify the maximum angle at which the door can be opened.

You can change the parameters related to the location of a door by using the options available in the **Location** rollout. Some of the options available in the **Location** rollout of the palette are discussed next.

## Opening Percent

Using this edit box, you can specify the opening percentage of the door. This option will be available when you select the arch type or halfround type door.

## Vertical alignment

The options in this drop-down list will be available only if the selected door is anchored. Using these options, you can specify whether the height of the door will be measured from the threshold of the door or from the head of the door.

## Head Height/Threshold Height

The **Head Height** or **Threshold Height** option gets activated depending on the selection made in the **Vertical alignment** drop-down list. Using these options, you can specify the height of door from the head/threshold.

Rest of the options in the **PROPERTIES** palette have already been discussed.

## Opening

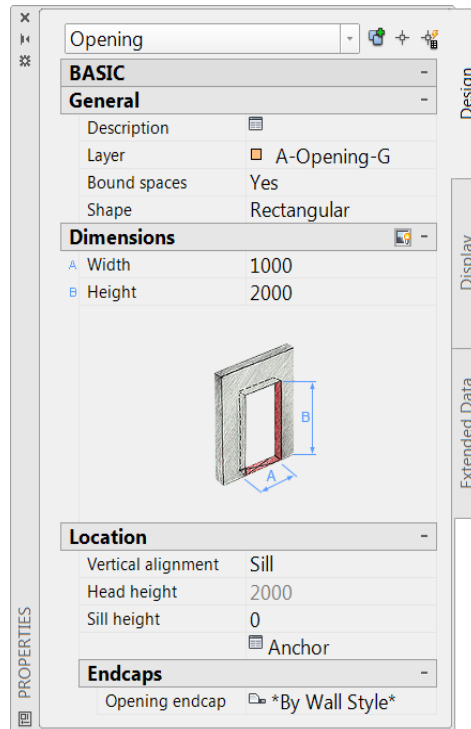


This tool is used to create an opening of a specified profile in the wall. To create an opening, choose the **Opening** tool from the **Door** drop-down in the **Build** panel of the **Home** tab; you will be prompted to select a wall or press ENTER. Select the wall on which you want to create an opening; you will be prompted to specify the insertion point. Click to specify the insertion point on the wall; the opening will be created. On selecting an opening, the **PROPERTIES** palette will be displayed, as shown in Figure 3-13. Some of the options available in the **PROPERTIES** palette are used to change the properties of an opening. These options are discussed next.

## Shape

This drop-down list is available in the **General** rollout of the **Basic** rollout. The options in this drop-down list are used to change the shape of the opening. There are 13 types of predefined shapes available in this drop-down list for creating an opening. You can customize the shape of an opening by selecting the **Custom** option from the drop-down list. On selecting the **Custom**

option, the **Profile** drop-down list will be displayed below the **Shape** drop-down list. You can create the selected custom profiles of opening using this drop-down list.



*Figure 3-13 The **PROPERTIES** palette displayed on selecting an opening*

### Width

This option from the **Dimensions** rollout is used to specify the width of opening.

### Height

This option from the **Dimensions** rollout is used to specify the height of opening.

### Vertical alignment

This drop-down list is available in the **Location** rollout. The options in this drop-down list will be available only if the selected opening is anchored. Using these options, you can specify whether the height of opening will be measured from the sill level of the opening or the head of the opening.

## Door/Window Assembly



This tool is used to create a door or window assembly. The assembly contains required number of doors, windows, or both. To create a door/window assembly, choose the **Door/Window Assembly** tool from the **Door** drop-down available in the **Build** panel of the **Home** tab; you will be prompted to select a wall, a grid assembly, or press ENTER. Select a wall; you will be prompted to specify the insertion point for door/window assembly. Click at the desired point on the wall; an anchored door/window assembly will be created. The options available in the **PROPERTIES** palette for a door/window assembly are same as discussed earlier.

## CREATING WINDOW

Windows are openings in a wall or door to facilitate the passage to light. If not closed, they also allow air and sound to pass through the wall or door. In AutoCAD MEP, windows are created by using the tools available in the **Window** drop-down. This drop-down list is available in the **Build** panel of the **Home** tab. The tools available in this drop-down list are discussed next.

### Window



This tool is used to create a standard window. To create a window, choose the **Window** tool from the **Window** drop-down available in the **Build** panel of the **Home** tab; you will be prompted to select a wall, a grid assembly, or press ENTER. Select a wall; you will be prompted to specify an insertion point. Click on the wall to specify the point; the window will be created at the specified point. Click on the wall to create more windows or press ENTER to exit the command. You can set the opening percentage of window by using the **Opening percent** field available in the **PROPERTIES** palette. The other options available in the **PROPERTIES** palette have already been discussed.

### Corner Window



This tool is used to create a window at the point where two walls meet. This window can only be created on a cornered wall. To create a corner window, choose the **Corner Window** tool from the **Window** drop-down available in the **Build** panel; you will be prompted to select a wall. Select a wall which is connected to the other wall at the corner; you will be prompted to specify the insertion point. Click on the wall to place the window and press ENTER to exit the command.

There are three conditions for creating a corner window. They are:

1. The walls meeting to create a corner must be in “L” shape.
2. Wall joints must be created by linear walls only.
3. Wall will join with similar components of intersecting walls.

Various options available in the **Dimensions** rollout of the **PROPERTIES** palette are discussed next.

### Standard sizes

The options in this drop-down list are used to change the standard size of the corner window. The standard sizes are generated by using the **Style Manager**. The pattern of size displayed in this drop-down list is given next.

(Width 1 x Width 2) x Height

Here **Width 1** and **Width 2** represent width of the window in two different directions, and **Height** is the height of window from bottom edge to top edge.

### Width

This field shows the total width of the window. This is the sum of the **Width 1** and **Width 2** values. You cannot change the value of this field.

### Width 1

This edit box is used to change the value of the width in the first direction. When you click on this edit box, a button will be displayed on the right of the edit box. On choosing this button, you can specify the value of width by selecting two points in the drawing. The value changed in this edit box is also reflected in the **Width** field and the **Standard sizes** drop-down list.

### Width 2

This edit box is used to change the value of width in the second direction. When you click on this edit box, a button will be displayed on the right of the edit box. On choosing this button, you can specify the value of width by selecting two points in the drawing. The value changed in this edit box is also reflected in the **Width** field and the **Standard sizes** drop-down list.

### Height

This edit box is used to change the value of height of the window.

### Measure to

The options available in this drop-down list are used to specify whether the value of width and height will be measured from inside of the frame or outside of the frame.

### Opening measure

The options available in this drop-down list are used to specify the width measurement pattern. There are three options available in this drop-down list: **Inside of opening**, **Center of opening**, and **Outside of opening**.

#### Inside of opening

When you choose this option, the width of the first side of corner window is measured from the inner edge of the other side of the corner window.

#### Center of opening

When you choose this option, the width of first side of corner window is measured from the center of the edge of other side of the corner window.

#### Outside of opening

When you choose this option, the width of the first side of corner window is measured from the outer edge of the other side of the corner window.

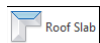
### Opening percent

Using this edit box, you can specify the opening percentage of the window.

## CREATING ROOFS AND SLABS

The tools to create roofs and slabs are available in the **Roof Slab** drop-down, refer to Figure 3-14. The tools in this drop-down are **Roof Slab**, **Roof**, and **Slab**. These tools are discussed next.

### Roof Slab



This tool is used to create a segment of roof. This segment does not have a direct connection with other entities. To create a roof slab, choose the **Roof Slab** tool from

the **Roof Slab** drop-down available in the **Build** panel of the **Home** tab; you will be prompted to specify the start point of the roof slab. The command sequence for creating a roof slab is given next.

Specify start point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MAtch]: *Specify the Start point of the roof slab.*  
Specify next point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MAtch]: *Specify the next point of the wall segment.*  
Specify next point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MAtch/Undo/Ortho close]: *Specify the next point of the wall segment.*  
Specify next point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MAtch/Undo/Ortho close/Close]: *Specify the next point of the wall segment or enter **Close** to close the boundary.*  
Specify next point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MAtch/Undo/Ortho close/Close]: *Specify the next point of the wall segment or enter **Close** to close the boundary.*



Figure 3-14 The **Roof Slab** drop-down

After selecting a roof slab, the **PROPERTIES** palette will be displayed, as shown in Figure 3-15. Various options available in the **Dimensions** rollout of this palette are discussed next.

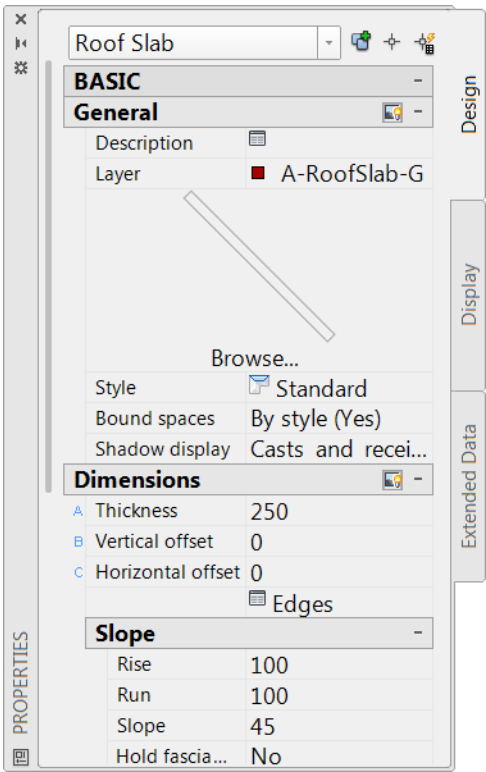


Figure 3-15 The **PROPERTIES** palette displayed on selecting a roof slab

**Thickness**

This edit box is used to specify the thickness of the roof slab. When you click on this edit box, a button is displayed on its right. On choosing this button, you can specify the value of thickness by selecting two points.

Vertical offset

This edit box is used to specify the offset value of the slab from the original position in vertical direction. You can also specify the offset value by selecting two points.

Horizontal offset

This edit box is used to specify the offset value of slab from the original position in the horizontal direction. You can also specify the offset value by selecting two points.

Edges

This button is available below the **Horizontal offset** edit box. When you choose this button, the **Roof Slab Edges** dialog box will be displayed, as shown in Figure 3-16. Also, a preview of the changes made in the edges are displayed in the **Preview** area on the right in the dialog box. You can change the parameters such as overhang value, edge style, and edge cut type by using the table displayed on the left in the dialog box. Various columns available in this table are discussed next.

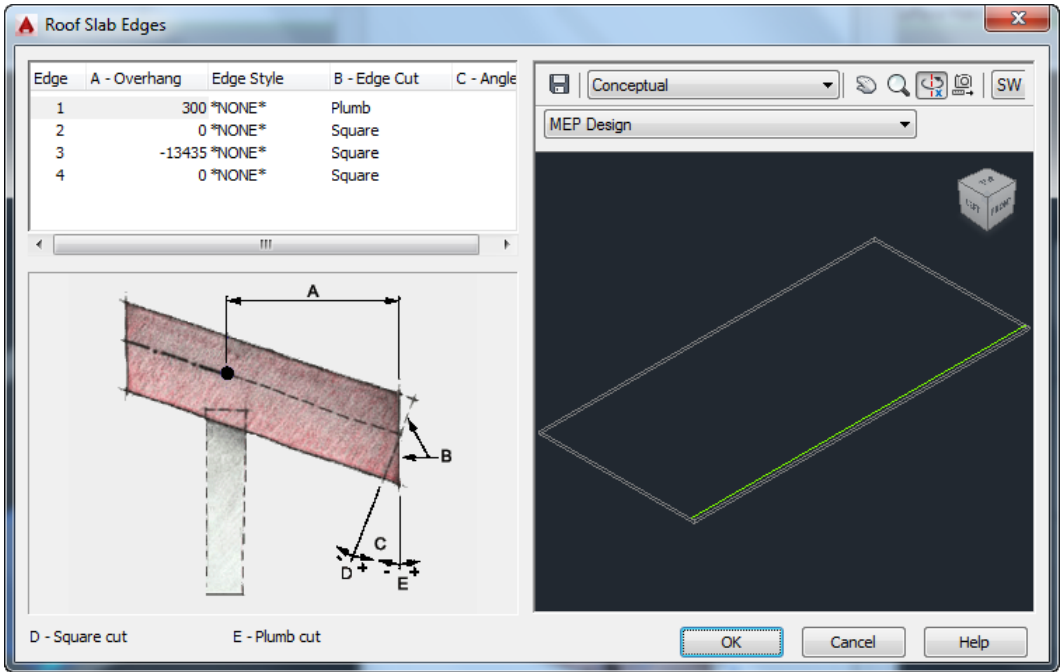


Figure 3-16 The Roof Slab Edges dialog box

Edge

All edges of the selected roof slab are displayed in this column by their sequence numbers. When you select any sequence number, its respective edge is highlighted in the **Preview** area.

A-Overhang

Using the fields available in this column, you can change the overhang value. Overhang is the area of slab which is out of the support boundary.



**Edge Style**

By default, the values in this column are set to **NONE**. You can choose any predefined style for slab edges. You can define an **Edge Style** by using the **Roof Slab Edge Style** node in the **Style Manager**. You can also import the edge styles by using the **STYLES BROWSER** palette.

**B-Edge Cut**

In this column, edge cut methods are displayed. There are two options for edge cut: **Square** and **Plumb**. The **Square** option is used to cut the edge perpendicular to the roof slab whereas the **Plumb** option is used to cut the edge perpendicular to the ground.

**C-Angle**

In this column, you can specify an angle for the edge. If you enter a positive value, the bottom edge will extend. If a negative value is entered, then the top edge will extend.

**Rise**

This edit box is used to specify the value of rise for a roof slab. Rise is the slope difference between the start and end edges of the slope of roof slab along vertical direction. You can also specify the value of rise by selecting two points. To do so, choose the button displayed at the right of this edit box; you will be prompted to select points. Select the points to specify the rise value.

**Run**

This field is used to display the value of run for a roof slab. Run is the horizontal span of the slope. The value in this field is generally fixed.

**Slope**

This edit box is used to specify the value of slope for a roof slab. The value of slope is specified in degrees. Any change in the value specified in the **Rise** or **Run** edit box is reflected in the **Slope** edit box.

**Hold fascia elevation**

The options in this drop-down list are used to manage the fascia of roof. There are three options available in this drop-down list: **No**, **By adjusting overhang**, and **By adjusting baseline height**.

**No**

When you choose this option, the alignment of fascia is ignored.

**By adjusting overhang**

When you choose this option, the fascia is aligned with the roof slab by adjusting the overhang.

**By adjusting baseline height**

When you choose this option, the fascia is aligned with the roof slab by adjusting the baseline height.

**Pivot Point X**

This edit box is used to specify the position of pivot point of roof slab in X direction. You can calculate the value of position in X direction by using the **QuickCalc** button available on the

right of the edit box. You can also use the **Pick Point** tool to specify the pivot point location which is discussed in the next section.


**Pivot Point Y**

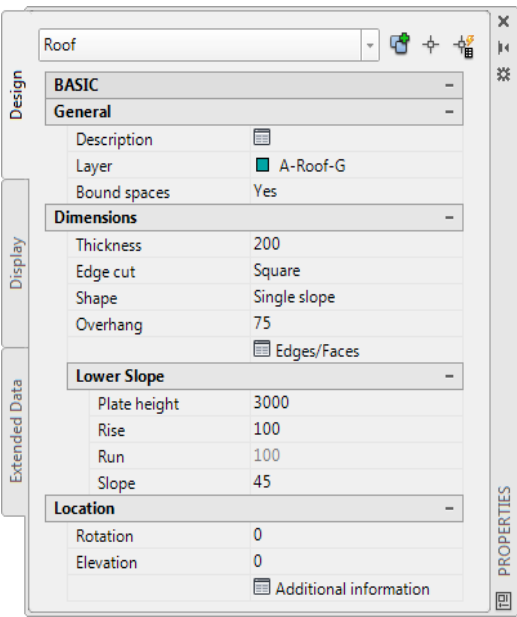
This edit box is used to specify the position of pivot point of roof slab in Y direction. Alternatively, you can specify the position of point by using the **Pick Point** tool available on the right of the edit box. You can also use the **QuickCalc** button as discussed earlier.

**Pivot Point Z**

This edit box is used to specify the position of pivot point of roof slab in Z direction. Alternatively, you can specify the position of point by using the **Pick Point** tool available on the right of the edit box. You can also use the **QuickCalc** button as discussed earlier.

**Roof**

 This tool is used to create a multi-peaked roof. To create a multi-peaked roof, invoke the **Roof** tool from the **Roof Slab** drop-down available in the **Build** panel of the **Home** tab; you will be prompted to specify the roof points. Specify the roof points; the roof will be created with the specified roof points. The **PROPERTIES** palette displayed on selecting a roof is shown in Figure 3-17.



*Figure 3-17 The **PROPERTIES** palette displayed on selecting a roof*

The options available in the **General**, **Dimensions**, and **Location** rollouts are same as discussed earlier. The options available in the **Lower Slope** rollout are discussed next.

**Plate height**

This edit box is used to specify the height of the base point of roof from the ground. You can also specify the plate height by using two points. In this case, you need to choose the **Pick Point** button available on the right of the edit box.

## Rise

This edit box is used to specify the value of rise for a roof. Rise is the difference in start and end edges of the slope of roof along vertical direction. You can also specify the value of rise by selecting two points. To do so, choose the button displayed at the right of this edit box; you will be prompted to select points. Select any two points on the screen to specify the rise value.

## Run

This field is used to display the value of run for a roof. Run is the horizontal span of the slope. The value in this field is generally fixed.

## Slope

This edit box is used to specify the value of slope for a roof. The value of slope is specified in degrees. Any change in the value specified in the **Rise** edit box or **Run** edit box is reflected in the **Slope** edit box.

You can also specify the plate height, rise, and slope value for the upper slope of the roof. To specify the values for the upper slope, you need to select the **Double slope** option from the **Shape** drop-down list in the **Dimensions** rollout. On doing so, the **Upper Slope** rollout will be displayed. The options in this rollout are similar to the options discussed for **Lower Slope** rollout.

## Slab

This tool is used to create flat roofs or floors. The roofs or floors created by using this tool are in the form of a segment. This segment does not have a direct connection with other entities. To create a slab, choose the **Slab** tool from the **Roof Slab** drop-down available in the **Build** panel of the **Home** tab; you will be prompted to specify the start point of the slab. The command prompt for creating a slab is given next.

Specify start point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MATch]: *Specify the Start point of the roof slab.*

Specify next point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MATch]: *Specify the next point of the wall segment.*

Specify next point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MATch/Undo/Ortho close]: *Specify the next point of the wall segment.*

Specify next point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MATch/Undo/Ortho close/Close]: *Specify the next point of the wall segment.*

Specify next point or [STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MATch/Undo/Ortho close/Close]: **C**

Specify start point or

[STyle/MOde/Height/Thickness/SLOpe/OVerhang/Justify/MATch/Undo]: 

After selecting a slab, the **PROPERTIES** palette is displayed, as shown in Figure 3-18. The options in the palette have already been discussed.

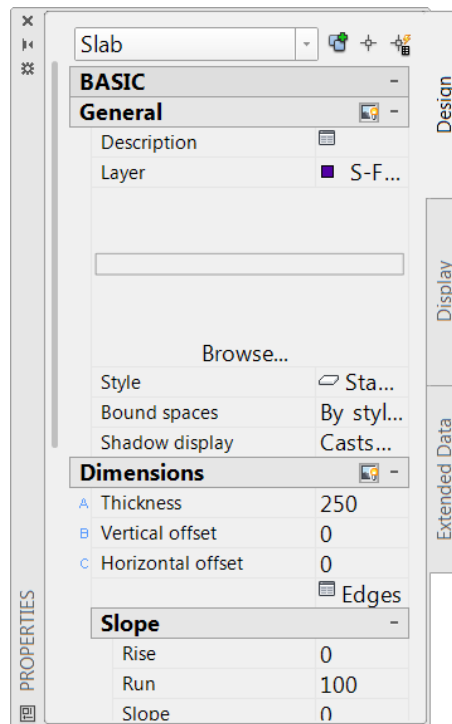


Figure 3-18 The **PROPERTIES** palette displayed on selecting a slab

## CREATING STAIRS AND RAILINGS

Stairs are the structures that connect one floor to another, thus enabling easy movement. Railings are the structures which act as support or barrier on the stairs. The options to create stairs and railings are available in the **Stair** drop-down. These options are discussed next.

### Stair

This tool is used to create rectangular stairs. There are various shapes of stairs such as straight, multi-landing, spiral, and U-shaped. While going on a curved path, the stairs can have curved landing. In such cases, the edges of stairs can also be curved. To create a stair, choose the **Stair** tool from the **Stair** drop-down available in the **Build** panel of the **Home** tab; you will be prompted to specify the start point of the stairs. Specify a point as the start point of the stairs; you will be prompted to specify the end point of the stairs. Specify a point as the end point to complete the stairs. While specifying the end point, you can specify the landing at desired position but this position must be within the specified limits. The limit of a stair is counted by the value specified in the **Riser count** edit box. The **PROPERTIES** palette displayed after choosing the **Stair** tool is shown in Figure 3-19. Some important options available in the **General** rollout of the palette on choosing this tool are discussed next.

### Shape

The options available in this drop-down list are used to specify the shape of the stairs. There are four options available in this drop-down list; **U-shaped**, **Multi-landing**, **Spiral**, and **Straight**. These options are discussed next.

**U-shaped**

Using this option, you can create U-shaped stairs, refer to Figure 3-20. In this type of stairs, the two rows of stairs run parallel and meet at the end points by a half-landing.

**Multi-landing**

Using this option, you can create stairs having multiple landings, refer to Figure 3-20. You can provide quarter landing or half landing. This landing can be flat or can have a turn.

**Spiral**

Using this option, you can create stairs in the shape of spiral, refer to Figure 3-20. In this type of stairs, the steps of stair revolve about a common center point from bottom to top. Spiral stairs can be in clockwise direction or counter-clockwise direction.

**Straight**

Using this option, you can create straight stairs, refer to Figure 3-20. In this type of stairs, the steps are created on a straight path that is inclined to the horizontal plane.

**Turn type**

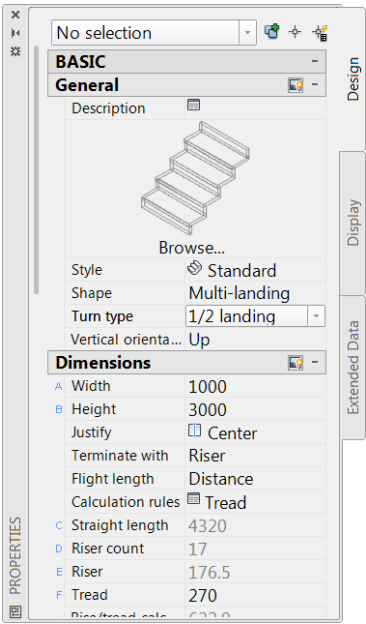
This drop-down list is displayed only when **U-shaped** or **Multi-landing** is selected from the **Shape** drop-down list. The options available in this drop-down list are used to define the type of landing or turning for the U-shaped or multi-landing stairs. There are four options available in this drop-down list which are discussed next.

**1/2 landing**

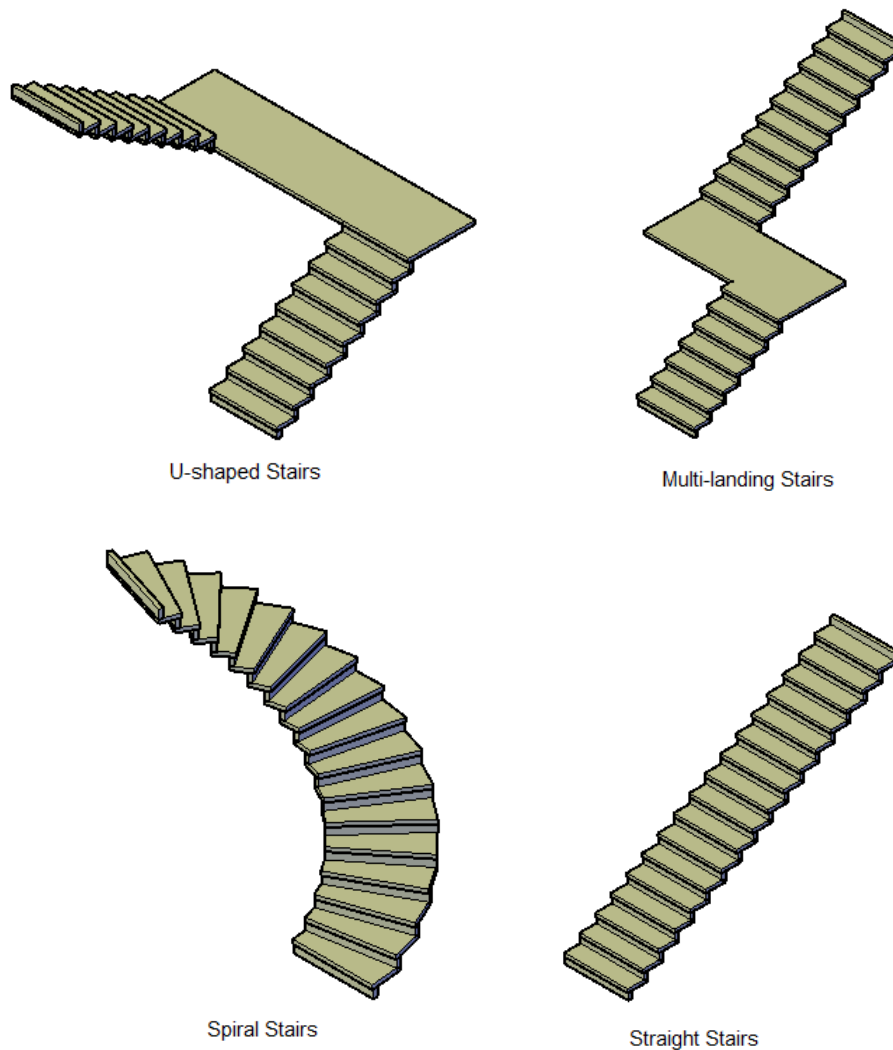
Using this option, you can create the U-shaped or multi-landing stairs having a flat landing of user-defined length, refer to Figure 3-21.

**1/2 turn**

Using this option, you can create the U-shaped or multi-landing stairs having steps at the turn, refer to Figure 3-21. Note that there must be at least three segments in the stairs and direction of turn of all the segments must be the same.



*Figure 3-19 The PROPERTIES palette displayed on choosing the Stair tool*



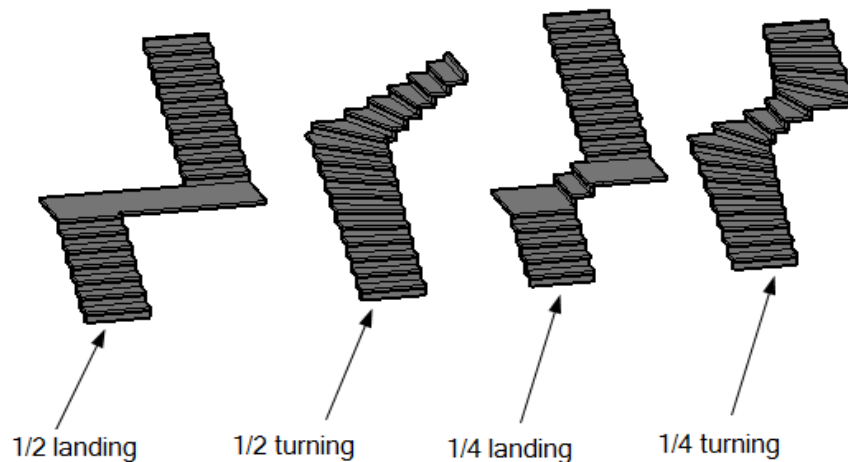
*Figure 3-20 Various type of stairs available in AutoCAD MEP*

#### **1/4 landing**

This option is available only when **Multi-landing** is selected from the **Shape** drop-down list. When you select this option, the width of landing created at turn will be equal to the width of the stair, refer to Figure 3-21. Generally, these type of stairs have two or more steps joined to the square landing.

#### **1/4 turn**

This option is available only when **Multi-landing** is selected from the **Shape** drop-down list. When you select this option, the resulting stairs will have steps at the turn, refer to Figure 3-21. These stairs can turn in both directions.



*Figure 3-21 Stairs with different turning types selected*

### Winder Style

This drop-down list is available only when **1/2 turn** or **1/4 turn** is selected from the **Turn type** drop-down list. There is a single type of winder style available in AutoCAD MEP: **Balanced**. The **Balanced** winder style is used to distribute steps of stairs evenly throughout the run.

### Horizontal Orientation

This drop-down list is displayed only when **U-shaped** or **Spiral** is selected from the **Shape** drop-down list. The options available in this drop-down list are used to define the direction of turn of stairs. There are two options available in this drop-down list: **Clockwise** and **Counterclockwise**. Using these options, you can select the clockwise or counterclockwise direction of turn of the stairs.

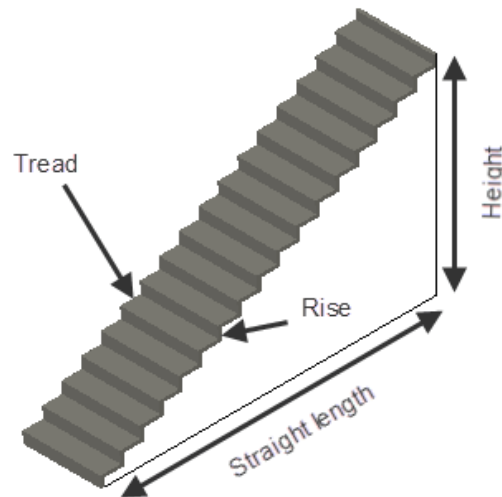
### Vertical Orientation

The options in this drop-down list are used to specify the vertical direction of the stairs. There are two options available in this drop-down list: **Up** and **Down**. The **Up** option is selected when you need to create stairs from lower floor to higher floor. The **Down** option is selected when you need to create stairs from higher floor to lower floor.

The options in the **General** rollout are also used to control the shape of stairs. Some important terms used for defining the size of stairs are displayed in Figure 3-22. The options available in the **Dimensions** rollout of the palette are used to control the size of stairs. These options are discussed next.

### Width

This edit box is used to specify the width of a step. You can also specify the width of a step by using two points. To do so, click on the button displayed on the right of the edit box; you will be prompted to select start point for width calculation. Select a start point; you will be prompted to select an end point for width calculation. Select a point; the width value for the specified points will be reflected in the edit box.



*Figure 3-22 Some important terms for defining the size of stairs*

### Height

This edit box is used to specify total height of the stairs. You can also specify the total height of stairs by using two points. The method of using the points is already discussed.

### Justify

The options in this drop-down list are used to change the justification of stairs. There are three options available in this drop-down list: **Left**, **Right**, and **Center**. These options change to **Inside**, **Outside**, and **Center** if the option selected from the **Shape** drop-down list is either **U-shaped** or **Spiral**.

### Terminate with

The options in this drop-down list are used to change the justification of stairs. There are three options available in this drop-down list: **Riser**, **Tread**, and **Landing**. When you select the **Riser** option, the stairs end with a riser. When you select the **Tread** option, the stairs end with a tread. If the **Landing** option is selected, the stairs end with a landing. Figure 3-23 shows the output of various options selected from the **Terminate with** drop-down list.

### Flight length

This drop-down list will be available when the **Multi-landing** option is selected from the **Shape** drop-down list. The options in this drop-down list are used to control the length of one segment of a staircase. There are two options available in this drop-down list: **Distance** and **Tread length**. Using the **Distance** option, you can specify the flight length by specifying total distance value. Using the **Tread length** option, you can specify the flight length by specifying the length of one tread. The total flight length is calculated on the basis of number of treads in the staircase.



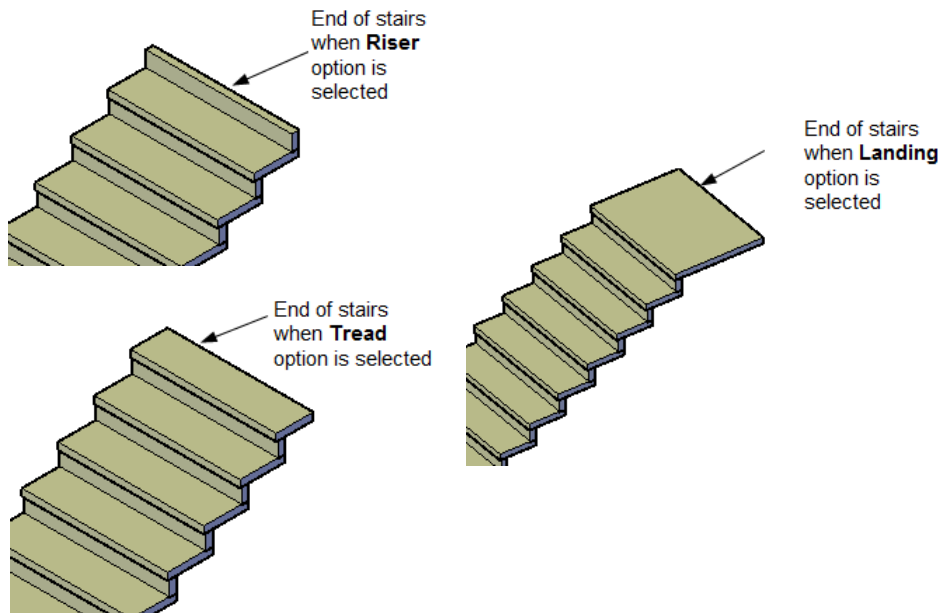


Figure 3-23 The output of various options selected from the *Terminate with* drop-down list

**Calculation rules**

When you click on the **Tread** button displayed in this field, the **Calculation Rules** dialog box will be displayed, as shown in Figure 3-24. By default, the **D-Tread** edit box is activated. On changing the value in this edit box, the value in the other edit boxes in this dialog box will change accordingly. To change values in other edit boxes manually, you need to lock the **D-Tread** edit box. To do so, choose the **lock** button; the **Calculation Rules** dialog box will be displayed, as shown in Figure 3-25. Now, you can change the value of any of the edit box in the dialog box by choosing the button adjacent to the respective edit box. In this dialog box, you can manually define the value in two edit boxes simultaneously. But if you choose the **C-Riser** edit box for defining the value of riser manually, then the other three edit boxes will be locked.

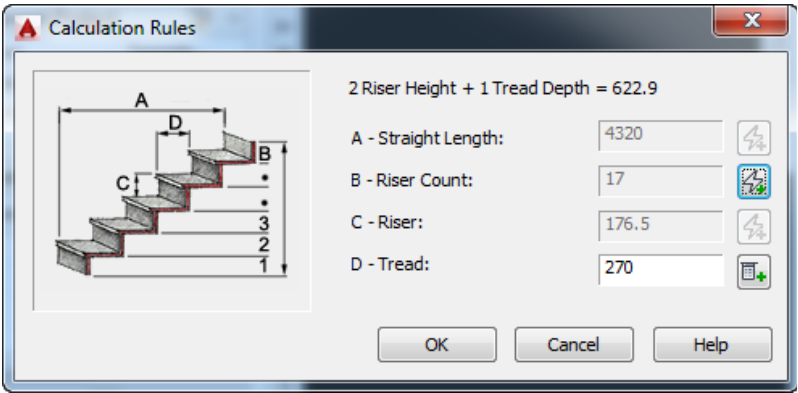


Figure 3-24 The *Calculation Rules* dialog box

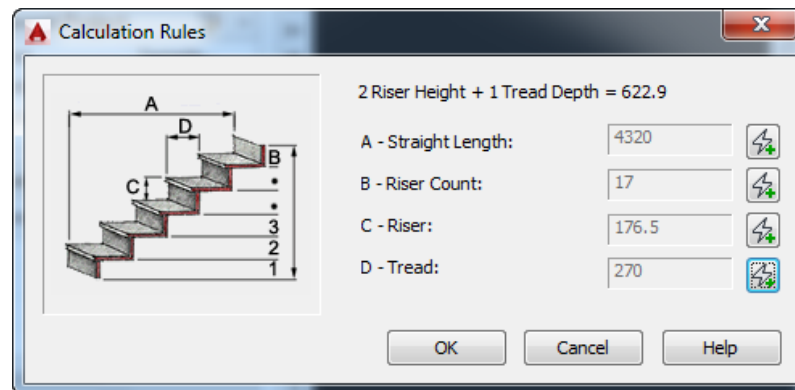


Figure 3-25 The **Calculation Rules** dialog box displayed after locking the edit boxes

The value of the edit boxes that are set to change manually can also be changed directly using the **PROPERTIES** palette. Note that in the **PROPERTIES** palette only those edit boxes will be active that are set to change manually in the **Calculation Rules** dialog box.

Some of the options in the **PROPERTIES** palette are displayed only when **Spiral** is selected from the **Shape** drop-down list of the palette. These options are discussed next.

### Specify on screen

This option will be available only when **Spiral** is selected from the **Shape** drop-down list. The options in this drop-down list are used to specify whether the second point specifies the radius along the starting direction or not. There are two options available in this drop-down list: **Yes** and **No**. When you select **Yes** from this drop-down list, then you can specify the radius of stairs on the screen while creating the stairs.

### Radius

This edit box is available only when you select the **No** option from the **Specify on screen** drop-down list. Using this edit box, you can specify the value of radius for the spiral stairs.

### Arc constraint

The options in this drop-down list are used to constrain the arc of the spiral stairs. There are three options available in this drop-down list: **Free**, **Total degrees**, and **Degrees per tread**. When the **Free** option is selected from this drop-down list, the stair run is unconstrained. When **Total degrees** is selected from this drop-down list, you can specify the total angle of arc around which the stairs are created. When you select the **Degrees per tread** option, you can specify the angle of each tread with respect to the adjacent stairs.

### Arc angle

This edit box is active only when the **Total degrees** or the **Degrees per tread** option is selected from the **Arc constraint** drop-down list. Using this edit box, you can specify the value of arc angle. The value specified in this edit box is linked to the option selected in the **Arc constraint** drop-down list. If you have selected the **Total degrees** option from the **Arc constraint** drop-down list, then the value specified in the **Arc angle** edit box is applicable for total degree of the spiral stairs. If the **Degrees per tread** is selected from the **Arc constraint** drop-down list, the angle value specified in the **Arc angle** edit box is applicable for each tread.

Other options in the **Dimensions** rollout have already been discussed. Some of the important options available in the **Advanced** rollout of the **PROPERTIES** palette are discussed next.

### Top offset

This edit box is available in the **Floor Settings** rollout. This edit box is used to specify the value for thickness of the floor at the top of the stairs.

### Bottom offset

This edit box is also available in the **Floor Settings** rollout and is used to specify the value of thickness of the floor at the bottom of the stairs.

### Minimum limit type

This drop-down list is available in the **Flight Height** rollout. Using the options available in this drop-down list, you can change the minimum limit for the height of flight. There are three options available in this drop-down list: **NONE**, **Risers**, and **Height**. By default, the **NONE** option is selected in this drop-down list. As a result, no limit is set for height or risers of the stairs. You can specify the minimum limit of risers by selecting the **Risers** option from the drop-down list. You can also specify the minimum height of stairs by using the **Height** option from this drop-down list.

### Minimum Risers

This edit box is available in the **Flight Height** rollout only when the **Risers** option is selected from the **Minimum limit type** drop-down list. You can specify the minimum value for height of the riser by using this edit box.

### Minimum Height

This edit box is available in the **Flight Height** rollout only when the **Height** option is selected in the **Minimum limit type** drop-down list. You can specify the minimum value for height of the stairs by using this edit box.

### Maximum limit type

Using the options available in this drop-down list, you can change the maximum limit for the height of flight. There are three options available in this drop-down list: **NONE**, **Risers**, and **Height**. By default, the **NONE** option is selected in this drop-down list. As a result, no limit is set for height or risers of the stairs. You can specify the maximum limit of risers by selecting the **Risers** option from the drop-down list. You can also specify the maximum height of stairs by using the **Height** option from this drop-down list.

### Maximum Risers

This edit box is available in the **Flight Height** rollout only when the **Risers** option is selected from the **Maximum limit type** drop-down list. You can specify the maximum value for height of the riser by using this edit box.

### Maximum Height

This edit box is available in the **Flight Height** rollout only when the **Height** option is selected from the **Maximum limit type** drop-down list. You can specify the maximum value for height for the stairs by using this edit box.

### Headroom height

This edit box is available in the **Interference** rollout. This edit box is used to specify the height of ceiling around the stairs opening from the tread. This height is required so that people do not collide with the roof while going through the stairs.

### Left clearance

This edit box will be available in the **Interference** rollout only when **Straight** or **Multi-landing** is selected from the **Shape** drop-down list. This edit box is used to specify the clearance value for stairs from the left edge of the opening in the roof.

### Right clearance

This edit box will be available in the **Interference** rollout only when **Straight** or **Multi-landing** is selected from the **Shape** drop-down list. This edit box is used to specify the clearance value for stairs from the right edge of the opening in the roof.

### Inside clearance

This edit box will be available in the **Interference** rollout only when **Spiral** or **U-shaped** is selected in the **Shape** drop-down list. This edit box is used to specify the clearance value for stairs from the inner edge of the opening in the roof.

### Outside clearance

This edit box will be available in the **Interference** rollout only when **Spiral** or **U-shaped** is selected in the **Shape** drop-down list. This edit box is used to specify the clearance value for stairs from the outer edge of the opening in the roof.

### Component

This option is available in the **Worksheet** rollout. It is used to edit the parameters for stairs. When you choose this option, the **Stair Components** dialog box will be displayed, as shown in Figure 3-26. The options available in this dialog box are discussed next.

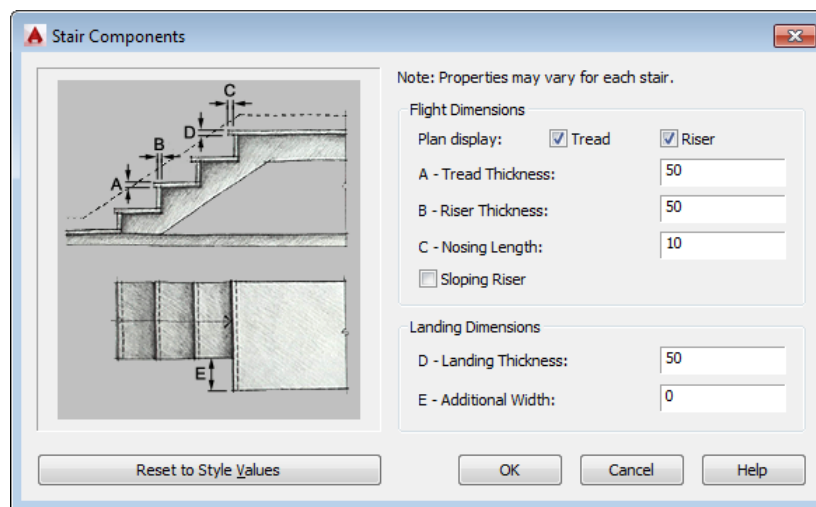


Figure 3-26 The Stair Components dialog box

**Note**

*You can edit the parameters in this dialog box only when you have selected the **Allow Each Stair to Vary** check box from the **Components** tab of the required **Stair Styles** in the **Style Manager**. The **Style Manager** is displayed on choosing the **Style Manager** tool from the **Style & Display** panel of the **Manage** tab in the **Ribbon**.*

**Tread**

This check box is available in the **Flight Dimensions** area. This check box is used to enable change in the value of tread thickness.

**Riser**

This check box is available in the **Flight Dimensions** area. This check box is used to enable change in the value of riser thickness.

**A - Tread Thickness**

This edit box is activated only when the **Tread** check box is selected. Using this edit box, you can specify the value for tread thickness. An annotated preview of all the related parameters will be displayed in the left of dialog box.

**B - Riser Thickness**

This edit box is activated only when the **Riser** check box is selected. Using this edit box, you can specify the value for riser thickness. An annotated preview of all the related parameters will be displayed on the left in the dialog box.

**C - Nosing Length**

This edit box is used to specify the length for extended portion of tread over the riser.

**Sloping Riser**

Select this check box if you want to create riser with a slope.

**D - Landing Thickness**

This edit box is available in the **Landing Dimensions** area. This edit box is used to specify the value for thickness of the landing.

**E - Additional Width**

This edit box is available in the **Landing Dimensions** area. This edit box is used to specify the value for additional width of landing.

**Reset to Style Values**

This button is used to reset the value of all the parameters to their original values. This button is available at the bottom of the dialog box.

**Landing extensions**

This tool is available in the **Worksheet** rollout. This tool is used to edit the parameters for stairs related to landing extensions. When you choose this tool, the **Landing Extensions** dialog box will be displayed, as shown in Figure 3-27. The options available in this dialog box are discussed next.

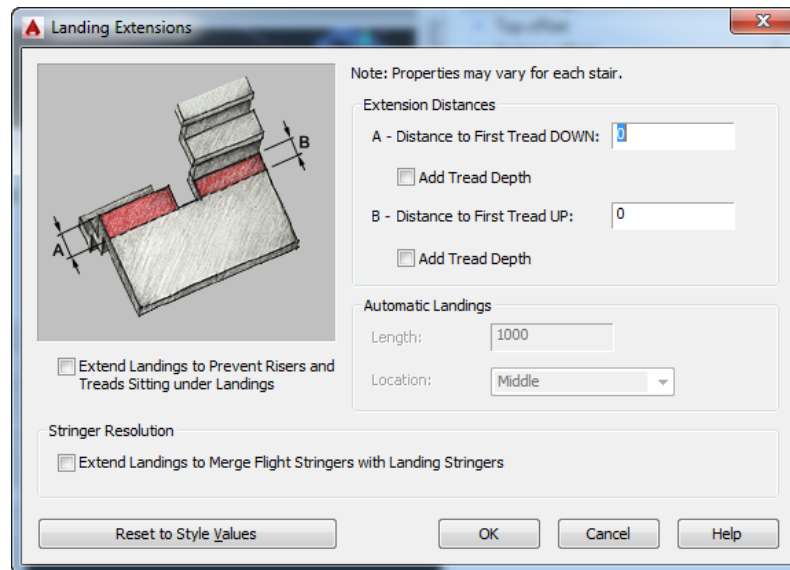


Figure 3-27 The *Landing Extensions* dialog box



#### Note

You can edit the parameters in this dialog box only when you have selected the **Allow Each Stair to Vary** check box from the **Landing Extensions** tab of **Stair Styles** in the **Style Manager**. The **Style Manager** is displayed on choosing the **Style Manager** tool from the **Style & Display** panel in the **Manage** tab of the **Ribbon**.

#### A - Distance to First Tread DOWN

This edit box is used to specify the value of extension of the tread attached to the lower riser. By specifying this value, you can extend the landing up to desired distance towards lower riser.

#### Add Tread Depth

Select this check box if you want to add tread depth to the value specified in the **Distance to First Tread DOWN** edit box.

#### B - Distance to First Tread UP

This edit box is used to specify the value for extension of the tread attached to the higher riser. By specifying this value, you can extend the landing up to desired distance towards higher riser.

#### Add Tread Depth

Select this check box if you want to add tread depth to the value specified in the **Distance to First Tread UP** edit box.


#### Extend Landings to Prevent Risers and Treads Sitting under Landings

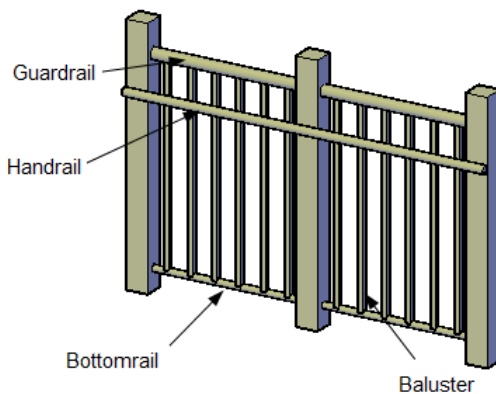
This check box is available below the preview area. Select this check box if you want to create landing at the level of the adjacent riser and tread. If you clear this check box, you will get flush or rectangular landings.

**Extend Landings to Merge Flight Stringers with Landing Stringers**

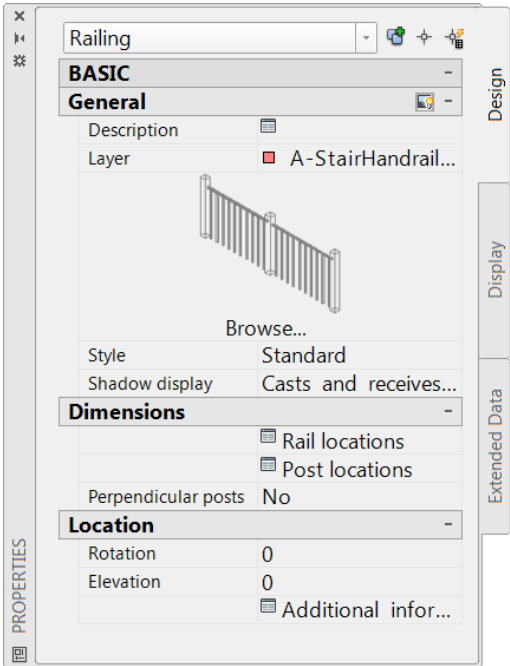
This check box is available in the **Stringer Resolution** area of the dialog box. Select this check box to extend the landings so that the landing stringers merge with the flight stringer.

**Railing**

 This tool is available in the **Stair** drop-down of the **Build** panel in the **Home** tab. This tool is used to create a stand-alone railing as well as a railing attached to stairs or some objects. To create a stand-alone railing, choose the **Railing** tool from the **Stair** drop-down; you will be prompted to specify the start point of the railing. Select a point as the start point; you will be prompted to specify the end point of the railing. Select a point as the end point; you will be prompted to specify the end point again. You can specify an end point for the next segment or you can press ENTER to exit the command. Figure 3-28 shows an annotated railing created with guardrail, handrail, and bottomrail. Figure 3-29 shows the **PROPERTIES** palette displayed on selecting a railing.



*Figure 3-28 An annotated railing*



*Figure 3-29 The **PROPERTIES** palette displayed on selecting a stand-alone railing*

Some of the important options available in the **Dimension** rollout of the **PROPERTIES** palette are discussed next.

**Rail locations**

When you select this option, the **Rail Locations** dialog box will be displayed, as shown in Figure 3-30. Various options available in this dialog box are discussed next.

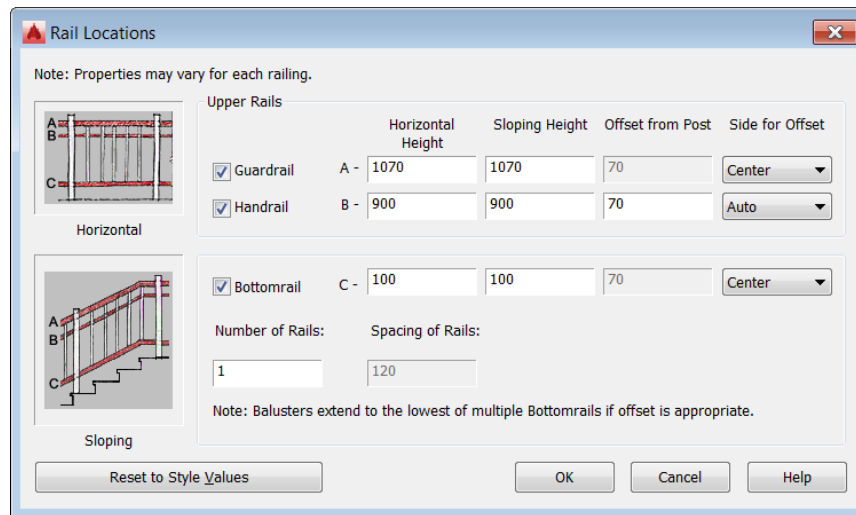


Figure 3-30 The Rail Locations dialog box



#### Note

The options in this dialog box can be edited only when the **Allow Each Railing to Vary** check box is selected from the **Rail Locations** tab of the **Railing Styles** option in the **Style Manager**.

#### Guardrail

When you select this check box, the edit boxes available next to the check box get activated. Using these edit boxes, you can specify horizontal height, sloping height, and offset value of guardrail from the post. You can also specify the side of offset by using the options available in the **Side for Offset** drop-down list.

#### Handrail

When you select this check box, the edit boxes available next to the check box get activated. Using these edit boxes, you can specify horizontal height, sloping height, and offset value of handrail from the post. You can also specify the side of offset by using the options available in the **Side for Offset** drop-down list.

#### Bottomrail

When you select this check box, the edit boxes available next to the check box get activated. Using these edit boxes, you can specify horizontal height, sloping height, and offset value for bottomrail from the post. You can also specify the side of offset by using the options available in the **Side for Offset** drop-down list. When you select the **Bottomrail** check box, then the **Number of Rails** and **Spacing of Rails** edit boxes get enabled. Using the **Number of Rails** edit box, you can specify the number of rails to be created from the bottom. Using the **Spacing of Rails** edit box, you can specify the value of spacing between two successive bottom rails.

#### Post locations

When you choose this tool, the **Post Locations** dialog box will be displayed, as shown in Figure 3-31. The options available in this dialog box are discussed next.



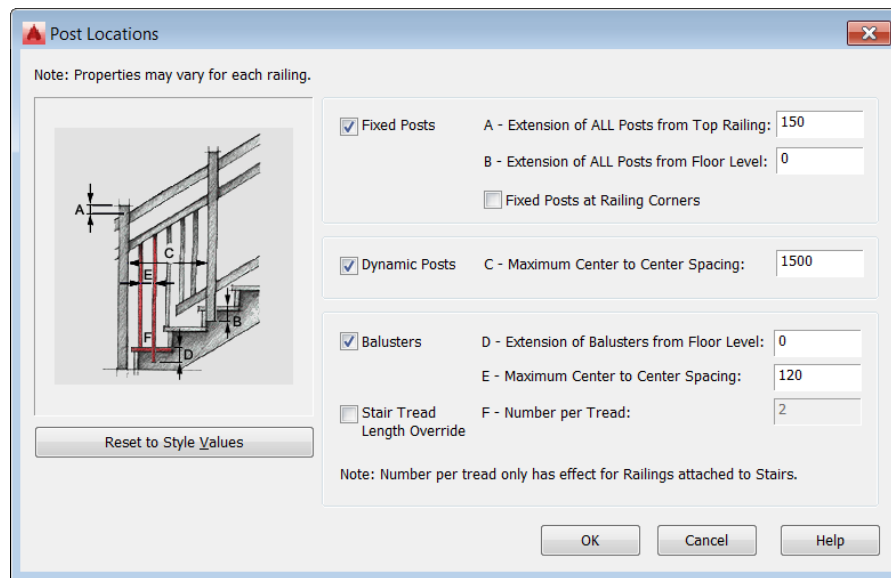


Figure 3-31 The Post Locations dialog box



#### Note

The options in this dialog box can be edited only when the **Allow Each Railing to Vary** check box is selected from the **Post Locations** tab of Railing Styles in the **Style Manager**.

#### Fixed Posts

This check box is used to enable the edit boxes that are used to modify the value of extension of the post. There are two edit boxes to change the value of extension: **Extension of ALL Posts from Top Railing** and **Extension of ALL Posts from Floor Level**. The **Extension of All Posts from Top Railing** edit box is used to specify the value of post above or below the top railing. The **Extension of ALL Posts from Floor Level** is used to specify the height of all the posts from the floor.

#### Fixed Posts at Railing Corners

This check box is used to include the posts present at the railing corners.

#### Dynamic Posts

When you select this check box, the **Maximum Center to Center Spacing** edit box is enabled. This edit box is used to modify the distance between two successive dynamic posts. Specify the value for distance between the dynamic posts in the edit box; the value will be taken as the maximum limit of distance between the two successive posts. When you create a railing having length more than this value, a new post is added in the railing.

#### Balusters

When you select this check box, the **Extension of Balusters from Floor Level** and **Maximum Center to Center Spacing** edit boxes are enabled. These check boxes are used to modify the values related to baluster. The **Extension of Balusters from Floor Level** edit box is used to specify the distance for bottom point of baluster from the level of corresponding tread. The **Maximum Center to Center Spacing** edit box is used to specify the center to center distance between the consecutive balusters.

Stair Tread Length Override

When you select this check box, the **Number per Tread** edit box is enabled. This edit box is used to override the value for number of balusters per tread.

Perpendicular posts

There are two options available in this drop-down list: **Yes** and **No**. When the **Yes** option is selected from this drop-down list, the posts in the railing will be perpendicular to the rails in the railing. If you select the **No** option from this drop-down list, the posts will be perpendicular to the tread.

Railing Extensions

This tool in the **Dimension** rollout will be available only when railing is added to the stairs and there is a need to extend the railing ahead of the stairs. The railings can be extended at two levels, either at floor levels or at landings, refer to Figure 3-32.

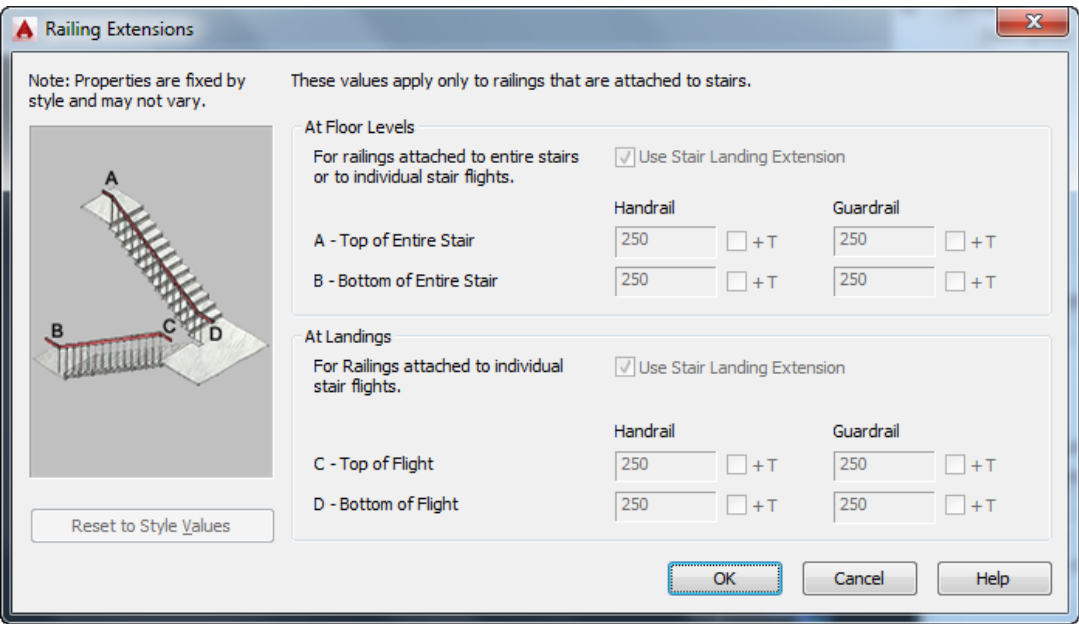


Figure 3-32 The Railing Extensions dialog box

At Floor Levels Area

When you select the **Use Stair Landing Extension** check box in the **At Floor Levels** area, the edit boxes given below get activated. You can specify the values for the **Top of Entire Stair** and **Bottom of Entire Stair** options in the **Handrail** and **Guardrail** edit boxes. Select the **+T** check box for adding the tread length to the extension value.

At Landings Area

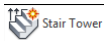
When you select the **Use Stair Landing Extension** check box in the **At Floor Levels** area, the edit boxes below it get activated. You can specify the values for top of flight and bottom of flight for the **Handrail** and **Guardrail** in the respective edit boxes. Select the **+T** check box for adding the tread length to the extension value.

**Note**

1. To create a railing attached to stairs, choose the **Railing** tool from the **Stair** drop-down; the **PROPERTIES** palette will be displayed. Select the **Stairs** option from the **Attached to** drop-down list in the **Location** rollout; you will be prompted to select the stairs in the drawing area. Select the stairs; the railing will be created along the selected stairs.

2. The options in **Railing Extension** dialog box can be edited only when the **Allow Each Railing to Vary** check box is selected in the **Extension** tab of the **Railing Styles** option in the **Style Manager**.

## Stair Tower



This tool is available in the **Stair** drop-down of the **Build** panel in the **Home** tab. This tool is used to create a stair tower from one stair. You can create a stair tower by using any stair shape except spiral. To create a stair tower, you need to fulfill the conditions given next.

1. A stair must already be created in the drawing.
2. You must have more than one level in the current project.

## CREATING GRIDS, BEAMS, COLUMNS, AND BRACES

To create grids, beams, columns, or braces, the tools are available in the **Enhanced Custom Grid** drop-down in the **Build** panel of the **Home** tab in the **Ribbon**. The tools in this drop-down are discussed next.

### Enhanced Custom Grid



This tool is available in the **Enhanced Custom Grid** drop-down. This tool is used to create column grids. When you choose this tool, the **Column Grid** dialog box will be displayed, as shown in Figure 3-33. Using the options in this dialog box, you can create two types of grids: orthogonal grids and radial grids. The methods to create these grids are discussed next.

### Creating Orthogonal Grids

To create orthogonal grids, select the **Orthogonal** radio button from the top left corner of the **Grid Layout** area; the modified **Grid Layout** area will be displayed. By default, the **Top** tab is selected in the dialog box. As a result, the grid lines will be created in the Top plane. To create a grid line, select the desired distance value from the list available on the left in the **Grid Layout** area; the preview of the grid lines distanced as per the selected value will be displayed in the **Preview** area. Also, the parameters of the grid lines will be displayed in the table on the right in the **Grid Layout** area. Keep on clicking on the desired distance values in the list till you get the required number of grid lines. Figure 3-34 shows the **Column Grid** dialog box after selecting values from the list displayed on the left. Similarly, you can add desired number of grids to the Bottom, Left, and Right planes. You can change the pattern of labeling by using the options available in the **X-Labeling** and **Y-Labeling** drop-down lists. Similarly, you can change other parameters for grids by using the options available in the dialog box. After setting all the parameters, choose the **OK** button; the grid will be displayed attached to the cursor and you will be prompted to specify the insertion point. Specify the insertion point; you will be prompted

to specify the rotation angle. Specify the rotation angle; the grid will be created at the specified location. Press ENTER to exit the command or you can specify an insertion point to create another grid with same specifications.

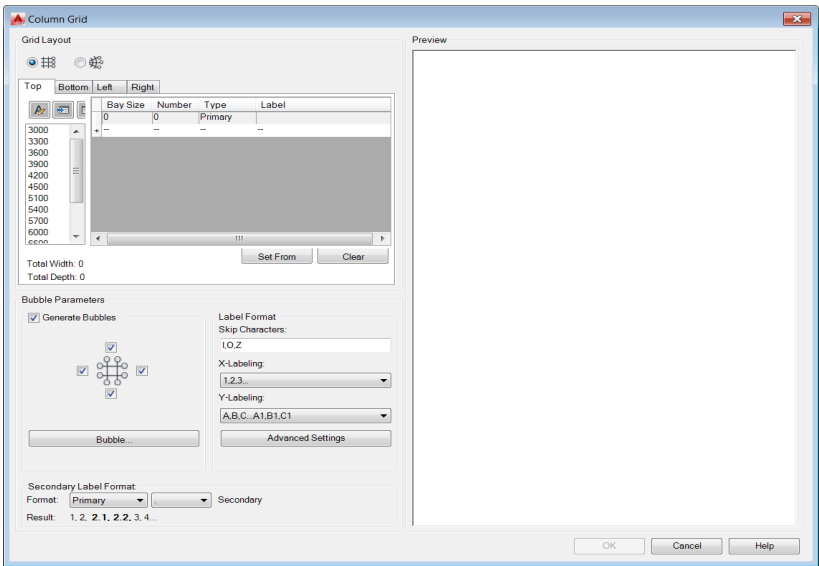


Figure 3-33 The Column Grid dialog box

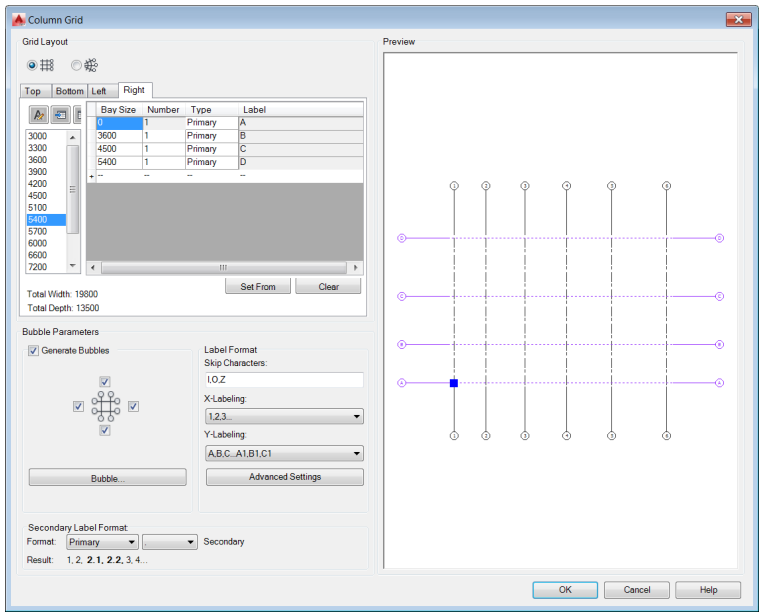


Figure 3-34 The Column Grid dialog box displayed after adding grid lines

Creating Radial Grids

To create radial grids, select the **Radial** radio button on the top left corner of the **Grid Layout** area; the modified **Grid Layout** area will be displayed, refer to Figure 3-35. By default, the **Radial** tab is selected in the dialog box, as a result the grid lines will be created in the radial direction. To create a grid line, select the desired angle value from the list available in the left of the dialog box; preview of the grid lines, at the selected value, will be displayed in the **Preview** area. Also, the parameters of the grid lines will be displayed in the table on the right in the **Grid Layout** area. You can add the desired number of grid lines by selecting them from the list. Figure 3-36 shows the **Column Grid** dialog box after selecting values from the list displayed on the left. Similarly, you can add desired number of grids in the form of an arc by selecting the **Arcs** tab. You can change the pattern of labeling by using the options available in the **X-Labeling** and **Y-Labeling** drop-down lists. Similarly, you can change other settings for grids by using the options available in the dialog box. After setting all the parameters, choose the **OK** button; the grid will be displayed attached to the cursor and you will be prompted to specify the insertion point. Specify the insertion point; you will be prompted to specify the rotation angle. Specify the rotation angle; the grid will be created at the specified location. Press ENTER to exit the command or you can specify an insertion point to create another grid with same specifications.

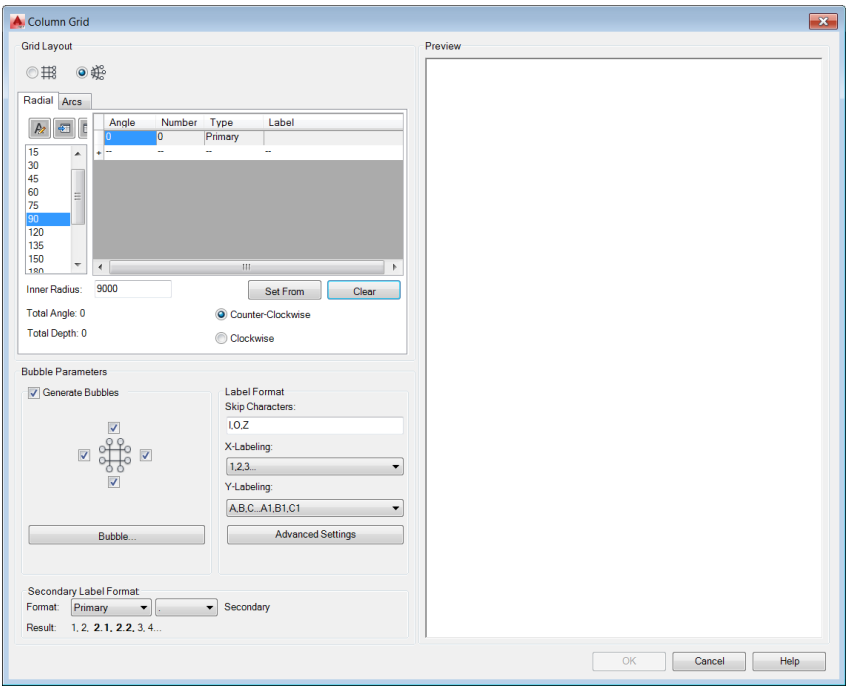


Figure 3-35 The modified *Column Grid* dialog box after selecting the *Radial* radio button

Custom Grid Convert



This tool is available in the **Enhanced Custom Grid** drop-down. It is used to convert the network of lines into column grids. When you choose this tool, you will be prompted to select a network of lines. The command prompt for creating a grid from lines in given next.

Select linework: *Select the network of lines that you want to convert in grid.*

Select linework:

Enter label extension or [No labels] <1200>: *Specify the length of extension line from the grid end point.*

Erase selected linework? [Yes/No] <No>: *Specify whether you want to delete the network of lines or not.*

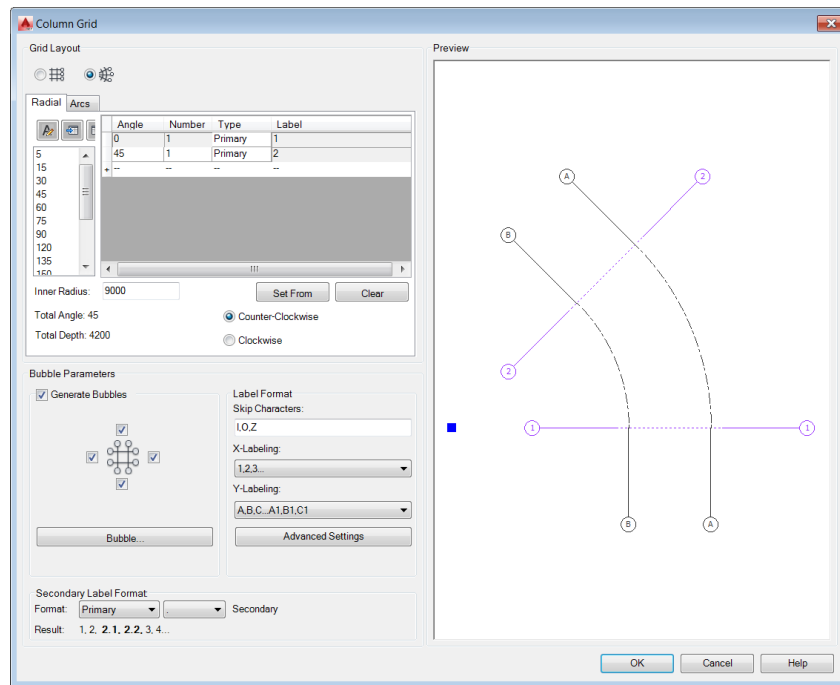


Figure 3-36 The modified **Column Grid** dialog box after selecting values from the list

## Column Grid



This tool is available in the **Enhanced Custom Grid** drop-down. It is used to create a column grid with predefined parameters. To create a column grid, choose the **Column Grid** tool from the drop-down; you will be prompted to specify the insertion point for the grid. Specify the insertion point; you will be prompted to specify the rotation angle for the grid. Specify the rotation angle; the grid will be created at the specified insertion point. Again, you will be prompted to specify the insertion point for the grid. Press ENTER to exit the command. You can edit the parameters of a grid by using the options available in the **PROPERTIES** palette, refer to Figure 3-37. Some important options in this palette are discussed next.

## Shape

This drop-down list is available in the **General** rollout of the **PROPERTIES** palette. The options in this drop-down list are used to change the shape of the grid to be created. There are two options available in this drop-down list: **Rectangular** and **Radial**. When the **Rectangular** option is selected, the grid to be created will be rectangular in shape. There will be horizontal and vertical grid lines in the grid. When you select the **Radial** option, the grids will be in the form of arcs and in the radial direction.

Specify on screen

This drop-down list is available in the **Dimensions** rollout of the **PROPERTIES** palette. The options in this drop-down list are used to specify the method for dimensioning the column grids. There are two options available in this drop-down list: **Yes** and **No**. When you choose the **Yes** option, you will be prompted to specify the corner points of the column grids in the screen. If the **No** option is chosen, then you need to specify the dimensions in the edit boxes available in the **PROPERTIES** palette.

X - Width

This edit box is available for both rectangular shaped and radial shaped grids. This edit box in the **Dimensions** rollout of the **PROPERTIES** palette gets activated only when the **No** option is selected in the **Specify on screen** drop-down list. This edit box is used to specify the value for the width of the grid.

Y - Depth

This edit box is available for rectangular shaped grids only. This edit box in the **Dimensions** rollout of the **PROPERTIES** palette gets activated only when the **No** option is selected in the **Specify on screen** drop-down list. This edit box is used to specify the value for the depth of the grid.

A - Angle

This edit box is available for the radial shaped grids only. This edit box in the **Dimensions** rollout of the **PROPERTIES** palette gets activated only when the **No** option is selected in the **Specify on screen** drop-down list. This edit box is used to specify the value for angle of the grid.

Layout type

This drop-down list is available in both the **X Axis** rollout as well as the **Y Axis** rollout. There are two options available in this drop-down list: **Repeat** and **Space evenly**. When the **Repeat** option is selected, the distance between the two grids is fixed and depending on the total size specified, the number of grid lines are inserted. If the **Space evenly** option is selected in the **Layout type** drop-down list, the total number of grid lines will be fixed and depending on the total size of grid boundary, the distance between the two grid lines will be adjusted.

Bay size

This edit box is available in both the **X Axis** and the **Y Axis** rollouts. This edit box is available only when the **Repeat** option is selected in the **Layout type** drop-down list. You can specify the distance between two grid lines perpendicular to the X and Y axes by using the edit box in the respective rollout.

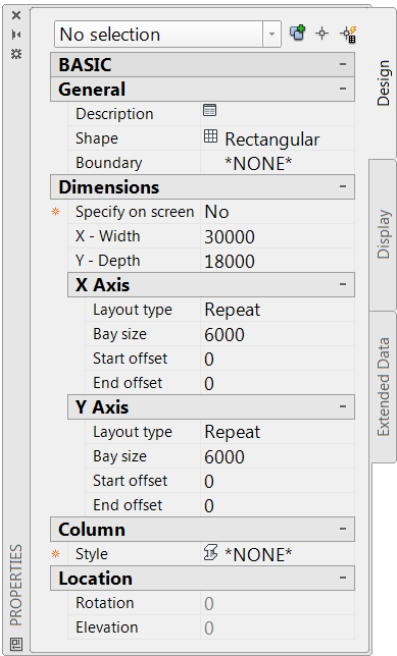


Figure 3-37 The **PROPERTIES** palette displayed on choosing the **Column Grid** tool



## Number of bays

This edit box is available in both the **X Axis** rollout as well as the **Y Axis** rollout. This edit box is available only when the **Space evenly** option is selected in the **Layout type** drop-down list. You can specify the number of grid lines along X axis by using the edit box in the respective rollout.

## Style

This drop-down list in the **Column** rollout of the **PROPERTIES** palette for the column grid will be available only after the custom convert column is applied to the drawing. It is used to change the type of column to be used for building the grid. The options available in this drop-down list are **NONE**, **8mm Drop Rod Support**, **CH421 (40X20X1.5) Roll Formed Channel Profile**, and **Standard**.

## Column

This tool is available in the **Enhanced Custom Grid** drop-down. This tool is used to create a column with predefined parameters. To create a column, choose the **Column** tool from the drop-down; you will be prompted to specify the position of the column in the drawing area. Select a point on the grid or specify a point in the drawing area; you will be prompted to specify the roll (rotation) of the column. Specify the roll by clicking in the drawing area or by specifying value in the command prompt; the column will be created at the specified point. You can change the parameters of the column by using the options available in the **PROPERTIES** palette, refer to Figure 3-38. Some of the important options in the **PROPERTIES** palette are discussed next.

## On object

This drop-down list is available in the **General** rollout. There are two options available in this drop-down list: **Yes** and **No**. When you select the **Yes** option, the column will be attached to the base object. If you move the base, the column will also move accordingly. When you choose the **No** option, the column will be placed as a separate object having no link with other objects.

## Start offset

This edit box is available in the **Dimensions** rollout. In this edit box, you can specify the offset value for the start point of the column from the insertion point.

## End offset

This edit box is available in the **Dimensions** rollout. In this edit box, you can specify the offset value for the end point of the column from the insertion point.

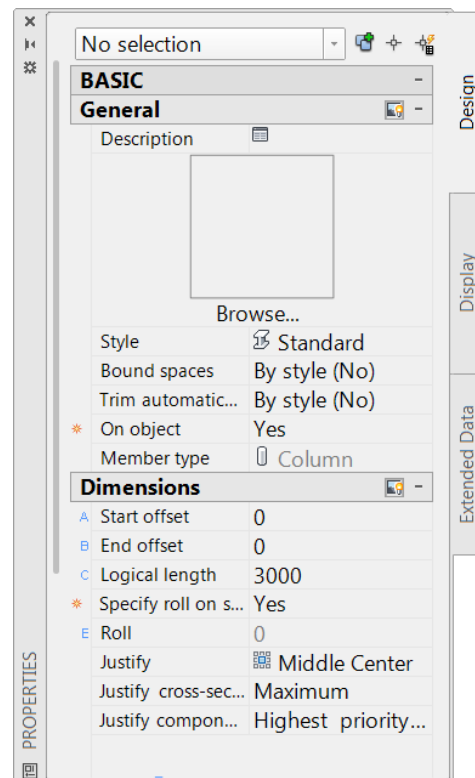


Figure 3-38 The **PROPERTIES** palette displayed on choosing the **Column** tool



### Logical Length

This edit box is available in the **Dimensions** rollout. In this edit box, you can specify the value for the length of the column.

### Specify roll on screen

This drop-down list is available in the **Dimensions** rollout. There are two options available in this drop-down list: **Yes** and **No**. When you select the **Yes** option, you will be prompted to specify the value for the rotation while placing the column. When you select the **No** option, you need to specify the value for the rotation of the column in the **Roll** edit box available in the **PROPERTIES** palette.

### Roll

This edit box is available in the **Dimensions** rollout only when the **No** option is selected in the **Specify roll on screen** drop-down list. In this edit box, you can specify the value for rotation of the column being created.

### Justify

This drop-down list is available in the **Dimensions** rollout. There are ten options available in this drop-down list to change the justification of the column.

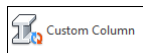
### Justify cross-section

This drop-down list is available in the **Dimensions** rollout. There are two options available in this drop-down list: **Maximum** and **At each node**. When you select the **Maximum** option from the drop-down list, the justification method is applied only to the columns having maximum cross section. When you choose the **At each node** option from the drop-down list, the justification method is applied to every column.

### Justify components

This drop-down list is available in the **Dimensions** rollout. There are two options available in this drop-down list: **Highest priority only** and **All**. When you select the **Highest priority only** option from the drop-down list, the justification methods will be applied only to the columns having highest priority. When the **All** option is selected from the drop-down list, then the justification method is applied to all the columns.

### Custom Column



This tool is available in the **Enhanced Custom Grid** drop-down. This tool is used to create a user defined column. To create a custom column, choose the **Custom Column** tool; you will be prompted to select a closed polyline, a closed spline, a circle, or an ellipse. Select a closed entity; you will be prompted to specify the insertion point or centroid. Select a point to specify as insertion point or centroid; the **Convert to Column** dialog box will be displayed, as shown in Figure 3-39. Specify the name of the column in the **New Name** edit box and choose the **OK** button from the dialog box; the custom column will be created at the specified location.

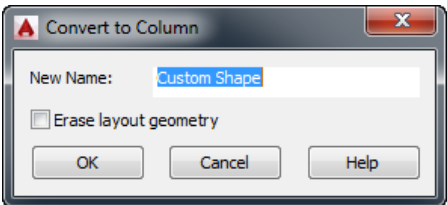


Figure 3-39 The *Convert to Column* dialog box

You can change the properties of a custom created column by using the **PROPERTIES** palette, refer to Figure 3-40. Some of the important options available in the **PROPERTIES** palette after selecting a custom column are discussed next.

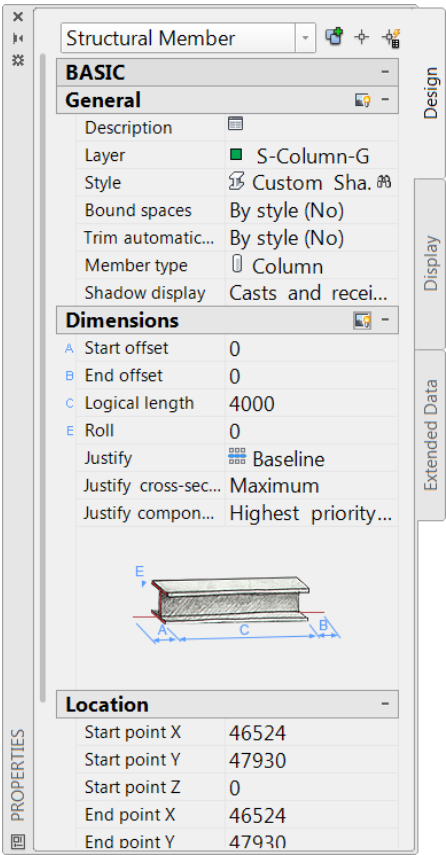


Figure 3-40 The *PROPERTIES* palette

### Bound spaces

This drop-down list is available in the **General** rollout. There are three options available in this drop-down list: **Yes**, **No**, and **By style (NO)**. When the **Yes** option is selected in the drop-down list, the created object will act as a space boundary. When the **No** option is selected in the drop-down list, the created object will not act as a space boundary. When the **By style (NO)** option is selected in the drop-down list, the boundary conditions of the object are specified by the style of the object.

### Trim automatically

This drop-down list is available in the **General** rollout. There are three options available in this drop-down list: **Yes**, **No**, and **By style (NO)**. When the **Yes** option is selected in the drop-down list, the created object will get automatically trimmed to join with the connecting object. When the **No** option is selected in the drop-down list, the created object will not get automatically trimmed to join with the connecting object. When the **By style (NO)** option is selected in the drop-down list, the trimming conditions of the object are specified by the style of the object.

### Member type

This drop-down list is available in the **General** rollout. There are three options available in this drop-down list: **Beam**, **Column**, and **Brace**. You can choose the **Beam** option from this drop-down list to create a custom beam. By default, the **Column** option is selected in the drop-down list. This option is used to create a column. You can create a brace by choosing the **Brace** option from the drop-down list.

The other options in the **PROPERTIES** palette have already been discussed.

### Beam



This tool is available in the **Enhanced Custom Grid** drop-down. This tool is used to create a beam. To create a beam, choose the **Beam** tool; you will be prompted to specify the start point of the beam. Specify the start point of the beam; you will be prompted to specify the end point of the beam. Specify the end point of the beam; the beam will be created with the specified parameters. You can specify the parameters of the beam in the **PROPERTIES** palette. The options available in the **PROPERTIES** palette for beam are similar to the options available for custom column. The options that are available only for a beam are discussed next.

### Array

This drop-down list is available in the **Layout** rollout. There are two options available in this drop-down list: **Yes** and **No**. The **No** option is selected by default in the drop-down list. When you select the **Yes** option, you can create multiple instances of the beam. On selecting the **Yes** option, the **Layout method** and **Number of bays** options become available in the **Layout** rollout. These options are used to specify the parameter for creating multiple instances of the beam.

### Layout method

This drop-down list is available in the **Layout** rollout. There are two options available in this drop-down list: **Space evenly** and **Repeat**. When you select the **Space evenly** option, the instances are spaced equally over the total distance. When you select the **Repeat** option, the instances are spaced according to the specified distance value specified.

### Number of bays

This edit box is available in the **Layout** rollout. In this edit box, you can specify the value for number of instances of the beam.

### Brace



This tool is available in the **Enhanced Custom Grid** drop-down. This tool is used to create a brace. To create a brace, choose the **Brace** tool; you will be prompted to specify

the start point of the brace. Specify the start point of the brace; you will be prompted to specify the end point of the brace. Specify the end point of the brace; the brace will be created with the specified parameters. You can specify the parameters of the brace in the **PROPERTIES** palette. The options available in the **PROPERTIES** palette for brace are similar to the options available for the custom column. The options that are available only for a brace are discussed next.

### Specify rise on screen

This drop-down list is available in the **Rise** rollout. There are two options available in this drop-down list: **Yes** and **No**. The **Yes** option is selected by default in the drop-down list. So you need to specify the value of rise on the screen while placing the braces. When you choose the **No** option, you can set the parameters related to rise by using the options available in the **PROPERTIES** palette.

### Method

This drop-down list is available in the **Rise** rollout. There are two options available in this drop-down list: **Angle** and **Distance**. On choosing the **Angle** option, you can set the value of rise by specifying angle value in the **Angle from first member** edit box.

### Distance along first member

This edit box is available in the **Rise** rollout. You can specify the value for distance of start point of the brace along the first member.

### Angle from the first member

This edit box is available only when the **Angle** option is selected in the **Method** drop-down list. You can specify the value for rotation of the brace with respect to the first member.

## CREATING PRIMITIVES

You can create basic objects like box, cylinder, torus and so on by using the tools available in AutoCAD MEP. These basic objects are called primitives. The tools to create primitives are available in the **Box** drop-down of the **Build** panel. The tools available in this drop-down are discussed next. The options for creating different primitive shapes also displayed in the command prompt.



### Note

*For better visualization, you may need to rotate the **ViewCube** while creating primitives shapes.*

### Box



The **Box** tool is used to create a box with the specified dimensions. To create a box, choose the **Box** tool from the **Box** drop-down in the **Build** panel; you will be prompted to specify the first corner of the box. Specify the first corner of the box; you will be prompted to specify the second corner of the box. Specify the second corner of the box; you will be prompted to specify the height of the box. Specify the height of the box; you will be prompted to specify the rotation angle of the box. Specify the rotation value; the box will be created.

### Pyramid



The **Pyramid** tool is used to create a pyramid with the specified dimensions. To create a pyramid, choose the **Pyramid** tool from the **Box** drop-down in the **Build** panel; you

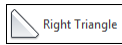
will be prompted to specify the first corner point of the pyramid. Specify the first corner point of the pyramid; you will be prompted to specify the second corner point. Specify the second corner point; you will be prompted to specify the height of the apex. Specify the height of the apex; you will be prompted to specify the rotation angle of the pyramid. Specify the value for rotation; a pyramid with specified settings will be created.

## Cylinder



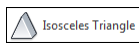
The **Cylinder** tool is used to create a cylinder of some specified dimensions. To create a cylinder, choose the **Cylinder** tool from the **Box** drop-down in the **Build** panel; you will be prompted to specify the insertion point of the cylinder. Specify the point in the drawing area; you will be prompted to specify the radius. Enter the radius value; you will be prompted to specify the height of the cylinder. Specify the height of the cylinder; you will be prompted to specify the rotation angle. Specify the value for rotation; a cylinder of specified dimensions will be created.

## Right Triangle



The **Right Triangle** tool is used to create a right triangle mass of some specified dimensions. To create a right triangle, choose the **Right Triangle** tool from the **Box** drop-down in the **Build** panel; you will be prompted to specify the first corner point of the right triangle. Specify the point in the drawing area; you will be prompted to specify the second corner point of the right triangle. Specify the second corner point; you will be prompted to specify the height of the apex. Specify the height of the apex; you will be prompted to specify the rotation angle of the right triangle. Specify the value for rotation; a right triangle of specified dimensions will be created.

## Isosceles Triangle



The **Isosceles Triangle** tool is used to create an isosceles triangle mass of some specified dimensions. The procedure to create an isosceles triangle is similar to the procedure of creating a right triangle mass.

## Cone



The **Cone** tool is used to create a cone of some specified dimensions. To create a cone, choose the **Cone** tool from the **Box** drop-down in the **Build** panel; you will be prompted to specify the insertion point of the cone. Specify the point in the drawing area; you will be prompted to specify the radius. Enter the radius value; you will be prompted to specify height of the cone. Specify the height of the cone; you will be prompted to specify the rotation angle. Specify the value of rotation; a cone of specified dimensions will be created.

## Dome



The **Dome** tool is used to create a dome of some specified dimensions. To create a dome, choose the **Dome** tool from the **Box** drop-down in the **Build** panel; you will be prompted to specify the insertion point of the dome. Specify the point in the drawing area; you will be prompted to specify the radius. Enter the radius value; you will be prompted to specify the rotation angle. Specify the value of rotation; a dome of specified dimensions will be created.

## Sphere



The **Sphere** tool is used to create a dome of some specified dimensions. To create a sphere, choose the **Sphere** tool from the **Box** drop-down in the **Build** panel; you will be prompted to specify the insertion point of the sphere. Specify the point in the drawing area; you will be prompted to specify the radius. Enter the radius value; you will be prompted to specify the rotation angle. Specify the value of rotation; a sphere with of dimensions will be created.

## Arch



The **Arch** tool is used to create an arch with the specified dimensions. To create an arch, choose the **Arch** tool from the **Box** drop-down in the **Build** panel; you will be prompted to specify the first corner point of the base. Specify the point in the drawing area; you will be prompted to specify the second corner point of the base. Specify the second corner point; you will be prompted to specify the height of the arch. Specify the height of the arch; you will be prompted to specify the rotation angle of the arch. Enter the value of rotation angle; an arch will be created with the specified parameters.

## Gable



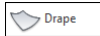
The **Gable** tool is used to create a gable of some specified dimensions. To create a gable, choose the **Gable** tool from the **Box** drop-down in the **Build** panel; you will be prompted to specify the first corner point of the base. Specify the point in the drawing area; you will be prompted to specify the second corner point of the base. Specify the second corner point; you will be prompted to specify the height of the gable. Specify the height of the gable; you will be specify the rotation angle of the arch. Enter the value of the rotation angle; a gable of specified dimensions will be created.

## Barrel Vault



The **Barrel Vault** tool is used to create a barrel vault of some specified dimensions. To create a barrel vault, choose the **Barrel Vault** tool from the **Box** drop-down in the **Build** panel; you will be prompted to specify the first corner point of the base. Specify the point in the drawing area; you will be prompted to specify the second corner point of the base. Specify the second corner point; you will be prompted to specify the rotation angle of the barrel vault. Enter the value of the rotation angle; a barrel vault of the specified dimensions will be created.

## Drape



The **Drape** tool is used to create a drape of some specified parameters. A drape is used to show contour of the site. You can create a drape with the help of polylines or polygons. To create a drape, choose the **Drape** tool from the **Box** drop-down in the **Build** panel; you will be prompted to select objects representing the contour. Select polylines or other objects representing the contour and then press ENTER; you will be prompted to erase or retain the selected contours. Enter **Y** or **N** at the command prompt; you will be prompted to generate a regular mesh. Enter **Y** or **N** at the command prompt. On specifying **N** at the command prompt, you will be prompted whether to generate a rectangular mesh. On entering **Y** at the command prompt; you will be prompted to specify the first corner of the rectangle to create a mesh. Specify a point in the drawing area; you will be prompted to specify the opposite corner of the rectangular mesh. Specify the opposite corner of the mesh; you will be prompted to specify the number of

subdivisions along the X direction. Enter the desired number of subdivisions at the command prompt; you will be prompted to specify the number of subdivisions along the Y direction. Enter the number of subdivisions at the command prompt; you will be prompted to specify the thickness value of the base. Enter the value of thickness at the command prompt; the drape with the selected contours will be created.

## Doric

The doric pillar is used for creating heritage type vertical structures. The **Doric** tool will be available only after **Box** is selected from the **Primitives** drop-down in the **Build** panel of the **Home** tab; the **Shape** option pops up in the command prompt. Select **Shape** in the command prompt; various options for different shapes get displayed in the command bar. Select the **DORic** option. Specify the center point of the doric shape in the drawing area; you will be prompted to specify the radius. Enter the radius value in the command bar; you will be prompted to specify the height of the doric shaped pillar. Specify the height for the pillar; you will be prompted to specify the rotation angle. Specify the value for the rotation angle; a doric pillar of specified dimensions will be created.

## TUTORIALS

### Tutorial 1

In this tutorial, you will create a model of a building, as shown in Figure 3-41. The plan of the building is given in Figure 3-42. (Expected time: 30 min)

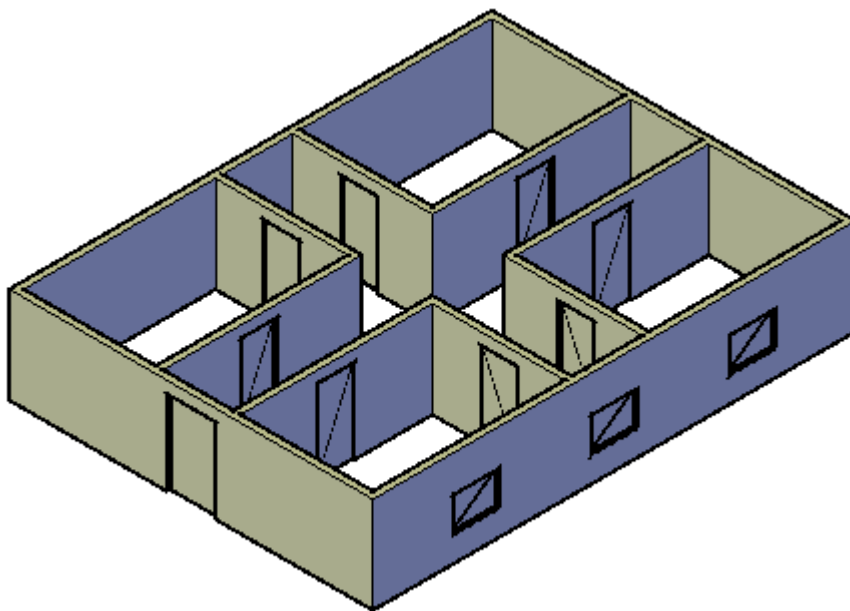
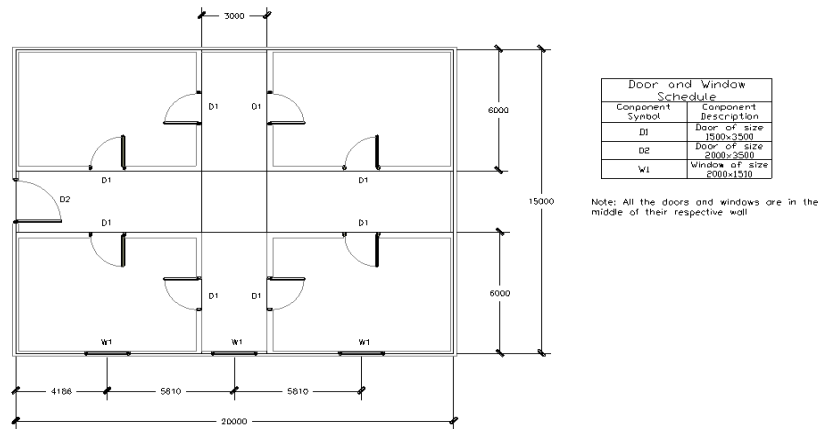


Figure 3-41 Model of a building



**Figure 3-42** Plan view of a building

Examine the model to determine the number of features in it. The model consists of three features, refer to Figure 3-41.

The following steps are required to complete this tutorial:

- Create a project file with the name Office.
- Create a new construct plan with the name C03\_tut01.
- Create walls by using the reference of line diagram, refer to Figures 3-42 and 3-43.
- Create doors according to the plan, refer to Figures 3-42 and 3-44.
- Create windows according to the plan, refer to Figure 3-42.

### Starting a New Project File

- Start AutoCAD MEP by using AutoCAD MEP 2016 - English (Global) icon from the desktop. Next, choose **New > Project** from the **Application Menu**; the **Project Browser** is displayed.
- Choose the **New Project** button available at the bottom of the **Project Browser**; the **Add Project** dialog box is displayed.
- Enter the project name as **Office** in the **Project Name** field. Also, enter the **Project Number** as **0001** and specify the description about the project as desired in their respective fields. Make sure that the **Create from template project** check box is selected.
- Choose the Browse button and select the file *Commercial Template Project (Metric).apj* from the *C:\ProgramData\Autodesk\MEP 2016\enu\Template\Commercial Template Project (Metric)* directory and then choose the **Open** button; the path of the selected file is added to the edit box displayed below the **Create from template project** check box.
- Choose the **OK** button; the newly created project file name is displayed in the left pane of the **Project Browser**.



6. Choose the **Close** button from the **Project Browser**; the **PROJECT NAVIGATOR** palette is displayed in the drawing area and the new project is activated. By default, the **Constructs** tab is active in the **PROJECT NAVIGATOR**.

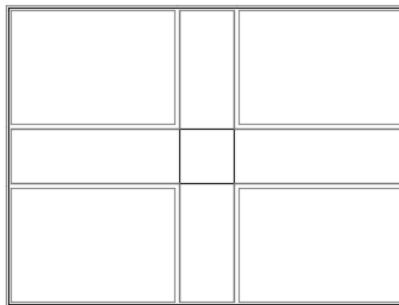
### Adding a New Construct

1. Choose the **Construct** tab in the **PROJECT NAVIGATOR**.
2. Choose the **Add Construct** button available at the bottom of the **PROJECT NAVIGATOR**; the **Add Construct** dialog box is displayed.
3. Click in the **Name** field and specify the name of construct as *C03\_tut01*. Make sure the **Open in drawing editor** check box is selected and choose the **OK** button; the *C03\_tut01* drawing file is opened.

### Creating Walls

Now, you will create walls.

1. Choose the **Architecture** option from the **Workspace Switching** flyout, if not already selected.
2. Choose the **Wall** tool from the **Wall** drop-down available in the **Build** panel of the **Home** tab; you are prompted to specify the start point of the wall. Also, the corresponding **PROPERTIES** palette is displayed.
2. Specify the value for width, base height, and justify as **254**, **4000**, and **Center**, respectively, in their respective fields in the **Dimensions** rollout of the **PROPERTIES** palette.
3. Click to specify the start point of the wall and then create the walls, as shown in Figure 3-43. For dimensions, refer to Figure 3-42.



*Figure 3-43 Walls created*

### Creating Doors

Now, you will create doors. For dimensions, refer to Figure 3-42.

1. Choose the **Door** tool from the **Door** drop-down available in the **Build** panel of the **Home** tab; you are prompted to select a wall or a grid assembly. Also, the **PROPERTIES** palette is displayed.

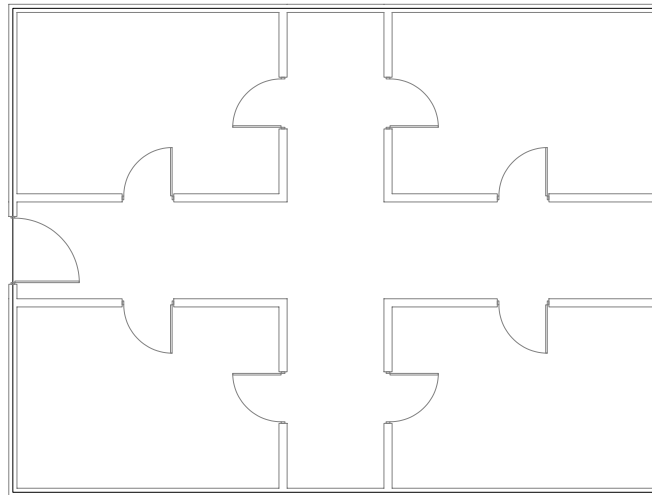
- Specify the value for width and height as **1500** and **3500**, respectively, in their respective fields in the **Dimensions** rollout of the **PROPERTIES** palette. Also, select the **Offset/Center** option from the **Position along wall** field in the **Location** rollout of the **PROPERTIES** palette.


**Note**

*The **Offset/Center** option helps you to justify the position of the doors at the center of the wall.*

- Click at the required locations to place the door D1, refer to Figure 3-42.
- Now, specify width as **2000** in the **Width** field available in the **Dimensions** rollout of the **PROPERTIES** palette and create the main gate D2. For positioning the gates, refer to Figure 3-42.

After creating the doors, the drawing is displayed, as shown in Figure 3-44.



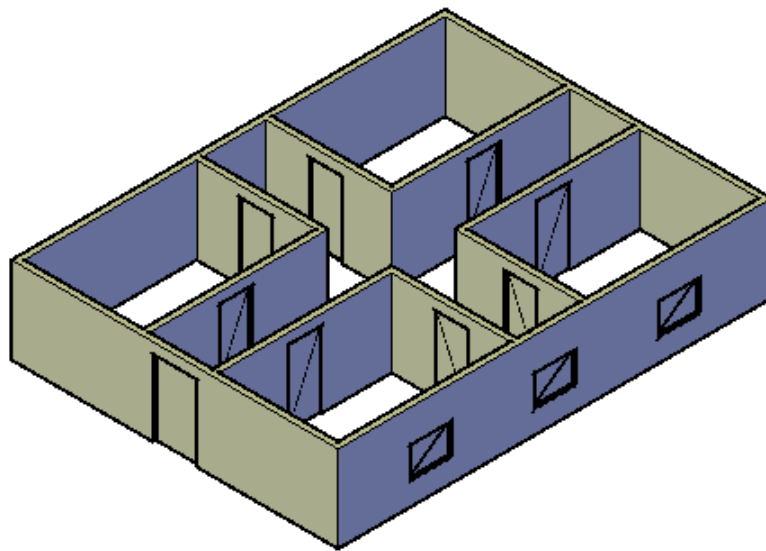
*Figure 3-44 The drawing after creating gates*

## Creating Windows

Now, you will create windows with the specifications given in Figure 3-42.

- Choose the **Window** tool from the **Window** drop-down available in the **Build** panel of the **Home** tab; you are prompted to select a wall or a grid assembly. Also, the **PROPERTIES** palette with corresponding options is displayed.
- Specify the value for width and height for the window as **2000** and **1510** respectively, in their corresponding fields in the **Dimensions** rollout of the **PROPERTIES** palette. Also, select the **Offset/Center** option from the **Position along wall** field in the **Location** rollout of the **PROPERTIES** palette.
- Click at the required locations to create the windows W1, refer to Figure 3-42.

The final model in the **SW Isometric** view and the **Conceptual** display style is shown in Figure 3-45.



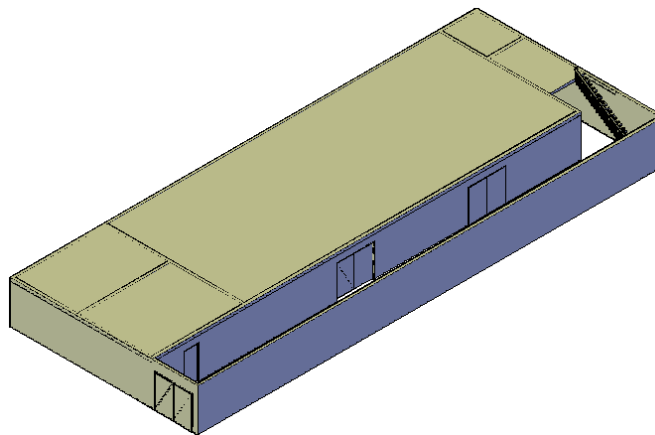
*Figure 3-45 Model of a building*

### **Saving the Drawing File**

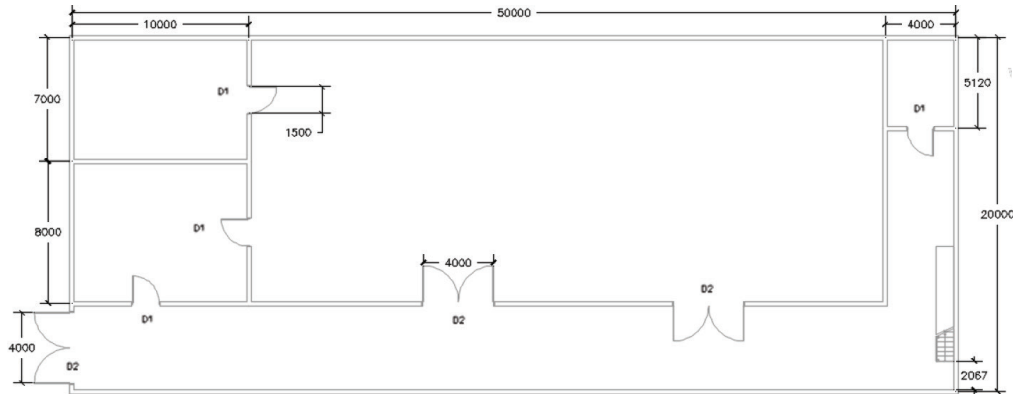
1. Choose **Save** from the **Application Menu** to save the drawing file with the name *c03\_tut1*.

## **Tutorial 2**

In this tutorial, you will create a model of a building, as shown in Figure 3-46. The plan of the building is given in Figure 3-47. **(Expected time: 30 min)**



*Figure 3-46 Model of a building*



*Figure 3-47 The plan of the building*

The following steps are required to complete this tutorial:

- Create a new project file.
- Create a new construct with the name C03\_tut02.
- Create walls by using the reference of the line diagram, refer to Figure 3-48.
- Create doors according the plan, refer to Figure 3-47.
- Create the roof according to the plan, refer to Figure 3-49.
- Create the stairs, refer to Figure 3-50.
- Create a cut in the slab for railing, refer to Figure 3-52.
- Create railing on the stairs.

After starting the AutoCAD MEP session, the first task is to create a project.

### Starting a New Project File

- Start AutoCAD MEP by using AutoCAD MEP 2016 - English (Global) icon from the desktop, if not started and then choose **New > Project** from the **Application Menu**; the **Project Browser** is displayed.
- Choose the **New Project** button available at the bottom of the **Project Browser**; the **Add Project** dialog box is displayed.
- Enter the project name as **Machining Plant** in the **Project Name** field. Also, enter the project number and description in their respective fields. Select the *Commercial Template Project (Metric).apj* as template for the project using the **Browse** button.
- Choose the **OK** button; the new created project file name is displayed on the left pane of the **Project Browser**.
- Choose the **Close** button from the **Project Browser**; the **PROJECT NAVIGATOR** palette is displayed in the drawing area and the new project is activated.

### Adding a New Construct

1. Choose the **Constructs** tab from the **PROJECT NAVIGATOR**. Choose the **Add Construct** button available at the bottom of the **PROJECT NAVIGATOR**; the **Add Construct** dialog box is displayed.
2. Click in the **Name** field and specify the name of the construct as *C03\_tut02*. Make sure that **Open in drawing editor** check box is selected and choose the **OK** button; the *C03\_tut02* drawing file is opened.

### Creating Walls

Now, you need to create walls. Make sure that the **Architecture** workspace is active.

1. Choose the **Wall** tool from the **Wall** drop-down available in the **Build** panel of the **Home** tab; you are prompted to specify the start point of the wall. Also, the **PROPERTIES** palette is displayed.
2. Specify width, base height, and justify as **254**, **4500**, and **Center**, respectively in their respective fields in the **Dimensions** rollout of the **PROPERTIES** palette if not specified.
3. Click to specify the start point of the wall and then create the walls, as shown in Figure 3-48. For dimensions, refer to Figure 3-47.



*Figure 3-48 Walls created using reference of line diagram*

### Creating Doors

Now, you need to create doors. For dimensions, refer to Figure 3-47. Make sure that the **Architecture** workspace is active.

1. Choose the **Door** tool from the **Door** drop-down available in the **Build** panel of the **Home** tab; you are prompted to select a wall or a grid assembly.

Note that the **PROPERTIES** palette with the corresponding options is displayed.

2. Specify width and height as **1500** and **3500** respectively, in their respective fields in the **Dimensions** rollout of the **PROPERTIES** palette.

- Also, select the **Offset/Center** option from the **Position along wall** field in the **Location** rollout and make sure that the **Standard** option is selected in the **Style** drop-down list of the **PROPERTIES** palette.
- Click at the required locations to create the doors D1, refer to Figure 3-47.

Now, you need to create the hinged double doors. As these doors are not available by default, so you need to select the **Hinged-Double** door option from the **PROPERTIES** palette.

- Select the **Door** tool from the **Door** drop-down available in the **Build** panel of the **Home** tab; you are prompted to select a wall or a grid assembly. Also, the **PROPERTIES** palette with the corresponding options is displayed.
- Click on the Style preview area in the **PROPERTIES** palette; the **STYLES BROWSER** palette is displayed. Choose the **Hinged-Double** door option from the gallery of **STYLE BROWSER** and double-click on it to select the door style.
- Specify width and height as **4000** and **3500** in their respective fields in the **Dimensions** rollout of the **PROPERTIES** palette. Select the **Unconstrained** option from the **Position along wall** field in the **Location** rollout of the **PROPERTIES** palette.

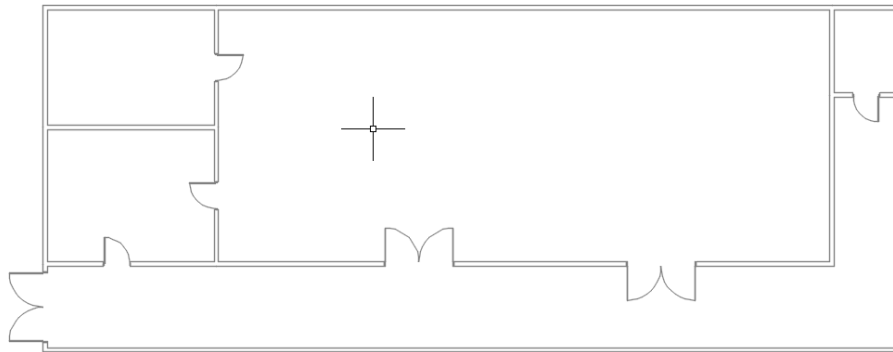


#### Note

The **Unconstrained** option is chosen in the **Position along wall** field of the **Location** rollout, so you can place the door D2 without any dimension reference.

- Click at the required location to position the doors D2, as shown in the Figure 3-47.

After creating the doors, the drawing is displayed as shown in Figure 3-49.



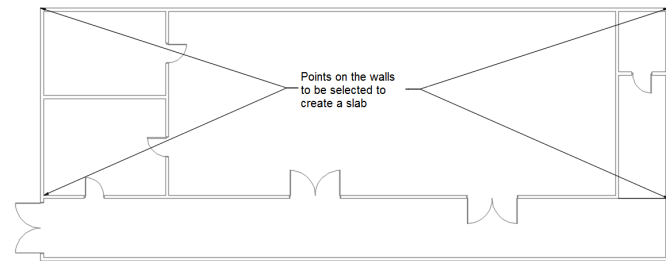
**Figure 3-49** The drawing after creating all the doors

### Creating Slab

Now, you need to create the slab with the specifications shown in Figure 3-50.

- Choose the **Slab** tool from the **Roof Slab** drop-down available in the **Build** panel of the **Home** tab; you are prompted to specify the start point of the slab.

2. Select one of the corner points of the building displayed in Figure 3-50; you are prompted to specify the next point for the slab.
3. Select rest of the corner points as shown in Figure 3-50.

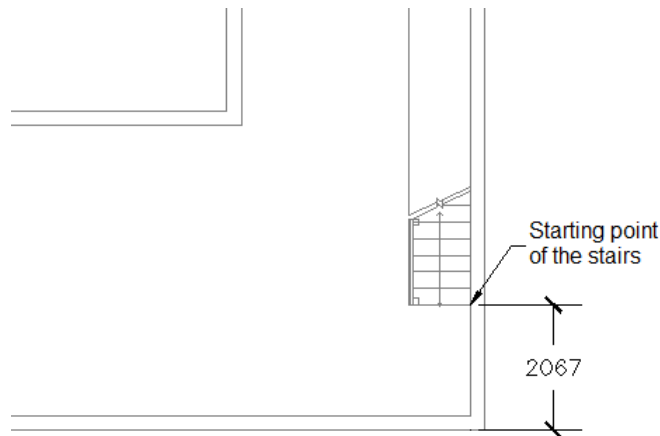


*Figure 3-50 Corner points for the slab*

### Creating Stairs

Now, you will create stairs attached to the slab.

1. Choose the **Stair** tool from the **Stair** drop-down available in the **Build** panel of the **Home** tab; you are prompted to specify the flight start point. Also, the **PROPERTIES** palette is displayed with the options relevant to stairs.
2. Specify width, height, justification, and termination as **1000**, **4500**, **Right**, and **Landing** in their respective fields in the **PROPERTIES** palette. Also, choose **Straight** from the **Shape** drop-down list in the **General** rollout.
3. Select a starting point for stairs and align it with the adjacent wall, refer to Figure 3-51.

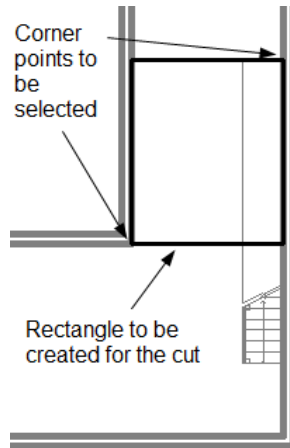


*Figure 3-51 Starting point of the stairs*

Now, you will create a cut on the slab to allow a passage through the stairs to the top of the roof.

### Creating Cut in the Slab

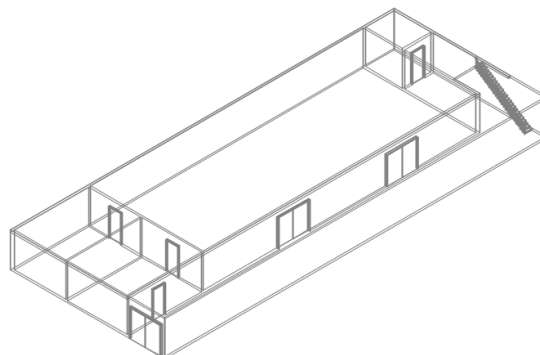
1. Choose the **Rectangle** tool from the **Rectangle** drop-down available in the **Draw** panel of the **Home** tab; you are prompted to specify the first corner point. Specify the corner points for the rectangle, as shown in Figure 3-52.



*Figure 3-52 Rectangle to be created for cut in the slab*

2. Select the slab and choose the **Trim** tool from the **Modify** panel in the **Slab** contextual tab; you are prompted to select a trimming object like a polygon or a solid object.
3. Select the rectangle created for the cut and press ENTER; you are prompted to specify the side to be deleted.
4. Click inside the rectangle, the area covered by the rectangle is trimmed. Press ESC to exit the tool.  
Now you need to hide the rectangle geometry created for trimming.
5. Right-click on the rectangle; a shortcut menu is displayed. Move the cursor on the **Isolate Objects** option in the shortcut menu; a flyout is displayed. Choose the **Hide Objects** option to hide the rectangle.

Isometric view of the drawing after creating the cut is shown in Figure 3-53.



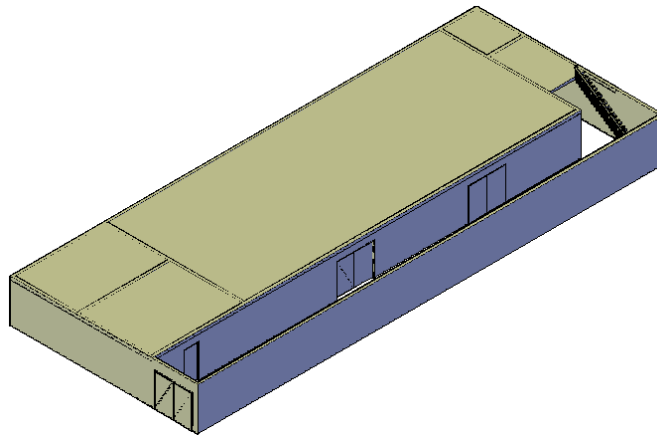
*Figure 3-53 Drawing after creating the cut in the slab*



### Creating Railing on the Stairs

1. Choose the **Railing** tool from the **Stair** drop-down available in the **Build** panel of the **Home** tab; you are prompted to specify the start point for the railing.
2. Choose **Attach** and then the **Stair** option from the command prompt; you are prompted to select a stair.
3. Select the stairs created earlier; a railing with the standard settings is created in the drawing area.
4. Deselect all the entities, select the railing, and invoke the **PROPERTIES** palette.
5. Enter **900** in the **Side offset** field in the **Location** rollout of the **PROPERTIES** palette.

After creating all the components, the final drawing (in conceptual view) is displayed, as shown in Figure 3-54.



*Figure 3-54 The final drawing*

### Saving the Drawing File

1. Choose **Save** from the **Application Menu** to save the drawing file with the name *c03\_tut2*.

---

## Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. A \_\_\_\_\_ is an opening in a wall or door to facilitate the passage of air and light.
2. The \_\_\_\_\_ tool is used to create a segment of roof which is not connected with other entities.

3. A \_\_\_\_\_ window can be created on a cornered wall.
4. You cannot create a curved wall using the **Wall** tool. (T/F)
5. A curtain wall is a non-structural wall. (T/F)
6. Using the **Stair** tool, you can create only straight stairs. (T/F)

## Review Questions

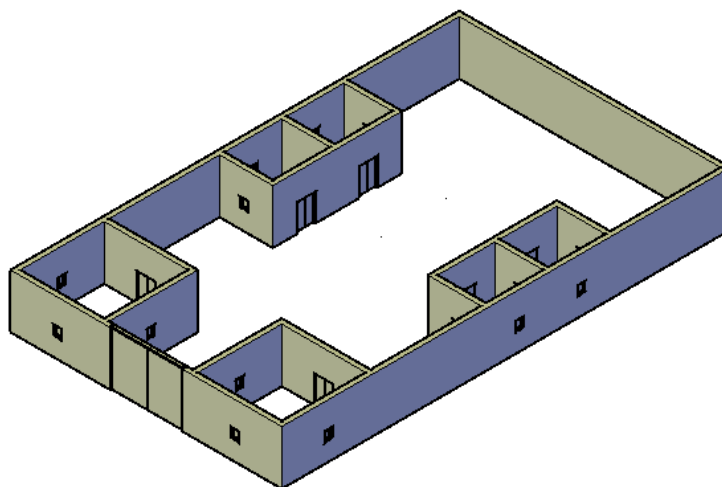
Answer the following questions:

1. On selecting a slab, the \_\_\_\_\_ contextual tab gets activated in the **Ribbon**.
2. The \_\_\_\_\_ tool is used to convert the network of lines into column grids.
3. Using the options in the **Style Manager**, you can create custom doors. (T/F)
4. Spiral stairs can be created only in clockwise direction. (T/F)
5. The **Railing** tool can be used to attach railing to a stair. (T/F)

## EXERCISE

### Exercise 1

Create the model of building, as shown in Figure 3-55. The plan view of the building is shown in Figure 3-56. **(Expected time: 45 min)**



*Figure 3-55 Model for Exercise 1*

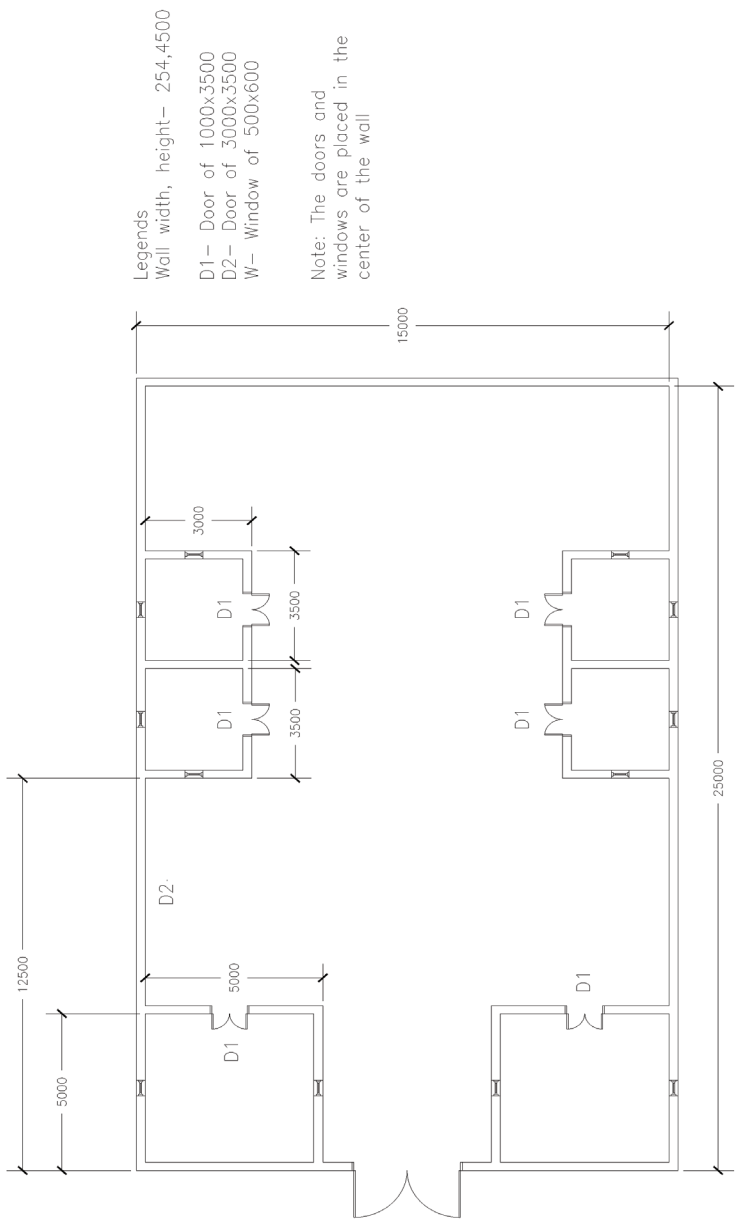


Figure 3-56 Plan of the building

**Answers to Self-Evaluation Test**

1. window, 2. Roof Slab, 3. cornered, 4. F, 5. T, 6. F