

PART 14

ELEVATIONS



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1 Elevations - Access

.1-14 ELEVATIONS

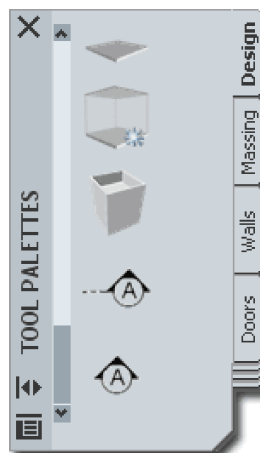
Elevations Toolbar

[How do I get this toolbar?](#)

You can also acquire access to these commands from the Alternate **Document** pull-down menu. From the **Document** pull-down menu, pick **Sections and Elevations >** and cascade to their respective command options - see image below, right.



Elevations Pull-down Menu and Tool Palette



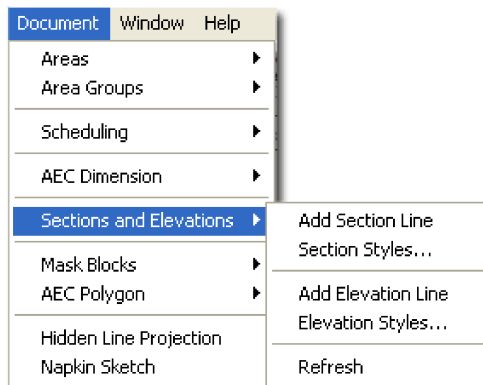
In ADT Elevations and Sections are broken up into two separate tasks though they are basically identical objects using nearly all of the same tools. This means that you can actually use the Elevation Line Object to create Sections and the Section Line Object to create Elevations. It's a bit silly, isn't it and we should really just think of this type of work as creating Projections because you can use either object to do Interior Elevations as well. In fact, you can also use the [Documentation Symbols](#) to produce the same results.

When you get ready to use the **Elevation** or Section Line **Objects**, think about what you want as the product of this "projection" and where you want it. For example, on a single story residential building you might have all of the information you want in one file but do you want the Elevations or Sections in the same file? On a larger commercial project, as another example, you will have all of the floors in separate files so in order to generate an Elevation or Section, you will need to create a composite file.

For both scenarios described above, I typically Xref everything I want for my Elevations and Sections into a Composite File where I add the Elevation and Section Line Objects and Generate the work need. Once this work has been Generated, I use Layout Tabs to set up the Sheets.

Most designers are familiar with the concept of a 2D Elevation or Section so that part of this process is relatively self-explanatory but ADT offers a new twist on this concept: 3D Elevations and Sections.

For Elevations, I prefer to use the 2D option because I typically break the live-link to the model at some point in order to finish off the work with linework that I just don't bother to add in Models. The 3D Elevation Object is basically a copy of the Model with Subdivision Controls for Color/Lineweights.



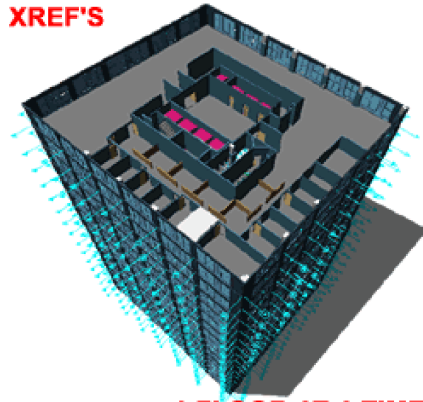
Note:

Since Elevations and Sections are basically the same thing in ADT, you might want to read up on Live Sections as another option for Elevations.

Elevations - Overview Discussion

When you get ready to use the Generate Elevation dialog box, you will have 2 choices in how you want to take the next step. The first choice allows you to

XREF'S



1 FLOOR AT A TIME

Elevations, what's the big deal?

Just pick on the View Front button and Viola, Front Elevation, right?

Yes and No.

During the Design phase of a project, cranking out rapid elevations with the View buttons is a reasonable solution but once a set begins

to look more like Development and Construction Documentation, you may want those Elevations to look a bit different than what you get automatically with the View buttons and the Elevation Representation Sets. You may want lines that are beyond to look lighter, for example. In addition to the lineweight issues, you may want to begin adding details to your elevations that you will never model. And you may also be working with sub-contractors who cannot deal with 3D objects, especially ARXobjects.

So, what seemed relatively easy suddenly gets more complicated. What you will need to think about is the long term projected goal and the intermediary steps you can take to get there. We've just discussed one of those steps: using the **View buttons**.

The next step might just be to get Elevations that have better lineweights followed by another step where the Elevations are 2-Dimensional.

The final step might likely be that your Elevations are 2-Dimensional non-associated Lines, Plines, Hatches, Text and so forth - the way Elevations have been done in AutoCAD for about 20 years now. You may be one of the few fortunate people who won't end up at this step but will actually be able to keep your Elevations linked to your model all the way through construction and even into archiving.

create an [Elevation that is still 3-Dimensional](#) but with the power to control lineweights relative to depth of field. The second choice allows you to create a [2-Dimensional Elevation](#) with lineweight control.

As you can see then, you might want to start with the 3D Elevation and then later move on to a 2D Elevation that eventually may end up as a non-associated 2D line Construction Document.

Personally, I like going straight to 2D if I am going to go through the trouble of generating an Elevation to begin with.

Single Building Model vs. Composite Building Model

Assembling a body of work in order to create an Elevation is another subject that can be discussed and debated greatly. There does seem to be a majority vote on the **Xref** approach rather than attempting to build one model in one file that solves all documentation needs. ADT's [Project Browser](#) emphasizes this approach and finally advocates the concept that buildings are made of pieces brought together rather than a whole broken apart. Though I believe one individual could probably make the one-model-does-all scenario work rather well, I would never advocate such a solution. Even on a small project, like a one-room remodel, I rely on Xref's.

By separating as much as possible into unique files, you not only provide others with the opportunity to work on a project simultaneously, but you provide yourself with another form of Layering. Though I completely comprehend the idea that if more is in one file, you can more easily edit it, I have found that I am actually more likely to lose information in the clutter. Instead, I simply run many files open at the same time and refer back and forth when necessary or rely on Edit-in-Place functionality.

By the time you are ready to Generate Elevations, you should also have one or more Composite files ready since most of your working drawings probably have everything else Xref'd in. I usually create a Model file where I Xref everything in and add other things that I want for Perspectives, Renderings, Sections and/or Elevations; like 3D topographic contour work, street and curb information, adjacent and background information and decorative elements such as cars, trees and people.

2 Adding Elevation Lines

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Adding Elevation Line Objects

Palette **Design**

Alt. Menu **Document> Sections and Elevations> Add Elevation Line**



Keyboard **BldgElevationLineAdd**

Links [Elevation Line - Display Props](#) - if you don't see an elevation object as illustrated to the right in blue.

[Interior Elevations](#) - for how to apply to interiors

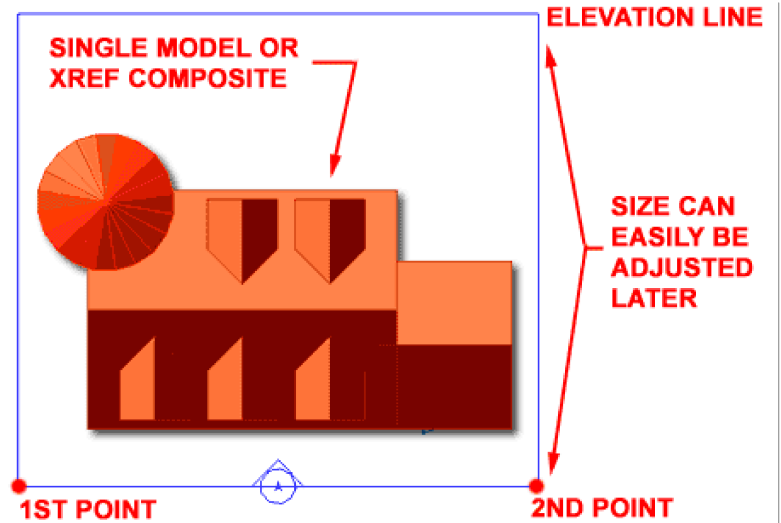
[Elevation Bubble Letter](#) - for how to change the letter/number

Adding an **Elevation Line Object** is a far easier task than figuring out how to put a project together to take advantage of this tool.

Illustrated to the right, I show a simple project viewed from the top with the two points that were used to create an **Elevation Line**, highlighted in red. From two points selected along the side that you wish to project an elevation from, you get a bounding box that will eventually surround or envelope your model. The size and depth of your elevation line (square) is not something you should be too concerned about at this point since you can easily adjust it after creation, with Grip Editing. Eventually it should surround everything you want in your Elevation or it will cut information out.

The Elevation Bubble is more of a tracking tool for you than for proper annotation; though you can certainly use it as a proper annotation symbol. There are better Elevation Marks in ADT that you can access from the **Annotation** tab of the **Tool Palette** or go to the Elevation Marks folder under the Documentation folder in the Design Center (type "**_AecDcSetImpElevationMarks**" or "**_AecDcSetMetElevationMarks**" for Metric).

For multiple Elevations, you can draw an Elevation Line for each side or **Copy** one **Elevation Line** object, **Rotate** it and position it as you like. If you happen to lose the elevation symbol, don't worry about it because that symbol does not affect the creation of the elevation; i.e., the frame is the actual tool - see the [Display Props](#) discussion for how to Color Code the "Defining Line".



3 Modifying Elevation Lines

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Elevation Line Properties - Dimensions tab

Menu N.A.

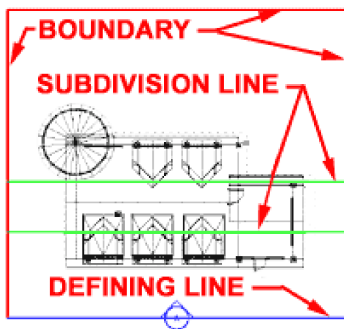


Keyboard **BldgElevationLineProps**

Mouse **Double Pick on Frame - Properties** Palette

Links

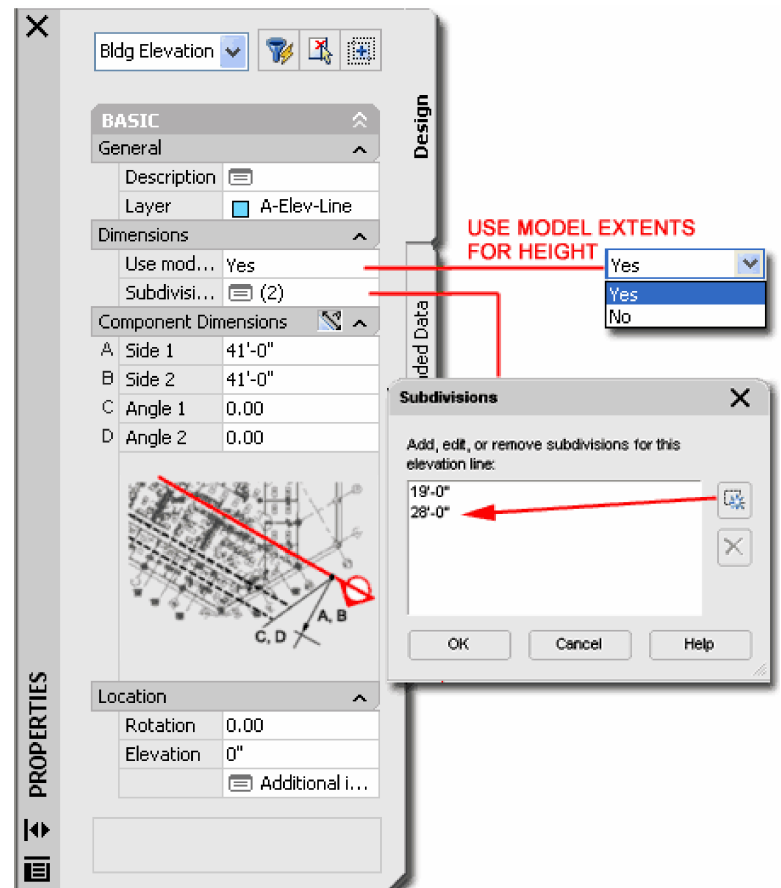
On the **Properties Palette** for the **Elevation Line Object**, illustrated to the right, you will find an assortment of options that control the proportions and segments.



Dimensions
Use Model Extents for Height - this drop-down list has a Yes or No option and applies to the overall size, in 3D Space, of the object selected when using this Elevation Line Object as a tool. In most cases you will probably want to Use Model Extents (Yes), but for

Interior Elevations you would not want to this option on.

Subdivisions - when you pick on this cell, you will activate the Subdivisions dialog box where you can Add, Edit or Remove



Subdivisions Lines. Subdivisions are measured from the Elevation Defining Line in and represent sectional divisions where you want the lineweight/color to vary. In other words, adding a Subdivision half way along your Elevation Boundary box will allow you to change the colors, linetypes and lineweight of all the lines/objects that lie beyond the subdivision line.

Lower Extension - (Use Model Extents for Height must be set to No) - an amount of space extended below the default ground plane for an Elevation Line. The default will capture information that lies 12 inches (308 mm) below the World Coordinate System or Ground Plane. See [Part 15 - Sections](#) for an example.

Component Dimensions

A Side 1 - use this value field to specify the length of the boundary from the 1st point used to create the Elevation Line Object. Grips can be used to modify this value as well.

B Side 2 - similar to A Side 1.

Modifying an Elevation Line with Grips

When you **Select** an **Elevation Line Object**, you should see several **Grip** points activate that you can use to edit with. These Grip points correspond to the values that you set on the Properties Palette for an Elevation Line Object.

Grip Stretching Subdivision Lines is as easy as it gets because you only have one Grip to work with. Grip Stretching any of the four corners of an Elevation Line may pose more of a problem. Since the Elevation Line Object supports irregular shaped tetragons, you can stretch any corner uniquely. If you don't want an irregular shape, simply use the **Shift key** while making your Grip spots **HOT**. This will allow you to work with two Grips at the same time and thus you can Grip Stretch one side evenly to exclude or include more of your project.

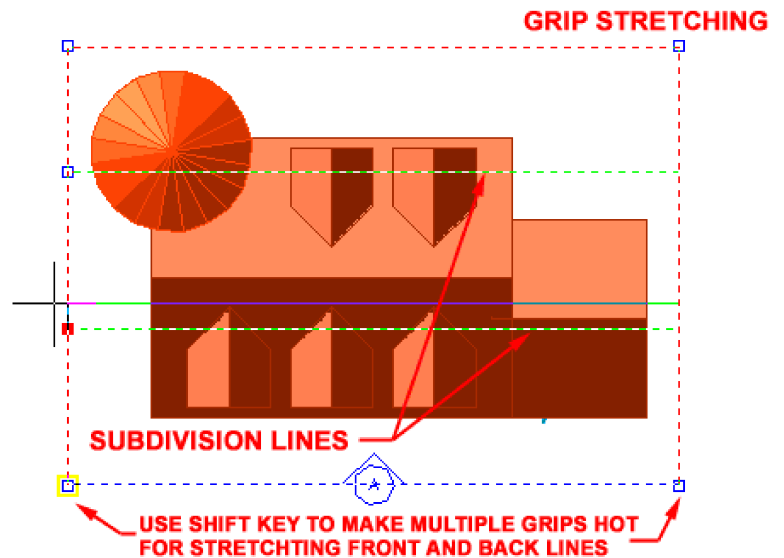
C Angle 1 - use this value field to specify the taper angle of the boundary from the 1st point used to create the Elevation Line Object. Grips can be used to modify this value as well. Negative Angles are allowed. This can be useful when trying to clip objects in or out of a Elevation that are not parallel or perpendicular to the Elevation Line Object.

D Angle 2 - similar to C Angle 1.

Location

Rotation - based on the global angle similar to all objects.

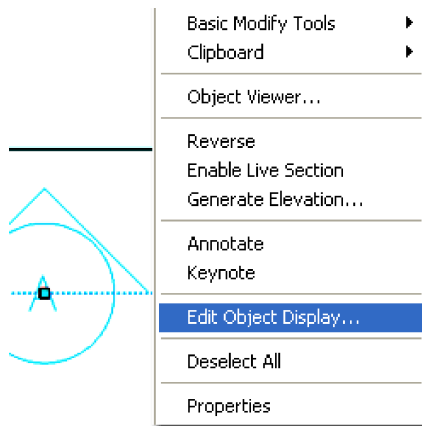
Elevation - if **Use Model Extents for Height** is set to **No**, this can be used to move the Elevation Line Object up or down relative to the Model and can thus be used to control the bottom of the elevation projection; e.g., for a portion of a multi-story building, like a single floor of a high-rise.



4 Elevation Line - Display Props

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Object Display... - Elevation Line



The Elevation Line object in ADT does not have a Style but you can use **Edit Object Display...** to access its display controls. On the **Object Specific pop-up menu**, illustrated left, select **Edit Object Display...** On the Object Display dialog box choose a Display Representation, like **Plan** and double pick on it or pick the **Edit**

Display Props... button.

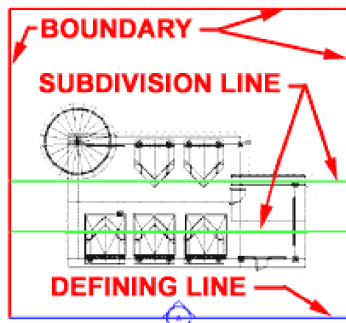
The only Display Props you can edit for an Elevation Line object are on the **Layer / Color / Linetype** tab. On this tab you should find three **Components: Defining Line, Subdivision Lines** and **Boundary**.

Tip:

If you color code these components, they are a lot easier to read when looking at them on your screen - see discussion below for how.

Display Properties - Elevation Line - Component Layers

From the **Display Props** tab, in **Plan** view or other **Representation Sets**, you can use the **Edit Display Props...** button to access the component's **Layer/ Color/ Linetype** tab.

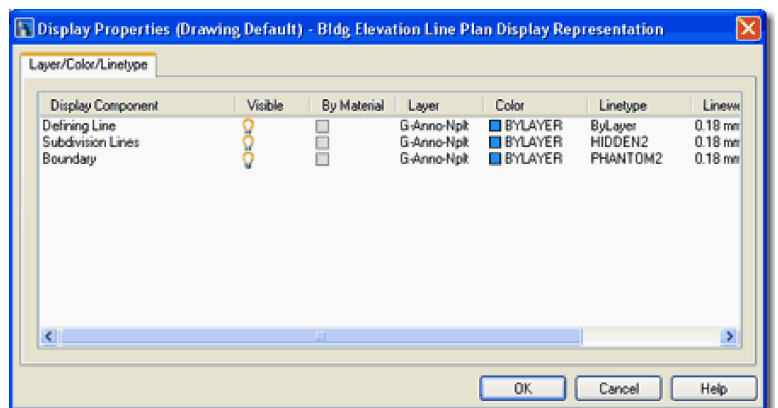
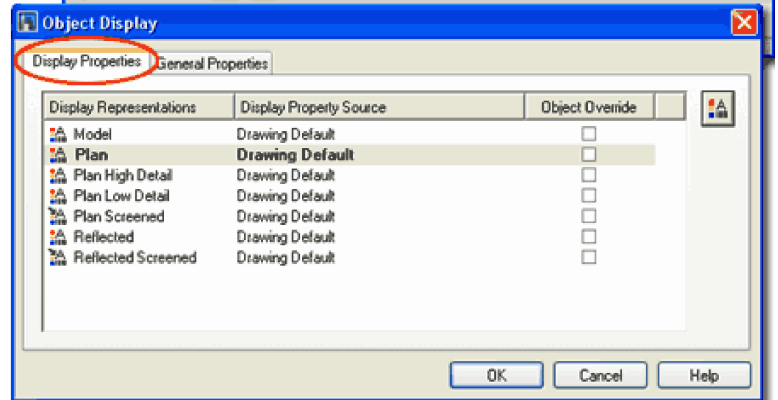
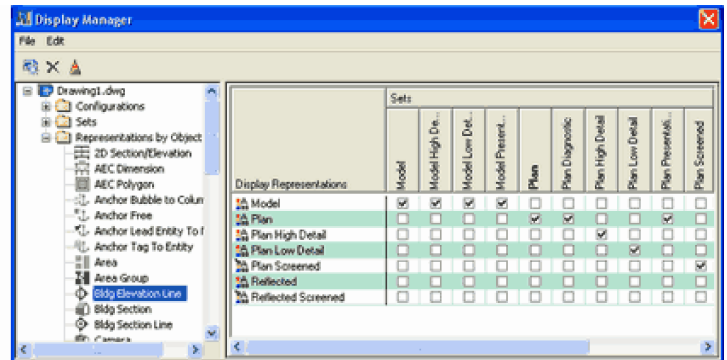


Notice on the Elevation Line's **Display Properties** dialog box, right, that you have three components that you can work with: **Defining Line, Subdivision Lines** and **Boundary**.

The **Defining Line** represents the side, direction and Width of the Elevation you intend to create.

The **Subdivision Lines** are internal Lines that you can set under the Dimensions category on the Properties Palette. These Lines can be used to control Color and Lineweight changes within the Elevation you generate with this Elevation Line. Typically, you will use this technique to imitate the way we have traditionally shown lines as lighter when farther back.

The **Boundary** represents the area that surrounds your building or project.



5 Creating Elevations

Generate Section/Elevation dialog box

Menu **N.A.**



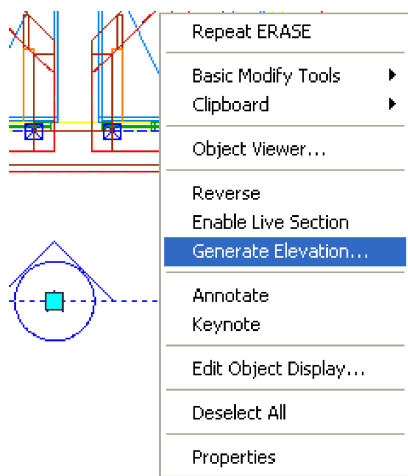
Keyboard **BldgElevationLineGenerate**

Mouse **Select Elevation Line Object, right-click and Select Generate Elevation...**

Links

When you are ready to actually create an Elevation, you will use the **Generate Section/Elevation** dialog box, illustrated to the right, to define the type of elevation you want; what you want in it, what it should be displayed like and where you want it placed. To Generate an Elevation, you can type

"BldgElevationLineGenerate" or simply Select your Elevation Line Object, right-click to invoke the object specific pop-up menu illustrated to the left and select **Generate Elevation...**



Both types are linked to the original drawing and thus can be updated to reflect your design changes at any given time. This will be discussed below.

Result Type

3D Section/Elevation Object - a copy of your drawing presented as an elevation object where subdivisions and other Elevation Line settings are displayed.

2D Section/Elevation Object with Hidden Line Removal - a projection on to a plane of your drawing where subdivisions and other Elevation Line settings are displayed. You can think of this as being much like a block or Xref associated with the Elevation Line and your original drawing. If exploded two times, you will get 2D line work.

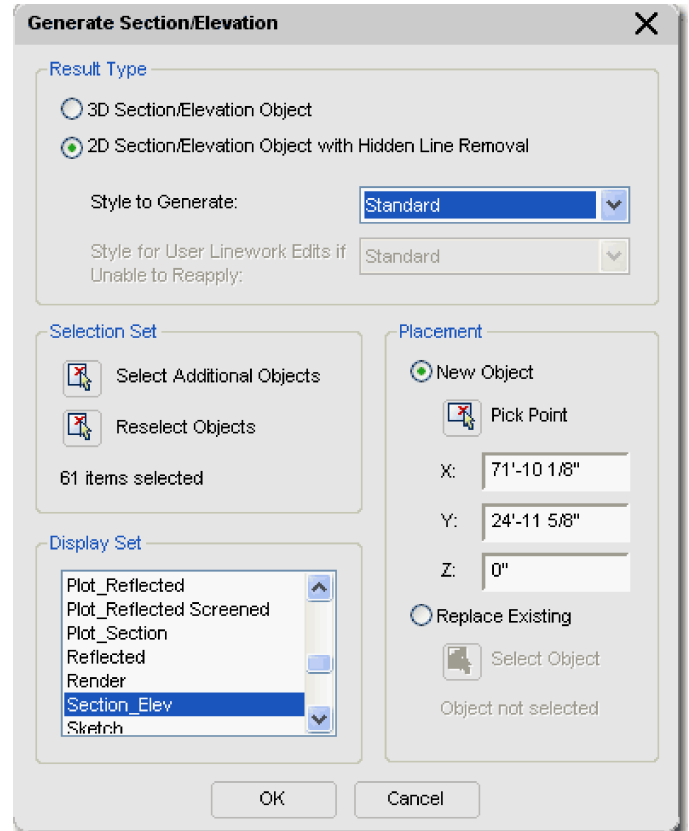
Style to Generate - the default **"Standard"** is all that you will find anywhere in ADT until you create your own. A custom Style will allow you to refine line colors and weights for objects within your 2D Elevation.

Style for User Linework Edits if Unable to Reapply - this option is only available when Updating a Section or Elevation that has had Linework Editing. You can use it to save the Editing to a new Style Name so the edits can be reapplied upon future update/refreshes.

Selection Set

Select Additional Objects - this button is active only after an Elevation Line has been associated with objects. It can be used to select more new objects to be associated. This may be useful when you want to create a set of elevations from the same Elevation Line where each one contains different or more information.

Select Objects (Reselect Objects) - this button changes once an Elevation Line has been associated with objects. This button allows you to reset what you want associated with your Elevation Line and thus, using the Shift key, you can also deselect objects.



Display Set - this should be an obvious option for you at this stage of a project but if there's still some uncertainty, you should read up on [Display Representation Sets](#). Basically this is just how you want objects to look in "Elevation View". One example is how Doors have the swing indicated by centerlines.

Placement

New Object - this radio button tells this dialog box that you want to create a new elevation object. Leaving this radio button checked while trying to adjust an existing elevation will result in duplicate elevation objects right on top of each other, so be careful about this option. A good way to avoid making a mistake is to select the elevation object itself, right-click, and then select the Refresh option on the object-specific pop-up menu.

Pick - this button with X, Y and Z corresponding values simply allows you to locate the lower left insertion point of your elevation object. Since you can move it at any time after creation, it isn't a big deal where you put it.

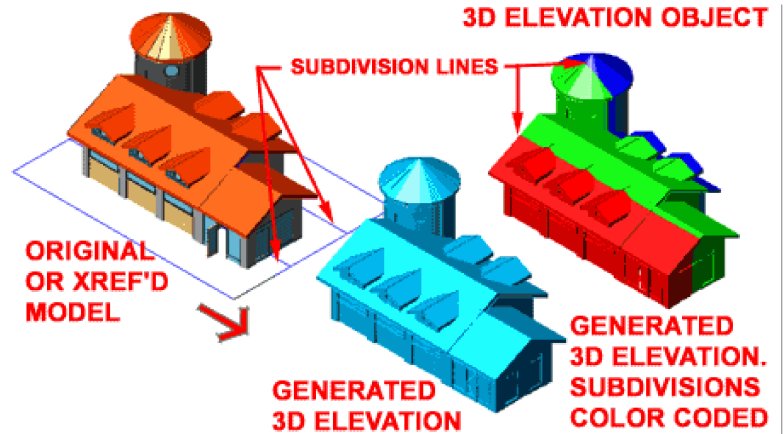
Replace Existing - this radio button should be used when you are in this dialog box without having used the Update route. In other words, if you simply used the Generate Section command or button to work on an existing elevation object. By checking Replace Existing, you will be asked to Select Object. This object has to be the existing elevation object that you intend to modify or update. After doing this selection, you can then proceed to Reselect Objects, deselect objects or select Additional Objects. Once again, it's a lot easier to simply pick the elevation object, right-click, and use the Refresh option.

3D Elevation Object Example

Links [3D Elevation - Display Props](#) - for how to change the resultant colors
[Display Properties - 3D Elevation - Component Layers - Example](#) - for an example of how the lineweights can look on a print.

Illustrated to the right I show the default **3D Elevation** object and how the same 3D Elevation object can be adjusted to reflect the **Color** changes (lineweights) for the Subdivision lines on the Elevation Line object.

To change the **Colors**, as illustrated, select the **3D Elevation** object, right-click and use [Edit Object Display...](#) as outlined below.

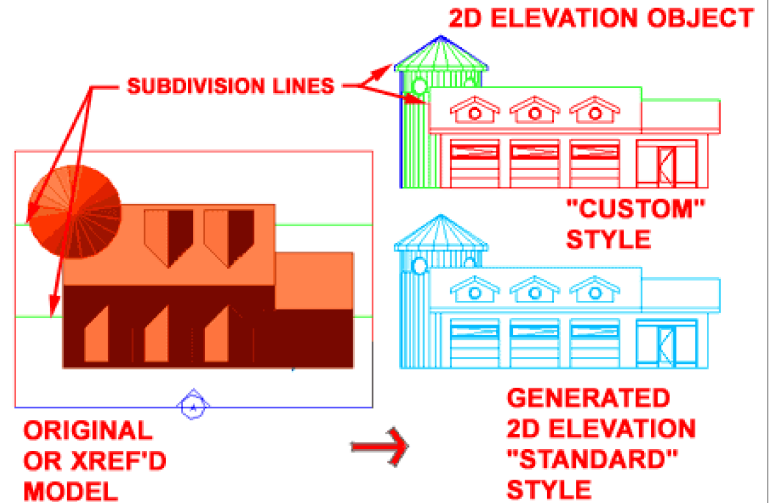


2D Elevation Object Example

Links [2D Section/Elevation Styles - Display Props tab](#) - for how to change the resultant colors
[2D Section/Elevation Styles - Display Components - Relationship Map](#) - for an example of how the lineweights can look on a print.

Illustrated to the right, I show the default **2D Elevation** object and how the same 2D Elevation object can be adjusted to reflect the **Color** changes (lineweights) for the Subdivision line on the Elevation Line object.

To change the **Colors**, as illustrated, select the **2D Elevation** object, right-click and use [Edit Object Display...](#) as outlined below.



Comments on Display Representation Sets for Elevations and Sections

If you don't choose the right **Display Representation Set** when you generate an **Elevation** or section, the objects generated in the automatic Elevation or section may not come out right. For example, you might only see a single horizontal line in an elevation view if you chose the PLAN Display Representation Set.

These Display Representation Sets tell ADT how to represent your Doors, Windows and other objects in an elevation or section as opposed to a plan view. A door, for example, will have a frame with a swing triangle in an elevation but not in a plan. If you recall, Display Representation Sets are actually groups of all the Display Representations; one for each Object Family.

When you select the Section_Elev Display Representation Set, you will be prompted to provide how far you want your new elevation object away from the actual model. Think of this as the Move command in AutoCAD.

When you have placed the new elevation object, it should look something like the illustration above. This new copy is actually linked to the original via the Elevation line.

6 Modifying Elevations

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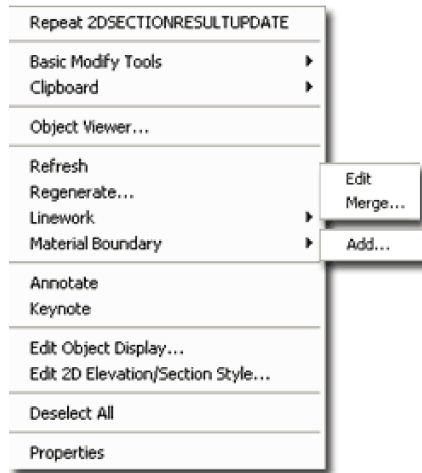
Regenerate Elevation

Menu **Documentation> Elevations> Update Elevation...**



Keyboard **BldgSectionUpdate**

Links [Generate Section/Elevation dialog box](#) - for information on all of the other features not discussed here for Regenerating.



Once 2D or 3D Elevations have been created, you can **Regenerate** them to update for changes made in the model, change the original selection set or make other changes offered on the **Generate Section/Elevation dialog** - illustrated right. For 3D Elevations, the option to use Styles is not available and for 2D Elevations, the option to save Edits to another Style is only

available if "in-place" editing has been done and if another Style exists.

Though this command can be activated by typing or creating a custom tool, the easiest way to Regenerate is to **Select an Elevation Object** (not the Elevation Line Object), **right-click** on the mouse and select **Regenerate...** off of the object-specific pop-up menu - illustrated left. You can only Regenerate one Elevation Object at a time but you can Refresh as many as you wish to Select.

When Regenerating, the **Generate Section/Elevation dialog** is used and just about all of the options, conditions and results are the same. You can even create a New Elevation by Regenerating an existing one (just use the New Object and Pick Point buttons). This means that you really only need to use this tool when working with 3D Elevations (which I never do) and when you need to Save 2D Linework Edits to a New Style and/or change the Selection Set. For most other forms of updating, use the Refresh option discussed below.

Note:

Though you can easily change the 2D Section/Elevation Style by changing the Style to Generate option when Regenerating, you can also just use the **Properties Palette** to **change the Style**.

Refresh Elevations

Menu **N.A.**

Alt. Menu **Document> Sections and Elevations> Refresh**
N.A.

Keyboard **2dSectionResultRefresh**

Mouse **Select Elevation Object(s), right-click, Select Refresh**

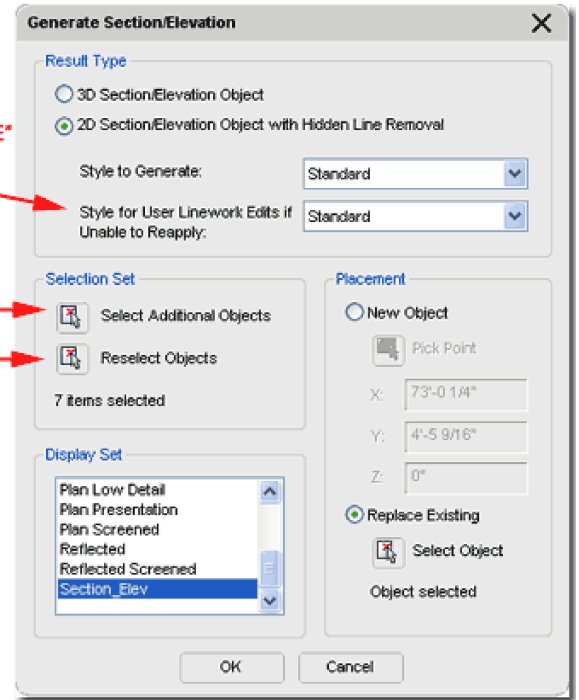
Links

This tool allows you to **Regenerate one or more Elevation Objects** without having to use the Generate Elevation/Section dialog box and thus acts more like a Refresh tool.

SAVE EDITS TO '2D SECTION/ELEVATION STYLE' UNDER STYLE MANAGER

ADD NEW OBJECTS NOT ORIGINALLY IN SELECTION

CREATE NEW SELECTION SET



Style for User Linework Edits if Unable to Reapply - a drop-down list that offers any 2D Section/Elevation Styles to save the Edited linework to. In plain English, this option is for when you Regenerate an Elevation knowing fully that some or all of the Edited Linework from a previous editing session will not translate correctly (match up or fit), but you would like to save it as a separate block to compare with. This new block can be set to display differently, like with all red lines, so you can more clearly see the edited linework that is no longer embedded. Read the [Summation](#), below, for more information.

By **selecting** one or more **Elevation objects** and right-clicking, you can use the **Refresh** option on the **object specific pop-up menu** to achieve the same results

Elevation - Properties Palette

Menu **N.A.**



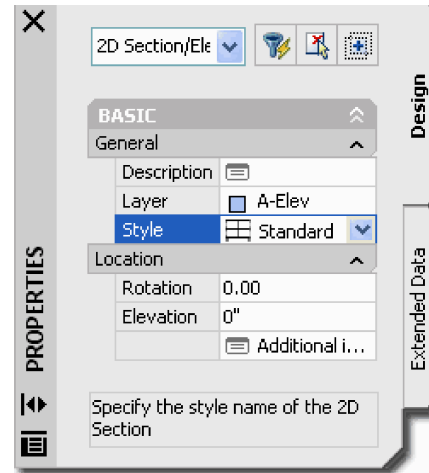
Keyboard **BldgSectionProps**

Mouse **Double Pick on Elevation Object**

Links

Since Elevation Objects are fairly simple with respect to options, the Properties Palette will reflect this fact. For 2D Elevations and Sections, you can **change the Style** and for 3D Elevations and Sections, you can only change position based items in the Location Field since 3D Elevations and Sections have no Styles.

You may want to use this button to provide a Description, Attach notes and Property Sources.



Elevation - Edit Linework

Menu **N.A.**



Keyboard **2dSectionResultEdit**

Mouse **Select Elevation Object, right-click, select Linework >, cascade to Edit...**

Links [Display Properties - 2D Section/Elevation Styles - Component Layers](#) - for information on how to access the Component Index Properties for color, lineweight, linetype and other changes.



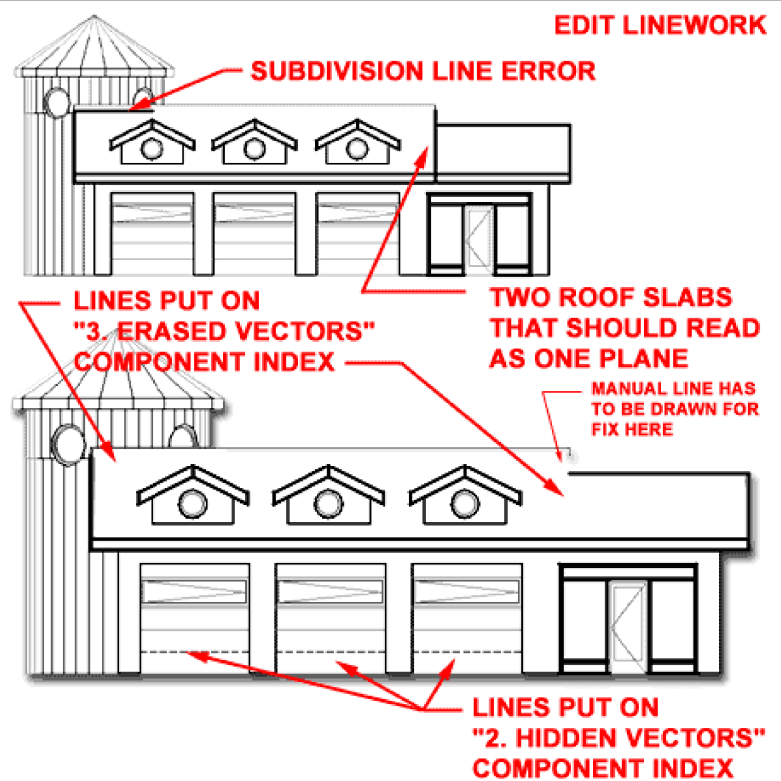
For 2D Elevations you can use an editing process somewhat similar to "Edit In Place" for Xref's that allows for some fairly limited linework modifications. These "Edits" might be for things like changing the Color or Linetype of certain lines or Removing lines that you don't want to show in the Elevation Object. To activate, **Select the Elevation Object, right-click, Select Linework and**

cascade over to the **Edit** option on the object-specific pop-up menu (see illustration to the left).

Once you have activated the Linework Edit session, the Elevation Object will behave much like regular linework so it is rather easy to work on it as if the lines are free for normal editing and it is also rather easy to forget to **"Save Changes"** (see below).

You cannot edit the lines as you would for a normal AutoCAD file because these lines actually reside within the Elevation Object and its Style. To make linework changes that are saved back into the Elevation Object Style, **you must use the "Modify Component..." option from the object-specific pop-up menu.**

When you **Edit Linework**, the lines must be assigned to Components within the Elevation Object's Style for proper Display



When you **Merge Linework**, which are new lines that you want to add to an existing Elevation Object, you must assign them to Components within the Elevation Object's Style just as for Edited Linework.

To **Delete Merged Linework**, use the Edit option, Delete the objects and Save Changes.

To Delete Object Linework generated by the model, use the Edit option, Modify Component... option and change the linework to the Erased Vectors Linework Component.

Note:

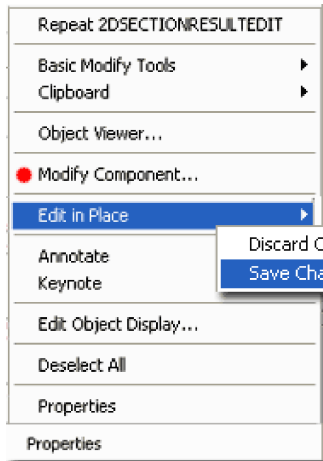
Edited Linework will "drop out" of the Elevation Object after a Refresh or Regenerate action if the objects changed in the source model after the editing was saved. The resultant linework will reside as new objects on top of the Elevation Objects that can be Erased.

Property results. This way, when Saved, the Edited or reassigned linework will be recalculated according to the Component assignment and display representation.

Elevation - Modify Component

Keyboard **2dSectionEditComponent**

Links [2D Section/Elevation Styles - Components tab](#) - for more information on where the Component Names come from and how you can add your own.



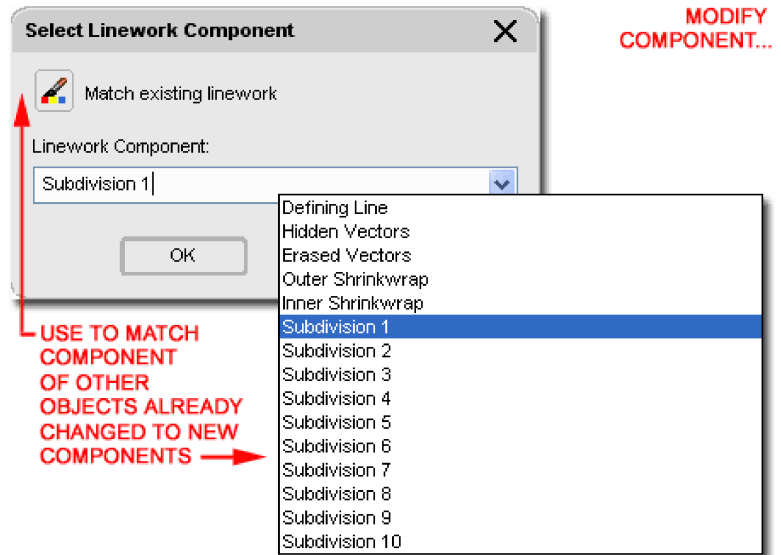
Once you have activated the **Edit in Place** function for a 2D Elevation, you can Select any part of that Elevation Object, right-click to see new options on the object-specific pop-up menu: **Modify Component** and **Edit in Place** with **Discard Changes** and **Save Changes**.

The **Modify Component...** option activates another

dialog box, illustrated right, that provides an unusual way to edit linework that is embedded within the Elevation Object. Because the Elevation Object is "live-linked" to the source model, edited linework must be saved in a unique way in order for that edited work to be regenerated in the future. Unfortunately this aspect of editing linework for Elevation Objects is thus tedious and time-consuming so you may want to solve editing needs another way (see comments below under Summation).

The **Match existing linework** option on the Select Linework Component dialog box allows you to use a tool like Property Painter to capture the Component of other linework in the current Elevation Object and apply it to object(s) being edited.

The **Linework Component drop-down list** provides access to the **Component Names** of the current Elevation Object's **Style** (the list illustrated to the right is the default list but you can [add your own component names](#)). When you select a Component Name, the linework being edited will be associated with the Display Properties for that Component as set within the current 2D Elevation / Section Object Style. Some of the default Component Names have some very practical Display Properties that you can easily take advantage of; such as Hidden Vectors (dashed lines) and Erased Vectors (deleted lines).



When you are done editing your Elevation Object, you must end the "Edit in Place" session much as you would for Xref's and this is done by selecting the **Save Changes** option via the object specific pop-up menu. Any changes that have been made to the current Elevation Object via the Select Linework Component dialog box will be saved using the current Elevation Object Style.

Elevation - Merge Linework

Menu **N.A.**

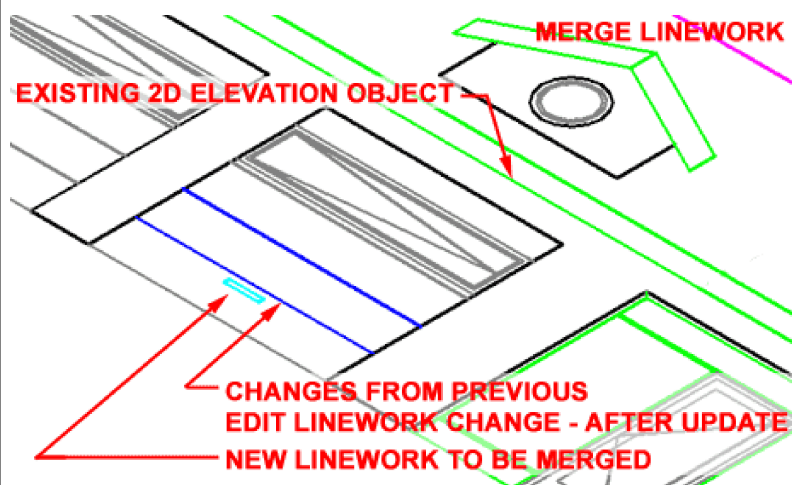


Keyboard **2dSectionResultMerge**

Links

New Linework can be Merged into a 2D Elevation Object by using the Merge option from the object-specific pop-up menu; acquired by selecting an Elevation Object and right-clicking.

When you Select one or more objects to Merge, the **Select Linework Component dialog box** will appear requesting that you assign the Merged Linework to a Component Name (as discussed above).



Modify 2D Sections/Elevations Summation:

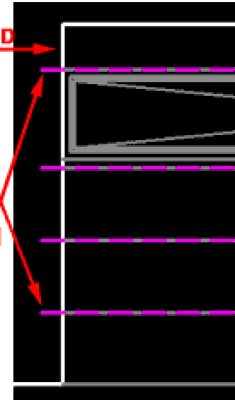
Working with 2D Elevations is fairly easy and rather efficient up until the point where you need to make specific refinements that have to be done right on the Elevation Object rather than in the Model from which it has been derived. The use of Edit in Place and Merge for Linework can be useful in a pinch where you do not wish to Explode the Elevation Object and lose the live-link. Be aware that Edited Linework cannot be saved in such a way that it is truly tied to the objects that the lines have been derived from. In other words, if you change the lines for a garage door to a dashed Component (like Index 9), for example, those lines will not move with the garage door if it has been moved in the Model file. Instead, by default, the linework is placed on top of the Regenerated 2D Elevation as a separate 2D Elevation Object. To assist in managing this, you will find that option to change such Edits (that cannot be reapplied) to another 2D Section/Elevation Style. If you create another 2D Section/Elevation Style for this type of linework and use only Red Line, for example, then you can use this Style to see when linework has been disassociated from the Elevation Object.

Generally, I find that Editing and Merging Linework is not worth the trouble it takes to worry about components and associations so we, at ARCHdigm, have developed a technique where we copy a live-linked Elevation Object to the side and Explode it two times. We edit the exploded Elevation as we would in the old days of regular AutoCAD drafting but use the original live-linked Elevation Object to update any changes made to the Model file. When changes have occurred, we copy the live-linked Elevation Object once again to another location, Explode it two times and copy out only those lines that need to be added to the first Exploded Elevation. In other words, we have a simple 2D line drawing for an elevation that was originally created from the Model but now gets updates from another copied and exploded elevation. The trick to using this technique is to pick the right time to start developing the Exploded elevation. **Comment: add new image showing exploded elevation work**

**SAVING EDITED LINEWORK
AT UPDATES IS NOT WHAT
YOU MIGHT HOPE FOR**

DOOR WAS MOVED

**ONCE SAVED,
EDITED
LINEWORK
HAS NO
ASSOCIATION
WITH THE 3D
MODEL**



7-14 ELEVATIONS

7 3D Elevation - Display Props

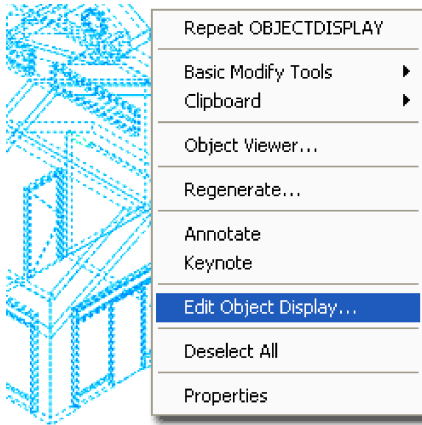
Object Display... - 3D Elevation

Menu **N.A.**

Keyboard **ObjectDisplay**

Mouse **Select Elevation Object, right-click, select Edit Object Display...**

Links [Object Style Display Properties](#) - for more information on working with the Display Manager



The 3D Elevation object in ADT does not have a Style but you can use the **Edit Object Display...** menu option to access and manage unique display controls. On the **Object Specific pop-up menu**, illustrated left, select Edit Object Display... On the Object Display dialog, illustrated to the right, choose a Display Representation to

modify or Override. Use the Override if you don't want your modifications to apply to all 3D Elevation Objects in the current drawing.

By default, there is really only one Display Representation that you can Modify or Override for 3D Elevation Objects and that is the Sub-divisions Display Representation. This Display Representation controls how you want the "Defining Line" and Subdivisions to appear in your 3D Elevation Object. Illustrated below I show how this can be used to color code the subdivisions.

Note:

Be aware that the Sub-divisions Display Representation for 3D Elevations actually comes from the Bldg. Section Object as illustrated above right on the Display Manager Window. This means that any changes you make to the Sub-divisions (without overrides) can affect Section Objects as well.

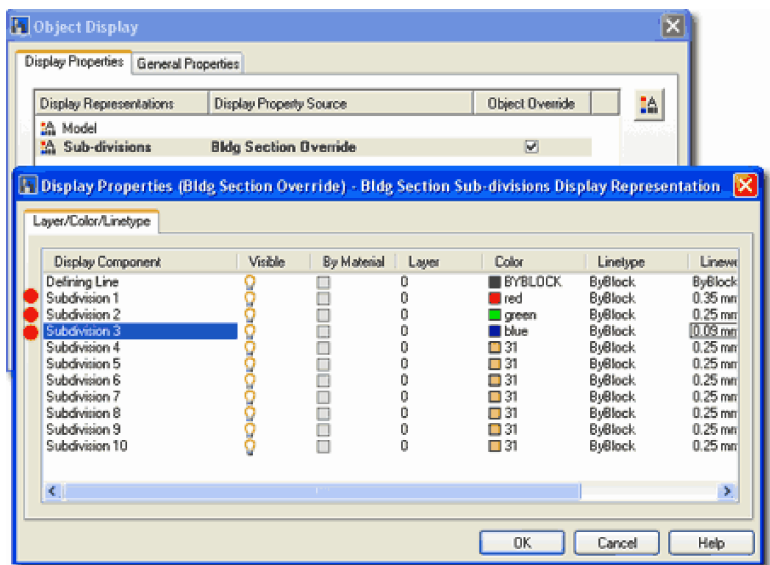
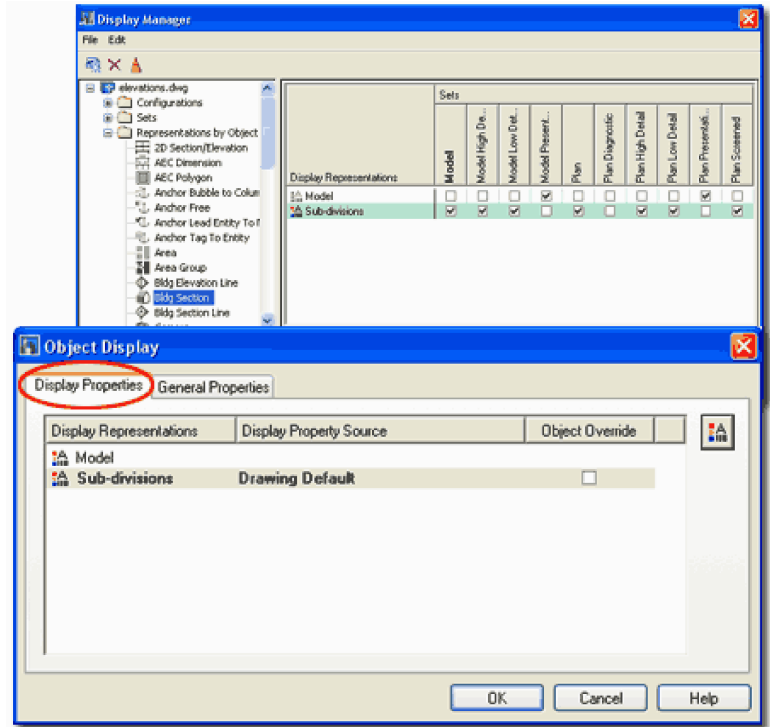
Display Properties - 3D Elevation - Component Layers

On the **Layer /Color /Linetype** tab of the **Display Properties** dialog box, illustrated to the right, you will find the power to control the Color (and consequently Lineweight for Color Dependant Plot Tables or .CTB files), Layers, Linetypes, Lineweights, Lt Scale, Plot Style (for .STB Plot files) and Visibility. The By Material option is not available for this Display Representation.

Illustrated to the right I show that I have Attached an Override for the 3D Section/Elevation Entity Property Source since I want these changes to be reflected on this 3D Elevation object only and not all 3D Elevation and Section objects in my drawing.

Defining Line - is the default color of your 2D Elevation but is primarily designed for the outline of a Sectional Cut right at the defining point of the cut. If you have and use the Subdivisions, this Component Color will not matter.

Subdivision 1 - 10 - a default set of subdivisions that are automatically associated with [physical subdivision lines](#) on your Elevation or Section Line object.

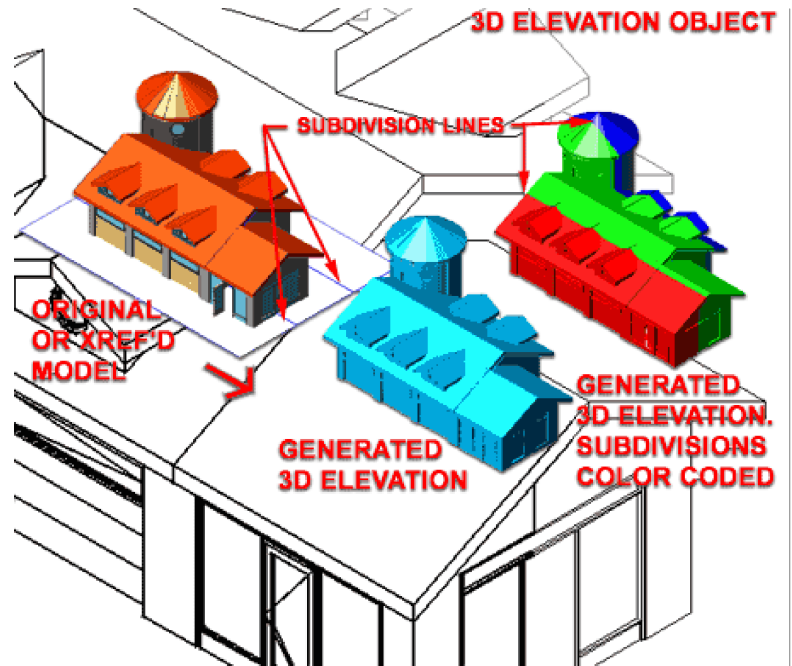


Display Properties - 3D Elevation - Component Layers - Example

Illustrated to the right I show the default **3D Elevation** Object and how the same 3D Elevation object can be adjusted to reflect the **Color** changes for the Subdivision lines on the Elevation Line object.

To change the **Colors**, as illustrated, select the **3D Elevation** object, right-click and use [Edit Object Display...](#) as outlined below.

Notice that for a background, I show what the multicolored 3D Elevation object might look like when plotted in black and white. Though I don't find much use for 3D Elevations, I have use them to achieve similar types of output. This technique is actually far more practical and useful on 3D Sections.



8 2D Elevation Styles

Style Manager - 2D Section/Elevation

Menu **Documentation> Elevations> Elevation Styles...**



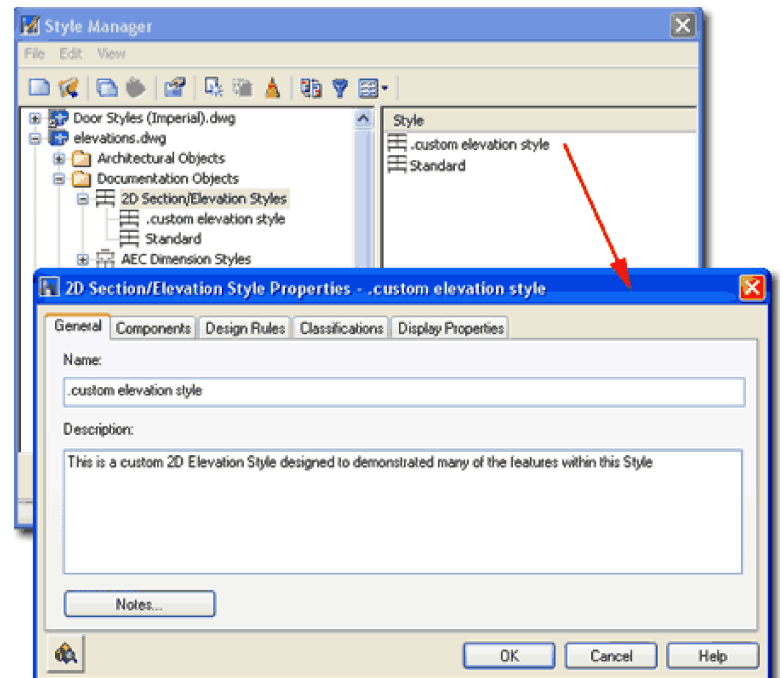
Keyboard **2dSectionStyle**

Links [2D Section/Elevation Styles - Display Components - Relationship Map](#)
[Object Style Management Overview](#) - for an explanation of what Object Styles are.

For 2D Elevation objects, you can use the **Style Manager** to load, modify, delete and create new 2D Elevation Styles.

Illustrated to the right, I show the process of creating a **New 2D Elevation Style** that I have Named "**Custom Elevation Style**". By **double-clicking** on this new style, you will invoke the **2D Section/Elevation Styles** dialog 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.



8-14 ELEVATIONS

2D Section/Elevation Styles - Components tab

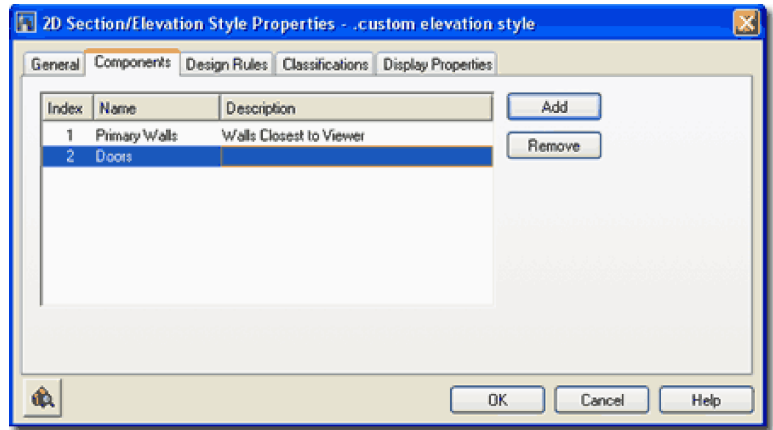
Links [Unique Component Layers](#)
[2D Section/Elevation Styles - Display Components](#)

[2D Section/Elevation Styles - Display Components - Relationship Map](#)

On the **Components** tab of the **2D Section/Elevation Style Properties** dialog box you can use the **Add** button to create custom **Component** names for use on the **Design Rules** tab and on the **Layer/Color/Linetype** tab of the **Display Properties** dialog box.

The basic concept behind this option is to allow you to define **Layer/ Color/ Linetype Component** Names that you can use to assign custom Layers, Colors and/or Linetypes for objects within your elevation. One example you could think of is a Component for the Swing lines on Doors and some Windows; often illustrated with a Centerline or Dashed linetype.

Illustrated to the right, I show that I have Added two unique Components named for what I intend to use them for: Walls and Doors. Follow the discussion below and you can see how I use these Components to change the line colors and weights of objects within an elevation object.



2D Section/Elevation Styles - Design Rules tab

Links [2D Section/Elevation Styles - Display Components - Relationship Map](#)
[2D Sections](#) - see this for a different screen capture

On the **Design Rules** tab of the **2D Section/Elevation Styles** dialog box you can use the **Add** button to create custom rules for what objects within your Model will be assigned unique characteristics in the 2D Elevation.

The basic concept behind this option is to create a " **filter**" that finds objects within your **Elevation Line** that match your specifications for **Color** and **Context**. Using this "filter", for example, you can have the Design Rules look for objects that have the Color 50 and lie in the closest front portion of your Subdivided Elevation Line to one of your custom Component Names.

Illustrated to the right, I show that I have **Added** two unique **Design Rules**. **Rule 1** finds objects in my example Model whose **Layer** is set to a **Color** of **50** and lie within my first **Subdivision**; it then assigns them to the **Component** Name "**Walls**" that I created on the Components tab.

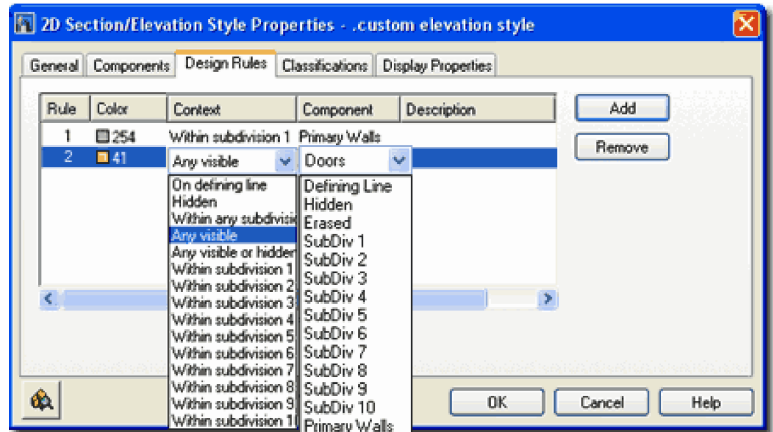
Rule 2 finds objects in my example Model whose **Layer** is set to a **Color** of **150** and lie within **Any Visible** portion of my Model; it then assigns them to the **Component** Name "**Doors**" that I created on the Components tab.

Note:

You don't actually need to create unique Component Names for the Design Rules to work correctly. You can simply assign objects to a Subdivision that hasn't already been used. The nice thing about using Named Components is that you can easily track them.

Rule - an index number automatically generated to assist in tracking.

Color - use the Select Color dialog box to set the color of the objects you are **filter for** (not against) If you want to change your Walls and you know they are set to Color 50, then you set Color to 50.

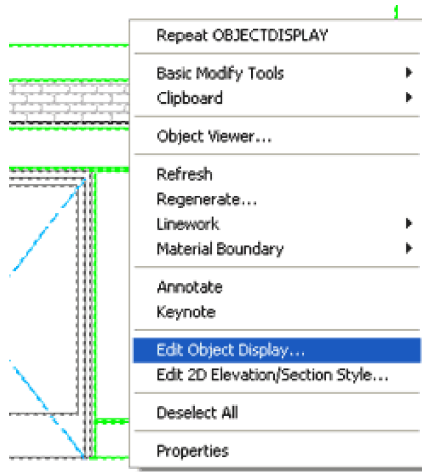


Context - use the drop-down list to help filter for objects you set by Color. You can use Any visible or Any visible or hidden to work with your Color selection to find all instances of objects with that Color. You can also refine your filter by specifying that you only want objects within a particular subdivision (as illustrated). This is how you can make Walls closer in an Elevation or Section darker than those beyond - even if they are in the same Subdivision.

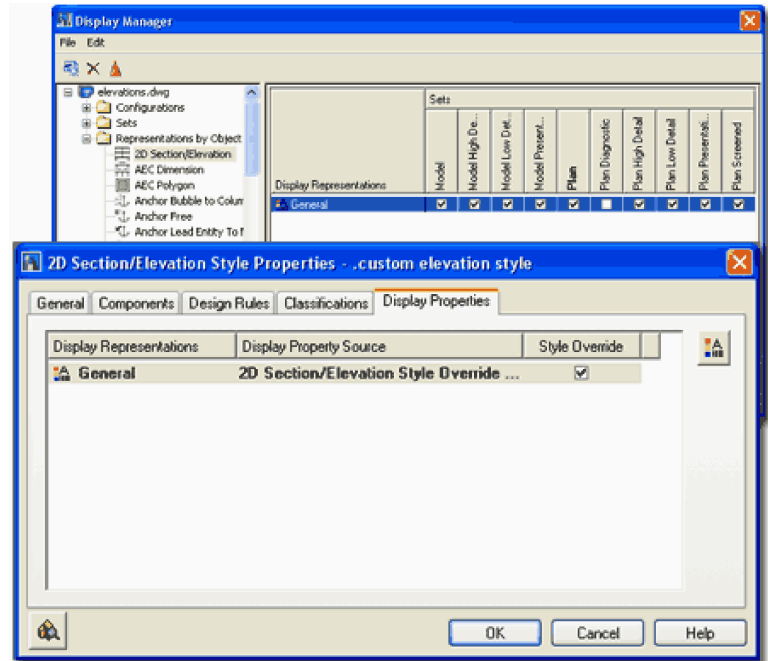
Component - use the drop-down list to specify what to do with the objects that have been filtered for by the Color and Context options. Component **Display**, if you realize by know, is controlled on the **Layer / Color / Linetype** tab of the Display Properties dialog box for a particular object or object Style. Using the pre-defined "SubDiv #" choices is okay as long as you pick numbers out of your range for the physical subdivisions that you may have on your Elevation or Section Line object. **You can also use unique Components , as illustrated with "Walls" and "Doors", by first creating them on the Components tab of this dialog box - see below for how to change their colors.**

2D Section/Elevation Styles - Display Props tab

The **Display Properties** tab on the **2D Section/Elevation Styles** dialog box provides access to the display characteristics of the components of your 2D Elevation objects; such as what **Subdivision** components are turned on or off, linetypes, layers and colors.



Illustrated to the left, is another way to access the **Display Props** tab; **select the specific object, right click** on your mouse to invoke the object-specific pop-up menu and select **Edit Object Display...** See discussion directly below.



Display Properties - 2D Section/Elevation Styles - Component Layers

On the **Layer /Color /Linetype** tab of the **Display Properties** dialog box, illustrated to the right, you will find the power to control the Color (and consequently Lineweight for Color Dependand Plot Tables or .CTB files).

Illustrated to the right, I show that there is only one Display Representation option "General" on the Display Properties tab of the 2D Section/Elevation Styles dialog box. I also show that I have **Attached** an **Override** for the 2D Section/Elevation Style Property Source since this is a custom Elevation Style that has properties I don't want placed upon other Elevations or Sections.

Defining Line - is the default color of your 2D Elevation but is primarily designed for the outline of a Sectional Cut right at the defining point of the cut. If you have and use the Subdivisions, this Component Color will not matter.

Outer Shrinkwrap - 2D Sections - see PART 15 - SECTIONS AND LIVE SECTIONS

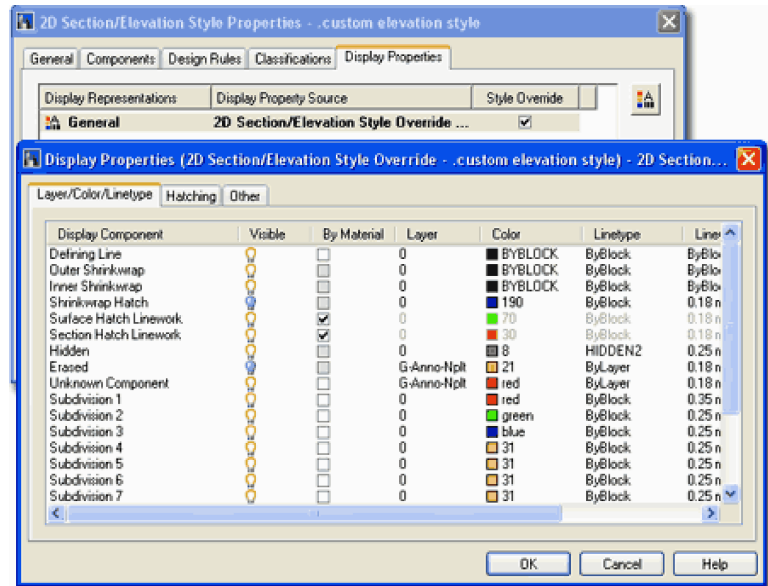
Inner Shrinkwrap - 2D Sections - see PART 15 - SECTIONS AND LIVE SECTIONS

Shrinkwrap Hatch - 2D Sections - see PART 15 - SECTIONS AND LIVE SECTIONS

Surface Hatch Linework - This Display Component applies to Hatch Patterns across the surfaces of Walls, Doors, Windows or any other object that has Material assignments as part of its Style. A Brick Wall, for example, will display as an Elevation Object with Bricks if this component is turned on here, a Brick Material has been assigned as a Style Property and the Display Property of that Brick Material has its Surface Hatch Component turned on. This is very convoluted and fortunately most of the Wall Styles included with ADT have the proper settings.

Section Hatch Linework - 2D Sections

Hidden - turned off by default. You can use this Component when you use the Edit Linework tool to assign lines within your 2D Elevation or Section a Hidden line appearance. Just make sure



Subdivision 1 - 10 - a default set of subdivisions that are automatically associated with [physical subdivision lines](#) on your Elevation or Section Line object.

Unique Component Names - these come automatically when you create a custom Component on the [Components tab](#) of the **2D Section/Elevation Styles** dialog box.

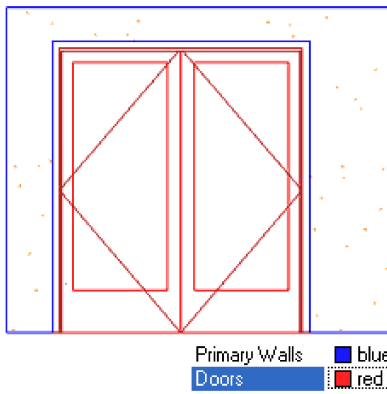
it's turned on here.

Erased - turned off by default. As with the Hidden Component, you can use this Component when you use the Edit Linework tool to assign lines within your 2D Elevation or Section an Erased appearance. To achieve this effect, leave the Component turned off.

Unknown Component - I am not sure about this one but I believe it's like a wildcard Component that you can use creatively - especially with Edit Linework, but it may be used automatically during such work, I don't actually know - hey, it's unknown.

Unique Component Layers

Links [2D Section/Elevation Styles - Components tab](#)

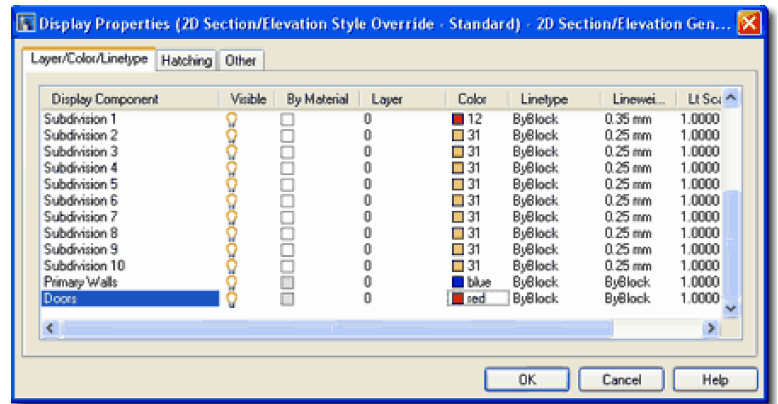


By creating unique components, you can use them for unique settings such as Color, Lineweight, Linetype and so forth.

Illustrated to the right I show the same two Component Names created in the steps above. If you recall, a Filter was set to find the Walls and the Doors based upon a Color within a

particular Context (like a subdivision number). After filtering, we get to set new Display Properties here as illustrated to the right and left with the Blue Primary Walls and Red Doors.

If you expand on this simple example, you should find that you can get some great results that come closer to how you have been drawing your elevations in regular AutoCAD.



Display Properties - 2D Section/Elevation Styles - Hatches tab

Links [Comment: Add link when completed for sections](#)

This option only applies to Sections.

Display Properties - 2D Section/Elevation Styles - Custom Display Component

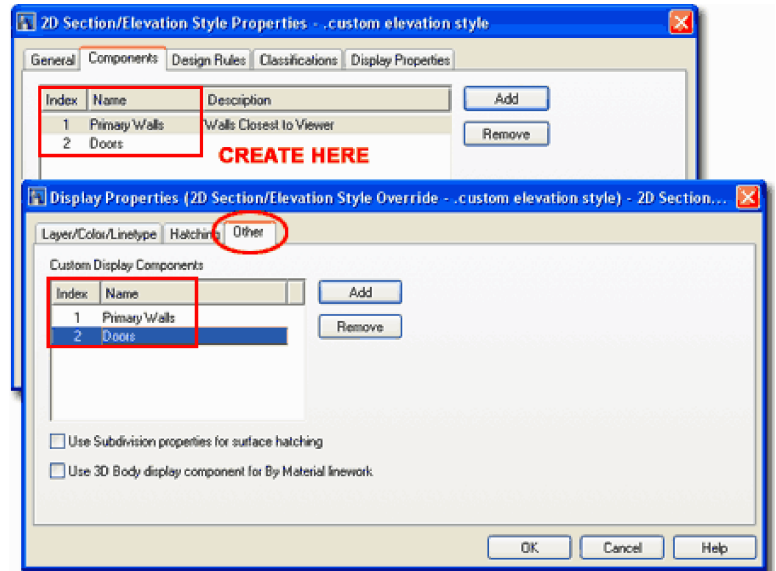
Links [2D Section/Elevation Styles - Components tab](#)

On the Other tab of the Display Properties dialog box you will find the ability to Add Custom Display Components but these are not quite the same as those Added under the 2D Section/Elevation Style Properties.

In the illustration to the right I show how **Adding Display Components** on the **2D Section/Elevation Style Properties dialog** automatically Adds them to the **Custom Display Components list** on the **Other tab** of the **Display Properties dialog**. Though you can Add Custom Display Components on the Other tab of the Display Properties dialog and even adjust Colors, Linetypes and so forth on the Layer/Color/Linetype tab, they never show up as anywhere else where you might actually want to use them; like when using the Modify Component... when Editing in Place. Therefore, I suggest that you only use the Add button on the 2D Section/Elevation Style Properties dialog.

Use Subdivision properties for surface hatching - this checkbox, when checked, will apply the same Display Properties to Surface Hatches that are applied to the linework for different Subdivisions. In other words, if you set up subdivisions so that lines are lighter in the back of an elevation, using this option will use the same settings for Hatches. The only problem with this option is that we usually want our Hatch Patterns even lighter than the linework so if you really want great result with this option you have to spend a good deal of time configuring Design Rules and the Layer/Color/Linetype settings.

Use 3D Body display components for By Material linework - this checkbox, when checked, will apply the same Display Properties to all Linework that is applied to the 3D Body Display Properties of the original object(s) from which the Elevation or Section was derived. Like the checkbox option above, this is another option that can be used to make the Elevation Object look more like the Model. To me, this option is not typical since my preference for how Elevations should look is quite a bit different from how I prefer my Model to look.



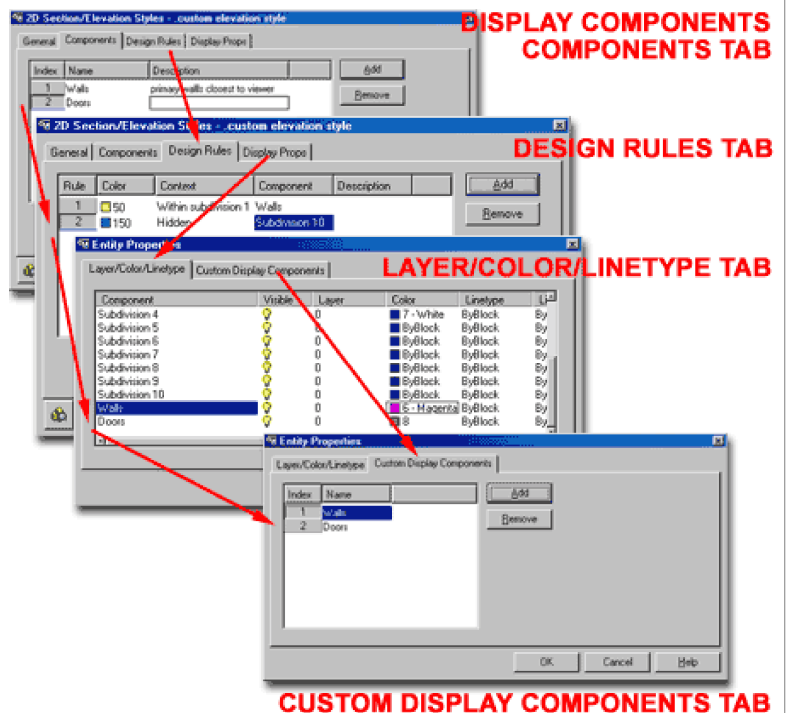
2D Section/Elevation Styles - Display Components - Relationship Map

MULTIPLE LINEWEIGHTS Illustrated to the right, is an overall map of how all the pieces come together for unique and custom **Components**.

Illustrated to the left, is an example of how you can use these unique Components to adjust the Colors and Lineweights of 2D Elevations to match you want them to look by traditional means.

By using the examples illustrated, I was able to make the Walls in Subdivision 1 darker, but not as dark as the Roof in Subdivision 1. I was able to lighten all the Doors, Windows Openings and Window Assemblies so they didn't read as dark as the Walls and Roof line in Subdivision 1.

Objects beyond Subdivision 1 can be controlled in a similar fashion or simply be allowed to be lighter and monotone - an easy and effective solution.



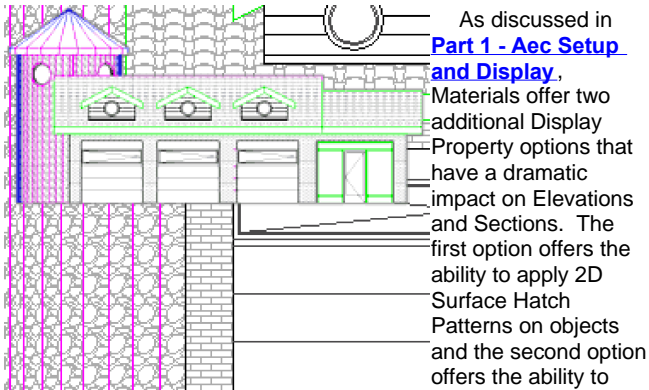
Surface Hatch

Menu **Format > Display Manager > 2D Section/Elevation Styles**



Keyboard **2dSectionResultStyleEdit**

Links [Object Style Properties - Materials Overview](#) - for an overview discussion of Materials and Surface Hatches.



Images on objects for Rendering purposes.

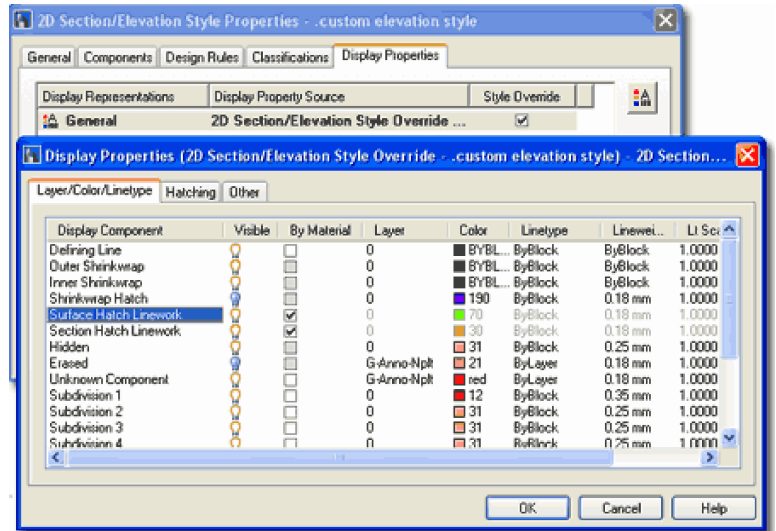
In Section 9 we will look at the use of Hatch Patterns across 2D Elevation Surfaces. For Rendering topics, see the Architectural Desktop Presentation eGuide.

For 3D Elevation Objects, since there is no Style that controls their Display Properties, their Display is derived directly from the Model Display Representation and thus whatever Materials it is set to use, are the Materials that you will see in the 3D Elevation Object.

For 2D Elevations Objects, there are several Display Property controls that all have to work together in order to get proper results. Illustrated to the right I show that the Layer/Color/Linetype tab of a 2D Elevation Object's Display Properties has a Surface Hatch Linework Display Component that you can turn On or Off. If you don't have any Surface Hatching assigned to the actual Objects from which the 2D Elevation was derived, you will not be able to add it here. Basically the you will need to decide on how you want to control the Display Properties of the Surface Hatch: By Material or by the options on this tab (such as Color).

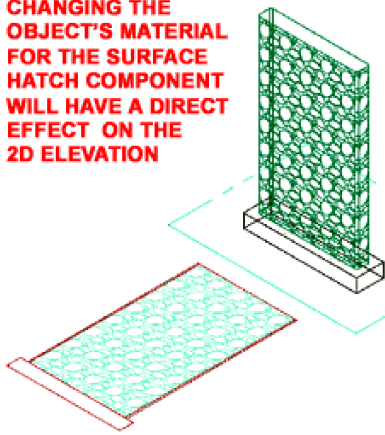
Adding a Material to an Object Overview

Links [Wall Style - Materials tab](#) - for more on Adding Surface Hatches to Walls



If you get stuck on weather or not to use the By Material checkbox for the Surface Hatch Linework Display Component, consider how the Hatch Pattern looks on your Model in Isometric. If you think the Color is fine then leave this setting alone (that's easy), if you really need a different Color, for example, then uncheck the By Material option and set the Color or other settings as you want the Surface Hatch to appear when using this 2D Section/Elevation Style.

CHANGING THE OBJECT'S MATERIAL FOR THE SURFACE HATCH COMPONENT WILL HAVE A DIRECT EFFECT ON THE 2D ELEVATION



Illustrated to the right I show the various dialog boxes used to add or modify the Surface Hatch Pattern for a simple Wall Style (Concrete - X). The steps shown are similar for most of the objects in ADT so you can use this approach to add horizontal or vertical lines for siding, roofing or other needs on Walls, Doors, Windows, Roofs and Slabs.

1) Use the **Style Properties dialog** box to access the Style's **Materials** tab.

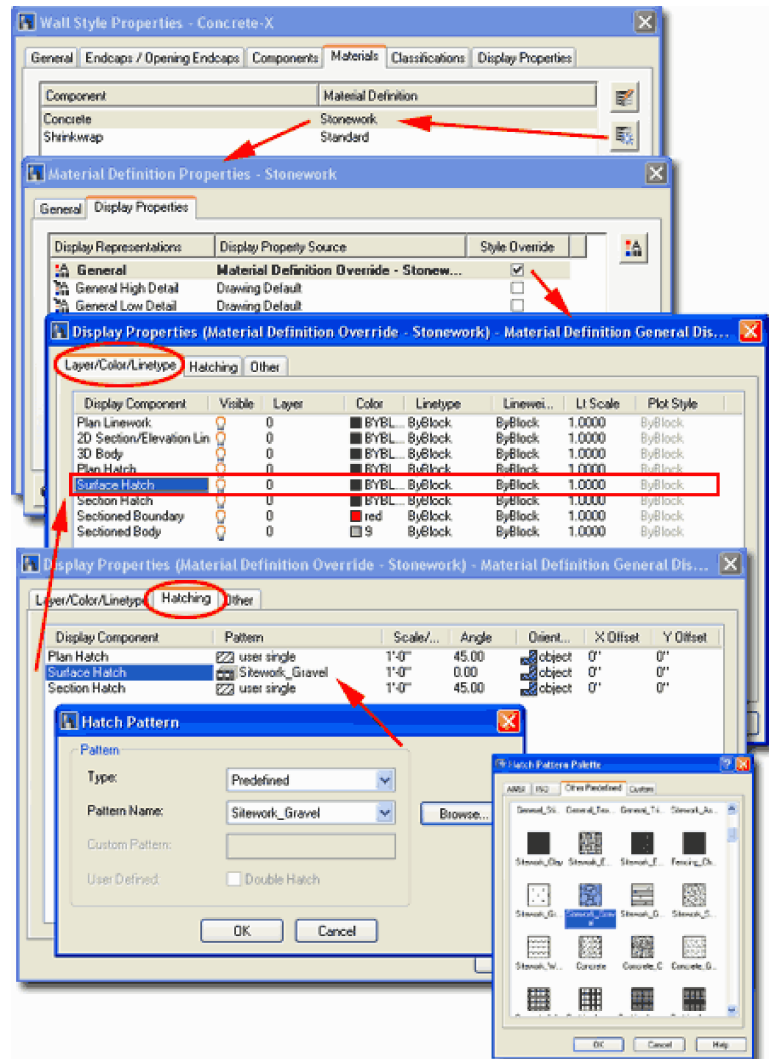
2) Add a New Material or Modify an existing **Component Material**.

3) On the **Material Definition's Display Properties tab**, use an **Override** for the Display Representation being used to Generate your Elevation Object(s). In the illustration to the right, I show that I have added an Override on the **General Display** Representation because that is what my Wall Style is using in the default 2D Elevations. If in doubt, you can add Overrides as many of the Display Representations as you think you need to. The Overrides are necessary because the Material Definition, like object styles, uses the same Display Representations for all cases of use; i.e., if you don't use an Override and set it to Bricks, that will become the default Hatch Pattern for the current Display Representation and you could end up with Bricks where you don't want them.

4) Once you activate the Style Override, you should be taken to the **Display Properties dialog** for the Material Definition Override. On this dialog, you should find that the **Surface Hatch Display Component** on the **Layer/ Color / Linetype** tab is turned OFF by default. Turn this Display Component **ON**.

5) To **set the Hatch Pattern** for this Material Definition, use the **Hatching tab** on the **Display Properties dialog** (same dialog as in step 4). For the Surface Hatch Display Component, pick on the **Pattern** field (image icon) and you should see the Hatch Pattern dialog where you can use a **Predefined Pattern Name** (use the **Browse...** button) to set a really nice pattern.

6) **Close All** dialog boxes and **Refresh** any existing 2D Elevation Objects to see the new Surface Hatch Pattern.



Material Boundary

Keyboard **2dSectionResultAddHatchBoundary**

Mouse **Select** 2D Elevation or Section Object, **Right-click** and select **Material Boundary > Add** from the object specific pop-up menu.

Links [Object Style Properties - Materials Overview](#) - for an overview discussion of Materials and Surface Hatches.



Material Boundaries provide the means to "Erase" or "Limit" Hatching and Linework on 2D Elevations and Sections. This means that you can define a boundary for where you want your hatch pattern across the surface and/or the lines of the object as well. In essence you can think of this as a Wipeout-like tool.

The concept is fairly simple to grasp: you draw a **Closed Polyline** shape over your 2D Elevation or Section and use it to "Erase" or "Limit" the whole or portions of it.

Illustrated to the right I show a **Before** and **After** shot of a simple 2D Elevation Object with Surface Hatches across most of it. In the Before shot, I show a Closed Polyline that can be used to Erase or Limit any or all of the Linework and Hatches. On the **2D Section/Elevation Material Boundary dialog**, also illustrated to the right, I show that I made specific choices for **Purpose**, **Apply to** and **Material Selection** in order to produce the results illustrated by the After shot.

Purpose - this drop-down list offers the ability to use the Closed Polyline as a Boundary that **Erases** the objects within it or **Limits** them from going beyond it.

Apply to - this drop-down list has five different options for what the Closed Polyline will affect: **Surfaces and Section Hatching**, **Surface Hatching Only**, **Section Hatching Only**, **Edge Linework Only** and **All Linework**. In the Before and After shots, I used the Surface Hatching Only option to only affect the Hatch Patterns but you can use the All Linework to create a Crop or Clip effect.

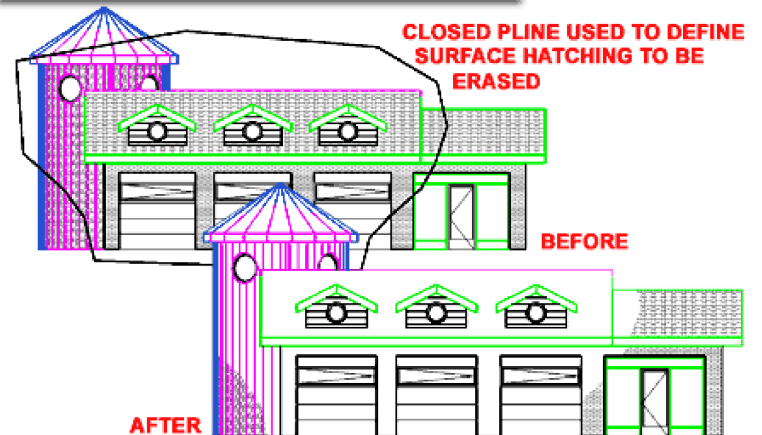
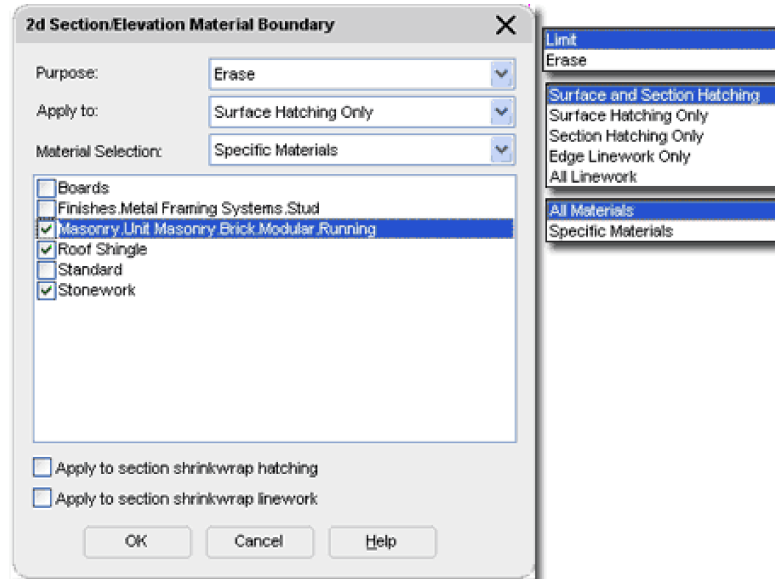
Material Selection - this drop-down list offers the option to choose which Materials you want the Closed Polyline to affect. By setting this drop-down list to "**Specific Materials**", you open up the Materials List below it and are thus able to specify the Materials to be affected. This means that you can, for example, "Erase" a Brick Hatch Pattern while leaving a Spanish Roof Tile Hatch Pattern unaffected though it resides within the Polyline.

Apply to section shrinkwrap hatching - 2D Sections - see PART 15 - SECTIONS AND LIVE SECTIONS

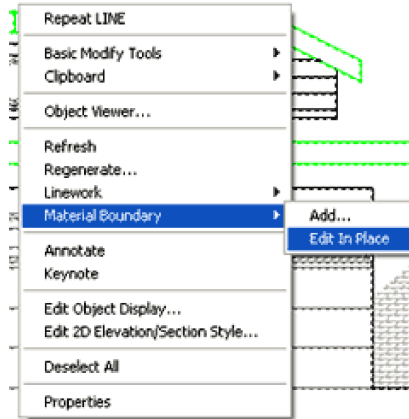
Apply to section shrinkwrap linework - 2D Sections - see PART 15 - SECTIONS AND LIVE SECTIONS

Material Boundary - Edit in Place

Once you have applied a Material Boundary, as outlined above, you can Modify it by using the "Edit In Place" menu option illustrated to the left. This option will only be available once a



Material Boundary has been Added.

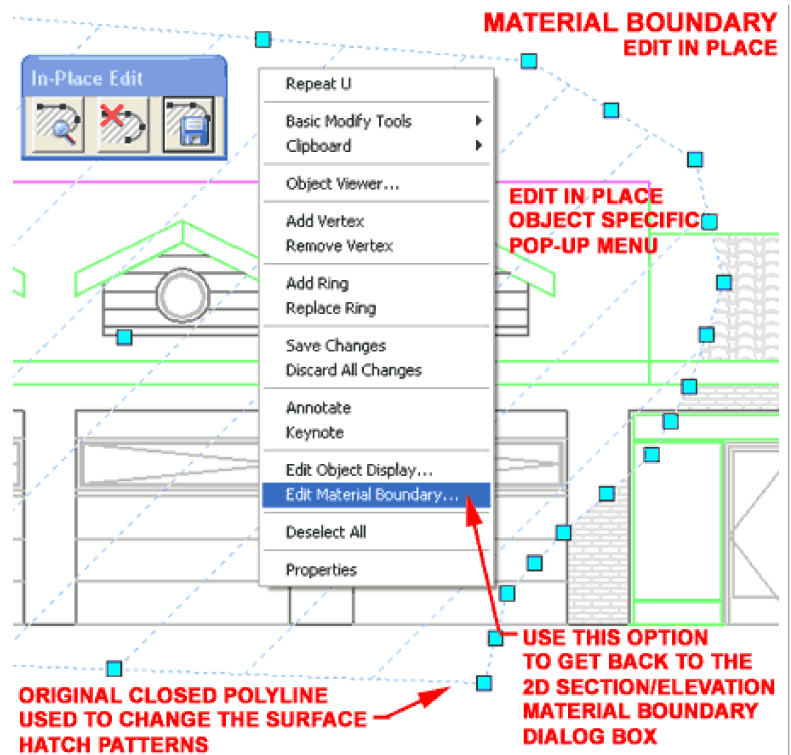


Illustrated to the right I show an example of what a Closed Polyline may look like when the **Material Boundary "Edit In Place"** feature has been activated. For most, the In-Place Edit toolbar and Grips should be concepts that are easy enough to comprehend: **Save All Changes, Discard All Changes, Grip Stretch** to alter the shape of Closed Polyline, etc.

However, what may not be self-evident, is that once you are in the "Edit In Place" Mode, you can Select the lightly Hatched Boundary, right-click and invoke the object specific pop-up menu as illustrated to the right.

By using the options on the object specific pop-up menu, you can **Add or Remove Vertex** Points, **Rings** and even change the **Display Properties** of the Boundary as it is displayed in the "Edit in Place" mode (that's wild, isn't it).

Of the group of options on the object specific pop-up menu, the one you are most likely to desire is the **Edit Material Boundary...** option which takes you back to the **2D Section/Elevation Material Boundary dialog box** used to create the Boundary in the first place.



10 Elevations - Customizing and Tricks

10-14 ELEVATIONS

Creating Interior Elevations

Links [Elevation Marks](#) - for how to generate interior elevations directly off of the Interior Elevation Mark.

In addition to creating Interior Elevations with the Elevation Marks, you can also create them with either the Section Line object or the **Elevation Line** object. Simply place the Section or Elevation line object inside the space you want an Interior Elevation of and **Generate your 2D Elevation**.

Once you have an Interior Elevation, you will probably want to narrow the focus of what is displayed since it probably looks more like a Section than an Interior Elevation, at this point.

Adjust the **Width** of your Elevation Line object (using Grips or Stretch) to match what you want in your Interior Elevation (see red arrows).

On the **Properties Palette** for the Elevation or Section Line Object, look for the **Dimensions** category, **change** the "**Use Model Extents for Heights**" to "**No**" and **set** the **Height** value manually to match what you want in your Interior Elevation. You will also need to set the **Lower extension** value to match your floor line height - most likely zero.

Update your Interior Elevation.

