

Civil 3D drawings contain two working environments, called model space and paper space. Model space contains a three dimensional model of the design elements in the drawing. Paper space is a two dimensional view of the objects in model space.

### Model Space

The model space environment is accessed through the tabs located at the bottom of the drawing area. A drawing will always have a Model tab and at least one layout tab. Drawing elements are drafted full size (at a 1:1 scale) in model space. The plotting scale of the drawing elements is controlled through the properties of the layouts.

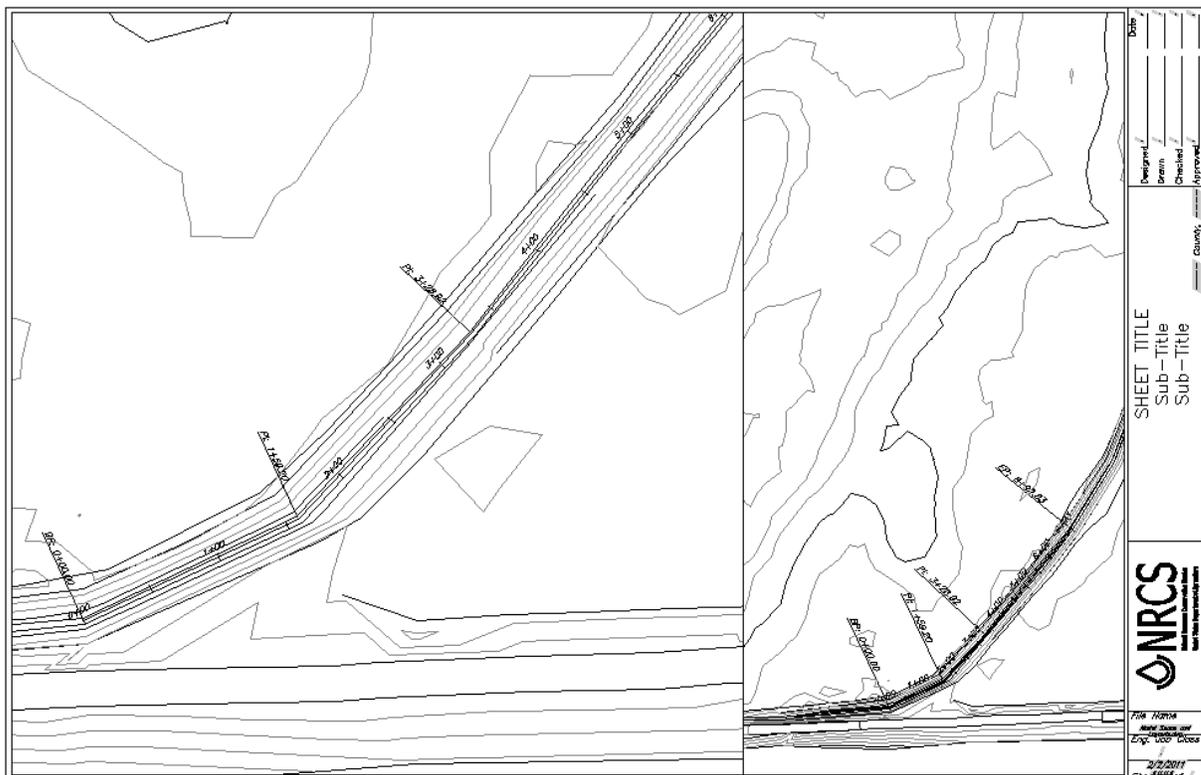
### Layouts

A layout is a representation of an individual plan sheet. The working area in a layout is referred to as Paper Space. It usually contains a title block plotted at a 1:1 scale, and design elements that you want to include on the plan sheet are organized on the layout drawing using viewports.

One way that layouts can be used is to organize text, dimensions, and other annotation objects entirely on layouts rather than in model space. This helps to reduce clutter in the working area of the drawing and makes it easier to control which notes appear on a plan sheet, especially when more than one sheet may contain a view of a common area of the drawing, such as the plan view of a site. Dimensions placed in a layout can display the model space dimension of the object in a viewport if you use object snap when dimensioning the object in a layout.

### Viewports

A viewport is essentially a window into model space from the layout. A specific scale can be applied to a viewport in order to control the size of the model space elements seen through the viewport. In the example below, two viewports are shown which are looking at the same location in model space. The viewport on the left is assigned a scale of 1:50 while the viewport on the right is assigned a scale of 1:200.

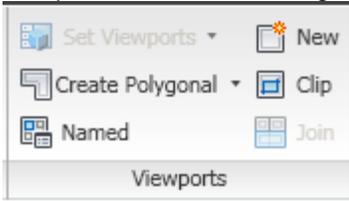


When a viewport is activated, its scale can be changed using the *Viewport Scale* menu on the *Application Status Bar* at the bottom right hand side of the window.



It is good practice to lock a viewport once you have it set at the scale and location in model space that you want to view through the viewport. This will prevent you from inadvertently moving or rescaling the viewport which is particularly important if you have text and dimensions in the layout. To lock a viewport, select its border, right click, go to *Display Locked* and select *Yes*, or you can also click on the lock icon to the left of the *Viewport Scale* menu on the *Application Status Bar*.

Viewport commands are organized on the viewports pane on the View ribbon, shown below.



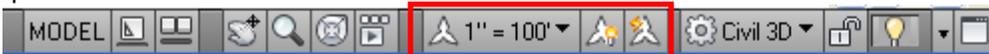
### Rotating Viewport Views

The view of model space can be rotated in a viewport using the MVSETUP command. The view of locked viewports cannot be rotated. When prompted to select an option, type *A* for Align, then *R* to rotate the view. Next, you will be prompted to select a basepoint in the viewport whose view will be rotated, then the angle to rotate the view. You can either type in an angle or you can draw a line to represent the direction that up in model space will be oriented to.

When typing in an angle value, positive values will rotate the view to the right or clockwise and negative values will rotate the view to the left or counter clockwise. Also, when typing in an angle value keep in mind that the value you enter will be referenced from the unrotated view of model space. For example, assume you have a viewport whose view has been rotated by 45 degrees, and you want to rotate the view an additional 45 degrees for a total rotation angle of 90 degrees. When you rotate the view for the second time you would need to specify a rotation angle of 90 degrees (the total rotation) instead of the additional 45 degree incremental angle.

### Annotative Text and Dimensions

A text or dimension style can be made annotative which ties the size of the text or dimension to the annotation scale in model space. The annotation scale is controlled using the annotation scale which is located on the Application Status Bar near the lower right hand corner of the window. This tool bar appears when you are Model space.



Annotative text and dimensions in model space are automatically resized when the model space annotation scale is changed. Model space text and dimensions that are seen through a viewport in a layout will be automatically resized based on the scale of the viewport that the text is viewed through. You may need to regenerate the view using the REGENALL command to make changes to the display take effect.

In the example on the previous page you can see how the alignment and contour labels and the dimension have been automatically rescaled so that the text is the same height in the layout even though the viewports are different scales.

### Plotting

You can save plot settings for a layout in a drawing which prevents you from needing to redefine them every time a layout is plotted. These settings are not built into the standard Minnesota drawing template, so you will need to redefine plotting settings for layouts in new drawings that are created.

Right click on the layout tab at the bottom of the drawing window and select *Page Setup Manager...* Select the layout from the page setup list and click on the *Modify...* button. A Page Setup window will appear which contains the same setting as the window that appears when you plot a drawing. Once you make changes to the settings in this window and click on the OK button, those settings are saved for that layout so you do not need to change the setting again the next time you plot that layout.

## Linetype Scaling

Linetype patterns can also be synchronized so that they show up at the same scale in model space and paper space, or between viewports of different scales in a layout. This is controlled through the PSLTSCALE variable.

If the PSLTSCALE variable is set to 0, the linetype scale will be controlled by the global linetype scale in model space (the LTSCALE value) and by the individual viewport scales in a layout. Linetypes will appear the same between model space and a viewport if the same scales LTSCALE and viewport scale are used, but the pattern will be different if the scales are not the same. An example of this is in the graphic below and to the left, which shows two viewports with different scales. The linetype pattern is different in the viewports because of the differing viewport scales.

Setting the PSLTSCALE variable to 1 will maintain the same linetype scaling between viewports of different scales, as is shown in the graphic below and to the right. A drawback to this option, however, is that the linetype may not display correctly in model space. In the example below, the global linetype scale is set to 1 to make the line patterns visible in the viewports, but when viewed in model space the line patterning is so small that the patterned lines appear as solid lines.

