CONSTRUCTION

Architectural Desktop 4 - **Development** Guide

PART 7

STAIRS - RAILINGS

Contents:

1 Stairs - Railings Access

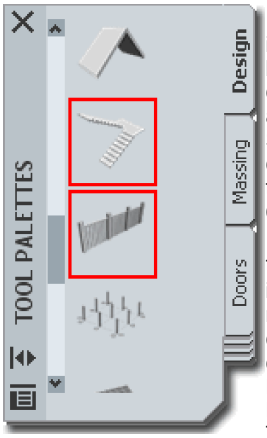
How do I get this toolbar?
You can also acquire access to some of these commands from the Alternate **Design** pull-down menu. From the **Design** pull-down menu, pick **Stairs >** and cascade to their respective command options - see image below, right. This toolbar is an optional tool and is not needed to use this guide but may help.

Stairs and Railings pull-down menu

Alt.Menu **Design> Stairs** or **Railings**

Keyboard **Stairs** or **Railings**

Links Adjusting to the New Interface for AutoCAD and ADT Users- for how to activate the Design pull-down menu

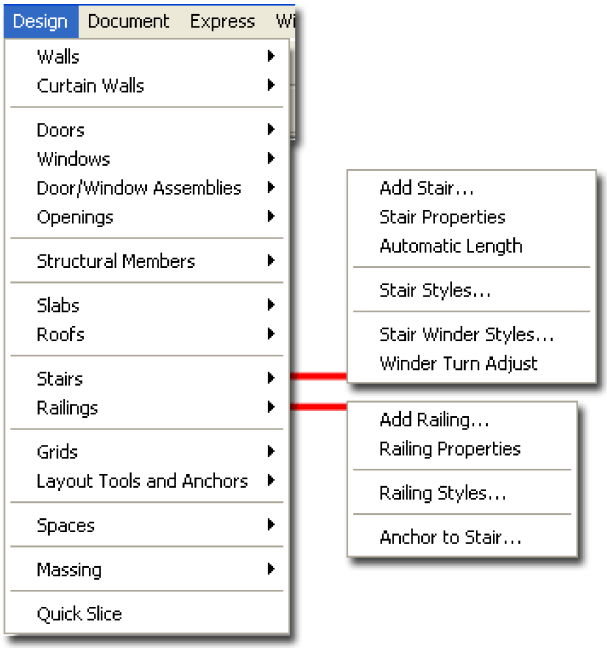


Stairs and **Railings** are one of the more intriguing Objects in Architectural Desktop because in most of my professional experience these items are given very little attention in standard Plans, Elevations and Sections because high detail would be too complex at those scales. In other words, the complexity is left for details that are drawn with traditional 2D linework.

The primary problem with both Object types is that they offer (and consequentially require) a growing body of input before you can get useful results. Railings, for example, are often drawn as a simple line in Plans but in ADT you can end up with Post, Balusters, Guardrails, Handrails and more. Though I happen to find great pleasure in working with Railing Styles, it is easy to understand why some designers get frustrated with these Objects and simply drawn 2D lines instead. For Stairs, the fundamental problem is that a designer really has to understand a great deal about how the Styles are configured and about how Stairs are really constructed in the physical world.

The answer to most of the problems you may face in working with these Objects is to go through the Style Settings and configure your own Styles so you can get the quick results you expect (those results should be faster than drawing treads as 2D lines). One example of what you are up against is the fact that most of the default Stair Styles that come with ADT, like Wood-Housed, are configured for commercial use as defined by the Uniform Building Codes in the United States of America.

In the sections below we will look at numerous options that I hope will allow you to produce just about any Stair Style you need with just about as much or as little detail as you desire. Having said that, be aware that there are also significant limitations and you may not be able to get exactly what you need. For several years now, for example, I have tinkered with escalators and you can see the latest work in the i-drop area. Under the Customization and Tricks section I have a Glass Stair Style that you might want to look at as well.



On the command line, you can type " **Stair**" or "**Railing**" when you want access to many of the Stair and Railing creation options. For direct access to an option within the Stair or Railing command-line menu, you can type the primary command plus the option you want direct access to. For example, if you want to Add a Stair, you can type " **StairAdd**" or if you want to Modify a Railing, you can type "**-RailingModify**".

Below is the command-line read-out for "**Stair**" and "**Railing**":

Command: STAIR
Stair [Add/Convert/Properties/Styles/customize Edge]:

Command: RAILING
Railing [Add/Convert/PRoperties/Styles/POsts]:

Note: for metric values below, I have used parentheses **( )** after most Imperial units. Those parenthesis without the "mm" in them have been stated that way to avoid confusion when a user types in these values - since AutoCAD does not accept "mm". You will see values like (200) and (200mm) and they are meant to reflect the same numerical value.

2 Loading Stair and Railing Styles

Opening Stair and Railing Style templates in the Style Manager

Alt. Menu **Design> Stairs> Stair Styles...**

Design> Railings> Railing Styles...

Keyboard **StairStyle**

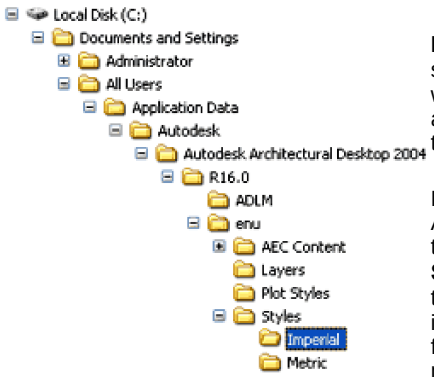
RailingStyle

Links Stair Styles - for how to create a Stair Style

Railing Styles - for how to create a Railing Style

Copying Wall Styles in the Style Manager - for more information on how to copy Styles from the Style Manager

ADT comes with a short list of predefined **Stair Styles** but a fairly extensive list of predefined Railing Styles that you can only access through the Style Manager. If you do a lot of work with Stairs and Railings, you may want to assemble a list of predefined Styles in the Content Browser and/or as a **Palette** where you can preset the Defaults.

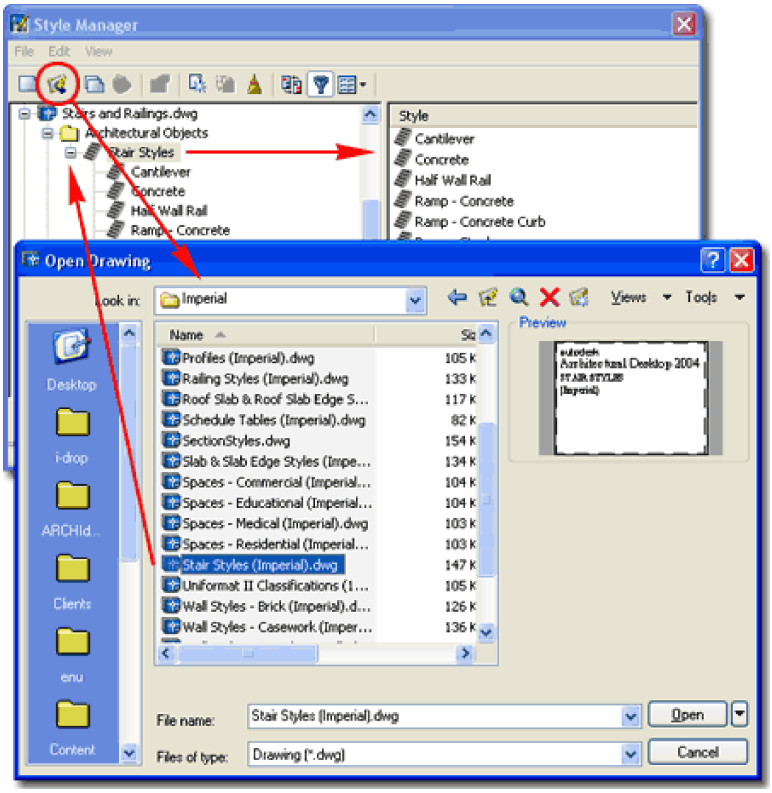


Both the **Imperial** and **Metric** folders contain similar **Styles** folders within which you will find one Stair and one Railing Style template drawing file.

For local installations of ADT, you are likely to find the **Imperial** or **Metric Stair and Railing Styles** in the **Styles Folder** as illustrated to the left. The full path to this location may vary but typically it is as illustrated. On a Network based installation of ADT, these Styles should be on a captured drive (like "G:\offices standards") or similar location with a folder name that indicates Styles. Consult your CAD or IT manager if you cannot locate the Styles Folder.

Stair Styles (Imperial).dwg
Stair Styles (Metric).dwg

Railing Styles (Imperial).dwg
Railing Styles (Metric).



Illustrated above, I show how you use the **Style Manager**, filtered for **Stair Styles**, to **Open** o the Stair Style template file from ADT's **Styles folder**. The process is much like Opening a drawing for editing.

3 Adding Stairs

Add Stairs Properties Palette

Menu **Design>Stairs>Add Stairs...**

Keyboard **StairAdd**

When **adding Stairs**, the **Properties Palette** offers an extensive list of options and features that can be a bit overwhelming at first glance. Some of the options will change, lock or introduce other options and some are tied to the current Stair Style as set in the Style drop-down list. The **Straight Shape** is a good place to start. Below is a list of the more common options; look to the specific **Stair Shapes** for more options.

GENERAL

Style - a drop-down list offering a list of currently loaded Stair Styles. Type StairStyle or use the Content Browser to load other Styles. Since creating Stair Styles can be a bit tricky, I recommend that you load the default Styles and use them as a place to start from. Many of these Styles can be modified to produce other results in less time than it takes to create new ones from scratch.

Shape - a drop-down list offering four choices: **U-shaped**, **Multi-landing**, **Spiral** and **Straight**. U-shaped and Multi-Landing Shapes provide the option for yet another Style called a Stair Winder Style when combined with 1/2 or 1/4 Turn Types (not illustrated).

Vertical Orientation - a drop-down list offering two choices: " **Up**" or "**Down**". Stairs drawn Down will drop below the current plane of reference and the Display Properties will interpret "Up" and "Down" Display Components accordingly (which is opposite of the "Up" Stairs). Spanning Multiple Floors is a separate subject that is not necessarily resolved by drawing Stairs "Up" or "Down". Typically I draw all Stairs as "Up".

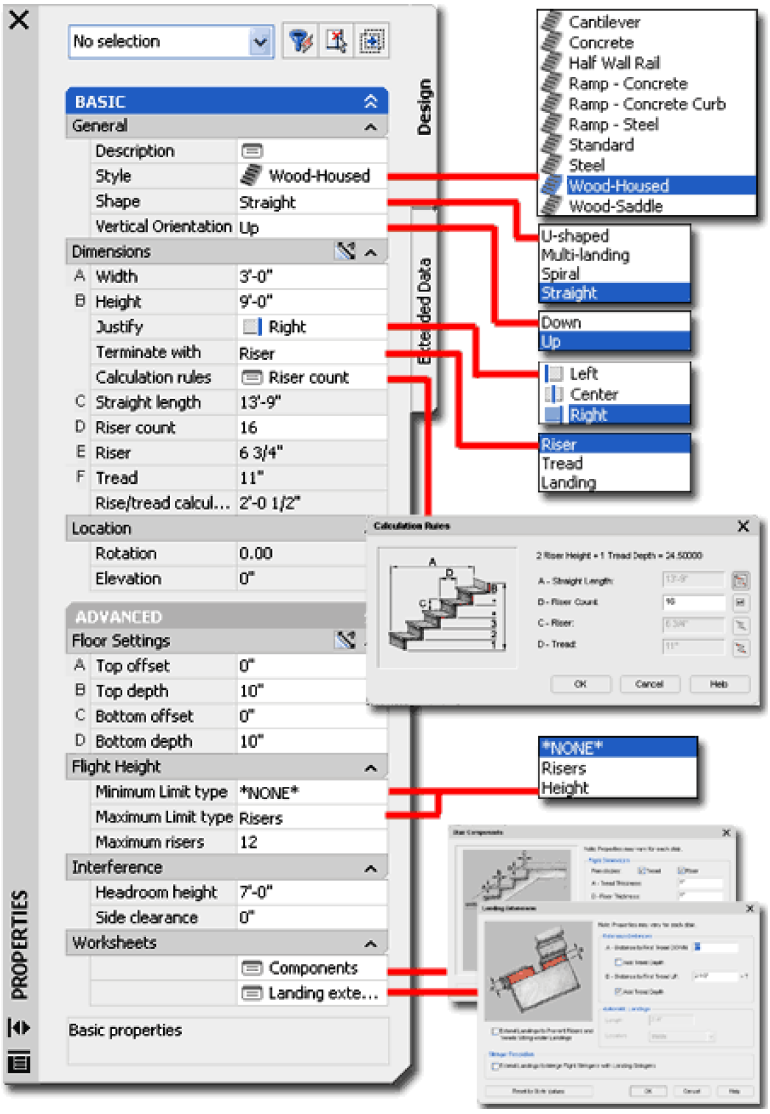
DIMENSIONS

Width - a value field where you specify the full width, outside edge to outside edge, of your Stairs.

Height - a value field where you specify the full height for your stairs. In the default template files, included with ADT, this measurement is from **Finished Floor to Finished Floor** but you can change this default to a measurement from " **Rough Floor to Floor** " - see **AEC Object Settings tab** of the **Options dialog box**. The difference between these two settings is how Top and Bottom Floor Offsets are interpreted by the Height Dimension. If you use Rough Floor to Rough Floor, the Height will always display as the original specification and will not display the difference set by Floor Offset Values. For the Finished floor to Finished Floor, setting, Floor Offsets affect display of the Stair Height. Typically I use the Finished Floor to Finished Floor option because ADT just doesn't offer enough general options to get to the detail level of sub-floors, bottom plates and so forth; Slabs, for example only have one component for the thickness.

Justify - a drop-down list offering three choices: Left, Center and Right. Typically I find that drawing stairs from an edge using Right or Left so that I can run along the edge of a Wall is easier than using the Center Justification. On U-Shaped Stairs, using a Right or Left Justification can prove to be very beneficial in the creation of this type of Stair Shape (see comments for U-Shaped Stairs below).

Terminate with - a drop-down list offering three choices: **Riser**, **Tread** and **Landing**. Using the Riser option for the termination of Stairs tends to be the most common solution even if you don't want to show a Riser on the last step (I often cover it with my Floor Slabs). This allows you to specify the true Floor-to-floor height and take advantage of the Calculator tools within the Stair Styles. Landing settings are set on the Stair Style's Properties dialog box under the Landing Extensions tab. This option produces different results on different Stair Shapes; on U-shaped Stairs, for example, the termination landing will be a full length landing matching the middle landing.



FLIGHT HEIGHT

Minimum Limit type - a drop-down list offering three choices: * **NONE***, **Risers** and **Height**. For Risers, you will be able to specify a Riser Limit in the value field below. For Height, you will be able to specify a Height Limit in the value field below.You can use these options as additional design rules on a Stair-by-Stair basis. This Limit option is a little weird and I generally prefer to leave it set to *NONE*. The Riser Limit, for example, does not limit the first flight on Multi-landing Stairs but only the flights after the first.

Maximum Limit type - a drop-down list offering three choices:* **NONE***, **Risers** and **Height.** This option is similar to the Minimum Limit type - see comments above. When used with Straight Stairs, for example, it will force landings at points where the Maximum height has been reached and can thus be a terrific option for designing code compliant stairs that need to cover excessive heights (this often occurs on exterior stair designs). Landing Lengths are set on the Stair Style's Properties dialog box.

INTERFERENCE

Headroom height - a value field where you can specify the head clearance you want above your stair treads and landings. The primary function of this value is for cutting or Adding Holes in Slabs. If you have a Slab above a Stair, you can use the **SlabHole** command to Select the Stair Object and cut a hole wherever the Headroom height requires it for proper clearance. The **Model Display Representation for Stairs** offers the **Clearance Display Component**, Off by default, that you can turn On to see the Headroom as a 3 dimensional mass.

Side Clearance - a value field where you can specify the headroom clearance for the sides of your stairs. Just as with the Headroom height, this is an option well suited for use with the **SlabHole** command to create a clearance hole in a floor slab around a Stair Object. This value affects both sides of a

Calculation Rules - see comments below.

LOCATION
Rotation and Elevation - value fields only available when Modifying Stairs.

FLOOR SETTINGS
See the discussion for Height and how the Stair Settings section of the Options dialog can affect how these values are interpreted.
Top offset - a value field in which you can specify a positive number for a height above the actual specified Height or a negative number below the actual specified Height. This type of option is usually used to compensate for finished floor materials.

Top depth - *Note: The Top and Bottom Depth settings currently have no effect on the stair or stringers. In addition, the top offset has no visible effect on the stair. Bottom offset extends or truncates any attached stringers. Both offset values affect the rough floor-to-floor height, if it is displayed. "* - quoted from the Autodesk® Architectural Desktop 2004 User's Guide.

Bottom offset - a value field in which you can specify a positive number for a height above the stair origin as originally drawn or a negative number below the original origin. The origin of a Stair is usually at Z=0 of the World UCS icon. Negative numbers on this option may produce unexpected results relative to Stringers and other design features so be careful when working with negative number for this value field. This type of option is usually used to compensate for finished floor materials.

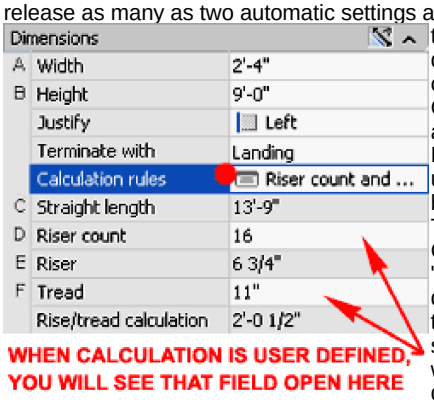
Bottom depth - see comments for Top Depth.

hole in a floor slab around a Stair Object. This value affects both sides of a Stair equally. See comments for Headroom height.

WORKSHEETS
Under the Worksheets section of the Properties Palette, you should find that there are two dialog box options: **Components** and **Landing Extensions**. These are actually tabs of the current Stair Style's Properties dialog box that have the option for unique settings per Stair Object; ranging from riser and tread dimensions to landing dimensions. To activate this "freedom", see the equivalent tabs on the current Stair Style's Properties dialog box and look for the "**Allow Each Stair to Vary**" checkbox option at the top. These dialog boxes are not set to be available for the default Stair Styles that come with ADT.

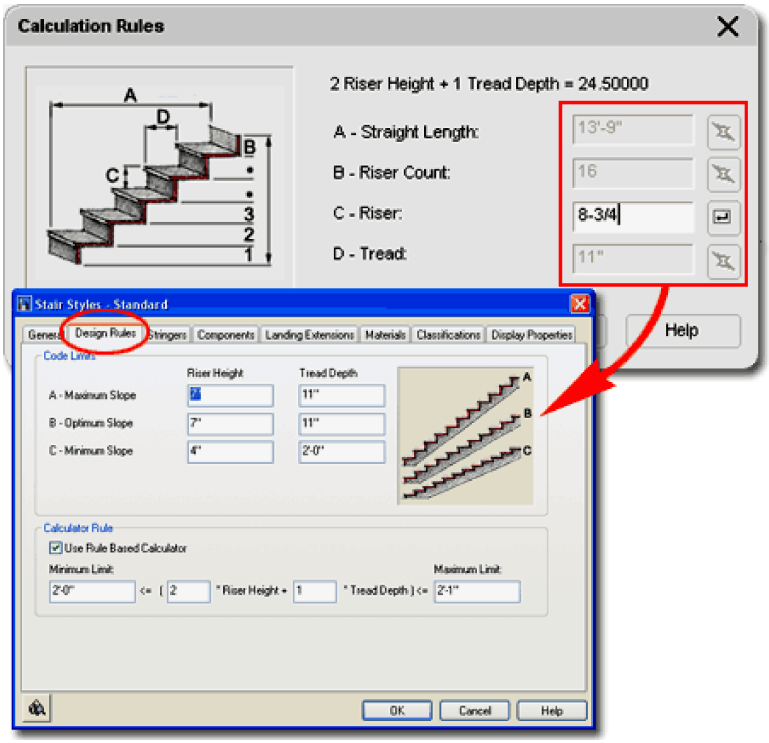
Calculation Rules dialog box

Calculation rules - picking on this option will activate the **Calculation Rules dialog box** illustrated to the right. The Calculation Rules are based on the current **Stair Style's Design Rules** settings but you can release as many as two automatic settings at a time and work with these settings in user defined mode. The changes you make on the Calculation Rules dialog are reflected on the Properties Palette where user-defined fields will now be free for input values. Though you can use the Calculation Rules dialog to "tweak" and fine-tune difficult stair designs, I find that leaving all of these settings as "Automatic" works best. You can quickly determine if the Calculation rules are all set to automatically calculate the four values by the fact that **C**, **D**, **E** and **F** value fields on the Properties Palette are gray and that the Calculation rules field reads " **Height**".



One good example of when to use this option is when you are drawing a Stair from an existing condition that you measured on-site. You may need to manually set a known Riser height or Tread depth based on those known values. If both come out incorrect no matter what you do, you will probably need to change the **Code Limits** on the **Design Rules tab** of the current Stair Style.

C or A - Straight Length - a way to change the full length for a flight of stairs that is similar to using Grips to change the length. When you release this value field, you can only release the Riser Count at the same time. Since changing this value often produces dialog alerts and even Defect Warnings, you may need to uncheck the " **Use Rule Based Calculator**" option on the current Stair Style's Design Rules tab in order to use this option more effectively.



D or B - Riser Count - a way to modify the number of Risers over the specified length. When you release this value field, you can release either Straight Length or Tread. If you specify a number of Risers that forces the Riser Height value above or below its limits (7" and 4" or 200mm and 140mm respectively, by default) you will get the "out of range" error message. To make this error message go away, either change the Upper Riser value limit on the Design Rules tab of the Stair Style, or specify an appropriate number of risers for the total height of your stairs.

E or C - Riser - a way to modify the height of the Risers over a flight of stairs. When you release this value field, you can release either Straight Length or Tread. See comments for Riser Count as they relate to working within the Code Rules range.

F or D - Tread - a way to modify the width of the Treads over a flight of stairs. When you release this value field, you can release either Riser Count or Riser. Tread Depth limits, like Riser Height limits are governed by the Design Rules tab of the current Stair Style; see comments above.

Convert to Stair

Menu **N.A.**

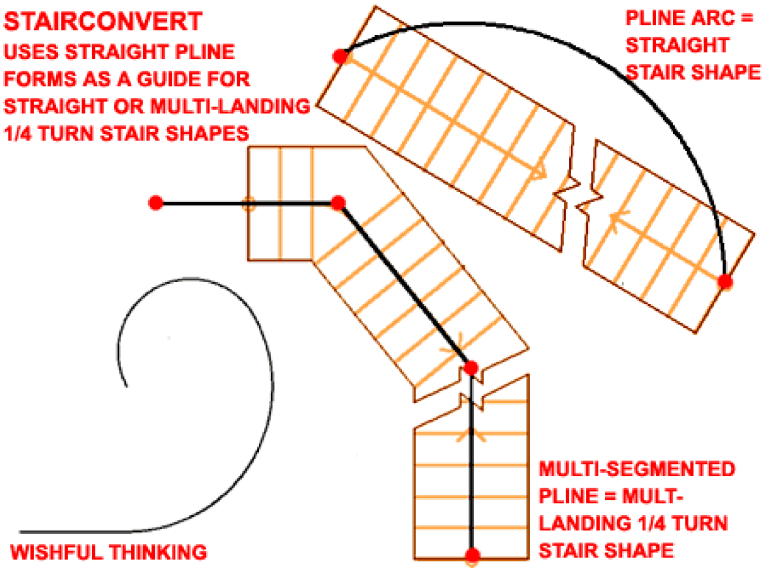
N.A.

Keyboard **StairConvert**

Another way to create Stairs is to use a command that has remained undocumented for quite some time now called **Convert to Stair**. The only way you can access this command is to type " **StairConvert**" on the command line. Once you have tried this command you may come to understand why this is the only way to access it.

In the illustration to the right I show some examples of how this command reads Polyline Objects and what it creates as a result. For multi-segmented Contiguous Polyline shapes, the result is usually a **Multi-Landing 1/4 Turn Stair Shape**. For single Polyline shapes, including Arcs, the result is usually a **Straight Stair Shape**. You cannot use this command to create cool spiral/winding stair designs.

For other Pline related options as they relate to Stair Shapes, see **Customize Edges** below.



4 Adding U-shaped Stairs

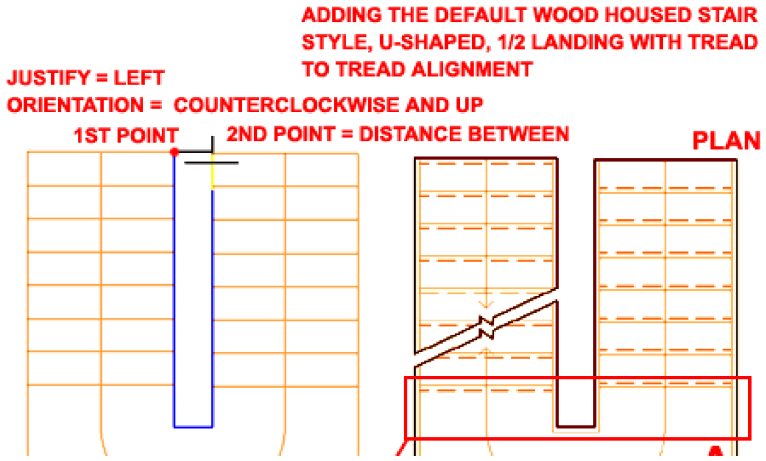
Add Stairs - U-shaped

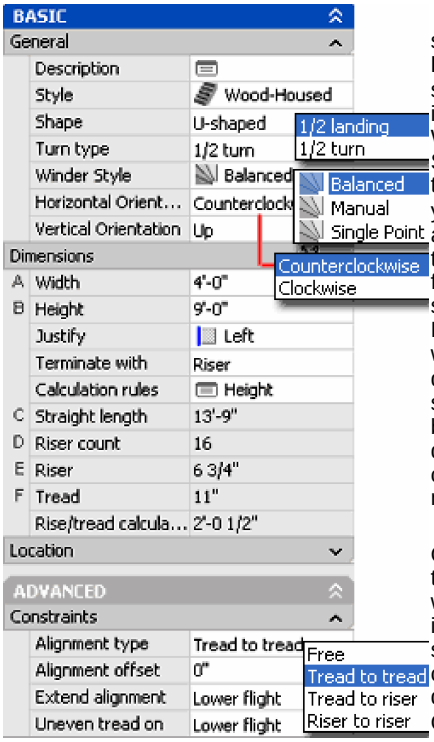
Alt. Menu **Design> Stairs> Add Stair...**

Keyboard **StairAdd**

Links Add Stairs Properties Palette - for more information on how other Palette settings can be used to create different results.

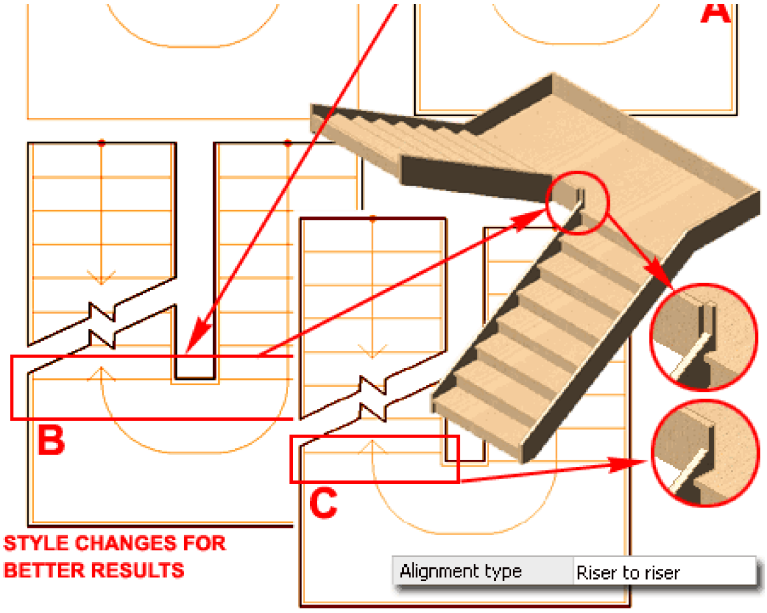
Adding the **U-shaped Stair Shape** is similar to adding most of the other stairs. For U-shaped Stairs you have two **Turn Type** options to choose from: **1/2 Landing** and **1/2 Turn**. You also get to choose between a **Clockwise** or **Counterclockwise** Horizontal Orientation.





Illustrated to the left I show a portion of the **Properties Palette** for the stairs created in the illustration above right. When adding U-shaped Stairs, it is helpful to set the **Justify** value to assist you in creating an appropriate gab between the up flight and the down flight. In the illustration I show that I am using the Left Justification combined with the **Counterclockwise** direction to allow me to specify the distance between the two flights directly rather than using center-to-center or right-to-right.

Once completed, I show the results of my Stair which has more graphical information than I care to show and the need for changes to the landing dimensions (see " **A**"). One way to change the graphical information is to choose another **Display Configuration**, like **Medium Detail**, or change the current **Display Representation**. For the Landing situation, I had to change the Stair Style's **Landing Extension** values in order to create the results that I show labeled as " **B**" where the Tread lines meet at the very edge of the Landing.



In the 3D View, I show that though using a **Tread to Tread Alignment Type** for this example Stair produced a plausible solution in Plan View, it did not do so in 3D. To create a more plausible solution for the 3D View, I show that I changed the Alignment Type to " **Riser to Riser**" (see illustration, left).

See below for more on Constraint options for U-shaped Stairs.

Creating "U-shaped", "1/2 Turn", Stairs

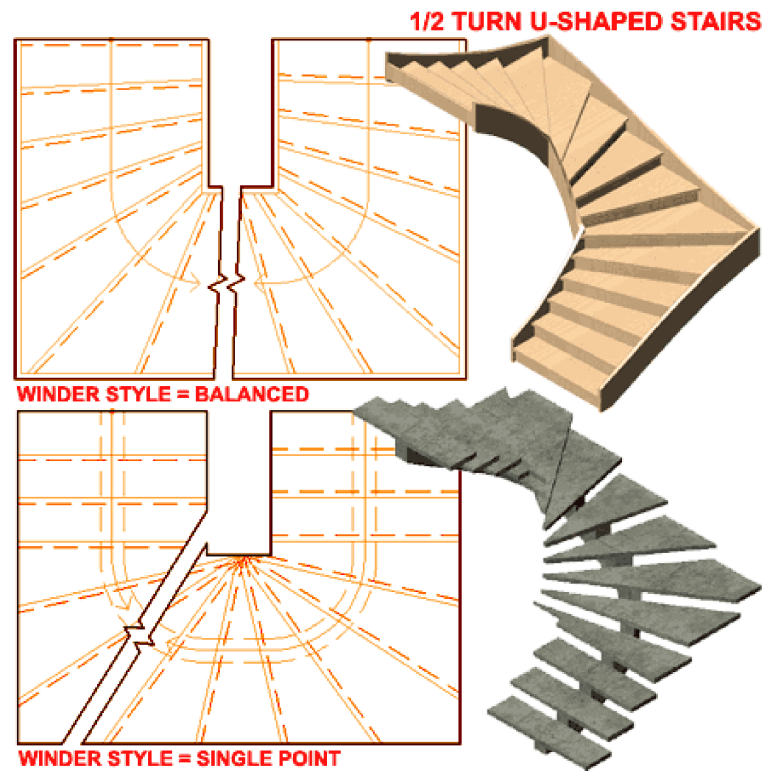
Links StairWinderStyle - see this section for more information on Winder Styles and results.

Illustrated to the right I show two examples of the **U-shaped 1/2 Turn Stair Shapes** using two different **Winder Styles**. In general, I do not find the 1/2 Turn Turn Type useful for any stairs existing or new that I come across. If you have a practical application for this type of Stair I'd like to hear about it just out of plain curiosity.

In the illustration to the upper right I show what happens when you use the default **Wood-Housed Style** and the default **Balanced Winder Style**. This Stair is basically ludicrous so I also show my efforts to make something more practical.

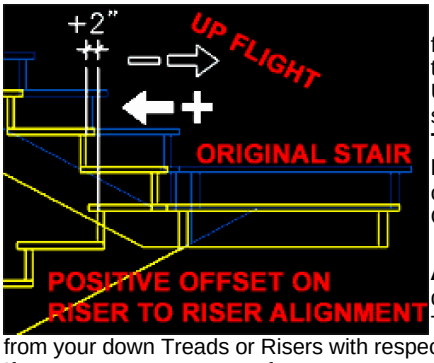
In the illustration to the lower right I show that I created a custom **Winder Style** using the **Single Poin** t Winder Type option. Since this combination of options produced nothing but Defect Warnings, I also changed the Stair Style to a Cantilever so there would not be any Stringer cleanup conflicts. Unlike the Balanced Winder Style, the Single Point left the side treads alone and only wound those around the landing as illustrated to the right.

When working with these types of Stairs, keep in mind that you have some extra Modification tools such as the **WinderTurnAdjust** command and the **Edit Turns** Grip-like Marker. Also, when working with stairs that tend to create Defect Warnings, try to remove Nosing Values, Landing Extensions and even Risers for better results.



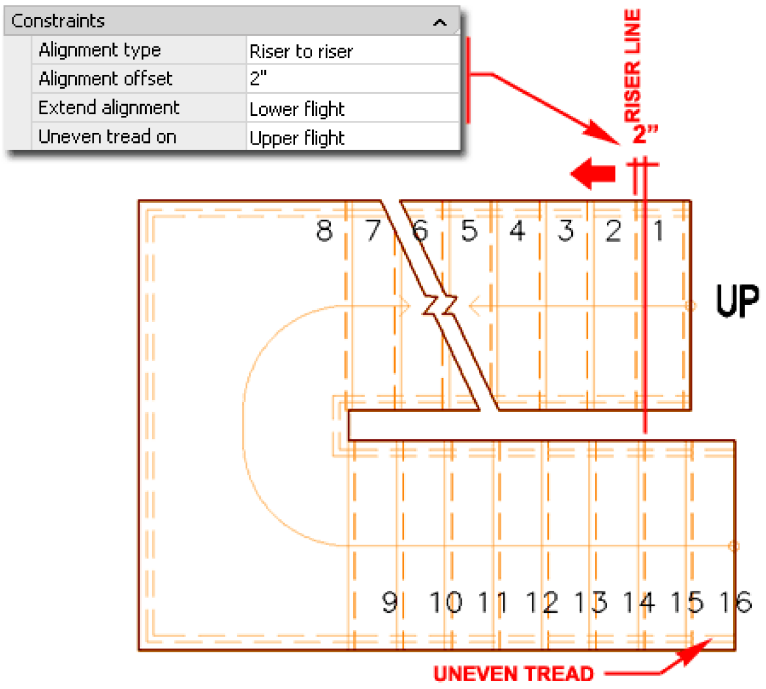
Stair Properties - Constraints

For **U-shaped Stairs** there are several **Constraint options** on the **Properties Palette** to assist in positioning the **Riser alignment**. Since you cannot use Grips to Stretch the Up or Down flights between the Landing, you will need to use the Constraints to adjust Riser positions and location of any uneven Riser count. Keep in mind that U-shaped stairs only have a limited amount of flexibility in Riser Position and if you desire a more staggered relationship between the Up and Down Risers, you may need to use a Multi-Landing Stair Shape or even two separate Stair Shapes that are Anchored to a Landing. For control over Riser position directly related to the Landing, see the **Landing Extension** options on the Stair Style's dialog box.



Alignment - There are four different ways to align the steps on one side of a U-shaped stair to the other side: **Free**, **Tread to Tread**, **Tread to Riser** and **Riser to Riser.** The Free option does not have an Offset value.

Alignment Offset - the distance you want your **up** Treads or Risers to vary from your down Treads or Risers with respect to the Alignment option. If you use **Tread to Tread** for an **alignment**, for example, and use 0" for the Offset value, then the Stairs should match on both sides of a U-shape. Use a positive number and the up flight moves forward of the down flight. Use a negative offset and the up flight moves backwards towards the landing with respect to the down flight. Be aware that as you move the up flight back and forth, the down flight will compensate with the gain or loss of an additional riser and the landing may also be adjusted to compensate for this change. Also, keep in mind that the down flight (down from the landing to the floor) remains static with respect to the insertion point while the top riser of the up flight will move freely.



Extend Alignment - this drop-down list offers two choices: **Lower Flight** and **Upper Flight**. Choosing one sets the flight affected by the alignment choices you make for Alignment Type and Alignment Offset; i.e., you can affect the Up Flight or the Down Flight relative to the Landing.

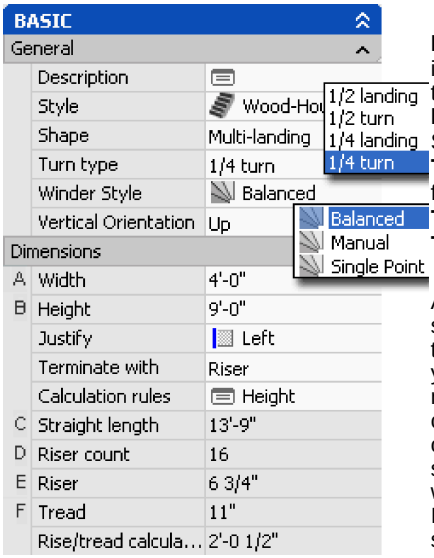
Uneven Tread On - this drop-down list offers two choices: **Lower Flight** and **Upper Flight**. Choosing one for Stairs that are unevenly distributed between the landing will set the flight that gets the extra tread. To see and understand the effects of this option it helps to set the Stair to " **Terminate With**" a "**Tread**".

Add Stairs Properties Palette - Multi-landing

Alt. Menu **Design> Stairs> Add Stair...**

Keyboard **StairAdd**

Links Add Stairs Properties Palette - for more information on how other Palette settings can be used to create different results.



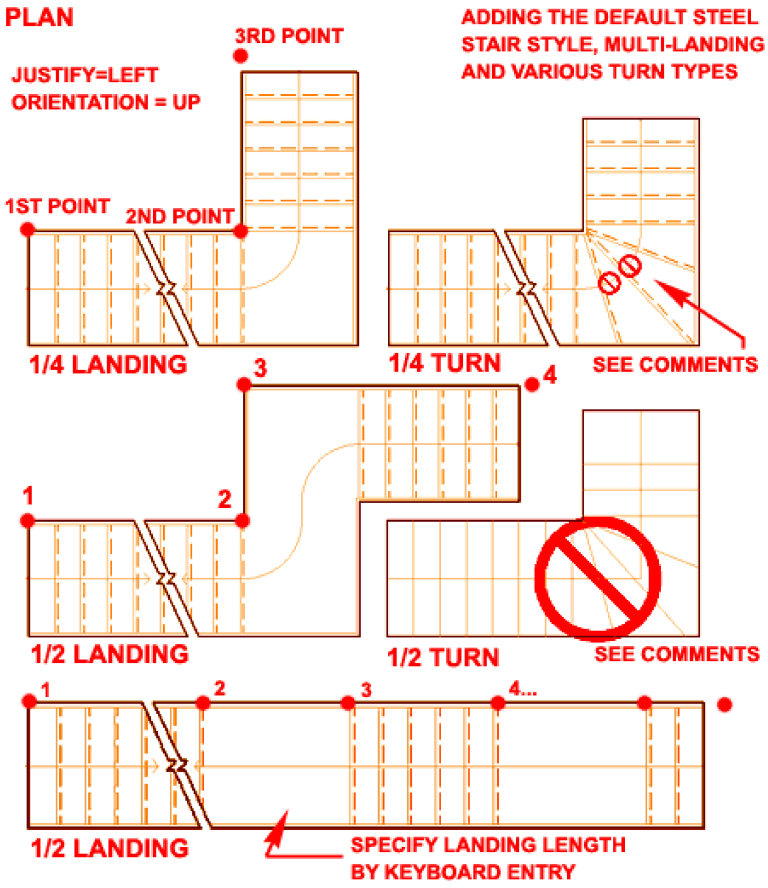
Adding the **Multi-landing Stair Shape** is similar to adding most of the other stairs. For **Multi-landing** Stair Shapes you have 4 **Turn Type** options to choose from: **1/4 Landing**, **1/4 Turn**, **1/2 Landing** and **1/2 Turn**.

As you create Multi-landing stairs, pay close attention to the graphic display. If you pick beyond the rectangle and stair riser count, you won't have the opportunity to shape the stair with landings; i.e., you will just get a straight run. If you pick somewhere short of the stair's full run, you should notice that the Riser Count locks while you are able to draw the landing length and direction. Once you have picked a second point to form the landing, the Stair Riser count should begin to count again as you see risers form on the screen. Continue this procedure until you have run out of risers for the given height.

The **1/4 Turn** and **1/2 Turn** Multi-landing Stairs do not have landings at the bend point but use a Winder Style instead to determine how the risers "turn" at the corner. When you specify 1/4 Turn or 1/2 Turn as the Turn Type, you should notice the option to select one or more **Winder Styles**. For these Stairs, simply pick a starting point, the bend or turn point and a final point out beyond the end of the full run.

The **1/4 Turn Multi-landing Stair Shape** will often produce one or more **Defect Warnings** due to problems with Stringer conflicts or Riser/Tread conflicts. See comments below for examples of Stringer changes. For Riser/Tread problems, I have found that reducing the Nosing Length to zero often resolves such conflicts.

The **1/2 Turn Multi-landing Stair Shape** appears to be a defective design option because I have yet to get this combination to produce anything but the result illustrated to the right (Defect Warning).



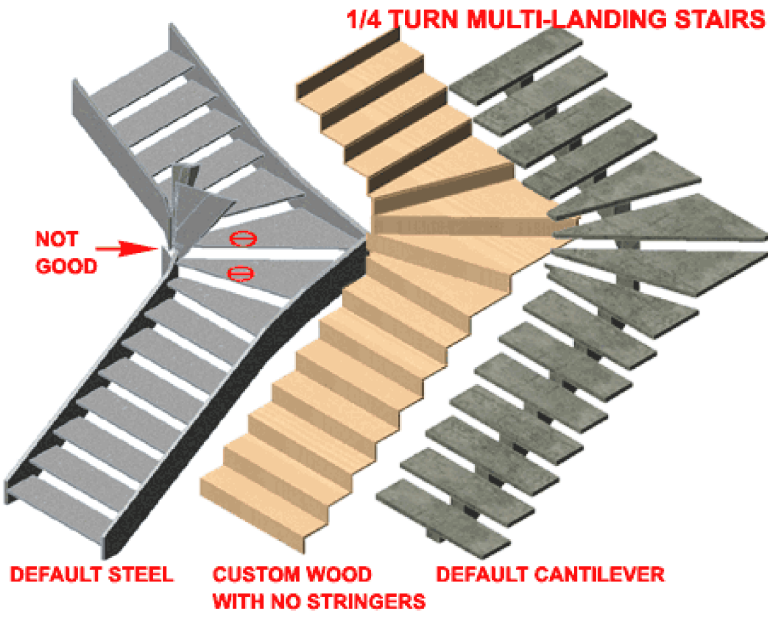
Note:
Remember that you can always specify a length by typing it on the command line. So, instead of picking a point in space for a landing, you can type 3' (914) on the command line and create a landing that is exactly 3'-0" (914) long.

Creating "Multi-landing", "1/4 Turn", Stairs

Illustrated to the right I show some three example **1/4 Turn Multi-landing Stair Shapes** and how some Style features may cause Defect Warnings and incorrect 3D results such as that illustrated by the Default Steel Stair Style.

Though you can work with **Winder Styles**, **Edit Turns** and even control the riser numbers at corners, these tools may not eliminate problematic results.

Illustrated to the right I show how a custom Wood Stair Style, that has been simplified by eliminating all Stringers, produces no Defect Warnings like its Steel counterpart. I also show how another Style, like the default Cantilever, may help to resolve such issues. Though these may not produce the right results in Sections, Elevations or 3D Views, it may be the only way to get the right results in Plans.



6 Adding Spiral Stairs

Add Stairs Properties Palette - Spiral

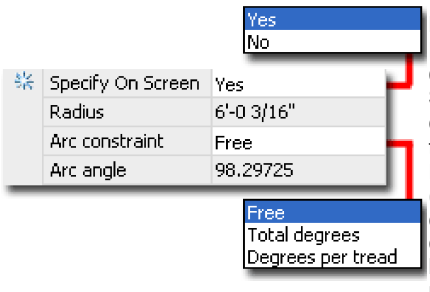
Alt. Menu **Design> Stairs> Add Stair...**

Keyboard **StairAdd**

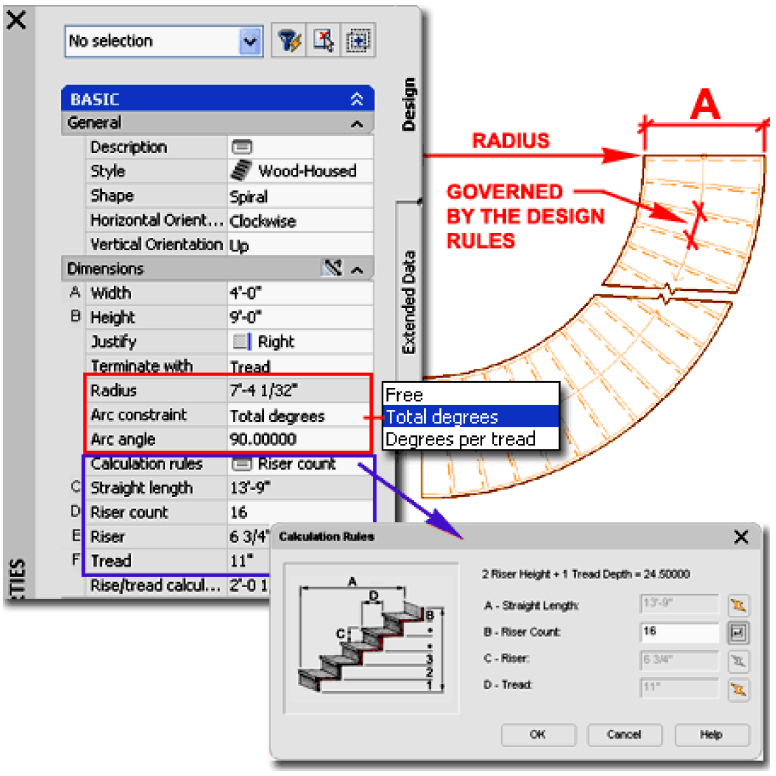
Links Add Stairs Properties Palette - for more information on how other Palette settings can be used to create different results.

Spiral Stair Shapes are relatively easy to draw provided you are working with large radii. The trouble starts when you start to pull the radius closer and closer to the center to create actual spirals instead of simple circular stairs. I will discuss the true spiral stair below and focus on the basic concepts here.

The Spiral Stair Shape offers unique settings that are all tied to the Arc Constraint options. This drop-down list offers three **Arc Constraint** options: **Free, Total Degrees** and **Degrees Per Tread**. When you select one of these constraints, you should notice that you will find different options as they relate to constraint type.



Arc Constraint:
Free - this option offers the Radius value field and a drop-down list for the **Specify On Screen** option: **Yes** / **No**. You can thus either specify the Radius by physical number (typed or picked on screen) or draw the stair by controlling the Radius based upon the second point picked on the screen (a nice option for those in design development phase).
Total Degrees - this option provides the **Arc angle** value field only where you must type in the total Arc angle for the full run of the Stair. This is a good option if you know that your stairs must be 90 degrees, for example.
Degrees Per Tread - this option provides the **Arc angle** value field only and you must type in the Angle for each Tread. This option is quite handy if you are attempting to input information from specifications such as those provided by Architectural Graphic



Radius - this value field is only available for the Free Arc Constraint option. The Radius value is measured from the center point of a Spiral Stair out the the Justification point, so a Center Justified Spiral Stair will be tighter than one Left Justified (assuming the Radius value is the same for both). Flipping Horizontal does not affect Left or Right Justification sides, so don't worry about that happening.

Standards.

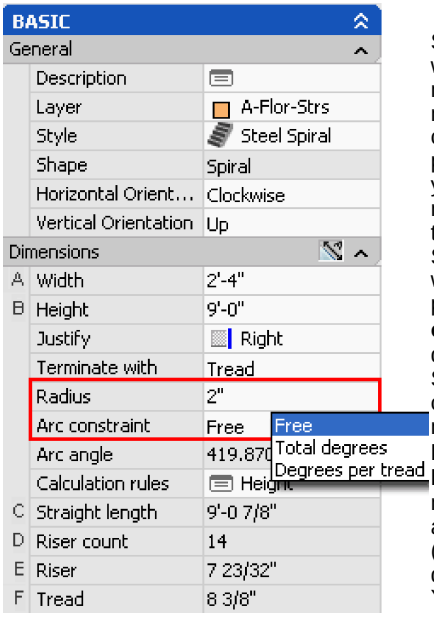
Arc Angle - only available for the **Total Degrees** and **Degrees Per Tread** Arc Constraints. See comments for Arc Constraints.

Illustrated to the right I show that in addition to using the Arc Constraint options, you can also work with the **Calculation Rules** to control how your Spiral Stairs are constructed. True Spiral Stairs, for example, often use more Risers than the Rules may utilize so you can increase the number manually. And finally, you will also need to consider the role of the **Design Rules** tab under the Stair Style which, if poorly configured for Spiral Stairs, can cause you a lot of frustration.

Justify - This option does not really play much of a role in the outcome of your Spiral Stair except when used in conjunction with the **Free Arc** Constraint option since that allows control over the Radius relative to the Justification Point.

Creating "Spiral" Stairs

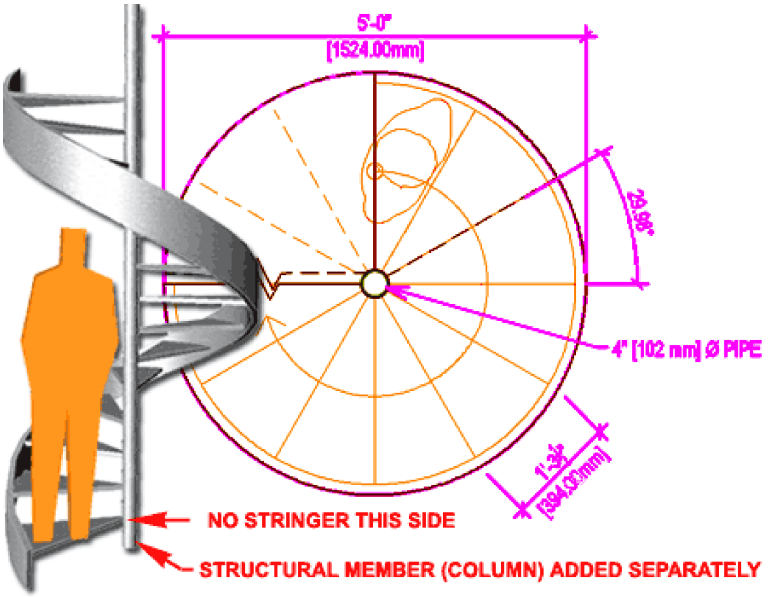
Links Part X - Appendix - to download this example stair and see what I did to create it.

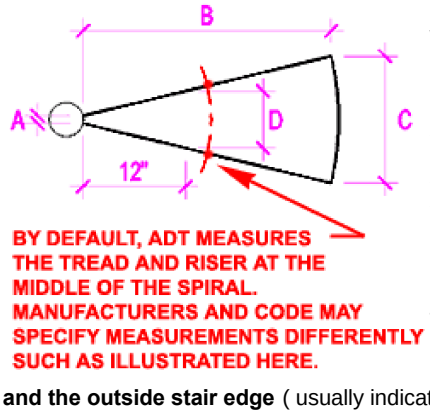


Creating true Spiral Stairs is something you would think this option makes easy based on the name but if you attempt to create those tightly wound pre-manufactured spirals, you'll soon realize that you really need to understand the broader aspect of Stair Styles. My first suggestion when working on this problem is to **create** a **custom Stair Style** designed specifically for Spiral Stairs. For this custom Stair Style, you will need to specify **Code Limits** under the **Design Rules tab** that meet manufacturer specifications and/or local building codes (usually narrower tread depths and taller risers). You will also need to create a single side **Stringer** designed under the **Stingers tab** for a Clockwise or CounterClockwise Horizontal Orientation since the center will be supported by a Column. For the example illustrated to the right, I reduced the Style to a bare minimum of essential settings: no Calculator Rule, no Nosing Length and if you intend to include a Landing, be sure to minimize those settings as well because all extra dimensional data adds to potential Defect Warning conditions.

The 60" [1524 mm] Diameter Steel Spiral Illustrated to the right comes as close to the standard dimensional criteria set forth in many architectural guidelines. It is not perfect but I have honestly not been able to get a perfect one yet. One of the primary problems is that each tread is centered on the column so having a wider tread at the column is really not possible without having a wider column. My personal attitude is that I'd like to get close but will rely on shop-drawings to refine the details (nonetheless, stair treads usually measure 22.5, 27 or 30 Degrees per tread and I only got 29.98 Degrees).

To create this type of result, confirm that you have a **custom Stair Style** and then set an appropriate **Width** (Radius of full Stair - Radius of Column). On the **Arc** Constraint drop-down list, set this option to **Free** so you can type in the **Radius** of the center Column (typically the diameter is 4" [394 mm]). If you look at the results of this input under **Arc Angle**, **Riser count**, **Riser** and **Tread**, you can determine how close you are to what you really want and if you want to fine tune the results, you can either use the **Calculation Rules dialog** or the other **Arc** Constraint options. If you attempt to set the exact **Degrees per tread**, for example, you should find that the Radius will also change and that's where this games starts. Eventually the game gets old.





Setting the **Design Rules** values for pre-manufactured Spiral Stairs can be a bit tricky since the Design Rules were not really designed to assist in the specifications for Spirals that are a bit different than most other stairs. Illustrated to the left I show some common dimensional reference points that standard guidelines take into consideration. the Red centerline indicates how ADT measures the Tread Depth: the **Arc Length** drawn at the **true midpoint between the inside stair edge and the outside stair edge** (usually indicated by the Graphics path).

7 Adding Straight Stairs

Add Stairs Properties Palette - Straight

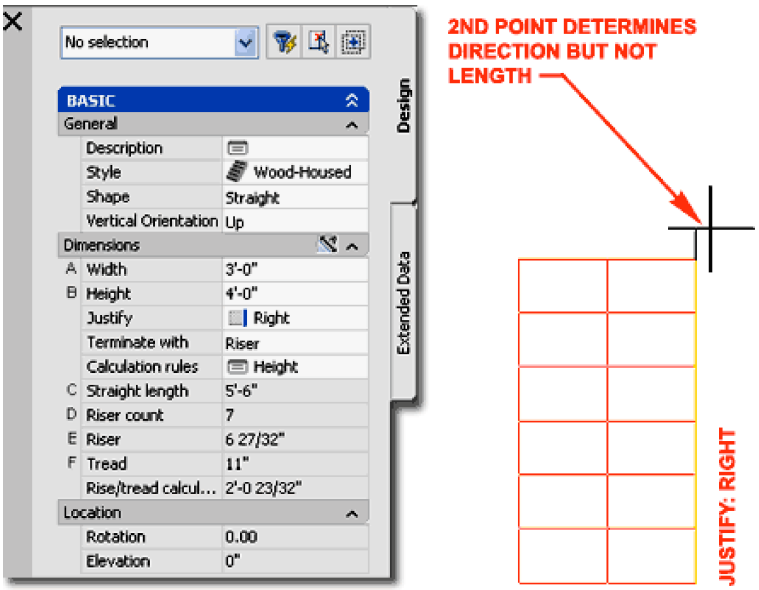
Alt. Menu **Design> Stairs> Add Stair...**

Keyboard **StairAdd**

Links [Add Stairs Properties Palette](#) - for more information on how other Palette settings can be used to create different results.

Straight Stair Shapes offer the least amount of options in this list of Shapes but it is still a fairly extensive list of options which includes Landings. Drawing a Straight Stair Shape is a bit easier than the other Shapes because the first and second points define start position and direction respectively. For the Direction, which may appear as a Length, you may pick close to the first point or far away from it with no difference in the outcome unless you have specified **Flight Height** limitations.

Using Flight Height settings you can make a Straight Stair act more like a Multi-Landing Shape. With a Maximum Riser Limit of four Risers, for example, a Landing will automatically occur after the fourth Riser in a Straight Run. The length of this automatic landing is controlled by the Landing Length setting on the **Landing Extensions tab** of the Stair Styles dialog box.

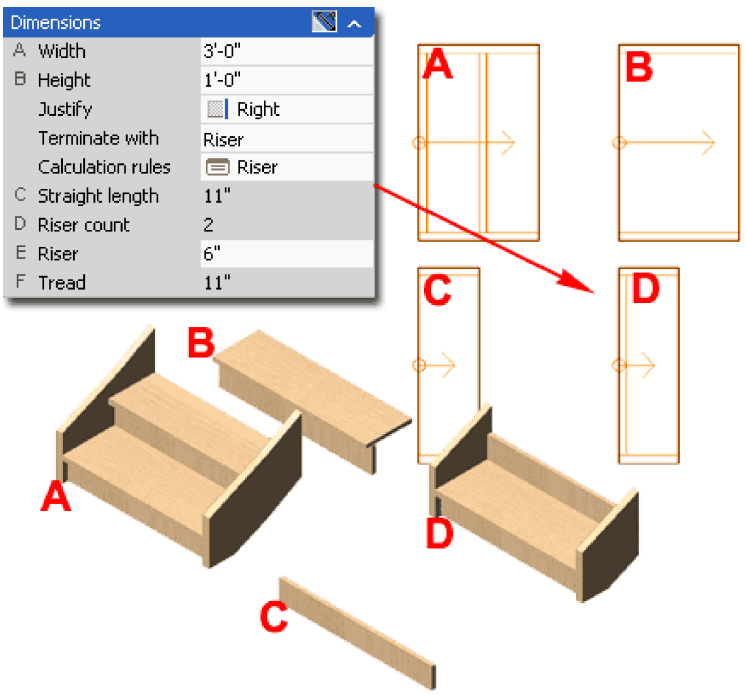


Creating "Straight" Stairs

Drawing the **Straight Stair Shape** is arguably the easiest stair to draw and you should not have any difficulty in getting this type of stair to display correctly for your projects. You may have to work on the Style to set Rise and Run rules or design related information but generally a Straight Run of Stairs should be straight forward (pun intended).

Having said that, however, in the illustration to the right I show the one scenario for Straight Stair Shapes that I continue to find problematic: the **single riser Straight Shape** . For Stair "**A**", I show that a two riser Straight Stair is easy to create but once you attempt to create the single riser Straight Stair you may end up with " **B**" or "**C**" where display problems may occur in one or more Views.

So far, the best and most consistent solution I have come up with for the single riser Straight Stair is illustrated as " **D**". For this solution, I limit the **Riser Count** to **2** and allow it to **Terminate with** a **Riser**. In Elevation View I then push the top Riser into my Floor Slab or equivalent Object so it disappears. It's not great but as you can see, "**B**", which looks correct in a 3D View, produces an erroneous result in Plan View.



8 Modifying Stairs

Modify Stair Properties Palette

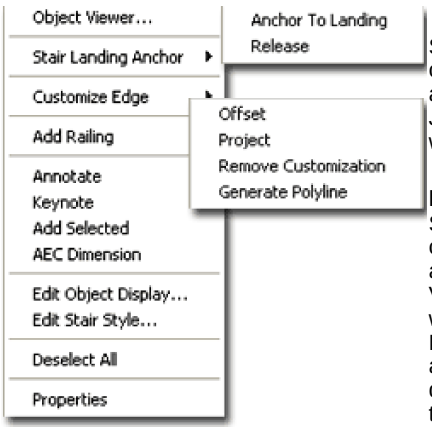
Alt. Menu **Design> Stairs> Stair Properties**

Keyboard **StairProps** or **-StairModify**

Mouse Double pick on Stair Object with left button

Links Add Stairs Properties Palette - for information on all of the various options on this Palette.

For **Modifying Stairs** you can use the **Properties Palette** which offers nearly all of the same options as those found when Adding Stairs. Once you have created a Stair in a drawing, you cannot change its **Shape** so you may be disappointed when you notice that this drop-down list is now gray. You should find, however, that all of the other options are available for you to modify and you can now use the Rotation, Elevation and Additional information options as well.



Width - The Width of a Stair adjusts relative to the current Justification setting and you can change the Justification for different width settings.

Height - The Height of a Stair adjusts relative to the current Vertical Orientation and you can change the Vertical Orientation while working with different Heights. Adding Height to a Down Stair will project it downward as if anchored at the top.

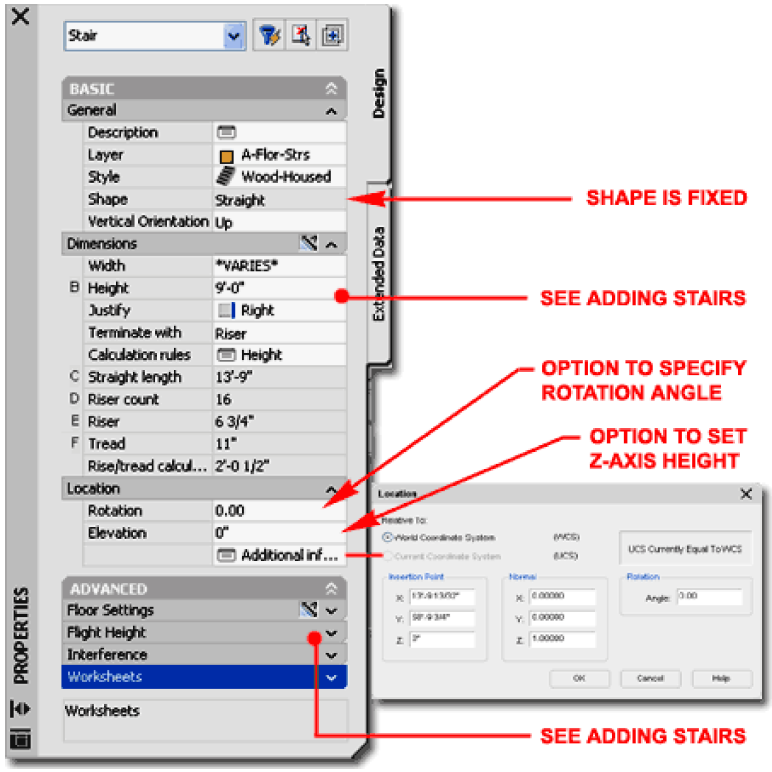
Justify - The Justification of a Stair is not visible on the Stair Object itself and does not appear to change a Stair when set to different values. However, it will affect the outcome of adjusting the Width value as stated above.

Rotation - use this value field to rotate the Stair much like using the Rotate command.

Elevation - use this value field to assign a Z-axis height for 3D work. This is similar to moving the object up or down in Elevation View. Since Stairs should relate correctly to other Objects such as Floor Slabs, be careful about moving them in Elevation since you may end up with erroneous results. I tend to follow simple rule that Z=0 is the top of my finished floor.

Additional information - use this dialog box to check for erroneous coordinate settings such as improper Z-axis values or to set unique position, scale or rotation values. This option is not available on Stairs that have been Anchored to Landings.

Anchor - this dialog box is only available on Stairs that have been Anchored to other Stairs with the **AnchorToStairLanding** tool - see below for more information on this subject.



For **Worksheets** and other options on this Palette, see the discussion under Adding Stairs for more information.

Illustrated to the left I show the object-specific pop-up menu and the options you have for a Stair Object. In addition to these options, you will find a great deal of flexibility for controlling the design of Stairs through the use of Grips.

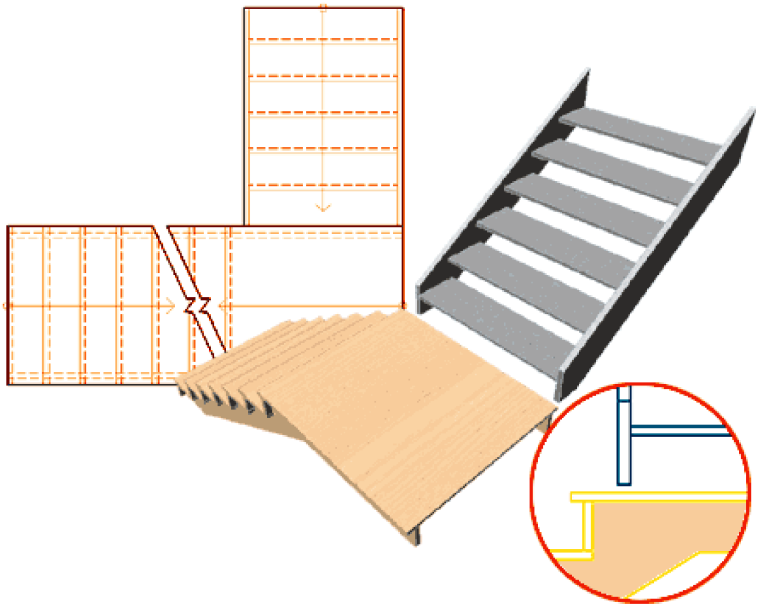
Anchor To Stair Landing

Menu	**N.A.**
Keyboard	**AnchorToStairLanding**
Mouse	Select Stair, right-click, select Stair Landing Anchor > and cascade to Anchor To Landing

The **AnchorToStairLanding** tool simply connects one Object, like a Mass Element, Wall or Stair, to a Stair Object. When used to Anchor one Stair to another, the affected Stair is moved into a default position in all three dimensions relative to the source Stair. It is interesting to note that neither stair actually needs a landing for this tool to work.

Illustrated to the right I show that I have used the AnchorToStairLanding tool to anchor an Open Steel Stair Style to a Wood Saddle Stair Style. In **Plan View** the graphic of this connection may appear correct but in other Views you may not find that the same can be said for this "anchoring". For some issues, you can use the Anchor dialog box to adjust the Anchored Object but for other issues I could not find any solutions anywhere.

In the illustration, lower right, I highlighted a slightly irritating problem that has to do with the fact that you don't have any "Position Along Landing Height (Z)" control on the Anchor dialog box. This means that you must accept the vertical position set by the Anchor and the Stair Style Components even if they don't make sense. I did not find that this was a problem with all of the Stairs but what I show in the illustration did occur on some combinations. Another odd phenomena that occurs with this tool is that your Stair may not always Anchor to the Stair Landing that you want it to. **Clearly, this routine was designed for Multi-Landing Stairs** and thus you may find it difficult to employ on Straight Stairs - and virtually impossible if you happen to have a Straight and a Multi-Landing in the same file.



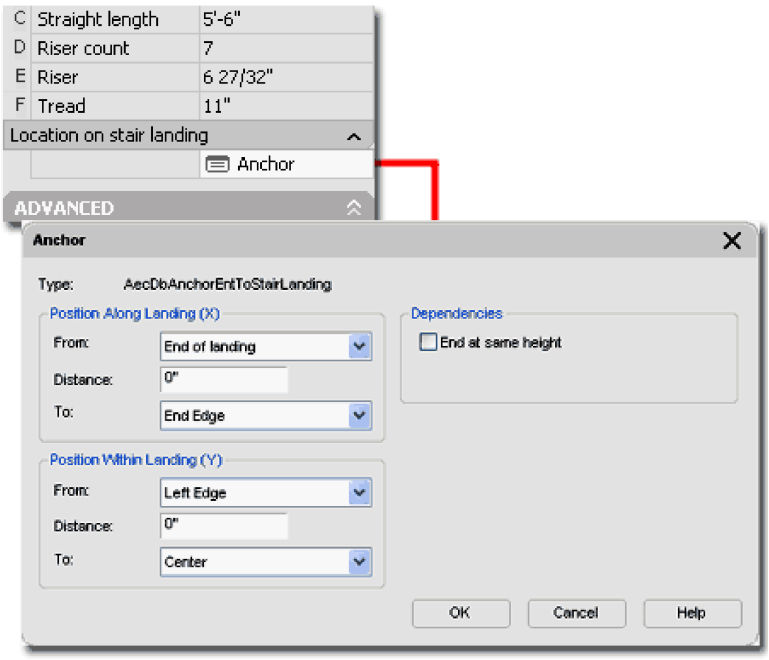
Anchor dialog

Once an Object such as a Stair has been Anchored to the Landing of a Stair, you will find that " **Location**" section of the **Properties Palette** will be replaced with an "Anchor" option as illustrated to the right.

The Anchor dialog box provides options for controlling where the Anchored Object is positioned in the absolute X and Y planes By working with the "**Position Along Landing (X)** " and the "**Position Within Landing (Y)** " options you can make some adjustments to the position of the Anchored Object in the absolute X-Y Plane only. Notice that there is no option for a Z-axis position.

End at same height - this checkbox option seems to have been designed for stairs that split in opposing directions, like a "Y" with a common landing in the middle; i.e., one stair is a Multi-Landing with a full height while the other is a Straight Shape Anchored to the lower Landing. With this Checkbox active, you can control both Stair Heights by working with the primary one.

Note:
There are some rather odd aspects of working with this Anchor system that I find annoying. This may have to do with my lack of knowledge about the use of this tool but you may find that the Position options don't produce the results you might imagine. For one, the Anchor does not really seem to read the Landing (supported the fact that a Landing isn't necessary for it to work). The other irritating aspect is the limitation of the Anchor; you can't Rotate the Anchored Object so if you want to continue a new stair style straight it cannot be achieved with this tool since it only allows a **Left** or **Right Edge** position. I really hate these types of limitations, don't you?

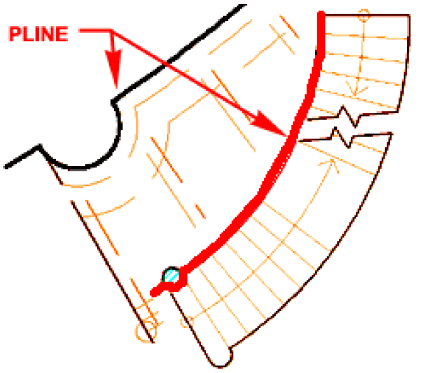


Customize Edges

Menu **N.A.**

Keyboard **StairCustomizeEdge**

Mouse Select Stair, right-click, select Customize Edge > and cascade to a desired option



SOMETIMES, TRACING THE ENTIRE EDGE IS THE ONLY WAY TO GET THE DESIRED RESULTS.

There are two primary tools to modify Stair Edges: **Offset** and **Project**. Offsetting Stair Edges is basically an obsolete tool since you can use Grip Points to achieve the same exact result with less effort but the Project option is fantastic.

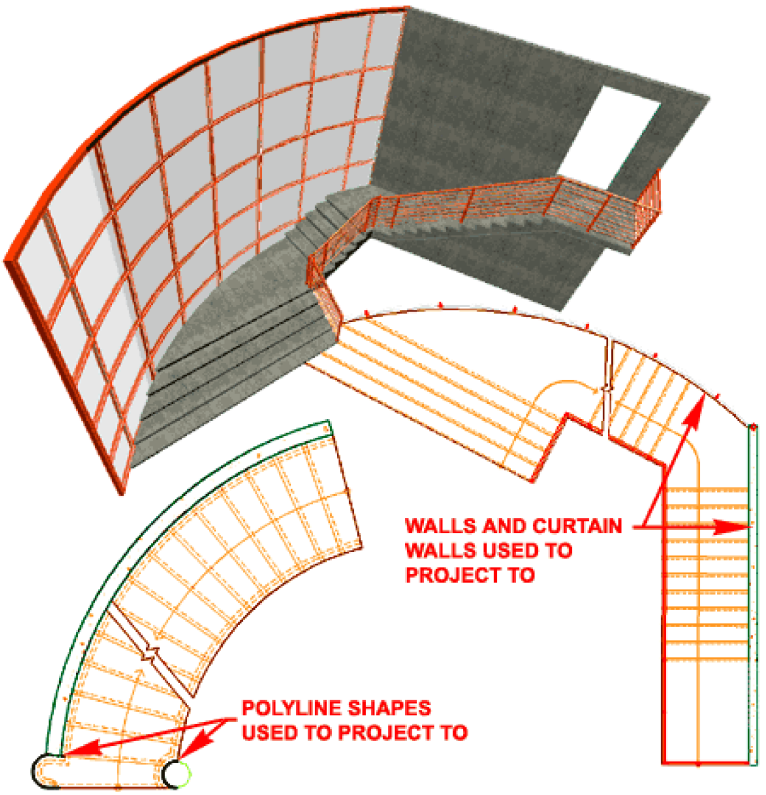
StairOffset - this command will ask that you "Select and edge of a stair" and then "Enter distance to offset ...". By typing a value on the command line you can increase or decrease the width of a Stair's Edge. See also the use of Grips for this task.

StairProject - this command will ask that you "Select an edge of a stair" and then "Select a Polyline or connected AEC objects to project to". In my own experience with this tool, I have found that using a Polyline and Walls have been the two primary objects that I have "projected" to on a regular basis but you can project to Columns, Mass Elements and many other ADT Objects.

StairRemoveCustomization - this command will remove custom edge modifications from the selected Stair Edge and restores the Stair to the original settings. One indication of the need for this tool or the success of having used it is that the Width field in the Properties Palette will stop reading "*VARIES*".

StairGeneratePolyline - this command will create a Polyline outline of the selected Stair Edge even if no customization has been performed.

Command: **_AecStairCustomizeEdge**
Customize Stair Edge [Offset/Project/Remove customization/Generate polyline]:



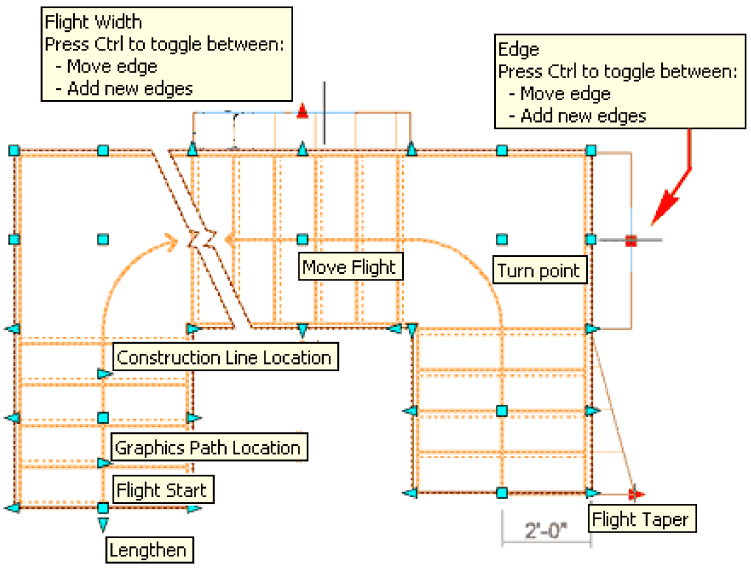
Note:
For best success with Projections, make sure the edge you are projecting your Stairs to extends beyond or across the stair itself. When having problems, particularly with Spiral Stair Style Edges, trace the entire edge with a Pline so your custom edge reads as one full edge rather than just the portion you want to modify - see illustration left.

Stair Grip Points

Stair Objects, unlike many other Objects in ADT, have the fewest **Grip Points** in 3D Views so **Plan View** is where you will find the greatest number of things you can change through the use of Grips.

Illustrated to the right I show a sample of the various Grip Points and options that you have for changing a Multi-Landing Stair Shape. Notice that some Grip Points offer options via the **Ctrl key** for **Moving** or **Adding a New Edge**. Be aware that not all Stair Shapes react the same way when working with specific Grip Points. U-shaped and Spiral Stair Shapes, for example, are more closely tied to their shape than Multi-Landing and Straight Shapes.

If you accidentally use a Grip Stretch on a Stair object and create a non-linear edge, you can always come back and undo such a mistake with the **Customize Edge**, **Remove customization** option - see discussion above.



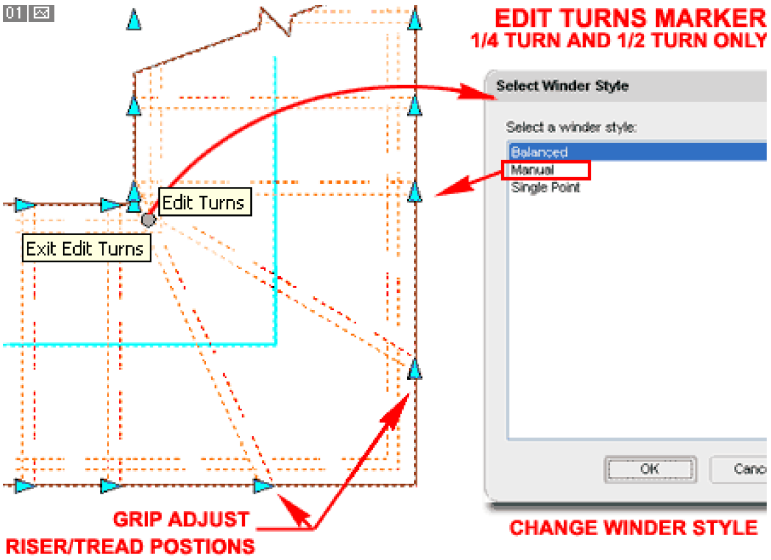
Edit Turns and Grip Points

Links [Stair Winder Properties](#) - see this section for more on Stair Winder Styles and how to create more options.

For **U-Shaped** and **Multi-landing Stair Shapes** using **1/4 or 1/2 Turn Types**, you will find a unique Grip-like maker that toggles between "**Edit Turns**" and "**Exit Edit Turns**". This marker is distinguishable by looking for a gray circle near the corner at a stair turn as illustrated to the right.

Two of the amazing features this icon offers is the ability to **Change** the **Turn Centerpoint** and/or **Change** the **Riser/Tread position**. Though you cannot change the Center Position and Riser/Tread positions at the same time, there are tricks to getting such results if you are careful with your Winder Style Selection. You can, for example, set a Stair to Single Point Winder Style to adjust Riser/Tread Positions and then change the Winder Style to Manual for a Centerpoint adjustment and then change the Winder Style back to Singlepoint. You can use a simple approach to achieving other results that are not possible under one particular Winder Style but be careful of the Balanced Winder Style since it can really throw a design off into the land of the unreal.

For stairs using the Balanced Winder Style, the Edit Turns marker will only activate the **Select Winder Style dialog** which is the same option as changing the Winder Style on the **Winder Style drop-down** list offered on the Properties Palette.



FOR BALANCED WINDER STYLES, THE EDIT TURN MARKER ACTIVATES THE SELECT WINDER STYLE DIALOG. FOR SINGLE POINT WINDER STYLES, THE EDIT TURNS MARKER PROVIDES A TURN CENTER GRIP. FOR MANUAL WINDER STYLES, THE EDIT RUNS MARKER PROVIDES GRIPS TO ADJUST THE RISER/TREAD POSITIONS AS ILLUSTRATED.

Winder Turn Adjust

Alt.Menu **Design> Stairs> Winder Turn Adjust**

Keyboard **WinderTurnAdjust**

Links [Stair Winder Styles](#) - for more information on Winder Styles and the "Adjust Winder Turn" checkbox.

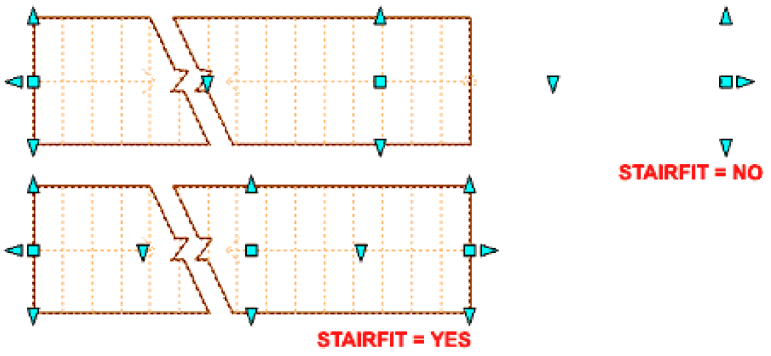
The **WinderTurnAdjust** command sounds straight forward when you read the command line prompt: "Select a Stair to adjust No. of Treads in Winder Turns:". However, when you attempt to use it you may find that it does not appear to do anything at all and you would be correct because this option only works when the **Winder Style** Settings have the " **Adjust Winder Turn**" checkbox checked.

Automatic Length

Alt.Menu **Design> Stairs> Automatic Length**

Keyboard **StairFit**

The **StairFit** command provides the option to Turn Off the default setting that automatically resets the Grip Points on Stairs as you make changes that affect the original Length. This is a rather odd option that you may never use. If you are experimenting with a fixed length and working with Landings at the end of your Stair Run, this might be useful since the original length will remain in place as you switch from Terminating with a Riser to Terminating with a Landing. **The actual Stair Length, as measured on the Properties Palette, is not affected by this toggle.**



9 Stair Style Properties

Style Manager - Stairs

Alt.Menu **Design> Stairs> Stairs Styles...**

Keyboard **StairStyle**

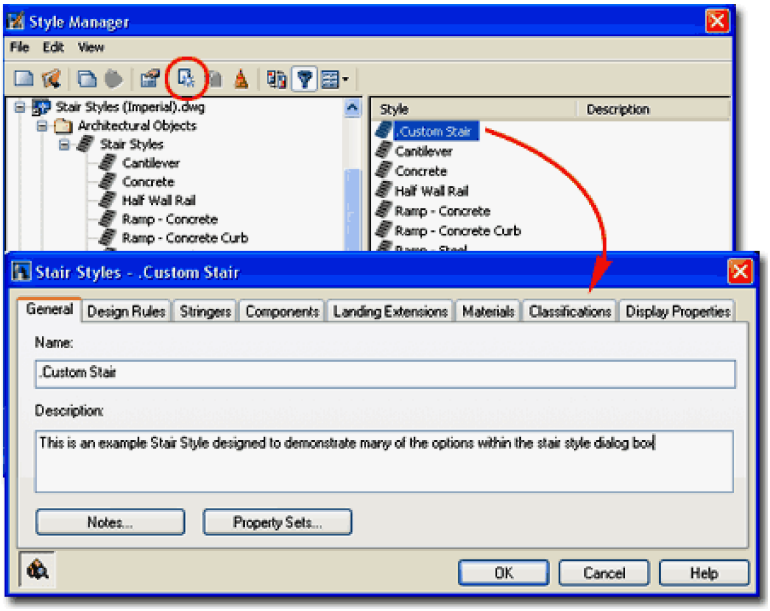
Mouse Select Stair, right-click, select Edit Stair Style

Links Object Style Management - for more information on Object Styles

Stair Winder Styles - for information on styles for Stairs with 1/4 and 1/2 Turn Types.

For Stair Styles, you can use the **Style Manager** to load, modify, delete and create new Stair Styles.

Though you can easily create New Stair Styles from Scratch using the **New button**, you may want to use the **Copy/Paste** technique instead because it is far easier to Modify Settings of an existing Object Style than it is to create one from Scratch. In some cases, you may even miss specific settings that can come back to haunt you much farther down the road on a project - things like Display Representations or Data for Schedules.

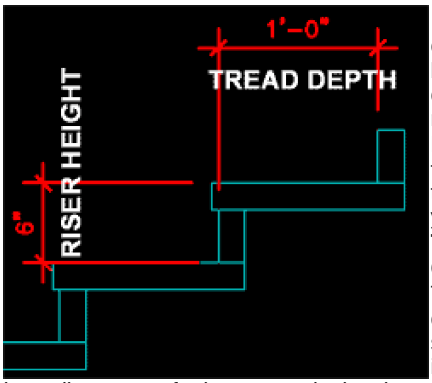


Illustrated above I show the process of creating a **New** Stair Slab Style that I have Named "**Custom Stair**". By **double-click**ing on this new style, I show that I have also activated the **Stair Styles Properties** dialog box where all of the custom settings can be made for the size, shape, rules and look of this particular object style.

The **General** tab provides access to the **Name** and **Description** fields for a Style; plus access to the attachment of **Notes** and Property Sets.

Stair Styles - Design Rules tab

Links Ramps - for an example of where you may want to define the slope as the same for all three settings.

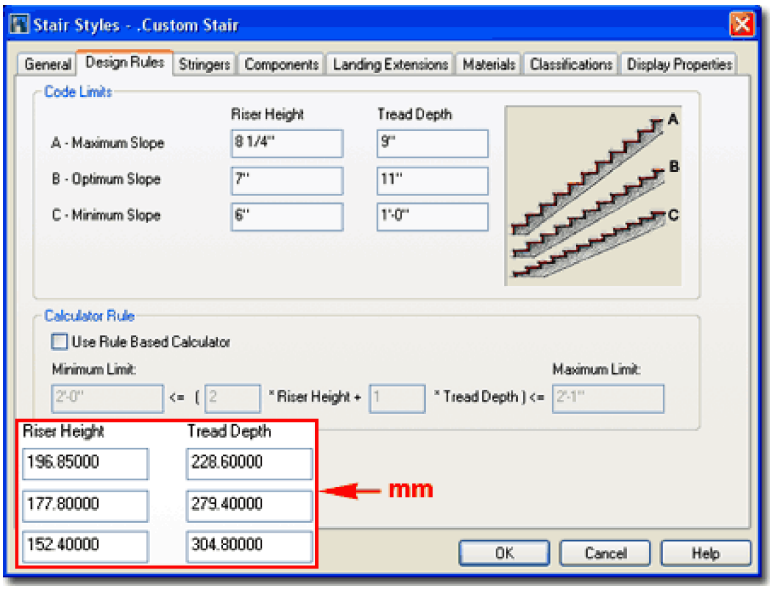


On the **Design Rules** tab of the **Stair Styles** dialog box, you will find two areas of stair slope or rise-and-run control. **Code Limits** is relatively straight forward in that you have three ranges to constrain your stair **Riser Height** and **Tread Depth**: **Maximum**, **Optimum** and **Minimum**. The **Calculator Rule** is optional and may not be as straight forward upon first inspection but its function is to allow you to further constrain the slope of your stairs and is thus a limit for your limits.

In trying to understand how to use all of these options, you may want to start by working without the Calculator Rule checked (I highly recommend this). Working without the Calculator Rule checked will allow you to set three or less ranges under the Code Limits and then test the results of those numbers without also having to consider what the Calculator Rule is doing. See comments in the next cell for more on this subject.

Code Limits:
When setting these values you may want to consider standard construction code rules as defined by BOCA, UBC and similar organizations. Riser Heights and Tread Depth values often vary between Residential and non-Residential architecture so you might use different Code Limits on Stairs for Residential work than those for Commercial work. Consequentially, you might consider creating a set of Stair Styles for different disciplines and label them accordingly.

A - Maximum Slope - the maximum slope would be defined by the **greatest** Riser Height you can use and the **shortest** Tread Depth you



C - Minimum Slope - the minimum slope would be defined by the **shortest** Riser Height and the **greatest** Tread Depth you can use. Keep in mind that the Riser Height and Tread Depth values you set here are not necessarily the low end of possible results. In other words A, B and C are all ranges that can be combined so you could end up with a Minimum Riser Height with a Maximum Tread Depth or any possible numbers in between.

Note:
Just because you can set a variety of Riser Height and Tread Depth values under the Code Limits does not necessarily mean that you should. You can limit the possible outcomes by using the same Riser Height and Tread Depth for more than one Slope and even use the same pair of numbers for all three. If you do set all three Slopes to the same value pairs, like 6" (152 mm) and 12" (305 mm) for example, your stairs will only work if you specify a Height devisable by 12" (305 mm). That's a bit extreme but interesting to know since you may want to employ tighter constraints than those that come with the default Stair Styles.

can use.

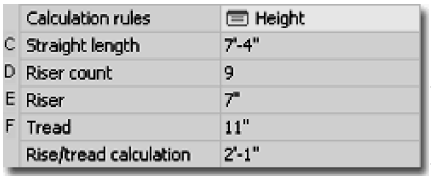
B - Optimum Slope - the optimum slope should be set to what you would like in a best case scenario.

Stair Styles - Design Rules tab - Calculator Rules

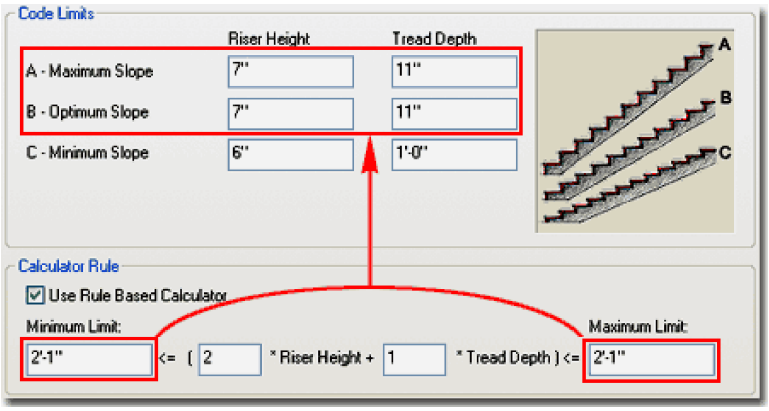
In the discussion above we looked at the basic Code Limits which allow you to provide three ranges for the Slope of your Stairs. In reality you typically only need two ranges for the highest and the lowest and that is why you find that most of the default Stair Styles use the same value pairs for the Maximum Slope and the Optimum Slope. Having the Optimum Slope can prove rather useful in difficult residential design, however, where this point is hit if possible while allowing you tremendous freedom to adjust the default results via the **Calculation Rules dialog** on the Properties Palette. One problem with straight ranges is that sometimes two results are possible within the same range and you may prefer one over the other. To set rules for the Code Limits, you can employ an even more restrictive tool: the **Calculator Rule**.

Calculator Rule:
Use Rule Based Calculator - check this box to use the default values or set your own limit values. In the United States, the Uniform Building Code (UBC) provides a formula for the optimum Stair Slope as 2R+T= 25" (636mm) which is usually achieved by using a 7" (178mm) Riser Height and an 11" (280mm) Tread Depth.

Minimum Limit <= [(**N * Riser Height**)+ (**M * Tread Depth**)] <= **Maximum Limit**
In this formula, you can use just about any number positive or negative for the Limits and any whole positive number for N and M but despite the freedom to input these numbers, you may not be creating a formula that makes sense. ADT will not provide you with an error message but you can use the Floating Viewer button to see if the result is producing a Stair Error. The Limits are based on the results of the equation as it applies to the Code Limit values you have specified; for example, 2*(**A - Maximum Slope** for the Riser Height) + 1*(**C - Minimum Slope** for the Tread Depth) could be used as the Maximum Limit.



Though the default Stair Styles have their Calculator Rule settings set as follows, "**2'-0"<=(2*Riser Height + 1*Tread Depth)<=2'-1**", you can tighten the formula to have the same Minimum and Maximum Limit and that will guarantee that you meet that exact criteria; such as 2'-1" or 25". In contrast, you can also expand the range

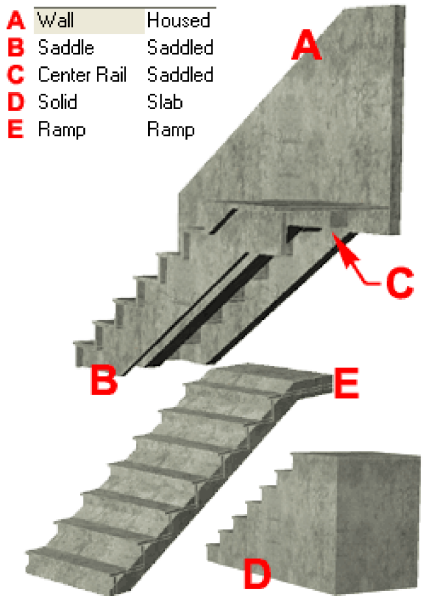


In the illustration above, I show an extreme case of restricting the Stairs to only follow one Rule as set by Maximum and Optimum Slope and the Calculator Rule. In this case, the Calculator rule simply guarantees that the Minimum Slope will never be used. If you draw Stairs with this configuration, all stairs whose Height is not divisible by 7" will result in Stairs with the Defect Warning marker. If you increase the Maximum Slope values, this Rule becomes a little more flexible while remaining fixed by the Calculation Rule of 25".

Illustrated to the left I show how on the **Properties Palette**, under the Dimensions section, you can read the results of your Stair Design Rules.

Note:
In your efforts to make sense of this information, keep in mind that you don't have to use the Calculator. If you set an acceptable Slope range using the Maximum, Optimum and Minimum values your Stairs should come out fine. I find that when I need to recreate existing building conditions, for example, on older buildings that the use of the Calculator prohibits my freedom to try different options while drawing the Stairs (see the Calculation Rules dialog on the Properties Palette). On the other hand, when designing new commercial spaces that must follow strict building code requirements, the Calculator can be quite beneficial in letting me know what is and is not possible.

Stair Styles - Stringers tab



On the **Stringers** tab of the **Stair Styles** dialog box, you will find four types of Stair Stringers (bases) that you can work with: **Saddled**, **Housed**, **Slab** and **Ramp**. Stringers are generally considered structural support members for the Risers and Treads but you can take some liberty with this idea to create things like Ramps.

Stringers - when you use the Add button, this column acquires a new row. You can name your Stringers as you see fit. This name will appear in the Materials Component list but not as a separate Display Component under the Display Properties list.

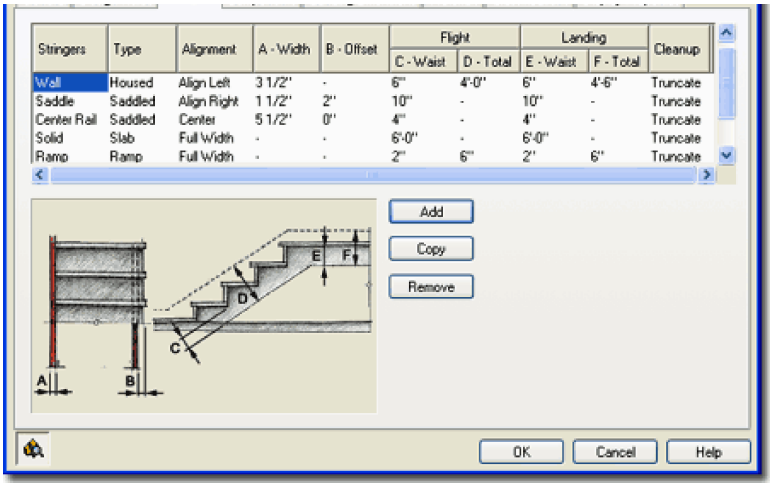
Type - for each Stringer row, you can use the Type drop-down list in the matching row cell to specify one of the four Stringer Types: **Saddled**, **Housed**, **Slab** or **Ramp.** **O**ther options are affected or limited by the choice made here.

Alignment - Saddled and Housed Stringer Types provide four Alignment options: **Left**, **Right**, **Center** and **Full Width**. Ramp and Slab Stringer Types are locked to Full Width.

A - Width - for Stringers that do not have an Alignment of "Full Width", this value controls the width of the stringer. Negative values are not allowed.

B - Offset - this option is only available for Stringers using the Saddled Type. Use Positive and Negative values to control the offset direction for Stringers Aligned to the Center.

C - Waist - this value field is available for all Stringer Types. See graphic on dialog box for explanation of what portion of a Stringer this setting controls. Negative values are not allowed. By using extremely large values for this option, you can force the stringer to height the floor to create a completely solid solution as illustrated above left (example "**D**"). For Ramp Stringer Types, you can use the Waist and the Offset to create a Ramp under regular Stairs for such solutions as stadium seating (example "**E**").



D - Total - this value field is not available for Saddled and Slab Stringer Types. Negative values are not allowed.

E - Waist - this value field is not available for Saddled and Slab Stringer Types. This value affects Landings.

F - Total - this value field is not available for Saddled and Slab Stringer Types. By working with large values you can use this option to create the appearance of Walls as illustrated above left (example " **A**"). This value affects Landings.

Cleanup - this drop-down list offering two options is available for all Stringer Types. All of the default Stair Styles that come with ADT have this value set to "Truncate". I think the term cleanup connotes a confusing interpretation about the "**Truncate**" versus " **Cleanup**" options since truncate is typically what you will want to see. When you use the "Cleanup" option, you should find that Stingers do not actually clean up but extend fully beyond adjacent stringers at points like Landings (in some cases this is actually more appropriate for true framing conditions but may produce more linework than you want to show in Plans).

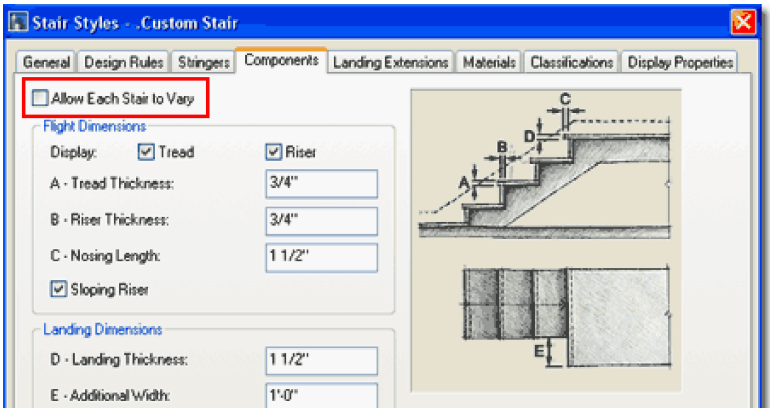
Illustrated to the left and above I show a series of different Stringer Types and some corresponding values to create unique results. By using trial and error experiments on these options, you can come up with some pretty interesting results that will hopefully save you time and effort in your production drawings.

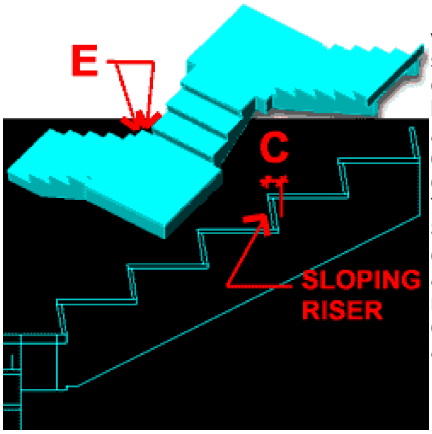
Stair Styles - Components tab

On the **Components** tab of the **Stair Styles** dialog box, you will find numerous control values for the Treads, Risers and Landing.

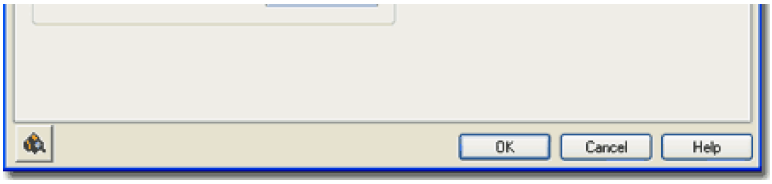
Allow Each Stair to Vary - checking this box allows you to change these values uniquely per Stair Object by using the Worksheets section on the Properties Palette. Though allowing this freedom might seem like a great idea, it is much like allowing for overrides on the Style settings so be sure you comprehend the consequences of this option. Don't check this box while trying to learn - trust me.

Flight Dimensions
Display - check boxes for turning Treads and Risers on or off. You can also turn these components On or Off under the Display Properties for specific Display Representations.





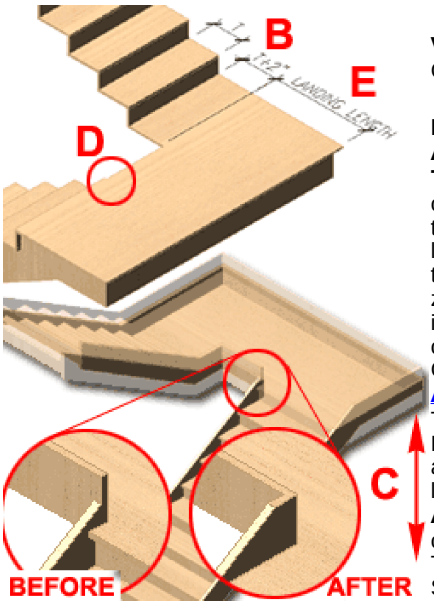
A and **B Thickness** values should be self-evident by the graphic on the Components tab, but **C - Nosing Length** actually has two roles. By default it serves as the overhang or lip on the Treads but when the **Sloping Rise**r checkbox is checked, it serves as the amount of slope. This also means that you cannot create a Sloping Riser with an overhang.



Landing Dimensions
D - Landing Thickness should be self-evident by the graphic on the Components tab, but **E - Additional Width** will behave differently than the graphic on this tab depending on which justification you use to draw your Stair object. If you justify by **Center**, as the illustration on the left (**E**), the E - Additional Width will occur on both sides of the landing. By the way, **1/4 Landing** is the **Turn Type** I used to create this example.

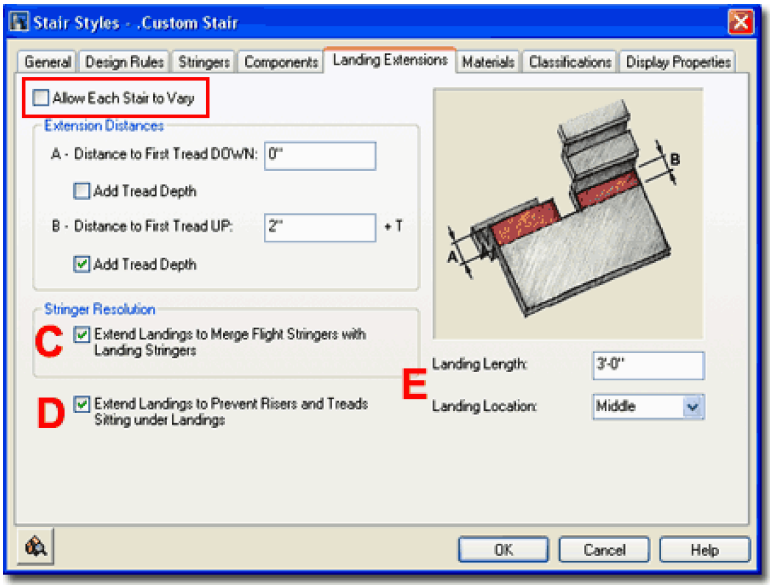
Stair Styles - Landing Extensions tab

On the **Landing Extensions** tab of the **Stair Styles** dialog box, you will find numerous value and check box options for controlling how Landings appear and behave relative to the current Stair settings. Some settings affect how Railings appear.



Allow Each Stair to Vary - see comments for Components tab above.

Extension Distances
A - Distance to First Tread DOWN - this value option provides the means to control how far out a landing will extend to the top down riser. Absolute zero can only be achieved if there is no Nosing Length on the Components tab. Constraint values, such as [Alignment type](#) (Tread to Tread) set on the Properties Palette can also affect the relationship of landing to riser distances.
Add Tread Depth - this check box simply adds the Tread value you for the Stair run to the Landing extension.



B - Distance to first tread UP - see comments for A - Distance to First Tread DOWN.

C - Extend Landings to Merge Flight Stringers with Landing Stringers - in the illustration to the left I show an example of how this option can be a great tool to resolve Housed Stair Styles so the Landing Stringer Merges properly with the Flight Stringers. Be aware that using this option adjusts the height of the Landing in order to make this feature work.

D - Extend Landings to Prevent Risers and Treads Sitting under Landings - in the illustration to the left I show an example of where you might notice how this option affects Stair Flights at Landings. If checked, you should notice that the Riser Thickness and Tread Nosing Length will shift back away from a Landing so there is no overlap with the Landing itself. If your Stairs have been drawn with a Tread to Tread, Tread to Riser or Riser to Riser Alignment Type instead of the Free Alignment Type, you may not notice how this option works.

E - Landing Length - use this value field to specify the depth of your Landing relative to other settings on this Tab and the other Tabs such as Nosing Length. Typically, Building Code has limitations on how narrow Landings can be so be sure to check for such values.

Landing Location - Middle, Top or **Bottom -** this drop-down list can be used to preset whether or not you want a Top or Bottom Landing on some Stair Shapes like the U-shaped. This option does not affect Straight or Multi-landing Shapes.

Stair Styles - Materials tab

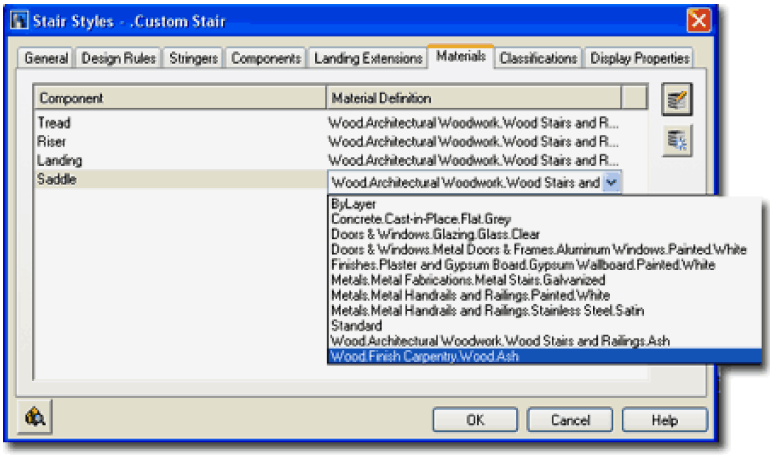
Links [Object Style Properties - Materials Overview](#) - for an expanded step-by-step explanation of Materials

The subject of **Materials** is one of the most expansive and confusing

topics in Architectural Desktop because it requires a complete comprehension of the product in order to take full advantage of this feature; from object styles to display representations. This subject will be discussed under **Part 1 - Display** and in the Presentation eGuide.

Illustrated to the right I show that Stairs will offer three fixed Components (**Tread**, **Riser** and **Landing**) and as many **Stringer** Components as you care to Add on the Stringers tab. If you create a Stair Style from scratch, the default **Material Definition** Name will be set to "Standard". If you have imported any of the Architectural Desktop Stair Styles from the Object Style Library, you should find that you will be able to use the Material Definitions that come with those objects - as illustrated to the right where I am selecting "Wood.Finish.Carpentry.Wood.Ash".

Though you are not required to use Material Definitions in Architectural Desktop, you are likely to find it difficult to avoid using them since most of the predefined Styles use them. Materials have thrown a monkey wrench into the whole Display System because they can actually take over control of how your linework appears in Plan View for Construction Documents (discussed below under Display Properties). The best thing to do when learning about Material Definitions is to match how most of the predefined Stair Styles have been configured; i.e., reverse engineer the ADT Styles.

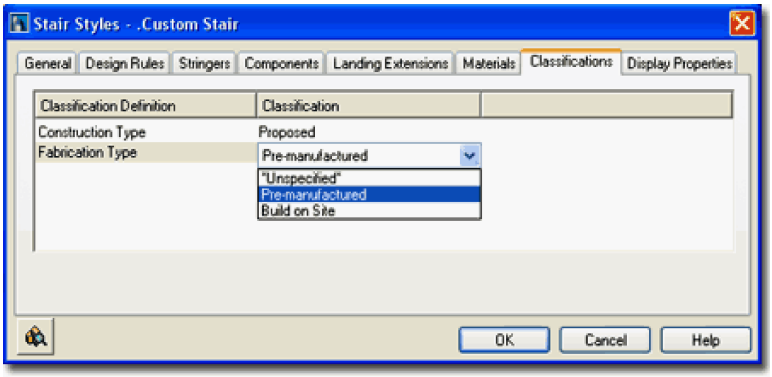


Stair Styles - Classifications tab

Links [Object Style Properties - Classifications Overview] - for an expanded step-by-step explanation of Classifications

The subject of **Classifications** is thankfully no where near as complicated as that of Materials so the only real question you will need to consider is if you need to use them. Classifications offer another way to separate Object Styles into categories that can be used in **Schedules** and even in **Display Representation Sets** (as "**Show**" or "**Hide**").

Illustrated to the right I show that I have two **Classification Definitions** (see **Format** pull-down menu), each with a list of **Classification Names** or Types. Generally you will not have any options on this Tab but if you have created at least one Classification Style that has been set to "Apply To" Stair Styles, you will be able to use it here. The range of use is really up to your imagination but it is fairly obvious that Classifications can be quite handy in Schedules. This topic will be discussed further under Part 18 - Schedules. You can also read a bit more about how to create Classification Definitions in **Part 1 - Display**.



Stair Styles - Display Properties tab

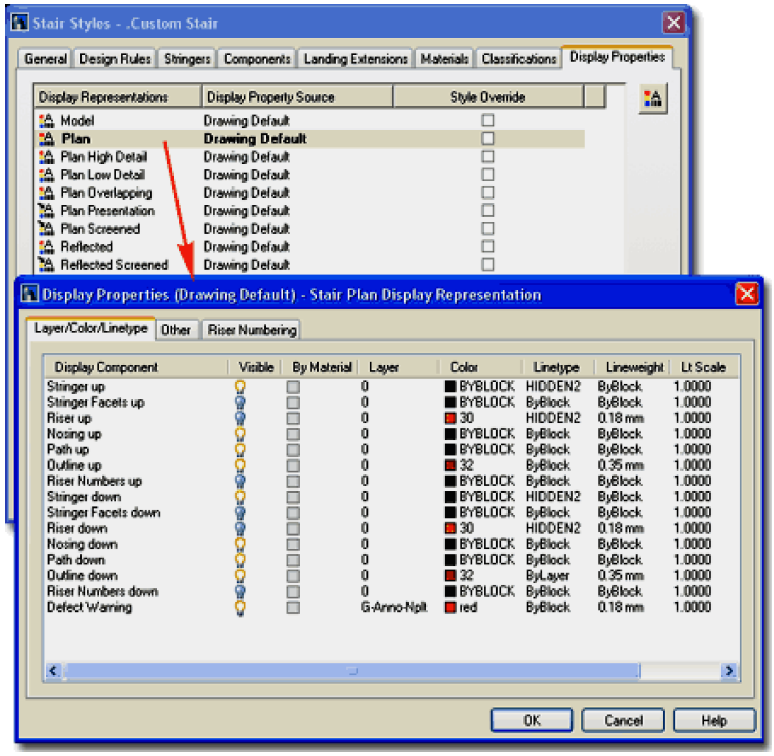
Object Style Display Properties Overview - for the full story

Links

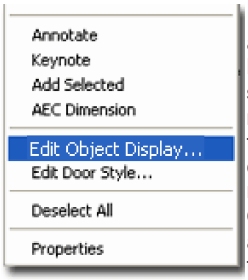
Object Style Display Properties Overview - for the full story on Display Properties for Style

Object Display Property Overrides - Object and Style Based - for an explanation of the differences between using Display Properties via the Styles versus the Edit Object Display... option.

The **Display Properties** tab of the **Stair Styles** dialog box, illustrated right, provides access to the display characteristics of the components of your Stair objects; from Visibility to Cut Plane Height overrides. This is also where you would go to have Stairs change color or Materials, for example, when you switch from one Display Configuration to another. See the discussion on Stair Display Properties below for more information on this subject.

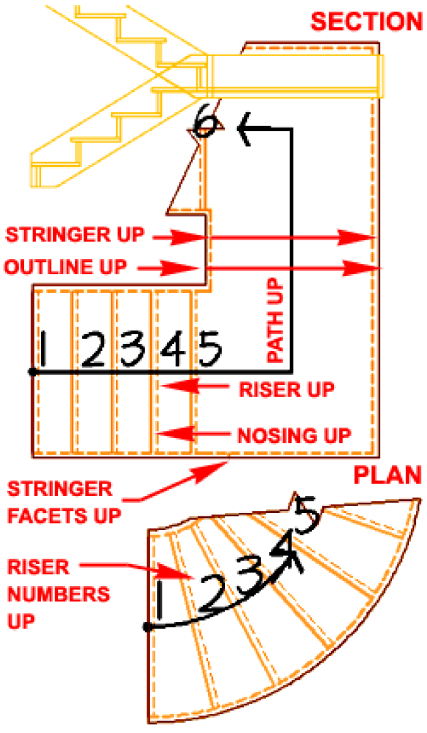


YOU CAN ALSO ACCESS DISPLAY PROPERTIES BY SELECTING AN OBJECT, RIGHT-CLICKING ON YOUR MOUSE AND USE THIS POP-UP MENU OPTION



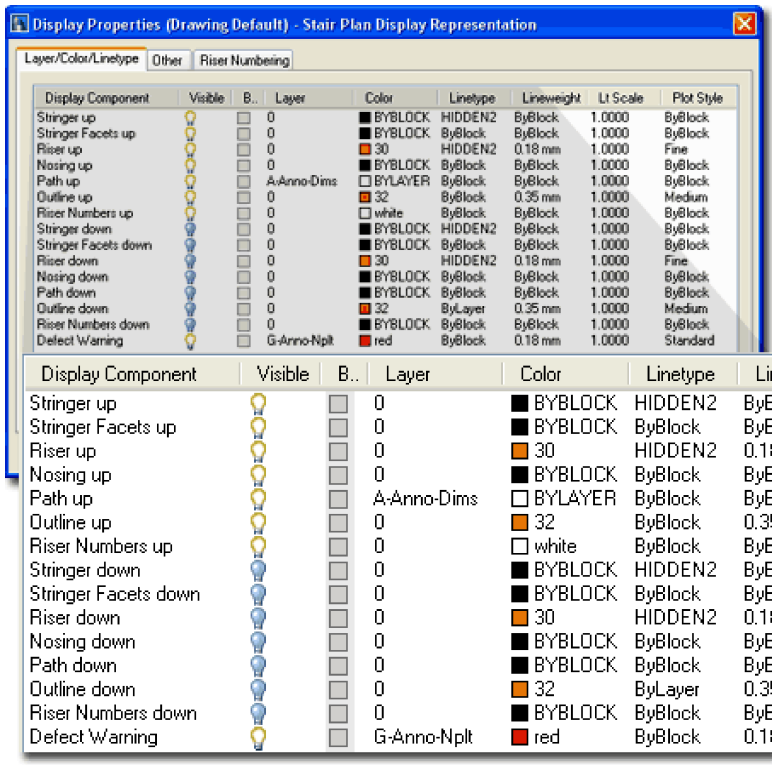
Illustrated to the left, is another way to access the **Display Properties** tab; **select** the specific **object**, **right click** on your mouse to invoke the object-specific pop-up menu and select **Edit Object Display...** Just be aware that when you use this approach, you can actually set an Object Override as opposed to a Style Override. Object Overrides can be extremely useful because they allow you to add things like Riser Numbering to any object within a Style Family but they can also be problematic because they lock you out from more centralized, Style level, controls.

Stair - Display Properties - Component Layers



Illustrated to the right and left I show all of the Stair Display Components for the "UP" portion of a Stair (the "Down" portion has been turned off for clarity).

Under the default **Plan Display Representation**, you should notice that you cannot control any of the Stair Display Components "**By Material**" so all settings are controlled right here on the **Display Properties dialog**. The Components should be fairly easy to figure out and since they are related to their dimensional counterparts on the Stair Style dialog box, the display may or may not produce visible results (in other words, no Nosing Length will produce a line right on top of the Riser so you won't see the Riser line).

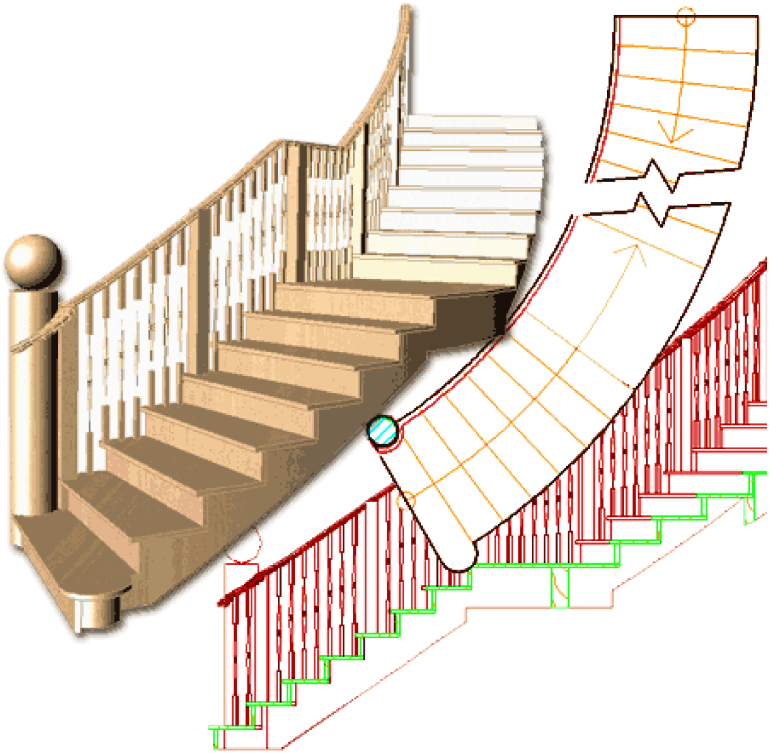


Generally, the scale of the drawing and the level of detail you wish to communicate at that scale will determine what Display Components you wish to have Visible. For Plan View, I tend to show very little detail by only displaying the Outline, Nosing and Path.

When working with Stairs, adopting a " **less is more**" approach may prove to be your best option for graphical display since more detail requires more complexity which, in turn, adds to more potential for problems such as Defect Warning icons. However, since stairs can be a significant architectural design statement and since drawing them in the traditional 2D way can prove to be exhausting there are times when you just have to push for as much as you can.

Illustrated to the right I show an example of one of my efforts to "push" the capabilities of the Stair and Railing Styles. I am by no means satisfied due to all sorts of odd limitations but I hope this example shows that some reaching may be worth the end results. The primary problem with working towards custom and unique design results is the time it takes to make all of the adjustments in trail-and-error fashion to get as close as possible to what you really want.

As with most of the other ADT Objects, my primary focus is on the Plan View. The **Plan Low Detail** Display Representation for Stairs tends to be a fairly good option for standard plans. The Plan View illustrated to the right uses the default Plan Low Detail Display Representation for the default **Wood-Saddle Stair Style. Both the 3D Perspective (High Detail) and the Section were derived from default settings.** The only extra work I did was some Edge Customization, addition of a custom round Column and the Hiding of one Railing Post.

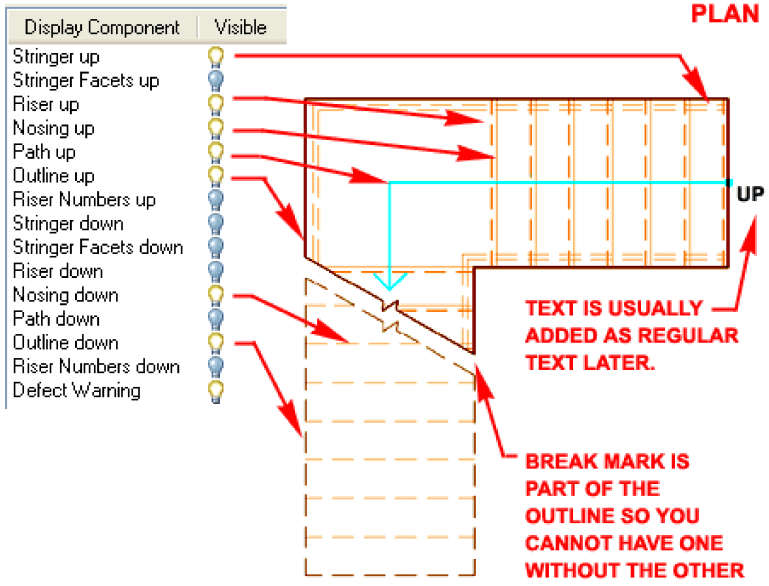


Stairs in Plan

Menu	**Format> Display Manager...**
	
Keyboard	**DisplayManager**
Keyboard	**DisplayProps** [**Attach**]
Mouse	Select Object, right-click, select Edit Door Style... or Edit Window Style... or Edit Object Display...
Links	Part 1 - Display - Object Display Properties Overview - for more information on how to access the Display Properties of this Object.

In **Plan View**, it should be obvious that your Stair display is derived from a 3D object that passes through a cut plane that establishes which components belong to the "Up" Display and which belong the the "Down" Display. By working with the Cut Plane settings on the "Other" tab of the Stair Style's dialog box, you can control where the cut plane shows up and where the differentiation of Above and Below occurs.

For the most part identifying what each of the **Display Components** control should be relatively easy and since the list repeats for the Up and Down Components, it is actually far shorter than it appears at first glance. The **Facets** indicate where Stringers change slope and probably doesn't provide much information for typical floor plan drawings. Having **Risers** and **Nosing** Display Components Visible at the same time is often too detailed and causes more confusion than anything else so I tend to keep the Risers Off. The **Outline** not only wraps the outer edge of a Stair but also controls the **Break Mark** (unfortunately). The **Path** is a graphic element that uses a Dimension Style to produce a leader. The **Riser Numbers** allow you to have sequential numbers displayed for each riser. There is no Hatch Display Component for Plan.



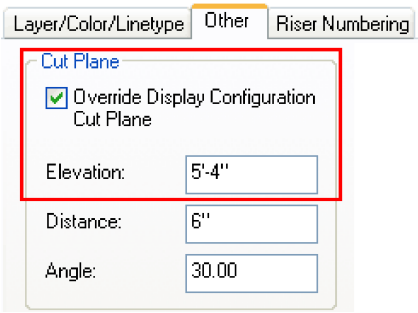
Illustrated above I show a slightly modified version of the default " **Medium Detail**" Display Configuration which uses the " **Plan**" **Display Representation** for most Objects. In order to illustrate how you can lighten the detail for the higher or "Down" portion of a Stair, I turned Off the Visibility of most of these Display Components but left them on for the "Up" portion.

Stairs Above and Below the Cutting Plane

Links

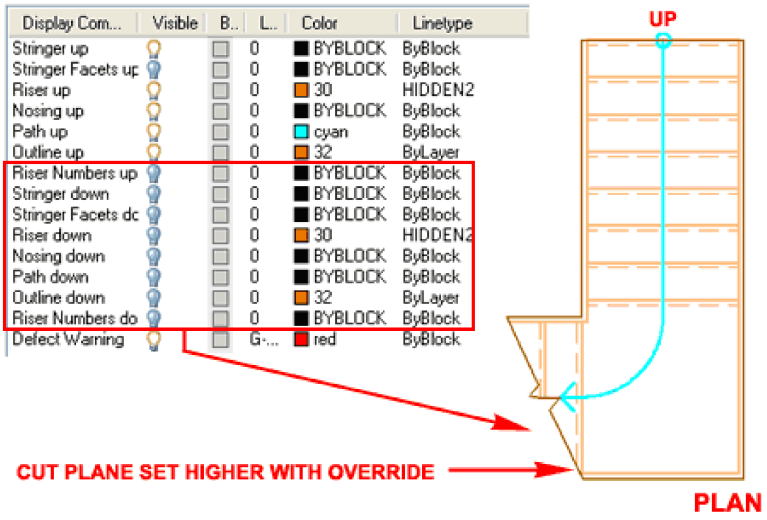
Part 1 - Display - Object Display Properties Overview - for more information on how to access the Display Properties of this Object.

Up-Down Display of Stair in Architectural Desktop 2004 - for a full article on a trick I created to solve this problem when using the same stairs between 2 floors.



Since Stair Object Display Components have been divided in half under several of the Display Representations, it is fairly easy to turn the **Visibility On** or **Off** for all of the "**Up**" or "**Down**" **Display Components** as illustrated to the right. This makes the task of getting a Stair to look right in one plan a simple job and you can use the "**Override Display Configuration Cut Plane**" checkbox to set any desired Cut Plane **Elevation** height which controls the point at which Display Components are "Up" or "Down".

By using the Edit Object Display... option to (right-click pop-up menu) to set an Object Display Override, you can work with different Stair Objects independently though they may all be part of the same Style; i.e., they could have different Cut Plane Overrides, for example.



The real problem with the "Up"/"Down" Display of Stairs is that you usually want the Stair(s) to display as "Up" on one Floor and "Down" on another. In addition, you would like to use the same Stair Object so changes are reflected in both Floors (assuming you keep your floors in separate drawing files). This can be achieved but is a lengthy subject that I have covered in a separate article on the ARCHidigm.com website - see Up-Down Display of Stair in Architectural Desktop 2004. In essence the solution utilizes the Display Representations of Stairs to create two solutions for the Plan Display; one for the "Up" and one for the "Down". These Display Representations are then associated with Display Configurations so you can toggle between them.

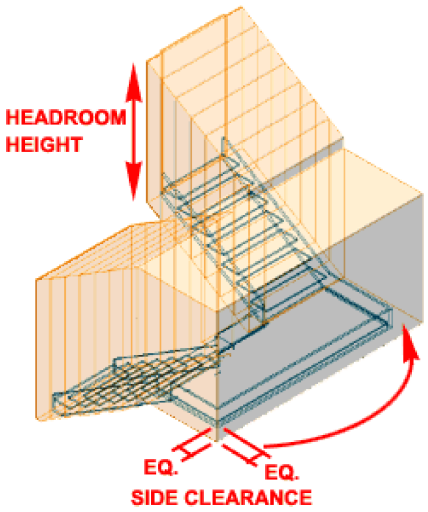
Stairs in Model

Links

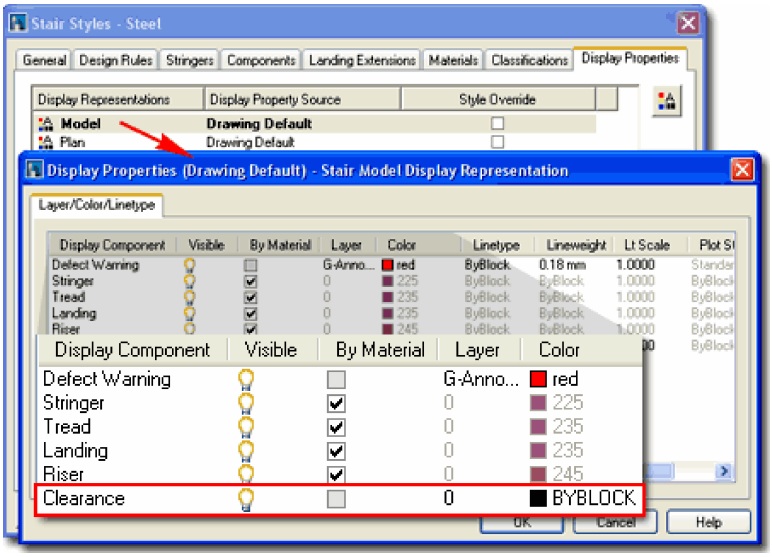
Interference - see this section of the Properties Palette for how to control the Clearance height and width

Stair Styles - Materials tab - for information on the By Material settings used for the Model Display Representation.

Stairs as Boolean Subtractions - for a neat trick on how to use the Clearance Component with Slabs.



On the **Properties Palette** for Stair Objects, you can set **Headroom Height and Side Clearance values** to assist in cutting Holes in objects like Slabs. By default, you will not see these values but should you want to see them, you can use the **Model Display Representation** to access a **Display Component** called "**Clearance**" and turn its **Visibility On**. This will allow you so see the Headheight and Side Clearance values as a 3-dimensional mass but only while viewing the Model; it will not display as a Plan graphic.



Display Properties - Stairs - Other tab

On the Other tab of the Display Properties dialog for a Stair Style, you can work with numerous drop-down lists and value fields to affect the Plan Representation of a Stair's Cut Plane, Arrows and Break Mark.

STAIR LINE - STRAIGHT, ENTIRE STAIR
ARROW = CUSTOM DIM STYLE
BREAK MARK = CURVED

STAIR LINE - STRAIGHT, PARALLEL
ARROW = STANDARD ARROW
BREAK MARK = NONE

STAIR LINE - STRAIGHT, OPPOSITE
ARROW = CUSTOM DIM STYLE
BREAK MARK = ZIGZAG

CUT PLANE
Override Display Configuration Cut Plane - use this checkbox option to allow a unique cut plane height setting that is not the same as the global one for Walls, Doors, Windows and other Objects. It is often desirable to allow stairs to run up higher than the standard global cut plane height so using this option is not unusual.

Elevation - the vertical (z-axis) height of your cut line. You can set a huge height if you are in a hurry and want no cut line. Setting a value to match a landing or turn often affects the Angle in strange ways that requires adjustments to the Angle.

Distance - the perpendicular distance between parallel cut lines illustrated by the Break Mark.

Angle - the angle of the cut line(s) as displayed by the Outline Display Component. Though all sorts of interesting Angles can be specified, the Elevation will limit what is possible and you may get another angle than what you have defined. An Angle of zero will produce a straight horizontal or vertical cut depending upon the direction of the Stair Flight.

ARROW
Size - the length of an arrow for the UP / DOWN indicators unless the "Arrow Size from Dimension Style Only" has been checked. This value is not scaled for the drawing like Dimension Styles so you need to specify a true size.

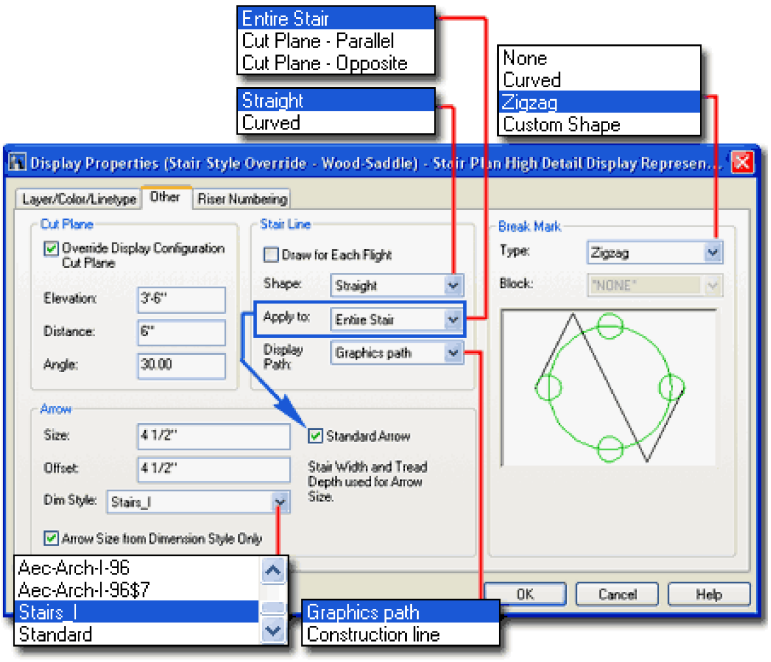
Offset - the distance an arrow sits away from the cut line.

Dim Style - the Dim Style name that controls the look of the UP / DOWN arrows and the base dot for first riser. Exit this dialogue box and use "DDIM" to access the Dimension Style specified on this drop-down list. Due to the unique settings and how they affect the graphic of a Stair, it is best to use a unique Dimension Style for Stairs.

Standard Arrow - a check box that will override the Dim Style and use a triangular shaped arrow that is as wide as the Stair Width and as tall as the depth of Tread. Not available if **Stair Line** - **Apply to:** is set to **Cut Plane - Opposite**.

STAIR LINE
Draw for Each Flight - a check box that will draw separate Up / Down arrow for each Flight of stairs rather than one set that wraps around a landing. Not available if **Stair Line** - **Apply to:** is set to **Cut Plane - Opposite**.

Shape - a drop-down list offering two stair line shapes: **Straight** or **Curved**. These affect the appearance of the graphic or leader line as it traces around bends for landings or other changes in direction. The Curved option often has trouble with non-standard arrow heads (you'll see the little tail).

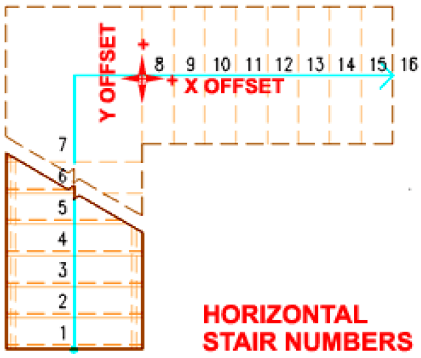


Apply to - a drop-down list offering three ways the stair line can be applied: **Entire Stair**, **Cut Plane - Parallel** and **Cut Plane - Opposite** (see illustration to the right). These settings affect how the arrow lines behave with respect to the total stair run and the break mark position. **Entire Stair** creates one single full length stair line with an arrow at the end. **Cut Plane - Parallel** is similar to full length but draws same-direction arrows at both sides of the break line. **Cut Plane - Opposite** is similar to Cut Plane - Parallel but flips the arrows at the break line so they are in opposite directions.

BREAK MARK
Type - a drop-down list offering four types of Break Marks: **None**, **Curved**, **Zigzag** and **Custom Shape**. The Curved is fairly dreadful but you can create your own if you desire a cool curve. To do this, create a 1:1 ratio break mark and make a block out of it. Now use the Custom Shape option and assign your custom block on the **Block** drop-down list. Hint: for your custom break mark block, don't add any part of the diagonal lines, draw only the break mark itself and don't exaggerate the wave too much (see illustration in the Break Mark preview). I haven't figured out the ratio but it appears that the block gets changed a little via this option.

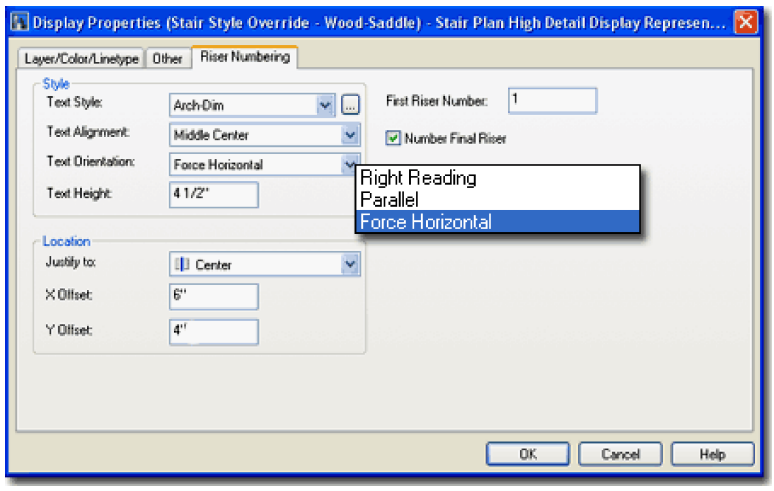
Block - a drop-down list of all the blocks in the current drawing file. This option is only available if you set **Type**, above, to **Custom Shape**.

Display Properties - Stairs - Riser Numbering tab



On the **Riser Numbering tab** of the **Stair Style's Display Properties dialog box**, illustrated to the right, you can control a rather impressive set of options for placing numbers next to your Stair Risers.

Illustrated to the left I show the results of the setting that I have used on the dialog box illustrated to the right. I think it safe to say that you are probably savvy enough to figure these settings out so I won't bore either of us with a lengthy explanation.



Text Style - this is just like the text style option for Dimensions, however, in my tests I found that the dot-dot-dot button does not work.

Text Orientation - the Force Horizontal really works and no matter how you rotate the Stairs, the text comes out horizontal.

Text Height - unlike Dimensions, this is the final text height so you will have to consider your printing scale to set a height large enough for proper reading.

First Riser Number - I attempted to use non-numeric values but you can't get away with that so I was not able to come up with slick tricks like "Up" or "R1" but I guess that's okay. It seems to me, however, that more people would have been interested in being able to label the Stairs with "Up" or "Down" using similar options. Why not offer both? Also, sometimes all architects want is the final Riser count.

11 Stair Winder Style Properties

Stair Winder Styles dialog box

Alt.Menu **Design> Stairs> Stair Winder Styles...**

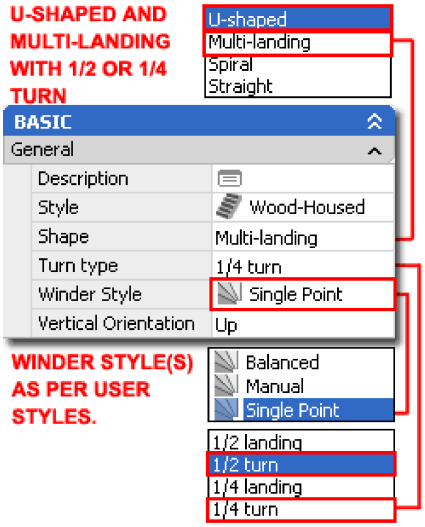
Keyboard **StairWinderStyle**

Mouse N.A.

Links [Object Style Management] - for more information on Object Styles

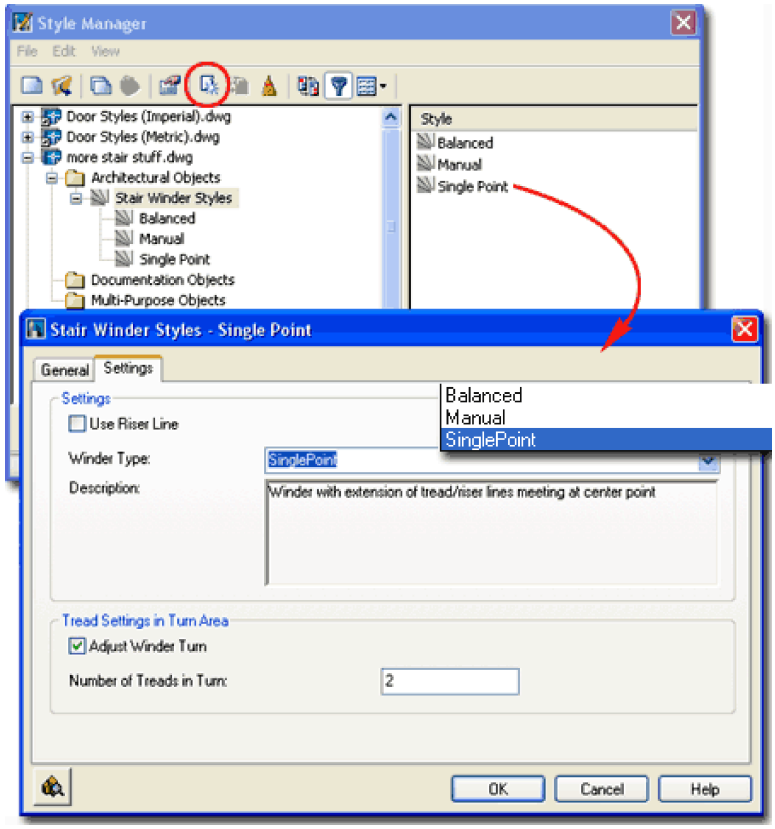
[Edit Turns and Grip Points] - for information on how to use the Edit Turns Marker relative to these Styles.

[WinderTurnAdjust] - for a command that allows you to change the number of risers in a turn.



Architectural Desktop 2004 introduced the **Stair Winder Style** in an obvious effort to assist users in their efforts to create unique winding stairs. Unfortunately, in my tests with this new option, I could only find one winder solution that I could actually employ on projects that I work on. The other winder styles, such as the default "Balanced" is so ridiculous that I don't believe such a winder has actually been built unless it was at an amusement park.

Perhaps you will have better results so lets break the options down. Illustrated to the left I show the places on the Properties Palette where you can employ the Winder Styles. Winder



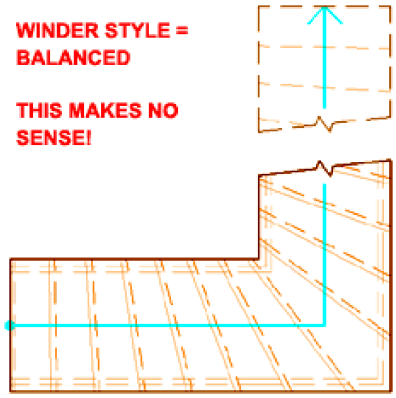
Winder Type - The **Balanced** Winder Type produces the most absurd winder results that I have ever seen where all risers wind. The **Manual** Winder Type will allow for Grip Editing of All the Riser positions which is rather powerful but you may find how they adjust a little frustrating. The **SinglePoint** Winder Style is the one that might be the most practical but it too has some frustrating limitations. Thus far I find that the best results come from switching back and forth between Manual and SinglePoint to take advantage of each Style's Edit in Place capabilities.

Styles can only be used as part of the **U-shaped + 1/2 Turn** and **Multi-Landing + 1/2 Turn** or **1/4 Turn** combinations. By default, you should have the "Balanced" Winder Style option and this Style produces the same winder result previous releases of ADT created.

Illustrated to the right I show the Stair Winder Styles dialog box where you can choose between three Winder Types: **Balanced**, **Manual** and **SinglePoint**.

Use Riser Line - this checkbox will set the winding point off the Riser Line in Plan View instead of the Nosing Line (unchecked). I did not find this option very useful since it produces the Defect Warning and erroneous Riser or Stringer results in 3D Views. It does seem to work okay if you don't have a Nosing value but then that's pretty much the same as leaving it unchecked.

of each Style's Edit in Place capabilities.



Adjust Winder Turn - this check box activates the option to specify "Number of Treads in Turn" and must be checked in order to use the WinderTurnAdjust command to edit these types of Stairs.

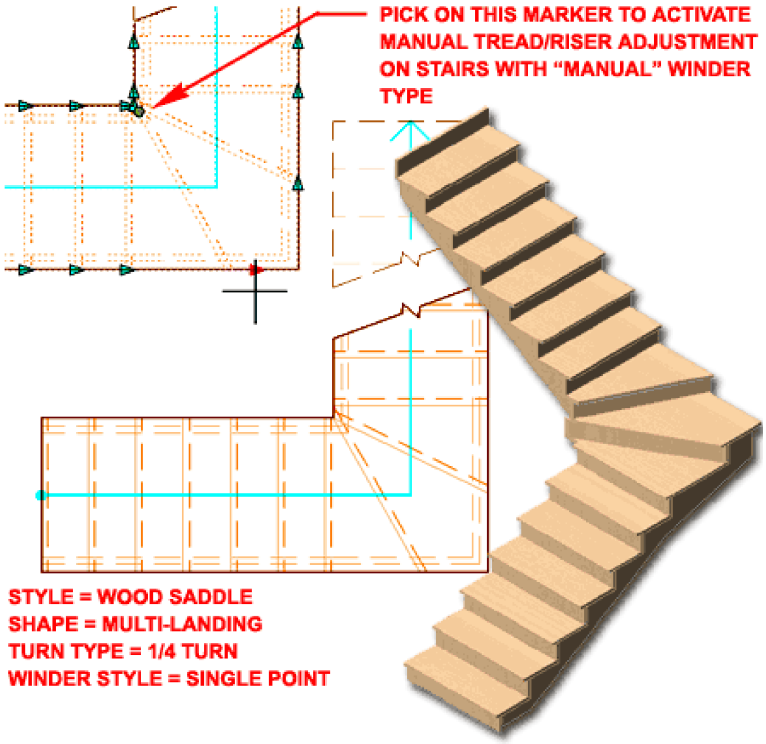
Number of Treads in Turn - by using this value field you can specify how many Risers and Treads you want in a Stair Turn. Unfortunately, though you can type the number one it will not be accepted upon return to this dialog so you cannot set the value to one and get a single winder; one of the most common stairs I come across in residential work.

Stair Winder Styles - Adding

Illustrated to the right is the only example Winder Stair example that I could honestly say is practical. Even this particular example has a problem in 3D where you can see that the cut of the Riser has a slight extension. By changing this from a SinglePoint Winder Type to a Manual Winder Type, the Edit Turns marker will provide the freedom to Grip Stretch each Riser/Tread but you may find how the Risers pivot a bit frustrating and basically impractical for serious use.

If you are determined to work with the Winder Styles to produce winder stairs, I recommend that you remove as many of the obstacles that produce Defect Warnings as you can. Stairs with Housing Stringers tend to produce the most problems. Removing Nosing values seems to help as well.

The illustration to the left was created by working with a **Single Point** Winder, switching it to **Manual** to Grip adjust the corner Riser and then going back to the Single Point to adjust the Turning Point. In order to get just one Riser in a Turn, you may need to use the WinderTurnAdjust command.



Ramps

Alt. Menu **Design> Stairs> Add Stairs...**

Keyboard **StairAdd**

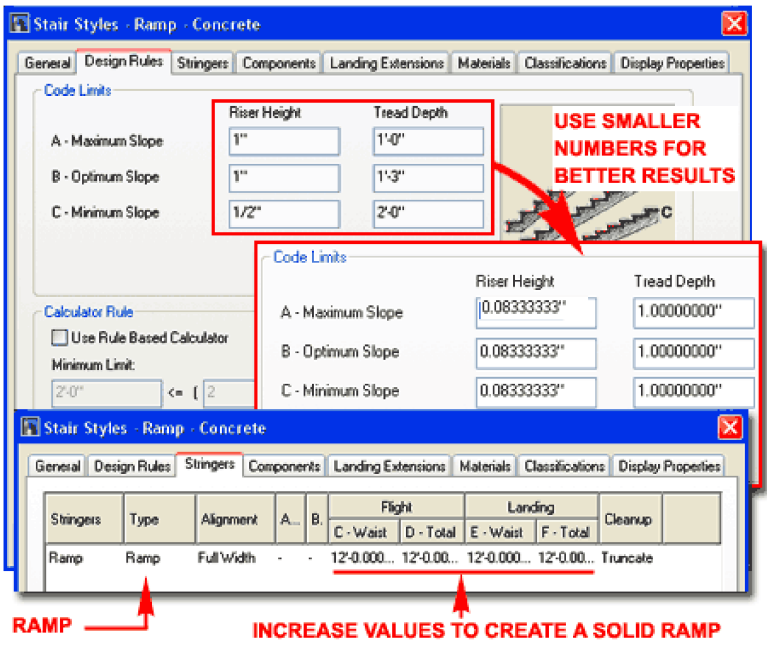
Links Stair Styles - for where to access the default Ramp Stair Styles.

When it comes to **Ramp** designs, there are usually a lot of architectural guidelines to take into consideration particularly related to the disabled. This means that you are likely to want very specific numbers for your slope and since Ramp Slope is controlled by the Code Limits on the **Design Rules tab** of the Stair Style dialog box, you may want to read up on that information above.

As an object, a Ramp is just a Stair Style without Risers and Treads; in other words, it's a Stringer set as a "Ramp" Type on the Stringers tab of the Style dialog box. In addition to using a single Stringer to form the Ramp, you can add other Stringer components to create such things as side walls or other structural elements.

Architectural Desktop comes with three example Ramp Stair Styles: **Ramp - Concrete**, **Ramp - Concrete Curb** and **Ramp - Steel**.

Note:
One trick I have found that often works on Ramps that use the small values illustrated the right, is to let these Stair Style **Terminate with** a **Tread**. This trick does not necessarily work on all Ramp Stair Styles since some may have Tread Depths that affect the overall Length dramatically.



The one major flaw with the Ramp is that it is based upon a Stair that uses a Riser-to-Tread system that does not really apply to Ramps. Ramps are typically based on Slope and though Slope can be expressed in the form of a rise over a run, the Code Limits were not designed for Slope but for Riser Heights and Tread Depths. This means that if you attempt to create a Ramp Slope with a very definitive ratio of 1:12, for example, you will be limited to heights of 1" and/or depths (lengths) of 12". In other words, this ratio will only allow ramps that have lengths that are divisible by 12". Since not all Ramps are divisible by 12", you might want to change your Riser Height and Tread Depth to smaller rations of the same Slope. This trick works up to a point. When I attempted to set a Ramp Tread Depth to 1" (to allow for Ramp Lengths of 1" increments - the perfect solution for me), I found that setting the Riser Height to 1/12" could only produce 0.08333333" which resulted in design errors.

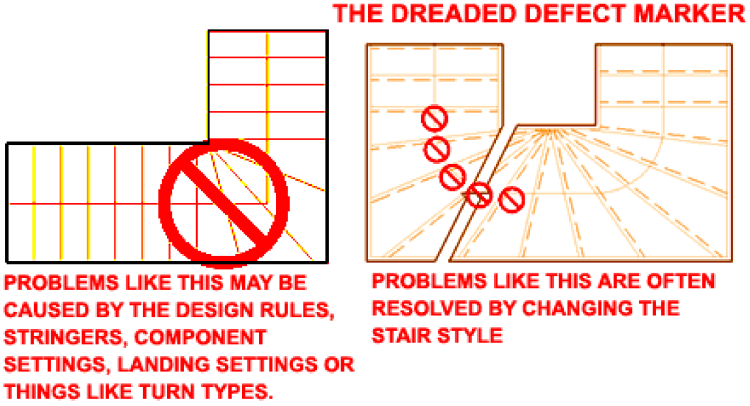
If you are facing this problem I must tell you that there really is no way around the calculation error and that if you really want a valid calculation, you must do the work yourself. You may even need to use another object, such as a Mass Element to create a reliable Ramp solution. However, if small margins of Error are not that big a problem for you (not good for ADA compliance), use the smallest evenly divisible ratio but don't use numbers that are too small because ADT will actually attempt to produce Risers and Treads to those values even though you don't see them (it will slow your system down). For 1:12, I found a Riser Height of .01562500 and a Tread Depth of 0.18750000 too small despite the fact that it comes closer to good results than other numbers I used.

Stair Problems

Though there are numerous things you can do to make the stair routine produce errors, I have illustrated two common causes to the right. As mentioned above, when discussing Spiral stairs, you cannot overlap ADT stairs yet nor even bring them full circle - not even on a Spiral.

Another Error, illustrated by a "No-Stair" red circle, is often caused by editing mistakes. A common mistake I make is to use the Grips to make rapid adjustments where a single stretch can create this error. Within the Yellow circle I show the centerline of this stair and how the end of the centerline must be, at least, at the true end of the defining rectangle. To fix this, just Grip the stair and pull the centerline out to the rectangles edge.

You cannot increase a Stair's Height with Grips even if you try it in Isometric or Elevation views so you will have to use the Properties Palette to accomplish this.



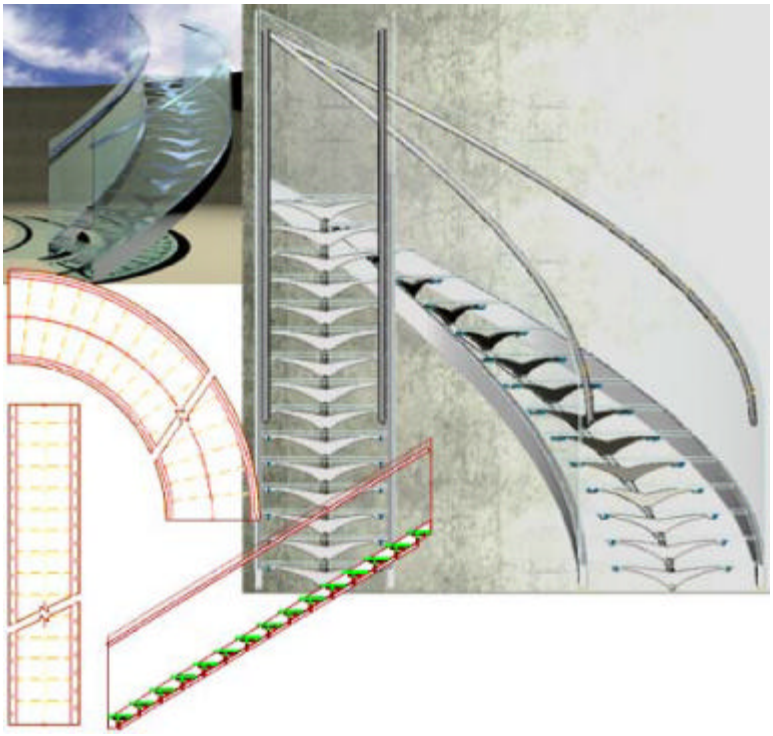
Creating a Custom Stair Style

Menu **Design>Stairs>Stairs Styles...**

Keyboard **StairStyle**

Links Stair Styles

Creating a Custom Railing Style - for more information on how I created the center support structure



Designing Custom Stair Styles is often a matter of how you visualize your options figuratively rather than literally. In the example illustrated to the left, the solution may be more about what you don't add than what you attempt to create. In fact, this Glass Stair example only has five parts to it: the default Tread (no Risers) and four Stringers (two of which are on top of each other). The rest of the product comes from two custom Railing Styles.

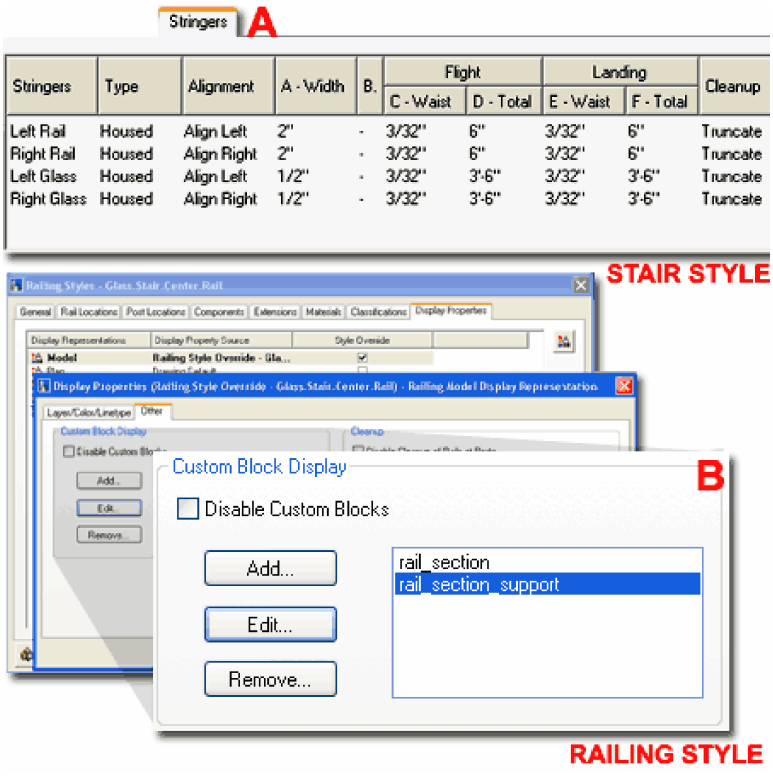
Before I take you through the overview of how I created this example Stair, you should know that the primary problem with Stair Styles for custom solutions is that they don't offer the option to Add... Blocks to change or Replace Components. Railing Styles, however, offer tremendous features for Adding Blocks to create your own Railing Style solutions.

For the Glass Stair, I turned off the Riser and used the Stringers tab (labeled as "**A**") on the Stair Style dialog box to create two solid metal rails at the bottom. For the Glass, I added another Stringer in the exact same location as the bottom rail but with a significantly greater height so it will act as a guardrail. Getting the look of Glass is a matter of using the Materials tab to assign a Glass Material Definition to these Components.

For the Railings, I had to create two because one was for the handrail and the other was for the support structure under the Stair Treads. The handrail Railing Style is so simple to create that you can just copy one from the existing Railing Styles template file but the center support Railing Style is the most difficult part of this whole exercise.

Illustrated below right, labeled as " **B**", I show that I have used the Add... button on the Display Properties tab of my custom center Railing Style dialog box. For this style, I used none of the default Components but created two Blocks of Components that I wanted to use instead: the center steel support tube or spine and the steel arch. One block was just a cylinder made out of a Mass Element and the other block was a Mass Element of the whole arched support system holding the glass. On the Custom Block dialog, after Adding these Blocks, I replaced the Baluster Component with the cylinder block and did the same thing with the support. Though I could have used the Post Component, I chose the Baluster because of the extra spacing options that are available on the Post Locations tab of the Railing Style dialog box.

More on this later...



Stairs Across Levels and Up Down Display

Links Up-Down Display of Stair in Architectural Desktop 2004 - for an in-depth article discussing one solution for this problem.

13 Adding Railings

Add Railing Properties Palette

Alt.Menu **Design> Railings> Add Railing...**

Keyboard **RailingAdd**

Mouse Select a Stair Object, right-click and select Add Railing

Links Loading Railing Styles - for information on loading Railing Styles.

When **adding Railings**, the **Properties Palette** offers a fairly short list of options so hopefully this will come as a nice relief when compared to the list for Stairs. The most common question I have been asked over the years about the Railing options is why you cannot use the Railing Locations and Post Locations dialog boxes under the Dimensions section of the Properties Palette. The answer to that question has to do with the Railing Style and I will explain more about that later on. When adding your first Railing, I recommend that you keep it simple despite all of the incredibly articulated Styles that come in the **Railing Styles template file**. The reason for this recommendation is that those highly detailed Railing Styles can cause your system to slow down dramatically; particularly in 3D Views with the Full Detail Display Configuration and active Materials.

GENERAL

Style - a drop-down list offering a list of currently loaded Railing Styles. Type RailingStyle or use the Content Browser to load other Styles. In the list of Railing Styles that come with ADT, the ones with Balusters affect system performance the most and of this list, those with the Wood Balusters take the greatest toll on system performance.

DIMENSIONS

Rail Locations dialog - activating this dialog brings you to the Rail Locations tab of the current Railing Style's dialog box. By default, all of the Railing Styles that come with ADT, have this setting locked so you cannot make unique changes to individual Railing Objects. Though you can release this option, it is similar to allowing Overrides and can result in frustration and irritation if not properly employed. To release, look for the "**Allow Each Railing to Vary**" checkbox on the **Rail Locations tab** of the current Railing Style's dialog box. For more on this subject see Modifying Railings and Railing Style Properties.

Post Locations dialog - see comments for Rail Locations dialog above.

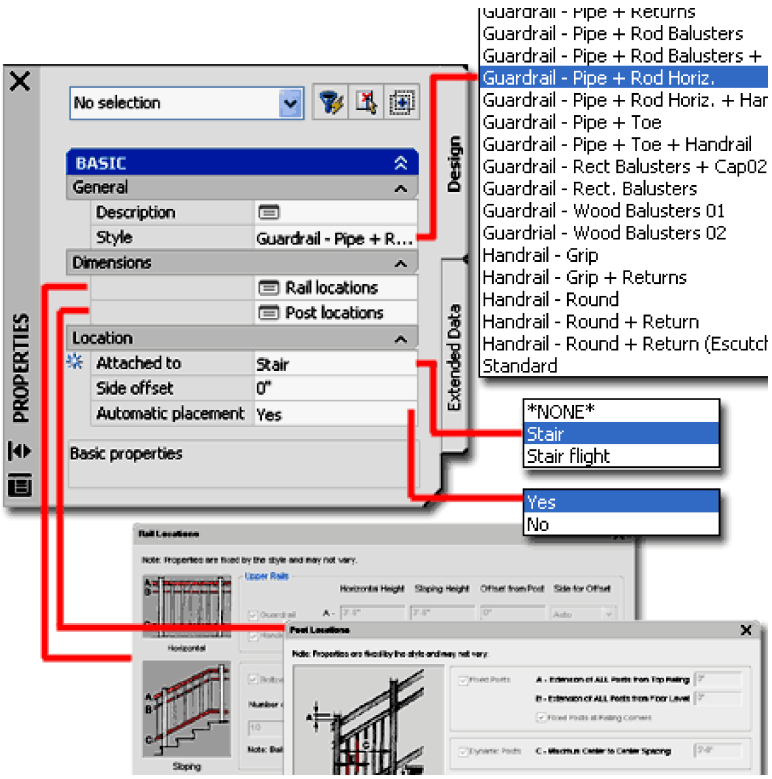
LOCATION

Attached to - a drop-down list offering three choices: "***NONE***", **Stair** and "**Stair Flight**". Once set, this option will not be available on the Properties Palette when making Modifications. You can, however, use the AnchorRelease command to free a Railing Object and even use RailingAnchorToStair command to re-attach it.

None - no objects are used for attachment but rather you are queried to pick points along the path for your railing. You might use this technique to create a fence along a yard, for example, or on decks and porches.

Stair - a Stair object must be selected and the Railing will be attached to the full flight of stairs and any landings in the flight. Since the Railing gets anchored to the Stair with this choice, it is a better method than using None.

Stair Flight - a Stair object must be selected but the Railing will only be attached to the single Flight of stairs where you picked to select the Stair; i.e., this won't put a Railing along the full flight but only along a portion of it.



Offset - a distance measured from the justification of the railing. Railings are generally placed automatically at Center, Right or Left of Stair objects so the Offset would occur from one of those three points depending on where you pick when you select your Stair. Depending upon the Railing Style, its Anchoring position is usually through the Center of the Posts. This is why Posts often dangle halfway over the edge of Stair Edges (an Offset of zero). Use negative numbers to push a Railing out past a Stair's Edge and positive numbers to bring it in.

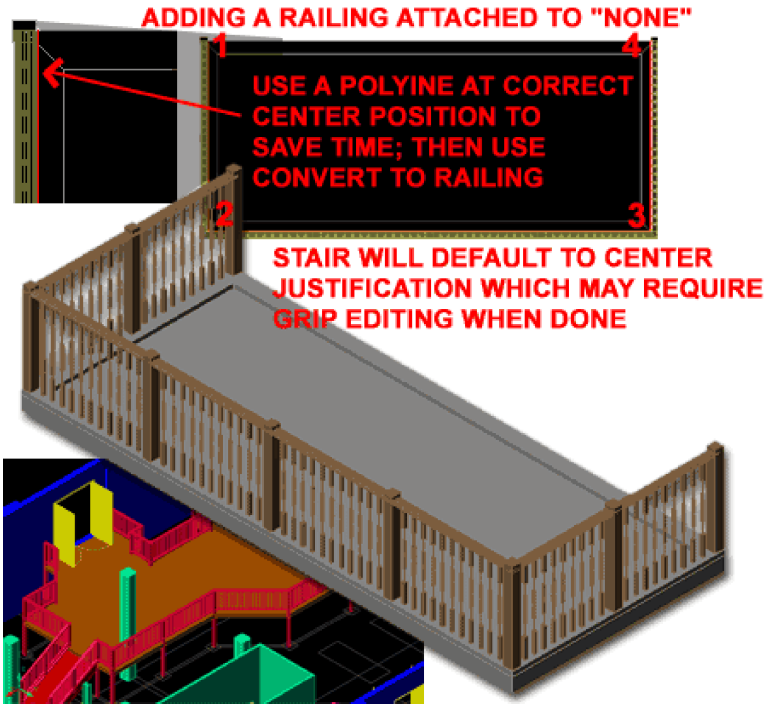
Automatic - This option is only available when using the Attached To: Stair option. When set to "No", you can control the length of the Railing along the Stair Path.

Adding Railing Attached To: none

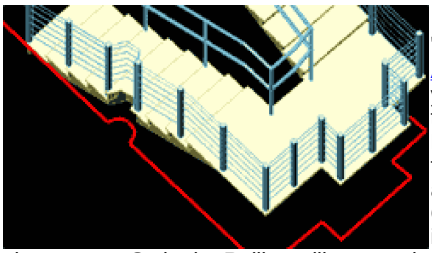
Using the **Attached To**: "**none**" option basically frees the Railing object from anchoring to any other ADT object and is thus a free floating object that will not automatically adjust when the object you have traced over is changed. This option is useful when you want to Add Railings to anything other than **Stairs** or **Stair Flights**; which means a lot of cases such as fences, porches, decks, unique landings, floor holes around stairs wells and even on top of Mansard Roofs if you like the French look.

Illustrated to the right, I show the points you might pick along an ADT object (Slab) to trace its edge for Railings (**1**, **2**, **3**, **4**). Unfortunately, this technique **center justifies** a Railing and there are no options for changing this when you Add the Railing so you will either have to Grip edit it after you are done, or plan ahead by using a correctly justified Pline. If you want an offset to match the thickness of your columns on a deck, for example, draw a **Plane** around the edge and offset it before Adding a Railing. Then, use the **Convert to Railing** button.

If you change an object that you want your Railing to match, you will have to Modify your Railing or delete it and go through the tracing process again because Railings are not anchored to objects that are not Stairs. You may be able to use Anchors to help this problem but that would only assist in keeping a Railing object locked to a position; it still will not adjust in size.

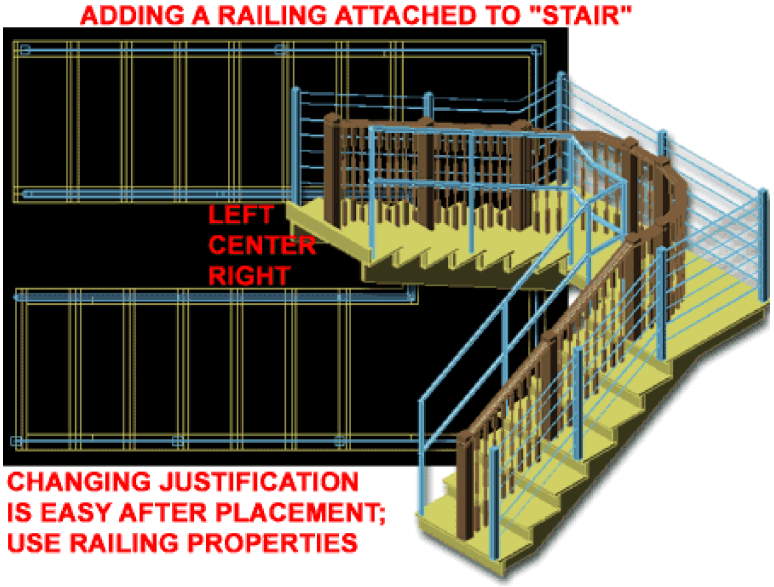


Adding Railing Attached To: Stair



Using the **Attached To:** "**Stair**" option not only Anchors your Railing to your Stair objects but reads the object and produces a Railing that runs the full flight from floor to floor; around landings and even Customized Edges (see image, left). If you change your Stair, the Railing will automatically adjust.

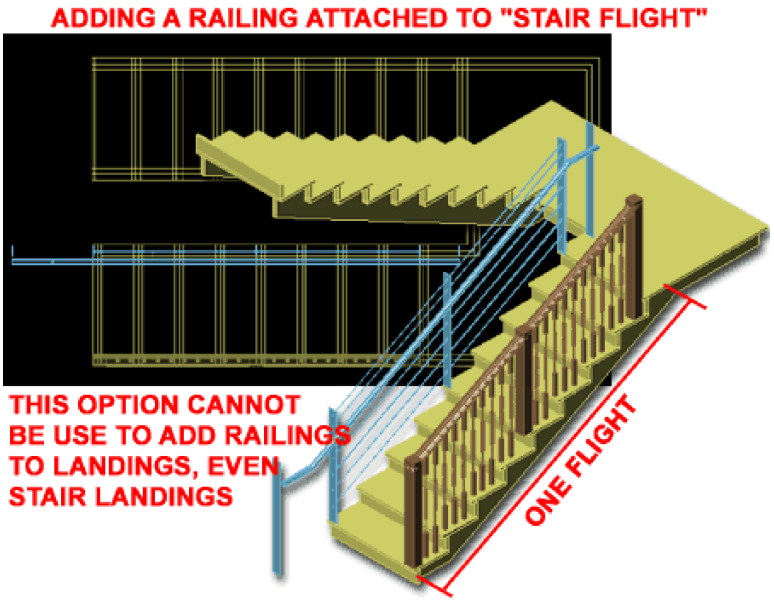
When you Add Railing and are queried to select a Stair object, the point at which you pick is use to determine the closest justification option (Left, Center or Right) and thus you may often end up with a Railing in the Center (as is illustrated to the right). If you end up with a Railing justified on the wrong side or in center, you can use the Railing Properties command to easily change the Justification - Anchors tab of Railing Properties.



Adding Railing Attached To: Stair Flight

Using the **Attached To:** "**Stair Flight**" option is very similar to the Attached To: "Stair" option, but only produces a Railing that runs the length of one flight from floor to landing or from landing to landing/floor. The anchoring and amazing ability to adjust to Customized Edges is also a part of this type of Railing option.

The only unfortunate aspect of this, that I see, is that you cannot use this option to place a Railing on a Stair landing. In some cases, for example, you want one type of Railing for open stairs but another at a landing that might be surrounded by walls (you might even want to switch to a simple guardrail at such a point). To achieve this result, you will have to use Attach to "none" for the landing portion and draw a separate Railing at the landing as discussed above.



14 Modifying Railings

Modify Railing Properties Palette

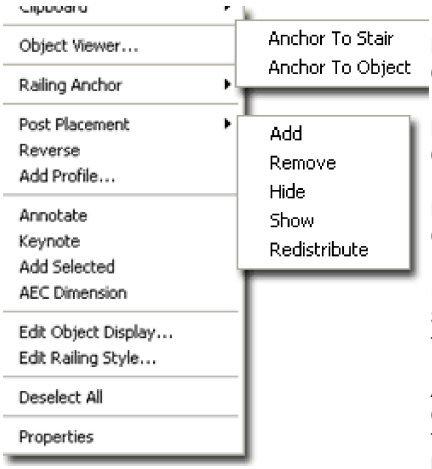
Alt.Menu **Design> Railings> Railing Properties**

Keyboard **RailingProps** or **-RailingModify**

Mouse Double pick on Railing Object with left button

Links Railing Styles - for how to create a Railing Style.

For **Modifying Railings** you can use the **Properties Palette** which offers nearly all of the same options as those found when Adding Railings. Under the Dimensions section you should find several dialog box access buttons but unless the Railing Style is set to " **Allow each Railing to Vary**", these dialog boxes will remain inaccessible.



DIMENSIONS

Rail locations - see cell directly below.

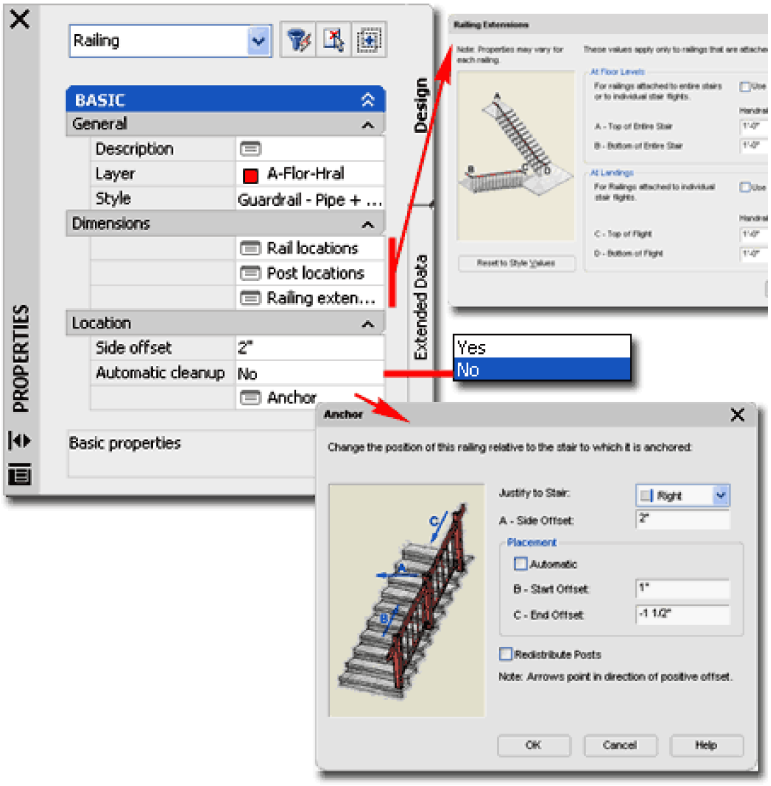
Post Locations - see cell directly below.

Railing Extensions - see cell directly below.

LOCATION

Side Offset - this value field is not available for Railings that have been Attached to "None". For all other Railings, this value field provides the option to move a Railing, Posts and all, horizontally relative to the Justification. See also Anchor dialog.

Automatic Cleanup - at the time of this writing I could find no evidence that this Yes/No option actually did anything to the Posts.



Anchor - this dialog box provides the option to change the original Justification to **Left**, **Right** or **Center** and another place to change the Side Offset value as discussed above. **Post Placement** is typically **Automatic** but can be set manually by using negative or positive values for " **B - Start Offset**" and "**C - End Offset**". If you move the first and/or last post position you may also want to have the remaining Posts and Dynamic Post positions redistributed based on the specifications within the Railing Style; use the "**Redistribute Posts**" checkbox for this feature.

Illustrated to the left I show the object-specific pop-up menu and the options you have for an un-Anchored Railing Object. In addition to these options, you will find some flexibility for controlling the design of Railing through the use of Grips.

Railing Styles dialog box - Allow Each Railing to Vary

Links [Railing Styles]

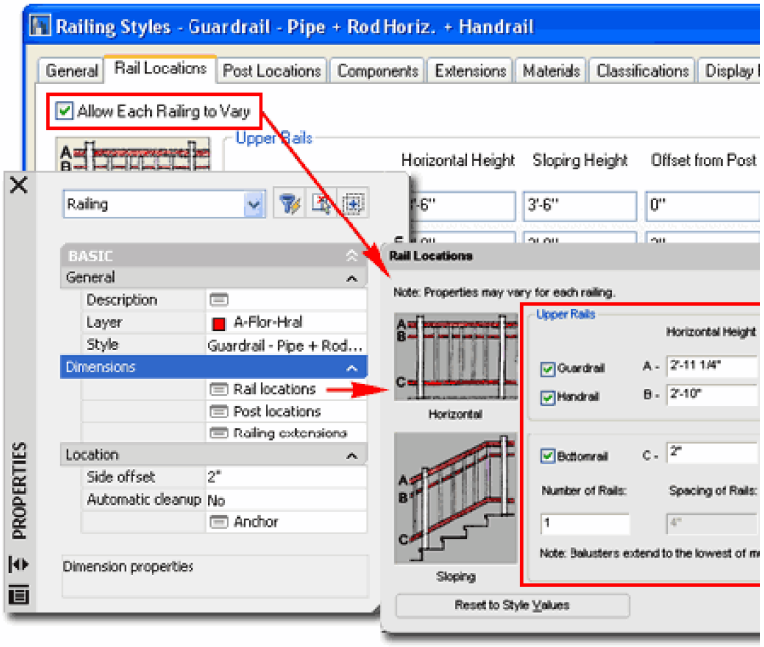
[Railing Styles - Rail Locations tab]

[Railing Styles - Post Locations tab]

[Railing Styles - Extension tab]

On the **Rail Locations** tab of the **Railing Properties** dialogue box, you may find that every value is gray and that you cannot edit any of the value fields. In fact, you may find that this is also the case for the **Post Locations** tab and the **Extensions** tab. This is because the Railing Style controls these settings.

If you go to a **Railing Styles** dialog box and look at the same set of tabs, you should see a check box on each of these tabs that offers "**Allow Each Railing to Vary** " as an option - see illustration, right. By checking these checkboxes, you provide the freedom to modify the value fields and settings through the Add and Modify Properties Palettes.

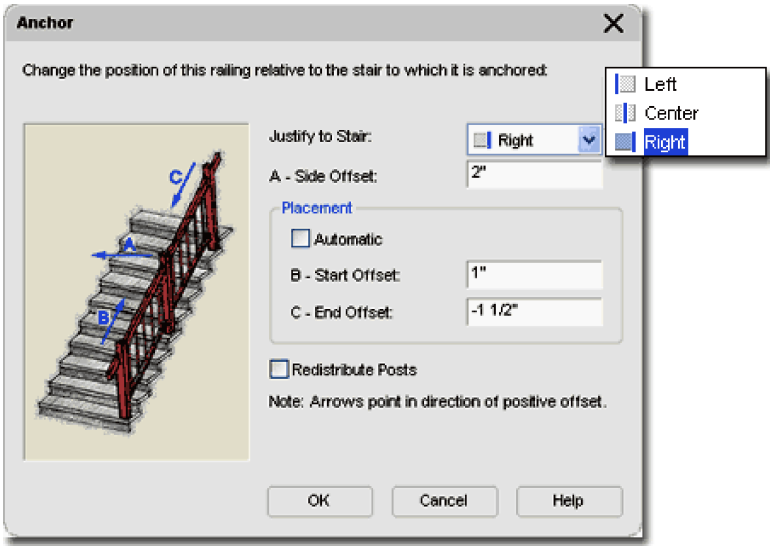


The Good vs. the Bad:

If you work with Allow Each Railing to Vary, you can end up with numerous different permutations of a single Railing Style in your project making it difficult to change all of them from a single dialog box. The good news about this is that you can always change your mind and go to the Railing Style tabs and uncheck this option to regain control of all Railing permutations. Doing this, however, means you will lose unique changes you may have made to those Railings.

Railing Properties - Anchor tab

On a Railing **Attached to** a **Stair** or **Stair Flight**, the Modify Properties Palette will offer access to the **Anchor** dialog box.. This dialog box also allows you to change the Justification of an Attached Railing, which is a great option if you simply want to move a Railing form one side of a Stair to the other.



Justify to Stair - Left, Center and Right are the three choices you have and if you want something beyond those points, you will have to use Side Offset.

A - Side Offset - this is the same offset option you should see directly on the Properties Palette when you [Add a Railing] or Modify a Railing. This value has to do with how far in from the Stair edge you want the centerline of your Railing Posts.

Sometimes I have been in a real hurry and simply copied an existing Railing by picking twice in the same spot on a stair (the Railing is anchored, so the copy will stay in the same position as the original); then I have used this Justification option to make the copied Railing hop over the the other side.

Placement

Automatic - on/off checkbox for the manual placement of First and Last Post relative to a Stair's Riser positions.

B - Start Offset - this is an offset perpendicular to the Risers so you can move the first post forward or back relative to its current position and affects the bottom of a Stair. Positive numbers pull a Post back in towards a Riser and negative numbers push a Post out away from a Riser. By using Grips on a Railing, you can change this value. Too much of an Offset in either direction may create unwanted results particularly since all of the Railing detail, such as the Balusters, are affected by this value.

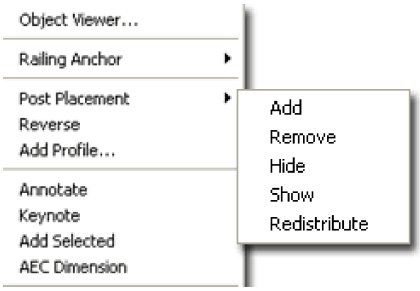
C - End Offset - this is just the same as Start Offset but for the top post. By using Grips on a Railing, you can change this value.

Redistribute Posts - The first thing you should be aware of about this unusual checkbox is that it is really more like Apply option; i.e., you check it to use it once to make a change and then it unchecks automatically. This box will never remain checked because of how it is works. This option can really mess up your work or fix mistakes. Redistribute is like a reset button where the posts get placed according to the default positions and new ones will be added at the ends if any Start or End Offset values have been set.

Post Placement Options

Keyboard	**RailingPostAdd**, **RailingPostRemove**, **RailingPostHide**, **RailingPostShow**, **RailingRedistributePosts**
Mouse	Select Railing Object, right click, select Post Placement and cascade to a desired option

For Railings you can work with the Object-Specific pop-up menu to **Add**, **Remove**, **Hide**, **Show** and **Redistribute Posts** along a Railing run. If you prefer to work in an Isometric View, you may need to use an Osnap like Nearest in order to Select the desired Post(s).

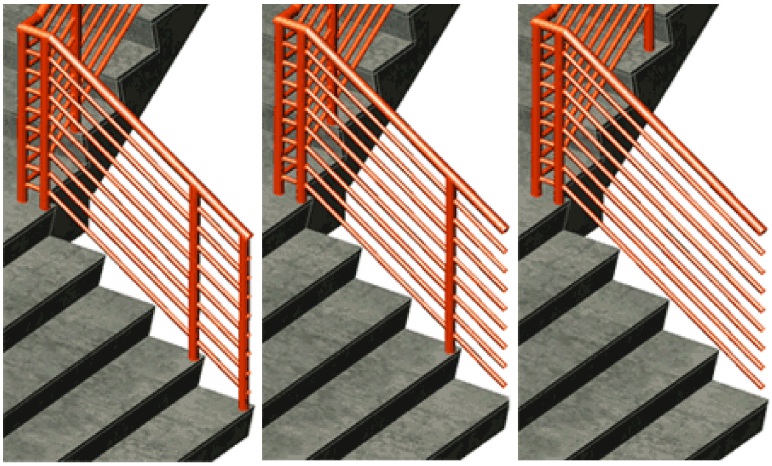


Add - by Osnapping to a specific point or by selecting a general point between other posts, you can use this option to introduce a new Fixed Post. You cannot Add a Post beyond a Railing's start or end position. Grips can be used to relocate an Added Post.

Remove - this option can only be used on Fixed Posts that are not also Corner Posts. Dynamic Posts cannot be Removed with this option. The Redistribute option can be used to Undo Added and Removed Posts.

Hide - this option can be used to turn off the display of one or more Posts.

Show - this option turns the display of all Hidden Posts back on.



POST ADDED POST HIDDEN POSTS REMOVED

Redistribute Posts - will match them against the Style settings and will remove custom changes such as Added, Removed or Hidden Posts. Think of this option as a Reset for Railing Po sts. This option can be great after Grip Stretching Fixed Posts to new Positions since it will redistribute based on the new positions.

Reverse Railing

Keyboard	**RailingReverse**
Mouse	Select Railing Object, right click and select Reverse

The **Reverse** Object-Specific pop-up menu option serves a function similar to the Mirror command by flipping the inside edge of a Railing to the outside edge and is very useful in working with Railing Styles that use a Handrail on one side. Essentially this is a tool to assist in working with Asymmetrical Railing Styles. If you need to work with any of the simple Handrail (or grab bar) Railing Styles that come with ADT that appear to only work for one direction, this is the tool to use to get those Railing Styles to work in the opposite direction.

Add Profile

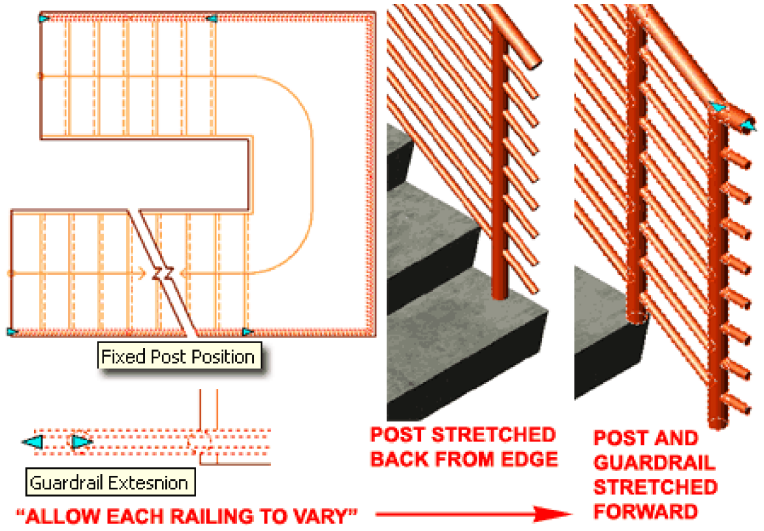
Keyboard	**RailingAddComponentProfile**
Mouse	Select Railing Object, right click and select Add Profile...
Link	Profile - Edit in Place - for more information on Profiles and the process of editing them right on objects

The **Add Profile** Object-Specific pop-up menu option allows for rapid changes to the Profile shape used to determine how the various Components within an existing Railing Style should appear. You can use this option to change a Railing Component to any existing Profile Definitions or to a new one created on-the-fly. When you wish to create a new Profile, you should notice that the In-Place Edit toolbar will appear and that the current Profile will be available for In-Place editing.

Railing Grip Points

For most Railings, the only **Grip Points** that you will find are on the **Fixed Post Positions** as illustrated to the right. Depending on the particular Style Settings, you may find the Stretch capabilities fairly limited for the Fixed Posts. In the middle illustration to the right I show how I have only been able to Grip Stretch the end Post back from the Stair Edge but not Forward.

If a Railing Style has one or more of its Tabs set to " **Allow Each Railing to Vary**", you should find more flexibility and freedom in what can be achieved with Grip Points. Illustrated to the right I show that in allowing my Railing Style to Vary, I was not only able to Stretch the End Post forward but also the **Guardrail Extensions** (independently). If your Railing Style has Guardrails and Handrails, you can Grip Stretch each independently.



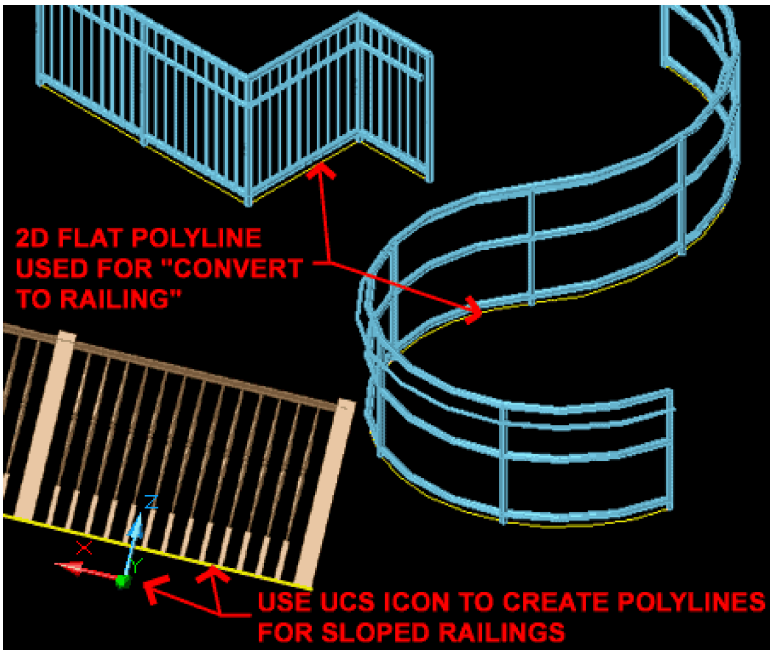
Convert to Railing

Menu **N.A.**

Keyboard **RailingConvert**

Converting a Polyline to a Railing is about as simple as it can get; just draw a regular Pline and use the Convert to Railing tool to create a Railing that follows the Pline as a path. When you use the Convert to Railing tool and select a Pline, you will be prompted to select a Railing Style.

To create sloped Railings, change the UCS icon to match the slope of your intended Railing, Draw your Pline and then use the Convert to Railing tool. If you don't adjust your UCS icon, the Railing will not follow the slope because it only reads the X and Y coordinates of the object as it was drawn, relative to the coordinate plane. This means that a Pline drawn in Front view, for example, will produce a sideways Railing.



Anchor Railing to Stair or Object

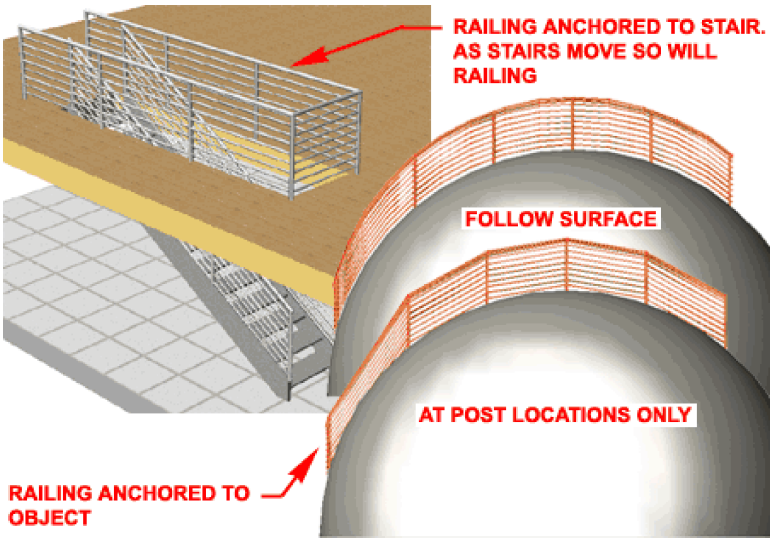
Menu **N.A.**

Keyboard **RailingAnchorToStair**

For Railings there are three primary Anchor options: **RailingAnchorToStair**, **RailingAnchorToObject** and **AnchorRelease**. The Anchor to Stair option is a bit unpredictable and does not have a consistent result but there are basically two results that you can expect most of the time. If a Railing tends to follow the shape of a Stair and is very close the Anchor option will usually attempt to transfer the Railing on to the Stair as if Attached to it. If the Railing is not particularly close to the Stair nor particularly similar to the Stair path, the Anchor simply sets a link between the two Objects so any Movement of the Stairs also Moves the Railings. This later option can be really handy when you have a Railing that wraps around a Stairwell.

The Anchor to Object option can be rather amazing since it has an internal option to "Follow Surface" allowing such results as Railings that wind over and around a Mass Element Sphere.

Note:



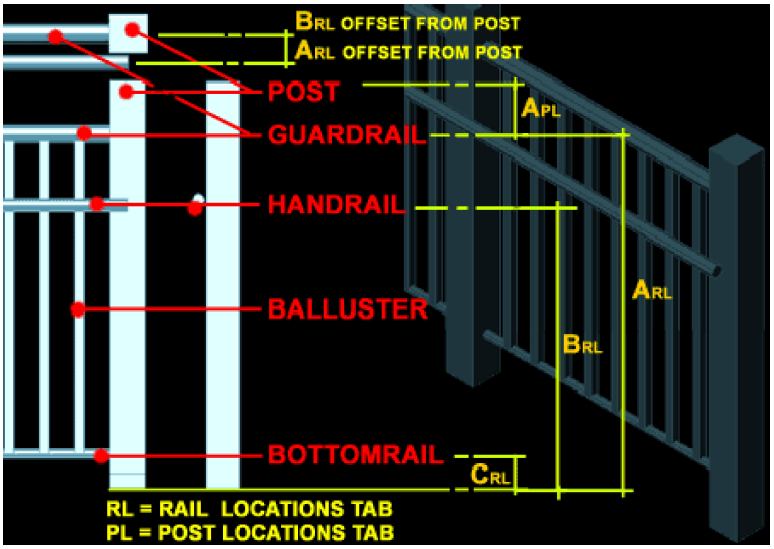
When using the Anchor to Stair option to control a Railing such as that in the illustration to the right, make sure to position the posts outside the edge of the Stair Object (on all sides) to prevent the Railing from jumping to the Stair Object itself.

15 Railing Styles

Railing Properties - Schematic Diagram of Components

Before you venture into the world of the Railing Styles dialog box and all of its settings, take a look at the illustration to the right and notice that there are five primary parts of Components to a Railing Object. In the physical world each Component Name connotes a certain function but in the digital world these names are more like placeholders and numeric controllers for just about anything you can dream up. This means that you can work with the Style settings in a very literal fashion or in a completely creative fashion to produce results that may not even have anything to do with Railings.

Unfortunately, on each tab you will find the same letters, like A, B and C used to represent different dimensional settings; i.e., A on the Rail Locations tab refers to a Guardrail's Horizontal Height and Offset from Post while A on the Post Locations tab refers to the **Extension of ALL Posts from Top Railing** height. On the graphic illustration to the right, I attempt to show some of the locations settings from two different tabs by using RL for **Rail Locations** tab and PL for **Post Locations** tab.



Style Manager - Railings

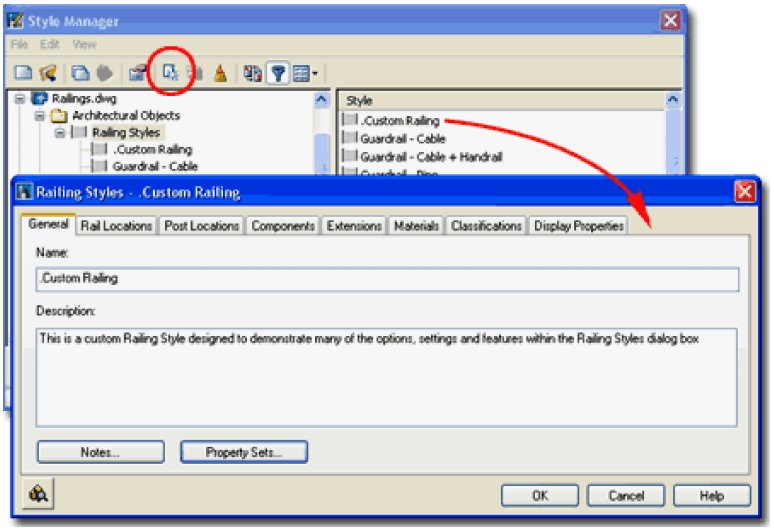
Alt.Menu **Design> Railings> Railing Styles...**

Keyboard **RailingStyle**

For Railing Styles, you can use the **Style Manager** to load, modify, delete and create new Railing Styles.

Though you can easily create New Stair Styles from Scratch using the **New button**, you may want to use the **Copy/Paste** technique instead because it is far easier to Modify Settings of an existing Object Style than it is to create one from Scratch. In some cases, you may even miss specific settings that can come back to haunt you much farther down the road on a project - things like Display Representations or Data for Schedules.

Illustrated to the right, I show the process of creating a **New** Railing Style that I have Named " **Custom Railing**". By **double-click**ing on this new style, you will invoke the **Railing Styles** dialogue box - as illustrated.



The **General** tab provides access to the **Name** and **Description** fields for a Style; plus access to the attachment of **Notes** and Property Sets.

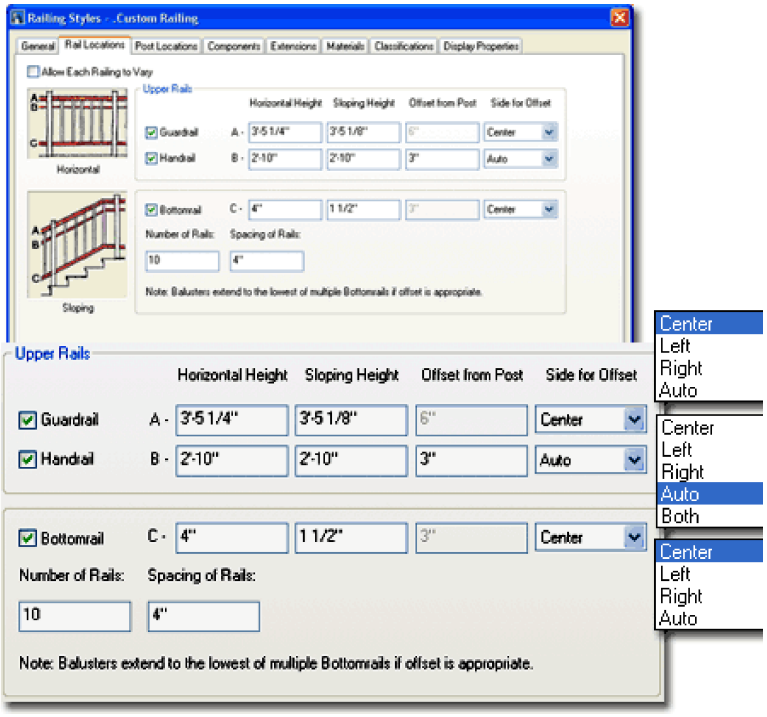
Railing Styles - Rail Locations tab

On the **Railing Locations** tab of the **Railing Styles** dialog box, you will find height and justification setting for **Guardrails**, **Handrails** and **Bottomrails**. Though each rail type connotes a certain function in reality, you do not always have to take these terms literally and understanding what each rail type controls is the most important thing to master. Likewise, setting values here does not necessarily mean that you will see the rail because there are other options for sizes and Component Display Properties for visibility control.

Allow Each Railing to Vary - this checkbox will provide access to these settings through the Properties Palette.

Guardrail - on/off checkbox but you cannot have both Guardrail and Handrail off. If you don't want either, you can set their dimensions to zero under the Components tab or use the Display Properties tab to turn their Visibility Off.
A - The **height** values should be self-evident from the graphics on this tab; the measurement is from base of column to centerline of Guardrail. **Offset from Post** refers to how far out from the centerline of a post you want the centerline of your Guardrail in cross-section view. **Side for Offset** refers to which side of the Posts you want the Guardrail; there are four options: **Center**, **Left**, **Right** and **Auto**. I have found that Auto works rather well but you may need to use the other options for cases where you are not attaching your Railing to a Stair or Stair Flight.

Handrail - on/off checkbox but you cannot have both Guardrail and Handrail off.
B - The **height** values should be self-evident from the graphics on this tab; the measurement is from base of column to centerline of Handrail. **Offset from Post** refers to how far out from the centerline of a post you want the centerline of your Handrail in cross-section view - if you also use Guardrails, you will most likely want to run your Handrails on the outside of your columns. **Side for Offset** refers to which side of the Posts you want the Handrail; there are five options: **Center**, **Left**, **Right**, **Auto** and **Both**. I have found that Auto works rather well but you may need to use the other options for cases where you are not attaching your Railing to a Stair or Stair Flight. Both is really nice for cases where you are running a Railing down the center of a wide set of stairs.



Bottomrail - **on/off** checkbox; if off, Balusters will run all of the way down to the Floor (Tread).
C - The **height** values should be self-evident from the graphics on this tab; the measurement is from base of column to centerline of Bottomrail.
Number of Rails allows you to create unique Railing designs by adding more horizontal members. If the number is set to a value greater than or equal to 2, you will be able to specify a **Spacing of Rails** in the value field below this value field. The **Spacing of Railings** refers to a centerline distance between the Bottomrail for each consecutive Bottomrail specified in the Number of Rails value field.

Railing Styles - Post Locations tab

Allow Each Railing to Vary - this checkbox will provide access to these settings through the Properties Palette.

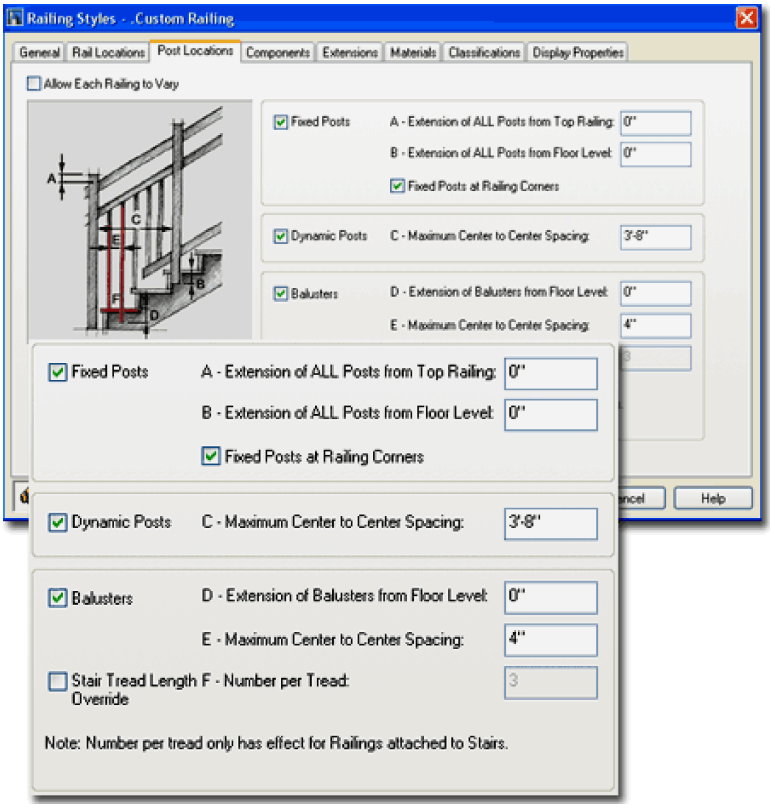
Fixed Posts - **on/off** checkbox for posts. If you uncheck this, you will also be turning off Dynamic Posts.
A - Extension of ALL Posts from Top Railing - This value actually is only affected by the position of either the Handrail or Guardrail. If the Guardrail is on, no matter what height, it will control the Extension of the posts if you want a low Guardrail and a high Handrail, you will have to Extend the Posts up to compensate.

B - Extension of All Posts from Floor Level - this value field can be used to project Posts down beyond the Tread (Floor) level using a positive number. Negative numbers can be used to raise Post bases up from the the Tread (Floor). Values used here lengthen or shorten the Post. Extreme negative values can actually project a Post up past it's top. This option is useful for Deck Railings where the posts need to be fixed to the ground but does not work well for achieving the same results on Railings that are Anchored to Stairs because of the slope.

Fixed Posts at Railing Corners - this checkbox option places a Post at every Railing transition point from horizontal changes in direction to vertical transitions such as riser to landing. It will place a Post not only at all corners of landings but also at corner breaks where you may have done extensive Custom Edge modifications to your Stair.

Dynamic Posts - **on/off** checkbox for spacing of posts not to exceed Max. Spacing value.
C - Maximum Center to Center Spacing - a value used to determine the greatest distance allowed before a Post must be placed. This value does not mean that all Posts will be exactly this far apart; Fixed Posts at Railing Corners, for example, will override this setting where needed.

Note: if you uncheck Dynamic Posts, you can place Post locations manually when creating Railings that are Attached to none .



Balusters - **on/off** checkbox for Balusters and spacing value.
D - Extension of Balusters from Floor Level - this value field can be used to project Balusters down beyond the Tread (Floor) level using a positive number.

E - Maximum Center to Center Spacing - this value field is used to specify the centerline to centerline distance between the Balusters. Keep in mind that Building Codes typically specify a dimension from inside face to inside face rather than from centerline to centerline. In the U.S., for example, you cannot allow a 4" diameter sphere to pass through your Balusters.

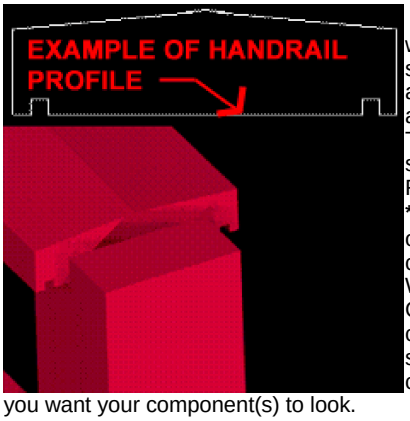
Stair Tread Length - on/off checkbox for the Override value field.
F - Number per Tread Override - When you use this value field, you are specifying how many Balusters you want for each Tread on a Stair Object, regardless of center-to-center spacing, per Tread Length.

Railing Styles - Components tab

Link Profiles - for more information on Profiles.

The **Components** tab of the **Railing Style** dialog box, illustrated to the right, is where you can specify the dimensional proportions of your Railing Style's Components. By default, you will find that there are two Profile Names that define two primary shapes: Rectangular and Circular.

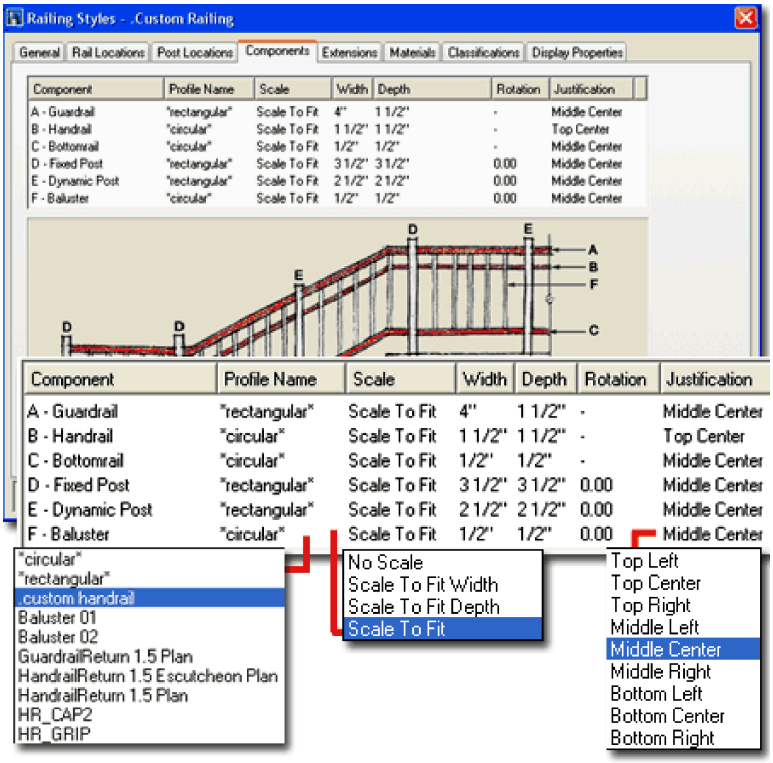
Components - this column of Components, lettered A-F is fixed. Though you cannot add Components, you can set change their shapes or set the dimensional values to zero. Custom items can be added through the Display Properties tab.



Profile Name - by picking within one of these cells, you should get a drop-down list of all the Profile names currently available in your drawing. There are two unique names specifically designed for Railings: ***circular*** and ***rectangular***. You can think of these as cylinders and columns depending upon the Width, Depth and Heights of Guardrails and Handrails. For custom shapes, you can select a Profile drawn as a cross-sectional view of how you want your component(s) to look.

Scale - this drop-down list is only available for custom Profile Names and offers the option to control custom Profile shapes uniquely. The scale is based on the Width and/or Depth values so "Scale To Fit, for example, will scale to fit the Width and Depth values.

Width and Depth - these value fields allow you to specify the physical dimensions of the Components in cross-section or profile view. Therefore, Width and Depth will be represent different directions in space depending upon the Component.



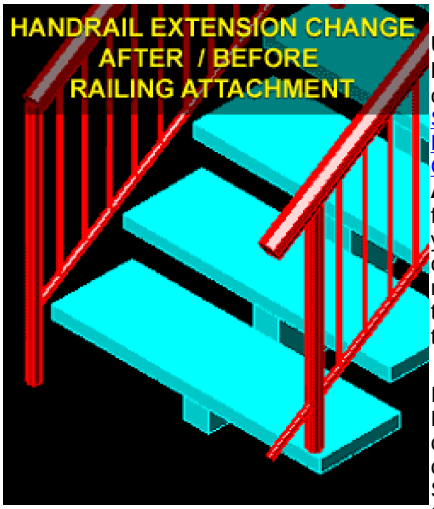
Rotation - this value field allows you to rotate your Component relative to its cross-sectional or profile view; Posts, for example, would be rotated based upon a Plan View.

Justification - this drop-down list offers an extensive number of Justification types including "Insertion" for custom Profile Names. The types will vary relative to the Component and the direction of Justification; i.e., Plan versus Elevation. Though these justifications refer to the cross-sectional or profile view of each Component, their position is always relative to an absolute centerline. Some Components, like the Guardrail, Handrail and Bottomrail have an Offset direction that determines how they are placed relative to this absolute centerline while this justification affects the position of the profile relative to that offset direction.

Railing Styles - Extensions tab

Allow Each Railing to Vary - this checkbox will provide access to these settings through the Properties Palette.

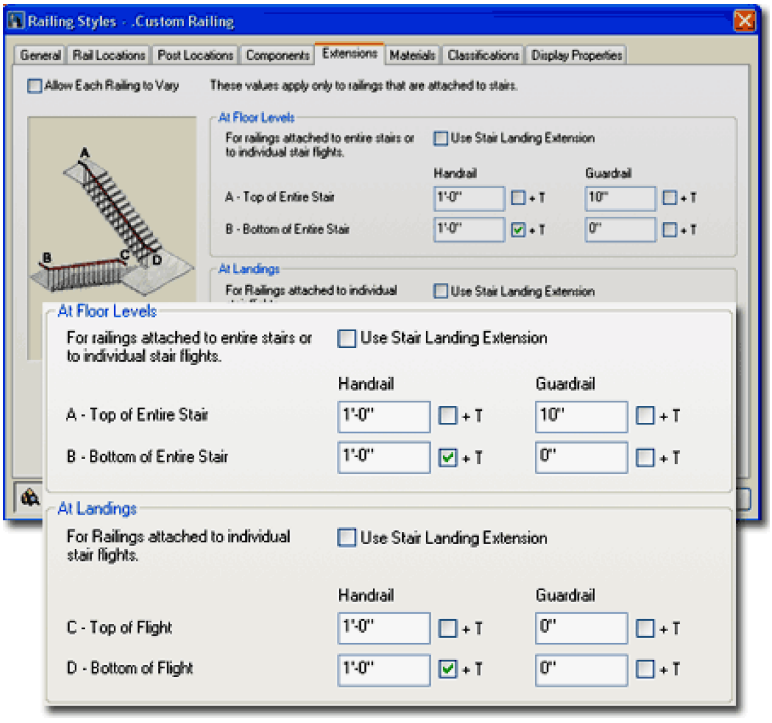
On the **Extensions** tab of the **Railing Properties** dialog box, you should find control settings for how you want your Guardrail and Handrail Extensions relative to Stairs or Stair Flights.



At Floor Levels Use Stair Landing Extension - on/off checkbox that defers to the Stair Style for how much to Extend the Handrail and/or Guardrail at Floors.

A - Top of Entire Stair - for all of these value fields, you can use positive (out) or negative (back) numbers and you can Add the depth of the **T**read to these values as well (+ **T**).

If you check the "Allow Each Railing to Vary" checkbox for this tab, you can actually use Grips to Stretch the Extension of Guardrails and/or Handrails. Guardrail Extensions also affect Balusters and Bottomrails.



B - Bottom of Entire Stair - see comments for A - Top of Entire Stair.

At Landings
Use Stair Landing Extension - on/off checkbox that defers to the Stair Style for how much to Extend the Handrail and/or Guardrail at Landings.
C - Top of Flight - see comments for A - Top of Entire Stair.

D - Bottom of Flight - see comments for A - Top of Entire Stair.

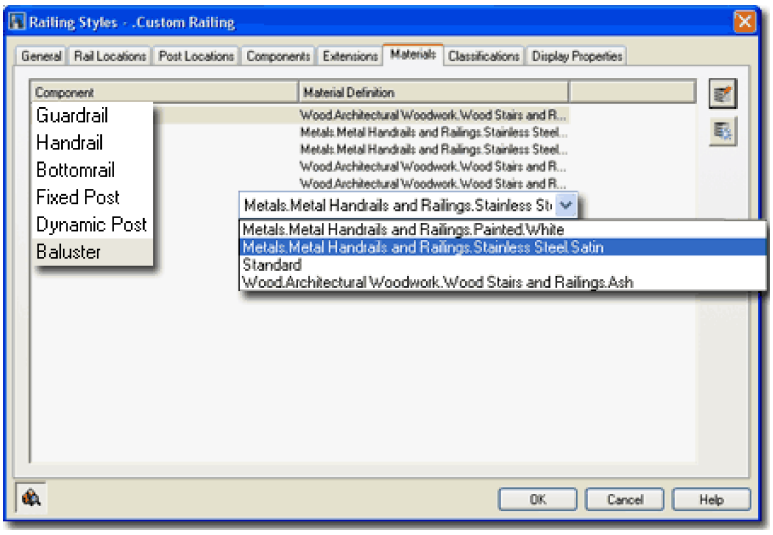
Railing Styles - Materials tab

Links Object Style Properties - Materials Overview - for an expanded step-by-step explanation of Materials

The subject of **Materials** is one of the most expansive and confusing topics in Architectural Desktop because it requires a complete comprehension of the product in order to take full advantage of this feature; from object styles to display representations. This subject will be discussed under **Part 1 - Display** and in the Presentation eGuide.

Illustrated to the right I show that Railings will offer six fixed Components: **Guardrail, Handrail, Bottomrail, Fixed Post, Dynamic Post and Baluster**. If you create a Railing Style from scratch, the default **Material Definition** Name will be set to "Standard". If you have imported any of the Architectural Desktop Railing Styles from the Object Style Library, you should find that you will be able to use the Material Definitions that come with those objects - as illustrated to the right where I am selecting "Metals.Metal Handrails and Railings.Stainless Steel Satin".

See also Stair Styles - Materials tab.

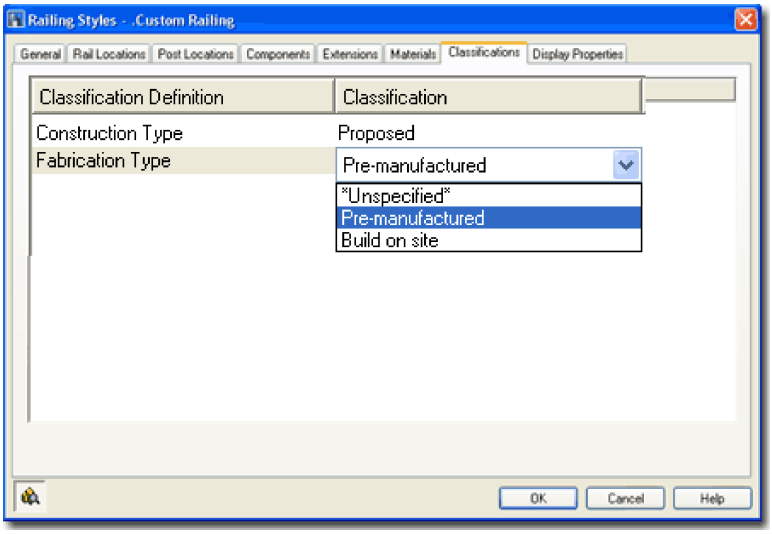


Railing Styles - Classifications tab

Links Object Style Properties - Classifications Overview - for an expanded step-by-step explanation of Classifications

The subject of **Classifications** is thankfully no where near as complicated as that of Materials so the only real question you will need to consider is if you need to use them. Classifications offer another way to separate Object Styles into categories that can be used in **Schedules** and even in **Display Representation Sets** (as "**Show**" or "**Hide**").

Illustrated to the right I show that I have two **Classification Definitions** (see **Format** pull-down menu), each with a list of **Classification Names** or Types. Generally you will not have any options on this Tab but if you have created at least one Classification Style that has been set to "Apply To" Railing Styles, you will be able to use it here. The range of use is really up to your imagination but it is fairly obvious that Classifications can be quite handy in Schedules. This topic will be discussed further under Part 18 - Schedules. You can also read a bit more about how to create Classification Definitions in **Part 1 - Display**.



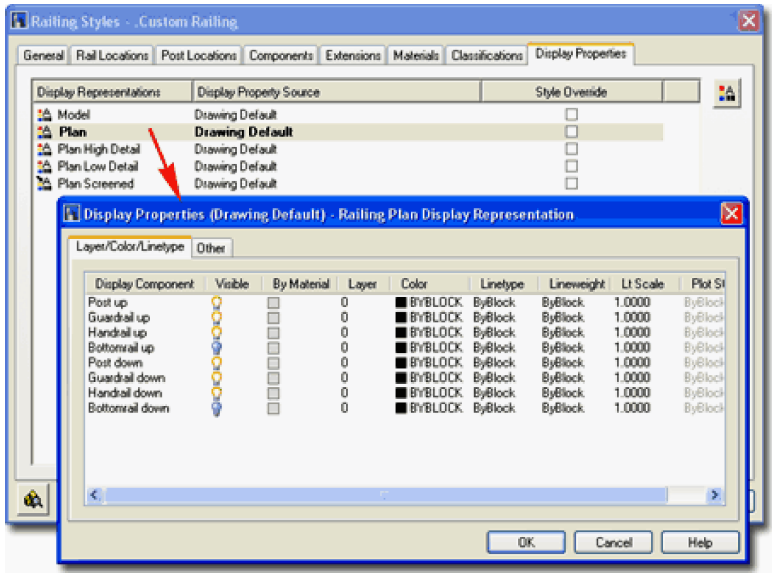
Railing Styles - Display Properties tab

Links Object Style Display Properties Overview - for the full story on Display Properties for Style

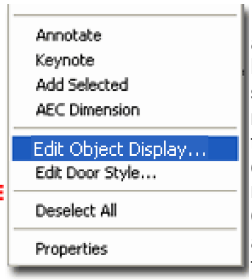
Object Display Property Overrides - Object and Style Based - for an explanation of the differences between using Display Properties via the Styles versus the Edit Object Display...

option.

The **Display Properties** tab of the **Railing Styles** dialog box, illustrated right, provides access to the display characteristics of the components of your Railing objects; from Visibility to Custom Blocks and Cleanup Settings. This is also where you would go to have Railings change color or Materials, for example, when you switch from one Display Configuration to another. See the discussion on Railing Display Properties below for more information on this subject.

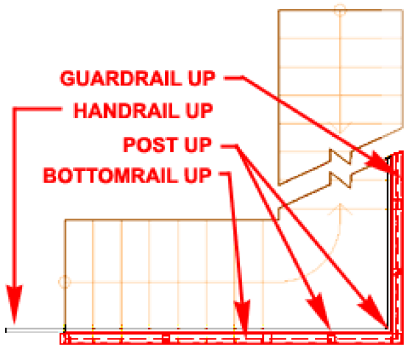


YOU CAN ALSO ACCESS DISPLAY PROPERTIES BY SELECTING AN OBJECT, RIGHT-CLICKING ON YOUR MOUSE AND USE THIS POP-UP MENU OPTION



Illustrated to the left, is another way to access the **Display Properties** tab; **select** the specific **object**, **right click** on your mouse to invoke the object-specific pop-up menu and select **Edit Object Display...** Just be aware that when you use this approach, you can actually set an Object Override as opposed to a Style Override. Object Overrides can be extremely useful because they allow you to add things like Riser Numbering to any object within a Style Family but they can also be problematic because they lock you out from more centralized, Style level, controls.

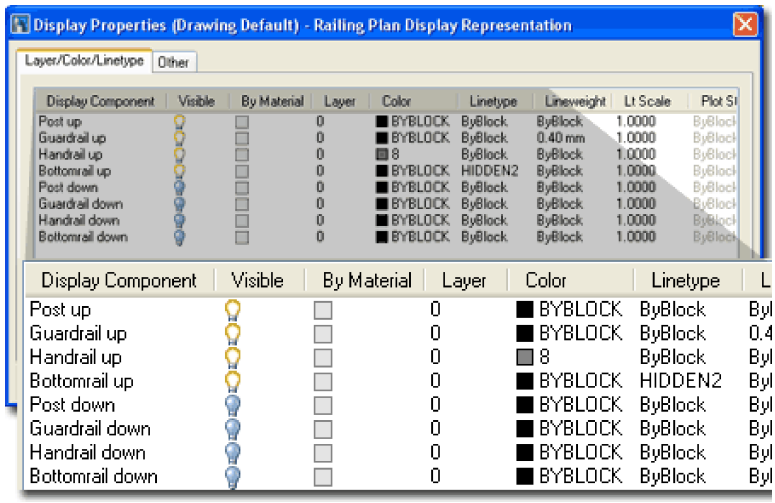
Railing - Display Properties - Component Layers



Illustrated to the right and left I show all of the Railing Display Components for the "UP" portion of a Railing Anchored to a Stair Object (the "Down" portion has been turned off for clarity).

Under the default **Plan Display Representation**, you should notice that you cannot control any of the Railing Display Components "**By Material**" so all settings are controlled right here on the **Display Properties dialog**.

Generally, the scale of the drawing and the level of detail you wish to communicate at that scale will determine what Display Components you wish to have Visible. For Plan View, I tend to only want the Handrail or Guardrail linework and definitely not the Posts or Bottomrails but it all depends on what you are trying to communicate.

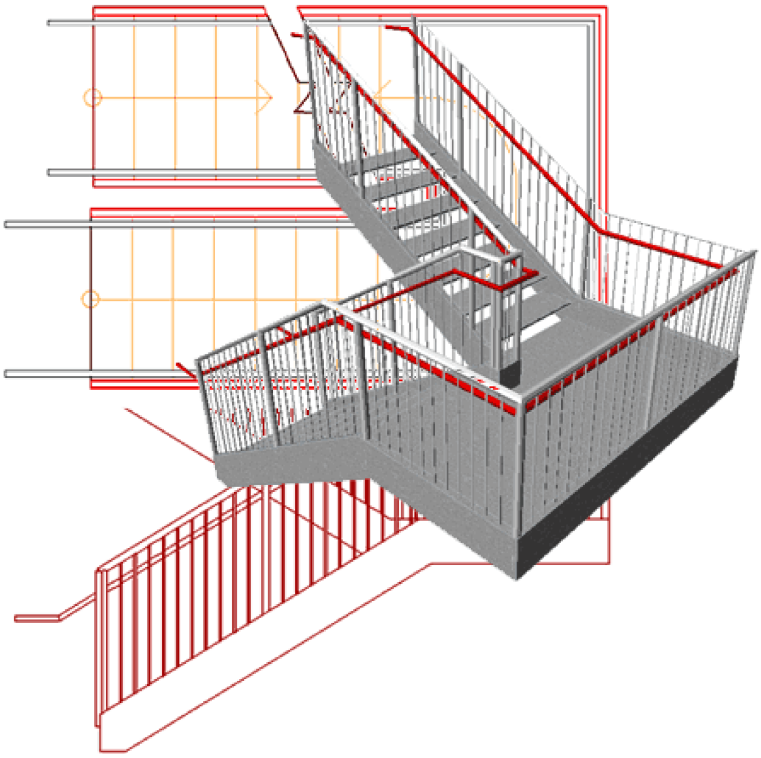


As with the Stairs, when it comes to Railings you may need to use even more retrain to adopt a "**less is more**" approach since adding detail is not only easy but fun. The price for detail, however, is significant and just a few railings can affect display performance on your system in very dramatic ways; especially when Zooming or Panning while Shademode is on and Materials are active.

Having said that, I have to admit that Railing Styles are one of my favorites and I continue to come up with odd new things that I can use them for. The whole Fences Kit that I offer on the ARCHIdigm.com website was created with Railing Styles. You see, Railings do not need Stairs to work so you can draw with them much like a Wall, Curtain Wall or other linear Object type. If you need curved Railings, you can use Polylines as a source for Converting. You can also Anchor Railings to other Objects such as Mass Elements and wrap them over the top of Domes, for example.

The primary feature that makes Railing Styles so useful for me is the option to Add custom Blocks and substitute them for the default internal Components. By using your own custom Blocks you can, for example, use Railings to create Street Lamp layouts or even planting systems.

Illustrated to the right I show a simple example of a default Metal Railing Style whose Display Properties were modified slightly. In Plan View I turned the **Posts** off and changed the Color of the **Handrail** Components so they will print lighter than the **Guardrail** Components. In Model View, I changed the Handrail Material to a Red Metal. When I Attached this Railing to the default Steel Stair, I use the Side Offset Property to center the Posts on top of the exterior Stingers.



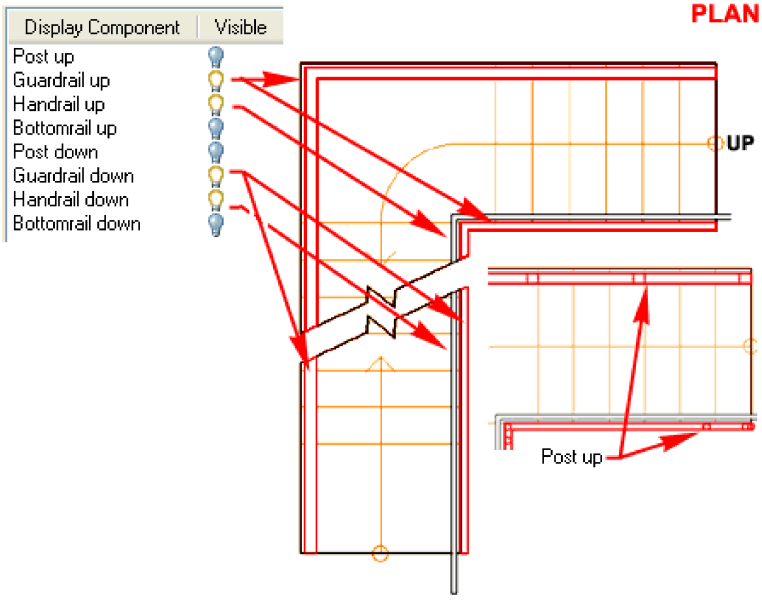
Railings in Plan

Menu	**Format> Display Manager...**
	
Keyboard	**DisplayManager**
Keyboard	**DisplayProps** [**Attach**]
Mouse	Select Object, right-click, select Edit Railing Style... or Edit Object Display...
Links	Part 1 - Display - Object Display Properties Overview - for more information on how to access the Display Properties of this Object.

In **Plan View**, Railings will pretty much all look the same but there is one major option that produces a different effect: Anchoring to Stairs. Railings that are not Anchored to Stair Objects will not distinguish between Up or Down Display Components nor will they offer a Cut Plane. This means that Stairs affect the Display of Railings.

Illustrated to the right I show two different Railing Styles that have been **Attached** to a simple "Standard" Stair Style. By default, most of the default ADT Railing Styles display Posts in Plan View even when those posts are completely hidden by a Guardrail so I show the " **Post up**" and "**Post Down**" **Display Components** turned **Off**.

For the most part identifying what each of the **Display Components** control should be relatively easy and since the list repeats for the Up and Down Components, it is actually far shorter than it appears at first glance. **Bottomrail** display is usually too much detail for common Construction Documents and may be something more appropriate for a Detail. There is no Hatch Display Component for Plan.



Illustrated above I show a slightly modified version of the default " **Medium Detail**" Display Configuration which uses the " **Plan**" **Display Representation** for most Objects. In order to illustrate how you can lighten a **Handrail** I changed its Display Component Color to Gray. I turned Off the Visibility of the **Posts**.

Railings Above and Below the Cutting Plane

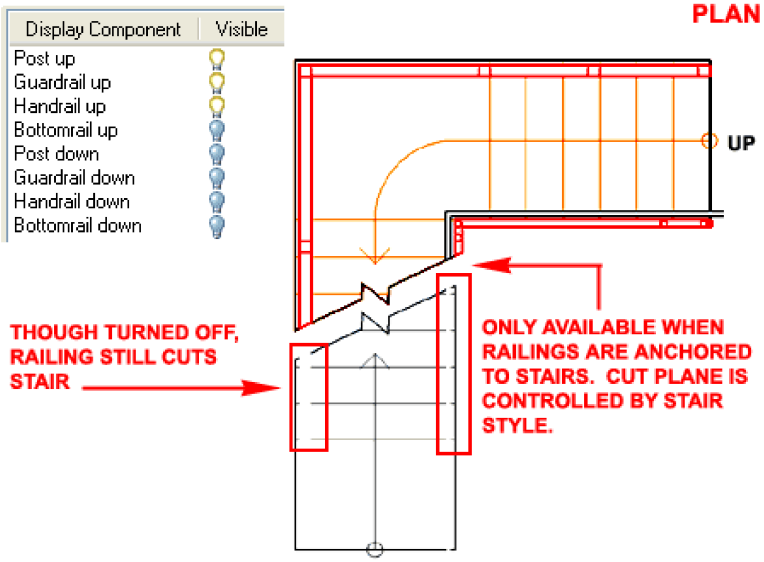
Links

Part 1 - Display - Object Display Properties Overview - for more information on how to access the Display Properties of this Object.

Up-Down Display of Stair in Architectural Desktop 2004 - for a full article on a trick I created to solve this problem when using the same stairs between 2 floors.

Since Railing Object Display Components have been divided in half under several of the Display Representations, it is fairly easy to turn the **Visibility On** or **Off** for all of the "**Up**" or "**Down**" **Display Components** as illustrated to the right. Notice, however, that if you turn Off the Visibility of a Railing but don't match that setting on the Stair, the Stair still gets cut by the Railing.

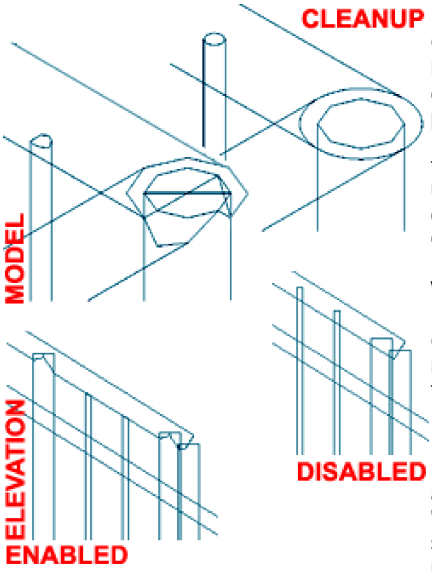
To control the Zigzag **Break Mark** and the **Cut Plane Height** for the Railing, you must adjust these settings on the "Other" tab of the Stair's Display Properties dialog box - see **Stairs Above and Below the Cutting Plane.**



Railings in Model

Links

Railing Styles - Materials tab - for information on the By Material settings used for the Model Display Representation.

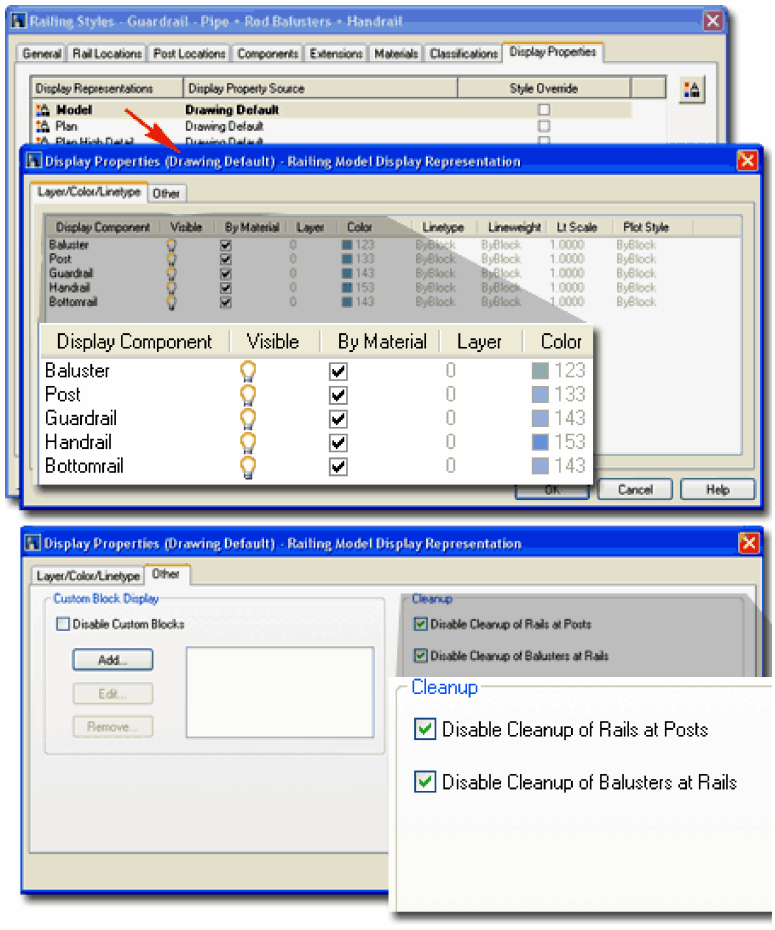


The list of Display Components for the **Model Display Representation** is equal to the number of physical components in the Railing Object Style and for these components, you can use the "**By Material**" option to defer display control to the Material Definition Style associated with each Component.

Generally, you probably will not spend much time fussing with these settings.

For the Model Display Representation, you should also find that there is an "**Other**" tab with a Cleanup section that can be used to make Railings perform faster on your system. The **Cleanup Disable** feature provides an option for making the display of Railings less taxing on your system while allowing you to work in 3D without having to do something as drastic as turning Off the Visibility of specific Display Components.

Illustrated to the left I show what a common Railing Style looks like in a 3D View with Cleanup Enabled and Disabled. For me, Disabling the Cleanup is find since the flaws don't show in Renderings anyway and I always Generate 2D Elevations and Sections instead of using the Live Elevations and Sections.



Display Properties - Stairs - Other tab

Depending on the Display Representation for a Railing Style, the **Other** tab of the Display Properties dialog may or may not offer the Cleanup options (Model only). The **Custom Block Display** section provides some of the most exciting design options for Railing Styles. For this section you have the option to **Disable Custom Blocks** so they don't display, **Add...**, **Edit..** and **Remove...** buttons to work with Block attachments. The Add... and Edit... buttons will access the Custom Block dialog box where you can use the Select Block... button to select one block.

STAIR LINE - STRAIGHT, ENTIRE STAIR
ARROW = CUSTOM DIM STYLE
BREAK MARK = CURVED

STAIR LINE - STRAIGHT, PARALLEL
ARROW = STANDARD ARROW
BREAK MARK = NONE

STAIR LINE - STRAIGHT, OPPOSITE
ARROW = CUSTOM DIM STYLE
BREAK MARK = ZIGZAG

SCALE TO FIT
Depth, Width, Height, Lock Ratio and **Between Comp. -** by using any single or combination of these checkboxes, you can control how your custom Block scales relative to the Component it is associated with. Using only the **Between Comp**., for example, will stretch one axis of your Block between Components such as the Posts and is therefore a fantastic solution for putting a Window (Glazing), Lattice or fabric Block between posts.

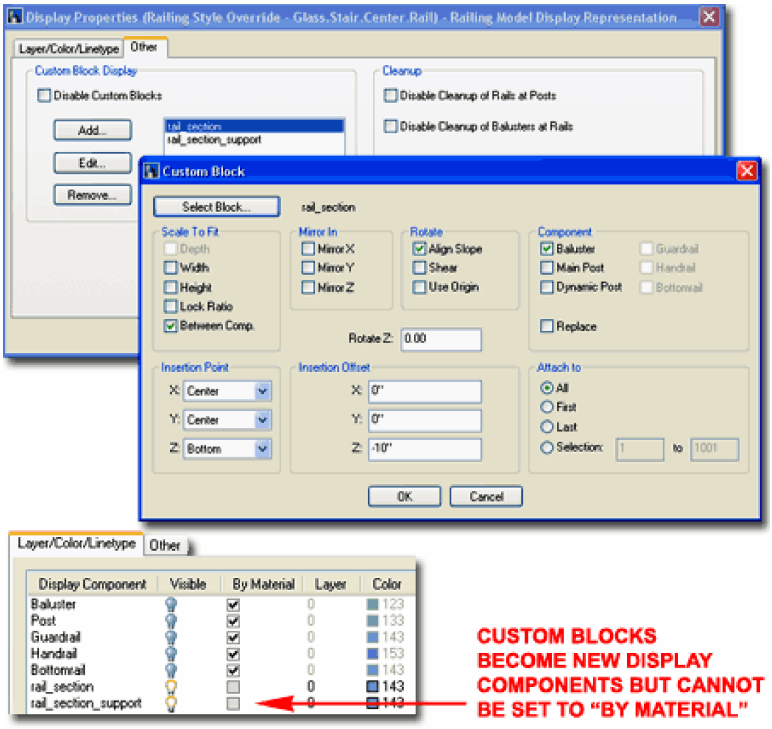
MIRROR IN
Mirror X, Mirror Y and **Mirror Z** - by using any single or combination of these checkboxes, you can flip Blocks that may not have been designed correctly to match desired use in your Railing.

ROTATE
Align Slope - by using this checkbox, you can force your Block to follow the slope of a Railing as it follows the slope of a Stair or other Object that it has been Anchored to. When using this option, you can also use the Shear or Use Origin options below it.

Shear - only works with Align Slope - using this checkbox option will cut the ends of your custom Block to match the cut of the Component as in "shear cut".

Use Origin - only works with Align Slope - using this checkbox option reads the origin of the railing component and derives a point in space based on a perpendicular vector from this origin relative to the slope. You will not notice much of an effect if your block is near the origin but if your block is inserted far from the origin, like on top of all posts, you will quickly see how this option affects your block. In essence, this is a more accurate definition of "align slope" because the block is positioned at a point perpendicular to the slope as opposed to a point straight up from a tread on a stair, for example. When you might use this option is another matter that is far less common since we typically build most railing components perpendicular to the ground plane.

COMPONENT
Baluster, Main Post, Dynamic Post, Guardrail, Handrail and **Bottomrail** - by using any single or combination of these checkboxes, you can assign your custom Block to one or more Railing Components to add custom effects or to completely **Replace** the component itself. This is how you can, for example, add a decorative top to your Posts or Replace the default Balusters with a custom design.



Replace - use this option together with one or more Components to physically replace the internal Component with your custom Block. The dimensions of the Component still apply but it just won't display.

Rotate Z: - by using this value field, you can rotate a custom Block through the absolute Z-axis even as it follow the curve of a Spiral Stair.

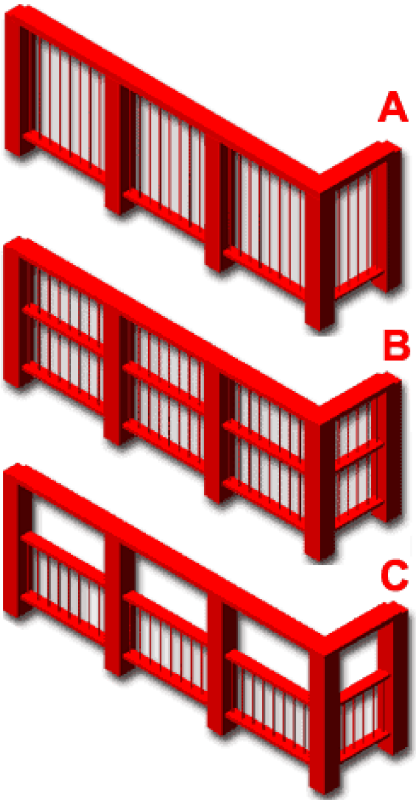
INSERTION POINT
X, Y and **Z** - by using the drop-down list options such as Left, Center, Right or Front, Center and Back, you can set matching Insertion Offset values to control where you want your custom Block to be positioned relative to the Component it has been associated with.

INSERTION OFFSET
X, **Y** and **Z** - value fields that refer to the relative Insertion Point settings to the left of these fields. You can use positive or negative values.

ATTACH TO
All, **First**, **Last** and **Selection** - use one radio button to control which Component is affected by the custom Block. You can, for example, Add a decorative Sphere to the First or Last Main Post instead of All of the Posts. The Selection option provides the means to set a Range.

Once a Block has been Added, you should find that the Block Name will be listed as a new **Display Component** on the **Layer/ Color/ Linetype tab** of the same Display Properties dialog box. Unfortunately, you cannot use the "By Material" option for Blocks so you may need to be a bit creative and take a long circuitous route by using a custom Mass Element for your Block. By using a Mass Element, you can attach a specific Material Definition exclusively to that Object before making a Block of it.

Manipulating Railing Components



Though the names and terms used to describe the various components of Railings imply that they have real-world functions that are similar, the fact of the matter is that these components are simply controls within a larger framework.

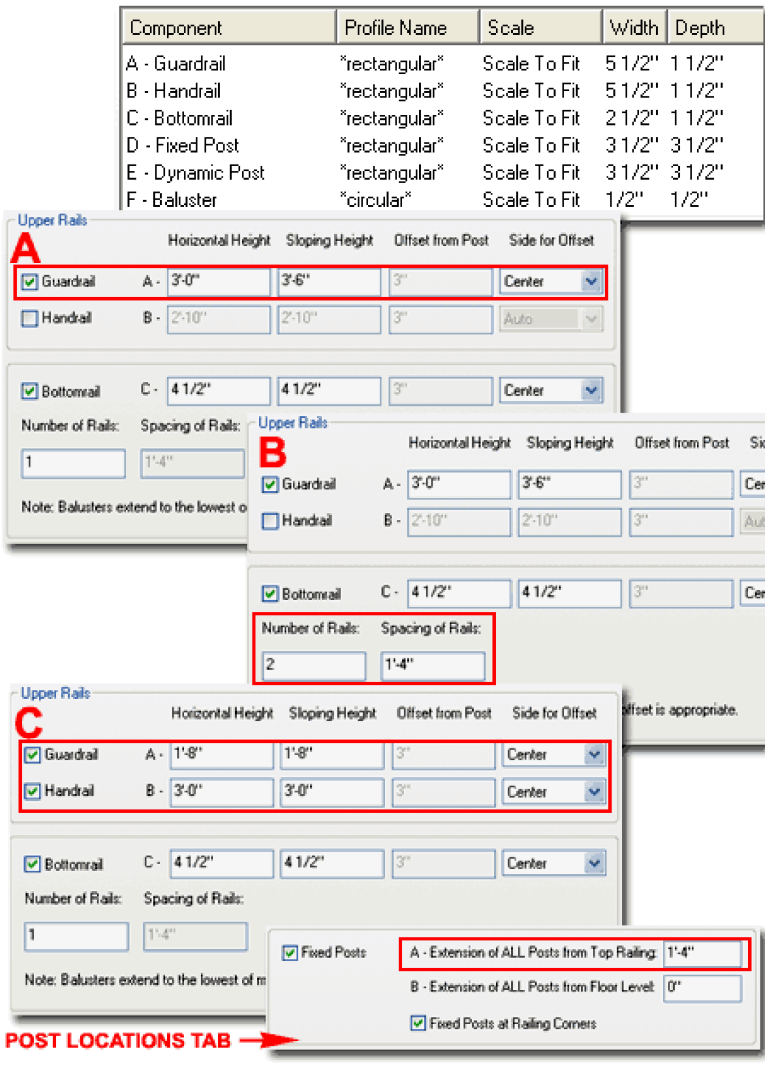
Illustrated to the left and right I show some simple examples of how you can play with the different components within a Railing Style to produce unique design results.

For Railing "**A**", I show that the Guardrail Component is used to control the Post and Baluster height.

For Railing "**B**", I show how a slight modification to the same Railing Style will produce horizontal members between the Bottomrail and Guardrail. These horizontal members are actually copies of the Bottomrail Component.

For Railing "**C**", I show how you can use the Guardrail and Handrail Components to alter how the Balusters appear while keeping a similar Railing design solution. To shorten the Balusters, I reduced the Guardrail height to about half of the original height and set the Handrail to the former height of the Guardrail. In essence, I am using the Handrail as a Guardrail. The problem with this trick is that the Guardrail also affects the height of the Posts but I have another trick for that; on the Post Locations tab, compensate for the reduction in Post height by adding it back as " **A - Extension of ALL Posts from Top Railing**".

I



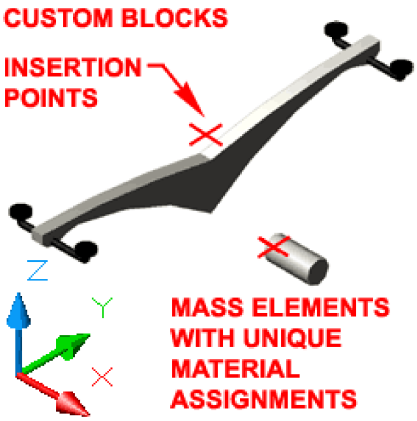
Creating a Custom Railing Style

Alt.Menu **Design> Railings> Railing Styles...**

Keyboard **RailingStyle**

Links [Railings in Model](#) - for information on how to access the "Other" tab illustrated to the right.

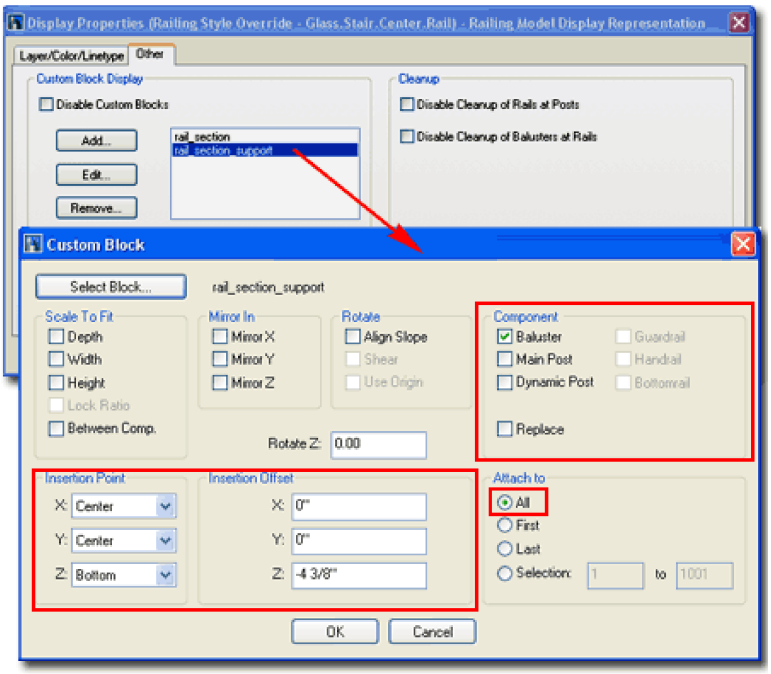
[Creating a Custom Stair Style](#) - for more information on how I created this Glass Stair

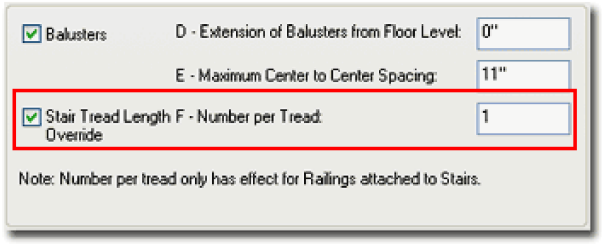


Designing Custom Railing Styles is actually far more flexible than designing custom Stair Styles because you can actually replace all of the default physical components with your own Custom Blocks to create just about any wild repetitive design option you want. The key is to think in terms of how the Railing Object works and then apply that functionality to other design problems; from fences to street lights.

In the illustration to the right and left I show an example of how I used two custom Blocks within a custom Railing Style to create the Glass Stair Design discussed earlier under Stairs. For the support structure under the Glass Treads I created a 3D Model with Mass Elements (or you can use Solid Modeling) and created a Block of it with an Insertion Point that would allow me to easily attach it under the Stair Tread. For the center support rail connecting each tread support, I had to create a custom tube because the Railing Style will not permit you to place a Bottomrail below the Stair (that was a little irritating to discover).

Illustrated to the right I show the how I configured the Custom Block dialog box settings for the glass tread support block. This was actually quite simple because all I wanted was one block under each tread of the Stair that this Railing would be attached to. Under Components, you can see that I used the Baluster Component option to associate this block with. That may seem odd but if you look at the Post Locations tab for the Railing Style, there is an option to force one Baluster per tread no matter its length (nice option).





POST LOCATIONS TAB

Note:
For the Center Support Rail, I used the Between Comp. option on the Custom Block dialog box. I also used the Align Slope Rotation option and the Baluster Component. This solution worked very well on Straight Stairs but had a little bit of error on Spiral Stairs due to the curvature. For Straight Stairs only, using the Main Post Component works very well because it stretches the cylindrical block between the top and bottom positions.