Automated Modeling

As with the macros in the "Automated Drawing" chapter, there are several 3D macros that can also be accessed through the Macros pull-down menu. With these macros, you can draw 3D stairs, windows, and doors, insert concrete forms, and do 3D framing and roofs.

When you choose Toolbox from the Edit menu, a dialog box appears with all 2D and 3D macros. Select a macro (.DCX) file from the list and click Open, or double-click on the macro filename to use the tool. Click on Cancel to cancel the operation.

In this chapter:

⊕ Adding 3D doors and windows to your model

⊕ Constructing 3D stairs

⊕ Inserting preconstructed concrete forms into your drawing or model

⊕ Creating 3D framing models

⊕ Creating Gable, Hip, Boston, Gambrel, Mansard, or Shed roofs

Tutorial

This section of the Tutorial guides you through some of the more commonly used items of the Toolbox to help you complete the schoolhouse. In order to keep this exercise simple, and to help you understand a little about 3D spatial relationships, you will work in orthographic (plan) view and then use the 3DViews menu to view your work.

Setting Up for 3D Modeling

You will create five new layers for the 3D items that you are going to add to the drawing. This enables your drawing file to contain both your plan drawings, used for construction documentation, and 3D drawings, used to present your designs.

1. If you are not in DataCAD, start DataCAD now and choose the drawing file that you worked on in the previous chapters.

2. Add five new layers to your drawing file.

3. Name the new layers: 3DWalls, 3DDoors, 3DWindow, 3DRoof, and 3DMisc.

4. Go to the Layers menu.

5. Turn off Doors, Windows, Plumb, Dim, Hatch, Notes, Misc, and Border.

6. Press Esc on the keyboard to refresh the drawing display.

7. Window in on the lower half of the plan.

Adding Windows

You will work with the walls, doors, and windows that you have already placed in your drawing. Do not erase them; they are an essential part of your drawing file.
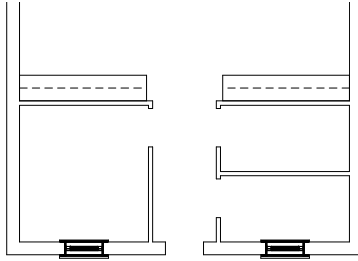
1. Make the 3DWindow layer the active layer.

2. Choose Toolbox from the Edit menu.

3. Choose AEC_MODL. You are prompted: *Select building component to model*.

4. Choose Windows to go to the WindElev menu.

5. Choose In Plan to draw the windows in plan view.

6. Choose UnitType. You are prompted: *Select type of window unit*.

7. Choose DblHung to draw double-hung windows.

8. Return to the WindPlan menu.

9. Choose Glass to go to the Glass menu.

10. Choose PaneHorz to define the number of glass panes (divisions) across the window. You are prompted: *Number of panes in the horizontal direction*.

11. Choose 3.

12. Choose PaneVert to define the number of glass panes top to bottom in the window. You are prompted: *Number of panes in the vertical direction*.

13. Choose 2.

14. Return to the WindPlan menu. You are prompted: *Enter a point on first inside corner of window*.

15. Click the middle mouse button on an inside corner of the front window opening in the office. You are prompted: *Enter a point on second inside corner of window*.

16. Click the middle mouse button the other inside corner of the window opening. You are prompted: *Enter a point on outside surface of wall*.

17. Click the middle mouse button on the outside of the wall. The window is created.

15

Click the middle mouse button to define the first inside corner of the window.

16

Click the middle mouse button to define the other inside corner of the window.

17

Click the middle mouse button to define the outside corner of the window.
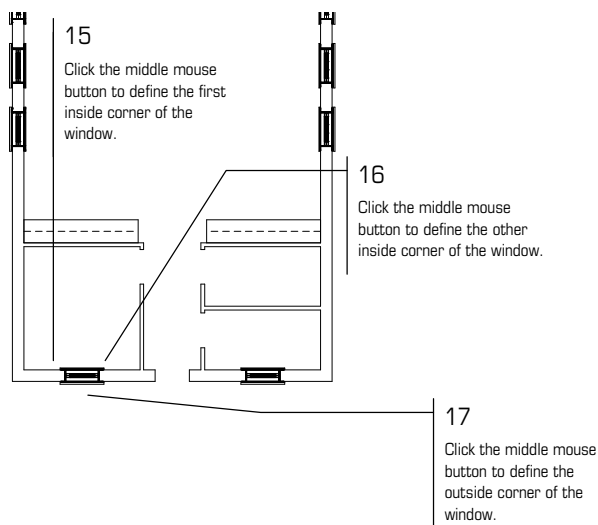
Placing windows

18. Repeat steps 15 - 17 to create the remaining windows. Remember that you can use the arrow keys on the keyboard to move around the drawing.
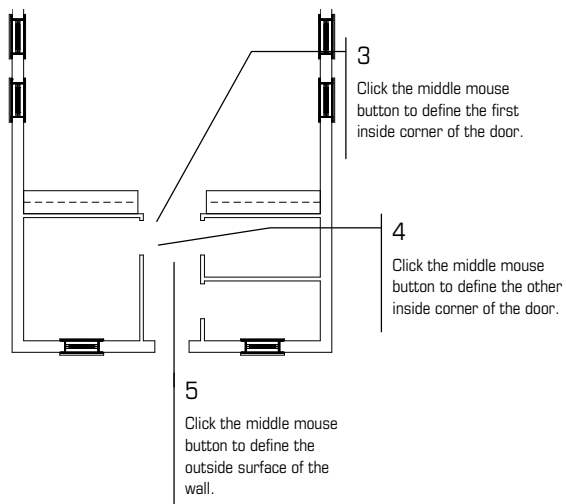
The 3D windows are drawn

19. When you are finished placing windows, return to the AEC_MODL menu.

Adding 3D Doors

1. Make 3DDoors the active layer.

2. Choose Doors from the AEC_MODL menu to go to the DoorPlan menu. You are prompted: *Enter a point on first inside corner of door*.

3. Move the cursor to an inside corner of the door opening in the office and click the middle mouse button. You are prompted: *Enter a point on second inside corner of door*.

4. Move the cursor to the other inside corner of the door and click the middle mouse button. You are prompted: *Enter a point on outside surface of wall*.

5. Move the cursor to the outside corner of the wall and click the middle mouse button. The first door is created.

6. Choose Door. You are prompted: *Select door data to change*.

7. Choose HingLft to change the hinge side of the front door to the left side.

8. Return to the DoorPlan menu.

9. Repeat steps 3 - 5 for the remaining doors.

3

Click the middle mouse button to define the first inside corner of the door.

4

Click the middle mouse button to define the other inside corner of the door.

5

Click the middle mouse button to define the outside surface of the wall.

Placing the first door

10. Return to the Edit menu.
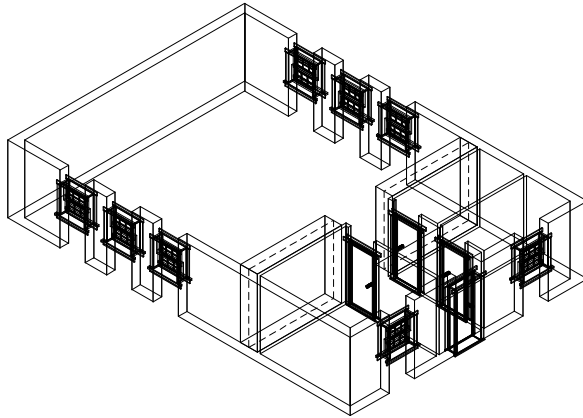
11. Recalculate the extents of the drawing.
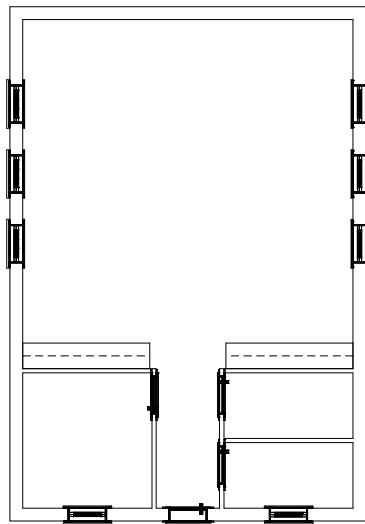
The doors are drawn

There are many other options you can use when placing doors and windows.

Viewing the 3D Model

Choose Isometric from the View menu on the Menu Bar. You will learn more viewing techniques in the Tutorial section of the "3D Viewing" chapter.

An isometric view of the schoolhouse walls, windows, and doors

Adding a 3D Roof

As mentioned throughout this book, layers allow you more control over your drawing. Later in this section of the Tutorial you will use these different layers to switch between viewing construction plans and presentation graphics.

1. Change to the 3DRoof layer.

2. Change the color of the 3DRoof layer to Magenta.

3. Choose Toolbox from the Edit menu.

4. Choose ROOFIT from the dialog box to go to the RoofIt menu.

5. Choose Gable to create a gable roof.

6. Choose Settings.

7. Set the wall thickness to 1 foot.

8. Return to the RoofIt menu. You are prompted: *Pick the 1st point of roof boundary*.

9. Select the lower-left corner of the exterior wall with the middle mouse button. You are prompted: *Enter second point of roof length*.

10. Select the upper-left corner of the exterior wall with the middle mouse button. You are prompted: *Enter second point of roof width*.
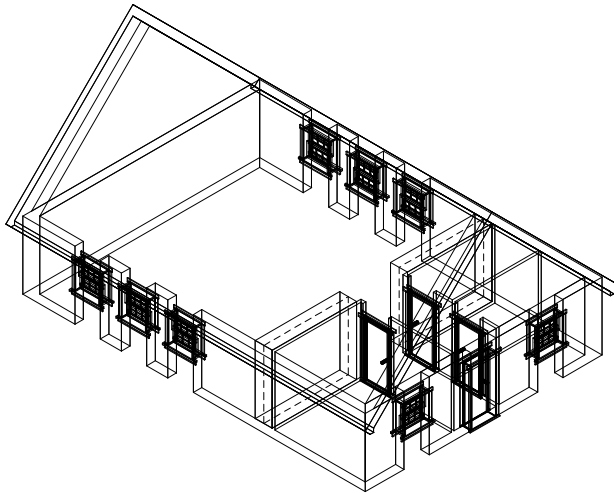
11. Select the upper-right corner of the exterior wall with the middle mouse button. The roof appears on top of the walls.

12. Return to the Edit menu.

It is important to select the points of the roof boundary in a clockwise direction to ensure that the roof will be placed correctly.

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13. Choose Isometric from the View menu on the Menu Bar to view the drawing in isometric.

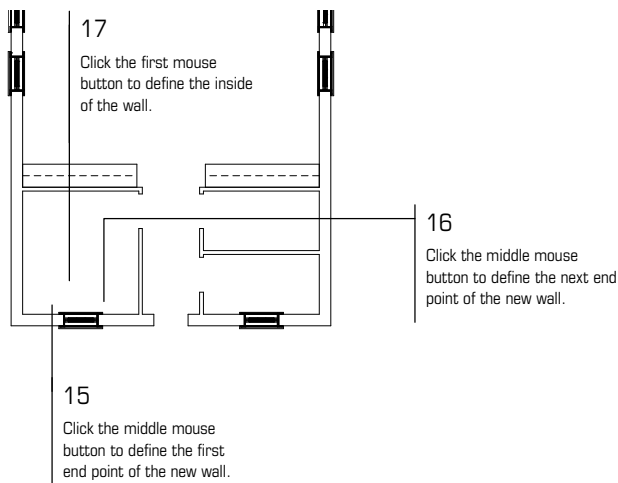An isometric view of the schoolhouse shows the new roof

Finishing the Schoolhouse Drawing

Notice that in the isometric view, portions of the wall above and below the windows are missing. You will fix them in the next exercise, but these wall segments are going to be put on a different layer than the existing Walls layer. Later in this chapter you will see the reason for having two wall layers.

1. Choose Orthographic from the View menu on the Menu Bar to view the schoolhouse in plan view.

2. Choose Layers from the Utility menu in the Menu Window.

3. Make 3DWalls the active layer, with only walls turned on. All other layers should be off.

4. Change the 3DWalls layer color to yellow.

5. Toggle the Walls option on.

6. Toggle the 2-line wall option on.

7. Set a new wall width of 1 foot.

8. Toggle Outside on.

9. Toggle Cap off, if it is on.

10. Press $\boxed{Z}$ on the keyboard. You are prompted: *Enter new Z-base*.

11. Type **0** and press $\boxed{\text{Enter}}$. You are prompted: *Enter new Z-height*.

12. Type **3.4** and press $\boxed{\text{Enter}}$. You have just established a new 3D setting for all new items you draw. All lines will now be drawn with a Z-base of 0 and a Z-height of 3′-4″.

13. Window in on the lower half of the plan.

14. Return to the Edit menu. You are prompted: *Select first end point of new line/wall*.

15. Move the cursor to an outside corner of the window opening in the office and click the middle mouse button. You are prompted: *Select next end point of line/wall*.

16. Move the cursor to the other outside corner of the window and click the middle mouse button. You are prompted: *Select a point to define the Inside of the wall*.

17. Move the cursor anywhere on the inside of the plan and click. The cutout is filled.

18. Right-click to disconnect from the wall you just drew.

19. Repeat steps 15 - 18 for the remaining exterior window openings. Be sure to disconnect from each wall segment you draw, before drawing the next. Remember to use the arrow keys on the keyboard to move around the drawing.

20. Press $\boxed{Z}$ on the keyboard. You are prompted: *Enter new Z-base*.

21. Type **6.8** and press $\boxed{\text{Enter}}$. You are prompted: *Enter new Z-height*.

22. Type **8** and press $\boxed{\text{Enter}}$. You have just established a new 3D setting for all new items you draw. All lines will now be drawn with a Z-base of 6.8 and a Z-height of 8′-0″.

17

Click the first mouse
button to define the inside
of the wall.

16

Click the middle mouse
button to define the next end
point of the new wall.

15

Click the middle mouse
button to define the first
end point of the new wall.

Placing headers and sills

23. Repeat steps 15 - 18 to fill in over top of the sills to create window headers. You are prompted: *Select first end point of new line/wall*.

24. Click the middle mouse button at the outside corner of the front door opening. You are prompted: *Select next end point of line/wall*.

25. Move the cursor to the other outside corner of the door and click the middle mouse button. You are prompted: *Select a point to define the Inside of the wall*.

26. Move the cursor anywhere on the interior of the plan and click. The door header is drawn.

27. Press ⬚= on the keyboard. The Message Window reads *Walls will NOT be drawn*.

28. Press ⬚= again. You are prompted: *Enter new wall width*.

29. Type **.4** and press ⎡Enter⎤. You are now set to draw the headers above the interior doors.

30. Move the cursor to an outside corner of the interior door opening in the office.

31. Repeat steps 24 - 26 to complete this header and the remaining interior headers.

32. Choose Isometric from the View menu on the Menu Bar to view the isometric view.

33. Toggle the 3DDoors, 3DWindow, and 3DRoof layers on.

34. Return to the Utility menu.

35. Recalculate the extents of the drawing.

This completes the Automated Modeling Tutorial. To continue with the tutorial exercises, turn to the "Tutorial" section at the beginning of the "3D Viewing" chapter.

3D Stairs

The 3DStairs menu provides everything you need to create a set of three-dimensional stairs. 3DStairs creates real stairs, not stacked slabs, making this representation of stairs more accurate than ever before. The 3DStairs macro has these main features:

- seven predefined stair types -- single-run, straight-run, double-back, L-shaped, open-well, curved, and spiral

- a stair calculator, which makes it easy for you to calculate the values of stair settings and then readjust the Settings menu values

With the stair forms and other settings you can customize the shape and placement of stair components. There are three ways to define the settings for the type of stairs you want to model:

- use the 3DStairs/Settings menu to select options and enter individual values for the various stair components

- use the Stair Form to display the settings on the screen for reference and/or customization

- save your stair settings to a file through the StrFile menu; when you want to model that specific stair type again, you can recall the file

Because of the interactive nature of stair components, changing one option can cause other options to change automatically. For example, when you close stringers, you can't have tread extensions.
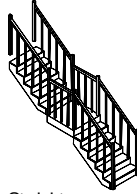
The sections that follow describe how to create each stair type. You can only use the Stair Calculator for single-run stairs; see "The Stair Calculator" later in this section for more information.

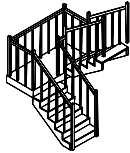➔ To draw 3D stairs:

1. Choose Toolbox from the Edit menu.

2. Choose 3DStairs from the Toolbox dialog box.
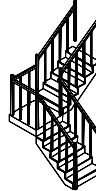
3. Choose a stair type.
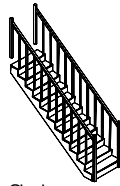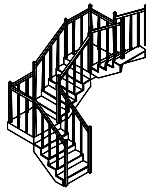
Single   Straight

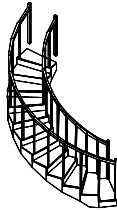Double Back   Spiral   L-Shaped

Open Well   Curved

Stair types

4. Set the options for the stair style you want. You can use either the Settings menu, the Stair Form, or you can load a stair file. When you model single-run stairs, you can use the Stair Calculator to determine the settings. See "Stair Settings" later in this section for more information.

5. Choose Begin to place the stairs. The tool automatically changes to a plan view and a boundary box appears representing the run of stairs.

When Ortho mode is on, the boundary box does not track with the cursor. Press ⊡ to toggle Ortho mode off.

6. Drag the stairs by the lower outside corner of the first run to the new stair position. The boundary box rotates as you move your cursor.

7. Rotate the stairs to the angle you want. The box rotates as you move the cursor.

8. Click to place the stairs. The stair model appears in the selected location with the settings you chose.

9. To change the results, erase the last group by pressing [Shift] + [<] and repeat steps 3 through 7.

Stair Settings

Use the Settings menu to change the settings for 3DStairs. Different options appear depending on the stair type you selected from the 3DStairs menu.

The options in the top half of the menu are global settings that apply to all stair types. The bottom half of the menu are stair component submenus. Each of these submenus contains the various settings for that particular component.

When you choose any of the Settings options, a list of values appears. Choose a value or press [Enter] to accept the given value.

Base Elevation

Use BaseElev to change the base elevation of a flight of stairs. Base elevation is the height, or elevation, at which the flight of stairs begins.
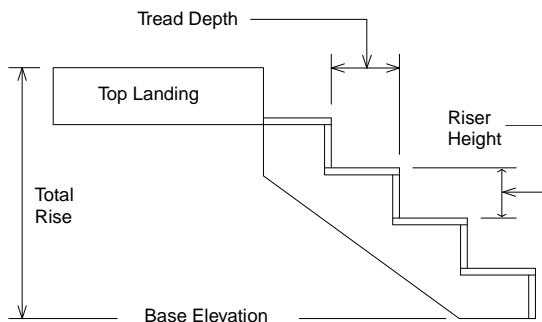
Base Elevation

Treads

Use TrdLngth to change the tread length. The tread length is the horizontal distance from one side of the tread to the other side. It does not include tread extension values. Any tread extensions are added to the tread length and only apply to stairs modeled with open stringers.
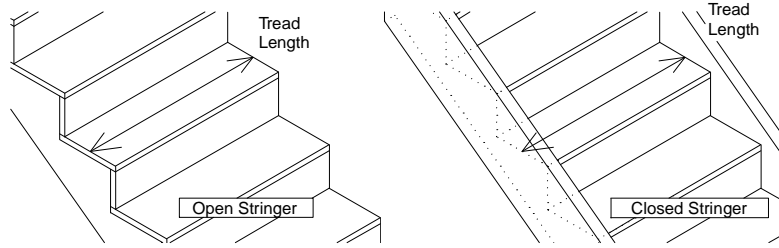
Tread length

Use Trd/Run1 to change the number of treads in the first run of stairs. This applies to all stair types. The number of treads does not include the landing at the top of the run and is equal to one less than the number of risers.

Use Trd/Run2 to change the number of treads in the second run of stairs. Trd/Run2 is only available for straight, double-back, open-well, and L-shaped stairs.

Use Trd/Run3 to change the number of treads in the third run of stairs. Trd/Run3 is only available for open-well stairs.

Radius of Curved Stairs

Use Radius to change the inner radius of curved and spiral stairs. Measure Radius from the exact center point to the inside face of the stringer for curved stairs and the radius of the center pole for spiral stairs.
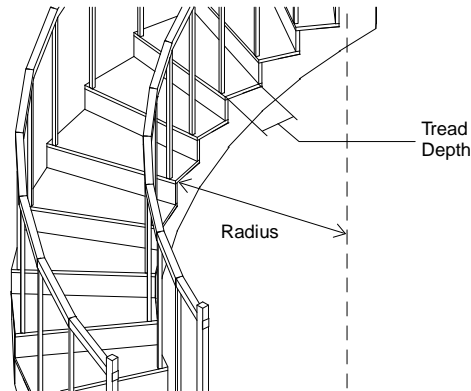

Radius on a curved flight of stairs

Clockwise

Clkwise applies to all stair types except single and straight. You can place the stairs clockwise or counterclockwise depending on your needs.

Chases

Use Chase to control the horizontal distance between the runs of a double-back flight of stairs. This setting effects the width of the intermediate landing and the tread length.

Double Back Stairs,
Plan View

Intermediate Landing
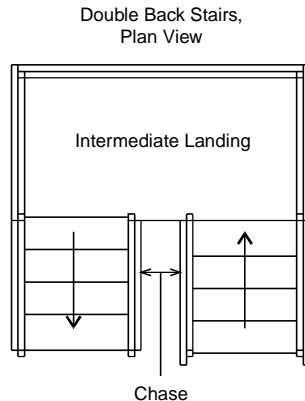
Chase

Chase

Landings

The top, bottom, and in some cases, intermediate landings all have depth and thickness settings. You can change the specific settings for each landing you create using the Landing menu in the 3DStairs/Settings menu. (Changing the settings on the top landing does not affect the settings of the bottom landing, and vice versa.)

Toggle DoLndTp on to model a landing at the top of the flight of stairs; toggle DoLndBt on to model a landing at the bottom of a flight of stairs.

The Depth option sets the landing depth. The *landing depth* is the horizontal distance from the front of the landing to the rear of the landing. When you model L-shaped or open-well stairs, you cannot set a landing depth on the intermediate landing. The landing depth equals the width of the run of stairs.
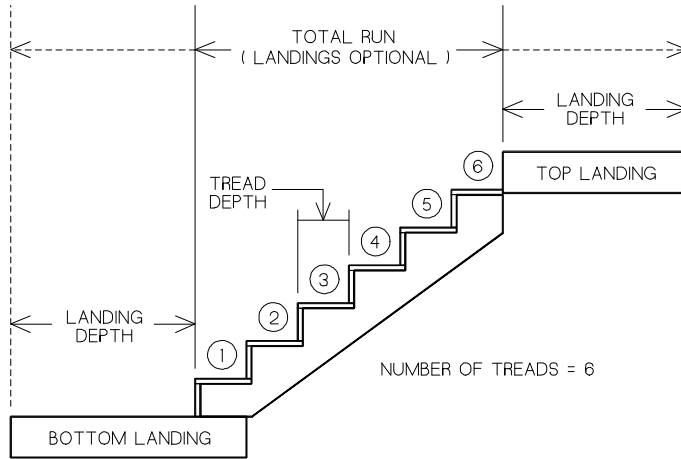
Landing depth

Thicknss shows the current thickness of a landing. Measure the landing thickness vertically from the underside to the top side. Thicknss sets the top, intermediate, and bottom landing thicknesses.

For stair types that have intermediate landings, IntrLand is always on. It is available for straight, double-back, open-well, or L-shaped stairs only. For rectangular or curved intermediate landings, use the Rectangl/Curved option; this is available for L-shaped, double-back, or open-well stairs only.

Double Back

Open Well

L-Shaped
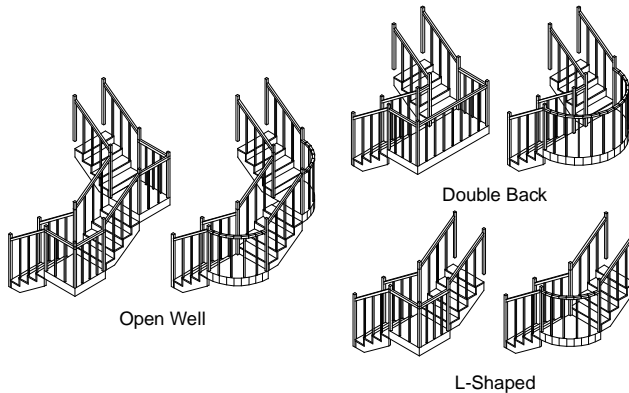
Rectangular / curved intermediate landings

Use Color to set the landing color. All landings in a single flight of stairs are modeled using the same color. See "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color.

Risers

Use the Riser menu to set options that create risers and determine riser height, thickness, and color. Toggle DoRiser on to model risers on your flight of stairs.

RiserHgt displays the current riser height in the Message Window and lets you reset it. The riser height is the vertical distance from the top of one tread to the top of the next.

Riser height, total rise, and tread depth

The Thicknss option displays the current riser thickness in the Message Window and lets you reset it. The *riser thickness* is the horizontal distance from the front side of the riser to the backside of the riser when you choose Thicknss.
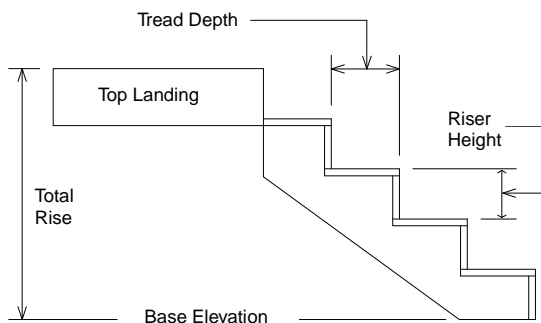
Use Color to set the landing color. All landings in a single flight of stairs are modeled using the same color. See "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color.

Treads

Use Tread to set options that model treads and determine the depth, thickness, and nosing of the treads. Toggle DoTread on to automatically calculate and model treads on a flight of stairs.

Depth displays the current tread depth in the Message Window and lets you reset it. The tread depth is the horizontal distance from the front of one tread to the front of the next tread. When you select a spiral stair, TredDegs (tread degrees) is displayed in the menu in place of depth. Tread degrees displays the inclusive angle of the treads on spiral stairs in the Message Window and lets you reset it.
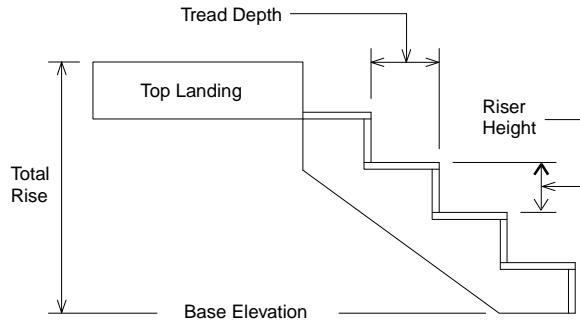
Tread depth

Thicknss displays the current tread thickness in the Message Window and lets you reset it. The tread thickness is the vertical distance from the top side of the tread to the bottom side of the tread.

LeftExtn and RghtExtn display the current left and right extension, respectively, of the tread in the Message Window and lets you reset it. Left extension includes tread length, the distance from one stringer to the next. LeftExtn controls the distance that the tread extends beyond the outside of the stringer. LeftExtn is available only for stairs with open stringers.
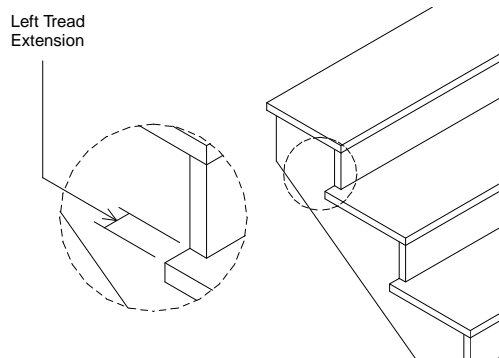
Tread extension

When Nosing is toggled on, you can set the nosing length and type for treads. 3DStairs prompts you for an overhang value when you toggle nosing on. Nosing controls the distance that the front of the tread extends beyond the front of the riser.

To set the nosing type to square or round, click on the RndNosng/SqrNosng toggle. This Nosing option changes between round and square just by clicking on it. If RndNosng is displayed in the Nosing menu, round nosing will be drawn on the stair treads; if SqrNosng is displayed in the Nosing menu, square nosing will be drawn on the stair treads.
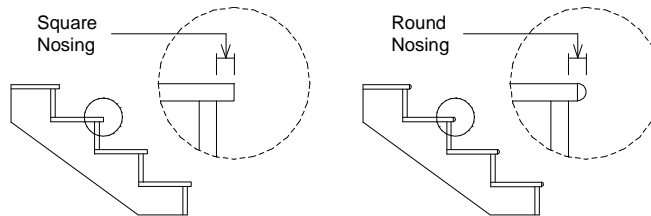
Nosing

Use Color to set the color for the treads. All treads in a flight of stairs are the same color. See "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color.

Stringers

Stringer allows you to set options that create stringers and determine where and what kind you want to use. Toggle DoLeft on to model a stringer on the left side of the run of stairs, toggle DoCtr on to model a stringer in the center of a run of stairs, or toggle DoRght on to model a stringer on the right side of the stairs.

When using DoCtr, the stringer is always modeled as an open stringer.

Use the ClosdStr/OpenStr toggle to set the stringer type to open or closed. When ClosdStr is displayed in the Stringer menu, stringers will be modeled as closed; when OpenStr is displayed in the Stringer menu, stringers will be modeled as open. Choose ClosdStr or OpenStr to toggle between the two options.

Width displays the current width of the stringer in the Message Window and lets you reset it. Measure the width from the top edge of the stringer to the bottom edge of the stringer.

Stringer Width, Closed Stringer

Stringer Width, Open Stringer
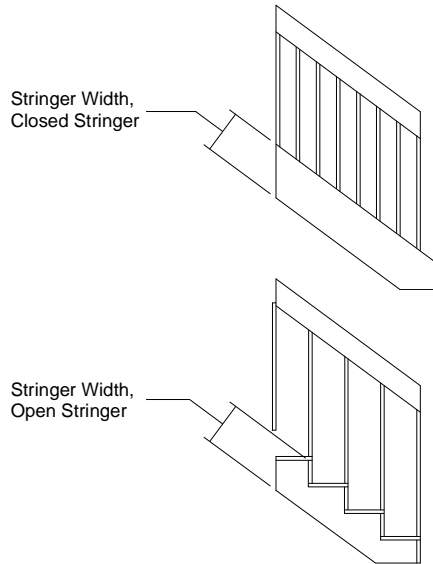
Stringer width (open or closed)

The stringer thickness is the horizontal distance from the inside of the stringer to the outside of the same stringer. Choose Thicknss from the Stringer menu, and then choose or type a new thickness value and press Enter.

Stringer Thickness
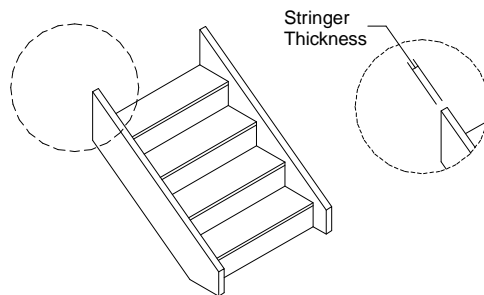
Stringer thickness

Use Color to set the color for the stringer. All stringers in a flight of stairs are modeled using the same color. See "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color.

Handrails

Toggle DoLeft on to model a handrail on the left side of the flight of stairs. Toggle DoRght on to model a handrail on the right side of a flight of stairs. When either of these options are toggled off, 3DStairs does not model the handrails on that side of the stairs.

The Rectangl/Cylinder toggle lets you choose between modeling a cylindrical or rectangular handrail. When you select Cylinder, the Radius and Division options appear for you to enter settings. When you select Rectangl, the Width and Depth options appear for you to set.
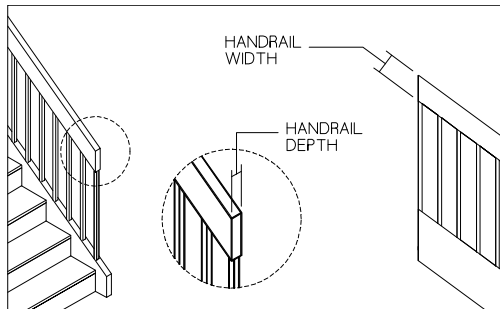
The Radius/Width toggle displays the current radius or width of the handrail in the Message Window, depending on whether you selected cylindrical or rectangular handrails. When you model a cylindrical handrail, you can adjust the radius of the cylinder. When you model a rectangular handrail, you can adjust the width of the rectangle. Measure width from the top of the handrail to the bottom of the handrail.

Handrail width and depth

The Depth/Division toggle displays the current depth or number of divisions in the handrail in the Message Window, depending on whether you select cylindrical or rectangular handrails. When you model a cylindrical handrail, you can adjust the division of the cylinder, or the number of sides in the cylinder. When you model a rectangular handrail, you can adjust the depth of the rectangle. Measure depth from one side of the handrail to the other side. You can use up to 36 divisions, but the more divisions you have, the longer it takes DataCAD to redraw.

Use Height to see or reset the current height of the handrail. Measure handrail height from the top surface of the handrail to the top of the tread.
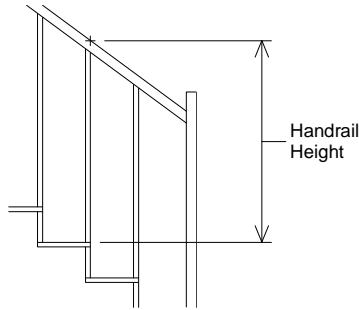
Handrail height

Use Color to set the color for the handrails. All handrails in a flight of stairs are modeled using the same color. See "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color.

Balusters

Use the Baluster menu in the 3DStairs/Settings menu to choose what kind of balusters, if any, to use for your stairs. Toggle DoBalus in the Baluster menu on to model balusters on your flight of stairs.

The Baluster menu has three options for baluster placement. OnSide models balusters on the sides of the stringers, OnTread models balusters on the treads, and OnStrng models balusters on the center of the stringer. OnStrng is available only when you model a closed stringer.

Depending on whether you choose OnSide, OnTread, or OnStrngr for baluster placement, either the Bal/Tred or Bal/Run1 option is displayed in the Baluster menu. The Bal/Tred option displays the number of balusters per tread in the Message Window and lets you change the value. Bal/Tred is only available when you use OnTread. The Bal/Run1 option displays the current number of balusters in the first run of the stairs in the Message Window and lets you change that value. Bal/Run1 is available only when you place the balusters on the side of the stringer (OnSide) or on the stringer (OnStrng).

The Bal/Run2 option displays the current number of balusters in the second run of the stairs in the Message Window and lets you change that value. Bal/Run2 is available only when you place the balusters on the side of the stringer (OnSide) or on the stringer (OnStrng) on straight, double-back, open-well, and L-shaped stairs.

The Bal/Run3 option displays the current number of balusters in the third run of the stairs in the Message Window and lets you change that value. Bal/Run3 is available only when you place the balusters on the side of the stringer (OnSide) or on the stringer (OnStrng) on open-well stairs.

Use Cylinder/Rectangl to choose between modeling a cylindrical or rectangular baluster. When you select Cylinder, the Radius and Division options appear. When you select Rectangl, the Width and Depth options appear.

The Radius/Width toggle displays the current radius or width of the baluster in the Message Window, depending on whether you selected cylindrical or rectangular balusters. When you model a cylindrical baluster, you can adjust the radius of the cylinder. When you model a rectangular baluster, you can adjust the width of the rectangle. Measure width from one side to the other of one baluster.

The Depth/Division toggle displays the current depth or number of divisions in the baluster in the Message Window, depending on whether you selected cylindrical or rectangular balusters. When you model a cylindrical baluster, you can adjust the division of the cylinder, or the number of sides in the cylinder. When you model a rectangular baluster, you can adjust the depth of the rectangle. Measure depth from the front to the back of the baluster.

You can use up to 36 divisions, but the more divisions you have, the longer it takes DataCAD to redraw.
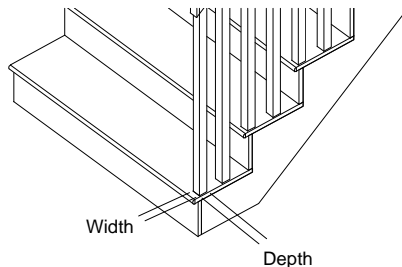
Baluster width and depth

Use Symbol to model balusters as symbols. When balusters are symbols, you can replace the balusters produced by 3DStairs with different, more detailed baluster symbols that you create.

➔ To use custom balusters in stairs:

1. Create your detailed baluster in the DataCAD drawing window and save it as a symbol. See "Saving and Deleting Symbols" in the "Templates and Symbols" section of the "Drawing Elements" chapter.

2. Choose 3DStairs from the Toolbox dialog box.

3. Set the baluster options as necessary.

4. Toggle Symbol on to draw the balusters as symbols.

5. Create your run of stairs.

6. Replace the existing balusters with the symbol you created in step 1 using the Replace option in the Template menu. See "Replacing a Symbol" in the "Templates and Symbols" section of the "Drawing Elements" chapter.

Balusters on Stringer   Balusters on Side   Balusters on Tread
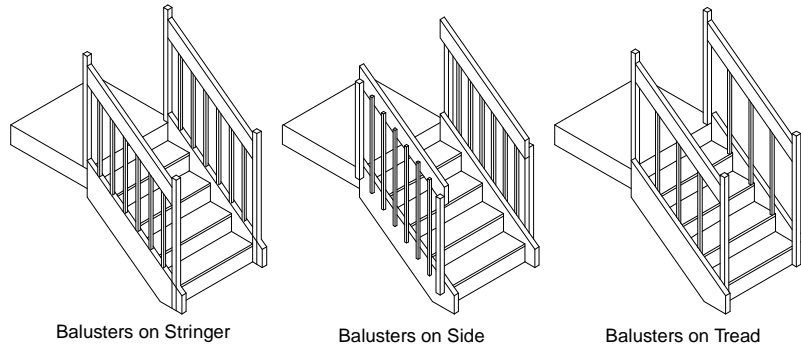
Baluster placement

VertOfst shows the current vertical offset of the baluster. Vertical is the distance that the bottom end of the balusters extends below the treads. Vertical offset appears only when you select OnSide.
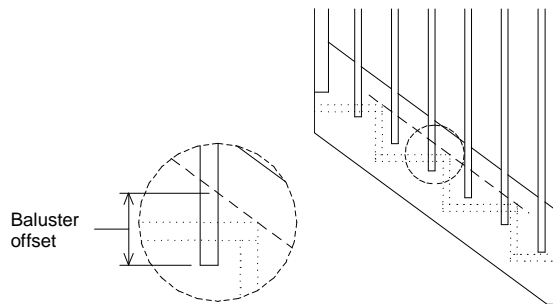
Baluster offset

Baluster vertical offset

HorzOfst shows the current horizontal offset of the baluster. When you model balusters on the treads, measure the offset from the side edge of the tread to the middle of the baluster. HorzOfst only appears when you select OnTread.

Baluster horizontal offset

Use Color to set the color for the balusters. All balusters in a flight of stairs are modeled using the same color. See "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color.

Newel Posts

Use NewelPst to model newel posts on the stairs. Toggle DoNlPst on to model newel posts on a flight of stairs. When DoNlPst is toggled off, 3DStairs models balusters in place of newel posts.
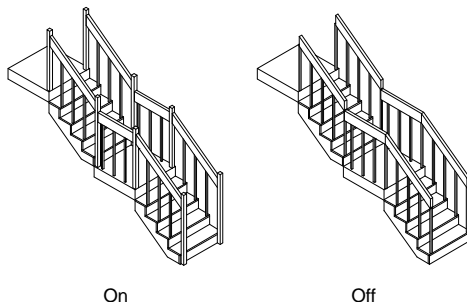
Newel posts on/off

Use Cylinder/Rectangl to choose between modeling a cylindrical or rectangular newel post. When you select Cylinder, the Radius and Division options are displayed. When you select Rectangl, the Width and Depth options are displayed.

The Radius/Width toggle displays the current radius or width of the newel post, depending on whether you selected cylindrical or rectangular newel posts, in the Message Window. When you model a cylindrical newel post, you can adjust the radius of the cylinder. When you model a rectangular newel post, you can adjust the width of the rectangle. Measure width from one edge, near a baluster, to the other edge, facing out, of the same newel post

The Depth/Division toggle displays the current depth or number of divisions in the newel post, depending on which of the previous options you selected, in the Message Window. When you model a cylindrical newel post, you can adjust the division of the cylinder, or the number of sides in the cylinder. When you model a rectangular newel post, you can adjust the depth of the rectangle. Measure depth from the edge of the newel post near the handrail to the open edge.

You can use up to 36 divisions, but the more divisions you have, the longer it takes DataCAD to redraw.
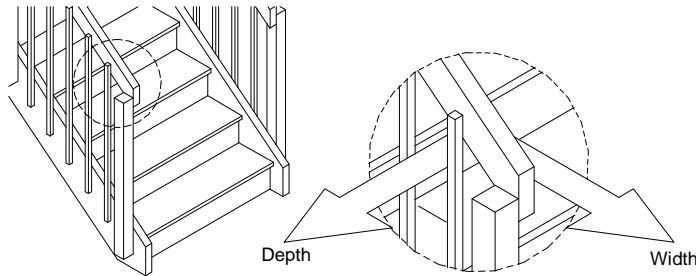
Newel post width and depth

Use Symbol to model newel posts as symbols. When newel posts are symbols, you can replace the newel posts produced by 3DStairs with custom newel post symbols that you create.

➔ To use custom newel posts in stairs:

1. Create your detailed newel post in the DataCAD drawing window and save it as a symbol. See "Saving and Deleting Symbols" in the "Templates and Symbols" section of the "Drawing Elements" chapter.

2. Choose 3DStairs from the Toolbox dialog box.

3. Set the newel post options as necessary.

4. Toggle Symbol on to draw the newel posts as symbols.

5. Create your run of stairs.

6. Replace the existing newel posts with the symbol you created in step 1 using the Replace option in the Template menu. See "Replacing a Symbol" in the "Templates and Symbols" section of the "Drawing Elements" chapter.
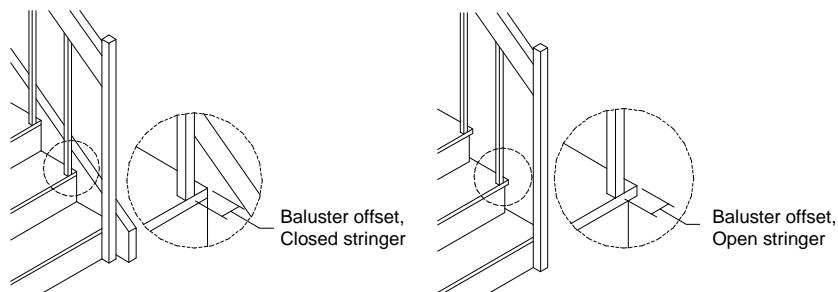
Use Color to set the color for the newel posts. All newel posts in a flight of stairs are modeled using the same color. See "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color.

Stair Form

➜ To display values and settings for all stair types:

1. Choose StrForm from the 3DStairs menu.

2. Press [Tab⇆] to move forward or [Shift] + [Tab⇆] to move backward through each line of the stair form.

3. Scroll through the two-page form by selecting ScrlFwrd or ScrlBack from the menu.

4. Press [Esc] to save settings and exit the StrForm menu, or choose Exit to leave the StrForm menu without saving any changes. For settings with options, you can scroll through them using [Spacebar].

Stair File

Use the StrFile option in the 3DStairs menu to save stair settings for future use, as well as load, save, delete, and rename stair setting files:

LoadStr	Loads a stair settings file; choose LoadStr from the StrFile menu and type the name of the file to load
SaveStr	Saves your current stair settings to a file; choose SaveStr from the StrFile menu and type the name of the file to save
DelStr	Deletes a stair settings file; choose DelStr from the StrFile menu and type the name of the file to delete
Rename	Renames an existing stair file; choose Rename from the StrFile menu, choose the file to rename, and type a new name
StrForm	Shortcut to the Stair Form menu; see "Stair Form" above for more information

The Stair Calculator

The Stair Calculator (Calculat) is available only when you create single-run stairs. Use it to calculate one of six possible values: total rise, number of risers, riser height, total run, number of treads, or tread depth.

Use the Stair Calculator as you would use a desktop calculator; prompts are displayed in the Message Window at the bottom of the screen. Save the answers to automatically update the 3DStairs/Settings menu for single-run stairs.

1. Choose Calculat from the 3DStairs menu.

2. Select an option from the Calculat menu to calculate and modify:

TotlRise	The number of risers times the riser height; same value regardless of whether LandTop is on or off
# Risers	The total rise divided by the riser height, including the rise of the top landing; changing the number of risers automatically changes the number of treads and vice versa
RiserHgt	The vertical distance from the top of one tread to the top of the next tread; the total rise divided by the number of risers
TotalRun	The horizontal distance from the top of the run of stairs to the bottom of the stairs; the number of treads times the tread depth (the distance can include landing depth for the top and bottom landings when those toggles are turned on)
# Treads	The number of treads in the stair run; changing the number of treads automatically changes the number of risers and vice versa (you can set TreadDth from this menu to recalculate the number of treads)
TreadDth	The horizontal distance from the face of one riser to the face of the next riser; the total run divided by the number of treads (you can change # Treads in this menu)
LandBtm	When LandBtm is on, the total run value includes the bottom landing depth
LandTop	When LandTop is on, the total run value includes the top landing depth
Reset	Resets your calculator settings to the default values
Update	Overwrite the old settings in the Setting menu with new settings; saves your calculated values
Begin	Use Begin to start modeling stairs. Follow the steps in the "Using Stairs" section for information on using Begin.
Template	Shortcut to the Template menu; select a template from the menu, or type a template name, and press [Enter]

| Hide | Perform hidden line removals; see "Hide" in the "3D Editing" chapter for more information |
| 3DViews | Shortcut to the 3DViews menu; see the "3D Viewing" chapter for more information |

3. With some Calculat menu options, an additional submenu is displayed. If the occurs, choose an option to modify; if not, skip to step 5.

4. Choose a new value from the menu or type a different value. As you change the values of a setting, the results are automatically calculated and displayed.

5. To modify other options, repeat steps 3 and 4.

6. Choose Update to update the settings in the 3DStairs/Settings menu.

The stair calculator only accepts a whole number of treads or risers as a result. If the values you enter in a calculation result in a fractional solution, the stair calculator modifies the values.
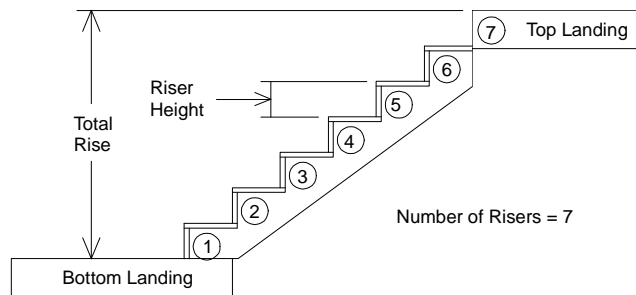
Total rise, riser height, and number of risers
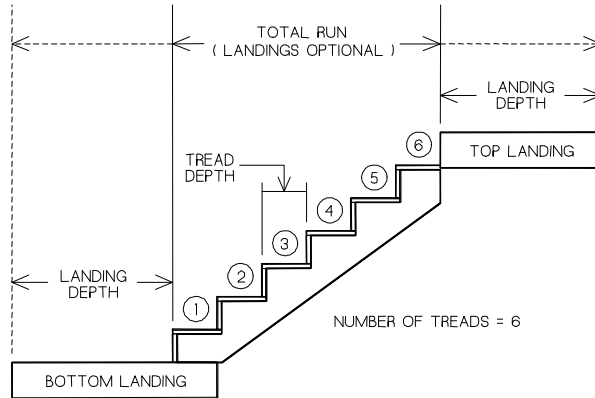
Total run, tread depth, and number of treads

For example, to calculate the number of risers through changing RiserHgt:

	Initial Settings	Modified Settings	Stair Calculator Results
TotlRise	12′0″	12′0″	12′3″
RiserHgt	6″	7″	7″
#Risers	24	20.57	21

Because #Risers is a fractional number, the Stair Calculator automatically adjusts the TotlRise so that the results are whole numbers. If you change TotlRise, Stair Calculator adjusts RiserHgt to find a whole number solution.

AEC Modeler

The AEC Modeler tool focuses on all aspects of door and window modeling, offering you simplified creation of 3D model components, while reducing creation time. Specifically, AEC Modeler allows you to set component dimension specifications and placement for windows and doors. To use the AEC Modeler, choose Toolbox from the Edit menu and then choose AEC_MODL from the Toolbox dialog box.

The AEC Modeler Template library speeds the design process by storing, retrieving, and viewing frequently used designs and modifications in the Template library. Quick access to a variety of detailed models, and the ability to modify them or insert them into projects, creates many new possibilities.

There are two view options available with this tool: plan and elevation.

Using the In Plan option, you can create entities in the Plan view and view a component as if you were looking at it from the top down. You must be in a parallel view (as assigned in the 3DViews menu) to select this option. When creating entities, the entry points you assign specify the width and wall thickness. The height of the component is determined by the Sill Hgt and Head Hgt options.

Using the In Elev option, you can create entities in an Elevation view and view a component as if you were looking at it from the side. You must be in a parallel view (as assigned in the 3DViews menu) to select this option. When creating entities, the entry points you assign specify the width and height, while you assign wall thickness (depth) in a menu. Any designs made in this view must be checked for coincidence of the wall and plane; otherwise, a lack of screen depth perception could cause placement outside the wall dimensions.

When using In Elev, you must first place the inner surface of the wall in the plane of the screen. You can do this using either the Elevation/NewElev or PlneSnap options in the 3DViews menu. When working with this option, you are defined as being outside the room (exterior), looking in. Therefore, snap to points on interior wall surfaces.

Additionally, the following four options appear in many of the Windows and Doors menus:

Color	Sets or resets the representative color for any modeling component; see "Color Menus" in "The Drawing Board" chapter for more information
LineWgt	Sets the line width (weight) for any modeling component that appears on screen or on printed or plotted output; choose LineWgt, and then choose or type a value and press `Enter`
LineType	Sets the representative line to solid, dotted, dashed, or dot-dashed
Spacing	Sets the line spacing between dots, dashes, and so on; choose Spacing, and then choose or type a value and press `Enter`

In addition to the Windows and Doors menus, AEC Modeler has several other options.

Cutouts creates an opening in a wall according to head height and sill height settings. When you choose Cutouts from the AEC_MODL menu, the following options appear:

Head Hgt	Sets the head height; choose or type a value and press `Enter`
Sill Hgt	Sets the sill height choose or type a value and press `Enter`
LyrSrch	Places cutouts in walls on layers other than the active layer

You can use Remove to remove a window, door, or cutout from a wall. If CutWall was used when creating the window, door or cutout, Remove also removes the void in the wall.

The Hide, 3DViews, and 3DEntity options are shortcuts to those menus. See the "3D Viewing" chapter for information on the Hide and 3DViews menus. See the "3D Drawing" chapter for information on the 3DEntity menu.

Modeling Windows

The Windows menu in AEC_MODL serves as the master level for accessing all three-dimensional window component groups. You can access window data, load and save previously designed windows, and select or enter window components and data.

All windows open outward, away from you.

Cutting Walls

CutWall is a toggle used to automatically create voids in slabs for windows. It is available in the Windows menu when InPlan is toggled on. When CutWall is toggled on, a LyrSrch toggle also becomes available.

Window Files

The WndwFile option is a convenient way to expand on initial template designs, tailoring the product to your needs. The files then become additional resources for quick recall. The WndwFile menu options include:

LoadWind   Loads window settings from saved files; select or type a window filename and press `Enter`; the window appears with all previously saved settings

SaveWind   Saves window settings to a file; type the filename and press `Enter`

DelWind   Deletes saved window files from the hard disk. To help prevent accidental deletions, the system prompts you for the name of the file you want to delete. Select the file you want to delete and press `Enter`. Choose Yes to delete the window file; otherwise choose No.

RenWind   Renames existing files; select a file to rename, type a new filename of up to eight characters long, and press `Enter`

CopyWind   Copies the contents of an existing window file to a new file; select the file to copy from and press `Enter`, then type the file to copy to and press `Enter`

Form   Displays a window data form

Window Forms

With the WndwForm option, you can view the settings for the current window. The design form offers a comprehensive view of the window parameters on one screen. These window parameters are divided into ten major groups.

To save Form settings, press `Esc`.

Saving Windows as Symbols

Use the Template option to create and save windows as symbols, developing a library of window symbols that you can add quickly to new projects.

This Template option is a shortcut to the Template menu. See "Templates and Symbols" in the "Drawing Elements" chapter for more information.

Window Height and Wall Thickness

You can set the head height and sill height of a window with the Head Hgt and Sill Hgt options, as well as use the Wall Thk option to change the wall thickness. The Head Hgt and Sill Hgt options only appear when In Plan is toggled on, while Wall Thk is only available when In Elev is toggled on. When you choose Head Hgt, sill Hgt, or Wall Thk, a list of values is displayed. Choose or type a new value and press Enter.

The Head Hgt and Sill Hgt settings are relative to Z-base.

Window Types

The UnitType menu displays available window types. Hinged window types open outward, away from the designer. Sliding windows, when viewed from the interior design position, have a fixed sash on the right and a movable sash on the left.

Choose from the following window types:

Fixed	Windows with fixed panes of glass
Casement	Casement windows
Awning	Awning windows, hinged at the top
Hopper	Hopper windows, hinged at the bottom
DblHung	Double-hung windows
Sliding	Sliding windows
% open	Determines the amount that the window appears open in the model, with 0% being fully closed and 100% being fully open

Window Casings

The Casing option controls the casing or exterior window group. You can set any of the following window casing options:

AtHead	Models casing elements at the window header
Width	Sets the casing width at the window header, the window jamb, and the sill across the window plane; choose the Width option under AtHead, AtJamb, or AtSill, and then choose or type a width and press Enter
Thicknss	Sets the casing thickness at the window header, the window jamb, and below the sill; choose or type a thickness and press Enter
Extensn	Sets the extension length past the outside edge of the vertical casing components (jamb casing) and past the outside edge of the vertical jamb casing component to the sillChoose or type an extension length and press Enter. For any extension, the measurement is always 0 when the outside edge of the vertical casing and the extension end are aligned. Positive numbers indicate an extension; negative numbers indicate a setback.
AtJamb	Models the casing element at the jamb (Width and Thicknss appear again below AtJamb)
AtSill	Models the casing elements below the sill. (Width, Thicknss and Extensn appear again below AtSill)
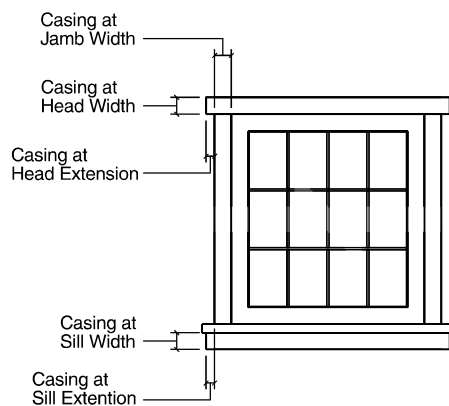
Window casing

Window Trim

Use Trim to control the trim or interior window component group. You can vary elements, such as the trim apron, according to aesthetic preference or design requirements:

|	
AtHead	Models trim elements at the window header
Width	Sets the trim width at the window jamb, across the window jamb; choose or type a value and press Enter
Thicknss	Sets the trim thickness at the window jamb and the window sill; choose or type a value and press Enter
Extensn	Sets the trim extension length past the outside edge of the vertical jamb trim components (jamb casing) or past the outside edge of the vertical jamb casing component of the sill; choose or type a value and press Enter. For any extension, the measurement is always 0 when the outside edge of the vertical casing and the extension end are aligned. Positive numbers indicate an extension; negative numbers indicate a setback.
AtJamb	Models trim elements at the jamb (Width and Thicknss appear again below AtJamb)
AtSill	Models trim elements at the sill (Width, Thicknss and Extensn appear again below AtSill)
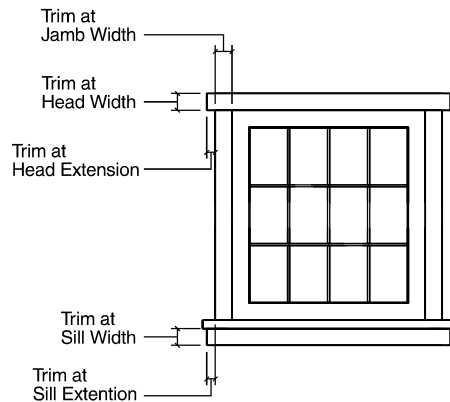
Window trim

Window Headers

The Head option lets you define the window header, or top of the frame. This area can become exceedingly detailed in a model rendering, with the inclusion of its structural and aesthetic elements in one master group. You can individually set the following components to provide a clearer view:

Do Head | Models the header component

HeadWdth | Sets the header width. Measure through the wall, from the inner surface of the wall, outward. This option appears when WalWdth is off. When you choose HeadWdth, a list of header width values appears. Choose or type a header width and press Enter.

Head Thk | Sets the window header thickness. Measure from top, the wall opening, to bottom. When you choose Head Thk, a list of header thickness values appears. Choose or type a header thickness and press Enter.

WalWdth | Calculates the header width equal to the thickness of the wall. When WalWdth is off, the width of the head is controlled by the header width setting.
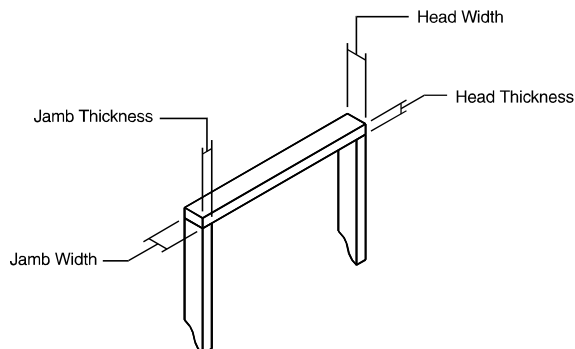
Window header

Window Jambs

Use the following Jamb options to define the window jamb:

Do Jamb   Models jamb components

JambWdth   Sets the jamb width. Measure through the wall from the inner surface of the wall, outward. This option appears when WalWdth is off. Choose JambWdth, and then choose or type a jamb width and press Enter.

Jamb Thk   Sets the jamb thickness. Measure from the void edge, or wall opening, inward toward the window center along the wall plane. Choose Jamb Thk, and then choose or type a jamb thickness and press Enter.

WalWdth   Sets the wall width. When this toggle is off, the width of the jamb is controlled by JambWdth.
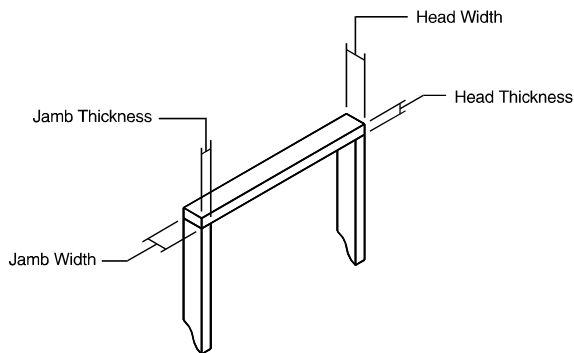
Window jamb

Window Sills

Sill lets you define the window sill. The sill is not broken down into stool (interior) and finish (exterior) sill components. Also, the sill horns are proportionate and do not carry different lengths on the interior and exterior extensions.

Do Sill	Models the sill
Thicknss	Sets the sill thickness from the bottom of the window opening, upward; choose Thicknss, and then choose or type a sill thickness and press Enter
In Extn	Sets the inside sill extension away from the plane of the wall toward the center of the room; choose In Extn, and then choose or type an inside sill thickness and press Enter
Out Extn	Sets the outside sill extension away from the plane of the wall outward; choose Out Extn, and then choose or type an outside sill extension and press Enter
SideExtn	Sets the inside and outside (sill horn) extensions from the sides of the window opening, outward, along the plane of the wall; choose SideExtn, and then choose or type a side extension and press Enter
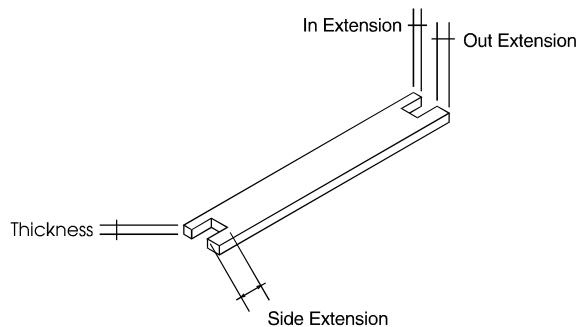
Window sill

Window Sashes

Sash defines the window sash assembly. The sash is the frame that holds the muntins and glass; without it, the muntins and glass would be suspended in 3D space. Single pane or double thermopane windows, while not having muntins, must have Centred toggled on to function within the confines of the wall plane.

Do Sash	Models the sash components; when Do Sash is off, muntins and glass are not added to the drawing even if DoMuntn and DoGlass are on
SashWdth	Sets the sash width for all components (top and bottom rails and stiles); choose SashWdth, and then choose or type a sash width and press Enter
SashThk	Sets the sash thickness for all sash components; choose SashThk, and then choose or type a sash thickness and press Enter
Centred	Centers a sash within the window frame. Centred and Offset are mutually exclusive; only one can be toggled on at any given time
Offset	Determines the sash offset placement from the inside of the window jamb. The distance is from the interior surface of the wall to the interior surface of the sash; choose Offset, and then choose or type a sash offset and press Enter

Muntins

Use Muntins to define and place window pane dividers within the sash assemblies. You can also set the number of window panes and their placement.

DoMuntn	Models muntins, or window pane dividers
MuntWdth	Sets the muntin width along the plane of the wall; the width applies equally to vertical and horizontal muntins; choose MuntWdth, and then choose or type a muntin width and press Enter
MuntThk	Sets the muntin thickness, which is measured through the window; choose MuntThk, and then choose or type a muntin thickness and press Enter
PaneHorz	Sets the number of panes per window horizontally; choose PaneHorz, and then choose or type a value and press Enter
PaneVert	Sets the number of panes per window vertically; choose PaneVert, and then choose or type a value and press Enter

PaneHorz and PaneVert are also available in the Glass menu. They are the same settings, so when you change either option in the Muntins menu, the new values are also displayed for the PaneHorz and PaneVert options in the Glass menu.

Centred	Centers a muntin within the sash; Centred and Offset are mutually exclusive; only one can be toggled on at any given time
Offset	Sets the offset placement of the muntins from the interior surface of the sash to the interior surface of the muntins; choose Offset, and then choose or type a muntin offset and press Enter; Centred and Offset are mutually exclusive; only one can be toggled on at any given time
FullEdg	Sets a full-edge muntin at the window sash
HalfEdg	Sets a half-edge muntin at the window
No Edg	Sets a no-edge muntin at the window sash
Slabs	Constructs muntins as slabs; when Slabs is toggled off, muntins are constructed as 3D lines

Glass

Use Glass to define the number of glass panes horizontally and vertically. It also sets the glass thickness for the window panes in the model. Since glass is represented as a slab or solid object, it is often left out of a model so that a hidden line removal can be performed as if the glass were transparent.

DoGlass	Models window glass in the window panes
GlassThk	Sets the glass thickness; choose GlassThk, and then choose or type a glass thickness and press Enter
PaneHorz	Sets the number of horizontal panes per window; choose PaneHorz, and then choose or type a value and press Enter
PaneVert	Sets the number of vertical panes per window; choose PaneVert, and then choose or type a value and press Enter

PaneHorz and PaneVert are also available in the Muntins menu. They are the same settings, so when you change either option in the Glass menu, the new values are also displayed for the PaneHorz and PaneVert options in the Muntins menu.

Centred	Centers a window pane glass in the muntin, through the window; Centred and Offset are mutually exclusive; only one can be toggled on at any given time
Offset	Sets the offset of the glass panes from the interior surface of the muntin to the interior surface of the glass; choose Offset, and then choose or type a glass pane offset and press Enter; Centred and Offset are mutually exclusive; only one can be toggled on at any given time

Modeling Doors

The Doors menu lets you access door data, load or save previously designed doors, and select or enter door components and data.

Cutting Walls

CutWall is a toggle used to automatically create voids in slabs for doors. It is available in the menu when InPlan is toggled on. When CutWall is toggled on, a LyrSrch toggle also becomes available.

Door File

Use the DoorFile option to load, save, delete, rename, or copy door files. Choose from the following DoorFile options:

LoadDoor	Loads door parameters from saved files; choose or type a door filename and press `Enter`
SaveDoor	Saves door parameters to a file; type a filename and press `Enter`
Del Door	Deletes saved door files from the hard disk. To help prevent accidental deletions, the system prompts for the filename requested. To delete a door file, select a filename and press `Enter`. Choose Yes to delete the file; otherwise choose No.
Ren Door	Renames existing files; select a file to rename, type a filename of up to eight characters long, and press `Enter`
CopyDoor	Copies the contents of an existing door file to a new file; type the name of the file to copy from and press `Enter`, then type the filename to copy to and press `Enter`
Form	Displays a door data form

All doors are created to open inward, toward you.

Door Forms

The DoorForm menu lets you view the settings for the door on which you are currently working. The design form offers a comprehensive view of the door parameters on one screen.

Saving 3D Doors as Symbols

Use the Template option to create and save doors as symbols, developing a library of door symbols that you can quickly insert into new projects. For more information, see "Templates and Symbols" in the "Drawing Elements" chapter.

Door Heights and Wall Thickness

You can set the head height and sill height of a door with the Head Hgt and Sill Hgt options, as well as use the Wall Thk option to change the wall thickness. The Head Hgt and Sill Hgt options are available only when In Plan is toggled on, while Wall Thk is only available when In Elev is toggled on. When you choose one of these options, a list of values is displayed in the Menu Window. Choose or type a new value and press `Enter`.

The Head Hgt and Sill Hgt settings are relative to Z-base.

Door Types

UnitType displays available door types. Doors swing inward (toward you), so you should build designs from the interior of a structure.

Choose a door type from the following options:

Single	Single door, hinged
Double	Double doors, hinged
Bifold	Bi-fold door
2xBifld	Double bi-fold doors
Sliding	Sliding door
Pocket	Pocket doors
% open	Determines the percentage that a door appears open in the model, with 0% being fully closed and 100% being fully open

Door Casings

Use Casing to control the casing or exterior door component group. You can set any of the following door casing options:

At Head	Models casing elements in the door header model
Width	Sets the casing width at the door header, across the door plane, and at the door jamb; choose or type a value and press Enter
Thicknss	Sets the casing thickness at the door head and at the door jamb; choose or type a value and press Enter
Extensn	Sets the extension length past the outside edge of the vertical casing components (jamb casing). Choose or type a value and press Enter. For any extension, this measurement is always 0 when the outside edge of the vertical casing and the extension end are aligned. Positive numbers indicate an extension; negative numbers indicate a setback.
At Jamb	Models casing elements in the door jamb model (Width and Thicknss appear again after this option)
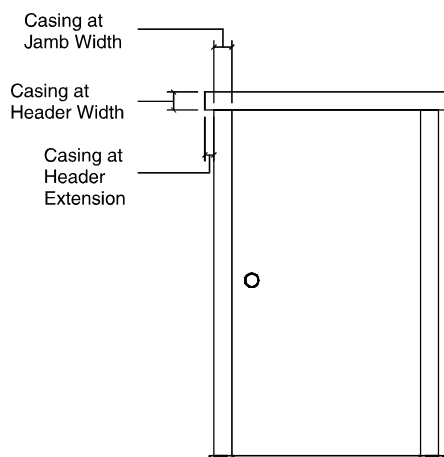
Door casing

Door Trim

Use Trim to control the trim, or interior door component group. You can vary such elements as the trim apron, according to aesthetic preference or design requirements.

At Head	Models trim elements at the door header model
Width	Sets the trim width at the door header and across the door jamb
Thicknss	Sets the trim thickness at the door header, through the door, and at the door jamb
Extensn	Sets the trim extension length past the outside edge of the vertical jamb trim components
At Jamb	Models trim elements in the door jamb model (Width and Thicknss appear again after AtJamb)

Trim at
Jamb Width

Trim at
Head Width

Trim at
Head Extension
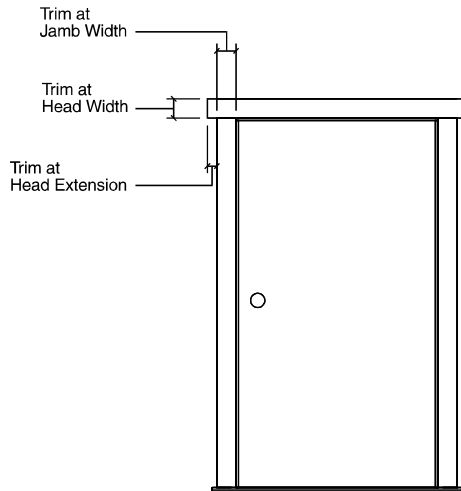
Door trim

Door Headers

Use Header to define the door header. This area can become exceedingly detailed in a model rendering, including its structural and aesthetic elements in one master group. With Header you can break down the various components to provide a clearer view.

Do Head	Models the door header
HeadWdth	Sets the door header width. Measure through the door, from the inner surface of the door outward. This option appears when WalWdth is off; choose HeadWdth, and then choose or type a header width and press Enter
HeadThk	Sets the door header thickness. Measure from top (wall opening) to bottom. When you choose HeadThk, a list of thickness values appears. Choose or type a header thickness and press Enter.
WalWdth	Calculates a header width equal to the wall thickness; when WalWdth is off, the width of the header is controlled by the header width (HeadWdth) setting
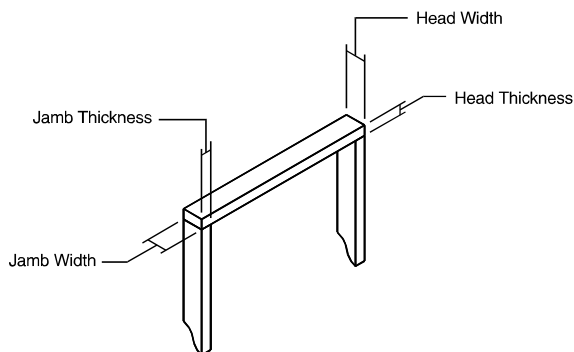
Door header

Door Jambs

The Jamb menu defines the door jamb, using the following options:

Do Jamb	Models jamb components
JambWdth	Sets the door jamb width (measure from the inner surface of the door, outward through the door); available only when WalWdth is off; choose JambWdth, and then choose or type a jamb width and press Enter
Thicknss	Sets the door jamb thickness (measure from the void edge, or wall opening, inward toward the door center along the wall plane); choose Thicknss, and then choose or type a jamb thickness and press Enter
WalWdth	Sets the jamb width equal to the wall width; when WalWdth is off, the width of the jamb is controlled by JambWdth; choose WalWdth, and then choose or type a jamb width and press Enter
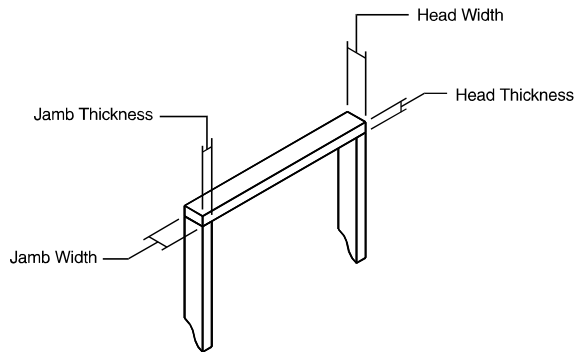
Door jamb

Door Sills

The Sill menu defines the door sill, using the following options:

Do Sill	Models the sill
Thicknss	Sets the sill thickness from the bottom of the door opening, upward at the sill middle; choose Thicknss, and then choose or type a sill thickness and press ⌷Enter⌷
EdgeThk	Sets the thickness of the tapered edge; choose EdgeThk, and then choose or type an edge thickness and press ⌷Enter⌷
InExtn	Sets the inside sill extension away from the plane of the door toward the center of the room; choose InExtn, and then choose or type an extension and press ⌷Enter⌷
Out Extn	Sets the exterior sill extension across the door plane from the exterior wall outward; choose Out Extn, and then choose or type an extension and press ⌷Enter⌷
SideExtn	Sets the exterior sill extension along the wall plane from the outside edge of the trim outward (also known as the "sill horns"); choose SideExtn, and then choose or type an extension and press ⌷Enter⌷
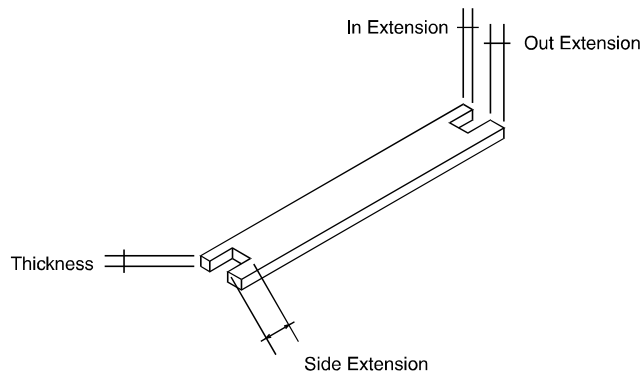
Sill thickness

Door Stops

Use Stop to place and size the door stops. The stop is drawn to the exterior of the door, whether the door is flush or offset. Door stops are not created for sliding or pocket doors, regardless of whether Do Stop is toggled on or not.

Do Stop	Models the door stop
StopWdth	Sets the stop width for all components (measure the stop width in the same direction as the jamb width and across the wall plane); choose StopWdth, and then choose or type a stop width and press ⌷Enter⌷
Stop Thk	Sets the stop thickness dimension (measure the stop thickness in the same direction as the jamb thickness and across the wall plane); choose Stop Thk, and then choose or type a stop thickness and press ⌷Enter⌷

Door Options

The Door menu sizes, positions, and hinges a door, using the following options:

Do Door	Models the door
Door Thk	Sets the door thickness; choose Door Thk, and then choose or type a door thickness and press ⌷Enter⌷
HingRht	Hinges doors on the right; determine the right side of the door by standing inside the structure and looking at the door
HingLft	Hinges doors on the left; determine the left side of the door by standing inside the structure and looking at the door
Flush	Sets the door flush with the outside wall
Offset	Sets the offset placement of the door from the interior wall surface across the wall plane; choose Offset, and then choose or type a value and press ⌷Enter⌋

Door Knobs

Use Knob to place, size, and identify the door knob; only round door knobs are available. When Do Door is off, you can't create a knob regardless of the Do Knob setting.

Do Knob   Models the knob

Diameter   Sets the diameter of the door knob; choose Diameter, and then choose or type a door knob diameter and press ⏎Enter

Extnsion   Sets the knob extension out from the door; choose Extnsion, and then choose or type a knob extension and press ⏎Enter

Knob Hgt   Sets the height of the knob from the bottom of the door; choose Knob Hgt, and then choose or type a knob height and press ⏎Enter

Offset   Sets the knob offset from the door edge; choose Offset, and then choose or type a knob offset and press ⏎Enter

Inside   Models a knob on the door interior

Outside   Models the knob on the door exterior; Outside and Inside can be toggled individually or together

Concrete

With the Concrete tool, you can add six different types of preconstructed concrete forms to your drawing or model. There are many options for each type of form, including altering each form's overall dimensions. The six concrete forms in this macro include:

- columns

- inverted tees (girders)

- standard beams (rectangular cross section)

- I-beam forms ("I" cross section)

- single tee forms

- double tee forms

All forms are added to your drawing as Slab entity types. Once you add a concrete form to your drawing, you can modify the model using any of the standard DataCAD editing features that operate on Slab entities, including Move, Copy, Rotate, Enlarge, Mirror, Erase, and Stretch. You can also use Voids and Partial in the 3DEntity/Slab menu.

Certain conventions and principles apply to the entering of all forms, except columns. These rules apply to the placement of long forms relative to two points indicating the beginning and end of a form. These two points form a line known as the *defining line*.

The form can lie to the right, left, or center of the defining line in plan view. (You can position the defining line at Z-base or Z-height, relative to the plan.) You can position a form relative to this defining line in the Z direction or position the top, bottom, or center of the form to coincide with the defining line in the Z direction. These alternatives provide a total of 18 choices for the position of any given form, relative to the defining line.

Columns begin as rectangular boxes. You can chamfer the vertical edges of the column and add up to four seats to the column to support the girders and beams. The location of a column is defined by two points, at opposite corners of a box, indicating the overall dimensions of the column. The column extends vertically from the current value of Z-base to the current value of Z-height.

➔ To draw columns:

1. Choose Column from the Concrete menu. The following options are displayed:

Width	Sets the column width
Depth	Sets the column height
Rotate	Enters columns that rotate about the entry point; you are prompted for the rotation angle of the column
LoLeft	Specifies the location of the column by its lower left corner
Center	Specifies the location of the column by its center point
UpRight	Specifies the location of the column by its upper right corner
TopSeat / BotSeat LftSeat / RhtSeat	Indicate the side of the column where the column seat is; you are prompted for the height of the column seat from the current value of Z-base (when a toggle is off, column seats are not added for that particular side)
SeatOnly	Adds column seats to an existing column or multiple sets of column seats to a single column in a multiple-story structure with monolithic concrete columns. When this toggle is on, you can add seats to a column, but you cannot add actual columns.
SeatWdth	Sets the distance from the face of the column to the outside of the column seat
SeatHght	Sets the distance from the top face of the column seat to the bottom edge of the column seat
Chamfer	Chamfers the edges of the column; otherwise, the column is angular in cross section (the size of the column seats automatically adjusts)
ChamSize	Sets the size of the column chamfers

2. Choose any options you want to set. When you choose Width, Depth, Rotate, TopSeat, BotSeat, LftSeat, RhtSeat, SeatWdth, and SeatHght a list of values appears.

3. Choose or type a value and press ⎡Enter⎤.

4. Select a point in the Drawing Window to place the column's location.

Standard beams have a simple rectangular cross section, but they can also have chamfers along the four edges of the beam. You can vary the height and width of the beam. There are 18 possible ways to position the beam relative to a defining line that extends from the first point entered to the second point entered.

➔ To draw a standard beam:

1. Choose Std Beam from the Concrete menu. The following options are displayed:

Width	Sets the beam width
Depth	Sets the beam depth
Chamfer	Chamfers the beam on all edges; otherwise, the beam is rectangular in the cross section. When Chamfer is on, you must enter the chamfer size.
Left	Draws the form to the left of the defining line in the X-Y plane
Center	Draws the form centered about the defining line in the X-Y plane
Right	Draws the form to the right of the defining line in the X-Y plane
Top	Draws the form with its top aligned to the defining line
Center	Draws the form with its center aligned to the defining line
Bottom	Draws the form with its bottom aligned to the defining line
Z-Base	Sets the beam's defining line at the Z-base
Z-Hght	Sets the beam's defining line at the Z-height

2. Choose any options you want to set. When you choose Width, Depth, and Chamfer, a list of values appears. Choose or type a value and press Enter.

3. Select the first end of the defining line.

4. Select the second end of the defining line.

I-beams are similar to standard beams, except that the beam is narrower at the middle of the cross section than it is at either end of the cross section. For a typical application, the stresses in the concrete are much higher at the top or bottom of the beam; therefore, an I-beam can be more economical to use than a standard rectangular beam.

➔ To draw an I-beam:

1. Choose I-Beam from the Concrete menu. The following options are displayed:

Width	Sets the overall horizontal measurement of the cross section of the I-beam
Depth	Sets the overall vertical measurement of the cross section of the I-beam
WebThick	Sets the thickness of the narrower portion of the beam independently of the overall width of the I-beam
FlngDpth	Sets the vertical dimensions of the I-beam flange independently of all other I-beam cross section dimensions
Left	Draws the form to the left of the defining line in the X-Y plane
Center	Draws the form centered about the defining line in the X-Y plane
Right	Draws the form to the right of the defining line in the X-Y plane
Top	Draws the form with its top aligned with the defining line
Center	Draws the form with its center aligned with the defining line
Bottom	Draws the form with its bottom aligned with the defining line
Z-Base	Sets the beam's defining line at the Z-base
Z-Height	Sets the beam's defining line at the Z-height

2. Choose any options you want to set. When you choose Width, Depth, WebThick, or FlngDpth, a list of values appears. Choose or type a value and press Enter .

3. Select the first end of the defining line.

4. Select the second end of the defining line.

Inverted tees, or girders, are typically used for supporting single or double tees across a long span such as a parking garage bay. Because they are in the shape of an inverted T, the beam portion of a single, double, or quad tee can be placed on a tee's shelf. You have a variety of options for changing the overall dimensions of the beam and for its placement in your model.

→ To draw an inverted tee:

1. Choose InvrtTee from the Concrete menu. The following options are displayed:

OvrlHgh	Sets the overall height of the inverted tee; choose OvrlHght, and then choose or type a value and press `Enter`
OvrlWdth	Changes the overall width of the inverted tee; choose OvrlWdth, and then choose or type a value and press `Enter`
NtchDpth	Changes the depth of the notch in the inverted tee; choose NtchDpth, and then choose or type a value and press `Enter`
BeamThck	Changes the thickness of the narrow portion of the inverted tee; choose BeamThck, and then choose or type a value and press `Enter`
Left	Draws the form to the left of the defining line in the X-Y plane
Center	Draws the form centered about the defining line in the X-Y plane
Right	Draws the form to the right of the defining line in the X-Y plane
Top	Draws the form with its top aligned with the defining line
Center	Draws the form with its center aligned to the defining line
Bottom	Draws the form with its bottom aligned to the defining line
Z-Base	Sets the defining line at the Z-base
Z-Height	Sets the defining line at the Z-height
Single	Places a shelf on only one side of the inverted tee (to the left of the defining line) on the end of the first inverted tee that is entered
Double	Places shelves of identical size on both sides of the inverted tee

2. Select the first end of the defining line.

3. Select a second point that is the opposite end of the defining line.

Single tee concrete forms are used as combination beams and floor slabs. In applications where the primary function is creating floors, a double tee form is generally used. Industrial buildings and parking structures use double tees for upper floors that must support large floor loads. A double tee form is easier to position and place because of the stability provided by having two beam sections. Single tees are used in special cases, where spans are exceptionally long or floor loads are exceptionally high. In these cases, the weight and size of double tee forms can make them too large and heavy for practical fabrication, shipment, or placement.

➔ To draw a single tee:

1. Choose SnglTee from the Concrete menu. The following options are displayed:

Width	Sets the overall width of the single tee form (the location of the beam flanges of the form are automatically adjusted); choose Width, and then choose or type a width and press [Enter]
Depth	Sets the overall depth of the single tee form; choose Depth, and then choose or type a depth and press [Enter]
WebThck	Sets the thickness of the floor slab portion of the single tee form; choose WebThck, and then choose or type a thickness and press [Enter]
BeamThck	Sets the thickness of the two support beams for the single tee slab
Left	Draws the form to the left of the defining line in the X-Y plane
Center	Draws the form centered about the defining line in the X-Y plane
Right	Draws the form to the right of the defining line in the X-Y plane
Top	Draws the form with its top aligned to the defining line
Center	Draws the form with its center aligned to the defining line
Bottom	Draws the form with its bottom aligned to the defining line
Z-Base	Places the defining line at Z-base
Z-Hght	Places the defining line at Z-height

2. Set the size of cross-sectional dimensions of the single tee form.

3. Select the first end point of the defining line.

4. Select the second end point of the defining line.

➔ To draw a double tee:

1. Choose DbleTee from the Concrete menu. The following options are displayed:

Width	Sets the overall width of the double tee form (the location of the beam flanges of the form are automatically adjusted); choose Width, and then choose or type a width and press Enter
Depth	Sets the overall depth of the double tee form; choose Depth, and then choose or type a depth and press Enter
WebThck	Sets the thickness of the floor slab portion of the double tee form; choose WebThck, and then choose or type a thickness and press Enter
BeamThck	Sets the thickness of the two support beams for the double tee slab; choose BeamThck, and then choose or type a thickness and press Enter
Left	Draws the form to the left of the defining line in the X-Y plane
Center	Draws the form centered about the defining line in the X-Y plane
Right	Draws the form to the right of the defining line in the X-Y plane
Top	Draws the form with its top aligned to the defining line
Center	Draws the form with its center aligned to the defining line
Bottom	Draws the form with its bottom aligned to the defining line
Z-Base	Places the defining line at Z-base
Z-Hght	Places the defining line at Z-height

2. Set the size of the cross-sectional dimensions of the double tee form.

3. Select the first end point of the defining line.

4. Select the second end point of the defining line.

3D Framing

FrameIt is a framing utility that helps you create three-dimensional floor, wall, and roof systems. Once you build framing members, use Extract to extract framing materials to print or save for use in the DataCAD Estimator.

Floor Framing

→ To frame a floor:

1. Choose Floors from the FrameIt menu.

2. Verify settings for Plate, Joist, and SubFloor. See "Sill Plate, Joist, and Sub-Floor Settings" below for more information.

3. Choose either Center or Sides to define the floor boundary from the center line of the vertical member or from one side of the floor to the other.

4. Define the floor to frame by defining a floor boundary or by choosing Select and selecting an existing floor boundary. To define the floor boundary, object snap to each point of the floor boundary, tracing the floor.

5. Choose Opening to define floor openings, such as chimneys or stairs. Select the first point of the floor opening, move the mouse to stretch the rubberband box around the opening, and select the second point of the rubberband box to define the floor opening.

6. Choose Beam to define beam style and location. Set the following options as necessary:

Single	Models single beams
Double	Models double beams
Custom	Customizes the number of entities that make up a beam
Color	Assigns a beam color; see "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color
Size	Sets a beam size (choose Change to change a standard lumber size in the menu)
Flush	Positions the top of the beam flush or equal to the top of the joist
Below	Positions the top of the beam equal to the bottom of the joist
Change	Changes the current framing member attributes (those attributes set when you selected or defined the floor boundary)
FileI/O	Accesses file options to save the current framing settings in a file, load saved settings, or delete or rename framing settings files

7. To make any changes before choosing Build, choose Edit or Change to access DataCAD editing options, including Move, Copy, Rotate, Mirror, Stretch, Enlarge, Erase, and Layers, or to globally change any floor member attributes.

If you choose Edit or Change, you must choose Build again for those changes to take effect.

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8. To save floor settings to a file, choose SaveFile from the FileI/O menu.

9. Choose Build and select the boundary on which to generate a floor system. Build generates a framing system based on the settings you defined above. For more information on using the selection menu to select the boundary to frame, see the "The Drawing Board" chapter.

   Use the following toggles before you select the boundary to frame for added control over the Build process:

SchemLyr	Builds framing members on the schematic layer
ActvLyr	Builds framing members on the active layer
FlrsOnly	Builds only floors with the current settings; otherwise, DataCAD builds all members; only available in the Floors/Build menu
WalsOnly	Builds only walls with the current settings; otherwise, DataCAD builds all members; only available in the Walls/Build menu
RfsOnly	Build only roofs with the current settings; otherwise, DataCAD builds all members; only available in the Roofs/Build menu

10. When framing is complete, you have access to the following DataCAD options: 3DViews, Hide, and Layers. See the "3D Viewing" and "Before You Draw" chapters for more information on these options.

11. Choose Exit to return to the Floors menu.

Sill Plate, Joist, and Subfloor Settings

Use Plate to set the following sill plate options:

DoPlate	Models sill plates
Single	Models single plates
Double	Models double plates
Custom	Customizes the number of entities that make up the plate
Color	Assigns a plate color; see "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color
Size	Sets a plate size; choose Change to change a standard lumber size in the menu

Use Joist to set the following joist options:

DoJoist	Models the joists
Size	Assigns a joist size, or defines a custom joist size; choose Change to change a standard lumber size in the menu
Spacing	Assigns joist spacing (measure spacing from the center line of one joist to the center line of the next joist)
Color	Assigns a joist color; see "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color
Angle	Changes the angle in which your joist member will be modeled within the schematic

Use SubFloor to set the following subfloor options:

DoSubflr	Models the subflooring
Single	Models single layer subfloors
Double	Models double layer subfloors
Custom	Customizes the number of entities that make up a subfloor
Color	Assigns a subfloor color; see "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color
Thicknss	Sets the subfloor thickness for each layer

Wall Framing

➔ To frame a wall:

1. Choose Walls from the FrameIt menu.

2. Verify the settings for WallHght, Plate, and Stud. See "Wall Height, Plate, and Stud Settings" below for more information.

3. Choose either Center or Sides to define the wall boundary from the center line of the vertical member or from one side of the wall to the other.

4. Choose either Exterior or Interior. Use Exterior to create outside wall systems; DataCAD assumes this will be a closed boundary. Use Interior to create inside wall systems; DataCAD toggles Closed off and you are drawing a single or string-line wall that does not close itself.

5. Define the wall to frame by defining a wall boundary or by choosing Select and selecting an existing floor or wall boundary. If defining the roof by the boundary, object snap to the first point of the wall boundary to frame and continue tracing the boundary from that point.

6. Choose Opening to define wall openings. Choose either Window or Door (for Exterior) or PassThru or Door (for Interior). If you choose Window or PassThru, verify the settings for SillHgt, HeadHght, and HeadStyl. For Door, define only HeadHght and HeadStyl.

Window	Defines window openings in the wall
Door	Defines door openings in the wall
SillHght	Defines the sill height; available only when Window is toggled on
HeadHght	Defines the header height of the door
HeadStyl	Defines the header style:

	Cripple	Member with smaller studs that run from the top of the header to the bottom of the lower top plate; maintains stud spacing
	Boxed	Solid member that runs from the top of the header to the bottom of lower top plate

Change	Changes any opening attributes
FileI/O	Accesses file options to save the current framing settings in a file, load saved settings, or delete or rename framing settings files

7. To make any changes before choosing Build, choose Edit or Change to access DataCAD editing options, including Move, Copy, Rotate, Mirror, Stretch, Enlarge, Erase, and Layers, or to globally change any wall member attributes.

If you choose Edit or Change, you must choose Build again for those changes to take effect.

8. To save wall settings to a file, choose SaveFile from the FileI/O menu.

9. Choose Build and select the boundary on which to generate a wall system. Build generates a framing system based on the settings you defined above. For more information on using the selection menu to select the boundary to frame, see the "The Drawing Board" chapter.

Use the following toggles before you select the boundary to frame for added control over the Build process:

SchemLyr	Builds framing members on the schematic layer
ActvLyr	Builds framing members on the active layer
FlrsOnly	Builds only floors with the current settings; otherwise, DataCAD builds all members; only available in the Floors/Build menu
WalsOnly	Builds only walls with the current settings; otherwise, DataCAD builds all members; only available in the Walls/Build menu
RfsOnly	Build only roofs with the current settings; otherwise, DataCAD builds all members; only available in the Roofs/Build menu

10. When framing is complete, choose Exit to return to the Walls menu.

Wall Height, Plate, and Stud Settings

Use WallHght to set wall height options. Choose a wall height from the list or type a wall height and press [Enter].

Use Plate to set the following top and bottom plate options:

DoTop	Models top plates
Single	Models single top plates
Double	Models double top plates
Custom	Customizes the number of entities that make up a top plate
Color	Assigns a top plate color; see "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color
DoBottom	Models bottom plates
Single	Models single bottom plates
Double	Models double bottom plates
Custom	Customizes the number of entities that make up a bottom plate
Color	Assigns a bottom plate color; see "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color

Use Stud to set vertical framing member options:

DoStud	Models the vertical stud member
Size	Assigns a stud size or defines a custom stud size
Spacing	Assigns stud spacing (measure spacing from the center line of one stud to the center line of the next stud)
Color	Assigns a stud color; see "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color

Roof Framing

Use Roof Framing to create three-dimensional roof framing systems. You can frame the following roof types: Shed, Gable, Hip, and Gambrel. See "3D Roofs" in this chapter for a description of each roof type.

➔ To frame a roof:

1. Choose Roofs from the FrameIt menu.

2. Choose the roof type to frame: Shed, Gable, Hip, or Gambrel.

3. Choose Settings to set the options for roof settings, including pitch, purlin height, rafters, sheathing, and overhang. See "Settings" below for more information.

4. Define the roof by defining a roof boundary or by choosing Select and selecting an existing wall or roof boundary. To define the roof with an existing boundary, choose that boundary and continue with step 6. To define the roof by a boundary, object snap to the first and second corners of the roof boundary to define the length of the roof parallel to the ridge.

Make sure that you define the roof boundary at a Z-base set to the plate height of the wall.

The following options appear on the menu:

Closed	Models a closed roof boundary
Backup	Backs up one roof corner so you can enter a new position
Cancel	Returns you to the FrameIt menu without defining a roof perimeter
Close/Exit	Stops defining the roof perimeter

5. If defining the roof by the boundary, choose the third corner of the roof perimeter to define the width of the roof perpendicular to the ridge. The roof boundary is calculated and closed.

6. Choose Opening to define roof openings, such as chimneys. Select the first point of the roof opening, move the mouse to stretch the rubberband box around the opening, and select the second point of the rubberband box to define the roof opening.

7. To make any changes before choosing Build, choose Edit or Change to access DataCAD editing options, including Move, Copy, Rotate, Mirror, Stretch, Enlarge, Erase, and Layers, or to globally change any roof framing member attributes.

If you choose Edit or Change, you must choose Build again for those changes to take effect.

8. To save roof settings to a file, choose SaveFile from the FileI/O menu.

9. Choose Build and select the boundary on which to generate a roof system. Build generates a framing system based on the settings you defined above. When you define a roof boundary, FrameIt bases the plate height on the current Z-Base setting. When you use Select to select an existing wall boundary, FrameIt uses the plate height of the wall.

FrameIt always centers ridge boards when framing roofs.

10. When framing is complete, choose Exit to return to the Roofs menu.

Settings

Use Pitch to set a pitch for Shed, Gable, and Hip roofs. Pitch is defined by rise and run; choose a pitch from the menu, or choose Custom, type a pitch, and press $\boxed{\text{Enter}}$. Use UprPitch and LwrPitch to set the pitch for the upper and lower sections, respectively, of a Gambrel roof.

Use MidRdgHt to set the height for purlins for Gambrel roofs. Choose a height from the menu, or choose Custom, type a height, and press $\boxed{\text{Enter}}$.

Use Rafters to set the following rafter options:

DoRafter	Models rafters; models collar ties every four feet
Size	Sets a rafter size from the list, or defines a custom rafter size
Spacing	Sets rafter spacing or defines custom rafter spacing (measure spacing from the center line of one rafter to the center line of the next rafter)
Color	Sets a ridge board and rafter color; see "Color Menus" in "The Drawing Board" chapter for information about how to choose a color
EaveSqr	Models fascia square to the angle of the rafter
EavePlmb	Models fascia parallel to the wall
BrdMouth	Assigns a Bird's Mouth dimension; choose a dimension from the menu, or choose Custom, type a dimension, and press [Enter]

Use Sheathng to set the following roof sheathing options:

DoSheath	Models roof sheathing
Single	Models single layer roof sheathing
Double	Models double layer roof sheathing
Custom	Models a custom number of roof sheathing layers
Color	Assigns a roof sheathing color; see "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color
Thicknss	Assigns the thickness of the roof sheathing material or defines a custom thickness

Use the following OverHang options to set the overhang distance. Measure OverHang from the outside face of the sheathing to the outside face of the rafter.

EaveOhng	Assigns an overhang distance at the eave
RakeOhng	Assigns an overhang distance on the gable end

File Options

Use FileI/O to access file options:

LoadFile	Loads a previously saved file of floor, wall, or roof framing settings
SaveFile	Saves the current framing settings in a file
DelFile	Deletes an existing file of framing settings
Rename	Renames an existing file of framing settings

Extracting Framing Materials

Use Extract to extract framing materials to print or save for use in DataCAD Estimator. Before you choose Extract, toggle on the layer containing the framing members to extract. A Framing Member Takeoffs list appears showing the Usage, Size, Unit, and Quantity of any framing members that exist on layers toggled on.

➔ To extract framing materials:

1. Choose Extract from the FrameIt menu.

2. Choose Yes to begin the extraction; otherwise choose No.

Resetting Framing Settings

➔ To reset all of the framing settings to their default values, clearing all your values:

1. Choose Reset from the FrameIt menu.

2. Choose Yes to reset all settings; otherwise choose No.

3D Roofs

RoofIt automates the construction of 3D roof models. You define the roof boundary and RoofIt automatically calculates and constructs a roof based on your settings.

The standard roof types available with RoofIt are Gable, Hip, Boston, Gambrel, Mansard, and Shed. You can also create your own customized roof shape. You can vary the pitch, overhang, and plate height settings, and specify the type of soffit and fascia you want to model. RoofIt also lets you join a new roof to an existing roof. You can create dormers or other complex roof shapes using this feature.

A complete roof model is composed entirely of 3D polygons. Because of this, you can easily process the model with DataCAD's hidden line removal feature, Hide.
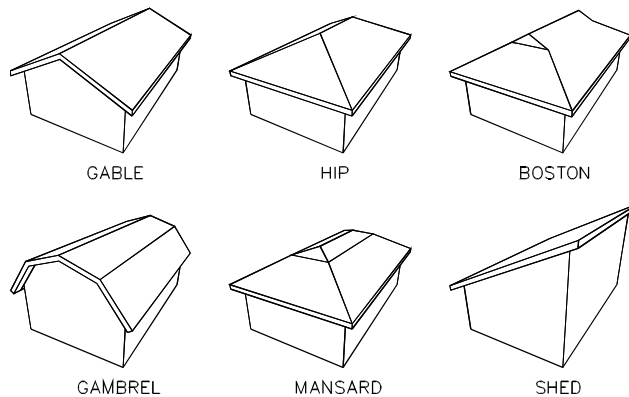
Standard roof types

➔ To create a roof model:

1. Choose RoofIt from the Toolbox menu. The following options are displayed:

   RectRoof   Constructs an orthogonal (rectangular) roof with no variation in settings; RectRoof is the easiest way to model a rectangular roof

   PolyRoof   Constructs a polygonal roof that is not orthogonal or a roof that has varied pitch, overhang, or plate height settings

RectRoof and PolyRoof are mutually exclusive; only one option will be displayed in the menu at any given time. If RectRoof is displayed in the RoofIt menu, clicking on it will change it to PolyRoof, putting DataCAD in polygonal roof drawing mode; you can begin drawing polygonal roofs. To change back to rectangular roof drawing mode, click on the PolyRoof option to change it to RectRoof.

Gable	Available roof type
Hip	Available roof type
Boston	Available roof type
Gambrel	Available roof type
Mansard	Available roof type
Shed	Available roof type
Join	Defines a Gable, Hip, or Shed roof that connects to an existing roof plane; the roof that you join onto may be any roof type you create using RoofIt
Settings	Sets roof options depending on the type of roof you're drawing; see "Setting Options" later in this section
PlatHgt	Sets different plate height values for each roof line than what's currently set in Settings/PlatHgt during PolyRoof creation; when PlatHgt is on, RoofIt prompts you for the plate height of each roof; only changes with Gable and Gambrel roofs
Pitch	Sets different pitch values for each roof line than what's currently set in Settings/Pitch during PolyRoof creation; when Pitch is on, RoofIt prompts you for the pitch of each roof side; only changes with Gable and Gambrel roofs
Overhng	Sets different overhang values for each roof line than what's currently set in Settings/Overhng during PolyRoof creation; when Overhng is on, RoofIt prompts you for the overhang of each roof side; only changes with Gable, Gambrel, and Shed roofs
Layers	Shortcut to the Utility/Layers menu without exiting RoofIt; see "Layers" in the "Before You Draw" chapter for more information
Hide	Shortcut to the 3DEdit/Hide menu without exiting Roof It; see "Hide" in the "3D Viewing" chapter for more information
3DViews	Shortcut to the 3DViews menu and look at your 3D model in different orientations without exiting RoofIt; see the "3D Viewing" chapter for more information
3DEntity	Shortcut to the 3DEntity menu without exiting RoofIt; see the "3D Drawing" chapter for more information

2. Choose RectRoof or PolyRoof to define a rectangular or polygonal roof. See "Defining a Roof Boundary" below for more information.

3. Choose one of the six standard roof types: Gable, Hip, Boston, Gambrel, Mansard, or Shed.

4. Choose Join if you are defining a roof to join with an existing Gable, Hip, or Shed roof plane.

5. Choose Settings to set roof options (if you don't need to vary any values, skip to step 6). Choose the option to set. These options vary depending on which roof type you selected in step 3. For a description of the Settings options see "Settings Options" later in this section.

6. If you are creating a Gable, Gambrel, or Shed polygonal roof, you can choose PlatHgt, Pitch, or Overhng from the RoofIt menu to change that setting for each roof edge you draw. Once you select the first point of the roof boundary, you can't move the control from one parameter to another. You can only change the value of one parameter as you define the roof boundary.

7. Define a roof boundary by entering length and width values for a rectangular roof or by entering a series of four points for a polygonal roof. (For a more detailed explanation see "Defining the Roof Boundary" below.)

8. If you are defining a roof to join choose the roof plane to join to when prompted.
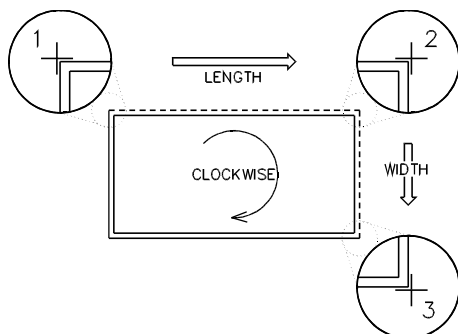
Defining the Roof Boundary

The method you use to define the roof boundary depends on whether the RectRoof or PolyRoof option is displayed in the RoofIt menu. (The option that is displayed is the type of roof you'll draw.)

Rectangular Roofs

When you model a rectangular roof, you define the roof shape by selecting points (in a clockwise direction) that define its length and width. This results in an orthogonal roof shape.

➔ To define a rectangular roof boundary:

1. If RectRoof is not displayed in the RoofIt menu, choose PolyRoof to toggle RectRoof on.

2. Select the first point of the roof boundary; this point is the first point of the roof length, which runs parallel to the ridge of the roof.

3. Select the second point of roof length.

4. Select the third point of the roof boundary to define the roof width. The roof width is the distance from one side of the building to the other; this is perpendicular to the roof length and roof ridge. On a Shed roof, this point locates the ridge (minus the overhang).

Defining a rectangular roof boundary

Polygonal Roofs

To model a non-orthogonal roof or to model a roof with varying parameters (PlatHgt, Pitch, or Overhng), use PolyRoof.

When you define a polygonal roof, you enter a series of four points. These points trace the edges of the roof boundary in a clockwise direction. The first and third edges of the boundary run parallel to the ridge; and the ridge bisects the second and fourth edges. Because the roof shape may be either orthogonal or non-orthogonal, the edges of the roof don't have to be parallel and perpendicular to the ridge.
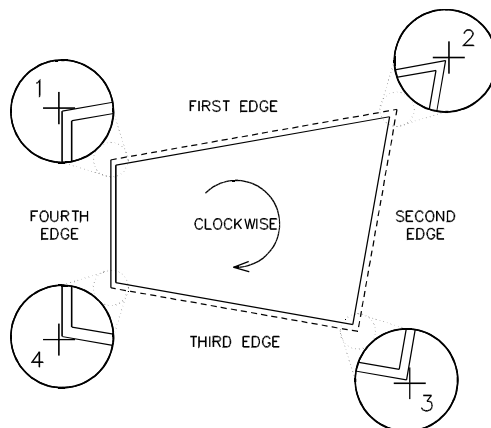
➜   To define a polygonal roof boundary:

1. If PolyRoof is not displayed in the RoofIt menu, choose RectRoof to toggle PolyRoof on.

2. Select the first point of the roof boundary. This is the first point of the roof length.

3. If you're drawing a Gable, Gambrel, or Shed roof and you toggled PlatHgt, Pitch, or OverHng on in the RoofIt menu, RoofIt prompts you to enter the value. RoofIt applies this value to the first edge of the roof.

4. Select the second point of the first roof edge.

5. If you're drawing a Gable, Gambrel, or Shed roof and you toggled Overhng on in the RoofIt menu, RoofIt again prompts you to enter a value. RoofIt applies this value to the second edge of the roof.

6. Select the third point of the roof boundary. The second edge of the roof boundary is bisected by, but not necessarily perpendicular to, the ridge. The Shed roof is an exception; on a Shed roof, this point locates the ridge (minus the overhang).

7. If you're drawing a Gable, Gambrel, or Shed roof and you toggled PlatHgt, Pitch, or OverHng on in the RoofIt menu, RoofIt prompts you to enter a value. RoofIt applies this value to the third edge of the roof.

8. Select the fourth point of the roof; unless you toggled OverHng on in the RoofIt menu, the boundary closes and the roof model is constructed.

9. If you toggled Overhng on, RoofIt prompts you to enter a value. RoofIt applies this value to the fourth edge of the roof. After you enter the value, the boundary closes and the roof model is constructed.
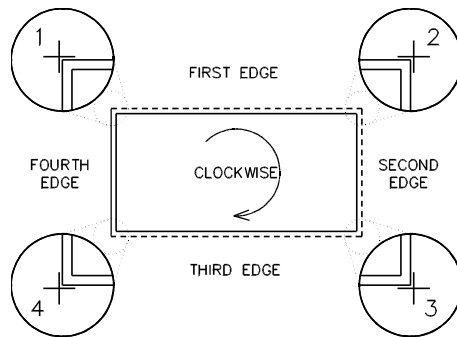
Defining an orthogonal PolyRoof boundary

Defining a non-orthogonal PolyRoof boundary

Joining Roofs

Use Join to define a Gable, Hip, or Shed roof that connects to any one existing roof plane. The roof that you join onto may be any roof type created with RoofIt.
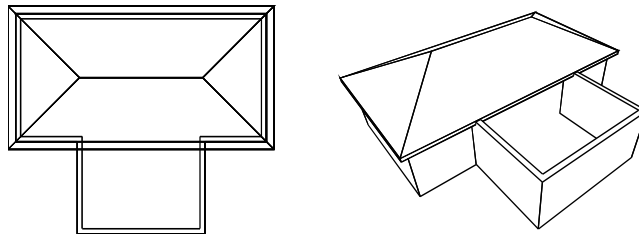
The following example shows how to use RectRoof to join a Hip roof; you can also use PolyRoof. Define the roof boundary in a clockwise manner regardless of which input mode you use: RectRoof or PolyRoof.

➔ To join two roofs:

1. Model the first roof using the steps outlined at the beginning of this section.
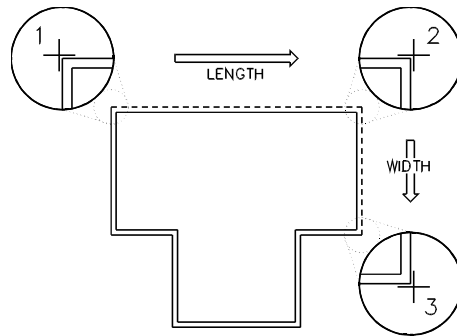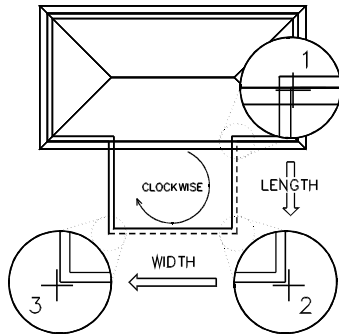

Defining the first boundary

First boundary defined (plan view and perspective hidden-line image)

2. Toggle Join on in the RoofIt menu. This tells RoofIt that the next roof you define will join onto an existing roof.

3. Define the boundary of the second roof. RoofIt prompts you to select the roof plane to join onto.

When defining the joining roof, if you selected any parameters to vary, RoofIt prompts you for values as outlined in the previous sections.
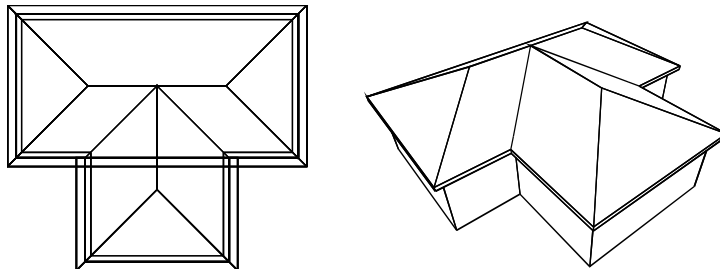
Join: Defining the second boundary

4. Select a point within the perimeter of the roof plane to join to. RoofIt highlights the roof plane and starts the join operation. The roof you defined extends to and clips at the selected roof plane.
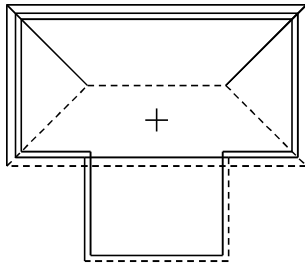
Selecting roof plane to join

Result of join (plan view and perspective hidden-line image)

Settings Options

The options that appear in the RoofIt/Settings menu depend on the type of roof you're drawing. The table below illustrates which settings appear for each roof type:

	Gable	Hip	Boston	Gambrel	Mansard	Shed
PlatHgt	X	X	X	X	X	X
Pitch	X	X	X	X	X	X
MidRidge				X	X	
2ndPitch				X	X	
RoofThck	X	X	X	X	X	X
Overhng	X	X	X	X	X	X
GblOffst			X			
WallThck	X	X	X	X	X	X
Fascia	X	X	X	X	X	
EndWall	X			X		X

Settings options include:

|	
PlatHgt	Sets the roof plate height; this value is an absolute Z-value and is not relative to the current Z-base and Z-height settings
Pitch	Sets the roof pitch in rise and run values (4:12, 5:12, 6:12, etc.); or enter a Custom pitch
MidRidge	Sets the purlin height on a Gambrel or Mansard roof; mid-ridge is a Z distance relative to the current PlatHgt setting
2ndPitch	Sets the second pitch on a Gambrel or a Mansard roof in rise and run values (4:12, 5:12, 6:12, etc.); or enter a Custom pitch
RoofThck	Sets the plate thickness of the roof
Overhng	Sets the roof overhang; measure overhang in the X, Y plane, from the roof definition boundary to the outermost point on the fascia
GblOffst	Sets the gable offset on a Boston roof; this distance is measured in the X, Y plane from the roof definition boundary to the exterior face of the gable end wall; only available when you choose to draw a Boston roof
WallThck	Sets the exterior wall thickness; controls the distance in the X, Y plane from the roof definition boundary to the intersection of the plate and the bottom plane of the roof
Fascia	Sets the width of the fascia on roofs with plumb fascia and horizontal soffits; does not affect the roof thickness (controlled by RoofThck); fascia width cannot exceed the plumb distance through the roof thickness; only available when SoffHorz and FaciaPlb are toggled on

SoffHorz/SoffIncl	Toggles between SoffHorz and SoffIncl to define the shape of the soffit; toggle SoffHorz on to draw the underside of the overhang (the soffit) horizontal, or parallel to the ground; toggle SoffIncl on to draw the soffit inclined, or parallel to the roof plane
FaciaPlb/FaciaSqr	Toggles between FaciaPlb and FaciaSqr to define the shape of the fascia; toggle FaciaPlb on to draw the outside of the overhang (the fascia) plumb, or perpendicular to the ground; toggle FaciaSqr on to draw the fascia is square, or perpendicular to the roof plane
EndWall	Toggles the construction of end walls as part of the roof model (end walls fill in the gaps between the plate and the underside of the roof); when you toggle EndWall on, RoofIt prompts you to enter the color of the end walls; see "Color Menus" in "The Drawing Board" chapter for more information about how to choose a color

EndWall only appears when you select a Gable, Boston, Gambrel, or Shed roof type. RoofIt determines the thickness of the end wall by using WallThck.
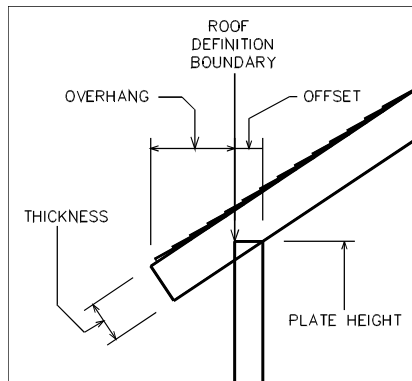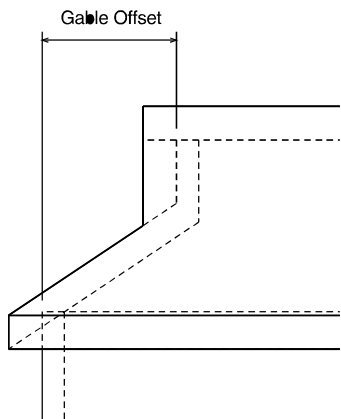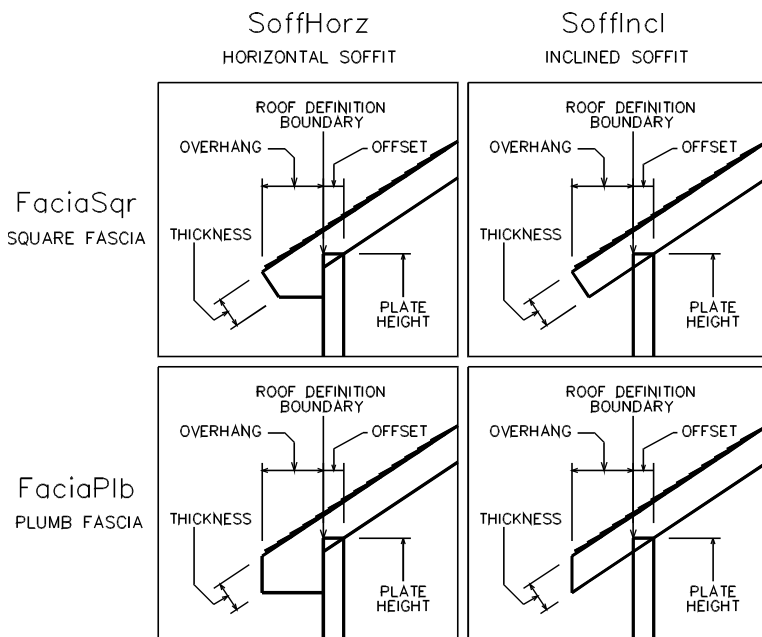

Roof parameters
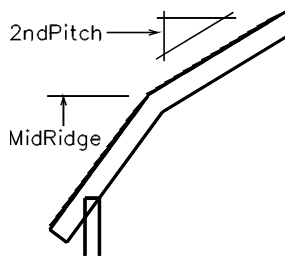
2ndPitch and MidRidge settings

Gable offset

Types of soffit and fascia